CERTIFICATE #3478.01

TEST REPORT

EUT Description	**WWAN module installed on Notebook PC**
Brand Name	**HP**
Model Name	**HSN-I45C-4**
FCC ID	**B94HNI45C4KL**
Date of Test Start/End	**2021-09-29 / 2022-01-20**
Features	**WWAN (5G NR, LTE, UMTS), WLAN, BT** (see section 6)
Description	**HP HSN-I45C-4 + WNC / HongBo antennas**

Applicant	**HP Inc.**
Address	**1501 Page Mill Road, Palo Alto CA 94304 USA**
Contact Person	**Cindy Su**
Telephone / Email	**+886 237895951/cindy.su@hp.com**

Reference Standards	**FCC 47 CFR Part §2.1093** (see section 1)	
RF Exposure Environment	**Portable devices - General population/uncontrolled exposure**	
Exposure Conditions	**Body worn**	
	SAR Result	SAR Limit
Maximum SAR Result & Limit	**1.06 W/kg (1g)**	**1.6 W/kg (1g)**
Min. test separation distance	**0mm to phantom, 19.85mm to antenna edge**	

Test Report identification	**210825-02.TR01**
Revision Control	**Rev. 00** **This test report revision replaces any previous test report revision** (See section 9)

The test results relate only to the samples tested.
Reference to accreditation shall be used only by full reproduction of test report.

Issued by	Reviewed by
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1. Standards, reference documents and applicable test methods

FCC	1. FCC Title 47 CFR Part §2.1093 – Radiofrequency radiation exposure evaluation: portable devices. 2019-10-01 Edition 2. FCC OET KDB 447498 D01 v06 – RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices. 3. FCC OET KDB 616217 D04 v01r02 – SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers. 4. FCC OET KDB 865664 D01 v01r04 – SAR Measurement Requirements for 100 MHz to 6 GHz. 5. FCC OET KDB 865664 D02 v01r02 – RF Exposure Compliance Reporting and Documentation Considerations. 6. FCC OET KDB 941225 D05 v02r05 – SAR Evaluation Considerations for LTE Devices. 7. FCC OET KDB 941225 D01 v03r01 – 3G SAR Measurement Procedures. 8. IEEE Std 1528-2013 – IEEE Recommended Practice Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques… 9. TCB Workshop Nov 2017 71-RF-Exposure-TCB-Slides-LTE UL/DL Carrier Aggregation SAR 10. TCB workshop November 2019; RF Exposure Policy Updates (5G NR FR1 NSA EN-DC UE SAR Evaluations), the FCC OET KDB 941225 D05 rules apply.

2. General conditions, competences and guarantees

- ✓ Tests performed under FCC standards identified in section 1 are covered by A2LA accreditation.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011.
- ✓ Intel WRF Lab declines any responsibility with respect to the identified information provided by the customer and that may affect the validity of results.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.

3. Preface

The HSN-I45C-4 Laptop PC includes the Time Averaging SAR (TAS) concept. The TAS algorithm is implemented in the Fibocom M2 FM350-GL modem, which is embedded in the FM350-GL cellular module (FCC ID: ZMOFM350GL).

The implementation details and TAS operating characteristics are described in a separated document [1]. The validation of algorithm operations is performed by Intel Corporation according to the range of commonly used accessible control parameters used for typical host products. The validation results are reported in document [2].

The FCC SAR limit is a time averaged exposure metric. At host level, the normally required SAR test procedures are applicable for SAR compliance testing at upper-threshold values of the algorithm, which is the maximum output power level for continuous time-averaging operations TAS algorithm enforces. The reliability of this has been demonstrated by results in the Algorithm Validation Test Report [2].

The model supports simultaneous transmission of WWAN, BT and WLAN. The TAS algorithm is only applied to WWAN cellular module.

The SAR evaluation of WWAN is performed in this report as well as the RF exposure assessment for simultaneous transmission of WWAN, WLAN and BT.

[1] 210317_TAS_Operational_Report_Rev01

[2] 201029-02.TR01_Rev01_Validation Report for 5G Time Averaging Algorithm

4. Environmental Conditions

✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	23.2ºC ± 2ºC
Humidity	37.3% ± 20%
Liquid Temperature	20.9ºC ± 2ºC

5. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	210825-02.S02	WWAN module installed on Notebook PC	HSN-I45C-4	00017605XS	2021-09-29	HongBo Antennas
#02	210825-02.S04	WWAN module installed on Notebook PC	HSN-I45C-4	00017605XN	2021-09-29	WNC Antennas

On both samples we used the same conducted power measurements as we swapped the WWAN module on the second sample during SAR testing

6. EUT Features

The herein information is provided by the customer.
Intel WRF Lab declines any responsibility for the accuracy of the stated customer provided information, especially if it has any impact on the correctness of test results presented in this report.

Brand Name	HP
Model Name	HSN-I45C-4
Prototype / Production	Production
Host Identification	HSN-I45C-4

Supported radios

WWAN:

Mode	Bands	Supported Tx Mode			
		WCDMA	HSDPA	HSUPA	DC-HSDPA
WCDMA / HSPA+	FDD II (1850.0 – 1910.0 MHz)	✓	✓	✓	✓
	FDD IV (1710.0 – 1755.0 MHz)	✓	✓	✓	✓
	FDD V (824.0 – 849.0 MHz)	✓	✓	✓	✓

FDD/TDD	Bands	Modulations	Bandwidth					
			1.4	3	5	10	15	20
LTE FDD	Band 2 (1850.0 – 1910.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	✓
	Band 4 (1710.0 – 1755.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	✓
	Band 5 (824.0 – 849.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓		
	Band 7 (2500.0 – 2570.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓	✓	✓
	Band 12 (699.0 – 716.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓		
	Band 13 (777.0 – 787.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓		
	Band 14 (788.0 – 798.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓		
	Band 17 (704.0 – 716.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓		
	Band 25 (1850.0 – 1915.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	✓
	Band 26 (814.0 – 849.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	
	Band 30 (2305.0 – 2315.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓		
	Band 66 (1710.0 – 1780.0 MHz)	QPSK/16QAM/64QAM/256QAM	✓	✓	✓	✓	✓	✓
LTE TDD	Band 38 (2570.0 – 2620.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓	✓	✓
	Band 41 (2496.0 – 2690.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓	✓	✓
	Band 48 (3550.0 – 3700.0 MHz)	QPSK/16QAM/64QAM/256QAM			✓	✓	✓	✓

Bands	Modulation	SCS (KHz)	Bandwidth												
			5	10	15	20	25	30	40	50	60	70	80	90	100
N2 FDD (1850.0 – 1910.0 MHz)	PI/2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓									
N5 FDD (824.0 – 849.0 MHz)	PV2 BPSK QPSK 16QAM 64QAM 256QAM	15 30 60	✓	✓ ✓	✓ ✓	✓ ✓									
N7 FDD (2500.0 – 2570.0 MHz)	PV2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓									
N25 FDD (1850.0 – 1915 MHz)	PV2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓									
N30 FDD (2305.0 – 2315.0 MHz)	PV2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓											
N38 TDD (2570.0 – 2620.0 MHz)	PV2 BPSK QPSK 16QAM 64QAM 256QAM	15 30 60	✓	✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓									
N41 TDD (2496.0 – 2690.0 MHz)	PV2 BPSK QPSK 16QAM 64QAM 256QAM	15 30				✓ ✓			✓ ✓	✓ ✓	✓		✓	✓	✓
N66 FDD (1710.0 – 1780.0 MHz)	PV2 BPSK QPSK 16QAM 64QAM 256QAM	15 30	✓	✓ ✓	✓ ✓	✓ ✓			✓ ✓						
N77 TDD* (3700.0 – 3980.0 MHz)	PV2 BPSK QPSK 16QAM 64QAM 256QAM	15 30		✓ ✓	✓ ✓	✓ ✓			✓ ✓	✓ ✓	✓		✓	✓	✓
N78 TDD** (3700.0 – 3800.0 MHz)	PV2 BPSK QPSK 16QAM 64QAM 256QAM	15 30		✓ ✓	✓ ✓	✓ ✓			✓ ✓	✓ ✓	✓		✓	✓	✓

*FCC limits 5G NR B77 to 3700-3980MHz
** FCC limits 5G NR B78 to 3700-3800MHz

UL carrier aggregation LTE (Inter-Band)	UL carrier aggregation LTE (Intra-band)
2A – 5A	5B
2A – 12A	7C
2A – 13A	38C
2A – 14A	41C
2A – 48A	48C
4A – 5A	66B
4A – 12A	66C
4A – 13A	
5A – 7A	
5A – 30A	
5A – 48A	
5A – 66A	
12A – 30A	
12A – 66A	
13A – 48A	
13A – 66A	
14A – 30A	
14A – 66A	
25A – 26A	
48A – 66A	

EN/DC possible combinations	
NR 5G Band	Associated LTE Bands
N2A	5, 12, 13, 14
N5A	2, 7, 30, 66, 48
N66A	5, 12, 13, 48
N41A	2,66,41
N77A	2,5,12,13,14, 30,66, 41
N78A	2, 5, 7, 38

UL carrier aggregation 5G FR1
n2A – n5A
n5A – n66A

WLAN

Mode	UL Freq Range
802.11b/g/n/ax	2.4GHz (2400.0 – 2483.5 MHz)
802.11a/n/ac/ax	5.2GHz (5150.0 – 5250.0 MHz) 5.3GHz (5250.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz) 5.8GHz (5725.0 – 5875.0 MHz)
802.11ax	6.0GHz (5925.0 – 7250.0 MHz)
Bluetooth v5.2 & BLE	2.4GHz (2400.0 – 2483.5 MHz)

Antenna Information "information provided by the applicant"

The DUTs have 2 WWAN TX antennas:

Transmitter	Main (Antenna 5)	Aux (Antenna 8)
Manufacturer	WNC	WNC
Antenna type	PIFA antenna	PIFA antenna
Part number	6036B0307201 (81ELA215.G03)	6036B0308001 (81EABL15.G13)

Transmitter	Main (Antenna 5)	Aux (Antenna 8)
Manufacturer	HongBo	HongBo
Antenna type	PIFA antenna	PIFA antenna
Part number	6036B0308701 (00-3302700250)	6036B0310001 (00-2602749550)

See Annex *F* for more details on antennas location.

WWAN Antenna Mapping

Configuration	Main (Ant 5)	Aux (Ant 8)
WCDMA	LB / MHB	
LTE	LB / MHB	
		UHB
NR 5G SA	(LB / MHB)	
		UHB
LTE ULCA	LB	MHB /UHB
	MHB	UHB
	B41	UHB
NR 5G ENDC	LB	MHB / B41
	B41	N41
	MHB	B41/N41
	B41/N41	UHB
	MHB	UHB
NR 5G ULCA	LB	MHB

- LB: WCDMA FDD V, LTE B5/12/13/14/17/26, 5G NR n5
- MHB: WCDMA FDD II/ FDD IV, LTE B2/4/7/25/30/66/38, 5G NR n2/n7/n25/n30/n38/n66
- UHB: LTE: B41/48; NR 5G: n41/n77/n78

Note: For EN-DC mode the 4G and 5G carriers transmit on separate antennas.
For inter-bands on LTE and NR 5G ULCA the carriers transmit on separate antennas.

Simultaneous Transmission Configurations

WWAN Main (Ant5) + WWAN Aux (Ant8) + WLAN 2.4GHz Main + BT Aux
WWAN Main (Ant5) + WWAN Aux (Ant8) + WLAN 2.4GHz Main + WLAN 2.4GHz Aux
WWAN Main (Ant5) + WWAN Aux (Ant8) + WLAN 5GHz Main + BT Aux
WWAN Main (Ant5) + WWAN Aux (Ant8) + WLAN 5GHz Main + WLAN 5GHz Aux
WWAN Main (Ant5) + WWAN Aux (Ant8) + WLAN 5GHz Main + WLAN 5GHz Aux + BT Aux
WWAN Main (Ant5) + WWAN Aux (Ant8) + WLAN 6GHz Main + BT Aux
WWAN Main (Ant5) + WWAN Aux (Ant8) + WLAN 6GHz Main + WLAN 6GHz Aux
WWAN Main (Ant5) + WWAN Aux (Ant8) + WLAN 6GHz Main + WLAN 6GHz Aux + BT Aux

WLAN transmitter is considered in this report just for the simultaneous transmission evaluation with the WWAN module (See section B.5.5)

Additional information

- 5.60-5.65 GHz band (TDWR) is supported by the device
- Band gap is supported by the device
- One power settings is implemented in the DUT:
  - Max power for Notebook mode
- Maximum Power Reduction (MPR) is implemented according to 3GPP, built-in by design on the tune-up power:

Modulation	Channel bandwidth / #RB						MPR (Db)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≥18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	>16	>18	≤ 3
256 QAM	≥1						≤ 5

The DUT uses the maximum MPR values described in the above tables.

The maximum power reduction is applicable on the Tune up tolerance.

- According to 3GPP 38-101-1, the UE is allowed to reduce the maximum output power due to higher order modulations and for channel bandwidths that meets both following criteria:
  - Channel bandwidth ≤ 100MHz.
  - Relative channel bandwidth ≤ 4% for TDD bands and ≤ 3% for FDD bands

Maximum power reduction (MPR) for power class 3			
Modulation	MPR (Db)		
	Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM PI/2 BPSK	≤ 3.5[1]	≤ 1.2[1]	≤ 0.2[1]
	0.5[2]	0.5[2]	0[2]
DFT-s-OFDM QPSK	≤ 1		0
DFT-s-OFDM 16 QAM	≤ 2		≤ 1
DFT-s-OFDM 64 QAM	≤ 2.5		
DFT-s-OFDM 256 QAM	4.5		
CP-OFDM QPSK	≤ 3		≤ 1.5
CP-OFDM 16 QAM	≤ 3		≤ 2
CP-OFDM 64 QAM	≤ 3.5		
CP-OFDM 256 QAM	≤ 6.5		
NOTE 1: Applicable for UE operating in TDD mode with PI/2 PBSK modulation and if the IE [P-Boost-BPSK] is set to 1 and 40% or less slots in radio frame are used for UL transmission for bands n40, n77, n78 and n79. NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n77, n78 and n79 and if the IE [Pboost-BPSK] is set to 0 and if more than 40% of slots in radio frame are used for UL transmission for bands n40, n77, n78 and n79.			

Maximum power reduction (MPR) for power class 2			
Modulation	MPR (Db)		
	Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM PI/2 BPSK	≤ 3.5	≤ 0.5	0
DFT-s-OFDM QPSK	≤ 3.5	≤ 1	0
DFT-s-OFDM 16 QAM	≤ 3.5	≤ 2	≤ 1
DFT-s-OFDM 64 QAM	≤ 3.5	≤ 2.5	
DFT-s-OFDM 256 QAM	≤ 4.5		
CP-OFDM QPSK	≤ 3.5	≤ 3	≤ 1.5
CP-OFDM 16 QAM	≤ 3.5	≤ 3	≤ 2
CP-OFDM 64 QAM	≤ 3.5		
CP-OFDM 256 QAM	≤ 6.5		

The following table indicates the power levels and tolerance for tablet mode:

Maximum Output power specification + Tune up tolerance

Mode	Tx Ant	Technology	Bands	Class	Nominal (dBm)	Tolerance dB	Lower Tolerance (dBm)	Upper Tolerance (dBm)
Laptop	5	WCDMA/HSPA	FDD II (1850.0 – 1910.0 MHz)	3	23.5	±1	22.5	24.5
	5	WCDMA/HSPA	FDD IV (1710.0 – 1755.0 MHz)	3	23.5	±1	22.5	24.5
	5	WCDMA/HSPA	FDD V (824.0 – 849.0 MHz)	3	23.5	±1	22.5	24.5
	5	LTE	B2 (1850.0 – 1910.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B4 (1710.0 – 1755.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B5 (824.0 – 849.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B7 (2500.0 – 2570.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B12 (699.0 – 716.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B13 (777.0 – 787.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B14 (788.0 – 798.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B17 (704.0 – 716.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B25 (1850.0 – 1915.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B26 (814.0 – 849.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B30 (2305.0 – 2315.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B38 (2570.0 – 2620.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B41 (2496.0 – 2690.0 MHz)	3	23.0	±1	22.0	24.0
	5	LTE	B41-HPUE (2496.0 – 2690.0 MHz)	2	26.0	±1	25.0	27.0
	5	LTE	B66 (1710.0 – 1780.0 MHz)	3	23.0	±1	22.0	24.0
	8	LTE	B2 (1850.0 – 1910.0 MHz)	3	23.0	±1	22.0	24.0
	8	LTE	B4 (1710.0 – 1755.0 MHz)	3	23.0	±1	22.0	24.0
	8	LTE	B7 (2500.0 – 2570.0 MHz)	3	23.0	±1	22.0	24.0
	8	LTE	B25 (1850.0 – 1915.0 MHz)	3	19.0	±1	18.0	20.0
	8	LTE	B30 (2305.0 – 2315.0 MHz)	3	23.0	±1	22.0	24.0
	8	LTE	B41 (2496.0 – 2690.0 MHz)	3	23.0	±1	22.0	24.0
	8	LTE	B41-HPUE(2496.0 – 2690.0 MHz)	2	23.0	±1	22.0	24.0
	8	LTE	B48 (3550.0 – 3700.0 MHz)	3	19.0	±1	18.0	20.0
	8	LTE	B66 (1710.0 – 1780.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N2 (1850.0 – 1910.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N5 (824.0 – 849.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N7 (2500.0 – 2570.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N25 (1850.0 – 1915.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N30 (2305.0 – 2315.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N38 (2570.0 – 2620.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N41 (2496.0 – 2690.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N41-HPUE(2496.0 – 2690.0 MHz)	2	26.0	±1	25.0	27.0
	5	5G NR	N66 (1710.0 – 1780.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N77 (3700.0 – 3980.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N77-HPUE(3700.0 – 3980.0 MHz)	2	26.0	±1	25.0	27.0
	5	5G NR	N78 (3700.0 – 3800.0 MHz)	3	23.0	±1	22.0	24.0
	5	5G NR	N78-HPUE(3700.0 – 3800.0 MHz)	3	26.0	±1	25.0	27.0
	8	5G NR	N2 (1850.0 – 1910.0 MHz)	3	23.0	±1	22.0	24.0
	8	5G NR	N38 (2570.0 – 2620.0 MHz)	3	23.0	±1	22.0	24.0
	8	5G NR	N41 (2496.0 – 2690.0 MHz)	3	23.0	±1	22.0	24.0
	8	5G NR	N41-HPUE(2496.0 – 2690.0 MHz)	2	26.0	±1	25.0	27.0
	8	5G NR	N66 (1710.0 – 1780.0 MHz)	3	23.0	±1	22.0	24.0
	8	5G NR	N77 (3700.0 – 3980.0 MHz)	3	19.0	±1	18.0	20.0
	8	5G NR	N77-HPUE(3700.0 – 3980.0 MHz)	2	19.0	±1	18.0	20.0
	8	5G NR	N78 (3700.0 – 3800.0 MHz)	3	19.0	±1	18.0	20.0
	8	5G NR	N78-HPUE(3700.0 – 3800.0 MHz)	3	19.0	±1	18.0	20.0

As mentioned in Section 3, the SAR compliance testing is performed at upper-threshold values of the algorithm, which is the maximum output power level for continuous time-averaging operations TAS algorithm enforces.
In TAS operation, the control parameters including the upper-threshold value are stored in NVM. They are inaccessible to the normal users and no other interface is available for changing these control parameters.
The table below shows the upper-threshold values used as continuous power for SAR testing as well as the different TAS parameters defined in [1] and [2] of section 3, to be embedded in the host:

Mode	Tx Ant.	Technology	Bands	Class	Nominal Full Power (dBm)	Upper Threshold (dBm)	Lower Threshold (dBm)	DPR_ON Power (dBm)
Laptop	5	WCDMA/HSPA	FDD II (1850.0 – 1910.0 MHz)	3	23.5	25.5	24.5	23.5
	5	WCDMA/HSPA	FDD IV (1710.0 – 1755.0 MHz)	3	23.5	25.5	24.5	23.5
	5	WCDMA/HSPA	FDD V (824.0 – 849.0 MHz)	3	23.5	25.5	24.5	23.5
	5	LTE	B2 (1850.0 – 1910.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B4 (1710.0 – 1755.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B5 (824.0 – 849.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B7 (2500.0 – 2570.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B12 (699.0 – 716.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B13 (777.0 – 787.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B14 (788.0 – 798.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B17 (704.0 – 716.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B25 (1850.0 – 1915.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B26 (814.0 – 849.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B30 (2305.0 – 2315.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B38 (2570.0 – 2620.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B41 (2496.0 – 2690.0 MHz)	3	23.0	25.0	24.0	23.0
	5	LTE	B41-HPUE(2496.0 – 2690.0 MHz)	2	26.0	28.0	27.0	26.0
	5	LTE	B66 (1710.0 – 1780.0 MHz)	3	23.0	25.0	24.0	23.0
	8	LTE	B2 (1850.0 – 1910.0 MHz)	3	23.0	25.0	24.0	23.0
	8	LTE	B4 (1710.0 – 1755.0 MHz)	3	23.0	25.0	24.0	23.0
	8	LTE	B7 (2500.0 – 2570.0 MHz)	3	23.0	26.0	25.0	24.0
	8	LTE	B25 (1850.0 – 1915.0 MHz)	3	23.0	21.0	20.0	19.0
	8	LTE	B30 (2305.0 – 2315.0 MHz)	3	23.0	25.0	24.0	23.0
	8	LTE	B41 (2496.0 – 2690.0 MHz)	3	23.0	25.0	24.0	23.0
	8	LTE	B41-HPUE(2496.0 – 2690.0 MHz)	2	26.0	25.0	24.0	23.0
	8	LTE	B48 (3550.0 – 3700.0 MHz)	3	21.0	21.0	20.0	19.0
	8	LTE	B66 (1710.0 – 1780.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N2 (1850.0 – 1910.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N5 (824.0 – 849.0 MHz)	3	23.0	21.5	20.5	19.5
	5	5G NR	N7 (2500.0 – 2570.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N25 (1850.0 – 1915.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N30 (2305.0 – 2315.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N38 (2570.0 – 2620.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N41 (2496.0 – 2690.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N41-HPUE(2496.0 – 2690.0 MHz)	2	23.0	28.0	27.0	26.0
	5	5G NR	N66 (1710.0 – 1780.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N77 (3700.0 – 3980.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N77-HPUE(3700.0 – 3980.0 MHz)	2	23.0	28.0	27.0	26.0
	5	5G NR	N78 (3700.0 – 3800.0 MHz)	3	23.0	25.0	24.0	23.0
	5	5G NR	N78-HPUE(3700.0 – 3800.0 MHz)	3	23.0	28.0	27.0	26.0
	8	5G NR	N2 (1850.0 – 1910.0 MHz)	3	23.0	25.0	24.0	23.0
	8	5G NR	N38 (2570.0 – 2620.0 MHz)	3	23.0	25.0	24.0	23.0
	8	5G NR	N41 (2496.0 – 2690.0 MHz)	3	23.0	25.0	24.0	23.0
	8	5G NR	N41 (2496.0 – 2690.0 MHz)	2	26.0	28.0	27.0	26.0
	8	5G NR	N66 (1710.0 – 1780.0 MHz)	3	23.0	25.0	24.0	23.0
	8	5G NR	N77 (3700.0 – 3980.0 MHz)	3	23.0	21.0	20.0	19.0
	8	5G NR	N77-HPUE(3700.0 – 3980.0 MHz)	2	26.0	21.0	20.0	19.0
	8	5G NR	N78 (3700.0 – 3800.0 MHz)	3	23.0	21.0	20.0	19.0
	8	5G NR	N78-HPUE(3700.0 – 3800.0 MHz)	3	23.0	21.0	20.0	19.0

SAR compliance is demonstrated with the *Reported SAR*: *Reported SAR = measured 1gSAR @ Reported Upper Threshold* < FCC SAR limit where, *Reported Upper Threshold = Upper Threshold (stored in NVM) + Tolerance*

7. Remarks and comments

1. Only the plots for the test positions with the highest measured SAR per band/mode are included in Annex C as required per FCC OET KDB 865664 D02, paragraph 2.3.h.
2. Maximum transmission power on modulations 64QAM and 256QAM for LTE and 5G NR, are lower than other modulations QPSK and 16QAM. Therefore, according to spot check evaluation, higher power modulations were chosen to perform all tests shown in the report.
3. The same conducted power measurements were used on both samples since the same WWAN module has been used on the samples under test during SAR measurements.

8. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

Mode	Band (UL)	Highest Reported SAR (1g) (W/kg)	Verdict
LTE FDD	Band 2 (1850.0 – 1910.0 MHz)	0.51	P
	Band 4 (1710.0 – 1755.0 MHz)	NM	NA
	Band 5 (824.0 – 849.0 MHz)	NM	NA
	Band 7 (2500.0 – 2570.0 MHz)	1.06	P
	Band 12 (699.0 – 716.0 MHz)	NM	NA
	Band 13 (777.0 – 787.0 MHz)	NM	NA
	Band 14 (788.0 – 798.0 MHz)	NM	NA
	Band 17 (704.0 – 716.0 MHz)	NM	NA
	Band 25 (1850.0 – 1915.0 MHz)	0.22	P
	Band 26 (814.0 – 849.0 MHz)	NM	NA
	Band 30 (2305.0 – 2315.0 MHz)	0.90	P
	Band 66 (1710.0 – 1780.0 MHz)	0.59	P
LTE TDD	Band 38 (2570.0 – 2620.0 MHz)	NM	NA
	Band 41 (2496.0 – 2690.0 MHz)	0.55	P
	Band 48 (3550.0 – 3700.0 MHz)	0.50	P
5G NR FR1 FDD	Band 2 (1850.0 – 1910.0 MHz)	0.57	P
	Band 5 (824.0 – 849.0 MHz)	NM	NA
	Band 7 (2500.0 – 2570.0 MHz)	NM	NA
	Band 25 (1850.0 – 1915.0 MHz)	NM	NA
	Band 30 (2305.0 – 2315.0 MHz)	NM	NA
	Band 66 (1710.0 – 1780.0 MHz)	0.91	P
5G NR FR1 TDD	Band 38 (2570.0 – 2620.0 MHz)	NM	NA
	Band 41 (2496.0 – 2690.0 MHz)	1.02	P
	Band 77 (3700.0 – 3980.0 MHz)	0.71	P
	Band 78 (3700.0 – 3800.0 MHz)	NM	NA

P: Pass
F: Fail
NM: Not Measured
NA: Not Applicable

According to the FCC OET KDB 690783 D01, this is the summary of the values for the Grant Listing:

Highest Reported SAR (1g) (W/kg)				
Exposure Condition	Equipment Class			
	PCE	DTS	DSS	U-NII
Body Worn	1.06	0.40	0.40	0.40
Simultaneous Tx	Sum-SAR: 1.46	Sum-SAR: 1.46	Sum-SAR: 1.46	Sum-SAR: 1.46

Considering the results of the performed test according to FCC 47CFR Part 2.1093 the item under test is IN COMPLIANCE with the requested specifications specified in Section1. Standards, reference documents and applicable test methods

9. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	E. Garcia	First Issue

Annex A. Test & System Description

A.1 SAR Definition

Specific Absorption rate is defined as the time derivative of the incremental energy (dW) absorbed by (dissipated in) and incremental mass (dm) contained in a volume element (dV) of a given density (ρ).

$$SAR = \frac{d}{dt} \cdot \left(\frac{dW}{dm}\right) = \frac{d}{dt} \cdot \left(\frac{dW}{\rho \cdot dV}\right)$$

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

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

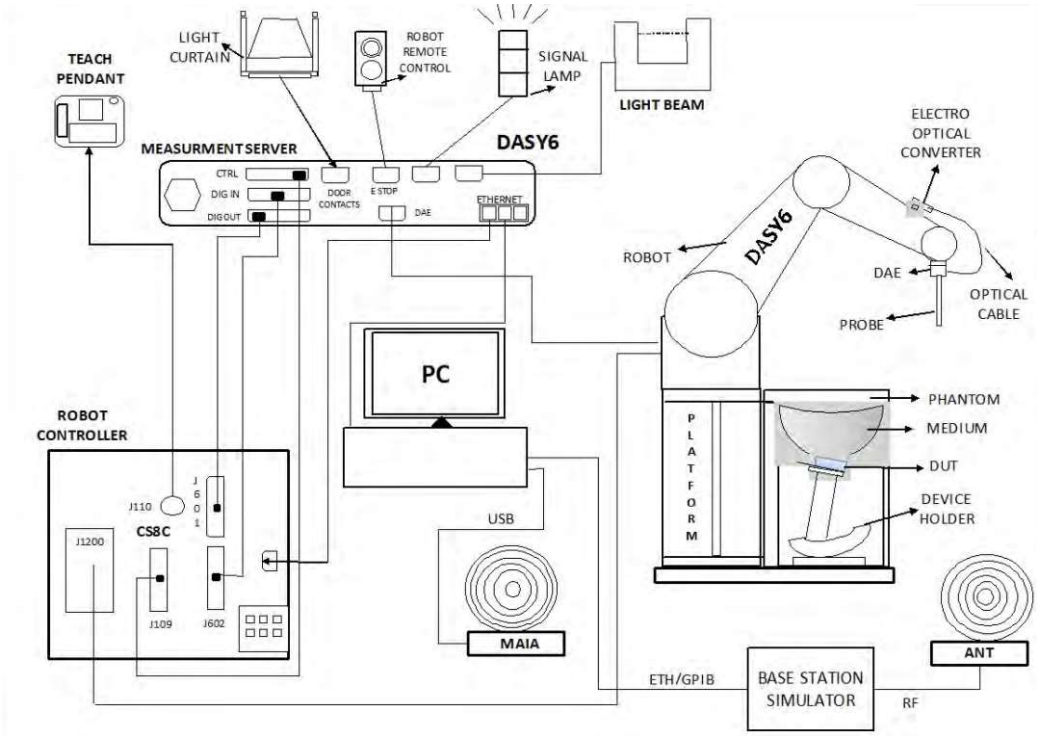
Where:

σ = Conductivity of the tissue (S/m)
ρ = Mass density of the tissue (kg/m3)
E = RMS electric field strength (V/m)

A.2 SAR Measurement System

A.2.1 SAR Measurement Setup

The DASY6 system for performing compliance tests consists of the following items:



- ✓ A standard high precision 6-axis robot (Staübli TX/RX family) with controller, teach pendant and software. It includes an arm extension for accommodating the data acquisition electronics (DAE)
- ✓ An isotropic field probe optimized and calibrated for the targeted measurements.
- ✓ A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- ✓ The Electro-optical Converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. The EOC signal is transmitted to the measurement server.
- ✓ The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movements interrupts.
- ✓ The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- ✓ A computer running Win7 professional operating system and the DASY6 software.
- ✓ Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- ✓ The phantom, the device holder and other accessories according to the targeted measurement.
- ✓ MAIA is a hardware interface (Antenna) used to evaluate the modulation and audio interference characteristics of RF signals.
- ✓ ANT is an ultra-wideband antenna for use with the base station simulators over 698 MHz to 6GHz.
- ✓ The base station simulator is an equipment used for SAR cellular tests in order to emulate the cellular signals characteristics and behavior between a regular base station and the equipment under test.
- ✓ Tissue simulating liquid.
- ✓ System Validation dipoles.
- ✓ Network emulator.

