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SAR TEST REPORT

Applicant Name: **SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677 Rep. of Korea	**Date of Issue:** 02. 21 2020 **Test Report No.:** HCT-SR-2002-FC001-R1 **Test Site: HCT CO., LTD.**

FCC ID: ZCASMA015A

Equipment Type:	**Mobile Phone**
Application Type	**Certification**
FCC Rule Part(s):	**CFR §2.1093**
Model Name:	**SM-A015A, SM-A015AZ**
Date of Test:	**02/07/2020 ~ 02/13/2020, 02/20/2020**

This device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in FCC KDB procedures and had been tested in accordance with the measurement procedures specified in FCC KDB procedures.

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.

Tested By	Reviewed By
Jee Lii, Lee Test Engineer SAR Team Certification Division	Yun Jeang, Heo Technical Manager SAR Team Certification Division

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REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	02. 18, 2020	Initial Release
1	02. 21. 2020	Added GSM850, 1900 GPRS Head, Body-Worn test

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1. Test Regulations

The tests documented in this report were performed in accordance with FCC CFR § 2.1093, IEEE 1528-2013, ANSI C63.26-2015 the following FCC Published RF exposure KDB procedures:

- FCC KDB Publication 941225 D01 3G SAR Procedures v03r01
- FCC KDB Publication 941225 D06 Hot Spot SAR v02r01
- FCC KDB Publication 941225 D05 SAR for LTE Devices v02r05
- FCC KDB Publication 941225 D05A LTE Rel.10 KDB Inquiry sheet v01r02
- FCC KDB Publication 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB Publication 447498 D01 General SAR Guidance v06
- FCC KDB Publication 648474 D04 Handset SAR v01r03
- FCC KDB Publication 616217 D04 v01r02 (Proximity Sensor)
- FCC KDB Publication 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- FCC KDB Publication 865664 D02 SAR Reporting v01r02

In Addition to the above, the following information was used.

- October 2013 TCB Workshop Notes (GPRS testing criteria)
- April 2015 TCB Workshop Notes (Simultaneous transmission summation clarified)
- October 2016 TCB Workshop Notes (Bluetooth Duty Factor)

2. Test Location

2.1 Test Laboratory

Company Name	HCT Co., Ltd.
Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Telephone	031-645-6300
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2.2 Test Facilities

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Korea	National Radio Research Agency (Designation No. KR0032)
	KOLAS (Testing No. KT197)

3. Information of the EUT

3.1 General Information of the EUT

Model Name	SM-A015A, SM-A015AZ
Equipment Type	Mobile Phone
FCC ID	ZCASMA015A
Application Type	Certification
Applicant	SAMSUNG Electronics Co., Ltd.

3.2 Attestation of test result of device under test

The Highest Reported SAR					
Band	Tx. Frequency	Equipment Class	Reported SAR (W/kg)		
			1g Head	1g Body-Worn	1g Hotspot
GSM/GPRS/EDGE 850	824.2 MHz ~ 848.8 MHz	PCE	0.46	0.43	0.51
GSM/GPRS/EDGE 1900	1 850.2 MHz ~ 1 909.8 MHz	PCE	0.36	0.20	0.44
WCDMA 850	826.4 MHz ~ 846.6 MHz	PCE	0.61	0.48	0.52
WCDMA 1700	1 712.4 MHz ~ 1 752.6 MHz	PCE	0.29	0.61	1.39
WCDMA 1900	1 852.4 MHz ~ 1 907.6 MHz	PCE	0.58	0.54	1.39
LTE Band 2 (PCS)	1 850.7 MHz ~ 1 909.3 MHz	PCE	0.56	0.36	1.06
LTE Band 4 (AWS)	1 710.7 MHz ~ 1 754.3 MHz	PCE	0.30	0.51	1.22
LTE Band 5 (Cell)	824.7 MHz ~ 848.3 MHz	PCE	0.30	0.34	0.39
LTE Band 12	699.7 MHz ~ 715.3 MHz	PCE	0.26	0.36	0.46
LTE Band 14	790.5 MHz ~ 795.5 MHz	PCE	0.29	0.39	0.46
802.11b	2 412 MHz ~ 2 462 MHz	DTS	0.59	<0.10	0.25
U-NII-1	5 180 MHz ~ 5 240 MHz	NII	N/A	N/A	N/A
U-NII-2A	5 260 MHz ~ 5 320 MHz	NII	0.40	0.62	N/A
U-NII-2C	5 500 MHz ~ 5 720 MHz	NII	0.34	0.43	N/A
U-NII-3	5 745 MHz ~ 5 825 MHz	NII	0.29	0.49	0.69
Bluetooth	2 402 MHz ~ 2 480 MHz	DSS	<0.10	<0.10	<0.10
Simultaneous SAR per KDB 690783 D01v01r03			**1.205**	**1.230**	**1.587**
Date(s) of Tests:	02/07/2020 ~ 02/13/2020, 02/20/2020				

4. Device Under Test Description

4.1 DUT specification

Device Wireless specification overview		
Band & Mode	**Operating Mode**	**Tx Frequency**
GSM850	Voice / Data	824.2 MHz ~ 848.8 MHz
GSM1900	Voice / Data	1 850.2 MHz ~ 1 909.8 MHz
WCDMA 850	Voice / Data	826.4 MHz ~ 846.6 MHz
WCDMA 1700	Voice / Data	1 712.4 MHz ~ 1 752.6 MHz
WCDMA 1900	Voice / Data	1 852.4 MHz ~ 1 907.6 MHz
LTE Band 2 (PCS)	Voice / Data	1 850.7 MHz ~ 1 909.3 MHz
LTE Band 4 (AWS)	Voice / Data	1 710.7 MHz ~ 1 754.3 MHz
LTE Band 5 (Cell)	Voice / Data	824.7 MHz ~ 848.3 MHz
LTE Band 7	Voice / Data	2 502.5 MHz ~ 2 567.5 MHz
LTE Band 12	Voice / Data	699.7 MHz ~ 715.3 MHz
LTE Band 14	Voice / Data	790.5 MHz ~ 795.5 MHz
U-NII-1	Voice / Data	5 180 MHz ~ 5 240 MHz
U-NII-2A	Voice / Data	5 260 MHz ~ 5 320 MHz
U-NII-2C	Voice / Data	5 500 MHz ~ 5 720 MHz
U-NII-3	Voice / Data	5 745 MHz ~ 5 825 MHz
2.4 GHz WLAN	Data	2 412 MHz ~ 2 462 MHz
Bluetooth / LE 5.0	Data	2 402 MHz ~ 2 480 MHz
Device Description		
Device Dimension	Overall (Length x Width): 147.0 mm x 66 mm Overall Diagonal: 156.4 mm	
Battery Information	Standard (Li-ion Polymer Battery)	
	Battery Model Name: QL1695 (Ningde Amperex Technology Limited)	
HW version	REV3.0	
SW(AP) version	A015A.001(A015AUCU0ATAC), A015AZ.001(A015AZUCE0ATA1)	
Device Serial Numbers	**Mode**	**Serial Number**
	GSM850 Head, GSM1900 Head, W2 Head, W4 Head, W5 Head, LTE2 Head, LTE4 Head,	R9JMC051W6J
	GSM850 Body, GSM1900 Body, W5 Body	R9JMC052EJJ
	5 GHz WLAN, W2, LTE4 Body	R9JMC0526JJ
	W2 Head, W4 Body, LTE2 Body, LTE4 Body, LTE5 Head, LTE5 Body, LTE12 Head, LTE12 Body, LTE14 Head, LTE14 Body	R9JMC052DXJ
	2.4 GHz WLAN Bluetooth	R9JMC052CRJ
	The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics are within operational tolerances expected for production units.	

4.2 Power Reduction for SAR

This device utilizes power reduction mechanisms for some wireless modes and bands for SAR compliance under some conditions when the device is being used in close proximity to the user's hand..

This device uses an independent fixed level power reduction mechanism for WLAN modes during held-to-ear scenarios. Per FCC Guidance, the held-to-ear exposure conditions were evaluated at reduced power according to the head SAR Positions described in IEEE1528-2013. Detailed descriptions of the power reduction mechanism are include in the operational description.

The reduced powers for the power reduction mechanisms were conformed via conducted power measurements at the RF Port .

4.3 Nominal and Maximum Output Power Specifications

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

4.3.1 Maximum PCE Output Power

Mode / Band		Voice	Burst Average GMSK (dBm)		Burst Average 8-PSK (dBm)	
		1 Tx Slot	1 Tx Slot	2 Tx Slot	1 Tx Slot	2 Tx Slot
GSM/GPRS/EDGE 850	Maximum	33.7	33.7	30.7	27.7	24.7
	Nominal	32.7	32.7	29.7	26.7	23.7
GSM/GPRS/EDGE1900	Maximum	31.0	31.0	28.7	27.2	25.2
	Nominal	30.0	30.0	27.7	26.2	24.2

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA
WCDMA Band 5 (850 MHz)	Maximum	24.7	23.7	23.7
	Nominal	23.7	22.7	22.7
WCDMA Band 4 (1700 MHz)	Maximum	23.5	22.6	22.5
	Nominal	22.5	21.6	21.5
WCDMA Band 2 (1900 MHz)	Maximum	24.7	23.7	23.6
	Nominal	23.7	22.7	22.6

Mode / Band		Modulated Average (dBm)
LTE Band 2 (PCS)	Maximum	24.2
	Nominal	23.2
LTE Band 4 (AWS)	Maximum	23.7
	Nominal	22.7
LTE Band 5	Maximum	24.2
	Nominal	23.2
LTE Band 12	Maximum	24.2
	Nominal	23.2
LTE Band 14	Maximum	24.0
	Nominal	23.0

4.3.2 Reduced PCE Power (Hotspot Mode / Grip-Sensor on)

Mode / Band		Voice	Burst Average GMSK (dBm)		Burst Average 8-PSK (dBm)	
		1 Tx Slot	1 Tx Slot	2 Tx Slot	1 Tx Slot	2 Tx Slot
GSM/GPRS/EDGE1900	Maximum	28.0	28.0	25.0	25.0	22.0
	Nominal	27.0	27.0	24.0	24.0	21.0

WCDMA band /HSDPA/HSUPA

Mode / Band		Modulated Average (dBm)		
		3GPP WCDMA	3GPP HSDPA	3GPP HSUPA
WCDMA Band 4 (1700 MHz)	Maximum	19.8	19.0	19.0
	Nominal	18.8	18.0	18.0
WCDMA Band 2 (1900 MHz)	Maximum	22.2	22.0	21.0
	Nominal	21.2	21.0	20.0

LTE

Mode / Band		Modulated Average (dBm)
LTE Band 2 (PCS)	Maximum	21.5
	Nominal	20.5
LTE Band 4 (AWS)	Maximum	18.7
	Nominal	17.7

4.3.4 Maximum 2.4 GHz, 5 GHz WIFI output power

Mode / Band		Modulated Average (dBm)				
		SISO				
		11a	11b	11g	11n	11ac
2.4 GHz WIFI (20 MHz)	Ch.1 ~ Ch.11	N/A	19.5	19.5	19.5	N/A
2.4 GHz WIFI (40 MHz)	Ch.3 ~ Ch.9	N/A	N/A	N/A	19.5	N/A
5 GHz WIFI (20 MHz)	5200 MHz	19.0	N/A	N/A	19.0	19.0
	5300 MHz	19.0	N/A	N/A	19.0	19.0
	5500 MHz	19.0	N/A	N/A	19.0	19.0
	5800 MHz	17.0	N/A	N/A	17.0	17.0
5 GHz WIFI (40 MHz)	5200 MHz	N/A	N/A	N/A	19.0	18.0
	5300 MHz	N/A	N/A	N/A	19.0	18.0
	5500 MHz	N/A	N/A	N/A	19.0	18.0
	5800 MHz	N/A	N/A	N/A	17.0	17.0
5 GHz WIFI (80 MHz)	5200 MHz	N/A	N/A	N/A	N/A	17.0
	5300 MHz	N/A	N/A	N/A	N/A	17.0
	5500 MHz	N/A	N/A	N/A	N/A	17.0
	5800 MHz	N/A	N/A	N/A	N/A	17.0

4.3.5 Reduced 2.4 GHz, 5 GHz WIFI output power

Mode / Band		Modulated Average (dBm)				
		SISO				
		11a	11b	11g	11n	11ac
2.4 GHz WIFI (20 MHz)	Ch.1 ~ Ch.11	N/A	19.0	19.0	19.0	N/A
2.4 GHz WIFI (40 MHz)	Ch.3 ~ Ch.9	N/A	N/A	N/A	18.0	N/A
5 GHz WIFI (20 MHz)	5200 MHz	16.0	N/A	N/A	16.0	16.0
	5300 MHz	16.0	N/A	N/A	16.0	16.0
	5500 MHz	16.0	N/A	N/A	16.0	16.0
	5800 MHz	16.0	N/A	N/A	16.0	16.0
5 GHz WIFI (40 MHz)	5200 MHz	N/A	N/A	N/A	16.0	16.0
	5300 MHz	N/A	N/A	N/A	16.0	16.0
	5500 MHz	N/A	N/A	N/A	16.0	16.0
	5800 MHz	N/A	N/A	N/A	16.0	16.0
5 GHz WIFI (80 MHz)	5200 MHz	N/A	N/A	N/A	N/A	16.0
	5300 MHz	N/A	N/A	N/A	N/A	16.0
	5500 MHz	N/A	N/A	N/A	N/A	16.0
	5800 MHz	N/A	N/A	N/A	N/A	16.0

4.3.6 Maximum Bluetooth Power

Mode / Band				Modulated Average (dBm)
Bluetooth	V2.0 with BR 0	CH 00	Maximum	9.5
		CH 39	Maximum	9.5
		CH 78	Maximum	9.5
	v4.0/4.2 with LE		Maximum	0

4.4 LTE Information

Item.		Description		
Frequency Range		LTE Band 2 (PCS)	1 850.7 MHz ~ 1 909.3 MHz	
		LTE Band 4 (AWS)	1 710.7 MHz ~ 1 754.3 MHz	
		LTE Band 5 (Cell)	824.7 MHz ~ 848.3 MHz	
		LTE Band 12	699.7 MHz ~ 715.3 MHz	
		LTE Band 14	790.5 MHz ~ 795.5 MHz	
Channel Bandwidths		LTE Band 2 (PCS)	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 5 (Cell)	1.4 MHz, 3 MHz, 5 MHz, 10 MHz	
		LTE Band 12	1.4 MHz, 3 MHz, 5 MHz, 10 MHz	
		LTE Band 14	5 MHz, 10 MHz	
Ch. No.& Freq.(MHz)		**Low**	**Mid**	**High**
LTE Band 2	1.4 MHz	1 850.7 (18607)	1 880.0 (18900)	1 909.3 (19193)
	3 MHz	1 851.5 (18615)	1 880.0 (18900)	1 908.5 (19185)
	5 MHz	1 852.5 (18625)	1 880.0 (18900)	1 907.5 (19175)
	10 MHz	1 855.0 (18650)	1 880.0 (18900)	1 905.0 (19150)
	15 MHz	1 857.5 (18675)	1 880.0 (18900)	1 902.5 (19125)
	20 MHz	1 860.0 (18700)	1 880.0 (18900)	1 900.0 (19100)
LTE Band 4	1.4 MHz	1 710.7 (19957)	1 732.5 (20175)	1 754.3 (20393)
	3 MHz	1 711.5 (19965)	1 732.5 (20175)	1 753.5 (20385)
	5 MHz	1 712.5 (19975)	1 732.5 (20175)	1 752.5 (20375)
	10 MHz	1 715.0 (20000)	1 732.5 (20175)	1 750.0 (20350)
	15 MHz	1 717.5 (20025)	1 732.5 (20175)	1 747.5 (20325)
	20 MHz	1 720.0 (20050)	1 732.5 (20175)	1 745.0 (20300)
LTE Band 5	1.4 MHz	824.7 (20407)	836.5 (20525)	848.3 (20643)
	3 MHz	825.5 (20415)	836.5 (20525)	847.5 (20635)
	5 MHz	826.5 (20425)	836.5 (20525)	846.5 (20625)
	10 MHz	829.0 (20450)	836.5 (20525)	844.0 (20600)
LTE Band 12	1.4 MHz	699.7 (23017)	707.5 (23095)	715.3 (23173)
	3 MHz	700.5 (23025)	707.5 (23095)	714.5 (23165)
	5 MHz	701.5 (23035)	707.5 (23095)	713.5 (23155)
	10 MHz	704.0 (23060)	707.5 (23095)	711.0 (23130)
LTE Band 14	5 MHz	790.5 (23305)	793 (23330)	795.5 (23355)
	10 MHz		793 (23330)	

UE Category	LTE Rel. 11, DL: Category 6, UL: Category 5
Modulations Supported in UL	QPSK, 16QAM, 64QAM
LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3	Yes
A-MPR disabled for SAR Testing.	Yes
LTE Carrier Aggregation	This device dose not supports Up-Link Carrier aggregation.in US.
LTE Release 10 information	This device does not support full CA features on 3GPP Release 12. The following LTE Release 12 features are not supported. Uplink Carrier aggregations, Relay, HetNet, Enhanced MIMO, elCl, WiFi offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.

4.5 DUT Antenna Locations

The overall dimensions of this device are > 9 X 5 cm. The overall diagonal dimension of the device is < 160 mm and the diagonal display is < 150 mm.

This model allows users to exchange data or media files with other Bluetooth enabled devices using Bluetooth, which means they can connect to other Bluetooth enabled devices via Bluetooth tethering. Therefore, SAR test was performed for additional simultaneous transmissions.
Head and Bluetooth Tethering SAR were evaluated for BT BR tethering applications.

Mode	Rear	Front	Left	Right	Bottom	Top
GSM/GPRS/EDGE 850	Yes	Yes	Yes	Yes	Yes	No
GSM/GPRS/EDGE 1900	Yes	Yes	Yes	Yes	Yes	No
WCDMA 850	Yes	Yes	Yes	Yes	Yes	No
WCDMA 1700	Yes	Yes	Yes	Yes	Yes	No
WCDMA 1900	Yes	Yes	Yes	Yes	Yes	No
LTE Band 2 (PCS)	Yes	Yes	Yes	Yes	Yes	No
LTE Band 4 (AWS)	Yes	Yes	Yes	Yes	Yes	No
LTE Band 5 (Cell)	Yes	Yes	Yes	Yes	Yes	No
LTE Band 12	Yes	Yes	Yes	Yes	Yes	No
LTE Band 14	Yes	Yes	Yes	Yes	Yes	No
2.4 ㎓ WLAN	Yes	Yes	Yes	No	No	Yes
5 ㎓ WLAN	Yes	Yes	Yes	No	No	Yes
Bluetooth	Yes	Yes	Yes	No	No	Yes

Particular EUT edges were not required to be evaluated for Bluetooth Tethering and Hotspot SAR if the edges were > 25 mm from the transmitting antenna according to FCC KDB 941225 D06v02r01 on page 2.
The distance between the transmit antennas and the edges of the device are included in the filing.
- Note: All test configurations are based on front view position.

4.6 SAR Summation Scenario

According to FCC KDB 447498 D01v06, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the EUT are shown below paths and are mode in same rectangle to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Simultaneous transmission paths

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

Simultaneous Transmission Scenarios			
Applicable Combination	Head	Body-Worn	Hotspot
GSM Voice + 2.4 GHz WiFi	Yes	Yes	N/A
GSM Voice + 5 GHz WiFi	Yes	Yes	N/A
GSM Voice + Bluetooth	Yes#	Yes	N/A
GPRS + 2.4 GHz WiFi	N/A	Yes	Yes
GPRS + 5 GHz WiFi	N/A	Yes	Yes
GPRS + Bluetooth	N/A	Yes	Yes#
WCDMA + 2.4 GHz WiFi	Yes	Yes	Yes
WCDMA + 5 GHz WiFi	Yes	Yes	Yes
WCDMA + Bluetooth	Yes#	Yes	Yes#
LTE + 2.4 GHz WiFi	Yes	Yes	Yes
LTE + 5 GHz WiFi	Yes	Yes	Yes
LTE+ Bluetooth	Yes#	Yes	Yes#

1. Bluetooth cannot transmit simultaneously with WLAN.
2. The device does not support licensed bands simultaneously transmitting.
3. WCDMA +WLAN scenario also represents the WCDMA Voice/DATA + WLAN hotspot scenario.
4. VoIP is supported in GPRS/EDGE
5. The highest reported SAR for each exposure condition is used for SAR summation purpose.
6. Wi-Fi Hotspot is supported for 2.4 GHz/ UNII-3 of 5 GHz WLAN.
7. This device supports # Bluetooth tethering.
8. 5 GHz Wireless Router is only supported for the UNII-3 by SW, therefore U-NII-1,U-NII2A and U-NII2C were not evaluated for wireless router conditions.

4.7 SAR Test Considerations

4.7.1 WiFi

Since wireless router operations are not allowed by the chipset firmware using U-NII-1, U-NII-2A & U-NII-2C WiFi, WiFi Hotspot SAR test and combinations are considered only 2.4 ㎓ and U-NII-3 for SAR with respected to wireless router configurations according to FCC KDB 941225 D06v02r01.

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg for 1g SAR and is less than 3.0 W/kg for 10g SAR, SAR is not required for U-NII-1 band according to FCC KDB 248227D01v02r02.

This device supports IEEE 802.11 ac with the following features:

a) Up to 80 ㎒ Bandwidth only
b) No aggregate channel configurations
c) 1Tx Antenna output
d) 256 QAM is supported
e) TDWR channels are supported.
f) Straddle channels are supported
g) Band gap channels are supported

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

4.7.2 Licensed Transmitter(s)

GSM/GPRS/EDGE DTM is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS/EDGE Data.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r05.

This Device supports 64QAM on the uplink for LTE Operations. Conducted powers for 64QAM uplink configurations were measured per section 5.1 of FCC KDB 941225 D05v02r05. SAR was not required for 64QAM sins the highest maximum output power for 64QAM is ≤ 0.5dB higher than the same configuration in QPSK and the reported SAR for QPSK configuration is ≤1.45 W/Kg, per section 5.2.4 for FCC KDB941225 D05v02r05.

This device supports LTE capabilities with overlapping transmission frequency ranges. When the supported frequency range of 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 tested for the band with the larger transmission frequency range.

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

Per FCC KDB 941225 D01v03r01, 12.2 kbps RMC is the primary mode and HSPA (HSUPA/HSDPA with RMC) is the secondary mode.
Per FCC KDB 941225 D01v03r01, The SAR test exclusion is applied to the secondary mode by the following equation.

$$Adjusted\ \ SAR = Highest\ \ Reported\ \ SAR\ \ x\ \ \frac{Secondary\ \ Max\ \ tune-up\ \ (mW)}{Primary\ \ Max\ \ tune\ \ tune-up(mW)} \leq 1.2\ \ \mathrm{W/kg.}$$

Based on the highest Reported SAR, the secondary mode is not required.

Per FCC KDB 690783 1 D01 SAR Listings on Grants v01r03 and KDB 447498 D01 General RF Exposure Guidance v06 The SAR numbers listed must be consistent with the highest reported test results required by the published RF exposure KDB procedures. When the measured SAR is not at the maximum tune-up tolerance limit or maximum output power allowed for production units, the measured results are scaled to the maximum conditions to determine compliance; the scaled results are referred to as the reported SAR.

The Reported SAR = The Measured SAR x-$\frac{Maximum\ \ tune-up\ \ (mW)}{Measured\ \ Conducted\ \ Power(mW)}$

The Reported SAR for WLAN and Bluetooth
The Reported SAR = The Measured SAR x-$\frac{Maximum\ \ tune-up\ \ (mW)}{Measured\ \ Conducted\ \ Power(mW)}$ x Duty factor

FCC KDB 447498 D01v06 General RF Exposure Guidance introduces a new formula for calculating the SAR a Peak Location Separation Ratio(SPLSR) between pairs of simultaneously transmitting antennas:
$SPLSR_i$=$(SAR_1 + SAR_2)^{1.5}/R_i$
Where:
SAR_1 is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR_2 is the highest measured of estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

$Ri_i$is the separation distance between the pair of simultaneous transmitting antennas, When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $[(\mathrm{X}_1 - \mathrm{X}_2)^2 + (\mathrm{Y}_1 - \mathrm{Y}_2)^2 + (\mathrm{Z}_1 - \mathrm{Z}_2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum 1-g of SAR> 1.6 W/kg and with the sum 10-g of SAR >4W/Kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:
$(SAR_1 + SAR_2)^{1.5}/R_i \leq 0.04$ for 1g SAR and $(SAR_1 + SAR_2)^{1.5}/R_i \leq 0.1$ for 10g SAR.

5. Introduction

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.

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 ㎓. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring 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 National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio Frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. 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.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative of the incremental electromagnetic energy (d*W*) absorbed by (dissipated in) an incremental mass (d*m*) contained in a volume element (d*V*) of a given density (*r*). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

$$SAR = \frac{d}{d\ t}\left(\frac{d\ U}{d\ m}\right)$$

Figure 1. SAR Mathematical Equation

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

$$SAR = \sigma\ E^2 / \rho$$

Where:

σ = conductivity of the tissue-simulant material (S/m)

ρ = mass density of the tissue-simulant material (kg/㎥)

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 relations 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. Description of test equipment

6.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure.2).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC with Windows XP or Windows 7 is working with SAR Measurement system DASY4 & DASY5, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

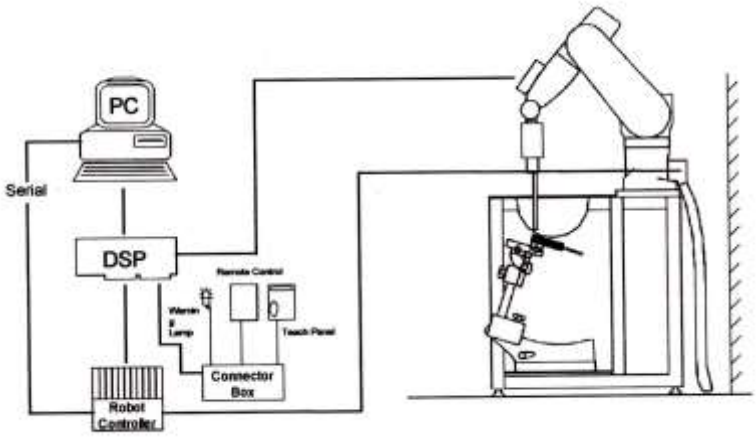


Figure 2. HCT SAR Lab. Test Measurement Set-up

The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in.

7. SAR Measurement Procedure

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

1. The SAR distribution at the exposed side of the head or body was measured at a distance no more than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the DUT's head and body area and the horizontal grid resolution was depending on the FCC KDB 865664 D01v01r04 table 4-1 & IEEE 1528-2013.

2. Based on step, the area of the maximum absorption was determined by sophisticated interpolations routines implemented in DASY software. When an Area Scan has measured all reachable point. DASY system computes the field maximal found in the scanned are, within a range of the maximum. SAR at this fixed point was measured and used as a reference value.

3. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB 865664 D01v01r04 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 (reference from the DASY manual.)

   a. The data at the surface were extrapolated, since the center of the dipoles is no more than 2.7 mm away from the tip of the probe (it is different from the probe type) and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

   b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 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 integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

   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. If the value changed by more than 5 %, the SAR evaluation and drift measurements were repeated.

Area scan and zoom scan resolution setting follow KDB 865664 D01v01r04 quoted below.

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5±1 mm	$^{1}/_{2}\cdot\delta\cdot\ln(2)$±0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		30°±1°	20°±1°
Maximum area scan Spatial resolution: Δx_{Area}, Δy_{Area}		≤ 2 GHz: ≤15 mm 2-3 GHz: ≤12 mm	3-4 GHz: ≤12 mm 4-6 GHz: ≤10 mm
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan Spatial resolution: Δx_{zoom}, Δy_{zoom}		≤ 2 GHz: ≤8mm 2-3 GHz: ≤5mm*	3-4 GHz: ≤5 mm* 4-6 GHz: ≤4 mm*
	uniform grid: $\Delta z_{zoom}(n)$	≤ 5 mm	3-4 GHz: ≤4 mm 4-5 GHz: ≤3 mm 5-6 GHz: ≤2 mm
Maximum zoom scan Spatial resolution normal to phantom surface	graded grid: $\Delta z_{zoom}(1)$: between 1 st two Points closest to phantom surface	≤ 4 mm	3-4 GHz: ≤3 mm 4-5 GHz: ≤2.5 mm 5-6 GHz: ≤2 mm
	graded grid: $\Delta z_{zoom}(n>1)$: between subsequent Points	$\leq 1.5\cdot\Delta z_{zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3-4 GHz: ≥28 mm 4-5 GHz: ≥25 mm 5-6 GHz: ≥22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

8. Description of Test Position

8.1 EAR REFERENCE POINT

Figure 8-2 shows the front, back and side views of the SAM phantom. The center-of-mouth reference point is labeled “M”, the left ear reference point (ERP) is marked “LE”, and the right ERP is marked “RE.” Each ERP is on the B-M (back-mouth) line located 15 mm behind the entrance-to-ear-canal (EEC) point, as shown in Figure 6-1. The Reference Plane is defined as passing through the two ear reference point and point M. 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.

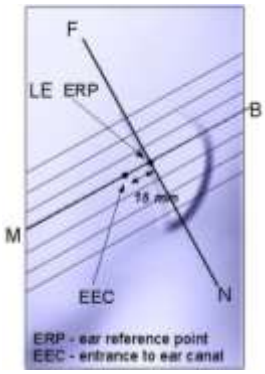


Figure 8-1
Close-up side view of ERP

8.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The device under test 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 8-3). The acoustic output was than located at the same level as the center of the ear reference point. The device under test 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 8-2
Front, back and side views of SAM Twin Phantom

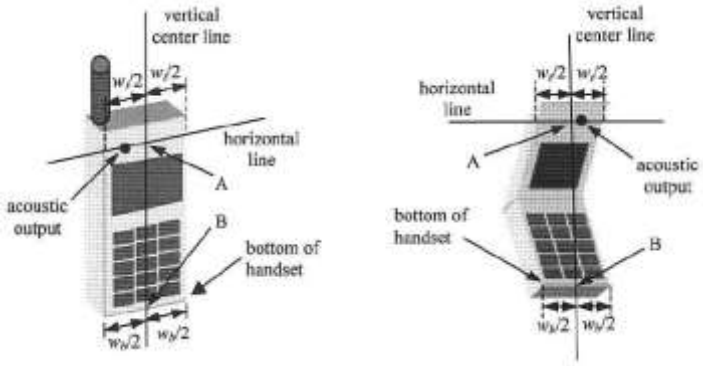


Figure 6-3. Handset vertical and horizontal reference lines

8.3 Device Holder

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

8.4 Position for cheek

Figure 6.4. shows cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

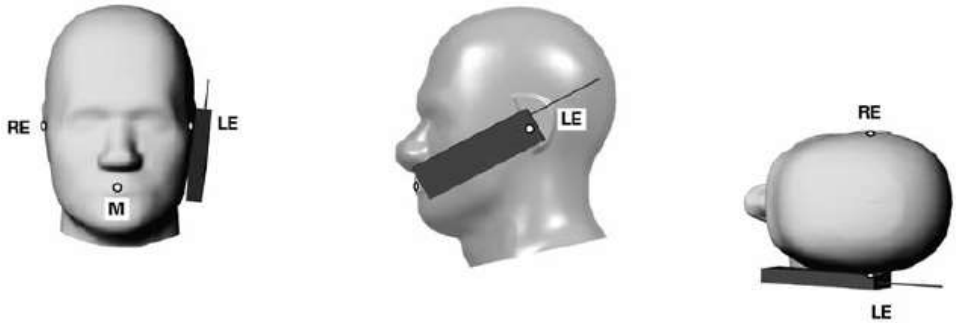


Figure 8.4 Cheek/ Touch position of the wireless device

8.5 Definition of the “tilted” position

Figure 6.5. shows tilted position. Place the device in the cheek position. Then while maintaining the orientation of the device, retract the device parallel to the reference plane far enough away from the phantom to enable a rotation of the device by 15°

Figure 8.5. Tilt 15°position of the wireless device

8.6 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-dips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-6). 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.. 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 8-6
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-dip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

8.7 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≥9cmx5 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 publication 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.

8.8 Additional Test Positions due to Proximity Conditions

This device uses a sensor to reduce output powers in extremity (hand-held) use conditions.

When the sensor detects a user is touching the device on or near to the antenna the device reduces the maximum allowed output power However, the proximity sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, an additional exposure condition is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level.

FCC KDB 616217 D04 v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional exposure conditions. The smallest separation distance determined by the sensor triggering and sensor coverage for each applicable edge, minus 1 mm. was used as the test separation distance for SAR testing. Sensor triggering distance summary data is included in below table.

Wireless technologies	Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	SAR Test distance
WWAN (GSM1900/ WCDMA B2/B4 /LTE/B2/B4)	Rear	20	N/A	N/A	19
	Front	16	N/A	N/A	15
	Bottom	20	N/A	N/A	19

8.9 Bluetooth tethering Configurations

Per May 2017 TCBC Workshop documents When Bluetooth tethering applies ,simultaneous transmission SAR needs consideration

This model allows users to exchange data or media files with other Bluetooth enabled devices using Bluetooth, which means they can connect to other Bluetooth enabled devices via Bluetooth tethering.
Therefore, SAR test was performed for additional simultaneous transmissions.
Head and Bluetooth tethering SAR were evaluated for BT BR tethering applications.

9. RF Exposure Limits

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR * (Partial Body)	1.6	8.0
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.4
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.0	20.0

NOTES:

* The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole-body.

*** The Spatial Peak value of the SAR averaged over any 10 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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 mad 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.

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.

10. FCC SAR General Measurement Procedures

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

10.1 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.

10.2 3G SAR Test Reduction Procedure

10.2.1 GSM, GPRS AND EDGE

The following procedures may be considered for each frequency band to determine SAR test reduction for devices operating in GSM/GPRS/EDGE modes to demonstrate RF exposure compliance. GSM voice mode transmits with 1 time-slot. GPRS and EDGE may transmit up to 4 time slots in the 8 time-slot frame according to the multi-slot class implemented in a device.

10.2.2 SAR Test Reduction

In FCC KDB 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. SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested

10.2.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB 941225 D01v03r01-3G SAR Measurement Procedures

The handset was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluation SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement Software calculates a reference point at the start and end of the test to Cheek for power drifts. If conducted Power deviations of more than 5 % occurred, the tests were repeated.

10.3 SAR Measurement Conditions for WCDMA

10.3.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in sec. 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.

10.3.2 Body SAR measurements

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

10.3.3 SAR Measurements with Rel. 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using and FRC with H-SET 1 in Sub-test and a 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to release 6 HSPA test procedures. 8.4.5 SAR Measurement 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 12.2kbps 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.

10.3.4 SAR Measurements with Rel. 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set1 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.

10.4 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r05 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluation 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).

10.4.1 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.

10.4.2 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.

10.4.3 A-MPR

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

10.4.4 Required RB Size and RB offsets for SAR testing

According to FCC KDB 941225 D05v02r05

a. Per sec 4.2.1, 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 Sec 4.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Sec 4.2.1.
c. Per Sec. 4.2.3, QPSK SAR is not required for the 100% all0cation 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 Sec. 4.2.4 and 4.3, SAR test for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sec. 4.2.1 through 4.2.3 is less than or equal to 1/2 dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/Kg.

10.5 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.

10.5.1 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 system 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.

10.5.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII2A 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 for 1g SAR or > 3.0 W/kg for 10g SAR. 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 for 1g SAR or > 3.0 W/kg for 10g SAR.

10.5.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 ㎒ (5.47 – 5.85 ㎓), 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 ㎓ 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.

10.5.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating nest 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 for 1g SAR and ≤ 1.0 W/kg for 10g SAR, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR or all test positions are measured.

10.5.5 2.4 ㎓ SAR test Requirements

SAR is measured for 2.4 ㎓ 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 is 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 ㎓ 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 ㎓ band, the Initial Test Configuration Procedures should be followed.

10.5.6 OFDM Transmission Mode and SAR Test Channel Selection

For the 2.4 ㎓ and 5 ㎓ bands, 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 and lowest order 802.11 a/g/n/ac mode. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11 ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.2., 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.

10.5.7 Initial Test Configuration Procedure

For OFDM, in both 2.4 ㎓ and 5 ㎓ bands, 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, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, 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.

10.5.8 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 on 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 for 1g SAR and ≤ 3.0 W/kg for 10g SAR, no additional SAR tests for the subsequent test configurations are required.

11. Output Power Specifications

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

Licensed bands

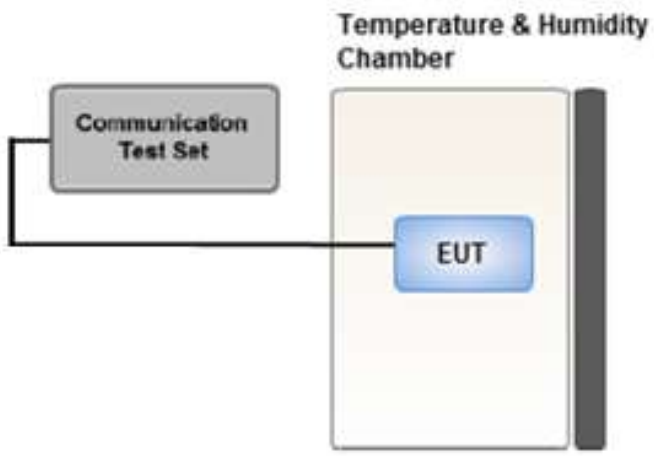
Test Description	Test Procedure Used
Conducted Output Power	- KDB 971168 D01 v03r01 - Section 5.2.4 - ANSI C63.26-2015 - Section 5.2.1 & 5.2.4.2

Test Overview
According to ANSI C63.26-2015 Section 5.2.1 when measuring the maximum RF output power from such devices, control over the EUT must be provided either through special test software (provided by manufacturer specifically for compliance testing, but not accessible by an end user) or through use of a base station emulator, communications test set, call box, or similar instrumentation that is capable of establishing a communications link with the EUT to enable control over variable parameters (e.g., output power, OBW, etc.).

In some cases, these instruments also include basic digital spectrum analyzer and/or power meter capabilities that can be utilized to measure the RF output power if the specified detectors and requirements can be realized and the measurement functions have been calibrated.

Test Procedure
1. The RF port of the EUT was connected to the Communication Tester via an RF cable.
2. Conducted average power was measured using a calibrated Radio Communication Tester.

Test setup



11.1 GSM

11.1.1 GSM Maximum Conducted Output Power

Mode / Band		Voice	GPRS(GMSK) Data – CS1(dBm)		EDGE Data (dBm)	
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot
Maximum		33.70	33.70	30.70	27.70	24.70
Nominal		32.70	32.70	29.70	26.70	23.70
GSM 850	128	32.89	32.90	30.02	27.27	24.31
	190	33.04	33.03	30.15	27.16	24.16
	251	32.78	32.77	30.28	27.09	24.15
Maximum		31.00	31.00	28.70	27.20	25.20
Nominal		30.00	30.00	27.70	26.20	24.20
GSM 1900	512	30.32	30.31	27.09	26.19	24.05
	661	30.59	30.57	27.67	26.55	24.40
	810	30.62	30.63	27.93	26.81	24.66

GSM Conducted output powers (Burst-Average)

Mode / Band		Voice	GPRS(GMSK) Data – CS1(dBm)		EDGE Data (dBm)	
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot
Maximum		24.67	24.67	24.68	18.67	18.68
Nominal		23.67	23.67	23.68	17.67	17.68
GSM 850	23.86	23.86	23.87	24.00	18.24	18.29
	24.01	24.01	24.00	24.13	18.13	18.14
	23.75	23.75	23.74	24.26	18.06	18.13
Maximum		21.97	21.97	22.68	18.17	19.18
Nominal		20.97	20.97	21.68	17.17	18.18
GSM 1900	21.29	21.29	21.28	21.07	17.16	18.03
	21.56	21.56	21.54	21.65	17.52	18.38
	21.59	21.59	21.60	21.91	17.78	18.64

GSM Conducted output powers (Frame-Average)

11.1.2 GSM Reduced Conducted Output Power (Hotspot mode activated)

Mode / Band		Voice	GPRS(GMSK) Data – CS1(dBm)		EDGE Data (dBm)	
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot
Maximum		28.00	28.00	25.00	25.00	22.00
Nominal		27.00	27.00	24.00	24.00	21.00
GSM 1900	512	26.95	26.96	23.89	23.69	21.06
	661	27.69	27.64	24.66	24.06	21.54
	810	27.95	27.96	24.98	24.36	21.83

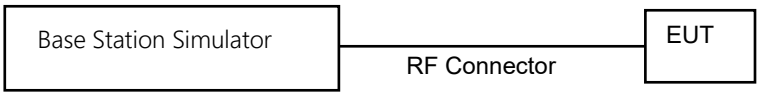
GSM Conducted output powers (Burst-Average)

Mode / Band		Voice	GPRS(GMSK) Data – CS1(dBm)		EDGE Data (dBm)	
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot
Maximum		18.97	18.97	18.98	15.97	15.98
Nominal		17.97	17.97	17.98	14.97	14.98
GSM 1900	512	17.92	17.93	17.87	14.66	15.04
	661	18.66	18.61	18.64	15.03	15.52
	810	18.92	18.93	18.96	15.33	15.81

GSM Conducted output powers (Frame-Average)

Note:
Time slot average factor is as follows:
1 Tx slot = 9.03 dB, Frame-Average output power = Burst-Average output power – 9.03 dB
2 Tx slot = 6.02 dB, Frame-Average output power = Burst-Average output power – 6.02 dB

GSM Class : B
GSM voice: Head SAR , Body worn SAR
GPRS/EDGE Multi-slots 10 : Hotspot SAR with GPRS/EDGE
Multi-slot Class 10 with CS 1 (GMSK)



11.2 WCDMA

HSPA+
This DUT is only capable of QPSK HSPA+ in uplink. Therefore, the RF conducted power is not measured according to 941225 D01v03r01 3G SAR.

