

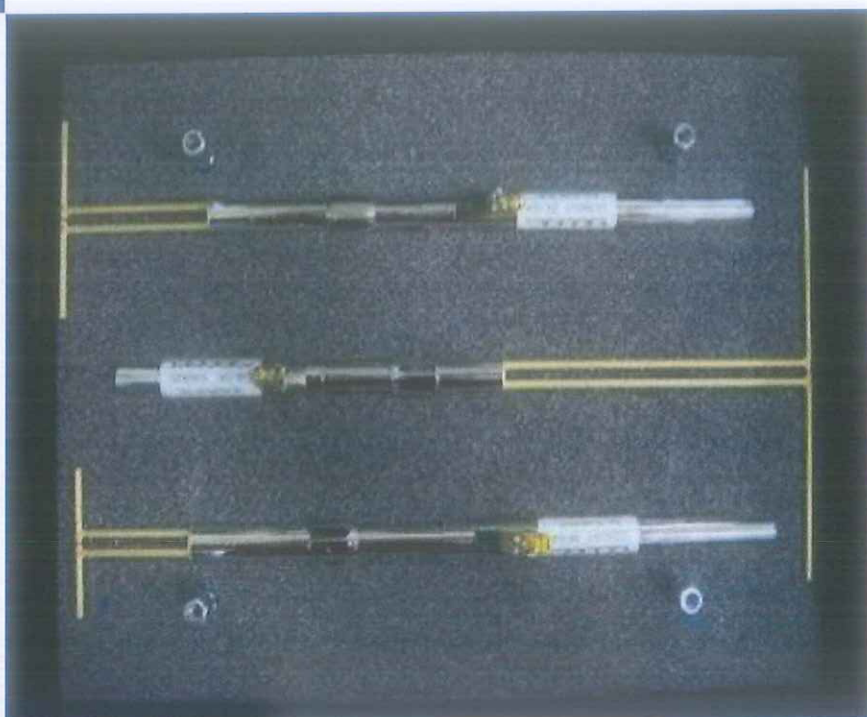
# SAR Dipole


ISSUED BY  
Shenzhen BALUN Technology Co., Ltd.




## Performance Measurement Report

FOR  
Validation Dipoles



Tested by:   
Zong Liyao  
(Engineer)

Approved by:   
Liao Jianming  
(Technical Director)

Report No.: LW-SZ1960012-701  
EUT Type: SAR Validation Dipole  
Model Name: D750V3, D835V2, D1750V2  
D1900V2, D2600V2  
D5GHzV2  
Brand Name: Speag

Test Conclusion: Pass  
Test Date: Mar. 12, 2019 ~ Jul. 13, 2019  
Date of Issue: Jul. 19, 2019

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# 1 GENERAL INFORMATION

## 1.1 Introduction

This document contains a summary of the requirements set forth by the IEEE 1528, FCC KDB 865664 D01 for reference dipoles used for SAR measurement system validations. Instead of the typical annual calibration recommended by measurement standards, the reference dipoles were demonstrated that the SAR target, impedance and return loss have remain stable, so the longer calibration interval is acceptable.

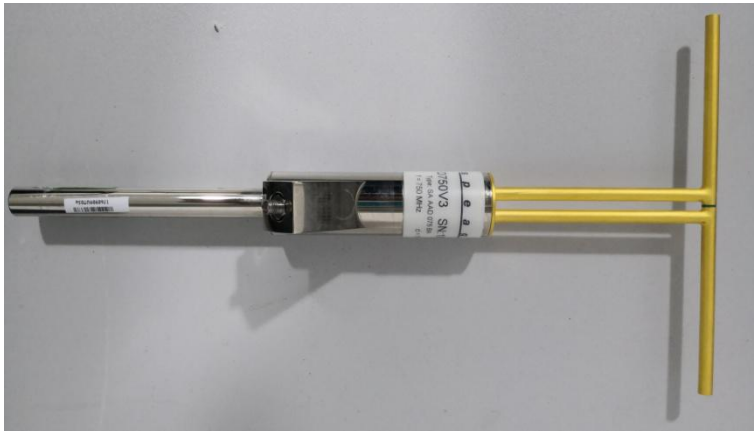
## 1.2 General Description for Equipment under Test (EUT)

EUT Type	DASY 5 Reference Dipoles
Manufacturer	Speag

Parameter	EUT 1	EUT 2	EUT 3	EUT 4	EUT 5	EUT 6
Model	D750V3	D835V2	D1750V2	D1900V2	D2600V2	D5GHzV2
Frequency	750 MHz	835 MHz	1750 MHz	1900 MHz	2600 MHz	5GHz-6GHz
Serial Number	SN 1055	SN 4d187	SN 1130	SN 5d193	SN 1095	SN 1200
Product Condition (New/ Used)	Used	Used	Used	Used	Used	Used
Last Cal. Date	2017/6/26	2017/6/26	2017/7/01	2017/6/30	2017/7/10	2017/6/29
Current meas. Date	2019/6/11	2019/6/11	2019/6/12	2019/6/12	2019/6/12	2019/6/13

### 1.3 EUT Photos

D750V3



D835V2



D1750V2



D1900V2



D2600V2



D5GHzV2





## 2 DIPOLE IMPEDANCE AND RETURN LOSS

The dipoles are designed to have low return loss when presented against a flat phantom at the specified distance. A Vector Network Analyser was used to perform a return loss measurement on the specific dipole when in the measurement location against the phantom and the distance was specified by the manufacturer with a special, low loss and low relative permittivity spacer.

The impedance was measured at the SMA-connector with the network analyser.

The measurement of verification with return loss should not deviate by more than 20% and minimum of 20 dB of the return loss, and the impedance (real or imaginary parts) should not deviate by more than 5 Ohms from the previous measurement using network analyzer.

