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SAR EVALUATION REPORT

Applicant Name:
Sony Corporation
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Tokyo, 108-0075, Japan

Date of Testing:
04/10/2022 - 07/05/2022
Test Site/Location:
Element, Columbia, MD, USA
Document Serial No.:
1M2206010068-03.PY7

FCC ID: **PY7-57325M**

APPLICANT: **SONY CORPORATION**

DUT Type: Portable Handset
Application Type: Class II Permissive Change
FCC Rule Part(s): CFR §2.1093
Permissive Change(s): See FCC Change Description
Date of Original Certification: June 17, 2022

Equipment Class	Band & Mode	Tx Frequency	SAR			
			1g Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)	10g Phablet (W/kg)
PCE	NR Band n41	2506.02 - 2679.99 MHz	0.77	< 0.1	< 0.1	N/A
PCE	NR Band n77	3710.01 - 3969.99 MHz	0.53	0.43	0.43	1.67
Simultaneous SAR per KDB 690783 D01v01r03:			N/A	N/A	N/A	N/A

Note: Only operations relevant to this permissive change were evaluated for compliance. Please see the original compliance evaluation in RF Exposure Technical Report S/N 1M2201200003-05.PY7 for complete evaluation of all other operating modes. The operational description includes a description of all changed items.

Note: This revised Test Report supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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.

RJ Ortanez
Executive Vice 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.

TABLE OF CONTENTS

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/DTM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/DTM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
LTE Band 71	Voice/Data	665.5 - 695.5 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 17	Voice/Data	706.5 - 713.5 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 66 (AWS)	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Voice/Data	1850.7 - 1914.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
LTE Band 48	Voice/Data	3552.5 - 3697.5 MHz
NR Band n71	Data	665.5 - 695.5 MHz
NR Band n5 (Cell)	Data	826.5 - 846.5 MHz
NR Band n66 (AWS)	Data	1712.5 - 1777.5 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	Data	2412 - 2462 MHz
U-NII-1	Data	5180 - 5240 MHz
U-NII-2A	Data	5260 - 5320 MHz
U-NII-2C	Data	5500 - 5720 MHz
U-NII-3	Data	5745 - 5825 MHz
U-NII-5	Data	5955 - 6415 MHz
U-NII-6	Data	6435 - 6525 MHz
U-NII-7	Data	6535 - 6875 MHz
U-NII-8	Data	6895 - 7115 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
NR Band n260	Data	37000 - 40000 MHz
NR Band n261	Data	27500 - 28350 MHz

1.2 Time-Averaging Algorithm for RF Exposure Compliance

This Device is enabled with the Qualcomm® Smart Transmit Gen2 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., P_{limit} for sub-6 radio) for each characterized technology and band (see RF Exposure Part 0 Test Report, report SN can be found in Section 1.11 - Bibliography).

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 1.0dB for this EUT.

Exposure Senario			Body-Worn	Hotspot	Extremity	Head	Maximum Tune-Up Output Power*
Averaging Volume			1g	1g	10g	1g	
Spacing			10 mm	10 mm	0 mm	0 mm	
DSI			3	3	3	2	
Technology/Band	Antenna	Antenna Group					Pmax
GSM 850	Main 1	AG0	23.3		23.3	23.3	23.3
GSM 1900	Main 2	AG0	17.8		17.8	17.8	17.8
UMTS 850	Main 1	AG0	21.0		21.0	21.0	21.0
UMTS 1750	Main 2	AG0	19.0		19.0	19.0	19.0
UMTS 1900	Main 2	AG0	19.0		19.0	19.0	19.0
LTE Band 71	Main 1	AG0	24.0		24.0	24.0	24.0
LTE Band 12/17	Main 1	AG0	21.0		21.0	24.0	24.0
LTE Band 12/17	Sub	AG1	20.5		20.5	N/A	23.5
LTE Band 13	Main 1	AG0	21.0		21.0	24.0	24.0
LTE Band 13	Sub	AG1	20.5		20.5	N/A	23.5
LTE Band 5 (Cell)	Main 1	AG0	21.0		21.0	24.0	24.0
LTE Band 5 (Cell)	Sub	AG1	20.5		20.5	N/A	23.5
LTE Band 66/4 (AWS)	Main 2	AG0	19.0		19.0	24.0	24.0
LTE Band 66/4 (AWS)	Sub	AG1	19.0		19.0	19.0	23.0
LTE Band 25/2 (PCS)	Main 2	AG0	19.0		19.0	24.0	24.0
LTE Band 2 (PCS)	Sub	AG1	19.0		19.0	19.0	23.0
LTE Band 48	Main 1	AG0	17.0		17.0	22.0	22.0
LTE Band 41 (PC3)	Main 2	AG0	17.0		17.0	22.0	22.0
NR Band n71	Main 1	AG0	24.0		24.0	24.0	24.0
NR Band n5 (Cell)	Main 1	AG0	21.0		21.0	24.0	24.0
NR Band n5 (Cell)	Sub	AG1	20.5		20.5	N/A	23.5
NR Band n66 (AWS)	Main 2	AG0	19.0		19.0	24.0	24.0
NR Band n2 (PCS)	Main 2	AG0	19.0		19.0	24.0	24.0
NR Band n41 (PC3)	Main 2	AG0	19.0		19.0	27.0	24.0
NR Band n41 (PC2)	Main 2	AG0	19.0		19.0	27.0	26.0
NR Band n41 (PC3)	Sub	AG1	16.0		16.0	17.0	19.5
NR Band n77 (PC3)	Main 1	AG0	18.0		18.0	27.0	24.0
NR Band n77 (PC2)	Main 1	AG0	18.0		18.0	27.0	26.0
NR Band n77 (PC3)	Sub	AG1	15.0		15.0	15.0	19.5
NR Band n77 (PC3)	4th path	AG1	16.3		16.3	N/A	16.3

*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 (e.g. GSM and LTE TDD).

*Maximum tune up output power P_{max} is used to configure EUT during RF tune up procedure. The maximum allowed output power is equal to maximum Tune up output power + 1dB device design uncertainty.

The maximum time-averaged output power (dBm) for any 2G/3G/4G/5G Sub6 WWAN technology, band, and DSI = minimum of "P_{limit} EFS" and "Maximum tune up output power P_{max}" + 1dB 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.

Measurement Condition: All conducted power and SAR measurements in this report (Part 1 test) were performed by setting *Reserve_power_margin* (Smart Transmit EFS entry) to 0dB.

1.3 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.

1.3.1 2G/3G/4G/5G Output Power

GSM/GPRS/EDGE 850										
Power Level		Voice (in dBm)	Data - Burst Average GMSK (in dBm)				Data - Burst Average 8-PSK (in dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
All DSI	Max Allowed Power	33.2	33.2	30.2	28.4	27.2	27.7	24.7	22.9	21.7
	Nominal	32.5	32.5	29.5	27.7	26.5	27.0	24.0	22.2	21.0
GSM/GPRS/EDGE 1900										
Power Level		Voice (in dBm)	Data - Burst Average GMSK (in dBm)				Data - Burst Average 8-PSK (in dBm)			
		1 TX Slot	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots	1 TX Slots	2 TX Slots	3 TX Slots	4 TX Slots
All DSI	Max Allowed Power	27.7	27.7	24.7	22.9	21.7	26.7	23.7	21.9	20.7
	Nominal	27.0	27.0	24.0	22.2	21.0	26.0	23.0	21.2	20.0

DTM 850					
Power Level		DTM (GSM+GPRS) (in dBm)		DTM (GSM+EGPRS) (in dBm)	
		2 TX Slots	3 TX Slots	2 TX Slots	3 TX Slots
All DSI	Max Allowed Power	30.2	28.4	24.7	22.9
	Nominal	29.5	27.7	24.0	22.2
DTM 1900					
Power Level		DTM (GSM+GPRS) (in dBm)		DTM (GSM+EGPRS) (in dBm)	
		2 TX Slots	3 TX Slots	2 TX Slots	3 TX Slots
All DSI	Max Allowed Power	24.7	22.9	23.7	21.9
	Nominal	24.0	22.2	23.0	21.2

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

UMTS Band 5 (850 MHz)					
Power Level		Modulated Average Output Power (in dBm)			
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6	3GPP DC-HSDPA Rel 8
All DSI	Max Allowed Power	21.7	21.0	21.0	21.0
	Nominal	21.0	20.0	20.0	20.0
UMTS Band 4 (1750 MHz)					
Power Level		Modulated Average Output Power (in dBm)			
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6	3GPP DC-HSDPA Rel 8
All DSI	Max Allowed Power	19.7	19.0	19.0	19.0
	Nominal	19.0	18.0	18.0	18.0
UMTS Band 2 (1900 MHz)					
Power Level		Modulated Average Output Power (in dBm)			
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6	3GPP DC-HSDPA Rel 8
All DSI	Max Allowed Power	19.7	19.0	19.0	19.0
	Nominal	19.0	18.0	18.0	18.0