A.2.2 E-Field Measurement Probe

The probe is constructed using three orthogonal dipole sensors arranged on an interlocking, triangular prism core. The probe has built-in shielding against static charges and is contained within a PEEK cylindrical enclosure material at the tip.

The probe's characteristics are:

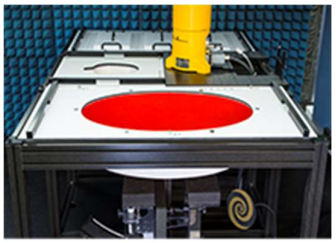
Frequency Range	30MHz – 6GHz
Length	337 mm
Probe tip external diameter	2.5 mm
Typical distance between dipoles and the probe tip	1 mm
Axial Isotropy (in human-equivalent liquids)	±0.3 dB
Hemispherical Isotropy (in human-equivalent liquids)	±0.5 dB
Linearity	±0.2 dB
Maximum operating SAR	100 W/kg
Lower SAR detection threshold	0.001 W/kg

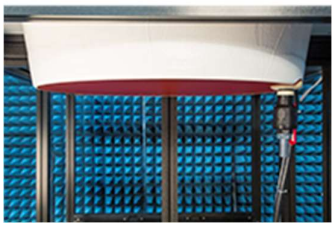
A.2.3 Flat Phantom

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

The phantom's characteristics are:

Material	Vinylester, glass fiber reinforced (VE-GF)
Shell thickness	2 mm ± 0.2 mm
Filling volume	30 Liters approx.
Dimensions	Major axis: 600mm / Minor axis: 400mm





A.2.4 Device Positioner

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of 0.5 mm would produce a SAR uncertainty of 20%. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

A simple but effective and easy-to-use extension for the Mounting Device; facilitates testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.); lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI and other Flat Phantoms.

A.3 Data Evaluation

- **Power Reference measurement**

The robot measures the E field in a specified reference position that can be either the selected section's grid reference point or a user point in this section at 4mm of the inner surface of the phantom, 2mm for frequencies above 3GHz.

- **Area Scan**

Measurement procedures for evaluating SAR from wireless handsets typically start with a coarse measurement grid to determine the approximate location of the local peak SAR values. This is known as the area-scan procedure. The SAR distribution is scanned along the inside surface of one side of the phantom head, at least for an area larger than the projection of the handset and antenna. The distance between the measured points and phantom surface should be less than 8 mm, and should remain constant (with variation less than ± 1 mm) during the entire scan in order to determine the locations of the local peak SAR with sufficient accuracy. The angle between the probe axis and the surface normal line is recommended but not required to be less than 30°. If this angle is larger than 30° and the closest point on the probe-tip housing to the phantom surface is closer than a probe diameter, the boundary effect may become larger and polarization dependent. This additional uncertainty needs to be analyzed and accounted for. To achieve this, modified test procedures and additional uncertainty analyses not described in this recommended practice may be required. The measurement and interpolation point spacing should be chosen such as to allow identification of the local peak locations to within one-half of the linear dimension of a side of the zoom-scan volume. Because a local peak having specific amplitude and steep gradients may produce a lower peak spatial-average SAR compared to peaks with slightly lower amplitude and less steep gradients, it is necessary to evaluate these other peaks as well. However, since the spatial gradients of local SAR peaks are a function of the wavelength inside the tissue-equivalent liquid and the incident magnetic field strength, it is not necessary to evaluate local peaks that are less than 2 dB or more below the global maximum peak. Two-dimensional spline algorithms (Brishoual et al. 2001; Press et al., 1996) are typically used to determine the peaks and gradients within the scanned area. If a peak is found at a distance from the scan border of less than one-half the edge dimension of the desired 1 g or 10 g cube, the measurement area should be enlarged if possible.

- **Zoom Scan**

To evaluate the peak spatial-average SAR values for 1 g or 10 g cubes, fine resolution volume scans, called zoom scans, are performed at the peak SAR locations identified during the area scan. The minimum zoom scan volume size should extend at least 1.5 times the edge dimension of a 1 g cube in all directions from the center of the scan volume, for both 1 g and 10 g peak spatial-average SAR evaluations. Along the phantom curved surfaces, the front face of the volume facing the tissue/liquid interface conforms to the curved boundary, to ensure that all SAR peaks are captured. The back face should be equally distorted to maintain the correct averaging mass. The flatness and orientation of the four side faces are unchanged from that of a cube whose orientation is within ± 30° of the line normal to the phantom at the center of the cube face next to the phantom surface. The peak local SAR locations that were determined in the area scan (interpolated values) should be used for the centers of the zoom scans. If a scan volume cannot be centered due to proximity of a phantom shape feature, the probe should be tilted to allow scan volume enlargement. If probe tilt is not feasible, the zoom-scan origin may be shifted, but not by more than half of the 1 g or 10 g cube edge dimension.

After the zoom-scan measurement, extrapolations from the closest measured points to the surface, for example along lines parallel to the zoom-scan centerline, and interpolations to a finer resolution between all measured and extrapolated points are performed. Extrapolation algorithm considerations are described in 6.5.3, and 3-D spline methods (Brishoual et al., 2001; Kreyszig, 1983; Press et al., 1996) can be used for interpolation. The peak spatial-average SAR is finally determined by a numerical averaging of the local SAR values in the interpolation grid, using for example a trapezoidal algorithm for the integration (averaging).

In some areas of the phantom, such as the jaw and upper head regions, the angle of the probe with respect to the line normal to the surface may be relatively large, e.g., greater than ± 30º, which could increase the boundary effect error to a larger level. In these cases, during the zoom scan a change in the orientation of the probe, the phantom, or both is recommended but not required for the duration of the zoom scan, so that the angle between the probe axis and the line normal to the surface is within 30º for all measurement points.

- **Power Drift measurement**

The robot re-measures the E-Field in the same reference location measured at the Power Reference. The drift measurement gives the field difference in dB from the first to the last reference reading. This allows a user to monitor the power drift of the device under test that must remain within a maximum variation of ±5%.

- **Post-processing**

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1528 and IEC 62209-1/2 standards. It can be conducted for 1g and 10g.

The software allows evaluations that combine measured data and robot positions, such as:

- ✓ Maximum search
- ✓ Extrapolation
- ✓ Boundary correction
- ✓ Peak search for averaged SAR

Interpolation between the measured points is performed when the resolution of the grid is not fine enough to compute the average SAR over a given mass.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.

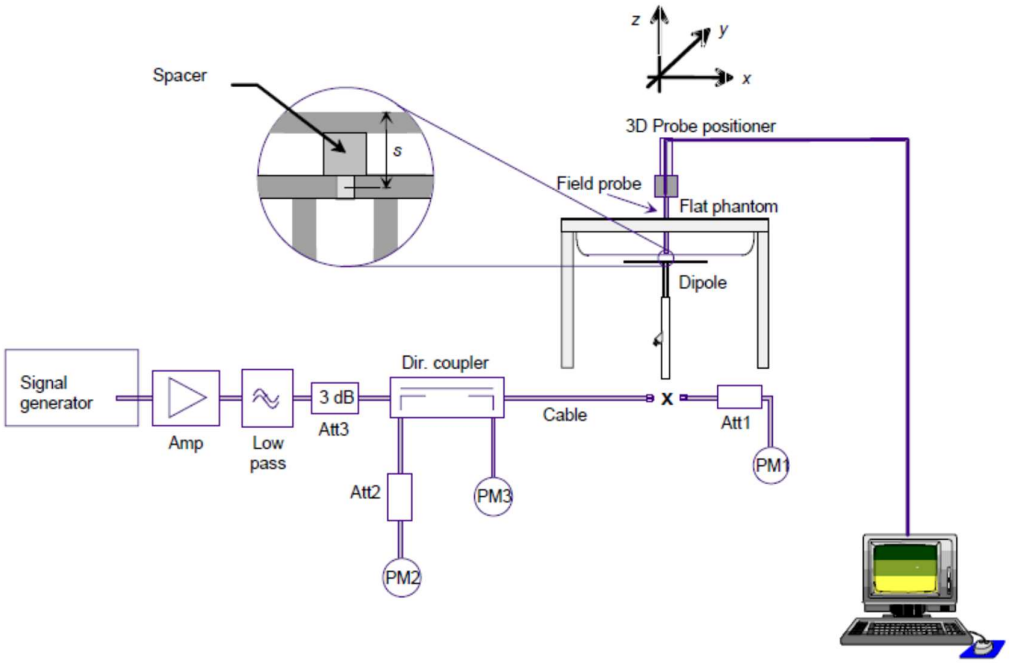
A.4 System and Liquid Check

A.4.1 System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results.

The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

In the simplified setup for system check, the EUT is replaced by a calibrated dipole and the power source is replaced by a controlled continuous wave generated by a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the phantom at the correct distance.



The equipment setup is shown below:

- ✓ Signal Generator
- ✓ Amplifier
- ✓ Directional coupler
- ✓ Power meter
- ✓ Calibrated dipole

First, the power meter PM1 (including attenuator Att1) is connected to the cable to measure the forward power at the location of the connector (x) to the system check source. The signal generator is adjusted for the desired forward power at the connector as read by power meter PM1 after attenuation Att1 and also as coupled through Att2 to PM2. After connecting the cable to the source, the signal generator is readjusted for the same reading at power meter PM2.

SAR results are normalized to a forward power of 1W to compare the values with the calibration reports results as described at IEEE 1528 and IEC 62209 standards.

A.4.2 Liquid Check

The dielectric parameters check is done prior to the use of the tissue simulating liquid. The verification is made by comparing the relative permittivity and conductivity to the values recommended by the applicable standards.

The liquid verification was performed using the following test setup:

- ✓ VNA (Vector Network Analyzer)
- ✓ Open-Short-Load calibration kit
- ✓ RF Cable
- ✓ Open-Ended Coaxial probe
- ✓ DAK software tool
- ✓ SAR Liquid
- ✓ De-ionized water
- ✓ Thermometer

These are the target dielectric properties of the tissue-equivalent liquid material as defined in FCC OET KDB 865664 D01.

Frequency	Body SAR	
(MHz)	ε_r (F/m)	σ (S/m)
150	61.9	0.80
300	58.2	0.92
450	56.7	0.94
835	55.2	0.97
900	55.0	1.05
1450	54.0	1.30
1800-2000	53.3	1.52
2450	52.7	1.95
3000	52.0	2.73
5800	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m3)

The measurement system implement a SAR error compensation algorithm as documented in IEEE Std 1528-2013 (equivalent to draft standard IEEE P1528-2011) to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters (applied to only scale up the measured SAR, and not downward) so, according to FCC OET KDB 865664 D01, the tolerance for ε_r and σ may be relaxed to ± 10%.

A.5 Test Equipment List

A.5.1 SAR System #2*

ID #	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
002-008	Data Acquisition Electronics	DAE4	1429	SPEAG	2021-05-11	2022-05-11
002-009	Dosimetric E-Field probe	EX3DV4	3978	SPEAG	2021-05-22	2022-05-22
002-000	6-axis Robot	TX60 L	F16/55FXA1/A/01	STAÜBLI	n/a	n/a
002-001	Robot Controller	CS8C	F16/55FXA1/C/01	STAÜBLI	n/a	n/a
002-002	Measurement Server	DASY6 P/N: SE UMS 028 BB	1489	SPEAG	n/a	n/a
002-003	Electro-Optical Converter	EOC60	1098	SPEAG	n/a	n/a
002-004	Light Beam Unit	SE UKS 030 AA	-	Di-soric	n/a	n/a
002-005	Oval Flat Phantom	ELI v8.0	2048	SPEAG	n/a	n/a
002-007	Measurement SW	DASY v6.14	9-5DEE27C2	SPEAG	n/a	n/a
002-006	Laptop Holder	P/N SM LH1 001 CD	-	SPEAG	n/a	n/a

*Used for LTE tests

A.5.2 SAR System #4**

ID #	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
002-008	Data Acquisition Electronics	DAE4	1628	SPEAG	2021-05-11	2022-05-11
002-009	Dosimetric E-Field probe	EX3DV4	7604	SPEAG	2021-05-22	2022-05-22
085-000	Data Acquisition Electronics	DAE4	1517	SPEAG	2021-03-11	2022-03-11
086-000	Dosimetric E-Field probe	EX3DV4	7455	SPEAG	2021-03-20	2022-03-20
004-000	6-axis Robot	TX90 XL	F11/5JL2A1/A/01	STAÜBLI	n/a	n/a
004-001	Robot Controller	CS8C	F11/5JL2A1/C/01	STAÜBLI	n/a	n/a
004-005	Measurement Server	DASY6 P/N: SE UMS 028 BB	-	SPEAG	n/a	n/a
004-004	Light Beam Unit	SE UKS 030 AA	1030	Di-soric	n/a	n/a
004-002	OvalFlat Phantom	ELI v8.0	2124	SPEAG	n/a	n/a
004-005	Measurement SW	DASY6 v16.0	9-658E90FA	SPEAG	n/a	n/a
004-010	Laptop Holder	P/N SM LH1 001 CD	-	SPEAG	n/a	n/a
458-000	Automation SW	SARA v2.2	-	Intel	n/a	n/a

**Used 5G NR tests

A.5.3 Shared Instrumentation

ID #	Device	Type/Model	Serial Number	Manufacturer	Cal. Date	Cal. Due Date
123-000	USB Power Sensor	NRP-Z81	102278	R&S	2021-04-13	2023-04-13
124-000	USB Power Sensor	NRP-Z81	102279	R&S	2021-04-13	2023-04-13
135-000	Network Emulator	CMW500	152721	R&S	2020-03-26	2022-03-26
023-000	5G Network Emulator	CMX500	101444	R&S	2020-08-24	2022-08-24
126-000	Vector Signal Generator	ESG E4438C	MY45092885	Agilent	2021-05-27	2023-05-27
099-000	Liquid measurement SW	DAK-3.5 V2.6.0.5	9-2687B491	SPEAG	n/a	n/a
339-000	Vector Network Analyzer	ZNB 40	101740	R&S	2020-07-10	2022-07-10
073-000	1750 MHz System Validation Dipole	D1750V2	1133	SPEAG	2021-01-14	2023-01-14
074-000	1900 MHz System Validation Dipole	D1900V2	5d197	SPEAG	2021-01-14	2023-01-14
075-000	2300 MHz System Validation Dipole	D2300V2	1046	SPEAG	2021-01-13	2023-01-13
076-000	2600 MHz System Validation Dipole	D2600V2	1100	SPEAG	2021-01-13	2023-01-13
404-000	3700 MHz System Validation Dipole	D3700V2	1093	SPEAG	2021-05-21	2023-05-21
327-000	Temperature & Humidity Logger	RA32E-TH1-RAS	RA32-F0DED9	AVTECH	2021-03-09	2023-03-09
398-000	Thermometer	922	33622932/208	Testo	2021-11-09	2023-11-19
198-000	0.8-21GHz RF amplifier	TVA-82-213A	2004003	Mini-Circuits	2021-08-13	2022-02-13
078-000	RF Cable	ST-18/SMAm/SMAm/48	1158830	Huber & Suhner	2021-08-13	2022-02-13
079-000	RF Cable	ST-18/SMAm/SMAm/48	1158831	Huber & Suhner	2021-08-13	2022-02-13
077-000	Coupler	CD0.5-8-20-30	1251-002	Amd-group	2021-08-13	2022-02-13

A.5.4 Tissue Simulant Liquid

TSL	Manufacturer / Model	Freq Range (MHz)	Main Ingredients	Note
Body WideBand System2	SPEAG MBBL600-6000V6 Batch 160603-01	600-6000	Ethanediol, Sodium petroleum sulfonate, Hexylene Glycol / 2-Methyl-pentane-2.4-diol, Alkoxylated alcohol	Used for WCDMA and LTE tests
Body WideBand System 4	SPEAG MBBL600-6000V6 Batch 160630-01	600-6000	Ethanediol, Sodium petroleum sulfonate, Hexylene Glycol / 2-Methyl-pentane-2.4-diol, Alkoxylated alcohol	Used for 5G NR tests

A.6 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the table below with a coverage factor of k = 2 to indicate a 95% level of confidence:

SPEAG DASY6 Uncertainty Budget According to IEC/IEEE 62209-1528 (4 MHz - 6 GHz) including IEEE 1528-2013 and IEC 62209-1/2016, IEC 62209-2/2010								
Symbol	Error Description	Uncert. Value	Prob Dist.	Div.	(ci) 1g	(ci) 10g	Std Unc. (1g)	Std Unc. (10g)
Measurement System Errors								
CF	*Probe Calibration*	±14.0 %	N	2	1	1	±7.0 %	±7.0 %
CF_{drift}	Probe Calibration Drift	±1.0 %	N	1	1	1	±1.0 %	±1.0 %
LIN	Probe Linearity	±4.7 %	R	√3	1	1	±2.7 %	±2.7 %
BBS	Broadband Signal	±3.0 %	N	2	1	1	±1.5 %	±1.5 %
ISO	*Axial Isotropy*	±4.7 %	R	√3	0.5	0.5	±1.4 %	±1.4 %
ISO	Hemispherical Isotropy	±9.6 %	R	√3	0.5	0.5	±2.8 %	±2.8 %
DAE	Data Acquisition	±0.3 %	N	1	1	1	±0.3 %	±0.3 %
AMB	RF Ambient	±1.8 %	N	1	1	1	±1.8 %	±1.8 %
Δ_{sys}	Probe Positioning	±0.2 %	N	1	0.33	0.33	±0.1 %	±0.1 %
DAT	Data Processing	±2.3 %	N	1	1	1	±2.3 %	±2.3 %
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.)$_{DAK}$	±2.5 %	N	1	0.78	0.71	±2.0 %	±1.8 %
LIQ(T_σ)	Conductivity (temp.)$_{BB}$	±3.4 %	R	√3	0.78	0.71	±1.5 %	±1.4 %
EPS	Phantom Permittivity	±14.0 %	R	√3	0.25	0.25	±2.0 %	±2.0 %
DAS	Distance DUT - TSL	±2.0 %	N	1	2	2	±4.0 %	±4.0 %
H	Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %
MOD	DUT Modulation$_m$	±2.4 %	R	√3	1	1	±1.4 %	±1.4 %
TAS	Time-average SAR	±2.6 %	R	√3	1	1	±1.5 %	±1.5 %
RF_{drift}	DUT drift	±5.0 %	N	1	1	1	±2.9 %	±2.9 %
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9 %	N	1	1	0.84	±1.9 %	±1.6 %
Combined Std. Uncertainty							±11.5 %	±11.4 %
Expanded STD Uncertainty							**±23.1 %**	**±22.9 %**

A.7 RF Exposure Limits

SAR assessments have been made in line with the requirements of FCC 47 CFR Part 2.1093 on the limitation of exposure of the general population / uncontrolled exposure for portable devices.

Exposure Type	General Population / Uncontrolled Environment
Peak spatial-average SAR (averaged over any 1 gram of tissue)	**1.6 W/kg**
Whole body average SAR	**0.08 W/kg**
Peak spatial-average SAR (extremities) (averaged over any 10 grams of tissue)	**4.0 W/kg**

Annex B. Test Results

The herein test results were performed by:

Test case measurement	Test Personnel
SAR measurement	E. Garcia, R. Luciani
Conducted measurement	F. Heurtematte

B.1 Test Conditions

B.1.1 Test SAR Test positions relative to the phantom

The device under test was a Notebook PC HSN-I45C-4 using a set PIFA antennas. The device was operated utilizing proprietary software, and each channel was measured using a communication tester to determine the maximum average power.

The device has 1 power setting:

- Laptop mode

See section 6 for details about power values for the configuration
See Annex F.3 for information about the platform antenna configuration

Laptop mode
According to FCC OET KDB 616217 D04, laptop position should be tested for SAR compliance with the display screen opened at an angle of 90° to the keyboard compartment and the notebook bottom surface must be touching the phantom.

Notebook	WWAN Aux ant8
Position	• Laptop

See B.*1.3.1* for a more detailed list of the applied reductions.

See section *F.2* for more information on the tested positions.

B.1.2 Test signal, Output power and Test Frequencies

B.1.2.1 LTE TDD consideration

According to KDB 941225 D05 SAR for LTE Devices, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

LTE TDD Bands support 3GPP TS 36.211 section 4.2 for Type 2 Frame structure and table 2 for uplink-downlink configurations and table 1 for special subframe configurations

Table 1

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	6592 T_S	(1+X) 2192 T_S	(1+X) 2560 T_S	7680 · T_S	(1+X) 2192 T_S	(1+X) 2560 T_S
1	19760 T_S			20480 T_S		
2	21952 T_S			23040 T_S		
3	24144 T_S			25600 T_S		
4	26336 T_S			7680 T_S	(2+X) 2192 T_S	(2+X) 2560 T_S
5	6592 T_S	(2+X) 2192 T_S	(2+X) 2560 T_S	20480 T_S		
6	19760 T_S			23040 T_S		
7	21952 T_S			12800 T_S		
8	24144 T_S			-	-	-
9	13168 T_S			-	-	-
10	13168 T_S	13150 T_S	12800 T_S	-	-	

Table2

Uplink-Downlink Config.	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.3%
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.3%
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.3%
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.7%
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.7%
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.7%
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.3%

Calculated duty cycle = Extended cyclic prefix in uplink *(TS)*# of S + # of U / period
The configuration used for SAR testing was the number 0 which corresponds to the highest duty cycle (Power Class 3)

Frame structure and maximal measured duty cycle (91%) for NR 5G FR1 are described in the table 3.

B.1.2.2 5G NR TDD consideration

Table3

Subframe Number																					
Radio Frame 0																					
SF0		SF1		SF2		SF3		SF4		SF5		SF6		SF7		SF8		SF9			
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9		
D	s	U	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U		
Radio Frame 1-2																					
SF0		SF1		SF2		SF3		SF4		SF5		SF6		SF7		SF8		SF9			
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9		
S	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U		
Radio Frame 3																					
SF0		SF1		SF2		SF3		SF4		SF5		SF6		SF7		SF8		SF9			
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9		
S	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U	S	U	U	U		

"D": Full DL slot, "s": partial slot, "S": partial slot for PUSCH, "U": full UL slot

B.1.3 Evaluation Exclusion and Test Reductions

B.1.3.1 SAR evaluation exclusion

The SAR Test Exclusion Threshold in FCC OET KDB 447498 D01 v06 can be applied to determine SAR test exclusion for adjacent edge configurations. For 100MHz to 6GHz and test separation distances ≤50mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following formula:

$$[(\text{max. power of channel, including tune} - \text{up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot \left[\sqrt{f_{(GHz)}}\right] \leq 3.0\ for\ 1g\ SAR, and \leq 7.5\ for\ 10g\ extremity\ SAR \quad (1)$$

Where:

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as numeric thresholds

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

For test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined using the following formulas:

$$\langle(Power\ allowed\ at\ numeric\ threshold\ for\ 50\ mm\ in\ (1)) + (test\ separation\ distance - 50\ mm) \cdot (f_{MHz}/150)\rangle mW,\ for\ 100MHz\ to\ 1500MHz \quad (2)$$

$$\langle(Power\ allowed\ at\ numeric\ threshold\ for\ 50\ mm\ in\ (1)) + (test\ separation\ distance - 50\ mm) \cdot 10)\rangle mW,\ for\ 1500MHz\ and\ \leq 6GHz \quad (3)$$

Test Exclusion

Antenna	Band Name	Output power		Laptop		Laptop
		dBm	**mW**			
WWAN (Main Ant5)	FDD II	24.5	281.8	>50		R
	FDD IV	24.5	281.8	>50		R
	FDD V	24.5	281.8	>50		R
	LTE 2	24.0	251.2	>50		R
	LTE 4	24.0	251.2	>50		R
	LTE 5	24.0	251.2	>50		R
	LTE 7	24.0	251.2	>50		R
	LTE 12	24.0	251.2	>50		R
	LTE 13	24.0	251.2	>50		R
	LTE 14	24.0	251.2	>50		R
	LTE 17	24.0	251.2	>50		R
	LTE 25	24.0	251.2	>50		R
	LTE 26	24.0	251.2	>50		R
	LTE 30	24.0	251.2	>50		R
	LTE 38	24.0	251.2	>50		R
	LTE 41	24.0	251.2	>50		R
	LTE 66	24.0	251.2	>50		R
	NR 2	24.0	251.2	>50		R
	NR 5	24.0	251.2	>50		R
	NR 7	24.0	251.2	>50		R
	NR 25	24.0	251.2	>50		R
	NR 30	24.0	251.2	>50		R
	NR 38	24.0	251.2	>50		R
	NR 41	24.0	251.2	>50		R
	NR 66	24.0	251.2	>50		R
	NR 77	27.0	501.2	>50		R
	NR 78	27.0	501.2	>50		R

Antenna	Band Name	Output power		Laptop	Laptop
		dBm	**mW**		
WWAN (Aux Ant8)	LTE 2	24.0	251.2	**<50**	T
	LTE 4	24.0	251.2	**<50**	R
	LTE 7	24.0	251.2	**<50**	T
	LTE 25	24.0	251.2	**<50**	T
	LTE 30	24.0	251.2	**<50**	T
	LTE 41	24.0	251.2	**<50**	T
	LTE 48	20.0	100.0	**<50**	T
	LTE 66	24.0	251.2	**<50**	T
	NR 2	24.0	251.2	**<50**	T
	NR 38	24.0	251.2	**<50**	T
	NR 41	24.0	251.2	**<50**	T
	NR 66	24.0	251.2	**<50**	T
	NR 77	20.0	100.0	**<50**	T
	NR 78	20.0	100.0	**<50**	R

T: Tested position
R: Reduced
See Annex *F* for a more detailed explanation of the separation distance related to the platform.

In order to evaluate SAR test exclusion for laptop user position in which the separation distance passes the 50mm limit, equations (2) and (3) are used with the corresponding frequencies for each band, the user distances for the laptop position and with the power values described on Section 6. The table below shows all cellular bands evaluated in this report grouped by frequency band, separation distances and the corresponding Power threshold in mW for each combination (distance and frequency)

Bands	Frequency	Separation distance to the body on mm										
		60	70	80	90	100	110	160	170	190	200	
LTE 12,13, 14, 17	750	223	273	323	373	423	473	723	773	873	923	Threshold values in mW
FDD V LTE 5, 26 NR 5	835	220	275	331	387	442	498	776	832	943	999	
FDD IV LTE 4, 66 NR 66	1750	213	313	413	513	613	713	1213	1313	1513	1613	
FDD II LTE 2, 25 NR 2, 25	1900	209	309	409	509	609	709	1209	1309	1509	1609	
LTE 30 NR 30	2300	199	299	399	499	599	699	1199	1299	1499	1599	
LTE 7, 38, 41 NR 7, 38, 41	2600	193	293	393	493	593	693	1193	1293	1493	1593	
LTE 48 NR 77, 78	3700	180	280	380	480	580	680	1180	1280	1480	1580	

The highest output power for all bands in notebook mode is 501.2mW which is smaller than all the values of the table, for distances >160mm. Since the considered distance between the user body and the antenna is minimum 200mm, SAR is not required for the notebook mode position for antenna Main 5. Refer to annex F3 for antenna position using notebook mode.

