SAR Dipole

ISSUED BY Shenzhen BALUN Technology Co., Ltd.



Performance Measurement Report

FOR Validation Dipoles





Report No.: LW-SZ1960012-701

EUT Type: SAR Validation Dipole

Model Name:

D750V3, D835V2, D1750V2

D1900V2, D2450V2, 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.

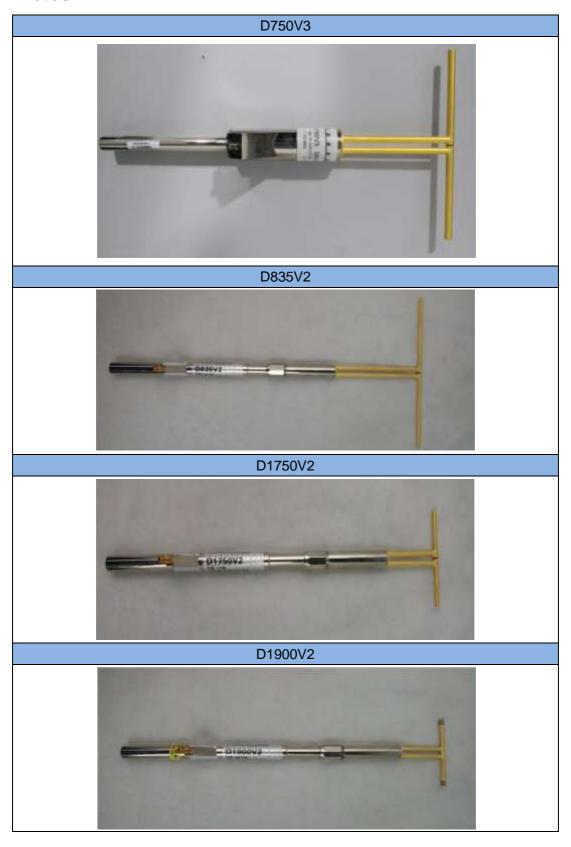
1.2 General Description for Equipment under Test (EUT)

EUT Type	DASY 5 Reference Dipoles
Manufacturer	Speag

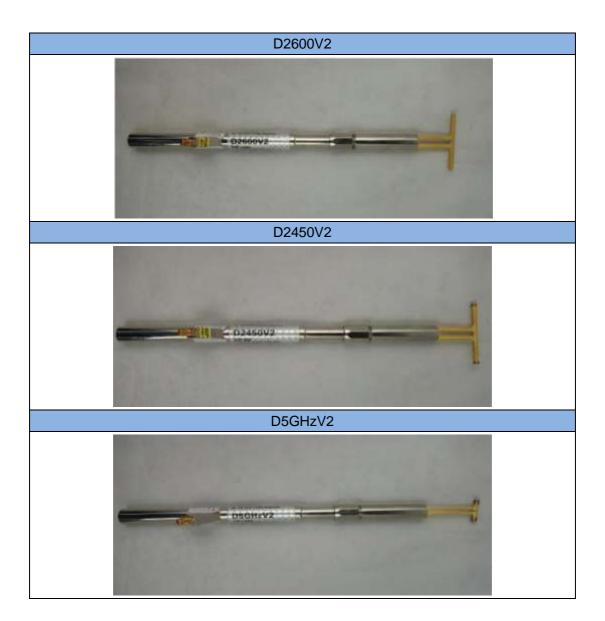
Parameter	EUT 1	EUT 2	EUT 3	EUT 4	EUT 5	EUT 6	EUT 7
Model	D750V3	D835V2	D1750V2	D1900V2	D2450V2	D2600V2	D5GHzV2
Frequency	750 MHz	835 MHz	1750 MHz	1900 MHz	2450MHz	2600 MHz	5GHz-6GHz
Serial Number	SN 1055	SN 4d187	SN 1130	SN 5d193	SN 952	SN 1095	SN 1200
Product							
Condition	Used						
(New/ Used)							
Last Cal. Date	2017/6/26	2017/6/26	2017/7/01	2017/6/30	2017/3/21	2017/7/10	2017/6/29
Current meas. Date	2019/6/11	2019/6/11	2019/6/12	2019/6/12	2019/3/12	2019/6/12	2019/6/13



1.3 EUT Photos









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.

