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SAR EVALUATION REPORT

Applicant Name:
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Date of Testing:
06/23/21
Test Site/Location:
PCTEST, Columbia, MD, USA
Document Serial No.:
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FCC ID:	**A3LSMF707U**
APPLICANT:	**SAMSUNG ELECTRONICS CO., LTD.**

DUT Type:	Portable Handset
Application Type:	Class II Permissive Change
FCC Rule Part(s):	CFR §2.1093
Model:	SM-F707U
Additional Models:	SM-F707U1
Permissive Change(s):	See FCC Change Document
Date of Original Certification:	07/20/2020

	SAR			
	1g Head (W/kg)	1g Body-Worn (W/kg)	1g Hotspot (W/kg)	10g Phablet (W/kg)
Simultaneous SAR per KDB 690783 D01v01r03:	1.35	1.42	1.48	N/A

Note: Please refer to RF Exposure Technical Report S/N: 1M2005040080-01-R1.A3L for original compliance evaluation.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.7 of this report; for North American frequency bands only.

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

Randy Ortanez
President

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

REV 21.4 M
09/11/2019

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
UMTS 1750	Voice/Data	1712.4 - 1752.6 MHz
UMTS 1900	Voice/Data	1852.4 - 1907.6 MHz
CDMA/EVDO BC10 (§90S)	Voice/Data	817.90 - 823.10 MHz
CDMA/EVDO BC0 (§22H)	Voice/Data	824.70 - 848.31 MHz
PCS CDMA/EVDO	Voice/Data	1851.25 - 1908.75 MHz
LTE Band 71	Voice/Data	665.5 - 695.5 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 14	Voice/Data	790.5 - 795.5 MHz
LTE Band 5 (Cell)	Voice/Data	824.7 - 848.3 MHz
LTE Band 26 (Cell)	Voice/Data	814.7 - 848.3 MHz
LTE Band 66 (AWS)	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4 (AWS)	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 25 (PCS)	Voice/Data	1850.7 - 1914.3 MHz
LTE Band 2 (PCS)	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 30	Voice/Data	2307.5 - 2312.5 MHz
LTE Band 7	Voice/Data	2502.5 - 2567.5 MHz
LTE Band 48	Voice/Data	3552.5 - 3697.5 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
LTE Band 38	Voice/Data	2572.5 - 2617.5 MHz
NR Band n71	Data	665.5 - 695.5 MHz
NR Band n5 (Cell)	Data	826.5 - 846.5 MHz
NR Band n66 (AWS)	Data	1712.5 - 1777.5 MHz
NR Band n25 (PCS)	Data	1852.5 - 1912.5 MHz
NR Band n2 (PCS)	Data	1852.5 - 1907.5 MHz
NR Band n41	Data	2506.02 - 2679.99 MHz
2.4 GHz WLAN	Voice/Data	2412 - 2462 MHz
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
MST	Data	555 Hz - 8.33 kHz

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1.2 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	Body-Worn Accessory	Wireless Router	Phablet	Notes
1	1x CDMA voice + 5 GHz WI-FI Ant 1	Yes	Yes	N/A	Yes	
2	1x CDMA voice + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI Ant 1	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
3	1x CDMA voice + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI Ant 1	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
4	1x CDMA voice + 2.4 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
5	1x CDMA voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
6	1x CDMA voice + 2.4 GHz Bluetooth Ant 1	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
7	1x CDMA voice + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
8	1x CDMA voice + 5 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
9	1x CDMA voice + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI MIMO	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
10	1x CDMA voice + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI MIMO	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
11	1x CDMA voice + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
12	1x CDMA voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2+ 5 GHz WI-FI MIMO	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
13	GSM voice + 5 GHz WI-FI Ant 1	Yes	Yes	N/A	Yes	
14	GSM voice + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI Ant 1	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
15	GSM voice + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI Ant 1	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
16	GSM voice + 2.4 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
17	GSM voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
18	GSM voice + 2.4 GHz Bluetooth Ant 1	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
19	GSM voice + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
20	GSM voice + 5 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
21	GSM voice + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI MIMO	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
22	GSM voice + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI MIMO	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
23	GSM voice + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	N/A	Yes	
24	GSM voice + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2 + 5 GHz WI-FI MIMO	Yes^	Yes	N/A	Yes	^Bluetooth Tethering is considered
25	UMTS + 5 GHz WI-FI Ant 1	Yes	Yes	Yes	Yes	
26	UMTS + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI Ant 1	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
27	UMTS + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI Ant 1	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
28	UMTS + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
29	UMTS + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
30	UMTS + 2.4 GHz Bluetooth Ant 1	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
31	UMTS + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
32	UMTS + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
33	UMTS + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
34	UMTS + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
35	UMTS + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
36	UMTS + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2 + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
37	LTE + 5G NR	Yes	Yes	N/A	Yes	
38	LTE + 5 GHz WI-FI Ant 1	Yes	Yes	Yes	Yes	
39	LTE + 5 GHz WI-FI Ant 1 + 5G NR	Yes	Yes	Yes	Yes	
40	LTE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI Ant 1	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
41	LTE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI Ant 1 + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
42	LTE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI Ant 1	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
43	LTE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI Ant 1 + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
44	LTE + 2.4 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
45	LTE + 2.4 GHz WI-FI MIMO + 5G NR	Yes	Yes	Yes	Yes	
46	LTE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
47	LTE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2 + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
48	LTE + 2.4 GHz Bluetooth Ant 1	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
49	LTE + 2.4 GHz Bluetooth Ant 1 + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
50	LTE + 2.4 GHz Bluetooth Ant 2	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
51	LTE + 2.4 GHz Bluetooth Ant 2 + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
52	LTE + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
53	LTE + 5 GHz WI-FI MIMO + 5G NR	Yes	Yes	Yes	Yes	
54	LTE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
55	LTE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI MIMO + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
56	LTE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
57	LTE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI MIMO + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
58	LTE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes	Yes	Yes	Yes	
59	LTE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO + 5G NR	Yes	Yes	Yes	Yes	
60	LTE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2 + 5 GHz WI-FI MIMO	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
61	LTE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2 + 5 GHz WI-FI MIMO + 5G NR	Yes^	Yes	Yes^	Yes	^Bluetooth Tethering is considered
62	CDMA/EVDO data + 5 GHz WI-FI Ant 1	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
63	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI Ant 1	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
64	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI Ant 1	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
65	CDMA/EVDO data + 2.4 GHz WI-FI MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
66	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
67	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
68	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 2	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
69	CDMA/EVDO data + 5 GHz WI-FI MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
70	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI MIMO	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
71	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI MIMO	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
72	CDMA/EVDO data + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	Yes*	Yes*	Yes	Yes	* Pre-installed VOIP applications are considered
73	CDMA/EVDO data + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2 + 5 GHz WI-FI MIMO	Yes*^	Yes*	Yes^	Yes	* Pre-installed VOIP applications are considered ^Bluetooth Tethering is considered
74	GPRS/EDGE + 5 GHz WI-FI Ant 1	N/A	N/A	Yes	Yes	
75	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI Ant 1	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered
76	GPRS/EDGE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI Ant 1	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered
77	GPRS/EDGE + 2.4 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
78	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered
79	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered
80	GPRS/EDGE + 2.4 GHz Bluetooth Ant 2	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered
81	GPRS/EDGE + 5 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
82	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 5 GHz WI-FI MIMO	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered
83	GPRS/EDGE + 2.4 GHz Bluetooth Ant 2 + 5 GHz WI-FI MIMO	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered
84	GPRS/EDGE + 2.4 GHz WI-FI MIMO + 5 GHz WI-FI MIMO	N/A	N/A	Yes	Yes	
85	GPRS/EDGE + 2.4 GHz Bluetooth Ant 1 + 2.4 GHz WI-FI Ant 2 + 5 GHz WI-FI MIMO	N/A	N/A	Yes^	Yes	^Bluetooth Tethering is considered

1. 2.4 GHz WLAN Antenna 1 and 2.4 GHz Bluetooth Antenna 2 cannot transmit simultaneously.
2. 2.4 GHz Bluetooth Antenna 1 and 2.4 GHz Bluetooth Antenna 2 cannot transmit simultaneously.
3. All licensed modes share the same antenna path and 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 Hotspot scenario.

