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SAR EVALUATION REPORT

Applicant Name:
Apple Inc.
One Apple Park Way
Cupertino, CA 95014 USA

Date of Testing:
02/15/2021 – 03/22/2021
Test Site/Location:
PCTEST Lab, Morgan Hill, CA, USA
Document Serial No.:
1C2101020003-01.BCG

FCC ID:	**BCGA2459**
APPLICANT:	**APPLE, INC.**

DUT Type:	Tablet Device
Application Type:	Certification
FCC Rule Part(s):	CFR §2.1093
Model:	A2459, A2460
Reference FCC ID:	BCGA2301

Equipment Class	Band & Mode	Tx Frequency	SAR
			1g Body (W/kg)
PCB	GPRS/EDGE 850	824.20 - 848.80 MHz	0.80
PCB	GPRS/EDGE 1900	1850.20 - 1909.80 MHz	0.80
PCB	UMTS 850	826.40 - 846.60 MHz	0.83
PCB	UMTS 1750	1712.4 - 1752.6 MHz	1.00
PCB	UMTS 1900	1852.4 - 1907.6 MHz	0.92
PCB	LTE Band 71	665.5 - 695.5 MHz	0.95
PCB	LTE Band 12	699.7 - 715.3 MHz	1.00
PCB	LTE Band 17	706.5 - 713.5 MHz	N/A
PCB	LTE Band 13	779.5 - 784.5 MHz	0.99
PCB	LTE Band 14	790.5 - 795.5 MHz	0.98
PCB	LTE Band 26 (Cell)	814.7 - 848.3 MHz	0.89
PCB	LTE Band 5 (Cell)	824.7 - 848.3 MHz	0.93
PCB	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	N/A
PCB	LTE Band 66 (AWS)	1710.7 - 1779.3 MHz	0.99
PCB	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	N/A
PCB	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	0.86
PCB	LTE Band 30	2307.5 - 2312.5 MHz	0.99
PCB	LTE Band 7	2502.5 - 2567.5 MHz	1.00
PCB	LTE Band 41	2498.5 - 2687.5 MHz	1.00
CBE	LTE Band 48	3552.5 - 3697.5 MHz	1.00
PCB	NR Band n71	665.5 - 695.5 MHz	0.64
PCB	NR Band n12	701.5 - 713.5 MHz	0.91
PCB	NR Band n5 (Cell)	826.5 - 846.5 MHz	0.96
PCB	NR Band n66 (AWS)	1712.5 - 1777.5 MHz	1.00
PCB	NR Band n25 (PCS)	1852.5 - 1912.5 MHz	0.83
PCB	NR Band n2 (PCS)	1852.5 - 1907.5 MHz	N/A
PCB	NR Band n41	2506.02 - 2679.99 MHz	1.00
PCB	NR Band n77	3710.01 - 3969.99 MHz	0.93
DTS	2.4 GHz WLAN	2412 - 2472 MHz	1.08
NII	U-NII-1	5180 - 5240 MHz	N/A
NII	U-NII-3A	5260 - 5320 MHz	1.08
NII	U-NII-2C	5500 - 5720 MHz	1.09
NII	U-NII-3	5745 - 5825 MHz	1.18
DSS/DTS	Bluetooth	2402 - 2480 MHz	1.19
Simultaneous SAR per KDB 690783 D01v01r03:			1.59

Note: This table above includes test data from RF Exposure technical report S/N: 1C2101020002-01.BCG (Rev 1) per FCC TCB workshop for data referencing of closely related product FCC ID BCGA2301.

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

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

Randy Ortanez
President

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

REV 21.4 M
09/11/2019

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GPRS/EDGE 850	Data	824.20 - 848.80 MHz
GPRS/EDGE 1900	Data	1850.20 - 1909.80 MHz
UMTS 850	Data	826.40 - 846.60 MHz
UMTS 1750	Data	1712.4 - 1752.6 MHz
UMTS 1900	Data	1852.4 - 1907.6 MHz
LTE Band 71	Data	665.5 - 695.5 MHz
LTE Band 12	Data	699.7 - 715.3 MHz
LTE Band 17	Data	706.5 - 713.5 MHz
LTE Band 13	Data	779.5 - 784.5 MHz
LTE Band 14	Data	790.5 - 795.5 MHz
LTE Band 26 (Cell)	Data	814.7 - 848.3 MHz
LTE Band 5 (Cell)	Data	824.7 - 848.3 MHz
LTE Band 4 (AWS)	Data	1710.7 - 1754.3 MHz
LTE Band 66 (AWS)	Data	1710.7 - 1779.3 MHz
LTE Band 2 (PCS)	Data	1850.7 - 1909.3 MHz
LTE Band 25 (PCS)	Data	1850.7 - 1914.3 MHz
LTE Band 30	Data	2307.5 - 2312.5 MHz
LTE Band 7	Data	2502.5 - 2567.5 MHz
LTE Band 41	Data	2498.5 - 2687.5 MHz
LTE Band 48	Data	3552.5 - 3697.5 MHz
NR Band n71	Data	665.5 - 695.5 MHz
NR Band n12	Data	701.5 - 713.5 MHz
NR Band n5 (Cell)	Data	826.5 - 846.5 MHz
NR Band n66 (AWS)	Data	1712.5 - 1777.5 MHz
NR Band n25 (PCS)	Data	1852.5 - 1912.5 MHz
NR Band n2 (PCS)	Data	1852.5 - 1907.5 MHz
NR Band n41	Data	2506.02 - 2679.99 MHz
NR Band n77	Data	3710.01 - 3969.99 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2472 MHz
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz

1.2 Data Referencing

Mode:	Reference FCC ID: BCGA2301	Variant FCC ID: BCGA2459
GPRS/EDGE 850 Ant 1	Fully Evaluated	Referenced
GPRS/EDGE 1900 Ant 1	Fully Evaluated	Referenced
UMTS 850 Ant 1	Fully Evaluated	Referenced
UMTS 1750 Ant 1	Fully Evaluated	Referenced
UMTS 1900 Ant 1	Fully Evaluated	Referenced
LTE Band 71 Ant 1	Fully Evaluated	Referenced
LTE Band 12 Ant 1	Fully Evaluated	Referenced
LTE Band 13 Ant 1	Fully Evaluated	Referenced
LTE Band 14 Ant 1	Fully Evaluated	Referenced
LTE Band 26 (Cell) Ant 1	Fully Evaluated	Referenced
LTE Band 5 (Cell) Ant 1	Fully Evaluated	Referenced
LTE Band 66 (AWS) Ant 1	Fully Evaluated	Referenced
LTE Band 25 (PCS) Ant 1	Fully Evaluated	Referenced
LTE Band 30 Ant 1	Fully Evaluated	Referenced
LTE Band 7 Ant 1	Fully Evaluated	Referenced
LTE Band 41 Ant 1	Fully Evaluated	Referenced
LTE Band 48 Ant 1	Fully Evaluated	Referenced
NR Band n71 Ant 1	Fully Evaluated	Referenced
NR Band n12 Ant 1	Fully Evaluated	Referenced
NR Band n5 Ant 1	Fully Evaluated	Referenced
NR Band n66 Ant 1	Fully Evaluated	Referenced
NR Band n25 Ant 1	Fully Evaluated	Referenced
NR Band n41 Ant 1	Fully Evaluated	Referenced
NR Band n77 Ant 1	Fully Evaluated	Referenced
GPRS/EDGE 850 Ant 3	Fully Evaluated	Referenced
GPRS/EDGE1900 Ant 3	Fully Evaluated	Referenced
UMTS 850 Ant 3	Fully Evaluated	Referenced
UMTS 1750 Ant 3	Fully Evaluated	Referenced
UMTS 1900 Ant 3	Fully Evaluated	Referenced
LTE Band 71 Ant 3	Fully Evaluated	Referenced
LTE Band 12 Ant 3	Fully Evaluated	Referenced
LTE Band 13 Ant 3	Fully Evaluated	Referenced
LTE Band 14 Ant 3	Fully Evaluated	Referenced
LTE Band 26 (Cell) Ant 3	Fully Evaluated	Referenced
LTE Band 5 (Cell) Ant 3	Fully Evaluated	Referenced
LTE Band 66 (AWS) Ant 3	Fully Evaluated	Referenced
LTE Band 25 (PCS) Ant 3	Fully Evaluated	Referenced
LTE Band 30 Ant 3	Fully Evaluated	Referenced
LTE Band 7 Ant 3	Fully Evaluated	Referenced
LTE Band 41 Ant 3	Fully Evaluated	Referenced
LTE Band 48 Ant 3	Fully Evaluated	Referenced
NR Band n71 Ant 3	Fully Evaluated	Referenced
NR Band n12 Ant 3	Fully Evaluated	Referenced
NR Band n5 Ant 3	Fully Evaluated	Referenced
NR Band n66 Ant 3	Fully Evaluated	Referenced
NR Band n25 Ant 3	Fully Evaluated	Referenced
NR Band n41 Ant 3	Fully Evaluated	Referenced
NR Band n77 Ant 3	Fully Evaluated	Referenced
GPRS/EDGE 1900 Ant 2b	Fully Evaluated	Referenced
UMTS 1750 Ant 2b	Fully Evaluated	Referenced
UMTS 1900 Ant 2b	Fully Evaluated	Referenced
LTE Band 66 (AWS) Ant 2b	Fully Evaluated	Referenced
LTE Band 25 (PCS) Ant 2b	Fully Evaluated	Referenced
LTE Band 30 Ant 2b	Fully Evaluated	Referenced
LTE Band 7 Ant 2b	Fully Evaluated	Referenced
LTE Band 41 Ant 2b	Fully Evaluated	Referenced
NR Band n66 Ant 2b	Fully Evaluated	Referenced
NR Band n25 Ant 2b	Fully Evaluated	Referenced
NR Band n41 Ant 2b	Fully Evaluated	Referenced
LTE Band 48 Ant 2a	Fully Evaluated	Referenced
NR Band n77 Ant 2a	Fully Evaluated	Referenced
GPRS/EDGE 1900 Ant 4b	Fully Evaluated	Referenced
UMTS 1750 Ant 4b	Fully Evaluated	Referenced
UMTS 1900 Ant 4b	Fully Evaluated	Referenced
LTE Band 66 (AWS) Ant 4b	Fully Evaluated	Referenced
LTE Band 25 (PCS) Ant 4b	Fully Evaluated	Referenced
LTE Band 30 Ant 4b	Fully Evaluated	Referenced
LTE Band 7 Ant 4b	Fully Evaluated	Referenced
LTE Band 41 Ant 4b	Fully Evaluated	Referenced
NR Band n66 Ant 4b	Fully Evaluated	Referenced
NR Band n25 Ant 4b	Fully Evaluated	Referenced
NR Band n41 Ant 4b	Fully Evaluated	Referenced
LTE Band 48 Ant 4a	Fully Evaluated	Fully Evaluated
NR Band n77 Ant 4a	Fully Evaluated	Fully Evaluated
2.4 GHz WLAN Ant 2a	Fully Evaluated	Referenced
2.4 GHz WLAN Ant 4a	Fully Evaluated	Fully Evaluated
5 GHz WLAN Ant 4b	Fully Evaluated	Referenced
5 GHz WLAN Ant 5b	Fully Evaluated	Referenced
Bluetooth Ant 2a	Fully Evaluated	Referenced
Bluetooth Ant 4a	Fully Evaluated	Fully Evaluated

Per manufacturer declaration, there are two tablet devices FCC ID: BCGA2301 and FCC ID: BCGA2459, with high degree of similarity, reference model FCC ID: BCGA2301 and variant model FCC ID: BCGA2459. The reference model supports mmWave operations, while the variant model has the mmWave components/antennas removed. Both models share the same material, form factor, circuit design, and components, including antennas and their locations. The reference and variant models use the same material, form factor, circuit design, and components, including antennas and their locations. The reference and variant models use the same power tables and have same tune-up tolerances.

Per FCC Approved Data Referencing Test Plan, testing was done fully on the reference model FCC ID: BCGA2301, while spot-check verification has been performed on variant model FCC ID: BCGA2459. Additionally, due to Antenna 4a location being close to the depopulated mmWave component, full testing has been done for all supported technologies on Antenna 4a. The reference and variant model comparison data summary is included in section 10.1. Please see RF exposure Technical report S/N: 1C2101020002-01.BCG (Rev 1) for complete compliance evaluation for the reference model.

1.3 Time-Averaging Algorithm for RF Exposure Compliance

This device is enabled with the Qualcomm® Smart Transmit feature. This feature performs time averaging algorithm in real time to control and manage transmitting power and ensure the time-averaged RF exposure is in compliance with FCC requirements all the time. Refer to Compliance Summary document for detailed description of Qualcomm® Smart Transmit feature (report SN could be found in Section 1.11 – Bibliography).

Note that WLAN operations are not enabled with Smart Transmit.

The Smart Transmit algorithm maintains the time-averaged transmit power, in turn, time-averaged RF exposure of SAR design_target, below the predefined time-averaged power limit (i.e., Plimit for sub-6 radio), for each characterized technology and band (see RF Exposure Part 0 Test Report, report SN could be found in Section 1.11 - Bibliography).

Exposure Scenario:	Ant 3 Body	Ant 3 Maximum Tune-up Output Power*	Ant 1 Body	Ant 1 Maximum Tune-up Output Power*	Ant 4a/4b Body	Ant 4a/4b Maximum Tune-up Output Power*	Ant 2a/2b Body	Ant 2a/2b Maximum Tune-up Output Power*
Averaging Volume:	1g		1g		1g		1g	
Spacing:	0 mm		0 mm		0 mm		0 mm	
DSI:	1		1		1		1	
Technology/Band	**Plimit corresponding to 0.8mW/g (SAR_design_target)**	Pmax	**Plimit corresponding to 0.8mW/g (SAR_design_target)**	Pmax	**Plimit corresponding to 0.8mW/g (SAR_design_target)**	Pmax	**Plimit corresponding to 0.8mW/g (SAR_design_target)**	Pmax
GPRS/EDGE 850 MHz	17.51	24.81	18.31	23.31	N/A	N/A	N/A	N/A
GPRS/EDGE 1900 MHz	14.91	22.81	13.71	19.81	11.81	22.81	13.71	19.81
UMTS B5	18.00	24.70	17.90	22.90	N/A	N/A	N/A	N/A
UMTS B4	15.00	24.70	14.50	21.20	13.10	24.20	14.00	21.20
UMTS B2	15.20	24.70	14.20	21.20	11.50	24.20	14.00	21.20
LTE FDD B71	19.70	24.70	19.10	22.90	N/A	N/A	N/A	N/A
LTE FDD B12	18.80	24.70	19.50	22.90	N/A	N/A	N/A	N/A
LTE FDD B17	18.80	24.70	19.50	22.90	N/A	N/A	N/A	N/A
LTE FDD B13	18.90	24.70	19.50	22.90	N/A	N/A	N/A	N/A
LTE FDD B14	18.90	24.70	19.50	22.90	N/A	N/A	N/A	N/A
LTE FDD B26	18.00	24.70	17.90	22.90	N/A	N/A	N/A	N/A
LTE FDD B5	18.00	24.70	17.90	22.90	N/A	N/A	N/A	N/A
LTE FDD B66/4	15.00	24.70	14.50	21.20	13.10	24.20	14.00	21.20
LTE FDD B25/2	15.20	24.70	14.20	21.20	11.50	24.20	14.00	21.20
LTE FDD B30	17.20	22.70	14.50	17.90	11.40	22.00	11.60	18.90
LTE FDD B7	14.70	24.70	13.40	19.90	11.50	24.20	11.80	20.90
LTE TDD B48	10.01	20.01	11.01	16.71	9.61	16.31	10.41	16.61
LTE TDD B48 ULCA	10.01	20.01	11.01	18.71	9.61	16.31	10.41	16.61
LTE TDD B41 PC3	14.11	22.71	15.51	17.91	11.81	22.21	10.61	18.91
LTE TDD B41 ULCA PC3	14.11	22.71	15.51	17.91	11.81	22.21	10.61	18.91
LTE TDD B41 PC2	14.11	23.06	15.51	18.26	11.81	22.56	10.61	19.26
LTE TDD B41 ULCA PC2	14.11	23.36	15.51	18.56	11.81	22.86	10.61	19.56
NR FDD n71	19.70	24.70	19.10	22.90	N/A	N/A	N/A	N/A
NR FDD n12	18.80	24.70	19.50	22.90	N/A	N/A	N/A	N/A
NR FDD n5	18.00	24.70	17.90	22.90	N/A	N/A	N/A	N/A
NR FDD n66	15.00	24.70	14.50	21.20	13.10	24.20	14.00	21.20
NR FDD n25/n2	15.20	24.70	14.20	21.20	11.50	24.20	14.00	21.20
NR TDD n41 PC3	14.10	21.20	13.00	24.70	11.80	21.20	10.60	24.20
NR TDD n41 PC2	14.10	19.49	13.00	22.99	11.80	19.49	10.60	22.49
NR TDD n77 PC3	10.00	24.70	9.10	20.70	8.50	24.70	8.80	21.70
NR TDD n77 PC2	10.00	22.99	9.10	18.99	8.50	22.99	8.80	19.99

Smart Transmit allows the device to transmit at higher power instantaneously, as high as P_{max}, when needed, but enforces power limiting to maintain time-averaged transmit power to P_{limit}. Below table shows P_{limit} EFS settings and maximum tune up output power P_{max} configured for this EUT for various transmit conditions (Device State Index DSI). Note that the device uncertainty for sub-6GHz WWAN is +1.0/-1.0 dB for this EUT.

*Maximum tune up output power Pmax is used to configure EUT during RF tune up procedure. The maximum allowed output power is equal to maximum Tune up output power + 1.0dB device design uncertainty.

*Note all P_{limit} EFS and maximum tune up output power P_{max} levels entered in above Table correspond to average power levels after accounting for duty cycle in the case of TDD modulation schemes (for e.g., GSM & LTE TDD).

The maximum time-averaged output power (dBm) for any 2G/3G/4G/5G WWAN technology, band, and DSI = minimum of "P_{limit} EFS" and "Maximum tune up output power P_{max}" +1.0/-1.0 dB device uncertainty. SAR values in

this report were scaled to this maximum time-averaged output power to determine compliance per KDB Publication 447498 D01v06.

The purpose of this report (Part 1 test) is to demonstrate that the EUT meets FCC SAR limits when transmitting in static transmission scenario at maximum allowable time-averaged power levels.

1.4 Power Reduction for SAR

This device additionally utilizes a power reduction mechanism for Bluetooth and WLAN operations. When WLAN/Bluetooth is operating simultaneously with certain combinations of 2G/3G/4G and 5 GHz WLAN antennas, the output power of is permanently reduced. SAR evaluations were additionally performed at the maximum allowed output power for these scenarios to evaluate simultaneous transmission compliance.

Additionally, this device uses an independent mechanism that limits WIFI powers to a time-averaged output power. For the purposes of this test report, all SAR measurements were performed with the algorithm disabled at the maximum time-averaged output power level. Appendix I includes verification data for this time-averaged SAR mechanism.

1.5 Nominal and Maximum Output Power Specifications

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

1.5.1 2G/3G/4G/5G Output Power for Portable Use Conditions

Table 1-1
GPRS/EDGE 850

Mode/Band	Antenna		Data- Burst Average GMSK (in dBm)		Data - Burst Average 8-PSK (in dBm)	
			1 TX Slots	2 TX Slots	1 TX Slots	2 TX Slots
GPRS/EDGE 850	Ant 1	Max allowed power	**28.50**	**25.50**	**25.00**	**24.00**
		Nominal	**27.50**	**24.50**	**24.00**	**23.00**
	Ant 3	Max allowed power	**27.70**	**24.70**	**26.50**	**24.70**
		Nominal	**26.70**	**23.70**	**25.50**	**23.70**

Table 1-2
GPRS/EDGE 1900

Mode/Band	Antenna		Data- Burst Average GMSK (in dBm)		Data - Burst Average 8-PSK (in dBm)	
			1 TX Slots	2 TX Slots	1 TX Slots	2 TX Slots
GPRS/EDGE 1900	Ant 1	Max allowed power	**23.90**	**20.90**	**22.00**	**20.90**
		Nominal	**22.90**	**19.90**	**21.00**	**19.90**
	Ant 2b	Max allowed power	**23.90**	**20.90**	**22.00**	**20.90**
		Nominal	**22.90**	**19.90**	**21.00**	**19.90**
	Ant 3	Max allowed power	**25.10**	**22.10**	**24.20**	**22.10**
		Nominal	**24.10**	**21.10**	**23.20**	**21.10**
	Ant 4b	Max allowed power	**22.00**	**19.00**	**21.80**	**19.00**
		Nominal	**21.00**	**18.00**	**20.80**	**18.00**

Table 1-3
UMTS B5 (850 MHz)

Mode/Band	Antenna		Modulated Average Output Power (in dBm)			
			3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6	3GPP DC-HSDPA Rel 8
UMTS Band 5 (850 MHz)	Ant 1	Max allowed power	**18.90**	**18.90**	**18.90**	**18.90**
		Nominal	**17.90**	**17.90**	**17.90**	**17.90**
	Ant 3	Max allowed power	**19.00**	**19.00**	**19.00**	**19.00**
		Nominal	**18.00**	**18.00**	**18.00**	**18.00**

Table 1-4
UMTS B4 (1750 MHz)

Mode/Band	Antenna		Modulated Average Output Power (in dBm)			
			3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6	3GPP DC-HSDPA Rel 8
UMTS Band 4 (1750 MHz)	Ant 1	Max allowed power	**15.50**	**15.50**	**15.50**	**15.50**
		Nominal	**14.50**	**14.50**	**14.50**	**14.50**
	Ant 2b	Max allowed power	**15.00**	**15.00**	**15.00**	**15.00**
		Nominal	**14.00**	**14.00**	**14.00**	**14.00**
	Ant 3	Max allowed power	**16.00**	**16.00**	**16.00**	**16.00**
		Nominal	**15.00**	**15.00**	**15.00**	**15.00**
	Ant 4b	Max allowed power	**14.10**	**14.10**	**14.10**	**14.10**
		Nominal	**13.10**	**13.10**	**13.10**	**13.10**

Table 1-5
UMTS B2 (1900 MHz)

Mode/Band	Antenna		Modulated Average Output Power (in dBm)			
			3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6	3GPP DC-HSDPA Rel 8
UMTS Band 2 (1900 MHz)	Ant 1	Max allowed power	**15.20**	**15.20**	**15.20**	**15.20**
		Nominal	**14.20**	**14.20**	**14.20**	**14.20**
	Ant 2b	Max allowed power	**15.00**	**15.00**	**15.00**	**15.00**
		Nominal	**14.00**	**14.00**	**14.00**	**14.00**
	Ant 3	Max allowed power	**16.20**	**16.20**	**16.20**	**16.20**
		Nominal	**15.20**	**15.20**	**15.20**	**15.20**
	Ant 4b	Max allowed power	**12.50**	**12.50**	**12.50**	**12.50**
		Nominal	**11.50**	**11.50**	**11.50**	**11.50**

Table 1-6
LTE Bands

Mode / Band		Modulated Average Output Power (in dBm)					
		Ant 1	Ant 2a	Ant 2b	Ant 3	Ant 4a	Ant 4b
LTE FDD Band 71	Max allowed power	20.10			20.70		
	Nominal	19.10			19.70		
LTE FDD Band 12	Max allowed power	20.50			19.80		
	Nominal	19.50			18.80		
LTE FDD Band 17	Max allowed power	20.50			19.80		
	Nominal	19.50			18.80		
LTE FDD Band 13	Max allowed power	20.50			19.90		
	Nominal	19.50			18.90		
LTE FDD Band 14	Max allowed power	20.50			19.90		
	Nominal	19.50			18.90		
LTE FDD Band 26	Max allowed power	18.90			19.00		
	Nominal	17.90			18.00		
LTE FDD Band 5	Max allowed power	18.90			19.00		
	Nominal	17.90			18.00		
LTE FDD Band 5 Intra-band ULCA	Max allowed power	18.90			19.00		
	Nominal	17.90			18.00		
LTE FDD Band 4	Max allowed power	15.50		15.00	16.00		14.10
	Nominal	14.50		14.00	15.00		13.10
LTE FDD Band 66	Max allowed power	15.50		15.00	16.00		14.10
	Nominal	14.50		14.00	15.00		13.10
LTE FDD Band 2	Max allowed power	15.20		15.00	16.20		12.50
	Nominal	14.20		14.00	15.20		11.50
LTE FDD Band 25	Max allowed power	15.20		15.00	16.20		12.50
	Nominal	14.20		14.00	15.20		11.50
LTE FDD Band 30	Max allowed power	15.50		12.60	18.20		12.40
	Nominal	14.50		11.60	17.20		11.40
LTE FDD Band 7	Max allowed power	14.40		12.80	15.70		12.50
	Nominal	13.40		11.80	14.70		11.50
LTE FDD Band 7 Intra-band ULCA	Max allowed power	14.40		12.80	15.70		12.50
	Nominal	13.40		11.80	14.70		11.50
LTE TDD Band 41 (PC3)	Max allowed power	18.50		13.60	17.10		14.80
	Nominal	17.50		12.60	16.10		13.80
LTE TDD Band 41 (PC3) Intra-band ULCA	Max allowed power	18.50		13.60	17.10		14.80
	Nominal	17.50		12.60	16.10		13.80
LTE TDD Band 41 (PC2)	Max allowed power	20.15		15.25	18.75		16.45
	Nominal	19.15		14.25	17.75		15.45
LTE TDD Band 41 (PC2) Intra-band ULCA	Max allowed power	20.15		15.25	18.75		16.45
	Nominal	19.15		14.25	17.75		15.45
LTE TDD Band 48	Max allowed power	14.00	13.40		13.00	12.60	
	Nominal	13.00	12.40		12.00	11.60	
LTE TDD Band 48 Intra-band ULCA	Max allowed power	14.00	13.40		13.00	12.60	
	Nominal	13.00	12.40		12.00	11.60	

Table 1-7
NR Bands

Mode / Band		Modulated Average Output Power (in dBm)					
		Ant 1	Ant 2a	Ant 2b	Ant 3	Ant 4a	Ant 4b
NR FDD Band n71	Max allowed power	20.10			20.70		
	Nominal	19.10			19.70		
NR FDD Band n12	Max allowed power	20.50			19.80		
	Nominal	19.50			18.80		
NR FDD Band n5	Max allowed power	18.90			19.00		
	Nominal	17.90			18.00		
NR FDD Band n66	Max allowed power	15.50		15.00	16.00		14.10
	Nominal	14.50		14.00	15.00		13.10
NR FDD Band n2	Max allowed power	15.20		15.00	16.20		12.50
	Nominal	14.20		14.00	15.20		11.50
NR FDD Band n25	Max allowed power	15.20		15.00	16.20		12.50
	Nominal	14.20		14.00	15.20		11.50
NR TDD Band n41 (PC3)	Max allowed power	14.00		11.60	15.10		12.80
	Nominal	13.00		10.60	14.10		11.80
NR TDD Band n41 (PC2)	Max allowed power	17.00		14.60	18.10		15.80
	Nominal	16.00		13.60	17.10		14.80
NR TDD Band n77 (PC3)	Max allowed power	10.10	9.80		11.00	9.50	
	Nominal	9.10	8.80		10.00	8.50	
NR TDD Band n77 (PC2)	Max allowed power	13.10	12.80		14.00	12.50	
	Nominal	12.10	11.80		13.00	11.50	

1.5.2 Maximum WLAN Time-Averaged Output Power

Note: Targets for 802.11ax RU operations can be found in Appendix G.

Mode/ Band			IEEE 802.11b (2.4 GHz)		IEEE 802.11g (2.4 GHz)		IEEE 802.11n (2.4 GHz)		IEEE 802.11ax SU (2.4 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 4a	20 MHz Bandwidth	1	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		2	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		3	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		4	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		5	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		6	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		7	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		8	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		9	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		10	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		11	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		12	12.00	10.50	12.00	10.50	12.00	10.50	11.50	10.00
		13	12.00	10.50	9.50	8.00	9.50	8.00	N/A	N/A

Mode/ Band			IEEE 802.11g (2.4 GHz)		IEEE 802.11n (2.4 GHz)		IEEE 802.11ax SU (2.4 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 4a	20 MHz Bandwidth	1	12.00	10.50	12.00	10.50	12.00	10.50
		2	12.00	10.50	12.00	10.50	12.00	10.50
		3	12.00	10.50	12.00	10.50	12.00	10.50
		4	12.00	10.50	12.00	10.50	12.00	10.50
		5	12.00	10.50	12.00	10.50	12.00	10.50
		6	12.00	10.50	12.00	10.50	12.00	10.50
		7	12.00	10.50	12.00	10.50	12.00	10.50
		8	12.00	10.50	12.00	10.50	12.00	10.50
		9	12.00	10.50	12.00	10.50	12.00	10.50
		10	12.00	10.50	12.00	10.50	12.00	10.50
		11	12.00	10.50	12.00	10.50	12.00	10.50
		12	11.75	10.25	11.75	10.25	11.25	9.75
		13	9.00	7.50	9.00	7.50	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Mode/ Band			IEEE 802.11b (2.4 GHz)		IEEE 802.11g (2.4 GHz)		IEEE 802.11n (2.4 GHz)		IEEE 802.11ax SU (2.4 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 2a	20 MHz Bandwidth	1	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		2	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		3	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		4	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		5	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		6	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		7	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		8	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		9	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		10	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		11	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		12	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		13	11.50	10.00	9.50	8.00	9.50	8.00	N/A	N/A

Mode/ Band			IEEE 802.11g (2.4 GHz)		IEEE 802.11n (2.4 GHz)		IEEE 802.11ax SU (2.4 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 2a	20 MHz Bandwidth	1	11.50	10.00	11.50	10.00	11.50	10.00
		2	11.50	10.00	11.50	10.00	11.50	10.00
		3	11.50	10.00	11.50	10.00	11.50	10.00
		4	11.50	10.00	11.50	10.00	11.50	10.00
		5	11.50	10.00	11.50	10.00	11.50	10.00
		6	11.50	10.00	11.50	10.00	11.50	10.00
		7	11.50	10.00	11.50	10.00	11.50	10.00
		8	11.50	10.00	11.50	10.00	11.50	10.00
		9	11.50	10.00	11.50	10.00	11.50	10.00
		10	11.50	10.00	11.50	10.00	11.50	10.00
		11	11.50	10.00	11.50	10.00	11.50	10.00
		12	11.50	10.00	11.50	10.00	11.25	9.75
		13	9.00	7.50	9.00	7.50	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Mode/ Band			IEEE 802.11a (5 GHz)		IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Ant 5b	20 MHz Bandwidth	36	16.00	14.50	16.00	14.50	16.00	14.50	16.00	14.50
		40	16.00	14.50	16.00	14.50	16.00	14.50	16.00	14.50
		44	16.00	14.50	16.00	14.50	16.00	14.50	16.00	14.50
		48	16.00	14.50	16.00	14.50	16.00	14.50	16.00	14.50
		52	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		56	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		60	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		64	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		100	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		104	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		108	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		112	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		116	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		120	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		124	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		128	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		132	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		136	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		140	16.50	15.00	16.50	15.00	16.50	15.00	15.00	13.50
		144	17.00	15.50	17.00	15.50	17.00	15.50	17.00	15.50
		149	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
		153	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
		157	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
		161	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
		165	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
	40 MHz Bandwidth	38			14.50	13.00	14.50	13.00	14.00	12.50
		46			16.00	14.50	16.00	14.50	16.00	14.50
		54			17.00	15.50	17.00	15.50	17.00	15.50
		62			16.00	14.50	16.00	14.50	15.00	13.50
		102			15.50	14.00	15.50	14.00	14.50	13.00
		110			17.00	15.50	17.00	15.50	17.00	15.50
		118			17.00	15.50	17.00	15.50	17.00	15.50
		126			17.00	15.50	17.00	15.50	17.00	15.50
		134			17.00	15.50	17.00	15.50	17.00	15.50
		142			17.00	15.50	17.00	15.50	17.00	15.50
		151			17.75	16.25	17.75	16.25	17.75	16.25
		159			17.75	16.25	17.75	16.25	17.75	16.25
	80 MHz Bandwidth	42					14.00	12.50	13.00	11.50
		58					16.00	14.50	15.00	13.50
		106					16.50	15.00	15.00	13.50
		122					17.00	15.50	17.00	15.50
		138					17.00	15.50	17.00	15.50
		155					17.75	16.25	17.50	16.00

Mode/ Band			IEEE 802.11a (5 GHz)		IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) CDD - Ant 5b	20 MHz Bandwidth	36	15.25	13.75	15.25	13.75	15.25	13.75	15.25	13.75
		40	15.25	13.75	15.25	13.75	15.25	13.75	15.25	13.75
		44	15.25	13.75	15.25	13.75	15.25	13.75	15.25	13.75
		48	15.25	13.75	15.25	13.75	15.25	13.75	15.25	13.75
		52	16.00	14.50	16.00	14.50	16.00	14.50	16.00	14.50
		56	16.00	14.50	16.00	14.50	16.00	14.50	16.00	14.50
		60	16.00	14.50	16.00	14.50	16.00	14.50	16.00	14.50
		64	16.00	14.50	16.00	14.50	16.00	14.50	16.00	14.50
		100	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		104	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		108	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		112	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		116	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		120	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		124	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		128	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		132	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		136	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		140	15.75	14.25	15.75	14.25	15.75	14.25	14.00	12.50
		144	15.75	14.25	15.75	14.25	15.75	14.25	15.75	14.25
		149	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
		153	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
		157	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
		161	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
		165	17.75	16.25	17.75	16.25	17.75	16.25	17.75	16.25
	40 MHz Bandwidth	38			14.00	12.50	14.00	12.50	13.50	12.00
		46			16.00	14.50	16.00	14.50	16.00	14.50
		54			17.00	15.50	17.00	15.50	17.00	15.50
		62			15.50	14.00	15.50	14.00	14.50	13.00
		102			15.00	13.50	15.00	13.50	13.50	12.00
		110			17.00	15.50	17.00	15.50	17.00	15.50
		118			17.00	15.50	17.00	15.50	17.00	15.50
		126			17.00	15.50	17.00	15.50	17.00	15.50
		134			17.00	15.50	17.00	15.50	16.50	15.00
		142			17.00	15.50	17.00	15.50	17.00	15.50
		151			17.75	16.25	17.75	16.25	17.75	16.25
		159			17.75	16.25	17.75	16.25	17.75	16.25
	80 MHz Bandwidth	42					13.00	11.50	12.50	11.00
		58					14.50	13.00	14.50	13.00
		106					14.50	13.00	14.00	12.50
		122					17.00	15.50	17.00	15.50
		138					17.00	15.50	17.00	15.50
		155					17.75	16.25	17.00	15.50

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Mode/ Band			IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - Ant 5b	20 MHz Bandwidth	36	16.00	14.50	16.00	14.50	16.00	14.50
		40	16.00	14.50	16.00	14.50	16.00	14.50
		44	16.00	14.50	16.00	14.50	16.00	14.50
		48	16.00	14.50	16.00	14.50	16.00	14.50
		52	17.00	15.50	17.00	15.50	17.00	15.50
		56	17.00	15.50	17.00	15.50	17.00	15.50
		60	17.00	15.50	17.00	15.50	17.00	15.50
		64	17.00	15.50	17.00	15.50	17.00	15.50
		100	16.50	15.00	16.50	15.00	17.00	15.50
		104	17.00	15.50	17.00	15.50	17.00	15.50
		108	17.00	15.50	17.00	15.50	17.00	15.50
		112	17.00	15.50	17.00	15.50	17.00	15.50
		116	17.00	15.50	17.00	15.50	17.00	15.50
		120	17.00	15.50	17.00	15.50	17.00	15.50
		124	17.00	15.50	17.00	15.50	17.00	15.50
		128	17.00	15.50	17.00	15.50	17.00	15.50
		132	17.00	15.50	17.00	15.50	17.00	15.50
		136	17.00	15.50	17.00	15.50	17.00	15.50
		140	16.00	14.50	16.00	14.50	14.00	12.50
		144	17.00	15.50	17.00	15.50	17.00	15.50
		149	17.75	16.25	17.75	16.25	17.75	16.25
		153	17.75	16.25	17.75	16.25	17.75	16.25
		157	17.75	16.25	17.75	16.25	17.75	16.25
		161	17.75	16.25	17.75	16.25	17.75	16.25
		165	17.75	16.25	17.75	16.25	17.75	16.25
	40 MHz Bandwidth	38	14.00	12.50	14.00	12.50	13.50	12.00
		46	16.00	14.50	16.00	14.50	16.00	14.50
		54	17.00	15.50	17.00	15.50	17.00	15.50
		62	15.50	14.00	15.50	14.00	14.50	13.00
		102	15.00	13.50	15.00	13.50	13.50	12.00
		110	17.00	15.50	17.00	15.50	17.00	15.50
		118	17.00	15.50	17.00	15.50	17.00	15.50
		126	17.00	15.50	17.00	15.50	17.00	15.50
		134	17.00	15.50	17.00	15.50	16.50	15.00
		142	17.00	15.50	17.00	15.50	17.00	15.50
		151	17.75	16.25	17.75	16.25	17.75	16.25
		159	17.75	16.25	17.75	16.25	17.75	16.25
	80 MHz Bandwidth	42	[redacted]		13.00	11.50	12.50	11.00
		58			14.50	13.00	14.50	13.00
		106			14.50	13.00	14.00	12.50
		122			17.00	15.50	17.00	15.50
		138			17.00	15.50	17.00	15.50
		155			17.75	16.25	17.00	15.50