11.2.1 WCDMA Maximum Conducted Output Power

WCDMA Band 5

3GPP Release Version	Mode	3GPP 34.121 Subtest	WCDMA Band 5 [dBm] UL 4132 DL 4357	UL 4183 DL 4408	UL 4233 DL 4458	MPR
99	WCDMA	12.2 kbps RMC	24.06	24.02	23.98	-
99		12.2 kbps AMR	24.07	24.02	23.98	
5	HSDPA	Subtest 1	22.91	22.82	22.75	1.0
5		Subtest 2	22.91	22.80	22.78	1.0
5		Subtest 3	22.44	22.39	22.28	1.4
5		Subtest 4	22.45	22.38	22.27	1.4
6	HSUPA	Subtest 1	22.88	22.85	22.83	1.0
6		Subtest 2	21.54	21.71	21.73	2.0
6		Subtest 3	21.77	21.35	21.35	2.2
6		Subtest 4	21.82	21.88	21.88	1.8
6		Subtest 5	22.73	22.86	22.83	1.0

WCDMA Average Conducted output powers

WCDMA Band 4

3GPP Release Version	Mode	3GPP 34.121 Subtest	WCDMA Band 4 [dBm] UL 1312 DL 1537	UL 1412 DL 1637	UL 1513 DL 1738	MPR
99	WCDMA	12.2 kbps RMC	22.80	22.94	22.78	-
99		12.2 kbps AMR	22.79	22.94	22.76	
5	HSDPA	Subtest 1	21.56	21.67	21.67	0.9
5		Subtest 2	21.57	21.70	21.65	0.9
5		Subtest 3	21.09	21.24	21.18	1.5
5		Subtest 4	21.11	21.25	21.19	1.5
6	HSUPA	Subtest 1	21.41	21.77	21.33	1.0
6		Subtest 2	20.35	20.34	20.68	2.0
6		Subtest 3	20.42	20.00	20.28	2.2
6		Subtest 4	20.84	20.85	21.15	1.6
6		Subtest 5	21.27	21.43	21.15	1.2

WCDMA Average Conducted output powers

WCDMA Band 2

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2 [dBm]			MPR
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938	
99	WCDMA	12.2 kbps RMC	23.76	23.92	23.91	-
99		12.2 kbps AMR	23.75	23.93	23.88	-
5	HSDPA	Subtest 1	22.75	22.87	22.80	1.0
5		Subtest 2	22.73	22.88	22.73	1.0
5		Subtest 3	22.19	22.34	22.22	1.5
5		Subtest 4	22.19	22.33	22.21	1.5
6	HSUPA	Subtest 1	22.72	22.75	22.13	1.1
6		Subtest 2	21.29	21.53	21.67	2.1
6		Subtest 3	21.14	21.82	21.39	2.2
6		Subtest 4	21.69	21.91	22.14	1.8
6		Subtest 5	22.68	22.71	21.97	1.3

WCDMA Average Conducted output powers

It is expected by the manufacturer that MPR for some HSPA Subtests may be up to 2 dB more than specified by 3GPP, But also as low as 1 dB according to the chipset implementation in this model to match manufacturer.

11.2.2 WCDMA Reduced Conducted Output Power (Hotspot, Grip Sensor back mode activated)

WCDMA Band 4 Hotspot Back-off Power

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 4 [dBm]			MPR
		Subtest	UL 1312 DL 1537	UL 1412 DL 1637	UL 1513 DL 1738	
99	WCDMA	12.2 kbps RMC	18.71	18.57	18.65	-
99		12.2 kbps AMR	18.69	18.54	18.64	-
5	HSDPA	Subtest 1	17.60	17.53	17.64	0
5		Subtest 2	17.58	17.52	17.63	0
5		Subtest 3	16.93	17.04	17.06	0
5		Subtest 4	16.93	17.04	17.05	0
6	HSUPA	Subtest 1	16.85	16.78	17.05	0
6		Subtest 2	16.48	16.49	16.60	0
6		Subtest 3	16.47	16.02	16.31	0
6		Subtest 4	16.37	16.49	16.89	0
6		Subtest 5	17.41	16.59	16.86	0

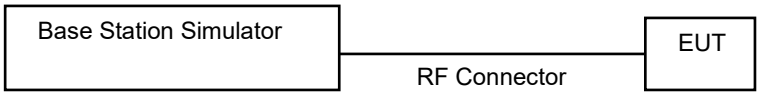
WCDMA Average Conducted output powers

WCDMA Band 2 Hotspot Back-off Power

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2 [dBm]			MPR
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938	
99	WCDMA	12.2 kbps RMC	21.25	21.19	21.18	-
99		12.2 kbps AMR	21.08	21.17	21.16	-
5	HSDPA	Subtest 1	20.05	20.18	20.10	0
5		Subtest 2	20.06	20.16	20.06	0
5		Subtest 3	19.50	19.56	19.48	0
5		Subtest 4	19.50	19.55	19.49	0
6	HSUPA	Subtest 1	19.76	19.81	19.81	0
6		Subtest 2	18.60	18.67	18.67	0
6		Subtest 3	18.32	18.38	18.86	0
6		Subtest 4	19.55	19.61	19.60	0
6		Subtest 5	19.53	19.59	19.67	0

WCDMA Average Conducted output powers

It is expected by the manufacturer that MPR for HSPA Subtests set be 0 dB when Power Back-off is applied.



11.3 LTE Maximum Output Power

LTE B4/5/12/14 at 20 ㎒ Bandwidth does not support three non-overlapping channels. Per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the mid channel of the group of overlapping channels should be selected for testing.

11.3.1 LTE Maximum Conducted Power

LTE Band 2 _ 1.4 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18607 Ch. 1850.7 ㎒	18900 Ch. 1880 ㎒	19193 Ch. 1909.3 ㎒		
1.4 ㎒	QPSK	1	0	23.24	23.17	23.49	0	0
		1	3	23.39	23.24	23.82	0	0
		1	5	23.33	23.38	23.73	0	0
		3	0	23.29	23.23	23.52	0	0
		3	1	23.33	23.27	23.54	0	0
		3	3	23.31	23.24	23.47	0	0
		6	0	22.32	22.27	22.41	0-1	1
	16QAM	1	0	21.87	21.92	22.66	0-1	1
		1	3	21.93	21.87	22.75	0-1	1
		1	5	21.63	21.94	22.66	0-1	1
		3	0	22.17	22.06	22.44	0-1	1
		3	1	22.21	22.14	22.40	0-1	1
		3	3	22.09	22.07	22.41	0-1	1
		6	0	21.01	20.97	21.32	0-2	2
	64QAM	1	0	21.26	21.00	21.32	0-2	2
		1	3	21.44	21.47	21.48	0-2	2
		1	5	21.42	21.42	21.65	0-2	2
		3	0	21.25	21.22	21.44	0-2	2
		3	1	21.30	20.87	21.48	0-2	2
		3	3	21.18	20.70	21.18	0-2	2
		6	0	20.25	20.08	20.23	0-3	3

LTE Band 2 _ 3 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18615 Ch. 1851.5 ㎒	18900 Ch. 1880 ㎒	19185 Ch. 1908.5 ㎒		
3 ㎒	QPSK	1	0	23.16	23.15	23.50	0	0
		1	7	23.36	23.41	23.60	0	0
		1	14	23.35	23.38	23.51	0	0
		8	0	22.32	22.36	22.56	0-1	1
		8	3	22.29	22.32	22.60	0-1	1
		8	7	22.29	22.32	22.45	0-1	1
		15	0	22.26	22.30	22.56	0-1	1
	16QAM	1	0	21.67	21.77	22.22	0-1	1
		1	7	22.01	22.05	22.26	0-1	1
		1	14	21.84	21.62	22.18	0-1	1
		8	0	21.26	21.31	21.40	0-2	2
		8	3	21.31	21.27	21.26	0-2	2
		8	7	21.05	21.27	21.50	0-2	2
		15	0	20.98	21.19	21.47	0-2	2
	64QAM	1	0	20.85	20.89	21.55	0-2	2
		1	7	21.00	21.15	21.66	0-2	2
		1	14	20.96	20.90	21.14	0-2	2
		8	0	20.21	20.24	20.43	0-3	3
		8	3	20.27	20.30	20.51	0-3	3
		8	7	20.15	20.09	20.29	0-3	3
		15	0	20.19	20.15	20.41	0-3	3

LTE Band 2 _ 5 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18625 Ch. 1852.5 ㎒	18900 Ch. 1880 ㎒	19175 Ch. 1907.5 ㎒		
5 ㎒	QPSK	1	0	23.05	23.38	23.46	0	0
		1	12	23.35	23.75	23.80	0	0
		1	24	23.46	23.35	23.66	0	0
		12	0	22.34	22.22	22.53	0-1	1
		12	6	22.33	22.32	22.39	0-1	1
		12	11	22.33	22.24	22.57	0-1	1
		25	0	22.28	22.19	22.53	0-1	1
	16QAM	1	0	21.89	21.54	22.38	0-1	1
		1	12	21.99	21.91	22.21	0-1	1
		1	24	22.09	21.94	22.43	0-1	1
		12	0	21.14	21.02	21.32	0-2	2
		12	6	21.02	21.13	21.32	0-2	2
		12	11	21.04	21.04	21.29	0-2	2
		25	0	21.19	21.11	21.45	0-2	2
	64QAM	1	0	20.92	20.83	21.43	0-2	2
		1	12	21.43	21.41	21.56	0-2	2
		1	24	20.91	20.92	21.13	0-2	2
		12	0	20.11	20.38	20.32	0-3	3
		12	6	20.09	20.29	20.28	0-3	3
		12	11	20.19	20.30	20.47	0-3	3
		25	0	20.12	20.13	20.40	0-3	3

LTE Band 2 _ 10 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18650 Ch. 1855 ㎒	18900 Ch. 1880 ㎒	19150 Ch. 1905 ㎒		
10 ㎒	QPSK	1	0	23.44	23.51	23.46	0	0
		1	24	23.56	23.58	23.76	0	0
		1	49	23.58	23.38	23.05	0	0
		25	0	22.40	22.36	22.56	0-1	1
		25	12	22.41	22.41	22.59	0-1	1
		25	24	22.36	22.28	22.51	0-1	1
		50	0	22.28	22.32	22.41	0-1	1
	16QAM	1	0	22.14	21.94	22.00	0-1	1
		1	24	22.58	21.83	22.10	0-1	1
		1	49	21.90	21.47	22.13	0-1	1
		25	0	21.31	21.12	21.45	0-2	2
		25	12	21.29	21.44	21.60	0-2	2
		25	24	21.24	21.32	21.50	0-2	2
		50	0	21.16	21.28	21.40	0-2	2
	64QAM	1	0	21.01	21.44	21.46	0-2	2
		1	24	21.42	21.14	21.70	0-2	2
		1	49	21.13	21.00	21.09	0-2	2
		25	0	20.24	20.14	20.48	0-3	3
		25	12	20.44	20.47	20.33	0-3	3
		25	24	20.37	20.45	20.27	0-3	3
		50	0	20.30	20.24	20.46	0-3	3

LTE Band 2 _ 15 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18675 Ch. 1857.5 ㎒	18900 Ch. 1880 ㎒	19125 Ch. 1902.5 ㎒		
15 ㎒	QPSK	1	0	23.39	23.44	23.29	0	0
		1	36	24.33	23.81	23.78	0	0
		1	74	23.36	23.48	22.99	0	0
		36	0	22.39	22.41	22.38	0-1	1
		36	18	22.44	22.32	22.46	0-1	1
		36	39	22.25	22.23	22.44	0-1	1
		75	0	22.26	22.29	22.46	0-1	1
	16QAM	1	0	21.98	21.48	21.56	0-1	1
		1	36	22.92	22.05	22.16	0-1	1
		1	74	22.12	22.03	22.19	0-1	1
		36	0	21.29	21.06	21.44	0-2	2
		36	18	21.42	21.31	21.53	0-2	2
		36	39	21.21	21.33	21.52	0-2	2
		75	0	21.32	21.26	21.55	0-2	2
	64QAM	1	0	21.30	21.47	21.02	0-2	2
		1	36	21.76	21.67	21.23	0-2	2
		1	74	21.46	21.17	21.37	0-2	2
		36	0	20.23	20.31	20.50	0-3	3
		36	18	20.47	20.48	20.60	0-3	3
		36	39	20.26	20.33	20.61	0-3	3
		75	0	20.35	20.21	20.40	0-3	3

LTE Band 2 _ 20 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18700 Ch. 1860 ㎒	18900 Ch. 1880 ㎒	19100 Ch. 1900 ㎒		
20 ㎒	QPSK	1	0	23.43	23.37	23.42	0	0
		1	49	**23.90**	23.63	23.63	0	0
		1	99	23.40	23.33	22.83	0	0
		50	0	22.35	22.43	**22.46**	0-1	1
		50	25	22.38	22.38	22.35	0-1	1
		50	49	22.33	22.32	22.37	0-1	1
		100	0	22.38	22.23	22.41	0-1	1
	16QAM	1	0	21.57	21.84	22.07	0-1	1
		1	49	22.11	21.78	22.20	0-1	1
		1	99	21.74	21.49	22.02	0-1	1
		50	0	21.24	21.44	21.26	0-2	2
		50	25	21.35	21.40	21.25	0-2	2
		50	49	21.37	21.31	21.18	0-2	2
		100	0	21.39	21.18	21.30	0-2	2
	64QAM	1	0	21.28	21.36	20.90	0-2	2
		1	49	21.63	21.32	21.28	0-2	2
		1	99	21.47	21.06	21.17	0-2	2
		50	0	20.45	20.35	20.50	0-3	3
		50	25	20.48	20.43	20.39	0-3	3
		50	49	20.26	20.30	20.43	0-3	3
		100	0	20.42	20.15	20.55	0-3	3

[LTE Band 4 Conducted Power]

LTE Band 4 _ 1.4 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				19957 Ch. 1710.7 ㎒	20175 Ch. 1732.5 ㎒	20393 Ch. 1754.3 ㎒		
1.4 ㎒	QPSK	1	0	22.72	23.03	22.97	0	0
		1	3	23.05	23.15	23.34	0	0
		1	5	22.92	23.06	23.21	0	0
		3	0	22.86	23.00	23.05	0	0
		3	1	22.99	23.06	23.20	0	0
		3	3	22.94	23.05	23.01	0	0
		6	0	21.89	22.11	21.99	0-1	1
	16QAM	1	0	21.15	21.42	21.53	0-1	1
		1	3	21.35	21.41	21.68	0-1	1
		1	5	21.26	21.25	21.72	0-1	1
		3	0	21.63	21.76	21.81	0-1	1
		3	1	21.88	21.88	21.79	0-1	1
		3	3	21.64	21.73	21.80	0-1	1
		6	0	20.66	20.70	20.81	0-2	2
	64QAM	1	0	20.50	21.15	20.91	0-2	2
		1	3	21.02	21.22	21.11	0-2	2
		1	5	20.94	20.56	20.60	0-2	2
		3	0	20.64	20.70	20.88	0-2	2
		3	1	20.53	20.87	20.74	0-2	2
		3	3	20.36	20.48	20.71	0-2	2
		6	0	19.77	19.74	20.04	0-3	3

LTE Band 4 _ 3 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				19965 Ch. 1711.5 ㎒	20175 Ch. 1732.5 ㎒	20385 Ch. 1753.5 ㎒		
3 ㎒	QPSK	1	0	22.91	23.04	22.82	0	0
		1	7	22.90	23.12	23.09	0	0
		1	14	22.94	22.95	23.10	0	0
		8	0	22.08	22.17	22.01	0-1	1
		8	3	21.83	22.06	21.98	0-1	1
		8	7	21.81	21.99	21.94	0-1	1
		15	0	21.88	21.92	21.91	0-1	1
	16QAM	1	0	21.16	21.81	21.24	0-1	1
		1	7	21.44	21.66	21.47	0-1	1
		1	14	21.30	21.23	21.32	0-1	1
		8	0	20.83	21.00	20.78	0-2	2
		8	3	20.89	21.02	20.98	0-2	2
		8	7	20.98	21.04	20.91	0-2	2
		15	0	20.90	20.95	21.01	0-2	2
	64QAM	1	0	20.95	20.98	20.43	0-2	2
		1	7	20.95	20.81	21.01	0-2	2
		1	14	20.43	20.47	20.65	0-2	2
		8	0	19.69	19.71	19.70	0-3	3
		8	3	19.77	19.82	19.79	0-3	3
		8	7	19.84	19.72	19.71	0-3	3
		15	0	19.79	19.87	19.81	0-3	3

LTE Band 4 _ 5 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				19975 Ch. 1712.5 ㎒	20175 Ch. 1732.5 ㎒	20375 Ch. 1752.5 ㎒		
5 ㎒	QPSK	1	0	22.97	22.89	23.04	0	0
		1	12	23.15	23.12	23.25	0	0
		1	24	23.00	22.94	23.22	0	0
		12	0	21.97	22.09	22.05	0-1	1
		12	6	21.85	21.99	21.99	0-1	1
		12	11	21.84	21.95	22.05	0-1	1
		25	0	21.90	21.95	21.96	0-1	1
	16QAM	1	0	21.22	21.35	21.42	0-1	1
		1	12	21.35	21.45	21.59	0-1	1
		1	24	21.40	21.44	21.66	0-1	1
		12	0	20.57	20.73	20.81	0-2	2
		12	6	20.54	20.67	20.82	0-2	2
		12	11	20.66	20.71	21.00	0-2	2
		25	0	20.79	20.95	20.81	0-2	2
	64QAM	1	0	20.38	20.49	20.68	0-2	2
		1	12	20.89	20.77	21.06	0-2	2
		1	24	20.78	20.50	20.82	0-2	2
		12	0	19.59	19.79	19.97	0-3	3
		12	6	19.58	19.99	19.89	0-3	3
		12	11	19.69	19.97	19.75	0-3	3
		25	0	19.59	19.94	19.72	0-3	3

LTE Band 4 _ 10 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				20000 Ch. 1715 ㎒	20175 Ch. 1732.5 ㎒	20350 Ch. 1750 ㎒		
10 ㎒	QPSK	1	0	22.98	22.92	22.98	0	0
		1	24	23.43	23.52	23.14	0	0
		1	49	22.86	22.96	23.16	0	0
		25	0	22.04	22.17	22.16	0-1	1
		25	12	22.08	22.06	22.10	0-1	1
		25	24	22.02	22.00	22.05	0-1	1
		50	0	22.00	22.02	21.89	0-1	1
	16QAM	1	0	21.36	21.48	21.70	0-1	1
		1	24	21.48	21.36	21.82	0-1	1
		1	49	21.66	21.43	21.65	0-1	1
		25	0	21.03	21.00	20.95	0-2	2
		25	12	20.98	20.96	21.09	0-2	2
		25	24	20.93	21.01	20.93	0-2	2
		50	0	20.91	20.83	20.87	0-2	2
	64QAM	1	0	20.57	21.02	21.09	0-2	2
		1	24	21.10	20.79	21.15	0-2	2
		1	49	21.02	21.02	21.12	0-2	2
		25	0	20.12	20.07	19.86	0-3	3
		25	12	19.99	19.96	20.21	0-3	3
		25	24	19.83	19.82	20.05	0-3	3
		50	0	19.80	19.73	19.79	0-3	3

LTE Band 4 _ 15 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				20025 Ch. 1717.5 ㎒	20175 Ch. 1732.5 ㎒	20325 Ch. 1747.5 ㎒		
15 ㎒	QPSK	1	0	22.89	22.70	23.25	0	0
		1	36	23.77	23.56	23.59	0	0
		1	74	22.65	23.19	23.23	0	0
		36	0	22.05	22.14	22.12	0-1	1
		36	18	22.19	22.12	22.16	0-1	1
		36	39	22.02	21.96	22.17	0-1	1
		75	0	22.10	21.97	22.01	0-1	1
	16QAM	1	0	21.44	21.59	21.35	0-1	1
		1	36	22.05	21.49	21.73	0-1	1
		1	74	21.61	21.57	21.25	0-1	1
		36	0	20.92	21.03	21.00	0-2	2
		36	18	21.09	21.03	21.14	0-2	2
		36	39	21.02	20.96	21.04	0-2	2
		75	0	20.99	20.96	21.10	0-2	2
	64QAM	1	0	21.08	20.79	21.13	0-2	2
		1	36	21.13	21.25	21.43	0-2	2
		1	74	20.93	21.10	21.13	0-2	2
		36	0	19.96	19.86	20.05	0-3	3
		36	18	20.12	20.06	20.17	0-3	3
		36	39	20.06	19.80	19.98	0-3	3
		75	0	19.99	19.87	19.80	0-3	3

LTE Band 4 _ 20 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]	MPR Allowed Per 3GPP [dB]	MPR [dB]
				20175 Ch. 1732.5 ㎒		
20 ㎒	QPSK	1	0	22.56	0	0
		1	49	**23.28**	0	0
		1	99	23.25	0	0
		50	0	**22.15**	0-1	1
		50	25	22.08	0-1	1
		50	49	21.97	0-1	1
		100	0	21.99	0-1	1
	16QAM	1	0	21.48	0-1	1
		1	49	22.27	0-1	1
		1	99	21.54	0-1	1
		50	0	21.05	0-2	2
		50	25	21.11	0-2	2
		50	49	20.99	0-2	2
		100	0	20.99	0-2	2
	64QAM	1	0	20.77	0-2	2
		1	49	20.96	0-2	2
		1	99	20.81	0-2	2
		50	0	20.05	0-3	3
		50	25	20.03	0-3	3
		50	49	19.89	0-3	3
		100	0	19.91	0-3	3

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[LTE Band 5 Conducted Power]

LTE Band 5 _ 1.4 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				20407 Ch. 824.7 ㎒	20525 Ch. 836.5 ㎒	20643 Ch. 848.3 ㎒		
1.4 ㎒	QPSK	1	0	23.18	23.35	23.51	0	0
		1	3	23.31	23.59	23.73	0	0
		1	5	23.27	23.40	23.51	0	0
		3	0	23.22	23.39	23.50	0	0
		3	1	23.24	23.41	23.41	0	0
		3	3	23.29	23.37	23.33	0	0
		6	0	22.31	22.40	22.34	0-1	1
	16QAM	1	0	21.81	21.83	22.03	0-1	1
		1	3	21.99	22.06	22.01	0-1	1
		1	5	21.81	21.80	21.89	0-1	1
		3	0	22.15	22.32	22.24	0-1	1
		3	1	22.28	22.48	22.42	0-1	1
		3	3	22.21	22.39	22.26	0-1	1
		6	0	21.04	21.27	21.28	0-2	2
	64QAM	1	0	21.47	21.52	21.22	0-2	2
		1	3	21.44	21.57	21.69	0-2	2
		1	5	21.05	21.14	21.60	0-2	2
		3	0	21.02	21.38	21.40	0-2	2
		3	1	21.10	21.40	21.31	0-2	2
		3	3	21.10	21.34	21.15	0-2	2
		6	0	20.24	20.25	20.37	0-3	3

LTE Band 5 _ 3 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				20415 Ch. 825.5 ㎒	20525 Ch. 836.5 ㎒	20635 Ch. 847.5 ㎒		
3 ㎒	QPSK	1	0	23.26	23.39	23.37	0	0
		1	7	23.42	23.55	23.55	0	0
		1	14	23.21	23.54	23.48	0	0
		8	0	22.37	22.44	22.37	0-1	1
		8	3	22.25	22.46	22.46	0-1	1
		8	7	22.19	22.43	22.41	0-1	1
		15	0	22.20	22.45	22.36	0-1	1
	16QAM	1	0	21.56	21.91	22.43	0-1	1
		1	7	21.80	22.12	22.23	0-1	1
		1	14	22.31	22.18	22.02	0-1	1
		8	0	21.39	21.49	21.42	0-2	2
		8	3	21.17	21.40	21.42	0-2	2
		8	7	21.25	21.46	21.50	0-2	2
		15	0	21.15	21.43	21.38	0-2	2
	64QAM	1	0	21.30	21.49	21.15	0-2	2
		1	7	21.43	21.58	21.60	0-2	2
		1	14	21.34	21.25	21.38	0-2	2
		8	0	20.21	20.48	20.38	0-3	3
		8	3	20.19	20.33	20.39	0-3	3
		8	7	20.08	20.29	20.46	0-3	3
		15	0	20.34	20.47	20.53	0-3	3

LTE Band 5 _ 5 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				20425 Ch. 826.5 ㎒	20525 Ch. 836.5 ㎒	20625 Ch. 846.5 ㎒		
5 ㎒	QPSK	1	0	23.05	23.15	23.27	0	0
		1	12	23.28	23.57	23.57	0	0
		1	24	23.05	23.41	23.30	0	0
		12	0	22.35	22.34	22.36	0-1	1
		12	6	22.26	22.48	22.36	0-1	1
		12	11	22.26	22.46	22.32	0-1	1
		25	0	22.26	22.43	22.34	0-1	1
	16QAM	1	0	21.63	22.00	21.97	0-1	1
		1	12	22.01	22.64	22.08	0-1	1
		1	24	21.74	22.00	21.98	0-1	1
		12	0	21.03	21.42	21.28	0-2	2
		12	6	21.16	21.54	21.45	0-2	2
		12	11	21.18	21.42	21.32	0-2	2
		25	0	21.21	21.49	21.34	0-2	2
	64QAM	1	0	21.22	21.28	21.09	0-2	2
		1	12	21.32	21.61	21.50	0-2	2
		1	24	21.21	21.30	21.36	0-2	2
		12	0	20.29	20.29	20.45	0-3	3
		12	6	20.34	20.34	20.37	0-3	3
		12	11	20.16	20.32	20.53	0-3	3
		25	0	20.26	20.55	20.42	0-3	3

LTE Band 5 _ 10 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]	MPR Allowed Per 3GPP [dB]	MPR [dB]
				20525 Ch. 836.5 ㎒		
10 ㎒	QPSK	1	0	23.30	0	0
		1	24	**23.55**	0	0
		1	49	23.53	0	0
		25	0	22.40	0-1	1
		25	12	22.46	0-1	1
		25	24	**22.52**	0-1	1
		50	0	22.43	0-1	1
	16QAM	1	0	22.03	0-1	1
		1	24	22.32	0-1	1
		1	49	22.03	0-1	1
		25	0	21.38	0-2	2
		25	12	21.53	0-2	2
		25	24	21.50	0-2	2
		50	0	21.33	0-2	2
	64QAM	1	0	21.30	0-2	2
		1	24	21.69	0-2	2
		1	49	21.43	0-2	2
		25	0	20.36	0-3	3
		25	12	20.30	0-3	3
		25	24	20.54	0-3	3
		50	0	20.37	0-3	3

[LTE Band 12 Conducted Power]

LTE Band 12 _ 1.4 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				23017 Ch. 699.7 ㎒	23095 Ch. 707.5 ㎒	23173 Ch. 715.3 ㎒		
1.4 ㎒	QPSK	1	0	23.24	23.54	23.23	0	0
		1	3	23.54	23.78	23.19	0	0
		1	5	23.42	23.51	23.21	0	0
		3	0	23.27	23.57	23.16	0	0
		3	1	23.27	23.63	23.28	0	0
		3	3	23.18	23.52	23.35	0	0
		6	0	22.17	22.41	22.29	0-1	1
	16QAM	1	0	21.92	22.16	21.76	0-1	1
		1	3	22.15	22.26	22.01	0-1	1
		1	5	21.97	22.08	21.88	0-1	1
		3	0	22.05	22.34	22.19	0-1	1
		3	1	22.08	22.48	22.15	0-1	1
		3	3	22.00	22.34	22.05	0-1	1
		6	0	21.06	21.28	21.04	0-2	2
	64QAM	1	0	21.72	21.48	21.40	0-2	2
		1	3	21.80	21.58	21.45	0-2	2
		1	5	21.76	21.11	20.98	0-2	2
		3	0	21.02	21.03	20.78	0-2	2
		3	1	21.05	21.10	21.02	0-2	2
		3	3	20.73	21.03	20.93	0-2	2
		6	0	20.15	20.33	20.24	0-3	3

LTE Band 12 _ 3 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				23025 Ch. 700.5 ㎒	23095 Ch. 707.5 ㎒	23165 Ch. 714.5 ㎒		
3 ㎒	QPSK	1	0	23.22	23.35	23.46	0	0
		1	7	23.66	23.64	23.65	0	0
		1	14	23.32	23.66	23.40	0	0
		8	0	22.27	22.52	22.42	0-1	1
		8	3	22.29	22.54	22.40	0-1	1
		8	7	22.24	22.51	22.36	0-1	1
		15	0	22.26	22.57	22.35	0-1	1
	16QAM	1	0	21.93	21.85	22.21	0-1	1
		1	7	22.01	22.20	22.60	0-1	1
		1	14	21.88	22.01	22.32	0-1	1
		8	0	21.26	21.45	21.47	0-2	2
		8	3	21.32	21.54	21.53	0-2	2
		8	7	21.38	21.64	21.41	0-2	2
		15	0	21.36	21.66	21.35	0-2	2
	64QAM	1	0	21.25	21.08	21.21	0-2	2
		1	7	21.32	21.58	21.49	0-2	2
		1	14	20.93	21.19	20.97	0-2	2
		8	0	20.09	20.42	20.30	0-3	3
		8	3	20.05	20.43	20.30	0-3	3
		8	7	19.95	20.42	20.14	0-3	3
		15	0	20.18	20.47	20.31	0-3	3

LTE Band 12 _ 5 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				23035 Ch. 701.5 MHz	23095 Ch. 707.5 MHz	23155 Ch. 713.5 MHz		
5 MHz	QPSK	1	0	23.31	23.37	23.46	0	0
		1	12	23.27	23.60	23.58	0	0
		1	24	23.27	23.46	23.35	0	0
		12	0	22.18	22.45	22.31	0-1	1
		12	6	22.27	22.61	22.32	0-1	1
		12	11	22.19	22.56	22.26	0-1	1
		25	0	22.26	22.52	22.35	0-1	1
	16QAM	1	0	21.72	22.40	22.47	0-1	1
		1	12	21.84	22.78	21.86	0-1	1
		1	24	21.87	22.21	21.76	0-1	1
		12	0	21.07	21.22	21.23	0-2	2
		12	6	21.07	21.37	21.24	0-2	2
		12	11	21.09	21.29	21.28	0-2	2
		25	0	21.21	21.51	21.45	0-2	2
	64QAM	1	0	20.89	21.36	21.46	0-2	2
		1	12	21.43	21.61	21.42	0-2	2
		1	24	21.02	21.06	21.28	0-2	2
		12	0	20.33	20.26	20.12	0-3	3
		12	6	20.29	20.42	20.20	0-3	3
		12	11	20.25	20.51	20.16	0-3	3
		25	0	20.37	20.54	20.30	0-3	3

LTE Band 12 _ 10 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]	MPR Allowed Per 3GPP [dB]	MPR [dB]
				23095 Ch. 707.5 MHz		
10 MHz	QPSK	1	0	23.34	0	0
		1	24	**23.70**	0	0
		1	49	23.42	0	0
		25	0	22.41	0-1	1
		25	12	**22.54**	0-1	1
		25	24	22.44	0-1	1
		50	0	22.44	0-1	1
	16QAM	1	0	21.94	0-1	1
		1	24	22.05	0-1	1
		1	49	21.91	0-1	1
		25	0	21.36	0-2	2
		25	12	21.51	0-2	2
		25	24	21.33	0-2	2
		50	0	21.52	0-2	2
	64QAM	1	0	21.25	0-2	2
		1	24	21.44	0-2	2
		1	49	21.40	0-2	2
		25	0	20.38	0-3	3
		25	12	20.65	0-3	3
		25	24	20.46	0-3	3
		50	0	20.37	0-3	3

[LTE Band 14 Conducted Power]

LTE Band 14 _ 5 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				23305 Ch. 790.5 MHz	23330 Ch. 793 MHz	23355 Ch. 795.5 MHz		
5 MHz	QPSK	1	0	23.25	23.30	23.18	0	0
		1	12	23.53	23.39	23.52	0	0
		1	24	23.14	23.18	23.28	0	0
		12	0	22.41	22.31	22.22	0-1	1
		12	6	22.36	22.25	22.32	0-1	1
		12	11	22.29	22.20	22.28	0-1	1
		25	0	22.33	22.18	22.24	0-1	1
	16QAM	1	0	22.11	22.02	22.04	0-1	1
		1	12	22.57	22.06	22.24	0-1	1
		1	24	22.34	21.85	22.12	0-1	1
		12	0	21.35	21.15	21.15	0-2	2
		12	6	21.40	21.18	21.25	0-2	2
		12	11	21.29	21.14	21.32	0-2	2
		25	0	21.44	21.38	21.25	0-2	2
	64QAM	1	0	21.44	21.44	21.23	0-2	2
		1	12	21.62	21.46	21.52	0-2	2
		1	24	21.28	21.31	21.34	0-2	2
		12	0	20.48	20.39	20.25	0-3	3
		12	6	20.21	20.48	20.27	0-3	3
		12	11	20.34	20.49	20.43	0-3	3
		25	0	20.46	20.39	20.24	0-3	3

LTE Band 14 _ 10 MHz Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Max. Average Power [dBm]	MPR Allowed Per 3GPP [dB]	MPR [dB]
				23330 Ch. 793 MHz		
10 MHz	QPSK	1	0	23.22	0	0
		1	24	**23.41**	0	0
		1	49	23.06	0	0
		25	0	**22.27**	0-1	1
		25	12	22.22	0-1	1
		25	24	22.17	0-1	1
		50	0	22.20	0-1	1
	16QAM	1	0	22.19	0-1	1
		1	24	22.44	0-1	1
		1	49	21.88	0-1	1
		25	0	21.21	0-2	2
		25	12	21.22	0-2	2
		25	24	21.10	0-2	2
		50	0	21.22	0-2	2
	64QAM	1	0	21.17	0-2	2
		1	24	21.38	0-2	2
		1	49	21.06	0-2	2
		25	0	20.30	0-3	3
		25	12	20.33	0-3	3
		25	24	20.09	0-3	3
		50	0	20.22	0-3	3

11.3.2 LTE Reduced Conducted Power (Hotspot, Grip Sensor activated)

[LTE Band 2 Conducted Power]

LTE Band 2 _ 1.4 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18607 Ch. 1850.7 ㎒	18900 Ch. 1880 ㎒	19193 Ch. 1909.3 ㎒		
1.4 ㎒	QPSK	1	0	20.76	20.86	20.64	0	0
		1	3	20.81	20.96	20.71	0	0
		1	5	20.80	21.01	20.64	0	0
		3	0	20.77	20.95	20.62	0	0
		3	1	20.80	21.11	20.66	0	0
		3	3	20.88	21.00	20.62	0	0
		6	0	19.75	19.78	19.62	0-1	1
	16QAM	1	0	19.54	19.76	19.20	0-1	1
		1	3	19.77	19.56	19.35	0-1	1
		1	5	19.35	19.35	19.28	0-1	1
		3	0	19.58	19.71	19.51	0-1	1
		3	1	19.73	19.81	19.56	0-1	1
		3	3	19.67	19.64	19.49	0-1	1
		6	0	18.71	18.82	18.56	0-2	2
	64QAM	1	0	18.51	18.88	18.88	0-2	2
		1	3	18.65	18.90	18.58	0-2	2
		1	5	19.08	19.10	18.88	0-2	2
		3	0	18.83	18.62	18.64	0-2	2
		3	1	18.64	18.68	18.66	0-2	2
		3	3	18.50	18.72	18.60	0-2	2
		6	0	17.76	17.81	17.65	0-3	3

LTE Band 2 _ 3 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18615 Ch. 1851.5 ㎒	18900 Ch. 1880 ㎒	19185 Ch. 1908.5 ㎒		
3 ㎒	QPSK	1	0	20.72	20.79	20.51	0	0
		1	7	20.95	21.02	20.63	0	0
		1	14	20.89	20.74	20.63	0	0
		8	0	19.86	19.84	19.59	0-1	1
		8	3	19.91	19.82	19.69	0-1	1
		8	7	19.78	19.92	19.74	0-1	1
		15	0	19.78	19.80	19.67	0-1	1
	16QAM	1	0	19.29	20.07	19.09	0-1	1
		1	7	19.59	19.78	19.37	0-1	1
		1	14	19.47	19.42	19.16	0-1	1
		8	0	18.87	18.88	18.72	0-2	2
		8	3	18.89	18.83	18.81	0-2	2
		8	7	18.92	18.83	18.87	0-2	2
		15	0	18.86	18.78	18.76	0-2	2
	64QAM	1	0	18.81	18.80	18.36	0-2	2
		1	7	18.88	18.98	18.80	0-2	2
		1	14	18.61	18.52	18.75	0-2	2
		8	0	17.82	17.81	17.73	0-3	3
		8	3	17.77	17.86	17.84	0-3	3
		8	7	17.75	17.87	17.76	0-3	3
		15	0	17.72	17.80	17.66	0-3	3

LTE Band 2 _ 5 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18625 Ch. 1852.5 ㎒	18900Ch. 1880 ㎒	19175 Ch. 1907.5 ㎒		
5 ㎒	QPSK	1	0	20.80	20.77	20.64	0	0
		1	12	20.99	20.99	20.71	0	0
		1	24	20.89	20.86	20.65	0	0
		12	0	19.86	19.89	19.63	0-1	1
		12	6	19.81	19.82	19.61	0-1	1
		12	11	19.78	19.85	19.66	0-1	1
		25	0	19.77	19.88	19.60	0-1	1
	16QAM	1	0	19.22	19.39	19.49	0-1	1
		1	12	19.60	19.60	19.55	0-1	1
		1	24	19.55	19.29	19.68	0-1	1
		12	0	18.84	18.68	18.43	0-2	2
		12	6	18.81	18.81	18.67	0-2	2
		12	11	18.76	18.92	18.73	0-2	2
		25	0	18.83	18.96	18.56	0-2	2
	64QAM	1	0	18.78	18.60	18.43	0-2	2
		1	12	19.04	18.66	18.42	0-2	2
		1	24	18.90	18.80	18.33	0-2	2
		12	0	17.90	17.76	17.58	0-3	3
		12	6	17.77	17.99	17.77	0-3	3
		12	11	17.93	17.90	17.80	0-3	3
		25	0	17.88	18.00	17.60	0-3	3

LTE Band 2 _ 10 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18650 Ch. 1855 ㎒	18900 Ch. 1880 ㎒	19150 Ch. 1905 ㎒		
10 ㎒	QPSK	1	0	20.86	21.00	20.80	0	0
		1	24	21.26	20.99	20.89	0	0
		1	49	20.80	21.02	20.71	0	0
		25	0	19.89	20.00	19.82	0-1	1
		25	12	19.89	19.91	19.78	0-1	1
		25	24	19.77	19.92	19.63	0-1	1
		50	0	19.87	19.81	19.61	0-1	1
	16QAM	1	0	19.44	19.41	19.43	0-1	1
		1	24	19.94	19.44	19.74	0-1	1
		1	49	19.28	19.33	19.22	0-1	1
		25	0	18.86	18.80	18.59	0-2	2
		25	12	18.86	18.82	18.84	0-2	2
		25	24	18.85	18.90	18.70	0-2	2
		50	0	18.94	18.79	18.57	0-2	2
	64QAM	1	0	18.49	17.82	18.77	0-2	2
		1	24	18.80	19.15	19.06	0-2	2
		1	49	18.96	18.85	18.66	0-2	2
		25	0	17.80	18.11	18.01	0-3	3
		25	12	17.72	18.03	18.07	0-3	3
		25	24	17.77	17.77	17.92	0-3	3
		50	0	17.87	17.93	17.72	0-3	3

LTE Band 2 _ 15 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18675 Ch. 1857.5 ㎒	18900 Ch. 1880 ㎒	19125 Ch. 1902.5 ㎒		
15 ㎒	QPSK	1	0	20.82	21.01	20.85	0	0
		1	36	21.19	21.29	21.07	0	0
		1	74	20.83	20.87	20.66	0	0
		36	0	19.93	20.03	19.75	0-1	1
		36	18	19.85	19.91	19.80	0-1	1
		36	39	19.86	19.86	19.62	0-1	1
		75	0	19.91	19.86	19.64	0-1	1
	16QAM	1	0	19.42	19.45	19.53	0-1	1
		1	36	19.52	19.63	19.61	0-1	1
		1	74	19.23	18.94	19.11	0-1	1
		36	0	18.88	18.90	18.72	0-2	2
		36	18	18.90	18.88	18.67	0-2	2
		36	39	18.81	18.75	18.49	0-2	2
		75	0	18.86	18.84	18.62	0-2	2
	64QAM	1	0	19.08	18.66	18.06	0-2	2
		1	36	19.25	19.33	18.64	0-2	2
		1	74	18.94	18.70	17.83	0-2	2
		36	0	17.96	18.04	17.78	0-3	3
		36	18	18.05	17.95	17.83	0-3	3
		36	39	17.95	18.02	17.75	0-3	3
		75	0	17.80	18.07	17.75	0-3	3

LTE Band 2 _ 20 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				18700 Ch. 1860 ㎒	18900 Ch. 1880 ㎒	19100 Ch. 1900 ㎒		
20 ㎒	QPSK	1	0	20.98	20.98	20.81	0	0
		1	49	**21.15**	21.07	21.05	0	0
		1	99	20.91	20.90	20.58	0	0
		50	0	19.91	19.95	19.85	0-1	1
		50	25	19.86	**19.98**	19.80	0-1	1
		50	49	19.83	19.89	19.63	0-1	1
		100	0	19.88	19.87	19.79	0-1	1
	16QAM	1	0	19.54	19.54	19.12	0-1	1
		1	49	19.54	20.17	19.36	0-1	1
		1	99	19.44	19.48	18.78	0-1	1
		50	0	18.81	19.01	18.82	0-2	2
		50	25	18.84	18.87	18.89	0-2	2
		50	49	18.82	18.80	18.64	0-2	2
		100	0	18.84	18.82	18.67	0-2	2
	64QAM	1	0	19.07	19.16	18.91	0-2	2
		1	49	19.15	18.93	19.00	0-2	2
		1	99	19.09	18.71	18.74	0-2	2
		50	0	17.96	17.94	17.88	0-3	3
		50	25	17.87	17.92	17.91	0-3	3
		50	49	17.74	17.96	17.67	0-3	3
		100	0	17.78	17.78	17.72	0-3	3

[LTE Band 4 Conducted Power]

