

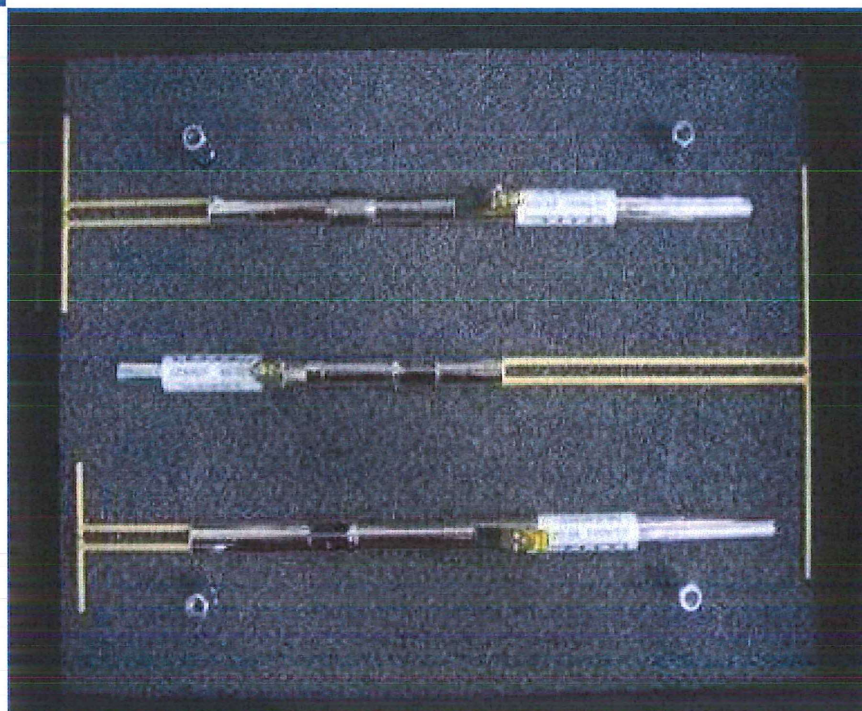
# SAR Dipole

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-SZ2120037-701

EUT Type: SAR Validation Dipole

Model Name: D835V2, D1750V2, D1900V2,  
D2450V2, D2600V2, D5GHzV2,

Brand Name: Speag

Test Conclusion: Pass

Test Date: Sep. 12, 2019 ~ Feb. 04, 2021

Date of Issue: Feb. 05, 2021

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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	D835V2	D1750V2	D1900V2	D2450V2	D2600V2	D5GHzV2
Frequency	835 MHz	1750 MHz	1900 MHz	2450MHz	2600 MHz	5GHz-6GHz
Serial Number	SN 4d187	SN 1130	SN 5d193	SN 952	SN 1095	SN 1200
Product Condition (New/ Used)	Used	Used	Used	Used	Used	Used
Last Cal. Date	2019/6/11	2019/09/12	2019/6/11	2019/6/10	2019/11/04	2020/2/17
Current meas. Date	2020/6/01	2020/09/08	2020/6/01	2020/6/02	2020/11/01	2021/2/04



### 1.3 EUT Photos

D835V2



D1750V2



D1900V2



D2450V2



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:

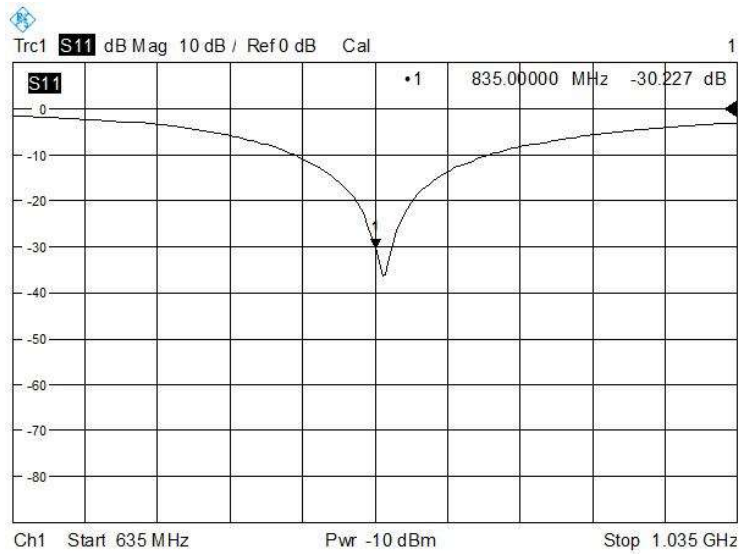
The "Previous Meas." in the following table refer to dipoles or other equivalent RF sources calibration reports.