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Mode/ Band			IEEE 802.11a (5 GHz)		IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Ant 4b	20 MHz Bandwidth	36	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		40	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		44	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		48	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		52	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		56	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		60	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		64	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		100	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		104	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		108	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		112	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		116	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		120	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		124	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		128	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		132	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		136	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		140	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		144	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		149	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		153	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		157	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		161	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		165	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
	40 MHz Bandwidth	38			10.50	9.00	10.50	9.00	10.50	9.00
		46			10.50	9.00	10.50	9.00	10.50	9.00
		54			10.50	9.00	10.50	9.00	10.50	9.00
		62			10.50	9.00	10.50	9.00	10.50	9.00
		102			9.00	7.50	9.00	7.50	9.00	7.50
		110			9.00	7.50	9.00	7.50	9.00	7.50
		118			9.00	7.50	9.00	7.50	9.00	7.50
		126			9.00	7.50	9.00	7.50	9.00	7.50
		134			9.00	7.50	9.00	7.50	9.00	7.50
		142			9.00	7.50	9.00	7.50	9.00	7.50
		151			11.50	10.00	11.50	10.00	11.50	10.00
		159			11.50	10.00	11.50	10.00	11.50	10.00
	80 MHz Bandwidth	42					10.50	9.00	10.50	9.00
		58					10.50	9.00	10.50	9.00
		106					9.00	7.50	9.00	7.50
		122					9.00	7.50	9.00	7.50
		138					9.00	7.50	9.00	7.50
		155					11.50	10.00	11.50	10.00

Mode/ Band			IEEE 802.11a (5 GHz)		IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) CDD - Ant 4b	20 MHz Bandwidth	36	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		40	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		44	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		48	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		52	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		56	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		60	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		64	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		100	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		104	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		108	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		112	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		116	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		120	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		124	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		128	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		132	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		136	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		140	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		144	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		149	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		153	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		157	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		161	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
		165	11.50	10.00	11.50	10.00	11.50	10.00	11.50	10.00
	40 MHz Bandwidth	38			10.50	9.00	10.50	9.00	10.50	9.00
		46			10.50	9.00	10.50	9.00	10.50	9.00
		54			10.50	9.00	10.50	9.00	10.50	9.00
		62			10.50	9.00	10.50	9.00	10.50	9.00
		102			9.00	7.50	9.00	7.50	9.00	7.50
		110			9.00	7.50	9.00	7.50	9.00	7.50
		118			9.00	7.50	9.00	7.50	9.00	7.50
		126			9.00	7.50	9.00	7.50	9.00	7.50
		134			9.00	7.50	9.00	7.50	9.00	7.50
		142			9.00	7.50	9.00	7.50	9.00	7.50
		151			11.50	10.00	11.50	10.00	11.50	10.00
		159			11.50	10.00	11.50	10.00	11.50	10.00
	80 MHz Bandwidth	42					10.50	9.00	10.50	9.00
		58					10.50	9.00	10.50	9.00
		106					9.00	7.50	9.00	7.50
		122					9.00	7.50	9.00	7.50
		138					9.00	7.50	9.00	7.50
		155					11.50	10.00	11.50	10.00

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Mode/ Band			IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - Ant 4b	20 MHz Bandwidth	36	10.50	9.00	10.50	9.00	10.50	9.00
		40	10.50	9.00	10.50	9.00	10.50	9.00
		44	10.50	9.00	10.50	9.00	10.50	9.00
		48	10.50	9.00	10.50	9.00	10.50	9.00
		52	10.50	9.00	10.50	9.00	10.50	9.00
		56	10.50	9.00	10.50	9.00	10.50	9.00
		60	10.50	9.00	10.50	9.00	10.50	9.00
		64	10.50	9.00	10.50	9.00	10.50	9.00
		100	9.00	7.50	9.00	7.50	9.00	7.50
		104	9.00	7.50	9.00	7.50	9.00	7.50
		108	9.00	7.50	9.00	7.50	9.00	7.50
		112	9.00	7.50	9.00	7.50	9.00	7.50
		116	9.00	7.50	9.00	7.50	9.00	7.50
		120	9.00	7.50	9.00	7.50	9.00	7.50
		124	9.00	7.50	9.00	7.50	9.00	7.50
		128	9.00	7.50	9.00	7.50	9.00	7.50
		132	9.00	7.50	9.00	7.50	9.00	7.50
		136	9.00	7.50	9.00	7.50	9.00	7.50
		140	9.00	7.50	9.00	7.50	9.00	7.50
		144	9.00	7.50	9.00	7.50	9.00	7.50
		149	11.50	10.00	11.50	10.00	11.50	10.00
		153	11.50	10.00	11.50	10.00	11.50	10.00
		157	11.50	10.00	11.50	10.00	11.50	10.00
		161	11.50	10.00	11.50	10.00	11.50	10.00
		165	11.50	10.00	11.50	10.00	11.50	10.00
	40 MHz Bandwidth	38	10.50	9.00	10.50	9.00	10.50	9.00
		46	10.50	9.00	10.50	9.00	10.50	9.00
		54	10.50	9.00	10.50	9.00	10.50	9.00
		62	10.50	9.00	10.50	9.00	10.50	9.00
		102	9.00	7.50	9.00	7.50	9.00	7.50
		110	9.00	7.50	9.00	7.50	9.00	7.50
		118	9.00	7.50	9.00	7.50	9.00	7.50
		126	9.00	7.50	9.00	7.50	9.00	7.50
		134	9.00	7.50	9.00	7.50	9.00	7.50
		142	9.00	7.50	9.00	7.50	9.00	7.50
		151	11.50	10.00	11.50	10.00	11.50	10.00
		159	11.50	10.00	11.50	10.00	11.50	10.00
	80 MHz Bandwidth	42	[redacted]		10.50	9.00	10.50	9.00
		58			10.50	9.00	10.50	9.00
		106			9.00	7.50	9.00	7.50
		122			9.00	7.50	9.00	7.50
		138			9.00	7.50	9.00	7.50
		155			11.50	10.00	11.50	10.00

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

1.5.1 Reduced WLAN Time-Averaged Output Power

Note: Targets for 802.11ax RU operations can be found in Appendix H.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11b (2.4 GHz)		IEEE 802.11g (2.4 GHz)		IEEE 802.11n (2.4 GHz)		IEEE 802.11ax SU (2.4 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 4a	20 MHz Bandwidth	1	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		2	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		3	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		4	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		5	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		6	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		7	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		8	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		9	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		10	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		11	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		12	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		13	9.00	7.50	9.00	7.50	9.00	7.50	N/A	N/A

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11g (2.4 GHz)		IEEE 802.11n (2.4 GHz)		IEEE 802.11ax SU (2.4 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 4a	20 MHz Bandwidth	1	9.00	7.50	9.00	7.50	9.00	7.50
		2	9.00	7.50	9.00	7.50	9.00	7.50
		3	9.00	7.50	9.00	7.50	9.00	7.50
		4	9.00	7.50	9.00	7.50	9.00	7.50
		5	9.00	7.50	9.00	7.50	9.00	7.50
		6	9.00	7.50	9.00	7.50	9.00	7.50
		7	9.00	7.50	9.00	7.50	9.00	7.50
		8	9.00	7.50	9.00	7.50	9.00	7.50
		9	9.00	7.50	9.00	7.50	9.00	7.50
		10	9.00	7.50	9.00	7.50	9.00	7.50
		11	9.00	7.50	9.00	7.50	9.00	7.50
		12	9.00	7.50	9.00	7.50	9.00	7.50
		13	9.00	7.50	9.00	7.50	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 2a/2b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11b (2.4 GHz)		IEEE 802.11g (2.4 GHz)		IEEE 802.11n (2.4 GHz)		IEEE 802.11ax SU (2.4 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 2a	20 MHz Bandwidth	1	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		2	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		3	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		4	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		5	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		6	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		7	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		8	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		9	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		10	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		11	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		12	8.50	7.00	8.50	7.00	8.50	7.00	8.50	7.00
		13	8.50	7.00	8.50	7.00	8.50	7.00	N/A	N/A

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 2a/2b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11g (2.4 GHz)		IEEE 802.11n (2.4 GHz)		IEEE 802.11ax SU (2.4 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 2a	20 MHz Bandwidth	1	8.50	7.00	8.50	7.00	8.50	7.00
		2	8.50	7.00	8.50	7.00	8.50	7.00
		3	8.50	7.00	8.50	7.00	8.50	7.00
		4	8.50	7.00	8.50	7.00	8.50	7.00
		5	8.50	7.00	8.50	7.00	8.50	7.00
		6	8.50	7.00	8.50	7.00	8.50	7.00
		7	8.50	7.00	8.50	7.00	8.50	7.00
		8	8.50	7.00	8.50	7.00	8.50	7.00
		9	8.50	7.00	8.50	7.00	8.50	7.00
		10	8.50	7.00	8.50	7.00	8.50	7.00
		11	8.50	7.00	8.50	7.00	8.50	7.00
		12	8.50	7.00	8.50	7.00	8.50	7.00
		13	8.50	7.00	8.50	7.00	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 2a/2b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11a (5 GHz)		IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Ant 5b	20 MHz Bandwidth	36	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		40	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		44	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		48	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		52	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		56	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		60	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		64	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		100	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		104	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		108	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		112	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		116	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		120	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		124	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		128	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		132	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		136	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		140	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		144	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		149	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		153	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		157	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		161	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		165	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
	40 MHz Bandwidth	38	[redacted]		12.00	10.50	12.00	10.50	12.00	10.50
		46			12.00	10.50	12.00	10.50	12.00	10.50
		54			13.00	11.50	13.00	11.50	13.00	11.50
		62			13.00	11.50	13.00	11.50	13.00	11.50
		102			13.00	11.50	13.00	11.50	13.00	11.50
		110			13.00	11.50	13.00	11.50	13.00	11.50
		118			13.00	11.50	13.00	11.50	13.00	11.50
		126			13.00	11.50	13.00	11.50	13.00	11.50
		134			13.00	11.50	13.00	11.50	13.00	11.50
		142			13.00	11.50	13.00	11.50	13.00	11.50
		151			13.75	12.25	13.75	12.25	13.75	12.25
		159			13.75	12.25	13.75	12.25	13.75	12.25
	80 MHz Bandwidth	42	[redacted]				12.00	10.50	12.00	10.50
		58					13.00	11.50	13.00	11.50
		106					13.00	11.50	13.00	11.50
		122					13.00	11.50	13.00	11.50
		138					13.00	11.50	13.00	11.50
		155					13.75	12.25	13.75	12.25

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 2a/2b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11a (5 GHz)		IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) CDD - Ant 5b	20 MHz Bandwidth	36	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		40	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		44	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		48	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		52	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		56	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		60	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		64	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		100	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		104	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		108	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		112	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		116	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		120	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		124	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		128	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		132	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		136	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		140	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		144	13.00	11.50	13.00	11.50	13.00	11.50	13.00	11.50
		149	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		153	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		157	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		161	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
		165	13.75	12.25	13.75	12.25	13.75	12.25	13.75	12.25
	40 MHz Bandwidth	38	[redacted]		12.00	10.50	12.00	10.50	12.00	10.50
		46			12.00	10.50	12.00	10.50	12.00	10.50
		54			13.00	11.50	13.00	11.50	13.00	11.50
		62			13.00	11.50	13.00	11.50	13.00	11.50
		102			13.00	11.50	13.00	11.50	13.00	11.50
		110			13.00	11.50	13.00	11.50	13.00	11.50
		118			13.00	11.50	13.00	11.50	13.00	11.50
		126			13.00	11.50	13.00	11.50	13.00	11.50
		134			13.00	11.50	13.00	11.50	13.00	11.50
		142			13.00	11.50	13.00	11.50	13.00	11.50
		151			13.75	12.25	13.75	12.25	13.75	12.25
		159			13.75	12.25	13.75	12.25	13.75	12.25
	80 MHz Bandwidth	42	[redacted]				12.00	10.50	12.00	10.50
		58					13.00	11.50	13.00	11.50
		106					13.00	11.50	13.00	11.50
		122					13.00	11.50	13.00	11.50
		138					13.00	11.50	13.00	11.50
		155					13.75	12.25	13.75	12.25

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 2a/2b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - Ant 5b	20 MHz Bandwidth	36	12.00	10.50	12.00	10.50	12.00	10.50
		40	12.00	10.50	12.00	10.50	12.00	10.50
		44	12.00	10.50	12.00	10.50	12.00	10.50
		48	12.00	10.50	12.00	10.50	12.00	10.50
		52	13.00	11.50	13.00	11.50	13.00	11.50
		56	13.00	11.50	13.00	11.50	13.00	11.50
		60	13.00	11.50	13.00	11.50	13.00	11.50
		64	13.00	11.50	13.00	11.50	13.00	11.50
		100	13.00	11.50	13.00	11.50	13.00	11.50
		104	13.00	11.50	13.00	11.50	13.00	11.50
		108	13.00	11.50	13.00	11.50	13.00	11.50
		112	13.00	11.50	13.00	11.50	13.00	11.50
		116	13.00	11.50	13.00	11.50	13.00	11.50
		120	13.00	11.50	13.00	11.50	13.00	11.50
		124	13.00	11.50	13.00	11.50	13.00	11.50
		128	13.00	11.50	13.00	11.50	13.00	11.50
		132	13.00	11.50	13.00	11.50	13.00	11.50
		136	13.00	11.50	13.00	11.50	13.00	11.50
		140	13.00	11.50	13.00	11.50	13.00	11.50
		144	13.00	11.50	13.00	11.50	13.00	11.50
		149	13.75	12.25	13.75	12.25	13.75	12.25
		153	13.75	12.25	13.75	12.25	13.75	12.25
		157	13.75	12.25	13.75	12.25	13.75	12.25
		161	13.75	12.25	13.75	12.25	13.75	12.25
		165	13.75	12.25	13.75	12.25	13.75	12.25
	40 MHz Bandwidth	38	12.00	10.50	12.00	10.50	12.00	10.50
		46	12.00	10.50	12.00	10.50	12.00	10.50
		54	13.00	11.50	13.00	11.50	13.00	11.50
		62	13.00	11.50	13.00	11.50	13.00	11.50
		102	13.00	11.50	13.00	11.50	13.00	11.50
		110	13.00	11.50	13.00	11.50	13.00	11.50
		118	13.00	11.50	13.00	11.50	13.00	11.50
		126	13.00	11.50	13.00	11.50	13.00	11.50
		134	13.00	11.50	13.00	11.50	13.00	11.50
		142	13.00	11.50	13.00	11.50	13.00	11.50
		151	13.75	12.25	13.75	12.25	13.75	12.25
		159	13.75	12.25	13.75	12.25	13.75	12.25
	80 MHz Bandwidth	42	[redacted]		12.00	10.50	12.00	10.50
		58			13.00	11.50	13.00	11.50
		106			13.00	11.50	13.00	11.50
		122			13.00	11.50	13.00	11.50
		138			13.00	11.50	13.00	11.50
		155			13.75	12.25	13.75	12.25

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11a (5 GHz)		IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Ant 4b	20 MHz Bandwidth	36	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		40	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		44	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		48	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		52	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		56	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		60	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		64	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		100	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		104	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		108	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		112	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		116	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		120	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		124	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		128	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		132	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		136	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		140	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		144	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		149	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
		153	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
		157	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
		161	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
		165	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
	40 MHz Bandwidth	38	[redacted]		4.50	3.00	4.50	3.00	4.50	3.00
		46			4.50	3.00	4.50	3.00	4.50	3.00
		54			4.50	3.00	4.50	3.00	4.50	3.00
		62			4.50	3.00	4.50	3.00	4.50	3.00
		102			3.00	1.50	3.00	1.50	3.00	1.50
		110			3.00	1.50	3.00	1.50	3.00	1.50
		118			3.00	1.50	3.00	1.50	3.00	1.50
		126			3.00	1.50	3.00	1.50	3.00	1.50
		134			3.00	1.50	3.00	1.50	3.00	1.50
		142			3.00	1.50	3.00	1.50	3.00	1.50
		151			5.50	4.00	5.50	4.00	5.50	4.00
		159			5.50	4.00	5.50	4.00	5.50	4.00
	80 MHz Bandwidth	42					4.50	3.00	4.50	3.00
		58					4.50	3.00	4.50	3.00
		106					3.00	1.50	3.00	1.50
		122					3.00	1.50	3.00	1.50
		138					3.00	1.50	3.00	1.50
		155					5.50	4.00	5.50	4.00

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11a (5 GHz)		IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) CDD - Ant 4b	20 MHz Bandwidth	36	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		40	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		44	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		48	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		52	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		56	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		60	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		64	4.50	3.00	4.50	3.00	4.50	3.00	4.50	3.00
		100	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		104	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		108	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		112	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		116	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		120	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		124	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		128	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		132	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		136	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		140	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		144	3.00	1.50	3.00	1.50	3.00	1.50	3.00	1.50
		149	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
		153	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
		157	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
		161	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
		165	5.50	4.00	5.50	4.00	5.50	4.00	5.50	4.00
	40 MHz Bandwidth	38			4.50	3.00	4.50	3.00	4.50	3.00
		46			4.50	3.00	4.50	3.00	4.50	3.00
		54			4.50	3.00	4.50	3.00	4.50	3.00
		62			4.50	3.00	4.50	3.00	4.50	3.00
		102			3.00	1.50	3.00	1.50	3.00	1.50
		110			3.00	1.50	3.00	1.50	3.00	1.50
		118			3.00	1.50	3.00	1.50	3.00	1.50
		126			3.00	1.50	3.00	1.50	3.00	1.50
		134			3.00	1.50	3.00	1.50	3.00	1.50
		142			3.00	1.50	3.00	1.50	3.00	1.50
		151			5.50	4.00	5.50	4.00	5.50	4.00
		159			5.50	4.00	5.50	4.00	5.50	4.00
	80 MHz Bandwidth	42					4.50	3.00	4.50	3.00
		58					4.50	3.00	4.50	3.00
		106					3.00	1.50	3.00	1.50
		122					3.00	1.50	3.00	1.50
		138					3.00	1.50	3.00	1.50
		155					5.50	4.00	5.50	4.00

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band			IEEE 802.11n (5 GHz)		IEEE 802.11ac (5 GHz)		IEEE 802.11ax SU (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) SDM - Ant 4b	20 MHz Bandwidth	36	4.50	3.00	4.50	3.00	4.50	3.00
		40	4.50	3.00	4.50	3.00	4.50	3.00
		44	4.50	3.00	4.50	3.00	4.50	3.00
		48	4.50	3.00	4.50	3.00	4.50	3.00
		52	4.50	3.00	4.50	3.00	4.50	3.00
		56	4.50	3.00	4.50	3.00	4.50	3.00
		60	4.50	3.00	4.50	3.00	4.50	3.00
		64	4.50	3.00	4.50	3.00	4.50	3.00
		100	3.00	1.50	3.00	1.50	3.00	1.50
		104	3.00	1.50	3.00	1.50	3.00	1.50
		108	3.00	1.50	3.00	1.50	3.00	1.50
		112	3.00	1.50	3.00	1.50	3.00	1.50
		116	3.00	1.50	3.00	1.50	3.00	1.50
		120	3.00	1.50	3.00	1.50	3.00	1.50
		124	3.00	1.50	3.00	1.50	3.00	1.50
		128	3.00	1.50	3.00	1.50	3.00	1.50
		132	3.00	1.50	3.00	1.50	3.00	1.50
		136	3.00	1.50	3.00	1.50	3.00	1.50
		140	3.00	1.50	3.00	1.50	3.00	1.50
		144	3.00	1.50	3.00	1.50	3.00	1.50
		149	5.50	4.00	5.50	4.00	5.50	4.00
		153	5.50	4.00	5.50	4.00	5.50	4.00
		157	5.50	4.00	5.50	4.00	5.50	4.00
		161	5.50	4.00	5.50	4.00	5.50	4.00
		165	5.50	4.00	5.50	4.00	5.50	4.00
	40 MHz Bandwidth	38	4.50	3.00	4.50	3.00	4.50	3.00
		46	4.50	3.00	4.50	3.00	4.50	3.00
		54	4.50	3.00	4.50	3.00	4.50	3.00
		62	4.50	3.00	4.50	3.00	4.50	3.00
		102	3.00	1.50	3.00	1.50	3.00	1.50
		110	3.00	1.50	3.00	1.50	3.00	1.50
		118	3.00	1.50	3.00	1.50	3.00	1.50
		126	3.00	1.50	3.00	1.50	3.00	1.50
		134	3.00	1.50	3.00	1.50	3.00	1.50
		142	3.00	1.50	3.00	1.50	3.00	1.50
		151	5.50	4.00	5.50	4.00	5.50	4.00
		159	5.50	4.00	5.50	4.00	5.50	4.00
	80 MHz Bandwidth	42	[redacted]		4.50	3.00	4.50	3.00
		58			4.50	3.00	4.50	3.00
		106			3.00	1.50	3.00	1.50
		122			3.00	1.50	3.00	1.50
		138			3.00	1.50	3.00	1.50
		155			5.50	4.00	5.50	4.00

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

1.5.2 Bluetooth Maximum and Reduced Output Power

Mode / Band		Modulated Average - Single Tx Chain (dBm) - Ant 4a
Bluetooth BDR/LE	Maximum	**12.75**
	Nominal	**11.25**
Bluetooth EDR	Maximum	**12.75**
	Nominal	**11.25**
Bluetooth HDR	Maximum	**10.00**
	Nominal	**8.50**
Mode / Band		Modulated Average - TXBF (dBm) - Ant 4a
Bluetooth BDR	Maximum	**12.75**
	Nominal	**11.25**
Bluetooth EDR	Maximum	**12.00**
	Nominal	**10.50**
Bluetooth HDR	Maximum	**10.00**
	Nominal	**8.50**
Bluetooth LE	Maximum	**5.50**
	Nominal	**4.00**

Note: In TxBF operations, each antenna transmits at maximum allowed powers as indicated above.

Mode / Band		Modulated Average - Single Tx Chain (dBm) - Ant 2a
Bluetooth BDR/LE	Maximum	**14.00**
	Nominal	**12.50**
Bluetooth EDR	Maximum	**13.00**
	Nominal	**11.50**
Bluetooth HDR	Maximum	**10.00**
	Nominal	**8.50**
Mode / Band		Modulated Average - TXBF (dBm) - Ant 2a
Bluetooth BDR	Maximum	**14.00**
	Nominal	**12.50**
Bluetooth EDR	Maximum	**12.00**
	Nominal	**10.50**
Bluetooth HDR	Maximum	**10.00**
	Nominal	**8.50**
Bluetooth LE	Maximum	**5.50**
	Nominal	**4.00**

Note: In TxBF operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 1 and 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with Licensed Bands Antenna 2a/2b and 5GHz WLAN Antenna 4b/5b active

Mode / Band		Modulated Average - Single Tx Chain (dBm) - Ant 4a
Bluetooth BDR/LE Reduced	Maximum	**10.75**
	Nominal	**9.25**
Bluetooth EDR Reduced	Maximum	**10.75**
	Nominal	**9.25**
Bluetooth HDR Reduced	Maximum	**10.00**
	Nominal	**8.50**

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 1 and 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with Licensed Bands Antenna 2a/2b and 5GHz WLAN Antenna 4b/5b active

Mode / Band		Modulated Average - TXBF (dBm) - Ant 4a
Bluetooth BDR Reduced	Maximum	**10.75**
	Nominal	**9.25**
Bluetooth EDR Reduced	Maximum	**10.75**
	Nominal	**9.25**
Bluetooth HDR Reduced	Maximum	**10.00**
	Nominal	**8.50**
Bluetooth LE Reduced	Maximum	**5.50**
	Nominal	**4.00**

Note: In TxBF operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with Licensed Bands Antenna 3 active
-Simultaneous conditions with 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with Inter-band ULCA active

Mode / Band		Modulated Average - Single Tx Chain (dBm) - Ant 4a
Bluetooth BDR/LE Reduced	Maximum	**9.75**
	Nominal	**8.25**
Bluetooth EDR Reduced	Maximum	**9.75**
	Nominal	**8.25**
Bluetooth HDR Reduced	Maximum	**9.75**
	Nominal	**8.25**

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with Licensed Bands Antenna 3 active
-Simultaneous conditions with 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with Inter-band ULCA active

Mode / Band		Modulated Average - TXBF (dBm) - Ant 4a
Bluetooth BDR Reduced	Maximum	**9.75**
	Nominal	**8.25**
Bluetooth EDR Reduced	Maximum	**9.75**
	Nominal	**8.25**
Bluetooth HDR Reduced	Maximum	**9.75**
	Nominal	**8.25**
Bluetooth LE Reduced	Maximum	**5.50**
	Nominal	**4.00**

Note: In TxBF operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 3 active and 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with Licensed Bands Antenna 4a/4b and 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with Inter-band ULCA and 5GHz WLAN Antenna 4b/5b active

Mode / Band		Modulated Average - Single Tx Chain (dBm) - Ant 4a
Bluetooth BDR/LE Reduced	Maximum	**5.75**
	Nominal	**4.25**
Bluetooth EDR Reduced	Maximum	**5.75**
	Nominal	**4.25**
Bluetooth HDR Reduced	Maximum	**5.75**
	Nominal	**4.25**

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 3 active and 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with Licensed Bands Antenna 4a/4b and 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with Inter-band ULCA and 5GHz WLAN Antenna 4b/5b active

Mode / Band		Modulated Average - TXBF (dBm) - Ant 4a
Bluetooth BDR Reduced	Maximum	**5.75**
	Nominal	**4.25**
Bluetooth EDR Reduced	Maximum	**5.75**
	Nominal	**4.25**
Bluetooth HDR Reduced	Maximum	**5.75**
	Nominal	**4.25**
Bluetooth LE Reduced	Maximum	**5.50**
	Nominal	**4.00**

Note: In TxBF operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with 5GHz WLAN Antenna and Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with 5GHz WLAN Antenna and Licensed Bands Antenna 3 active
-Simultaneous conditions with Inter-band ULCA active

Mode / Band		Modulated Average - Single Tx Chain (dBm) - Ant 2a
Bluetooth BDR/LE Reduced	Maximum	**11.00**
	Nominal	**9.50**
Bluetooth EDR Reduced	Maximum	**11.00**
	Nominal	**9.50**
Bluetooth HDR Reduced	Maximum	**10.00**
	Nominal	**8.50**

Below table is applicable in the following conditions:
-Simultaneous conditions with 5GHz WLAN Antenna 4b/5b active
-Simultaneous conditions with 5GHz WLAN Antenna and Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with 5GHz WLAN Antenna and Licensed Bands Antenna 3 active
-Simultaneous conditions with Inter-band ULCA active

Mode / Band		Modulated Average - TXBF (dBm) - Ant 2a
Bluetooth BDR Reduced	Maximum	**11.00**
	Nominal	**9.50**
Bluetooth EDR Reduced	Maximum	**11.00**
	Nominal	**9.50**
Bluetooth HDR Reduced	Maximum	**10.00**
	Nominal	**8.50**
Bluetooth LE Reduced	Maximum	**5.50**
	Nominal	**4.00**

Note: In TxBF operations, each antenna transmits at maximum allowed powers as indicated above.

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 1 active
-Simultaneous conditions with Licensed Bands Antenna 2a/2b active
-Simultaneous conditions with Inter-band ULCA and 5GHz WLAN Antenna 4b/5b active

Mode / Band		Modulated Average - Single Tx Chain (dBm) - Ant 2a
Bluetooth BDR/LE Reduced	Maximum	**10.00**
	Nominal	**8.50**
Bluetooth EDR Reduced	Maximum	**10.00**
	Nominal	**8.50**
Bluetooth HDR Reduced	Maximum	**10.00**
	Nominal	**8.50**

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 1 active
-Simultaneous conditions with Licensed Bands Antenna 2a/2b active
-Simultaneous conditions with Inter-band ULCA and 5GHz WLAN Antenna 4b/5b active

Mode / Band		Modulated Average - TXBF (dBm) - Ant 2a
Bluetooth BDR Reduced	Maximum	**10.00**
	Nominal	**8.50**
Bluetooth EDR Reduced	Maximum	**10.00**
	Nominal	**8.50**
Bluetooth HDR Reduced	Maximum	**10.00**
	Nominal	**8.50**
Bluetooth LE Reduced	Maximum	**5.50**
	Nominal	**4.00**

Note: In TxBF operations, each antenna transmits at maximum allowed powers as indicated above.

1.6 DUT Antenna Locations

The overall diagonal dimension of the device is > 200 mm. A diagram showing the location of the device antennas can be found in Appendix D. Exact antenna dimensions and separation distances are shown in the Technical Descriptions in the FCC filings.

Table 1-8
Device Edges/Sides for SAR Testing

Mode	Back	Front	Top	Bottom	Right	Left
LTE Band 48 Ant 4a	Yes	No	Yes	No	No	Yes
NR Band n77 Ant 4a	Yes	No	Yes	No	No	Yes
2.4 WLAN Ant 4a	Yes	No	Yes	No	No	Yes
Bluetooth Ant 4a	Yes	No	Yes	No	No	Yes

Note: Per FCC KDB Publication 616217 D04v01r01, particular edges were not required to be evaluated for SAR based on the SAR exclusion threshold in KDB 447498 D01V06. Additional edges may have been evaluated for simultaneous transmission analysis.

1.7 Simultaneous Transmission Capabilities

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

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

Table 1-9
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Body
1	Cellular Band + 2.4 GHz WI-FI	Yes
2	Cellular Band + 5 GHz WI-FI	Yes
3	Cellular Band + 2.4 GHz Bluetooth	Yes
4	Cellular Band + 2.4 GHz WI-FI MIMO	Yes
5	Cellular Band + 5 GHz WI-FI MIMO	Yes
6	Cellular Band + 2.4 GHz Bluetooth (TXBF)	Yes
7	Cellular Band + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes
8	Cellular Band + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	Yes
9	Cellular Band + 2.4 GHz Bluetooth (TXBF) + 5 GHz WI-FI	Yes
10	Cellular Band + 2.4 GHz Bluetooth (TXBF) + 5 GHz WI-FI MIMO	Yes
11	2.4 GHz Bluetooth + 5 GHZ WI-FI	Yes
12	2.4 GHz Bluetooth + 5 GHZ WI-FI MIMO	Yes
13	2.4 GHz Bluetooth (TXBF) + 5 GHz WI-FI	Yes
14	2.4 GHz Bluetooth (TXBF) + 5 GHz WI-FI MIMO	Yes

Table 1-10
Simultaneous Transmission Scenarios of Inter-band ULCA

No.	Capable Transmit Configuration	Body	Notes
1	Cellular Ant 1 LB + Cellular Ant 3 MB/HB	Yes	LTE Bands transmitting from Ant 1 LB: LTE B12/13/5 LTE Bands transmitting from Ant 3 MB/HB: LTE B4/66/2/7
2	Cellular Ant 1 LB + Cellular Ant 2b MB/HB	Yes	LTE Bands transmitting from Ant 1 LB: LTE B12/13/5 LTE Bands transmitting from Ant 2b MB/HB: LTE B4/66/2/7
3	Cellular Ant 1 LB + Cellular Ant 4b MB/HB	Yes	LTE Bands transmitting from Ant 1 LB: LTE B12/13/5 LTE Bands transmitting from Ant 4b MB/HB: LTE B4/66/2/7
4	Cellular Ant 3 LB + Cellular Ant 1 MB/HB	Yes	LTE Bands transmitting from Ant 3 LB: LTE B12/13/5 LTE Bands transmitting from Ant 1 MB/HB: LTE B4/66/2/7
5	Cellular Ant 3 LB + Cellular Ant 2b MB/HB	Yes	LTE Bands transmitting from Ant 3 LB: LTE B12/13/5 LTE Bands transmitting from Ant 2b MB/HB: LTE B4/66/2/7
6	Cellular Ant 3 LB + Cellular Ant 4b MB/HB	Yes	LTE Bands transmitting from Ant 3 LB: LTE B12/13/5 LTE Bands transmitting from Ant 4b MB/HB: LTE B4/66/2/7

Note: The technical description includes all the possible Inter-band ULCA combinations.

Table 1-11
Simultaneous Transmission Scenarios with Inter-band ULCA Active

No.	Capable Transmit Configuration	Body
1	LTE Inter-Band ULCA + 2.4 GHz WI-FI	Yes
2	LTE Inter-Band ULCA + 5 GHz WI-FI	Yes
3	LTE Inter-Band ULCA + 2.4 GHz Bluetooth	Yes
4	LTE Inter-Band ULCA+ 2.4 GHz WI-FI MIMO	Yes
5	LTE Inter-Band ULCA + 5 GHz WI-FI MIMO	Yes
6	LTE Inter-Band ULCA + 2.4 GHz Bluetooth (TxBF)	Yes
7	LTE Inter-Band ULCA + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes
8	LTE Inter-Band ULCA + 2.4 GHz Bluetooth (TxBF) + 5 GHz WI-FI	Yes
9	LTE Inter-Band ULCA + 2.4 GHz Bluetooth + 5 GHz WI-FI MIMO	Yes
10	LTE Inter-Band ULCA + 2.4 GHz Bluetooth (TxBF) + 5 GHz WI-FI MIMO	Yes

Note: LTE inter-band ULCA can operate in any of the combinations in Table 1-10.

1. There are no limitations in the above listed simultaneous transmission scenarios between cellular antennas and BT/WI-FI antennas.
2. 2.4 GHz WLAN and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
3. For licensed bands, Ant 2a and Ant 2b cannot transmit simultaneously, and Ant 4a and Ant 4b cannot transmit simultaneously.
4. This device supports 2x2 MIMO Tx for WLAN 802.11a/g/n/ac/ax. 802.11a/g/n/ac/ax supports CDD and STBC and 802.11n/ac/ax additionally supports SDM. Each WLAN antenna can transmit independently or together when operating with MIMO.
5. While 5 GHz MIMO is active, 5 GHz Ant 4b and Ant 5b can be transmitting together.
6. EN-DC operation is supported with LTE + 5G NR FR1 scenarios. The LTE anchor bands are shown in the NR FR1 checklist.
7. This device supports VoWIFI.

1.8 Miscellaneous SAR Test Considerations

(A) WIFI/BT

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg, SAR is not required for U-NII-1 band according to FCC KDB Publication 248227 D01v02r02.

The WLAN/Bluetooth chipset in this device is produced by two different suppliers. The electrically identical modules are manufactured with the identical mechanical structure to meet the same specifications and functions. Two device variants are referenced as Variant 1 and Variant 2 in this report. WLAN/Bluetooth SAR worst case configuration was spotchecked on Varaint 1 and Variant 2. The Variant with the highest reported SAR value was evaluated for the remaining WLAN/Bluetooth configurations.

This device supports channel 1-13 for 2.4 GHz WLAN. However, because channel 12/13 targets are not higher than that of channels 1-11, channels 1, 6, and 11 were considered for SAR testing per FCC KDB 248227 D01V02r02

This device supports IEEE 802.11ac with the following features:

a) Up to 80 MHz Bandwidth only
b) No aggregate channel configurations
c) 2 Tx antenna output
d) 256 QAM is supported
e) TDWR and Band gap channels are supported

This device supports IEEE 802.11ax with the following features:

a) Up to 80 MHz Bandwidth only for 5 GHz
b) Up to 20 MHz Bandwidth only for 2.4 GHz
c) No aggregate channel configurations
d) 2 Tx antenna output
e) Up to 1024 QAM is supported
f) TDWR and Band gap channels are supported for 5 GHz
g) MU-MIMO UL Operations are not supported

Per April 2019 TCB Workshop Notes, SAR testing was not required for 802.11ax when applying the initial test configuration procedures of KDB 248227, with 802.11ax considered a higher order 802.11 mode.