5. Per the manufacturer, WIFI Direct is not expected to be used in conjunction with a held-to-ear or body-worn accessory voice call. Therefore, there are no simultaneous transmission scenarios involving WIFI direct beyond that listed in the above table.
6. 5 GHz Wireless Router is only supported for the U-NII-3 by S/W, therefore U-NII-1, U-NII-2A, and U-NII-2C were not evaluated for wireless router conditions.
7. This device supports VOLTE.
8. This device supports VOWIFI.
9. This device supports Bluetooth Tethering.
10. LTE + 5G NR Scenarios are limited to EN-DC combinations with anchor bands shown in the NR FR1 checklist.
11. This device supports 2x2 MIMO Tx for WLAN 802.11a/g/n/ac/ax. 802.11a/g/n/ac/ax supports CDD and STBC and 802.11n/ac/ax additionally supports SDM. Each WLAN antenna can transmit independently or together when operating with MIMO.

1.3 Miscellaneous SAR Test Considerations

(A) WIFI/BT

There were no changes made to the WIFI and BT operations within this device. Please see original compliance evaluation in RF Exposure Technical Report S/N 1M2005040080-01-R1.A3L for complete evaluation of these operating modes.

(B) Licensed Transmitter(s)

Only operations relevant to this permissive change were evaluated for compliance. Please see original compliance evaluation in RF Exposure Technical Report S/N 1M2005040080-01-R1.A3L for complete evaluation of all other operating modes. The operational description includes a description of all changed items.

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg. Additional SAR tests for phablet SAR were evaluated per KDB 616217 Section 6 (See Section 6.9 for more information).

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.

NR implementation of n71, n5, n66, n2, n25, and n41 is limited to EN-DC operations only. In EN-DC mode, NR operates with the LTE Bands shown in the NR FR1 checklist acting as anchor bands. Per FCC guidance, SAR tests for NR Bands and LTE Anchors Bands were performed separately due to limitations in SAR probe calibration factors.

1.4 Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 941225 D01v03r01, D05v02r04, D05Av01r02, D06v02r01 (2G/3G/4G and Hotspot)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D01v06 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 648474 D04v01r03 (Phablet Procedures)

2 LTE AND NR INFORMATION

LTE Information					
Form Factor	Portable Handset				
Frequency Range of each LTE transmission band	LTE Band 71 (665.5 - 695.5 MHz)				
	LTE Band 12 (699.7 - 715.3 MHz)				
	LTE Band 13 (779.5 - 784.5 MHz)				
	LTE Band 14 (790.5 - 795.5 MHz)				
	LTE Band 5 (Cell) (824.7 - 848.3 MHz)				
	LTE Band 26 (Cell) (814.7 - 848.3 MHz)				
	LTE Band 66 (AWS) (1710.7 - 1779.3 MHz)				
	LTE Band 4 (AWS) (1710.7 - 1754.3 MHz)				
	LTE Band 25 (PCS) (1850.7 - 1914.3 MHz)				
	LTE Band 2 (PCS) (1850.7 - 1909.3 MHz)				
	LTE Band 30 (2307.5 - 2312.5 MHz)				
	LTE Band 7 (2502.5 - 2567.5 MHz)				
	LTE Band 48 (3552.5 - 3697.5 MHz)				
	LTE Band 41 (2498.5 - 2687.5 MHz)				
	LTE Band 38 (2572.5 - 2617.5 MHz)				
Channel Bandwidths	LTE Band 71: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 12: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 13: 5 MHz, 10 MHz				
	LTE Band 14: 5 MHz, 10 MHz				
	LTE Band 5 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
	LTE Band 26 (Cell): 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 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 30: 5 MHz, 10 MHz				
	LTE Band 7: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 48: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	LTE Band 38: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
LTE Band 71: 5 MHz	665.5 (133147)		680.5 (133297)	695.5 (133447)	
LTE Band 71: 10 MHz	668 (133172)		680.5 (133297)	693 (133422)	
LTE Band 71: 15 MHz	670.5 (133197)		680.5 (133297)	690.5 (133397)	
LTE Band 71: 20 MHz	673 (133222)		680.5 (133297)	688 (133372)	
LTE Band 12: 1.4 MHz	699.7 (23017)		707.5 (23095)	715.3 (23173)	
LTE Band 12: 3 MHz	700.5 (23025)		707.5 (23095)	714.5 (23165)	
LTE Band 12: 5 MHz	701.5 (23035)		707.5 (23095)	713.5 (23155)	
LTE Band 12: 10 MHz	704 (23060)		707.5 (23095)	711 (23130)	
LTE Band 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 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 26 (Cell): 1.4 MHz	814.7 (26697)		831.5 (26865)	848.3 (27033)	
LTE Band 26 (Cell): 3 MHz	815.5 (26705)		831.5 (26865)	847.5 (27025)	
LTE Band 26 (Cell): 5 MHz	816.5 (26715)		831.5 (26865)	846.5 (27015)	
LTE Band 26 (Cell): 10 MHz	819 (26740)		831.5 (26865)	844 (26990)	
LTE Band 26 (Cell): 15 MHz	821.5 (26765)		831.5 (26865)	841.5 (26965)	
LTE Band 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 30: 5 MHz	2307.5 (27685)		2310 (27710)	2312.5 (27735)	
LTE Band 30: 10 MHz	N/A		2310 (27710)	N/A	
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 48: 5 MHz	3552.5 (55265)	3600.8 (55748)	N/A	3649.2 (56232)	3697.5 (56715)
LTE Band 48: 10 MHz	3555 (55290)	3601.7 (55757)	N/A	3648.3 (56223)	3695 (56690)
LTE Band 48: 15 MHz	3557.5 (55315)	3602.5 (55765)	N/A	3647.5 (56215)	3692.5 (56965)
LTE Band 48: 20 MHz	3560 (55340)	3603.3 (55773)	N/A	3646.7 (56207)	3690 (56640)
LTE Band 41: 5 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 10 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 15 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 41: 20 MHz	2506 (39750)	2549.5 (40185)	2593 (40620)	2636.5 (41055)	2680 (41490)
LTE Band 38: 5 MHz	2572.5 (37775)		2595 (38000)	2617.5 (38225)	
LTE Band 38: 10 MHz	2575 (37800)		2595 (38000)	2615 (38200)	
LTE Band 38: 15 MHz	2577.5 (37825)		2595 (38000)	2612.5 (38175)	
LTE Band 38: 20 MHz	2580 (37850)		2595 (38000)	2610 (38150)	
UE Category	DL UE Cat 20, UL UE Cat 18				
Modulations Supported in UL	QPSK, 16QAM, 64QAM, 256QAM				
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
LTE Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Additional Information	This device does not support full CA features on 3GPP Release 15. It supports carrier aggregation, downlink MIMO features as shown in Section 9 and Appendix F. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. The following LTE Release 15 Features are not supported: LAA, Relay, HetNet, Enhanced MIMO, eICIC, WIFI Offloading, eMBMS, Cross-Carrier Scheduling, Enhanced SC-FDMA.				

