SAR TEST REPORT

Applicant	:	Acer Incorporated
Address	:	8F, 88, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City, 22181, Taiwan
Equipment	:	Notebook Computer
Model No.	:	N26ED1*** (* can be 0-9, a-z, A-Z, "(","(")", "-", "/", "\", "_" or blank for the marketing purpose)
Marketing Name		AL16-63P, AL16-63T, AL16-64P, AL16-64T, AL16-57P, AL16-58P, AL16-58T
Trade Name	:	Acer
FCC ID.	:	2AATL-6252C-PUB

I HEREBY CERTIFY THAT:

The sample was received on Jul. 03, 2026 and the testing was completed on Jul. 21, 2026 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Angelo Chang

Angelo Chang / Supervisor

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory

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History of this test report

Attachment No.	Issued Date	Description
26070027-TRFCC07	Aug. 26, 2026	Original

1. Summary of Maximum SAR Value

Results for highest reported SAR values for each frequency band and mode are as below:

Highest SAR (1 g Value)

Equipment Class	Band	Antenna	Maximum Scaled SAR (W/kg)	Maximum Report SAR (W/kg)
DTS	2.4G WLAN	SISO-Main	1.15	1.15
DTS	2.4G WLAN	SISO-Aux	0.69	
U-NII-2C	5G WLAN	SISO-Main	1.14	
U-NII-2C	5G WLAN	SISO-Aux	0.63	
U-NII-3	5G WLAN	SISO-Main	1.13	
U-NII-3	5G WLAN	SISO-Aux	0.69	
U-NII-4	5G WLAN	SISO-Main	1.13	
U-NII-4	5G WLAN	SISO-Aux	0.71	
DSS	Bluetooth	SISO-Aux	0.03	
Limit (W/kg)		1.6		

Highest Simultaneous Transmission SAR Values (1 g Value)

Equipment Class	Maximum Report SAR (W/kg)	SPLSR
DTS	1.76	0.01
U-NII	1.84	0.01
Limit (W/kg)	1.6	/

Note: The simultaneous transmission SAR detail please refer to section 10.1.

Note :

1.Considering the results of the performed test according to FCC 47CFR Part 2.1093 and ISED RSS 102, Issue 6 the item under test is IN COMPLIANCE with the requested specifications specified in Section1. Standards, reference documents and applicable test methods

2.The lab has reduced the uncertainty risk factor from test equipment, environment and staff technicians which according to the standard on contract. Therefore, the test result will only be determined by standard requirement.

2. Test Configuration of Equipment under Test

Operation Frequency Range	BT / BLE: 2400-2483.5MHz 2.4GHz: 802.11b/g/n/ax: 2400-2483.5MHz 5GHz: 802.11a/n/ac/ax: 5150-5250MHz, 5250-5350MHz,5470-5725MHz, 5725-5875MHz
Center Frequency Range	BT / BLE: 2402MHz-2480MHz 2.4GHz: 802.11b/g/n/ax: 2412MHz-2462MHz 5GHz: 802.11a/n/ac/ax: 5180-5240MHz, 5260-5320MHz, 5500-5720MHz, 5745-5825MHz
Modulation Type	BT: GFSK, π/4-DQPSK, 8DPSK BLE: GFSK 2.4GHz: 802.11b: CCK, DQPSK, DBPSK 802.11g/n: BPSK, QPSK, 16QAM, 64QAM 802.11ax: BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM 5GHz: 802.11n/a: BPSK, QPSK, 16QAM, 64QAM 802.11ac: BPSK, QPSK, 16QAM, 64QAM, 256QAM 802.11ax: BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM
Modulation Technology	DSSS, OFDM, FHSS, DTS, OFDMA
Data Rate	BT: GFSK: 1Mbps, π/4-DQPSK: 2Mbps ,8DPSK: 3Mbps BLE:1Mbps, 2Mbps 2.4GHz: 802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0 – MCS15, HT20/40 802.11ax: MCS0 – MCS11, HE20/40 5GHz: 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps 802.11n: MCS0 – MCS15, HT20/40 802.11ac: MCS0 – MCS9, VHT20/40/80/160 802.11ax: MCS0 – MCS11, HE20/40/80/160
Antenna Type	FPC Antenna
Antenna Gain	For BT/BLE: 2400-2483.5MHz: ANT Aux:1.93dBi For WLAN: 2400-2483.5MHz: ANT Main:1.20dB, ANT Aux:1.93dBi 5150-5250MHz: ANT Main:0.42dBi, ANT Aux:2.10dBi 5250-5350MHz: ANT Main:0.61dBi, ANT Aux:2.19dBi 5470-5725MHz: ANT Main:1.19dBi, ANT Aux:2.52dBi 5725-5850MHz: ANT Main: 0.67dBi, ANT Aux:1.95dBi
Wireless Module	FN-LINK TECHNOLOGY LIMITED / 6252C-PUB

Note:
1. EUT support TPC Function.
2. EUT support Client mode without radar detection.
3. For more details, please refer to the User's manual of the EUT.

The devices can be installed inside the EUT are listed below (For this M/B with AMD CPU):

Component	Vendor	Description
M/B	UMA	EM_AKK327_441B
CPU	AMD	Product Description of Processor Manufacturer and Max Speed up to and include 2GHz.
Panel	K&D	KD160YYYYY (Y=0-9, A-Z or blank)
	CSOT	MNG007YYYYY (Y=0-9, A-Z or blank)
Memory		On board
SSD		Up to 1024GB
Battery		One re-chargeable battery pack
WLAN	FN-LINK	6252C-PUB
Camera		HD Camera
Adapter	DELTA	ADP-65KE D
	LITE-ON	PA-1650-58
	CHICONY	A20-065N3A

The devices can be installed inside the EUT are listed below (For this M/B with Intel CPU):

Component	Vendor	Description
M/B	UMA	EM_WCL327_441B
		EM_WCL327_315B
CPU	Intel	Product Description of Processor Manufacturer and Max Speed up to and include 2.2GHz.
Panel	K&D	KD160YYYYY (Y=0-9, A-Z or blank)
	CSOT	MNG007YYYYY (Y=0-9, A-Z or blank)
SSD		Up to 1024GB
Memory		LPDDR55X up to 16GB
Battery		One re-chargeable battery pack
WLAN	FN-LINK	6252C-PUB
Camera		HD Camera
Adapter	DELTA	ADP-65KE D
	LITE-ON	PA-1650-58
	CHICONY	A20-065N3A

The I/O ports are listed below:

I/O Port Type	Quantity
HDMI Port	one
Type-C Port	two
USB 3.0 Port	two
Audio	one
Micro SD Slot	one

2.1 The Difference of Model No.

The differences between model numbers is marketing purpose.

3. General Information of Test

Organization	Cerpass Technology Corp.	
☒ Test Site	Cerpass Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel: +886-3-3226-888 Fax: +886-3-3226-881	
	FCC	TW1439, TW1079
	ISED Company Number	4934E
	ISED CAB identifier	TW1439

Test Item	Test Site	Tested By	Ambient Temperature	Ambient Relative Humidity	Test Period
SAR	RFSAR01-NK	Roy	18°C~ 25°C	30% ~ 70%	2026 7/16~7/21

4. Remarks and comments

1. Variability and simultaneous transmission results shown in this report are based on the highest SAR value obtained among all antenna manufacturers.
2.Only the plots for the test positions with the highest measured SAR per band/mode are included in Annex C as required per FCC OET KDB 865664 D02, paragraph 2.3.8.