Mode / Band	Antenna		Modulated Average Output Power (in dBm)	
			DSI =2 (Head)	DSI =3 (Body Worn, Hotspot, Phablet)
LTE Band 71	Main 1	Max Allowed Power	25.0	25.0
		Nominal	24.0	24.0
LTE Band 12	Main 1	Max Allowed Power	25.0	22.0
		Nominal	24.0	21.0
LTE Band 12	Sub	Max Allowed Power	N/A	21.5
		Nominal	N/A	20.5
LTE Band 17	Main 1	Max Allowed Power	25.0	22.0
		Nominal	24.0	21.0
LTE Band 17	Sub	Max Allowed Power	N/A	21.5
		Nominal	N/A	20.5
LTE Band 13	Main 1	Max Allowed Power	25.0	22.0
		Nominal	24.0	21.0
LTE Band 13	Sub	Max Allowed Power	N/A	21.5
		Nominal	N/A	20.5
LTE Band 5 (Cell)	Main 1	Max Allowed Power	25.0	22.0
		Nominal	24.0	21.0
LTE Band 5 (Cell)	Sub	Max Allowed Power	N/A	21.5
		Nominal	N/A	20.5
LTE Band 66 (AWS)	Main 2	Max Allowed Power	25.0	20.0
		Nominal	24.0	19.0
LTE Band 66 (AWS)	Sub	Max Allowed Power	20.0	20.0
		Nominal	19.0	19.0
LTE Band 4	Main 2	Max Allowed Power	25.0	20.0
		Nominal	24.0	19.0
LTE Band 25 (PCS)	Main 2	Max Allowed Power	25.0	20.0
		Nominal	24.0	19.0
LTE Band 2 (PCS)	Main 2	Max Allowed Power	25.0	20.0
		Nominal	24.0	19.0
LTE Band 2 (PCS)	Sub	Max Allowed Power	20.0	20.0
		Nominal	19.0	19.0
LTE Band 41	Main 2	Max Allowed Power	25.0	20.0
		Nominal	24.0	19.0
LTE Band 48	Main 1	Max Allowed Power	25.0	20.0
		Nominal	24.0	19.0

Mode / Band	Antenna		Modulated Average Output Power (in dBm)	
			DSI =2 (Head)	DSI =3 (Body Worn, Hotspot, Phablet)
NR Band n71	Main 1	Max Allowed Power	25.0	25.0
		Nominal	24.0	24.0
NR Band n5 (Cell)	Main 1	Max Allowed Power	25.0	22.0
		Nominal	24.0	21.0
NR Band n5 (Cell)	Sub	Max Allowed Power	N/A	21.5
		Nominal	N/A	20.5
NR Band n66 (AWS)	Main 2	Max Allowed Power	25.0	20.0
		Nominal	24.0	19.0
NR Band n2 (PCS)	Main 2	Max Allowed Power	25.0	20.0
		Nominal	24.0	19.0
NR Band n41 (PC2)	Main 2	Max Allowed Power	27.0	20.0
		Nominal	26.0	19.0
NR Band n41 (PC3)	Main 2	Max Allowed Power	25.0	20.0
		Nominal	24.0	19.0
NR Band n41 (PC3, UL-MIMO)	Sub	Max Allowed Power	18.0	17.0
		Nominal	17.0	16.0
NR Band n77 (PC2)	Main 1	Max Allowed Power	27.0	19.0
		Nominal	26.0	18.0
NR Band n77 (PC3)	Main 1	Max Allowed Power	25.0	19.0
		Nominal	24.0	18.0
NR Band n77 (PC3, UL-MIMO)	Sub	Max Allowed Power	16.0	16.0
		Nominal	15.0	15.0
NR Band n77 (PC3)	4th path	Max Allowed Power	N/A	17.3
		Nominal	N/A	16.3

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

1.3.2 2.4 GHz Maximum SISO/MIMO WLAN Output Power

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

Mode	Band	IEEE 802.11 (in dBm)							
		SISO				MIMO			
		Chain 0							
		b	g	n	ax (SU)	b	g (CDD+STBC)	n (CDD+STBC,SDM)	ax (SU) (CDD+STBC,SDM)
Maximum/ Nominal Power		Max	Max	Max	Max	Max	Max	Max	Max
2.4 GHz WIFI	2.45 GHz	14.5	15.0 ch. 1: 14.0 ch. 11: 13.5	15.0 ch. 1: 13.5 ch. 11: 13.0	15.0 ch. 1: 13.5 ch. 11: 13.0	14.5	15.0 ch. 1: 14.0 ch. 11: 13.5	15.0 ch. 1: 13.5 ch. 11: 13.0	15.0 ch. 1: 13.5 ch. 11: 13.0
Mode	Band	IEEE 802.11 (in dBm)							
		SISO				MIMO			
		Chain 1							
		b	g	n	ax (SU)	b	g (CDD+STBC)	n (CDD+STBC,SDM)	ax (SU) (CDD+STBC,SDM)
Maximum/ Nominal Power		Max	Max	Max	Max	Max	Max	Max	Max
2.4 GHz WIFI	2.45 GHz	12.7	15.0 ch. 1: 14.0 ch. 11: 13.5	15.0 ch. 1: 13.5 ch. 11: 13.0	15.0 ch. 1: 13.5 ch. 11: 13.0	12.7	15.0 ch. 1: 14.0 ch. 11: 13.5	15.0 ch. 1: 13.5 ch. 11: 13.0	15.0 ch. 1: 13.5 ch. 11: 13.0

Note: in MIMO operations, each Chain 0 and Chain 1 transmits at maximum allowed powers as indicated above.

1.3.3 2.4 GHz Reduced MIMO WLAN Output Powers

The below table is applicable during Simultaneous Conditions with 2.4 GHz and 5/6 GHz WLAN

Mode	Band	IEEE 802.11 (in dBm)							
		MIMO							
		Chain 0				Chain 1			
		b	g (CDD+STBC)	n (CDD+STBC,SDM)	ax (SU) (CDD+STBC,SDM)	b	g (CDD+STBC)	n (CDD+STBC,SDM)	ax (SU) (CDD+STBC,SDM)
Maximum/ Nominal Power		Max	Max	Max	Max	Max	Max	Max	Max
2.4 GHz WIFI	2.45 GHz	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0

Note: in MIMO operations, each Chain 0 and Chain 1 transmits at maximum allowed powers as indicated above.

1.3.4 5 GHz Maximum SISO/MIMO WLAN Output Power

Mode	Band	IEEE 802.11 (in dBm)							
		SISO				MIMO			
		Chain 0							
		a	n (CDD+STBC, SDM)	ac (CDD+STBC, SDM)	ax (SU) (CDD+STBC, SDM)	a	n (CDD+STBC, SDM)	ac (CDD+STBC, SDM)	ax (SU) (CDD+STBC, SDM)
Maximum/ Nominal Power		Max	Max	Max	Max	Max	Max	Max	Max
5 GHz WIFI (20MHz BW)	UNII-1	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	UNII-2A	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	UNII-2C	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	UNII-3	11.5	11.5 ch. 149: 11.0	11.5 ch. 149: 11.0	11.5 ch. 149: 11.0	11.5	11.5 ch. 149: 11.0	11.5 ch. 149: 11.0	11.5 ch. 149: 11.0
5 GHz WIFI (40MHz BW)	UNII-1		11.5	11.5	11.5		11.5	11.5	11.5
	UNII-2A		11.5	11.5	11.5		11.5	11.5	11.5
	UNII-2C		11.5	11.5	11.5		11.5	11.5	11.5
	UNII-3		11.5 ch. 151: 11.0	11.5 ch. 151: 11.0	11.5 ch. 151: 11.0		11.5 ch. 151: 11.0	11.5 ch. 151: 11.0	11.5 ch. 151: 11.0
5 GHz WIFI (80MHz BW)	UNII-1			11.5	11.5			11.5	11.5
	UNII-2A			11.5	11.5			11.5	11.5
	UNII-2C			11.5	11.5			11.5	11.5
	UNII-3			11.5	11.5			11.5	11.5
5 GHz WIFI (160MHz BW)	UNII-1			11.5	11.5			11.5	11.5
	UNII-2A			11.5	11.5			11.5	11.5

