FCC SAR TEST REPORT

FCC ID	**:**	**UZ7RE40**
Equipment	**:**	**RFID Module**
Brand Name	**:**	**Zebra**
Model Name	**:**	**RE40**
Applicant	**:**	**Zebra Technologies Corporation** **3 Overlook Point, Lincolnshire, IL 60069 USA**
Manufacturer	**:**	**Zebra Technologies Corporation** **3 Overlook Point, Lincolnshire, IL 60069 USA**
Standard	**:**	**FCC 47 CFR Part 2 (2.1093)**

The product was received on Jun. 20, 2024 and testing was started from Jul. 30, 2024 and completed on Aug. 15, 2024. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

Approved by: Cona Huang / Deputy Manager

Testing Laboratory
1190

Sporton International Inc. EMC & Wireless Communications Laboratory
No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan

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History of this test report

Report No.	Version	Description	Issued Date
FA461168	01	Initial issue of report	Sep. 09, 2024

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for Zebra Technologies Corporation, RFID Module, RE40, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary Hand (Separation 0mm) 10g SAR (W/kg)	Highest Simultaneous Transmission 10g SAR (W/kg)
DSS	900MHz	RFID	1.97	2.87
Date of Testing:			2024/07/30 ~ 2024/08/15	

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (4.0 W/kg for Hand 10g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

Reviewed by: Jason Wang
Report Producer: Carlie Tsai

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- 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 616217 D04 SAR for laptop and tablets v01r02

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	RFID Module
Brand Name	Zebra
Model Name	RE40
FCC ID	UZ7RE40
Wireless Technology and Frequency Range	RFID: 902.75 MHz ~ 927.25 MHz
Mode	RFID: ASK
HW Version	DV
MFD	29MAY24

Remark:

1. The RFID reader will attach two different zebra tablet devices (FCC ID: UZ7ET65AW Report No.: FA371211A and FCC ID: UZ7ET60AW Report No.: FA332310) during test. Since the product will be attached to the tablet and used to scan objects and use in the hand is considered for RF exposure assessment.

Host Information	
Equipment Name	RFID Reader
Brand Name	Zebra
Model Name	XBK-ET6X-RFID
EUT Stage	Identical Prototype

Accessories Information				
Tablet 1	Brand Name	Zebra	Model Number	ET60AW
Tablet 2	Brand Name	Zebra	Model Number	ET65AW
Battery	Brand Name	ZEBRA	Model Number	BT-000484
Adapter	Brand Name	ZEBRA	Model Number	PWR-BGA15V45W-UC2-WW

4. RF Exposure Limits

4.1 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.

4.2 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.

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. Specific Absorption Rate (SAR)

5.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

5.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\mathbf{dm}}\right) = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\boldsymbol{\rho}\mathbf{dv}}\right)$$

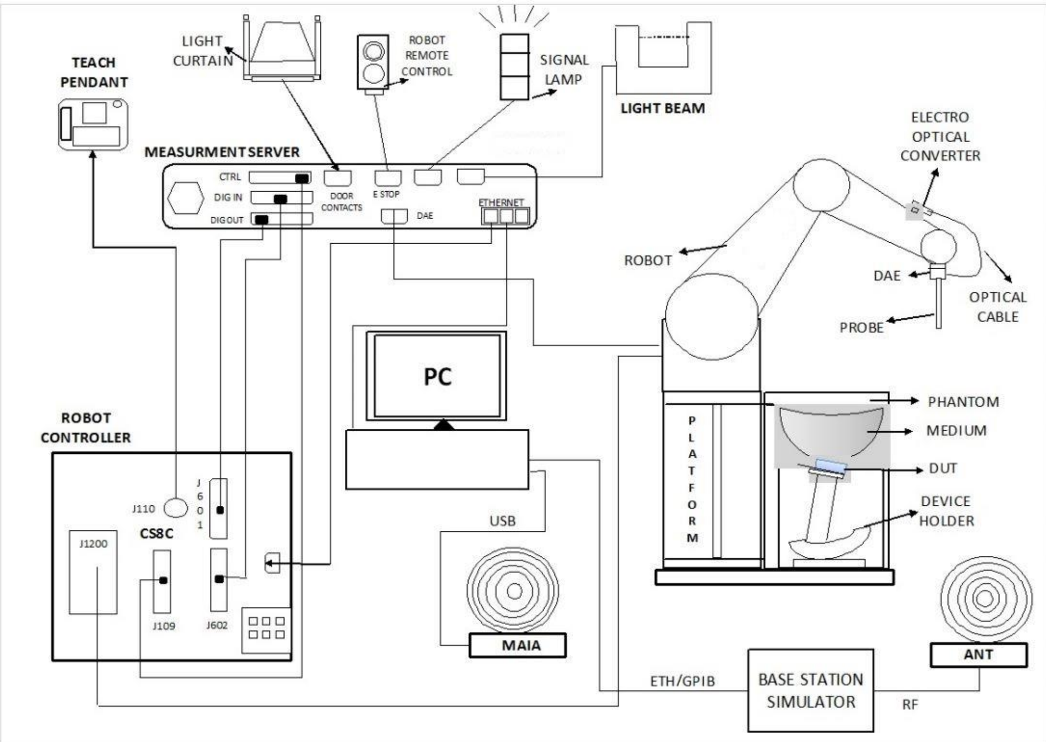
SAR is expressed in units of Watts per kilogram (W/kg)

$$\mathbf{SAR} = \frac{\boldsymbol{\sigma}|\mathbf{E}|^2}{\boldsymbol{\rho}}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

6. System Description and Setup

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



- The DASY system in SAR Configuration is shown above
- 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 windows software and the DASY 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.

6.1 Test Site Location

The SAR measurement facilities used to collect data are within both Sporton Lab list below test site location are accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190 and 3786) and the FCC designation No. TW1190 and TW3786 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test.

