



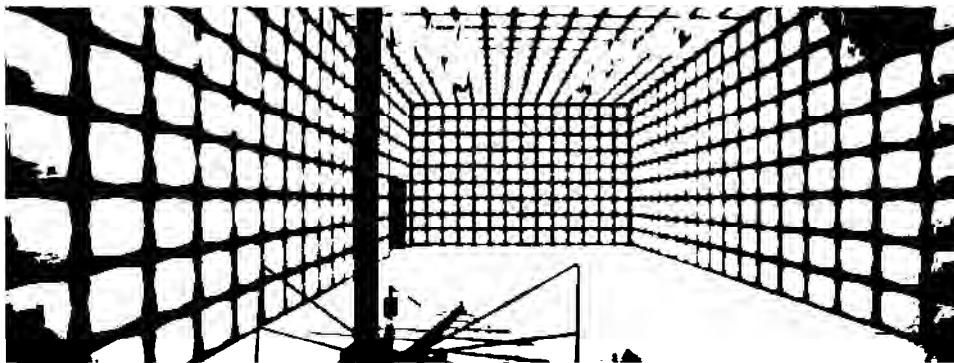
# Masimo Corporation

Rad-67

SAR Evaluation Report: MASI0632, Issue Date: December 9, 2020

Evaluated to the following SAR specification:

FCC 2.1093:2020



NVLAP LAB CODE: 200881-0



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# CERTIFICATE OF TEST



**Last Date of Test: December 9, 2020**  
**Masimo Corporation**  
**EUT: Rad-67**

## Applicable Standard

Test Description	Specification	Test Method	Pass/Fail
SAR Evaluation	FCC 2.1093:2020	FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 FCC KDB 248227 D01 v02r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013	Pass

## Highest Measured SAR Values:

Radio	Equipment Class	Frequency Bands (MHz)	Body (W/kg)	Limit (W/kg)	Exposure Environment
			1g	1g	
Bluetooth	DSS	2402-2480	<b>0.30</b>	1.6	General Population
Wi-Fi 802.11bgn	DTS	2412-2462	<b>0.37</b>	1.6	
Wi-Fi 802.11an	NII	5180-5240	0.35	1.6	
		5260-5320	0.54	1.6	
		5500-5700	<b>0.75</b>	1.6	
		5745-5825	0.42	1.6	

## Deviations From Test Standards

None

**Approved By:**

Don Facteau, Systems Architect

# REVISION HISTORY



<b>Revision Number</b>	<b>Description</b>	<b>Date</b> (yyyy-mm-dd)	<b>Page Number</b>
00	None		

# ACCREDITATIONS AND AUTHORIZATIONS



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## United States

**FCC** - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

**A2LA** - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

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## Canada

**ISED** - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

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## European Union

**European Commission** – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

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## Australia/New Zealand

**ACMA** - Recognized by ACMA as a CAB for the acceptance of test data.

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## Korea

**MSIT / RRA** - Recognized by KCC's RRA as a CAB for the acceptance of test data.

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## Japan

**VCCI** - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

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## Taiwan

**BSMI** – Recognized by BSMI as a CAB for the acceptance of test data.

**NCC** - Recognized by NCC as a CAB for the acceptance of test data.

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## Singapore

**IDA** – Recognized by IDA as a CAB for the acceptance of test data.

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## Israel

**MOC** – Recognized by MOC as a CAB for the acceptance of test data.

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## Hong Kong

**OFCA** – Recognized by OFCA as a CAB for the acceptance of test data.

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## Vietnam

**MIC** – Recognized by MIC as a CAB for the acceptance of test data.

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## SCOPE

For details on the Scopes of our Accreditations, please visit:  
<https://www.nwemc.com/emc-testing-accreditations>

# FACILITIES



**California**  
 Labs OC01-17  
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 Irvine, CA 92618  
 (949) 861-8918

**Minnesota**  
 Labs MN01-11  
 9349 W Broadway Ave.  
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 (612)-638-5136

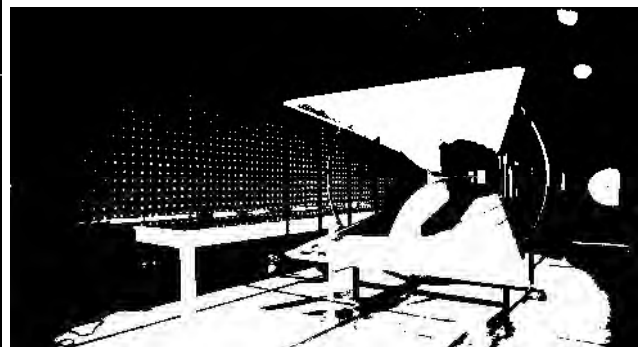
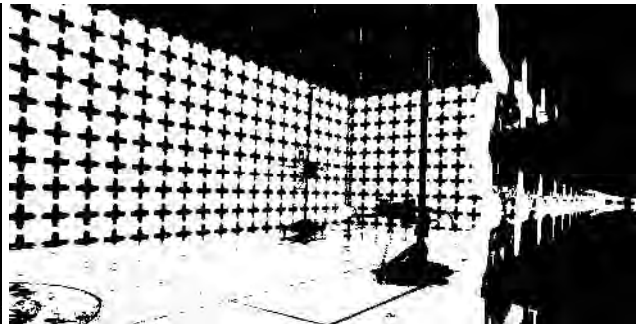
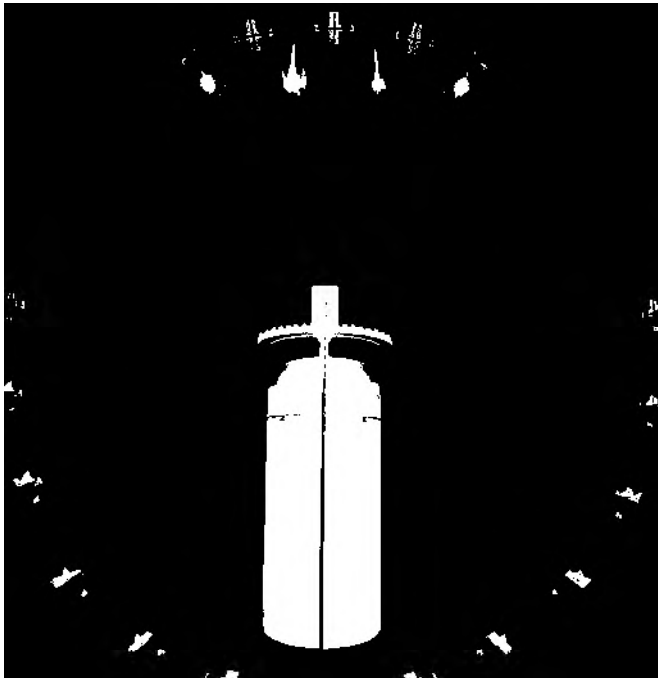
**Oregon**  
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 6775 NE Evergreen Pkwy #400  
 Hillsboro, OR 97124  
 (503) 844-4066

**Texas**  
 Labs TX01-09  
 3801 E Plano Pkwy  
 Plano, TX 75074  
 (469) 304-5255

**Washington**  
 Labs NC01-05  
 19201 120<sup>th</sup> Ave NE  
 Bothell, WA 98011  
 (425)984-6600

## NVLAP

NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
<b>Innovation, Science and Economic Development Canada</b>				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
<b>BSMI</b>				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
<b>VCCI</b>				
A-0029	A-0109	A-0108	A-0201	A-0110
<b>Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA</b>				
US0158	US0175	US0017	US0191	US0157



# PRODUCT DESCRIPTION



2014-12-10

## Client and Equipment Under Test (EUT) Information

Company Name:	Masimo Corporation
Address:	52 Discovery
City, State, Zip:	Irvine, CA 92618
Test Requested By:	Anami Joshi
Model:	Rad-67
First Date of Test:	July 13, 2020
Last Date of Test:	December 9, 2020
Receipt Date of Samples:	June 29, 2020
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

## Information Provided by the Party Requesting the Test

### Functional Description of the EUT:

System testing on Rad-67 with MWMII radio installed. The radio contains a combination 802.11abgn and Bluetooth radio module. The device is handheld and can be used within 20 cm of the human torso.

FCC ID: VKF-MWM2

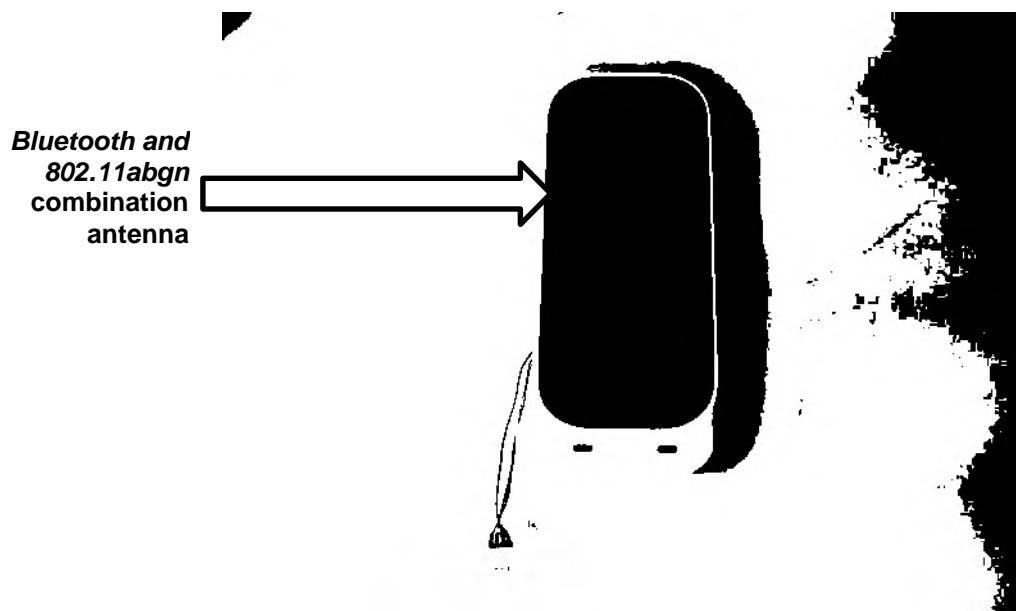
The device contains the following radios:

BLE and Bluetooth BDR/EDR: 2402 – 2480 MHz

802.11bgn: 2412 – 2462 MHz (SISO, 20 and 40 MHz channel bandwidths)

802.11an: 5180 – 5240, 5260 – 5320, 5500 – 5700, 5745 – 5825 MHz (SISO, 20 and 40 MHz channel bandwidths)

### Location of transmit antenna(s):



# PRODUCT DESCRIPTION



2014-12-10

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## Testing Locations and Separation Distance:

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Technology	EUT Orientation					
	Front	Back	Left	Right	Top	Bottom
Bluetooth BDR/EDR/LE	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
802.11bgn DSSS	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
802.11bgn OFDM	Reduced <sup>1</sup>	Reduced <sup>1</sup>	Reduced <sup>1</sup>	Reduced <sup>1</sup>	Reduced <sup>1</sup>	Reduced <sup>1</sup>
802.11an U-NII-1	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
802.11an U-NII-2A	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
802.11an U-NII-2C	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
802.11an U-NII-3	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm

1: Per KDB 248227 D01 5.2.2, when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS maximum output power and if the SAR  $\leq 1.2$  W/kg over 1g, SAR is not required for 2.4 GHz OFDM conditions.

2: Per KDB 248227 D01 5.3.1, SAR is initially measured on the band with the highest rated power between U-NII-1 and U-NII-2A, when they are the same U-NII-2A is measured. The SAR value for the non-measured band is then estimated by taking the SAR value for the measured band and adjusting it by the ratio of the rated power values between the non-measured band and the measured band. If the estimated SAR  $\leq 1.2$  W/kg over 1g, SAR is not required for the non-measured band.

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## Rated Power and Software Power Settings:

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Radio and/or Band	Max Rated Power (dBm)	Software Power Setting
Bluetooth	8.3	Note 1
Wi-Fi 2.4 GHz ISM	17.1	15
Wi-Fi U-NII-1	15.1	15
Wi-Fi U-NII-2A	15.3	15
Wi-Fi U-NII-2C	14.4	15
WiFi U-NII-3	13.9	15

1: The output power for this radio could not be set by the lab. It was tested as provided by the manufacturer.

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## Simultaneous Transmission:

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The EUT does not have simultaneous transmission capability.

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## Testing Objective:

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To demonstrate compliance of the 802.11abgn radio and the Bluetooth BDR/EDR radio with the SAR requirements of FCC 2.1093:2020.

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# CONFIGURATIONS



## Configuration MASI0632- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Rad-67	Masimo Corporation	27712	5000006607

## Configuration MASI0632- 2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Rad-67	Masimo Corporation	27712	5000006560



# MODIFICATIONS



## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2020-07-30	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.
2	2020-9-23	SAR Evaluation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.
3	2020-11-3	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2020-11-11	SAR Evaluation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.
5	2020-12-9	SAR Evaluation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# TISSUE – EQUIVALENT LIQUID DESCRIPTION




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## Characterization of tissue-equivalent liquid dielectric properties

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When below 5 GHz, the measured values must be within  $\pm 10\%$  of the target values provided SAR error compensation algorithms documented in IEEE Std 1528-2013 section E.3.2.2 are implemented for upward correction purposes only. When between 5 and 6 GHz, measured values must be within  $\pm 5\%$  of the target values. The temperature variation in the liquid during SAR measurements must be within  $\pm 2$  °C of that recorded when the dielectric properties were measured.

The dielectric parameters of the tissue-equivalent liquids were measured using the SPEAG DAKS:200 dielectric assessment kit. The dielectric measurements were made across the frequency range of the liquid. The attached data sheets show that the dielectric parameters of the liquid were within the required tolerances.

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## Target values of dielectric parameters

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Per KDB 865664 D01 v01r04, Appendix A:

The head tissue dielectric parameters recommended by IEEE Std 1528-2013 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in IEEE Std 1528 are derived from tissue dielectric parameters computed from the 4-Cole-Cole equations described above and extrapolated according to the head parameters specified in IEEE Std 1528.”

Linear interpolation is used for determining target dielectric parameters for values between those listed. Linear extrapolation is used for determining target dielectric parameters for values above 5800 MHz.

Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma$ (S/m)	$\epsilon_r$	$\sigma$ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity, and  $\rho = 1000$  kg/m<sup>3</sup>)

# TISSUE – EQUIVALENT LIQUID DESCRIPTION



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## Composition of Ingredients for Liquid Tissue Phantoms

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Element uses broadband tissue equivalent liquids prepared by SPEAG and confirmed by Element to be within  $\pm 10\%$  of target values below 5 GHz and  $\pm 5\%$  of target values between 5 and 6 GHz. SAR error compensation algorithms documented in IEEE Std 1528-2013 are implemented for upward correction purposes only.

By percent weight, the approximate compositions of the broadband tissue are listed below. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation:

Material	Percent Weight
Ethenediol	<5.2%
Sodium Petroleum Sulfonate	<2.9%
Hexylene Glycol	<2.9%
Alkoxylated Alcohol	<2.0%
Mineral Oils	<20%
Deionized Water	Fill to volume

The exact liquid recipes are proprietary to the tissue equivalent liquid manufacturer.

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## SAR Correction Formula for Deviation from Target Dielectric Values

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When measuring below 5 GHz, a correction formula is automatically applied by the measurement software to SAR data to account for the deviation from the target dielectric values. The correction formula only scales measured values upward. The SAR system manufacturer has been contacted and has verified Element's implementation and understanding of the SAR correction formula. The correction is calculated following IEEE Std 1528-2013 Annex E.3. Where SAR correction is considered, there will be a note stating "SAR corrected for target medium." The equation is as follows:

$$\Delta SAR = c_{\epsilon} \Delta \epsilon_r + c_{\sigma} \Delta \sigma$$

Where the values for,  $\Delta \epsilon_r$  and  $\Delta \sigma$  and are the percent the permittivity and conductivity respectively are away from ideal values and where  $\Delta SAR$  is the percent the measured SAR value is corrected.

When 1 g peak spatial-average SAR measurements are taken:

$$c_{\epsilon} = -7.854 \times 10^{-4} f^3 + 9.402 \times 10^{-3} f^2 - 2.742 \times 10^{-2} f - 0.2026$$

$$c_{\sigma} = 9.804 \times 10^{-3} f^3 - 8.661 \times 10^{-2} f^2 + 2.981 \times 10^{-2} f + 0.7829$$

Where  $f$  is the frequency in GHz.

When 10 g peak spatial-average SAR measurements are taken:

$$c_{\epsilon} = 3.456 \times 10^{-3} f^3 - 3.531 \times 10^{-2} f^2 + 7.675 \times 10^{-2} f - 0.1860$$

$$c_{\sigma} = 4.479 \times 10^{-3} f^3 - 1.586 \times 10^{-2} f^2 - 0.1972 f + 0.7717$$

Where  $f$  is the frequency in GHz.



# TISSUE – EQUIVALENT LIQUID

EUT:	Rad-67	Work Order:	MASI0632
Customer:	Masimo Corporation	Job Site:	MN11
Attendees:	None	Customer Project:	None

## TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2020	FCC KDB 865664 D01 v01r04, FCC KDB 865664 D02 v01r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013

## HBBL600-10000V6

Date	Tissue Temp (°C)	Ambient Temp (°C)	Freq. (MHz)	Measured Values		Target Values		Deviation	
				Relative Permittivity	Cond. (S/m)	Relative Permittivity	Cond. (S/m)	Permittivity Deviation	Cond. Deviation
9/22/2020	20.0	21.9	2400	40.9	1.77	39.3	1.76	4.1%	0.4%
			2450	40.8	1.81	39.2	1.80	4.1%	0.4%
			2500	40.7	1.85	39.1	1.85	4.2%	-0.1%
9/23/2020	23.0	22.0	2400	41.7	1.85	39.3	1.76	6.2%	4.8%
			2450	41.6	1.89	39.2	1.80	6.2%	4.8%
			2500	41.5	1.93	39.1	1.85	6.2%	4.2%
11/4/2020	22.8	21.8	2400	40.5	1.82	39.3	1.76	3.2%	3.6%
			2450	40.5	1.87	39.2	1.80	3.2%	3.7%
			2500	40.4	1.91	39.1	1.85	3.4%	3.2%
11/5/2020	23.1	20.9	2400	39.2	1.76	39.3	1.76	-0.3%	-0.3%
			2450	39.1	1.80	39.2	1.80	-0.3%	-0.1%
			2500	39.0	1.85	39.1	1.85	-0.3%	0.1%
11/6/2020	22.9	22.0	5150	36.1	4.45	36.0	4.60	0.4%	-3.2%
			5200	36.1	4.52	36.0	4.66	0.2%	-3.1%
			5250	36.0	4.59	35.9	4.71	0.3%	-2.5%
			5300	35.9	4.67	35.9	4.76	0.1%	-2.0%
			5350	35.8	4.73	35.8	4.81	0.1%	-1.7%
			5500	35.7	4.87	35.6	4.96	0.4%	-1.8%
			5550	35.7	4.92	35.6	5.01	0.3%	-1.8%
			5600	35.7	4.98	35.5	5.07	0.5%	-1.9%
			5650	35.6	5.04	35.5	5.12	0.3%	-1.6%
			5700	35.5	5.10	35.4	5.17	0.2%	-1.4%
			5750	35.3	5.15	35.4	5.22	-0.3%	-1.4%
11/9/2020	22.9	22.1	2400	40.6	1.81	39.3	1.76	3.4%	3.0%
			2450	40.5	1.86	39.2	1.80	3.4%	3.1%
			2500	40.5	1.90	39.1	1.85	3.5%	2.5%
11/10/2020	21.0	20.9	5150	35.1	4.56	36.0	4.60	-2.4%	-0.9%
			5200	35.0	4.63	36.0	4.66	-2.7%	-0.7%
			5250	35.0	4.70	35.9	4.71	-2.6%	-0.3%
			5300	34.9	4.77	35.9	4.76	-2.8%	0.2%
			5350	34.8	4.84	35.8	4.81	-2.7%	0.5%
			5500	34.6	5.00	35.6	4.96	-2.9%	0.8%
			5550	34.5	5.05	35.6	5.01	-3.2%	0.8%
			5600	34.3	5.11	35.5	5.07	-3.3%	0.7%
			5650	34.2	5.16	35.5	5.12	-3.6%	0.8%
			5700	34.1	5.21	35.4	5.17	-3.7%	0.9%
			5750	34.0	5.27	35.4	5.22	-3.9%	0.9%
11/11/2020	21.0	21.2	5800	33.9	5.32	35.3	5.27	-4.0%	0.9%
			5850	33.8	5.37	35.3	5.32	-4.3%	0.9%
			5150	35.0	4.62	36.0	4.60	-2.8%	0.3%
			5200	34.9	4.68	36.0	4.66	-3.0%	0.5%
			5250	34.8	4.76	35.9	4.71	-3.0%	1.0%
			5300	34.8	4.83	35.9	4.76	-3.2%	1.5%
			5350	34.7	4.90	35.8	4.81	-3.1%	1.8%
			5700	33.9	5.29	35.4	5.17	-4.2%	2.2%
			5750	33.8	5.34	35.4	5.22	-4.4%	2.3%
			5800	33.7	5.39	35.3	5.27	-4.4%	2.2%
			5850	33.6	5.44	35.3	5.32	-4.7%	2.2%



# TISSUE – EQUIVALENT LIQUID

11/12/2020	22.7	23.7	5150	35.6	4.51	36.0	4.60	-1.2%	-1.9%			
			5200	35.5	4.58	36.0	4.66	-1.4%	-1.7%			
			5250	35.4	4.65	35.9	4.71	-1.4%	-1.2%			
			5300	35.3	4.73	35.9	4.76	-1.5%	-0.7%			
			5350	35.3	4.79	35.8	4.81	-1.5%	-0.4%			
			5500	35.0	4.95	35.6	4.96	-1.6%	-0.2%			
			5550	34.9	5.00	35.6	5.01	-1.8%	-0.2%			
			5600	34.8	5.06	35.5	5.07	-1.9%	-0.3%			
			5650	34.7	5.11	35.5	5.12	-2.2%	-0.1%			
			5700	34.6	5.17	35.4	5.17	-2.3%	0.0%			
			5750	34.5	5.22	35.4	5.22	-2.6%	0.0%			
			5800	34.4	5.27	35.3	5.27	-2.6%	0.1%			
			5850	34.3	5.32	35.3	5.32	-2.9%	0.1%			
12/7/2020	21.2	21.7	5150	37.0	4.64	36.0	4.60	2.8%	0.8%			
			5200	36.9	4.70	36.0	4.66	2.6%	0.9%			
			5250	36.8	4.77	35.9	4.71	2.6%	1.3%			
			5300	36.8	4.84	35.9	4.76	2.4%	1.8%			
			5350	36.7	4.91	35.8	4.81	2.4%	2.1%			
			5500	36.5	5.07	35.6	4.96	2.4%	2.2%			
			5550	36.4	5.12	35.6	5.01	2.2%	2.2%			
			5600	36.3	5.17	35.5	5.07	2.2%	2.1%			
			5650	36.2	5.23	35.5	5.12	1.9%	2.2%			
			5700	36.1	5.29	35.4	5.17	1.9%	2.3%			
			5750	35.9	5.34	35.4	5.22	1.5%	2.3%			
			12/9/2020	22.2	22.8	5150	36.8	4.41	36.0	4.60	2.1%	-4.1%
						5200	36.7	4.48	36.0	4.66	1.9%	-3.9%
5250	36.6	4.54				35.9	4.71	2.0%	-3.5%			
5300	36.6	4.61				35.9	4.76	1.8%	-3.1%			
5350	36.5	4.68				35.8	4.81	1.9%	-2.8%			
5500	36.3	4.83				35.6	4.96	1.9%	-2.7%			
5550	36.2	4.87				35.6	5.01	1.7%	-2.8%			
5600	36.1	4.92				35.5	5.07	1.8%	-2.9%			
5650	36.0	4.98				35.5	5.12	1.5%	-2.8%			
5700	35.9	5.03				35.4	5.17	1.4%	-2.8%			
5750	35.8	5.08				35.4	5.22	1.0%	-2.7%			

# SAR SYSTEM VERIFICATION DESCRIPTION

## REQUIREMENT

Per IEEE 1528, Section 8.2.1, “System checks are performed prior to compliance tests and the results must always be within  $\pm 10\%$  of the target value corresponding to the test frequency, liquid, and the source used. The target values are 1 g or 10 g averaged SAR values measured on systems having current system validation and calibration status, and using the system check setup as shown in Figure 14. These target values should be determined using a standard source.”

## TEST DESCRIPTION

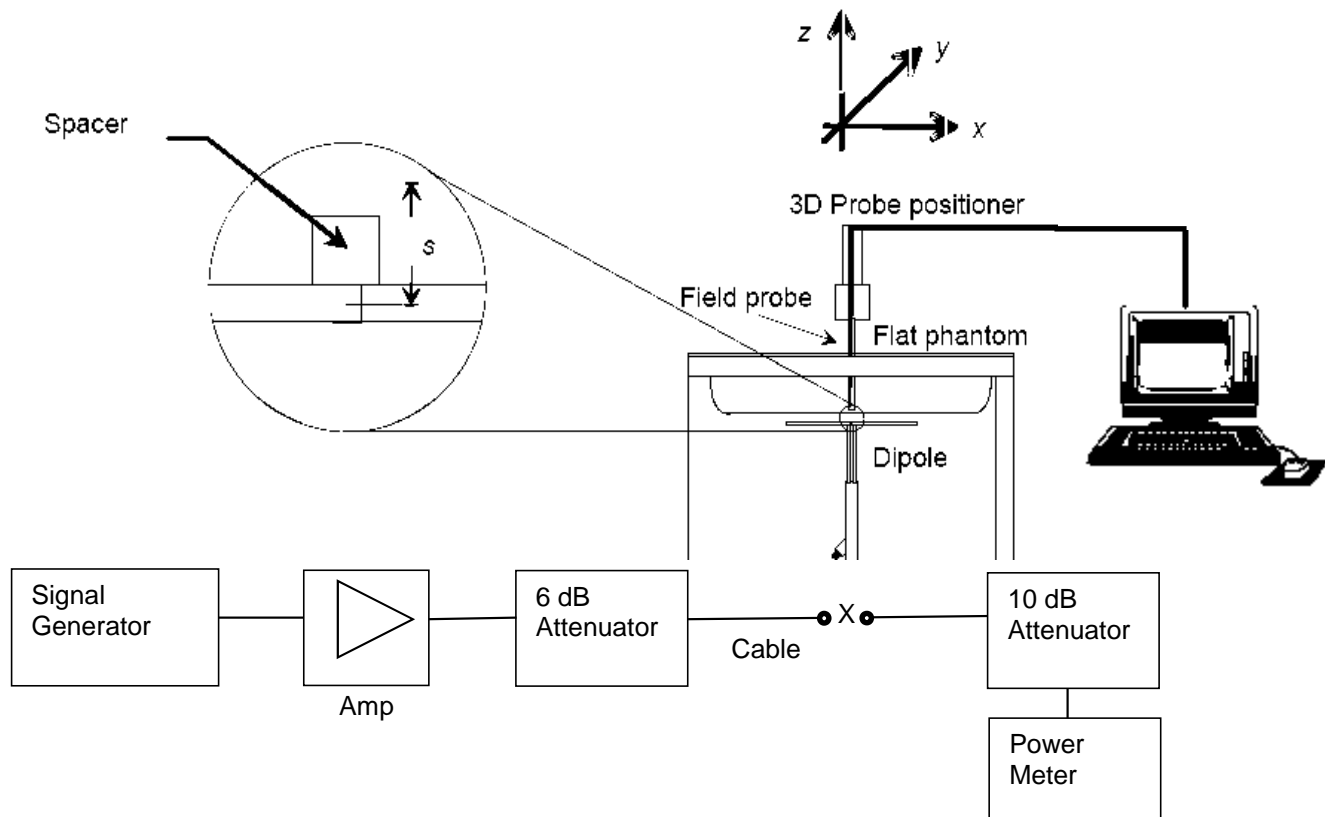
Within 24 hours of a measurement, then every 72 hours thereafter, Element used the system validation kit (calibrated reference dipole) to test whether the system was operating within its specifications. The validation was performed in the indicated bands by making SAR measurements of the reference dipole with the phantom filled with the tissue-equivalent liquid. First, a signal generator and power amplifier were used to produce a 100mW level as measured with a power meter at the antenna terminals of the dipole (X). Then, the reference dipole was positioned below the bottom of the phantom and centered with its axis parallel to the longest side of the phantom. A low loss and low relative permittivity spacer was used to establish the correct distance between the center axis of the reference dipole and the liquid.

For the reference dipoles, the spacing distance  $s$  is given by:

$s = 15\text{mm}, \pm 0.2\text{mm}$  for  $300\text{MHz} \leq f \leq 1000 \text{ MHz}$ :

$s = 10\text{mm}, \pm 0.2\text{mm}$  for  $1000\text{MHz} \leq f \leq 6000\text{MHz}$

The measured 1 g and 10 g spatial average SAR values were normalized to a 1W dipole input power for comparison to the calibration data. The results are summarized in the attached table. The deviation is less than 10% in all cases, indicating that the system performance check was within tolerance.



