TESTING (OR CALIBRATION)
NVLAP LAB CODE 600141-0

Registration
No.788871

TEST REPORT
FOR SAR TESTING

Report No.: SRTC2019-9004(F)- 19080201(H)

Product Name: Fi Smart Collar

Product Model: FC1

Applicant: Barking Labs Corp.

Manufacturer: Barking Labs Corp.

Specification: Part 2.1093

IEEE Std 1528

KDB Procedures

FCC ID: 2ARXN-FC1

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30 Shixing Street, Shijingshan District, Beijing, P.R. China

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1 GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).
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)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, Beijing P.R. China
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1.3 Applicant's details

Company:	Barking Labs Corp.
Address:	53 Bridge St., Suite 103
City:	Brooklyn, NY
Country or Region:	USA
Contacted person:	Bob Blake
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Fax:	---
Email:	bob@tryfi.com

1.4 Manufacturer's details

Company:	Barking Labs Corp.
Address:	53 Bridge St., Suite 103
City:	Brooklyn, NY
Country or Region:	USA
Contacted person:	Bob Blake
Tel:	+1-914-249-9347
Fax:	---
Email:	bob@tryfi.com

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2019.08.02
Testing Start Date:	2019.08.10
Testing End Date:	2019.08.12

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	21~23	30~33

Normal Supply Voltage (V d.c.):	3.8

2.1 Final equipment build status

Wireless Technology and Frequency Bands	☐GSM Band: GSM900/DCS1800 ☐WCDMA Band: 1/8 ☒Cat.M: Band 2/4/12 ☐Bluetooth Band: 2.4GHz~2.4835GHz ☐Wi-Fi Band: 2.4GHz~2.4835GHz
Mode	GSM ☐Voice (GMSK) ☐GPRS (GMSK) ☐EGPRS (GMSK) WCDMA ☐UMTS Rel. 99 (Voice & Data) ☐HSDPA (Rel. 5) ☐HSUPA (Rel. 6) ☐HSPA+ (Rel.7) ☐DC-HSDPA (Rel.8) Wi-Fi (802.11a/b/g/n) ☐802.11a ☐802.11b ☐802.11g ☐802.11n (20MHz) ☐802.11n (40MHz) Bluetooth ☐BR(GFSK) ☐EDR (π/4 DQPSK, 8-DPSK) ☐BLE(GFSK) LTE ☐QPSK ☐16QAM ☐64QAM
Duty Cycle	GSM Voice: 12.5%; GPRS: 12.5% (1 Slot), 25% (2 Slots), 37.5% (3 Slots), 50% (4 Slots) WCDMA: 100% Wi-Fi 802.11b/g/n: 100% Bluetooth: 32.25% (DH1), 66.68% (DH3), 77.52% (DH5)
GPRS Multi-Slot Class	☐Class 8 - One Up ☐Class 10 - Two Up ☐Class 12 - 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 (Dual Transfer Mode)	Not Supported

2.2 Support equipment

The following support equipment was used to exercise the EUT during testing:

Batteries	JKIT/Li-Lon
H/W Version	Rev.B
S/W Version	v1.0
IMEI	357812093107545
Notes	The relevant tests have been performed in order to verify in which combination case the EUT would have the worst features.

3 REFERENCE SPECIFICATION

Specification	Version	Title
Part 2.1093	2018	Radiofrequency 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
IEEE Std 1528a	2005	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques Amendment 1: CAD File for Human Head Model (SAM Phantom)
KDB 447498 D01	v06	General RF Exposure Guidance
KDB 648474 D04	v01r03	Handset SAR
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 in the used SAM phantoms

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 lowest, middle 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- probe 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 16-bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines.
The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection
The robot uses its own controller with a built in VME-bus computer.

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 EN 62209-1 & 2.
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 (see Section 4.6.1) 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 EN 62209-1 & 2. All tests were carried out using simulants whose dielectric parameters were within ± 5% of the recommended values. All tests were carried out within 24 hours of measuring the dielectric parameters.
The depth of the tissue simulant was 15.0 ± 0.5 cm measured from the ear reference point during system checking and device measurements.
The following tissue stimulants were used for Head and Body test:

Name	Broadband tissue-equivalent liquid
Type	HBBL600-6000V6 Head Simulating Liquid

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 Dasy52 system.

Device holder supplied by SPEAG

4.6.2 Test positions

4.6.2.1 Against Phantom Head
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 EN 62209-1 & 2.

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 distances are 5mm for trunk. The device was oriented with its antenna facing the phantom since this orientation gives higher results.

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~3GHz) and 10mm x 10mm (above 5GHz) measurement grid used when two staggered one-dimensional cubic splines are used to estimate the maximum SAR location. Next, a zoom scan, a minimum of 7 x 7x7 points covering a volume of at least 30x30x30mm, was performed around the highest E-field value 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.

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 trivariate 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 measured SAR values for Head configuration and Body Worn configuration are given as follows. The device conforms to the requirements of the standard(s) when the maximum measured SAR value is less than or equal to the limit.

Exposure Position	Mode/Band	10g-SAR Reported Result (W/kg)	Highest 10g-SAR Reported Result (W/kg)	10g-Limit (W/kg)	Result
Limbs (0mm Gap)	Band 2	0.308	0.41	4.0	Pass
	Band 4	0.411			
	Band 12	0.121			

Simultaneous Transmission Summary

Exposure Position	Mode	Highest 10g-SAR Result(W/kg)	Limit (W/kg)/10g	Result
Limbs (0mm Gap)	Cat M & BLE	0.42	4.0	Pass

This Test Report Is Issued by: Mr. Peng Zhen	Checked by: Mr. Li Bin
Tested by: Miss. Wu Han	Issued date: 20190820

6 TEST RESULTS

6.1 Manufacturing Tolerance

Cat M

Band 2

20BW 1RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
20BW 50%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0

Band 4

20BW 1RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
20BW 50%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

Band 12

10BW 1RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
10BW 50%RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

Bluetooth (BLE)