Mode	Band	IEEE 802.11 (in dBm)							
		SISO				MIMO			
		Chain 1							
		a	n (CDD+STBC, SDM)	ac (CDD+STBC, SDM)	ax (SU) (CDD+STBC, SDM)	a	n (CDD+STBC, SDM)	ac (CDD+STBC, SDM)	ax (SU) (CDD+STBC, SDM)
Maximum/ Nominal Power		Max	Max	Max	Max	Max	Max	Max	Max
5 GHz WIFI (20MHz BW)	UNII-1	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	UNII-2A	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	UNII-2C	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	UNII-3	11.5	11.5 ch. 149: 11.0	11.5 ch. 149: 11.0	11.5 ch. 149: 11.0	11.5	11.5 ch. 149: 11.0	11.5 ch. 149: 11.0	11.5 ch. 149: 11.0
5 GHz WIFI (40MHz BW)	UNII-1		11.5	11.5	11.5		11.5	11.5	11.5
	UNII-2A		11.5	11.5	11.5		11.5	11.5	11.5
	UNII-2C		11.5	11.5	11.5		11.5	11.5	11.5
	UNII-3		11.5 ch. 151: 11.0	11.5 ch. 151: 11.0	11.5 ch. 151: 11.0		11.5 ch. 151: 11.0	11.5 ch. 151: 11.0	11.5 ch. 151: 11.0
5 GHz WIFI (80MHz BW)	UNII-1			11.5	11.5			11.5	11.5
	UNII-2A			11.5	11.5			11.5	11.5
	UNII-2C			11.5	11.5			11.5	11.5
	UNII-3			11.5	11.5			11.5	11.5
5 GHz WIFI (160MHz BW)	UNII-1			11.5	11.5			11.5	11.5
	UNII-2A			11.5	11.5			11.5	11.5

Note: in MIMO operations, each Chain 0 and Chain 1 transmits at maximum allowed powers as indicated above.

1.3.5 5 GHz Reduced MIMO WLAN Output Powers

The below table is applicable during Simultaneous Conditions with 2.4 GHz and 5 GHz WLAN

Mode	Band	IEEE 802.11 (in dBm)							
		MIMO							
		Chain 0				Chain 1			
		a	n (CDD+STBC, SDM)	ac (CDD+STBC, SDM)	ax (SU) (CDD+STBC, SDM)	a	n (CDD+STBC, SDM)	ac (CDD+STBC, SDM)	ax (SU) (CDD+STBC, SDM)
Maximum/ Nominal Power		Max	Max	Max	Max	Max	Max	Max	Max
5 GHz WIFI (20MHz BW)	UNII-1	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
	UNII-2A	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
	UNII-2C	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
	UNII-3	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
5 GHz WIFI (40MHz BW)	UNII-1		9.5	9.5	9.5		9.5	9.5	9.5
	UNII-2A		9.5	9.5	9.5		9.5	9.5	9.5
	UNII-2C		9.5	9.5	9.5		9.5	9.5	9.5
	UNII-3		9.5	9.5	9.5		9.5	9.5	9.5
5 GHz WIFI (80MHz BW)	UNII-1			9.5	9.5			9.5	9.5
	UNII-2A			9.5	9.5			9.5	9.5
	UNII-2C			9.5	9.5			9.5	9.5
	UNII-3			9.5	9.5			9.5	9.5
5 GHz WIFI (160MHz BW)	UNII-1			9.5	9.5			9.5	9.5
	UNII-2A			9.5	9.5			9.5	9.5

Note: in MIMO operations, each Chain 0 and Chain 1 transmits at maximum allowed powers as indicated above.

1.3.6 2.4 GHz Maximum Bluetooth Output Power

Bluetooth (in dBm)
14
EDR (in dBm)
13
BLE 1Mbps (in dBm)
10.79
BLE 2Mbps (in dBm)
10.79

1.4 DUT Antenna Locations

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

Table 1-1
Device Edges/Sides for SAR Testing

Device Sides/Edges for SAR Testing							
	Antenna	Back	Front	Top	Bottom	Right	Left
NR Band n41	Sub	Yes	Yes	Yes	No	Yes	Yes
NR Band n77	Main 1	Yes	Yes	No	Yes	No	Yes
NR Band n77	Sub	Yes	Yes	Yes	No	Yes	Yes

Note: Particular DUT edges were not required to be evaluated for wireless router SAR or phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06v02r01 Section III and FCC KDB Publication 648474 D04v01r03. The distances between the transmit antennas and the edges of the device are included in the filing. When wireless router mode is enabled, U-NII-2A, U-NII-2C operations are disabled.

1.5 Near Field Communications (NFC) Antenna

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

1.6 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. The standalone reported SAR in the original filing was used to determine simultaneous transmission compliance as it is more conservative. Please see the original filing for complete evaluation of simultaneous transmission analysis

Table 1-2
Simultaneous Transmission Scenarios

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

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

1.7 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.

Since Wireless Router operations are not allowed by the chipset firmware using U-NII-2A and U-NII-2C WIFI, only 2.4 GHz, U-NII-1, and U-NII-3 WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations according to FCC KDB 941225 D06v02r01.

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) 2 Tx antenna output
d) Up to 1024 QAM is supported
e) TDWR and Band gap channels are supported for 5 GHz
f) MU-MIMO UL Operations are not supported

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg. Because wireless router operations are not supported for U-NII-2A and U-NII-2C WLAN, phablet SAR tests were performed. Phablet SAR was not evaluated for 2.4 GHz and U-NII-3 WLAN operations since wireless router 1g SAR was < 1.2 W/kg.

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.

This device supports 6 GHz WIFI Operations. RF Exposure assessment for these bands can be found in the WIFI6E RF Exposure Report (report SN can be found in Section 1.11 – Bibliography). Simultaneous transmission analysis is addressed in the Simultaneous Numerical Calculations Appendix of this report.

(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.

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 the Downlink LTE CA RF Conducted Powers Appendix.

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

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

This device supports 5G NR for Bands n260 and n261. RF Exposure assessment and simultaneous transmission analysis for these bands can be found in the Near Field PD Report (report SN can be found in Section 1.11 – Bibliography).

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.

1.8 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r04, D05Av01r02, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D04v01r03 (Phablet Procedures)
- FCC KDB Publication 616217 D04v01r02 (Proximity Sensor)
- October 2013 TCB Workshop Notes (GPRS Testing Considerations)
- April 2018 TCB Workshop Notes (LTE Carrier Aggregation)

1.9 Device Serial Numbers

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

1.10 Bibliography

Report Type	Report Serial Number
Near Field PD Report (Part 1)	Original Filing
RF Exposure Part 2 Test Report	Original Filing
RF Exposure Compliance Summary Report	Original Filing
WIFI 6GHz RF exposure	Original Filing