B.1.3.2 General SAR test reduction

According to FCC OET KDB 447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

WWAN SAR Test reduction

Transmission Mode	SAR test exclusion/reduction
HSDPA	According to FCC OET KDB 941225 D01, SAR evaluation is not required when the maximum average output power is < ¼ dB higher than the measured on the corresponding channels without HSDPA, using 12.2kbps RMC, and the maximum SAR for 12.2kbps RMC is < 1.2 W/kg.
HSUPA	According to FCC OET KDB 941225 D01, SAR evaluation is not required when the maximum average output power is < ¼ dB higher than the measured on the corresponding channels without HSUPA, using 12.2kbps RMC, and the maximum SAR for 12.2kbps RMC is < 1.2 W/kg.
DC+HSDPA	According to FCC OET KDB 941225 D01, SAR evaluation is not required when the maximum average output power is < ¼ dB higher than the measured on the corresponding channels without DC+HSDPA, using 12.2kbps RMC, and the maximum SAR for 12.2kbps RMC is < 1.2 W/kg.
LTE	According to FCC OET KDB 941225 D05, testing of 100% RB allocation, higher order modulations or lower BW is not required when these conditions are met: ○ For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. ○ For each modulation besides QPSK, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg. ○ For lower BW, only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg. For LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing; therefore, the requirement for H, M, and L channels may not fully apply
5G NR	According to TCB workshop November 2019; RF Exposure Policy Updates (5G NR FR1 NSA EN-DC UE SAR Evaluations), the FCC OET KDB 941225 D05 rules apply.

B.2 Conducted Power Measurements

B.2.1 LTE

B.2.1.1 LTE Band 2 FDD Antenna Aux ant8

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE 2	20 MHz	18700	1860	1RB Low	1 Pos 0	24.00	0	23.34	24.00	1	22.55
				1RB Mid	1 Pos 50	24.00	0	23.43	24.00	1	22.66
				1RB High	1 Pos 99	24.00	0	23.38	24.00	1	22.60
				50% RB Low	50 Pos 0	24.00	1	22.54	24.00	2	21.52
				50% RB Mid	50 Pos 24	24.00	1	22.58	24.00	2	21.56
				50% RB High	50 Pos 50	24.00	1	22.54	24.00	2	21.54
				100% RB	100 Pos 0	24.00	1	22.52	24.00	2	21.53
		18900	1880	1RB Low	1 Pos 0	24.00	0	23.49	24.00	1	23.06
				1RB Mid	1 Pos 50	24.00	0	23.61	24.00	1	23.15
				1RB High	1 Pos 99	24.00	0	23.48	24.00	1	23.09
				50% RB Low	50 Pos 0	24.00	1	22.46	24.00	2	21.43
				50% RB Mid	50 Pos 24	24.00	1	22.66	24.00	2	21.64
				50% RB High	50 Pos 50	24.00	1	22.65	24.00	2	21.68
				100% RB	100 Pos 0	24.00	1	22.59	24.00	2	21.57
		19100	1900	1RB Low	1 Pos 0	24.00	0	23.52	24.00	1	22.73
				1RB Mid	1 Pos 50	24.00	0	23.61	24.00	1	22.79
				1RB High	1 Pos 99	24.00	0	23.51	24.00	1	22.68
				50% RB Low	50 Pos 0	24.00	1	22.71	24.00	2	21.70
				50% RB Mid	50 Pos 24	24.00	1	22.72	24.00	2	21.73
				50% RB High	50 Pos 50	24.00	1	22.65	24.00	2	21.67
				100% RB	100 Pos 0	24.00	1	22.68	24.00	2	21.67
	15 MHz	18675	1857.5	1RB Low	1 Pos 0	24.00	0	23.50	24.00	1	22.95
				1RB Mid	1 Pos 38	24.00	0	23.52	24.00	1	23.01
				1RB High	1 Pos 74	24.00	0	23.48	24.00	1	23.01
				50% RB Low	38 Pos 0	24.00	1	22.52	24.00	2	21.51
				50% RB Mid	38 Pos 19	24.00	1	22.48	24.00	2	21.53
				50% RB High	38 Pos 39	24.00	1	22.46	24.00	2	21.48
				100% RB	75 Pos 0	24.00	1	22.52	24.00	2	21.51
		18900	1880	1RB Low	1 Pos 0	24.00	0	23.48	24.00	1	22.91
				1RB Mid	1 Pos 38	24.00	0	23.61	24.00	1	22.95
				1RB High	1 Pos 74	24.00	0	23.51	24.00	1	22.89
				50% RB Low	38 Pos 0	24.00	1	22.50	24.00	2	21.52
				50% RB Mid	38 Pos 19	24.00	1	22.60	24.00	2	21.64
				50% RB High	38 Pos 39	24.00	1	22.61	24.00	2	21.62
				100% RB	75 Pos 0	24.00	1	22.60	24.00	2	21.56
		19125	1902.5	1RB Low	1 Pos 0	24.00	0	23.60	24.00	1	22.79
				1RB Mid	1 Pos 38	24.00	0	23.59	24.00	1	22.72
				1RB High	1 Pos 74	24.00	0	23.52	24.00	1	22.67
				50% RB Low	38 Pos 0	24.00	1	22.66	24.00	2	21.65
				50% RB Mid	38 Pos 19	24.00	1	22.68	24.00	2	21.63
				50% RB High	38 Pos 39	24.00	1	22.61	24.00	2	21.62
				100% RB	75 Pos 0	24.00	1	22.59	24.00	2	21.60
	10 MHz	18650	1855	1RB Low	1 Pos 0	24.00	0	23.56	24.00	1	22.96
				1RB Mid	1 Pos 24	24.00	0	23.48	24.00	1	22.95
				1RB High	1 Pos 49	24.00	0	23.44	24.00	1	22.98
				50% RB Low	25 Pos 0	24.00	1	22.48	24.00	2	21.57
				50% RB Mid	25 Pos 12	24.00	1	22.47	24.00	2	21.57
				50% RB High	25 Pos 25	24.00	1	22.46	24.00	2	21.53
				100% RB	50 Pos0	24.00	1	22.51	24.00	2	21.54
		18900	1880	1RB Low	1 Pos 0	24.00	0	23.54	24.00	1	22.56
				1RB Mid	1 Pos 24	24.00	0	23.60	24.00	1	22.63
				1RB High	1 Pos 49	24.00	0	23.58	24.00	1	22.59
				50% RB Low	25 Pos 0	24.00	1	22.51	24.00	2	21.60
				50% RB Mid	25 Pos 12	24.00	1	22.59	24.00	2	21.68
				50% RB High	25 Pos 25	24.00	1	22.65	24.00	2	21.75
				100% RB	50 Pos0	24.00	1	22.61	24.00	2	21.60
		19150	1905	1RB Low	1 Pos 0	24.00	0	23.59	24.00	1	22.75
				1RB Mid	1 Pos 24	24.00	0	23.60	24.00	1	22.74
				1RB High	1 Pos 49	24.00	0	23.55	24.00	1	22.69
				50% RB Low	25 Pos 0	24.00	1	22.63	24.00	2	21.67
				50% RB Mid	25 Pos 12	24.00	1	22.61	24.00	2	21.61
				50% RB High	25 Pos 25	24.00	1	22.61	24.00	2	21.63
				100% RB	50 Pos0	24.00	1	22.67	24.00	2	21.67

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE 2	5 MHz	18625	1852.5	1RB Low	1 Pos 0	24.00	0	23.67	24.00	1	22.45
				1RB Mid	1 Pos 50	24.00	0	23.64	24.00	1	22.41
				1RB High	1 Pos 99	24.00	0	23.61	24.00	1	22.40
				50% RB Low	50 Pos 0	24.00	1	22.53	24.00	2	21.49
				50% RB Mid	50 Pos 24	24.00	1	22.45	24.00	2	21.48
				50% RB High	50 Pos 50	24.00	1	22.46	24.00	2	21.43
				100% RB	100 Pos 0	24.00	1	22.52	24.00	2	21.58
		18900	1880	1RB Low	1 Pos 0	24.00	0	23.64	24.00	1	22.66
				1RB Mid	1 Pos 50	24.00	0	23.64	24.00	1	22.66
				1RB High	1 Pos 99	24.00	0	23.63	24.00	1	22.63
				50% RB Low	50 Pos 0	24.00	1	22.56	24.00	2	21.52
				50% RB Mid	50 Pos 24	24.00	1	22.59	24.00	2	21.52
				50% RB High	50 Pos 50	24.00	1	22.56	24.00	2	21.52
				100% RB	100 Pos 0	24.00	1	22.62	24.00	2	21.62
		19175	1907.5	1RB Low	1 Pos 0	24.00	0	23.59	24.00	1	22.84
				1RB Mid	1 Pos 50	24.00	0	23.55	24.00	1	22.78
				1RB High	1 Pos 99	24.00	0	23.59	24.00	1	22.82
				50% RB Low	50 Pos 0	24.00	1	22.61	24.00	2	21.63
				50% RB Mid	50 Pos 24	24.00	1	22.57	24.00	2	21.61
				50% RB High	50 Pos 50	24.00	1	22.56	24.00	2	21.57
				100% RB	100 Pos 0	24.00	1	22.60	24.00	2	21.63
	3 MHz	18615	1851.5	1RB Low	1 Pos 0	24.00	0	23.50	24.00	1	22.97
				1RB Mid	1 Pos 38	24.00	0	23.46	24.00	1	22.91
				1RB High	1 Pos 74	24.00	0	23.44	24.00	1	22.91
				50% RB Low	38 Pos 0	24.00	1	22.42	24.00	2	21.65
				50% RB Mid	38 Pos 19	24.00	1	22.41	24.00	2	21.62
				50% RB High	38 Pos 39	24.00	1	22.46	24.00	2	21.63
				100% RB	75 Pos 0	24.00	1	22.51	24.00	2	21.51
		18900	1880	1RB Low	1 Pos 0	24.00	0	23.57	24.00	1	23.08
				1RB Mid	1 Pos 38	24.00	0	23.55	24.00	1	23.02
				1RB High	1 Pos 74	24.00	0	23.52	24.00	1	23.03
				50% RB Low	38 Pos 0	24.00	1	22.49	24.00	2	21.70
				50% RB Mid	38 Pos 19	24.00	1	22.54	24.00	2	21.68
				50% RB High	38 Pos 39	24.00	1	22.51	24.00	2	21.72
				100% RB	75 Pos 0	24.00	1	22.50	24.00	2	21.62
		19185	1908.5	1RB Low	1 Pos 0	24.00	0	23.54	24.00	1	22.98
				1RB Mid	1 Pos 38	24.00	0	23.55	24.00	1	22.98
				1RB High	1 Pos 74	24.00	0	23.52	24.00	1	22.97
				50% RB Low	38 Pos 0	24.00	1	22.59	24.00	2	21.75
				50% RB Mid	38 Pos 19	24.00	1	22.51	24.00	2	21.70
				50% RB High	38 Pos 39	24.00	1	22.54	24.00	2	21.70
				100% RB	75 Pos 0	24.00	1	22.56	24.00	2	21.63
	1.4 MHz	18607	1850.7	1RB Low	1 Pos 0	24.00	0	23.30	24.00	1	22.41
				1RB Mid	1 Pos 24	24.00	0	23.28	24.00	1	22.37
				1RB High	1 Pos 49	24.00	0	23.27	24.00	1	22.37
				50% RB Low	25 Pos 0	24.00	1	23.40	24.00	2	22.51
				50% RB Mid	25 Pos 12	24.00	1	23.42	24.00	2	22.54
				50% RB High	25 Pos 25	24.00	1	23.36	24.00	2	22.50
				100% RB	50 Pos0	24.00	1	22.33	24.00	2	21.32
		18900	1880	1RB Low	1 Pos 0	24.00	0	23.32	24.00	1	22.44
				1RB Mid	1 Pos 24	24.00	0	23.31	24.00	1	22.44
				1RB High	1 Pos 49	24.00	0	23.33	24.00	1	22.44
				50% RB Low	25 Pos 0	24.00	1	23.41	24.00	2	22.50
				50% RB Mid	25 Pos 12	24.00	1	23.41	24.00	2	22.52
				50% RB High	25 Pos 25	24.00	1	23.41	24.00	2	22.55
				100% RB	50 Pos0	24.00	1	22.36	24.00	2	21.36
		19193	1909.3	1RB Low	1 Pos 0	24.00	0	23.30	24.00	1	22.45
				1RB Mid	1 Pos 24	24.00	0	23.29	24.00	1	22.41
				1RB High	1 Pos 49	24.00	0	23.30	24.00	1	22.45
				50% RB Low	25 Pos 0	24.00	1	23.42	24.00	2	22.55
				50% RB Mid	25 Pos 12	24.00	1	23.44	24.00	2	22.56
				50% RB High	25 Pos 25	24.00	1	23.42	24.00	2	22.57
				100% RB	50 Pos0	24.00	1	22.39	24.00	2	21.36

B.2.1.2 LTE Band 4 FDD Antenna Aux ant8

SAR Measurement for LTE Band 4 FDD (Frequency range: 1710 – 1755MHz) is covered by LTE Band 66 FDD (Frequency range: 1710 – 1780MHz) due to overlapping frequency range, same maximum tune-up and same bandwidth.

B.2.1.3 LTE Band 7 FDD Antenna Aux ant8

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE 7	20 MHz	20850	2510	1RB Low	1 Pos 0	24.00	0	23.41	24.00	1	22.72
				1RB Mid	1 Pos 50	24.00	0	23.53	24.00	1	22.83
				1RB High	1 Pos 99	24.00	0	23.37	24.00	1	22.68
				50% RB Low	50 Pos 0	24.00	1	22.44	24.00	2	21.42
				50% RB Mid	50 Pos 24	24.00	1	22.51	24.00	2	21.44
				50% RB High	50 Pos 50	24.00	1	22.52	24.00	2	21.45
				100% RB	100 Pos 0	24.00	1	22.47	24.00	2	21.47
		21100	2535	1RB Low	1 Pos 0	24.00	0	23.28	24.00	1	22.86
				1RB Mid	1 Pos 50	24.00	0	23.44	24.00	1	23.04
				1RB High	1 Pos 99	24.00	0	23.31	24.00	1	22.92
				50% RB Low	50 Pos 0	24.00	1	22.48	24.00	2	21.48
				50% RB Mid	50 Pos 24	24.00	1	22.50	24.00	2	21.48
				50% RB High	50 Pos 50	24.00	1	22.45	24.00	2	21.45
				100% RB	100 Pos 0	24.00	1	22.50	24.00	2	21.44
		21350	2560	1RB Low	1 Pos 0	24.00	0	23.42	24.00	1	22.61
				1RB Mid	1 Pos 50	24.00	0	23.49	24.00	1	22.69
				1RB High	1 Pos 99	24.00	0	23.40	24.00	1	22.57
				50% RB Low	50 Pos 0	24.00	1	22.52	24.00	2	21.46
				50% RB Mid	50 Pos 24	24.00	1	22.53	24.00	2	21.52
				50% RB High	50 Pos 50	24.00	1	22.45	24.00	2	21.44
				100% RB	100 Pos 0	24.00	1	22.49	24.00	2	21.48
	15 MHz	20825	2507.5	1RB Low	1 Pos 0	24.00	0	23.38	24.00	1	23.02
				1RB Mid	1 Pos 38	24.00	0	23.44	24.00	1	23.11
				1RB High	1 Pos 74	24.00	0	23.30	24.00	1	22.96
				50% RB Low	38 Pos 0	24.00	1	22.50	24.00	2	21.45
				50% RB Mid	38 Pos 19	24.00	1	22.47	24.00	2	21.52
				50% RB High	38 Pos 39	24.00	1	22.44	24.00	2	21.46
				100% RB	75 Pos 0	24.00	1	22.45	24.00	2	21.47
		21100	2535	1RB Low	1 Pos 0	24.00	0	23.37	24.00	1	22.81
				1RB Mid	1 Pos 38	24.00	0	23.42	24.00	1	22.86
				1RB High	1 Pos 74	24.00	0	23.28	24.00	1	22.78
				50% RB Low	38 Pos 0	24.00	1	22.46	24.00	2	21.49
				50% RB Mid	38 Pos 19	24.00	1	22.41	24.00	2	21.47
				50% RB High	38 Pos 39	24.00	1	22.40	24.00	2	21.46
				100% RB	75 Pos 0	24.00	1	22.44	24.00	2	21.42
		21375	2562.5	1RB Low	1 Pos 0	24.00	0	23.41	24.00	1	22.56
				1RB Mid	1 Pos 38	24.00	0	23.49	24.00	1	22.60
				1RB High	1 Pos 74	24.00	0	23.42	24.00	1	22.52
				50% RB Low	38 Pos 0	24.00	1	22.44	24.00	2	21.43
				50% RB Mid	38 Pos 19	24.00	1	22.51	24.00	2	21.46
				50% RB High	38 Pos 39	24.00	1	22.48	24.00	2	21.51
				100% RB	75 Pos 0	24.00	1	22.46	24.00	2	21.48
	10 MHz	20800	2505	1RB Low	1 Pos 0	24.00	0	23.42	24.00	1	23.07
				1RB Mid	1 Pos 24	24.00	0	23.46	24.00	1	23.09
				1RB High	1 Pos 49	24.00	0	23.40	24.00	1	23.08
				50% RB Low	25 Pos 0	24.00	1	22.45	24.00	2	21.51
				50% RB Mid	25 Pos 12	24.00	1	22.49	24.00	2	21.50
				50% RB High	25 Pos 25	24.00	1	22.48	24.00	2	21.55
				100% RB	50 Pos0	24.00	1	22.52	24.00	2	21.48
		21100	2535	1RB Low	1 Pos 0	24.00	0	23.38	24.00	1	22.40
				1RB Mid	1 Pos 24	24.00	0	23.43	24.00	1	22.42
				1RB High	1 Pos 49	24.00	0	23.42	24.00	1	22.38
				50% RB Low	25 Pos 0	24.00	1	22.44	24.00	2	21.54
				50% RB Mid	25 Pos 12	24.00	1	22.43	24.00	2	21.52
				50% RB High	25 Pos 25	24.00	1	22.42	24.00	2	21.53
				100% RB	50 Pos0	24.00	1	22.48	24.00	2	21.48
		21400	2565	1RB Low	1 Pos 0	24.00	0	23.41	24.00	1	22.56
				1RB Mid	1 Pos 24	24.00	0	23.47	24.00	1	22.59
				1RB High	1 Pos 49	24.00	0	23.47	24.00	1	22.62
				50% RB Low	25 Pos 0	24.00	1	22.51	24.00	2	21.55
				50% RB Mid	25 Pos 12	24.00	1	22.47	24.00	2	21.54
				50% RB High	25 Pos 25	24.00	1	22.49	24.00	2	21.46
				100% RB	50 Pos0	24.00	1	22.48	24.00	2	21.47

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE 7	5 MHz	20775	2502.5	1RB Low	1 Pos 0	24.00	0	23.51	24.00	1	22.42
				1RB Mid	1 Pos 12	24.00	0	23.50	24.00	1	22.34
				1RB High	1 Pos 24	24.00	0	23.55	24.00	1	22.39
				50% RB Low	12 Pos 0	24.00	1	22.43	24.00	2	21.48
				50% RB Mid	12 Pos 6	24.00	1	22.42	24.00	2	21.43
				50% RB High	12 Pos 11	24.00	1	22.44	24.00	2	21.42
				100% RB	25 Pos 0	24.00	1	22.44	24.00	2	21.51
		21100	2535	1RB Low	1 Pos 0	24.00	0	23.42	24.00	1	22.51
				1RB Mid	1 Pos 12	24.00	0	23.41	24.00	1	22.49
				1RB High	1 Pos 24	24.00	0	23.45	24.00	1	22.47
				50% RB Low	12 Pos 0	24.00	1	22.47	24.00	2	21.41
				50% RB Mid	12 Pos 6	24.00	1	22.42	24.00	2	21.36
				50% RB High	12 Pos 11	24.00	1	22.38	24.00	2	21.31
				100% RB	25 Pos 0	24.00	1	22.40	24.00	2	21.43
		21425	2567.5	1RB Low	1 Pos 0	24.00	0	23.46	24.00	1	22.75
				1RB Mid	1 Pos 12	24.00	0	23.50	24.00	1	22.74
				1RB High	1 Pos 24	24.00	0	23.48	24.00	1	22.75
				50% RB Low	12 Pos 0	24.00	1	22.51	24.00	2	21.52
				50% RB Mid	12 Pos 6	24.00	1	22.47	24.00	2	21.45
				50% RB High	12 Pos 11	24.00	1	22.46	24.00	2	21.48
				100% RB	25 Pos 0	24.00	1	22.50	24.00	2	21.48

B.2.1.4 LTE Band 25 FDD Antenna Aux ant8

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE 25	20 MHz	26140	1860.0	1RB Low	1 Pos 0	20.00	0	18.77	20.00	1	17.35
				1RB Mid	1 Pos 50	20.00	0	18.85	20.00	1	17.42
				1RB High	1 Pos 99	20.00	0	18.70	20.00	1	17.26
				50% RB Low	50 Pos 0	20.00	1	17.72	20.00	2	16.72
				50% RB Mid	50 Pos 24	20.00	1	17.88	20.00	2	16.85
				50% RB High	50 Pos 50	20.00	1	17.80	20.00	2	16.81
				100% RB	100 Pos 0	20.00	1	17.75	20.00	2	16.73
		26365	1882.5	1RB Low	1 Pos 0	20.00	0	18.81	20.00	1	17.81
				1RB Mid	1 Pos 50	20.00	0	18.81	20.00	1	17.90
				1RB High	1 Pos 99	20.00	0	18.75	20.00	1	17.76
				50% RB Low	50 Pos 0	20.00	1	17.89	20.00	2	16.87
				50% RB Mid	50 Pos 24	20.00	1	17.90	20.00	2	16.90
				50% RB High	50 Pos 50	20.00	1	17.87	20.00	2	16.83
				100% RB	100 Pos 0	20.00	1	17.90	20.00	2	16.84
		26590	1905.0	1RB Low	1 Pos 0	20.00	0	18.84	20.00	1	17.43
				1RB Mid	1 Pos 50	20.00	0	18.95	20.00	1	17.59
				1RB High	1 Pos 99	20.00	0	18.81	20.00	1	17.48
				50% RB Low	50 Pos 0	20.00	1	17.88	20.00	2	16.81
				50% RB Mid	50 Pos 24	20.00	1	17.89	20.00	2	16.79
				50% RB High	50 Pos 50	20.00	1	17.72	20.00	2	16.68
				100% RB	100 Pos 0	20.00	1	17.78	20.00	2	16.77
	15 MHz	26115	1857.5	1RB Low	1 Pos 0	20.00	0	18.85	20.00	1	17.62
				1RB Mid	1 Pos 38	20.00	0	18.90	20.00	1	17.69
				1RB High	1 Pos 74	20.00	0	18.78	20.00	1	17.57
				50% RB Low	38 Pos 0	20.00	1	17.70	20.00	2	16.69
				50% RB Mid	38 Pos 19	20.00	1	17.82	20.00	2	16.76
				50% RB High	38 Pos 39	20.00	1	17.78	20.00	2	16.71
				100% RB	75 Pos 0	20.00	1	17.76	20.00	2	16.75
		26365	1882.5	1RB Low	1 Pos 0	20.00	0	18.83	20.00	1	18.03
				1RB Mid	1 Pos 38	20.00	0	18.81	20.00	1	18.08
				1RB High	1 Pos 74	20.00	0	18.72	20.00	1	18.00
				50% RB Low	38 Pos 0	20.00	1	17.84	20.00	2	16.84
				50% RB Mid	38 Pos 19	20.00	1	17.84	20.00	2	16.80
				50% RB High	38 Pos 39	20.00	1	17.83	20.00	2	16.77
				100% RB	75 Pos 0	20.00	1	17.84	20.00	2	16.82
		26615	1907.5	1RB Low	1 Pos 0	20.00	0	18.88	20.00	1	17.84
				1RB Mid	1 Pos 38	20.00	0	18.87	20.00	1	17.84
				1RB High	1 Pos 74	20.00	0	18.86	20.00	1	17.77
				50% RB Low	38 Pos 0	20.00	1	17.84	20.00	2	16.88
				50% RB Mid	38 Pos 19	20.00	1	17.87	20.00	2	16.89
				50% RB High	38 Pos 39	20.00	1	17.78	20.00	2	16.80
				100% RB	75 Pos 0	20.00	1	17.81	20.00	2	16.81
	10 MHz	26090	1855.0	1RB Low	1 Pos 0	20.00	0	18.87	20.00	1	17.44
				1RB Mid	1 Pos 24	20.00	0	18.89	20.00	1	17.49
				1RB High	1 Pos 49	20.00	0	18.85	20.00	1	17.43
				50% RB Low	25 Pos 0	20.00	1	17.78	20.00	2	16.75
				50% RB Mid	25 Pos 12	20.00	1	17.82	20.00	2	16.81
				50% RB High	25 Pos 25	20.00	1	17.83	20.00	2	16.81
				100% RB	50 Pos0	20.00	1	17.83	20.00	2	16.80
		26365	1882.5	1RB Low	1 Pos 0	20.00	0	18.88	20.00	1	18.04
				1RB Mid	1 Pos 24	20.00	0	18.86	20.00	1	18.02
				1RB High	1 Pos 49	20.00	0	18.75	20.00	1	17.97
				50% RB Low	25 Pos 0	20.00	1	17.83	20.00	2	16.87
				50% RB Mid	25 Pos 12	20.00	1	17.87	20.00	2	16.91
				50% RB High	25 Pos 25	20.00	1	17.80	20.00	2	16.80
				100% RB	50 Pos0	20.00	1	17.83	20.00	2	16.80
		26640	1910.0	1RB Low	1 Pos 0	20.00	0	18.92	20.00	1	17.84
				1RB Mid	1 Pos 24	20.00	0	18.94	20.00	1	17.87
				1RB High	1 Pos 49	20.00	0	18.89	20.00	1	17.80
				50% RB Low	25 Pos 0	20.00	1	17.95	20.00	2	16.98
				50% RB Mid	25 Pos 12	20.00	1	17.85	20.00	2	16.85
				50% RB High	25 Pos 25	20.00	1	17.80	20.00	2	16.81
				100% RB	50 Pos0	20.00	1	17.93	20.00	2	16.88