GFSK			
Channel	0	19	39
Tolerance (dBm)	-6.0~-3.0	-6.0~-3.0	-6.0~-3.0

6.2 Cat M Measurement result

LTE_CAT.M1_ Band 2

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)
QPSK	1850.7	18607	1.4	1	0	22.37
				3	0	21.48
				6	0	20.26
	1880	18900		1	0	22.07
				3	0	21.58
				6	0	20.15
	1909.3	19193		1	0	22.03
				3	0	21.23
				6	0	20.16
16QAM	1850.7	18607	1.4	1	0	21.32
				1	5	21.21
				3	0	20.63
				5	0	20.06
				5	1	20.08
	1880	18900		1	0	21.26
				1	5	21.19
				3	0	20.47
				5	0	20.04
				5	1	20.06
	1909.3	19193		1	0	21.28
				1	5	21.19
				3	0	20.58
				5	0	20.01
				5	1	20.05
QPSK	1851.7	18615	3	1	0	22.34
				3	0	21.47
				6	0	20.24
	1880	18900		1	0	22.06
				3	0	21.59
				6	0	20.17
	1908.5	19185		1	0	22.02
				3	0	21.58
				6	0	20.21
16QAM	1851.7	18615	3	1	0	21.33
				1	5	21.22
				3	0	20.38
				5	0	20.07
				5	1	20.08
	1880	18900		1	0	21.27
				1	5	21.21
				3	0	20.61
				5	0	20.02
				5	1	20.06
	1908.5	19185		1	0	21.26
				1	5	21.20
				3	0	20.56
				5	0	20.03
				5	1	20.06

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)
QPSK	1852.5	18625	5	1	0	22.34
				3	0	21.59
				6	0	20.27
	1880	18900		1	0	22.07
				3	0	21.28
				6	0	20.16
	1907.5	19175		1	0	22.03
				3	0	21.30
				6	0	20.18
16QAM	1852.5	18625	5	1	0	21.35
				1	5	21.25
				3	0	20.28
				5	0	20.06
				5	1	20.09
	1880	18900		1	0	21.28
				1	5	21.21
				3	0	20.48
				5	0	20.04
				5	1	20.06
	1907.5	19175		1	0	21.32
				1	5	21.19
				3	0	20.18
				5	0	20.03
				5	1	20.07
QPSK	1855	18650	10	1	0	22.38
				3	0	21.48
				6	0	20.25
	1880	18900		1	0	22.11
				3	0	21.45
				6	0	20.15
	1905	19150		1	0	22.08
				3	0	21.42
				6	0	20.21
16QAM	1855	18650	10	1	0	21.36
				1	5	21.22
				3	0	20.15
				5	0	20.12
				5	1	20.17
	1880	18900		1	0	21.31
				1	5	21.21
				3	0	20.45
				5	0	20.06
				5	1	20.08
	1905	19150		1	0	21.29
				1	5	21.12
				3	0	20.58
				5	0	20.03
				5	1	20.06

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)
QPSK	1857.5	18675	15	1	0	22.39
				3	0	21.28
				6	0	20.24
	1880	18900		1	0	22.12
				3	0	21.67
				6	0	20.16
	1902.5	19125		1	0	22.11
				3	0	21.68
				6	0	20.21
16QAM	1857.5	18675	15	1	0	21.34
				1	5	21.26
				3	0	20.17
				5	0	20.12
				5	1	20.16
	1880	18900		1	0	21.34
				1	5	21.24
				3	0	20.19
				5	0	20.12
				5	1	20.23
	1902.5	19125		1	0	21.31
				1	5	21.25
				3	0	20.17
				5	0	20.12
				5	1	20.24
QPSK	1860	18700	20	1	0	**22.43**
				3	0	21.68
				6	0	20.25
	1880	18900		1	0	**22.13**
				3	0	21.53
				6	0	20.21
	1900	19100		1	0	**22.14**
				3	0	21.70
				6	0	20.12
16QAM	1860	18700	20	1	0	21.36
				1	5	21.24
				3	0	20.38
				5	0	20.13
				5	1	20.21
	1880	18900		1	0	21.32
				1	5	21.24
				3	0	20.47
				5	0	20.21
				5	1	20.06
	1900	19100		1	0	21.32
				1	5	21.25
				3	0	20.37
				5	0	20.15
				5	1	20.18

LTE_CAT.M1_ Band 4

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)
QPSK	1710.5	19957	1.4	1	0	23.02
				3	0	21.37
				6	0	20.93
	1732.5	20175		1	0	22.86
				3	0	21.47
				6	0	20.84
	1754.3	20393		1	0	22.85
				3	0	21.27
				6	0	20.79
16QAM	1710.5	19957	1.4	1	0	21.78
				1	5	21.64
				3	0	21.26
				5	0	20.89
				5	1	20.93
	1732.5	20175		1	0	21.62
				1	5	21.57
				3	0	21.35
				5	0	20.83
				5	1	20.86
	1754.3	20393		1	0	21.60
				1	5	21.58
				3	0	21.45
				5	0	20.81
				5	1	20.84
QPSK	1711.5	19965	3	1	0	23.14
				3	0	22.10
				6	0	21.05
	1732.5	20175		1	0	22.98
				3	0	21.25
				6	0	20.96
	1753.5	20385		1	0	22.97
				3	0	21.34
				6	0	20.91
16QAM	1711.5	19965	3	1	0	21.87
				1	5	21.76
				3	0	21.28
				5	0	21.01
				5	1	21.08
	1732.5	20175		1	0	21.74
				1	5	21.69
				3	0	21.39
				5	0	20.95
				5	1	20.98
	1753.5	20385		1	0	21.72
				1	5	21.70
				3	0	21.45
				5	0	20.93
				5	1	20.96

