



SAR EVALUATION REPORT

Applicant Name:
Samsung Electronics Co., Ltd.
129, Samsung-ro, Maetan dong,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
02/08/21 - 02/10/21
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
1M2102050006-01.A3L

FCC ID: **A3LSMG998U**

APPLICANT: **SAMSUNG ELECTRONICS CO., LTD.**

DUT Type: Portable Handset
Application Type: Class II Permissive Change
FCC Rule Part(s): CFR §2.1093
Model: SM-G998U
Additional Model: SM-G998U1
Permissive Change(s): See FCC Change Document
Date of Original Certification: 12/23/20

Equipment Class	Band & Mode	Tx Frequency	SAR			
			1g Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)	10g Phablet (W/kg)
PCE	LTE Band 66 (AWS)	1710.7 - 1779.3 MHz	0.89	0.12	0.21	N/A
PCE	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	0.74	0.27	0.21	N/A
PCE	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	N/A	N/A	N/A	N/A
Simultaneous SAR per KDB 690783 D01v01r03:			1.34	0.80	1.12	N/A

Note: The following test data was evaluated for the current test report. Please refer to RF Exposure Technical Report S/N 1M2009230152-01-R2.A3L for original compliance evaluation.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.9 of this report; for North American frequency bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Test results reported herein relate only to the item(s) tested.


Randy Ortanez
President



The SAR Tick is an initiative of the Mobile & Wireless Forum (MWF). While a product may be considered eligible, use of the SAR Tick logo requires an agreement with the MWF. Further details can be obtained by emailing: sartick@mwfa.info.

FCC ID: A3LSMG998U	 SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 1 of 51

TABLE OF CONTENTS

1	DEVICE UNDER TEST	3
2	LTE AND NR INFORMATION	18
3	INTRODUCTION	20
4	DOSIMETRIC ASSESSMENT	21
5	DEFINITION OF REFERENCE POINTS.....	22
6	TEST CONFIGURATION POSITIONS.....	23
7	RF EXPOSURE LIMITS	27
8	FCC MEASUREMENT PROCEDURES.....	28
9	RF CONDUCTED POWERS	30
10	SYSTEM VERIFICATION.....	35
11	SAR DATA SUMMARY	37
12	FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS.....	39
13	SAR MEASUREMENT VARIABILITY	46
14	EQUIPMENT LIST.....	47
15	MEASUREMENT UNCERTAINTIES.....	48
16	CONCLUSION.....	49
17	REFERENCES	50
APPENDIX A: SAR TEST PLOTS		
APPENDIX B: SAR DIPOLE VERIFICATION PLOTS		
APPENDIX C: SAR TISSUE SPECIFICATIONS		
APPENDIX D: SAR SYSTEM VALIDATION		
APPENDIX E: DUT ANTENNA DIAGRAM & SAR TEST SETUP PHOTOGRAPHS		
APPENDIX F: LTE LOWER BANDWIDTH RF CONDUCTED POWERS		
APPENDIX G: POWER REDUCTION VERIFICATION		
APPENDIX H: PROBE AND DIPOLE CALIBRATION CERTIFICATES		

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 2 of 51	

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
CDMA/EVDO BC10 (\$90S)	Voice/Data	817.90 - 823.10 MHz
CDMA/EVDO BC0 (\$22H)	Voice/Data	824.70 - 848.31 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 71	Voice/Data	665.5 - 695.5 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 14	Voice/Data	790.5 - 795.5 MHz
LTE Band 26 (Cell)	Voice/Data	814.7 - 848.3 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 66 (AWS)	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Voice/Data	1850.7 - 1914.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 30	Voice/Data	2307.5 - 2312.5 MHz
LTE Band 7	Voice/Data	2502.5 - 2567.5 MHz
LTE Band 48	Voice/Data	3552.5 - 3697.5 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
LTE Band 38	Voice/Data	2572.5 - 2617.5 MHz
NR Band n71	Data	665.5 - 695.5 MHz
NR Band n12	Data	701.5 - 713.5 MHz
NR Band n5 (Cell)	Data	826.5 - 846.5 MHz
NR Band n66 (AWS)	Data	1712.5 - 1777.5 MHz
NR Band n25 (PCS)	Data	1852.5 - 1912.5 MHz
NR Band n2 (PCS)	Data	1852.5 - 1907.5 MHz
NR Band n30	Data	2307.5 - 2312.5 MHz
NR Band n41	Data	2506.02 - 2679.99 MHz
NR Band n77	Data	3710.01 - 3969.99 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2462 MHz
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
U-NII-5	Voice/Data	5925 - 6425 MHz
U-NII-6	Voice/Data	6425 - 6525 MHz
U-NII-7	Voice/Data	6525 - 6875 MHz
U-NII-8	Voice/Data	6875 - 7125 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
NR Band n260	Data	37000 - 40000 MHz
NR Band n261	Data	27500 - 28350 MHz

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 3 of 51

1.2 Time-Averaging Algorithm for RF Exposure Compliance

Exposure Scenario:		Body-Worn	Phablet	Phablet	Head	Hotspot	Earjack	Maximum Tune-up Output Power*
Averaging Volume:		1g	10g	10g	1g	1g	10g	
Spacing:		15 mm	8, 6, 11 mm	0 mm	0 mm	10 mm	0 mm	
DSI:		0	0	1	2	3	4	
Technology/Band	Antenna	Plimit corresponding to 1mW/g (SAR_design_target)						Pmax
CDMA/EVDO BC10	A	30.7		26.9	32.1	26.9	26.9	24.8
CDMA/EVDO BC0	A	30.5		27.0	31.9	27.0	27.0	24.8
CDMA/EVDO BC1	A	27.2		18.5	34.3	18.5	18.5	23.0
GSM/GPRS/EDGE 850 MHz	A	31.8		26.9	33.6	26.9	26.9	24.8
GSM/GPRS/EDGE 1900 MHz	A	26.3		18.8	35.4	18.8	18.8	21.3
UMTS B5	A	30.9		26.7	32.3	26.7	26.7	24.5
UMTS B4	A	25.4		18.5	32.5	18.5	18.5	23.0
UMTS B2	A	27.0		18.5	34.2	18.5	18.5	23.0
LTE FDD B71	A	31.8		27.4	34.0	27.4	27.4	24.8
LTE FDD B12	A	32.0		27.2	33.3	27.2	27.2	24.8
LTE FDD B13	A	31.5		27.0	32.6	27.0	27.0	24.8
LTE FDD B14	A	31.3		26.8	32.8	26.8	26.8	24.8
LTE FDD B26	A	31.4		26.9	32.9	26.9	26.9	24.8
LTE FDD B5	A	30.6		26.9	32.2	26.9	26.9	24.8
LTE FDD B66/4	A	24.8		18.5	31.9	18.5	18.5	23.0
LTE FDD B66	E	23.5		23.5	19.0	19.0	23.5	23.0
LTE FDD B25/2	A	25.7		18.5	32.0	18.5	18.5	23.5
LTE FDD B25/2	E	23.5		23.5	17.5	19.0	23.5	23.5
LTE FDD B30	A	27.2		20.0	37.6	19.0	20.0	23.0
LTE FDD B7	B	28.7		20.0	33.4	20.0	20.0	23.0
LTE TDD B48	I	20.0		20.0	17.0	20.0	20.0	21.5
LTE TDD B41/38	B	26.6		20.0	35.6	19.0	20.0	22.0
LTE TDD B41 (PC2)	B	26.6		20.0	35.6	19.0	20.0	22.9
NR FDD n71	A	31.3		29.2	33.6	29.2	29.2	24.5
NR FDD n12	A	31.1		28.8	33.3	28.8	28.8	24.5
NR FDD n5	A	30.3		27.1	31.8	26.6	27.1	24.5
NR FDD n66	A	24.6		18.5	32.1	18.5	18.5	23.8
NR FDD n66	E	23.5		23.5	19.0	19.0	23.5	23.5
NR FDD n25/2	A	26.5		18.5	33.8	18.5	18.5	23.8
NR FDD n25/2	E	23.5		23.5	19.0	19.0	23.5	23.5
NR FDD n30	A	25.4		20.0	35.9	19.0	20.0	23.0
NR TDD n41 (PC3)	B	18.0		14.0	18.0	13.0	14.0	24.5
NR TDD n41 (PC2)	B	18.0		14.0	18.0	13.0	14.0	25.0
NR TDD n41 (PC3)	E	17.0		17.0	14.0	15.0	17.0	24.0
NR TDD n41 (PC2)	E	17.0		17.0	14.0	15.0	17.0	26.0
NR TDD n77 (PC3)	I	19.5		19.5	15.0	17.5	19.5	23.5
NR TDD n77 (PC2)	I	19.5		19.5	15.0	17.5	19.5	25.5

The Smart Transmit Algorithm was not affected by the permissive changes. Please see original technical filings 1M2009230152-01-R2.A3L for compliance evaluation.

1.3 Power Reduction for SAR

This device used an independent fixed level power reduction mechanism for WLAN when 5G NR is active and also for WLAN/BT during all voice or VoIP held to ear scenarios. Per FCC Guidance, the held-to-ear exposure conditions were evaluated at reduced power according to the head SAR positions described in IEEE 1528-2013. Detailed descriptions of the power reduction mechanism are included in the operational description.

1.4 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 4 of 51	

1.4.1

2G/3G/4G/5G Output Power

CDMA BC10 (815 MHz)				
Power Level		Modulated Average Output Power (in dBm)		
		1x-RTT	EVDO Rev 0	EVDO Rev A
DSI = 0 (Body-Worn or Phablet Max)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
DSI = 1 (Phablet Reduced)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
DSI = 2 (Head)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
DSI = 3 (Hotspot)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
DSI = 4 (Earjack)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
CDMA BC0 (835 MHz)				
Power Level		Modulated Average Output Power (in dBm)		
		1x-RTT	EVDO Rev 0	EVDO Rev A
DSI = 0 (Body-Worn or Phablet Max)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
DSI = 1 (Phablet Reduced)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
DSI = 2 (Head)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
DSI = 3 (Hotspot)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
DSI = 4 (Earjack)	Max allowed power	25.8	25.8	25.8
	Nominal	24.8	24.8	24.8
CDMA BC1 (1900 MHz)				
Power Level		Modulated Average Output Power (in dBm)		
		1x-RTT	EVDO Rev 0	EVDO Rev A
DSI = 0 (Body-Worn or Phablet Max)	Max allowed power	24.0	24.0	24.0
	Nominal	23.0	23.0	23.0
DSI = 1 (Phablet Reduced)	Max allowed power	19.5	19.5	19.5
	Nominal	18.5	18.5	18.5
DSI = 2 (Head)	Max allowed power	24.0	24.0	24.0
	Nominal	23.0	23.0	23.0
DSI = 3 (Hotspot)	Max allowed power	19.5	19.5	19.5
	Nominal	18.5	18.5	18.5
DSI = 4 (Earjack)	Max allowed power	19.5	19.5	19.5
	Nominal	18.5	18.5	18.5

GSM/GPRS/EDGE 850										
Power Level		Voice (in dBm)	Data - Burst Average GMSK (in dBm)				Data - Burst Average 8-PSK (in dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
DSI = 0 (Body-Worn or Phablet Max)	Max allowed power	33.5	33.5	32.0	30.0	28.0	27.5	25.5	23.5	22.5
	Nominal	32.5	32.5	31.0	29.0	27.0	26.5	24.5	22.5	21.5
DSI = 1 (Phablet Reduced)	Max allowed power	33.5	33.5	32.0	30.0	28.0	27.5	25.5	23.5	22.5
	Nominal	32.5	32.5	31.0	29.0	27.0	26.5	24.5	22.5	21.5
DSI = 2 (Head)	Max allowed power	33.5	33.5	32.0	30.0	28.0	27.5	25.5	23.5	22.5
	Nominal	32.5	32.5	31.0	29.0	27.0	26.5	24.5	22.5	21.5
DSI = 3 (Hotspot)	Max allowed power	N/A	33.5	32.0	30.0	28.0	27.5	25.5	23.5	22.5
	Nominal	N/A	32.5	31.0	29.0	27.0	26.5	24.5	22.5	21.5
DSI = 4 (Earjack)	Max allowed power	33.5	33.5	32.0	30.0	28.0	27.5	25.5	23.5	22.5
	Nominal	32.5	32.5	31.0	29.0	27.0	26.5	24.5	22.5	21.5
GSM/GPRS/EDGE 1900										
Power Level		Voice (in dBm)	Data - Burst Average GMSK (in dBm)				Data - Burst Average 8-PSK (in dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
DSI = 0 (Body-Worn or Phablet Max)	Max allowed power	30.0	30.0	28.5	26.5	24.5	26.5	24.0	22.0	21.0
	Nominal	29.0	29.0	27.5	25.5	23.5	25.5	23.0	21.0	20.0
DSI = 1 (Phablet Reduced)	Max allowed power	29.0	29.0	26.0	24.2	23.0	26.5	24.0	22.0	21.0
	Nominal	28.0	28.0	25.0	23.2	22.0	25.5	23.0	21.0	20.0
DSI = 2 (Head)	Max allowed power	30.0	30.0	28.5	26.5	24.5	26.5	24.0	22.0	21.0
	Nominal	29.0	29.0	27.5	25.5	23.5	25.5	23.0	21.0	20.0
DSI = 3 (Hotspot)	Max allowed power	N/A	29.0	26.0	24.2	23.0	26.5	24.0	22.0	21.0
	Nominal	N/A	28.0	25.0	23.2	22.0	25.5	23.0	21.0	20.0
DSI = 4 (Earjack)	Max allowed power	29.0	29.0	26.0	24.2	23.0	26.5	24.0	22.0	21.0
	Nominal	28.0	28.0	25.0	23.2	22.0	25.5	23.0	21.0	20.0

For GSM, the above powers listed are GSM burst average values.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 5 of 51	

UMTS Band 5 (850 MHz)					
Power Level		Modulated Average Output Power (in dBm)			
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6	3GPP DC-HSDPA Rel 8
DSI = 0 (Body-Worn or Phablet Max)	Max allowed power	25.5	24.5	24.5	24.5
	Nominal	24.5	23.5	23.5	23.5
DSI = 1 (Phablet Reduced)	Max allowed power	25.5	24.5	24.5	24.5
	Nominal	24.5	23.5	23.5	23.5
DSI = 2 (Head)	Max allowed power	25.5	24.5	24.5	24.5
	Nominal	24.5	23.5	23.5	23.5
DSI = 3 (Hotspot)	Max allowed power	25.5	24.5	24.5	24.5
	Nominal	24.5	23.5	23.5	23.5
DSI = 4 (Earjack)	Max allowed power	25.5	24.5	24.5	24.5
	Nominal	24.5	23.5	23.5	23.5
UMTS Band 4 (1750 MHz)					
Power Level		Modulated Average Output Power (in dBm)			
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6	3GPP DC-HSDPA Rel 8
DSI = 0 (Body-Worn or Phablet Max)	Max allowed power	24.0	23.0	23.0	23.0
	Nominal	23.0	22.0	22.0	22.0
DSI = 1 (Phablet Reduced)	Max allowed power	19.5	18.5	18.5	18.5
	Nominal	18.5	17.5	17.5	17.5
DSI = 2 (Head)	Max allowed power	24.0	23.0	23.0	23.0
	Nominal	23.0	22.0	22.0	22.0
DSI = 3 (Hotspot)	Max allowed power	19.5	18.5	18.5	18.5
	Nominal	18.5	17.5	17.5	17.5
DSI = 4 (Earjack)	Max allowed power	19.5	18.5	18.5	18.5
	Nominal	18.5	17.5	17.5	17.5
UMTS Band 2 (1900 MHz)					
Power Level		Modulated Average Output Power (in dBm)			
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6	3GPP DC-HSDPA Rel 8
DSI = 0 (Body-Worn or Phablet Max)	Max allowed power	24.0	23.0	23.0	23.0
	Nominal	23.0	22.0	22.0	22.0
DSI = 1 (Phablet Reduced)	Max allowed power	19.5	18.5	18.5	18.5
	Nominal	18.5	17.5	17.5	17.5
DSI = 2 (Head)	Max allowed power	24.0	23.0	23.0	23.0
	Nominal	23.0	22.0	22.0	22.0
DSI = 3 (Hotspot)	Max allowed power	19.5	18.5	18.5	18.5
	Nominal	18.5	17.5	17.5	17.5
DSI = 4 (Earjack)	Max allowed power	19.5	18.5	18.5	18.5
	Nominal	18.5	17.5	17.5	17.5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 6 of 51	

Mode / Band		Modulated Average Output Power (in dBm)				
		DSI = 0 (Body-Worn or Phablet Max)	DSI = 1 (Phablet Reduced)	DSI = 2 (Head)	DSI = 3 (Hotspot)	DSI = 4 (Earjack)
NR FDD Band n71	Max allowed	25.5	25.5	25.5	25.5	25.5
	Nominal	24.5	24.5	24.5	24.5	24.5
NR FDD Band n12	Max allowed	25.5	25.5	25.5	25.5	25.5
	Nominal	24.5	24.5	24.5	24.5	24.5
NR FDD Band n5	Max allowed	25.5	25.5	25.5	25.5	25.5
	Nominal	24.5	24.5	24.5	24.5	24.5
NR FDD Band n66 Ant A	Max allowed	24.8	19.5	24.8	19.5	19.5
	Nominal	23.8	18.5	23.8	18.5	18.5
NR FDD Band n66 Ant E	Max allowed	24.5	24.5	20.0	20.0	24.5
	Nominal	23.5	23.5	19.0	19.0	23.5
NR FDD Band n25 Ant A	Max allowed	24.8	19.5	24.8	19.5	19.5
	Nominal	23.8	18.5	23.8	18.5	18.5
NR FDD Band n25 Ant E	Max allowed	24.5	24.5	20.0	20.0	24.5
	Nominal	23.5	23.5	19.0	19.0	23.5
NR FDD Band n2 Ant A	Max allowed	24.8	19.5	24.8	19.5	19.5
	Nominal	23.8	18.5	23.8	18.5	18.5
NR FDD Band n2 Ant E	Max allowed	24.5	24.5	20.0	20.0	24.5
	Nominal	23.5	23.5	19.0	19.0	23.5
NR FDD Band n30	Max allowed	24.0	21.0	24.0	20.0	21.0
	Nominal	23.0	20.0	23.0	19.0	20.0
NR TDD Band n41 (PC3) Ant B	Max allowed	19.0	15.0	19.0	14.0	15.0
	Nominal	18.0	14.0	18.0	13.0	14.0
NR TDD Band n41 (PC2) Ant B	Max allowed	19.0	15.0	19.0	14.0	15.0
	Nominal	18.0	14.0	18.0	13.0	14.0
NR TDD Band n41 (PC3) Ant E	Max allowed	18.0	18.0	15.0	16.0	18.0
	Nominal	17.0	17.0	14.0	15.0	17.0
NR TDD Band n41 (PC2) Ant E	Max allowed	18.0	18.0	15.0	16.0	18.0
	Nominal	17.0	17.0	14.0	15.0	17.0
NR TDD Band n77 (PC3)	Max allowed	20.5	20.5	16.0	18.5	20.5
	Nominal	19.5	19.5	15.0	17.5	19.5
NR TDD Band n77 (PC2)	Max allowed	20.5	20.5	16.0	18.5	20.5
	Nominal	19.5	19.5	15.0	17.5	19.5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 7 of 51	

Mode / Band		Modulated Average Output Power (in dBm)				
		DSI = 0 (Body-Worn or Phablet Max)	DSI = 1 (Phablet Reduced)	DSI = 2 (Head)	DSI = 3 (Hotspot)	DSI = 4 (Earjack)
NR FDD Band n71	Max allowed	25.5	25.5	25.5	25.5	25.5
	Nominal	24.5	24.5	24.5	24.5	24.5
NR FDD Band n12	Max allowed	25.5	25.5	25.5	25.5	25.5
	Nominal	24.5	24.5	24.5	24.5	24.5
NR FDD Band n5	Max allowed	25.5	25.5	25.5	25.5	25.5
	Nominal	24.5	24.5	24.5	24.5	24.5
NR FDD Band n66 Ant A	Max allowed	24.8	19.5	24.8	19.5	19.5
	Nominal	23.8	18.5	23.8	18.5	18.5
NR FDD Band n66 Ant E	Max allowed	24.5	24.5	20.0	20.0	24.5
	Nominal	23.5	23.5	19.0	19.0	23.5
NR FDD Band n25 Ant A	Max allowed	24.8	19.5	24.8	19.5	19.5
	Nominal	23.8	18.5	23.8	18.5	18.5
NR FDD Band n25 Ant E	Max allowed	24.5	24.5	20.0	20.0	24.5
	Nominal	23.5	23.5	19.0	19.0	23.5
NR FDD Band n2 Ant A	Max allowed	24.8	19.5	24.8	19.5	19.5
	Nominal	23.8	18.5	23.8	18.5	18.5
NR FDD Band n2 Ant E	Max allowed	24.5	24.5	20.0	20.0	24.5
	Nominal	23.5	23.5	19.0	19.0	23.5
NR FDD Band n30	Max allowed	24.0	21.0	24.0	20.0	21.0
	Nominal	23.0	20.0	23.0	19.0	20.0
NR TDD Band n41 (PC3) Ant B	Max allowed	19.0	15.0	19.0	14.0	15.0
	Nominal	18.0	14.0	18.0	13.0	14.0
NR TDD Band n41 (PC2) Ant B	Max allowed	19.0	15.0	19.0	14.0	15.0
	Nominal	18.0	14.0	18.0	13.0	14.0
NR TDD Band n41 (PC3) Ant E	Max allowed	18.0	18.0	15.0	16.0	18.0
	Nominal	17.0	17.0	14.0	15.0	17.0
NR TDD Band n41 (PC2) Ant E	Max allowed	18.0	18.0	15.0	16.0	18.0
	Nominal	17.0	17.0	14.0	15.0	17.0
NR TDD Band n77 (PC3)	Max allowed	20.5	20.5	16.0	18.5	20.5
	Nominal	19.5	19.5	15.0	17.5	19.5
NR TDD Band n77 (PC2)	Max allowed	20.5	20.5	16.0	18.5	20.5
	Nominal	19.5	19.5	15.0	17.5	19.5

For LTE TDD and NR TDD, the above powers listed are TDD burst average values.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 8 of 51	

1.4.2 2.4 GHz Maximum SISO/MIMO WLAN Output Power

Note: Targets for 802.11ax RU operations can be found in the original filing S/N: 1M2009230152-01-R2.A3L

Mode	Band	IEEE 802.11 (in dBm)									
		SISO				MIMO					
		Antenna 1		Antenna 2							
		b				g (CDD + STBC)		n (CDD + STBC, SDM)		ax (SU) (CDD + STBC, SDM)	
		Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum
2.4 GHz WIFI	2.45 GHz	18.5	19.5	19.5	20.5	20.5	21.5	20.5	21.5	20.5 ch. 1: 17.0 ch. 11: 17.5	21.5 ch. 1: 18.0 ch. 11: 18.5

1.4.3 2.4 GHz Reduced WLAN Output Powers

Note: Targets for 802.11ax RU operations can be found in the original filing S/N: 1M2009230152-01-R2.A3L

The below table is applicable in the following conditions:

- RCV Active
- Simultaneous conditions with 5/6 GHz WLAN (RCV not Active)
- Simultaneous conditions with 5G NR (RCV not Active)

Mode	Band	IEEE 802.11 (in dBm)							
		SISO		MIMO					
		Antenna 1 & Antenna 2							
		b		g (CDD + STBC)		n (CDD + STBC, SDM)		ax (SU) (CDD + STBC, SDM)	
		Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum
2.4 GHz WIFI	2.45 GHz	16.0	17.0	19.0	20.0	19.0	20.0	19.0 ch. 1: 17.0 ch. 11: 17.5	20.0 ch. 1: 18.0 ch. 11: 18.5

The below table is applicable in the following conditions:

- RCV Active during simultaneous conditions with 5/6 GHz WLAN
- RCV Active during simultaneous conditions with 5G NR

Mode	Band	IEEE 802.11 (in dBm)							
		SISO		MIMO					
		Antenna 1 & Antenna 2							
		b		g (CDD + STBC)		n (CDD + STBC, SDM)		ax (SU) (CDD + STBC, SDM)	
		Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum
2.4 GHz WIFI	2.45 GHz	13.0	14.0	16.0	17.0	16.0	17.0	16.0	17.0

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 9 of 51	

1.4.4 5 GHz Maximum SISO/MIMO WLAN Output Power

Note: Targets for 802.11ax RU operations can be found in the original filing S/N: 1M2009230152-01-R2.A3L

Mode	Band	IEEE 802.11 (in dBm)							
		MIMO							
		a (CDD + STBC)		n (CDD + STBC, SDM)		ac (CDD + STBC, SDM)		ax (SU) (CDD + STBC, SDM)	
		Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum
5 GHz WIFI (20MHz BW)	5200 MHz	19.5	20.5	19.5	20.5	19.5	20.5	19.5	20.5
	5300 MHz	19.5	20.5	19.5	20.5	19.5	20.5	19.5	20.5
	5500 MHz	19.5	20.5	19.5	20.5	19.5	20.5	19.5	20.5
	5800 MHz	19.5	20.5	19.5	20.5	19.5	20.5	19.5	20.5
5 GHz WIFI (40MHz BW)	5200 MHz			19.0 ch. 38 17.0	20.0 ch. 38 18.0	19.0 ch. 38 17.0	20.0 ch. 38 18.0	19.0 ch. 38 17.0	20.0 ch. 38 18.0
	5300 MHz			19.0 ch. 62 17.0	20.0 ch. 62 18.0	19.0 ch. 62 17.0	20.0 ch. 62 18.0	19.0 ch. 62 17.0	20.0 ch. 62 18.0
	5500 MHz			19.0 ch. 102 17.5	20.0 ch. 102 18.5	19.0 ch. 102 17.5	20.0 ch. 102 18.5	19.0 ch. 102 17.5	20.0 ch. 102 18.5
	5800 MHz			19.0	20.0	19.0	20.0	19.0	20.0
5 GHz WIFI (80MHz BW)	5200 MHz					17.0	18.0	17.0	18.0
	5300 MHz					17.0	18.0	17.0	18.0
	5500 MHz					18.5	19.5	18.5	19.5
	5800 MHz					18.5	19.5	18.5	19.5
5 GHz WIFI (160MHz BW)	5250 MHz					15.0	16.0	15.0	16.0
	5570 MHz					16.5	17.5	16.5	17.5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 10 of 51	

1.4.5 5 GHz Reduced WLAN Output Powers

Note: Targets for 802.11ax RU operations can be found in the original filing S/N: 1M2009230152-01-R2.A3L

The below table is applicable in the following conditions:

- RCV Active
- Simultaneous conditions with 2.4 GHz WLAN
- Simultaneous conditions with 5G NR
- RCV Active during simultaneous conditions with 2.4 GHz WLAN
- RCV Active during simultaneous conditions with 5G NR

Mode	Band	IEEE 802.11 (in dBm)							
		MIMO							
		a (CDD + STBC)		n (CDD + STBC, SDM)		ac (CDD + STBC, SDM)		ax (SU) (CDD + STBC, SDM)	
		Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum
5 GHz WIFI (20MHz BW)	5200 MHz	16.0	17.0	16.0	17.0	16.0	17.0	16.0	17.0
	5300 MHz	16.0	17.0	16.0	17.0	16.0	17.0	16.0	17.0
	5500 MHz	16.0	17.0	16.0	17.0	16.0	17.0	16.0	17.0
	5800 MHz	16.0	17.0	16.0	17.0	16.0	17.0	16.0	17.0
5 GHz WIFI (40MHz BW)	5200 MHz			16.0	17.0	16.0	17.0	16.0	17.0
	5300 MHz			16.0	17.0	16.0	17.0	16.0	17.0
	5500 MHz			16.0	17.0	16.0	17.0	16.0	17.0
	5800 MHz			16.0	17.0	16.0	17.0	16.0	17.0
5 GHz WIFI (80MHz BW)	5200 MHz					16.0	17.0	16.0	17.0
	5300 MHz					16.0	17.0	16.0	17.0
	5500 MHz					16.0	17.0	16.0	17.0
	5800 MHz					16.0	17.0	16.0	17.0
5 GHz WIFI (160MHz BW)	5250 MHz					15.0	16.0	15.0	16.0
	5570 MHz					16.0	17.0	16.0	17.0

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 11 of 51

1.4.6 2.4 GHz Maximum Bluetooth Output Power

Mode	Single Antenna				Single Antenna in Dual Mode				Dual	
	Antenna 1		Antenna 2		Antenna 1		Antenna 2			
	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum
Bluetooth (in dBm)	16.0	17.0	16.0	17.0	11.1	12.1	10.9	11.9	14.0	15.0
Bluetooth EDR (in dBm)	13.0	14.0	13.0	14.0	15.0	16.0	12.6	13.6	17.0	18.0
Bluetooth LE 2Mbps (in dBm)			9.0	10.0						
Bluetooth LE 1Mbps, 125/500Kbps (in dBm)			9.0	10.0						

1.4.7 2.4 GHz Reduced Bluetooth Output Power

The below table is applicable in the following conditions:

- RCV active

Mode	Single Antenna				Single Antenna in Dual Mode				Dual	
	Antenna 1		Antenna 2		Antenna 1		Antenna 2			
	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum
Bluetooth (in dBm)	13.0	14.0	13.0	14.0	10.0	11.0	10.0	11.0	13.0	14.0
Bluetooth EDR (in dBm)	13.0	14.0	13.0	14.0	10.0	11.0	10.0	11.0	13.0	14.0
Bluetooth LE 2Mbps (in dBm)			9.0	10.0						
Bluetooth LE 1Mbps, 125/500Kbps (in dBm)			9.0	10.0						

FCC ID: A3LSMG998U	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 12 of 51

1.5 DUT Antenna Locations

The overall dimensions of this device are > 9 x 5 cm. A diagram showing the location of the device antennas can be found in Appendix E. Since the diagonal dimension of this device is > 160 mm and <200 mm, it is considered a “phablet.”

Table 1-1
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
LTE Band 66 (AWS) Antenna E	Yes	Yes	Yes	No	No	Yes
LTE Band 25 (PCS) Antenna E	Yes	Yes	Yes	No	No	Yes

Note: Particular DUT edges were not required to be evaluated for wireless router SAR or phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III and FCC KDB Publication 648474 D04v01r03. The distances between the transmit antennas and the edges of the device are included in the filing.

1.6 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the device for this model. Therefore, all SAR tests were performed with the device which already incorporates the NFC antenna. A diagram showing the location of the NFC antenna can be found in Appendix E.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 13 of 51	

1.7 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, transmitters are considered to be operating simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06 4.3.2 procedures.

**Table 1-2
Simultaneous Transmission Scenarios**

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Phablet	Notes
1	1x CDMA voice + 2.4 GHz WLAN	Yes	Yes	N/A	Yes	
2	1x CDMA voice + 2.4 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
3	1x CDMA voice + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
4	1x CDMA voice + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
5	1x CDMA voice + 2.4 GHz WLAN + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
6	1x CDMA voice + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
7	1x CDMA voice + 2.4 GHz WLAN + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
8	1x CDMA voice + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
9	1x CDMA voice + 2.4 GHz Bluetooth Ant 1	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
10	1x CDMA voice + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
11	1x CDMA voice + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
12	1x CDMA voice + 2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
13	1x CDMA voice + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
14	1x CDMA voice + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
15	1x CDMA voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
16	1x CDMA voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
17	1x CDMA voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
18	GSM voice + 2.4 GHz WLAN	Yes	Yes	N/A	Yes	
19	GSM voice + 2.4 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
20	GSM voice + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
21	GSM voice + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
22	GSM voice + 2.4 GHz WLAN + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
23	GSM voice + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
24	GSM voice + 2.4 GHz WLAN + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
25	GSM voice + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
26	GSM voice + 2.4 GHz Bluetooth Ant 1	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
27	GSM voice + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
28	GSM voice + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
29	GSM voice + 2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
30	GSM voice + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
31	GSM voice + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
32	GSM voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
33	GSM voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
34	GSM voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
35	UMTS + 2.4 GHz WLAN	Yes	Yes	Yes	Yes	
36	UMTS + 2.4 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
37	UMTS + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
38	UMTS + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
39	UMTS + 2.4 GHz WLAN + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
40	UMTS + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
41	UMTS + 2.4 GHz WLAN + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
42	UMTS + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
43	UMTS + 2.4 GHz Bluetooth Ant 1	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
44	UMTS + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
45	UMTS + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
46	UMTS + 2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
47	UMTS + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
48	UMTS + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
49	UMTS + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
50	UMTS + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
51	UMTS + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
52	LTE + 2.4 GHz WLAN	Yes	Yes	Yes	Yes	
53	LTE + 2.4 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
54	LTE + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
55	LTE + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
56	LTE + 2.4 GHz WLAN + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
57	LTE + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
58	LTE + 2.4 GHz WLAN + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
59	LTE + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
60	LTE + 2.4 GHz Bluetooth Ant 1	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
61	LTE + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
62	LTE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
63	LTE + 2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
64	LTE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
65	LTE + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
66	LTE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
67	LTE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
68	LTE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 14 of 51

Table 1-3
Simultaneous Transmission Scenarios Cont.

No.	Capable Transmit Configuration	Head	Body-Worn Accessory	Wireless Router	Phablet	Notes
69	LTE + NR	Yes	Yes	N/A	Yes	
70	LTE + NR + 2.4 GHz WLAN	Yes	Yes	Yes	Yes	
71	LTE + NR + 2.4 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
72	LTE + NR + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
73	LTE + NR + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
74	LTE + NR + 2.4 GHz WLAN + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
75	LTE + NR + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes	Yes	Yes	Yes	
76	LTE + NR + 2.4 GHz WLAN + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
77	LTE + NR + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes	Yes	N/A	Yes	
78	LTE + NR + 2.4 GHz Bluetooth Ant 1	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
79	LTE + NR + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
80	LTE + NR + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
81	LTE + NR + 2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
82	LTE + NR + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
83	LTE + NR + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
84	LTE + NR + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
85	LTE + NR + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^	Yes	Yes^	Yes	^ Bluetooth Tethering is considered
86	LTE + NR + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^	Yes	N/A	Yes	^ Bluetooth Tethering is considered
87	NR + 2.4 GHz WLAN	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
88	NR + 2.4 GHz WLAN MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
89	NR + 5 GHz WLAN MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
90	NR + 6 GHz WLAN MIMO	Yes*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered.
91	NR + 2.4 GHz WLAN + 5 GHz WLAN MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
92	NR + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
93	NR + 2.4 GHz WLAN + 6 GHz WLAN MIMO	Yes*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered.
94	NR + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered.
95	NR + 2.4 GHz Bluetooth Ant 1	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
96	NR + 2.4 GHz Bluetooth Ant 2	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
97	NR + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
98	NR + 2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	Yes^*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
99	NR + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
100	NR + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
101	NR + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
102	NR + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
103	NR + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
104	CDMA/EVDO data + 2.4 GHz WLAN	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
105	CDMA/EVDO data + 2.4 GHz WLAN MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
106	CDMA/EVDO data + 5 GHz WLAN MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
107	CDMA/EVDO data + 6 GHz WLAN MIMO	Yes*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered.
108	CDMA/EVDO data + 2.4 GHz WLAN + 5 GHz WLAN MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
109	CDMA/EVDO data + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered.
110	CDMA/EVDO data + 2.4 GHz WLAN + 6 GHz WLAN MIMO	Yes*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered.
111	CDMA/EVDO data + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	Yes*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered.
112	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
113	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 2	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
114	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
115	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	Yes^*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
116	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
117	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
118	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
119	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	Yes^*	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
120	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	Yes^*	Yes*	N/A	Yes	* Pre-installed VOIP applications are considered. ^ Bluetooth Tethering is considered
121	GPRS/EDGE + 2.4 GHz WLAN	N/A	N/A	Yes	Yes	
122	GPRS/EDGE + 2.4 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
123	GPRS/EDGE + 5 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
124	GPRS/EDGE + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes	
125	GPRS/EDGE + 2.4 GHz WLAN + 5 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
126	GPRS/EDGE + 2.4 GHz WLAN MIMO + 5 GHz WLAN MIMO	N/A	N/A	Yes	Yes	
127	GPRS/EDGE + 2.4 GHz WLAN + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes	
128	GPRS/EDGE + 2.4 GHz WLAN MIMO + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes	
129	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1	N/A	N/A	Yes^	Yes	^ Bluetooth Tethering is considered
130	GPRS/EDGE + 2.4 GHz Bluetooth Ant 2	N/A	N/A	Yes^	Yes	^ Bluetooth Tethering is considered
131	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WLAN MIMO	N/A	N/A	Yes^	Yes	^ Bluetooth Tethering is considered
132	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes	
133	GPRS/EDGE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	N/A	N/A	Yes^	Yes	^ Bluetooth Tethering is considered
134	GPRS/EDGE + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes	
135	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2	N/A	N/A	Yes^	Yes	^ Bluetooth Tethering is considered
136	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 5 GHz WLAN MIMO	N/A	N/A	Yes^	Yes	^ Bluetooth Tethering is considered
137	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz Bluetooth Ant 2 + 6 GHz WLAN MIMO	N/A	N/A	N/A	Yes	

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 15 of 51	

1. 2.4 GHz WLAN and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. 5 GHz WLAN and 6 GHz WLAN share the same antenna path and cannot transmit simultaneously.
3. All licensed modes share the same antenna path and cannot transmit simultaneously.
4. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN Hotspot scenario.
5. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
6. 5 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, U-NII2A, and U-NII2C were not evaluated for wireless router conditions.
7. 6 GHz Wireless Router is not supported, therefore it was not evaluated for wireless router conditions.
8. This device supports 2x2 MIMO Tx for WLAN 802.11a/g/n/ac/ax. 802.11a/g/n/ac/ax supports CDD and STBC and 802.11n/ac/ax additionally supports SDM. 2.4 GHz WLAN antenna can transmit independently or together when operating with MIMO. 5/6 GHz WLAN can transmit only when operating with MIMO.
9. This device supports VoWIFI.
10. This device supports Bluetooth Tethering.
11. This device supports VoLTE.
12. LTE + 5G NR FR1 Scenarios are limited to EN-DC combinations with anchor bands as shown in the NR FR1 checklist.
13. 5G NR FR2 n260 and n261 cannot transmit simultaneously.
14. LTE + 5G NR FR2 Scenarios are limited to EN-DC combinations with anchor bands as shown in the NR FR2 checklist.

