11 MEASUREMENT PROCEDURES

11.1 GENERAL DESCRIPTION OF TEST PROCEDURES

For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide continuous transmitting RF signal. This RF signal utilized in SAR measurement has almost 100% duty cycle and its crest factor is 1.
For the 802.11b/g/n SAR tests, a communication link is set up with the test mode software for WIFI mode test. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate. Testing at higher data rates is not required when the maximum average output power is less than 0.25dB higher than those measured at the lowest data rate.802.11b/g/n operating modes are tested independently according to the service requirements in each frequency band.

For the body SAR tests for GSM850 and GSM1900, a communication link is set up with a System Simulator (SS) by air link. Using CMW 500 the power level is set to “5” for GSM850, set to “0” for GSM1900. The GPRS class is 12 for this EUT; it has at most 4Timesolts in uplink and at most 4Timesolts in downlink, the maximum total Timesolts is 5. The EGPRS class is 12 for this EUT; it has at most 4 Timesolts in uplink and at most 4 Timesolts in downlink, the maximum total Timesolts is 5.
When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.
According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:
Table 7: The allowed power reduction in the multi-slot configuration:

Number of timeslots in uplink assignment	Permissible nominal reduction of maximum output power (dB)
1	0
2	0 to 3,0
3	1,8 to 4,8
4	3,0 to 6,0

For the UMTS Test configuration:
Maximum output power is verified on the High, Middle and Low channel according to the procedures described in section 5.2 of 3GPP TS 34. 121, using the appropriate RMC or AMR with TPC(transmit power control) set to all up bits for WCDMA/HSDPA or applying the required inner loop power control procedures to the maximum output power while HSUPA is active. Results for all applicable physical channel configuration (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) should be tabulated in the SAR report. All configuration that are not supported by the DUT or can not be measured due to technical or equipment limitations should be clearly identified.
SAR for head exposure configurations in voice mode is measured using a 12.2kbps RMC with TPC bits configured to all up bits. SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2kbps AMR is less than 1/4 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2kbps AMR with a 3.4 kbps SRB(Signaling radio bearer) using the exposure configuration that results in the highest SAR in 12.2kbps RMC for that RF channel.
SAR for body exposure configurations in voice and data modes is measured using 12.2kbps RMC with TPC bits configured to all up bits. SAR for other spreading codes and multiple DPDCHn, when supported by the DUT,are not required when the maximum average output of each RF channel, for each spreading code and DPDCHn configuration, are less than 1/4 dB higher than those measured in 12.2kbps RMC. Otherwise, SAR is measured on the maximum output channel with an applicable RMC configuration for the corresponding spreading code or DPDCHn using the exposure configuration that results in the highest SAR with 12.2 kbps RMC. When more than 2 DPDCHn are supported by the DUT, it may be necessary to configure additional DPDCHn for a DUT using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.
For the HSDPA Test configuration:
SAR for body exposure configurations is measured according to the ‘Body SAR Measurements’ procedures of that section. In addition,body SAR is also measured for HSDPA when the maximum average output of each RF channel with HSDPA active is at least ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1,

using the highest body SAR configuration in 12.2 kbps RMC without HSDPA.
HSDPA should be configured according to the UE category of a test device.The number of HSDSCH/ HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(βc, βd), and HS-DPCCH power offset parameters (∆ACK, ∆NACK, ∆CQI) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Table 8: Subtests for UMTS Release 5 HSDPA

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (note 1, note 2)	CM(dB) (note 3)	MPR(dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (note 4)	15/15 (note 4)	64	12/15 (note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note1: $\triangle_{ACK}$, $\triangle_{NACK}$ and $\triangle_{CQI}$= 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c=30/15$ ⇔ $\beta_{hs}=30/15*\beta_c$

Note2:For the HS-DPCCH power mask requirement test in clause 5.2C,5.7A,and the Error Vector Magnitude(EVM) with HS-DPCCH test in clause 5.13.1.A,and HSDPA EVM with phase discontinuity in clause 5.13.1AA, $\triangle_{ACK}$ and $\triangle_{NACK}$= 8 (A_{hs}=30/15) with $\beta_{hs}=30/15*\beta_c$,and $\triangle_{CQI}$= 7 (A_{hs}=24/15) with $\beta_{hs}=24/15*\beta_c$.

Note3: CM=1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4:For subtest 2 the $\beta_c\beta_d$ ratio of 12/15 for the TFC during the measurement period(TF1,TF0) is achieved by setting the signaled gain factors for the reference TFC (TFC1,TF1) to β_c=11/15 and β_d=15/15.

Table 9: Settings of required H-Set 1 QPSK in HSDPA mode

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	534
Inter-TTI Distance	TTI's	3
Number of HARQ Processes	Processes	2
Information Bit Payload (N_{INF})	Bits	3202
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	4800
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	9600
Coding Rate	/	0.67
Number of Physical Channel Codes	Codes	5
Modulation	/	QPSK

For the HSDPA Test configuration:
Body SAR is also measured for HSPA when the maximum average output of each RF channel with HSPA

active is at least ¼ dB higher than that measured without HSPA using 12.2 kbps RMC or the maximum SAR for 12.2 kbps RMC is above 75% of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.2 kbps RMC without HSPA.
Due to inner loop power control requirements in HSPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E- DCH configurations for HSPA should be configured according to the β values indicated below as well as other applicable procedures described in the ‘WCDMA Handset’ and ‘Release 5 HSDPA Data Devices’ sections of 3 G device.

Table 10: Sub-Test 5 Setup for Release 6 HSUPA

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, ΔNACK and Δ_{CQI} = 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c$ = 30/15 ⇔ β_{hs}= 30/15 *β_c.
Note 2: CM = 1 for βc/βd =12/15, β_{hs}/β_c =24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-
DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the βc/βd ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the
signaled gain factors for the reference TFC (TF1, TF1) to βc = 10/15 and βd = 15/15.
Note 4: For subtest 5 the βc/βd ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the
signaled gain factors for the reference TFC (TF1, TF1) to βc = 14/15 and βd = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Figure 5.1g.
Note 6: βed can not be set directly; it is set by Absolute Grant Value.

Table 11: HSUPA UE category

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCH TTI (ms)	Minimum Spreading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185
	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	11484	5.76
	4	4	10		20000	2.00
7 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	22996	?
	4	4	10		20000	?

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.
UE Categories 1 to 6 supports QPSK only. UE Category 7 supports QPSK and 16QAM. (TS25.306-7.3.0)

For LTE SAR Tests:

1. R&S CMW500 base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r03, for QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r03, smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.
8. Tests were performed when EUT operating without power back-off and operating with power back-off in accordance with general note 3, 4, 5, 6, 7 above.

LTE MPR permanently built-in by design

Table 6.2.-1: Maximum Power Reduction(MPR) for Power Class 3							
Modulation	Channel Bandwidth/ Transmission Bandwidth(RB)						MPR
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz	
QPSK	>5	>4	>8	>12	>16	>18	≤1
16-QAM	≤5	≤4	≤8	≤12	≤16	≤18	≤1
16-QAM	>5	>4	>8	>12	>16	>18	≤2

Test Channel Number and Frequency

LTE Band 4										
	Bandwidth: 3MHz		Bandwidth: 5MHz		Bandwidth: 10MHz		Bandwidth: 15MHz		Bandwidth: 20MHz	
	Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)	Channel	Freq (MHz)
L	19965	1711.5	19975	1712.5	20000	1715.0	20025	1717.5	20050	1720.0
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20385	1753.5	20375	1752.5	20350	1750.0	20325	1747.5	20300	1745.0

11.2 MEASUREMENT VARIABILITY

Per FCC KDB Publication 865664 D01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

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

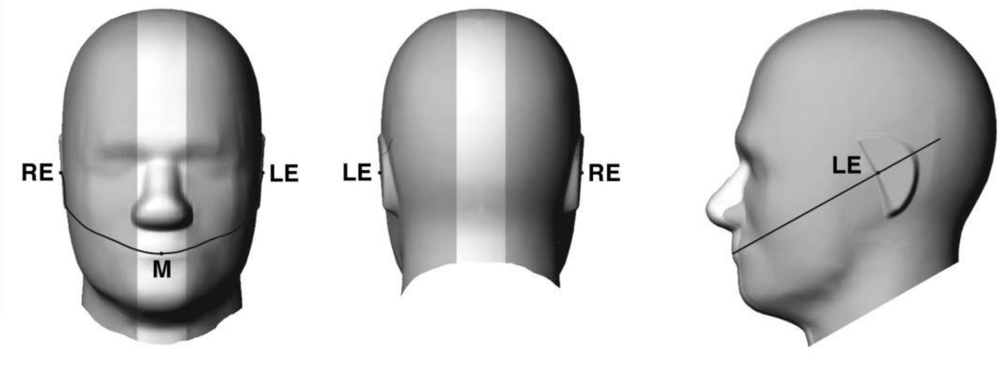
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg.

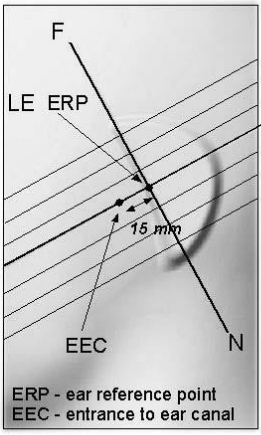
11.3 Test Positions Requirements

(1) Ear and handset reference point

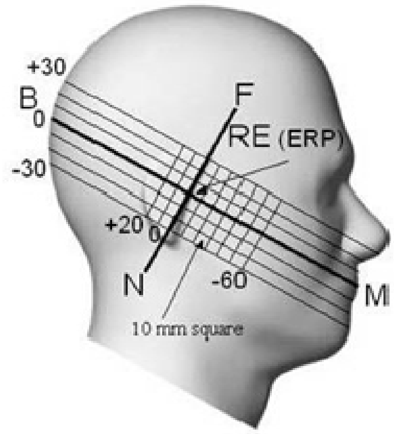
Picture11 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Picture12.The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Picture13). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Picture12. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.