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)
QPSK	1712.5	19975	5	1	0	23.15
				3	0	22.16
				6	0	21.06
	1732.5	20175		1	0	22.99
				3	0	21.20
				6	0	20.97
	1752.5	20375		1	0	22.98
				3	0	21.24
				6	0	20.92
16QAM	1712.5	19975	5	1	0	21.91
				1	5	21.77
						21.15
				5	0	21.02
				5	1	21.06
	1732.5	20175		1	0	21.75
				1	5	21.72
				3	0	21.10
				5	0	20.96
				5	1	20.98
	1752.5	20375		1	0	21.73
				1	5	21.71
				3	0	21.30
				5	0	20.94
				5	1	20.97
QPSK	1715	20000	10	1	0	23.27
				3	0	22.10
				6	0	21.18
	1732.5	20175		1	0	23.11
				3	0	21.47
				6	0	21.09
	1750	20350		1	0	23.12
				3	0	21.43
				6	0	21.04
16QAM	1715	20000	10	1	0	22.21
				1	5	21.89
				3	0	21.65
				5	0	21.14
				5	1	21.16
	1732.5	20175		1	0	21.87
				1	5	21.82
				3	0	21.43
				5	0	21.08
				5	1	21.11
	1750	20350		1	0	21.85
				1	5	21.83
				3	0	21.52
				5	0	21.06
				5	1	21.07

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)
QPSK	1717.5	20025	15	1	0	23.35
				3	0	22.19
				6	0	21.26
	1732.5	20175		1	0	23.19
				3	0	22.16
				6	0	21.17
	1747.5	20325		1	0	23.22
				3	0	22.14
				6	0	21.12
16QAM	1717.5	20025	15	1	0	22.29
				1	5	21.97
				3	0	21.56
				5	0	21.22
				5	1	21.24
	1732.5	20175		1	0	21.95
				1	5	21.97
				3	0	21.43
				5	0	21.16
				5	1	21.19
	1747.5	20325		1	0	21.93
				1	5	21.91
				3	0	21.42
				5	0	21.14
				5	1	21.15
QPSK	1720	20050	20	1	0	**23.44**
				3	0	22.31
				6	0	21.35
	1732.5	20175		1	0	**23.28**
				3	0	22.47
				6	0	21.26
	1745	20300		1	0	**23.29**
				3	0	22.38
				3	0	21.21
16QAM	1720	20050	20	1	0	22.38
				1	5	22.06
				3	0	21.59
				5	0	21.31
				5	1	21.33
	1732.5	20175		1	0	22.04
				1	5	21.99
				3	0	21.45
				5	0	21.25
				5	1	21.28
	1745	20300		1	0	22.02
				1	5	22.08
				3	0	21.68
				5	0	21.23
				5	1	21.24

LTE_CAT.M1_ Band 12

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)
QPSK	699.7	23017	1.4	1	0	23.49
				3	0	22.10
				6	0	21.65
	707.5	23095		1	0	23.63
				3	0	22.37
				6	0	21.65
	715.3	23173		1	0	23.74
				3	0	22.48
				6	0	21.78
16QAM	699.7	23017	1.4	1	0	22.38
				1	5	22.34
				3	0	21.72
				5	0	21.58
				5	1	21.59
	707.5	23095		1	0	22.51
				1	5	22.48
				3	0	21.73
				5	0	21.67
				5	1	21.68
	715.3	23173		1	0	22.57
				1	5	22.54
				3	0	21.94
				5	0	21.70
				5	1	21.72
QPSK	700.5	23025	3	1	0	23.50
				3	0	22.29
				6	0	21.66
	707.5	23095		1	0	23.64
				3	0	22.36
				6	0	21.66
	714.5	23165		1	0	23.75
				3	0	22.39
				6	0	21.79
16QAM	700.5	23025	3	1	0	22.39
				1	5	22.35
				3	0	21.68
				5	0	21.59
				5	1	21.60
	707.5	23095		1	0	22.52
				1	5	22.49
				3	0	21.85
				5	0	21.68
				5	1	21.69
	714.5	23165		1	0	22.58
				1	5	22.55
				3	0	21.84
				5	0	21.71
				5	1	21.73

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Power (dBm)
QPSK	701.5	23035	5	1	0	23.51
				3	0	22.10
				6	0	21.67
	707.5	23095		1	0	23.65
				3	0	22.39
				6	0	21.67
	713.5	23155		1	0	23.76
				3	0	22.13
				6	0	21.80
16QAM	701.5	23035	5	1	0	22.40
				1	5	22.36
				3	0	21.83
				5	0	21.60
				5	1	21.61
	707.5	23095		1	0	22.53
				1	5	22.50
				3	0	21.93
				5	0	21.69
				5	1	21.70
	713.5	23155		1	0	22.59
				1	5	22.56
				3	0	21.87
				5	0	21.72
				5	1	21.74
QPSK	704	23060	10	1	0	**23.57**
				3	0	22.46
				6	0	21.73
	707.5	23095		1	0	**23.71**
				3	0	22.41
				6	0	21.73
	711	23130		1	0	**23.82**
				3	0	22.37
				6	0	21.86
16QAM	704	23060	10	1	0	22.46
				1	5	22.42
				3	0	21.84
				5	0	21.66
				5	1	21.67
	707.5	23095		1	0	22.59
				1	5	22.56
				3	0	21.94
				5	0	21.75
				5	1	21.76
	711	23130		1	0	22.65
				1	5	22.62
				3	0	21.92
				5	0	21.78
				5	1	21.80

6.3 Bluetooth Measurement result

Modulation type	Test Result (dBm)		
	2402MHz (Ch0)	2440MHz (Ch19)	2480MHz (Ch39)
GFSK (LE 1Mbps))	-3.44	-3.27	-3.15

6.4 Standalone SAR Test Exclusion Considerations

Standalone 10-g limbs 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

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.
According to the KDB447498 appendix A

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	*SAR Test Exclusion Threshold* (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