1.8 Miscellaneous SAR Test Considerations

(A) WIFI/BT

There were no changes made to the WIFI and BT operations within this device. Please see original compliance evaluation in RF Exposure Technical Report S/N 1M2009230152-01-R2.A3L for complete evaluation of these operating modes.

(B) Licensed Transmitter(s)

Only operations relevant to this permissive change were evaluated for compliance. Please see original compliance evaluation in RF Exposure Technical Report 1M2009230152-01-R2.A3L for complete evaluation of all other operating modes. The operational description includes a description of all changed items.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r04.

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.

This device supports LTE capabilities with overlapping transmission frequency ranges. When the supported frequency range of an LTE Band falls completely within an LTE band with a larger transmission frequency range, both LTE bands have the same target power (or the band with the larger transmission frequency range has a higher target power), and both LTE bands share the same transmission path and signal characteristics, SAR was only assessed for the band with the larger transmission frequency range.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 16 of 51	

This device supports 64QAM and 256QAM on the uplink and 256QAM on the downlink for LTE Operations. Conducted powers for 64QAM and 256QAM uplink configurations were measured per Section 5.1 of FCC KDB Publication 941225D05v02r05. SAR was not required for 64QAM or 256QAM since the highest maximum output power for 64QAM and 256QAM is $\leq \frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg, per Section 5.2.4 of FCC KDB Publication 941225 D05v02r05.

No additional Part 2 testing was required for this C2PC since the changes do not impact the essential test cases evaluated in the original filing. The original filing includes at least one band of evaluation with same output power characteristics, and therefore, any additional evaluation for Part 2 smart transmit algorithm verification was not necessary.

1.9 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r04, D05Av01r02, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D04v01r03 (Phablet Procedures)

1.10 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units. The serial numbers used for each test are indicated alongside the results in Section 11.

1.11 Bibliography

Report Type	Report Serial Number
RF Exposure Part 0 Test Report	1M2102050006-02.A3L

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 17 of 51

LTE Information					
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 71 (865.5 - 895.5 MHz)				
	LTE Band 12 (690.7 - 715.3 MHz)				
	LTE Band 13 (770.5 - 784.5 MHz)				
	LTE Band 14 (790.5 - 795.5 MHz)				
	LTE Band 26 (Cell) (814.7 - 848.3 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 66 (AWS) (1710.7 - 1770.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 25 (PCS) (1850.7 - 1914.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 30 (2307.5 - 2312.5 MHz)				
	LTE Band 7 (2502.5 - 2567.5 MHz)				
	LTE Band 48 (3552.5 - 3697.5 MHz)				
	LTE Band 41 (2498.5 - 2587.5 MHz)				
	LTE Band 38 (2572.5 - 2617.5 MHz)				
Channel Bandwidths	LTE Band 71: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 14: 5 MHz, 10 MHz				
	LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 25 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 30: 5 MHz, 10 MHz				
	LTE Band 7: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 48: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 38: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 71: 5 MHz	665.5 (133147)		680.5 (133297)		695.5 (133447)
LTE Band 71: 10 MHz	668 (133172)		680.5 (133297)		693 (133422)
LTE Band 71: 15 MHz	670.5 (133197)		680.5 (133297)		690.5 (133397)
LTE Band 71: 20 MHz	673 (133222)		680.5 (133297)		688 (133372)
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)		715.3 (23173)
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)		714.5 (23165)
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)		713.5 (23155)
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)		711 (23130)
LTE Band 13: 5 MHz	779.5 (23205)		782 (23230)		784.5 (23255)
LTE Band 13: 10 MHz	N/A		782 (23230)		N/A
LTE Band 14: 5 MHz	790.5 (23305)		793 (23330)		795.5 (23355)
LTE Band 14: 10 MHz	N/A		793 (23330)		N/A
LTE Band 26 (Cell): 1.4 MHz	814.7 (26697)		831.5 (26865)		848.3 (27033)
LTE Band 26 (Cell): 3 MHz	815.5 (26705)		831.5 (26865)		847.5 (27025)
LTE Band 26 (Cell): 5 MHz	816.5 (26715)		831.5 (26865)		846.5 (27015)
LTE Band 26 (Cell): 10 MHz	819 (26740)		831.5 (26865)		844 (26990)
LTE Band 26 (Cell): 15 MHz	821.5 (26765)		831.5 (26865)		841.5 (26965)
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)		848.3 (20643)
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)		847.5 (20635)
LTE Band 5 (Cell): 5 MHz	826.5 (20425)		836.5 (20525)		846.5 (20625)
LTE Band 5 (Cell): 10 MHz	829 (20450)		836.5 (20525)		844 (20600)
LTE Band 66 (AWS): 1.4 MHz	1710.7 (131979)		1745 (132322)		1779.3 (132665)
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)		1745 (132322)		1778.5 (132657)
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)		1745 (132322)		1777.5 (132647)
LTE Band 66 (AWS): 10 MHz	1715 (132022)		1745 (132322)		1775 (132622)
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)		1745 (132322)		1772.5 (132597)
LTE Band 66 (AWS): 20 MHz	1720 (132072)		1745 (132322)		1770 (132572)
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)		1754.3 (20393)
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)		1753.5 (20385)
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)		1732.5 (20175)		1752.5 (20375)
LTE Band 4 (AWS): 10 MHz	1715 (20000)		1732.5 (20175)		1750 (20350)
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)		1732.5 (20175)		1747.5 (20325)
LTE Band 4 (AWS): 20 MHz	1720 (20050)		1732.5 (20175)		1745 (20300)
LTE Band 25 (PCS): 1.4 MHz	1850.7 (26047)		1882.5 (26365)		1914.3 (26683)
LTE Band 25 (PCS): 3 MHz	1851.5 (26055)		1882.5 (26365)		1913.5 (26675)
LTE Band 25 (PCS): 5 MHz	1852.5 (26065)		1882.5 (26365)		1912.5 (26665)
LTE Band 25 (PCS): 10 MHz	1855 (26090)		1882.5 (26365)		1910 (26640)
LTE Band 25 (PCS): 15 MHz	1857.5 (26115)		1882.5 (26365)		1907.5 (26615)
LTE Band 25 (PCS): 20 MHz	1860 (26140)		1882.5 (26365)		1905 (26590)
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)		1880 (18900)		1909.3 (19193)
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)		1880 (18900)		1908.5 (19185)
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)		1880 (18900)		1907.5 (19175)
LTE Band 2 (PCS): 10 MHz	1855 (18650)		1880 (18900)		1905 (19150)
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)		1880 (18900)		1902.5 (19125)
LTE Band 2 (PCS): 20 MHz	1860 (18700)		1880 (18900)		1900 (19100)
LTE Band 30: 5 MHz	2307.5 (27685)		2310 (27710)		2312.5 (27735)
LTE Band 30: 10 MHz	N/A		2310 (27710)		N/A
LTE Band 7: 5 MHz	2502.5 (20775)		2535 (21100)		2567.5 (21425)
LTE Band 7: 10 MHz	2505 (20800)		2535 (21100)		2565 (21400)
LTE Band 7: 15 MHz	2507.5 (20825)		2535 (21100)		2562.5 (21375)
LTE Band 7: 20 MHz	2510 (20850)		2535 (21100)		2560 (21350)
LTE Band 48: 5 MHz	3552.5 (55265)	3600.8 (55748)	N/A	3649.2 (56232)	3697.5 (56715)
LTE Band 48: 10 MHz	3555 (55290)	3601.7 (55757)	N/A	3648.3 (56223)	3695 (56690)
LTE Band 48: 15 MHz	3557.5 (55315)	3602.5 (55765)	N/A	3647.5 (56215)	3692.5 (56665)
LTE Band 48: 20 MHz	3560 (55340)	3603.3 (55773)	N/A	3646.7 (56207)	3690 (56640)
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 38: 5 MHz	2572.5 (37775)		2595 (38000)		2617.5 (38225)
LTE Band 38: 10 MHz	2575 (37800)		2595 (38000)		2615 (38200)
LTE Band 38: 15 MHz	2577.5 (37825)		2595 (38000)		2612.5 (38175)
LTE Band 38: 20 MHz	2580 (37850)		2595 (38000)		2610 (38150)
UE Category	DL UE Cat 20, UL UE Cat 18				
Modulations Supported in UL	QPSK, 16QAM, 64QAM, 256QAM				
LTE MPR permanently implemented per 3GPP TS 36.101 section 6.2.3-6.2.57 (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Additional Information	This device does not support full CA features on 3GPP Release 16. It supports carrier aggregation, downlink MIMO, LAA features as shown in Section 9 and Appendix F. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 16 Features are not supported: Relay, HetNet, Enhanced MIMO, eCIC, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

FCC ID: A3LSMG998U		SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 18 of 51	

NR Information					
Form Factor	Portable Handset				
Frequency Range of each NR transmission band	NR Band n71 (665.5 - 695.5 MHz)				
	NR Band n12 (701.5 - 713.5 MHz)				
	NR Band n5 (Cell) (826.5 - 846.5 MHz)				
	NR Band n66 (AWS) (1712.5 - 1777.5 MHz)				
	NR Band n25 (PCS) (1852.5 - 1912.5 MHz)				
	NR Band n2 (PCS) (1852.5 - 1907.5 MHz)				
	NR Band n30 (2307.5 - 2312.5 MHz)				
	NR Band n41 (2506.02 - 2679.99 MHz)				
	NR Band n77 (3710.01 - 3969.99 MHz)				
	NR Band n71: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Bandwidths	NR Band n12: 5 MHz, 10 MHz, 15 MHz				
	NR Band n5 (Cell): 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	NR Band n66 (AWS): 5 MHz, 10 MHz, 15 MHz, 20 MHz, 30 MHz, 40 MHz				
	NR Band n25 (PCS): 5 MHz, 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz				
	NR Band n2 (PCS): 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	NR Band n30: 5 MHz, 10 MHz				
	NR Band n41: 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 80 MHz, 90MHz, 100 MHz				
	NR Band n77: 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz,80 MHz, 90 MHz, 100 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
NR Band n71: 5 MHz	665.5 (133147)		680.5 (136100)		695.5 (133447)
NR Band n71: 10 MHz	668 (133600)		680.5 (136100)		693 (138600)
NR Band n71: 15 MHz	670.5 (134100)		680.5 (136100)		690.5 (138100)
NR Band n71: 20 MHz	673 (134600)		680.5 (136100)		688 (137600)
NR Band n12: 5 MHz	701.5 (140300)		707.5 (141500)		713.5 (142700)
NR Band n12: 10 MHz	704 (140800)		707.5 (141500)		711 (142200)
NR Band n12: 15 MHz	706.5 (141300)		707.5 (141500)		708.5 (141700)
NR Band n5 (Cell): 5 MHz	826.5 (165300)		836.5 (167300)		846.5 (169300)
NR Band n5 (Cell): 10 MHz	829 (165800)		836.5 (167300)		844 (168800)
NR Band n5 (Cell): 15 MHz	831.5 (166300)		836.5 (167300)		841.5 (168300)
NR Band n5 (Cell): 20 MHz	834 (166800)		836.5 (167300)		839 (167800)
NR Band n66 (AWS): 5 MHz	1712.5 (342500)		1745 (349000)		1777.5 (355500)
NR Band n66 (AWS): 10 MHz	1715 (343000)		1745 (349000)		1775 (355000)
NR Band n66 (AWS): 15 MHz	1717.5 (343500)		1745 (349000)		1772.5 (354500)
NR Band n66 (AWS): 20 MHz	1720 (344000)		1745 (349000)		1770 (354000)
NR Band n66 (AWS): 30 MHz	1725 (345000)		1745 (349000)		1765 (353000)
NR Band n66 (AWS): 40 MHz	1730 (346000)		1745 (349000)		1760 (352000)
NR Band n25 (PCS): 5 MHz	1852.5 (370500)		1882.5 (376500)		1912.5 (382500)
NR Band n25 (PCS): 10 MHz	1855 (371000)		1882.5 (376500)		1910 (382000)
NR Band n25 (PCS): 15 MHz	1857.5 (371500)		1882.5 (376500)		1907.5 (381500)
NR Band n25 (PCS): 20 MHz	1860 (372000)		1882.5 (376500)		1905 (381000)
NR Band n25 (PCS): 25 MHz	1862.5 (372500)		1882.5 (376500)		1902.5 (380500)
NR Band n25 (PCS): 30 MHz	1865 (373000)		1882.5 (376500)		1900 (380000)
NR Band n25 (PCS): 40 MHz	1870 (374000)		1882.5 (376500)		1895 (379000)
NR Band n2 (PCS): 5 MHz	1852.5 (370500)		1880 (376000)		1907.5 (381500)
NR Band n2 (PCS): 10 MHz	1855 (371000)		1880 (376000)		1905 (381000)
NR Band n2 (PCS): 15 MHz	1857.5 (371500)		1880 (376000)		1902.5 (380500)
NR Band n2 (PCS): 20 MHz	1860 (372000)		1880 (376000)		1900 (380000)
NR Band n30: 5 MHz	2307.5 (461500)		2310 (462000)		2312.5 (462500)
NR Band n30: 10 MHz	N/A		2310 (462000)	N/A	
NR Band n41: 20 MHz	2506.02 (501204)	2549.49 (509898)	2592.99 (518598)	2636.49 (527298)	2679.99 (535998)
NR Band n41: 30 MHz	2511 (502200)	2552.01 (510402)	2592.99 (518598)	2634 (526800)	2674.98 (534996)
NR Band n41: 40 MHz	2516.01 (503202)	2567.34 (513468)	N/A		2670 (534000)
NR Band n41: 50 MHz	2521.02 (504204)		2592.99 (518598)	2664.99 (532998)	
NR Band n41: 60 MHz	2526 (505200)		2592.99 (518598)	2659.98 (531996)	
NR Band n41: 80 MHz	2536.02 (507204)		N/A		2649.99 (529998)
NR Band n41: 90 MHz	2541 (508200)		N/A		2644.98 (528996)
NR Band n41: 100 MHz	2546.01 (509202)		2592.99 (518598)		2640 (528000)
NR Band n77: 20 MHz	3710.01 (647334)	3762 (650800)	3813.99 (654266)	3866.01 (657734)	3918 (661200)
NR Band n77: 30 MHz	3715.02 (647668)	3765 (651000)	3815.01 (654334)	3864.99 (657666)	3915 (661000)
NR Band n77: 40 MHz	3720 (648000)	3768 (651200)	3816 (654400)	3864 (657600)	3912 (660800)
NR Band n77: 50 MHz	3725.01 (648334)	3782.49 (652166)	3840 (656000)		3897.51 (659834)
NR Band n77: 60 MHz	3730.02 (648668)	3803.34 (653556)	N/A		3876.66 (658444)
NR Band n77: 70 MHz	3735 (649000)	3804.99 (653666)	N/A		3875.01 (65334)
NR Band n77: 80 MHz	3740.01 (649334)	N/A		3840 (656000)	N/A
NR Band n77: 90 MHz	3745.02 (649668)	N/A		3840 (656000)	N/A
NR Band n77: 100 MHz	3750 (650000)	N/A		N/A	3930 (662000)
SCS for NR Band n71/n12/n5/n66/n25/n2/n30	15 kHz				
SCS for NR Band n41/n77	30 kHz				
Modulations Supported in UL	DFT-s-OFDM: $\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM				
NR MPR Permanently implemented per 3GPP TS 38.101	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
EN-DC Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Anchor Bands for NR Band n71	LTE Band 2/66				
LTE Anchor Bands for NR Band n12	LTE Band 2/66				
LTE Anchor Bands for NR Band n5 (Cell)	LTE Band 2/30/48/66				
LTE Anchor Bands for NR Band n66 (AWS)	LTE Band 2/5/12/13/14/30/48				
LTE Anchor Bands for NR Band n25 (PCS)	LTE Band 12/66				
LTE Anchor Bands for NR Band n2 (PCS)	LTE Band 5/12/13/14/30/48/66				
LTE Anchor Bands for NR Band n30	N/A				
LTE Anchor Bands for NR Band n41	LTE Band 2/12/25/41/66				
LTE Anchor Bands for NR Band n77	LTE Band 2/5/12/13/14/30/66				

FCC ID: A3LSMG998U		SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 19 of 51	

3 INTRODUCTION

The FCC and Innovation, Science, and Economic Development Canada have adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 and Health Canada Safety Code 6 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. [1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz [3] and Health Canada RF Exposure Guidelines Safety Code 6 [22]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

3.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 3-1).

Equation 3-1
SAR Mathematical Equation

$$SAR = \frac{d}{dt} \left(\frac{dU}{dm} \right) = \frac{d}{dt} \left(\frac{dU}{\rho dv} \right)$$

SAR is expressed in units of Watts per Kilogram (W/kg).

$$SAR = \frac{\sigma \cdot E^2}{\rho}$$

where:

- σ = conductivity of the tissue-simulating material (S/m)
- ρ = mass density of the tissue-simulating material (kg/m³)
- E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 20 of 51

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
 - a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
 - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

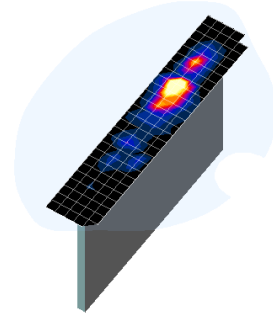


Figure 4-1
Sample SAR Area Scan

Table 4-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04*

Frequency	Maximum Area Scan Resolution (mm) ($\Delta x_{\text{area}}, \Delta y_{\text{area}}$)	Maximum Zoom Scan Resolution (mm) ($\Delta x_{\text{zoomTV}}, \Delta y_{\text{zoom}}$)	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid	Graded Grid		
				$\Delta z_{\text{zoom}}(n)$	$\Delta z_{\text{zoom}}(n-1)^*$	
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 22

*Also compliant to IEEE 1528-2013 Table 6

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 21 of 51

5.1 EAR REFERENCE POINT

Figure 5-2 shows the front, back and side views of the SAM Twin Phantom. The point “M” is the reference point for the center of the mouth, “LE” is the left ear reference point (ERP), and “RE” is the right ERP. The ERP is 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (see Figure 5-1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].

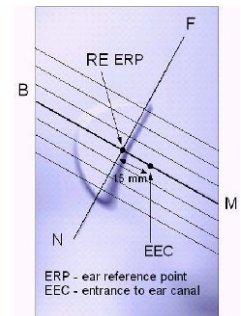


Figure 5-1
Close-Up Side view
of ERP

5.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the acoustic output located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (See Figure 5-3). The acoustic output was then located at the same level as the center of the ear reference point. The test device was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.

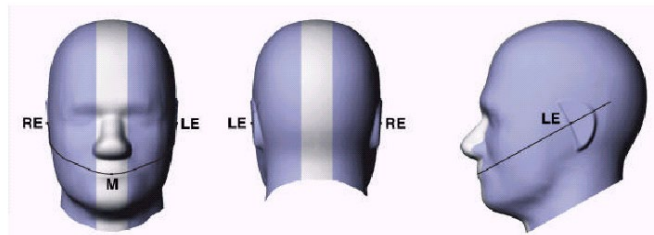


Figure 5-2
Front, back and side view of SAM Twin Phantom

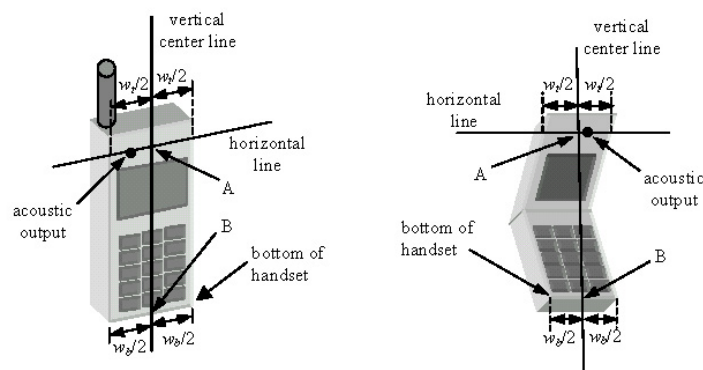


Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 22 of 51

6 TEST CONFIGURATION POSITIONS

6.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon = 3$ and loss tangent $\delta = 0.02$.

6.2 Positioning for Cheek

1. The test device was positioned with the device close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6-1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

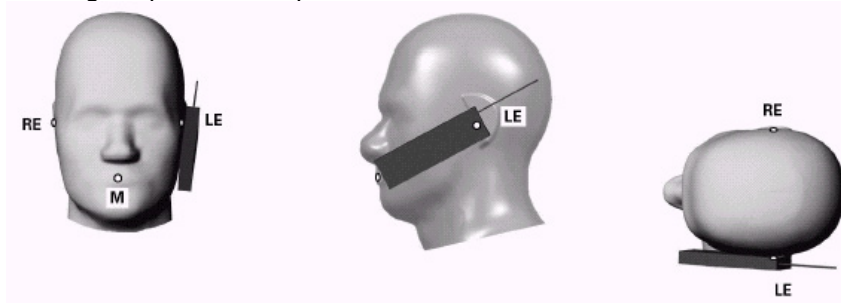


Figure 6-1 Front, Side and Top View of Cheek Position

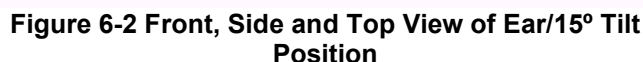
2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the pinna.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the reference plane.
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical with respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the device contact with the ear, the device was rotated about the NF line until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 6-2).

6.3 Positioning for Ear / 15° Tilt

With the test device aligned in the “Cheek Position”:

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degrees.
2. The phone was then rotated around the horizontal line by 15 degrees.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the handset touched the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. In this situation, the tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 6-2).

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 23 of 51



contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented.

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

6.6 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1g body and 10g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v06, Cell phones (handsets) are not normally designed to be used on extremities or operated in extremity only exposure conditions. The maximum output power levels of handsets generally do not require extremity SAR testing to show compliance. Therefore, extremity SAR was not evaluated for this device.

6.7 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v02r01 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) are based on a composite test separation distance of 10 mm from the front, back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

6.8 Phablet Configurations

For smart phones with a display diagonal dimension > 150 mm or an overall diagonal dimension > 160 mm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 25 of 51

support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna ≤ 25 mm from that surface or edge, in direct contact with the phantom, for 10g SAR. The UMPC mini-tablet 1g SAR at 5 mm is not required. When hotspot mode applies, 10g SAR is required only for the surfaces and edges with hotspot mode 1g SAR > 1.2 W/kg.

6.9 Proximity Sensor Considerations

This device uses a power reduction mechanism to reduce output powers in certain use conditions when the device is used close the user's body.

When the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum allowed output power. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, additional evaluation is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional test positions. Sensor triggering distance summary data is included in Appendix G.

The sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the sensor entirely covers the antennas.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 26 of 51	

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

7.2 Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table 7-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (W/kg) or (mW/g)
Peak Spatial Average SAR Head	1.6	8.0
Whole Body SAR	0.08	0.4
Peak Spatial Average SAR Hands, Feet, Ankle, Wrists, etc.	4.0	20

1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 27 of 51

8 FCC MEASUREMENT PROCEDURES

Power measurements for licensed transmitters are performed using a base station simulator under digital average power.

8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, when SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as *reported* SAR. The highest *reported* SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

8.2 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01v03r01 “3G SAR Measurement Procedures.”

The device is placed into a simulated call using a base station simulator in a RF shielded chamber. Establishing connections in this manner ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. Devices under test are evaluated prior to testing, with a fully charged battery and were configured to operate at maximum output power. In order to verify that the device is tested throughout the SAR test at maximum output power, the SAR measurement system measures a “point SAR” at an arbitrary reference point at the start and end of the 1 gram SAR evaluation, to assess for any power drifts during the evaluation. If the power drift deviates by more than 5%, the SAR test and drift measurements are repeated.

8.3 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r04 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

8.3.1 Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

8.3.2 MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

8.3.3 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 28 of 51

8.3.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

- a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
 - i. The required channel and offset combination with the highest maximum output power is required for SAR.
 - ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
 - iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
- b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
- c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
- d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to $\frac{1}{2}$ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/kg.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 29 of 51	

9 RF CONDUCTED POWERS

All conducted power measurements in this section were performed by setting *Reserve_power_margin* (Qualcomm® Smart Transmit EFS entry) to 0dB, so that the EUT transmits continuously at minimum (P_{limit} , maximum tune up output power P_{max}).

Note: Per FCC KDB Publication 941225 D05v02r05, LTE SAR for the lower bandwidths was not required for testing since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg. Lower bandwidth conducted powers for all LTE bands can be found in Appendix F.

9.1 LTE Conducted Powers

9.1.1 LTE Band 66 Antenna E

Table 9-1

LTE Band 66 (AWS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 20 MHz Bandwidth

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132072 (1720.0 MHz)	132322 (1745.0 MHz)	132572 (1770.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.12	22.98	23.33	0	0
	1	50	23.21	23.27	23.42		0
	1	99	23.05	23.16	23.26		0
	50	0	22.27	22.28	22.30	0-1	1
	50	25	22.28	22.33	22.50		1
	50	50	22.31	22.35	22.49		1
	100	0	22.10	22.28	22.48		1
16QAM	1	0	22.20	22.30	22.65	0-1	1
	1	50	22.50	22.43	22.43		1
	1	99	22.23	22.21	22.26		1
	50	0	21.30	21.35	21.31	0-2	2
	50	25	21.41	21.38	21.44		2
	50	50	21.26	21.44	21.41		2
	100	0	21.23	21.28	21.31		2
64QAM	1	0	21.17	21.10	21.25	0-2	2
	1	50	21.45	21.50	21.48		2
	1	99	21.11	21.37	21.50		2
	50	0	20.28	20.34	20.36	0-3	3
	50	25	20.47	20.44	20.46		3
	50	50	20.50	20.39	20.34		3
	100	0	20.38	20.31	20.40		3
256QAM	1	0	18.30	18.41	18.39	0-5	5
	1	50	18.25	18.39	18.44		5
	1	99	18.31	18.46	18.51		5
	50	0	18.28	18.41	18.45		5
	50	25	18.40	18.37	18.33		5
	50	50	18.32	18.39	18.56		5
	100	0	18.34	18.44	18.39		5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 30 of 51

Table 9-2

LTE Band 66 (AWS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) or DSI = 2 (Head) - 20 MHz Bandwidth

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132072 (1720.0 MHz)	132322 (1745.0 MHz)	132572 (1770.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	19.13	19.05	19.04	0	0
	1	50	19.23	19.45	19.16		0
	1	99	19.06	19.25	19.00		0
	50	0	19.30	19.24	19.28	0-1	0
	50	25	19.36	19.37	19.30		0
	50	50	19.18	19.22	19.33		0
	100	0	19.27	19.30	19.31		0
16QAM	1	0	19.32	19.42	19.57	0-1	0
	1	50	19.58	19.58	19.61		0
	1	99	19.30	19.62	19.42		0
	50	0	19.25	19.33	19.28	0-2	0
	50	25	19.45	19.47	19.46		0
	50	50	19.27	19.46	19.26		0
	100	0	19.20	19.38	19.48		0
64QAM	1	0	19.62	19.57	19.55	0-2	0
	1	50	19.53	19.43	19.44		0
	1	99	19.35	19.66	19.47		0
	50	0	19.31	19.33	19.33	0-3	0
	50	25	19.22	19.37	19.49		0
	50	50	19.33	19.41	19.36		0
	100	0	19.40	19.44	19.46		0
256QAM	1	0	18.34	18.31	18.32	0-5	1
	1	50	18.41	18.40	18.43		1
	1	99	18.25	18.28	18.28		1
	50	0	18.27	18.38	18.39		1
	50	25	18.28	18.39	18.33		1
	50	50	18.27	18.51	18.42		1
	100	0	18.34	18.40	18.34		1

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Approved by:
Quality Manager

Document S/N:

1M2102050006-01.A3L

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

Page 31 of 51

9.1.2

LTE Band 25 Antenna E

Table 9-3

LTE Band 25 (PCS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active) - 20 MHz Bandwidth

LTE Band 25 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26140 (1860.0 MHz)	26365 (1882.5 MHz)	26590 (1905.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.23	23.43	23.26	0	0
	1	50	23.21	23.36	23.23		0
	1	99	23.32	23.40	23.32		0
	50	0	22.91	22.78	22.87	0-1	1
	50	25	22.89	22.95	22.89		1
	50	50	22.79	22.88	22.83		1
16QAM	100	0	22.87	22.90	22.84	0-1	1
	1	0	23.07	23.01	23.05		1
	1	50	23.01	23.12	23.09		1
	1	99	23.09	23.27	23.04	0-2	1
	50	0	21.72	21.88	21.88		2
	50	25	21.86	21.83	21.89		2
64QAM	50	50	21.89	21.94	21.83	0-2	2
	100	0	21.73	21.81	21.82		2
	1	0	22.00	22.07	22.06		0-2
	1	50	22.13	22.02	22.06	2	
	1	99	22.10	21.92	21.97	2	
	256QAM	50	0	20.93	20.88	20.96	0-3
50		25	20.91	20.92	20.88	3	
50		50	20.87	21.00	20.79	3	
100		0	20.84	20.85	20.93	0-5	3
1		0	18.51	18.52	18.66		5
1		50	18.58	18.78	18.65		5
1	99	18.55	18.89	18.70	5		
50	0	18.63	18.71	18.63	5		
50	25	18.63	18.75	18.59	5		
256QAM	50	50	18.59	18.77	18.76	0-5	5
	100	0	18.60	18.64	18.71		5

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Approved by:
Quality Manager

Document S/N:

1M2102050006-01.A3L

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

Page 32 of 51

Table 9-4
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) - 20 MHz Bandwidth

LTE Band 25 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26140 (1860.0 MHz)	26365 (1882.5 MHz)	26590 (1905.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	19.24	19.25	19.29	0	0
	1	50	19.19	19.24	19.33		0
	1	99	19.32	19.26	19.30		0
	50	0	19.35	19.36	19.42	0-1	0
	50	25	19.41	19.31	19.28		0
	50	50	19.36	19.40	19.22		0
	100	0	19.30	19.27	19.32		0
16QAM	1	0	19.46	19.43	19.63	0-1	0
	1	50	19.55	19.52	19.42		0
	1	99	19.54	19.68	19.56		0
	50	0	19.28	19.27	19.26	0-2	0
	50	25	19.33	19.43	19.44		0
	50	50	19.50	19.31	19.45		0
	100	0	19.43	19.33	19.28		0
64QAM	1	0	19.40	19.55	19.56	0-2	0
	1	50	19.48	19.49	19.51		0
	1	99	19.55	19.54	19.61		0
	50	0	19.41	19.38	19.37	0-3	0
	50	25	19.40	19.49	19.44		0
	50	50	19.45	19.43	19.31		0
	100	0	19.32	19.33	19.49		0
256QAM	1	0	18.68	18.37	18.46	0-5	0.5
	1	50	18.55	18.86	18.42		0.5
	1	99	18.61	18.69	18.30		0.5
	50	0	18.48	18.39	18.43		0.5
	50	25	18.37	18.51	18.56		0.5
	50	50	18.51	18.55	18.52		0.5
	100	0	18.32	18.48	18.50		0.5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by:
Document S/N:	Test Dates:	DUT Type:		Quality Manager
1M2102050006-01.A3L	02/08/21 - 02/10/21	Portable Handset		Page 33 of 51

Table 9-5
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 2 (Head) - 20 MHz Bandwidth

LTE Band 25 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26140 (1860.0 MHz)	26365 (1882.5 MHz)	26590 (1905.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	17.72	17.56	17.54	0	0
	1	50	17.63	17.57	17.51		0
	1	99	17.70	17.65	17.50		0
	50	0	17.80	17.64	17.72	0-1	0
	50	25	17.72	17.75	17.73		0
	50	50	17.74	17.74	17.75		0
	100	0	17.69	17.64	17.65		0
16QAM	1	0	18.15	17.99	18.15	0-1	0
	1	50	18.16	18.04	18.11		0
	1	99	18.22	18.12	18.09		0
	50	0	17.71	17.59	17.72	0-2	0
	50	25	17.72	17.69	17.73		0
	50	50	17.75	17.74	17.85		0
	100	0	17.67	17.65	17.67		0
64QAM	1	0	17.93	17.79	18.22	0-2	0
	1	50	17.98	17.88	18.21		0
	1	99	18.09	17.98	18.22		0
	50	0	17.77	17.67	17.77	0-3	0
	50	25	17.79	17.78	17.78		0
	50	50	17.80	17.79	17.88		0
	100	0	17.65	17.67	17.65		0
256QAM	1	0	17.42	17.23	17.49	0-5	0
	1	50	17.87	17.63	17.90		0
	1	99	17.70	17.54	17.65		0
	50	0	17.63	17.55	17.64		0
	50	25	17.74	17.78	17.77		0
	50	50	17.70	17.72	17.84		0
	100	0	17.65	17.69	17.69		0

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 34 of 51

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (°C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ϵ	% dev σ	% dev ϵ
2/9/2021	1750 Head	21.5	1710	1.343	38.888	1.348	40.142	-0.37%	-3.12%
			1720	1.354	38.825	1.354	40.126	0.00%	-3.24%
			1745	1.382	38.679	1.368	40.087	1.02%	-3.51%
			1750	1.388	38.654	1.371	40.079	1.24%	-3.56%
			1770	1.411	38.563	1.383	40.047	2.02%	-3.71%
			1790	1.431	38.483	1.394	40.016	2.65%	-3.83%
2/10/2021	1900 Head	25.0	1850	1.349	40.225	1.400	40.000	-3.64%	0.56%
			1860	1.359	40.177	1.400	40.000	-2.93%	0.44%
			1880	1.381	40.098	1.400	40.000	-1.36%	0.24%
			1900	1.401	40.027	1.400	40.000	0.07%	0.07%
			1905	1.406	40.009	1.400	40.000	0.43%	0.02%
			1910	1.411	39.991	1.400	40.000	0.79%	-0.02%
2/9/2021	1750 Body	22.2	1950	1.450	39.822	1.400	40.000	3.57%	-0.44%
			1710	1.470	52.566	1.463	53.537	0.48%	-1.81%
			1720	1.481	52.520	1.469	53.511	0.82%	-1.85%
			1745	1.509	52.413	1.485	53.445	1.62%	-1.93%
			1750	1.515	52.393	1.488	53.432	1.81%	-1.94%
			1770	1.538	52.317	1.501	53.379	2.47%	-1.99%
2/8/2021	1900 Body	24.8	1790	1.560	52.253	1.514	53.326	3.04%	-2.01%
			1850	1.475	52.747	1.520	53.300	-2.96%	-1.04%
			1860	1.485	52.717	1.520	53.300	-2.30%	-1.09%
			1880	1.506	52.665	1.520	53.300	-0.92%	-1.19%
			1900	1.529	52.616	1.520	53.300	0.59%	-1.28%
			1905	1.534	52.604	1.520	53.300	0.92%	-1.31%
			1910	1.540	52.592	1.520	53.300	1.32%	-1.33%
			1950	1.582	52.481	1.520	53.300	4.08%	-1.54%

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 D01v01r04 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 35 of 51

10.2 Test System Verification

Prior to SAR assessment, the system is verified to $\pm 10\%$ of the SAR measurement on the reference dipole at the time of calibration by the calibration facility. Full system validation status and result summary can be found in Appendix D.

