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SAR EVALUATION REPORT

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

Date of Testing:
06/14/2022 – 08/07/2022
Test Site/Location:
Element, Morgan Hill, CA, USA
Document Serial No.:
1C2205090042-22.BCG

FCC ID: **BCG-A2622**

APPLICANT: **APPLE, INC.**

DUT Type: Watch
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: A2622

Equipment Class	Band & Mode	Tx Frequency	SAR	
			1g Head (W/kg)	10g Extremity (W/kg)
PCT	UMTS 850	826.40 - 846.60 MHz	< 0.1	0.31
PCT	UMTS 1750	1712.4 - 1752.6 MHz	0.17	< 0.1
PCT	UMTS 1900	1852.4 - 1907.6 MHz	0.74	< 0.1
PCT	LTE Band 12	699.7 - 715.3 MHz	< 0.1	0.18
PCT	LTE Band 17	706.5 - 713.5 MHz	N/A	N/A
PCT	LTE Band 13	779.5 - 784.5 MHz	< 0.1	0.22
PCT	LTE Band 14	790.5 - 795.5 MHz	< 0.1	0.43
PCT	LTE Band 26 (Cell)	814.7 - 848.3 MHz	< 0.1	0.38
PCT	LTE Band 5 (Cell)	824.7 - 848.3 MHz	< 0.1	0.34
PCT	LTE Band 66 (AWS)	1710.7 - 1779.3 MHz	0.13	< 0.1
PCT	LTE Band 4 (AWS)	1710.7 - 1754.3 MHz	N/A	N/A
PCT	LTE Band 25 (PCS)	1850.7 - 1914.3 MHz	0.93	< 0.1
PCT	LTE Band 2 (PCS)	1850.7 - 1909.3 MHz	N/A	N/A
PCT	LTE Band 7	2502.5 - 2567.5 MHz	0.65	0.18
PCT	LTE Band 41	2498.5 - 2687.5 MHz	0.48	0.17
DTS	2.4 GHz WLAN	2412 - 2472 MHz	0.33	0.12
NII	U-NII-1	5180 - 5240 MHz	N/A	N/A
NII	U-NII-2A	5260 - 5320 MHz	< 0.1	< 0.1
NII	U-NII-2C	5500 - 5720 MHz	< 0.1	< 0.1
NII	U-NII-3	5745 - 5825 MHz	< 0.1	< 0.1
DSS/DTS	Bluetooth	2402 - 2480 MHz	< 0.1	< 0.1
Simultaneous SAR per KDB 690783 D01v01r03:			1.26	0.55

This watch 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 1.8 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

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

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
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 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 14	Voice/Data	790.5 - 795.5 MHz
LTE Band 26 (Cell)	Voice/Data	814.7 - 848.3 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 66 (AWS)	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Voice/Data	1850.7 - 1914.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 7	Voice/Data	2502.5 - 2567.5 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2472 MHz
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
UWB	Data	6489.6 - 7987.2 MHz

1.2 Power Reduction for SAR

There is no power reduction used for any band/mode implemented in this device for SAR purposes.

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 Maximum Output Power – UMTS Mode

Mode/Band		Modulated Average Output Power (in dBm)		
		3GPP WCDMA Rel 99	3GPP HSDPA Rel 5	3GPP HSUPA Rel 6
UMTS Band 5 (850 MHz)	Max allowed power	**25.00**	**25.00**	**24.00**
	Nominal	**24.00**	**24.00**	**23.00**
UMTS Band 4 (1750 MHz)	Max allowed power	**24.00**	**24.00**	**24.00**
	Nominal	**23.00**	**23.00**	**23.00**
UMTS Band 2 (1900 MHz)	Max allowed power	**24.00**	**24.00**	**24.00**
	Nominal	**23.00**	**23.00**	**23.00**

1.3.2 Maximum Output Power – LTE Mode

Mode / Band		Modulated Average Output Power (in dBm)
LTE FDD Band 12	Max allowed power	**25.50**
	Nominal	**24.50**
LTE FDD Band 17	Max allowed power	**25.50**
	Nominal	**24.50**
LTE FDD Band 13	Max allowed power	**25.50**
	Nominal	**24.50**
LTE FDD Band 14	Max allowed power	**25.50**
	Nominal	**24.50**
LTE FDD Band 26	Max allowed power	**25.50**
	Nominal	**24.50**
LTE FDD Band 5	Max allowed power	**25.50**
	Nominal	**24.50**
LTE FDD Band 4	Max allowed power	**24.50**
	Nominal	**23.50**
LTE FDD Band 66	Max allowed power	**24.50**
	Nominal	**23.50**
LTE FDD Band 2	Max allowed power	**24.50**
	Nominal	**23.50**
LTE FDD Band 25	Max allowed power	**24.50**
	Nominal	**23.50**
LTE FDD Band 7	Max allowed power	**23.50**
	Nominal	**22.50**
LTE TDD Band 41 (PC3)	Max allowed power	**23.50**
	Nominal	**22.50**

1.3.3 Maximum Output Power – WiFi Mode

Mode/ Band			IEEE 802.11b (2.4 GHz)		IEEE 802.11g (2.4 GHz)		IEEE 802.11n (2.4 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm)	20 MHz Bandwidth	1	19.00	18.00	17.00	16.00	17.00	16.00
		2	19.00	18.00	18.00	17.00	18.00	17.00
		3	19.00	18.00	18.50	17.50	18.50	17.50
		4	19.00	18.00	18.50	17.50	18.50	17.50
		5	19.00	18.00	18.50	17.50	18.50	17.50
		6	19.00	18.00	18.50	17.50	18.50	17.50
		7	19.00	18.00	18.50	17.50	18.50	17.50
		8	19.00	18.00	18.50	17.50	18.50	17.50
		9	19.00	18.00	18.00	17.00	18.00	17.00
		10	19.00	18.00	17.00	16.00	17.00	16.00
		11	19.00	18.00	14.00	13.00	14.00	13.00
		12	18.00	17.00	13.00	12.00	13.00	12.00
		13	16.00	15.00	2.00	1.00	2.00	1.00

Mode/ Band			IEEE 802.11a (5 GHz)		IEEE 802.11n (5 GHz)	
		Channel	Maximum	Nominal	Maximum	Nominal
Modulated Average - Single Tx Chain (dBm)	20 MHz Bandwidth	36	17.00	16.00	17.00	16.00
		40	17.00	16.00	17.00	16.00
		44	17.00	16.00	17.00	16.00
		48	17.00	16.00	17.00	16.00
		52	17.00	16.00	17.00	16.00
		56	17.00	16.00	17.00	16.00
		60	17.00	16.00	17.00	16.00
		64	17.00	16.00	17.00	16.00
		100	17.00	16.00	17.00	16.00
		104	17.00	16.00	17.00	16.00
		108	17.00	16.00	17.00	16.00
		112	17.00	16.00	17.00	16.00
		116	17.00	16.00	17.00	16.00
		120	17.00	16.00	17.00	16.00
		124	17.00	16.00	17.00	16.00
		128	17.00	16.00	17.00	16.00
		132	17.00	16.00	17.00	16.00
		136	16.00	15.00	16.00	15.00
		140	14.50	13.50	14.50	13.50
		144	17.00	16.00	17.00	16.00
		149	17.00	16.00	17.00	16.00
		153	17.00	16.00	17.00	16.00
		157	17.00	16.00	17.00	16.00
		161	17.00	16.00	17.00	16.00
		165	17.00	16.00	17.00	16.00

1.3.4 Maximum Output Power – Bluetooth Mode

Mode / Band		Modulated Average - Single Tx Chain (dBm)
Bluetooth BDR/LE	Maximum	**13.00**
	Nominal	**12.00**
Bluetooth EDR	Maximum	**13.00**
	Nominal	**12.00**
Bluetooth HDR	Maximum	**13.00**
	Nominal	**12.00**

1.4 DUT Antenna Locations

A diagram showing the location of the device antennas can be found in Appendix E**.**

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 Appendix E.

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.

Table 1-1
Simultaneous Transmission Scenarios

No.	Capable Transmit Configuration	Head	Extremity
1	UMTS + 2.4 GHz WI-FI	Yes	Yes
2	UMTS + 5 GHz WI-FI	Yes	Yes
3	UMTS + 2.4 GHz Bluetooth	Yes	Yes
4	UMTS + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes	Yes
5	LTE + 2.4 GHz WI-FI	Yes	Yes
6	LTE + 5 GHz WI-FI	Yes	Yes
7	LTE + 2.4 GHz Bluetooth	Yes	Yes
8	LTE + 2.4 GHz Bluetooth + 5 GHz WI-FI	Yes	Yes
9	2.4 GHz Bluetooth + 5 GHz WI-FI	Yes	Yes

1. 2.4 GHz WLAN, and 2.4 GHz Bluetooth share the same antenna path and cannot transmit simultaneously.
2. 2.4 GHz WLAN, and 5 GHz WLAN share the same antenna path and cannot transmit simultaneously.
3. Licensed modes cannot transmit simultaneously.
4. When the user utilizes multiple services in UMTS 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the UMTS+WLAN scenario also represents the UMTS Voice/DATA + WLAN scenario.
5. This device supports VOLTE.
6. This device supports VOWIFI.

1.7 Miscellaneous SAR Test Considerations

(A) WIFI/BT

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

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.

(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 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 is limited to 27 RB on the uplink for 16QAM modulation. Additional measurements were evaluated to support SAR test exclusion for 16 QAM as described in Section 7.5.4.

1.8 Guidance Applied

- FCC KDB Publication 941225 D01v03r01, D05v02r04 (3G/4G)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance, Wrist-worn Device Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- IEEE 1528-2013

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 10.

1.10 Device Housing Types and Wrist Band Types

This device has one housing type that was evaluated independently for SAR: Titanium. The device can also be used with different wristband accessories. The non-metallic wrist accessory, sport and fabric band, were evaluated for all exposure conditions.

2 LTE INFORMATION

LTE Information					
Form Factor	Watch				
Frequency Range of each LTE transmission band	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 17 (706.5 - 713.5 MHz)				
	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 14 (790.5 - 795.5 MHz)				
	LTE Band 26 (Cell) (814.7 - 848.3 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 66 (AWS) (1710.7 - 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 7 (2502.5 - 2567.5 MHz)				
	LTE Band 41 (2498.5 - 2687.5 MHz)				
Channel Bandwidths	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 17: 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 14: 5 MHz, 10 MHz				
	LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 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 7: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)	715.3 (23173)	
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)	714.5 (23165)	
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)	713.5 (23155)	
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)	711 (23130)	
LTE Band 17: 5 MHz	706.5 (23755)		710 (23790)	713.5 (23825)	
LTE Band 17: 10 MHz	709 (23780)		710 (23790)	711 (23800)	
LTE Band 13: 5 MHz	779.5 (23205)		782 (23230)	784.5 (23255)	
LTE Band 13: 10 MHz	N/A		782 (23230)	N/A	
LTE Band 14: 5 MHz	790.5 (23305)		793 (23330)	795.5 (23355)	
LTE Band 14: 10 MHz	N/A		793 (23330)	N/A	
LTE Band 26 (Cell): 1.4 MHz	814.7 (26697)		831.5 (26865)	848.3 (27033)	
LTE Band 26 (Cell): 3 MHz	815.5 (26705)		831.5 (26865)	847.5 (27025)	
LTE Band 26 (Cell): 5 MHz	816.5 (26715)		831.5 (26865)	846.5 (27015)	
LTE Band 26 (Cell): 10 MHz	819 (26740)		831.5 (26865)	844 (26990)	
LTE Band 5 (Cell): 1.4 MHz	824.7 (20407)		836.5 (20525)	848.3 (20643)	
LTE Band 5 (Cell): 3 MHz	825.5 (20415)		836.5 (20525)	847.5 (20635)	
LTE Band 5 (Cell): 5 MHz	826.5 (20425)		836.5 (20525)	846.5 (20625)	
LTE Band 5 (Cell): 10 MHz	829 (20450)		836.5 (20525)	844 (20600)	
LTE Band 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 7: 5 MHz	2502.5 (20775)		2535 (21100)	2567.5 (21425)	
LTE Band 7: 10 MHz	2505 (20800)		2535 (21100)	2565 (21400)	
LTE Band 7: 15 MHz	2507.5 (20825)		2535 (21100)	2562.5 (21375)	
LTE Band 7: 20 MHz	2510 (20850)		2535 (21100)	2560 (21350)	
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
UE Category	1				
Modulations Supported in UL	QPSK, 16QAM				
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 Additional Information	This device does not support full CA features on 3GPP Release 12. All uplink communications are identical to the Release 8 Specifications. The following LTE Release 12 Features are not supported: Carrier Aggregation, Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

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:

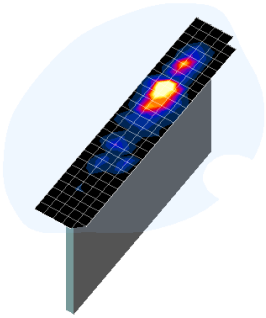

Figure 4-1
Sample SAR Area Scan

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).
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). 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 IEE 1528-2013 Table 6

5 TEST CONFIGURATION POSITIONS

5.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. Additionally, a manufacturer provided low-loss foam was used to position the device for head SAR evaluations.