2 LTE AND NR INFORMATION

LTE Information					
Form Factor	Portable Handset				
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 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 66 (AWS) (1710.7 - 1779.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 25 (PCS) (1850.7 - 1914.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 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 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 66 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 4 (AWS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 25 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 2 (PCS): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 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 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)	848.3 (20643)	
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)	847.5 (20635)	
LTE Band 5 (Cell): 5 MHz	826.5 (20425)		836.5 (20525)	846.5 (20625)	
LTE Band 5 (Cell): 10 MHz	829 (20450)		836.5 (20525)	844 (20600)	
LTE Band 66 (AWS): 1.4 MHz	1710.7 (131979)		1745 (132322)	1779.3 (132665)	
LTE Band 66 (AWS): 3 MHz	1711.5 (131987)		1745 (132322)	1778.5 (132657)	
LTE Band 66 (AWS): 5 MHz	1712.5 (131997)		1745 (132322)	1777.5 (132647)	
LTE Band 66 (AWS): 10 MHz	1715 (132022)		1745 (132322)	1775 (132622)	
LTE Band 66 (AWS): 15 MHz	1717.5 (132047)		1745 (132322)	1772.5 (132597)	
LTE Band 66 (AWS): 20 MHz	1720 (132072)		1745 (132322)	1770 (132572)	
LTE Band 4 (AWS): 1.4 MHz	1710.7 (19957)		1732.5 (20175)	1754.3 (20393)	
LTE Band 4 (AWS): 3 MHz	1711.5 (19965)		1732.5 (20175)	1753.5 (20385)	
LTE Band 4 (AWS): 5 MHz	1712.5 (19975)		1732.5 (20175)	1752.5 (20375)	
LTE Band 4 (AWS): 10 MHz	1715 (20000)		1732.5 (20175)	1750 (20350)	
LTE Band 4 (AWS): 15 MHz	1717.5 (20025)		1732.5 (20175)	1747.5 (20325)	
LTE Band 4 (AWS): 20 MHz	1720 (20050)		1732.5 (20175)	1745 (20300)	
LTE Band 25 (PCS): 1.4 MHz	1850.7 (26047)		1882.5 (26365)	1914.3 (26683)	
LTE Band 25 (PCS): 3 MHz	1851.5 (26055)		1882.5 (26365)	1913.5 (26675)	
LTE Band 25 (PCS): 5 MHz	1852.5 (26065)		1882.5 (26365)	1912.5 (26665)	
LTE Band 25 (PCS): 10 MHz	1855 (26090)		1882.5 (26365)	1910 (26640)	
LTE Band 25 (PCS): 15 MHz	1857.5 (26115)		1882.5 (26365)	1907.5 (26615)	
LTE Band 25 (PCS): 20 MHz	1860 (26140)		1882.5 (26365)	1905 (26590)	
LTE Band 2 (PCS): 1.4 MHz	1850.7 (18607)		1880 (18900)	1909.3 (19193)	
LTE Band 2 (PCS): 3 MHz	1851.5 (18615)		1880 (18900)	1908.5 (19185)	
LTE Band 2 (PCS): 5 MHz	1852.5 (18625)		1880 (18900)	1907.5 (19175)	
LTE Band 2 (PCS): 10 MHz	1855 (18650)		1880 (18900)	1905 (19150)	
LTE Band 2 (PCS): 15 MHz	1857.5 (18675)		1880 (18900)	1902.5 (19125)	
LTE Band 2 (PCS): 20 MHz	1860 (18700)		1880 (18900)	1900 (19100)	
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2549.5 (40185)	2593 (40620)	2636.5 (41055)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2549.5 (40185)	2593 (40620)	2636.5 (41055)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2549.5 (40185)	2593 (40620)	2636.5 (41055)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2549.5 (40185)	2593 (40620)	2636.5 (41055)
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 20, UL UE Cat 13				
Modulations Supported in UL	QPSK, 16QAM, 64QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Additional Information	This device does not support full CA features on 3GPP Release 15. It supports carrier aggregation, downlink MIMO, LAA features as shown in Appendix J. 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	Portable Handset					
Frequency Range of each NR transmission band	NR Band n71 (665.5 - 695.5 MHz)					
	NR Band n5 (Cell) (826.5 - 846.5 MHz)					
	NR Band n66 (AWS) (1712.5 - 1777.5 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, 20 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 n2 (PCS): 5 MHz, 10 MHz, 15 MHz, 20 MHz					
	NR Band n41: 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 80 MHz, 90 MHz, 100 MHz					
	NR Band n77: 20 MHz, 30 MHz, 40 MHz, 60 MHz, 80 MHz, 100 MHz					
Channel Numbers and Frequencies (MHz)						
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 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 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: 30 MHz	2511 (502200)	2552.01 (510402)	2592.99 (518598)		2634 (526800)	2674.98 (534996)
NR Band n41: 40 MHz	2516.01 (503202)	2567.34 (513468)	N/A		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: 30 MHz	3715.02 (647668)	3765 (651000)	3815.01 (654334)	3864.99 (657666)	3915 (661000)	3964.98 (664332)
NR Band n77: 40 MHz	3720 (648000)	3768 (651200)	3816 (654400)	3864 (657600)	3912 (660800)	3960 (664000)
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: 100 MHz	3750 (650000)	N/A	N/A	N/A	N/A	3930 (662000)
SCS for NR Band n71/n5/n66/n2	15 kHz					
SCS for NR Band n41/n77	30 kHz					
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					
LTE Anchor Bands for NR Band n5 (Cell)	LTE Band 66/2					
LTE Anchor Bands for NR Band n66 (AWS)	LTE Band 12/13/2/5					
LTE Anchor Bands for NR Band n2 (PCS)	LTE Band 12/13/66/5					
LTE Anchor Bands for NR Band n41	LTE Band 12/2					
LTE Anchor Bands for NR Band n77	LTE Band 12/13/2/5/66					

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:

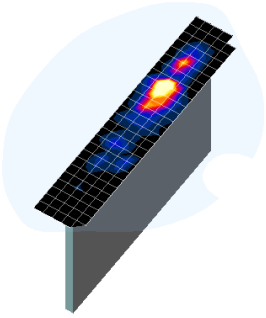

Figure 4-1
Sample SAR Area Scan

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 4-1) and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

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

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

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

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*Δz_{zoom}(n-1)	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5*Δz_{zoom}(n-1)	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5*Δz_{zoom}(n-1)	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5*Δz_{zoom}(n-1)	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5*Δz_{zoom}(n-1)	≥ 22

*Also compliant to IEEE 1528-2013 Table 6

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

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

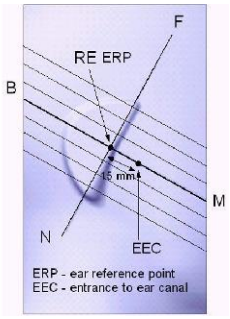

Figure 5-1
Close-Up Side view of ERP

5.2 HANDSET REFERENCE POINTS

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

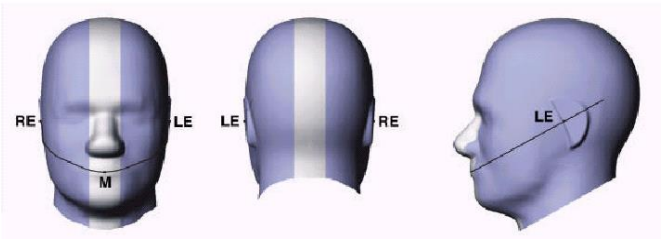

Figure 5-2
Front, back and side view of SAM Twin Phantom

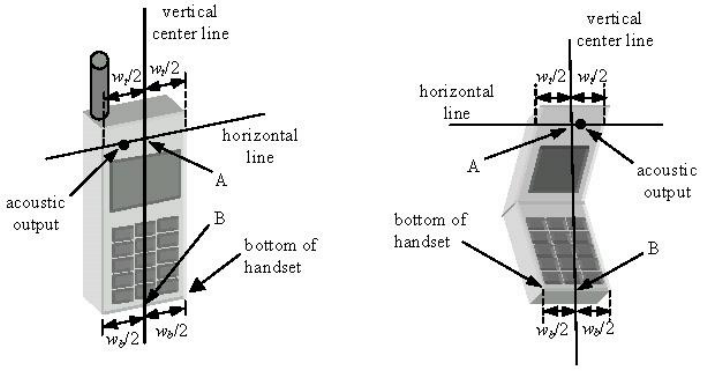

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

6 TEST CONFIGURATION POSITIONS

6.1 Device Holder

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

6.2 Positioning for Cheek

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

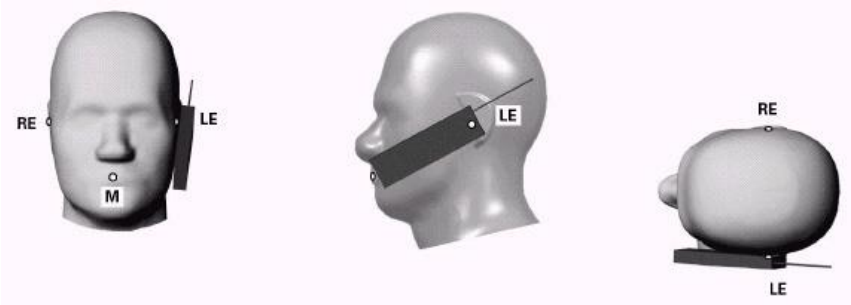

Figure 6-1 Front, Side and Top View of Cheek Position

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

6.3 Positioning for Ear / 15º Tilt

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

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

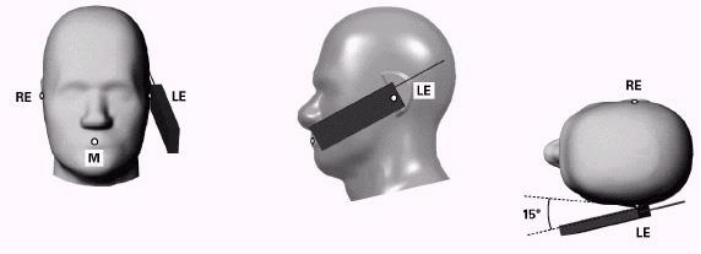

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

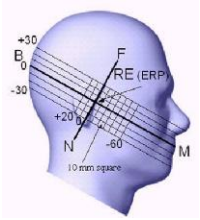

Figure 6-3
Side view w/ relevant markings

6.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones. Per IEEE 1528-2013, a rotated SAM phantom is necessary to allow probe access to such regions. Both SAM heads of the TwinSAM-Chin20 are rotated 20 degrees around the NF line. Each head can be removed from the table for emptying and cleaning.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r03. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR location identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

