Certificate Number: 5055.02

TEST REPORT FOR SAR TESTING

Report No：SRTC2022-9004(F)-22010702(H)

Product Name: Feature Phone

Applicant: FCNT LIMITED

Manufacturer: FCNT LIMITED

Specification: Part 2.1093

IEEE Std 1528

KDB Procedures

FCC ID: 2AYY9FMP189

The State Radio_monitoring_center Testing Center (SRTC)

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1. GENERAL INFORMATION

1.1 Notes of the test report

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The test results relate only to individual items of the samples which have been tested.

The certification and accreditation identifiers used in this report shall not be applicable to the tested or calibrated samples thereof. The manufacturer shall not mark the tested samples or items (or a separate part of the item) with the identifiers of certification and accreditation to mislead relevant parties about the tested samples or items.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
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1.3 Applicant's details

Company:	FCNT LIMITED
Address:	Chuorinkan 7-10-1 Yamato, Kanagawa 2420007, Japan

1.4 Manufacturer's details

Company:	FCNT LIMITED
Address:	Chuorinkan 7-10-1 Yamato, Kanagawa 2420007, Japan

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2022.01.07
Testing Start Date:	2022.01.10
Testing End Date:	2021. 01.26

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	22	35

Normal Supply Voltage (Vdc.):	3.9V

2. DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipent Build Status

Wireless Technology and Frequency Bands	☒GSM Band: GSM850/1900 ☒WCDMA Band: FDD V ☒LTE Band: 5 ☐Wi-Fi Band: 2.4GHz/5GHz ☐BT/BLE
Mode	GSM ☒Voice (GMSK) ☒GPRS (GMSK) ☐EGPRS (GMSK/8PSK) WCDMA ☒UMTS Rel. 99 ☒HSDPA (Rel. 5) ☒HSUPA (Rel. 6) ☐HSPA+ (Rel. 7)(Downlink only) ☐DC-HSDPA (Rel. 8) LTE ☒QPSK ☒16QAM ☒64QAM Wi-Fi2.4GHz (802.11b/g/n/ax) ☐802.11b ☐802.11g ☐802.11n (20MHz/40MHz) ☐802.11ax (20MHz) Wi-Fi5GHz ☐802.11a ☐802.11n (20MHz/40MHz) ☐802.11ac (20MHz/40MHz/80MHz) ☐802.11ax (20MHz/40MHz/80MHz) Bluetooth ☐BR(GFSK) ☐EDR(π/4 DQPSK , 8-DPSK) ☐BLE(GFSK)
Duty Cycle*	GPRS/EDGE: 12.5% (1 Slot), 25% (2 Slots), 37.5% (3 Slots), 50% (4 Slots) WCDMA: 100% LTE(FDD): 100% LTE(TDD): 63.3% maximum
Multi-Slot Class for GPRS/EDGE	☐Class 8 - One Up ☐Class 10 - Two Up ☐Class 12 - Four Up ☒Class 33- Four Up
Mobile Phone Capability	☐Class A - Mobile phones can be connected to both GPRS and GSM services simultaneously. ☒Class B - Mobile phones can be attached to both GPRS and GSM services, using one service at a time. ☐Class C - Mobile phones are attached to either GPRS or GSM voice service. You need to switch manually between services
DTM	Not Supported

Note	For licensed cellular network duty cycle is inherent. For unlicensed network WLAN Duty cycle is depends on the data traffic, and the traffic allocation in operating mode could be the most conservative condition which with 100% duty cycle. SAR measurement also use non signalling mode, so the duty factor shall be taken into consideration.
H/W Version	V1.3.0
S/W Version	V00R008A
IMEI	IMEI1: 350712880003534 IMEI2: 350712880002734

2.2 Support Equipment

Equipment	Battery
Type	Li-Lon
Manufacturer	FCNT LIMITED
Model Number	CA54310-0076
Capacity	1680mAh 6.4Wh
Nominal Voltage	3.8V

3. REFERENCE SPECIFICATION

Specification	Version	Title
Part 2.1093	2021	Radio frequency radiation exposure evaluation: portable devices.
IEEE Std 1528	2013	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 447498 D01	v06	General RF Exposure Guidance
KDB 447498 D02	v02r01	SAR MEASUREMENT PROCEDURES FOR USB DONGLE TRANSMITTERS
KDB 648474 D04	v01r03	Handset SAR
KDB 941225 D01	v03r01	3G SAR Procedures
KDB 248227 D01	v02r02	SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS
KDB 865664 D01	v01r04	SAR Measurement from 100 MHz to 6 GHz
KDB 865664 D02	v01r02	RF Exposure Reporting
KDB 941225 D05	v02r05	SAR for LTE Devices

4. TEST CONDITIONS

4.1 Picture to demonstrate the required liquid depth

The liquid depth is large than 15cm in the used SAM phantoms in flat section, and the depth of the tissue simulant was 15.0 ± 0.5 cm measured from the ear reference point during system checking and device measurements.

Liquid depth for SAR Measurement

4.2 Test Signal, Frequencies and Output Power

The device was put into operation by using a call tester. Communication between the device and the call tester was established by air link.
The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.
In all operating bands the measurements were performed on middle channel, and few of them were also performed on lowest and highest channels.

4.3 SAR Measurement Set-up

The system is based on a high precision robot (working range greater than 0.9m), which positions the probes with a positional repeatability of better than ± 0.02mm. Special E-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit. A cell controller system contains the power supply, robot controller, teaches pendant (Joystick), and remote control, is used to drive the

robot motors.
The PC consists of the Micron Pentium IV computer with Win7 system and SAR Measurement Software DASY5 Professional, A/D interface card, monitor, mouse, and keyboard. The Stäubli 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. The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16bit 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.

4.4 Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin headed "SAM Phantom", manufactured by SPEAG. The phantom conforms to the requirements of IEEE 1528.
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.
The SPEAG device holder was used to position the device in all tests whilst a tripod was used to position the validation dipoles against the flat section of phantom.