5.2 Positioning for Head

Devices that are designed to be worn on the wrist may operate in speaker mode for voice communication, with the device worn on the wrist and positioned next to the mouth. When next-to-mouth SAR evaluation is required, the device is positioned at 10 mm from a flat phantom filled with head tissue-equivalent medium. The device is evaluated with wrist bands strapped together to represent normal use conditions.

5.3 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. When extremity SAR evaluation is required, the device is evaluated with the back of the device touching the flat phantom. The phantom was filled with head tissue equivalent medium. The device was evaluated with Sport wristband unstrapped and touching the phantom. For the Fabric wristband, the device was evaluated with wristbands strapped and the distance between wristbands and the phantom was minimized to represent the spacing created by actual use conditions.

6 RF EXPOSURE LIMITS

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

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

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

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

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

7 FCC MEASUREMENT PROCEDURES

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

7.1 Measured and Reported SAR

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

7.2 3G SAR Test Reduction Procedure

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

7.3 Procedures Used to Establish RF Signal for SAR

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

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

7.4 SAR Measurement Conditions for UMTS

7.4.1 Output Power Verification

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

7.4.2 Head SAR Measurements

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all “1s”. SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than 0.25 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer) using the exposure configuration that resulted in the highest SAR for that RF channel in the 12.2 kbps RMC mode.

7.4.3 Body SAR Measurements

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

7.4.4 SAR Measurements with Rel 5 HSDPA

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

7.4.5 SAR Measurements with Rel 6 HSUPA

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

When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

7.5 SAR Measurement Conditions for LTE

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

7.5.1 Spectrum Plots for RB Configurations

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

7.5.2 MPR

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

7.5.3 A-MPR

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

7.5.4 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05v02r04:

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
    i. The required channel and offset combination with the highest maximum output power is required for SAR.
    ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
    iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.
c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sections 5.2.1 through 5.2.3 is less than or equal to ½ dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is <1.45 W/kg.
e. This device can only operate with 16QAM on the uplink with less than or equal to 27 RB. For 16QAM configurations with 10 MHz, 15 MHz and 20 MHz bandwidths, LTE powers for RB size of 15 (“50% RB”) and 27 (“100% RB”) with offsets to upper edge, middle, and lower edge of the channel are additionally measured for both QPSK and 16QAM modulations to support comparison and SAR test exclusion per Section 5.2.4 and 5.3.

7.5.5 TDD

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

7.6 SAR Testing with 802.11 Transmitters

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

7.6.1 General Device Setup

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

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

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

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

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

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

7.6.4 2.4 GHz SAR Test Requirements

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

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

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

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

7.6.5 OFDM Transmission Mode and SAR Test Channel Selection

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

7.6.6 Initial Test Configuration Procedure

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

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

7.6.7 Subsequent Test Configuration Procedures

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

8 RF CONDUCTED POWERS

8.1 UMTS Conducted Powers

Table 8-1
Maximum Conducted Powers

3GPP Release Version	Mode	3GPP 34.121 Subtest	Cellular Band [dBm]			AWS Band [dBm]			PCS Band [dBm]			3GPP MPR [dB]
			4132	4183	4233	1312	1412	1513	9262	9400	9538	
99	WCDMA	12.2 kbps RMC	24.01	24.10	23.92	23.12	23.13	22.97	23.20	23.25	22.98	-
99		12.2 kbps AMR	24.02	24.08	23.88	23.11	23.01	22.94	23.09	23.12	22.94	-
6	HSDPA	Subtest 1	24.45	24.55	24.32	23.37	23.28	23.15	23.58	23.55	23.30	0
6		Subtest 2	23.48	23.57	23.36	22.45	22.37	22.32	22.55	22.58	22.27	0
6		Subtest 3	23.05	23.13	22.89	22.01	21.98	21.88	22.04	22.11	21.88	0.5
6		Subtest 4	22.76	22.86	22.63	21.87	21.80	21.73	21.82	21.87	21.67	0.5
6	HSUPA	Subtest 1	22.61	22.72	22.47	22.58	22.43	22.46	22.56	22.58	22.37	0
6		Subtest 2	21.27	21.38	21.16	20.31	20.25	20.23	20.36	20.41	20.22	2
6		Subtest 3	22.31	22.38	22.18	21.24	21.18	21.14	21.28	21.37	21.10	1
6		Subtest 4	21.55	21.65	21.38	20.56	20.52	20.50	20.51	20.68	20.30	2
6		Subtest 5	23.50	23.60	23.40	22.58	22.49	22.47	22.59	22.60	22.25	0

This device does not support DC-HSDPA.

Figure 8-1
Power Measurement Setup

8.2 LTE Conducted Powers

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

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.

8.2.1 LTE Band 12

Table 8-2
LTE Band 12 Conducted Power - 10 MHz Bandwidth

LTE Band 12 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23095 (707.5 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**24.67**	0	0
	1	25	24.32		0
	1	49	24.44		0
	25	0	**23.55**	0-1	1
	25	12	23.42		1
	25	25	23.33		1
	50	0	23.54		1
	15	0	23.42	0-1	1
	15	17	23.32		1
	15	35	23.25		1
	27	0	23.50	0-2	1
	27	12	23.34		1
	27	23	23.28		1
16QAM	1	0	23.78	0-2	1
	1	25	23.83		1
	1	49	23.90		1
	25	0	22.71	0-3	2
	25	12	22.56		2
	25	25	22.48		2
	15	0	22.65	0-5	2
	15	17	22.53		2
	15	35	22.43		2
	27	0	22.66		2
	27	12	22.49		2
	27	23	22.43		2

8.2.2 LTE Band 13

Table 8-3
LTE Band 13 Conducted Power - 10 MHz Bandwidth

LTE Band 13 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23230 (782.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	**24.57**	0	0
	1	25	24.30		0
	1	49	24.41		0
	25	0	23.51	0-1	1
	25	12	23.54		1
	25	25	**23.56**		1
	50	0	23.55		1
	15	0	23.61	0-1	1
	15	17	23.51		1
	15	35	23.60		1
	27	0	23.56	0-2	1
	27	12	23.51		1
	27	23	23.60		1
16QAM	1	0	24.22	0-2	1
	1	25	23.90		1
	1	49	23.91		1
	25	0	22.82	0-3	2
	25	12	22.80		2
	25	25	22.85		2
	15	0	22.84	0-5	2
	15	17	22.77		2
	15	35	22.86		2
	27	0	22.76		2
	27	12	22.73		2
	27	23	22.84		2

8.2.3 LTE Band 14

Table 8-4
LTE Band 14 Conducted Power - 10 MHz Bandwidth

LTE Band 14 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 23330 (793.0 MHz) Conducted Power [dBm]	MPR Allowed per 3GPP [dB]	MPR [dB]
QPSK	1	0	25.01	0	0
	1	25	**25.08**		0
	1	49	24.67		0
	25	0	**24.13**	0-1	1
	25	12	23.95		1
	25	25	23.89		1
	50	0	24.04		1
	15	0	23.97	0-1	1
	15	17	23.95		1
	15	35	23.90		1
	27	0	24.06	0-2	1
	27	12	23.98		1
	27	23	23.87		1
16QAM	1	0	24.08	0-2	1
	1	25	24.06		1
	1	49	23.87		1
	25	0	22.72	0-3	2
	25	12	22.58		2
	25	25	22.51		2
	15	0	22.68	0-5	2
	15	17	22.69		2
	15	35	22.57		2
	27	0	22.71		2
	27	12	22.62		2
	27	23	22.48		2

8.2.4 LTE Band 26

Table 8-5
LTE Band 26 Conducted Power - 10 MHz Bandwidth

LTE Band 26 (Cell) 10 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26740 (819.0 MHz)	Mid Channel 26865 (831.5 MHz)	High Channel 26990 (844.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	24.57	24.50	24.60	0	0
	1	25	**24.72**	24.64	24.61		0
	1	49	24.52	24.54	24.50		0
	25	0	**23.77**	23.61	23.54	0-1	1
	25	12	23.66	23.58	23.42		1
	25	25	23.65	23.59	23.48		1
	50	0	23.76	23.60	23.56		1
	15	0	23.54	23.55	23.55	0-1	1
	15	17	23.64	23.53	23.40		1
	15	35	23.55	23.59	23.46		1
	27	0	23.62	23.52	23.50	0-2	1
	27	12	23.69	23.50	23.40		1
	27	23	23.70	23.54	23.46		1
16QAM	1	0	23.36	23.35	23.40	0-2	1
	1	25	23.45	23.30	23.16		1
	1	49	23.32	23.50	23.30		1
	25	0	22.16	22.07	22.08	0-3	2
	25	12	22.16	22.01	21.93		2
	25	25	22.18	22.02	22.02		2
	15	0	22.06	22.01	22.11	0-5	2
	15	17	22.17	22.02	21.93		2
	15	35	22.07	22.08	21.95		2
	27	0	22.12	22.02	22.00		2
	27	12	22.22	22.00	21.88		2
	27	23	22.20	22.04	21.95		2

8.2.5 LTE Band 5

Table 8-6
LTE Band 5 Conducted Power - 10 MHz Bandwidth

LTE Band 5 (Cell) 10 MHz Bandwidth					
Modulation	RB Size	RB Offset	Mid Channel 20525 (836.5 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]		
QPSK	1	0	24.33	0	0
	1	25	**24.47**		0
	1	49	24.41		0
	25	0	23.53	0-1	1
	25	12	23.54		1
	25	25	**23.57**		1
	50	0	23.51		1
	15	0	23.45	0-1	1
	15	17	23.56		1
	15	35	23.53		1
	27	0	23.52	0-2	1
	27	12	23.57		1
	27	23	23.50		1
16QAM	1	0	23.39	0-2	1
	1	25	23.40		1
	1	49	23.31		1
	25	0	22.02	0-3	2
	25	12	22.07		2
	25	25	22.06		2
	15	0	21.93	0-5	2
	15	17	22.09		2
	15	35	22.05		2
	27	0	22.01		2
	27	12	22.03		2
	27	23	22.05		2

