



PCTEST ENGINEERING LABORATORY, INC.

7185 Oakland Mills Road, Columbia, MD 21046 USA

Tel. +1.410.290.6652 / Fax +1.410.290.6654

<http://www.pctestlab.com>



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:

03/08/2017

Test Site/Location:

PCTEST Lab, Columbia, MD, USA

Document Serial No.:

1M1703090099-01-R1.A3L

FCC ID:

A3LSMG955U

APPLICANT:

SAMSUNG ELECTRONICS CO., LTD.

DUT Type:

Portable Handset

Application Type:

Class II Permissive Change

FCC Rule Part(s):

CFR §2.1093

Model:

SM-G955U

Additional Model(s):

SM-G955U1

Test Device Serial No.:

[S/N: 0912A, 09129, 09127, 09140]

Permissive Change(s):

Adding LTE-U Downlink Only Operations

Note: This revised Test Report (S/N: 1M1703090099-01-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

Note: The following test data was evaluated for the current test report. Please refer to RF Exposure Technical Report S/N 1M1701030005-01-R1.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 1.4 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 Manufacturers Forum (MMF). While a product may be considered eligible, use of the SAR Tick logo requires an agreement with the MMF. Further details can be obtained by emailing: sartick@mmfai.info.

FCC ID: A3LSMG955U		SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset		Page 1 of 12

T A B L E O F C O N T E N T S

1	DEVICE UNDER TEST	3
2	LTE INFORMATION	5
3	FCC MEASUREMENT PROCEDURES.....	6
4	RF CONDUCTED POWERS.....	7
5	EQUIPMENT LIST.....	9
6	CONCLUSION.....	10
7	REFERENCES	11

FCC ID: A3LSMG955U	 SAR EVALUATION REPORT 	Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset
		Page 2 of 12

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
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
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
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 17	Voice/Data	706.5 - 713.5 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 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 41	Voice/Data	2498.5 - 2687.5 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
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 - 2480 MHz
MST	Data	555 Hz - 8.33 kHz

1.2 Power Reduction for SAR

This device utilizes a power reduction mechanism for some wireless modes and bands for SAR compliance under portable hotspot conditions and under some conditions when the device is being used in close proximity to the user's hand. Detailed descriptions of the power reduction mechanism are included in the operational description.

FCC ID: A3LSMG955U		SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset		Page 3 of 12

1.3 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications for LTE B4 and B2. See RF Exposure Technical Report S/N 1M1701030005-01-R1.A3L for complete maximum and nominal output power specifications.

1.3.1 Maximum PCE Power

Mode / Band		Modulated Average (dBm)
LTE Band 4 (AWS)	Maximum	25.0
	Nominal	24.5
LTE Band 2 (PCS)	Maximum	24.5
	Nominal	24.0

1.3.2 Reduced PCE Power – Hotspot Mode Activated

Mode / Band		Modulated Average (dBm)
LTE Band 4 (AWS)	Maximum	21.0
	Nominal	20.5
LTE Band 2 (PCS)	Maximum	20.5
	Nominal	20.0

1.3.3 Reduced PCE Power – Grip Sensor Activated

Mode / Band		Modulated Average (dBm)
LTE Band 4 (AWS)	Maximum	22.5
	Nominal	22.0
LTE Band 2 (PCS)	Maximum	22.5
	Nominal	22.0

1.4 SAR Test Exclusion

Per FCC KDB Publication 941225 D05Av01r02 and FCC guidance, additional SAR measurements were not required since the maximum average output power in downlink only LTE CA mode were not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive. See RF Exposure Technical Report S/N 1M1701030005-01-R1.A3L for SAR compliance evaluation and complete RF conducted output power measurements.

1.5 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D05v02r04, D05Av01r02 (4G)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)

FCC ID: A3LSMG955U	 SAR EVALUATION REPORT 		Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset	Page 4 of 12