LTE Band 4 _ 1.4 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				19957 Ch. 1710.7 ㎒	20175 Ch. 1732.5 ㎒	20393 Ch. 1754.3 ㎒		
1.4 ㎒	QPSK	1	0	17.94	18.06	18.01	0	0
		1	3	18.02	18.09	18.10	0	0
		1	5	17.95	18.05	18.06	0	0
		3	0	17.94	17.98	18.02	0	0
		3	1	17.99	18.13	17.98	0	0
		3	3	17.95	18.04	18.03	0	0
		6	0	16.90	17.07	16.88	0-1	1
	16QAM	1	0	16.33	17.14	17.05	0-1	1
		1	3	16.63	16.62	16.67	0-1	1
		1	5	16.42	16.66	16.44	0-1	1
		3	0	16.78	17.19	16.71	0-1	1
		3	1	17.02	17.21	16.80	0-1	1
		3	3	17.15	17.19	16.74	0-1	1
		6	0	15.76	16.23	15.76	0-2	2
	64QAM	1	0	15.95	16.08	16.11	0-2	2
		1	3	15.84	16.30	16.16	0-2	2
		1	5	15.68	16.19	16.15	0-2	2
		3	0	15.72	16.12	15.72	0-2	2
		3	1	15.83	16.15	15.88	0-2	2
		3	3	15.75	15.62	15.66	0-2	2
		6	0	14.83	15.38	14.71	0-3	3

LTE Band 4 _ 3 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				19965 Ch. 1711.5 ㎒	20175 Ch. 1732.5 ㎒	20385 Ch. 1753.5 ㎒		
3 ㎒	QPSK	1	0	17.86	18.05	18.08	0	0
		1	7	17.94	18.10	18.24	0	0
		1	14	17.87	18.03	18.04	0	0
		8	0	17.06	17.12	16.93	0-1	1
		8	3	16.98	17.12	16.97	0-1	1
		8	7	16.84	17.06	16.93	0-1	1
		15	0	16.85	17.01	16.94	0-1	1
	16QAM	1	0	16.81	16.89	16.67	0-1	1
		1	7	16.13	16.78	16.80	0-1	1
		1	14	16.01	16.43	16.65	0-1	1
		8	0	15.88	16.32	15.92	0-2	2
		8	3	15.90	16.22	15.98	0-2	2
		8	7	15.86	16.26	16.11	0-2	2
		15	0	15.93	16.10	15.95	0-2	2
	64QAM	1	0	16.03	16.15	15.58	0-2	2
		1	7	15.98	16.13	16.07	0-2	2
		1	14	15.80	16.06	15.95	0-2	2
		8	0	14.80	14.91	14.73	0-3	3
		8	3	14.82	14.97	14.76	0-3	3
		8	7	14.70	15.02	14.81	0-3	3
		15	0	14.76	14.95	14.86	0-3	3

LTE Band 4 _ 5 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				19975 Ch. 1712.5 ㎒	20175 Ch. 1732.5 ㎒	20375 Ch. 1752.5 ㎒		
5 ㎒	QPSK	1	0	17.87	18.00	18.06	0	0
		1	12	17.89	17.96	18.37	0	0
		1	24	17.88	18.07	18.12	0	0
		12	0	16.95	17.03	17.10	0-1	1
		12	6	16.89	17.03	16.98	0-1	1
		12	11	16.78	17.09	16.97	0-1	1
		25	0	16.86	17.02	16.93	0-1	1
	16QAM	1	0	16.90	16.43	17.15	0-1	1
		1	12	16.50	16.85	16.65	0-1	1
		1	24	16.45	16.72	16.70	0-1	1
		12	0	15.65	15.90	15.93	0-2	2
		12	6	15.84	15.98	16.00	0-2	2
		12	11	15.83	16.06	15.98	0-2	2
		25	0	15.82	15.99	16.06	0-2	2
	64QAM	1	0	15.69	16.02	15.57	0-2	2
		1	12	16.01	16.22	16.18	0-2	2
		1	24	15.77	16.15	16.15	0-2	2
		12	0	14.81	14.93	14.94	0-3	3
		12	6	15.04	14.92	15.00	0-3	3
		12	11	14.90	14.80	14.90	0-3	3
		25	0	14.77	14.89	14.94	0-3	3

LTE Band 4 _ 10 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				20000 Ch. 1715 ㎒	20175 Ch. 1732.5 ㎒	20350 Ch. 1750 ㎒		
10 ㎒	QPSK	1	0	17.96	17.86	18.01	0	0
		1	24	18.07	18.15	18.29	0	0
		1	49	17.89	17.87	18.07	0	0
		25	0	16.93	17.02	17.07	0-1	1
		25	12	16.93	17.08	16.88	0-1	1
		25	24	16.83	17.01	17.15	0-1	1
		50	0	16.81	17.04	17.04	0-1	1
	16QAM	1	0	16.69	16.56	16.75	0-1	1
		1	24	16.28	17.12	16.66	0-1	1
		1	49	16.09	16.69	16.64	0-1	1
		25	0	15.89	15.98	16.04	0-2	2
		25	12	15.99	16.15	16.32	0-2	2
		25	24	15.90	16.08	16.32	0-2	2
		50	0	15.97	15.93	16.12	0-2	2
	64QAM	1	0	15.66	15.72	15.77	0-2	2
		1	24	16.03	15.92	16.50	0-2	2
		1	49	15.58	15.67	15.74	0-2	2
		25	0	14.94	15.13	15.10	0-3	3
		25	12	14.94	15.29	14.93	0-3	3
		25	24	14.84	15.05	15.15	0-3	3
		50	0	14.82	15.00	14.93	0-3	3

LTE Band 4 _ 15 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]			MPR Allowed Per 3GPP [dB]	MPR [dB]
				20025 Ch. 1717.5 ㎒	20175 Ch. 1732.5 ㎒	20325 Ch. 1747.5 ㎒		
15 ㎒	QPSK	1	0	17.91	17.96	18.16	0	0
		1	36	18.07	18.10	18.27	0	0
		1	74	17.99	18.00	18.02	0	0
		36	0	16.89	17.01	17.06	0-1	1
		36	18	16.92	17.08	16.95	0-1	1
		36	39	16.87	16.99	17.05	0-1	1
		75	0	16.89	17.00	16.97	0-1	1
	16QAM	1	0	16.57	16.51	16.56	0-1	1
		1	36	17.17	16.71	16.59	0-1	1
		1	74	16.55	16.61	16.26	0-1	1
		36	0	15.84	15.95	16.05	0-2	2
		36	18	15.88	16.04	15.97	0-2	2
		36	39	16.01	15.95	16.12	0-2	2
		75	0	15.95	16.07	16.13	0-2	2
	64QAM	1	0	15.50	15.71	15.40	0-2	2
		1	36	16.42	16.42	16.24	0-2	2
		1	74	15.86	15.93	15.86	0-2	2
		36	0	14.92	14.85	15.04	0-3	3
		36	18	14.85	15.12	15.00	0-3	3
		36	39	14.99	15.03	15.14	0-3	3
		75	0	14.78	15.02	15.00	0-3	3

LTE Band 4 _ 20 ㎒ Bandwidth

Bandwidth	Modulation	RB Size	RB Offset	Reduced Power [dBm]	MPR Allowed Per 3GPP [dB]	MPR [dB]
				20175 Ch. 1732.5 ㎒		
20 ㎒	QPSK	1	0	**18.17**	0	0
		1	49	18.11	0	0
		1	99	18.10	0	0
		50	0	17.00	0-1	1
		50	25	**17.13**	0-1	1
		50	49	16.98	0-1	1
		100	0	17.02	0-1	1
	16QAM	1	0	16.60	0-1	1
		1	49	17.31	0-1	1
		1	99	16.67	0-1	1
		50	0	16.06	0-2	2
		50	25	16.12	0-2	2
		50	49	16.04	0-2	2
		100	0	15.98	0-2	2
	64QAM	1	0	15.80	0-2	2
		1	49	16.30	0-2	2
		1	99	15.81	0-2	2
		50	0	15.12	0-3	3
		50	25	15.08	0-3	3
		50	49	15.02	0-3	3
		100	0	14.94	0-3	3

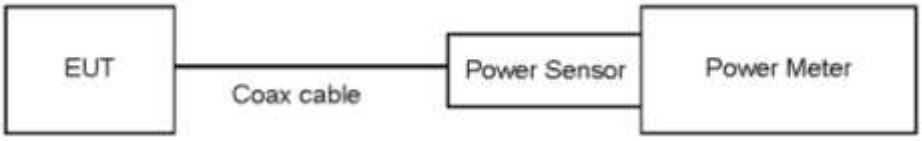
11.4 WIFI Conducted Power measurement method

Un-Licensed bands (DTS Band)

Test Description	Test Procedure Used
Conducted Output Power	- KDB 558074 v05 - Section 8.3.2.3 - ANSI 63.10-2013 - Section 11.9.2.3

Test Procedure
1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Test setup

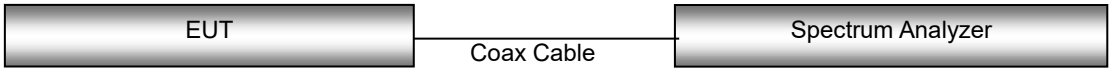


Un-Licensed bands (NII Band)

Test Description	Test Procedure Used
Conducted Output Power	- KDB 789033 D02 v02r01 - Section E.3.a

Test Procedure
1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Test setup



11.4.1 IEEE 802.11 (2.4 GHz) Maximum Conducted Power

Mode	Frequency [MHz]	Channel	IEEE 802.11 (2.4 GHz) Average RF Conducted Power [dBm]
802.11b	2 412	1	19.01
	2 437	6	18.92
	2 462	11	18.85
802.11g	2 412	1	19.20
	2 437	6	19.24
	2 462	11	19.06
802.11n (HT20)	2 412	1	19.03
	2 437	6	19.29
	2 462	11	19.11
802.11n (HT40)	2 422	3	18.62
	2 437	6	18.39
	2 452	9	18.28

11.4.2 IEEE 802.11 (2.4 GHz) Reduced Conducted Power (Held to ear VOIP)

Mode	Frequency [MHz]	Channel	IEEE 802.11 (2.4 GHz) Reduced Average Conducted Power [dBm]
802.11b	2 412	1	18.42
	2 437	6	18.37
	2 462	11	18.34
802.11g	2 412	1	18.57
	2 437	6	18.70
	2 462	11	18.57
802.11n (HT20)	2 412	1	18.66
	2 437	6	18.72
	2 462	11	18.61
802.11n (HT40)	2 422	3	17.25
	2 437	6	17.19
	2 452	9	17.15

11.4.3 IEEE 802.11 (5 GHz) Maximum Conducted Power

Mode	Frequency [MHz]	Channel	IEEE 802.11n(5 GHz) Average RF Conducted Power [dBm]
802.11n (40 MHz BW)	5 190	38	18.92
	5 230	46	18.98
	5 270	54	18.92
	5 310	62	18.91
	5 510	102	18.44
	5 590	118	18.53
	5 630	126	18.83
	5 710	142	18.43
	5 755	151	15.96
	5 795	159	16.10

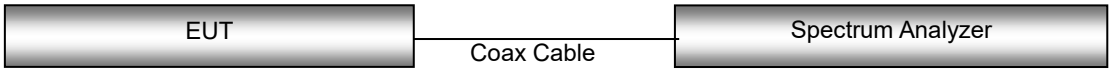
Mode	Frequency [MHz]	Channel	IEEE 802.11ac(5 GHz) Average RF Conducted Power [dBm
802.11ac (80 MHz BW)	5 210	42	16.98
	5 290	58	16.71
	5 530	106	16.40
	5 610	122	16.75
	5 690	138	16.81
	5 775	155	15.99

11.4.4 IEEE 802.11 (5 GHz) Reduced Conducted Power (Held to ear VOIP)

Mode	Frequency [MHz]	Channel	IEEE 802.11 (5 GHz) Reduced Average Conducted Power [dBm]
802.11ac (80 MHz BW)	5 210	42	15.99
	5 290	58	15.69
	5 530	106	15.39
	5 610	122	15.65
	5 690	138	15.81
	5 775	155	14.97

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:
▪ Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
▪ For transmission mode with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
▪ For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
▪ For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.

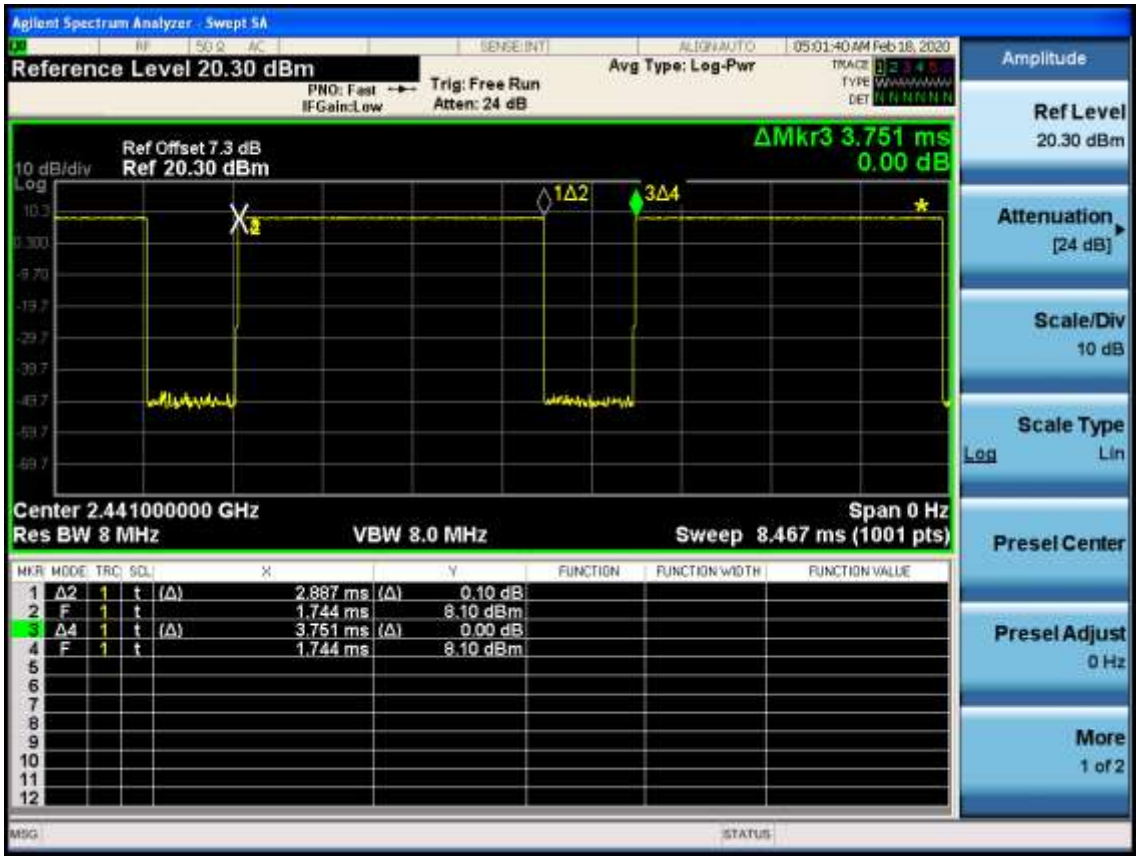
Test Configuration



11.5 Bluetooth Conducted Power

The Burst averaged-conducted power

Mode	Channel	Bluetooth Power [dBm]
DH5	0	6.73
	39	8.57
	78	7.96
2-DH5	0	4.93
	39	6.75
	78	6.14
3-DH5	0	4.93
	39	6.75
	78	6.14



Duty Cycle

= (BT-On time /BT-Full time) =(2.887/3.751) = 0.770 (DH5)

Duty factor= 1/Duty cycle : 1.299

12. System Verification

12.1 Tissue Verification

The body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity.

Table for Head Tissue Verification									
Date of Tests	Tissue Temp. (°C)	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
02/07/2020	20.9	750H	705	0.851	42.065	0.889	42.174	-4.27%	-0.26%
			710	0.856	41.993	0.890	42.148	-3.82%	-0.37%
			750	0.895	41.442	0.893	41.940	0.22%	-1.19%
			785	0.925	40.999	0.896	41.758	3.24%	-1.82%
02/12/2020	21.0	835H	820	0.911	42.493	0.899	41.577	1.33%	2.20%
			835	0.928	42.292	0.900	41.500	3.11%	1.91%
			850	0.940	42.102	0.916	41.500	2.62%	1.45%
02/07/2020	20.9	835H	820	0.912	42.506	0.899	41.577	1.45%	2.23%
			835	0.928	42.329	0.900	41.500	3.11%	2.00%
			850	0.938	42.171	0.916	41.500	2.40%	1.62%
02/20/2020	20.7	835H	820	0.911	42.566	0.899	41.577	1.33%	2.38%
			835	0.928	42.328	0.900	41.500	3.11%	2.00%
			850	0.937	42.108	0.916	41.500	2.29%	1.47%
02/12/2020	21.0	1800H	1710	1.300	39.439	1.348	40.144	-3.56%	-1.76%
			1750	1.340	39.308	1.371	40.080	-2.26%	-1.93%
			1800	1.392	39.083	1.400	40.000	-0.57%	-2.29%
02/13/2020	20.9	1900H	1850	1.360	38.796	1.400	40.000	-2.86%	-3.01%
			1900	1.418	38.696	1.400	40.000	1.29%	-3.26%
			1910	1.424	38.643	1.400	40.000	1.71%	-3.39%
02/12/2020	21.0	1900H	1850	1.361	38.794	1.400	40.000	-2.79%	-3.02%
			1900	1.418	38.685	1.400	40.000	1.29%	-3.29%
			1910	1.424	38.637	1.400	40.000	1.71%	-3.41%
02/20/2020	20.7	1900H	1850	1.344	40.463	1.400	40.000	-4.00%	1.16%
			1900	1.359	40.294	1.400	40.000	-2.93%	0.73%
			1910	1.367	40.284	1.400	40.000	-2.36%	0.71%
02/11/2020	19.8	2450H	2400	1.728	38.616	1.756	39.290	-1.59%	-1.72%
			2450	1.790	38.349	1.800	39.200	-0.56%	-2.17%
			2500	1.842	38.192	1.855	39.140	-0.70%	-2.42%
02/11/2020	20.2	5180H-5825H	5180	4.721	36.991	4.635	36.010	1.86%	2.72%
			5250	4.847	36.904	4.706	35.930	3.00%	2.71%
			5280	4.777	36.778	4.737	35.894	0.84%	2.46%
			5320	4.748	36.880	4.778	35.846	-0.63%	2.88%
			5500	5.043	36.518	4.963	35.640	1.61%	2.46%
			5600	5.173	36.713	5.065	35.530	2.13%	3.33%
			5750	5.299	36.797	5.219	35.360	1.53%	4.06%
			5800	5.264	36.976	5.270	35.300	-0.11%	4.75%
			5825	5.145	36.432	5.296	35.270	-0.98%	-4.30%

Table for Body Tissue Verification									
Date of Tests	Tissue Temp. (°C)	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
02/11/2020	21.5	750B	705	0.923	55.812	0.959	55.710	-3.75%	0.18%
			710	0.928	55.780	0.960	55.690	-3.33%	0.16%
			750	0.968	55.393	0.963	55.530	0.52%	-0.25%
			785	0.995	54.997	0.966	55.397	3.00%	-0.72%
02/12/2020	20.2	835B	820	0.943	53.562	0.969	55.260	-2.68%	-3.07%
			835	0.959	53.394	0.970	55.200	-1.13%	-3.27%
			850	0.970	53.160	0.988	55.150	-1.82%	-3.61%
02/10/2020	21.4	835B	820	0.942	56.520	0.969	55.260	-2.79%	2.28%
			835	0.961	56.339	0.970	55.200	-0.93%	2.06%
			850	0.973	56.182	0.988	55.150	-1.52%	1.87%
02/20/2020	20.4	835B	820	0.941	56.590	0.969	55.260	-2.89%	2.41%
			835	0.960	56.410	0.970	55.200	-1.03%	2.19%
			850	0.972	56.246	0.988	55.150	-1.62%	1.99%
02/13/2020	20.8	1800B	1710	1.455	53.895	1.463	53.534	-0.55%	0.67%
			1750	1.488	53.866	1.488	53.430	0.00%	0.82%
			1800	1.536	53.745	1.520	53.300	1.05%	0.83%
02/13/2020	20.3	1900B	1850	1.483	53.609	1.520	53.300	-2.43%	0.58%
			1900	1.526	53.548	1.520	53.300	0.39%	0.47%
			1910	1.543	53.566	1.520	53.300	1.51%	0.50%
02/13/2020	20.8	1900B	1850	1.479	53.669	1.520	53.300	-2.70%	0.69%
			1900	1.525	53.523	1.520	53.300	0.33%	0.42%
			1910	1.537	53.594	1.520	53.300	1.12%	0.55%
02/20/2020	20.4	1900B	1850	1.479	53.642	1.520	53.300	-2.70%	0.64%
			1900	1.527	53.523	1.520	53.300	0.46%	0.42%
			1910	1.535	53.572	1.520	53.300	0.99%	0.51%
02/11/2020	19.8	2450B	2400	1.880	53.900	1.902	52.770	-1.16%	2.14%
			2450	1.948	53.712	1.950	52.700	-0.10%	1.92%
			2500	2.004	53.538	2.021	52.640	-0.84%	1.71%
02/12/2020	21.0	5180B-5600B	5180	5.222	47.742	5.276	49.038	-1.02%	-2.64%
			5250	5.476	48.246	5.358	48.950	2.20%	-1.44%
			5280	5.324	47.364	5.393	48.908	-1.28%	-3.16%
			5320	5.429	46.747	5.439	48.852	-0.18%	-4.31%
			5500	5.670	47.046	5.650	48.610	0.35%	-3.22%
			5600	5.822	47.949	5.766	48.470	0.97%	-1.07%
02/13/2020	20.8	5750B-5825B	5750	5.869	46.447	5.942	48.270	-1.23%	-3.78%
			5800	6.041	46.146	6.000	48.200	0.68%	-4.26%
			5825	5.970	46.096	6.029	48.165	-0.98%	-4.30%

12.2 System Verification

Input Power: 50 mW

Freq. [MHz]	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp. [°C]	Liquid Temp. [°C]	1 W Target SAR_{1g} (SPEAG) [W/kg]	50mW Measured SAR_{1g} [W/kg]	1 W Normalized SAR_{1g} [W/kg]	Deviation [%]	Limit [%]
750	02/07/2020	3076	1014	Head	21.2	20.9	8.25	0.425	8.5	+ 3.03	± 10
750	02/11/2020	3076		Body	21.8	21.5	8.48	0.425	8.5	+ 0.24	± 10
835	02/12/2020	7370	441	Head	21.2	21.0	9.69	0.495	9.9	+ 2.17	± 10
835	02/07/2020	3076		Head	21.2	20.9	9.69	0.501	10.02	+ 3.41	± 10
835	02/20/2020	7370		Head	20.9	20.7	9.69	0.473	9.46	- 2.37	± 10
835	02/12/2020	3797		Body	20.4	20.2	9.73	0.465	9.3	- 4.42	± 10
835	02/10/2020	3076		Body	21.7	21.4	9.73	0.495	9.9	+ 1.75	± 10
835	02/20/2020	3797		Body	20.6	20.4	9.73	0.479	9.58	- 1.54	± 10
1 800	02/12/2020	7370	2d015	Head	21.2	21.0	38.5	1.96	39.2	+ 1.82	± 10
1 800	02/13/2020	3863		Body	21.1	20.8	38.3	1.84	36.8	- 3.92	± 10
1 900	02/13/2020	7370	5d061	Head	21.2	20.9	39.9	2.02	40.4	+ 1.25	± 10
1 900	02/12/2020	7370		Head	21.2	21.0	39.9	1.92	38.4	- 3.76	± 10
1 900	02/20/2020	7370		Head	20.9	20.7	39.9	1.88	37.6	- 5.76	± 10
1 900	02/13/2020	3797		Body	20.4	20.3	39.8	1.90	38.0	- 4.52	± 10
1 900	02/13/2020	3863		Body	21.1	20.8	39.8	1.89	37.8	- 5.03	± 10
1 900	02/20/2020	3797		Body	20.6	20.4	39.8	1.85	37	- 7.04	± 10
2 450	02/11/2020	3968	965	Head	20.0	19.8	52.3	2.66	53.2	+ 1.72	± 10
2 450	02/11/2020	3968		Body	20.0	19.8	51.2	2.73	54.6	+ 6.64	± 10
5 250	02/11/2020	3863	1107	Head	20.6	20.2	81.6	4.05	81.0	- 0.74	± 10
5 250	02/12/2020	3863		Body	21.2	21.0	75.4	3.73	74.6	- 1.06	± 10
5 600	02/11/2020	3863		Head	20.6	20.2	84.0	4.17	83.4	- 0.71	± 10
5 600	02/12/2020	3863		Body	21.2	21.0	78.5	3.81	76.2	- 2.93	± 10
5 750	02/11/2020	3863		Head	20.6	20.2	80.9	4.23	84.6	+ 4.57	± 10
5 750	02/13/2020	3863		Body	21.1	20.8	76.6	3.61	72.2	- 5.74	± 10

12.3 System Verification Procedure

SAR measurement was prior to assessment, the system is verified to the ± 10 % of the specifications at each frequency band by using the system verification kit. (Graphic Plots Attached)

- Cabling the system, using the verification kit equipment.
- Generate about 50 mW Input level from the signal generator to the Dipole Antenna.
- Dipole antenna was placed below the flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.
- The results are normalized to 1 W input power.

Note;
SAR Verification was performed according to the FCC KDB 865664 D01v01r04.

13. SAR Test Data Summary

13.1 SAR Measurement Results

GSM 850 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
836.6	190	GSM	33.7	33.04	-0.15	Left Cheek	1:8.3	0.396	1.164	0.461	-
836.6	190	GSM	33.7	33.04	-0.12	Left Tilt	1:8.3	0.171	1.164	0.199	-
836.6	190	GSM	33.7	33.04	-0.12	Right Cheek	1:8.3	0.399	1.164	**0.464**	1
836.6	190	GSM	33.7	33.04	0.10	Right Tilt	1:8.3	0.240	1.164	0.279	-
836.6	190	GPRS 2Tx	30.7	30.15	-0.12	Left Cheek	1:4.1495	0.278	1.135	0.316	-
836.6	190	GPRS 2Tx	30.7	30.15	-0.15	Left Tilt	1:4.1495	0.141	1.135	0.160	-
836.6	190	GPRS 2Tx	30.7	30.15	0.16	Right Cheek	1:4.1495	0.262	1.135	0.297	-
836.6	190	GPRS 2Tx	30.7	30.15	-0.01	Right Tilt	1:4.1495	0.133	1.135	0.151	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg Averaged over 1 gram					

GSM 1900 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
1 880	661	GSM	31.0	30.59	-0.12	Left Cheek	1:8.3	0.239	1.099	0.263	-
1 880	661	GSM	31.0	30.59	0.03	Left Tilt	1:8.3	0.225	1.099	0.247	-
1 880	661	GSM	31.0	30.59	0.03	Right Cheek	1:8.3	0.330	1.099	**0.363**	2
1 880	661	GSM	31.0	30.59	0.12	Right Tilt	1:8.3	0.151	1.099	0.166	-
1 909.8	810	GPRS 2Tx	28.7	27.93	-0.14	Left Cheek	1:4.1495	0.148	1.194	0.177	-
1 909.8	810	GPRS 2Tx	28.7	27.93	0.14	Left Tilt	1:4.1495	0.128	1.194	0.153	-
1 909.8	810	GPRS 2Tx	28.7	27.93	0.19	Right Cheek	1:4.1495	0.165	1.194	0.197	-
1 909.8	810	GPRS 2Tx	28.7	27.93	0.16	Right Tilt	1:4.1495	0.089	1.194	0.106	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg Averaged over 1 gram					

WCDMA 850 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		**(W/kg)**	
836.6	4183	RMC	24.7	24.02	0.13	Left Cheek	1:1	0.523	1.169	**0.611**	3
836.6	4183	RMC	24.7	24.02	-0.13	Left Tilt	1:1	0.222	1.169	0.260	-
836.6	4183	RMC	24.7	24.02	-0.11	Right Cheek	1:1	0.493	1.169	0.576	-
836.6	4183	RMC	24.7	24.02	-0.15	Right Tilt	1:1	0.291	1.169	0.340	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

WCDMA 1700 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		**(W/kg)**	
1 732.4	1412	RMC	23.5	22.94	-0.17	Left Cheek	1:1	0.154	1.138	0.175	-
1 732.4	1412	RMC	23.5	22.94	0.16	Left Tilt	1:1	0.118	1.138	0.134	-
1 732.4	1412	RMC	23.5	22.94	0.02	Right Cheek	1:1	0.258	1.138	**0.294**	4
1 732.4	1412	RMC	23.5	22.94	0.01	Right Tilt	1:1	0.104	1.138	0.118	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

WCDMA 1900 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		**(W/kg)**	
1 880	9400	RMC	24.7	23.92	-0.02	Left Cheek	1:1	0.360	1.197	0.431	-
1 880	9400	RMC	24.7	23.92	0.11	Left Tilt	1:1	0.348	1.197	0.417	-
1 880	9400	RMC	24.7	23.92	-0.19	Right Cheek	1:1	0.480	1.197	**0.575**	5
1 880	9400	RMC	24.7	23.92	0.01	Right Tilt	1:1	0.229	1.197	0.274	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

LTE Band 2 Head SAR															
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(W/kg)		(W/kg)	
1 860	18700	QPSK	20	24.2	23.90	-0.09	Left Cheek	0	1	49	1:1	0.368	1.072	0.394	-
1 900	19100	QPSK	20	23.2	22.46	0.17	Left Cheek	1	50	0	1:1	0.337	1.186	0.400	-
1 860	18700	QPSK	20	24.2	23.90	0.14	Left Tilt	0	1	49	1:1	0.297	1.072	0.318	-
1 900	19100	QPSK	20	23.2	22.46	0.07	Left Tilt	1	50	0	1:1	0.179	1.186	0.212	-
1 860	18700	QPSK	20	24.2	23.90	-0.02	Right Cheek	0	1	49	1:1	0.525	1.072	**0.563**	6
1 900	19100	QPSK	20	23.2	22.46	0.01	Right Cheek	1	50	0	1:1	0.369	1.186	0.438	-
1 860	18700	QPSK	20	24.2	23.90	0.16	Right Tilt	0	1	49	1:1	0.228	1.072	0.244	-
1 900	19100	QPSK	20	23.2	22.46	0.10	Right Tilt	1	50	0	1:1	0.127	1.186	0.151	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Head 1.6 W/kg Averaged over 1 gram								

LTE Band 4 Head SAR															
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(W/kg)		(W/kg)	
1 732.5	20175	QPSK	20	23.7	23.28	0.17	Left Cheek	0	1	49	1:1	0.157	1.102	0.173	-
1 732.5	20175	QPSK	20	22.7	22.15	-0.01	Left Cheek	1	50	0	1:1	0.110	1.135	0.125	-
1 732.5	20175	QPSK	20	23.7	23.28	0.11	Left Tilt	0	1	49	1:1	0.099	1.102	0.109	-
1 732.5	20175	QPSK	20	22.7	22.15	-0.04	Left Tilt	1	50	0	1:1	0.074	1.135	0.084	-
1 732.5	20175	QPSK	20	23.7	23.28	-0.17	Right Cheek	0	1	49	1:1	0.271	1.102	**0.299**	7
1 732.5	20175	QPSK	20	22.7	22.15	-0.16	Right Cheek	1	50	0	1:1	0.198	1.135	0.225	-
1 732.5	20175	QPSK	20	23.7	23.28	-0.12	Right Tilt	0	1	49	1:1	0.115	1.102	0.127	-
1 732.5	20175	QPSK	20	22.7	22.15	-0.06	Right Tilt	1	50	0	1:1	0.076	1.135	0.086	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Head 1.6 W/kg Averaged over 1 gram								

LTE Band 5 Head SAR															
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(W/kg)		(W/kg)	
836.5	20525	QPSK	10	24.2	23.55	0.18	Left Cheek	0	1	24	1:1	0.255	1.161	0.296	-
836.5	20525	QPSK	10	23.2	22.52	0.08	Left Cheek	1	25	24	1:1	0.257	1.169	0.300	-
836.5	20525	QPSK	10	24.2	23.55	0.01	Left Tilt	0	1	24	1:1	0.120	1.161	0.139	-
836.5	20525	QPSK	10	23.2	22.52	0.04	Left Tilt	1	25	24	1:1	0.103	1.169	0.120	-
836.5	20525	QPSK	10	24.2	23.55	-0.09	Right Cheek	0	1	24	1:1	0.249	1.161	0.289	-
836.5	20525	QPSK	10	23.2	22.52	0.11	Right Cheek	1	25	24	1:1	0.257	1.169	**0.300**	8
836.5	20525	QPSK	10	24.2	23.55	-0.19	Right Tilt	0	1	24	1:1	0.143	1.161	0.166	-
836.5	20525	QPSK	10	23.2	22.52	-0.04	Right Tilt	1	25	24	1:1	0.141	1.169	0.165	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Head 1.6 W/kg Averaged over 1 gram								

LTE Band 12 Head SAR															
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(W/kg)		(W/kg)	
707.5	23095	QPSK	10	24.2	23.70	0.08	Left Cheek	0	1	24	1:1	0.206	1.122	0.231	-
707.5	23095	QPSK	10	23.2	22.54	0.14	Left Cheek	1	25	12	1:1	0.205	1.164	0.239	-
707.5	23095	QPSK	10	24.2	23.70	-0.13	Left Tilt	0	1	24	1:1	0.100	1.122	0.112	-
707.5	23095	QPSK	10	23.2	22.54	0.04	Left Tilt	1	25	12	1:1	0.077	1.164	0.090	-
707.5	23095	QPSK	10	24.2	23.70	0.15	Right Cheek	0	1	24	1:1	0.228	1.122	**0.256**	9
707.5	23095	QPSK	10	23.2	22.54	-0.02	Right Cheek	1	25	12	1:1	0.211	1.164	0.246	-
707.5	23095	QPSK	10	24.2	23.70	0.04	Right Tilt	0	1	24	1:1	0.112	1.122	0.126	-
707.5	23095	QPSK	10	23.2	22.54	0.07	Right Tilt	1	25	12	1:1	0.107	1.164	0.125	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Head 1.6 W/kg Averaged over 1 gram								

LTE Band 14 Head SAR															
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(W/kg)		(W/kg)	
793	23330	QPSK	10	24.0	23.41	0.10	Left Cheek	0	1	24	1:1	0.252	1.146	**0.289**	10
793	23330	QPSK	10	23.0	22.27	0.16	Left Cheek	1	25	0	1:1	0.198	1.183	0.234	-
793	23330	QPSK	10	24.0	23.41	0.04	Left Tilt	0	1	24	1:1	0.135	1.146	0.155	-
793	23330	QPSK	10	23.0	22.27	0.16	Left Tilt	1	25	0	1:1	0.103	1.183	0.122	-
793	23330	QPSK	10	24.0	23.41	-0.07	Right Cheek	0	1	24	1:1	0.237	1.146	0.272	-
793	23330	QPSK	10	23.0	22.27	0.18	Right Cheek	1	25	0	1:1	0.235	1.183	0.278	-
793	23330	QPSK	10	24.0	23.41	0.05	Right Tilt	0	1	24	1:1	0.148	1.146	0.170	-
793	23330	QPSK	10	23.0	22.27	0.06	Right Tilt	1	25	0	1:1	0.137	1.183	0.162	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Head 1.6 W/kg Averaged over 1 gram								

DTS Head SAR															
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(W/kg)	(W/kg)		(Duty)	(W/kg)	
2 412	1	802.11b	20	1	19.0	18.42		Left Cheek	100	0.484		1.143	1.000		-
2 412	1	802.11b	20	1	19.0	18.42		Left Tilt	100	0.521		1.143	1.000		-
2 412	1	802.11b	20	1	19.0	18.42	-0.11	Right Cheek	100	0.945	0.520	1.143	1.000	**0.594**	11
2 412	1	802.11b	20	1	19.0	18.42	-0.11	Right Tilt	100	0.636	0.335	1.143	1.000	0.383	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Head 1.6 W/kg Averaged over 1 gram							

NII Head SAR																
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(W/kg)	(W/kg)		(Duty)	(W/kg)	
5 290	58	802.11ac	80	MCS0	16.0	15.69		Left Cheek	96.0	0.329		1.074	1.042		-
5 290	58	802.11ac	80	MCS0	16.0	15.69		Left Tilt	96.0	0.410		1.074	1.042		-
5 290	58	802.11ac	80	MCS0	16.0	15.69	0.17	Right Check	96.0	0.809	0.355	1.074	1.042	**0.397**	12
5 290	58	802.11ac	80	MCS0	16.0	15.69		Right Tilt	96.0	0.557		1.074	1.042		-
5 690	138	802.11ac	80	MCS0	16.0	15.81		Left Cheek	96.0	0.449		1.045	1.042		-
5 690	138	802.11ac	80	MCS0	16.0	15.81		Left Tilt	96.0	0.474		1.045	1.042		-
5 690	138	802.11ac	80	MCS0	16.0	15.81	-0.12	Right Cheek	96.0	0.744	0.316	1.045	1.042	0.344	-
5 690	138	802.11ac	80	MCS0	16.0	15.81		Right Tilt	96.0	0.605		1.045	1.042		-
5 775	155	802.11ac	80	MCS0	16.0	14.97		Left Cheek	96.0	0.395		1.268	1.042		-
5 775	155	802.11ac	80	MCS0	16.0	14.97		Left Tilt	96.0	0.427		1.268	1.042		-
5 775	155	802.11ac	80	MCS0	16.0	14.97	-0.03	Right Cheek	96.0	0.458	0.219	1.268	1.042	0.289	-
5 775	155	802.11ac	80	MCS0	16.0	14.97		Right Tilt	96.0	0.389		1.268	1.042		-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Head 1.6 W/kg Averaged over 1 gram							

DSS Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dBm)	(dBm)	(dB)		(W/kg)		(Duty)	(W/kg)	
2 441	39	Bluetooth DH5	9.5	8.57	-0.10	Left Cheek	0.023	1.239	1.299	0.037	-
2 441	39	Bluetooth DH5	9.5	8.57	-0.17	Left Tilt	0.025	1.239	1.299	0.040	-
2 441	39	Bluetooth DH5	9.5	8.57	-0.02	Right Cheek	0.036	1.239	1.299	**0.058**	13
2 441	39	Bluetooth DH5	9.5	8.57	-0.10	Right Tilt	0.023	1.239	1.299	0.037	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

13.2 Body-worn SAR Measurement Results

This product is applied with power reduction by operation of grip sensor at 20mm on the Rear side and 16mm on the front Side in GSM1900 / WCDMAB4 / B2LTE B2 / B4 mode. Thus, SAR measurement of the rear side 15mm of the Body Worn SAR was performed at power reduction.

GSM/ WCDMA Body-Worn SAR													
Frequency		Mode		Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.			(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
836.6	190	GSM 850 Voice		33.7	33.04	-0.01	Rear	1:8.3	15	0.372	1.164	**0.433**	14
836.6	190	GSM 850 Voice		33.7	33.04	-0.07	Front	1:8.3	15	0.350	1.164	0.407	-
836.6	190	GPRS 2Tx		30.7	30.15	0.16	Rear	1:4.1495	15	0.346	1.135	0.393	-
836.6	190	GPRS 2Tx		30.7	30.15	-0.09	Front	1:4.1495	15	0.310	1.135	0.352	-
1 909.8	810	GSM 1900 Voice		28	27.95	-0.13	Rear	1:8.3	15	0.142	1.005	0.143	-
1 880	661	GSM 1900 Voice		31.0	30.59	-0.11	Front	1:8.3	15	0.181	1.099	**0.199**	15
1 909.8	810	GPRS 2Tx		25	24.98	-0.19	Rear	1:4.1495	15	0.139	1.005	0.140	-
1 909.8	810	GPRS 2Tx		28.7	27.93	-0.18	Front	1:4.1495	15	0.107	1.194	0.128	-
836.6	4183	WCDMA 850	RMC	24.7	24.02	-0.01	Rear	1:1	15	0.410	1.169	**0.479**	16
836.6	4183	WCDMA 850	RMC	24.7	24.02	0.11	Front	1:1	15	0.386	1.169	0.451	-
1 732.4	1412	WCDMA 1700	RMC	19.8	18.57	-0.04	Rear	1:1	15	0.461	1.327	**0.612**	17
1 732.4	1412	WCDMA 1700	RMC	23.5	22.94	0.17	Front	1:1	15	0.433	1.138	0.493	-
1 880	9400	WCDMA 1900	RMC	22.2	21.19	0.03	Rear	1:1	15	0.315	1.262	0.398	-
1 880	9400	WCDMA 1900	RMC	24.7	23.92	0.03	Front	1:1	15	0.454	1.197	**0.543**	18
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram						

LTE Body-Worn SAR																
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
1 860	18700	LTE 2 QPSK	20	21.5	21.15	-0.15	Rear	0	1	49	1:1	15	0.323	1.084	0.350	-
1 880	18900		20	20.5	19.98	-0.11	Rear	1	50	25	1:1	15	0.216	1.127	0.243	-
1 860	18700		20	24.2	23.90	0.454	Front	0	1	49	1:1	15	0.333	1.072	**0.357**	19
1 900	19100		20	23.2	22.46	0.454	Front	1	50	0	1:1	15	0.246	1.186	0.292	-
1 732.5	20175	LTE 4 QPSK	20	18.7	18.17	-0.11	Rear	0	1	0	1:1	15	0.399	1.130	0.451	-
1 732.5	20175		20	17.7	17.13	-0.09	Rear	1	50	25	1:1	15	0.287	1.140	0.327	-
1 732.5	20175		20	23.7	23.28	-0.13	Front	0	1	49	1:1	15	0.458	1.102	**0.505**	20
1 732.5	20175		20	22.7	22.15	-0.10	Front	1	50	0	1:1	15	0.357	1.135	0.405	-
836.5	20525	LTE 5 QPSK	10	24.2	23.55	-0.01	Rear	0	1	24	1:1	15	0.290	1.161	**0.337**	21
836.5	20525		10	23.2	22.52	0.02	Rear	1	25	24	1:1	15	0.232	1.169	0.271	-
836.5	20525		10	24.2	23.55	-0.16	Front	0	1	24	1:1	15	0.264	1.161	0.307	-
836.5	20525		10	23.2	22.52	0.07	Front	1	25	24	1:1	15	0.216	1.169	0.253	-
707.5	23095	LTE 12 QPSK	10	24.2	23.70	-0.16	Rear	0	1	24	1:1	15	0.323	1.122	**0.362**	22
707.5	23095		10	23.2	22.54	-0.00	Rear	1	25	12	1:1	15	0.242	1.164	0.282	-
707.5	23095		10	24.2	23.70	-0.00	Front	0	1	24	1:1	15	0.276	1.122	0.310	-
707.5	23095		10	23.2	22.54	-0.06	Front	1	25	12	1:1	15	0.209	1.164	0.243	-
793	23330	LTE 14 QPSK	10	24.0	23.41	-0.16	Rear	0	1	24	1:1	15	0.342	1.146	**0.392**	23
793	23330		10	23.0	22.27	-0.04	Rear	1	25	0	1:1	15	0.274	1.183	0.324	-
793	23330		10	24.0	23.41	0.09	Front	0	1	24	1:1	15	0.309	1.146	0.354	-
793	23330		10	23.0	22.27	-0.00	Front	1	25	0	1:1	15	0.243	1.183	0.287	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

DTS Body-Worn SAR																	
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
2 412	1	802.11b	20	1	19.5	19.01	-0.04	Rear	100	15	0.119	0.082	1.119	1.000	**0.092**	24
2 412	1	802.11b	20	1	19.5	19.01		Front	100	15	0.105		1.119	1.000		-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg (mW/g) Averaged over 1 gram								

NII Body-Worn SAR																	
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
5 270	54	802.11n	40	MCS0	19	18.92	0.18	Rear	98.0	15	1.34	0.595	1.019	1.020	**0.618**	25
5 270	54	802.11n	40	MCS0	19	18.92	-0.13	Front	98.0	15	0.262	0.122	1.019	1.020	0.127	-
5 630	126	802.11n	40	MCS0	19	18.83	0.03	Rear	98.0	15	0.940	0.406	1.040	1.020	0.431	-
5 630	126	802.11n	40	MCS0	19	18.83	0.11	Front	98.0	15	0.218	0.032	1.040	1.020	0.034	-
5 775	155	802.11ac	80	MCS0	17	15.99	0.17	Rear	96.0	15	0.890	0.372	1.262	1.040	0.488	-
5 775	155	802.11ac	80	MCS0	17	15.99	0.10	Front	96.0	15	0.129	0.033	1.262	1.040	0.043	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg (mW/g) Averaged over 1 gram								

DSS Body-Worn SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Distance	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dBm)	(dBm)	(dB)		(mm)	(W/kg)		(Duty)	(W/kg)	
2 441	39	Bluetooth DH5	9.5	8.57	-0.11	Rear	15	0.00476	1.239	1.299	0.008	-
2 441	39	Bluetooth DH5	9.5	8.57	-0.14	Front	15	0.00509	1.239	1.299	**0.008**	26
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg (mW/g) Averaged over 1 gram					

13.3 Hotspot SAR Measurement Results

.This product is powered by the Grip sensor at 20mm on the back, 16mm on the front, and 20mm on the bottom in the GSM1900 / WCDMAB4 / B2LTE B2 / B4 mode. Therefore, hotspot SAR measurements on the rear side, front side, and bottom side of the hotspot SAR were performed under power reduction.