Note:

The "Previous Meas." in the following table refer to dipoles or other equivalent RF sources calibration reports.

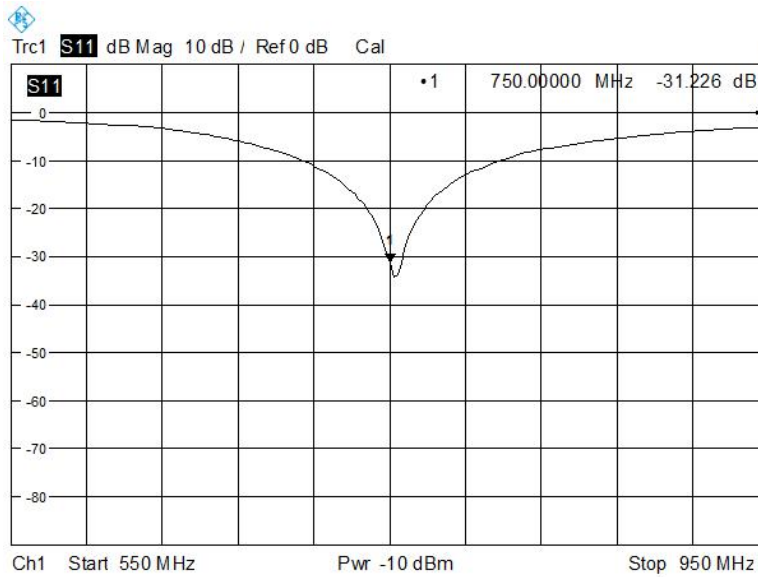


## 2.1 D750V3

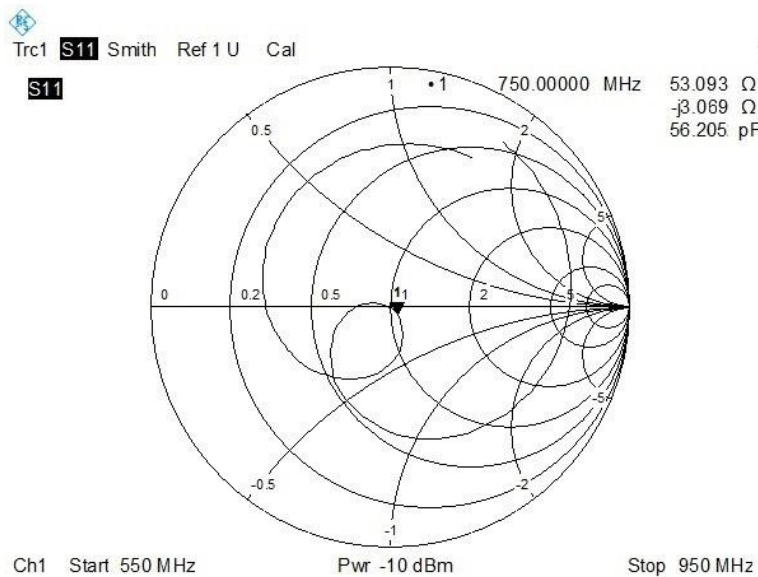
### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-31.226	-30.728	1.6%
Impedance	53.093 $\Omega$ - 3.069 $j\Omega$	52.793 $\Omega$ - 3.016 $j\Omega$	0.3 $\Omega$ (Real part)

#### Return Loss



#### Impedance

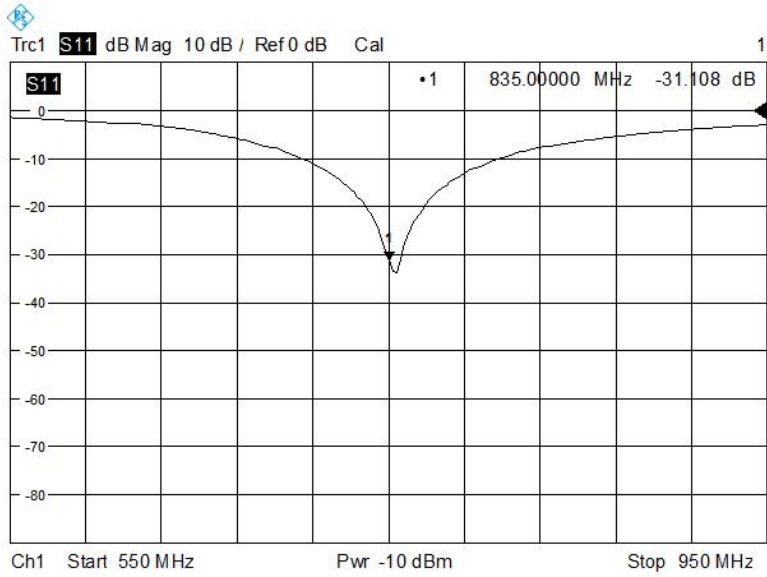




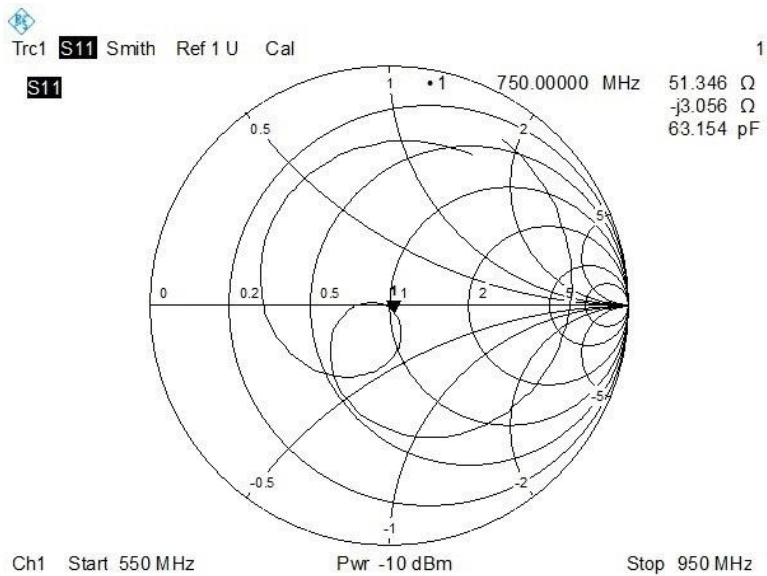
**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-31.108	-30.881	0.7%
Impedance	51.346 $\Omega$ - 3.056 $j\Omega$	51.921 $\Omega$ - 3.131 $j\Omega$	-0.575 $\Omega$ (Real part)