(B) Licensed Transmitter(s)

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v03r01.

NR implementation supports SA and NSA mode. In EN-DC mode, NR operates with the LTE Bands shown in the NR FR1 checklist acting as anchor bands. Per FCC guidance, SAR tests for NR Bands and LTE Anchors Bands were performed separately due to limitations in SAR probe calibration factors

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest

bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r04.

This device supports LTE Carrier Aggregation (CA) in the downlink. All uplink communications are identical to Release 8 specifications. Per FCC KDB Publication 941225 D05A v01r02, SAR for LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive. The downlink carrier aggregation exclusion analysis can be found in Appendix E.

This device supports downlink 4x4 MIMO operations for some LTE Bands. Per May 2017 TCB Workshop Notes, SAR for 4x4 DL MIMO was not needed since the maximum average output power in 4x4 DL MIMO mode was not more than 0.25 dB higher than the maximum output power with 4x4 DL MIMO inactive. Additionally, SAR for 4x4 MIMO Downlink Carrier Aggregation was not needed since the maximum average output power in 4x4 MIMO Downlink Carrier Aggregation mode was not more than 0.25 dB higher than the maximum output power with 4x4 MIMO Downlink and downlink carrier aggregation inactive.

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

This device supports both Power Class 2 (PC2) and Power Class 3 (PC3) for LTE Band 41 and NR Band n41/77. Per May 2017 TCB Workshop Notes, SAR tests were performed with Power Class 3 (given the specific UL/DL limitations for Power Class 2). Additionally, SAR testing for the power class condition was evaluated for the highest configuration in Power Class 3 for each test configuration to confirm the results were scalable linearly (See Section 13.1).

This device supports LTE Carrier Aggregation (CA) for LTE Band 41, LTE Band 48, LTE Band 5 and LTE Band 7 with two component carriers in the uplink. SAR Measurements and conducted powers were evaluated per 2017 Fall TCB Workshop Notes.

1.9 Guidance Applied

- FCC KDB Publication 941225 D01v03r01, D05v02r04, D05Av01r02 (2G/3G/4G)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 616217 D04v01r02 (Tablet)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)
- May 2017 TCB Workshop Notes (LTE 4x4 Downlink MIMO, LTE Band 41 Power Class 2/3)
- April 2018 TCB Workshop Notes (LTE Carrier Aggregation)
- April 2019 TCB Workshop Notes (IEEE 802.11ax)
- October 2018 TCB Workshop Notes (Inter-band Uplink Carrier Aggregation)
- October 2020 TCB Workshop Notes (SAR Data Referencing)

1.10 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units. The serial numbers used for each test are indicated alongside the results in Section 10.

1.11 Bibliography

Report Type	Report Serial Number
SAR Part 0 Test Report	1C2101020003-34.BCG
RF Exposure Part 2 Test Report	1C2101020003-20.BCG
RF Exposure Compliance Summary Report	1C2101020003-21.BCG

2 LTE INFORMATION

LTE Information					
Form Factor	Tablet Device				
Frequency Range of each LTE transmission band	LTE Band 71 (665.5 - 695.5 MHz)				
	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 17 (706.5 - 713.5 MHz)				
	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 14 (790.5 - 795.5 MHz)				
	LTE Band 26 (Cell) (814.7 - 848.3 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 66 (AWS) (1710.7 - 1779.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 25 (PCS) (1850.7 - 1914.3 MHz)				
	LTE Band 41 (2498.5 - 2687.5 MHz)				
	LTE Band 48 (3552.5 - 3697.5 MHz)				
Channel Bandwidths	LTE Band 71: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 17: 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 14: 5 MHz, 10 MHz				
	LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 25 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 48: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 71: 5 MHz	665.5 (133147)		680.5 (133297)	695.5 (133447)	
LTE Band 71: 10 MHz	668 (133172)		680.5 (133297)	693 (133422)	
LTE Band 71: 15 MHz	670.5 (133197)		680.5 (133297)	690.5 (133397)	
LTE Band 71: 20 MHz	673 (133222)		680.5 (133297)	688 (133372)	
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)	715.3 (23173)	
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)	714.5 (23165)	
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)	713.5 (23155)	
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)	711 (23130)	
LTE Band 17: 5 MHz	706.5 (23755)		710 (23790)	713.5 (23825)	
LTE Band 17: 10 MHz	709 (23780)		710 (23790)	711 (23800)	
LTE Band 13: 5 MHz	779.5 (23205)		782 (23230)	784.5 (23255)	
LTE Band 13: 10 MHz	N/A		782 (23230)	N/A	
LTE Band 14: 5 MHz	790.5 (23305)		793 (23330)	795.5 (23355)	
LTE Band 14: 10 MHz	N/A		793 (23330)	N/A	
LTE Band 26 (Cell): 1.4 MHz	814.7 (26697)		831.5 (26865)	848.3 (27033)	
LTE Band 26 (Cell): 3 MHz	815.5 (26705)		831.5 (26865)	847.5 (27025)	
LTE Band 26 (Cell): 5 MHz	816.5 (26715)		831.5 (26865)	846.5 (27015)	
LTE Band 26 (Cell): 10 MHz	819 (26740)		831.5 (26865)	844 (26990)	
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)	848.3 (20643)	
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)	847.5 (20635)	
LTE Band 5 (Cell): 5 MHz	826.5 (20425)		836.5 (20525)	846.5 (20625)	
LTE Band 5 (Cell): 10 MHz	829 (20450)		836.5 (20525)	844 (20600)	
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)	1754.3 (20393)	
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)	1753.5 (20385)	
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)		1732.5 (20175)	1752.5 (20375)	
LTE Band 4 (AWS): 10 MHz	1715 (20000)		1732.5 (20175)	1750 (20350)	
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)		1732.5 (20175)	1747.5 (20325)	
LTE Band 4 (AWS): 20 MHz	1720 (20050)		1732.5 (20175)	1745 (20300)	
LTE Band 66 (AWS): 1.4 MHz	1710.7 (131979)		1745 (132322)	1779.3 (132665)	
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)		1745 (132322)	1778.5 (132657)	
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)		1745 (132322)	1777.5 (132647)	
LTE Band 66 (AWS): 10 MHz	1715 (132022)		1745 (132322)	1775 (132622)	
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)		1745 (132322)	1772.5 (132597)	
LTE Band 66 (AWS): 20 MHz	1720 (132072)		1745 (132322)	1770 (132572)	
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)		1880 (18900)	1909.3 (19193)	
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)		1880 (18900)	1908.5 (19185)	
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)		1880 (18900)	1907.5 (19175)	
LTE Band 2 (PCS): 10 MHz	1855 (18650)		1880 (18900)	1905 (19150)	
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)		1880 (18900)	1902.5 (19125)	
LTE Band 2 (PCS): 20 MHz	1860 (18700)		1880 (18900)	1900 (19100)	
LTE Band 25 (PCS): 1.4 MHz	1850.7 (26047)		1882.5 (26365)	1914.3 (26683)	
LTE Band 25 (PCS): 3 MHz	1851.5 (26055)		1882.5 (26365)	1913.5 (26675)	
LTE Band 25 (PCS): 5 MHz	1852.5 (26065)		1882.5 (26365)	1912.5 (26665)	
LTE Band 25 (PCS): 10 MHz	1855 (26090)		1882.5 (26365)	1910 (26640)	
LTE Band 25 (PCS): 15 MHz	1857.5 (26115)		1882.5 (26365)	1907.5 (26615)	
LTE Band 25 (PCS): 20 MHz	1860 (26140)		1882.5 (26365)	1905 (26590)	
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 48: 5 MHz	3552.5 (55265)	3600.8 (55748)	N/A	3649.2 (56232)	3697.5 (56715)
LTE Band 48: 10 MHz	3555 (55290)	3601.7 (55757)	N/A	3648.3 (56223)	3695 (56690)
LTE Band 48: 15 MHz	3557.5 (55315)	3602.5 (55765)	N/A	3647.5 (56215)	3692.5 (56665)
LTE Band 48: 20 MHz	3560 (55340)	3603.3 (55773)	N/A	3646.7 (56207)	3690 (56640)
UE Category	DL UE Cat 19 (QPSK, 16QAM, 64QAM, 256QAM) UL UE Cat 16 (QPSK, 16QAM 64QAM, 256QAM)				
Modulations Supported in UL	QPSK, 16QAM, 64QAM, 256QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Additional Information	This device does not support full CA features on 3GPP Release 15. It supports carrier aggreagation and downlink MIMO features as shown in Section 8 and Appendix F. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 15 Features are not supported: Relay, HetNet, Enhanced MIMO, eICIC, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

NR Information						
Form Factor	Tablet Device					
Frequency Range of each NR transmission band	NR Band n71 (665.5 - 695.5 MHz)					
	NR Band n12 (701.5 - 713.5 MHz)					
	NR Band n5 (Cell) (826.5 - 846.5 MHz)					
	NR Band n66 (AWS) (1712.5 - 1777.5 MHz)					
	NR Band n25 (PCS) (1852.5 - 1912.5 MHz)					
	NR Band n2 (PCS) (1852.5 - 1907.5 MHz)					
	NR Band n41 (2506.02 - 2679.99 MHz)					
	NR Band n77 (3710.01 - 3969.99 MHz)					
Channel Bandwidths	NR Band n71: 5 MHz, 10 MHz, 15 MHz, 15 MHz					
	NR Band n12: 5 MHz, 10 MHz, 15 MHz					
	NR Band n5 (Cell): 5 MHz, 10 MHz, 15 MHz, 20 MHz					
	NR Band n66 (AWS): 5 MHz, 10 MHz, 15 MHz, 20 MHz					
	NR Band n25 (PCS): 5 MHz, 10 MHz, 15 MHz, 20 MHz					
	NR Band n2 (PCS): 5 MHz, 10 MHz, 15 MHz, 20 MHz					
	NR Band n41: 20 MHz, 40 MHz, 50 MHz, 60 MHz, 80 MHz, 90 MHz, 100 MHz					
	NR Band n77: 20 MHz, 40 MHz, 50 MHz, 60 MHz, 80 MHz, 90 MHz, 100 MHz					
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid		Mid-High	High
NR Band n71: 5 MHz	665.5 (133147)		680.5 (136100)		695.5 (133447)	
NR Band n71: 10 MHz	668 (133600)		680.5 (136100)		693 (138600)	
NR Band n71: 15 MHz	670.5 (134100)		680.5 (136100)		690.5 (138100)	
NR Band n71: 20 MHz	673 (134600)		680.5 (136100)		688 (137600)	
NR Band n12: 5 MHz	701.5 (140300)		707.5 (141500)		713.5 (142700)	
NR Band n12: 10 MHz	704 (140800)		707.5 (141500)		711 (142200)	
NR Band n12: 15 MHz	706.5 (141300)		707.5 (141500)		708.5 (141700)	
NR Band n5 (Cell): 5 MHz	826.5 (165300)		836.5 (167300)		846.5 (169300)	
NR Band n5 (Cell): 10 MHz	829 (165800)		836.5 (167300)		844 (168800)	
NR Band n5 (Cell): 15 MHz	831.5 (166300)		836.5 (167300)		841.5 (168300)	
NR Band n5 (Cell): 20 MHz	834 (166800)		836.5 (167300)		839 (167800)	
NR Band n66 (AWS): 5 MHz	1712.5 (342500)		1745 (349000)		1777.5 (355500)	
NR Band n66 (AWS): 10 MHz	1715 (343000)		1745 (349000)		1775 (355000)	
NR Band n66 (AWS): 15 MHz	1717.5 (343500)		1745 (349000)		1772.5 (354500)	
NR Band n66 (AWS): 20 MHz	1720 (344000)		1745 (349000)		1770 (354000)	
NR Band n25 (PCS): 5 MHz	1852.5 (370500)		1882.5 (376500)		1912.5 (382500)	
NR Band n25 (PCS): 10 MHz	1855 (371000)		1882.5 (376500)		1910 (382000)	
NR Band n25 (PCS): 15 MHz	1857.5 (371500)		1882.5 (376500)		1907.5 (381500)	
NR Band n25 (PCS): 20 MHz	1860 (372000)		1882.5 (376500)		1905 (381000)	
NR Band n2 (PCS): 5 MHz	1852.5 (370500)		1880 (376000)		1907.5 (381500)	
NR Band n2 (PCS): 10 MHz	1855 (371000)		1880 (376000)		1905 (381000)	
NR Band n2 (PCS): 15 MHz	1857.5 (371500)		1880 (376000)		1902.5 (380500)	
NR Band n2 (PCS): 20 MHz	1860 (372000)		1880 (376000)		1900 (380000)	
NR Band n41: 20 MHz	2506.02 (501204)	2549.49 (509898)	2592.99 (518598)		2636.49 (527298)	2679.99 (535998)
NR Band n41: 40 MHz	2516.01 (503202)	2567.34 (513468)	N/A		2618.67 (523734)	2670 (534000)
NR Band n41: 50 MHz	2521.02 (504204)		2592.99 (518598)		2664.99 (532998)	
NR Band n41: 60 MHz	2526 (505200)		2592.99 (518598)		2659.98 (531996)	
NR Band n41: 80 MHz	2536.02 (507204)		N/A		2649.99 (529998)	
NR Band n41: 90 MHz	2541 (508200)		N/A		2644.98 (528996)	
NR Band n41: 100 MHz	2546.01 (509202)		2592.99 (518598)		2640 (528000)	
NR Band n77: 20 MHz	3710.01 (647334)	3762 (650800)	3813.99 (654266)	3866.01 (657734)	3918 (661200)	3969.99 (664666)
NR Band n77: 40 MHz	3720 (648000)	3768 (651200)	3816 (654400)	3864 (657600)	3912 (660800)	3960 (664000)
NR Band n77: 50 MHz	3725.01 (648334)	3782.49 (652166)	3840 (656000)		3897.51 (659834)	3954.99 (663666)
NR Band n77: 60 MHz	3730.02 (648668)	3803.34 (653556)	N/A	N/A	3876.66 (658444)	3949.98 (663332)
NR Band n77: 80 MHz	3740.01 (649334)	N/A	3840 (656000)		N/A	3939.99 (662666)
NR Band n77: 90 MHz	3745.02 (649668)	N/A	3840 (656000)		N/A	3934.98 (662332)
NR Band n77: 100 MHz	3750 (650000)	N/A	N/A	N/A	N/A	3930 (662000)
SCS for NR Band n71/n12/n5/n66/n25/n2	15 kHz					
SCS for NR Band n41/n77	30 kHz					
Modulations Supported in UL	DFT-s-OFDM: π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM					
A-MPR (Additional MPR) disabled for SAR Testing?	YES					
EN-DC Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations					
LTE Anchor Bands for NR Band n71	LTE Band 66/2/7					
LTE Anchor Bands for NR Band n12	LTE Band 66/2					
LTE Anchor Bands for NR Band n5 (Cell)	LTE Band 66/2/30/7/48					
LTE Anchor Bands for NR Band n66 (AWS)	LTE Band 71/12/13/14/5/48					
LTE Anchor Bands for NR Band n25 (PCS)	LTE Band 12					
LTE Anchor Bands for NR Band n2 (PCS)	LTE Band 12/13/14/5					
LTE Anchor Bands for NR Band n41	LTE Band 66/2/25/26					
LTE Anchor Bands for NR Band n77	LTE Band 12/13/14/66/2/30/7/41					

3 INTRODUCTION

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

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

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

σ = conductivity of the tissue-simulating material (S/m)
ρ = mass density of the tissue-simulating material (kg/m^3)
E = Total RMS electric field strength (V/m)

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

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

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

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.

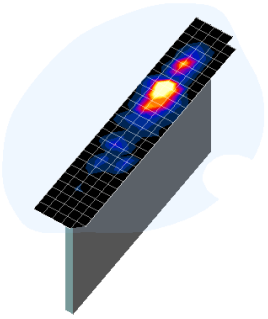


Figure 4-1
Sample SAR Area Scan

3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

   a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

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

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

*Also compliant to IEEE 1528-2013 Table 6

5 TEST CONFIGURATION POSITIONS

5.1 Device Holder

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

5.2 SAR Testing for Tablet per KDB Publication 616217 D04v01r02

Per FCC KDB Publication 616217 D04v01r02, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR Exclusion Threshold in KDB 447498 D01v06 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

6 RF EXPOSURE LIMITS

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

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

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

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

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

7 MEASUREMENT PROCEDURES

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

7.1 Measured and Reported SAR

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

7.2 3G SAR Test Reduction Procedure

In FCC KDB Publication 941225 D01v03r01, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

7.3 Procedures Used to Establish RF Signal for SAR

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

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

7.4 SAR Measurement Conditions for UMTS

7.4.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC with TPC (transmit power control) set to all “1s” or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

7.4.2 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all “1s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple $DPDCH_n$ configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreading code or $DPDCH_n$, for the highest reported SAR configuration in 12.2 kbps RMC.

7.4.3 SAR Measurements with Rel 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, for the highest reported SAR configuration in 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

7.4.4 SAR Measurements with Rel 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

7.4.5 SAR Measurement Conditions for DC-HSDPA

SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

7.5 SAR Measurement Conditions for LTE

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

7.5.1 Spectrum Plots for RB Configurations

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

7.5.2 MPR

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

7.5.3 A-MPR

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

7.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
    i. The required channel and offset combination with the highest maximum output power is required for SAR.
    ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
    iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.

7.5.5 TDD

LTE TDD testing is performed using the SAR test guidance provided in FCC KDB 941225 D05v02r04. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05v02r04. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211 Section 4.

7.5.6 Downlink Only Carrier Aggregation

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

7.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r02 for more details.

7.6.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.

A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

7.6.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7.6.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification. Unless band gap channels are permanently disabled, SAR must be considered for these channels. Each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

7.6.4 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n/ax OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7.6.5 OFDM Transmission Mode and SAR Test Channel Selection

When the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. Per April 2019 TCB Workshop guidance, 802.11ax was considered the highest order 802.11 mode. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

7.6.6 Initial Test Configuration Procedure

For OFDM, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order IEEE 802.11 mode. The channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 7.6.5). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7.6.7 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg, no additional SAR tests for the subsequent test configurations are required. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7.6.8 MIMO SAR considerations

Per KDB Publication 248227 D01v02r02, the simultaneous SAR provisions in KDB Publication 447498 D01v06 should be applied to determine simultaneous transmission SAR test exclusion for WIFI MIMO. If the sum of 1g single transmission chain SAR measurements is <1.6 W/kg, no additional SAR measurements for MIMO are required. Alternatively, SAR for MIMO can be measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8 RF CONDUCTED POWERS

All conducted power measurements for 2G/3G/4G/5G Sub6 WWAN technologies and bands in this section were performed by setting Reserve_power_margin (Qualcomm® Smart Transmit EFS entry) to 0dB, so that the EUT transmits continuously at minimum (Plimit, maximum tune up output power Pmax).

8.1 LTE Plimit Conducted Powers

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

8.1.1 LTE Band 48

Table 8-1
LTE Band 48 Measured P_{limit} Ant 4a - 20 MHz Bandwidth

LTE Band 48 20 MHz Bandwidth								
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			55340 (3560.0 MHz)	55773 (3603.3 MHz)	56207 (3646.7 MHz)	56640 (3690.0 MHz)		
			Conducted Power [dBm]					
QPSK	1	0	11.53	11.57	11.72	**11.83**	0	0
	1	50	11.51	11.53	11.73	11.70		0
	1	99	11.54	11.58	11.74	11.71		0
	50	0	11.68	11.68	11.79	**11.85**	0-1	0
	50	25	11.68	11.70	11.82	11.84		0
	50	50	11.70	11.72	11.83	11.83		0
	100	0	11.69	11.70	11.76	11.82		0
16QAM	1	0	11.60	11.52	11.72	11.74	0-1	0
	1	50	11.55	11.48	11.70	11.66		0
	1	99	11.56	11.51	11.69	11.67		0
	50	0	11.44	11.38	11.50	11.54	0-2	0
	50	25	11.46	11.40	11.57	11.59		0
	50	50	11.45	11.39	11.59	11.52		0
	100	0	11.44	11.37	11.50	11.55		0
64QAM	1	0	11.39	11.37	11.55	11.55	0-2	0
	1	50	11.41	11.39	11.58	11.56		0
	1	99	11.46	11.41	11.59	11.54		0
	50	0	11.47	11.42	11.55	11.51	0-3	0
	50	25	11.50	11.44	11.56	11.62		0
	50	50	11.46	11.43	11.60	11.56		0
	100	0	11.47	11.45	11.55	11.60		0
256QAM	1	0	11.44	11.44	11.60	11.61	0-5	0
	1	50	11.45	11.46	11.62	11.56		0
	1	99	11.49	11.48	11.59	11.57		0
	50	0	11.48	11.47	11.55	11.51		0
	50	25	11.53	11.50	11.57	11.63		0
	50	50	11.46	11.47	11.60	11.59		0
	100	0	11.48	11.46	11.54	11.60		0

8.1.2 LTE Uplink Carrier Aggregation Conducted Powers

Table 8-2
LTE Uplink Carrier Aggregation Measured P_{limit} – Ant 4a

	PCC							SCC							Power	
Combination	PCC Band	PCC Bandwidth [MHz]	PCC (UL/DL) Channel	PCC (UL/DL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL/DL) Channel	SCC (UL/DL) Frequency [MHz]	Modulation	SCC UL# RB	SCC UL RB Offset	LTE Tx.Power with UL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_48C	LTE B48	20	55340	3560.0	QPSK	1	99	LTE B48	20	55538	3579.8	QPSK	1	0	11.35	11.54

Notes:

1. This device supports uplink carrier aggregation for LTE CA_7C, LTE CA_5B, LTE CA_41C and LTE CA_48C with a maximum of two component carriers. For intra-band contiguous carrier aggregation scenarios, 3GPP 36.101 Table 6.2.2A-1 specifies that the aggregate maximum allowed output power is equivalent to the single carrier scenario. 3GPP 36.101 6.2.3A allows for several dB of MPR to be applied when non-contiguous RB allocation is implemented. The conducted powers and MPR settings in this device are permanently implemented per the above 3GPP requirements.
2. Per FCC Guidance, the output power with uplink CA active was measured for the configuration with the highest reported SAR with single carrier for each exposure condition. The power was measured with wideband signal integration over both component carriers.

Figure 8-1
Power Measurement Setup

8.2 NR Plimit Conducted Powers

Note: Per October 2020 TCB Workshop Guidance, NR FR1 SAR evaluations are being generally based on adapting the existing LTE SAR procedures (FCC KDB Publication 941225 D05v02r05). Therefore, NR SAR for the lower bandwidths was not required for testing based on the measured output power and the reported NR SAR for the highest bandwidth. Lower bandwidth conducted powers for all NR bands can be found in appendix H.

8.2.1 NR Band 77 PC3

Table 8-3
NR Band n77 PC3 Measured P_{limit} Ant 4a – 100 MHz Bandwidth

NR Band n77 100 MHz Bandwidth						
			Channel		MPR Allowed per 3GPP [dB]	MPR [dB]
Modulation	RB Size	RB Offset	650000 (3750 MHz)	662000 (3930 MHz)		
			Conducted Power [dBm]			
DFT-s-OFDM π/2 BPSK	1	1	8.11	8.17	0	0.0
	1	137	8.25	8.14		0.0
	1	271	8.00	7.95		0.0
	135	0	8.30	8.03	0-0.5	0.0
	135	69	8.14	8.13	0	0.0
	135	138	8.05	8.10	0-0.5	0.0
	270	0	8.14	8.13		0.0
DFT-s-OFDM QPSK	1	1	8.36	8.32	0	0.0
	1	137	**8.37**	8.22		0.0
	1	271	8.05	8.07		0.0
	135	0	**8.36**	8.09	0-1	0.0
	135	69	8.35	8.12	0	0.0
	135	138	8.09	8.09	0-1	0.0
	270	0	8.19	8.15		0.0
DFT-s-OFDM 16QAM	1	1	8.25	8.22	0-1	0.0
CP-OFDM QPSK	1	1	8.30	8.39	0-1.5	0.0

8.2.2 NR Band 77 PC2

Table 8-3
NR Band n77 PC2 Measured P_{limit} Ant 4a – 100 MHz Bandwidth

NR Band n77 100 MHz Bandwidth						
			Channel		MPR Allowed per 3GPP [dB]	MPR [dB]
Modulation	RB Size	RB Offset	650000 (3750 MHz)	662000 (3930 MHz)		
			Conducted Power [dBm]			
DFT-s-OFDM π/2 BPSK	1	1	11.67	11.44	0	0.0
	1	137	11.30	11.12		0.0
	1	271	11.40	10.95		0.0
	135	0	11.45	10.85	0-0.5	0.0
	135	69	11.18	10.97	0	0.0
	135	138	11.41	10.98	0-0.5	0.0
	270	0	11.25	11.00		0.0
DFT-s-OFDM QPSK	1	1	11.41	11.16	0	0.0
	1	137	11.74	11.21		0.0
	1	271	11.05	11.12		0.0
	135	0	11.48	10.94	0-1	0.0
	135	69	11.25	10.86	0	0.0
	135	138	11.25	11.15	0-1	0.0
	270	0	11.24	10.97		0.0
DFT-s-OFDM 16QAM	1	1	11.06	11.07	0-1	0.0
CP-OFDM QPSK	1	1	11.52	11.20	0-1.5	0.0

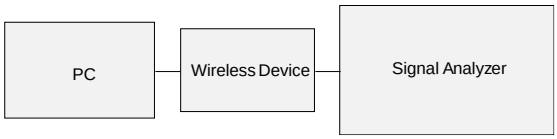


Figure 8-2
Power Measurement Setup

8.3 WLAN Maximum Time-Averaged Conducted Powers

Table 8-5
2.4 GHz WLAN Maximum Average RF Power – Ant 4a, Variant 1

2.4GHz Conducted Power [dBm]					
Freq [MHz]	Channel	IEEE Transmission Mode			
		802.11b	802.11g	802.11n	802.11ax (SU)
		Average	Average	Average	Average
2412	1	10.98	11.09	11.06	11.02
2437	6	11.12	11.15	11.12	11.15
2462	11	10.94	11.03	11.04	10.99

Table 8-6
2.4 GHz WLAN Maximum Average RF Power – Ant 4a, Variant 2

2.4GHz Conducted Power [dBm]					
Freq [MHz]	Channel	IEEE Transmission Mode			
		802.11b	802.11g	802.11n	802.11ax (SU)
		Average	Average	Average	Average
2412	1	11.07	10.91	11.06	10.95
2437	6	11.09	11.13	11.12	11.12
2462	11	10.91	10.90	10.89	10.92

8.4 WLAN Reduced Time-Averaged Conducted Powers

Table 8-7
2.4 GHz WLAN 3 dBm Reduced Average RF Power – Ant 4a, Variant 1

2.4GHz Conducted Power [dBm]					
Freq [MHz]	Channel	IEEE Transmission Mode			
		802.11b	802.11g	802.11n	802.11ax (SU)
		Average	Average	Average	Average
2412	1	8.15	8.17	7.80	7.89
2437	6	8.26	8.09	8.10	8.04
2462	11	8.17	8.15	7.86	7.92

Table 8-8
2.4 GHz WLAN 3 dBm Reduced Average RF Power – Ant 4a, Variant 2

2.4GHz Conducted Power [dBm]					
Freq [MHz]	Channel	IEEE Transmission Mode			
		802.11b	802.11g	802.11n	802.11ax (SU)
		Average	Average	Average	Average
2412	1	8.03	7.94	7.97	8.03
2437	6	8.15	7.96	7.98	8.15
2462	11	8.19	7.94	7.86	8.02

8.5 WLAN Power Reduction Verification Summary

Table 8-9
WLAN Power Reduction Verification

Antenna	Mode/Band	Condition (s)	Maximum Scenario Maximum Allowed Tune Up Power [dBm]	Reduced Scenario Maximum Allowed Tune Up Power [dBm]	Maximum Target Power [dBm] (Tolerance [dB])	Reduced Target Power [dBm] (Tolerance [dB])	Maximum Measured Power [dBm]	Reduced Measured Power [dBm]	Verdict
Ant 4A	2.4 GHz WLAN	Main Band 4A/4B ON	12.00	9.00	10.50 (+1.5/-1.5)	7.50 (+1.5/-1.5)	11.03	7.78	PASS
	2.4 GHz WLAN	ULCA ON	12.00	9.00	10.50 (+1.5/-1.5)	7.50 (+1.5/-1.5)	11.03	7.88	PASS

8.6 Notes for WLAN

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.
- The WLAN chipset in this device is produced by two different suppliers. The electrically identical modules are manufactured with the identical mechanical structure to meet the same specifications and functions. Two device variants are referenced as Variant 1 and Variant 2 in this report.
- WLAN SAR worst case configuration was spotchecked on Variant 1 and Variant 2. The Variant with the highest reported SAR value was evaluated for the remaining WLAN configurations.

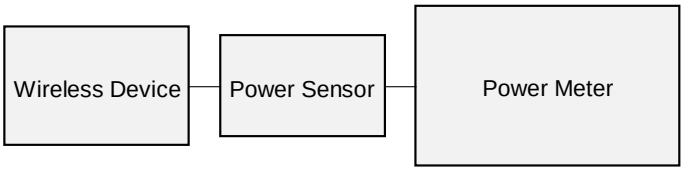


Figure 8-3
Power Measurement Setup

8.7 Bluetooth Maximum Conducted Powers

Table 8-10
Bluetooth Maximum Average RF Power – Ant 4a, Variant 1

Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	1.0	0	12.63	18.323
2441	GFSK	1.0	39	11.79	15.101
2480	GFSK	1.0	78	11.80	15.136

Table 8-11
Bluetooth Maximum Average RF Power – Ant 4a, Variant 2

Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	1.0	0	11.27	13.397
2441	GFSK	1.0	39	11.75	14.962
2480	GFSK	1.0	78	12.42	17.458

8.8 Bluetooth Reduced Conducted Powers

Table 8-12
Bluetooth 2 dB Reduced Average RF Power – Ant 4a, Variant 1

Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	1.0	0	9.90	9.772
2441	GFSK	1.0	39	9.75	9.441
2480	GFSK	1.0	78	9.93	9.840

Table 8-13
Bluetooth 2 dB Reduced Average RF Power – Ant 4a, Variant 2

Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	1.0	0	9.40	8.710
2441	GFSK	1.0	39	9.93	9.840
2480	GFSK	1.0	78	10.02	10.046

Table 8-14
Bluetooth 3 dB Reduced Average RF Power – Ant 4a, Variant 1

Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	1.0	0	9.03	7.998
2441	GFSK	1.0	39	9.25	8.414
2480	GFSK	1.0	78	9.40	8.710

Table 8-15
Bluetooth 3 dB Reduced Average RF Power – Ant 4a, Variant 2

Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	1.0	0	8.76	7.516
2441	GFSK	1.0	39	8.69	7.396
2480	GFSK	1.0	78	8.78	7.551

Table 8-16
Bluetooth 7 dB Reduced Average RF Power – Ant 4a, Variant 1

Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	1.0	0	5.66	3.681
2441	GFSK	1.0	39	5.48	3.532
2480	GFSK	1.0	78	5.60	3.631

Table 8-17
Bluetooth 7 dB Reduced Average RF Power – Ant 4a, Variant 2

Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	1.0	0	4.89	3.083
2441	GFSK	1.0	39	5.00	3.162
2480	GFSK	1.0	78	4.83	3.041

8.9 Bluetooth Duty Cycle Plots

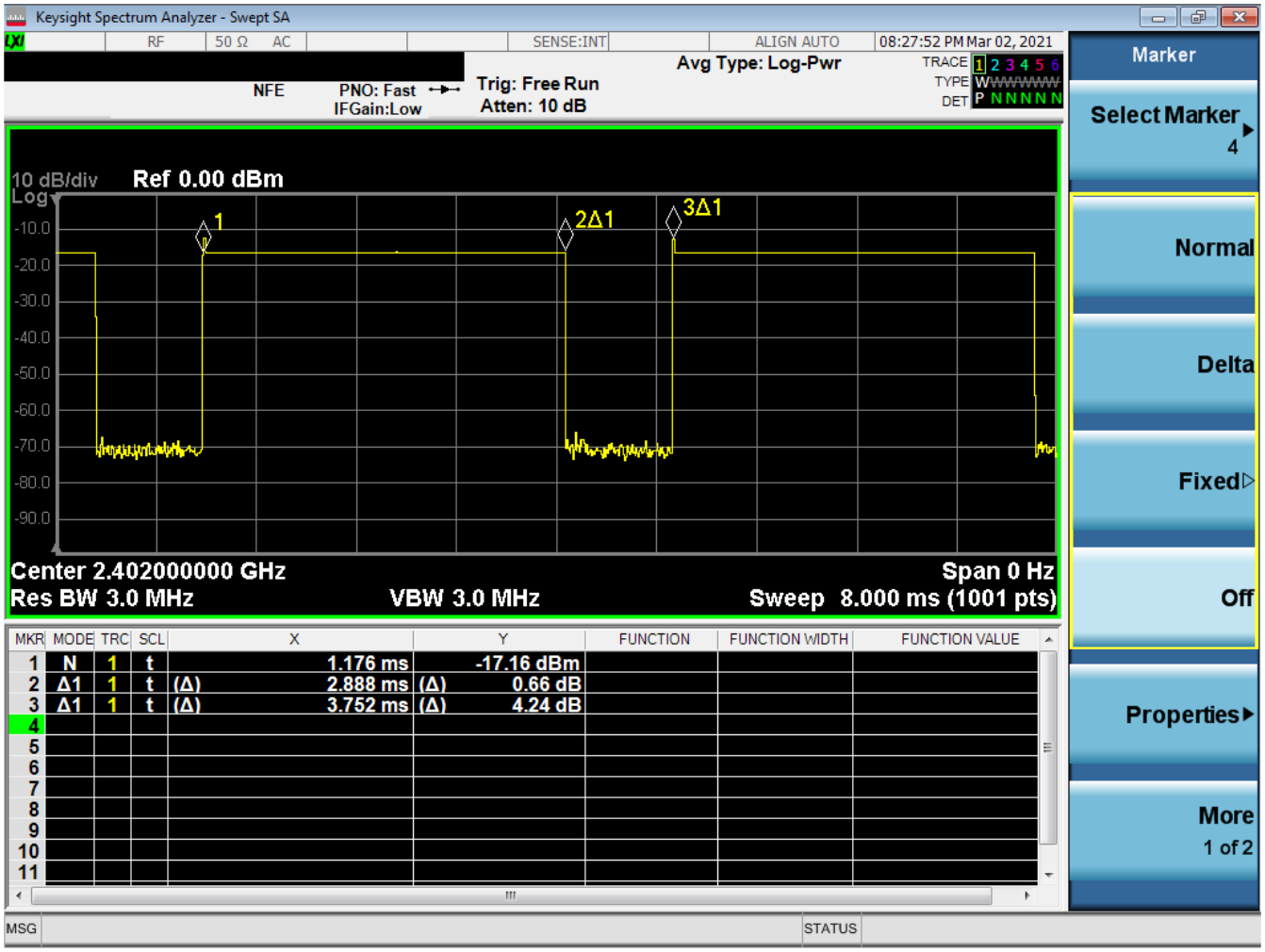


Figure 8-4
Bluetooth Transmission Plot – Ant 4a, Variant 1

Equation 8-1
Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.888ms}{3.752ms} * 100\% = 77.0\%$$

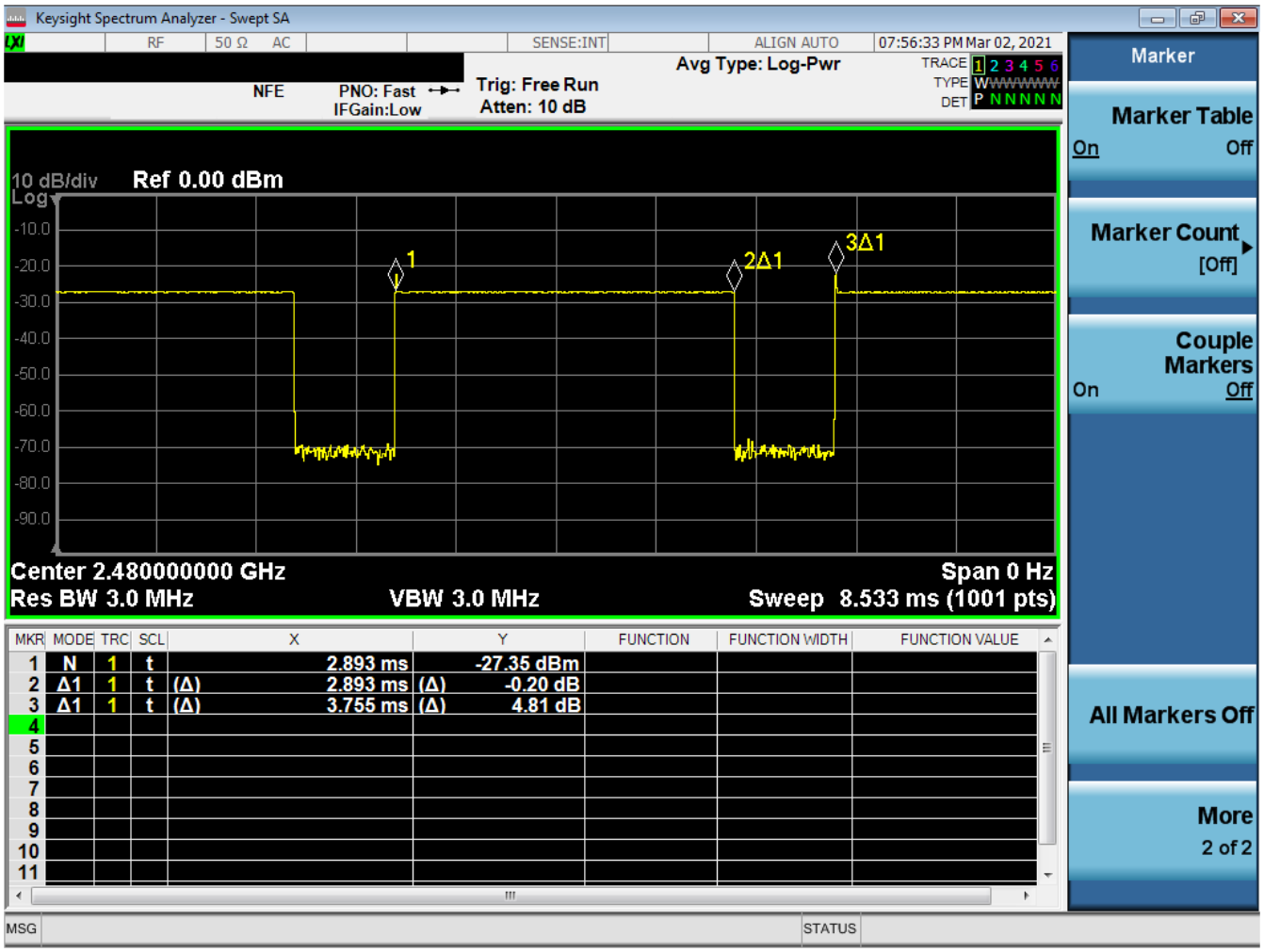


Figure 8-5
Bluetooth Transmission Plot – Ant 4a, Variant 2

Equation 8-2
Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.893ms}{3.755ms} * 100\% = 77.0\%$$

8.10 Bluetooth Power Reduction Verification Summary

Table 8-18
Bluetooth Power Reduction Verification

Antenna	Mode/Band	Condition (s)	Maximum Scenario Maximum Allowed Tune Up Power [dBm]	Reduced Scenario Maximum Allowed Tune Up Power [dBm]	Maximum Target Power [dBm] (Tolerance [dB])	Reduced Target Power [dBm] (Tolerance [dB])	Maximum Measured Power [dBm]	Reduced Measured Power [dBm]	Verdict
Ant 4A	2.4 GHz Bluetooth	Main Band 4A/4B ON	12.75	9.75	11.25 (+1.5/-2)	8.25 (+1.5/-2)	11.47	8.07	PASS
	2.4 GHz Bluetooth	Main Band 3 ON	12.75	9.75	11.25 (+1.5/-2)	8.25 (+1.5/-2)	11.47	8.22	PASS
	2.4 GHz Bluetooth	5GHz WLAN Ant 4B/5B ON	12.75	9.75	11.25 (+1.5/-2)	8.25 (+1.5/-2)	11.47	8.28	PASS
	2.4 GHz Bluetooth	ULCA ON	12.75	9.75	11.25 (+1.5/-2)	8.25 (+1.5/-2)	11.47	8.30	PASS
	2.4 GHz Bluetooth	Main Band 1 ON and 5GHz WLAN Ant 4B/5B ON	12.75	10.75	11.25 (+1.5/-2)	9.25 (+1.5/-2)	11.47	9.41	PASS
	2.4 GHz Bluetooth	Ant 2A/2B ON and 5GHz WLAN Ant 4B/5B ON	12.75	10.75	11.25 (+1.5/-2)	9.25 (+1.5/-2)	11.47	9.63	PASS
	2.4 GHz Bluetooth	Main Band 3 ON and 5GHz WLAN Ant 4B/5B ON	12.75	5.75	11.25 (+1.5/-2)	4.25 (+1.5/-2)	11.47	4.01	PASS
	2.4 GHz Bluetooth	Main Band 4A/4B ON and 5GHz WLAN Ant 4B/5B ON	12.75	5.75	11.25 (+1.5/-2)	4.25 (+1.5/-2)	11.47	3.83	PASS
	2.4 GHz Bluetooth	ULCA ON and 5GHz WLAN Ant 4B/5B ON	12.75	5.75	11.25 (+1.5/-2)	4.25 (+1.5/-2)	11.47	4.07	PASS

Conducted powers were measured for each Mode/Band applied condition. All conducted power measurements were verified to be within tolerance.

