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PART 0 SAR CHAR REPORT

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Date of Testing:
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Test Site/Location:
Element, Columbia, MD, USA
Element, Suwon, Korea
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APPLICANT:	**SAMSUNG ELECTRONICS CO., LTD**

Report Type:	Part 0 SAR Characterization
DUT Type:	Portable Handset
Model(s):	SC-53G
Additional Model:	SCG37

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Test results reported herein relate only to the item(s) tested.

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

TABLE OF CONTENTS

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
GSM/GPRS/EDGE 850	Voice/Data	824.20 - 848.80 MHz
GSM/GPRS/EDGE 1900	Voice/Data	1850.20 - 1909.80 MHz
UMTS 850	Voice/Data	826.40 - 846.60 MHz
LTE Band 12	Voice/Data	699.7 - 715.3 MHz
LTE Band 13	Voice/Data	779.5 - 784.5 MHz
LTE Band 5	Voice/Data	824.7 - 848.3 MHz
LTE Band 66	Voice/Data	1710.7 - 1779.3 MHz
LTE Band 4	Voice/Data	1710.7 - 1754.3 MHz
LTE Band 2	Voice/Data	1850.7 - 1909.3 MHz
LTE Band 41	Voice/Data	2498.5 - 2687.5 MHz
NR Band n5	Voice/Data	826.5 - 846.5 MHz
NR Band n66	Voice/Data	1712.5 - 1777.5 MHz
NR Band n41	Voice/Data	2501.01 - 2685 MHz
2.4 GHz WIFI	Voice/Data	2412 - 2462 MHz
5 GHz WIFI	Voice/Data	U-NII-1: 5180 - 5240 MHz U-NII-2A: 5260 - 5320 MHz U-NII-2C: 5500 - 5720 MHz U-NII-3: 5745 - 5825 MHz U-NII-4: 5845 - 5885 MHz
6 GHz WIFI	Voice/Data	U-NII-5: 5935 - 6415 MHz U-NII-6: 6435 - 6515 MHz U-NII-7: 6535 - 6875 MHz U-NII-8: 6895 - 7115 MHz
2.4 GHz Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz
UWB	Data	6489.6 - 7987.2 MHz
WPT	N/A	110 kHz - 148 kHz

This device uses the Qualcomm® Smart Transmit Plus, EFS v24 feature to control and manage transmitting power in real time and to ensure the time-averaged RF exposure is in compliance with the FCC requirement at all times for 2G/3G/4G/5G WWAN and WLAN/BT operations. Additionally, this device supports NFC/WPT/UWB technologies, but the output power of these modems is not controlled by the Smart Transmit algorithm.

1.2 Time-Averaging for SAR and Power Density

This device is enabled with Qualcomm® Smart Transmit Plus, EFS v24 algorithm to control and manage transmitting power in real time and to ensure that the time-averaged RF exposure from 2G/3G/4G/5G Sub-6 NR WWAN and WLAN/BT is in compliance with FCC requirements. This Part 0 report shows SAR characterization of WWAN radios for 2G/3G/4G/5G Sub-6 NR/WLAN/BT. Characterization is achieved by determining PLimit for 2G/3G/4G/5G Sub-6 NR/WLAN/BT that corresponds to the exposure design targets after accounting for all device design related uncertainties, i.e., SAR_design_target (< FCC SAR limit) for sub-6 radio. The SAR characterization is denoted as SAR Char in this report. Section 1.3 includes a nomenclature of the specific terms used in this report.

The compliance test under the static transmission scenario and simultaneous transmission analysis are reported in Part 1 report. The validation of the time-averaging algorithm and compliance under the dynamic (time- varying) transmission scenario for WWAN/WLAN/BT technologies are reported in Part 2 report (report SN could be found in Section 1.4 – Bibliography).