## 2.1 D835V2

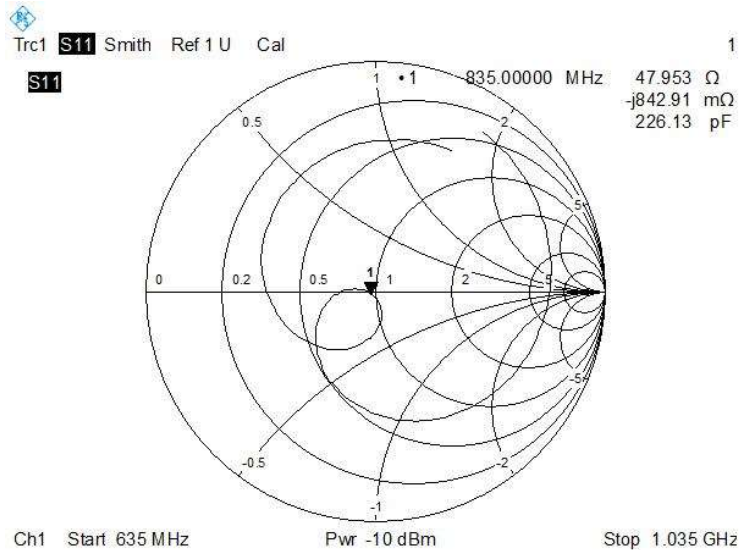
### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-30.227	-28.95	-4.41%
Impedance	47.953Ω – 0.843 jΩ	51.919 Ω - 3.091jΩ	-3.966Ω (Real part)

#### Return Loss



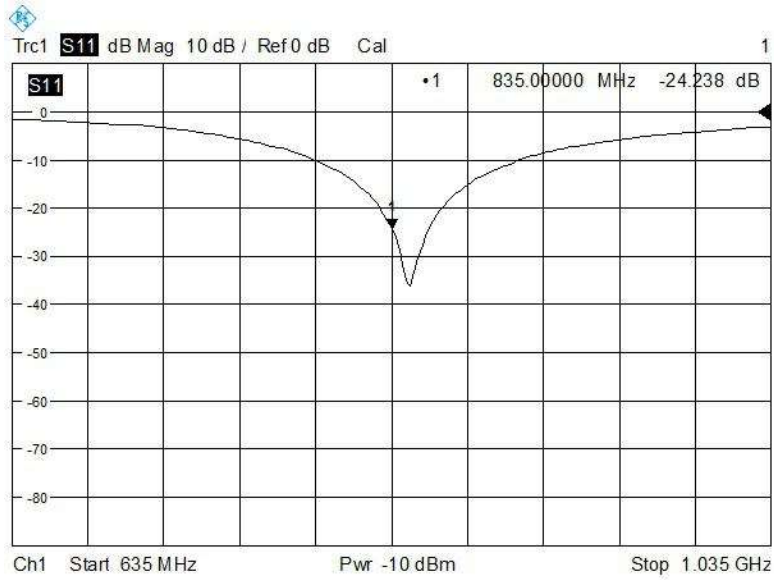
#### Impedance



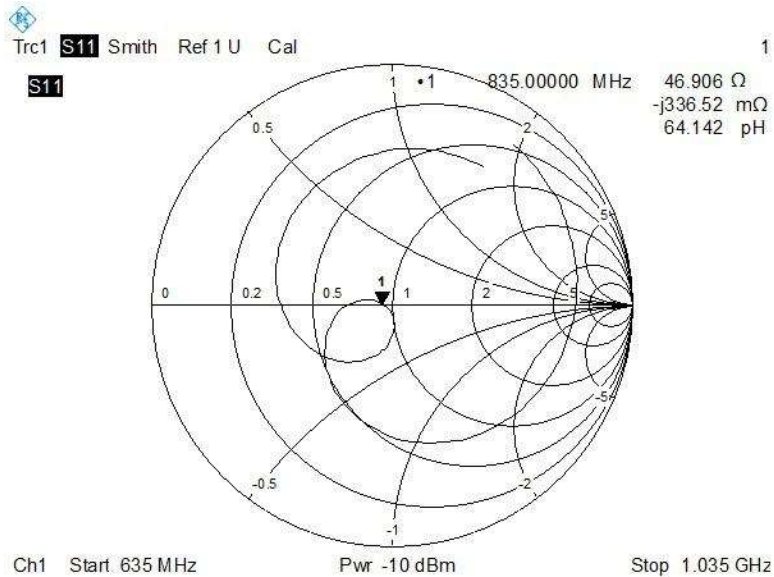
**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-24.238	-24.864	2.518%
Impedance	46.906 $\Omega$ - 0.336 j $\Omega$	47.302 $\Omega$ - 4.868 j $\Omega$	4.532 $\Omega$ (Imaginary part)

