Performance Qualification Report For 900MHz SAR Dipole-1

Equipment Details:

Description: Dipole
Manufacturer: Speag
Model Number: D900V2
Serial Number: 132
Calibration Date: 2024/09/26

Calibration and Checked By:

Bob Lu

Bob Lu

Approved By:

Luke Jiang

Luke Jiang

1. Equipment List & Calibration Information:

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY6 Measurement Server	DASY6 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1724	2024/03/28	2025/03/27
Dosimetric E-field Probes	EX3DV4	7783	2024/04/12	2025/04/11
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Simulated Tissue Liquid Head	HBBL600-10000V6	2200808-2	Each Time	
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Network Analyzer	E5071C	SER MY46519680	2024/05/21	2025/05/20
Network Analyzer Calibration Kit	50Ω	51026	NCR	NCR
MXG Analog Signal Generator	N5181A	MY48180408	2024/01/16	2025/01/15
Microwave peak power sensor	MA24418A	12622	NCR	NCR
USB wideband power sensor	U2021XA	MY52350001	2024/05/21	2025/05/20
20dBAttenuator	N/A	N/A	NCR	NCR
Directional Coupler	855673	3307	NCR	NCR

2.Standard Requirements:

Referring to KDB 865664 D01 3.3.2, for dipole calibration, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements:

1) When the measured SAR does not deviates from the calibrated SAR value by more than 10%.

2) When the most recent return-loss result, measured at least annually, does not deviate by more than 20% from the previous measurement or meeting the required 20 dB minimum return-loss requirement.

3) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, does not deviate by more than 5 Ω from the previous measurement.

3. Environmental Conditions:

TSL Temperature:	19.6 ~ 20.3℃
Ambient Temperature:	21.8 ~ 23℃
Relative Humidity:	49 ~ 63%
ATM Pressure:	101.3 kPa
Test Date:	*2024/09/26*

4. Test Results:

Return Loss &Impedance Measurement Results:

Frequency (MHz)	Simulated Liquid	Parameter	Measured Value	Target Value	Deviation	Reference Range	Results
900	Head	Return Loss	21.803 dB	22.005 dB	-0.92%	±20%;≥20dB	Pass
		Real Impedance	49.421 Ω	47.694 Ω	1.727 Ω	≤5Ω	Pass
		Imaginary Impedance	-8.084 Ω	-7.428 Ω	0.656 Ω	≤5Ω	Pass

Liquid Verification Results:

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
900	Simulated Tissue Liquid Head	39.867	0.975	41.50	0.97	-3.93	0.52	±5

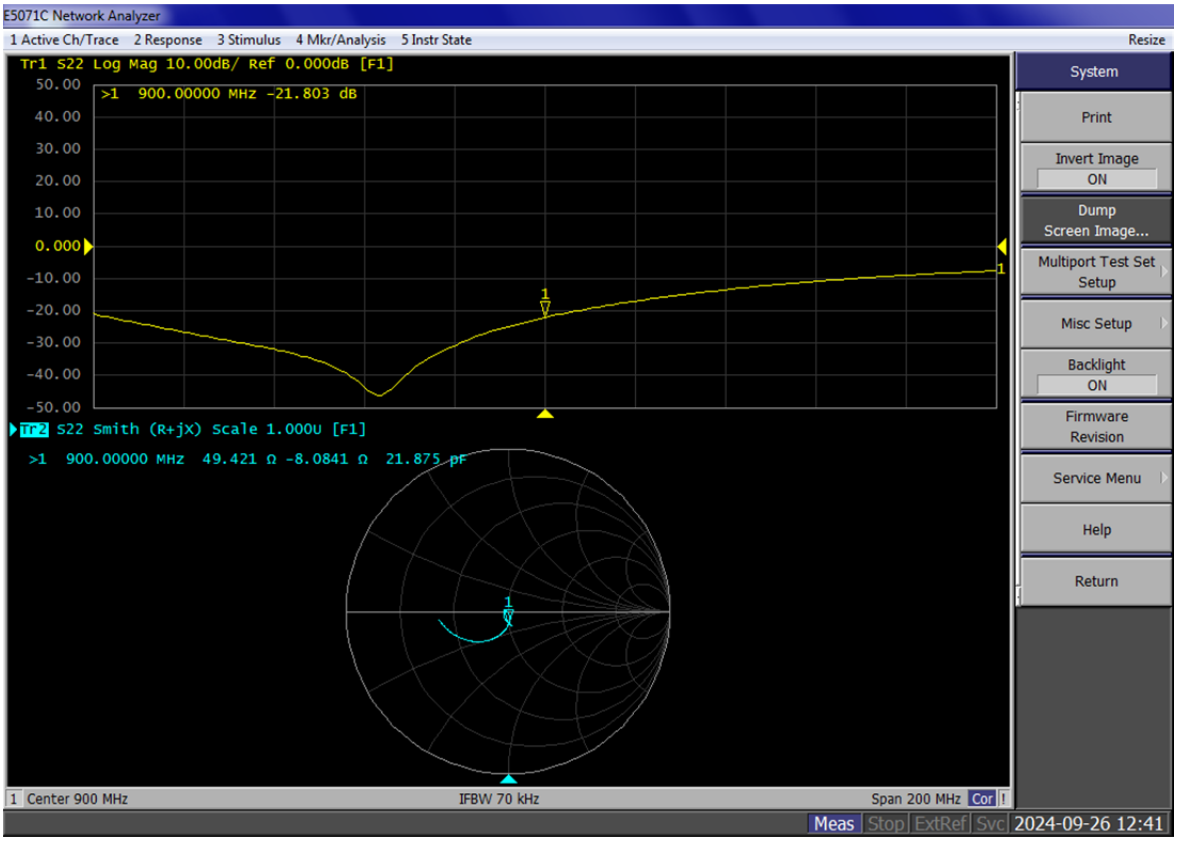
System Accuracy Check Results:

Frequency Band (MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/Kg)	Delta (%)	Tolerance (%)
900	Head	100	1g	1.05	10.5	10.8	-2.778	±10
			10g	0.688	6.88	6.93	-0.722	±10

Note:
1. Return Loss Deviation = (Measured-Target)/Target×100%
2. The target values above please refer to 900MHz dipole calibration certificate (Certificate No .: 23J02Z80061), which was issue by CTTL.

5. Test Plot &System Validation Data：

Dipole, 900MHz, 132



System Performance900 MHz Head

DUT: Dipole 900 MHz; Type: D900V2; Serial: 132

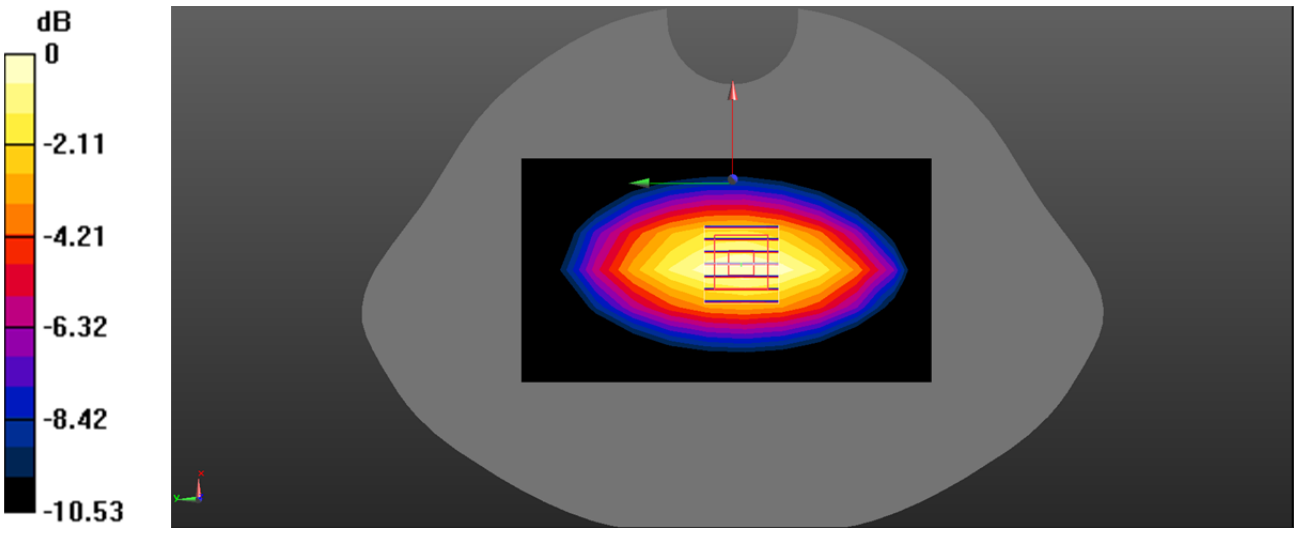
Communication System: UID 0, CW (0); Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.975 S/m; ε_r = 39.867; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7783; ConvF(9.05, 9.05, 9.05) @ 900 MHz;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1724; Calibrated: 3/28/2024
- Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962
- Measurement SW: DASY52, Version 52.10 (2);

