

Test report No:

NIE: 69323RAN.001

Test report

IEEE Std 1528™-2013

(*) Identification of item tested	TCAM: Telematics and Connectivity Antenna Module
(*) Trademark	Continental
(*) Model and /or type reference	TCAM1NA2
(*) Other identification of the product	Hw version: E4.4 Sw version: 11.16.11 FCC ID: KR5TCAM1NA2 IC: 7812D-TCAM1NA2
(*) Features	2G, 3G, LTE, GNSS, WLAN, BLE, ISM Receiver
Applicant	Continental Automotive GmbH Siemensstrasse 12, 93055 Regensburg, Germany
Test method requested, standard	1. IEEE Std 1528™-2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques. 2. FCC 47 CFR Part 2.1093. (10-1-15 Edition) Radiofrequency radiation exposure evaluation: portable devices.
Summary	Considering the results of the performed test, the item under test is IN COMPLIANCE with FCC 47CFR Part 2.1093 exposure limits. The maximum 1-g SAR found during this test has been 0.197 W/kg, for WCDMA II mode. The maximum 1-g SAR for multiband transmission found during this test has been 0.266 W/kg.
Approved by (name / position & signature)	Miguel Lacave Antennas Lab Manager
Date of issue	2021-11-05
Report template No	FDT08_23 (*) "Data provided by the client"

Index

Competences and guarantees	3
General conditions	3
Uncertainty	3
Data provided by the client.....	3
Usage of samples	4
Test sample description	4
Identification of the client.....	4
Testing period and place.....	4
Document history	5
Environmental conditions	5
Remarks and comments	5
Testing verdicts.....	7
Summary	7
Appendix A: Test configuration	8
Appendix B: Test results	19
Appendix C: Measurement Reports	61
Appendix D: System Validation Reports.....	87
Appendix E: Calibration data.....	97
Appendix F: Photographs.....	178

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

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DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

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The results presented in this Test Report apply only to the particular item under test established in this document.

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the following documents:

1. DEKRA Testing and Certification S.A.U. internal document PODT000.
2. FCC OET KDB 865664 D01 - SAR Measurement Requirements for 100 MHz to 6 GHz v01r04 (August 2015).

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested", "Other identification of the product", "Features" and "Test sample description").
2. Maximum output power and testing distance.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by: the client

Sample M/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
69323/003	WLAN conducted	TCAM1NA2	76364	2021/07/13
69323/006	WWAN module	TCAM1NA2	76354	2021/07/13

Sample M/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
69323/002	WLAN radiated	TCAM1NA2	76362	2021/07/13
69323/013	WWAN radiated (Main Ant)	TCAM1NA2	76329	2021/07/13
69323/014	WWAN radiated (Backup Ant)	TCAM1NA2	76344	2021/07/13

1. Sample M/01 has undergone the test(s) specified in subclause "Test method requested": Conducted average output power.
2. Sample M/02 has undergone the test(s) specified in subclause "Test method requested": SAR evaluation for 2G, 3G, LTE and Wi-Fi.

Test sample description

Description of product	TCAM: vehicle antenna module for Telematics and Connectivity Antenna purposes.		
Software version.....	11.16.11		
Hardware version	E4.4		
Mounting position	☐	Table top equipment	
	☐	Wall/Ceiling mounted equipment	
	☐	Floor standing equipment	
	☐	Hand-held equipment	
	☒	Other: Vehicular environment equipment (Car Roof)	
Accessories (not part of the test item).....	Description	Type	Manufacturer
	Charging adapter	---	
Copy of marking plate:			

Identification of the client

Continental Automotive GmbH
Siemensstrasse 12, 93055 Regensburg, Germany

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-07-14
Date (finish)	2021-08-05

Document history

Report number	Date	Description
69323RAN.001	2021-11-05	First release

Environmental conditions

Date	Max. Temp.	Min. Temp.	Max. Hum.	Min. Hum.	Limit
	°C	°C	%	%	
From 2021-07-14 to 2021-08-05	24.97	21.12	64.23	44.07	18-25 °C, 30-70%

Remarks and comments

1: Testing of GPRS EDGE mode is not required according to test reductions mentioned in FCC OET KDB 941225 D01 3G SAR Procedures, paragraph "5. GSM, GPRS and EDGE"

2: Testing of HSDPA/HSPA/HSPA+/DC-HSPA modes are not required according to paragraph "2.1 3G SAR test reduction procedure" mentioned in FCC OET KDB 941225 D01 3G SAR Procedures.

3: Only the plots of the highest reported SAR for each test position and mode/band are included in appendix C.

4: The tests have been performed by the technical personnel: Francisco J. Sánchez.

5: References

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093 and the following FCC Published RF exposure KDB procedures:

- FCC OET KDB 447498 D01 General RF Exposure Guidance v06 (October 2015)
- FCC OET KDB 865664 D01 - SAR Measurement Requirements for 100 MHz to 6 GHz v01r04 (August 2015).
- FCC OET KDB 865664 D02 RF Exposure Reporting v01r02 (October 2015)
- FCC OET KDB 941225 D01 3G SAR Procedures v03r01 (October 2015).
- FCC OET KDB 941225 D05 SAR for LTE Devices v02r05 (October 2015).
- FCC OET KDB 248227 D01 802.11 Wi-Fi SAR v02r02 (October 2015).

6: The instrumentation utilized to perform the tests covered in this test report is listed in the following table:

Equipment	NC
Dosimetric E-field probe SPEAG EX3DV4	6125
Data acquisition device SPEAG DAE4	3430
Electro-optical converter SPEAG EOC3	3438
Robot Stäubli RX60BL, Robot controller Stäubli CS7MB	3420
Measurement server SPEAG DASY5 SE UMS 011 BS	3847
Oval flat phantom SPEAG ELI 4	3525
SAR measurement software SPEAG DASY52 V52.10.4.1527	3423
SAR postprocessing software SPEAG SEMCAD X	3423
750 MHz dipole validation kit SPEAG D750V3	3919
900 MHz dipole validation kit SPEAG D900V2	3426
1800 MHz dipole validation kit SPEAG D1800V2	3427
2450 MHz dipole validation kit SPEAG D2450V2	3429
2600 MHz dipole validation kit SPEAG D2600V2	3527
5 GHz dipole validation kit SEPAG D5GHzV2	3524
Head Tissue Equivalent Liquids for 750 MHz band	3920
Head Tissue Equivalent Liquids for 835 MHz band	3631
Head Tissue Equivalent Liquids for 900 MHz band	3631
Head Tissue Equivalent Liquids for 1700 MHz band	6028
Head Tissue Equivalent Liquids for 1900 MHz band	3633
Head Tissue Equivalent Liquids for 2450 MHz band	4173
Head Tissue Equivalent Liquids for 2600 MHz band	4173
Head Tissue Equivalent Liquids for 5 GHz bands	3636
Universal Radio Communication Tester R&S CMW 500	3934
Vector network analyzer Agilent FieldFox N9923A	4482
Dielectric probe kit SPEAG DAK-3.5	4171
Power meter Agilent E4419B	4393
RF Generator R&S SMU200	3346
DC Power supply Agilent U8002A	4835
Dual directional coupler HP 778D	1084
Dual directional coupler NARDA 4227-16	3630
Power amplifier MITEQ AMF-4D-00400600-50-30P	3485
6 dB attenuator Weinschel 75 A-6-11	2400
SPEAG Mounting Device for Hand-held devices	3424
Power sensor DC 50 MHz to 18 GHz R&S model NRP-Z81	4164
Digital thermometer LKM Electronics model DTM300-Spezial	4170
Temperature and humidity probe HUMIDIPROBE Pico Technology	3453

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

Summary

FCC 47CFR Part 2.1093	VERDICT			
	N/A	P	F	NM
GSM 850		P		
GSM 1900		P		
WCDMA II		P		
WCDMA IV		P		
WCDMA V		P		
LTE 2		P		
LTE 4		P		
LTE 5		P		
LTE 7		P		
LTE 12		P		
LTE 13		P		
LTE 17		P		
802.11b/g/n		P		
802.11a/g/n/ac		P		
Bluetooth		P		

Appendix A: Test configuration

INDEX

1.	GENERAL INTRODUCTION	10
1.1.	Application Standard	10
1.2.	General requirements	10
1.3.	Measurement system requirements	10
1.4.	Phantom requirements	10
1.5.	Measurement Liquids requirements.	10
2.	MEASUREMENT SYSTEM	11
2.1.	Measurement System	11
2.2.	Test Positions of device relative to head and body	14
2.3.	Test to be performed	14
2.4.	Description of interpolation/extrapolation scheme	14
2.5.	Determination of the largest peak spatial-average SAR	14
2.6.	System Validation	14
3.	UNCERTAINTY	15
4.	SAR LIMIT	17
5.	DEVICE UNDER TEST	17
5.1.	Dimensions	17
5.2.	Wireless Technology	17
5.3.	Simultaneous Transmission	18
5.4.	Antenna Location	18

1. GENERAL INTRODUCTION

1.1. Application Standard

The Federal Communications Commission (FCC) sets the limits for General Population/Uncontrolled exposure to radio frequency electromagnetic fields for transmitting devices designed to be used within 20 centimetres of the body of the user under FCC 47 CFR Part 1.1310, paragraph (c).

1.2. General requirements

The SAR measurement has been performed continuing the following considerations and environment conditions:

- The ambient temperature shall be in the range of 18°C to 25°C and the variation shall not exceed +/- 2°C during the test.
- The ambient humidity shall be in the range of and 30% - 70%.
- The device battery shall be fully charged before each measurement.

1.3. Measurement system requirements

The measurement system used for SAR tests fulfils the procedural and technical requirements described at the reference standards used.

1.4. Phantom requirements

The phantom model for body measurements is an elliptical open-top container with a flat bottom, with the following shape and dimensions:

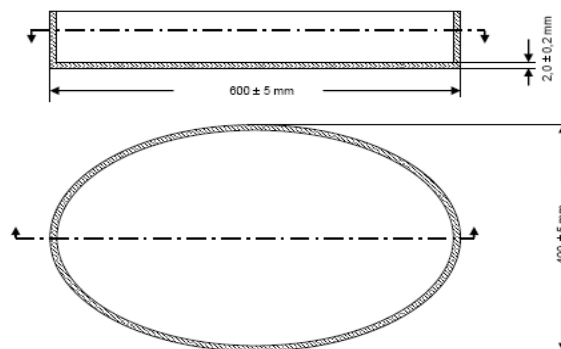


Figure 1: Proportions and shape of Phantom shell

1.5. Measurement Liquids requirements.

The liquids used to simulate the human tissues, must fulfil the requirements of the dielectric properties required. These target dielectric properties per FCC OET KDB 865664 D01 instructions come from the dipole and probe calibration data which are included in Appendix B, Section 3, of this document.

To minimize the effect of reflections on peak spatial-average SAR values, from the upper surface of the tissue-equivalent liquid, the depth of the liquid should be at least 15 cm.

2. MEASUREMENT SYSTEM

2.1. Measurement System

The DASY5 system for performing compliance tests consists of the following items:

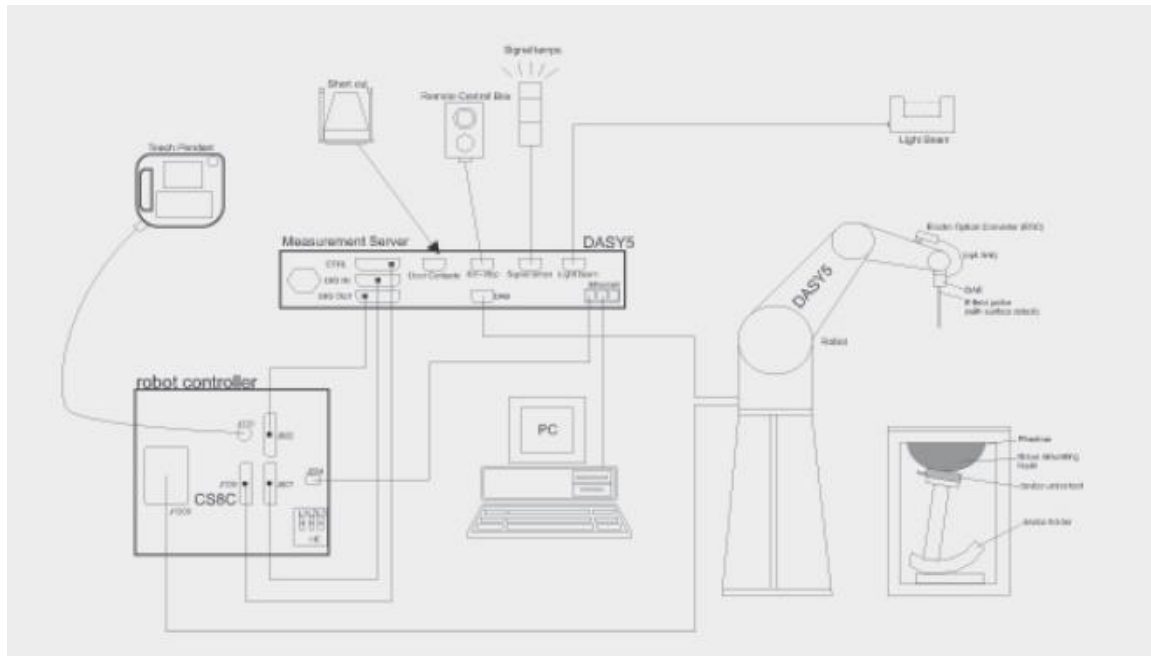


Figure 2: SAR Measurement system

A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).

An isotropic field probe optimized and calibrated for the targeted measurement.

A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.

The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.

The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.

A computer running the DASY5 software.

Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.

The phantom, the device holder and other accessories according to the targeted measurement.

	Model	EX3DV4
	Construction	Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).
	Frequency	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
	Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
	Dynamic Range	10 μ W/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)
	Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1.0 mm

	Model	DAE4
	Construction	Signal amplifier, multiplexer, A/D converter, and control logic. Serial optical link communication with DASY4/5 embedded system (fully remote controlled). Two-step probe touch detector for mechanical surface detection and emergency robot stop.
	Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)
	Input Offset Voltage	< 5 μ V (with auto zero)
	Input Resistance	200 MOhm
	Input Bias Current	< 50 fA

	Model	ELI
	Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.
	Material	Vinylester, glass fiber reinforced (VE-GF)
	Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
	Shell Thickness	2 $\pm$ 0.2 mm (bottom plate)
	Dimensions	Major axis: 600 mm Minor axis: 400 mm
	Filling Volume	Approx. 30 liters
	Wooden Support	SPEAG standard phantom table

	Model	Mounting Device for Hand-Held Transmitters
	Construction	In combination with the Twin SAM V5.0/V5.0c or ELI Phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).
	Material	Polyoxymethylene (POM)

	Model	System Validations Kits 450 MHz – 6 GHz		
	Construction	Symmetrical dipole with I/4 balun. Enables measurement of feedpoint impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.		
	Frequency	450 MHz to 5800 MHz		
	Return Loss	20 dB at specified validation position		
	Dimensions (length and overall height in mm)	Product	Dipole length	Overall height
		D450V3	290.0	330.0
		D750V3	179.0	330.0
		D900V2	148.5	340.0
		D1800V2	72.5	300.0
		D2000V2	65.0	300.0
		D2300V2	56.3	290.0
		D2450V2	52.0	290.0
		D2600V2	49.2	290.0
		D3300V2	38.0	285.0
		D3500V2	37.0	285.0
		D3700V2	34.7	285.0
		D3900V2	32.0	280.0
		D4200V2	30.1	280.0
		D4600V2	27.0	280.0
		D4900V2	25.0	280.0
		D5GHzV2	20.6	300.0

2.2. Test Positions of device relative to head and body

The device under test consists of a shark fin antenna which will be installed on the roof of an specific car model into a fixed position, over the rear seat row at the center of the roof close to the rear window. The device has two transmitting antennas, the main antenna (external) which will be situated outside the car roof once installed, and the backup antenna (internal) which will be used only if there were any problem with the main antenna, and it is situated in the interior of the car.

As the main antenna is outside the metallic roof of the car body, measurements have been performed for the internal antenna as a worst case condition for the passengers of the car.

Once installed, according to the manufacturer, the closer distance between the internal antenna and the interior roof surface of the car will be 24.62 mm.

The device has been tested placed at the centre of the flat phantom with its back side facing the flat phantom surface simulating the normal use conditions, at a testing distance of 24 mm.

2.3. Test to be performed

Test shall be performed for each test position previously described, using the channel producing the highest rated output power. Additionally the other applicable test frequency channels must be measure for the test configuration providing the highest SAR for each applicable transmitting band.

2.4. Description of interpolation/extrapolation scheme

The local SAR inside the Phantom is measured using small dipole sensing elements inside a probe element. The probe tip must not be in contact with the Phantoms surface in order to minimise measurement errors, but the highest local SAR is obtained from measurements at a certain distances from the shell trough extrapolation. The accurate assessment of the maximum SAR averaged over 1 gr and 10 gr. requires a very fine resolution in the three dimensional scanned data array. Since the measurements have to be performed over a limited time, the measured data have to be interpolated to provide an array of sufficient resolution.

The interpolation of 2D area scan is used after the initial area scan, at a fixed distance from the Phantom shell wall. The initial scan data is collected with approx. 15 mm spatial resolution and this interpolation is used to find the location of the local maximum for positioning the subsequent 3D scanning within a 1 mm resolution.

For the 3D scan, data is collected on a spatially regular 3D grid having 5 mm steps in both directions. After the data collection by the SAR probe, the data are extrapolated in the depth direction to assign values to points in the 3D array closer to the shell wall. A notional extrapolation value is also assigned to the first point outside the shell wall so that subsequent interpolation schemes will be applicable right up to the shell wall boundary.

2.5. Determination of the largest peak spatial-average SAR

To determine the maximum value of the peak spatial-average SAR of a DUT, all device positions, configurations and operational modes should be tested for each frequency band.

The averaging volume shall be chosen as 1gr. of contiguous tissue. The cubic volumes, over which the SAR measurements are averaged after extrapolation and interpolation, are chosen in order to include the highest values of local SAR.

The maximum SAR level for the DUT will be the maximum level obtained of the performed measurements, and indicated in the previous points.

2.6. System Validation

Prior to the SAR measurements, system verification is done to verify the system accuracy. A complete SAR evaluation is done using a half-wavelength dipole as source with the frequency of the mid-band channel of the operating band, or within 10% of this channel.

The measured 1 gr. and 10 gr. SAR should be within 10% of the expected target values specified in the calibration certificate of the dipole, for the specific tissue and frequency used.

3. UNCERTAINTY

According to FCC OET KDB 865664 D01 - SAR Measurement Requirements for 100 MHz to 6 GHz v01r04 (August 2015), as the highest measured 1-g SAR has been < 1.5 W/kg, SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in the actual SAR report, but it has been included for ISO 17025 accreditation.

Uncertainty for 300 MHz – 3 GHz

ERROR SOURCES	Uncertainty value (± %)	Probability distribution	Divisor	(ci) 1g	(ci) 10g	Standard uncertainty (1g) (± %)	Standard uncertainty (10g) (± %)
Measurement Equipment							
Probe Calibration	6.650	6.650	N	1	1	1	6.650
Axial Isotropy	3.500	3.500	R	√3	0.7	0.7	1.415
Hemispherical Isotropy	2.320	2.320	R	√3	0.7	0.7	0.938
Boundary effect	1.000	1.000	R	√3	1	1	0.577
Linearity	4.700	4.700	R	√3	1	1	2.714
System Detection limits	0.250	0.250	R	√3	1	1	0.144
Probe modulation response	4.800	4.800	N	1	1	1	4.800
Readout electronics	0.300	0.300	N	1	1	1	0.300
Response time	1.010	1.010	R	√3	1	1	0.583
Integration time	2.600	2.600	R	√3	1	1	1.501
RF Ambient noise	3.000	3.000	R	√3	1	1	1.732
RF Ambient reflections	3.000	3.000	R	√3	1	1	1.732
Probe positioner mech. restrictions	0.400	0.400	R	√3	1	1	0.231
Probe positioning with respect to phantom shell	2.900	2.900	R	√3	1	1	1.674
Max. SAR Eval.	2.000	2.000	R	√3	1	1	1.155
Test Sample Related							
Device holder uncertainty	2.900	N	1	1	1	2.900	2.900
Test sample positioning	3.600	N	1	1	1	3.600	3.600
Drift of output power	5.000	R	√3	1	1	2.887	2.887
Phantom and Setup							
Phantom uncertainty (shape and thickness tolerances)	6.100	R	√3	1	1	3.522	3.522
Algorithm for correcting SAR for deviations in permittivity and conductivity	1.900	R	√3	1	0.84	1.097	0.921
Liquid conductivity (meas.)	2.454	N	1	0.78	0.71	1.914	1.742
Liquid permittivity (meas.)	2.454	N	1	0.26	0.26	0.638	0.638
Liquid conductivity – temperature uncertainty	5.220	R	√3	0.78	0.71	2.351	2.140
Liquid permittivity – temperature uncertainty	0.840	R	√3	0.23	0.26	0.112	0.126
Combined standard uncertainty	$u_c = \sqrt{\sum_{i=1}^m c_i^2 \cdot u_i^2}$					12.00	11.92
Expanded uncertainty (confidence interval of 95%)	$u_e = 2.00 u_c$					24.00	23.84

Table 1: Uncertainty Assessment for 300 MHz - 3 GHz.

Uncertainty for 3 GHz – 6 GHz

ERROR SOURCES	Uncertainty value (± %)	Probability distribution	Divisor	(c _i) 1g	(c _i) 10g	Standard uncertainty (1g) (± %)	Standard uncertainty (10g) (± %)
Measurement Equipment							
Probe Calibration	7.000	N	1	1	1	7.000	7.000
Axial Isotropy	3.500	R	√3	0.7	0.7	1.415	1.415
Hemisfericall Isotropy	2.320	R	√3	0.7	0.7	0.938	0.938
Boundary effect	2.000	R	√3	1	1	1.155	1.155
Linearity	4.700	R	√3	1	1	2.714	2.714
System Detection limits	0.250	R	√3	1	1	0.144	0.144
Probe modulation response	4.800	N	1	1	1	4.800	4.800
Readout electronics	0.300	N	1	1	1	0.300	0.300
Response time	1.010	R	√3	1	1	0.583	0.583
Integration time	2.600	R	√3	1	1	1.501	1.501
RF Ambient noise	3.000	R	√3	1	1	1.732	1.732
RF Ambient reflections	3.000	R	√3	1	1	1.732	1.732
Probe positioner mech. restrictions	0.400	R	√3	1	1	0.231	0.231
Probe positioning with respect to phantom shell	6.700	R	√3	1	1	3.868	3.868
Max. SAR Eval.	4.000	R	√3	1	1	2.309	2.309
Test Sample Related							
Device holder uncertainty	2.900	N	1	1	1	2.900	2.900
Test sample positioning	3.600	N	1	1	1	3.600	3.600
Drift of output power	5.000	R	√3	1	1	2.887	2.887
Phantom and Setup							
Phantom uncertainty (shape and thickness tolerances)	6.600	R	√3	1	1	3.811	3.811
Algorithm for correcting SAR for deviations in permittivity and conductivity	1.900	R	√3	1	0.84	1.097	0.921
Liquid conductivity (meas.)	2.454	N	1	0.78	0.71	1.914	1.742
Liquid permittivity (meas.)	2.454	N	1	0.26	0.26	0.638	0.638
Liquid conductivity – temperature uncertainty	3.360	R	√3	0.78	0.71	1.513	1.377
Liquid permittivity – temperature uncertainty	0.780	R	√3	0.23	0.26	0.104	0.117
Combined standard uncertainty	$u_c = \sqrt{\sum_{i=1}^m c_i^2 \cdot u_i^2}$					12.84	12.79
Expanded uncertainty (confidence interval of 95%)	$ue = 2.00 u_c$					25.68	25.57

Table 2: Uncertainty Assessment for 3 GHz - 6 GHz.

4. SAR LIMIT

Having a worst case measurement, the SAR limit is valid for general population/uncontrolled exposure.