8.2.6 LTE Band 66

Table 8-7
LTE Band 66 Conducted Power - 20 MHz Bandwidth

LTE Band 66 (AWS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 132072 (1720.0 MHz)	Mid Channel 132322 (1745.0 MHz)	High Channel 132572 (1770.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.43	23.47	23.48	0	0
	1	50	23.58	23.27	23.40		0
	1	99	**23.66**	23.38	23.45		0
	50	0	22.79	22.74	22.69	0-1	1
	50	25	**22.88**	22.81	22.73		1
	50	50	22.84	22.73	22.77		1
	100	0	22.82	22.83	22.79		1
	15	0	23.51	23.61	23.36	0-1	0
	15	42	23.53	23.58	23.38		0
	15	85	23.54	23.49	23.39		0
	27	0	22.67	22.77	22.53	0-2	1
	27	37	23.12	22.73	22.69		1
	27	73	23.01	22.74	22.70		1
16QAM	1	0	22.51	22.63	22.59	0-2	1
	1	50	22.61	22.51	22.41		1
	1	99	22.76	22.40	22.62		1
	15	0	22.31	22.33	22.19	0-3	1
	15	42	22.35	22.18	22.14		1
	15	85	22.38	22.18	22.24		1
	27	0	21.52	21.47	21.28	0-5	2
	27	37	21.57	21.43	21.36		2
	27	73	21.46	21.30	21.34		2

8.2.7 LTE Band 25

Table 8-8
LTE Band 25 Conducted Power - 20 MHz Bandwidth

LTE Band 25 (PCS) 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 26140 (1860.0 MHz)	Mid Channel 26365 (1882.5 MHz)	High Channel 26590 (1905.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	23.02	**23.33**	23.00	0	0
	1	50	23.05	23.11	23.09		0
	1	99	23.08	22.95	23.05		0
	50	0	22.05	22.11	21.99	0-1	1
	50	25	22.09	**22.28**	22.04		1
	50	50	22.10	22.11	22.02		1
	100	0	22.23	22.25	22.27		1
	15	0	23.03	23.06	22.87	0-1	0
	15	42	23.09	23.07	22.96		0
	15	85	23.08	22.97	22.81		0
	27	0	21.98	22.06	21.86	0-2	1
	27	37	22.05	22.12	21.95		1
	27	73	22.03	22.01	21.81		1
16QAM	1	0	22.54	22.52	22.36	0-2	1
	1	50	22.63	22.54	22.43		1
	1	99	22.68	22.39	22.17		1
	15	0	22.15	22.27	22.11	0-3	1
	15	42	22.26	22.34	22.19		1
	15	85	22.30	22.21	21.95		1
	27	0	21.14	21.23	21.05	0-5	2
	27	37	21.24	21.25	21.17		2
	27	73	21.26	21.13	20.95		2

8.2.8 LTE Band 7

Table 8-9
LTE Band 7 Conducted Power - 20 MHz Bandwidth

LTE Band 7 20 MHz Bandwidth							
Modulation	RB Size	RB Offset	Low Channel 20850 (2510.0 MHz)	Mid Channel 21100 (2535.0 MHz)	High Channel 21350 (2560.0 MHz)	MPR Allowed per 3GPP [dB]	MPR [dB]
			Conducted Power [dBm]				
QPSK	1	0	22.19	22.44	22.40	0	0
	1	50	22.43	22.42	22.37		0
	1	99	22.41	**22.56**	22.53		0
	50	0	21.38	21.48	21.35	0-1	1
	50	25	21.49	21.42	21.43		1
	50	50	**21.57**	21.35	21.47		1
	100	0	21.56	21.55	21.51		1
	15	0	22.35	22.41	22.36	0-1	0
	15	42	22.47	22.36	22.35		0
	15	85	22.46	22.39	22.44		0
	27	0	21.31	21.45	21.30	0-2	1
	27	37	21.47	21.33	21.34		1
	27	73	21.41	21.34	21.39		1
16QAM	1	0	21.65	21.93	22.02	0-2	1
	1	50	22.18	21.96	21.89		1
	1	99	22.17	21.91	22.11		1
	15	0	21.31	21.67	21.55	0-3	1
	15	42	21.72	21.65	21.53		1
	15	85	21.72	21.68	21.58		1
	27	0	20.33	20.67	20.45	0-5	2
	27	37	20.65	20.62	20.47		2
	27	73	20.72	20.51	20.49		2

8.2.9 LTE Band 41

Table 8-10
LTE Band 41 Conducted Power - 20 MHz Bandwidth

LTE Band 41 20 MHz Bandwidth									
Modulation	RB Size	RB Offset	Low Channel	Low-Mid Channel	Mid Channel	Mid-High Channel	High Channel	MPR Allowed per 3GPP [dB]	MPR [dB]
			39750 (2506.0 MHz)	40185 (2549.5 MHz)	40620 (2593.0 MHz)	41055 (2636.5 MHz)	41490 (2680.0 MHz)		
			Conducted Power [dBm]						
QPSK	1	0	22.24	22.65	22.45	22.32	22.23	0	0
	1	50	22.65	22.64	22.47	22.33	22.37		0
	1	99	22.66	**22.67**	22.40	22.27	22.29		0
	50	0	21.38	21.60	21.41	21.26	21.23	0-1	1
	50	25	21.57	21.58	21.42	21.21	21.27		1
	50	50	21.63	**21.64**	21.39	21.20	21.26		1
	100	0	21.60	21.62	21.44	21.22	21.36		1
	15	0	22.26	22.64	22.46	22.27	22.23	0-1	0
	15	42	22.54	22.63	22.43	22.28	22.35		0
	15	85	22.66	22.56	22.38	22.22	22.27		0
	27	0	21.26	21.59	21.35	21.25	21.13	0-2	1
	27	37	21.56	21.57	21.39	21.24	21.24		1
	27	73	21.61	21.51	21.32	21.18	21.19		1
16QAM	1	0	21.30	21.98	21.45	21.51	21.57	0-2	1
	1	50	21.78	21.91	21.42	21.39	21.67		1
	1	99	22.02	21.89	21.37	21.47	21.43		1
	15	0	21.19	21.79	21.47	21.38	21.21	0-3	1
	15	42	21.53	21.73	21.51	21.38	21.28		1
	15	85	21.67	21.68	21.48	21.35	21.30		1
	27	0	20.24	20.69	20.49	20.32	20.17	0-5	2
	27	37	20.55	20.72	20.44	20.32	20.27		2
	27	73	20.59	20.67	20.40	20.29	20.20		2

Figure 8-2
Power Measurement Setup

8.3 WLAN Conducted Powers

Table 8-11
2.4 GHz WLAN Maximum Average RF Power

2.4GHz Conducted Power [dBm]				
Freq [MHz]	Channel	IEEE Transmission Mode		
		802.11b	802.11g	802.11n
		Average	Average	Average
2412	1	18.74	15.57	15.95
2437	6	18.79	17.40	17.51
2462	11	18.76	13.20	13.15

Table 8-12
5 GHz WLAN Maximum Average RF Power

5GHz (20MHz) Conducted Power [dBm]			
Freq [MHz]	Channel	IEEE Transmission Mode	
		802.11a	802.11n
		Average	Average
5180	36	16.05	16.04
5200	40	16.09	15.97
5220	44	16.03	16.04
5240	48	15.98	16.05
5260	52	16.10	16.08
5280	56	16.06	16.04
5300	60	15.95	16.10
5320	64	15.97	16.00
5500	100	16.05	16.03
5600	120	16.07	16.04
5620	124	16.00	16.03
5720	144	16.06	16.09
5745	149	16.02	16.06
5785	157	15.98	16.02
5825	165	15.97	16.00

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

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.

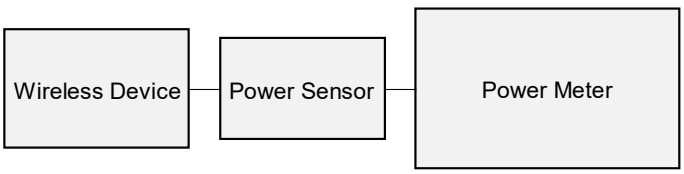

Figure 8-3
Power Measurement Setup

8.4 Bluetooth Conducted Powers

Table 8-13
Bluetooth Average RF Power

Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	GFSK	1.0	0	12.11	16.255
2441	GFSK	1.0	39	12.00	15.849
2480	GFSK	1.0	78	12.27	16.866

Note 1: Bluetooth was evaluated with a test mode with 100% transmission duty factor.

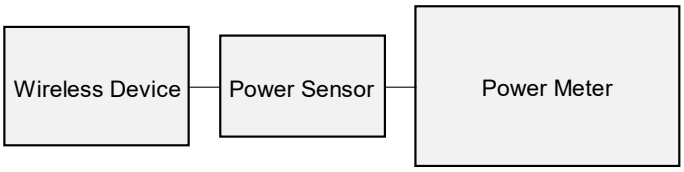

Figure 8-4
Power Measurement Setup

9 SYSTEM VERIFICATION

9.1 Tissue Verification

Table 9-1
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
08/03/2022	750 Head	19.4	680	0.847	40.265	0.888	42.305	-4.62%	-4.82%
			695	0.851	40.221	0.889	42.227	-4.27%	-4.75%
			700	0.853	40.215	0.889	42.201	-4.05%	-4.71%
			710	0.856	40.196	0.890	42.149	-3.82%	-4.63%
			725	0.861	40.181	0.891	42.071	-3.37%	-4.49%
			750	0.869	40.136	0.894	41.942	-2.80%	-4.31%
			770	0.877	40.086	0.895	41.838	-2.01%	-4.19%
			785	0.883	40.043	0.896	41.760	-1.45%	-4.11%
			800	0.889	40.004	0.897	41.682	-0.89%	-4.03%
08/04/2022	750 Head	24.9	695	0.854	43.010	0.889	42.227	-3.94%	1.85%
			700	0.858	42.941	0.889	42.201	-3.49%	1.75%
			710	0.868	42.804	0.890	42.149	-2.47%	1.55%
			725	0.882	42.599	0.891	42.071	-1.01%	1.26%
			750	0.905	42.251	0.894	41.942	1.23%	0.74%
			770	0.923	41.989	0.895	41.838	3.13%	0.36%
			785	0.938	41.807	0.896	41.760	4.69%	0.11%
08/05/2022	750 Head	21.6	680	0.888	40.465	0.888	42.305	0.00%	-4.35%
			695	0.893	40.410	0.889	42.227	0.45%	-4.30%
			700	0.894	40.396	0.889	42.201	0.56%	-4.28%
			710	0.897	40.371	0.890	42.149	0.79%	-4.22%
			725	0.902	40.339	0.891	42.071	1.23%	-4.12%
			750	0.911	40.262	0.894	41.942	1.90%	-4.01%
			770	0.917	40.188	0.895	41.838	2.46%	-3.94%
			785	0.922	40.145	0.896	41.760	2.90%	-3.87%
			800	0.927	40.110	0.897	41.682	3.34%	-3.77%
08/07/2022	750 Head	23.1	680	0.882	42.214	0.888	42.305	-0.68%	-0.22%
			695	0.887	42.161	0.889	42.227	-0.22%	-0.16%
			700	0.888	42.148	0.889	42.201	-0.11%	-0.13%
			710	0.892	42.129	0.890	42.149	0.22%	-0.05%
			725	0.897	42.108	0.891	42.071	0.67%	0.09%
			750	0.906	42.045	0.894	41.942	1.34%	0.25%
			770	0.913	41.956	0.895	41.838	2.01%	0.28%
			785	0.918	41.897	0.896	41.760	2.46%	0.33%
			800	0.923	41.861	0.897	41.682	2.90%	0.43%
08/01/2022	835 Head	20.9	815	0.907	40.133	0.898	41.594	1.00%	-3.51%
			820	0.909	40.120	0.899	41.578	1.11%	-3.51%
			835	0.914	40.070	0.900	41.500	1.56%	-3.45%
			850	0.920	40.020	0.916	41.500	0.44%	-3.57%
06/21/2022	1750 Head	21.3	1710	1.374	38.895	1.348	40.142	1.93%	-3.11%
			1720	1.381	38.885	1.354	40.126	1.99%	-3.09%
			1745	1.400	38.845	1.368	40.087	2.34%	-3.10%
			1750	1.404	38.836	1.371	40.079	2.41%	-3.10%
			1770	1.417	38.790	1.383	40.047	2.46%	-3.14%
			1790	1.431	38.738	1.394	40.016	2.65%	-3.19%

Table 9-2
Measured Head Tissue Properties (Cont.)