**Return Loss**



**Impedance**



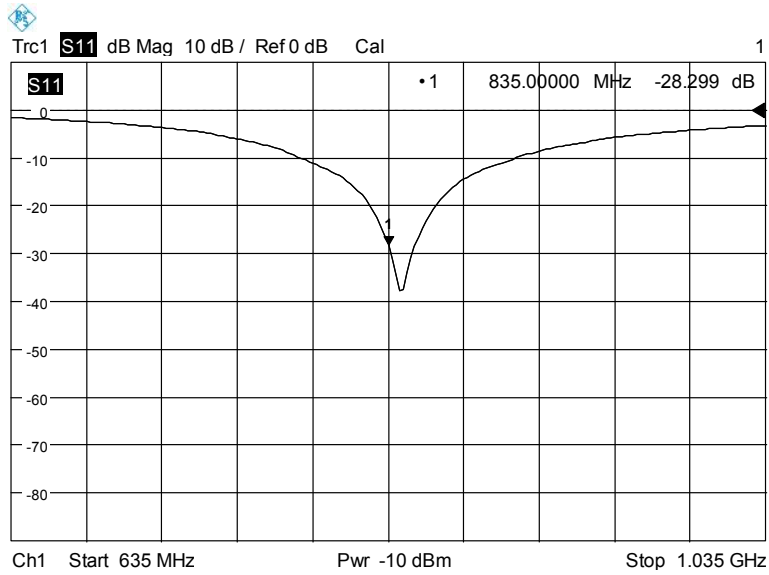


## 2.2 D835V2

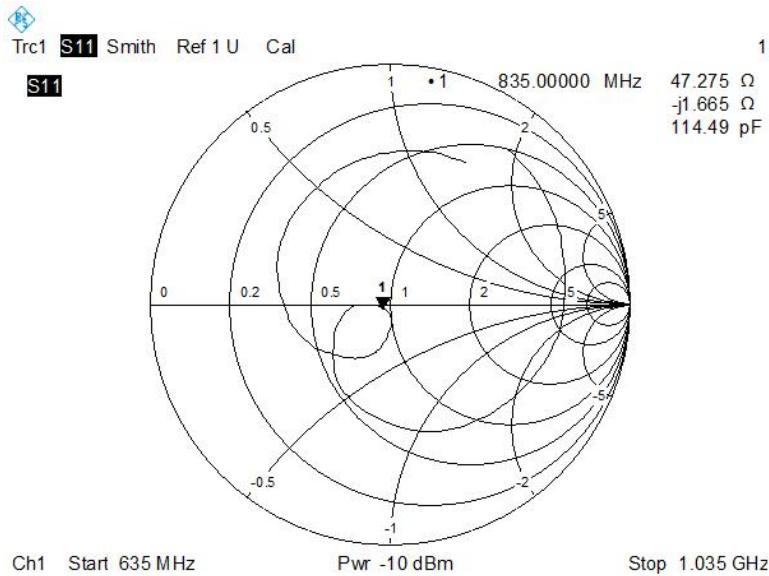
### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	28.299	-29.391	-3.715%
Impedance	47.275Ω – 1.665 jΩ	48.614 Ω - 2.557 jΩ	-1.339Ω (Real part)

