Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	49.7 Ω - 9.8 jΩ
Return Loss	- 20.1 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	57.2 Ω - 6.4 jΩ
Return Loss	- 21.0 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	56.4 Ω - 6.7 jΩ
Return Loss	- 21.2 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	51.2 Ω - 8.3 jΩ
Return Loss	- 21.6 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	59.9 Ω - 3.0 jΩ
Return Loss	- 20.5 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	58.2 Ω - 4.5 jΩ
Return Loss	- 21.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 ns

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
Manufactured on	September 20, 2012

Date: 25.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1155

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.52 S/m; ε_r = 34.6; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 4.86 S/m; ε_r = 34.2; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 5.06 S/m; ε_r = 33.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

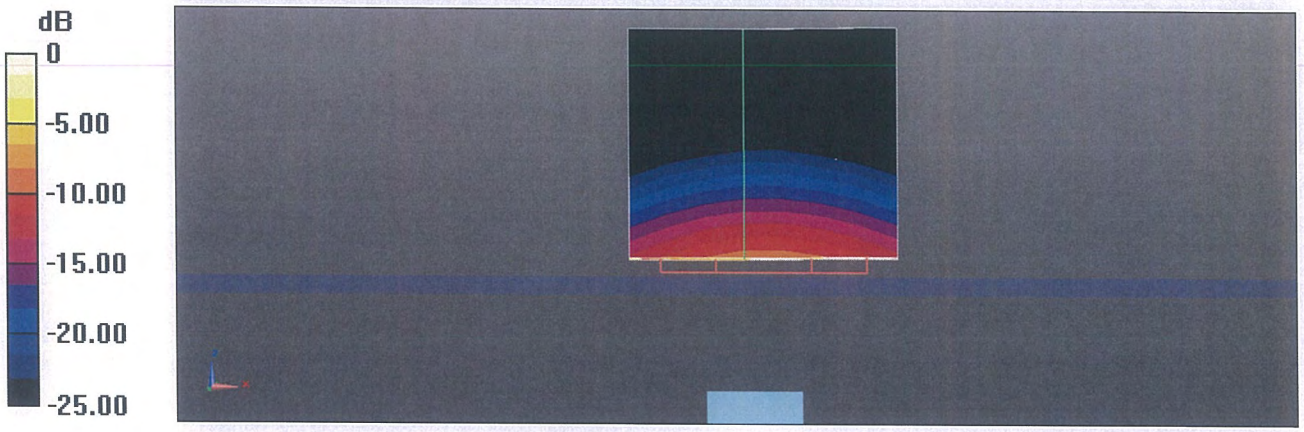
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.58, 5.58, 5.58); Calibrated: 31.12.2016, ConvF(5.09, 5.09, 5.09); Calibrated: 31.12.2016, ConvF(5.02, 5.02, 5.02); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.22 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 29.0 W/kg
SAR(1 g) = 7.88 W/kg; SAR(10 g) = 2.25 W/kg
Maximum value of SAR (measured) = 18.0 W/kg

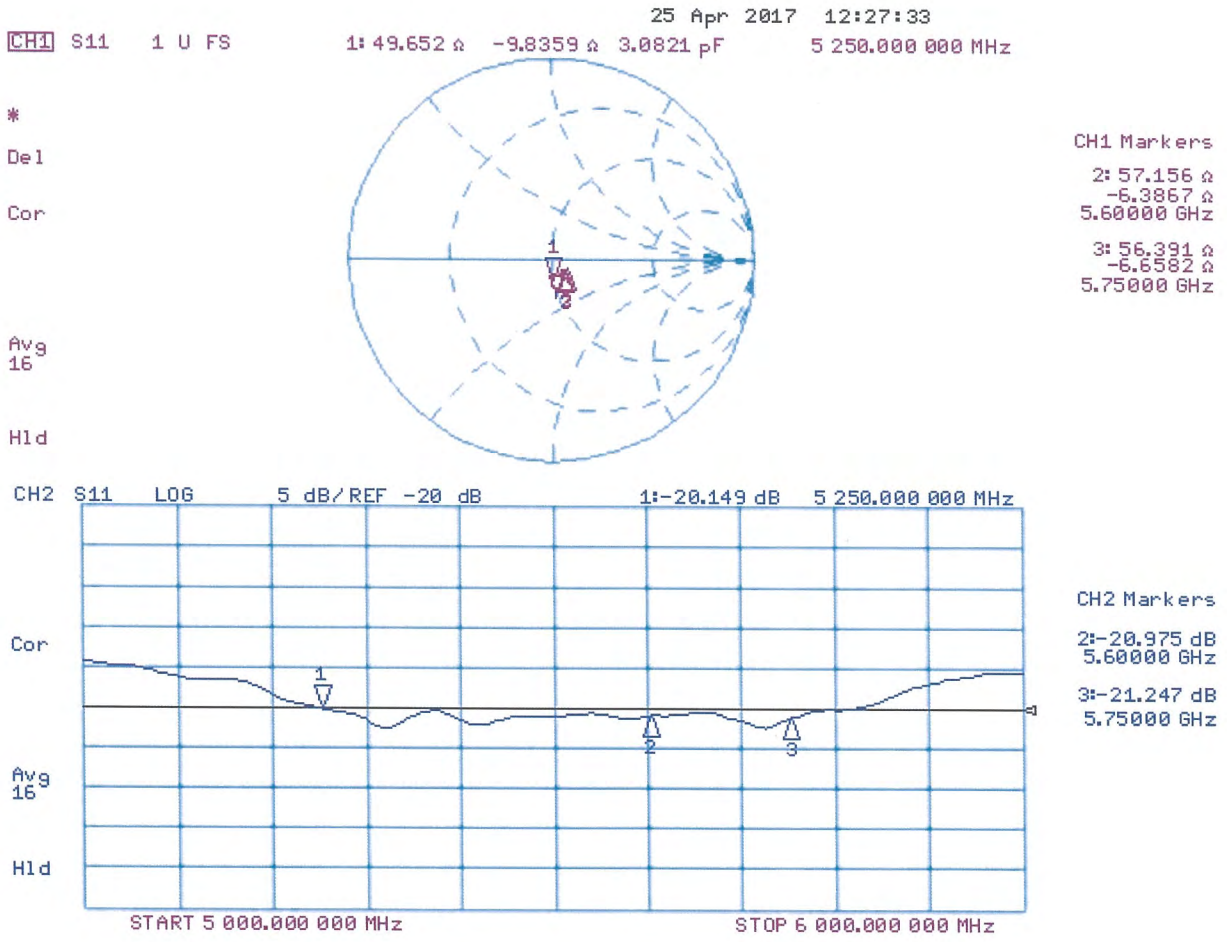
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.31 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 32.2 W/kg
SAR(1 g) = 8.19 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.08 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 31.5 W/kg
SAR(1 g) = 7.8 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 18.0 W/kg = 12.55 dBW/kg