Picture11 Front, back, and side views of SAM twin phantom



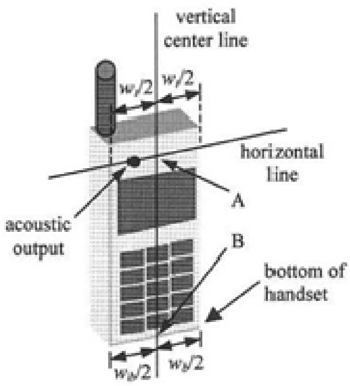
Picture12 Close-up side view of phantom showing the ear region.

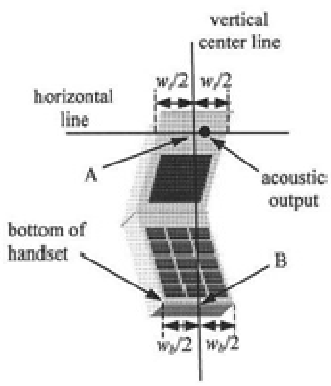


Picture13 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

(2) Definition of the cheek position

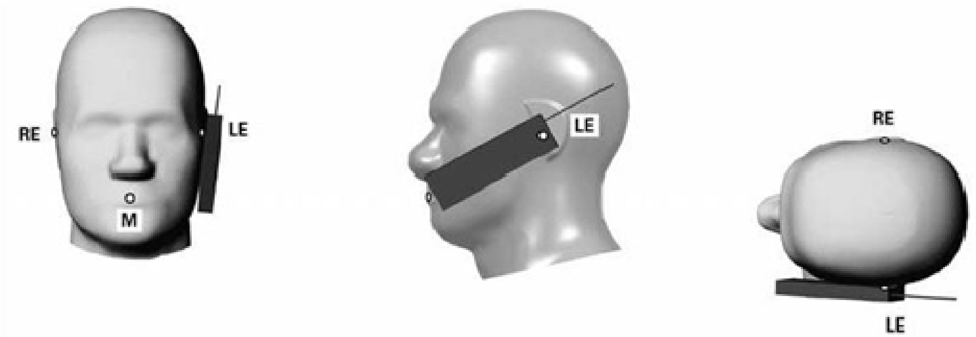
1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Picture 14 and Picture 15), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Picture 14). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Picture 15), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Picture 16), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Picture 16. The actual rotation angles should be documented in the test report.





Picture14 Handset vertical and horizontal reference lines—"fixed case

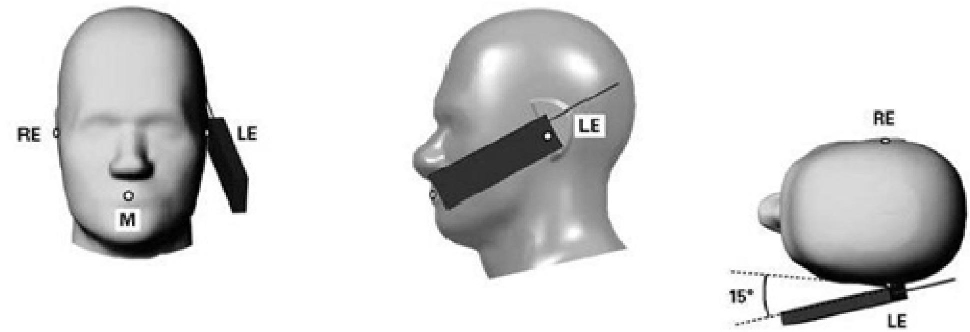
Picture15 Handset vertical and horizontal reference lines—"clam-shell case"



Picture16 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.

(3) Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Picture 17. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

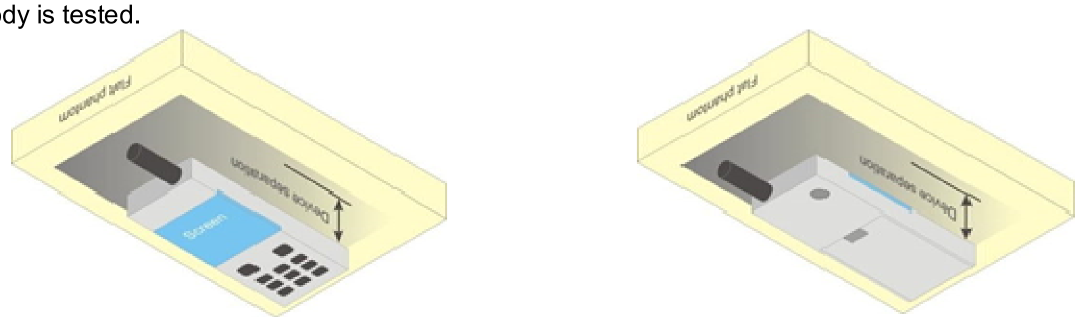


Picture17 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

(4)Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Picture 18). Per KDB 648474 D04v01r02, 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 447498 D01v05r02 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for 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 handset attached to the handset.
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 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 test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-chip used with

different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.



Picture18 Body Worn Position

(5)Wireless Router
Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC HDB Publication 941225 D06v01r01 where SAR test considerations for handsets (L x W ⩾ 9 cm x 5 cm) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined form 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 D01v05r02 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.

11.4 TEST RESULTS

11.4.1 Conducted Power Results

The output average power of WiFi 2.4G is as following:

Mode	Channel	Data rate (Mbps)	Power Setting	AV Power (dBm)
11b	1	1	19	13.06
	6	1	19	13.23
	11	1	19	13.49
11g	1	6	17	8.73
	6	6	17	10.70
	11	6	17	8.34
11n HT20	1	MCS0	17	8.50
	6	MCS0	17	10.79
	11	MCS0	17	8.21
11n HT40	3	MCS0	16.5	6.82
	6	MCS0	16.5	9.32
	9	MCS0	16.5	6.88

The output average power of BT (DSS) is as following:

Mode	Channel 0 (dBm)	Channel 39 (dBm)	Channel 78 (dBm)
1Mbps	2.01	2.35	0.71
2Mbps	0.86	1.34	-0.33
3Mbps	0.92	1.4	-0.41

The output average power of BT (DTS) is as following:

Mode	Channel 0 (dBm)	Channel 19 (dBm)	Channel 39 (dBm)
GFSK	-4.86	-4.1	-5.75

For SIM 1 Card:

The Averaged conducted power for GSM 850/1900 is as following:
Burst Average Power test result as bellowing:

Band	GSM 850			GSM 1900		
Channel	128	189	251	512	661	810
Frequency(MHz)	824.2	836.4	848.8	1850.2	1880	1909.8
GSM Voice	32.61	32.64	32.70	29.12	29.25	29.13
GPRS Multi-Slot Class8 (1 Uplink)	32.60	32.63	32.68	29.12	29.28	29.15
GPRS Multi-Slot Class10 (2 Uplink)	31.90	31.90	31.97	28.25	28.47	28.49
GPRS Multi-Slot Class11 (3 Uplink)	30.19	30.20	30.25	26.22	26.67	26.85
GPRS Multi-Slot Class12 (4 Uplink)	29.09	29.06	29.11	25.27	25.51	25.71

Note:
GPRS, CS1 coding scheme.
Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link
Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 6 working link
Multi-Slot Class 11 , Support Max 4 downlink, 3 uplink , 7 working link
Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 8 working link

Source-based Time Averaged Burst Power as bellowing:

Band	GSM 850				GSM 1900			
Channel	128	189	251	Time average factor	512	699	885	Time average factor
Frequency(MHz)	824.2	836.4	848.8		1850.2	1880	1909.8	
GSM Voice	23.61	23.64	23.70	-9.03	20.12	20.25	20.13	-9.03
GPRS Multi-Slot Class8 (1 Uplink)	23.60	23.63	23.68	-9.03	20.12	20.28	20.15	-9.03
GPRS Multi-Slot Class10 (2 Uplink)	25.90	25.90	25.97	-6.02	22.25	22.47	22.49	-6.02
GPRS Multi-Slot Class11 (3 Uplink)	25.93	25.94	25.99	-3.26	21.96	22.41	22.59	-3.26
GPRS Multi-Slot Class12 (4 Uplink)	26.09	26.06	26.11	-3.01	22.27	22.51	22.71	-3.01

Note: 1 uplink , Time average factor =10*log(1/8)=-9.03dB,
2 uplink , Time average factor =10*log(2/8)=-6.02dB,
3 uplink, Time average factor =10*log(3/8)=-4.26dB,
4 uplink, Time average factor =10*log(4/8)=-3.01dB,
Source based time average power = Burst Average power + Time Average factor

The Averaged conducted power for UMTS Band V is as following:

Band			WCDMA V		
TX Channel			4132	4182	4233
Frequency (MHz)			826.4	836.4	846.6
3GPP MPR (dB)	3GPP Rel 99	AMR 12.2Kbps	22.35	22.31	22.36
	3GPP Rel 99	RMC 12.2Kbps	22.36	22.33	22.4
0	3GPP Rel 6	HSDPA Subtest-1	21.88	21.84	21.86
0	3GPP Rel 6	HSDPA Subtest-2	21.91	21.87	21.98
0.5	3GPP Rel 6	HSDPA Subtest-3	21.44	21.36	21.47
0.5	3GPP Rel 6	HSDPA Subtest-4	21.43	21.4	21.44
0	3GPP Rel 6	HSUPA Subtest-1	21.93	21.97	21.97
2	3GPP Rel 6	HSUPA Subtest-2	20.62	20.65	20.71
1	3GPP Rel 6	HSUPA Subtest-3	21.59	21.56	21.57
2	3GPP Rel 6	HSUPA Subtest-4	20.55	20.44	20.58
0	3GPP Rel 6	HSUPA Subtest-5	21.82	21.8	21.9

The Averaged conducted power for UMTS Band II is as following:

Band			WCDMA II		
TX Channel			9262	9400	9538
Frequency (MHz)			1852.4	1880	1907.6
3GPP MPR (dB)	3GPP Rel 99	AMR 12.2Kbps	22.13	22.26	22.23
	3GPP Rel 99	RMC 12.2Kbps	22.15	22.27	22.26
0	3GPP Rel 6	HSDPA Subtest-1	21.66	21.76	21.72
0	3GPP Rel 6	HSDPA Subtest-2	21.7	21.81	21.91
0.5	3GPP Rel 6	HSDPA Subtest-3	21.24	21.33	21.34
0.5	3GPP Rel 6	HSDPA Subtest-4	21.21	21.31	21.41
0	3GPP Rel 6	HSUPA Subtest-1	21.72	21.84	21.78
2	3GPP Rel 6	HSUPA Subtest-2	20.38	20.6	20.58
1	3GPP Rel 6	HSUPA Subtest-3	21.26	21.38	21.47
2	3GPP Rel 6	HSUPA Subtest-4	20.33	20.41	20.45
0	3GPP Rel 6	HSUPA Subtest-5	21.7	21.79	21.77

