FCC SAR Test Report

Applicant	:	**Meta Platforms Technologies, LLC.**
Equipment	:	**VR Headset**
Brand Name	:	**META PLATFORMS TECHNOLOGIES, LLC**
Model Name	:	**DK94EC**
FCC ID	:	**2AGOZ-L31W**
Standard	:	**FCC 47 CFR Part 2 (2.1093)**

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Si Zhang

Approved by: Si Zhang

ilac-MRA ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FA222304-01	01	Initial issue of report	Jul. 12, 2022
FA222304-01	02	Updated relevant data of nRF	Aug. 04, 2022

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Meta Platforms Technologies, LLC., VR Headset, DK94EC**, are as follows.

Equipment Class	Band	Reported SAR	Highest Simultaneous Transmission	APD	Scaled PD
		Head (Separation 0mm) (1g SAR W/kg)	1g SAR (W/kg)	Head (W/m^2)	psPD (W/m^2)
DTS	2.4GHz WLAN	**0.69**	1.06		
NII	5GHz WLAN	0.23	1.06		
6XD	WIFI6E	<0.10	0.75	0.31	1.29
DSS	Bluetooth	0.12	0.50		
DTS	nRF	<0.10	1.06		
Date of Testing:		2022/6/6 ~ 2022/8/1			

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for head 1g SAR) and Power density exposure limits (1 mW/cm^2) specified in FCC 47 CFR part 2 (2.1093), ANSI/IEEE C95.1-1992 and FCC 47 CFR Part1.1310, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

2. Administration Data

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

<table>
<tr><th colspan="4">Testing Laboratory</th></tr>
<tr><td>Test Firm</td><td colspan="3">Sporton International Inc. (Kunshan)</td></tr>
<tr><td>Test Site Location</td><td colspan="3">No. 1098, Pengxi North Road, Kunshan Economic Development Zone
Jiangsu Province 215300 People’s Republic of China
TEL : +86-512-57900158
FAX : +86-512-57900958</td></tr>
<tr><td rowspan="2">Test Site No.</td><td>Sporton Site No.</td><td>FCC Designation No.</td><td>FCC Test Firm Registration No.</td></tr>
<tr><td>SAR04-KS</td><td>CN1257</td><td>314309</td></tr>
</table>

<table>
<tr><th colspan="2">Applicant</th></tr>
<tr><td>Company Name</td><td>Meta Platforms Technologies, LLC.</td></tr>
<tr><td>Address</td><td>1 Hacker Way, Menlo Park, CA 94025, USA</td></tr>
</table>

3. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards.

· FCC 47 CFR Part 2 (2.1093)
· ANSI/IEEE C95.1-1992
· IEEE 1528-2013
· IEC/IEEE 62209-1528:2020
· SPEAG DASY6 System Handbook
· SPEAG DASY6 Application Note (Interim Procedure for Device Operation at 6GHz-10GHz)
· IEC TR 63170:2018
· IEC 62479:2010
· FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
· FCC KDB 865664 D02 SAR Reporting v01r02
· FCC KDB 447498 D01 General RF Exposure Guidance v06
· FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
· FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	VR Headset
Brand Name	META PLATFORMS TECHNOLOGIES, LLC
Model Name	DK94EC
FCC ID	2AGOZ-L31W
S/N	230YC63D3V0024
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz WLAN 6E U-NII-5: 5925 MHz ~ 6425 MHz WLAN 6E U-NII-6: 6425 MHz ~ 6525 MHz WLAN 6E U-NII-7: 6525 MHz ~ 6875 MHz WLAN 6E U-NII-8: 6875 MHz ~ 7125 MHz Bluetooth: 2402 MHz ~ 2480 MHz nRF : 2402 MHz ~ 2478 MHz
Mode	WLAN 2.4GHz 802.11b/g/n/ac/ax HT20/VHT20/HE20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/VHT160 WLAN 5GHz 802.11ax HE20/HE40/HE 80/HE160 WLAN 6GHz 802.11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE nRF: GFSK
SW Version	28151810289300000
EUT Stage	Identical Prototype

Remark:
1. 802.11n-HT40 is not supported in 2.4GHz WLAN.
2. The EUT has no voice function.

5. RF Exposure Limits

5.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

5.3 RF Exposure limit for below 6GHz

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

1. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

5.4 RF Exposure limit for above 6GHz

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310. Power density evaluations in units of W/m^2 or mW/cm^2.

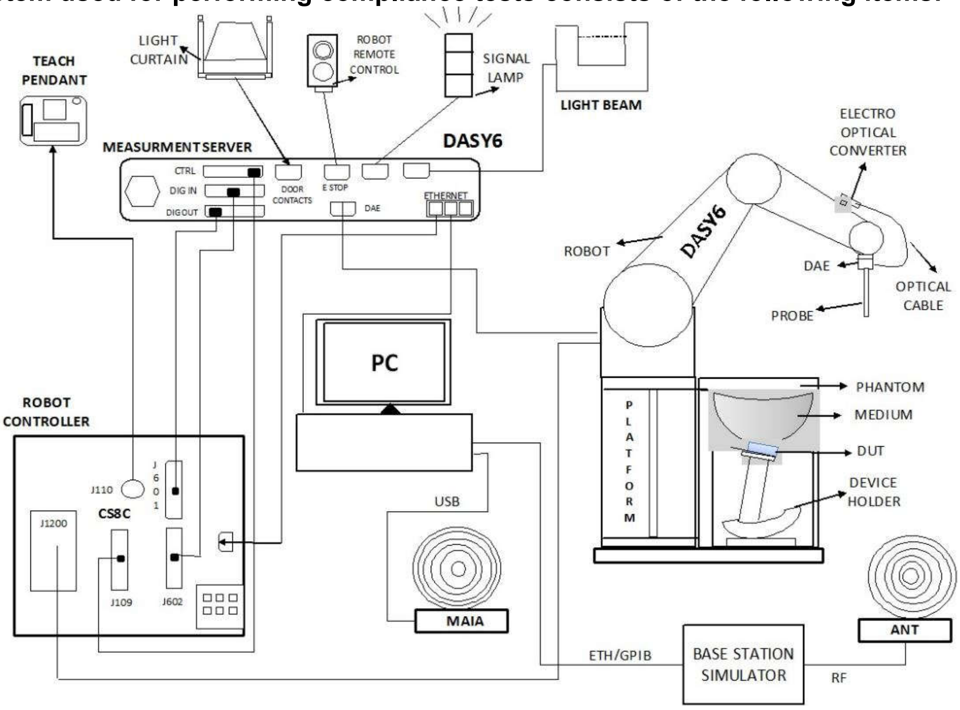
Peak Spatially Averaged Power Density was evaluated over a circular area of $4cm^2$ per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

Note: 1.0 mW/cm^2 is 10 W/m^2

6. System Description and Setup

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



- A standard high precision 6-axis robot 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 Win7 or Win10 and the DASY5 or DASY6 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.

7. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	2450MHz System Validation Kit	D2450V2	924	2020/9/2	2023/9/1
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2019/9/24	2022/9/22
SPEAG	6500MHz System Validation Kit	D6.5GHzV2	1031	2021/3/1	2024/2/29
SPEAG	5G Verification Source	10GHz	2005	2021/11/26	2022/11/25
SPEAG	Data Acquisition Electronics	DAE4	1279	2021/9/21	2022/9/20
SPEAG	Data Acquisition Electronics	DAE4	1338	2021/12/1	2022/11/30
SPEAG	Dosimetric E-Field Probe	EX3DV4	7592	2021/6/24	2022/6/23
SPEAG	Dosimetric E-Field Probe	EX3DV4	7630	2022/3/4	2023/3/3
SPEAG	Dosimetric E-Field Probe	ES3DV4	3279	2021/8/24	2022/8/23
SPEAG	EUmmWV Probe Tip Protection	EUmmWV4	9432	2021/11/29	2022/11/28
SPEAG	mmWave Phantom	mmWave	1065	NCR	NCR
SPEAG	SAM Twin Phantom	SAM Twin	TP-1644	NCR	NCR
SPEAG	SAM Twin Phantom	SAM Twin	TP-1842	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Rohde & Schwarz	Signal Generator	SMB100A	100455	2022/1/5	2023/1/4
Keysight	Preamplifier	83017A	MY57280111	2021/7/12	2022/7/11
Keysight	Preamplifier	83017A	MY57280111	2022/7/11	2023/7/10
Agilent	ENA Series Network Analyzer	E5071C	MY46106933	2021/7/31	2022/7/30
Agilent	ENA Series Network Analyzer	E5071C	MY46104587	2022/5/24	2023/5/23
SPEAG	Dielectric Probe Kit	DAK-3.5	1071	2022/1/24	2023/1/23
Anritsu	Vector Signal Generator	MG3710A	6201682672	2022/1/6	2023/1/5
Rohde & Schwarz	Power Meter	NRVD	102081	2021/8/12	2022/8/11
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2021/8/12	2022/8/11
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2021/8/12	2022/8/11
Rohde & Schwarz	Power Sensor	NRP50S	101254	2022/4/7	2023/4/6
R&S	CBT BLUETOOTH TESTER	CBT	100641	2022/1/5	2023/1/4
EXA	Spectrum Analyzer	FSV7	101631	2021/10/14	2022/10/13
FLUKE	DIGITAC THERMOMETER	51II	97240029	2021/10/23	2022/10/22
Testo	Thermo-Hygrometer	608-H1	1241332126	2022/1/6	2023/1/5
mini-circuits	amplifier	ZVE-3W-83+	162601250	Note 1	
Agilent	Dual Directional Coupler	778D	20500	Note 1	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note 1	
ET Industries	Dual Directional Coupler	C-058-10	N/A	Note 1	
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
ARRA	Power Divider	A3200-2	N/A	Note 1	
MCL	Attenuation1	BW-S10W5+	N/A	Note 1	
MCL	Attenuation2	BW-S10W5+	N/A	Note 1	
MCL	Attenuation3	BW-S10W5+	N/A	Note 1	
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A	Note 1	
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B	Note 1	
Agilent	Dual Directional Coupler	778D	20500	Note 1	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.

2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

8. SAR System Verification

8.1 SAR Tissue Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18℃ to 25℃, measured with calibrated instruments and apparatuses, such as network analyzers and temperature probes. The temperature of the tissue-equivalent medium during SAR measurement must also be within 18℃ to 25℃ and within ± 2℃ of the temperature when the tissue parameters are characterized. The tissue dielectric measurement system must be calibrated before use. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements.
The liquid tissue depth was at least 15cm in the phantom for all SAR testing

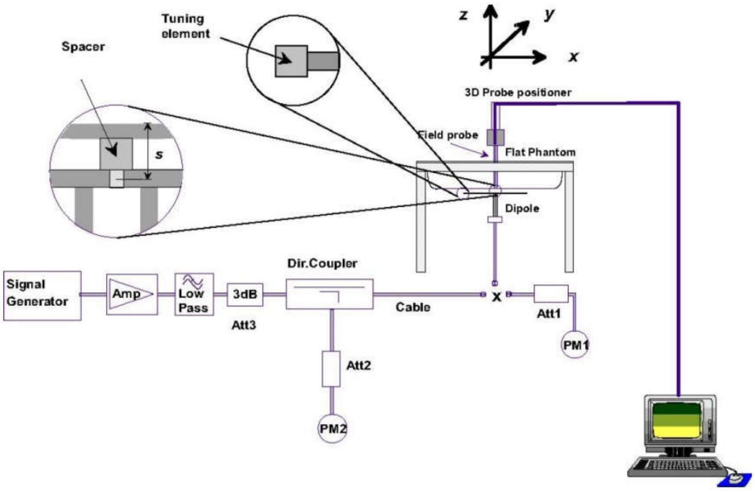
<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	Head	22.7	1.869	40.799	1.80	39.20	3.83	4.08	±5	2022/6/6
5250	Head	22.9	4.588	36.228	4.71	35.90	-2.59	0.91	±5	2022/6/8
5600	Head	22.8	4.968	35.683	5.07	35.50	-2.01	0.52	±5	2022/6/10
5750	Head	22.8	5.137	35.512	5.22	35.40	-1.59	0.32	±5	2022/6/12
6500	Head	22.8	6.080	34.000	6.07	34.50	0.16	-1.45	±5	2022/6/14
2450	Head	22.8	1.810	38.628	1.80	39.20	0.56	-1.46	±5	2022/7/18
5600	Head	22.7	4.987	35.587	5.07	35.50	-1.64	0.25	±5	2022/7/4
2450	Head	22.9	1.768	39.330	1.80	39.20	-1.78	0.33	±5	2022/8/1