NR Information					
Form Factor	Portable Handset				
Frequency Range of each NR transmission band	NR Band n71 (670.5 - 690.5 MHz)				
	NR Band n5 (Cell) (826.5 - 846.5 MHz)				
	NR Band n66 (AWS) (1712.5 - 1777.5 MHz)				
	NR Band n25 (PCS) (1852.5 - 1912.5 MHz)				
	NR Band n2 (PCS) (1852.5 - 1907.5 MHz)				
	NR Band n41 (2506.02 - 2679.99 MHz)				
Channel Bandwidths	NR Band n71: 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	NR Band n5 (Cell): 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	NR Band n66 (AWS): 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	NR Band n25 (PCS): 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	NR Band n2 (PCS): 5 MHz, 10 MHz, 15 MHz, 20 MHz				
	NR Band n41: 20 MHz, 40 MHz, 50 MHz, 60 MHz, 80 MHz, 90 MHz, 100 MHz				
Channel Numbers and Frequencies (MHz)	Low	Low-Mid	Mid	Mid-High	High
NR Band n71: 5 MHz	665.5 (133100)		680.5 (136100)	695.5 (139100)	
NR Band n71: 10 MHz	668 (133600)		680.5 (136100)	693 (138600)	
NR Band n71: 15 MHz	670.5 (134100)		680.5 (136100)	690.5 (138100)	
NR Band n71: 20 MHz	673 (134600)		680.5 (136100)	688 (137600)	
NR Band n5 (Cell): 5 MHz	826.5 (165300)		836.5 (167300)	846.5 (169300)	
NR Band n5 (Cell): 10 MHz	829 (165800)		836.5 (167300)	844 (168800)	
NR Band n5 (Cell): 15 MHz	831.5 (166300)		836.5 (167300)	841.5 (168300)	
NR Band n5 (Cell): 20 MHz	834 (166800)		836.5 (167300)	839 (167800)	
NR Band n66 (AWS): 5 MHz	1712.5 (342500)		1745 (349000)	1777.5 (355500)	
NR Band n66 (AWS): 10 MHz	1715 (343000)		1745 (349000)	1775 (355000)	
NR Band n66 (AWS): 15 MHz	1717.5 (343500)		1745 (349000)	1772.5 (354500)	
NR Band n66 (AWS): 20 MHz	1720 (344000)		1745 (349000)	1770 (354000)	
NR Band n25 (PCS): 5 MHz	1852.5 (370500)		1882.5 (376500)	1912.5 (382500)	
NR Band n25 (PCS): 10 MHz	1855 (371000)		1882.5 (376500)	1910 (382000)	
NR Band n25 (PCS): 15 MHz	1857.5 (371500)		1882.5 (376500)	1907.5 (381500)	
NR Band n25 (PCS): 20 MHz	1860 (372000)		1882.5 (376500)	1905 (381000)	
NR Band n2 (PCS): 5 MHz	1852.5 (370500)		1880 (376000)	1907.5 (381500)	
NR Band n2 (PCS): 10 MHz	1855 (371000)		1880 (376000)	1905 (381000)	
NR Band n2 (PCS): 15 MHz	1857.5 (371500)		1880 (376000)	1902.5 (380500)	
NR Band n2 (PCS): 20 MHz	1860 (372000)		1880 (376000)	1900 (380000)	
NR Band n41: 20 MHz	2506.02 (501204)	2549.49 (509898)	2592.99 (518598)	2636.49 (527298)	2679.99 (535998)
NR Band n41: 40 MHz	2516.01 (503202)	2567.34 (513468)	N/A	2618.67 (523734)	2670 (534000)
NR Band n41: 50 MHz	2521.02 (504204)		2592.99 (518598)	2664.99 (532998)	
NR Band n41: 60 MHz	2526 (505200)		2592.99 (518598)	2659.98 (531996)	
NR Band n41: 80 MHz	2536.02 (507204)		N/A	2649.99 (529998)	
NR Band n41: 90 MHz	2541 (508200)		N/A	2644.98 (528996)	
NR Band n41: 100 MHz	2546.01 (509202)		2592.99 (518598)	2640 (528000)	
SCS for NR Band n71/n5/n66/n25/n2	15 kHz				
SCS for NR Band n41	30 kHz				
Modulations Supported in UL	DFT-s-OFDM: π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM				
NR MPR Permanently implemented per 3GPP TS 38.101	YES				
A-MPR (Additional MPR) disabled for SAR Testing?	YES				
EN-DC Carrier Aggregation Possible Combinations	The technical description includes all the possible carrier aggregation combinations				
LTE Anchor Bands for NR Band n71	LTE Band 2/66				
LTE Anchor Bands for NR Band n5 (Cell)	LTE Band 2/30/66				
LTE Anchor Bands for NR Band n66 (AWS)	LTE Band 5/12/13/14/48				
LTE Anchor Bands for NR Band n25 (PCS)	LTE Band 12				
LTE Anchor Bands for NR Band n2 (PCS)	LTE Band 5/12/13/14				
LTE Anchor Bands for NR Band n41	LTE Band 2/66				