Laboratory	EMC & Wireless Communications Laboratory		Wensan Laboratory				
Test Site Location	TW1190 No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan		TW3786 No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan				
Test Site No.	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY	SAR15-HY	SAR18-HY	SAR21-HY
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	SAR16-HY	SAR19-HY	SAR22-HY
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-HY	SAR17-HY	SAR20-HY	

6.2 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG).The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)	
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 μW/g – >100 mW/g; Linearity: ±0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm	

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 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 μW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 μW/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 mm	

6.3 Data Acquisition Electronics (DAE)

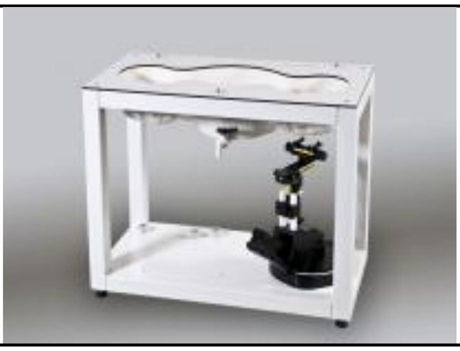
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

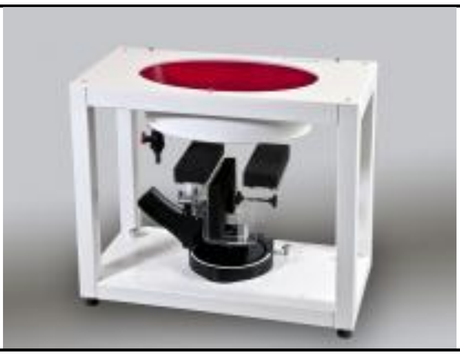
6.4 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

6.5 Device Holder

<Mounting Device for Hand-Held Transmitter>

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). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

Mounting Device for Laptops

7. Measurement Procedures

The measurement procedures are as follows:

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
(b) Place the EUT in the positions as Appendix D demonstrates.
(c) Set scan area, grid size and other setting on the DASY software.
(d) Measure SAR results for the highest power channel on each testing position.
(e) Find out the largest SAR result on these testing positions of each band
(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

7.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

7.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

7.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

7.4 Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

<table>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

7.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

7.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

8. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit(2)	D750V3	1117	Mar. 24, 2022	Mar. 21, 2025
SPEAG	835MHz System Validation Kit(2)	D835V2	499	Aug. 18, 2021	Aug. 15, 2024
SPEAG	900MHz System Validation Kit	D900V2	190	Oct. 11, 2023	Oct. 10, 2024
SPEAG	1750MHz System Validation Kit(2)	D1750V2	1068	Nov. 21, 2022	Nov. 18, 2025
SPEAG	1900MHz System Validation Kit(2)	D1900V2	5d041	Aug. 19, 2021	Aug. 16, 2024
SPEAG	2300MHz System Validation Kit	D2300V2	1088	Jul. 10, 2024	Jul. 09, 2025
SPEAG	2600MHz System Validation Kit(2)	D2600V2	1089	Mar. 24, 2022	Mar. 21, 2025
SPEAG	3500MHz System Validation Kit(2)	D3500V2	1036	Mar. 23, 2022	Mar. 20, 2025
SPEAG	3700MHz System Validation Kit	D3700V2	1022	Jul. 10, 2024	Jul. 09, 2025
SPEAG	3900MHz System Validation Kit(2)	D3900V2	1017	Apr. 22, 2022	Apr. 19, 2025
SPEAG	Data Acquisition Electronics	DAE4	703	Apr. 22, 2024	Apr. 21, 2025
SPEAG	Data Acquisition Electronics	DAE4	1512	Mar. 14, 2024	Mar. 13, 2025
SPEAG	Dosimetric E-Field Probe	EX3DV4	7793	Mar. 01, 2024	Feb. 28, 2025
SPEAG	Dosimetric E-Field Probe	EX3DV4	7814	Jun. 20, 2024	Jun. 19, 2025
Testo	Hygro meter	608-H1	45196600	Nov. 02, 2023	Nov. 01, 2024
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Nov. 13, 2023	Nov. 12, 2024
Keysight	5G Wireless Test Platform	E7515B	MY58300712	Apr. 22, 2024	Apr. 21, 2025
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Sep. 27, 2023	Sep. 26, 2024
Keysight	ENA Network Analyzer	E5071C	MY46104758	Oct. 30, 2023	Oct. 29, 2024
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 19, 2023	Sep. 18, 2024
SPEAG	Dielectric Probe Kit	DAK-12	1156	Jul. 15, 2024	Jul. 14, 2025
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3690	Aug. 09, 2023	Aug. 08, 2024
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3252	Jul. 31, 2024	Jul. 30, 2025
Anritsu	Power Meter	ML2495A	1419002	Aug. 17, 2023	Aug. 16, 2024
Anritsu	Power Sensor	MA2411B	1911176	Aug. 18, 2023	Aug. 17, 2024
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jul. 09, 2024	Jul. 08, 2025
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 16, 2023	Oct. 15, 2024
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Warison	Directional Coupler	WCOU-10-50S-10	WR889BMC4B1	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	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.

9. System Verification

9.1 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)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	22.5	0.891	41.800	0.89	41.90	0.11	-0.24	±5	2024/7/30
835	22.5	0.925	41.600	0.90	41.50	2.78	0.24	±5	2024/7/30
900	22.5	0.934	42.700	0.97	41.50	-3.71	2.89	±5	2024/8/15
1750	22.5	1.360	40.700	1.37	40.10	-0.73	1.50	±5	2024/7/30
1900	22.5	1.440	39.100	1.40	40.00	2.86	-2.25	±5	2024/7/30
2300	22.5	1.620	39.000	1.67	39.50	-2.99	-1.27	±5	2024/7/30
2600	22.5	1.960	37.900	1.96	39.00	0.00	-2.82	±5	2024/7/30
3500	22.4	2.860	37.800	2.91	37.90	-1.72	-0.26	±5	2024/7/31
3700	22.4	3.050	37.600	3.12	37.70	-2.24	-0.27	±5	2024/7/31
3900	22.4	3.240	37.500	3.33	37.51	-2.70	-0.03	±5	2024/7/31

9.2 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.