4.5 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528. All tests were carried out using simulants whose dielectric parameters were within ± 10% below 3GHz and ± 5% above 3GHz of the recommended values when use DASY system according to KDB865664D01. All tests were carried out within 24 hours of measuring the dielectric parameters.

Tissue Stimulant Recipes	
Name	Broadband tissue-equivalent liquid
Type	HBBL600-6000V6 Simulating Liquid
Note: The stimulant could be the same for head and body.	

4.6 DESCRIPTION OF THE TEST PROCEDURE

4.6.1 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the Dasy system.

Device holder supplied by SPEAG

4.6.2 Test Exposure Conditions

4.6.2.1 Head Configuration

Measurements were made in “cheek” and “tilt” positions on both the left hand and right-hand sides of the phantom.
The positions used in the measurements were according to IEEE 1528 "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".

4.6.2.2 Body Worn Configuration

The device was placed in the SPEAG holder below the flat section of the phantom. The distance between the device and the phantom was kept at the separation distance using a separate flat spacer that was removed before the start of the measurements. And the distance is normally determined according to the actual scene which might be the worst use condition for general exposure. The device’s front and rear were oriented facing the phantom since these orientations give higher results for most regular portable devices.

4.6.2.3 Hotspot Configuration

Hotspot mode SAR is measured for all edges and surfaces of the device with a transmitting antenna located within 25 mm from that surface or edge; for the data modes, wireless technologies and frequency bands supporting hotspot mode.

4.6.3 Scan Procedure

First, area scans were used for determination of the field distribution and the approximate location of the local peak SAR values. The SAR distribution is scanned along the inside surface, at least for an area larger than the projection of the handset and antenna. The angle between the probe axis and the surface normal line is recommended but not required to be less than 30°. The SAR distribution is first measured on a 2-D coarse grid. The scan region should cover all areas that are exposed and encompassed by the projection of the handset. There are 15 mm × 15 mm (equal or less than 2GHz), 12 mm × 12 mm (from 2GHz~4GHz) and 10mm x 10mm (from 4GHz~6GHz) measurement grid used when two staggered one-dimensional cubic splines are used to estimate the maximum SAR location.
When the reported 1g-SAR estimated by area scan is less than 1.40 w/kg.
Zoom scan was performed by using the configuration mentioned below or more conservative scan area and step to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.
Below 3GHz：32mmX32mmX30mm scan area with 8 mm X8 mm X5 mm steps
2GHz-3GHz：32mmX32mmX30mm scan area with 8 mm X8 mm X5 mm steps
3GHz-4GHz：28mmX28mmX28mm scan area with 7 mm X7 mm X4 mm steps
4GHz-5GHz： 25mmX25mmX24mm scan area with 5 mm X5 mm X3 mm steps

5GHz-6GHz： 25mmX25mmX22mm scan area with 5 mm X5 mm X2 mm steps

4.6.4 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation.

The interpolation, extrapolation and maximum search routines within DASY5 are all based on the modified Quadratic Shepard's method (Robert J. Renka, Multivariate Interpolation of Large Sets of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).

The interpolation scheme combines a least-square fitted function method with a weighted average method. A triradiate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighboring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

5 RESULT SUMMARY

The maximum reported SAR values for all exposure conditions are given as follows. The device conforms to the requirements of the standard(s) when the maximum reported SAR value is less than or equal to the limit.

Standalone Transmission Summary					
Exposure Position	Frequency Band MAIN	SAR Result(W/kg)	Highest SAR Result(W/kg)	Limit(W/kg)	Verdict
Head	GSM850	0.50	0.59	1.60	Pass
	GSM1900	0.59			
	WCDMA Band V	0.53			
	LTE Band5	0.55			
Body-Worn	GSM850	0.77	1.09	1.60	Pass
	GSM1900	1.09			
	WCDMA Band V	0.98			
	LTE Band5	0.93			

This Test Report Is Approved by: Mr. Peng Zhen	Review by: Mr. Li Bin
Tested and issued by: Ms.Li Jin	Approved date: 2022/01/29

6 TEST RESULT

6.1 Measurement result

GSM Measurement result

Division Factors (for Measured Power and Frame Average Power):

To average the power, the division factor is as follows:

1TX-slot (1uplink) = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots(2uplink) = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots (3uplink) = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots (4uplink) = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

GSM850

TX Mode	TX slot	Burst Power (dBm)			Tuneup Tolerance (dBm)	Frame power(dBm)			Tuneup Tolerance (dBm)
		Frequency/Channel				Frequency/Channel			
		824.2	836.6	848.8		824.2	836.6	848.8	
		128	190	251		128	190	251	
GSM	1 Tx slot	32.39	32.78	33.05	33.50	23.36	23.75	24.02	24.50
GPRS/ EGPRS (GMSK)	1 Tx slot	32.42	32.75	32.98	33.50	23.39	23.72	23.95	24.00
	2 Tx slots	30.41	30.67	30.80	32.00	24.39	24.65	24.78	25.00
	3 Tx slots	28.36	28.80	28.90	30.50	24.10	24.54	24.64	25.00
	4 Tx slots	27.15	27.42	27.72	29.50	24.14	24.41	24.71	25.00

PCS 1900

TX Mode	TX slot	Burst Power (dBm)			Tuneup Tolerance (dBm)	Frame power(dBm)			Tuneup Tolerance (dBm)
		Frequency/Channel				Frequency/Channel			
		1850	1880	1910		1850	1880	1910	
		512	661	810		512	661	810	
GSM	1 Tx slot	29.18	29.21	29.12	29.50	20.15	20.18	20.09	20.50
GPRS/ EGPRS (GMSK)	1 Tx slot	29.00	29.10	29.04	29.50	19.97	20.07	20.01	20.50
	2 Tx slots	26.58	26.62	26.61	27.50	20.56	20.60	20.59	21.00
	3 Tx slots	24.78	24.77	24.71	26.50	20.52	20.51	20.45	21.00
	4 Tx slots	23.41	23.34	23.40	24.50	20.40	20.33	20.39	20.50

According to the frame average conducted power as above, the SAR measurements are performed with 2**Tx slots (2 uplink 3Downlink)** of GPRS850 and 2**Tx slots (2 uplink 3Downlink)** of GPRS1900.