**Return Loss**



**Impedance**

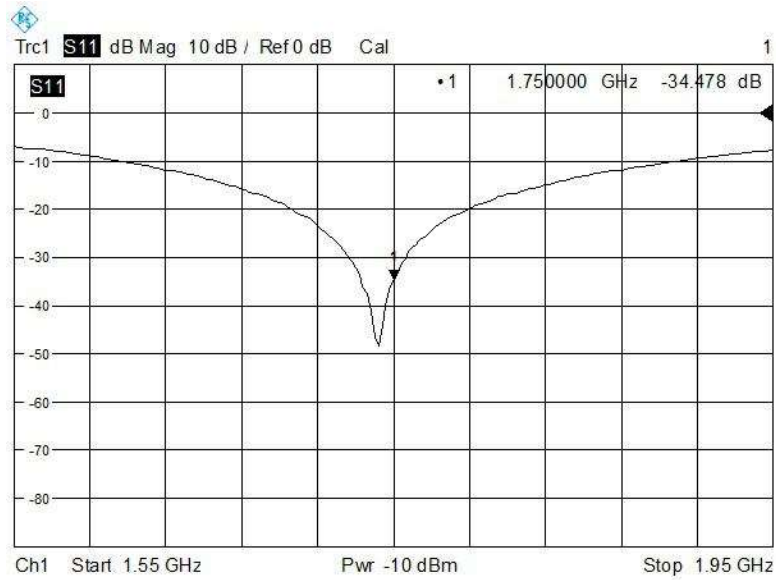


### 2.23.3 D1750V2

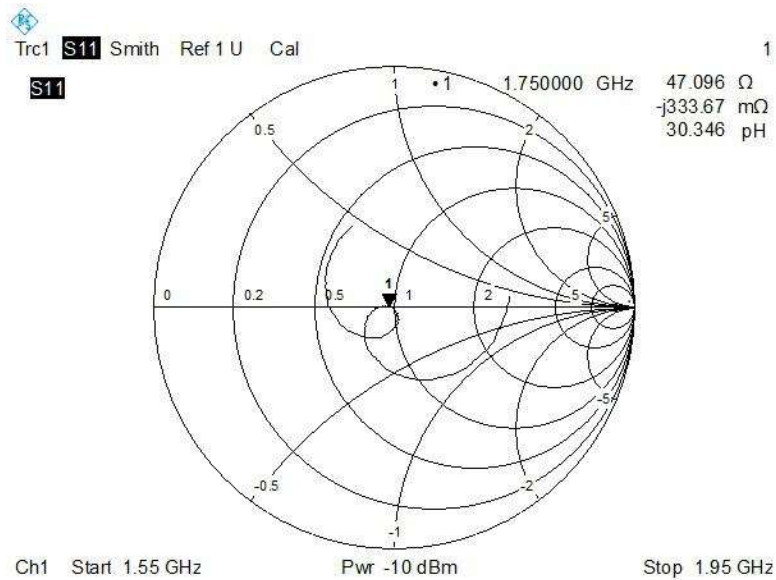
#### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-34.478	-32.43	6.32%
Impedance	47.096 $\Omega$ -0.334 j $\Omega$	50.193 $\Omega$ - 2.388 j $\Omega$	3.097 $\Omega$ (Real part)

#### Return Loss



#### Impedance



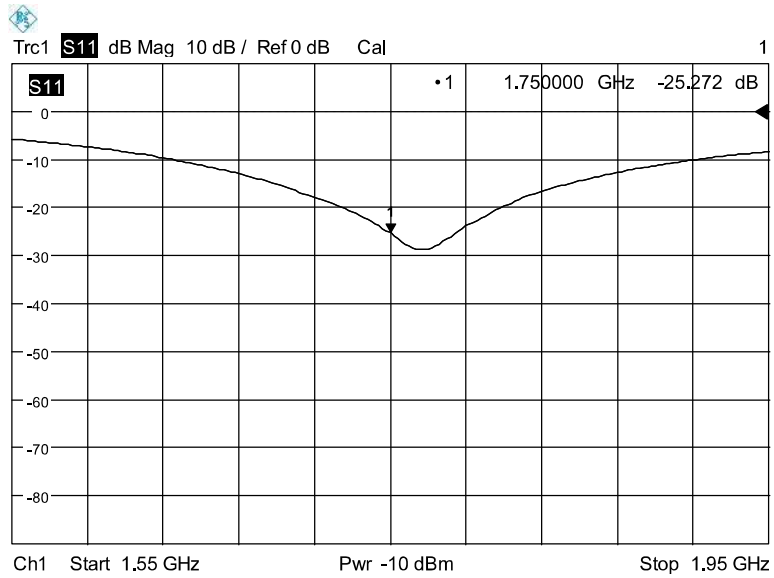




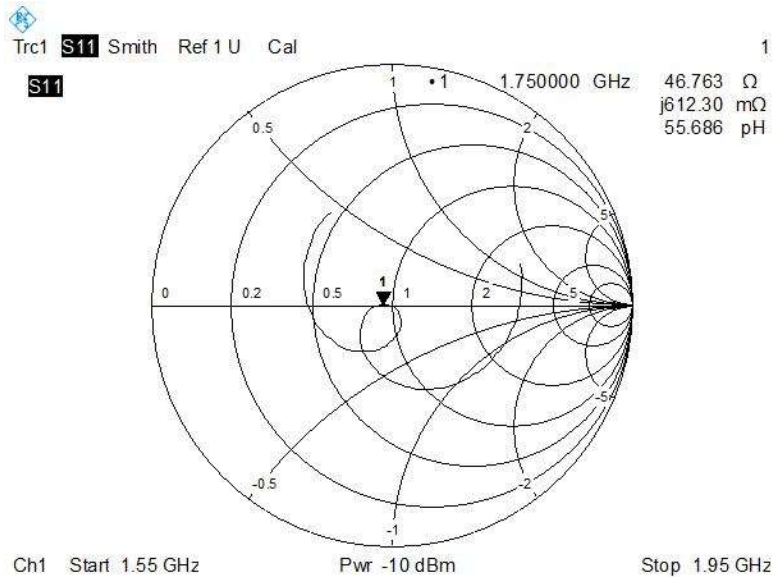
**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-25.272	-24.825	1.81%
Impedance	46.763 $\Omega$ +0.612 j $\Omega$	45.20 $\Omega$ - 2.611 j $\Omega$	3.223 $\Omega$ (Real part)