Table 10-2
System Verification Results – 1g

System Verification TARGET & MEASURED												
SAR System #	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Source SN	Probe SN	Measured SAR _{1g} (W/kg)	1 W Target SAR _{1g} (W/kg)	1 W Normalized SAR _{1g} (W/kg)	Deviation _{1g} (%)
P	1750	HEAD	02/09/2021	22.3	20.8	0.100	1148	7308	3.760	35.900	37.600	4.74%
P	1900	HEAD	02/10/2021	24.0	23.8	0.100	5d148	7308	3.840	39.100	38.400	-1.79%
I	1750	BODY	02/09/2021	21.1	21.0	0.100	1008	7551	3.790	37.400	37.900	1.34%
J	1900	BODY	02/08/2021	20.7	22.8	0.100	5d080	7410	3.810	39.200	38.100	-2.81%

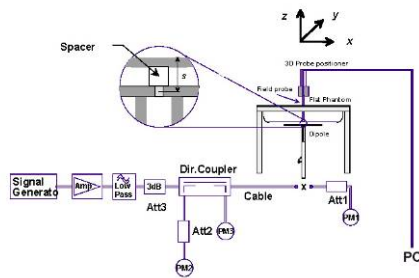


Figure 10-1
System Verification Setup Diagram



Figure 10-2
System Verification Setup Photo

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 36 of 51

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
LTE Band 66 (AWS) Antenna E Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #	
Mhz	Ch.														(W/kg)		(W/kg)		
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.45	0.01	0	Right	Cheek	QPSK	1	50	03524	1:1	0.634	1.135	0.720	
1720.00	132072	Low	LTE Band 66 (AWS)	20	20.0	19.36	0.00	0	Right	Cheek	QPSK	50	25	03524	1:1	0.547	1.159	0.634	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.37	-0.05	0	Right	Cheek	QPSK	50	25	03524	1:1	0.641	1.156	0.741	
1770.00	132572	High	LTE Band 66 (AWS)	20	20.0	19.33	-0.05	0	Right	Cheek	QPSK	50	50	03524	1:1	0.763	1.167	0.890	A1
1770.00	132572	High	LTE Band 66 (AWS)	20	20.0	19.31	-0.03	0	Right	Cheek	QPSK	100	0	03524	1:1	0.749	1.172	0.878	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.45	0.07	0	Right	Tilt	QPSK	1	50	03524	1:1	0.445	1.135	0.505	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.37	0.03	0	Right	Tilt	QPSK	50	25	03524	1:1	0.454	1.156	0.525	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.45	-0.01	0	Left	Cheek	QPSK	1	50	03524	1:1	0.426	1.135	0.484	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.37	0.02	0	Left	Cheek	QPSK	50	25	03524	1:1	0.428	1.156	0.495	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.45	0.08	0	Left	Tilt	QPSK	1	50	03524	1:1	0.513	1.135	0.582	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.37	-0.03	0	Left	Tilt	QPSK	50	25	03524	1:1	0.519	1.156	0.600	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

Table 11-2
LTE Band 25 (PCS) Antenna E Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
1860.00	26140	Low	LTE Band 25 (PCS)	20	18.5	17.72	0.01	0	Right	Cheek	QPSK	1	0	01071	1:1	0.604	1.197	0.723	A2
1860.00	26140	Low	LTE Band 25 (PCS)	20	18.5	17.80	-0.07	0	Right	Cheek	QPSK	50	0	01071	1:1	0.627	1.175	0.737	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	18.5	17.75	0.00	0	Right	Cheek	QPSK	50	25	01071	1:1	0.620	1.189	0.737	
1905.00	26590	High	LTE Band 25 (PCS)	20	18.5	17.75	0.00	0	Right	Cheek	QPSK	50	50	01071	1:1	0.623	1.189	0.741	
1860.00	26140	Low	LTE Band 25 (PCS)	20	18.5	17.72	0.04	0	Right	Tilt	QPSK	1	0	01071	1:1	0.395	1.197	0.473	
1860.00	26140	Low	LTE Band 25 (PCS)	20	18.5	17.80	0.01	0	Right	Tilt	QPSK	50	0	01071	1:1	0.413	1.175	0.485	
1860.00	26140	Low	LTE Band 25 (PCS)	20	18.5	17.72	0.09	0	Left	Cheek	QPSK	1	0	01071	1:1	0.364	1.197	0.436	
1860.00	26140	Low	LTE Band 25 (PCS)	20	18.5	17.80	0.13	0	Left	Cheek	QPSK	50	0	01071	1:1	0.381	1.175	0.448	
1860.00	26140	Low	LTE Band 25 (PCS)	20	18.5	17.72	0.03	0	Left	Tilt	QPSK	1	0	01071	1:1	0.348	1.197	0.417	
1860.00	26140	Low	LTE Band 25 (PCS)	20	18.5	17.80	-0.03	0	Left	Tilt	QPSK	50	0	01071	1:1	0.351	1.175	0.412	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram										

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 37 of 51

11.1 Standalone Body-Worn SAR Data

Table 11-3
LTE Antenna E Body-Worn SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
1770.00	132572	High	LTE Band 66 (AWS)	20	24.0	23.42	0.07	0	32682	QPSK	1	50	15 mm	back	1:1	0.106	1.143	0.121	A3
1770.00	132572	High	LTE Band 66 (AWS)	20	23.0	22.50	0.04	1	32682	QPSK	50	25	15 mm	back	1:1	0.086	1.122	0.096	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	24.5	23.43	-0.17	0	01071	QPSK	1	0	15 mm	back	1:1	0.209	1.279	0.267	A5
1882.50	26365	Mid	LTE Band 25 (PCS)	20	23.5	22.95	-0.02	1	01071	QPSK	50	25	15 mm	back	1:1	0.169	1.135	0.192	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT																			
Spatial Peak									Body										
Uncontrolled Exposure/General Population									1.6 W/kg (mW/g)										
									averaged over 1 gram										

11.2 Standalone Hotspot SAR Data

Table 11-4
LTE Band 66 (AWS) Antenna E Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.45	0.06	0	33524	QPSK	1	50	10 mm	back	1:1	0.075	1.135	0.085	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.37	0.08	0	33524	QPSK	50	25	10 mm	back	1:1	0.076	1.156	0.088	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.45	-0.01	0	33524	QPSK	1	50	10 mm	front	1:1	0.105	1.135	0.119	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.37	0.00	0	33524	QPSK	50	25	10 mm	front	1:1	0.107	1.156	0.124	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.45	0.01	0	33524	QPSK	1	50	10 mm	top	1:1	0.179	1.135	0.203	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.37	0.00	0	33524	QPSK	50	25	10 mm	top	1:1	0.182	1.156	0.210	A4
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.45	0.04	0	33524	QPSK	1	50	10 mm	left	1:1	0.082	1.135	0.093	
1745.00	132322	Mid	LTE Band 66 (AWS)	20	20.0	19.37	-0.05	0	33524	QPSK	50	25	10 mm	left	1:1	0.083	1.156	0.096	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT								Body											
Spatial Peak								1.6 W/kg (mW/g)											
Uncontrolled Exposure/General Population								averaged over 1 gram											

Table 11-5
LTE Band 25 (PCS) Antenna E Hotspot SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #	
MHz	Ch.														(W/kg)		(W/kg)		
1905.00	26590	High	LTE Band 25 (PCS)	20	20.0	19.33	0.03	0	01071	QPSK	1	50	10 mm	back	1:1	0.143	1.167	0.167	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.0	19.42	0.07	0	01071	QPSK	50	0	10 mm	back	1:1	0.148	1.143	0.169	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.0	19.33	0.09	0	01071	QPSK	1	50	10 mm	front	1:1	0.168	1.167	0.196	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.0	19.42	0.09	0	01071	QPSK	50	0	10 mm	front	1:1	0.166	1.143	0.190	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.0	19.33	0.09	0	01071	QPSK	1	50	10 mm	top	1:1	0.176	1.167	0.205	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.0	19.42	0.07	0	01071	QPSK	50	0	10 mm	top	1:1	0.180	1.143	0.206	A6
1905.00	26590	High	LTE Band 25 (PCS)	20	20.0	19.33	-0.04	0	01071	QPSK	1	50	10 mm	left	1:1	0.124	1.167	0.145	
1905.00	26590	High	LTE Band 25 (PCS)	20	20.0	19.42	0.01	0	01071	QPSK	50	0	10 mm	left	1:1	0.135	1.143	0.154	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT																			
Spatial Peak								Body											
Uncontrolled Exposure/General Population								1.6 W/kg (mW/g)											
								averaged over 1 gram											

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 38 of 51

11.3 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB Publication 865664 D01v01r04, variability SAR tests were not required since measured SAR results for all frequency bands were less than 0.8 W/kg.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is > 160 mm and < 200 mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.
11. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the 1g thresholds for the equivalent test cases.
12. This device uses Qualcomm Smart Transmit for 2G/3G/4G/5G operations to control and manage transmitting power in real time to ensure RF Exposure compliance. Per FCC Guidance, compliance was assessed at the minimum of the time averaged power and the maximum output power for each band/mode/exposure condition (DSI).

LTE Notes:

1. LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 8.3.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 and MCC=001 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per KDB Publication 941225 D05Av01r02, SAR for downlink only LTE CA operations was not needed since the maximum average output power in LTE CA mode was not > 0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 39 of 51

12 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

12.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

Please see the original compliance evaluation in RF Exposure Technical Report S/N: 1M2009230152-01-R2.A3L for the standalone reported SAR for modes and bands not evaluated for this permissive change.

12.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D01v06 4.3.2 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1g SAR for all the simultaneous transmitting antennas in a specific physical test configuration is ≤ 1.6 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g or 10g SAR.

Per FCC KDB Publication 941225 D06v02r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR (“-”).

Qualcomm Smart Transmit algorithm in WWAN adds directly the time-averaged RF exposure from 4G and time-averaged RF exposure from 5G NR. Smart Transmit algorithm controls the total RF exposure from both 4G and 5G NR to not exceed FCC limit. Therefore, simultaneous transmission compliance between 4G+5G operations is demonstrated in the Part 2 Report during algorithm validation.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 40 of 51	

12.3 Head SAR Simultaneous Transmission Analysis

Table 12-1
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Held to Ear)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO at 19 dBm SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	1+2	1+3	1+4
Head SAR	LTE Band 66 (AWS) Antenna E	0.890	0.127	0.307	0.400	1.017	1.197	1.290
	LTE Band 25 (PCS) Antenna E	0.741	0.127	0.307	0.400	0.868	1.048	1.141

Table 12-2
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Held to Ear)

Configuration	Mode	4G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	LTE Band 66 (AWS) Antenna E	0.890	0.146	1.036
	LTE Band 25 (PCS) Antenna E	0.741	0.146	0.887

Table 12-3
Simultaneous Transmission Scenario with 6 GHz WLAN MIMO (Held to Ear)

Configuration	Mode	4G SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	LTE Band 66 (AWS) Antenna E	0.890	0.023	0.913
	LTE Band 25 (PCS) Antenna E	0.741	0.023	0.764

Table 12-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN and 5 GHz WLAN MIMO (Held to Ear)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO at 16 dBm SAR (W/kg)	5 GHz WLAN MIMO SAR at 16 dBm (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	5	1+2+5	1+3+5	1+4+5
Head SAR	LTE Band 66 (AWS) Antenna E	0.890	0.127	0.307	0.166	0.146	1.163	1.343	1.202
	LTE Band 25 (PCS) Antenna E	0.741	0.127	0.307	0.166	0.146	1.014	1.194	1.053

Table 12-5
Simultaneous Transmission Scenario with 2.4 GHz WLAN and 6 GHz WLAN MIMO (Held to Ear)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO at 16 dBm SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	5	1+2+5	1+3+5	1+4+5
Head SAR	LTE Band 66 (AWS) Antenna E	0.890	0.127	0.307	0.166	0.023	1.040	1.220	1.079
	LTE Band 25 (PCS) Antenna E	0.741	0.127	0.307	0.166	0.023	0.891	1.071	0.930

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 41 of 51	

Table 12-6
Simultaneous Transmission Scenario with Bluetooth (Held to Ear)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	LTE Band 66 (AWS) Antenna E	0.890	0.027	0.142	0.917	1.032	1.059
	LTE Band 25 (PCS) Antenna E	0.741	0.027	0.142	0.768	0.883	0.910

Table 12-7
Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN MIMO (Held to Ear)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR at 16 dBm (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	1+2+4	1+3+4	1+2+3+4
Head SAR	LTE Band 66 (AWS) Antenna E	0.890	0.027	0.142	0.146	1.063	1.178	1.205
	LTE Band 25 (PCS) Antenna E	0.741	0.027	0.142	0.146	0.914	1.029	1.056

Table 12-8
Simultaneous Transmission Scenario with Bluetooth and 6 GHz WLAN MIMO (Held to Ear)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	1+2+4	1+3+4	1+2+3+4
Head SAR	LTE Band 66 (AWS) Antenna E	0.890	0.027	0.142	0.023	0.940	1.055	1.082
	LTE Band 25 (PCS) Antenna E	0.741	0.027	0.142	0.023	0.791	0.906	0.933

12.4 Body-Worn Simultaneous Transmission Analysis

Table 12-9
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Body-Worn at 1.5 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn SAR	LTE Band 66 (AWS) Antenna E	0.121	0.209	0.134	0.330	0.255	0.464
	LTE Band 25 (PCS) Antenna E	0.267	0.209	0.134	0.476	0.401	0.610

Table 12-10
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Configuration	Mode	4G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn SAR	LTE Band 66 (AWS) Antenna E	0.121	0.472	0.593
	LTE Band 25 (PCS) Antenna E	0.267	0.472	0.739

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 42 of 51	

Table 12-11
Simultaneous Transmission Scenario with 6 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Configuration	Mode	4G SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body-Worn SAR	LTE Band 66 (AWS) Antenna E	0.121	0.061	0.182
	LTE Band 25 (PCS) Antenna E	0.267	0.061	0.328

Table 12-12
Simultaneous Transmission Scenario with 2.4 GHz WLAN and 5 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO at 19 dBm SAR (W/kg)	5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	5	1+2+5	1+3+5	1+4+5
Body-Worn SAR	LTE Band 66 (AWS) Antenna E	0.121	0.209	0.134	0.074	0.110	0.440	0.365	0.305
	LTE Band 25 (PCS) Antenna E	0.267	0.209	0.134	0.074	0.110	0.586	0.511	0.451

Table 12-13
Simultaneous Transmission Scenario with 2.4 GHz WLAN and 6 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO at 19 dBm SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	5	1+2+5	1+3+5	1+4+5
Body-Worn SAR	LTE Band 66 (AWS) Antenna E	0.121	0.209	0.134	0.074	0.061	0.391	0.316	0.256
	LTE Band 25 (PCS) Antenna E	0.267	0.209	0.134	0.074	0.061	0.537	0.462	0.402

Table 12-14
Simultaneous Transmission Scenario with Bluetooth (Body-Worn at 1.5 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body-Worn SAR	LTE Band 66 (AWS) Antenna E	0.121	0.046	0.012	0.167	0.133	0.179
	LTE Band 25 (PCS) Antenna E	0.267	0.046	0.012	0.313	0.279	0.325

Table 12-15
Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	1+2+4	1+3+4	1+2+3+4
Body-Worn SAR	LTE Band 66 (AWS) Antenna E	0.121	0.046	0.012	0.472	0.639	0.605	0.651
	LTE Band 25 (PCS) Antenna E	0.267	0.046	0.012	0.472	0.785	0.751	0.797

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 43 of 51

Table 12-16
Simultaneous Transmission Scenario with Bluetooth and 6 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	6 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	1+2+4	1+3+4	1+2+3+4
Body-Worn SAR	LTE Band 66 (AWS) Antenna E	0.121	0.046	0.012	0.061	0.228	0.194	0.240
	LTE Band 25 (PCS) Antenna E	0.267	0.046	0.012	0.061	0.374	0.340	0.386

12.5 Hotspot SAR Simultaneous Transmission Analysis

Table 12-17
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Hotspot at 1.0 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Hotspot SAR	LTE Band 66 (AWS) Antenna E	0.210	0.454	0.458	0.664	0.668	1.122
	LTE Band 25 (PCS) Antenna E	0.206	0.454	0.458	0.660	0.664	1.118

Table 12-18
Simultaneous Transmission Scenario with 5 GHz WLAN MIMO (Hotspot at 1.0 cm)

Configuration	Mode	4G SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Hotspot SAR	LTE Band 66 (AWS) Antenna E	0.210	0.492	0.702
	LTE Band 25 (PCS) Antenna E	0.206	0.492	0.698

Table 12-19
Simultaneous Transmission Scenario with 2.4 GHz WLAN and 5 GHz WLAN MIMO (Hotspot at 1.0 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	2.4 GHz WLAN MIMO at 19 dBm SAR (W/kg)	5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	5	1+2+5	1+3+5	1+4+5
Hotspot SAR	LTE Band 66 (AWS) Antenna E	0.210	0.454	0.458	0.182	0.174	0.838	0.842	0.566
	LTE Band 25 (PCS) Antenna E	0.206	0.454	0.458	0.182	0.174	0.834	0.838	0.562

FCC ID: A3LSMG998U	 PCTEST Proud to be part of  element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	Page 44 of 51	

Table 12-20
Simultaneous Transmission Scenario with Bluetooth (Hotspot at 1.0 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Hotspot SAR	LTE Band 66 (AWS) Antenna E	0.210	0.122	0.064	0.332	0.274	0.396
	LTE Band 25 (PCS) Antenna E	0.206	0.122	0.064	0.328	0.270	0.392

Table 12-21
Simultaneous Transmission Scenario with Bluetooth and 5 GHz WLAN MIMO (Hotspot at 1.0 cm)

Configuration	Mode	4G SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	4	1+2+4	1+3+4	1+2+3+4
Hotspot SAR	LTE Band 66 (AWS) Antenna E	0.210	0.122	0.064	0.492	0.824	0.766	0.888
	LTE Band 25 (PCS) Antenna E	0.206	0.122	0.064	0.492	0.820	0.762	0.884

12.6 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528-2013 Section 6.3.4.1.2.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 45 of 51

13 SAR MEASUREMENT VARIABILITY

13.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, variability SAR tests were not required since measured SAR results for all frequency bands were less than 0.8 W/kg

13.2 Measurement Uncertainty

The measured SAR was <1.5 W/kg for 1g and <3.75 W/kg for 10g for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis per IEEE 1528-2013 was not required.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 46 of 51

14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	85033E	3.5mm Standard Calibration Kit	6/6/2020	Annual	6/6/2021	MY53402352
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8753ES	Network Analyzer	3/5/2020	Annual	3/5/2021	MY40001472
Agilent	8753ES	S-Parameter Network Analyzer	9/16/2020	Annual	9/16/2021	MY40000670
Agilent	E4438C	ESG Vector Signal Generator	3/8/2019	Biennial	3/8/2021	MY42082385
Agilent	E5515C	Wireless Communications Test Set	2/26/2020	Annual	2/26/2021	GB44400860
Agilent	N5182A	MXG Vector Signal Generator	2/19/2020	Annual	2/19/2021	MY47420651
Agilent	N9020A	MXA Signal Analyzer	3/26/2020	Annual	3/26/2021	MY56470202
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Anritsu	MA24106A	USB Power Sensor	9/15/2020	Annual	9/15/2021	1244515
Anritsu	MA2411B	Pulse Power Sensor	9/22/2020	Annual	9/22/2021	1315051
Anritsu	ML2495A	Power Meter	11/3/2020	Annual	11/3/2021	1039008
Anritsu	ML2496A	Power Meter	3/23/2020	Annual	3/23/2021	1351001
Control Company	4040	Therm./ Clock/ Humidity Monitor	2/17/2020	Biennial	2/17/2022	200113269
Control Company	4352	Long Stem Thermometer	6/26/2019	Biennial	6/26/2021	192282744
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
KEYSIGHT	E4438C	VECTOR SIGNAL GENERATOR	6/22/2020	Annual	6/22/2021	MY45092078
Keysight Technologies	AT/N6705B	DC Power Supply	N/A	N/A	N/A	MY53001315
Keysight Technologies	N6705B	DC Power Analyzer	4/27/2019	Biennial	4/27/2021	MY53004059
Keysight Technologies	U3401A	Digital Multimeter	5/14/2020	Biennial	5/14/2022	MY57201470
Insize	1108-150	Digital Caliper	1/17/2020	Biennial	1/17/2022	409193536
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/12/2020	Annual	5/12/2021	1070
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Pasternack	NC-100	Torque Wrench	8/4/2020	Biennial	8/4/2022	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMW500	Radio Communication Tester	11/4/2020	Annual	11/4/2021	100976
Rohde & Schwarz	CMW500	Radio Communication Tester	4/2/2019	Biennial	4/2/2021	103962
Rohde & Schwarz	CMW500	Radio Communication Tester	10/16/2020	Annual	10/16/2021	106578
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	9/29/2020	Annual	9/29/2021	101307
SPEAG	D1750V2	1750 MHz SAR Dipole	5/12/2020	Annual	5/12/2021	1148
SPEAG	D1900V2	1900 MHz SAR Dipole	2/21/2019	Biennial	2/21/2021	5d148
SPEAG	D1765V2	1765 MHz SAR Dipole	5/23/2018	Triennial	5/23/2021	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	10/23/2018	Triennial	10/23/2021	5d080
SPEAG	EX3DV4	SAR Probe	7/31/2020	Annual	7/31/2021	7308
SPEAG	EX3DV4	SAR Probe	10/20/2020	Annual	10/20/2021	7551
SPEAG	EX3DV4	SAR Probe	7/20/2020	Annual	7/20/2021	7410
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/11/2020	Annual	8/11/2021	1450
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/16/2020	Annual	10/16/2021	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/15/2020	Annual	7/15/2021	1322

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 47 of 51

15 MEASUREMENT UNCERTAINTIES

a	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System								
Probe Calibration	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	2.0	R	1.73	1.0	1.0	1.2	1.2	∞
Linearity	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	0.25	R	1.73	1.0	1.0	0.1	0.1	∞
Readout Electronics	0.3	N	1	1.0	1.0	0.3	0.3	∞
Response Time	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions - Noise	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
RF Ambient Conditions - Reflections	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	6.7	R	1.73	1.0	1.0	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Test Sample Related								
Test Sample Positioning	2.7	N	1	1.0	1.0	2.7	2.7	35
Device Holder Uncertainty	1.67	N	1	1.0	1.0	1.7	1.7	5
Output Power Variation - SAR drift measurement	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
SAR Scaling	0.0	R	1.73	1.0	1.0	0.0	0.0	∞
Phantom & Tissue Parameters								
Phantom Uncertainty (Shape & Thickness tolerances)	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	4.2	N	1	0.78	0.71	3.3	3.0	10
Liquid Permittivity - measurement uncertainty	4.1	N	1	0.23	0.26	1.0	1.1	10
Liquid Conductivity - Temperature Uncertainty	3.4	R	1.73	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Uncertainty	0.6	R	1.73	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)	RSS					11.5	11.3	60
Expanded Uncertainty (95% CONFIDENCE LEVEL)	k=2					23.0	22.6	

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 48 of 51

16 CONCLUSION

16.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Innovation, Science, and Economic Development Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 49 of 51

17 REFERENCES

- [1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.
- [2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.
- [3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.
- [4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.
- [5] IEEE Standards Coordinating Committee 39 –Standards Coordinating Committee 34 – IEEE Std. 1528-2013, IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.
- [6] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.
- [7] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.
- [8] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 1 -124.
- [9] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.
- [10] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.
- [11] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.
- [12] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.
- [13] G. Hartsgrrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.
- [14] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.
- [15] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.
- [16] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.
- [17] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 50 of 51

- [18] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.
- [19] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hochschule Zürich, Dosimetric Evaluation of the Cellular Phone.
- [20] IEC 62209-1, Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz), July 2016.
- [21] Innovation, Science, Economic Development Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 5, March 2015.
- [22] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2015
- [23] FCC SAR Test Procedures for 2G-3G Devices, Mobile Hotspot and UMPC Devices KDB Publications 941225, D01-D07
- [24] SAR Measurement Guidance for IEEE 802.11 Transmitters, KDB Publication 248227 D01
- [25] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D03-D04
- [26] FCC SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers, FCC KDB Publication 616217 D04
- [27] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02
- [28] FCC General RF Exposure Guidance and SAR Procedures for Dongles, KDB Publication 447498, D01-D02
- [29] Anexo à Resolução No. 533, de 10 de Setembro de 2009.
- [30] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element		SAR EVALUATION REPORT 		Approved by: Quality Manager
Document S/N: 1M2102050006-01.A3L	Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset		Page 51 of 51	

APPENDIX A: SAR TEST DATA

PCTEST

DUT: A3LSMG998U; Type: Portable Handset; Serial: 03524

Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1

Medium: 1750 Head; Medium parameters used:

$f = 1770 \text{ MHz}$; $\sigma = 1.411 \text{ S/m}$; $\epsilon_r = 38.563$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 02/09/2021; Ambient Temp: 22.3°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7308; ConvF(8.55, 8.55, 8.55) @ 1770 MHz; Calibrated: 7/31/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1450; Calibrated: 8/11/2020

Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 66 (AWS), Right Head, Cheek, High.ch
20 MHz Bandwidth, QPSK, 50 RB, 50 RB Offset

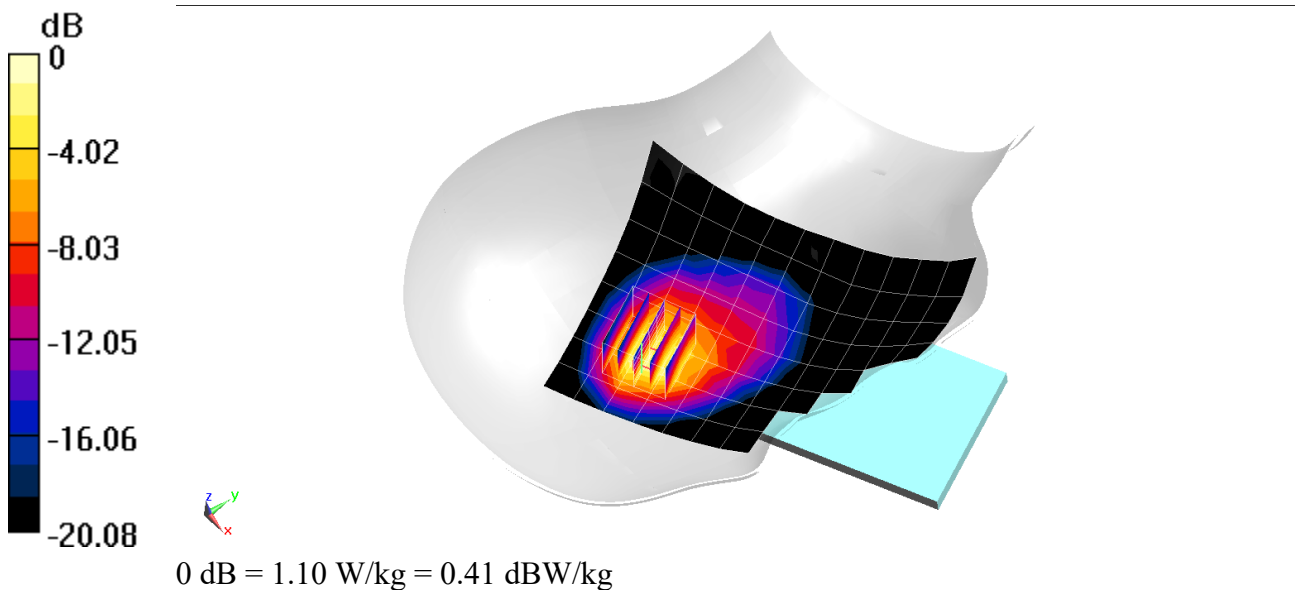
Area Scan (9x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 24.75 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.763 W/kg



PCTEST

DUT: A3LSMG998U; Type: Portable Handset; Serial: 01071

Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1860 MHz; Duty Cycle: 1:1

Medium: 1900 Head; Medium parameters used:

$f = 1860 \text{ MHz}$; $\sigma = 1.359 \text{ S/m}$; $\epsilon_r = 40.177$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Test Date: 02/10/2021; Ambient Temp: 24.0°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN7308; ConvF(8.2, 8.2, 8.2) @ 1860 MHz; Calibrated: 7/31/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1450; Calibrated: 8/11/2020

Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 25 (PCS), Right Head, Cheek, Low.ch
20 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset

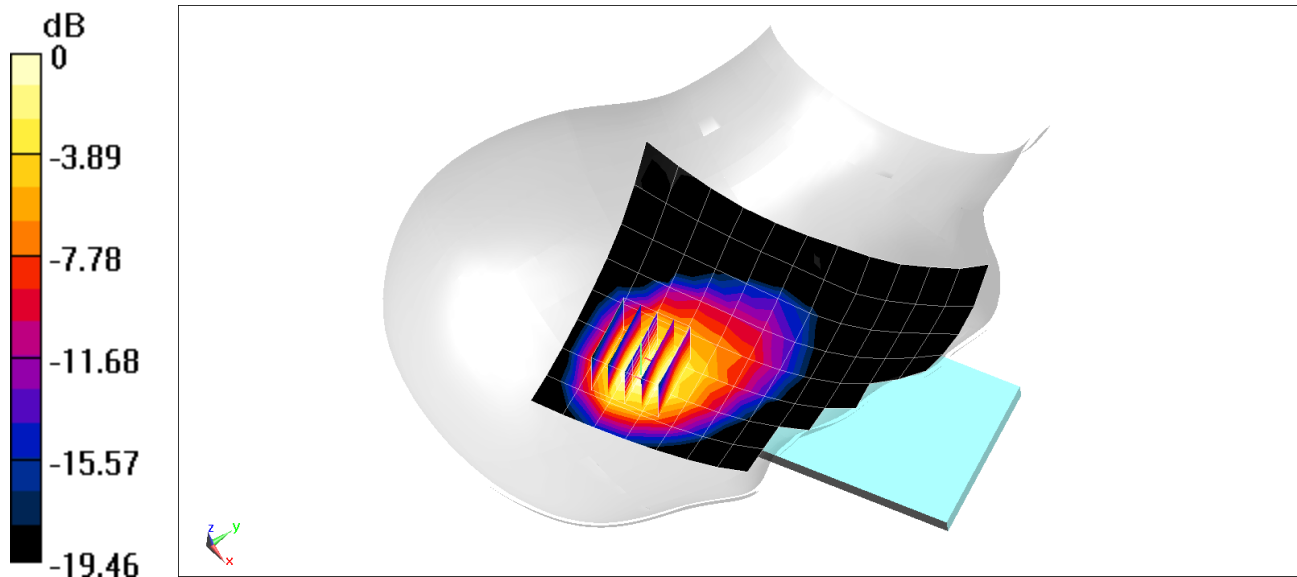
Area Scan (9x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 23.46 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.627 W/kg



0 dB = 0.880 W/kg = -0.56 dBW/kg

PCTEST

DUT: A3LSMG998U; Type: Portable Handset; Serial: 32682

Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1770 MHz; Duty Cycle: 1:1

Medium: 1750 Body; Medium parameters used:

$f = 1770 \text{ MHz}$; $\sigma = 1.538 \text{ S/m}$; $\epsilon_r = 52.317$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02/09/2021; Ambient Temp: 21.1°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7551; ConvF(8.32, 8.32, 8.32) @ 1770 MHz; Calibrated: 10/20/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 10/16/2020

Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 66 (AWS), Body SAR, Back side, High.ch
20 MHz Bandwidth, QPSK, 1 RB, 50 RB Offset

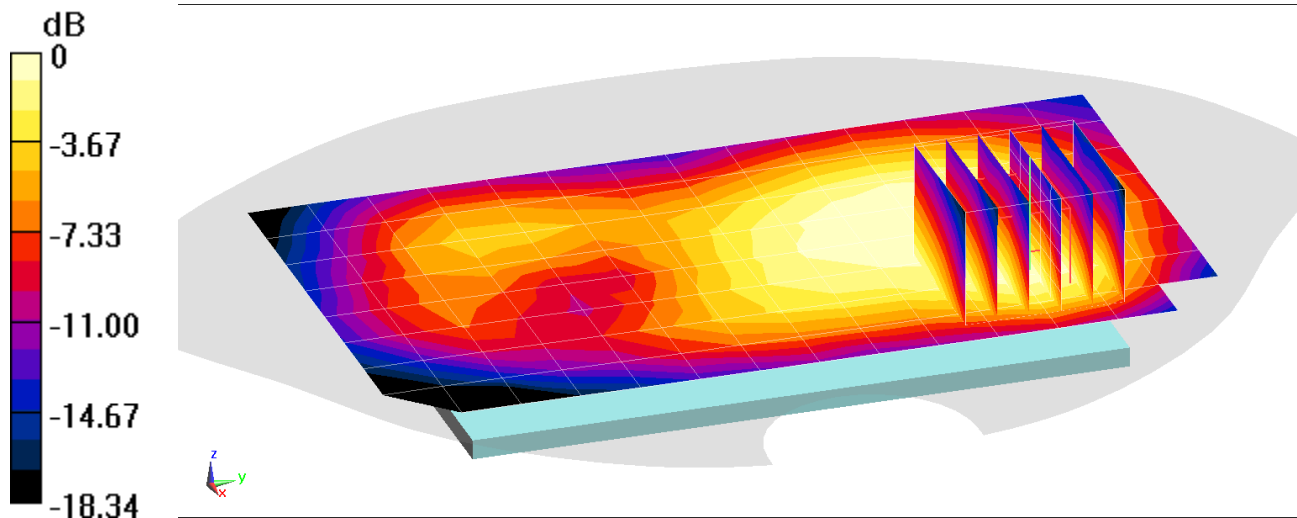
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.836 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.189 W/kg

SAR(1 g) = 0.106 W/kg



0 dB = 0.154 W/kg = -8.12 dBW/kg

PCTEST

DUT: A3LSMG998U; Type: Portable Handset; Serial: 33524

Communication System: UID 0, LTE Band 66 (AWS); Frequency: 1745 MHz; Duty Cycle: 1:1

Medium: 1750 Body; Medium parameters used:

$f = 1745 \text{ MHz}$; $\sigma = 1.509 \text{ S/m}$; $\epsilon_r = 52.413$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02/09/2021; Ambient Temp: 21.1°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7551; ConvF(8.32, 8.32, 8.32) @ 1745 MHz; Calibrated: 10/20/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 10/16/2020

Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 66 (AWS), Body SAR, Top Edge, Mid.ch
20 MHz Bandwidth, QPSK, 50 RB, 25 RB Offset

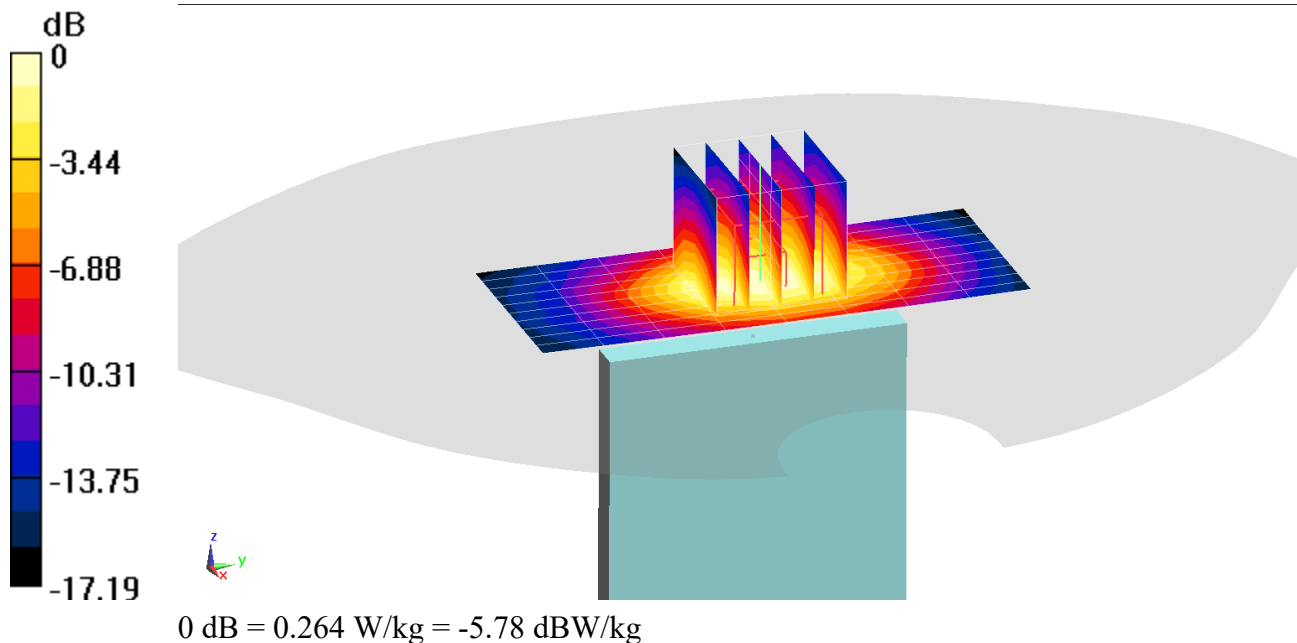
Area Scan (11x9x1): Measurement grid: $dx=5\text{mm}$, $dy=15\text{mm}$

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.37 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.313 W/kg

SAR(1 g) = 0.182 W/kg



PCTEST

DUT: A3LSMG998U; Type: Portable Handset; Serial: 01071

Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used (interpolated):

$f = 1882.5 \text{ MHz}$; $\sigma = 1.509 \text{ S/m}$; $\epsilon_r = 52.659$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.5 cm

Test Date: 02/08/2021; Ambient Temp: 20.7°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN7410; ConvF(7.76, 7.76, 7.76) @ 1882.5 MHz; Calibrated: 7/20/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 7/15/2020

Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 25 (PCS), Body SAR, Back side, Mid.ch
20 MHz Bandwidth, QPSK, 1 RB, 0 RB Offset

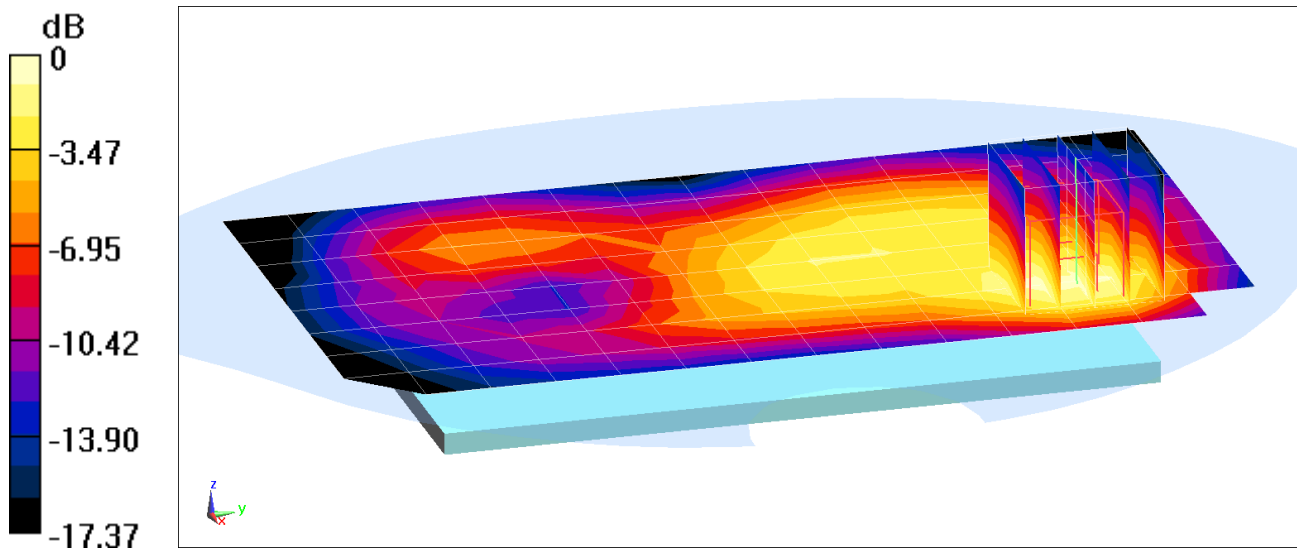
Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.44 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 0.350 W/kg