5. Basic restrictions and Standards

5.1 Test Standards

FCC	FCC 47 CFR Part 2 (2.1093) IEEE C95.1
ISED	RSS-102 Issue6 RSS-102.SAR.MEAS

5.2 Reference Standards

FCC KDB Publication 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
FCC KDB Publication 447498 D01 General RF Exposure Guidance v06
FCC KDB Publication 447498 D04 Interim General RF Exposure Guidance v01
FCC KDB Publication 616217 D04 SAR for laptop and tablets v01r02
FCC KDB Publication 248227 D01 802.11 Wi-Fi SAR v02r02
FCC KDB Publication 941225D06 Hot Spot SAR v02r01
IEEE 62209-1528 : 2020

5.3 Environment Condition

Item	Target
Ambient Temperature(℃)	18~25
Temperature of Simulant(℃)	20~22
Relative Humidity(%RH)	30~70

5.4 RF Exposure Limits

SAR assessments have been made in line with the requirements of FCC 47CFR Part 2.1093 and ISED RSS 102 issue 5 on the limitation of exposure of the general population / uncontrolled exposure for portable devices.

Exposure Type	General Population / Uncontrolled Environment
Peak spatial-average SAR (averaged over any 1 gram of tissue)	**1.6 W/kg**
Whole body average SAR	**0.08 W/kg**
Peak spatial-average SAR (extremities) (averaged over any 10 grams of tissue)	**4.0 W/kg**

for above 6GHz

Exposure Type	Power density (S)
Limits for Occupational/Controlled Exposure. 1.5GHz – 100GHz	**50.0 W/m^2**
Limits for General Population/ Uncontrolled Exposure. 1.5GHz – 100GHz	**10.0 W/m^2**

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. 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

6. Test & System Description

6.1 SAR Definition

Specific Absorption rate is defined as the time derivative of the incremental energy (dW) absorbed by (dissipated in) and incremental mass (dm) contained in a volume element (dV) of a given density (ρ).

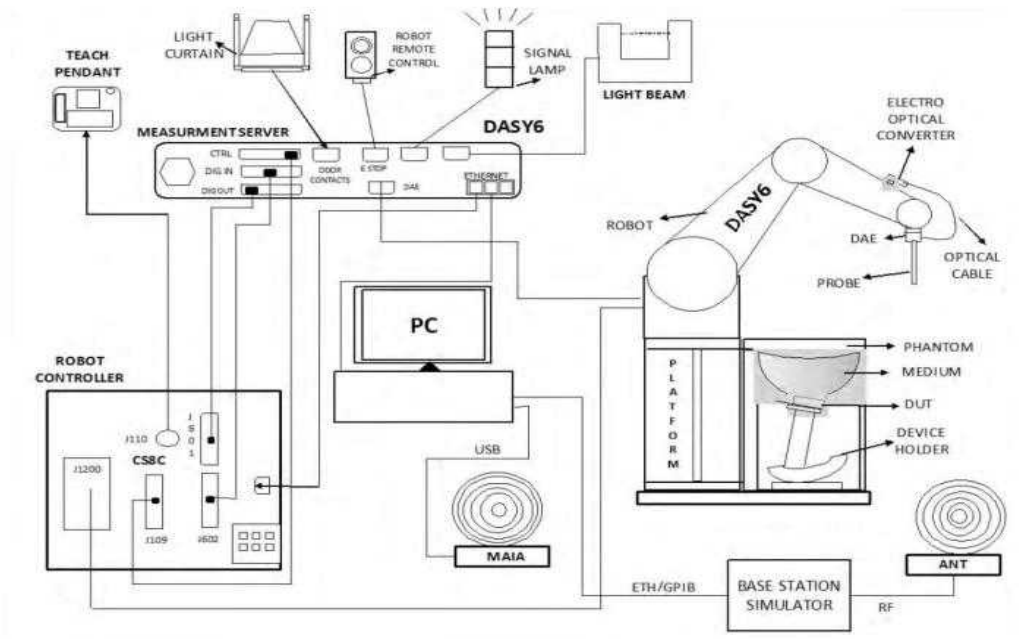
$$SAR = \frac{d}{dt} \cdot \left(\frac{dW}{dm}\right) = \frac{d}{dt} \cdot \left(\frac{dW}{\rho \cdot dV}\right)$$

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

Where:

σ = Conductivity of the tissue (S/m)
ρ = Mass density of the tissue (kg/m3)
E = RMS electric field strength (V/m)

6.2 SAR Measurement System



- ✓ A standard high precision 6-axis robot with controller, teach pendant and software. It includes an arm extension for accommodating the data acquisitionelectronics (DAE)
- ✓ An isotropic field probe optimized and calibrated for the targeted measurements.
- ✓ 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. 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 movements interrupts.
- ✓ The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- ✓ A computer running Win10 professional operating system and the cDASY6 and DASY5 V5.2 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.

6.3 Probes

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. SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE 1528, EN 62209-1, IEC 62209, etc.) under ISO 17025. The calibration data are in Appendix A.		
Model	EX3DV4	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	4 MHz to 10 GHz Linearity: ± 0.2 dB (30 MHz to 10 GHz)	
Directivity	± 0.1 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 µW/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

6.4 Data Acquisition Electronics (DAE)

Model	DAE4	
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4 mV, 400 mV)	
Input Offset Voltage	< 5 µV (with auto zero)	
Input Bias Current	Input Bias Current	
Dimensions	60 x 60 x 68 mm	

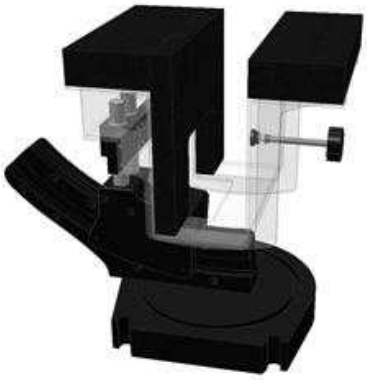
6.5 Robot

The DASY5 system uses the high precision robots TX60 L type out of the newer series from Stäubli SA (France). For the 6-axis controller DASY6 system, the CS8C robot controller version from Stäubli is used. The XL robot series have many features that are important for our application: ■ High precision (repeatability 0.02 mm) ■ High reliability (industrial design) ■ Jerk-free straight movements ■ Low ELF interference (the closed metallic construction shields against motor control fields) ■ 6-axis controller	

6.6 SAM Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas: ■ Left head ■ Right head ■ Flat phantom	
The ELI4 Phantom also is a fiberglass shell phantom with 2mm shell thickness. It has 30 liters filling volume, and with a dimension of 600mm for major ellipse axis, 400mm for minor axis. It is intended for compliance testing of handheld and body-mounted wireless devices in frequency range of 30 MHz to 6GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.	
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.	

6.7 Device Holder

The DASY5 device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR).Thus the device needs no repositioning when changing the angles. The DASY5 device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity εr =3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.	
The laptop extension is lightweight and made of POM, acrylic glass and foam. It fits easily on upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.	

