

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$55.3 \Omega + 1.3 j\Omega$
Return Loss	- 25.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 22.04.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:919

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.87$ S/m; $\epsilon_r = 38$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.96, 7.96, 7.96) @ 2450 MHz; Calibrated: 03.11.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.01.2024
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 119.3 V/m; Power Drift = 0.03 dB

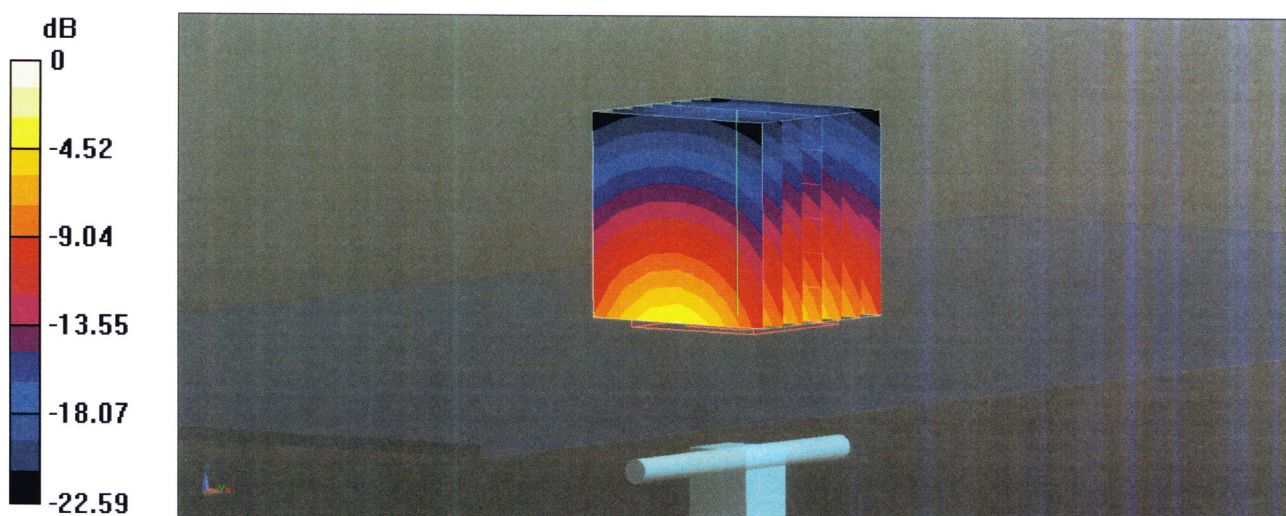
Peak SAR (extrapolated) = 27.2 W/kg

SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.3 W/kg