#### Return Loss



#### Impedance



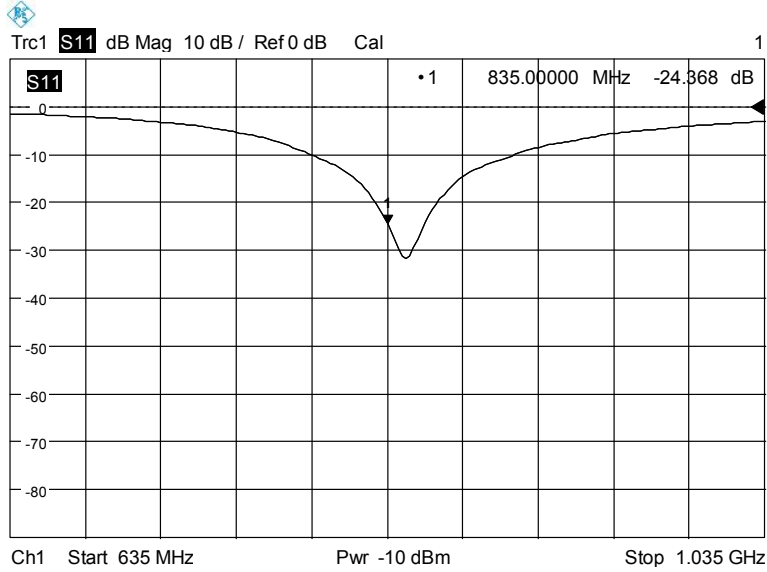




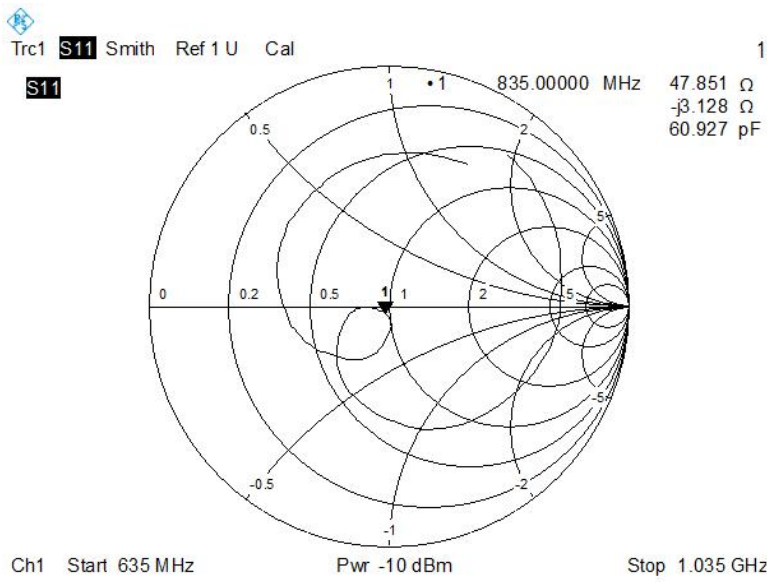
**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-24.368	-25.430	-4.2%
Impedance	47.851 $\Omega$ - 3.128 $j\Omega$	46.544 $\Omega$ - 3.507 $j\Omega$	1.307 $\Omega$ (Real part)

**Return Loss**



**Impedance**

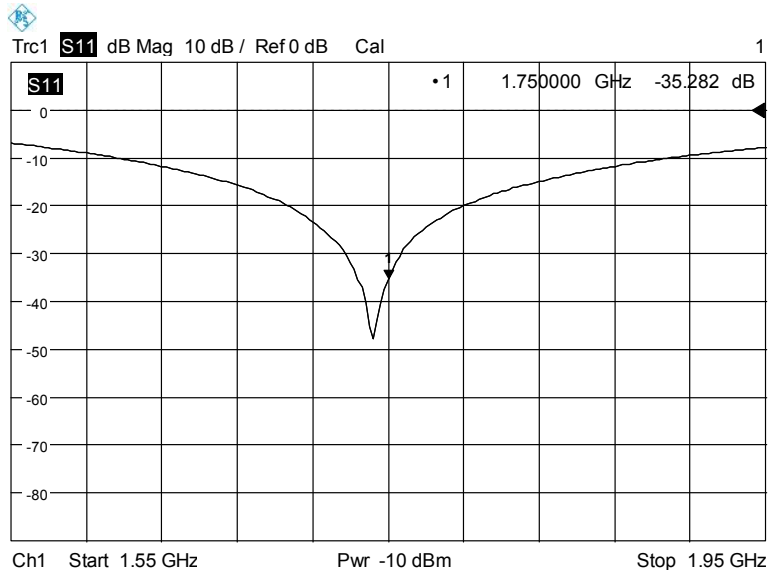


### 2.33.3 D1750V2

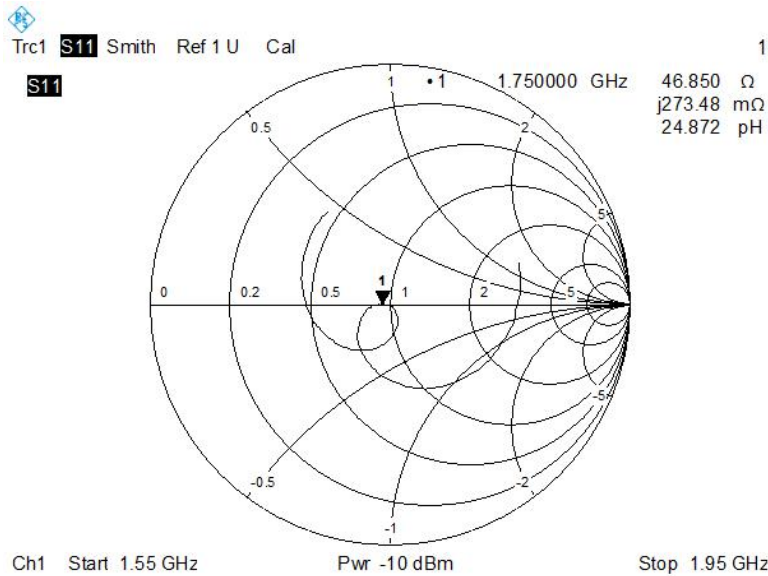
#### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-35.282	-34.478	2.3%
Impedance	46.850 $\Omega$ +0.273 j $\Omega$	48.643 $\Omega$ - 1.407 j $\Omega$	-1.793 $\Omega$ (Imaginary part)