GSM 850 Hotspot SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
836.6	190	GPRS 2Tx	30.7	30.15	-0.11	Rear	1:4.15	10	0.450	1.135	**0.511**	27
836.6	190	GPRS 2Tx	30.7	30.15	-0.13	Front	1:4.15	10	0.381	1.135	0.432	-
836.6	190	GPRS 2Tx	30.7	30.15	-0.01	Left	1:4.15	10	0.259	1.135	0.294	-
836.6	190	GPRS 2Tx	30.7	30.15	0.17	Right	1:4.15	10	0.242	1.135	0.275	-
836.6	190	GPRS 2Tx	30.7	30.15	-0.02	Bottom	1:4.15	10	0.052	1.135	0.059	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

GSM 1900 Hotspot SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
1 909.8	810	GPRS 2Tx	25.0	24.98	-0.13	Rear	1:4.1495	10	0.338	1.005	0.340	-
1 909.8	810	GPRS 2Tx	25.0	24.98	-0.05	Front	1:4.1495	10	0.200	1.005	0.201	-
1 909.8	810	GPRS 2Tx	28.7	27.93	-0.02	Left	1:4.1495	10	0.115	1.194	0.137	-
1 909.8	810	GPRS 2Tx	28.7	27.93	-0.18	Right	1:4.1495	10	0.118	1.194	0.141	-
1 909.8	810	GPRS 2Tx	25.0	24.98	0.04	Bottom	1:4.1495	10	0.436	1.005	**0.438**	28
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

WCDMA 850 Hotspot SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
836.6	4183	RMC	24.7	24.02	0.06	Rear	1:1	10	0.442	1.169	**0.517**	29
836.6	4183	RMC	24.7	24.02	-0.09	Front	1:1	10	0.409	1.169	0.478	-
836.6	4183	RMC	24.7	24.02	0.02	Left	1:1	10	0.333	1.169	0.389	-
836.6	4183	RMC	24.7	24.02	-0.01	Right	1:1	10	0.270	1.169	0.316	-
836.6	4183	RMC	24.7	24.02	-0.14	Bottom	1:1	10	0.067	1.169	0.078	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

WCDMA 1700 Hotspot SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
1 712.4	1312	RMC	19.8	18.71	-0.18	Rear	1:1	10	0.849	1.285	1.091	-
1 732.4	1412	RMC	19.8	18.57	0.06	Rear	1:1	10	0.852	1.327	1.131	-
1 752.6	1513	RMC	19.8	18.65	0.13	Rear	1:1	10	0.674	1.303	0.878	-
1 732.4	1412	RMC	19.8	18.57	-0.12	Front	1:1	10	0.364	1.327	0.483	-
1 732.4	1412	RMC	23.5	22.94	0.10	Left	1:1	10	0.064	1.138	0.073	-
1 732.4	1412	RMC	23.5	22.94	-0.03	Right	1:1	10	0.123	1.138	0.140	-
1 712.4	1312	RMC	19.8	18.71	0.11	Bottom	1:1	10	0.698	1.285	0.897	-
1 732.4	1412	RMC	19.8	18.57	0.04	Bottom	1:1	10	1.05	1.327	**1.393**	30
1 752.6	1513	RMC	19.8	18.65	0.11	Bottom	1:1	10	0.868	1.303	1.131	-
1 732.4	1412	RMC	19.8	18.57	0.04	Bottom	1:1	10	1.05	1.327	1.393	*
1 732.4	1412	RMC	19.8	18.57	0.16	Bottom	1:1	10	1.02	1.327	1.354	**
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

Note: * Data entry indicate Variability measurement.
** Data entry indicate Device holder perturbation measurement.

WCDMA 1900 Hotspot SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
1 852.4	9262	RMC	22.2	21.25	-0.05	Rear	1:1	10	0.702	1.245	0.874	-
1 880	9400	RMC	22.2	21.19	-0.10	Rear	1:1	10	0.749	1.262	0.945	-
1907.6	9538	RMC	22.2	21.18	-0.09	Rear	1:1	10	0.484	1.265	0.612	-
1 880	9400	RMC	22.2	21.19	-0.04	Front	1:1	10	0.374	1.262	0.472	-
1 880	9400	RMC	24.7	23.92	-0.01	Left	1:1	10	0.256	1.197	0.306	-
1 880	9400	RMC	24.7	23.92	0.05	Right	1:1	10	0.280	1.197	0.335	-
1 852.4	9262	RMC	22.2	21.25	0.05	Bottom	1:1	10	1.12	1.245	**1.394**	31
1 880	9400	RMC	22.2	21.19	0.16	Bottom	1:1	10	1.01	1.262	1.275	-
1907.6	9538	RMC	22.2	21.18	0.08	Bottom	1:1	10	0.908	1.265	1.149	-
1 852.4	9262	RMC	22.2	21.25	0.15	Bottom	1:1	10	1.06	1.245	1.320	*
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

Note: * Data entry indicate Variability measurement.

LTE Band 2 (PCS) Hotspot SAR																
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
1 860	18700	QPSK	20	21.5	21.15	-0.06	Rear	0	1	49	1:1	10	0.744	1.084	0.806	-
1 880	18900	QPSK	20	21.5	21.07	-0.05	Rear	0	1	49	1:1	10	0.642	1.104	0.709	-
1 900	19100	QPSK	20	21.5	21.05	-0.01	Rear	0	1	49	1:1	10	0.543	1.109	0.602	-
1 880	18900	QPSK	20	20.5	19.98	-0.04	Rear	1	50	25	1:1	10	0.487	1.127	0.549	-
1 860	18700	QPSK	20	20.5	19.88	-0.10	Rear	1	100	0	1:1	10	0.560	1.153	0.646	-
1 860	18700	QPSK	20	21.5	21.15	-0.06	Front	0	1	49	1:1	10	0.378	1.084	0.410	-
1 880	18900	QPSK	20	20.5	19.98	-0.13	Front	1	50	25	1:1	10	0.270	1.127	0.304	-
1 860	18700	QPSK	20	24.2	23.90	-0.11	Left	0	1	49	1:1	10	0.228	1.072	0.244	-
1 880	18900	QPSK	20	23.2	22.46	-0.10	Left	1	50	0	1:1	10	0.222	1.186	0.263	-
1 860	18700	QPSK	20	24.2	23.90	0.01	Right	0	1	49	1:1	10	0.295	1.072	0.316	-
1 880	18900	QPSK	20	23.2	22.46	-0.04	Right	1	50	0	1:1	10	0.197	1.186	0.234	-
1 860	18700	QPSK	20	21.5	21.15	-0.06	Bottom	0	1	49	1:1	10	0.950	1.084	1.030	-
1 880	18900	QPSK	20	21.5	21.07	0.14	Bottom	0	1	49	1:1	10	0.959	1.104	**1.059**	32
1 900	19100	QPSK	20	21.5	21.05	0.02	Bottom	0	1	49	1:1	10	0.868	1.109	0.963	-
1 880	18900	QPSK	20	20.5	19.98	0.05	Bottom	1	50	25	1:1	10	0.668	1.127	0.753	-
1 860	18700	QPSK	20	20.5	19.88	0.16	Bottom	1	100	0	1:1	10	0.645	1.153	0.744	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

LTE Band 4 Hotspot SAR																	
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
1 732.5	20175	QPSK	20	18.7	18.17	-0.13	Rear	0	1	0	1:1	10	0.795	1.130	0.898	-
1 732.5	20175	QPSK	20	17.7	17.13	-0.13	Rear	1	50	25	1:1	10	0.585	1.140	0.667	-
1 732.5	20175	QPSK	20	17.7	17.02	-0.12	Rear	1	100	0	1:1	10	0.575	1.169	0.672	
1 732.5	20175	QPSK	20	18.7	18.17	-0.13	Front	0	1	0	1:1	10	0.299	1.130	0.338	-
1 732.5	20175	QPSK	20	17.7	17.13	-0.18	Front	1	50	25	1:1	10	0.212	1.140	0.242	-
1 732.5	20175	QPSK	20	23.7	23.28	-0.12	Left	0	1	49	1:1	10	0.063	1.102	0.069	-
1 732.5	20175	QPSK	20	22.7	22.15	-0.18	Left	0	50	0	1:1	10	0.050	1.135	0.057	-
1 732.5	20175	QPSK	20	23.7	23.28	0.08	Right	0	1	49	1:1	10	0.124	1.102	0.137	-
1 732.5	20175	QPSK	20	22.7	22.15	-0.10	Right	0	50	0	1:1	10	0.108	1.135	0.123	-
1 732.5	20175	QPSK	20	18.7	18.17	0.14	Bottom	0	1	0	1:1	10	1.080	1.130	**1.220**	33
1 732.5	20175	QPSK	20	17.7	17.13	0.13	Bottom	1	50	25	1:1	10	0.781	1.140	0.890	-
1 732.5	20175	QPSK	20	17.7	17.02	0.13	Bottom	1	100	0	1:1	10	0.671	1.169	0.784	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

LTE Band 5 Hotspot SAR																	
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
836.5	20525	QPSK	10	24.2	23.55	-0.05	Rear	0	1	24	1:1	10	0.339	1.161	**0.394**	34
836.5	20525	QPSK	10	23.2	22.52	-0.05	Rear	1	25	24	1:1	10	0.283	1.169	0.331	-
836.5	20525	QPSK	10	24.2	23.55	0.06	Front	0	1	24	1:1	10	0.298	1.161	0.346	-
836.5	20525	QPSK	10	23.2	22.52	-0.02	Front	1	25	24	1:1	10	0.243	1.169	0.284	-
836.5	20525	QPSK	10	24.2	23.55	-0.07	Left	0	1	24	1:1	10	0.274	1.161	0.318	-
836.5	20525	QPSK	10	23.2	22.52	0.06	Left	1	25	24	1:1	10	0.213	1.169	0.249	-
836.5	20525	QPSK	10	24.2	23.55	0.18	Right	0	1	24	1:1	10	0.306	1.161	0.355	-
836.5	20525	QPSK	10	23.2	22.52	0.04	Right	1	25	24	1:1	10	0.251	1.169	0.293	-
836.5	20525	QPSK	10	24.2	23.55	0.06	Bottom	0	1	24	1:1	10	0.049	1.161	0.057	-
836.5	20525	QPSK	10	23.2	22.52	-0.05	Bottom	1	25	24	1:1	10	0.040	1.169	0.047	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

LTE Band 12 Hotspot SAR																
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
707.5	23095	QPSK	10	24.2	23.70	-0.10	Rear	0	1	24	1:1	10	0.410	1.122	**0.460**	35
707.5	23095	QPSK	10	23.2	22.54	0.01	Rear	1	25	12	1:1	10	0.308	1.164	0.359	-
707.5	23095	QPSK	10	24.2	23.70	-0.08	Front	0	1	24	1:1	10	0.321	1.122	0.360	-
707.5	23095	QPSK	10	23.2	22.54	-0.00	Front	1	25	12	1:1	10	0.239	1.164	0.278	-
707.5	23095	QPSK	10	24.2	23.70	-0.11	Left	0	1	24	1:1	10	0.235	1.122	0.264	-
707.5	23095	QPSK	10	23.2	22.54	-0.00	Left	1	25	12	1:1	10	0.179	1.164	0.208	-
707.5	23095	QPSK	10	24.2	23.70	-0.07	Right	0	1	24	1:1	10	0.270	1.122	0.303	-
707.5	23095	QPSK	10	23.2	22.54	0.06	Right	1	25	12	1:1	10	0.202	1.164	0.235	-
707.5	23095	QPSK	10	24.2	23.70	0.07	Bottom	0	1	24	1:1	10	0.038	1.122	0.043	-
707.5	23095	QPSK	10	23.2	22.54	0.13	Bottom	1	25	12	1:1	10	0.029	1.164	0.034	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

LTE Band 14 Hotspot SAR																
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
793	23330	QPSK	10	24.0	23.41	0.06	Rear	0	1	24	1:1	10	0.385	1.146	0.441	-
793	23330	QPSK	10	23.0	22.27	-0.02	Rear	1	25	0	1:1	10	0.300	1.183	0.355	-
793	23330	QPSK	10	24.0	23.41	-0.03	Front	0	1	24	1:1	10	0.321	1.146	0.368	-
793	23330	QPSK	10	23.0	22.27	0.04	Front	1	25	0	1:1	10	0.258	1.183	0.305	-
793	23330	QPSK	10	24.0	23.41	-0.00	Left	0	1	24	1:1	10	0.362	1.146	0.415	-
793	23330	QPSK	10	23.0	22.27	-0.07	Left	1	25	0	1:1	10	0.290	1.183	0.343	-
793	23330	QPSK	10	24.0	23.41	0.14	Right	0	1	24	1:1	10	0.400	1.146	**0.458**	36
793	23330	QPSK	10	23.0	22.27	-0.05	Right	1	25	0	1:1	10	0.303	1.183	0.358	-
793	23330	QPSK	10	24.0	23.41	0.17	Bottom	0	1	24	1:1	10	0.050	1.146	0.057	-
793	23330	QPSK	10	23.0	22.27	0.11	Bottom	1	25	0	1:1	10	0.039	1.183	0.046	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

DTS Hotspot SAR																
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
2 412	1	802.11b	20	1	19.5	19.01	-0.04	Rear	100	10	0.375	0.226	1.119	1.000	**0.253**	37
2 412	1	802.11b	20	1	19.5	19.01		Front	100	10	0.204		1.119	1.000		-
2 412	1	802.11b	20	1	19.5	19.01	0.01	Left	100	10	0.135	0.039	1.119	1.000	0.044	-
2 412	1	802.11b	20	1	19.5	19.01	0.02	Top	100	10	0.196	0.102	1.119	1.000	0.114	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg Averaged over 1 gram								

5GHz WLAN Hotspot SAR																
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
5 775	155	802.11ac	80	MCS0	17.0	15.99	0.19	Rear	96.0	10	1.26	0.525	1.262	1.040	**0.689**	38
5 775	155	802.11ac	80	MCS0	17.0	15.99	0.06	Front	96.0	10	0.183	0.054	1.262	1.040	0.071	-
5 775	155	802.11ac	80	MCS0	17.0	15.99	0.13	Left	96.0	10	1.12	0.490	1.262	1.040	0.643	-
5 775	155	802.11ac	80	MCS0	17.0	15.99	0.12	Top	96.0	10	0.380	0.149	1.262	1.040	0.196	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg Averaged over 1 gram								

DSS Tethering SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Distance	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dBm)	(dBm)	(dB)		(mm)	(W/kg)		(Duty)	(W/kg)	
2 441	39	Bluetooth DH5	9.5	8.57	-0.15	Rear	10	0.013	1.239	1.299	**0.021**	39
2 441	39	Bluetooth DH5	9.5	8.57	-0.18	Front	10	0.00849	1.239	1.299	0.014	-
2 441	39	Bluetooth DH5	9.5	8.57	-0.17	Left	10	0.00713	1.239	1.299	0.011	-
2 441	39	Bluetooth DH5	9.5	8.57	-0.10	Top	10	0.00956	1.239	1.299	0.015	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg (mW/g) Averaged over 1 gram					

13.4 SAR Measurement Result for Grip-sensor Maximum –power

. This product is powered by the Grip sensor at 20mm on the Rear side, 16mm on the front, and 20mm on the bottom in the GSM1900 / WCDMAB4 / B2/LTE B2 / B4 mode. Thus, additional SAR measurements were made at the rear side 19mm, front side 15mm, and bottom side ,19mmat maximum output conditions.

GSM 1900 Grip-sensor SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
1 909.8	810	GPRS 2Tx	28.7	27.93	-0.19	Rear	1:4.1495	19	0.100	1.194	0.119	-
1 909.8	810	GPRS 2Tx	28.7	27.93	-0.18	Front	1:4.1495	15	0.107	1.194	0.128	-
1 909.8	810	GPRS 2Tx	28.7	27.93	-0.14	Bottom	1:4.1495	19	0.182	1.194	0.217	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

WCDMA 1700 Grip-sensor SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
1 732.4	1412	RMC	23.5	22.94	-0.13	Rear	1:1	19	0.628	1.138	0.715	-
1 732.4	1412	RMC	23.5	22.94	0.17	Front	1:1	15	0.433	1.138	0.493	-
1 712.4	1312	RMC	23.5	22.80	0.17	Bottom	1:1	19	0.994	1.175	1.168	-
1 732.4	1412	RMC	23.5	22.94	-0.00	Bottom	1:1	19	0.872	1.138	0.992	-
1 752.6	1513	RMC	23.5	22.78	-0.05	Bottom	1:1	19	0.805	1.180	0.950	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

WCDMA 1900 Grip-sensor SAR												
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(mm)	(W/kg)		(W/kg)	
1 880	9400	RMC	24.7	23.92	-0.09	Rear	1:1	19	0.289	1.197	0.346	-
1 880	9400	RMC	24.7	23.92	0.03	Front	1:1	15	0.454	1.197	0.543	-
1 852.4	9262	RMC	24.7	23.76	0.18	Bottom	1:1	19	0.663	1.242	0.823	-
1 880	9400	RMC	24.7	23.92	0.14	Bottom	1:1	19	0.910	1.197	1.089	-
1907.6	9538	RMC	24.7	23.91	0.16	Bottom	1:1	19	0.495	1.199	0.594	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg Averaged over 1 gram						

LTE Band 2 (PCS) Grip-sensor SAR																
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
1 860	18700	QPSK	20	24.2	23.90	-0.16	Rear	0	1	49	1:1	19	0.423	1.072	0.453	-
1 900	19100	QPSK	20	23.2	22.46	-0.07	Rear	1	50	0	1:1	19	0.247	1.186	0.293	-
1 860	18700	QPSK	20	24.2	23.90	-0.15	Front	0	1	49	1:1	15	0.333	1.072	0.357	-
1 900	19100	QPSK	20	23.2	22.46	-0.09	Front	1	50	0	1:1	15	0.246	1.186	0.292	-
1 860	18700	QPSK	20	24.2	23.90	-0.08	Bottom	0	1	49	1:1	19	0.613	1.072	0.657	-
1 900	19100	QPSK	20	23.2	22.46	-0.01	Bottom	1	50	0	1:1	19	0.410	1.186	0.486	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

LTE Band 4 Grip-sensor SAR																
Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	MPR	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)		(dB)				(mm)	(W/kg)		(W/kg)	
1 732.5	20175	QPSK	20	23.7	23.28	0.04	Rear	0	1	49	1:1	19	0.775	1.102	0.854	-
1 732.5	20175	QPSK	20	22.7	22.15	-0.19	Rear	1	50	0	1:1	19	0.633	1.135	0.718	-
1 732.5	20175	QPSK	20	22.7	21.99	-0.18	Rear	1	100	0	1:1	19	0.512	1.178	0.603	-
1 732.5	20175	QPSK	20	23.7	23.28	-0.13	Front	0	1	49	1:1	15	0.458	1.102	0.505	-
1 732.5	20175	QPSK	20	22.7	22.15	-0.10	Front	1	50	0	1:1	15	0.357	1.135	0.405	-
1 732.5	20175	QPSK	20	23.7	23.28	0.19	Bottom	0	1	49	1:1	19	1.06	1.102	1.168	-
1 732.5	20175	QPSK	20	22.7	22.15	0.02	Bottom	1	50	0	1:1	19	0.894	1.135	1.015	-
1 732.5	20175	QPSK	20	22.7	21.99	0.06	Bottom	1	100	0	1:1	19	0.703	1.178	0.828	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg Averaged over 1 gram									

13.5 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, FCC KDB Procedure.
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB 648474 D04v01r03, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was ≤ 1.2 W/kg, no additional SAR evaluation using a headset cable were required.
8. Per FCC KDB 865664 D01v01r04, variability SAR measurement were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg for 1g SAR and >2 for 10g SAR Please see Section 15 for variability analysis.
9. This device utilizes power reduction for some wireless mode and technologies, as outlined in sec. 4.3 The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous scenarios.
10. During SAR testing for the Hotspot conditions per KDB 941225 D06v02r01, the actual portable hotspot operation (with actual simultaneous transmission of a transmitter with WiFi) was not activated.

GSM/GPRS Test Notes:

1. This EUT'S GSM and GPRS device class is B.
2. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
3. Justification for reduced test configurations per KDB 941225 D01v03r01: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power including tolerance was evaluated for SAR.
4. Per FCC KDB 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is 1/2 dB, instead of the middle channel, the highest output power channel must be used.
5. Justification for reduced test configurations per KDB Publication 941225 D01v03r01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.

WCDMA Notes:

1. The 12.2 kbps RMC mode is the primary mode per KDB 941225 D01v03r01.
2. WCDMA SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB publication 941225 D01v03r01. AMR and HSPA SAR was not required per the 3G Test Reduction Procedure in KDB Publication 941225 D01v03r01.
3. Per FCC KDB 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the channel highest output power channel was used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Consideration for LTE Devices in FCC KDB 941225 D05v02r05.
2. According to FCC KDB 941225 D05v02r05:
   When the reported SAR is ≤ 0.8 W/kg, testing of the 100% RB allocation and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the 1RB, 50%RB and 100%RB allocation with highest output power for that channel.
   Only one channel, and as reported SAR values for 1RB allocation and 50%RB allocation were less than 1.45W/Kg only the highest power RB offset for each allocation was required.
3. 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 target MPR is indicated alongside the SAR results.
4. When Power reduction is applied , MPR is 0
5. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.
6. SAR test reduction is applied using the following criteria:
   Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is >0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel. Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are >0.8 W/kg, testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation <1.45 W/kg. Testing for 16-QAM modulation is not required because the reported SAR for QPSK is <1.45 W/kg and its output power is not more than 0.5 dB higher than that a QPSK. Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is <1.45 W/kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

WLAN Notes:

1. For held-to-ear and hotspot operations, the initial test position procedures were applied. For initial test position, the highest extrapolated peak SAR will be used. When reported SAR for the initial test position is ≤ 0.4 W/kg for 1g SAR and ≤ 1.0 W/kg for 10g SAR, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR results is ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR or all test position are measured.
2. Per KDB 2482227 D01v02r02 justification for test configurations of 2.4 GHz WiFi Single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11 g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR.
3. Per KDB 2482227 D01v02r02 justification for test configurations of 5 GHz WiFi Single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission mode were not investigated since the highest reported SAR for initial test configuration adjusted by the ration of maximum output powers is less than 1.2 W/kg for 1g SAR and less than 3.0 W/kg for 10 g SAR.
4. When the maximum reported 1g averaged SAR is ≤ 0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
5. The device was configured to transmit continuously at the required data rated, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated WLAN test reports.

Bluetooth Notes:

1. Bluetooth SAR was measured with the device connected to a call box with hopping disabled with DH5 operation and Tx Tests mode type. Per October 2016 TCBC Workshop Notes, the reported SAR was scaled to 100% transmission duty factor to determine compliance. Please see sec.11 for the time-domain plot and calculation for duty factor of the device.
2. Head and Bluetooth tethering SAR were evaluated for BT BR tethering applications.

14. Simultaneous SAR Analysis

This device is contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per KDB Publication 447498 D01v06 4.3.2, simultaneous transmission SAR test exclusion may be applied when the sum of 1g SAR and 10g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6W/kg for 1g SAR and ≤4 W/kg for 10g SAR. The different test positions in an exposure condition may be considered collectively to determine SAR exclusion according to the sum of 1g or 10g SAR.

14.1 Head SAR Simultaneous Transmission Analysis.

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN				
Exposure condition	Band	WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Head SAR	GSM 850	0.464	0.594	1.058
	GPRS 850	0.316	0.594	0.910
	GSM 1900	0.363	0.594	0.957
	GPRS 1900	0.197	0.594	0.791
	WCDMA 850	0.611	0.594	**1.205**
	WCDMA 1700	0.294	0.594	0.888
	WCDMA 1900	0.575	0.594	1.169
	LTE Band 2	0.563	0.594	1.157
	LTE Band 4	0.299	0.594	0.893
	LTE Band 5	0.300	0.594	0.894
	LTE Band 12	0.256	0.594	0.850
	LTE Band 14	0.289	0.594	0.883

Simultaneous Transmission Summation Scenario with 5 GHz WLAN				
Exposure condition	Band	WWAN SAR (W/kg)	5 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Head SAR	GSM 850	0.464	0.397	0.861
	GPRS 850	0.316	0.397	0.713
	GSM 1900	0.363	0.397	0.760
	GPRS 1900	0.197	0.397	0.594
	WCDMA 850	0.611	0.397	1.008
	WCDMA 1700	0.294	0.397	0.691
	WCDMA 1900	0.575	0.397	0.972
	LTE Band 2	0.563	0.397	0.960
	LTE Band 4	0.299	0.397	0.696
	LTE Band 5	0.300	0.397	0.697
	LTE Band 12	0.256	0.397	0.653
	LTE Band 14	0.289	0.397	0.686

Simultaneous Transmission Summation Scenario with Bluetooth				
Exposure condition	Band	WWAN SAR (W/kg)	Bluetooth (W/kg)	∑ 1-g SAR (W/kg)
Head SAR	GSM 850	0.464	0.058	0.522
	GPRS 850	0.316	0.058	0.374
	GSM 1900	0.363	0.058	0.421
	GPRS 1900	0.197	0.058	0.255
	WCDMA 850	0.611	0.058	0.669
	WCDMA 1700	0.294	0.058	0.352
	WCDMA 1900	0.575	0.058	0.633
	LTE Band 2	0.563	0.058	0.621
	LTE Band 4	0.299	0.058	0.357
	LTE Band 5	0.300	0.058	0.358
	LTE Band 12	0.256	0.058	0.314
	LTE Band 14	0.289	0.058	0.347

14.2 Body-Worn SAR Simultaneous Transmission Analysis.

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	15	GSM 850	0.433	0.092	0.525
		GPRS 850	0.393	0.092	0.485
		GSM 1900	0.199	0.092	0.291
		GPRS 1900	0.166	0.092	0.258
		WCDMA 850	0.479	0.092	0.571
		WCDMA 1700	0.612	0.092	0.704
		WCDMA 1900	0.543	0.092	0.635
		LTE Band 2	0.357	0.092	0.449
		LTE Band 4	0.505	0.092	0.597
		LTE Band 5	0.337	0.092	0.429
		LTE Band 12	0.362	0.092	0.454
		LTE Band 14	0.392	0.092	0.484

Simultaneous Transmission Summation Scenario with 5 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	5 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	15	GSM 850	0.433	0.618	1.051
		GPRS 850	0.393	0.618	1.011
		GSM 1900	0.199	0.618	0.817
		GPRS 1900	0.166	0.618	0.784
		WCDMA 850	0.479	0.618	1.097
		WCDMA 1700	0.612	0.618	**1.230**
		WCDMA 1900	0.543	0.618	1.161
		LTE Band 2	0.357	0.618	0.975
		LTE Band 4	0.505	0.618	1.123
		LTE Band 5	0.337	0.618	0.955
		LTE Band 12	0.362	0.618	0.980
		LTE Band 14	0.392	0.618	1.010

Simultaneous Transmission Summation Scenario with Bluetooth					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Body-worn	15	GSM 850	0.433	0.008	0.441
		GPRS 850	0.393	0.008	0.401
		GSM 1900	0.199	0.008	0.207
		GPRS 1900	0.166	0.008	0.174
		WCDMA 850	0.479	0.008	0.487
		WCDMA 1700	0.612	0.008	0.620
		WCDMA 1900	0.543	0.008	0.551
		LTE Band 2	0.357	0.008	0.365
		LTE Band 4	0.505	0.008	0.513
		LTE Band 5	0.337	0.008	0.345
		LTE Band 12	0.362	0.008	0.370
		LTE Band 14	0.392	0.008	0.400

14.3 Hotspot SAR Simultaneous Transmission Analysis.

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN							
Exposure condition	Distance (mm)	Band		WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)	SPLSR (Yes/No)
Hotspot	10	GSM 850		0.511	0.253	0.764	No
		GSM 1900		0.438	0.253	0.691	No
		WCDMA 850		0.517	0.253	0.770	No
		WCDMA 1700	Rear	1.131	0.253	1.384	No
			Front	0.483	0.253	0.736	No
			Left	0.073	0.044	0.117	No
			Right	0.140		0.140	No
			Top		0.114	0.114	No
			Bottom	1.393		1.393	No
		WCDMA 1900	Rear	0.945	0.253	1.198	No
			Front	0.472	0.253	0.725	No
			Left	0.306	0.044	0.350	No
			Right	0.335		0.335	No
			Top		0.114	0.114	No
			Bottom	1.394		1.394	No
		LTE Band 2		1.059	0.253	1.312	No
		LTE Band 4		1.220	0.253	1.473	No
		LTE Band 5		0.394	0.253	0.647	No
		LTE Band 12		0.460	0.253	0.713	No
		LTE Band 14		0.458	0.253	0.711	No

Simultaneous Transmission Summation Scenario with 5 GHz WLAN							
Exposure condition	Distance (mm)	Band		WWAN SAR (W/kg)	5 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)	SPLSR (Yes/No)
Hotspot	10	GSM 850		0.511	0.689	1.200	No
		GSM 1900		0.438	0.689	1.127	No
		WCDMA 850		0.517	0.689	1.206	No
		WCDMA 1700	Rear	1.131	0.689	1.820	Yes (#1)
			Front	0.483	0.071	0.554	No
			Left	0.073	0.643	0.716	No
			Right	0.140		0.140	No
			Top		0.196	0.196	No
			Bottom	1.393		1.393	No
		WCDMA 1900	Rear	0.945	0.689	1.634	Yes (#2)
			Front	0.472	0.071	0.543	No
			Left	0.306	0.643	0.949	No
			Right	0.335		0.335	No
			Top		0.196	0.196	No
			Bottom	1.394		1.394	No
		LTE Band 2	Rear	0.806	0.689	1.495	No
			Front	0.410	0.071	0.481	No
			Left	0.263	0.643	0.906	No
			Right	0.316		0.316	No
			Top		0.196	0.196	No
			Bottom	1.059		1.059	No
		LTE Band 4	Rear	0.898	0.689	**1.587**	No
			Front	0.338	0.071	0.409	No
			Left	0.069	0.643	0.712	No
			Right	0.137		0.137	No
			Top		0.196	0.196	No
			Bottom	1.220		1.220	No
		LTE Band 5		0.394	0.689	1.084	No
		LTE Band 12		0.460	0.689	1.150	No
		LTE Band 14		0.458	0.689	1.148	No

Simultaneous Transmission Summation Scenario with Bluetooth					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	Bluetooth SAR (W/kg)	∑ 1-g SAR (W/kg)
Bluetooth Tethering	10	GSM 850	0.511	0.021	0.532
		GSM 1900	0.438	0.021	0.459
		WCDMA 850	0.517	0.021	0.538
		WCDMA 1700	1.393	0.021	1.414
		WCDMA 1900	1.394	0.021	1.415
		LTE Band 2	1.059	0.021	1.080
		LTE Band 4	1.220	0.021	1.241
		LTE Band 5	0.394	0.021	0.415
		LTE Band 12	0.460	0.021	0.481
		LTE Band 14	0.458	0.021	0.479

14.4 SAR to Peak Location Separation Ratio (SPLSR)

FCC KDB 447498 D01v06 General RF Exposure Guidance introduces a new formula for calculating the SAR a Peak Location Separation Ratio(SPLSR) between pairs of simultaneously transmitting antennas:

$\boldsymbol{SPLSR}$ =$(\boldsymbol{SAR_1} + \boldsymbol{SAR_2})^{1.5}/\boldsymbol{R_i}$

Where:

$\boldsymbol{SAR_1}$ is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

$\boldsymbol{SAR_2}$ is the highest measured of estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

$\boldsymbol{Ri}$ is the separation distance between the pair of simultaneous transmitting antennas, When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $[(\mathbf{X_1} - \mathbf{X_2})^2 + (\mathbf{Y_1} - \mathbf{Y_2})^2 + (\mathbf{Z_1} - \mathbf{Z_2})^2]$

In order for a pair of simultaneous transmitting antennas with the sum 1-g of SAR> 1.6 W/kg and with the sum 10-g of SAR >4 W/Kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$(\boldsymbol{SAR_1} + \boldsymbol{SAR_2})^{1.5}/\boldsymbol{R_i} \leq \mathbf{0.04}$ for 1g SAR and $(\boldsymbol{SAR_1} + \boldsymbol{SAR_2})^{1.5}/\boldsymbol{R_i} \leq \mathbf{0.1}$ for 10g SAR

Per Sec. 14, below simultaneous transmission summations need to be calculated SPLSR.

14.4.1 SPLSR Evaluation

Peak location for SAR Rear side (Active)

Mode/Band	X(mm)	Y(mm)	Z(mm)	Reported SAR [W/kg]
WCDMA 1700	0.073	-0.0045	-0.174	0.852
WCDMA 1900	0.0715	-0.006	-0.174	0.749
WLAN 5 GHz	-0.055	0.029	-0.173	0.525

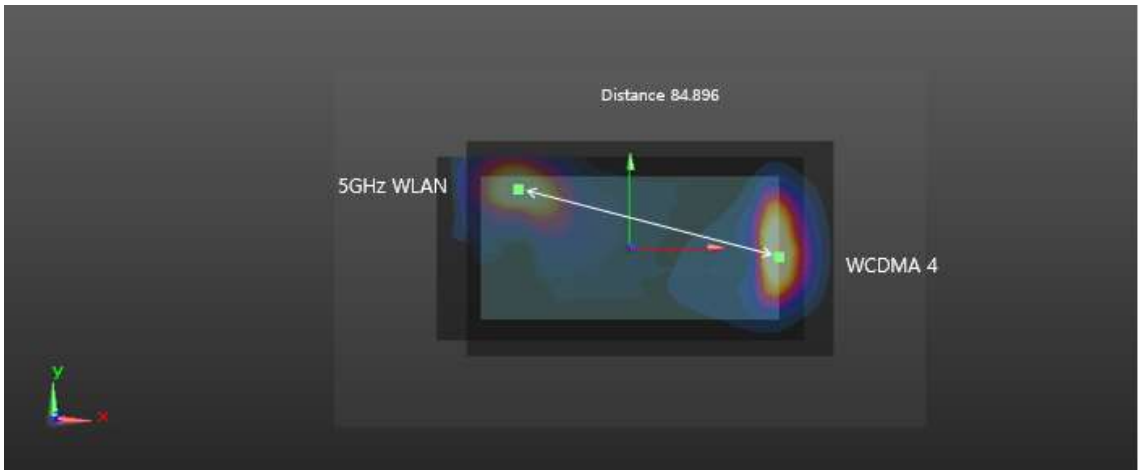
14.4.2 SAR to Peak Location Ratio (SPLSR) Figures

Mode		Sum 1g SAR [W/kg]	Peak SAR Separation Distance (mm)	SPLSR	Plot No
WCDMA 1700	5 GHz Ant.	1 + 2			
1	2				
1.131	0.689	1.820	84.896	0.029	#1

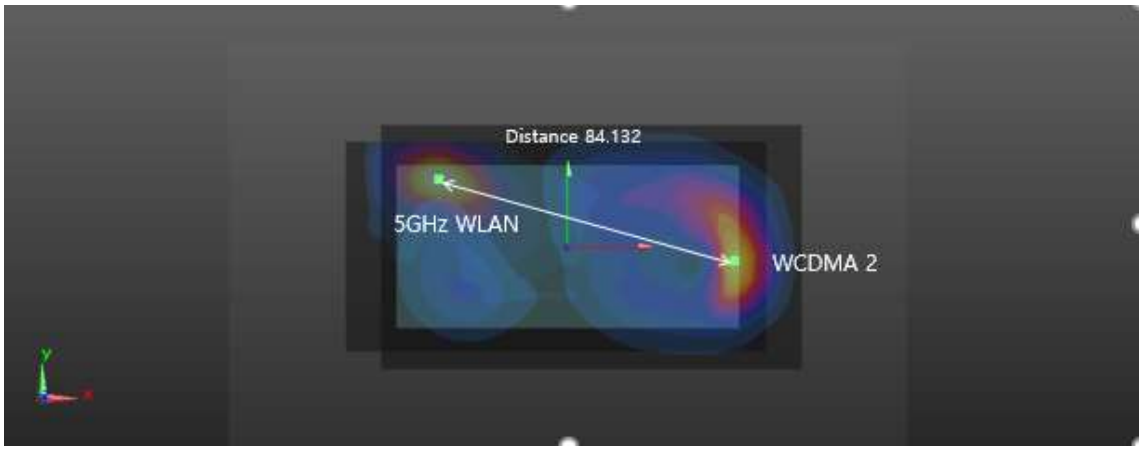
Mode		Sum 1g SAR [W/kg]	Peak SAR Separation Distance (mm)	SPLSR	Plot No
WCDMA 1900	5 GHz Ant.	1 + 2			
1	2				
0.945	0.689	1.634	84.132	0.025	#2

14.4.3 SPLSR Plot

SPLSR Plot #1: WCDMA 1700 + 5 GHz WLAN



SPLSR Plot #2: WCDMA 1900 + 5 GHz WLAN



14.4 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 IEEE1528-2013.

15. SAR Measurement Variability and Uncertainty

In accordance with KDB procedure 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz, SAR additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg for 1g SAR or < 2.0 W/kg for 10g SAR; steps 2) through 4) do not apply.

2) When the original highest measured 1g SAR is ≥ 0.80 W/kg or 10g SAR ≥ 2.0W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg for 1g SAR or ≥ 3.625 W/kg for 10g SAR (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg for 1g SAR or ≥3.75 W/kg for 10g SAR and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Hotspot SAR measurement variability Results

Frequency		Mode/Band	Configuration	Measured SAR (W/kg)	Repeated SAR (W/kg)	SAR Ratio
MHz	Channel					
1 852.4	9262	WCDMA 1900	Bottom	1.12	1.06	1.06
1 732.4	1412	WCDMA 1700	Bottom	1.05	1.05	1.00

16. Device Holder Perturbation Verification.

In accordance with published DUT Holder Perturbations in Oct.2016 TCB Workshop.
When Highest reported SAR is over 1.2 W/kg, Holder Perturbation Verification is required for each antenna, using the highest configuration among all applicable frequency bands.

Frequency		Mode/Band	Configuration	Highest Reported SAR		Deviation (%)
				(without Device Holder)	(with Device Holder)	
MHz	Channel			(W/kg)	(W/kg)	
1 732.4	1412	WCDMA 4 (Hotspot)	Rear	1.393	1.354	1.03

17. Measurement Uncertainty

The measured SAR was <1.5 W/Kg for 1g SAR and <3.75 W/Kg For 10g SAR for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis per IEEE1528-2013 was not required.