The SAR values have to be averaged over a mass of 1 gr. (SAR 1 gr.) with the shape of a cube and averaged over a mass of 10 gr (Extremity SAR 10 gr). These levels could not exceed the values indicated in the application Standard:

Standard	Exposure	SAR	SAR Limit (W/kg)
FCC 47 CFR Part 1.1310, Paragraph (c)	General population/Uncontrolled	SAR 1-g.	1.6
FCC 47 CFR Part 1.1310, Paragraph (c)	General population/Uncontrolled Extremity	SAR 10-g.	4.0

Table 3: SAR limit

5. DEVICE UNDER TEST

5.1. Dimensions

Dimensions	Millimetres
Length x Width x Height	155.0 x 105.0 x 20.0
Length x Width x Height (including ext antenna)	155.0 x 105.0 x 90.0

Table 4: Dimensions

5.2. Wireless Technology

Wireless Technology	SAR Testing	Frequency Bands	Modes
GSM	Required	850 / 1900	- Voice (GMSK) - GPRS (GMSK, Multi-slot class 33) - EGPRS (8PSK, Multi-slot class 33)
W-CDMA	Required	II/IV/V	- UMTS Rel. 99 - HSDPA (Rel. 5) - HSPA (Rel. 6) - HSPA+ (Rel. 7) - DC-HSDPA (Rel. 8)
LTE	Required	2/4/5/7/12/13/17	- QPSK and 16-QAM (Rel. 9)
Wi-Fi	Required	2.4 GHz	- 802.11b/g/n20/n40/ac20
	Required	5 GHz	- 802.11a/n20/n40/ac80
Bluetooth	Not Required*	2.4 GHz	- Bluetooth LE

Table 5: Supported modes

* See Appendix B section 2.5. Bluetooth of this document for more details

5.3. Simultaneous Transmission

Simultaneous transmission evaluation was performed according to FCC OET KDB 447498 D01 General RF Exposure Guidance v06 (October 2015). The detailed simultaneous transmission combination is:

Capable Transmit Configurations
WWAN+WLAN+BT

Table 6: Simultaneous transmission

5.4. Antenna Location

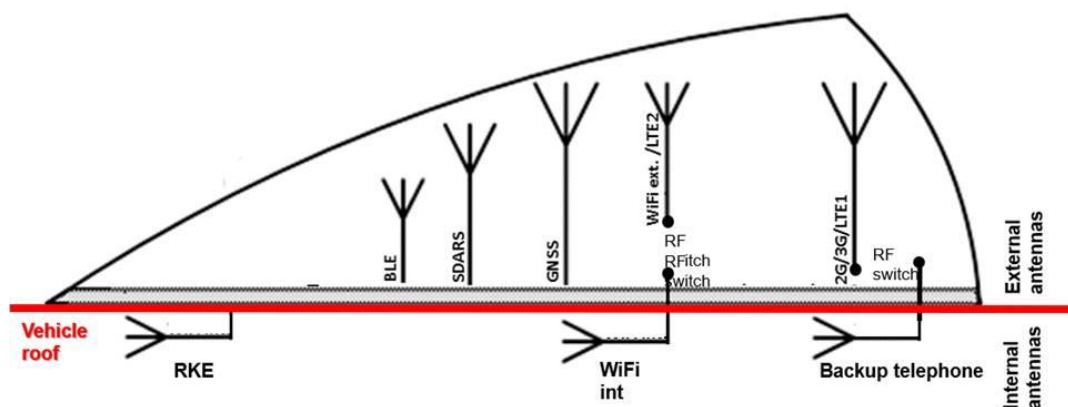


Figure 3: Antenna diagram location sketch

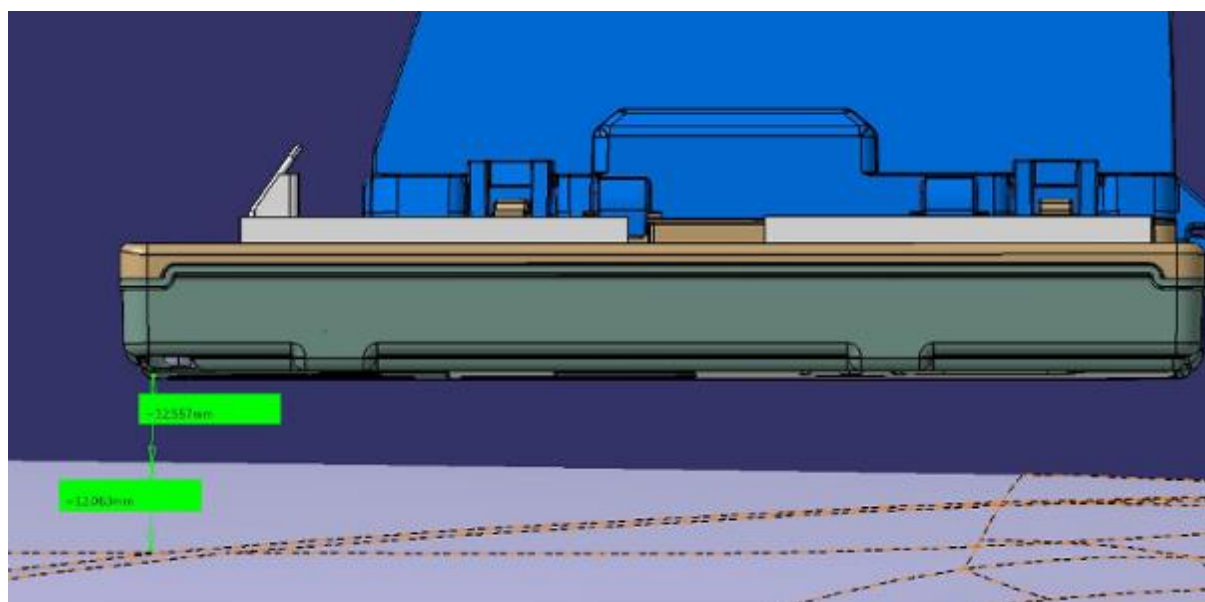


Figure 4: Minimum distance between the device and interior roof surface of the car.

Appendix B: Test results

INDEX

1. TEST CONDITIONS	21
1.1. Power supply (V):.....	21
1.2. Temperature (°C):	21
1.3. Test signal, Output Power and Frequencies.....	21
1.4. DUT and test-site configurations	22
2. CONDUCTED AVERAGE POWER MEASUREMENTS	23
2.1. GSM/GPRS/EGPRS Bands	23
2.2. WCDMA/HSDPA/HSPA/HSPA+ Bands	25
2.3. LTE Bands.	30
2.4. Wi-Fi	43
2.5. Bluetooth.....	45
3. TISSUE PARAMETERS MEASUREMENTS.....	46
4. SYSTEM CHECK MEASUREMENTS	48
4.1. Validation results for Head TSL.....	48
5. MEASUREMENT RESULTS FOR SAR (SPECIFIC ABSORPTION RATE)	49
5.1. Summary maximum results for 1-g Head SAR measurements.....	49
5.2. Result for simultaneous multi-band transmission	49
5.3. Results for GPRS 850 MHz band – 2 slots.....	50
5.4. Results for GPRS 1900 MHz Band – 2 slots.	50
5.5. Results for WCDMA Band II.....	51
5.6. Results for WCDMA Band IV	51
5.7. Results for WCDMA Band V	52
5.8. Results for LTE Band 2 (1 RB, 20 MHz, QPSK)	52
5.9. Results for LTE Band 2 (50% RB, 20 MHz, QPSK).....	53
5.10. Results for LTE Band 4 (1 RB, 20 MHz, QPSK)	53
5.11. Results for LTE Band 4 (50% RB, 20 MHz, QPSK).....	54
5.12. Results for LTE Band 5 (1 RB, 10 MHz, QPSK)	54
5.13. Results for LTE Band 5 (50% RB, 10 MHz, QPSK).....	55
5.14. Results for LTE Band 7 (1 RB, 20 MHz, QPSK)	55
5.15. Results for LTE Band 7 (50% RB, 20 MHz, QPSK).....	56
5.16. Results for LTE Band 12 (1 RB, 10 MHz, QPSK)	56
5.17. Results for LTE Band 12 (50% RB, 10 MHz, QPSK).....	57
5.18. Results for LTE Band 13 (1 RB, 10 MHz, QPSK)	57
5.19. Results for LTE Band 13 (50% RB, 10 MHz, QPSK).....	58
5.20. Results for LTE Band 17 (1 RB, 10 MHz, QPSK)	58
5.21. Results for Wi-Fi 2450 MHz Band	59
5.22. Results for Wi-Fi 5200 MHz Band	59
5.23. Results for Wi-Fi 5800 MHz Band	60
5.24. Variability results.....	60

1. TEST CONDITIONS

1.1. Power supply (V):

$V_n = 12 \text{ V}$

Type of power supply = DC Voltage from power supply.

1.2. Temperature (°C):

$T_n = +20.00 \text{ to } +25.00$

The subscript n indicates normal test conditions.

1.3. Test signal, Output Power and Frequencies

The sample was put into operation by using a R&S CMW 500 as base station simulator. The output power of the device was set to Power Control Level (PCL) maximum for all tests.

For the 802.11a/b/g/n/ac modes, the device was put into operation by using a manufacturer proprietary test mode, setting the maximum output power for each mode. The duty factor was set to maximum (aprox. 100%).

In all operating bands and test positions, the measurements were performed on middle, lowest and highest channels.

The actual SAR sample does not have accessible antenna connectors for conducted measurements, so the conducted average output power was measured using others identical samples (M/01) provided by the manufacturer with auxiliary external connectors that makes the measurements representative and applicable for all the tested samples. See 'usage of samples' paragraph of this report.

The maximum conducted time-averaged power of the device for each mode was measured with a power sensor R&S NRP-Z81.

The target power alignments, including tune-up tolerance, for RF components declared by the manufacturer for each supported technology are:

Band	Burst Averaged Output Power (dBm)				Frame Averaged Output Power (dBm)			
	1 Tx slot	2 Tx slots	3 Tx slots	4 Tx Slots	1 Tx slot	2 Tx slots	3 Tx slots	4 Tx slots
GSM/GPRS 850	33.50	32.00	30.00	29.00	24.47	25.98	25.74	25.99
E-GPRS 850	27.50	25.50	24.50	23.50	18.47	19.48	20.24	20.49
GSM/GPRS 1900	30.50	29.00	27.00	26.00	21.47	22.98	22.74	22.99
E-GPRS 1900	26.50	24.50	23.50	22.50	17.47	18.48	19.24	19.49

Output Power (dBm)	Transmission Mode		
	WCDMA II	WCDMA IV	WCDMA V
Maximum	24.5	24.5	24.5

Output Power (dBm)	Transmission Mode						
	LTE B2	LTE B4	LTE B5	LTE B7	LTE B12	LTE B13	LTE B17
Maximum	24.0	24.0	24.0	24.0	24.0	24.0	24.0

Band	Output Power (dBm)	Transmission Mode				
		802.11b	802.11g	802.11n20	802.11n40	Bluetooth LE
2.4 GHz	Maximum	18.5	17.5	16.5	14.5	4.0

Band	Output Power (dBm)	Transmission Mode			
		802.11a	802.11n20/ac20	802.11n40/ac40	802.11ac80
5 GHz	Maximum	14.5	14.5	13.5	11.5

1.4. DUT and test-site configurations

For all supported modes, a test separation distance between the back face of the DUT and flat phantom surface of 24 mm was set to perform measurements.

2. CONDUCTED AVERAGE POWER MEASUREMENTS

2.1. GSM/GPRS/EGPRS Bands

- GPRS 850: For data mode. PCL 5, CS1 coding scheme and Gamma 3 were set to allow DUT's max power transmission for each slot.

GPRS 850 - Frame Average Output Power							
Channel Number	Frequency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slots	Power (dBm) 3 Slots	Power (dBm) 4 Slots	PCL	Modulation
128	824.2	23.1	24.6	24.5	24.5	5	GMSK-CS1
190	836.6	23.1	24.6	24.4	24.3	5	GMSK-CS1
251	848.8	23.0	24.5	24.4	24.3	5	GMSK-CS1

GPRS 850 - Average Burst Output Power							
Channel Number	Frequency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slots	Power (dBm) 3 Slots	Power (dBm) 4 Slots	PCL	Modulation
128	824.2	32.2	30.7	28.7	27.5	5	GMSK-CS1
190	836.6	32.1	30.6	28.6	27.4	5	GMSK-CS1
251	848.8	32.0	30.5	28.6	27.3	5	GMSK-CS1

- EGPRS 850: For data mode. PCL 8, MCS5 coding scheme and Gamma 6 were set to allow DUT's max power transmission for each slot.

EDGE 850 - Frame Average Output Power							
Channel Number	Frequency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slots	Power (dBm) 3 Slots	Power (dBm) 4 Slots	PCL	Modulation
128	824.2	17.0	18.7	18.7	18.8	8	8PSK-MCS5
190	836.6	16.8	18.6	18.7	18.7	8	8PSK-MCS5
251	848.8	16.8	18.5	18.6	18.7	8	8PSK-MCS5

EDGE 850 - Average Burst Output Power							
Channel Number	Frequency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slots	Power (dBm) 3 Slots	Power (dBm) 4 Slots	PCL	Modulation
128	824.2	26.0	24.7	23.0	21.9	8	8PSK-MCS5
190	836.6	25.9	24.6	23.0	21.8	8	8PSK-MCS5
251	848.8	25.8	24.5	22.8	21.7	8	8PSK-MCS5

- GPRS1900: For data mode. PCL 0, CS1 coding scheme and Gamma 3 were set to allow max power transmission for each slot.

GPRS 1900 - Frame Average Output Power							
Channel Number	Frequency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slots	Power (dBm) 3 Slots	Power (dBm) 4 Slots	PCL	Modulation
512	1850.2	20.9	22.6	22.6	21.4	0	GMSK-CS1
661	1880.0	20.9	22.3	22.3	21.1	0	GMSK-CS1
810	1909.8	20.5	22.2	21.9	20.6	0	GMSK-CS1

GPRS 1900 - Average Burst Output Power							
Channel Number	Frequency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slots	Power (dBm) 3 Slots	Power (dBm) 4 Slots	PCL	Modulation
512	1850.2	29.9	28.6	26.9	24.4	0	GMSK-CS1
661	1880.0	29.9	28.3	26.6	24.1	0	GMSK-CS1
810	1909.8	29.5	28.2	26.1	23.6	0	GMSK-CS1

- EGPRS 1900: For data mode, PCL 2, MCS5 coding scheme and Gamma 5 were set to allow max power transmission for each slot.

EDGE 1900 - Frame Average Output Power							
Channel Number	Frequency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slots	Power (dBm) 3 Slots	Power (dBm) 4 Slots	PCL	Modulation
512	1850.2	16.3	18.3	18.0	17.8	2	8PSK-MCS5
661	1880.0	16.6	18.6	18.3	18.1	2	8PSK-MCS5
810	1909.8	16.3	18.2	18.0	17.7	2	8PSK-MCS5

EDGE 1900 - Average Burst Output Power							
Channel Number	Frequency (MHz)	Power (dBm) 1 Slot	Power (dBm) 2 Slots	Power (dBm) 3 Slots	Power (dBm) 4 Slots	PCL	Modulation
512	1850.2	25.3	24.3	22.3	20.8	2	8PSK-MCS5
661	1880.0	25.7	24.6	22.6	21.1	2	8PSK-MCS5
810	1909.8	25.3	24.2	22.3	20.8	2	8PSK-MCS5

2.2. WCDMA/HSDPA/HSPA/HSPA+ Bands

- **WCDMA:** The DUT supports power Class 3, with a nominal maximum output power of 24 dBm. Tests were completed according to 3GPP TS34.121, section 5.

Mode	Subtest	Rel99
WCDMA	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2Kbps RMC
	Power Control Algorithm	Algorithm2
	β_c/β_d	8/15

Band	Mode	Channel Number	Frequency (MHz)	Average Output Power (dBm)
FDD II 1900	WCDMA	9262	1852.4	24.02
FDD II 1900	WCDMA	9400	1880.0	23.84
FDD II 1900	WCDMA	9538	1907.6	23.79

Band	Mode	Channel Number	Frequency (MHz)	Average Output Power (dBm)
FDD IV 1700	WCDMA	1312	1712.4	24.08
FDD IV 1700	WCDMA	1412	1732.6	24.21
FDD IV 1700	WCDMA	1512	1752.6	24.22

Band	Mode	Channel Number	Frequency (MHz)	Average Output Power (dBm)
FDD V 850	WCDMA	4132	826.4	23.91
FDD V 850	WCDMA	4182	836.4	23.82
FDD V 850	WCDMA	4233	846.6	23.85

- **HSDPA:**

Mode	Subtest	1	2	3	4
HSDPA	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2Kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	HSUPA Loopback			
	Power Control Algorithm	Algorithm 2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64	64	64	64
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	MPR	0	0	0.5	0.5
	Dack	8			
	Dnak	8			
	Ack-Nack repetition factor	3			
	DCQI	8			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = β_{hs}/β_c	30/15			

				Average Output Power (dBm)			
Band	Mode	Channel Number	Frequency (MHz)	Subtest			
				1	2	3	4
FDD II 1900	HSDPA	9262	1852.4	23.09	23.07	22.55	22.54
FDD II 1900	HSDPA	9400	1880.0	22.87	22.85	22.41	22.42
FDD II 1900	HSDPA	9538	1907.6	22.69	22.67	22.17	22.20

				Average Output Power (dBm)			
Band	Mode	Channel Number	Frequency (MHz)	Subtest			
				1	2	3	4
FDD IV 1700	HSDPA	1312	1712.4	22.90	22.88	22.33	22.36
FDD IV 1700	HSDPA	1412	1732.6	23.16	23.11	22.54	22.53
FDD IV 1700	HSDPA	1512	1752.6	23.16	23.12	22.61	22.60

				Average Output Power (dBm)			
Band	Mode	Channel Number	Frequency (MHz)	Subtest			
				1	2	3	4
FDD V 850	HSDPA	4132	826.4	22.80	22.77	22.31	22.37
FDD V 850	HSDPA	4182	836.4	22.76	22.73	22.27	22.32
FDD V 850	HSDPA	4233	846.6	22.79	22.81	22.28	22.34

- **HSPA:**

Mode	Subtest	1	2	3	4	5
HSPA	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2Kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm 2				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	15/15
	β_{ec}	209/225	12/15	30/15	2/15	24/15
	β_c/β_d	11/15	6/15	15/9	2/15	15/15
	β_{hs}	22/15	12/15	30/15	4/15	30/15
	β_{ed}	1309/225	94/75	47/15	56/75	134/15
	MPR (dB)	0	2	1	2	0
	Dack	8				
	Dnak	8				
	Ack-Nack repetition factor	3				
	DCQI	8				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	Ahs = β_{hs}/β_c	30/15				
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL DataRate Kbps	242.1	174.9	482.8	205.8	308.9

				Average Output Power (dBm)				
Band	Mode	CH	Frequency (MHz)	Subtest				
				1	2	3	4	5
FDD II 1900	HSPA	9262	1852.4	22.95	22.47	23.07	23.04	23.09
FDD II 1900	HSPA	9400	1880.0	22.89	22.38	22.98	22.90	23.04
FDD II 1900	HSPA	9538	1907.6	22.70	22.20	22.76	22.72	22.81

				Average Output Power (dBm)				
Band	Mode	CH	Frequency (MHz)	Subtest				
				1	2	3	4	5
FDD IV 1700	HSPA	1312	1712.4	22.84	22.17	22.89	22.85	22.93
FDD IV 1700	HSPA	1412	1732.6	23.17	22.64	23.04	23.02	23.19
FDD IV 1700	HSPA	1512	1752.6	23.22	22.62	23.13	23.12	23.34

				Average Output Power (dBm)				
Band	Mode	CH	Frequency (MHz)	Subtest				
				1	2	3	4	5
FDD V 850	HSPA	4132	826.4	22.75	22.24	22.82	22.81	22.84
FDD V 850	HSPA	4182	836.4	22.74	22.21	22.80	22.71	22.83
FDD V 850	HSPA	4233	846.6	22.76	22.24	22.81	22.82	22.85

- HSPA+

Mode	Subtest	1
HSPA+	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2Kbps RMC
	HSDPA FRC	H-Set1
	HSUPA Test	HSUPA Loopback
	Power Control Algorithm	Algorithm 2
	β_c	1
	β_d	0
	β_{ec}	30/15
	β_{hs}	30/15
	β_{ed} (2xSF2)	β_{ed1} : 30/15 β_{ed2} : 30/15
	β_{ed} (2xSF4)	β_{ed3} : 24/15 β_{ed4} : 24/15
	CM (dB)	3.5
	MPR (dB)	2.5
	D E-DPCCH	7
	AG Index	14
	ETFCI	105

The DUT doesn't support 16QAM for uplink, so the uplink category and release was the same as HSPA, therefore the RF conducted power for HSPA+ was not measured.

Band	Mode	Channel Number	Frequency (MHz)	Average Output Power (dBm)
FDD II 1900	HSPA+	9262	1852.4	22.98
FDD II 1900	HSPA+	9400	1880.0	22.85
FDD II 1900	HSPA+	9538	1907.6	22.65

Band	Mode	Channel Number	Frequency (MHz)	Average Output Power (dBm)
FDD IV 1700	HSPA+	1312	1712.4	22.86
FDD IV 1700	HSPA+	1412	1732.6	23.20
FDD IV 1700	HSPA+	1512	1752.6	23.07

Band	Mode	Channel Number	Frequency (MHz)	Average Output Power (dBm)
FDD V 850	HSPA+	4132	826.4	22.88
FDD V 850	HSPA+	4182	836.4	22.77
FDD V 850	HSPA+	4233	846.6	22.79

- DC-HSDPA

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2 Kbps RMC			
	HSDPA FRC	H-Set 12			
	Power Control Algorithm	Algorithm 2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	CM (dB)	0	1	1.5	1.5
	MPR	0.0	0.0	0.5	0.5
HSDPA Specific Settings	Dack	8			
	Dnak	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = β_{hs}/β_c	30/15			

Band	Mode	Channel Number	Frequency (MHz)	Average Output Power (dBm)			
				Subtest			
				1	2	3	4
FDD II 1900	DC-HSDPA	9262	1852.4	22.61	22.59	22.63	22.51
FDD II 1900	DC-HSDPA	9400	1880.0	22.47	22.44	22.40	22.29
FDD II 1900	DC-HSDPA	9538	1907.6	22.29	22.27	22.26	22.15

Band	Mode	Channel Number	Frequency (MHz)	Average Output Power (dBm)			
				Subtest			
				1	2	3	4
FDD IV 1700	DC-HSDPA	1312	1712.4	22.47	22.53	22.41	22.25
FDD IV 1700	DC-HSDPA	1412	1732.6	22.70	22.68	23.10	22.46
FDD IV 1700	DC-HSDPA	1512	1752.6	22.54	22.58	22.71	22.48

Band	Mode	Channel Number	Frequency (MHz)	Average Output Power (dBm)			
				Subtest			
				1	2	3	4
FDD V 850	DC-HSDPA	4132	826.4	22.33	22.32	22.32	22.15
FDD V 850	DC-HSDPA	4182	836.4	22.25	22.20	22.17	22.04
FDD V 850	DC-HSDPA	4233	846.6	22.24	22.22	22.23	21.90

2.3. LTE Bands.

LTE MPR is permanently implemented for the device. A-MPR was disabled for all SAR tests. The following power reductions are used for higher RB allocations and 16-QAM modulation:

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
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

- LTE B2

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH 1860.0 MHz	Mid CH 1880.0 MHz	High CH 1900.0 MHz
LTE B2	20 MHz	QPSK	1RB Low	0	22.89	23.08	23.50
			1RB Mid	0	23.43	23.71	23.51
			1RB High	0	23.03	23.20	22.83
			50% Low	1	22.33	22.33	22.47
			50% Mid	1	22.36	22.39	22.31
			50% High	1	22.26	22.20	22.14
			100%	1	22.41	22.25	22.30
		16-QAM	1RB Low	1	22.42	22.34	23.17
			1RB Mid	1	22.10	23.13	22.28
			1RB High	1	21.66	22.37	21.77
			50% Low	2	21.53	21.20	21.35
			50% Mid	2	21.37	21.35	21.27
			50% High	2	21.23	21.17	20.92
			100%	2	21.41	21.16	21.18
Band	BW	Modulation	Mode	MPR	Low CH 1857.5 MHz	Mid CH 1880.0 MHz	High CH 1902.5 MHz
LTE B2	15 MHz	QPSK	1RB Low	0	22.92	22.98	23.23
			1RB Mid	0	23.57	23.64	23.55
			1RB High	0	23.07	22.87	22.98
			50% Low	1	22.39	22.32	22.37
			50% Mid	1	22.40	22.36	22.36
			50% High	1	22.18	22.24	22.10
			100%	1	22.34	22.18	22.29
		16-QAM	1RB Low	1	22.41	22.17	22.97
			1RB Mid	1	22.75	22.61	22.41
			1RB High	1	21.66	22.13	21.61
			50% Low	2	21.26	21.38	21.26
			50% Mid	2	21.28	21.24	21.21
			50% High	2	21.13	21.15	20.96
			100%	2	21.23	21.14	21.09

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					1855.0 MHz	1880.0MHz	1905.0 MHz
LTE B2	10 MHz	QPSK	1RB Low	0	23.25	23.18	23.19
			1RB Mid	0	23.55	23.38	23.29
			1RB High	0	23.21	22.98	22.98
			50% Low	1	22.31	22.37	22.31
			50% Mid	1	22.38	22.34	22.29
			50% High	1	22.24	22.26	22.08
			100%	1	22.28	22.20	22.22
		16-QAM	1RB Low	1	22.83	22.73	22.13
			1RB Mid	1	22.59	22.33	22.92
			1RB High	1	21.85	21.43	22.41
			50% Low	2	21.32	21.03	21.41
			50% Mid	2	21.51	21.41	21.36
			50% High	2	21.36	21.36	21.15
			100%	2	21.16	21.18	21.11
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					1852.5 MHz	1880.0 MHz	1907.5 MHz
LTE B2	5 MHz	QPSK	1RB Low	0	23.06	22.78	22.87
			1RB Mid	0	23.47	22.98	23.12
			1RB High	0	23.09	23.01	22.89
			50% Low	1	22.22	22.26	22.13
			50% Mid	1	22.30	22.37	22.12
			50% High	1	22.37	22.35	22.12
			100%	1	22.36	22.28	22.20
		16-QAM	1RB Low	1	21.91	22.35	22.22
			1RB Mid	1	22.28	22.40	22.16
			1RB High	1	22.05	21.94	21.82
			50% Low	2	21.17	20.98	20.99
			50% Mid	2	21.42	21.02	20.83
			50% High	2	21.50	20.98	20.80
			100%	2	21.39	21.14	21.11

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					1851.5 MHz	1880.0 MHz	1908.5 MHz
LTE B2	3 MHz	QPSK	1RB Low	0	23.25	23.03	22.98
			1RB Mid	0	23.50	23.39	23.30
			1RB High	0	23.47	23.44	23.03
			50% Low	1	22.33	22.30	22.22
			50% Mid	1	22.35	22.31	22.18
			50% High	1	22.39	22.29	22.11
			100%	1	22.30	22.30	22.16
		16-QAM	1RB Low	1	22.74	22.35	21.99
			1RB Mid	1	22.44	22.27	22.32
			1RB High	1	22.32	22.20	22.21
			50% Low	2	21.36	20.96	21.34
			50% Mid	2	21.37	21.35	21.13
			50% High	2	21.33	21.32	21.06
			100%	2	21.14	21.16	21.04
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					1850.7 MHz	1880.0 MHz	1909.3 MHz
LTE B2	1.4 MHz	QPSK	1RB Low	0	23.36	23.10	22.77
			1RB Mid	0	23.40	23.24	22.89
			1RB High	0	23.41	23.19	22.79
			50% Low	1	23.36	23.20	22.93
			50% Mid	1	23.41	23.22	23.02
			50% High	1	23.41	23.39	23.15
			100%	1	22.37	22.30	22.04
		16-QAM	1RB Low	1	22.35	22.60	21.84
			1RB Mid	1	22.24	22.35	22.43
			1RB High	1	22.29	22.17	22.43
			50% Low	2	22.41	22.15	22.20
			50% Mid	2	22.44	22.37	22.12
			50% High	2	22.60	22.46	22.00
			100%	2	21.66	21.14	20.89