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE25	5 MHz	26065	1852.5	1RB Low	1 Pos 0	20.00	0	18.80	20.00	1	18.21
				1RB Mid	1 Pos 38	20.00	0	18.83	20.00	1	18.20
				1RB High	1 Pos 74	20.00	0	18.80	20.00	1	18.18
				50% RB Low	38 Pos 0	20.00	1	17.80	20.00	2	16.79
				50% RB Mid	38 Pos 19	20.00	1	17.83	20.00	2	16.76
				50% RB High	38 Pos 39	20.00	1	17.87	20.00	2	16.78
				100% RB	75 Pos 0	20.00	1	17.82	20.00	2	16.81
		26365	1882.5	1RB Low	1 Pos 0	20.00	0	18.84	20.00	1	17.93
				1RB Mid	1 Pos 38	20.00	0	18.82	20.00	1	17.90
				1RB High	1 Pos 74	20.00	0	18.78	20.00	1	17.90
				50% RB Low	38 Pos 0	20.00	1	17.77	20.00	2	16.81
				50% RB Mid	38 Pos 19	20.00	1	17.81	20.00	2	16.82
				50% RB High	38 Pos 39	20.00	1	17.79	20.00	2	16.80
				100% RB	75 Pos 0	20.00	1	17.83	20.00	2	16.82
		26665	1912.5	1RB Low	1 Pos 0	20.00	0	18.98	20.00	1	17.96
				1RB Mid	1 Pos 38	20.00	0	18.97	20.00	1	17.99
				1RB High	1 Pos 74	20.00	0	18.97	20.00	1	17.93
				50% RB Low	38 Pos 0	20.00	1	17.99	20.00	2	16.90
				50% RB Mid	38 Pos 19	20.00	1	17.97	20.00	2	16.83
				50% RB High	38 Pos 39	20.00	1	17.91	20.00	2	16.79
				100% RB	75 Pos 0	20.00	1	17.94	20.00	2	16.86
	3 MHz	26055	1851.5	1RB Low	1 Pos 0	20.00	0	18.85	20.00	1	18.03
				1RB Mid	1 Pos 24	20.00	0	18.81	20.00	1	18.04
				1RB High	1 Pos 49	20.00	0	18.82	20.00	1	18.06
				50% RB Low	25 Pos 0	20.00	1	17.82	20.00	2	16.79
				50% RB Mid	25 Pos 12	20.00	1	17.84	20.00	2	16.80
				50% RB High	25 Pos 24	20.00	1	17.81	20.00	2	16.79
				100% RB	50 Pos 0	20.00	1	17.84	20.00	2	16.77
		26365	1882.5	1RB Low	1 Pos 0	20.00	0	18.88	20.00	1	18.02
				1RB Mid	1 Pos 24	20.00	0	18.83	20.00	1	18.03
				1RB High	1 Pos 49	20.00	0	18.81	20.00	1	18.00
				50% RB Low	25 Pos 0	20.00	1	17.80	20.00	2	16.77
				50% RB Mid	25 Pos 12	20.00	1	17.81	20.00	2	16.77
				50% RB High	25 Pos 24	20.00	1	17.78	20.00	2	16.75
				100% RB	50 Pos 0	20.00	1	17.81	20.00	2	16.77
		26675	1913.5	1RB Low	1 Pos 0	20.00	0	18.91	20.00	1	18.07
				1RB Mid	1 Pos 24	20.00	0	18.88	20.00	1	18.09
				1RB High	1 Pos 49	20.00	0	18.84	20.00	1	18.12
				50% RB Low	25 Pos 0	20.00	1	17.87	20.00	2	16.90
				50% RB Mid	25 Pos 12	20.00	1	17.89	20.00	2	16.87
				50% RB High	25 Pos 24	20.00	1	17.84	20.00	2	16.84
				100% RB	50 Pos 0	20.00	1	17.86	20.00	2	16.85
	1.4 MHz	26047	1850.7	1RB Low	1 Pos 0	20.00	0	18.87	20.00	1	17.64
				1RB Mid	1 Pos 12	20.00	0	18.95	20.00	1	17.70
				1RB High	1 Pos 24	20.00	0	18.88	20.00	1	17.65
				50% RB Low	12 Pos 0	20.00	1	18.87	20.00	2	17.93
				50% RB Mid	12 Pos 6	20.00	1	18.90	20.00	2	17.92
				50% RB High	12 Pos 11	20.00	1	18.89	20.00	2	17.93
				100% RB	25 Pos 0	20.00	1	17.86	20.00	2	16.87
		26365	1882.5	1RB Low	1 Pos 0	20.00	0	18.85	20.00	1	17.65
				1RB Mid	1 Pos 12	20.00	0	18.90	20.00	1	17.71
				1RB High	1 Pos 24	20.00	0	18.92	20.00	1	17.63
				50% RB Low	12 Pos 0	20.00	1	18.85	20.00	2	17.89
				50% RB Mid	12 Pos 6	20.00	1	18.86	20.00	2	17.90
				50% RB High	12 Pos 11	20.00	1	18.86	20.00	2	17.89
				100% RB	25 Pos 0	20.00	1	17.83	20.00	2	16.83
		26683	1914.3	1RB Low	1 Pos 0	20.00	0	18.98	20.00	1	17.69
				1RB Mid	1 Pos 12	20.00	0	19.00	20.00	1	17.74
				1RB High	1 Pos 24	20.00	0	18.93	20.00	1	17.69
				50% RB Low	12 Pos 0	20.00	1	18.92	20.00	2	17.97
				50% RB Mid	12 Pos 6	20.00	1	18.93	20.00	2	17.97
				50% RB High	12 Pos 11	20.00	1	18.92	20.00	2	17.98
				100% RB	25 Pos 0	20.00	1	17.89	20.00	2	16.94

B.2.1.5 LTE Band 30 FDD Antenna Aux ant8

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE30	10 MHz	27710	2310	1RB Low	1 Pos 0	24.00	0	22.77	24.00	1	22.04
				1RB Mid	1 Pos 24	24.00	0	22.85	24.00	1	22.05
				1RB High	1 Pos 49	24.00	0	22.85	24.00	1	22.06
				50% RB Low	25 Pos 0	24.00	1	21.86	24.00	2	20.90
				50% RB Mid	25 Pos 12	24.00	1	21.81	24.00	2	20.87
				50% RB High	25 Pos 24	24.00	1	21.76	24.00	2	20.78
				100% RB	50 Pos 0	24.00	1	21.85	24.00	2	20.82
	5.0 MHz	27710	2310	1RB Low	1 Pos 0	24.00	0	22.85	24.00	1	22.19
				1RB Mid	1 Pos 12	24.00	0	22.85	24.00	1	22.15
				1RB High	1 Pos 24	24.00	0	22.86	24.00	1	22.15
				50% RB Low	12 Pos 0	24.00	1	21.82	24.00	2	20.82
				50% RB Mid	12 Pos 6	24.00	1	21.76	24.00	2	20.74
				50% RB High	12 Pos 11	24.00	1	21.75	24.00	2	20.67
				100% RB	25 Pos 0	24.00	1	21.80	24.00	2	20.78

B.2.1.6 LTE Band 41 TDD Antenna Aux ant8

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE41	20 MHz	39750	2506	1RB Low	1 Pos 0	24.00	0	23.14	24.00	1	22.30
				1RB Mid	1 Pos 50	24.00	0	23.13	24.00	1	22.34
				1RB High	1 Pos 99	24.00	0	22.87	24.00	1	22.08
				50% RB Low	50 Pos 0	24.00	1	22.21	24.00	2	21.20
				50% RB Mid	50 Pos 24	24.00	1	22.16	24.00	2	21.09
				50% RB High	50 Pos 50	24.00	1	22.05	24.00	2	21.04
				100% RB	100 Pos 0	24.00	1	22.07	24.00	2	21.04
		40185	2549.5	1RB Low	1 Pos 0	24.00	0	22.94	24.00	1	21.61
				1RB Mid	1 Pos 50	24.00	0	22.96	24.00	1	21.63
				1RB High	1 Pos 99	24.00	0	22.97	24.00	1	21.59
				50% RB Low	50 Pos 0	24.00	1	21.99	24.00	2	21.02
				50% RB Mid	50 Pos 24	24.00	1	22.01	24.00	2	20.96
				50% RB High	50 Pos 50	24.00	1	21.90	24.00	2	20.93
				100% RB	100 Pos 0	24.00	1	21.92	24.00	2	20.92
		40620	2593	1RB Low	1 Pos 0	24.00	0	23.26	24.00	1	22.21
				1RB Mid	1 Pos 50	24.00	0	23.27	24.00	1	22.19
				1RB High	1 Pos 99	24.00	0	23.08	24.00	1	22.05
				50% RB Low	50 Pos 0	24.00	1	22.30	24.00	2	21.27
				50% RB Mid	50 Pos 24	24.00	1	22.29	24.00	2	21.17
				50% RB High	50 Pos 50	24.00	1	22.16	24.00	2	21.13
				100% RB	100 Pos 0	24.00	1	22.16	24.00	2	21.18
		41055	2636.5	1RB Low	1 Pos 0	24.00	0	23.13	24.00	1	22.36
				1RB Mid	1 Pos 50	24.00	0	23.19	24.00	1	22.37
				1RB High	1 Pos 99	24.00	0	22.92	24.00	1	22.11
				50% RB Low	50 Pos 0	24.00	1	22.22	24.00	2	21.21
				50% RB Mid	50 Pos 24	24.00	1	22.22	24.00	2	21.12
				50% RB High	50 Pos 50	24.00	1	22.09	24.00	2	21.10
				100% RB	100 Pos 0	24.00	1	22.15	24.00	2	21.05
		41490	2680	1RB Low	1 Pos 0	24.00	0	23.28	24.00	1	21.98
				1RB Mid	1 Pos 50	24.00	0	23.25	24.00	1	21.96
				1RB High	1 Pos 99	24.00	0	23.03	24.00	1	21.61
				50% RB Low	50 Pos 0	24.00	1	22.28	24.00	2	21.24
				50% RB Mid	50 Pos 24	24.00	1	22.23	24.00	2	21.27
				50% RB High	50 Pos 50	24.00	1	22.23	24.00	2	21.17
				100% RB	100 Pos 0	24.00	1	22.18	24.00	2	21.18

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE41	15 MHz	39750	2506	1RB Low	1 Pos 0	24.00	0	23.15	24.00	1	22.48
				1RB Mid	1 Pos 38	24.00	0	23.09	24.00	1	22.42
				1RB High	1 Pos 74	24.00	0	22.88	24.00	1	22.23
				50% RB Low	38 Pos 0	24.00	1	22.17	24.00	2	21.17
				50% RB Mid	38 Pos 19	24.00	1	22.04	24.00	2	21.03
				50% RB High	38 Pos 39	24.00	1	22.02	24.00	2	21.01
				100% RB	75 Pos 0	24.00	1	22.03	24.00	2	21.01
		40185	2549.5	1RB Low	1 Pos 0	24.00	0	23.02	24.00	1	22.04
				1RB Mid	1 Pos 38	24.00	0	22.98	24.00	1	21.93
				1RB High	1 Pos 74	24.00	0	22.98	24.00	1	21.98
				50% RB Low	38 Pos 0	24.00	1	21.93	24.00	2	20.85
				50% RB Mid	38 Pos 19	24.00	1	21.90	24.00	2	20.86
				50% RB High	38 Pos 39	24.00	1	21.95	24.00	2	20.94
				100% RB	75 Pos 0	24.00	1	21.97	24.00	2	20.87
		40620	2593	1RB Low	1 Pos 0	24.00	0	23.28	24.00	1	22.29
				1RB Mid	1 Pos 38	24.00	0	23.21	24.00	1	22.27
				1RB High	1 Pos 74	24.00	0	23.04	24.00	1	22.10
				50% RB Low	38 Pos 0	24.00	1	22.25	24.00	2	21.31
				50% RB Mid	38 Pos 19	24.00	1	22.23	24.00	2	21.19
				50% RB High	38 Pos 39	24.00	1	22.09	24.00	2	21.13
				100% RB	75 Pos 0	24.00	1	22.23	24.00	2	21.15
		41055	2636.5	1RB Low	1 Pos 0	24.00	0	23.09	24.00	1	22.48
				1RB Mid	1 Pos 38	24.00	0	23.05	24.00	1	22.39
				1RB High	1 Pos 74	24.00	0	22.92	24.00	1	22.32
				50% RB Low	38 Pos 0	24.00	1	22.13	24.00	2	21.09
				50% RB Mid	38 Pos 19	24.00	1	22.04	24.00	2	21.05
				50% RB High	38 Pos 39	24.00	1	21.98	24.00	2	20.99
				100% RB	75 Pos 0	24.00	1	22.03	24.00	2	21.04
		41490	2680.0	1RB Low	1 Pos 0	24.00	0	23.32	24.00	1	22.29
				1RB Mid	1 Pos 38	24.00	0	23.20	24.00	1	22.25
				1RB High	1 Pos 74	24.00	0	23.07	24.00	1	22.07
				50% RB Low	38 Pos 0	24.00	1	22.21	24.00	2	21.21
				50% RB Mid	38 Pos 19	24.00	1	22.12	24.00	2	21.13
				50% RB High	38 Pos 39	24.00	1	22.08	24.00	2	21.07
				100% RB	75 Pos 0	24.00	1	22.12	24.00	2	21.12

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE41	10 MHz	39750	2506	1RB Low	1 Pos 0	24.00	0	23.18	24.00	1	22.48
				1RB Mid	1 Pos 24	24.00	0	23.10	24.00	1	22.43
				1RB High	1 Pos 49	24.00	0	22.94	24.00	1	22.30
				50% RB Low	25 Pos 0	24.00	1	22.09	24.00	2	21.16
				50% RB Mid	25 Pos 12	24.00	1	22.13	24.00	2	21.20
				50% RB High	25 Pos 24	24.00	1	22.08	24.00	2	21.07
				100% RB	50 Pos 0	24.00	1	22.10	24.00	2	21.08
		40185	2549.5	1RB Low	1 Pos 0	24.00	0	22.89	24.00	1	21.79
				1RB Mid	1 Pos 24	24.00	0	22.86	24.00	1	21.78
				1RB High	1 Pos 49	24.00	0	22.85	24.00	1	21.81
				50% RB Low	25 Pos 0	24.00	1	21.86	24.00	2	20.88
				50% RB Mid	25 Pos 12	24.00	1	21.84	24.00	2	20.81
				50% RB High	25 Pos 24	24.00	1	21.88	24.00	2	20.85
				100% RB	50 Pos 0	24.00	1	21.94	24.00	2	20.84
		40620	2593	1RB Low	1 Pos 0	24.00	0	23.29	24.00	1	22.31
				1RB Mid	1 Pos 24	24.00	0	23.23	24.00	1	22.26
				1RB High	1 Pos 49	24.00	0	23.15	24.00	1	22.12
				50% RB Low	25 Pos 0	24.00	1	22.28	24.00	2	21.24
				50% RB Mid	25 Pos 12	24.00	1	22.19	24.00	2	21.23
				100% RB	50 Pos 0	24.00	1	22.14	24.00	2	21.19
				1RB Low	1 Pos 0	24.00	1	22.24	24.00	2	21.21
		41055	2636.5	1RB Mid	1 Pos 24	24.00	0	23.08	24.00	1	22.45
				1RB High	1 Pos 49	24.00	0	23.04	24.00	1	22.43
				50% RB Low	25 Pos 0	24.00	0	23.04	24.00	1	22.44
				50% RB Mid	25 Pos 12	24.00	1	22.16	24.00	2	21.13
				100% RB	50 Pos 0	24.00	1	22.10	24.00	2	21.10
				1RB Low	1 Pos 0	24.00	1	22.08	24.00	2	21.17
				1RB Mid	1 Pos 24	24.00	1	22.13	24.00	2	21.10
		41490	2680	1RB High	1 Pos 49	24.00	0	23.25	24.00	1	22.12
				50% RB Low	25 Pos 0	24.00	0	23.16	24.00	1	22.06
				50% RB Mid	25 Pos 12	24.00	0	23.17	24.00	1	22.06
				100% RB	50 Pos 0	24.00	1	22.16	24.00	2	21.18
				1RB Low	1 Pos 0	24.00	1	22.16	24.00	2	21.18
				1RB Mid	1 Pos 24	24.00	1	22.18	24.00	2	21.19
				1RB High	1 Pos 49	24.00	1	22.21	24.00	2	21.20

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE41	5.0 MHz	39750	2506	1RB Low	1 Pos 0	24.00	0	23.13	24.00	1	22.52
				1RB Mid	1 Pos 12	24.00	0	23.10	24.00	1	22.46
				1RB High	1 Pos 24	24.00	0	23.01	24.00	1	22.42
				50% RB Low	12 Pos 0	24.00	1	22.16	24.00	2	21.11
				50% RB Mid	12 Pos 6	24.00	1	22.07	24.00	2	21.02
				50% RB High	12 Pos 11	24.00	1	22.03	24.00	2	20.98
				100% RB	25 Pos 0	24.00	1	22.08	24.00	2	21.06
		40185	2549.5	1RB Low	1 Pos 0	24.00	0	22.97	24.00	1	22.21
				1RB Mid	1 Pos 12	24.00	0	22.99	24.00	1	22.21
				1RB High	1 Pos 24	24.00	0	23.00	24.00	1	22.21
				50% RB Low	12 Pos 0	24.00	1	21.87	24.00	2	20.83
				50% RB Mid	12 Pos 6	24.00	1	21.82	24.00	2	20.74
				50% RB High	12 Pos 11	24.00	1	21.79	24.00	2	20.73
				100% RB	25 Pos 0	24.00	1	21.87	24.00	2	20.85
		40620	2593	1RB Low	1 Pos 0	24.00	0	23.25	24.00	1	22.48
				1RB Mid	1 Pos 12	24.00	0	23.18	24.00	1	22.42
				1RB High	1 Pos 24	24.00	0	23.09	24.00	1	22.40
				50% RB Low	12 Pos 0	24.00	1	22.26	24.00	2	21.25
				50% RB Mid	12 Pos 6	24.00	1	22.20	24.00	2	21.17
				50% RB High	12 Pos 11	24.00	1	22.16	24.00	2	21.20
				100% RB	25 Pos 0	24.00	1	22.22	24.00	2	21.24
		41055	2636.5	1RB Low	1 Pos 0	24.00	0	23.12	24.00	1	22.35
				1RB Mid	1 Pos 12	24.00	0	23.11	24.00	1	22.31
				1RB High	1 Pos 24	24.00	0	23.08	24.00	1	22.30
				50% RB Low	12 Pos 0	24.00	1	22.13	24.00	2	21.00
				50% RB Mid	12 Pos 6	24.00	1	22.09	24.00	2	21.02
				50% RB High	12 Pos 11	24.00	1	22.06	24.00	2	20.95
				100% RB	25 Pos 0	24.00	1	22.06	24.00	2	21.06
		41490	2680	1RB Low	1 Pos 0	24.00	0	23.23	24.00	1	22.58
				1RB Mid	1 Pos 12	24.00	0	23.20	24.00	1	22.54
				1RB High	1 Pos 24	24.00	0	23.21	24.00	1	22.51
				50% RB Low	12 Pos 0	24.00	1	22.17	24.00	2	21.10
				50% RB Mid	12 Pos 6	24.00	1	22.11	24.00	2	21.10
				50% RB High	12 Pos 11	24.00	1	22.21	24.00	2	21.08
				100% RB	25 Pos 0	24.00	1	22.22	24.00	2	21.21

B.2.1.7 LTE Band 48 FDD Antenna Aux ant8

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE 48	20 MHz	55340	3560	1RB Low	1 Pos 0	20.00	0	18.70	20.00	1	17.85
				1RB Mid	1 Pos 50	20.00	0	18.93	20.00	1	18.04
				1RB High	1 Pos 99	20.00	0	18.83	20.00	1	17.92
				50% RB Low	50 Pos 0	20.00	1	17.83	20.00	2	16.82
				50% RB Mid	50 Pos 24	20.00	1	17.88	20.00	2	16.88
				50% RB High	50 Pos 50	20.00	1	17.88	20.00	2	16.85
				100% RB	100 Pos 0	20.00	1	17.83	20.00	2	16.80
		55990	3625	1RB Low	1 Pos 0	20.00	0	18.80	20.00	1	17.97
				1RB Mid	1 Pos 50	20.00	0	19.05	20.00	1	18.19
				1RB High	1 Pos 99	20.00	0	19.00	20.00	1	18.13
				50% RB Low	50 Pos 0	20.00	1	18.10	20.00	2	17.13
				50% RB Mid	50 Pos 24	20.00	1	18.15	20.00	2	17.14
				50% RB High	50 Pos 50	20.00	1	18.15	20.00	2	17.16
				100% RB	100 Pos 0	20.00	1	18.10	20.00	2	17.10
		56640	3690	1RB Low	1 Pos 0	20.00	0	18.82	20.00	1	18.05
				1RB Mid	1 Pos 50	20.00	0	18.94	20.00	1	18.22
				1RB High	1 Pos 99	20.00	0	18.90	20.00	1	18.17
				50% RB Low	50 Pos 0	20.00	1	17.95	20.00	2	16.91
				50% RB Mid	50 Pos 24	20.00	1	17.98	20.00	2	16.95
				50% RB High	50 Pos 50	20.00	1	17.95	20.00	2	16.94
				100% RB	100 Pos 0	20.00	1	17.92	20.00	2	16.89
	15 MHz	55315	3557.5	1RB Low	1 Pos 0	20.00	0	18.80	20.00	1	18.15
				1RB Mid	1 Pos 38	20.00	0	18.92	20.00	1	18.16
				1RB High	1 Pos 74	20.00	0	18.87	20.00	1	18.17
				50% RB Low	38 Pos 0	20.00	1	17.82	20.00	2	16.75
				50% RB Mid	38 Pos 19	20.00	1	17.83	20.00	2	16.77
				50% RB High	38 Pos 39	20.00	1	17.89	20.00	2	16.80
				100% RB	75 Pos 0	20.00	1	17.84	20.00	2	16.80
		55990	3625	1RB Low	1 Pos 0	20.00	0	19.08	20.00	1	18.32
				1RB Mid	1 Pos 38	20.00	0	19.22	20.00	1	18.50
				1RB High	1 Pos 74	20.00	0	19.17	20.00	1	18.45
				50% RB Low	38 Pos 0	20.00	1	18.11	20.00	2	17.22
				50% RB Mid	38 Pos 19	20.00	1	18.16	20.00	2	17.22
				50% RB High	38 Pos 39	20.00	1	18.17	20.00	2	17.23
				100% RB	75 Pos 0	20.00	1	18.17	20.00	2	17.17
		56665	3692.5	1RB Low	1 Pos 0	20.00	0	18.77	20.00	1	18.43
				1RB Mid	1 Pos 38	20.00	0	19.02	20.00	1	18.55
				1RB High	1 Pos 74	20.00	0	18.98	20.00	1	18.51
				50% RB Low	38 Pos 0	20.00	1	17.96	20.00	2	16.95
				50% RB Mid	38 Pos 19	20.00	1	18.00	20.00	2	16.97
				50% RB High	38 Pos 39	20.00	1	18.04	20.00	2	17.00
				100% RB	75 Pos 0	20.00	1	18.00	20.00	2	17.00
	10 MHz	55290	3555	1RB Low	1 Pos 0	20.00	0	18.83	20.00	1	18.06
				1RB Mid	1 Pos 24	20.00	0	18.84	20.00	1	18.08
				1RB High	1 Pos 49	20.00	0	18.86	20.00	1	18.11
				50% RB Low	25 Pos 0	20.00	1	17.88	20.00	2	16.83
				50% RB Mid	25 Pos 12	20.00	1	17.88	20.00	2	16.83
				50% RB High	25 Pos 25	20.00	1	17.91	20.00	2	16.88
				100% RB	50 Pos0	20.00	1	17.89	20.00	2	16.88
		55990	3625	1RB Low	1 Pos 0	20.00	0	19.15	20.00	1	17.99
				1RB Mid	1 Pos 24	20.00	0	19.17	20.00	1	18.03
				1RB High	1 Pos 49	20.00	0	19.24	20.00	1	18.08
				50% RB Low	25 Pos 0	20.00	1	18.15	20.00	2	17.13
				50% RB Mid	25 Pos 12	20.00	1	18.15	20.00	2	17.13
				50% RB High	25 Pos 25	20.00	1	18.21	20.00	2	17.2
				100% RB	50 Pos0	20.00	1	18.2	20.00	2	17.15
		56690	3695	1RB Low	1 Pos 0	20.00	0	19.02	20.00	1	18.2
				1RB Mid	1 Pos 24	20.00	0	19.04	20.00	1	18.25
				1RB High	1 Pos 49	20.00	0	19.05	20.00	1	18.25
				50% RB Low	25 Pos 0	20.00	1	18	20.00	2	16.94
				50% RB Mid	25 Pos 12	20.00	1	18.02	20.00	2	16.99
				50% RB High	25 Pos 25	20.00	1	18.01	20.00	2	16.98
				100% RB	50 Pos0	20.00	1	18.03	20.00	2	16.99

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE 48	5 MHz	55265	3552.5	1RB Low	1 Pos 0	20.00	0	18.93	20.00	1	18.17
				1RB Mid	1 Pos 12	20.00	0	18.92	20.00	1	18.18
				1RB High	1 Pos 24	20.00	0	18.92	20.00	1	18.17
				50% RB Low	12 Pos 0	20.00	1	17.82	20.00	2	16.85
				50% RB Mid	12 Pos 6	20.00	1	17.81	20.00	2	16.86
				50% RB High	12 Pos 11	20.00	1	17.82	20.00	2	16.86
				100% RB	25 Pos 0	20.00	1	17.85	20.00	2	16.81
		55990	3625	1RB Low	1 Pos 0	20.00	0	19.19	20.00	1	18.55
				1RB Mid	1 Pos 12	20.00	0	19.25	20.00	1	18.63
				1RB High	1 Pos 24	20.00	0	19.26	20.00	1	18.62
				50% RB Low	12 Pos 0	20.00	1	18.14	20.00	2	17.06
				50% RB Mid	12 Pos 6	20.00	1	18.15	20.00	2	17.03
				50% RB High	12 Pos 11	20.00	1	18.14	20.00	2	17.04
				100% RB	25 Pos 0	20.00	1	18.16	20.00	2	17.15
		56715	3697.5	1RB Low	1 Pos 0	20.00	0	19.00	20.00	1	18.56
				1RB Mid	1 Pos 12	20.00	0	19.03	20.00	1	18.55
				1RB High	1 Pos 24	20.00	0	18.97	20.00	1	18.57
				50% RB Low	12 Pos 0	20.00	1	18.00	20.00	2	17.02
				50% RB Mid	12 Pos 6	20.00	1	17.96	20.00	2	16.97
				50% RB High	12 Pos 11	20.00	1	17.94	20.00	2	17.01
				100% RB	25 Pos 0	20.00	1	18.01	20.00	2	16.91

B.2.1.8 LTE Band 66 FDD Antenna Aux ant8

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE66	20 MHz	132072	1720	1RB Low	1 Pos 0	24.00	0	23.45	24.00	1	22.67
				1RB Mid	1 Pos 50	24.00	0	23.58	24.00	1	22.84
				1RB High	1 Pos 99	24.00	0	23.50	24.00	1	22.74
				50% RB Low	50 Pos 0	24.00	1	22.65	24.00	2	21.63
				50% RB Mid	50 Pos 24	24.00	1	22.64	24.00	2	21.61
				50% RB High	50 Pos 50	24.00	1	22.59	24.00	2	21.61
				100% RB	100 Pos 0	24.00	1	22.60	24.00	2	21.60
		132322	1745	1RB Low	1 Pos 0	24.00	0	23.47	24.00	1	22.93
				1RB Mid	1 Pos 50	24.00	0	23.53	24.00	1	23.01
				1RB High	1 Pos 99	24.00	0	23.47	24.00	1	23.01
				50% RB Low	50 Pos 0	24.00	1	22.64	24.00	2	21.62
				50% RB Mid	50 Pos 24	24.00	1	22.61	24.00	2	21.60
				50% RB High	50 Pos 50	24.00	1	22.58	24.00	2	21.53
				100% RB	100 Pos 0	24.00	1	22.62	24.00	2	21.58
		132572	1770	1RB Low	1 Pos 0	24.00	0	23.52	24.00	1	22.69
				1RB Mid	1 Pos 50	24.00	0	23.56	24.00	1	22.72
				1RB High	1 Pos 99	24.00	0	23.52	24.00	1	22.67
				50% RB Low	50 Pos 0	24.00	1	22.55	24.00	2	21.50
				50% RB Mid	50 Pos 24	24.00	1	22.62	24.00	2	21.62
				50% RB High	50 Pos 50	24.00	1	22.55	24.00	2	21.51
				100% RB	100 Pos 0	24.00	1	22.56	24.00	2	21.57
	15 MHz	132047	1717.5	1RB Low	1 Pos 0	24.00	0	23.49	24.00	1	22.99
				1RB Mid	1 Pos 38	24.00	0	23.54	24.00	1	23.09
				1RB High	1 Pos 74	24.00	0	23.45	24.00	1	23.03
				50% RB Low	38 Pos 0	24.00	1	22.58	24.00	2	21.54
				50% RB Mid	38 Pos 19	24.00	1	22.55	24.00	2	21.58
				50% RB High	38 Pos 39	24.00	1	22.56	24.00	2	21.57
				100% RB	75 Pos 0	24.00	1	22.55	24.00	2	21.57
		132422	1755	1RB Low	1 Pos 0	24.00	0	23.49	24.00	1	22.78
				1RB Mid	1 Pos 38	24.00	0	23.51	24.00	1	22.84
				1RB High	1 Pos 74	24.00	0	23.46	24.00	1	22.82
				50% RB Low	38 Pos 0	24.00	1	22.54	24.00	2	21.56
				50% RB Mid	38 Pos 19	24.00	1	22.56	24.00	2	21.59
				50% RB High	38 Pos 39	24.00	1	22.54	24.00	2	21.58
				100% RB	75 Pos 0	24.00	1	22.58	24.00	2	21.55
		132597	1772.5	1RB Low	1 Pos 0	24.00	0	23.54	24.00	1	22.66
				1RB Mid	1 Pos 38	24.00	0	23.53	24.00	1	22.70
				1RB High	1 Pos 74	24.00	0	23.47	24.00	1	22.63
				50% RB Low	38 Pos 0	24.00	1	22.55	24.00	2	21.53
				50% RB Mid	38 Pos 19	24.00	1	22.50	24.00	2	21.55
				50% RB High	38 Pos 39	24.00	1	22.53	24.00	2	21.55
				100% RB	75 Pos 0	24.00	1	22.54	24.00	2	21.56
	10 MHz	132022	1715	1RB Low	1 Pos 0	24.00	0	23.52	24.00	1	23.02
				1RB Mid	1 Pos 24	24.00	0	23.58	24.00	1	23.07
				1RB High	1 Pos 49	24.00	0	23.55	24.00	1	23.03
				50% RB Low	25 Pos 0	24.00	1	22.59	24.00	2	21.65
				50% RB Mid	25 Pos 12	24.00	1	22.60	24.00	2	21.67
				50% RB High	25 Pos 24	24.00	1	22.63	24.00	2	21.70
				100% RB	50 Pos 0	24.00	1	22.60	24.00	2	21.59
		132422	1755	1RB Low	1 Pos 0	24.00	0	23.52	24.00	1	22.49
				1RB Mid	1 Pos 24	24.00	0	23.55	24.00	1	22.49
				1RB High	1 Pos 49	24.00	0	23.53	24.00	1	22.53
				50% RB Low	25 Pos 0	24.00	1	22.60	24.00	2	21.70
				50% RB Mid	25 Pos 12	24.00	1	22.50	24.00	2	21.64
				50% RB High	25 Pos 24	24.00	1	22.57	24.00	2	21.68
				100% RB	50 Pos 0	24.00	1	22.63	24.00	2	21.63
		132622	1775	1RB Low	1 Pos 0	24.00	0	23.54	24.00	1	22.66
				1RB Mid	1 Pos 24	24.00	0	23.56	24.00	1	22.68
				1RB High	1 Pos 49	24.00	0	23.55	24.00	1	22.69
				50% RB Low	25 Pos 0	24.00	1	22.59	24.00	2	21.63
				50% RB Mid	25 Pos 12	24.00	1	22.61	24.00	2	21.58
				50% RB High	25 Pos 24	24.00	1	22.57	24.00	2	21.56
				100% RB	50 Pos 0	24.00	1	22.62	24.00	2	21.62