18. SAR Test Equipment

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	Triple Modular Phantom	-	N/A	N/A	N/A
SPEAG	SAM Phantom	-	N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F12/ 5K9GA1/ C/ 01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F17/ 59CHA1/ C/ 01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F17/ 59RAA1/ C/ 01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F13/ 5R4XF1/ C/ 01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F11/5K3RA1/C/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F12/ 5K9GA1/ A/ 01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F17/ 59CHA1/ A/ 01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F17/ 59RAA1/ A/ 01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F13/ 5R4XF1/ A/ 01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F11/5K3RA1/A/01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1206 0513	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	010963	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	40331922309	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1338 1332	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1203 0309	N/A	N/A	N/A
SPEAG	DAE4	1225	11/18/2019	Annual	11/18/2020
SPEAG	DAE3	446	07/18/2019	Annual	07/18/2020
SPEAG	DAE4	648	05/23/2019	Annual	05/23/2020
SPEAG	DAE4	652	02/03/2020	Annual	02/03/2021
SPEAG	DAE4	868	09/04/2019	Annual	09/04/2020
SPEAG	DAE4	869	09/19/2019	Annual	09/19/2020
SPEAG	E-Field Probe EX3DV4	3797	11/28/2019	Annual	11/28/2020
SPEAG	E-Field Probe EX3DV4	7370	08/29/2019	Annual	08/29/2020
SPEAG	E-Field Probe EX3DV4	3863	05/15/2019	Annual	05/15/2020
SPEAG	E-Field Probe ES3DV3	3076	07/23/2019	Annual	07/23/2020
SPEAG	E-Field Probe EX3DV4	3968	09/27/2019	Annual	09/27/2020
SPEAG	Dipole D750V3	1014	05/27/2019	Annual	05/27/2020
SPEAG	Dipole D835V2	441	08/23/2019	Annual	08/23/2020
SPEAG	Dipole D1800V2	2d015	09/19/2019	Annual	09/19/2020
SPEAG	Dipole D1900V2	5d061	01/21/2020	Annual	01/21/2021
SPEAG	Dipole D2450V2	965	11/21/2019	Annual	11/21/2020
SPEAG	Dipole D5GHzV2	1107	09/26/2019	Annual	09/26/2020
Agilent	Power Meter E4419B	MY41291386	10/07/2019	Annual	10/07/2020
Agilent	Power Meter N1911A	MY45101406	09/10/2019	Annual	09/10/2020
Agilent	Power Sensor 8481A	SG1091286	10/07/2019	Annual	10/07/2020
Agilent	Power Sensor 8481A	MY41090873	10/07/2019	Annual	10/07/2020
Agilent	Power Sensor N1921A	MY55220026	09/06/2019	Annual	09/06/2020
SPEAG	DAKS 3.5	1031	04/16/2019	Annual	04/16/2020
SPEAG	VNA-R140	0050813	03/11/2019	Annual	03/11/2020
Agilent	WIRELESS COMMUNICATION E5515C	MY48361100	10/07/2019	Annual	10/07/2020

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
Agilent	Signal Generator N5182A	MY47070230	05/08/2019	Annual	05/08/2020
Agilent	11636B/Power Divider	58698	02/28/2019	Annual	03/06/2020
TESTO	175-H1/Thermometer	40331939309	01/29/2020	Annual	01/29/2021
TESTO	175-H1/Thermometer	40331915309	01/29/2020	Annual	01/29/2021
TESTO	175-H1/Thermometer	40331922309	01/29/2020	Annual	01/29/2021
TESTO	175-H1/Thermometer	40332651310	01/29/2020	Annual	01/29/2021
TESTO	175-H1/Thermometer	40331949309	01/29/2020	Annual	01/29/2021
EMPOWER	RF Power Amplifier	1084	07/23/2019	Annual	07/23/2020
EMPOWER	RF Power Amplifier	1011	10/08/2019	Annual	10/08/2020
MICRO LAB	LP Filter / LA-15N	10453	10/07/2019	Annual	10/07/2020
MICRO LAB	LP Filter / LA-30N	-	10/07/2019	Annual	10/07/2020
MICRO LAB	LP Filter / LA-60N	32011	10/07/2019	Annual	10/07/2020
Apitech	Attenuator (3dB) 18B-03	1	06/04/2019	Annual	06/04/2020
Agilent	Attenuator (20dB) 33340C	1642	05/08/2019	Annual	05/08/2020
Agilent	Directional Bridge	3140A03878	06/12/2019	Annual	06/12/2020
Agilent	MXA Signal Analyzer N9020A	MY50510407	10/29/2019	Annual	10/29/2020
HP	Dual Directional Coupler	16072	10/07/2019	Annual	10/07/2020
Anritsu	Radio Communication Tester MT8820C	6201074225	03/05/2019	Annual	03/05/2020
Anritsu	Radio Communication Tester MT8821C	6201502997	08/09/2019	Annual	08/09/2020
R&S	Bluetooth CBT	100272	03/04/2019	Annual	03/04/2020

* The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Verification measurement is performed by HCT Lab. before each test. The brain/body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity (dielectric constant) of the brain/body-equivalent material.

19. Conclusion

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 - 2005.

These measurements were taken to simulate the RF effects 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 abortion and distribution of electromagnetic energy in the body are very complex phenomena the 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.

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Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/12/2020
Plot No.: 1

DUT: SM-A015A, SM-A015AZ; Type: Bar

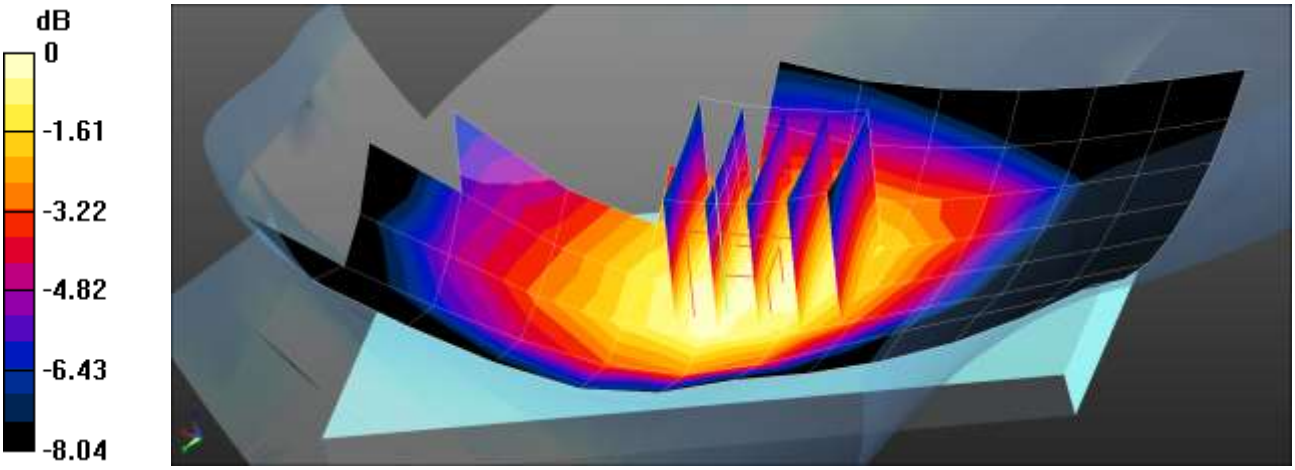
Communication System: UID 0, GSM 850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.929 S/m; ε_r = 42.27; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(9.88, 9.88, 9.88); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Right
- Measurement SW: DASY52, Version 52.8 (8);

GSM850 Head Right Touch 190ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.467 W/kg

GSM850 Head Right Touch 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.244 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 0.496 W/kg
SAR(1 g) = 0.399 W/kg; SAR(10 g) = 0.305 W/kg
Maximum value of SAR (measured) = 0.468 W/kg



0 dB = 0.468 W/kg = −3.30 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.9 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/13/2020
Plot No.: 2

DUT: SM-A015A, SM-A015AZ; Type: Bar

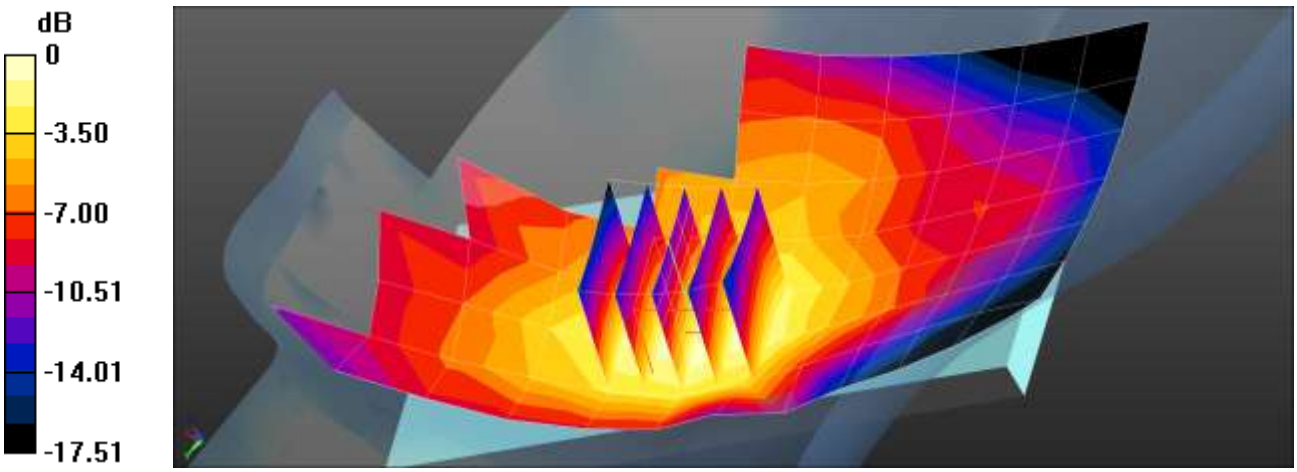
Communication System: UID 0, GSM 1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 1880 MHz; σ = 1.395 S/m; ε_r = 38.726; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(8.09, 8.09, 8.09); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

GSM1900 Head Left Touch 661ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.451 W/kg

GSM1900 Head Left Touch 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.686 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.532 W/kg
SAR(1 g) = 0.330 W/kg; SAR(10 g) = 0.200 W/kg
Maximum value of SAR (measured) = 0.450 W/kg



0 dB = 0.450 W/kg = −3.47 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/12/2020
Plot No.: 3

DUT: SM-A015A, SM-A015AZ; Type: Bar

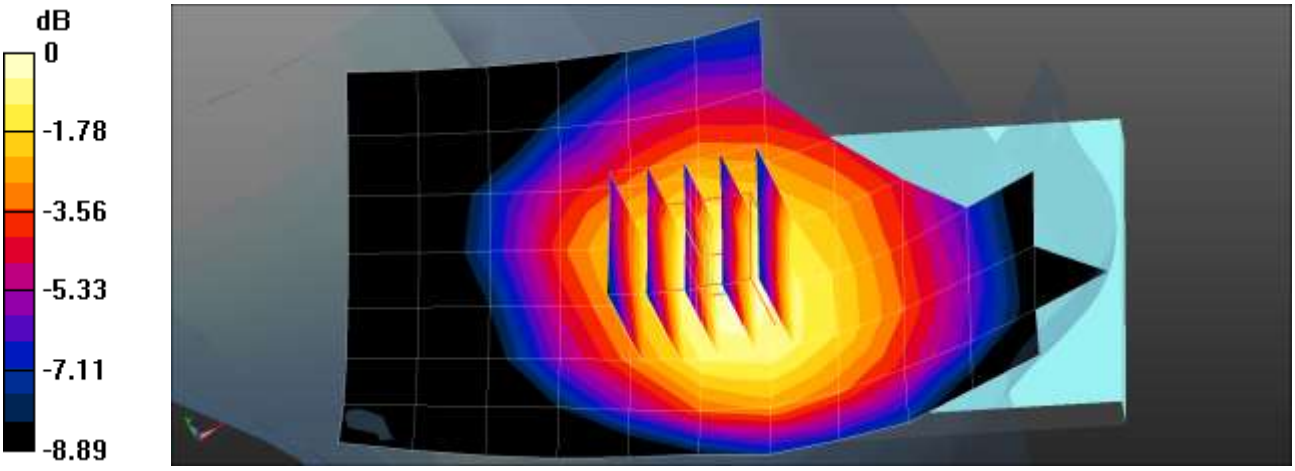
Communication System: UID 0, WCDMA850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.929 S/m; ε_r = 42.27; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(9.88, 9.88, 9.88); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Right
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA 5 Head Left Touch 4183ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.581 W/kg

WCDMA 5 Head Left Touch 4183ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.575 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.657 W/kg
SAR(1 g) = 0.523 W/kg; SAR(10 g) = 0.399 W/kg
Maximum value of SAR (measured) = 0.609 W/kg



0 dB = 0.609 W/kg = −2.15 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/12/2020
Plot No.: 4

DUT: SM-A015A, SM-A015AZ; Type: Bar

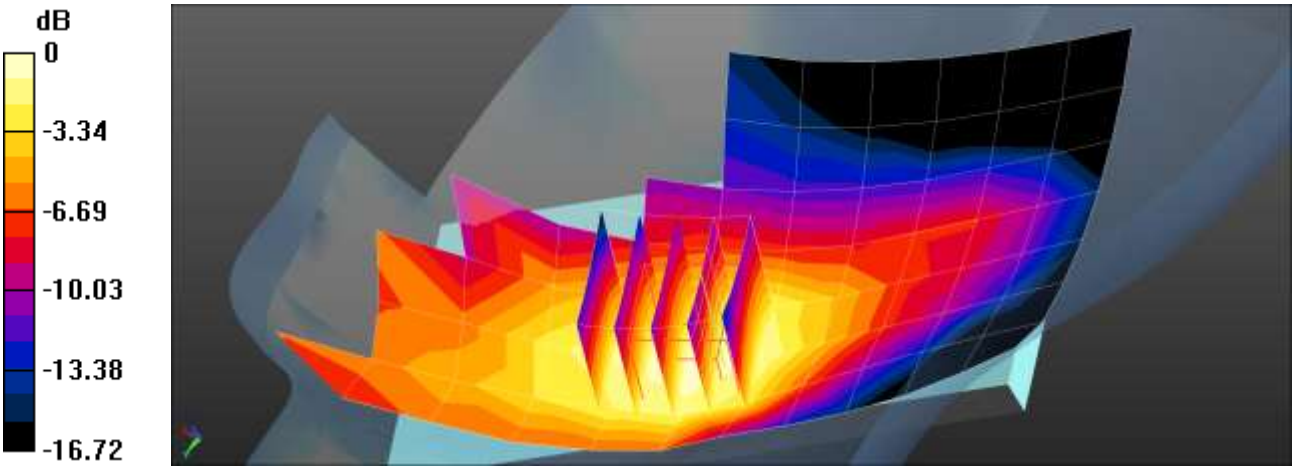
Communication System: UID 0, WCDMA IV (0); Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.317 S/m; ε_r = 39.344; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(8.43, 8.43, 8.43); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA 4 Head Right Touch 1412ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.342 W/kg

WCDMA 4 Head Right Touch 1412ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.647 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.389 W/kg
SAR(1 g) = 0.258 W/kg; SAR(10 g) = 0.165 W/kg
Maximum value of SAR (measured) = 0.338 W/kg



0 dB = 0.338 W/kg = −4.71 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/12/2020
Plot No.: 5

DUT: SM-A015A, SM-A015AZ; Type: Bar

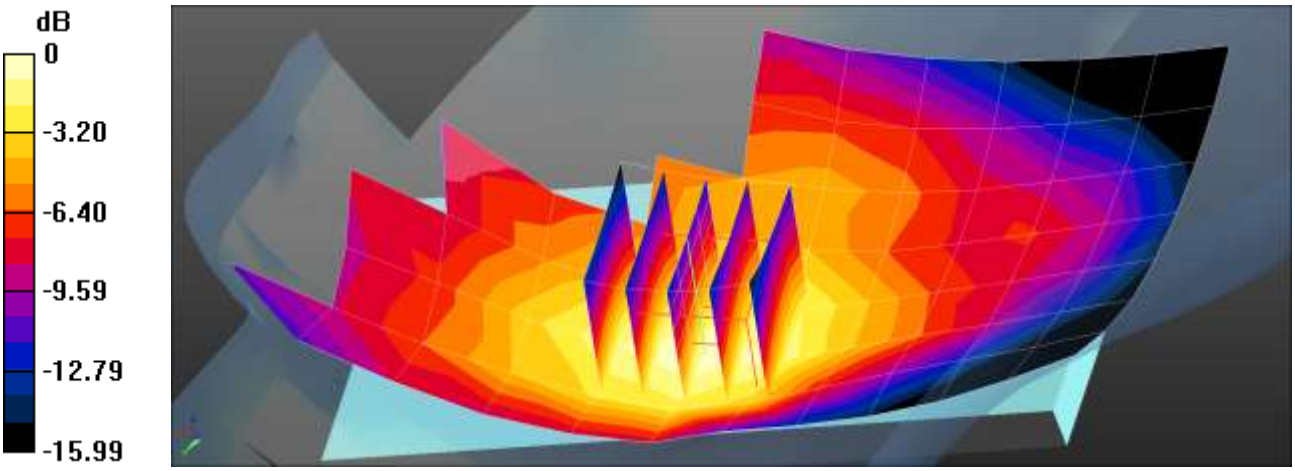
Communication System: UID 0, WCDMA1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.398 S/m; ε_r = 38.709; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(8.09, 8.09, 8.09); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA 2 Head Right Touch 9400ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.645 W/kg

WCDMA 2 Head Right Touch 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.346 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 0.764 W/kg
SAR(1 g) = 0.480 W/kg; SAR(10 g) = 0.296 W/kg
Maximum value of SAR (measured) = 0.653 W/kg



0 dB = 0.653 W/kg = −1.85 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/12/2020
Plot No.: 6

DUT: SM-A015A, SM-A015AZ; Type: Bar

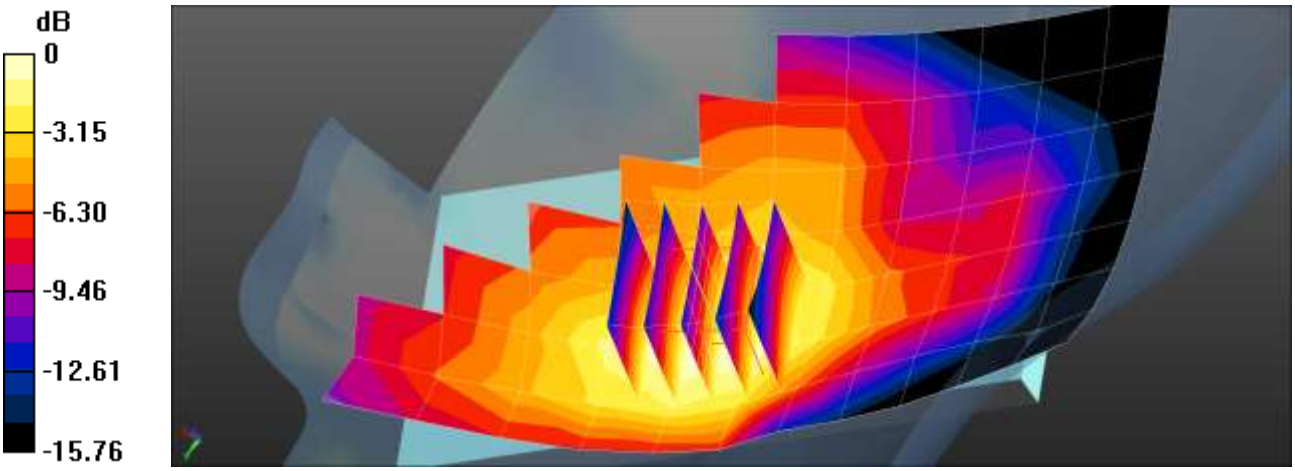
Communication System: UID 0, LTE Band 2 (0); Frequency: 1860 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1860 MHz; σ = 1.374 S/m; ε_r = 38.793; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(8.09, 8.09, 8.09); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 2 Head Right Touch QPSK 20MHz 1RB 49offset 18700ch/Area Scan (8x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.711 W/kg

LTE Band 2 Head Right Touch QPSK 20MHz 1RB 49offset 18700ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.259 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.818 W/kg
SAR(1 g) = 0.525 W/kg; SAR(10 g) = 0.334 W/kg
Maximum value of SAR (measured) = 0.691 W/kg



0 dB = 0.691 W/kg = −1.61 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/12/2020
Plot No.: 7

DUT: SM-A015A, SM-A015AZ; Type: Bar

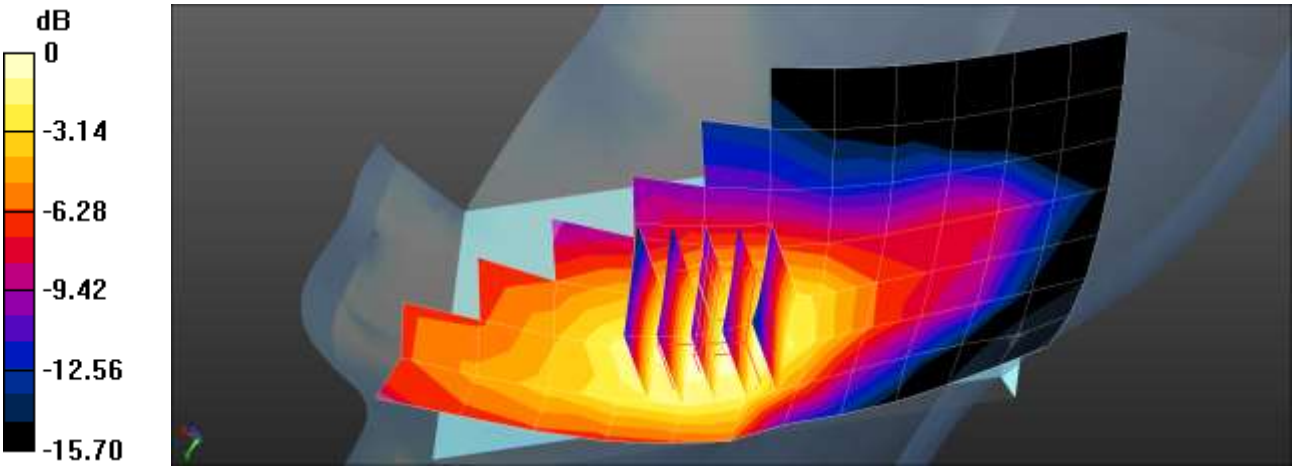
Communication System: UID 0, LTE Band 4 (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.318 S/m; ε_r = 39.344; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(8.43, 8.43, 8.43); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 4 Head Right Touch QPSK 20MHz 1RB 49offset 20175ch/Area Scan (8x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.358 W/kg

LTE Band 4 Head Right Touch QPSK 20MHz 1RB 49offset 20175ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.591 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.411 W/kg
SAR(1 g) = 0.271 W/kg; SAR(10 g) = 0.174 W/kg



0 dB = 0.358 W/kg = −4.46 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.9 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/07/2020
Plot No.: 8

DUT: SM-A015A, SM-A015AZ; Type: Bar

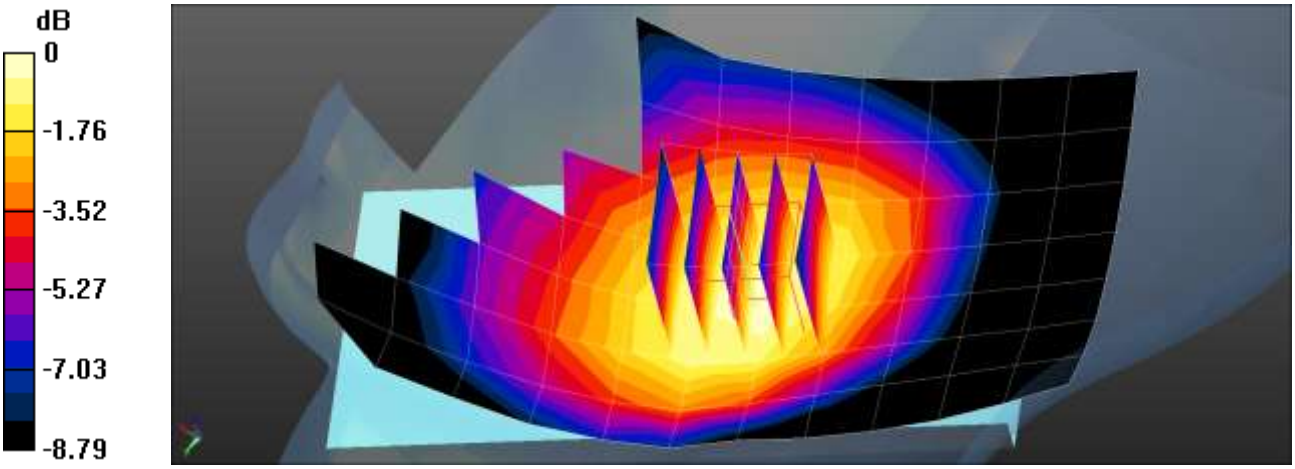
Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.929 S/m; ε_r = 42.303; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.22, 6.22, 6.22); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: SAM_Right_20170913
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 5 Head Right Touch QPSK 10MHz 25RB 24offset 20525ch/Area Scan (8x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.280 W/kg

LTE Band 5 Head Right Touch QPSK 10MHz 25RB 24offset 20525ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.856 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.328 W/kg
SAR(1 g) = 0.257 W/kg; SAR(10 g) = 0.193 W/kg
Maximum value of SAR (measured) = 0.287 W/kg



0 dB = 0.287 W/kg = −5.42 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.9 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/07/2020
Plot No.: 9

DUT: SM-A015A, SM-A015AZ; Type: Bar

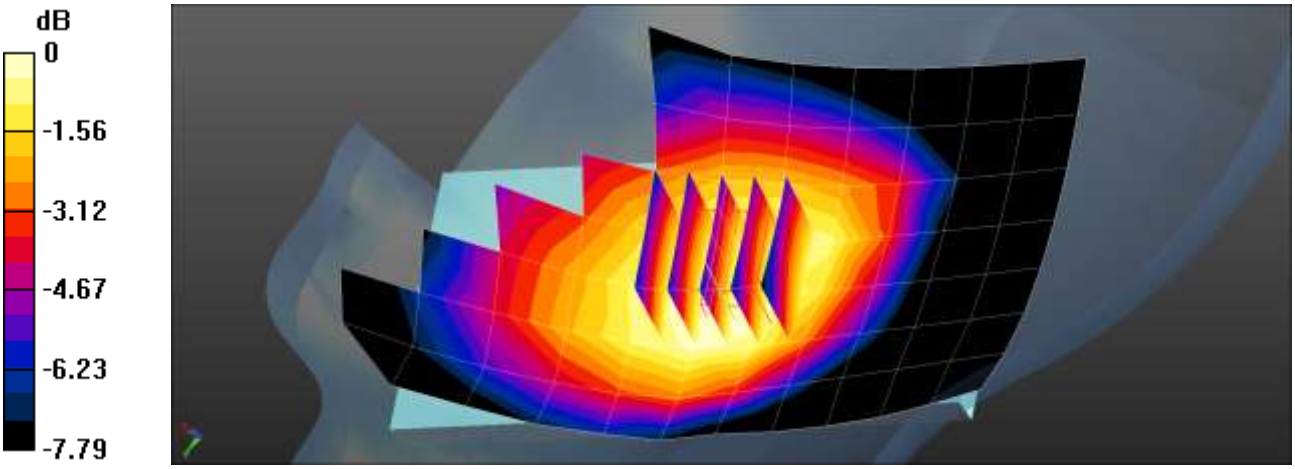
Communication System: UID 0, LTE Band 12 (0); Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.855 S/m; ε_r = 42.029; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.52, 6.52, 6.52); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: SAM_Right_20170913
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 12 Head Right Touch QPSK 10MHz 1RB 24offset 23095ch/Area Scan (8x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.254 W/kg

LTE Band 12 Head Right Touch QPSK 10MHz 1RB 24offset 23095ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.725 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.278 W/kg
SAR(1 g) = 0.228 W/kg; SAR(10 g) = 0.182 W/kg
Maximum value of SAR (measured) = 0.244 W/kg



0 dB = 0.244 W/kg = −6.13 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.9 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/07/2020
Plot No.: 10

DUT: SM-A015A, SM-A015AZ; Type: Bar

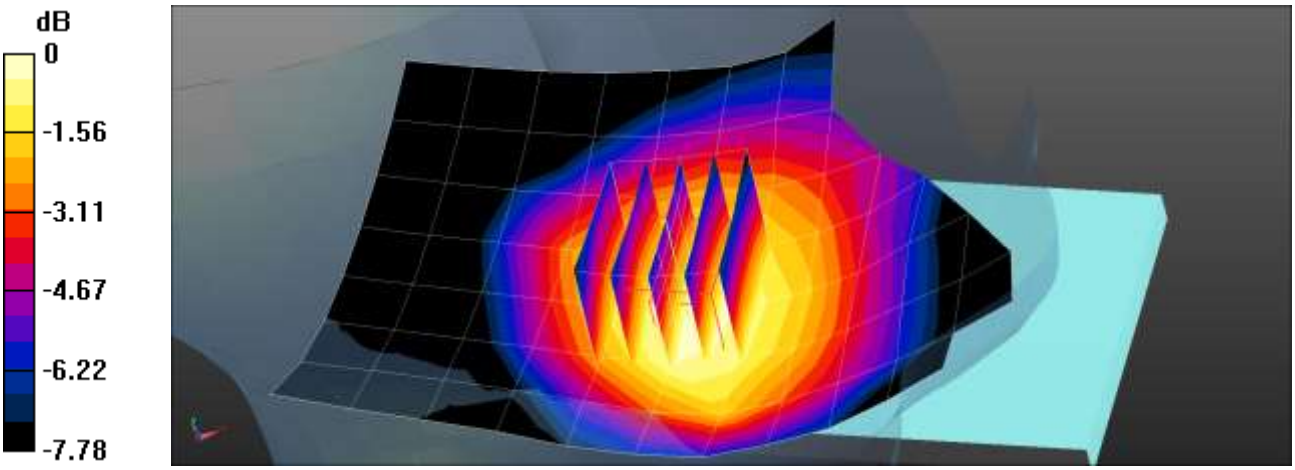
Communication System: UID 0, LTE 14 (0); Frequency: 793 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 793 MHz; σ = 0.933 S/m; ε_r = 40.859; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.52, 6.52, 6.52); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: SAM_Right_20170913
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 14 Head Left Touch QPSK 10MHz 1RB 24offset 23330ch/Area Scan (8x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.273 W/kg

LTE Band 14 Head Left Touch QPSK 10MHz 1RB 24offset 23330ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.185 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.319 W/kg
SAR(1 g) = 0.252 W/kg; SAR(10 g) = 0.194 W/kg



0 dB = 0.273 W/kg = −5.64 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.8 ℃
Ambient Temperature: 20.0 ℃
Test Date: 02/11/2020
Plot No.: 11

DUT: SM-A015A, SM-A015AZ; Type: Bar

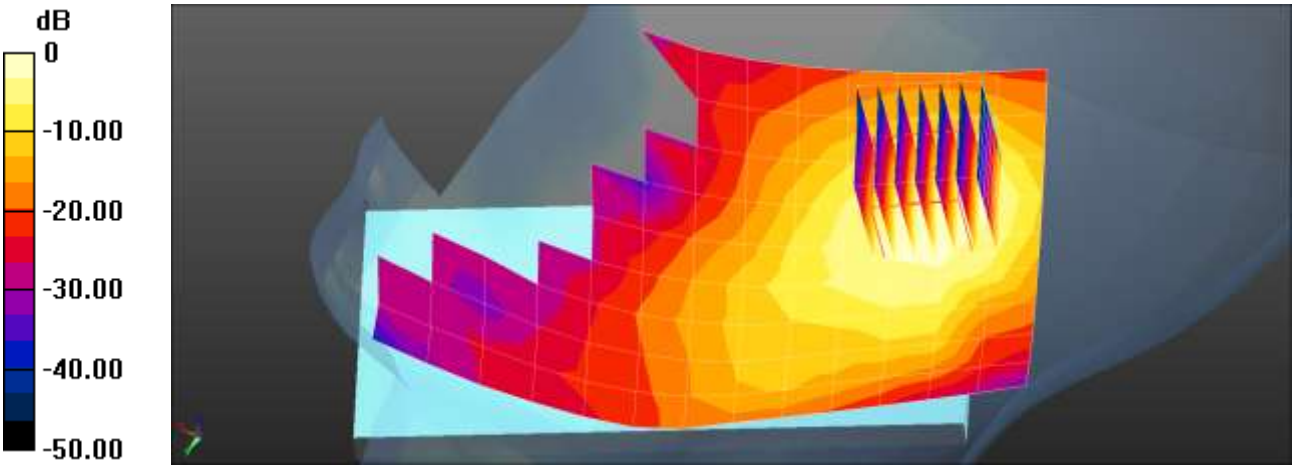
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.75 S/m; ε_r = 38.565; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3968; ConvF(7.6, 7.6, 7.6); Calibrated: 2019-09-27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2019-09-19
- Phantom: SAM with CRP v5.0_F
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Head Right Touch 1Mbps 1ch/Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.903 W/kg

802.11b Head Right Touch 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.31 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.520 W/kg; SAR(10 g) = 0.249 W/kg
Maximum value of SAR (measured) = 0.877 W/kg



0 dB = 0.903 W/kg = −0.44 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.2 ℃
Ambient Temperature: 20.6 ℃
Test Date: 02/11/2020
Plot No.: 12

DUT: SM-A015A, SM-A015AZ; Type: Bar

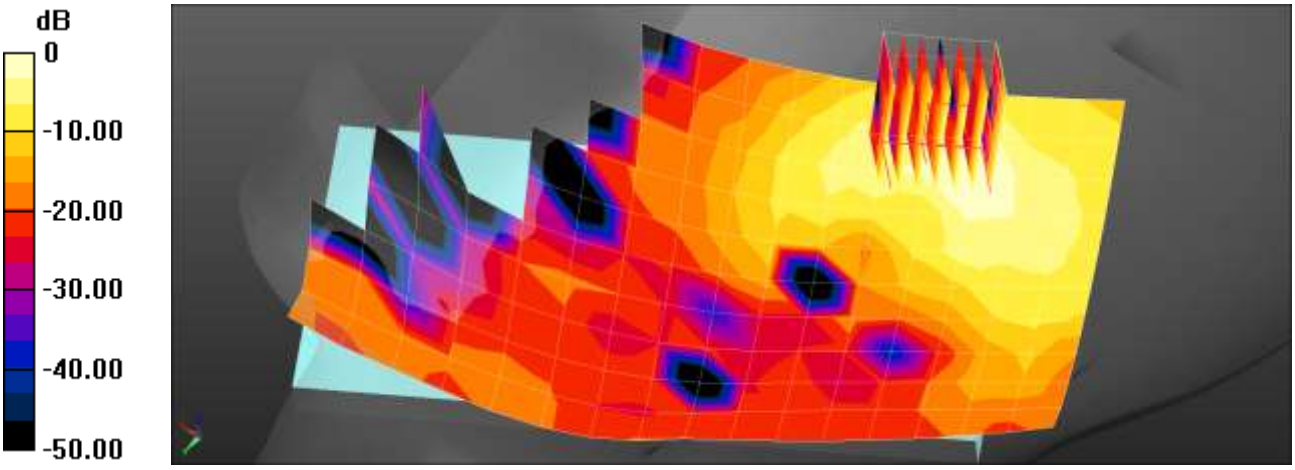
Communication System: UID 0, WIFI 5GHz (0); Frequency: 5290 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5290 MHz; σ = 4.906 S/m; ε_r = 36.892; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(5.09, 5.09, 5.09); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: Twin-SAM V4.0 (Left-Right)
- Measurement SW: DASY52, Version 52.10 (2);

802.11ac80 Head Right Touch MCS0 58ch/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.709 W/kg

802.11ac80 Head Right Touch MCS0 58ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio:1.4
Reference Value = 4.035 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.355 W/kg; SAR(10 g) = 0.112 W/kg
Maximum value of SAR (measured) = 0.898 W/kg



0 dB = 0.709 W/kg = −1.49 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.8 ℃
Ambient Temperature: 20.0 ℃
Test Date: 02/11/2020
Plot No.: 13

DUT: SM-A015A, SM-A015AZ; Type: Bar

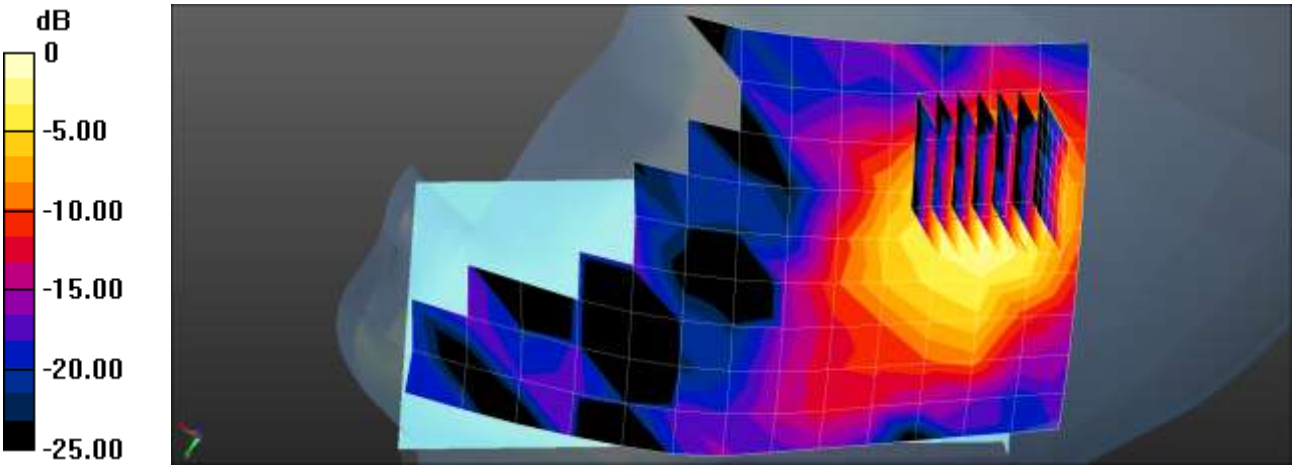
Communication System: UID 0, Bluetooth (0); Frequency: 2441 MHz;Duty Cycle: 1:1.299
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.78 S/m; ε_r = 38.377; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:

- Probe: EX3DV4 - SN3968; ConvF(7.6, 7.6, 7.6); Calibrated: 2019-09-27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2019-09-19
- Phantom: SAM with CRP v5.0_F
- Measurement SW: DASY52, Version 52.8 (8);

Bluetooth Head Right Touch DH5 39ch/Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.0618 W/kg

Bluetooth Head Right Touch DH5 39ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.396 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.0830 W/kg
SAR(1 g) = 0.036 W/kg; SAR(10 g) = 0.016 W/kg
Maximum value of SAR (measured) = 0.0630 W/kg



0 dB = 0.0630 W/kg = −12.01 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.2 ℃
Ambient Temperature: 20.4 ℃
Test Date: 02/12/2020
Plot No.: 14

DUT: SM-A015A, SM-A015AZ; Type: Bar

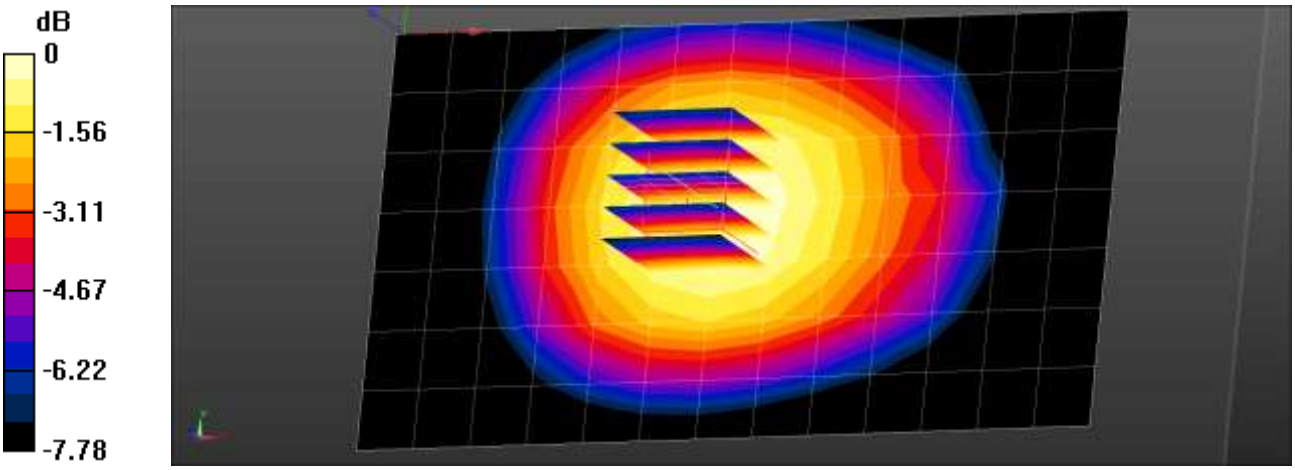
Communication System: UID 0, GSM 850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 S/m; ε_r = 53.376; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.97, 8.97, 8.97); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

GSM850 Body Rear 190ch/Area Scan (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.447 W/kg

GSM850 Body Rear 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.35 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.490 W/kg
SAR(1 g) = 0.372 W/kg; SAR(10 g) = 0.283 W/kg
Maximum value of SAR (measured) = 0.451 W/kg



0 dB = 0.451 W/kg = −3.46 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.3 ℃
Ambient Temperature: 20.4 ℃
Test Date: 02/13/2020
Plot No.: 15

DUT: SM-A015A, SM-A015AZ; Type: Bar

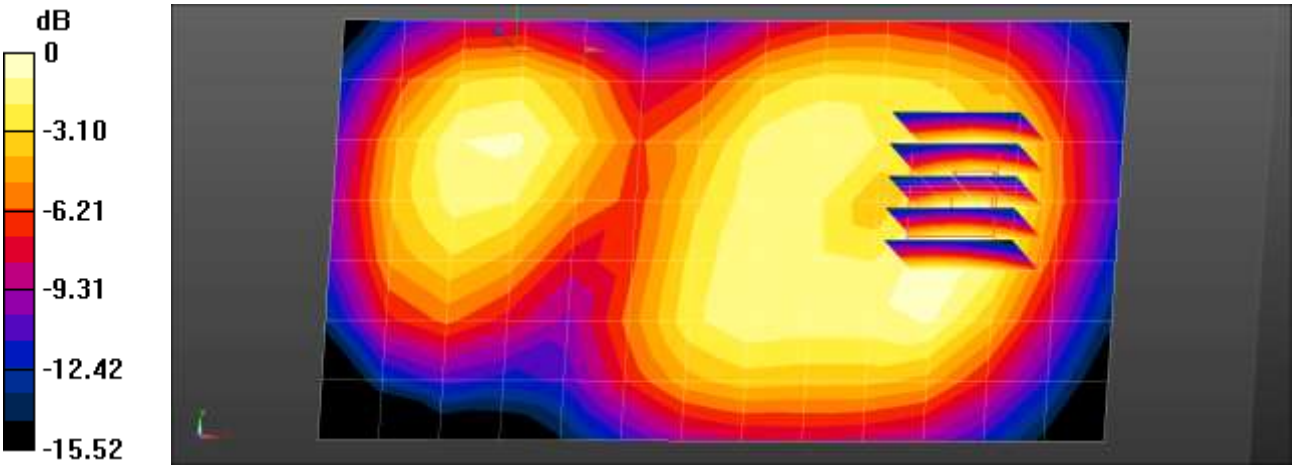
Communication System: UID 0, GSM1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:8.30042
Medium parameters used: f = 1880 MHz; σ = 1.514 S/m; ε_r = 53.598; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.61, 7.61, 7.61); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