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
06/24/2022	1750 Head	20.0	1710	1.345	38.732	1.348	40.142	-0.22%	-3.51%
			1720	1.351	38.712	1.354	40.126	-0.22%	-3.52%
			1745	1.367	38.659	1.368	40.087	-0.07%	-3.56%
			1750	1.371	38.649	1.371	40.079	0.00%	-3.57%
			1770	1.384	38.622	1.383	40.047	0.07%	-3.56%
			1790	1.395	38.579	1.394	40.016	0.07%	-3.59%
08/07/2022	1750 Head	22.1	1710	1.329	38.635	1.348	40.142	-1.41%	-3.75%
			1720	1.335	38.616	1.354	40.126	-1.40%	-3.76%
			1745	1.351	38.573	1.368	40.087	-1.24%	-3.78%
			1750	1.355	38.565	1.371	40.079	-1.17%	-3.78%
			1770	1.366	38.532	1.383	40.047	-1.23%	-3.78%
			1790	1.377	38.491	1.394	40.016	-1.22%	-3.81%
06/15/2022	1900 Head	20.9	1850	1.413	40.029	1.400	40.000	0.93%	0.07%
			1860	1.419	40.015	1.400	40.000	1.36%	0.04%
			1880	1.431	39.983	1.400	40.000	2.21%	-0.04%
			1900	1.442	39.956	1.400	40.000	3.00%	-0.11%
			1905	1.445	39.950	1.400	40.000	3.21%	-0.12%
			1910	1.448	39.943	1.400	40.000	3.43%	-0.14%
08/05/2022	1900 Head	20.8	1850	1.389	38.333	1.400	40.000	-0.79%	-4.17%
			1860	1.395	38.310	1.400	40.000	-0.36%	-4.22%
			1880	1.408	38.280	1.400	40.000	0.57%	-4.30%
			1900	1.421	38.271	1.400	40.000	1.50%	-4.32%
			1905	1.424	38.269	1.400	40.000	1.71%	-4.33%
			1910	1.427	38.266	1.400	40.000	1.93%	-4.34%
06/14/2022	2450 Head	21.6	2300	1.705	39.605	1.670	39.500	2.10%	0.27%
			2310	1.712	39.597	1.679	39.480	1.97%	0.30%
			2320	1.719	39.587	1.687	39.460	1.90%	0.32%
			2400	1.777	39.471	1.756	39.289	1.20%	0.46%
			2450	1.816	39.399	1.800	39.200	0.89%	0.51%
			2480	1.837	39.339	1.833	39.162	0.22%	0.45%
			2500	1.853	39.324	1.855	39.136	-0.11%	0.48%
			2510	1.861	39.318	1.866	39.123	-0.27%	0.50%
			2535	1.882	39.292	1.893	39.092	-0.58%	0.51%
			2550	1.893	39.264	1.909	39.073	-0.84%	0.49%
			2560	1.901	39.241	1.920	39.060	-0.99%	0.46%
			2600	1.935	39.158	1.964	39.009	-1.48%	0.38%
			2650	1.975	39.103	2.018	38.945	-2.13%	0.41%
			2680	1.999	39.033	2.051	38.907	-2.54%	0.32%
			2700	2.016	38.991	2.073	38.882	-2.75%	0.28%
06/14/2022	2450 Head	24.9	2300	1.723	40.562	1.670	39.500	3.17%	2.69%
			2310	1.734	40.530	1.679	39.480	3.28%	2.66%
			2320	1.745	40.492	1.687	39.460	3.44%	2.62%
			2400	1.834	40.192	1.756	39.289	4.44%	2.30%
			2450	1.886	40.005	1.800	39.200	4.78%	2.05%
			2480	1.918	39.879	1.833	39.162	4.64%	1.83%
			2500	1.941	39.813	1.855	39.136	4.64%	1.73%
			2510	1.953	39.783	1.866	39.123	4.66%	1.69%
			2535	1.980	39.704	1.893	39.092	4.60%	1.57%
			2550	1.995	39.641	1.909	39.073	4.50%	1.45%
			2560	2.005	39.595	1.920	39.060	4.43%	1.37%
			2600	2.052	39.433	1.964	39.009	4.48%	1.09%
			2650	2.108	39.285	2.018	38.945	4.46%	0.87%
			2680	2.140	39.151	2.051	38.907	4.34%	0.63%
			2700	2.163	39.075	2.073	38.882	4.34%	0.50%

Table 9-3
Measured Head Tissue Properties (Cont.)

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
08/02/2022	2450 Head	21.3	2300	1.717	38.273	1.670	39.500	*2.81%*	*-3.11%*
			2310	1.724	38.259	1.679	39.480	*2.68%*	*-3.09%*
			2320	1.730	38.242	1.687	39.460	*2.55%*	*-3.09%*
			2400	1.790	38.140	1.756	39.289	*1.94%*	*-2.92%*
			2450	1.828	38.048	1.800	39.200	*1.56%*	*-2.94%*
			2480	1.851	38.006	1.833	39.162	*0.98%*	*-2.95%*
			2500	1.865	37.971	1.855	39.136	*0.54%*	*-2.98%*
			2510	1.872	37.952	1.866	39.123	*0.32%*	*-2.99%*
			2535	1.889	37.908	1.893	39.092	*-0.21%*	*-3.03%*
			2550	1.901	37.889	1.909	39.073	*-0.42%*	*-3.03%*
			2560	1.909	37.873	1.920	39.060	*-0.57%*	*-3.04%*
			2600	1.941	37.804	1.964	39.009	*-1.17%*	*-3.09%*
			2650	1.978	37.724	2.018	38.945	*-1.98%*	*-3.14%*
			2680	2.003	37.664	2.051	38.907	*-2.34%*	*-3.19%*
			2700	2.018	37.641	2.073	38.882	*-2.65%*	*-3.19%*
06/14/2022	2600 Head	19.1	2300	1.672	40.715	1.670	39.500	*0.12%*	*3.08%*
			2310	1.679	40.697	1.679	39.480	*0.00%*	*3.08%*
			2320	1.687	40.678	1.687	39.460	*0.00%*	*3.09%*
			2400	1.751	40.561	1.756	39.289	*-0.28%*	*3.24%*
			2450	1.791	40.481	1.800	39.200	*-0.50%*	*3.27%*
			2480	1.814	40.430	1.833	39.162	*-1.04%*	*3.24%*
			2500	1.830	40.396	1.855	39.136	*-1.35%*	*3.22%*
			2510	1.838	40.379	1.866	39.123	*-1.50%*	*3.21%*
			2535	1.858	40.343	1.893	39.092	*-1.85%*	*3.20%*
			2550	1.871	40.320	1.909	39.073	*-1.99%*	*3.19%*
			2560	1.879	40.302	1.920	39.060	*-2.14%*	*3.18%*
			2600	1.911	40.239	1.964	39.009	*-2.70%*	*3.15%*
			2650	1.953	40.159	2.018	38.945	*-3.22%*	*3.12%*
			2680	1.977	40.110	2.051	38.907	*-3.61%*	*3.09%*
			2700	1.993	40.073	2.073	38.882	*-3.86%*	*3.06%*

Table 9-4
Measured Head Tissue Properties (Cont.)

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
06/15/2022	5200-5800 Head	21.5	5180	4.490	35.286	4.635	36.009	-3.13%	-2.01%
			5190	4.503	35.265	4.645	35.998	-3.06%	-2.04%
			5200	4.514	35.247	4.655	35.986	-3.03%	-2.05%
			5210	4.526	35.234	4.666	35.975	-3.00%	-2.06%
			5220	4.536	35.220	4.676	35.963	-2.99%	-2.07%
			5240	4.553	35.166	4.696	35.940	-3.05%	-2.15%
			5250	4.562	35.142	4.706	35.929	-3.06%	-2.19%
			5260	4.575	35.120	4.717	35.917	-3.01%	-2.22%
			5270	4.588	35.104	4.727	35.906	-2.94%	-2.23%
			5280	4.602	35.089	4.737	35.894	-2.85%	-2.24%
			5290	4.614	35.075	4.748	35.883	-2.82%	-2.25%
			5300	4.624	35.057	4.758	35.871	-2.82%	-2.27%
			5310	4.634	35.041	4.768	35.860	-2.81%	-2.28%
			5320	4.646	35.020	4.778	35.849	-2.76%	-2.31%
			5500	4.849	34.727	4.963	35.643	-2.30%	-2.57%
			5510	4.859	34.706	4.973	35.632	-2.29%	-2.60%
			5520	4.871	34.689	4.983	35.620	-2.25%	-2.61%
			5530	4.886	34.674	4.994	35.609	-2.16%	-2.63%
			5540	4.899	34.656	5.004	35.597	-2.10%	-2.64%
			5550	4.908	34.638	5.014	35.586	-2.11%	-2.66%
			5560	4.919	34.622	5.024	35.574	-2.09%	-2.68%
			5580	4.943	34.587	5.045	35.551	-2.02%	-2.71%
			5600	4.964	34.557	5.065	35.529	-1.99%	-2.74%
			5610	4.975	34.546	5.076	35.518	-1.99%	-2.74%
			5620	4.986	34.530	5.086	35.506	-1.97%	-2.75%
			5640	5.004	34.484	5.106	35.483	-2.00%	-2.82%
			5660	5.028	34.453	5.127	35.460	-1.93%	-2.84%
			5670	5.039	34.431	5.137	35.449	-1.91%	-2.87%
			5680	5.047	34.411	5.147	35.437	-1.94%	-2.90%
			5690	5.055	34.394	5.158	35.426	-2.00%	-2.91%
			5700	5.066	34.374	5.168	35.414	-1.97%	-2.94%
			5710	5.079	34.350	5.178	35.403	-1.91%	-2.97%
			5720	5.091	34.328	5.188	35.391	-1.87%	-3.00%
			5745	5.118	34.298	5.214	35.363	-1.84%	-3.01%
			5750	5.124	34.289	5.219	35.357	-1.82%	-3.02%
			5755	5.130	34.276	5.224	35.351	-1.80%	-3.04%
			5765	5.140	34.252	5.234	35.340	-1.80%	-3.08%
			5775	5.150	34.233	5.245	35.329	-1.81%	-3.10%
			5785	5.162	34.217	5.255	35.317	-1.77%	-3.11%
			5795	5.174	34.192	5.265	35.305	-1.73%	-3.15%
			5800	5.179	34.179	5.270	35.300	-1.73%	-3.18%
			5800	5.179	34.179	5.270	35.300	-1.73%	-3.18%
			5805	5.185	34.167	5.275	35.294	-1.71%	-3.19%
			5825	5.208	34.138	5.296	35.271	-1.66%	-3.21%
			5835	5.220	34.125	5.305	35.230	-1.60%	-3.14%
			5845	5.231	34.110	5.315	35.210	-1.58%	-3.12%
			5855	5.242	34.092	5.325	35.197	-1.56%	-3.14%
			5865	5.254	34.079	5.336	35.190	-1.54%	-3.16%
			5865	5.254	34.079	5.336	35.190	-1.54%	-3.16%
			5865	5.254	34.079	5.336	35.190	-1.54%	-3.16%
			5865	5.254	34.079	5.336	35.190	-1.54%	-3.16%
			5875	5.268	34.060	5.347	35.183	-1.48%	-3.19%
			5885	5.281	34.040	5.357	35.177	-1.42%	-3.23%
			5905	5.304	33.996	5.379	35.163	-1.39%	-3.32%