SAR(1 g) = 0.209 W/kg



0 dB = 0.298 W/kg = -5.26 dBW/kg

PCTEST

DUT: A3LSMG998U; Type: Portable Handset; Serial: 01071

Communication System: UID 0, LTE Band 25 (PCS); Frequency: 1905 MHz; Duty Cycle: 1:1

Medium: 1900 Body; Medium parameters used:

$f = 1905 \text{ MHz}$; $\sigma = 1.534 \text{ S/m}$; $\epsilon_r = 52.604$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02/08/2021; Ambient Temp: 20.7°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN7410; ConvF(7.76, 7.76, 7.76) @ 1905 MHz; Calibrated: 7/20/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 7/15/2020

Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 25 (PCS), Body SAR, Top Edge, High.ch
20 MHz Bandwidth, QPSK, 50 RB, 0 RB Offset

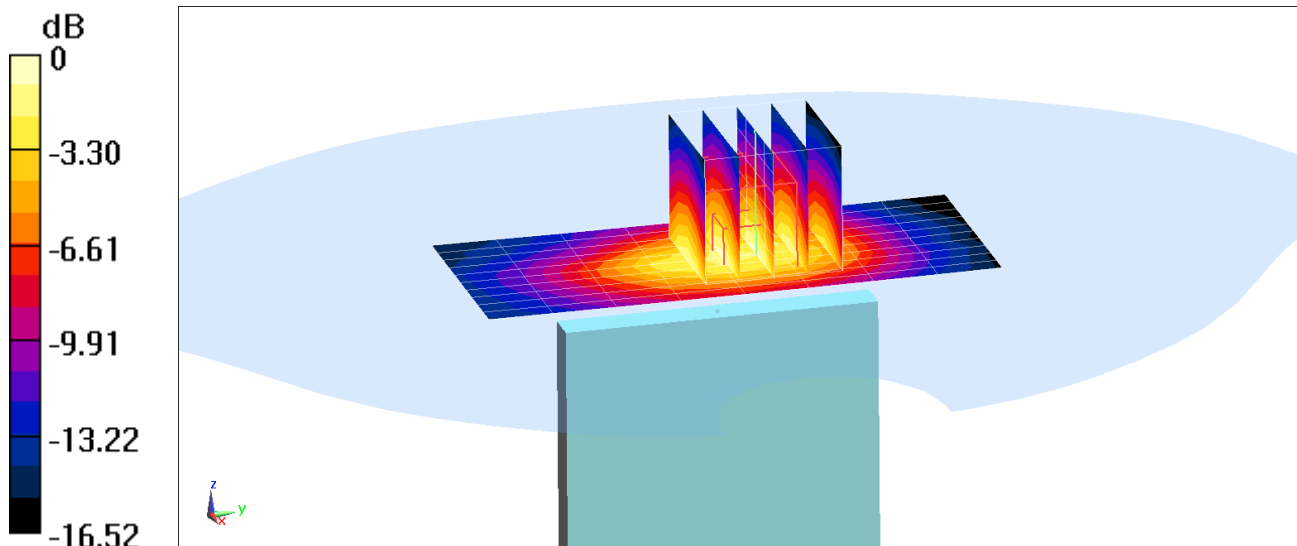
Area Scan (11x9x1): Measurement grid: dx=5mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.30 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.304 W/kg

SAR(1 g) = 0.180 W/kg



0 dB = 0.370 W/kg = -4.32 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1148

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Head Medium parameters used:

$f = 1750 \text{ MHz}$; $\sigma = 1.388 \text{ S/m}$; $\epsilon_r = 38.654$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02/09/2021; Ambient Temp: 22.3°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN7308; ConvF(8.55, 8.55, 8.55) @ 1750 MHz; Calibrated: 7/31/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1450; Calibrated: 8/11/2020

Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

1750 MHz System Verification at 20.0 dBm (100 mW)

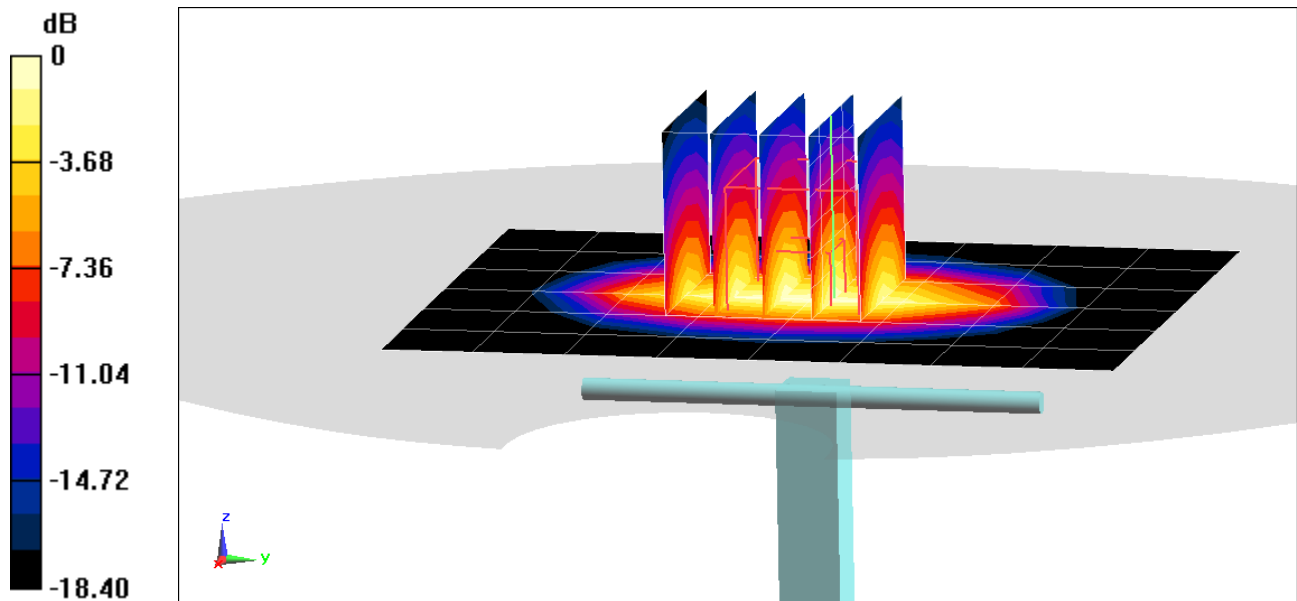
Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Peak SAR (extrapolated) = 7.45 W/kg

SAR(1 g) = 3.76 W/kg

Deviation(1 g) = 4.74%



PCTEST

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d148

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Head Medium parameters used:

$f = 1900 \text{ MHz}$; $\sigma = 1.401 \text{ S/m}$; $\epsilon_r = 40.027$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02/10/2021; Ambient Temp: 24.0°C; Tissue Temp: 23.8°C

Probe: EX3DV4 - SN7308; ConvF(8.2, 8.2, 8.2) @ 1900 MHz; Calibrated: 7/31/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1450; Calibrated: 8/11/2020

Phantom: Twin-SAM V5.0; Type: QD 000 P40 CD; Serial: 1792

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

1900 MHz System Verification at 20.0 dBm (100 mW)

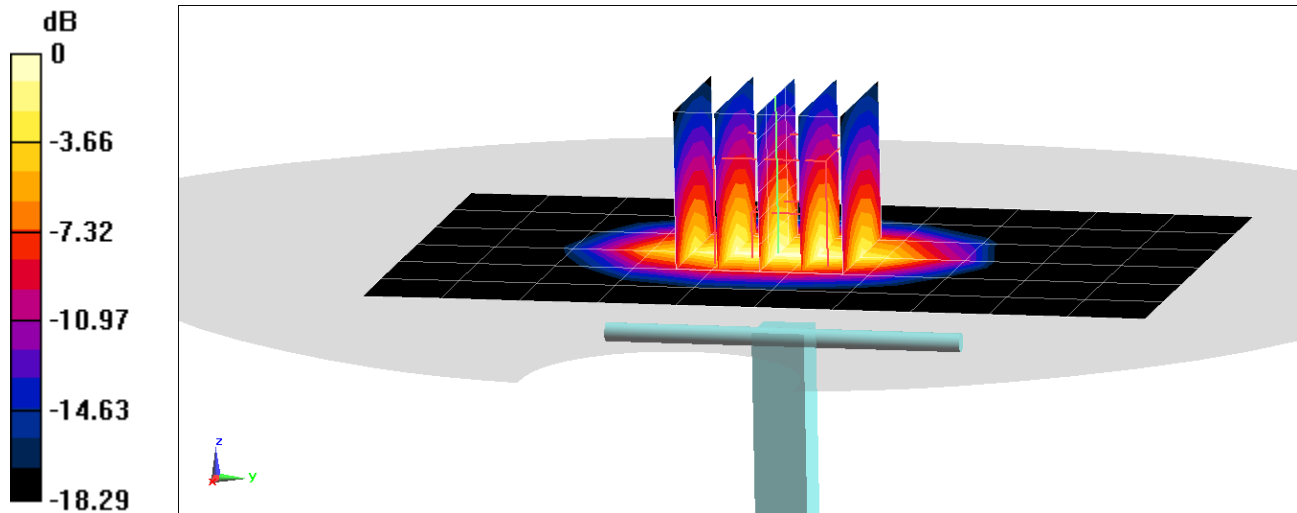
Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Peak SAR (extrapolated) = 7.49 W/kg

SAR(1 g) = 3.84 W/kg

Deviation(1 g) = -1.79%



0 dB = 6.13 W/kg = 7.87 dBW/kg

PCTEST

DUT: Dipole 1750 MHz; Type: D1765V2; Serial: 1008

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium: 1750 Body Medium parameters used:

$f = 1750$ MHz; $\sigma = 1.515$ S/m; $\epsilon_r = 52.393$; $\rho = 1000$ kg/m³

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02/09/2021; Ambient Temp: 21.1°C; Tissue Temp: 21.0°C

Probe: EX3DV4 - SN7551; ConvF(8.32, 8.32, 8.32) @ 1750 MHz; Calibrated: 10/20/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1333; Calibrated: 10/16/2020

Phantom: Right Back Twin-SAM V5.0 (30); Type: QD 000 P40 CD; Serial: 1692

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

1750 MHz System Verification at 20.0 dBm (100 mW)

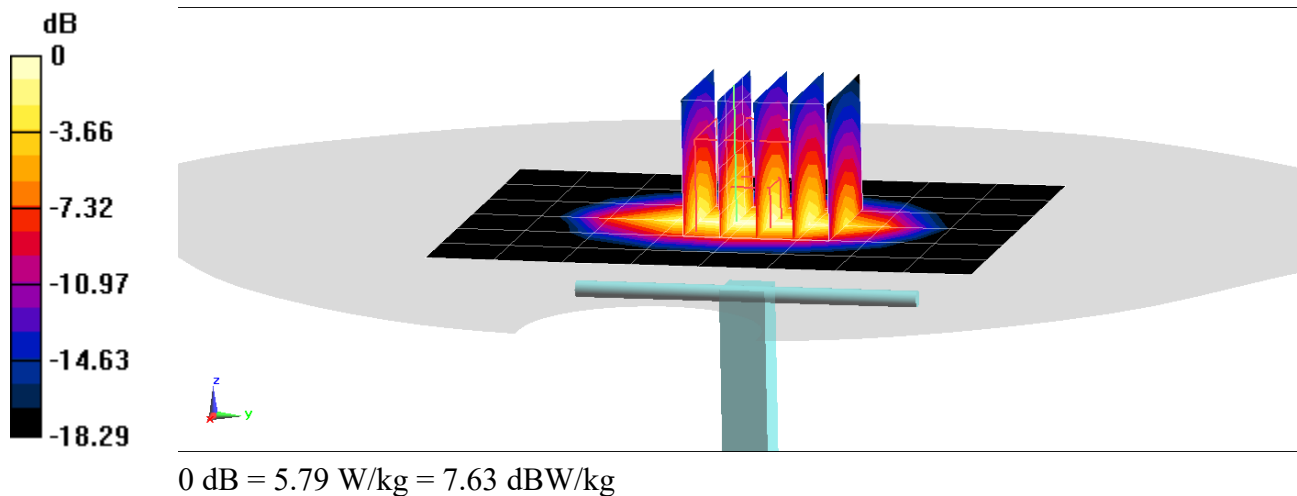
Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Peak SAR (extrapolated) = 7.11 W/kg

SAR(1 g) = 3.79 W/kg

Deviation(1 g) = 1.34%



PCTEST

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d080

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: 1900 Body Medium parameters used:

$f = 1900 \text{ MHz}$; $\sigma = 1.529 \text{ S/m}$; $\epsilon_r = 52.616$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02/08/2021; Ambient Temp: 20.7°C; Tissue Temp: 22.8°C

Probe: EX3DV4 - SN7410; ConvF(7.76, 7.76, 7.76) @ 1900 MHz; Calibrated: 7/20/2020

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1322; Calibrated: 7/15/2020

Phantom: SAM Left; Type: QD000P40CC; Serial: TP: 1375

Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

1900 MHz System Verification at 20.0 dBm (100 mW)

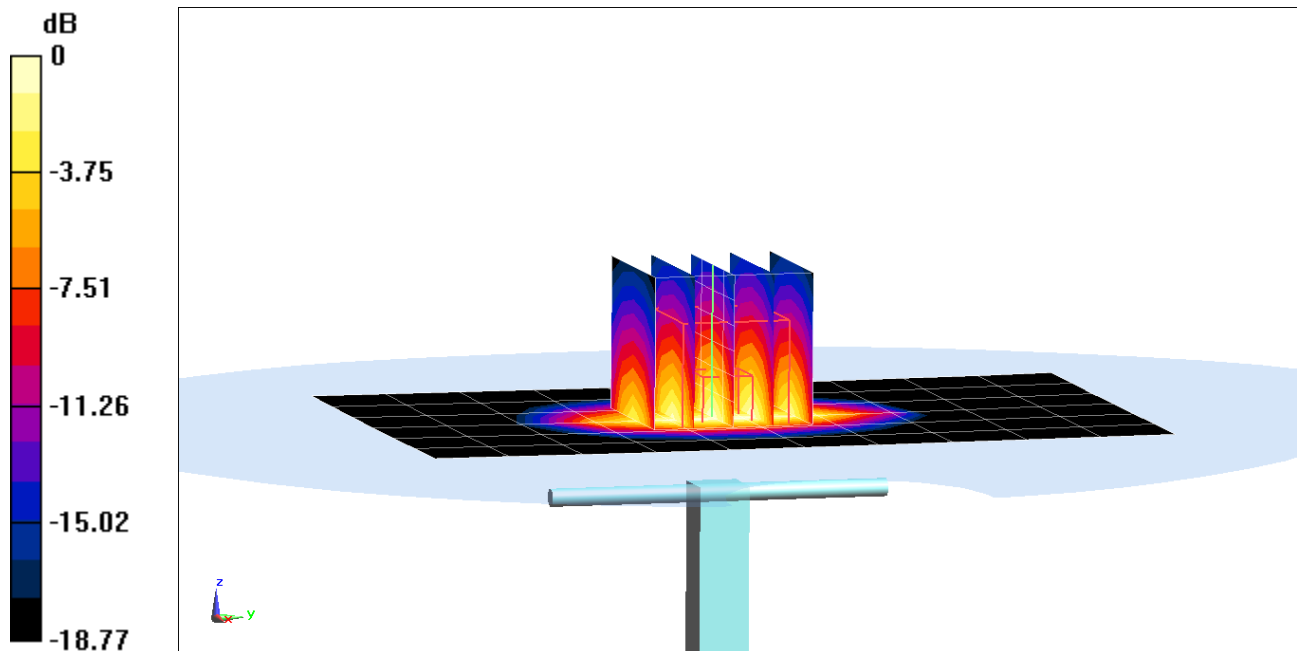
Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Peak SAR (extrapolated) = 7.15 W/kg

SAR(1 g) = 3.81 W/kg

Deviation(1 g) = -2.81%



0 dB = 5.97 W/kg = 7.76 dBW/kg

APPENDIX C: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

- 1) The network analyzer and probe system was configured and calibrated.
- 2) The probe was immersed in the tissue. The tissue was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
- 3) The complex admittance with respect to the probe aperture was measured
- 4) The complex relative permittivity ϵ' can be calculated from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi' d\rho' d\rho$$

where Y is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

3 Composition / Information on ingredients

3.2 Mixtures

Description: Aqueous solution with surfactants and inhibitors

Declarable, or hazardous components:

CAS: 107-21-1 EINECS: 203-473-3 Reg.nr.: 01-2119456816-28-0000	Ethanedial STOT RE 2, H373; Acute Tox. 4, H302	>1.0-4.9%
CAS: 68608-26-4 EINECS: 271-781-5 Reg.nr.: 01-2119527859-22-0000	Sodium petroleum sulfonate Eye Irrit. 2, H319	< 2.9%
CAS: 107-41-5 EINECS: 203-489-0 Reg.nr.: 01-2119539582-35-0000	Hexylene Glycol / 2-Methyl-pentane-2,4-diol Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.9%
CAS: 68920-66-1 NLP: 500-236-9 Reg.nr.: 01-2119489407-26-0000	Alkoxylated alcohol, > C₁₈ Aquatic Chronic 2, H411; Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.0%

Additional information:

For the wording of the listed risk phrases refer to section 16.

Not mentioned CAS-, EINECS- or registration numbers are to be regarded as Proprietary/Confidential.

The specific chemical identity and/or exact percentage concentration of proprietary components is withheld as a trade secret.

Figure C-1

Note: Liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

FCC ID: A3LSMG998U	 PCTEST Prüfung für das Gerät	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX C: Page 1 of 3

Measurement Certificate / Material Test

Item Name	Body Tissue Simulating Liquid (MBBL600-6000V6)
Product No.	SL AAM U16 BC (Batch: 200803-1)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the KDB 865664 compliance standard.

Test Condition

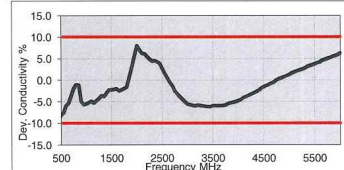
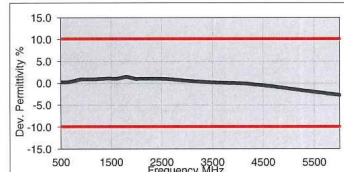
Ambient Condition 22°C ; 30% humidity
 TSL Temperature 22°C
 Test Date 6-Aug-20
 Operator CL

Additional Information

TSL Density
 TSL Heat-capacity

Results

f [MHz]	Measured			Target		Diff.to Target [%]	
	e'	e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	56.3	26.8	0.89	56.1	0.95	0.3	-6.3
750	55.8	22.6	0.94	55.5	0.96	0.5	-2.1
800	55.7	21.6	0.96	55.3	0.97	0.7	-1.0
825	55.7	21.1	0.97	55.2	0.98	0.8	-1.0
835	55.7	20.9	0.98	55.1	0.99	1.0	-0.5
850	55.6	20.7	0.98	55.2	0.99	0.8	-1.0
900	55.5	19.9	1.00	55.0	1.05	0.9	-4.8
1400	54.7	15.9	1.24	54.1	1.28	1.1	-3.1
1450	54.6	15.8	1.27	54.0	1.30	1.1	-2.3
1600	54.4	15.3	1.36	53.8	1.39	1.1	-2.2
1625	54.4	15.3	1.38	53.8	1.41	1.2	-2.1
1640	54.4	15.2	1.39	53.7	1.42	1.3	-2.1
1650	54.3	15.2	1.39	53.7	1.43	1.1	-2.8
1700	54.2	15.1	1.43	53.6	1.46	1.2	-2.1
1750	54.2	15.0	1.46	53.4	1.49	1.4	-2.0
1800	54.1	14.9	1.50	53.3	1.52	1.5	-1.3
1810	54.1	14.9	1.51	53.3	1.52	1.5	-0.7
1825	54.1	14.9	1.52	53.3	1.52	1.5	0.0
1850	54.0	14.9	1.53	53.3	1.52	1.3	0.7
1900	54.0	14.8	1.57	53.3	1.52	1.3	3.3
1950	53.9	14.8	1.60	53.3	1.52	1.1	5.3
2000	53.8	14.8	1.64	53.3	1.52	0.9	7.9
2050	53.8	14.7	1.68	53.2	1.57	1.1	7.0
2100	53.7	14.7	1.72	53.2	1.62	1.0	6.2
2150	53.7	14.7	1.76	53.1	1.66	1.1	6.0
2200	53.6	14.7	1.80	53.0	1.71	1.1	5.3
2250	53.5	14.8	1.85	53.0	1.76	1.0	5.1
2300	53.5	14.8	1.89	52.9	1.81	1.1	4.4
2350	53.4	14.8	1.94	52.8	1.85	1.1	4.9
2400	53.3	14.8	1.98	52.8	1.90	1.0	4.2
2450	53.3	14.9	2.03	52.7	1.95	1.1	4.1
2500	53.2	14.9	2.07	52.6	2.02	1.1	2.5
2550	53.1	15.0	2.12	52.6	2.09	1.0	1.4
2600	53.0	15.0	2.17	52.5	2.16	0.9	0.5



3500	51.4	16.0	3.11	51.3	3.31	0.2	-6.0
3700	51.1	16.2	3.34	51.1	3.55	0.1	-5.9
5200	48.3	18.7	5.42	49.0	5.30	-1.5	2.3
5250	48.2	18.8	5.50	49.0	5.36	-1.6	2.5
5300	48.1	18.9	5.57	48.9	5.42	-1.7	2.8
5500	47.7	19.2	5.86	48.6	5.65	-2.0	3.8
5600	47.5	19.3	6.01	48.5	5.77	-2.1	4.2
5700	47.3	19.4	6.16	48.3	5.88	-2.3	4.8
5800	47.0	19.6	6.32	48.2	6.00	-2.4	5.3
6000	46.6	19.8	6.62	47.9	6.23	-2.7	6.3
6500							
7000							
7500							
8000							
8500							
9000							
9500							
10000							

Figure C-2
600 – 5800 MHz Body Tissue Equivalent Matter

FCC ID: A3LSMG998U		SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX C: Page 2 of 3

Measurement Certificate / Material Test

Item Name	Head Tissue Simulating Liquid (HBBL600-10000V6)
Product No.	SL AAH U16 BC (Batch: 200805-4)
Manufacturer	SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

Test Condition

Ambient Condition 22°C ; 30% humidity

TSL Temperature 22°C

Test Date 6-Aug-20

Operator CL

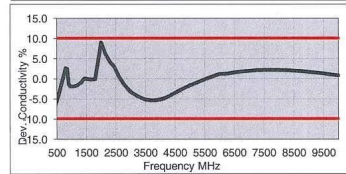
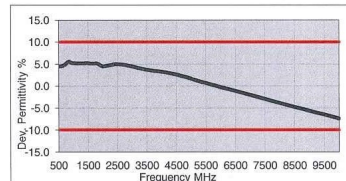
Additional Information

TSL Density

TSL Heat-capacity

Results

f [MHz]	Measured			Target		Diff.to Target [%]	
	e'	e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	44.7	25.7	0.86	42.7	0.88	4.6	-2.5
750	44.1	21.7	0.90	41.9	0.89	5.1	0.7
800	44.0	20.7	0.92	41.7	0.90	5.6	2.5
825	43.9	20.3	0.93	41.6	0.91	5.6	2.6
835	43.9	20.1	0.94	41.5	0.91	5.7	3.1
850	43.8	19.9	0.94	41.5	0.92	5.5	2.6
900	43.7	19.1	0.96	41.5	0.97	5.3	-1.0
1400	42.7	15.1	1.18	40.6	1.18	5.2	0.0
1450	42.6	14.9	1.20	40.5	1.20	5.2	0.0
1600	42.4	14.4	1.28	40.3	1.28	5.2	-0.3
1625	42.4	14.4	1.30	40.3	1.30	5.3	0.1
1640	42.4	14.3	1.31	40.3	1.31	5.3	0.3
1650	42.3	14.3	1.31	40.2	1.31	5.1	-0.2
1700	42.2	14.2	1.34	40.2	1.34	5.1	-0.2
1750	42.2	14.1	1.37	40.1	1.37	5.3	-0.1
1800	42.1	14.0	1.40	40.0	1.40	5.3	0.0
1810	42.1	14.0	1.41	40.0	1.40	5.3	0.7
1825	42.1	13.9	1.42	40.0	1.40	5.3	1.4
1850	42.0	13.9	1.43	40.0	1.40	5.0	2.1
1900	41.9	13.8	1.46	40.0	1.40	4.7	4.3
1950	41.9	13.8	1.49	40.0	1.40	4.7	6.4
2000	41.8	13.7	1.53	40.0	1.40	4.5	9.3
2050	41.7	13.7	1.56	39.9	1.44	4.5	8.0
2100	41.7	13.7	1.60	39.8	1.49	4.7	7.5
2150	41.6	13.6	1.63	39.7	1.53	4.7	6.3
2200	41.5	13.6	1.67	39.6	1.58	4.7	5.8
2250	41.5	13.6	1.70	39.6	1.62	4.9	4.8
2300	41.4	13.6	1.74	39.5	1.67	4.9	4.4
2350	41.3	13.6	1.78	39.4	1.71	4.9	4.0
2400	41.2	13.6	1.82	39.3	1.76	4.9	3.7
2450	41.2	13.6	1.85	39.2	1.80	5.1	2.8
2500	41.1	13.6	1.89	39.1	1.85	5.0	1.9
2550	41.0	13.7	1.94	39.1	1.91	4.9	1.6
2600	40.9	13.7	1.98	39.0	1.96	4.8	0.8



3500	39.4	14.2	2.77	37.9	2.91	3.7	-5.1
3700	39.0	14.3	2.95	37.7	3.12	3.5	-5.3
5200	36.4	15.9	4.61	36.0	4.66	1.3	-1.0
5250	36.4	16.0	4.67	35.9	4.71	1.2	-0.9
5300	36.3	16.0	4.72	35.9	4.76	1.1	-0.7
5500	35.9	16.2	4.96	35.6	4.96	0.7	-0.1
5600	35.7	16.3	5.07	35.5	5.07	0.5	0.2
5700	35.5	16.4	5.19	35.4	5.17	0.3	0.4
5800	35.4	16.5	5.31	35.3	5.27	0.1	0.7
6000	35.0	16.6	5.54	35.1	5.48	-0.2	1.2
6500	34.1	17.1	6.17	34.5	6.07	-1.1	1.6
7000	33.2	17.4	6.78	33.9	6.65	-2.0	2.0
7500	32.3	17.7	7.40	33.3	7.24	-2.9	2.2
8000	31.5	18.0	8.01	32.7	7.84	-3.8	2.2
8500	30.6	18.2	8.63	32.1	8.45	-4.7	2.1
9000	29.8	18.4	9.24	31.5	9.08	-5.6	1.8
9500	29.0	18.6	9.84	31.0	9.71	-6.5	1.3
10000	28.1	18.8	10.44	30.4	10.36	-7.4	0.8

Figure C-3
 600 – 5800 MHz Head Tissue Equivalent Matter

FCC ID: A3LSMG998U		SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX C: Page 3 of 3

APPENDIX D: SAR SYSTEM VALIDATION

Per FCC KDB Publication 865664 D02v01r02, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

Table D-1
SAR System Validation Summary – 1g

SAR System	Freq. (MHz)	Date	Probe SN	Probe Cal Point		Cond. (σ)	Perm. (ϵ_r)	CW VALIDATION			MOD. VALIDATION		
								SENSITIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
P	1750	9/9/2020	7308	1750	Head	1.384	41.983	PASS	PASS	PASS	N/A	N/A	N/A
P	1900	9/10/2020	7308	1900	Head	1.442	40.894	PASS	PASS	PASS	GMSK	PASS	N/A
I	1750	2/3/2021	7551	1750	Body	1.520	51.025	PASS	PASS	PASS	N/A	N/A	N/A
J	1900	12/3/2020	7410	1900	Body	1.561	52.634	PASS	PASS	PASS	GMSK	PASS	N/A

NOTE: While the probes have been calibrated for both CW and modulated signals, all measurements were performed using communication systems calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to FCC KDB Publication 865664 D01v01r04.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of the Samsung	SAR EVALUATION REPORT		Approved by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX D: Page 1 of 1

APPENDIX F: LTE LOWER BANDWIDTH RF CONDUCTED POWERS

All conducted power measurements for 4G Sub6 WWAN technologies and bands in this section were performed by setting *Reserve_power_margin* (Qualcomm® Smart Transmit EFS entry) to 0 dB, so that the EUT transmits continuously at minimum (P_{limit} , maximum tune up output power P_{max}).

F.1 LTE Lower Bandwidth RF Conducted Powers

F.1.1 LTE Band 66 Antenna E

Table F-1

LTE Band 66 (AWS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 15 MHz Bandwidth

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132047 (1717.5 MHz)	132322 (1745.0 MHz)	132597 (1772.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.95	22.88	22.93	0	0
	1	36	22.92	23.04	22.90		0
	1	74	22.80	22.93	23.02		0
	36	0	21.98	22.03	21.95	0-1	1
	36	18	22.08	22.06	22.08		1
	36	37	22.00	22.08	22.04		1
	75	0	22.08	21.97	21.96		1
16QAM	1	0	22.04	22.17	22.24	0-1	1
	1	36	22.25	22.32	22.22		1
	1	74	22.05	22.27	22.39		1
	36	0	21.00	20.99	20.92	0-2	2
	36	18	21.08	21.02	21.11		2
	36	37	21.06	21.10	21.00		2
	75	0	20.98	21.02	20.92		2
64QAM	1	0	21.02	21.07	21.18	0-2	2
	1	36	21.25	21.20	21.13		2
	1	74	21.06	21.19	21.26		2
	36	0	20.01	20.08	20.00	0-3	3
	36	18	20.12	20.10	20.18		3
	36	37	20.01	20.14	20.08		3
	75	0	20.07	19.97	19.96		3
256QAM	1	0	17.95	18.14	18.02	0-5	5
	1	36	18.18	18.11	18.23		5
	1	74	18.13	17.89	18.01		5
	36	0	18.04	18.02	18.03		5
	36	18	18.07	18.03	18.10		5
	36	37	18.03	18.06	18.01		5
	75	0	18.01	18.00	17.92		5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX F: Page 1 of 25

Table F-2

LTE Band 66 (AWS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 10 MHz Bandwidth

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132047 (1717.5 MHz)	132322 (1745.0 MHz)	132597 (1772.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.77	22.88	22.93	0	0
	1	36	22.92	23.04	23.05		0
	1	74	22.80	22.93	23.02		0
	36	0	21.98	22.03	21.95	0-1	1
	36	18	22.08	22.06	22.08		1
	36	37	22.00	22.08	22.04		1
	75	0	22.08	21.97	22.00		1
16QAM	1	0	22.04	22.17	22.24	0-1	1
	1	36	22.25	22.32	22.22		1
	1	74	22.05	22.27	22.39		1
	36	0	21.00	20.99	20.92	0-2	2
	36	18	21.08	21.02	21.11		2
	36	37	21.06	21.10	21.00		2
	75	0	20.98	21.02	20.92		2
64QAM	1	0	21.02	21.07	21.18	0-2	2
	1	36	21.25	21.20	21.13		2
	1	74	21.06	21.19	21.26		2
	36	0	20.01	20.08	20.00	0-3	3
	36	18	20.12	20.10	20.18		3
	36	37	20.01	20.14	20.08		3
	75	0	20.07	19.97	19.96		3
256QAM	1	0	17.95	18.14	18.02	0-5	5
	1	36	18.18	18.11	18.23		5
	1	74	18.13	18.00	18.01		5
	36	0	18.04	18.02	18.03		5
	36	18	18.07	18.03	18.10		5
	36	37	18.03	18.06	18.10		5
	75	0	18.01	18.00	17.92		5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX F: Page 2 of 25

Table F-3

LTE Band 66 (AWS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 5 MHz Bandwidth

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131997 (1712.5 MHz)	132322 (1745.0 MHz)	132647 (1777.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.04	22.94	22.94	0	0
	1	12	23.11	23.19	22.92		0
	1	24	23.04	23.06	22.86		0
	12	0	22.16	22.09	22.11	0-1	1
	12	6	22.11	22.11	22.09		1
	12	13	22.05	22.06	22.07		1
	25	0	22.07	22.04	22.04		1
16QAM	1	0	22.16	22.36	22.25	0-1	1
	1	12	22.26	22.46	22.11		1
	1	24	22.14	22.43	22.11		1
	12	0	21.14	21.13	21.14	0-2	2
	12	6	21.15	21.13	21.07		2
	12	13	21.05	21.15	21.02		2
	25	0	21.12	21.06	21.05		2
64QAM	1	0	21.28	21.28	21.39	0-2	2
	1	12	21.24	21.31	21.22		2
	1	24	21.19	21.25	21.26		2
	12	0	20.11	20.11	20.13	0-3	3
	12	6	20.14	20.13	20.08		3
	12	13	20.10	20.16	20.02		3
	25	0	20.13	20.04	20.06		3
256QAM	1	0	18.19	18.17	18.37	0-5	5
	1	12	18.22	18.11	18.11		5
	1	24	18.08	18.15	18.18		5
	12	0	18.07	18.10	18.07		5
	12	6	18.12	18.12	18.01		5
	12	13	18.03	18.10	18.15		5
	25	0	18.11	18.06	18.00		5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX F: Page 3 of 25

Table F-4

LTE Band 66 (AWS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 3 MHz Bandwidth

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131987 (1711.5 MHz)	132322 (1745.0 MHz)	132657 (1778.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.09	22.98	23.02	0	0
	1	7	23.08	23.32	22.93		0
	1	14	22.99	22.94	22.83		0
	8	0	22.08	22.72	22.02	0-1	1
	8	4	22.12	22.70	22.04		1
	8	7	22.04	22.11	22.04		1
	15	0	22.12	22.14	22.05		1
16QAM	1	0	22.26	22.22	22.17	0-1	1
	1	7	22.22	22.26	22.14		1
	1	14	22.15	22.25	22.07		1
	8	0	21.16	21.14	21.05	0-2	2
	8	4	21.13	21.27	21.04		2
	8	7	21.06	21.13	21.03		2
	15	0	21.10	21.06	21.03		2
64QAM	1	0	21.30	21.19	21.27	0-2	2
	1	7	21.23	21.37	20.99		2
	1	14	21.21	21.18	21.22		2
	8	0	19.94	20.07	20.11	0-3	3
	8	4	20.11	20.25	20.04		3
	8	7	20.14	20.20	20.02		3
	15	0	20.10	20.10	20.06		3
256QAM	1	0	18.21	18.24	18.19	0-5	5
	1	7	18.18	18.19	18.05		5
	1	14	18.18	18.22	18.22		5
	8	0	18.13	18.00	18.08		5
	8	4	18.13	18.13	18.02		5
	8	7	18.08	18.13	18.15		5
	15	0	18.08	18.06	18.01		5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX F: Page 4 of 25

Table F-5

LTE Band 66 (AWS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 1.4 MHz Bandwidth

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131979 (1710.7 MHz)	132322 (1745.0 MHz)	132665 (1779.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	22.95	22.93	22.85	0	0
	1	2	23.03	23.08	23.00		0
	1	5	22.90	23.00	22.90		0
	3	0	22.60	22.62	22.58		0
	3	2	22.53	22.66	22.58		0
	3	3	22.53	22.61	22.48		0
	6	0	22.01	22.00	22.00	0-1	1
16QAM	1	0	22.20	22.08	22.20	0-1	1
	1	2	22.24	22.29	22.20		1
	1	5	22.05	22.18	22.07		1
	3	0	21.72	21.77	21.73		1
	3	2	21.73	21.85	21.77		1
	3	3	21.72	21.82	21.72		1
	6	0	21.00	21.06	21.02	0-2	2
64QAM	1	0	21.20	21.09	21.16	0-2	2
	1	2	21.28	21.24	21.32		2
	1	5	21.16	21.31	21.19		2
	3	0	20.64	20.64	20.69		2
	3	2	20.81	20.84	20.71		2
	3	3	20.74	20.83	20.80		2
	6	0	20.04	20.03	20.01	0-3	3
256QAM	1	0	18.13	18.11	17.93	0-5	5
	1	2	18.25	18.13	18.09		5
	1	5	18.16	18.08	18.16		5
	3	0	18.05	18.03	18.00		5
	3	2	18.14	18.03	18.07		5
	3	3	18.09	18.01	18.20		5
	6	0	18.02	17.97	17.96		5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX F: Page 5 of 25

Table F-6

LTE Band 66 (AWS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) or DSI = 2 (Head) - 15 MHz Bandwidth

LTE Band 66 (AWS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132047 (1717.5 MHz)	132322 (1745.0 MHz)	132597 (1772.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.89	19.01	19.20	0	0
	1	36	18.93	19.02	18.93		0
	1	74	18.84	18.96	19.00		0
	36	0	19.04	19.12	19.11	0-1	0
	36	18	19.08	19.13	19.19		0
	36	37	19.02	19.14	19.12		0
	75	0	19.04	19.08	19.08		0
16QAM	1	0	18.95	19.47	19.67	0-1	0
	1	36	19.17	19.53	19.38		0
	1	74	18.83	19.44	19.51		0
	36	0	19.00	19.12	19.19	0-2	0
	36	18	19.10	19.14	19.27		0
	36	37	19.02	19.13	19.16		0
	75	0	19.07	19.10	19.11		0
64QAM	1	0	19.22	19.59	19.33	0-2	0
	1	36	19.31	19.64	19.18		0
	1	74	19.24	19.67	19.30		0
	36	0	19.09	19.18	19.26	0-3	0
	36	18	19.14	19.17	19.35		0
	36	37	19.11	19.20	19.24		0
	75	0	19.10	19.19	19.16		0
256QAM	1	0	18.51	18.37	18.01	0-5	1
	1	36	18.60	18.42	18.28		1
	1	74	18.51	18.34	17.89		1
	36	0	18.07	18.17	18.16		1
	36	18	18.15	18.18	18.23		1
	36	37	18.08	18.22	18.14		1
	75	0	18.11	18.15	18.13		1