6.8 Test Equipment and Ancillaries Used for Tests

Test Item	SAR				
Test Site	RFSAR01-NK				
Name of Equipment	Manufacturer	Type/Model	Serial No	Calibration Date	Valid Date
Robot	Staubli	TX60L Lspeag	F13/5P6VA1/A/01	NA	NA
DASY Test Software	Staubli	cDASY6 V16.2.4.2524	/	NA	NA
DASY Test Software	Staubli	DASY5.2	14.6.14.7483	NA	NA
EXG Analog Sginal Generator	KEYSIGHT	N5172B	MY61253477	2025/09/01	2026/08/31
S-Parameter Network Analyzer	Anritsu	MS46122B	2147302	2025/08/18	2026/08/17
S-Parameter Network Analyzer	Agilent	E5071C	70045-459-220-350	2025/10/27	2026/10/26
Dielectric parameter probes	SPEAG	DAKS-3.5	1121	NA	NA
Power Meter	Anritsu	ML2495A	1224005	2026/01/27	2027/01/26
Power Sensor	Anritsu	MA2411B	1207295	2026/01/27	2027/01/26
Data Acquisition Electronics	SPEAG	DAE4	1379	2025/09/11	2026/09/10
Dosimetric E-Field Probe	SPEAG	EX3DV4	3927	2025/09/18	2026/09/17
2450MHz System Validation Dipole	SPEAG	D2450V2	914	2024/07/10	2027/07/09
5GHz System Validation Dipole	SPEAG	D5GHzV2	1156	2024/07/12	2027/07/11
Amplifier	Mini-Circuits	ZVE-8G+	70501814	NA	NA
Amplifier	Mini-Circuits	ZVE-3W-183+	N636102230	NA	NA
Thermometer	Hi Sun	TH05A	11442	2026/07/27	2027/07/26

*Please Refer to the Appendix A. DASY Calibration Certificate.

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. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole can be found in Appendix B. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration

6.9 Return Loss Verification

Type	Frequency	Tissue	Return Loss (dB)	Limit	Verified Date	Deviation	Status
Calibration	2450 MHz	Head	-28.528	Within 20%	2024/7/10		
Measurement	2450 MHz	Head	-26.511	Within 20%	2025/7/9	2.017	PASS
Measurement	2450 MHz	Head	-26.564	Within 20%	2026/7/8	1.964	PASS
Calibration	5750 MHz	Head	-23.549	Within 20%	2024/7/12		
Measurement	5750 MHz	Head	-22.003	Within 20%	2025/7/9	1.546	PASS
Measurement	5750 MHz	Head	-22.115	Within 20%	2026/7/8	1.434	PASS

6.10 Impedance Verification

Type	Frequency	Tissue	Impedance (Ω)	Limit	Verified Date	Deviation (Ω)	Status
Calibration	2450 MHz	Head	52.592	Within 5 Ω	2023/5/16		
Measurement	2450 MHz	Head	54.328	Within 5 Ω	2025/7/9	1.736	PASS
Measurement	2450 MHz	Head	54.461	Within 5 Ω	2026/7/8	0.133	PASS
Calibration	5750 MHz	Head	55.85	Within 5 Ω	2024/7/12		
Measurement	5750 MHz	Head	54.488	Within 5 Ω	2025/7/9	1.362	PASS
Measurement	5750 MHz	Head	54.475	Within 5 Ω	2026/7/8	0.013	PASS

7. The SAR Measurement Procedure

7.1 System Performance Check

7.1.1 Purpose

1. To verify the simulating liquids are valid for testing.
2. To verify the performance of testing system is valid for testing.

7.1.2 Tissue Dielectric Parameters for Head Phantoms

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 10 % are listed in Table.

<Tissue Dielectric Parameters in IEEE 1528-2013 and IEC/IEEE 62209-1528>

Frequency (MHz)	Target Permittivity	Range of ±10 %	Target Conductivity	Range of ±10 %
450	43.5	39.2 ~ 47.9	0.87	0.78 ~ 0.96
750	41.9	37.7 ~ 46.1	0.89	0.80 ~ 0.98
835	41.5	37.4 ~ 45.7	0.90	0.81 ~ 0.99
900	41.5	37.4 ~ 45.7	0.97	0.87 ~ 1.07
1450	40.5	36.5 ~ 44.6	1.20	1.08 ~ 1.32
1500	40.4	36.4 ~ 44.4	1.23	1.11 ~ 1.35
1640	40.2	36.2 ~ 44.2	1.31	1.18 ~ 1.44
1750	40.1	36.1 ~ 44.1	1.37	1.23 ~ 1.51
1800	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
1900	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
2000	40.0	36.0 ~ 44.0	1.40	1.26 ~ 1.54
2100	39.8	35.8 ~ 43.8	1.49	1.34 ~ 1.64
2300	39.5	35.6 ~ 43.5	1.67	1.50 ~ 1.84
2450	39.2	35.3 ~ 43.1	1.80	1.62 ~ 1.98
2600	39.0	35.1 ~ 42.9	1.96	1.76 ~ 2.16
3000	38.5	34.7 ~ 42.4	2.40	2.16 ~ 2.64
3500	37.9	34.1 ~ 41.7	2.91	2.62 ~ 3.20
4000	37.4	33.7 ~ 41.1	3.43	3.09 ~ 3.77
4500	36.8	33.1 ~ 40.5	3.94	3.55 ~ 4.33
5000	36.2	32.6 ~ 39.8	4.45	4.01 ~ 4.90
5200	36.0	32.4 ~ 39.6	4.66	4.19 ~ 5.13
5400	35.8	32.2 ~ 39.4	4.86	4.37 ~ 5.35
5600	35.5	32.0 ~ 39.1	5.07	4.56 ~ 5.58
5800	35.3	31.8 ~ 38.8	5.27	4.74 ~ 5.80
6000	35.1	31.6 ~ 38.6	5.48	4.93 ~ 6.03
6500	34.5	31.1 ~ 38.0	6.07	5.46 ~ 6.68
7000	33.9	30.5 ~ 37.3	6.65	5.99 ~ 7.32

Note:

1.According to April 2019 TCB workshop, Effective February 19,2019,FCC has permitted the use of single head-tissue simulating liquid specified in IEC 62209-1 for all SAR tests.

7.1.3 Tissue Calibration Result

■ The dielectric parameters of the liquids were verified prior to the SAR evaluation using DASY5 Dielectric Assessment Kit and Agilent Vector Network Analyzer E5071C.

Please Refer to the Appendix B System Performance Check.

Note:
1. The Delta Permittivity% and Delta Conductivity% should be both within ±5% limit of target values.
2. Refer to KDB 865664 D01 v01r04, The depth of body tissue-equivalent liquid in a phantom must be ≥ 15.0 cm with ≤ ± 0.5 cm variation for SAR measurements ≤ 3 GHz and ≥ 10.0 cm with ≤ ± 0.5 cm variation for measurements > 3 GHz.