3 INTRODUCTION

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

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

3.1 SAR Definition

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

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

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

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

4 DOSIMETRIC ASSESSMENT

4.1 Measurement Procedure

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

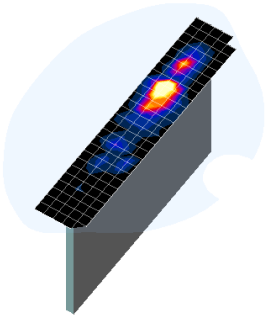

Figure 4-1
Sample SAR Area Scan

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

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

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

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

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

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

*Also compliant to IEEE 1528-2013 Table 6

5 DEFINITION OF REFERENCE POINTS

5.1 EAR REFERENCE POINT

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

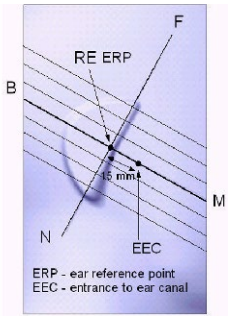

Figure 5-1
Close-Up Side view of ERP

5.2 HANDSET REFERENCE POINTS

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

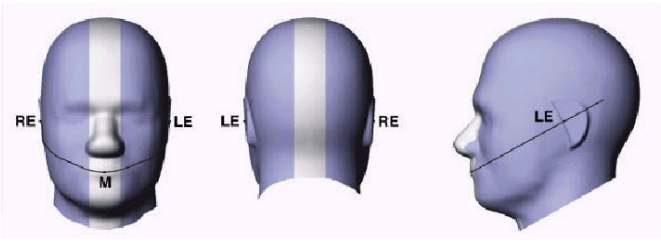

Figure 5-2
Front, back and side view of SAM Twin Phantom

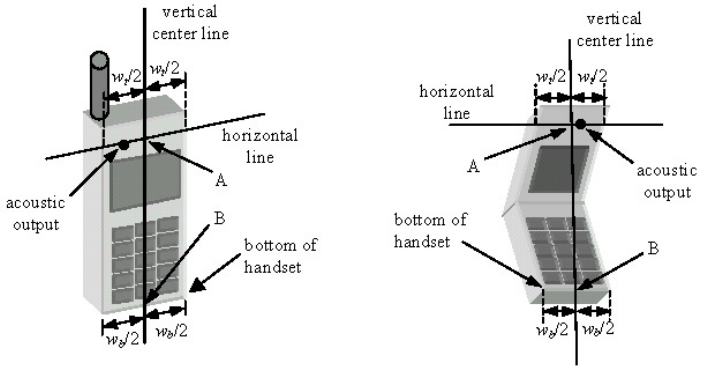

Figure 5-3
Handset Vertical Center & Horizontal Line Reference Points

6 TEST CONFIGURATION POSITIONS

6.1 Device Holder

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

6.2 Positioning for Cheek

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

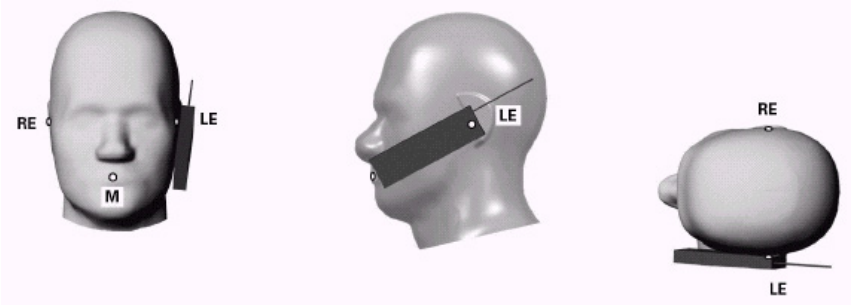

Figure 6-1 Front, Side and Top View of Cheek Position

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

6.3 Positioning for Ear / 15º Tilt

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

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

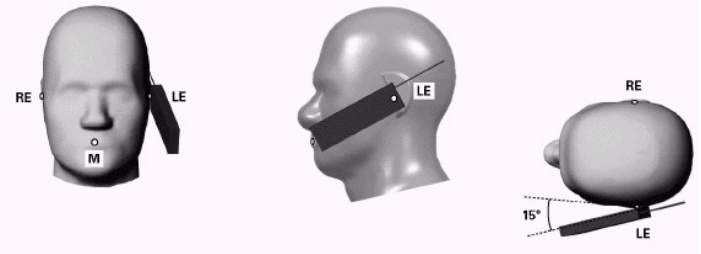

Figure 6-2 Front, Side and Top View of Ear/15º Tilt Position

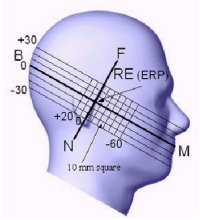

Figure 6-3
Side view w/ relevant markings

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

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

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

6.5 Body-Worn Accessory Configurations

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

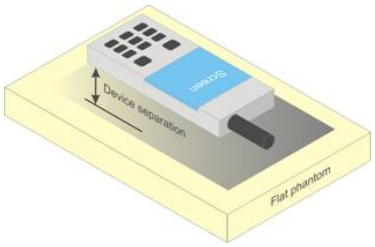

Figure 6-4
Sample Body-Worn Diagram

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not

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

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

6.6 Extremity Exposure Configurations

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

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

6.7 Wireless Router Configurations

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

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

6.8 Phablet Configurations

For smart phones with a display diagonal dimension > 150 mm or an overall diagonal dimension > 160 mm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna <=25 mm from that surface or edge, in direct contact with the phantom, for 10g SAR. The UMPC mini-tablet 1g SAR at 5 mm is not required. When hotspot mode applies, 10g SAR is required only for the surfaces and edges with hotspot mode 1g SAR > 1.2 W/kg.

6.9 Proximity Sensor Considerations

This device uses a power reduction mechanism to reduce output powers in certain use conditions when the device is used close the user's body.

When the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum allowed output power. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, additional evaluation is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a nonreduced output power level. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional test positions. Sensor triggering distance summary data is included in Appendix G.

The sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the sensor entirely covers the antennas.

7 RF EXPOSURE LIMITS

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

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

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

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

8 FCC MEASUREMENT PROCEDURES

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

8.1 Measured and Reported SAR

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

8.2 3G SAR Test Reduction Procedure

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

8.3 Procedures Used to Establish RF Signal for SAR

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

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

8.4 SAR Measurement Conditions for CDMA2000

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

8.4.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by FCC KDB Publication 941225 D01v03r01 “3G SAR Measurement Procedures.” Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in the “All Up” condition.

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1, Table 8-1 parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH_0 and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 bps SCH0 data rate.
4. Under RC3, C.S0011 Table 4.4.5.2-2, Table 8-2 was applied.

Table 8-1
Parameters for Max. Power for RC1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table 8-2
Parameters for Max. Power for RC3

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-86
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

5. FCHs were configured at full rate for maximum SAR with “All Up” power control bits.

8.4.2 Head SAR Measurements

SAR for next to the ear head exposure is measured in RC3 with the handset configured to transmit at fullrate in SO55. The 3G SAR test reduction procedure is applied to RC1 with RC3 as the primary mode; otherwise, SAR is required for the channel with maximum measured output in RC1 using the head exposure configuration that results in the highest reported SAR in RC3.

Head SAR is additionally evaluated using EVDO Rev. A to support compliance for VoIP operations. See Section 8.4.5 for EVDO Rev. A configuration parameters.

8.4.3 Body-worn SAR Measurements

SAR for body-worn exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. The 3G SAR test reduction procedure is applied to the multiple code channel configuration (FCH+SCHn), with FCH only as the primary mode. Otherwise, SAR is required for multiple code channel configuration (FCH + SCHn), with FCH at full rate and SCH0 enabled at 9600 bps, using the highest reported SAR configuration for FCH only. When multiple code channels are enabled, the transmitter output can shift by more than 0.5 dB and may lead to higher SAR drifts and SCH dropouts.

The 3G SAR test reduction procedure is applied to body-worn accessory SAR in RC1 with RC3 as the primary mode. Otherwise, SAR is required for RC1, with SO55 and full rate, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

8.4.4 Body-worn SAR Measurements for EVDO Devices

For handsets with EVDO capabilities, the 3G SAR test reduction procedure is applied to EVDO Rev. 0 with 1x RTT RC3 as the primary mode to determine body-worn accessory test requirements. Otherwise, body-worn accessory SAR is required for Rev. 0, at 153.6 kbps, using the highest reported SAR configuration for body-worn accessory exposure in RC3.

The 3G SAR test reduction procedure is applied to Rev. A, with Rev. 0 as the primary mode to determine body-worn accessory SAR test requirements. When SAR is not required for Rev. 0, the 3G SAR test reduction is applied with 1x RTT RC3 as the primary mode.

When SAR is required for EVDO Rev. A, SAR is measured with a Reverse Data Channel payload size of 4096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations, using the highest reported SAR configuration for body-worn accessory exposure in Rev. 0 or 1x RTT RC3, as appropriate.

8.4.5 Body SAR Measurements for EVDO Hotspot

Hotspot Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. The 3G SAR test reduction procedure is applied to Rev. A, Subtype 2 Physical layer configuration, with Rev. 0 as the primary mode; otherwise, SAR is measured for Rev. A using the highest reported SAR configuration for body-worn accessory exposure in Rev. 0. The AT is tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations.

For EVDO data devices that also support 1x RTT voice and/or data operations, the 3G SAR test reduction procedure is applied to 1x RTT RC3 and RC1 with EVDO Rev. 0 and Rev. A as the respective primary modes. Otherwise, the 'Body-Worn Accessory SAR' procedures in the '3GPP2 CDMA 2000 1x Handsets' section are applied.

8.4.6 CDMA2000 1x Advanced

This device additionally supports 1x Advanced. Conducted powers are measured using SO75 with RC8 on the uplink and RC11 on the downlink per FCC KDB Publication 941225 D01v03r01. Smart blanking is disabled for all measurements. The EUT is configured with forward power control Mode 000 and reverse power control at 400 bps. Conducted powers are measured on an Agilent 8960 Series 10 Wireless Communications Test Set, Model E5515C using the CDMA2000 1x Advanced application, Option E1962B-410.

The 3G SAR test reduction procedure is applied to the 1x-Advanced transmission mode with 1x RTT RC3 as the primary mode. When SAR measurement is required, the 1x-Advanced power measurement configurations are used. The1x Advanced SAR procedures are applied separately to head, body-worn accessory and other exposure conditions.

8.5 SAR Measurement Conditions for UMTS

8.5.1 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.

8.5.2 Head SAR Measurements

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the

primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

8.5.3 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.

8.5.4 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.

8.5.5 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.

8.5.6 SAR Measurement Conditions for DC-HSDPA

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

8.6 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).

8.6.1 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.

8.6.2 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.

8.6.3 A-MPR

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

8.6.4 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.

8.6.5 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.

8.6.6 Downlink Only Carrier Aggregation

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

8.7 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.

8.7.1 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.

8.7.2 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.

8.7.3 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.

8.7.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.7.5 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.

8.7.6 OFDM Transmission Mode and SAR Test Channel Selection

When the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. 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.

8.7.7 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 8.7.6). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8.7.8 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.