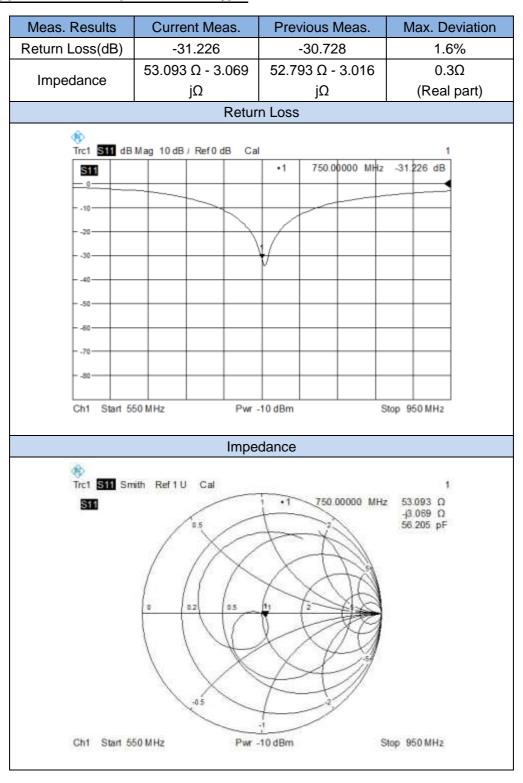
The measurement of verification with return loss should not deviate by more than 20% and minimum of 20 dB of the return loss, and the impedance (real or imaginary parts) should not deviate by more than 5 Ohms from the previous measurement using network analyzer.

Note:

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



2.1 D750V3

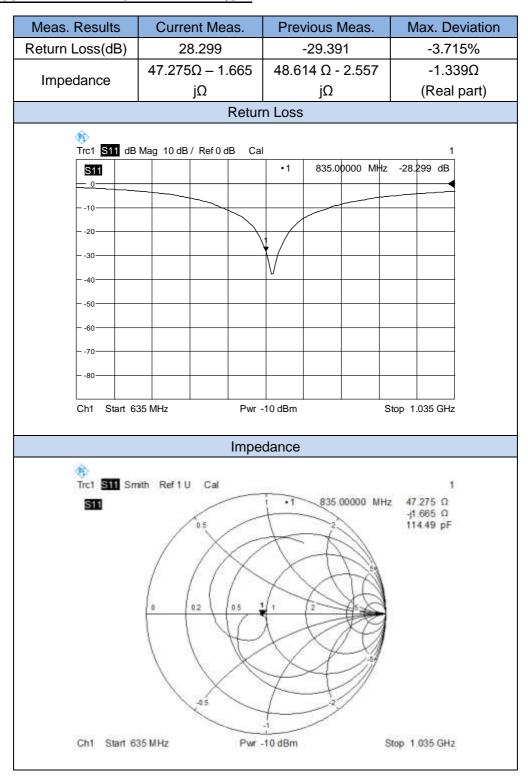




Meas. Results	Current Mea	s. Prev	vious Meas.	Max. Deviation						
Return Loss(dB)	-31.108		-30.881	0.7%						
Impodonos	51.346 Ω - 3.0	056 51.9	21 Ω - 3.131	-0.575Ω						
Impedance	jΩ		jΩ	(Real part)						
Return Loss										
S11		•1	835.00000 MHz	-31.108 dB						
0	+									
-10										
20		1/								
30		₩								
40										
50	+ + +									
60										
70										
80										
Ch1 Start 550 MHz Pwr -10 dBm Stop 950 MHz										
	Impedance									
*										
The state of the s	th Ref1U Cal			1						
S11		1.1	750.00000 MHz	-j3.056 Ω						
	0.5	1		63.154 pF						
	/ /X	$/ \setminus$	11/4							
	1 // /	$\wedge \swarrow \wedge$	16th							
1	0 02 0	5 11								
0 02 05 1 2 4										
		\times								
	/ X	X	1//							
	-05	4	-3/							
(4230) 1000 - 1000										
Ch1 Start 55	0 MHz	Pwr -10 dBm	8	Stop 950 MHz						