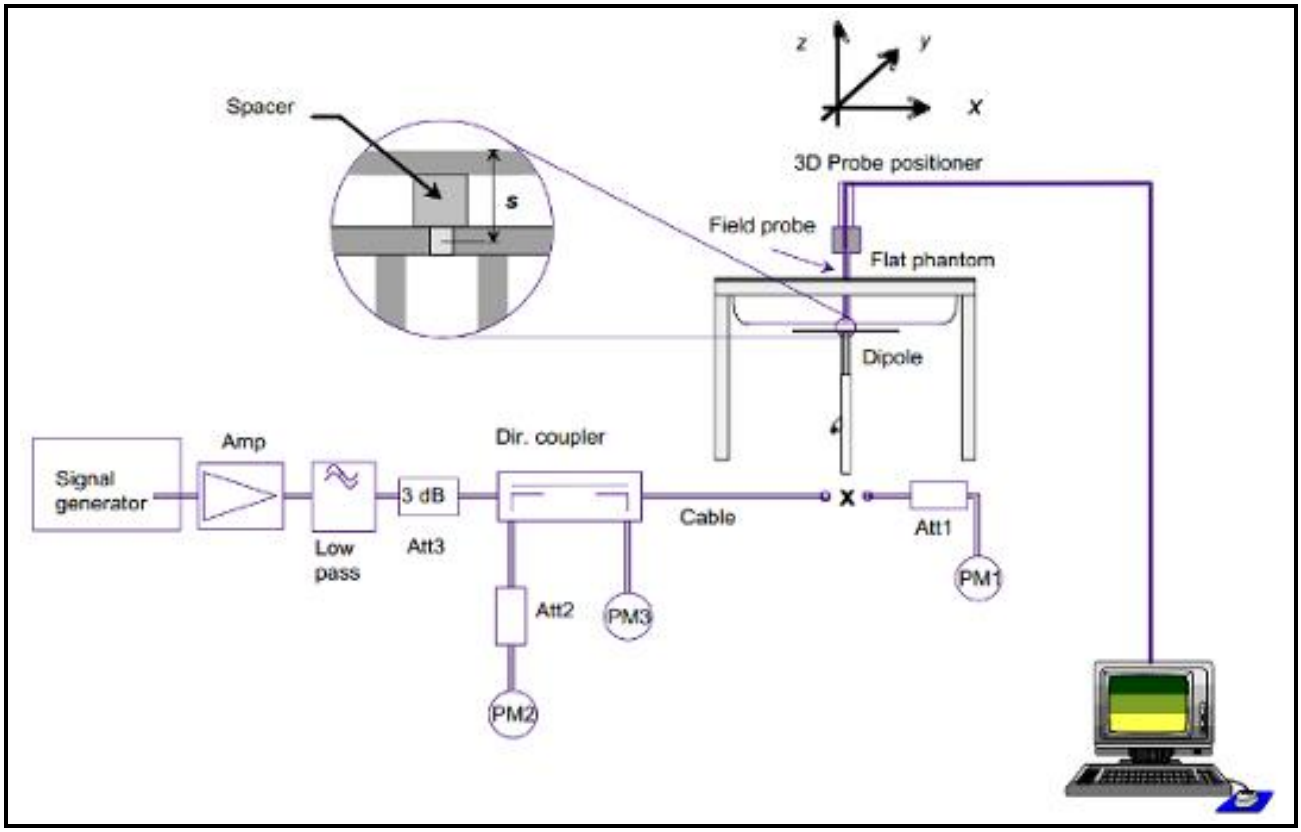
7.1.4 System Performance Check Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and the system performance check. They are read-only document files and destined as fully defined but unmeasured masks, so the finished system performance check must be saved under a different name. The system performance check document requires the SAM Twin Phantom or ELI4 Phantom, so the phantom must be properly installed in your system. (User defined measurement procedures can be created by opening a new document or editing an existing document file). Before you start the system performance check, you need only to tell the system with which components (probe, medium, and device) you are performing the system performance check; the system will take care of all parameters.

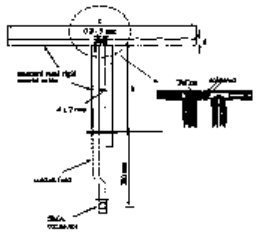
- **The Power Reference Measurement and Power Drift Measurement** jobs are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the Dipole output power. If it is too high (above ±0.2 dB), the system performance check should be repeated;
- **The Surface Check** job tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ±0.1mm). In that case it is better to abort the system performance check and stir the liquid;
- **The Area Scan** job measures the SAR above the dipole on a plane parallel to the surface. It is used to locate the approximate location of the peak SAR. The proposed scan uses large grid spacing for faster measurement; due to the symmetric field, the peak detection is reliable;
- **The Zoom Scan** job measures the field in a volume around the peak SAR value assessed in the previous Area Scan job (for more information see the application note on SAR evaluation).

If the system performance check gives reasonable results. The dipole input power(forward power) was 250mW, 1 g and 10 g spatial average SAR values normalized to 1W dipole input power give reference data for comparisons and it's equal to 10x(dipole forward power). The next sections analyze the expected uncertainties of these values, as well as additional checks for further information or troubleshooting.

7.1.5 System Performance Check Setup



7.1.6 Validation Dipoles

The dipoles use is based on the IEEE Std.1528-2013 and FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 standard, and is complied with mechanical and electrical specifications in line with the requirements of both EN62209-1 and EN62209-2. The table below provides details for the mechanical and electrical specifications for the dipoles.	

7.1.7 Result of System Performance Check: Valid Result

Please Refer to the Appendix B System Performance Check.

8. SAR Measurement Procedure

8.1 Test Procedures

Step 1 Setup a Connection

First, engineer should record the conducted power before the test. Then establish a call in handset at the maximum power level with a base station simulator via air interface, or make the EUT estimate by itself in testing band. Place the EUT to the specific test location. After the testing, must export SAR test data by SEMCAD. Then writing down the conducted power of the EUT into the report, also the SAR values tested.

Step 2 Power Reference Measurements

To measure the local E-field value at a fixed location which value will be taken as a reference value for calculating a possible power drift.

Step 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 locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) 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 KDB 865664 D01v01r04

	≤ 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.	

Step 4 Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose 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 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 v01r04

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

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.

Step 5 Power Drift Measurements

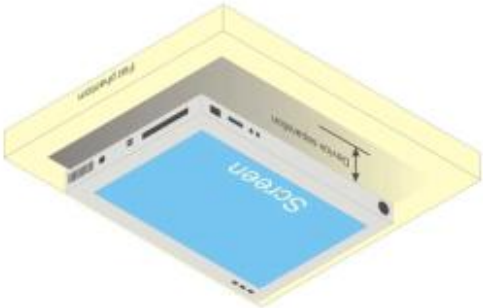
Repetition of the E-field measurement at the fixed location mentioned in Step 1 to make sure the two results differ by less than ± 0.2 dB.

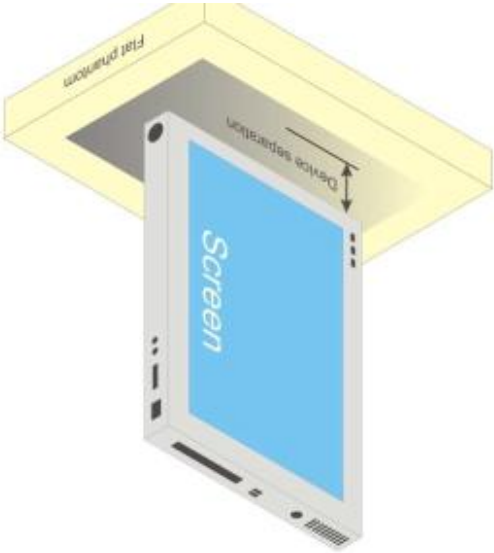
8.2 EUT Testing Position

8.2.1 Testing for Tablet

For full-size tablet, according to KDB 616217 D04, SAR evaluation is required for back surface and edges of the devices. The back surface and edges of the tablet are tested with the tablet touching the phantom. Exposures from antennas through the front surface of the display section of a tablet are generally limited to the user's hands.