Band	BW	Channel #	Freq (MHz)	% RB Allocation	RB Position	QPSK			16 QAM		
						Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)	Factory Upper Tolerance (dBm)	MPR	Measured Output Power (dBm)
LTE66	5.0 MHz	131997	1712.5	1RB Low	1 Pos 0	24.00	0	23.67	24.00	1	22.48
				1RB Mid	1 Pos 12	24.00	0	23.69	24.00	1	22.50
				1RB High	1 Pos 24	24.00	0	23.68	24.00	1	22.53
				50% RB Low	12 Pos 0	24.00	1	22.56	24.00	2	21.52
				50% RB Mid	12 Pos 6	24.00	1	22.59	24.00	2	21.60
				50% RB High	12 Pos 11	24.00	1	22.59	24.00	2	21.55
				100% RB	25 Pos 0	24.00	1	22.59	24.00	2	21.67
		132422	1755	1RB Low	1 Pos 0	24.00	0	23.54	24.00	1	22.61
				1RB Mid	1 Pos 12	24.00	0	23.54	24.00	1	22.59
				1RB High	1 Pos 24	24.00	0	23.55	24.00	1	22.60
				50% RB Low	12 Pos 0	24.00	1	22.53	24.00	2	21.51
				50% RB Mid	12 Pos 6	24.00	1	22.50	24.00	2	21.48
				50% RB High	12 Pos 11	24.00	1	22.49	24.00	2	21.47
				100% RB	25 Pos 0	24.00	1	22.58	24.00	2	21.62
		132647	1777.5	1RB Low	1 Pos 0	24.00	0	23.55	24.00	1	22.80
				1RB Mid	1 Pos 12	24.00	0	23.60	24.00	1	22.81
				1RB High	1 Pos 24	24.00	0	23.60	24.00	1	22.81
				50% RB Low	12 Pos 0	24.00	1	22.60	24.00	2	21.61
				50% RB Mid	12 Pos 6	24.00	1	22.54	24.00	2	21.60
				50% RB High	12 Pos 11	24.00	1	22.52	24.00	2	21.55
				100% RB	25 Pos 0	24.00	1	22.60	24.00	2	21.59
	3.0 MHz	131987	1711.5	1RB Low	1 Pos 0	24.00	0	23.54	24.00	1	23.00
				1RB Mid	1 Pos 7	24.00	0	23.50	24.00	1	23.04
				1RB High	1 Pos 14	24.00	0	23.57	24.00	1	23.04
				50% RB Low	8 Pos 0	24.00	1	22.54	24.00	2	21.70
				50% RB Mid	8 Pos 4	24.00	1	22.52	24.00	2	21.76
				50% RB High	8 Pos 7	24.00	1	22.56	24.00	2	21.77
				100% RB	15 Pos 0	24.00	1	22.61	24.00	2	21.70
		132422	1755	1RB Low	1 Pos 0	24.00	0	23.50	24.00	1	23.04
				1RB Mid	1 Pos 7	24.00	0	23.50	24.00	1	23.01
				1RB High	1 Pos 14	24.00	0	23.46	24.00	1	23.01
				50% RB Low	8 Pos 0	24.00	1	22.52	24.00	2	21.70
				50% RB Mid	8 Pos 4	24.00	1	22.52	24.00	2	21.71
				50% RB High	8 Pos 7	24.00	1	22.49	24.00	2	21.67
				100% RB	15 Pos 0	24.00	1	22.51	24.00	2	21.57
		132657	1778.5	1RB Low	1 Pos 0	24.00	0	23.59	24.00	1	23.10
				1RB Mid	1 Pos 7	24.00	0	23.54	24.00	1	23.05
				1RB High	1 Pos 14	24.00	0	23.53	24.00	1	23.07
				50% RB Low	8 Pos 0	24.00	1	22.54	24.00	2	21.76
				50% RB Mid	8 Pos 4	24.00	1	22.57	24.00	2	21.77
				50% RB High	8 Pos 7	24.00	1	22.56	24.00	2	21.73
				100% RB	15 Pos 0	24.00	1	22.58	24.00	2	21.64
	1.4 MHz	131979	1710	1RB Low	1 Pos 0	24.00	0	23.35	24.00	1	22.46
				1RB Mid	1 Pos 2	24.00	0	23.34	24.00	1	22.48
				1RB High	1 Pos 5	24.00	0	23.34	24.00	1	22.47
				50% RB Low	3 Pos 0	24.00	1	23.46	24.00	2	22.58
				50% RB Mid	3 Pos 1	24.00	1	23.48	24.00	2	22.61
				50% RB High	3 Pos 2	24.00	1	23.48	24.00	2	22.63
				100% RB	6 Pos 0	24.00	1	22.44	24.00	2	21.43
		132422	1755	1RB Low	1 Pos 0	24.00	0	23.29	24.00	1	22.39
				1RB Mid	1 Pos 2	24.00	0	23.31	24.00	1	22.41
				1RB High	1 Pos 5	24.00	0	23.33	24.00	1	22.41
				50% RB Low	3 Pos 0	24.00	1	23.40	24.00	2	22.53
				50% RB Mid	3 Pos 1	24.00	1	23.42	24.00	2	22.57
				50% RB High	3 Pos 2	24.00	1	23.39	24.00	2	22.56
				100% RB	6 Pos 0	24.00	1	22.39	24.00	2	21.37
		132665	1779.3	1RB Low	1 Pos 0	24.00	0	23.33	24.00	1	22.46
				1RB Mid	1 Pos 2	24.00	0	23.35	24.00	1	22.46
				1RB High	1 Pos 5	24.00	0	23.34	24.00	1	22.45
				50% RB Low	3 Pos 0	24.00	1	23.44	24.00	2	22.58
				50% RB Mid	3 Pos 1	24.00	1	23.45	24.00	2	22.60
				50% RB High	3 Pos 2	24.00	1	23.45	24.00	2	22.62
				100% RB	6 Pos 0	24.00	1	22.44	24.00	2	21.42

B.2.2 LTE UL Carrier Aggregation

B.2.2.1 Intra-Band Contiguous

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The UL CA mode power measurements represent the total power across both carriers.

According to November 2017 TCB workshop, the following needs to be performed: The maximum measured output power, RB allocation, CC offsets, CC channel BWs, MPR, modulation and other relevant information for all UL CA SAR configurations are required in SAR reports to support the test setup and results, including explanations, call box configurations and certain testing restriction
1) When the maximum output for UL CA is ≤ standalone LTE mode
• The primary carrier is configured according to the highest standalone SAR configuration tested
• The secondary carrier and subsequent CCs are configured according to procedures used for power measurement and parameters similar to that used for the PCC
2) When the Reported SAR for UL CA configuration, is > 1.2 W/kg, UL CA SAR is also required for all the other test channels

LTE CA 7C Antenna Aux ant8:

Band	Modulation / BW	PCC			SCC			Pwr Avg (dBm)	Factory Upper Tolerance (dBm)
		Ch	Freq (MHz)	RB Allocation	Ch	Freq (MHz)	RB Allocation		
LTE 7C	QPSK / 20MHz	21001	2525.1	1RB High	21199	2544.9	1RB Low	23.38	24.00

LTE CA 41C Antenna Aux ant8:

Band	Modulation / BW	PCC			SCC			Pwr Avg (dBm)	Factory Upper Tolerance (dBm)
		Ch	Freq (MHz)	RB Allocation	Ch	Freq (MHz)	RB Allocation		
LTE 41C	QPSK / 20MHz	40521	2583.1	1RB High	40719	2602.9	1RB Low	23.37	24.00

LTE CA 48C Antenna Aux 8:

Band	Modulation / BW	PCC			SCC			Pwr Avg (dBm)	Factory Upper Tolerance (dBm)
		Ch	Freq (MHz)	RB Allocation	Ch	Freq (MHz)	RB Allocation		
LTE 48C	QPSK / 20MHz	55891	3615.1	1RB High	56089	3634.9	1RB Low	19.48	20.00

LTE CA 66B, 66C Antenna Aux ant8:

Band	Modulation / BW	PCC			SCC			Pwr Avg (dBm)	Factory Upper Tolerance (dBm)
		Ch	Freq (MHz)	RB Allocation	Ch	Freq (MHz)	RB Allocation		
LTE 66B	QPSK / 10MHz	132373	1750.1	1RB High	132472	1760	1RB Low	23.70	24.00
LTE 66C	QPSK / 20MHz	132323	1745.1	1RB High	132521	1764.9	1RB Low	23.78	24.00

B.2.3 5G NR (FR1) Notebook Mode

B.2.3.1 5G NR (FR1) Band 2 FDD Antenna Aux ant8

Band	BW (MHz)	Modulation	Mode	RB Allocation	RB Offset	Factory upper tolerance (dBm)	Measured Output Power (dBm)		
							Frequency (MHz) / Channel		
							1860	1880	1900
							372000	376000	396000
NR2	20	DFS-s OFDM	PI/2 BPSK	1RB Low	0	24.00	23.12	23.17	23.28
			QPSK	1RB Low	0	24.00	23.25	23.24	23.41
				1RB Mid	50	24.00	23.44	23.50	23.66
				1RB High	99	24.00	23.27	23.52	23.73
				50% RB Low	0	24.00	23.48	23.19	23.64
				50% RB Mid	25	24.00	23.57	23.43	23.72
				50% RB High	49	24.00	23.53	23.60	23.81
				100% RB	0	24.00	23.49	23.38	23.73
			16QAM	1RB Low	0	24.00	23.41	23.34	23.55
			64QAM	1RB Low	0	24.00	23.62	23.38	23.72
			256QAM	1RB Low	0	24.00	23.00	23.28	23.21
		CP-OFDM	QPSK	1RB Low	0	24.00	23.34	23.29	23.46
							Frequency (MHz) / Channel		
							1857.5	1880	1880
							371500	376000	380500
	15	DFS-s OFDM	QPSK	1RB Low	0	24.00	23.36	23.21	23.42
				50% RB Low	0	24.00	23.50	23.22	23.66
							Frequency (MHz) / Channel		
							1855	1880	1905
							371000	376000	381000
	10	DFS-s OFDM	QPSK	1RB Low	0	24.00	23.25	23.16	23.53
				50% RB Low	0	24.00	23.28	23.15	23.59
							Frequency (MHz) / Channel		
							1852.5	1880	1907.5
							370500	376000	381500
	5	DFS-s OFDM	QPSK	1RB Low	0	24.00	23.41	23.26	23.77
				50% RB Low	0	24.00	23.52	23.36	23.86

B.2.3.2 5G NR (FR1) Band 38 TDD Antenna Aux ant8

SAR Measurement for Band NR 38 TDD (FCC Frequency range: 2570 – 2620MHz) is covered by Band NR41 TDD (FCC Frequency range: 2496 – 2690MHz) due to overlapping frequency range, same maximum tune-up and same bandwidth.

B.2.3.1 5G NR (FR1) Band 41 TDD Power Class 3 Antenna Aux ant8

SAR Measurement for Band NR 41 TDD Power Class 3 (FCC Frequency range: 2496 – 2690MHz) is covered by Band NR41 TDD Power Class 2 (FCC Frequency range: 2496 – 2690MHz) due to overlapping frequency range, same maximum tune-up and same bandwidth.

B.2.3.2 5G NR (FR1) Band 41 TDD Power Class 2 Antenna Aux ant8

Band	BW (MHz)	Modulation	Mode	RB Allocation	RB Offset	Factory upper tolerance (dBm)	Measured Output Power (dBm)				
							Frequency (MHz) / Channel				
							2546	2569.5	2593	2616.5	2640
							509200	513900	518600	523300	528000
NR41	100	DFS-s OFDM	PI/2 BPSK	1RB Low	0	27.00			26.22		
			QPSK	1RB Low	0	27.00			26.32		
				1RB Mid	136	27.00			26.75		
				1RB High	270	27.00			25.78		
				50% RB Low	0	27.00			26.79		
				50% RB Mid	68	27.00			26.79		
				50% RB High	137	27.00			26.63		
				100% RB	0	27.00			26.72		
			16QAM	1RB Low	0	27.00			26.59		
			64QAM	1RB Low	0	27.00			26.26		
			256QAM	1RB Low	0	27.00			26.54		
		CP-OFDM	QPSK	1RB Low	0	27.00			26.21		
							Frequency (MHz) / Channel				
							2541	2567	2593	2619	2645
							508200	513400	518600	523800	529000
	90	DFS-s OFDM	QPSK	1RB Low	0	27.00			26.59		
				50% RB Low	0	27.00			26.79		
							Frequency (MHz) / Channel				
							2536	2564.5	2593	2621.5	2650
							507200	512900	518600	524300	530000
	80	DFS-s OFDM	QPSK	1RB Low	0	27.00			26.91		
				50% RB Low	0	27.00			26.77		
							Frequency (MHz) / Channel				
							2526	2559.5	2593	2626.5	2660
							505200	511900	518600	525300	532000
	60	DFS-s OFDM	QPSK	1RB Low	0	27.00			26.84		
				50% RB Low	0	27.00			26.67		
							Frequency (MHz) / Channel				
							2521	2557	2593	2629	2665
							504200	511400	518600	525800	5330000
	50	DFS-s OFDM	QPSK	1RB Low	0	27.00			26.59		
				50% RB Low	0	27.00			26.65		
							Frequency (MHz) / Channel				
							2516	2554.5	2593	2631.5	2670
							503200	510900	518600	526300	534000
	40	DFS-s OFDM	QPSK	1RB Low	0	27.00			26.16		
				50% RB Low	0	27.00			26.52		
							Frequency (MHz) / Channel				
							2506	2549.5	2593	2636.5	2680
							501200	509900	518600	527300	536000
	20	DFS-s OFDM	QPSK	1RB Low	0	27.00			26.33		
				50% RB Low	0	27.00			26.58		

B.2.3.3 5G NR (FR1) Band 66 FDD Antenna Aux ant8

Band	BW	Modulation	Mode	RB Allocation	RB Offset	Factory upper tolerance (dBm)	Measured Output Power (dBm)		
							Frequency (MHz) / Channel		
							1730	1745	1760
							346000	349000	352000
NR66	40	DFS-s OFDM	PI/2 BPSK	1RB Low	0	24.00		23.87	
			QPSK	1RB Low	0	24.00		23.89	
				1RB Mid	136	24.00		23.52	
				1RB High	270	24.00		23.18	
				50% RB Low	0	24.00		23.10	
				50% RB Mid	68	24.00		23.41	
				50% RB High	137	24.00		23.34	
				100% RB	0	24.00		23.13	
			16QAM	1RB Low	0	24.00		23.82	
			64QAM	1RB Low	0	24.00		23.02	
			256QAM	1RB Low	0	24.00		23.22	
		CP-OFDM	QPSK	1RB Low	0	24.00		22.75	
							Frequency (MHz) / Channel		
							1720	1745	1770
							344000	349000	354000
	20	DFS-s OFDM	QPSK	1RB Low	0	24.00		23.24	
				50% RB Low	0	24.00		23.28	
							Frequency (MHz) / Channel		
							1717.5	1745	1772.5
							343500	349000	354500
	15	DFS-s OFDM	QPSK	1RB Low	0	24.00		23.32	
				50% RB Low	0	24.00		23.36	
							Frequency (MHz) / Channel		
							1715	1745	1775
							343000	349000	355000
	10	DFS-s OFDM	QPSK	1RB Low	0	24.00		23.26	
				50% RB Low	0	24.00		23.25	
							Frequency (MHz) / Channel		
							1712.5	1745	1745
							342500	349000	355500
	5	DFS-s OFDM	QPSK	1RB Low	0	24.00		23.43	
				50% RB Low	0	24.00		23.48	

B.2.3.4 5G NR (FR1) Band 77 TDD Antenna Aux ant8

Band	BW	Modulation	Mode	RB Allocation	RB Offset	Factory upper tolerance (dBm)	Measured Output Power (dBm) Antenna 8				
							Frequency (MHz) / Channel				
							3840	3795	3750	3885	3930
							656600	653000	650000	659000	662000
NR77	100	DFS-s OFDM	PI/2 BPSK	1RB Low	0	20.00			19.57		
			QPSK	1RB Low	0	20.00			19.62		
				1RB Mid	136	20.00			19.07		
				1RB High	270	20.00			18.75		
				50% RB Low	0	20.00			19.14		
				50% RB Mid	68	20.00			19.22		
				50% RB High	137	20.00			19.23		
				100% RB	0	20.00			19.15		
			16QAM	1RB Low	0	20.00			18.87		
			64QAM	1RB Low	0	20.00			18.62		
			256QAM	1RB Low	0	20.00			18.63		
		CP-OFDM	QPSK	1RB Low	0	20.00			18.72		
							Frequency (MHz) / Channel				
							3840	3795	3750	3885	3930
							656600	653000	650000	659000	662000
	90	DFS-s OFDM	QPSK	1RB Low	0	20.00			18.52		
				50% RB Low	0	20.00			19.19		
							Frequency (MHz) / Channel				
							3840	3795	3750	3885	3930
							656600	653000	650000	659000	662000
	80	DFS-s OFDM	QPSK	1RB Low	0	20.00			18.56		
				50% RB Low	0	20.00			19.25		
							Frequency (MHz) / Channel				
							3840	3795	3750	3885	3930
							656600	653000	650000	659000	662000
	60	DFS-s OFDM	QPSK	1RB Low	0	20.00			18.81		
				50% RB Low	0	20.00			19.39		
							Frequency (MHz) / Channel				
							3840	3795	3750	3885	3930
							656600	653000	650000	659000	662000
	50	DFS-s OFDM	QPSK	1RB Low	0	20.00			19.02		
				50% RB Low	0	20.00			19.49		
							Frequency (MHz) / Channel				
							3840	3795	3750	3885	3930
							656600	653000	650000	659000	662000
	40	DFS-s OFDM	QPSK	1RB Low	0	20.00			19.02		
				50% RB Low	0	20.00			19.41		
							Frequency (MHz) / Channel				
							3840	3795	3750	3885	3930
							656600	653000	650000	659000	662000
	20	DFS-s OFDM	QPSK	1RB Low	0	20.00			19.26		
				50% RB Low	0	20.00			19.44		

B.2.3.5 5G NR (FR1) UL Carrier Aggregation

For NR ULCA mode, each carrier transmits on separate antennas. Each exposure has been measured separately. For each, the highest standalone SAR conditions are added to derive the Total SAR. Refer to paragraph B.5.5

B.3 Tissue Parameters Measurement

Body TSL SAR System #2

Body TSL	Target TSL		Measured TSL		Deviation %		
Freq (MHz)	ε'(F/m)	σ(S/m)	ε'(F/m)	σ(S/m)	Deviation ε'	Deviation σ	Date
1750	53.43	1.49	50.09	1.44	-6.25	-3.36	2022-01-10
1900	53.3	1.52	49.82	1.54	-6.53	1.32	2022-01-10
2300	52.9	1.81	49.31	1.84	-6.79	1.66	2022-01-10
2600	52.51	2.16	48.93	2.12	-6.82	-1.85	2022-01-10
3700	51.05	3.55	46.64	3.24	-8.64	-8.73	2022-01-10

Body TSL SAR System #4

Body TSL	Target TSL		Measured TSL		Deviation %		
Freq (MHz)	ε'(F/m)	σ(S/m)	ε'(F/m)	σ(S/m)	Deviation ε'	Deviation σ	Date
1750	53.43	1.49	51.67	1.55	-3.29	4.03	2022-01-17
1900	53.3	1.52	51.49	1.54	-3.4	1.32	2022-01-13
2600	52.51	2.16	50.26	2.15	-4.28	-0.46	2022-01-17
3700	51.05	3.55	49.58	3.42	-2.88	-3.66	2022-01-17

See *Annex D* below for more details.

B.4 System Check Measurements

Body Measurements SAR System #2

Frequency (MHz)	Average	Target SAR (W/kg)	Measured SAR (W/kg)	Deviation to target (%)	Limit (%)	Date
1750	1g	37.10	33.80	-8.89	±10	2022-01-10
	10g	19.60	18.02	-8.06		
1900	1g	40.30	38.80	-3.72		2022-01-10
	10g	21.00	20.40	-2.86		
2300	1g	47.90	45.80	-4.38		2022-01-10
	10g	23.20	22.00	-5.17		
2600	1g	54.10	52.80	-2.40		2022-01-10
	10g	24.10	23.80	-1.24		
3700	1g	62.10	60.00	-3.38		2022-01-10
	10g	22.20	22.40	0.90		

Body Measurements SAR System #4

Frequency (MHz)	Average	Target SAR (W/kg)	Measured SAR (W/kg)	Deviation to target (%)	Limit (%)	Date
1750	1g	36.80	38.20	3.80	±10	2022-01-17
	10g	19.40	20.40	5.15		
1900	1g	40.30	41.40	2.73		2022-01-14
	10g	21.00	21.40	1.90		
2600	1g	54.10	53.80	-0.55		2022-01-17
	10g	24.10	24.20	0.41		
3700	1g	62.10	59.60	-4.03		2022-01-17
	10g	22.20	22.20	0.00		

See Annex C for more details.

B.5 SAR Test Results

B.5.1 LTE

B.5.1.1 LTE Band 2 FDD

Band	Antenna	BW (MHz)	Mod.	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Band 2	WNC	20	QPSK	18900	1880	Laptop	1RB Mid	0.39	0.46	0.50	
							50RB Mid	0.44	0.38	0.42	
	HongBo	20	QPSK	18900	1880	Laptop	1RB Mid	0.39	0.46	0.51	**1**
							50RB Mid	0.44	0.40	0.44	

B.5.1.2 LTE Band 7 FDD

Band	Antenna	BW (MHz)	Mod.	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Band 7	HongBo	20	QPSK	21100	2535	Laptop	1RB Mid	0.50	0.54	0.60	
							50RB Mid	0.54	0.47	0.54	
	WNC	20	QPSK	20850	2510	Laptop	1RB Mid	0.47	0.95	1.06	**2**
							50RB Mid	0.49	0.72	0.81	
				21100	2535		1RB Mid	0.50	0.94	1.05	
							50RB Mid	0.54	0.75	0.85	
							100RB Mid	0.50	0.73	0.82	
				21350	2560		1RB Mid	0.51	0.90	1.01	
							50RB Mid	0.47	0.72	0.80	

UL CA 7C

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC.
From the above table on standalone testing on LTE Band7, Laptop position with low channel is chosen as the configuration that gives the highest SAR, thus, the same is used for UL CA testing

Band	Antenna	Modulation / BW	PCC			SCC			Position	Scaling Factor (dB)	Measured SAR 1g (W/Kg)	Reported SAR 1g (W/Kg)
			Ch	Freq (MHz)	RB Allocation	Ch	Freq (MHz)	RB Allocation				
LTE 7C	WNC	QPSK / 20MHz	21001	2525.1	1RB High	21199	2544.9	1RB Low	Laptop	0.62	0.67	0.77
	HongBo	QPSK / 20MHz	21001	2525.1	1RB High	21199	2544.9	1RB Low	Laptop	0.62	0.52	0.60

PCC RB allocation settings for UL CA have been adjusted based on the worst-case power

B.5.1.3 LTE Band 25 FDD

Band	Antenna	BW (MHz)	Mod.	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Band 25	WNC	20	QPSK	26365	1882.5	Laptop	1RB Mid	1.19	0.14	0.18	
							50RB Mid	1.10	0.12	0.15	
	HongBo	20	QPSK	26365	1882.5	Laptop	1RB Mid	1.19	0.17	0.22	**3**
							50RB Mid	1.10	0.13	0.17	

B.5.1.4 LTE Band 30 FDD

Band	Antenna	BW (MHz)	Mod.	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Band 30	WNC	10	QPSK	27710	2310	Laptop	1RB Mid	1.15	0.69	0.90	**4**
							50RB Mid	1.19	0.54	0.71	
							100RB Mid	1.15	0.54	0.71	
	HongBo	10	QPSK	27710	2310	Laptop	1RB Mid	1.15	0.43	0.55	
							50RB Mid	1.19	0.37	0.49	

B.5.1.5 LTE Band 41 TDD

Band	Antenna	BW (MHz)	Mod.	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Band 41	WNC	20	QPSK	40620	2593	Laptop	1RB Mid	0.73	0.47	0.55	**5**
							50RB Mid	0.71	0.36	0.43	
	HongBo	20	QPSK	40620	2593	Laptop	1RB Mid	0.73	0.29	0.34	
							50RB Mid	0.71	0.23	0.27	

UL CA 41C

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC.

From the above table on standalone testing on LTE Band41, Back Face position on antenna5 and Laptop on antenna8 are chosen as the configurations that give the highest SAR, thus, the same is used for UL CA testing.

Band	Antenna	Modulation / BW	PCC			SCC			Position	Scaling Factor (dB)	Measured SAR 1g (W/Kg)	Reported SAR 1g (W/Kg)
			Ch	Freq (MHz)	RB Allocation	Ch	Freq (MHz)	RB Allocation				
LTE 7C	WNC	QPSK / 20MHz	40521	2583.1	1RB High	40719	2602.9	1RB Low	Laptop	0.63	0.16	0.19
	HongBo	QPSK / 20MHz	40521	2583.1	1RB High	40719	2602.9	1RB Low	Laptop	0.63	0.16	0.18

PCC RB allocation settings for UL CA have been adjusted based on the worst-case power

B.5.1.6 LTE Band 48 TDD

Band	Antenna	BW (MHz)	Mod.	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Band 48	WNC	20	QPSK	55990	3625	Laptop	1RB Mid	0.95	0.21	0.26	
							50RB Mid	0.85	0.17	0.20	
	HongBo	20	QPSK	55990	3625	Laptop	1RB Mid	0.95	0.40	0.50	**6**
							50RB Mid	0.85	0.32	0.39	

UL CA 48C

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC.