6.5 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-4). Per FCC KDB Publication 648474 D04v01r03, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

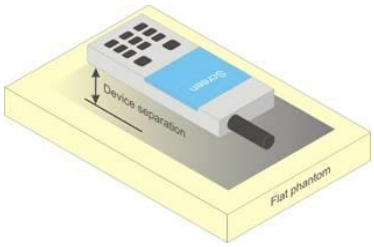

Figure 6-4
Sample Body-Worn Diagram

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that

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

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented.
Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

6.6 Extremity Exposure Configurations

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

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

6.7 Wireless Router Configurations

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

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

6.8 Phablet Configurations

For smart phones with a display diagonal dimension > 150 mm or an overall diagonal dimension > 160 mm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally

required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna <=25 mm from that surface or edge, in direct contact with the phantom, for 10g SAR. The UMPC mini-tablet 1g SAR at 5 mm is not required. When hotspot mode applies, 10g SAR is required only for the surfaces and edges with hotspot mode 1g SAR > 1.2 W/kg.

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT *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.

8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

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

8.2 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.

8.3 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.

9 RF CONDUCTED POWERS

All conducted power measurements for 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 (P_{limit}, maximum tune up output power P_{max}).

9.1 NR Conducted Powers

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 the NR Lower Bandwidth Conducted Powers Appendix.

Note: Some bands do not support non-overlapping channels. Per FCC Guidance, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Note: The NR Band n77 powers for the Main Antenna were reused from the original FCC grant. These powers can be found in document 1M2201200003-05.PY7

9.1.1 NR Band n41

Table 9-1
NR Band n41 Sub Antenna Measured P_{max} for DSI=2 (Head) - 100 MHz Bandwidth

NR Band n41 100 MHz Bandwidth						
			Channel			
Modulation	RB Size	RB Offset	518598 (2592.99 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]	Deviation 518598 [dB]
CP-OFDM QPSK	1	1	16.36	0-1.5	0.0	-0.64
	1	137	**16.75**		0.0	-0.25
	1	271	16.55		0.0	-0.45
	1	272	16.28	0-3	0.0	-0.72
	137	0	16.56		0.0	-0.44
	137	68	16.61	0-1.5	0.0	-0.39
	137	136	**16.68**	0-3	0.0	-0.32
	273	0	16.58		0.0	-0.42

Table 9-2
NR Band n41 Sub Antenna Measured P_{limit} for DSI=3 (Bodyworn, Hotspot and Phablet)- 100 MHz Bandwidth

NR Band n41 100 MHz Bandwidth						
			Channel			
Modulation	RB Size	RB Offset	518598 (2592.99 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]	Deviation 518598 [dB]
CP-OFDM QPSK	1	1	**15.44**	0-1.5	0.0	-0.56
	1	137	15.42		0.0	-0.58
	1	271	15.37		0.0	-0.63
	1	272	15.43	0-3	0.0	-0.57
	137	0	15.38		0.0	-0.62
	137	68	15.41	0-1.5	0.0	-0.59
	137	136	**15.43**	0-3	0.0	-0.57
	273	0	15.37		0.0	-0.63

9.1.1 NR Band n77

Table 9-3
NR Band n77 Sub Antenna Measured P_{max} for all DSI - 100 MHz Bandwidth

NR Band n77 100 MHz Bandwidth								
			Channel		MPR Allowed per 3GPP [dB]	MPR [dB]	Deviation 650000 [dB]	Deviation 662000 [dB]
Modulation	RB Size	RB Offset	650000 (3750 MHz)	662000 (3930 MHz)				
			Conducted Power [dBm]					
CP-OFDM QPSK	1	1	14.70	14.20	0-1.5	0.0	-0.30	-0.80
	1	137	14.68	14.45		0.0	-0.32	-0.55
	1	271	**14.91**	14.49		0.0	-0.09	-0.51
	1	272	14.90	14.37	0-3	0.0	-0.10	-0.63
	137	0	14.78	14.40		0.0	-0.22	-0.60
	137	68	14.78	14.51	0-1.5	0.0	-0.22	-0.49
	137	136	**14.81**	14.42	0-3	0.0	-0.19	-0.58
	273	0	14.80	14.50		0.0	-0.20	-0.50

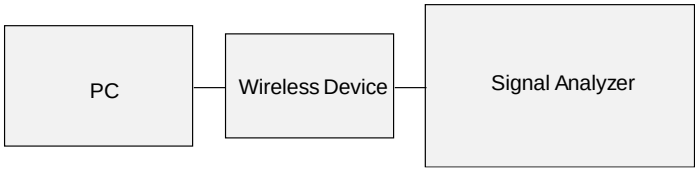

Figure 9-1
Power Measurement Setup

10 SYSTEM VERIFICATION

10.1 Tissue Verification

Table 10-1
Measured Head 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
05/08/2022	2450 Head	22.4	2300	1.702	39.879	1.670	39.500	1.92%	0.96%
			2310	1.713	39.841	1.679	39.480	2.03%	0.91%
			2320	1.725	39.801	1.687	39.460	2.25%	0.86%
			2400	1.811	39.522	1.756	39.289	3.13%	0.59%
			2450	1.867	39.335	1.800	39.200	3.72%	0.34%
			2480	1.899	39.230	1.833	39.162	3.60%	0.17%
			2500	1.920	39.158	1.855	39.136	3.50%	0.06%
			2510	1.931	39.124	1.866	39.123	3.48%	0.00%
			2535	1.958	39.032	1.893	39.092	3.43%	-0.15%
			2550	1.976	38.978	1.909	39.073	3.51%	-0.24%
			2560	1.988	38.943	1.920	39.060	3.54%	-0.30%
			2600	2.032	38.808	1.964	39.009	3.46%	-0.52%
			2650	2.088	38.606	2.018	38.945	3.47%	-0.87%
			2680	2.124	38.515	2.051	38.907	3.56%	-1.01%
			2700	2.144	38.456	2.073	38.882	3.42%	-1.10%
04/18/2022	3600 Head	20.8	3300	2.623	39.946	2.708	38.157	-3.14%	4.69%
			3350	2.666	39.852	2.759	38.100	-3.37%	4.60%
			3450	2.759	39.672	2.861	37.986	-3.57%	4.44%
			3500	2.811	39.592	2.913	37.929	-3.50%	4.38%
			3550	2.854	39.485	2.964	37.871	-3.71%	4.26%
			3560	2.866	39.471	2.974	37.860	-3.63%	4.26%
			3600	2.910	39.424	3.015	37.814	-3.48%	4.26%
			3650	2.955	39.306	3.066	37.757	-3.62%	4.10%
			3690	2.999	39.255	3.107	37.711	-3.48%	4.09%
			3700	3.007	39.249	3.117	37.700	-3.53%	4.11%
			3750	3.057	39.116	3.169	37.643	-3.53%	3.91%
			3900	3.209	38.907	3.323	37.471	-3.43%	3.83%
			3930	3.243	38.838	3.353	37.437	-3.28%	3.74%
			4100	3.425	38.554	3.528	37.243	-2.92%	3.52%
			4150	3.489	38.481	3.579	37.186	-2.51%	3.48%