8.11 Notes for Bluetooth

- The Bluetooth chipset in this device is produced by two different suppliers. The electrically identical modules are manufactured with the identical mechanical structure to meet the same specifications and functions. Two device variants are referenced as Variant 1 and Variant 2 in this report.
- Bluetooth SAR worst case configuration was spotchecked on Variant 1 and Variant 2. The Variant with the highest reported SAR value was evaluated for the remaining Bluetooth configurations.
- Full power measurements were performed for Variant 1 and Variant 2 per FCC KDB Procedures 248227.

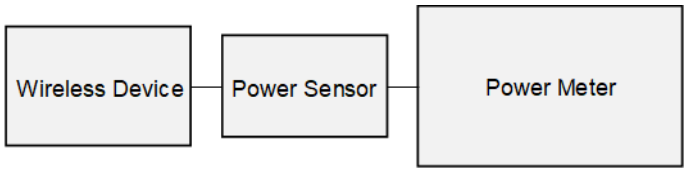


Figure 8-6
Power Measurement Setup

9 SYSTEM VERIFICATION

9.1 Tissue Verification

Table 9-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (°C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
2/17/2021	750B	22.1	680	0.952	53.584	0.958	55.804	-0.63%	-3.98%
			695	0.957	53.544	0.959	55.745	-0.21%	-3.95%
			700	0.959	53.531	0.959	55.726	0.00%	-3.94%
			710	0.962	53.506	0.960	55.687	0.21%	-3.92%
			720	0.966	53.482	0.961	55.648	0.52%	-3.89%
			725	0.967	53.469	0.961	55.629	0.62%	-3.88%
			740	0.973	53.430	0.963	55.570	1.04%	-3.85%
			755	0.978	53.393	0.964	55.512	1.45%	-3.82%
			770	0.984	53.360	0.965	55.453	1.97%	-3.77%
			785	0.990	53.333	0.966	55.395	2.48%	-3.72%
			800	0.995	53.304	0.967	55.336	2.90%	-3.67%
2/18/2021	750B	22.8	680	0.966	53.961	0.958	55.804	0.84%	-3.30%
			695	0.970	53.924	0.959	55.745	1.15%	-3.27%
			700	0.972	53.914	0.959	55.726	1.36%	-3.25%
			710	0.975	53.891	0.960	55.687	1.56%	-3.23%
			720	0.979	53.871	0.961	55.648	1.87%	-3.19%
			725	0.980	53.859	0.961	55.629	1.98%	-3.18%
			740	0.986	53.822	0.963	55.570	2.39%	-3.15%
			755	0.991	53.783	0.964	55.512	2.80%	-3.11%
			770	0.997	53.746	0.965	55.453	3.32%	-3.08%
			785	1.002	53.715	0.966	55.395	3.73%	-3.03%
			800	1.007	53.688	0.967	55.336	4.14%	-2.98%
2/18/2021	1750B	21.9	1710	1.433	53.784	1.463	53.537	-2.05%	0.46%
			1750	1.462	53.770	1.488	53.432	-1.75%	0.63%
			1790	1.490	53.693	1.514	53.326	-1.59%	0.69%
2/18/2021	2450B	22.8	2400	1.974	51.392	1.902	52.767	3.79%	-2.61%
			2450	2.016	51.318	1.950	52.700	3.38%	-2.62%
			2500	2.064	51.230	2.021	52.636	2.13%	-2.67%
2/21/2021	2450B	21.7	2400	1.996	51.032	1.902	52.767	4.94%	-3.29%
			2450	2.040	50.961	1.950	52.700	4.62%	-3.30%
			2500	2.084	50.882	2.021	52.636	3.12%	-3.33%
2/23/2021	2450B	21.0	2400	1.996	51.785	1.902	52.767	4.94%	-1.86%
			2450	2.039	51.727	1.950	52.700	4.56%	-1.85%
			2500	2.093	51.626	2.021	52.636	3.56%	-1.92%
2/26/2021	2450B	22.2	2400	1.996	50.468	1.902	52.767	4.94%	-4.36%
			2450	2.040	50.391	1.950	52.700	4.62%	-4.38%
			2500	2.085	50.317	2.021	52.636	3.17%	-4.41%
2/15/2021	3500B-3700B	22.5	3500	3.341	49.811	3.314	51.321	0.81%	-2.94%
			3550	3.388	49.730	3.372	51.254	0.47%	-2.97%
			3600	3.445	49.662	3.431	51.186	0.41%	-2.98%
			3645	3.488	49.602	3.483	51.125	0.14%	-2.98%
			3685	3.534	49.530	3.530	51.070	0.11%	-3.02%
			3725	3.575	49.492	3.577	51.016	-0.06%	-2.99%

Table 9-2
Measured Tissue Properties (Cont.)

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (°C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
2/19/2021	3500B-3700B	20.8	3500	3.391	50.531	3.314	51.321	2.32%	-1.54%
			3550	3.442	50.446	3.372	51.254	2.08%	-1.58%
			3600	3.502	50.374	3.431	51.186	2.07%	-1.59%
			3645	3.540	50.300	3.483	51.125	1.64%	-1.61%
			3685	3.590	50.251	3.530	51.070	1.70%	-1.60%
			3725	3.633	50.185	3.577	51.016	1.57%	-1.63%
3/15/2021	3500B-3700B	20.8	3500	3.407	50.614	3.314	51.321	2.81%	-1.38%
			3550	3.459	50.544	3.372	51.254	2.58%	-1.39%
			3600	3.522	50.471	3.431	51.186	2.65%	-1.40%
			3645	3.564	50.398	3.483	51.125	2.33%	-1.42%
			3685	3.614	50.336	3.530	51.070	2.38%	-1.44%
			3725	3.657	50.274	3.577	51.016	2.24%	-1.45%
2/22/2021	3700B-3900B	19.5	3700	3.418	49.913	3.548	51.050	-3.66%	-2.23%
			3750	3.477	49.822	3.606	50.982	-3.58%	-2.28%
			3900	3.663	49.588	3.781	50.779	-3.12%	-2.35%
			3930	3.703	49.539	3.816	50.738	-2.96%	-2.36%
03/22/2021	3700B-3900B	22.8	3700	3.571	49.833	3.548	51.050	0.65%	-2.38%
			3750	3.623	49.754	3.606	50.982	0.47%	-2.41%
			3900	3.794	49.550	3.781	50.779	0.34%	-2.42%
			3930	3.829	49.521	3.816	50.738	0.34%	-2.40%
02/18/2021	5200B-5800B	22.5	5180	5.347	47.786	5.276	49.041	1.35%	-2.56%
			5200	5.383	47.749	5.299	49.014	1.59%	-2.58%
			5220	5.403	47.737	5.323	48.987	1.50%	-2.55%
			5240	5.422	47.710	5.346	48.960	1.42%	-2.55%
			5260	5.447	47.663	5.369	48.933	1.45%	-2.60%
			5280	5.475	47.608	5.393	48.906	1.52%	-2.65%
			5300	5.504	47.565	5.416	48.879	1.62%	-2.69%
			5320	5.530	47.540	5.439	48.851	1.67%	-2.68%
			5500	5.752	47.218	5.650	48.607	1.81%	-2.86%
			5520	5.788	47.194	5.673	48.580	2.03%	-2.85%
			5540	5.815	47.182	5.696	48.553	2.09%	-2.82%
			5560	5.844	47.155	5.720	48.526	2.17%	-2.83%
			5580	5.870	47.090	5.743	48.499	2.21%	-2.91%
			5600	5.893	47.060	5.766	48.471	2.20%	-2.91%
			5620	5.922	47.020	5.790	48.444	2.28%	-2.94%
			5640	5.953	46.989	5.813	48.417	2.41%	-2.95%
			5660	5.982	46.979	5.837	48.390	2.48%	-2.92%
			5680	6.008	46.944	5.860	48.363	2.53%	-2.93%
			5700	6.034	46.897	5.883	48.336	2.57%	-2.98%
			5745	6.095	46.819	5.936	48.275	2.68%	-3.02%
			5765	6.130	46.795	5.959	48.248	2.87%	-3.01%
			5785	6.163	46.747	5.982	48.220	3.03%	-3.05%
			5800	6.178	46.733	6.000	48.200	2.97%	-3.04%
			5805	6.183	46.727	6.006	48.193	2.95%	-3.04%
			5825	6.202	46.683	6.029	48.166	2.87%	-3.08%
03/08/2021	5200B-5800B	23.6	5180	5.284	48.219	5.276	49.041	0.15%	-1.68%
			5200	5.317	48.171	5.299	49.014	0.34%	-1.72%
			5220	5.337	48.141	5.323	48.987	0.26%	-1.73%
			5240	5.356	48.116	5.346	48.960	0.19%	-1.72%
			5260	5.382	48.070	5.369	48.933	0.24%	-1.76%
			5280	5.409	48.031	5.393	48.906	0.30%	-1.79%
			5300	5.437	47.989	5.416	48.879	0.39%	-1.82%
			5320	5.460	47.975	5.439	48.851	0.39%	-1.79%
			5500	5.689	47.690	5.650	48.607	0.69%	-1.89%
			5520	5.715	47.661	5.673	48.580	0.74%	-1.89%
			5540	5.746	47.644	5.696	48.553	0.88%	-1.87%
			5560	5.768	47.616	5.720	48.526	0.84%	-1.88%
			5580	5.797	47.577	5.743	48.499	0.94%	-1.90%
			5600	5.826	47.540	5.766	48.471	1.04%	-1.92%
			5620	5.856	47.506	5.790	48.444	1.14%	-1.94%
			5640	5.882	47.480	5.813	48.417	1.19%	-1.94%
			5660	5.906	47.456	5.837	48.390	1.18%	-1.93%
			5680	5.932	47.425	5.860	48.363	1.23%	-1.94%
			5700	5.958	47.393	5.883	48.336	1.27%	-1.95%
			5745	6.024	47.307	5.936	48.275	1.48%	-2.01%
			5765	6.053	47.286	5.959	48.248	1.58%	-1.99%
			5785	6.084	47.256	5.982	48.220	1.71%	-2.00%
			5800	6.096	47.237	6.000	48.200	1.60%	-2.00%
			5805	6.100	47.230	6.006	48.193	1.57%	-2.00%
			5825	6.129	47.183	6.029	48.166	1.66%	-2.04%

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

9.2 Test System Verification

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

Table 9-2
System Verification Results – 1g

System Verification TARGET & MEASURED												
SAR System #	**Tissue Frequency (MHz)**	**Tissue Type**	**Date**	**Amb. Temp (°C)**	**Liquid Temp (°C)**	**Input Power (W)**	**Source SN**	**Probe SN**	**Measured SAR_{1g} (W/kg)**	**1 W Target SAR_{1g} (W/kg)**	**1 W Normalized SAR_{1g} (W/kg)**	**$Deviation_{1g}$ (%)**
AM6	2450	BODY	02/23/2021	22.5	20.2	0.100	921	7546	5.470	50.800	54.700	7.68%
AM6	2450	BODY	02/26/2021	22.1	20.3	0.100	921	7546	5.460	50.800	54.600	7.48%
AM4	3500	BODY	02/15/2021	23.5	22.6	0.100	1055	7421	6.240	65.000	62.400	-4.00%
AM4	3700	BODY	02/15/2021	23.5	22.6	0.100	1002	7421	6.330	64.700	63.300	-2.16%
AM1	3700	BODY	02/22/2021	22.4	20.8	0.100	1002	3837	6.540	64.700	65.400	1.08%
AM1	3900	BODY	02/22/2021	22.4	20.8	0.100	1062	3837	6.300	66.300	63.000	-4.98%

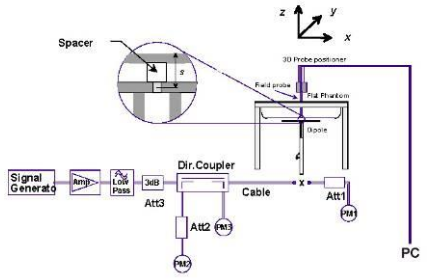


Figure 9-1
System Verification Setup Diagram

Figure 9-2
System Verification Setup Photo

10 SAR DATA SUMMARY

10.1 Standalone SAR Data

Table 10-1
LTE Band 48 Ant 4a Body SAR

MEASUREMENT RESULTS																											
1 CC Uplink | 2CC Uplink	Component Carrier	FREQUENCY			Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Antenna Config.	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	SAR (10g)	Reported SAR (10g)	Plot #
		MHz	Ch.																(W/kg)		(W/kg)	(W/kg)	(W/kg)	
1 CC Uplink	N/A	3560.00	55340	Low	LTE Band 48	20	12.6	11.54	-0.03	0	Ant 4a	YKQ1K9KXW2	QPSK	1	99	0 mm	back	1:1.58	0.624	1.276	0.796	0.192	0.245	
1 CC Uplink	N/A	3603.30	55773	Low-Mid	LTE Band 48	20	12.6	11.58	-0.01	0	Ant 4a	YKQ1K9KXW2	QPSK	1	99	0 mm	back	1:1.58	0.600	1.265	0.759	0.181	0.229	
1 CC Uplink	N/A	3646.70	56207	Mid-High	LTE Band 48	20	12.6	11.74	-0.03	0	Ant 4a	YKQ1K9KXW2	QPSK	1	99	0 mm	back	1:1.58	0.561	1.219	0.684	0.167	0.204	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.83	0.00	0	Ant 4a	YKQ1K9KXW2	QPSK	1	0	0 mm	back	1:1.58	0.660	1.194	0.788	0.184	0.220	
1 CC Uplink	N/A	3560.00	55340	Low	LTE Band 48	20	12.6	11.70	0.04	0	Ant 4a	YKQ1K9KXW2	QPSK	50	50	0 mm	back	1:1.58	0.635	1.230	0.781	0.195	0.240	
1 CC Uplink	N/A	3603.30	55773	Low-Mid	LTE Band 48	20	12.6	11.72	0.13	0	Ant 4a	YKQ1K9KXW2	QPSK	50	50	0 mm	back	1:1.58	0.615	1.225	0.753	0.185	0.227	
1 CC Uplink	N/A	3646.70	56207	Mid-High	LTE Band 48	20	12.6	11.83	0.01	0	Ant 4a	YKQ1K9KXW2	QPSK	50	50	0 mm	back	1:1.58	0.593	1.194	0.708	0.176	0.210	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.85	0.00	0	Ant 4a	YKQ1K9KXW2	QPSK	50	0	0 mm	back	1:1.58	0.646	1.189	0.768	0.180	0.214	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.82	-0.03	0	Ant 4a	YKQ1K9KXW2	QPSK	100	0	0 mm	back	1:1.58	0.651	1.197	0.779	0.181	0.217	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.83	0.11	0	Ant 4a	YKQ1K9KXW2	QPSK	1	0	0 mm	top	1:1.58	0.201	1.194	0.240	0.047	0.056	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.85	0.02	0	Ant 4a	YKQ1K9KXW2	QPSK	50	0	0 mm	top	1:1.58	0.192	1.189	0.228	0.045	0.054	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.83	0.00	0	Ant 4a	YKQ1K9KXW2	QPSK	1	0	0 mm	bottom	1:1.58	0.000	1.194	0.000	0.000	0.000	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.85	0.00	0	Ant 4a	YKQ1K9KXW2	QPSK	50	0	0 mm	bottom	1:1.58	0.000	1.189	0.000	0.000	0.000	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.83	0.00	0	Ant 4a	YKQ1K9KXW2	QPSK	1	0	0 mm	right	1:1.58	0.000	1.194	0.000	0.000	0.000	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.85	0.00	0	Ant 4a	YKQ1K9KXW2	QPSK	50	0	0 mm	right	1:1.58	0.000	1.189	0.000	0.000	0.000	
1 CC Uplink	N/A	3560.00	55340	Low	LTE Band 48	20	12.6	11.54	-0.04	0	Ant 4a	YKQ1K9KXW2	QPSK	1	99	0 mm	left	1:1.58	0.671	1.276	0.856	0.174	0.222	A1
2CC Uplink	PCC	3560.00	55340	Low	LTE Band 48	20	12.6	11.35	0.04	0	Ant 4a	YKQ1K9KXW2	QPSK	1	99	0 mm	left	1:1.58	0.612	1.334	0.816	0.159	0.212	
2CC Uplink	SCC	3579.80	55538	Low	LTE Band 48	20								1	0									
1 CC Uplink	N/A	3603.30	55773	Low-Mid	LTE Band 48	20	12.6	11.58	0.04	0	Ant 4a	YKQ1K9KXW2	QPSK	1	99	0 mm	left	1:1.58	0.593	1.265	0.750	0.150	0.190	
1 CC Uplink	N/A	3646.70	56207	Mid-High	LTE Band 48	20	12.6	11.74	-0.01	0	Ant 4a	YKQ1K9KXW2	QPSK	1	99	0 mm	left	1:1.58	0.587	1.219	0.716	0.145	0.177	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.83	0.06	0	Ant 4a	YKQ1K9KXW2	QPSK	1	0	0 mm	left	1:1.58	0.567	1.194	0.677	0.136	0.162	
1 CC Uplink	N/A	3560.00	55340	Low	LTE Band 48	20	12.6	11.70	0.02	0	Ant 4a	YKQ1K9KXW2	QPSK	50	50	0 mm	left	1:1.58	0.659	1.230	0.811	0.171	0.210	
1 CC Uplink	N/A	3603.30	55773	Low-Mid	LTE Band 48	20	12.6	11.72	0.00	0	Ant 4a	YKQ1K9KXW2	QPSK	50	50	0 mm	left	1:1.58	0.611	1.225	0.748	0.158	0.194	
1 CC Uplink	N/A	3646.70	56207	Mid-High	LTE Band 48	20	12.6	11.83	-0.01	0	Ant 4a	YKQ1K9KXW2	QPSK	50	50	0 mm	left	1:1.58	0.579	1.194	0.691	0.146	0.174	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.85	-0.04	0	Ant 4a	YKQ1K9KXW2	QPSK	50	0	0 mm	left	1:1.58	0.566	1.189	0.673	0.136	0.162	
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	20	12.6	11.82	0.03	0	Ant 4a	YKQ1K9KXW2	QPSK	100	0	0 mm	left	1:1.58	0.565	1.197	0.676	0.137	0.164	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																	Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 10-2
NR Band n77 Ant 4a Body SAR

MEASUREMENT RESULTS																								
FREQUENCY		Mode	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Antenna Config	Power Drift [dB]	MPR [dB]	Power Class	Serial Number	Waveform	Modulation	RB Size	RB Offset	Spacing	MPR [dB]	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	SAR (10g)	Reported SAR (10g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	(W/kg)	(W/kg)	
3750.00	650000 Low	NR Band n77	100	9.5	8.37	Ant 4a	-0.13	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	1	137	0 mm	back	1:1	0.498	1.297	0.646	0.145	0.188	
3930.00	662000 High	NR Band n77	100	9.5	8.32	Ant 4a	-0.15	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	1	1	0 mm	back	1:1	0.530	1.312	0.695	0.150	0.197	
3750.00	650000 Low	NR Band n77	100	9.5	8.36	Ant 4a	-0.14	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	135	0	0 mm	back	1:1	0.408	1.300	0.530	0.130	0.169	
3930.00	662000 High	NR Band n77	100	9.5	8.12	Ant 4a	-0.13	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	135	69	0 mm	back	1:1	0.661	1.374	0.908	0.185	0.254	
3750.00	650000 Low	NR Band n77	100	9.5	8.19	Ant 4a	-0.12	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	270	0	0 mm	back	1:1	0.346	1.352	0.468	0.111	0.150	
3750.00	650000 Low	NR Band n77	100	9.5	8.37	Ant 4a	0.01	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	1	137	0 mm	top	1:1	0.117	1.297	0.152	0.030	0.039	
3750.00	650000 Low	NR Band n77	100	9.5	8.36	Ant 4a	0.09	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	135	0	0 mm	top	1:1	0.161	1.300	0.209	0.041	0.053	
3750.00	650000 Low	NR Band n77	100	9.5	8.37	Ant 4a	0.11	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	1	137	0 mm	bottom	1:1	0.000	1.297	0.000	0.000	0.000	
3750.00	650000 Low	NR Band n77	100	9.5	8.36	Ant 4a	0.00	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	135	0	0 mm	bottom	1:1	0.000	1.300	0.000	0.000	0.000	
3750.00	650000 Low	NR Band n77	100	9.5	8.37	Ant 4a	0.00	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	1	137	0 mm	right	1:1	0.000	1.297	0.000	0.000	0.000	
3750.00	650000 Low	NR Band n77	100	9.5	8.36	Ant 4a	0.00	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	135	0	0 mm	right	1:1	0.000	1.300	0.000	0.000	0.000	
3750.00	650000 Low	NR Band n77	100	9.5	8.37	Ant 4a	0.05	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	1	137	0 mm	left	1:1	0.470	1.297	0.610	0.122	0.158	
3930.00	662000 High	NR Band n77	100	9.5	8.32	Ant 4a	0.02	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	1	1	0 mm	left	1:1	0.544	1.312	0.714	0.143	0.188	
3750.00	650000 Low	NR Band n77	100	9.5	8.36	Ant 4a	-0.05	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	135	0	0 mm	left	1:1	0.444	1.300	0.577	0.121	0.157	
3930.00	662000 High	NR Band n77	100	9.5	8.12	Ant 4a	-0.02	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	135	69	0 mm	left	1:1	0.680	1.374	0.934	0.166	0.228	A2
3930.00	662000 High	NR Band n77	100	12.5	10.86	Ant 4a	0.01	0.0	PC2	VX96JL925Q	DFT-S-OFDM	QPSK	135	69	0 mm	left	1:2	0.617	1.459	0.900	0.161	0.235	
3750.00	650000 Low	NR Band n77	100	9.5	8.19	Ant 4a	-0.02	0.0	PC3	VX96JL925Q	DFT-S-OFDM	QPSK	270	0	0 mm	left	1:1	0.442	1.352	0.598	0.119	0.161	
3930.00	662000 High	NR Band n77	100	9.5	8.39	Ant 4a	0.15	0.0	PC3	VX96JL925Q	CP-OFDM	QPSK	1	1	0 mm	left	1:1	0.574	1.291	0.741	0.149	0.192	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 10-3
2.4 GHz WLAN Ant 4a Body SAR

MEASUREMENT RESULTS																					
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	SAR (10g)	Reported SAR (10g)	Plot #
MHz	Ch.														(W/kg)			(W/kg)	(W/kg)	(W/kg)	
2412	1	802.11b	DSSS	22	12.00	10.98	-0.12	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	back	100.0	0.797	1.265	1.000	1.008	0.309	0.391	
2437	6	802.11b	DSSS	22	12.00	11.12	-0.12	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	back	100.0	0.768	1.225	1.000	0.941	0.300	0.368	
2462	11	802.11b	DSSS	22	12.00	10.94	-0.15	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	back	100.0	0.814	1.276	1.000	1.039	0.316	0.403	A3
2462	11	802.11b	DSSS	22	12.00	10.91	-0.07	0 mm	Ant 4a	V2	NY07QJRF6M	1	back	100.0	0.776	1.285	1.000	0.997	0.308	0.396	
2437	6	802.11b	DSSS	22	12.00	11.12	-0.11	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	top	100.0	0.270	1.225	1.000	0.331	0.082	0.100	
2437	6	802.11b	DSSS	22	12.00	11.12	-0.16	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	bottom	100.0	0.003	1.225	1.000	0.004	0.001	0.001	
2437	6	802.11b	DSSS	22	12.00	11.12	0.19	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	right	100.0	0.001	1.225	1.000	0.001	0.000	0.000	
2412	1	802.11b	DSSS	22	12.00	10.98	-0.08	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	left	100.0	0.719	1.265	1.000	0.910	0.247	0.312	
2437	6	802.11b	DSSS	22	12.00	11.12	0.12	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	left	100.0	0.723	1.225	1.000	0.886	0.250	0.306	
2462	11	802.11b	DSSS	22	12.00	10.94	0.11	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	left	100.0	0.684	1.276	1.000	0.873	0.232	0.296	
2437	6	802.11b	DSSS	22	9.00	8.26	-0.13	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	back	100.0	0.344	1.186	1.000	0.408	0.137	0.162	
2437	6	802.11b	DSSS	22	9.00	8.26	0.19	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	top	100.0	0.125	1.186	1.000	0.148	0.038	0.045	
2437	6	802.11b	DSSS	22	9.00	8.26	-0.18	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	left	100.0	0.296	1.186	1.000	0.351	0.103	0.122	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram							

Table 10-4
Bluetooth Ant 4a Body SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	SAR (10g)	Reported SAR (10g)	Plot #
MHz	Ch.													(W/kg)			(W/kg)	(W/kg)	(W/kg)	
2402	0	Bluetooth	FHSS	12.75	11.27	-0.18	0 mm	Ant 4a	V2	M3K4XGQPY4	1	back	77.0	0.646	1.406	1.006	0.914	0.258	0.365	
2441	39	Bluetooth	FHSS	12.75	11.79	0.13	0 mm	Ant 4a	V1	LQ2V52MFQ7	1	back	77.0	0.711	1.247	1.006	0.892	0.278	0.349	
2441	39	Bluetooth	FHSS	12.75	11.75	-0.21	0 mm	Ant 4a	V2	M3K4XGQPY4	1	back	77.0	0.847	1.259	1.006	1.073	0.341	0.432	A4
2480	78	Bluetooth	FHSS	12.75	12.42	0.07	0 mm	Ant 4a	V2	M3K4XGQPY4	1	back	77.0	0.702	1.079	1.006	0.762	0.280	0.304	
2480	78	Bluetooth	FHSS	12.75	12.42	-0.18	0 mm	Ant 4a	V2	M3K4XGQPY4	1	top	77.0	0.260	1.079	1.006	0.282	0.078	0.085	
2480	78	Bluetooth	FHSS	12.75	12.42	-0.14	0 mm	Ant 4a	V2	M3K4XGQPY4	1	bottom	77.0	0.007	1.079	1.006	0.008	0.003	0.003	
2480	78	Bluetooth	FHSS	12.75	12.42	0.05	0 mm	Ant 4a	V2	M3K4XGQPY4	1	right	77.0	0.000	1.079	1.006	0.000	0.000	0.000	
2480	78	Bluetooth	FHSS	12.75	12.42	-0.02	0 mm	Ant 4a	V2	M3K4XGQPY4	1	left	77.0	0.485	1.079	1.006	0.526	0.189	0.205	
2480	78	Bluetooth	FHSS	10.75	10.02	0.05	0 mm	Ant 4a	V2	M3K4XGQPY4	1	back	77.0	0.414	1.183	1.006	0.493	0.160	0.190	
2480	78	Bluetooth	FHSS	10.75	10.02	-0.13	0 mm	Ant 4a	V2	M3K4XGQPY4	1	top	77.0	0.190	1.183	1.006	0.226	0.057	0.068	
2480	78	Bluetooth	FHSS	10.75	10.02	0.13	0 mm	Ant 4a	V2	M3K4XGQPY4	1	left	77.0	0.356	1.183	1.006	0.424	0.120	0.143	
2480	78	Bluetooth	FHSS	9.75	8.78	-0.08	0 mm	Ant 4a	V2	M3K4XGQPY4	1	back	77.0	0.315	1.250	1.006	0.396	0.122	0.153	
2480	78	Bluetooth	FHSS	9.75	8.78	-0.14	0 mm	Ant 4a	V2	M3K4XGQPY4	1	top	77.0	0.153	1.250	1.006	0.192	0.047	0.059	
2480	78	Bluetooth	FHSS	9.75	8.78	-0.01	0 mm	Ant 4a	V2	M3K4XGQPY4	1	left	77.0	0.282	1.250	1.006	0.355	0.095	0.119	
2441	39	Bluetooth	FHSS	5.75	5.00	-0.06	0 mm	Ant 4a	V2	M3K4XGQPY4	1	back	77.0	0.152	1.189	1.006	0.182	0.061	0.073	
2441	39	Bluetooth	FHSS	5.75	5.00	-0.08	0 mm	Ant 4a	V2	M3K4XGQPY4	1	top	77.0	0.051	1.189	1.006	0.061	0.015	0.018	
2441	39	Bluetooth	FHSS	5.75	5.00	-0.08	0 mm	Ant 4a	V2	M3K4XGQPY4	1	left	77.0	0.109	1.189	1.006	0.130	0.038	0.045	
2441	39	Bluetooth	FHSS	12.75	11.75	0.16	0 mm	Ant 4a	V2	M3K4XGQPY4	1	back	77.0	0.821	1.259	1.006	1.040	0.331	0.419	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population														Body 1.6 W/kg (mW/g) averaged over 1 gram						

Note: The reported SAR was scaled to the 77.5% transmission duty factor to determine compliance since the duty factor of the device is permanently limited to 77.5% per the manufacturer.

Note: Blue entry represents variability measurement.

Table 10-5
PCB/CBE Spot-check Verification of Data Referencing

MEASUREMENT RESULTS																									
1 CC Uplink | 2CC Uplink	Component Carrier	FREQUENCY		Mode	Service	Bandwidth [MHz]	Waveform	Modulation	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Device Serial Number	RB Size	RB Offset	Side	Duty Cycle	SAR (1g)	Scaling Factor (Power)	Reported SAR (1g)	SAR (10g)	Reported SAR (10g)	Reported SAR for Reference Model (1g)
		MHz	Ch.																(W/kg)		(W/kg)	(W/kg)	(W/kg)	(W/kg)
1 CC Uplink	N/A	707.50	23095	Mid	LTE Band 12	N/A	10	N/A	QPSK	20.50	19.51	0.02	0 mm	Ant 1	W56W2CQQVJ	1	0	Back	1:1	0.723	1.256	0.908	0.325	0.408	0.999
1 CC Uplink	N/A	3690.00	56640	High	LTE Band 48	N/A	20	N/A	QPSK	14.00	13.39	-0.14	0 mm	Ant 1	VX96JL925Q	50	0	Back	1:1.58	0.820	1.151	0.944	0.236	0.272	0.973
1 CC Uplink	N/A	707.50	23095	Mid	LTE Band 12	N/A	10	N/A	QPSK	19.80	19.10	0.08	0 mm	Ant 3	LQ2V52MFQ7	50	0	Back	1:1	0.846	1.175	0.994	0.428	0.503	0.999
2CC Uplink	PCC	3690.00	56640	High	LTE Band 48 ULCA	N/A	20	N/A	QPSK	13.00	12.82	-0.16	0 mm	Ant 3	DJKC9YP29G	100	0	Back	1:1.58	0.904	1.042	0.942	0.248	0.258	0.968
2CC Uplink	SCC	3670.20	56442	High	LTE Band 48 ULCA	N/A	20	N/A								100	0								
N/A	N/A	3930.00	662000	High	NR n77	N/A	100	DFT-s-OFDM	QPSK	9.80	8.01	-0.18	0 mm	Ant 2a	M3K4XGQPY4	1	271	Back	1:1	0.459	1.510	0.693	0.126	0.190	0.701
1 CC Uplink	N/A	3560.00	55340	Low	LTE Band 48	N/A	20	N/A	QPSK	13.40	12.64	0.02	0 mm	Ant 2a	M3K4XGQPY4	50	50	Right	1:1.58	0.814	1.191	0.969	0.213	0.254	0.996
1 CC Uplink	N/A	1770.00	132572	High	LTE Band 66	N/A	20	N/A	QPSK	15.00	14.21	-0.02	0 mm	Ant 2b	DJKC9YP29G	50	25	Bottom	1:1	0.798	1.199	0.957	0.305	0.247	0.983
N/A	N/A	1752.60	1513	High	UMTS 1750	RMC	N/A	N/A	N/A	14.10	13.17	0.11	0 mm	Ant 4b	DJKC9YP29G	N/A		Back	1:1	0.799	1.239	0.990	0.331	0.321	0.999
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Body 1.6 W/kg (mW/g) averaged over 1 gram										

Table 10-6
DSS/DTS Spot-check Verification of Data Referencing

MEASUREMENT RESULTS																						
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	SAR (10g)	Reported SAR (10g)	Reported SAR for Reference Model (1g)
MHz	Ch.														(W/kg)			(W/kg)	(W/kg)	(W/kg)	(W/kg)
2412.00	1	802.11b	DSSS	22	11.50	10.25	0.13	0 mm	Ant 2a	V1	LQ2V52MFQ7	1	Back	100.0	0.703	1.334	1.000	0.938	0.275	0.367	1.047
2441.00	39	Bluetooth	FHSS	N/A	14.00	13.50	-0.14	0 mm	Ant 2a	V2	NY07QJRF6M	1	Back	76.8	0.729	1.122	1.009	0.823	0.285	0.322	1.010
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram													

Note: The reported BT SAR was scaled to the 77.5% transmission duty factor to determine compliance since the duty factor of the device is permanently limited to 77.5% per the manufacturer.