Test Site	Date	Frequency (MHz)	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 (%)	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
SAR-01	2024/7/30	750	50	D750V3-1117	EX3DV4 - SN7814	DAE4 Sn1512	0.423	8.520	8.46	-0.70	0.285	5.600	5.7	1.79
SAR-01	2024/7/30	835	50	D835V2-499	EX3DV4 - SN7814	DAE4 Sn1512	0.491	9.680	9.82	1.45	0.328	6.280	6.56	4.46
SAR-06	2024/8/15	900	50	D900V2-190	EX3DV4 - SN7793	DAE4 Sn703	0.575	11.200	11.5	2.68	0.375	7.140	7.5	5.04
SAR-01	2024/7/30	1750	50	D1750V2-1068	EX3DV4 - SN7814	DAE4 Sn1512	1.780	36.700	35.6	-3.00	0.970	19.300	19.4	0.52
SAR-01	2024/7/30	1900	50	D1900V2-5d041	EX3DV4 - SN7814	DAE4 Sn1512	1.990	40.600	39.8	-1.97	0.991	21.100	19.82	-6.07
SAR-01	2024/7/30	2300	50	D2300V2-1088	EX3DV4 - SN7814	DAE4 Sn1512	2.220	48.200	44.4	-7.88	1.080	23.300	21.6	-7.30
SAR-01	2024/7/30	2600	50	D2600V2-1089	EX3DV4 - SN7814	DAE4 Sn1512	2.650	55.400	53	-4.33	1.210	24.600	24.2	-1.63
SAR-01	2024/7/31	3500	50	D3500V2-1036	EX3DV4 - SN7814	DAE4 Sn1512	3.150	67.400	63	-6.53	1.220	25.100	24.4	-2.79
SAR-01	2024/7/31	3700	50	D3700V2-1022	EX3DV4 - SN7814	DAE4 Sn1512	3.250	68.100	65	-4.55	1.230	25.200	24.6	-2.38
SAR-01	2024/7/31	3900	50	D3900V2-1017	EX3DV4 - SN7814	DAE4 Sn1512	3.190	68.700	63.8	-7.13	1.150	23.900	23	-3.77

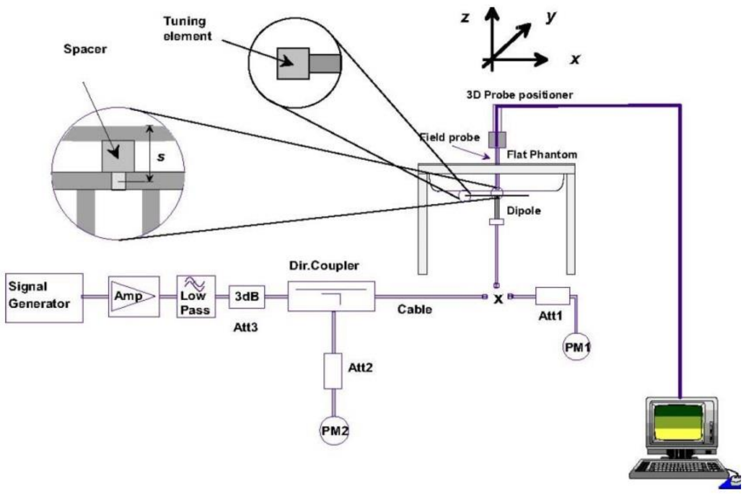


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

10. RF Exposure Positions

10.1 SAR Testing for Tablet

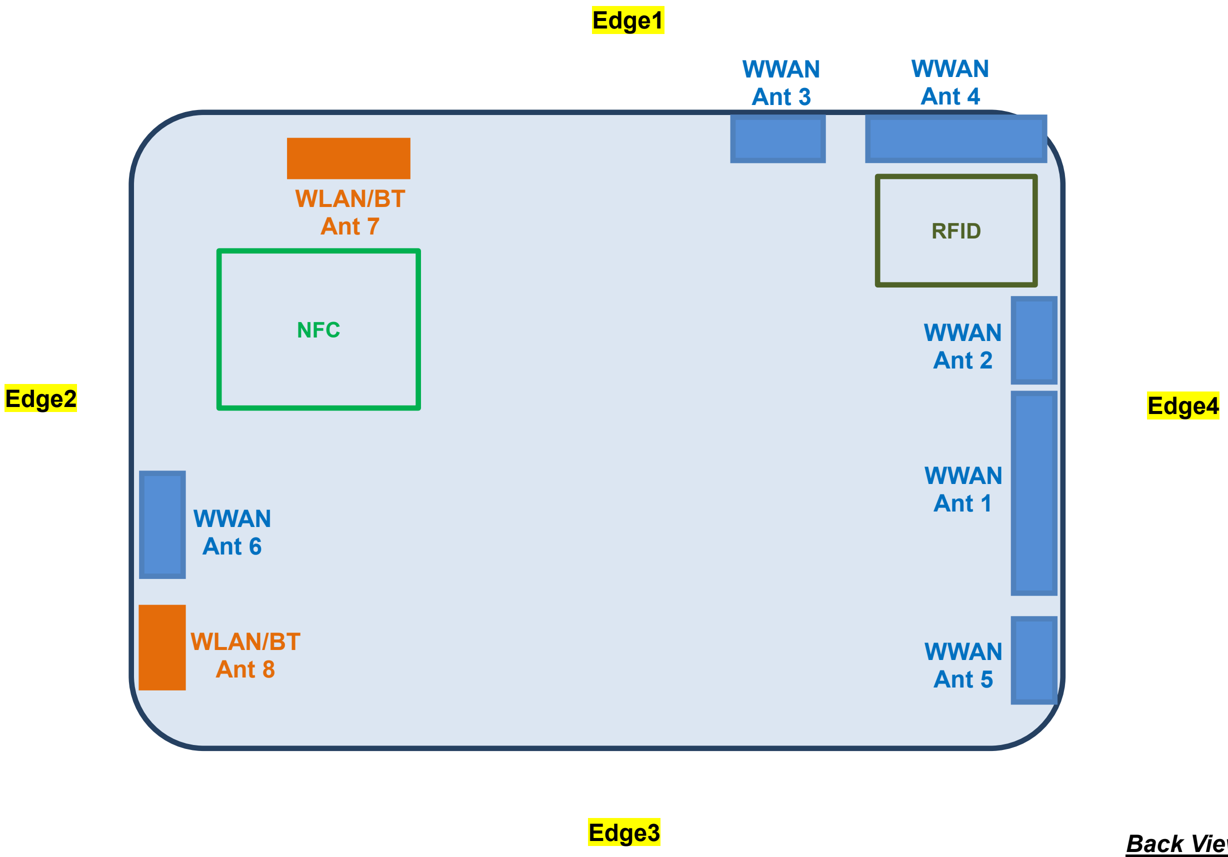
This device can be used also in full sized tablet exposure conditions, due to its size. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR exclusion threshold in KDB 447498 D01v06 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