2.2 D835V2

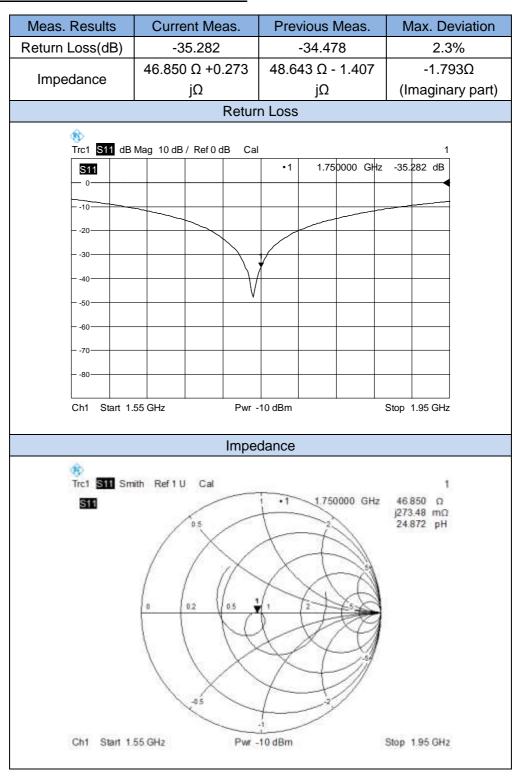




	-24.36 47.851 Ω - jΩ Mag 10 dB / Ref Ω	Return ef 0 dB Cal Pwr -10	46.544 Loss	5.430 · Ω - 3.507 jΩ	1.3	
Trc1 S11 dB S11 - 0 10 20 30 40 50 60 70 80 Ch1 Start 63	jΩ Mag 10 dB / Ref Ω	Return ef 0 dB Cal Pwr -10	Loss ·1 8	jΩ	(Rea	al part)
Trc1 S11 dB S11 - 01020304050607080 Ch1 Start 6:	Mag 10 dB / Ref 0	Return ef 0 dB Cal Pwr -10	·1 8		lz -24.368 dF	1 3 4
Trc1 S11 dB S11 - 01020304050607080 Ch1 Start 63		ef 0 dB Cal	•1 8	835.00000 MH		3
Trc1 S11 dB S11 - 01020304050607080 Ch1 Start 63		Pwr -10		835.00000 MH		3
1020304050607080 Ch1 Start 6:	35 MHz			835.00000 MH		
20 30 40 50 60 70 80 Ch1 Start 63	35 MHz		0 dBm		Stop 1 025 G	H7
30 40 50 60 70 80 80 	35 MHz		0 dBm		Stop 1 025 G	H7
30 40 50 60 70 80 80 	35 MHz		0 dBm		Stop 1 025 G	H7
4050607080 Ch1 Start 6:	35 MHz		0 dBm		Stop 1 025 G	Hz
50	35 MHz		0 dBm		Stop 1 025 G	Hz
60 70 80 Ch1 Start 6:	35 MHz		0 dBm		Stop 1 025 G	Hz
70 80 Ch1 Start 6:	35 MHz		0 dBm		Stop 1 035 G	Hz
Ch1 Start 6:	35 MHz		0 dBm		Stop 1 035 Cl	Hz
Ch1 Start 6:	35 MHz		0 dBm		Stop 1 035 G	Hz
Trc1 S11 Sm	35 MHz		0 dBm		Stop. 1.035 GI	 Hz
(f) Trc1 S11 Sm	00 IVII 12		o abiii			
Trc1 SII Sm					Ctop 1.000 Ct	12
Trc1 SII Sm		Impeda	ance			
Ch1 Start 6	nith Ref 1 U Cal	0.5		835.00000 M	Hz 47.851 c -J3.128 c 60.927 p) F



