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# SAR TEST REPORT





The following samples were submitted and identified on behalf of the client as:

Cellular Phone **Equipment Under Test** 

Sharp Corporation, Mobile Communication B.U. **Company Name** 

2-13-1. Hachihonmatsu-lida. **Company Address** 

Higashi-hiroshima-shi, Hiroshima 739-0192, Japan

**Standards** IEEE/ANSI C95.1-1992, IEEE 1528-2013,

> KDB248227D01v02r02,KDB865664D01v01r04, KDB865664D02v01r02,KDB941225D01v03r01, KDB941225D06v02r01,KDB447498D01v06,

KDB648474D04v01r03

**FCC ID** APYHRO00271 **Date of Receipt** Nov. 26, 2018

Date of Test(s) Dec. 13, 2018 ~ Dec. 16, 2018

Date of Issue Dec. 26, 2018

In the configuration tested, the EUT complied with the standards specified above.

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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#### Signed on behalf of SGS

Clerk / Ruby Ou	Engineer / Bond Tsai	Asst. Manager / John Yeh	
Kuby Ou	Bondisai	John Teh	
		Date: Dec. 26, 2018	

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No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號

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	Highest SAR Summary						
Equipment class	Frequency Band	Head Body-worn Hotspot (Separation 10mm) (Separation 10mm)		Highest Simultaneous Transmission			
		1g SAR(W/Kg)					
Licensed	GSM 850	0.40	0.91	-			
Licensed	GPRS 850	-	-	1.10	1.23		
DTS	2.4GHz WLAN	0.13	0.13	0.18	1.23		
DSS	Bluetooth	0.10	0.12	-			
Date	of Testing	2018/12/13~2018/12/16					

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# **Revision History**

Report Number	Revision	Description	Issue Date
E5/2018/C0044	Rev.00	Initial creation of document	Dec. 26, 2018

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# 1. General Information

# 1.1 Testing Laboratory

SGS Taiwan Ltd. Electronics & Communication Laboratory			
No. 2, Keji 1 <sup>st</sup> Rd., Guishan Township, Taoyuan County, 33383, Taiwan			
Tel	+886-2-2299-3279		
Fax +886-2-2298-0488			
Internet	http://www.tw.sgs.com/		

# 1.2 Details of Applicant

Company Name	Sharp Corporation, Mobile Communication B.U.	
I Compony Address	2-13-1, Hachihonmatsu-lida, Higashi-hiroshima-shi,Hiroshima 739-0192, Japan	

#### 1.2.1 Details of Manufacturer

Company Name	Sharp Corporation
Company Address	1 Takumi-cho, Sakai-ku, Sakai City,Osaka 590-8522,Japan

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# 1.3 Description of EUT

EUT Name	Cellular Phone					
FCC ID	APYHRO00271					
Mode of Operation	☐GSM ☐GPRS  ☐WCDMA ☐HSDPA ☐HSUPA  ☐WLAN802.11 b/g/n(20M) ☐Bluetooth					
	GSM (DTM multi class B)	1/8.3				
Duty Cycle	GPRS (support multi class 12 max)	1/2 (1Dn4UP) 1/2.76 (1Dn3UP) 1/4.1 (1Dn2UP) 1/8.3 (1Dn1UP)				
	WCDMA	1				
	WLAN802.11 b/g/n(20M) 1					
	Bluetooth		1			
	GSM850	824	_	849		
	GSM1900	1850	_	1910		
TX Frequency Range (MHz)	WCDMA Band V	824	_	849		
(1411 12)	WiFi 2.4GHz	2400	_	2462		
	Bluetooth	2402	_	2480		
	GSM850	128	_	251		
Oh a ma al Niverb a m	GSM1900	512	_	810		
Channel Number (ARFCN)	WCDMA Band V	4132	_	4233		
,	WiFi 2.4GHz	1	_	11		
	Bluetooth	0	_	78		

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Max. SAR (1-g) (Unit: W/Kg)						
Mode	Band	Measured	Reported	Position / Channel		
Head	GSM 850	0.29	0.40			
	GSM 1900	0.19	0.24	<ul><li>□ Left □ Right</li><li>□ Cheek □ Tilt</li><li>□ 661 □ Channel</li></ul>		
	WCDMA Band V	0.25	0.27	<ul><li>□ Left □ Right</li><li>□ Cheek □ Tilt</li><li>4233 Channel</li></ul>		
	WLAN 802.11b	0.13	0.13	□Left ⊠Right ⊠Cheek □Tilt 6 Channel		
	Bluetooth	0.08	0.10	☐Left ⊠Right ☐Cheek ☐Tilt ☐ Channel		

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Max. SAR (1-g) (Unit: W/Kg)						
Mode	Band	Measured	Reported	Position / Channel		
	GSM 850	0.67	0.91	☐Front ⊠BackChannel		
Body-worn	GSM 1900	0.29	0.40	☐Front ⊠Back 810 Channel		
	WCDMA Band V	0.76	0.83	☐Front ⊠Back 4233 Channel		
	WLAN 802.11b	0.13	0.13	☐Front ⊠Back 6 _Channel		
	Bluetooth	0.09	0.12	☐Front ⊠Back 78 Channel		

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Max. SAR (1-g) (Unit: W/Kg)						
Mode	Band	Measured	Reported	Positio	on / Channel	
	GPRS 850 (1Dn4UP)	0.71	1.10	☐Front☐Top☐Left	⊠Back □Right _Channel	
Hotspot	GPRS 1900 (1Dn4UP)	0.40	0.57	☐Front ☐Top ☐Left 512	⊠Back □Right Channel	
mode	WCDMA Band V	0.76	0.83	☐Front ☐Top ☐Left 4233	⊠Back □Right _Channel	
	WLAN 802.11b	0.17	0.18	☐Front ☐Top ☐Left 6	□Back ⊠Right _Channel	

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## **GSM 850 - conducted power table:**

om ood oondaotoa ponor tabler					
EUT mode Frequency		i CH I i		Burst average power	Source-based time average power
(MHz)		(dBm)	Avg. (dBm)	Avg. (dBm)	
0014.050	824.2	128	33.4	31.72	22.69
GSM 850 - (GMSK)	836.6	190	33.4	31.91	22.88
	848.8	251	33.4	32.05	23.02
The division factor compared to the number of TX time slot					
Division factor				1 TX time slot	
	Division factor				03

## **GPRS 850 - conducted power table:**

			Burst avera	age power					
Max. Rated Avg. Power + Max. Tolerance (dBm)			33.4	31.2	29.4	28.2			
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP			
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)			
GPRS	824.2	128	31.75	29.54	27.62	26.48			
850	836.6	190	31.97	29.58	27.59	26.38			
830	848.8	251	32.08	29.44	27.52	26.31			
		Sc	ource-based tim	e average powe	er				
GPRS	824.2	128	22.72	23.52	23.36	23.47			
850	836.6	190	22.94	23.56	23.33	23.37			
830	848.8	251	23.05	23.42	23.26	23.30			
	The division factor compared to the number of TX time slot								
Division factor			1 TX time slot -9.03	2 TX time slot -6.02	3 TX time slot -4.26	4 TX time slot -3.01			

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### GSM 1900 - conducted power table:

	Jenn 1999 Gernandtsa perior tabler									
EUT mode	Frequency (MHz)	СН	Max. Rated Avg. Power + Max.Tolerance	Burst average power	Source-based time average power					
	(1011 12)		(dBm)	Avg. (dBm)	Avg. (dBm)					
				(dDIII)	(dDIII)					
CCM4000	1850.2	512	30.4	29.22	20.19					
GSM1900 (GMSK)	1800	661	30.4	29.33	20.30					
(001.)	1909.8	810	30.4	28.96	19.93					
	The d	ivision factor	compared to the nu	mber of TX time slot						
	Divi	sion factor	1 TX time slot							
	DIVI	SION Ideloi		-9.03						

# GPRS 1900 - conducted power table:

		•	Burst avera	age power					
Max. Rated Avg. Power + Max. Tolerance (dBm)			30.4	28.2	26.4	25.2			
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP			
EUT mode	Frequency (MHz)	СН	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)			
GPRS	1850.2	512	29.28	26.72	24.92	23.65			
1900	I 1880 I 661		29.37	26.67	24.93	23.79			
1900	1909.8	810	29.01	26.65	24.73	23.78			
		Sc	ource-based tim	rce-based time average power					
GPRS	1850.2	512	20.25	20.70	20.66	20.64			
1900	1880	661	20.34	20.65	20.67	20.78			
1900	1909.8	810	19.98	20.63	20.47	20.77			
	The division factor compared to the number of TX time slot								
Div	vision factor			2 TX time slot		4 TX time slot			
			-9.03	-6.02	-4.26	-3.01			

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# WCDMA Band V - HSDPA / HSUPA Conducted power table (Unit: dBm):

	Band		WCDMA V	-
	TX Channel	4132	4183	4233
	Frequency (MHz)	826.4	836.6	846.6
Max. Rated Av	g. Power+Max. Tolerance (dBm)		23.80	
3GPP Rel 99	RMC 12.2Kbps	23.05	23.26	23.44
	HSDPA Subtest-1	22.19	22.23	22.24
3GPP Rel 5	HSDPA Subtest-2	21.49	21.69	21.62
SOFF INCIS	HSDPA Subtest-3	21.45	21.66	21.82
	HSDPA Subtest-4	21.44	21.56	21.80
	HSUPA Subtest-1	21.82	22.09	21.43
	HSUPA Subtest-2	20.03	20.26	20.66
3GPP Rel 6	HSUPA Subtest-3	19.88	20.05	20.09
	HSUPA Subtest-4	20.94	21.08	21.02
	HSUPA Subtest-5	21.90	22.00	22.10

#### Subtests for WCDMA Release 5 HSDPA

SUB-TEST	$\beta_{c}$	$\beta_d$	β <sub>d</sub> (SF)	$\beta_c/\beta_d$	β <sub>HS</sub> (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15	15/15	64	12/15	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

#### Subtests for WCDMA Release 6 HSUPA

SUB-TEST	βς	$\beta_d$	β <sub>d</sub> (SF)	β <sub>o</sub> /β <sub>d</sub>	β <sub>HS</sub> (Note1)	β <sub>ec</sub>	β <sub>ed</sub> (Note 5) (Note 6)	β <sub>ed</sub> (SF)	β <sub>ed</sub> (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β <sub>ed</sub> 1: 47/15 β <sub>ed</sub> 2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	15/15	64	15/15	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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# WLAN802.11 b/g/n (20M) conducted power table:

		Main /	Antenna			
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		1	2412		12.00	11.81
		2	2417		15.00	14.85
	802.11b	6	2437	1Mbps	15.00	14.86
		10	2457		15.00	14.82
		11	2462		12.00	11.76
		1	2412		12.00	11.84
		2	2417		15.00	14.86
2450 MHz	802.11g	6	2437	6Mbps	15.00	14.81
		10	2457		15.00	14.79
		11	2462		12.00	11.87
		1	2412		12.00	11.80
		2	2417		15.00	14.89
	802.11n-HT20	6	2437	MCS0	15.00	14.74
		10	2457		15.00	14.81
		11	2462		12.00	11.81

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# Bluetooth maximum power table:

			=			
Mode	Mode Channel	Frequency	Average	Max. Rated Avg. Power + Max.		
lviode Channel	(MHz)	1Mbps	2Mbps	3Mbps	Tolerance (dBm)	
	CH 00	2402	10.23	9.17	9.29	
BR/EDR	CH 39	2441	10.17	9.14	9.21	11.5
	CH 78	2480	10.37	9.18	9.28	

Modo	Mode Channel		Average Output Power (dBm)	Max. Rated Avg. Power + Max.
Mode Ch	Chamer	(MHz)	GFSK	Tolerance (dBm)
	CH 00	2402	3.89	
LE	CH 19 2440		3.71	11.5
	CH 39	2480	3.91	

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#### 1.4 Test Environment

Ambient Temperature: 22±2° C Tissue Simulating Liquid: 22±2° C

# 1.5 Operation Description

- 1. The EUT is controlled by using a Radio Communication Tester (MT8820C), and the communication between the EUT and the tester is established by air link.
- 2. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.
- 3. During the SAR testing, the DASY 5 system checks power drift by comparing the e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.
- 4. SAR test reduction for GPRS mode is determined by the source-based time-averaged output power. The data mode with highest specified time-averaged output power should be tested for SAR compliance.
- 5. The 3G SAR test reduction procedure is applied to HSDPA with 12.2 kbps RMC as the primary mode. Since the maximum output power in a secondary mode (HSDPA) is  $\leq \frac{1}{4}$  dB higher than the primary mode (WCDMA), SAR measurement is not required for the secondary mode (HSDPA). The following 4 sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS 34.121. A summary of these setting are illustrated below:

Sub-test	βε	βα	βd (SF)	βο/βα	β <sub>HS</sub> <sup>(1)(2)</sup>	CM <sup>(3)</sup> (dB)	MPR <sup>(3)</sup> (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 <sup>(4)</sup>	15/15 <sup>(4)</sup>	64	12/15 <sup>(4)</sup>	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ<sub>ΑCK</sub>, Δ<sub>NACK</sub> and Δ<sub>CQI</sub> = 30/15 with β<sub>HS</sub> = 30/15 \* β<sub>C</sub>.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA,  $\Delta_{ACK}$  and  $\Delta_{NACK}$  = 30/15 with  $\beta_{HS}$  = 30/15 \*  $\beta_0$ , and  $\Delta_{CGI}$  = 24/15 with  $\beta_{HS}$  = 24/15 \*  $\beta_c$ 

Note 3: CM = 1 for  $\beta_0/\beta_0$  = 12/15,  $\beta_{HS}/\beta_0$  = 24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β/βd ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain

factors for the reference TFC (TF1, TF1) to  $\beta_c$  = 11/15 and  $\beta_d$  = 15/15.