11. RFID Output Power (Unit: dBm)

<RFID Conducted Power>

RFID	Mode	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	ASK	902.75	23.62	24.50	87.01
		914.75	23.56	24.50	
		927.25	23.58	24.50	

12. Antenna Location



Back View

The separation distance for antenna to edge :

Antenna	To Edge1 (mm)	To Edge2 (mm)	To Edge3 (mm)	To Edge4 (mm)
RFID	33	155.2	110	10

<SAR test exclusion table>

General Note:

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. Per KDB 447498 D01v06, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
4. Per KDB 447498 D01v06, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
5. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison
6. Per KDB 447498 D01v06, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
   a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

Exposure Position	Wireless Interface	RFID
	Calculated Frequency (MHz)	927.25
	Maximum power (dBm)	24.5
	Maximum rated power(mW)	281.84
Bottom Face	Separation distance(mm)	23.0
	exclusion threshold	11.8
	Testing required?	**Yes**
Edge 1	Separation distance(mm)	33.0
	exclusion threshold	8.2
	Testing required?	**Yes**
Edge 2	Separation distance(mm)	155.2
	exclusion threshold	1208.0
	Testing required?	**No**
Edge 3	Separation distance(mm)	110.0
	exclusion threshold	756.0
	Testing required?	**No**
Edge 4	Separation distance(mm)	10.0
	exclusion threshold	27.1
	Testing required?	**Yes**

13. 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. Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
2. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg a factor 2.5 for 10g SAR.

13.1 Hand SAR

<RFID SAR>

Plot No.	Band	Modulation	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
27	RFID 900	ASK	Bottom Face	0mm	902.75	902.75	23.62	24.50	1.223	87.01	1.149	-0.05	1.400	1.968
	RFID 900	ASK	Bottom Face	0mm	914.75	914.75	23.56	24.50	1.240	87.01	1.149	0	1.250	1.782
	RFID 900	ASK	Bottom Face	0mm	927.25	927.25	23.58	24.50	1.235	87.01	1.149	-0.02	0.741	1.051
	RFID 900	ASK	Edge 1	0mm	902.75	902.75	23.62	24.50	1.223	87.01	1.149	-0.07	0.045	0.063
	RFID 900	ASK	Edge 4	0mm	902.75	902.75	23.62	24.50	1.223	87.01	1.149	0.03	0.108	0.152

14. Spot check Results

General Note:

1. The RFID reader will attach zebra tablet device (FCC ID: UZ7ET65AW Report No.: FA371211A and FCC ID: UZ7ET60AW Report No.: FA332310) during test. According to section 12 antenna location, due to the RFID antenna is close to WWAN antenna 1/2/3/4 and stay more than 5 cm away from WWAN ant 5/6 and WLAN antenna 7/8, therefore, spot check WWAN antenna 1/2/3/4 to ensure the SAR is compliance.
2. 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 WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   c. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg a factor 2.5 for 10g SAR.

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
01	WCDMA II Ant 1	RMC 12.2Kbps	Bottom Face	0mm	9262	1852.4	16.80	17.50	1.175	0.09	0.076	0.089
02	WCDMA IV Ant 1	RMC 12.2Kbps	Bottom Face	0mm	1513	1752.6	15.80	16.50	1.175	0.14	0.071	0.083
03	WCDMA V Ant 1	RMC 12.2Kbps	Bottom Face	0mm	4182	836.4	20.11	20.50	1.094	0.1	0.108	0.118

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	LTE Band 7 Ant 3	20M	QPSK	1	0	Bottom Face	0mm	21350	2560	16.08	16.80	1.180			-0.14	0.010	0.012
04	LTE Band 7_Ant 2	20M	QPSK	1	0	Bottom Face	0mm	21350	2560	13.55	14.60	1.274			-0.1	0.024	0.031
05	LTE Band 12 Ant 1	10M	QPSK	1	0	Bottom Face	0mm	23095	707.5	20.65	21.50	1.216			-0.16	0.084	0.102
06	LTE Band 13 Ant 1	10M	QPSK	1	0	Bottom Face	0mm	23230	782	20.86	22.10	1.330			0.06	0.090	0.120
07	LTE Band 14 Ant 1	10M	QPSK	1	0	Bottom Face	0mm	23330	793	21.56	22.40	1.213			0.13	0.090	0.109
08	LTE Band 25 Ant 1	20M	QPSK	1	0	Bottom Face	0mm	26140	1860	16.30	17.40	1.288			-0.17	0.075	0.097
	LTE Band 25_Ant 4	20M	QPSK	1	0	Bottom Face	0mm	26590	1905	16.43	17.00	1.140			-0.08	0.050	0.057
09	LTE Band 26 Ant 1	15M	QPSK	1	0	Bottom Face	0mm	26865	831.5	20.25	20.90	1.161			-0.18	0.119	0.138
10	LTE Band 30 Ant 3	10M	QPSK	1	0	Bottom Face	0mm	27710	2310	16.19	17.30	1.291			0.16	0.019	0.025
11	LTE Band 66 Ant 1	20M	QPSK	1	0	Bottom Face	0mm	132072	1720	15.50	16.30	1.202			-0.1	0.062	0.075
	LTE Band 66_Ant 4	20M	QPSK	1	0	Bottom Face	0mm	132572	1770	15.91	17.00	1.285			-0.05	0.036	0.046
12	LTE Band 71 Ant 1	20M	QPSK	1	0	Bottom Face	0mm	133297	680.5	21.19	22.30	1.291			-0.11	0.065	0.084
	LTE Band 41 Ant 3	20M	QPSK	1	0	Bottom Face	0mm	41490	2680	15.56	16.80	1.330	62.9	1.006	0.15	0.011	0.015
13	LTE Band 41_Ant 2	20M	QPSK	1	0	Bottom Face	0mm	40185	2549.5	15.88	16.70	1.208	62.9	1.006	0.12	0.028	0.034
14	LTE Band 48_Ant 3	20M	QPSK	1	0	Bottom Face	0mm	56640	3690	11.39	12.20	1.205	62.9	1.006	-0.13	0.031	0.038