Configuration/Head 900MHz Pin=100mW/Area Scan (7x12x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.49 W/kg

Configuration/Head 900MHz Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 35.34 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.66 W/kg
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.688 W/kg
Maximum value of SAR (measured) = 1.44 W/kg



0 dB = 1.44 W/kg = 1.58 dBW/kg

Performance Qualification Report For 1750MHz SAR Dipole-1

Equipment Details:

Description: Dipole
Manufacturer: Speag
Model Number: D1750V2
Serial Number: 1199
Calibration Date: 2024/03/27

Calibration and Checked By: Bob Lu

Approved By: Luke Jiang

1. Equipment List & Calibration Information:

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY6 Measurement Server	DASY6 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1325	2023/09/27	2024/09/26
E-Field Probe	EX3DV4	7382	2023/09/27	2024/09/26
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Simulated Tissue Liquid Head	HBBL600-10000V6	2200808-2	Each Time	
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Network Analyzer	E5071C	SER MY46519680	2023/06/08	2024/06/07
Network Analyzer Calibration Kit	50Ω	51026	NCR	NCR
MXG Analog Signal Generator	N5181A	MY48180408	2024/01/16	2025/01/15
Microwave peak power sensor	MA24418A	12622	NCR	NCR
USB wideband power sensor	U2021XA	MY52350001	2023/06/08	2024/06/07
20dBAttenuator	N/A	N/A	NCR	NCR
Directional Coupler	855673	3307	NCR	NCR

2. Standard Requirements:

Referring to KDB 865664 D01 3.3.2, for dipole calibration, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements:

1) When the measured SAR does not deviates from the calibrated SAR value by more than 10%.

2) When the most recent return-loss result, measured at least annually, does not deviate by more than 20% from the previous measurement or meeting the required 20 dB minimum return-loss requirement.

3) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, does not deviate by more than 5 Ω from the previous measurement.

3. Environmental Conditions:

TSL Temperature:	18.7 ~ 19.6℃
Ambient Temperature:	21 ~ 22.7℃
Relative Humidity:	43 ~ 48%
ATM Pressure:	101.3 kPa
Test Date:	*2024/03/27*

4. Test Results:

Return Loss &Impedance Measurement Results:

Frequency (MHz)	Simulated Liquid	Parameter	Measured Value	Target Value	Deviation	Reference Range	Results
1750	Head	Return Loss	26.929 dB	26.017 dB	3.505%	±20%;≥20dB	Pass
		Real Impedance	45.532 Ω	46.939 Ω	1.407 Ω	≤5Ω	Pass
		Imaginary Impedance	-1.154 Ω	3.765 Ω	4.919 Ω	≤5Ω	Pass

Liquid Verification Results:

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
1750	Simulated Tissue Liquid Head	40.441	1.329	40.07	1.37	0.93	-2.99	±5

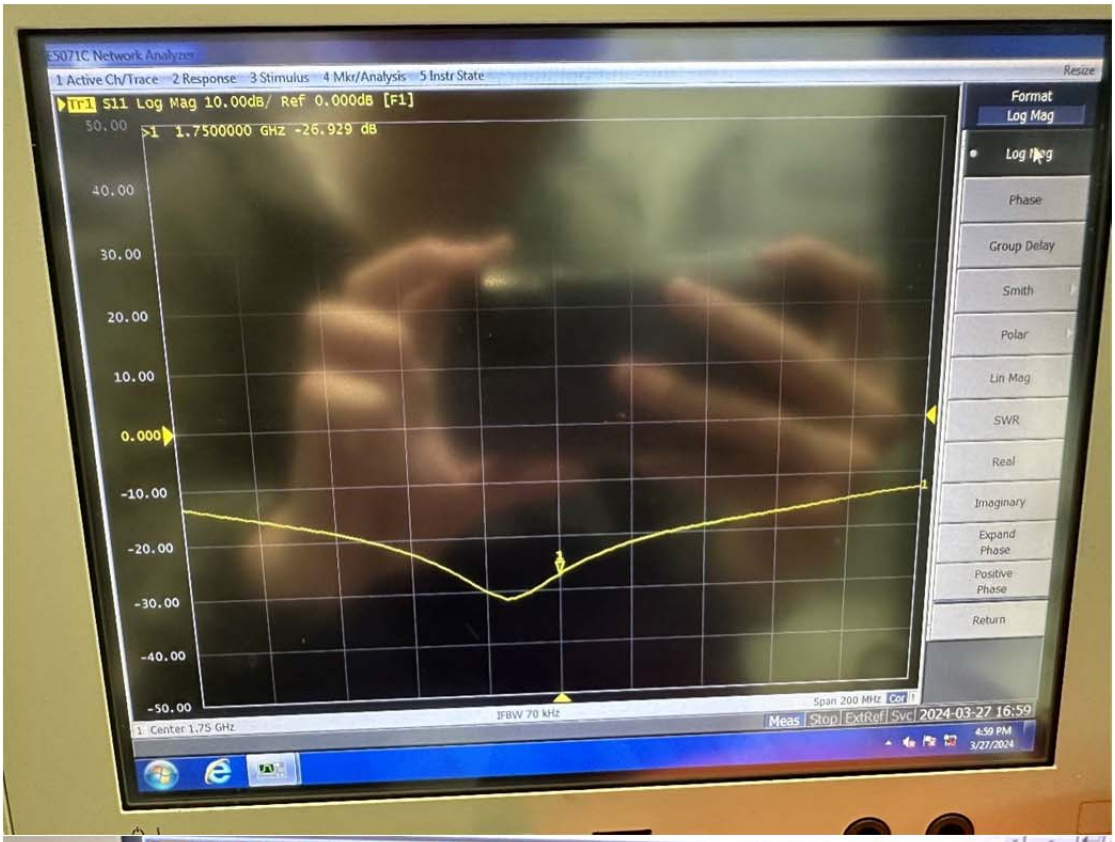
System Accuracy Check Results:

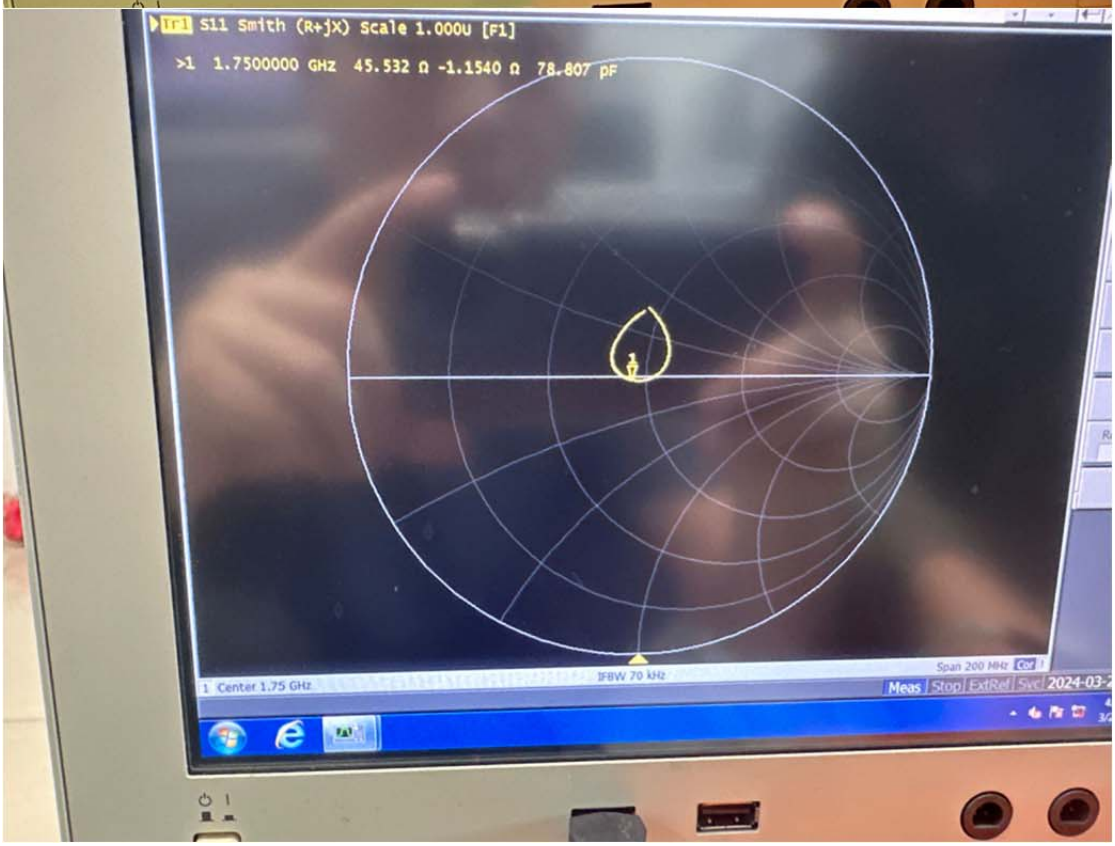
Frequency Band (MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/Kg)	Delta (%)	Tolerance (%)
1750	Head	100	1g	3.73	37.3	36.0	3.611	±10
			10g	2.01	20.1	18.9	6.349	±10

Note:
1. Return Loss Deviation = (Measured-Target)/Target×100%
2. The target values above please refer to 1750MHz dipole calibration certificate (Certificate No .: D1750V2-1199_Mar23), which was issue by SPEAG.