- **LTE B4**

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					1720.0 MHz	1732.5 MHz	1745.0 MHz
LTE B4	20 MHz	QPSK	1RB Low	0	22.94	23.50	23.57
			1RB Mid	0	23.03	23.73	23.63
			1RB High	0	22.90	23.41	23.29
			50% Low	1	22.42	22.25	22.63
			50% Mid	1	22.32	22.36	22.51
			50% High	1	22.33	22.45	22.24
			100%	1	22.46	22.27	22.49
		16-QAM	1RB Low	1	22.64	22.49	23.44
			1RB Mid	1	21.88	22.83	22.58
			1RB High	1	21.73	22.53	22.25
			50% Low	2	21.52	21.20	21.71
			50% Mid	2	21.35	21.36	21.46
			50% High	2	21.22	21.43	21.11
			100%	2	21.45	21.19	21.59
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE B4	15 MHz	QPSK	1RB Low	0	23.25	23.03	23.25
			1RB Mid	0	23.09	23.61	23.31
			1RB High	0	23.34	23.39	23.05
			50% Low	1	22.43	22.32	22.62
			50% Mid	1	22.33	22.35	22.34
			50% High	1	22.35	22.39	22.23
			100%	1	22.42	22.17	22.47
		16-QAM	1RB Low	1	23.03	22.99	22.75
			1RB Mid	1	22.48	22.41	22.55
			1RB High	1	21.92	21.70	21.94
			50% Low	2	21.52	21.04	21.63
			50% Mid	2	21.26	21.42	21.36
			50% High	2	21.20	21.48	21.23
			100%	2	21.48	21.17	21.45

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					1715.0 MHz	1732.5MHz	1750.0 MHz
LTE B4	10 MHz	QPSK	1RB Low	0	23.21	22.99	23.27
			1RB Mid	0	23.37	23.33	23.13
			1RB High	0	23.23	23.13	23.23
			50% Low	1	22.44	22.14	22.34
			50% Mid	1	22.39	22.26	22.26
			50% High	1	22.29	22.29	22.19
			100%	1	22.45	22.21	22.37
		16-QAM	1RB Low	1	22.81	22.75	22.34
			1RB Mid	1	22.40	22.42	22.85
			1RB High	1	21.71	22.09	22.21
			50% Low	2	21.58	21.05	21.47
			50% Mid	2	21.41	21.46	21.33
			50% High	2	21.25	21.51	21.18
			100%	2	21.43	21.19	21.27
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					1712.5 MHz	1732.5MHz	1752.5 MHz
LTE B4	5 MHz	QPSK	1RB Low	0	23.07	22.72	22.91
			1RB Mid	0	23.07	23.11	23.20
			1RB High	0	22.97	23.22	23.34
			50% Low	1	22.39	22.13	22.41
			50% Mid	1	22.22	22.26	22.25
			50% High	1	22.16	22.32	22.37
			100%	1	22.39	22.12	22.43
		16-QAM	1RB Low	1	21.78	22.48	22.04
			1RB Mid	1	21.95	21.93	22.20
			1RB High	1	21.81	21.42	22.11
			50% Low	2	21.20	21.02	21.15
			50% Mid	2	20.94	21.28	21.17
			50% High	2	21.11	21.20	21.16
			100%	2	21.28	21.08	21.21

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					1711.5 MHz	1732.5MHz	1753.5 MHz
LTE B4	3 MHz	QPSK	1RB Low	0	23.07	23.06	22.96
			1RB Mid	0	22.96	23.28	23.41
			1RB High	0	23.11	23.32	23.26
			50% Low	1	22.45	22.23	22.28
			50% Mid	1	22.34	22.32	22.24
			50% High	1	22.28	22.35	22.32
			100%	1	22.40	22.29	22.29
		16-QAM	1RB Low	1	22.84	22.79	22.38
			1RB Mid	1	22.29	22.23	22.77
			1RB High	1	21.88	22.17	22.70
			50% Low	2	21.43	21.08	21.62
			50% Mid	2	21.36	21.36	21.29
			50% High	2	21.31	21.35	21.29
			100%	2	21.41	21.10	21.30
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					1710.7 MHz	1732.5MHz	1754.3 MHz
LTE B4	1.4 MHz	QPSK	1RB Low	0	23.08	23.17	23.04
			1RB Mid	0	23.08	23.19	23.18
			1RB High	0	23.11	23.21	23.16
			50% Low	1	23.41	23.15	23.30
			50% Mid	1	23.47	23.19	23.47
			50% High	1	23.38	23.20	23.49
			100%	1	22.49	22.22	22.36
		16-QAM	1RB Low	1	22.15	22.59	22.92
			1RB Mid	1	22.46	22.23	22.45
			1RB High	1	22.73	22.21	22.20
			50% Low	2	22.45	22.34	22.14
			50% Mid	2	22.37	22.09	22.17
			50% High	2	22.26	22.11	22.25
			100%	2	21.47	21.10	21.34

- **LTE B5**

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					829.0 MHz	836.5 MHz	844.0 MHz
LTE B5	10 MHz	QPSK	1RB Low	0	22.89	22.96	22.80
			1RB Mid	0	23.36	23.32	22.99
			1RB High	0	23.04	22.85	22.60
			50% Low	1	22.03	22.21	21.98
			50% Mid	1	22.45	22.23	21.99
			50% High	1	22.23	22.01	21.90
			100%	1	22.12	22.14	21.94
		16-QAM	1RB Low	1	22.53	22.69	21.92
			1RB Mid	1	22.30	22.29	22.62
			1RB High	1	21.47	21.18	22.16
			50% Low	2	20.97	21.19	21.29
			50% Mid	2	21.27	21.24	21.12
			50% High	2	21.22	20.93	21.00
			100%	2	20.90	21.05	20.92
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					826.5 MHz	836.5 MHz	846.5 MHz
LTE B5	5 MHz	QPSK	1RB Low	0	22.73	22.70	22.65
			1RB Mid	0	23.17	23.08	22.93
			1RB High	0	23.04	22.84	22.75
			50% Low	1	22.00	22.23	21.75
			50% Mid	1	22.07	22.18	21.88
			50% High	1	21.95	22.12	21.85
			100%	1	21.97	22.08	21.74
		16-QAM	1RB Low	1	21.52	22.44	21.71
			1RB Mid	1	21.92	22.32	21.84
			1RB High	1	21.82	21.93	21.50
			50% Low	2	20.68	21.04	20.63
			50% Mid	2	20.96	20.97	20.60
			50% High	2	20.89	20.93	20.55
			100%	2	21.04	20.92	20.64

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					825.5 MHz	836.5 MHz	847.4 MHz
LTE B5	3 MHz	QPSK	1RB Low	0	22.95	22.88	22.66
			1RB Mid	0	23.00	23.25	22.92
			1RB High	0	22.92	23.08	22.71
			50% Low	1	22.07	22.21	21.82
			50% Mid	1	22.11	22.15	21.84
			50% High	1	22.01	22.11	21.78
			100%	1	22.01	22.21	21.71
		16-QAM	1RB Low	1	22.42	22.60	21.86
			1RB Mid	1	22.02	22.18	22.25
			1RB High	1	21.96	21.90	22.27
			50% Low	2	20.89	20.94	20.99
			50% Mid	2	20.94	21.05	20.90
			50% High	2	21.03	21.05	20.82
			100%	2	20.83	20.94	20.77
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					824.7 MHz	836.5 MHz	848.2 MHz
LTE B5	1.4 MHz	QPSK	1RB Low	0	22.83	23.12	22.50
			1RB Mid	0	22.87	23.11	22.65
			1RB High	0	22.90	23.07	22.63
			50% Low	1	22.90	23.14	22.71
			50% Mid	1	23.02	23.18	22.72
			50% High	1	23.09	23.16	22.81
			100%	1	22.07	22.23	21.82
		16-QAM	1RB Low	1	22.05	22.28	22.28
			1RB Mid	1	22.33	22.20	21.97
			1RB High	1	22.30	22.06	21.67
			50% Low	2	22.18	22.29	21.55
			50% Mid	2	22.07	22.00	21.39
			50% High	2	21.91	21.98	21.36
			100%	2	21.04	20.94	20.50

- **LTE B7**

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					2510.0 MHz	2535.0 MHz	2560.0 MHz
LTE B7	20 MHz	QPSK	1RB Low	0	22.68	22.76	22.95
			1RB Mid	0	23.20	22.98	23.29
			1RB High	0	22.71	22.85	22.95
			50% Low	1	22.07	22.15	22.17
			50% Mid	1	22.14	22.12	22.13
			50% High	1	22.03	21.99	21.95
			100%	1	22.01	22.08	22.06
		16-QAM	1RB Low	1	22.49	22.00	22.89
			1RB Mid	1	21.82	22.53	22.29
			1RB High	1	21.47	22.23	21.71
			50% Low	2	20.98	21.19	21.10
			50% Mid	2	21.09	21.06	21.14
			50% High	2	20.86	20.94	20.91
			100%	2	20.91	21.08	21.06
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					2507.5 MHz	2535.0 MHz	2562.5 MHz
LTE B7	15 MHz	QPSK	1RB Low	0	22.91	22.70	22.76
			1RB Mid	0	23.41	22.88	23.40
			1RB High	0	22.99	22.92	22.58
			50% Low	1	22.07	22.12	22.28
			50% Mid	1	22.15	22.13	22.09
			50% High	1	22.06	21.99	21.95
			100%	1	22.01	22.05	22.03
		16-QAM	1RB Low	1	22.53	22.24	22.36
			1RB Mid	1	22.21	22.01	22.31
			1RB High	1	21.77	21.38	21.57
			50% Low	2	20.94	21.00	21.14
			50% Mid	2	21.10	20.94	21.03
			50% High	2	21.04	20.94	20.71
			100%	2	20.94	21.04	20.98

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					2505.0 MHz	2535.0 MHz	2565.0 MHz
LTE B7	10 MHz	QPSK	1RB Low	0	22.91	22.89	22.88
			1RB Mid	0	23.18	23.08	23.18
			1RB High	0	22.92	23.04	23.01
			50% Low	1	22.15	22.08	22.15
			50% Mid	1	22.08	22.12	22.04
			50% High	1	21.97	22.00	21.96
			100%	1	22.13	22.07	22.13
		16-QAM	1RB Low	1	22.50	22.53	22.42
			1RB Mid	1	22.21	22.10	22.65
			1RB High	1	21.60	21.46	22.09
			50% Low	2	20.87	21.11	21.31
			50% Mid	2	21.15	21.21	21.00
			50% High	2	20.95	20.91	20.89
			100%	2	20.93	20.94	21.02
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					2502.5 MHz	2535.0 MHz	2567.5 MHz
LTE B7	5 MHz	QPSK	1RB Low	0	22.67	22.66	22.54
			1RB Mid	0	23.40	22.90	22.90
			1RB High	0	22.91	22.67	22.63
			50% Low	1	21.99	22.03	22.08
			50% Mid	1	22.10	21.95	21.89
			50% High	1	22.09	22.01	21.86
			100%	1	22.04	22.00	21.99
		16-QAM	1RB Low	1	21.63	22.29	22.04
			1RB Mid	1	22.02	22.24	21.62
			1RB High	1	21.76	21.99	21.29
			50% Low	2	20.87	20.90	20.99
			50% Mid	2	20.87	21.06	20.71
			50% High	2	20.80	21.10	20.60
			100%	2	20.91	21.12	20.87

- **LTE B12**

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					-	707.5 MHz	-
LTE B12	10 MHz	QPSK	1RB Low	0	-	22.98	-
			1RB Mid	0	-	23.17	-
			1RB High	0	-	22.99	-
			50% Low	1	-	22.26	-
			50% Mid	1	-	22.20	-
			50% High	1	-	22.16	-
			100%	1	-	22.20	-
		16-QAM	1RB Low	1	-	22.49	-
			1RB Mid	1	-	22.15	-
			1RB High	1	-	21.74	-
			50% Low	2	-	21.06	-
			50% Mid	2	-	21.17	-
			50% High	2	-	21.13	-
			100%	2	-	21.22	-
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					701.5 MHz	707.5 MHz	713.5 MHz
LTE B12	5 MHz	QPSK	1RB Low	0	23.18	22.63	22.77
			1RB Mid	0	23.64	22.95	23.08
			1RB High	0	23.55	22.78	22.96
			50% Low	1	22.22	22.14	22.12
			50% Mid	1	22.18	22.18	22.23
			50% High	1	22.10	22.18	22.13
			100%	1	22.08	22.17	22.08
		16-QAM	1RB Low	1	21.82	22.64	22.02
			1RB Mid	1	21.90	22.43	22.10
			1RB High	1	21.76	21.59	21.90
			50% Low	2	21.01	21.02	20.87
			50% Mid	2	21.34	20.97	20.95
			50% High	2	21.25	20.83	20.82
			100%	2	21.23	21.03	21.10

Note: According to KDB941225 D05 SAR for LTE Devices, for LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					700.5 MHz	707.5 MHz	714.5 MHz
LTE B12	3 MHz	QPSK	1RB Low	0	23.16	22.89	22.92
			1RB Mid	0	23.41	23.04	23.13
			1RB High	0	23.18	23.01	22.89
			50% Low	1	22.24	22.17	22.21
			50% Mid	1	22.27	22.17	22.02
			50% High	1	22.20	22.24	22.08
			100%	1	22.21	22.24	22.19
		16-QAM	1RB Low	1	22.65	22.66	22.00
			1RB Mid	1	22.16	22.27	22.49
			1RB High	1	22.10	21.96	22.36
			50% Low	2	21.17	21.08	21.36
			50% Mid	2	21.24	21.24	21.22
			50% High	2	21.26	21.24	21.20
			100%	2	21.17	21.08	21.17
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					699.7 MHz	707.5 MHz	715.3 MHz
LTE B12	1.4 MHz	QPSK	1RB Low	0	23.08	23.16	22.84
			1RB Mid	0	23.19	23.11	22.91
			1RB High	0	23.16	23.19	22.86
			50% Low	1	23.16	23.22	22.96
			50% Mid	1	23.27	23.27	22.97
			50% High	1	23.16	23.24	23.07
			100%	1	22.22	22.24	22.13
		16-QAM	1RB Low	1	22.24	22.38	22.67
			1RB Mid	1	22.20	22.22	22.16
			1RB High	1	22.08	22.20	21.92
			50% Low	2	21.72	22.29	21.95
			50% Mid	2	22.21	22.09	21.97
			50% High	2	22.11	22.14	21.99
			100%	2	21.10	21.06	21.19

- LTE B13

Band	BW	Modulation	Mode	MPR	Average Output Power (dBm)		
					Low CH	Mid CH	High CH
					-	782.0 MHz	-
LTE B13	10 MHz	QPSK	1RB Low	0	-	22.66	-
			1RB Mid	0	-	22.92	-
			1RB High	0	-	22.73	-
			50% Low	1	-	21.89	-
			50% Mid	1	-	21.91	-
			50% High	1	-	21.79	-
			100%	1	-	21.86	-
		16-QAM	1RB Low	1	-	22.21	-
			1RB Mid	1	-	22.00	-
			1RB High	1	-	21.36	-
			50% Low	2	-	20.94	-
			50% Mid	2	-	20.90	-
			50% High	2	-	20.77	-
			100%	2	-	20.82	-
Band	BW	Modulation	Mode	MPR	Low CH	Mid CH	High CH
					779.5 MHz	782.0 MHz	784.5 MHz
LTE B13	5 MHz	QPSK	1RB Low	0	-	22.61	-
			1RB Mid	0	-	23.17	-
			1RB High	0	-	22.69	-
			50% Low	1	-	21.86	-
			50% Mid	1	-	21.88	-
			50% High	1	-	21.89	-
			100%	1	-	21.75	-
		16-QAM	1RB Low	1	-	21.35	-
			1RB Mid	1	-	21.70	-
			1RB High	1	-	21.25	-
			50% Low	2	-	20.59	-
			50% Mid	2	-	20.77	-
			50% High	2	-	20.79	-
			100%	2	-	20.81	-

Note: According to KDB941225 D05 SAR for LTE Devices, for LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

- LTE B17

Conducted output power for LTE Band 17 has not been measured because it is covered by LTE Band 12 due to overlapping frequency range (LTE Band 17 frequency range: 704 – 716 MHz, LTE Band 12 frequency range: 699 – 716 MHz) and same maximum tune-up and channel bandwidth.

2.4. Wi-Fi

- 2.4 GHz Band:

Band	Mode	Channel / Freq (MHz)	Average Output Power (dBm)
2.4 GHz	802.11b	1/2412	15.49
		6/2437	15.80
		11/2462	16.06
	802.11g	1/2412	13.97
		6/2437	14.42
		11/2462	14.26
	802.11n20	1/2412	13.94
		6/2437	14.49
		11/2462	14.42
	802.11n40	3/2422	12.78
		6/2437	12.86
		9/2452	11.62

- 5 GHz U-NII-1 Band:

Band	Mode	Channel / Freq (MHz)	Average Output Power (dBm)
U-NII-1	802.11a	36/5180	11.25
		40/5200	11.28
		44/5200	11.24
		48/5240	11.19
	802.11n20	36/5180	11.02
		40/5200	11.12
		44/5200	10.99
		48/5240	10.98
	802.11ac20	36/5180	11.07
		40/5200	11.01
		44/5200	10.95
		48/5240	10.97
	802.11n40	38/5190	10.21
		46/5230	10.14
	802.11ac40	38/5190	10.25
		46/5230	12.06
	802.11ac80	42/5210	7.65

- 5 GHz U-NII-3 Band:

Band	Mode	Channel / Freq (MHz)	Average Output Power (dBm)
U-NII-3	802.11a	132/5660	12.04
		149/5745	12.12
		165/5825	11.90
	802.11n20	132/5660	11.87
		149/5745	11.90
		165/5825	11.66
	802.11ac20	132/5660	11.89
		149/5745	11.88
		165/5825	11.65
	802.11n40	134/5670	11.11
		142/5710	10.44
		151/5755	11.18
		159/5795	10.45
	802.11ac40	134/5670	11.18
		142/5710	10.42
		151/5755	11.10
		159/5795	10.43
	802.11ac80	138/5690	10.09
		155/5775	10.29

2.5. Bluetooth

Band	Mode	Channel / Freq (MHz)	Average Output Power (dBm)
2.4 GHz	Bluetooth LE	0 / 2402	-1.0
		39 / 2440	-1.0
		78 / 2480	-1.1

Based on paragraph “4.3.1 Standalone SAR test exclusion considerations” of the KDB 447498 D01 - General RF Exposure Guidance:

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$

Protocol	Max. Declared Output Power		Min. Test separation distance (mm)	Frequency (GHz)	Result	Test Exclusion
	(dBm)	(mW)				
Bluetooth LE	4.0	2.512	24.0	2.402 - 2.480	0.16	√

The computed value for Bluetooth is < 3.0, so Bluetooth mode qualifies for Standalone SAR test exclusion for 1-g SAR and 10-g SAR.

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})/x}] \text{ W/kg for test separation distances } \leq 50 \text{ mm; where } x = 7.5 \text{ for 1-g SAR and } x = 18.75 \text{ for 10-g extremity SAR}$$

Estimated SAR					
Protocol	Max. Output Power		Min. Test separation distance (mm)	Frequency (GHz)	Estimated 1-g SAR
	(dBm)	(mW)			
Bluetooth LE	4.0	2.512	24.0	2.48	0.022

3. TISSUE PARAMETERS MEASUREMENTS

Frequency (MHz)	Target Head Tissue		Measured Head Tissue		Deviation %		Measured Date
	Permittivity ϵ	Conductivity σ [S/m]	Permittivity ϵ	Conductivity σ [S/m]	Permittivity ϵ	Conductivity σ [S/m]	
750	41.94	0.89	40.99	0.89	-2.28	0.07	2021-07-21
835	41.50	0.90	42.49	0.90	2.39	0.02	2021-07-23
900	41.50	0.97	41.82	0.97	0.76	-0.31	2021-07-23
835	41.50	0.90	43.13	0.90	3.94	-0.15	2021-07-26
900	41.50	0.97	41.97	0.97	1.12	-0.52	2021-07-26
1750	40.07	1.37	38.94	1.42	-2.82	3.25	2021-07-27
1800	40.00	1.40	38.72	1.46	-3.21	4.31	2021-07-27
1800	40.00	1.40	39.52	1.36	-1.21	-2.77	2021-07-28
1900	40.07	1.40	39.07	1.43	-2.32	2.39	2021-07-28
2450	39.20	1.80	39.34	1.82	0.36	1.26	2021-07-29
2600	39.00	1.96	38.92	1.95	-0.21	-0.68	2021-07-29
2450	39.20	1.80	39.53	1.83	0.85	1.94	2021-08-02
2600	39.00	1.96	39.08	1.97	0.20	0.65	2021-08-02
5200	36.00	4.66	36.21	4.74	0.58	1.81	2021-08-03
5500	35.65	4.97	35.88	5.02	0.65	1.02	2021-08-03
5800	35.30	5.27	35.59	5.32	0.84	1.00	2021-08-03

Note: The dielectric properties have been measured by the contact probe method at 22° C.

- Composition / Information on ingredients

Head and Muscle Tissue Simulation Liquids HSL750V2/MSL750V2

H ₂ O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7%

Head and Muscle Tissue Simulation Liquids HSL900/MSL900

H ₂ O	Water, 35 – 58%
Sucrose	Sugar, white, refined, 40 – 60%
NaCl	Sodium Chloride, 0 – 6%
Hydroxyethyl-cellulose	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone, 0.1 – 0.7%

Head and Muscle Tissue Simulation Liquids HBBL1350-1850V3/M HBBL1350-1850V3

H ₂ O	50 – 73 %
Non-ionic detergents	27 – 50 % polyoxyethylenesorbitan monolaurate
NaCl	0 – 2 %
Preservative	0.05 – 0.1% Preventol-D7
Safety relevant ingredients:	
CAS-No. 55965-84-9	< 0.1 % aqueous preparation, containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone
CAS-No. 9005-64-5	<50 % polyoxyethylenesorbitan monolaurate

Head and Muscle Tissue Simulation Liquids HSL1800/MSL1800

H ₂ O	Water, 52 – 75%
C8H ₁₈ O ₃	Diethylene glycol monobutyl ether (DGBE), 25 – 48% (CAS-No. 112-34-5, EC-No. 203-961-6, EC-index-No. 603-096-00-8)
NaCl	Sodium Chloride, <1.0%

Head and Muscle Tissue Simulation Liquids HBBL1900-3800V3/M HBBL1900-3800V3

H ₂ O	50 – 73 %
Non-ionic detergents	27 – 50 % polyoxyethylenesorbitan monolaurate
NaCl	0 – 2 %
Preservative	0.05 – 0.1% Preventol-D7
Safety relevant ingredients:	
CAS-No. 55965-84-9	< 0.1 % aqueous preparation, containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyl-3(2H)-isothiazolone
CAS-No. 9005-64-5	<50 % polyoxyethylenesorbitan monolaurate

Head and Muscle Tissue Simulation Liquids HBBL5GHZV2

H ₂ O	76 – 80 %
Mineral Oil	10 – 12 %
Emulsifiers	8 – 10 %
Additives and Salt	1 – 3%

4. SYSTEM CHECK MEASUREMENTS

4.1. Validation results for Head TSL

Date	Frequency (MHz)	SAR over	Fast SAR (W/kg)	SAR (W/kg)	1 W Target SAR (W/kg)	1 W Norm. SAR (W/kg)	Drift (%)
2021-07-21	750	1 gr.	2.21	2.20	8.64	8.69	0.57
		10 gr.	1.50	1.44	5.65	5.69	0.66
2021-07-23	900	1 gr.	2.73	2.69	11.3	10.77	-4.67
		10 gr.	1.83	1.74	7.23	6.97	-3.62
2021-07-26	900	1 gr.	2.73	2.74	11.3	10.91	-3.45
		10 gr.	1.84	1.77	7.23	7.05	-2.52
2021-07-27	1800	1 gr.	10.50	10.20	38.8	40.80	5.15
		10 gr.	5.29	5.29	20.2	21.16	4.75
2021-07-28	1800	1 gr.	9.73	9.56	38.8	38.68	-0.30
		10 gr.	5.20	4.88	20.20	19.75	-2.26
2021-08-02	2450	1 gr.	13.00	12.80	53.4	53.00	-0.75
		10 gr.	6.01	5.93	25.0	24.55	-1.79
2021-07-29	2600	1 gr.	14.10	13.70	57.6	55.12	-4.31
		10 gr.	6.26	6.08	25.7	24.46	-4.82
2021-08-03	5200	1 gr.	7.28	7.74	78.4	76.51	-2.41
		10 gr.	2.01	2.24	22.4	22.14	-1.14
2021-08-04	5800	1 gr.	7.14	7.68	81.6	77.51	-5.01
		10 gr.	2.02	2.18	23.1	22.00	-4.75

5. MEASUREMENT RESULTS FOR SAR (SPECIFIC ABSORPTION RATE)

5.1. Summary maximum results for 1-g Head SAR measurements.

Mode	Antenna	Side / Position	Channel (Frequency)	Reported SAR 1-g (W/kg)	Limit SAR 1-g (W/kg)
GPRS 4 slots 850 MHz	External	Back face/24 mm	CH 128 (824.2 MHz)	0.195	1.6
GPRS 4 slots 1900 MHz	Back-up	Back face/24 mm	CH 810 (1909.8 MHz)	0.107	1.6
WCDMA Band II	Back-up	Back face/24 mm	CH 9262 (1852.4 MHz)	0.197	1.6
WCDMA Band IV	Back-up	Back face/24 mm	CH 1512 (1752.6 MHz)	0.181	1.6
WCDMA Band V	External	Back face/24 mm	CH 4132 (826.4 MHz)	0.123	1.6
LTE Band 2	Back-up	Back face/24 mm	CH 18700 (1860 MHz)	0.165	1.6
LTE Band 4	Back-up	Back face/24 mm	CH 20300 (1745 MHz)	0.172	1.6
LTE Band 5	External	Back face/24 mm	CH 20450 (829 MHz)	0.111	1.6
LTE Band 7	Back-up	Back face/24 mm	CH 21100 (2535 MHz)	0.078	1.6
LTE Band 12	Back-up	Back face/24 mm	CH 23095 (707.5 MHz)	0.146	1.6
LTE Band 13	Back-up	Back face/24 mm	CH 23230 (782.0 MHz)	0.167	1.6
Wi-Fi 2.4 GHz	Back-up	Back face/24 mm	CH 11 (2462.0 MHz)	0.044	1.6
Wi-Fi 5.2 GHz	Back-up	Back face/24 mm	CH 38 (5190.0 MHz)	0.047	1.6
Wi-Fi 5.8 GHz	Back-up	Back face/24 mm	CH 132 (5660.0 MHz)	0.046	1.6
Bluetooth	Back-up	Estimated SAR	CH 78 (2480.0 MHz)	0.022	1.6