Table 10-7
NII Spot-check Verification of Data Referencing

MEASUREMENT RESULTS																						
FREQUENCY		Mode	Service	Bandwidth [MHz]	Modulation	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	SAR (10g)	Reported SAR (10g)	Reported SAR for Reference Model (1g)
MHz	Ch.															(W/kg)			(W/kg)	(W/kg)	(W/kg)	(W/kg)
5690.00	138	802.11ac	OFDM	80	N/A	9.00	7.95	-0.20	0 mm	Ant 4b	V1	NVK6KVY4NP	29.3	Back	96.1	0.674	1.274	1.041	0.894	0.193	0.256	1.093
5775.00	155	802.11ac	OFDM	80	N/A	17.75	17.57	-0.16	0 mm	Ant 5b	V2	DJKC9YP29G	29.3	Right	96.1	0.993	1.042	1.041	1.077	0.311	0.337	1.179
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Body 1.6 W/kg (mW/g) averaged over 1 gram													

10.2 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in FCC KDB Publication 616217 D04v01r02, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 11.4 for variability analysis.
7. FCC KDB Publication 616217 D04v01r02 Section 4.3, SAR tests are required for the back surface and edges of the tablet with the tablet touching the phantom. The SAR Exclusion Threshold in FCC KDB 447498 D01v06 was applied to determine SAR test exclusion for adjacent edge configurations.
8. The orange highlights throughout the report represents the highest scaled SAR per Equipment Class.
9. This device uses Smart Transmit for 2G/3G/4G/5G operations to control and manage transmitting power in real time to ensure RF Exposure compliance. Per FCC Guidance, compliance for was assessed at the minimum of the time averaged power and the maximum output power for each band/mode/exposure condition (DSI).
10. This device is depopulated version of the fully populated reference model FCC ID: BCGA2301. The worst case configurations of reference model for each equipment class and antenna was selected for spot-check verification with variant model. The spot-check verification results showed negligible impact of RF Exposure from depopulation. SAR data of antenna 1/2a/2b/3/4b/5b was referenced based on the reference model test results.

LTE Notes:

1. LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 7.5.4.

2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 and MCC=001 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported LTE Band 41 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for 1g evaluations, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.
6. Per KDB Publication 941225 D05Av01r02, SAR for downlink only LTE CA operations was not needed since the maximum average output power in LTE CA mode was not >0.25 dB higher than the maximum output power when downlink carrier aggregation was inactive.
7. This device supports Power Class 2 and Power Class 3 operations for LTE Band 41. The highest available duty cycle for Power Class 2 operations is 43.3 % using UL-DL configuration 1. Per FCC Guidance, all SAR tests were performed using Power Class 3. SAR with power class 2 at the available duty factor was additionally performed for the power class 3 configuration with the highest SAR configuration for each exposure conditions. Please see Section 13 for linearity results.
8. For LTE Band 5, LTE Band 7, LTE Band 41, and LTE Band 48, per FCC guidance, SAR was first measured with only a single carrier active in the uplink (carrier aggregation not active). For each exposure condition, the uplink CA scenario with two component carriers was additionally tested for the configuration with the highest SAR when carrier aggregation was not active. The SCC was configured with the closest available contiguous channel. The two component carriers were configured so the resource blocks are physically allocated side by side to achieve the maximum output power.
9. This device supports LTE Band 41 ULCA active with Power Class 2. Highest SAR test configuration for each exposure condition in Power Class 3 with ULCA active was repeated with Power Class 2 with ULCA active.

NR Notes:

1. NR implementation supports SA and NSA modes. NR implementation in EN-DC mode operates with the LTE Bands shown in the NR FR1 checklist acting as anchor bands. Per FCC guidance, SAR tests for NR Bands and LTE Anchors Bands were performed separately due to limitations in SAR probe calibration factors.
2. Per FCC KDB Publication 447498 D01v06, when the reported NR n77 SAR measured at the highest output power channel in a given a test configuration was > 0.4 W/kg for 1g evaluations, testing at the other channels was required for such test configurations.
3. Due to test setup limitations, SAR testing for NR was performed using test mode software to establish the connection.
4. Simultaneous transmission analysis for EN-DC operations is addressed in the Part 2 Test Report (Serial Number can be found in the bibliography).
5. This device additionally supports some EN-DC conditions where additional LTE carriers are added on the downlink only.
6. NR Test Configurations were selected per the following guidelines per FCC Guidance:
    a. MPR is permanently implemented per 3GPP standards. Conducted power and SAR test configurations were identified for RB configurations/modulations with MPR=0 dB as the most conservative SAR scenarios 1 RB and 50% RB allocations with a low, mid and high offset within

the “Inner RB allocation” range were selected to identify the configurations with the highest power.

b. The SAR test guidance outlined in section 5 of KDB 941225 D05 was generally adapted for the NR testing. DFT-S-OFDM QPSK was used as the lowest order modulation. Additional modulations were not required since conducted power was not > 0.5 dB higher than the lowest order modulation.

c. All available SCS settings for this device were evaluated. The NR checklist contains information about the SCS settings per band.

7. This device supports Power Class 2 and Power Class 3 operations for NR Band n41 and NR Band n77. The highest available duty cycle for Power Class 2 operations is 50.0%. Per FCC Guidance, all SAR tests were performed using Power Class 3. SAR with power class 2 at the available duty factor was additionally performed for the power class 3 configuration with the highest SAR configuration for each exposure conditions. Please see Section 13 for linearity results.

WLAN Notes:

1. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n/ax) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 7.6.4 for more information.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg for 1g evaluations. See Section 7.6.5 for more information.
3. Per KDB Publication 248227 D01v02r02, SAR for MIMO was evaluated by following the simultaneous SAR provisions from KDB Publication 447498 D01v06 by either evaluating the sum of the 1g SAR values of each antenna transmitting independently or making a SAR measurement with both antennas transmitting simultaneously. Please see Section 11 for complete analysis.
4. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg for 1g evaluations or all test channels were measured.
5. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated EMC test reports.

Bluetooth Notes

1. Bluetooth SAR was evaluated with a test mode with hopping disabled with DH5 operation. The reported SAR was scaled to the 77.5% transmission duty factor to determine compliance since the duty factor of the device is limited to 77.5% per the manufacturer. See Section 10.6 for the time domain plot and calculation for the duty factor of the device.

11 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

11.1 Introduction

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

11.2 Simultaneous Transmission Procedures

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

Note:
SAR Summations for some scenarios when the output power levels are reduced, SAR values at the maximum output power level were used as the most conservative evaluation for simultaneous transmission analysis.

For each position, the highest SAR value across all modes for the applicable cellular band antenna was considered for summation to determine simultaneous SAR test exclusion.

*The SAR distributions for at least one of the antennas are spatially separated from the other antennas per FCC KDB Publication 248227 Section 6.1 procedures. Therefore, the simultaneous transmission were treated independently for this configuration. See section 11.4 for more information about the Spatial Separation Analysis.

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

Please see complete compliance evaluation of reference FCC ID: BCGA2301 in RF Exposure Technical Report S/N: 1C2101020002-01.BCG (Rev 1) for the standalone reported SAR for modes and bands not evaluated for variant models.

Note: SAR data of Antenna 1/2a/2b/3/4b/5b was referenced from reference model FCC ID: BCGA2301 in RF exposure Technical report S/N: 1C2101020002-01.BCG (Rev 1).

11.3 Body SAR Simultaneous Transmission Analysis

Table 11-1
Cellular Band Ant 1 Simultaneous Transmission Scenario with 2.4 GHz WLAN

Simult Tx	Configuration	Cellular Band Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2a SAR (W/kg)	2.4 GHz WLAN Ant 4a SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.999	1.047	1.039	1.047*	1.039*	1.047*
	Top	0.041	0.000	0.331	0.041	0.372	0.372
	Bottom	0.737	0.289	0.004	1.026	0.741	**1.030**
	Right	0.055	0.796	0.001	0.851	0.056	0.852
	Left	0.999	0.000	0.910	0.999	0.999*	0.999*

Table 11-2
Cellular Band Ant 2a Simultaneous Transmission Scenario with 2.4 GHz WLAN

Simult Tx	Configuration	Cellular Band Ant 2a SAR (W/kg)	2.4 GHz WLAN Ant 2a 3dB Backoff SAR (W/kg)	2.4 GHz WLAN Ant 4a SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.640	0.414	1.039	**1.054**	1.039*	1.054*
	Top	0.003	0.000	0.331	0.003	0.334	0.334
	Bottom	0.190	0.153	0.004	0.343	0.194	0.347
	Right	0.685	0.356	0.001	1.041	0.686	1.042
	Left	0.000	0.000	0.910	0.000	0.910	0.910

Table 11-3
Cellular Band Ant 2b Simultaneous Transmission Scenario with 2.4 GHz WLAN

Simult Tx	Configuration	Cellular Band Ant 2b SAR (W/kg)	2.4 GHz WLAN Ant 2a 3dB Backoff SAR (W/kg)	2.4 GHz WLAN Ant 4a SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.937	0.414	1.039	**1.351**	1.039*	1.351*
	Top	0.024	0.000	0.331	0.024	0.355	0.355
	Bottom	0.983	0.153	0.004	1.136	0.987	1.140
	Right	0.060	0.356	0.001	0.416	0.061	0.417
	Left	0.023	0.000	0.910	0.023	0.933	0.933

Table 11-4
Cellular Band Ant 3 Simultaneous Transmission Scenario with 2.4 GHz WLAN

Simult Tx	Configuration	Cellular Band Ant 3 SAR (W/kg)	2.4 GHz WLAN Ant 2a SAR (W/kg)	2.4 GHz WLAN Ant 4a SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.999	1.047	1.039	1.047*	1.039*	1.047*
	Top	0.990	0.000	0.331	0.990	**1.321**	**1.321**
	Bottom	0.047	0.289	0.004	0.336	0.051	0.340
	Right	0.961	0.796	0.001	0.961*	0.962	0.962*
	Left	0.042	0.000	0.910	0.042	0.952	0.952

Table 11-5
Cellular Band Ant 4a Simultaneous Transmission Scenario with 2.4 GHz WLAN

Simult Tx	Configuration	Cellular Band Ant 4a SAR (W/kg)	2.4 GHz WLAN Ant 2a SAR (W/kg)	2.4 GHz WLAN Ant 4a 3dB Backoff SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.908	1.047	0.408	1.047*	**1.316**	1.316*
	Top	0.240	0.000	0.148	0.240	0.388	0.388
	Bottom	0.000	0.289	0.004	0.289	0.004	0.293
	Right	0.000	0.796	0.001	0.796	0.001	0.797
	Left	0.934	0.000	0.351	0.934	1.285	1.285

Table 11-6
Cellular Band Ant 4b Simultaneous Transmission Scenario with 2.4 GHz WLAN

Simult Tx	Configuration	Cellular Band Ant 4b SAR (W/kg)	2.4 GHz WLAN Ant 2a SAR (W/kg)	2.4 GHz WLAN Ant 4a 3dB Backoff SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.999	1.047	0.408	1.047*	**1.407**	1.407*
	Top	0.999	0.000	0.148	0.999	1.147	1.147
	Bottom	0.006	0.289	0.004	0.295	0.010	0.299
	Right	0.021	0.796	0.001	0.817	0.022	0.818
	Left	0.058	0.000	0.351	0.058	0.409	0.409

Table 11-7
Cellular Band Ant 4a Simultaneous Transmission Scenario with 5 GHz WLAN

Simult Tx	Configuration	Cellular Band Ant 4a SAR (W/kg)	5 GHz WLAN Ant 4b 6dB Backoff SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.908	0.283	0.161	1.191	1.069	**1.352**
	Top	0.240	0.202	0.000	0.442	0.240	0.442
	Bottom	0.000	0.001	0.036	0.001	0.036	0.037
	Right	0.000	0.015	1.179	0.015	1.179	1.194
	Left	0.934	0.044	0.024	0.978	0.958	1.002

Table 11-8
Cellular Band Ant 1 Simultaneous Transmission Scenario with 2.4 GHz BT

Simult Tx	Configuration	Cellular Band Ant 1 SAR (W/kg)	Bluetooth Ant 2a 4dB Backoff SAR (W/kg)	Bluetooth Ant 4a SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.999	0.297	1.073	1.296	1.073*	1.073*
	Top	0.041	0.020	0.282	0.061	0.323	0.343
	Bottom	0.737	0.131	0.008	0.868	0.745	0.876
	Right	0.055	0.289	0.000	0.344	0.055	0.344
	Left	0.999	0.000	0.526	0.999	**1.525**	**1.525**

Table 11-9
Cellular Band Ant 2a Simultaneous Transmission Scenario with 2.4 GHz BT

Simult Tx	Configuration	Cellular Band Ant 2a SAR (W/kg)	Bluetooth Ant 2a 4dB Backoff SAR (W/kg)	Bluetooth Ant 4a SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.640	0.297	1.073	0.937	1.073*	1.073*
	Top	0.003	0.020	0.282	0.023	0.285	0.305
	Bottom	0.190	0.131	0.008	0.321	0.198	0.329
	Right	0.685	0.289	0.000	0.974	0.685	**0.974**
	Left	0.000	0.000	0.526	0.000	0.526	0.526

Table 11-10
Cellular Band Ant 2b Simultaneous Transmission Scenario with 2.4 GHz BT

Simult Tx	Configuration	Cellular Band Ant 2b SAR (W/kg)	Bluetooth Ant 2a 4dB Backoff SAR (W/kg)	Bluetooth Ant 4a SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.937	0.297	1.073	**1.234**	1.073*	1.234*
	Top	0.024	0.020	0.282	0.044	0.306	0.326
	Bottom	0.983	0.131	0.008	1.114	0.991	1.122
	Right	0.060	0.289	0.000	0.349	0.060	0.349
	Left	0.023	0.000	0.526	0.023	0.549	0.549

Table 11-11
Cellular Band Ant 3 Simultaneous Transmission Scenario with 2.4 GHz BT

Simult Tx	Configuration	Cellular Band Ant 3 SAR (W/kg)	Bluetooth Ant 2a SAR (W/kg)	Bluetooth Ant 4a 3dB Backoff SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.999	1.010	0.396	1.010*	**1.395**	1.010*
	Top	0.990	0.020	0.192	1.010	1.182	1.202
	Bottom	0.047	0.219	0.008	0.266	0.055	0.274
	Right	0.961	0.881	0.000	0.961*	0.961	0.961*
	Left	0.042	0.000	0.355	0.042	0.397	0.397

Table 11-12
Cellular Band Ant 4a Simultaneous Transmission Scenario with 2.4 GHz BT

Simult Tx	Configuration	Cellular Band Ant 4a SAR (W/kg)	Bluetooth Ant 2a SAR (W/kg)	Bluetooth Ant 4a 3dB Backoff SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.908	1.010	0.396	1.010*	**1.304**	1.304*
	Top	0.240	0.020	0.192	0.260	0.432	0.452
	Bottom	0.000	0.219	0.008	0.219	0.008	0.227
	Right	0.000	0.881	0.000	0.881	0.000	0.881
	Left	0.934	0.000	0.355	0.934	1.289	1.289

Table 11-13
Cellular Band Ant 4b Simultaneous Transmission Scenario with 2.4 GHz BT

Simult Tx	Configuration	Cellular Band Ant 4b SAR (W/kg)	Bluetooth Ant 2a SAR (W/kg)	Bluetooth Ant 4a 3dB Backoff SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Body SAR	Back	0.999	1.010	0.396	1.010*	**1.395**	1.395*
	Top	0.999	0.020	0.192	1.019	1.191	1.211
	Bottom	0.006	0.219	0.008	0.225	0.014	0.233
	Right	0.021	0.881	0.000	0.902	0.021	0.902
	Left	0.058	0.000	0.355	0.058	0.413	0.413

Table 11-14
Cellular Band Ant 1 Simultaneous Transmission Scenario with 2.4 GHz BT and 5GHz WLAN MIMO

Simult Tx	Configuration	Cellular Band Ant 1 SAR (W/kg)	Bluetooth Ant 2a 4dB Backoff SAR (W/kg)	Bluetooth Ant 4a 2dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.999	0.297	0.493	1.093	0.161	1.586*
	Top	0.041	0.020	0.226	0.705	0.000	0.992
	Bottom	0.737	0.131	0.008	0.001	0.036	0.913
	Right	0.055	0.289	0.000	0.015	1.179	**1.538**
	Left	0.999	0.000	0.424	0.044	0.024	1.491

Table 11-15
Cellular Band Ant 2a Simultaneous Transmission Scenario with 2.4 GHz BT and 5GHz WLAN MIMO

Simult Tx	Configuration	Cellular Band Ant 2a SAR (W/kg)	Bluetooth Ant 2a 4dB Backoff SAR (W/kg)	Bluetooth Ant 4a 2dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b 4dB Backoff SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.640	0.297	0.493	1.093	0.066	1.586*
	Top	0.003	0.020	0.226	0.705	0.000	0.954
	Bottom	0.190	0.131	0.008	0.001	0.036	0.366
	Right	0.685	0.289	0.000	0.015	0.497	**1.486**
	Left	0.000	0.000	0.424	0.044	0.024	0.492

Table 11-16
Cellular Band Ant 2b Simultaneous Transmission Scenario with 2.4 GHz BT and 5GHz WLAN MIMO

Simult Tx	Configuration	Cellular Band Ant 2b SAR (W/kg)	Bluetooth Ant 2a 4dB Backoff SAR (W/kg)	Bluetooth Ant 4a 2dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b 4dB Backoff SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.937	0.297	0.493	1.093	0.066	1.586*
	Top	0.024	0.020	0.226	0.705	0.000	0.975
	Bottom	0.983	0.131	0.008	0.001	0.036	**1.159**
	Right	0.060	0.289	0.000	0.015	0.497	0.861
	Left	0.023	0.000	0.424	0.044	0.024	0.515

Table 11-17
Cellular Band Ant 3 Simultaneous Transmission Scenario with 2.4 GHz BT and 5GHz WLAN MIMO

Simult Tx	Configuration	GPRS 850 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.792	0.349	0.182	1.093	0.161	1.275*
	Top	0.693	0.020	0.061	0.705	0.000	**1.479**
	Bottom	0.012	0.170	0.008	0.001	0.036	0.227
	Right	0.201	0.313	0.000	0.015	1.179	1.507*
	Left	0.025	0.000	0.130	0.044	0.024	0.223
Simult Tx	Configuration	GPRS 1900 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.601	0.349	0.182	1.093	0.161	1.275*
	Top	0.376	0.020	0.061	0.705	0.000	**1.162**
	Bottom	0.022	0.170	0.008	0.001	0.036	0.237
	Right	0.563	0.313	0.000	0.015	1.179	1.507*
	Left	0.002	0.000	0.130	0.044	0.024	0.200

Simult Tx	Configuration	UMTS 850 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.831	0.349	0.182	1.093	0.161	1.275*
	Top	0.653	0.020	0.061	0.705	0.000	**1.439**
	Bottom	0.014	0.170	0.008	0.001	0.036	0.229
	Right	0.389	0.313	0.000	0.015	1.179	1.507*
	Left	0.028	0.000	0.130	0.044	0.024	0.226

Simult Tx	Configuration	UMTS 1750 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.603	0.349	0.182	1.093	0.161	1.275*
	Top	0.207	0.020	0.061	0.705	0.000	**0.993**
	Bottom	0.040	0.170	0.008	0.001	0.036	0.255
	Right	0.946	0.313	0.000	0.015	1.179	1.507*
	Left	0.006	0.000	0.130	0.044	0.024	0.204

Simult Tx	Configuration	UMTS 1900 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.916	0.349	0.182	1.093	0.161	1.275*
	Top	0.465	0.020	0.061	0.705	0.000	**1.251**
	Bottom	0.036	0.170	0.008	0.001	0.036	0.251
	Right	0.677	0.313	0.000	0.015	1.179	1.507*
	Left	0.004	0.000	0.130	0.044	0.024	0.202

Simult Tx	Configuration	LTE Band 71 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.952	0.349	0.182	1.093	0.161	1.275*
	Top	0.701	0.020	0.061	0.705	0.000	**1.487**
	Bottom	0.013	0.170	0.008	0.001	0.036	0.228
	Right	0.292	0.313	0.000	0.015	1.179	1.507*
	Left	0.032	0.000	0.130	0.044	0.024	0.230

Simult Tx	Configuration	LTE Band 12 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.999	0.349	0.182	1.093	0.161	1.275*
	Top	0.721	0.020	0.061	0.705	0.000	**1.507**
	Bottom	0.020	0.170	0.008	0.001	0.036	0.235
	Right	0.284	0.313	0.000	0.015	1.179	1.507*
	Left	0.032	0.000	0.130	0.044	0.024	0.230

Simult Tx	Configuration	LTE Band 13 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.804	0.349	0.182	1.093	0.161	1.275*
	Top	0.678	0.020	0.061	0.705	0.000	**1.464**
	Bottom	0.014	0.170	0.008	0.001	0.036	0.229
	Right	0.261	0.313	0.000	0.015	1.179	1.507*
	Left	0.030	0.000	0.130	0.044	0.024	0.228

Simult Tx	Configuration	LTE Band 14 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.735	0.349	0.182	1.093	0.161	1.275*
	Top	0.591	0.020	0.061	0.705	0.000	**1.377**
	Bottom	0.016	0.170	0.008	0.001	0.036	0.231
	Right	0.229	0.313	0.000	0.015	1.179	1.507*
	Left	0.028	0.000	0.130	0.044	0.024	0.226

Simult Tx	Configuration	LTE Band 26 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.887	0.349	0.182	1.093	0.161	1.275*
	Top	0.723	0.020	0.061	0.705	0.000	**1.509**
	Bottom	0.016	0.170	0.008	0.001	0.036	0.231
	Right	0.273	0.313	0.000	0.015	1.179	1.507*
	Left	0.024	0.000	0.130	0.044	0.024	0.222

Simult Tx	Configuration	LTE Band 5 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.929	0.349	0.182	1.093	0.161	1.275*
	Top	0.712	0.020	0.061	0.705	0.000	**1.498**
	Bottom	0.019	0.170	0.008	0.001	0.036	0.234
	Right	0.271	0.313	0.000	0.015	1.179	1.507*
	Left	0.036	0.000	0.130	0.044	0.024	0.234

Simult Tx	Configuration	LTE Band 66 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.543	0.349	0.182	1.093	0.161	1.275*
	Top	0.193	0.020	0.061	0.705	0.000	**0.979**
	Bottom	0.047	0.170	0.008	0.001	0.036	0.262
	Right	0.894	0.313	0.000	0.015	1.179	1.507*
	Left	0.003	0.000	0.130	0.044	0.024	0.201

Simult Tx	Configuration	LTE Band 25 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.690	0.349	0.182	1.093	0.161	1.275*
	Top	0.387	0.020	0.061	0.705	0.000	1.173
	Bottom	0.026	0.170	0.008	0.001	0.036	0.241
	Right	0.513	0.313	0.000	0.015	1.179	1.507*
	Left	0.002	0.000	0.130	0.044	0.024	0.200

Simult Tx	Configuration	LTE Band 30 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.987	0.349	0.182	1.093	0.161	1.275*
	Top	0.635	0.020	0.061	0.705	0.000	**1.421**
	Bottom	0.016	0.170	0.008	0.001	0.036	0.231
	Right	0.675	0.313	0.000	0.015	1.179	1.507*
	Left	0.000	0.000	0.130	0.044	0.024	0.198

Simult Tx	Configuration	LTE Band 7 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.531	0.349	0.182	1.093	0.161	1.275*
	Top	0.990	0.020	0.061	0.705	0.000	See Table Below
	Bottom	0.002	0.170	0.008	0.001	0.036	0.217
	Right	0.199	0.313	0.000	0.015	1.179	1.507*
	Left	0.012	0.000	0.130	0.044	0.024	**0.210**

Simult Tx	Configuration	LTE Band 7 Ant 3 & 5 GHz WLAN Ant 4b SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Top	0.836	0.020	0.061	0.000	0.917

Simult Tx	Configuration	LTE Band 41 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.436	0.349	0.182	1.093	0.161	1.275*
	Top	0.974	0.020	0.061	0.705	0.000	See Table Below
	Bottom	0.011	0.170	0.008	0.001	0.036	**0.226**
	Right	0.190	0.313	0.000	0.015	1.179	1.507*
	Left	0.006	0.000	0.130	0.044	0.024	0.204

Simult Tx	Configuration	LTE Band 41 Ant 3 & 5 GHz WLAN Ant 4b SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Top	0.866	0.020	0.061	0.000	0.947

Simult Tx	Configuration	LTE Band 48 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.968	0.349	0.182	1.093	0.161	1.275*
	Top	0.521	0.020	0.061	0.705	0.000	1.307
	Bottom	0.001	0.170	0.008	0.001	0.036	0.216
	Right	0.013	0.313	0.000	0.015	1.179	**1.520**
	Left	0.007	0.000	0.130	0.044	0.024	0.205

Simult Tx	Configuration	NR Band n71 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.841	0.349	0.182	1.093	0.161	1.275*
	Top	0.619	0.020	0.061	0.705	0.000	**1.405**
	Bottom	0.012	0.170	0.008	0.001	0.036	0.227
	Right	0.339	0.313	0.000	0.015	1.179	1.507*
	Left	0.042	0.000	0.130	0.044	0.024	0.240

Simult Tx	Configuration	NR Band n12 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.906	0.349	0.135	1.093	0.161	1.275*
	Top	0.623	0.020	0.055	0.705	0.000	**1.403**
	Bottom	0.020	0.170	0.008	0.001	0.036	0.235
	Right	0.390	0.313	0.001	0.015	1.179	1.507*
	Left	0.025	0.000	0.150	0.044	0.024	0.243

Simult Tx	Configuration	NR Band n5 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.958	0.349	0.135	1.093	0.161	1.275*
	Top	0.740	0.020	0.055	0.705	0.000	**1.520**
	Bottom	0.016	0.170	0.008	0.001	0.036	0.231
	Right	0.335	0.313	0.001	0.015	1.179	1.507*
	Left	0.039	0.000	0.150	0.044	0.024	0.257

Simult Tx	Configuration	NR Band n66 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.568	0.349	0.182	1.093	0.161	1.275*
	Top	0.169	0.020	0.061	0.705	0.000	**0.955**
	Bottom	0.034	0.170	0.008	0.001	0.036	0.249
	Right	0.961	0.313	0.000	0.015	1.179	1.507*
	Left	0.005	0.000	0.130	0.044	0.024	0.203

Simult Tx	Configuration	NR Band n25 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.712	0.349	0.182	1.093	0.161	1.275*
	Top	0.340	0.020	0.061	0.705	0.000	**1.126**
	Bottom	0.015	0.170	0.008	0.001	0.036	0.230
	Right	0.484	0.313	0.000	0.015	1.179	1.507*
	Left	0.000	0.000	0.130	0.044	0.024	0.198

Simult Tx	Configuration	NR Band n41 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.514	0.349	0.182	1.093	0.161	1.275*
	Top	0.983	0.020	0.061	0.705	0.000	See Table Below
	Bottom	0.004	0.170	0.008	0.001	0.036	0.219
	Right	0.204	0.313	0.000	0.015	1.179	1.507*
	Left	0.010	0.000	0.130	0.044	0.024	**0.208**

Simult Tx	Configuration	NR Band n41 Ant 3 & 5 GHz WLAN Ant 4b SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Top	0.904	0.020	0.061	0.000	0.985

Simult Tx	Configuration	NR Band n77 Ant 3 SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.930	0.349	0.182	1.093	0.161	1.275*
	Top	0.522	0.020	0.061	0.705	0.000	**1.308**
	Bottom	0.000	0.170	0.008	0.001	0.036	0.215
	Right	0.414	0.313	0.000	0.015	1.179	1.507*
	Left	0.013	0.000	0.130	0.044	0.024	0.211

Table 11-18
Cellular Band Ant 4a Simultaneous Transmission Scenario with 2.4 GHz BT and 5GHz WLAN MIMO

Simult Tx	Configuration	Cellular Band Ant 4a SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b 6dB Backoff SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.908	0.349	0.182	0.283	0.161	1.373*
	Top	0.240	0.020	0.061	0.202	0.000	0.523
	Bottom	0.000	0.170	0.008	0.001	0.036	0.215
	Right	0.000	0.313	0.000	0.015	1.179	**1.507**
	Left	0.934	0.000	0.130	0.044	0.024	1.132

Table 11-19
Cellular Band Ant 4b Simultaneous Transmission Scenario with 2.4 GHz BT and 5GHz WLAN MIMO

Simult Tx	Configuration	Cellular Band Ant 4b SAR (W/kg)	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 7dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b 6dB Backoff SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.999	0.349	0.182	0.283	0.161	1.464*
	Top	0.999	0.020	0.061	0.202	0.000	1.282
	Bottom	0.006	0.170	0.008	0.001	0.036	0.221
	Right	0.021	0.313	0.000	0.015	1.179	**1.528**
	Left	0.058	0.000	0.130	0.044	0.024	0.256

Table 11-20
2.4 GHz BT Ant 2a Simultaneous Transmission Scenario with 5GHz WLAN MIMO

Simult Tx	Configuration	Bluetooth Ant 2a 3dB Backoff SAR (W/kg)	Bluetooth Ant 4a 3dB Backoff SAR (W/kg)	5 GHz WLAN Ant 4b SAR (W/kg)	5 GHz WLAN Ant 5b SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.349	0.396	1.093	0.161	1.489*
	Top	0.020	0.192	0.705	0.000	0.917
	Bottom	0.170	0.008	0.001	0.036	0.215
	Right	0.313	0.000	0.015	1.179	**1.507**
	Left	0.000	0.355	0.044	0.024	0.423

Table 11-21
Simultaneous Transmission Scenario with 2.4 GHz Bluetooth

Simult Tx	Configuration	Bluetooth Ant 2a SAR (W/kg)	Bluetooth Ant 4a SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Body SAR	Back	1.010	1.073	1.073*
	Top	0.020	0.282	0.302
	Bottom	0.219	0.008	0.227
	Right	0.881	0.000	0.881
	Left	0.000	0.526	0.526

11.4 Spatial Separation Analysis

Per FCC KDB Publication 248227, antennas may be considered spatially separated when the aggregate SAR from multiple antennas at any location in the combined SAR distribution is either ≤ 1.2 W/kg where at least 90% of the SAR is attributed to a single SAR distribution or ≤ 0.4 W/kg where no more than one SAR distribution is contributing > 0.1 W/kg.

Spatial separation was determined by inspection of the area scan SAR distributions to confirm that at all locations, SAR was < 1.2 W/kg, where at least 90% of the SAR is attributed to a single SAR distribution. See below for illustrations of the spatial separated antennas considered.