5. Test Plot & SystemValidation Data：

Dipole, 1750MHz, 1199





System Performance1750 MHz Head

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1199

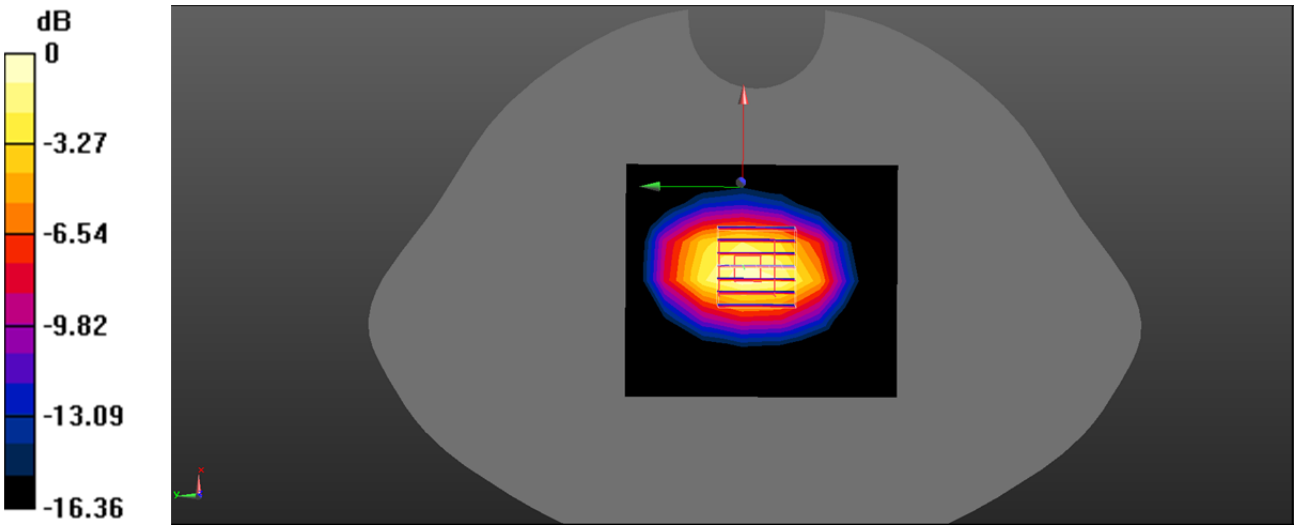
Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.329 S/m; ε_r = 40.441; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7382; ConvF(8.6, 8.6, 8.6) @ 1750 MHz;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1325; Calibrated: 9/27/2023
- Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962
- Measurement SW: DASY52, Version 52.10 (2);

Configuration/Head 1750MHz Pin=100mW/Area Scan (7x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.85 W/kg

Configuration/Head 1750MHz Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.72 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 6.36 W/kg
SAR(1 g) = 3.73 W/kg; SAR(10 g) = 2.01 W/kg
Maximum value of SAR (measured) = 4.10 W/kg



0 dB = 4.10 W/kg = 6.13 dBW/kg

Performance Qualification Report For 1750MHz SAR Dipole-2

Equipment Details:

Description: Dipole
Manufacturer: Speag
Model Number: D1750V2
Serial Number: 1199
Calibration Date: 2025/03/26

Calibration and Checked By: Bob Lu

Approved By: Luke Jiang

1. Equipment List & Calibration Information:

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY6 Measurement Server	DASY6 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1325	2024/10/08	2025/10/07
Dosimetric E-field Probes	EX3DV4	7896	2024/11/07	2025/11/06
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Simulated Tissue Liquid Head	HBBL600-10000V6	2200808-2	Each Time	
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Network Analyzer	E5071C	SER MY46519680	2024/05/21	2025/05/20
Network Analyzer Calibration Kit	50Ω	51026	NCR	NCR
MXG Analog Signal Generator	N5181A	MY48180408	2024/12/04	2025/12/03
Microwave peak power sensor	MA24418A	12622	NCR	NCR
USB wideband power sensor	U2021XA	MY52350001	2024/05/21	2025/05/20
20dBAttenuator	N/A	N/A	NCR	NCR
Directional Coupler	855673	3307	NCR	NCR

2. Standard Requirements:

Referring to KDB 865664 D01 3.3.2, for dipole calibration, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements:

1) When the measured SAR does not deviates from the calibrated SAR value by more than 10%.

2) When the most recent return-loss result, measured at least annually, does not deviate by more than 20% from the previous measurement or meeting the required 20 dB minimum return-loss requirement.

3) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, does not deviate by more than 5 Ω from the previous measurement.

3. Environmental Conditions:

TSL Temperature:	18.2 ~ 19.6℃
Ambient Temperature:	18.8 ~ 20.7℃
Relative Humidity:	50 ~ 63%
ATM Pressure:	98.1 kPa
Test Date:	*2025/03/26*

4. Test Results:

Return Loss & Impedance Measurement Results:

Frequency (MHz)	Simulated Liquid	Parameter	Measured Value	Target Value	Deviation	Reference Range	Results
1750	Head	Return Loss	26.228 dB	26.017 dB	0.811 %	±20%;≥20dB	Pass
		Real Impedance	46.595 Ω	46.939 Ω	0.344 Ω	≤5Ω	Pass
		Imaginary Impedance	3.267 Ω	3.765 Ω	0.498 Ω	≤5Ω	Pass

Liquid Verification Results:

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
1750	Simulated Tissue Liquid Head	39.304	1.345	40.07	1.37	-1.91	-1.82	±5

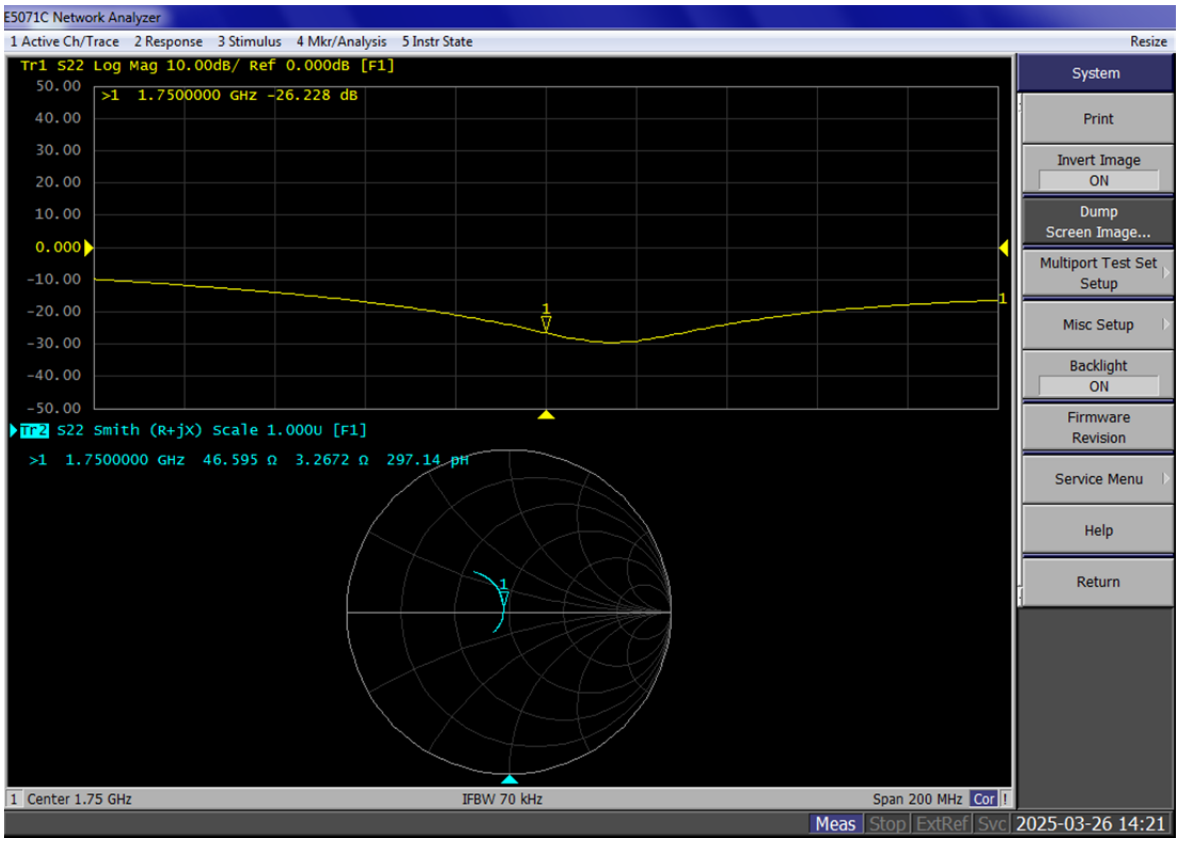
System Accuracy Check Results:

Frequency Band (MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/Kg)	Delta (%)	Tolerance (%)
1750	Head	100	1g	3.34	33.4	36.0	-7.222	±10
			10g	1.90	19.0	18.9	0.529	±10

Note:
1. Return Loss Deviation = (Measured-Target)/Target×100%
2. The target values above please refer to 1750MHz dipole calibration certificate (Certificate No .: D1750V2-1199_Mar23), which was issue by SPEAG.