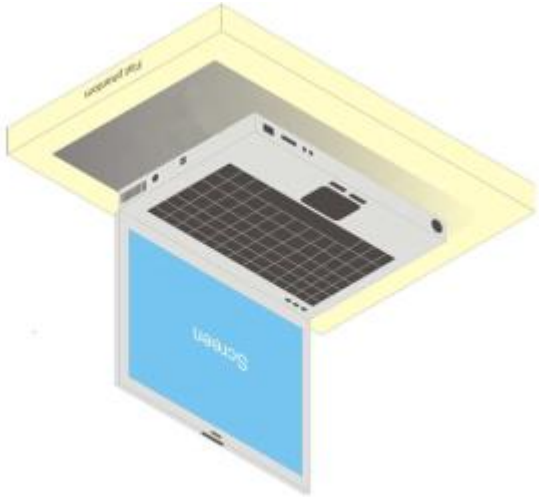
Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.





8.2.2 SAR Testing for Laptop PC

For laptop PC, according to KDB 616217 D04, SAR evaluation is required for the bottom surface of the keyboard. This EUT was tested in the base of EUT directly against the flat phantom. The required minimum test separation distance for incorporating transmitters and antennas into laptop computer display is determined with the display screen opened at an angle of 90° to the keyboard compartment.



8.3 Measurement Evaluation

<WLAN >

Initial Test Configuration

An initial test configuration is determined for OFDM transmission modes in 2.4 GHz and 5 GHz bands according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. 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.

Subsequent Test Configuration

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. Additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. When the highest reported SAR for the initial test configuration according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

SAR Test Configuration and Channel Selection

When multiple channel bandwidth configurations in a frequency band have the same specified maximum output power, the initial test configuration is using largest channel bandwidth, lowest order modulation, lowest data rate, and lowest order 802.11 mode (i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n).After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following.

1) The channel closest to mid-band frequency is selected for SAR measurement.

2) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

Test Reduction for U-NII-1 (5.2 GHz) and U-NII-2A (5.3 GHz) Bands

For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following.

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition).

2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration.

A Wi-Fi device must be 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 for SAR measurement. The test frequencies established using test mode must correspond to the actual channel frequencies. When 802.11 frame gaps are accounted for in the transmission,

a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling.

In addition, a periodic transmission duty factor is required for current generation SAR systems to measure SAR correctly. The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

9. Wi-Fi SAR Exclusion and Results

9.1 Measured Conducted Average Power

Please Refer to the Appendix C Measured Conducted Power.

9.2 Antenna Location

Antenna	Wireless Interface
Ant S1 (Aux)	BT /WLAN 2.4/5
Ant S0 (Main)	WLAN 2.4/5

9.3 SAR Test Results Summary

Please Refer to the Appendix D SAR measurement data.

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 WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor

d. For WLAN/Bluetooth: 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.

WLAN Note:

1. Per KDB248227 D01 v02r02 section 5.2.1 2), when the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.
2. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, 802.11g/n OFDM SAR is not required, per KDB248227 D01 v02r01 section 5.2.2 2).

9.4 SAR Measurement Variability

According to KDB 865664 D01v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. The following procedures are applied to determine if repeated measurements are required:

1. The original highest measured Reported SAR 1-g is ≧ 0.80 W/kg, repeated that measurement once.
2. Perform a second repeated measurement the ratio of the largest to the smallest SAR for the original and first repeated measurements is <1.2 W/kg, or when the original or repeated measurement is ≧ 1.45 W/kg (~10% from the 1-g SAR limit).

Frequency		SAR 1g (W/kg)						
Channel	MHz	Original	First Repeated		Second Repeated		Second Repeated	
		Value	Value	Ratio	Value	Ratio	Value	Ratio
6	2437	1.04	0.973	1.069	N/A	N/A	N/A	N/A
60	5300	1.09	0.977	1.116	N/A	N/A	N/A	N/A

10. Simultaneous Transmission Analysis

1. The reported SAR summation is calculated based on the same configuration and test position.

8. 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.

v) The SPLSR calculated results please refer to section 8.2.

10.1 Simultaneous transmission of MIMO in 802.11 test exclusion considerations

Frequency (GHz)	Test Position (Body)	WLAN Main SAR (W/Kg)	WLAN Aux SAR (W/Kg)	Simultaneous Transmission (W/Kg)	Antenna pair in mm	Peak location separation ratio
2.4	Bottom(NB)	1.04	0.69	1.73	244	0.009
2.4	Front Edge(NB)	1.15	0.61	1.76	244	0.010
5	Bottom(NB)	0.62	0.71	1.33	N/A	N/A
5	Front Edge(NB)	1.14	0.70	1.84	244	0.010

Note :

The sum of value is less than 1.6W/Kg or the ratio is determined by (SAR1 + SAR2)1.5/Ri, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for SAR test exclusion

11. Measurement Uncertainty

DASY6 Uncertainty Budget According to IEEE 1528-2013 and IEC 62209-1528 (2 GHz- 6 GHz range)								
Error Description	**Uncertainty Value (±%)**	**Probability**	**Divisor**	**(Ci) 1g**	**(Ci) 10g**	**Standard Uncertainty (1g) (±%)**	**Standard Uncertainty (10g) (±%)**	**(Vi) Veff**
Measurement System errors								
Probe Calibration	13.10	N	2	1	1	6.6	6.6	∞
Probe Calibration Drift	1.70	N	1.732	1	1	1.0	1.0	∞
Probe Linearity	4.70	R	1.732	1	1	2.7	2.7	∞
Broadband Signal	2.80	N	1.732	1	1	1.6	1.6	∞
Probe Isotropy	7.60	R	1.732	1	1	4.4	4.4	∞
DAE	0.30	N	1	1	1	0.3	0.3	∞
RF Ambient	1.80	N	1	1	1	1.8	1.8	∞
Probe Positioning	0.36	N	1	0.67	0.67	0.2	0.2	∞
Data Processing	2.30	N	1	1	1	2.3	2.3	∞
phantom and device errors								
Conductivity (meas.) DAK	2.50	N	1	0.78	0.71	2.0	1.8	∞
Conductivity (temp.) BB	2.40	R	1.732	0.78	0.71	1.1	1.0	∞
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 Positioning	1.00	N	1	1	1	1.0	1.0	∞
Device Holder	3.60	N	1	1	1	3.6	3.6	∞
DUT Modulation	2.40	R	1.732	1	1	1.4	1.4	∞
Time-average SAR	1.70	R	1.732	1	1	1.0	1.0	∞
DUT drift	2.50	N	1	1	1	2.5	2.5	∞
Correction to the SAR results								
Deviation to Target	1.90	N	1	1	0.84	1.9	1.6	∞
SAR correction	0.00	R	1.732	1	0.84	0.0	0.0	∞
Combined Std. Uncertainty						12.1%	12.0%	
Coverage Factor for 95 %						K=2	K=2	
Expanded STD Uncertainty						24.1%	24.0%	