Impedance Measurement Plot for Head TSL



Date: 26.04.2017

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1155

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.5 S/m; ε_r = 47.7; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 5.97 S/m; ε_r = 47; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5750 MHz; σ = 6.18 S/m; ε_r = 46.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

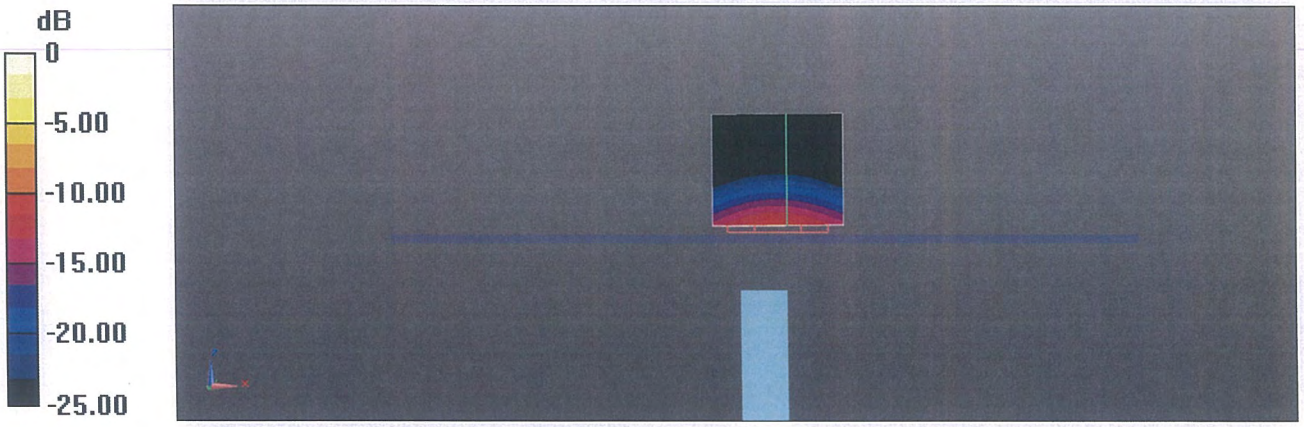
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.14, 5.14, 5.14); Calibrated: 31.12.2016, ConvF(4.57, 4.57, 4.57); Calibrated: 31.12.2016, ConvF(4.51, 4.51, 4.51); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 28.03.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1442); SEMCAD X 14.6.10(7413)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.55 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.1 W/kg
Maximum value of SAR (measured) = 17.4 W/kg