GSM1900 Body Front 661ch/Area Scan (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.248 W/kg

GSM1900 Body Front 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.607 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.301 W/kg
SAR(1 g) = 0.181 W/kg; SAR(10 g) = 0.107 W/kg
Maximum value of SAR (measured) = 0.257 W/kg



0 dB = 0.257 W/kg = −5.90 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.2 ℃
Ambient Temperature: 20.4 ℃
Test Date: 02/12/2020
Plot No.: 16

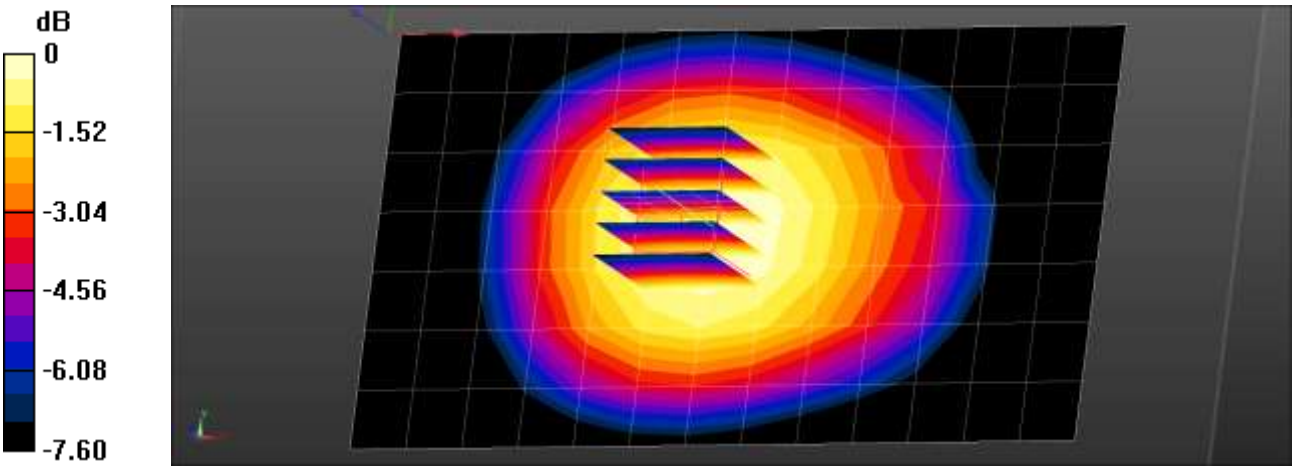
DUT: SM-A015A, SM-A015AZ; Type: Bar

Communication System: UID 0, WCDMA850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 S/m; ε_r = 53.376; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.97, 8.97, 8.97); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

WCMDA Band 5 Body Rear 4183ch/Area Scan (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.494 W/kg
WCMDA Band 5 Body Rear 4183ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.60 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.536 W/kg
SAR(1 g) = 0.410 W/kg; SAR(10 g) = 0.312 W/kg
Maximum value of SAR (measured) = 0.492 W/kg



0 dB = 0.492 W/kg = −3.08 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.8 ℃
Ambient Temperature: 21.1 ℃
Test Date: 02/13/2020
Plot No.: 17

DUT: SM-A015A, SM-A015AZ; Type: Bar

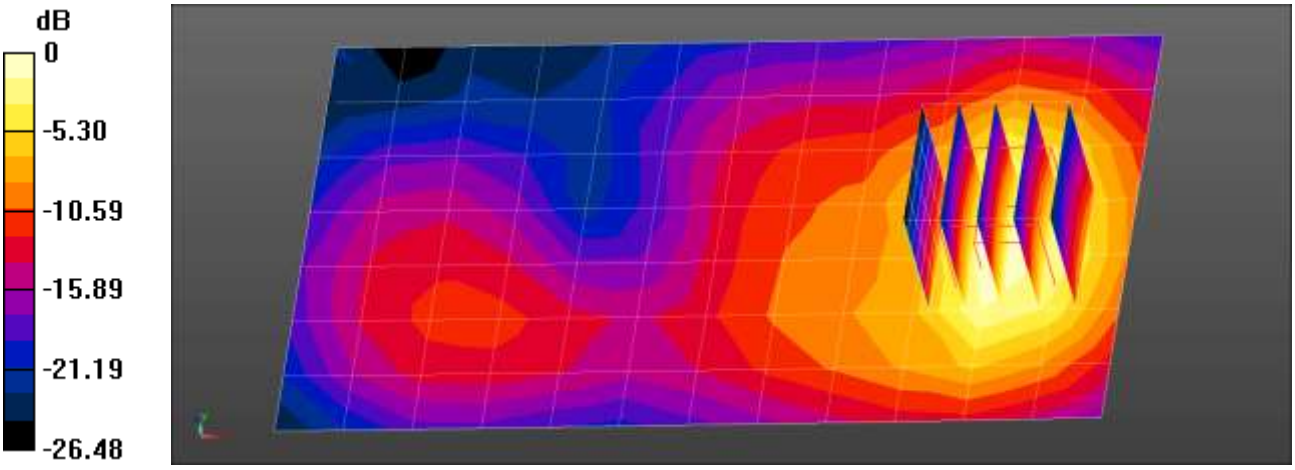
Communication System: UID 0, WCDMA IV (0); Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.48 S/m; ε_r = 53.925; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(8.23, 8.23, 8.23); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

WCDMA Band 4 Body Rear 1412ch/Area Scan (8x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.628 W/kg

WCDMA Band 4 Body Rear 1412ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.526 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.780 W/kg
SAR(1 g) = 0.461 W/kg; SAR(10 g) = 0.259 W/kg
Maximum value of SAR (measured) = 0.665 W/kg



0 dB = 0.628 W/kg = −2.02 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.8 ℃
Ambient Temperature: 21.1 ℃
Test Date: 02/13/2020
Plot No.: 18

DUT: SM-A015A, SM-A015AZ; Type: Bar

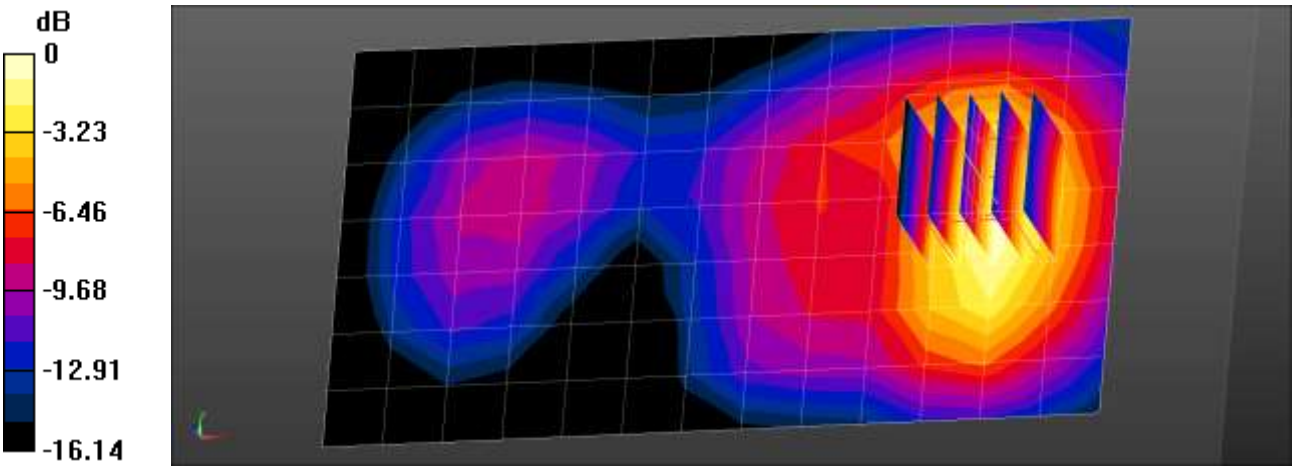
Communication System: UID 0, WCDMA1900 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.513 S/m; ε_r = 53.61; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.99, 7.99, 7.99); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

WCDMA band 2 Body Front 9400ch/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.627 W/kg

WCDMA band 2 Body Front 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.086 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.766 W/kg
SAR(1 g) = 0.454 W/kg; SAR(10 g) = 0.261 W/kg
Maximum value of SAR (measured) = 0.644 W/kg



0 dB = 0.644 W/kg = −1.91 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.8 ℃
Ambient Temperature: 21.1 ℃
Test Date: 02/13/2020
Plot No.: 19

DUT: SM-A015A, SM-A015AZ; Type: Bar

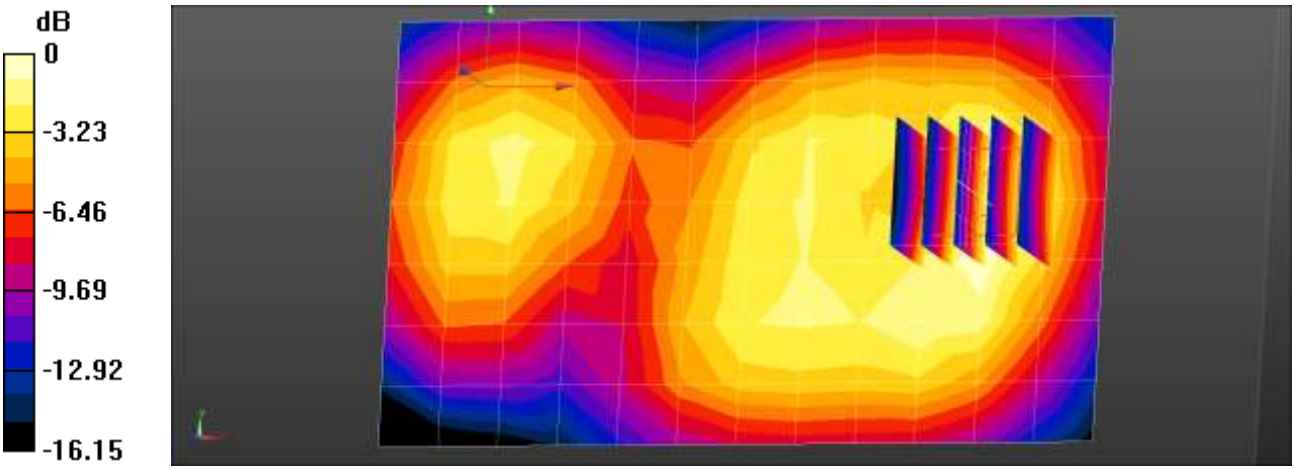
Communication System: UID 0, LTE Band2 (0); Frequency: 1860 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1860 MHz; σ = 1.492 S/m; ε_r = 53.645; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.99, 7.99, 7.99); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

LTE band 2 Body Front QPSK 20MHz 1RB 49offset 18700ch/Area Scan (8x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.474 W/kg

LTE band 2 Body Front QPSK 20MHz 1RB 49offset 18700ch/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.70 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.581 W/kg
SAR(1 g) = 0.333 W/kg; SAR(10 g) = 0.189 W/kg
Maximum value of SAR (measured) = 0.490 W/kg



0 dB = 0.490 W/kg = −3.10 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.8 ℃
Ambient Temperature: 21.1 ℃
Test Date: 02/13/2020
Plot No.: 20

DUT: SM-A015A, SM-A015AZ; Type: Bar

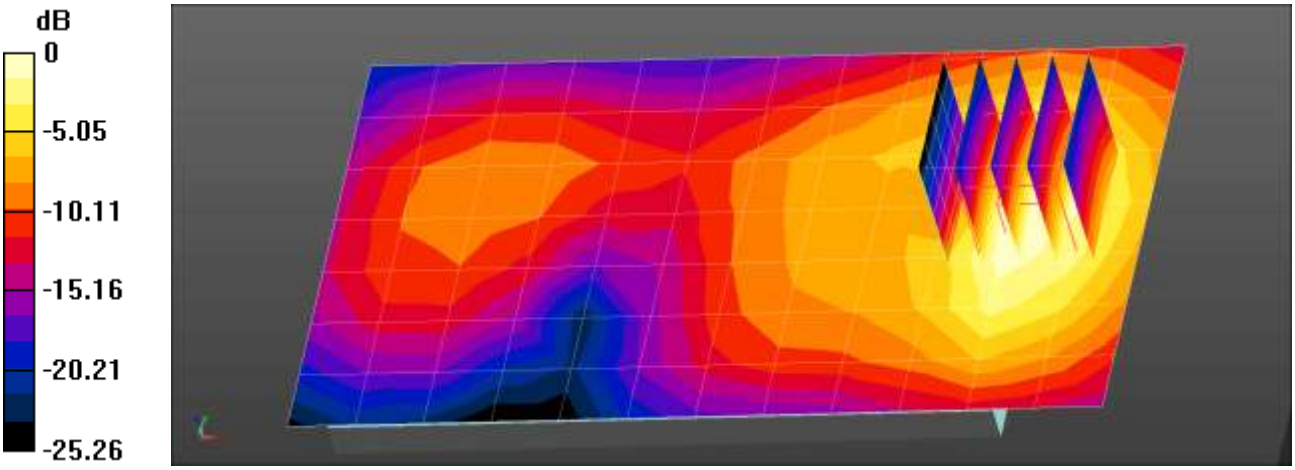
Communication System: UID 0, LTE Band4 (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.481 S/m; ε_r = 53.924; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(8.23, 8.23, 8.23); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

LTE band 4 Body Front QPSK 20MHz 1RB 49offset 20175ch/Area Scan (8x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.584 W/kg

LTE band 4 Body Front QPSK 20MHz 1RB 49offset 20175ch/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.513 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.769 W/kg
SAR(1 g) = 0.458 W/kg; SAR(10 g) = 0.263 W/kg
Maximum value of SAR (measured) = 0.653 W/kg



0 dB = 0.584 W/kg = −2.33 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.4 ℃
Ambient Temperature: 21.7 ℃
Test Date: 02/10/2020
Plot No.: 21

DUT: SM-A015A, SM-A015AZ; Type: Bar

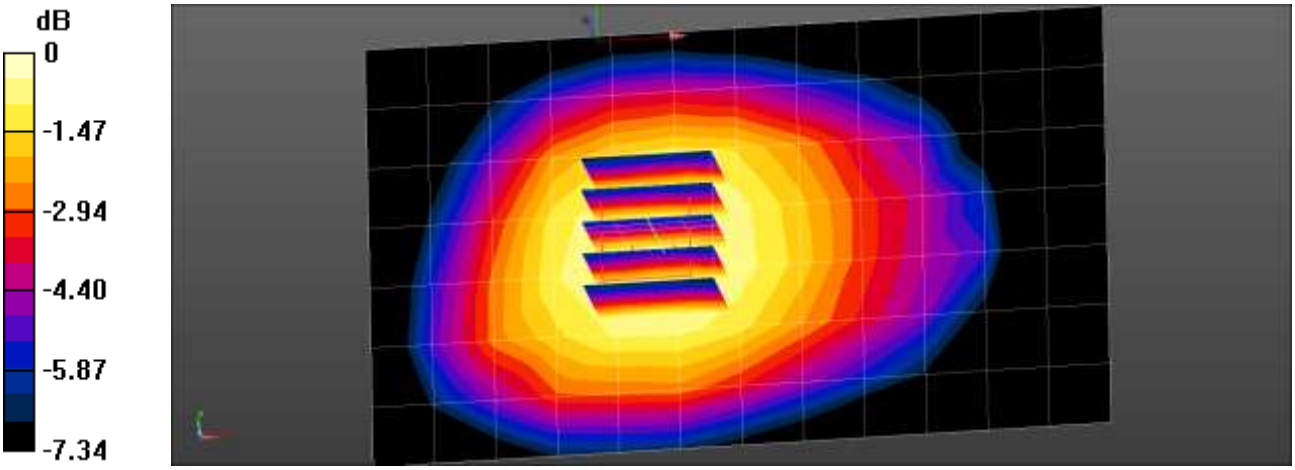
Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.962 S/m; ε_r = 56.323; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(5.97, 5.97, 5.97); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 5 Body worn Rear QPSK 10MHz 1RB 24offset 20525ch/Area Scan (13x8x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.307 W/kg

LTE Band 5 Body worn Rear QPSK 10MHz 1RB 24offset 20525ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.47 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.368 W/kg
SAR(1 g) = 0.290 W/kg; SAR(10 g) = 0.223 W/kg
Maximum value of SAR (measured) = 0.321 W/kg



0 dB = 0.321 W/kg = −4.93 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.5 ℃
Ambient Temperature: 21.8 ℃
Test Date: 02/11/2020
Plot No.: 22

DUT: SM-A015A, SM-A015AZ; Type: Bar

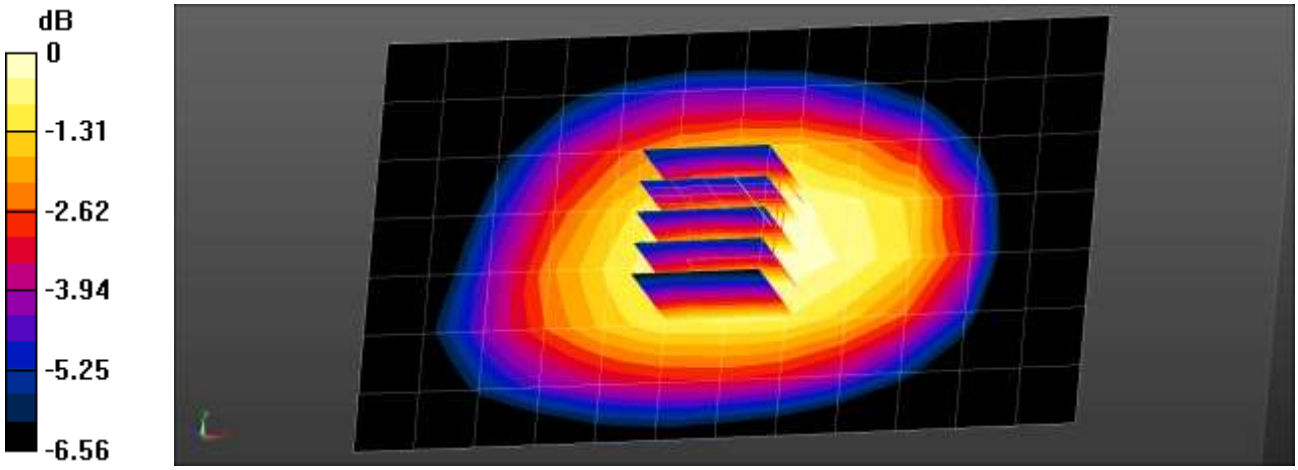
Communication System: UID 0, LTE Band 12 (0); Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.926 S/m; ε_r = 55.797; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.12, 6.12, 6.12); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 12 Body worn Rear QPSK 10MHz 1RB 24offset 23095ch/Area Scan (13x8x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.357 W/kg

LTE Band 12 Body worn Rear QPSK 10MHz 1RB 24offset 23095ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.55 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.396 W/kg
SAR(1 g) = 0.323 W/kg; SAR(10 g) = 0.257 W/kg
Maximum value of SAR (measured) = 0.353 W/kg



0 dB = 0.353 W/kg = −4.52 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.5 ℃
Ambient Temperature: 21.8 ℃
Test Date: 02/11/2020
Plot No.: 23

DUT: SM-A015A, SM-A015AZ; Type: Bar

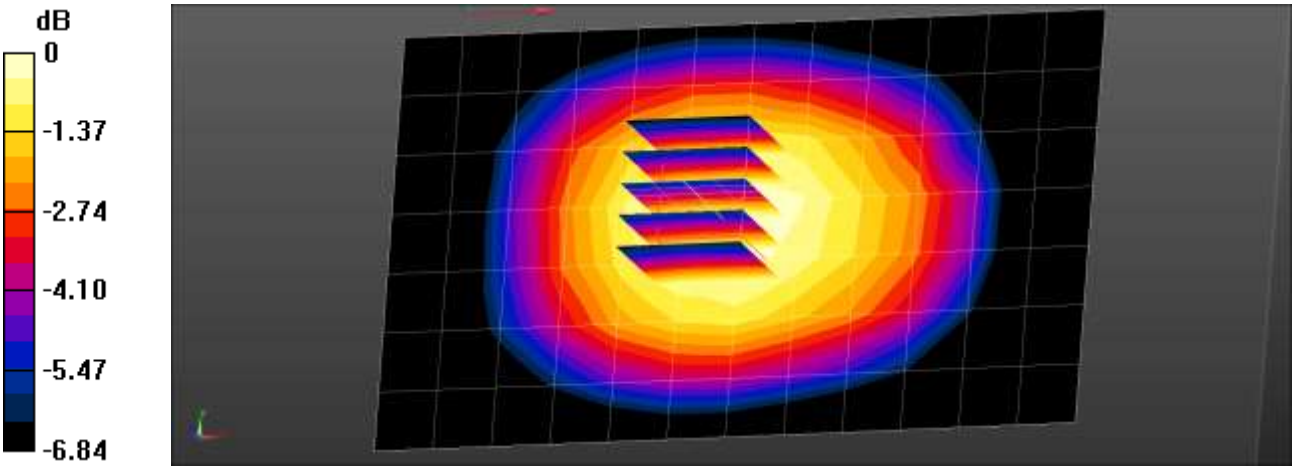
Communication System: UID 0, LTE 14 (0); Frequency: 793 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 793 MHz; σ = 1.005 S/m; ε_r = 54.943; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.12, 6.12, 6.12); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 14 Body worn Rear QPSK 10MHz 1RB 24offset 23330ch/Area Scan (13x8x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.363 W/kg

LTE Band 14 Body worn Rear QPSK 10MHz 1RB 24offset 23330ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.96 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.426 W/kg
SAR(1 g) = 0.342 W/kg; SAR(10 g) = 0.266 W/kg
Maximum value of SAR (measured) = 0.374 W/kg



0 dB = 0.374 W/kg = −4.27 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.8 ℃
Ambient Temperature: 20.0 ℃
Test Date: 02/11/2020
Plot No.: 24

DUT: SM-A015A, SM-A015AZ; Type: Bar

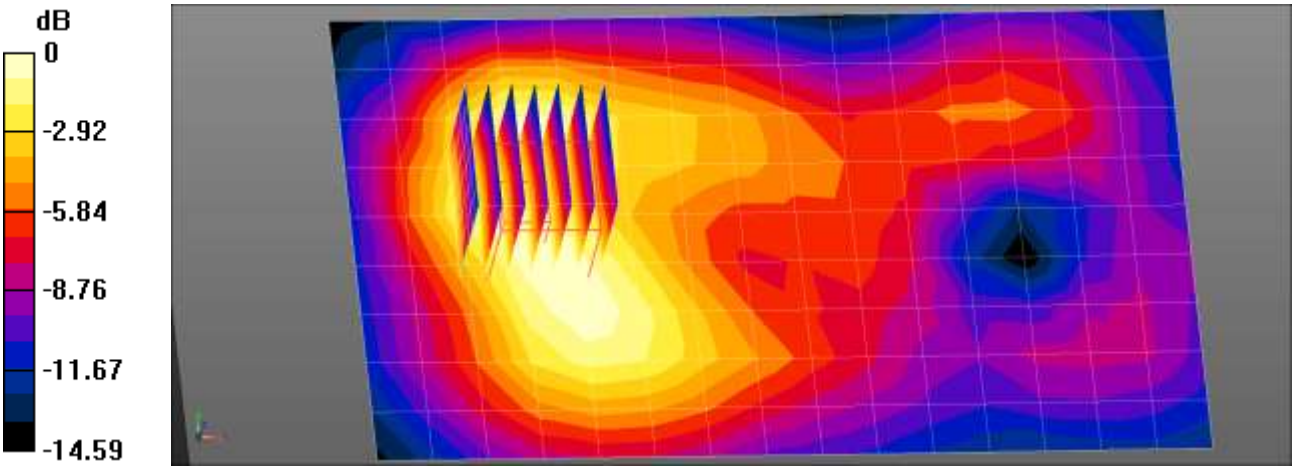
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.909 S/m; ε_r = 53.846; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3968; ConvF(7.68, 7.68, 7.68); Calibrated: 2019-09-27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2019-09-19
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Body worn Rear 1Mbps 1ch/Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.119 W/kg

802.11b Body worn Rear 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.757 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.153 W/kg
SAR(1 g) = 0.082 W/kg; SAR(10 g) = 0.046 W/kg
Maximum value of SAR (measured) = 0.116 W/kg



0 dB = 0.119 W/kg = −9.26 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.2 ℃
Test Date: 02/12/2020
Plot No.: 25

DUT: SM-A015A, SM-A015AZ; Type: Bar

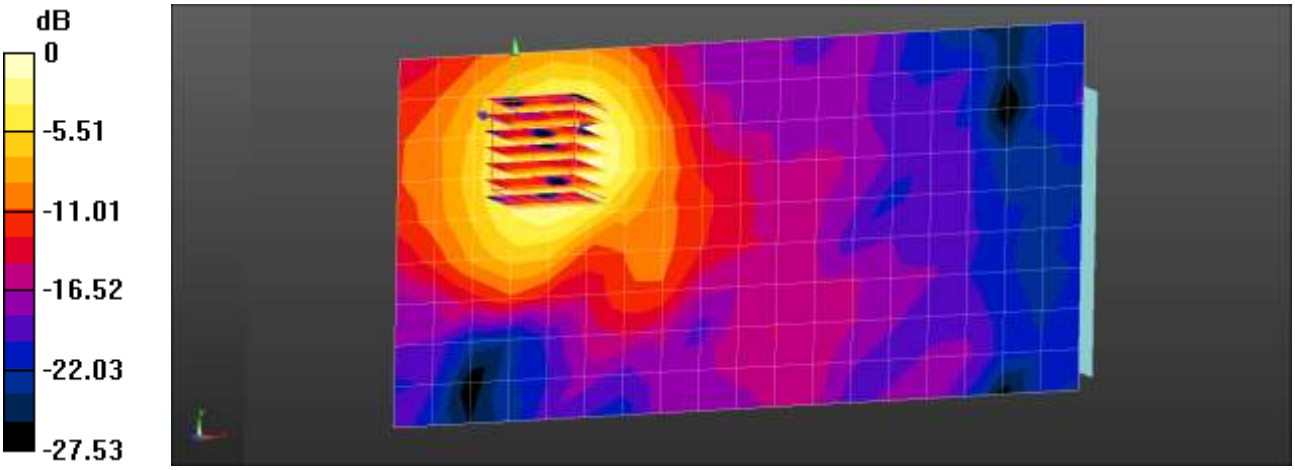
Communication System: UID 0, WIFI 5GHz (0); Frequency: 5270 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5270 MHz; σ = 5.509 S/m; ε_r = 47.765; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.4, 4.4, 4.4); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

802.11n40 Body-worn Rear MCS0 54ch/Area Scan (19x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.20 W/kg

802.11n40 Body-worn Rear MCS0 54ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio:1.4
Reference Value = 2.516 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 2.05 W/kg
SAR(1 g) = 0.595 W/kg; SAR(10 g) = 0.228 W/kg
Maximum value of SAR (measured) = 1.32 W/kg



0 dB = 1.20 W/kg = 0.80 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.8 ℃
Ambient Temperature: 20.0 ℃
Test Date: 02/11/2020
Plot No.: 26

DUT: SM-A015A, SM-A015AZ; Type: Bar

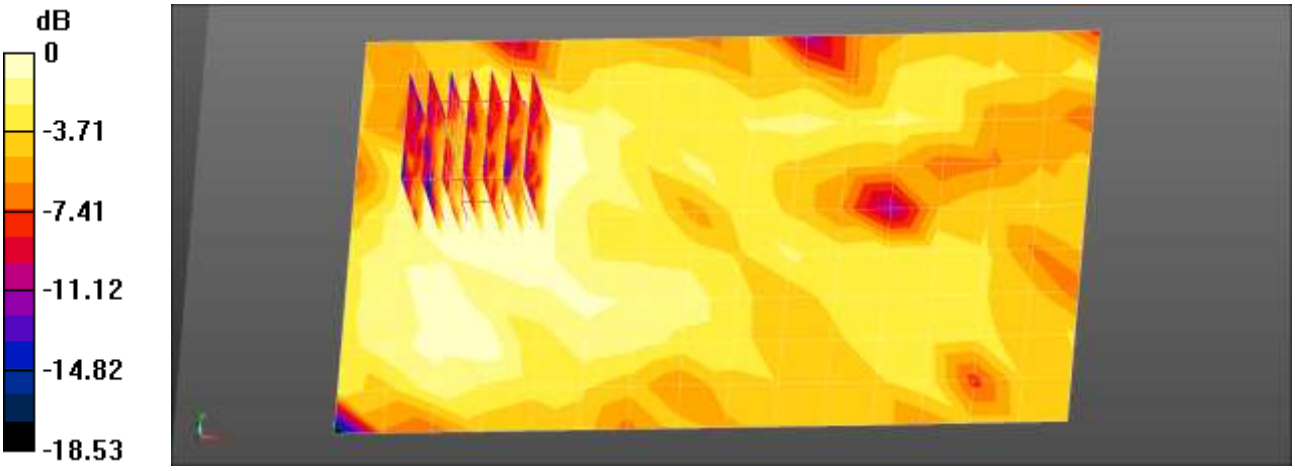
Communication System: UID 0, Bluetooth (0); Frequency: 2441 MHz;Duty Cycle: 1:1.299
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.938 S/m; ε_r = 53.71; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3968; ConvF(7.68, 7.68, 7.68); Calibrated: 2019-09-27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2019-09-19
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

Bluetooth Body worn Front DH5 39ch/Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.00955 W/kg

Bluetooth Body worn Front DH5 39ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.049 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.0100 W/kg
SAR(1 g) = 0.00509 W/kg; SAR(10 g) = 0.00288 W/kg
Maximum value of SAR (measured) = 0.00740 W/kg



0 dB = 0.00740 W/kg = −21.31 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.2 ℃
Ambient Temperature: 20.4 ℃
Test Date: 02/12/2020
Plot No.: 27

DUT: SM-A015A, SM-A015AZ; Type: Bar

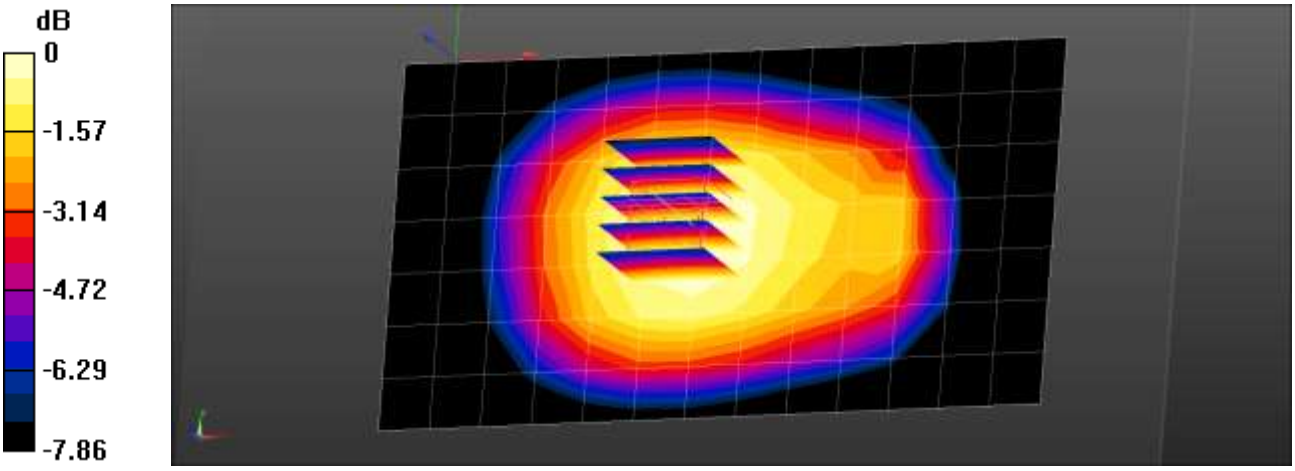
Communication System: UID 0, GSM 850 2Tx (0); Frequency: 836.6 MHz;Duty Cycle: 1:4.14954
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 S/m; ε_r = 53.376; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.97, 8.97, 8.97); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

GSM850 Body Rear 190ch 2Tx/Area Scan (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.532 W/kg

GSM850 Body Rear 190ch 2Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.84 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.591 W/kg
SAR(1 g) = 0.450 W/kg; SAR(10 g) = 0.346 W/kg
Maximum value of SAR (measured) = 0.543 W/kg



0 dB = 0.543 W/kg = −2.65 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.3 ℃
Ambient Temperature: 20.4 ℃
Test Date: 02/13/2020
Plot No.: 28

DUT: SM-A015A, SM-A015AZ; Type: Bar

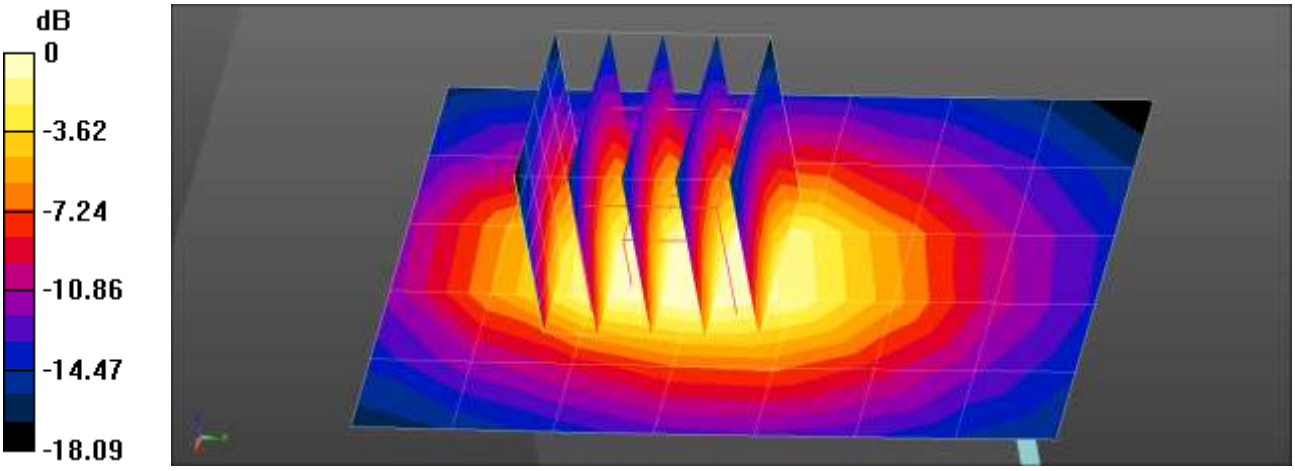
Communication System: UID 0, GSM1900 2Tx (0); Frequency: 1909.8 MHz;Duty Cycle: 1:4.14954
Medium parameters used: f = 1910 MHz; σ = 1.545 S/m; ε_r = 53.566; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.61, 7.61, 7.61); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

GSM1900 Body Bottom 810ch 2Tx/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.439 W/kg

GSM1900 Body Bottom 810ch 2Tx/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.81 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.765 W/kg
SAR(1 g) = 0.436 W/kg; SAR(10 g) = 0.231 W/kg
Maximum value of SAR (measured) = 0.653 W/kg



0 dB = 0.439 W/kg = −3.58 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.2 ℃
Ambient Temperature: 20.4 ℃
Test Date: 02/12/2020
Plot No.: 29

DUT: SM-A015A, SM-A015AZ; Type: Bar

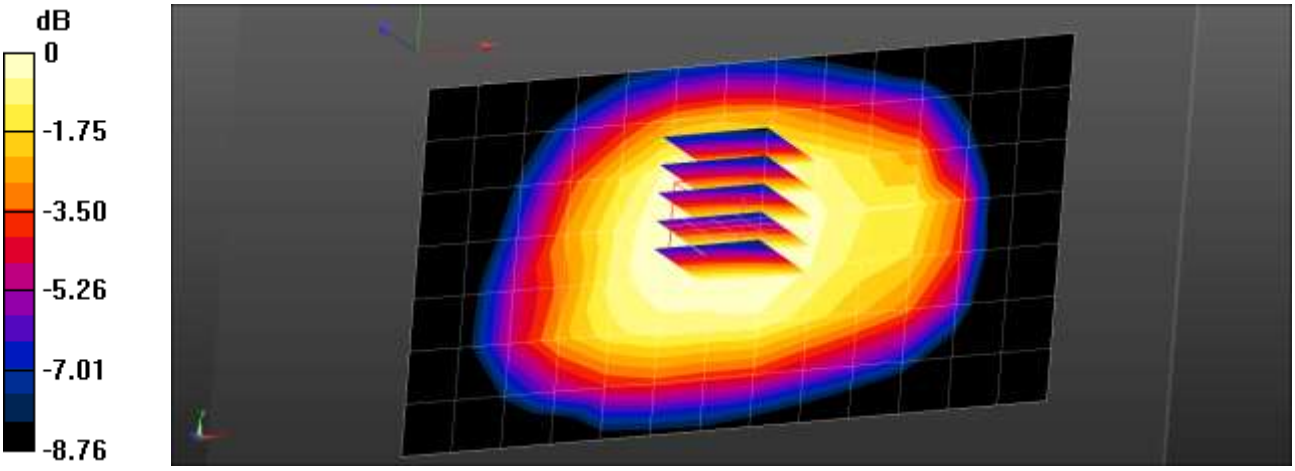
Communication System: UID 0, WCDMA850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 S/m; ε_r = 53.376; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.97, 8.97, 8.97); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

WCMDA Band 5 Body Rear 4183ch/Area Scan (14x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.574 W/kg

WCMDA Band 5 Body Rear 4183ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.40 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.580 W/kg
SAR(1 g) = 0.442 W/kg; SAR(10 g) = 0.333 W/kg
Maximum value of SAR (measured) = 0.530 W/kg



0 dB = 0.530 W/kg = −2.76 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.8 ℃
Ambient Temperature: 21.1 ℃
Test Date: 02/13/2020
Plot No.: 30

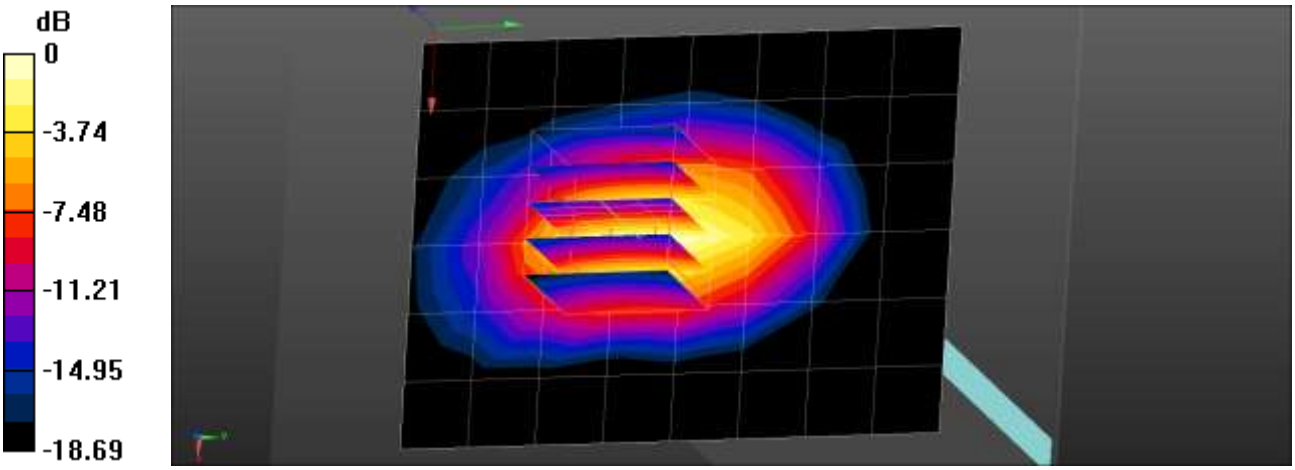
DUT: SM-A015A, SM-A015AZ; Type: Bar

Communication System: UID 0, WCDMA IV (0); Frequency: 1732.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.4 MHz; σ = 1.48 S/m; ε_r = 53.925; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(8.23, 8.23, 8.23); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.8 (8);

WCDMA band 4 Body Bottom 1412ch/Area Scan (9x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.49 W/kg
WCDMA band 4 Body Bottom 1412ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.85 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.90 W/kg
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.548 W/kg
Maximum value of SAR (measured) = 1.60 W/kg



0 dB = 1.60 W/kg = 2.04 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.8 ℃
Ambient Temperature: 21.1 ℃
Test Date: 02/13/2020
Plot No.: 31

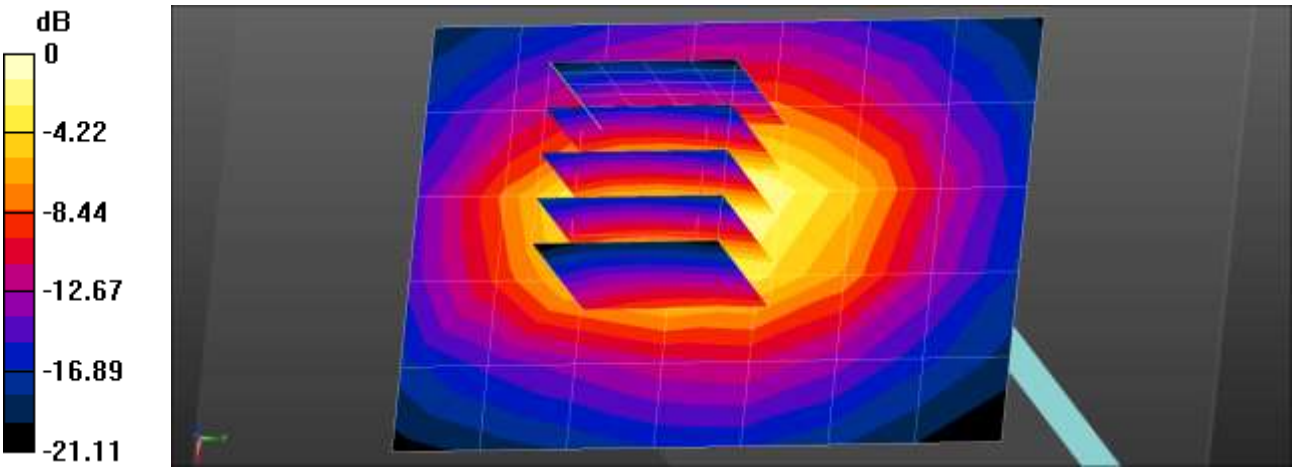
DUT: SM-A015A, SM-A015AZ; Type: Bar

Communication System: UID 0, WCDMA1900 (0); Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.484 S/m; ε_r = 53.663; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.99, 7.99, 7.99); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