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). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

9.2 Test System Verification

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

Table 9-5
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 (%)
AM14	750	HEAD	08/04/2022	21.9	22.9	0.20	1094	7357	1.670	8.47	8.350	-1.42%
AM6	750	HEAD	08/07/2022	21.9	21.5	0.20	1097	7532	1.560	8.21	7.800	-4.99%
AM12	835	HEAD	08/01/2022	21.4	20.9	0.20	4d108	7499	1.970	9.70	9.850	1.55%
AM13	1750	HEAD	06/21/2022	21.8	21.3	0.10	1104	7360	3.700	35.70	37.000	3.64%
AM13	1750	HEAD	06/24/2022	20.8	18.6	0.10	1104	7360	3.440	35.70	34.400	-3.64%
AM10	1900	HEAD	06/15/2022	21.9	20.0	0.10	5d181	7308	4.150	40.10	41.500	3.49%
AM11	2450	HEAD	06/14/2022	20.8	23.0	0.10	855	7420	5.130	52.30	51.300	-1.91%
AM10	2450	HEAD	08/02/2022	21.6	20.8	0.10	921	7308	5.130	54.20	51.300	-5.35%
AM10	2600	HEAD	06/14/2022	23.4	21.8	0.10	1042	7308	5.700	55.80	57.000	2.15%
AM4	2600	HEAD	06/14/2022	22.8	20.4	0.10	1042	3837	5.530	55.80	55.300	-0.90%
AM9	5250	HEAD	06/15/2022	22.6	21.0	0.05	1123	7638	4.170	80.50	83.400	3.60%
AM9	5600	HEAD	06/15/2022	22.6	21.0	0.05	1123	7638	3.890	83.70	77.800	-7.05%
AM9	5750	HEAD	06/15/2022	22.6	21.0	0.05	1123	7638	3.780	80.50	75.600	-6.09%

Table 9-6
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 (%)
AM12	750	HEAD	08/03/2022	21.4	19.6	0.20	1097	7499	1.110	5.34	5.550	3.93%
AM12	750	HEAD	08/05/2022	24.2	22.2	0.20	1097	7499	1.110	5.34	5.550	3.93%
AM12	835	HEAD	08/01/2022	21.4	20.9	0.20	4d108	7499	1.280	6.33	6.400	1.11%
AM13	1750	HEAD	06/24/2022	20.8	18.6	0.10	1104	7360	1.810	18.80	18.100	-3.72%
AM13	1750	HEAD	08/07/2022	23.4	22.1	0.10	1104	7360	1.780	18.80	17.800	-5.32%
AM10	1900	HEAD	06/15/2022	21.9	20.0	0.10	5d181	7308	2.140	20.80	21.400	2.88%
AM13	1900	HEAD	08/05/2022	23.2	20.3	0.10	5d181	7360	1.940	20.80	19.400	-6.73%
AM11	2450	HEAD	06/14/2022	20.8	23.0	0.10	855	7420	2.300	24.50	23.000	-6.12%
AM10	2450	HEAD	08/02/2022	21.6	20.8	0.10	921	7308	2.360	25.50	23.600	-7.45%
AM10	2600	HEAD	06/14/2022	23.4	21.8	0.10	1042	7308	2.550	24.90	25.500	2.41%
AM4	2600	HEAD	06/14/2022	22.8	20.4	0.10	1042	3837	2.520	24.90	25.200	1.20%
AM9	5250	HEAD	06/15/2022	22.6	21.0	0.05	1123	7638	1.200	22.90	24.000	4.80%
AM9	5600	HEAD	06/15/2022	22.6	21.0	0.05	1123	7638	1.100	23.70	22.000	-7.17%
AM9	5750	HEAD	06/15/2022	22.6	21.0	0.05	1123	7638	1.090	22.70	21.800	-3.96%

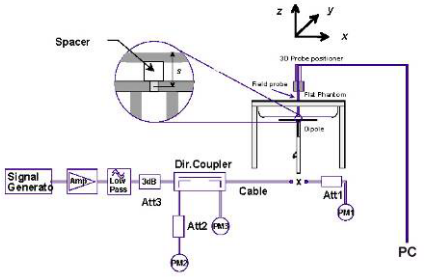

Figure 9-1
System Verification Setup Diagram

Figure 9-2
System Verification Setup Photo

10 SAR DATA SUMMARY

10.1 Standalone Head SAR Data

Table 10-1
UMTS 850 MHz Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Spacing	Housing Type	Wristband Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	25.00	24.10	0.06	front	10 mm	Titanium	Sport	T09KG7NVGC	1:1	0.001	1.230	0.001	A1
836.60	4183	UMTS 850	RMC	25.00	24.10	-0.14	front	10 mm	Titanium	Fabric	T09KG7NVGC	1:1	0.001	1.230	0.001	
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 10-2
UMTS 1750 MHz Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Spacing	Housing Type	Wristband Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	24.00	23.13	-0.02	front	10 mm	Titanium	Sport	J6XC6R75LX	1:1	0.125	1.222	0.153	
1732.40	1412	UMTS 1750	RMC	24.00	23.13	0.02	front	10 mm	Titanium	Fabric	J6XC6R75LX	1:1	0.137	1.222	0.167	A2
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 10-3
UMTS 1900 MHz Head SAR