WCDMA Measurement result

Release 99

The following procedures are according to FCC KDB Publication 941225 D01.

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 1
	RMC mode AMR mode	12.2kbps RMC 12.2kbps RMC in 3.4 kbps SRB
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Release 5

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	CM(dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15(3)	15/15(3)	64	12/15(3)	24/15	1.0
3	15/15	8/15	64	15/18	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

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

Note2:CM=1 for β_c/β_d=12/15, β_{hs}/β_c=24/15.

Note3: For subtest 2 the β_c/β_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(TF1,TF1) to β_c=11/15 and β_d=15/15.

Release 6

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121.

Sub-test	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	2.0	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	2.0	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	2.0	21	81

Note1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} =8⇔A_{hs}=β_{hs}/β_c=30/15⇔β_{hs}=30/15*β_c.

Note2: CM=1 for β_c/β_d =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.

Note3: For subtest 1 the β_c/β_d 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 β_c=10/15 and β_d=15/15.

Note4: For subtest 5 the β_c/β_d 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 β_c=14/15 and β_d=15/15.

NOTE5: Testing UE using E-DPDCH Physical layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.

NOTE6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Release 7

The following 1 Sub-test was completed according to Release 7 procedures in section 5.2 of 3GPP TS34.121.

Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).

Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.

Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

Release 8

Table E.5.0: Levels for HSDPA connection setup

Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH _Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Proces ses	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

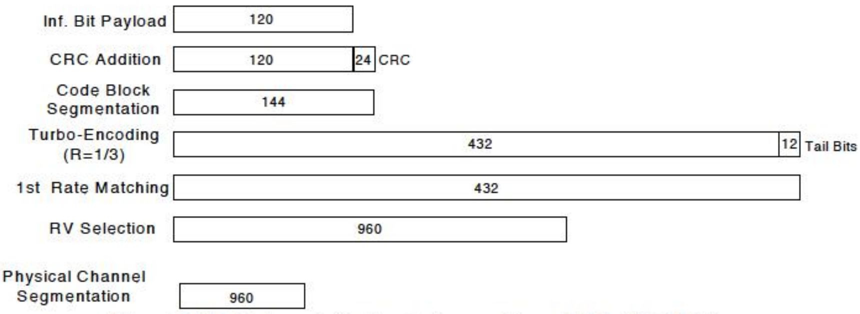


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

The following 4 Sub-tests for HSDPA were completed according to Release 8 procedures in section 5.2 of 3GPP TS34.121.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	CM(dB) (2)
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 (3)	15/15 (3)	64	12/15 (3)	24/15	1.0
3	15/15	8/15	64	15/18	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

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

Note2:CM=1 for $\beta_c/\beta_d=12/15$, $\beta_{hs}/\beta_c=24/15$.

Note3: For subtest 2 the β_c/β_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(TF1,TF1) to $\beta_c=11/15$ and $\beta_d=15/15$.

WCDMA

WCDMA band V

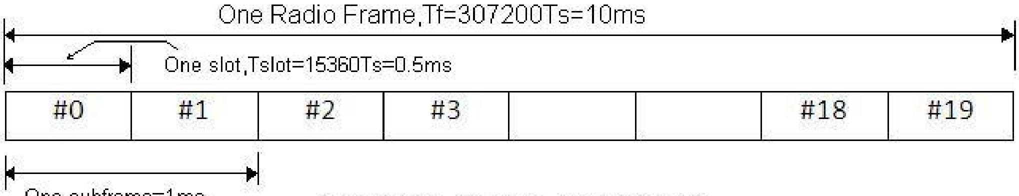
Mode		RF Output Power(dBm)			Tuneup Tolerance (dBm)
		4132	4183	4233	
		826.4	836.6	846.6	
Release 99	RMC,12.2kbps	23.43	23.64	23.51	24.0
HSDPA	Subtest1	22.01	22.16	22.09	23.0
	Subtest2	22.02	22.22	22.21	23.0
	Subtest3	21.40	21.66	21.60	22.5
	Subtest4	21.48	21.64	21.67	22.5
HSUPA	Subtest1	21.34	22.10	21.52	23.0
	Subtest2	20.72	20.69	20.91	21.0
	Subtest3	20.63	21.19	20.82	22.0
	Subtest4	20.84	20.98	20.13	21.0
	Subtest5	21.97	22.14	22.18	23.0

Note: UMTS SAR was tested under Rel.99 RMC 12.2kbps mode per KDB Publication 941225 D01.for other higher release configuration, SAR was not required since any average output power was not more than 0.25 dB higher than the RMC level.

LTE Measurement result

General description:

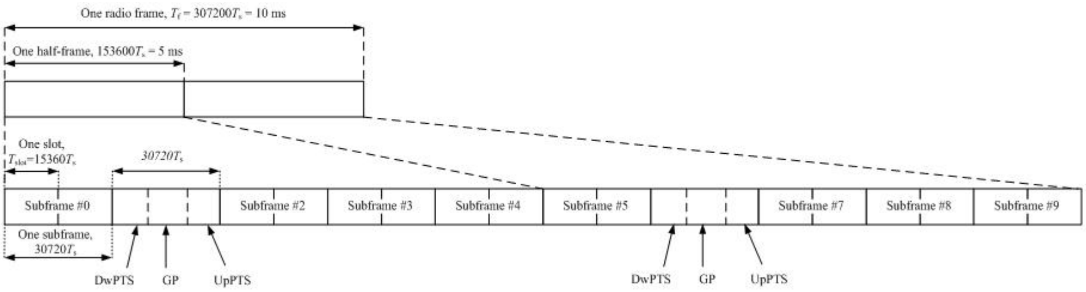
FDD-LTE frame structure

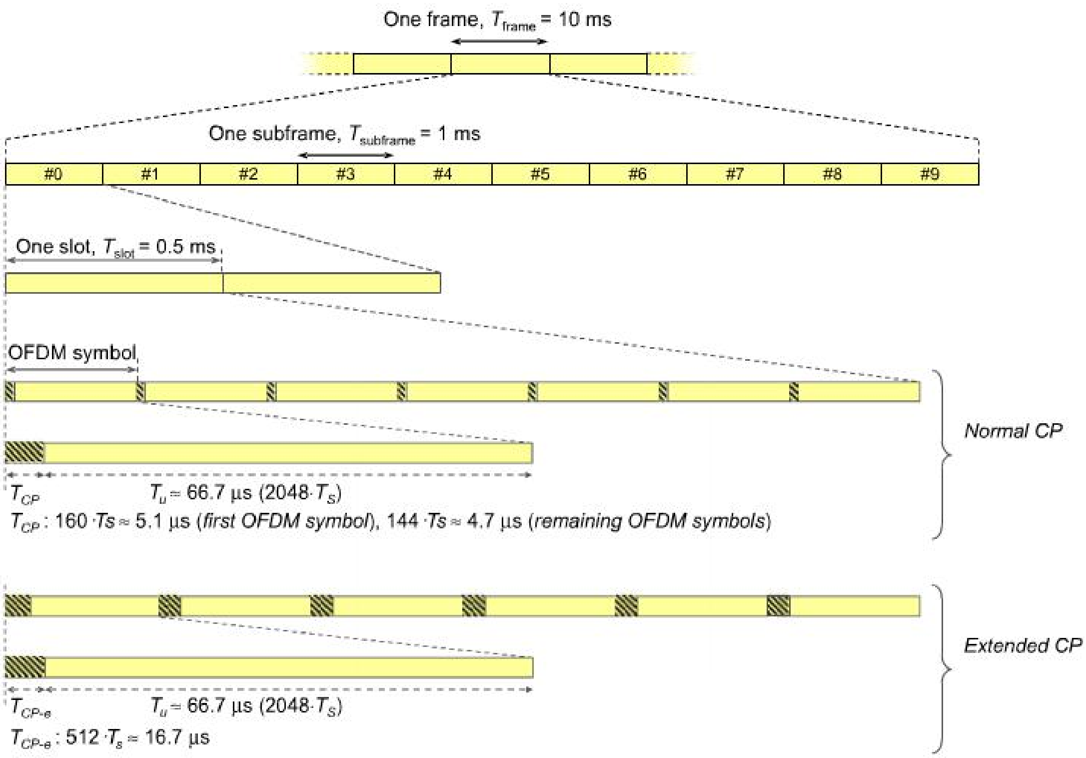


LTE-Frame-structure, FDD, Type-1

Type 1 is used as LTE FDD frame structure. As shown in the figure above, an LTE TDD frame is made of total 20 slots, each of 0.5ms. Two consecutive time slots will form one subframe. 10 such subframes form one radio frame. One subframe duration is about 1 ms.and the duty cycle is inherent as100%

TDD-LTE frame structure





Uplink-downlink configuration

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Special sub-frame configuration

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			-	-	-
8	$24144 \cdot T_s$			-	-	-

Special sub-frame with cyclic prefix uplink

Special sub-frame configuration		Duty factor with normal cyclic prefix in uplink	Duty factor with extended cyclic prefix in uplink
Normal cyclic prefix in downlink	0~4	7.13%	8.33%
	5~9	14.3%	16.7%
Extended cyclic prefix in downlink	0~3	7.13%	8.33%
	4~7	14.3%	16.7%

So we perform SAR test with maximum duty factor equal to 63.3% by using uplink-downlink configuration 0.

Note: One sub-frame is 30720Ts=1ms, when UpPTS(uplink) in special sub-frame with extended cyclic prefix, duty factor = 5120/30720=0.167.There are 5 sub-frames in half frame(3up link),so the final duty factor is (30720*3+5120)/(30720*5)=63.3% which we used to evaluate the SAR compliance (worst case)

LTE Band 5

BW	Modulation	RB Size	RB Offset	Conducted power(dBm)			
				20407	20525	20643	Tune-up
				824.7	836.5	848.3	Tolerance
1.4	QPSK	1	0	23.36	23.45	23.16	24.0
		1	3	23.46	23.39	23.31	24.0
		1	5	23.28	23.23	23.33	24.0
		3	0	23.44	23.17	23.23	23.5
		3	1	23.50	23.29	23.30	23.5
		3	3	23.25	23.20	23.28	23.5
		6	0	22.32	22.26	22.10	22.5
	16QAM	1	0	21.90	22.21	22.12	22.5
		1	3	22.04	22.50	22.20	22.5
		1	5	22.12	22.51	22.34	23.0
		3	0	22.12	21.84	22.01	22.5
		3	1	22.48	22.27	22.00	22.5
		3	3	22.28	22.16	22.00	22.5
		6	0	21.07	21.24	21.07	21.5
	64QAM	1	0	22.51	22.55	22.03	23.0
		1	3	22.51	22.62	22.47	23.0
		1	5	22.30	22.54	22.35	23.0
		3	0	22.76	22.08	22.11	23.0
		3	1	22.25	22.12	22.38	22.5
		3	3	22.65	22.22	22.17	23.0
		6	0	21.00	21.30	20.81	21.5