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

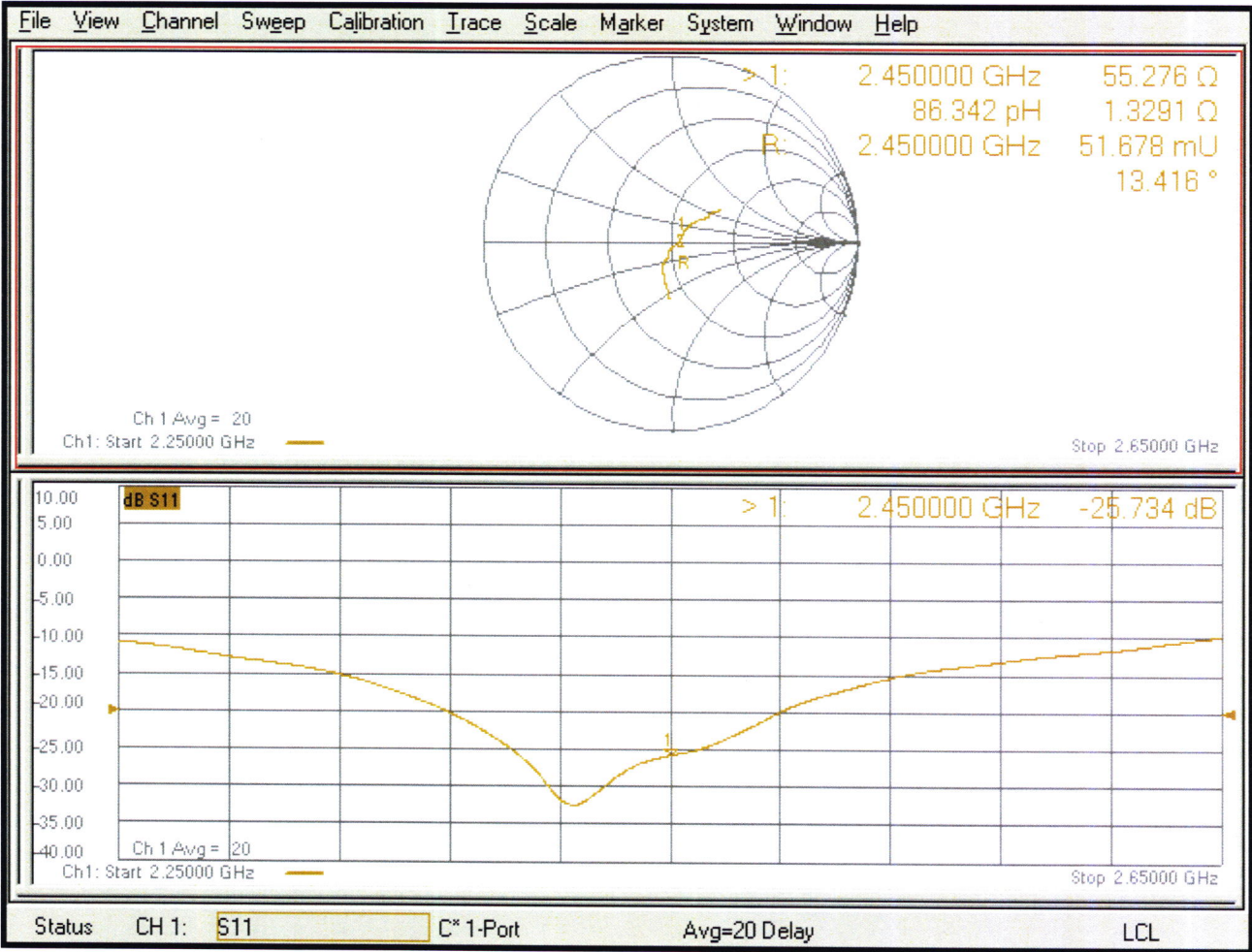
Ratio of SAR at M2 to SAR at M1 = 50.1%

Maximum value of SAR (measured) = 22.4 W/kg



0 dB = 22.4 W/kg = 13.51 dBW/kg

Impedance Measurement Plot for Head TSL





Dipole Internal Calibration Record

Asset No. :	E-434	Model No. :	D2450V2	Serial No. :	919
Environmental	22.5°C, 57 %	Original Cal.Date :	April 22, 2024	Next Cal. Date :	April 22, 2027

Standard List

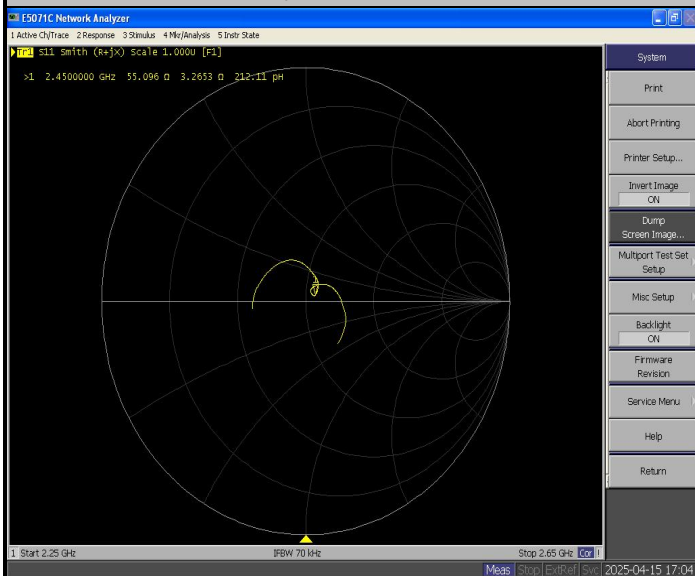
1	IEC/IEEE 62209-1528:2020	Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528:Human Models,Instrumentation And Procedures(Frequency Range of 4 MHz to 10GHz)
2	KDB865664	SAR Measurement Requirements for 100 MHz to 6 GHz