MEASUREMENT RESULTS																	
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Spacing	Housing Type	Wristband Type	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	24.00	23.25	-0.01	front	10 mm	Titanium	Sport	W56W41636N	1:1	0.377	1.189	0.448	
1852.40	9262	UMTS 1900	RMC	24.00	23.20	0.00	front	10 mm	Titanium	Fabric	W56W41636N	1:1	0.333	1.202	0.400	
1880.00	9400	UMTS 1900	RMC	24.00	23.25	0.04	front	10 mm	Titanium	Fabric	W56W41636N	1:1	0.621	1.189	0.738	A3
1907.60	9538	UMTS 1900	RMC	24.00	22.98	-0.05	front	10 mm	Titanium	Fabric	W56W41636N	1:1	0.582	1.265	0.736	
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 10-4
LTE Band 12 Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Spacing	Housing Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
707.50	23095	Mid	LTE Band 12	10	Sport	25.50	24.67	0.00	0	front	10 mm	Titanium	QPSK	1	0	FWHQT45W0N	1:1	0.000	1.211	0.000	
707.50	23095	Mid	LTE Band 12	10	Sport	24.50	23.55	0.01	1	front	10 mm	Titanium	QPSK	25	0	FWHQT45W0N	1:1	0.000	1.245	0.000	
707.50	23095	Mid	LTE Band 12	10	Fabric	25.50	24.67	0.07	0	front	10 mm	Titanium	QPSK	1	0	FWHQT45W0N	1:1	0.001	1.211	0.001	A4
707.50	23095	Mid	LTE Band 12	10	Fabric	24.50	23.55	0.00	1	front	10 mm	Titanium	QPSK	25	0	FWHQT45W0N	1:1	0.000	1.245	0.000	
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 10-5
LTE Band 13 Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Spacing	Housing Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
782.00	23230	Mid	LTE Band 13	10	Sport	25.50	24.57	0.20	0	front	10 mm	Titanium	QPSK	1	0	J6XC6R75LX	1:1	0.002	1.239	0.002	A5
782.00	23230	Mid	LTE Band 13	10	Sport	24.50	23.56	-0.09	1	front	10 mm	Titanium	QPSK	25	25	J6XC6R75LX	1:1	0.002	1.242	0.002	
782.00	23230	Mid	LTE Band 13	10	Fabric	25.50	24.57	0.09	0	front	10 mm	Titanium	QPSK	1	0	J6XC6R75LX	1:1	0.000	1.239	0.000	
782.00	23230	Mid	LTE Band 13	10	Fabric	24.50	23.56	0.09	1	front	10 mm	Titanium	QPSK	25	25	J6XC6R75LX	1:1	0.000	1.242	0.000	
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 10-6
LTE Band 14 Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Spacing	Housing Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
793.00	23330	Mid	LTE Band 14	10	Sport	25.50	25.08	0.06	0	front	10 mm	Titanium	QPSK	1	25	J6XC6R75LX	1:1	0.002	1.102	0.002	
793.00	23330	Mid	LTE Band 14	10	Sport	24.50	24.13	0.09	1	front	10 mm	Titanium	QPSK	25	0	J6XC6R75LX	1:1	0.001	1.089	0.001	
793.00	23330	Mid	LTE Band 14	10	Fabric	25.50	25.08	0.07	0	front	10 mm	Titanium	QPSK	1	25	J6XC6R75LX	1:1	0.002	1.102	0.002	A6
793.00	23330	Mid	LTE Band 14	10	Fabric	24.50	24.13	0.02	1	front	10 mm	Titanium	QPSK	25	0	J6XC6R75LX	1:1	0.001	1.089	0.001	
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 10-7
LTE Band 26 (Cell) Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Spacing	Housing Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
819.00	26740	Low	LTE Band 26 (Cell)	10	Sport	25.50	24.72	0.09	0	front	10 mm	Titanium	QPSK	1	25	T09KG7NVGC	1:1	0.001	1.197	0.001	A7
819.00	26740	Low	LTE Band 26 (Cell)	10	Sport	24.50	23.77	0.06	1	front	10 mm	Titanium	QPSK	25	0	T09KG7NVGC	1:1	0.000	1.183	0.000	
819.00	26740	Low	LTE Band 26 (Cell)	10	Fabric	25.50	24.72	0.00	0	front	10 mm	Titanium	QPSK	1	25	T09KG7NVGC	1:1	0.000	1.197	0.000	
819.00	26740	Low	LTE Band 26 (Cell)	10	Fabric	24.50	23.77	0.00	1	front	10 mm	Titanium	QPSK	25	0	T09KG7NVGC	1:1	0.000	1.183	0.000	
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 10-8
LTE Band 5 (Cell) Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Spacing	Housing Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Sport	25.50	24.47	0.00	0	front	10 mm	Titanium	QPSK	1	25	W56W41636N	1:1	0.001	1.268	0.001	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Sport	24.50	23.57	-0.01	1	front	10 mm	Titanium	QPSK	25	25	W56W41636N	1:1	0.001	1.239	0.001	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Fabric	25.50	24.47	0.02	0	front	10 mm	Titanium	QPSK	1	25	W56W41636N	1:1	0.002	1.268	0.003	A8
836.50	20525	Mid	LTE Band 5 (Cell)	10	Fabric	24.50	23.57	0.04	1	front	10 mm	Titanium	QPSK	25	25	W56W41636N	1:1	0.001	1.239	0.001	
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 10-9
LTE Band 66 (AWS) Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Spacing	Housing Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g)	Scaling Factor	Reported SAR (1g)	Plot #
MHz	Ch.																	(W/kg)		(W/kg)	
1720.00	132072	Low	LTE Band 66 (AWS)	20	Sport	24.50	23.66	0.02	0	front	10 mm	Titanium	QPSK	1	99	FWHQT45W0N	1:1	0.106	1.213	0.129	A9
1720.00	132072	Low	LTE Band 66 (AWS)	20	Sport	23.50	22.88	-0.06	1	front	10 mm	Titanium	QPSK	50	25	FWHQT45W0N	1:1	0.088	1.153	0.101	
1720.00	132072	Low	LTE Band 66 (AWS)	20	Fabric	24.50	23.66	0.00	0	front	10 mm	Titanium	QPSK	1	99	FWHQT45W0N	1:1	0.091	1.213	0.110	
1720.00	132072	Low	LTE Band 66 (AWS)	20	Fabric	23.50	22.88	-0.04	1	front	10 mm	Titanium	QPSK	50	25	FWHQT45W0N	1:1	0.075	1.153	0.086	
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 10-10
LTE Band 25 (PCS) Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Spacing	Housing Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																				
1882.50	26365	Mid	LTE Band 25 (PCS)	20	Sport	24.50	23.33	-0.06	0	front	10 mm	Titanium	QPSK	1	0	W56W41636N	1:1	0.292	1.309	0.382	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	Sport	23.50	22.28	0.02	1	front	10 mm	Titanium	QPSK	50	25	W56W41636N	1:1	0.267	1.324	0.354	
1860.00	26140	Low	LTE Band 25 (PCS)	20	Fabric	24.50	23.08	0.20	0	front	10 mm	Titanium	QPSK	1	99	W56W41636N	1:1	0.449	1.387	0.623	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	Fabric	24.50	23.33	0.00	0	front	10 mm	Titanium	QPSK	1	0	W56W41636N	1:1	0.477	1.309	0.624	
1905.00	26590	High	LTE Band 25 (PCS)	20	Fabric	24.50	23.09	0.12	0	front	10 mm	Titanium	QPSK	1	50	W56W41636N	1:1	0.669	1.384	**0.926**	A10
1882.50	26365	Mid	LTE Band 25 (PCS)	20	Fabric	23.50	22.28	0.04	1	front	10 mm	Titanium	QPSK	50	25	W56W41636N	1:1	0.436	1.324	0.577	
1905.00	26590	High	LTE Band 25 (PCS)	20	Fabric	23.50	22.27	-0.01	1	front	10 mm	Titanium	QPSK	100	0	W56W41636N	1:1	0.647	1.327	0.859	
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 10-11
LTE Band 7 Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Spacing	Housing Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																				
2535.00	21100	Mid	LTE Band 7	20	Sport	23.50	22.56	-0.01	0	front	10 mm	Titanium	QPSK	1	99	VC46WM4X3G	1:1	0.351	1.242	0.436	
2510.00	20850	Low	LTE Band 7	20	Sport	22.50	21.57	0.02	1	front	10 mm	Titanium	QPSK	50	50	VC46WM4X3G	1:1	0.268	1.239	0.332	
2510.00	20850	Low	LTE Band 7	20	Fabric	23.50	22.43	0.00	0	front	10 mm	Titanium	QPSK	1	50	VC46WM4X3G	1:1	0.503	1.279	0.643	
2535.00	21100	Mid	LTE Band 7	20	Fabric	23.50	22.56	0.01	0	front	10 mm	Titanium	QPSK	1	99	VC46WM4X3G	1:1	0.523	1.242	0.650	A11
2560.00	21350	High	LTE Band 7	20	Fabric	23.50	22.53	-0.08	0	front	10 mm	Titanium	QPSK	1	99	VC46WM4X3G	1:1	0.471	1.250	0.589	
2510.00	20850	Low	LTE Band 7	20	Fabric	22.50	21.57	-0.03	1	front	10 mm	Titanium	QPSK	50	50	VC46WM4X3G	1:1	0.435	1.239	0.539	
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 10-12
LTE Band 41 Head SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Spacing	Housing Type	Modulation	RB Size	RB Offset	Device Serial Number	Duty Cycle	SAR (1g) (W/kg)	Scaling Factor	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																				
2549.50	40185	Low-Mid	LTE Band 41	20	Sport	23.50	22.67	-0.08	0	front	10 mm	Titanium	QPSK	1	99	TNJX5VKX6Q	1:1.58	0.344	1.211	0.417	
2549.50	40185	Low-Mid	LTE Band 41	20	Sport	22.50	21.64	-0.05	1	front	10 mm	Titanium	QPSK	50	50	TNJX5VKX6Q	1:1.58	0.305	1.219	0.372	
2549.50	40185	Low-Mid	LTE Band 41	20	Fabric	23.50	22.67	-0.08	0	front	10 mm	Titanium	QPSK	1	99	TNJX5VKX6Q	1:1.58	0.395	1.211	0.478	A12
2549.50	40185	Low-Mid	LTE Band 41	20	Fabric	22.50	21.64	-0.04	1	front	10 mm	Titanium	QPSK	50	50	TNJX5VKX6Q	1:1.58	0.307	1.219	0.374	
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 10-13
2.4 GHz WLAN Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Spacing	Housing Type	Wristband Type	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	SAR (1g) (W/kg)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g) (W/kg)	Plot #
MHz	Ch.																		
2437	6	802.11b	DSSS	22	19.00	18.79	-0.10	front	10 mm	Titanium	Sport	TNJX5VKX6Q	1	99.7	0.296	1.050	1.003	0.312	
2437	6	802.11b	DSSS	22	19.00	18.79	-0.05	front	10 mm	Titanium	Fabric	TNJX5VKX6Q	1	99.7	0.317	1.050	1.003	**0.334**	A13
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 10-14
5 GHz WLAN Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Spacing	Housing Type	Wristband Type	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	SAR (1g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.														(W/kg)			(W/kg)	
5260	52	802.11a	OFDM	20	17.00	16.10	0.02	front	10 mm	Titanium	Sport	J6XC6R75LX	6	97.6	0.036	1.230	1.025	0.045	
5260	52	802.11a	OFDM	20	17.00	16.10	0.06	front	10 mm	Titanium	Fabric	J6XC6R75LX	6	97.6	0.058	1.230	1.025	0.073	
5600	120	802.11a	OFDM	20	17.00	16.07	-0.03	front	10 mm	Titanium	Sport	HN4RCQVVVY	6	97.6	0.023	1.239	1.025	0.029	
5600	120	802.11a	OFDM	20	17.00	16.07	-0.10	front	10 mm	Titanium	Fabric	HN4RCQVVVY	6	97.6	0.049	1.239	1.025	0.062	
5745	149	802.11a	OFDM	20	17.00	16.02	-0.02	front	10 mm	Titanium	Sport	HN4RCQVVVY	6	97.6	0.065	1.253	1.025	**0.083**	A14
5745	149	802.11a	OFDM	20	17.00	16.02	-0.02	front	10 mm	Titanium	Fabric	HN4RCQVVVY	6	97.6	0.059	1.253	1.025	0.076	
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 10-15
Bluetooth Head SAR

MEASUREMENT RESULTS																		
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Spacing	Housing Type	Wristband Type	Device Serial Number	Data Rate (Mbps)	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.													(W/kg)			(W/kg)	
2480.00	78	Bluetooth	FHSS	13.00	12.27	-0.02	front	10 mm	Titanium	Sport	TNJX5VKX6Q	1	100	0.064	1.183	1.000	**0.076**	A15
2480.00	78	Bluetooth	FHSS	13.00	12.27	-0.12	front	10 mm	Titanium	Fabric	TNJX5VKX6Q	1	100	0.062	1.183	1.000	0.073	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Head** **1.6 W/kg (mW/g)** averaged over 1 gram											

10.2 Standalone Extremity SAR Data

Table 10-16
UMTS 850 MHz Extremity SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Housing Type	Wristband Type	Device Serial Number	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
836.60	4183	UMTS 850	RMC	25.00	24.10	-0.11	0 mm	Titanium	Sport	TNJX5VKX6Q	1:1	back	0.212	1.230	0.261	
836.60	4183	UMTS 850	RMC	25.00	24.10	-0.06	0 mm	Titanium	Fabric	TNJX5VKX6Q	1:1	back	0.253	1.230	0.311	A16
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Extremity** **4.0 W/kg (mW/g)** averaged over 10 grams									

Table 10-17
UMTS 1750 MHz Extremity SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Housing Type	Wristband Type	Device Serial Number	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
1732.40	1412	UMTS 1750	RMC	24.00	23.13	-0.08	0 mm	Titanium	Sport	J6XC6R75LX	1:1	back	0.047	1.222	0.057	
1732.40	1412	UMTS 1750	RMC	24.00	23.13	0.07	0 mm	Titanium	Fabric	J6XC6R75LX	1:1	back	0.047	1.222	0.057	A17
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Extremity** **4.0 W/kg (mW/g)** averaged over 10 grams									

Table 10-18
UMTS 1900 MHz Extremity SAR

MEASUREMENT RESULTS																
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Housing Type	Wristband Type	Device Serial Number	Duty Cycle	Side	SAR (10g)	Scaling Factor	Reported SAR (10g)	Plot #
MHz	Ch.												(W/kg)		(W/kg)	
1880.00	9400	UMTS 1900	RMC	24.00	23.25	-0.14	0 mm	Titanium	Sport	Y1X21JXGQ4	1:1	back	0.068	1.189	0.081	
1880.00	9400	UMTS 1900	RMC	24.00	23.25	-0.01	0 mm	Titanium	Fabric	Y1X21JXGQ4	1:1	back	0.078	1.189	0.093	A18
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Extremity** **4.0 W/kg (mW/g)** averaged over 10 grams									

Table 10-19
LTE Band 12 Extremity Body SAR

MEASUREMENT RESULTS																							
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Housing Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																				
707.50	23095	Mid	LTE Band 12	10	Sport	25.50	24.67	-0.11	0	Titanium	JRK2PXM0VG	QPSK	1	0	0 mm	back	1:1	0.123	1.211	0.149	
707.50	23095	Mid	LTE Band 12	10	Sport	24.50	23.55	0.12	1	Titanium	JRK2PXM0VG	QPSK	25	0	0 mm	back	1:1	0.100	1.245	0.125	
707.50	23095	Mid	LTE Band 12	10	Fabric	25.50	24.67	0.03	0	Titanium	JRK2PXM0VG	QPSK	1	0	0 mm	back	1:1	0.151	1.211	0.183	A19
707.50	23095	Mid	LTE Band 12	10	Fabric	24.50	23.55	0.05	1	Titanium	JRK2PXM0VG	QPSK	25	0	0 mm	back	1:1	0.117	1.245	0.146	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Extremity 4.0 W/kg (mW/g) averaged over 10 grams						

Table 10-20
LTE Band 13 Extremity Body SAR

MEASUREMENT RESULTS																							
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Housing Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																				
782.00	23230	Mid	LTE Band 13	10	Sport	25.50	24.57	0.00	0	Titanium	HN4RCQVVVY	QPSK	1	0	0 mm	back	1:1	0.142	1.239	0.176	
782.00	23230	Mid	LTE Band 13	10	Sport	24.50	23.56	0.02	1	Titanium	HN4RCQVVVY	QPSK	25	25	0 mm	back	1:1	0.116	1.242	0.144	
782.00	23230	Mid	LTE Band 13	10	Fabric	25.50	24.57	0.08	0	Titanium	HN4RCQVVVY	QPSK	1	0	0 mm	back	1:1	0.174	1.239	0.216	A20
782.00	23230	Mid	LTE Band 13	10	Fabric	24.50	23.56	0.10	1	Titanium	HN4RCQVVVY	QPSK	25	25	0 mm	back	1:1	0.127	1.242	0.158	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Extremity 4.0 W/kg (mW/g) averaged over 10 grams						

Table 10-21
LTE Band 14 Extremity Body SAR

MEASUREMENT RESULTS																							
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Housing Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																				
793.00	23330	Mid	LTE Band 14	10	Sport	25.50	25.08	0.01	0	Titanium	J6XC6R75LX	QPSK	1	25	0 mm	back	1:1	0.394	1.102	**0.434**	A21
793.00	23330	Mid	LTE Band 14	10	Sport	24.50	24.13	-0.13	1	Titanium	J6XC6R75LX	QPSK	25	0	0 mm	back	1:1	0.303	1.089	0.330	
793.00	23330	Mid	LTE Band 14	10	Fabric	25.50	25.08	0.00	0	Titanium	J6XC6R75LX	QPSK	1	25	0 mm	back	1:1	0.370	1.102	0.408	
793.00	23330	Mid	LTE Band 14	10	Fabric	24.50	24.13	0.03	1	Titanium	J6XC6R75LX	QPSK	25	0	0 mm	back	1:1	0.279	1.089	0.304	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Extremity 4.0 W/kg (mW/g) averaged over 10 grams						