DASY6 Uncertainty Budget According to IEEE 1528-2013 and IEC 62209-1528 (2 GHz- 6 GHz range)								
Error Description	**Uncertainty Value (±%)**	**Probability**	**Divisor**	**(Ci) 1g**	**(Ci) 10g**	**Standard Uncertainty (1g) (±%)**	**Standard Uncertainty (10g) (±%)**	**(Vi) Veff**
Measurement System errors								
Probe Calibration	13.10	N	2	1	1	6.6	6.6	∞
Probe Calibration Drift	1.70	N	1.732	1	1	1.0	1.0	∞
Probe Linearity	4.70	R	1.732	1	1	2.7	2.7	∞
Broadband Signal	2.80	N	1.732	1	1	1.6	1.6	∞
Probe Isotropy	7.60	R	1.732	1	1	4.4	4.4	∞
DAE	0.30	N	1	1	1	0.3	0.3	∞
RF Ambient	1.80	N	1	1	1	1.8	1.8	∞
Probe Positioning	0.36	N	1	0.67	0.67	0.2	0.2	∞
Data Processing	2.30	N	1	1	1	2.3	2.3	∞
phantom and device errors								
Conductivity (meas.) DAK	2.50	N	1	0.78	0.71	2.0	1.8	∞
Conductivity (temp.) BB	2.40	R	1.732	0.78	0.71	1.1	1.0	∞
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 Positioning	1.00	N	1	1	1	1.0	1.0	∞
Device Holder	3.60	N	1	1	1	3.6	3.6	∞
DUT Modulation	2.40	R	1.732	1	1	1.4	1.4	∞
Time-average SAR	1.70	R	1.732	1	1	1.0	1.0	∞
DUT drift	2.50	N	1	1	1	2.5	2.5	∞
Correction to the SAR results								
Deviation to Target	1.90	N	1	1	0.84	1.9	1.6	∞
SAR correction	0.00	R	1.732	1	0.84	0.0	0.0	∞
Combined Std. Uncertainty						12.1%	12.0%	
Coverage Factor for 95 %						K=2	K=2	
Expanded STD Uncertainty						24.1%	24.0%	

----------THE END OF REPORT----------

Appendix A. DASY Calibration Certificate

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client **Cerpass**
Taoyuan

Certificate No. **EX-3927_Sep25**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3927
Calibration procedure(s)	QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6, QA CAL-25.v8 Calibration procedure for dosimetric E-field probes
Calibration date	September 18, 2025

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Calibration Date (Certificate No.)	Sched. Cal.
Power Sensor R&S NRP-33T	SN: 100967	30-Apr-25 (No. 1020-300791789)	Apr-26
N-type mismatch combination	SN: L1119	26-Mar-25 (No. 217-04292)	Mar-26
OCP DAK-12	SN: 1016	16-Sept-25 (No. OCP-DAK12-1016_Sep25)	Sep-26
OCP DAK-3.5	SN: 1249	16-Sept-25 (No. OCP-DAK3.5-1249_Sep25)	Sep-26
Reference Probe EX3DV4	SN: 7349	10-Jan-25 (No. EX3-7349_Jan25)	Jan-26
DAE4	SN: 1301	07-Nov-24 (No. DAE4-1301_Nov24)	Nov-25

Secondary Standards	ID	Check Date (in house)	Sched. Check
ACAP 2020 Setup 1	SN: L1404	30-Sept-24 (No. Report_ACAP2020E-Cave_20240930s)	Sep-25
OCP DAK-12	SN: 1029	27-Feb-25 (No. OCP-DAK12-1029_Feb25)	Feb-26
OCP DAK-3.5	SN: 1336	09-Dec-24 (No. OCP-DAK3.5-1336_Dec24)	Dec-25

	Name	Function	Signature
Calibrated by	Joanna Lleshaj	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	i.A.

Issued: September 18, 2025

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Glossary

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices – Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ±50 MHz to ±100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Parameters of Probe: EX3DV4 - SN:3927

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k = 2)
Norm (μV/(V/m)^2) [A]	0.60	0.68	0.62	±10.1%
DCP (mV) [B]	103.1	100.0	101.4	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] k = 2
0	Continuous Wave	X	0.00	0.00	1.00	0.00	145.1	±1.5%	±4.7%
		Y	0.00	0.00	1.00		147.1		
		Z	0.00	0.00	1.00		144.5		
10352	Pulse (D=10%, T=5 ms)	X	0.67	64.45	15.60	10.00	24.0	±1.8%	±9.6%
		Y	0.96	64.23	15.65		25.0		
		Z	0.74	63.81	15.54		25.0		
10353	Pulse (D=20%, T=5 ms)	X	0.61	67.46	15.60	6.99	48.0	±1.3%	±9.6%
		Y	0.87	67.24	15.61		49.0		
		Z	0.67	66.82	15.54		49.0		
10354	Pulse (D=40%, T=5 ms)	X	0.55	70.47	15.61	3.98	95.0	±1.2%	±9.6%
		Y	0.78	70.25	15.57		98.0		
		Z	0.60	69.83	15.54		97.0		
10355	Pulse (D=60%, T=5 ms)	X	0.52	72.23	15.61	2.22	142.0	±1.3%	±9.6%
		Y	0.73	72.01	15.54		147.0		
		Z	0.55	71.59	15.53		146.0		
10387	Random (BW=1 MHz, MOD=QPSK)	X	0.58	69.35	15.61	0.00	115.0	±1.8%	±9.6%
		Y	0.86	69.13	15.60		120.0		
		Z	0.66	68.71	15.54		118.0		
10388	Random (BW=10 MHz, MOD=QPSK)	X	1.91	69.24	15.59	0.00	122.0	±1.5%	±9.6%
		Y	2.02	69.02	15.83		128.0		
		Z	1.84	68.60	15.57		126.0		
10396	Random (BW=100 kHz, MOD=64QAM)	X	0.01	85.86	15.66	1.25	83.0	±2.7%	±9.6%
		Y	0.00	67.96	14.24		86.0		
		Z	0.03	50.38	15.40		85.0		
10399	Random (BW=40 MHz, MOD=64QAM)	X	3.06	68.18	15.59	0.00	113.0	±3.4%	±9.6%
		Y	3.04	67.96	15.86		119.0		
		Z	2.88	67.54	15.58		117.0		
10414	Random (BW=40 MHz, HIGH PAR)	X	4.60	65.91	15.59	0.00	91.0	±1.2%	±9.6%
		Y	4.65	65.69	15.86		96.0		
		Z	4.37	65.28	15.58		95.0		

Note: For details on UID parameters see Appendix

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EX3DV4 - SN:3927

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 ms V^{-2}	T2 ms V^{-1}	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
x	32.0	235.56	34.46	8.06	0.00	5.09	0.68	0.27	1.01
y	41.6	307.81	34.84	24.01	0.00	5.10	0.19	0.42	1.01
z	34.5	255.19	34.74	9.70	0.14	5.10	0.74	0.33	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	35.6°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	12 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Note: Measurement distance from surface can be increased to 3–4 mm for an *Area Scan* job.