8.2 SAR System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2022/6/6	2450	Head	50	924	7592	1279	2.640	51.40	52.8	2.72
2022/6/8	5250	Head	50	1113	7592	1279	3.890	80.50	77.8	-3.35
2022/6/10	5600	Head	50	1113	7592	1279	4.310	83.40	86.2	3.36
2022/6/12	5750	Head	50	1113	7592	1279	3.850	80.00	77	-3.75
2022/6/14	6500	Head	100	1031	7592	1279	26.600	289.00	266	-7.96
2022/7/18	2450	Head	50	924	7630	1279	2.600	51.40	52	1.17
2022/7/4	5600	Head	50	1113	7630	1279	4.120	83.40	82.4	-1.20
2022/8/1	2450	Head	50	924	3279	1338	2.500	51.40	50	-2.72



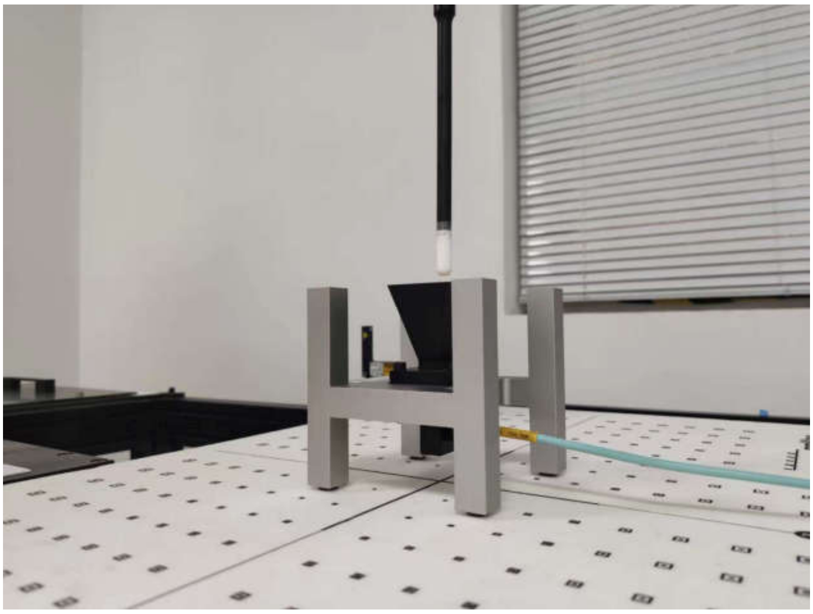
System Performance Check Setup

Setup Photo

8.3 PD System Verification Results

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check. The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.

Frequency (GHz)	5G Verification Source	Probe S/N	DAE S/N	Distance (mm)	Prad (mW)	Measured 4 cm^2 (W/m^2)	Targeted 4 cm^2 (W/m^2)	Deviation (dB)	Date
10	10GHz_2005	9432	1279	10	125	137	151	-0.42	2022/6/15



System Verification Setup Photo

9. RF Exposure Positions

9.1 Ear and handset reference point

Figure 9.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 9.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 9.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 9.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

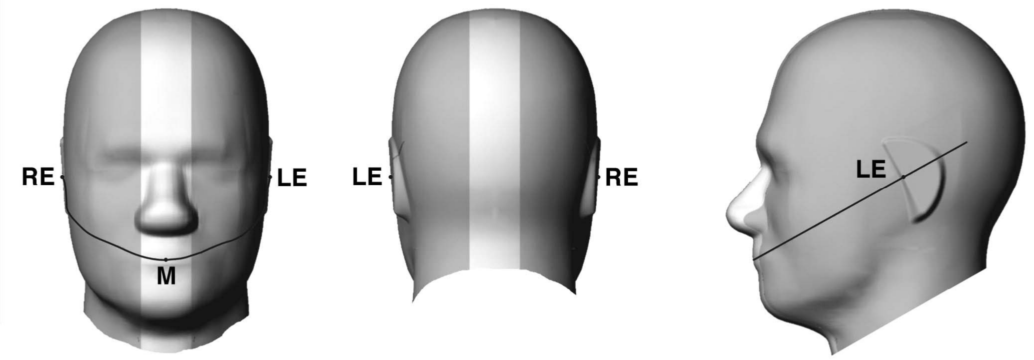


Fig 9.1.1 Front, back, and side views of SAM twin phantom

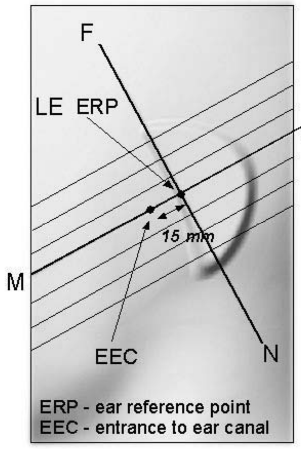


Fig 9.1.2 Close-up side view of phantom showing the ear region.

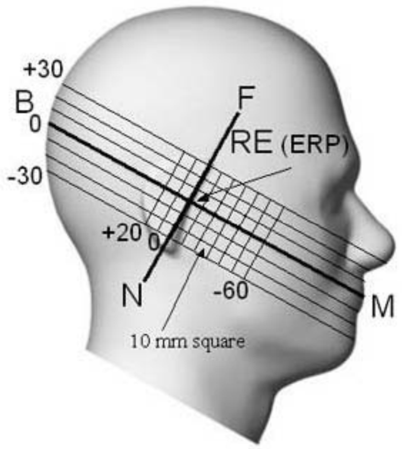


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

9.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Figure 9.2.1 and Figure 9.2.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 9.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 9.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 9.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 9.2.3. The actual rotation angles should be documented in the test report.