6. The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) with 12.2 kbps RMC as the primary mode. Since the maximum output power in a secondary mode (HSPA) is  $\leq \frac{1}{4}$  dB higher than the primary mode (WCDMA), SAR measurement is not required for the secondary mode (HSPA). The following

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5 sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS 34.121. A summary of these setting are illustrated below:

Sub-test	βο	βd	β <sub>d</sub> (SF)	β <sub>c</sub> / β <sub>d</sub>	β <sub>HS</sub> (1)	βες	β <sub>ed</sub> (4)(5)	β <sub>ed</sub> (SF)	β <sub>ed</sub> (Codes)	CM (2) (dB)	MPR (2)(6) (dB)	AG (5) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β <sub>ed</sub> 1: 47/15 β <sub>ed</sub> 2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

#### **WLAN**

### 802.11b DSSS SAR Test Requirements:

- 7. SAR is measured for 2.4 GHz 802.11b DSSS mode using the highest measured maximum output power channel, when the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 8. When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

#### 802.11g/n OFDM SAR Test Exclusion Requirements:

- 9. SAR is not required for 802.11g/n since the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
- 10. BT and WLAN use the same antenna path and Bluetooth can't transmit with WLAN simultaneously.
- 11. According to KDB447498D01v06, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is  $\leq 0.8$  W/kg, when the transmission band is  $\leq 100MHz$ .

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Note 1: For sub-test 1 to 4, Δαρχ, Δαρχ, Δαρχ and Δροι = 30/15 with β<sub>HS</sub> = 30/15 \* β<sub>E</sub>. For sub-test 5, Δαρχ, Δαρχ, Δαρχ, Δαρχ = 5/15 with β<sub>HS</sub> = 5/15 \* β<sub>E</sub>.

Note 2: CM = 1 for β<sub>2</sub>/β<sub>d</sub> = 12/15, β<sub>HS</sub>β<sub>e</sub> = 24/15. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM.

Note 3: For subtest 1 the Be/Be ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_e = 10/15$  and  $\beta_d = 15/15$ .

In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g

Note 5: βed can not be set directly; it is set by Absolute Grant Value.

lote 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.



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12. According to **KDB865664D01v01r04**, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is ≥ 0.8 W/kg, repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit)

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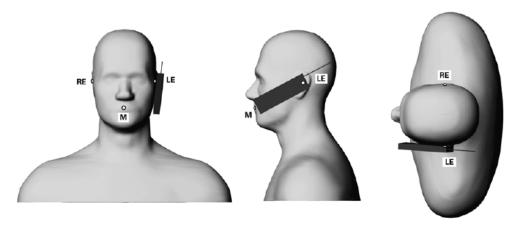
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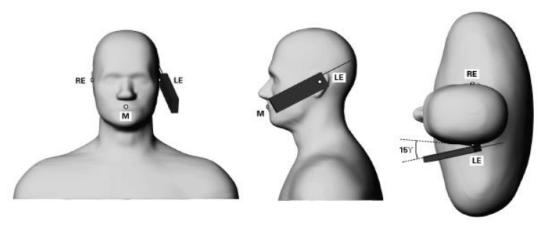
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# 1.6 Positioning Procedure

#### **Head SAR measurement statement**



Phone position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning.



Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning.

# Cheek/Touch Position:

The handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.

#### Ear/Tilt Position:

With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.

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# **Body SAR measurement statement**

1. Body-worn exposure: 10mm

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the same wireless transmission configuration is used for testing body-worn accessory and hotspot mode SAR, respectively, in voice and data mode, SAR results for the most conservative test separation distance configuration may be used to support both SAR conditions. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for the body-worn accessory with a headset attached to the handset.

### 2. Hotspot exposure: 10mm

A test separation distance of 10 mm is required between the phantom and all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge when the form factor of a handset is larger than  $9 \text{ cm} \times 5 \text{ cm}$ ,

Test configurations of WWAN:

- (1) Front side
- (2) Back side
- (3) Top side
- (4) Right side
- (5) Left side

# Test configurations of WLAN:

- (1) Front side
- (2) Back side
- (3) Top side
- (4) Right side

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3. Based on KDB941225D06v02r01, the hotspot mode and body-worn accessory SAR test configurations may overlap for handsets. When the same wireless mode transmission configurations for voice and data are required for SAR measurements, the more conservative configuration with a smaller separation distance should be tested for the overlapping SAR configurations. For WCDMA /WLAN, since the maximum power is the same between body-worn and hotspot mode, and the test distance of hotspot mode is the same with that of body-worn mode, hotspot mode SAR is used to support body-worn SAR. For GSM850/1900, since the wireless mode transmission configurations is different between body-worn and hotspot mode, body-worn SAR is performed.

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#### 1.7 Evaluation Procedures

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- 1. The extraction of the measured data (grid and values) from the Zoom Scan.
- 2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).
- 3. The generation of a high-resolution mesh within the measured volume.
- 4. The interpolation of all measured values from the measurement grid to the high-resolution grid.
- 5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface.
- 6. The calculation of the averaged SAR within masses of 1g and 10g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within –2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans.

The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is

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the moved around until the highest averaged SAR is found.

If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

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# 1.8 Probe Calibration Procedures

For the calibration of E-field probes in lossy liquids, an electric field with an accurately known field strength must be produced within the measured liquid. For standardization purposes it would be desirable if all measurements which are necessary to assess the correct field strength would be traceable to standardized measurement procedures. In the following two different calibration techniques are summarized:

## 1.8.1 Transfer Calibration with Temperature Probes

In lossy liquids the specific absorption rate (SAR) is related both to the electric field (E) and the temperature gradient ( $\delta T / \delta t$ ) in the liquid.

$$SAR = C \frac{\delta T}{\delta t}$$
,

Whereby  $\sigma$  is the conductivity,  $\rho$  the density and c the heat capacity of the liquid.

Hence, the electric field in lossy liquid can be measured indirectly by measuring the temperature gradient in the liquid. Non-disturbing temperature probes (optical probes or thermistor probes with resistive lines) with high spatial resolution (<1-2 mm) and fast reaction time (<1 s) are available and can be easily calibrated with high precision [1]. The setup and the exciting source have no influence on the calibration; only the relative positioning uncertainties of the standard temperature probe and the E-field probe to be calibrated must be considered. However, several problems limit the available accuracy of probe calibrations with temperature probes:

1. The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be completely avoided, as the measured field itself destroys the thermal equilibrium in the liquid. With a careful setup these errors can be kept

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small.

2. The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.

- 3. The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures (~ 2% for c; much better for ρ), there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed ±5%.
- 4. Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

Considering these problems, the possible accuracy of the calibration of E-field probes with temperature gradient measurements in a carefully designed setup is about  $\pm 10\%$  (RSS) [2]. Recently, a setup which is a combination of the waveguide techniques and the thermal measurements was presented in [3]. The estimated uncertainty of the setup is  $\pm 5\%$  (RSS) when the same liquid is used for the calibration and for actual measurements and  $\pm 7-9\%$  (RSS) when not, which is in good agreement with the estimates given in [2].

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### 1.8.2 Calibration with Analytical Fields

In this method a technical setup is used in which the field can be calculated analytically from measurements of other physical magnitudes (e.g., input power). This corresponds to the standard field method for probe calibration in air; however, there is no standard defined for fields in lossy liquids.

When using calculated fields in lossy liquids for probe calibration, several points must be considered in the assessment of the uncertainty:

- 1. The setup must enable accurate determination of the incident power.
- 2. The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
- 3. Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

#### References

- (1) N. Kuster, Q. Balzano, and J.C. Lin, Eds., *Mobile Communications Safety*, Chapman & Hall, London, 1997.
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- (3) K. Jokela, P. Hyysalo, and L. Puranen, \Calibration of specific absorption rate (SAR) probes in waveguide at 900 MHz", *IEEE Transactions on Instrumentation and Measurements*, vol. 47, no. 2, pp. 432{438, Apr. 1998.

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# 1.9 The SAR Measurement System

A block diagram of the SAR measurement system is given in Fig. a. This SAR measurement system uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 5 professional system). Model EX3DV4 field probes are used to determine the internal electric fields. The SAR can be obtained from the equation SAR=  $\sigma$  (|Ei|2)/  $\rho$  where  $\sigma$  and  $\rho$  are the conductivity and mass density of the tissue-simulant.

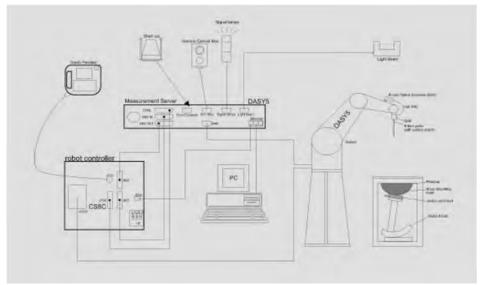


Fig. a A block diagram of the SAR measurement system

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The DASY 5 system for performing compliance tests consists of the following items:

- 1. A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- 2. A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- 3. 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.
- 4. The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- 5. 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.
- 6. A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- 7. A computer operating Windows7
- 8. DASY 5 software.
- 9. Remote control with teach pendant and additional circuitry for robot safety such as
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- 11. The device holder for handheld mobile phones.
- 12. Tissue simulating liquid mixed according to the given recipes.
- 13. Validation dipole kits allowing to validate the proper functioning of the system.

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# 1.10 System Components

#### **EX3DV4 E-Field Probe**

Construction	Symmetrical design with triangular core  Built-in shielding against static charges								
	PEEK enclosure material (resistant to								
	organic solvents, e.g., DGBE)								
Calibration	Basic Broad Band Calibration in air								
	onversion Factors (CF) for								
	SL835/1900/2450MHz Additional CF for								
	other liquids and frequencies upon request								
Frequency	10 MHz to > 6 GHz, Linearity: ± 0.6 dB								
Directivity	± 0.3 dB in HSL (rotation around probe axis)								
	± 0.5 dB in tissue material (rotation normal to probe axis)								
Dynamic	10 μW/g to > 100 mW/g								
Range	Linearity: ± 0.2 dB (noise: typically < 1 μW/g)								
Dimensions	Tip diameter: 2.5 mm								
Application	High precision dosimetric measurements in any exposure scenario								
	(e.g., very strong gradient fields). Only probe which enables compliance								
	testing for frequencies up to 6 GHz with precision of better 30%.								