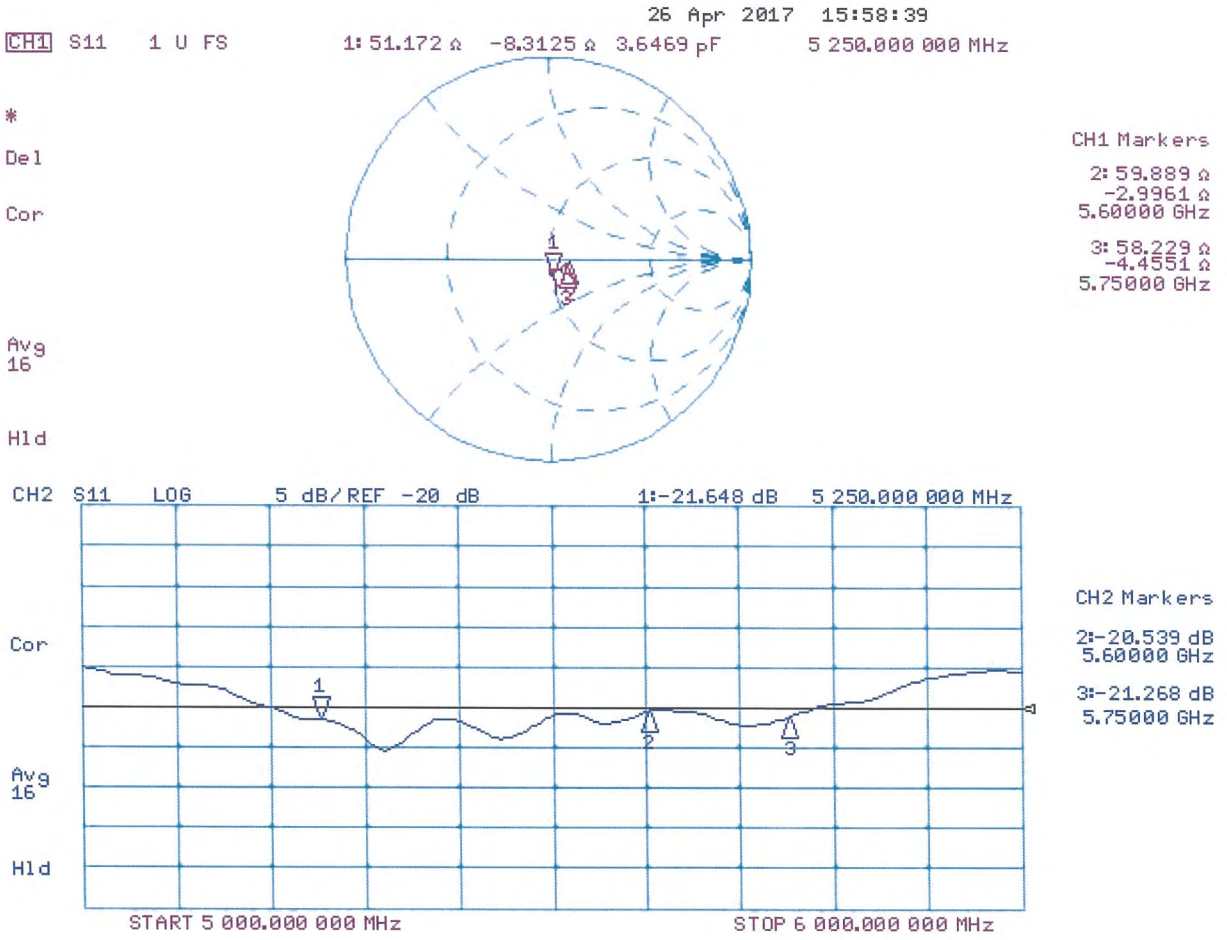
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 62.72 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 32.9 W/kg
SAR(1 g) = 7.91 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 19.9 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.66 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 32.8 W/kg
SAR(1 g) = 7.63 W/kg; SAR(10 g) = 2.13 W/kg
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 17.4 W/kg = 12.41 dBW/kg

Impedance Measurement Plot for Body TSL

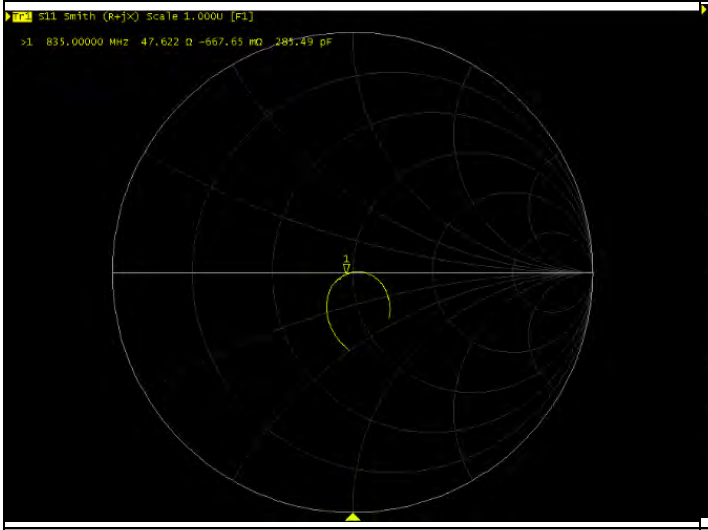


Justification of the extended calibration of Dipole D835V2 SN: 4d126

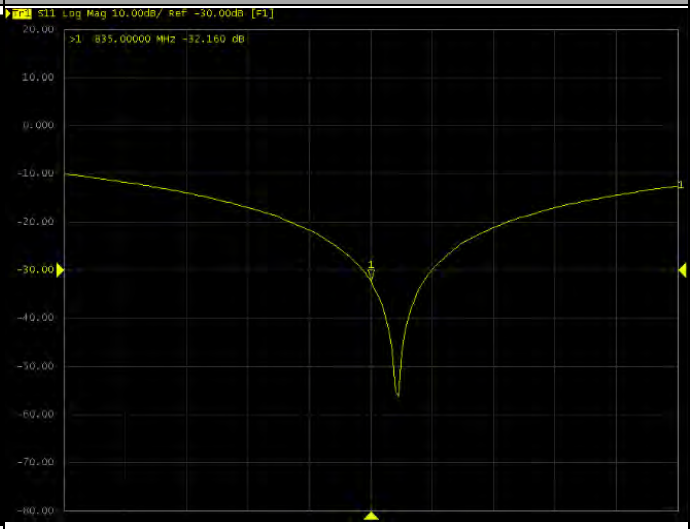
Per KDB 865664, we have measured the impedance and return loss as below.
1) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.
2) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5ohm from the previous measurement.