# SAR SYSTEM VERIFICATION



EUT:	Rad-67	Work Order:	MASI0632
Customer:	Masimo Corporation	Job Site:	MN11
Attendees:	None	Customer Project:	None

## TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2020	FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 FCC KDB 248227 D01 v02r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013

## RESULTS

Date	Tissue Temp (°C)	Ambient Temp (°C)	Freq. (MHz)	Conducted Power into Dipole (dBm)	1W Adj. Factor (dB)	Measured Values		Normalized Values		Target Values		Deviation	
						1g	10g	1g	10g	1g	10g	1g	10g
9/22/2020	20.0	21.9	2450	20.0	10.0	5.24	2.42	52.4	24.2	52.3	24.5	0.2%	-1.2%
11/4/2020	22.8	21.8	2450	20.0	10.0	5.34	2.49	53.4	24.9	52.3	24.5	2.1%	1.6%
11/9/2020	22.9	22.1	<b>2450</b>	<b>20.0</b>	<b>10.0</b>	<b>5.42</b>	<b>2.51</b>	<b>54.2</b>	<b>25.1</b>	<b>52.3</b>	<b>24.5</b>	<b>3.6%</b>	<b>2.4%</b>
11/6/2020	22.9	22.0	5200	20.0	10.0	8.16	2.35	81.6	23.5	80.4	22.7	1.5%	3.5%
			<b>5500</b>	<b>20.0</b>	<b>10.0</b>	<b>7.80</b>	<b>2.22</b>	<b>78.0</b>	<b>22.2</b>	<b>86.4</b>	<b>24.3</b>	<b>-9.7%</b>	<b>-8.6%</b>
			5800	20.0	10.0	8.03	2.27	80.3	22.7	81	22.7	-0.9%	0.0%
11/10/2020	21.0	20.9	5500	20.0	10.0	8.05	2.27	80.5	22.7	86.4	24.3	-6.8%	-6.6%
			<b>5800</b>	<b>20.0</b>	<b>10.0</b>	<b>7.86</b>	<b>2.21</b>	<b>78.6</b>	<b>22.1</b>	<b>81</b>	<b>22.7</b>	<b>-3.0%</b>	<b>-2.6%</b>
12/7/2020	21.2	21.7	<b>5200</b>	<b>20.0</b>	<b>10.0</b>	<b>8.62</b>	<b>2.48</b>	<b>86.2</b>	<b>24.8</b>	<b>80.4</b>	<b>22.7</b>	<b>7.2%</b>	<b>9.3%</b>
			5500	20.0	10.0	9.34	2.65	93.4	26.5	86.4	24.3	8.1%	9.1%

# SAR SYSTEM VERIFICATION



Tested By:	Kyle McMullan	Room Temperature (°C):	22.1
Date:	11/9/2020 7:12:56 AM	Liquid Temperature (°C):	22.9
		Humidity (%RH):	55.3%
		Bar. Pressure (mb):	1007 mbar

## 2450MHz System Check 11-9-20

**DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:xxx**

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz; Communication System PAR: 0 dB; PMF: 1  
Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.871$  S/m;  $\epsilon_r = 41.397$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN7558; ConvF(7.62, 7.62, 7.62) @ 2450 MHz; Calibrated: 10/21/2020
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface), z = 31.0, 101.0
- Electronics: DAE4 Sn1364; Calibrated: 10/12/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

**System Check/System Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 72.05 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 11.3 W/kg

**SAR(1 g) = 5.42 W/kg; SAR(10 g) = 2.51 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 9.08 W/kg

**System Check/System Check/Area Scan (61x81x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 9.58 W/kg

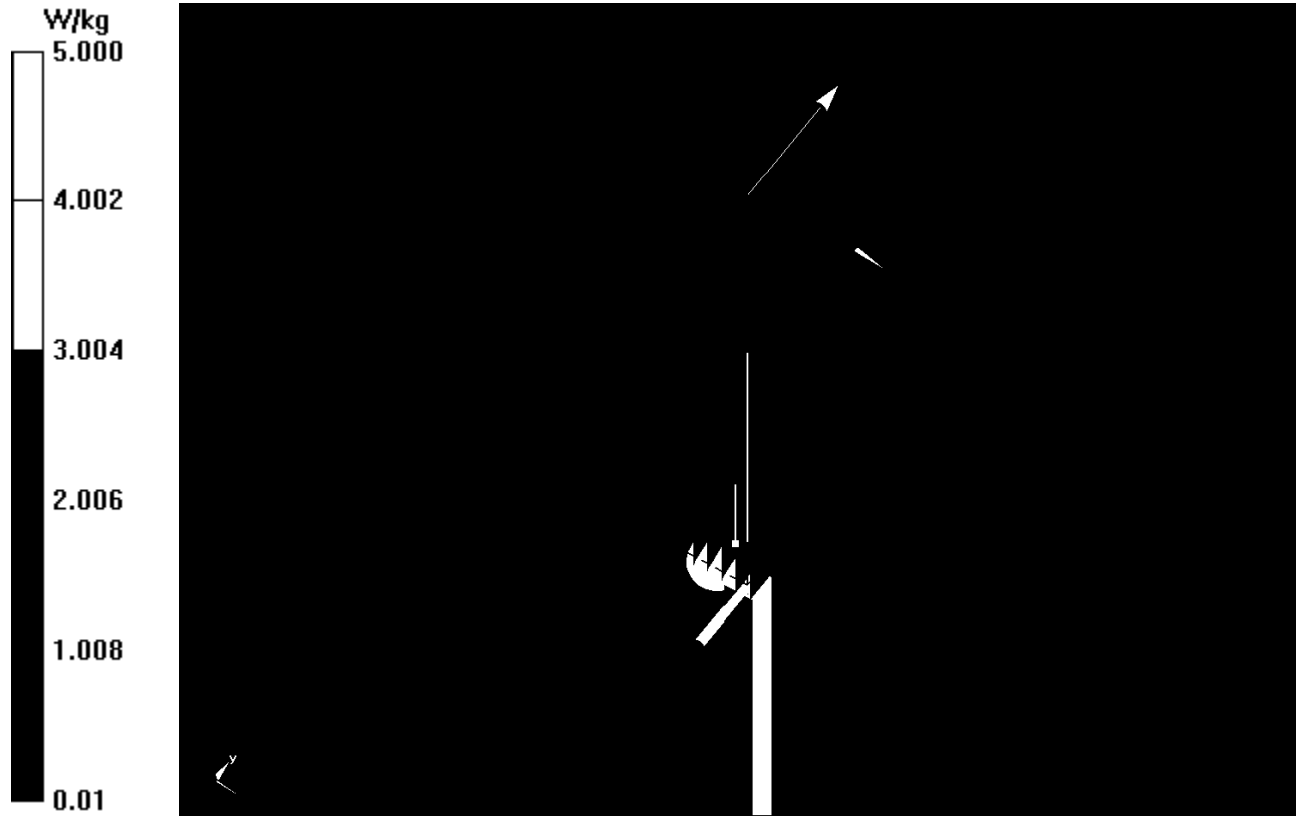
**System Check/System Check/Z Scan (1x1x21):** Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 47.60 V/m

Approved By



# SAR SYSTEM VERIFICATION



# SAR SYSTEM VERIFICATION



Tested By:	Kyle McMullan	Room Temperature (°C):	21.7
Date:	12/7/2020 10:40:11 AM	Liquid Temperature (°C):	21.2
		Humidity (%RH):	27.6%
		Bar. Pressure (mb):	1020 mb

## 5200MHz 5500MHz 5800MHz System Checks Rev2

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx**

Communication System: UID 10000, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz);  
Frequency: 5200 MHz; Communication System PAR: 0 dB; PMF: 1  
Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.702$  S/m;  $\epsilon_r = 36.926$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3746; ConvF(5.13, 5.13, 5.13) @ 5200 MHz; Calibrated: 11/18/2020
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface),  $z = 21.0, 101.0$
- Electronics: DAE4 Sn1237; Calibrated: 11/4/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

**System Check/System Check - Low Channel/Zoom Scan (7x9x7) (9x9x11)/Cube 0:** Measurement grid:

$dx=4$ mm,  $dy=4$ mm,  $dz=2$ mm

Reference Value = 70.47 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 35.3 W/kg

**SAR(1 g) = 8.62 W/kg; SAR(10 g) = 2.48 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 21.5 W/kg

**System Check/System Check - Low Channel/Area Scan (41x61x1):** Interpolated grid:  $dx=1.000$  mm,

$dy=1.000$  mm

Maximum value of SAR (interpolated) = 22.2 W/kg

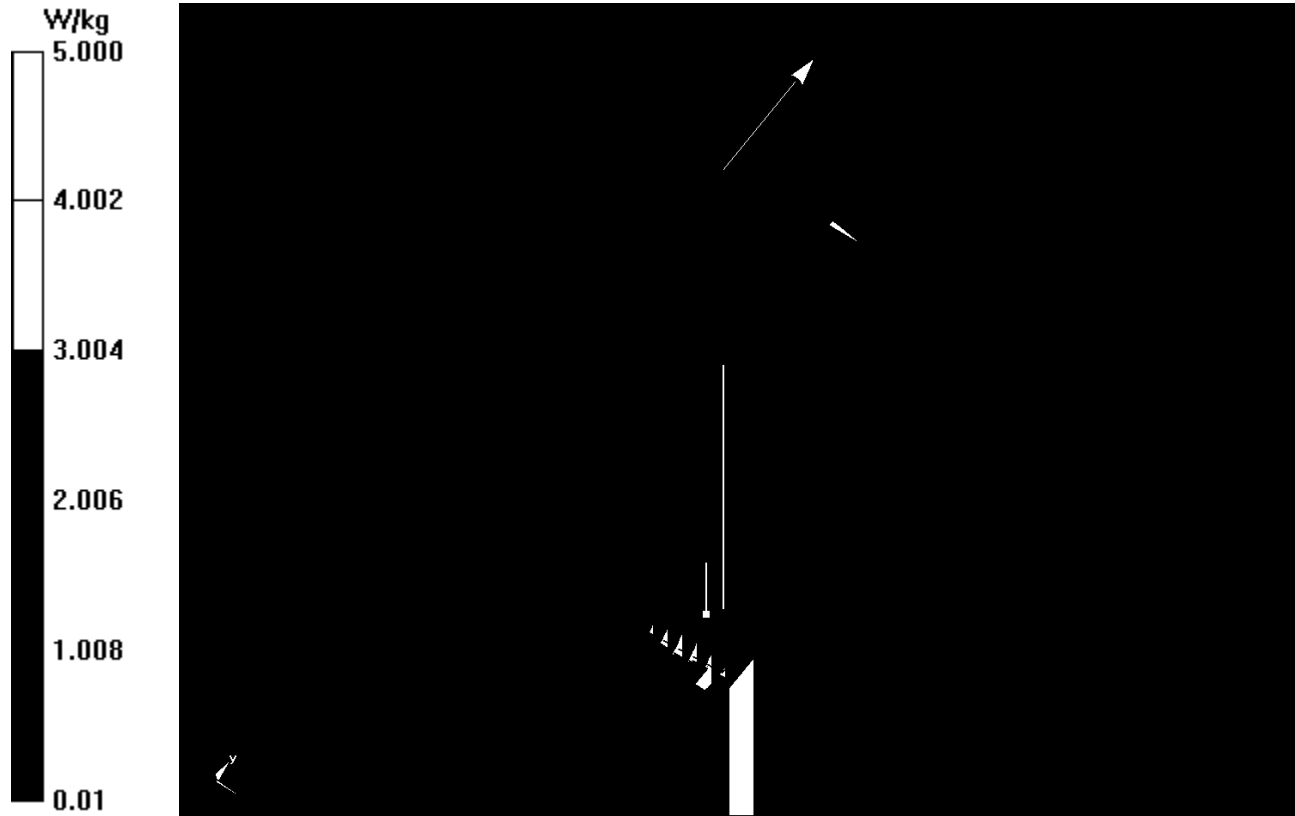
**System Check/System Check - Low Channel/Z Scan (1x1x21):** Measurement grid:  $dx=20$ mm,  $dy=20$ mm,

$dz=5$ mm

Maximum value of Total (measured) = 30.64 V/m

Approved By

# SAR SYSTEM VERIFICATION



# SAR SYSTEM VERIFICATION



Tested By:	Kyle McMullan	Room Temperature (°C):	22.0
Date:	11/6/2020 7:27:46 AM	Liquid Temperature (°C):	22.9
		Humidity (%RH):	35.8%
		Bar. Pressure (mb):	1016

## 5200MHz 5500MHz 5800MHz System Checks Rev2 11-6-20

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx**

Communication System: UID 10000, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz);  
Frequency: 5500 MHz; Communication System PAR: 0 dB; PMF: 1  
Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.869$  S/m;  $\epsilon_r = 35.728$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN7558; ConvF(4.82, 4.82, 4.82) @ 5500 MHz; Calibrated: 10/21/2020
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface),  $z = 21.0, 101.0$
- Electronics: DAE4 Sn1364; Calibrated: 10/12/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASYS2 52.10.2(1504); SEMCAD X 14.6.12(7470)

**System Check/System Check - Mid Channel/Zoom Scan (7x9x7) (7x7x11)/Cube 0:** Measurement grid:

$dx=4$ mm,  $dy=4$ mm,  $dz=2$ mm

Reference Value = 60.66 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 33.6 W/kg

**SAR(1 g) = 7.8 W/kg; SAR(10 g) = 2.22 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 20.2 W/kg

**System Check/System Check - Mid Channel/Area Scan (41x61x1):** Interpolated grid:  $dx=1.000$  mm,

$dy=1.000$  mm

Maximum value of SAR (interpolated) = 21.7 W/kg

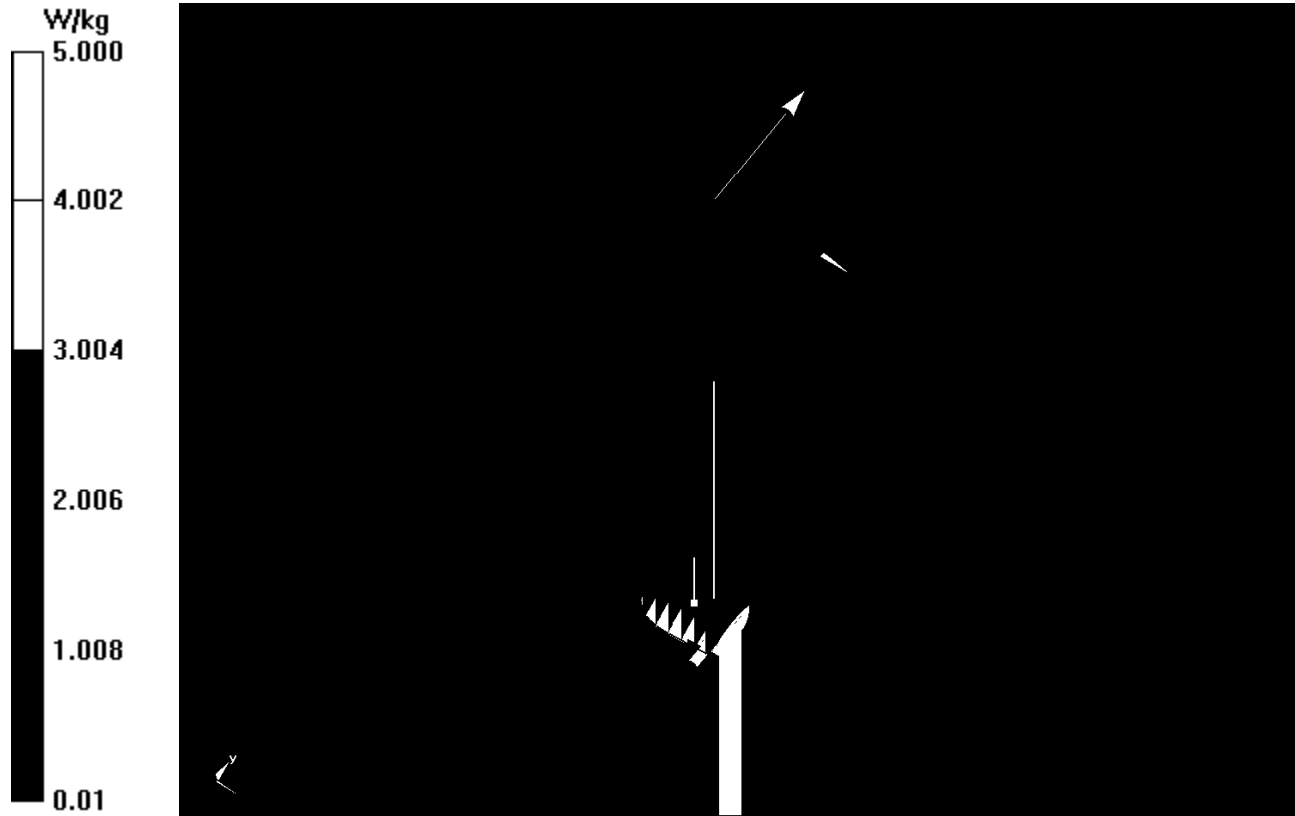
**System Check/System Check - Mid Channel/Z Scan (1x1x21):** Measurement grid:  $dx=20$ mm,  $dy=20$ mm,

$dz=5$ mm

Maximum value of Total (measured) = 25.05 V/m

Approved By

# SAR SYSTEM VERIFICATION



# SAR SYSTEM VERIFICATION



Tested By:	Kyle McMullan	Room Temperature (°C):	20.9
Date:	11/10/2020 9:56:57 AM	Liquid Temperature (°C):	21.0
		Humidity (%RH):	34%
		Bar. Pressure (mb):	1013 mb

## 5200MHz 5500MHz 5800MHz System Checks 11-10-20Rev2

**DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx**

Communication System: UID 10000, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz);  
Frequency: 5800 MHz; Communication System PAR: 0 dB; PMF: 1  
Medium parameters used:  $\sigma = 0$  S/m,  $\epsilon_r = 1$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.318$  S/m;  $\epsilon_r = 33.905$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN7558; ConvF(4.87, 4.87, 4.87) @ 5800 MHz; Calibrated: 10/21/2020
  - Modulation Compensation:
- Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 101.0, 21.0$
- Electronics: DAE4 Sn1364; Calibrated: 10/12/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASYS2 52.10.2(1504); SEMCAD X 14.6.12(7470)

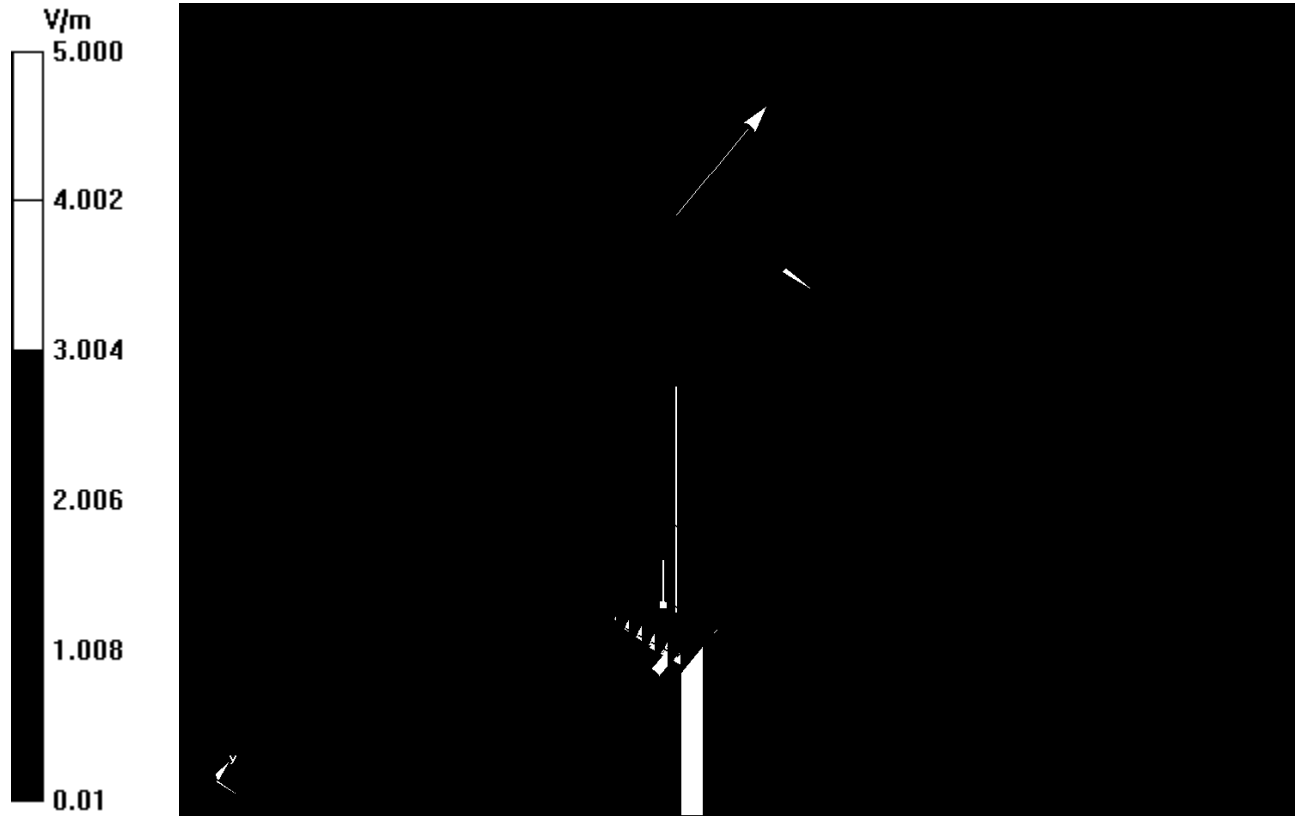
**System Check/System Check - High Channel/Z Scan (1x1x21):** Measurement grid:  $dx=20$ mm,  $dy=20$ mm,  $dz=5$ mm  
Maximum value of Total (measured) = 64.78 V/m

**System Check/System Check - High Channel/Area Scan (41x61x1):** Interpolated grid:  $dx=1.000$  mm,  $dy=1.000$  mm  
Maximum value of SAR (interpolated) = 21.4 W/kg

**System Check/System Check - High Channel/Zoom Scan (7x9x7) (9x9x11)/Cube 0:** Measurement grid:  $dx=4$ mm,  $dy=4$ mm,  $dz=2$ mm  
Reference Value = 64.02 V/m; Power Drift = 0.10 dB  
Peak SAR (extrapolated) = 37.4 W/kg  
**SAR(1 g) = 7.86 W/kg; SAR(10 g) = 2.21 W/kg** (SAR corrected for target medium)  
Maximum value of SAR (measured) = 20.9 W/kg

Approved By

# SAR SYSTEM VERIFICATION



# OUTPUT POWER



EUT:	Rad-67	Work Order:	MASI0632
Serial Number:	5000006607	Date:	3-November-20
Customer:	Masimo Corporation	Temperature:	21.6 °C
Attendees:	None	Relative Humidity:	30.6% RH
Customer Project:	None	Bar. Pressure:	1008.9 mbar
Tested By:	Kyle McMullan	Job Site:	MN11
Power:	Battery	Configuration:	MASI0632-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2020	FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 FCC KDB 248227 D01 v02r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013

## COMMENTS

None

## RESULTS

Channel	Frequency (MHz)	Radio Mode	Data Rate (Mbps)	Modulation	Software Power Setting (No units)	Output Power (dBm)	mW
1	2412	802.11b	1	DSSS	17	16.5	44.7
			11	<b>DSSS</b>	<b>17</b>	<b>16.7</b>	<b>46.9</b>
		802.11g	6	OFDM	14	13.6	23.0
			54	OFDM	14	13.6	22.7
		802.11n	MCS0 (20 MHz)	OFDM	15	14.2	26.1
			MCS7 (20 MHz)	OFDM	15	14.4	27.2
1/5	2422	802.11n	MCS0 (40 MHz)	OFDM	10	9.9	9.7
			MCS7 (40 MHz)	OFDM	10	9.9	9.7
			MCS7 (40 MHz)	OFDM	10	9.9	9.7
6	2437	802.11b	1	DSSS	17	16.2	42.1
			11	<b>DSSS</b>	<b>17</b>	<b>16.6</b>	<b>46.1</b>
		802.11g	6	OFDM	14	13.8	24.0
			54	OFDM	14	13.5	22.6
		802.11n	MCS0 (20 MHz)	OFDM	15	14.2	26.4
			MCS7 (20 MHz)	OFDM	15	14.3	27.0
			MCS0 (40 MHz)	OFDM	10	9.7	9.4
			MCS7 (40 MHz)	OFDM	10	9.9	9.7
			MCS7 (40 MHz)	OFDM	10	9.9	9.7
11	2462	802.11b	1	DSSS	17	16.3	42.7
			11	<b>DSSS</b>	<b>17</b>	<b>16.4</b>	<b>44.0</b>
		802.11g	6	OFDM	14	13.9	24.7
			54	OFDM	14	13.5	22.3
		802.11n	MCS0 (20 MHz)	OFDM	15	13.9	24.5
			MCS7 (20 MHz)	OFDM	15	14.2	26.2
7/11	2452	802.11n	MCS0 (40 MHz)	OFDM	10	9.9	9.8
			MCS7 (40 MHz)	OFDM	10	9.8	9.6



# OUTPUT POWER



EUT:	Rad-67	Work Order:	MASI0632
Serial Number:	5000006607	Date:	3-November-20
Customer:	Masimo Corporation	Temperature:	21.6 °C
Attendees:	None	Relative Humidity:	30.6% RH
Customer Project:	None	Bar. Pressure:	1008.9 mbar
Tested By:	Kyle McMullan	Job Site:	MN11
Power:	Battery	Configuration:	MASI0632-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2020	FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 FCC KDB 248227 D01 v02r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013

## COMMENTS

None
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## RESULTS

Channel	Frequency (MHz)	Radio Mode	Data Rate (Mbps)	Modulation	Software Power Setting (dBm)	Output Power (dBm)	mW
36	5180	802.11a	6	OFDM	20	13.9	24.5
			54	OFDM	20	13.7	23.3
		802.11n	MCS0	OFDM	20	13.4	21.9
			MCS7	OFDM	20	13.6	22.6
40	5200	802.11a	6	OFDM	20	13.8	23.8
			54	OFDM	20	14.0	24.9
		802.11n	MCS0	OFDM	20	13.6	23.0
			MCS7	OFDM	20	13.9	24.7
44	5220	802.11a	6	OFDM	20	13.8	23.9
			54	OFDM	20	13.8	23.8
		802.11n	MCS0	OFDM	20	13.5	22.2
			MCS7	OFDM	20	13.7	23.2
48	5240	802.11a	6	OFDM	20	13.8	24.2
			54	OFDM	20	13.8	24.0
		802.11n	MCS0	OFDM	20	13.4	21.9
			MCS7	OFDM	20	13.7	23.6
52	5260	802.11a	6	OFDM	21	14.8	30.1
			54	OFDM	21	15.2	32.7
		802.11n	MCS0	OFDM	21	14.6	28.9
			MCS7	OFDM	21	14.5	28.4
56	5280	802.11a	6	OFDM	21	14.6	28.8
			54	OFDM	21	15.0	31.4
		802.11n	MCS0	OFDM	21	14.4	27.7
			MCS7	OFDM	21	14.2	26.1
60	5300	802.11a	6	OFDM	21	14.8	30.3
			54	OFDM	21	15.0	31.4
		802.11n	MCS0	OFDM	21	14.5	28.2
			MCS7	OFDM	21	14.4	27.8
64	5320	802.11a	6	OFDM	21	14.6	28.6
			54	OFDM	21	14.8	30.3
		802.11n	MCS0	OFDM	21	14.2	26.4
			MCS7	OFDM	21	14.2	26.3
100	5500	802.11a	6	OFDM	21	13.6	22.9
			54	OFDM	21	13.6	23.1
		802.11n	MCS0	OFDM	21	13.3	21.4
			MCS7	OFDM	21	13.5	22.4

# OUTPUT POWER

116	5580	802.11a	<b>6</b>	<b>OFDM</b>	<b>21</b>	<b>13.8</b>	<b>23.8</b>
			54	OFDM	21	13.7	23.6
		802.11n	MCS0	OFDM	21	13.5	22.4
			MCS7	OFDM	21	13.6	23.0
140	5700	802.11a	6	OFDM	21	13.1	20.2
			54	OFDM	21	13.2	20.9
		802.11n	MCS0	OFDM	21	12.9	19.4
			<b>MCS7</b>	<b>OFDM</b>	<b>21</b>	<b>13.3</b>	<b>21.4</b>
149	5745	802.11a	<b>6</b>	<b>OFDM</b>	<b>21</b>	<b>13.7</b>	<b>23.6</b>
			54	OFDM	21	13.7	23.5
		802.11n	MCS0	OFDM	21	13.2	21.0
			MCS7	OFDM	21	13.1	20.6
157	5785	802.11a	<b>6</b>	<b>OFDM</b>	<b>21</b>	<b>13.5</b>	<b>22.3</b>
			54	OFDM	21	13.3	21.3
		802.11n	MCS0	OFDM	21	13.2	20.7
			MCS7	OFDM	21	13.0	20.1
165	5825	802.11a	<b>6</b>	<b>OFDM</b>	<b>21</b>	<b>13.3</b>	<b>21.2</b>
			54	OFDM	21	13.0	19.8
		802.11n	MCS0	OFDM	21	12.8	19.1
			MCS7	OFDM	21	12.8	18.9
38F	5190	802.11n	MCS0	OFDM	18	12.4	17.3
			MCS7	OFDM	18	12.6	18.1
46F	5230	802.11n	MCS0	OFDM	18	12.3	17.1
			MCS7	OFDM	18	12.6	18.4
54F	5270	802.11n	MCS0	OFDM	18	11.8	15.0
			MCS7	OFDM	18	11.4	13.8
62F	5310	802.11n	MCS0	OFDM	18	11.5	14.1
			MCS7	OFDM	18	11.2	13.0
102F	5510	802.11n	MCS0	OFDM	18	10.8	12.0
			MCS7	OFDM	18	11.1	12.8
110F	5550	802.11n	MCS0	OFDM	18	10.8	12.1
			MCS7	OFDM	18	10.7	11.9
134F	5670	802.11n	MCS0	OFDM	18	10.5	11.3
			MCS7	OFDM	18	10.2	10.4
151F	5755	802.11n	MCS0	OFDM	18	10.0	10.0
			MCS7	OFDM	18	10.2	10.5
159F	5795	802.11n	MCS0	OFDM	18	12.4	17.3
			MCS7	OFDM	18	12.6	18.1

# OUTPUT POWER



EUT:	Rad-67	Work Order:	MASI0632
Serial Number:	5000006607	Date:	13-July-2020
Customer:	Masimo Corporation	Temperature:	22.0 °C
Attendees:	None	Relative Humidity:	55.5% RH
Customer Project:	None	Bar. Pressure:	1010.5 mbar
Tested By:	Marcelo Aguayo	Job Site:	MN11
Power:	Battery	Configuration:	MASI0632-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2020	FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 FCC KDB 248227 D01 v02r02 FCC KDB 447498 D01 v06 IEEE Std 1528:2013

## COMMENTS

None
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## RESULTS

Channel	Frequency	Modulation	Software Power Setting	Output Power (dBm)	mW
0	2402	<b>DH5 GFSK</b>	<b>Max</b>	<b>8.9</b>	<b>7.76</b>
		2DH5 pi/4 DQPSK	Max	3.7	2.34
		3DH5 8DPSK	Max	4.1	2.57
37		BLE GFSK	Max	3	2.00
39	2440	<b>DH5 GFSK</b>	<b>Max</b>	<b>8.4</b>	<b>6.92</b>
		2DH5 pi/4 DQPSK	Max	3.7	2.34
		3DH5 8DPSK	Max	3.7	2.34
17		BLE GFSK	Max	2.6	1.82
78	2480	<b>DH5 GFSK</b>	<b>Max</b>	<b>7.9</b>	<b>6.17</b>
		2DH5 pi/4 DQPSK	Max	2.9	1.95
		3DH5 8DPSK	Max	2.9	1.95
39		BLE GFSK	Max	1.5	1.41

# SAR TEST DATA



EUT:	Rad-67	Work Order:	MASI0632
Customer:	Masimo Corporation	Job Site:	MN11
Attendees:	None	Customer Project:	None

## TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2020	FCC KDB 248227 D01 V02r02 FCC KDB 447498 D01 v01r06 FCC KDB 865664 D01 v01r04 FCC KDB 865664 D02 v01r02 IEEE Std 1528:2013

## COMMENTS

None

## DEVIATIONS FROM TEST STANDARD

None

## SCALING FACTORS

Radio	EUT Power (dBm)	Max Power (dBm) <sup>3</sup>	Max Power Scaling Factor <sup>1</sup>	Test Mode Duty Factor (%)	Max. Field Duty Cycle (%) <sup>4</sup>	Scaling Factor <sup>2</sup>
Bluetooth	8.9	8.3	1.00	100	100	1.00
Wi-Fi 2.4 GHz	16.7	17.1	1.10	95	40	0.44
U-NII-1	13.9	15.1	1.32	95	40	0.53
U-NII-2A	15.2	15.3	1.02	95	40	0.41
U-NII-2C	13.8	14.4	1.15	95	40	0.46
U-NII-3	13.7	13.9	1.05	95	40	0.42

1: Max power scaling factor =  $10^{(Max\ Power\ (dBm) - Measured\ Power\ (dBm)) / 10}$

2: Scaling factor = Max power scaling factor \* Max Field Duty Cycle / 100

3: Rated Power source is MASI0553.4 Rev. 2

4: Anami Joshi attests the 802.11abgn duty cycle will be restricted by software and limited to a maximum of 40%.