1.3 Nomenclature for Part 0 Report

Technology	Term	Description
2G/3G/4G/5G Sub-6 NR	P_{limit}	Power level that corresponds to the exposure design target (*SAR_design_target)* after accounting for all device design related uncertainties
	P_{max}	Maximum tune up output power
	SAR_design_target	Target SAR level < FCC SAR limit after accounting for all device design related uncertainties
	SAR Char	Table containing *Plimit* for all technologies and bands

1.4 Bibliography

Report Type	Report Serial Number
RF Exposure Part 1 test Report	1M2508270082-23.A3L
RF Exposure Part 2 Test Report	1M2508270082-22.A3L
RF Exposure Compliance Summary	1M2508270082-25.A3L

2 SAR AND POWER DENSITY MEASUREMENTS

2.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 2-1).

Equation 2-1
SAR Mathematical Equation

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

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

$$SAR = \frac{\sigma \cdot E^2}{\rho}$$

where:

σ	=	conductivity of the tissue-simulating material (S/m)
ρ	=	mass density of the tissue-simulating material (kg/m^3)
E	=	Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

2.2 SAR Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 2-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.

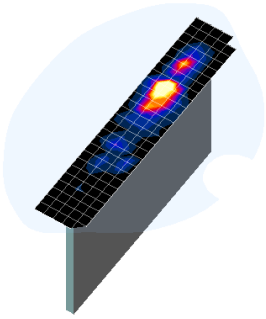

Figure 2-1
Sample SAR Area Scan

3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 2-1) and IEEE 1528-2013. On the

basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 2-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.

c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

Table 2-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04*

Frequency	Maximum Area Scan Resolution (mm) (Δx_{area}, Δy_{area})	Maximum Zoom Scan Resolution (mm) (Δx_{zoom}, Δy_{zoom})	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid	Graded Grid		
			$\Delta z_{zoom}(n)$	$\Delta z_{zoom}(1)$*	$\Delta z_{zoom}(n>1)$*	
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≤ 4	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 22

*Also compliant to IEEE 1528-2013 Table 6

3 SAR CHARACTERIZATION

3.1 DSI and SAR Determination

This device uses different Device State Index (DSI) to configure different time averaged power levels based on certain exposure scenarios. Depending on the detection scheme implemented in the smartphone, the worst-case SAR was determined by measurements for the relevant exposure conditions for that DSI. Detailed descriptions of the detection mechanisms are included in the operational description.

When 1g SAR and 10g SAR exposure comparison is needed, the worst-case was determined from SAR normalized to 1g or 10g SAR limit.

The device state index (DSI) conditions used in Table 3-1 represent different exposure scenarios.

Table 3-1
DSI and Corresponding Exposure Scenarios

Scenario	Description	SAR Test Cases
Head (DSI = 1)	▪ Device positioned next to head ▪ Receiver Active	*Head SAR per KDB Publication 648474 D04*
Hotspot mode (DSI = 0)	▪ Device transmits in hotspot mode near body ▪ Hotspot Mode Active	*Hotspot SAR per KDB Publication 941225 D06*
Phablet (DSI = 0)	▪ Device is held with hand.	*Phablet SAR per KDB Publication 648474 D04 & KDB Publication 616217 D04*
Body-worn (DSI = 0)	▪ Device being used with a body-worn accessory	*Body-worn SAR per KDB Publication 648474 D04*

3.2 SAR Design Target

SAR_design_target is determined by ensuring that it is less than FCC SAR limit after accounting for total device designed related uncertainties specified by the manufacturer (see Table 3-2).

Table 3-2
***SAR_design_target* Calculations**

SAR_design_target			
$SAR\_design\_target < SAR\_regulatory\_limit \times 10^{\frac{-Total\ Uncertainty}{10}}$			
1g SAR (W/kg)		**10g SAR (W/kg)**	
Total Uncertainty	1.0 dB	*Total Uncertainty*	1.0 dB
SAR_regulatory_limit	1.6 W/kg	*SAR_regulatory_limit*	4.0 W/kg
SAR_design_target	1.0 W/kg	*SAR_design_target*	2.5 W/kg

3.3 SAR Char

SAR test results corresponding to *Pmax* for each antenna/technology/band/DSI can be found in Appendix A.