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Reviewed by:

Quality Manager

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

APPENDIX F:

Page 6 of 25

Table F-7

LTE Band 66 (AWS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) or DSI = 2 (Head) - 10 MHz Bandwidth

LTE Band 66 (AWS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			132022 (1715.0 MHz)	132322 (1745.0 MHz)	132622 (1775.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.84	18.66	18.91	0	0
	1	25	18.90	18.99	19.18		0
	1	49	18.66	18.76	18.97		0
	25	0	19.04	19.06	19.09	0-1	0
	25	12	19.07	19.12	19.15		0
	25	25	18.94	19.11	19.09		0
	50	0	18.99	19.04	19.08		0
16QAM	1	0	19.19	19.00	19.23	0-1	0
	1	25	19.33	19.13	19.20		0
	1	49	19.17	19.24	18.96		0
	25	0	19.10	19.15	19.15	0-2	0
	25	12	19.16	19.23	19.18		0
	25	25	18.99	19.22	19.13		0
	50	0	19.04	19.10	19.08		0
64QAM	1	0	19.23	19.21	19.22	0-2	0
	1	25	19.09	19.47	19.66		0
	1	49	18.88	19.21	19.34		0
	25	0	19.15	19.16	19.19	0-3	0
	25	12	19.19	19.23	19.23		0
	25	25	19.08	19.21	19.19		0
	50	0	19.05	19.10	19.13		0
256QAM	1	0	18.20	18.28	18.61	0-5	1
	1	25	18.23	18.62	18.80		1
	1	49	18.21	18.52	18.59		1
	25	0	18.11	18.18	18.15		1
	25	12	18.16	18.26	18.23		1
	25	25	18.02	18.21	18.16		1
	50	0	18.01	18.04	18.18		1

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Reviewed by:

Quality Manager

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

APPENDIX F:

Page 7 of 25

Table F-8

LTE Band 66 (AWS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) or DSI = 2 (Head) - 5 MHz Bandwidth

LTE Band 66 (AWS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131997 (1712.5 MHz)	132322 (1745.0 MHz)	132647 (1777.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	19.04	19.11	19.25	0	0
	1	12	19.06	19.06	19.20		0
	1	24	18.96	19.05	19.16		0
	12	0	19.11	19.13	19.22	0-1	0
	12	6	19.10	19.12	19.20		0
	12	13	19.02	19.16	19.14		0
	25	0	19.06	19.10	19.18		0
16QAM	1	0	19.62	19.65	19.55	0-1	0
	1	12	19.59	19.72	19.44		0
	1	24	19.52	19.58	19.34		0
	12	0	19.25	19.31	19.32	0-2	0
	12	6	19.30	19.29	19.28		0
	12	13	19.15	19.34	19.23		0
	25	0	19.16	19.19	19.15		0
64QAM	1	0	19.45	19.48	19.71	0-2	0
	1	12	19.44	19.49	19.60		0
	1	24	19.31	19.39	19.53		0
	12	0	19.22	19.15	19.36	0-3	0
	12	6	19.21	19.16	19.33		0
	12	13	19.10	19.15	19.24		0
	25	0	19.12	19.11	19.23		0
256QAM	1	0	18.17	18.38	18.26	0-5	1
	1	12	18.39	18.29	18.18		1
	1	24	18.25	18.27	18.15		1
	12	0	18.14	18.20	18.38		1
	12	6	18.13	18.23	18.36		1
	12	13	18.04	18.24	18.25		1
	25	0	18.13	18.18	18.29		1

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Reviewed by:

Quality Manager

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

APPENDIX F:

Page 8 of 25

Table F-9

LTE Band 66 (AWS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) or DSI = 2 (Head) - 3 MHz Bandwidth

LTE Band 66 (AWS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131987 (1711.5 MHz)	132322 (1745.0 MHz)	132657 (1778.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.95	19.04	19.18	0	0
	1	7	18.89	19.02	18.94		0
	1	14	18.92	19.12	19.12		0
	8	0	19.14	19.09	19.23	0-1	0
	8	4	19.11	19.20	19.17		0
	8	7	19.06	19.18	19.14		0
	15	0	19.12	19.13	19.12		0
16QAM	1	0	19.17	19.38	19.67	0-1	0
	1	7	19.09	19.08	19.42		0
	1	14	19.09	19.33	19.61		0
	8	0	19.22	19.24	19.35	0-2	0
	8	4	19.18	19.30	19.29		0
	8	7	19.15	19.35	19.21		0
	15	0	19.09	19.24	19.26		0
64QAM	1	0	19.44	19.45	19.40	0-2	0
	1	7	19.28	19.43	19.25		0
	1	14	19.29	19.46	19.40		0
	8	0	19.16	19.20	19.30	0-3	0
	8	4	19.14	19.31	19.26		0
	8	7	19.11	19.30	19.26		0
	15	0	19.23	19.17	19.27		0
256QAM	1	0	18.11	18.72	18.24	0-5	1
	1	7	18.16	18.64	18.07		1
	1	14	18.04	18.74	18.18		1
	8	0	18.26	18.20	18.15		1
	8	4	18.24	18.30	18.16		1
	8	7	18.18	18.29	18.17		1
	15	0	18.20	18.19	18.27		1

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Reviewed by:

Quality Manager

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

APPENDIX F:

Page 9 of 25

Table F-10

LTE Band 66 (AWS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) or DSI = 2 (Head) - 1.4 MHz Bandwidth

LTE Band 66 (AWS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			131979 (1710.7 MHz)	132322 (1745.0 MHz)	132665 (1779.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.95	18.86	19.10	0	0
	1	2	19.03	18.99	19.23		0
	1	5	18.91	18.98	19.21		0
	3	0	18.96	18.98	19.08		0
	3	2	18.99	19.07	19.18		0
	3	3	18.94	19.06	19.13		0
	6	0	19.00	19.08	19.17	0-1	0
16QAM	1	0	19.45	19.03	19.21	0-1	0
	1	2	19.48	19.15	19.37		0
	1	5	19.40	19.23	19.33		0
	3	0	19.26	19.22	19.23		0
	3	2	19.29	19.37	19.32		0
	3	3	19.22	19.31	19.26		0
	6	0	19.01	19.28	19.31	0-2	0
64QAM	1	0	19.22	19.23	19.52	0-2	0
	1	2	19.29	19.30	19.66		0
	1	5	19.12	19.42	19.63		0
	3	0	19.25	19.03	19.50		0
	3	2	19.29	19.17	19.59		0
	3	3	19.24	19.13	19.56		0
	6	0	19.41	19.24	19.20	0-3	0
256QAM	1	0	17.96	17.91	18.18	0-5	1
	1	2	18.02	18.00	18.33		1
	1	5	17.94	18.04	18.21		1
	3	0	18.13	18.14	18.19		1
	3	2	18.19	18.21	18.30		1
	3	3	18.13	18.24	18.25		1
	6	0	18.11	18.17	18.20		1

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Reviewed by:

Quality Manager

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

APPENDIX F:

Page 10 of 25

F.1.2

LTE Band 25 Antenna E

Table F-11

LTE Band 25 (PCS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 15 MHz Bandwidth

LTE Band 25 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26115 (1857.5 MHz)	26365 (1882.5 MHz)	26615 (1907.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.28	23.59	23.70	0	0
	1	36	23.64	23.59	23.69		0
	1	74	23.49	23.64	23.68		0
	36	0	22.58	22.54	22.65	0-1	1
	36	18	22.71	22.60	22.75		1
	36	37	22.65	22.68	22.80		1
	75	0	22.64	22.67	22.70		1
16QAM	1	0	22.38	22.75	22.76	0-1	1
	1	36	22.64	22.69	22.64		1
	1	74	22.70	22.71	22.74		1
	36	0	21.54	21.51	21.61	0-2	2
	36	18	21.72	21.64	21.66		2
	36	37	21.67	21.75	21.76		2
	75	0	21.62	21.63	21.65		2
64QAM	1	0	21.61	21.72	21.96	0-2	2
	1	36	21.88	21.82	21.96		2
	1	74	21.83	21.90	21.89		2
	36	0	20.63	20.53	20.59	0-3	3
	36	18	20.72	20.61	20.69		3
	36	37	20.65	20.70	20.80		3
	75	0	20.62	20.74	20.67		3
256QAM	1	0	18.62	18.65	18.69	0-5	5
	1	36	18.79	18.79	19.04		5
	1	74	18.76	18.77	18.81		5
	36	0	18.65	18.53	18.62		5
	36	18	18.74	18.65	18.72		5
	36	37	18.70	18.75	18.80		5
	75	0	18.60	18.70	18.63		5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX F: Page 11 of 25

Table F-12

LTE Band 25 (PCS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26090 (1855.0 MHz)	26365 (1882.5 MHz)	26640 (1910.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.32	23.31	23.65	0	0
	1	25	23.56	23.52	23.63		0
	1	49	23.40	23.33	23.64		0
	25	0	22.51	22.51	22.69	0-1	1
	25	12	22.65	22.70	22.73		1
	25	25	22.59	22.68	22.73		1
	50	0	22.59	22.65	22.67		1
16QAM	1	0	22.57	22.75	22.83	0-1	1
	1	25	22.80	22.85	22.91		1
	1	49	22.74	22.79	22.96		1
	25	0	21.55	21.56	21.71	0-2	2
	25	12	21.67	21.71	21.81		2
	25	25	21.70	21.63	21.70		2
	50	0	21.60	21.63	21.67		2
64QAM	1	0	21.71	21.58	21.88	0-2	2
	1	25	22.00	21.88	21.93		2
	1	49	21.72	21.64	21.98		2
	25	0	20.62	20.51	20.69	0-3	3
	25	12	20.73	20.81	20.80		3
	25	25	20.64	20.67	20.82		3
	50	0	20.67	20.69	20.65		3
256QAM	1	0	18.54	18.29	18.65	0-5	5
	1	25	18.75	18.74	18.82		5
	1	49	18.51	18.57	18.51		5
	25	0	18.58	18.52	18.61		5
	25	12	18.72	18.76	18.81		5
	25	25	18.62	18.60	18.73		5
	50	0	18.63	18.68	18.70		5

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Reviewed by:

Quality Manager

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

APPENDIX F:

Page 12 of 25

Table F-13

LTE Band 25 (PCS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 5 MHz Bandwidth

LTE Band 25 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26065 (1852.5 MHz)	26365 (1882.5 MHz)	26665 (1912.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.54	23.52	23.63	0	0
	1	12	23.51	23.57	23.70		0
	1	24	23.57	23.66	23.68		0
	12	0	22.61	22.60	22.76	0-1	1
	12	6	22.64	22.70	22.75		1
	12	13	22.64	22.74	22.81		1
	25	0	22.65	22.66	22.73		1
16QAM	1	0	22.73	22.69	22.81	0-1	1
	1	12	22.65	22.78	22.89		1
	1	24	22.76	22.77	22.83		1
	12	0	21.65	21.59	21.74	0-2	2
	12	6	21.67	21.73	21.80		2
	12	13	21.67	21.71	21.77		2
	25	0	21.63	21.69	21.78		2
64QAM	1	0	21.83	21.78	21.92	0-2	2
	1	12	21.65	21.78	21.89		2
	1	24	21.85	21.88	21.93		2
	12	0	20.61	20.61	20.83	0-3	3
	12	6	20.65	20.70	20.85		3
	12	13	20.66	20.71	20.82		3
	25	0	20.64	20.68	20.83		3
256QAM	1	0	18.73	18.73	18.87	0-5	5
	1	12	18.73	18.75	18.87		5
	1	24	18.82	18.91	18.89		5
	12	0	18.66	18.60	18.72		5
	12	6	18.65	18.71	18.79		5
	12	13	18.66	18.76	18.76		5
	25	0	18.63	18.73	18.78		5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX F: Page 13 of 25

Table F-14

LTE Band 25 (PCS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 3 MHz Bandwidth

LTE Band 25 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26055 (1851.5 MHz)	26365 (1882.5 MHz)	26675 (1913.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.55	23.56	23.53	0	0
	1	7	23.64	23.61	23.51		0
	1	14	23.54	23.62	23.67		0
	8	0	22.59	22.63	22.72	0-1	1
	8	4	22.67	22.71	22.75		1
	8	7	22.67	22.64	22.74		1
	15	0	22.63	22.63	22.74		1
16QAM	1	0	22.70	22.82	22.76	0-1	1
	1	7	22.78	22.70	22.70		1
	1	14	22.69	22.79	22.83		1
	8	0	21.64	21.68	21.76	0-2	2
	8	4	21.69	21.69	21.76		2
	8	7	21.66	21.67	21.76		2
	15	0	21.65	21.66	21.77		2
64QAM	1	0	21.80	21.82	21.92	0-2	2
	1	7	21.73	21.79	21.82		2
	1	14	21.70	21.90	21.91		2
	8	0	20.66	20.64	20.81	0-3	3
	8	4	20.71	20.76	20.81		3
	8	7	20.63	20.73	20.76		3
	15	0	20.65	20.70	20.73		3
256QAM	1	0	18.80	18.84	18.75	0-5	5
	1	7	18.71	18.76	18.84		5
	1	14	18.80	18.85	18.90		5
	8	0	18.66	18.67	18.74		5
	8	4	18.70	18.73	18.75		5
	8	7	18.66	18.70	18.75		5
	15	0	18.65	18.70	18.74		5

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Reviewed by:

Quality Manager

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

APPENDIX F:

Page 14 of 25

Table F-15

LTE Band 25 (PCS) Measured P_{Max} for DSI = 0 (Body-worn, or Phablet with grip sensor inactive) or DSI = 1 (Phablet with grip sensor active) and/or DSI = 4 (Earjack Active)- 1.4 MHz Bandwidth

LTE Band 25 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26047 (1850.7 MHz)	26365 (1882.5 MHz)	26683 (1914.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	23.46	23.44	23.49	0	0
	1	2	23.49	23.52	23.61		0
	1	5	23.46	23.53	23.61		0
	3	0	23.50	23.43	23.52		0
	3	2	23.53	23.53	23.60		0
	3	3	23.51	23.53	23.63		0
	6	0	22.54	22.58	22.69	0-1	1
16QAM	1	0	22.66	22.65	22.58	0-1	1
	1	2	22.69	22.73	22.82		1
	1	5	22.65	22.80	22.84		1
	3	0	22.57	22.56	22.56		1
	3	2	22.57	22.59	22.67		1
	3	3	22.55	22.62	22.55		1
	6	0	21.55	21.55	21.72	0-2	2
64QAM	1	0	21.73	21.74	21.68	0-2	2
	1	2	21.86	21.80	21.90		2
	1	5	21.72	21.69	21.88		2
	3	0	21.90	21.82	21.80		2
	3	2	21.90	21.83	21.92		2
	3	3	21.79	21.80	21.89		2
	6	0	20.62	20.58	20.67	0-3	3
256QAM	1	0	18.69	18.65	18.74	0-5	5
	1	2	18.87	18.81	18.77		5
	1	5	18.74	18.75	18.78		5
	3	0	18.62	18.61	18.65		5
	3	2	18.75	18.66	18.68		5
	3	3	18.80	18.71	18.66		5
	6	0	18.63	18.55	18.60		5

FCC ID: A3LSMG998U



SAR EVALUATION REPORT



Reviewed by:

Quality Manager

Test Dates:

02/08/21 - 02/10/21

DUT Type:

Portable Handset

APPENDIX F:

Page 15 of 25

Table F-16
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) - 15 MHz Bandwidth

LTE Band 25 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26115 (1857.5 MHz)	26365 (1882.5 MHz)	26615 (1907.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.89	19.19	19.20	0	0
	1	36	19.06	19.17	19.19		0
	1	74	18.95	19.28	19.12		0
	36	0	19.11	19.02	19.13	0-1	0
	36	18	19.24	19.14	19.27		0
	36	37	19.17	19.20	19.31		0
	75	0	19.13	19.14	19.19		0
16QAM	1	0	18.97	19.70	19.71	0-1	0
	1	36	19.08	19.53	19.66		0
	1	74	19.07	19.58	19.63		0
	36	0	19.12	19.03	19.21	0-2	0
	36	18	19.21	19.15	19.31		0
	36	37	19.18	19.21	19.34		0
	75	0	19.15	19.18	19.22		0
64QAM	1	0	19.24	19.69	19.36	0-2	0
	1	36	19.44	19.77	19.40		0
	1	74	19.41	19.76	19.37		0
	36	0	19.18	19.09	19.25	0-3	0
	36	18	19.28	19.19	19.36		0
	36	37	19.25	19.27	19.41		0
	75	0	19.22	19.28	19.29		0
256QAM	1	0	18.93	18.77	18.42	0-5	0.5
	1	36	18.58	19.06	18.71		0.5
	1	74	19.02	19.03	18.56		0.5
	36	0	18.67	18.59	18.66		0.5
	36	18	18.77	18.72	18.79		0.5
	36	37	18.75	18.75	18.83		0.5
	75	0	18.73	18.71	18.73		0.5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	APPENDIX F: Page 16 of 25		

Table F-17
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) - 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26090 (1855.0 MHz)	26365 (1882.5 MHz)	26640 (1910.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.88	18.76	19.04	0	0
	1	25	19.13	18.94	19.08		0
	1	49	18.88	18.81	19.06		0
	25	0	19.10	19.05	19.11	0-1	0
	25	12	19.21	19.24	19.19		0
	25	25	19.14	19.18	19.21		0
	50	0	19.18	19.16	19.07		0
16QAM	1	0	18.96	18.93	19.58	0-1	0
	1	25	19.12	19.16	19.68		0
	1	49	19.20	19.30	19.57		0
	25	0	19.16	19.19	19.17	0-2	0
	25	12	19.28	19.37	19.26		0
	25	25	19.19	19.28	19.27		0
	50	0	19.11	19.21	19.16		0
64QAM	1	0	19.44	19.08	19.20	0-2	0
	1	25	19.56	19.34	19.41		0
	1	49	19.26	19.12	19.30		0
	25	0	19.19	19.17	19.24	0-3	0
	25	12	19.34	19.32	19.37		0
	25	25	19.29	19.29	19.35		0
	50	0	19.18	19.24	19.19		0
256QAM	1	0	19.11	18.28	18.34	0-5	0.5
	1	25	19.04	18.57	18.73		0.5
	1	49	19.06	18.33	18.32		0.5
	25	0	18.67	18.67	18.71		0.5
	25	12	18.77	18.86	18.82		0.5
	25	25	18.73	18.83	18.78		0.5
	50	0	18.76	18.72	18.66		0.5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	APPENDIX F: Page 17 of 25		

Table F-18
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) - 5 MHz Bandwidth

LTE Band 25 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26065 (1852.5 MHz)	26365 (1882.5 MHz)	26665 (1912.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	19.16	19.10	19.21	0	0
	1	12	19.13	19.13	19.15		0
	1	24	19.22	19.28	19.19		0
	12	0	19.20	19.15	19.23	0-1	0
	12	6	19.19	19.18	19.26		0
	12	13	19.21	19.22	19.21		0
	25	0	19.19	19.19	19.19		0
16QAM	1	0	19.74	19.31	19.45	0-1	0
	1	12	19.73	19.32	19.43		0
	1	24	19.81	19.42	19.40		0
	12	0	19.32	19.24	19.31	0-2	0
	12	6	19.37	19.29	19.36		0
	12	13	19.35	19.35	19.31		0
	25	0	19.29	19.27	19.21		0
64QAM	1	0	19.52	19.44	19.57	0-2	0
	1	12	19.51	19.48	19.55		0
	1	24	19.59	19.56	19.52		0
	12	0	19.18	19.09	19.36	0-3	0
	12	6	19.20	19.17	19.39		0
	12	13	19.16	19.15	19.36		0
	25	0	19.20	19.17	19.29		0
256QAM	1	0	18.86	18.76	18.63	0-5	0.5
	1	12	18.87	18.83	18.64		0.5
	1	24	18.94	18.90	18.66		0.5
	12	0	18.74	18.65	18.87		0.5
	12	6	18.78	18.78	18.90		0.5
	12	13	18.76	18.76	18.87		0.5
	25	0	18.79	18.72	18.82		0.5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	APPENDIX F: Page 18 of 25		

Table F-19
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) – 3 MHz Bandwidth

LTE Band 25 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26055 (1851.5 MHz)	26365 (1882.5 MHz)	26675 (1913.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.97	19.07	19.07	0	0
	1	7	18.96	18.98	19.15		0
	1	14	19.00	19.08	19.14		0
	8	0	19.13	19.12	19.21	0-1	0
	8	4	19.15	19.18	19.18		0
	8	7	19.12	19.16	19.19		0
	15	0	19.17	19.15	19.20		0
16QAM	1	0	19.20	19.06	19.58	0-1	0
	1	7	19.14	19.03	19.56		0
	1	14	19.21	19.20	19.61		0
	8	0	19.21	19.29	19.30	0-2	0
	8	4	19.23	19.32	19.32		0
	8	7	19.18	19.31	19.29		0
	15	0	19.13	19.23	19.30		0
64QAM	1	0	19.39	19.50	19.28	0-2	0
	1	7	19.33	19.42	19.32		0
	1	14	19.35	19.51	19.37		0
	8	0	19.19	19.24	19.28	0-3	0
	8	4	19.20	19.26	19.31		0
	8	7	19.15	19.27	19.29		0
	15	0	19.24	19.19	19.29		0
256QAM	1	0	18.52	18.65	18.63	0-5	0.5
	1	7	18.55	19.18	18.65		0.5
	1	14	18.56	18.69	18.66		0.5
	8	0	18.77	18.74	18.70		0.5
	8	4	18.75	18.78	18.74		0.5
	8	7	18.73	18.75	18.70		0.5
	15	0	18.67	18.73	18.81		0.5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	APPENDIX F: Page 19 of 25		

Table F-20
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 3 (Hotspot Mode) – 1.4 MHz Bandwidth

LTE Band 25 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26047 (1850.7 MHz)	26365 (1882.5 MHz)	26683 (1914.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	18.96	18.91	19.12	0	0
	1	2	18.94	18.97	19.17		0
	1	5	19.02	18.94	19.14		0
	3	0	18.97	18.95	19.04		0
	3	2	19.08	19.02	19.08		0
	3	3	19.05	19.00	19.04		0
	6	0	19.11	19.07	19.09	0-1	0
16QAM	1	0	19.48	19.07	19.21	0-1	0
	1	2	19.55	19.12	19.25		0
	1	5	19.50	19.18	19.26		0
	3	0	19.30	19.21	19.17		0
	3	2	19.36	19.33	19.24		0
	3	3	19.28	19.28	19.20		0
	6	0	19.04	19.26	19.23	0-2	0
64QAM	1	0	19.19	19.27	19.46	0-2	0
	1	2	19.34	19.34	19.62		0
	1	5	19.25	19.35	19.56		0
	3	0	19.30	19.06	19.45		0
	3	2	19.34	19.13	19.51		0
	3	3	19.31	19.11	19.48		0
	6	0	19.46	19.22	19.12	0-3	0
256QAM	1	0	18.47	18.45	18.66	0-5	0.5
	1	2	18.54	18.51	18.73		0.5
	1	5	18.53	18.49	18.70		0.5
	3	0	18.70	18.66	18.71		0.5
	3	2	18.77	18.72	18.72		0.5
	3	3	18.72	18.70	18.69		0.5
	6	0	18.69	18.63	18.65		0.5

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	APPENDIX F: Page 20 of 25		

Table F-21
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 2 (Head) - 15 MHz Bandwidth

LTE Band 25 (PCS) 15 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26115 (1857.5 MHz)	26365 (1882.5 MHz)	26615 (1907.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	17.47	17.62	17.73	0	0
	1	36	17.65	17.57	17.74		0
	1	74	17.61	17.69	17.62		0
	36	0	17.60	17.55	17.62	0-1	0
	36	18	17.71	17.67	17.73		0
	36	37	17.66	17.74	17.81		0
	75	0	17.64	17.66	17.69		0
16QAM	1	0	17.98	17.60	18.15	0-1	0
	1	36	18.03	17.56	18.18		0
	1	74	17.84	17.87	18.10		0
	36	0	17.57	17.52	17.67	0-2	0
	36	18	17.67	17.64	17.77		0
	36	37	17.63	17.73	17.83		0
	75	0	17.62	17.66	17.69		0
64QAM	1	0	18.01	17.99	17.86	0-2	0
	1	36	18.22	17.95	17.92		0
	1	74	18.14	18.08	17.85		0
	36	0	17.64	17.60	17.73	0-3	0
	36	18	17.71	17.71	17.82		0
	36	37	17.70	17.78	17.91		0
	75	0	17.71	17.69	17.76		0
256QAM	1	0	17.81	17.70	17.40	0-5	0
	1	36	18.01	18.00	17.71		0
	1	74	17.94	17.89	17.55		0
	36	0	17.63	17.58	17.66		0
	36	18	17.75	17.72	17.75		0
	36	37	17.69	17.75	17.81		0
	75	0	17.66	17.72	17.70		0

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	APPENDIX F: Page 21 of 25		

Table F-22
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 2 (Head) - 10 MHz Bandwidth

LTE Band 25 (PCS) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26090 (1855.0 MHz)	26365 (1882.5 MHz)	26640 (1910.0 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	17.26	17.30	17.56	0	0
	1	25	17.48	17.53	17.62		0
	1	49	17.20	17.34	17.58		0
	25	0	17.57	17.51	17.58	0-1	0
	25	12	17.69	17.69	17.70		0
	25	25	17.61	17.64	17.71		0
	50	0	17.63	17.63	17.63		0
16QAM	1	0	17.66	17.64	18.01	0-1	0
	1	25	17.68	17.62	18.12		0
	1	49	17.75	17.66	18.07		0
	25	0	17.66	17.54	17.62	0-2	0
	25	12	17.78	17.73	17.74		0
	25	25	17.72	17.67	17.75		0
	50	0	17.63	17.61	17.65		0
64QAM	1	0	17.61	17.58	17.72	0-2	0
	1	25	17.88	17.97	17.86		0
	1	49	17.60	17.80	17.82		0
	25	0	17.66	17.61	17.72	0-3	0
	25	12	17.77	17.79	17.84		0
	25	25	17.71	17.72	17.85		0
	50	0	17.67	17.69	17.72		0
256QAM	1	0	17.42	17.72	17.30	0-5	0
	1	25	17.54	18.10	17.66		0
	1	49	17.28	17.93	17.33		0
	25	0	17.70	17.61	17.64		0
	25	12	17.79	17.75	17.74		0
	25	25	17.75	17.72	17.79		0
	50	0	17.66	17.73	17.63		0

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	APPENDIX F: Page 22 of 25		

Table F-23
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 2 (Head) - 5 MHz Bandwidth

LTE Band 25 (PCS) 5 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26065 (1852.5 MHz)	26365 (1882.5 MHz)	26665 (1912.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	17.60	17.44	17.71	0	0
	1	12	17.59	17.48	17.72		0
	1	24	17.70	17.63	17.70		0
	12	0	17.66	17.61	17.73	0-1	0
	12	6	17.69	17.64	17.78		0
	12	13	17.67	17.67	17.76		0
	25	0	17.64	17.69	17.73		0
16QAM	1	0	17.73	17.74	18.18	0-1	0
	1	12	17.76	17.79	18.22		0
	1	24	17.84	17.93	18.20		0
	12	0	17.71	17.67	17.86	0-2	0
	12	6	17.76	17.78	17.90		0
	12	13	17.72	17.80	17.89		0
	25	0	17.63	17.70	17.80		0
64QAM	1	0	17.91	17.52	18.09	0-2	0
	1	12	17.92	17.56	18.05		0
	1	24	17.99	17.68	18.04		0
	12	0	17.75	17.65	17.73	0-3	0
	12	6	17.74	17.74	17.77		0
	12	13	17.76	17.76	17.72		0
	25	0	17.70	17.68	17.74		0
256QAM	1	0	17.56	17.22	17.92	0-5	0
	1	12	17.53	17.29	17.88		0
	1	24	17.66	17.37	17.90		0
	12	0	17.79	17.64	17.81		0
	12	6	17.82	17.69	17.87		0
	12	13	17.78	17.72	17.85		0
	25	0	17.72	17.74	17.77		0

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX F: Page 23 of 25

Table F-24
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 2 (Head) – 3 MHz Bandwidth

LTE Band 25 (PCS) 3 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26055 (1851.5 MHz)	26365 (1882.5 MHz)	26675 (1913.5 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	17.44	17.50	17.64	0	0
	1	7	17.49	17.45	17.63		0
	1	14	17.50	17.53	17.64		0
	8	0	17.62	17.62	17.69	0-1	0
	8	4	17.66	17.64	17.73		0
	8	7	17.62	17.63	17.72		0
	15	0	17.66	17.66	17.72		0
16QAM	1	0	17.74	17.75	17.81	0-1	0
	1	7	17.75	17.60	17.80		0
	1	14	17.81	17.71	17.86		0
	8	0	17.68	17.67	17.83	0-2	0
	8	4	17.73	17.73	17.86		0
	8	7	17.68	17.66	17.84		0
	15	0	17.60	17.62	17.77		0
64QAM	1	0	17.86	17.91	18.01	0-2	0
	1	7	17.84	17.83	18.04		0
	1	14	17.88	17.88	18.05		0
	8	0	17.65	17.66	17.82	0-3	0
	8	4	17.69	17.69	17.85		0
	8	7	17.64	17.67	17.78		0
	15	0	17.70	17.76	17.74		0
256QAM	1	0	17.52	17.63	17.74	0-5	0
	1	7	17.58	17.55	18.21		0
	1	14	17.59	17.60	17.82		0
	8	0	17.73	17.75	17.80		0
	8	4	17.75	17.76	17.84		0
	8	7	17.73	17.78	17.81		0
	15	0	17.72	17.73	17.80		0

FCC ID: A3LSMG998U	 PCTEST Proud to be part of element	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset	APPENDIX F: Page 24 of 25		

Table F-25
LTE Band 25 (PCS) Measured P_{Limit} for DSI = 2 (Head) – 1.4 MHz Bandwidth

LTE Band 25 (PCS) 1.4 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel	Mid Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			26047 (1850.7 MHz)	26365 (1882.5 MHz)	26683 (1914.3 MHz)		
			Conducted Power [dBm]				
QPSK	1	0	17.43	17.55	17.49	0	0
	1	2	17.53	17.62	17.59		0
	1	5	17.46	17.63	17.53		0
	3	0	17.58	17.46	17.49		0
	3	2	17.58	17.53	17.55		0
	3	3	17.54	17.50	17.54		0
	6	0	17.62	17.56	17.57	0-1	0
16QAM	1	0	17.65	17.61	17.98	0-1	0
	1	2	17.67	17.69	17.99		0
	1	5	17.75	17.71	17.97		0
	3	0	17.77	17.62	17.77		0
	3	2	17.86	17.67	17.80		0
	3	3	17.81	17.65	17.77		0
	6	0	17.80	17.69	17.55	0-2	0
64QAM	1	0	17.76	17.93	17.73	0-2	0
	1	2	17.88	18.03	17.81		0
	1	5	17.87	18.01	17.74		0
	3	0	17.62	17.88	17.76		0
	3	2	17.66	17.94	17.80		0
	3	3	17.64	17.91	17.75		0
	6	0	17.74	17.60	17.91	0-3	0
256QAM	1	0	17.45	17.64	17.51	0-5	0
	1	2	17.56	17.66	17.53		0
	1	5	17.57	17.63	17.55		0
	3	0	17.71	17.59	17.66		0
	3	2	17.78	17.68	17.73		0
	3	3	17.78	17.66	17.67		0
	6	0	17.73	17.61	17.66		0

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX F: Page 25 of 25

APPENDIX G POWER REDUCTION VERIFICATION

Per the May 2017 TCBC Workshop Notes, demonstration of proper functioning of the power reduction mechanisms is required to support the corresponding SAR configurations. The verification process was divided into two parts: (1) evaluation of output power levels for individual or multiple triggering mechanisms and (2) evaluation of the triggering distances for proximity-based sensors.

G.1 Power Verification Procedure

The power verification was performed according to the following procedure:

1. A base station simulator was used to establish a conducted RF connection and the output power was monitored. The power measurements were confirmed to be within expected tolerances for all states before and after a power reduction mechanism was triggered. For licensed modes, the device state index as displayed on the device UI was recorded before and after the mechanism was triggered.
2. Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.
3. Steps 1 and 2 were repeated for all individual power reduction mechanisms and combinations thereof. For the combination cases, one mechanism was switched to a 'triggered' state at a time; powers were confirmed to be within tolerances after each additional mechanism was activated.

G.2 Main Antenna Verification Summary

Table G-1
Power Measurement Verification for Main Antenna

Mechanism(s)		Mode/Band	Conducted Power (dBm)		
1st	2nd		Un-triggered (Max)	Mechanism #1 (Reduced)	Mechanism #2 (Reduced)
Held-to-Ear		LTE Band 66 Antenna E	0	2	
Hotspot On		LTE Band 66 Antenna E	0	3	
Held-to-Ear	Hotspot On	LTE Band 66 Antenna E	0	2	2
Hotspot On	Held-to-Ear	LTE Band 66 Antenna E	0	3	2
Held-to-Ear		LTE Band 25 Antenna E	0	2	
Hotspot On		LTE Band 25 Antenna E	0	3	
Held-to-Ear	Hotspot On	LTE Band 25 Antenna E	0	2	2
Hotspot On	Held-to-Ear	LTE Band 25 Antenna E	0	3	2
Held-to-Ear		LTE Band 2 Antenna E	0	2	
Hotspot On		LTE Band 2 Antenna E	0	3	
Held-to-Ear	Hotspot On	LTE Band 2 Antenna E	0	2	2
Hotspot On	Held-to-Ear	LTE Band 2 Antenna E	0	3	2

*Note: This device uses different Device State Indices (DSI) to configure different time averaged power levels based on certain exposure scenarios. For this device, DSI = 2 represents the case where the device is held to ear, and DSI = 3 represents the case when hotspot mode is active. DSI = 0 is configured at max power when the device cannot detect the use condition.