<5G NR SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	FR1 n7_Ant 3	40M	BPSK	1	1	Bottom Face	0mm	507000	2535	15.84	17.10	1.337			-0.19	0.009	0.012
15	FR1 n7_Ant 2	40M	BPSK	1	1	Bottom Face	0mm	507000	2535	13.62	14.70	1.282			0.03	0.019	0.024
16	FR1 n12_Ant 1	15M	BPSK	1	1	Bottom Face	0mm	141500	707.5	21.41	21.80	1.094			-0.02	0.126	0.138
17	FR1 n13_Ant 1	10M	BPSK	1	1	Bottom Face	0mm	156400	782	21.45	22.20	1.189			0.06	0.095	0.113
18	FR1 n14_Ant 1	10M	BPSK	1	1	Bottom Face	0mm	158600	793	21.57	22.30	1.183			-0.04	0.083	0.098
19	FR1 n25_Ant 1	40M	BPSK	1	1	Bottom Face	0mm	376500	1882.6	17.25	17.70	1.109			0.11	0.072	0.080
	FR1 n25_Ant 4	40M	BPSK	1	1	Bottom Face	0mm	376500	1882.6	16.72	17.30	1.143			0.08	0.043	0.049
20	FR1 n26_Ant 1	20M	BPSK	1	1	Bottom Face	0mm	166300	831.5	20.53	21.10	1.140			-0.02	0.102	0.116
21	FR1 n30_Ant 3	10M	BPSK	1	1	Bottom Face	0mm	462000	2310	17.51	17.90	1.094			0.12	0.020	0.022
22	FR1 n66 Ant 1	40M	BPSK	1	1	Bottom Face	0mm	349000	1745	15.28	16.00	1.180			-0.01	0.076	0.090
	FR1 n66 Ant 4	40M	BPSK	1	1	Bottom Face	0mm	349000	1745	16.72	17.10	1.091			-0.05	0.039	0.043
23	FR1 n71 Ant 1	20M	BPSK	1	1	Bottom Face	0mm	136100	680.5	21.97	22.40	1.104			0.01	0.132	0.146
	FR1 n41_HPUE_Ant 3	100M	BPSK	1	1	Bottom Face	0mm	518598	2592.99	15.81	16.80	1.256	100	1.000	-0.04	0.009	0.011
24	FR1 n41_HPUE_Ant 2	100M	BPSK	1	1	Bottom Face	0mm	518598	2592.99	14.06	14.50	1.107	100	1.000	0.06	0.025	0.028
25	FR1 n48_Ant 3	40M	BPSK	1	1	Bottom Face	0mm	641667	3625	9.77	10.30	1.130	100	1.000	0.01	0.030	0.034
26	FR1 n77_HPUE_Ant 3	100M	BPSK	1	1	Bottom Face	0mm	656000	3840	9.35	10.60	1.334	100	1.000	-0.03	0.038	0.051
	FR1 n77_HPUE_Ant 3	100M	BPSK	1	1	Bottom Face	0mm	633332	3499.98	9.25	10.60	1.365	100	1.000	-0.06	0.006	0.008
	FR1 n77_HPUE_Ant 2	100M	BPSK	1	1	Bottom Face	0mm	656000	3840	9.57	10.50	1.239	100	1.000	-0.08	0.020	0.025
	FR1 n77_HPUE_Ant 2	100M	BPSK	1	1	Bottom Face	0mm	633332	3499.98	9.51	10.50	1.256	100	1.000	-0.06	0.013	0.016

15. Simultaneous Transmission Analysis

<WWAN SKU>

NO.	Simultaneous Transmission Configurations	Hand
Non-DBS		
1.	WWAN + WLAN2.4GHz Ant 7 + WLAN2.4GHz Ant 8 + NFC + RFID 900	Yes
2.	WWAN + WLAN2.4GHz Ant 8 + Bluetooth Ant 7 + NFC + RFID 900	Yes
3.	WWAN + WLAN2.4GHz Ant 7 + Bluetooth Ant 8 + NFC + RFID 900	Yes
4.	WWAN + WLAN5G/6GHz Ant 7+WLAN5G/6GHz Ant 8+Bluetooth Ant 7 + NFC + RFID 900	Yes
5.	WWAN + WLAN5G/6GHz Ant 7+WLAN5G/6GHz Ant 8+Bluetooth Ant 8 + NFC + RFID 900	Yes
DBS		
6.	WWAN +WLAN2.4GHz Ant 7+8 + WLAN5GHz Ant 7+8 + NFC + RFID 900	Yes
7.	WWAN +WLAN2.4GHz Ant 8 + WLAN5G/6GHz Ant 7+8 + Bluetooth Ant 7 + NFC + RFID 900	Yes
8.	WWAN +WLAN2.4GHz Ant 7+ WLAN5G/6GHz Ant 7+8 + Bluetooth Ant 8 + NFC + RFID 900	Yes