11.4.1 Back Side Spatial Separation Analysis

Figure 11-1
Back Side Spatial Separation for Antenna 1 and Antenna 2a

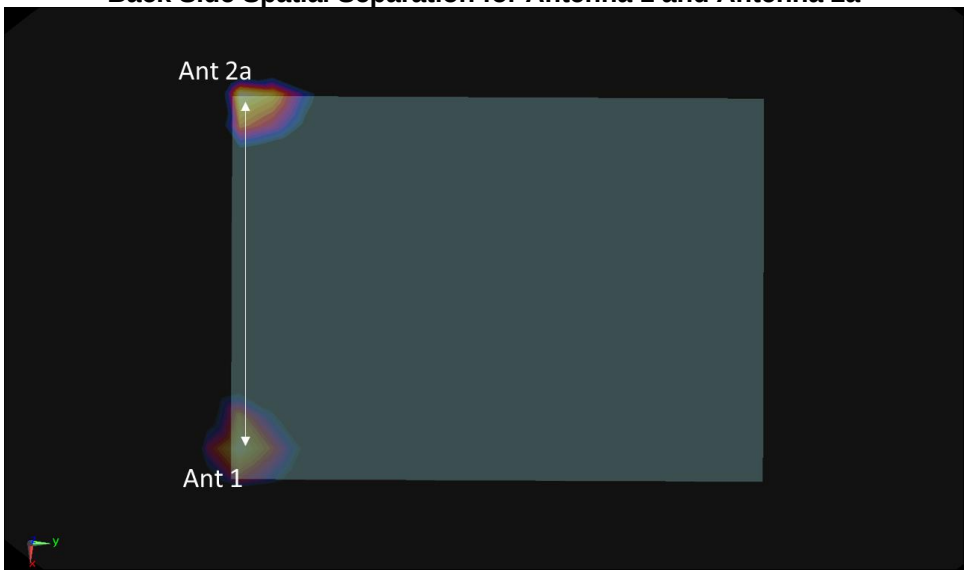


Figure 11-2
Back Side Spatial Separation for Antenna 1 and Antenna 4a

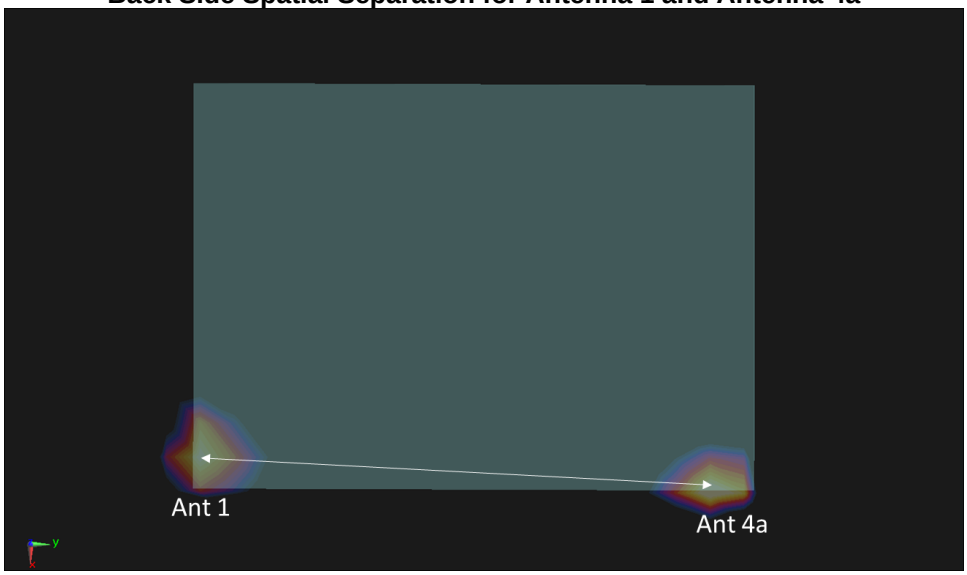


Figure 11-3
Back Side Spatial Separation for Antenna 2a and Antenna 4a

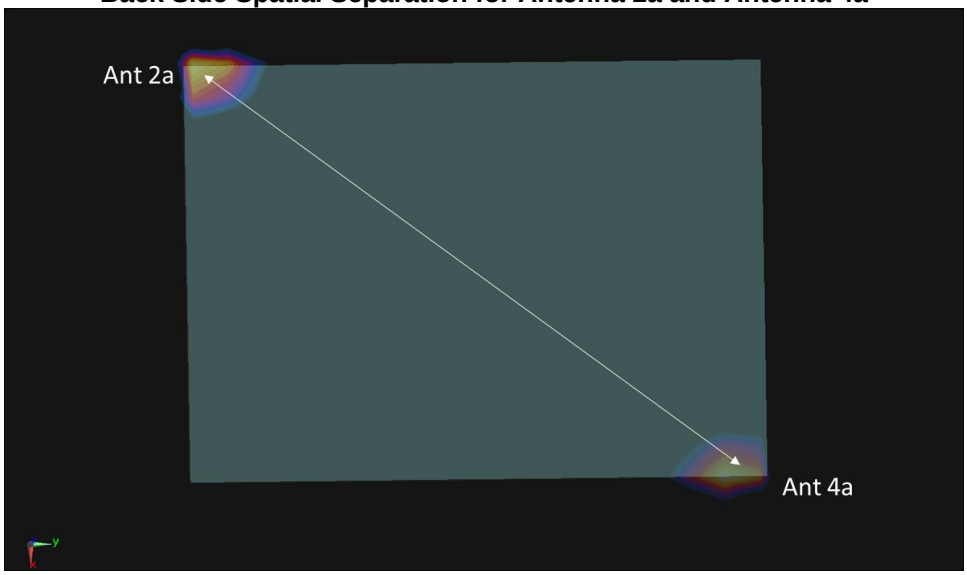


Figure 11-4
Back Side Spatial Separation for Antenna 2b and Antenna 4a

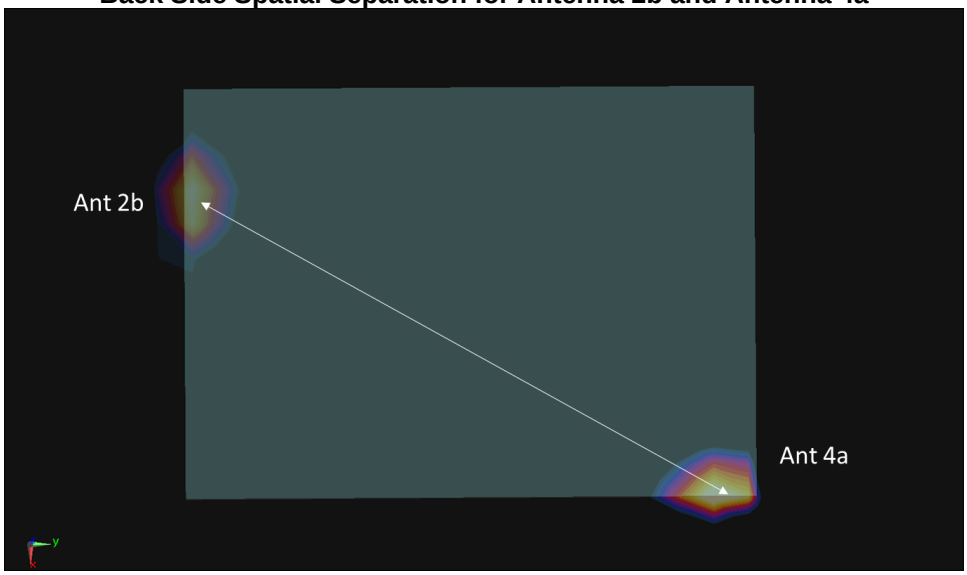


Figure 11-5
Back Side Spatial Separation for Antenna 3 and Antenna 2a

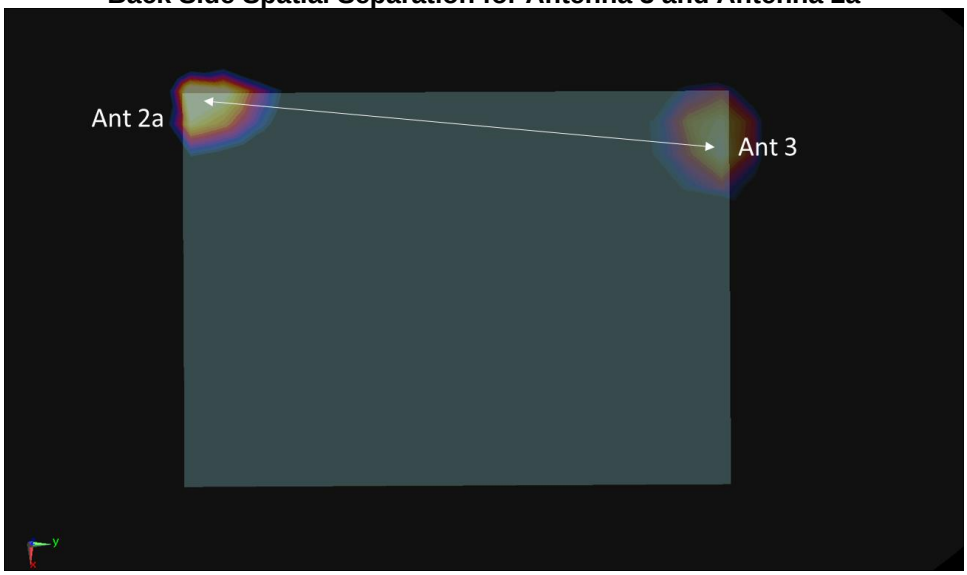


Figure 11-6
Back Side Spatial Separation for Antenna 3 and Antenna 4a

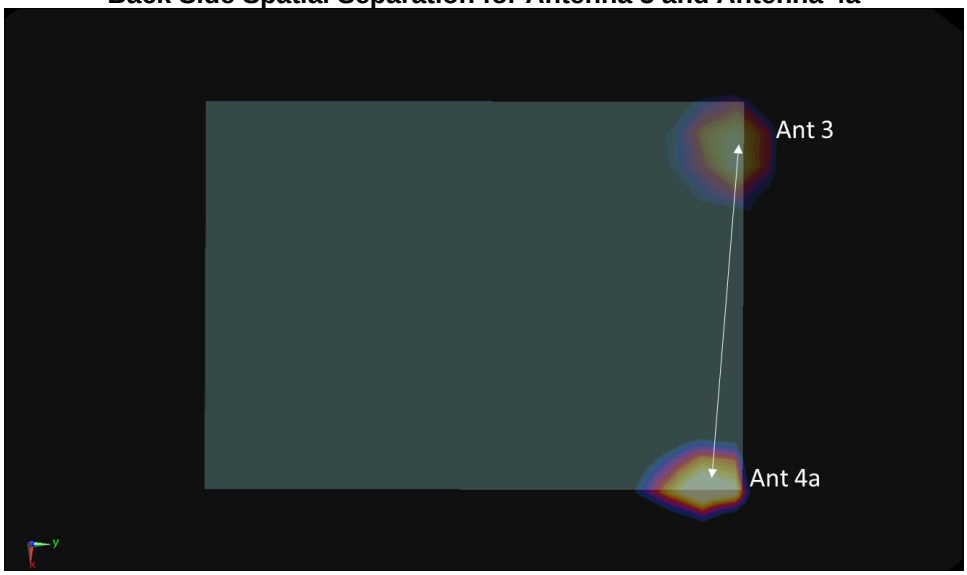


Figure 11-7
Back Side Spatial Separation for Antenna 4b and Antenna 2a

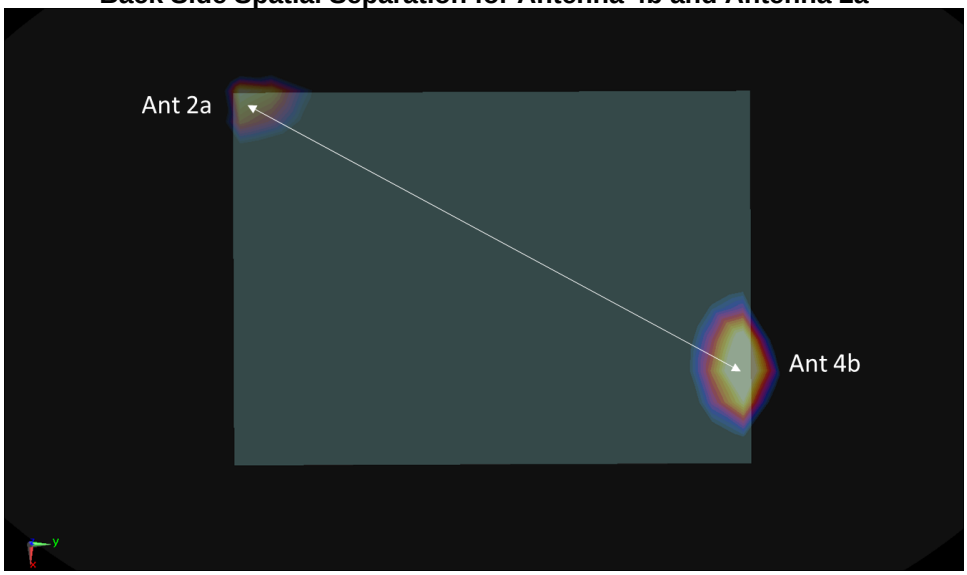


Figure 11-8
Back Side Spatial Separation for Antenna 4b and Antenna 1

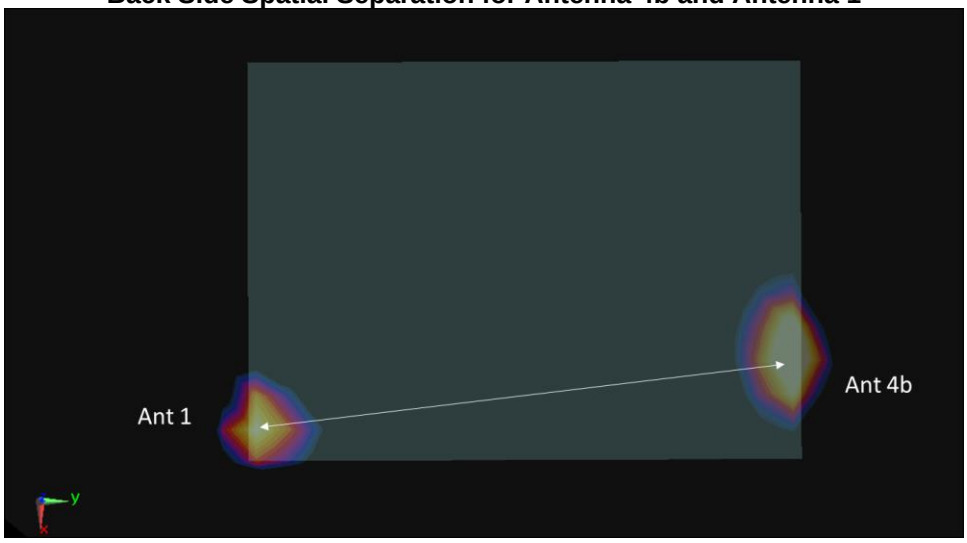


Figure 11-9
Back Side Spatial Separation for Antenna 4b and Antenna 2b

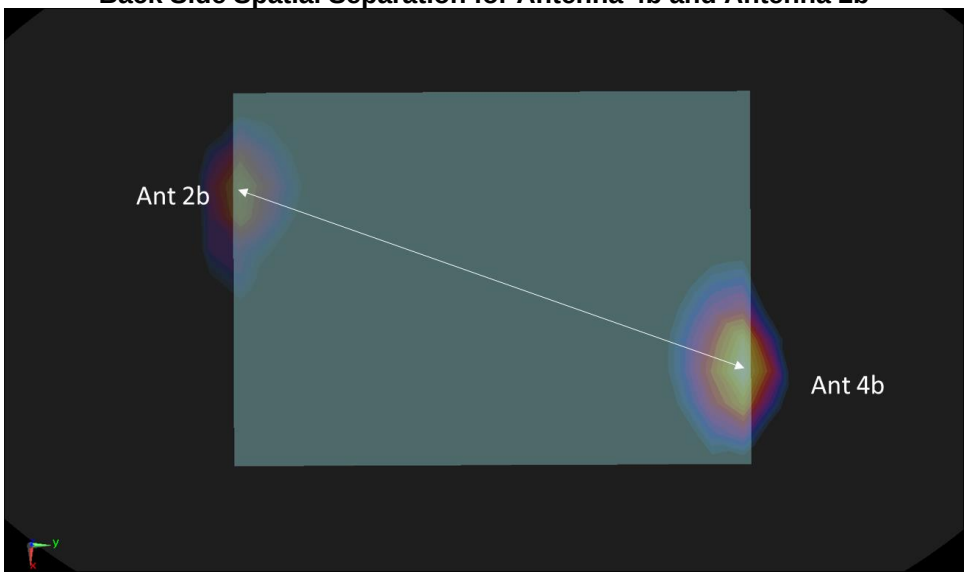


Figure 11-10
Back Side Spatial Separation for Antenna 4b and Antenna 3

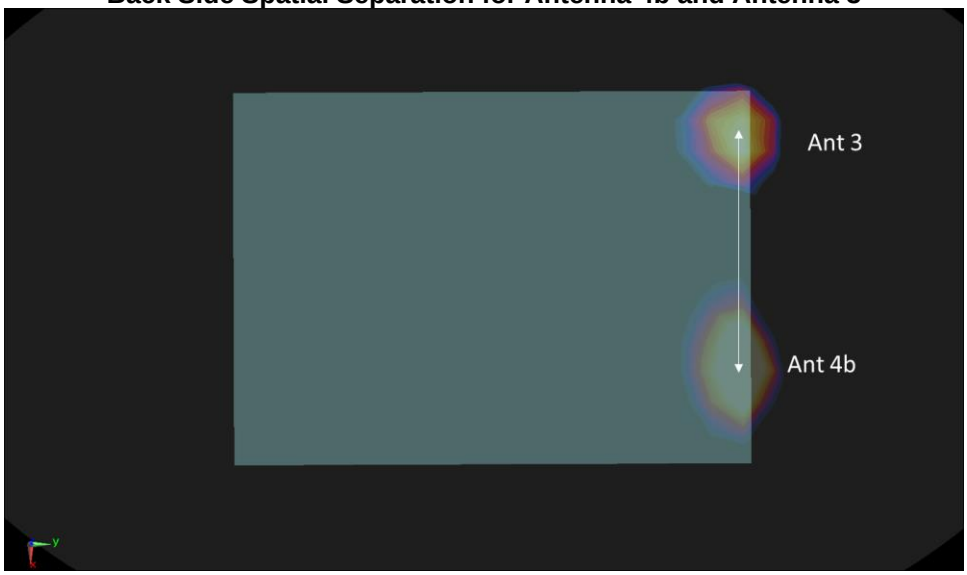


Figure 11-11
Back Side Spatial Separation for Antenna 4b and Antenna 5b

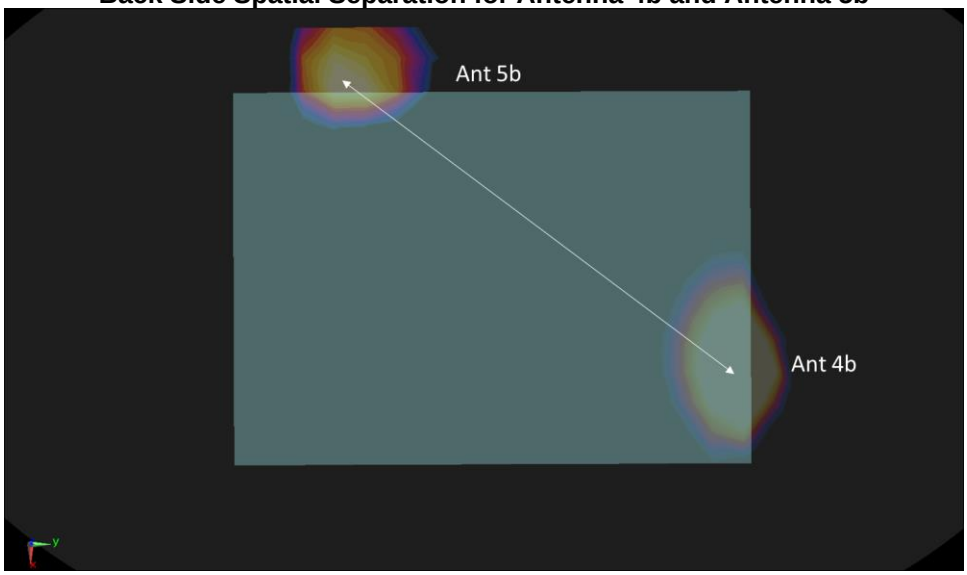
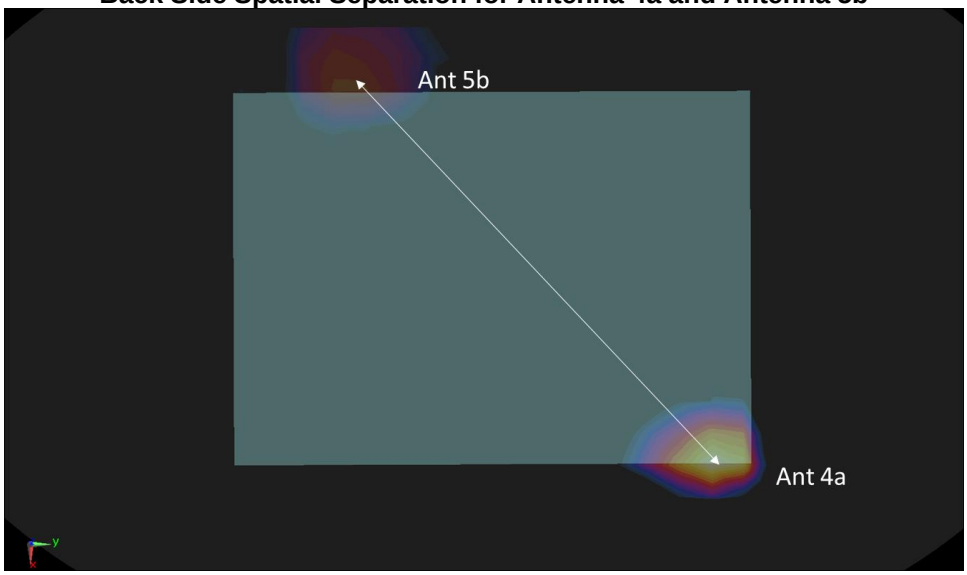


Figure 11-12
Back Side Spatial Separation for Antenna 4a and Antenna 5b



11.4.2 Right Edge Spatial Separation Analysis

Figure 11-13
Right Edge Spatial Separation for Antenna 3 and Antenna 2a

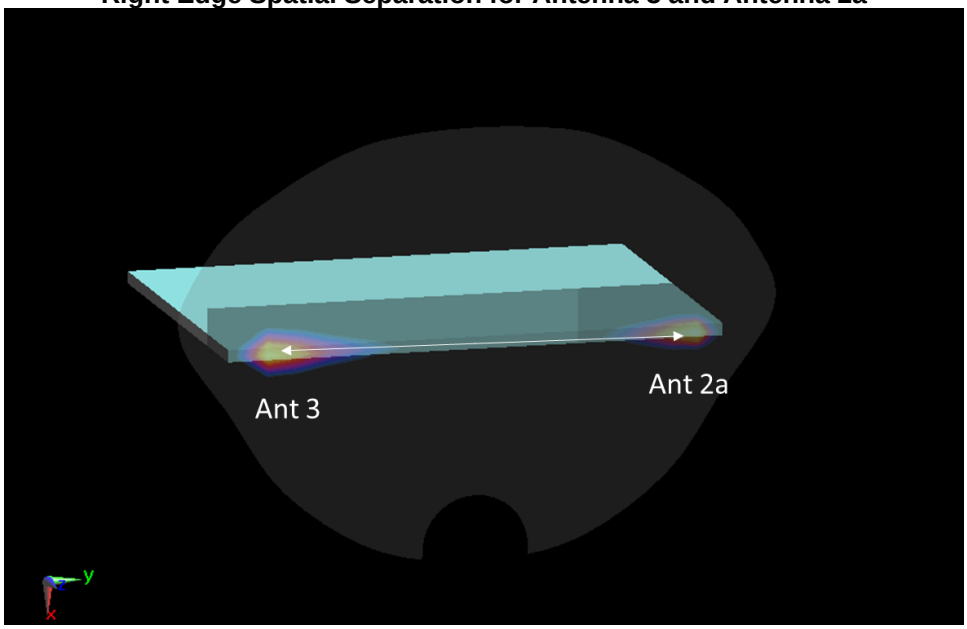
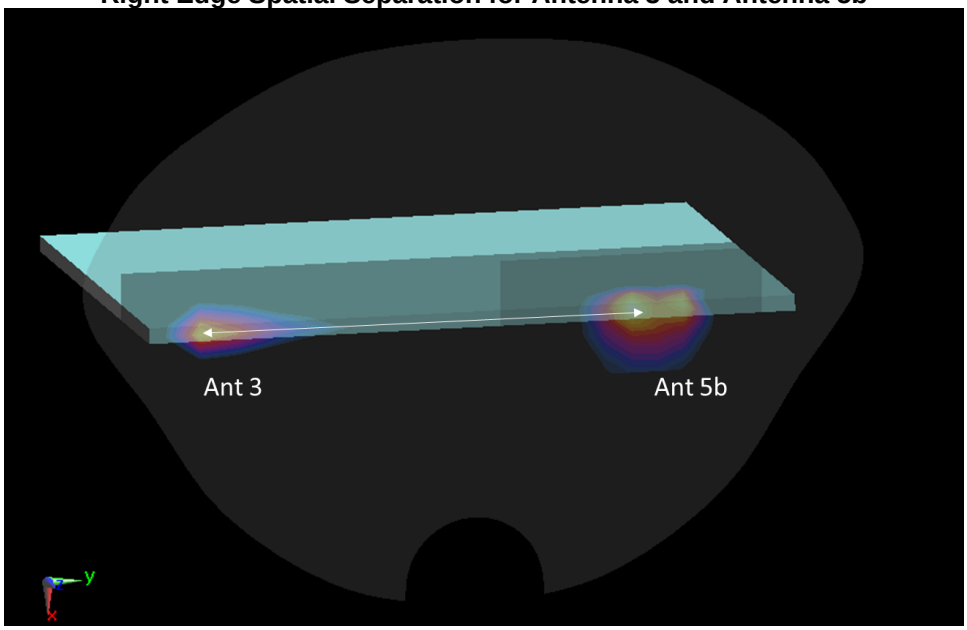
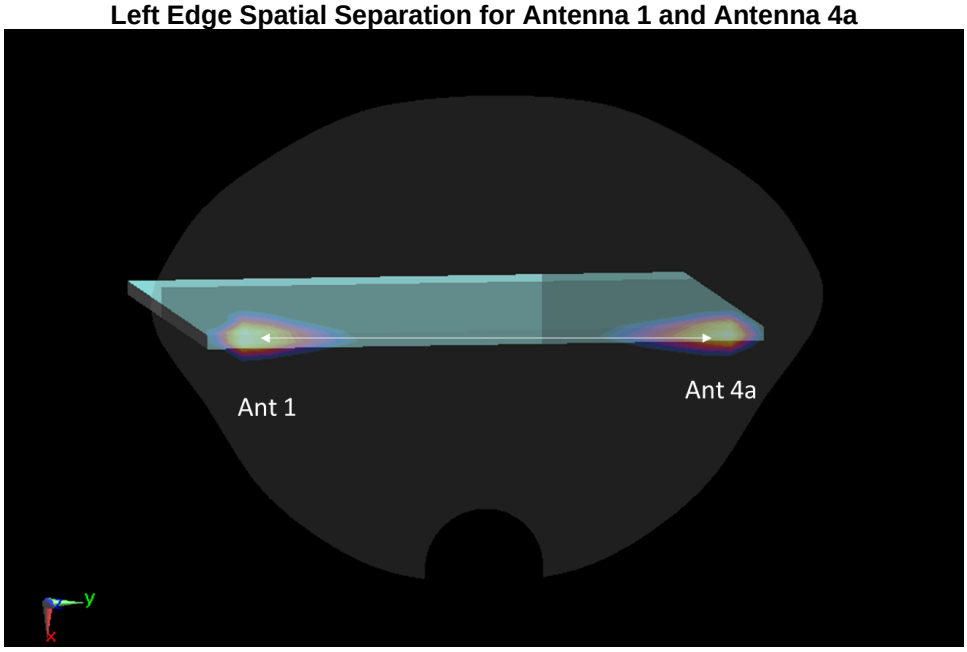


Figure 11-14
Right Edge Spatial Separation for Antenna 3 and Antenna 5b



11.4.3 Left Edge Spatial Separation Analysis

Figure 11-15
Left Edge Spatial Separation for Antenna 1 and Antenna 4a



11.5 Simultaneous Transmission Conclusion

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

12 SAR MEASUREMENT VARIABILITY

12.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

Table 12-1
Body SAR Measurement Variability Results

BODY VARIABILITY RESULTS															
Band	FREQUENCY		Mode	Antenna	Service	Data Rate (Mbps)	Side	Spacing	Measured SAR (1g)	1st Repeated SAR (1g)	Ratio	2nd Repeated SAR (1g)	Ratio	3rd Repeated SAR (1g)	Ratio
	MHz	Ch.							(W/kg)	(W/kg)		(W/kg)		(W/kg)	
2450	2441.00	39	Bluetooth	Ant 4a	FHSS	1	back	0 mm	0.847	0.821	1.03	N/A	N/A	N/A	N/A
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Body 1.6 W/kg (mW/g) averaged over 1 gram							

12.2 Measurement Uncertainty

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

13 ADDITIONAL TESTING PER FCC GUIDANCE

13.1 NR Band n77 Power Class 2 and Power Class 3 Linearity

This device supports Power Class 2 and Power Class 3 operations for NR Band n77. The highest available duty cycle for Power Class 2 operations is 50%. Per October 2020 TCB Workshop Guidance, NR FR1 SAR evaluations are being generally based on adapting the existing LTE SAR procedures. Therefore, based on the device behavior, all SAR tests were performed using Power Class 3. SAR with Power Class 2 at the highest power and available duty factor was additionally performed for the Power Class 3 configuration with the highest SAR for each exposure condition. The linearity between the Power Class 2 and Power Class 3 SAR results and the respective frame averaged powers was calculated to determine that the results were linear. No additional SAR measurements were required since the linearity between power classes was < 10% and all reported SAR values were < 1.4 W/kg for 1g and < 3.5 W/kg for 10g.

Table 13-1
NR Band n77 Body Linearity Data – Ant 4a

	NR Band n77 PC3	NR Band n77 PC2
Maximum Allowed Output Power (dBm)	9.5	12.5
Measured Output Power (dBm)	8.12	10.86
Measured SAR (W/kg)	0.68	0.617
Measured Power (mW)	6.49	12.19
Duty Cycle	100.0%	50.0%
Frame Averaged Output Power (mW)	6.49	6.09
% deviation from expected linearity		-3.44%

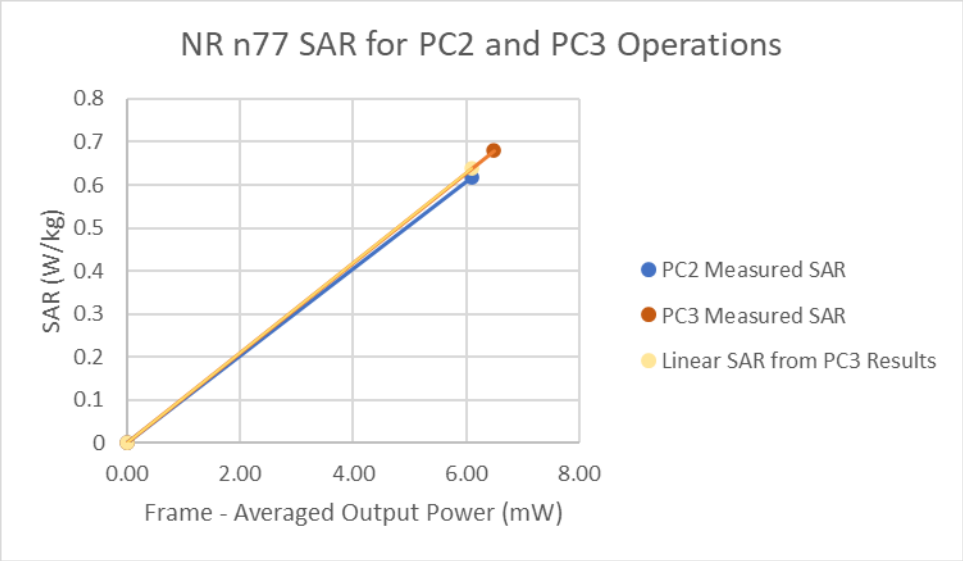


Figure 13-1
NR Band n77 Body Linearity – Ant 4a

14 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8753ES	S-Parameter Network Analyzer	9/16/2020	Annual	9/16/2021	MY40000670
Agilent	E4438C	ESG Vector Signal Generator	12/2/2020	Annual	12/2/2021	MY42081752
Agilent	E5515C	Wireless Communications Test Set	12/15/2020	Annual	12/15/2021	GB42361078
Agilent	N5182A	MXG Vector Signal Generator	9/25/2020	Annual	9/25/2021	US46240505
Agilent	N5182A	MXG Vector Signal Generator	12/1/2020	Annual	12/1/2021	MY47420837
Agilent	N9020A	MXA Signal Analyzer	12/21/2020	Annual	12/21/2021	MY50200571
Amplifier Research	150A100C	Amplifier	CBT	N/A	CBT	350132
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343971
Anritsu	MA24106A	USB Power Sensor	9/15/2020	Annual	9/15/2021	1244515
Anritsu	MA24106A	USB Power Sensor	9/15/2020	Annual	9/15/2021	1248508
Anritsu	MA24106A	USB Power Sensor	6/8/2020	Annual	6/8/2021	2018534
Anritsu	MA24106A	USB Power Sensor	6/3/2020	Annual	6/3/2021	2018527
Anritsu	MA2411B	Pulse Power Sensor	12/18/2020	Annual	12/18/2021	1126066
Anritsu	ML2495A	Power Meter	11/3/2020	Annual	11/3/2021	1039008
Anritsu	MT8820C	Radio Communication Analyzer	9/30/2020	Annual	9/30/2021	6201240328
Anritsu	MT8821C	Radio Communication Analyzer	5/21/2020	Annual	5/21/2021	6201144419
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291470
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291455
Control Company	4040	Therm./Clock/Humidity Monitor	6/29/2019	Biennial	6/29/2021	192291460
Control Company	4353	Long Stem Thermometer	10/28/2020	Biennial	10/28/2022	200670646
Control Company	4353	Long Stem Thermometer	10/28/2020	Biennial	10/28/2022	200670653
Insize	1108-150	Digital Caliper	1/17/2020	Biennial	1/17/2022	409193536
KEYSIGHT	E4438C	VECTOR SIGNAL GENERATOR	6/22/2020	Annual	6/22/2021	MY45092078
MCL	BW-N10W5+	10dB Attenuator	CBT	N/A	CBT	1611
MCL	BW-N3W5+	3dB Attenuator	CBT	N/A	CBT	1812
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1311
Mini-Circuits	NLP-1000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	ZHDC-16-63-S+	50-6000MHz Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMW500	Radio Communication Tester	5/13/2020	Annual	5/13/2021	167284
Rohde & Schwarz	CMW500	Radio Communication Tester	4/28/2020	Annual	4/28/2021	167285
Rohde & Schwarz	CMW500	Radio Communication Tester	10/16/2020	Annual	10/16/2021	101699
Rohde & Schwarz	CMW500	Radio Communication Tester	10/16/2020	Annual	10/16/2021	106578
Rohde & Schwarz	CMW500	Radio Communication Tester	10/27/2020	Annual	10/27/2021	108843
Rohde & Schwarz	FSP-7	Spectrum Analyzer	1/9/2020	Biennial	1/9/2022	100990
Rohde& Schwarz	CMW500	Wideband Radio Communication Tester	9/17/2020	Annual	9/17/2021	145663
Rosenberger	32W1006-016	Torque Wrench	12/1/2020	Annual	12/1/2021	N/A
SPEAG	DAKS-3.5	Portable DAK	9/9/2020	Annual	9/9/2021	1045
SPEAG	D750V3	750 MHz SAR Dipole	5/18/2018	Triennial	5/18/2021	1034
SPEAG	D1750V2	1750 MHz SAR Dipole	5/15/2018	Triennial	5/15/2021	1092
SPEAG	D2450V2	2450 MHz SAR Dipole	11/12/2018	Triennial	11/12/2021	921
SPEAG	D2450V2	2450 MHz SAR Dipole	5/16/2018	Triennial	5/16/2021	945
SPEAG	D3500V2	3500 MHz SAR Dipole	8/16/2019	Biennial	8/16/2021	1055
SPEAG	D3700V2	3700 MHz SAR Dipole	10/17/2019	Biennial	10/17/2021	1002
SPEAG	D3900V2	3900 MHz SAR Dipole	11/13/2020	Annual	11/13/2021	1062
SPEAG	D5GHzV2	5 GHz SAR Dipole	9/13/2018	Triennial	9/13/2021	1163
SPEAG	D5GHzV2	5 GHz SAR Dipole	3/13/2018	Triennial	3/13/2021	1123
SPEAG	EX3DV4	SAR Probe	7/16/2020	Annual	7/16/2021	7546
SPEAG	EX3DV4	SAR Probe	3/20/2020	Annual	3/20/2021	7421
SPEAG	EX3DV4	SAR Probe	1/18/2021	Annual	1/18/2022	3837
SPEAG	EX3DV4	SAR Probe	6/22/2020	Annual	6/22/2021	7416
SPEAG	EX3DV4	SAR Probe	10/21/2020	Annual	10/21/2021	7558
SPEAG	EX3DV4	SAR Probe	10/21/2020	Annual	10/21/2021	7420
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/12/2020	Annual	10/12/2021	1213
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/12/2020	Annual	10/12/2021	1364
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/14/2020	Annual	4/14/2021	1532
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/19/2020	Annual	3/19/2021	604
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/13/2021	Annual	1/13/2022	793
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/11/2020	Annual	6/11/2021	701

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

15 MEASUREMENT UNCERTAINTIES

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c_i 1gm	c_i 10 gms	1gm u_i (± %)	10gms u_i (± %)	v_i
Measurement System									
Probe Calibration	E2.1	6.55	N	1	1	1	6.6	6.6	∞
Axial Isotropy	E2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E2.2	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	E2.3	2	R	1.732	1	1	1.2	1.2	∞
Linearity	E2.4	0.3	N	1	1	1	0.3	0.3	∞
System Detection Limits	E2.4	0.25	R	1.732	1	1	0.1	0.1	∞
Readout Electronics	E2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E2.7	0.8	R	1.732	1	1	0.5	0.5	∞
Integration Time	E2.8	2.6	R	1.732	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E6.1	3	R	1.732	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E6.1	3	R	1.732	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E6.2	0.8	R	1.732	1	1	0.5	0.5	∞
Probe Positioning w/ respect to Phantom	E6.3	6.7	R	1.732	1	1	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E5	4	R	1.732	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E4.2	3.12	N	1	1	1	3.1	3.1	35
Device Holder Uncertainty	E4.1	1.67	N	1	1	1	1.7	1.7	5
Output Power Variation - SAR drift measurement	E2.9	5	R	1.732	1	1	2.9	2.9	∞
SAR Scaling	E6.5	0	R	1.732	1	1	0.0	0.0	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E3.1	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	E3.3	4.3	N	1	0.78	0.71	3.3	3.0	76
Liquid Permittivity - measurement uncertainty	E3.3	4.2	N	1	0.23	0.26	1.0	1.1	75
Liquid Conductivity - Temperature Uncertainty	E3.4	3.4	R	1.732	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Unceritainty	E3.4	0.6	R	1.732	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	E3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	E3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)			RSS				11.6	11.4	191
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				23.2	22.8	

16 CONCLUSION

16.1 Measurement Conclusion

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

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

17 REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.

[2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.

[3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.

[4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.

[5] IEEE Standards Coordinating Committee 39 –Standards Coordinating Committee 34 – IEEE Std. 1528-2013, IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

[6] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[7] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[8] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 1 -124.

[9] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[10] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[11] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[12] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[13] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.

[14] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[15] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.

[16] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[17] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[18] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.

[19] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hoschschule Zürich, Dosimetric Evaluation of the Cellular Phone.

[20] IEC 62209-1, Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz), July 2016.

[21] Innovation, Science, Economic Development Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 5, March 2015.