#### Return Loss



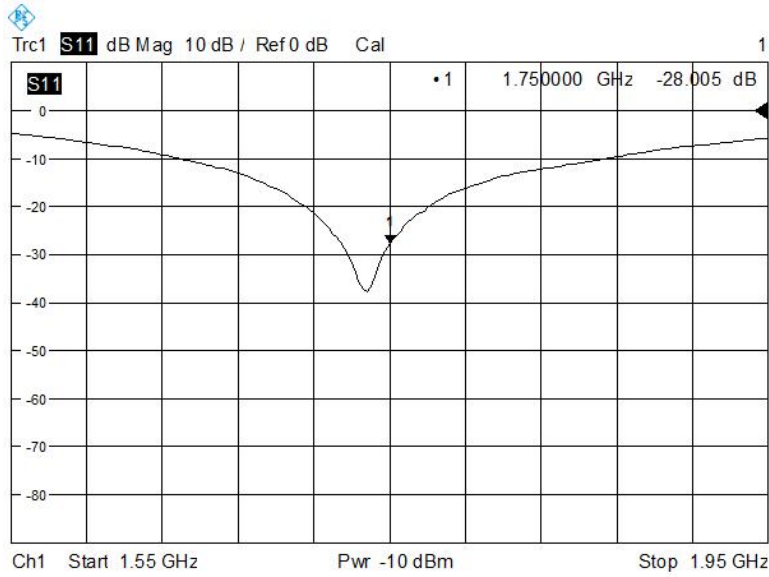
#### Impedance



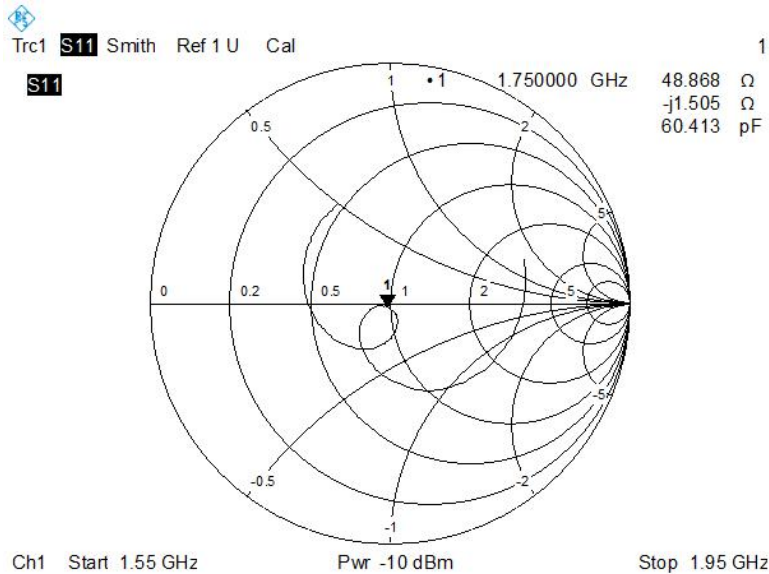
**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-28.005	-27.872	0.5%
Impedance	48.868 $\Omega$ - 1.505 $j\Omega$	46.763 $\Omega$ + 0.612 $j\Omega$	-2.117 $\Omega$ (Real part)

**Return Loss**



**Impedance**



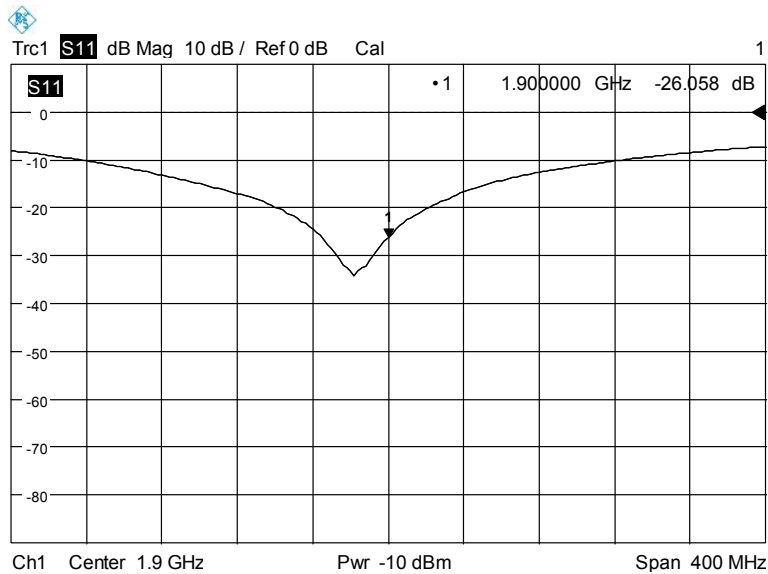


## 2.4D1900V2

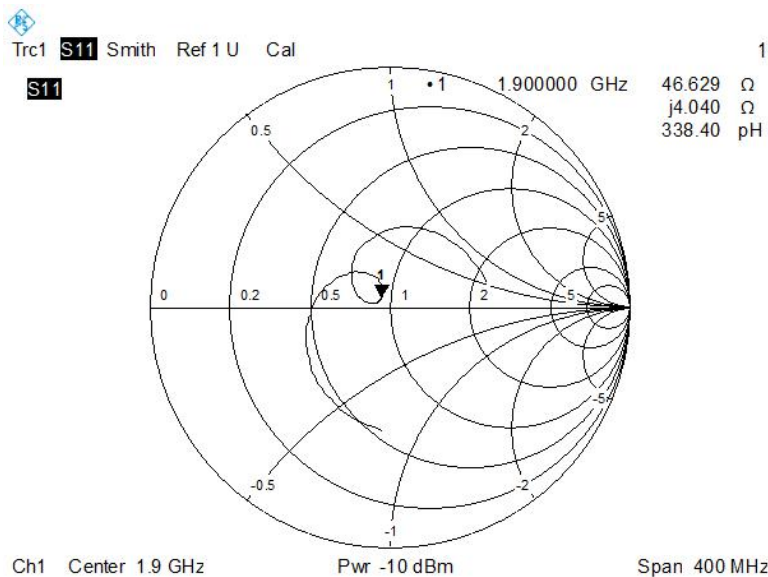
### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-26.058	-25.822	0.9%
Impedance	$46.629 \Omega + 4.040 j\Omega$	$48.893 \Omega + 5.253 j\Omega$	-2.264 $\Omega$ (Real part)