2 LTE INFORMATION

LTE Information					
FCC ID	A3LSMG955U				
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 17 (706.5 - 713.5 MHz)				
	LTE Band 13 (779.5 - 784.5 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 - 1779.3 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)				
Channel Bandwidths	LTE Band 41 (2498.5 - 2687.5 MHz)				
	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 17: 5 MHz, 10 MHz				
	LTE Band 13: 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				
Channel Numbers and Frequencies (MHz)	LTE Band 30: 5 MHz, 10 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	Low	Low-Mid	Mid	Mid-High	High
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 17: 5 MHz	706.5 (23755)		710 (23790)		713.5 (23825)
LTE Band 17: 10 MHz	709 (23780)		710 (23790)		711 (23800)
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 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)	1733.6 (132208)	N/A	1756.4 (132436)	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	1890.7 (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 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)
UE Category	DL UE Cat 16 (QPSK, 16QAM, 64QAM, 256QAM) UL UE Cat 5 (QPSK, 16QAM, 64QAM)				
Modulations Supported in UL	QPSK, 16QAM, 64QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (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 Release 12 Additional Information	This device does not support full CA features on 3GPP Release 12. It supports carrier aggregation and downlink MIMO features as shown in the filing. All other uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC unless otherwise specified. The following LTE Release 12 Features are not supported: Relay, HetNet, Enhanced eCIC, WIFI Offloading using LAA or LWA, MDH, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

FCC ID: A3LSMG955U		SAR EVALUATION REPORT		Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset	Page 5 of 12	

3 FCC MEASUREMENT PROCEDURES

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

3.1 Downlink Only Carrier Aggregation

Conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. For every supported combination of downlink only carrier aggregation, additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band. Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for carrier aggregation configurations when the average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

For 3CC downlink carrier aggregation combinations, PCC uplink channel was selected based on section C)3)b)ii) of KDB 941225 D05 V01r02. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation. For inter-band CA, the SCC downlink channels were selected near the middle of their transmission bands. For contiguous intra-band CA, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521. For non-contiguous intra-band CA, the downlink channel spacing between the component carriers was set to be larger than the nominal channel spacing and provided maximum separation between the component carriers. All selected downlink channels remained fully within the downlink transmission band of the respective component carrier.

FCC ID: A3LSMG955U	 SAR EVALUATION REPORT 	Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset
		Page 6 of 12

4

RF CONDUCTED POWERS

4.1.1 LTE-U Conducted Powers

This device supports LTE-U with downlink carrier aggregation only for B252 and B255. All uplink communications and acknowledgements in LTE Band 2 and 4 remain identical to specifications when downlink carrier aggregation is inactive.

Per FCC Guidance and KDB Publication 941225 D05A v01r02, for every supported combination, additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.

The PCC uplink channel was selected based on section C)3)b)ii) of KDB 941225 D05 V01r02. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation per 3GPP requirements. The SCC downlink channels were selected near the middle of their transmission bands. For contiguous intra-band carriers, the downlink channel spacing between the component carriers was set to multiple of 300 kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521.

Per FCC KDB Publication 941225 D05Av01r02, no SAR measurements are required for carrier aggregation configurations when the average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

Table 4-1
Two Component Carrier Maximum Conducted Powers

PCC									SCC				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx Power with LTE-U Active (dBm)	LTE Single Carrier Tx Power (dBm)
LTE B2	15	19125	1902.5	QPSK	1	0	1125	1982.5	LTE B252	20	255644	5200	23.19	23.54
LTE B2	15	19125	1902.5	QPSK	1	0	1125	1982.5	LTE B255	20	261494	5785	23.18	23.54
LTE B4	20	20300	1745	QPSK	1	0	2300	2145	LTE B252	20	255644	5200	24.34	24.85
LTE B4	20	20300	1745	QPSK	1	0	2300	2145	LTE B255	20	261494	5785	24.39	24.85

Table 4-2
Three Component Carrier Maximum Conducted Powers

PCC									SCC 1				SCC 2				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Freq. [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Freq. [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Freq. [MHz]	LTE Tx Power with LTE-U Active (dBm)	LTE Single Carrier Tx Power (dBm)
LTE B2	15	19125	1902.5	QPSK	1	0	1125	1982.5	LTE B252	20	255644	5200	LTE B252	20	255842	5219.8	23.20	23.54
LTE B2	15	19125	1902.5	QPSK	1	0	1125	1982.5	LTE B255	20	261494	5785	LTE B255	20	261692	5804.8	23.21	23.54
LTE B4	20	20300	1745	QPSK	1	0	2300	2145	LTE B255	20	261519	5787.5	LTE B255	20	255842	5219.8	24.39	24.85
LTE B4	20	20300	1745	QPSK	1	0	2300	2145	LTE B255	20	261494	5785	LTE B255	20	261692	5804.8	24.30	24.85

Table 4-3
Two Component Carrier Hotspot Reduced Conducted Powers

PCC									SCC				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx Power with LTE-U Active (dBm)	LTE Single Carrier Tx Power (dBm)
LTE B2	20	19100	1900	64QAM	1	0	1100	1980	LTE B252	20	255644	5200	19.86	20.50
LTE B2	20	19100	1900	64QAM	1	0	1100	1980	LTE B255	20	261494	5785	19.87	20.50
LTE B4	20	20050	1720	QPSK	50	0	2050	2120	LTE B252	20	255644	5200	20.60	20.79
LTE B4	20	20050	1720	QPSK	50	0	2050	2120	LTE B255	20	261494	5785	20.65	20.79