Parameters of Probe: EX3DV4 - SN:3927

Calibration Parameter Determined in HSL

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc[H] ($k = 2$)
2450	39.2	1.80	7.19	7.02	7.11	0.33	1.27	±11.0%
5250	35.9	4.71	5.62	5.49	5.56	0.30	1.27	±13.1%
5600	35.5	5.07	5.09	4.97	5.04	0.27	1.27	±13.1%
5750	35.4	5.22	5.20	5.08	5.15	0.26	1.27	±13.1%

[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10% if SAR correction is applied.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3–6 GHz at any distance larger than half the probe tip diameter from the boundary.

[H] The stated uncertainty is the total calibration uncertainty ($k = 2$) of Norm·ConvF. This is equivalent to the uncertainty component with the symbol CF in Table 9 of IEC/IEEE 62209-1528:2020.

Parameters of Probe: EX3DV4 - SN:3927

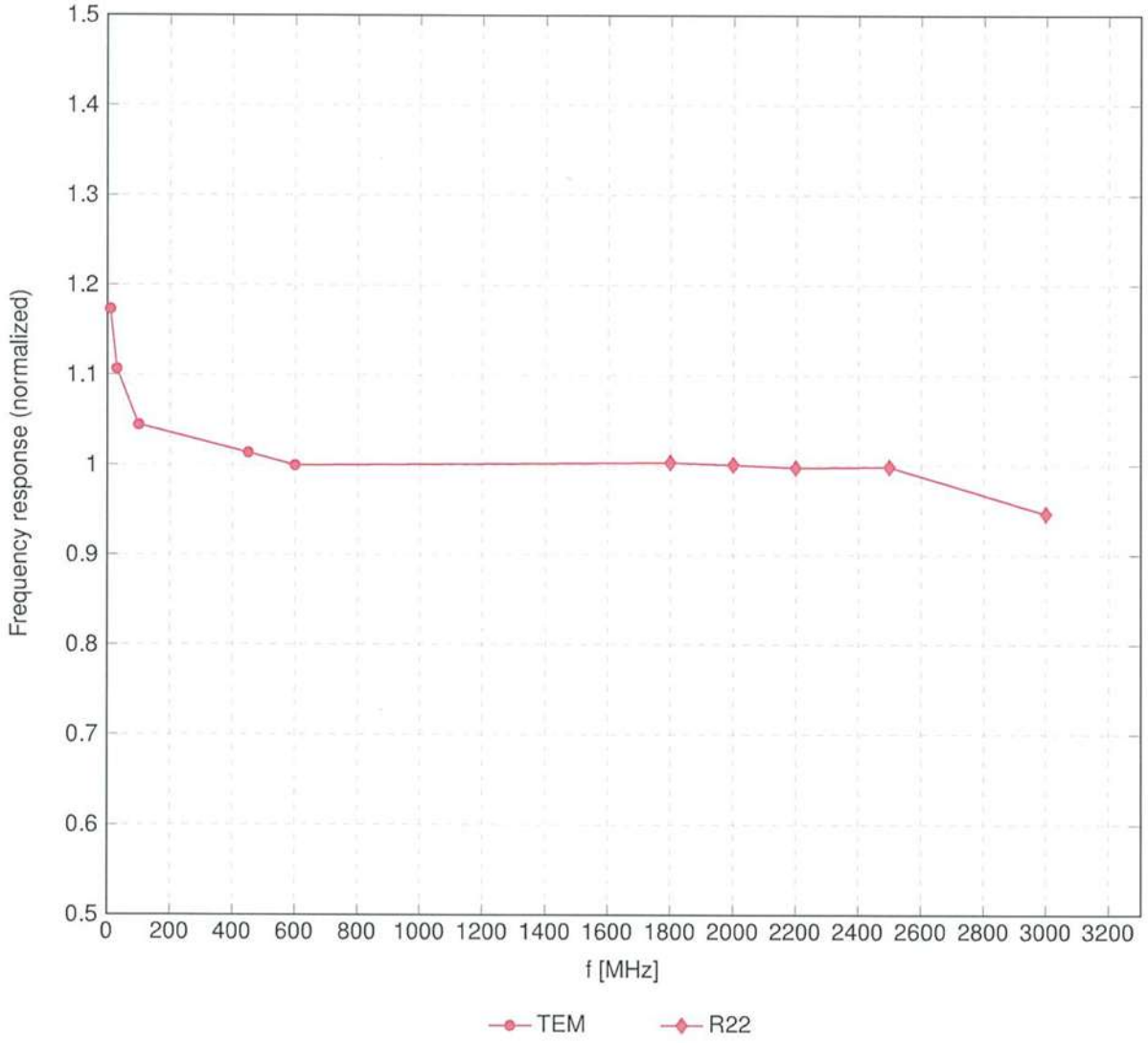
Calibration Parameter Determined in HSL

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc[H] ($k = 2$)
6500	34.5	6.07	5.33	5.21	5.28	0.20	1.27	±18.6%

[C] Frequency validity is −600/+700 MHz at 6.5 GHz, ±700 MHz at or above 7 GHz, and ±150 MHz at 9.85 GHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±10% from the target values (typically better than ±6%) and are valid for TSL with deviations of up to ±10%.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz; below ±2% for frequencies between 3–6 GHz; and below ±4% for frequencies between 6–10 GHz at any distance larger than half the probe tip diameter from the boundary.
[H] The stated uncertainty is the total calibration uncertainty ($k = 2$) of Norm·ConvF. This is equivalent to the uncertainty component with the symbol CF in Table 9 of IEC/IEEE 62209-1528:2020.