#### Return Loss



#### Impedance

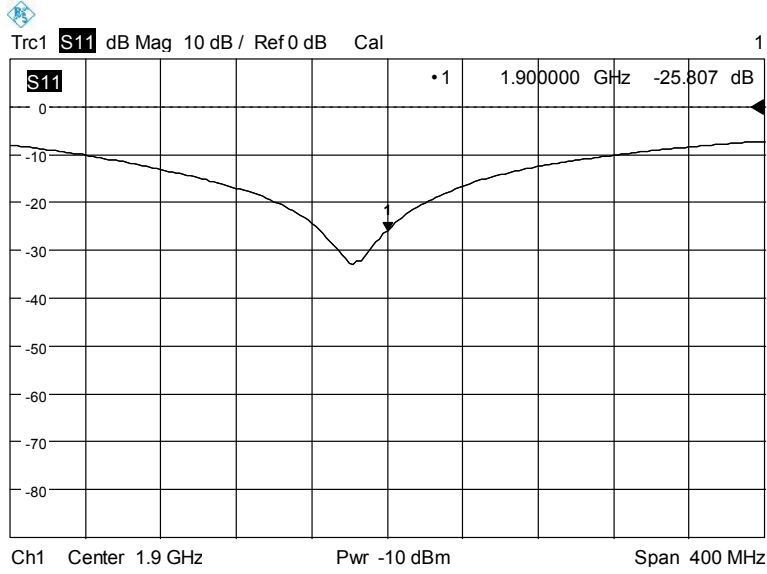




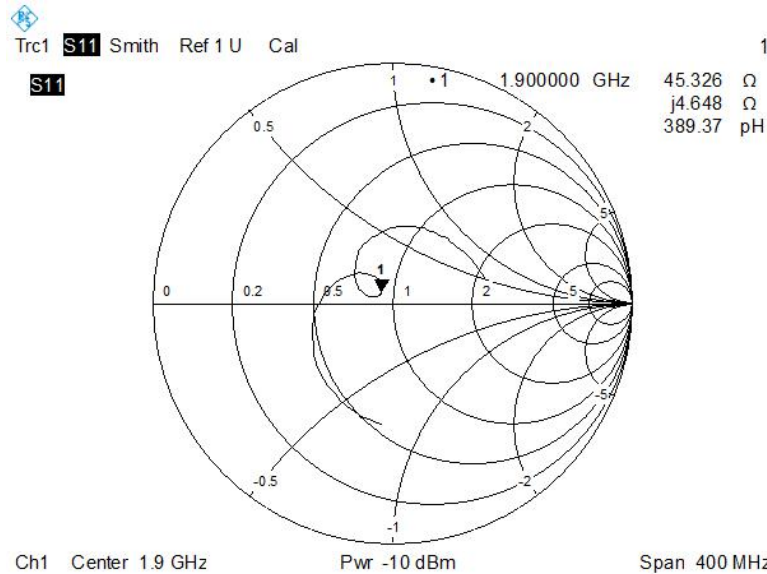
**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-25.807	-24.513	5.3%
Impedance	45.326 $\Omega$ + 4.648 j $\Omega$	46.749 $\Omega$ + 4.221 j $\Omega$	-1.423 $\Omega$ (Real part)

**Return Loss**



**Impedance**



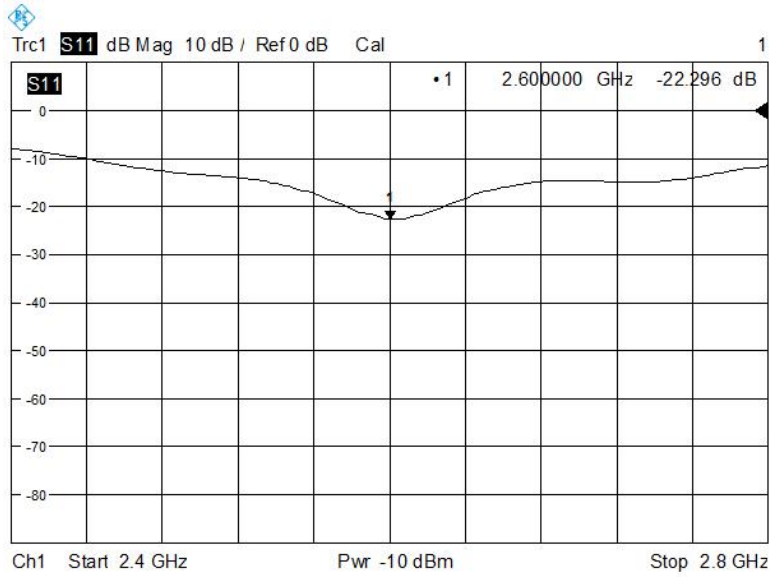


## 2.5 D2600V2

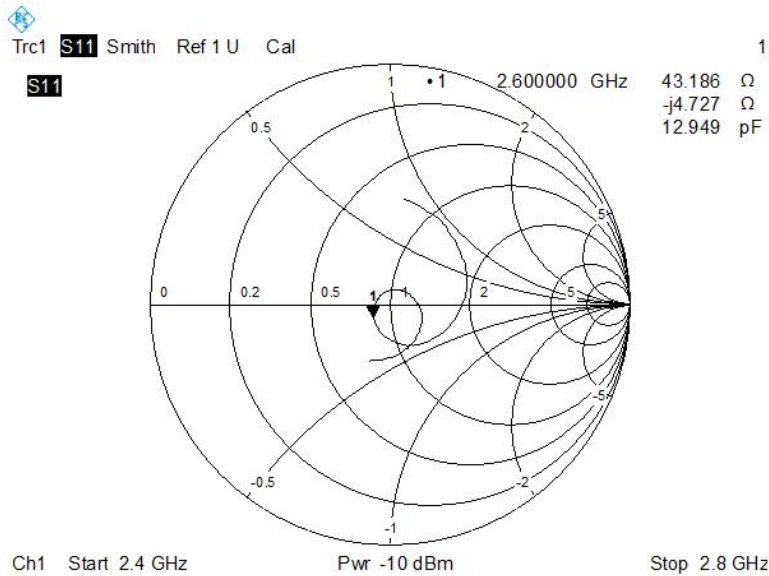
### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-22.296	-22.192	0.5%
Impedance	43.186 $\Omega$ -4.727 j $\Omega$	46.754 $\Omega$ -7.288 j $\Omega$	-3.568 $\Omega$ (Real part)