Table 10-2
Measured Body 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
04/10/2022	2450 Body	23.8	2300	1.737	51.706	1.809	52.900	-3.98%	-2.26%
			2310	1.750	51.674	1.816	52.887	-3.63%	-2.29%
			2320	1.764	51.643	1.826	52.873	-3.40%	-2.33%
			2400	1.870	51.359	1.902	52.767	-1.68%	-2.67%
			2450	1.936	51.195	1.950	52.700	-0.72%	-2.86%
			2480	1.973	51.088	1.993	52.662	-1.00%	-2.99%
			2500	2.001	51.010	2.021	52.636	-0.99%	-3.09%
			2510	2.014	50.975	2.035	52.623	-1.03%	-3.13%
			2535	2.050	50.894	2.071	52.592	-1.01%	-3.23%
			2550	2.071	50.851	2.092	52.573	-1.00%	-3.28%
			2560	2.084	50.825	2.106	52.560	-1.04%	-3.30%
			2600	2.135	50.686	2.163	52.509	-1.29%	-3.47%
			2650	2.206	50.497	2.234	52.445	-1.25%	-3.71%
			2680	2.247	50.402	2.277	52.407	-1.32%	-3.83%
			2700	2.272	50.328	2.305	52.382	-1.43%	-3.92%
06/14/2022	3600 Body	21.2	3300	2.996	52.099	3.080	51.593	-2.73%	0.98%
			3350	3.048	52.009	3.139	51.525	-2.90%	0.94%
			3450	3.163	51.816	3.256	51.389	-2.86%	0.83%
			3500	3.225	51.745	3.314	51.321	-2.69%	0.83%
			3550	3.280	51.647	3.372	51.254	-2.73%	0.77%
			3560	3.292	51.621	3.384	51.240	-2.72%	0.74%
			3600	3.343	51.554	3.431	51.186	-2.56%	0.72%
			3650	3.400	51.473	3.489	51.118	-2.55%	0.69%
			3690	3.454	51.399	3.536	51.063	-2.32%	0.66%
			3700	3.467	51.388	3.548	51.050	-2.28%	0.66%
			3750	3.527	51.294	3.606	50.982	-2.19%	0.61%
			3900	3.719	51.044	3.781	50.779	-1.64%	0.52%
			3930	3.758	50.968	3.816	50.738	-1.52%	0.45%
			4100	3.991	50.682	4.015	50.507	-0.60%	0.35%
			4150	4.063	50.561	4.073	50.439	-0.25%	0.24%
07/05/2022	3600 Body	19.8	3300	2.967	53.410	3.080	51.593	-3.67%	3.52%
			3350	3.023	53.318	3.139	51.525	-3.70%	3.48%
			3450	3.144	53.145	3.256	51.389	-3.44%	3.42%
			3500	3.205	53.072	3.314	51.321	-3.29%	3.41%
			3550	3.263	52.976	3.372	51.254	-3.23%	3.36%
			3560	3.279	52.956	3.384	51.240	-3.10%	3.35%
			3600	3.325	52.904	3.431	51.186	-3.09%	3.36%
			3650	3.391	52.798	3.489	51.118	-2.81%	3.29%
			3690	3.441	52.734	3.536	51.063	-2.69%	3.27%
			3700	3.455	52.728	3.548	51.050	-2.62%	3.29%
			3750	3.515	52.644	3.606	50.982	-2.52%	3.26%
			3900	3.720	52.412	3.781	50.779	-1.61%	3.22%
			3930	3.759	52.361	3.816	50.738	-1.49%	3.20%
			4100	4.000	52.066	4.015	50.507	-0.37%	3.09%
			4150	4.070	51.977	4.073	50.439	-0.07%	3.05%

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.

10.2 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 the SAR System Validation Appendix.

Table 10-3
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 SAR1g (W/kg)	1W Target SAR1g (W/kg)	1W Normalized SAR 1g (W/kg)	Deviation1g (%)
P	2600	HEAD	05/08/2022	20.3	20.4	0.10	1064	7410	5.840	58.10	58.400	0.52%
L	3700	HEAD	04/18/2022	22.6	21.5	0.10	1067	7670	6.730	67.20	67.300	0.15%
L	3900	HEAD	04/18/2022	22.6	21.5	0.10	1056	7670	6.790	68.90	67.900	-1.45%
S	2600	BODY	04/10/2022	22.3	21.8	0.10	1004	7552	5.450	55.40	54.500	-1.62%
L	3700	BODY	06/14/2022	22.0	21.0	0.10	1018	7670	6.430	63.50	64.300	1.26%
L	3900	BODY	06/14/2022	22.0	21.0	0.10	1073	7670	6.170	64.30	61.700	-4.04%

Table 10-4
System Verification Results – 10g

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 SAR10g (W/kg)	1W Target SAR10g (W/kg)	1W Normalized SAR10g (W/kg)	Deviation10g (%)
L	3700	BODY	07/05/2022	20.9	20.7	0.10	1018	7670	2.170	22.50	21.700	-3.56%
L	3900	BODY	07/05/2022	20.9	20.7	0.10	1073	7670	2.180	22.00	21.800	-0.91%

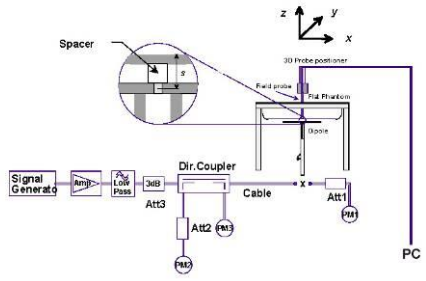

Figure 10-1
System Verification Setup Diagram

Figure 10-2
System Verification Setup Photo

11 SAR DATA SUMMARY

11.1 Standalone Head SAR Data

Table 11-1
NR Band n41 Head SAR

MEASUREMENT RESULTS																					
FREQUENCY			Side	Test Position	Mode	Antenna Config	Serial Number	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	Maximum Allowed Power [dBm]	Conducted Power [dBm]	MPR [dB]	Power Drift [dB]	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
2592.99	518598	Mid	Right	Cheek	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	137	18.0	16.75	0	-0.03	1:1	0.142	1.334	0.189	
2592.99	518598	Mid	Right	Cheek	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	18.0	16.68	0	0.01	1:1	0.137	1.355	0.186	
2592.99	518598	Mid	Right	Tilt	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	137	18.0	16.75	0	-0.20	1:1	0.075	1.334	0.100	
2592.99	518598	Mid	Right	Tilt	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	18.0	16.68	0	0.17	1:1	0.077	1.355	0.104	
2592.99	518598	Mid	Left	Cheek	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	137	18.0	16.75	0	-0.02	1:1	0.508	1.334	0.678	
2592.99	518598	Mid	Left	Cheek	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	18.0	16.68	0	-0.02	1:1	0.531	1.355	0.720	
2592.99	518598	Mid	Left	Cheek	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	273	0	18.0	16.58	0	0.05	1:1	0.553	1.387	0.767	A1
2592.99	518598	Mid	Left	Tilt	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	137	18.0	16.75	0	-0.05	1:1	0.302	1.334	0.403	
2592.99	518598	Mid	Left	Tilt	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	18.0	16.68	0	-0.09	1:1	0.287	1.355	0.389	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population													Head 1.6 W/kg (mW/g) averaged over 1 gram								

Table 11-2
NR Band n77 Head SAR

MEASUREMENT RESULTS																					
FREQUENCY			Side	Test Position	Mode	Antenna Config	Serial Number	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	Maximum Allowed Power [dBm]	Conducted Power [dBm]	MPR [dB]	Power Drift [dB]	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
3750.00	650000	Low	Right	Cheek	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	27.0	25.76	0	-0.09	1:1	0.048	1.330	0.064	
3750.00	650000	Low	Right	Cheek	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	27.0	25.75	0	0.08	1:1	0.039	1.334	0.052	
3750.00	650000	Low	Right	Cheek	NR Band n77	Main 1	01229	100	CP-OFDM	QPSK	1	1	25.5	24.20	1.5	0.09	1:1	0.030	1.349	0.040	
3750.00	650000	Low	Right	Tilt	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	27.0	25.76	0	0.01	1:1	0.041	1.330	0.055	
3750.00	650000	Low	Right	Tilt	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	27.0	25.75	0	-0.16	1:1	0.034	1.334	0.045	
3750.00	650000	Low	Left	Cheek	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	27.0	25.76	0	0.06	1:1	0.044	1.330	0.059	
3750.00	650000	Low	Left	Cheek	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	27.0	25.75	0	0.01	1:1	0.040	1.334	0.053	
3750.00	650000	Low	Left	Tilt	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	27.0	25.76	0	0.04	1:1	0.013	1.330	0.017	
3750.00	650000	Low	Left	Tilt	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	27.0	25.75	0	0.07	1:1	0.018	1.334	0.024	
3750.00	650000	Low	Right	Cheek	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	-0.02	1:1	0.106	1.285	0.136	
3750.00	650000	Low	Right	Cheek	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	0.06	1:1	0.111	1.315	0.146	
3750.00	650000	Low	Right	Tilt	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	0.05	1:1	0.082	1.285	0.105	
3750.00	650000	Low	Right	Tilt	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	-0.03	1:1	0.085	1.315	0.112	
3750.00	650000	Low	Left	Cheek	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	0.03	1:1	0.367	1.285	0.472	
3930.00	662000	High	Left	Cheek	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	1	271	16.0	14.49	0	-0.18	1:1	0.211	1.416	0.299	
3750.00	650000	Low	Left	Cheek	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	0.01	1:1	0.399	1.315	0.525	
3930.00	662000	High	Left	Cheek	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	137	68	16.0	14.51	0	0.04	1:1	0.188	1.409	0.265	
3750.00	650000	Low	Left	Cheek	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	273	0	16.0	14.80	0	-0.01	1:1	0.402	1.318	0.530	A2
3750.00	650000	Low	Left	Tilt	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	-0.05	1:1	0.167	1.285	0.215	
3750.00	650000	Low	Left	Tilt	NR Band n77	Sub	01187	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	0.06	1:1	0.175	1.315	0.230	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population													Head 1.6 W/kg (mW/g) averaged over 1 gram								