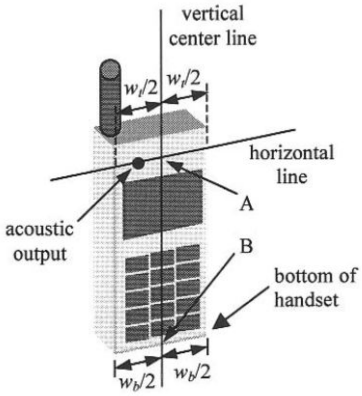


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

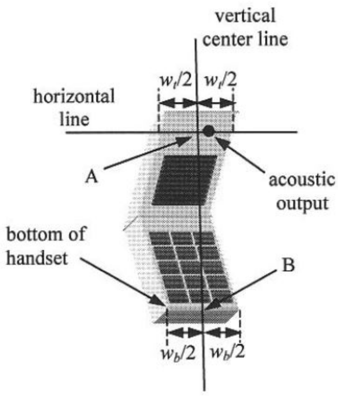


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

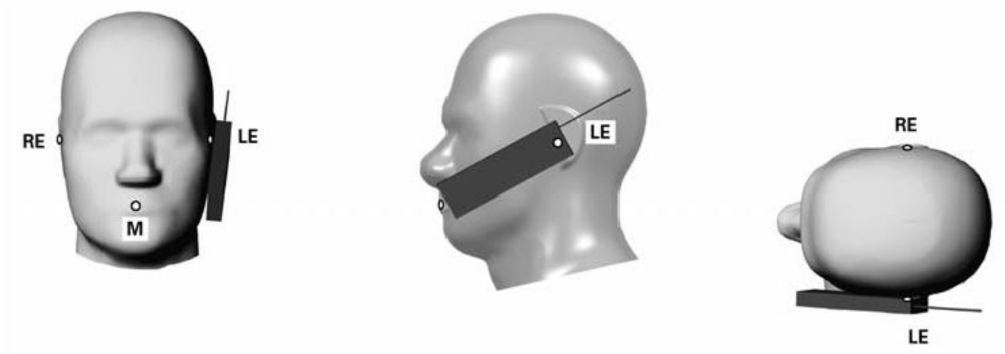


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

Note:
The device head SAR is performed at head of SAM twin phantom.

<EUT Setup Photos>

Please refer to Appendix D for the test setup photos.

9.3 Miscellaneous Testing Considerations

- Evaluate SAR using 6-7 GHz parameters per IEC/IEEE 62209-1528:2020.
- Per procedures of KDB Pubs. 447498 and 248227, and applicable product-specific procedures among KDB Pubs. 648474 (handsets/phablets).
- Where supported by the test system, also report estimated absorbed (epithelial) power density (for reference purposes only, not specifically for compliance) and estimated incident PD, derived from measured SAR.
- In addition, for the highest SAR test configurations evaluate incident PD using the mmw near-field probe and total-field/power-density reconstruction method (2 mm closest meas. plane)
  - Adjust measured results per amount that measurement uncertainty exceeds 30 % (see e.g. IEC 62479:2010)

10. Conducted RF Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<WLAN Conducted Power>

General Note:

1. For each antenna, transmit power in SISO operation is larger than (or equal to) the power in MIMO operation, RF exposure compliance of MIMO mode can be deduced from the compliance simultaneous transmission of antennas operating in SISO mode.
2. Per KDB 248227 D01v02r02, the simultaneous SAR provisions in KDB publication 447498 should be applied to determine simultaneous transmission SAR test exclusion for WiFi MIMO. If the sum of 1g single transmission chain SAR measurements is < 1.6W/kg and SAR peak to location ratio ≤ 0.04, no additional SAR measurements for MIMO.
3. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures. For “Not required”, SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band or when MIMO mode was not performed, due to for each antenna, transmit power in SISO operation is larger than (or equal to) the power in MIMO operation, RF exposure compliance of MIMO mode can be deduced from the compliance simultaneous transmission of antennas operating in SISO mode. Additional output power measurements were not necessary.
4. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
5. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
6. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
7. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.18 The initial test position procedure is described in the following:
   a. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
   b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.

c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

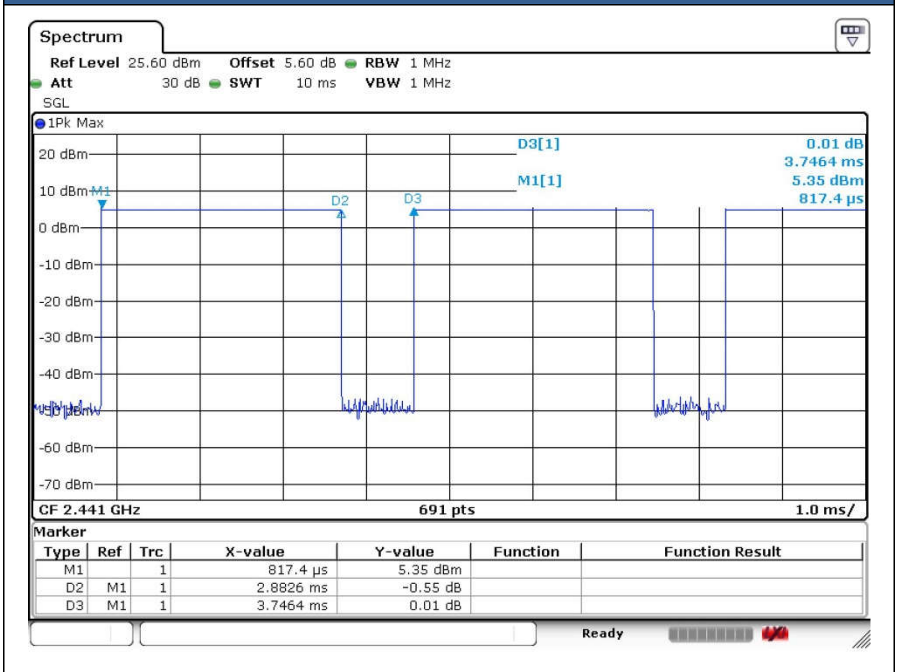
8. In applying the test guidance, the IEEE 802.11 mode with the maximum output power (out of all modes) should be considered for testing
9. For modes with the same maximum output power, the guidance from section 5.3.2 a) of FCC KDB Publication 248227 D01 should be applied, with 802.11ax being considered as the highest 802.11 mode for the appropriate frequency bands
10. When SAR testing for 802.11ax is required
    a. If the maximum output power is highest for OFDMA scenarios, choose the tone size with the maximum number of tones and the highest maximum output power
    b. Otherwise, consider the fully allocated channel for SAR testing
    c. When SAR testing is required on RU sizes less than the fully allocated channel, use the RU number closest to the middle of the channel, choosing the higher RU number when two RUs are equidistant to the middle of the channel