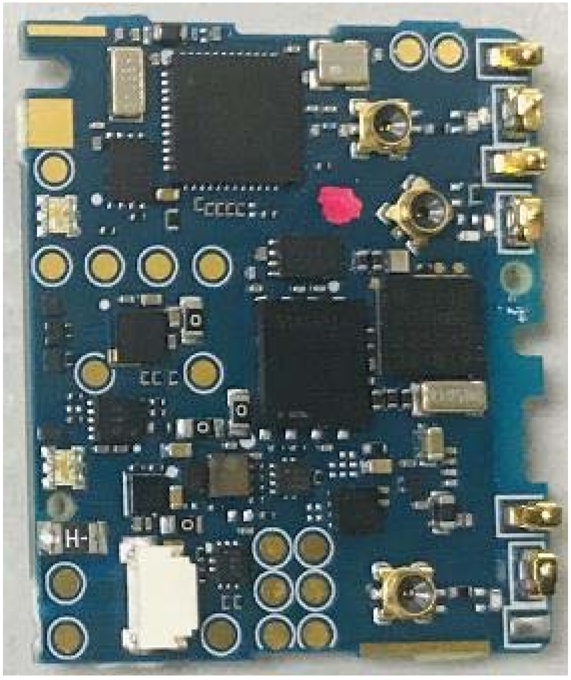
Note: 10-g Extremity SAR Test Exclusion Power Thresholds are 2.5 times higher than the 1-g SAR Test Exclusion Thresholds indicated above. These thresholds do not apply, by extrapolation or other means, to occupational exposure limits.

Summary of Transmitters

Band/Mode	Position	Max. RF output power (mW)	SAR test exclusion Threshold (mW)	SAR Required
(2.4~2.4835) GHz Bluetooth	Limbs	0.484	25	No

6.5 RF exposure conditions

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



6.5.1 Limbs Exposure conditions

For WWAN

Test Configurations	SAR Required	Note
Back	yes	/
Front	yes	/
Top	yes	/
Bottom	yes	/
Left	yes	/
Right	yes	/

6.6 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 analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system checking results (dielectric parameters and SAR values) are given in the table below.

Date Tested	System dipole	T.S. Liquid	SAR measured (normalized to 1W)		Target (Ref.Value)	Delta (%)	Tolerance (%)
2019.08.10	D750V3	Body	10g	5.62	5.73	-1.92	±10
2019.08.11	D1800V2	Body	10g	20.37	20.8	-2.07	±10
2019.08.12	D2000V2	Body	10g	19.62	20.4	-3.82	±10

Plots of the system checking scans are given in Appendix A.

Tissue Simulants used in the Measurements

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.

Date Tested	Freq. (MHz)	Liquid parameters	measured	Target	Delta (%)	Tolerance (%)
2019.08.10	Body 750	εr	53.07	55.50	-4.4	±5
		σ[S/m]	0.94	0.96	-2.1	±5
2019.08.11	Body 1800	εr	53.22	53.30	-0.2	±5
		σ[S/m]	1.48	1.52	-2.6	±5
2019.08.12	Body 2000	εr	52.60	53.30	-1.3	±5
		σ[S/m]	1.50	1.52	-1.3	±5

6.7 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 centre 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: There is no KDB for Cat M, since Cat M belongs to LTE, KDB 941225 is referred.

The measured Limbs SAR values for the test device are tabulated below:
Mode: Cat.M Band 2
L:1860MHz M:1880 MHz H:1900MHz
SAR Values Limit of SAR (W/kg): 4.0W/kg (10g Average)

Test Case		Channel	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	Mode					10g Average	10g Average
Back	20BW 1RB (limbs)	L	22.43	22.50	1.02	---	---
		M	22.13	22.50	1.09	0.097	0.106
		H	22.14	22.50	1.09	---	---
Front		L	22.43	22.50	1.02	---	---
		M	22.13	22.50	1.09	0.170	0.185
		H	22.14	22.50	1.09	---	---
Top		L	22.43	22.50	1.02	---	---
		M	22.13	22.50	1.09	0.283	0.308
		H	22.14	22.50	1.09	---	---
Bottom		L	22.43	22.50	1.02	---	---
		M	22.13	22.50	1.09	0.093	0.102
		H	22.14	22.50	1.09	---	---
Left		L	22.43	22.50	1.02	---	---
		M	22.13	22.50	1.09	0.036	0.039
		H	22.14	22.50	1.09	---	---
Right		L	22.43	22.50	1.02	---	---
		M	22.13	22.50	1.09	0.024	0.026
		H	22.14	22.50	1.09	---	---

Test Case		Channel	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	Mode					10g Average	10g Average
Back	20BW 50%RB (limbs)	L	21.68	22.00	1.08	---	---
		M	21.53	22.00	1.11	0.093	0.103
		H	21.70	22.00	1.07	---	---
Front		L	21.68	22.00	1.08	---	---
		M	21.53	22.00	1.11	0.103	0.114
		H	21.70	22.00	1.07	---	---
Top		L	21.68	22.00	1.08	---	---
		M	21.53	22.00	1.11	**0.249**	**0.276**
		H	21.70	22.00	1.07	---	---
Bottom		L	21.68	22.00	1.08	---	---
		M	21.53	22.00	1.11	0.072	0.080
		H	21.70	22.00	1.07	---	---
Left		L	21.68	22.00	1.08	---	---
		M	21.53	22.00	1.11	0.017	0.019
		H	21.70	22.00	1.07	---	---
Right		L	21.68	22.00	1.08	---	---
		M	21.53	22.00	1.11	0.015	0.017
		H	21.70	22.00	1.07	---	---

Mode: Cat.M Band 4

L:1720MHz M:1732.5 MHz H:1745MHz

SAR Values Limit of SAR (W/kg): 4.0W/kg (10g Average)

Test Case		Channel	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	Mode					10g Average	10g Average
Back	20BW 1RB (limbs)	L	23.44	23.50	1.01	---	---
		M	23.28	23.50	1.05	0.118	0.124
		H	23.29	23.50	1.05	---	---
Front		L	23.44	23.50	1.01	---	---
		M	23.28	23.50	1.05	0.225	0.236
		H	23.29	23.50	1.05	---	---
Top		L	23.44	23.50	1.01	---	---
		M	23.28	23.50	1.05	0.185	0.194
		H	23.29	23.50	1.05	---	---
Bottom		L	23.44	23.50	1.01	---	---
		M	23.28	23.50	1.05	**0.391**	**0.411**
		H	23.29	23.50	1.05	---	---
Left		L	23.44	23.50	1.01	---	---
		M	23.28	23.50	1.05	0.024	0.025
		H	23.29	23.50	1.05	---	---
Right		L	23.44	23.50	1.01	---	---
		M	23.28	23.50	1.05	0.053	0.056
		H	23.29	23.50	1.05	---	---