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#### **Phantom**

i mantoni	
Model	Twin SAM
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.
Shell Thickness	2 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Height: 850 mm; Length: 1000 mm; Width: 500 mm

# **DEVICE HOLDER**

Construction	In combination with the Twin SAM Phantom
	V4.0/V4.0C or Twin SAM, the Mounting
	Device (made from POM) enables the
	rotation of the mounted transmitter in
	spherical coordinates, whereby the rotation
	point is the ear opening. The devices can
	be easily and accurately positioned
	according to IEC, IEEE, CENELEC, FCC or
	other specifications. The device holder can
	be locked at different phantom locations
	(left head, right head, flat phantom).



**Device Holder** 

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# 1.11 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% (according to KDB865664D01) from the target SAR values.

These tests were done at 835/1900/2450 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1. During the tests, the liquid depth above the ear reference points was above 15 cm (≤3G) or 10 cm (>3G) in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

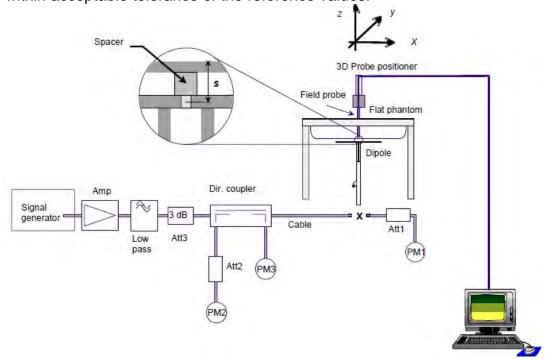


Fig. b The block diagram of system verification

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Validation Kit	S/N	Frequ (MF	-	1W Target SAR-1g (mW/g)	Pin=250mW Measured SAR-1g (mW/g)	Measured SAR-1g normalized to 1W (mW/g)	Deviation (%)	Measured Date
D835V2	4d063	835	Head	9.48	2.44	9.76	2.95%	Dec. 13, 2018
D635V2	2 40063	000	Body	9.56	2.45	9.80	2.51%	Dec. 13, 2018
D1900V2	5d173	1900	Head	40.7	9.88	39.52	-2.90%	Dec. 14, 2018
D1900V2	50173 1900		Body	40.9	9.95	39.80	-2.69%	Dec. 14, 2018
D2450V2	D2450V2 727		Head	52.1	13.20	52.80	1.34%	Dec. 15, 2018
D2400V2 121		2450	Body	50.8	12.80	51.20	0.79%	Dec. 16, 2018

Table 1. Results of system validation

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# 1.12 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this Head-simulant fluid were measured by using the Agilent Model 85070E Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with Network Analyzer.

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the flat section of the phantom was at least 15 cm (≤3G) or 10 cm (>3G) during all tests. (Appendix Fig. 2)

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Tissue Type	Measurement Date	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	% dev εr	% dev σ
		824.2	41.556	0.899	41.472	0.892	0.20%	0.80%
		826.4	41.545	0.899	41.465	0.892	0.19%	0.82%
	Dec 42 2040	835	41.500	0.900	41.440	0.894	0.14%	0.67%
	Dec, 13. 2018	836.6	41.500	0.902	41.437	0.897	0.15%	0.52%
		846.6	41.500	0.912	41.417	0.900	0.20%	1.37%
		848.8	41.500	0.915	41.413	0.910	0.21%	0.53%
		1850.2	40.000	1.400	39.531	1.382	1.17%	1.29%
	D 44 0040	1880	40.000	1.400	39.528	1.389	1.18%	0.79%
	Dec, 14. 2018	1900	40.000	1.400	39.501	1.393	1.25%	0.50%
Head		1909.8	40.000	1.400	39.450	1.398	1.37%	0.14%
		2402	39.285	1.757	39.776	1.750	-1.25%	0.42%
		2412	39.268	1.766	39.725	1.755	-1.16%	0.64%
		2417	39.259	1.771	39.716	1.759	-1.16%	0.66%
		2437	39.223	1.788	39.667	1.760	-1.13%	1.59%
	Dec, 15. 2018	2441	39.216	1.792	39.661	1.787	-1.13%	0.28%
300, 101 2010	2450	39.200	1.800	39.656	1.788	-1.16%	0.67%	
		2457	39.191	1.808	39.648	1.794	-1.17%	0.75%
		2462	39.185	1.813	39.645	1.809	-1.17%	0.23%
		2480	39.162	1.827	39.644	1.812	-1.23%	0.80%
		824.2	55.242	0.969	54.188	0.957	1.91%	1.25%
		826.4	55.234	0.969	54.174	0.960	1.92%	0.96%
		835	55.200	0.970	54.160	0.961	1.88%	0.93%
	Dec, 13. 2018	836.6	55.195	0.972	54.145	0.963	1.90%	0.92%
	846.6	55.164	0.984	54.114	0.972	1.90%	1.25%	
		848.8	55.158	0.987	54.101	0.975	1.92%	1.21%
		1850.2	53.300	1.520	52.811	1.512	0.92%	0.53%
	5 44 0040	1880	53.300	1.520	52.807	1.515	0.92%	0.33%
Dec, 14. 2018  Body	1900	53.300	1.520	52.803	1.522	0.93%	-0.13%	
	1909.8	53.300	1.520	52.792	1.523	0.95%	-0.20%	
3		2402	52.764	1.904	53.151	1.925	-0.73%	-1.10%
	2412	52.751	1.914	53.145	1.932	-0.75%	-0.96%	
		2417	52.744	1.918	53.131	1.936	-0.73%	-0.91%
		2437	52.717	1.938	53.112	1.956	-0.75%	-0.95%
	Dec, 16. 2018	2441	52.712	1.941	53.022	1.958	-0.59%	-0.86%
		2450	52.700	1.950	52.971	1.967	-0.51%	-0.87%
		2457	52.691	1.960	52.920	1.975	-0.43%	-0.77%
		2462	52.685	1.967	52.898	1.985	-0.40%	-0.91%
		2480	52.662	1.993	52.887	2.010	-0.43%	-0.88%

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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# The composition of the tissue simulating liquid:

-		Ingredient						
Frequency (MHz)	Mode	DGMBE	Water	Salt	Preventol D-7	Cellulose	Sugar	Total amount
050	Head	1	532.98 g	18.3 g	2.4 g	3.2 g	766 g	1.3L(Kg)
850	Body	_	631.68 g	11.72 g	1.2 g	-	600 g	1.0L(Kg)
4000	Head	444.52 g	552.42 g	3.06 g	ı	I	_	1.0L(Kg)
1900	Body	300.67 g	716.56 g	4.0 g	-	-	_	1.0L(Kg)
2450	Head	550 g	450 g			_	_	1.0L(Kg)
	Body	301.7 g	698.3 g	_		-	_	1.0L(Kg)

Table 3. Recipes for tissue simulating liquid

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#### 1.13 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," ANSI/IEEE C95.1, By the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter.

Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

1. Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over a 10 grams of tissue (defined as a tissue volume in the shape of a cube).

Occupational/Controlled limits apply when persons are exposed as consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

2. Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube).

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Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube).

General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure.

Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.(Table .6)

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR (Brain)	1.60 W/kg	8.00 W/kg
Spatial Average SAR (Whole Body)	0.08 W/kg	0.40 W/kg
Spatial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 W/kg	20.00 W/kg

Table 4. RF exposure limits

#### Notes:

- 1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
- Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

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# 2. Summary of Results

#### **GSM 850**

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling			Plot page
						, ,		Measured	Reported	
	Re Cheek	-	251	848.8	33.40	32.05	36.46%	0.26	0.35	-
	Re Tilt	-	251	848.8	33.40	32.05	36.46%	0.08	0.11	-
Head	Le Cheek	-	128	824.2	33.40	31.72	47.23%	0.26	0.38	-
(GSM)	Le Cheek	-	190	836.6	33.40	31.91	40.93%	0.28	0.39	-
-	Le Cheek	-	251	848.8	33.40	32.05	36.46%	0.29	0.40	47
	Le Tilt	-	251	848.8	33.40	32.05	36.46%	0.09	0.12	-
	Front side	10	251	848.8	33.40	32.05	36.46%	0.29	0.40	-
Body-worn	Back side	10	128	824.2	33.40	31.72	47.23%	0.58	0.85	-
(GSM)	Back side	10	190	836.6	33.40	31.91	40.93%	0.61	0.86	-
	Back side	10	251	848.8	33.40	32.05	36.46%	0.67	0.91	48
	Front side	10	128	824.2	28.20	26.48	48.59%	0.29	0.43	-
	Back side	10	128	824.2	28.20	26.48	48.59%	0.58	0.86	-
Hotspot	Back side	10	190	836.6	28.20	26.38	52.05%	0.66	1.00	-
(GPRS)	Back side	10	251	848.8	28.20	26.31	54.53%	0.71	1.10	49
<1Dn4Up>	Top side	10	128	824.2	28.20	26.48	48.59%	0.03	0.04	-
	Right side	10	128	824.2	28.20	26.48	48.59%	0.22	0.33	-
	Left side	10	128	824.2	28.20	26.48	48.59%	0.36	0.53	-

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#### **GSM 1900**

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling			Plot page
					reletance (azını)	(42)		Measured	Reported	
	Re Cheek	-	661	1880	30.40	29.33	27.94%	0.18	0.23	-
	Re Tilt	-	661	1880	30.40	29.33	27.94%	0.14	0.18	-
Head	Le Cheek	-	512	1850.2	30.40	29.22	31.22%	0.17	0.22	-
(GSM)	Le Cheek	-	661	1880	30.40	29.33	27.94%	0.19	0.24	50
	Le Cheek	-	810	1909.8	30.40	28.96	39.32%	0.16	0.22	-
	Le Tilt	-	661	1880	30.40	29.33	27.94%	0.15	0.19	-
	Front side	10	661	1880	30.40	29.33	27.94%	0.20	0.26	-
Body-worn	Back side	10	512	1850.2	30.40	29.22	31.22%	0.25	0.33	-
(GSM)	Back side	10	661	1880	30.40	29.33	27.94%	0.25	0.32	-
	Back side	10	810	1909.8	30.40	28.96	39.32%	0.29	0.40	51
	Front side	10	661	1880	25.20	23.79	38.36%	0.27	0.37	-
	Back side	10	512	1850.2	25.20	23.65	42.89%	0.40	0.57	52
Hotspot	Back side	10	661	1880	25.20	23.79	38.36%	0.39	0.54	-
(GPRS)	Back side	10	810	1909.8	25.20	23.78	38.68%	0.38	0.53	-
<1Dn4Up>	Top side	10	661	1880	25.20	23.79	38.36%	0.15	0.21	-
	Right side	10	661	1880	25.20	23.79	38.36%	0.07	0.10	-
	Left side	10	661	1880	25.20	23.79	38.36%	0.23	0.32	-

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#### **WCDMA Band V**

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
						,		Measured	Reported	
	RE Cheek	-	4233	846.6	23.8	23.44	8.64%	0.23	0.25	-
	RE Tilt	-	4233	846.6	23.8	23.44	8.64%	0.10	0.11	-
R99	LE Cheek	-	4132	826.4	23.8	23.05	18.85%	0.22	0.26	-
(Head)	LE Cheek	-	4183	836.6	23.8	23.26	13.24%	0.23	0.26	-
	LE Cheek	-	4233	846.6	23.8	23.44	8.64%	0.25	0.27	53
	LE Tilt	-	4233	846.6	23.8	23.44	8.64%	0.09	0.10	-
Dody Mars	Front side	10	4233	846.6	23.8	23.44	8.64%	0.33	0.36	-
Body-Worn	Back side	10	4233	846.6	23.8	23.44	8.64%	0.76	0.83	-
	Front side	10	4233	846.6	23.8	23.44	8.64%	0.33	0.36	-
	Back side	10	4132	826.4	23.8	23.05	18.85%	0.67	0.80	-
	Back side	10	4183	836.6	23.8	23.26	13.24%	0.72	0.82	-
Hotspot	Back side	10	4233	846.6	23.8	23.44	8.64%	0.76	0.83	54
	Top side	10	4233	846.6	23.8	23.44	8.64%	0.05	0.05	-
	Right side	10	4233	846.6	23.8	23.44	8.64%	0.24	0.26	-
	Left side	10	4233	846.6	23.8	23.44	8.64%	0.37	0.40	-