<2.4GHz Bluetooth>

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The Bluetooth duty cycle is 76.94 % as following figure, according to 2016 Oct. TCB workshop for Bluetooth SAR scaling need further consideration and the maximum duty cycle is 100%, therefore the actual duty cycle will be scaled up to100% for Bluetooth reported SAR calculation.

Bluetooth time-domain plot

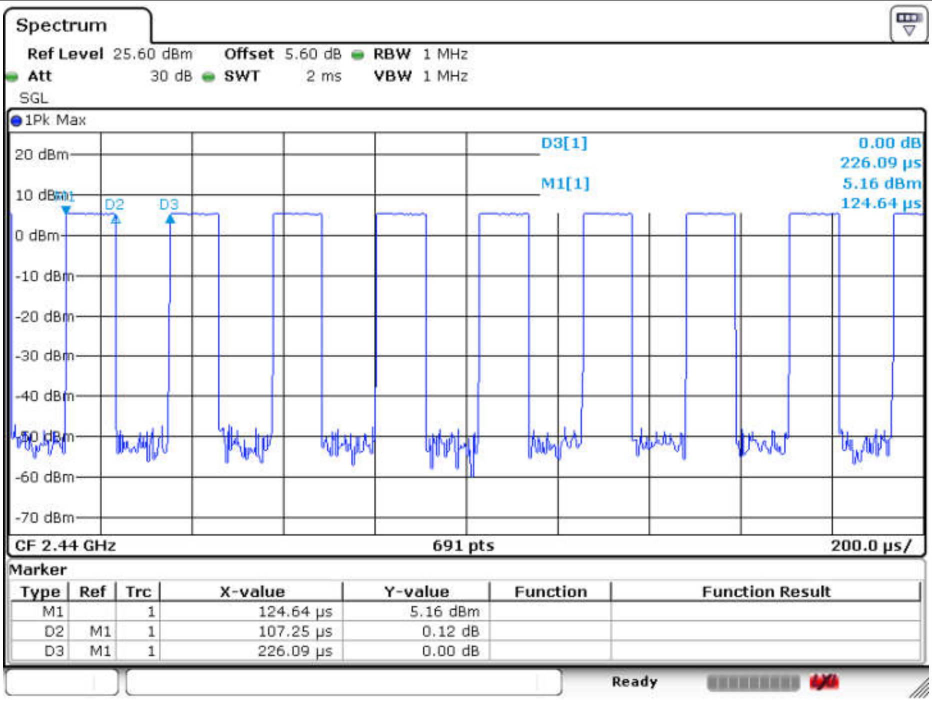


<2.4GHz nRF>

General Note:

1. The nRF duty cycle are 47.44% as following figure, for nRF SAR scaling need further consideration and the maximum duty cycle is 50%(Declared by Manufacturer), therefore the actual duty cycle will be scaled up to 50% for nRF reported SAR calculation.

nRF time-domain plot



11. Antenna Location

The detailed antenna location information can refer to SAR Test Setup Photos.

12. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For nRF testing of nRF signal with 50% duty cycle (Declared by Manufacturer), the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle) *50%"
   d. For WLAN/nRF: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   · ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   · ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   · ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. For WIFI6E doesn’t support wireless router capability.
5. Per FCC guidance, SAR was performed using 6.5 GHz SAR probe calibration factors.
6. Per October 2020 TCB Workshop Interim procedures, start instead with a minimum of 5 test channels across the full band, then adapt and apply conducted power and SAR test reduction procedures of KDB Pub. 248227 v02r02
7. Absorbed power density (APD) using a 4cm2 averaging area is reported based on SAR measurements.
8. The device head SAR is performed at head of SAM twin phantom.
9. Due to all of the VR glasses have a fixed plastic and also we remove all entire sponge cushions, when wear on the head, there will a distance between user's head and RF antenna, the minimum distance between human head and device curve is 20mm
10. Due to the setup limitation because fixed plastic of device on the head phantom, so we place the device under the head phantom and the minimum distance is 20mm.
11. A non-standard setup was used for SAR and PD testing based on guidance from the FCC. The inquiry document contains additional information.

WLAN SAR Note:

1. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
2. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
3. For WLAN SAR testing was performed on single antenna RF power in SISO mode is larger or equal to the single antenna RF power in MIMO mode, and for RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode. So WLAN SAR testing was performed on SISO antenna, MIMO SAR base on standalone SAR summed together as MIMO SAR.
4. During SAR testing the WLAN transmission was verified using a spectrum analyzer.
5. When SAR testing for 802.11ax is required
   a. If the maximum output power is highest for OFDMA scenarios, choose the tone size with the maximum number of tones and the highest maximum output power
   b. Otherwise, consider the fully allocated channel for SAR testing
   c. When SAR testing is required on RU sizes less than the fully allocated channel, use the RU number closest to the middle of the channel, choosing the higher RU number when two RUs are equidistant to the middle of the channel.