Test Case		Channel	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	Mode					10g Average	10g Average
Back	20BW 50%RB (limbs)	L	22.31	22.50	1.04	---	---
		M	22.47	22.50	1.01	0.091	0.092
		H	22.38	22.50	1.03	---	---
Front		L	22.31	22.50	1.04	---	---
		M	22.47	22.50	1.01	0.172	0.174
		H	22.38	22.50	1.03	---	---
Top		L	22.31	22.50	1.04	---	---
		M	22.47	22.50	1.01	0.142	0.143
		H	22.38	22.50	1.03	---	---
Bottom		L	22.31	22.50	1.04	---	---
		M	22.47	22.50	1.01	0.322	0.325
		H	22.38	22.50	1.03	---	---
Left		L	22.31	22.50	1.04	---	---
		M	22.47	22.50	1.01	0.016	0.016
		H	22.38	22.50	1.03	---	---
Right		L	22.31	22.50	1.04	---	---
		M	22.47	22.50	1.01	0.018	0.018
		H	22.38	22.50	1.03	---	---

Mode: Cat.M Band 12

L:704MHz M:707.5 MHz H:711MHz

SAR Values Limit of SAR (W/kg): 4.0W/kg (10g Average)

Test Case		Channel	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	Mode					10g Average	10g Average
Back	10BW 1RB (limbs)	L	23.57	24.00	1.10	---	---
		M	23.71	24.00	1.07	0.102	0.109
		H	23.82	24.00	1.04	---	---
Front		L	23.57	24.00	1.10	---	---
		M	23.71	24.00	1.07	**0.113**	**0.121**
		H	23.82	24.00	1.04	---	---
Top		L	23.57	24.00	1.10	---	---
		M	23.71	24.00	1.07	0.054	0.058
		H	23.82	24.00	1.04	---	---
Bottom		L	23.57	24.00	1.10	---	---
		M	23.71	24.00	1.07	0.078	0.083
		H	23.82	24.00	1.04	---	---
Left		L	23.57	24.00	1.10	---	---
		M	23.71	24.00	1.07	0.056	0.060
		H	23.82	24.00	1.04	---	---
Right		L	23.57	24.00	1.10	---	---
		M	23.71	24.00	1.07	0.041	0.044
		H	23.82	24.00	1.04	---	---

Test Case		Channel	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	Mode					10g Average	10g Average
Back	10BW 50%RB (limbs)	L	22.46	22.50	1.01	---	---
		M	22.41	22.50	1.02	0.083	0.085
		H	22.37	22.50	1.03	---	---
Front		L	22.46	22.50	1.01	---	---
		M	22.41	22.50	1.02	0.072	0.073
		H	22.37	22.50	1.03	---	---
Top		L	22.46	22.50	1.01	---	---
		M	22.41	22.50	1.02	0.046	0.047
		H	22.37	22.50	1.03	---	---
Bottom		L	22.46	22.50	1.01	---	---
		M	22.41	22.50	1.02	0.026	0.027
		H	22.37	22.50	1.03	---	---
Left		L	22.46	22.50	1.01	---	---
		M	22.41	22.50	1.02	0.023	0.023
		H	22.37	22.50	1.03	---	---
Right		L	22.46	22.50	1.01	---	---
		M	22.41	22.50	1.02	0.015	0.016
		H	22.37	22.50	1.03	---	---

6.8 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.

The same procedures shouldbe adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

The Highest Reported SAR configuration in Each Frequency Band

Frequency band	Air interface	Limbs(w/kg)
750 MHz	Cat M BAND12	<2.0
1800/1900 MHz	Cat M BAND2 Cat M BAND4	<2.0

6.9 Simultaneous Transmission SAR Analysis

According to the formula (KDB447498 4.3.2) the Bluetooth SAR as follow:
[(max. power of channel, including tune-up tolerance, mw)/ (min. test separation distance, mm)]
[√f(GHz)/x] W/kg for test separation distances≤50mm.
Limbs:
min. test separation distance = 5mm
Where x=7.5 for 1-g SAR, and x=18.75 for 10-g SAR.

Estimated SAR BLE

Mode	Position	F(GHz)	Distance(mm)	Estimated
BLE	Limbs	2.480	5	0.008

The sum of SAR values for Cat M& BLE

	MAXIMUM SAR VALUE FOR LIMBS
Cat M	0.411
BLE	0.008
Sum	0.419
Note	Bottom: Cat M Band4+BLE

According to the above tables, the sum of SAR values for Cat M and BLE ＜4.0 W/kg. So simultaneous transmission SAR are not required for BLE transmitter.

7 MEASUREMENT UNCERTAINTY

DASY5 Uncertainty Budget								
Error description	Uncertainty value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std.Unc (1g).	Std.Unc. (10g)	(vi) Veff
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%	∞
Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%	∞
Modulation Response	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%	∞
System detection limits	±1.0%	R	$\sqrt{3}$	1	1	±0.6%	±0.6%	∞
Boundary effects	±2.0%	R	$\sqrt{3}$	1	1	±0.6%	±1.2%	∞
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%	∞
Post-processing	±4.0%	R	$\sqrt{3}$	1	1	±2.3%	±2.3%	∞
Test Sample Related								
Device holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Power Scaling	±0%	R	$\sqrt{3}$	1	1	±0%	±0%	∞
Power drift	±5.0%	R	$\sqrt{3}$	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom uncertainty	±7.9%	R	$\sqrt{3}$	1	1	±4.6%	±4.6%	∞
SAR correction	±1.9%	R	$\sqrt{3}$	1	0.84	±1.1%	±0.9%	∞
Liquid conductivity(mea.)	±2.5%	N	$\sqrt{3}$	0.78	0.71	±1.1%	±1.0%	∞
Liquid Permittivity (mea.)	±2.5%	N	$\sqrt{3}$	0.26	0.26	±0.3%	±0.4%	∞
Temp. unc. - Conductivity	±3.4%	N	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%	∞
Temp. unc. - Permittivity	±0.4%	N	$\sqrt{3}$	0.23	0.26	±0.1%	±0.1%	∞
Combined std. Uncertainty						±12.5%	±12.5%	748
Expanded STD Uncertainty						±25.1%	±25.0%	