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#### WLAN 802.11b

Mode	Mode Position		СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
					reieraniee (azim)	(42)		Measured	Reported	
	RE Cheek	-	1	2412	12	11.81	4.45%	0.06	0.06	-
	RE Cheek	-	2	2417	15	14.85	3.49%	0.11	0.11	-
	RE Cheek	-	6	2437	15	14.86	3.26%	0.13	0.13	55
Head	RE Cheek	-	10	2457	15	14.82	4.21%	0.11	0.11	-
пеаи	RE Cheek	-	11	2462	12	11.76	5.66%	0.07	0.07	-
	RE Tilt	-	6	2437	15	14.86	3.26%	0.04	0.04	-
	LE Cheek	-	6	2437	15	14.86	3.26%	0.09	0.09	-
	LE Tilt	-	6	2437	15	14.86	3.26%	0.04	0.04	-
Body-	Front side	10	6	2437	15	14.86	3.26%	0.04	0.04	-
worn	Back side	10	6	2437	15	14.86	3.26%	0.13	0.13	-
	Front side	10	6	2437	15	14.86	3.26%	0.04	0.04	-
	Back side	10	6	2437	15	14.86	3.26%	0.13	0.13	-
	Top side	10	6	2437	15	14.86	3.26%	0.02	0.02	-
Hotopot	Right side	10	1	2412	12	11.81	4.45%	0.09	0.09	-
Hotspot	Right side	10	2	2417	15	14.85	3.49%	0.15	0.16	-
	Right side	10	6	2437	15	14.86	3.26%	0.17	0.18	56
	Right side	10	10	2457	15	14.82	4.21%	0.16	0.17	-
	Right side	10	11	2462	12	11.76	5.66%	0.09	0.10	-

#### **Bluetooth**

Mode Position		Distance (mm) CH		Freq. (MHz)	Freq. Power + Max A	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
					Tolerance (ubili)	(dBiii)		Measured	Reported	
	RE Cheek	-	0	2402	11.5	10.23	33.97%	0.07	0.09	-
	RE Cheek	-	39	2441	11.5	10.17	35.83%	0.07	0.10	-
Head	RE Cheek	-	78	2480	11.5	10.37	29.72%	0.08	0.10	57
rieau	RE Tilt	-	78	2480	11.5	10.37	29.72%	0.02	0.03	-
	LE Cheek	-	78	2480	11.5	10.37	29.72%	0.04	0.05	-
	LE Tilt	-	78	2480	11.5	10.37	29.72%	0.02	0.03	-
	Front side	10	78	2480	11.5	10.37	29.72%	0.02	0.03	-
Body-	Back side	10	0	2402	11.5	10.23	33.97%	0.08	0.11	-
worn	Back side	10	39	2441	11.5	10.17	35.83%	0.09	0.12	-
	Back side	10	78	2480	11.5	10.37	29.72%	0.09	0.12	58

#### Note:

$$\text{Scaling} = \frac{\text{reported SAR}}{\text{measured SAR}} = \frac{P2 (\text{mW})}{P1 (\text{mW})} = 10^{\left(\frac{P2 - P1}{10}\right) (\text{dBm})}$$

Reported SAR = measured SAR \* (scaling)

Where P2 is maximum specified power, P1 is measured conducted power

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## 3. Simultaneous Transmission Analysis **Simultaneous Transmission Scenarios:**

Simultaneous Transmit Configurations	Head	Body-Worn	Hotspot
GSM + 2.4GHz Wi-Fi	Yes	Yes	No
GPRS + 2.4GHz Wi-Fi	No	No	Yes
WCDMA + 2.4GHz Wi-Fi	Yes	Yes	Yes
GSM+BT	Yes	Yes	No
GPRS + BT	No	Yes	No
WCDMA + BT	Yes	Yes	No

#### Note:

- 1. The device does not support DTM function. Body-worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
- 2. Based on KDB447498D01 note 36, when SAR test exclusion is allowed by other published RF exposure KDB procedures, such as the 2.5 cm hotspot mode SAR test exclusion for an edge or surface, then estimated SAR is not required to determine simultaneous SAR test exclusion.
- 3: Based on KDB 648474 D04v01r03 note 6, simultaneous transmission SAR for 10-g extremity SAR requires consideration only when standalone 10-g SAR is required.

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#### 3.1 Estimated SAR calculation

According to KDB447498 D01v06 – When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

Estimated SAR = 
$$\frac{\text{Max. tune up power (mW)}}{\text{Min. test separation distance(mm)}} \times \frac{\sqrt{\text{f(GHz)}}}{7.5}$$

If the minimum test separation distance is < 5mm, a distance of 5mm is used for estimated SAR calculation. When the test separation distance is >50mm, the 0.4W/kg is used for SAR-1g.

#### 3.2 SPLSR evaluation and analysis

Per KDB447498D01, when the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR sum to peak location separation ratio(SPLSR).

The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion.

The ratio is determined by (SAR1 + SAR2)^1.5/Ri, rounded to two decimal digits, and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

SAR1 and SAR2 are the highest reported or estimated SAR for each antenna in the pair, and Ri is the separation distance between the peak SAR locations for the antenna pair in mm.

When standalone test exclusion applies, SAR is estimated; the peak location is assumed to be at the feed-point or geometric center of the antenna.

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#### **Simultaneous Transmission Combination**

repo	rted SAR \	WWAN and WI	LAN 2.4GHz,	ΣSAR evalua	tion
Frequency	_	:	reported S	SAR / W/kg	ΣSAR
band		osition	WWAN	WLAN	<1.6W/kg
		Right cheek	0.35	0.13	0.48
GSM 850	Head	Right tilt	0.11	0.04	0.15
G3W 650	Head	Left cheek	0.40	0.09	0.49
		Left tilt	0.12	0.04	0.16
		Front side	0.43	0.04	0.47
0000 050		Back side	1.10	0.13	1.23
GPRS 850 (1Dn4UP)	Hotspot	Top side	0.04	0.02	0.06
		Right side	0.33	0.18	0.51
		Left side	0.53	-	-
GSM 1900	Head	Right cheek	0.23	0.13	0.36
		Right tilt	0.18	0.04	0.22
	пеац	Left cheek	0.24	0.09	0.33
		Left tilt	0.19	0.04	0.23
	Hotspot	Front side	0.37	0.04	0.41
0000 4000		Back side	0.57	0.13	0.70
GPRS 1900 (1Dn4UP)		Top side	0.21	0.02	0.23
(1211161)		Right side	0.10	0.18	0.28
		Left side	0.32	-	-
		Right cheek	0.25	0.13	0.38
	Head	Right tilt	0.11	0.04	0.15
	Heau	Left cheek	0.27	0.09	0.36
MODMA		Left tilt	0.10	0.04	0.14
WCDMA Band V		Front side	0.36	0.04	0.40
Dana v		Back side	0.83	0.13	0.96
	Hotspot	Top side	0.05	0.02	0.07
		Right side	0.26	0.18	0.44
		Left side	0.40	-	-

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reported	d SAR WW	AN and WLA	N 2.4GHz, ΣS	AR evaluation	on	
Frequency	D	osition	reported S	reported SAR / W/kg		
band	P	osition	WWAN	WLAN	<1.6W/kg	
GSM 850	body-	Front side	0.40	0.04	0.44	
G3W 630	worn	Back side	0.91	0.13	1.04	
GSM 1900	body-	Front side	0.26	0.04	0.30	
GSW 1900	worn	Back side	0.40	0.13	0.53	
WCDMA Band V	body- worn	Front side	0.36	0.04	0.40	
		Back side	0.83	0.13	0.96	

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report	ed SAR W	WAN and Blue	etooth, ΣSAR	evaluation	
Frequency		osition	reported S	AR / W/kg	ΣSAR
band		osition	WWAN	BT	<1.6W/kg
		Right cheek	0.35	0.10	0.45
	Head	Right tilt	0.11	0.03	0.14
GSM 850	пеац	Left cheek	0.40	0.05	0.45
GSIVI 630		Left tilt	0.12	0.03	0.15
	body-	Front side	0.40	0.03	0.43
	worn	Back side	0.91	0.12	1.03
	Head	Right cheek	0.23	0.10	0.33
		Right tilt	0.18	0.03	0.21
GSM 1900		Left cheek	0.24	0.05	0.29
GSW 1900		Left tilt	0.19	0.03	0.22
	body-	Front side	0.26	0.03	0.29
	worn	Back side	0.40	0.12	0.52
		Right cheek	0.25	0.10	0.35
	Head	Right tilt	0.11	0.03	0.14
WCDMA Band V	rieau	Left cheek	0.27	0.05	0.32
VV CDIVIA Ballu V		Left tilt	0.10	0.03	0.13
	body-	Front side	0.36	0.03	0.39
	worn	Back side	0.83	0.12	0.95

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## 4. Instruments List

Manufacturer	Device	Туре	Serial number	Date of last calibration	Date of next calibration
SPEAG	Dosimetric E-Field Probe	EX3DV4	3938		Oct.23,2019
		D835V2	4d063	Aug.23,2018	Aug.22,2019
SPEAG	System Validation Dipole	D1900V2	5d173	Apr.25,2018	Apr.25,2019
	2.60.0	D2450V2	727	Apr.24,2018	Apr.23,2019
SPEAG	Data acquisition Electronics	DAE4	1336	Aug.06,2018	Aug.05,2019
SPEAG	Software	DASY 52 V52.8.8	N/A	Calibration not required	Calibration not required
SPEAG	Phantom	SAM	N/A	Calibration not required	Calibration not required
Network Analyzer	Agilent	E5071C	MY46107530	Feb.26,2018	Feb.25,2019
Agilent	Dielectric Probe Kit	85070E	MY44300677	Calibration not required	Calibration not required
Agilent	Dual-directional	772D	MY52180142	Jul.04,2018	Jul.03,2019
Agilent	coupler	778D	MY52180302	Jul.05,2018	Jul.04,2019
Agilent	RF Signal Generator	N5181A	MY50144143	Mar.14,2018	Mar.13,2019
Agilent	Power Meter	E4417A	MY52240003	Dec.21,2017	Dec.20,2018
Agilent	Power Sensor	E9301H	MY52200003	Dec.21,2017	Dec.20,2018
Agilent	Fower Sensor	E930111	MY52200004	Dec.21,2017	Dec.20,2018
TECPEL	Digital thermometer	DTM-303A	TP130077	Mar.09,2018	Mar.08,2019
Anritsu	Radio Communication Test	MT8820C	6201061049	Apr.08,2018	Apr.07,2019

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## 5. Measurements

Date: 2018/12/13

#### GSM 850 Head Le Cheek CH 251

Communication System: GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.30042

Medium parameters used: f = 848.8 MHz;  $\sigma = 0.91 \text{ S/m}$ ;  $\epsilon_r = 41.413$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

Ambient temperature: 22.3°C; Liquid temperature: 21.5°C

#### DASY5 Configuration:

Probe: EX3DV4 - SN3938; ConvF(9.5, 9.5, 9.5); Calibrated: 2018/10/24;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1336; Calibrated: 2018/8/6

Phantom: SAM

DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.354 W/kg

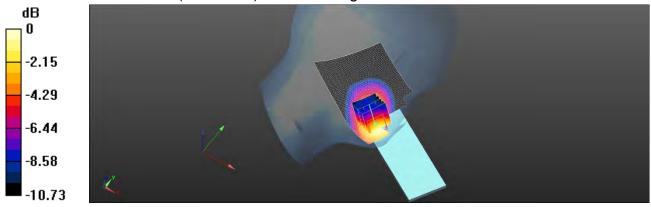
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.946 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.416 W/kg

SAR(1 g) = 0.288 W/kg; SAR(10 g) = 0.194 W/kg

Maximum value of SAR (measured) = 0.359 W/kg



0 dB = 0.359 W/kg = -4.45 dBW/kg

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Date: 2018/12/13

## GSM 850\_Body-worn\_Back side\_CH 251\_10mm

Communication System: GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.30042

Medium parameters used: f = 848.8 MHz;  $\sigma = 0.975 \text{ S/m}$ ;  $\epsilon_r = 54.101$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

## **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(9.56, 9.56, 9.56); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x91x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.807 W/kg

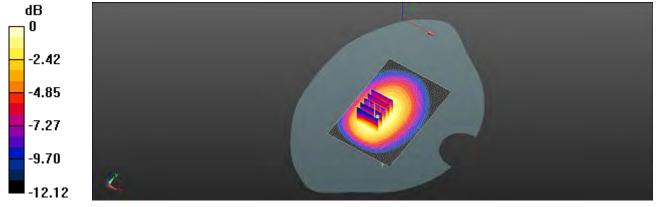
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.31 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.926 W/kg