FCC ID: A3LSMG998U	 PCTEST Proud to be part of 	SAR EVALUATION REPORT		Reviewed by: Quality Manager
Test Dates: 02/08/21 - 02/10/21	DUT Type: Portable Handset			APPENDIX G: Page 1 of 1

APPENDIX H: PROBE AND DIPOLE CALIBRATION CERTIFICATES



Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1750V2-1148_May20**

CALIBRATION CERTIFICATE

Object **D1750V2 - SN:1148**

Calibration procedure(s) **QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **May 12, 2020**

BN ✓
6-2-2020

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: BH9394 (20k)	31-Mar-20 (No. 217-03106)	Apr-21
Type-N mismatch combination	SN: 310982 / 06327	31-Mar-20 (No. 217-03104)	Apr-21
Reference Probe EX3DV4	SN: 7349	31-Dec-19 (No. EX3-7349_Dec19)	Dec-20
DAE4	SN: 601	27-Dec-19 (No. DAE4-601_Dec19)	Dec-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

Calibrated by:	Name Jeffrey Katzman	Function Laboratory Technician	Signature <i>J. Katzman</i>
Approved by:	Katja Pokovic	Technical Manager	<i>K. Pokovic</i>

Issued: May 13, 2020

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.3 $\pm$ 6 %	1.35 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.88 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	35.9 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.69 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	18.9 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	54.1 $\pm$ 6 %	1.47 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	8.98 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	36.3 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.80 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.3 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.2 Ω - 1.9 j Ω
Return Loss	- 33.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.0 Ω - 1.7 j Ω
Return Loss	- 25.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------

DASY5 Validation Report for Head TSL

Date: 12.05.2020

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1148

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.35$ S/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.76, 8.76, 8.76) @ 1750 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 105.6 V/m; Power Drift = -0.03 dB

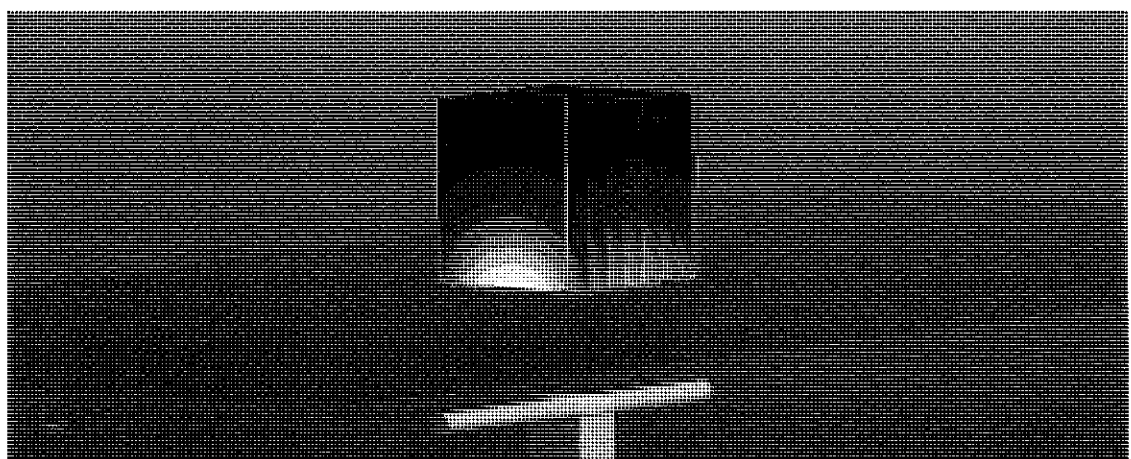
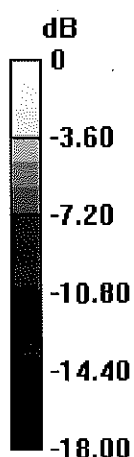
Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 8.88 W/kg; SAR(10 g) = 4.69 W/kg

Smallest distance from peaks to all points 3 dB below = 10 mm

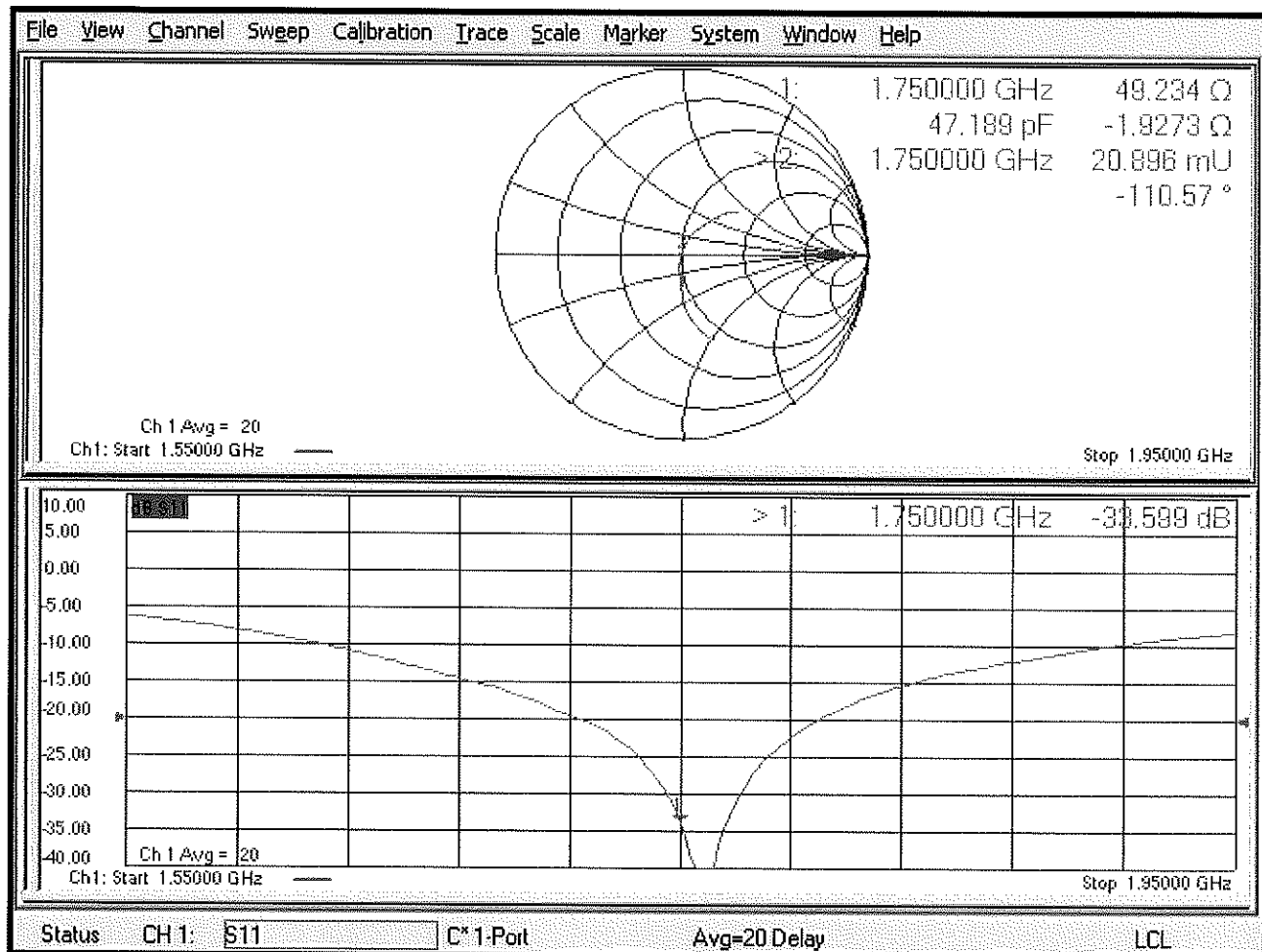
Ratio of SAR at M2 to SAR at M1 = 54.4%

Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.05.2020

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1148

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.47$ S/m; $\epsilon_r = 54.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.61, 8.61, 8.61) @ 1750 MHz; Calibrated: 31.12.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.12.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.95 V/m; Power Drift = -0.05 dB

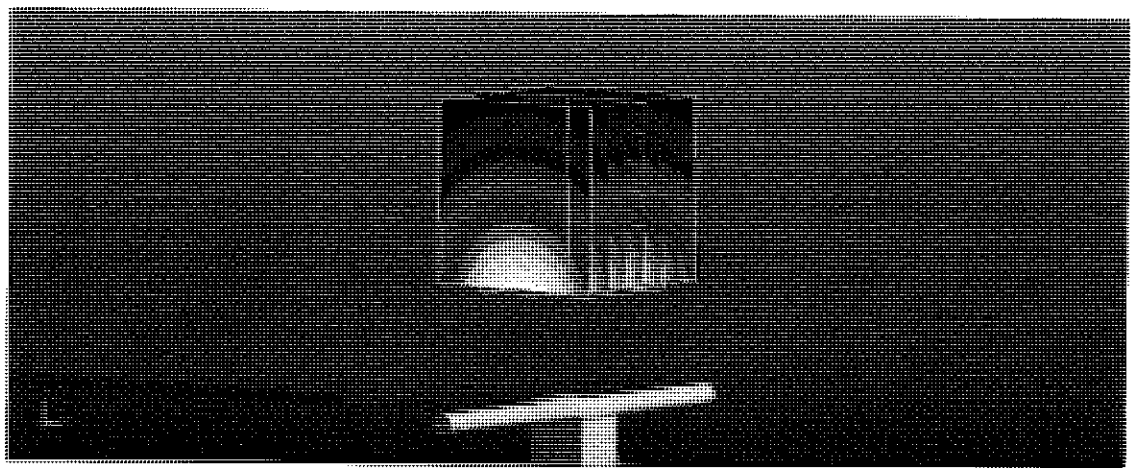
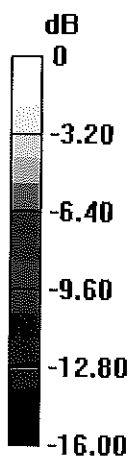
Peak SAR (extrapolated) = 16.1 W/kg

SAR(1 g) = 8.98 W/kg; SAR(10 g) = 4.8 W/kg

Smallest distance from peaks to all points 3 dB below = 10 mm

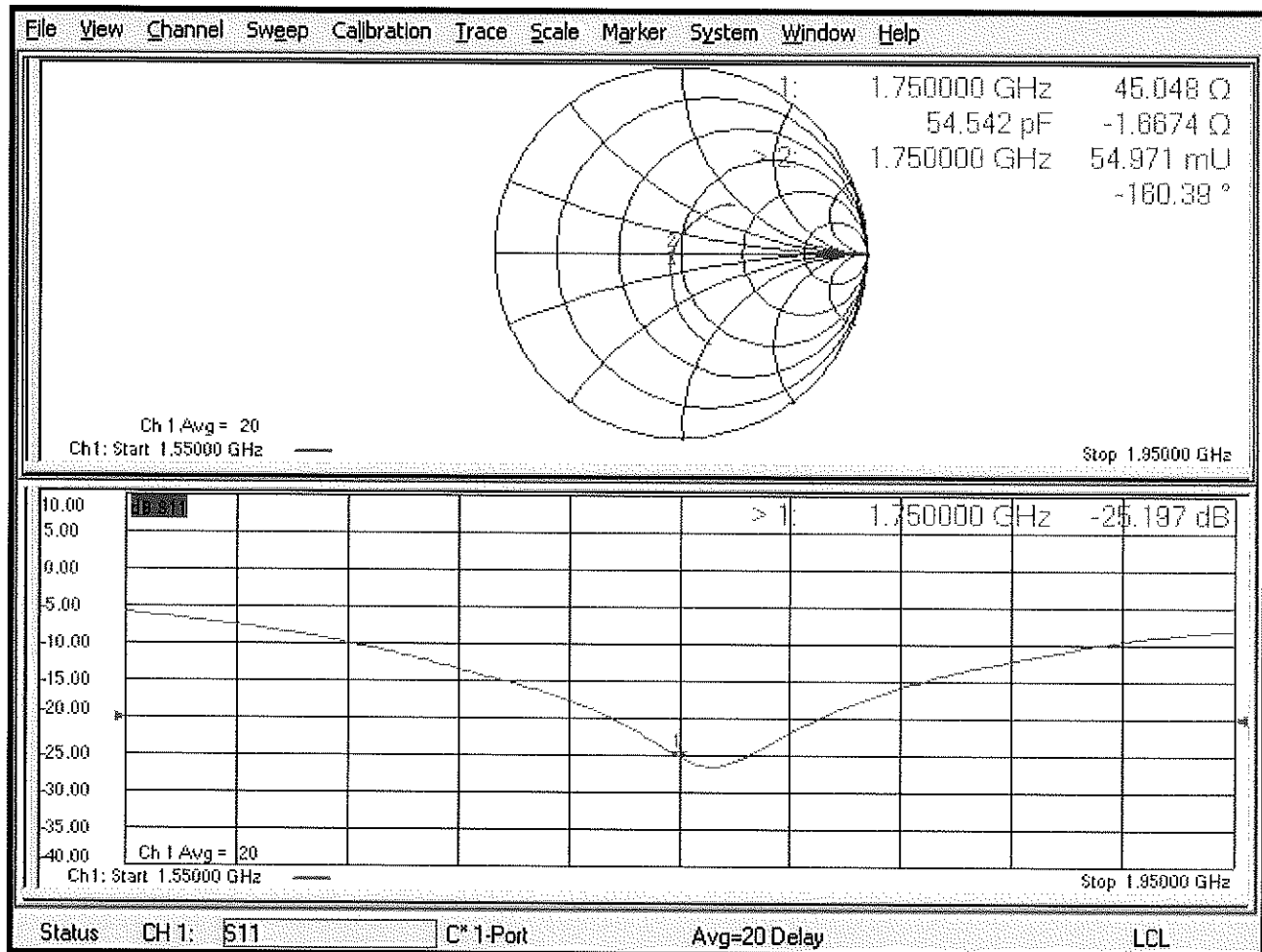
Ratio of SAR at M2 to SAR at M1 = 57.1%

Maximum value of SAR (measured) = 13.6 W/kg



0 dB = 13.6 W/kg = 11.34 dBW/kg

Impedance Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1765V2-1008 May18**

CALIBRATION CERTIFICATE

Object **D1765V2 - SN-1008**

Calibration procedure(s)

QA CAL-05 v1.0

Calibration procedure for dipole validation kits above 700 MHz

Calibration date:

May 23, 2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02572/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB97480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

Calibrated by:

Name

Manu Seitz

Function

Laboratory Technician

Signature

Approved by:

Katja Pokovic

Technical Manager

Issued: May 23, 2018

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

BNV
7/16/2018
BNV
05/20/2019
BNV
05/29/2020
Extended



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5.0 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.34 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.2 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.0 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.2 $\pm$ 6 %	1.46 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.4 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.92 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.9 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.7 Ω - 6.5 j Ω
Return Loss	- 23.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.3 Ω - 6.0 j Ω
Return Loss	- 20.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.210 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 06, 2005

Appendix (Additional assessments outside the scope of SCS 0108)

Measurement Conditions

DASY system configuration, as far as not given on page 1 and 3.

Phantom	SAM Head Phantom	For usage with cSAR3DV2-R/L
---------	------------------	-----------------------------

SAR result with SAM Head (Top)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	37.4 W/kg ± 17.5 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.9 W/kg ± 16.9 % (k=2)

SAR result with SAM Head (Mouth)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	38.2 W/kg ± 17.5 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.06 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.4 W/kg ± 16.9 % (k=2)

SAR result with SAM Head (Neck)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	37.4 W/kg ± 17.5 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.2 W/kg ± 16.9 % (k=2)

SAR result with SAM Head (Ear)

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	7.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	28.7 W/kg ± 17.5 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.01 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	16.1 W/kg ± 16.9 % (k=2)

DASY5 Validation Report for Head TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN:1008

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.34$ S/m; $\epsilon_r = 39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

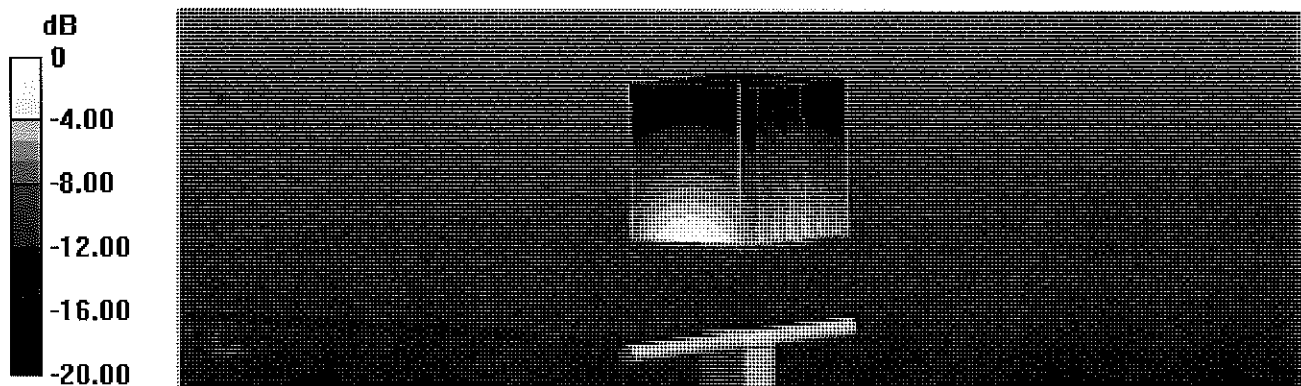
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.6 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 16.4 W/kg

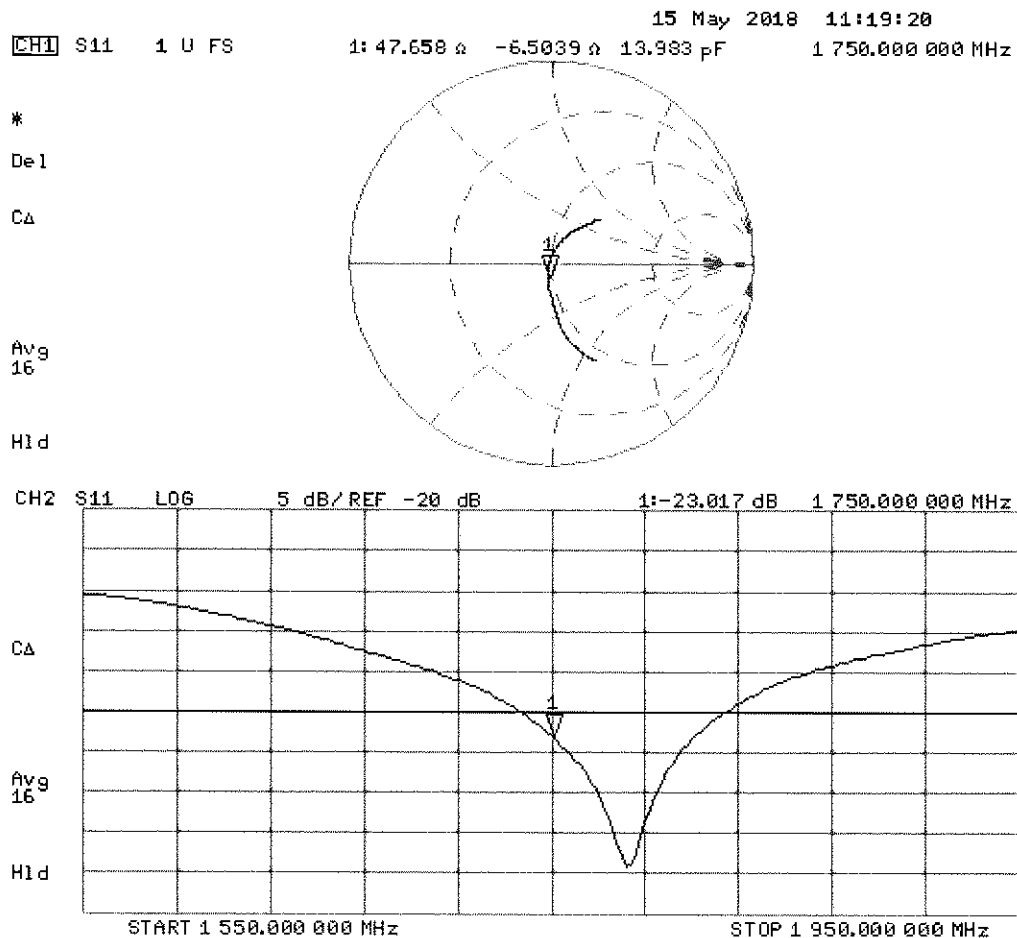
SAR(1 g) = 8.94 W/kg; SAR(10 g) = 4.71 W/kg

Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 15.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN:1008

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.46$ S/m; $\epsilon_r = 53.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.35, 8.35, 8.35) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

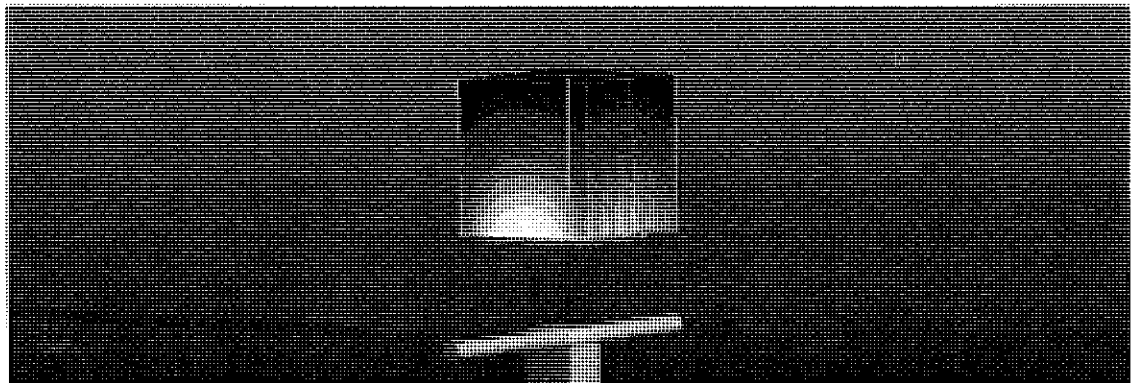
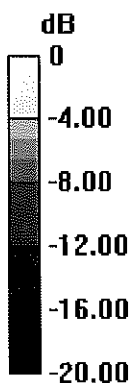
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.4 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 16.1 W/kg

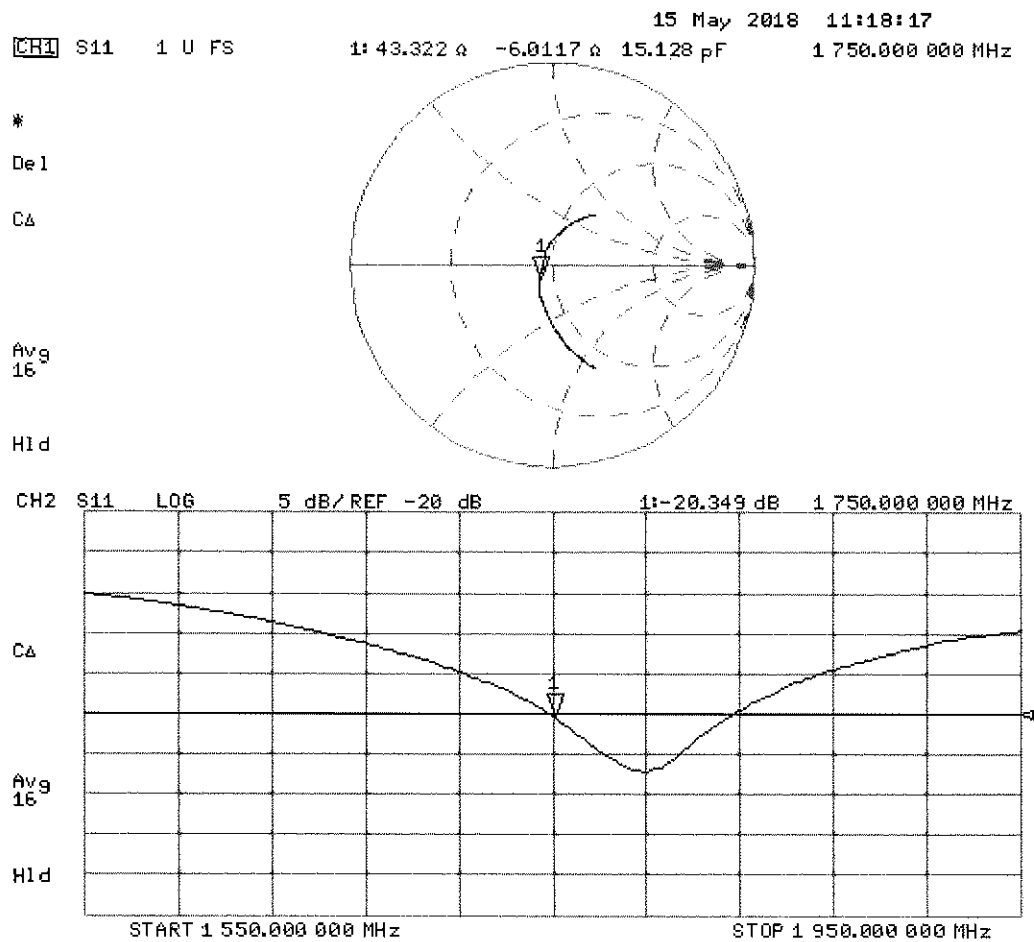
SAR(1 g) = 9.21 W/kg; SAR(10 g) = 4.92 W/kg

Maximum value of SAR (measured) = 13.7 W/kg



0 dB = 13.7 W/kg = 11.37 dBW/kg

Impedance Measurement Plot for Body TSL



DASY5 Validation Report for SAM Head

Date: 23.05.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1765 MHz; Type: D1765V2; Serial: D1765V2 - SN:1008

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.37$ S/m; $\epsilon_r = 41.8$; $\rho = 1000$ kg/m³

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: SAM Head
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

SAM/Head/Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 105.8 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.95 W/kg

Maximum value of SAR (measured) = 13.9 W/kg

SAM/Head/Mouth/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.2 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 16.6 W/kg

SAR(1 g) = 9.47 W/kg; SAR(10 g) = 5.06 W/kg

Maximum value of SAR (measured) = 13.7 W/kg

SAM/Head/Neck/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.7 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 15.8 W/kg

SAR(1 g) = 9.26 W/kg; SAR(10 g) = 5.02 W/kg

Maximum value of SAR (measured) = 13.8 W/kg

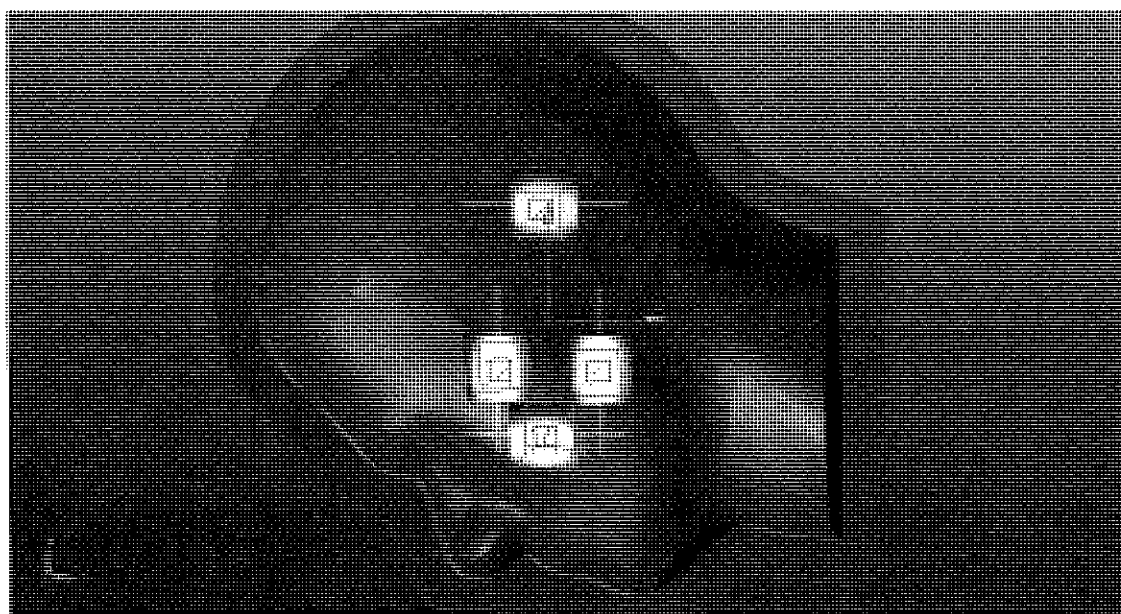
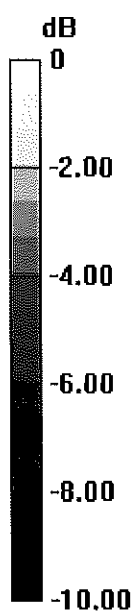
SAM/Head/Ear/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.46 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 11.8 W/kg

SAR(1 g) = 7.12 W/kg; SAR(10 g) = 4.01 W/kg

Maximum value of SAR (measured) = 10.3 W/kg



0 dB = 10.3 W/kg = 10.13 dBW/kg

Certification of Calibration

Object D1765V2 – SN: 1008

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extension Calibration date: 5/17/2019

Description: SAR Validation Dipole at 1750 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	3/11/2019	Annual	3/11/2020	US39170122
Agilent	N5182A	MXG Vector Signal Generator	11/28/2018	Annual	11/28/2019	MY47420603
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Anritsu	MA2411B	Pulse Power Sensor	11/20/2018	Annual	11/20/2019	1027293
Anritsu	MA2411B	Pulse Power Sensor	10/30/2018	Annual	10/30/2019	1126066
Anritsu	ML2495A	Power Meter	10/21/2018	Annual	10/21/2019	941001
Control Company	4040	Therm./ Clock/ Humidity Monitor	10/9/2018	Biennial	10/9/2020	181647811
Control Company	4352	Ultra Long Stem Thermometer	6/6/2018	Biennial	6/6/2020	181334678
Keysight	772D	Dual Directional Coupler	CBT	N/A	CBT	MY52180215
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	6/4/2018	Annual	6/4/2019	MY53401181
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Seekonk	NC-100	Torque Wrench	7/11/2018	Annual	7/11/2019	N/A
SPEAG	EX3DV4	SAR Probe	6/25/2018	Annual	6/25/2019	7409
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/18/2018	Annual	6/18/2019	1334
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	3914
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/14/2019	Annual	2/14/2020	1272
SPEAG	DAK-3.5	Dielectric Assessment Kit	9/11/2018	Annual	9/11/2019	1091

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halfoster	Test Engineer	<i>BRODIE HALFOSTER</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

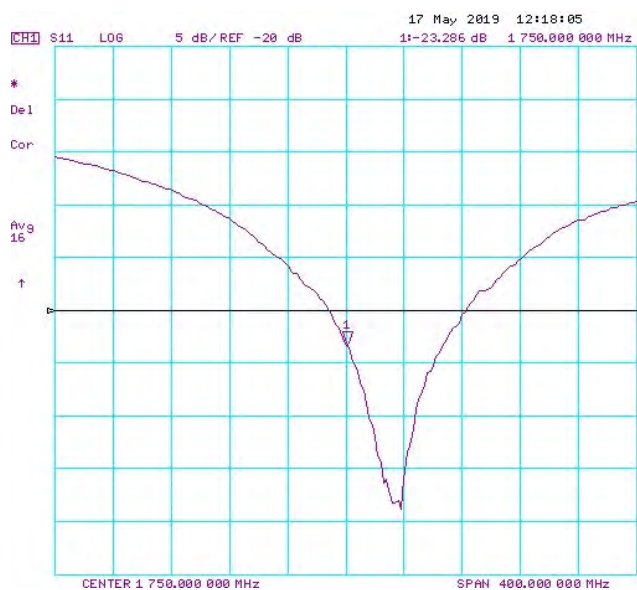
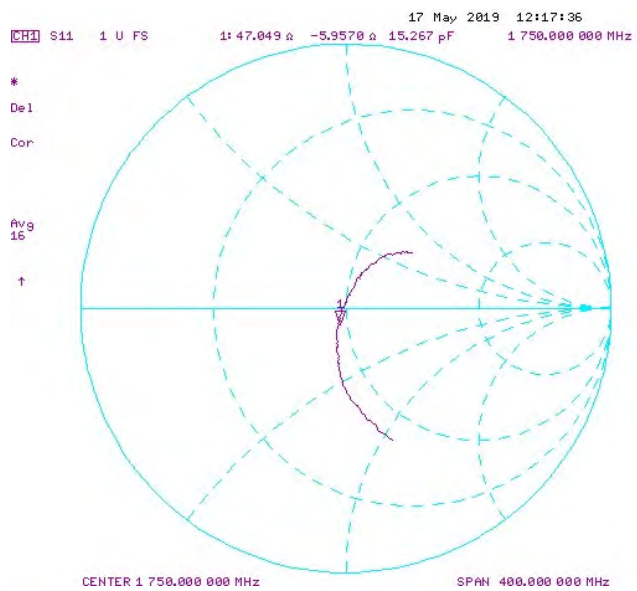
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

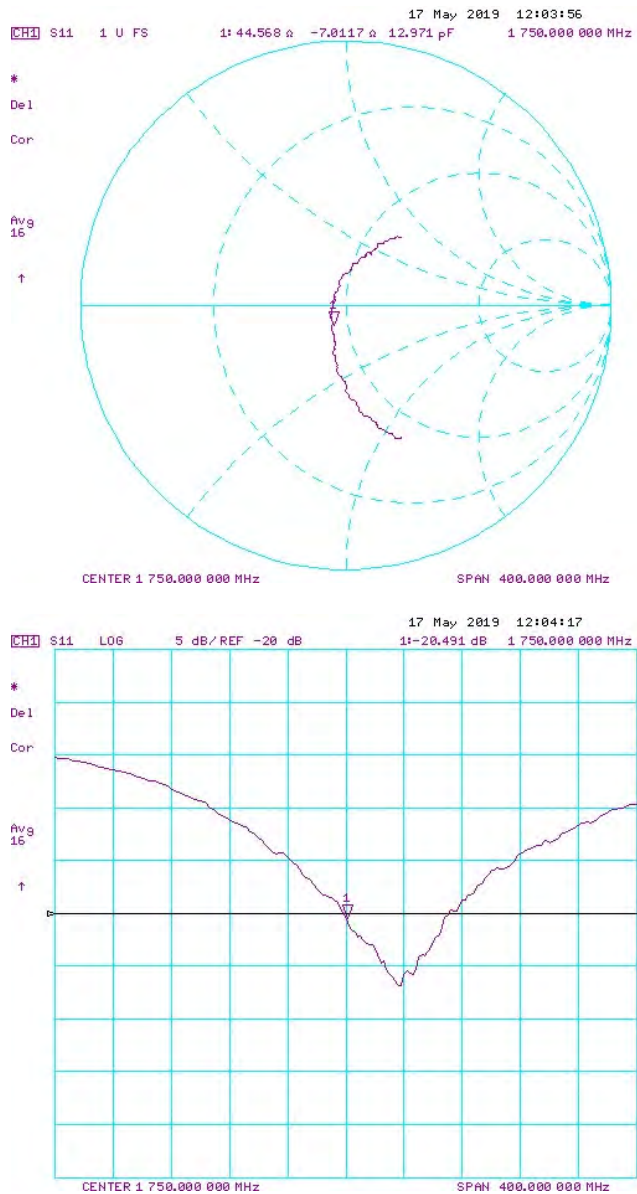
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/23/2018	5/17/2019	1.21	3.62	3.63	0.28%	1.9	1.92	1.05%	47.7	47	0.7	-6.5	-6	0.5	-23	-23.3	-1.20%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/23/2018	5/17/2019	1.21	3.74	3.95	5.61%	1.99	2.08	4.52%	43.3	44.6	1.3	-6	-7	1	-20.3	-20.5	-0.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object **D1765V2 – SN: 1008**

Calibration procedure(s) **Procedure for Calibration Extension for SAR Dipoles.**

Extension Calibration date: **5/23/2020**

Description: **SAR Validation Dipole at 1750 MHz.**

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable DAK	9/10/2019	Annual	9/10/2020	1045
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench (8" lb)	5/23/2018	Biennial	5/23/2020	22217
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	4/21/2020	Annual	4/21/2021	7357
SPEAG	EX3DV4	SAR Probe	7/16/2019	Annual	7/16/2020	7410
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2019	Annual	7/11/2020	1322
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/12/2020	Annual	3/12/2021	1368

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halfoster	Test Engineer	<i>BRODIE HALFOSTER</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

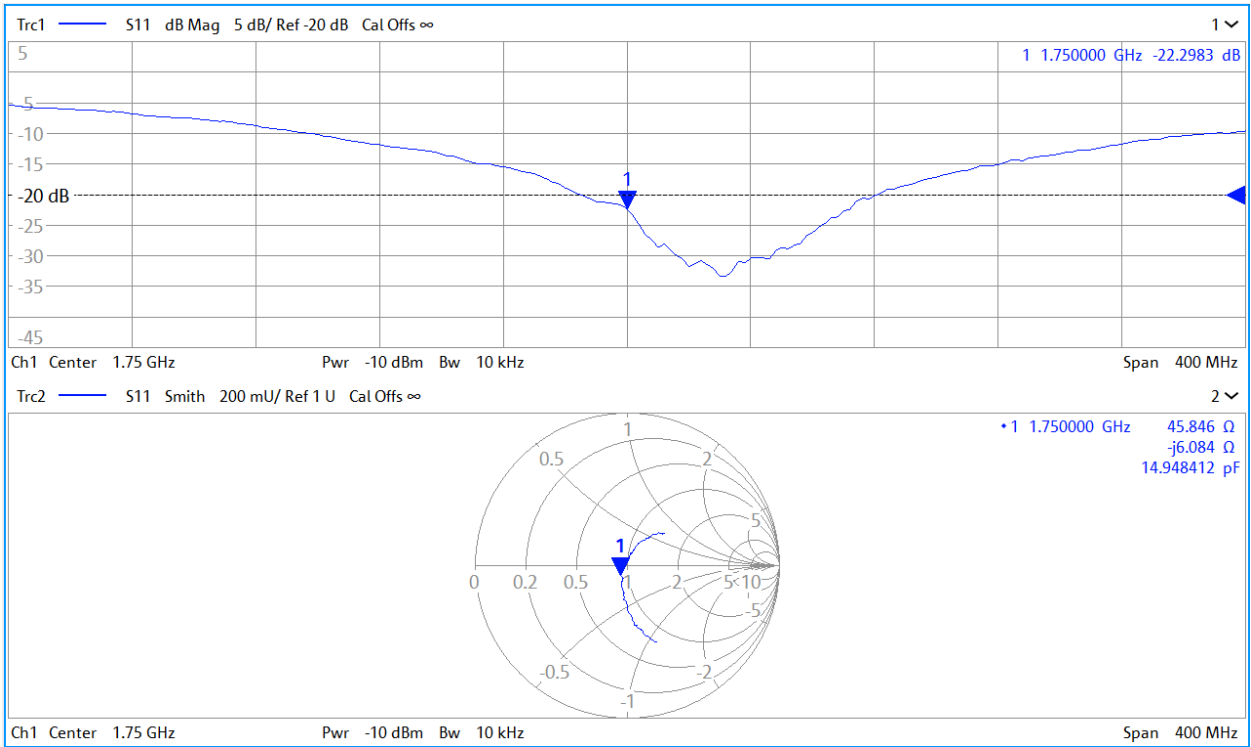
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