<WLAN SKU>

NO.	Simultaneous Transmission Configurations	Hand
Non-DBS		
1.	WLAN2.4GHz Ant 7 + WLAN2.4GHz Ant 8 + NFC + RFID 900	Yes
2.	WLAN2.4GHz Ant 8 + Bluetooth Ant 7 + NFC + RFID 900	Yes
3.	WLAN2.4GHz Ant 8 + Bluetooth Ant 8 + NFC + RFID 900	Yes
4.	WLAN5GHz Ant 7+WLAN5GHz Ant 8+Bluetooth Ant 7 + NFC + RFID 900	Yes
5.	WLAN5GHz Ant 7+WLAN5GHz Ant 8+Bluetooth Ant 8 + NFC + RFID 900	Yes
6.	WLAN6GHz Ant 7+WLAN6GHz Ant 8+Bluetooth Ant 7 + NFC + RFID 900	Yes
7.	WLAN6GHz Ant 7+WLAN6GHz Ant 8+Bluetooth Ant 8 + NFC + RFID 900	Yes
DBS		
8.	WLAN2.4GHz Ant 7+8 + WLAN5GHz Ant 7+8 + NFC + RFID 900	Yes
9.	WLAN2.4GHz Ant 7+8 + WLAN6GHz Ant 7+8 + NFC + RFID 900	Yes
10.	WLAN2.4GHz Ant 8 + WLAN5GHz Ant 7+8 + Bluetooth Ant 7 + NFC + RFID 900	Yes
11.	WLAN2.4GHz Ant 7 + WLAN5GHz Ant 7+8 + Bluetooth Ant 8 + NFC + RFID 900	Yes
12.	WLAN2.4GHz Ant 8 + WLAN6GHz Ant 7+8 + Bluetooth Ant 7 + NFC + RFID 900	Yes
13.	WLAN2.4GHz Ant 7 + WLAN6GHz Ant 7+8 + Bluetooth Ant 8 + NFC + RFID 900	Yes

General Note:

1. The WWAN and WLAN 10g SAR results refer to FCC ID: UZ7ET65AW Report No. FA371211A and FCC ID: UZ7ET60AW Report No: FA332310 and using perform Sim-Tx analysis with RFID device.
2. The Scaled SAR summation is calculated based on the same configuration and test position.
3. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) 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, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.

15.1 Hand Exposure Conditions

WWAN SKU

<Non-DBS>

WWAN Ant	Exposure Position	1 Maximum WWAN 10g SAR (W/kg)	2 NFC 10g SAR (W/kg)	3 WLAN2.4GHz Ant 7 10g SAR (W/kg)	4 WLAN2.4GHz Ant 8 10g SAR (W/kg)	5 WLAN2.4GHz Ant 7+8(8) 10g SAR (W/kg)	6 WLAN5/6GHz Ant 7+8 10g SAR (W/kg)	7 Bluetooth Ant 7 10g SAR (W/kg)	8 Bluetooth Ant 8 10g SAR (W/kg)	9 RFID 900 10g SAR (W/kg)	1+2+5+9 Summed 10g SAR (W/kg)	1+2+6+7+9 Summed 10g SAR (W/kg)	1+2+4+7+9 Summed 10g SAR (W/kg)	1+2+6+8+9 Summed 10g SAR (W/kg)	1+2+3+8+9 Summed 10g SAR (W/kg)
Ant 1	Bottom Face at 0mm	0.146	0.001	0.369	0.258	0.036	0.273	0.069	0.065	1.968	**2.151**	**2.457**	**2.442**	**2.453**	**2.441**
	Edge 1 at 0mm	0.226	0.001	0.135		0.205	0.117	0.001		0.063	**0.424**	**0.407**	**0.406**	**0.424**	**0.290**
	Edge 2 at 0mm			0.103	0.175	0.115	0.085	0.001	0.001		**0.103**	**0.086**	**0.086**	**0.104**	**0.176**
	Edge 3 at 0mm	0.064			0.107				0.001		**0.064**	**0.064**	**0.065**	**0.065**	**0.171**
	Edge 4 at 0mm	0.531								0.152	**0.683**	**0.683**	**0.683**	**0.683**	**0.683**
Ant 2	Bottom Face at 0mm	0.034	0.001	0.369	0.258	0.036	0.273	0.069	0.065	1.968	**2.371**	**2.344**	**2.340**	**2.436**	**2.329**
	Edge 1 at 0mm	0.068	0.001	0.135		0.205	0.117	0.001		0.063	**0.266**	**0.249**	**0.248**	**0.266**	**0.132**
	Edge 2 at 0mm			0.103	0.175	0.115	0.085	0.001	0.001		**0.103**	**0.086**	**0.086**	**0.104**	**0.176**
	Edge 3 at 0mm	0.008			0.107				0.001		**0.008**	**0.008**	**0.009**	**0.009**	**0.115**
	Edge 4 at 0mm	0.173								0.152	**0.325**	**0.325**	**0.325**	**0.325**	**0.325**
Ant 3	Bottom Face at 0mm	0.051	0.001	0.369	0.258	0.036	0.273	0.069	0.065	1.968	**2.388**	**2.361**	**2.357**	**2.453**	**2.346**
	Edge 1 at 0mm	0.295	0.001	0.135		0.205	0.117	0.001		0.063	**0.493**	**0.476**	**0.475**	**0.493**	**0.359**
	Edge 2 at 0mm			0.103	0.175	0.115	0.085	0.001	0.001		**0.103**	**0.086**	**0.086**	**0.104**	**0.176**
	Edge 3 at 0mm				0.107				0.001		**0.000**	**0.000**	**0.001**	**0.001**	**0.107**
	Edge 4 at 0mm	0.303								0.152	**0.455**	**0.455**	**0.455**	**0.455**	**0.455**
Ant 4	Bottom Face at 0mm	0.057	0.001	0.369	0.258	0.036	0.273	0.069	0.065	1.968	**2.394**	**2.367**	**2.363**	**2.459**	**2.352**
	Edge 1 at 0mm	0.567	0.001	0.135		0.205	0.117	0.001		0.063	**0.765**	**0.748**	**0.747**	**0.765**	**0.631**
	Edge 2 at 0mm			0.103	0.175	0.115	0.085	0.001	0.001		**0.103**	**0.086**	**0.086**	**0.104**	**0.176**
	Edge 3 at 0mm				0.107				0.001		**0.000**	**0.000**	**0.001**	**0.001**	**0.107**
	Edge 4 at 0mm	0.194								0.152	**0.346**	**0.346**	**0.346**	**0.346**	**0.346**
Ant 5	Bottom Face at 0mm	0.465	0.001	0.369	0.258	0.036	0.273	0.069	0.065	1.968	**2.802**	**2.775**	**2.771**	**2.867**	**2.760**
	Edge 1 at 0mm		0.001	0.135		0.205	0.117	0.001		0.063	**0.198**	**0.181**	**0.180**	**0.198**	**0.064**
	Edge 2 at 0mm			0.103	0.175	0.115	0.085	0.001	0.001		**0.103**	**0.086**	**0.086**	**0.104**	**0.176**
	Edge 3 at 0mm	0.067			0.107				0.001		**0.067**	**0.067**	**0.068**	**0.068**	**0.174**
	Edge 4 at 0mm	0.302								0.152	**0.454**	**0.454**	**0.454**	**0.454**	**0.454**
Ant 6	Bottom Face at 0mm	0.394	0.001	0.369	0.258	0.036	0.273	0.069	0.065	1.968	**2.731**	**2.704**	**2.700**	**2.796**	**2.689**
	Edge 1 at 0mm	0.037	0.001	0.135		0.205	0.117	0.001		0.063	**0.235**	**0.218**	**0.217**	**0.235**	**0.101**
	Edge 2 at 0mm	0.306		0.103	0.175	0.115	0.085	0.001	0.001		**0.409**	**0.392**	**0.392**	**0.410**	**0.482**
	Edge 3 at 0mm	0.029			0.107				0.001		**0.029**	**0.029**	**0.030**	**0.030**	**0.136**
	Edge 4 at 0mm									0.152	**0.152**	**0.152**	**0.152**	**0.152**	**0.152**