11.2 Standalone Body-Worn SAR Data

Table 11-3
NR Band n41 Body-worn SAR

MEASUREMENT RESULTS																					
FREQUENCY			Side	Spacing	Mode	Antenna Config	Serial Number	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	Maximum Allowed Power [dBm]	Conducted Power [dBm]	MPR [dB]	Power Drift [dB]	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
2592.99	518598	Mid	back	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	1	17.0	15.44	0	0.05	1:1	0.021	1.432	0.030	
2592.99	518598	Mid	back	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	17.0	15.43	0	0.03	1:1	0.019	1.435	0.027	
2592.99	518598	Mid	front	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	1	17.0	15.44	0	0.14	1:1	0.026	1.432	0.037	
2592.99	518598	Mid	front	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	17.0	15.43	0	-0.05	1:1	0.027	1.435	0.039	A3
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 11-4
NR Band n77 Body-worn SAR

MEASUREMENT RESULTS																					
FREQUENCY			Side	Spacing	Mode	Antenna Config	Serial Number	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	Maximum Allowed Power [dBm]	Conducted Power [dBm]	MPR [dB]	Power Drift [dB]	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
3930.00	662000	High	back	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	19.0	18.95	0	0.06	1:1	0.304	1.012	0.308	
3930.00	662000	High	back	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	19.0	18.83	0	0.00	1:1	0.300	1.040	0.312	
3930.00	662000	High	back	10 mm	NR Band n77	Main 1	01229	100	CP-OFDM	QPSK	1	1	19.0	18.38	0	0.02	1:1	0.369	1.153	0.425	A4
3930.00	662000	High	front	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	19.0	18.95	0	0.11	1:1	0.090	1.012	0.091	
3930.00	662000	High	front	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	19.0	18.83	0	0.12	1:1	0.085	1.040	0.088	
3750.00	650000	Low	back	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	0.02	1:1	0.047	1.285	0.060	
3750.00	650000	Low	back	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	-0.08	1:1	0.040	1.315	0.053	
3750.00	650000	Low	front	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	0.04	1:1	0.015	1.285	0.019	
3750.00	650000	Low	front	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	0.04	1:1	0.020	1.315	0.026	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram											

11.3 Standalone Hotspot SAR Data

Table 11-5
NR Band n41 Hotspot SAR

MEASUREMENT RESULTS																					
FREQUENCY			Side	Spacing	Mode	Antenna Config	Serial Number	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	Maximum Allowed Power [dBm]	Conducted Power [dBm]	MPR [dB]	Power Drift [dB]	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
2592.99	518598	Mid	back	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	1	17.0	15.44	0	0.05	1:1	0.021	1.432	0.030	
2592.99	518598	Mid	back	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	17.0	15.43	0	0.03	1:1	0.019	1.435	0.027	
2592.99	518598	Mid	front	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	1	17.0	15.44	0	0.14	1:1	0.026	1.432	0.037	
2592.99	518598	Mid	front	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	17.0	15.43	0	-0.05	1:1	0.027	1.435	0.039	
2592.99	518598	Mid	top	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	1	17.0	15.44	0	-0.05	1:1	0.018	1.432	0.026	
2592.99	518598	Mid	top	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	17.0	15.43	0	0.02	1:1	0.015	1.435	0.022	
2592.99	518598	Mid	right	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	1	17.0	15.44	0	-0.12	1:1	0.055	1.432	0.079	
2592.99	518598	Mid	right	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	17.0	15.43	0	0.01	1:1	0.057	1.435	0.082	A5
2592.99	518598	Mid	left	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	1	1	17.0	15.44	0	0.08	1:1	0.000	1.432	0.000	
2592.99	518598	Mid	left	10 mm	NR Band n41	Sub	00841	100	CP-OFDM	QPSK	137	136	17.0	15.43	0	0.07	1:1	0.000	1.435	0.000	
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 11-6
NR Band n77 Hotspot SAR

MEASUREMENT RESULTS																					
FREQUENCY			Side	Spacing	Mode	Antenna Config	Serial Number	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	Maximum Allowed Power [dBm]	Conducted Power [dBm]	MPR [dB]	Power Drift [dB]	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
3930.00	662000	High	back	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	19.0	18.95	0	0.06	1:1	0.304	1.012	0.308	
3930.00	662000	High	back	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	19.0	18.83	0	0.00	1:1	0.300	1.040	0.312	
3930.00	662000	High	back	10 mm	NR Band n77	Main 1	01229	100	CP-OFDM	QPSK	1	1	19.0	18.38	0	0.02	1:1	0.369	1.153	0.425	A4
3930.00	662000	High	front	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	19.0	18.95	0	0.11	1:1	0.090	1.012	0.091	
3930.00	662000	High	front	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	19.0	18.83	0	0.12	1:1	0.085	1.040	0.088	
3930.00	662000	High	bottom	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	19.0	18.95	0	0.02	1:1	0.076	1.012	0.077	
3930.00	662000	High	bottom	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	19.0	18.83	0	0.02	1:1	0.077	1.040	0.080	
3930.00	662000	High	left	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	19.0	18.95	0	-0.11	1:1	0.054	1.012	0.055	
3930.00	662000	High	left	10 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	19.0	18.83	0	0.20	1:1	0.052	1.040	0.054	
3750.00	650000	Low	back	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	0.02	1:1	0.047	1.285	0.060	
3750.00	650000	Low	back	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	-0.08	1:1	0.040	1.315	0.053	
3750.00	650000	Low	front	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	0.04	1:1	0.015	1.285	0.019	
3750.00	650000	Low	front	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	0.04	1:1	0.020	1.315	0.026	
3750.00	650000	Low	top	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	0.20	1:1	0.012	1.285	0.015	
3750.00	650000	Low	top	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	0.09	1:1	0.016	1.315	0.021	
3750.00	650000	Low	right	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	-0.07	1:1	0.022	1.285	0.028	
3750.00	650000	Low	right	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	0.02	1:1	0.015	1.315	0.020	
3750.00	650000	Low	left	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	1	271	16.0	14.91	0	0.03	1:1	0.000	1.285	0.000	
3750.00	650000	Low	left	10 mm	NR Band n77	Sub	01062	100	CP-OFDM	QPSK	137	136	16.0	14.81	0	0.03	1:1	0.000	1.315	0.000	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Body 1.6 W/kg (mW/g) averaged over 1 gram						

11.4 Standalone Phablet SAR Data

Table 11-7
NR Band n77 Phablet SAR

MEASUREMENT RESULTS																					
FREQUENCY			Side	Spacing	Mode	Antenna Config	Serial Number	Bandwidth [MHz]	Waveform	Modulation	RB Size	RB Offset	Maximum Allowed Power [dBm]	Conducted Power [dBm]	MPR [dB]	Power Drift [dB]	Duty Cycle	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
3750.00	650000	Low	back	0 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	19.0	18.83	0	-0.11	1:1	1.510	1.040	1.570	
3930.00	662000	High	back	0 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	1	137	19.0	18.95	0	0.05	1:1	1.320	1.012	1.336	
3750.00	650000	Low	back	0 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	0	19.0	18.82	0	0.04	1:1	1.590	1.042	1.657	A6
3930.00	662000	High	back	0 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	135	69	19.0	18.83	0	0.10	1:1	1.310	1.040	1.362	
3750.00	650000	Low	back	0 mm	NR Band n77	Main 1	01229	100	DFT-S-OFDM	QPSK	270	0	19.0	18.76	0	0.01	1:1	1.400	1.057	1.480	
3930.00	662000	High	back	0 mm	NR Band n77	Main 1	01229	100	CP-OFDM	QPSK	1	1	19.0	18.38	0	0.03	1:1	1.450	1.153	1.672	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Phablet 4 W/kg (mW/g) averaged over 10 grams												

11.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was ≤ 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were required.
8. Per FCC KDB 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 12 for variability analysis.
9. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 6.7 for more details).
10. Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is > 160 mm and < 200 mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.
11. Additional SAR tests for phablet SAR were evaluated per KDB 616217 Section 6 (See Section 6.9 for more information).
12. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the 1g thresholds for the equivalent test cases.
13. This device uses Qualcomm Smart Transmit for 2G/3G/4G/5G operations to control and manage transmitting power in real time to ensure RF Exposure compliance. Per FCC Guidance, compliance for was assessed at the minimum of the time averaged power and the maximum output power for each band/mode/exposure condition (DSI).