**Return Loss**



**Impedance**



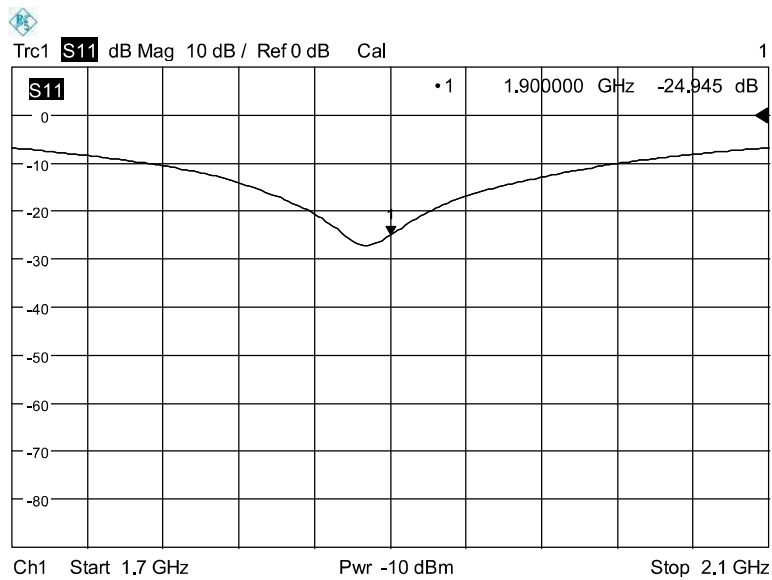


## 2.3D1900V2

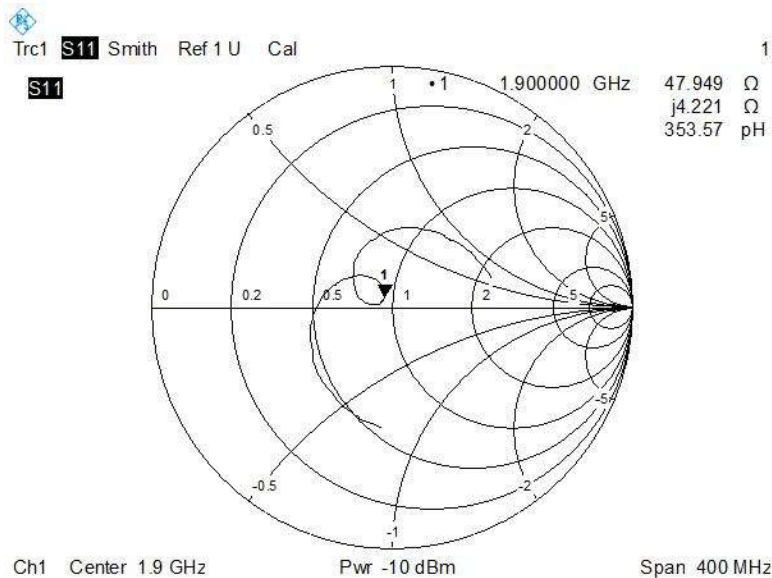
### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-24.945	-24.339	2.49%
Impedance	47.949 $\Omega$ + 4.221 j $\Omega$	51.748 $\Omega$ + 5.933 j $\Omega$	3.799 $\Omega$ (Real part)