## RESULTS – BODY CONFIGURATION

Radio and Band	Transmit Freq. (MHz)	EUT Position	EUT Channel	Modulation	SAR Drift (%)	Measured Values		Scaling Factor	Scaled Values		Test Run Name
						1g	10g		1g	10g	
Bluetooth DSS/DTS	2402	Front	0	DH5 GFSK	1.92	0.07	0.03	1.00	0.07	0.03	BT 2402 Front 1
	2402	Back	0	DH5 GFSK	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	BT 2402 Back 1
	2402	Left	0	DH5 GFSK	4.55	0.20	0.08	1.00	0.20	0.08	BT 2402 Left 1
	2402	Right	0	DH5 GFSK	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	BT 2402 Right 1
	2402	Top	0	DH5 GFSK	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	BT 2402 Top 1
	2402	Bottom	0	DH5 GFSK	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	BT 2402 Bottom 1
	2440	Left	39	DH5 GFSK	-3.54	0.19	0.07	1.00	0.19	0.07	BT 2440 Left 1
	<b>2480</b>	<b>Left</b>	<b>78</b>	<b>DH5 GFSK</b>	<b>2.51</b>	<b>0.30</b>	<b>0.11</b>	<b>1.00</b>	<b>0.30</b>	<b>0.11</b>	<b>BT 2480 Left 1</b>
Wi-Fi 2.4 GHz DTS	2412	Front	1	802.11b 11Mbps	-0.06	0.28	0.13	0.44	0.12	0.06	Wi-Fi 2412 Front 1
	2412	Back	1	802.11b 11Mbps	0.71	0.21	0.09	0.44	0.09	0.04	Wi-Fi 2412 Back 1
	2412	Left	1	802.11b 11Mbps	0.58	0.45	0.18	0.44	0.20	0.08	Wi-Fi 2412 Left 1
	2412	Right	1	802.11b 11Mbps	N/A <sup>2</sup>	0.01	0.01	0.44	0.01	0.01	Wi-Fi 2412 Right 1
	2412	Top	1	802.11b 11Mbps	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	Wi-Fi 2412 Top 1
	2412	Bottom	1	802.11b 11Mbps	3.06	0.01	0.01	0.44	0.01	0.01	Wi-Fi 2412 Bottom 1
	<b>2437</b>	<b>Left</b>	<b>6</b>	<b>802.11b 11Mbps</b>	<b>-0.36</b>	<b>0.85</b>	<b>0.31</b>	<b>0.44</b>	<b>0.37</b>	<b>0.14</b>	<b>Wi-Fi 2437 Left 1</b>
2462	Left	11	802.11b 11Mbps	0.88	0.85	0.31	0.44	0.37	0.14	Wi-Fi 2462 Left 1	
Wi-Fi U-NII-1 NII	5200	Front	40	802.11a 54Mbps	-2.81	0.34	0.08	0.53	0.18	0.04	U-NII-1 5200 Front 1
	5200	Back	40	802.11a 54Mbps	-0.93	0.17	0.06	0.53	0.09	0.03	U-NII-1 5200 Back 1
	5200	Left	40	802.11a 54Mbps	0.69	0.44	0.11	0.53	0.23	0.06	U-NII-1 5200 Left 1
	5200	Right	40	802.11a 54Mbps	N/A <sup>2</sup>	0.02	0.01	0.53	0.01	0.01	U-NII-1 5200 Right 1
	5200	Top	40	802.11a 54Mbps	1.28	0.06	0.02	0.53	0.03	0.01	U-NII-1 5200 Top 1
	5200	Bottom	40	802.11a 54Mbps	N/A <sup>2</sup>	0.02	0.01	0.53	0.01	0.01	U-NII-1 5200 Bottom 1
	5180	Left	36	802.11a 6Mbps	-0.29	0.64	0.15	0.53	0.34	0.08	U-NII-1 5180 Left 1
	<b>5240</b>	<b>Left</b>	<b>48</b>	<b>802.11a 6Mbps</b>	<b>-2.03</b>	<b>0.66</b>	<b>0.16</b>	<b>0.53</b>	<b>0.35</b>	<b>0.08</b>	<b>U-NII-1 5240 Left 1</b>

# SAR TEST DATA



Radio and Band	Transmit Freq. (MHz)	EUT Position	EUT Channel	Modulation	SAR Drift (%)	Measured Values		Scaling Factor	Scaled Values		Test Run Name
						1g	10g		1g	10g	
Wi-Fi U-NII-2A NII	5260	Front	52	802.11a 54Mbps	3.50	1.07	0.24	0.41	0.44	0.10	U-NII-2A 5260 Front 1
	5260	Back	52	802.11a 54Mbps	1.70	0.12	0.03	0.41	0.05	0.01	U-NII-2A 5260 Back 1
	5260	Left	52	802.11a 54Mbps	N/A <sup>2</sup>	1.29	0.33	0.41	0.53	0.14	U-NII-2A 5260 Left 1
	5260	Right	52	802.11a 54Mbps	-2.91	0.01	0.01	0.41	0.01	0.01	U-NII-2A 5260 Right 1
	5260	Top	52	802.11a 54Mbps	1.32	0.02	0.01	0.41	0.01	0.01	U-NII-2A 5260 Top 1
	5260	Bottom	52	802.11a 54Mbps	N/A <sup>2</sup>	0.01	0.01	0.41	0.01	0.01	U-NII-2A 5260 Bottom 1
	<b>5300</b>	<b>Left</b>	<b>60</b>	<b>802.11a 54Mbps</b>	<b>-4.67</b>	<b>1.32</b>	<b>0.31</b>	<b>0.41</b>	<b>0.54</b>	<b>0.13</b>	<b>U-NII-2A 5300 Left 1</b>
5320	Left	64	802.11a 54Mbps	-3.61	1.30	0.31	0.41	0.53	0.13	U-NII-2A 5320 Left 1	
Wi-Fi U-NII-2C NII	5580	Front	116	802.11a 6Mbps	-4.76	1.14	0.25	0.46	0.52	0.12	U-NII-2C 5580 Front 1
	5580	Back	116	802.11a 6Mbps	-4.23	0.11	0.03	0.46	0.05	0.01	U-NII-2C 5580 Back 1
	5580	Left	116	802.11a 6Mbps	0.18	1.50	0.34	0.46	0.69	0.16	U-NII-2C 5580 Left 1
	5580	Right	116	802.11a 6Mbps	N/A <sup>2</sup>	0.01	0.01	0.46	0.01	0.01	U-NII-2C 5580 Right 1
	5580	Top	116	802.11a 6Mbps	N/A <sup>2</sup>	0.01	0.01	0.46	0.01	0.01	U-NII-2C 5580 Top 1
	5580	Bottom	116	802.11a 6Mbps	-4.90	0.01	0.01	0.46	0.01	0.01	U-NII-2C 5580 Bottom 1
	<b>5500</b>	<b>Left</b>	<b>100</b>	<b>802.11a 54Mbps</b>	<b>0.40</b>	<b>1.63</b>	<b>0.39</b>	<b>0.46</b>	<b>0.75</b>	<b>0.18</b>	<b>U-NII-2C 5500 Left 1</b>
5700	Left	140	802.11n MCS7 20 MHz	-0.56	1.00	0.25	0.46	0.46	0.12	U-NII-2C 5700 Left 1	
Wi-Fi U-NII-3 NII	5745	Front	149	802.11a 6Mbps	1.26	0.88	0.21	0.42	0.37	0.09	U-NII-3 5745 Front 1
	5745	Back	149	802.11a 6Mbps	N/A <sup>2</sup>	0.03	0.01	0.42	0.01	0.01	U-NII-3 5745 Back 1
	<b>5745</b>	<b>Left</b>	<b>149</b>	<b>802.11a 6Mbps</b>	<b>1.10</b>	<b>1.00</b>	<b>0.25</b>	<b>0.42</b>	<b>0.42</b>	<b>0.11</b>	<b>U-NII-3 5745 Left 1</b>
	5745	Right	149	802.11a 6Mbps	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>	U-NII-3 5745 Right 1
	5745	Top	149	802.11a 6Mbps	N/A <sup>2</sup>	0.01	0.01	0.42	0.01	0.01	U-NII-3 5745 Top 1
	5745	Bottom	149	802.11a 6Mbps	N/A <sup>2</sup>	0.01	0.01	0.42	0.01	0.01	U-NII-3 5745 Bottom 1
	5785	Left	157	802.11a 6Mbps	-3.00	0.70	0.17	0.42	0.29	0.07	U-NII-3 5785 Left 1
5825	Left	165	802.11a 6Mbps	0.58	0.53	0.13	0.42	0.22	0.05	U-NII-3 5825 Left 1	

Note 1 in the measured values indicates that no measurement was found due to the signal being lower than the probe could measure. The SAR probe is capable of measurements down to 0.010 mW/g.

Note 2 in the measured values indicates the SAR value was low enough where a SAR drift measurement was not practical.

## RESULTS – REPEAT MEASUREMENTS

Repeated Test Run	SAR Drift (%)	Measured Values		Scaling Factor	Scaled Values		Largest Variation (%)		Test Run Name
		1g	10g		1g	10g	1g	10g	
Wi-Fi 2437 Left 1	0.51	0.92	0.32	0.44	0.40	0.14	9.41	0.57	Wi-Fi 2437 Left 1b
U-NII-2A 5300 Left 1	1.29	1.40	0.34	0.41	0.57	0.14	6.30	7.23	U-NII-2A 5300 Left 1b
U-NII-2C 5500 Left 1	-0.12	1.59	0.38	0.46	0.73	0.17	74.14	50.50	U-NII-2C 5500 Left 1b
	1.87	1.33	0.32	0.46	0.61	0.15			U-NII-2C 5500 Left 1c
	-4.88	1.16	0.26	0.46	0.53	0.12			U-NII-2C 5500 Left 1d
U-NII-3 5745 Left 1	-2.33	0.81	0.20	0.42	0.34	0.08	33.33	63.69	U-NII-3 5745 Left 1b
	-2.72	0.75	0.16	0.42	0.32	0.07			U-NII-3 5745 Left 1c

# SAR TEST DATA



Tested By:	Marcelo Aguayo, Kyle McMullan, William Hoffa	Room Temperature (°C):	22.0
Date:	9/23/2020 8:59:19 PM	Liquid Temperature (°C):	23.0
Serial Number:	5000006560	Humidity (%RH):	50.4%
Configuration:	MASI0632-2	Bar. Pressure (mb):	1017
Comments:	None		

## BT 2480 Left 1

**DUT: Rad-67; Type: NA; Serial: 5000006560**

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2480 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated):  $f = 2480$  MHz;  $\sigma = 1.841$  S/m;  $\epsilon_r = 41.049$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN3746; ConvF(7.02, 7.02, 7.02) @ 2480 MHz; Calibrated: 11/19/2019
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 23.0, 1.0$
- Electronics: DAE4 Sn1237; Calibrated: 2/4/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Body/Body/Zoom Scan (8x8x12)/Cube 0:** Measurement grid:  $dx=4$ mm,  $dy=4$ mm,  $dz=2$ mm

Reference Value = 14.76 V/m; Power Drift = 15.13 V/m

Peak SAR (extrapolated) = 0.750 W/kg

**SAR(1 g) = 0.296 W/kg; SAR(10 g) = 0.111 W/kg** (SAR corrected for target medium)

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.565 W/kg

**Body/Body/Area scan (51x51x1):** Interpolated grid:  $dx=1.000$  mm,  $dy=1.000$  mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.694 W/kg

**Body/Body/Reference scan (21x71x1):** Interpolated grid:  $dx=3.000$  mm,  $dy=3.000$  mm

Info: Interpolated medium parameters used for SAR evaluation.

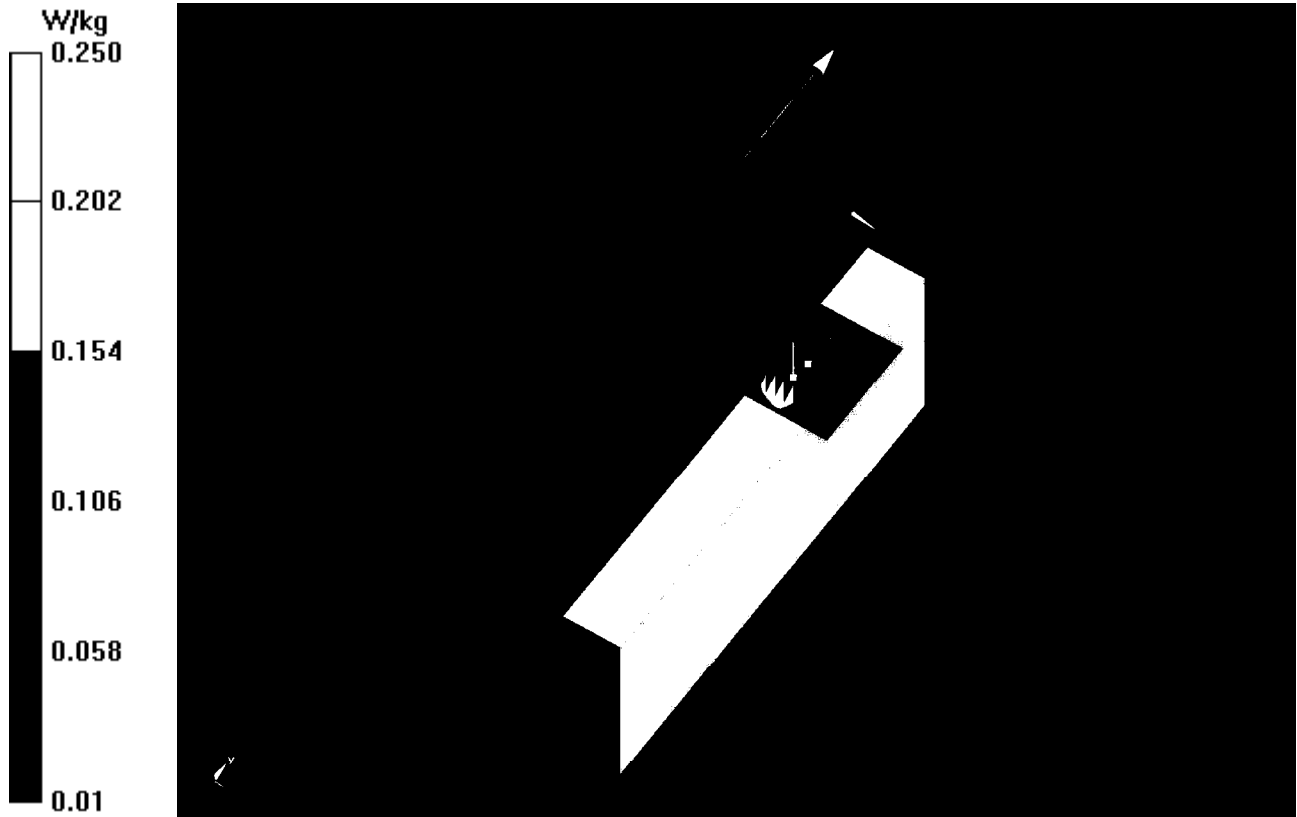
Maximum value of SAR (interpolated) = 0.266 W/kg

Approved By

# SAR TEST DATA



BT 2480 Left 1



# SAR TEST DATA



Tested By:	Marcelo Aguayo, Kyle McMullan, William Hoffa	Room Temperature (°C):	21.8
Date:	11/4/2020 2:26:39 PM	Liquid Temperature (°C):	22.8
Serial Number:	5000006560	Humidity (%RH):	27.6%
Configuration:	MASI0632-2	Bar. Pressure (mb):	1013 mbar
Comments:	None		

## Wi-Fi 2437 Left 1

**DUT: Rad-67; Type: NA; Serial: 5000006560**

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2437 MHz; Communication System PAR: 0.486 dB; PMF: 1.05755

Medium parameters used (interpolated):  $f = 2437$  MHz;  $\sigma = 1.855$  S/m;  $\epsilon_r = 40.486$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- Probe: EX3DV4 - SN7558; ConvF(7.62, 7.62, 7.62) @ 2437 MHz; Calibrated: 10/21/2020
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 23.0, 1.0$
- Electronics: DAE4 Sn1364; Calibrated: 10/12/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASYS2 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Body/Body/Zoom Scan (9x9x12)/Cube 0:** Measurement grid:  $dx=4$ mm,  $dy=4$ mm,  $dz=2$ mm

Reference Value = 19.69 V/m; Power Drift = 19.62 V/m

Peak SAR (extrapolated) = 2.26 W/kg

**SAR(1 g) = 0.852 W/kg; SAR(10 g) = 0.314 W/kg** (SAR corrected for target medium)

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.65 W/kg

**Body/Body/Area scan (51x51x1):** Interpolated grid:  $dx=1.000$  mm,  $dy=1.000$  mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 1.73 W/kg

**Body/Body/Reference scan (41x71x1):** Interpolated grid:  $dx=3.000$  mm,  $dy=3.000$  mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.690 W/kg

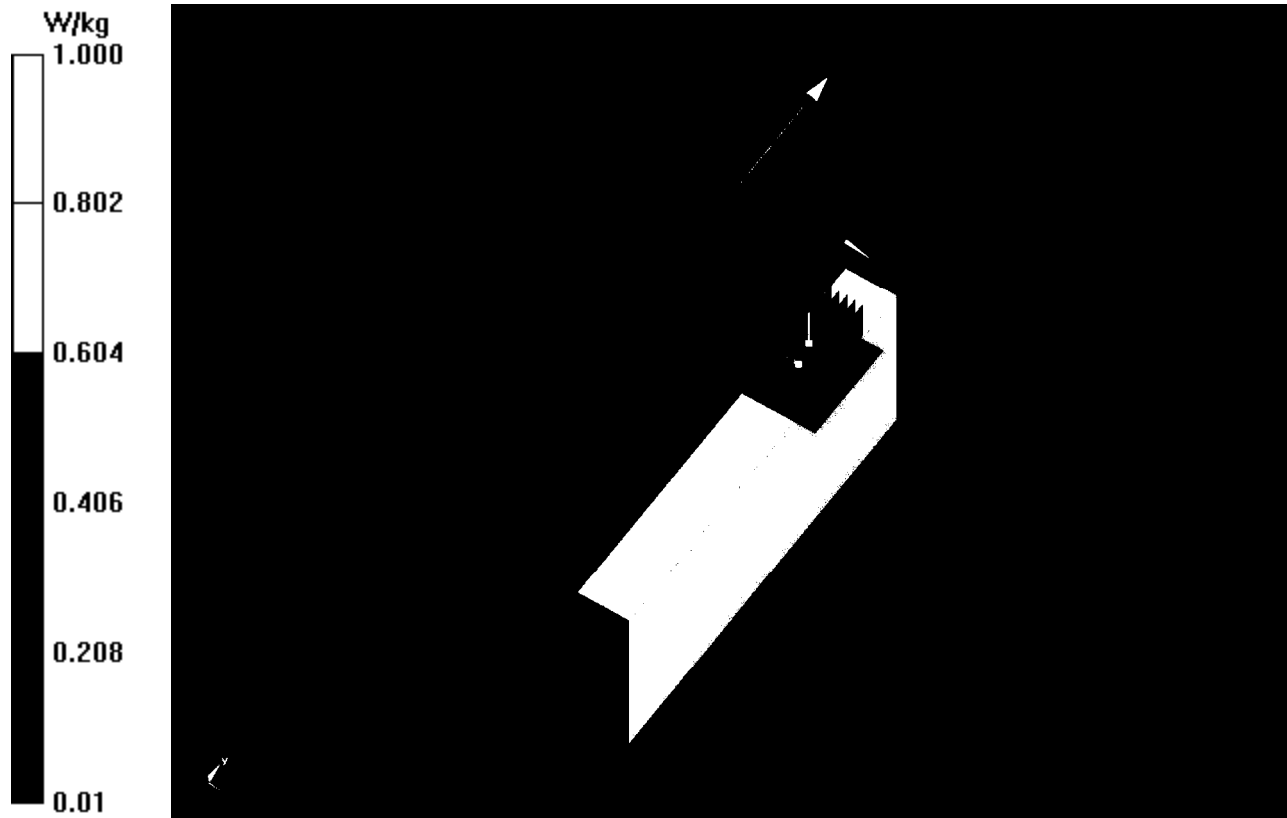
Approved By



# SAR TEST DATA



Wi-Fi 2437 Left 1



# SAR TEST DATA



Tested By:	Marcelo Aguayo, Kyle McMullan, William Hoffa	Room Temperature (°C):	22.8
Date:	12/9/2020 4:46:35 PM	Liquid Temperature (°C):	22.2
Serial Number:	5000006560	Humidity (%RH):	28.9%
Configuration:	MASI0632-2	Bar. Pressure (mb):	1014
Comments:	None		

## U-NII-1 5240 Left 1

**DUT: Rad-67; Type: NA; Serial: 5000006560**

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);  
Frequency: 5240 MHz; Communication System PAR: 0.3 dB; PMF: 1.03514  
Medium parameters used (interpolated):  $f = 5240$  MHz;  $\sigma = 4.531$  S/m;  $\epsilon_r = 36.63$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY Configuration:

- Probe: EX3DV4 - SN7558; ConvF(5.36, 5.36, 5.36) @ 5240 MHz; Calibrated: 10/21/2020
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 23.0, 1.0$
- Electronics: DAE4 Sn1364; Calibrated: 10/12/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Body/Body/Zoom Scan (9x9x12)/Cube 0:** Measurement grid:  $dx=4$ mm,  $dy=4$ mm,  $dz=2$ mm

Reference Value = 15.75 V/m; Power Drift = 15.44 V/m

Peak SAR (extrapolated) = 2.90 W/kg

**SAR(1 g) = 0.655 W/kg; SAR(10 g) = 0.157 W/kg** (SAR corrected for target medium)

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 1.74 W/kg

**Body/Body/Area scan (51x51x1):** Interpolated grid:  $dx=1.000$  mm,  $dy=1.000$  mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 1.71 W/kg

**Body/Body/Reference scan (31x71x1):** Interpolated grid:  $dx=3.000$  mm,  $dy=3.000$  mm

Info: Interpolated medium parameters used for SAR evaluation.

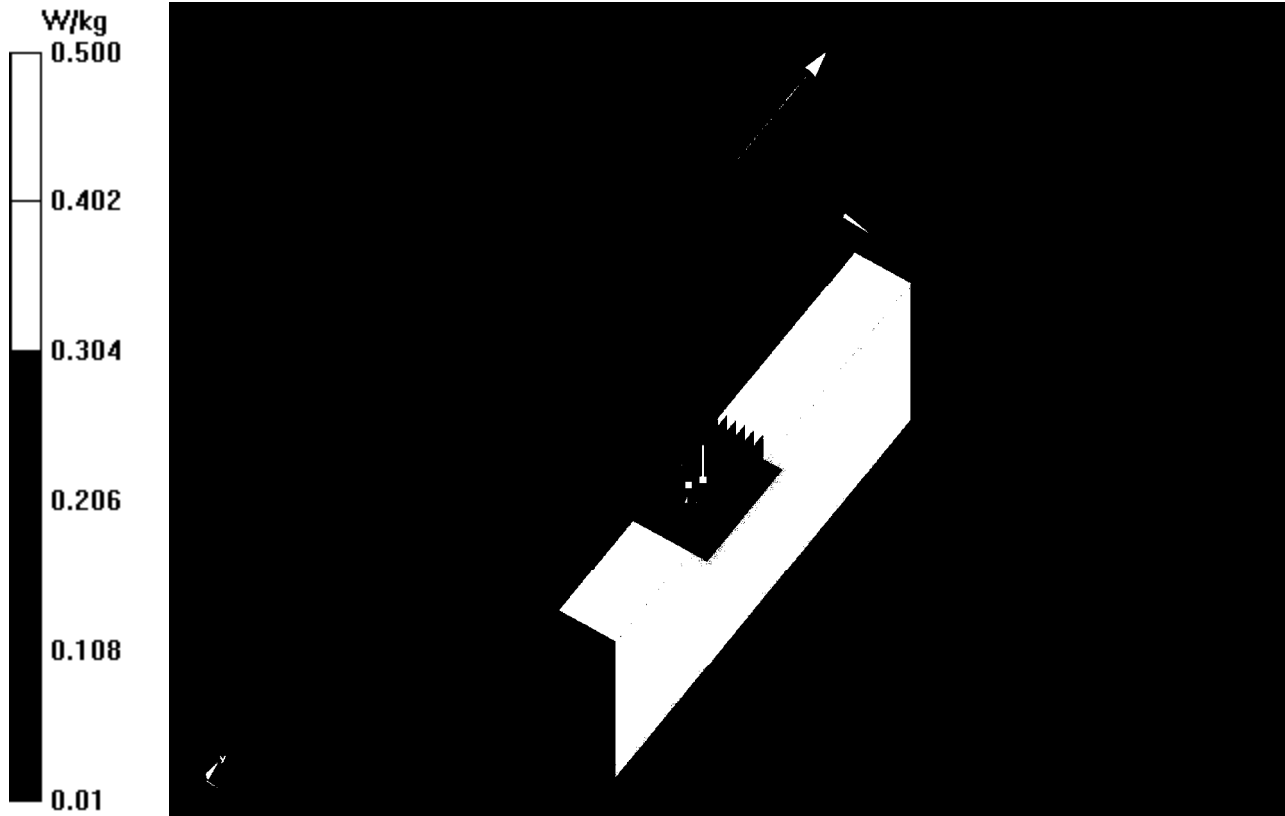
Maximum value of SAR (interpolated) = 0.165 W/kg

Approved By

# SAR TEST DATA



U-NII-1 5240 Left 1



# SAR TEST DATA



Tested By:	Marcelo Aguayo, Kyle McMullan, William Hoffa	Room Temperature (°C):	22.0
Date:	11/6/2020 1:03:04 PM	Liquid Temperature (°C):	22.9
Serial Number:	5000006560	Humidity (%RH):	35.8%
Configuration:	MASI0632-2	Bar. Pressure (mb):	1016
Comments:	None		

## U-NII-2A 5300 Left 1

**DUT: Rad-67; Type: NA; Serial: 5000006560**

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);  
Frequency: 5300 MHz; Communication System PAR: 1.935 dB; PMF: 1.24954  
Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.667$  S/m;  $\epsilon_r = 35.923$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

### DASY Configuration:

- Probe: EX3DV4 - SN7558; ConvF(5.36, 5.36, 5.36) @ 5300 MHz; Calibrated: 10/21/2020
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 23.0, 1.0$
- Electronics: DAE4 Sn1364; Calibrated: 10/12/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASYS5 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Body/Body/Zoom Scan (10x9x12)/Cube 0:** Measurement grid:  $dx=4$ mm,  $dy=4$ mm,  $dz=2$ mm

Reference Value = 10.49 V/m; Power Drift = 9.965 V/m

Peak SAR (extrapolated) = 5.66 W/kg

**SAR(1 g) = 1.32 W/kg; SAR(10 g) = 0.309 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 3.43 W/kg

**Body/Body/Area scan (51x51x1):** Interpolated grid:  $dx=1.000$  mm,  $dy=1.000$  mm

Maximum value of SAR (interpolated) = 3.30 W/kg

**Body/Body/Reference scan (21x71x1):** Interpolated grid:  $dx=3.000$  mm,  $dy=3.000$  mm

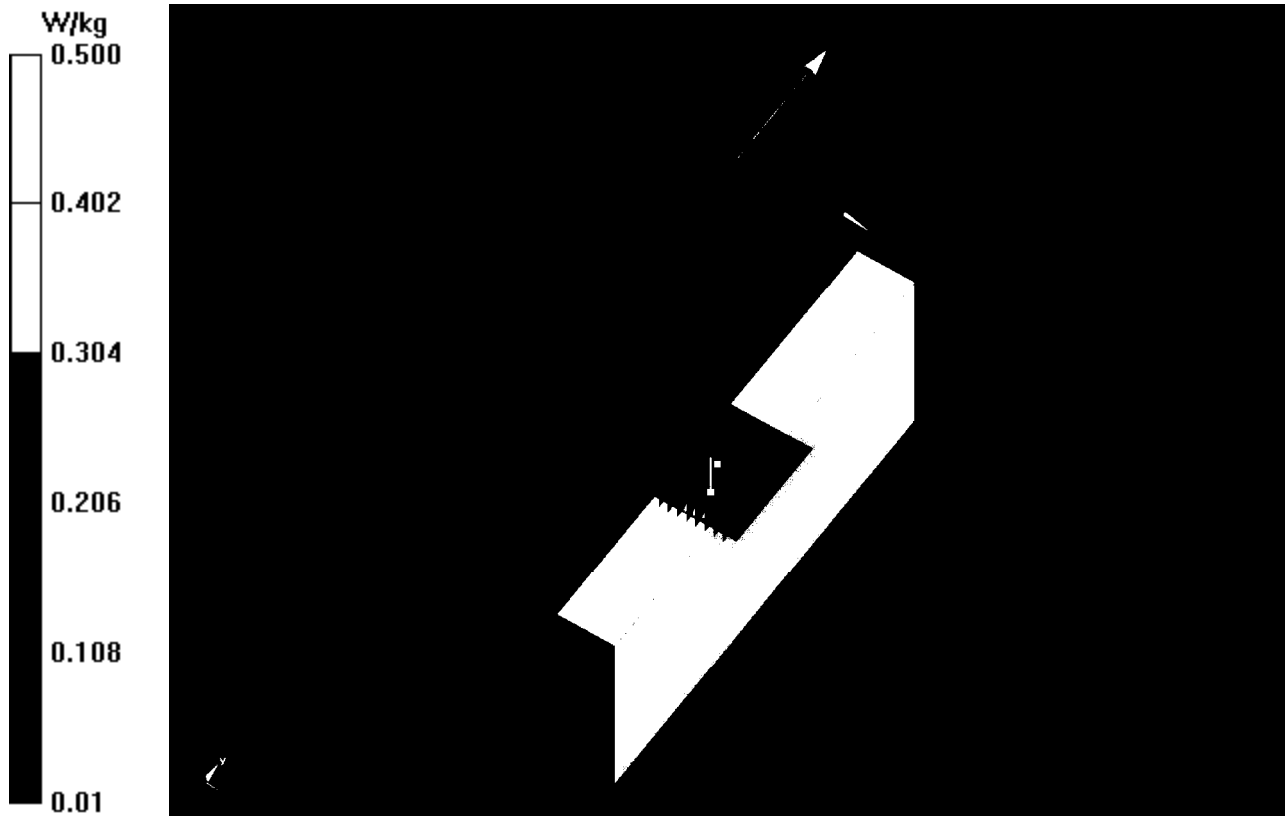
Maximum value of SAR (interpolated) = 0.793 W/kg

Approved By

# SAR TEST DATA



U-NII-2A 5300 Left 1



# SAR TEST DATA



Tested By:	Marcelo Aguayo, Kyle McMullan, William Hoffa	Room Temperature (°C):	21.2
Date:	11/11/2020 7:56:26 AM	Liquid Temperature (°C):	21.0
Serial Number:	5000006560	Humidity (%RH):	29.6%
Configuration:	MASI0632-2	Bar. Pressure (mb):	1015 mbar
Comments:	None		

## U-NII-2C 5500 Left 1

**DUT: Rad-67; Type: NA; Serial: 5000006560**

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);  
Frequency: 5500 MHz; Communication System PAR: 1.935 dB; PMF: 1.24954  
Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.067$  S/m;  $\epsilon_r = 34.398$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

### DASY Configuration:

- Probe: EX3DV4 - SN7558; ConvF(4.82, 4.82, 4.82) @ 5500 MHz; Calibrated: 10/21/2020
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 23.0, 1.0$
- Electronics: DAE4 Sn1364; Calibrated: 10/12/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASYS 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Body/Body/Zoom Scan (10x9x12)/Cube 0:** Measurement grid:  $dx=4$ mm,  $dy=4$ mm,  $dz=2$ mm  
Reference Value = 5.540 V/m; Power Drift = 5.562 V/m  
Peak SAR (extrapolated) = 7.36 W/kg  
**SAR(1 g) = 1.63 W/kg; SAR(10 g) = 0.394 W/kg** (SAR corrected for target medium)  
Maximum value of SAR (measured) = 4.35 W/kg

**Body/Body/Area scan (51x51x1):** Interpolated grid:  $dx=1.000$  mm,  $dy=1.000$  mm  
Maximum value of SAR (interpolated) = 3.73 W/kg

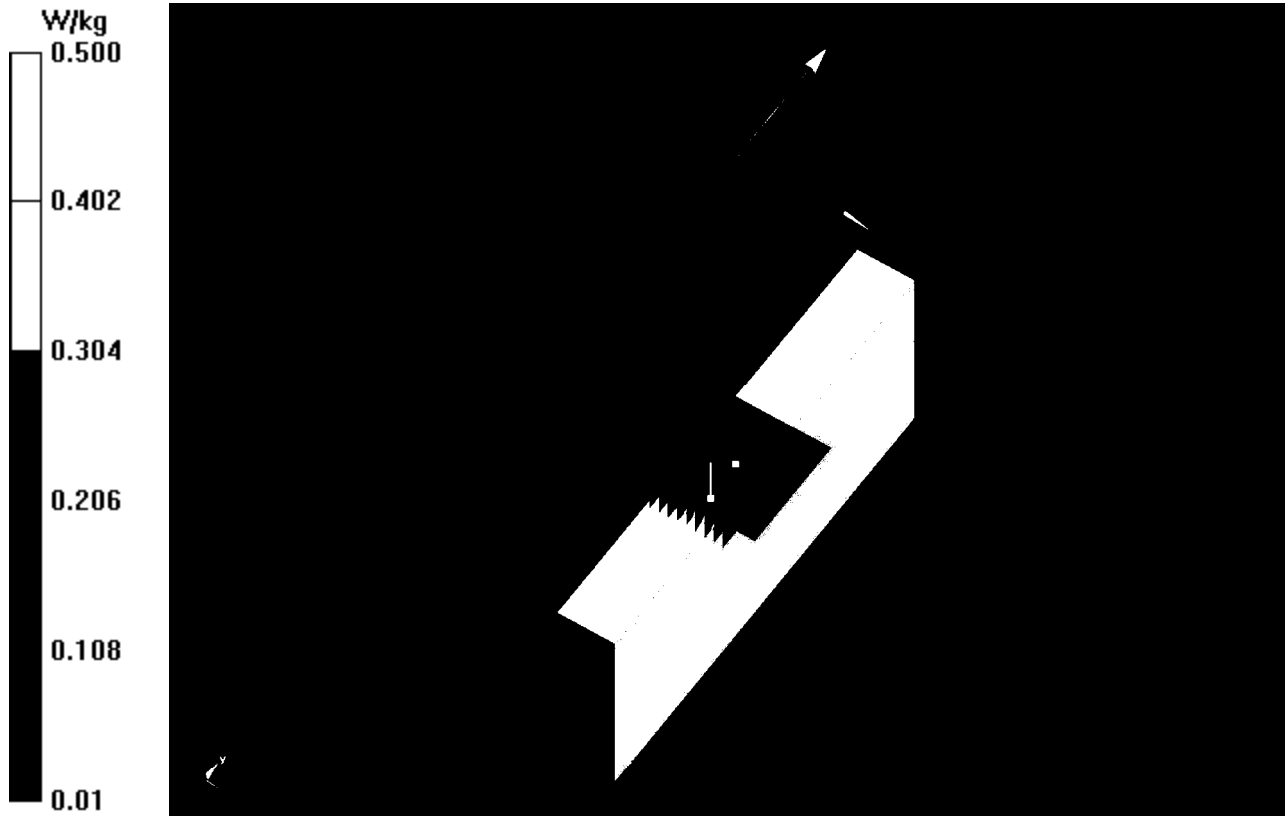
**Body/Body/Reference scan (21x71x1):** Interpolated grid:  $dx=3.000$  mm,  $dy=3.000$  mm  
Maximum value of SAR (interpolated) = 0.460 W/kg