5. Test Plot & SystemValidation Data：

Dipole, 1750MHz, 1199



System Performance1750 MHz Head

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1199

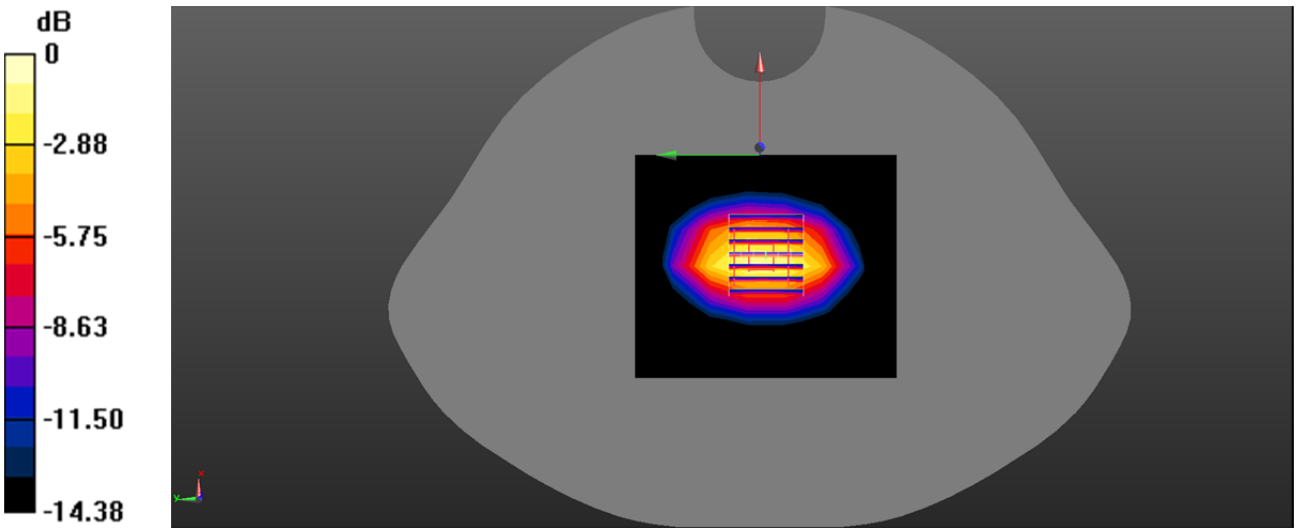
Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.345 S/m; ε_r = 39.304; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7896; ConvF(7.2, 7.55, 7.56) @ 1750 MHz;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1325; Calibrated: 10/8/2024
- Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962
- Measurement SW: DASY52, Version 52.10 (2);

Configuration/Head 1750MHz Pin=100mW/Area Scan (7x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 4.21 W/kg

Configuration/Head 1750MHz Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.96 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 5.38 W/kg
SAR(1 g) = 3.34 W/kg; SAR(10 g) = 1.9 W/kg
Maximum value of SAR (measured) = 4.75 W/kg



0 dB = 4.75 W/kg = 6.77 dBW/kg

Performance Qualification Report For 1900MHz SAR Dipole-1

Equipment Details:

Description: Dipole
Manufacturer: Speag
Model Number: D1900V2
Serial Number: 5d231
Calibration Date: 2024/02/01

Calibration and Checked By: Bob Lu

Approved By: Luke Jiang

1. Equipment List & Calibration Information:

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY6 Measurement Server	DASY6 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1325	2023/09/27	2024/09/26
E-Field Probe	EX3DV4	7382	2023/09/27	2024/09/26
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Simulated Tissue Liquid Head	HBBL600-10000V6	2200808-2	Each Time	
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Network Analyzer	E5071C	SER MY46519680	2023/06/08	2024/06/07
Network Analyzer Calibration Kit	50Ω	51026	NCR	NCR
MXG Analog Signal Generator	N5181A	MY48180408	2024/01/16	2025/01/15
Microwave peak power sensor	MA24418A	12622	NCR	NCR
USB wideband power sensor	U2021XA	MY52350001	2023/06/08	2024/06/07
20dBAttenuator	N/A	N/A	NCR	NCR
Directional Coupler	855673	3307	NCR	NCR

2. Standard Requirements:

Referring to KDB 865664 D01 3.3.2, for dipole calibration, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements:

1) When the measured SAR does not deviates from the calibrated SAR value by more than 10%.

2) When the most recent return-loss result, measured at least annually, does not deviate by more than 20% from the previous measurement or meeting the required 20 dB minimum return-loss requirement.

3) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, does not deviate by more than 5 Ω from the previous measurement.

3. Environmental Conditions:

TSL Temperature:	20.1 ~ 21.2℃
Ambient Temperature:	22.2 ~ 23.1℃
Relative Humidity:	58 ~ 68%
ATM Pressure:	101.3kPa
Test Date:	*2024/02/01*

4. Test Results:

Return Loss & Impedance Measurement Results:

Frequency (MHz)	Simulated Liquid	Parameter	Measured Value	Target Value	Deviation	Reference Range	Results
1900	Head	Return Loss	27.268 dB	26.067dB	4.607 %	±20%;≥20dB	Pass
		Real Impedance	52.799 Ω	50.307 Ω	2.492 Ω	≤5Ω	Pass
		Imaginary Impedance	3.453 Ω	4.985 Ω	-1.532 Ω	≤5Ω	Pass

Liquid Verification Results:

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
1900	Simulated Tissue Liquid Head	38.750	1.372	40.00	1.40	-3.13	-2.00	±5

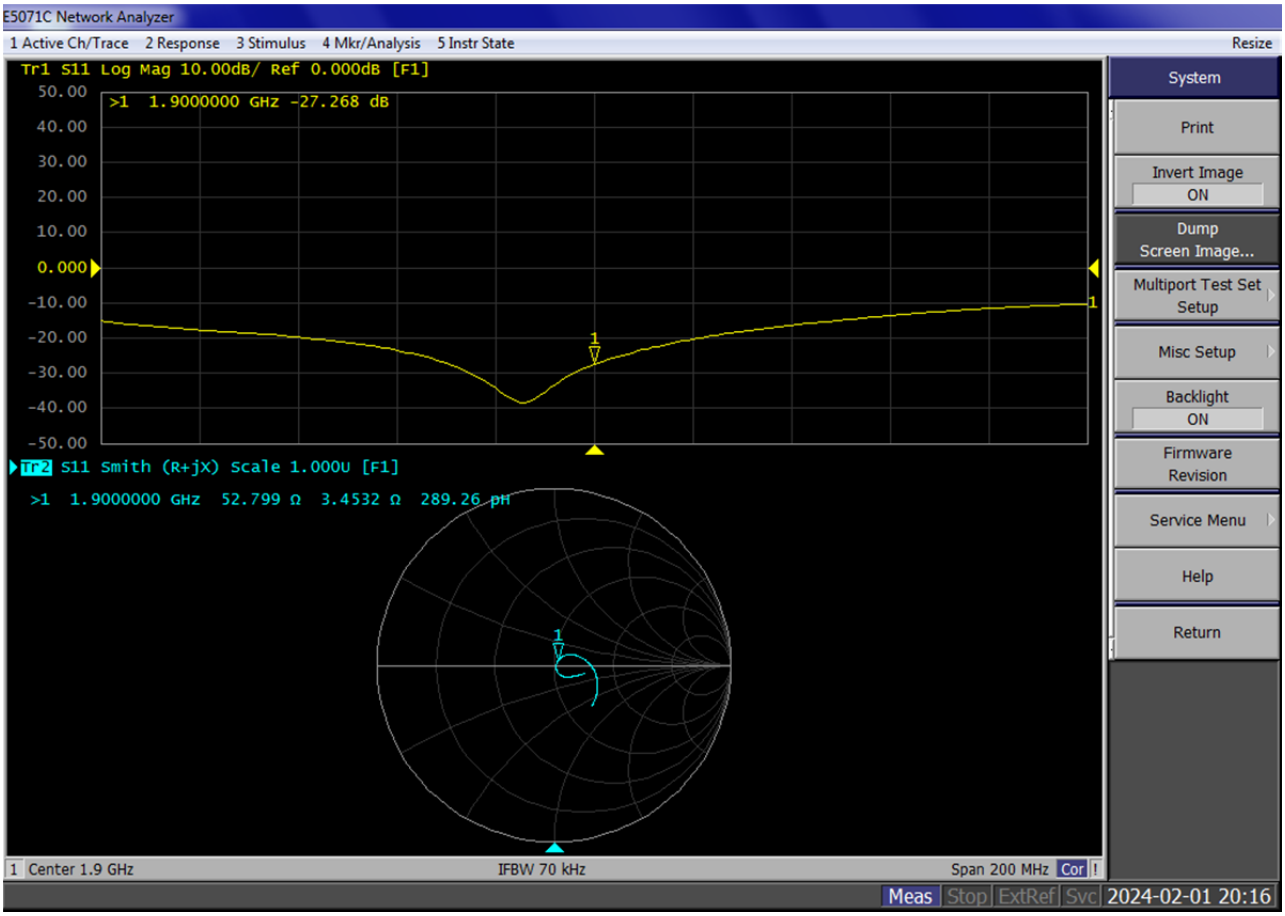
System Accuracy Check Results:

Frequency Band (MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/Kg)	Delta (%)	Tolerance (%)
1900	Head	100	1g	3.73	37.3	39.9	-6.516	±10
			10g	1.96	19.6	20.8	-5.769	±10

Note:
1. Return Loss Deviation = (Measured-Target)/Target×100%
2. The target values above please refer to 1900MHz dipole calibration certificate (Certificate No .: Z23-60084), which was issue by CTTL.

5. Test Plot &SystemValidation Data：

Dipole, 1900MHz, 5d231



System Performance1900 MHz Head

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d231

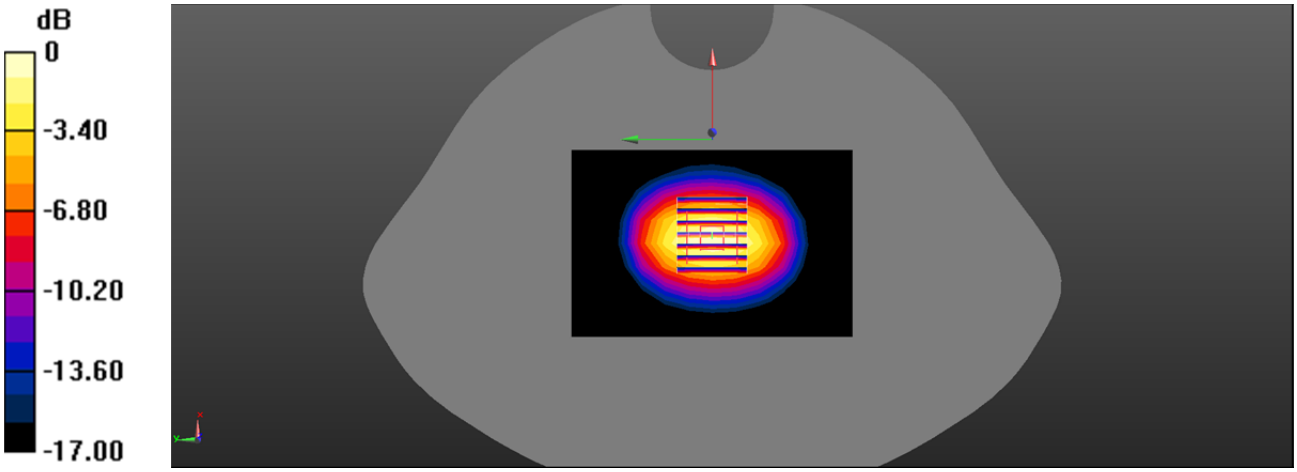
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.372 S/m; ε_r = 38.75; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7382; ConvF(8.3, 8.3, 8.3) @ 1900 MHz;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1325; Calibrated: 9/27/2023
- Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962
- Measurement SW: DASY52, Version 52.10 (2);

Configuration/Head 1900MHz Pin=100mW/Area Scan (9x13x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 4.21 W/kg

Configuration/Head 1900MHz Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.38 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 6.87 W/kg
SAR(1 g) = 3.73 W/kg; SAR(10 g) = 1.96 W/kg
Maximum value of SAR (measured) = 4.17 W/kg



0 dB = 4.17 W/kg = 6.20 dBW/kg

Performance Qualification Report For 1900MHz SAR Dipole-2

Equipment Details:

Description: Dipole
Manufacturer: Speag
Model Number: D1900V2
Serial Number: 5d231
Calibration Date: 2025/02/05

Calibration and Checked By: Bob Lu

Approved By: Luke Jiang

1. Equipment List & Calibration Information:

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY6 Measurement Server	DASY6 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1325	2024/10/08	2025/10/07
Dosimetric E-field Probes	EX3DV4	7896	2024/11/07	2025/11/06
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Simulated Tissue Liquid Head	HBBL600-10000V6	2200808-2	Each Time	
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Network Analyzer	E5071C	SER MY46519680	2024/05/21	2025/05/20
Network Analyzer Calibration Kit	50Ω	51026	NCR	NCR
MXG Analog Signal Generator	N5181A	MY48180408	2024/12/04	2025/12/03
Microwave peak power sensor	MA24418A	12622	NCR	NCR
USB wideband power sensor	U2021XA	MY52350001	2024/05/21	2025/05/20
20dBAttenuator	N/A	N/A	NCR	NCR
Directional Coupler	855673	3307	NCR	NCR

2. Standard Requirements:

Referring to KDB 865664 D01 3.3.2, for dipole calibration, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements:

1) When the measured SAR does not deviates from the calibrated SAR value by more than 10%.

2) When the most recent return-loss result, measured at least annually, does not deviate by more than 20% from the previous measurement or meeting the required 20 dB minimum return-loss requirement.

3) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, does not deviate by more than 5 Ω from the previous measurement.

3. Environmental Conditions:

TSL Temperature:	20.2 ~ 20.8℃
Ambient Temperature:	22.8 ~ 23.5℃
Relative Humidity:	41 ~ 46%
ATM Pressure:	101.1 kPa
Test Date:	*2025/02/05*

4. Test Results:

Return Loss & Impedance Measurement Results:

Frequency (MHz)	Simulated Liquid	Parameter	Measured Value	Target Value	Deviation	Reference Range	Results
1900	Head	Return Loss	26.141 dB	26.067dB	0.284 %	±20%;≥20dB	Pass
		Real Impedance	54.759 Ω	50.307 Ω	4.452 Ω	≤5Ω	Pass
		Imaginary Impedance	2.011 Ω	4.985 Ω	-2.974 Ω	≤5Ω	Pass

Liquid Verification Results:

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
1900	Simulated Tissue Liquid Head	40.296	1.364	40.00	1.40	0.74	-2.57	±5

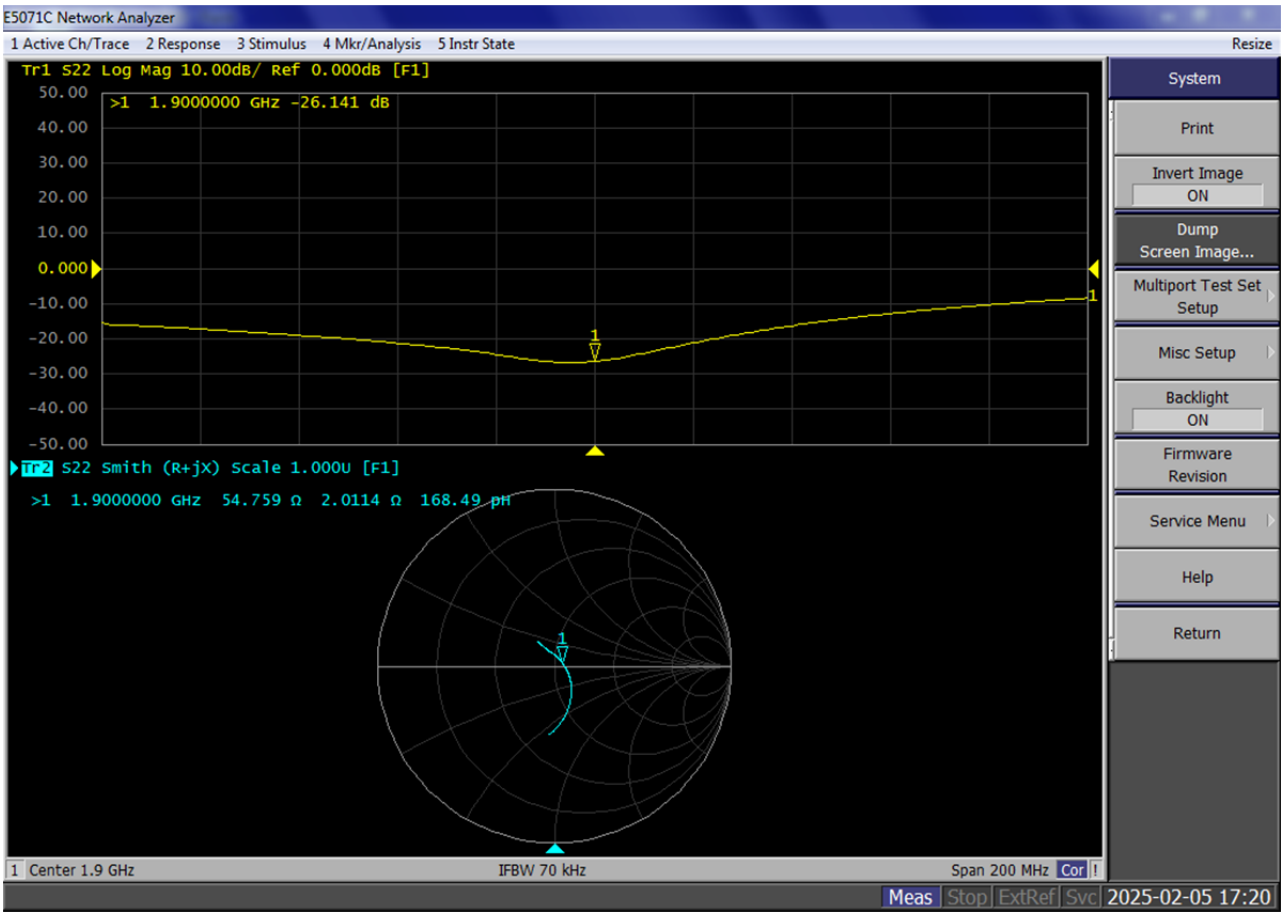
System Accuracy Check Results:

Frequency Band (MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/Kg)	Delta (%)	Tolerance (%)
1900	Head	100	1g	4.10	41.0	39.9	2.757	±10
			10g	2.22	22.2	20.8	6.731	±10

Note:
1. Return Loss Deviation = (Measured-Target)/Target×100%
2. The target values above please refer to 1900MHz dipole calibration certificate (Certificate No .: Z23-60084), which was issue by CTTL.

5. Test Plot & SystemValidation Data：

Dipole, 1900MHz, 5d231



System Performance1900 MHz Head

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d231

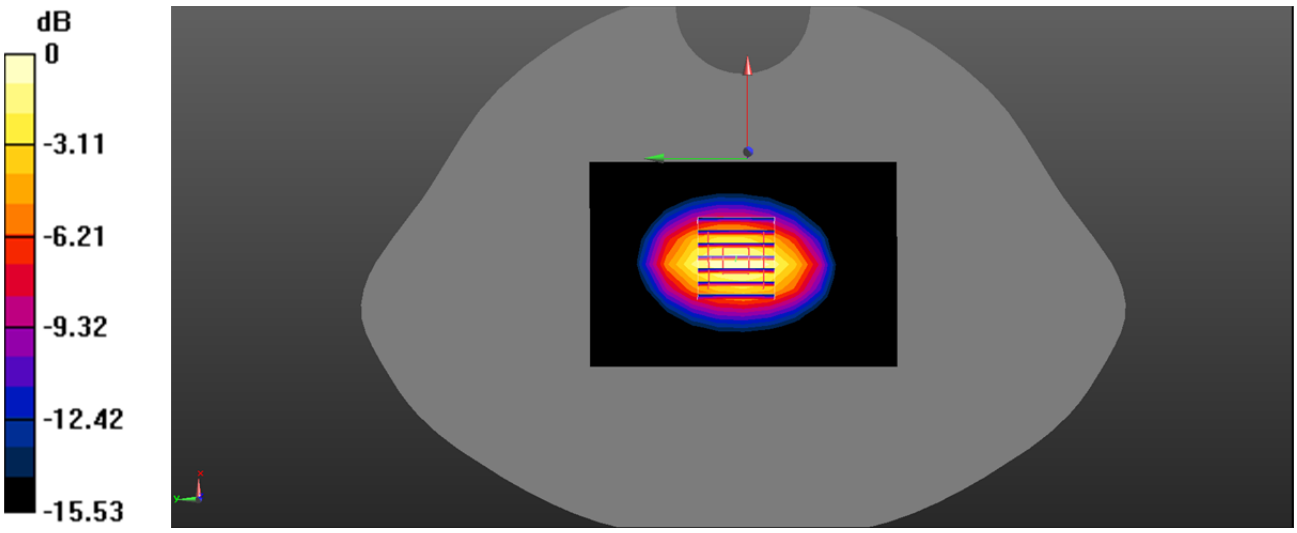
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.364 S/m; ε_r = 40.296; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7896; ConvF(6.96, 7.29, 7.3) @ 1900 MHz;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1325; Calibrated: 10/8/2024
- Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962
- Measurement SW: DASY52, Version 52.10 (2);

Configuration/Head 1900MHz Pin=100mW/Area Scan (9x13x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.23 W/kg

Configuration/Head 1900MHz Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.69 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 6.90 W/kg
SAR(1 g) = 4.1 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 6.01 W/kg



0 dB = 6.01 W/kg = 7.79 dBW/kg

Performance Qualification Report For 2600MHz SAR Dipole-1

Equipment Details:

Description: Dipole
Manufacturer: Speag
Model Number: D2600V2
Serial Number: 1207
Calibration Date: 2024/03/27

Calibration and Checked By: Bob Lu

Approved By: Luke Jiang

1. Equipment List & Calibration Information:

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY6 Measurement Server	DASY6 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1325	2023/09/27	2024/09/26
E-Field Probe	EX3DV4	7382	2023/09/27	2024/09/26
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Simulated Tissue Liquid Head	HBBL600-10000V6	2200808-2	Each Time	
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Network Analyzer	E5071C	SER MY46519680	2023/06/08	2024/06/07
Network Analyzer Calibration Kit	50Ω	51026	NCR	NCR
MXG Analog Signal Generator	N5181A	MY48180408	2024/01/16	2025/01/15
Microwave peak power sensor	MA24418A	12622	NCR	NCR
USB wideband power sensor	U2021XA	MY52350001	2023/06/08	2024/06/07
20dBAttenuator	N/A	N/A	NCR	NCR
Directional Coupler	855673	3307	NCR	NCR

2. Standard Requirements:

Referring to KDB 865664 D01 3.3.2, for dipole calibration, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements:

1) When the measured SAR does not deviates from the calibrated SAR value by more than 10%.

2) When the most recent return-loss result, measured at least annually, does not deviate by more than 20% from the previous measurement or meeting the required 20 dB minimum return-loss requirement.

3) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, does not deviate by more than 5 Ω from the previous measurement.

3. Environmental Conditions:

TSL Temperature:	18.7 ~ 19.6℃
Ambient Temperature:	21 ~ 22.7℃
Relative Humidity:	43 ~ 48%
ATM Pressure:	101.3 kPa
Test Date:	*2024/03/27*

4. Test Results:

Return Loss & Impedance Measurement Results:

Frequency (MHz)	Simulated Liquid	Parameter	Measured Value	Target Value	Deviation	Reference Range	Results
2600	Head	Return Loss	30.923 dB	27.361 dB	13.019%	±20%;≥20dB	Pass
		Real Impedance	48.396 Ω	45.943 Ω	2.453 Ω	≤5Ω	Pass
		Imaginary Impedance	-0.109 Ω	-0.667 Ω	0.558 Ω	≤5Ω	Pass

Liquid Verification Results:

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
2600	Simulated Tissue Liquid Head	37.773	1.962	39.00	1.96	-3.15	0.10	±5