Equipment Information

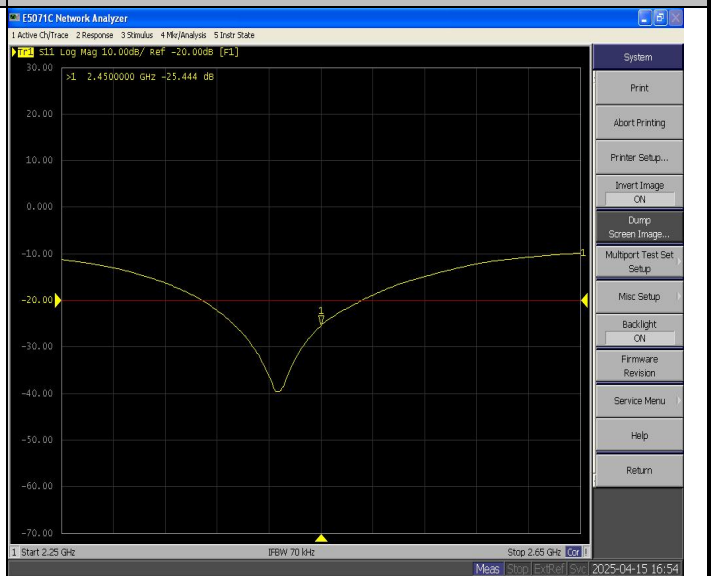
Equipment :	Manufacturer :	Model No. :	Serial No. :	Cal.Organisation :	Cal. Date :
Power Amplifier	Mini-Circuits	ZHL-42W+	QA1333003	N/A	June 29, 2024
DC Source metter	Iteck	IT6154	006104126768201001	N/A	June 29, 2024
Vector Network Analyze	Agilent	E5071C	MY46102965	N/A	January 11, 2025
Signal Generator	Agilent	N5172B	MY53050758	N/A	January 11, 2025
Smart Power Sensor	R&S	NRP18S	101333	N/A	June 1, 2024
Dielectric Assessment	Speag	DAK-3.5	1226	N/A	January 20, 2025
Directional Coupler	Woken	TS-PCC0M-05	0107090019	N/A	January 11, 2025
Coupler	Woken	0110A05601O-10	COM5BNW1A2	N/A	January 12, 2025
Liquid Thermometer	Nscing Es	YZ6021S	/	N/A	November 24, 2024

Model No	For Head Tissue				
D2450V2	Item	Original Cal. Result	Verified on 2025/4/15	Deviation	Result
	Impedance, transformed to feed point	55.3Ω+1.3jΩ	55.09Ω+3.27Ω	<5Ω	Pass
	Return Loss(dB)	-25.7	-25.444	-1.0%	Pass
	SAR Value for 1g(mW/g)	13.6	12.7	-6.6%	Pass
	SAR Value for 10g(mW/g)	6.3	5.97	-5.2%	Pass

Impedance Test-Head



Return Loss-Head



Test Laboratory: BTL Inc.

Date: 2025/4/15

System Check_H2450_0415**DUT: Dipole 2450 MHz D2450V2;SN:919;**

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

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.836$ S/m; $\epsilon_r = 39.639$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C; Liquid Temperature: 22.1°C

DASY Configuration:

- Probe: EX3DV4 - SN3809; ConvF(7.59, 6.97, 6.79)@2450 MHz; Calibrated: 2025/1/24
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1390; Calibrated: 2024/11/14
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1222
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Area Scan (6x7x1): Measurement grid: $dx=15$ mm, $dy=15$ mm

Maximum value of SAR (measured) = 15.6 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 111.4 V/m; Power Drift = -0.04 dB