[22] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2015

[23] FCC SAR Test Procedures for 2G-3G Devices, Mobile Hotspot and UMPC Devices KDB Publications 941225, D01-D07

[24] SAR Measurement Guidance for IEEE 802.11 Transmitters, KDB Publication 248227 D01

[25] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D03-D04

[26] FCC SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers, FCC KDB Publication 616217 D04

[27] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02

[28] FCC General RF Exposure Guidance and SAR Procedures for Dongles, KDB Publication 447498, D01-D02

[29] Anexo à Resolução No. 533, de 10 de Septembro de 2009.

[30] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010

APPENDIX A: SAR TEST DATA

PCTEST

DUT: BCGA2459; Type: Tablet Device; Serial: YKQ1K9KXW2

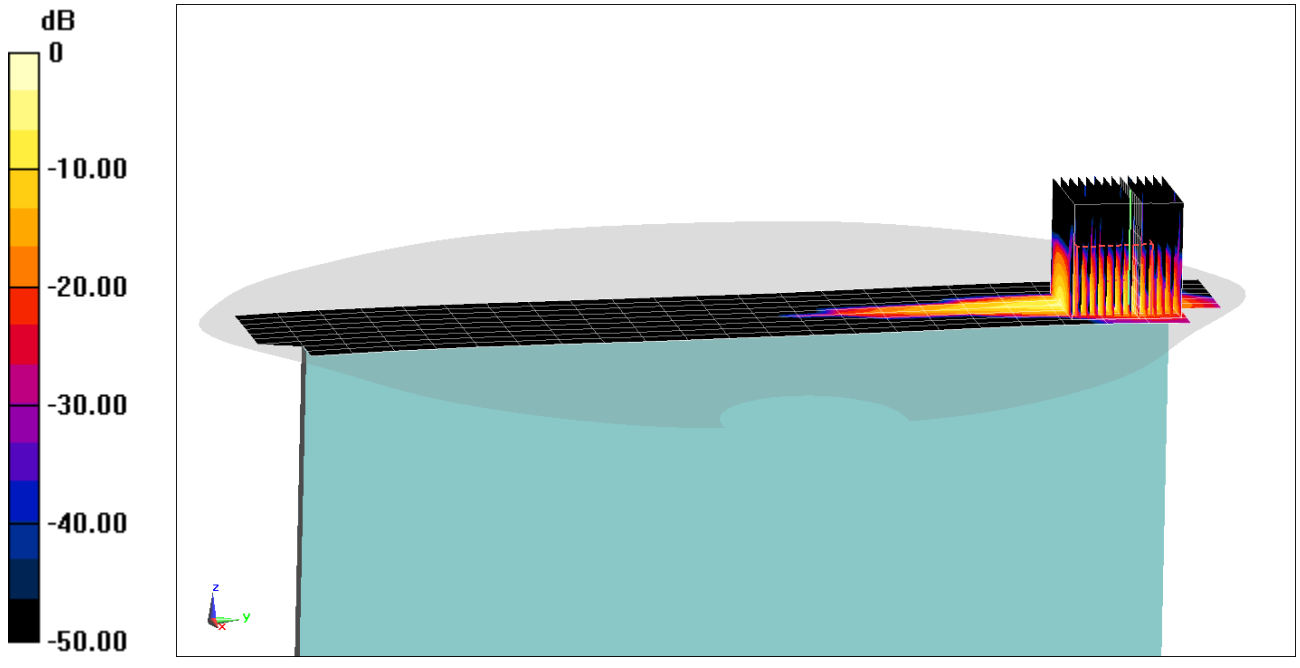
Communication System: UID 0, LTE Band 48; Frequency: 3560 MHz; Duty Cycle: 1:1.58
Medium: 3500-3700 Body; Medium parameters used (interpolated):
f = 3560 MHz; σ = 3.399 S/m; ε_r = 49.716; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 02-15-2021; Ambient Temp: 23.5°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7421; ConvF(6.72, 6.72, 6.72) @ 3560 MHz; Calibrated: 3/20/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn604; Calibrated: 3/19/2020
Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: LTE Band 48, Antenna 4a, Body SAR, Left Edge, Low.ch, 20 MHz Bandwidth, QPSK, 1 RB, 99 RB Offset

Area Scan (10x26x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (13x14x8)/Cube 0: Measurement grid: dx=2.4mm, dy=2.4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 16.05 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 4.06 W/kg
SAR(1 g) = 0.671 W/kg; SAR(10 g) = 0.174 W/kg



0 dB = 2.08 W/kg = 3.18 dBW/kg

PCTEST

DUT: BCGA2459; Type: Tablet Device; Serial: VX96JL925Q

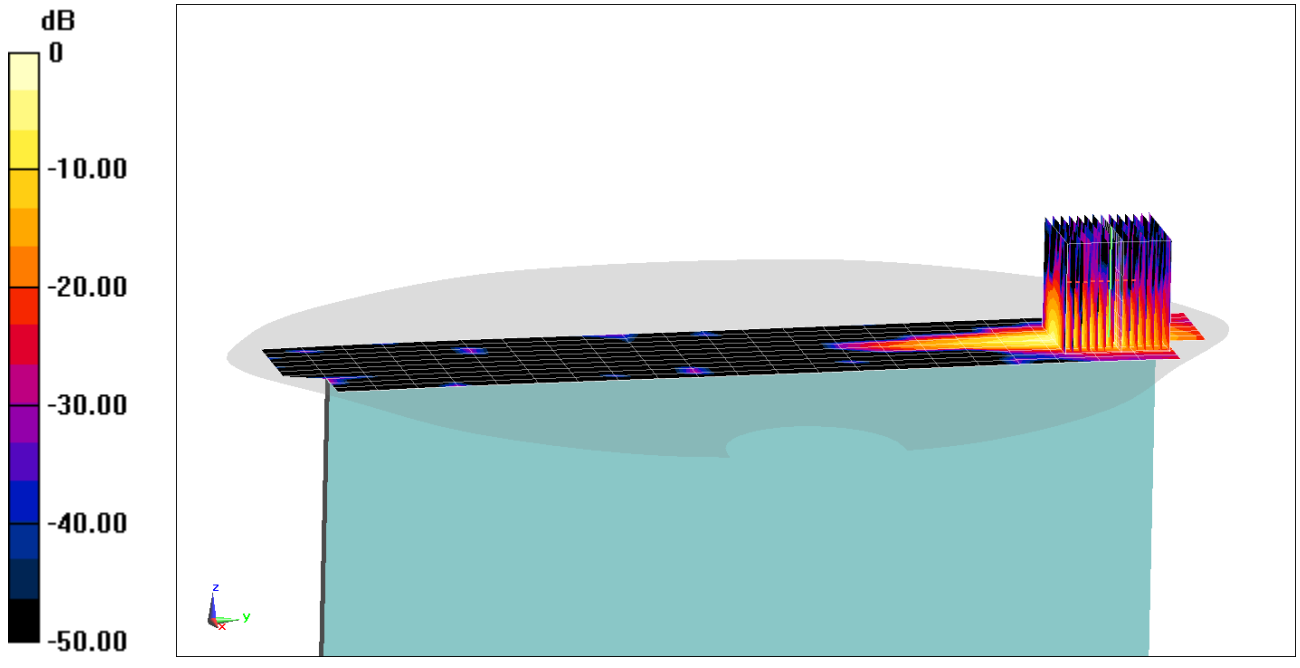
Communication System: UID 0, NR Band n77 full DC; Frequency: 3930 MHz; Duty Cycle: 1:1
Medium: 3700-3900 Body; Medium parameters used:
f = 3930 MHz; σ = 3.703 S/m; ε_r = 49.539; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 02-22-2021; Ambient Temp: 22.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN3837; ConvF(5.97, 5.97, 5.97) @ 3930 MHz; Calibrated: 1/18/2021
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn793; Calibrated: 1/13/2021
Phantom: Twin-SAM V4.0; Type: QD 000 P40 CD; Serial: 1736
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: NR Band n77 PC3, Antenna 4a, Body SAR, Left Edge, 100 MHz Bandwidth, DFT-s-OFDM QPSK, Ch. 662000, 135 RB, 69 RB Offset

Area Scan (11x26x1): Measurement grid: dx=5mm, dy=12mm
Zoom Scan (14x14x8)/Cube 0: Measurement grid: dx=2.4mm, dy=2.4mm, dz=1.4mm; Graded Ratio: 1.4
Reference Value = 15.59 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.57 W/kg
SAR(1 g) = 0.680 W/kg; SAR(10 g) = 0.166 W/kg



0 dB = 1.89 W/kg = 2.76 dBW/kg

PCTEST

DUT: BCGA2459; Type: Tablet Device; Serial: LQ2V52MFQ7

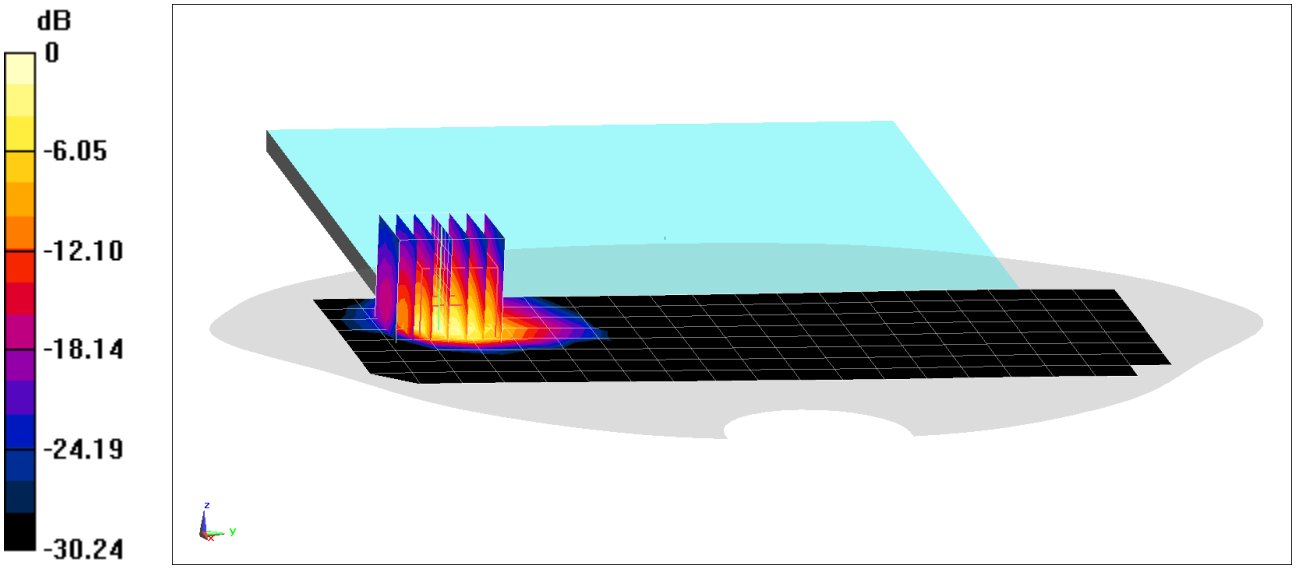
Communication System: UID 0, IEEE 802.11b; Frequency: 2462 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2462 MHz; σ = 2.052 S/m; ε_r = 51.703; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 02-23-2021; Ambient Temp: 22.5°C; Tissue Temp: 20.2°C

Probe: EX3DV4 - SN7546; ConvF(7.32, 7.32, 7.32) @ 2462 MHz; Calibrated: 7/16/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1532; Calibrated: 4/14/2020
Phantom: Twin-SAM V4.0 Main; Type: QD 000 P40 CC; Serial: 1114
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: IEEE 802.11b, Antenna 4a, Variant 1, 22 MHz Bandwidth, Body SAR, Ch 11, 1 Mbps, Back Side

Area Scan (9x20x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.90 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 2.60 W/kg
SAR(1 g) = 0.814 W/kg; SAR(10 g) = 0.316 W/kg



0 dB = 1.71 W/kg = 2.33 dBW/kg

PCTEST

DUT: BCGA2459; Type: Tablet Device; Serial: M3K4XGQPY4

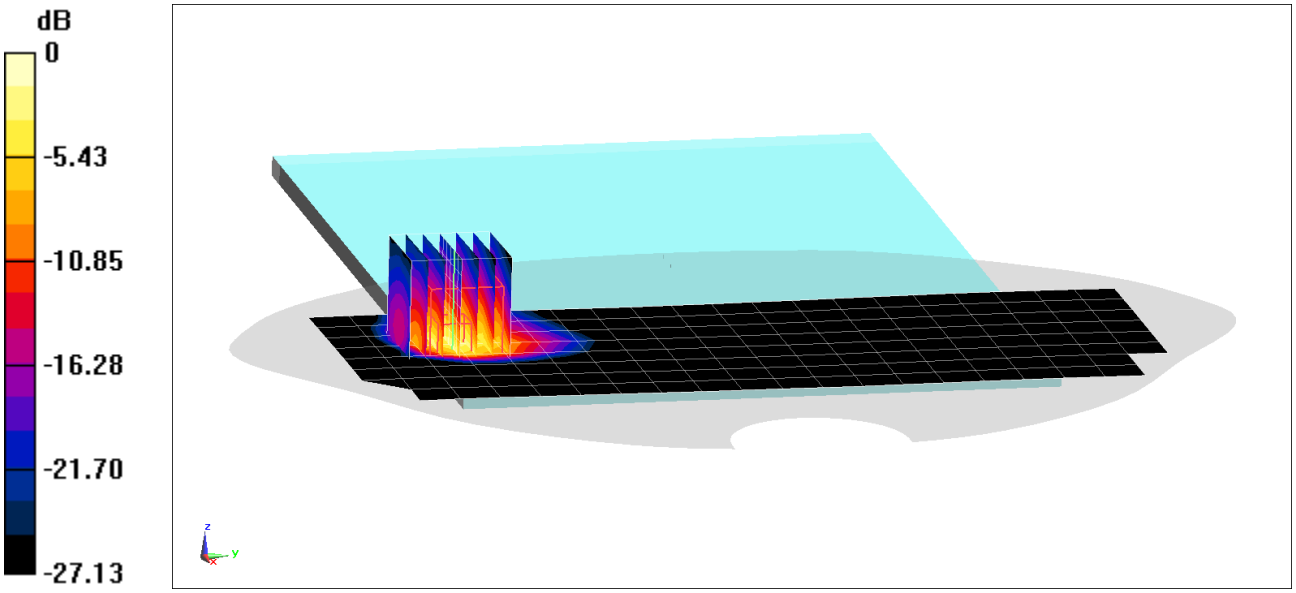
Communication System: UID 0, Bluetooth; Frequency: 2441 MHz; Duty Cycle: 1:1.298
Medium: 2450 Body; Medium parameters used (interpolated):
f = 2441 MHz; σ = 2.032 S/m; ε_r = 50.405; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 0.0 cm

Test Date: 02-26-2021; Ambient Temp: 22.1°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7546; ConvF(7.32, 7.32, 7.32) @ 2441 MHz; Calibrated: 7/16/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1532; Calibrated: 4/14/2020
Phantom: Twin-SAM V4.0 Main; Type: QD 000 P40 CC; Serial: 1114
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

Mode: Bluetooth, Antenna 4a, Variant 2, Body SAR, Ch 39, 1 Mbps, Back Side

Area Scan (9x21x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.45 V/m; Power Drift = -0.21 dB
Peak SAR (extrapolated) = 2.70 W/kg
SAR(1 g) = 0.847 W/kg; SAR(10 g) = 0.341 W/kg



0 dB = 1.91 W/kg = 2.81 dBW/kg

APPENDIX B: SYSTEM VERIFICATION

PCTEST

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921

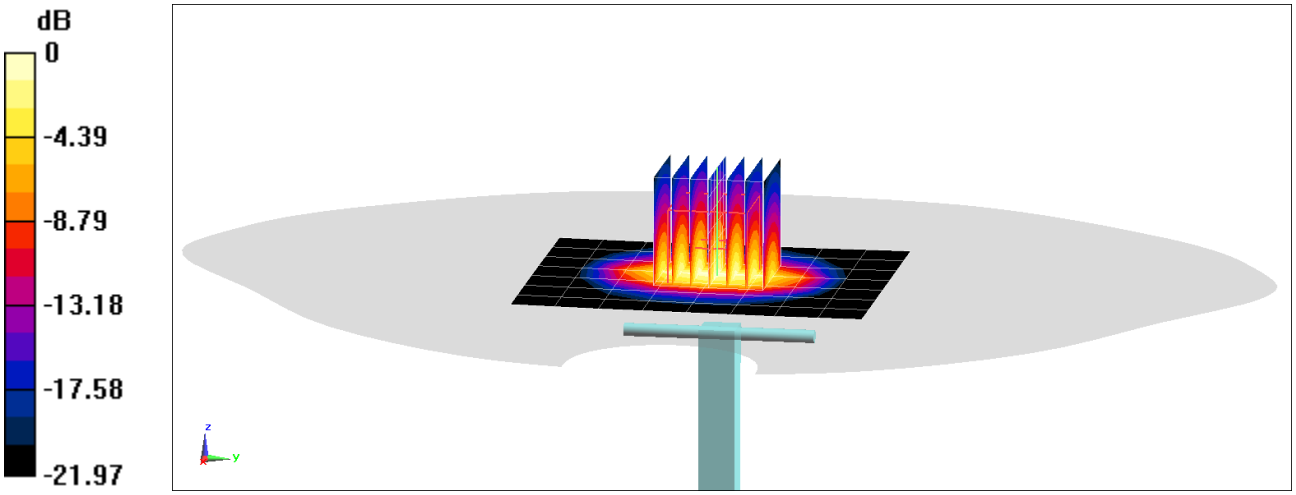
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.039 S/m; ε_r = 51.727; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-23-2021; Ambient Temp: 22.5°C; Tissue Temp: 20.2°C

Probe: EX3DV4 - SN7546; ConvF(7.32, 7.32, 7.32) @ 2450 MHz; Calibrated: 7/16/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1532; Calibrated: 4/14/2020
Phantom: Twin-SAM V4.0 Main; Type: QD 000 P40 CC; Serial: 1114
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.2 W/kg
SAR(1 g) = 5.47 W/kg; SAR(10 g) = 2.53 W/kg
Deviation(1 g) = 7.68%



0 dB = 9.13 W/kg = 9.60 dBW/kg

PCTEST

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 921

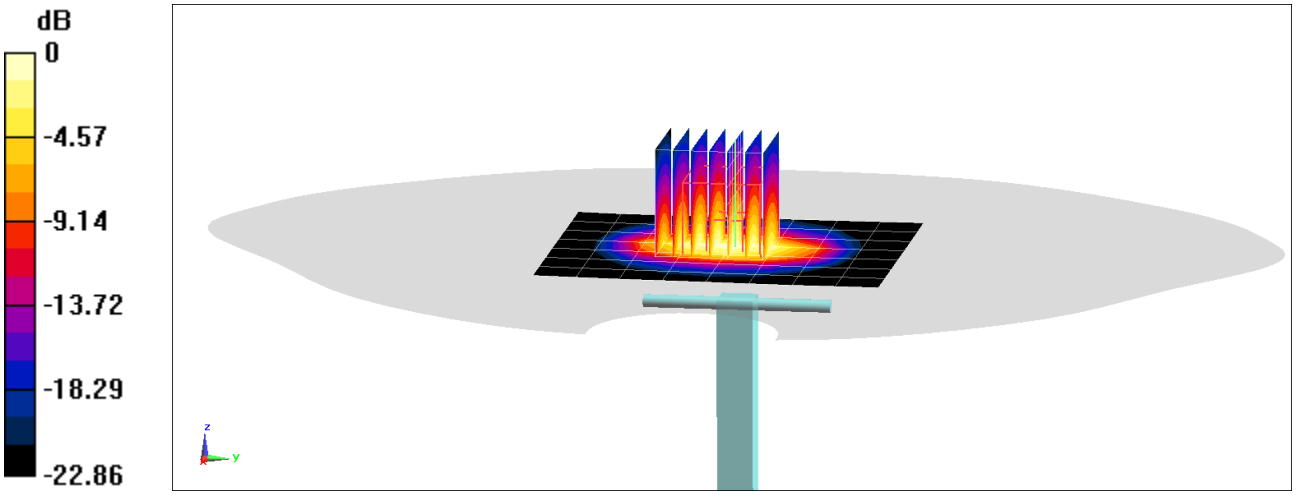
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: 2450 Body; Medium parameters used:
f = 2450 MHz; σ = 2.04 S/m; ε_r = 50.391; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-26-2021; Ambient Temp: 22.1°C; Tissue Temp: 20.3°C

Probe: EX3DV4 - SN7546; ConvF(7.32, 7.32, 7.32) @ 2450 MHz; Calibrated: 7/16/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1532; Calibrated: 4/14/2020
Phantom: Twin-SAM V4.0 Main; Type: QD 000 P40 CC; Serial: 1114
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

2450 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Peak SAR (extrapolated) = 11.2 W/kg
SAR(1 g) = 5.46 W/kg; SAR(10 g) = 2.52 W/kg
Deviation(1 g) = 7.48%



0 dB = 9.06 W/kg = 9.57 dBW/kg

PCTEST

DUT: Dipole 3500 MHz; Type: D3500V2; Serial: 1055

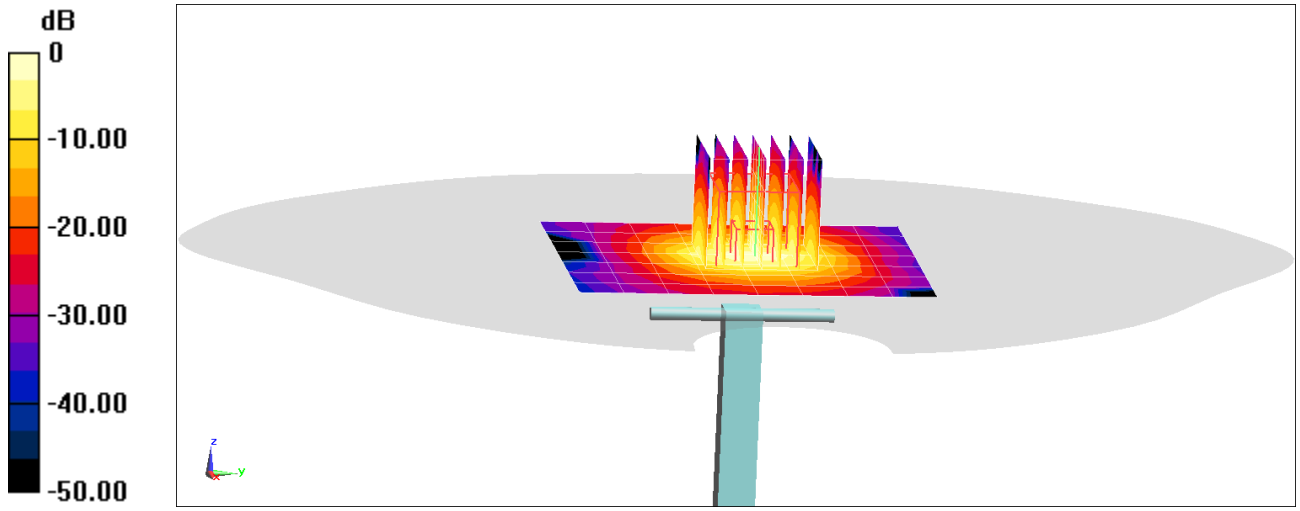
Communication System: UID 0, CW; Frequency: 3500 MHz; Duty Cycle: 1:1
Medium: 3500-3700 Body; Medium parameters used:
f = 3500 MHz; σ = 3.341 S/m; ε_r = 49.811; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-15-2021; Ambient Temp: 23.5°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7421; ConvF(6.72, 6.72, 6.72) @ 3500 MHz; Calibrated: 3/20/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn604; Calibrated: 3/19/2020
Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

3500 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 6.24 W/kg; SAR(10 g) = 2.3 W/kg
Deviation(1 g) = -4.00%



0 dB = 12.1 W/kg = 10.83 dBW/kg

PCTEST

DUT: Dipole 3700 MHz; Type: D3700V2; Serial: 1002

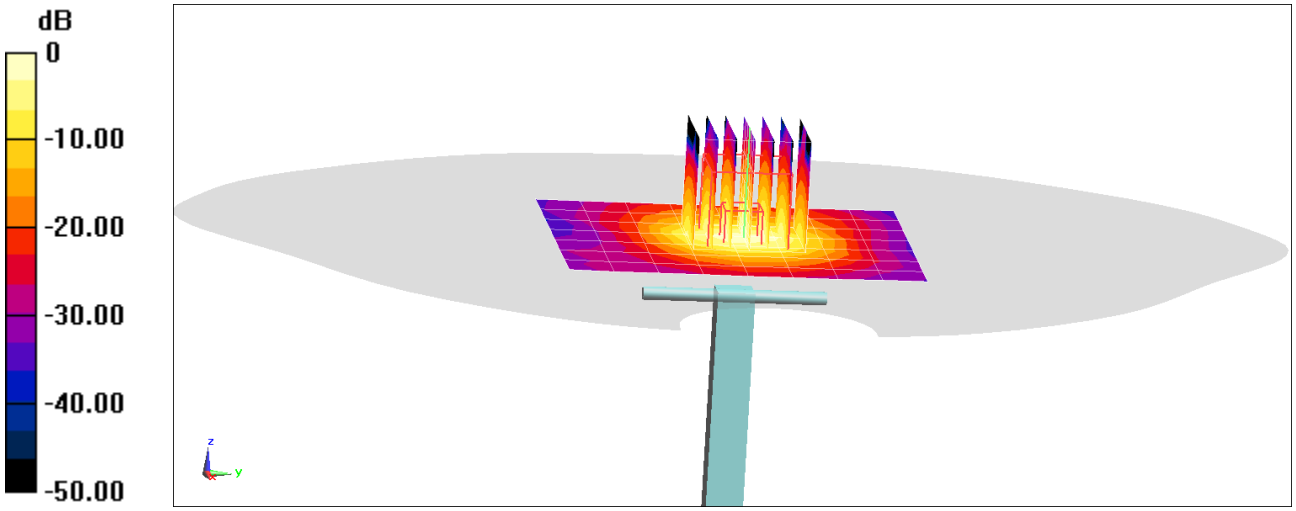
Communication System: UID 0, CW; Frequency: 3700 MHz; Duty Cycle: 1:1
Medium: 3500-3700 Body; Medium parameters used (interpolated):
f = 3700 MHz; σ = 3.549 S/m; ε_r = 49.516; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-15-2021; Ambient Temp: 23.5°C; Tissue Temp: 22.6°C

Probe: EX3DV4 - SN7421; ConvF(6.57, 6.57, 6.57) @ 3700 MHz; Calibrated: 3/20/2020
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn604; Calibrated: 3/19/2020
Phantom: Twin-SAM V4.0; Type: QD 000 P40 CC; Serial: 1179
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

3700 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 6.33 W/kg; SAR(10 g) = 2.26 W/kg
Deviation(1 g) = -2.16%



0 dB = 12.5 W/kg = 10.97 dBW/kg

PCTEST

DUT: Dipole 3700 MHz; Type: D3700V2; Serial: 1002

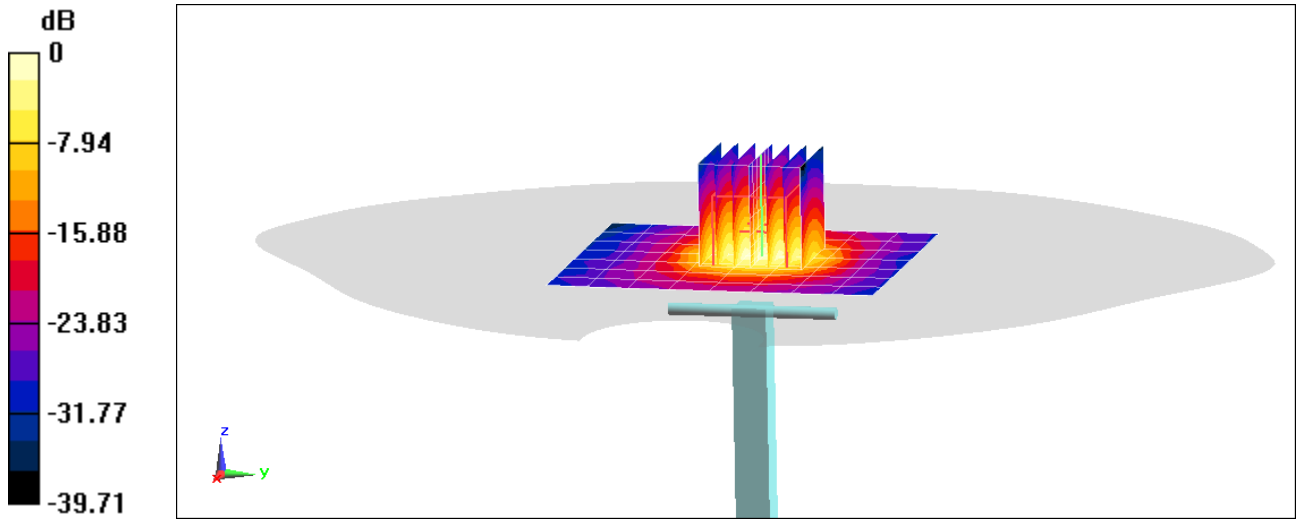
Communication System: UID 0, CW; Frequency: 3700 MHz; Duty Cycle: 1:1
Medium: 3700-3900 Body; Medium parameters used:
f = 3700 MHz; σ = 3.418 S/m; ε_r = 49.913; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-22-2021; Ambient Temp: 22.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN3837; ConvF(6.15, 6.15, 6.15) @ 3700 MHz; Calibrated: 1/18/2021
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn793; Calibrated: 1/13/2021
Phantom: Twin-SAM V4.0; Type: QD 000 P40 CD; Serial: 1736
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

3700 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 6.54 W/kg; SAR(10 g) = 2.36 W/kg
Deviation(1 g) = 1.08%



0 dB = 12.9 W/kg = 11.11 dBW/kg

PCTEST

DUT: Dipole 3900 MHz; Type: D3900V2; Serial: 1062

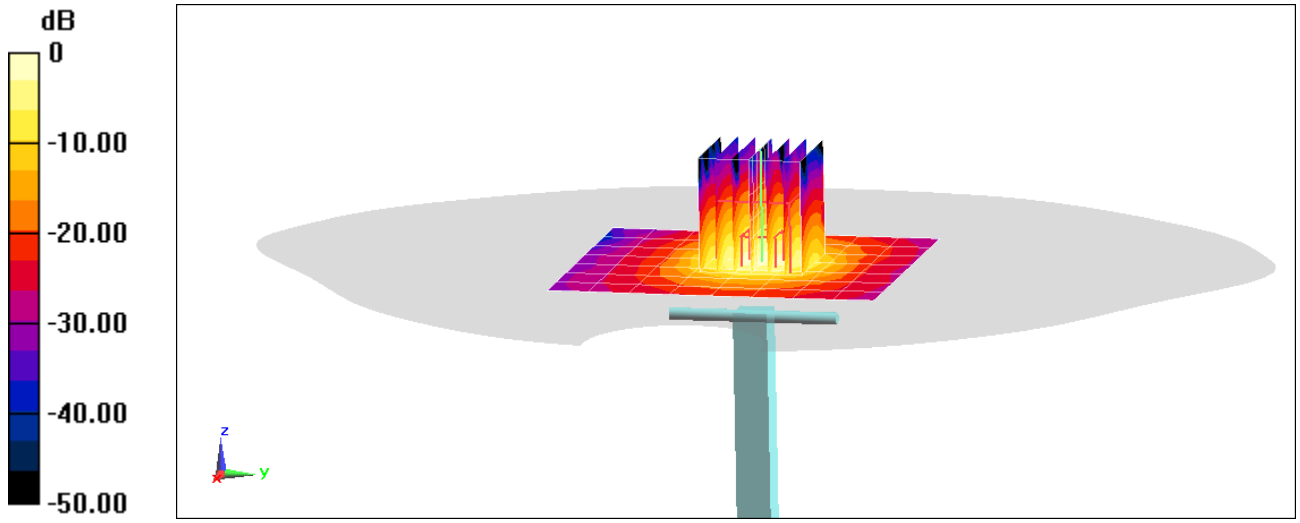
Communication System: UID 0, CW; Frequency: 3900 MHz; Duty Cycle: 1:1
Medium: 3700-3900 Body; Medium parameters used:
f = 3900 MHz; σ = 3.663 S/m; ε_r = 49.588; ρ = 1000 kg/m^3
Phantom section: Flat Section; Space: 1.0 cm

Test Date: 02-22-2021; Ambient Temp: 22.4°C; Tissue Temp: 20.8°C

Probe: EX3DV4 - SN3837; ConvF(5.97, 5.97, 5.97) @ 3900 MHz; Calibrated: 1/18/2021
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn793; Calibrated: 1/13/2021
Phantom: Twin-SAM V4.0; Type: QD 000 P40 CD; Serial: 1736
Measurement SW: DASY52, Version 52.10 (4);SEMCAD X Version 14.6.14 (7483)

3900 MHz System Verification at 20.0 dBm (100 mW)

Area Scan (8x9x1): Measurement grid: dx=12mm, dy=12mm
Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=1.4mm; Graded Ratio: 1.4
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 6.3 W/kg; SAR(10 g) = 2.17 W/kg
Deviation(1 g) = -4.98%



0 dB = 12.9 W/kg = 11.11 dBW/kg

APPENDIX C: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

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

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{\left[\ln(b/a)\right]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi' \frac{\exp\left[-j\omega r(\mu_0\varepsilon_r'\varepsilon_0)^{1/2}\right]}{r} d\phi' d\rho' d\rho$$

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

3 Composition / Information on ingredients

3.2 Mixtures
Description: Aqueous solution with surfactants and inhibitors
Declarable, or hazardous components:

CAS: 107-21-1 EINECS: 203-473-3 Reg.nr.: 01-2119456816-28-0000	**Ethanediol** STOT RE 2, H373; Acute Tox. 4, H302	>1.0-4.9%
CAS: 68608-26-4 EINECS: 271-781-5 Reg.nr.: 01-2119527859-22-0000	**Sodium petroleum sulfonate** Eye Irrit. 2, H319	< 2.9%
CAS: 107-41-5 EINECS: 203-489-0 Reg.nr.: 01-2119539582-35-0000	**Hexylene Glycol / 2-Methyl-pentane-2,4-diol** Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.9%
CAS: 68920-66-1 NLP: 500-236-9 Reg.nr.: 01-2119489407-26-0000	**Alkoxylated alcohol, > C_{16}** Aquatic Chronic 2, H411; Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.0%

Additional information:
For the wording of the listed risk phrases refer to section 16.
Not mentioned CAS-, EINECS- or registration numbers are to be regarded as Proprietary/Confidential.
The specific chemical identity and/or exact percentage concentration of proprietary components is withheld as a trade secret.

Figure C-1

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

Schmid & Partner Engineering AG

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Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Measurement Certificate / Material Test

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

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the KDB 865664 compliance standard.

Test Condition

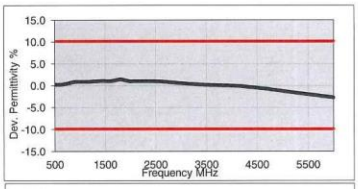
Ambient Condition	22°C ; 30% humidity
TSL Temperature	22°C
Test Date	6-Aug-20
Operator	CL

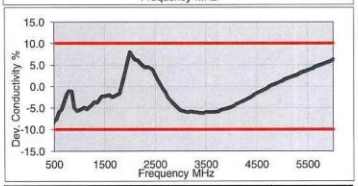
Additional Information

TSL Density
TSL Heat-capacity

Results

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





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

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

APPENDIX D: SAR SYSTEM VALIDATION

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

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

Table D-1
SAR System Validation Summary – 1g

SAR System	Freq. (MHz)	Date	Probe SN	Probe Cal Point		Cond. (σ)	Perm. (εr)	CW VALIDATION			MOD. VALIDATION		
								SENSITIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
AM6	2450	11/12/2020	7546	2450	Body	2.015	50.58	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
AM4	3500	5/11/2020	7421	3500	Body	3.389	50.34	PASS	PASS	PASS	TDD	PASS	N/A
AM4	3700	5/11/2020	7421	3700	Body	3.66	49.71	PASS	PASS	PASS	TDD	PASS	N/A
AM1	3700	2/4/2021	3837	3700	Body	3.399	50.196	PASS	PASS	PASS	TDD	PASS	N/A
AM1	3900	2/4/2021	3837	3900	Body	3.643	49.873	PASS	PASS	PASS	TDD	PASS	N/A

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

APPENDIX F: POWER REDUCTION VERIFICATION

The device supports manufacturer's proprietary power reduction mechanism called "Detect Mode" for the Main Cellular Antenna. Details of this mechanism can be found in the Operational Description. When the device is being used "on-body" or "held in hand" by the user, the device will detect motion and reduce the power of the main antenna. Per the manufacturer, the mechanism is agnostic to different cellular air interfaces. Detect Mode operation was verified for two test cases, on-body and held in hand, for each supported cellular band. The power reduction verification results are below.