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 which the initial certified product used:

Test Equipment	Model	Serial Number	Calibration date	Calibration Due data
DAE	DAE4	546	2018.10.15	2019.10.14
Dosimetric E-field Probe	ES3DV3	3127	2018.11.02	2019.11.01
Dipole Validation Kit	D750V3	1011	2017.09.13	2020.09.12
Dipole Validation Kit	D1800V2	2d084	2017.09.15	2020.09.14
Dipole Validation Kit	D2000V2	1009	2018.02.01	2021.01.31

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 750

SAR target

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

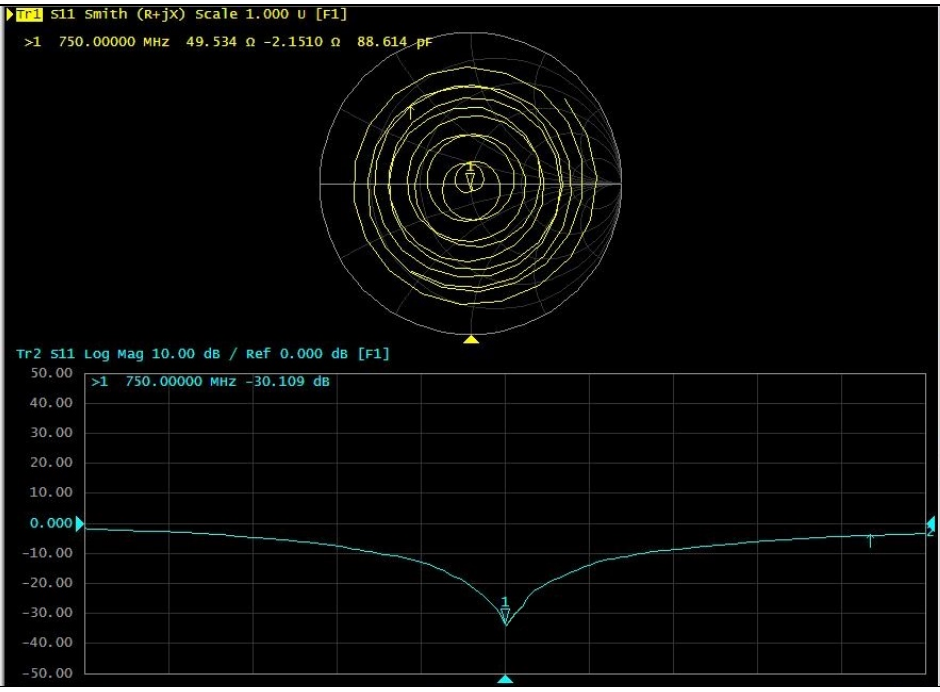
Impedance and Return loss measured by Network analyzer

The most recent measurement of the real or imaginary parts of the impedance (measured on 2018.8.20), deviates within 5 Ω from the previous measurement. (Data from the last calibration report)

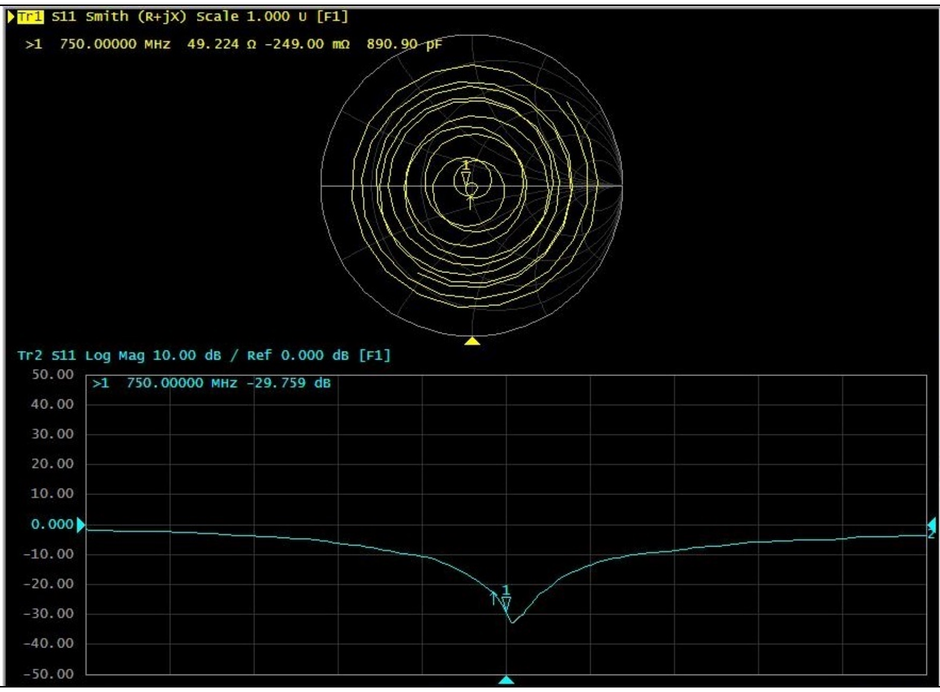
The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

Head TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	deviation
Impedance	51.0Ω-2.79jΩ	49.5Ω-2.15jΩ	<5Ω
Return loss	-30.7 db	-33.1 db	<20%

Body TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	deviation
Impedance	46.6Ω-3.61jΩ	49.5Ω-0.22jΩ	<5Ω
Return loss	-25.8db	-28.8db	<20%