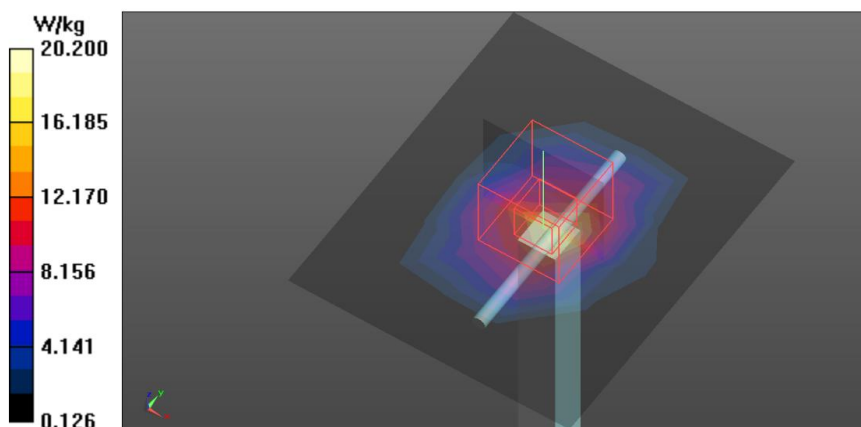
Peak SAR (extrapolated) = 23.9 W/kg

SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.97 W/kg

Smallest distance from peaks to all points 3 dB below = 10.7 mm

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

Maximum value of SAR (measured) = 20.2 W/kg



Calibrator:

Justin Huang

Approver:

Herbert Lin



Dipole Internal Calibration Record

Asset No. :	E-434	Model No. :	D2450V2	Serial No. :	919
Environmental	22.8°C, 55 %	Original Cal.Date :	April 22, 2024	Next Cal. Date :	April 22, 2027

Standard List

1	IEC/IEEE 62209-1528:2020	Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528:Human Models,Instrumentation And Procedures(Frequency Range of 4 MHz to 10GHz)
2	KDB865664	SAR Measurement Requirements for 100 MHz to 6 GHz

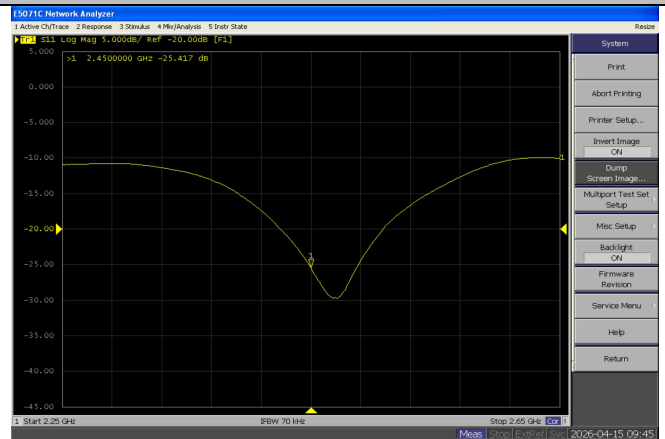
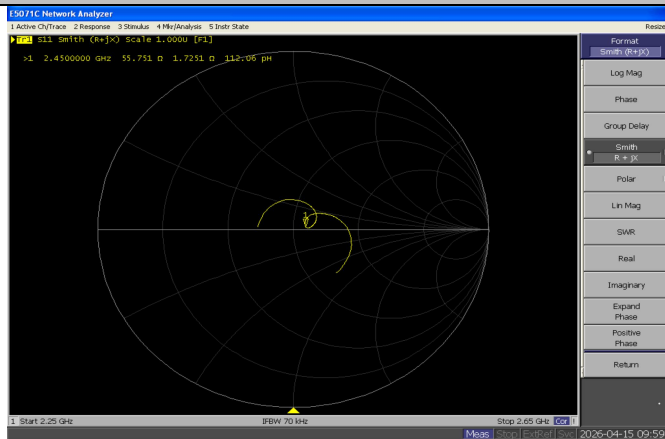
Equipment Information