5.2. Result for simultaneous multi-band transmission

Transmission Modes	Position	Σ SAR _i (W/kg)	Total SAR 1-g (W/kg)	Limit SAR 1-g (W/kg)	Verdict
WCDMA II+Wi-Fi +BT	Back Face	0.197+0.047+0.022	0.266	1.6	Pass

5.3. Results for GPRS 850 MHz band – 2 slots.

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 190 (836.6 MHz)	0.099	0.105	-0.459	1.380	0.145	
Back face	24	CH 128 (824.2 MHz)	0.134	0.141	0.577	1.380	0.195	1
Back face	24	CH 251 (848.8 MHz)	0.090	0.093	0.231	1.413	0.132	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 190 (836.6 MHz)	0.091	0.096	0.231	1.380	0.132	
Back face	24	CH 128 (824.2 MHz)	0.073	0.076	-1.938	1.380	0.104	
Back face	24	CH 251 (848.8 MHz)	0.111	0.115	0.231	1.413	0.162	2

5.4. Results for GPRS 1900 MHz Band – 2 slots.

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 512 (1850.2 MHz)	0.018	0.015	2.920	1.096	0.017	3
Back face	24	CH 661 (1880 MHz)	0.013	0.011	2.920	1.175	0.012	
Back face	24	CH 810 (1909.8 MHz)	0.014	0.011	3.395	1.202	0.013	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 512 (1850.2 MHz)	0.086	0.085	4.352	1.096	0.093	
Back face	24	CH 661 (1880 MHz)	0.075	0.076	1.274	1.175	0.090	
Back face	24	CH 810 (1909.8 MHz)	0.091	0.089	1.042	1.202	0.107	4

5.5. Results for WCDMA Band II

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 9262 (1852.4 MHz)	0.040	0.038	-1.938	1.117	0.042	5
Back face	24	CH 9400 (1880 MHz)	0.032	0.030	-1.938	1.164	0.035	
Back face	24	CH 9538 (1907.6 MHz)	0.035	0.035	-2.389	1.178	0.041	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 9262 (1852.4 MHz)	0.179	0.176	1.158	1.117	0.197	6
Back face	24	CH 9400 (1880 MHz)	0.172	0.168	4.954	1.164	0.196	
Back face	24	CH 9538 (1907.6 MHz)	0.130	0.123	-2.725	1.178	0.145	

5.6. Results for WCDMA Band IV

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 1512 (1752.6 MHz)	0.023	0.020	2.329	1.067	0.021	
Back face	24	CH 1312 (1712.4 MHz)	0.021	0.019	-1.938	1.069	0.020	
Back face	24	CH 1412 (1732.6 MHz)	0.022	0.020	2.802	1.102	0.022	7

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 1512 (1752.6 MHz)	0.174	0.170	1.625	1.067	0.181	8
Back face	24	CH 1312 (1712.4 MHz)	0.157	0.158	0.925	1.069	0.169	
Back face	24	CH 1412 (1732.6 MHz)	0.145	0.142	1.859	1.102	0.156	

5.7. Results for WCDMA Band V

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 4132 (826.4 MHz)	0.103	0.107	-1.031	1.146	0.123	9
Back face	24	CH 4183 (836.6 MHz)	0.081	0.085	0.346	1.169	0.099	
Back face	24	CH 4233 (846.6 MHz)	0.071	0.073	-0.574	1.161	0.084	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 4132 (826.4 MHz)	0.057	0.059	-0.688	1.146	0.068	
Back face	24	CH 4183 (836.6 MHz)	0.065	0.068	-0.574	1.169	0.080	
Back face	24	CH 4233 (846.6 MHz)	0.074	0.075	-0.803	1.161	0.088	10

5.8. Results for LTE Band 2 (1 RB, 20 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 18900 (1880 MHz)	0.026	0.025	-2.725	1.069	0.027	
Back face	24	CH 18700 (1860 MHz)	0.037	0.037	3.039	1.140	0.042	11
Back face	24	CH 19100 (1900 MHz)	0.028	0.028	4.954	1.119	0.031	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 18900 (1880 MHz)	0.153	0.147	4.954	1.069	0.157	
Back face	24	CH 18700 (1860 MHz)	0.149	0.145	0.231	1.140	0.165	12
Back face	24	CH 19100 (1900 MHz)	0.150	0.138	-2.051	1.119	0.154	

5.9. Results for LTE Band 2 (50% RB, 20 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 19100 (1900 MHz)	0.020	0.020	1.158	1.130	0.023	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 19100 (1900 MHz)	0.129	0.123	1.274	1.130	0.139	

Testing of additional LTE configurations is not required due to the SAR test procedures mentioned in FCC OET KDB 941225 D05 – SAR for LTE Devices v02r05.

5.10. Results for LTE Band 4 (1 RB, 20 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 20175 (1732.5 MHz)	0.016	0.015	4.472	1.064	0.016	
Back face	24	CH 20050 (1720 MHz)	0.020	0.018	4.592	1.250	0.022	13
Back face	24	CH 20300 (1745 MHz)	0.016	0.013	1.976	1.089	0.015	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 20175 (1732.5 MHz)	0.145	0.142	1.859	1.064	0.151	
Back face	24	CH 20050 (1720 MHz)	0.135	0.132	1.158	1.250	0.165	
Back face	24	CH 20300 (1745 MHz)	0.154	0.158	1.274	1.089	0.172	14

5.11. Results for LTE Band 4 (50% RB, 20 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 20050 (1720 MHz)	0.015	0.011	2.447	1.089	0.012	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 20300 (1745 MHz)	0.119	0.118	0.231	1.089	0.128	

Testing of additional LTE configurations is not required due to the SAR test procedures mentioned in FCC OET KDB 941225 D05 – SAR for LTE Devices v02r05.

5.12. Results for LTE Band 5 (1 RB, 10 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 20450 (829 MHz)	0.090	0.096	0.809	1.159	0.111	15
Back face	24	CH 20525 (836.5 MHz)	0.075	0.081	-1.031	1.169	0.094	
Back face	24	CH 20600 (844 MHz)	0.066	0.068	-1.258	1.262	0.086	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 20450 (829 MHz)	0.053	0.056	-3.061	1.159	0.064	
Back face	24	CH 20525 (836.5 MHz)	0.065	0.067	-0.917	1.169	0.078	
Back face	24	CH 20600 (844 MHz)	0.067	0.071	-0.115	1.262	0.089	16

5.13. Results for LTE Band 5 (50% RB, 10 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 20450 (829 MHz)	0.073	0.077	-0.688	1.135	0.087	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 20450 (829 MHz)	0.046	0.047	-0.115	1.135	0.053	

Testing of additional LTE configurations is not required due to the SAR test procedures mentioned in FCC OET KDB 941225 D05 – SAR for LTE Devices v02r05.

5.14. Results for LTE Band 7 (1 RB, 20 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 21350 (2560 MHz)	0.037	0.039	2.447	1.178	0.045	
Back face	24	CH 20850 (2510 MHz)	0.054	0.049	0.000	1.202	0.059	17
Back face	24	CH 21100 (2535 MHz)	0.043	0.042	3.276	1.265	0.053	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 21350 (2560 MHz)	0.054	0.050	-3.839	1.178	0.059	
Back face	24	CH 20850 (2510 MHz)	0.066	0.063	1.274	1.202	0.076	
Back face	24	CH 21100 (2535 MHz)	0.069	0.062	1.042	1.265	0.078	18

5.15. Results for LTE Band 7 (50% RB, 20 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 21350 (2560 MHz)	0.032	0.021	1.976	1.211	0.025	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 21350 (2560 MHz)	0.046	0.044	-0.230	1.211	0.053	

Testing of additional LTE configurations is not required due to the SAR test procedures mentioned in FCC OET KDB 941225 D05 – SAR for LTE Devices v02r05.

5.16. Results for LTE Band 12 (1 RB, 10 MHz, QPSK)

Note: According to KDB941225 D05 SAR for LTE Devices, for LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, the middle channel of the group of overlapping channels should be selected for testing.

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 23095 (707.5 MHz)	0.088	0.093	-1.258	1.211	0.112	19

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 23095 (707.5 MHz)	0.116	0.121	-0.115	1.211	0.146	20

5.17. Results for LTE Band 12 (50% RB, 10 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 23095 (707.5 MHz)	0.069	0.072	-1.258	1.186	0.086	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 23095 (707.5 MHz)	0.090	0.093	1.042	1.186	0.110	

Testing of additional LTE configurations is not required due to the SAR test procedures mentioned in FCC OET KDB 941225 D05 – SAR for LTE Devices v02r05.

5.18. Results for LTE Band 13 (1 RB, 10 MHz, QPSK)

Note: According to KDB941225 D05 SAR for LTE Devices, for LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, the middle channel of the group of overlapping channels should be selected for testing.

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 23230 (782.0 MHz)	0.095	0.100	1.274	1.282	0.128	21

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 23230 (782.0 MHz)	0.117	0.130	3.157	1.282	0.167	22

5.19. Results for LTE Band 13 (50% RB, 10 MHz, QPSK)

- External antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 23230 (782.0 MHz)	0.075	0.077	-1.031	1.285	0.099	

- Back-up antenna

Position	Dist (mm)	Channel (Frequency)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	CH 23230 (782.0 MHz)	0.089	0.094	0.925	1.285	0.121	

Testing of additional LTE configurations is not required due to the SAR test procedures mentioned in FCC OET KDB 941225 D05 – SAR for LTE Devices v02r05.

5.20. Results for LTE Band 17 (1 RB, 10 MHz, QPSK)

SAR for LTE Band 17 has not been measured because it is covered by LTE Band 12 due to overlapping frequency range (LTE Band 17 frequency range: 704 – 716 MHz, LTE Band 12 frequency range: 699 – 716 MHz) and same maximum tune-up and channel bandwidth.

5.21. Results for Wi-Fi 2450 MHz Band

- External antenna

Results for external antenna measurements of the device at 0 mm have been lower than SAR noise level.

- Back-up antenna

Position	Dist (mm)	Mode	CH	Freq (MHz)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	802.11b	11	2462	0.048	0.044	0.462	1.000	0.044	23
Back face	24	802.11g	6	2437	0.021	0.019	1.742	2.032	0.038	
Back face	24	802.11n20	6	2437	0.014	0.008	-2.837	1.589	0.013	
Back face	24	802.11n40	6	2437	0.012	0.010	1.042	1.459	0.014	
Back face	24	802.11b	1	2412	0.030	0.028	-2.613	1.125	0.031	
Back face	24	802.11b	6	2437	0.029	0.027	0.693	1.047	0.028	

5.22. Results for Wi-Fi 5200 MHz Band

- External antenna

Results for external antenna measurements of the device at 0 mm have been lower than SAR noise level.

- Back-up antenna

Position	Dist (mm)	Mode	CH	Freq (MHz)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	24	802.11a	40	5200	0.044	0.036	1.859	1.180	0.043	
Back face	24	802.11n20	40	5200	0.039	0.038	-2.164	1.225	0.046	
Back face	24	802.11n40	38	5190	0.040	0.039	-3.728	1.199	0.047	24
Back face	24	802.11ac80	42	5210	0.020	0.013	1.042	1.365	0.018	
Back face	24	802.11n40	46	5230	0.041	0.035	-3.506	1.219	0.042	

5.23. Results for Wi-Fi 5800 MHz Band

- External antenna

Results for external antenna measurements of the device at 0 mm have been lower than SAR noise level.

- Back-up antenna

Position	Dist (mm)	Mode	CH	Freq (MHz)	Estimated SAR 1-g (W/kg)	SAR 1-g (W/kg)	Power Drift (%)	Scale factor	Reported SAR 1-g (W/kg)	Plot No.
Back face	10	802.11a	149	5745	0.026	0.021	2.212	1.000	0.021	
Back face	10	802.11n20	149	5745	0.024	0.021	2.447	1.023	0.021	
Back face	10	802.11n40	151	5755	0.020	0.018	-0.115	1.000	0.018	
Back face	10	802.11ac80	155	5775	0.007	0.007	3.395	1.000	0.007	
Back face	10	802.11a	132	5660	0.085	0.046	2.683	1.000	0.046	25
Back face	10	802.11a	165	5825	0.016	0.015	4.112	1.023	0.015	

5.24. Variability results

According to KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, paragraph “2.8.1. 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.

Repeated measurements are required only when the measured 1-g SAR is ≥ 0.80 W/kg, or 10-g SAR is ≥ 2.0 W/kg, using the highest measured SAR configuration for that tissue-equivalent medium, therefore no Variability measurements are needed for this device.

Appendix C: Measurement Reports

Plot N° 1

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 26/07/2021

DUT: TCAM E4.4 NA; **Type:** Shark fin Antenna; **Serial:** 76329

Communication System: UID 10024 - DAC, GPRS-FDD (TDMA, GMSK, TN 0-1); Frequency: 824.2 MHz; Duty Cycle: 1:4.53211

Medium parameters used: $f = 825$ MHz; $\sigma = 0.89$ S/m; $\epsilon_r = 43.29$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.43, 9.43, 9.43) @ 824.2 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - External Ant/GPRS 850, 2 slots, Low CH, Back face/Area Scan

(111x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.159 W/kg

Flat Phantom, Faces, d=24mm - External Ant/GPRS 850, 2 slots, Low CH, Back face/Zoom Scan

(6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.31 V/m; Power Drift = 0.04 dB

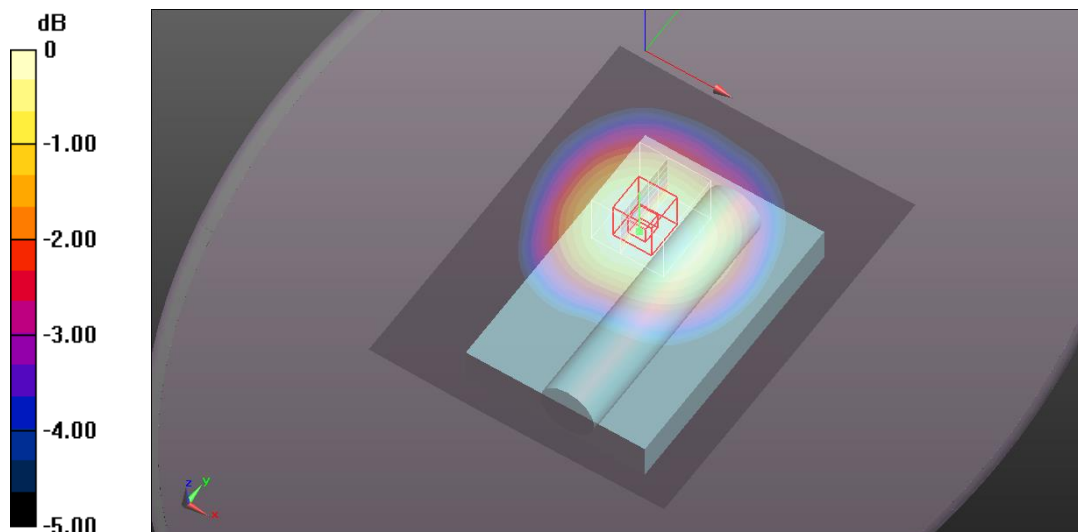
Peak SAR (extrapolated) = 0.172 W/kg

SAR(1 g) = 0.141 W/kg; SAR(10 g) = 0.108 W/kg (SAR corrected for target medium)

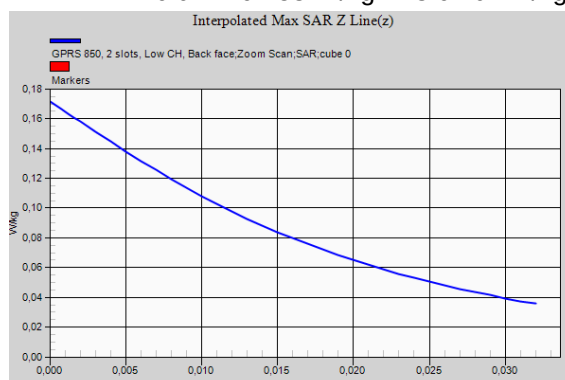
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 79.8%

Maximum value of SAR (measured) = 0.158 W/kg



0 dB = 0.158 W/kg = -8.01 dBW/kg



Plot N° 2

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 23/07/2021

DUT: TCAM E4.4 NA; **Type:** Backup Antenna; **Serial:** 76344

Communication System: UID 10024 - DAC, GPRS-FDD (TDMA, GMSK, TN 0-1); Frequency: 848.6 MHz; Duty Cycle: 1:4.53211

Medium parameters used (interpolated): $f = 848.6$ MHz; $\sigma = 0.917$ S/m; $\epsilon_r = 42.337$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.43, 9.43, 9.43) @ 848.6 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - Backup Ant/GPRS 850, 2 slots, High CH, Back face/Area Scan (111x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.135 W/kg

Flat Phantom, Faces, d=24mm - Backup Ant/GPRS 850, 2 slots, High CH, Back face/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.82 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.147 W/kg

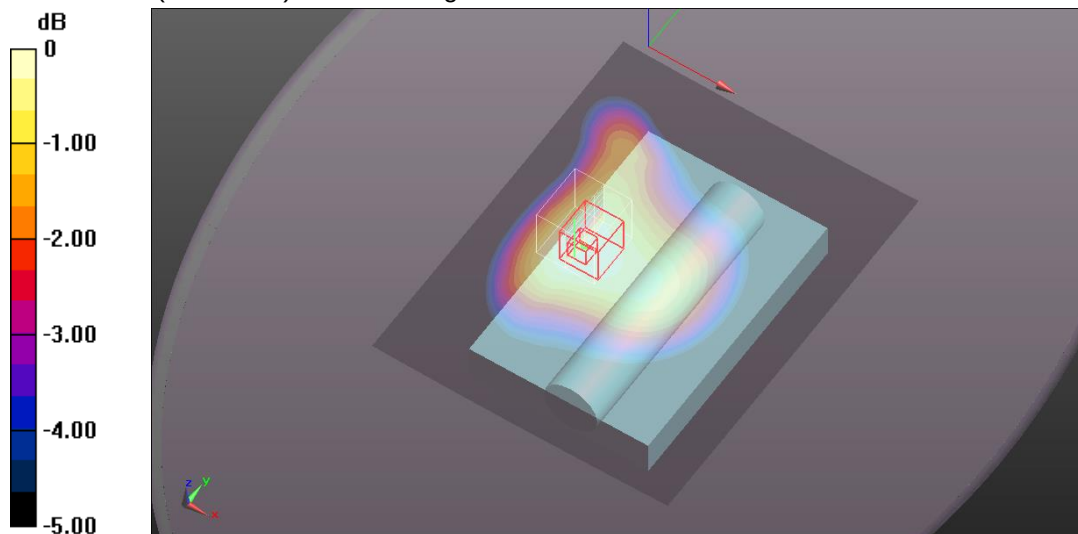
SAR(1 g) = 0.115 W/kg; SAR(10 g) = 0.087 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

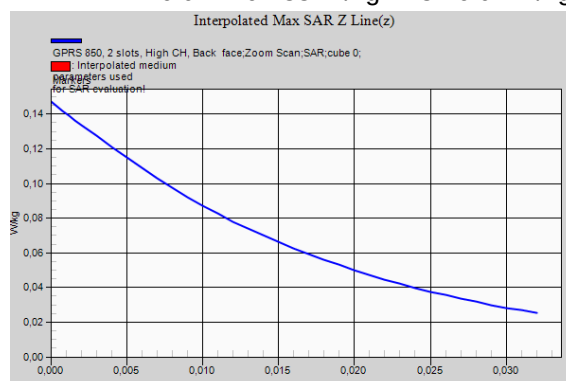
Ratio of SAR at M2 to SAR at M1 = 76.9%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.133 W/kg



0 dB = 0.133 W/kg = -8.76 dBW/kg



Plot N° 3

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 29/07/2021

DUT: TCAM E4.4 NA; **Type:** Shark fin Antenna; **Serial:** 76329

Communication System: UID 10024 - DAC, GPRS-FDD (TDMA, GMSK, TN 0-1); Frequency: 1850.2 MHz; Duty Cycle: 1:4.53211

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 39.279$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1850.2 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24mm - External Ant/GPRS 1900 2 slots, Low CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.0235 W/kg

Flat Phantom, d=24mm - External Ant/GPRS 1900 2 slots, Low CH, Back face/Zoom Scan (6x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.721 V/m; Power Drift = 0.25 dB

Peak SAR (extrapolated) = 0.0260 W/kg

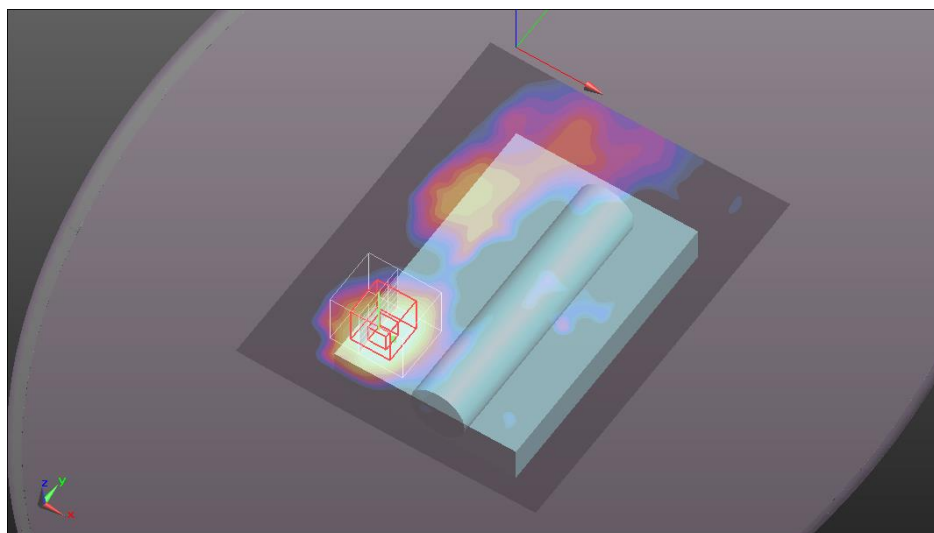
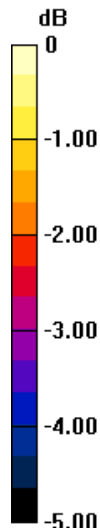
SAR(1 g) = 0.015 W/kg; SAR(10 g) = 0.00856 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

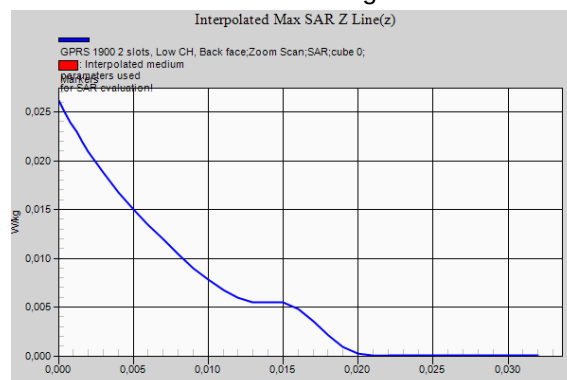
Ratio of SAR at M2 to SAR at M1 = 58.3%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0208 W/kg



0 dB = 0.0208 W/kg = -16.82 dBW/kg



Plot N° 4

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 28/07/2021

DUT: TCAM E4.4 NA; **Type:** Backup Antenna; **Serial:** 76344

Communication System: UID 10024 - DAC, GPRS-FDD (TDMA, GMSK, TN 0-1); Frequency: 1909.8 MHz; Duty Cycle: 1:4.53211

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.44$ S/m; $\epsilon_r = 39.02$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1909.8 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24mm - Backup Ant/GPRS 1900 2 slots, High CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.120 W/kg

Flat Phantom, d=24mm - Backup Ant/GPRS 1900 2 slots, High CH, Back face/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.333 V/m; Power Drift = 0.09 dB

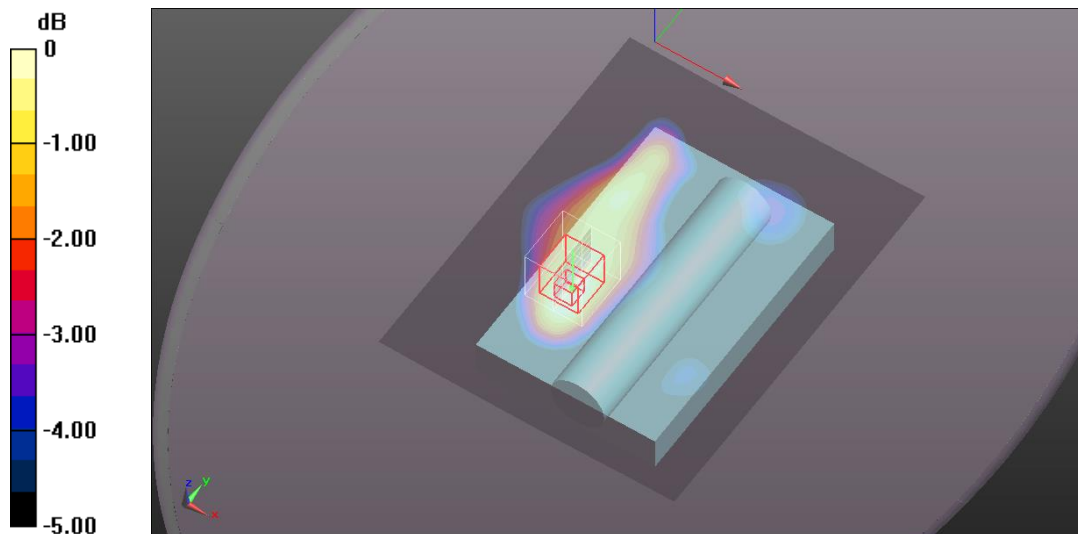
Peak SAR (extrapolated) = 0.147 W/kg

SAR(1 g) = 0.089 W/kg; SAR(10 g) = 0.053 W/kg (SAR corrected for target medium)