The Averaged conducted power for LTE Band 4 is as following:

Mode	Band Width (MHz)	Modulation	Uplink Channel Number	Frequency (MHz)	RB Size	RB Offset	Maximum Average Power (dBm)
LTE Band 4	20MHz	QPSK	20050	1720	1	0	22.13
					1	50	21.50
					1	99	21.71
					50	0	21.09
					50	50	20.96
					100	0	20.71
			20175	1732.5	1	0	22.06
					1	50	21.63
					1	99	21.65
					50	0	20.99
					50	50	20.84
					100	0	20.41
			20300	1745	1	0	22.03
					1	50	21.73
					1	99	21.51
					50	0	20.96
					50	50	20.83
					100	0	20.42
		16-QAM	20050	1720	1	0	21.65
					1	50	21.48
					1	99	21.69
					24	0	20.73
					24	76	20.52
					100	0	20.56
			20175	1732.5	1	0	21.42
					1	50	21.33
					1	99	21.38
					75	0	20.40
					75	25	20.44
					100	0	20.41
			20300	1745	1	0	21.59
					1	49	21.72
					1	99	21.44
					75	0	20.78
					75	25	20.74
					100	0	20.72
LTE Band 4	15MHz	QPSK	20025	1717.5	1	0	21.26
					1	38	21.46
					1	74	21.72
					36	0	20.87
					36	39	20.83
					75	0	20.89
			20175	1732.5	1	0	21.68
					1	38	21.57
					1	74	21.56
					36	0	20.55
					36	39	20.53
					75	0	20.58
			20325	1747.5	1	0	21.77
					1	38	21.67
					1	74	21.63
					36	0	20.33

					36	39	20.30
					75	0	20.40
		16-QAM	20025	1717.5	1	0	21.44
					1	37	21.27
					1	74	21.64
					24	0	20.93
					24	51	20.82
					75	0	20.09
			20175	1732.5	1	0	21.70
					1	37	21.54
					1	74	21.53
					24	0	20.59
					24	51	20.55
					75	0	20.41
			20325	1747.5	1	0	21.38
					1	37	21.29
					1	74	21.18
					24	0	20.28
					24	51	20.08
					75	0	20.15
LTE Band 4	10MHz	QPSK	20000	1715	1	0	21.44
					1	24	21.31
					1	49	21.25
					25	0	20.85
					25	25	20.73
					50	0	20.74
			20175	1732.5	1	0	21.20
					1	24	21.12
					1	49	21.00
					25	0	20.30
					25	25	20.01
					50	0	20.09
			20350	1750	1	0	21.77
					1	24	21.57
					1	49	21.58
					25	0	20.88
					25	25	20.98
					50	0	20.99
		16-QAM	20000	1715	1	0	21.14
					1	25	20.96
					1	49	20.85
					30	0	20.89
					30	20	20.75
					50	0	20.74
			20175	1732.5	1	0	21.68
					1	25	21.40
					1	49	21.01
					30	0	20.64
					30	20	20.46
					50	0	20.12
			20350	1750	1	0	21.34
					1	25	21.23
					1	49	21.17
					30	0	21.02
					30	20	20.39
					50	0	20.33
LTE	5MHz	QPSK	19975	1712.5	1	0	21.89

Band 4					1	13	21.46
					1	24	21.62
					10	0	20.95
					10	15	20.89
					25	0	20.86
			20175	1732.5	1	0	21.26
					1	12	21.39
					1	24	21.38
					10	0	20.37
					10	6	20.30
					25	0	20.31
			20375	1752.5	1	0	21.39
					1	13	21.35
					1	24	21.28
					10	0	20.24
					10	6	20.22
					25	0	20.22
		16-QAM	19975	1712.5	1	0	21.62
					1	13	21.54
					1	24	21.42
					8	0	20.96
					8	17	20.90
					25	0	20.86
			20175	1732.5	1	0	21.16
					1	13	21.13
					1	24	21.15
					8	0	20.38
					8	17	20.39
					25	0	20.22
			20375	1752.5	1	0	20.37
					1	13	20.36
					1	24	20.30
					8	0	20.03
					8	17	20.09
					25	0	20.03
LTE Band 4	3MHz	QPSK	19965	1711.5	1	0	21.92
					1	8	21.68
					1	14	21.65
					10	0	20.99
					10	5	20.97
					15	0	20.90
			20175	1732.5	1	0	21.48
					1	8	21.60
					1	14	21.52
					10	0	20.62
					10	5	20.57
					15	0	20.59
			20385	1753.5	1	0	20.75
					1	7	20.86
					1	14	20.73
					10	0	20.05
					10	5	20.08
					15	0	20.03
		16-QAM	19965	1711.5	1	0	21.54
					1	8	21.53
					1	14	21.48
					6	0	20.83

					6	9	20.82
					15	0	20.75
			20175	1732.5	1	0	21.35
					1	8	21.37
					1	14	21.28
					6	0	20.33
					6	4	20.28
					15	0	20.01
			20385	1753.5	1	0	20.83
					1	7	20.80
					1	14	20.69
					6	0	20.02
					6	9	20.04
					15	0	20.06
LTE Band 4	1.4MHz	QPSK	19957	1710.7	1	0	21.31
					1	2	21.39
					1	5	21.37
					3	0	20.81
					3	2	20.83
					6	0	20.82
			20175	1732.5	1	0	21.45
					1	2	21.49
					1	5	21.35
					3	0	20.89
					3	2	20.82
					6	0	20.59
			20393	1754.3	1	0	20.87
					1	2	20.76
					1	5	20.78
					3	0	20.62
					3	2	20.64
					6	0	20.09
		16-QAM	19957	1710.7	1	0	21.99
					1	2	21.91
					1	5	21.89
					3	0	20.91
					3	2	20.92
					6	0	20.84
			20175	1732.5	1	0	21.07
					1	2	21.00
					1	5	21.10
					3	0	20.55
					3	2	20.48
					6	0	20.39
			20393	1754.3	1	0	20.16
					1	2	20.05
					1	5	20.06
					3	0	20.10
					3	2	20.08
					6	0	20.03

For SIM 2 Card:

The Averaged conducted power for GSM 850/1900 is as following:
Burst Average Power test result as bellowing:

Band	GSM 850			GSM 1900		
Channel	128	189	251	512	661	810
Frequency(MHz)	824.2	836.4	848.8	1850.2	1880	1909.8
GSM Voice	32.61	32.63	32.69	29.11	29.22	29.04
GPRS Multi-Slot Class8 (1 Uplink)	32.60	32.62	32.68	29.10	29.21	29.06
GPRS Multi-Slot Class10 (2 Uplink)	31.89	31.91	31.95	28.23	28.47	28.42
GPRS Multi-Slot Class11 (3 Uplink)	30.17	30.19	30.25	26.22	26.65	26.81
GPRS Multi-Slot Class12 (4 Uplink)	29.07	29.06	29.10	25.26	25.50	25.69

Note:
GPRS, CS1 coding scheme.
Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link
Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 6 working link
Multi-Slot Class 11 , Support Max 4 downlink, 3 uplink , 7 working link
Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 8 working link

Source-based Time Averaged Burst Power as bellowing:

Band	GSM 850				GSM 1900			
Channel	128	189	251	Time average factor	512	699	885	Time average factor
Frequency(MHz)	824.2	836.4	848.8		1850.2	1880	1909.8	
GSM Voice	23.61	23.63	23.69	-9.03	20.11	20.22	20.04	-9.03
GPRS Multi-Slot Class8 (1 Uplink)	23.60	23.62	23.68	-9.03	20.10	20.21	20.06	-9.03
GPRS Multi-Slot Class10 (2 Uplink)	25.89	25.91	25.95	-6.02	22.23	22.47	22.42	-6.02
GPRS Multi-Slot Class11 (3 Uplink)	25.91	25.93	25.99	-3.26	21.96	22.39	22.55	-3.26
GPRS Multi-Slot Class12 (4 Uplink)	26.07	26.06	26.10	-3.01	22.26	22.50	22.69	-3.01

Note: 1 uplink , Time average factor =10*log(1/8)=-9.03dB,
2 uplink , Time average factor =10*log(2/8)=-6.02dB,
3 uplink, Time average factor =10*log(3/8)=-4.26dB,
4 uplink, Time average factor =10*log(4/8)=-3.01dB,
Source based time average power = Burst Average power + Time Average factor

11.4.2 SAR TEST RESULTS

SAR Values

Plot No.	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
GSM850_Head_20150805											
	GPRS (4 Tx slots)	Right Cheek	-	251	848.8	29.10	29.50	1.096	-0.05	0.133	0.146
	GPRS (4 Tx slots)	Right Tilted	-	251	848.8	29.10	29.50	1.096	0.03	0.095	0.104
50	GPRS (4 Tx slots)	Left Cheek	-	251	848.8	29.10	29.50	1.096	0.06	0.199	0.218
	GPRS (4 Tx slots)	Left Tilted	-	251	848.8	29.10	29.50	1.096	-0.07	0.101	0.111
GSM1900_Head_20150803											
	GPRS (4 Tx slots)	Right Cheek	-	810	1909.8	25.71	26.00	1.069	-0.09	0.164	0.175
	GPRS (4 Tx slots)	Right Tilted	-	810	1909.8	25.71	26.00	1.069	-0.06	0.113	0.121
3	GPRS (4 Tx slots)	Left Cheek	-	810	1909.8	25.71	26.00	1.069	-0.02	0.28	0.299
	GPRS (4 Tx slots)	Left Tilted	-	810	1909.8	25.71	26.00	1.069	-0.03	0.132	0.141
WCDMA V_Head_20150805											
	RMC 12.2K	Right Cheek	-	4233	846.6	22.40	22.50	1.023	-0.02	0.047	0.048
	RMC 12.2K	Right Tilted	-	4233	846.6	22.40	22.50	1.023	0.09	0.031	0.032
54	RMC 12.2K	Left Cheek	-	4233	846.6	22.40	22.50	1.023	0.07	0.072	0.074
	RMC 12.2K	Left Tilted	-	4233	846.6	22.40	22.50	1.023	-0.04	0.043	0.044
WCDMA II_Head_20150803											
	RMC 12.2K	Right Cheek	-	9400	1880	22.27	22.50	1.054	0.03	0.312	0.329
	RMC 12.2K	Right Tilted	-	9400	1880	22.27	22.50	1.054	0.05	0.137	0.144
7	RMC 12.2K	Left Cheek	-	9400	1880	22.27	22.50	1.054	0.09	0.363	0.383
	RMC 12.2K	Left Tilted	-	9400	1880	22.27	22.50	1.054	0.07	0.169	0.178
LTE Band 4_Head_20150804											
	20M QPSK 1Rb 0Offset	Right Cheek	-	20050	1720	22.13	22.50	1.089	-0.1	0.103	0.112
	20M QPSK 1Rb 0Offset	Right Tilted	-	20050	1720	22.13	22.50	1.089	0.07	0.069	0.075
23	20M QPSK 1Rb 0Offset	Left Cheek	-	20050	1720	22.13	22.50	1.089	-0.08	0.158	0.172