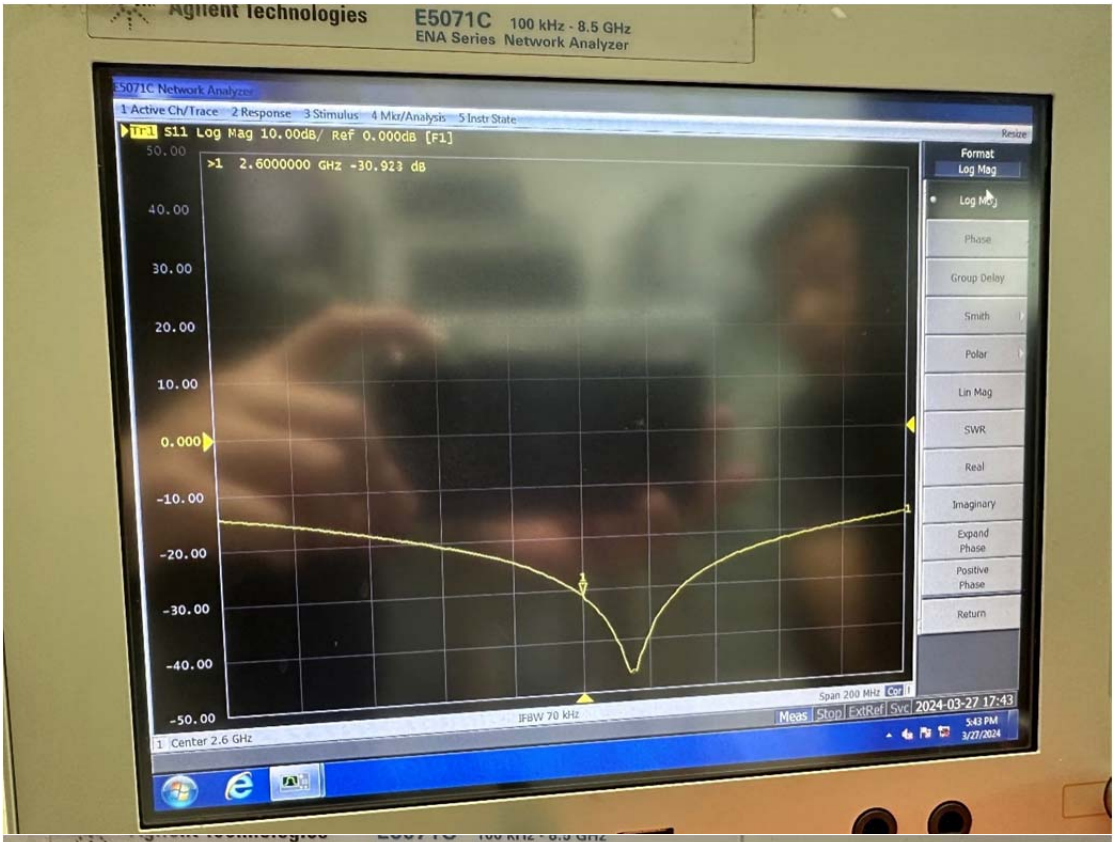
System Accuracy Check Results:

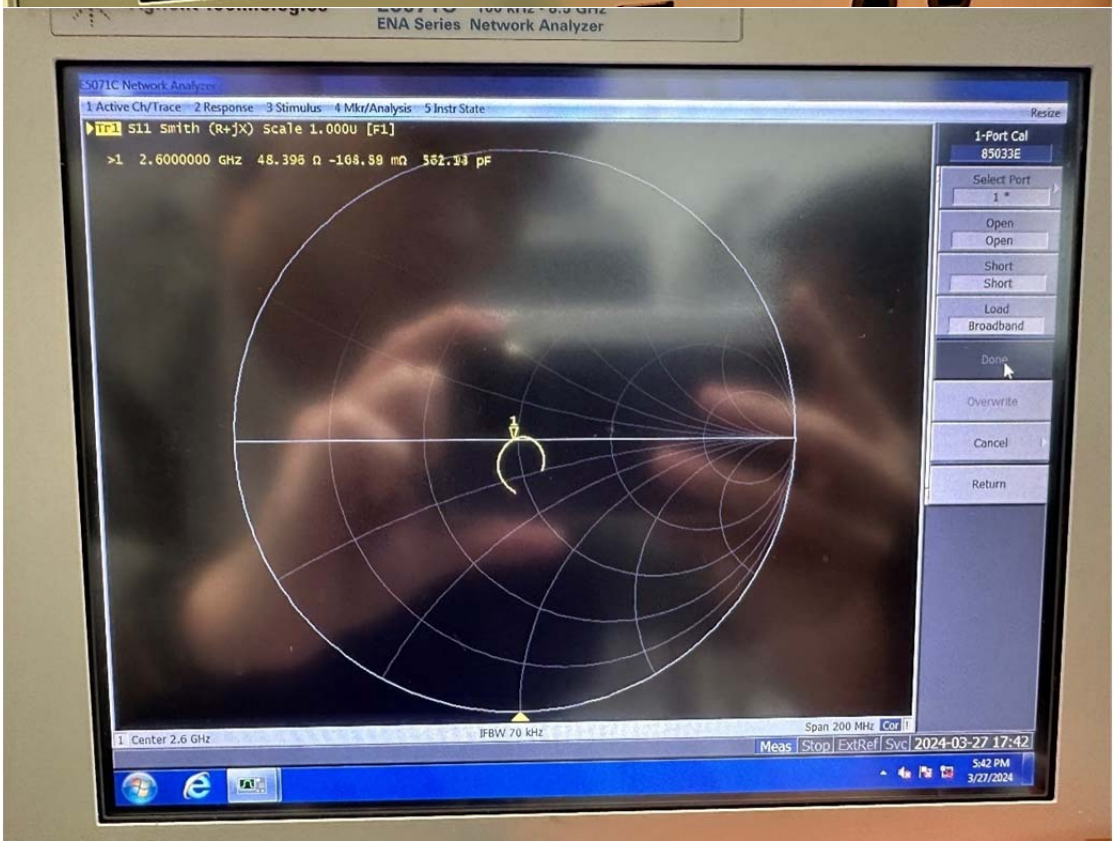
Frequency Band (MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/Kg)	Delta (%)	Tolerance (%)
2600	Head	100	1g	5.53	55.3	55.2	0.181	±10
			10g	2.56	25.6	24.8	3.226	±10

Note:
1. Return Loss Deviation = (Measured-Target)/Target×100%
2. The target values above please refer to 2600MHz dipole calibration certificate (Certificate No .: D2600V2-1207_Mar23), which was issue by SPEAG.

5. Test Plot & SystemValidation Data：

Dipole, 2600MHz, 1207





System Performance2600 MHz Head

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1207

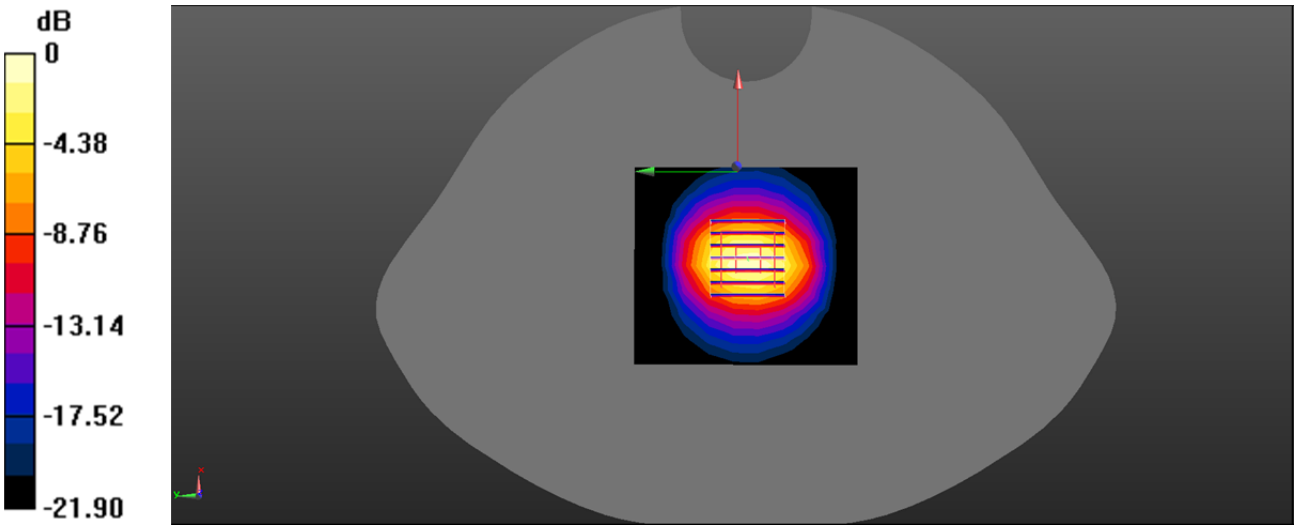
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 1.962 S/m; ε_r = 37.773; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7382; ConvF(7.65, 7.65, 7.65) @ 2600 MHz;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1325; Calibrated: 9/27/2023
- Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962
- Measurement SW: DASY52, Version 52.10 (2);

Configuration/Head 2600MHz Pin=100mW/Area Scan (9x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 8.73 W/kg

Configuration/Head 2600MHz Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.25 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 11.2 W/kg
SAR(1 g) = 5.53 W/kg; SAR(10 g) = 2.56 W/kg
Maximum value of SAR (measured) = 9.21 W/kg



0 dB = 9.21 W/kg = 9.64 dBW/kg

Performance Qualification Report For 2600MHz SAR Dipole-2

Equipment Details:

Description: Dipole
Manufacturer: Speag
Model Number: D2600V2
Serial Number: 1207
Calibration Date: 2025/03/26

Calibration and Checked By: Bob Lu

Approved By: Luke Jiang

1. Equipment List & Calibration Information:

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY6 Measurement Server	DASY6 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1325	2024/10/08	2025/10/07
Dosimetric E-field Probes	EX3DV4	7896	2024/11/07	2025/11/06
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Simulated Tissue Liquid Head	HBBL600-10000V6	2200808-2	Each Time	
SAM Twin Phantom	SAM-Twin V8.0	1962	NCR	NCR
Network Analyzer	E5071C	SER MY46519680	2024/05/21	2025/05/20
Network Analyzer Calibration Kit	50Ω	51026	NCR	NCR
MXG Analog Signal Generator	N5181A	MY48180408	2024/12/04	2025/12/03
Microwave peak power sensor	MA24418A	12622	NCR	NCR
USB wideband power sensor	U2021XA	MY52350001	2024/05/21	2025/05/20
20dBAttenuator	N/A	N/A	NCR	NCR
Directional Coupler	855673	3307	NCR	NCR

2. Standard Requirements:

Referring to KDB 865664 D01 3.3.2, for dipole calibration, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements:

1) When the measured SAR does not deviates from the calibrated SAR value by more than 10%.