SAR(1 g) = 0.668 W/kg; SAR(10 g) = 0.465 W/kg

Maximum value of SAR (measured) = 0.799 W/kg



0 dB = 0.799 W/kg = -0.97 dBW/kg

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## GPRS 850\_Hotspot\_Back side\_CH 251\_10mm

Communication System: GPRS (1Dn4Up); Frequency: 848.8 MHz; Duty Cycle: 1:1.99986 Medium parameters used: f = 848.8 MHz;  $\sigma = 0.975$  S/m;  $\epsilon_r = 54.101$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

## **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(9.56, 9.56, 9.56); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x91x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.815 W/kg

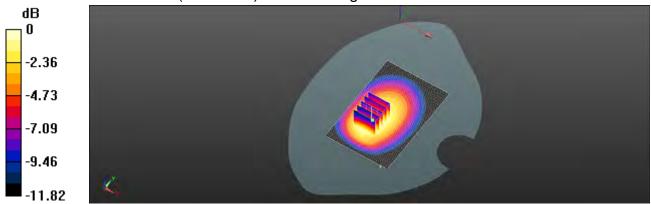
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 24.27 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.917 W/kg

SAR(1 g) = 0.706 W/kg; SAR(10 g) = 0.585 W/kg

Maximum value of SAR (measured) = 0.809 W/kg



0 dB = 0.809 W/kg = -1.19 dBW/kg

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#### GSM 1900 Head Le Cheek CH 661

Communication System: GSM; Frequency: 1880 MHz; Duty Cycle: 1:8.30042

Medium parameters used: f = 1880 MHz;  $\sigma = 1.389 \text{ S/m}$ ;  $\varepsilon_r = 39.528$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.95, 7.95, 7.95); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.255 W/kg

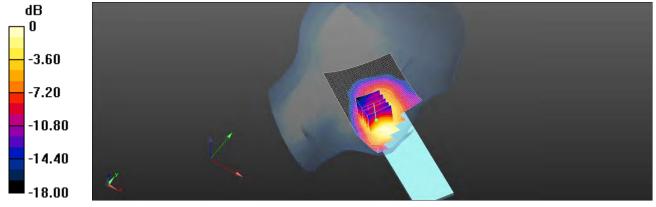
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.112 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.287 W/kg

SAR(1 g) = 0.194 W/kg; SAR(10 g) = 0.126 W/kg

Maximum value of SAR (measured) = 0.231 W/kg



0 dB = 0.231 W/kg = -5.91 dBW/kg

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## GSM 1900 Body-worn Back side CH 810 10mm

Communication System: GSM; Frequency: 1909.8 MHz; Duty Cycle: 1:8.30042

Medium parameters used: f = 1909.8 MHz;  $\sigma = 1.523 \text{ S/m}$ ;  $\epsilon_r = 52.792$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.52, 7.52, 7.52); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x101x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.354 W/kg

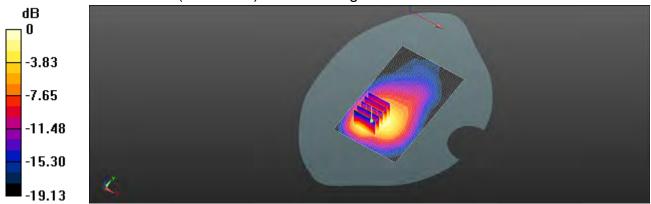
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.787 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.439 W/kg

SAR(1 g) = 0.287 W/kg; SAR(10 g) = 0.156 W/kg

Maximum value of SAR (measured) = 0.344 W/kg



0 dB = 0.344 W/kg = -4.64 dBW/kg

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## GPRS 1900\_Hotspot\_Back side\_CH 512\_10mm

Communication System: GPRS (1Dn4Up); Frequency: 1850.2 MHz; Duty Cycle: 1:1.99986 Medium parameters used: f = 1850.2 MHz;  $\sigma = 1.512$  S/m;  $\epsilon_r = 52.811$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.52, 7.52, 7.52); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x91x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.713 W/kg

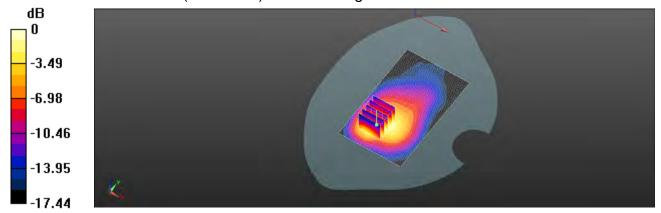
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.019 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.722 W/kg

SAR(1 g) = 0.404 W/kg; SAR(10 g) = 0.221 W/kg

Maximum value of SAR (measured) = 0.693 W/kg



0 dB = 0.693 W/kg = -2.10 dBW/kg

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#### WCDMA Band V Head Le Cheek CH 4233

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: f = 846.6 MHz;  $\sigma = 0.9 \text{ S/m}$ ;  $\varepsilon_r = 41.417$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

Ambient temperature: 22.3°C; Liquid temperature: 21.5°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(9.5, 9.5, 9.5); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.412 W/kg

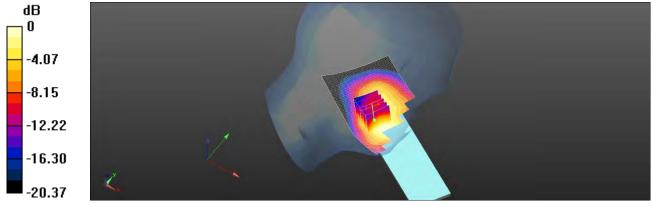
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.227 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.383 W/kg

SAR(1 g) = 0.252 W/kg; SAR(10 g) = 0.146 W/kg

Maximum value of SAR (measured) = 0.385 W/kg



0 dB = 0.385 W/kg = -4.69 dBW/kg

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## WCDMA Band V Hotspot Back side CH 4233 10mm

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used: f = 846.6 MHz;  $\sigma = 0.972 \text{ S/m}$ ;  $\varepsilon_r = 54.114$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

## **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(9.56, 9.56, 9.56); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x91x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.878 W/kg

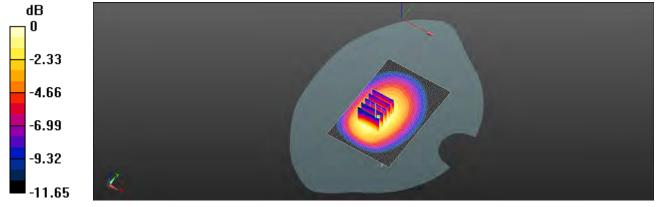
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.74 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.06 W/kg

SAR(1 g) = 0.758 W/kg; SAR(10 g) = 0.528 W/kg

Maximum value of SAR (measured) = 0.920 W/kg



0 dB = 0.920 W/kg = -0.36 dBW/kg

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#### WLAN 802.11b Head Re Cheek CH 6

Communication System: WLAN 2.45G; Frequency: 2437 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2437 MHz;  $\sigma = 1.76$  S/m;  $\epsilon_r = 39.667$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Right Section

Ambient temperature: 22.1°C; Liquid temperature: 21.6°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.17, 7.17, 7.17); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (71x151x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.186 W/kg

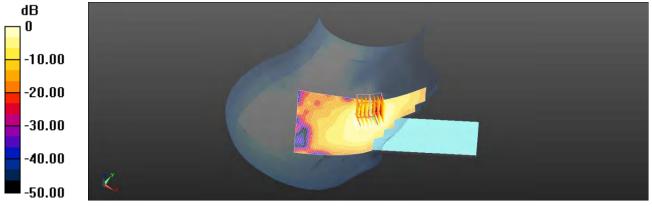
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.359 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.233 W/kg

SAR(1 g) = 0.131 W/kg; SAR(10 g) = 0.066 W/kg

Maximum value of SAR (measured) = 0.182 W/kg



0 dB = 0.182 W/kg = -7.39 dBW/kg

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## WLAN 802.11b\_Hotspot\_Right side\_CH 6\_10mm

Communication System: WLAN 2.45G; Frequency: 2437 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2437 MHz;  $\sigma = 1.956$  S/m;  $\epsilon_r = 53.112$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.9°C

## **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.3, 7.3, 7.3); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (51x121x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.273 W/kg

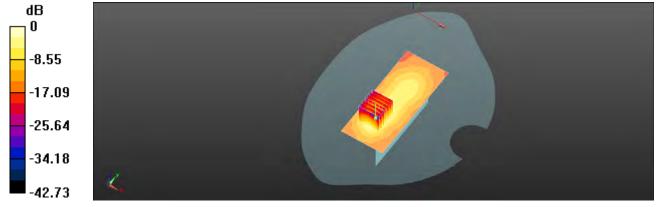
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 5.081 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.354 W/kg

SAR(1 g) = 0.167 W/kg; SAR(10 g) = 0.073 W/kg

Maximum value of SAR (measured) = 0.260 W/kg



0 dB = 0.260 W/kg = -5.85 dBW/kg

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Date: 2018/12/15

## Bluetooth(GFSK)\_Head\_Re Cheek\_CH 78

Communication System: Bluetooth; Frequency: 2480 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2480 MHz;  $\sigma = 1.812 \text{ S/m}$ ;  $\varepsilon_r = 39.644$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

Ambient temperature: 22.1°C; Liquid temperature: 21.6°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.17, 7.17, 7.17); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (71x151x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.111 W/kg

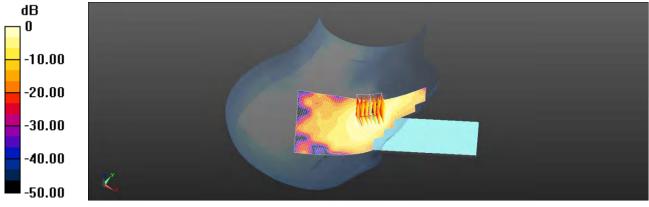
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.342 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.143 W/kg

SAR(1 g) = 0.076 W/kg; SAR(10 g) = 0.037 W/kg

Maximum value of SAR (measured) = 0.110 W/kg



0 dB = 0.110 W/kg = -9.60 dBW/kg

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Date: 2018/12/16

## Bluetooth(GFSK)\_Body-worn\_Back side\_CH 78\_10mm

Communication System: Bluetooth; Frequency: 2480 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2480 MHz;  $\sigma = 2.01 \text{ S/m}$ ;  $\epsilon_r = 52.887$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.9°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.3, 7.3, 7.3); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (81x121x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.144 W/kg

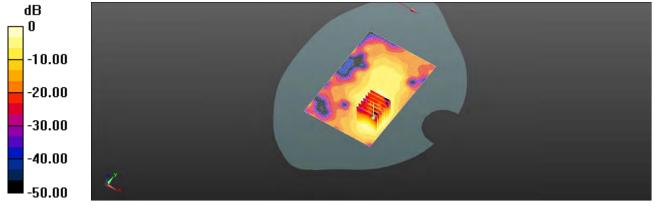
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.629 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.200 W/kg

SAR(1 g) = 0.094 W/kg; SAR(10 g) = 0.041 W/kg

Maximum value of SAR (measured) = 0.146 W/kg



0 dB = 0.146 W/kg = -8.35 dBW/kg

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## 6. SAR System Performance Verification

Date: 2018/12/13

#### Dipole 835 MHz SN:4d063 Head

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz;  $\sigma = 0.894$  S/m;  $\varepsilon_r = 41.44$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient temperature: 22.3°C; Liquid temperature: 21.5°C

#### DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(9.5, 9.5, 9.5); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (41x121x1): Interpolated grid: dx=15 mm, dy=15 mm

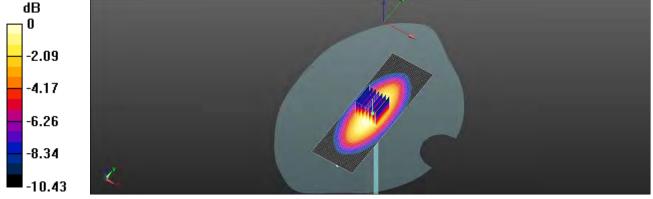
Maximum value of SAR (interpolated) = 2.98 W/kg