8.7.9 MIMO SAR considerations

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

9 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

9.1 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.

NR band n25 additionally represents NR band n2 since their transmission frequency ranges are overlapped and they share the same transmission path and signal characteristics.

Please see the original compliance evaluation in RF Exposure Technical Report S/N 1M2005040080-01-R1.A3L for the standalone reported SAR for modes and bands not evaluated for this permissive change.

9.2 Simultaneous Transmission Procedures

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

Per FCC KDB Publication 648474 D04 Handset SAR, Phablet SAR tests were not required if wireless router 1g SAR (scaled to the maximum output power, including tolerance) < 1.2 W/kg. Therefore, no further analysis beyond the tables included in this section was required to determine that possible simultaneous transmission scenarios would not exceed the SAR limit.

9.3 Head SAR Simultaneous Transmission Analysis

(*) For test positions that were not required to be evaluated for WLAN SAR per FCC KDB publication 248227, the worst case WLAN SAR result for the applicable exposure conditions was used for simultaneous transmission analysis.

Table 9-1
Simultaneous Transmission Scenario with 5 GHz WLAN Antenna 1 (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.155	0.370*	**0.782**
	Right Tilt	0.110	0.119	0.370*	0.599
	Left Cheek	0.191	0.067	0.370	0.628
	Left Tilt	0.108	0.061	0.370*	0.539
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.095	0.370*	**0.722**
	Right Tilt	0.110	0.051	0.370*	0.531
	Left Cheek	0.191	0.077	0.370	0.638
	Left Tilt	0.108	0.046	0.370*	0.524

Table 9-2
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz Antenna 1 WLAN (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.155	0.172	0.370*	0.954
	Right Tilt	0.110	0.119	0.151	0.370*	0.750
	Left Cheek	0.191	0.067	0.428	0.370	**1.056**
	Left Tilt	0.108	0.061	0.285	0.370*	0.824
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.095	0.172	0.370*	0.894
	Right Tilt	0.110	0.051	0.151	0.370*	0.682
	Left Cheek	0.191	0.077	0.428	0.370	**1.066**
	Left Tilt	0.108	0.046	0.285	0.370*	0.809

Table 9-3
Simultaneous Transmission Scenario with Bluetooth Antenna 2 and 5 GHz Antenna 1 WLAN (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.155	0.091	0.370*	**0.873**
	Right Tilt	0.110	0.119	0.007	0.370*	0.606
	Left Cheek	0.191	0.067	0.075	0.370	0.703
	Left Tilt	0.108	0.061	0.009	0.370*	0.548
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.095	0.091	0.370*	**0.813**
	Right Tilt	0.110	0.051	0.007	0.370*	0.538
	Left Cheek	0.191	0.077	0.075	0.370	0.713
	Left Tilt	0.108	0.046	0.009	0.370*	0.533

Table 9-4
Simultaneous Transmission Scenario with 2.4 GHz MIMO WLAN (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.155	0.134	0.546
	Right Tilt	0.110	0.119	0.098	0.327
	Left Cheek	0.191	0.067	0.664	**0.922**
	Left Tilt	0.108	0.061	0.448	0.617
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.095	0.134	0.486
	Right Tilt	0.110	0.051	0.098	0.259
	Left Cheek	0.191	0.077	0.664	**0.932**
	Left Tilt	0.108	0.046	0.448	0.602

Table 9-5
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 2.4 GHz WLAN Antenna 2 (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.155	0.172	0.078	0.662
	Right Tilt	0.110	0.119	0.151	0.078*	0.458
	Left Cheek	0.191	0.067	0.428	0.078*	**0.764**
	Left Tilt	0.108	0.061	0.285	0.078*	0.532
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.095	0.172	0.078	0.602
	Right Tilt	0.110	0.051	0.151	0.078*	0.390
	Left Cheek	0.191	0.077	0.428	0.078*	**0.774**
	Left Tilt	0.108	0.046	0.285	0.078*	0.517

Table 9-6
Simultaneous Transmission Scenario with Bluetooth Antenna 1
(Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.155	0.172	0.584
	Right Tilt	0.110	0.119	0.151	0.380
	Left Cheek	0.191	0.067	0.428	**0.686**
	Left Tilt	0.108	0.061	0.285	0.454
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.095	0.172	0.524
	Right Tilt	0.110	0.051	0.151	0.312
	Left Cheek	0.191	0.077	0.428	**0.696**
	Left Tilt	0.108	0.046	0.285	0.439

Table 9-7
Simultaneous Transmission Scenario with Bluetooth Antenna 2
(Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.155	0.091	**0.503**
	Right Tilt	0.110	0.119	0.007	0.236
	Left Cheek	0.191	0.067	0.075	0.333
	Left Tilt	0.108	0.061	0.009	0.178
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.095	0.091	**0.443**
	Right Tilt	0.110	0.051	0.007	0.168
	Left Cheek	0.191	0.077	0.075	0.343
	Left Tilt	0.108	0.046	0.009	0.163

Table 9-8
Simultaneous Transmission Scenario with 5GHz MIMO WLAN (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.155	0.415*	**0.827**
	Right Tilt	0.110	0.119	0.415*	0.644
	Left Cheek	0.191	0.067	0.415	0.673
	Left Tilt	0.108	0.061	0.196	0.365
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Head SAR	Right Cheek	0.257	0.095	0.415*	**0.767**
	Right Tilt	0.110	0.051	0.415*	0.576
	Left Cheek	0.191	0.077	0.415	0.683
	Left Tilt	0.108	0.046	0.196	0.350

Table 9-9
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz MIMO WLAN (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.155	0.172	0.415*	0.999
	Right Tilt	0.110	0.119	0.151	0.415*	0.795
	Left Cheek	0.191	0.067	0.428	0.415	**1.101**
	Left Tilt	0.108	0.061	0.285	0.196	0.650
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.095	0.172	0.415*	0.939
	Right Tilt	0.110	0.051	0.151	0.415*	0.727
	Left Cheek	0.191	0.077	0.428	0.415	**1.111**
	Left Tilt	0.108	0.046	0.285	0.196	0.635

Table 9-10
Simultaneous Transmission Scenario with Bluetooth Antenna 2 and 5 GHz MIMO WLAN (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.155	0.091	0.415*	**0.918**
	Right Tilt	0.110	0.119	0.007	0.415*	0.651
	Left Cheek	0.191	0.067	0.075	0.415	0.748
	Left Tilt	0.108	0.061	0.009	0.196	0.374
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.095	0.091	0.415*	**0.858**
	Right Tilt	0.110	0.051	0.007	0.415*	0.583
	Left Cheek	0.191	0.077	0.075	0.415	0.758
	Left Tilt	0.108	0.046	0.009	0.196	0.359

Table 9-11
Simultaneous Transmission Scenario with 2.4 GHz MIMO WLAN and 5 GHz MIMO WLAN (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.155	0.134	0.415*	0.961
	Right Tilt	0.110	0.119	0.098	0.415*	0.742
	Left Cheek	0.191	0.067	0.664	0.415	**1.337**
	Left Tilt	0.108	0.061	0.448	0.196	0.813
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Right Cheek	0.257	0.095	0.134	0.415*	0.901
	Right Tilt	0.110	0.051	0.098	0.415*	0.674
	Left Cheek	0.191	0.077	0.664	0.415	**1.347**
	Left Tilt	0.108	0.046	0.448	0.196	0.798

Table 9-12
Simultaneous Transmission Scenario with Bluetooth Antenna 1, 2.4 GHz Antenna 2 WLAN, and 5 GHz MIMO WLAN (Held to Ear)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Head SAR	Right Cheek	0.257	0.155	0.172	0.078	0.415*	1.077
	Right Tilt	0.110	0.119	0.151	0.078*	0.415*	0.873
	Left Cheek	0.191	0.067	0.428	0.078*	0.415	**1.179**
	Left Tilt	0.108	0.061	0.285	0.078*	0.196	0.728
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Head SAR	Right Cheek	0.257	0.095	0.172	0.078	0.415*	1.017
	Right Tilt	0.110	0.051	0.151	0.078*	0.415*	0.805
	Left Cheek	0.191	0.077	0.428	0.078*	0.415	**1.189**
	Left Tilt	0.108	0.046	0.285	0.078*	0.196	0.713