Approved By

# SAR TEST DATA



U-NII-2C 5500 Left 1



# SAR TEST DATA



Tested By:	Marcelo Aguayo, Kyle McMullan, William Hoffa	Room Temperature (°C):	21.2
Date:	11/11/2020 11:22:02 AM	Liquid Temperature (°C):	21.0
Serial Number:	5000006560	Humidity (%RH):	29.6%
Configuration:	MASI0632-2	Bar. Pressure (mb):	1015 mbar
Comments:	None		

## U-NII-3 5745 Left 1

**DUT: Rad-67; Type: NA; Serial: 5000006560**

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);  
Frequency: 5745 MHz; Communication System PAR: 0.3 dB; PMF: 1.03514  
Medium parameters used (interpolated):  $f = 5745$  MHz;  $\sigma = 5.332$  S/m;  $\epsilon_r = 33.842$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

### DASY Configuration:

- Probe: EX3DV4 - SN7558; ConvF(4.87, 4.87, 4.87) @ 5745 MHz; Calibrated: 10/21/2020
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 23.0, 1.0$
- Electronics: DAE4 Sn1364; Calibrated: 10/12/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASYS5 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Body/Body/Zoom Scan (10x9x12)/Cube 0:** Measurement grid:  $dx=4$ mm,  $dy=4$ mm,  $dz=2$ mm

Reference Value = 23.64 V/m; Power Drift = 23.89 V/m

Peak SAR (extrapolated) = 4.85 W/kg

**SAR(1 g) = 1 W/kg; SAR(10 g) = 0.248 W/kg** (SAR corrected for target medium)

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 2.65 W/kg

**Body/Body/Area scan (51x51x1):** Interpolated grid:  $dx=1.000$  mm,  $dy=1.000$  mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 2.26 W/kg

**Body/Body/Reference scan (21x71x1):** Interpolated grid:  $dx=3.000$  mm,  $dy=3.000$  mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.297 W/kg

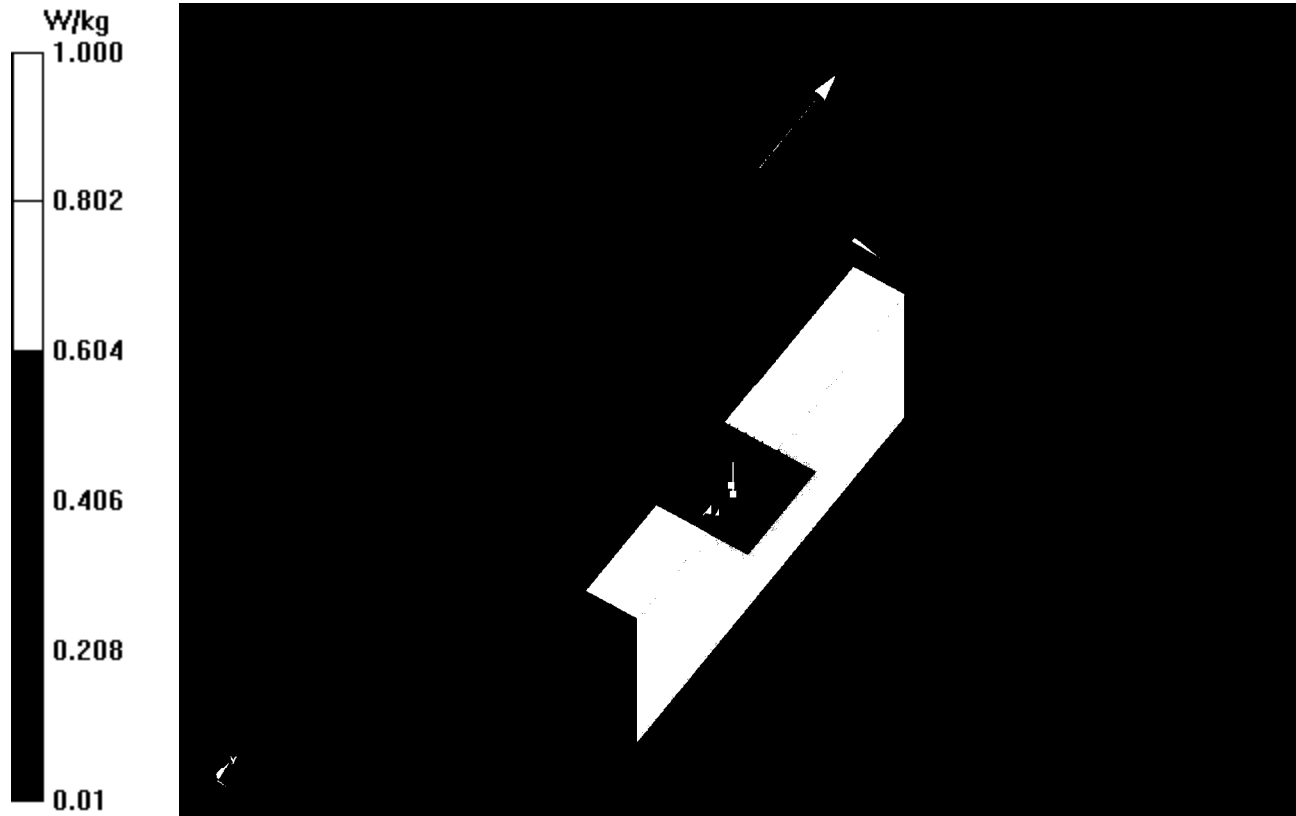
Approved By



# SAR TEST DATA



U-NII-3 5745 Left 1



# SAR TEST DATA



Tested By:	Marcelo Aguayo, Kyle McMullan, William Hoffa	Room Temperature (°C):	21.2
Date:	11/11/2020 9:47:06 AM	Liquid Temperature (°C):	21.0
Serial Number:	5000006560	Humidity (%RH):	29.6%
Configuration:	MASI0632-2	Bar. Pressure (mb):	1015 mbar
Comments:	None		

## U-NII-2C 5500 Left 1b

**DUT: Rad-67; Type: NA; Serial: 5000006560**

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);  
Frequency: 5500 MHz; Communication System PAR: 1.935 dB; PMF: 1.24954  
Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.067$  S/m;  $\epsilon_r = 34.398$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

### DASY Configuration:

- Probe: EX3DV4 - SN7558; ConvF(4.82, 4.82, 4.82) @ 5500 MHz; Calibrated: 10/21/2020
  - Modulation Compensation:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 23.0, 1.0$
- Electronics: DAE4 Sn1364; Calibrated: 10/12/2020
- Phantom: ELI V6.0 (SAC); Type: QD OVA 003 AA; Serial: 2044
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

**Body/Body/Zoom Scan (10x9x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 7.221 V/m; Power Drift = 7.213 V/m

Peak SAR (extrapolated) = 7.17 W/kg

**SAR(1 g) = 1.59 W/kg; SAR(10 g) = 0.384 W/kg** (SAR corrected for target medium)

Maximum value of SAR (measured) = 4.22 W/kg

**Body/Body/Area scan (51x51x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 3.95 W/kg

**Body/Body/Reference scan (21x71x1):** Interpolated grid: dx=3.000 mm, dy=3.000 mm

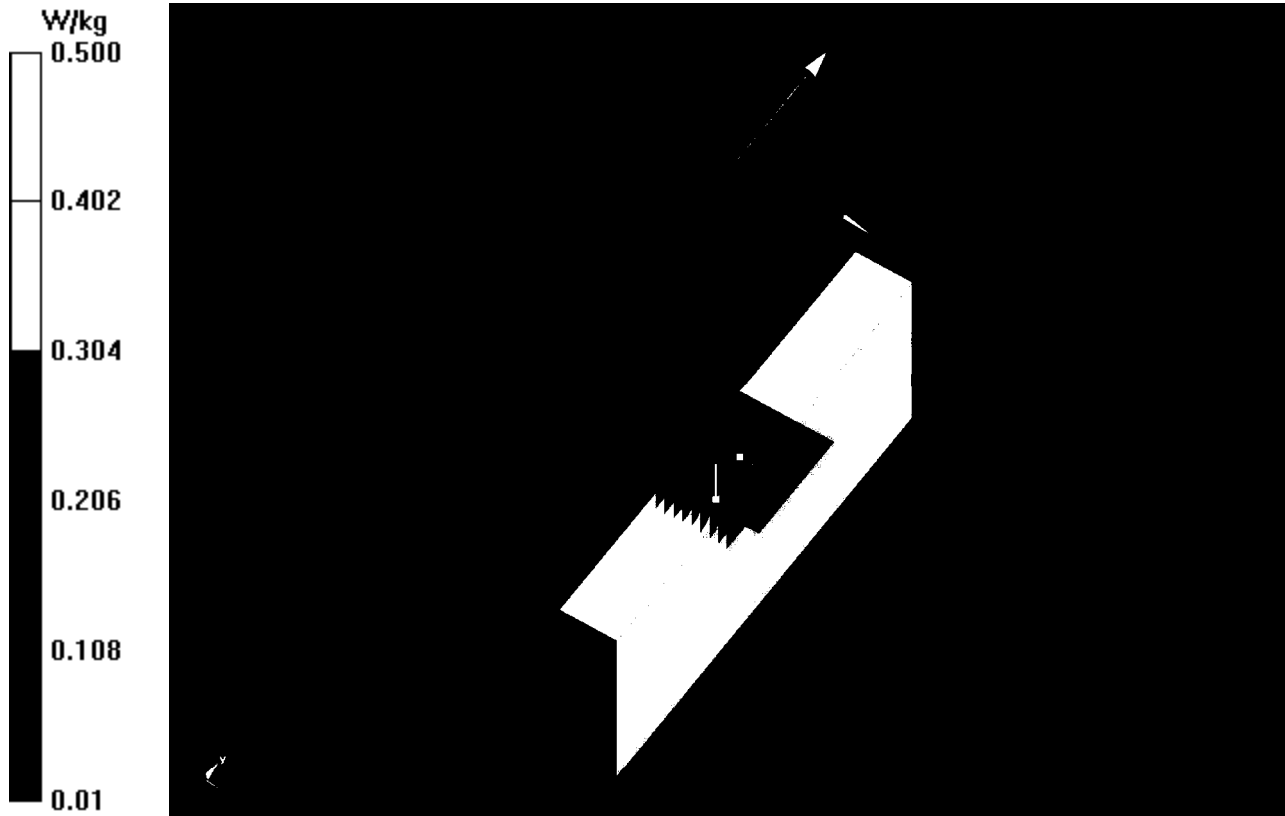
Maximum value of SAR (interpolated) = 0.425 W/kg

Approved By

# SAR TEST DATA



U-NII-2C 5500 Left 1b



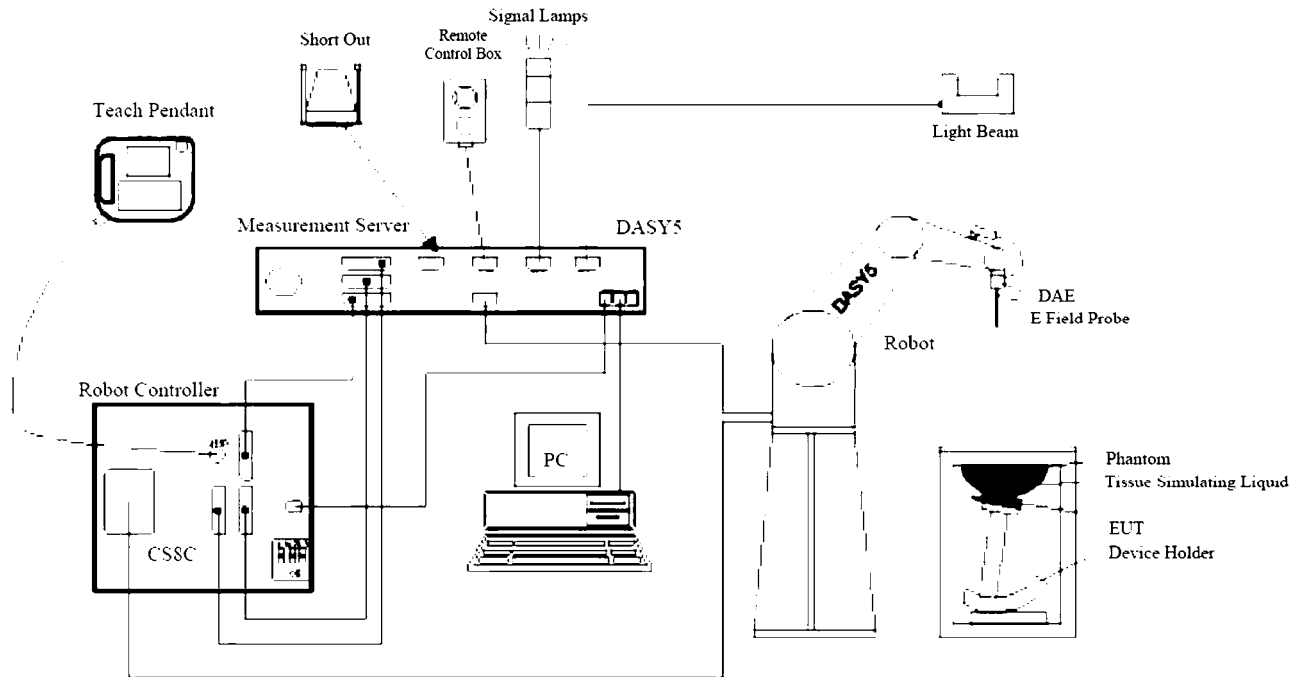
# SYSTEM AND TEST SITE DESCRIPTION

## SAR MEASUREMENT SYSTEM

### Schmid & Partner Engineering AG, DASY52

Element selected the leader in SAR evaluation systems to provide the measurement tools for this evaluation. SPEAG's DASY52 is the fastest and most accurate scanner on the market. It is fully compatible with all world-wide standards for transmitters operating at the ear or within 20cm of the body. It provides full compatibility with IEC 62209-1, IEC 62209-2, IEEE 1528 as well as national adaptations such as FCC OET-65c and Korean Std. MIC #2000-93

The DASY52 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot (Staubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom, oval flat phantom, device holder, tissue simulating liquids, and validation dipole kits.

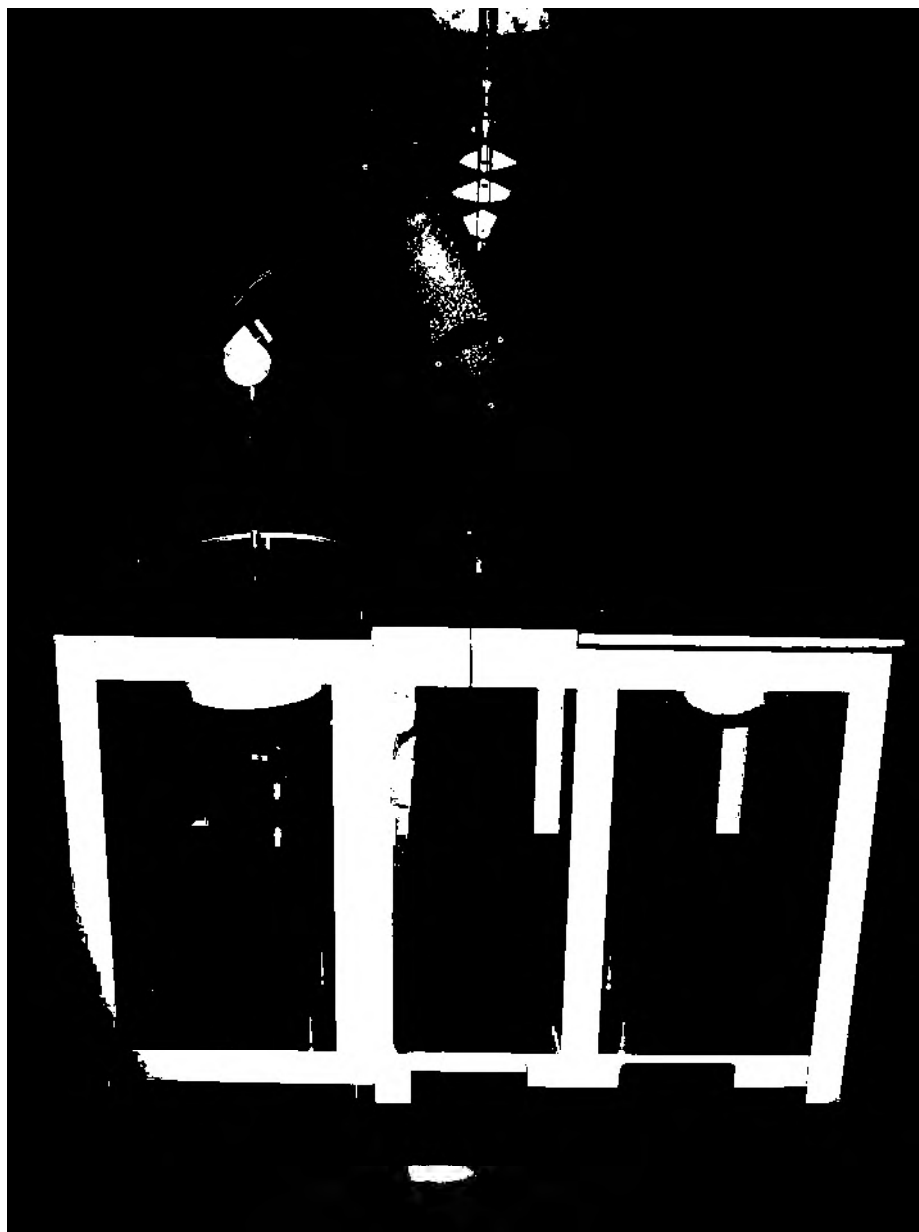
# SYSTEM AND TEST SITE DESCRIPTION

## TEST SITE

### Element

The SAR measurement system is located in a semi-anechoic chamber. This provides an ambient free environment that also eliminates reflections.

The chamber is 12 ft wide by 16 ft long x 8 ft high. A dedicated HVAC unit provides +/- 1 degree C temperature control.



# TEST EQUIPMENT



## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Amplifier	Mini Circuits	ZVE-3W-83+	TTA	NCR <sup>1</sup>	0 mo
Antenna - Dipole	SPEAG	D2450V2	ADL	11/9/2020	12 mo
Antenna - Dipole	SPEAG	D5GHzV2	ADM	11/9/2020	12 mo
DAE	SPEAG	SD 000 D04 EJ	SAH*	12/11/2019	12 mo
DAE	SPEAG	SD 000 D04 EJ	SAH*	11/4/2020	12 mo
DAE	SPEAG	SD 000 D04	1364*	10/12/2020	12 mo
Device Holder	SPEAG	N/A	SAW	NCR	0 mo
Dielectric Assessment Kit	SPEAG	DAKS:200	IPR	4/25/2019	36 mo
Generator - Signal	Agilent	V2920A	TIH	NCR	0 mo
Meter - Power	Agilent	N1913A	SQL	7/13/2020	12 mo
Power Sensor	Agilent	N8481A	SQN	7/13/2020	12 mo
Power Sensor	Agilent	E9300H	SQO	10/22/2020	12 mo
Probe - Dielectric	SPEAG	DAKS-3.5	IPRA	11/12/2019	36 mo
Probe - SAR	SPEAG	EX3DV4	SAG*	11/19/2019	12 mo
Probe - SAR	SPEAG	EX3DV4	SAG*	11/18/2020	12 mo
Probe - SAR	SPEAG	EX3DV4	7558*	10/21/2020	12 mo
SAR - Tissue Test Solution	SPEAG	HBBL600-10000V6	SALN	At start of testing	
SAR Test System	SPEAG	QD 000 P40 CC	SAB	NCR	0 mo
Thermometer	Omega Engineering, Inc.	HH311	DUI	2/15/2018	36 mo

\*DAE SAH and Probe SAG were calibrated over the course of testing, R247 and R248 were used in the interim.

Note 1: The output of the signal generator / amplifier is verified with the calibrated power meter listed above.

## SAR SYSTEM VALIDATION SUMMARY

Dipole	Date	Freq.	Tissue Perm.	Tissue Cond.	CW				OFDM		
					Sensitivity	Linearity	Isotropy	Reduced DC	802.11n	LTE	LTE TDD
ADQ	2020-6-16	750	57.10	0.91	Pass	Pass	Pass	N/A	N/A	Pass	Pass
ADM	2020-6-16	5200	50.32	5.35	Pass	Pass	Pass	N/A	Pass	N/A	N/A
ADM	2020-6-16	5300	50.11	5.52	Pass	Pass	Pass	N/A	Pass	N/A	N/A
ADM	2020-6-16	5500	49.96	5.78	Pass	Pass	Pass	N/A	Pass	N/A	N/A
ADM	2020-6-16	5800	49.38	6.21	Pass	Pass	Pass	N/A	Pass	N/A	N/A

1: Reduced duty cycle to match a single GSM time slot.

2: Reduced duty cycle to match a single DECT time slot.

# MEASUREMENT UNCERTAINTY



## MEASUREMENT UNCERTAINTY BUDGETS PER IEEE 1528:2013

300-3000 MHz Range								
Uncertainty Component	Tolerance (+/- %)	Probability Distribution	Divisor	$c_i(1g)$	$c_i(10g)$	$u_i(1g)$ (+/-%)	$u_i(10g)$ (+/-%)	$v_i$
<b>Measurement System</b>								
Probe calibration (k=1)	6.0	normal	1	1	1	6.0	6.0	$\infty$
Axial isotropy	4.7	rectangular	1.732	0.707	0.707	1.9	1.9	$\infty$
Hemispherical isotropy	9.6	rectangular	1.732	0.707	0.707	3.9	3.9	$\infty$
Boundary effect	1.0	rectangular	1.732	1	1	0.6	0.6	$\infty$
Linearity	4.7	rectangular	1.732	1	1	2.7	2.7	$\infty$
System detection limits	1.0	rectangular	1.732	1	1	0.6	0.6	$\infty$
Modulation Response	2.4	rectangular	1.732	1	1	1.4	1.4	$\infty$
Readout electronics	0.3	normal	1	1	1	0.3	0.3	$\infty$
Response time	0.8	rectangular	1.732	1	1	0.5	0.5	$\infty$
Integration time	2.6	rectangular	1.732	1	1	1.5	1.5	$\infty$
RF ambient conditions - noise	3.0	rectangular	1.732	1	1	1.7	1.7	$\infty$
RF Ambient Reflections	3.0	rectangular	1.732	1	1	1.7	1.7	$\infty$
Probe positioner mechanical tolerance	0.4	rectangular	1.732	1	1	0.2	0.2	$\infty$
Probe positioner with respect to phantom shell	2.9	rectangular	1.732	1	1	1.7	1.7	$\infty$
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	2.0	rectangular	1.732	1	1	1.2	1.2	$\infty$
<b>Test Sample Related</b>								
Device Positioning	2.9	normal	1	1	1	2.9	2.9	145
Device Holder	3.6	normal	1	1	1	3.6	3.6	5
Power Drift	5.0	rectangular	1.732	1	1	2.9	2.9	$\infty$
Power scaling	1.0	rectangular	1.732	1	1	0.6	0.6	$\infty$
<b>Phantom and tissue parameters</b>								
Phantom Uncertainty - shell thickness tolerances	6.1	rectangular	1.732	1	1	3.5	3.5	$\infty$
Uncertainty in SAR correction for deviations in permittivity and conductivity	1.9	normal	1	1.00	0.84	1.9	1.6	$\infty$
Liquid conductivity - measurement uncertainty	2.5	normal	1	0.78	0.71	2.0	1.8	$\infty$
Liquid permittivity - measurement uncertainty	2.5	normal	1	0.26	0.26	0.7	0.7	$\infty$
Temp Uncertainty - Conductivity	3.4	rectangular	1.732	0.8	0.71	1.5	1.4	$\infty$
Temp Uncertainty - Permittivity	0.4	rectangular	1.732	0.2	0.26	0.1	0.1	$\infty$
Combined Standard Uncertainty	RSS					11.4	11.3	361
Expanded Measurement Uncertainty (95% Confidence/	normal (k=2)					22.8	22.7	

# MEASUREMENT UNCERTAINTY



## MEASUREMENT UNCERTAINTY BUDGETS PER IEEE 1528:2013

3000-6000 MHz Range								
Uncertainty Component	Tolerance (+/- %)	Probability Distribution	Divisor	$c_i$ (1g)	$c_i$ (10g)	$u_i$ (1g) (+/-%)	$u_i$ (10g) (+/-%)	$v_i$
<b>Measurement System</b>								
Probe calibration (k=1)	6.6	normal	1	1	1	6.6	6.6	$\infty$
Axial isotropy	4.7	rectangular	1.732	0.707	0.707	1.9	1.9	$\infty$
Hemispherical isotropy	9.6	rectangular	1.732	0.707	0.707	3.9	3.9	$\infty$
Boundary effect	2.0	rectangular	1.732	1	1	1.2	1.2	$\infty$
Linearity	4.7	rectangular	1.732	1	1	2.7	2.7	$\infty$
System detection limits	1.0	rectangular	1.732	1	1	0.6	0.6	$\infty$
Modulation Response	2.4	rectangular	1.732	1	1	1.4	1.4	$\infty$
Readout electronics	0.3	normal	1	1	1	0.3	0.3	$\infty$
Response time	0.8	rectangular	1.732	1	1	0.5	0.5	$\infty$
Integration time	2.6	rectangular	1.732	1	1	1.5	1.5	$\infty$
RF ambient conditions - noise	3.0	rectangular	1.732	1	1	1.7	1.7	$\infty$
RF Ambient Reflections	3.0	rectangular	1.732	1	1	1.7	1.7	$\infty$
Probe positioner mechanical tolerance	0.8	rectangular	1.732	1	1	0.5	0.5	$\infty$
Probe positioner with respect to phantom shell	6.7	rectangular	1.732	1	1	3.9	3.9	$\infty$
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	4.0	rectangular	1.732	1	1	2.3	2.3	$\infty$
<b>Test Sample Related</b>								
Device Positioning	2.9	normal	1	1	1	2.9	2.9	145
Device Holder	3.6	normal	1	1	1	3.6	3.6	5
Power Drift	5.0	rectangular	1.732	1	1	2.9	2.9	$\infty$
Power scaling	1.0	rectangular	1.732	1	1	0.6	0.6	$\infty$
<b>Phantom and tissue parameters</b>								
Phantom Uncertainty - shell thickness tolerances	6.6	rectangular	1.732	1	1	3.8	3.8	$\infty$
Uncertainty in SAR correction for deviations in permittivity and conductivity	1.9	normal	1	1.00	0.84	1.9	1.6	$\infty$
Liquid conductivity - measurement uncertainty	2.5	normal	1	0.78	0.71	2.0	1.8	$\infty$
Liquid permittivity - measurement uncertainty	2.5	normal	1	0.26	0.26	0.7	0.7	$\infty$
Temp Uncertainty - Conductivity	3.4	rectangular	1.732	0.8	0.71	1.5	1.4	$\infty$
Temp Uncertainty - Permittivity	0.4	rectangular	1.732	0.2	0.26	0.1	0.1	$\infty$
Combined Standard Uncertainty	RSS					12.5	12.4	748
Expanded Measurement Uncertainty (95% Confidence/	normal (k=2)					25.0	24.9	



ADM

Calibration Laboratory of  
Schmid & Partner  
Engineering AG  
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst  
C Service suisse d'étalonnage  
S Servizio svizzero di taratura  
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client Element

Certificate No: D5GHzV2-1066\_Nov19

### CALIBRATION CERTIFICATE

Object D5GHzV2 - SN:1066  
Calibration procedure(s) QA CAL-22.v4  
Calibration Procedure for SAR Validation Sources between 3-6 GHz

Calibration date: November 19, 2019

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 3503	25-Mar-19 (No. EX3-3503_Mar19)	Mar-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

Calibrated by:	Name Leif Klysner	Function: Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 20, 2019

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

### Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Additional Documentation:

- DASY4/5 System Handbook

### Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

## Measurement Conditions

DASY system configuration, as far as not given on page 1.