12.1 Head SAR Test Result

<WLAN2.4G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Inner Surface	0mm	Right Ant 1	1	2412	17.68	19.50	1.521	99	1.010	-0.11	0.271	0.416
	WLAN2.4GHz	802.11b 1Mbps	Inner Surface	0mm	Right Ant 1	6	2437	17.73	19.50	1.503	99	1.010	0.03	0.281	0.427
	WLAN2.4GHz	802.11b 1Mbps	Inner Surface	0mm	Right Ant 1	11	2462	17.74	19.50	1.500	99	1.010	-0.02	0.322	0.488
	WLAN2.4GHz	802.11b 1Mbps	Inner Surface	0mm	Left Ant 2	1	2412	18.36	19.50	1.300	98.67	1.013	0.02	0.459	0.605
01	WLAN2.4GHz	802.11b 1Mbps	Inner Surface	0mm	Left Ant 2	6	2437	18.31	19.50	1.315	98.67	1.013	0.03	0.514	0.685
	WLAN2.4GHz	802.11b 1Mbps	Inner Surface	0mm	Left Ant 2	11	2462	18.27	19.50	1.327	98.67	1.013	0.01	0.391	0.526
	WLAN2.4GHz	802.11g 6Mbps	Inner Surface	0mm	Right Ant 1	1	2412	14.69	16.50	1.517	100	1.000	-0.03	0.163	0.247
	WLAN2.4GHz	802.11g 6Mbps	Inner Surface	0mm	Right Ant 1	6	2437	15.48	17.00	1.419	100	1.000	0.02	0.213	0.302
	WLAN2.4GHz	802.11g 6Mbps	Inner Surface	0mm	Right Ant 1	11	2462	12.34	14.00	1.466	100	1.000	0.07	0.130	0.191
	WLAN2.4GHz	802.11g 6Mbps	Inner Surface	0mm	Left Ant 2	1	2412	14.47	16.00	1.422	100	1.000	0.08	0.246	0.350
	WLAN2.4GHz	802.11g 6Mbps	Inner Surface	0mm	Left Ant 2	6	2437	16.25	17.00	1.189	100	1.000	0.03	0.195	0.232
	WLAN2.4GHz	802.11g 6Mbps	Inner Surface	0mm	Left Ant 2	11	2462	13.21	14.50	1.346	100	1.000	-0.01	0.089	0.120

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	1Mbps	Inner Surface	0mm	Left Ant 2	0	2402	5.01	6.50	1.410	76.94	1.300	0.03	0.043	0.079
	Bluetooth	1Mbps	Inner Surface	0mm	Left Ant 2	39	2441	5.13	6.50	1.371	76.94	1.300	0.01	0.046	0.082
02	Bluetooth	1Mbps	Inner Surface	0mm	Left Ant 2	78	2480	4.87	6.50	1.456	76.94	1.300	-0.01	0.062	0.117

<WLAN5G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN5GHz	802.11n-HT40 MCS0	Inner Surface	0mm	Right Ant 1	54	5270	16.27	17.50	1.327	98.87	1.011	0.09	0.110	0.148
	WLAN5GHz	802.11n-HT40 MCS0	Inner Surface	0mm	Right Ant 1	62	5310	11.69	13.00	1.352	98.87	1.011	0.05	0.079	0.108
03	WLAN5GHz	802.11n-HT40 MCS0	Inner Surface	0mm	Left Ant 2	54	5270	15.99	17.50	1.416	98.87	1.011	0.06	0.157	0.225
	WLAN5GHz	802.11n-HT40 MCS0	Inner Surface	0mm	Left Ant 2	62	5310	11.44	13.00	1.432	98.87	1.011	0.07	0.048	0.070
	WLAN5GHz	802.11ac-VHT80 MCS0	Inner Surface	0mm	Right Ant 1	106	5530	9.61	11.00	1.377	98.78	1.012	0.01	0.040	0.056
	WLAN5GHz	802.11ac-VHT80 MCS0	Inner Surface	0mm	Right Ant 1	122	5610	16.19	17.50	1.351	98.78	1.012	0.09	0.060	0.082
	WLAN5GHz	802.11ac-VHT80 MCS0	Inner Surface	0mm	Right Ant 1	138	5690	16.07	17.50	1.390	98.78	1.012	0.03	0.077	0.108
	WLAN5GHz	802.11ax-HE80 MCS0	Inner Surface	0mm	Left Ant 2	106	5530	8.89	10.50	1.449	98.63	1.014	0.11	0.027	0.040
	WLAN5GHz	802.11ax-HE80 MCS0	Inner Surface	0mm	Left Ant 2	122	5610	15.54	17.50	1.570	98.63	1.014	0.01	0.099	0.158
	WLAN5GHz	802.11ax-HE80 MCS0	Inner Surface	0mm	Left Ant 2	138	5690	15.57	17.50	1.560	98.63	1.014	0.02	0.141	0.223
	WLAN5GHz	802.11ac-VHT80 MCS0	Inner Surface	0mm	Right Ant 1	155	5775	16.13	17.50	1.371	98.78	1.012	0.01	0.061	0.085
	WLAN5GHz	802.11ac-VHT80 MCS0	Inner Surface	0mm	Left Ant 2	155	5775	15.52	17.50	1.578	98.17	1.019	0.09	0.088	0.141

<WLAN6G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured APD (W/m^2)
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Right Ant 1	15	6025	6.81	7.00	1.045	97.93	1.021	0.04	0.012	0.013	0.124
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Right Ant 1	47	6185	7.02	7.50	1.117	97.93	1.021	0.02	0.009	0.010	0.054
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Right Ant 1	111	6505	7.07	7.50	1.104	97.93	1.021	0.06	0.011	0.012	0.072
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Right Ant 1	175	6825	7.05	8.00	1.245	97.93	1.021	0.09	0.011	0.014	0.078
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Right Ant 1	207	6985	7.28	8.00	1.180	97.93	1.021	0.01	0.014	0.017	0.134
04	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Left Ant 2	15	6025	6.62	7.00	1.091	98.62	1.014	0.01	0.037	**0.041**	**0.313**
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Left Ant 2	47	6185	6.70	7.00	1.072	98.62	1.014	-0.02	0.015	0.016	0.132
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Left Ant 2	111	6505	6.59	7.50	1.233	98.62	1.014	0.03	0.014	0.018	0.117
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Left Ant 2	175	6825	6.85	8.00	1.303	98.62	1.014	0.01	0.023	0.030	0.175
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	0mm	Left Ant 2	207	6985	7.02	8.00	1.253	98.62	1.014	0.01	0.019	0.024	0.150