	20M QPSK 1Rb 0Offset	Left Tilted	-	20050	1720	22.13	22.50	1.089	-0.09	0.088	0.096
	20M QPSK 50Rb 0Offset	Right Cheek	-	20050	1720	21.09	21.50	1.099	-0.06	0.098	0.108
	20M QPSK 50Rb 0Offset	Right Tilted	-	20050	1720	21.09	21.50	1.099	0.04	0.063	0.069
	20M QPSK 50Rb 0Offset	Left Cheek	-	20050	1720	21.09	21.50	1.099	0.09	0.149	0.164
	20M QPSK 50Rb 0Offset	Left Tilted	-	20050	1720	21.09	21.50	1.099	-0.11	0.086	0.095
GSM850_Body_20150805											
	GPRS (4 Tx slots)	Front	1	251	848.8	29.10	29.50	1.096	0.05	0.346	0.379
57	GPRS (4 Tx slots)	Back	1	251	848.8	29.10	29.50	1.096	0.04	0.627	**0.687**
	GPRS (4 Tx slots)	Left Side	1	251	848.8	29.10	29.50	1.096	-0.05	0.093	0.102
	GPRS (4 Tx slots)	Right Side	1	251	848.8	29.10	29.50	1.096	-0.03	0.087	0.095
	GPRS (4 Tx slots)	Bottom Side	1	251	848.8	29.10	29.50	1.096	0.06	0.126	0.138
GSM1900_Body_20150803											
	GPRS (4 Tx slots)	Front	1	810	1909.8	25.71	26.00	1.069	-0.07	0.471	0.504
10	GPRS (4 Tx slots)	Back	1	810	1909.8	25.71	26.00	1.069	-0.09	0.778	**0.832**
	GPRS (4 Tx slots)	Left Side	1	810	1909.8	25.71	26.00	1.069	0.06	0.136	0.145
	GPRS (4 Tx slots)	Right Side	1	810	1909.8	25.71	26.00	1.069	0.09	0.115	0.123
	GPRS (4 Tx slots)	Bottom Side	1	810	1909.8	25.71	26.00	1.069	0.12	0.312	0.334
	GPRS (4 Tx slots)	Back	1	512	1850.2	25.27	26.00	1.183	-0.03	0.698	0.826
	GPRS (4 Tx slots)	Back	1	661	1880	25.51	26.00	1.119	-0.06	0.712	0.797
WCDMA V_Body_20150805											
	RMC 12.2K	Front	1	4233	846.6	22.40	22.50	1.023	0.11	0.106	0.108
62	RMC 12.2K	Back	1	4233	846.6	22.40	22.50	1.023	0.07	0.219	**0.224**
	RMC 12.2K	Left Side	1	4233	846.6	22.40	22.50	1.023	-0.09	0.043	0.044
	RMC 12.2K	Right Side	1	4233	846.6	22.40	22.50	1.023	0.03	0.032	0.033

	RMC 12.2K	Bottom Side	1	4233	846.6	22.40	22.50	1.023	-0.04	0.05	0.051
WCDMA II_Body_20150803											
	RMC 12.2K	Front	1	9400	1880	22.27	22.50	1.054	0.07	0.288	0.304
17	RMC 12.2K	Back	1	9400	1880	22.27	22.50	1.054	-0.04	0.561	**0.592**
	RMC 12.2K	Left Side	1	9400	1880	22.27	22.50	1.054	0.03	0.095	0.100
	RMC 12.2K	Right Side	1	9400	1880	22.27	22.50	1.054	0.02	0.077	0.081
	RMC 12.2K	Bottom Side	1	9400	1880	22.27	22.50	1.054	-0.03	0.133	0.140
LTE Band 4_Body_20150804											
	QPSK 1Rb 0Offset	Front	1	20050	1720	22.13	22.50	1.089	-0.08	0.256	0.279
30	QPSK 1Rb 0Offset	Back	1	20050	1720	22.13	22.50	1.089	-0.15	0.538	**0.586**
	QPSK 1Rb 0Offset	Left Side	1	20050	1720	22.13	22.50	1.089	0.12	0.088	0.096
	QPSK 1Rb 0Offset	Right Side	1	20050	1720	22.13	22.50	1.089	-0.06	0.063	0.069
	QPSK 1Rb 0Offset	Bottom Side	1	20050	1720	22.13	22.50	1.089	0.07	0.117	0.127
	QPSK 50Rb 0Offset	Front	1	20050	1720	21.09	21.50	1.099	-0.02	0.239	0.263
	QPSK 50Rb 0Offset	Back	1	20050	1720	21.09	21.50	1.099	-0.06	0.527	0.579
	QPSK 50Rb 0Offset	Left Side	1	20050	1720	21.09	21.50	1.099	0.03	0.083	0.091
	QPSK 50Rb 0Offset	Right Side	1	20050	1720	21.09	21.50	1.099	0.07	0.059	0.065
	QPSK 50Rb 0Offset	Bottom Side	1	20050	1720	21.09	21.50	1.099	0.01	0.108	0.119

Plot No.	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Setting	Data Rate	Average Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WLAN2.4G_802.11b_Head_20150804												
	Right Cheek	-	11	2462	19	1Mbps	13.49	14.00	1.125	-0.02	0.233	0.262
	Right Tilted	-	11	2462	19	1Mbps	13.49	14.00	1.125	0.01	0.178	0.200
41	Left Cheek	-	11	2462	19	1Mbps	13.49	14.00	1.125	-0.07	0.281	0.316
	Left Tilted	-	11	2462	19	1Mbps	13.49	14.00	1.125	-0.05	0.236	0.265
WLAN2.4G_802.11b_Body_20150804												
	Front	1	11	2462	19	1Mbps	13.49	14.00	1.125	-0.08	0.053	0.060

44	Back	1	11	2462	19	1Mbps	13.49	14.00	1.125	-0.03	0.084	0.094
	Right Side	1	11	2462	19	1Mbps	13.49	14.00	1.125	-0.06	0.026	0.029
	Top Side	1	11	2462	19	1Mbps	13.49	14.00	1.125	0.03	0.035	0.039

Note:

1. The value with blue color is the maximum SAR Value of each test band.
2. SAR test reduction and exclusion guidance
   (1) The SAR exclusion threshold for distances <50mm is defined by the following equation:

   (max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm).

   $\sqrt{\text{Frequency(GHz)}}$ ≤3.0

   (2) The SAR exclusion threshold for distances >50mm is defined by the following equation, as illustrated in KDB 447498 D01 Appendix B:

   a) at 100 MHz to 1500 MHz

   [(Power allowed at numeric Threshold at 50 mm in step 1) + (test separation distance- 50 mm) · (f (MHz)/150)] mW

   b) at > 1500 MHz and ≤ 6 GHz

   [Power allowed at numeric Threshold at 50 mm in step 1) + (test separation distance-50 mm) ·10] mW

   Evaluation (BT) = [10^(3/10)/5] *($2.480^{1/2}$) =0.628＜3.0, so SAR is not required for Bluetooth.
3. Per KDB 447498 D01v05r02, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor.
4. Per KDB 447498 D01v05r02, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
   a. ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   b. ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   c. ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
5. Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg.
6. SAR is not required for the following 2.4 GHz OFDM conditions.
   1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
   2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
7. Per KDB 941225 D01v03, considering the possibility of e.g. 3rd party VoIP operation for Head and body SAR test reduction for GSM and GPRS and EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The 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. Therefore, the EUT was set in GPRS (4Tx slots) for GSM850/GSM1900.
8. WCDMA mode were tested under RMC 12.2kbps without HSPA (HSDPA/HSUPA) inactive per KDB Publication 941225 D01. HSPA (HSDPA/HSUPA) SAR for body was required since the maximum SAR for 12.2kbps RMC was above 75% SAR limit.
9. Per KDB 941225 D01v03, RMC 12.2kbps setting is used to evaluate SAR. If the maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ 1/4 dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA /HSUPA.