<DBS>

WWAN Ant	Exposure Position	1	2	3	4	5	6	7	8	9	1+2+4+6+7+9 Summed 10g SAR (W/kg)	1+2+5+6+9 Summed 10g SAR (W/kg)	1+2+3+6+8+9 Summed 10g SAR (W/kg)
		Maximum WWAN	NFC	WLAN2.4GHz Ant 7	WLAN2.4GHz Ant 8	WLAN2.4GHz Ant 7+8(8)	WLAN5/6GHz Ant 7+8	Bluetooth Ant 7	Bluetooth Ant 8	RFID 900			
		10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)			
Ant 1	Bottom Face at 0mm	0.146	0.001	0.205	0.148	0.194	0.150	0.069	0.065	1.968	**2.482**	**2.459**	**2.535**
	Edge 1 at 0mm	0.226	0.001	0.073		0.103	0.050	0.001		0.063	**0.341**	**0.443**	**0.413**
	Edge 2 at 0mm			0.038	0.094	0.076	0.035	0.001	0.001		**0.130**	**0.111**	**0.074**
	Edge 3 at 0mm	0.064			0.107				0.001		**0.171**	**0.064**	**0.065**
	Edge 4 at 0mm	0.531								0.152	**0.683**	**0.683**	**0.683**
Ant 2	Bottom Face at 0mm	0.034	0.001	0.205	0.148	0.194	0.150	0.069	0.065	1.968	**2.370**	**2.347**	**2.423**
	Edge 1 at 0mm	0.068	0.001	0.073		0.103	0.050	0.001		0.063	**0.183**	**0.285**	**0.255**
	Edge 2 at 0mm			0.038	0.094	0.076	0.035	0.001	0.001		**0.130**	**0.111**	**0.074**
	Edge 3 at 0mm	0.008			0.107				0.001		**0.115**	**0.008**	**0.009**
	Edge 4 at 0mm	0.173								0.152	**0.325**	**0.325**	**0.325**
Ant 3	Bottom Face at 0mm	0.051	0.001	0.205	0.148	0.194	0.150	0.069	0.065	1.968	**2.387**	**2.364**	**2.440**
	Edge 1 at 0mm	0.295	0.001	0.073		0.103	0.050	0.001		0.063	**0.410**	**0.512**	**0.482**
	Edge 2 at 0mm			0.038	0.094	0.076	0.035	0.001	0.001		**0.130**	**0.111**	**0.074**
	Edge 3 at 0mm				0.107				0.001		**0.107**	**0.000**	**0.001**
	Edge 4 at 0mm	0.303								0.152	**0.455**	**0.455**	**0.455**
Ant 4	Bottom Face at 0mm	0.057	0.001	0.205	0.148	0.194	0.150	0.069	0.065	1.968	**2.393**	**2.370**	**2.446**
	Edge 1 at 0mm	0.567	0.001	0.073		0.103	0.050	0.001		0.063	**0.682**	**0.784**	**0.754**
	Edge 2 at 0mm			0.038	0.094	0.076	0.035	0.001	0.001		**0.130**	**0.111**	**0.074**
	Edge 3 at 0mm				0.107				0.001		**0.107**	**0.000**	**0.001**
	Edge 4 at 0mm	0.194								0.152	**0.346**	**0.346**	**0.346**
Ant 5	Bottom Face at 0mm	0.391	0.001	0.205	0.148	0.194	0.150	0.069	0.065	1.968	**2.727**	**2.704**	**2.780**
	Edge 1 at 0mm		0.001	0.073		0.103	0.050	0.001		0.063	**0.115**	**0.217**	**0.187**
	Edge 2 at 0mm			0.038	0.094	0.076	0.035	0.001	0.001		**0.130**	**0.111**	**0.074**
	Edge 3 at 0mm	0.067			0.107				0.001		**0.174**	**0.067**	**0.068**
	Edge 4 at 0mm	0.302								0.152	**0.454**	**0.454**	**0.454**
Ant 6	Bottom Face at 0mm	0.036	0.001	0.205	0.148	0.194	0.150	0.069	0.065	1.968	**2.372**	**2.349**	**2.425**
	Edge 1 at 0mm	0.037	0.001	0.073		0.103	0.050	0.001		0.063	**0.152**	**0.254**	**0.224**
	Edge 2 at 0mm	0.034		0.038	0.094	0.076	0.035	0.001	0.001		**0.164**	**0.145**	**0.108**
	Edge 3 at 0mm	0.029			0.107				0.001		**0.136**	**0.029**	**0.030**
	Edge 4 at 0mm									0.152	**0.152**	**0.152**	**0.152**