Table 10-22
LTE Band 26 (Cell) Extremity Body SAR

MEASUREMENT RESULTS																							
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Housing Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																				
819.00	26740	Low	LTE Band 26 (Cell)	10	Sport	25.50	24.72	0.02	0	Titanium	TNJX5VKX6Q	QPSK	1	25	0 mm	back	1:1	0.319	1.197	0.382	A22
819.00	26740	Low	LTE Band 26 (Cell)	10	Sport	24.50	23.77	-0.12	1	Titanium	TNJX5VKX6Q	QPSK	25	0	0 mm	back	1:1	0.223	1.183	0.264	
819.00	26740	Low	LTE Band 26 (Cell)	10	Fabric	25.50	24.72	-0.05	0	Titanium	TNJX5VKX6Q	QPSK	1	25	0 mm	back	1:1	0.224	1.197	0.268	
819.00	26740	Low	LTE Band 26 (Cell)	10	Fabric	24.50	23.77	-0.03	1	Titanium	TNJX5VKX6Q	QPSK	25	0	0 mm	back	1:1	0.185	1.183	0.219	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Extremity 4.0 W/kg (mW/g) averaged over 10 grams						

Table 10-23
LTE Band 5 (Cell) Extremity Body SAR

MEASUREMENT RESULTS																							
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Housing Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																				
836.50	20525	Mid	LTE Band 5 (Cell)	10	Sport	25.50	24.47	0.04	0	Titanium	W56W41636N	QPSK	1	25	0 mm	back	1:1	0.239	1.268	0.303	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Sport	24.50	23.57	0.03	1	Titanium	W56W41636N	QPSK	25	25	0 mm	back	1:1	0.203	1.239	0.252	
836.50	20525	Mid	LTE Band 5 (Cell)	10	Fabric	25.50	24.47	0.04	0	Titanium	W56W41636N	QPSK	1	25	0 mm	back	1:1	0.265	1.268	0.336	A23
836.50	20525	Mid	LTE Band 5 (Cell)	10	Fabric	24.50	23.57	0.06	1	Titanium	W56W41636N	QPSK	25	25	0 mm	back	1:1	0.214	1.239	0.265	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population															Extremity 4.0 W/kg (mW/g) averaged over 10 grams						

Table 10-24
LTE Band 66 (AWS) Extremity Body SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Housing Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																				
1720.00	132072	Low	LTE Band 66 (AWS)	20	Sport	24.50	23.66	0.03	0	Titanium	T09KG7NVGC	QPSK	1	99	0 mm	back	1:1	0.052	1.213	0.063	A24
1720.00	132072	Low	LTE Band 66 (AWS)	20	Sport	23.50	22.88	0.07	1	Titanium	T09KG7NVGC	QPSK	50	25	0 mm	back	1:1	0.046	1.153	0.053	
1720.00	132072	Low	LTE Band 66 (AWS)	20	Fabric	24.50	23.66	-0.11	0	Titanium	T09KG7NVGC	QPSK	1	99	0 mm	back	1:1	0.043	1.213	0.052	
1720.00	132072	Low	LTE Band 66 (AWS)	20	Fabric	23.50	22.88	-0.11	1	Titanium	T09KG7NVGC	QPSK	50	25	0 mm	back	1:1	0.038	1.153	0.044	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																	Extremity 4.0 W/kg (mW/g) averaged over 10 grams				

Table 10-25
LTE Band 25 (PCS) Extremity Body SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Housing Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																				
1882.50	26365	Mid	LTE Band 25 (PCS)	20	Sport	24.50	23.33	-0.16	0	Titanium	VC46WM4X3G	QPSK	1	0	0 mm	back	1:1	0.053	1.309	0.069	A25
1882.50	26365	Mid	LTE Band 25 (PCS)	20	Sport	23.50	22.28	-0.05	1	Titanium	VC46WM4X3G	QPSK	50	25	0 mm	back	1:1	0.047	1.324	0.062	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	Fabric	24.50	23.33	-0.19	0	Titanium	VC46WM4X3G	QPSK	1	0	0 mm	back	1:1	0.043	1.309	0.056	
1882.50	26365	Mid	LTE Band 25 (PCS)	20	Fabric	23.50	22.28	-0.10	1	Titanium	VC46WM4X3G	QPSK	50	25	0 mm	back	1:1	0.038	1.324	0.050	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																	Extremity 4.0 W/kg (mW/g) averaged over 10 grams				

Table 10-26
LTE Band 7 Extremity Body SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Housing Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																				
2535.00	21100	Mid	LTE Band 7	20	Sport	23.50	22.56	0.06	0	Titanium	W56W41636N	QPSK	1	99	0 mm	back	1:1	0.147	1.242	0.183	
2510.00	20850	Low	LTE Band 7	20	Sport	22.50	21.57	0.00	1	Titanium	W56W41636N	QPSK	50	50	0 mm	back	1:1	0.136	1.239	0.169	
2535.00	21100	Mid	LTE Band 7	20	Fabric	23.50	22.56	-0.03	0	Titanium	W56W41636N	QPSK	1	99	0 mm	back	1:1	0.148	1.242	0.184	A26
2510.00	20850	Low	LTE Band 7	20	Fabric	22.50	21.57	-0.10	1	Titanium	W56W41636N	QPSK	50	50	0 mm	back	1:1	0.096	1.239	0.119	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																	Extremity 4.0 W/kg (mW/g) averaged over 10 grams				

Table 10-27
LTE Band 41 Extremity Body SAR

MEASUREMENT RESULTS																						
FREQUENCY			Mode	Bandwidth [MHz]	Wristband Type	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Housing Type	Device Serial Number	Modulation	RB Size	RB Offset	Spacing	Side	Duty Cycle	SAR (10g) (W/kg)	Scaling Factor	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																				
2549.50	40185	Low-Mid	LTE Band 41	20	Sport	23.50	22.67	0.04	0	Titanium	Y1X21JXGQ4	QPSK	1	99	0 mm	back	1:1.58	0.140	1.211	0.170	
2549.50	40185	Low-Mid	LTE Band 41	20	Sport	22.50	21.64	0.03	1	Titanium	Y1X21JXGQ4	QPSK	50	50	0 mm	back	1:1.58	0.083	1.219	0.101	
2549.50	40185	Low-Mid	LTE Band 41	20	Fabric	23.50	22.67	-0.02	0	Titanium	Y1X21JXGQ4	QPSK	1	99	0 mm	back	1:1.58	0.140	1.211	0.170	A27
2549.50	40185	Low-Mid	LTE Band 41	20	Fabric	22.50	21.64	0.03	1	Titanium	Y1X21JXGQ4	QPSK	50	50	0 mm	back	1:1.58	0.107	1.219	0.130	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																	Extremity 4.0 W/kg (mW/g) averaged over 10 grams				

Table 10-28
2.4 GHz WLAN Extremity SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Housing Type	Wristband Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (10g) (W/kg)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (10g) (W/kg)	Plot #
MHz	Ch.																		
2437	6	802.11b	DSSS	22	19.00	18.79	0.03	0 mm	Titanium	Sport	Y1X21JXGQ4	1	back	99.7	0.112	1.050	1.003	**0.118**	A28
2437	6	802.11b	DSSS	22	19.00	18.79	0.01	0 mm	Titanium	Fabric	Y1X21JXGQ4	1	back	99.7	0.095	1.050	1.003	0.100	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population																Extremity 4.0 W/kg (mW/g) averaged over 10 grams			

Table 10-29
5 GHz WLAN Extremity SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Bandwidth [MHz]	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Housing Type	Wristband Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (10g)	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Reported SAR (10g)	Plot #
MHz	Ch.														(W/kg)			(W/kg)	
5260	52	802.11a	OFDM	20	17.00	16.10	-0.04	0 mm	Titanium	Sport	VC46WM4X3G	6	back	97.6	0.003	1.230	1.025	0.004	
5260	52	802.11a	OFDM	20	17.00	16.10	-0.08	0 mm	Titanium	Fabric	VC46WM4X3G	6	back	97.6	0.006	1.230	1.025	0.008	A29
5600	120	802.11a	OFDM	20	17.00	16.07	0.08	0 mm	Titanium	Sport	VC46WM4X3G	6	back	97.6	0.000	1.239	1.025	0.000	
5600	120	802.11a	OFDM	20	17.00	16.07	0.08	0 mm	Titanium	Fabric	VC46WM4X3G	6	back	97.6	0.000	1.239	1.025	0.000	
5745	149	802.11a	OFDM	20	17.00	16.02	0.00	0 mm	Titanium	Sport	J6XC6R75LX	6	back	97.6	0.000	1.253	1.025	0.000	
5745	149	802.11a	OFDM	20	17.00	16.02	-0.13	0 mm	Titanium	Fabric	J6XC6R75LX	6	back	97.6	0.000	1.253	1.025	0.000	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Extremity 4.0 W/kg (mW/g) averaged over 10 grams												

Table 10-30
Bluetooth Extremity SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Housing Type	Wristband Type	Device Serial Number	Data Rate (Mbps)	Side	Duty Cycle (%)	SAR (10g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (10g)	Plot #
MHz	Ch.													(W/kg)			(W/kg)	
2480	78	Bluetooth	FHSS	13.00	12.27	-0.14	0 mm	Titanium	Sport	TNJX5VKX6Q	1	back	100	0.011	1.183	1.000	0.013	
2480	78	Bluetooth	FHSS	13.00	12.27	0.03	0 mm	Titanium	Fabric	TNJX5VKX6Q	1	back	100	0.011	1.183	1.000	0.013	A30
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Extremity 4.0 W/kg (mW/g) averaged over 10 grams											

10.3 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Per FCC KDB Publication 865664 D01v01r04, variability SAR tests were not required since measured SAR results for all frequency bands were less than 0.8 W/kg and 2.0 W/kg for 10g SAR.
7. This device has one housing type: Titanium. The non-metallic wrist accessories, sport and fabric, were evaluated for all exposure conditions.
8. This device is a portable wrist-worn device and does not support any other use conditions. Therefore, the procedures in FCC KDB Publication 447498 D01v06 Section 6.2 have been applied for extremity and next to mouth (head) conditions.
9. Unless otherwise noted, when 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds below.

UMTS Notes:

1. UMTS mode was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01v03r01. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03r01.
2. Per FCC KDB Publication 447498 D01v06, if the reported (scaled) SAR measured at the highest output power channel for each test configuration is ≤ 0.8 W/kg for 1g evaluations and ≤ 2.0 W/kg for 10g SAR then testing at the other channels is not required for such test configuration(s).

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r04. The general test procedures used for testing can be found in Section 7.5.4.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 and MCC=001 on the base station simulator. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).
4. Per FCC KDB Publication 447498 D01v06, when the reported LTE Band 41 SAR measured at the highest output power channel in a given a test configuration was > 0.6 W/kg for 1g evaluations and > 1.5 W/kg for 10g SAR, testing at the other channels was required for such test configurations.
5. TDD LTE was tested per the guidance provided in FCC KDB Publication 941225 D05v02r04. Testing was performed using UL-DL configuration 0 with 6 UL subframes and 2 S subframes using extended cyclic prefix only and special subframe configuration 6. SAR tests were performed at maximum output power and worst-case transmission duty factor in extended cyclic prefix. Per 3GPP 36.211 Section 4, the duty factor for special subframe configuration 6 using extended cyclic prefix is 0.633.
6. This device can only operate with 16 QAM on the uplink with less than or equal to 27 RB. QPSK and 16QAM LTE powers for RB size of 15 (“50% RB”) and 27 (“100% RB”) were additionally measured to support comparison and SAR test exclusion per KDB 941225 D05v02r04 Section 5.2.4 and 5.3.