Dipole 835 Head TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	51.50Ω-0.7jΩ	47.62Ω-0.67jΩ	R= -3.88Ω, X= 0.03Ω
Return Loss	-35.8dB	-32.16dB	10.17%
Dipole 835 Body TST	**Target Value**	**Measured Value**	**Difference**
Impedance transformed to feed point	48Ω-2.5jΩ	44.09Ω-0.94jΩ	R= -3.91Ω, X= 1.56Ω
Return Loss	-29.6dB	-25.2dB	14.86%
Measured Date	2015-07-23	2017-07-19	-----

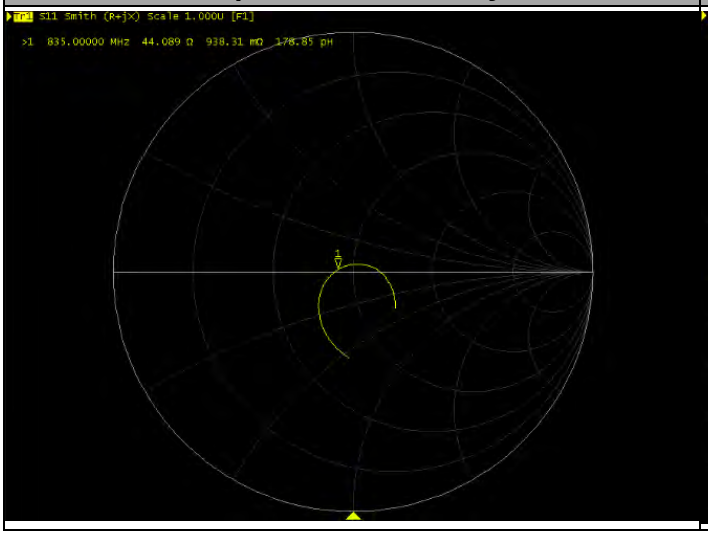
Impedance Test-Head



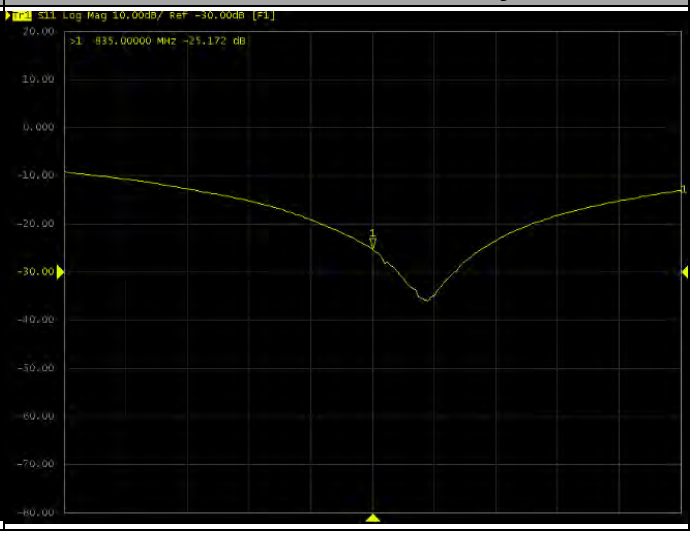
Return Loss Test-Head



Impedance Test-Body



Return Loss Test- Body

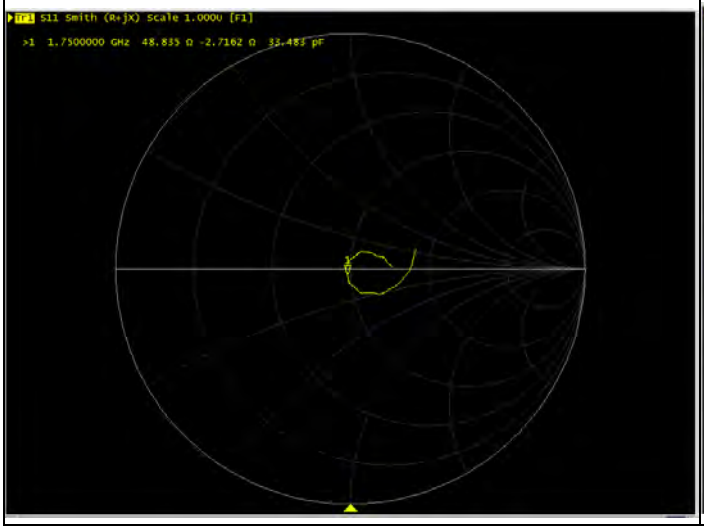


Justification of the extended calibration of Dipole D1750V2 SN:1145

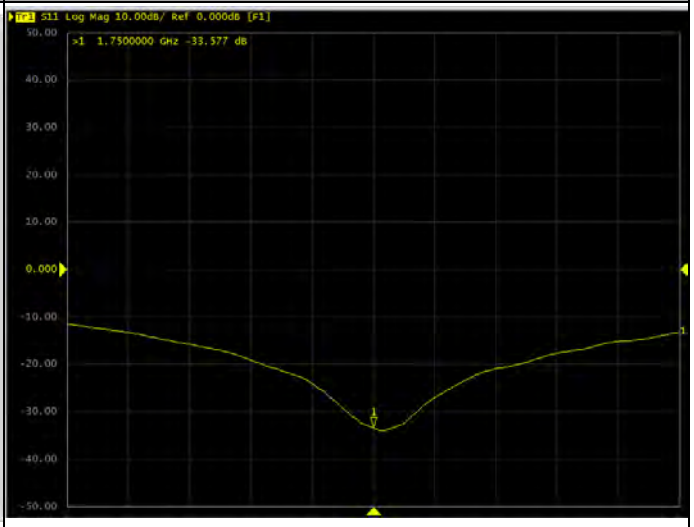
Per KDB 865664, we have measured the impedance and return loss as below.
1) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.
2) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5ohm from the previous measurement.

Dipole 1750 Head TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	49.5Ω-1.3jΩ	48.84Ω-2.72jΩ	R=-0.66Ω, X=-1.42Ω
Return Loss	-36.9dB	-33.58dB	-9.00%
Dipole 1750 Body TST	**Target Value**	**Measured Value**	**Difference**
Impedance transformed to feed point	46.5Ω-1.3jΩ	45.54Ω-3.55jΩ	R=-0.96Ω, X=-2.25Ω
Return Loss	-28.2dB	-25.8dB	-8.51%
Measured Date	2016-02-02	2017-01-26	-----