#### Return Loss



#### Impedance

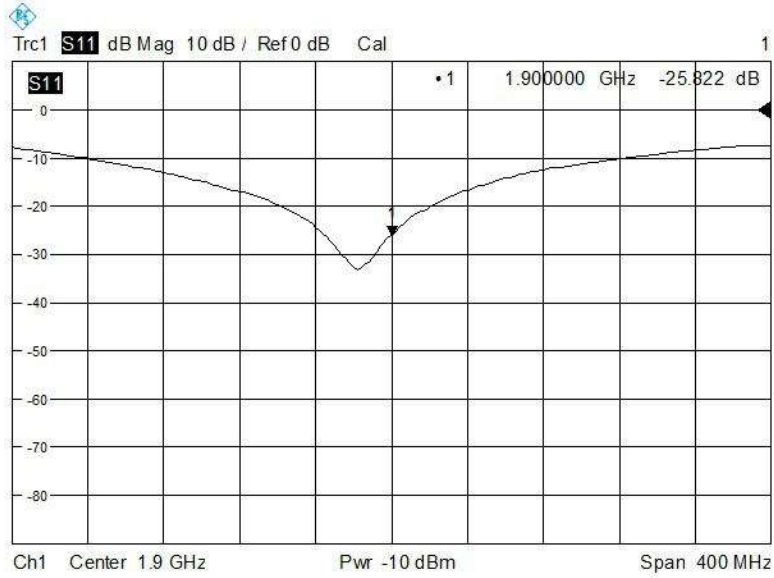




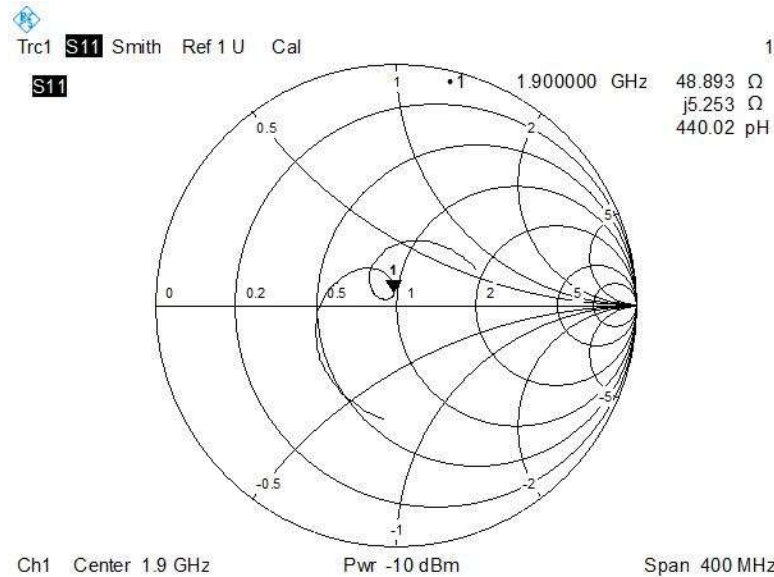
**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-25.822	-24.704	4.53%
Impedance	48.893 $\Omega$ + 5.253 j $\Omega$	47.771 $\Omega$ + 5.242 j $\Omega$	1.122 $\Omega$ (Real part)

**Return Loss**



**Impedance**



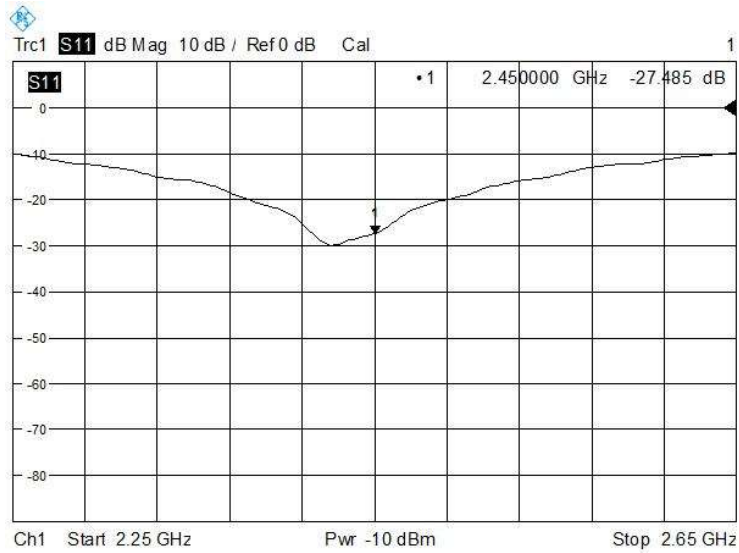


## 2.4D2450V2

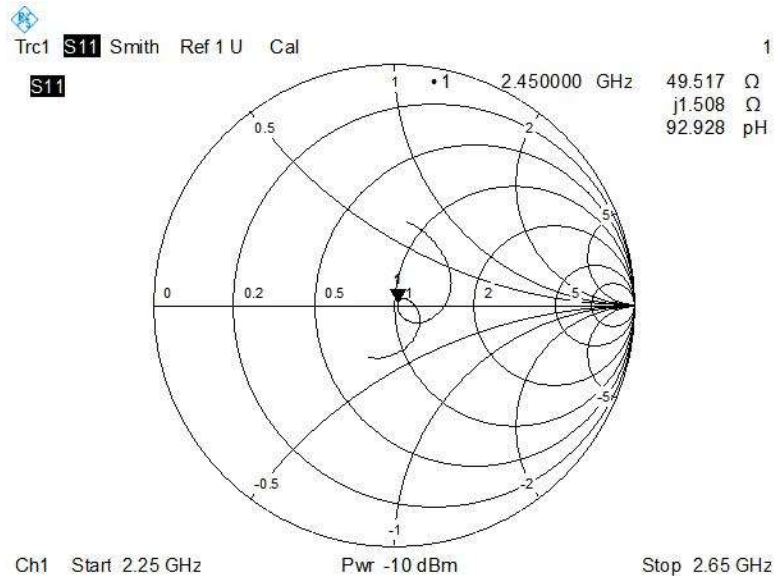
### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-27.485	-26.753	2.74%
Impedance	49.517 $\Omega$ + 1.508 j $\Omega$	54.071 $\Omega$ + 2.513 j $\Omega$	4.554 $\Omega$ (Real part)