<nRF SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	nRF	-	Inner Surface	0mm	nRF Ant (Left)	0	2402	-0.12	0.00	1.028	47.44	1.054	0.01	0.004	0.004
05	nRF	-	Inner Surface	0mm	nRF Ant (Left)	19	2440	-0.29	0.00	1.069	47.44	1.054	-0.01	0.005	**0.006**
	nRF	-	Inner Surface	0mm	nRF Ant (Left)	38	2478	-0.27	0.00	1.064	47.44	1.054	-0.01	0.002	0.002
	nRF	-	Inner Surface	0mm	nRF Ant (Right)	0	2402	-0.12	0.00	1.028	47.44	1.054	0.05	0.003	0.003
	nRF	-	Inner Surface	0mm	nRF Ant (Right)	19	2440	-0.29	0.00	1.069	47.44	1.054	0.02	0.004	0.005
	nRF	-	Inner Surface	0mm	nRF Ant (Right)	38	2478	-0.27	0.00	1.064	47.44	1.054	0.07	0.004	0.004

12.2 PD Test Result

Power Density General Notes:

1. The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
2. Batteries are fully charged at the beginning of the measurements.
3. Absorbed power density (APD) using a 4cm^2 averaging area is reported based on SAR measurements.
4. Power density was calculated by repeated E-field measurements on two measurement planes separated by λ/4.
5. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools.
6. Per FCC guidance and equipment manufacturer guidance, power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.68 dB (85.4%) was used to determine the psPD measurement scaling factor.
7. Probe sensor to outer of lens is 10mm, outer of lens to boundary of white outer housing is 10mm, the total is 20 mm separation distance between probe sensor and boundary of white outer housing.

<WLAN PD>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Grip Step (λ)	Scaling Factor for measurement uncertainty	Power Drift (dB)	Normal psPD (W/m^2)	Scaled Normal psPD (W/m^2)	Total psPD (W/m^2)	Scaled Total psPD (W/m^2)
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Right Ant 1	15	6025	6.81	7.00	1.045	97.93	1.021	0.0625	1.5535	-0.05	0.423	0.70	0.479	0.79
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Right Ant 1	47	6185	7.02	7.50	1.117	97.93	1.021	0.0625	1.5535	-0.02	0.494	0.87	0.517	0.92
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Right Ant 1	111	6505	7.07	7.50	1.104	97.93	1.021	0.0625	1.5535	-0.04	0.306	0.54	0.361	0.63
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Right Ant 1	175	6825	7.05	8.00	1.245	97.93	1.021	0.0625	1.5535	-0.04	0.390	0.77	0.444	0.88
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Right Ant 1	207	6985	7.28	8.00	1.180	97.93	1.021	0.0625	1.5535	-0.05	0.446	0.83	0.473	0.89
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Left Ant 2	15	6025	6.62	7.00	1.091	97.93	1.021	0.0625	1.5535	-0.01	0.471	0.82	0.476	0.82
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Left Ant 2	47	6185	6.70	7.00	1.071	98.62	1.014	0.0625	1.5535	-0.02	0.427	0.72	0.475	0.80
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Left Ant 2	111	6505	6.59	7.50	1.233	98.62	1.014	0.0625	1.5535	-0.02	0.342	0.66	0.367	0.71
1	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Left Ant 2	175	6825	6.85	8.00	1.303	98.62	1.014	0.0625	1.5535	-0.01	0.591	1.21	0.626	**1.29**
	WLAN6GHz	802.11ax-HE160 MCS0	Inner Surface	10mm	Left Ant 2	207	6985	7.02	8.00	1.253	98.62	1.014	0.0625	1.5535	-0.02	0.269	0.53	0.331	0.65

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	VR Headset
		Head
1.	nRF + 2.4G WiFi SISO + 5G WiFi MIMO	Yes
2.	nRF + 2.4G WiFi SISO + 6G WiFi MIMO	Yes
3.	nRF + 2.4G WiFi MIMO + 5G WiFi MIMO	Yes
4.	nRF + 2.4G WiFi MIMO + 6G WiFi MIMO	Yes
5.	nRF + BT + 5G WiFi MIMO	Yes
6.	nRF + BT + 6G WiFi MIMO	Yes

Note:

1. The EUT has no voice function means data only.
2. WLAN2.4 and Bluetooth share the same antenna, and they cannot transmit simultaneously each other.
3. According to the EUT characteristic, WLAN 2.4GHz/WLAN 5GHz/6GHz and nRF can transmit simultaneously.
4. According to the EUT characteristic, WLAN 5GHz/6GHz and Bluetooth can transmit simultaneously.
5. According to the EUT characteristic, WLAN 2.4GHz and WLAN 5GHz/6GHz can transmit simultaneously.
6. The worst case 5 GHz WLAN SAR for each configuration was used for SAR summation.
7. The maximum SAR summation is calculated based on the same configuration and test position.
8. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) 1g Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of [(x1-x2)2 + (y1-y2)2 + (z1-z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04 for 1g SAR, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band 1g SAR < 1.6W/kg.
9. For simultaneous transmission analysis, nRF SAR is estimated per KDB 447498 D01v06 based on the formula below:
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR.
   ii) When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 0.4 W/kg for 1-g SAR, when the test separation distances is > 50 mm.