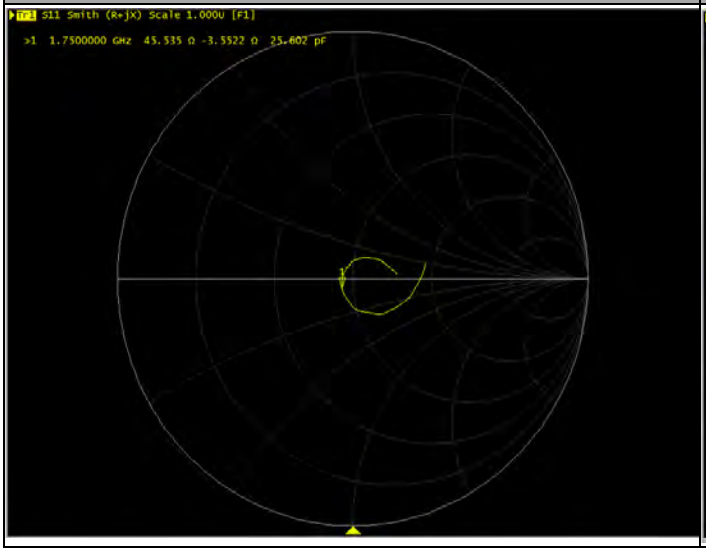
Impedance Test-Head



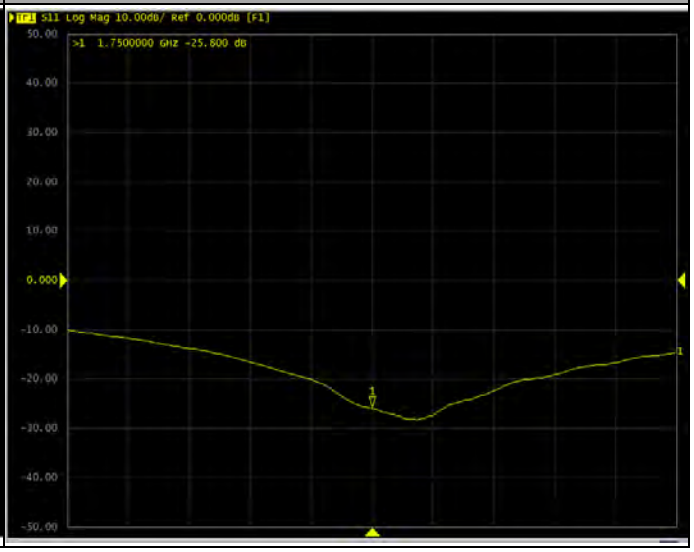
Return Loss Test-Head



Impedance Test-Body



Return Loss Test- Body

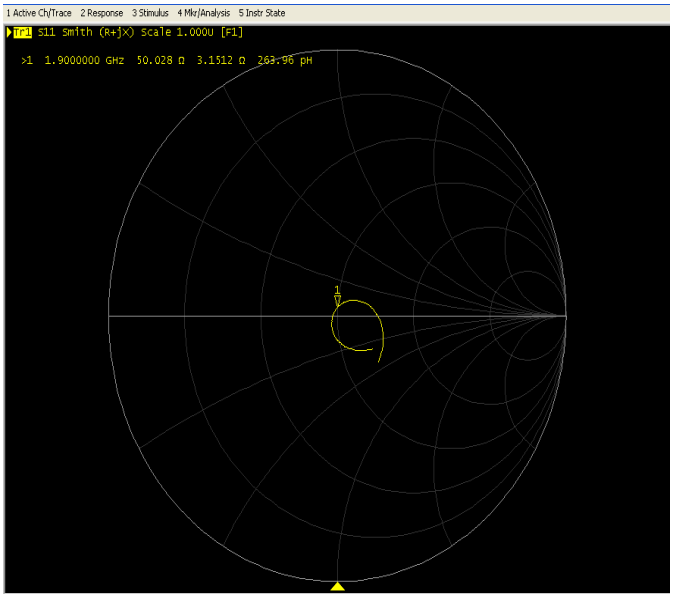


Justification of the extended calibration of Dipole D1900V2 SN: 5d091

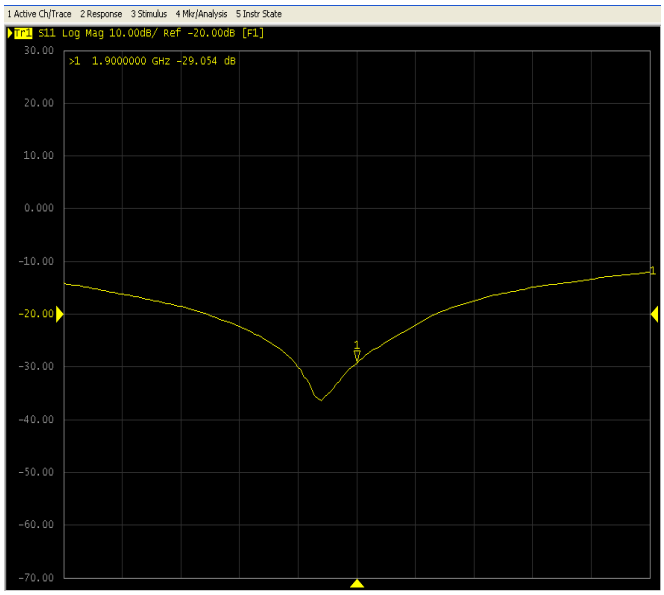
Per KDB 865664, we have Measured the Impedance and Return Loss as below, and the return loss is <-20dB, with 20% of prior calibration; the real or imaginary parts of the impedance is with 5 ohm of prior calibration. Therefore the verification result should support extended calibration. `

Dipole1900 Head TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	52.0Ω+5.5jΩ	50.03Ω+3.15jΩ	R=-1.97Ω, X=-2.35Ω
Return Loss	-24.8dB	-29.05dB	-17.14%
Dipole1900 Body TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	48.2Ω+6.0jΩ	47.44Ω+5.92jΩ	R=-0.76Ω, X=-0.08Ω
Return Loss	-24.0dB	-23.57dB	1.80%
Measured Date	2015-09-21	2017-09-19	-----