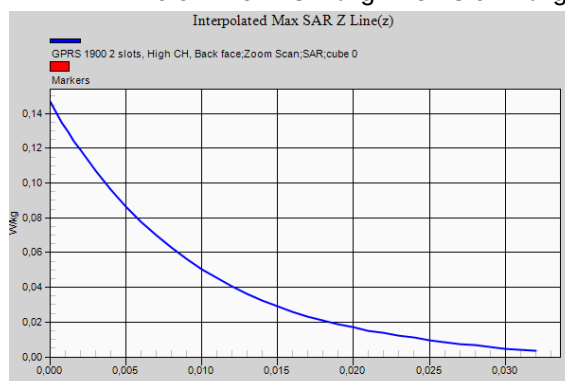
Smallest distance from peaks to all points 3 dB below = 19.5 mm

Ratio of SAR at M2 to SAR at M1 = 59%

Maximum value of SAR (measured) = 0.118 W/kg



0 dB = 0.118 W/kg = -9.28 dBW/kg



Plot N° 5

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 29/07/2021

DUT: TCAM E4.4 NA; **Type:** Shark fin Antenna; **Serial:** 76329

Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 1852.4 MHz; Duty Cycle: 1:1.95434

Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.402$ S/m; $\epsilon_r = 39.268$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1852.4 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24mm - External Ant/WCDMA II, Low CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.0522 W/kg

Flat Phantom, d=24mm - External Ant/WCDMA II, Low CH, Back face/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.152 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 0.0620 W/kg

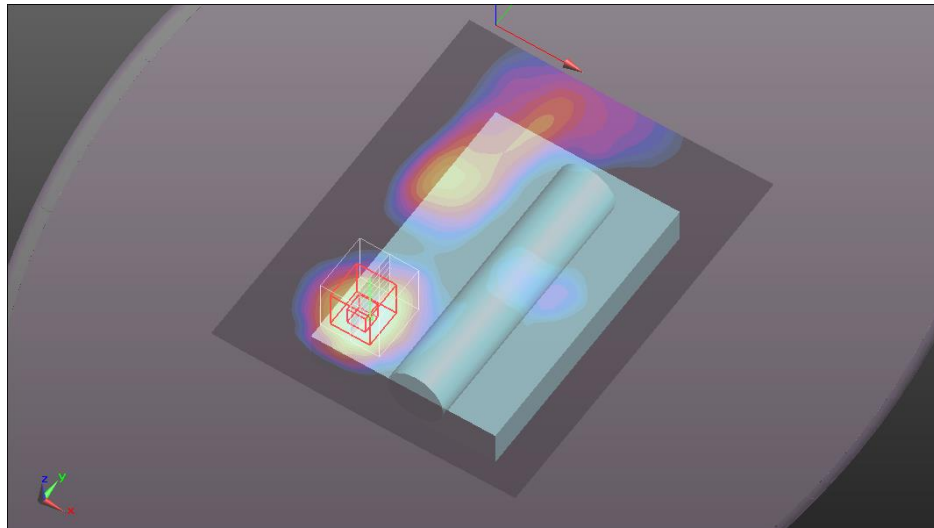
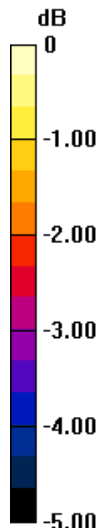
SAR(1 g) = 0.038 W/kg; SAR(10 g) = 0.022 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

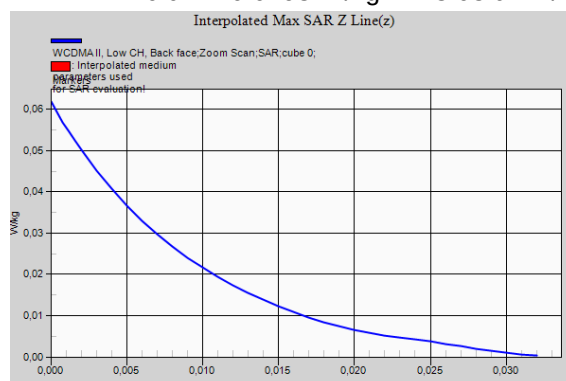
Ratio of SAR at M2 to SAR at M1 = 58.7%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0498 W/kg



0 dB = 0.0498 W/kg = -13.03 dBW/kg



Plot N° 6

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 28/07/2021

DUT: TCAM E4.4 NA; **Type:** Backup Antenna; **Serial:** 76344

Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 1852.4 MHz; Duty Cycle: 1:1.95434

Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.402$ S/m; $\epsilon_r = 39.268$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1852.4 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24mm - Backup Ant/WCDMA II, Low CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.234 W/kg

Flat Phantom, d=24mm - Backup Ant/WCDMA II, Low CH, Back face/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.756 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.284 W/kg

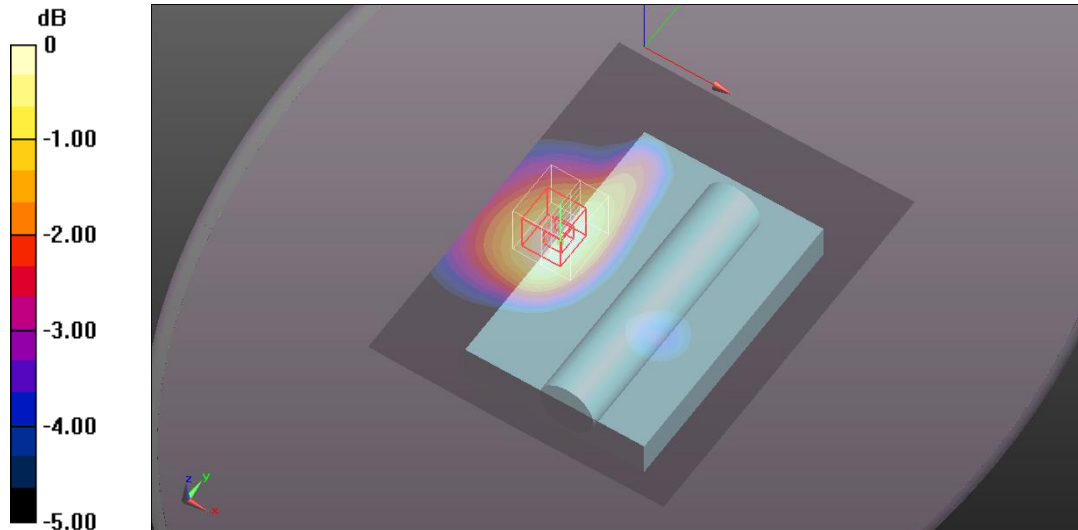
SAR(1 g) = 0.176 W/kg; SAR(10 g) = 0.110 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

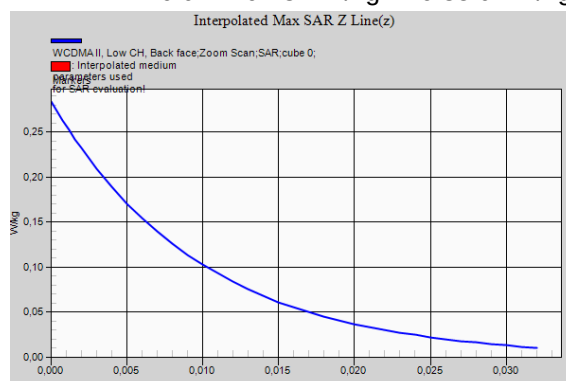
Ratio of SAR at M2 to SAR at M1 = 59.9%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.232 W/kg



0 dB = 0.232 W/kg = -6.35 dBW/kg



Plot N° 7

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 27/07/2021

DUT: TCAM E4.4 NA; **Type:** Shark fin Antenna; **Serial:** 76329

Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 1712.4 MHz; Duty Cycle: 1:1.95434

Medium parameters used (interpolated): $f = 1712.4$ MHz; $\sigma = 1.382$ S/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1712.4 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - External Ant/WCDMA IV, Low CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.0279 W/kg

Flat Phantom, Faces, d=24mm - External Ant/WCDMA IV, Low CH, Back face/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.843 V/m; Power Drift = 0.25 dB

Peak SAR (extrapolated) = 0.0320 W/kg

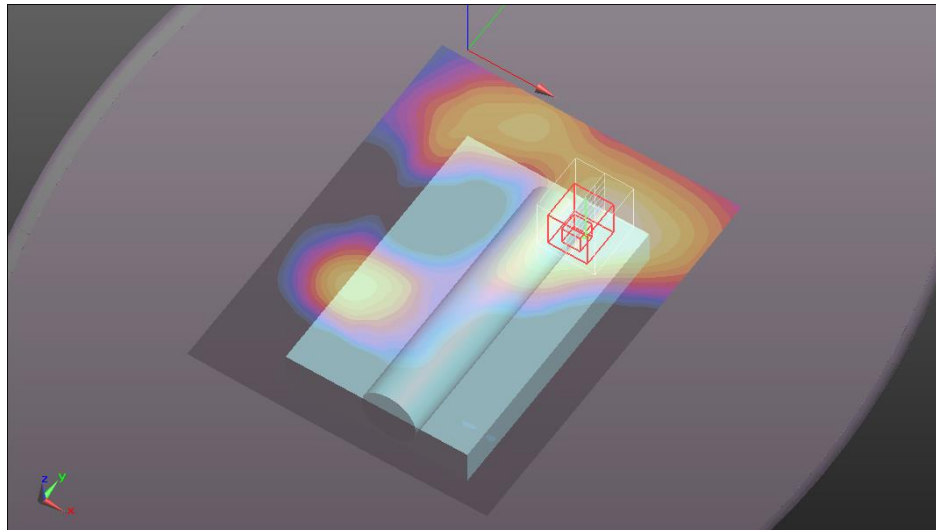
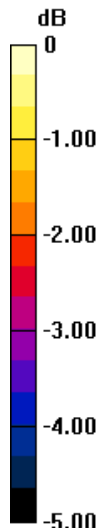
SAR(1 g) = 0.020 W/kg; SAR(10 g) = 0.012 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

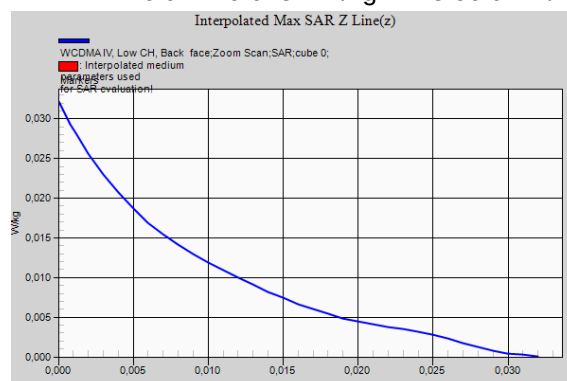
Ratio of SAR at M2 to SAR at M1 = 61.2%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0252 W/kg



0 dB = 0.0252 W/kg = -15.99 dBW/kg



Plot N° 8

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 28/07/2021

DUT: TCAM E4.4 NA; **Type:** Backup Antenna; **Serial:** 76344

Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 1752.6 MHz; Duty Cycle: 1:1.95434

Medium parameters used (interpolated): $f = 1752.6$ MHz; $\sigma = 1.423$ S/m; $\epsilon_r = 38.927$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1752.6 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - Backup Ant/WCDMA IV, High CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.225 W/kg

Flat Phantom, Faces, d=24mm - Backup Ant/WCDMA IV, High CH, Back face/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.655 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.270 W/kg

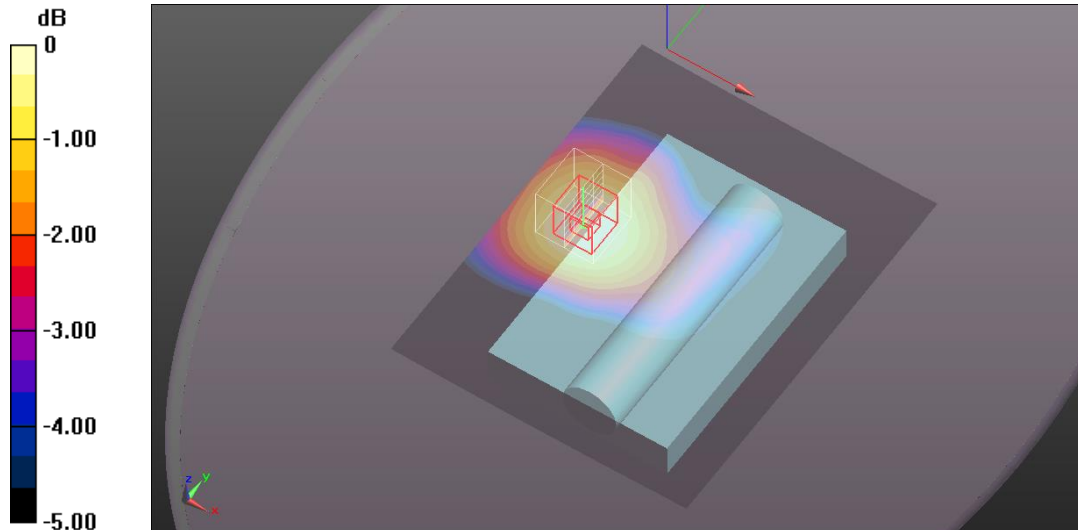
SAR(1 g) = 0.170 W/kg; SAR(10 g) = 0.109 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

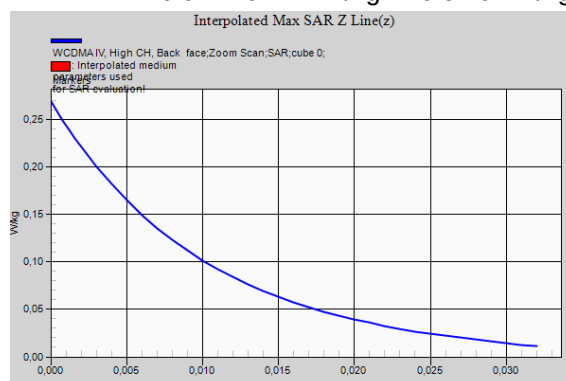
Ratio of SAR at M2 to SAR at M1 = 61.2%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.222 W/kg



0 dB = 0.222 W/kg = -6.54 dBW/kg



Plot N° 9

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 26/07/2021

DUT: TCAM E4.4 NA; Type: Shark fin Antenna; Serial: 76329

Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 826.4 MHz; Duty Cycle: 1:1.95434

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.89$ S/m; $\epsilon_r = 43.245$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.43, 9.43, 9.43) @ 826.4 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - External Ant/WCDMA V, Low CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.122 W/kg

Flat Phantom, Faces, d=24mm - External Ant/WCDMA V, Low CH, Back face/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.94 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.131 W/kg

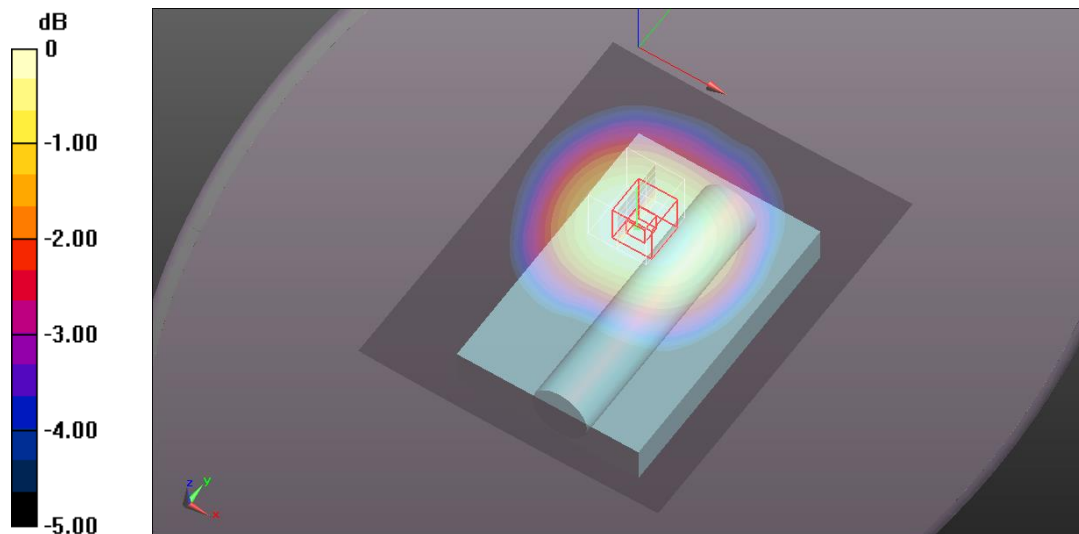
SAR(1 g) = 0.107 W/kg; SAR(10 g) = 0.082 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

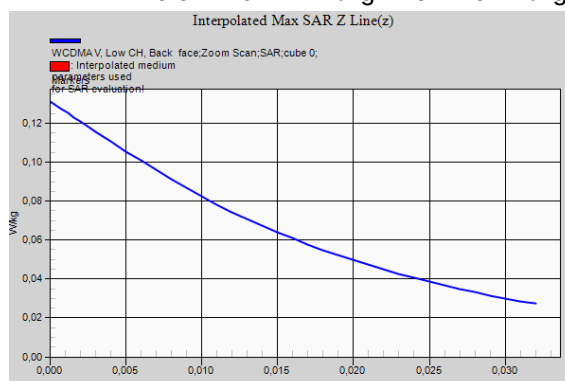
Ratio of SAR at M2 to SAR at M1 = 79.4%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.121 W/kg



0 dB = 0.121 W/kg = -9.17 dBW/kg



Plot N° 10

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 23/07/2021

DUT: TCAM E4.4 NA; **Type:** Backup Antenna; **Serial:** 76344

Communication System: UID 10011 - CAB, UMTS-FDD (WCDMA); Frequency: 846.6 MHz; Duty Cycle: 1:1.95434

Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 0.913$ S/m; $\epsilon_r = 42.361$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.43, 9.43, 9.43) @ 846.6 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - Backup Ant/WCDMA V, High CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.0892 W/kg

Flat Phantom, Faces, d=24mm - Backup Ant/WCDMA V, High CH, Back face/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.288 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.0970 W/kg

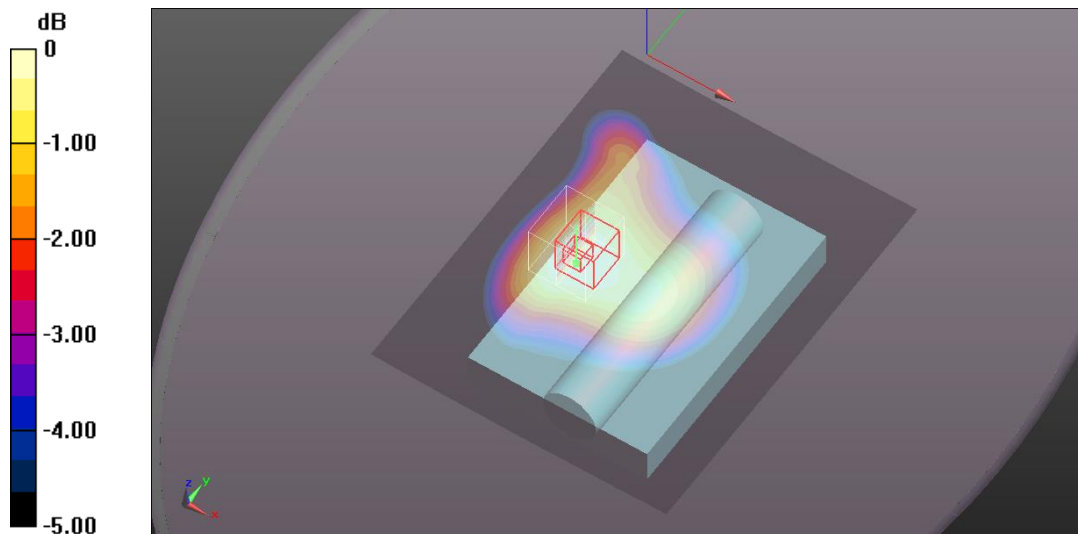
SAR(1 g) = 0.075 W/kg; SAR(10 g) = 0.057 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

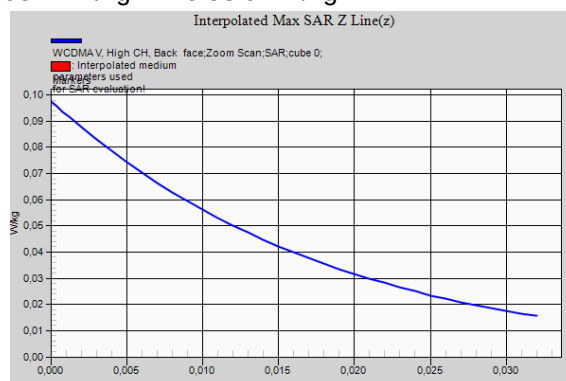
Ratio of SAR at M2 to SAR at M1 = 76.6%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0874 W/kg



0 dB = 0.0874 W/kg = -10.58 dBW/kg



Plot N° 11

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 29/07/2021

DUT: TCAM E4.4 NA; **Type:** Shark fin Antenna; **Serial:** 76329

Communication System: UID 10169 - CAD, LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1860 MHz;
Duty Cycle: 1:3.74111

Medium parameters used: $f = 1860$ MHz; $\sigma = 1.41$ S/m; $\epsilon_r = 39.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1860 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24mm - External Ant/LTE 2, 1 RB Mid, Low CH, Back face/Area Scan (111x141x1):

Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.0488 W/kg

Flat Phantom, d=24mm - External Ant/LTE 2, 1 RB Mid, Low CH, Back face/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 3.150 V/m; Power Drift = 0.26 dB

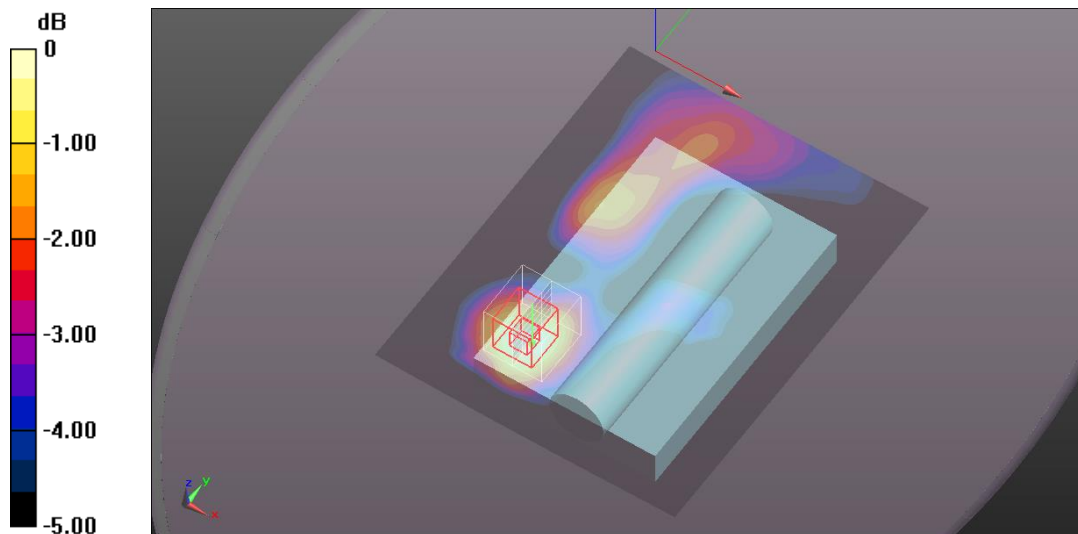
Peak SAR (extrapolated) = 0.0610 W/kg

SAR(1 g) = 0.037 W/kg; SAR(10 g) = 0.021 W/kg (SAR corrected for target medium)

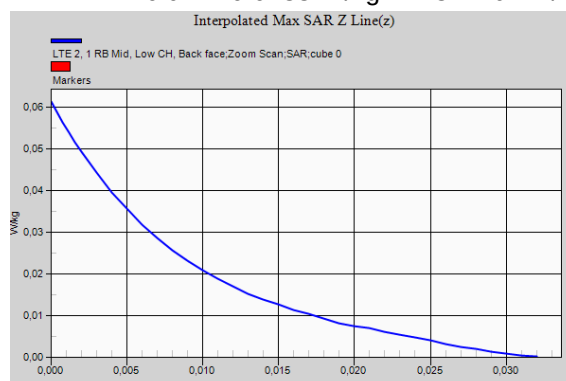
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 57.4%

Maximum value of SAR (measured) = 0.0488 W/kg



0 dB = 0.0488 W/kg = -13.12 dBW/kg



Plot N° 12

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 28/07/2021

DUT: TCAM E4.4 NA; Type: Backup Antenna; Serial: 76344

Communication System: UID 10169 - CAD, LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1860 MHz;
Duty Cycle: 1:3.74111

Medium parameters used: $f = 1860$ MHz; $\sigma = 1.41$ S/m; $\epsilon_r = 39.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1860 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24mm - Backup Ant/LTE 2, 1 RB Mid, Low CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.195 W/kg

Flat Phantom, d=24mm - Backup Ant/LTE 2, 1 RB Mid, Low CH, Back face/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.89 V/m; Power Drift = 0.02 dB

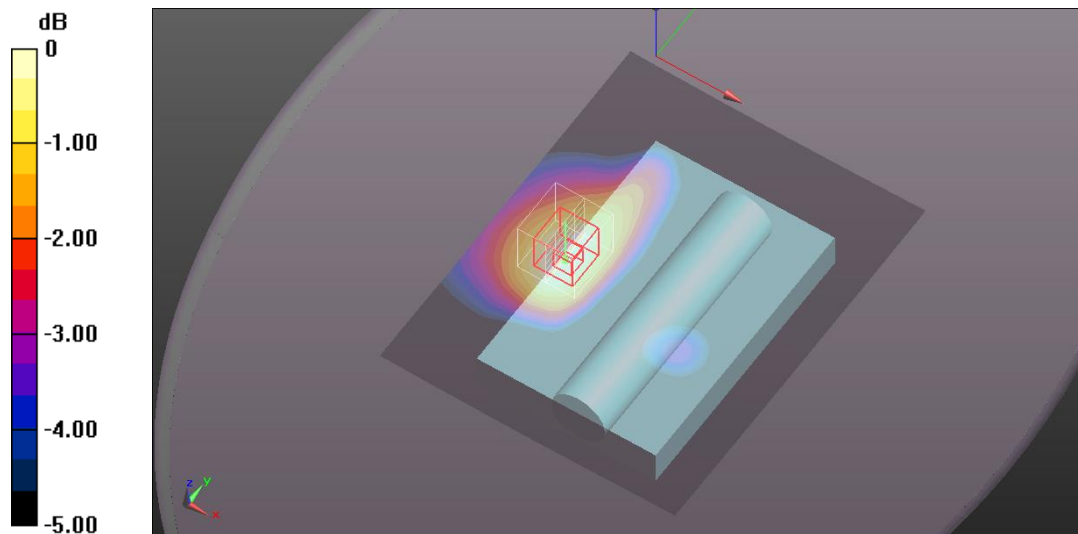
Peak SAR (extrapolated) = 0.236 W/kg

SAR(1 g) = 0.145 W/kg; SAR(10 g) = 0.090 W/kg (SAR corrected for target medium)