11.4.3 GRAPH RESULTs

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 05.08.2015

50-GSM850-GPRS(4 Tx slots)-Left Cheek-Ch251

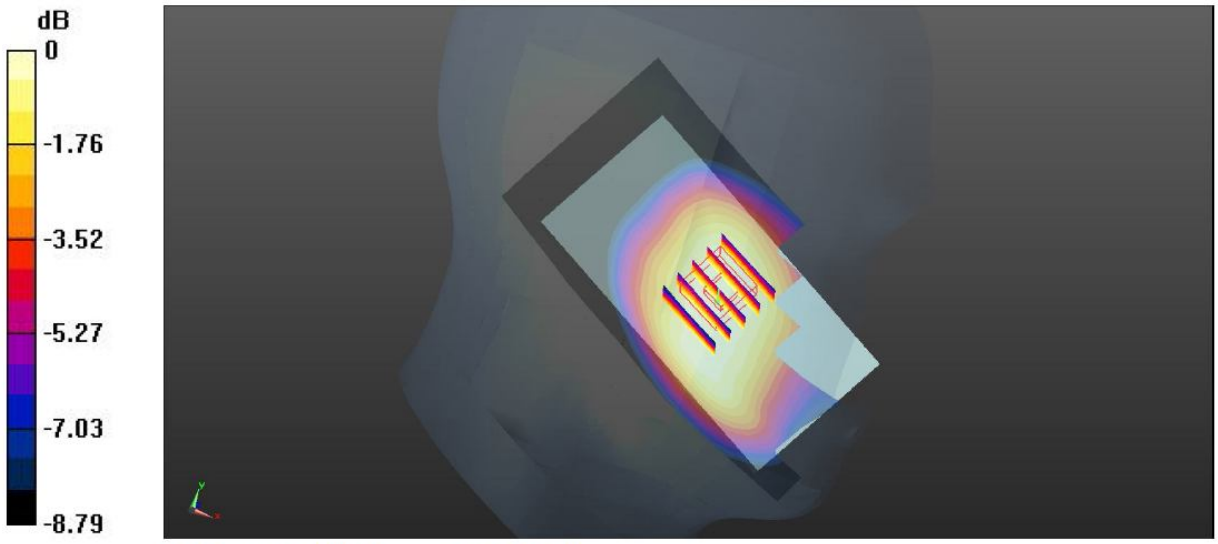
Communication System: UID 0, GPRS/EDGE12 (0); Frequency: 848.8 MHz;Duty Cycle: 1:2.08
Medium: HSL_835_150805
Medium parameters used: f = 849 MHz; $\sigma = 0.906$ S/m; $\varepsilon_r = 41.379$; $\rho = 1000$ kg/m^3
Ambient Temperature: 23.6 ℃; Liquid Temperature: 22.7 ℃

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(10.08, 10.08, 10.08); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch251/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.236 W/kg

Configuration/Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.117 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.241 W/kg
SAR(1 g) = 0.199 W/kg; SAR(10 g) = 0.155 W/kg
Maximum value of SAR (measured) = 0.224 W/kg



0 dB = 0.224 W/kg = -6.50 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 03.08.2015

03-GSM1900-GPRS(4 Tx slots)-Left Cheek-Ch810

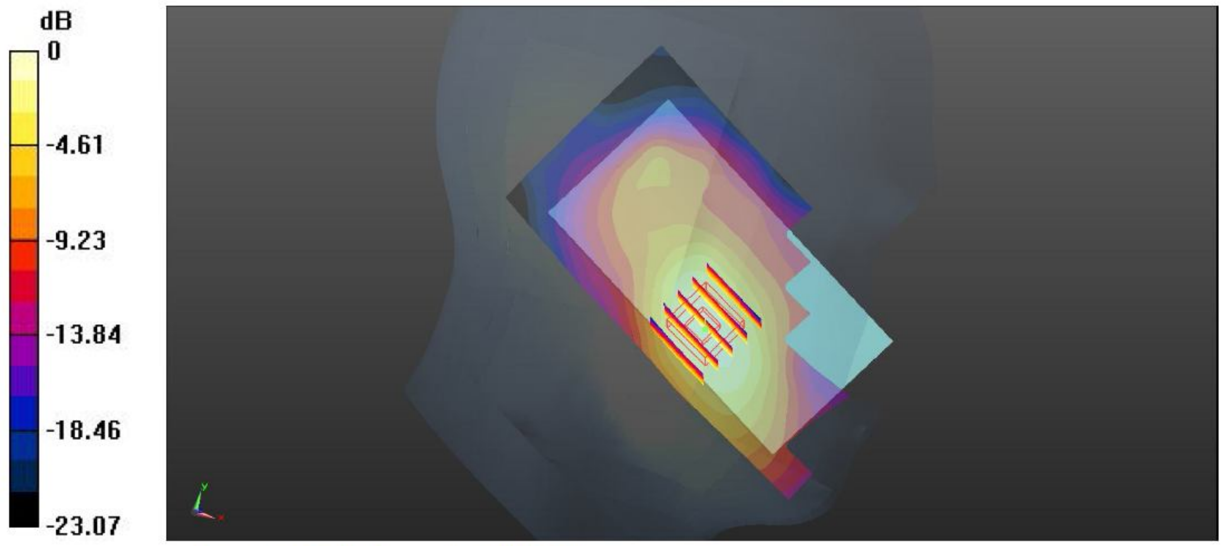
Communication System: UID 0, GPRS/EDGE12 (0); Frequency: 1909.8 MHz;Duty Cycle: 1:2.08
Medium: HSL_1900_150803
Medium parameters used: f = 1910 MHz; σ = 1.444 S/m; ε_r = 39.761; ρ = 1000 kg/m^3
Ambient Temperature: 23.5 ℃; Liquid Temperature: 22.6 ℃

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(8.18, 8.18, 8.18); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch810/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.372 W/kg

Configuration/Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.586 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.465 W/kg
SAR(1 g) = 0.280 W/kg; SAR(10 g) = 0.159 W/kg
Maximum value of SAR (measured) = 0.376 W/kg



0 dB = 0.376 W/kg = -4.25 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 05.08.2015

54-WCDMA V-RMC 12.2K-Left Cheek-Ch4233

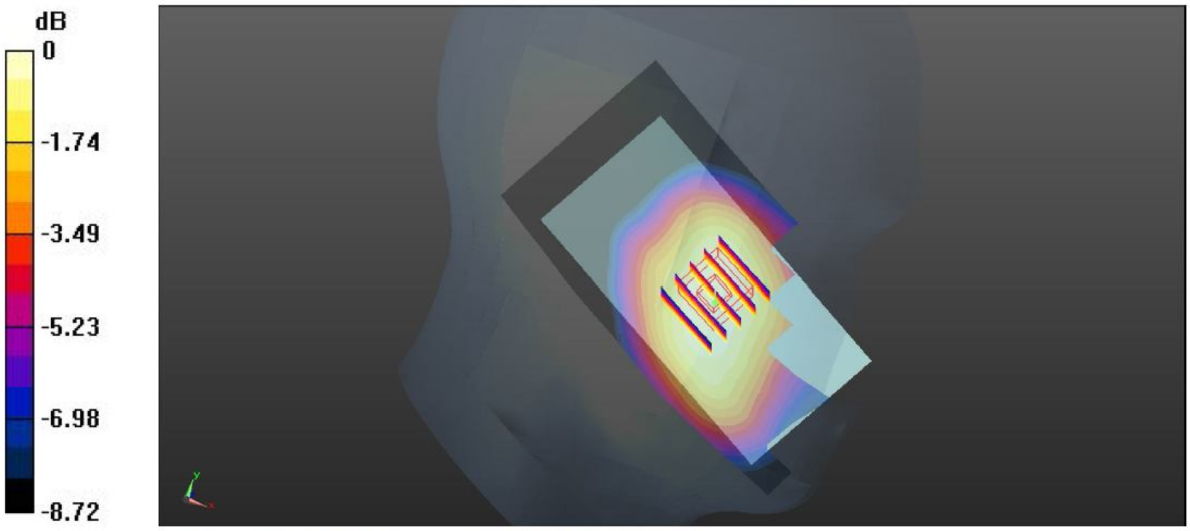
Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium: HSL_835_150805
Medium parameters used: f = 847 MHz; σ = 0.904 S/m; ε_r = 41.403; ρ = 1000 kg/m^3
Ambient Temperature: 23.6 ℃; Liquid Temperature: 22.7 ℃

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(10.08, 10.08, 10.08); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch4233/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.0835 W/kg

Configuration/Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.812 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.0880 W/kg
SAR(1 g) = 0.072 W/kg; SAR(10 g) = 0.056 W/kg
Maximum value of SAR (measured) = 0.0814 W/kg



0 dB = 0.0814 W/kg = -10.89 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 03.08.2015

07-WCDMA II-RMC 12.2K-Left Cheek-Ch9400

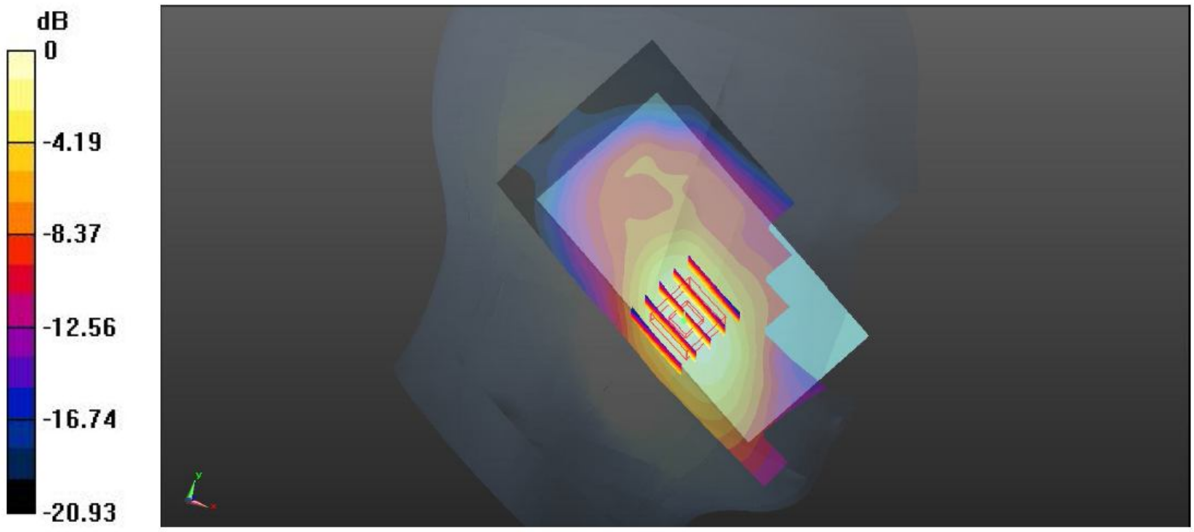
Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: HSL_1900_150803
Medium parameters used: f = 1880 MHz; σ = 1.413 S/m; ε_r = 39.879; ρ = 1000 kg/m^3
Ambient Temperature: 23.5 ℃; Liquid Temperature: 22.6 ℃

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(8.18, 8.18, 8.18); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch9400/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.477 W/kg