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

Reference Value = 59.99 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.43 W/kg

SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.56 W/kgMaximum value of SAR (measured) = 2.98 W/kg



0 dB = 2.98 W/kq = 4.74 dBW/kq

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Date: 2018/12/13

## Dipole 835 MHz SN:4d063 Body

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz;  $\sigma = 0.961$  S/m;  $\epsilon_r = 54.16$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(9.56, 9.56, 9.56); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (51x131x1): Interpolated grid: dx=15 mm, dy=15 mm

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

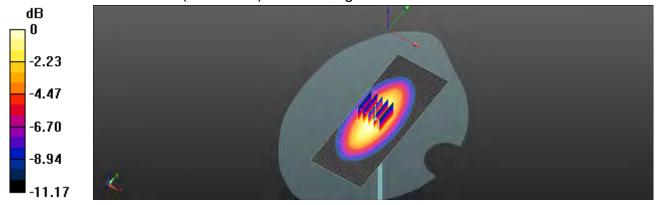
**Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 57.03 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 3.92 W/kg

SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.57 W/kg

Maximum value of SAR (measured) = 3.31 W/kg



0 dB = 3.31 W/kg = 5.20 dBW/kg

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Date: 2018/12/14

## Dipole 1900 MHz\_SN:5d173\_Head

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz;  $\sigma = 1.393 \text{ S/m}$ ;  $\epsilon_r = 39.501$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

## **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.95, 7.95, 7.95); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (41x101x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.2 W/kg

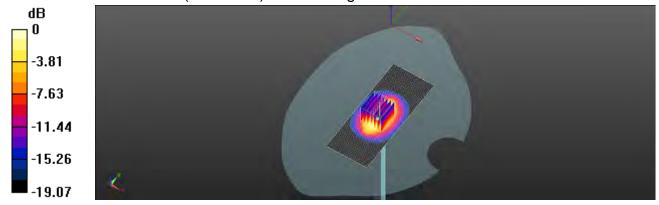
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.8 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.88 W/kg; SAR(10 g) = 5.17 W/kg

Maximum value of SAR (measured) = 14.0 W/kg



0 dB = 14.0 W/kg = 11.45 dBW/kg

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Date: 2018/12/14

## Dipole 1900 MHz\_SN:5d173\_Body

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz;  $\sigma = 1.522 \text{ S/m}$ ;  $\epsilon_r = 52.803$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Ambient temperature: 22.2°C; Liquid temperature: 21.7°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.52, 7.52, 7.52); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (51x61x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.1 W/kg

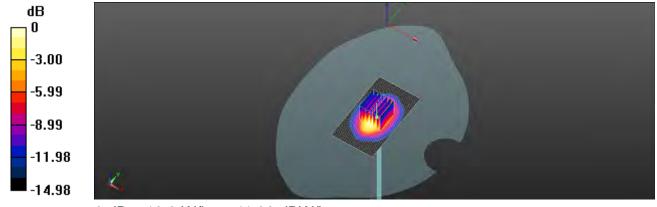
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.06 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 16.6 W/kg

SAR(1 g) = 9.95 W/kg; SAR(10 g) = 5.35 W/kg

Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.39 dBW/kg

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Date: 2018/12/15

## Dipole 2450 MHz\_SN:727\_Head

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz;  $\sigma = 1.788 \text{ S/m}$ ;  $\varepsilon_r = 39.656$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.6°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.17, 7.17, 7.17); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (51x101x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 20.0 W/kg

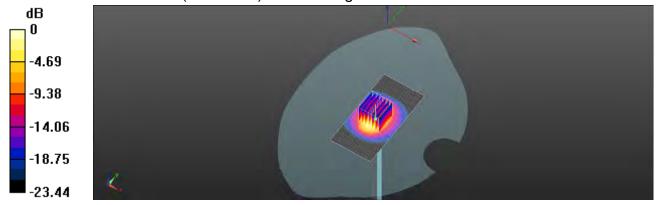
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 107.3 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 26.7 W/kg

SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.15 W/kg

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



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

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Date: 2018/12/16

## Dipole 2450 MHz\_SN:727\_Body

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz;  $\sigma = 1.967 \text{ S/m}$ ;  $\epsilon_r = 52.971$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Ambient temperature: 22.1°C; Liquid temperature: 21.9°C

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.3, 7.3, 7.3); Calibrated: 2018/10/24;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2018/8/6
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (51x101x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 20.3 W/kg

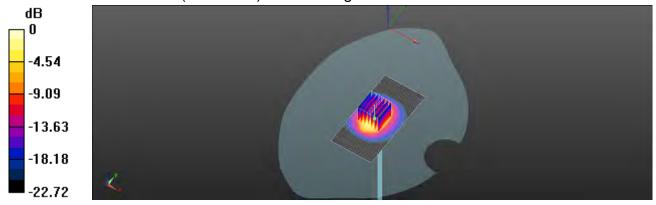
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.5 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 26.9 W/kg

SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.97 W/kg

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



0 dB = 19.8 W/kg = 12.97 dBW/kg

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## 7. DAE & Probe Calibration Certificate

Calibration Laboratory of Schweizerischer Kalibrierdienst S Schmid & Partner Service suisse d'étalonnage C Engineering AG Servizio svizzero di taratura S strasse 43, 8004 Zurich, Switzerta 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. Client SGS-TW (Auden) Certificate No: DAE4-1336\_Aug18 CALIBRATION CERTIFICATE DAE4 - SD 000 D04 BM - SN: 1336 Object QA CAL-05.v29 Celibration procedure(s) Calibration procedure for the data acquisition electronics (DAE) August 06, 2018 Calibration date: 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 peri of the certificate. All calibrations have been conducted in the closed laboratory facility; environment temperature (22  $\pm$  5)°C and number < 70%. Calibration Equipment used IM&TE critical for calibration) Primary Standards Cal Date (Gertificate No.) Screduled Calibration Kethley Multimeter Type 2001 SN: 0810278 31-Aug-17 (No:21092) Aug-18 Secondary Standards Check Date (in house). Scheduled Check SE UWS 053 AA 1001 04-Jan-18 (in house check) Auto DAE Calibration Unit. in house check; Jan-19 SE UMS 006 AA 1002 04-Jan-18 (in house check) in house check: Jan-19 Calibrated by: Laboratory Technician Deputy Manager Sven Kühn Approved by: This calibration perfilicate shall not be reproduced except in full without written approval of the laboratory

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Certificate No: DAE4-1336 Aug18

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Calibration Laboratory of Schmid & Partner

Accredited by the Swiss Accreditation Service (SAS)

Engineering AG pughausstrasse 43, 8004 Zurloh, Switzerland





S Service suisse d'étatonnage C Servizio svizzero di taratura S Swiss Calibration Service

Acqueration No.: SCS 0108

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Glossary

DAF data acquisition electronics

information used in DASY system to align probe sensor X to the robot Connector angle

coordinate system.

#### Methods Applied and Interpretation of Parameters.

- DC Voltage Measurement: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- Connector angle. The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - DC Voltage Measurement Linearity. Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement,
  - Common mode sensitivity: Influence of a positive or negative common mode voltage on the differential measurement.
  - Channel separation: Influence of a voltage on the neighbor channels not subject to an input voltage.
  - AD Converter Values with inputs shorted: Values on the Internal AD converter corresponding to zero input voltage
  - Input Offset Measurement: Output voltage and statistical results over a large number of zero voltage measurements.
  - Input Offset Current: Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - Input resistance: Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - Low Battery Alarm Voltage: Typical value for information. Below this voltage, a battery alarm signal is generated.
  - Power consumption: Typical value for information. Supply currents in various operating modes.

Certificate No: DAE4-1336\_Aug18

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#### DC Voltage Measurement

A/D - Converter Resolution nominal

full range = -100...+300 mV full range = -1.....+3mV High Flange: 1LSB = 6.1µV Low Range: ILSB = SinV DASY measurement parameters; Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Α.	Z
High Range	403.344 ± 0.02% (k=2)	403.624 ± 0.02% (k=2)	403.107 ± 0.02% (k=2)
Low Range	3.95102 ± 1.50% (k=2)	3,98703 ± 1,50% (k=2)	3,99683 ± 1,50% (k=2)

#### Connector Angle

287.0° ± 1°

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#### Appendix (Additional assessments outside the scope of SCS0108)

#### 1. DC Voltage Linearity

High Renge	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	200042.98	8.65	0.00
Channel X + Input	20006.34	1.77	0.01
Channel X - Input	-20005,65	-0.58	0.00
Channel Y + Input	200034.32	0.12	0.00
Channel Y + Input	20003.47	-1:57	0.01
Channel Y - Input	20008.39	-1.21	0.01
Channel Z + Input	200032.22	-2.05	-0.00
Channel Z + Input	20002.78	-2.14	-0.01
Channel Z - Input	-20007.34	-2.09	0.01

Low Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	2001.47	0.30	0,01
Channel X + Input	201.92	0.79	0.39
Channel X - Input	-198.26	0.59	-0.30
Channel Y + Input	2001,55	0.37	0.02
Channel Y + Input	200.97	-0.11	-0.05
Channel Y - Input	-199.34	-0.43	0.22
Channel Z + Input	2001,12	0.04	0.00
Channel Z + Input	200.15	-0.89	-0.44
Channel Z - Input	-200.14	11.15	0.58

#### 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec. Measuring time: 3 sec.

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	B:04	4.72
	- 200	4.13	4.79
Channel Y	200	-3,65	-3.78
	200	2.68	2.45
Channel Z	200	22,40	22.16
	-200	-24.83	-25.10

#### 3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	+1	6.12	+1.64
Channel Y	200	9.19		6.46
Channel Z	200	8.44	6.31	9

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#### 4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec.

	High Range (LSB)	Low Range (LSB)
Channel X	15666	16509
Channel Y	15907	15587
Channel Z	15855	15507

#### 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec: Measuring time: 3 sec

	Average (μV)	min. Ωffset (μV)	max. Offset (μV)	Std, Deviation (µV)
Channel X	0.87	-0.00	2.62	0.36
Channel Y	3,53	2.87	4.59	0.34
Channel Z	-0.18	-1.34	1.53	0.54

#### 6. Input Offset Current

ominal Input circuitry offset current on all channels <25fA

7. Input Resistance (Typical values for information)

	Zaroing (kOhm)	Measuring (MOhm)
Channel X	200	500
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	47.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	16	+14
Supply (- Vcc)	-0.01	-B	-9

Certificate No: DAE4-1336 Aug18

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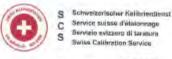
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Accreditation No.: SCS 0108

SGS-TW (Auden)

Сиптеми No: EX3-3938\_Oct18

#### CALIBRATION CERTIFICATE Object EX3DV4 - SN:3938 Coleration procedure of QA CAL-01.V9; QA CAL 12 V9; QA CAL-14.V4, QA CAL-23 V5; QA CAL-25.v6 Calibration procedure for dosimetric E-field probes Calibration date October 24, 2018 This calibration certificate documents the trackability to national standards, which realize the physical units of migratiroments (Sri. The measurements and the uncortainties 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, anvironment temperature (22 ± 3)°C and furnidity < 70%. Calibration Equipment used (M&TE ortical for calibration)

Primary Standards	ID	Call Date (Certificate No.)	Scheduled Caroration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-16i
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 55277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
Reference Probe ES3DV2	SN: 3013	30-Dec-17 (No. ES3-3013 Dec17)	Dec-1B
DAE4	SN: 660	21-Dec-17 (Nr. DAE4-660_Dec17)	Dec-18
Secondary Standards	ID.	Check Date (in house)	Scheduled Check
Power maler E44198	SN: GB41293874	05-Apr-16 (in house check Jun-18)	In house check: Jun 20
Power service E4452A	SN: MY41498087	05-Apr-16 (in house check Jun-18)	In house check: Jun 20
Power sensor E4412A	SN:000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8645C	SN: USS642U01700	04-Aug-99 (in house check Jun.18)	In house check Jun-20
Network Analyzer E8368A	3N. US41080477	31-Mar-14 (in house check Oct-18)	In house check Oct-19

	Name	Function	Signature
Calibrated by:	Julion Kastruli	Laboratory Technician	+ W-
Approved by	Kritiz Penoyie	Ticure (Atme	Reag
	95au au a an	ethous written approval of the laborato	Issued: October 24, 2018

Certificate No. EX3-3938, Oct 16

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#### Calibration Laboratory of

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Accordination No.: SCS 0108

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#### Glossary:

tissue simulating liquid sensitivity in free space NORMK, y, z DOP/ sensitivity in TSL / NORMx,y,z dicide compression point

crest factor (1/duty, cycle) of the RF signal modulation dependent linearization parameters CF A, B, C, D

Poistization o protation around probe axis

Polynzalion II 3 rotation around an axis that is in the plane normal to probe axis (all messurement center).

i.e., S = 0 is normal to probe exis-

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 Str. 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 hard-
- b): held and budy-mounted devices used next to the ser (frequency range of 300 MHz to 6 GHz)", July 2016

  i) 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 iii) KDB 865684, "SAR Measurement Requirements for 100 MHz to 6 GHz."

#### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization (i = 0 (f≤ 900 MHz in TEM-cell, f = 1800 MHz; R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E<sup>2</sup>-field. uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z \* frequency\_tesponse (see Frequency Response Chart), This linearization is implemented in DASY4 activate versions later than 4.2. The uncertainty of the frequency response is included. n the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical inearization parameters assessed based on the data of power sweep with DW alginal indundantly required). DCP does not depend on frequency nor mode.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the eignal characteristics
- Ax.y.z; Bx.y.z; Cx.y.z; Dx.y.z; VRx.y.z; A, B, C, D are numerical linearization parameters assessed bosed 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 diade.
- media. Wit is the maximum calibration range expressed in RMS voltage across the diade.

  Convir and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for fix 800 MHz) and inside waveguide using analytical field distributions based on power measurements for fix 800 MHz. The semi-octupe 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 MORMX, y, z.\* Convir whereby the uncertainty corresponds to that given for Convir. A frequency dependent Convir-is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz. MHz
- Sphinical isotropy (3D deviation from Isotropy): In a field of low gradients realized using a flat plannom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe to (on probe axis). No tolerance required:
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

Certificate No: EX3-3x38, Oct 8

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EX3DVA - SN:3608

Report No.: E5/2018/C0044

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Ciniatur 24, 2816

# Probe EX3DV4

SN:3938

Manufactured: Calibrated: May 2, 2013 October 24, 2018

Calibrated for DASY/EASY Systems (Note: non-compatible with DASY2 system!)

Certificate No: EX3 3509, David

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EX3DV4- SN 3938

Optober 24, 2018

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

#### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Une (k=2)
Norm (µV)(V/m) <sup>2</sup> ) <sup>6</sup> DCP (mV) <sup>6</sup>	0.51	0.57	0.33	± 10.7 %
DCP (m/V)	103.2	100.3	107.8	2 10-1 70

#### Modulation Calibration Da

nip	Communication System Name		A dB	B dBõV	- 0	D dB	VR mV	Une (k=2)
D	CW	X	0.0	0,0	1.0	0.00	164.0	±3.5 %
		Y.	0.0	0.0	1.0		1742	
		Z	0.0	0.0	1.0		176.3	

### Sensor Model Parameters

	C1 fF	C2 IF	v ·	T1 ms.V-2	ms.V=	T3 ms	T4 VT	75 V"	Th
X	59.09	436.9	35.15	26.09	1.205	5,10	1.012	0.575	1.009
A.	53.22	40B.3	37.24	24.25	1.457	5.10	0.000	0.766	1.013
Z	46.65	332.5	32.92	15.26	1.153	4.98	2.000	0.225	1.008

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%

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The uncertainties of Norm X,Y,Z on retraffed the E<sup>4</sup>-faint uncertainty made TSL (see Pages 5 and 6)

<sup>\*</sup> Mannelous Insurious communities and a succession of the support of the support



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EX2DV4~EN:390III

October 24, 5000

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>G</sup>	Relative Permittivity	Conductivity (S(m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>®</sup>	Depth " (mm)	Une (k=2)
750	41.9	0.89	9.82	9.82	9,82	0.45	0.80	± 12.0 %
835	41,5	0.90	9.50	9.50	9.50	0.50	0.85	± 12.0 %
900	41,5	0.97	9.25	9.25	9.25	0.33	1:04	±1205
1450	40.5	1:20	8.53	6.53	8,53	0.30	0,88	± 12.0 %
1750	40:1	1.37	8.32	8.32	H.32	0.36	0,90	±12.0 %
1900	40.0	1.40	7.85	7.95	7.95	0.29	0,90	± 12.0%
2000	40.0	1.40	7.93	7.93	7:93	0.36	0.80	±12.09
2300	39.5	1.67	7.69	7.59	7.53	0.37	0.80	11209
2450	39.2	1.80	7.17	7,17	7.17	0.36	0.83	±12.0 %
2600	39.0	1.96	7.31	7.11	7.11	0.38	0:87	± 12.0 %
5250	35.9	4.71	5.00	5.00	5.00	0.40	1,80	£ 13.1 8
5600	35.5	6.07	4.65	4.65	4.65	0,40	1.80	±13.1 %
5750	35.4	5.22	4.76	4.76	4.76	0,40	1.80	±13.1%

Emplayers validity above 300 MHz of ± 100 MHz only applies to DASY v4.4 and tighes (see Page 2), also 4 is counciled to ± 50 MHz. The uncertainty of calibration frequency and the uncertainty for the indicated frequency front. Prequency validity and the set 10, 25, 46, 50 and 70 MHz for Don't assessments of 20, 64, 120, 150 and 20 MHz respectively. Above 5 CHs frequency yailthy can be estimated to ± 100 MHz.

\*At frequencies below 3 GHz, the validity of tissue parameters (a and a) can be released to ± 10% if Equal complementain immule or applied to measured SAR values. At frequencies shows 5 GHz, the validity of tissue parameters (a and a) is casticitied to ± 10% if the uncertainty is the RSS of the Conference of the confer

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EX3DV4-5N:3935

October 24, 2018

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

### Calibration Parameter Determined in Body Tissue Simulating Media

F(MHz)*	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF 2	Alpha <sup>d</sup>	Depth is (mm)	Unic (k=2)
750	55.5	0.96	9.72	9.72	9.72	0.46	0.87	±1203
835	55.2	0.97	9.56	9.56	9.56	0.41	0.92	±12.0%
900	55.0	1.05	9.33	9.33	9.33	0.48	0.87	±12.0%
1450	54.0	1,30	7.98	7,911	7.98	0.32	0.90	±12.09
1750	53.4	1.49	7.83	7.83	7.83	0.43	0.90	±12.09
1900	53.3	1.52	7:52	7.52	7.52	0.33	0.95	± 12.0 9
2000	53.3	1.52	7.62	7,62.	7:62	0.36	0.89	± 12.0 %
2300	52.9	1.81	7.33	7.33	7.33	0.42	10,87	± 12.0 %
2450	52.7	7,95	7.30	7.30	7.30	0.35	0.87	= 12.0 %
2600	52.5	2.16	7.15	7.15	7.16	0.33	0.95	± 12.0 %
5250	48,9	5,36	4.23	4.23	4,23	0.50	1.90	± 13.1.9
5800	48.5	5.77	3.77	3.77	3.77	0.50	7.90	±13.1%
5800	48.2	6.00	4.00	4.00	4.00	0.50	1.90	± 13.1 %

Frequency walkfly either 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher is an Page 2), able this restricted to ± 50 MHz. The accordingly in the PRSS of the ConvEurodrams, at an England Inspection of the United States of the ConvEurodrams of the United States of the ConvEurodrams of the United States of the ConvEurodrams of 30, 64, 128, 150 and 201 MHz respectively. Where 6 GHz frequency variety can be extended to ± 110 MHz.

At Inspection 50 MLz, the validity of issue parameters (a state) can be retared to ± 10% initiate comparisation formula is agreed to the ConvEurodrams. At Procuration above 3 Chiz, the validity of issue parameters (a state) in the 10% initiate comparisation for reducing formula of the PSSS of the ConvEurodrams of the ConvEurodrams of the PSSS of the ConvEurodrams of the ConvEurodrams of the PSSS of the ConvEurodrams of the ConvEurodrams of the PSSS of the ConvEurodrams of the ConvEurodrams of the PSSS of the ConvEurodrams of the PSSS of the ConvEurodrams of the ConvEurodrams of the PSSS of the ConvEurodrams of the PSSS of the ConvEurodrams of the ConvEurodrams of the PSSS of the ConvEurodrams of the PSSS

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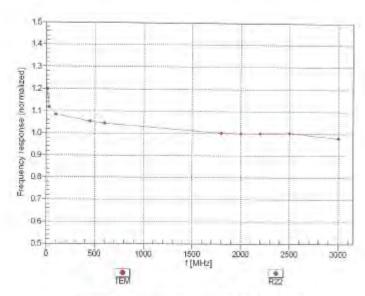


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EX3DV4-3N:3938

October 24, 2018

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



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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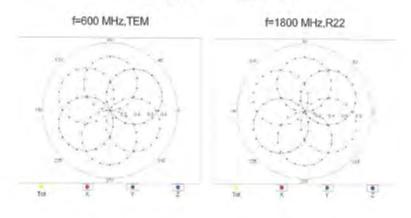
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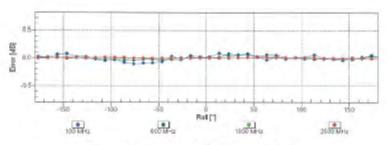


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## Receiving Pattern (b), 9 = 0°





Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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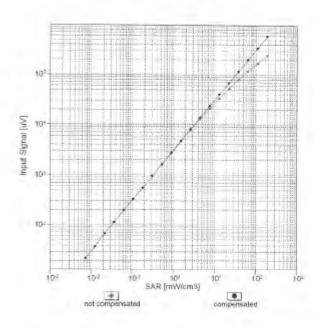


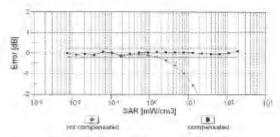
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October 24, 2018

# Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)





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

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# EX3DV4-SN:3938 October 24, 2018 Conversion Factor Assessment f = 835 MHz WGLS R9 (H\_convF) r = 1900 MHz WGLS R22 (H\_convF) \*\*\* Deviation from Isotropy in Liquid Error (¢, 9), f = 900 MHz 0.6 0.4 0,2 0.0 -0.4 -0.6 180

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-1.0 -0.8 -0.8 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8 1.0 Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

20

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October 24, 2018

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

#### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-26.4
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
Proba 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 Messurement Distance from Surface	1.4 mm