9.4 Open Body-Worn Simultaneous Transmission Analysis

Table 9-13
Simultaneous Transmission Scenario with 5 GHz WLAN Antenna 1 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.745	0.193	**1.178**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.527	0.193	**0.960**

Table 9-14
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz WLAN Antenna 1 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.745	0.062	0.193	**1.240**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.527	0.062	0.193	**1.022**

Table 9-15
Simultaneous Transmission Scenario with Bluetooth Antenna 2 and 5 GHz WLAN Antenna 1 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.745	0.059	0.193	**1.237**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.527	0.059	0.193	**1.019**

Table 9-16
Simultaneous Transmission Scenario with 2.4 GHz MIMO WLAN (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.745	0.218	**1.203**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.527	0.218	**0.985**

Table 9-17
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 2.4 GHz WLAN Antenna 2 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn	LTE Band 14	0.240	0.745	0.062	0.147	**1.194**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.527	0.062	0.147	**0.976**

Table 9-18
Simultaneous Transmission Scenario with Bluetooth Antenna 1 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.745	0.062	**1.047**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.527	0.062	**0.829**

Table 9-19
Simultaneous Transmission Scenario with Bluetooth Antenna 2 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.745	0.059	**1.044**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.527	0.059	**0.826**

Table 9-20
Simultaneous Transmission Scenario with 5 GHz MIMO WLAN (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.745	0.219	**1.204**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.240	0.527	0.219	**0.986**

Table 9-21
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz MIMO WLAN
(Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.745	0.062	0.219	**1.266**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.527	0.062	0.219	**1.048**

Table 9-22
Simultaneous Transmission Scenario with Bluetooth Antenna 2 and 5 GHz MIMO WLAN
(Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.745	0.059	0.219	**1.263**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.527	0.059	0.219	**1.045**

Table 9-23
Simultaneous Transmission Scenario with 2.4 GHz MIMO WLAN and 5 GHz MIMO WLAN
(Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.745	0.218	0.219	**1.422**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.240	0.527	0.218	0.219	**1.204**

Table 9-24
Simultaneous Transmission Scenario with Bluetooth Antenna 1, 2.4 GHz Antenna 2 WLAN, and 5 GHz MIMO WLAN (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body - Worn SAR	LTE Band 14	0.240	0.745	0.062	0.147	0.219	**1.413**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body - Worn SAR	LTE Band 14	0.240	0.527	0.062	0.147	0.219	**1.195**

9.5 Open Hotspot SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v02r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR ("-").

(*) For test positions that were not required to be evaluated for WLAN SAR per FCC KDB publication 248227, the worst case WLAN SAR result for the applicable exposure conditions was used for simultaneous transmission analysis.

Table 9-25
Simultaneous Transmission Scenario with 5 GHz WLAN Antenna 1 (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.437	0.273	1.126
	Front	0.317	0.366	0.400*	1.083
	Top	-	-	0.400*	0.400
	Bottom	0.274	0.864	-	**1.138**
	Right	0.368	0.066	0.400	0.834
	Left	0.109	0.069	-	0.178
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.292	0.273	**0.981**
	Front	0.317	0.250	0.400*	0.967
	Top	-	-	0.400*	0.400
	Bottom	0.274	0.665	-	0.939
	Right	0.368	0.027	0.400	0.795
	Left	0.109	0.100	-	0.209

Table 9-26
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz WLAN Antenna 1 (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.437	0.115	0.273	**1.241**
	Front	0.317	0.366	0.136	0.400*	1.219
	Top	-	-	0.067	0.400*	0.467
	Bottom	0.274	0.864	-	-	1.138
	Right	0.368	0.066	0.220	0.400	1.054
	Left	0.109	0.069	-	-	0.178
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.292	0.115	0.273	1.096
	Front	0.317	0.250	0.136	0.400*	**1.103**
	Top	-	-	0.067	0.400*	0.467
	Bottom	0.274	0.665	-	-	0.939
	Right	0.368	0.027	0.220	0.400	1.015
	Left	0.109	0.100	-	-	0.209

Table 9-27
Simultaneous Transmission Scenario with Bluetooth Antenna 2 and 5 GHz WLAN Antenna 1 (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.437	0.163	0.273	**1.289**
	Front	0.317	0.366	0.011	0.400*	1.094
	Top	-	-	-	0.400*	0.400
	Bottom	0.274	0.864	-	-	1.138
	Right	0.368	0.066	-	0.400	0.834
	Left	0.109	0.069	0.003	-	0.181
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.292	0.163	0.273	**1.144**
	Front	0.317	0.250	0.011	0.400*	0.978
	Top	-	-	-	0.400*	0.400
	Bottom	0.274	0.665	-	-	0.939
	Right	0.368	0.027	-	0.400	0.795
	Left	0.109	0.100	0.003	-	0.212

Table 9-28
Simultaneous Transmission Scenario with 2.4 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.437	0.470	**1.323**
	Front	0.317	0.366	0.355	1.038
	Top	-	-	0.519*	0.519
	Bottom	0.274	0.864	-	1.138
	Right	0.368	0.066	0.519	0.953
	Left	0.109	0.069	0.519*	0.697
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.292	0.470	**1.178**
	Front	0.317	0.250	0.355	0.922
	Top	-	-	0.519*	0.519
	Bottom	0.274	0.665	-	0.939
	Right	0.368	0.027	0.519	0.914
	Left	0.109	0.100	0.519*	0.728

Table 9-29
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 2.4 GHz WLAN Antenna 2 (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.437	0.115	0.508	**1.476**
	Front	0.317	0.366	0.136	0.031	0.850
	Top	-	-	0.067	-	0.067
	Bottom	0.274	0.864	-	-	1.138
	Right	0.368	0.066	0.220	-	0.654
	Left	0.109	0.069	-	0.077	0.255
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.292	0.115	0.508	**1.331**
	Front	0.317	0.250	0.136	0.031	0.734
	Top	-	-	0.067	-	0.067
	Bottom	0.274	0.665	-	-	0.939
	Right	0.368	0.027	0.220	-	0.615
	Left	0.109	0.100	-	0.077	0.286

Table 9-30
Simultaneous Transmission Scenario with Bluetooth Antenna 1
(Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.437	0.115	0.968
	Front	0.317	0.366	0.136	0.819
	Top	-	-	0.067	0.067
	Bottom	0.274	0.864	-	**1.138**
	Right	0.368	0.066	0.220	0.654
	Left	0.109	0.069	-	0.178
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.292	0.115	0.823
	Front	0.317	0.250	0.136	0.703
	Top	-	-	0.067	0.067
	Bottom	0.274	0.665	-	**0.939**
	Right	0.368	0.027	0.220	0.615
	Left	0.109	0.100	-	0.209

Table 9-31
Simultaneous Transmission Scenario with Bluetooth Antenna 2
(Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.437	0.163	1.016
	Front	0.317	0.366	0.011	0.694
	Top	-	-	-	-
	Bottom	0.274	0.864	-	**1.138**
	Right	0.368	0.066	-	0.434
	Left	0.109	0.069	0.003	0.181
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.292	0.163	0.871
	Front	0.317	0.250	0.011	0.578
	Top	-	-	-	-
	Bottom	0.274	0.665	-	**0.939**
	Right	0.368	0.027	-	0.395
	Left	0.109	0.100	0.003	0.212