BW	Modulation	RB Size	RB Offset	Conducted power(dBm)			
				20415	20525	20635	Tune-up Tolerance
				825.5	836.5	847.5	
3	QPSK	1	0	23.19	23.05	23.34	24.0
		1	8	23.29	23.16	23.38	24.0
		1	14	22.98	23.10	23.36	24.0
		8	0	22.31	22.13	22.21	22.5
		8	4	22.13	22.31	22.15	22.5
		8	7	22.07	22.30	22.12	22.5
		15	0	22.28	22.17	22.14	22.5
	16QAM	1	0	22.99	22.25	22.35	23.0
		1	8	23.01	22.45	22.29	23.5
		1	14	22.54	22.77	22.29	23.0
		8	0	21.18	21.07	20.92	21.5
		8	4	21.06	21.16	21.05	21.5
		8	7	21.05	21.14	21.14	21.5
		15	0	21.32	21.19	20.96	21.5
	64QAM	1	0	22.55	22.31	22.06	23.0
		1	8	22.81	22.40	22.20	23.0
		1	14	22.31	22.32	22.19	22.5
		8	0	21.65	21.12	21.05	22.0
		8	4	21.50	21.22	21.09	21.5
		8	7	21.04	21.19	21.07	21.5
		15	0	20.88	21.20	21.05	21.5

BW	Modulation	RB Size	RB Offset	Conducted power(dBm)			
				20425	20525	20625	Tune-up Tolerance
				826.5	836.5	846.5	
5	QPSK	1	0	23.28	23.02	22.76	24.0
		1	12	23.10	23.32	23.10	24.0
		1	24	22.98	22.90	22.89	24.0
		12	0	22.12	22.07	22.11	22.5
		12	7	22.05	22.25	22.27	22.5
		12	13	21.95	22.22	22.19	22.5
		25	0	22.09	22.26	22.20	22.5
	16QAM	1	0	22.32	21.77	21.69	22.5
		1	12	22.22	22.23	22.47	22.5
		1	24	21.85	21.89	22.25	22.5
		12	0	20.89	21.04	21.06	21.5
		12	7	20.93	21.23	21.23	21.5
		12	13	20.94	21.08	21.15	21.5
		25	0	21.02	21.14	20.97	21.5
	64QAM	1	0	22.09	21.58	22.26	22.5
		1	12	21.99	22.24	22.52	23.0
		1	24	21.60	21.70	22.39	22.5
		12	0	21.07	20.90	21.03	21.5
		12	7	21.00	21.22	21.20	21.5
		12	13	21.01	21.07	21.13	21.5
		25	0	21.20	21.15	21.06	21.5

BW	Modulation	RB Size	RB Offset	Conducted power(dBm)			
				20450	20525	20600	Tune-up Tolerance
				829	836.5	844	
10	QPSK	1	0	23.79	23.92	23.77	24.0
		1	25	23.59	23.62	23.47	24.0
		1	49	22.97	22.94	23.06	24.0
		25	0	22.12	22.00	22.15	22.5
		25	12	22.06	22.22	22.20	22.5
		25	25	22.12	22.07	22.09	22.5
		50	0	22.16	22.09	22.13	22.5
	16QAM	1	0	22.30	23.03	22.50	23.5
		1	25	21.76	23.59	22.56	24.0
		1	49	22.22	21.82	22.34	22.5
		25	0	21.12	21.20	21.07	21.5
		25	12	21.06	21.33	21.03	21.5
		25	25	21.03	21.11	21.01	21.5
		50	0	21.18	21.11	21.02	21.5
	64QAM	1	0	21.69	22.38	22.63	23.0
		1	25	22.02	22.76	22.50	23.0
		1	49	21.71	22.37	22.46	22.5
		25	0	21.12	21.01	21.27	21.5
		25	12	21.17	21.25	21.22	21.5
		25	25	21.03	21.01	21.10	21.5
		50	0	21.05	21.09	21.23	21.5

6.2 Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

Mothod1:

According to the KDB447498 4.3.1 (1)

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f (GHz)] ≤ 3.0 for 1-g SAR, where

- ·f(GHz) is the RF channel transmit frequency in GHz
- ·Power and distance are rounded to the nearest mW and mm before calculation
- ·The result is rounded to one decimal place for comparison

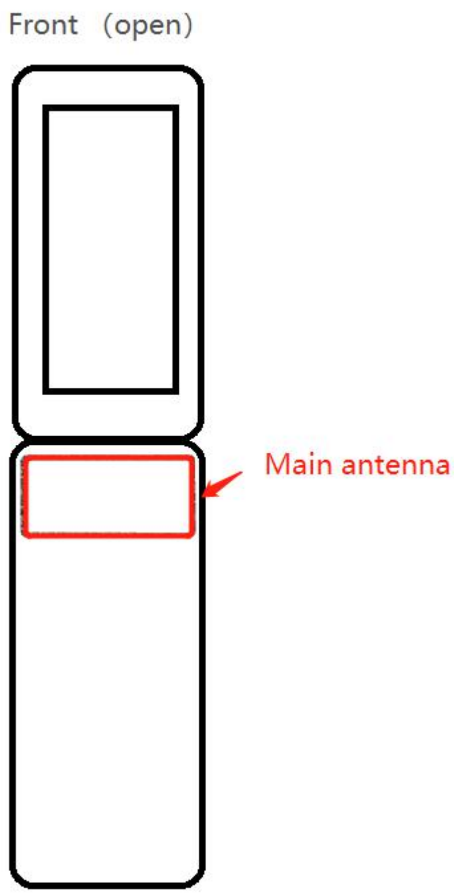
The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

This is equivalent to [(max. power of channel, including tune-up tolerance, mW)/(60/√f(GHz) mW)] ·[20 mm/(min.test separation distance, mm)] ≤ 1.0 for 1-g SAR; also see Appendix A for approximate exclusion threshold values at selected frequencies and distances.

Note: Anyway, We evaluated SAR for BT/WIFI,so there is no need to consider this part.

6.3 RF exposure conditions

Refer to the follow picture “Antenna information” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.



All of Implementation antenna

Main Antenna(TX):

GSM 850/1900 WCDMA BandV LTE Band 5

Considered the separation distance between antennas to sides, Position listed as below shall be evaluated.