#### Return Loss



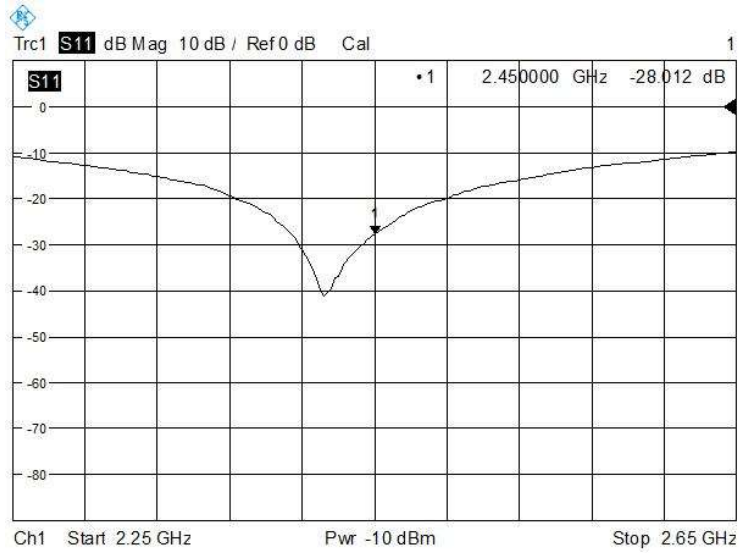
#### Impedance



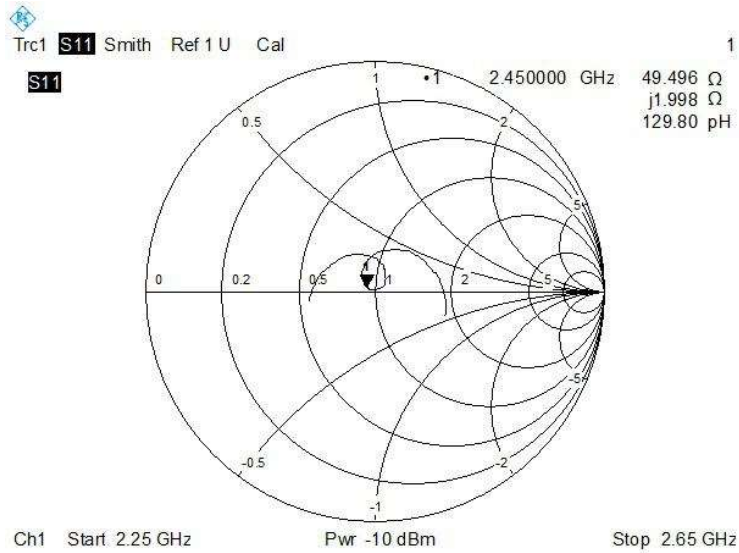
**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss (dB)	-28.012	-27.882	0.47%
Impedance	49.496 $\Omega$ + 1.998 $j\Omega$	52.349 $\Omega$ + 3.40 $j\Omega$	2.853 $\Omega$ (Imaginary part)