From the above table on standalone testing on LTE Band48, Back Face position on antenna5 and Laptop on antenna8 are chosen as the configurations that give the highest SAR, thus, the same is used for UL CA testing

Band	Antenna	Modulation / BW	PCC			SCC			Position	Scaling Factor (dB)	Measured SAR 1g (W/Kg)	Reported SAR 1g (W/Kg)
			Ch	Freq (MHz)	RB Allocation	Ch	Freq (MHz)	RB Allocation				
LTE 48C	WNC	QPSK / 20MHz	55891	3615.1	1RB High	56089	3634.9	1RB Low	Laptop	0.52	0.14	0.15
	HongBo	QPSK / 20MHz	55891	3615.1	1RB High	56089	3634.9	1RB Low	Laptop	0.52	0.12	0.14

PCC RB allocation settings for UL CA have been adjusted based on the worst-case power

B.5.1.7 LTE Band 66 FDD

Band	Anetnna	BW (MHz)	Mod.	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Band 66	WNC	20	QPSK	132322	1745	Laptop	1RB Mid	0.47	0.47	0.53	
							50RB Mid	0.39	0.37	0.40	
	HongBo	20	QPSK	132322	1745	Laptop	1RB Mid	0.47	0.53	0.59	**7**
							50RB Mid	0.39	0.41	0.45	

UL CA 66B, 66C

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC.
From the above table on standalone testing on LTE Band66, Laptop position in the low channel is chosen as the configurations that gives the highest SAR, thus, the same is used for UL CA testing for the 66C mode. Since the 10MHz was not tested in standalone, due to KDB 941225 reduction list, the initial configuration for the 66B mode was taken from the worst-case scenario of the 20MHz

Band	Antenna	Modulation / BW	PCC			SCC			Position	Scaling Factor (dB)	Measured SAR 1g (W/Kg)	Reported SAR 1g (W/Kg)
			Ch	Freq (MHz)	RB Allocation	Ch	Freq (MHz)	RB Allocation				
LTE 66B	WNC	QPSK / 20MHz	132373	1750.1	1RB High	132472	1760	1RB Low	Laptop	0.30	0.23	0.24
	HongBo	QPSK / 20MHz	132373	1750.1	1RB High	132472	1760	1RB Low	Laptop	0.30	0.23	0.24
LTE 66C	WNC	QPSK / 20MHz	132323	2145.1	1RB High	132521	1764.9	1RB Low	Laptop	0.22	0.29	0.30
	HongBo	QPSK / 20MHz	132323	2145.1	1RB High	132521	1764.9	1RB Low	Laptop	0.22	0.29	0.31

PCC RB allocation settings for UL CA have been adjusted based on the worst-case power

B.5.2 5G NR

B.5.2.1 5G NR 2 for ENDC Only

Band	Antenna	Modulation / BW	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
NR2	WNC	QPSK / 20MHz	376000	1880.0	Laptop	1RB Mid	0.50	0.51	0.57	**8**
	HongBo	QPSK / 20MHz	376000	1880.0	Laptop	1RB Mid	0.50	0.48	0.54	

B.5.2.2 5G NR 41

Band	Antenna	Modulation / BW	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
NR 41	WNC	QPSK / 100MHz	518601	2593	Laptop	1RB Mid	0.25	0.74	0.78	
						50RB Mid	0.21	0.89	0.92	
						100RB Mid	0.28	0.87	1.02	9
	HongBo	QPSK / 100MHz	518601	2593	Laptop	1RB Mid	0.25	0.42	0.44	
						50RB Mid	0.21	0.49	0.51	

B.5.2.3 5G NR 66

Band	Antenna	Modulation / BW	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
NR66	WNC	QPSK / 20MHz	349000	1745.0	Laptop	1RB Mid	0.48	0.82	0.91	**10**
						50RB Mid	0.59	0.79	0.91	
						100RB Mid	0.87	0.74	0.90	
	HongBo	QPSK / 20MHz	349000	1745.0	Laptop	1RB Mid	0.48	0.60	0.67	
						50RB Mid	0.59	0.57	0.65	

B.5.2.4 5G NR 77

Band	Antenna	Modulation / BW	Channel Number	Freq (MHz)	Position	% RB Allocation	Scaling Factor (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
NR77	WNC	QPSK / 20MHz	650000	3750.0	Laptop	1RB Mid	0.93	0.33	0.41	
						50RB Mid	0.78	0.33	0.40	
	HongBo	QPSK / 20MHz	650000	3750.0	Laptop	1RB Mid	0.93	0.51	0.63	
						50RB Mid	0.78	0.59	0.71	**11**

B.5.3 ENDC

For EN-DC mode, the 4G and 5G carriers transmit on separate antennas. Each exposure has been measured separately. For both LTE and 5G-NR, the highest standalone SAR conditions are added to derive the Total SAR. Refer to paragraph B.5.5

B.5.4 SAR Measurement Variability

According to FCC OET KDB 865664, SAR Measurement variability is assessed when the maximum initial measured SAR is ≥0.8 W/kg for a certain band/mode. If the measured SAR value of the initial repeated measurement is <1.45 W/kg with <20% variation, only one repeated measurement is required to confirm that the results are not expected to have substantial variations.
A second repeated measurement is required only if the measured results for the initial repeated measurement are within 10% of the SAR limit or vary by more than 20%.
A third repeated measurement is required only if the original, first or second repeated measurement ≥1.5W/Kg and the ratio of largest to smallest SAR for the original, first and second repeated measurement is > 1.2.

Band / Mode	Position	Ch #	Freq. (MHz)	Measured SAR 1g (W/kg)	1st Repeated SAR 1g (W/kg)	2nd Repeated SAR 1g (W/kg)	Highest Ratio
LTE FDD 7 / QPSK – 20MHz	Laptop	20850	2510	0.95	0.91		1.04
NR 41 / QPSK – 100MHz	Laptop	518601	2593	0.89	0.88		1.01

B.5.5 Simultaneous Transmission SAR Evaluation

According to FCC OET KDB 447498 D01, when the sum of 1g SAR for all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

All the values stated in the table below are the worst case found for standalone measurement with disregard of the transmission mode or channel where the worst case was found.

Antenna	Position	Highest Reported SAR (1g) (W/kg)			
		WWAN	WLAN 2.4GHz	WLAN 5/6GHz	Bluetooth
WWAN (Main ant5)	Laptop	0.40*			
WWAN (Aux ant8)	Laptop	1.06			
Main WLAN	Laptop		0.40*	0.40*	
Aux WLAN	Laptop		0.40*	0.40*	0.40*

*According to FCC OET KDB 447498 D01, when standalone test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated to 0.4 W/Kg for 1-g SAR when the test separation is > 50mm in order to determine simultaneous transmission test exclusion.

Position	Simultaneous Tx Antenna Combination					Σ SAR 1g (W/Kg)	Limit (W/kg)
	#	WWAN Main ant5	WWAN Aux ant8	Main Antenna	Aux Antenna		
Laptop	1	Cellular	Cellular	WLAN 5/6GHz	WLAN 5/6GHz	**2.26**	1.6
	2	Cellular	Cellular	WLAN 5/6GHz	WLAN 5/6GHz+ BT	**2.66**	
	3	Cellular	Cellular	WLAN 5/6GHz	BT	**2.26**	
	4	Cellular	Cellular	WLAN 2.4GHz	WLAN 2.4GHz	**2.26**	
	5	Cellular	Cellular	WLAN 2.4GHz	BT	**2.26**	

In case the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio (SPLSR). According to the last table possible simultaneous transmission combinations are identified for each position from 1 to 5, each combination will be analyzed by antenna pairs. Antenna pairs considered in one configuration won't be performed again in case they are repeated on the next simultaneous configuration:

Position	Ant. Pair case	Antenna	Reported SAR 1g (W/kg)	Σ SAR 1g (W/Kg)	Peak Location (mm) (x,y,z)	SAR to peak location separation ratio	Limit
Laptop	1a	WWAN (Main ant5)	0.40	1.46			0.04
		WWAN (Aux ant8)	1.06				
	1b	WWAN (Main ant5)	0.40	0.80			
		Main WLAN 5/6GHz	0.40				
	1c	WWAN (Main ant5)	0.40	0.80			
		Aux WLAN 5/6GHz	0.40				
	1d	WWAN (Aux ant8)	1.06	1.46			
		Main WLAN 5/6GHz	0.40				
	1e	WWAN (Aux ant8)	1.06	1.46			
		Aux WLAN 5/6GHz	0.40				
	1f	Main WLAN 5GHz	0.40	0.80			
		Aux WLAN 5/6GHz	0.40				
	2a	WWAN (Main ant5)	0.40	0.80			
		Aux WLAN1 BT	0.40				
	2b	WWAN (Aux ant8)	1.06	1.46			
		Aux WLAN1 BT	0.40				
	4a	WWAN (Main ant5)	0.40	0.80			
		Main WLAN 2.4GHz	0.40				
	4b	WWAN (Main ant5)	0.40	0.80			
		Aux WLAN 2.4GHz	0.40				
	4c	WWAN (Aux ant8)	1.06	1.46			
		Main WLAN 2.4GHz	0.40				
	4d	WWAN (Aux ant8)	1.06	1.46			
		Aux WLAN 2.4GHz	0.40				
	4e	Main WLAN 2.4GHz	0.40	0.80			
		Aux WLAN1 2.4GHz	0.40				

Considering the results described above and according to the simultaneous transmission evaluation exclusions described in FCC OET KDB 447498 D01, no SPLSR nor enlarged zoom scan measurements are required.

Annex C. Test System Plots

1. LTE Band 2, QPSK - 20MHz, CH18900, Antenna HongBo 65
2. LTE Band 7, QPSK - 20MHz, CH20850 Antenna WNC 66
3. LTE Band 25, QPSK - 20MHz, CH26365, Antenna HongBo 67
4. LTE Band 30, QPSK - 10MHz, CH27710, Antenna WNC 68
5. LTE Band 41, QPSK - 20MHz, CH40620, Antenna WNC 69
6. LTE Band 48, QPSK - 20MHz, CH55990, Antenna HongBo 70
7. LTE Band 66, QPSK - 20MHz, CH132322, Antenna HongBo 71
8. 5G NR FR1 Band 2, QPSK - 20MHz, CH376000, Antenna WNC 72
9. 5G NR FR1 Band 41, QPSK - 100MHz, CH518598, Antenna WNC 73
10. 5G NR FR1 Band 66, QPSK - 100MHz, CH349000, Antenna WNC 74
11. 5G NR FR1 Band 77, QPSK - 100MHz, CH650000, Antenna HongBo 75
12. System Check Body Liquid 1750MHz – 2022-01-10 76
13. System Check Body Liquid 1750MHz – 2022-01-17 77
14. System Check Body Liquid 1900MHz – 2022-01-10 78
15. System Check Body Liquid 1900MHz – 2022-01-14 79
16. System Check Body Liquid 2300MHz 80
17. System Check Body Liquid 2600MHz – 2022-01-10 81
18. System Check Body Liquid 2600MHz – 2022-01-17 82
19. System Check Body Liquid 3700MHz – 2022-01-10 83
20. System Check Body Liquid 3700MHz – 2022-01-17 84

1. LTE Band 2, QPSK - 20MHz, CH18900, Antenna HongBo

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-4	315.0 x 220.0 x 12.0	00017605XS	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	Laptop, 0.00	Band 2, E-UTRA/FDD	LTE-FDD, 10169-CAE	1880.0, 18900	7.98	1.53	49.9

Hardware Setup

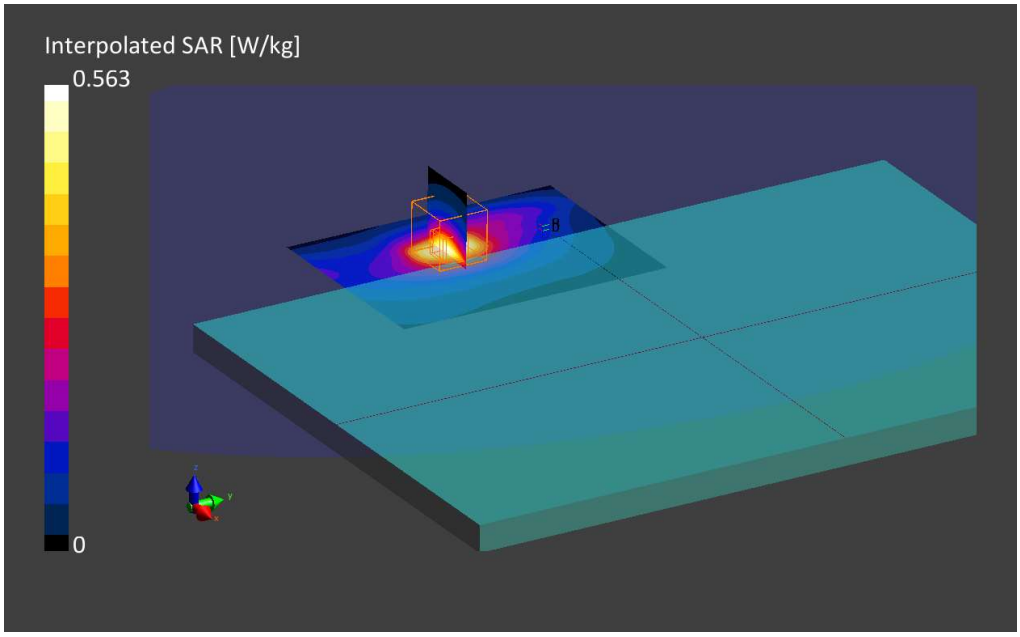
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	90.0 x 120.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	15.0 x 15.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	No	Yes
Grading Ratio	n/a	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 13:32	2022-01-10, 13:37
psSAR1g [W/kg]	0.456	0.464
psSAR10g [W/kg]	0.251	0.243
Power Drift [dB]	0.02	-0.10
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		83.0
Dist 3dB Peak [mm]		10.8



2. LTE Band 7, QPSK - 20MHz, CH20850 Antenna WNC

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-4	315.0 x 220.0 x 12.0	00017605XN	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	Laptop, 0.00	Band 7, E-UTRA/FDD	LTE-FDD, 10169-CAE	2510.0, 20850	7.24	2.04	49.0

Hardware Setup

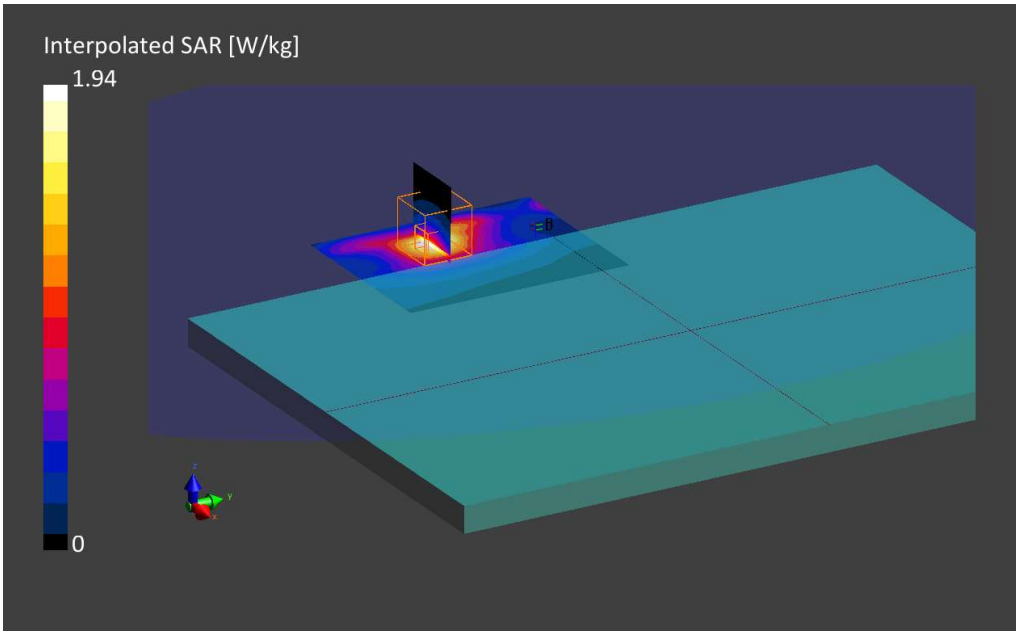
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	80.0 x 100.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	No	Yes
Grading Ratio	n/a	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 21:59	2022-01-10, 22:06
psSAR1g [W/kg]	0.913	0.954
psSAR10g [W/kg]	0.465	0.479
Power Drift [dB]	0.02	0.02
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		79.4
Dist 3dB Peak [mm]		11.0



3. LTE Band 25, QPSK - 20MHz, CH26365, Antenna HongBo

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-4	300.0 x 215.0 x 15.0	00017605XS	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	Laptop, 0.00	Band 25, E-UTRA/FDD	LTE-FDD, 10169-CAE	1882.5, 26365	7.98	1.53	49.8

Hardware Setup

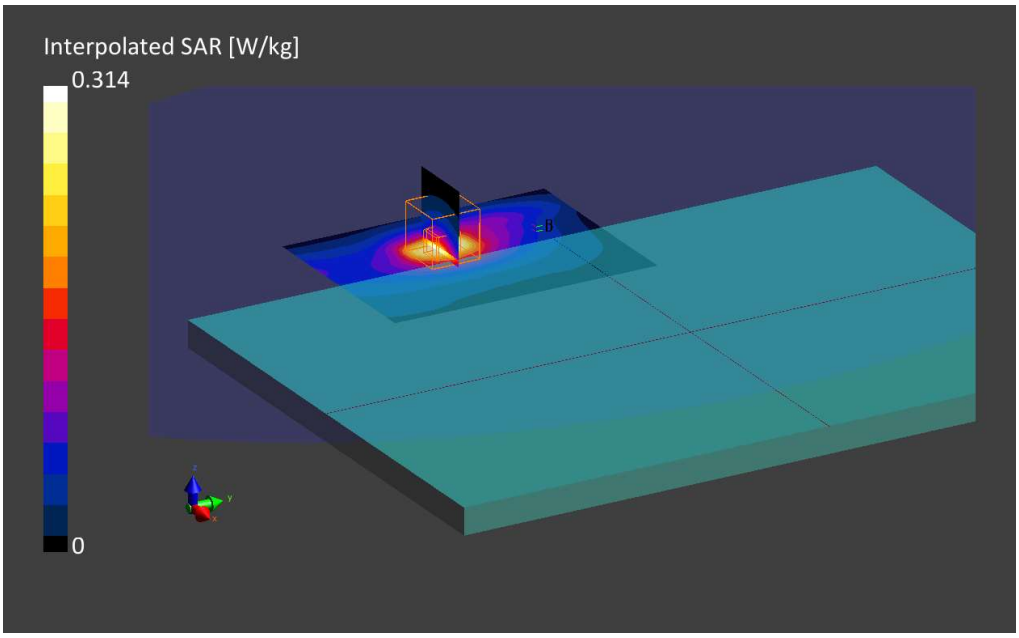
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	90.0 x 120.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	15.0 x 15.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 15:00	2022-01-10, 15:06
psSAR1g [W/kg]	0.152	0.168
psSAR10g [W/kg]	0.083	0.087
Power Drift [dB]	0.08	0.09
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		82.5
Dist 3dB Peak [mm]		10.8



4. LTE Band 30, QPSK - 10MHz, CH27710, Antenna WNC

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-4	315.0 x 220.0 x 12.0	00017605XN	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	Laptop, 0.00	Band 30, E-UTRA/FDD	LTE-FDD, 10175-CAG	2310.0, 27710	7.45	1.85	49.3

Hardware Setup

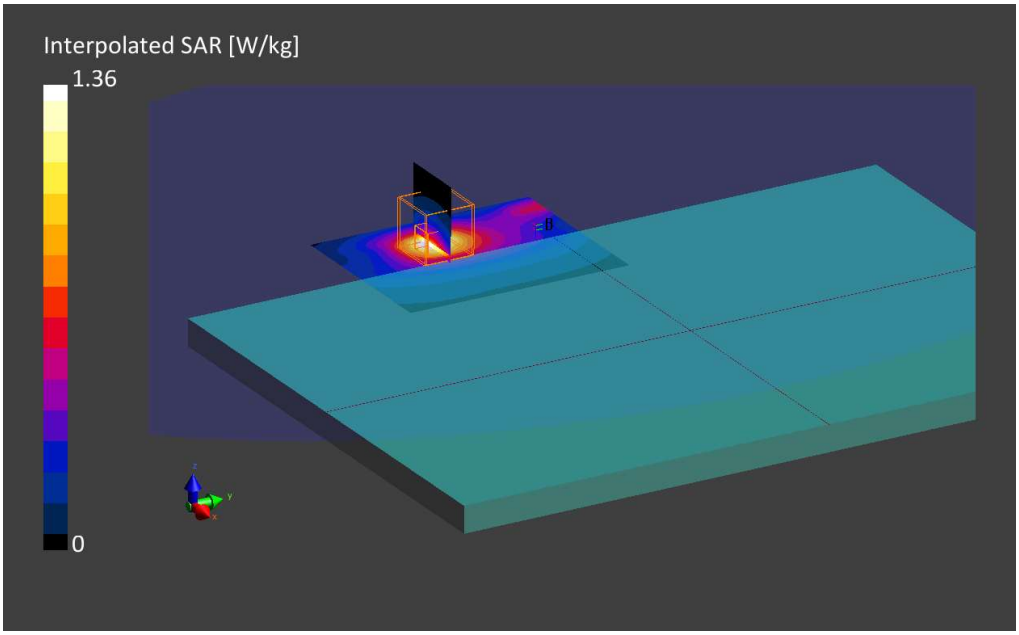
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	80.0 x 100.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 22:22	2022-01-10, 22:29
psSAR1g [W/kg]	0.675	0.691
psSAR10g [W/kg]	0.350	0.357
Power Drift [dB]	0.09	0.04
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		80.1
Dist 3dB Peak [mm]		11.4



5. LTE Band 41, QPSK - 20MHz, CH40620, Antenna WNC

Device under Test Properties

Model, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-4	315.0 x 220.0 x 12.0	00017605XN	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	Laptop, 0.00	Band 41, E-UTRA/TDD	LTE-TDD, 10435-AAF	2593.0, 40620	7.24	2.12	48.9

Hardware Setup

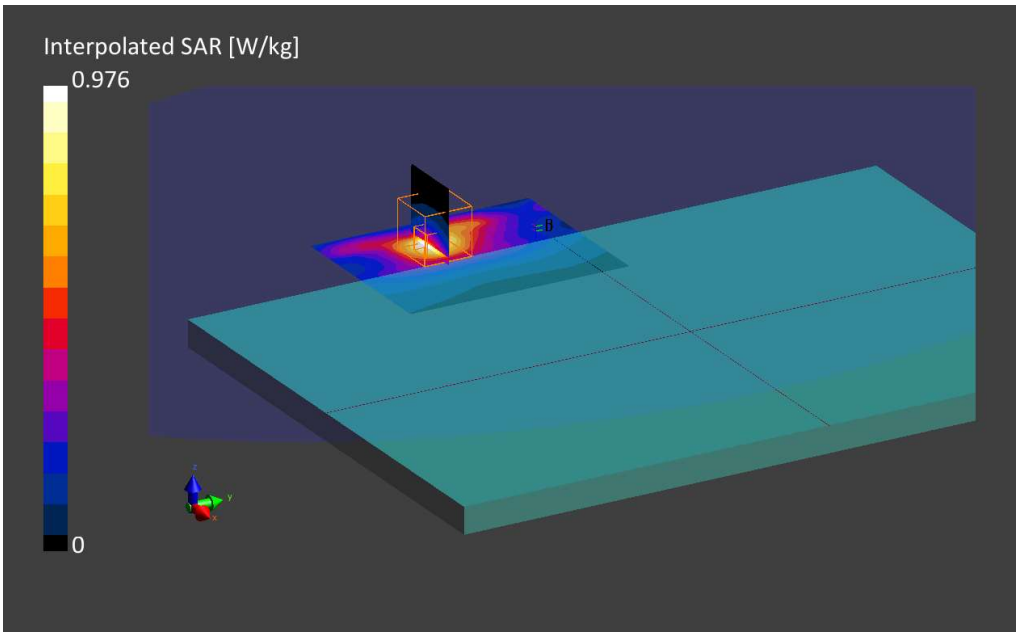
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	80.0 x 100.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 22:56	2022-01-10, 23:03
psSAR1g [W/kg]	0.453	0.469
psSAR10g [W/kg]	0.229	0.234
Power Drift [dB]	0.10	0.04
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		78.5
Dist 3dB Peak [mm]		11.0



6. LTE Band 48, QPSK - 20MHz, CH55990, Antenna HongBo

Device under Test Properties

Model, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-4	315.0 x 220.0 x 12.0	00017605XS	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	Laptop, 0.00	Band 48, E-UTRA/TDD	LTE-TDD, 10435-AAF	3625.0, 55990	6.07	3.15	46.7

Hardware Setup

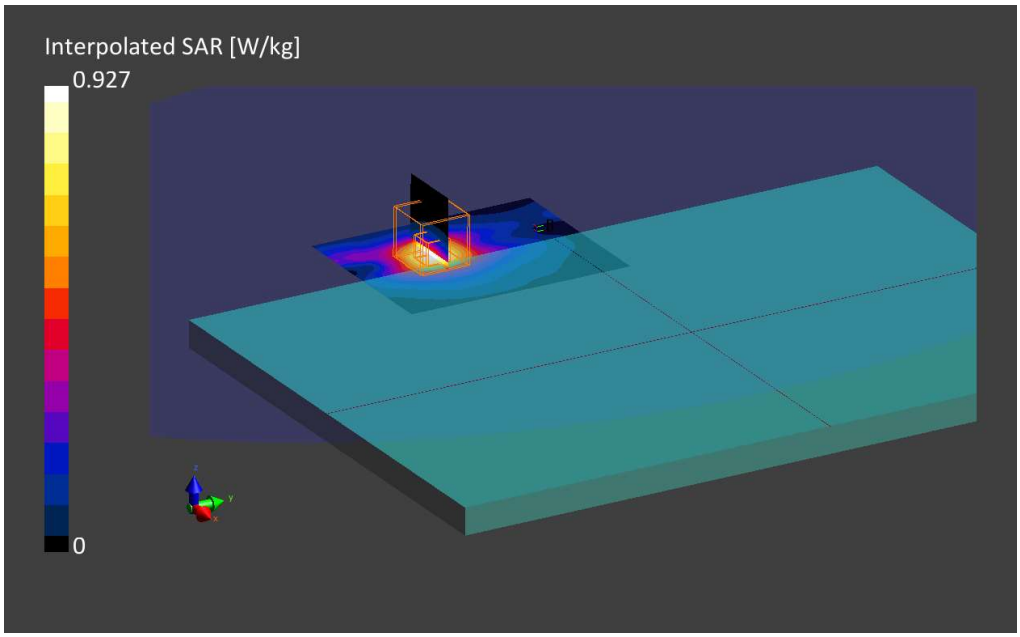
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	80.0 x 100.0	28.0 x 28.0 x 28.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.4
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 17:21	2022-01-10, 17:28
psSAR1g [W/kg]	0.390	0.403
psSAR10g [W/kg]	0.183	0.186
Power Drift [dB]	-0.01	0.14
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		76.6
Dist 3dB Peak [mm]		11.7



7. LTE Band 66, QPSK - 20MHz, CH132322, Antenna HongBo

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-4	315.0 x 220.0 x 12.0	00017605XS	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	Laptop, 0.00	Band 66, E-UTRA/FDD	LTE-FDD, 10169-CAE	1745.0, 132322	8.37	1.44	50.1

Hardware Setup

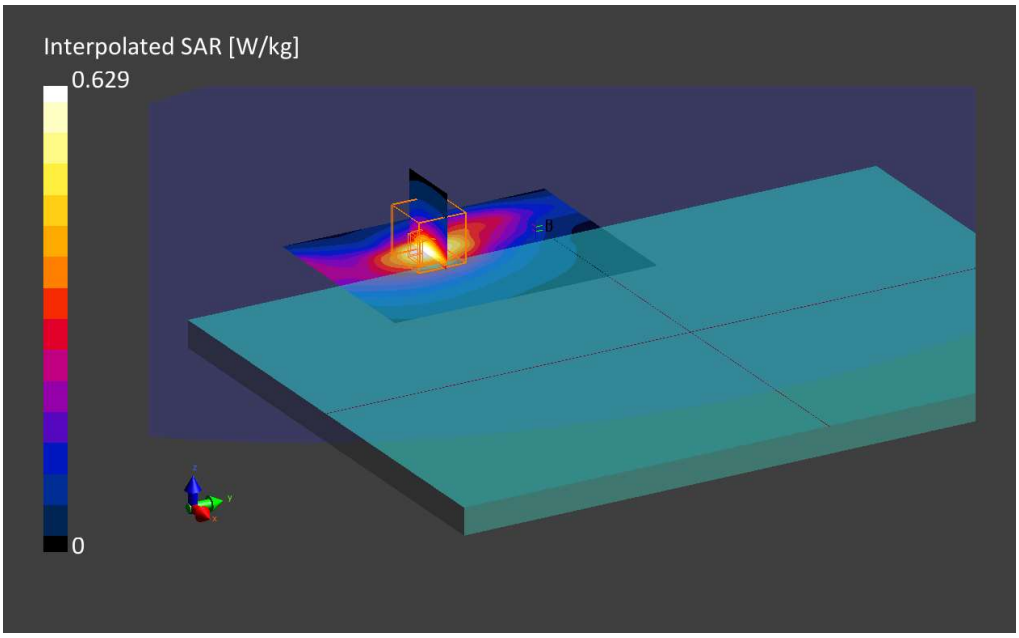
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	90.0 x 120.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	15.0 x 15.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.4
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 15:19	2022-01-10, 15:25
psSAR1g [W/kg]	0.512	0.528
psSAR10g [W/kg]	0.291	0.296
Power Drift [dB]	-0.00	0.03
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		81.7
Dist 3dB Peak [mm]		11.4



8. 5G NR FR1 Band 2, QPSK - 20MHz, CH376000, Antenna WNC

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-3	300.0 x 215.0 x 15.0	00017605XN	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat MSL	Laptop 0.00	Band n2	5G NR FR1 FDD, 10931-AAB	1880.0, 376000	8.62	1.53	51.5