2.33.3 D1750V2

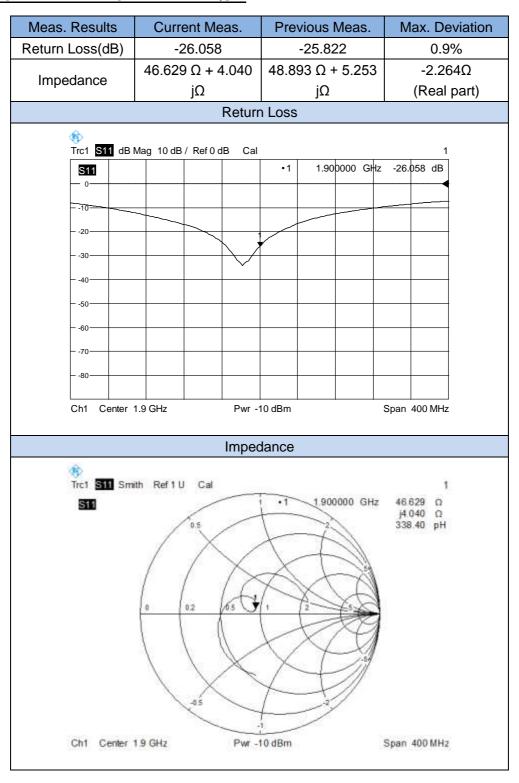




Meas. Results	Current Me	eas.	Prev	ious I	Meas.	M	lax. Deviation		
Return Loss(dB)	-28.005	5	-	27.87	72		0.5%		
Impedance	48.868 Ω - ′	1.505	46.76	3 Ω +	0.612		-2.117Ω		
impedance	jΩ			jΩ			(Real part)		
		Return	Loss						
♦	40 dD i D-40	an oa							
S11	Mag 10 dB / Ref0	dB Cal	•1	1.75	0000 GHz	-28.	005 dB		
0							├ ─₹		
-10	+								
20	+		-4						
-30		1×1	\longrightarrow						
40		$\vdash \lor \vdash$							
50									
60									
-70		\vdash							
-80									
Ch1 Start 1.55 GHz Pwr -10 dBm Stop 1.95 GHz									
		Impeda	ance						
Trc1 SII Sm	th Ref 1 U Cal	X		1,750	0000 GHz	-11.	1 868 Ω 505 Ω 413 pF		
Ch1 Start 1.	55 GHz	Pwr -1	0 dBm			Stop	1.95 GHz		



2.4D1900V2





Meas. Results	Current N	/leas.	Prev	ious M	leas.	Max. De	viation			
Return Loss(dB)	-25.80)7	,	-24.513	3	5.39	%			
Impedance	45.326 Ω +	4.648	46.74	19 Ω + 4	4.221	-1.42	:3Ω			
impedance	jΩ			jΩ		(Real	part)			
	Return Loss									
®	10 ID / D /	0.15.0.1								
S11	Mag 10 dB / Ref	0 dB Cal	•1	1.9000	000 GHz	-25.807 dB				
0										
-10										
20										
-30										
-40										
50										
60										
70										
80										
Ch1 Center	1.9 GHz	Pwr -	10 dBm		\$	Span 400 MHz				
		Impe	dance							
€										
STATE OF THE PARTY	ith Ref 1 U Ca	31	1 1	- 10000	00 GHz	1 45.326 Ω				
S11	0.5		+	1,3000	oo anz	45.326 Ω j4.648 Ω 389.37 pH				
	/ ">	ζ.	1	-1		000 at pit				
	1/	\times	1	1	11/2					
	1	17	X	XT	D					
	0 0.2	N5 3	(,)	2	500					
		1	\	1	9					
			1	^_	$\rightarrow J$					
	/ /		_/_	4	///					
	-05	X	1-		/					
	1									
Ch1 Center	1.9 GHz	Pwr -	10 dBm	86	95	Span 400 MHz				
wasterin world thrill	overentet i comini	20.000				The second secon				