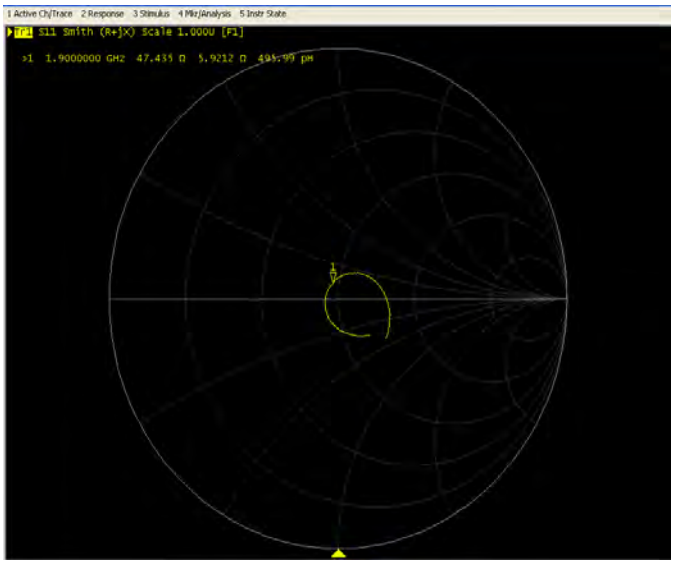
Impedance Test-Head



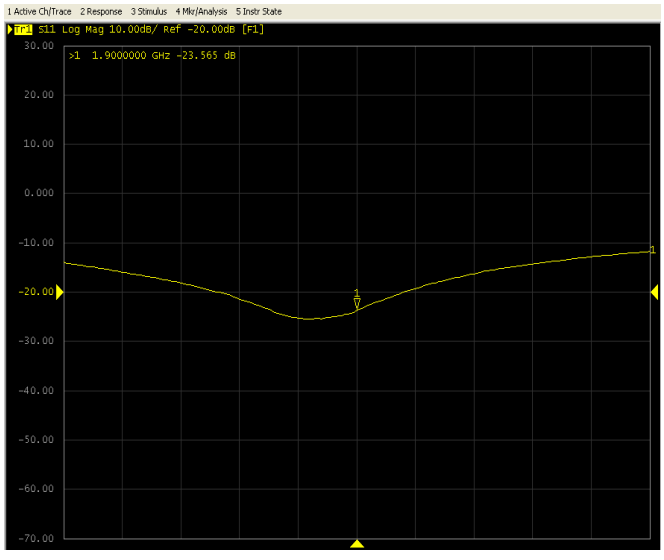
Return Loss Test-Head



Impedance Test-Body



Return Loss Test-Body

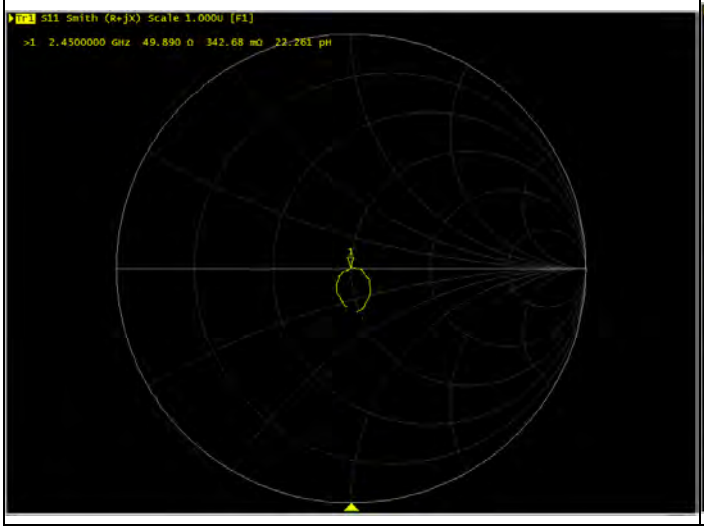


Justification of the extended calibration of Dipole D2450V2 SN:978

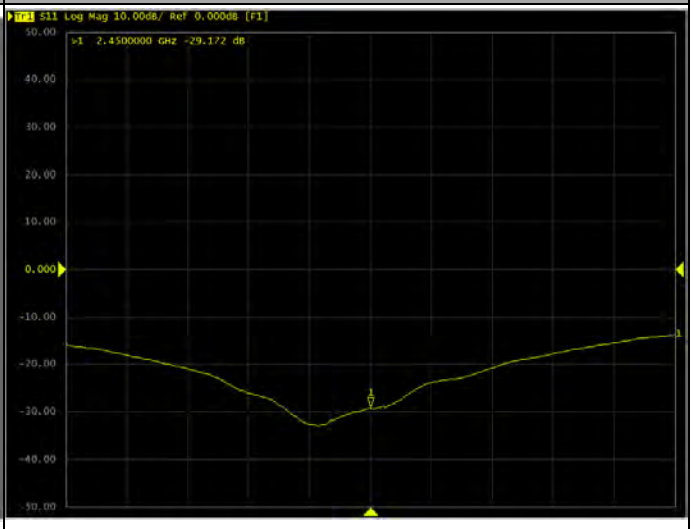
Per KDB 865664, we have measured the impedance and return loss as below.
1) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.
2) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5ohm from the previous measurement.

Dipole 2450 Head TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	53Ω+3.6jΩ	49.89Ω+0.34jΩ	R=-3.11Ω, X=-3.26Ω
Return Loss	-26.8dB	-29.17dB	8.84%
Dipole 2450 Body TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	49.8Ω+5.8jΩ	50.68Ω+2.02jΩ	R=0.88Ω, X=-3.78Ω
Return Loss	-24.7dB	-23.91dB	-3.20%
Measured Date	2016-02-08	2017-01-26	-----