#### Return Loss



#### Impedance

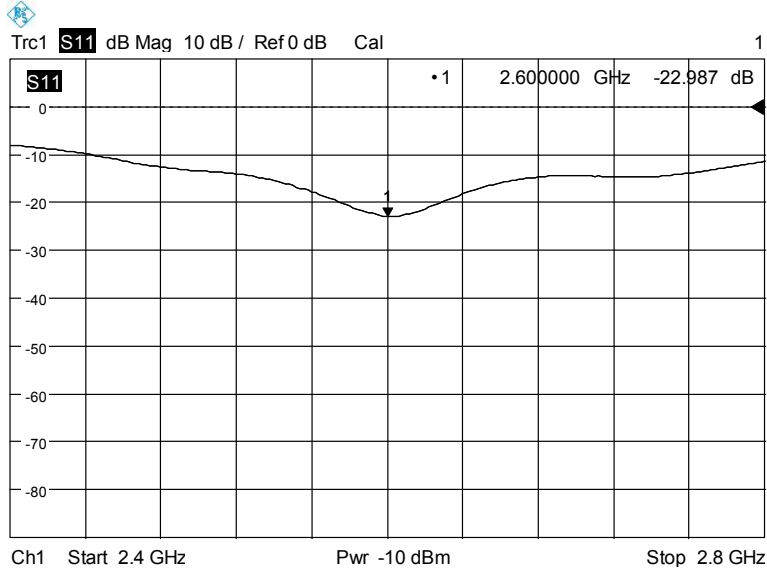




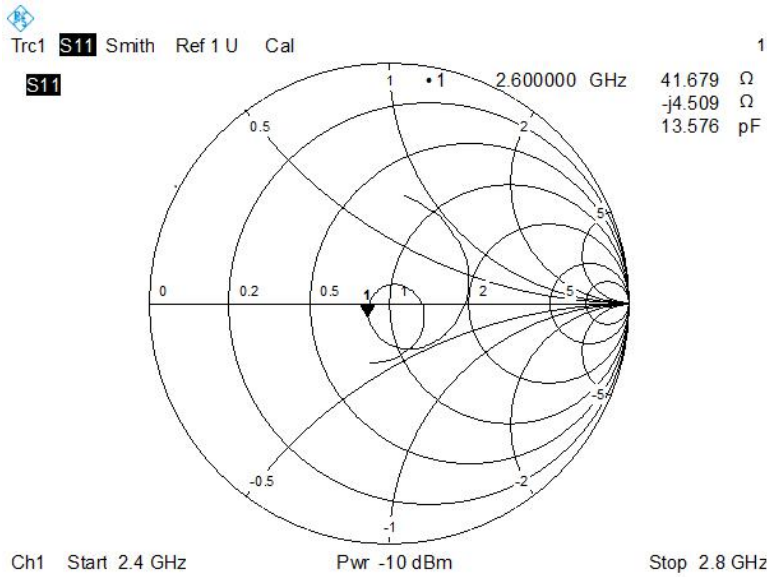
### RETURN LOSS AND IMPEDANCE IN BODY LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-22.987	-21.794	5.5%
Impedance	41.679 $\Omega$ -4.509 $j\Omega$	46.334 $\Omega$ -5.883 $j\Omega$	-4.655 $\Omega$ (Real part)