2) When the most recent return-loss result, measured at least annually, does not deviate by more than 20% from the previous measurement or meeting the required 20 dB minimum return-loss requirement.

3) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, does not deviate by more than 5 Ω from the previous measurement.

3. Environmental Conditions:

TSL Temperature:	18.2 ~ 19.6℃
Ambient Temperature:	18.8 ~ 20.7℃
Relative Humidity:	50 ~ 63%
ATM Pressure:	98.1 kPa
Test Date:	*2025/03/26*

4. Test Results:

Return Loss & Impedance Measurement Results:

Frequency (MHz)	Simulated Liquid	Parameter	Measured Value	Target Value	Deviation	Reference Range	Results
2600	Head	Return Loss	26.677 dB	27.361 dB	-2.500 %	±20%;≥20dB	Pass
		Real Impedance	47.675 Ω	45.943 Ω	1.732 Ω	≤5Ω	Pass
		Imaginary Impedance	-3.890 Ω	-0.667 Ω	3.223 Ω	≤5Ω	Pass

Liquid Verification Results:

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
2600	Simulated Tissue Liquid Head	39.478	1.977	39.00	1.96	1.23	0.87	±5

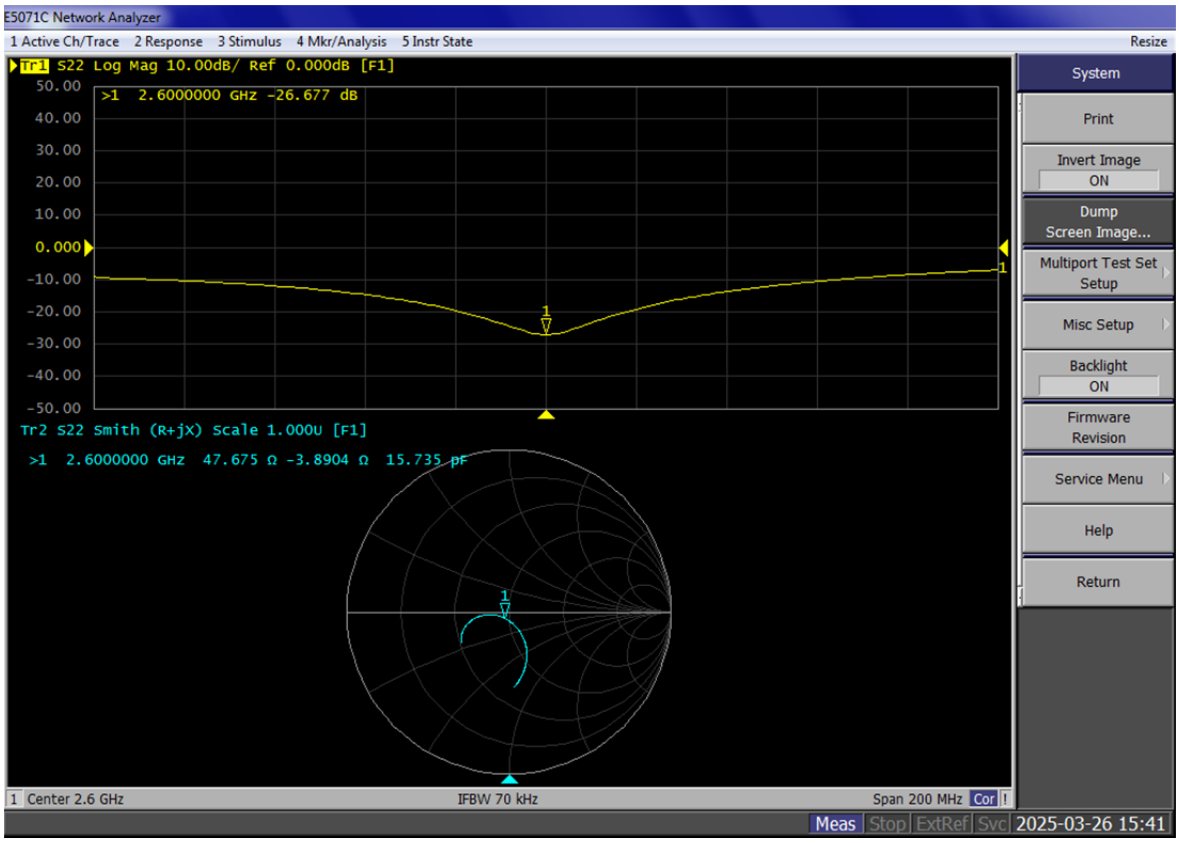
System Accuracy Check Results:

Frequency Band (MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/Kg)	Delta (%)	Tolerance (%)
2600	Head	100	1g	5.44	54.4	55.2	-1.449	±10
			10g	2.68	26.8	24.8	8.065	±10

Note:
1. Return Loss Deviation = (Measured-Target)/Target×100%
2. The target values above please refer to 2600MHz dipole calibration certificate (Certificate No .: D2600V2-1207_Mar23), which was issue by SPEAG.

5. Test Plot & SystemValidation Data：

Dipole, 2600MHz, 1207



System Performance2600 MHz Head

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1207

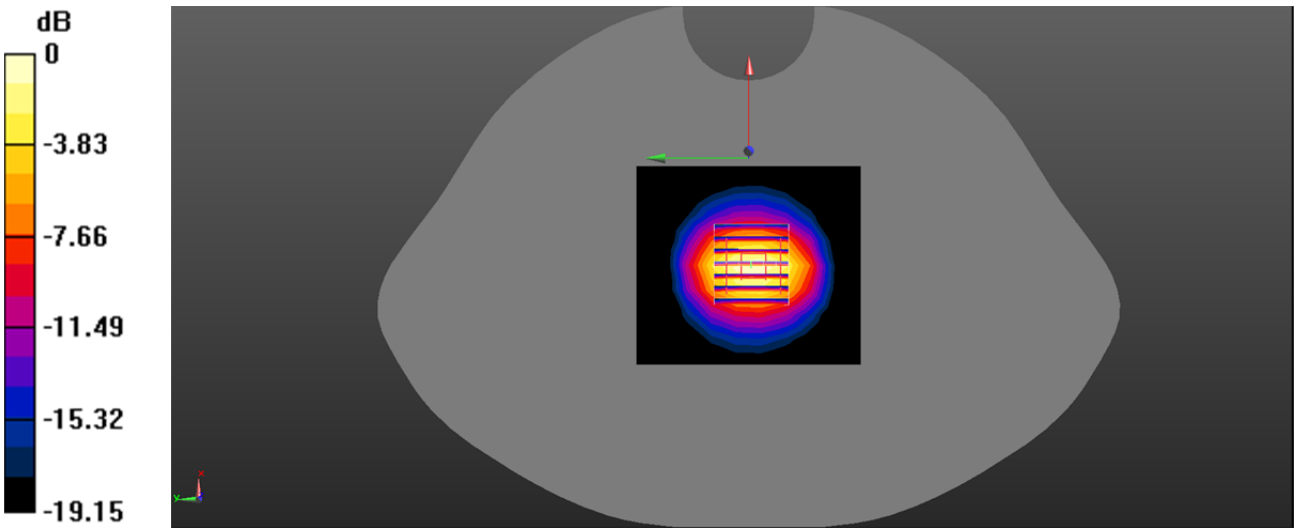
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 1.977 S/m; ε_r = 39.478; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7896; ConvF(6.6, 6.92, 6.93) @ 2600 MHz;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1325; Calibrated: 10/8/2024
- Phantom: SAM-Twin V8.0 P1aP2a; Type: QD 000 P41 AA ; Serial: 1962
- Measurement SW: DASY52, Version 52.10 (2);

Configuration/Head 2600MHz Pin=100mW/Area Scan (9x10x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 8.19 W/kg

Configuration/Head 2600MHz Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.30 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 9.79 W/kg
SAR(1 g) = 5.44 W/kg; SAR(10 g) = 2.68 W/kg
Maximum value of SAR (measured) = 8.45 W/kg



0 dB = 8.45 W/kg = 9.27 dBW/kg