Plimit is calculated by linearly scaling with the measured SAR at the Ppart0 to correspond to the *SAR_design_target*. When *Plimit* < *Pmax*, *Ppart0* was used as Plimit in the Smart Transmit EFS. When *Plimit* > *Pmax* and *Ppart0*=Pmax, calculated *Plimit* was used in the Smart Transmit EFS. All reported SAR obtained from the Ppart0 SAR tests was less than *SAR_Design_targe*t+ 1 dB Uncertainty. The final *Plimit* determination for each exposure scenario corresponding to *SAR_design_target* are shown in Table 3-3.

Table 3-3
***PLimit* Determination**

Device State Index (DSI)	*PLimit* Determination Scenarios
0	The worst-case SAR exposure is determined as maximum SAR normalized to the limit (i.e. lowest P_{limit}) among: 1. Body Worn SAR 2. Phablet SAR measured at 0 mm spacing for back, front, top, bottom, right and left. 3. Hotspot SAR at 5 and 10 mm
1	P_{limit} is calculated based on 1g Head SAR

Table 3-4
SAR Characterizations

Exposure Scenario			Maximum Tune-Up Output Power*	Body-Worn, Hotspot, or Phablet	Head
Averaging Volume				1g/10g	1g
Spacing				5mm, 10mm, 0mm	0mm
DSI				0	1
Technology/Band	Antenna	Antenna Group	P_{max}	P_{limit}	P_{limit}
GSM 850	A	AG0	25.3	25.6	29.0
GSM 850	E	AG1	25.3	20.8	20.3
GSM 1900	A	AG0	22.1	17.8	26.3
UMTS 850	A	AG0	24.0	26.3	28.4
UMTS 850	E	AG1	24.0	21.0	20.0
LTE Band 12	A	AG0	23.0	26.5	27.4
LTE Band 12	E	AG1	23.0	22.0	21.0
LTE Band 13	A	AG0	23.0	25.7	28.4
LTE Band 13	E	AG1	23.0	21.0	21.0
LTE Band 5	A	AG0	24.0	26.2	28.5
LTE Band 5	E	AG1	24.0	21.0	21.0
LTE Band 66/4	A	AG0	23.0	17.0	24.7
LTE Band 2	A	AG0	23.0	17.0	25.5
LTE Band 41	B	AG0	22.0	17.0	31.8
LTE Band 41	F	AG1	22.0	18.5	16.0
NR Band n5	A	AG0	24.0	25.4	28.8
NR Band n5	E	AG1	24.0	21.0	21.0
NR Band n66	A	AG0	23.0	17.0	25.9
NR Band n66	F	AG1	23.0	20.0	18.0
NR Band n41 PC2	B	AG0	25.0	17.0	21.0
NR Band n41 PC2	F	AG1	25.0	18.5	16.0
2.4 GHz WIFI	G	AG1	19.0	19.7	15.0
2.4 GHz WIFI	I	AG1	19.0	19.9	15.0
2.4 GHz WIFI	MIMO	AG1	17.0	17.9	15.0
5 GHz WIFI	G	AG1	17.0	13.0	15.0
5 GHz WIFI	E	AG1	17.0	13.0	15.0
5 GHz WIFI	MIMO	AG1	17.0	13.0	15.0
6 GHz WIFI	G	AG1	16.0	11.0	14.0
6 GHz WIFI	E	AG1	16.0	11.0	14.0
6 GHz WIFI	MIMO	AG1	16.0	11.0	14.0
2.4 GHz Bluetooth	G	AG1	16.4	20.4	18.5
2.4 GHz Bluetooth	I	AG1	16.5	21.8	18.2
2.4 GHz Bluetooth MIMO	G	AG1	13.0	20.1	19.8
2.4 GHz Bluetooth MIMO	I	AG1	12.0	18.2	18.0

Notes:

1. When $P_{max} < P_{limit}$ EFS, the DUT will operate at a power level up to P_{max}
2. All P_{limit} EFS and maximum tune-up output power P_{max} levels entered in above Table correspond to average power levels after accounting for duty cycle in the case of GMSK, TDD, or OFDM modulation schemes (e.g. GSM, LTE TDD, WLAN, BT).
3. Maximum tune-up output power P_{max} is used to configure EUT during RF tune up procedure. The maximum allowed output power is equal to maximum tune-up output power + 1dB device design uncertainty.
4. WLAN MIMO P_{max} and P_{limit} are defined per antenna chain.
5. Based on Qualcomm guidance, for multi_tx_factor > 1.0, the reported SAR for each tech/band/ant/DSI is scaled using min{Plimit *multi_tx_factor*10^(sub6 device uncertainty/10), Pmax} in simultaneous transmission evaluations. For this device, the manufacturer declared a multi_tx_factor of 1.27.

4 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	CBT	N/A	CBT	3051A00187
Agilent	N5182A	MXG Vector Signal Generator	5/30/2025	Annual	5/30/2026	MY48180366
Agilent	N5182A	MXG Vector Signal Generator	8/1/2025	Annual	8/1/2026	MY47420651
Agilent	8753ES	S-Parameter Vector Network Analyzer	1/6/2025	Annual	1/6/2026	MY40001472
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Amplifier Research	1S51G6	Amplifier	CBT	N/A	CBT	433974
Anritsu	MN8110B	I/O Adaptor	CBT	N/A	CBT	6261747881
Rohde & Schwarz	NRP2	Power Meter	5/23/2025	Annual	5/23/2026	103084
Anritsu	MT8821C	Radio Communication Analyzer MT8821C	6/9/2025	Annual	6/9/2026	6201144418
Anritsu	MT8821C	Radio Communication Analyzer MT8821C	3/14/2025	Annual	3/14/2026	6201381794
Anritsu	MT8000A	Radio Communication Test Station	6/4/2025	Annual	6/4/2026	6261914237
Anritsu	MT8000A	Radio Communication Test Station	11/12/2024	Annual	11/12/2025	6272337405
Anritsu	MA24106A	USB Power Sensor	5/29/2025	Annual	5/29/2026	1344554
Anritsu	MA24106A	USB Power Sensor	6/26/2025	Annual	6/26/2026	1827529
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240174346
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240171096
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240171059
Control Company	4040	Therm./ Clock/ Humidity Monitor	4/15/2024	Biennial	4/15/2026	240310280
Control Company	4040	Therm./ Clock/ Humidity Monitor	10/15/2024	Biennial	10/15/2026	240763503
Testo	ALARM-HYGROMETER	ALARM-HYGROMETER	7/3/2025	Annual	7/3/2026	83316952
Testo	ALARM-HYGROMETER	ALARM-HYGROMETER	7/3/2025	Annual	7/3/2026	83316953
Testo	ALARM-HYGROMETER	ALARM-HYGROMETER	7/3/2025	Annual	7/3/2026	83316970
Keysight Technologies	N9020A	MXA Signal Analyzer	7/7/2025	Annual	7/7/2026	MY48010233
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MCL	BW-N3W5+	3dB Attenuator	CBT	N/A	CBT	2028
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	CBT	N/A	CBT	31634
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	ZUDC10-83-5+	Directional Coupler	CBT	N/A	CBT	2050
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Seekonk	NC-100	Torque Wrench	4/2/2024	Biennial	4/2/2026	1262
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	1/10/2025	Annual	1/10/2026	131453
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	8/27/2024	Biennial	8/27/2026	167085
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	12/10/2024	Annual	12/10/2025	167286
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	1/6/2025	Annual	1/6/2026	131454
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	7/9/2025	Annual	7/9/2026	166462
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	2/22/2025	Annual	2/22/2026	168527
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	1/6/2025	Annual	1/6/2026	150117