Table 9-32
Simultaneous Transmission Scenario with 5 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.437	0.314	**1.167**
	Front	0.317	0.366	0.389*	1.072
	Top	-	-	0.389*	0.389
	Bottom	0.274	0.864	-	1.138
	Right	0.368	0.066	0.389	0.823
	Left	0.109	0.069	-	0.178
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Hotspot SAR	Back	0.416	0.292	0.314	**1.022**
	Front	0.317	0.250	0.389*	0.956
	Top	-	-	0.389*	0.389
	Bottom	0.274	0.665	-	0.939
	Right	0.368	0.027	0.389	0.784
	Left	0.109	0.100	-	0.209

Table 9-33
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.437	0.115	0.314	**1.282**
	Front	0.317	0.366	0.136	0.389*	1.208
	Top	-	-	0.067	0.389*	0.456
	Bottom	0.274	0.864	-	-	1.138
	Right	0.368	0.066	0.220	0.389	1.043
	Left	0.109	0.069	-	-	0.178
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.292	0.115	0.314	**1.137**
	Front	0.317	0.250	0.136	0.389*	1.092
	Top	-	-	0.067	0.389*	0.456
	Bottom	0.274	0.665	-	-	0.939
	Right	0.368	0.027	0.220	0.389	1.004
	Left	0.109	0.100	-	-	0.209

Table 9-34
Simultaneous Transmission Scenario with Bluetooth Antenna 2 and 5 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.437	0.163	0.314	**1.330**
	Front	0.317	0.366	0.011	0.389*	1.083
	Top	-	-	-	0.389*	0.389
	Bottom	0.274	0.864	-	-	1.138
	Right	0.368	0.066	-	0.389	0.823
	Left	0.109	0.069	0.003	-	0.181
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.292	0.163	0.314	**1.185**
	Front	0.317	0.250	0.011	0.389*	0.967
	Top	-	-	-	0.389*	0.389
	Bottom	0.274	0.665	-	-	0.939
	Right	0.368	0.027	-	0.389	0.784
	Left	0.109	0.100	0.003	-	0.212

Table 9-35
Simultaneous Transmission Scenario with 2.4 GHz MIMO WLAN and 5 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO at 17 dBm SAR (W/kg)	5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.437	0.282	0.163*	**1.298**
	Front	0.317	0.366	0.256	0.163*	1.102
	Top	-	-	0.447*	0.163*	0.610
	Bottom	0.274	0.864	-	-	1.138
	Right	0.368	0.066	0.447	0.163	1.044
	Left	0.109	0.069	0.447*	-	0.625
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO at 17 dBm SAR (W/kg)	5 GHz WLAN MIMO at 16 dBm SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.416	0.292	0.282	0.163*	**1.153**
	Front	0.317	0.250	0.256	0.163*	0.986
	Top	-	-	0.447*	0.163*	0.610
	Bottom	0.274	0.665	-	-	0.939
	Right	0.368	0.027	0.447	0.163	1.005
	Left	0.109	0.100	0.447*	-	0.656

Table 9-36
Simultaneous Transmission Scenario with Bluetooth Antenna 1, 2.4 GHz Antenna 2 WLAN, and 5 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 at 15 dBm SAR (W/kg)	5 GHz WLAN MIMO at 16 dBm SAR	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.416	0.437	0.115	0.265	0.163*	**1.396**
	Front	0.317	0.366	0.136	0.265*	0.163*	1.247
	Top	-	-	0.067	-	0.163*	0.230
	Bottom	0.274	0.864	-	-	-	1.138
	Right	0.368	0.066	0.220	-	0.163	0.817
	Left	0.109	0.069	-	0.265*	-	0.443
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 at 15 dBm SAR (W/kg)	5 GHz WLAN MIMO at 16 dBm SAR	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.416	0.292	0.115	0.265	0.163*	**1.251**
	Front	0.317	0.250	0.136	0.265*	0.163*	1.131
	Top	-	-	0.067	-	0.163*	0.230
	Bottom	0.274	0.665	-	-	-	0.939
	Right	0.368	0.027	0.220	-	0.163	0.778
	Left	0.109	0.100	-	0.265*	-	0.474

9.6 Closed Body-Worn Simultaneous Transmission Analysis

Table 9-37
Simultaneous Transmission Scenario with 5 GHz WLAN Antenna 1 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.210	0.059	**0.512**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.332	0.059	**0.634**

Table 9-38
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz WLAN Antenna 1 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.210	0.038	0.059	**0.550**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.332	0.038	0.059	**0.672**

Table 9-39
Simultaneous Transmission Scenario with Bluetooth Antenna 2 and 5 GHz WLAN Antenna 1 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.210	0.000	0.059	**0.512**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.332	0.000	0.059	**0.634**

Table 9-40
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.210	0.092	**0.545**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.332	0.092	**0.667**

Table 9-41
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 2.4 GHz WLAN Antenna 2 (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.210	0.038	0.002	**0.493**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.332	0.038	0.002	**0.615**

Table 9-42
Simultaneous Transmission Scenario with Bluetooth Antenna 1
(Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.210	0.038	**0.491**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.332	0.038	**0.613**

Table 9-43
Simultaneous Transmission Scenario with Bluetooth Antenna 2
(Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.210	0.000	**0.453**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.332	0.000	**0.575**

Table 9-44
Simultaneous Transmission Scenario with 5 GHz MIMO WLAN (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.210	0.054	**0.507**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body - Worn SAR	LTE Band 14	0.243	0.332	0.054	**0.629**

Table 9-45
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz MIMO WLAN
(Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.210	0.038	0.054	**0.545**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.332	0.038	0.054	**0.667**

Table 9-46
Simultaneous Transmission Scenario with Bluetooth Antenna 2 and 5 GHz MIMO WLAN (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.210	0.000	0.054	**0.507**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.332	0.000	0.054	**0.629**

Table 9-47
Simultaneous Transmission Scenario with 2.4 GHz MIMO WLAN and 5 GHz MIMO WLAN
(Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.210	0.092	0.054	**0.599**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body - Worn SAR	LTE Band 14	0.243	0.332	0.092	0.054	**0.721**

Table 9-48
Simultaneous Transmission Scenario with Bluetooth Antenna 1, 2.4 GHz Antenna 2 WLAN, and 5 GHz MIMO WLAN (Body-Worn at 1.5 cm)

Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body - Worn SAR	LTE Band 14	0.243	0.210	0.038	0.002	0.054	**0.547**
Configuration	LTE Anchor Band	4G SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body - Worn SAR	LTE Band 14	0.243	0.332	0.038	0.002	0.054	**0.669**

9.7 Closed Hotspot SAR Simultaneous Transmission Analysis

Per FCC KDB Publication 941225 D06v02r01, the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR ("-").

(*) For test positions that were not required to be evaluated for WLAN SAR per FCC KDB publication 248227, the worst case WLAN SAR result for the applicable exposure conditions was used for simultaneous transmission analysis.

Table 9-49
Simultaneous Transmission Scenario with 5 GHz WLAN Antenna 1 (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.172	0.097	0.689
	Front	0.120	0.045	0.269	0.434
	Top	-	-	-	-
	Bottom	0.209	0.386	0.183	**0.778**
	Right	0.085	0.025	0.303	0.413
	Left	0.075	0.060	-	0.135
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.189	0.097	0.706
	Front	0.120	0.043	0.269	0.432
	Top	-	-	-	-
	Bottom	0.209	0.489	0.183	**0.881**
	Right	0.085	0.025	0.303	0.413
	Left	0.075	0.088	-	0.163

Table 9-50
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz WLAN Antenna 1 (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.172	0.082	0.097	0.771
	Front	0.120	0.045	0.094	0.269	0.528
	Top	-	-	-	-	0.000
	Bottom	0.209	0.386	0.081	0.183	**0.859**
	Right	0.085	0.025	0.184	0.303	0.597
	Left	0.075	0.060	-	-	0.135
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.189	0.082	0.097	0.788
	Front	0.120	0.043	0.094	0.269	0.526
	Top	-	-	-	-	0.000
	Bottom	0.209	0.489	0.081	0.183	**0.962**
	Right	0.085	0.025	0.184	0.303	0.597
	Left	0.075	0.088	-	-	0.163