NR Notes:

1. 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.
2. Due to test setup limitations, SAR testing for NR TDD was performed using test mode software to establish the connection.
3. Simultaneous transmission analysis for EN-DC operations is addressed in the Part 2 Test Report (Serial Number can be found in the original filing).
4. This device additionally supports some EN-DC conditions where additional LTE carriers are added on the downlink only.
5. Per FCC Guidance, NR modulations and RB Sizes/Offsets were selected for testing such that configurations with the highest output power were evaluated for SAR tests.
6. Per FCC KDB Publication 447498 D01v06, when the reported NR Band n77 C-Band SAR measured at the highest output power channel in a given a test configuration was > 0.4 W/kg for 1g evaluations and > 1 W/kg for 10g evaluation, testing at the other channels was required for such test configurations.

12 SAR MEASUREMENT VARIABILITY

12.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, variability SAR tests were not required since measured SAR results for all frequency bands were less than 0.8 W/kg for 1g SAR and less than 2.0 W/kg for 10g SAR.

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 EQUIPMENT LIST

Note: 1) All equipment was used solely within its respective calibration period. 2) 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.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E4404B	Spectrum Analyzer	N/A	N/A	N/A	MY45113242
Agilent	E4438C	ESG Vector Signal Generator	5/10/2022	Annual	5/10/2023	MY42082659
Agilent	E4438C	ESG Vector Signal Generator	2/14/2022	Annual	2/14/2023	MY42082385
Agilent	N5182A	MXG Vector Signal Generator	6/21/2021	Annual	6/21/2022	MY47420603
Agilent	N5182A	MXG Vector Signal Generator	6/15/2021	Annual	6/15/2022	MY47420800
Agilent	8753ES	S-Parameter Vector Network Analyzer	2/11/2022	Annual	2/11/2023	MY40003841
Agilent	8753ES	S-Parameter Vector Network Analyzer	12/17/2021	Annual	12/17/2022	MY40000670
Agilent	E5515C	Wireless Communications Test Set	5/12/2022	Annual	5/12/2023	GB43304278
Agilent	E5515C	Wireless Communications Test Set	5/6/2021	Annual	5/6/2022	GB44400860
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433974
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433972
Anritsu	ML2496A	Power Meter	4/21/2021	Annual	4/21/2022	1351001
Anritsu	ML2496A	Power Meter	3/31/2022	Annual	3/31/2023	1138001
Anritsu	MA2411B	Pulse Power Sensor	4/29/2022	Annual	4/29/2023	1207470
Anritsu	MA2411B	Pulse Power Sensor	9/21/2021	Annual	9/21/2022	1339008
Anritsu	MT8821C	Radio Communication Analyzer MT8821C	5/24/2022	Annual	5/24/2023	6201144418
Anritsu	MT8821C	Radio Communication Analyzer MT8821C	3/31/2022	Annual	3/31/2023	6201664756
Anritsu	MT8821C	Radio Communication Analyzer MT8821C	9/26/2021	Annual	9/26/2022	6201524637
Anritsu	MT8821C	Radio Communication Analyzer MT8821C	8/10/2021	Annual	8/10/2022	6262150000
Anritsu	MT8000A	Radio Communication Test Station	8/2/2021	Annual	8/2/2022	6272337438
Anritsu	MT8000A	Radio Communication Test Station	8/2/2021	Annual	8/2/2022	6272337436
Anritsu	MT8000A	Radio Communication Test Station	8/2/2021	Annual	8/2/2022	6272337437
Anritsu	MA24106A	USB Power Sensor	6/1/2022	Annual	6/1/2023	1349514
Anritsu	MA24106A	USB Power Sensor	5/14/2022	Annual	5/14/2023	1349509
Control Company	4353	Long Stem Thermometer	10/28/2020	Biennial	10/28/2022	200670623
Control Company	4353	Long Stem Thermometer	10/28/2020	Biennial	10/28/2022	200670633
Control Company	4353	Long Stem Thermometer	10/28/2020	Biennial	10/28/2022	200670635
Control Company	4040	Therm./ Clock/ Humidity Monitor	2/28/2018	Biennial	CBT	170151872
Control Company	4040	Therm./ Clock/ Humidity Monitor	2/28/2018	Biennial	CBT	170151893
Mitutoyo	500-196-30	CD-6"ASX 6Inch Digital Caliper	2/16/2022	Triennial	2/16/2025	A20238413
Keysight Technologies	N6705B	DC Power Analyzer	5/5/2021	Triennial	5/5/2024	MY53004059
Keysight Technologies	N9020A	MXA Signal Analyzer	4/14/2022	Annual	4/14/2023	MY48010233
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	7/6/2021	Annual	7/6/2022	31634
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	ZUDC10-83-S+	Directional Coupler	CBT	N/A	CBT	2050
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Seekonk	TSF-100	Torque Wrench	7/8/2021	Annual	7/8/2022	47639-29
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	4/18/2022	Annual	4/18/2023	128633
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	4/8/2022	Annual	4/8/2023	162125
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	4/7/2022	Annual	4/7/2023	167283
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2/21/2022	Annual	2/21/2023	164948
SPEAG	DAK-3.5	Dielectric Assessment Kit	1/6/2022	Annual	1/6/2023	1278
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/18/2021	Annual	8/18/2022	1041
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1379
SPEAG	D2600V2	2600 MHz SAR Dipole	6/14/2019	Triennial	6/14/2022	1064
SPEAG	D2600V2	2600 MHz SAR Dipole	4/14/2021	Biennial	4/14/2023	1004
SPEAG	D3700V2	3700 MHz SAR Dipole	1/21/2020	Triennial	1/21/2023	1067
SPEAG	D3700V2	3700 MHz SAR Dipole	1/19/2021	Biennial	1/19/2023	1018
SPEAG	D3900V2	3900 MHz SAR Dipole	10/9/2020	Biennial	10/9/2022	1056
SPEAG	D3900V2	3900 MHz SAR Dipole	6/10/2021	Annual	6/10/2022	1073
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/13/2021	Annual	7/13/2022	1583
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/3/2021	Annual	8/3/2022	1681
SPEAG	DAE4	Dasy Data Acquisition Electronics	8/4/2021	Annual	8/4/2022	1680
SPEAG	EX3DV4	SAR Probe	7/20/2021	Annual	7/20/2022	7410
SPEAG	EX3DV4	SAR Probe	8/5/2021	Annual	8/5/2022	7670
SPEAG	EX3DV4	SAR Probe	9/20/2021	Annual	9/20/2022	7552

14 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	E.2.1	7	N	1	1	1	7.0	7.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	E.2.3	2	R	1.732	1	1	1.2	1.2	∞
Linearity	E.2.4	0.3	N	1	1	1	0.3	0.3	∞
System Detection Limits	E.2.4	0.25	R	1.732	1	1	0.1	0.1	∞
Modulation Response	E.2.5	4.8	R	1.732	1	1	2.8	2.8	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	1.732	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.732	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	3	R	1.732	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	3	R	1.732	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.8	R	1.732	1	1	0.5	0.5	∞
Probe Positioning w/ respect to Phantom	E.6.3	6.7	R	1.732	1	1	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	4	R	1.732	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	3.12	N	1	1	1	3.1	3.1	35
Device Holder Uncertainty	E.4.1	1.67	N	1	1	1	1.7	1.7	5
Output Power Variation - SAR drift measurement	E.2.9	5	R	1.732	1	1	2.9	2.9	∞
SAR Scaling	E.6.5	0	R	1.732	1	1	0.0	0.0	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	E.3.3	4.3	N	1	0.78	0.71	3.3	3.0	76
Liquid Permittivity - measurement uncertainty	E.3.3	4.2	N	1	0.23	0.26	1.0	1.1	75
Liquid Conductivity - Temperature Uncertainty	E.3.4	3.4	R	1.732	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Unceritainty	E.3.4	0.6	R	1.732	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)			RSS				12.2	12.0	191
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.4	24.0	

The above measurement uncertainties are according to IEEE Std. 1528-2013

15 CONCLUSION

15.1 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]

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