Configuration/Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.968 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.598 W/kg
SAR(1 g) = 0.363 W/kg; SAR(10 g) = 0.210 W/kg
Maximum value of SAR (measured) = 0.488 W/kg



0 dB = 0.488 W/kg = -3.12 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 04.08.2015

23-LTE Band 4-20M-QPSK-1RB 0Offset-Left Cheek-Ch20050

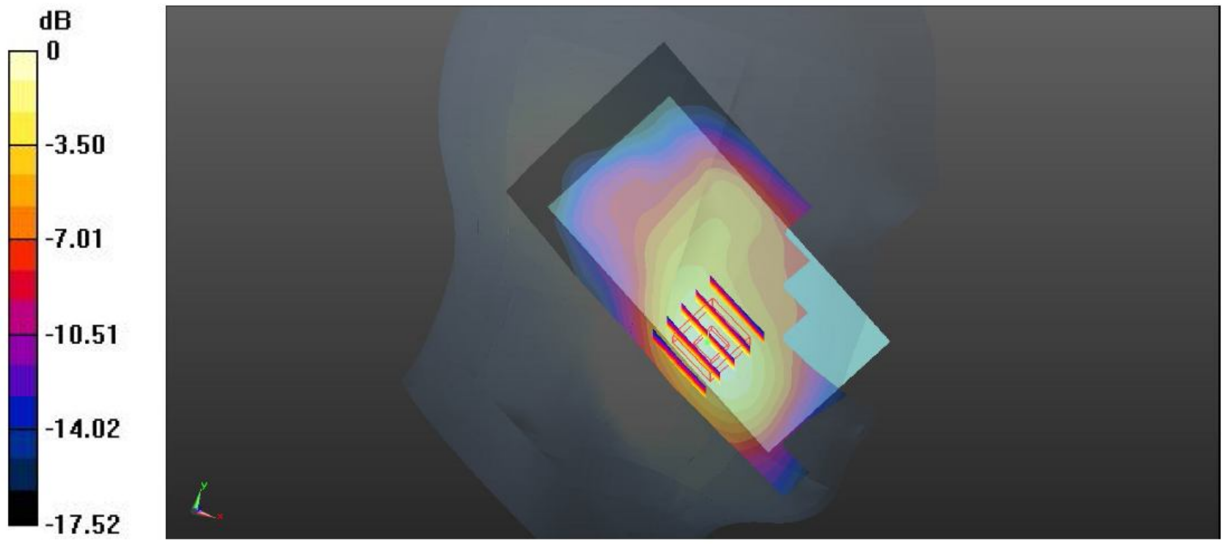
Communication System: UID 0, Generic LTE (0); Frequency: 1720 MHz;Duty Cycle: 1:1
Medium: HSL_1750_150804
Medium parameters used: f = 1720 MHz; σ = 1.319 S/m; ε_r = 39.679; ρ = 1000 kg/m^3
Ambient Temperature: 23.3 ℃; Liquid Temperature: 22.6 ℃

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(8.18, 8.18, 8.18); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch20050/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.182 W/kg

Configuration/Ch20050/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.370 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.250 W/kg
SAR(1 g) = 0.158 W/kg; SAR(10 g) = 0.095 W/kg
Maximum value of SAR (measured) = 0.209 W/kg



0 dB = 0.209 W/kg = -6.80 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 05.08.2015

57-GSM850-GPRS(4 Tx slots)-Back-1cm-Ch251

Communication System: UID 0, GPRS/EDGE12 (0); Frequency: 848.8 MHz;Duty Cycle: 1:2.08
Medium: MSL_835_150805
Medium parameters used: f = 849 MHz; σ = 0.991 S/m; ε_r = 55.451; ρ = 1000 kg/m^3
Ambient Temperature: 23.5 ℃; Liquid Temperature: 22.8 ℃

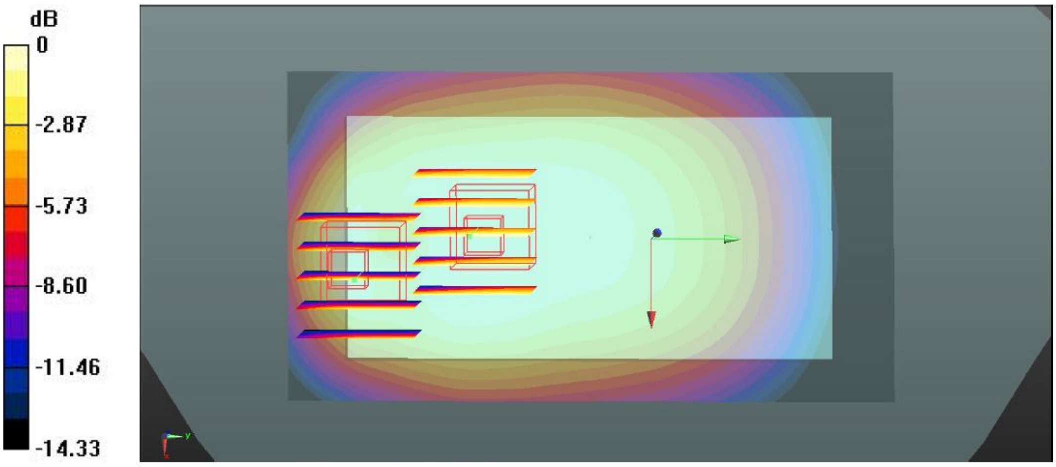
DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(10.27, 10.27, 10.27); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch251/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.725 W/kg

Configuration/Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.619 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.829 W/kg
SAR(1 g) = 0.627 W/kg; SAR(10 g) = 0.464 W/kg
Maximum value of SAR (measured) = 0.730 W/kg

Configuration/Ch251/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.619 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.772 W/kg
SAR(1 g) = 0.421 W/kg; SAR(10 g) = 0.241 W/kg
Maximum value of SAR (measured) = 0.606 W/kg



0 dB = 0.606 W/kg = -2.18 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 03.08.2015

10-GSM1900-GPRS(4 Tx slots)-Back-1cm-Ch810

Communication System: UID 0, GPRS/EDGE12 (0); Frequency: 1909.8 MHz;Duty Cycle: 1:2.08
Medium: MSL_1900_150803
Medium parameters used: f = 1910 MHz; σ = 1.563 S/m; ε_r = 52.65; ρ = 1000 kg/m^3
Ambient Temperature: 23.4 ℃; Liquid Temperature: 22.7 ℃

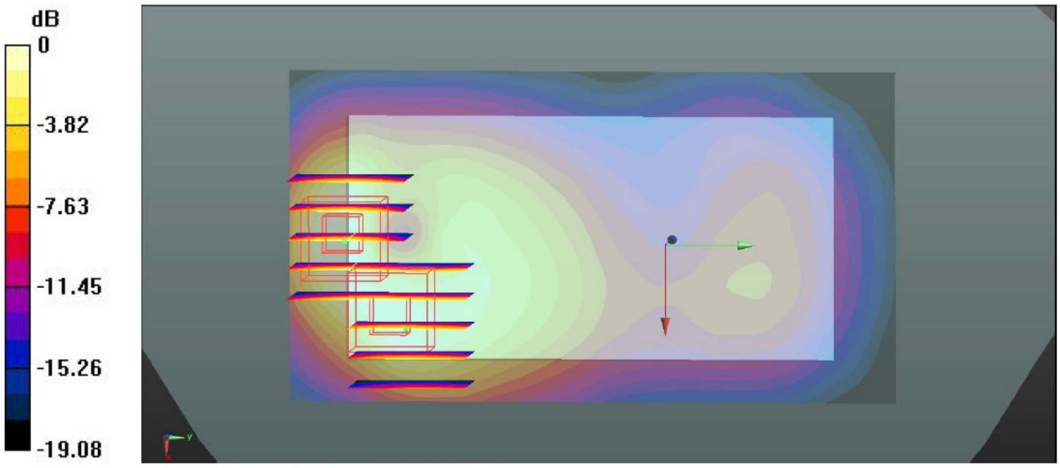
DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(8.06, 8.06, 8.06); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch810/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.14 W/kg

Configuration/Ch810/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.655 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.35 W/kg
SAR(1 g) = 0.778 W/kg; SAR(10 g) = 0.404 W/kg
Maximum value of SAR (measured) = 1.11 W/kg

Configuration/Ch810/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.655 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.26 W/kg
SAR(1 g) = 0.732 W/kg; SAR(10 g) = 0.390 W/kg
Maximum value of SAR (measured) = 0.989 W/kg



0 dB = 0.989 W/kg = -0.05 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 05.08.2015

62-WCDMA V-RMC 12.2K-Back-1cm-Ch4233

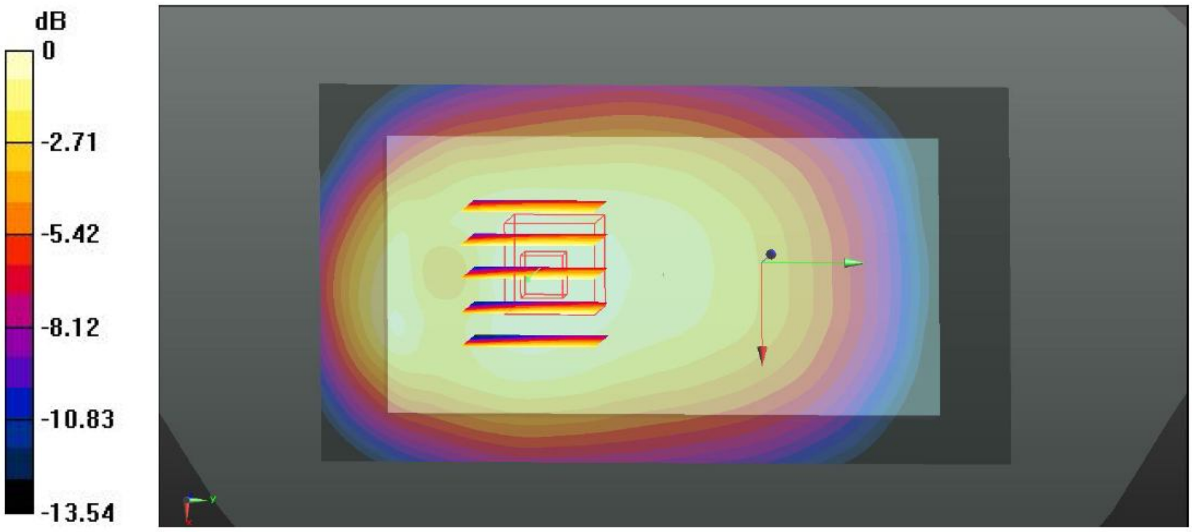
Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium: MSL_835_150805
Medium parameters used: f = 847 MHz; σ = 0.989 S/m; ε_r = 55.467; ρ = 1000 kg/m^3
Ambient Temperature: 23.5 ℃; Liquid Temperature: 22.8 ℃