2/3/4G SAR Head test Position: Left Cheek, Left Tilt, Right Cheek, Right Tilt

Main antenna: SAR Body test Position: back, front

6.4 System Checking

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. For the measurement of the following parameters the SPEAG DAKS-3.5 dielectric parameter probe is used, representing the open-ended coaxial probe measurement procedure.

Freq.(MHz)	Liquid parameters	measured	Target	Delta (%)	Tolerance (%)	Verdict
835	εr	42.99	41.50	3.58	±10	Pass
	σ[S/m]	0.93	0.90	2.78	±10	Pass
1800	εr	39.31	40.00	-1.72	±10	Pass
	σ[S/m]	1.40	1.40	-0.29	±10	Pass
2000	εr	41.31	40.00	3.28	±10	Pass
	σ[S/m]	1.47	1.40	4.79	±10	Pass

Note: For DASY system, the conservative tolerance 5% could expand to 10% when the frequency under 3GHz

A system check measurement was made following once the determination of the dielectric parameters of the simulant, using the dipole validation kit. The system checking results (dielectric parameters and SAR values) are given in the table below.

Date	Freq. (MHz)	SAR measured (normalized to 1W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
2022.01.12	835	1g	9.28	9.38	-1.07	±10
2022.01.13	1800	1g	40.00	38.9	2.83	±10
2022.01.14	2000	1g	42.56	41.0	3.80	±10

6.5 SAR TEST RESULT

In order to determine the largest value of the peak spatial-average SAR of a handset, all device positions, configurations, and operational modes should be tested for each frequency band according to Steps 1 to 3 below.

Step 1: The tests should be performed at the channel that is closest to the center of the transmit frequency band.

a) All device positions (cheek and tilt, for both left and right sides of the SAM phantom),

b) All configurations for each device position in a), e.g., antenna extended and retracted, and

c) All operational modes for each device position in item a) and configuration in item b) in each frequency band, e.g., analog and digital, If more than three frequencies need to be tested (i.e., Nc > 3), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing the highest peak spatial-average SAR determined in Step 1 for each frequency, perform all tests at all other test frequency channels, e.g., lowest and highest frequencies. In addition, for all other conditions (device position, configuration, and operational mode) where the peak spatial-average SAR value determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies should be tested as well.

Step 3: Examine all data to determine the largest value of the peak.

Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

Scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.

Duty Factor = 1 / Duty Cycle(%)

For cellular network:

Reported SAR (W/kg) = Measured SAR (W/kg) * Scaling Factor

For WLAN

Reported SAR (W/kg) = Measured SAR (W/kg) * Scaling Factor*Duty factor

2. Per KDB 447498 D01v06, for each exposure position, if the highest output channel reported SAR ≤0.8W/kg, other channels SAR testing are not necessary.

3. The distance between the EUT and the phantom bottom is 5mm.

The measured and reported Head/body SAR values for the test device are tabulated below:

Mode: GSM 850

fL(MHz)=824.2MHz fM(MHz)=836.5MHz fH(MHz)= 848.8MHz

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test case				Meas power(dBm)	Tune-up(dBm)	Scaling factor	Meas SAR(w/kg)		Report SAR(w/kg)	
GSM850	Exposure condition	Position	Channel				First	Second	First	Second
GPRS/EDGE GMSK	Head	Left Cheek	L	30.41	32.00	1.44	---	---	---	---
			M	30.67	32.00	1.36	0.368	---	0.500	---
			H	30.80	32.00	1.32	---	---	---	---
		Left tilt	L	30.41	32.00	1.44	---	---	---	---
			M	30.67	32.00	1.36	0.150	---	0.204	---
			H	30.80	32.00	1.32	---	---	---	---
		Right Cheek	L	30.41	32.00	1.44	---	---	---	---
			M	30.67	32.00	1.36	0.301	---	0.409	---
			H	30.80	32.00	1.32	---	---	---	---
		Right tilt	L	30.41	32.00	1.44	---	---	---	---
			M	30.67	32.00	1.36	0.132	---	0.180	---
			H	30.80	32.00	1.32	---	---	---	---
GPRS/EDGE GMSK	Body-worn	Back	L	30.41	32.00	1.44	---	---	---	---
			M	30.67	32.00	1.36	0.565	---	0.768	---
			H	30.80	32.00	1.32	---	---	---	---
		Front	L	30.41	32.00	1.44	---	---	---	---
			M	30.67	32.00	1.36	0.195	---	0.265	---
			H	30.80	32.00	1.32	---	---	---	---

Mode: GSM 1900

fL (MHz)=1850.2MHz fM (MHz)=1880.0MHz fH (MHz)=1909.8MHz

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test case				Meas power(dBm)	Tune-up(dBm)	Scaling factor	Meas SAR(w/kg)		Report SAR(w/kg)	
GSM1900	Exposure condition	Position	Channel				First	Second	First	Second
GPRS/EDGE GMSK	Head	Left Cheek	L	26.58	27.50	1.24	---	---	---	---
			M	26.62	27.50	1.22	0.487	---	0.594	---
			H	26.61	27.50	1.23	---	---	---	---
		Left tilt	L	26.58	27.50	1.24	---	---	---	---
			M	26.62	27.50	1.22	0.161	---	0.196	---
			H	26.61	27.50	1.23	---	---	---	---
		Right Cheek	L	26.58	27.50	1.24	---	---	---	---
			M	26.62	27.50	1.22	0.425	---	0.519	---
			H	26.61	27.50	1.23	---	---	---	---
		Right tilt	L	26.58	27.50	1.24	---	---	---	---
			M	26.62	27.50	1.22	0.138	---	0.168	---
			H	26.61	27.50	1.23	---	---	---	---
GPRS/EDGE GMSK	Body-worn	Back	L	26.58	27.50	1.24	0.875	0.874	1.085	1.084
			M	26.62	27.50	1.22	0.896	0.895	1.093	1.092
			H	26.61	27.50	1.23	0.890	0.890	1.095	1.095
		Front	L	26.58	27.50	1.24	---	---	---	---
			M	26.62	27.50	1.22	0.543	---	0.662	---
			H	26.61	27.50	1.23	---	---	---	---