WCDMA band 2 Body Bottom 9262ch/Area Scan (8x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.49 W/kg
WCDMA band 2 Body Bottom 9262ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.77 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 2.06 W/kg
SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.575 W/kg
Maximum value of SAR (measured) = 1.70 W/kg



0 dB = 1.49 W/kg = 1.74 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.8 ℃
Ambient Temperature: 21.1 ℃
Test Date: 02/13/2020
Plot No.: 32

DUT: SM-A015A, SM-A015AZ; Type: Bar

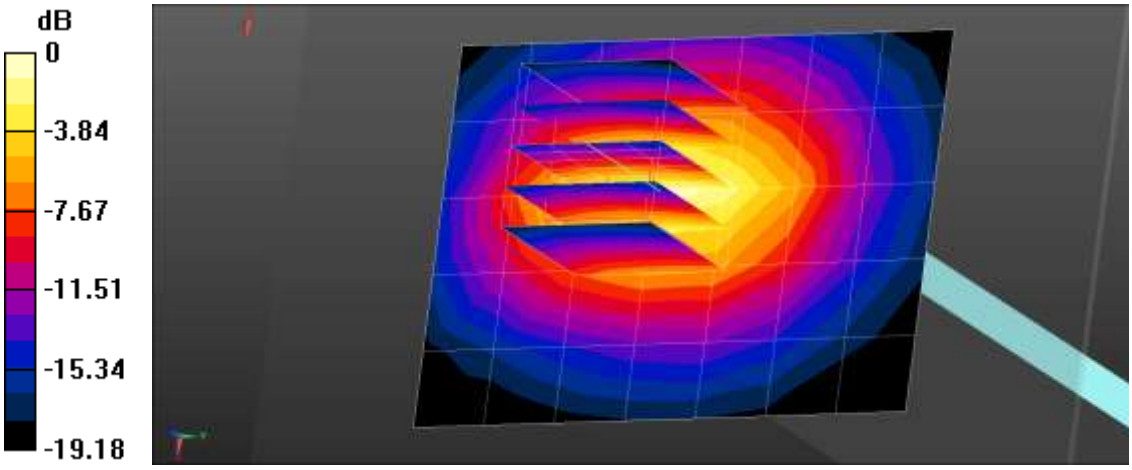
Communication System: UID 0, LTE Band2 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.513 S/m; ε_r = 53.61; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.99, 7.99, 7.99); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

LTE band 2 Body Bottom QPSK 20MHz 1RB 49offset 18900ch/Area Scan (8x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.47 W/kg

LTE band 2 Body Bottom QPSK 20MHz 1RB 49offset 18900ch/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.44 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 0.959 W/kg; SAR(10 g) = 0.488 W/kg



0 dB = 1.47 W/kg = 1.67 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.8 ℃
Ambient Temperature: 21.1 ℃
Test Date: 02/13/2020
Plot No.: 33

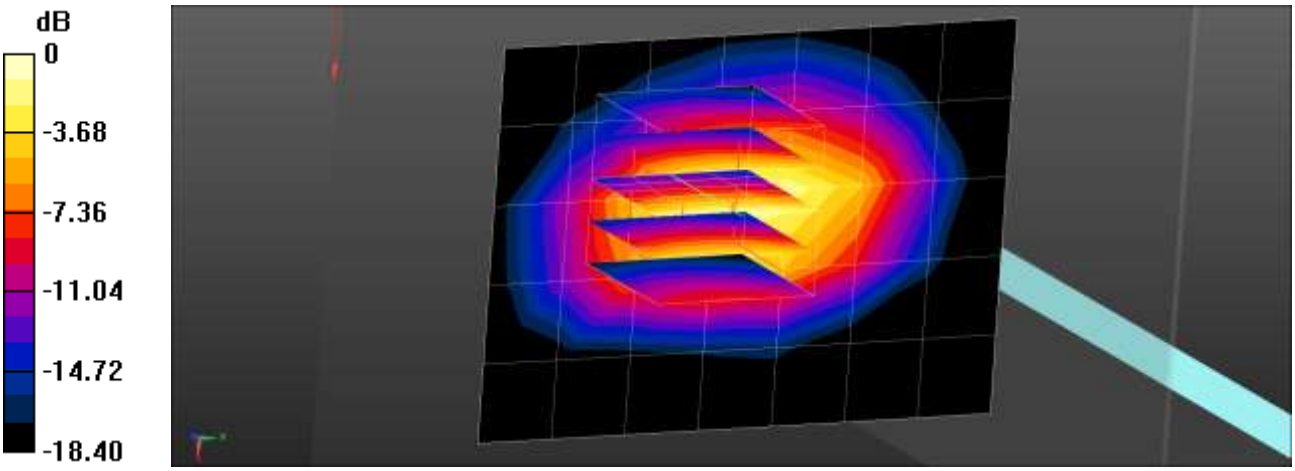
DUT: SM-A015A, SM-A015AZ; Type: Bar

Communication System: UID 0, LTE Band4 (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.481 S/m; ε_r = 53.924; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(8.23, 8.23, 8.23); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

LTE band 4 Body Bottom QPSK 20MHz 1RB 0offset 20175ch/Area Scan (8x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.33 W/kg
LTE band 4 Body Bottom QPSK 20MHz 1RB 0offset 20175ch/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.63 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 1.99 W/kg
SAR(1 g) = 1.08 W/kg; SAR(10 g) = 0.560 W/kg
Maximum value of SAR (measured) = 1.62 W/kg



0 dB = 1.62 W/kg = 2.10 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.4 ℃
Ambient Temperature: 21.7 ℃
Test Date: 02/10/2020
Plot No.: 34

DUT: SM-A015A, SM-A015AZ; Type: Bar

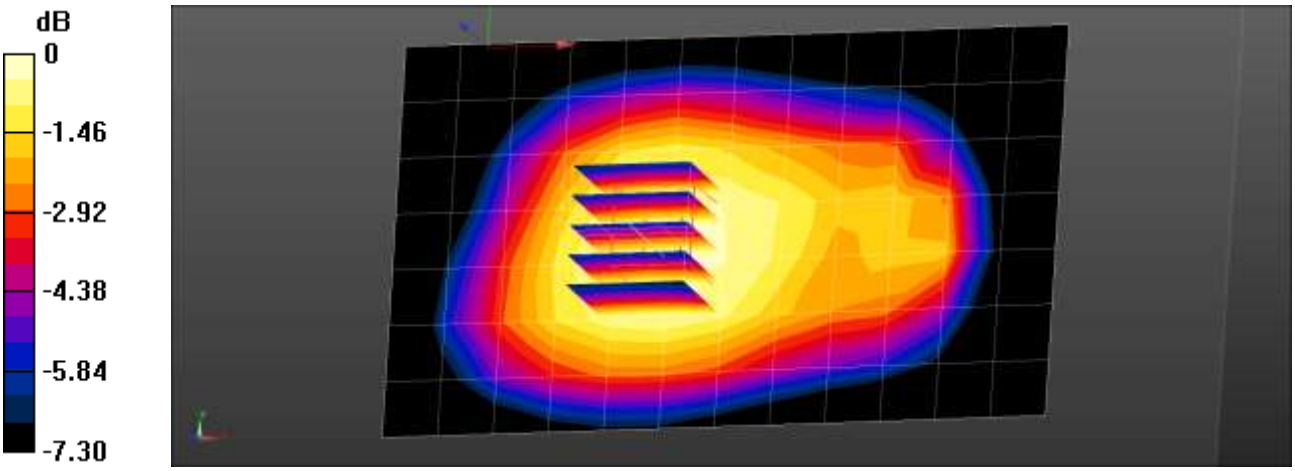
Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.962 S/m; ε_r = 56.323; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(5.97, 5.97, 5.97); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 5 Body Rear QPSK 10MHz 1RB 24offset 20525ch/Area Scan (13x8x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.369 W/kg

LTE Band 5 Body Rear QPSK 10MHz 1RB 24offset 20525ch/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.30 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.411 W/kg
SAR(1 g) = 0.339 W/kg; SAR(10 g) = 0.265 W/kg



0 dB = 0.369 W/kg = −4.33 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.5 ℃
Ambient Temperature: 21.8 ℃
Test Date: 02/11/2020
Plot No.: 35

DUT: SM-A015A, SM-A015AZ; Type: Bar

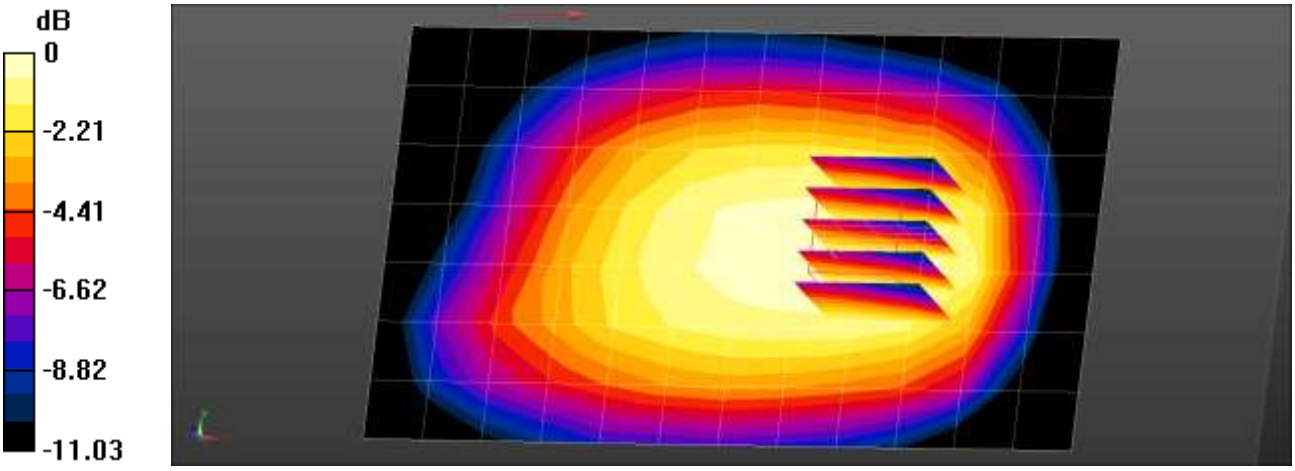
Communication System: UID 0, LTE Band 12 (0); Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.926 S/m; ε_r = 55.797; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.12, 6.12, 6.12); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 12 Body Rear QPSK 10MHz 1RB 24offset 23095ch/Area Scan (13x8x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.444 W/kg

LTE Band 12 Body Rear QPSK 10MHz 1RB 24offset 23095ch/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.60 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.517 W/kg
SAR(1 g) = 0.410 W/kg; SAR(10 g) = 0.303 W/kg
Maximum value of SAR (measured) = 0.456 W/kg



0 dB = 0.456 W/kg = −3.41 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.5 ℃
Ambient Temperature: 21.8 ℃
Test Date: 02/11/2020
Plot No.: 36

DUT: SM-A015A, SM-A015AZ; Type: Bar

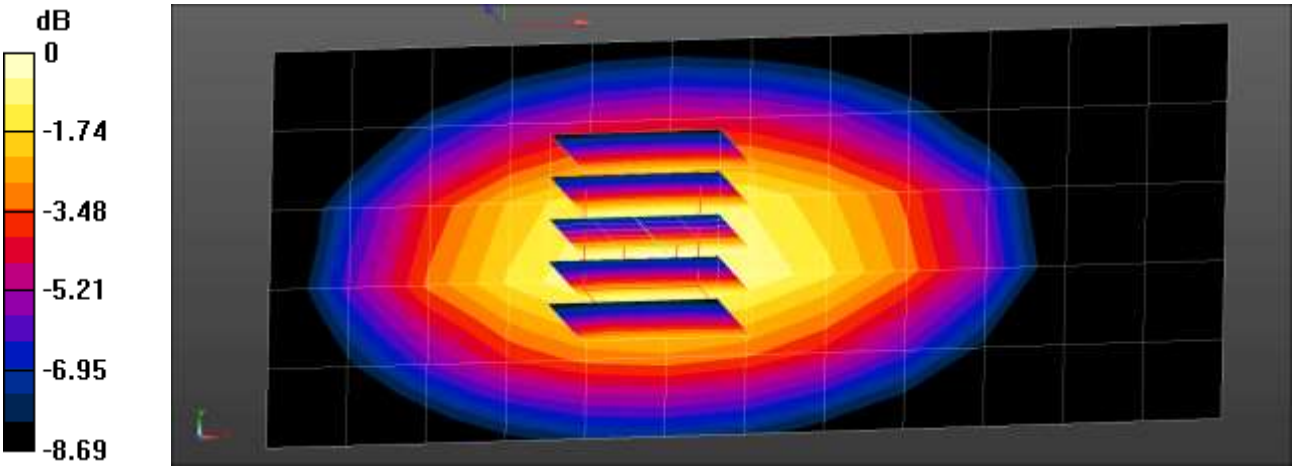
Communication System: UID 0, LTE 14 (0); Frequency: 793 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 793 MHz; σ = 1.005 S/m; ε_r = 54.943; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.12, 6.12, 6.12); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

LTE Band 14 Body Right QPSK 10MHz 1RB 24offset 23330ch/Area Scan (13x6x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.429 W/kg

LTE Band 14 Body Right QPSK 10MHz 1RB 24offset 23330ch/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.38 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.558 W/kg
SAR(1 g) = 0.400 W/kg; SAR(10 g) = 0.280 W/kg
Maximum value of SAR (measured) = 0.456 W/kg



0 dB = 0.456 W/kg = −3.41 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.8 ℃
Ambient Temperature: 20.0 ℃
Test Date: 02/11/2020
Plot No.: 37

DUT: SM-A015A, SM-A015AZ; Type: Bar

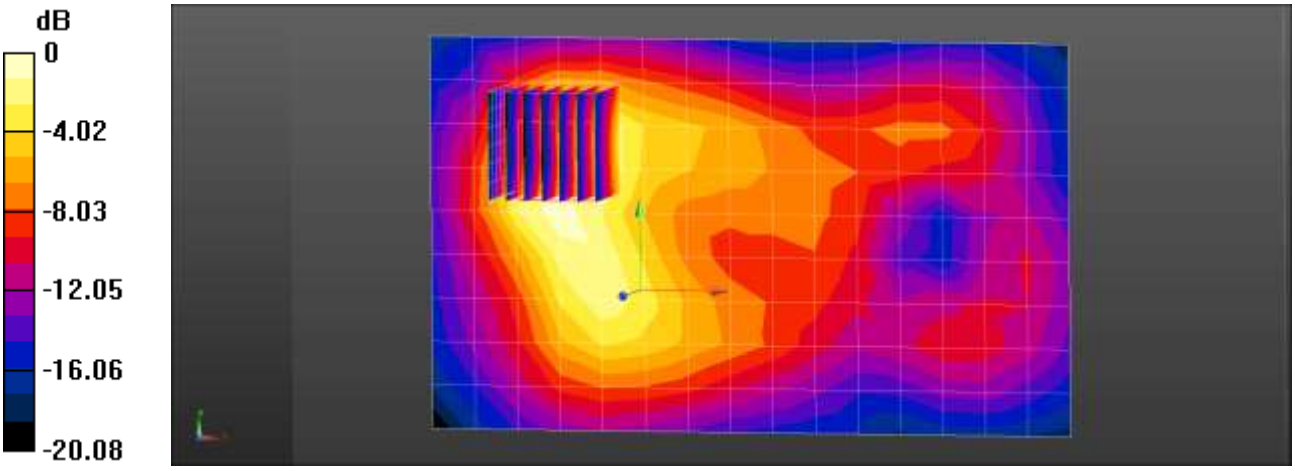
Communication System: UID 0, 2450MHz FCC (0); Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.909 S/m; ε_r = 53.846; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3968; ConvF(7.68, 7.68, 7.68); Calibrated: 2019-09-27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2019-09-19
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

802.11b Body Rear 1Mbps 1ch/Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.320 W/kg

802.11b Body Rear 1Mbps 1ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.331 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.500 W/kg
SAR(1 g) = 0.226 W/kg; SAR(10 g) = 0.109 W/kg
Maximum value of SAR (measured) = 0.367 W/kg



0 dB = 0.320 W/kg = −4.95 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.8 ℃
Ambient Temperature: 21.1 ℃
Test Date: 02/13/2020
Plot No.: 38

DUT: SM-A015A, SM-A015AZ; Type: Bar

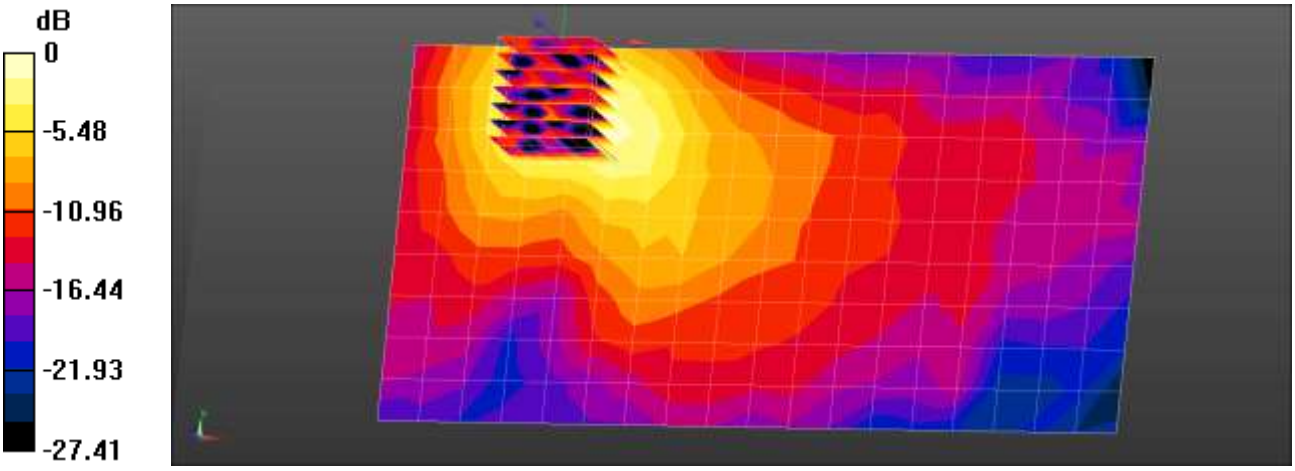
Communication System: UID 0, WIFI 5GHz (0); Frequency: 5775 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5775 MHz; σ = 6.168 S/m; ε_r = 47.815; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.21, 4.21, 4.21); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

802.11ac80 Body Rear MCS0 155ch/Area Scan (19x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.16 W/kg

802.11ac80 Body Rear MCS0 155ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio:1.4
Reference Value = 4.497 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 2.25 W/kg
SAR(1 g) = 0.525 W/kg; SAR(10 g) = 0.192 W/kg
Maximum value of SAR (measured) = 1.29 W/kg



0 dB = 1.16 W/kg = 0.64 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.8 ℃
Ambient Temperature: 20.0 ℃
Test Date: 02/11/2020
Plot No.: 39

DUT: SM-A015A, SM-A015AZ; Type: Bar

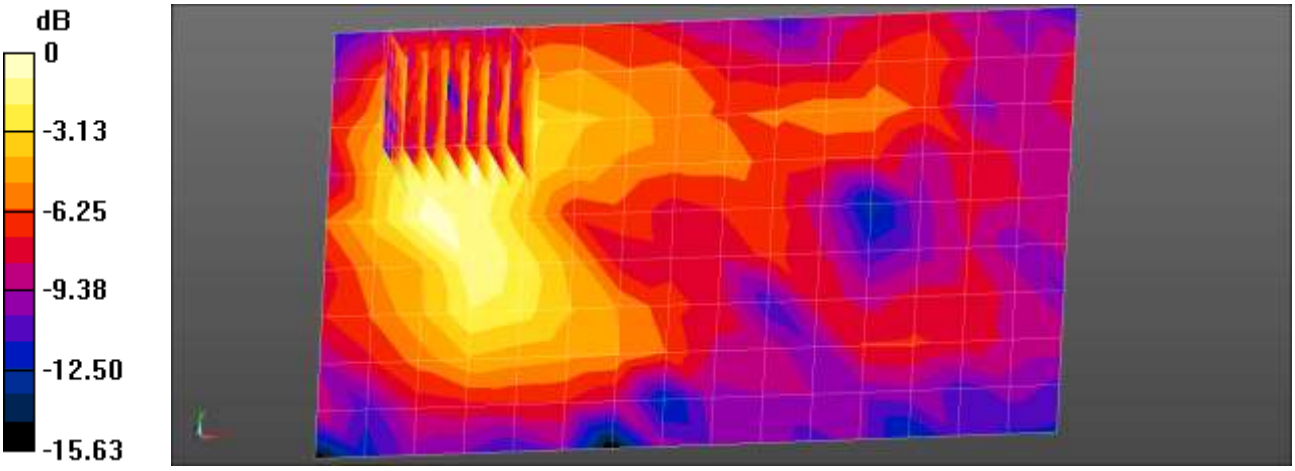
Communication System: UID 0, Bluetooth (0); Frequency: 2441 MHz;Duty Cycle: 1:1.299
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.938 S/m; ε_r = 53.71; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3968; ConvF(7.68, 7.68, 7.68); Calibrated: 2019-09-27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2019-09-19
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

Bluetooth Body Rear DH5 39ch/Area Scan (10x16x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.0223 W/kg

Bluetooth Body Rear DH5 39ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.169 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.0330 W/kg
SAR(1 g) = 0.013 W/kg; SAR(10 g) = 0.00609 W/kg
Maximum value of SAR (measured) = 0.0233 W/kg



0 dB = 0.0223 W/kg = −16.53 dBW/kg

Attachment 2. – Dipole Verification Plots

■ Verification Data (750 ㎒ Head)

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 20.9 ℃
Test Date: 02/07/2020

DUT: Dipole 750 MHz D750V3; Type: D750V3

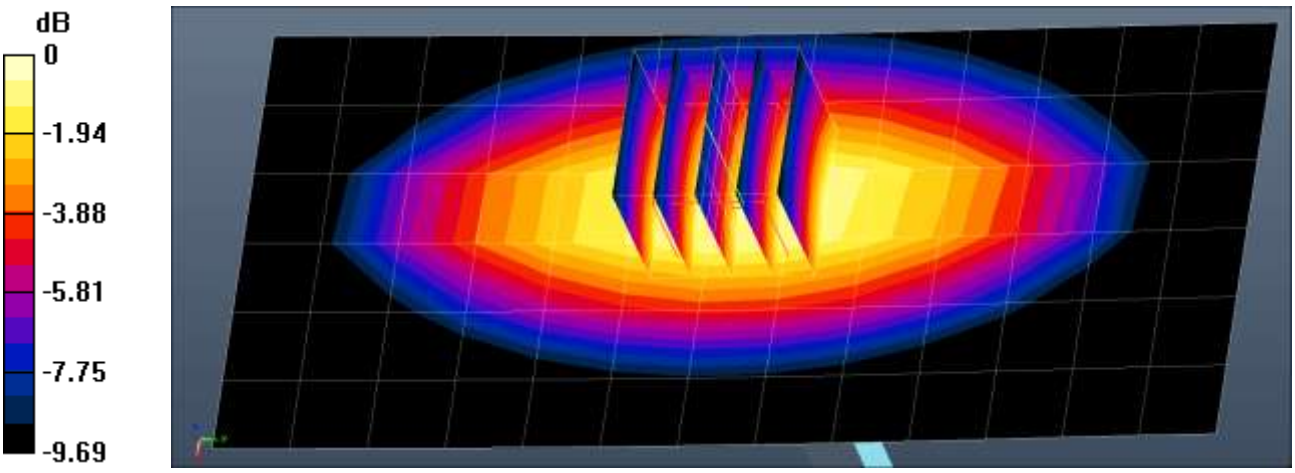
Communication System: UID 0, CW (0); Frequency: 750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.895 S/m; ε_r = 41.442; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.52, 6.52, 6.52); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: SAM_Right_20170913
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/750MHz Head Verification/Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.428 W/kg

Dipole/750MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.48 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.621 W/kg
SAR(1 g) = 0.425 W/kg; SAR(10 g) = 0.285 W/kg
Maximum value of SAR (measured) = 0.491 W/kg



0 dB = 0.491 W/kg = −3.09 dBW/kg

■ **Verification Data (750 MHz Body)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 21.5 ℃
Test Date: 02/11/2020

DUT: Dipole 750 MHz D750V3; Type: D750V3

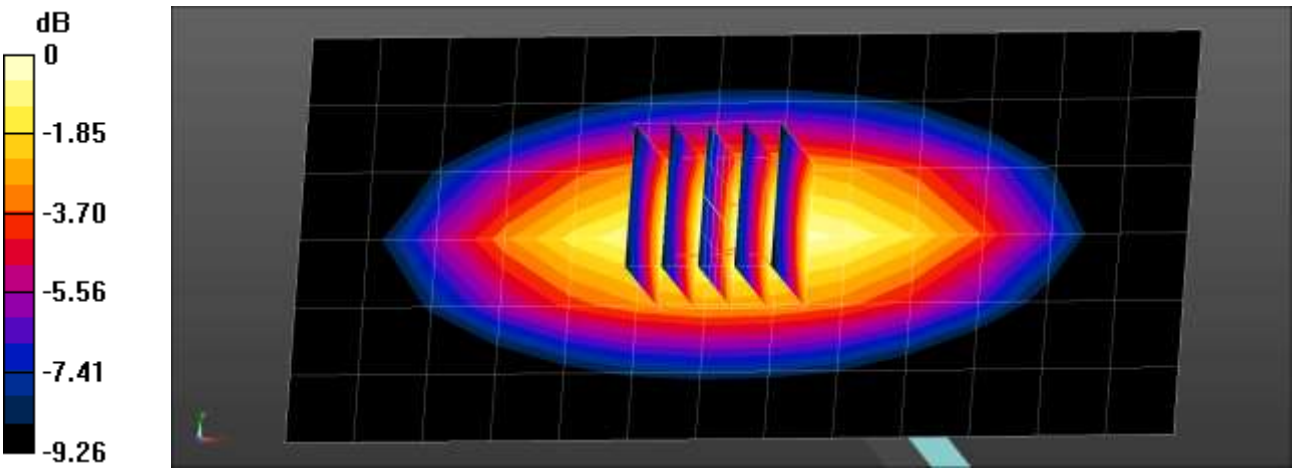
Communication System: UID 0, CW (0); Frequency: 750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.968 S/m; ε_r = 55.393; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.12, 6.12, 6.12); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/750MHz Body Verification/Area Scan (7x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.484 W/kg

Dipole/750MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.08 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.619 W/kg
SAR(1 g) = 0.425 W/kg; SAR(10 g) = 0.286 W/kg
Maximum value of SAR (measured) = 0.494 W/kg



0 dB = 0.494 W/kg = −3.06 dBW/kg

■ **Verification Data (835 MHz Head)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	21.0 ℃
Test Date:	02/12/2020

DUT: Dipole 835 MHz D835V2; Type: D835V2

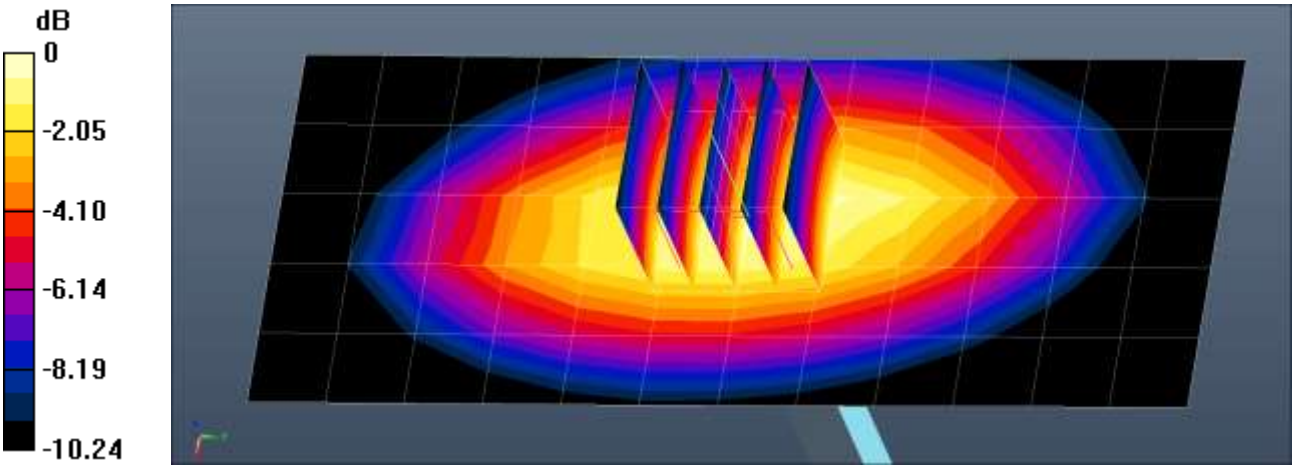
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.928 S/m; ε_r = 42.292; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(9.88, 9.88, 9.88); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Right
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/835MHz Head Verification/Area Scan (6x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.624 W/kg

Dipole/835MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.95 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.733 W/kg
SAR(1 g) = 0.495 W/kg; SAR(10 g) = 0.331 W/kg
Maximum value of SAR (measured) = 0.653 W/kg



0 dB = 0.653 W/kg = −1.85 dBW/kg

■ **Verification Data (835 MHz Head)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.9 ℃
Test Date:	02/07/2020

DUT: Dipole 835 MHz D835V2; Type: D835V2

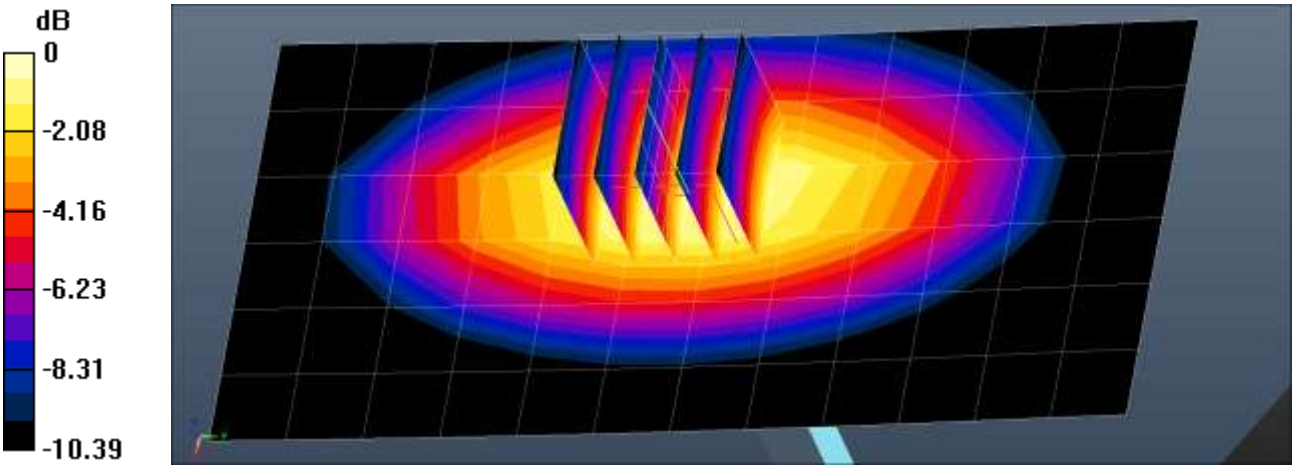
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.928 S/m; ε_r = 42.329; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(6.22, 6.22, 6.22); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: SAM_Right_20170913
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/835MHz Head Verification/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.534 W/kg

Dipole/835MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.28 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.745 W/kg
SAR(1 g) = 0.501 W/kg; SAR(10 g) = 0.331 W/kg
Maximum value of SAR (measured) = 0.586 W/kg



0 dB = 0.586 W/kg = −2.32 dBW/kg

■ **Verification Data (835 MHz Head)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 20.7 ℃
Test Date: 02/20/2020

DUT: Dipole 835 MHz D835V2; Type: D835V2

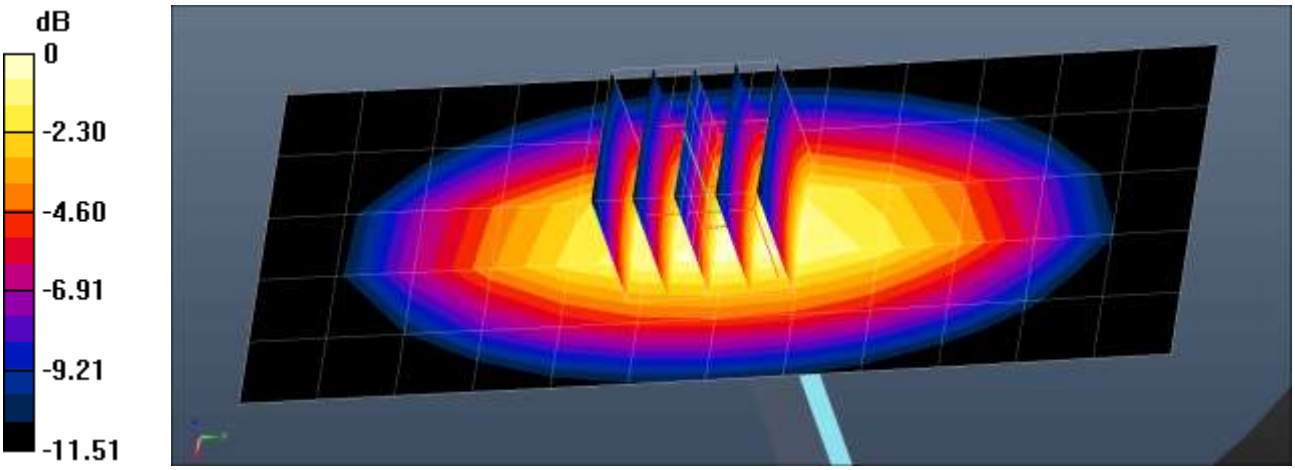
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.928 S/m; ε_r = 42.328; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(9.88, 9.88, 9.88); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2020-02-03
- Phantom: SAM with CRP v5.0_Right
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/835MHz Head Verification/Area Scan (6x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.598 W/kg

Dipole/835MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.90 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.777 W/kg
SAR(1 g) = 0.473 W/kg; SAR(10 g) = 0.302 W/kg
Maximum value of SAR (measured) = 0.661 W/kg



0 dB = 0.661 W/kg = −1.80 dBW/kg

■ **Verification Data (835 MHz Body)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 20.2 ℃
Test Date: 02/12/2020

DUT: Dipole 835 MHz D835V2; Type: D835V2

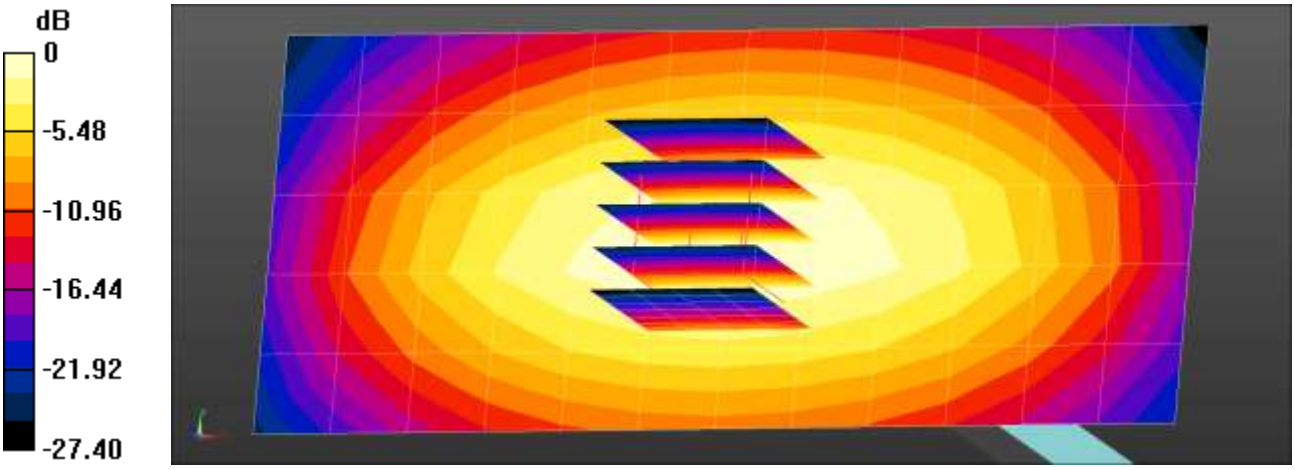
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.959 S/m; ε_r = 53.394; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.97, 8.97, 8.97); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/835MHz Body Verification/Area Scan (13x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.583 W/kg

Dipole/835MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.28 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.712 W/kg
SAR(1 g) = 0.465 W/kg; SAR(10 g) = 0.304 W/kg
Maximum value of SAR (measured) = 0.627 W/kg



0 dB = 0.583 W/kg = −2.34 dBW/kg

■ **Verification Data (835 MHz Body)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 21.4 ℃
Test Date: 02/10/2020

DUT: Dipole 835 MHz D835V2; Type: D835V2

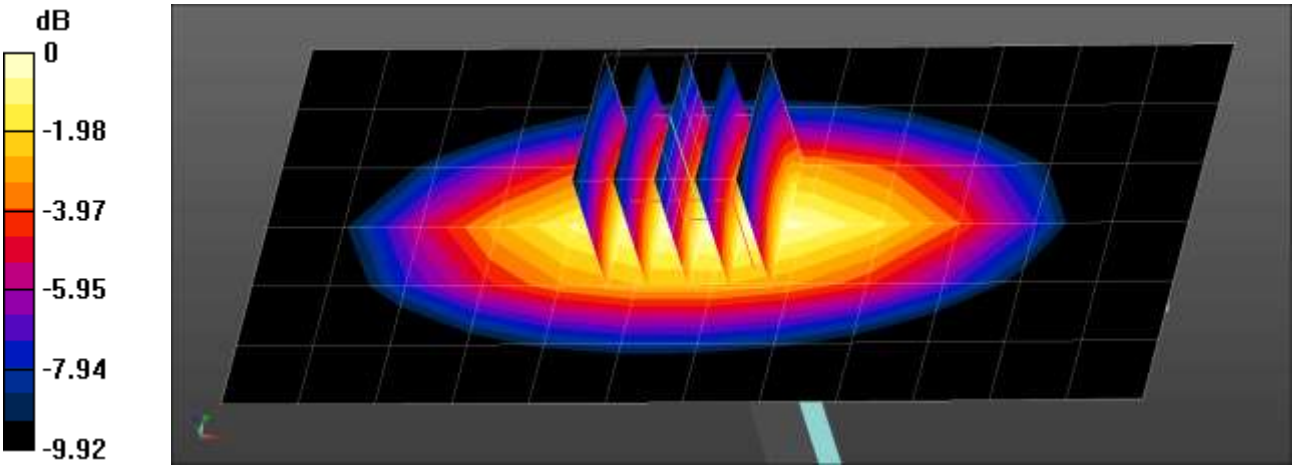
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.961 S/m; ε_r = 56.339; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3076; ConvF(5.97, 5.97, 5.97); Calibrated: 2019-07-23;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2019-05-23
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/835MHz Body Verification/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.574 W/kg

Dipole/835MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.84 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.718 W/kg
SAR(1 g) = 0.495 W/kg; SAR(10 g) = 0.328 W/kg
Maximum value of SAR (measured) = 0.575 W/kg



0 dB = 0.575 W/kg = −2.40 dBW/kg

■ **Verification Data (850 MHz Body)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.4 ℃
Test Date:	02/20/2020

DUT: Dipole 835 MHz D835V2; Type: D835V2

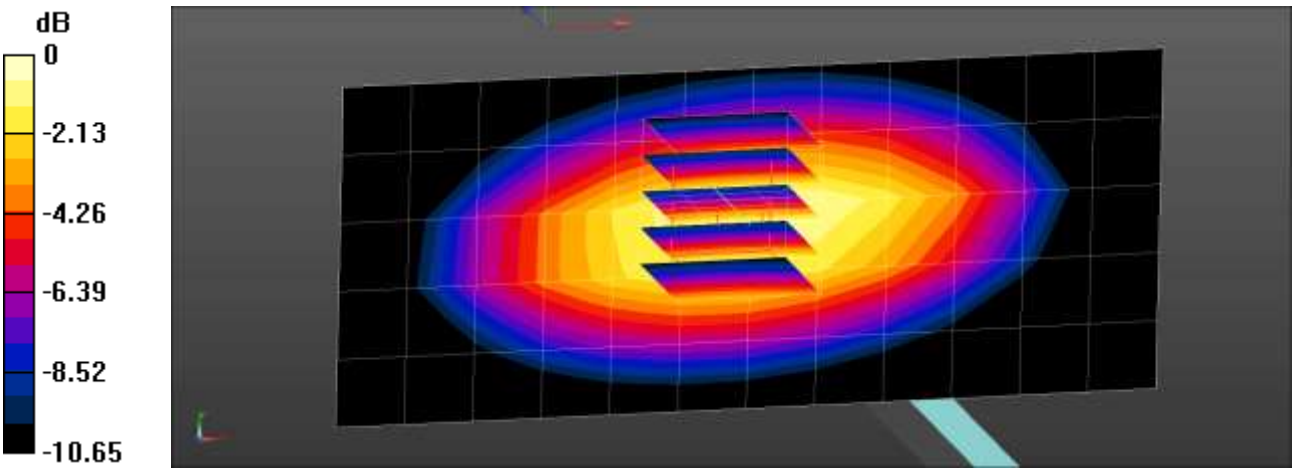
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.96 S/m; ε_r = 56.41; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(8.97, 8.97, 8.97); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/835MHz Body Verification/Area Scan (13x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.600 W/kg