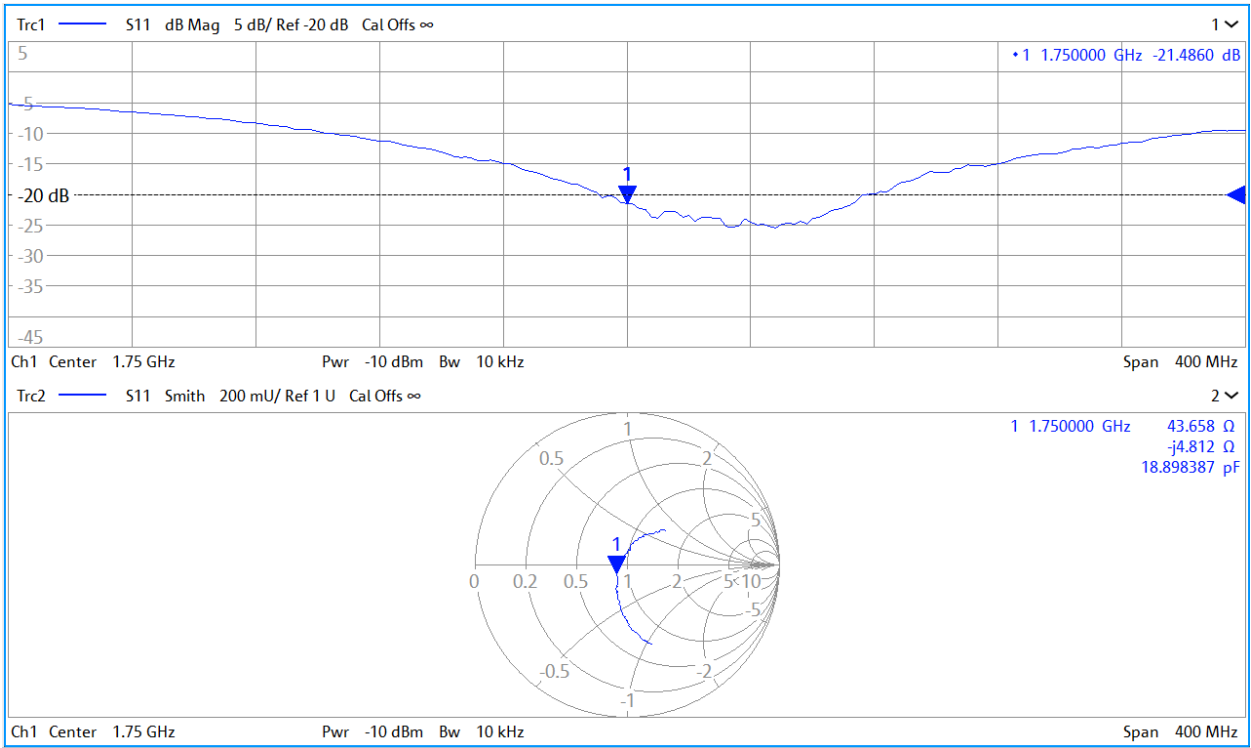
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
5/23/2018	5/23/2020	1.21	3.62	3.65	0.83%	1.90	1.94	2.11%	47.7	45.9	1.9	-6.5	-6.1	0.4	-23	-22.3	3.10%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
5/23/2018	5/23/2020	1.21	3.74	4.00	6.95%	1.99	2.12	6.53%	43.3	43.7	0.4	-6.0	-4.8	1.2	-20.3	-21.5	-5.90%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1900V2-5d080_Oct18**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d080**

Calibration procedure(s) **QA CAL-05 v10**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **October 23, 2018**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 23, 2018

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.3 $\pm$ 6 %	1.40 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.7 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.9 $\pm$ 6 %	1.47 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.2 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.6 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5 Ω + 7.9 j Ω
Return Loss	- 21.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω + 8.1 j Ω
Return Loss	- 21.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.193 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 28, 2006

DASY5 Validation Report for Head TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d080

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.18, 8.18, 8.18) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

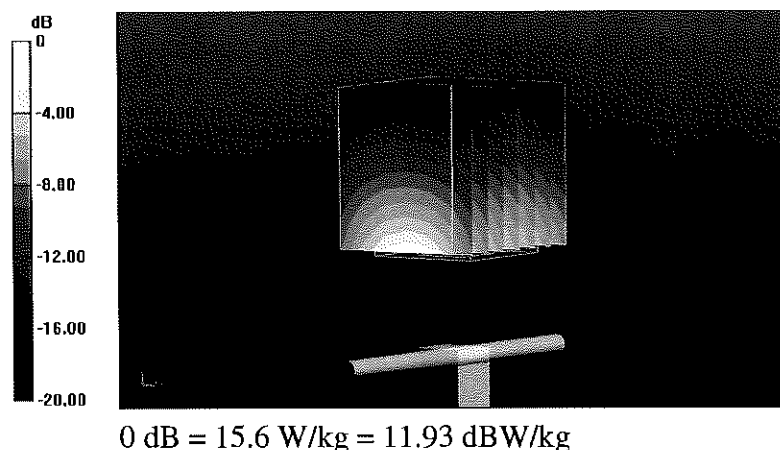
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 110.0 V/m; Power Drift = -0.05 dB

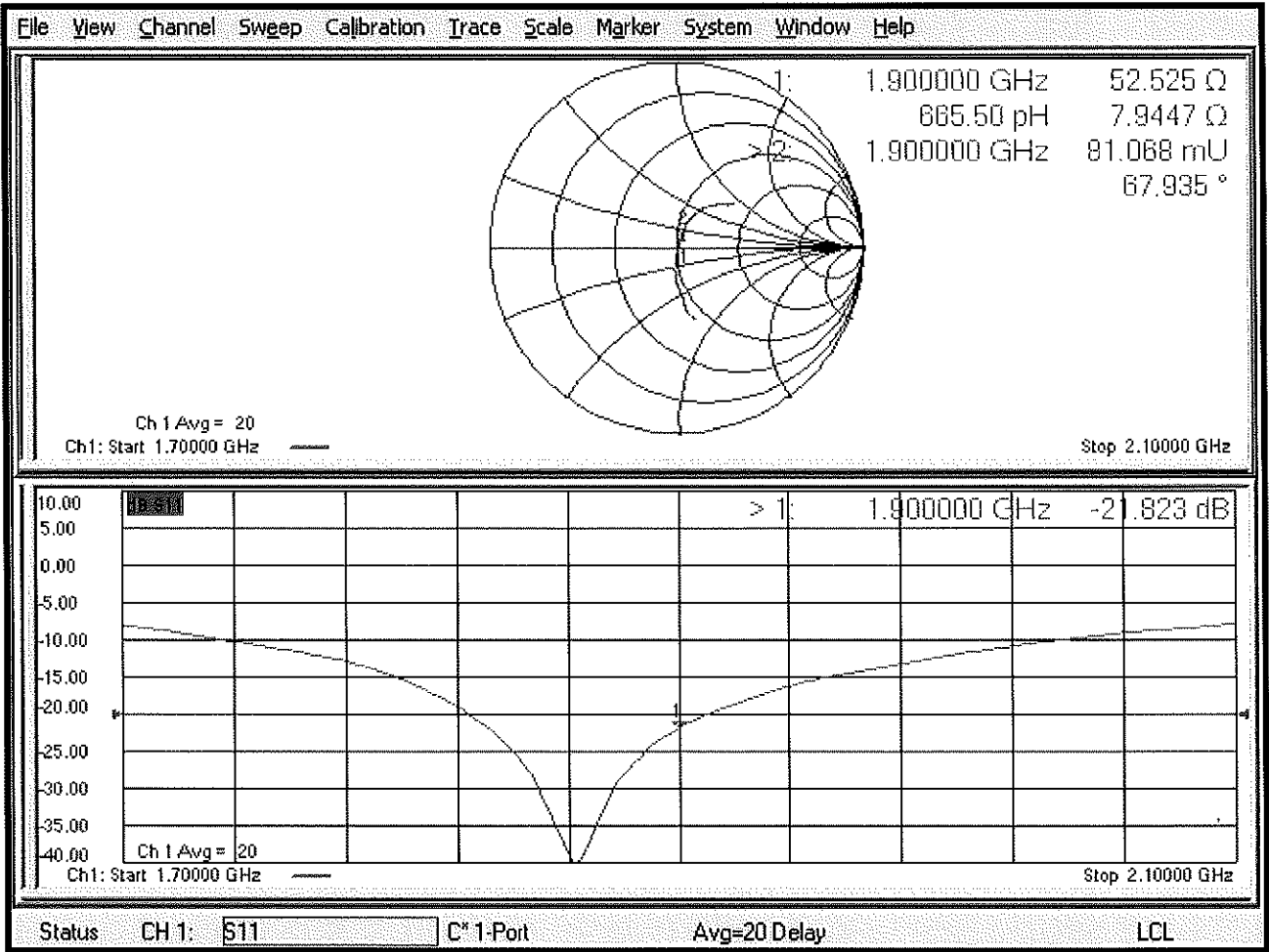
Peak SAR (extrapolated) = 18.7 W/kg

SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.18 W/kg

Maximum value of SAR (measured) = 15.6 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 23.10.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d080

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.47$ S/m; $\epsilon_r = 52.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.15, 8.15, 8.15) @ 1900 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

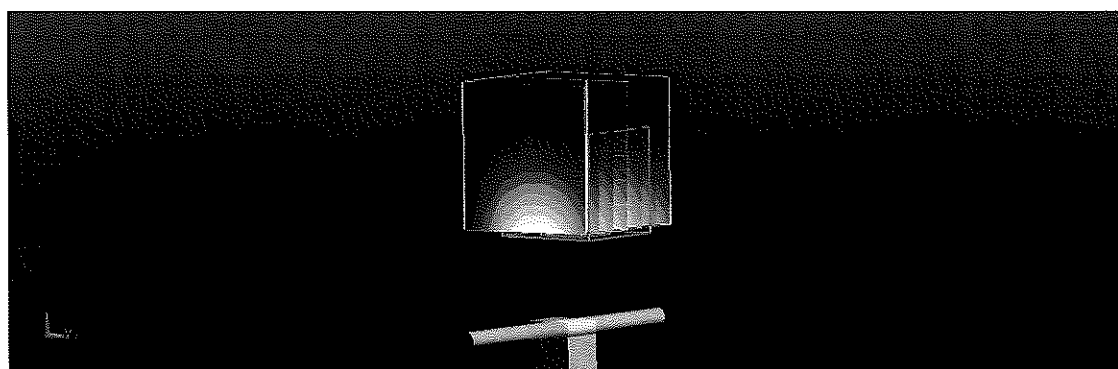
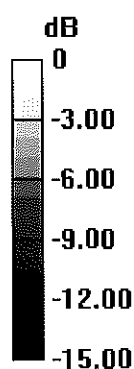
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.86 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 17.3 W/kg

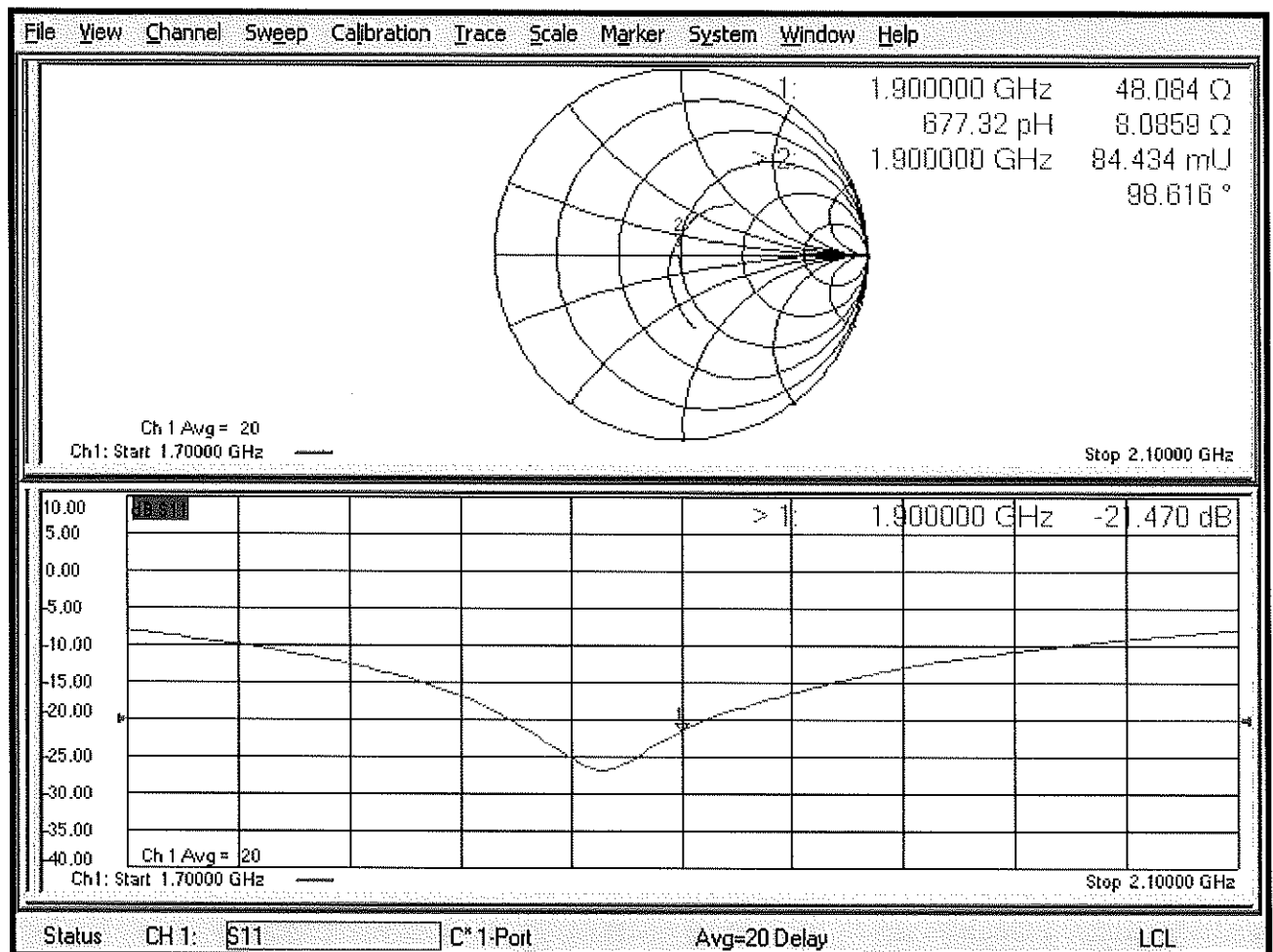
SAR(1 g) = 9.62 W/kg; SAR(10 g) = 5.09 W/kg

Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.49 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1900V2 – SN:5d080

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extended Calibration date: October 18, 2019

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/13/2019	Annual	8/13/2020	1041
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	11/20/2018	Annual	11/20/2019	1039008
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	2/19/2019	Annual	2/19/2020	3914
SPEAG	EX3DV4	SAR Probe	5/16/2019	Annual	5/16/2020	7406
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/8/2019	Annual	5/8/2020	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/14/2019	Annual	2/14/2020	1272

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path.

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halfoster	Team Lead Engineer	<i>BRODIE HALFOSTER</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

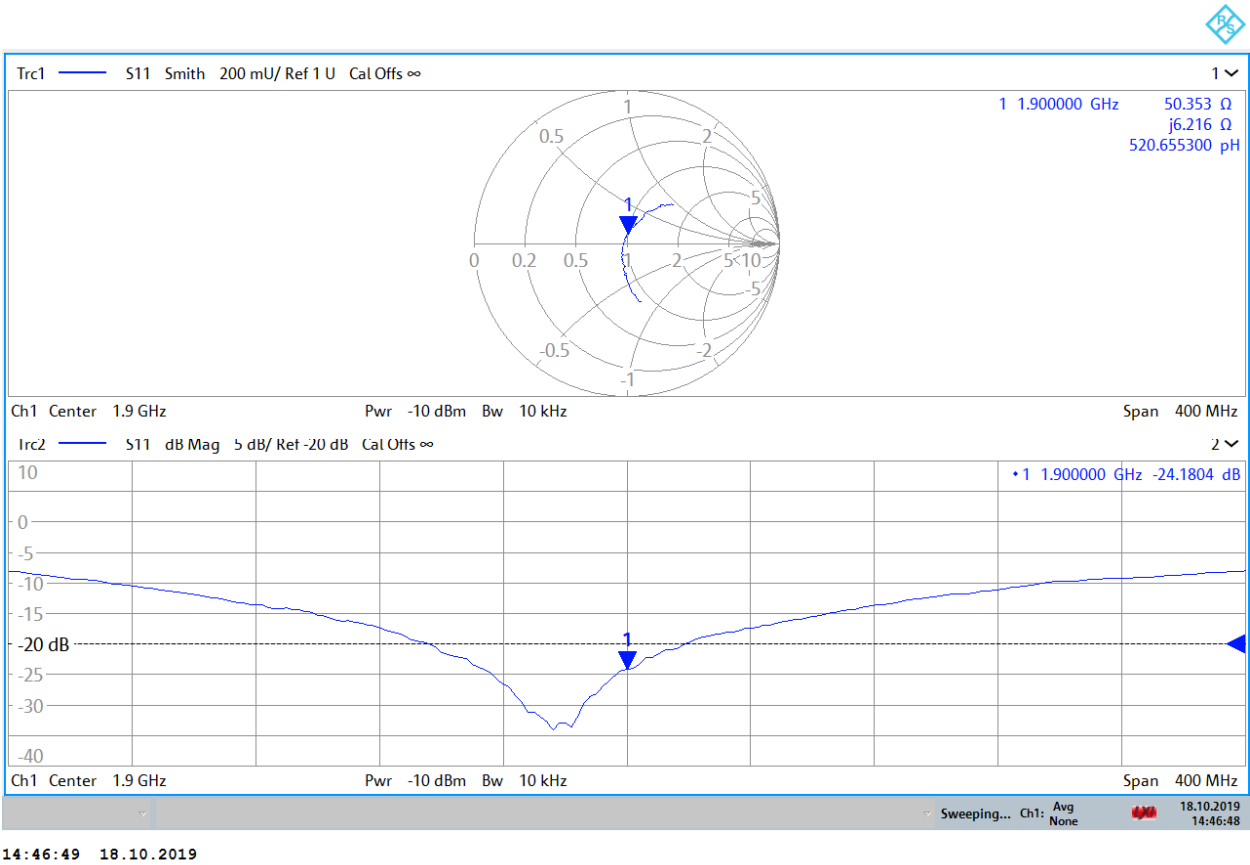
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

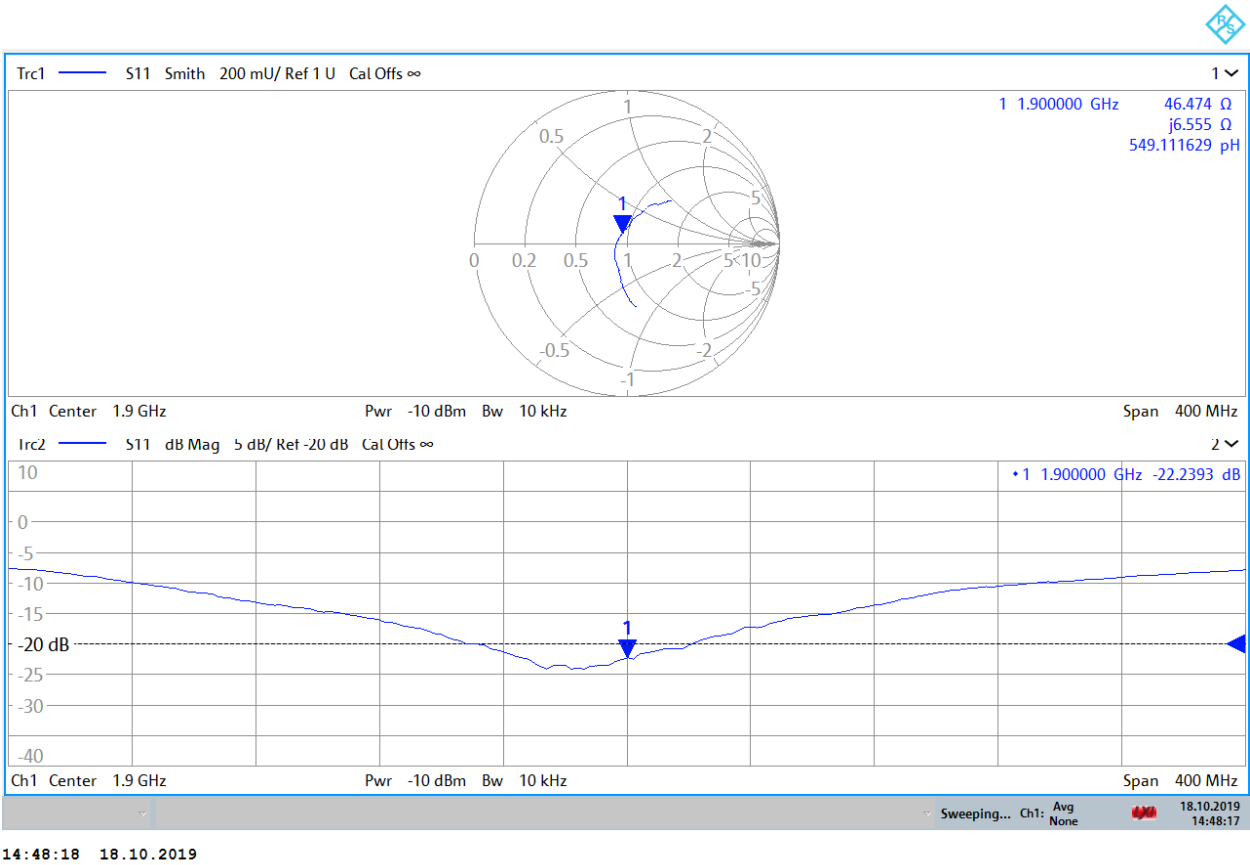
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
10/23/2018	10/18/2019	1.193	3.98	4.16	4.52%	2.07	2.13	2.90%	52.5	50.4	2.1	7.9	6.2	1.7	-21.8	-24.2	-10.90%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
10/23/2018	10/18/2019	1.193	3.92	4.21	7.40%	2.06	2.16	4.85%	48.1	46.5	1.6	8.1	6.6	1.5	-21.5	-22.2	-3.40%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



Certification of Calibration

Object: D1900V2 – SN: 5d080

Calibration procedure(s): Procedure for Calibration Extension for SAR Dipoles.

Extension Calibration date: 10/18/2020

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	11/29/2018	Biennial	11/29/2020	181766816
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Agilent	85033E	3.5mm Standard Calibration Kit	6/6/2020	Annual	6/6/2021	MY53402352
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	9/29/2020	Annual	9/29/2021	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/12/2020	Annual	5/12/2021	1070
Anritsu	MA2411B	Pulse Power Sensor	8/12/2020	Annual	8/12/2021	1207364
Anritsu	MA2411B	Pulse Power Sensor	9/22/2020	Annual	9/22/2021	1315051
Anritsu	ML2495A	Power Meter	1/15/2020	Annual	1/15/2021	1328004
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Agilent	N5182A	MXG Vector Signal Generator	5/13/2020	Annual	5/13/2021	MY47420603
Pasternack	NC-100	Torque Wrench	8/4/2020	Biennial	8/4/2022	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	3/18/2020	Annual	3/18/2021	7526
SPEAG	EX3DV4	SAR Probe	12/11/2019	Annual	12/11/2020	7570
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/18/2019	Annual	12/18/2020	859
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/12/2020	Annual	3/12/2021	1368

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halfoster	Test Engineer	<i>BRODIE HALFOSTER</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

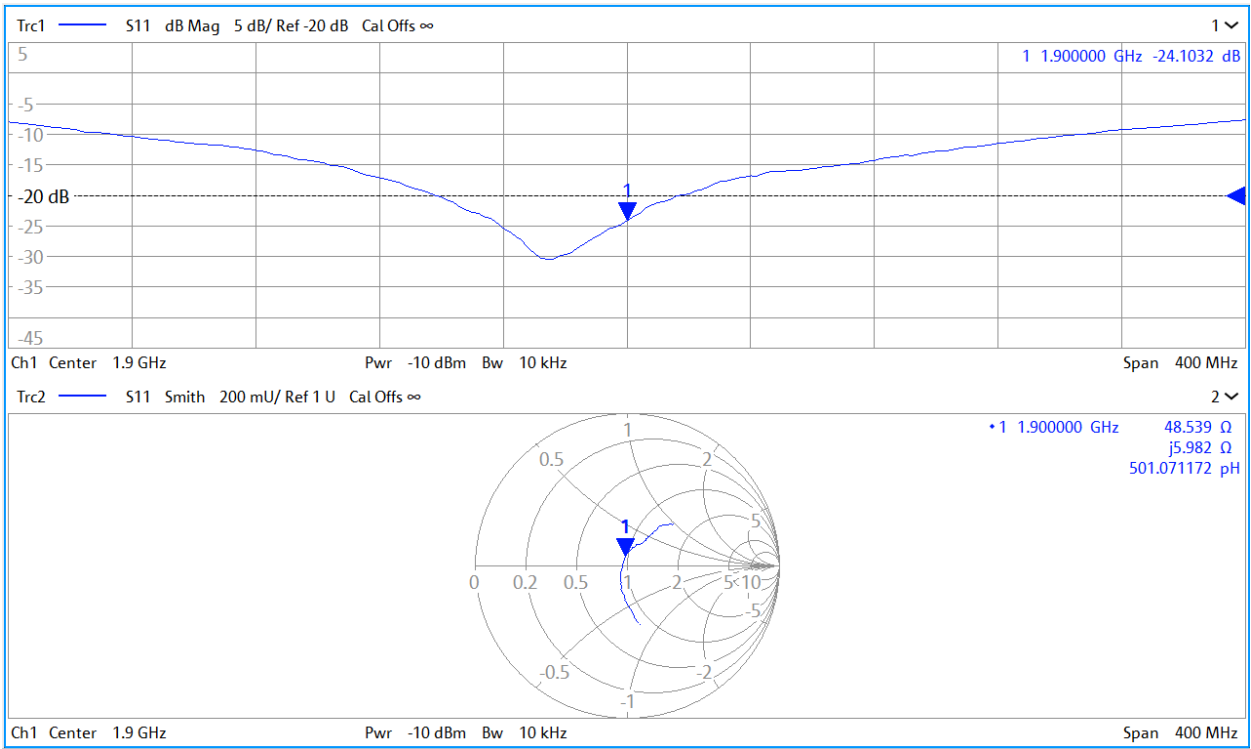
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

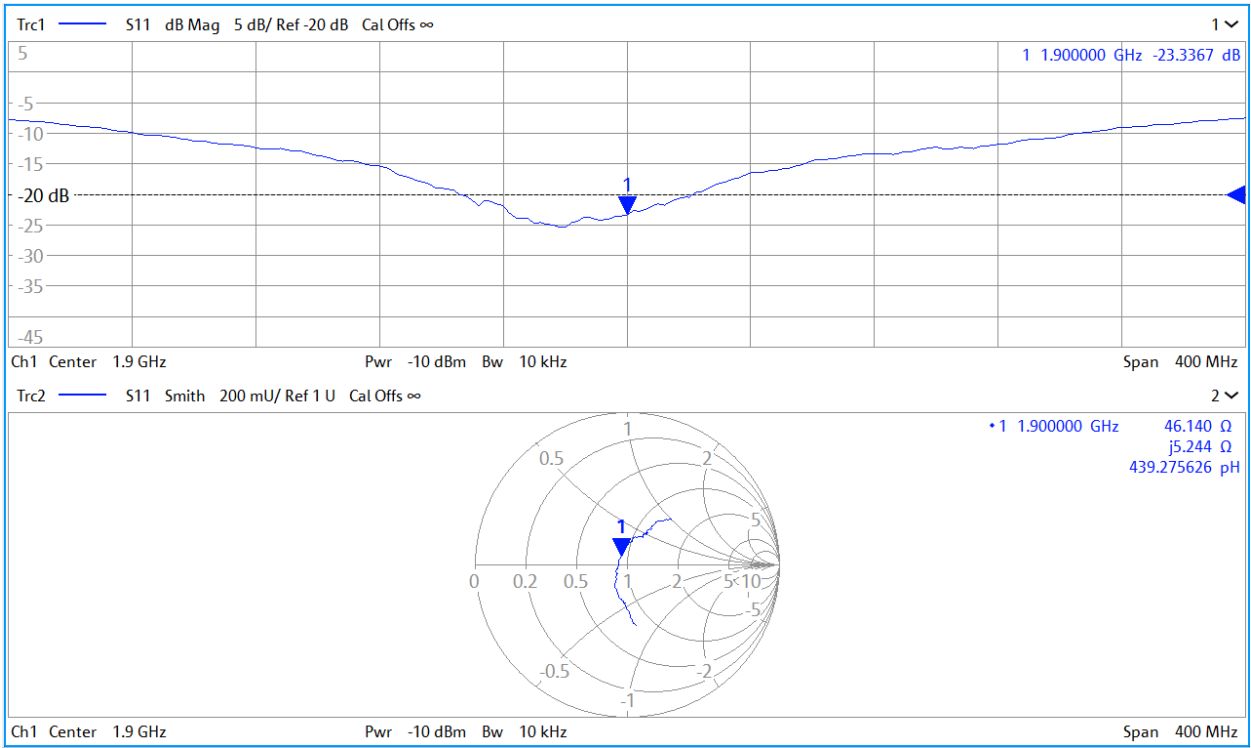
The following dipole was checked to pass the above 3 requirements to have 3-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
10/23/2018	10/18/2020	1.193	3.98	4.01	0.75%	2.07	2.05	-0.97%	52.5	49.5	4	7.9	6	1.9	-21.8	-24.1	-10.60%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
10/23/2018	10/18/2020	1.193	3.92	4.24	8.16%	2.06	2.18	5.83%	48.1	46.1	2	8.1	5.2	2.9	-21.5	-23.3	-8.50%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL





Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **D1900V2-5d148 Feb19**

CALIBRATION CERTIFICATE

Object **D1900V2 - SN:5d148**

Calibration procedure(s) **QA CAL-05.v11**
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: **February 21, 2019**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	31-Dec-18 (No. EX3-7349_Dec18)	Dec-19
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	07-Oct-15 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

Calibrated by: **Name** **Manu Seltz** **Function** **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Signature

Issued: February 21, 2019

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.9 $\pm$ 6 %	1.38 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.65 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.1 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.4 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.6 $\pm$ 6 %	1.47 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.56 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.1 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.5 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$51.8 \Omega + 6.8 j\Omega$
Return Loss	- 23.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.4 \Omega + 7.8 j\Omega$
Return Loss	- 21.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.170 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------

DASY5 Validation Report for Head TSL

Date: 21.02.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d148

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.38$ S/m; $\epsilon_r = 40.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.26, 8.26, 8.26) @ 1900 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

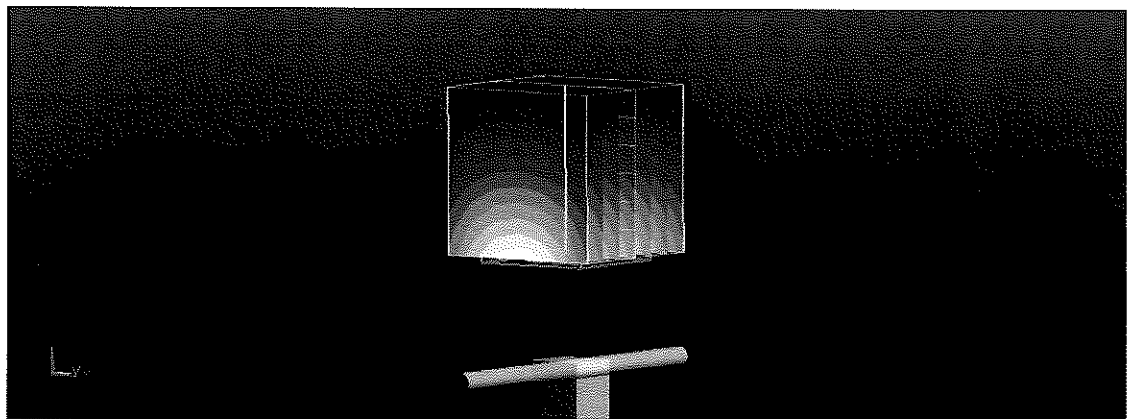
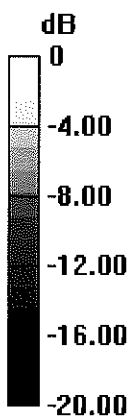
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 109.4 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.8 W/kg

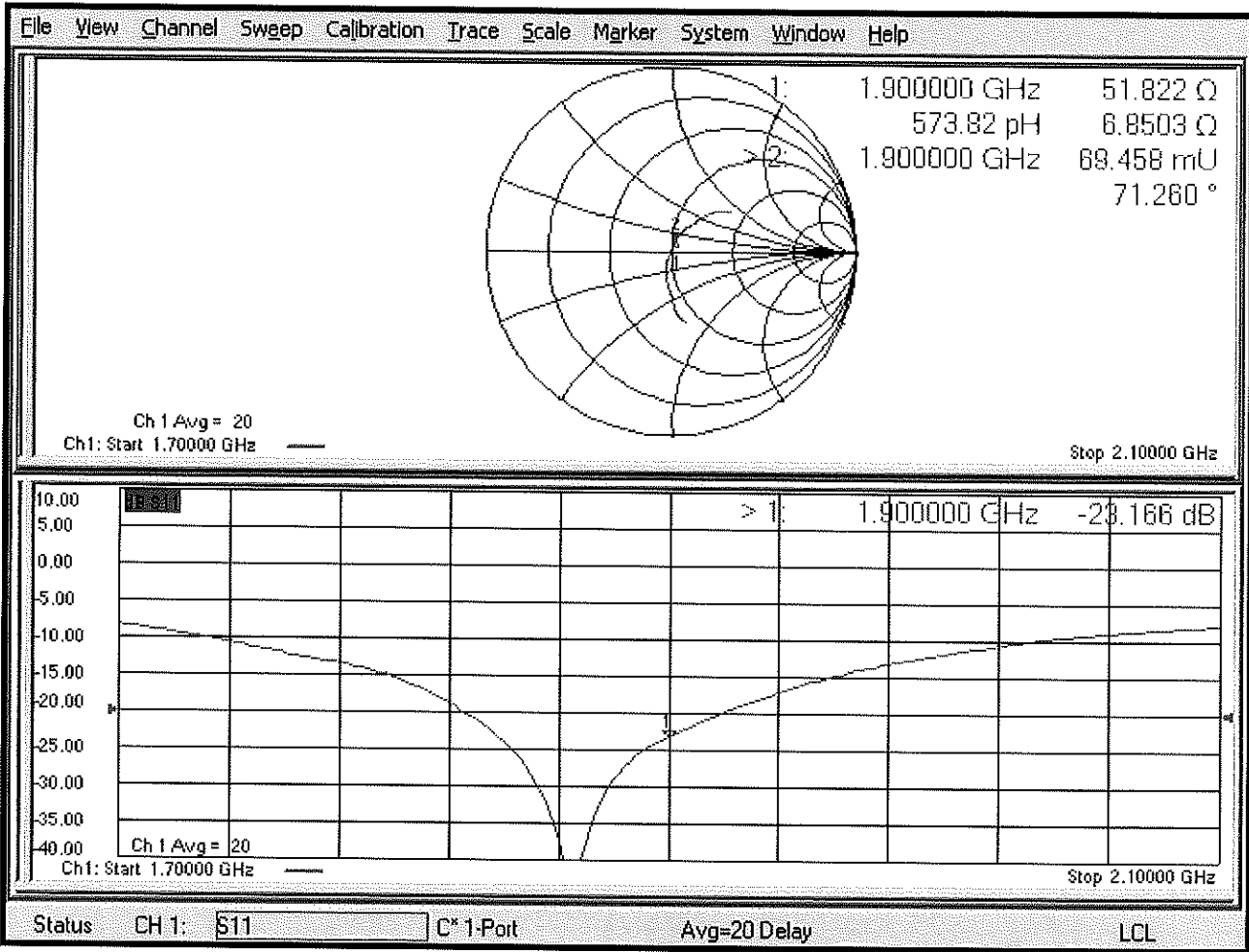
SAR(1 g) = 9.65 W/kg; SAR(10 g) = 5.05 W/kg

Maximum value of SAR (measured) = 15.0 W/kg



0 dB = 15.0 W/kg = 11.76 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.02.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d148

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.47$ S/m; $\epsilon_r = 53.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.23, 8.23, 8.23) @ 1900 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

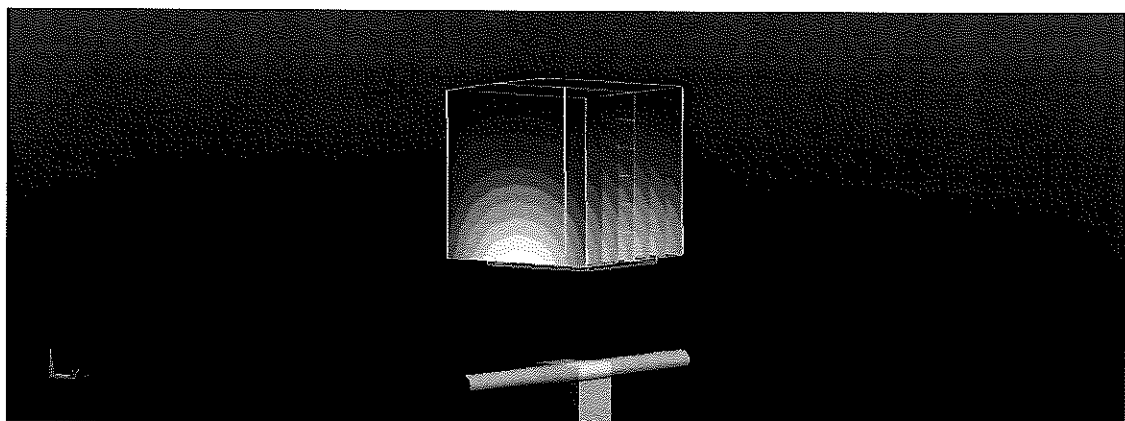
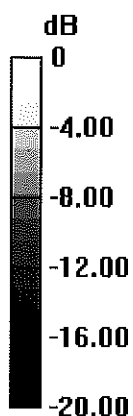
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.7 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 17.0 W/kg

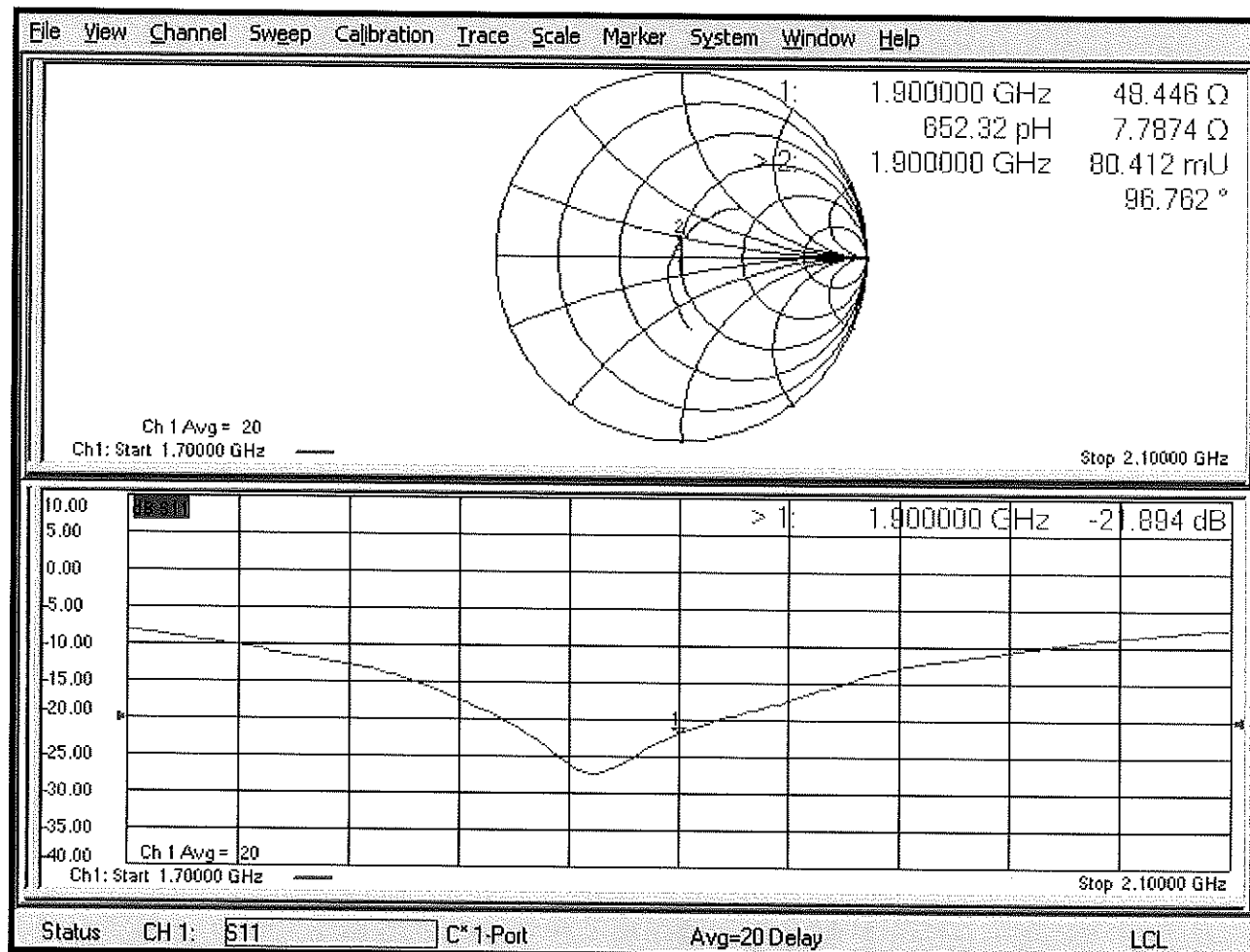
SAR(1 g) = 9.56 W/kg; SAR(10 g) = 5.05 W/kg

Maximum value of SAR (measured) = 14.4 W/kg



0 dB = 14.4 W/kg = 11.58 dBW/kg

Impedance Measurement Plot for Body TSL



Certification of Calibration

Object D1900V2 – SN: 5d148

Calibration procedure(s) Procedure for Calibration Extension for SAR Dipoles.