Mode: WCDMA BAND V

fL (MHz)=826.4MHz fM (MHz)=836.6MHz fH (MHz)= 846.6MHz

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test case				Meas power(dBm)	Tune-up(dBm)	Scaling factor	Meas SAR(w/kg)		Report SAR(w/kg)	
WCDMA V	Exposure condition	Position	Channel				First	Second	First	Second
RMC	Head	Left Cheek	L	23.43	24.00	1.14	---	---	---	---
			M	23.64	24.00	1.09	0.490	---	0.534	---
			H	23.51	24.00	1.12	---	---	---	---
		Left tilt	L	23.43	24.00	1.14	---	---	---	---
			M	23.64	24.00	1.09	0.263	---	0.287	---
			H	23.51	24.00	1.12	---	---	---	---
		Right Cheek	L	23.43	24.00	1.14	---	---	---	---
			M	23.64	24.00	1.09	0.378	---	0.412	---
			H	23.51	24.00	1.12	---	---	---	---
		Right tilt	L	23.43	24.00	1.14	---	---	---	---
			M	23.64	24.00	1.09	0.212	---	0.231	---
			H	23.51	24.00	1.12	---	---	---	---
RMC	Body-worn	Back	L	23.43	24.00	1.14	0.852	0.853	0.971	0.972
			M	23.64	24.00	1.09	0.903	0.902	0.984	0.983
			H	23.51	24.00	1.12	0.876	0.874	0.981	0.979
		Front	L	23.43	24.00	1.14	---	---	---	---
			M	23.64	24.00	1.09	0.335	---	0.365	---
			H	23.51	24.00	1.12	---	---	---	---

Mode: LTE Band 5

fL (MHz)=829 MHz fM (MHz)=836.5MHz fH (MHz)= 844MHz

Limit of SAR (W/kg) : <1.6W/kg (1g Average)

Test case				Meas power(dBm)	Tune-up(dBm)	Scaling factor	Meas SAR(w/kg)		Report SAR(w/kg)	
LTE5	Exposure condition	Position	Channel				First	Second	First	Second
QPSK 1RB	Head	Left Cheek	L	23.79	24.00	1.05	---	---	---	---
			M	23.92	24.00	1.02	0.538	---	0.549	---
			H	23.77	24.00	1.05	---	---	---	---
		Left tilt	L	23.79	24.00	1.05	---	---	---	---
			M	23.92	24.00	1.02	0.257	---	0.262	---
			H	23.77	24.00	1.05	---	---	---	---
		Right Cheek	L	23.79	24.00	1.05	---	---	---	---
			M	23.92	24.00	1.02	0.409	---	0.417	---
			H	23.77	24.00	1.05	---	---	---	---
		Right tilt	L	23.79	24.00	1.05	---	---	---	---
			M	23.92	24.00	1.02	0.191	---	0.195	---
			H	23.77	24.00	1.05	---	---	---	---
QPSK 1RB	Body-worn	Back	L	23.79	24.00	1.05	0.882	0.881	0.926	0.925
			M	23.92	24.00	1.02	0.914	0.912	0.932	0.930
			H	23.77	24.00	1.05	0.880	0.878	0.924	0.922
		Front	L	23.79	24.00	1.05	---	---	---	---
			M	23.92	24.00	1.02	0.338	---	0.345	---
			H	23.77	24.00	1.05	---	---	---	---

6.6 SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

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

2) When the original highest measured SAR is ≥ 0.80 W/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 (~ 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 and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

7 MEASUREMENT UNCERTAINTY

(0.3 - 3 GHz range)

Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±6.0 %	N	1	1	1	±6.0 %	±6.0 %	∞
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	$\sqrt{3}$	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Modulation Response^m	±2.4 %	R	$\sqrt{3}$	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.4 %	R	$\sqrt{3}$	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Max. SAR Eval.	±2.0 %	R	$\sqrt{3}$	1	1	±1.2 %	±1.2 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %	∞
Power Scaling^p	±0 %	R	$\sqrt{3}$	1	1	±0.0 %	±0.0 %	∞
Phantom and Setup								
Phantom Uncertainty	±6.1 %	R	$\sqrt{3}$	1	1	±3.5 %	±3.5 %	∞
SAR correction	±1.9 %	R	$\sqrt{3}$	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.)^{DAK}	±2.5 %	R	$\sqrt{3}$	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.) ^{DAK}	±2.5 %	R	$\sqrt{3}$	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity ^{BB}	±3.4 %	R	$\sqrt{3}$	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity ^{BB}	±0.4 %	R	$\sqrt{3}$	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±11.2 %	±11.1 %	361
Expanded STD Uncertainty						**±22.3 %**	**±22.2 %**	

(3 - 6 GHz range)

Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±6.55 %	N	1	1	1	±6.55 %	±6.55 %	∞
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	$\sqrt{3}$	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±2.0 %	R	$\sqrt{3}$	1	1	±1.2 %	±1.2 %	∞
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Modulation Response^m	±2.4 %	R	$\sqrt{3}$	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Probe Positioning	±6.7 %	R	$\sqrt{3}$	1	1	±3.9 %	±3.9 %	∞
Max. SAR Eval.	±4.0 %	R	$\sqrt{3}$	1	1	±2.3 %	±2.3 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %	∞
Power Scaling^p	±0 %	R	$\sqrt{3}$	1	1	±0.0 %	±0.0 %	∞
Phantom and Setup								
Phantom Uncertainty	±6.6 %	R	$\sqrt{3}$	1	1	±3.8 %	±3.8 %	∞
SAR correction	±1.9 %	R	$\sqrt{3}$	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.)^{DAK}	±2.5 %	R	$\sqrt{3}$	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.)^{DAK}	±2.5 %	R	$\sqrt{3}$	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity^{BB}	±3.4 %	R	$\sqrt{3}$	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity^{BB}	±0.4 %	R	$\sqrt{3}$	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±12.3 %	±12.2 %	748
Expanded STD Uncertainty						**±24.6 %**	**±24.5 %**	

8 TEST EQUIPMENTS

The measurements were performed using an automated near-field scanning system, DASY5, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements was the 'advanced extrapolation' algorithm.