SPEAG	DAK-3.5	Dielectric Assessment Kit	11/5/2024	Annual	11/5/2025	1277
SPEAG	DAK-3.5	Dielectric Assessment Kit	7/14/2025	Annual	7/14/2026	1039
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1237
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1390
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1580
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1384
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1515
SPEAG	DAK-12	Dielectric Assessment Kit (4MHz - 3GHz)	3/10/2025	Annual	3/10/2026	1102
SPEAG	DAK-12	Dielectric Assessment Kit (4MHz - 3GHz)	7/14/2025	Annual	7/14/2026	1039
SPEAG	CLA-13	Confined Loop Antenna	9/4/2025	Annual	9/4/2026	1002
SPEAG	D750V3	750 MHz SAR Dipole	3/4/2025	Annual	3/4/2026	1054
SPEAG	D835V2	835 MHz SAR Dipole	3/4/2025	Annual	3/4/2026	4d047
SPEAG	D835V2	835 MHz SAR Dipole	1/18/2024	Biennial	1/18/2026	4d132
SPEAG	D835V2	835 MHz SAR Dipole	3/11/2024	Biennial	3/11/2026	4d133
SPEAG	D1750V2	1750 MHz SAR Dipole	11/7/2024	Annual	11/7/2025	1150
SPEAG	D1750V2	1750 MHz SAR Dipole	1/13/2025	Annual	1/13/2026	1148
SPEAG	D1900V2	1900 MHz SAR Dipole	2/7/2025	Annual	2/7/2026	5d148
SPEAG	D2450V2	2450 MHz SAR Dipole	11/7/2024	Annual	11/7/2025	981
SPEAG	D2450V2	2450 MHz SAR Dipole	10/7/2025	Annual	10/7/2026	797
SPEAG	D2450V2	2450 MHz SAR Dipole	6/3/2025	Annual	6/3/2026	945
SPEAG	D2600V2	2600 MHz SAR Dipole	6/3/2025	Annual	6/3/2026	1009
SPEAG	D2600V2	2600 MHz SAR Dipole	8/11/2025	Annual	8/11/2026	1126
SPEAG	D2600V2	2600 MHz SAR Dipole	6/6/2025	Annual	6/6/2026	1064
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/17/2024	Biennial	1/17/2026	1191
SPEAG	D5GHzV2	5 GHz SAR Dipole	6/2/2025	Annual	6/2/2026	1237
SPEAG	D5GHzV2	5 GHz SAR Dipole	2/21/2024	Biennial	2/21/2026	1057
SPEAG	D6.5GHzV2	6.5 GHz SAR Dipole	2/4/2025	Annual	2/4/2026	1111
SPEAG	D8GHzV2	8GHz SAR Dipole	3/6/2025	Annual	3/6/2026	1007
SPEAG	5G Verification Source 10GHz	10GHz System Verification Antenna	3/4/2025	Annual	3/4/2026	1002
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/11/2025	Annual	3/11/2026	1415
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/9/2025	Annual	5/9/2026	1678
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/7/2025	Annual	4/7/2026	1407
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/13/2025	Annual	1/13/2026	1530
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/10/2025	Annual	4/10/2026	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/14/2025	Annual	1/14/2026	1466
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/4/2025	Annual	6/4/2026	1502
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/4/2025	Annual	6/4/2026	1652
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/5/2025	Annual	6/5/2026	1558
SPEAG	DAE4ip	Dasy Data Acquisition Electronics	2/7/2025	Annual	2/7/2026	1638
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/4/2024	Annual	12/4/2025	1213
SPEAG	DAE4ip	Dasy Data Acquisition Electronics	2/5/2025	Annual	2/5/2026	1639
SPEAG	EX3DV4	SAR Probe	11/11/2024	Annual	11/11/2025	7539
SPEAG	EX3DV4	SAR Probe	5/9/2025	Annual	5/9/2026	7660
SPEAG	EX3DV4	SAR Probe	4/8/2025	Annual	4/8/2026	7718
SPEAG	EX3DV4	SAR Probe	3/7/2025	Annual	3/7/2026	7488
SPEAG	EX3DV4	SAR Probe	1/7/2025	Annual	1/7/2026	7713
SPEAG	EX3DV4	SAR Probe	4/7/2025	Annual	4/7/2026	7659
SPEAG	EX3DV4	SAR Probe	8/12/2025	Annual	8/12/2026	7491
SPEAG	EX3DV4	SAR Probe	6/12/2025	Annual	6/12/2026	7402
SPEAG	EX3DV4	SAR Probe	6/12/2025	Annual	6/12/2026	7637
SPEAG	EX3DV4	SAR Probe	6/11/2025	Annual	6/11/2026	7661
SPEAG	EX3DV4	SAR Probe	2/10/2025	Annual	2/10/2026	7570
SPEAG	EUmmWV3	EUmmWV3 Probe	3/12/2025	Annual	3/12/2026	9421
SPEAG	EUmmWV3	EUmmWV3 Probe	1/8/2025	Annual	1/8/2026	9389