Hardware Setup

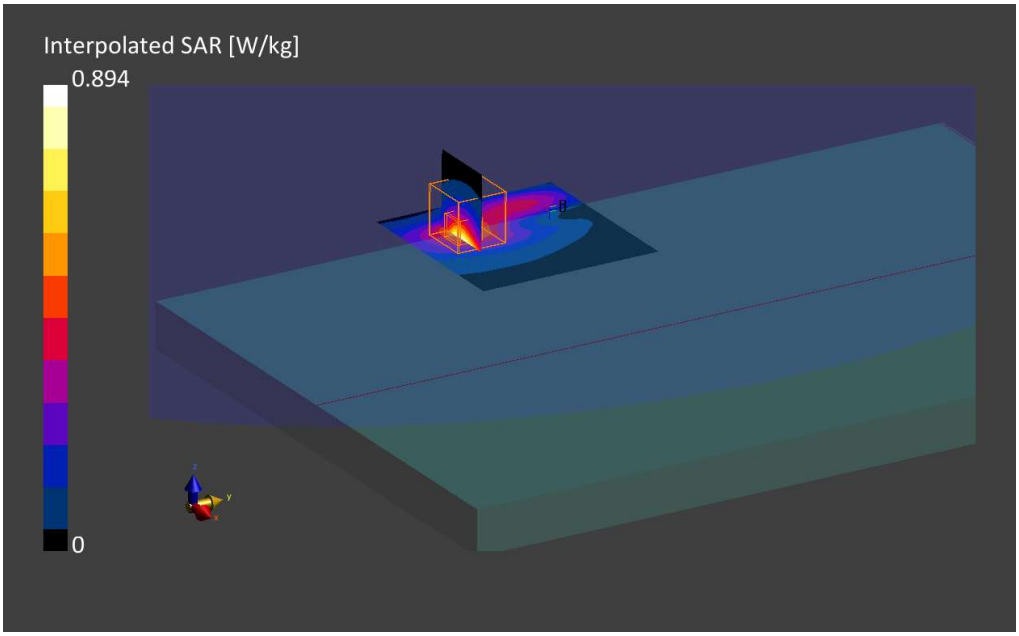
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2124	MBBL-600-6000, 2022-Jan-13	EX3DV4 - SN7604, 2021-08-16	DAE4 Sn1628, 2021-08-06

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	80.0 x 80.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	Yes	Yes
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-14, 18:54	2022-01-14, 19:02
SAR1g [W/Kg]	0.478	0.509
SAR10g [W/Kg]	0.268	0.277
Power Drift [dB]	0.17	-0.07
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only



9. 5G NR FR1 Band 41, QPSK - 100MHz, CH518598, Antenna WNC

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-3	300.0 x 215.0 x 15.0	00017605XN	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat MSL	Laptop 0.00	Band n41	5G NR FR1 TDD, 10868-AAD	2593.0, 518598	8.1	2.14	50.3

Hardware Setup

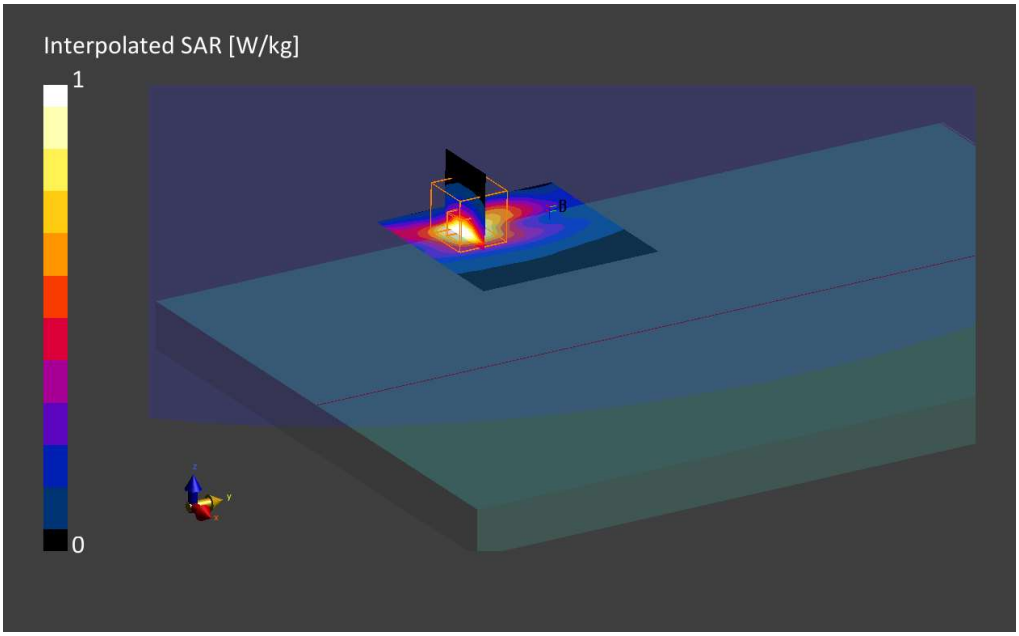
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2124	MBBL-600-6000, 2022-Jan-17	EX3DV4 - SN7604, 2021-08-16	DAE4 Sn1628, 2021-08-06

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	80.0 x 80.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	Yes	Yes
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-17, 10:49	2022-01-17, 11:08
SAR1g [W/Kg]	0.819	0.870
SAR10g [W/Kg]	0.418	0.421
Power Drift [dB]	0.01	0.14
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only



10. 5G NR FR1 Band 66, QPSK - 100MHz, CH349000, Antenna WNC

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-3	300.0 x 215.0 x 15.0	00017605XN	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat MSL	Laptop 0.00	Band n66	5G NR FR1 FDD, 10934-AAB	1745.0, 349000	9.02	1.54	51.6

Hardware Setup

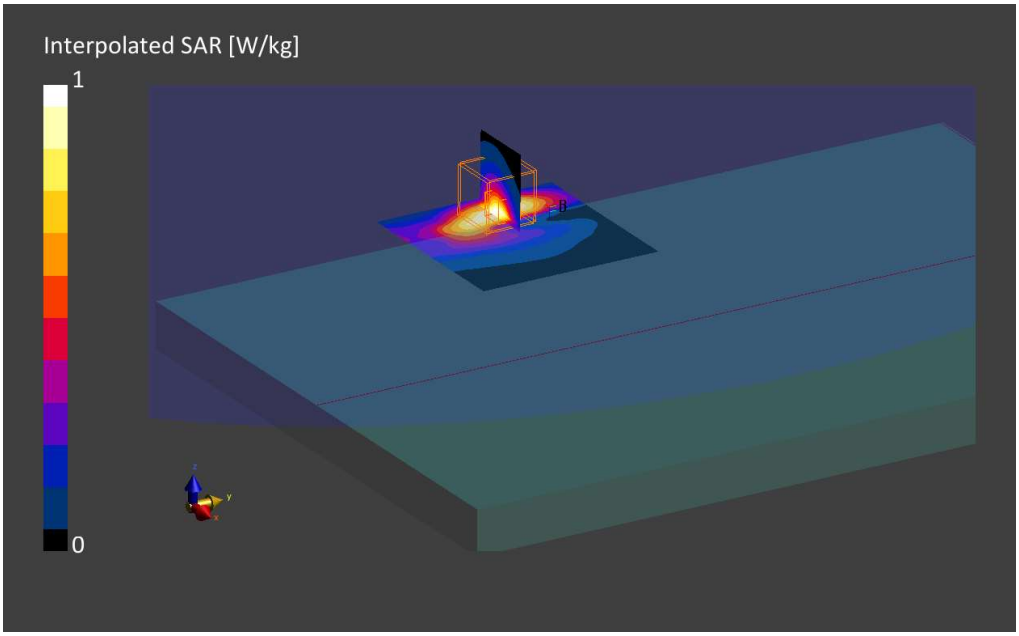
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2124	MBBL-600-6000, 2022-Jan-17	EX3DV4 - SN7604, 2021-08-16	DAE4 Sn1628, 2021-08-06

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	80.0 x 80.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	Yes	Yes
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-17, 13:52	2022-01-17, 14:07
SAR1g [W/Kg]	0.778	0.816
SAR10g [W/Kg]	0.430	0.430
Power Drift [dB]	0.03	-0.07
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only



11. 5G NR FR1 Band 77, QPSK - 100MHz, CH650000, Antenna HongBo

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
HSN-I45C-3	300.0 x 215.0 x 15.0	00017605XS	Laptop

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat MSL	Laptop 0.00	Band n77	5G NR FR1 TDD, 10917-AAB	3750.0, 650000	6.13	3.40	49.4

Hardware Setup

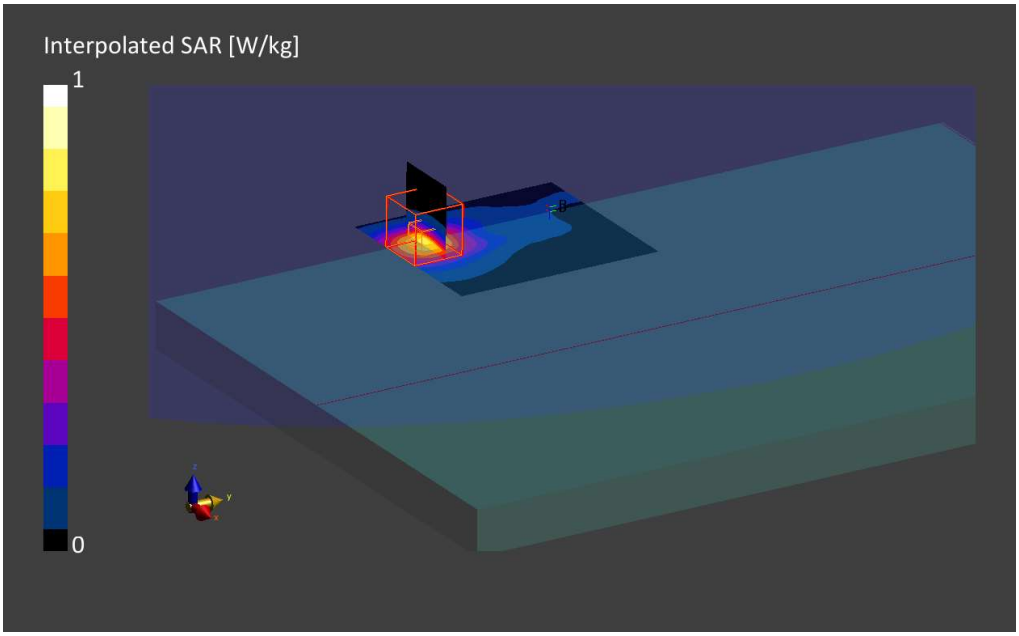
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2124	MBBL-600-6000, 2022-Jan-17	EX3DV4 - SN7455, 2021-03-19	DAE4 Sn1628, 2021-08-06

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	80.0 x 80.0	28.0 x 28.0 x 28.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.4
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	Yes	Yes
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-17, 17:50	2022-01-17, 18:00
SAR1g [W/Kg]	0.588	0.591
SAR10g [W/Kg]	0.277	0.270
Power Drift [dB]	-0.02	-0.04
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only



12. System Check Body Liquid 1750MHz – 2022-01-10

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	Serial Number	DUT Type
Dipole 1750MHz, SPEAG	50.0 x 10.0 x 8.0	1133	Validation Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	,		, 0--	1750.0, 0	8.37	1.44	50.1

Hardware Setup

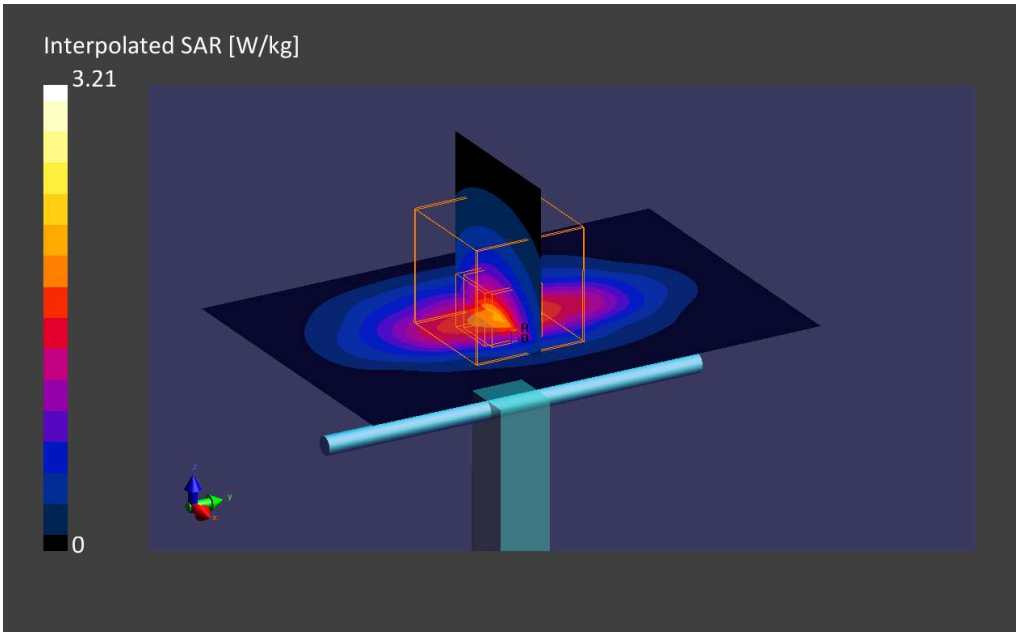
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	60.0 x 90.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	15.0 x 15.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 10:27	2022-01-10, 10:31
psSAR1g [W/kg]	1.55	1.69
psSAR10g [W/kg]	0.843	0.901
Power Drift [dB]	0.04	-0.21
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		82.3
Dist 3dB Peak [mm]		9.6



13. System Check Body Liquid 1750MHz – 2022-01-17

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	Serial Number	DUT Type
, SPEAG	50.0 x 10.0 x 20.0	1133	Validation Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat MSL			,	1750.0, 0	9.02	1.55	51.7

Hardware Setup

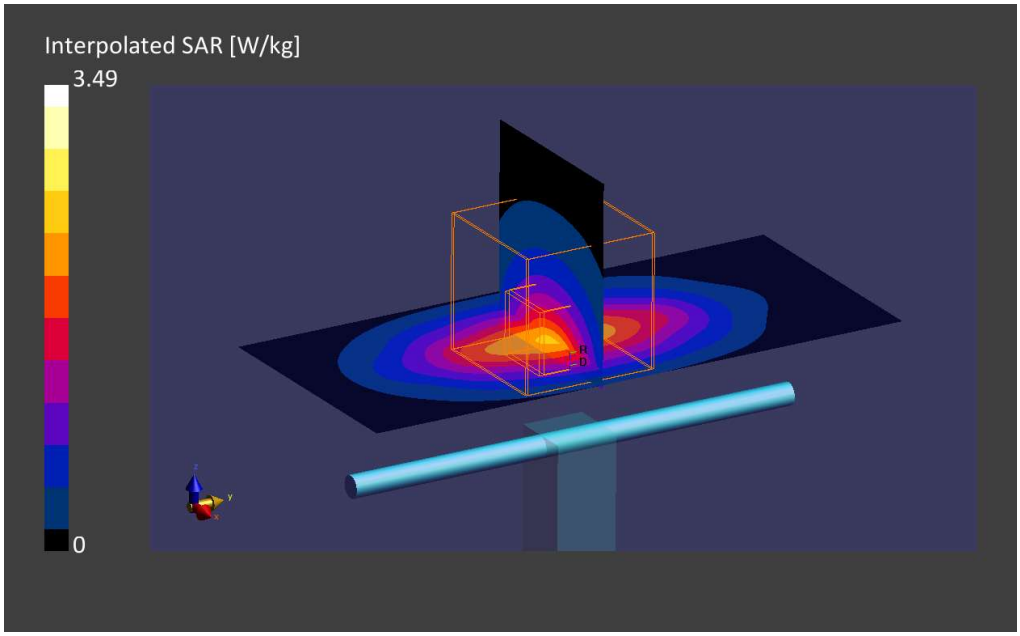
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2124	MBBL-600-6000, 2022-Jan-17	EX3DV4 - SN7604, 2021-08-16	DAE4 Sn1628, 2021-08-06

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 90.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 15.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	Yes	Yes
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-17, 14:52	2022-01-17, 14:58
psSAR1g [W/Kg]	1.95	1.91
psSAR10g [W/Kg]	1.02	1.02
Power Drift [dB]	-0.03	-0.02
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only



14. System Check Body Liquid 1900MHz – 2022-01-10

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	S/N	DUT Type
Dipole 1900MHz, SPEAG	50.0 x 10.0 x 8.0	5d197	Validation Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	,		, 0--	1900.0, 0	7.98	1.54	49.8

Hardware Setup

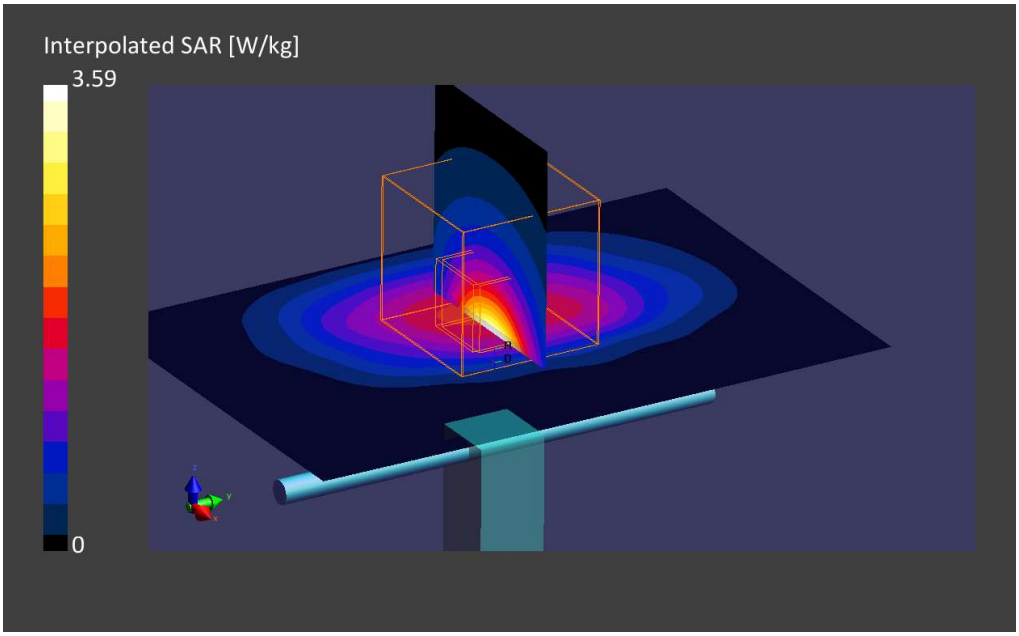
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	60.0 x 90.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	15.0 x 15.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 10:57	2022-01-10, 11:02
psSAR1g [W/kg]	1.60	1.94
psSAR10g [W/kg]	0.903	1.02
Power Drift [dB]	-0.02	-0.16
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		82.4
Dist 3dB Peak [mm]		9.6



15. System Check Body Liquid 1900MHz – 2022-01-14

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	Serial Number	DUT Type
, SPEAG	50.0 x 10.0 x 20.0	5d197	Validation Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat MSL			,	1900.0, 0	8.62	1.54	51.5

Hardware Setup

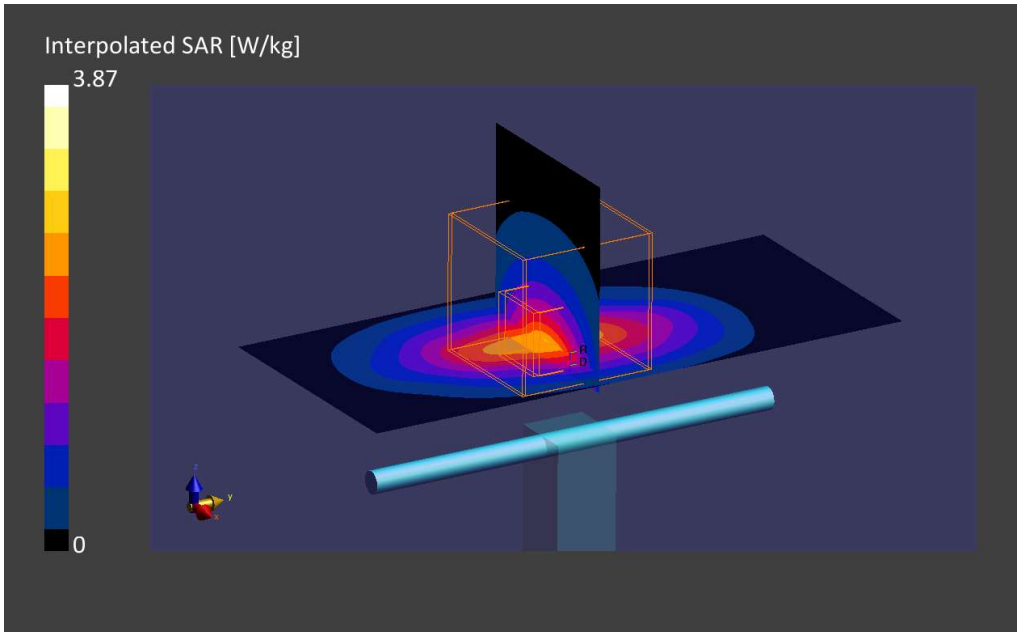
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2124	MBBL-600-6000, 2022-Jan-13	EX3DV4 - SN7604, 2021-08-16	DAE4 Sn1628, 2021-08-06

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 90.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 15.0	6.0 x 6.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	Yes	Yes
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-14, 17:01	2022-01-14, 17:07
psSAR1g [W/Kg]	2.06	2.07
psSAR10g [W/Kg]	1.06	1.07
Power Drift [dB]	-0.02	-0.01
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only



16. System Check Body Liquid 2300MHz

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	Serial Number	DUT Type
D2300MHZ, SPEAG	50.0 x 10.0 x 8.0	1046	Validation Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	,		, 0--	2300.0, 0	7.45	1.84	49.3

Hardware Setup

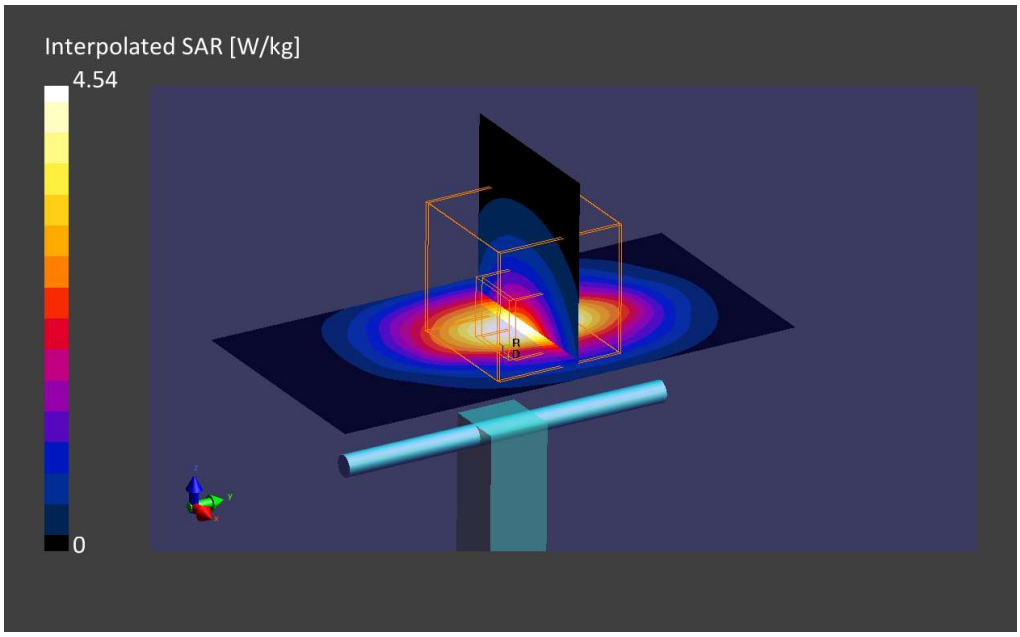
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 80.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 11:10	2022-01-10, 11:16
psSAR1g [W/kg]	2.15	2.29
psSAR10g [W/kg]	1.02	1.10
Power Drift [dB]	-0.07	-0.04
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		81.6
Dist 3dB Peak [mm]		8.5



17. System Check Body Liquid 2600MHz – 2022-01-10

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	Serial Number	DUT Type
D2600MHz, SPEAG	50.0 x 10.0 x 8.0	1100	Validation Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	,		, 0--	2600.0, 0	7.24	2.12	48.9

Hardware Setup

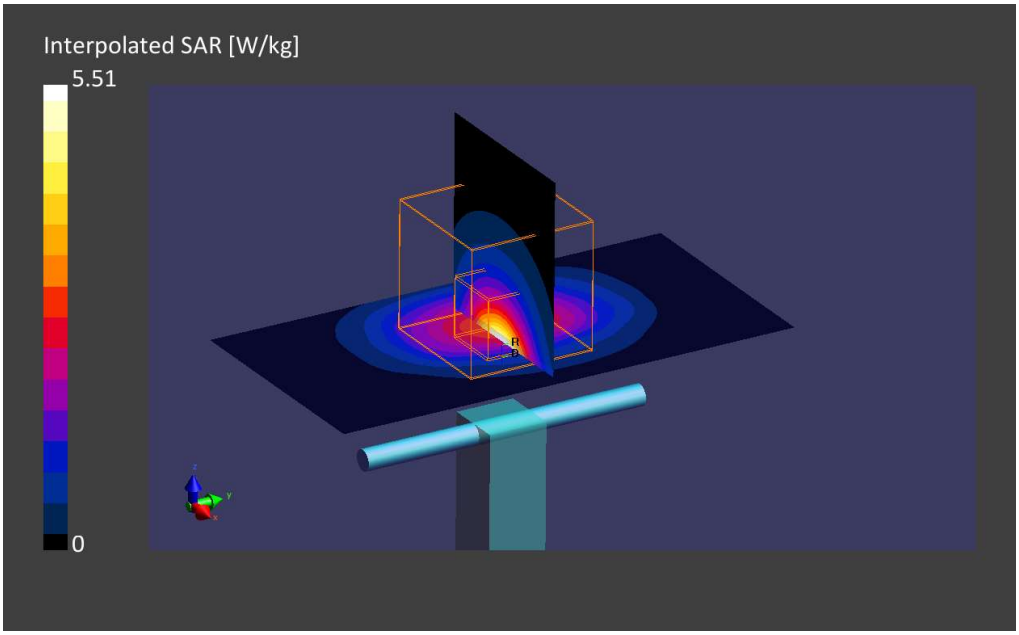
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt)	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 80.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 10:44	2022-01-10, 10:51
psSAR1g [W/kg]	2.44	2.64
psSAR10g [W/kg]	1.13	1.19
Power Drift [dB]	0.01	0.03
Power Scaling Scaling Factor [dB]	Disabled	Disabled
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		80.7
Dist 3dB Peak [mm]		8.9



18. System Check Body Liquid 2600MHz – 2022-01-17

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	Serial Number	DUT Type
, SPEAG	50.0 x 10.0 x 20.0		Validation Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat MSL			,	2600.0, 0	8.1	2.15	50.3

Hardware Setup

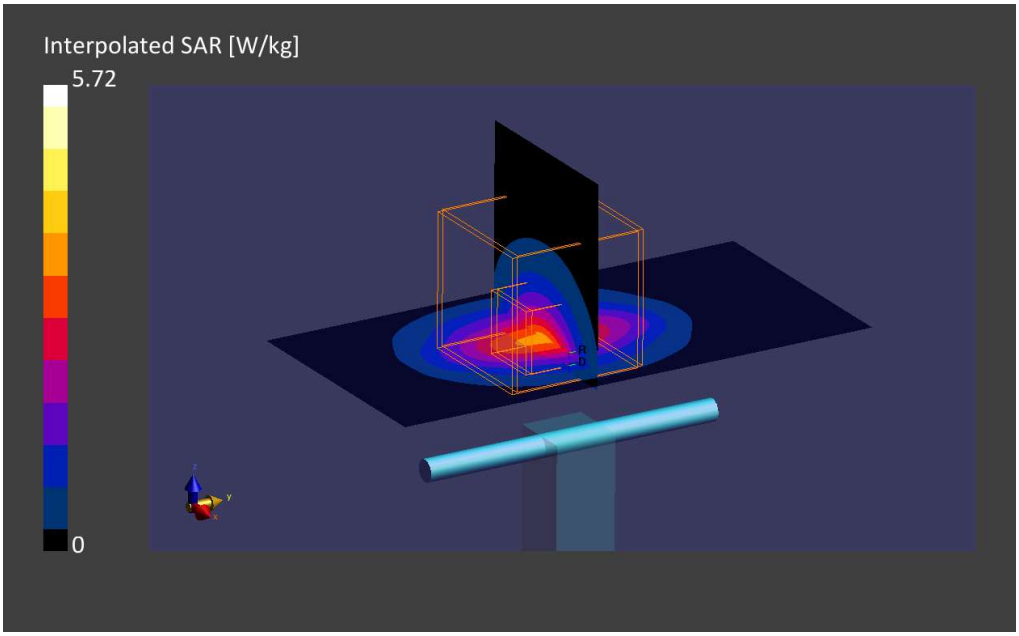
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2124	MBBL-600-6000, 2022-Jan-17	EX3DV4 - SN7604, 2021-08-16	DAE4 Sn1628, 2021-08-06

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 80.0	30.0 x 30.0 x 30.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.5
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	Yes	Yes
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-17, 15:20	2022-01-17, 15:28
psSAR1g [W/Kg]	2.67	2.69
psSAR10g [W/Kg]	1.17	1.21
Power Drift [dB]	0.02	-0.00
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only