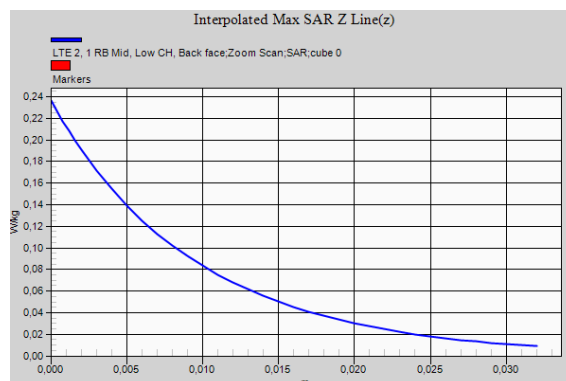
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 59.6%

Maximum value of SAR (measured) = 0.190 W/kg



0 dB = 0.190 W/kg = -7.21 dBW/kg



Plot Nº 13

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 27/07/2021

DUT: TCAM E4.4 NA; Type: Shark fin Antenna; Serial: 76329

Communication System: UID 10169 - CAD, LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1720 MHz;
Duty Cycle: 1:3.74111

Medium parameters used: $f = 1720$ MHz; $\sigma = 1.39$ S/m; $\epsilon_r = 39.07$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1720 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - External Ant/LTE 4, 1 RB Mid, Low CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0257 W/kg

Flat Phantom, Faces, d=24mm - External Ant/LTE 4, 1 RB Mid, Low CH, Back face/Zoom Scan (5x5x7)/Cube

0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.974 V/m; Power Drift = 0.39 dB

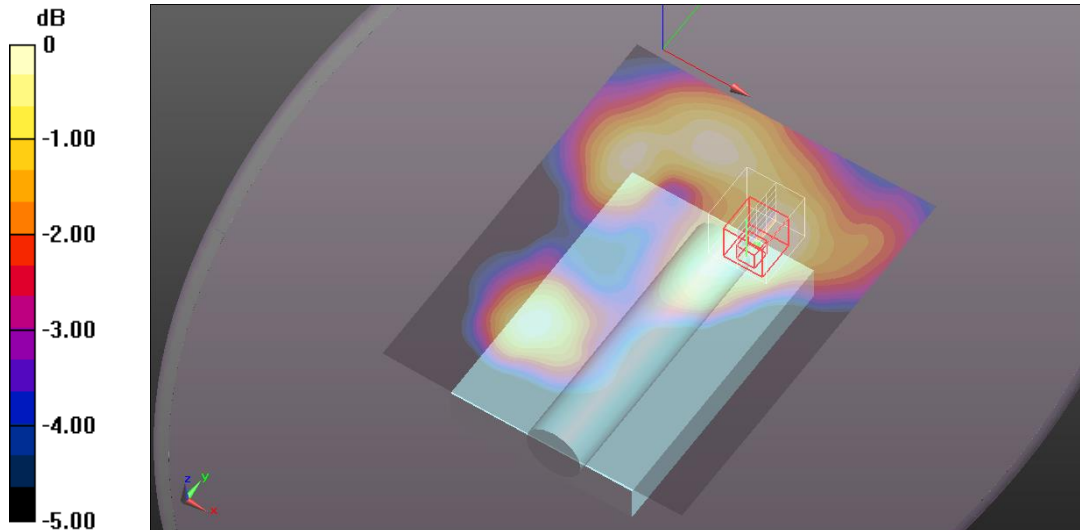
Peak SAR (extrapolated) = 0.0300 W/kg

SAR(1 g) = 0.018 W/kg; SAR(10 g) = 0.011 W/kg (SAR corrected for target medium)

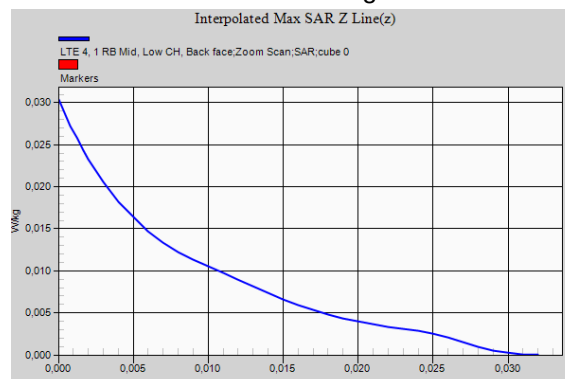
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 58%

Maximum value of SAR (measured) = 0.0234 W/kg



0 dB = 0.0234 W/kg = -16.31 dBW/kg



Plot N° 14

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 28/07/2021

DUT: TCAM E4.4 NA; **Type:** Backup Antenna; **Serial:** 76344

Communication System: UID 10169 - CAD, LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 1744.9 MHz; Duty Cycle: 1:3.74111

Medium parameters used (interpolated): $f = 1744.9$ MHz; $\sigma = 1.415$ S/m; $\epsilon_r = 38.965$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1744.9 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - Backup Ant/LTE 4, 1 RB Mid, High CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.199 W/kg

Flat Phantom, Faces, d=24mm - Backup Ant/LTE 4, 1 RB Mid, High CH, Back face/Zoom Scan (5x5x7)/Cube

0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.330 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.248 W/kg

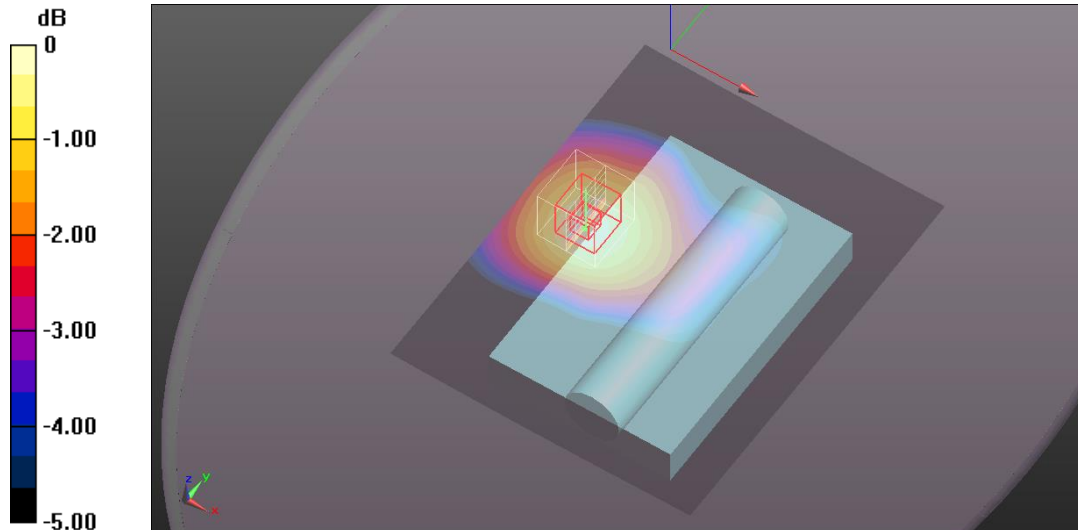
SAR(1 g) = 0.158 W/kg; SAR(10 g) = 0.100 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

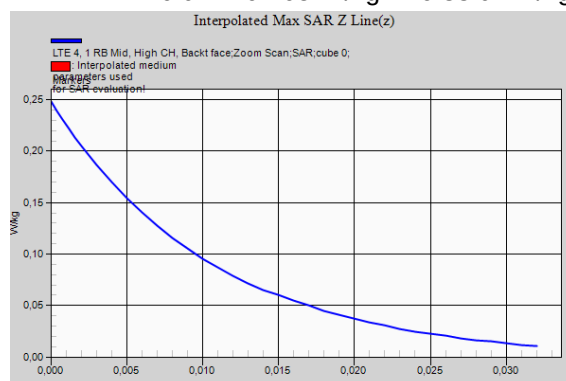
Ratio of SAR at M2 to SAR at M1 = 62.2%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.205 W/kg



0 dB = 0.205 W/kg = -6.88 dBW/kg



Plot N° 15

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 26/07/2021

DUT: TCAM E4.4 NA; **Type:** Shark fin Antenna; **Serial:** 76329

Communication System: UID 10175 - CAE, LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 829 MHz; Duty Cycle: 1:3.7325

Medium parameters used (interpolated): $f = 829$ MHz; $\sigma = 0.89$ S/m; $\epsilon_r = 43.162$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.43, 9.43, 9.43) @ 829 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - External Ant/LTE 5, 1 RB Mid, Low CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.106 W/kg

Flat Phantom, Faces, d=24mm - External Ant/LTE 5, 1 RB Mid, Low CH, Back face/Zoom Scan (5x5x7)/Cube

0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.20 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.118 W/kg

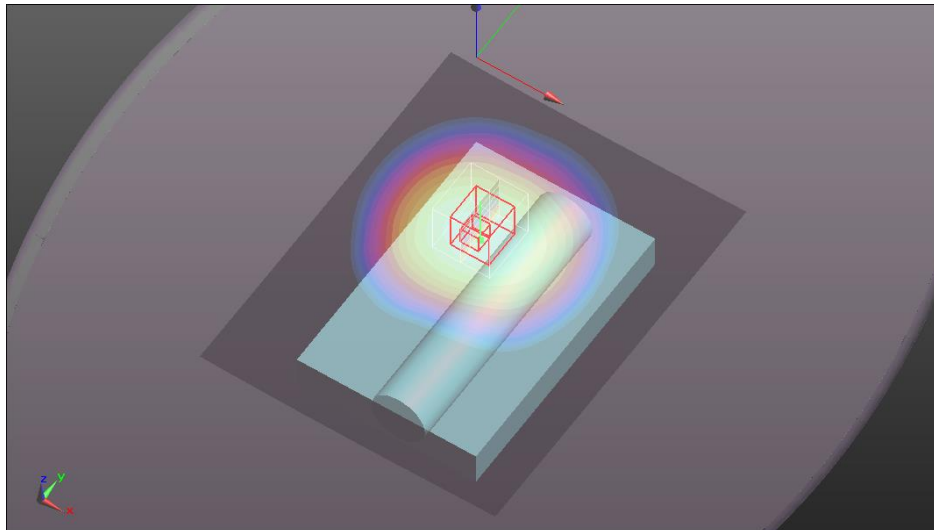
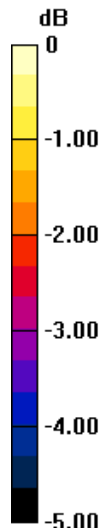
SAR(1 g) = 0.096 W/kg; SAR(10 g) = 0.073 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

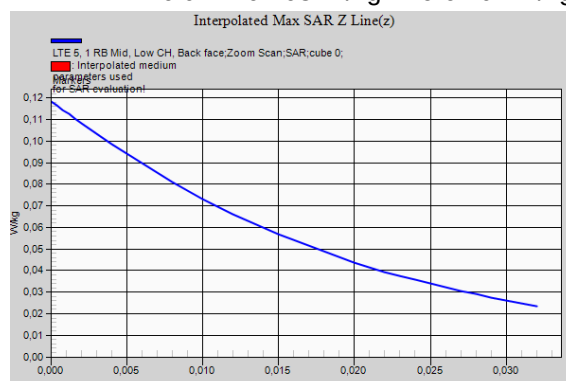
Ratio of SAR at M2 to SAR at M1 = 78.6%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.108 W/kg



0 dB = 0.108 W/kg = -9.67 dBW/kg



Plot N° 16

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 23/07/2021

DUT: TCAM E4.4 NA; **Type:** Backup Antenna; **Serial:** 76344

Communication System: UID 10175 - CAG, LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 843.9 MHz;
Duty Cycle: 1:3.73594

Medium parameters used (interpolated): $f = 843.9$ MHz; $\sigma = 0.91$ S/m; $\epsilon_r = 42.391$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.43, 9.43, 9.43) @ 843.9 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - Backup Ant/LTE 5, 1 RB Mid, High CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.0816 W/kg

Flat Phantom, Faces, d=24mm - Backup Ant/LTE 5, 1 RB Mid, High CH, Back face/Zoom Scan (5x5x7)/Cube

0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.626 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.0910 W/kg

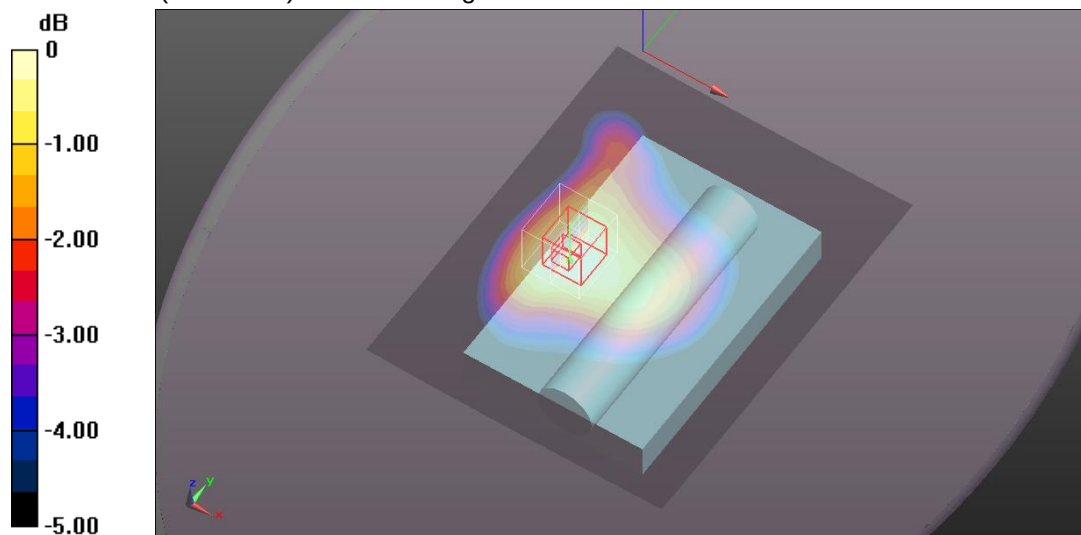
SAR(1 g) = 0.071 W/kg; SAR(10 g) = 0.052 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

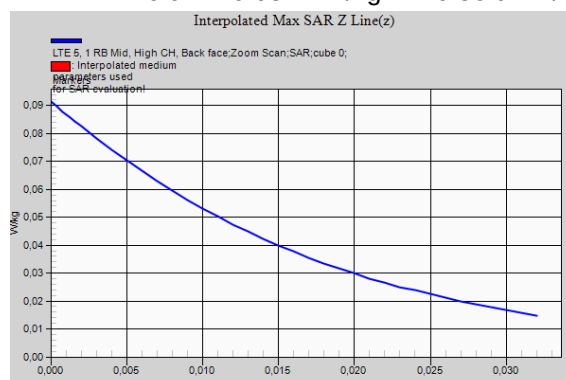
Ratio of SAR at M2 to SAR at M1 = 77%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0821 W/kg



0 dB = 0.0821 W/kg = -10.86 dBW/kg



Plot N° 17

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 29/07/2021

DUT: TCAM E4.4 NA; Type: Shark fin Antenna; Serial: 76329

Communication System: UID 10169 - CAE, LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 2510 MHz;
Duty Cycle: 1:3.74111

Medium parameters used: $f = 2510$ MHz; $\sigma = 1.87$ S/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(7.27, 7.27, 7.27) @ 2510 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24 mm - External Ant/LTE 7, 1 Rb Mid, Low CH, Back face/Area Scan (131x171x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.0751 W/kg

Flat Phantom, d=24 mm - External Ant/LTE 7, 1 Rb Mid, Low CH, Back face/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.726 V/m; Power Drift = 0.00 dB

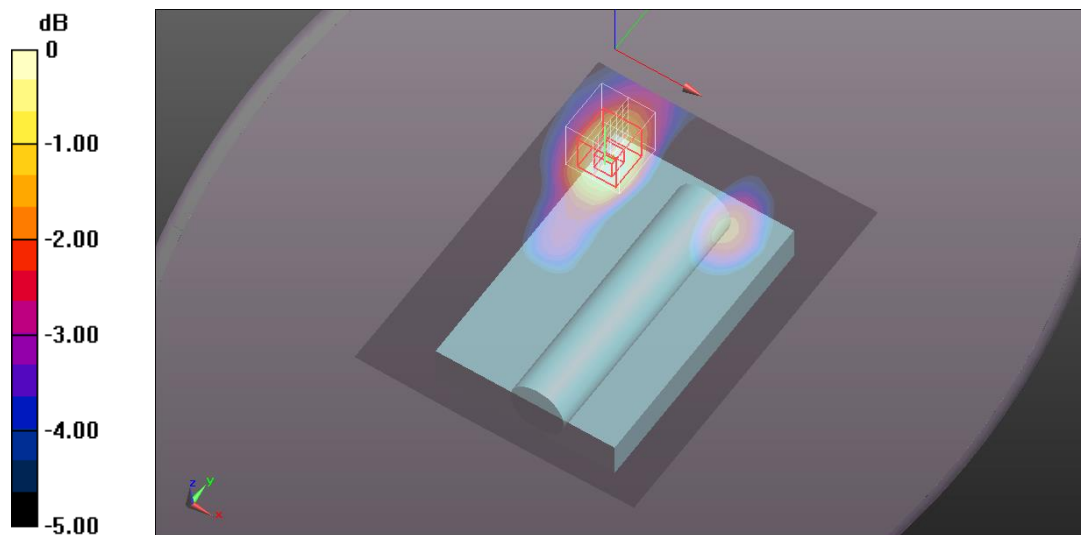
Peak SAR (extrapolated) = 0.0940 W/kg

SAR(1 g) = 0.049 W/kg; SAR(10 g) = 0.025 W/kg (SAR corrected for target medium)

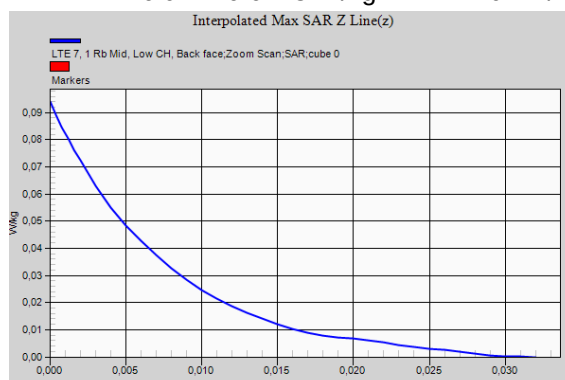
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 51.7%

Maximum value of SAR (measured) = 0.0718 W/kg



0 dB = 0.0718 W/kg = -11.44 dBW/kg



Plot N° 18

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 30/07/2021

DUT: TCAM E4.4 NA; **Type:** Backup Antenna; **Serial:** 76344

Communication System: UID 10169 - CAE, LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK); Frequency: 2535 MHz; Duty Cycle: 1:3.74111

Medium parameters used (interpolated): $f = 2535$ MHz; $\sigma = 1.91$ S/m; $\epsilon_r = 39.02$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(7.27, 7.27, 7.27) @ 2535 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24 mm - Backup Ant/LTE 7, 1 Rb Mid, Mid CH, Back face/Area Scan (131x171x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.0975 W/kg

Flat Phantom, d=24 mm - Backup Ant/LTE 7, 1 Rb Mid, Mid CH, Back face/Zoom Scan (8x8x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.134 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.118 W/kg

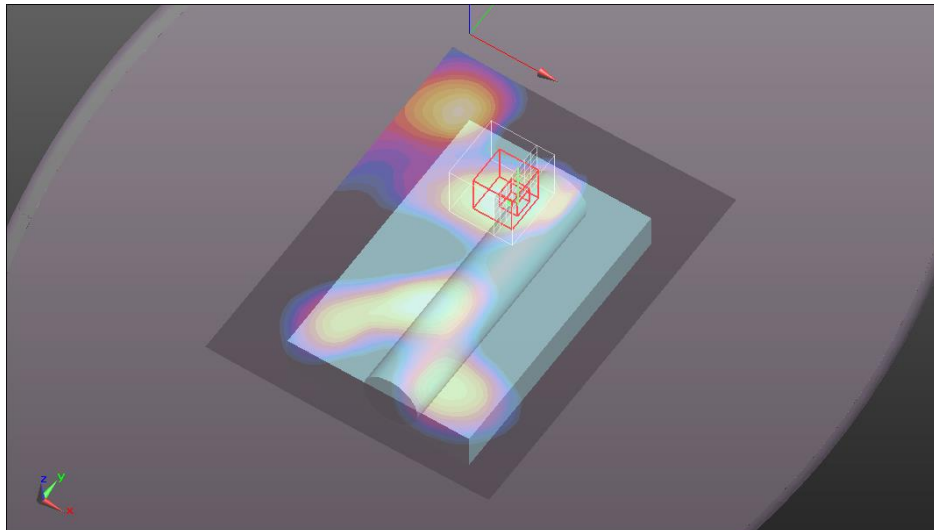
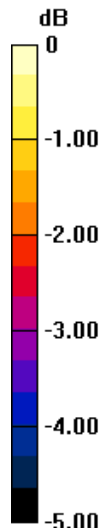
SAR(1 g) = 0.062 W/kg; SAR(10 g) = 0.035 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

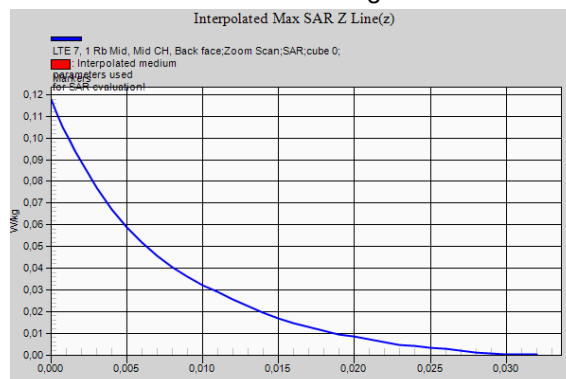
Ratio of SAR at M2 to SAR at M1 = 51%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0884 W/kg



0 dB = 0.0884 W/kg = -10.54 dBW/kg



Plot N° 19

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 21/07/2021

DUT: TCAM E4.4 NA; **Type:** Shark fin Antenna; **Serial:** 76329

Communication System: UID 10175 - CAE, LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 707.5 MHz; Duty Cycle: 1:3.7325

Medium parameters used (interpolated): $f = 707.5$ MHz; $\sigma = 0.87$ S/m; $\epsilon_r = 41.655$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.84, 9.84, 9.84) @ 707.5 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - External Ant/LTE 12, 1 RB Mid, Mid CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.105 W/kg

Flat Phantom, Faces, d=24mm - External Ant/LTE 12, 1 RB Mid, Mid CH, Back face/Zoom Scan (5x5x7)/Cube

0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.27 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.114 W/kg

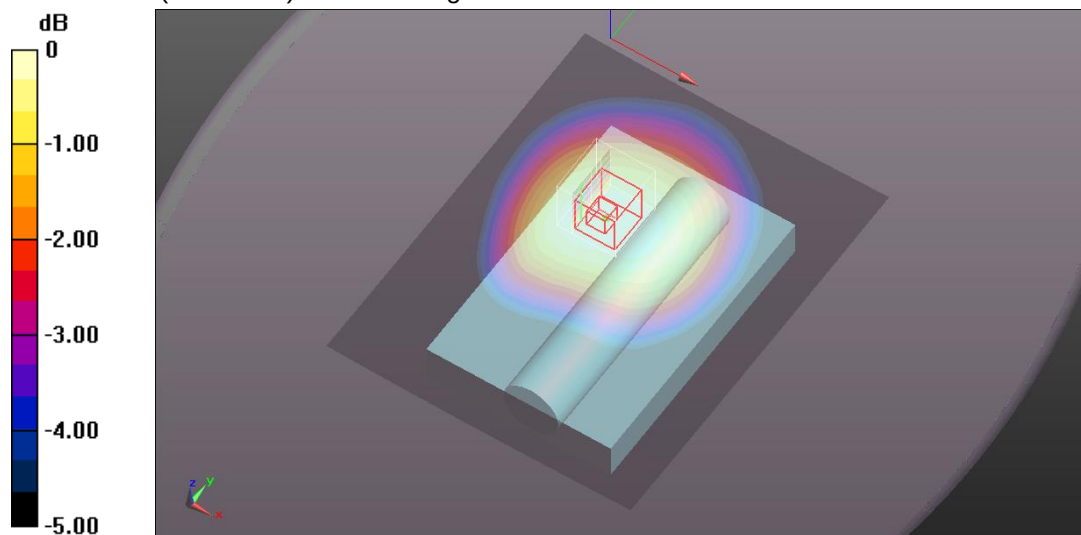
SAR(1 g) = 0.093 W/kg; SAR(10 g) = 0.073 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

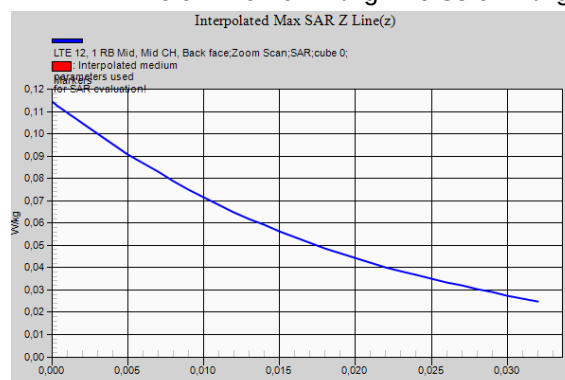
Ratio of SAR at M2 to SAR at M1 = 78.9%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.104 W/kg



0 dB = 0.104 W/kg = -9.83 dBW/kg



Plot N° 20

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 22/07/2021

DUT: TCAM E4.4 NA; **Type:** Backup Antenna; **Serial:** 76344

Communication System: UID 10175 - CAE, LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 707.5 MHz; Duty Cycle: 1:3.7325

Medium parameters used (interpolated): $f = 707.5$ MHz; $\sigma = 0.87$ S/m; $\epsilon_r = 41.655$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.84, 9.84, 9.84) @ 707.5 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - Backup/LTE 12, 1 RB Mid, Mid CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.139 W/kg

Flat Phantom, Faces, d=24mm - Backup/LTE 12, 1 RB Mid, Mid CH, Back face/Zoom Scan (6x6x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.28 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.153 W/kg