<b>DASY Version</b>	DASY5	V52.10.3
<b>Extrapolation</b>	Advanced Extrapolation	
<b>Phantom</b>	Modular Flat Phantom V5.0	
<b>Distance Dipole Center - TSL</b>	10 mm	with Spacer
<b>Zoom Scan Resolution</b>	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
<b>Frequency</b>	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5500 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

## Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
<b>Nominal Head TSL parameters</b>	22.0 °C	36.0	4.66 mho/m
<b>Measured Head TSL parameters</b>	(22.0 ± 0.2) °C	34.8 ± 6 %	4.45 mho/m ± 6 %
<b>Head TSL temperature change during test</b>	< 0.5 °C	----	----

## SAR result with Head TSL at 5200 MHz

<b>SAR averaged over 1 cm<sup>3</sup> (1 g) of Head TSL</b>	Condition	
SAR measured	100 mW input power	8.11 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>80.4 W/kg ± 19.9 % (k=2)</b>

<b>SAR averaged over 10 cm<sup>3</sup> (10 g) of Head TSL</b>	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>22.7 W/kg ± 19.5 % (k=2)</b>

### Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	1.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	4.54 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>83.4 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.6 W/kg ± 19.5 % (k=2)</b>

### Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	4.74 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.72 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>86.4 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.46 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>24.3 W/kg ± 19.5 % (k=2)</b>

### Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.3 ± 6 %	4.84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.53 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>84.5 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>23.8 W/kg ± 19.5 % (k=2)</b>

### Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	5.05 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>81.0 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	<b>22.7 W/kg ± 19.5 % (k=2)</b>

### Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.1 ± 6 %	5.45 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.51 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>74.5 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>20.8 W/kg ± 19.5 % (k=2)</b>

### Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.9 ± 6 %	5.58 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.78 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>77.2 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>21.5 W/kg ± 19.5 % (k=2)</b>

### Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.6 ± 6 %	5.85 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.18 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>81.2 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.24 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>22.2 W/kg ± 19.5 % (k=2)</b>

### Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.4 ± 6 %	5.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>80.7 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.25 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>22.3 W/kg ± 19.5 % (k=2)</b>

### Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.0 ± 6 %	6.26 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

### SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.66 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>76.0 W/kg ± 19.9 % (k=2)</b>

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.11 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	<b>20.8 W/kg ± 19.5 % (k=2)</b>



## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	$51.9 \Omega - 7.3 j\Omega$
Return Loss	- 22.6 dB

### Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	$50.4 \Omega - 1.7 j\Omega$
Return Loss	- 35.0 dB

### Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	$50.9 \Omega - 2.2 j\Omega$
Return Loss	- 32.4 dB

### Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	$57.2 \Omega - 0.3 j\Omega$
Return Loss	- 23.4 dB

### Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	$55.8 \Omega + 0.5 j\Omega$
Return Loss	- 25.2 dB

### Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	$51.9 \Omega - 6.4 j\Omega$
Return Loss	- 23.6 dB

### Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	$50.6 \Omega - 1.3 j\Omega$
Return Loss	- 36.9 dB

### Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	$52.0 \Omega - 1.7 j\Omega$
Return Loss	- 31.9 dB

### Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	56.7 $\Omega$ - 0.1 $j\Omega$
Return Loss	- 24.0 dB

### Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	56.0 $\Omega$ - 0.1 $j\Omega$
Return Loss	- 25.0 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.196 ns
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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
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## DASY5 Validation Report for Head TSL

Date: 18.11.2019

Test Laboratory: SPEAG, Zurich, Switzerland

### DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1066

Communication System: UID 0.- CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 4.45$  S/m;  $\epsilon_r = 34.8$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5300$  MHz;  $\sigma = 4.54$  S/m;  $\epsilon_r = 34.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5500$  MHz;  $\sigma = 4.74$  S/m;  $\epsilon_r = 34.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 4.84$  S/m;  $\epsilon_r = 34.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.05$  S/m;  $\epsilon_r = 34$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

#### DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.64, 5.64, 5.64) @ 5200 MHz, ConvF(5.39, 5.39, 5.39) @ 5300 MHz, ConvF(5.1, 5.1, 5.1) @ 5500 MHz, ConvF(4.95, 4.95, 4.95) @ 5600 MHz, ConvF(4.96, 4.96, 4.96) @ 5800 MHz; Calibrated: 25.03.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

### Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 77.43 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 29.1 W/kg

**SAR(1 g) = 8.11 W/kg; SAR(10 g) = 2.3 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 68.8%

Maximum value of SAR (measured) = 18.5 W/kg

### Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 79.05 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 30.0 W/kg

**SAR(1 g) = 8.41 W/kg; SAR(10 g) = 2.39 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 68.9%

Maximum value of SAR (measured) = 19.2 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 78.07 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 34.0 W/kg

**SAR(1 g) = 8.72 W/kg; SAR(10 g) = 2.46 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 66.4%

Maximum value of SAR (measured) = 20.6 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 = 78.88 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 31.9 W/kg

**SAR(1 g) = 8.53 W/kg; SAR(10 g) = 2.41 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 67.3%

Maximum value of SAR (measured) = 19.8 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 74.94 V/m; Power Drift = 0.08 dB

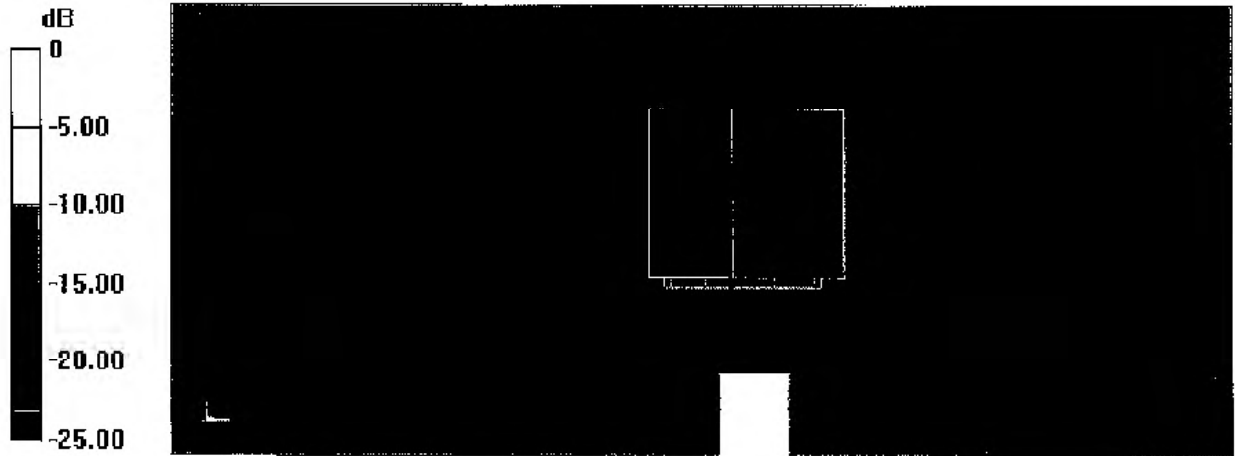
Peak SAR (extrapolated) = 32.6 W/kg

**SAR(1 g) = 8.18 W/kg; SAR(10 g) = 2.3 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

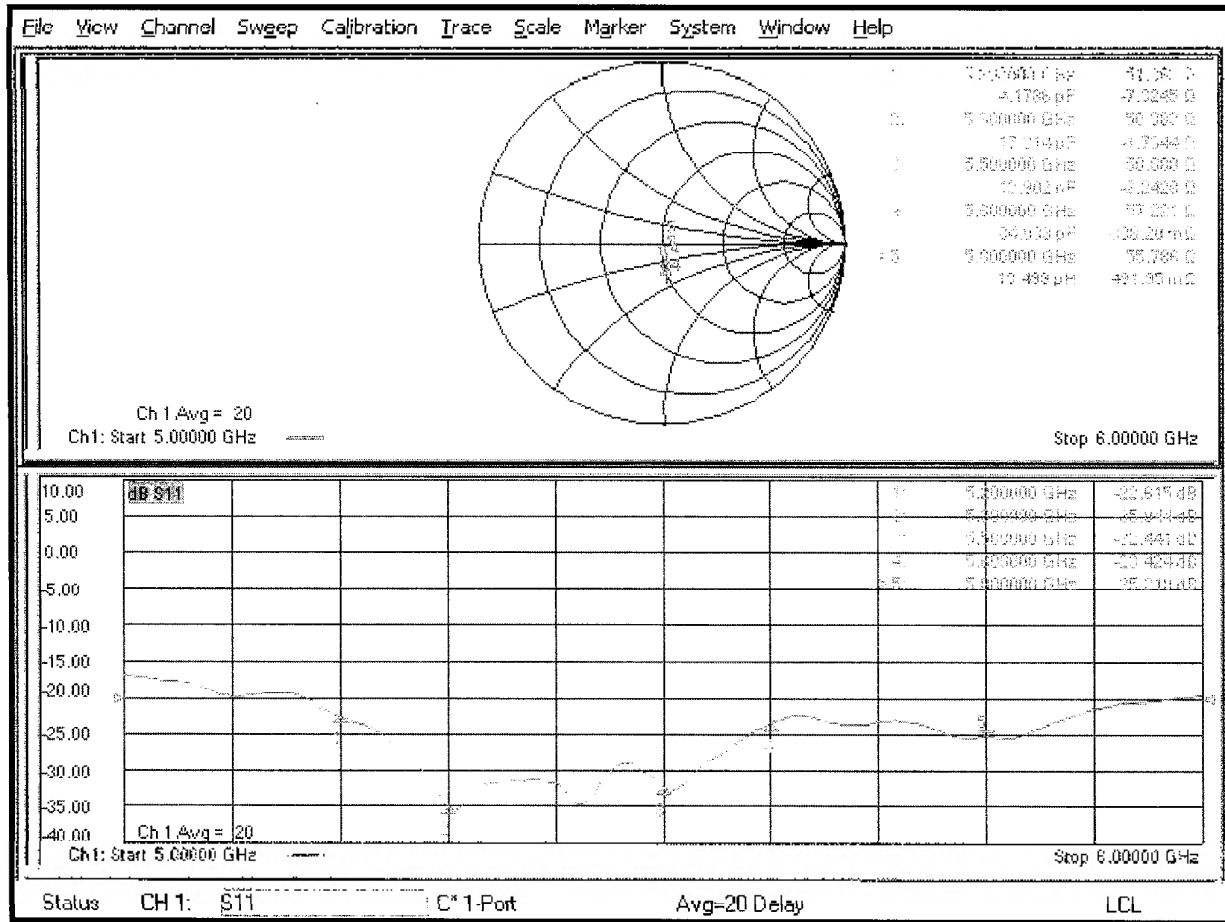
Ratio of SAR at M2 to SAR at M1 = 65.5%

Maximum value of SAR (measured) = 19.5 W/kg



0 dB = 19.5 W/kg = 12.90 dBW/kg

# Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 19.11.2019

Test Laboratory: SPEAG, Zurich, Switzerland

### DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1066

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used:  $f = 5200$  MHz;  $\sigma = 5.45$  S/m;  $\epsilon_r = 47.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5300$  MHz;  $\sigma = 5.58$  S/m;  $\epsilon_r = 46.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5500$  MHz;  $\sigma = 5.85$  S/m;  $\epsilon_r = 46.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.99$  S/m;  $\epsilon_r = 46.4$ ;  $\rho = 1000$  kg/m<sup>3</sup>,

Medium parameters used:  $f = 5800$  MHz;  $\sigma = 6.26$  S/m;  $\epsilon_r = 46$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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) @ 5200 MHz, ConvF(5.25, 5.25, 5.25) @ 5300 MHz, ConvF(4.79, 4.79, 4.79) @ 5500 MHz, ConvF(4.74, 4.74, 4.74) @ 5600 MHz, ConvF(4.62, 4.62, 4.62) @ 5800 MHz; Calibrated: 25.03.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

### Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.53 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 28.2 W/kg

**SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.10 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 67.8%

Maximum value of SAR (measured) = 17.2 W/kg

### Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.04 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 30.5 W/kg

**SAR(1 g) = 7.78 W/kg; SAR(10 g) = 2.17 W/kg**

Smallest distance from peaks to all points 3 dB below = 6.9 mm

Ratio of SAR at M2 to SAR at M1 = 66.2%

Maximum value of SAR (measured) = 17.9 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.89 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 34.1 W/kg

**SAR(1 g) = 8.18 W/kg; SAR(10 g) = 2.24 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 64.6%

Maximum value of SAR (measured) = 19.4 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 = 70.24 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 35.3 W/kg

**SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.25 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 63.6%

Maximum value of SAR (measured) = 19.4 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,**

**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 68.12 V/m; Power Drift = -0.04 dB

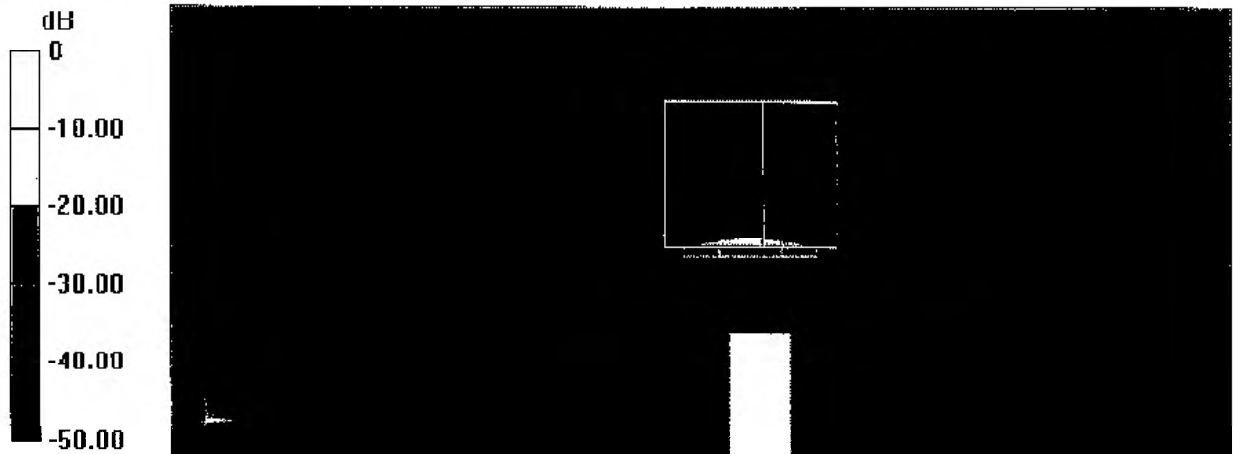
Peak SAR (extrapolated) = 33.5 W/kg

**SAR(1 g) = 7.66 W/kg; SAR(10 g) = 2.11 W/kg**

Smallest distance from peaks to all points 3 dB below = 7.2 mm

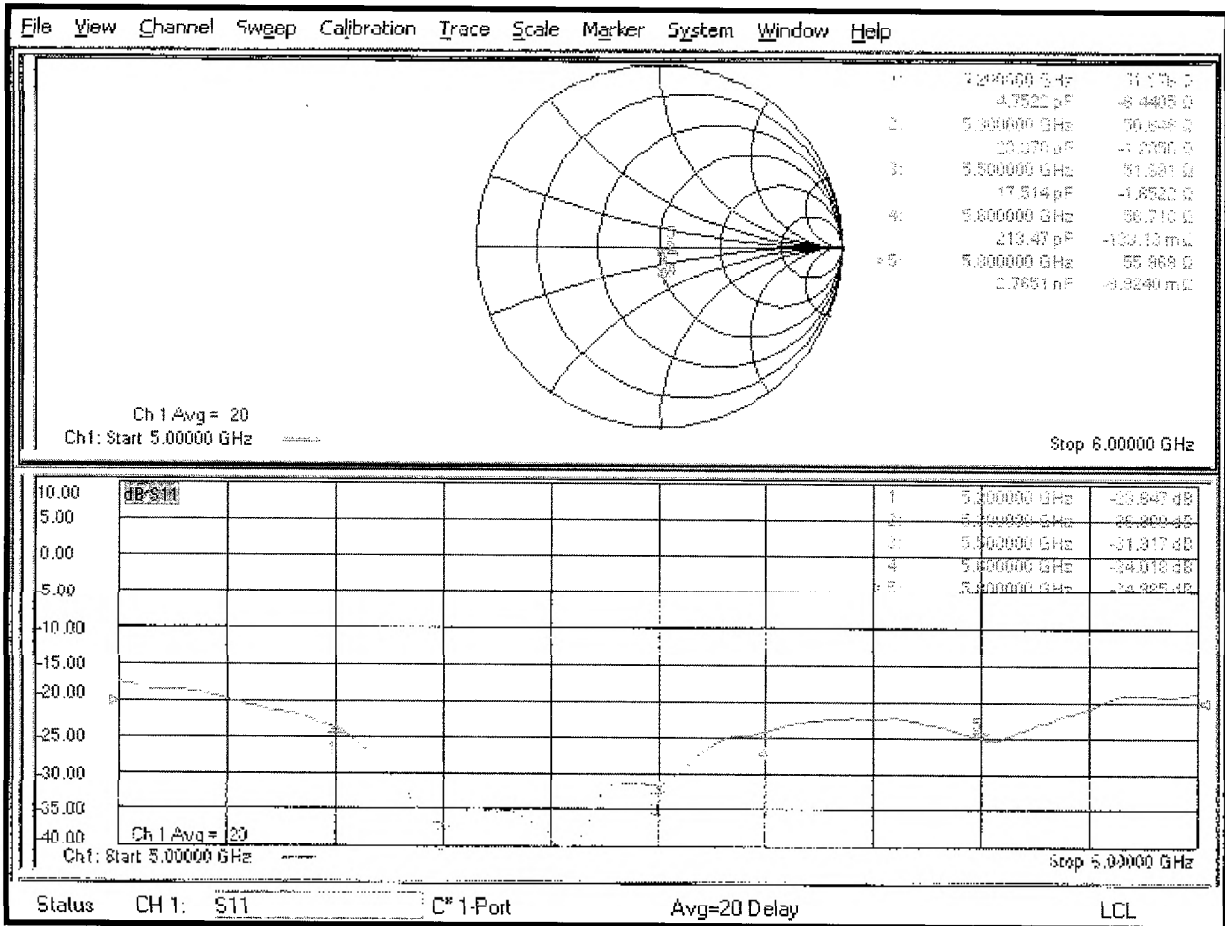
Ratio of SAR at M2 to SAR at M1 = 63%

Maximum value of SAR (measured) = 18.6 W/kg



0 dB = 17.2 W/kg = 12.37 dBW/kg

# Impedance Measurement Plot for Body TSL





# Calibration Report for Antenna - Dipole

PseCal  
2020.06.10.0

DUT Code:	ADM	Cal Date:	2020-11-09
Description	Antenna - Dipole	Temperature:	20.4C
Model	D5GHzV2	Humidity:	37.80%
Manufacturer	SPEAG	Tester:	Kyle McMullan
Certificate No.:	ADM2020-11-09	Pressure:	1012.6mb
		Job Site:	MN11

<b>TEST SPECIFICATIONS</b>			
Specification:	WP 438 SAR Dipole Verificaiton	Version:	2020 - Rev 0
Specification:		Version:	

<b>TEST PARAMETERS</b>			
Device Received In Tolerance:	Yes	Calibrated Frequency Range:	N/A
		Next Cal Due Date:	2021-11-10

<b>Equipment Used to perform calibration</b>									
Item:	Analyzer - Network Analyzer	Identifier:	NAM	Model:	E5071C	Last Cal:	2019-11-13	Cal Due:	2022-11-13
Item:	Fixture/Kit - Calibration/Verification	Identifier:	NAN	Model:	85032F	Last Cal:	NCR	Cal Due:	NCR
Item:	Terminator	Identifier:	NANA	Model:	85032-60017	Last Cal:	2020-09-10	Cal Due:	2021-09-10
Item:		Identifier:		Model:		Last Cal:		Cal Due:	
Item:		Identifier:		Model:		Last Cal:		Cal Due:	
Item:		Identifier:		Model:		Last Cal:		Cal Due:	

**COMMENTS, OPINIONS and INTERPRETATIONS**

None

**Measurement Uncertainty**

	Probability Distribution	Impedance (dB)	Insertion Loss (dB)	Value (dB)	Value (+/- %)
Expanded uncertainty U (level of confidence = 95%)	normal (k=2)		1		

**RESULTS**

Pass

**This measurement was a calibration verification. (Instrument parameters are within tolerances.)**

Measurements are traceable to the International System of Units (SI) via NIST.

CALIBRATION DATA ATTACHED

5200 MHz	Head Phantom		Return Loss		Real Impedence	Imaginary Impedence
		2020 Value (dB)	-23.7	2020 Value ( $\Omega$ )	47.9	-6.0
2019 Value (dB)	-22.6	2019 Value ( $\Omega$ )	51.9	-7.3		
Deviation (%)	-4.9	Deviation ( $\Omega$ )	4	-1.3		
Limit (%)	20	Limit ( $\Omega$ )	5	5		
Limit (< dB)	-20	Results	Pass	Pass		
Results	Pass					
Body Phantom	2020 Value (dB)	-25.8	2020 Value ( $\Omega$ )	48.5	-3.9	
	2019 Value (dB)	-23.6	2019 Value ( $\Omega$ )	51.9	-6.4	
	Deviation (%)	-9.3	Deviation ( $\Omega$ )	3.4	-2.5	
	Limit (%)	20	Limit ( $\Omega$ )	5	5	
	Limit (< dB)	-20	Results	Pass	Pass	
	Results	Pass				

5300 MHz	Head Phantom		Return Loss		Real Impedence	Imaginary Impedence
		2020 Value (dB)	-32.1	2020 Value ( $\Omega$ )	48.2	2.6
2019 Value (dB)	-35.0	2019 Value ( $\Omega$ )	50.4	-1.7		
Deviation (%)	8.3	Deviation ( $\Omega$ )	2.2	-4.3		
Limit (%)	20	Limit ( $\Omega$ )	5	5		
Limit (< dB)	-20	Results	Pass	Pass		
Results	Pass					
Body Phantom	2020 Value (dB)	-34.0	2020 Value ( $\Omega$ )	50.9	3.3	
	2019 Value (dB)	-36.9	2019 Value ( $\Omega$ )	50.6	-1.3	
	Deviation (%)	7.9	Deviation ( $\Omega$ )	-0.3	-4.6	
	Limit (%)	20	Limit ( $\Omega$ )	5	5	
	Limit (< dB)	-20	Results	Pass	Pass	
	Results	Pass				

5500 MHz	Head Phantom		Return Loss		Real Impedence	Imaginary Impedence
		2020 Value (dB)	-30.4	2020 Value ( $\Omega$ )	53.1	0.0
2019 Value (dB)	-32.4	2019 Value ( $\Omega$ )	50.9	-2.2		
Deviation (%)	6.2	Deviation ( $\Omega$ )	-2.2	-2.2		
Limit (%)	20	Limit ( $\Omega$ )	5	5		
Limit (< dB)	-20	Results	Pass	Pass		
Results	Pass					
Body Phantom	2020 Value (dB)	-29.0	2020 Value ( $\Omega$ )	52.6	2.5	
	2019 Value (dB)	-31.9	2019 Value ( $\Omega$ )	52.0	-1.7	
	Deviation (%)	9.1	Deviation ( $\Omega$ )	-0.6	-4.2	
	Limit (%)	20	Limit ( $\Omega$ )	5	5	
	Limit (< dB)	-20	Results	Pass	Pass	
	Results	Pass				

5600 MHz			Return Loss		Real Impedence	Imaginary Impedence
			Head Phantom		2020 Value (dB)	-24.3
2019 Value (dB)	-23.4	2019 Value ( $\Omega$ )		57.2	-0.3	
Deviation (%)	-3.8	Deviation ( $\Omega$ )		4.8	3.5	
Limit (%)	20	Limit ( $\Omega$ )		5	5	
Limit (< dB)	-20	Results		Pass	Pass	
Results	Pass					
Body Phantom	2020 Value (dB)	53.2	2020 Value ( $\Omega$ )	53.2	-4.7	
	2019 Value (dB)	-24.0	2019 Value ( $\Omega$ )	56.7	-0.1	
	Deviation (%)	321.7	Deviation ( $\Omega$ )	3.5	4.6	
	Limit (%)	20	Limit ( $\Omega$ )	5	5	
	Limit (< dB)	-20	Results	Pass	Pass	
	Results	Pass				

5800 MHz			Return Loss		Real Impedence	Imaginary Impedence
			Head Phantom		2020 Value (dB)	-27.5
2019 Value (dB)	-25.2	2019 Value ( $\Omega$ )		55.8	0.5	
Deviation (%)	-9.1	Deviation ( $\Omega$ )		3.7	-2.3	
Limit (%)	20	Limit ( $\Omega$ )		5	5	
Limit (< dB)	-20	Results		Pass	Pass	
Results	Pass					
Body Phantom	2020 Value (dB)	-25.4	2020 Value ( $\Omega$ )	51.4	4.6	
	2019 Value (dB)	-25.0	2019 Value ( $\Omega$ )	56	-0.1	
	Deviation (%)	-1.6	Deviation ( $\Omega$ )	4.6	-4.7	
	Limit (%)	20	Limit ( $\Omega$ )	5	5	
	Limit (< dB)	-20	Results	Pass	Pass	
	Results	Pass				

ADL

**Calibration Laboratory of  
Schmid & Partner  
Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

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Multilateral Agreement for the recognition of calibration certificates**

Accreditation No.: **SCS 0108**

Client **Element**

Certificate No: **D2450V2-855\_Nov19**

**CALIBRATION CERTIFICATE**

Object **D2450V2 - SN:855**

Calibration procedure(s) **QA CAL-05.v11  
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **November 12, 2019**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

Calibrated by: **Jeton Kastrati**      Name: **Jeton Kastrati**      Function: **Laboratory Technician**

Approved by: **Katja Pokovic**      Name: **Katja Pokovic**      Function: **Technical Manager**

Signature

Issued: November 12, 2019

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.31	0.27	0.21	$\pm 10.1 \%$
DCP (mV) <sup>B</sup>	102.6	96.7	102.2	

### Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	138.7	$\pm 2.7 \%$	$\pm 4.7 \%$
		Y	0.0	0.0	1.0		137.0		
		Z	0.0	0.0	1.0		154.4		

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-114.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

**Note:** Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth (mm) <sup>G</sup>	Unc (k=2)
450	43.5	0.87	10.39	10.39	10.39	0.13	1.30	± 13.3 %
750	41.9	0.89	9.37	9.37	9.37	0.58	0.80	± 12.0 %
835	41.5	0.90	9.11	9.11	9.11	0.40	0.90	± 12.0 %
900	41.5	0.97	8.93	8.93	8.93	0.51	0.80	± 12.0 %
1750	40.1	1.37	8.03	8.03	8.03	0.25	0.86	± 12.0 %
1900	40.0	1.40	7.62	7.62	7.62	0.30	0.86	± 12.0 %
2300	39.5	1.67	7.48	7.48	7.48	0.30	0.86	± 12.0 %
2450	39.2	1.80	7.22	7.22	7.22	0.33	0.82	± 12.0 %
2550	39.1	1.91	6.94	6.94	6.94	0.26	0.86	± 12.0 %
3500	37.9	2.91	6.75	6.75	6.75	0.30	1.30	± 13.1 %
3700	37.7	3.12	6.68	6.68	6.68	0.35	1.30	± 13.1 %
5200	36.0	4.66	5.13	5.13	5.13	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.99	4.99	4.99	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.59	4.59	4.59	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.48	4.48	4.48	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.46	4.46	4.46	0.40	1.80	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Calibration Parameter Determined in Body Tissue Simulating Media

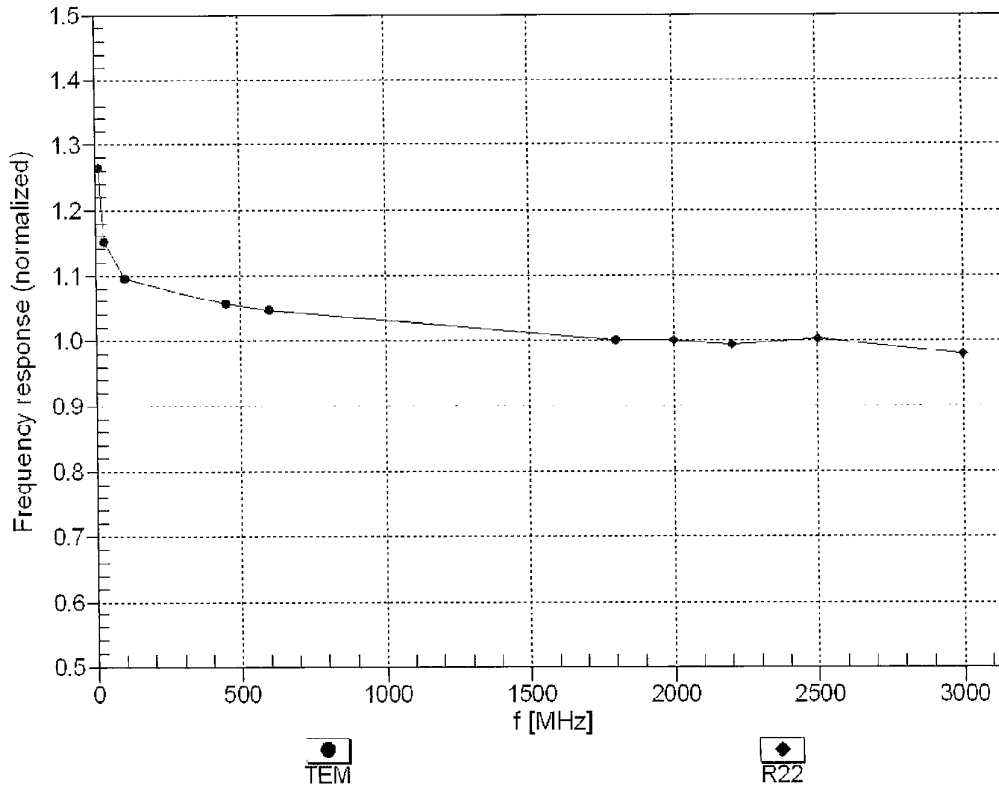
f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
450	56.7	0.94	10.41	10.41	10.41	0.08	1.20	± 13.3 %
750	55.5	0.96	9.35	9.35	9.35	0.39	0.80	± 12.0 %
835	55.2	0.97	9.08	9.08	9.08	0.40	0.89	± 12.0 %
900	55.0	1.05	9.01	9.01	9.01	0.37	0.80	± 12.0 %
1750	53.4	1.49	7.78	7.78	7.78	0.31	0.88	± 12.0 %
1900	53.3	1.52	7.50	7.50	7.50	0.41	0.80	± 12.0 %
2300	52.9	1.81	7.47	7.47	7.47	0.46	0.86	± 12.0 %
2450	52.7	1.95	7.35	7.35	7.35	0.38	0.80	± 12.0 %
2550	52.6	2.09	7.15	7.15	7.15	0.31	0.80	± 12.0 %
3500	51.3	3.31	6.50	6.50	6.50	0.40	1.30	± 13.1 %
3700	51.0	3.55	6.32	6.32	6.32	0.40	1.30	± 13.1 %
5200	49.0	5.30	4.31	4.31	4.31	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.20	4.20	4.20	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.83	3.83	3.83	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.77	3.77	3.77	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.75	3.75	3.75	0.50	1.90	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

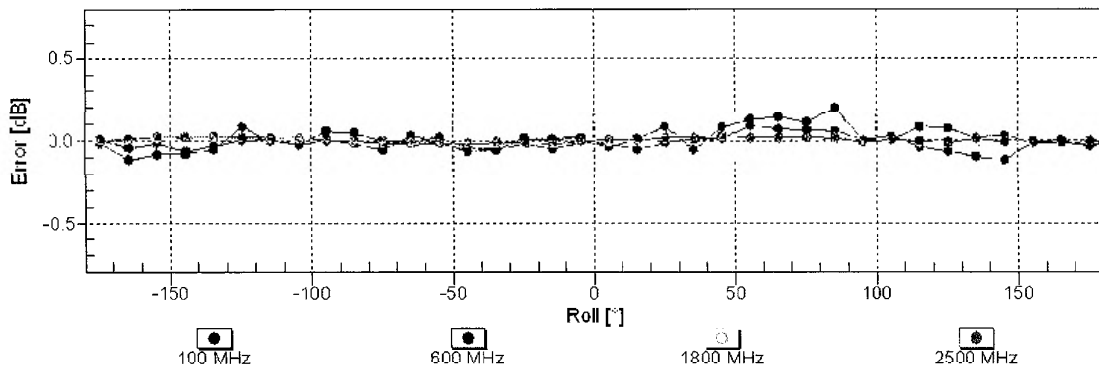
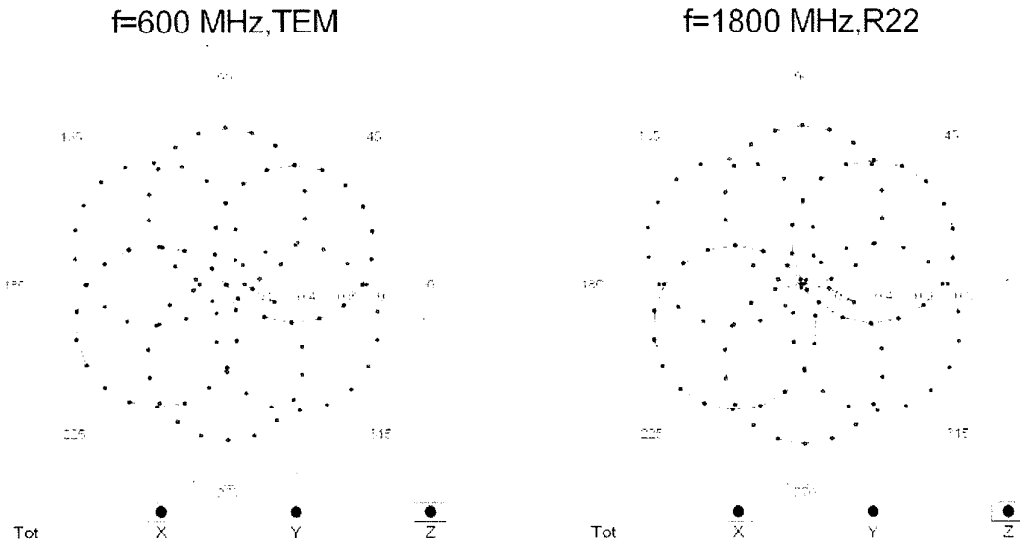
<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

### Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

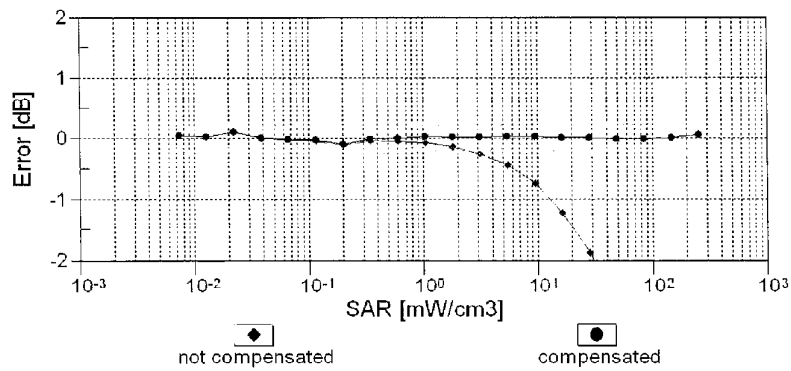
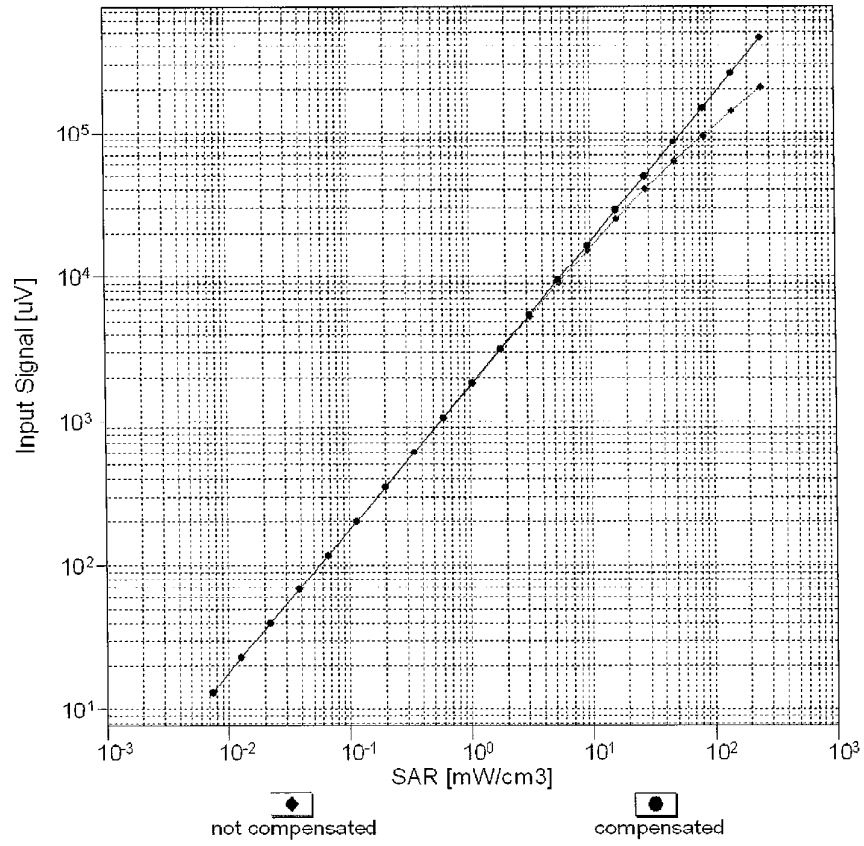
### Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$



**Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )**

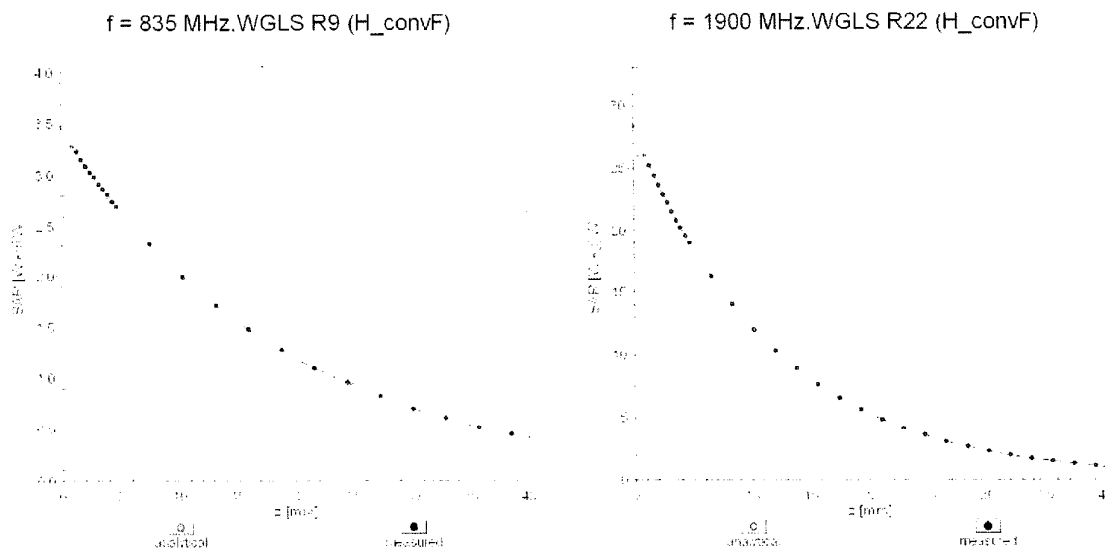
# Dynamic Range f(SAR<sub>head</sub>)

(TEM cell , f<sub>eval</sub>= 1900 MHz)

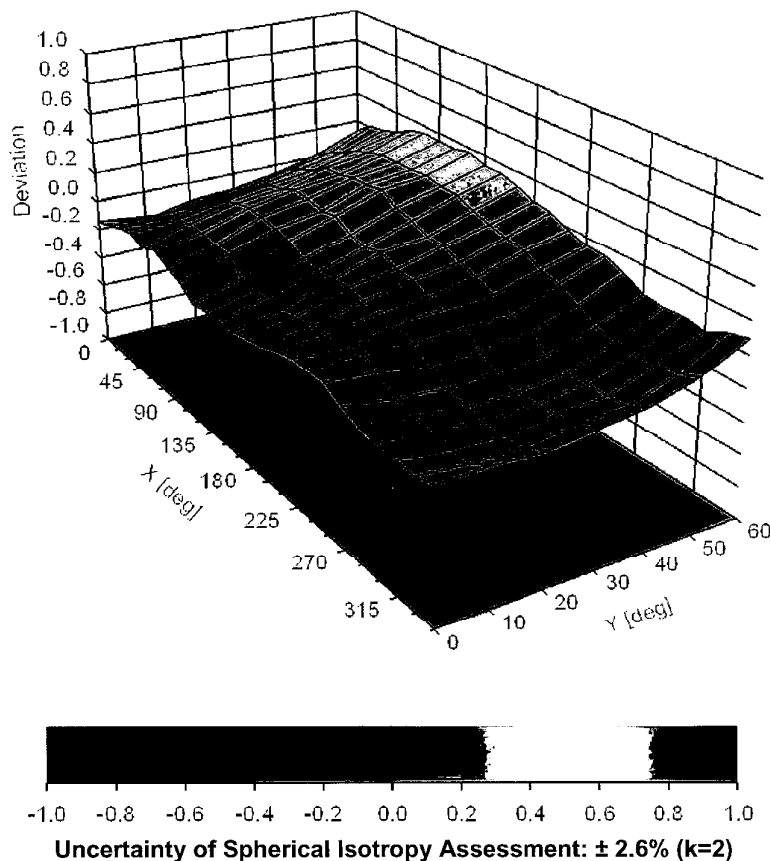


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error ( $\phi, \vartheta$ ), f = 900 MHz



# Calibration Report for Antenna - Dipole

PsaCal  
2020.06.10.0

DUT Code:	ADL	Cal Date:	2020-11-09
Description	Antenna - Dipole	Temperature:	20.4C
Model	D2450V2	Humidity:	37.80%
Manufacturer	SPEAG	Tester:	Kyle McMullan
Certificate No.:	ADL2020-11-09	Pressure:	1012.6mb
		Job Site:	MN11

<b>TEST SPECIFICATIONS</b>			
Specification:	WP 438 SAR Dipole Verificaiton	Version:	2020 - Rev 0
Specification:		Version:	

<b>TEST PARAMETERS</b>			
Device Received In Tolerance:	Yes	Calibrated Frequency Range:	N/A
		Next Cal Due Date:	2021-11-10

<b>Equipment Used to perform calibration</b>									
Item:	Analyzer - Network Analyzer	Identifier:	NAM	Model:	E5071C	Last Cal:	2019-11-13	Cal Due:	2022-11-13
Item:	Fixture/Kit - Calibration/Verification	Identifier:	NAN	Model:	85032F	Last Cal:	NCR	Cal Due:	NCR
Item:	Terminator	Identifier:	NANA	Model:	85032-60017	Last Cal:	2020-09-10	Cal Due:	2021-09-10
Item:		Identifier:		Model:		Last Cal:		Cal Due:	
Item:		Identifier:		Model:		Last Cal:		Cal Due:	
Item:		Identifier:		Model:		Last Cal:		Cal Due:	

**COMMENTS, OPINIONS and INTERPRETATIONS**

None

**Measurement Uncertainty**

	Probability Distribution	Impedance (dB)	Insertion Loss (dB)	Value (dB)	Value (+/- %)
Expanded uncertainty U (level of confidence = 95%)	normal (k=2)		1		

**RESULTS**

Pass

**This measurement was a calibration verification. (Instrument parameters are within tolerances.)**

Measurements are traceable to the International System of Units (SI) via NIST.

CALIBRATION DATA ATTACHED



		Return Loss		Real Impedence	Imaginary Impedence
Head Phantom	2020 Value (dB)	-26.3	2020 Value ( $\Omega$ )	52.0	3.5
	2019 Value (dB)	-24.7	2019 Value ( $\Omega$ )	52.2	5.6
	Deviation (%)	-6.5	Deviation ( $\Omega$ )	0.2	2.1
	Limit (%)	20	Limit ( $\Omega$ )	5	5
	Limit (< dB)	-20	Results	Pass	Pass
	Results	Pass			
Body Phantom	2020 Value (dB)	-24.2	2020 Value ( $\Omega$ )	48.3	1.8
	2019 Value (dB)	-23.3	2019 Value ( $\Omega$ )	49	6.7
	Deviation (%)	-3.9	Deviation ( $\Omega$ )	0.7	4.9
	Limit (%)	20	Limit ( $\Omega$ )	5	5
	Limit (< dB)	-20	Results	Pass	Pass
	Results	Pass			



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **PC Test**

Certificate No: **EX3-7558 Oct20**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:7558**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7  
Calibration procedure for dosimetric E-field probes**

✓  
10/29/20  
ATH

Calibration date: **October 21, 2020**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
			Issued: October 21, 2020
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**Glossary:**

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

**Calibration is Performed According to the Following Standards:**

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Methods Applied and Interpretation of Parameters:**

- *NORM<sub>x,y,z</sub>*: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). *NORM<sub>x,y,z</sub>* are only intermediate values, i.e., the uncertainties of *NORM<sub>x,y,z</sub>* does not affect the  $E^2$ -field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)<sub>x,y,z</sub> = NORM<sub>x,y,z</sub> \* frequency\_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCP<sub>x,y,z</sub>*: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR*: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>; A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORM<sub>x,y,z</sub> \* ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORM<sub>x</sub>* (no uncertainty required).

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:7558

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.48	0.52	0.66	± 10.1 %
DCP (mV) <sup>B</sup>	98.0	99.5	100.1	

### Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB/μV	C	D dB	VR mV	Max dev.	Max Unc <sup>E</sup> (k=2)
0	CW	X	0.00	0.00	1.00	0.00	185.3	± 3.5 %	± 4.7 %
		Y	0.00	0.00	1.00		175.8		
		Z	0.00	0.00	1.00		194.4		
10352- AAA	Pulse Waveform (200Hz, 10%)	X	20.00	92.45	21.49	10.00	60.0	± 4.2 %	± 9.6 %
		Y	4.47	72.65	13.35		60.0		
		Z	20.00	96.19	23.70		60.0		
10353- AAA	Pulse Waveform (200Hz, 20%)	X	20.00	94.66	21.43	6.99	80.0	± 2.8 %	± 9.6 %
		Y	11.55	82.34	15.52		80.0		
		Z	20.00	97.94	23.58		80.0		
10354- AAA	Pulse Waveform (200Hz, 40%)	X	20.00	99.95	22.63	3.98	95.0	± 1.5 %	± 9.6 %
		Y	20.00	89.29	16.80		95.0		
		Z	20.00	103.17	24.81		95.0		
10355- AAA	Pulse Waveform (200Hz, 60%)	X	20.00	107.24	24.81	2.22	120.0	± 1.2 %	± 9.6 %
		Y	20.00	94.87	18.51		120.0		
		Z	20.00	109.53	26.47		120.0		
10387- AAA	QPSK Waveform, 1 MHz	X	1.72	64.86	14.62	1.00	150.0	± 1.6 %	± 9.6 %
		Y	1.69	65.42	14.75		150.0		
		Z	1.72	64.96	14.58		150.0		
10388- AAA	QPSK Waveform, 10 MHz	X	2.22	67.03	15.22	0.00	150.0	± 1.1 %	± 9.6 %
		Y	2.21	67.28	15.39		150.0		
		Z	2.23	67.14	15.19		150.0		
10396- AAA	64-QAM Waveform, 100 kHz	X	2.93	69.89	18.46	3.01	150.0	± 0.8 %	± 9.6 %
		Y	2.96	71.11	19.18		150.0		
		Z	3.18	71.05	18.99		150.0		
10399- AAA	64-QAM Waveform, 40 MHz	X	3.54	66.79	15.57	0.00	150.0	± 0.8 %	± 9.6 %
		Y	3.53	66.89	15.64		150.0		
		Z	3.56	66.88	15.57		150.0		
10414- AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.98	65.52	15.42	0.00	150.0	± 1.7 %	± 9.6 %
		Y	4.92	65.58	15.47		150.0		
		Z	4.80	64.92	15.09		150.0		

Note: For details on UID parameters see Appendix

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:7558

### Sensor Model Parameters

	C1 fF	C2 fF	$\alpha$ V <sup>-1</sup>	T1 ms.V <sup>-2</sup>	T2 ms.V <sup>-1</sup>	T3 ms	T4 V <sup>-2</sup>	T5 V <sup>-1</sup>	T6
X	54.9	406.34	34.96	12.08	0.22	5.04	1.48	0.20	1.01
Y	47.9	355.89	35.11	12.75	0.00	4.99	1.96	0.05	1.01
Z	55.1	407.93	34.98	17.29	0.07	5.10	1.47	0.24	1.01

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-162.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

**Note:** Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:7558

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
750	41.9	0.89	10.31	10.31	10.31	0.40	0.93	± 12.0 %
835	41.5	0.90	9.95	9.95	9.95	0.50	0.80	± 12.0 %
1750	40.1	1.37	8.70	8.70	8.70	0.35	0.86	± 12.0 %
1900	40.0	1.40	8.34	8.34	8.34	0.31	0.86	± 12.0 %
2300	39.5	1.67	7.91	7.91	7.91	0.35	0.90	± 12.0 %
2450	39.2	1.80	7.62	7.62	7.62	0.36	0.90	± 12.0 %
2600	39.0	1.96	7.43	7.43	7.43	0.39	0.90	± 12.0 %
5250	35.9	4.71	5.36	5.36	5.36	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.82	4.82	4.82	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.87	4.87	4.87	0.40	1.80	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:7558

### Calibration Parameter Determined in Body Tissue Simulating Media

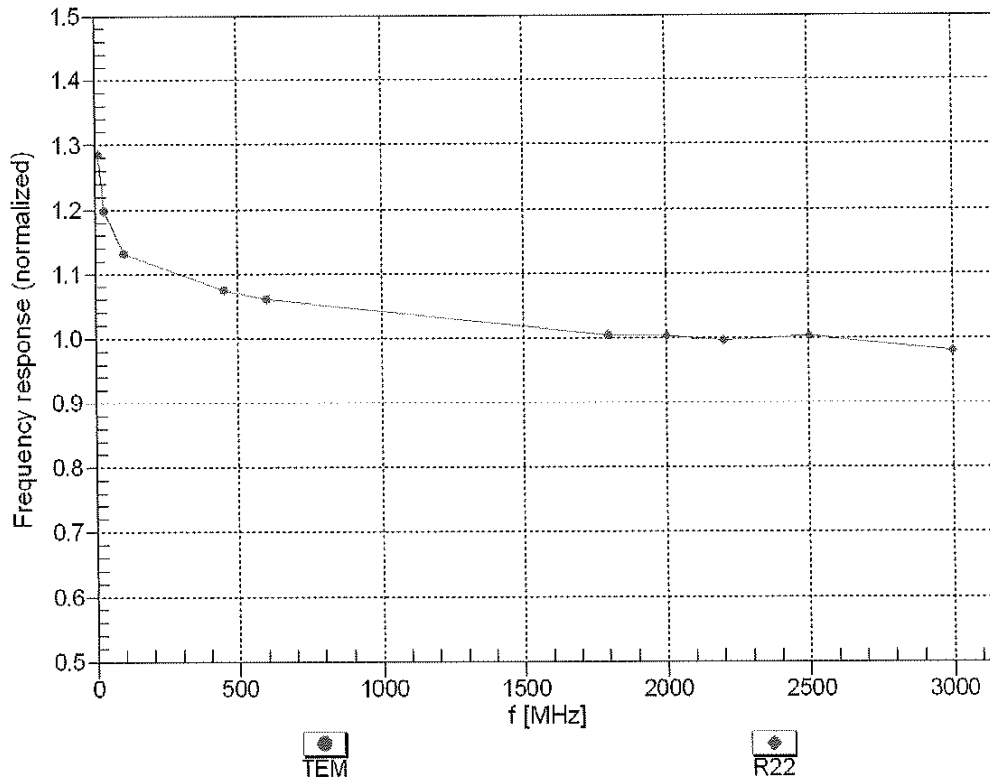
f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
750	55.5	0.96	10.41	10.41	10.41	0.40	0.92	± 12.0 %
835	55.2	0.97	10.09	10.09	10.09	0.30	1.02	± 12.0 %
1750	53.4	1.49	8.27	8.27	8.27	0.38	0.88	± 12.0 %
1900	53.3	1.52	7.93	7.93	7.93	0.39	0.88	± 12.0 %
2300	52.9	1.81	7.85	7.85	7.85	0.35	0.90	± 12.0 %
2450	52.7	1.95	7.64	7.64	7.64	0.38	0.93	± 12.0 %
2600	52.5	2.16	7.46	7.46	7.46	0.33	0.94	± 12.0 %
5250	48.9	5.36	4.81	4.81	4.81	0.50	1.90	± 13.1 %
5600	48.5	5.77	4.25	4.25	4.25	0.50	1.90	± 13.1 %
5750	48.3	5.94	4.32	4.32	4.32	0.50	1.90	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

### Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)

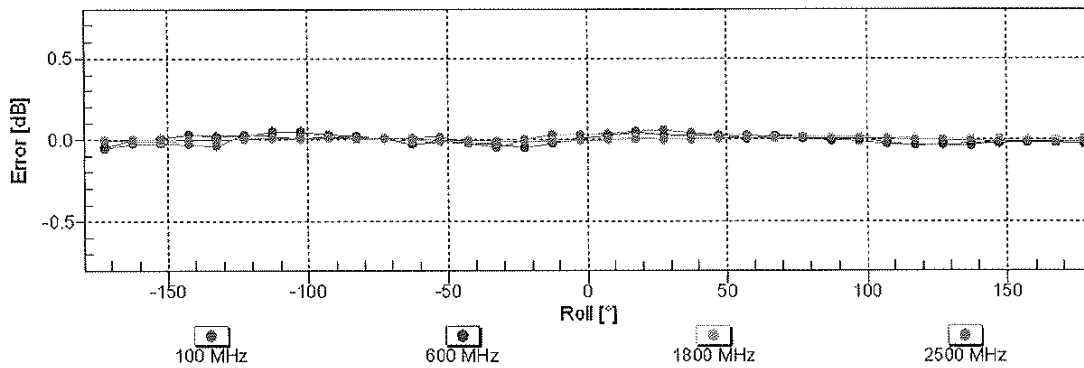
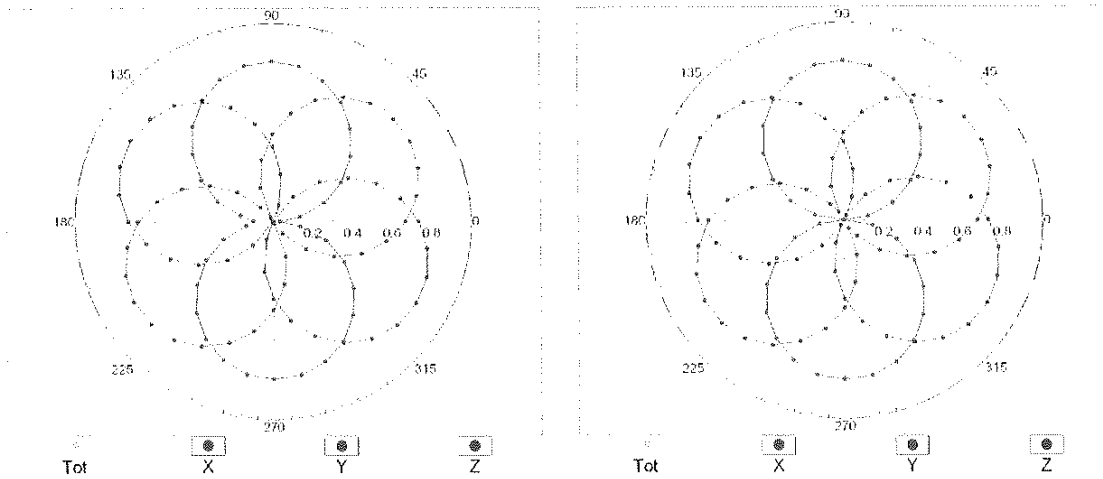


Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

### Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$

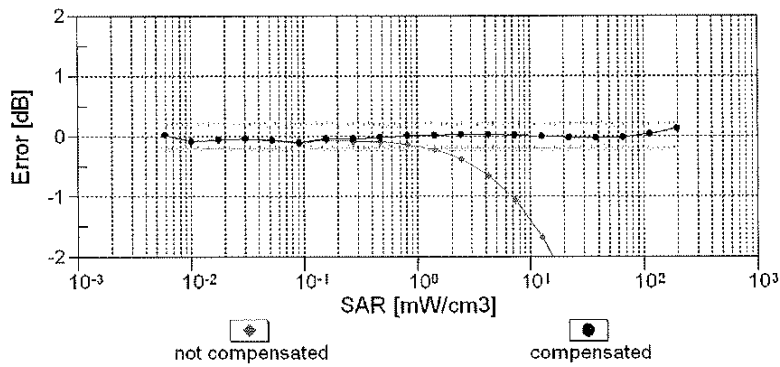
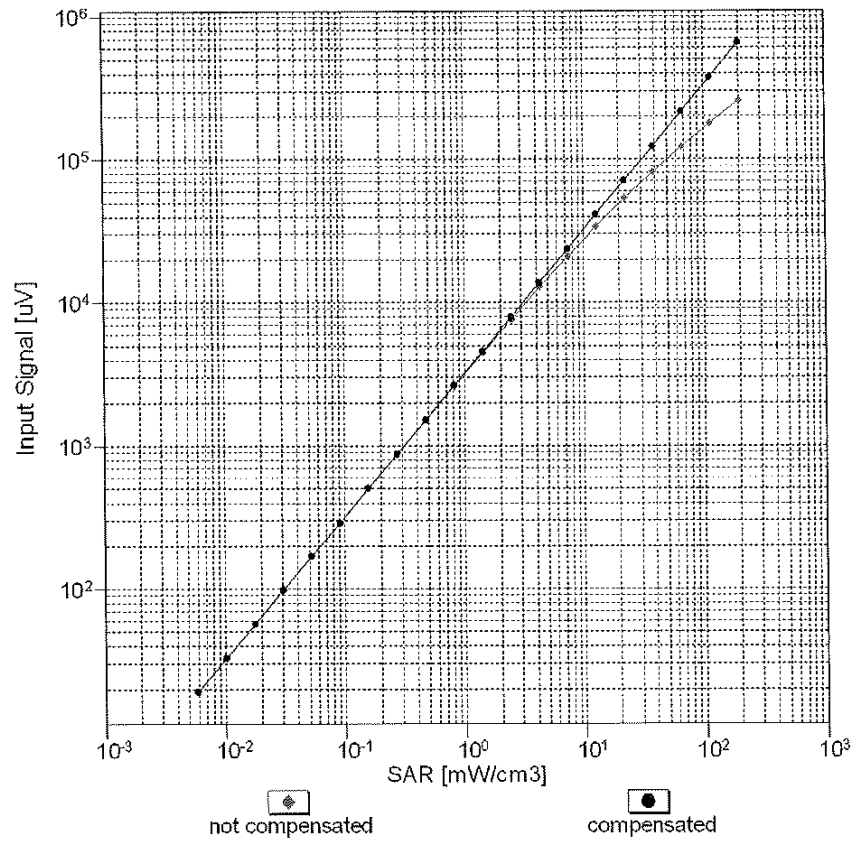
f=600 MHz, TEM

f=1800 MHz, R22



Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  (k=2)

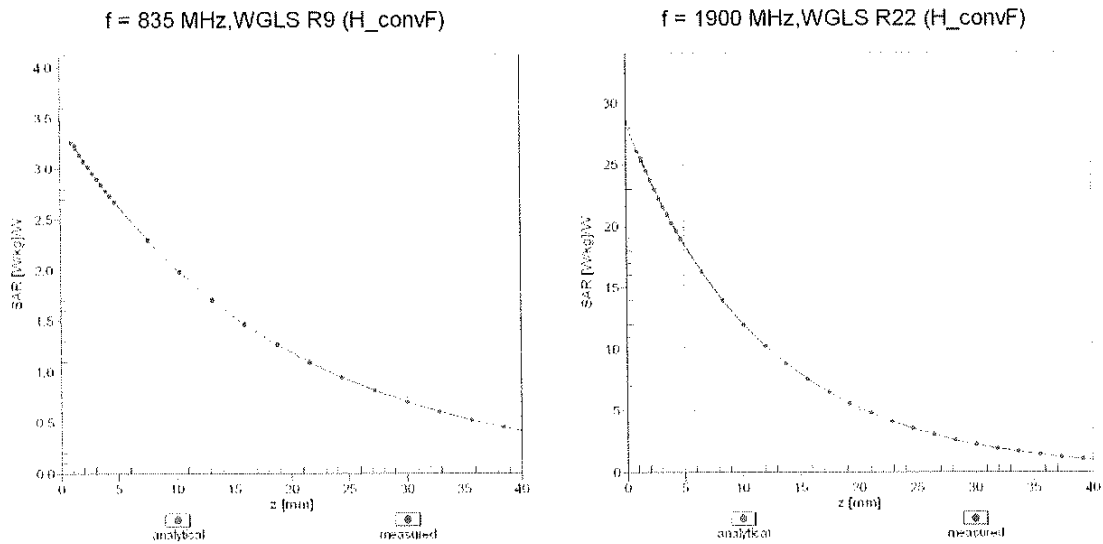
### Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f_{\text{eval}} = 1900 \text{ MHz}$ )



Uncertainty of Linearity Assessment:  $\pm 0.6\%$  (k=2)

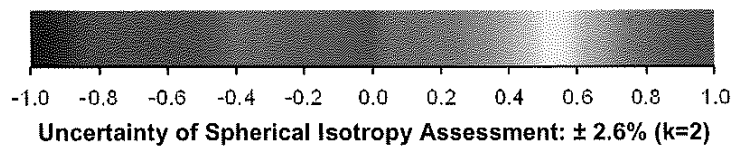
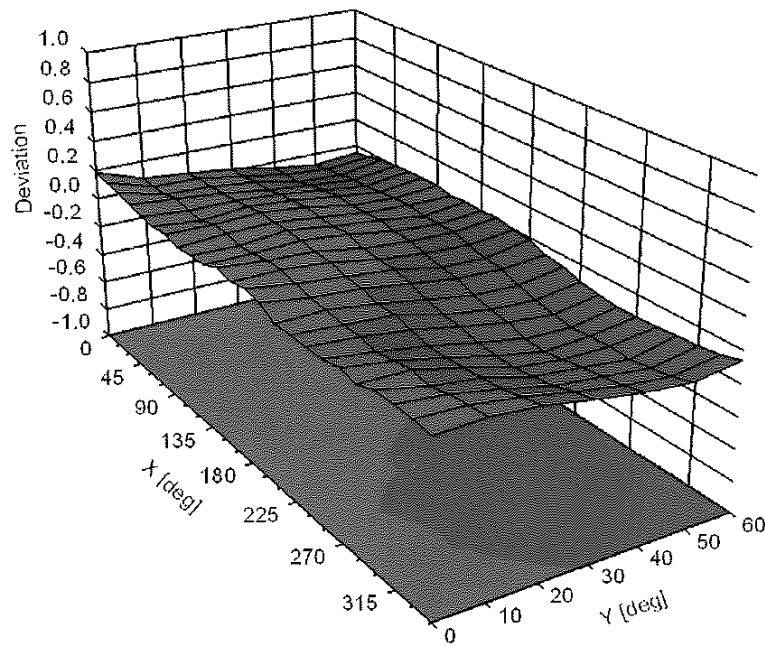


## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

Error ( $\phi, \theta$ ), f = 900 MHz



## Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc <sup>E</sup> (k=2)
0		CW	CW	0.00	± 4.7 %
10010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	± 9.6 %
10011	CAB	UMTS-FDD (WCDMA)	WCDMA	2.91	± 9.6 %
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	± 9.6 %
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	± 9.6 %
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	± 9.6 %
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	± 9.6 %
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	± 9.6 %
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	± 9.6 %
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	± 9.6 %
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	± 9.6 %
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6 %
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	± 9.6 %
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	± 9.6 %
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	± 9.6 %
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	± 9.6 %
10033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	± 9.6 %
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	± 9.6 %
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	± 9.6 %
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	± 9.6 %
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	± 9.6 %
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	± 9.6 %
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	± 9.6 %
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	± 9.6 %
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	± 9.6 %
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	± 9.6 %
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	± 9.6 %
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	± 9.6 %
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	± 9.6 %
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	± 9.6 %
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	± 9.6 %
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	± 9.6 %
10062	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	± 9.6 %
10063	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	± 9.6 %
10064	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	± 9.6 %
10065	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	± 9.6 %
10066	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	± 9.6 %
10067	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	± 9.6 %
10068	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 %
10069	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	± 9.6 %
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	± 9.6 %
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	± 9.6 %
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	± 9.6 %
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	± 9.6 %
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	± 9.6 %
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	± 9.6 %
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	± 9.6 %
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	± 9.6 %
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	± 9.6 %
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	± 9.6 %
10097	CAC	UMTS-FDD (HSDPA)	WCDMA	3.98	± 9.6 %
10098	DAC	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	± 9.6 %

10099	CAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	± 9.6 %
10100	CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	± 9.6 %
10101	CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10102	CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10103	DAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10104	CAE	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	± 9.6 %
10105	CAE	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	± 9.6 %
10108	CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6 %
10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	± 9.6 %
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	± 9.6 %
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10114	CAG	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10115	CAG	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	± 9.6 %
10116	CAG	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	± 9.6 %
10117	CAG	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAD	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	± 9.6 %
10119	CAD	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	± 9.6 %
10142	CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10143	CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	± 9.6 %
10144	CAC	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	± 9.6 %
10145	CAC	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	± 9.6 %
10146	CAC	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAC	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	± 9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10151	CAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	± 9.6 %
10152	CAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10153	CAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	± 9.6 %
10154	CAF	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10155	CAF	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10156	CAF	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10158	CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	± 9.6 %
10160	CAG	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	± 9.6 %
10161	CAG	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10162	CAG	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	± 9.6 %
10166	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	± 9.6 %
10167	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	± 9.6 %
10168	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	± 9.6 %
10169	CAG	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10170	CAG	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10171	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	± 9.6 %
10172	CAE	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10173	CAE	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10174	CAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10175	CAF	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10176	CAF	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10177	CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10178	CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10179	AAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %

10181	CAG	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10182	CAG	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10183	CAG	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10184	CAG	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10185	CAI	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	± 9.6 %
10186	CAG	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10187	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10188	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10189	CAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10193	CAE	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	± 9.6 %
10194	AAD	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	± 9.6 %
10195	CAE	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	± 9.6 %
10196	CAE	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10197	AAE	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10198	CAF	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10219	CAF	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	± 9.6 %
10220	AAF	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	± 9.6 %
10223	CAD	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	± 9.6 %
10224	CAD	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	± 9.6 %
10225	CAD	UMTS-FDD (HSPA+)	WCDMA	5.97	± 9.6 %
10226	CAD	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	± 9.6 %
10227	CAD	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	± 9.6 %
10228	CAD	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	± 9.6 %
10229	DAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10230	CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	± 9.6 %
10232	CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10233	CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10235	CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10236	CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10237	CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10238	CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10239	CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10240	CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10241	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	± 9.6 %
10242	CAD	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	± 9.6 %
10243	CAD	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	± 9.6 %
10244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10245	CAG	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	± 9.6 %
10246	CAG	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10247	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	± 9.6 %
10248	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	± 9.6 %
10249	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10250	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	± 9.6 %
10251	CAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	± 9.6 %
10252	CAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10253	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	± 9.6 %
10254	CAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	± 9.6 %
10255	CAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	± 9.6 %
10256	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	± 9.6 %
10257	CAD	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	± 9.6 %
10258	CAD	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	± 9.6 %
10259	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	± 9.6 %

10260	CAG	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	± 9.6 %
10261	CAG	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10262	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	± 9.6 %
10263	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	± 9.6 %
10264	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	± 9.6 %
10265	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10266	CAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	± 9.6 %
10267	CAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10269	CAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	± 9.6 %
10270	CAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	± 9.6 %
10274	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	± 9.6 %
10275	CAD	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	± 9.6 %
10277	CAD	PHS (QPSK)	PHS	11.81	± 9.6 %
10278	CAD	PHS (QPSK, BW 884MHz, Rolloff 0.5)	PHS	11.81	± 9.6 %
10279	CAG	PHS (QPSK, BW 884MHz, Rolloff 0.38)	PHS	12.18	± 9.6 %
10290	CAG	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	± 9.6 %
10291	CAG	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	± 9.6 %
10292	CAG	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	± 9.6 %
10293	CAG	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	± 9.6 %
10295	CAG	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	± 9.6 %
10297	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	± 9.6 %
10298	CAF	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10299	CAF	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	± 9.6 %
10300	CAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10301	CAC	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	WiMAX	12.03	± 9.6 %
10302	CAB	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3CTRL)	WiMAX	12.57	± 9.6 %
10303	CAB	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	12.52	± 9.6 %
10304	CAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	11.86	± 9.6 %
10305	CAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	15.24	± 9.6 %
10306	CAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	14.67	± 9.6 %
10307	AAB	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC)	WiMAX	14.49	± 9.6 %
10308	AAB	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	WiMAX	14.46	± 9.6 %
10309	AAB	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3)	WiMAX	14.58	± 9.6 %
10310	AAB	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3)	WiMAX	14.57	± 9.6 %
10311	AAB	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	± 9.6 %
10313	AAD	iDEN 1:3	iDEN	10.51	± 9.6 %
10314	AAD	iDEN 1:6	iDEN	13.48	± 9.6 %
10315	AAD	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc dc)	WLAN	1.71	± 9.6 %
10316	AAD	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc dc)	WLAN	8.36	± 9.6 %
10317	AAA	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc dc)	WLAN	8.36	± 9.6 %
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	± 9.6 %
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	± 9.6 %
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	± 9.6 %
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	± 9.6 %
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	± 9.6 %
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	± 9.6 %
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	± 9.6 %
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	± 9.6 %
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	± 9.6 %
10400	AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc dc)	WLAN	8.37	± 9.6 %
10401	AAA	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc dc)	WLAN	8.60	± 9.6 %
10402	AAA	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc dc)	WLAN	8.53	± 9.6 %
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	± 9.6 %
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	± 9.6 %
10406	AAD	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	± 9.6 %