Dipole/835MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.89 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.746 W/kg
SAR(1 g) = 0.479 W/kg; SAR(10 g) = 0.313 W/kg
Maximum value of SAR (measured) = 0.653 W/kg



0 dB = 0.653 W/kg = −1.85 dBW/kg

■ **Verification Data (1 800 ㎒ Head)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	21.0 ℃
Test Date:	02/12/2020

DUT: Dipole 1800 MHz D1800V2; Type: D1800V2

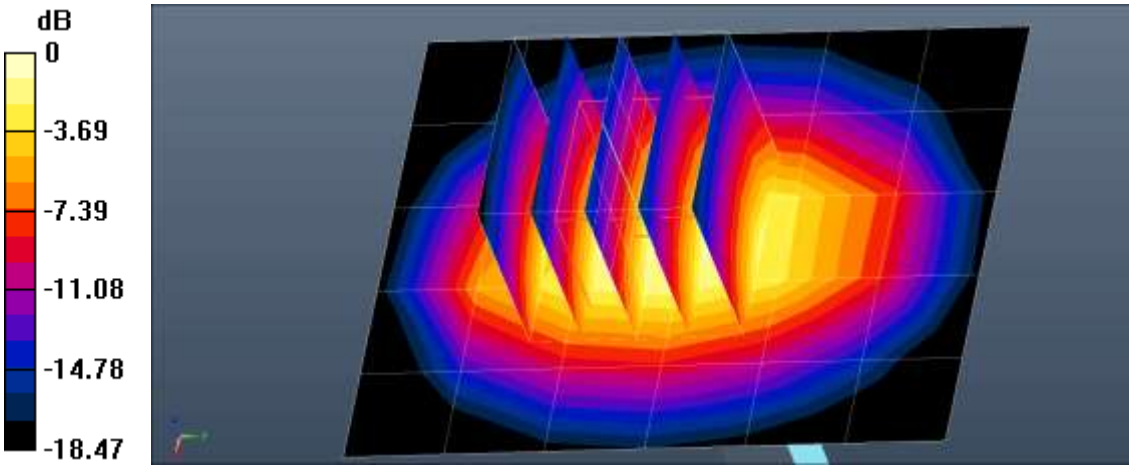
Communication System: UID 0, CW (0); Frequency: 1800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.392 S/m; ε_r = 39.083; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(8.43, 8.43, 8.43); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/1800MHz Head Verification/Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.29 W/kg

Dipole/1800MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.71 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 1.96 W/kg; SAR(10 g) = 1.03 W/kg
Maximum value of SAR (measured) = 3.07 W/kg



0 dB = 3.07 W/kg = 4.87 dBW/kg

■ **Verification Data (1 800 MHz Body)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 20.8 ℃
Test Date: 02/13/2020

DUT: Dipole 1800 MHz D1800V2; Type: D1800V2

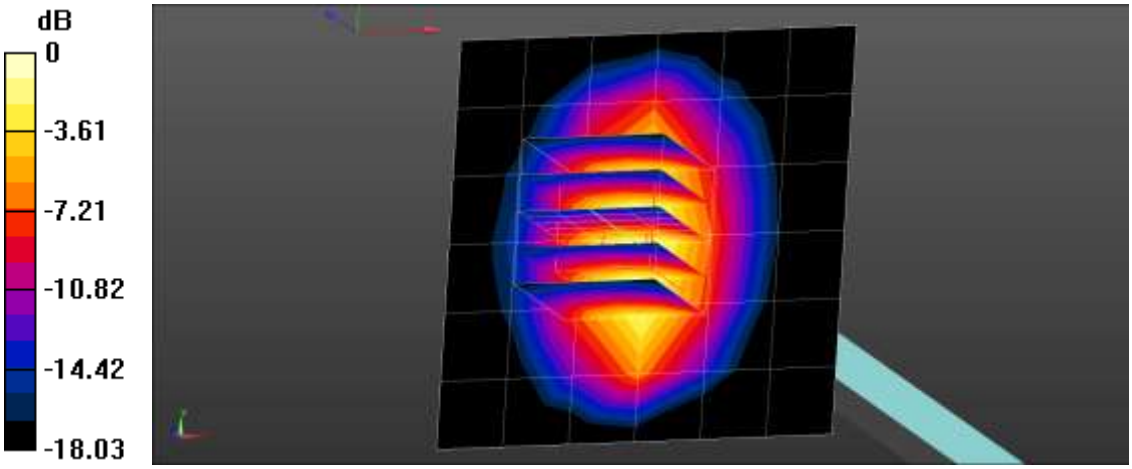
Communication System: UID 0, CW (0); Frequency: 1800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.536 S/m; ε_r = 53.745; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(8.23, 8.23, 8.23); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/1800 MHz Body Verification/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.85 W/kg

Dipole/1800 MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 44.69 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.55 W/kg
SAR(1 g) = 1.84 W/kg; SAR(10 g) = 0.949 W/kg
Maximum value of SAR (measured) = 2.94 W/kg



0 dB = 2.94 W/kg = 4.68 dBW/kg

■ **Verification Data (1 900 MHz Head)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.9 ℃
Test Date:	02/13/2020

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

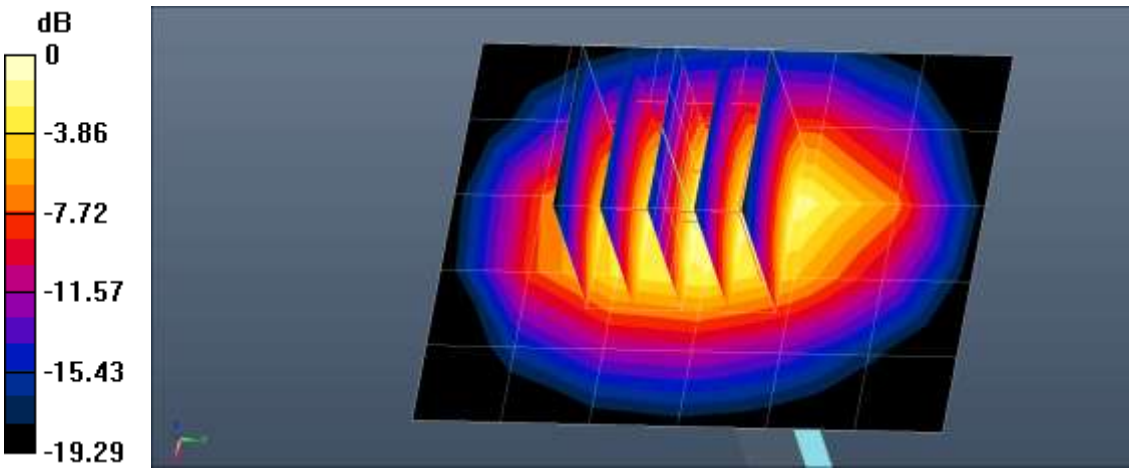
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.418 S/m; ε_r = 38.696; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(8.09, 8.09, 8.09); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/1900MHz Head Verification/Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.82 W/kg

Dipole/1900MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 48.35 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 4.04 W/kg
SAR(1 g) = 2.02 W/kg; SAR(10 g) = 1.04 W/kg
Maximum value of SAR (measured) = 3.26 W/kg



0 dB = 3.26 W/kg = 5.13 dBW/kg

■ **Verification Data (1 900 MHz Head)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 21.0 ℃
Test Date: 02/12/2020

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

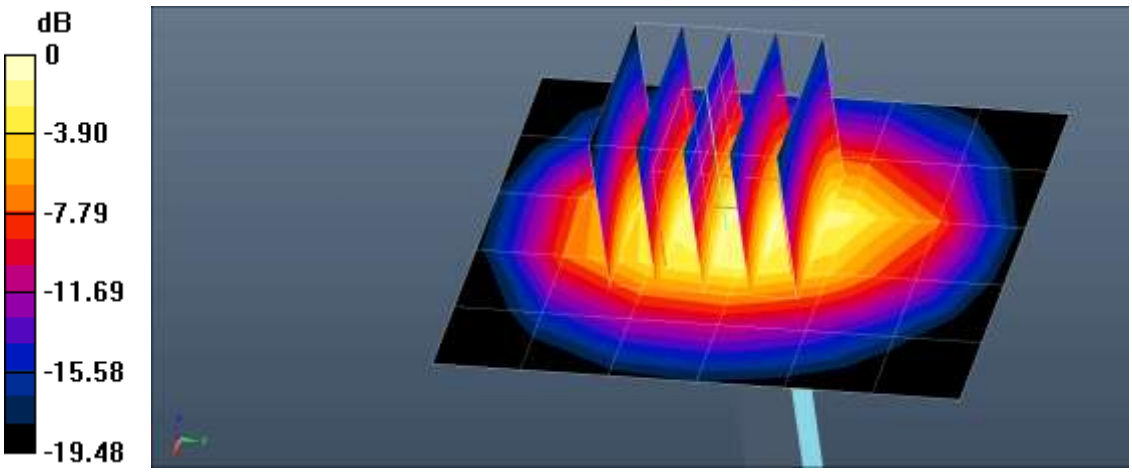
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.418 S/m; ε_r = 38.685; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(8.09, 8.09, 8.09); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn868; Calibrated: 2019-09-04
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/1900MHz Head Verification/Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.64 W/kg

Dipole/1900MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 47.08 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 3.80 W/kg
SAR(1 g) = 1.92 W/kg; SAR(10 g) = 0.991 W/kg
Maximum value of SAR (measured) = 3.06 W/kg



0 dB = 3.06 W/kg = 4.86 dBW/kg

■ **Verification Data (1 900 MHz Head)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 20.7 ℃
Test Date: 02/20/2020

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

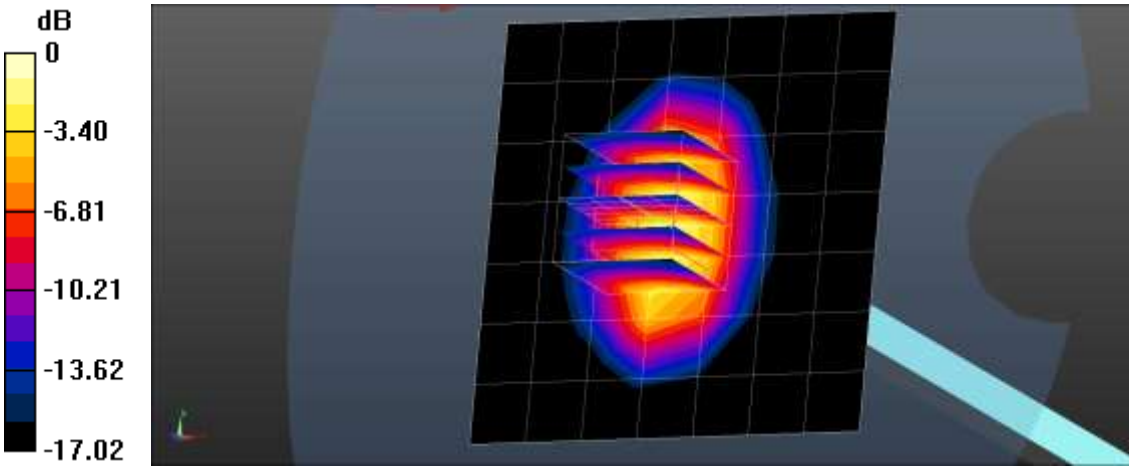
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.359 S/m; ε_r = 40.294; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7370; ConvF(8.09, 8.09, 8.09); Calibrated: 2019-08-29;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2020-02-03
- Phantom: SAM with CRP v5.0_Front
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/1900MHz Head Verification/Area Scan (8x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.25 W/kg

Dipole/1900MHz Head Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 45.51 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 3.52 W/kg
SAR(1 g) = 1.88 W/kg; SAR(10 g) = 0.987 W/kg
Maximum value of SAR (measured) = 2.94 W/kg



0 dB = 2.94 W/kg = 4.68 dBW/kg

■ **Verification Data (1 900 MHz Body)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 20.3 ℃
Test Date: 02/13/2020

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

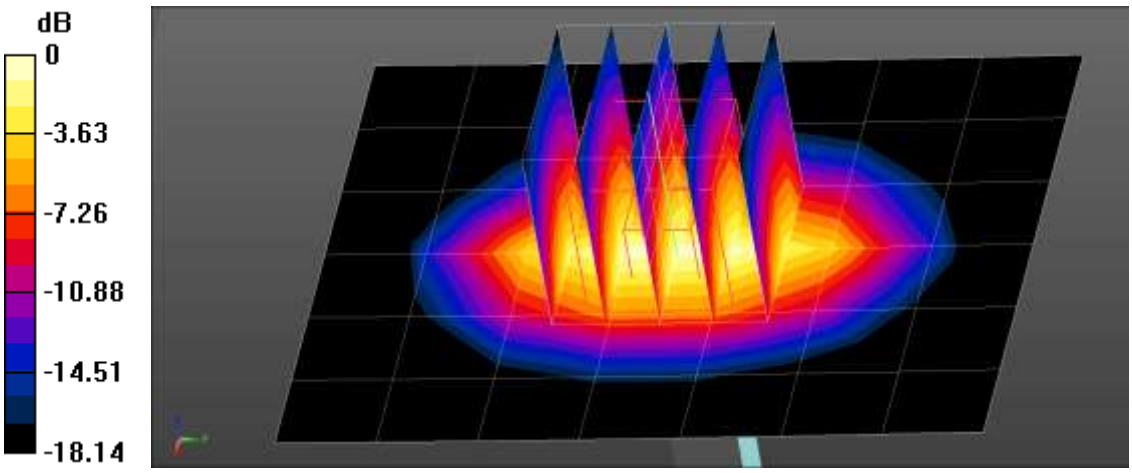
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.526 S/m; ε_r = 53.548; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.61, 7.61, 7.61); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/1900MHz Body Verification/Area Scan (7x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.73 W/kg

Dipole/1900MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 45.87 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 1.9 W/kg; SAR(10 g) = 0.971 W/kg
Maximum value of SAR (measured) = 3.01 W/kg



0 dB = 3.01 W/kg = 4.79 dBW/kg

■ **Verification Data (1 900 MHz Body)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.8 ℃
Test Date:	02/13/2020

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

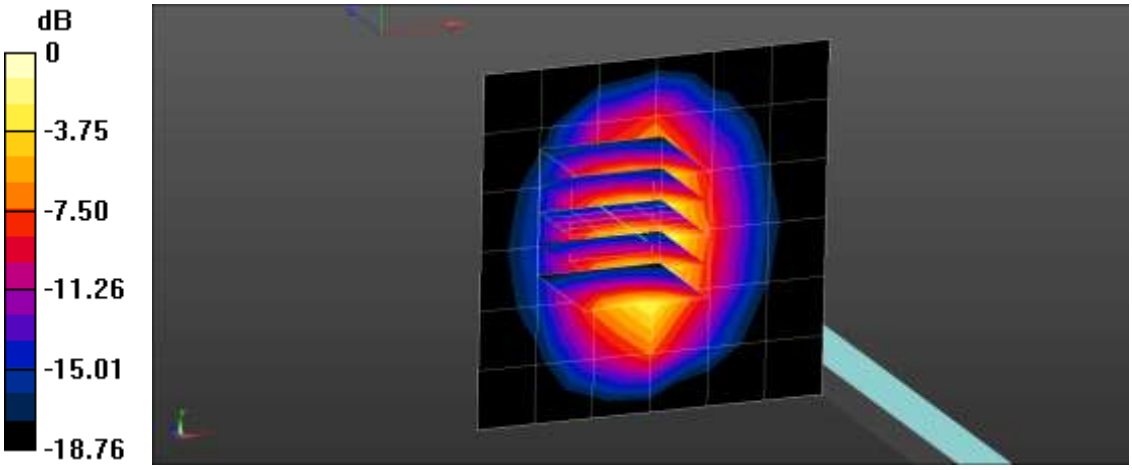
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.525 S/m; ε_r = 53.523; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(7.99, 7.99, 7.99); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/1 900 MHz Body Verification/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.93 W/kg

Dipole/1 900 MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 45.75 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.69 W/kg
SAR(1 g) = 1.89 W/kg; SAR(10 g) = 0.961 W/kg
Maximum value of SAR (measured) = 3.03 W/kg



0 dB = 3.03 W/kg = 4.81 dBW/kg

■ **Verification Data (1 900 MHz Body)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.4 ℃
Test Date:	02/20/2020

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2

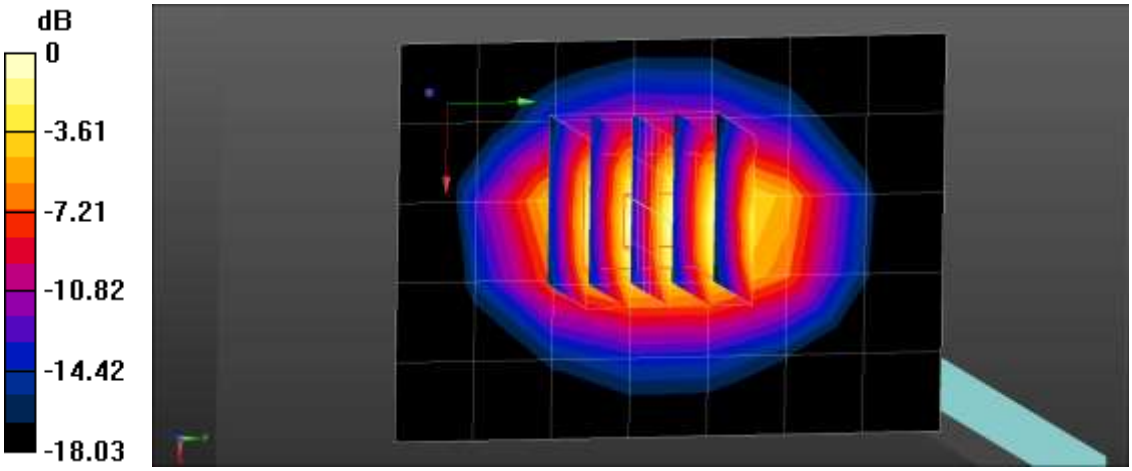
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.527 S/m; ε_r = 53.523; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3797; ConvF(7.61, 7.61, 7.61); Calibrated: 2019-11-28;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn446; Calibrated: 2019-07-18
- Phantom: MFP_V5.1C (20deg probe tilt)
- Measurement SW: DASY52, Version 52.10 (2);

1900MHz Body Verification/Area Scan (6x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.22 W/kg

1900MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 43.44 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 3.41 W/kg
SAR(1 g) = 1.85 W/kg; SAR(10 g) = 0.963 W/kg
Maximum value of SAR (measured) = 2.87 W/kg



0 dB = 2.87 W/kg = 4.58 dBW/kg

■ **Verification Data (2 450 MHz Head)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 19.8 ℃
Test Date: 02/11/2020

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2

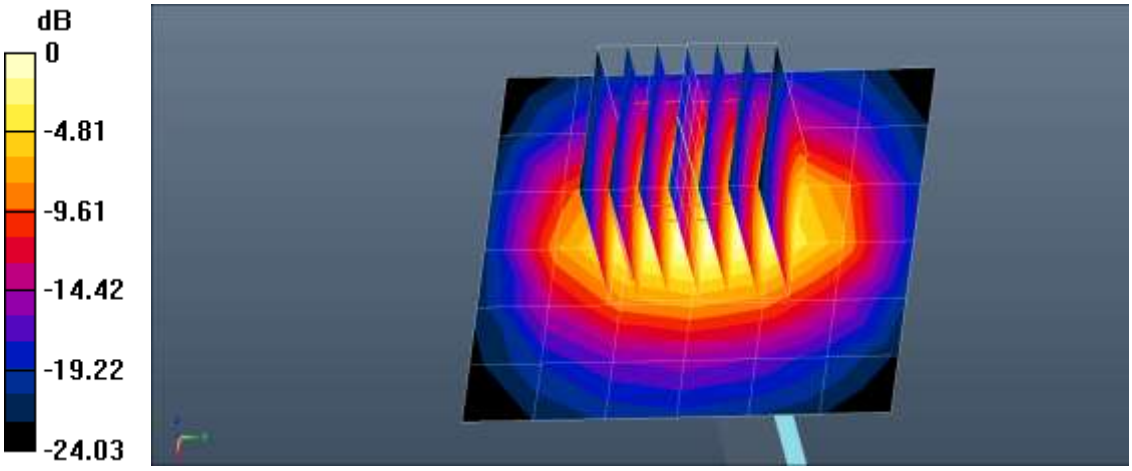
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.79 S/m; ε_r = 38.349; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3968; ConvF(7.6, 7.6, 7.6); Calibrated: 2019-09-27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2019-09-19
- Phantom: SAM with CRP v5.0_F
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2450MHz Head Verification/Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 4.26 W/kg

Dipole/2450MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.33 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 6.08 W/kg
SAR(1 g) = 2.66 W/kg; SAR(10 g) = 1.18 W/kg
Maximum value of SAR (measured) = 4.73 W/kg



0 dB = 4.73 W/kg = 6.75 dBW/kg

■ **Verification Data (2 450 MHz Body)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 19.8 ℃
Test Date: 02/11/2020

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2

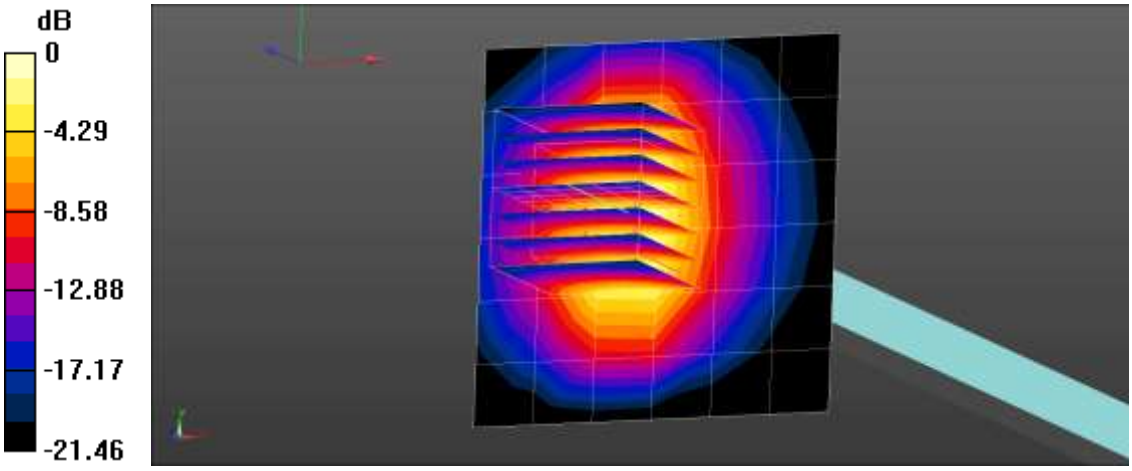
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.948 S/m; ε_r = 53.712; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3968; ConvF(7.68, 7.68, 7.68); Calibrated: 2019-09-27;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2019-09-19
- Phantom: Triple Flat Phantom 5.1C
- Measurement SW: DASY52, Version 52.8 (8);

Dipole/2450MHz Body Verification/Area Scan (7x7x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 3.16 W/kg

Dipole/2450MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 43.97 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 5.50 W/kg
SAR(1 g) = 2.73 W/kg; SAR(10 g) = 1.27 W/kg
Maximum value of SAR (measured) = 4.36 W/kg



0 dB = 4.36 W/kg = 6.39 dBW/kg

■ **Verification Data (5 250 MHz Head)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.2 ℃
Test Date:	02/11/2020

DUT: Dipole D5GHzV2; Type: D5GHzV2

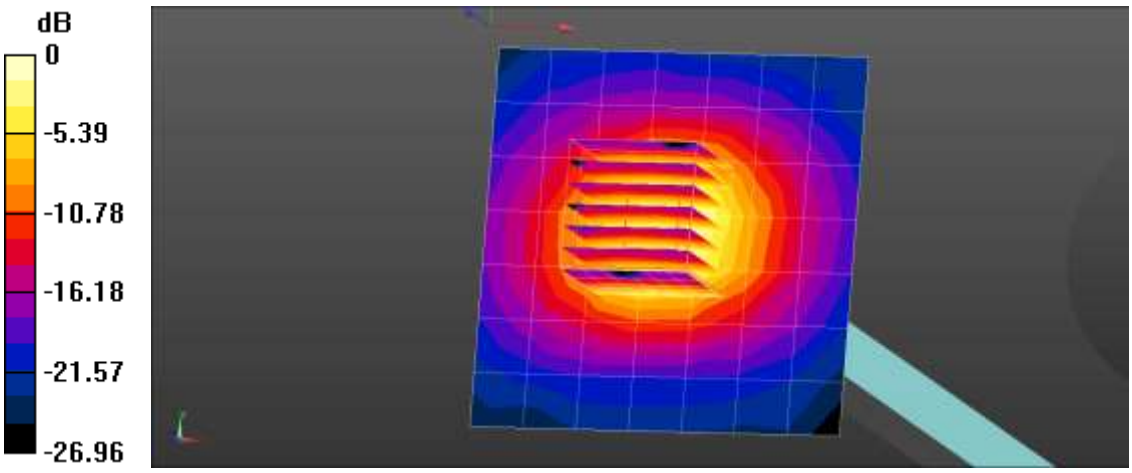
Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.847 S/m; ε_r = 36.904; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(5.09, 5.09, 5.09); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: Twin-SAM V4.0 (Left-Right)
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/5250 MHz Head Verification/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 7.43 W/kg

Dipole/5250 MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio:1.4
Reference Value = 49.65 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 16.8 W/kg
SAR(1 g) = 4.05 W/kg; SAR(10 g) = 1.21 W/kg
Maximum value of SAR (measured) = 10.0 W/kg



0 dB = 7.43 W/kg = 8.71 dBW/kg

■ **Verification Data (5 250 MHz Body)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	21.0 ℃
Test Date:	02/12/2020

DUT: Dipole D5GHzV2; Type: D5GHzV2

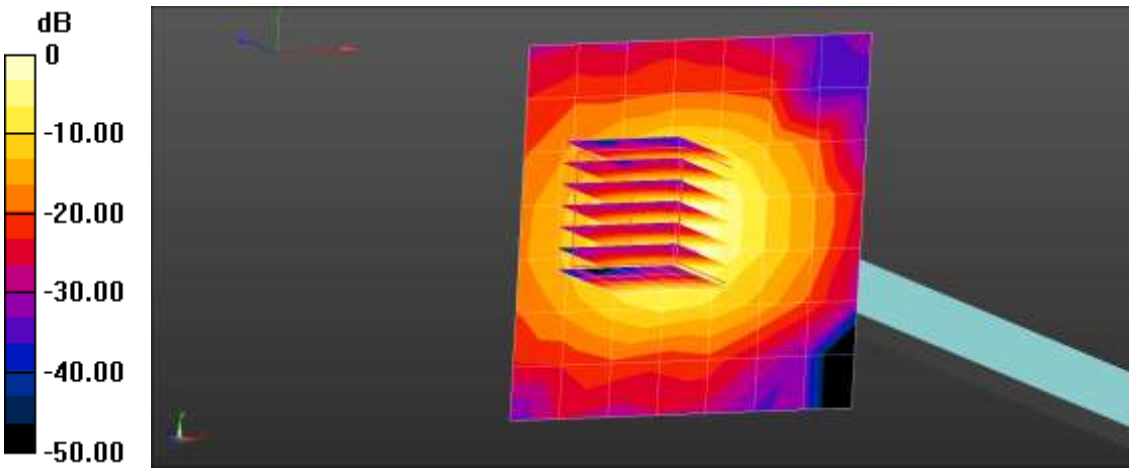
Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 5.476 S/m; ε_r = 48.246; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.4, 4.4, 4.4); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/5250MHz Body Verification/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.87 W/kg

Dipole/5250MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio:1.4
Reference Value = 44.70 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 15.4 W/kg
SAR(1 g) = 3.73 W/kg; SAR(10 g) = 1.08 W/kg
Maximum value of SAR (measured) = 9.47 W/kg



0 dB = 6.87 W/kg = 8.37 dBW/kg

■ **Verification Data (5 600 MHz Head)**

Test Laboratory:	HCT CO., LTD
Input Power	0.05 W
Liquid Temp:	20.2 ℃
Test Date:	02/11/2020

DUT: Dipole D5GHzV2; Type: D5GHzV2

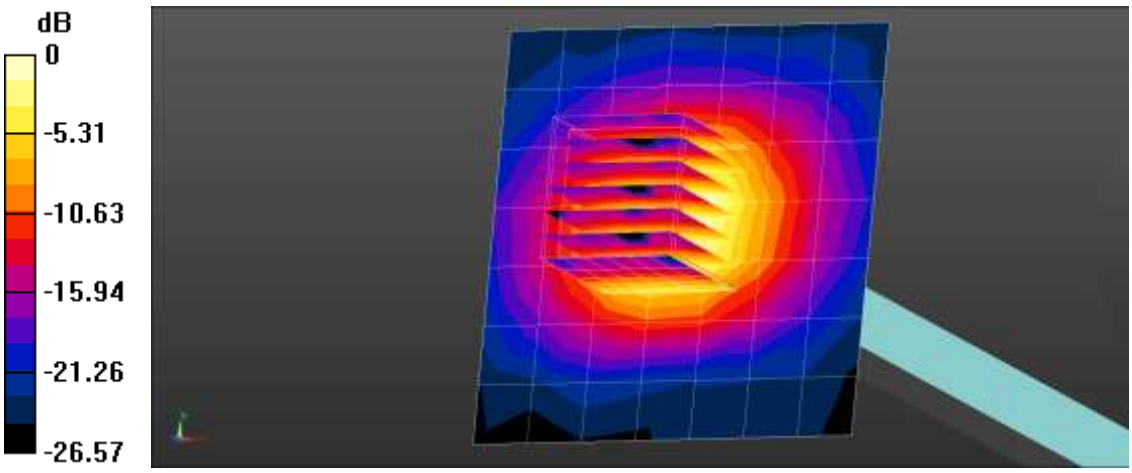
Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.173 S/m; ε_r = 36.713; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.69, 4.69, 4.69); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: Twin-SAM V4.0 (Left-Right)
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/5600 MHz Head Verification/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 7.88 W/kg

Dipole/5600 MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio:1.4
Reference Value = 49.19 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 18.1 W/kg
SAR(1 g) = 4.17 W/kg; SAR(10 g) = 1.24 W/kg
Maximum value of SAR (measured) = 10.4 W/kg



0 dB = 7.88 W/kg = 8.96 dBW/kg

■ **Verification Data (5 600 MHz Body)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 21.0 ℃
Test Date: 02/12/2020

DUT: Dipole D5GHzV2; Type: D5GHzV2

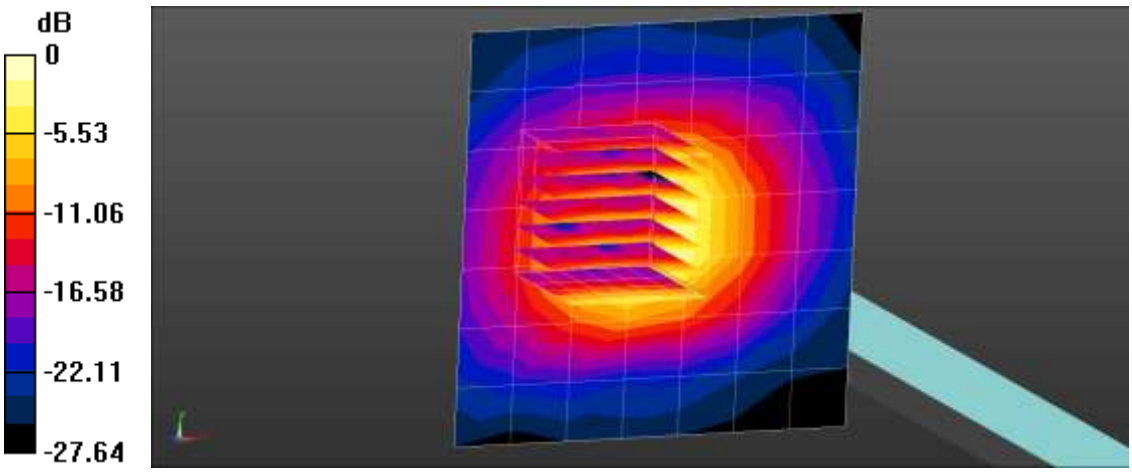
Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.822 S/m; ε_r = 47.949; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(3.94, 3.94, 3.94); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/5600MHz Body Verification/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 7.24 W/kg

Dipole/5600MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio:1.4
Reference Value = 45.71 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 3.81 W/kg; SAR(10 g) = 1.09 W/kg
Maximum value of SAR (measured) = 10.1 W/kg



0 dB = 7.24 W/kg = 8.60 dBW/kg

■ **Verification Data (5 750 MHz Head)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 20.2 ℃
Test Date: 02/11/2020

DUT: Dipole D5GHzV2; Type: D5GHzV2

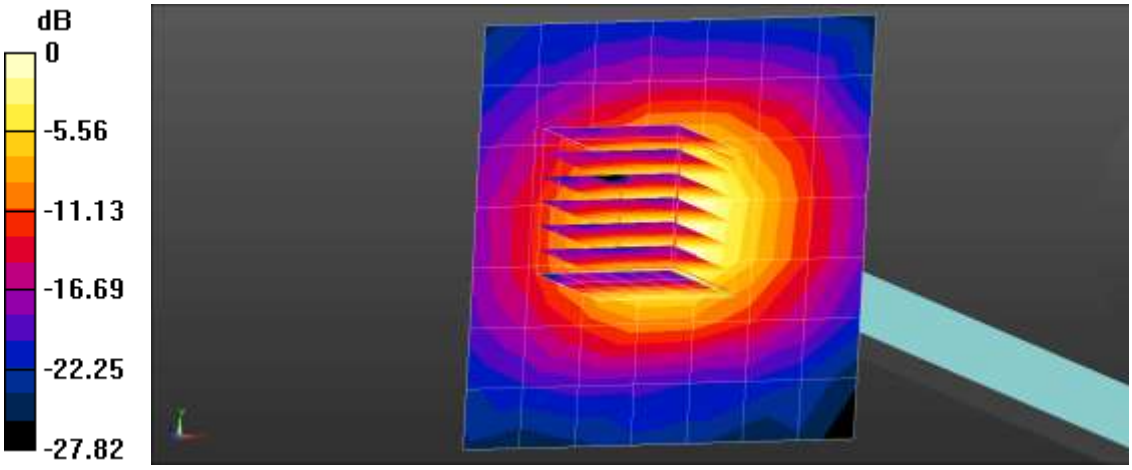
Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.299 S/m; ε_r = 36.797; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.99, 4.99, 4.99); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: Twin-SAM V4.0 (Left-Right)
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/5750 MHz Head Verification/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 7.28 W/kg

Dipole/5750 MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio:1.4
Reference Value = 49.84 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 19.1 W/kg
SAR(1 g) = 4.23 W/kg; SAR(10 g) = 1.27 W/kg
Maximum value of SAR (measured) = 10.7 W/kg



0 dB = 7.28 W/kg = 8.62 dBW/kg

■ **Verification Data (5 750 MHz Body)**

Test Laboratory: HCT CO., LTD
Input Power 0.05 W
Liquid Temp: 20.8 ℃
Test Date: 02/13/2020

DUT: Dipole D5GHzV2; Type: D5GHzV2

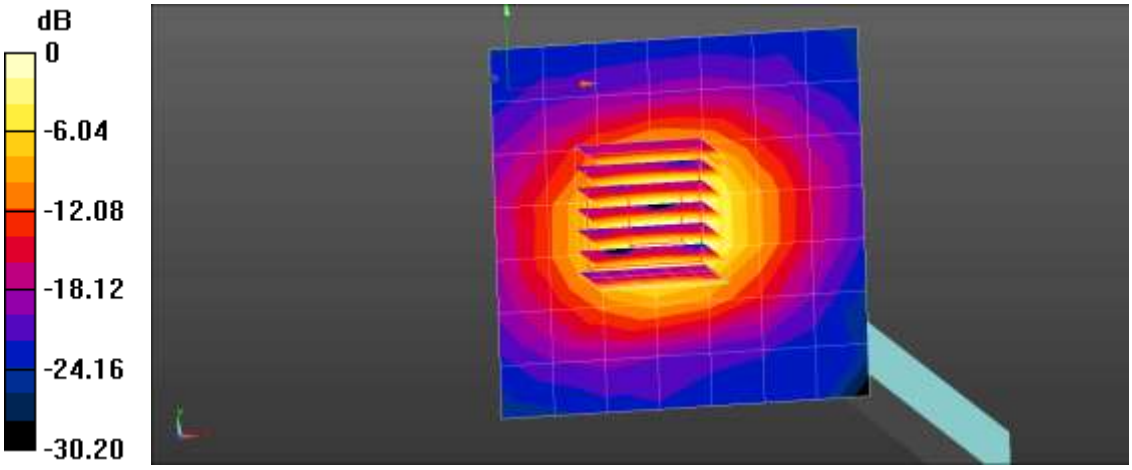
Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.869 S/m; ε_r = 46.447; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3863; ConvF(4.21, 4.21, 4.21); Calibrated: 2019-05-15;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1225; Calibrated: 2019-11-18
- Phantom: MFP_V5.1C_20171020
- Measurement SW: DASY52, Version 52.10 (2);

Dipole/5750MHz Body Verification/Area Scan (8x8x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.82 W/kg

Dipole/5750MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm; Graded Ratio:1.4
Reference Value = 44.15 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 3.61 W/kg; SAR(10 g) = 1.04 W/kg
Maximum value of SAR (measured) = 9.45 W/kg



0 dB = 6.82 W/kg = 8.34 dBW/kg

Attachment 3. – SAR Tissue Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and
saline solution (see Table 3.1). Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for
the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Harts grove.

Ingredients (% by weight)	Frequency (MHz)											
	750		835		1 750		1 900		2 450 – 2 700		3500 - 5 800	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	41.1	51.7	40.45	53.06	52.6	68.8	54.9	70.17	71.88	73.2	65.52	78.66
Salt (NaCl)	1.4	0.9	1.45	0.94	0.4	0.2	0.18	0.39	0.16	0.1	0.0	0.0
Sugar	57.0	47.2	57.0	44.9	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
HEC	0.2	0	1.0	1.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Bactericide	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.97	0.0	17.24	10.67
DGBE	0.0	0.0	0.0	0.0	47	31	44.92	29.44	7.99	26.7	0.0	0.0
Diethylene glycol hexyl ether	-	-	-	-	-	-	-	-	-	-	-	-

Salt:	99 % Pure Sodium Chloride	Sugar:	98 % Pure Sucrose
Water:	De-ionized, 16M resistivity	HEC:	Hydroxyethyl Cellulose
DGBE:	99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol]		
Triton X-100(ultra-pure):	Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether		

Composition of the Tissue Equivalent Matter

Attachment 4. – SAR System Validation

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

SAR System No.	Probe	Probe Type	Probe Calibration Point		Dipole	Date	Dielectric Parameters		CW Validation			Modulation Validation		
							Measured Permittivity	Measured Conductivity	Sensitivity	Probe Linearity	Probe Isotropy	MOD. Type	Duty Factor	PAR
11	3076	ES3DV3	Head	750	1014	2019-08-06	42.0	0.88	PASS	PASS	PASS	N/A	N/A	N/A
11	3076	ES3DV3	Body	750	1014	2019-08-06	55.6	0.98	PASS	PASS	PASS	N/A	N/A	N/A
12	7370	EX3DV4	Head	835	441	2019-09-11	41.6	0.91	PASS	PASS	PASS	GMSK	PASS	N/A
11	3076	ES3DV3	Head	835	441	2019-09-03	41.6	0.91	PASS	PASS	PASS	N/A	N/A	N/A
3	3797	EX3DV4	Body	835	441	2019-12-10	55.3	0.98	PASS	PASS	PASS	GMSK	PASS	N/A
11	3076	ES3DV3	Body	835	441	2019-09-03	55.5	0.97	PASS	PASS	PASS	N/A	N/A	N/A
12	7370	EX3DV4	Head	1750	2d015	2019-10-01	40.1	1.39	PASS	PASS	PASS	N/A	N/A	N/A
1	3863	EX3DV4	Body	1750	2d015	2019-10-01	53.5	1.52	PASS	PASS	PASS	N/A	N/A	N/A
12	7370	EX3DV4	Head	1900	5d061	2020-01-30	40.1	1.42	PASS	PASS	PASS	N/A	N/A	N/A
12	7370	EX3DV4	Head	1900	5d061	2020-01-30	40.1	1.42	PASS	PASS	PASS	GMSK	PASS	N/A
3	3797	EX3DV4	Body	1900	5d061	2020-01-30	53.3	1.53	PASS	PASS	PASS	GMSK	PASS	N/A
1	3863	EX3DV4	Body	1900	5d061	2020-01-30	53.5	1.52	PASS	PASS	PASS	GMSK	PASS	N/A
1	3863	EX3DV4	Body	1900	5d061	2020-01-30	53.5	1.52	PASS	PASS	PASS	N/A	N/A	N/A
3	3797	EX3DV4	Body	1900	5d061	2020-01-30	53.3	1.53	PASS	PASS	PASS	GMSK	PASS	N/A
9	3968	EX3DV4	Head	2450	965	2019-11-30	39.4	1.81	PASS	PASS	PASS	OFDM	N/A	PASS
9	3968	EX3DV4	Body	2450	965	2019-11-30	52.8	1.94	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Head	5250	1107	2019-10-11	35.6	4.71	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Head	5600	1107	2019-10-11	35.3	5.04	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Head	5750	1107	2019-10-11	35.8	5.25	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Body	5250	1107	2019-10-11	48.8	5.36	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Body	5600	1107	2019-10-11	48.3	5.78	PASS	PASS	PASS	OFDM	N/A	PASS
1	3863	EX3DV4	Body	5750	1107	2019-10-11	48.4	5.95	PASS	PASS	PASS	OFDM	N/A	PASS

SAR System Validation Summary 1g

Note;
All measurement were performed using probes calibrated for CW signal only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04. SAR system were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to KDB 865664 D01v01r04.