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(10.27, 10.27, 10.27); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch4233/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.256 W/kg

Configuration/Ch4233/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.356 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.291 W/kg
SAR(1 g) = 0.219 W/kg; SAR(10 g) = 0.162 W/kg
Maximum value of SAR (measured) = 0.257 W/kg



0 dB = 0.257 W/kg = -5.90 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 03.08.2015

17-WCDMA II-RMC 12.2K-Back-1cm-Ch9400

Communication System: UID 0, UMTS-FDD (WCDMA) (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900_150803
Medium parameters used: f = 1880 MHz; σ = 1.528 S/m; ε_r = 52.754; ρ = 1000 kg/m^3
Ambient Temperature: 23.4 ℃; Liquid Temperature: 22.7 ℃

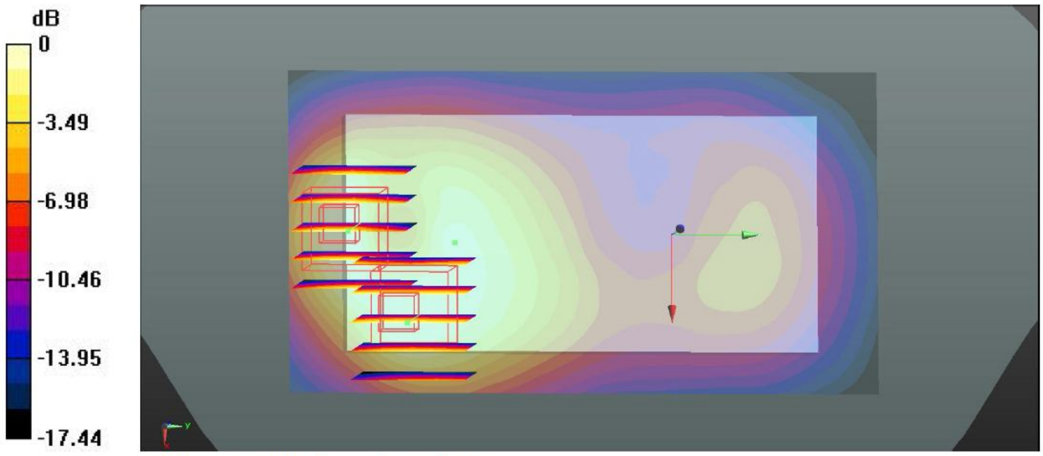
DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(8.06, 8.06, 8.06); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch9400/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.744 W/kg

Configuration/Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.079 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.930 W/kg
SAR(1 g) = 0.561 W/kg; SAR(10 g) = 0.316 W/kg
Maximum value of SAR (measured) = 0.729 W/kg

Configuration/Ch9400/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.079 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.892 W/kg
SAR(1 g) = 0.522 W/kg; SAR(10 g) = 0.271 W/kg
Maximum value of SAR (measured) = 0.694 W/kg



0 dB = 0.694 W/kg = -1.59 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 04.08.2015

30-LTE Band 4-20M-QPSK-1RB 0Offset-Back-1cm-Ch20050

Communication System: UID 0, Generic LTE (0); Frequency: 1720 MHz;Duty Cycle: 1:1
Medium: MSL_1750_150804
Medium parameters used: f = 1720 MHz; σ = 1.449 S/m; ε_r = 52.599; ρ = 1000 kg/m^3
Ambient Temperature: 23.3 ℃; Liquid Temperature: 22.7 ℃

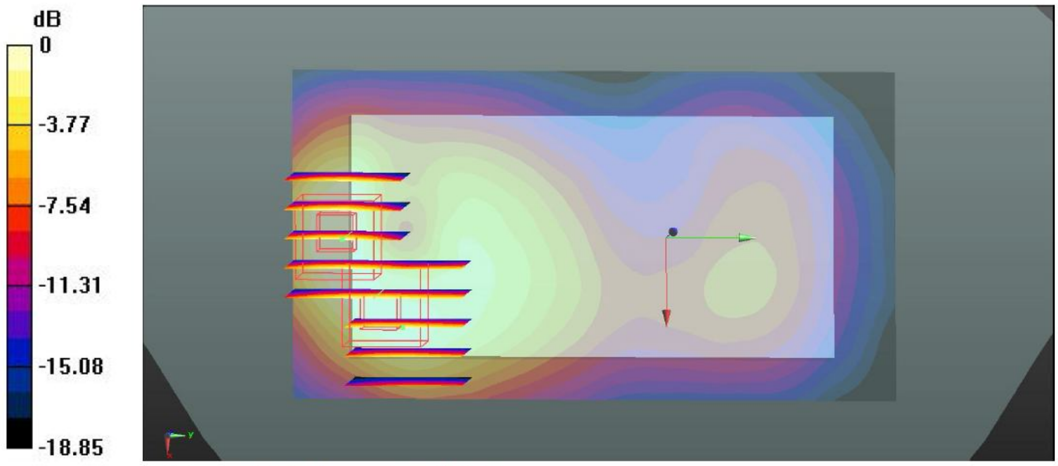
DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(8.06, 8.06, 8.06); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch20050/Area Scan (61x111x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.708 W/kg

Configuration/Ch20050/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.011 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.920 W/kg
SAR(1 g) = 0.538 W/kg; SAR(10 g) = 0.286 W/kg
Maximum value of SAR (measured) = 0.740 W/kg

Configuration/Ch20050/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.011 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.850 W/kg
SAR(1 g) = 0.504 W/kg; SAR(10 g) = 0.276 W/kg
Maximum value of SAR (measured) = 0.676 W/kg



0 dB = 0.676 W/kg = -1.70 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 04.08.2015

41-WLAN2.4G-802.11b-Left Cheek-Ch11

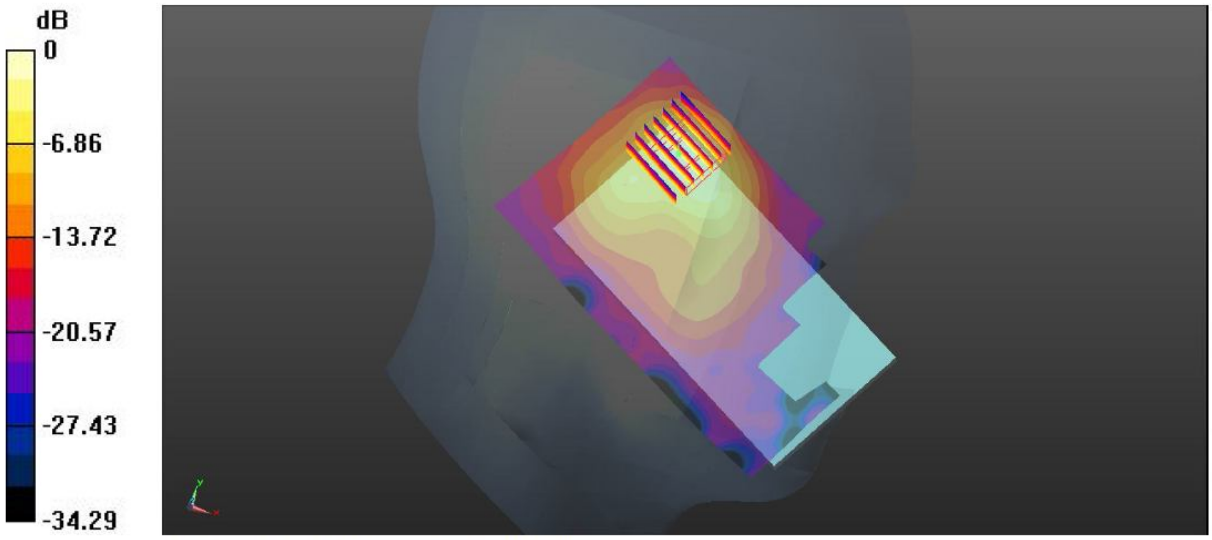
Communication System: UID 0, WIFI (0); Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: HSL_2450_150804
Medium parameters used: f = 2462 MHz; σ = 1.806 S/m; ε_r = 40.087; ρ = 1000 kg/m^3
Ambient Temperature: 23.3 ℃; Liquid Temperature: 22.8 ℃

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(7.36, 7.36, 7.36); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch11/Area Scan (81x141x1): Interpolated grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.451 W/kg

Configuration/Ch11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.310 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.666 W/kg
SAR(1 g) = 0.281 W/kg; SAR(10 g) = 0.112 W/kg
Maximum value of SAR (measured) = 0.446 W/kg



0 dB = 0.446 W/kg = -3.51 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd. Date/Time: 04.08.2015