Extension Calibration date: 2/21/2020

Description: SAR Validation Dipole at 1900 MHz.

Calibration Equipment used:

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4352	Ultra Long Stem Thermometer	8/2/2018	Biennial	8/2/2020	181334684
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433971
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Keysight Technologies	85033E	Standard Mechanical Calibration Kit (DC to 9GHz, 3.5mm)	7/2/2019	Annual	7/2/2020	MY53401181
Rohde & Schwarz	ZNLE6	Vector Network Analyzer	10/11/2019	Annual	10/11/2020	101307
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
SPEAG	DAKS-3.5	Portable DAK	9/10/2019	Annual	9/10/2020	1045
Anritsu	MA2411B	Pulse Power Sensor	8/14/2019	Annual	8/14/2020	1315051
Anritsu	MA2411B	Pulse Power Sensor	8/8/2019	Annual	8/8/2020	1339008
Anritsu	ML2495A	Power Meter	12/17/2019	Annual	12/17/2020	941001
Agilent	N5182A	MXG Vector Signal Generator	8/19/2019	Annual	8/19/2020	MY47420837
Seekonk	NC-100	Torque Wrench	5/9/2018	Biennial	5/9/2020	22217
MiniCircuits	ZHDC-16-63-S+	Bidirectional Coupler	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
SPEAG	EX3DV4	SAR Probe	9/19/2019	Annual	9/19/2020	7551
SPEAG	EX3DV4	SAR Probe	7/16/2019	Annual	7/16/2020	7410
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/17/2019	Annual	9/17/2020	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/11/2019	Annual	7/11/2020	1322

Measurement Uncertainty = $\pm 23\%$ (k=2)

	Name	Function	Signature
Calibrated By:	Brodie Halfoster	Test Engineer	<i>BRODIE HALFOSTER</i>
Approved By:	Kaitlin O'Keefe	Senior Technical Manager	<i>KOK</i>

DIPOLE CALIBRATION EXTENSION

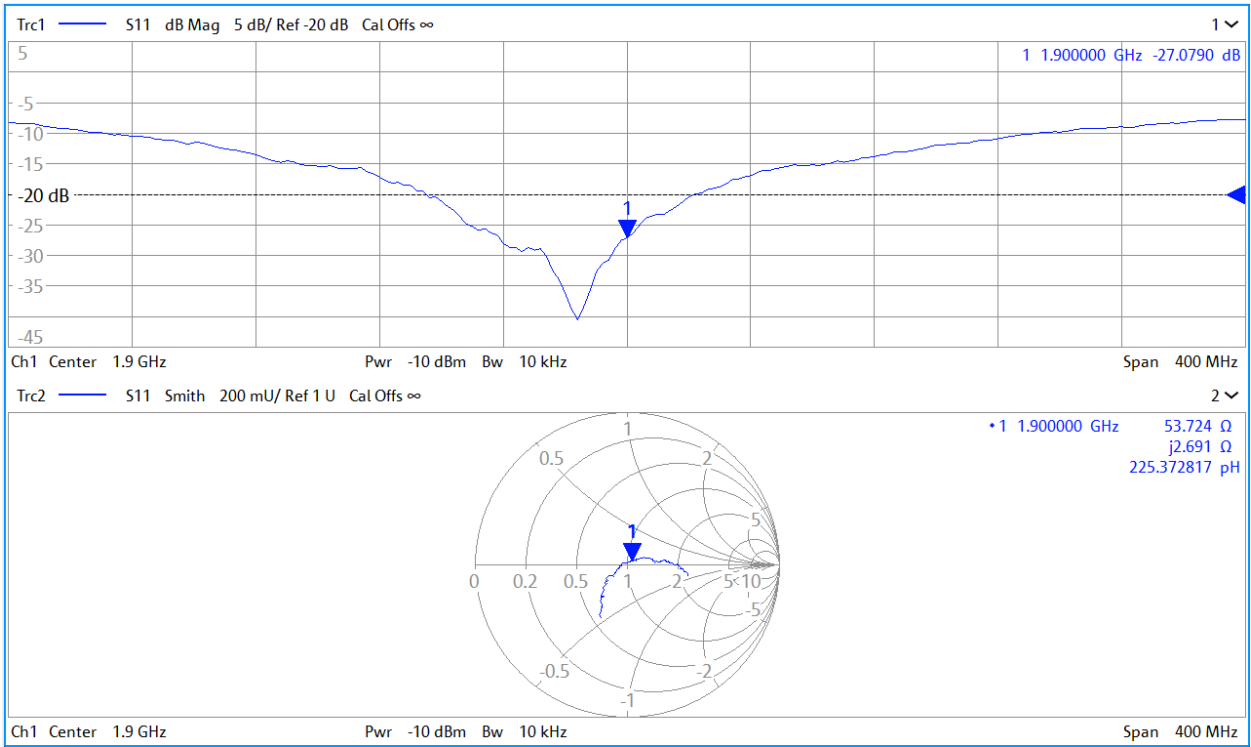
Per KDB 865664 D01, calibration intervals of up to three years may be considered for reference dipoles when it is demonstrated that the SAR target, impedance and return loss of a dipole have remained stable according to the following requirements:

1. The measured SAR does not deviate more than 10% from the target on the calibration certificate.
2. The return-loss does not deviate more than 20% from the previous measurement and meets the required 20dB minimum return-loss requirement.
3. The measurement of real or imaginary parts of impedance does not deviate more than 5Ω from the previous measurement.

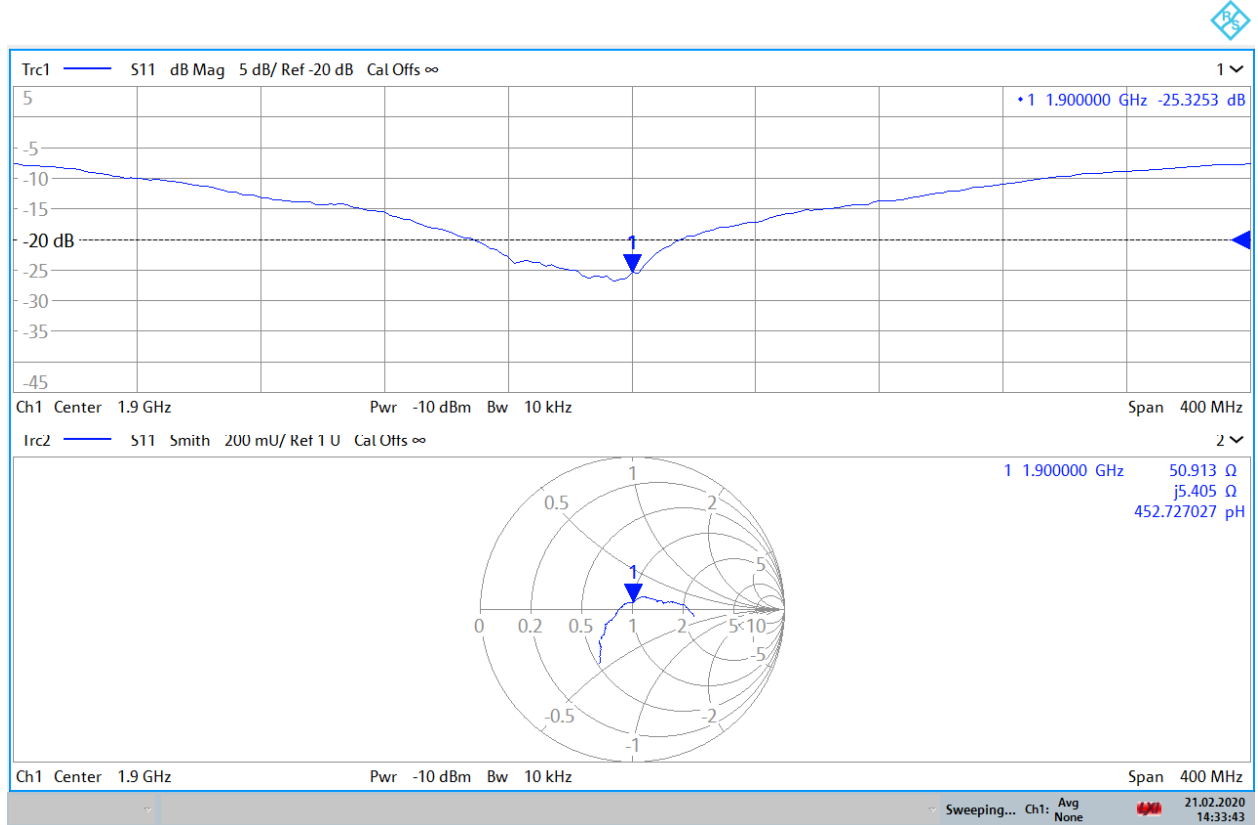
The following dipole was checked to pass the above 3 requirements to have 2-year calibration period from the calibration date:

Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Head (1g) W/kg @ 20.0 dBm	Measured Head SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Head (10g) W/kg @ 20.0 dBm	Measured Head SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Head (Ohm) Real	Measured Impedance Head (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Head (Ohm) Imaginary	Measured Impedance Head (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Head (dB)	Measured Return Loss Head (dB)	Deviation (%)	PASS/FAIL
2/21/2019	2/21/2020	1.17	3.91	4.15	5.14%	2.04	2.13	4.41%	51.8	53.7	1.9	6.8	2.7	4.1	-23.2	-27.1	-16.70%	PASS
Calibration Date	Extension Date	Certificate Electrical Delay (ns)	Certificate SAR Target Body (1g) W/kg @ 20.0 dBm	Measured Body SAR (1g) W/kg @ 20.0 dBm	Deviation 1g (%)	Certificate SAR Target Body (10g) W/kg @ 20.0 dBm	Measured Body SAR (10g) W/kg @ 20.0 dBm	Deviation 10g (%)	Certificate Impedance Body (Ohm) Real	Measured Impedance Body (Ohm) Real	Difference (Ohm) Real	Certificate Impedance Body (Ohm) Imaginary	Measured Impedance Body (Ohm) Imaginary	Difference (Ohm) Imaginary	Certificate Return Loss Body (dB)	Measured Return Loss Body (dB)	Deviation (%)	PASS/FAIL
2/21/2019	2/21/2020	1.17	3.91	4.06	3.84%	2.05	2.08	1.46%	48.4	50.9	2.5	7.8	5.4	2.4	-21.9	-25.3	-15.60%	PASS

Impedance & Return-Loss Measurement Plot for Head TSL



Impedance & Return-Loss Measurement Plot for Body TSL



14:33:44 21.02.2020



Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **EX3-7308_Jul20**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:7308**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v7**
Calibration procedure for dosimetric E-field probes

Calibration date: **July 31, 2020**

BNV
08-12-20

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

Calibrated by:	Name Jeffrey Katzman	Function Laboratory Technician	Signature <i>J. Katzman</i>
Approved by:	Katja Pokovic	Technical Manager	<i>K. Pokovic</i>
			Issued: August 3, 2020
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			



Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7308

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.53	0.61	0.56	$\pm 10.1 \%$
DCP (mV) ^B	104.4	99.0	106.4	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Max Unc ^E (k=2)
0	CW	X	0.00	0.00	1.00	0.00	146.9	$\pm 2.7 \%$	$\pm 4.7 \%$
		Y	0.00	0.00	1.00		158.2		
		Z	0.00	0.00	1.00		156.4		
10352- AAA	Pulse Waveform (200Hz, 10%)	X	1.46	60.26	6.19	10.00	60.0	$\pm 4.3 \%$	$\pm 9.6 \%$
		Y	20.00	89.73	19.39		60.0		
		Z	1.50	60.51	6.24		60.0		
10353- AAA	Pulse Waveform (200Hz, 20%)	X	0.78	60.00	4.85	6.99	80.0	$\pm 2.8 \%$	$\pm 9.6 \%$
		Y	20.00	90.88	18.95		80.0		
		Z	0.84	60.00	4.89		80.0		
10354- AAA	Pulse Waveform (200Hz, 40%)	X	0.00	124.60	1.75	3.98	95.0	$\pm 2.3 \%$	$\pm 9.6 \%$
		Y	20.00	95.39	19.95		95.0		
		Z	24.00	72.00	7.00		95.0		
10355- AAA	Pulse Waveform (200Hz, 60%)	X	0.00	157.40	29.42	2.22	120.0	$\pm 1.3 \%$	$\pm 9.6 \%$
		Y	20.00	103.21	22.47		120.0		
		Z	9.89	157.50	12.37		120.0		
10387- AAA	QPSK Waveform, 1 MHz	X	0.50	62.36	11.61	1.00	150.0	$\pm 2.9 \%$	$\pm 9.6 \%$
		Y	1.81	65.93	15.30		150.0		
		Z	0.48	63.23	12.19		150.0		
10388- AAA	QPSK Waveform, 10 MHz	X	1.26	64.94	13.31	0.00	150.0	$\pm 1.0 \%$	$\pm 9.6 \%$
		Y	2.39	68.44	16.00		150.0		
		Z	1.27	65.95	13.66		150.0		
10396- AAA	64-QAM Waveform, 100 kHz	X	1.62	63.64	15.27	3.01	150.0	$\pm 0.9 \%$	$\pm 9.6 \%$
		Y	3.13	71.23	19.24		150.0		
		Z	1.70	64.72	15.82		150.0		
10399- AAA	64-QAM Waveform, 40 MHz	X	2.76	65.87	14.83	0.00	150.0	$\pm 1.4 \%$	$\pm 9.6 \%$
		Y	3.64	67.35	15.94		150.0		
		Z	2.76	66.43	15.07		150.0		
10414- AAA	WLAN CCDF, 64-QAM, 40MHz	X	3.72	65.63	15.03	0.00	150.0	$\pm 2.5 \%$	$\pm 9.6 \%$
		Y	5.05	65.79	15.65		150.0		
		Z	3.68	66.09	15.18		150.0		

Note: For details on UID parameters see Appendix

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of Norm X,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7308

Sensor Model Parameters

	C1 fF	C2 fF	α V ⁻¹	T1 ms.V ⁻²	T2 ms.V ⁻¹	T3 ms	T4 V ⁻²	T5 V ⁻¹	T6
X	9.4	67.91	33.50	1.58	0.00	4.90	0.42	0.00	1.00
Y	56.4	422.55	35.70	12.94	0.00	5.03	1.33	0.25	1.01
Z	8.4	59.71	32.47	4.24	0.00	4.90	0.53	0.00	1.00

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-163.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Note: Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7308

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unc (k=2)
750	41.9	0.89	10.63	10.63	10.63	0.37	0.90	± 12.0 %
835	41.5	0.90	10.17	10.17	10.17	0.40	0.90	± 12.0 %
1750	40.1	1.37	8.55	8.55	8.55	0.26	0.86	± 12.0 %
1900	40.0	1.40	8.20	8.20	8.20	0.27	0.86	± 12.0 %
2300	39.5	1.67	7.70	7.70	7.70	0.30	0.90	± 12.0 %
2450	39.2	1.80	7.33	7.33	7.33	0.35	0.90	± 12.0 %
2600	39.0	1.96	7.19	7.19	7.19	0.37	0.90	± 12.0 %

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7308

Calibration Parameter Determined in Body Tissue Simulating Media

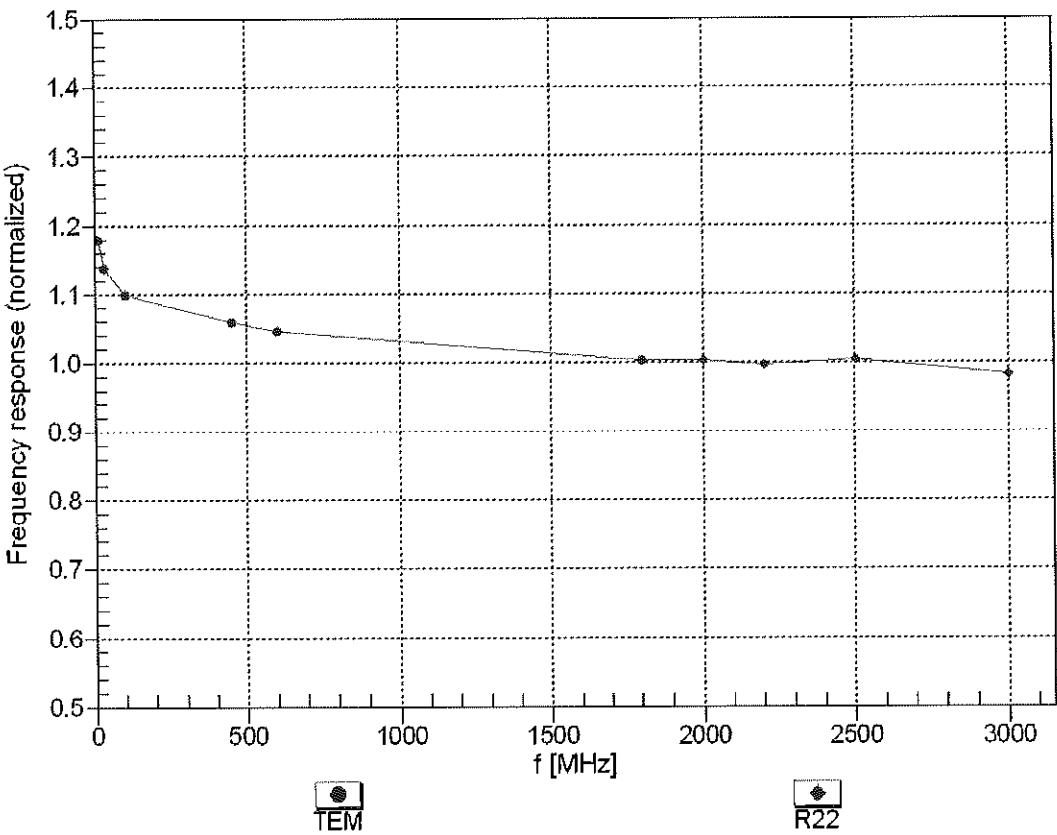
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unc (k=2)
750	55.5	0.96	10.19	10.19	10.19	0.42	0.83	± 12.0 %
835	55.2	0.97	9.92	9.92	9.92	0.38	0.90	± 12.0 %
1750	53.4	1.49	8.20	8.20	8.20	0.33	0.86	± 12.0 %
1900	53.3	1.52	7.77	7.77	7.77	0.34	0.92	± 12.0 %
2300	52.9	1.81	7.61	7.61	7.61	0.40	0.90	± 12.0 %
2450	52.7	1.95	7.41	7.41	7.41	0.32	0.95	± 12.0 %
2600	52.5	2.16	7.37	7.37	7.37	0.29	0.95	± 12.0 %

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)

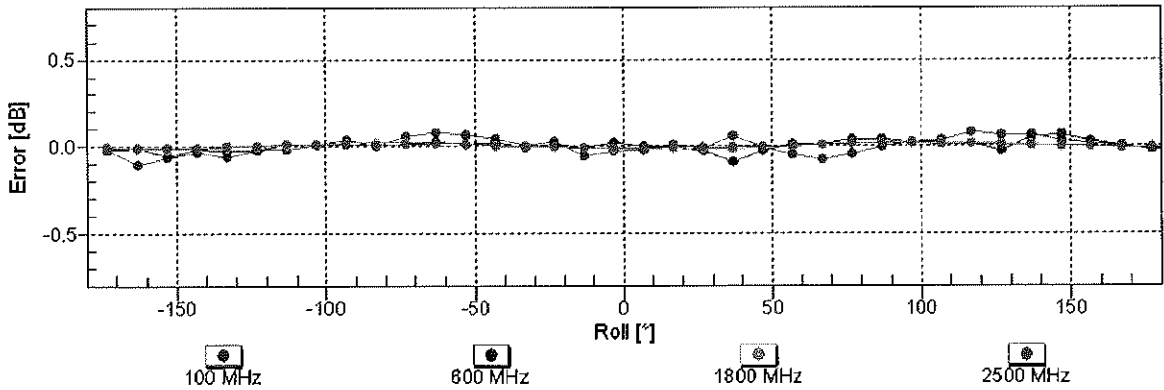
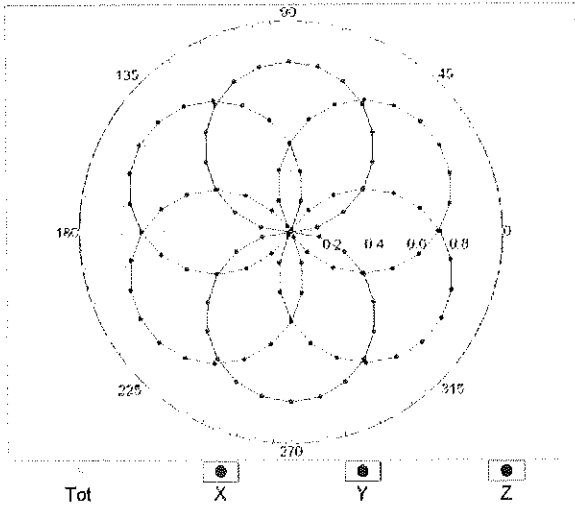
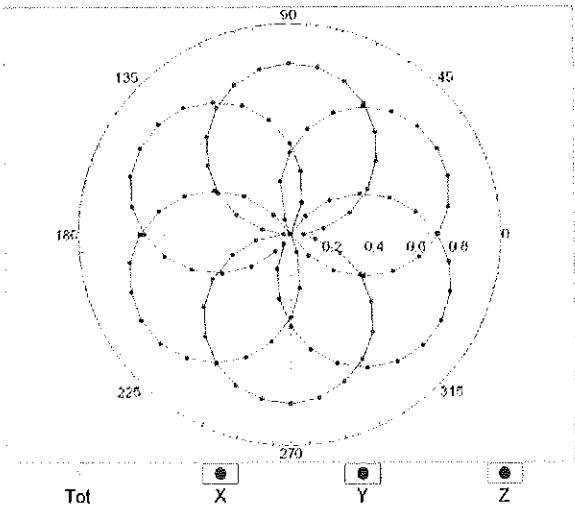


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Receiving Pattern (ϕ), $\theta = 0^\circ$

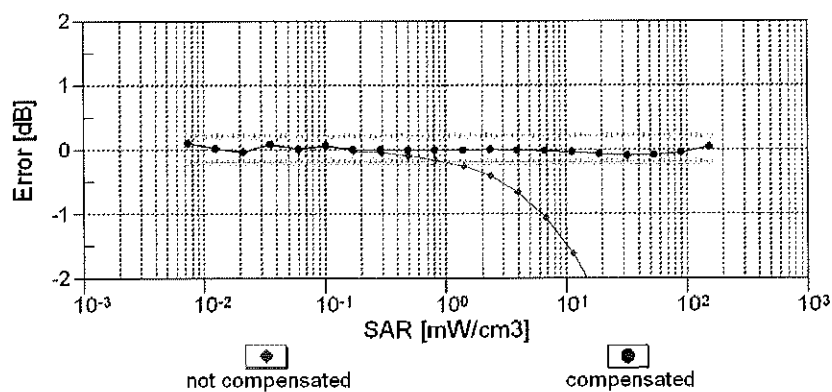
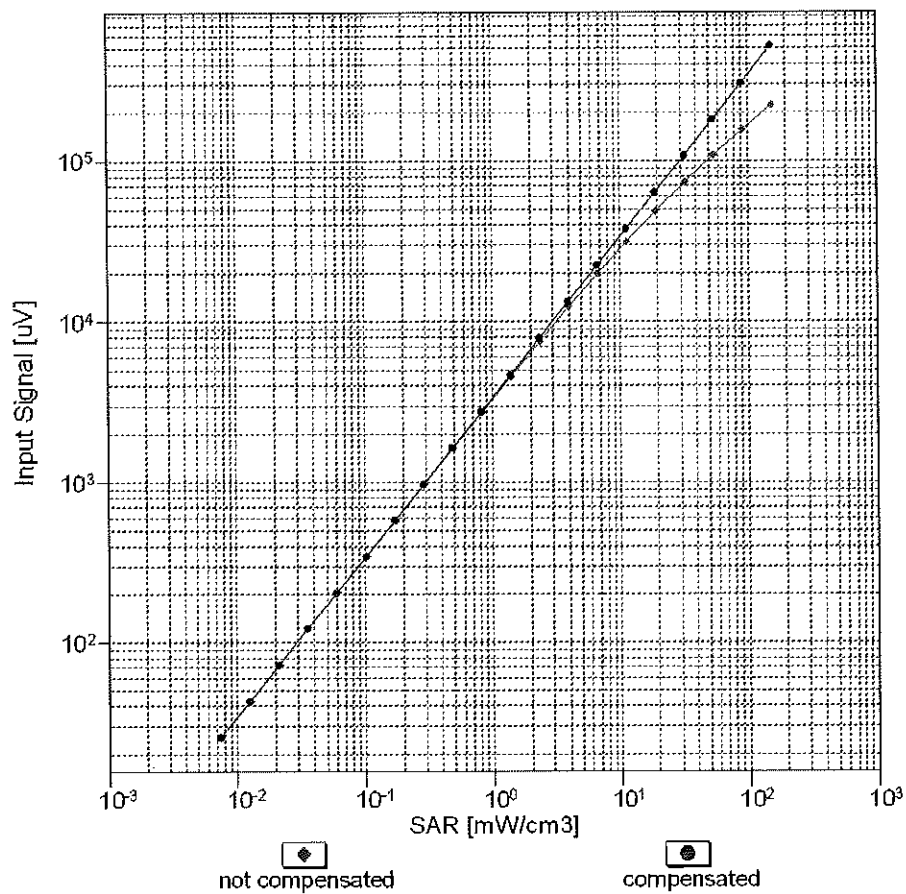
f=600 MHz,TEM

f=1800 MHz,R22



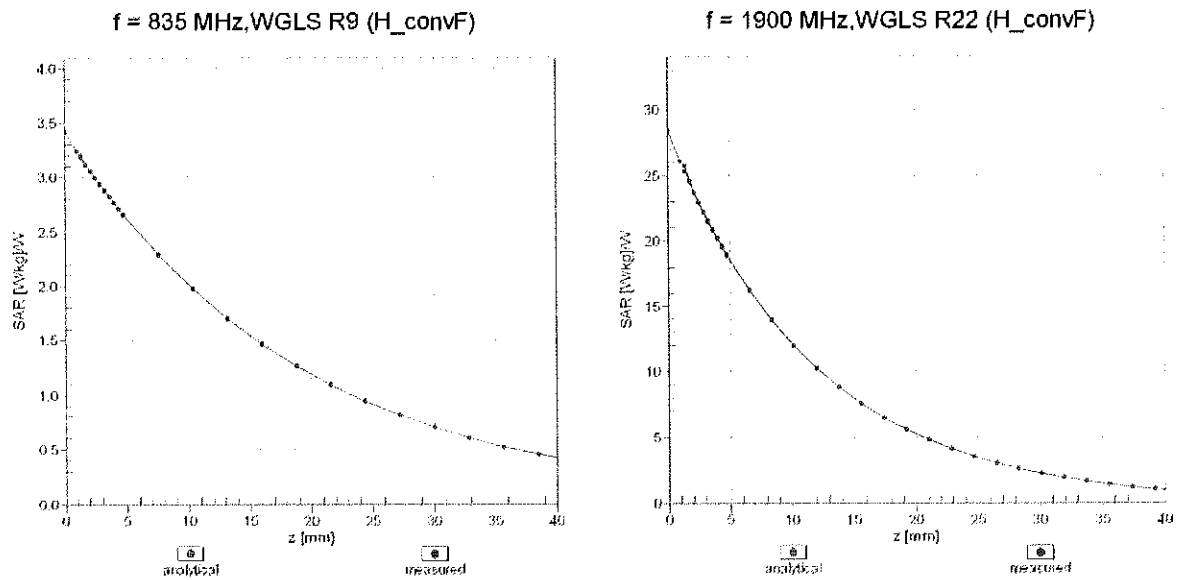
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f_{\text{eval}} = 1900 \text{ MHz}$)



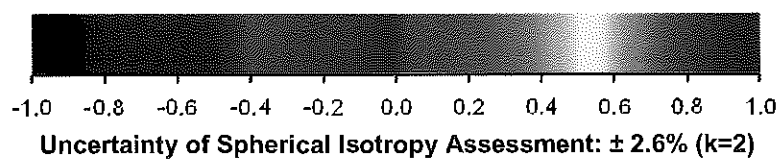
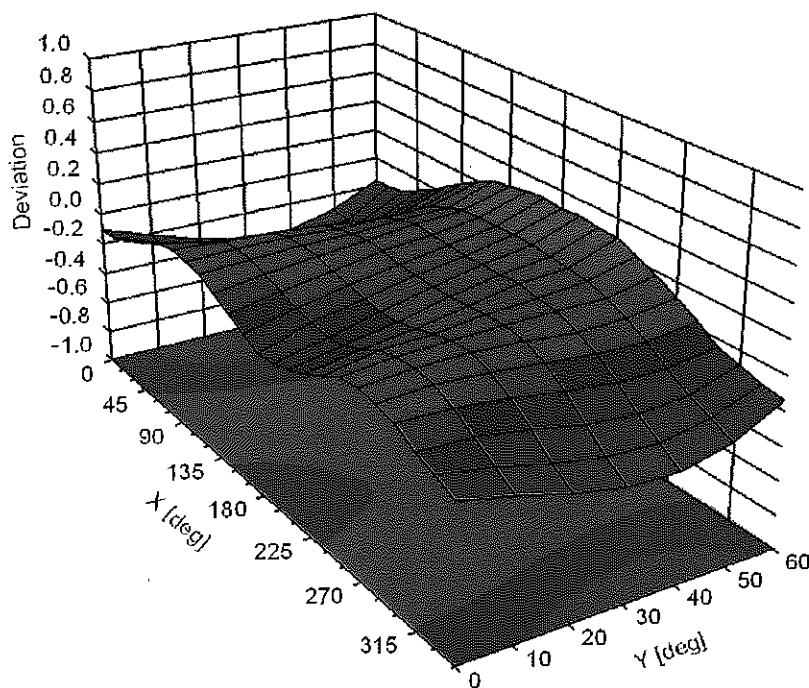
Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc [±] (k=2)
0		CW	CW	0.00	± 4.7 %
10010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	± 9.6 %
10011	CAB	UMTS-FDD (WCDMA)	WCDMA	2.91	± 9.6 %
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	± 9.6 %
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	± 9.6 %
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	± 9.6 %
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	± 9.6 %
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	± 9.6 %
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	± 9.6 %
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	± 9.6 %
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	± 9.6 %
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6 %
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	± 9.6 %
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	± 9.6 %
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	± 9.6 %
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	± 9.6 %
10033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	± 9.6 %
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	± 9.6 %
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	± 9.6 %
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	± 9.6 %
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	± 9.6 %
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	± 9.6 %
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	± 9.6 %
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	± 9.6 %
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	± 9.6 %
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	± 9.6 %
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	± 9.6 %
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	± 9.6 %
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	± 9.6 %
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	± 9.6 %
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	± 9.6 %
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	± 9.6 %
10062	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	± 9.6 %
10063	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	± 9.6 %
10064	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	± 9.6 %
10065	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	± 9.6 %
10066	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	± 9.6 %
10067	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	± 9.6 %
10068	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 %
10069	CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	± 9.6 %
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	± 9.6 %
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	± 9.6 %
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	± 9.6 %
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	± 9.6 %
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	± 9.6 %
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	± 9.6 %
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	± 9.6 %
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	± 9.6 %
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	± 9.6 %
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	± 9.6 %
10097	CAB	UMTS-FDD (HSDPA)	WCDMA	3.98	± 9.6 %
10098	CAB	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	± 9.6 %
10099	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	± 9.6 %
10100	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	± 9.6 %
10101	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10102	CAE	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10103	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10104	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	± 9.6 %
10105	CAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	± 9.6 %
10108	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6 %

10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	± 9.6 %
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	± 9.6 %
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10114	CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10115	CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	± 9.6 %
10116	CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	± 9.6 %
10117	CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	± 9.6 %
10119	CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAE	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	± 9.6 %
10142	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10143	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	± 9.6 %
10144	CAE	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	± 9.6 %
10145	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	± 9.6 %
10146	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAF	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	± 9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10151	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	± 9.6 %
10152	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10153	CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	± 9.6 %
10154	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10155	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10156	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10158	CAG	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	± 9.6 %
10160	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	± 9.6 %
10161	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10162	CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	± 9.6 %
10166	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	± 9.6 %
10167	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	± 9.6 %
10168	CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	± 9.6 %
10169	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10170	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10171	AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	± 9.6 %
10172	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10173	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10174	CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10175	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10176	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10177	CAI	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10178	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10179	CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10181	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10182	CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10183	AAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10184	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10185	CAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	± 9.6 %
10186	AAE	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10187	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10188	CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10189	AAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10193	CAC	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	± 9.6 %
10194	CAC	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	± 9.6 %
10195	CAC	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	± 9.6 %
10196	CAC	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10197	CAC	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10198	CAC	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10219	CAC	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	± 9.6 %

10220	CAC	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	± 9.6 %
10223	CAC	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	± 9.6 %
10224	CAC	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	± 9.6 %
10225	CAB	UMTS-FDD (HSPA+)	WCDMA	5.97	± 9.6 %
10226	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	± 9.6 %
10227	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	± 9.6 %
10228	CAB	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	± 9.6 %
10229	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10230	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	± 9.6 %
10232	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10233	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10235	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10236	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10237	CAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10238	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10239	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10240	CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10241	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	± 9.6 %
10242	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	± 9.6 %
10243	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	± 9.6 %
10244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10245	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	± 9.6 %
10246	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10247	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	± 9.6 %
10248	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	± 9.6 %
10249	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10250	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	± 9.6 %
10251	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	± 9.6 %
10252	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10253	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	± 9.6 %
10254	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	± 9.6 %
10255	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	± 9.6 %
10256	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	± 9.6 %
10257	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	± 9.6 %
10258	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	± 9.6 %
10259	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	± 9.6 %
10260	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	± 9.6 %
10261	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10262	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	± 9.6 %
10263	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	± 9.6 %
10264	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	± 9.6 %
10265	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10266	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	± 9.6 %
10267	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10269	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	± 9.6 %
10270	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	± 9.6 %
10274	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	± 9.6 %
10275	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	± 9.6 %
10277	CAA	PHS (QPSK)	PHS	11.81	± 9.6 %
10278	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.5)	PHS	11.81	± 9.6 %
10279	CAA	PHS (QPSK, BW 884MHz, Rolloff 0.38)	PHS	12.18	± 9.6 %
10290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	± 9.6 %
10291	AAB	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	± 9.6 %
10292	AAB	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	± 9.6 %
10293	AAB	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	± 9.6 %
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	± 9.6 %
10297	AAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	± 9.6 %
10298	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10299	AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	± 9.6 %