13.1 Head Exposure Conditions

Position	1	2	3	4	5	6	7	8	9	10	1+5+6+10 Summed	2+5+6+10 Summed	1+7+8+10 Summed	2+7+8+10 Summed	3+4+5+6+10 Summed	3+4+7+8+10 Summed	5+6+9+10 Summed	7+8+9+10 Summed
	WLAN2.4GHz Ant 1 802.11b SISO	WLAN2.4GHz Ant 2 802.11b SISO	WLAN2.4GHz Ant 1 for MIMO Chain 1	WLAN2.4GHz Ant 2 for MIMO Chain 2	WLAN5GHz Ant 1 for MIMO Chain 1	WLAN5GHz Ant 2 for MIMO Chain 2	WLAN6GHz Ant 1 for MIMO Chain 1	WLAN6GHz Ant 2 for MIMO Chain 2	Bluetooth	nRF								
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)
Inner Surface	0.488	0.685	0.302	0.350	0.148	0.225	0.017	0.041	0.117	0.006	0.867	**1.064**	0.552	**0.749**	1.031	0.716	**0.496**	0.181

Test Engineer : Martin Li, Varus Wang, Light Wang, Ricky Gu, Damon Zhu

14. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg and highest measured 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

Declaration of Conformity:
The test results with all measurement uncertainty excluded is presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

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

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

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

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor[(a)]	$1/k^{(b)}$	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

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

(b) κ is the coverage factor

Standard Uncertainty for Assumed Distribution

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

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

The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.

DASY6 Uncertainty Budget (Frequency band: 4 MHz - 10 GHz range)							
Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	18.60	N	2	1	1	9.3	9.3
Probe Calibration Drift	1.00	N	1	1	1	1.0	1.0
Probe Linearity	4.70	R	1.732	1	1	2.7	2.7
Broadband Signal	3.00	N	1	1	1	3.0	3.0
Probe Isotropy	7.60	R	2	1	1	3.8	3.8
Data Acquisition	0.30	N	1.732	1	1	0.2	0.2
RF Ambient	1.80	N	1	1	1	1.8	1.8
Probe Positioning	0.20	N	1	0.33	0.33	0.1	0.1
Data Processing	3.50	N	1	1	1	3.5	3.5
Phantom and Device Errors							
Conductivity (meas.) DAK	2.50	N	1	0.78	0.71	2.0	1.8
Conductivity (temp.) BB	5.40	R	1.732	0.78	0.71	2.4	2.2
Phantom Permittivity	14.00	R	1.732	0.5	0.5	4.0	4.0
Distance DUT - TSL	2.00	N	1	2	2	4.0	4.0
Device Holder	3.60	N	1	1	1	3.6	3.6
DUT Modulationm	2.40	R	1.732	1	1	1.4	1.4
Time-average SAR	2.60	R	1.732	1	1	1.5	1.5
DUT drift	5.00	N	1	1	1	5.0	5.0
Correction to the SAR results							
Deviation to Target	1.90	N	1	1	0.84	1.9	1.6
SAR scalingp	0.00	R	1.732	1	1	0.0	0.0
Combined Std. Uncertainty						14.9%	14.8%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						29.8%	29.6%

SAR Uncertainty Budget for frequency range 4MHz to 10GHz

cDASY6 Module mmWave Uncertainty Budget Evaluation Distances to the Antennas > λ/2π In Compliance with IEC TR 63170					
Error Description	**Uncertainty Value (±dB)**	**Probability**	**Divisor**	**(Ci)**	**Standard Uncertainty (±dB)**
Uncertainty terms dep endent on the measurement system					
Probe Calibration	0.49	N	1	1	0.49
Probe correction	0.00	R	1.732	1	0.00
Frequency response (BW ≤ 1 GHz)	0.20	R	1.732	1	0.12
Sensor cross coupling	0.00	R	1.732	1	0.00
Isotropy	0.50	R	1.732	1	0.29
Linearity	0.20	R	1.732	1	0.12
Probe scattering	0.00	R	1.732	1	0.00
Probe positioning offset	0.30	R	1.732	1	0.17
Probe positioning repeatability	0.04	R	1.732	1	0.02
Sensor mechanical offset	0.00	R	1.732	1	0.00
Probe spatial resolution	0.00	R	1.732	1	0.00
Field impedance dependance	0.00	R	1.732	1	0.00
Amplitude and phase drift	0.00	R	1.732	1	0.00
Amplitude and phase noise	0.04	R	1.732	1	0.02
Measurement area truncation	0.00	R	1.732	1	0.00
Data acquisition	0.03	N	1	1	0.03
Sampling	0.00	R	1.732	1	0.00
Field reconstruction	2.00	R	1.732	1	1.15
Forward transformation	0.00	R	1.732	1	0.00
Power density scaling	0.00	R	1.732	1	0.00
Spatial averaging	0.10	R	1.732	1	0.06
System detection limit	0.04	R	1.732	1	0.02
Uncertainty terms dep endent on the DUT and environmental factors					
Probe coupling with DUT	0.00	R	1.732	1	0.0
Modulation response	0.40	R	1.732	1	0.2
Integration time	0.00	R	1.732	1	0.0
Response time	0.00	R	1.732	1	0.0
Device holder influence	0.10	R	1.732	1	0.1
DUT alignment	0.00	R	1.732	1	0.0
RF ambient conditions	0.04	R	1.732	1	0.0
Ambient reflections	0.04	R	1.732	1	0.0
Immunity / secondary reception	0.00	R	1.732	1	0.0
Drift of the DUT		R	1.732	1	
Combined Std. Uncertainty					1.34
Expanded STD Uncertainty (95%)					**2.68**

PD Uncertainty Budget

15. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

[3] IEEE Std. 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, Sep 2013

[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.

[6] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[7] FCC KDB 648474 D04 v01r03, “SAR Evaluation Considerations for Wireless Handsets”, Oct 2015.

[8] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[9] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.

[10] IEC/IEEE 62209-1528:2020, “Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)”, Oct. 2020

[11] IEC 62479:2010 Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)

[12] IEC TR 63170: 2018 Measurement procedure for the evaluation of power density related to human exposure to radio frequency fields from wireless communication devices operating between 6 GHz and 100 GHz

[13] SPEAG DASY6 System Handbook

[14] SPEAG DASY6 Application Note (Interim Procedures for Devices Operating at 6-10 GHz)

------THE END------