WLAN SKU

<Non-DBS>

Exposure Position	1 NFC 10g SAR (W/kg)	2 WLAN2.4GHz Ant 7 10g SAR (W/kg)	3 WLAN2.4GHz Ant 8 10g SAR (W/kg)	4 WLAN2.4GHz Ant 7+8(8) 10g SAR (W/kg)	5 WLAN5/6GHz Ant 7+8 10g SAR (W/kg)	6 Bluetooth Ant 7 10g SAR (W/kg)	7 Bluetooth Ant 8 10g SAR (W/kg)	8 RFID 900 10g SAR (W/kg)	**1+4+8 Summed 10g SAR (W/kg)**	**1+5+6+8 Summed 10g SAR (W/kg)**	**1+3+6+8 Summed 10g SAR (W/kg)**	**1+5+7+8 Summed 10g SAR (W/kg)**	**1+2+7+8 Summed 10g SAR (W/kg)**
Bottom Face at 0mm	0.001	0.414	0.170	0.278	0.239	0.014	0.019	1.968	**2.247**	**2.222**	**2.153**	**2.227**	**2.152**
Edge 1 at 0mm	0.001	0.106		0.054	0.072	0.001		0.063	**0.118**	**0.137**	**0.065**	**0.136**	**0.064**
Edge 2 at 0mm		0.058	0.073	0.053	0.175	0.001	0.001		**0.053**	**0.176**	**0.074**	**0.176**	**0.074**
Edge 3 at 0mm			0.185				0.001		**0.000**	**0.000**	**0.185**	**0.001**	**0.185**
Edge 4 at 0mm								0.152	**0.152**	**0.152**	**0.152**	**0.152**	**0.152**

<DBS>

Exposure Position	1 NFC 10g SAR (W/kg)	2 WLAN2.4GHz Ant 7 10g SAR (W/kg)	3 WLAN2.4GHz Ant 8 10g SAR (W/kg)	4 WLAN2.4GHz Ant 7+8(8) 10g SAR (W/kg)	5 WLAN5/6GHz Ant 7+8 10g SAR (W/kg)	6 Bluetooth Ant 7 10g SAR (W/kg)	7 Bluetooth Ant 8 10g SAR (W/kg)	8 RFID 900 10g SAR (W/kg)	**1+3+5+6+8 Summed 10g SAR (W/kg)**	**1+4+5+8 Summed 10g SAR (W/kg)**	**1+2+5+7+8 Summed 10g SAR (W/kg)**
Bottom Face at 0mm	0.001	0.257	0.127	0.278	0.191	0.014	0.019	1.968	**2.301**	**2.438**	**2.436**
Edge 1 at 0mm	0.001	0.052		0.054	0.079	0.001		0.063	**0.144**	**0.197**	**0.195**
Edge 2 at 0mm		0.058	0.059	0.053	0.155	0.001	0.001		**0.215**	**0.208**	**0.214**
Edge 3 at 0mm			0.185				0.001		**0.185**	**0.000**	**0.001**
Edge 4 at 0mm								0.152	**0.152**	**0.152**	**0.152**

Test Engineer： Jocelyn Huang, Rain Chiu, Carter Jhuang and Johnny Weng

16. Uncertainty Assessment

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.

Applicable for SAR Measurements:

Uncertainty Budget (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
Axial Isotropy	4.70	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.60	R	1.732	0.7	0.7	3.9	3.9
Linearity	4.70	R	1.732	1	1	2.7	2.7
Modulation Response	4.68	R	1.732	1	1	2.7	2.7
System Detection Limits	1.00	R	1.732	1	1	0.6	0.6
Boundary Effects	2.00	R	1.732	1	1	1.2	1.2
Readout Electronics	0.30	N	1	1	1	0.3	0.3
Response Time	0.00	R	1.732	1	1	0.0	0.0
Integration Time	2.60	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.00	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.00	R	1.732	1	1	1.7	1.7
Probe Positioner	0.40	R	1.732	1	1	0.2	0.2
Probe Positioning	6.70	R	1.732	1	1	3.9	3.9
Post-processing	4.00	R	1.732	1	1	2.3	2.3
Test Sample Related							
Device Holder	3.60	N	1	1	1	3.6	3.6
Test sample Positioning	3.03	N	1	1	1	3.0	3.0
Power Scaling	0.00	R	1.732	1	1	0.0	0.0
Power Drift	5.00	R	1.732	1	1	2.9	2.9
Phantom and Setup							
Phantom Uncertainty	7.60	R	1.732	1	1	4.4	4.4
SAR correction	0.00	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.03	N	1	0.78	0.77	0.0	0.0
Liquid Conductivity (target)	5.00	R	1.732	0.78	0.77	2.3	2.2
Liquid Conductivity (mea.)	2.50	R	1.732	0.78	0.77	1.1	1.1
Temp. unc. - Conductivity	3.68	R	1.732	0.78	0.77	1.7	1.6
Liquid Permittivity Repeatability	0.02	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.00	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.50	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.84	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						14.5%	14.2%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						29.0%	28.4%

17. 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 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[6] FCC KDB 616217 D04 v01r02, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, Oct 2015

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

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