The following table lists calibration dates of SPEAG components:

Test Equipment	Model	Serial Number	Calibration date	Calibration Due data
DAE	DAE4	546	2021.08.25	2022.08.24
DAE	DAE4	720	2021.10.08	2022.10.07
Dosimetric E-field Probe	EX3DV4	3708	2021.10.20	2022.10.19
Dosimetric E-field Probe	ES3DV3	3127	2021.08.27	2022.08.26
Dipole Validation Kit	D750V3	1101	2020.10.16	2023.10.15
Dipole Validation Kit	D835V2	4d023	2020.10.16	2023.10.15
Dipole Validation Kit	D900V2	171	2020.09.17	2023.09.16
Dipole Validation Kit	D1800V2	2d084	2020.09.18	2023.09.17
Dipole Validation Kit	D2000V2	1009	2020.10.14	2023.10.13
Dipole Validation Kit	D2450V2	738	2020.10.13	2023.10.12
Dipole Validation Kit	D2600V2	1166	2019.11.08	2022.11.07
Dipole Validation Kit	D5GHzV2	1079	2020.10.10	2023.10.09

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration date	Calibration Due data
Signal Generator	E4428C	MY45280865	2021.08.20	2022.08.19
Signal Generator	SML 03	103514	2021.08.20	2022.08.19
Power meter	E4417A	MY45101182	2021.08.20	2022.08.19
Power meter	E4417A	MY45101004	2021.08.20	2022.08.19
Power Sensor	E4412A	MY41502214	2021.08.20	2022.08.19
Power Sensor	E4412A	MY41502130	2021.08.20	2022.08.19
Power Sensor	E9300B	MY41496001	2021.08.20	2022.08.19
Power Sensor	E9300B	MY41496003	2021.08.20	2022.08.19
Communication Tester	E5515C	MY48367401	2021.08.20	2022.08.19
Communication Tester	CMW500	161702	2021.08.20	2022.08.19
Communication Tester	MT8820C	6201300660	2021.08.20	2022.08.19
Communication Tester	MT8821C	6201547819	2021.08.20	2022.08.19
Vector Network Analyzer	E5071C	MY43030474	2021.08.20	2022.08.19
Calibration Kit	85054D	MY39200751	2021.08.20	2022.08.19

Detailed information of Isotropic E-field Probe Type EX3DV4

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Calibration certificate in Appendix C
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Optical Surface Detection	± 0.3 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Dynamic Range	10 μW/g to > 100 W/kg Linearity: ± 0.2 dB (noise: typically < 1 μW/g)
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

According to KDB 865664 D01 section 3.2.2, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the **SAR target**, **impedance** and **return loss** of a dipole have remain stable according to the following requirements.

1) The test laboratory must ensure that the required supporting information and documentation are included in the SAR report to qualify for the three-year extended calibration interval; otherwise, the IEEE Std 1528-2013 recommended annual calibration applies.
2) Immediate re-calibration is required for the following conditions.
a) After a dipole is damaged and properly repaired to meet required specifications.
b) When the measured SAR deviates from the calibrated SAR value by more than 10% due to changes in physical, mechanical, electrical or other relevant dipole conditions; i.e., the error is not introduced by incorrect measurement procedures or other issues relating to the SAR measurement system.
c) When the most recent return-loss result, measured at least annually, deviates by more than 20% from the previous measurement (i.e. value in dB×0.2) or not meeting the required 20 dB minimum return-loss requirement.
d) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, deviates by more than 5 Ω from the previous measurement

Dipole

SAR target

Refers to system check, measured SAR (1g and 10g) deviates from the Target SAR value of calibration report within 10%.

Impedance and Return loss measured by Network analyzer

The most recent measurement of the real or imaginary parts of the impedance deviates within 5 Ω from the previous measurement. (Data from the last calibration report)

The most recent return-loss result deviates within 20% from the previous measurement. (Data from the last calibration report)

Dipole450 TSL Parameters		
Parameters	Measured data	Target (Ref. Value)
Impedance	59.1Ω+0.06jΩ	55.5Ω+6.40jΩ
Return loss	-21.6 dB	-21.9 dB

Dipole750 TSL Parameters		
Parameters	Measured data	Target (Ref. Value)
Impedance	53.8Ω-4.02jΩ	53.7Ω-1.63jΩ
Return loss	-25.5 dB	-28.2dB

Dipole835 TSL Parameters		
Parameters	Measured data	Target (Ref. Value)
Impedance	54.5Ω-6.16jΩ	52.6Ω-2.37jΩ
Return loss	-34.1 dB	-29.3dB

Dipole900 TSL Parameters		
Parameters	Measured data	Target (Ref. Value)
Impedance	53.0Ω-5.24jΩ	49.1Ω-6.69jΩ
Return loss	-23.2 dB	-23.4dB

Dipole1450 TSL Parameters		
Parameters	Measured data	Target (Ref. Value)
Impedance	54.7Ω+3.95jΩ	52.4Ω-1.35jΩ
Return loss	-33.1 dB	-31.5dB

Dipole1800 TSL Parameters		
Parameters	Measured data	Target (Ref. Value)
Impedance	44.2Ω+5.06jΩ	48.9Ω-2.71jΩ
Return loss	-31.8 dB	-30.6dB

Dipole2000 TSL Parameters		
Parameters	Measured data	Target (Ref. Value)
Impedance	51.9Ω-3.37jΩ	49.4Ω-2.46jΩ
Return loss	-28.4 dB	-31.9dB