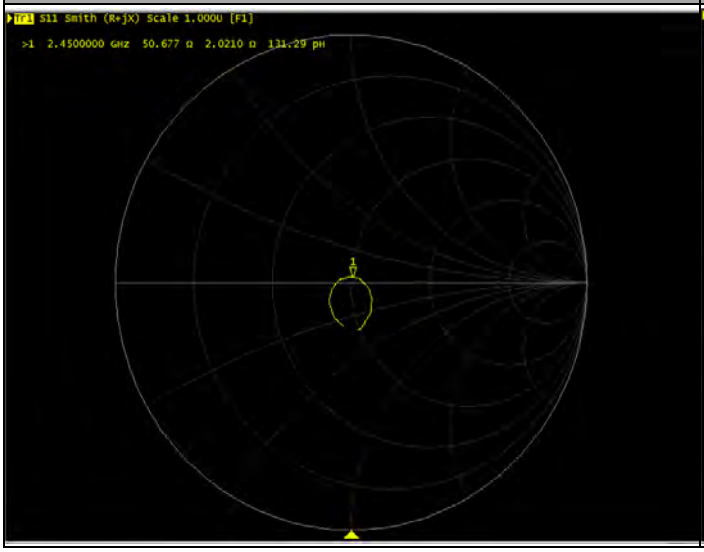
Impedance Test-Head



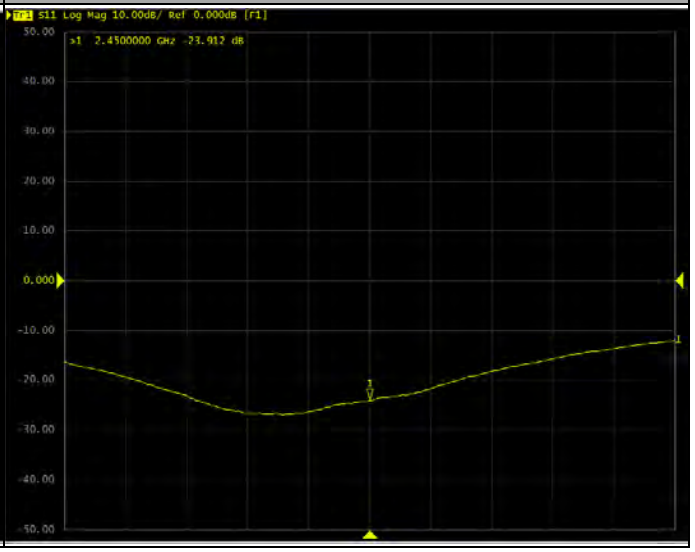
Return Loss Test-Head



Impedance Test-Body



Return Loss Test- Body

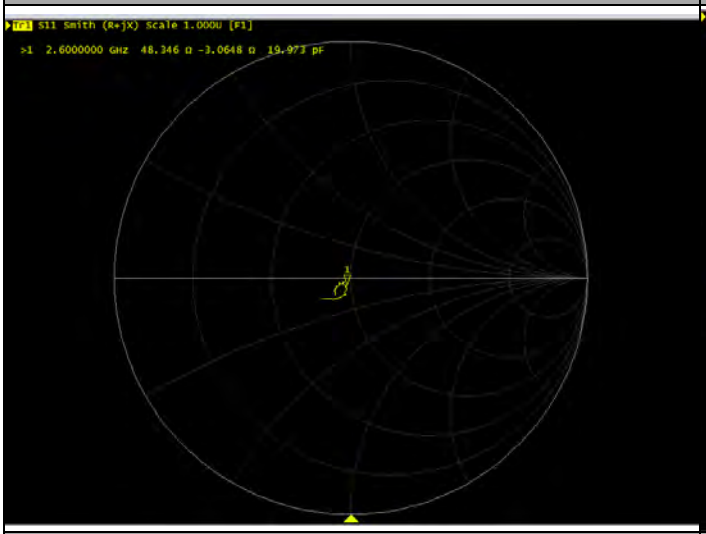


Justification of the extended calibration of Dipole D2600V2 SN:1119

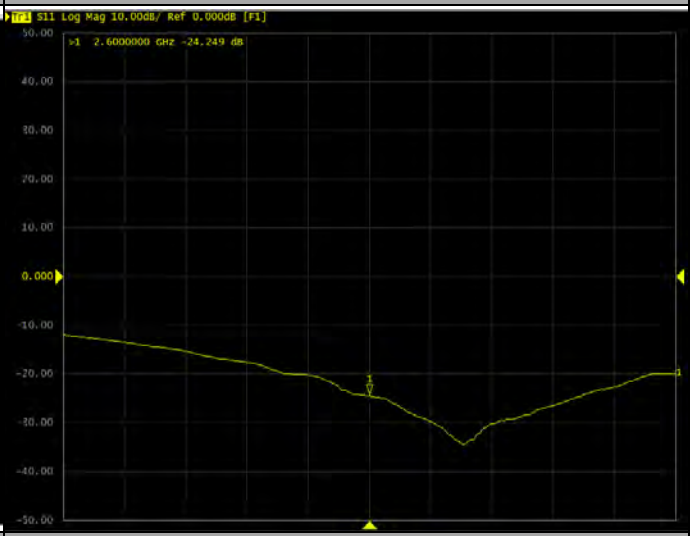
Per KDB 865664, we have Measured the Impedance and Return Loss as below, and the return loss is <-20dB, with 20% of prior calibration; the real or imaginary parts of the impedance is with 