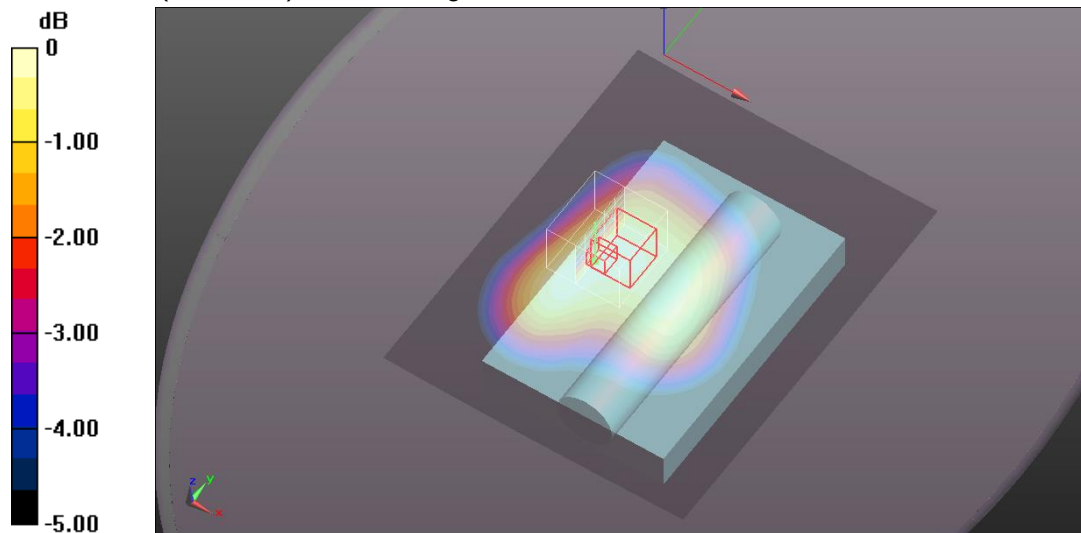
SAR(1 g) = 0.121 W/kg; SAR(10 g) = 0.094 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

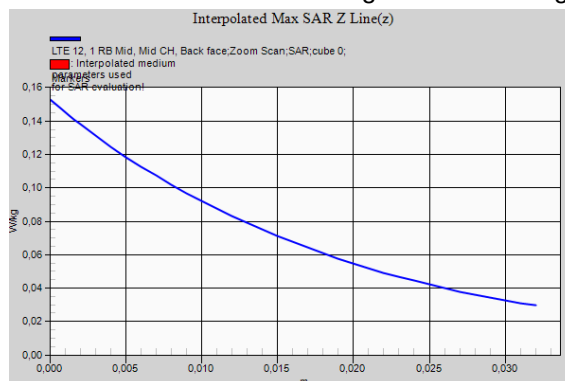
Ratio of SAR at M2 to SAR at M1 = 77.8%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.138 W/kg



0 dB = 0.138 W/kg = -8.60 dBW/kg



Plot N° 21

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 22/07/2021

DUT: TCAM E4.4 NA; **Type:** Shark fin Antenna; **Serial:** 76329

Communication System: UID 10175 - CAG, LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 782 MHz; Duty Cycle: 1:3.7325

Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.914 \text{ S/m}$; $\epsilon_r = 40.592$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.84, 9.84, 9.84) @ 782 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - External Ant/LTE 13, 1 RB Mid, Mid CH, Back face/Area Scan (111x141x1):

Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.114 W/kg

Flat Phantom, Faces, d=24mm - External Ant/LTE 13, 1 RB Mid, Mid CH, Back face/Zoom Scan (6x5x7)/Cube

0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 9.402 V/m ; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.127 W/kg

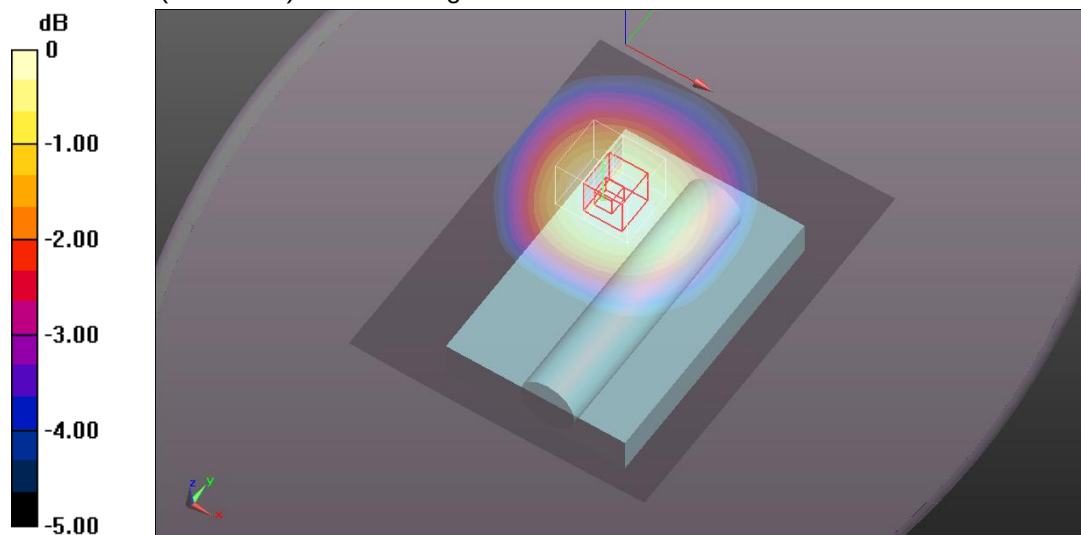
SAR(1 g) = 0.100 W/kg ; SAR(10 g) = 0.075 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

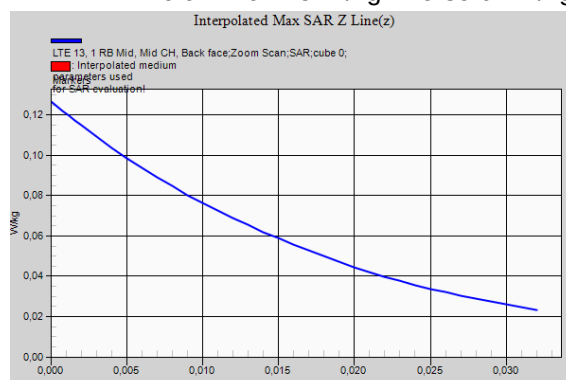
Ratio of SAR at M2 to SAR at M1 = 79.5%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.115 W/kg



0 dB = 0.115 W/kg = -9.39 dBW/kg



Plot N° 22

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 22/07/2021

DUT: TCAM E4.4 NA; Type: Backup Antenna; Serial: 76344

Communication System: UID 10175 - CAG, LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK); Frequency: 782 MHz; Duty Cycle: 1:3.7325

Medium parameters used (interpolated): $f = 782$ MHz; $\sigma = 0.914$ S/m; $\epsilon_r = 40.592$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.84, 9.84, 9.84) @ 782 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, Faces, d=24mm - Backup/LTE 13, 1 RB Mid, Mid CH, Back face/Area Scan (111x141x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.141 W/kg

Flat Phantom, Faces, d=24mm - Backup/LTE 13, 1 RB Mid, Mid CH, Back face/Zoom Scan (7x6x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.41 V/m; Power Drift = 0.27 dB

Peak SAR (extrapolated) = 0.164 W/kg

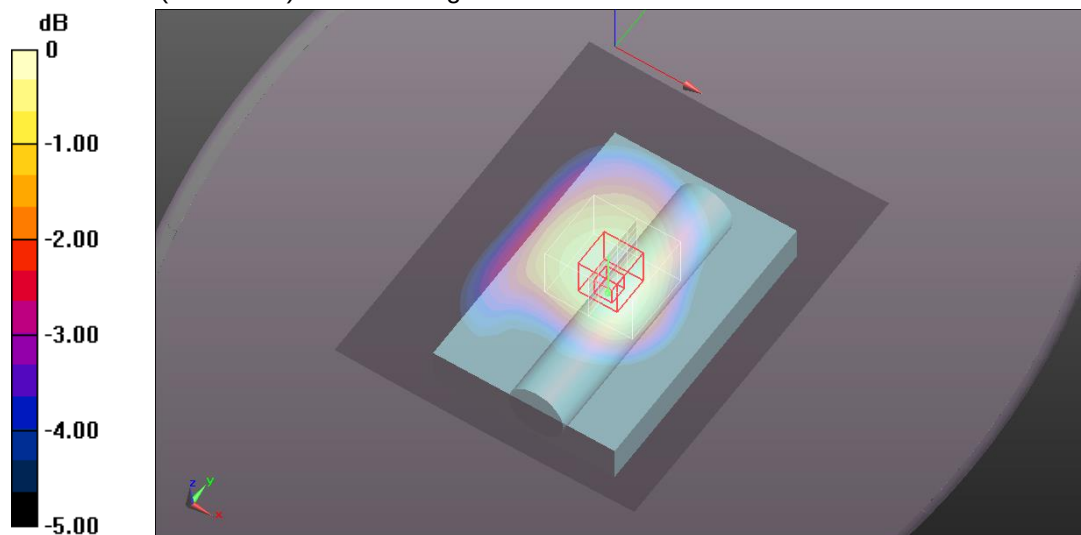
SAR(1 g) = 0.130 W/kg; SAR(10 g) = 0.098 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 30.8 mm

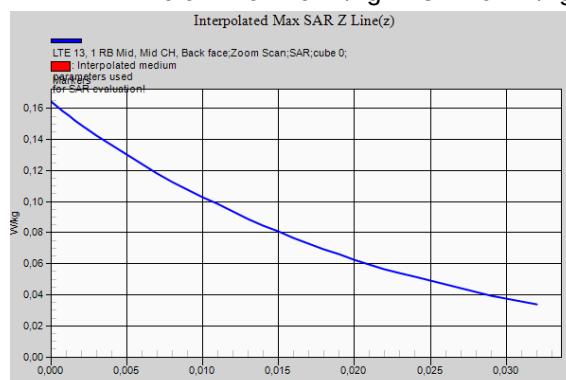
Ratio of SAR at M2 to SAR at M1 = 79%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.149 W/kg



0 dB = 0.149 W/kg = -8.27 dBW/kg



Plot N° 23

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 02/08/2021

DUT: TCAM E4.4 NA; Type: Backup Antenna; Serial: 76362

Communication System: UID 10415 - AAA, IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle);

Frequency: 2462 MHz; Duty Cycle: 1:1.42561

Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 1.85$ S/m; $\epsilon_r = 39.558$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(7.47, 7.47, 7.47) @ 2462 MHz; Calibrated: 28/08/2020

- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn669; Calibrated: 19/08/2020

- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060

- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24 mm - Backup Ant/2450MHz/802.11b, High CH, Back face/Area Scan (131x171x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.0640 W/kg

Flat Phantom, d=24 mm - Backup Ant/2450MHz/802.11b, High CH, Back face/Zoom Scan (8x8x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.861 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.0820 W/kg

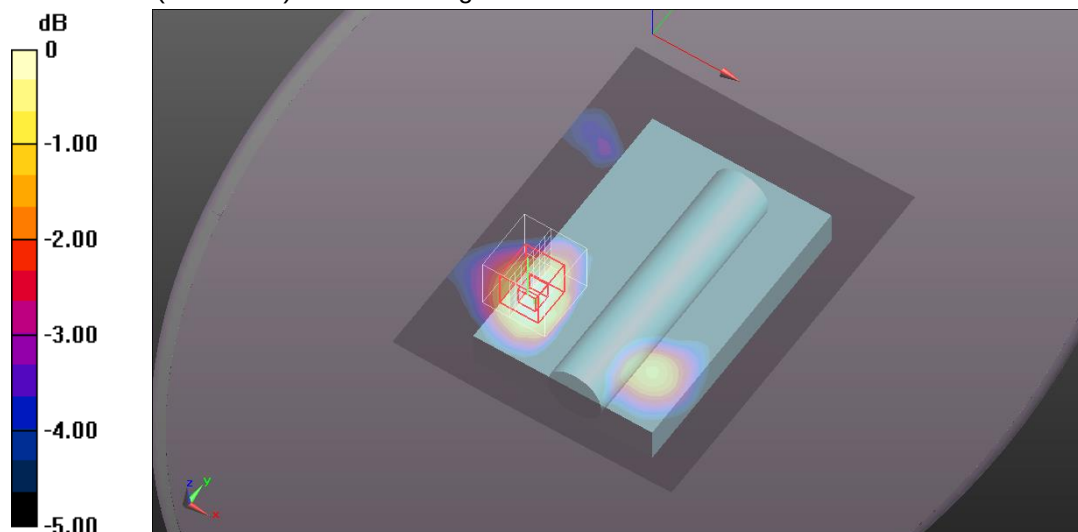
SAR(1 g) = 0.044 W/kg; SAR(10 g) = 0.024 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

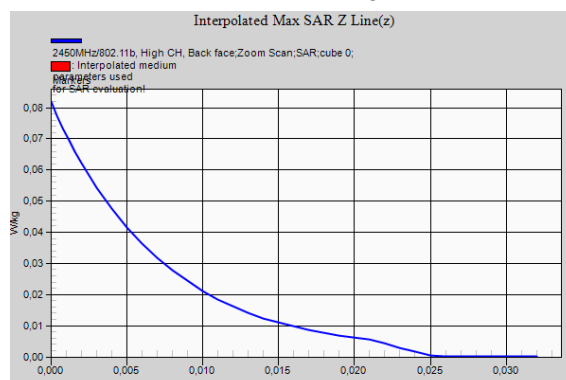
Ratio of SAR at M2 to SAR at M1 = 51.1%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0620 W/kg



0 dB = 0.0620 W/kg = -12.08 dBW/kg



Plot N° 24

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 03/08/2021

DUT: TCAM E4.4 NA; Type: Backup Antenna; Serial: 76362

Communication System: UID 10599 - AAB, IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc duty cycle); Frequency: 5190 MHz; Duty Cycle: 1:7.56833

Medium parameters used (interpolated): $f = 5190$ MHz; $\sigma = 4.73$ S/m; $\epsilon_r = 36.21$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(5.71, 5.71, 5.71) @ 5190 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=24 mm - Backup Ant/5200MHz/802.11n40, MCS0, Mid CH, Back Face, CH0/Area Scan (131x171x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.0717 W/kg

Flat Phantom, d=24 mm - Backup Ant/5200MHz/802.11n40, MCS0, Mid CH, Back Face, CH0/Zoom Scan (9x9x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.904 V/m; Power Drift = -0.33 dB

Peak SAR (extrapolated) = 0.150 W/kg

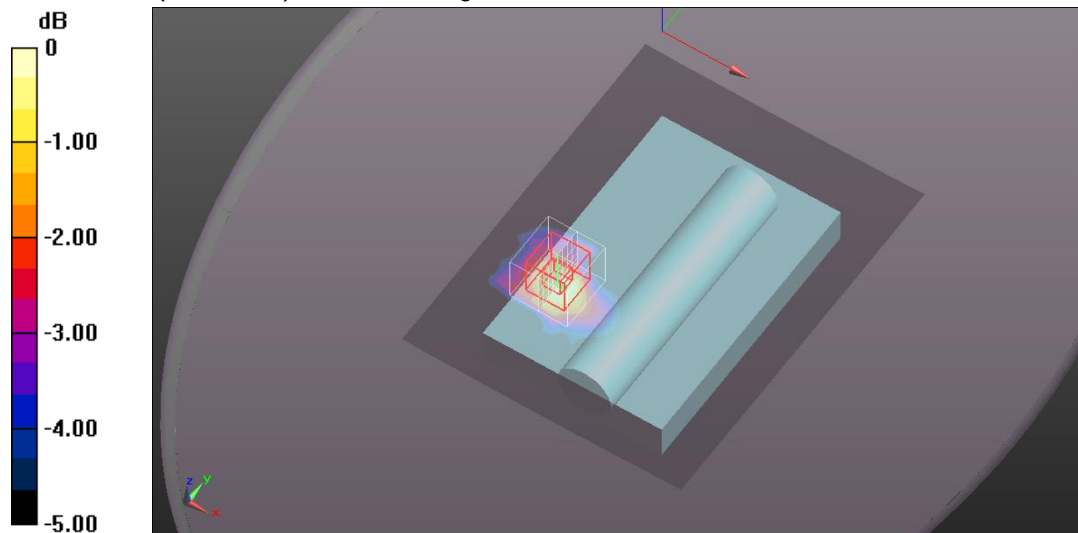
SAR(1 g) = 0.039 W/kg; SAR(10 g) = 0.016 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

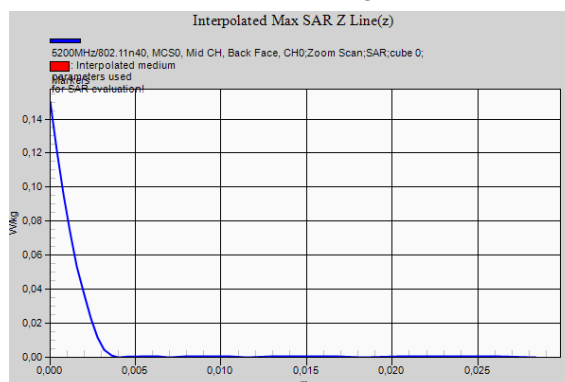
Ratio of SAR at M2 to SAR at M1 = 48.5%

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0766 W/kg



0 dB = 0.0766 W/kg = -11.16 dBW/kg



Plot N° 25

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 04/08/2021

DUT: TCAM E4.4 NA; Type: Backup Antenna; Serial: 76362

Communication System: UID 10417 - AAB, IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle);

Frequency: 5660 MHz; Duty Cycle: 1:6.65273

Medium parameters used: $f = 5660$ MHz; $\sigma = 5.17$ S/m; $\epsilon_r = 35.79$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(5.02, 5.02, 5.02) @ 5660 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 2mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Flat Phantom, d=10 mm - Backup Ant/5800MHz/802.11a, 6Mbps, Low CH, Back Face/Area Scan

(131x171x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.0986 W/kg

Flat Phantom, d=10 mm - Backup Ant/5800MHz/802.11a, 6Mbps, Low CH, Back Face/Zoom Scan

(8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 3.463 V/m; Power Drift = 0.23 dB

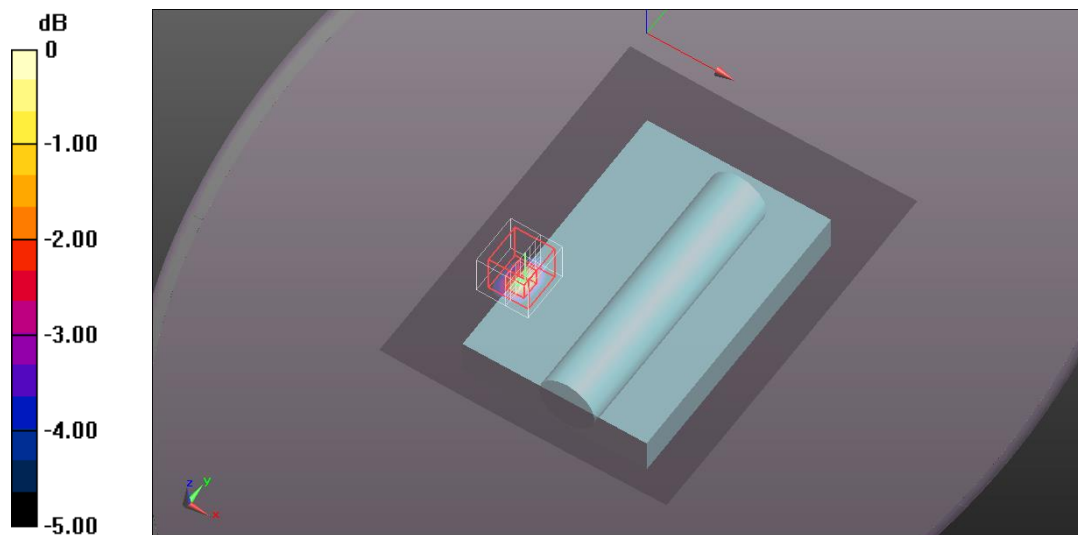
Peak SAR (extrapolated) = 0.202 W/kg

SAR(1 g) = 0.046 W/kg; SAR(10 g) = 0.015 W/kg (SAR corrected for target medium)

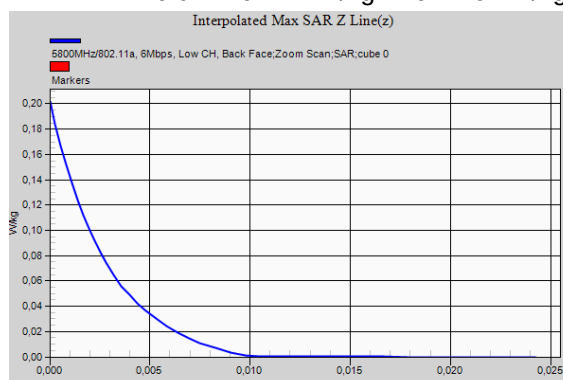
Smallest distance from peaks to all points 3 dB below = 8.3 mm

Ratio of SAR at M2 to SAR at M1 = 62.3%

Maximum value of SAR (measured) = 0.122 W/kg



0 dB = 0.122 W/kg = -9.14 dBW/kg



Appendix D: System Validation Reports

Validation results in 750 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 21/07/2021

DUT: Dipole 750 MHz D750V3; Type: D750V3; Serial: D750V3 - SN:1036

Communication System: UID 0, CW (0); Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750$ MHz; $\sigma = 0.89$ S/m; $\epsilon_r = 40.99$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.84, 9.84, 9.84) @ 750 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Configuration 750MHz, 2021-07-21/d=15mm, Pin=250 mW/Area Scan (61x91x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.53 W/kg

Configuration 750MHz, 2021-07-21/d=15mm, Pin=250 mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.26 V/m; Power Drift = 0.06 dB

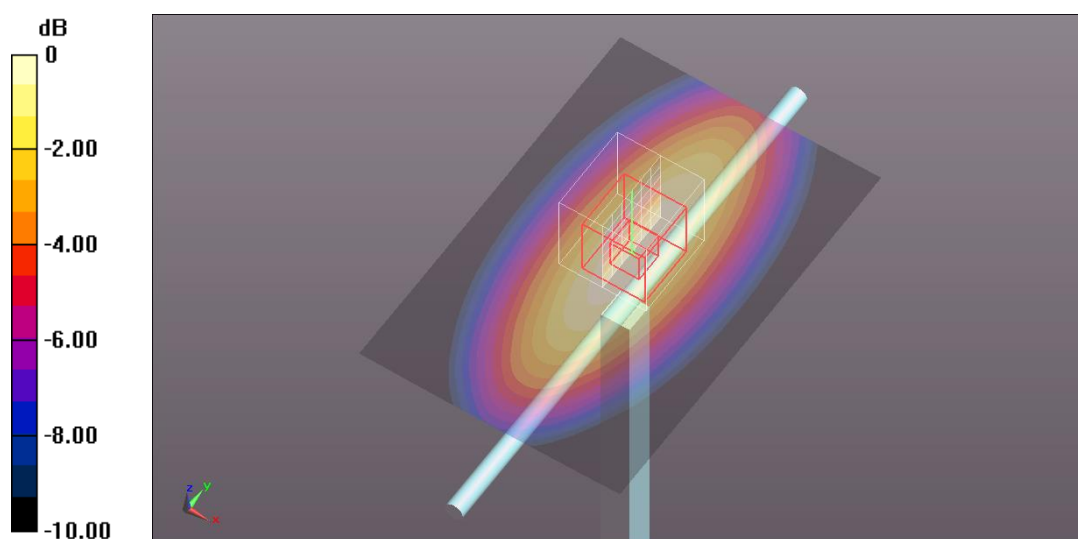
Peak SAR (extrapolated) = 3.31 W/kg

SAR(1 g) = 2.2 W/kg; SAR(10 g) = 1.44 W/kg (SAR corrected for target medium)

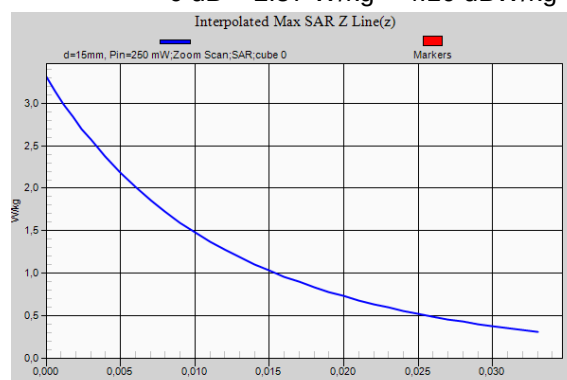
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 67%

Maximum value of SAR (measured) = 2.57 W/kg



0 dB = 2.57 W/kg = 4.10 dBW/kg



Validation results in 900 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 23/07/2021

DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d007

Communication System: UID 0, CW; Frequency: 900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 900$ MHz; $\sigma = 0.97$ S/m; $\epsilon_r = 41.82$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.43, 9.43, 9.43) @ 900 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Configuration 900MHz, 2021-07-23/d=15mm, Pin=250 mW/Area Scan (61x91x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 3.15 W/kg

Configuration 900MHz, 2021-07-23/d=15mm, Pin=250 mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.49 V/m; Power Drift = -0.02 dB

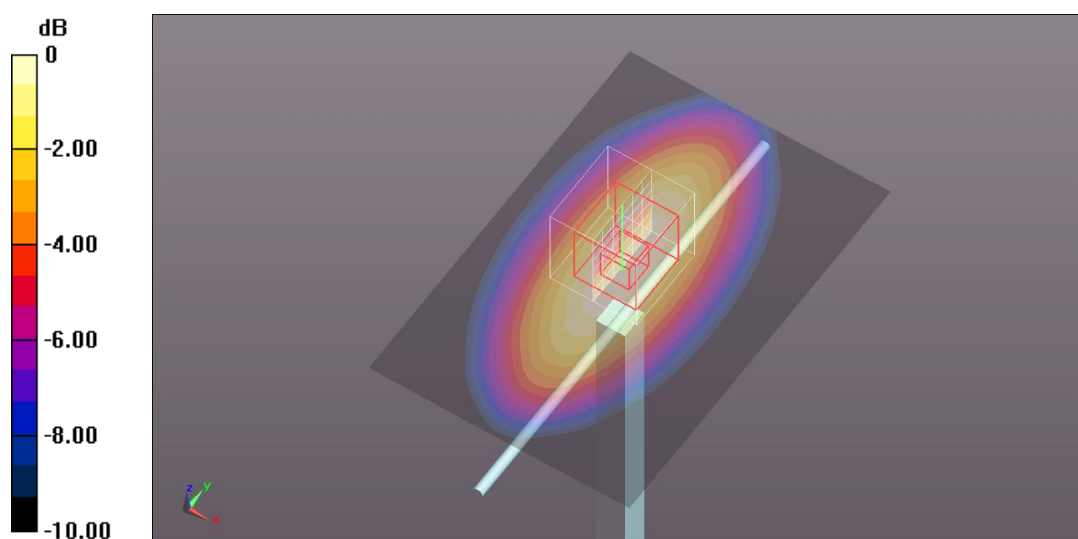
Peak SAR (extrapolated) = 4.07 W/kg

SAR(1 g) = 2.69 W/kg; SAR(10 g) = 1.74 W/kg (SAR corrected for target medium)