**Return Loss**



**+Impedance**





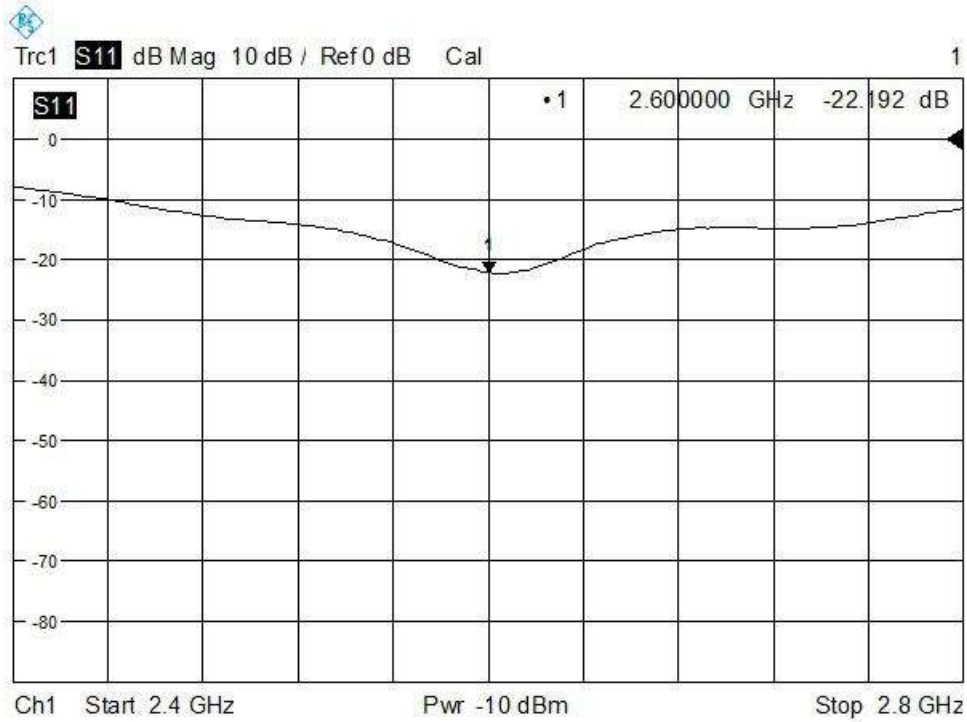


## 2.5 D2600V2

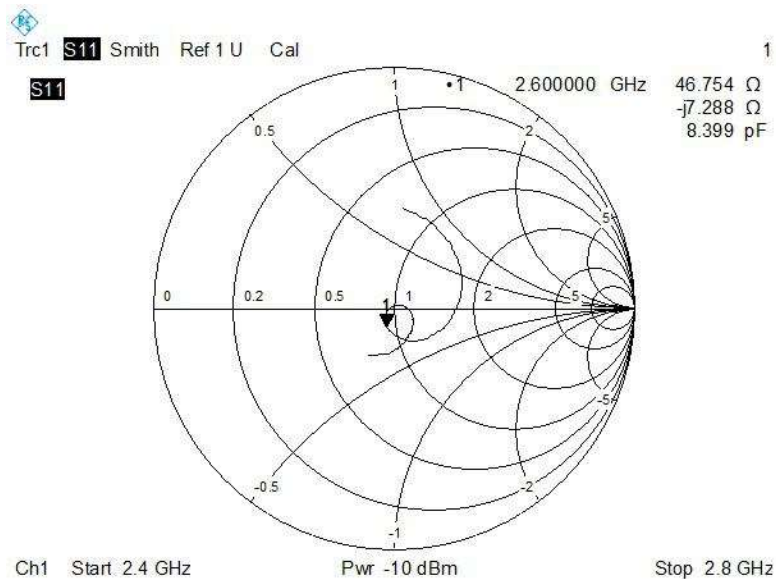
### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-22.192	-25.784	13.93%
Impedance	46.754 $\Omega$ -j7.288 j $\Omega$	49.443 $\Omega$ -5.089j $\Omega$	2.689 $\Omega$ (Real part)

#### Return Loss



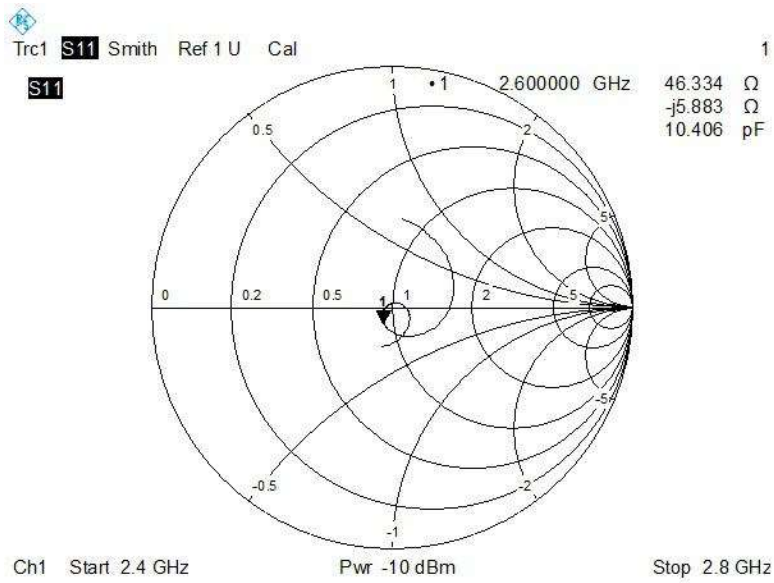
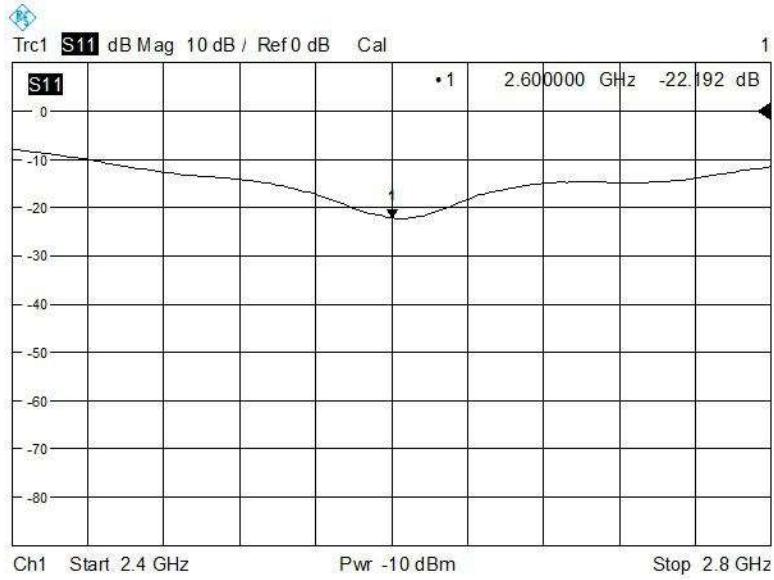
#### Impedance