Table 9-51
Simultaneous Transmission Scenario with Bluetooth Antenna 2 and 5 GHz WLAN Antenna 1 (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.172	0.096	0.097	**0.785**
	Front	0.120	0.045	0.207	0.269	0.641
	Top	-	-	0.001	-	0.001
	Bottom	0.209	0.386	0.000	0.183	0.778
	Right	0.085	0.025	-	0.303	0.413
	Left	0.075	0.060	0.027	-	0.162
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.189	0.096	0.097	**0.802**
	Front	0.120	0.043	0.207	0.269	0.639
	Top	-	-	0.001	-	0.001
	Bottom	0.209	0.489	0.000	0.183	0.881
	Right	0.085	0.025	-	0.303	0.413
	Left	0.075	0.088	0.027	-	0.190

Table 9-52
Simultaneous Transmission Scenario with 2.4 GHz WLAN MIMO (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.172	0.136	0.728
	Front	0.120	0.045	0.438	0.603
	Top	-	-	0.449*	0.449
	Bottom	0.209	0.386	0.184	**0.779**
	Right	0.085	0.025	0.449	0.559
	Left	0.075	0.060	0.449*	0.584
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.189	0.136	0.745
	Front	0.120	0.043	0.438	0.601
	Top	-	-	0.449*	0.449
	Bottom	0.209	0.489	0.184	**0.882**
	Right	0.085	0.025	0.449	0.559
	Left	0.075	0.088	0.449*	0.612

Table 9-53
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 2.4 GHz WLAN Antenna 2 (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.172	0.082	0.003	0.677
	Front	0.120	0.045	0.094	0.622	**0.881**
	Top	-	-	-	0.622*	0.622
	Bottom	0.209	0.386	0.081	0.002	0.678
	Right	0.085	0.025	0.184	-	0.294
	Left	0.075	0.060	-	0.106	0.241
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.189	0.082	0.003	0.694
	Front	0.120	0.043	0.094	0.622	**0.879**
	Top	-	-	-	0.622*	0.622
	Bottom	0.209	0.489	0.081	0.002	0.781
	Right	0.085	0.025	0.184	-	0.294
	Left	0.075	0.088	-	0.106	0.269

Table 9-54
Simultaneous Transmission Scenario with Bluetooth Antenna 1
(Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.172	0.082	0.674
	Front	0.120	0.045	0.094	0.259
	Top	-	-	-	-
	Bottom	0.209	0.386	0.081	**0.676**
	Right	0.085	0.025	0.184	0.294
	Left	0.075	0.060	-	0.135
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.189	0.082	0.691
	Front	0.120	0.043	0.094	0.257
	Top	-	-	-	-
	Bottom	0.209	0.489	0.081	**0.779**
	Right	0.085	0.025	0.184	0.294
	Left	0.075	0.088	-	0.163

Table 9-55
Simultaneous Transmission Scenario with Bluetooth Antenna 2
(Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.172	0.096	**0.688**
	Front	0.120	0.045	0.207	0.372
	Top	-	-	0.001	0.001
	Bottom	0.209	0.386	0.000	0.595
	Right	0.085	0.025	-	0.110
	Left	0.075	0.060	0.027	0.162
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.189	0.096	**0.705**
	Front	0.120	0.043	0.207	0.370
	Top	-	-	0.001	0.001
	Bottom	0.209	0.489	0.000	0.698
	Right	0.085	0.025	-	0.110
	Left	0.075	0.088	0.027	0.190

Table 9-56
Simultaneous Transmission Scenario with 5 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.172	0.079	0.671
	Front	0.120	0.045	0.325	0.490
	Top	-	-	-	-
	Bottom	0.209	0.386	0.179	**0.774**
	Right	0.085	0.025	0.303	0.413
	Left	0.075	0.060	-	0.135
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	1+2+3
Body SAR	Back	0.420	0.189	0.079	0.688
	Front	0.120	0.043	0.325	0.488
	Top	-	-	-	-
	Bottom	0.209	0.489	0.179	**0.877**
	Right	0.085	0.025	0.303	0.413
	Left	0.075	0.088	-	0.163

Table 9-57
Simultaneous Transmission Scenario with Bluetooth Antenna 1 and 5 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.172	0.082	0.079	0.753
	Front	0.120	0.045	0.094	0.325	0.584
	Top	-	-	-	-	0.000
	Bottom	0.209	0.386	0.081	0.179	**0.855**
	Right	0.085	0.025	0.184	0.303	0.597
	Left	0.075	0.060	-	-	0.135
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.189	0.082	0.079	0.770
	Front	0.120	0.043	0.094	0.325	0.582
	Top	-	-	-	-	0.000
	Bottom	0.209	0.489	0.081	0.179	**0.958**
	Right	0.085	0.025	0.184	0.303	0.597
	Left	0.075	0.088	-	-	0.163

Table 9-58
Simultaneous Transmission Scenario with Bluetooth Ant 2 and 5 GHz WLAN MIMO (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.172	0.096	0.079	0.767
	Front	0.120	0.045	0.207	0.325	0.697
	Top	-	-	0.001	-	0.001
	Bottom	0.209	0.386	0.000	0.179	**0.774**
	Right	0.085	0.025	-	0.303	0.413
	Left	0.075	0.060	0.027	-	0.162
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.189	0.096	0.079	0.784
	Front	0.120	0.043	0.207	0.325	0.695
	Top	-	-	0.001	-	0.001
	Bottom	0.209	0.489	0.000	0.179	**0.877**
	Right	0.085	0.025	-	0.303	0.413
	Left	0.075	0.088	0.027	-	0.190

Table 9-59
Simultaneous Transmission Scenario with 2.4 GHz MIMO WLAN and 5 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.172	0.136	0.079	0.807
	Front	0.120	0.045	0.438	0.325	0.928
	Top	-	-	0.449*	-	0.449
	Bottom	0.209	0.386	0.184	0.179	**0.958**
	Right	0.085	0.025	0.449	0.303	0.862
	Left	0.075	0.060	0.449*	-	0.584
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz WLAN MIMO SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Body SAR	Back	0.420	0.189	0.136	0.079	0.824
	Front	0.120	0.043	0.438	0.325	0.926
	Top	-	-	0.449*	-	0.449
	Bottom	0.209	0.489	0.184	0.179	**1.061**
	Right	0.085	0.025	0.449	0.303	0.862
	Left	0.075	0.088	0.449*	-	0.612

Table 9-60
Simultaneous Transmission Scenario with Bluetooth Antenna 1, 2.4 GHz Antenna 2 WLAN, and 5 GHz MIMO WLAN (Hotspot at 1.0 cm)

Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n66 (AWS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.420	0.172	0.082	0.003	0.079	0.756
	Front	0.120	0.045	0.094	0.622	0.325	**1.206**
	Top	-	-	-	0.622*	-	0.622
	Bottom	0.209	0.386	0.081	0.002	0.179	0.857
	Right	0.085	0.386	0.184	-	0.303	0.958
	Left	0.075	0.025	-	0.106	-	0.206
Simult Tx	Configuration	LTE Band 14 SAR (W/kg)	NR Band n2 (PCS) SAR (W/kg)	2.4 GHz Bluetooth Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	5 GHz WLAN MIMO SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	5	1+2+3+4+5
Body SAR	Back	0.420	0.189	0.082	0.003	0.079	0.773
	Front	0.120	0.043	0.094	0.622	0.325	**1.204**
	Top	-	-	-	0.622*	-	0.622
	Bottom	0.209	0.489	0.081	0.002	0.179	0.960
	Right	0.085	0.489	0.184	-	0.303	1.061
	Left	0.075	0.025	-	0.106	-	0.206

9.8 Simultaneous Transmission Conclusion

The above numerical summed SAR results are sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528- 2013 Section 6.3.4.1.2.

10 CONCLUSION

10.1 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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