44-WLAN2.4G-802.11b-Back-1cm-Ch11

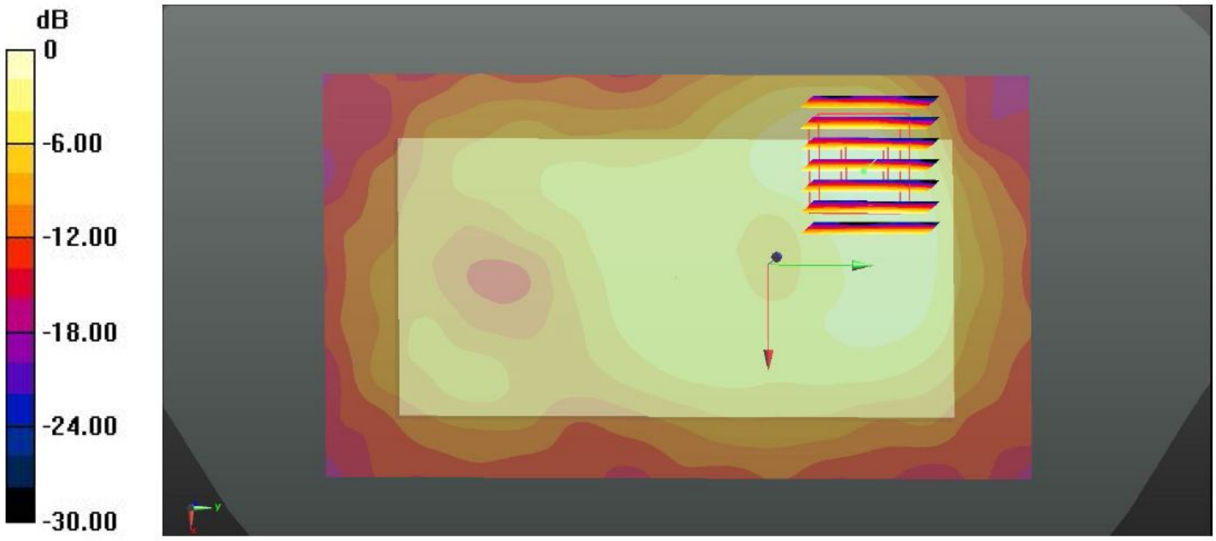
Communication System: UID 0, WIFI (0); Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: MSL_2450_150804
Medium parameters used: f = 2462 MHz; σ = 2.046 S/m; ε_r = 52.782; ρ = 1000 kg/m^3
Ambient Temperature: 23.3 ℃; Liquid Temperature: 22.7 ℃

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(7.66, 7.66, 7.66); Calibrated: 10.07.2015;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 23.06.2015
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1794
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Ch11/Area Scan (81x141x1): Interpolated grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.132 W/kg

Configuration/Ch11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.162 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.182 W/kg
SAR(1 g) = 0.084 W/kg; SAR(10 g) = 0.040 W/kg
Maximum value of SAR (measured) = 0.130 W/kg



0 dB = 0.130 W/kg = -8.86 dBW/kg

11.4.4 Simultaneous Transmission Conditions

When standalone SAR is not required to be measured per FCC KDB 447498 D01v05 4.3.2 2), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

Estimated SAR=(max. power of channel, including tune-up tolerance, mW)/(min. test separation

distance, mm)*($\sqrt{\text{Frequency (GHz)}}$ /7.5)

Per FCC KDB 447498 D01v05 IV.C.1.iii, simultaneous transmission SAR test exclusion may be applied when
the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration
is ≤1.6 W/kg. When the sum is greater than the SAR limit, SAR test exclusion is determined by the SAR to peak
location separation ratio.
Ration=(SAR1 + SAR2)1.5/Ri ≤ 0.04

Simultaneous Transmission Configurations	Head	Body	Note
GSM850/1900/WCDMA Band V/II/LTE Band 4 + 2.4GHz WLAN	Yes	Yes	
GSM850/1900/WCDMA Band V/II/LTE Band 4 + 2.4GHz BT	Yes	Yes	

Note: Wlan2.4G and Bluetooth share the same antenna, So the Simultaneous SAR are not required for BT and wifi antenna.
Estimated $SAR_{BT(Head)}$= [10^(3/10)/5]*(√2.48)/7.5=0.084W/kg
Estimated $SAR_{BT(Body)}$= [10^(3/10)/10]*(√2.48)/7.5=0.042W/kg

	WWAN Band	Exposure Position	1	2	3	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)
			WWAN	2.4GHz WLAN	2.4GHz BT		
			SAR(W/kg)	SAR(W/kg)	SAR(W/kg)		
Head	GSM850	Right Cheek	0.146	0.262	0.084	0.408	0.230
		Right Tilted	0.104	0.2	0.084	0.304	0.188
		Left Cheek	0.218	0.316	0.084	0.534	0.302
		Left Tilted	0.111	0.265	0.084	0.376	0.195
	GSM1900	Right Cheek	0.175	0.262	0.084	0.437	0.259
		Right Tilted	0.121	0.2	0.084	0.321	0.205
		Left Cheek	0.299	0.316	0.084	0.615	0.383
		Left Tilted	0.141	0.265	0.084	0.406	0.225
	WCDMA Band V	Right Cheek	0.048	0.262	0.084	0.310	0.132
		Right Tilted	0.032	0.2	0.084	0.232	0.116
		Left Cheek	0.074	0.316	0.084	0.390	0.158
		Left Tilted	0.044	0.265	0.084	0.309	0.128
	WCDMA Band II	Right Cheek	0.329	0.262	0.084	0.591	0.413
		Right Tilted	0.144	0.2	0.084	0.344	0.228
		Left Cheek	0.383	0.316	0.084	0.699	0.467
		Left Tilted	0.178	0.265	0.084	0.443	0.262
	LTE Band 4	Right Cheek	0.112	0.262	0.084	0.374	0.196

		Right Tilted	0.075	0.2	0.084	0.275	0.159
		Left Cheek	0.172	0.316	0.084	0.488	0.256
		Left Tilted	0.096	0.265	0.084	0.361	0.180
Body (Hotspot)	GSM850	Front	0.379	0.06	0.042	0.439	0.421
		Back	0.687	0.094	0.042	0.781	0.729
		Left Side	0.102			0.102	0.102
		Right Side	0.095	0.029	0.042	0.124	0.137
		Top Side		0.039	0.042	0.039	0.042
		Bottom Side	0.138			0.138	0.138
	GSM1900	Front	0.504	0.06	0.042	0.564	0.546
		Back	0.832	0.094	0.042	0.926	0.874
		Left Side	0.145			0.145	0.145
		Right Side	0.123	0.029	0.042	0.152	0.165
		Top Side		0.039	0.042	0.039	0.042
		Bottom Side	0.334			0.334	0.334
	WCDMA Band V	Front	0.108	0.06	0.042	0.168	0.150
		Back	0.224	0.094	0.042	0.318	0.266
		Left Side	0.044			0.044	0.044
		Right Side	0.033	0.029	0.042	0.062	0.075
		Top Side		0.039	0.042	0.039	0.042
		Bottom Side	0.051			0.051	0.051
	WCDMA Band II	Front	0.304	0.06	0.042	0.364	0.346
		Back	0.592	0.094	0.042	0.686	0.634
		Left Side	0.1			0.100	0.100
		Right Side	0.081	0.029	0.042	0.110	0.123
		Top Side		0.039	0.042	0.039	0.042
		Bottom Side	0.14			0.140	0.140
	LTE Band 4	Front	0.279	0.06	0.042	0.339	0.321
		Back	0.586	0.094	0.042	0.680	0.628
		Left Side	0.096			0.096	0.096
		Right Side	0.069	0.029	0.042	0.098	0.111
		Top Side		0.039	0.042	0.039	0.042
		Bottom Side	0.127			0.127	0.127
Body (Body worn)	GSM850	Front	0.379	0.06	0.042	0.439	0.421
		Back	0.687	0.094	0.042	0.781	0.729
		Front - Headset					
		Back - Headset					
	GSM1900	Front	0.504	0.06	0.042	0.564	0.546
		Back	0.832	0.094	0.042	0.926	0.874
		Front - Headset					
		Back - Headset					
	WCDMA	Front	0.108	0.06	0.042	0.168	0.150

	Band V	Back	0.224	0.094	0.042	0.318	0.266
		Front - Headset					
		Back - Headset					
	WCDMA Band II	Front	0.304	0.06	0.042	0.364	0.346
		Back	0.592	0.094	0.042	0.686	0.634
		Front - Headset					
		Back - Headset					
	LTE Band 4	Front	0.279	0.06	0.042	0.339	0.321
		Back	0.586	0.094	0.042	0.680	0.628
		Front - Headset					
		Back - Headset					

12 700MHZ TO 3GHZ MEASUREMENT UNCERTAINTY

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in table below.

Uncertainty Distributions	Normal	Rectangluar	Triangular	U-Shape
Multi-plying Factor[(a)]	1/K[(b)]	1/√3	1/√6	1/√2

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity
(b) K is the coverage factor

Table 12 Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

No.	Description	Type	Uncertainty Value(%)	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	5.5	N	1	1	1	5.5	5.5	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	N	1	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
continue										
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						9.25	9.12	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						18.5	18.2	\

13 MAIN TEST INSTRUMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Signal Generator	Agilent	N5181A	MY50145187	2015-5-16	1year
2	RF Power Meter. Dual Channel	BOONTON	4232A	10539	2015-5-16	1year
3	Power Sensor	BOONTON	51011EMC	34236/34238	2015-5-16	1year
4	Wideband Radio Communication Tester	R&S	CMW500	1201.0002K50-140 822zk	2015-5-16	1year
5	Signal Analyzer	Agilent	N9010A	My53470879	2015-5-16	1year
6	Network Analyzer	Agilent	E5071C	MY46316645	2015-5-16	1year
7	E-Field Probe	SPEAG	EX3DV4	3970	2015-7-10	1year
8	DAE	SPEAG	DAE4	1418	2015-6-23	1year
9	Validation Kit 900MHz	SPEAG	D900V2	1d162	2014-1-14	2year
10	Validation Kit 1750MHz	SPEAG	D1750V2	1023	2014-6-17	2year
11	Validation Kit 1950MHz	SPEAG	D1950V3	1151	2014-1-10	2year
12	Validation Kit 2450MHz	SPEAG	D2450V2	927	2014-1-13	2year
13	Dual Directional Coupler	Agilent	EE393	TW5451008	2015-5-16	1year
14	10dB Attenuator	Mini-Circuits	15542	3 1344	2015-5-16	1year
15	10dB Attenuator	Mini-Circuits	15542	3 1415	2015-5-16	1year
16	30dB Attenuator	Mini-Circuits	15542	3 1420	2015-5-16	1year
17	Power Amplifier	MILMEGA	80RF1000-175	1059345	2015-5-16	1 Year
18	Power Amplifier	MILMEGA	AS0102-55	1018770	2015-5-16	1 Year
19	Power Amplifier	MILMEGA	AS1860-50	1059346	2015-5-16	1 Year
20	Power Meter	Agilent	N1918A	MY54180006	2015-5-16	1 Year
21	Twin SAM V5.0	SPEAG	QD 000 P40 CD	1794	N/A	N/A
22	Device Holder	SPEAG	N/A	N/A	N/A	N/A

END OF REPORT BODY