**RETURN LOSS AND IMPEDANCE IN BODY LIQUID**

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation
Return Loss(dB)	-22.192	-23.544	5.74%
Impedance	46.334 $\Omega$ -5.883 j $\Omega$	46.722 $\Omega$ -5.546 j $\Omega$	0.388 $\Omega$ (Real part)

**Return Loss**



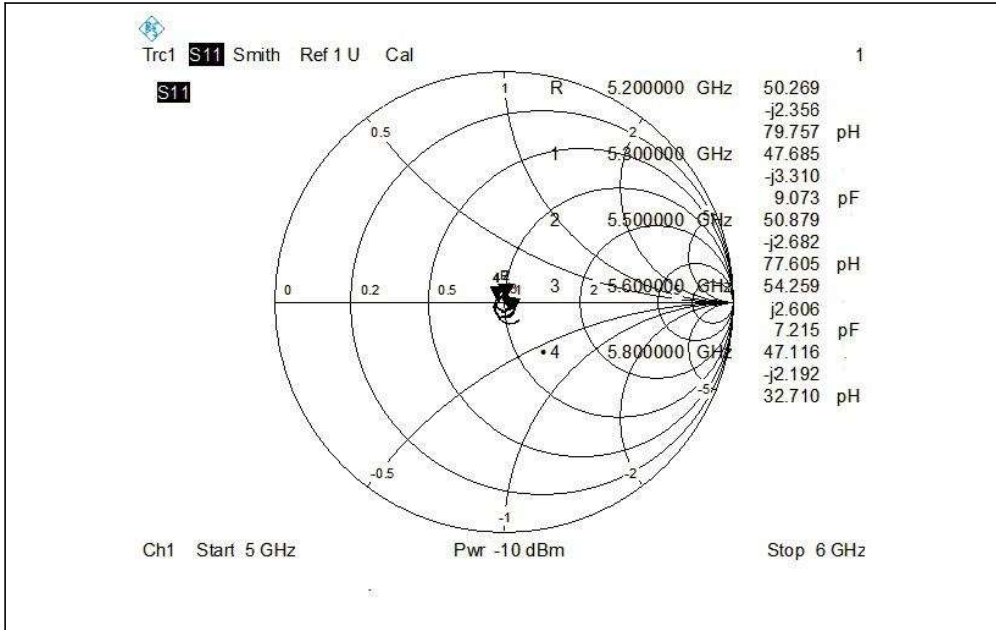
**Impedance**



## 2.6D5GHzV2

### RETURN LOSS AND IMPEDANCE IN HEAD LIQUID

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation																		
5200 MHz																					
Return Loss(dB)	-30.669	-26.768	14.57%																		
Impedance	50.269 $\Omega$ -2.356 j $\Omega$	48.076 $\Omega$ -4.072 j $\Omega$	2.193 $\Omega$ (Real part)																		
5300 MHz																					
Return Loss(dB)	-28.296	-24.513	15.43%																		
Impedance	47.685 $\Omega$ -3.310 j $\Omega$	44.645 $\Omega$ -1.737 j $\Omega$	3.040 $\Omega$ (Real part)																		
5500 MHz																					
Return Loss(dB)	-27.984	-25.270	10.74%																		
Impedance	50.879 $\Omega$ -2.682 j $\Omega$	51.294 $\Omega$ -5.376 j $\Omega$	2.694 $\Omega$ (Imaginary part)																		
5600 MHz																					
Return Loss(dB)	-25.490	-25.588	0.38%																		
Impedance	54.259 $\Omega$ +2.606j $\Omega$	55.495 $\Omega$ +0.732 j $\Omega$	1.874 $\Omega$ (Imaginary part)																		
5800 MHz																					
Return Loss(dB)	-29.226	-28.185	3.69%																		
Impedance	47.116 $\Omega$ -2.192 j $\Omega$	49.545 $\Omega$ -3.856 j $\Omega$	2.429 $\Omega$ (Real part)																		
Return Loss																					
<table border="1" style="margin-top: 10px;"> <thead> <tr> <th>•R</th> <th>Frequency (GHz)</th> <th>Return Loss (dB)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5.200000</td> <td>-30.669</td> </tr> <tr> <td>2</td> <td>5.300000</td> <td>-28.296</td> </tr> <tr> <td>3</td> <td>5.500000</td> <td>-27.984</td> </tr> <tr> <td>4</td> <td>5.600000</td> <td>-25.490</td> </tr> <tr> <td>5</td> <td>5.800000</td> <td>-29.226</td> </tr> </tbody> </table> <p>Trc1 S11 dB Mag 10 dB / Ref 0 dB Cal Smo 1 Ch1 Center 5.5 GHz Pwr -10 dBm Span 1 GHz</p>				•R	Frequency (GHz)	Return Loss (dB)	1	5.200000	-30.669	2	5.300000	-28.296	3	5.500000	-27.984	4	5.600000	-25.490	5	5.800000	-29.226
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