WLAN Notes:

1. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section 7.6.4 for more information.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg for 1g evaluations. See Section 7.6.5 for more information.
3. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg for 1g evaluations or all test channels were measured. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.
4. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance.

Bluetooth Notes

1. To determine compliance, Bluetooth SAR was measured with the maximum power condition. Bluetooth was evaluated with a test mode with 100% transmission duty factor.

11 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

11.1 Introduction

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

11.2 Simultaneous Transmission Procedures

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

11.3 Head SAR Simultaneous Transmission Analysis

For SAR summation, the highest reported SAR across all housing and wristband types was used as a conservative evaluation for the simultaneous transmission analysis.

Table 11-1
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Head at 1.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Head SAR	UMTS 850	0.001	0.334	0.335
	UMTS 1750	0.167	0.334	0.501
	UMTS 1900	0.738	0.334	1.072
	LTE Band 12	0.001	0.334	0.335
	LTE Band 13	0.002	0.334	0.336
	LTE Band 14	0.002	0.334	0.336
	LTE Band 26 (Cell)	0.001	0.334	0.335
	LTE Band 5 (Cell)	0.003	0.334	0.337
	LTE Band 66 (AWS)	0.129	0.334	0.463
	LTE Band 25 (PCS)	0.926	0.334	**1.260**
	LTE Band 7	0.650	0.334	0.984
	LTE Band 41	0.478	0.334	0.812

Table 11-2
Simultaneous Transmission Scenario with Bluetooth, and 5 GHz WLAN (Head at 1.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Head SAR	UMTS 850	0.001	0.076	0.083	0.077	0.084	0.160
	UMTS 1750	0.167	0.076	0.083	0.243	0.250	0.326
	UMTS 1900	0.738	0.076	0.083	0.814	0.821	0.897
	LTE Band 12	0.001	0.076	0.083	0.077	0.084	0.160
	LTE Band 13	0.002	0.076	0.083	0.078	0.085	0.161
	LTE Band 14	0.002	0.076	0.083	0.078	0.085	0.161
	LTE Band 26 (Cell)	0.001	0.076	0.083	0.077	0.084	0.160
	LTE Band 5 (Cell)	0.003	0.076	0.083	0.079	0.086	0.162
	LTE Band 66 (AWS)	0.129	0.076	0.083	0.205	0.212	0.288
	LTE Band 25 (PCS)	0.926	0.076	0.083	1.002	1.009	**1.085**
	LTE Band 7	0.650	0.076	0.083	0.726	0.733	0.809
	LTE Band 41	0.478	0.076	0.083	0.554	0.561	0.637

Table 11-3
Simultaneous Transmission Scenario with Bluetooth and WLAN (Head at 1.0 cm)

Exposure Condition	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
	1	2	1+2
Head SAR	0.076	0.083	**0.159**

11.4 Extremity SAR Simultaneous Transission Analysis

For SAR summation, the highest reported SAR across all housing and wristband types was used as a conservative evaluation for the simultaneous transmission analysis.

Table 11-4
Simultaneous Transmission Scenario with 2.4 GHz WLAN (Extremity at 0.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		1	2	1+2
Extremity SAR	UMTS 850	0.311	0.118	0.429
	UMTS 1750	0.057	0.118	0.175
	UMTS 1900	0.093	0.118	0.211
	LTE Band 12	0.183	0.118	0.301
	LTE Band 13	0.216	0.118	0.334
	LTE Band 14	0.434	0.118	**0.552**
	LTE Band 26 (Cell)	0.382	0.118	0.500
	LTE Band 5 (Cell)	0.336	0.118	0.454
	LTE Band 66 (AWS)	0.063	0.118	0.181
	LTE Band 25 (PCS)	0.069	0.118	0.187
	LTE Band 7	0.184	0.118	0.302
	LTE Band 41	0.170	0.118	0.288

Table 11-5
Simultaneous Transmission Scenario with Bluetooth, and 5 GHz WLAN (Extremity at 0.0 cm)

Exposure Condition	Mode	3G/4G SAR (W/kg)	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)		
		1	2	3	1+2	1+3	1+2+3
Extremity SAR	UMTS 850	0.311	0.013	0.008	0.324	0.319	0.332
	UMTS 1750	0.057	0.013	0.008	0.070	0.065	0.078
	UMTS 1900	0.093	0.013	0.008	0.106	0.101	0.114
	LTE Band 12	0.183	0.013	0.008	0.196	0.191	0.204
	LTE Band 13	0.216	0.013	0.008	0.229	0.224	0.237
	LTE Band 14	0.434	0.013	0.008	0.447	0.442	**0.455**
	LTE Band 26 (Cell)	0.382	0.013	0.008	0.395	0.390	0.403
	LTE Band 5 (Cell)	0.336	0.013	0.008	0.349	0.344	0.357
	LTE Band 66 (AWS)	0.063	0.013	0.008	0.076	0.071	0.084
	LTE Band 25 (PCS)	0.069	0.013	0.008	0.082	0.077	0.090
	LTE Band 7	0.184	0.013	0.008	0.197	0.192	0.205
	LTE Band 41	0.170	0.013	0.008	0.183	0.178	0.191

Table 11-6
Simultaneous Transmission Scenario with Bluetooth and WLAN (Extremity at 0.0 cm)

Exposure Condition	Bluetooth SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
	1	2	1+2
Extremity SAR	0.013	0.008	**0.021**

11.5 Simultaneous Transmission Conclusion

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

12 SAR MEASUREMENT VARIABILITY

12.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was not assessed for each frequency band since all measured SAR values are < 0.8 W/kg for 1g SAR and < 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 was not required.

13 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E4438C	ESG Vector Signal Generator	12/14/2020	Biennial	12/14/2022	MY42082385
Agilent	E4438C	ESG Vector Signal Generator	5/10/2022	Annual	5/10/2023	MY42082659
Agilent	N5182A	MXG Vector Signal Generator	11/17/2021	Annual	11/17/2022	US46240505
Agilent	N5182A	MXG Vector Signal Generator	7/20/2022	Annual	7/20/2023	MY47420800
Agilent	8753ES	S-Parameter Vector Network Analyzer	2/11/2022	Annual	2/11/2023	MY40003841
Agilent	8753ES	S-Parameter Vector Network Analyzer	6/14/2022	Annual	6/14/2023	US39170118
Agilent	N4010A	Wireless Connectivity Test Set	2/4/2022	Annual	2/4/2023	GB43193563
Agilent	E5515C	Wireless Connectivity Test Set	5/12/2022	Annual	5/12/2023	GB43304278
Agilent	N9020A	MXA Signal Analyzer	5/6/2022	Annual	5/6/2023	MY51240479
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	353317
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	353468
Anritsu	ML2495A	Power Meter	3/29/2022	Annual	3/29/2023	1306009
Anritsu	ML2496A	Power Meter	12/6/2021	Annual	12/6/2022	1351001
Anritsu	MA2411B	Pulse Power Sensor	3/2/2022	Annual	3/2/2023	1126066
Anritsu	MA2411B	Pulse Power Sensor	4/29/2022	Annual	4/29/2023	1207470
Anritsu	MT8821C	Radio Communication Analyzer	5/2/2022	Annual	5/2/2023	6200901190
Anritsu	MT8821C	Radio Communication Analyzer	5/24/2022	Annual	5/24/2023	6201144418
Anritsu	MT8821C	Radio Communication Analyzer	3/31/2022	Annual	3/31/2023	6201664756
Anritsu	MT8821C	Radio Communication Analyzer	6/27/2022	Annual	6/27/2023	6261895213
Anritsu	MA24106A	USB Power Sensor	4/12/2022	Annual	4/12/2023	1244524
Anritsu	MA24106A	USB Power Sensor	10/20/2021	Annual	10/20/2022	1344545
Control Company	4353	Long Stem Thermometer	1/24/2022	Biennial	1/24/2024	200043588
Control Company	4353	Long Stem Thermometer	1/24/2022	Biennial	1/24/2024	200043634
Control Company	4352	Long Stem Thermometer	1/24/2022	Biennial	1/24/2024	200043644
Control Company	4352	Long Stem Thermometer	1/24/2022	Biennial	1/24/2024	200043647
Control Company	4040	Therm./ Clock/ Humidity Monitor	2/17/2022	Biennial	2/17/2024	200113269
Control Company	4040	Therm./ Clock/ Humidity Monitor	2/17/2022	Biennial	2/17/2024	200113274
Control Company	4040	Therm./ Clock/ Humidity Monitor	3/6/2022	Biennial	3/6/2024	200170289
Control Company	4040	Therm./ Clock/ Humidity Monitor	3/6/2022	Biennial	3/6/2024	200170296
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	ZHDC-16-63-S+	50-6000MHz Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE5011-1	Torque Wrench	12/21/2021	Biennial	12/21/2023	82475
Insize	1108-150	Digital Caliper	4/5/2022	Biennial	4/5/2024	409193536
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1324
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1260
SPEAG	DAKS-3.5	Portable DAK	10/7/2021	Anunual	10/7/2022	1045
SPEAG	D750V3	750 MHz SAR Dipole	9/8/2021	Annual	9/8/2022	1097
SPEAG	D750V3	750 MHz SAR Dipole	11/11/2021	Annual	11/11/2022	1094
SPEAG	D835V2	835 MHz SAR Dipole	11/1/2019	Triennial	11/11/2022	4d108
SPEAG	D1750V2	1750 MHz SAR Dipole	9/9/2022	Biennial	9/9/2022	1104
SPEAG	D1900V2	1900 MHz SAR Dipole	9/10/2022	Biennial	9/10/2022	5d181
SPEAG	D2450V2	2450 MHz SAR Dipole	11/12/2019	Trennial	11/12/2022	855
SPEAG	D2450V2	2450 MHz SAR Dipole	11/9/2021	Annual	11/9/2022	921
SPEAG	D2600V2	2600 MHz SAR Dipole	5/11/2022	Annual	5/11/2023	1042
SPEAG	D5250V2	5 GHz SAR Dipole	3/22/2022	Annual	3/22/2023	1123
SPEAG	EX3DV4	SAR Probe	4/19/2023	Annual	4/19/2023	7499
SPEAG	EX3DV4	SAR Probe	4/21/2022	Annual	4/21/2023	7357
SPEAG	EX3DV4	SAR Probe	4/22/2022	Annual	4/22/2023	7532
SPEAG	EX3DV4	SAR Probe	3/21/2022	Annual	3/21/2023	7360
SPEAG	EX3DV4	SAR Probe	2/21/2022	Annual	2/21/2023	7308
SPEAG	EX3DV4	SAR Probe	10/27/2021	Annual	10/27/2022	7420
SPEAG	EX3DV4	SAR Probe	1/19/2022	Annual	1/19/2023	3837
SPEAG	EX3DV4	SAR Probe	3/22/2022	Annual	3/22/2023	7638
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/13/2022	Annual	4/13/2023	1465
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/13/2022	Annual	4/13/2023	1582
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/13/2022	Annual	4/13/2023	501
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/21/2022	Annual	3/21/2023	534
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/24/2022	Annual	2/24/2023	467
SPEAG	DAE4	Dasy Data Acquisition Electronics	11/18/2021	Annual	11/18/2022	1237
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/13/2022	Annual	1/13/2023	793
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/21/2022	Annual	3/21/2023	1408

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

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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