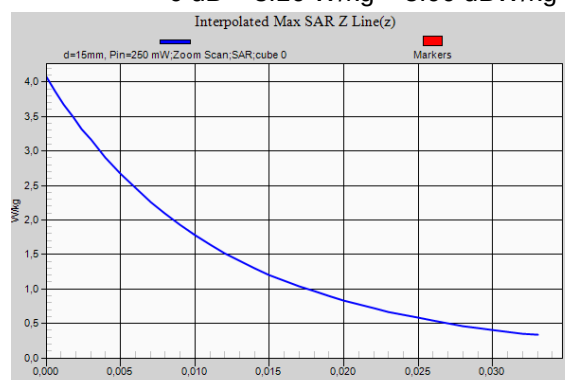
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 66.1%

Maximum value of SAR (measured) = 3.16 W/kg



0 dB = 3.16 W/kg = 5.00 dBW/kg



Validation results in 900 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 26/07/2021

DUT: Dipole 900 MHz D900V2; Type: D900V2; Serial: D900V2 - SN:1d007

Communication System: UID 0, CW; Frequency: 900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 900$ MHz; $\sigma = 0.97$ S/m; $\epsilon_r = 41.97$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(9.43, 9.43, 9.43) @ 900 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Configuration 900MHz, 2021-07-26/d=15mm, Pin=250 mW/Area Scan (61x91x1):

Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 3.14 W/kg

Configuration 900MHz, 2021-07-26/d=15mm, Pin=250 mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 57.23 V/m; Power Drift = 0.10 dB

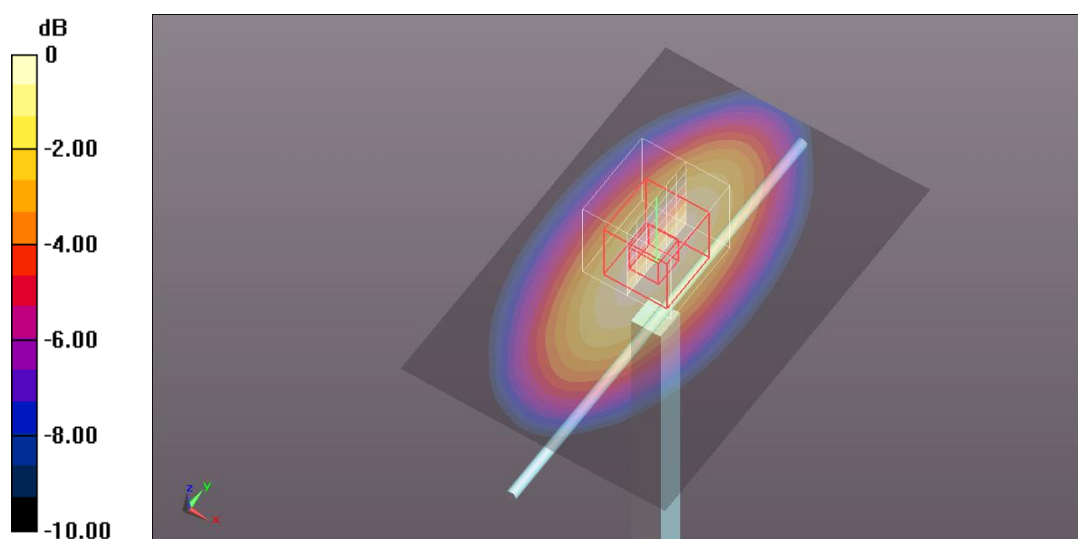
Peak SAR (extrapolated) = 4.13 W/kg

SAR(1 g) = 2.74 W/kg; SAR(10 g) = 1.77 W/kg (SAR corrected for target medium)

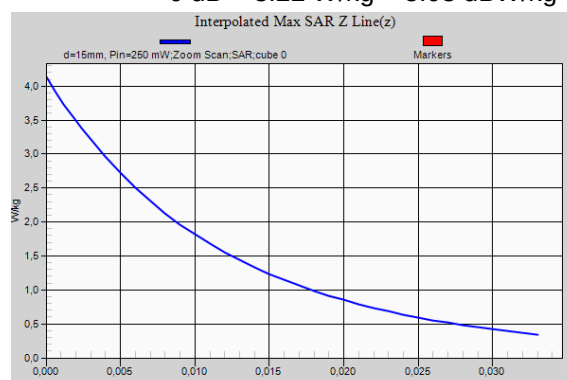
Smallest distance from peaks to all points 3 dB below = 20.5 mm

Ratio of SAR at M2 to SAR at M1 = 66.2%

Maximum value of SAR (measured) = 3.22 W/kg



0 dB = 3.22 W/kg = 5.08 dBW/kg



Validation results in 1800 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 27/07/2021

DUT: Dipole 1800 MHz D1800V2; **Type:** D1800V2; **Serial:** D1800V2 - SN:2d099

Communication System: UID 0, CW (0); Frequency: 1800 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1800$ MHz; $\sigma = 1.46$ S/m; $\epsilon_r = 38.72$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1800 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Configuration 1800MHz(1700), 2021-07-27/d=10mm, Pin=250 mW/Area Scan (91x91x1):

Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 13.0 W/kg

Configuration 1800MHz(1700), 2021-07-27/d=10mm, Pin=250 mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 94.60 V/m; Power Drift = 0.05 dB

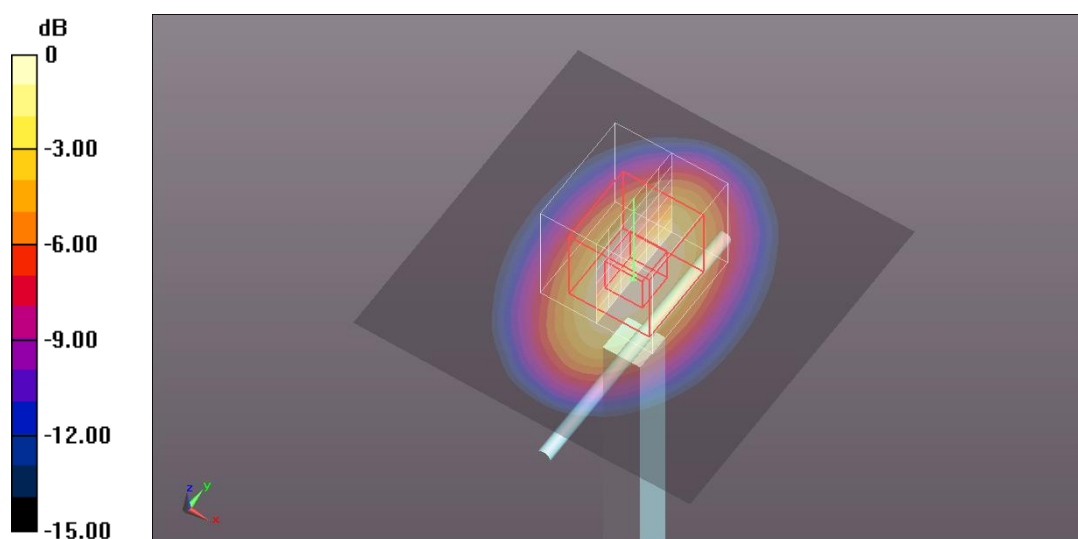
Peak SAR (extrapolated) = 19.5 W/kg

SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.29 W/kg (SAR corrected for target medium)

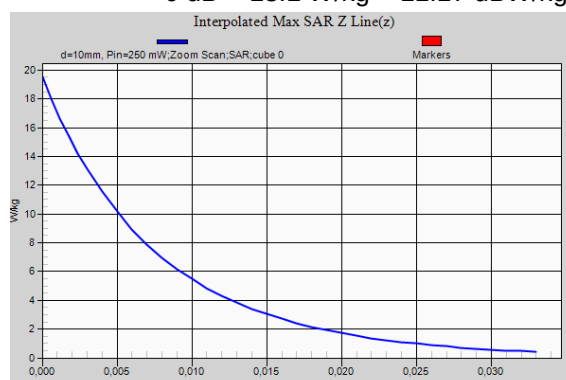
Smallest distance from peaks to all points 3 dB below = 11.1 mm

Ratio of SAR at M2 to SAR at M1 = 53.1%

Maximum value of SAR (measured) = 13.1 W/kg



0 dB = 13.1 W/kg = 11.17 dBW/kg



Validation results in 1800 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 28/07/2021

DUT: Dipole 1800 MHz D1800V2; **Type:** D1800V2; **Serial:** D1800V2 - **SN:**2d099

Communication System: UID 0, CW (0); Frequency: 1800 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1800$ MHz; $\sigma = 1.36$ S/m; $\epsilon_r = 39.52$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(8.25, 8.25, 8.25) @ 1800 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Configuration 1800MHz(1900), 2021-07-28/d=10mm, Pin=250 mW/Area Scan (91x91x1):

Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 11.9 W/kg

Configuration 1800MHz(1900), 2021-07-28/d=10mm, Pin=250 mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 92.09 V/m; Power Drift = 0.02 dB

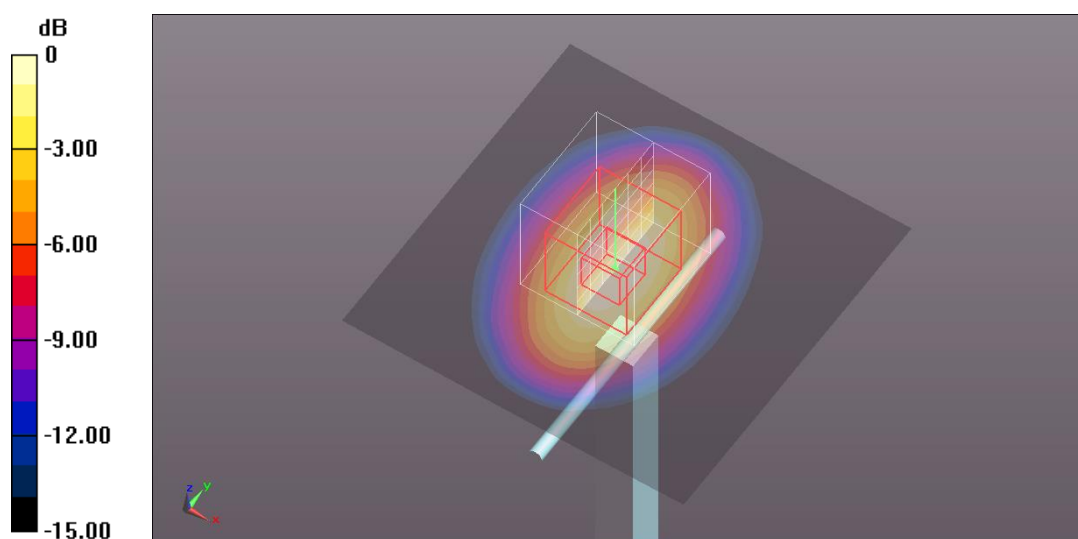
Peak SAR (extrapolated) = 18.0 W/kg

SAR(1 g) = 9.56 W/kg; SAR(10 g) = 4.88 W/kg (SAR corrected for target medium)

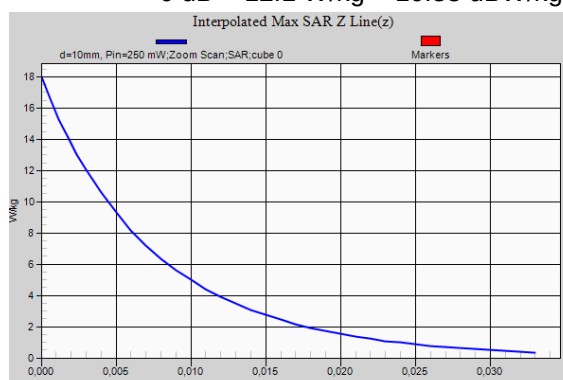
Smallest distance from peaks to all points 3 dB below = 11.1 mm

Ratio of SAR at M2 to SAR at M1 = 52.8%

Maximum value of SAR (measured) = 12.1 W/kg



0 dB = 12.1 W/kg = 10.83 dBW/kg



Validation results in 2450 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 02/08/2021

DUT: Dipole 2450 MHz D2450V2; **Type:** D2450V2; **Serial:** D2450V2 - SN:756

Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.83$ S/m; $\epsilon_r = 39.53$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(7.47, 7.47, 7.47) @ 2450 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Configuration 2450MHz, 2021-08-02/d=10mm, Pin=250 mW 2/Area Scan (91x91x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 17.0 W/kg

Configuration 2450MHz, 2021-08-02/d=10mm, Pin=250 mW 2/Zoom Scan (8x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.13 V/m; Power Drift = 0.03 dB

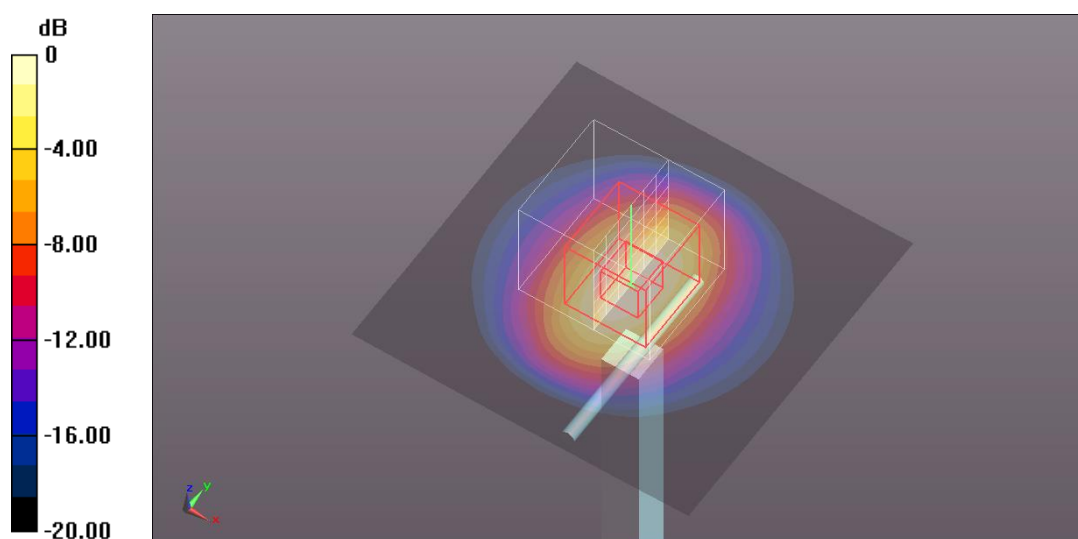
Peak SAR (extrapolated) = 26.6 W/kg

SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.93 W/kg (SAR corrected for target medium)

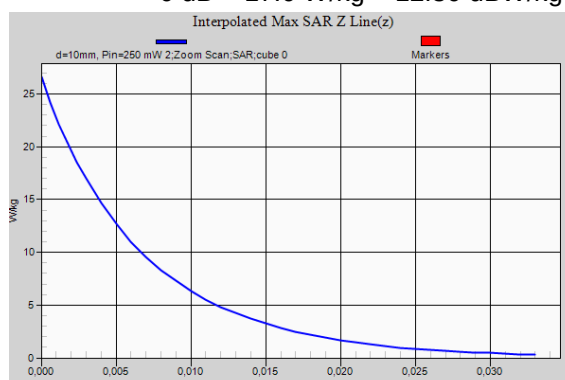
Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 49.2%

Maximum value of SAR (measured) = 17.0 W/kg



0 dB = 17.0 W/kg = 12.30 dBW/kg



Validation results in 2600 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; **Date:** 29/07/2021

DUT: Dipole 2600 MHz D2600V2; **Type:** D2600V2; **Serial:** D2600V2 - **SN:**1023

Communication System: UID 0, CW (0); Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2600$ MHz; $\sigma = 1.95$ S/m; $\epsilon_r = 38.92$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(7.27, 7.27, 7.27) @ 2600 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Configuration 2600MHz, 2021-07/d=10mm, Pin=250 mW/Area Scan (91x91x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 18.7 W/kg

Configuration 2600MHz, 2021-07/d=10mm, Pin=250 mW/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.71 V/m; Power Drift = -0.04 dB

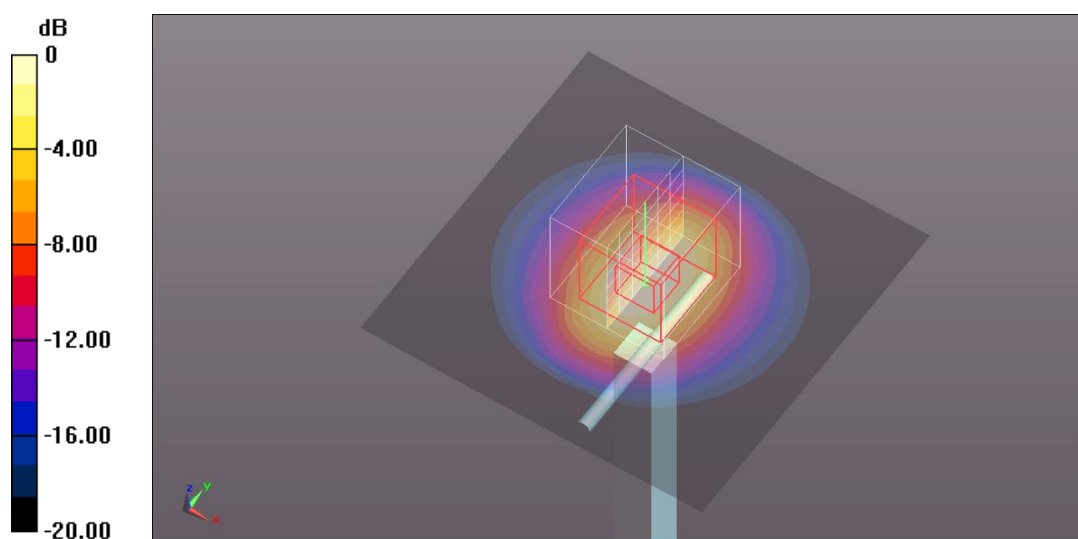
Peak SAR (extrapolated) = 29.6 W/kg

SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.08 W/kg (SAR corrected for target medium)

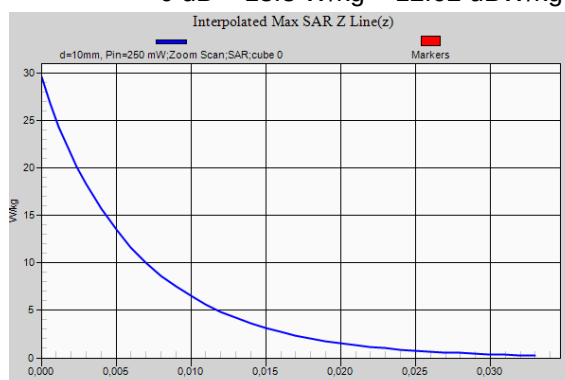
Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 47.2%

Maximum value of SAR (measured) = 18.3 W/kg



0 dB = 18.3 W/kg = 12.62 dBW/kg



Validation results in 5200 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 03/08/2021

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN:1071

Communication System: UID 0, CW (0); Frequency: 5200 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5200$ MHz; $\sigma = 4.74$ S/m; $\epsilon_r = 36.21$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(5.71, 5.71, 5.71) @ 5200 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Configuration 5GHz/2021-08-03, 5200MHz, d=10mm, Pin=100 mW/Area Scan (61x61x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 19.5 W/kg

Configuration 5GHz/2021-08-03, 5200MHz, d=10mm, Pin=100 mW/Zoom Scan (8x8x8)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 60.52 V/m; Power Drift = 0.04 dB

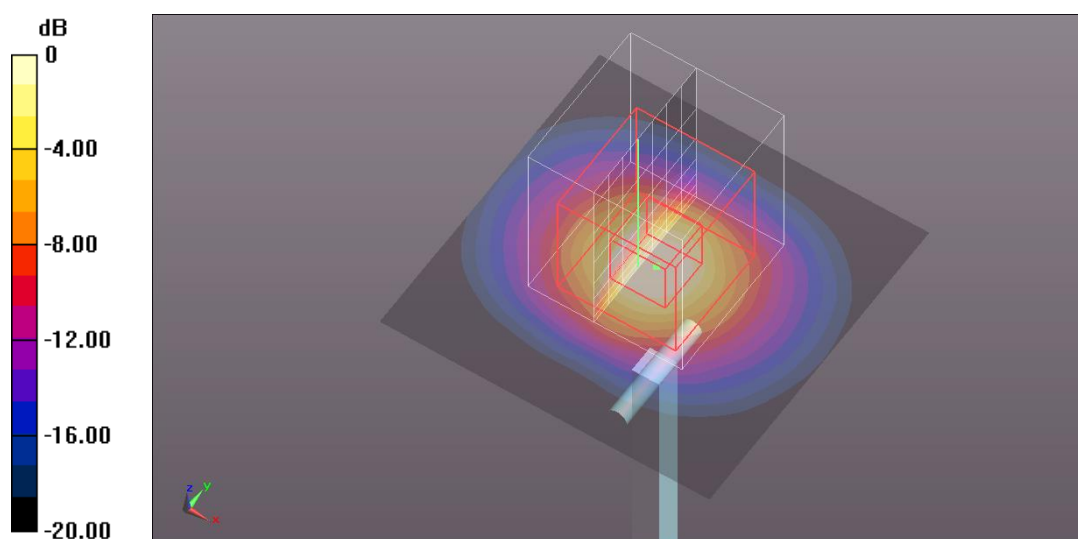
Peak SAR (extrapolated) = 29.0 W/kg

SAR(1 g) = 7.74 W/kg; SAR(10 g) = 2.24 W/kg (SAR corrected for target medium)

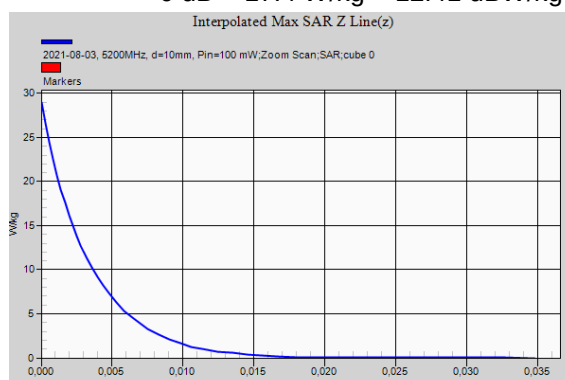
Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 67.6%

Maximum value of SAR (measured) = 17.4 W/kg



0 dB = 17.4 W/kg = 12.41 dBW/kg



Validation results in 5800 MHz Band for Head TSL

Test Laboratory: DEKRA Testing and Certification, S.A.U; Date: 04/08/2021

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN:1071

Communication System: UID 0, CW (0); Frequency: 5800 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5800$ MHz; $\sigma = 5.32$ S/m; $\epsilon_r = 35.59$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7461; ConvF(5.15, 5.15, 5.15) @ 5800 MHz; Calibrated: 28/08/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn669; Calibrated: 19/08/2020
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1060
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Configuration 5GHz/2021-08-04, 5800MHz, d=10mm, Pin=100 mW/Area Scan (61x61x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 20.9 W/kg

Configuration 5GHz/2021-08-04, 5800MHz, d=10mm, Pin=100 mW/Zoom Scan (8x8x8)/Cube 0:

Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 59.87 V/m; Power Drift = 0.18 dB

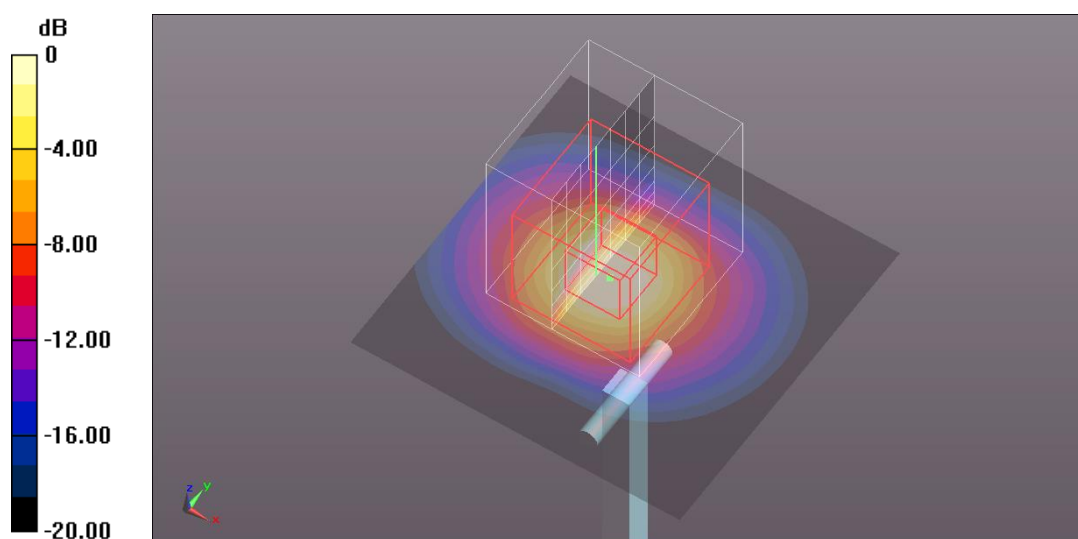
Peak SAR (extrapolated) = 34.1 W/kg

SAR(1 g) = 7.68 W/kg; SAR(10 g) = 2.18 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 7.1 mm

Ratio of SAR at M2 to SAR at M1 = 61.6%

Maximum value of SAR (measured) = 18.9 W/kg



0 dB = 18.9 W/kg = 12.76 dBW/kg