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole 2600 Head TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	49.1Ω-7.4jΩ	48.35Ω-3.06jΩ	R=-0.75Ω, X=4.34Ω
Return Loss	-22.5dB	-24.25dB	7.78%
Dipole 2600 Body TST	Target Value	Measured Value	Difference
Impedance transformed to feed point	45.8Ω-6.0jΩ	43.94Ω-5.35jΩ	R=-1.86Ω, X=0.65Ω
Return Loss	-22.3dB	-23.41dB	4.98%
Measured Date	2016-02-03	2017-01-26	-----

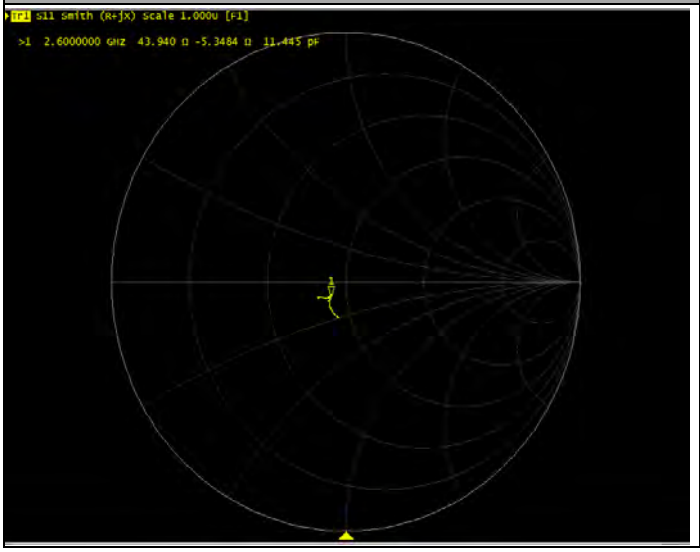
Impedance Test-Head



Return Loss Test-Head



Impedance Test-Body



Return Loss Test- Body