FCC ID: A3LSMG955U	 SAR EVALUATION REPORT 		Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1-A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset	Page 7 of 12

Table 4-4
Three Component Carrier Hotspot Reduced Conducted Powers

PCC									SCC 1				SCC 2				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx Power with LTE-U Active (dBm)	LTE Single Carrier Tx Power (dBm)
LTE B2	20	19100	1900	64QAM	1	0	1100	1980	LTE B252	20	255644	5200	LTE B252	20	255842	5219.8	20.29	20.50
LTE B2	20	19100	1900	64QAM	1	0	1100	1980	LTE B255	20	261494	5785	LTE B255	20	261692	5804.8	20.25	20.50
LTE B4	20	20050	1720	QPSK	50	0	2050	2120	LTE B252	20	255644	5200	LTE B252	20	255842	5219.8	20.39	20.79
LTE B4	20	20050	1720	QPSK	50	0	2050	2120	LTE B255	20	261494	5785	LTE B255	20	261692	5804.8	20.55	20.79

Table 4-5
Two Component Carrier Grip Sensor Reduced Conducted Powers

PCC									SCC				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx Power with LTE-U Active (dBm)	LTE Single Carrier Tx Power (dBm)
LTE B2	20	19100	1900	16QAM	1	0	1100	1980	LTE B252	20	255644	5200	21.92	22.32
LTE B2	20	19100	1900	16QAM	1	0	1100	1980	LTE B255	20	261494	5785	21.75	22.32
LTE B4	20	20300	1745	16QAM	1	0	2300	2145	LTE B252	20	255644	5200	22.05	22.50
LTE B4	20	20300	1745	16QAM	1	0	2300	2145	LTE B255	20	261494	5785	22.10	22.50

Table 4-6
Three Component Carrier Grip Sensor Reduced Conducted Powers

PCC									SCC 1				SCC 2				Power	
PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	PCC (DL) Channel	PCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	SCC Band	SCC Bandwidth [MHz]	SCC (DL) Channel	SCC (DL) Frequency [MHz]	LTE Tx Power with LTE-U Active (dBm)	LTE Single Carrier Tx Power (dBm)
LTE B2	20	19100	1900	16QAM	1	0	1100	1980	LTE B252	20	255644	5200	LTE B252	20	255842	5219.8	21.82	22.32
LTE B2	20	19100	1900	16QAM	1	0	1100	1980	LTE B255	20	261494	5785	LTE B255	20	261692	5804.8	21.77	22.32
LTE B4	20	20300	1745	16QAM	1	0	2300	2145	LTE B252	20	255644	5200	LTE B252	20	255842	5219.8	21.93	22.50
LTE B4	20	20300	1745	16QAM	1	0	2300	2145	LTE B255	20	261494	5785	LTE B255	20	261692	5804.8	21.98	22.50

Notes:

- Per FCC guidance LTE Band 66 standalone powers were used to select measurement configurations for LTE Band 4, and LTE B25 standalone SISO powers were used to select measurement configurations for LTE Band 2.
- See RF Exposure Technical Report S/N 1M1701030005-01-R1.A3L for complete RF conducted output power measurements.



Figure 4-A
Power Measurement Setup

FCC ID: A3LSMG955U	 SAR EVALUATION REPORT 				Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset			Page 8 of 12

5 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Rohde & Schwarz	CMW500	Radio Communication tester	3/25/2016	Annual	3/25/2017	128633
Pasternack	NC-100	Torque Wrench	5/21/2015	Biennial	5/21/2017	N/A
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139

CBT (Calibrated Before Testing): Prior to testing, the attenuator was connected to a calibrated source to determine the losses of the measurement path.

FCC ID: A3LSMG955U	 SAR EVALUATION REPORT 		Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset	Page 9 of 12

6 CONCLUSION

6.1 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: A3LSMG955U	 SAR EVALUATION REPORT 	Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset
		Page 10 of 12

7

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: A3LSMG955U	 SAR EVALUATION REPORT 		Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset	Page 11 of 12

- [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, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.
- [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: A3LSMG955U	 SAR EVALUATION REPORT 		Approved by: Quality Manager
Document S/N: 1M1703090099-01-R1.A3L	Test Dates: 03/08/2017	DUT Type: Portable Handset	Page 12 of 12