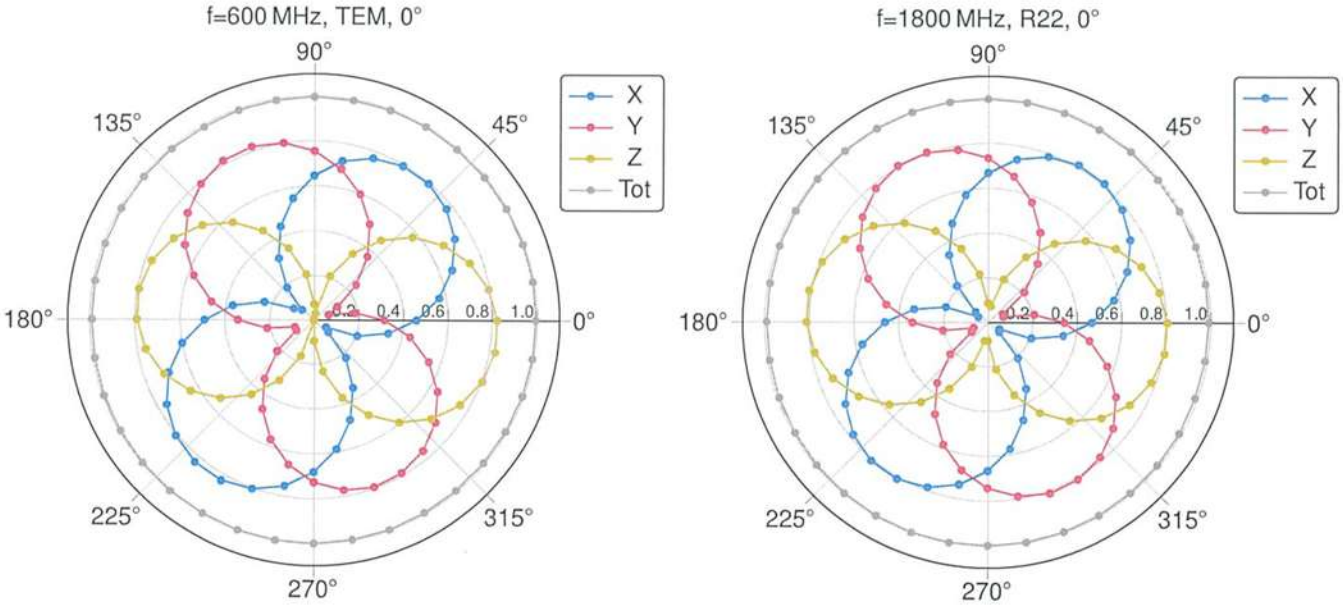
Frequency Response of E-Field

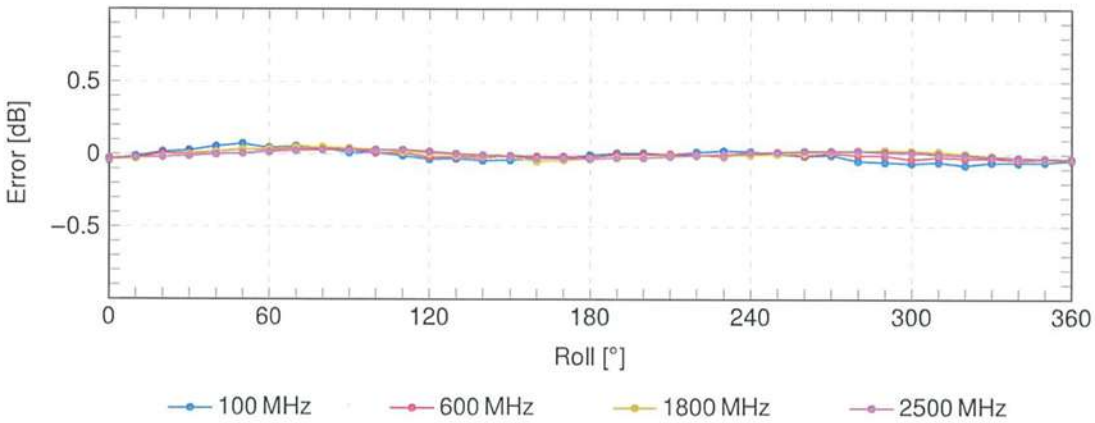
(TEM-Cell:ifi110 EXX, Waveguide:R22)



Uncertainty of Frequency Response of E-field: ±6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0°$

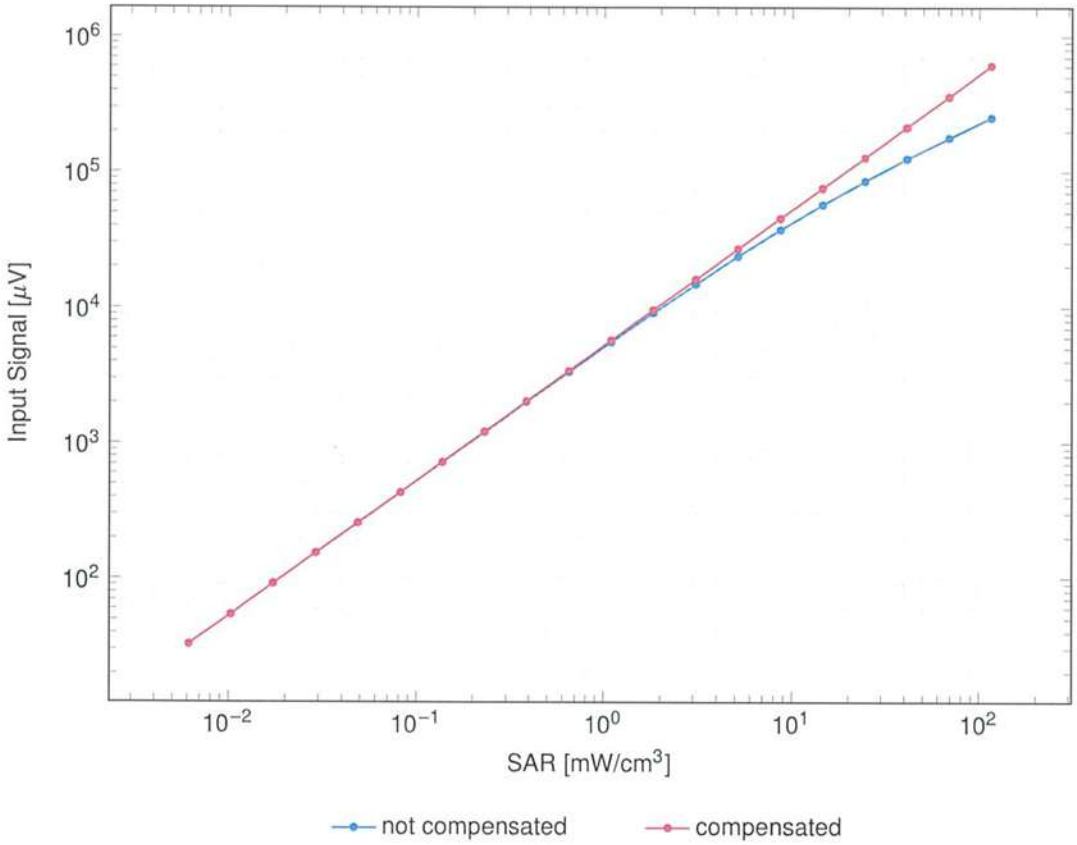


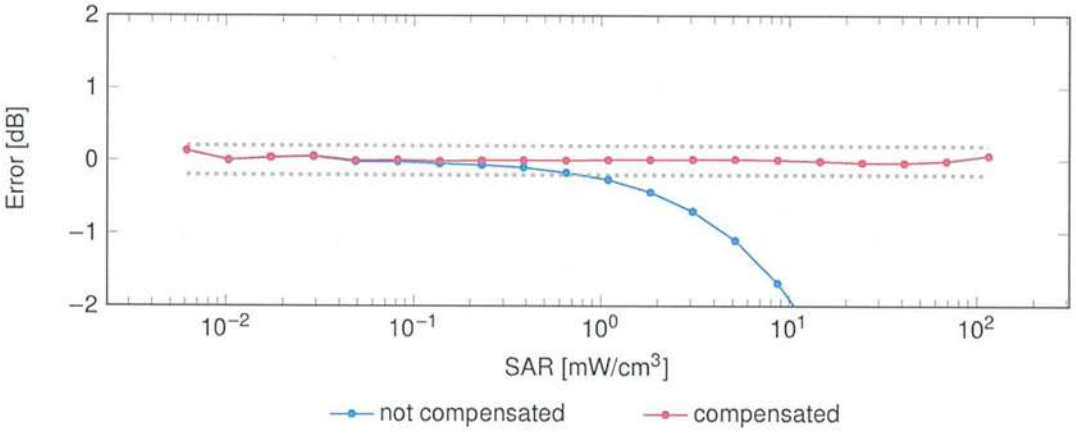


Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

Dynamic Range f(SAR_{HSL})

(TEM cell, f_{eval} = 1900 MHz)





Uncertainty of Linearity Assessment: ±0.6% (k=2)