Head TSL Parameters



Body TSL Parameters

Dipole1800

SAR target

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

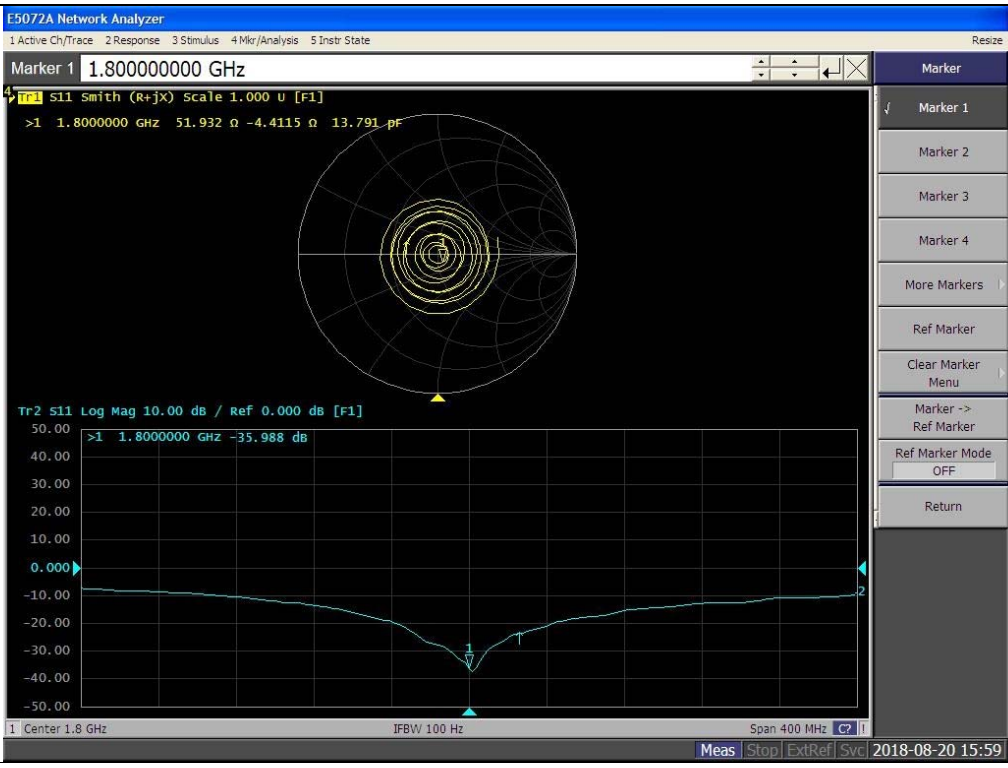
Impedance and Return loss measured by Network analyzer

The most recent measurement of the real or imaginary parts of the impedance (measured on 2018.8.20), deviates within 5 Ω from the previous measurement. (Data from the last calibration report)

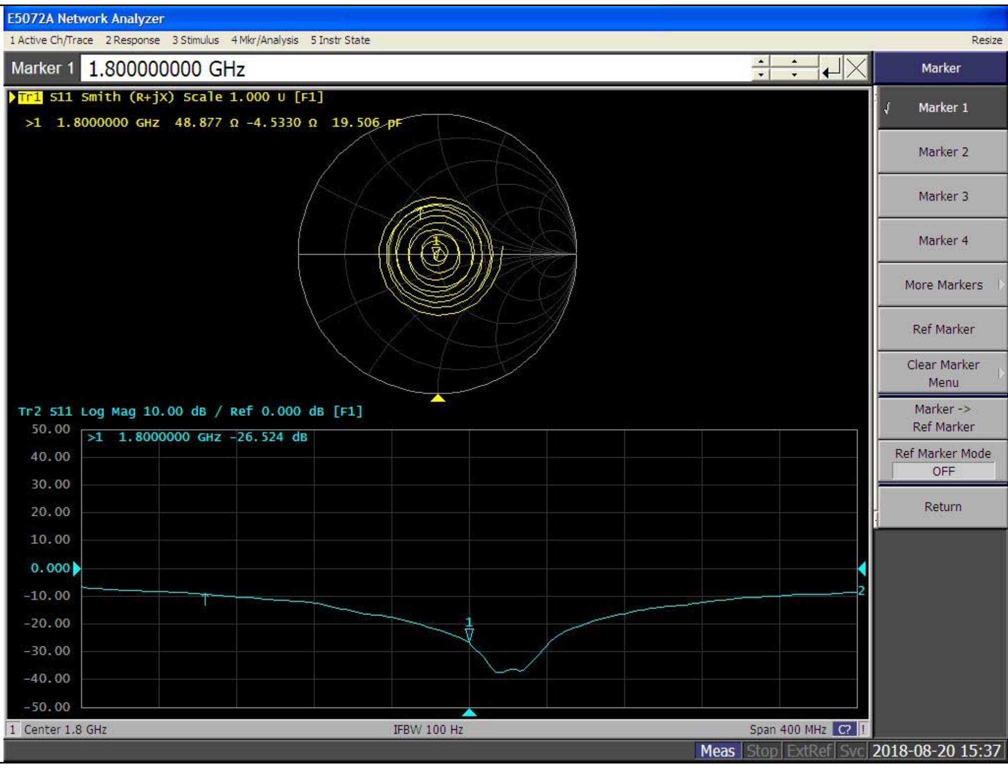
The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

Head TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	deviation
Impedance	49.3Ω-1.55jΩ	51.9Ω-4.41jΩ	<5Ω
Return loss	-35.4 db	-36.0db	<20%

Body TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	deviation
Impedance	46.0Ω-1.32jΩ	48.9Ω-4.53jΩ	<5Ω
Return loss	-27.1db	-26.5db	<20%