2.5 D2450V2

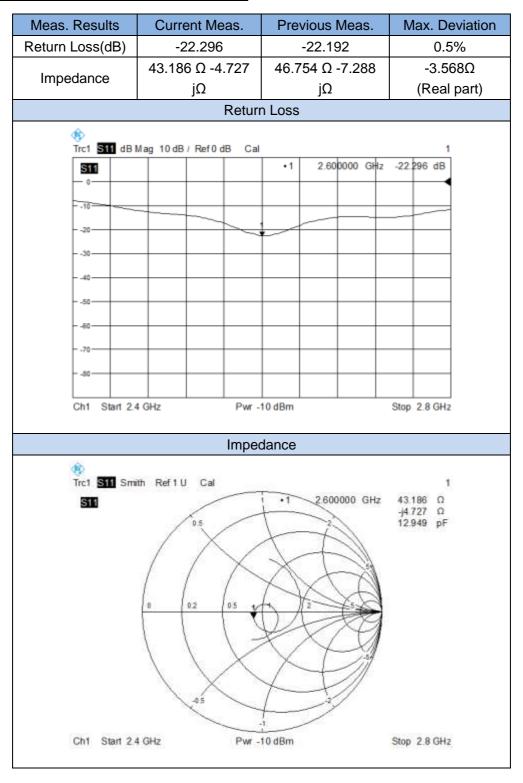
Meas. Results	Current	Meas.	Previ	ous Meas.	Max. Deviation	n			
Return Loss(dB)	-26.3	50	-2	28.271	-6.8%				
Impedance	46.7 Ω + 1	.584 jΩ	49.7 C	2 + 1.669 jΩ	3.011Ω (Real part)				
Return Loss									
∳ Trc1 S11 dB	Mag 10dB/R	ef0dB Ca	ıl		1				
S11			•1	2.450000 GH	z -26.350 dB				
10									
20		1							
40		\square							
50									
60									
70									
-00									
Ch1 Start 2	2.25 GHz	Pwr	-10 dBm		Stop 2.65 GHz				
		Impe	dance						
SII	0 02	95		2.450000 Gi	j1.584 Ω 102.89 pH				
Ch1 Start 2	.25 GH2	Pwr	-10 dBm		Stop 2.65 GHz				



Meas. Results	Current Me	eas.	Previ	ous Mea	as.	Max. Devia	ition			
Return Loss (dB)	-27.330)	-:	27.205		-0.5%				
Impedance	46.3 Ω + 0.4	22 jΩ	46.8 🕻	Ω + 1.658	З јΩ	1.236Ω (Imaginary				
Return Loss										
frc1 S11 dB	Mag 10 dB / Ref 0	dB Cal				1				
S11			•1	2.450000) GHz	-27.330 dB				
20										
30 40										
50 60										
70										
Ch1 Start 2.	25 GHz	Pwr -1	0 dBm			Stop 2.65 GHz				
		+Impe	dance							
Trc1 S11 Sm S11	0 02	95 0	, -	2.450000	GHz	1 46.267 Ω j422.43 mΩ 27.441 pH				
Ch1 Center	2.45 GHz	Pwr -1	0 dBm		5	Span 400 MHz				