Note:

1. CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.
2. Each equipment item was used solely within its respective calibration period.

5 MEASUREMENT UNCERTAINTIES

SAR Uncertainty Budget based on IEEE 1528-2013 (0.3 GHz to 10 GHz)

a	b	c	d	e *f(d,k)*	f	g	h cxf/e	i cxg/e	k
Uncertainty component	**Reference**	**Tol. (± %)**	**Prob. dist.**	**Dvi.**	**ci (1g)**	**ci (10g)**	**1g ui (± %)**	**10g ui (± %)**	**vi**
Measurement system									
Probe calibration	E.2.1	9.30	N	1	1	1	9.30	9.30	∞
Axial isotropy	E.2.2	0.25	N	1	0.707	0.707	0.18	0.18	∞
Hemispherical isotropy	E.2.2	1.30	N	1	0.707	0.707	0.92	0.92	∞
Boundary effect	E.2.3	2.00	R	1.73	1	1	1.15	1.15	∞
Linearity	E.2.4	0.30	R	1.73	1	1	0.17	0.17	∞
System detection limits	E.2.4	0.25	R	1.73	1	1	0.14	0.14	∞
Modulation response	E.2.5	4.80	R	1.73	1	1	2.77	2.77	∞
Readout electronics	E.2.6	0.30	N	1	1	1	0.30	0.30	∞
Response time	E.2.7	1.01	R	1.73	1	1	0.58	0.58	∞
Integration time	E.2.8	2.60	R	1.73	1	1	1.50	1.50	∞
RF ambient conditions - noise	E.6.1	3.00	R	1.73	1	1	1.73	1.73	∞
RF ambient conditions - reflections	E.6.1	3.00	R	1.73	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	0.04	R	1.73	1	1	0.02	0.02	∞
Probe positioning with respect to phantom shell	E.6.3	0.80	R	1.73	1	1	0.46	0.46	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	E.5	4.00	R	1.73	1	1	2.31	2.31	∞
Test sample related									
Test sample positioning	E.4.2	3.12	N	1	1	1	3.12	3.12	35
Device holder uncertainty	E.4.1	1.67	N	1	1	1	1.67	1.67	5
Output power variation - SAR drift	E.2.9	5.00	R	1.73	1	1	2.89	2.89	∞
SAR scaling	E.6.5	0.00	R	1.73	1	1	0.00	0.00	∞
Phantom and tissue parameters									
Phantom shell uncertainty - shape, thickness and permittivity	E.3.1	7.60	R	1.73	1	1	4.39	4.39	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	0.00	N	1	1	1	0.00	0.00	∞
Liquid conductivity measurement	E.3.3	4.27	N	1	0.78	0.71	3.33	3.03	55
Liquid permittivity measurement	E.3.3	4.18	N	1	0.23	0.26	0.96	1.09	55
Liquid conductivity - temperature uncertainty	E.3.4	3.40	R	1.73	0.78	0.71	1.53	1.39	∞
Liquid permittivity - temperature uncertainty	E.3.4	0.60	R	1.73	0.23	0.26	0.08	0.09	∞
Liquid Conductivity - deviation from target values	E.3.2	5.00	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity - deviation from target values	E.3.2	5.00	R	1.73	0.60	0.49	1.73	1.41	∞
Combined standard uncertainty							**13.1**	**12.9**	**150**
Expanded uncertainty (95% confidence interval)							**26.2**	**25.8**	