Head TSL Parameters



Body TSL Parameters

Dipole2000

SAR target

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

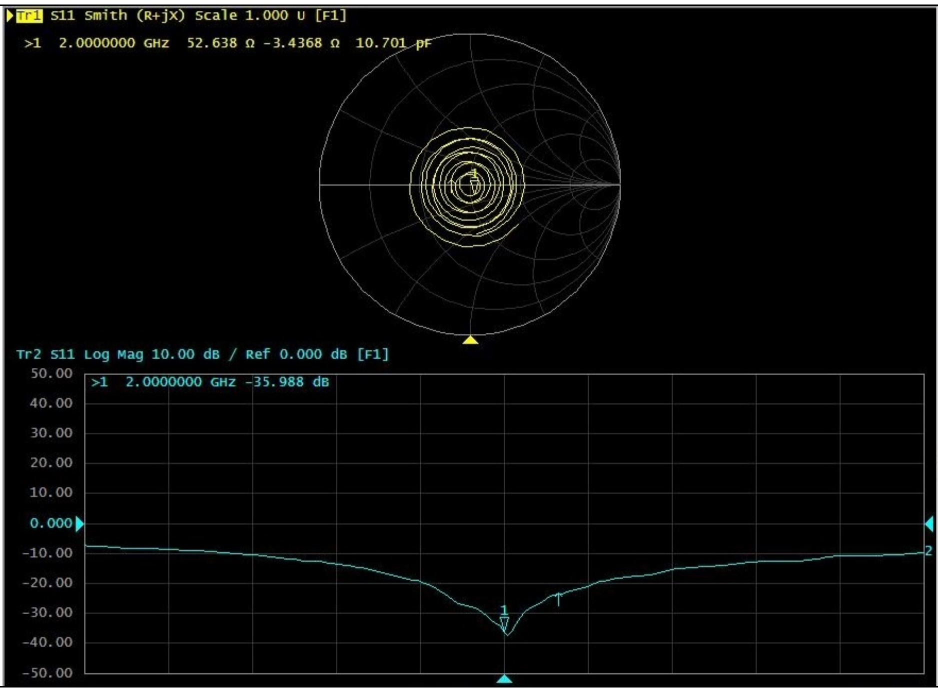
Impedance and Return loss measured by Network analyzer

The most recent measurement of the real or imaginary parts of the impedance (measured on 2018.8.20), deviates within 5 Ω from the previous measurement. (Data from the last calibration report)

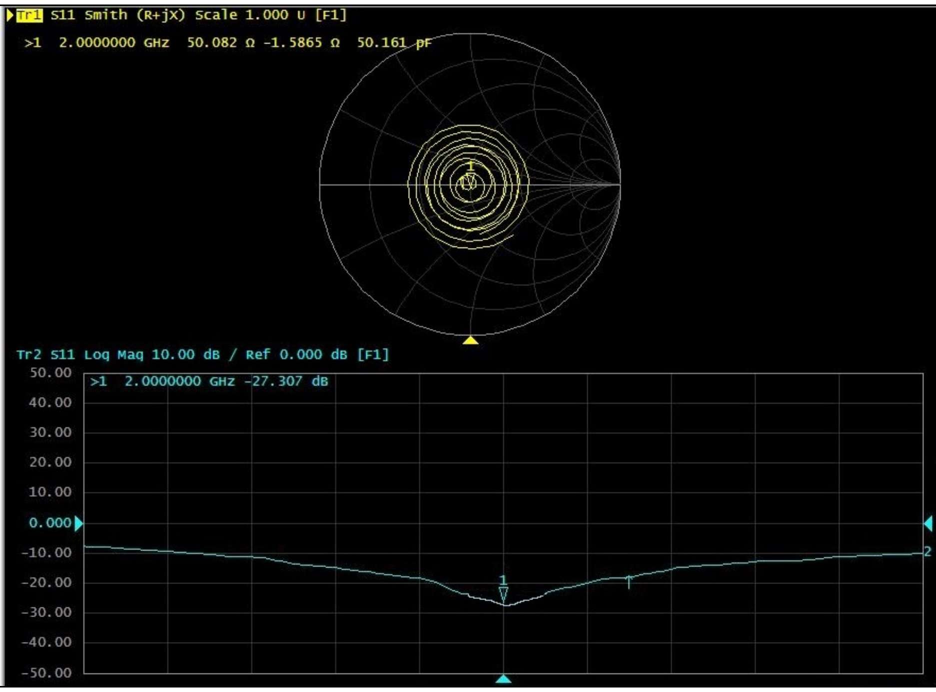
The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

Head TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	deviation
Impedance	49.8Ω-2.08jΩ	52.64Ω-3.44jΩ	<5Ω
Return loss	-33.6 db	-36.0db	<20%

Body TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	deviation
Impedance	46.3Ω-1.63jΩ	50.08Ω-1.59jΩ	<5Ω
Return loss	-27.6db	-27.31db	<20%



Head TSL Parameters



Body TSL Parameters

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration date	Calibration Due data
Signal Generator	E4428C	MY45280865	2018.08.20	2019.08.19
Signal Generator	SML 03	103514	2018.08.20	2019.08.19
Power meter	E4417A	MY45101182	2018.08.20	2019.08.19
Power Sensor	E4412A	MY41502214	2018.08.20	2019.08.19
Power Sensor	E4412A	MY41502130	2018.08.20	2019.08.19
Power meter	E4417A	MY45101004	2018.08.20	2019.08.19
Power Sensor	E9300B	MY41496001	2018.08.20	2019.08.19
Power Sensor	E9300B	MY41496003	2018.08.20	2019.08.19
Communication Tester	CMW500	134669	2018.08.20	2019.08.19
Vector Network Analyzer	VNA R140	0011213	2018.10.17	2019.10.16
Dielectric Parameter Probe	DAKS-3.5	1042	2018.10.17	2019.10.16
Network Analyzer	E5072A	MY51100334	2018.03.01	2019.02.28

Detailed information of Isotropic E-field Probe Type ES3DV3

Construction	Symmetrical design with triangular core Interleaved sensors 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 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Dynamic Range	5 μW/g to > 100 W/kg; Linearity: ± 0.2 dB
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

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%.

ANNEX A – TEST PLOTS

Please refer to the attachment.

ANNEX B – RELEVANT PAGES FROM CALIBRATION REPORTS

Please refer to the attachment.