10410	AAA	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10414	AAA	WLAN CCDF, 64-QAM, 40MHz	Generic	8.54	± 9.6 %
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc dc)	WLAN	1.54	± 9.6 %
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10417	AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Long)	WLAN	8.14	± 9.6 %
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Short)	WLAN	8.19	± 9.6 %
10422	AAA	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	± 9.6 %
10423	AAA	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	± 9.6 %
10424	AAE	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	± 9.6 %
10425	AAE	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	± 9.6 %
10426	AAE	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	± 9.6 %
10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	± 9.6 %
10430	AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	± 9.6 %
10431	AAC	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	± 9.6 %
10432	AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10433	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10434	AAG	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	± 9.6 %
10435	AAA	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10447	AAA	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	± 9.6 %
10448	AAA	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.53	± 9.6 %
10449	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.51	± 9.6 %
10450	AAA	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	± 9.6 %
10451	AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	± 9.6 %
10453	AAC	Validation (Square, 10ms, 1ms)	Test	10.00	± 9.6 %
10456	AAC	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc dc)	WLAN	8.63	± 9.6 %
10457	AAC	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	± 9.6 %
10458	AAC	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	± 9.6 %
10459	AAC	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	± 9.6 %
10460	AAC	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	± 9.6 %
10461	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10462	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.30	± 9.6 %
10463	AAD	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10464	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10465	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10466	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10467	AAA	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10469	AAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10470	AAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10471	AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10472	AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10473	AAA	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10474	AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10475	AAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10477	AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10478	AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10479	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10480	AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.18	± 9.6 %
10481	AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10482	AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.71	± 9.6 %
10483	AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, Sub)	LTE-TDD	8.39	± 9.6 %
10484	AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.47	± 9.6 %
10485	AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.59	± 9.6 %
10486	AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.38	± 9.6 %
10487	AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.60	± 9.6 %

10488	AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.70	± 9.6 %
10489	AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10490	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10491	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10492	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.41	± 9.6 %
10493	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.55	± 9.6 %
10494	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.37	± 9.6 %
10496	AAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10497	AAE	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10498	AAE	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.40	± 9.6 %
10499	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.68	± 9.6 %
10500	AAF	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10501	AAF	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.44	± 9.6 %
10502	AAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.52	± 9.6 %
10503	AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.72	± 9.6 %
10504	AAB	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10505	AAC	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10506	AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10507	AAC	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.36	± 9.6 %
10508	AAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.55	± 9.6 %
10509	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.99	± 9.6 %
10510	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.49	± 9.6 %
10511	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.51	± 9.6 %
10512	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10513	AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.42	± 9.6 %
10514	AAE	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10515	AAE	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 99pc dc)	WLAN	1.58	± 9.6 %
10516	AAE	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc dc)	WLAN	1.57	± 9.6 %
10517	AAF	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc dc)	WLAN	1.58	± 9.6 %
10518	AAF	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10519	AAF	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc dc)	WLAN	8.39	± 9.6 %
10520	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc dc)	WLAN	8.12	± 9.6 %
10521	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc dc)	WLAN	7.97	± 9.6 %
10522	AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc dc)	WLAN	8.45	± 9.6 %
10523	AAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc dc)	WLAN	8.08	± 9.6 %
10524	AAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc dc)	WLAN	8.27	± 9.6 %
10525	AAC	IEEE 802.11ac WiFi (20MHz, MCS0, 99pc dc)	WLAN	8.36	± 9.6 %
10526	AAF	IEEE 802.11ac WiFi (20MHz, MCS1, 99pc dc)	WLAN	8.42	± 9.6 %
10527	AAF	IEEE 802.11ac WiFi (20MHz, MCS2, 99pc dc)	WLAN	8.21	± 9.6 %
10528	AAF	IEEE 802.11ac WiFi (20MHz, MCS3, 99pc dc)	WLAN	8.36	± 9.6 %
10529	AAF	IEEE 802.11ac WiFi (20MHz, MCS4, 99pc dc)	WLAN	8.36	± 9.6 %
10531	AAF	IEEE 802.11ac WiFi (20MHz, MCS6, 99pc dc)	WLAN	8.43	± 9.6 %
10532	AAF	IEEE 802.11ac WiFi (20MHz, MCS7, 99pc dc)	WLAN	8.29	± 9.6 %
10533	AAE	IEEE 802.11ac WiFi (20MHz, MCS8, 99pc dc)	WLAN	8.38	± 9.6 %
10534	AAE	IEEE 802.11ac WiFi (40MHz, MCS0, 99pc dc)	WLAN	8.45	± 9.6 %
10535	AAE	IEEE 802.11ac WiFi (40MHz, MCS1, 99pc dc)	WLAN	8.45	± 9.6 %
10536	AAF	IEEE 802.11ac WiFi (40MHz, MCS2, 99pc dc)	WLAN	8.32	± 9.6 %
10537	AAF	IEEE 802.11ac WiFi (40MHz, MCS3, 99pc dc)	WLAN	8.44	± 9.6 %
10538	AAF	IEEE 802.11ac WiFi (40MHz, MCS4, 99pc dc)	WLAN	8.54	± 9.6 %
10540	AAA	IEEE 802.11ac WiFi (40MHz, MCS6, 99pc dc)	WLAN	8.39	± 9.6 %
10541	AAA	IEEE 802.11ac WiFi (40MHz, MCS7, 99pc dc)	WLAN	8.46	± 9.6 %
10542	AAA	IEEE 802.11ac WiFi (40MHz, MCS8, 99pc dc)	WLAN	8.65	± 9.6 %
10543	AAC	IEEE 802.11ac WiFi (40MHz, MCS9, 99pc dc)	WLAN	8.65	± 9.6 %
10544	AAC	IEEE 802.11ac WiFi (80MHz, MCS0, 99pc dc)	WLAN	8.47	± 9.6 %
10545	AAC	IEEE 802.11ac WiFi (80MHz, MCS1, 99pc dc)	WLAN	8.55	± 9.6 %

10546	AAC	IEEE 802.11ac WiFi (80MHz, MCS2, 99pc dc)	WLAN	8.35	± 9.6 %
10547	AAC	IEEE 802.11ac WiFi (80MHz, MCS3, 99pc dc)	WLAN	8.49	± 9.6 %
10548	AAC	IEEE 802.11ac WiFi (80MHz, MCS4, 99pc dc)	WLAN	8.37	± 9.6 %
10550	AAC	IEEE 802.11ac WiFi (80MHz, MCS6, 99pc dc)	WLAN	8.38	± 9.6 %
10551	AAC	IEEE 802.11ac WiFi (80MHz, MCS7, 99pc dc)	WLAN	8.50	± 9.6 %
10552	AAC	IEEE 802.11ac WiFi (80MHz, MCS8, 99pc dc)	WLAN	8.42	± 9.6 %
10553	AAC	IEEE 802.11ac WiFi (80MHz, MCS9, 99pc dc)	WLAN	8.45	± 9.6 %
10554	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 99pc dc)	WLAN	8.48	± 9.6 %
10555	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 99pc dc)	WLAN	8.47	± 9.6 %
10556	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 99pc dc)	WLAN	8.50	± 9.6 %
10557	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 99pc dc)	WLAN	8.52	± 9.6 %
10558	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 99pc dc)	WLAN	8.61	± 9.6 %
10560	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 99pc dc)	WLAN	8.73	± 9.6 %
10561	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 99pc dc)	WLAN	8.56	± 9.6 %
10562	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 99pc dc)	WLAN	8.69	± 9.6 %
10563	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 99pc dc)	WLAN	8.77	± 9.6 %
10564	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc dc)	WLAN	8.25	± 9.6 %
10565	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc dc)	WLAN	8.45	± 9.6 %
10566	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc dc)	WLAN	8.13	± 9.6 %
10567	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc dc)	WLAN	8.00	± 9.6 %
10568	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc dc)	WLAN	8.37	± 9.6 %
10569	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc dc)	WLAN	8.10	± 9.6 %
10570	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc dc)	WLAN	8.30	± 9.6 %
10571	AAC	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc dc)	WLAN	1.99	± 9.6 %
10572	AAC	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 90pc dc)	WLAN	1.99	± 9.6 %
10573	AAC	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc dc)	WLAN	1.98	± 9.6 %
10574	AAC	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc dc)	WLAN	1.98	± 9.6 %
10575	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	± 9.6 %
10576	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	± 9.6 %
10577	AAC	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	± 9.6 %
10578	AAD	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	± 9.6 %
10579	AAD	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	± 9.6 %
10580	AAD	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10581	AAD	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	± 9.6 %
10582	AAD	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	± 9.6 %
10583	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc dc)	WLAN	8.59	± 9.6 %
10584	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc dc)	WLAN	8.60	± 9.6 %
10585	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 90pc dc)	WLAN	8.70	± 9.6 %
10586	AAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 90pc dc)	WLAN	8.49	± 9.6 %
10587	AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc dc)	WLAN	8.36	± 9.6 %
10588	AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 90pc dc)	WLAN	8.76	± 9.6 %
10589	AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 90pc dc)	WLAN	8.35	± 9.6 %
10590	AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 90pc dc)	WLAN	8.67	± 9.6 %
10591	AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS0, 90pc dc)	WLAN	8.63	± 9.6 %
10592	AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10593	AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS2, 90pc dc)	WLAN	8.64	± 9.6 %
10594	AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 90pc dc)	WLAN	8.74	± 9.6 %
10595	AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS4, 90pc dc)	WLAN	8.74	± 9.6 %
10596	AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS5, 90pc dc)	WLAN	8.71	± 9.6 %
10597	AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS6, 90pc dc)	WLAN	8.72	± 9.6 %
10598	AAA	IEEE 802.11n (HT Mixed, 20MHz, MCS7, 90pc dc)	WLAN	8.50	± 9.6 %
10599	AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS0, 90pc dc)	WLAN	8.79	± 9.6 %
10600	AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS1, 90pc dc)	WLAN	8.88	± 9.6 %
10601	AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS2, 90pc dc)	WLAN	8.82	± 9.6 %
10602	AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc dc)	WLAN	8.94	± 9.6 %
10603	AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS4, 90pc dc)	WLAN	9.03	± 9.6 %



10604	AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS5, 90pc dc)	WLAN	8.76	± 9.6 %
10605	AAA	IEEE 802.11n (HT Mixed, 40MHz, MCS6, 90pc dc)	WLAN	8.97	± 9.6 %
10606	AAC	IEEE 802.11n (HT Mixed, 40MHz, MCS7, 90pc dc)	WLAN	8.82	± 9.6 %
10607	AAC	IEEE 802.11ac WiFi (20MHz, MCS0, 90pc dc)	WLAN	8.64	± 9.6 %
10608	AAC	IEEE 802.11ac WiFi (20MHz, MCS1, 90pc dc)	WLAN	8.77	± 9.6 %
10609	AAC	IEEE 802.11ac WiFi (20MHz, MCS2, 90pc dc)	WLAN	8.57	± 9.6 %
10610	AAC	IEEE 802.11ac WiFi (20MHz, MCS3, 90pc dc)	WLAN	8.78	± 9.6 %
10611	AAC	IEEE 802.11ac WiFi (20MHz, MCS4, 90pc dc)	WLAN	8.70	± 9.6 %
10612	AAC	IEEE 802.11ac WiFi (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10613	AAC	IEEE 802.11ac WiFi (20MHz, MCS6, 90pc dc)	WLAN	8.94	± 9.6 %
10614	AAC	IEEE 802.11ac WiFi (20MHz, MCS7, 90pc dc)	WLAN	8.59	± 9.6 %
10615	AAC	IEEE 802.11ac WiFi (20MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10616	AAC	IEEE 802.11ac WiFi (40MHz, MCS0, 90pc dc)	WLAN	8.82	± 9.6 %
10617	AAC	IEEE 802.11ac WiFi (40MHz, MCS1, 90pc dc)	WLAN	8.81	± 9.6 %
10618	AAC	IEEE 802.11ac WiFi (40MHz, MCS2, 90pc dc)	WLAN	8.58	± 9.6 %
10619	AAC	IEEE 802.11ac WiFi (40MHz, MCS3, 90pc dc)	WLAN	8.86	± 9.6 %
10620	AAC	IEEE 802.11ac WiFi (40MHz, MCS4, 90pc dc)	WLAN	8.87	± 9.6 %
10621	AAC	IEEE 802.11ac WiFi (40MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10622	AAC	IEEE 802.11ac WiFi (40MHz, MCS6, 90pc dc)	WLAN	8.68	± 9.6 %
10623	AAC	IEEE 802.11ac WiFi (40MHz, MCS7, 90pc dc)	WLAN	8.82	± 9.6 %
10624	AAC	IEEE 802.11ac WiFi (40MHz, MCS8, 90pc dc)	WLAN	8.96	± 9.6 %
10625	AAC	IEEE 802.11ac WiFi (40MHz, MCS9, 90pc dc)	WLAN	8.96	± 9.6 %
10626	AAC	IEEE 802.11ac WiFi (80MHz, MCS0, 90pc dc)	WLAN	8.83	± 9.6 %
10627	AAC	IEEE 802.11ac WiFi (80MHz, MCS1, 90pc dc)	WLAN	8.88	± 9.6 %
10628	AAC	IEEE 802.11ac WiFi (80MHz, MCS2, 90pc dc)	WLAN	8.71	± 9.6 %
10629	AAC	IEEE 802.11ac WiFi (80MHz, MCS3, 90pc dc)	WLAN	8.85	± 9.6 %
10630	AAC	IEEE 802.11ac WiFi (80MHz, MCS4, 90pc dc)	WLAN	8.72	± 9.6 %
10631	AAC	IEEE 802.11ac WiFi (80MHz, MCS5, 90pc dc)	WLAN	8.81	± 9.6 %
10632	AAC	IEEE 802.11ac WiFi (80MHz, MCS6, 90pc dc)	WLAN	8.74	± 9.6 %
10633	AAC	IEEE 802.11ac WiFi (80MHz, MCS7, 90pc dc)	WLAN	8.83	± 9.6 %
10634	AAC	IEEE 802.11ac WiFi (80MHz, MCS8, 90pc dc)	WLAN	8.80	± 9.6 %
10635	AAC	IEEE 802.11ac WiFi (80MHz, MCS9, 90pc dc)	WLAN	8.81	± 9.6 %
10636	AAC	IEEE 802.11ac WiFi (160MHz, MCS0, 90pc dc)	WLAN	8.83	± 9.6 %
10637	AAC	IEEE 802.11ac WiFi (160MHz, MCS1, 90pc dc)	WLAN	8.79	± 9.6 %
10638	AAC	IEEE 802.11ac WiFi (160MHz, MCS2, 90pc dc)	WLAN	8.86	± 9.6 %
10639	AAC	IEEE 802.11ac WiFi (160MHz, MCS3, 90pc dc)	WLAN	8.85	± 9.6 %
10640	AAC	IEEE 802.11ac WiFi (160MHz, MCS4, 90pc dc)	WLAN	8.98	± 9.6 %
10641	AAC	IEEE 802.11ac WiFi (160MHz, MCS5, 90pc dc)	WLAN	9.06	± 9.6 %
10642	AAC	IEEE 802.11ac WiFi (160MHz, MCS6, 90pc dc)	WLAN	9.06	± 9.6 %
10643	AAC	IEEE 802.11ac WiFi (160MHz, MCS7, 90pc dc)	WLAN	8.89	± 9.6 %
10644	AAC	IEEE 802.11ac WiFi (160MHz, MCS8, 90pc dc)	WLAN	9.05	± 9.6 %
10645	AAC	IEEE 802.11ac WiFi (160MHz, MCS9, 90pc dc)	WLAN	9.11	± 9.6 %
10646	AAC	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	± 9.6 %
10647	AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub=2,7)	LTE-TDD	11.96	± 9.6 %
10648	AAC	CDMA2000 (1x Advanced)	CDMA2000	3.45	± 9.6 %
10652	AAC	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	± 9.6 %
10653	AAC	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.42	± 9.6 %
10654	AAC	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	± 9.6 %
10655	AAC	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	± 9.6 %
10658	AAC	Pulse Waveform (200Hz, 10%)	Test	10.00	± 9.6 %
10659	AAC	Pulse Waveform (200Hz, 20%)	Test	6.99	± 9.6 %
10660	AAC	Pulse Waveform (200Hz, 40%)	Test	3.98	± 9.6 %
10661	AAC	Pulse Waveform (200Hz, 60%)	Test	2.22	± 9.6 %
10662	AAC	Pulse Waveform (200Hz, 80%)	Test	0.97	± 9.6 %
10670	AAC	Bluetooth Low Energy	Bluetooth	2.19	± 9.6 %
10671	AAD	IEEE 802.11ax (20MHz, MCS0, 90pc dc)	WLAN	9.09	± 9.6 %

10672	AAD	IEEE 802.11ax (20MHz, MCS1, 90pc dc)	WLAN	8.57	± 9.6 %
10673	AAD	IEEE 802.11ax (20MHz, MCS2, 90pc dc)	WLAN	8.78	± 9.6 %
10674	AAD	IEEE 802.11ax (20MHz, MCS3, 90pc dc)	WLAN	8.74	± 9.6 %
10675	AAD	IEEE 802.11ax (20MHz, MCS4, 90pc dc)	WLAN	8.90	± 9.6 %
10676	AAD	IEEE 802.11ax (20MHz, MCS5, 90pc dc)	WLAN	8.77	± 9.6 %
10677	AAD	IEEE 802.11ax (20MHz, MCS6, 90pc dc)	WLAN	8.73	± 9.6 %
10678	AAD	IEEE 802.11ax (20MHz, MCS7, 90pc dc)	WLAN	8.78	± 9.6 %
10679	AAD	IEEE 802.11ax (20MHz, MCS8, 90pc dc)	WLAN	8.89	± 9.6 %
10680	AAD	IEEE 802.11ax (20MHz, MCS9, 90pc dc)	WLAN	8.80	± 9.6 %
10681	AAG	IEEE 802.11ax (20MHz, MCS10, 90pc dc)	WLAN	8.62	± 9.6 %
10682	AAF	IEEE 802.11ax (20MHz, MCS11, 90pc dc)	WLAN	8.83	± 9.6 %
10683	AAA	IEEE 802.11ax (20MHz, MCS0, 99pc dc)	WLAN	8.42	± 9.6 %
10684	AAC	IEEE 802.11ax (20MHz, MCS1, 99pc dc)	WLAN	8.26	± 9.6 %
10685	AAC	IEEE 802.11ax (20MHz, MCS2, 99pc dc)	WLAN	8.33	± 9.6 %
10686	AAC	IEEE 802.11ax (20MHz, MCS3, 99pc dc)	WLAN	8.28	± 9.6 %
10687	AAE	IEEE 802.11ax (20MHz, MCS4, 99pc dc)	WLAN	8.45	± 9.6 %
10688	AAE	IEEE 802.11ax (20MHz, MCS5, 99pc dc)	WLAN	8.29	± 9.6 %
10689	AAD	IEEE 802.11ax (20MHz, MCS6, 99pc dc)	WLAN	8.55	± 9.6 %
10690	AAE	IEEE 802.11ax (20MHz, MCS7, 99pc dc)	WLAN	8.29	± 9.6 %
10691	AAB	IEEE 802.11ax (20MHz, MCS8, 99pc dc)	WLAN	8.25	± 9.6 %
10692	AAA	IEEE 802.11ax (20MHz, MCS9, 99pc dc)	WLAN	8.29	± 9.6 %
10693	AAA	IEEE 802.11ax (20MHz, MCS10, 99pc dc)	WLAN	8.25	± 9.6 %
10694	AAA	IEEE 802.11ax (20MHz, MCS11, 99pc dc)	WLAN	8.57	± 9.6 %
10695	AAA	IEEE 802.11ax (40MHz, MCS0, 90pc dc)	WLAN	8.78	± 9.6 %
10696	AAA	IEEE 802.11ax (40MHz, MCS1, 90pc dc)	WLAN	8.91	± 9.6 %
10697	AAA	IEEE 802.11ax (40MHz, MCS2, 90pc dc)	WLAN	8.61	± 9.6 %
10698	AAA	IEEE 802.11ax (40MHz, MCS3, 90pc dc)	WLAN	8.89	± 9.6 %
10699	AAA	IEEE 802.11ax (40MHz, MCS4, 90pc dc)	WLAN	8.82	± 9.6 %
10700	AAA	IEEE 802.11ax (40MHz, MCS5, 90pc dc)	WLAN	8.73	± 9.6 %
10701	AAA	IEEE 802.11ax (40MHz, MCS6, 90pc dc)	WLAN	8.86	± 9.6 %
10702	AAA	IEEE 802.11ax (40MHz, MCS7, 90pc dc)	WLAN	8.70	± 9.6 %
10703	AAA	IEEE 802.11ax (40MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10704	AAA	IEEE 802.11ax (40MHz, MCS9, 90pc dc)	WLAN	8.56	± 9.6 %
10705	AAA	IEEE 802.11ax (40MHz, MCS10, 90pc dc)	WLAN	8.69	± 9.6 %
10706	AAC	IEEE 802.11ax (40MHz, MCS11, 90pc dc)	WLAN	8.66	± 9.6 %
10707	AAC	IEEE 802.11ax (40MHz, MCS0, 99pc dc)	WLAN	8.32	± 9.6 %
10708	AAC	IEEE 802.11ax (40MHz, MCS1, 99pc dc)	WLAN	8.55	± 9.6 %
10709	AAC	IEEE 802.11ax (40MHz, MCS2, 99pc dc)	WLAN	8.33	± 9.6 %
10710	AAC	IEEE 802.11ax (40MHz, MCS3, 99pc dc)	WLAN	8.29	± 9.6 %
10711	AAC	IEEE 802.11ax (40MHz, MCS4, 99pc dc)	WLAN	8.39	± 9.6 %
10712	AAC	IEEE 802.11ax (40MHz, MCS5, 99pc dc)	WLAN	8.67	± 9.6 %
10713	AAC	IEEE 802.11ax (40MHz, MCS6, 99pc dc)	WLAN	8.33	± 9.6 %
10714	AAC	IEEE 802.11ax (40MHz, MCS7, 99pc dc)	WLAN	8.26	± 9.6 %
10715	AAC	IEEE 802.11ax (40MHz, MCS8, 99pc dc)	WLAN	8.45	± 9.6 %
10716	AAC	IEEE 802.11ax (40MHz, MCS9, 99pc dc)	WLAN	8.30	± 9.6 %
10717	AAC	IEEE 802.11ax (40MHz, MCS10, 99pc dc)	WLAN	8.48	± 9.6 %
10718	AAC	IEEE 802.11ax (40MHz, MCS11, 99pc dc)	WLAN	8.24	± 9.6 %
10719	AAC	IEEE 802.11ax (80MHz, MCS0, 90pc dc)	WLAN	8.81	± 9.6 %
10720	AAC	IEEE 802.11ax (80MHz, MCS1, 90pc dc)	WLAN	8.87	± 9.6 %
10721	AAC	IEEE 802.11ax (80MHz, MCS2, 90pc dc)	WLAN	8.76	± 9.6 %
10722	AAC	IEEE 802.11ax (80MHz, MCS3, 90pc dc)	WLAN	8.55	± 9.6 %
10723	AAC	IEEE 802.11ax (80MHz, MCS4, 90pc dc)	WLAN	8.70	± 9.6 %
10724	AAC	IEEE 802.11ax (80MHz, MCS5, 90pc dc)	WLAN	8.90	± 9.6 %
10725	AAC	IEEE 802.11ax (80MHz, MCS6, 90pc dc)	WLAN	8.74	± 9.6 %
10726	AAC	IEEE 802.11ax (80MHz, MCS7, 90pc dc)	WLAN	8.72	± 9.6 %
10727	AAC	IEEE 802.11ax (80MHz, MCS8, 90pc dc)	WLAN	8.66	± 9.6 %

10728	AAC	IEEE 802.11ax (80MHz, MCS9, 90pc dc)	WLAN	8.65	± 9.6 %
10729	AAC	IEEE 802.11ax (80MHz, MCS10, 90pc dc)	WLAN	8.64	± 9.6 %
10730	AAC	IEEE 802.11ax (80MHz, MCS11, 90pc dc)	WLAN	8.67	± 9.6 %
10731	AAC	IEEE 802.11ax (80MHz, MCS0, 99pc dc)	WLAN	8.42	± 9.6 %
10732	AAC	IEEE 802.11ax (80MHz, MCS1, 99pc dc)	WLAN	8.46	± 9.6 %
10733	AAC	IEEE 802.11ax (80MHz, MCS2, 99pc dc)	WLAN	8.40	± 9.6 %
10734	AAC	IEEE 802.11ax (80MHz, MCS3, 99pc dc)	WLAN	8.25	± 9.6 %
10735	AAC	IEEE 802.11ax (80MHz, MCS4, 99pc dc)	WLAN	8.33	± 9.6 %
10736	AAC	IEEE 802.11ax (80MHz, MCS5, 99pc dc)	WLAN	8.27	± 9.6 %
10737	AAC	IEEE 802.11ax (80MHz, MCS6, 99pc dc)	WLAN	8.36	± 9.6 %
10738	AAC	IEEE 802.11ax (80MHz, MCS7, 99pc dc)	WLAN	8.42	± 9.6 %
10739	AAC	IEEE 802.11ax (80MHz, MCS8, 99pc dc)	WLAN	8.29	± 9.6 %
10740	AAC	IEEE 802.11ax (80MHz, MCS9, 99pc dc)	WLAN	8.48	± 9.6 %
10741	AAC	IEEE 802.11ax (80MHz, MCS10, 99pc dc)	WLAN	8.40	± 9.6 %
10742	AAC	IEEE 802.11ax (80MHz, MCS11, 99pc dc)	WLAN	8.43	± 9.6 %
10743	AAC	IEEE 802.11ax (160MHz, MCS0, 90pc dc)	WLAN	8.94	± 9.6 %
10744	AAC	IEEE 802.11ax (160MHz, MCS1, 90pc dc)	WLAN	9.16	± 9.6 %
10745	AAC	IEEE 802.11ax (160MHz, MCS2, 90pc dc)	WLAN	8.93	± 9.6 %
10746	AAC	IEEE 802.11ax (160MHz, MCS3, 90pc dc)	WLAN	9.11	± 9.6 %
10747	AAC	IEEE 802.11ax (160MHz, MCS4, 90pc dc)	WLAN	9.04	± 9.6 %
10748	AAC	IEEE 802.11ax (160MHz, MCS5, 90pc dc)	WLAN	8.93	± 9.6 %
10749	AAC	IEEE 802.11ax (160MHz, MCS6, 90pc dc)	WLAN	8.90	± 9.6 %
10750	AAC	IEEE 802.11ax (160MHz, MCS7, 90pc dc)	WLAN	8.79	± 9.6 %
10751	AAC	IEEE 802.11ax (160MHz, MCS8, 90pc dc)	WLAN	8.82	± 9.6 %
10752	AAC	IEEE 802.11ax (160MHz, MCS9, 90pc dc)	WLAN	8.81	± 9.6 %
10753	AAC	IEEE 802.11ax (160MHz, MCS10, 90pc dc)	WLAN	9.00	± 9.6 %
10754	AAC	IEEE 802.11ax (160MHz, MCS11, 90pc dc)	WLAN	8.94	± 9.6 %
10755	AAC	IEEE 802.11ax (160MHz, MCS0, 99pc dc)	WLAN	8.64	± 9.6 %
10756	AAC	IEEE 802.11ax (160MHz, MCS1, 99pc dc)	WLAN	8.77	± 9.6 %
10757	AAC	IEEE 802.11ax (160MHz, MCS2, 99pc dc)	WLAN	8.77	± 9.6 %
10758	AAC	IEEE 802.11ax (160MHz, MCS3, 99pc dc)	WLAN	8.69	± 9.6 %
10759	AAC	IEEE 802.11ax (160MHz, MCS4, 99pc dc)	WLAN	8.58	± 9.6 %
10760	AAC	IEEE 802.11ax (160MHz, MCS5, 99pc dc)	WLAN	8.49	± 9.6 %
10761	AAC	IEEE 802.11ax (160MHz, MCS6, 99pc dc)	WLAN	8.58	± 9.6 %
10762	AAC	IEEE 802.11ax (160MHz, MCS7, 99pc dc)	WLAN	8.49	± 9.6 %
10763	AAC	IEEE 802.11ax (160MHz, MCS8, 99pc dc)	WLAN	8.53	± 9.6 %
10764	AAC	IEEE 802.11ax (160MHz, MCS9, 99pc dc)	WLAN	8.54	± 9.6 %
10765	AAC	IEEE 802.11ax (160MHz, MCS10, 99pc dc)	WLAN	8.54	± 9.6 %
10766	AAC	IEEE 802.11ax (160MHz, MCS11, 99pc dc)	WLAN	8.51	± 9.6 %
10767	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	7.99	± 9.6 %
10768	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10769	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10770	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10771	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10772	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.23	± 9.6 %
10773	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.03	± 9.6 %
10774	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	± 9.6 %
10775	AAC	5G NR (CP-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	± 9.6 %
10776	AAC	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10777	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10778	AAC	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10779	AAC	5G NR (CP-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.42	± 9.6 %
10780	AAC	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10781	AAC	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	± 9.6 %
10782	AAC	5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10783	AAC	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	± 9.6 %

10784	AAC	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	± 9.6 %
10785	AAC	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10786	AAC	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10787	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.44	± 9.6 %
10788	AAC	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10789	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10790	AAC	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10791	AAC	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.83	± 9.6 %
10792	AAC	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.92	± 9.6 %
10793	AAC	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.95	± 9.6 %
10794	AAC	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10795	AAC	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.84	± 9.6 %
10796	AAC	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	± 9.6 %
10797	AAC	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.01	± 9.6 %
10798	AAC	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10799	AAC	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %
10801	AAC	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	± 9.6 %
10802	AAC	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.87	± 9.6 %
10803	AAE	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	± 9.6 %
10805	AAD	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10806	AAD	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10809	AAD	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10810	AAD	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10812	AAD	5G NR (CP-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10817	AAD	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10818	AAD	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10819	AAD	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.33	± 9.6 %
10820	AAD	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.30	± 9.6 %
10821	AAC	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10822	AAD	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10823	AAC	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10824	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.39	± 9.6 %
10825	AAD	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10827	AAD	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.42	± 9.6 %
10828	AAE	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.43	± 9.6 %
10829	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10830	AAD	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.63	± 9.6 %
10831	AAD	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.73	± 9.6 %
10832	AAD	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.74	± 9.6 %
10833	AAD	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10834	AAD	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.75	± 9.6 %
10835	AAD	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10836	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.66	± 9.6 %
10837	AAD	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.68	± 9.6 %
10839	AAD	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	± 9.6 %
10840	AAD	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.67	± 9.6 %
10841	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.71	± 9.6 %
10843	AAD	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.49	± 9.6 %
10844	AAD	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10846	AAD	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10854	AAD	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %
10855	AAD	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10856	AAD	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10857	AAD	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.35	± 9.6 %
10858	AAD	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	± 9.6 %
10859	AAD	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	± 9.6 %

10860	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10861	AAD	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.40	± 9.6 %
10863	AAD	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10864	AAE	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	± 9.6 %
10865	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	± 9.6 %
10866	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10868	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.89	± 9.6 %
10869	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10870	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.86	± 9.6 %
10871	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10872	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.52	± 9.6 %
10873	AAD	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %
10874	AAD	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10875	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10876	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.39	± 9.6 %
10877	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	7.95	± 9.6 %
10878	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10879	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.12	± 9.6 %
10880	AAD	5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.38	± 9.6 %
10881	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	± 9.6 %
10882	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.96	± 9.6 %
10883	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.57	± 9.6 %
10884	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.53	± 9.6 %
10885	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	± 9.6 %
10886	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	± 9.6 %
10887	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	± 9.6 %
10888	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.35	± 9.6 %
10889	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.02	± 9.6 %
10890	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.40	± 9.6 %
10891	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.13	± 9.6 %
10892	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.41	± 9.6 %
10897	AAD	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.66	± 9.6 %
10898	AAD	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	± 9.6 %
10899	AAD	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	± 9.6 %
10900	AAD	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10901	AAD	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10902	AAD	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10903	AAD	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10904	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10905	AAD	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10906	AAD	5G NR (DFT-s-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10907	AAD	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.78	± 9.6 %
10908	AAD	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10909	AAD	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.96	± 9.6 %
10910	AAD	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10911	AAD	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10912	AAD	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10913	AAD	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10914	AAD	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	± 9.6 %
10915	AAD	5G NR (DFT-s-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10916	AAD	5G NR (DFT-s-OFDM, 50% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10917	AAD	5G NR (DFT-s-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10918	AAD	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10919	AAD	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10920	AAD	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10921	AAD	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %

10922	AAD	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	± 9.6 %
10923	AAD	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10924	AAD	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10925	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.95	± 9.6 %
10926	AAD	5G NR (DFT-s-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10927	AAD	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10928	AAD	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10929	AAD	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10930	AAD	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10931	AAD	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10932	AAB	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10933	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10934	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10935	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10936	AAC	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10937	AAB	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.77	± 9.6 %
10938	AAB	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10939	AAB	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.82	± 9.6 %
10940	AAB	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	± 9.6 %
10941	AAB	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10942	AAB	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10943	AAB	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.95	± 9.6 %
10944	AAB	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.81	± 9.6 %
10945	AAB	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10946	AAC	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10947	AAB	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10948	AAB	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10949	AAB	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10950	AAB	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10951	AAB	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.92	± 9.6 %
10952	AAB	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.25	± 9.6 %
10953	AAB	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.15	± 9.6 %
10954	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.23	± 9.6 %
10955	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.42	± 9.6 %
10956	AAB	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.14	± 9.6 %
10957	AAC	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.31	± 9.6 %
10958	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.61	± 9.6 %
10959	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.33	± 9.6 %
10960	AAB	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.32	± 9.6 %
10961	AAB	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.36	± 9.6 %
10962	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.40	± 9.6 %
10963	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10964	AAB	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.29	± 9.6 %
10965	AAB	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.37	± 9.6 %
10966	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10967	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.42	± 9.6 %
10968	AAB	5G NR DL (CP-OFDM, TM 3.1, 100 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.49	± 9.6 %
10972	AAB	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	11.59	± 9.6 %
10973	AAB	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	9.06	± 9.6 %
10974	AAB	5G NR (CP-OFDM, 100% RB, 100 MHz, 256-QAM, 30 kHz)	5G NR FR1 TDD	10.28	± 9.6 %

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

**Calibration Laboratory of  
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Accreditation No.: **SCS 0108**

Client **Element**

Certificate No: **EX3-3746\_Nov20**

## CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3746**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v6, QA CAL-23.v5,  
QA CAL-25.v7  
Calibration procedure for dosimetric E-field probes**

Calibration date: **November 18, 2020**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41499087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator IIP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

Calibrated by:	Name <b>Michael Weber</b>	Function <b>Laboratory Technician</b>	Signature 
Approved by:	Name <b>Katja Pokovic</b>	Technical Manager	

Issued: November 24, 2020

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

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### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).



## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.31	0.27	0.21	$\pm 10.1 \%$
DCP (mV) <sup>B</sup>	102.6	96.7	102.2	

### Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	138.7	$\pm 2.7 \%$	$\pm 4.7 \%$
		Y	0.0	0.0	1.0		137.0		
		Z	0.0	0.0	1.0		154.4		

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-114.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

**Note:** Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth (mm) <sup>G</sup>	Unc (k=2)
450	43.5	0.87	10.39	10.39	10.39	0.13	1.30	± 13.3 %
750	41.9	0.89	9.37	9.37	9.37	0.58	0.80	± 12.0 %
835	41.5	0.90	9.11	9.11	9.11	0.40	0.90	± 12.0 %
900	41.5	0.97	8.93	8.93	8.93	0.51	0.80	± 12.0 %
1750	40.1	1.37	8.03	8.03	8.03	0.25	0.86	± 12.0 %
1900	40.0	1.40	7.62	7.62	7.62	0.30	0.86	± 12.0 %
2300	39.5	1.67	7.48	7.48	7.48	0.30	0.86	± 12.0 %
2450	39.2	1.80	7.22	7.22	7.22	0.33	0.82	± 12.0 %
2550	39.1	1.91	6.94	6.94	6.94	0.26	0.86	± 12.0 %
3500	37.9	2.91	6.75	6.75	6.75	0.30	1.30	± 13.1 %
3700	37.7	3.12	6.68	6.68	6.68	0.35	1.30	± 13.1 %
5200	36.0	4.66	5.13	5.13	5.13	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.99	4.99	4.99	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.59	4.59	4.59	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.48	4.48	4.48	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.46	4.46	4.46	0.40	1.80	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Calibration Parameter Determined in Body Tissue Simulating Media

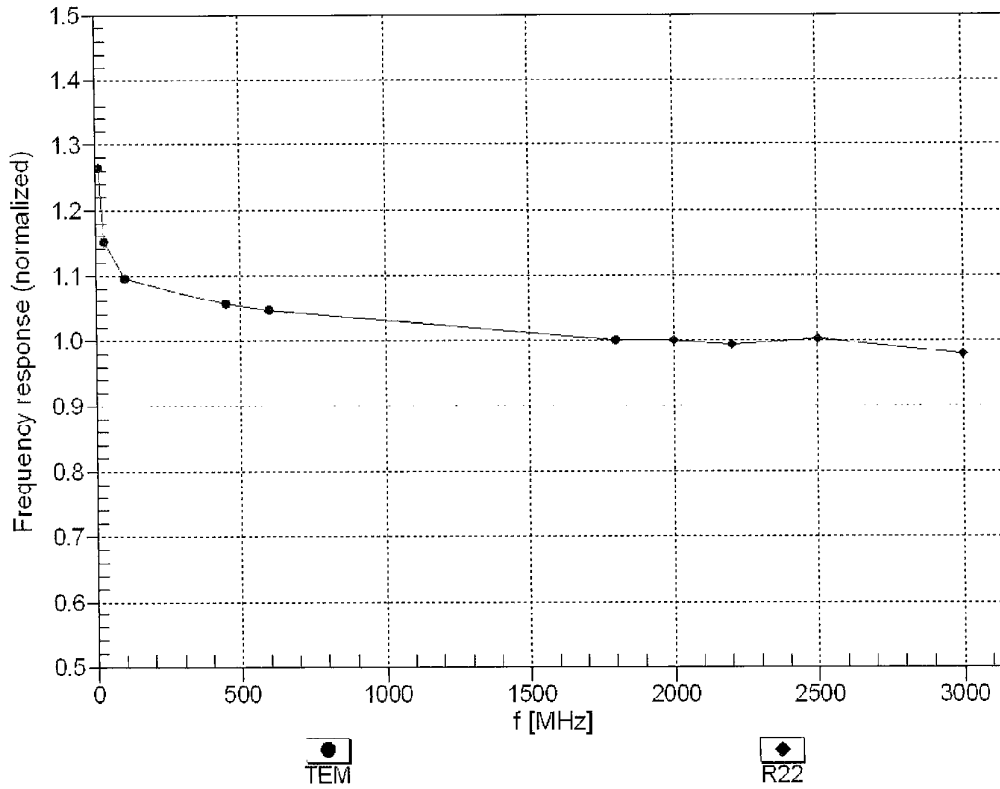
f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
450	56.7	0.94	10.41	10.41	10.41	0.08	1.20	± 13.3 %
750	55.5	0.96	9.35	9.35	9.35	0.39	0.80	± 12.0 %
835	55.2	0.97	9.08	9.08	9.08	0.40	0.89	± 12.0 %
900	55.0	1.05	9.01	9.01	9.01	0.37	0.80	± 12.0 %
1750	53.4	1.49	7.78	7.78	7.78	0.31	0.88	± 12.0 %
1900	53.3	1.52	7.50	7.50	7.50	0.41	0.80	± 12.0 %
2300	52.9	1.81	7.47	7.47	7.47	0.46	0.86	± 12.0 %
2450	52.7	1.95	7.35	7.35	7.35	0.38	0.80	± 12.0 %
2550	52.6	2.09	7.15	7.15	7.15	0.31	0.80	± 12.0 %
3500	51.3	3.31	6.50	6.50	6.50	0.40	1.30	± 13.1 %
3700	51.0	3.55	6.32	6.32	6.32	0.40	1.30	± 13.1 %
5200	49.0	5.30	4.31	4.31	4.31	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.20	4.20	4.20	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.83	3.83	3.83	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.77	3.77	3.77	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.75	3.75	3.75	0.50	1.90	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

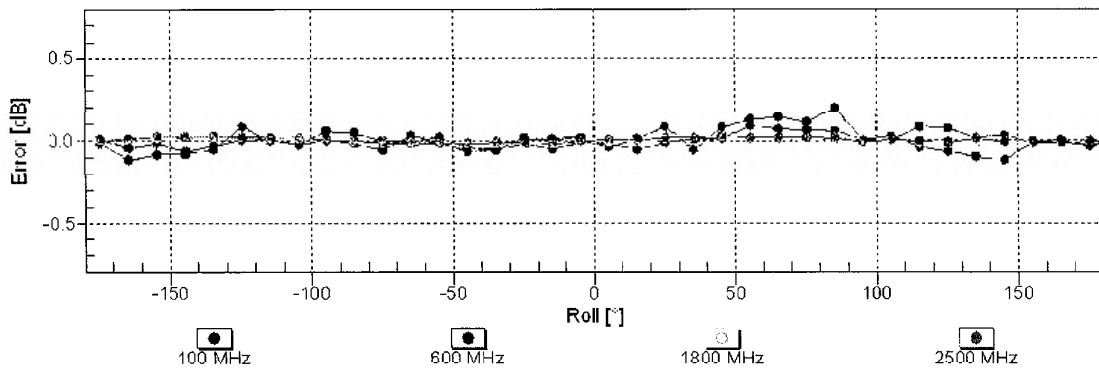
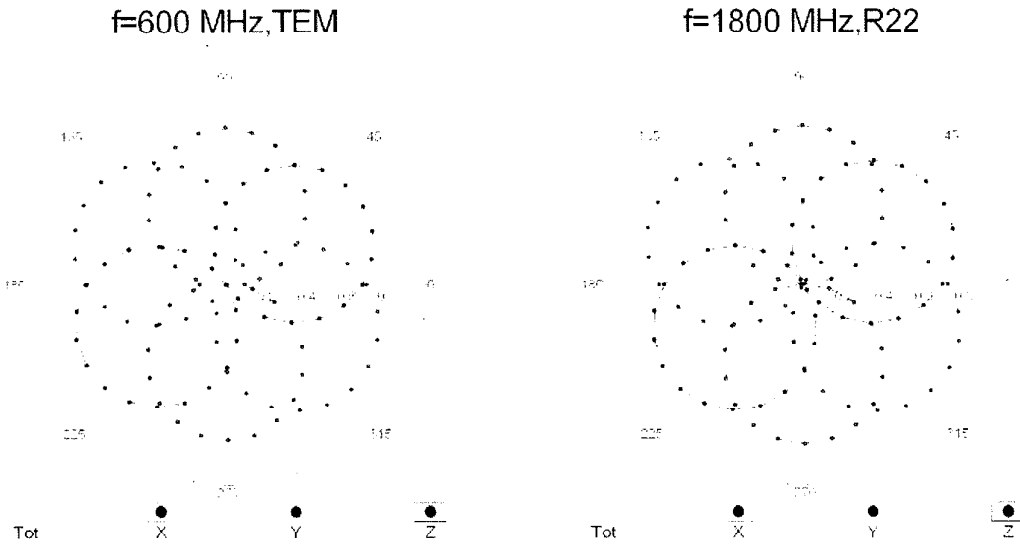
<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

### Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

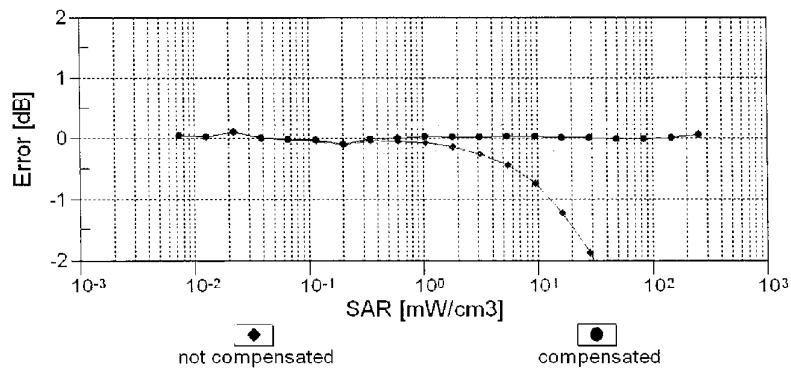
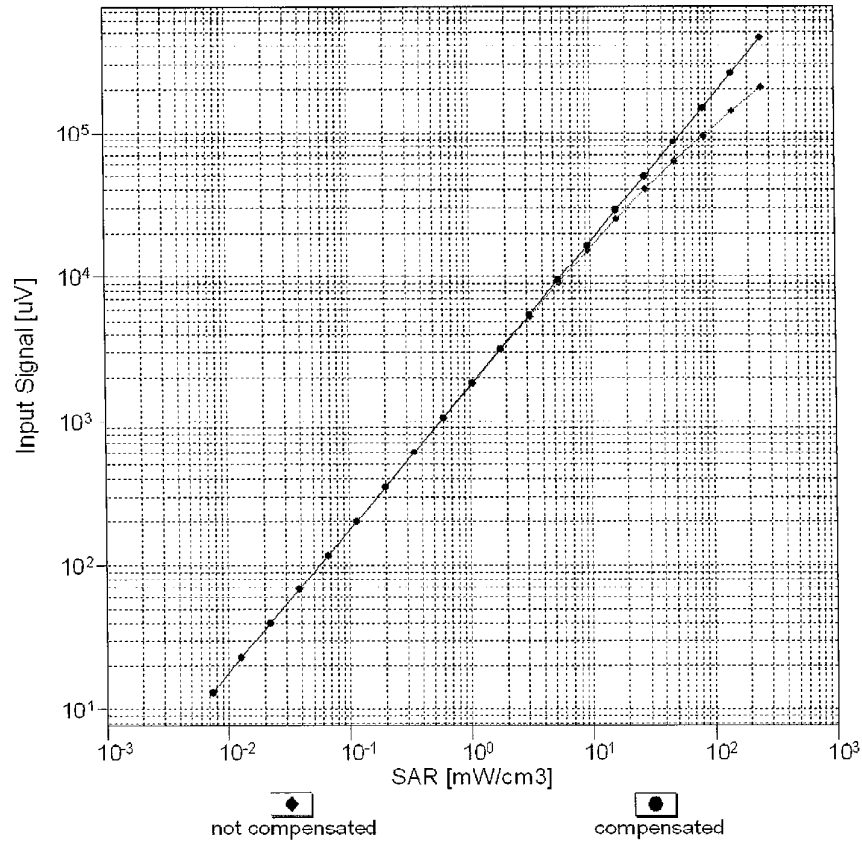
### Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$



Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )

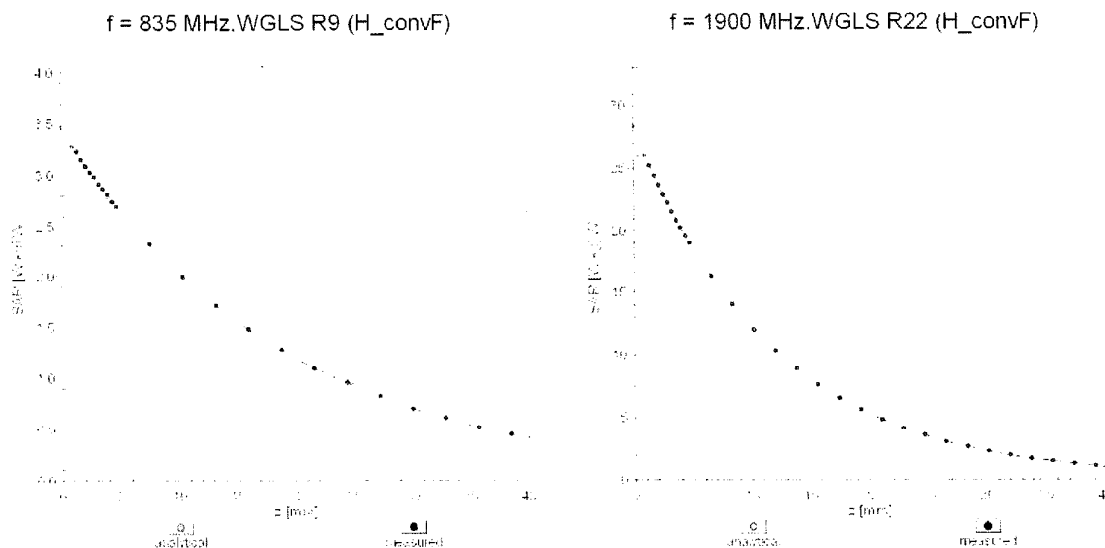
# Dynamic Range f(SAR<sub>head</sub>)

(TEM cell , f<sub>eval</sub>= 1900 MHz)

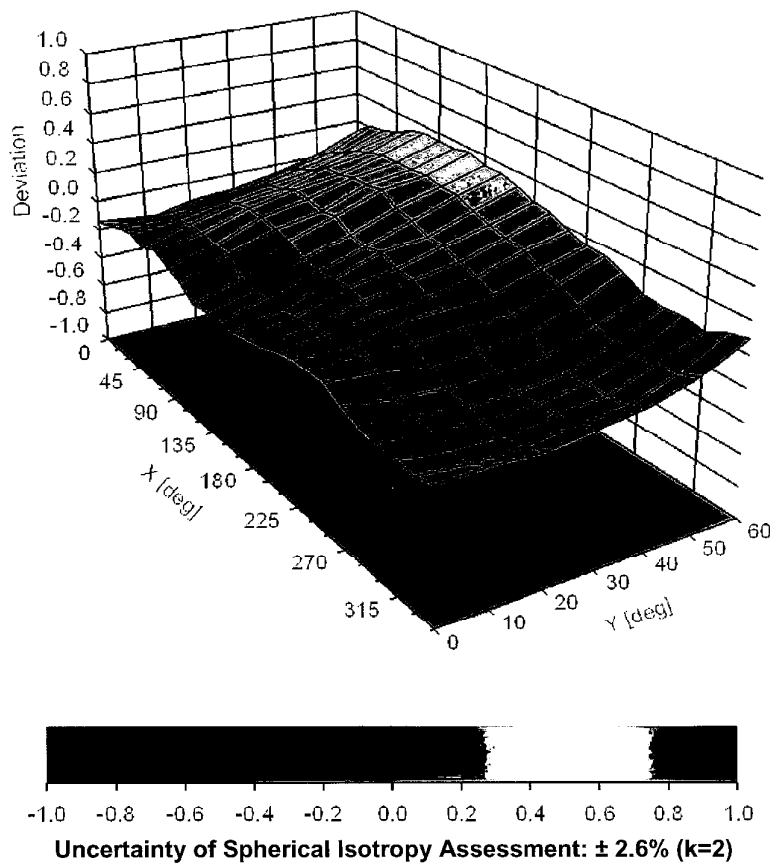


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

## Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error ( $\phi, \vartheta$ ), f = 900 MHz







Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **Element**

Certificate No: **EX3-3746\_Nov20**

**CALIBRATION CERTIFICATE**

Object **EX3DV4 - SN:3746**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v6, QA CAL-23.v5,  
QA CAL-25.v7  
Calibration procedure for dosimetric E-field probes**

Calibration date: **November 18, 2020**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

Calibrated by:	Name <b>Michael Weber</b>	Function Laboratory Technician	Signature 
Approved by:	Name <b>Katja Pokovic</b>	Function Technical Manager	

Issued: November 24, 2020

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 0108**

The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\phi$	$\phi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.31	0.27	0.21	$\pm 10.1 \%$
DCP (mV) <sup>B</sup>	102.6	96.7	102.2	

### Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	138.7	$\pm 2.7 \%$	$\pm 4.7 \%$
		Y	0.0	0.0	1.0		137.0		
		Z	0.0	0.0	1.0		154.4		

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the  $E^2$ -field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-114.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

**Note:** Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth (mm) <sup>G</sup>	Unc (k=2)
450	43.5	0.87	10.39	10.39	10.39	0.13	1.30	± 13.3 %
750	41.9	0.89	9.37	9.37	9.37	0.58	0.80	± 12.0 %
835	41.5	0.90	9.11	9.11	9.11	0.40	0.90	± 12.0 %
900	41.5	0.97	8.93	8.93	8.93	0.51	0.80	± 12.0 %
1750	40.1	1.37	8.03	8.03	8.03	0.25	0.86	± 12.0 %
1900	40.0	1.40	7.62	7.62	7.62	0.30	0.86	± 12.0 %
2300	39.5	1.67	7.48	7.48	7.48	0.30	0.86	± 12.0 %
2450	39.2	1.80	7.22	7.22	7.22	0.33	0.82	± 12.0 %
2550	39.1	1.91	6.94	6.94	6.94	0.26	0.86	± 12.0 %
3500	37.9	2.91	6.75	6.75	6.75	0.30	1.30	± 13.1 %
3700	37.7	3.12	6.68	6.68	6.68	0.35	1.30	± 13.1 %
5200	36.0	4.66	5.13	5.13	5.13	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.99	4.99	4.99	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.59	4.59	4.59	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.48	4.48	4.48	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.46	4.46	4.46	0.40	1.80	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

### Calibration Parameter Determined in Body Tissue Simulating Media

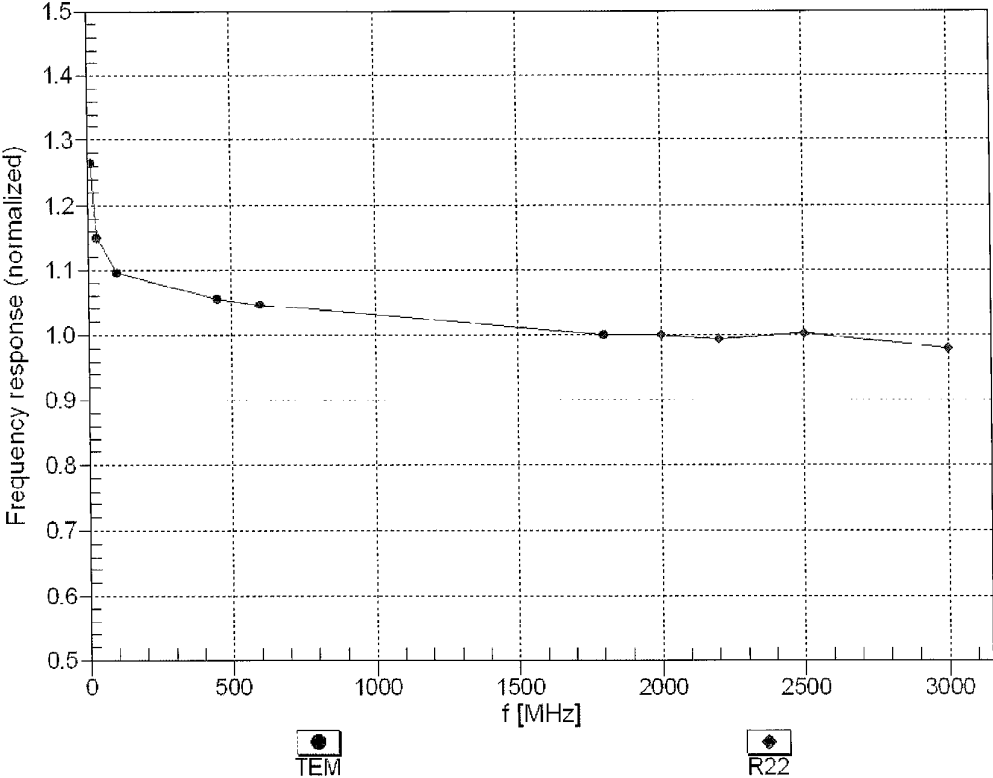
f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth (mm) <sup>G</sup>	Unc (k=2)
450	56.7	0.94	10.41	10.41	10.41	0.08	1.20	± 13.3 %
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835	55.2	0.97	9.08	9.08	9.08	0.40	0.89	± 12.0 %
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2450	52.7	1.95	7.35	7.35	7.35	0.38	0.80	± 12.0 %
2550	52.6	2.09	7.15	7.15	7.15	0.31	0.80	± 12.0 %
3500	51.3	3.31	6.50	6.50	6.50	0.40	1.30	± 13.1 %
3700	51.0	3.55	6.32	6.32	6.32	0.40	1.30	± 13.1 %
5200	49.0	5.30	4.31	4.31	4.31	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.20	4.20	4.20	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.83	3.83	3.83	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.77	3.77	3.77	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.75	3.75	3.75	0.50	1.90	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

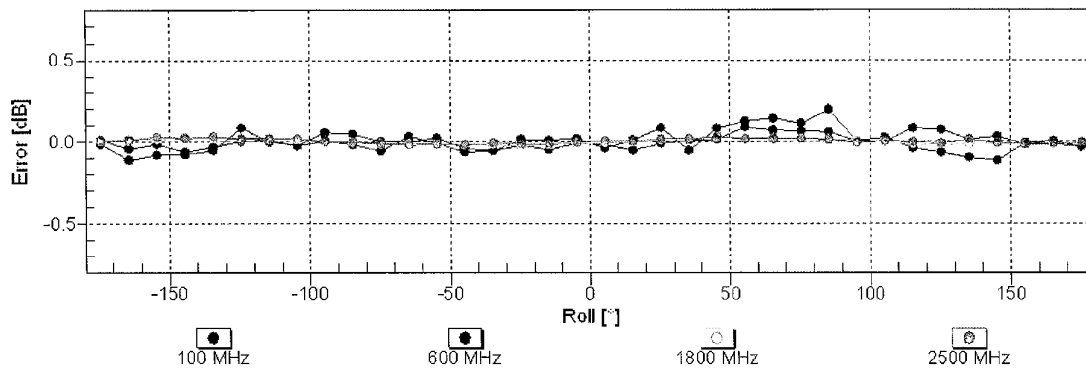
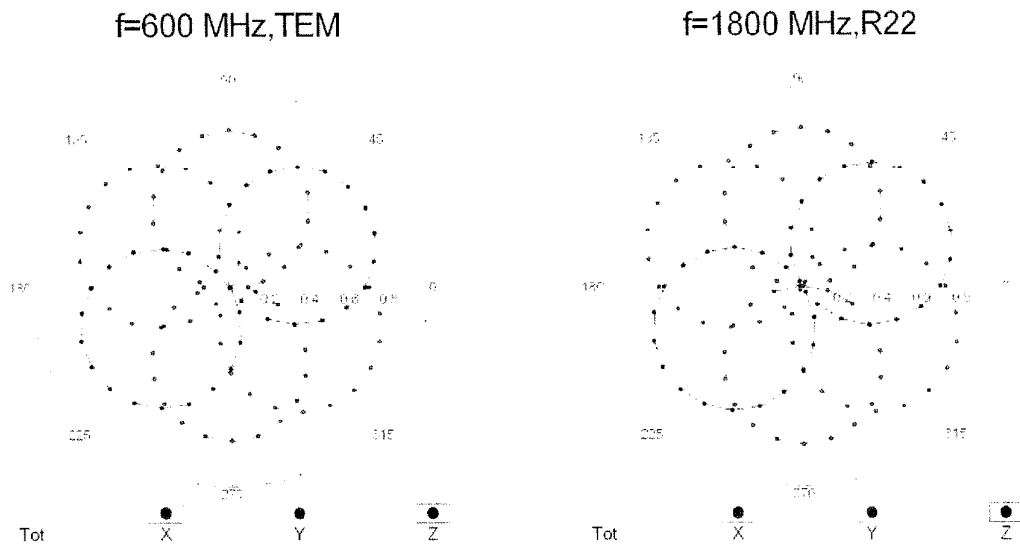
<sup>G</sup> Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

### Frequency Response of E-Field (TEM-Cell:ifi1110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  (k=2)

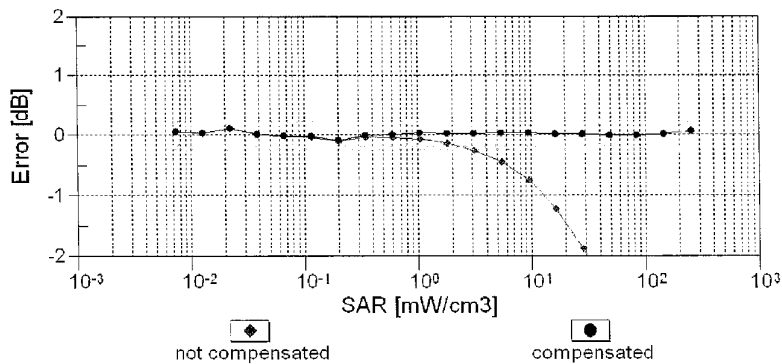
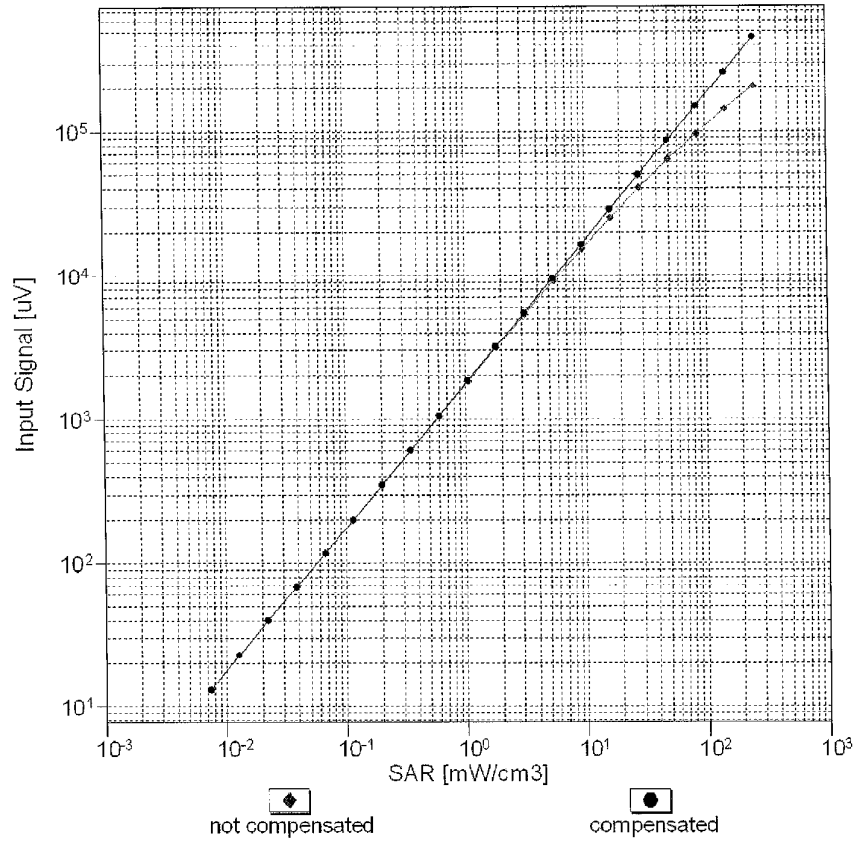
## Receiving Pattern ( $\phi$ ), $\vartheta = 0^\circ$



**Uncertainty of Axial Isotropy Assessment:  $\pm 0.5\%$  ( $k=2$ )**

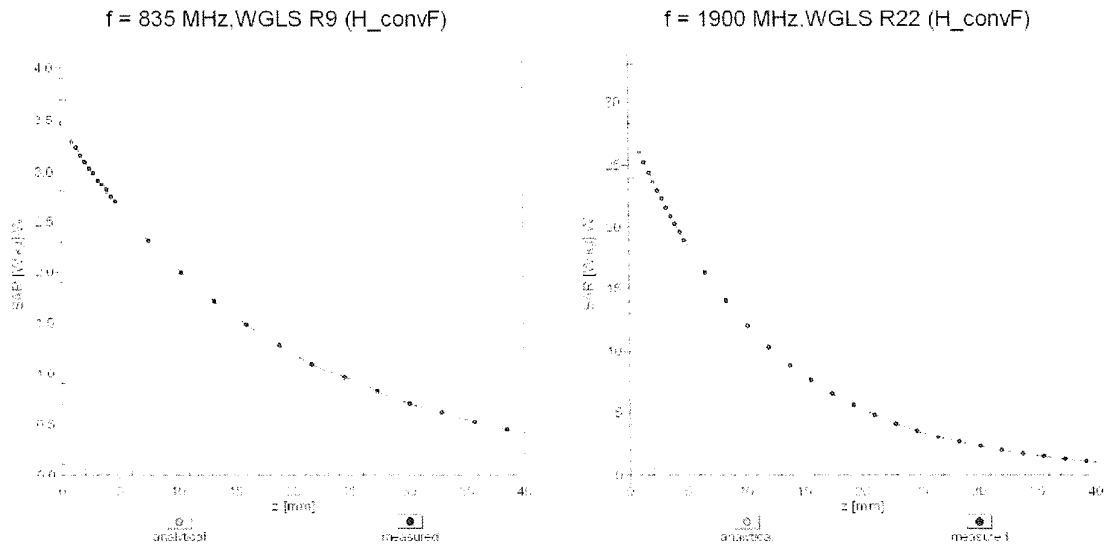


## Dynamic Range $f(SAR_{head})$ (TEM cell , $f_{eval} = 1900$ MHz)



**Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )**

# Conversion Factor Assessment



## Deviation from Isotropy in Liquid Error ( $\phi, \vartheta$ ), f = 900 MHz