2.6 D2600V2





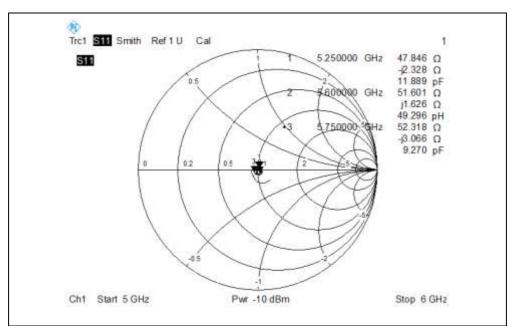
Meas. Results	Current Me	eas.	Prev	ious M	leas.	Max. Deviation				
Return Loss(dB)	-22.987	7		-21.79	4	5.5%				
Impedance	41.679 Ω -4	1.509	46.3	34 Ω -5	5.883	-4.655Ω				
impedance	jΩ			jΩ		(Real part)				
Return Loss										
Trc1 S11 dB Mag 10 dB / Ref 0 dB Cal 1										
S11	wag 10 dB / Horo	db our	•1	2.6000	000 GHz	-22.987 dB				
0										
10										
20										
30										
40										
50										
60										
70										
80										
Ch1 Start 2.4	1 GHz	Pwr -	10 dBm	-		Stop 2.8 GHz				
		Imped	dance							
180										
	0.5 0.5	0.5		2,6000	00 GHz	1 41.679 Ω -)4.509 Ω 13.576 pF				
Ch1 Start 2.4	I GHz	Pwr -	10 dBm			Stop 2.8 GHz				



2.7 D5GHzV2

Meas. Results	Current Meas.	Previous Meas.	Max. Deviation			
	5250	MHz				
Return Loss(dB)	-26.080	-25.052	4.1%			
Impedance	47.846 Ω -2.328 jΩ	47.735 Ω -4.621 jΩ	2.293Ω (Imaginary n			
	F600	MHz	part)			
Datum Laga(dD)	-24.770	-26.377	-6.1%			
Return Loss(dB)						
Impedance	51.601 Ω -1.626	54.525 Ω+2.142	-2.924Ω			
	jΩ	jΩ	(Real part)			
D. (I (!D)		MHz	5.00/			
Return Loss(dB)	-31.141	-29.503	5.6%			
Impedance	52.318 Ω -3.066	51.171 Ω -3.278	1.147Ω (Real part)			
<u>'</u>	JΩ JΩ					
Alb.	Retur	n Loss				
Trc1 S11 dB1	Mag 10 dB / Ref0 dB Cal		1			
S11		1 5.750000 GHz •2 5.250000 GHz	-31.141 dB -26.080 dB			
0		3 5.600000 GHz				
-10						
-20	2	<u> </u>				
20		1				
40	<i>^</i>	W \	4			
-50						
60						
-70						
50						
Ch1 Start 5	GHz Pwr-	10 dBm	Stop 6 GHz			
	Impe	dance				

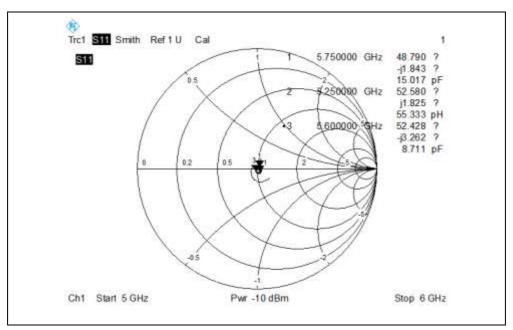






Meas. Results	Current Meas.	Previous Meas.	Max. Deviation	
	5250	MHz		
Return Loss(dB)	-31.244	-30.483	2.5%	
Impedance	48.790 Ω -1.843 jΩ	47.975 Ω -2.840 jΩ	0.997Ω (Imaginary n part)	
	5600	MHz		
Return Loss(dB)	-24.96	-24.636	1.3%	
Impedance	52.580 Ω +1.825 jΩ	54.321 Ω + 3.910 jΩ	-2.085Ω (Imaginary n part)	
	5750	MHz	. ,	
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)	
Δ.	Returi	n Loss		
- 10 - 10 - 20 - 30 - 40 - 50 - 50 - 50 - 50	Mag 10 dB / Ref 0 dB Cal	1 5.250000 GHz 2 5.600000 GHz -3 5.750000 GHz	-31,244 dB -24,960 dB -30,060 dB	
Ch1 Start 5 0	GHz Pwr -	10 dBm	Stop 6 GHz	
	Imne	dance		





--END OF REPORT--