19. System Check Body Liquid 3700MHz – 2022-01-10

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	Serial Number	DUT Type
D2600MHz, SPEAG	50.0 x 10.0 x 17.0	1093	Validation Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat, MSL	,		, 0--	3700.0, 0	6.07	3.24	46.6

Hardware Setup

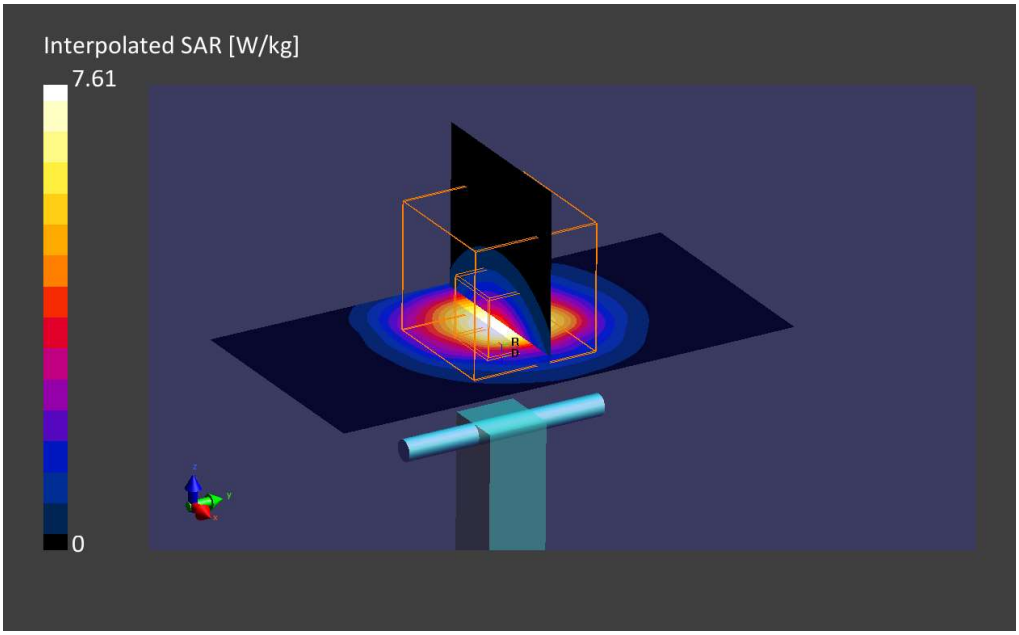
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) -	MBBL-600-6000, 2022-Jan-10	EX3DV4 - SN3978, 2021-05-21	DAE4 Sn1429, 2021-05-11

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 80.0	28.0 x 28.0 x 28.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.4
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	VMS + 6p	VMS + 6p
Scan Method	Measured	Measured

Measurement Results

	Area Scan	Zoom Scan
Date	2022-01-10, 10:08	2022-01-10, 10:14
psSAR1g [W/kg]	2.79	3.00
psSAR10g [W/kg]	1.09	1.12
Power Drift [dB]	-0.09	-0.07
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only
M2/M1 [%]		77.0
Dist 3dB Peak [mm]		8.0



20. System Check Body Liquid 3700MHz – 2022-01-17

Device under Test Properties

Name, Manufacturer	Dimensions [mm]	Serial Number	DUT Type
, SPEAG	50.0 x 10.0 x 20.0	1093	Validation Dipole

Exposure Conditions

Phantom Section, TSL	Position, Test Distance [mm]	Band	Group, UID	Frequency [MHz], Channel Number	Conversion Factor	TSL Conductivity [S/m]	TSL Permittivity
Flat MSL			,	3700.0, 0	6.13	3.42	49.6

Hardware Setup

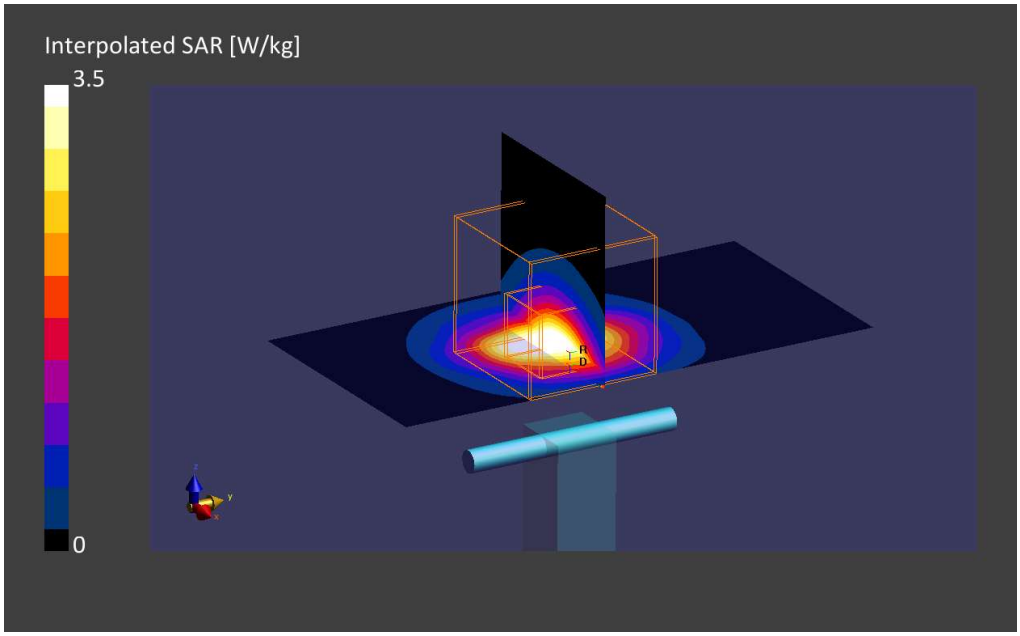
Phantom	TSL, Measured Date	Probe, Calibration Date	DAE, Calibration Date
ELI V8.0 (20deg probe tilt) - 2124	MBBL-600-6000, 2022-Jan-17	EX3DV4 - SN7455, 2021-03-19	DAE4 Sn1628, 2021-08-06

Scan Setup

	Area Scan	Zoom Scan
Grid Extents [mm]	40.0 x 80.0	28.0 x 28.0 x 28.0
Grid Steps [mm]	10.0 x 10.0	5.0 x 5.0 x 1.4
Sensor Surface [mm]	3.0	1.4
Graded Grid	Yes	Yes
Grading Ratio	1.5	1.5
MAIA	Confirmed by MAIA	Confirmed by MAIA
Surface Detection	Yes	Yes
Scan Method	Measured	Measured

Measurement Results

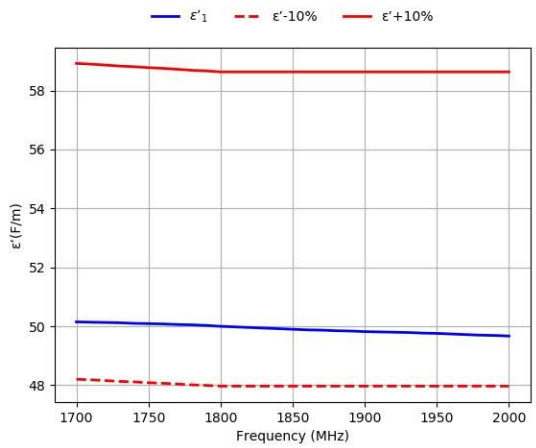
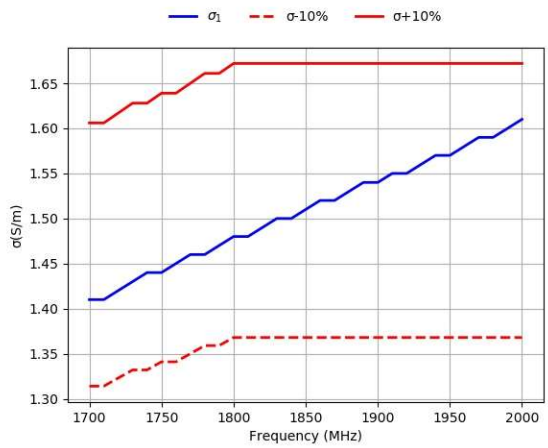
	Area Scan	Zoom Scan
Date	2022-01-17, 15:49	2022-01-17, 15:57
psSAR1g [W/Kg]	2.78	2.98
psSAR10g [W/Kg]	1.05	1.11
Power Drift [dB]	0.00	0.04
Power Scaling	Disabled	Disabled
Scaling Factor [dB]		
TSL Correction	Positive Only	Positive Only



Annex D. TSL Dielectric Parameters

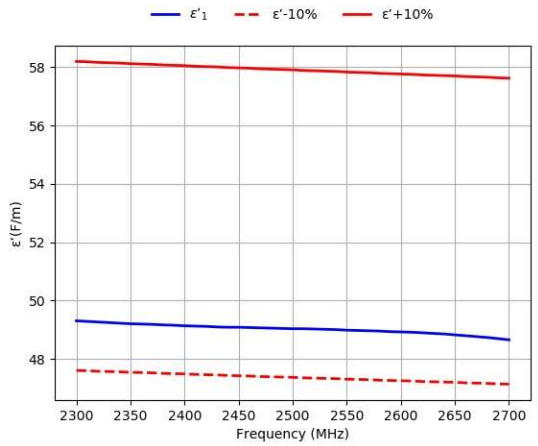
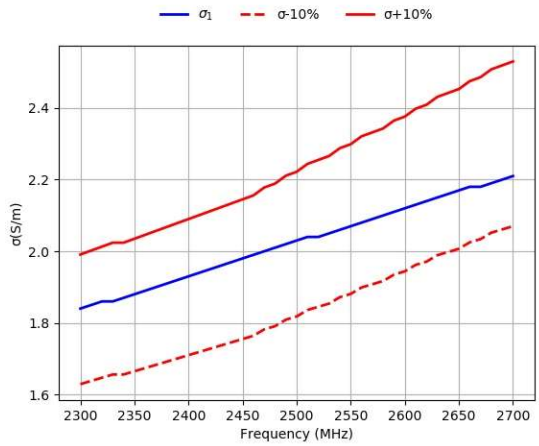
D.1 Body 1700MHz-1950MHz SAR System #2

Freq. (MHz)	Target		2022-01-10 Measured	
	ε' (F/m)	σ (S/m)	ε'$_1$ (F/m)	σ$_1$ (S/m)
1700	53.56	1.46	50.15	1.41
1710	53.54	1.46	50.14	1.41
1720	53.51	1.47	50.13	1.42
1730	53.48	1.48	50.12	1.43
1740	53.46	1.48	50.1	1.44
1750	53.43	1.49	50.09	1.44
1760	53.41	1.49	50.08	1.45
1770	53.38	1.5	50.06	1.46
1780	53.35	1.51	50.05	1.46
1790	53.33	1.51	50.03	1.47
1800	53.3	1.52	50.0	1.48
1810	53.3	1.52	49.98	1.48
1820	53.3	1.52	49.96	1.49
1830	53.3	1.52	49.94	1.5
1840	53.3	1.52	49.92	1.5
1850	53.3	1.52	49.9	1.51
1860	53.3	1.52	49.88	1.52
1870	53.3	1.52	49.87	1.52
1880	53.3	1.52	49.85	1.53
1890	53.3	1.52	49.84	1.54
1900	53.3	1.52	49.82	1.54
1910	53.3	1.52	49.81	1.55
1920	53.3	1.52	49.8	1.55
1930	53.3	1.52	49.79	1.56
1940	53.3	1.52	49.77	1.57
1950	53.3	1.52	49.76	1.57
1960	53.3	1.52	49.74	1.58
1970	53.3	1.52	49.72	1.59
1980	53.3	1.52	49.7	1.59
1990	53.3	1.52	49.69	1.6
2000	53.3	1.52	49.67	1.61

Permittivity	Conductivity
	

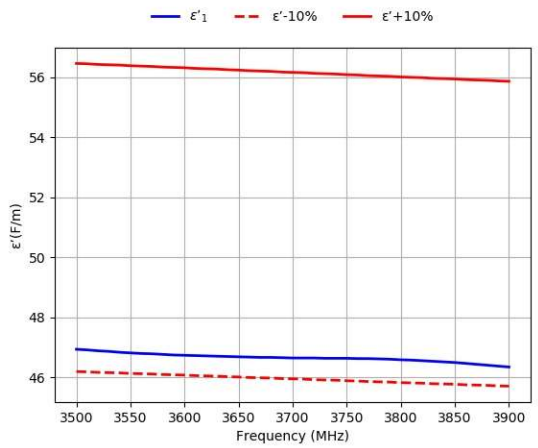
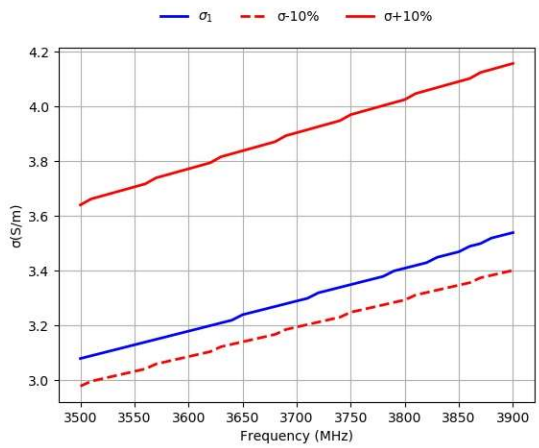
D.2 Body 2300MHz-2700MHz SAR System #2

			2022-01-10	
	Target		Measured	
Freq.(MHz)	e' (F/m)	s (S/m)	e'1 (F/m)	s1 (S/m)
2300	52.9	1.81	49.31	1.84
2310	52.89	1.82	49.29	1.85
2320	52.87	1.83	49.27	1.86
2330	52.86	1.84	49.25	1.86
2340	52.85	1.84	49.23	1.87
2350	52.83	1.85	49.21	1.88
2360	52.82	1.86	49.2	1.89
2370	52.81	1.87	49.19	1.9
2380	52.79	1.88	49.17	1.91
2390	52.78	1.89	49.16	1.92
2400	52.77	1.9	49.14	1.93
2410	52.75	1.91	49.13	1.94
2420	52.74	1.92	49.12	1.95
2430	52.73	1.93	49.1	1.96
2440	52.71	1.94	49.09	1.97
2450	52.7	1.95	49.09	1.98
2460	52.69	1.96	49.08	1.99
2470	52.67	1.98	49.07	2.0
2480	52.66	1.99	49.06	2.01
2490	52.65	2.01	49.05	2.02
2500	52.64	2.02	49.04	2.03
2510	52.62	2.04	49.04	2.04
2520	52.61	2.05	49.03	2.04
2530	52.6	2.06	49.02	2.05
2540	52.59	2.08	49.01	2.06
2550	52.57	2.09	48.99	2.07
2560	52.56	2.11	48.98	2.08
2570	52.55	2.12	48.97	2.09
2580	52.53	2.13	48.96	2.1
2590	52.52	2.15	48.94	2.11
2600	52.51	2.16	48.93	2.12
2610	52.5	2.18	48.92	2.13
2620	52.48	2.19	48.9	2.14
2630	52.47	2.21	48.88	2.15
2640	52.46	2.22	48.86	2.16
2650	52.45	2.23	48.83	2.17
2660	52.43	2.25	48.8	2.18
2670	52.42	2.26	48.77	2.18
2680	52.41	2.28	48.74	2.19
2690	52.39	2.29	48.7	2.2
2700	52.38	2.3	48.66	2.21

Permittivity	Conductivity
	

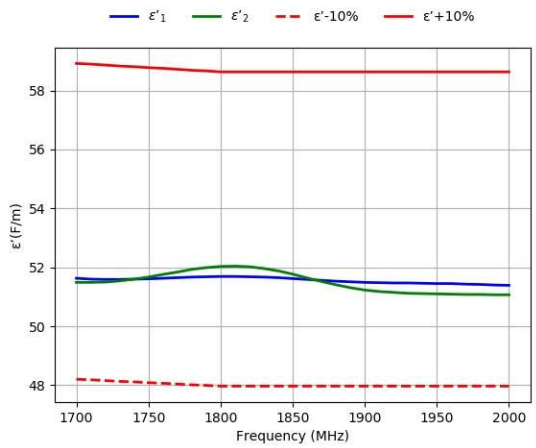
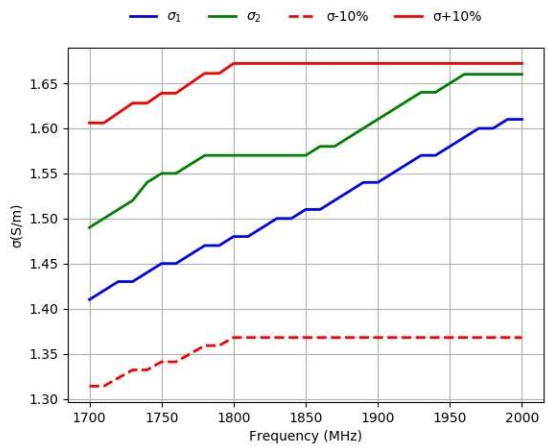
D.3 Body 3500MHz-3900MHz SAR System #2

			2022-01-10	
	Target		Measured	
Freq.(MHz)	e' (F/m)	s (S/m)	e'1 (F/m)	s1 (S/m)
3500.0	51.32	3.31	46.93	2.99
3510.0	51.31	3.33	46.91	3.0
3520.0	51.29	3.34	46.88	3.01
3530.0	51.28	3.35	46.86	3.03
3540.0	51.27	3.36	46.83	3.04
3550.0	51.25	3.37	46.81	3.05
3560.0	51.24	3.38	46.79	3.06
3570.0	51.23	3.4	46.78	3.08
3580.0	51.21	3.41	46.76	3.09
3590.0	51.2	3.42	46.74	3.1
3600.0	51.19	3.43	46.73	3.11
3610.0	51.17	3.44	46.72	3.13
3620.0	51.16	3.45	46.71	3.14
3630.0	51.15	3.47	46.7	3.15
3640.0	51.13	3.48	46.69	3.17
3650.0	51.12	3.49	46.68	3.18
3660.0	51.1	3.5	46.67	3.19
3670.0	51.09	3.51	46.66	3.2
3680.0	51.08	3.52	46.66	3.21
3690.0	51.06	3.54	46.65	3.23
3700.0	51.05	3.55	46.64	3.24
3710.0	51.04	3.56	46.64	3.25
3720.0	51.02	3.57	46.64	3.26
3730.0	51.01	3.58	46.63	3.27
3740.0	51.0	3.59	46.63	3.28
3750.0	50.98	3.61	46.63	3.29
3760.0	50.97	3.62	46.62	3.3
3770.0	50.95	3.63	46.62	3.31
3780.0	50.94	3.64	46.61	3.32
3790.0	50.93	3.65	46.6	3.33
3800.0	50.91	3.66	46.58	3.34
3810.0	50.9	3.68	46.57	3.35
3820.0	50.89	3.69	46.55	3.36
3830.0	50.87	3.7	46.53	3.37
3840.0	50.86	3.71	46.51	3.37
3850.0	50.85	3.72	46.49	3.38
3860.0	50.83	3.73	46.46	3.39
3870.0	50.82	3.75	46.43	3.4
3880.0	50.81	3.76	46.4	3.41
3890.0	50.79	3.77	46.37	3.41
3900.0	50.78	3.78	46.34	3.42

Permittivity	Conductivity
	

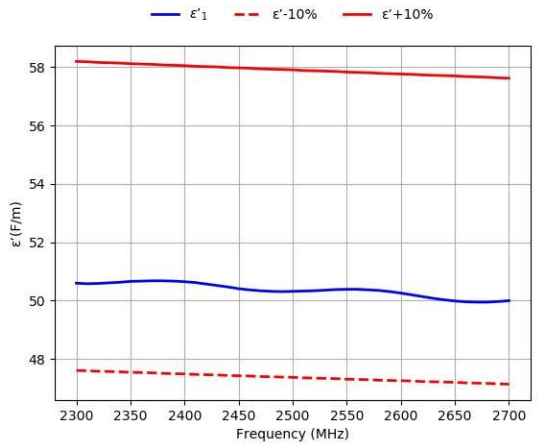
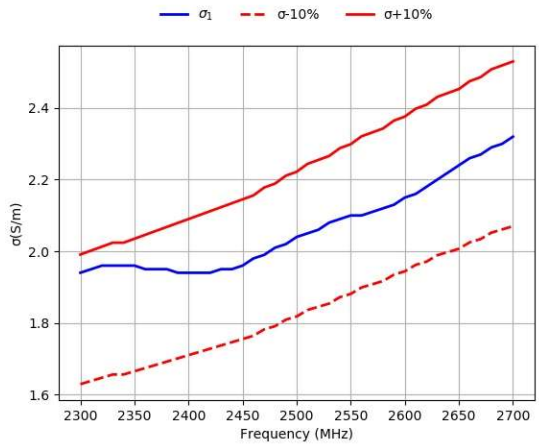
D.4 Body 1700MHz-2000MHz SAR System #4

			2022-01-13		2022-01-17	
Freq. (MHz)	Target		Measured			
	ε' (F/m)	σ (S/m)	ε'$_1$ (F/m)	σ$_1$ (S/m)	ε'$_2$ (F/m)	σ$_2$ (S/m)
1700	53.56	1.46	51.63	1.41	51.49	1.49
1710	53.54	1.46	51.6	1.42	51.49	1.5
1720	53.51	1.47	51.59	1.43	51.5	1.51
1730	53.48	1.48	51.59	1.43	51.54	1.52
1740	53.46	1.48	51.6	1.44	51.6	1.54
1750	53.43	1.49	51.61	1.45	51.67	1.55
1760	53.41	1.49	51.63	1.45	51.76	1.55
1770	53.38	1.5	51.65	1.46	51.84	1.56
1780	53.35	1.51	51.67	1.47	51.93	1.57
1790	53.33	1.51	51.68	1.47	51.99	1.57
1800	53.3	1.52	51.69	1.48	52.03	1.57
1810	53.3	1.52	51.69	1.48	52.04	1.57
1820	53.3	1.52	51.68	1.49	52.02	1.57
1830	53.3	1.52	51.67	1.5	51.96	1.57
1840	53.3	1.52	51.65	1.5	51.88	1.57
1850	53.3	1.52	51.62	1.51	51.77	1.57
1860	53.3	1.52	51.59	1.51	51.64	1.58
1870	53.3	1.52	51.56	1.52	51.52	1.58
1880	53.3	1.52	51.53	1.53	51.41	1.59
1890	53.3	1.52	51.51	1.54	51.31	1.6
1900	53.3	1.52	51.49	1.54	51.23	1.61
1910	53.3	1.52	51.48	1.55	51.18	1.62
1920	53.3	1.52	51.47	1.56	51.15	1.63
1930	53.3	1.52	51.47	1.57	51.12	1.64
1940	53.3	1.52	51.46	1.57	51.11	1.64
1950	53.3	1.52	51.45	1.58	51.1	1.65
1960	53.3	1.52	51.45	1.59	51.09	1.66
1970	53.3	1.52	51.43	1.6	51.08	1.66
1980	53.3	1.52	51.42	1.6	51.08	1.66
1990	53.3	1.52	51.4	1.61	51.07	1.66
2000	53.3	1.52	51.39	1.61	51.07	1.66

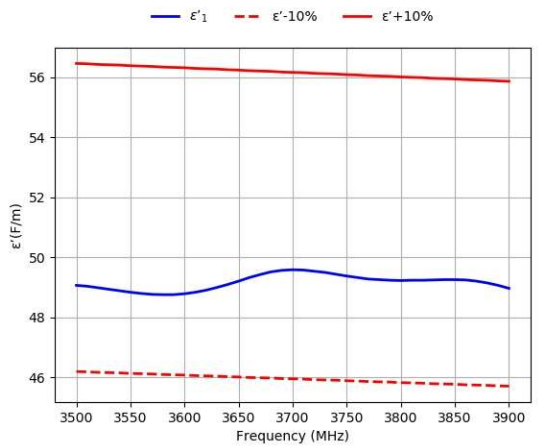
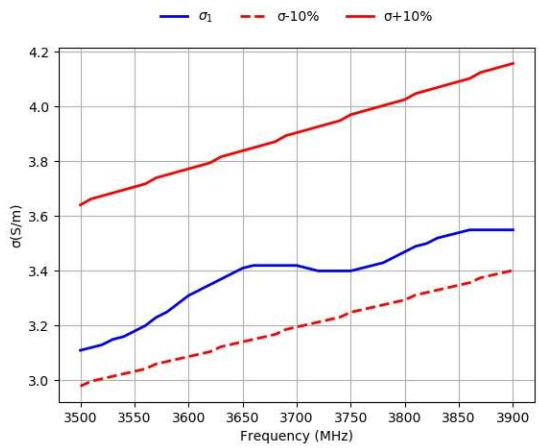
Permittivity	Conductivity
	

D.5 Body 2300MHz-2700MHz SAR System #4

			2022-01-17	
	Target		Measured	
Freq.(MHz)	e' (F/m)	s (S/m)	e'1 (F/m)	s1 (S/m)
2300	52.9	1.81	50.6	1.94
2310	52.89	1.82	50.58	1.95
2320	52.87	1.83	50.59	1.96
2330	52.86	1.84	50.61	1.96
2340	52.85	1.84	50.63	1.96
2350	52.83	1.85	50.66	1.96
2360	52.82	1.86	50.67	1.95
2370	52.81	1.87	50.68	1.95
2380	52.79	1.88	50.68	1.95
2390	52.78	1.89	50.67	1.94
2400	52.77	1.9	50.65	1.94
2410	52.75	1.91	50.62	1.94
2420	52.74	1.92	50.57	1.94
2430	52.73	1.93	50.52	1.95
2440	52.71	1.94	50.47	1.95
2450	52.7	1.95	50.41	1.96
2460	52.69	1.96	50.37	1.98
2470	52.67	1.98	50.34	1.99
2480	52.66	1.99	50.32	2.01
2490	52.65	2.01	50.31	2.02
2500	52.64	2.02	50.32	2.04
2510	52.62	2.04	50.33	2.05
2520	52.61	2.05	50.34	2.06
2530	52.6	2.06	50.36	2.08
2540	52.59	2.08	50.38	2.09
2550	52.57	2.09	50.39	2.1
2560	52.56	2.11	50.39	2.1
2570	52.55	2.12	50.37	2.11
2580	52.53	2.13	50.35	2.12
2590	52.52	2.15	50.31	2.13
2600	52.51	2.16	50.26	2.15
2610	52.5	2.18	50.2	2.16
2620	52.48	2.19	50.14	2.18
2630	52.47	2.21	50.08	2.2
2640	52.46	2.22	50.03	2.22
2650	52.45	2.23	49.99	2.24
2660	52.43	2.25	49.96	2.26
2670	52.42	2.26	49.95	2.27
2680	52.41	2.28	49.95	2.29
2690	52.39	2.29	49.97	2.3
2700	52.38	2.3	50.0	2.32

Permittivity	Conductivity
	

D.6 Body 3500MHz-3900MHz SAR System #4

			2022-01-17	
	Target		Measured	
Freq.(MHz)	e' (F/m)	s (S/m)	e'1 (F/m)	s1 (S/m)
3500	51.32	3.31	49.06	3.11
3510	51.31	3.33	49.03	3.12
3520	51.29	3.34	48.98	3.13
3530	51.28	3.35	48.93	3.15
3540	51.27	3.36	48.88	3.16
3550	51.25	3.37	48.83	3.18
3560	51.24	3.38	48.79	3.2
3570	51.23	3.4	48.76	3.23
3580	51.21	3.41	48.75	3.25
3590	51.2	3.42	48.75	3.28
3600	51.19	3.43	48.78	3.31
3610	51.17	3.44	48.83	3.33
3620	51.16	3.45	48.9	3.35
3630	51.15	3.47	48.99	3.37
3640	51.13	3.48	49.09	3.39
3650	51.12	3.49	49.2	3.41
3660	51.1	3.5	49.32	3.42
3670	51.09	3.51	49.42	3.42
3680	51.08	3.52	49.51	3.42
3690	51.06	3.54	49.56	3.42
3700	51.05	3.55	49.58	3.42
3710	51.04	3.56	49.57	3.41
3720	51.02	3.57	49.53	3.4
3730	51.01	3.58	49.49	3.4
3740	51.0	3.59	49.43	3.4
3750	50.98	3.61	49.37	3.4
3760	50.97	3.62	49.32	3.41
3770	50.95	3.63	49.27	3.42
3780	50.94	3.64	49.25	3.43
3790	50.93	3.65	49.23	3.45
3800	50.91	3.66	49.22	3.47
3810	50.9	3.68	49.23	3.49
3820	50.89	3.69	49.23	3.5
3830	50.87	3.7	49.24	3.52
3840	50.86	3.71	49.25	3.53
3850	50.85	3.72	49.25	3.54
3860	50.83	3.73	49.24	3.55
3870	50.82	3.75	49.2	3.55
3880	50.81	3.76	49.14	3.55
3890	50.79	3.77	49.06	3.55
3900	50.78	3.78	48.96	3.55

Permittivity	Conductivity