#### Return Loss



#### Impedance



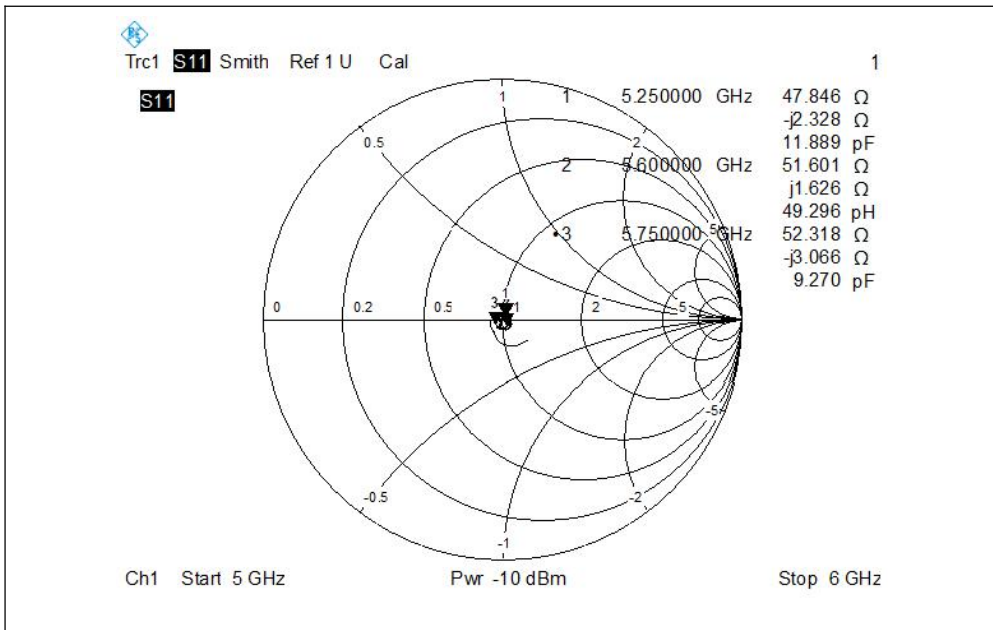


## 2.6 D5GHzV2

### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation												
5250 MHz															
Return Loss(dB)	-26.080	-25.052	4.1%												
Impedance	47.846 $\Omega$ -2.328 j $\Omega$	47.735 $\Omega$ -4.621 j $\Omega$	2.293 $\Omega$ (Imaginary n part)												
5600 MHz															
Return Loss(dB)	-24.770	-26.377	-6.1%												
Impedance	51.601 $\Omega$ -1.626 j $\Omega$	54.525 $\Omega$ +2.142 j $\Omega$	-2.924 $\Omega$ (Real part)												
5750 MHz															
Return Loss(dB)	-31.141	-29.503	5.6%												
Impedance	52.318 $\Omega$ -3.066 j $\Omega$	51.171 $\Omega$ -3.278 j $\Omega$	1.147 $\Omega$ (Real part)												
Return Loss															
<p>Trc1 S11 dB Mag 10 dB / Ref 0 dB Cal 1</p> <table border="1"> <thead> <tr> <th>Point</th> <th>Frequency (GHz)</th> <th>Return Loss (dB)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5.750000</td> <td>-31.141</td> </tr> <tr> <td>2</td> <td>5.250000</td> <td>-26.080</td> </tr> <tr> <td>3</td> <td>5.600000</td> <td>-24.770</td> </tr> </tbody> </table> <p>Ch1 Start 5 GHz Pwr -10 dBm Stop 6 GHz</p>				Point	Frequency (GHz)	Return Loss (dB)	1	5.750000	-31.141	2	5.250000	-26.080	3	5.600000	-24.770
Point	Frequency (GHz)	Return Loss (dB)													
1	5.750000	-31.141													
2	5.250000	-26.080													
3	5.600000	-24.770													
Impedance															

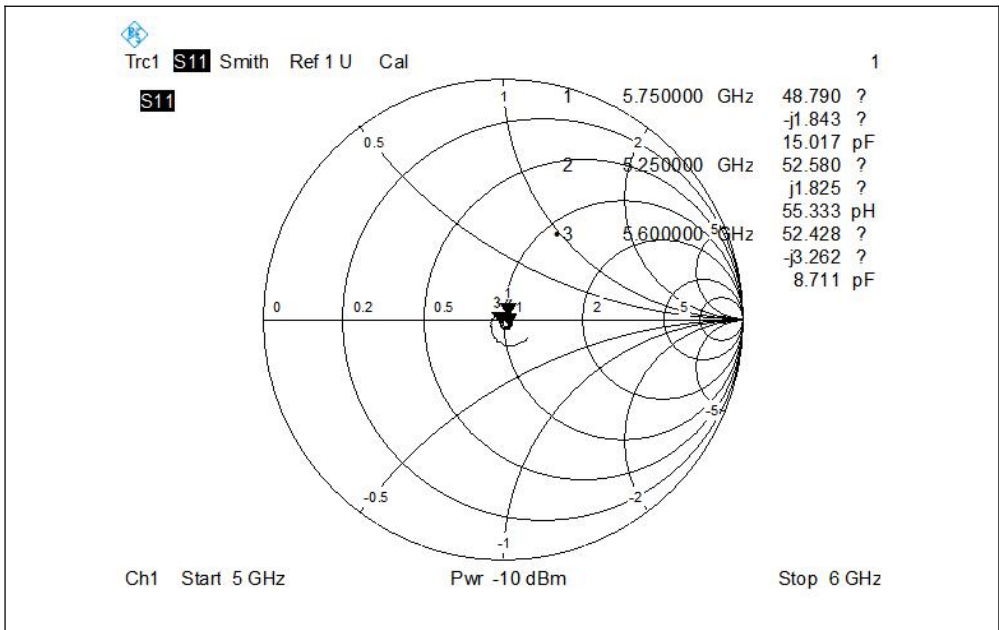






**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation												
<b>5250 MHz</b>															
Return Loss(dB)	-31.244	-30.483	2.5%												
Impedance	48.790 Ω -1.843 jΩ	47.975 Ω -2.840 jΩ	0.997Ω (Imaginary n part)												
<b>5600 MHz</b>															
Return Loss(dB)	-24.96	-24.636	1.3%												
Impedance	52.580 Ω +1.825 jΩ	54.321 Ω + 3.910 jΩ	-2.085Ω (Imaginary n part)												
<b>5750 MHz</b>															
Return Loss(dB)	-30.060	-29.774	1.0%												
Impedance	52.428 Ω -3.262 jΩ	51.737 Ω -2.126 jΩ	-1.136Ω (Imaginary n part)												
<b>Return Loss</b>															
<p>Trc1 S11 dB Mag 10 dB / Ref 0 dB Cal 1</p> <table border="1"> <thead> <tr> <th>Point</th> <th>Frequency (GHz)</th> <th>Return Loss (dB)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5.250000</td> <td>-31.244</td> </tr> <tr> <td>2</td> <td>5.600000</td> <td>-24.960</td> </tr> <tr> <td>3</td> <td>5.750000</td> <td>-30.060</td> </tr> </tbody> </table> <p>Ch1 Start 5 GHz Pwr -10 dBm Stop 6 GHz</p>				Point	Frequency (GHz)	Return Loss (dB)	1	5.250000	-31.244	2	5.600000	-24.960	3	5.750000	-30.060
Point	Frequency (GHz)	Return Loss (dB)													
1	5.250000	-31.244													
2	5.600000	-24.960													
3	5.750000	-30.060													
<b>Impedance</b>															



--END OF REPORT--