1.1 Main Antenna Power Verification Summary

Table F-1
Main Antenna Power Verification

Mode/Band	Antenna	Maximum Scenario Maximum Allowed Target Power [dBm]	Mode			
			Free Body Space	Test Case 1	Test Case 2	Verdict
LTE Band 48	Antenna 4a	18.30 (± 1)	19.16*	DSI 1^	DSI 1^	PASS
LTE B48 Intra-Band ULCA	Antenna 4a	18.30 (± 1)	19.23*	DSI 1^	DSI 1^	PASS
NR n77(PC3)	Antenna 4a	24.70 (± 1)	23.86*	DSI 1^	DSI 1^	PASS
NR n77(PC2)	Antenna 4a	26.00 (± 1)	25.38*	DSI 1^	DSI 1^	PASS

Test Case 1: Device Held in Hand

Test Case 2: Device Resting on Lap

* No Smart Transmission behavior was observed during the measurement.

^ Smart Transmission behavior was observed during the measurement.

Test Cases represent typical scenarios in which the device power would be reduced. In these scenarios detect mode has been verified to identify typical on-body use-cases including when thin objects, such as a magazine or newspaper are placed between the body and the device. In the absence of detect mode output, the device defaults to the most conservative power.

APPENDIX G: IEEE 802.11AX RU SAR EXCLUSION

G.1 IEEE 802.11ax RU SAR Exclusion

To make the most efficient use of the additional available subcarriers (data tones), IEEE 802.11ax can utilize Orthogonal Frequency-Division Multiple Access (OFDMA) which divides the existing 802.11 channels into smaller subchannels called Resource Units (RUs). Possible RU sizes are: 26T, 52T, 106T, 242T, 484T and 996T.

Per FCC Guidance, 802.11ax was considered a higher order 802.11 mode when compared to a/b/g/n/ac to apply KDB Publication 248227 D01v02r02 for OFDM mode selection. Therefore, SAR tests were not required for 802.11ax based on the maximum allowed output powers of OFDM modes and the reported SAR values. Per FCC Guidance, maximum conducted powers were performed for each RU size to demonstrate that the output powers would not be higher than the other OFDM 802.11 modes.

G.2 IEEE 802.11ax RU Target Powers

G.2.1 Maximum 802.11ax RU Time-Averaged Output Power

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 4a	20 MHz Bandwidth	1	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		2	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		3	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		4	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		5	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		6	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		7	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		8	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		9	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		10	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		11	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		12	11.00	9.50	11.00	9.50	11.00	9.50	11.00	9.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 4a	20 MHz Bandwidth	1	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		2	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		3	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		4	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		5	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		6	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		7	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		8	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		9	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		10	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		11	12.00	10.50	12.00	10.50	12.00	10.50	12.00	10.50
		12	10.50	9.00	10.50	9.00	10.50	9.00	10.50	9.00
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

G.2.2 Reduced 802.11ax RU Time-Averaged Output Power

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm) - Antenna 4a	20 MHz Bandwidth	1	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		2	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		3	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		4	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		5	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		6	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		7	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		8	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		9	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		10	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		11	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		12	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Below table is applicable in the following conditions:
-Simultaneous conditions with Licensed Bands Antenna 4a/4b active
-Simultaneous conditions with Inter-band ULCA active

Mode/ Band		Tones	26T		52T		106T		242T	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - 2 Tx Chain (dBm) - Antenna 4a	20 MHz Bandwidth	1	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		2	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		3	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		4	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		5	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		6	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		7	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		8	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		9	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		10	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		11	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		12	9.00	7.50	9.00	7.50	9.00	7.50	9.00	7.50
		13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: In MIMO operations, each antenna transmits at maximum allowed powers as indicated above.

G.3 IEEE 802.11ax Measured Powers

Table G-1
Maximum 2.4 GHz 802.11ax RU Time-Averaged WLAN Output Power – Ant 4a

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	26T	0	11.03
			4	11.09
			8	10.97
2437	6	26T	0	11.01
			4	11.03
			8	10.95
2462	11	26T	0	11.05
			4	11.00
			8	11.06

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	52T	37	10.99
			38	10.96
			40	10.92
2437	6	52T	37	10.99
			38	10.97
			40	11.01
2462	11	52T	37	11.05
			38	11.09
			40	10.94

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	106T	53	11.07
			54	10.96
2437	6	106T	53	11.09
			54	10.98
2462	11	106T	53	10.93
			54	11.02

Freq [MHz]	Channel	Tones	RU Index	Avg Conducted Powers (dBm)
2412	1	242T	61	11.08
2437	6	242T	61	11.04
2462	11	242T	61	11.06

APPENDIX H: LTE AND NR LOWER BANDWIDTH RF CONDUCTED POWERS

All conducted power measurements for 4G/5G in this section were performed by setting *Reserve_power_margin* (Qualcomm® Smart Transmit EFS entry) to 0 dB, so that the EUT transmits continuously at ***Plimit***.

H.1 LTE Lower Bandwidth RF Conducted Powers

H.1.1 LTE Band 48

Table H-1
LTE Band 48 Measured P_{limit} Ant 4a - 15 MHz Bandwidth

LTE Band 48 15 MHz Bandwidth								
Modulation	RB Size	RB Offset	Low Channel 55315 (3557.5 MHz)	Low-Mid Channel 55765 (3602.5 MHz)	Mid-High Channel 56215 (3647.5 MHz)	High Channel 56665 (3692.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]					
QPSK	1	0	11.36	11.55	11.59	11.71	0	0
	1	36	11.44	11.58	11.63	11.72		0
	1	74	11.48	11.57	11.63	11.69		0
	36	0	11.52	11.64	11.64	11.75	0-1	0
	36	18	11.56	11.68	11.64	11.80		0
	36	37	11.52	11.66	11.70	11.74		0
	75	0	11.51	11.60	11.59	11.75		0
16QAM	1	0	11.20	11.36	11.64	11.52	0-1	0
	1	36	11.22	11.39	11.63	11.53		0
	1	74	11.29	11.40	11.66	11.50		0
	36	0	11.25	11.40	11.28	11.45	0-2	0
	36	18	11.27	11.36	11.30	11.55		0
	36	37	11.23	11.34	11.35	11.47		0
	75	0	11.26	11.41	11.28	11.51		0
64QAM	1	0	11.25	11.36	11.41	11.51	0-2	0
	1	36	11.33	11.42	11.45	11.55		0
	1	74	11.36	11.45	11.49	11.55		0
	36	0	11.32	11.45	11.39	11.51	0-3	0
	36	18	11.33	11.44	11.39	11.59		0
	36	37	11.32	11.38	11.46	11.51		0
	75	0	11.28	11.44	11.39	11.55		0
256QAM	1	0	11.22	11.32	11.42	11.45	0-5	0
	1	36	11.34	11.41	11.46	11.52		0
	1	74	11.37	11.40	11.47	11.48		0
	36	0	11.33	11.42	11.31	11.44		0
	36	18	11.39	11.41	11.36	11.52		0
	36	37	11.36	11.36	11.42	11.47		0
	75	0	11.36	11.38	11.34	11.50		0

Table H-2
LTE Band 48 Measured P_{limit} Ant 4a - 10 MHz Bandwidth

LTE Band 48 10 MHz Bandwidth								
Modulation	RB Size	RB Offset	Low Channel 55290 (3555.0 MHz)	Low-Mid Channel 55757 (3601.7 MHz)	Mid-High Channel 56223 (3648.3 MHz)	High Channel 56690 (3695.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]					
QPSK	1	0	11.23	11.32	11.52	11.47	0	0
	1	25	11.20	11.29	11.43	11.44		0
	1	49	11.26	11.33	11.53	11.43		0
	25	0	11.30	11.45	11.40	11.47	0-1	0
	25	12	11.33	11.46	11.42	11.50		0
	25	25	11.36	11.46	11.45	11.54		0
	50	0	11.30	11.45	11.39	11.49		0
16QAM	1	0	11.64	11.72	11.76	11.80	0-1	0
	1	25	11.56	11.66	11.69	11.82		0
	1	49	11.67	11.70	11.80	11.79		0
	25	0	11.31	11.43	11.37	11.48	0-2	0
	25	12	11.32	11.41	11.41	11.48		0
	25	25	11.33	11.43	11.48	11.54		0
	50	0	11.29	11.41	11.35	11.45		0
64QAM	1	0	11.50	11.55	11.62	11.70	0-2	0
	1	25	11.41	11.53	11.58	11.66		0
	1	49	11.47	11.53	11.67	11.69		0
	25	0	11.33	11.44	11.46	11.54	0-3	0
	25	12	11.35	11.46	11.47	11.57		0
	25	25	11.34	11.41	11.54	11.58		0
	50	0	11.39	11.45	11.50	11.56		0
256QAM	1	0	11.20	11.47	11.34	11.41	0-5	0
	1	25	11.22	11.52	11.37	11.41		0
	1	49	11.21	11.57	11.38	11.49		0
	25	0	11.35	11.43	11.42	11.55		0
	25	12	11.41	11.39	11.48	11.51		0
	25	25	11.35	11.43	11.53	11.56		0
	50	0	11.41	11.43	11.44	11.51		0

Table H-3
LTE Band 48 Measured P_{limit} Ant 4a - 5 MHz Bandwidth

LTE Band 48 5 MHz Bandwidth								
Modulation	RB Size	RB Offset	Low Channel 55265 (3552.5 MHz)	Low-Mid Channel 55748 (3600.8 MHz)	Mid-High Channel 56232 (3649.2 MHz)	High Channel 56715 (3697.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]					
QPSK	1	0	11.22	11.28	11.57	11.47	0	0
	1	12	11.20	11.23	11.41	11.40		0
	1	24	11.22	11.36	11.58	11.44		0
	12	0	11.34	11.44	11.47	11.57	0-1	0
	12	6	11.30	11.43	11.50	11.53		0
	12	13	11.31	11.43	11.52	11.53		0
	25	0	11.35	11.46	11.50	11.51		0
16QAM	1	0	11.17	11.23	11.37	11.43	0-1	0
	1	12	11.15	11.18	11.30	11.31		0
	1	24	11.19	11.29	11.34	11.40		0
	12	0	11.57	11.67	11.72	11.80	0-2	0
	12	6	11.54	11.67	11.72	11.78		0
	12	13	11.54	11.66	11.72	11.78		0
	25	0	11.66	11.70	11.76	11.80		0
64QAM	1	0	11.15	11.54	11.70	11.44	0-2	0
	1	12	11.16	11.54	11.56	11.35		0
	1	24	11.15	11.57	11.70	11.41		0
	12	0	11.22	11.49	11.59	11.54	0-3	0
	12	6	11.25	11.47	11.58	11.52		0
	12	13	11.27	11.49	11.59	11.52		0
	25	0	11.31	11.41	11.47	11.62		0
256QAM	1	0	11.25	11.49	11.63	11.68	0-5	0
	1	12	11.27	11.42	11.54	11.59		0
	1	24	11.25	11.56	11.63	11.66		0
	12	0	11.33	11.34	11.40	11.53		0
	12	6	11.35	11.39	11.42	11.49		0
	12	13	11.39	11.39	11.44	11.49		0
	25	0	11.35	11.44	11.51	11.58		0

H.2 NR Lower Bandwidth RF Conducted Powers

H.2.1 NR Band n77 PC3

Table H-4
NR Band n77 PC3 Measured P_{limit} Ant 4a - 90 MHz Bandwidth

NR Band n77 90 MHz Bandwidth							
Modulation	RB Size	RB Offset	649668 (3745.02 MHz)	656000 (3840 MHz)	662332 (3934.98 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
DFT-s-OFDM π/2 BPSK	1	1	8.49	8.60	8.43	0	0.0
	1	123	8.50	8.46	8.40		0.0
	1	243	8.25	8.61	8.42		0.0
	120	0	8.34	8.43	8.09	0-0.5	0.0
	120	63	8.38	8.41	8.24	0	0.0
	120	125	8.32	8.56	8.31	0-0.5	0.0
	243	0	8.34	8.43	8.19		0.0
DFT-s-OFDM QPSK	1	1	8.38	8.60	8.37	0	0.0
	1	123	8.33	8.31	8.28		0.0
	1	243	8.22	8.64	8.37		0.0
	120	0	8.33	8.44	8.10	0-1	0.0
	120	63	8.29	8.47	8.23	0	0.0
	120	125	8.32	8.55	8.30	0-1	0.0
	243	0	8.27	8.46	8.21		0.0
DFT-s-OFDM 16QAM	1	1	8.40	8.53	8.30	0-1	0.0
CP-OFDM QPSK	1	1	8.36	8.43	8.38	0-1.5	0.0

Table H-5
NR Band n77 PC3 Measured P_{limit} Ant 4a - 80 MHz Bandwidth

NR Band n77 80 MHz Bandwidth							
			Channel			MPR Allowed per 3GPP [dB]	MPR [dB]
Modulation	RB Size	RB Offset	649334 (3740.01 MHz)	656000 (3840 MHz)	662666 (3939.99 MHz)		
			Conducted Power [dBm]				
DFT-s-OFDM π/2 BPSK	1	1	8.14	8.43	8.06	0	0.0
	1	109	8.07	8.38	8.23		0.0
	1	215	8.01	8.40	8.15		0.0
	108	0	8.11	8.14	8.01	0-0.5	0.0
	108	55	8.06	8.24	8.06	0	0.0
	108	109	8.05	8.41	8.15	0-0.5	0.0
	216	0	8.06	8.35	8.02		0.0
DFT-s-OFDM QPSK	1	1	8.06	8.32	8.02	0	0.0
	1	109	8.04	8.21	8.21		0.0
	1	215	8.00	8.44	8.11		0.0
	108	0	8.10	8.13	8.00	0-1	0.0
	108	55	8.04	8.22	8.10	0	0.0
	108	109	8.04	8.38	8.12	0-1	0.0
	216	0	8.06	8.32	8.00		0.0
DFT-s-OFDM 16QAM	1	1	8.04	8.38	8.00	0-1	0.0
CP-OFDM QPSK	1	1	8.07	8.31	8.08	0-1.5	0.0

Table H-6
NR Band n77 PC3 Measured P_{limit} Ant 4a - 60 MHz Bandwidth

NR Band n77 60 MHz Bandwidth								
			Channel				MPR Allowed per 3GPP [dB]	MPR [dB]
Modulation	RB Size	RB Offset	648668 (3730.02 MHz)	653556 (3803.34 MHz)	658444 (3876.66 MHz)	663332 (3949.98 MHz)		
			Conducted Power [dBm]					
DFT-s-OFDM π/2 BPSK	1	1	8.31	8.72	8.36	8.11	0	0.0
	1	81	8.35	8.57	8.70	8.34		0.0
	1	160	8.26	8.40	8.19	8.24		0.0
	81	0	8.31	8.63	8.58	8.06	0-0.5	0.0
	81	41	8.21	8.62	8.57	8.22	0	0.0
	81	81	8.33	8.52	8.53	8.21	0-0.5	0.0
	162	0	8.27	8.57	8.48	8.13		0.0
DFT-s-OFDM QPSK	1	1	8.22	8.74	8.30	8.10	0	0.0
	1	81	8.24	8.59	8.55	8.14		0.0
	1	160	8.32	8.32	8.21	8.28		0.0
	81	0	8.35	8.61	8.56	8.04	0-1	0.0
	81	41	8.22	8.58	8.58	8.17	0	0.0
	81	81	8.32	8.54	8.54	8.18	0-1	0.0
	162	0	8.23	8.61	8.47	8.11		0.0
DFT-s-OFDM 16QAM	1	1	8.32	8.71	8.19	8.00	0-1	0.0
CP-OFDM QPSK	1	1	8.20	8.61	8.22	8.12	0-1.5	0.0

Table H-7
NR Band n77 PC3 Measured P_{limit} Ant 4a - 50 MHz Bandwidth

NR Band n77 50 MHz Bandwidth									
			Channel						
Modulation	RB Size	RB Offset	648334 (3725.01 MHz)	652166 (3782.49 MHz)	656000 (3840 MHz)	659834 (3897.51 MHz)	663666 (3954.99 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]						
DFT-s-OFDM π/2 BPSK	1	1	8.11	8.65	7.75	7.95	8.19	0	0
	1	67	8.28	8.44	7.79	7.91	7.88		0
	1	131	8.23	8.05	8.16	8.10	7.96		0
	64	0	8.04	8.60	7.70	7.73	7.97	0-0.5	0
	64	35	8.10	8.37	7.70	7.84	7.90	0	0
	64	69	8.20	8.07	8.02	7.90	7.82	0-0.5	0
	128	0	8.03	8.32	7.69	7.79	7.92		0
DFT-s-OFDM QPSK	1	1	8.00	8.75	7.85	7.88	8.10	0	0
	1	67	8.21	8.30	7.63	7.80	7.85		0
	1	131	8.16	7.90	8.07	7.96	7.93		0
	64	0	8.01	8.55	7.72	7.79	7.95	0-1	0
	64	35	8.08	8.35	7.62	7.84	7.88	0	0
	64	69	8.14	8.21	8.02	7.95	7.83	0-1	0
	128	0	8.06	8.32	7.69	7.80	7.91		0
DFT-s-OFDM 16QAM	1	1	8.04	8.70	7.85	7.90	8.03	0-1	0
CP-OFDM QPSK	1	1	8.07	8.75	7.96	8.00	8.10	0-1.5	0

Table H-8
NR Band n77 PC3 Measured P_{limit} Ant 4a - 40 MHz Bandwidth

NR Band n77 40 MHz Bandwidth									
			Channel						
Modulation	RB Size	RB Offset	648000 (3720 MHz)	651200 (3768 MHz)	654400 (3816 MHz)	657600 (3864 MHz)	660800 (3912 MHz)	664000 (3960 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]							
DFT-s-OFDM π/2 BPSK	1	1	8.00	8.73	7.90	7.72	7.95	8.44	0	0.0
	1	53	7.75	8.32	7.70	7.80	7.71	8.05		0.0
	1	104	8.15	8.04	7.60	7.91	7.77	8.10		0.0
	50	0	7.75	8.55	7.65	7.79	7.65	8.25	0-0.5	0.0
	50	28	7.86	8.30	7.61	7.75	7.76	8.13	0	0.0
	50	56	8.04	8.23	7.60	7.81	7.80	8.00	0-0.5	0.0
	100	0	7.80	8.39	7.66	7.90	7.76	8.16		0.0
DFT-s-OFDM QPSK	1	1	7.99	8.75	7.84	7.76	7.80	8.47	0	0.0
	1	53	7.79	8.41	7.59	7.83	7.80	8.14		0.0
	1	104	8.05	8.10	7.65	7.80	7.81	8.00		0.0
	50	0	7.80	8.60	7.70	7.75	7.72	8.26	0-1	0.0
	50	28	7.81	8.32	7.60	7.79	7.72	8.14	0	0.0
	50	56	8.09	8.27	7.62	7.77	7.77	8.03	0-1	0.0
	100	0	7.85	8.40	7.59	7.91	7.71	8.15		0.0
DFT-s-OFDM 16QAM	1	1	8.03	8.70	8.00	7.85	7.90	8.40	0-1	0.0
CP-OFDM QPSK	1	1	8.06	8.78	7.99	8.05	8.00	8.38	0-1.5	0.0

Table H-9
NR Band n77 PC3 Measured P_{limit} Ant 4a - 20 MHz Bandwidth

NR Band n77 20 MHz Bandwidth										
			Channel						MPR Allowed per 3GPP [dB]	MPR [dB]
Modulation	RB Size	RB Offset	647334 (3710.01 MHz)	650800 (3762 MHz)	654266 (3813.99 MHz)	657734 (3866.01 MHz)	661200 (3918 MHz)	664666 (3969.99 MHz)		
			Conducted Power [dBm]							
DFT-s-OFDM π/2 BPSK	1	1	7.97	8.12	7.85	8.03	8.02	7.92	0	0.0
	1	26	7.86	8.07	7.80	7.97	7.91	7.85		0.0
	1	49	8.07	8.00	7.76	8.11	8.01	7.86		0.0
	25	0	7.92	7.99	7.70	7.96	7.90	7.74	0-0.5	0.0
	25	13	7.90	7.98	7.75	7.95	7.95	7.71	0	0.0
	25	26	7.87	7.87	7.62	7.93	7.82	7.84	0-0.5	0.0
	50	0	7.85	7.95	7.73	7.92	7.90	7.75		0.0
DFT-s-OFDM QPSK	1	1	8.04	8.04	7.90	8.00	8.00	7.90	0	0.0
	1	26	7.96	**8.05**	7.80	7.95	7.92	7.90		0.0
	1	49	8.04	7.94	7.60	8.02	7.93	8.01		0.0
	25	0	7.90	7.94	7.73	8.00	7.91	7.80	0-1	0.0
	25	13	7.88	**8.02**	7.65	7.90	7.84	7.71	0	0.0
	25	26	7.99	7.86	7.60	8.00	7.91	7.72	0-1	0.0
	50	0	7.90	7.93	7.75	7.96	7.80	7.76		0.0
DFT-s-OFDM 16QAM	1	1	7.97	8.20	7.85	8.12	8.01	7.95	0-1	0.0
CP-OFDM QPSK	1	1	8.07	8.17	7.90	8.04	8.08	7.93	0-1.5	0.0

APPENDIX I: WIFI TIME-AVERAGED SAR VERIFICATION

I.1 WIFI Time-Averaged SAR Verification Summary

This device supports the manufacturer's time-averaged SAR (TAS) mechanism for WLAN operations. The output power is controlled in real-time so that the power averaged over any 60 second window does not exceed the level tested for SAR in this report. The time-averaged SAR algorithm tracks the energy contribution relative to the available energy budget for each transmitter, defined as the "utilization ratio." Once the utilization ratios for each of the individual WLAN transmitters are calculated, they are summed to derive the overall WLAN system power utilization ratio. This metric is used by the WLAN chipset to manage power levels over time and ensure that SAR limits are never exceeded.

Per ISED Guidance, the following test scenarios were defined to validate the TAS mechanism. The specific scenarios are constructed to validate the operation of the algorithm in all operational states, including transitions between states/antennas:

- Change in channel/band
- Change in antenna (includes connection drop scenario)
- Change in device state, e.g Cell on/off WiFi power change

Predefined transmit profiles for each test scenario are provided by the manufacturer's test automation software to control the operation of the DUT while synchronized operational data was recorded from internal firmware and external power monitors. The data was plotted over time relative to the utilization limit to demonstrate that the maximum time-averaged power is never exceeded. "Reported" values were output and captured directly from DUT firmware, while "Measured" results were obtained from external power metering. The uncertainty budget applied to the WLAN power control functions for this device is 1.5 dB. In all test cases, WLAN radios were configured to operate at 100% duty cycle.

Table I-1
Test Configurations for WIFI Time-Averaged SAR Verification

Mode	Antenna	Channel	Plim (dBm)	Plim (mW)
802.11b, 22 MHz Bandwidth	4a	7	12	16
802.11b, 22 MHz Bandwidth (Reduced)	4a	7	9	8
802.11b, 22 MHz Bandwidth	2a	7	11.5	14
802.11a, 20 MHz Bandwidth	5b	149	17.75	60
802.11a, 20 MHz Bandwidth	4b	149	11.5	13

Plim is the maximum time-averaged output power evaluated for SAR compliance

Note1: For the time-averaged 5 GHz Ant 4B testing, the Plimit set in the device software at the time of testing was 11.25 dBm. The corresponding values in mW above were used to assess the time-averaged algorithm with the parameters loaded onto the device at the time of testing.

I.2 Verification Summary

Scenario 1: Change in Antenna

For this test, the effect on the time-averaging algorithm from a change in the active transmit antenna was evaluated. Figures I-1 and I-2 show a switch of 2.4 GHz transmissions from antenna 4a to antenna 2a at Time = 120 s, while Figures I-3 and I-4 show a comparable transition for antenna 5b to antenna 4b 5 GHz transmissions. In both cases the test automation is controlling the WLAN radios to operate at 100% duty cycle. In both cases the utilization ratio never exceeds 100% and the average transmit power never exceeds the Plim of each respective antenna.

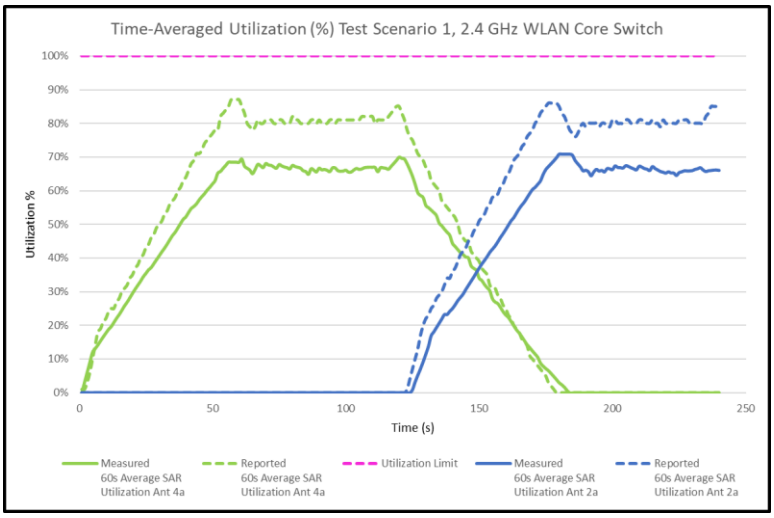


Figure I-1
60s Average SAR Utilization vs. Time, 2.4 GHz

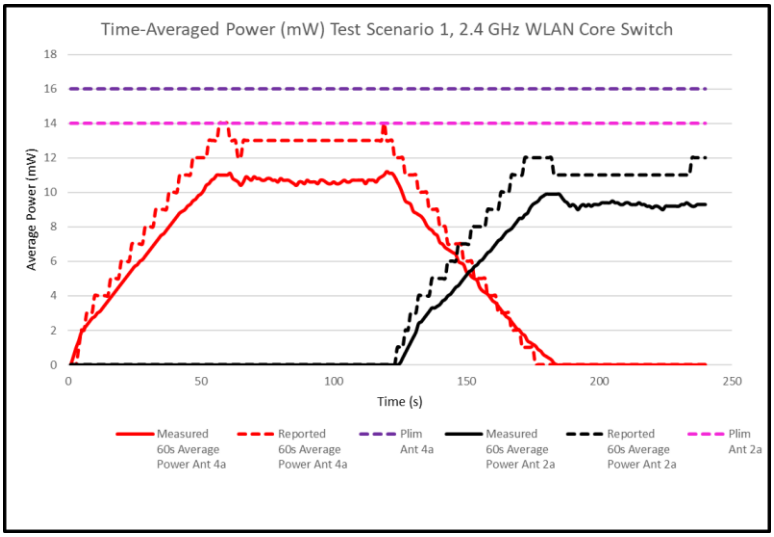


Figure I-2
60s Average Power vs. Time, 2.4 GHz

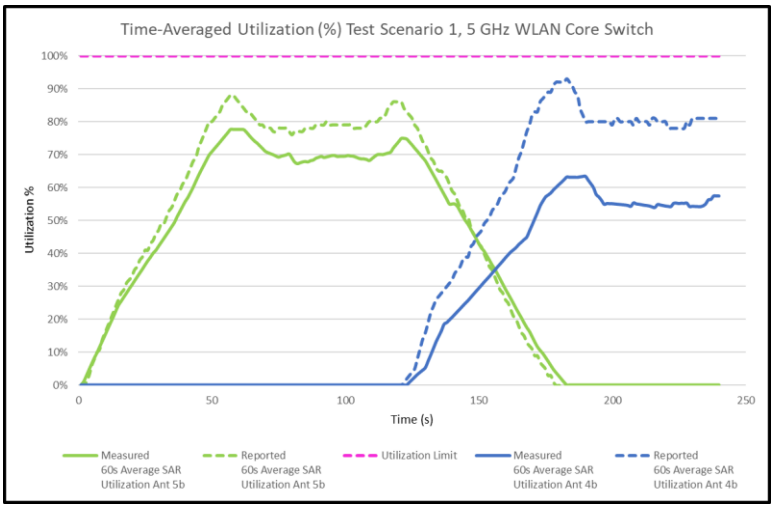


Figure I-3
60s Average SAR Utilization vs. Time, 5 GHz

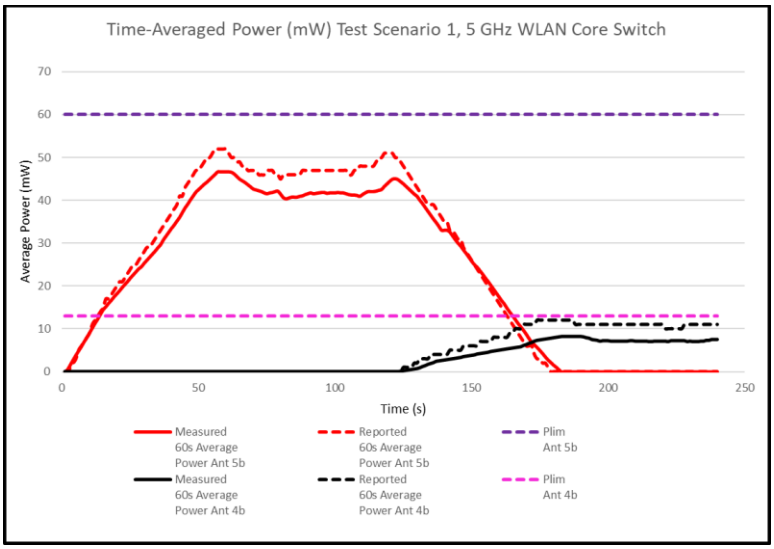


Figure I-4
60s Average Power vs. Time, 5 GHz

Scenario 2: Change in Channel/Band Test Case

This test demonstrates the efficacy of the time-averaged SAR algorithm while switching between 2.4 GHz and 5 GHz WLAN bands. In addition, it shows that the algorithm tracks time-averaged power and system utilization when the active transmitter is disabled and then reconnects.

The 2.4 GHz Ant 4a transmitter is active at 100% duty cycle until Time = 120 s. When 2.4 GHz transmissions cease, the 5 GHz Ant 5b transmitter is activated and begins to negotiate a new connection. The connection is established and the increase in average transmit power and utilization can clearly be seen. In this case the utilization ratio never exceeds 100% and the average transmit power never exceeds the Plim of each respective antenna.

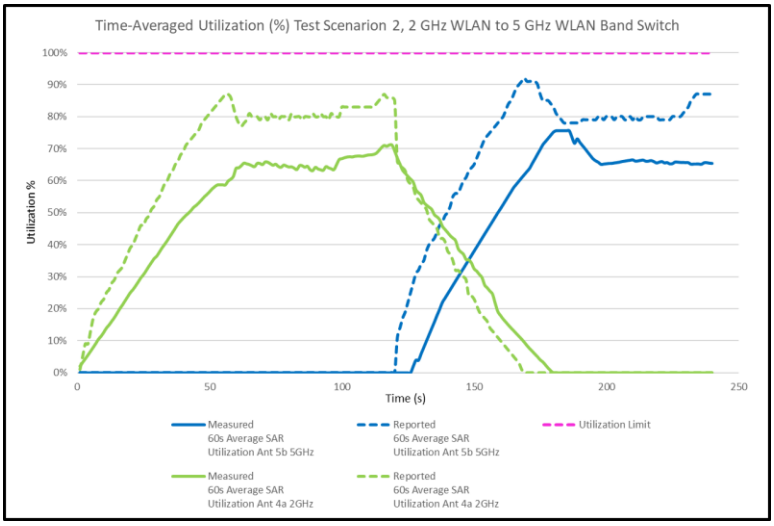


Figure I-5
60s Average Utilization vs. Time during Band Switch

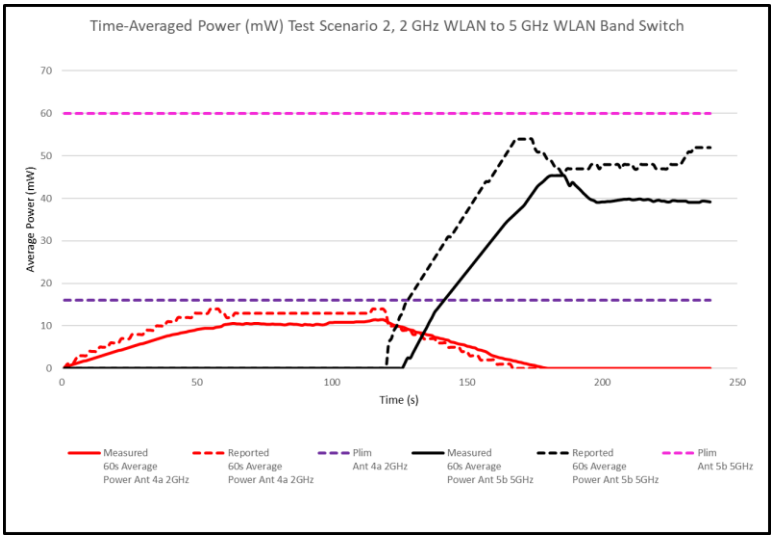


Figure I-6
60s Average Power vs. Time during Band Switch

Scenario 3: Change in Device State

This test demonstrates the efficacy of the time-averaged SAR algorithm when an external power control trigger is activated, transitioning between cell off and cell on at Time = 120 s.

The 2.4 GHz Ant 4a transmitter is active at 100% duty cycle until Time = 120 s. At this point a cellular connection occurs. The connection is established and the decrease in average transmit power and can clearly be seen, while utilization remains consistent. In this case the utilization ratio never exceeds 100% and the average transmit power never exceeds the Plim of the device state.

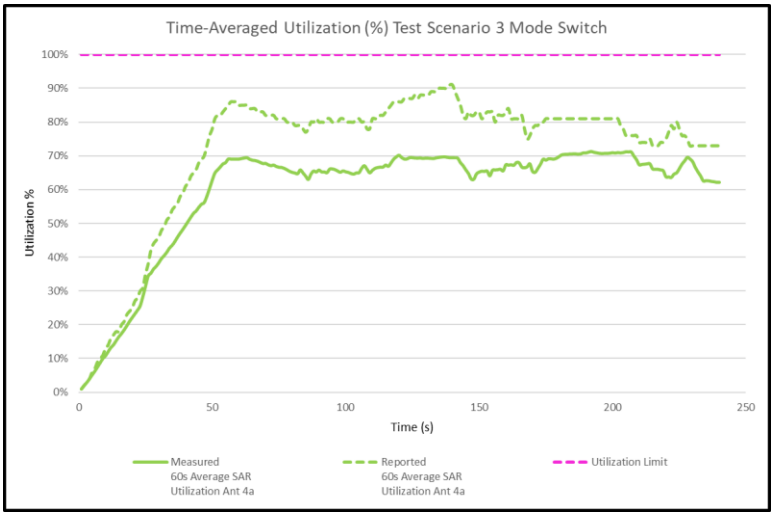


Figure I-7
60s Average Utilization vs. Time during Mode Switch

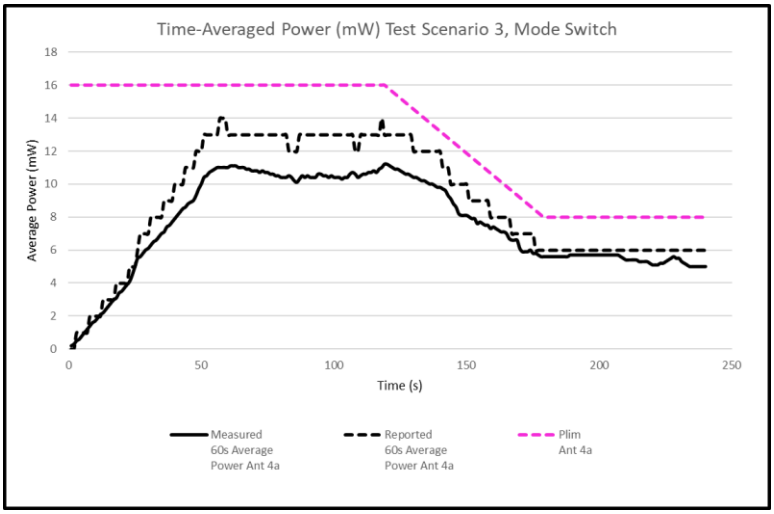


Figure I-8
60s Average Power vs. Time during Mode Switch