Equipment :	Manufacturer :	Model No. :	Serial No. :	Cal.Organization :	Cal. Date :
Power Amplifier	Mini-Circuits	ZHL-42W+	QA1333003	N/A	May 29, 2025
DC Source metter	Iteck	IT6154	006104126768201001	N/A	May 29, 2025
Vector Network Analyze	Agilent	E5071C	MY46102965	N/A	December 20, 2025
Signal Generator	Agilent	N5172B	MY53050758	N/A	December 20, 2025
Smart Power Sensor	R&S	NRP18S	101333	N/A	May 29, 2025
Dielectric Assessment	Speag	DAK-3.5	1226	N/A	February 19, 2026
Directional Coupler	Woken	TS-PCC0M-05	0107090019	N/A	December 20, 2025
Coupler	Woken	0110A05601O-10	COM5BNW1A2	N/A	December 20, 2025
Liquid Thermometer	Nscing Es	YZ6021S	/	N/A	November 13, 2025

Model No	For Head Tissue				
D2450V2	Item	Original Cal. Result	Verified on 2026/4/15	Deviation	Result
	Impedance, transformed to feed point	55.3Ω+1.3jΩ	55.8Ω+1.7jΩ	<5Ω	Pass
	Return Loss(dB)	-25.7	-25.4	-1.2%	Pass
	SAR Value for 1g(mW/g)	13.6	12.9	-5.1%	Pass
	SAR Value for 10g(mW/g)	6.3	5.87	-6.8%	Pass

Impedance Test-Head

Return Loss-Head



Test Laboratory: BTL Inc.

Date: 2026/4/15

System Check_H2450_0415**DUT: Dipole 2450 MHz D2450V2; SN:919;**

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

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.824$ S/m; $\epsilon_r = 38.36$; $\rho = 1000$ kg/m³

Ambient Temperature : 22.8 °C; Liquid Temperature : 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3809; ConvF(7.46, 7.46, 7.46) @ 2450 MHz; Calibrated: 2026/3/20
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 1.0, 31.0$
- Electronics: DAE4 Sn1390; Calibrated: 2025/11/19
- Phantom: Twin-SAM V5.0 (30deg probe tilt); Type: QD000P40CB; Serial: TP:1469
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 13.4 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 111.9 V/m; Power Drift = -0.02 dB

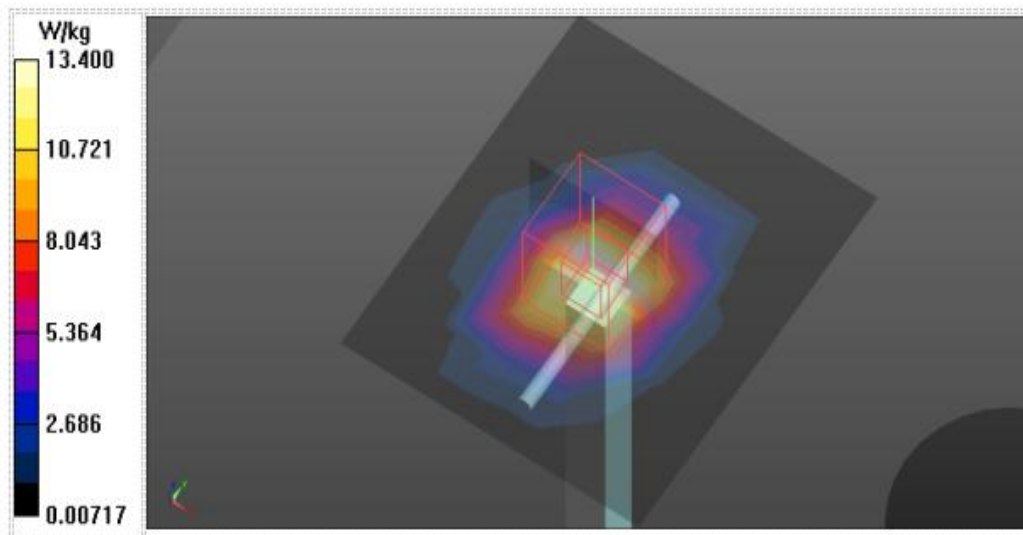
Peak SAR (extrapolated) = 27.1 W/kg

SAR(1 g) = 12.9 W/kg; SAR(10 g) = 5.87 W/kg

Smallest distance from peaks to all points 3 dB below = 9.6 mm

Ratio of SAR at M2 to SAR at M1 = 47%

Maximum value of SAR (measured) = 21.8 W/kg



Calibrator: Dana Chen

Approver:

Herbert Lin