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UND	Communication System Name		A dB	qB MA	С	tlB	WR mV	Max Unc* (k=2)
0	CW	X	0.00	0.00	1.00	0.00	164.0	± 3.5 %
	1	V.	0.00	.0.00	1.00	-	174.2	37 0100 73
		Z	0.00	0.00	1.00		176.3	
10010- CAA	SAR Validation (Square, 100ms, 10ms)	X	11.84	84.28	19.03	10.00	20.0	19.8%
0,01		Y	4.75	72.52	14.55		20.0	
			2.70	65.86	10.62	_	20.0	
10011- CAB	UMTS-FED (WCDMA)	X	1,25	71.04	17.46	0.00	150,0	主导反称
		Y	0.87	85.19	13,50		150.0	
		Z	1 10	89.84	16.56		150.0	
10012- CAB	IEEE 802,11b WIFI 2.4 GHz (DSSS, 1 Mbps)	X	1.29	65,77	16.62	0.43	100.0	3.9.E W
0110	/ August	Y	1.13	B3.57	14.74		150.0	
		Z	1.17	54.77	15.66		150.0	
10013- CAB	IEEE 802.11g WIFI 2.4 GHz (DSSS- OFDM, 6 Mbps)	X	5.06	87.01	17.40	1.46	150.0	±9.6%
WT YO	OF CIRC C MODEL	Y	4.93	66.63	17.09		150.0	
		Z	4.79	66.72	16.84		150.0	
10021- DAC	GBM-FOD (TDMA, GMSK)	×	100.00	118.51	30,68	9,39	50,0	198%
		Y	100.00	117.47	30.14		50.0	
		Z	9.68	81.68	18.25		50.0	
10023- DAC	OPRS-FDD (TDMA, GMSK, TN 0)	X	100.00	118,45	30.70	9.57	50.0	± 9.6 %
		W	100.00	117.42	30.17	-	50.0	
		Z	8.28	79.56	17.55		50.0	
10024- DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	100.00	116.27	28,62	6,56	60,0	±9,6%
Ditto		Y	100.00	113.88	27.38		60.0	
		2	17.36	88.43	18.89		60.0	
10025- DAC	EDGE-FDD (TDMA, IIPSK, TN 0)	×	14.85	105,13	41,18	12.57	50.0	±86%
DIVE		Ÿ	6.69	80.08	30.32		50.0	
		2	5.13	73.32	26,13	_	50.0	
10026- DAC	EDGE-FOD (TDMA, 8PSK, TN 0-1)	×	28.61	116.31	40.38	9.56	60.0	29.6%
Pol. Are.		8	17.18	103.12	35.82		60.0	
		Z	10.76	92.22	31.22		ED.D	
10027- DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	100,00	116.23	27.82	4,80	80.0	±9.6 %
D/TU		4	100.00	112.20	25.80		80.0	
		Z	100.00	105.42	22.06		80.0	
10028- DAC	BPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	117.56	27.68	3.55	100.0	±9.6%
		Y	100.00	111.19	24.62		100.0	
		12	100 00	105.06	21.28		100.0	
10029- DAC	EDGE-FDD (TDMA, BPSK, TN 0-1-2)	×	14.44	99.44	33.73	7.80	80.0	±9.6%
		Y	10.38	91.48	30.62		- 80.0	
		2	6.98	83.31	26.90		0.08	-
10030- GAA	IEEE BOZ.15.1 Bluesonth (GFSK, DH1)	8	100.00	115.12	27.62	5.30	70:0:	19.6%
-1.41		Y	100,00	111.80	25.93		70.0	
	The state of the s	Z	13.15	85.08	17.21		70.0	
10031- CAA	IEEE 802.15.1 Bluelpoilt (GFSK, DH3)	X	100,00	120.41	27.44	1.88	100.0	±9.6 %
		Y	100.00	105.85	20.53		100.0	
		Z	100.00	102.30	18.50		100.0	1

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EX3DV4- SN:3038

October 24, 2016

10032- DAA	IEEE 802:15 1 Bluetooth (GESK, DH5)	×	100.00	129.17	29.93	1.17	100.0	± 0,6 %
		N	100,00	101.34	18.13		100.0	
	and the second second	Z	100.00	104.25	16.92	1	100.0	
1003:1- CAÁ	(PM-DQPSK. DH1)	×	100.00	128.01	35,11	5.30	70,0	19.6 W
		Y	30.26	106.06	28.70		70.0	
		Z	7.08	82.85	20.38		70.0	-
10034- CAA	IEEE 802.15.1 Bluelouth (PV4-DGPSK, DH3)	×	31.82.	111.52	29.61	1.88	100.0	±9.6 %
		字	1.54	81.70	19.61		100.0	
		Z	3.36	77.14	17.43		100.U	
10005- CAA	IEEE 802 15,1 Bluelooth (PI/4-DQPSK, DH6)	X	8.76	93.7A	24,54	1,17	100,0	±9.0%
		Y.	2.58	74.38	16.81		100.0	
	CONTRACTOR OF COURSE	-2	2.45	74./B	16.51	100	100.0	
10036- CAA	IEEE 802.15.1 Bluerouth (B-DPSK, DH1)	×	100.00	128.23	35.27	5.30	70.0	19.0%
		Y	49.55	114:02	30.85		70.0	
	The second of th	.2	8,81	95.86	21.44		70.0	
10037- CAA	IEEE BI32 15 1 Bitlefooth (II-DPSK, DH3)	X	28.47	109:85	29.14	1.88	100.0	±3.0%
		.Y	4.63	80.65	15,28		100.0	
1		Z	3.10	76:20	17.05		100.0	
10038- CAA	IEEE IIOZ 10:1 Blunipolft (R-DPSK, DHS)	×	9.40	95,18	25,08	107	100,0	19.6%
		Y .	2.66	74.97	16.94		100.0	
	In believe to the Australia	Z	2.52	75.38	16.85		100.0	
10039 CAB	CDMA2000 (1xRTT, RC1)	X	2.91	79.68	19.30	0.00	158,0	196%
		Y	1.40	87.94	13.51		150.0	
	The same of the sa	2	2.58	79.60	18:81		150.0	
10042 EAB	(S-54 ) IS-136 FOD (TDMA/FDM, PI/4- DQPSK, Hafrale)	×	100.00	114.29	27.89	7.78	50.0	±96%
		V	100.00	112.24	26.63		50.0	
		Z	7.08	77.79	15.66		50.0	
10044- CAA	(S-91/EIA/TIA-553) FOD (FDMA, FMI)	Х	0.00	111.10	2.98	0.00	150.0	19.6%
		4	0.12	121.97	13.26		150.0	
		Z	0.02	124.98	11,44	_	150.0	
10046- CAA	DECT (TDD: TDMA/FDM; GFSK; Full Skit 24)	3	100,00	120.31	32.96	13.50	25.0	19,8%
		Y	28.80	98.60	27.12		25.0	
		Z	6.10	73.04	18.88		25.0	-
10045- CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	.X	100.00	118.79	31.19	10.79	40.0	498 S
		Ŷ.	42.73	105.35	27.59		40.0	
	Secretary of the second	2	6.52	75.70	16,44		40.0	
10058- GAA	LIMTS-TOD (YD-SCDMA, 1-28 Mcps)	X	59/92	116.40	32.89	9.03	50,0	±9.8%
_		Y	20.27	96.61	26.81		50.0	-
Local Control		2	8,72	11.48	20.30	-	30.0	
DAC	EDGE-FDO (TOMA, BPSIC, TN 0-1-2-3)	X	3.99	90.34	29,75	6.55	100.0	196%
		Y	7.41	84.68	27.34		100.0	
ABBE	least to the same of the same	· Z	5.31	78.46	24.34		100.0	-
10059- CAB	IEEE 802 11b WIFI 2.4 GHz (DSSS, 2 Mbps)	X	1.45	68,16	17.83	0.67	110.0	298 A
		Y	1.24	65.28	15,64		110.0	
The Later of	A CONTRACTOR OF THE PARTY OF TH	Z	1:24	66,D8	15.24		1.10.0	
	(EEE 802.11b) WIFI 2.4 GHz (DSSS, 5.5	×	400.00	138.52	35.86	1,30	110.0	#86%
10060- CAB	Mbpsi					1.00	2,741.4	11.4
	Albpsi	Y	100.00	127.82	31.55		1100	

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No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號

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10061- CAB	IEEE 802 11b WiFi 2.4 GH≥ (DSSS, 11 Mbps)	X	37.93	122.29	34.76	2,04	110.0	±9.6%
		Y	7.04	91.70	25.29		110.0	
		2	3.71	82.53	21.92		110.0	
10062- CAC	IEEE 802 11a/h WIFI 5 GHz (OFDM, 6 Mbps)	X	4.83	86.93	16.78	0.49	100,0	±95%
	1	1.Y	4.68	66.44	16.40		100.0	
		Z	4.61	66.82	16.41	-	100.0	
10083- CAC	IEEE 802,11a/h WIFL5 GHz (OFDM, 9 Mbps)	X	4,86	87.07	16.91	0.72	100.0	#9.8.N
	and the second	Y	4.71	66.58	16.52		100.0	
		Ż	4.62	86.89	16.47		100.0	
10064- CAC	JEEE 802.11a/h WIFI 5 GHz (OFDM, 12 Moos)	×	5.19	67.38	17.15	0.86	100.0	±9.0%
		Y	5.02	66.91	16.79		100.0	
		Z	4:90	67.10	16.66		100.0	
10065- CAC	IEEE 802 11a/h WIFI 5 GHz (OFDM, 18 Mbps)	X	5.07	67.37	17.30	1.21	100.0	±9.6 %
-1.10	and a	Y	4.91	66.89	16.94		100.0	
		Z	4.77	66.99	96.73		100.0	
10086-	IEEE 802.11am WiFi 5 GHz IOFDM 24	X.	5.11	67.44	17.51	1.46	100.0	±9.6 %
CAC	Mhps)	Y	4.95	66.98	17.15	1,40	100.0	10.0%
		Z	4.78	66.99	16.85	_	100.0	
10087-	(EEE 802 11a/n WiFI 5 GHz (OFDM, 36	X	5.40	67.52	17.91	204	100.0	Tin n ni
CAC	Mbps)	Y	5.26	111111111111111111111111111111111111111	17.62	204	1.500	主0.6%
				67.17			100.0	
(Sage	THE REAL PROPERTY OF THE PROPERTY OF	Z	5.06	67,09	17.23		100.0	1000
10068- DAC	JEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	5.51	67.80	18.25	2.55	100.0	±9.63
		4	5.36	87.40	17.94		100,0	
		Z	5.11	67.14	17.41		100.0	
10069- CAC	IEEE 802 11a/h W/FI 5 GHz (OFDM, 54 Mbps)	×	5.58	67.69	18.40	2.67	100,0	19.6%
		Y	5.44	67.37	18.13		100.0	
	Proportion Committee	Z	5.19	67.11	17.58		100.0	
10071- CAB	(DSSS/OFDM, 9 Mops)	×	5.17	67.17	17.75	1.99	100.0	±9.6%
-		Y	5.05	66.81	17,46		100.0	
		Z	4.88	56.78	17.09		100.D	
10072- CAB	(DSSS/OFDM, 12 Mbcs)	×	521	57.68	18.06	2.30	100,0	±5.6 %
CTYSE	The contract result in temporal	· V	5.08	87.27	17.74	-	100.0	
		Z	4.87	67.11	17.28		100.0	
10073- CAB	(EEE 802.11g WiF) 2.4 GHz (DSSS/OFDM, 18 Mbps)	×	5.30	67.92	18.44	2.83	100.0	1985
	The second second contracted	Y.	5.18	67.55	18:13		100.0	
		Z	4 94	57.26	17.56		100.0	
10074- GAB	IEEE 802-11g WIFI 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	5.29	67,90	18.65	3.30	100.0	±969
	The second secon	·Y	5.19	67.54	18.34		100.0	
		Z	4.93	67.18	17.70		100.0	
10075-	IEEE 802 11a WFI 2.4 GHz	X	5.40	68.28	19.10	3.82	3000	±984
CAB	(DSSS/OFDM, 36 Mbps)	Y	5.28	67.86	18.77		90.0	
		Z	4.98	67.33	17.99		90.0	
10076-	IEEE 802.11g WFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	5.38	67,97	19.17	4.15	90.0	19.69
CAB	(разалония, чо моры)	Y	5.29	67.64	18.88		90.0	
		Z	5.00	87.13	18.10		90.D	
+0077	STEE BOOK HE SHOW IN A COLL.	X	5.41	68.03	19.26	4:30	90.0	1967
10077- CAB	(DSSS/OFDM, 54 Mbps)	100		-	1	#,AD	1000	2007
		Y	5.32	67.72	18.98		90.0	
		2	5.93	67.21	18.19		100.1.13	

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19.5 V	150.0	7	0.00	15.87	70.94	1.20	X	CDMA2800 (1xRTT, RC3)	10081-
- 10,00,0			-1,0,0	3000				2.47.421.000.000	CAE
	150.0			10.59	63.33	0.66	Y		
	150.0			14.01	69.12	0.97	Z	and the second s	
18.03	80.0		4.77	6.54	61,30	1.35	×	IS-54) IS-138 FDO (TDMA/FDM, P)/4- DQPSK, Fulirate)	10082- CAB
	80.0			5.56	60.10	1.15	4	1.76	
W V I	80.0	-31		4.82	60.00	0.90	2	Application and a second second	CORP.
19.6%	60.0		6.56	28.67	116.34	100.00	X	GPRS-FDD (TDMA, GMSK, TN 0-4)	DAC
	60.0			27.45	113.98	100.00	Y		
	80.0	-	-	18.81	88.08	16,90	Z	UMTS-EDD (HSDPA)	10097
198%	150.0		0.00	16,78	69,10	1.98	×	UNITS FUD (HSUPA)	CAB
	150.0	-		14.64	66.14	1.88	Y		
	180.0	4		16.52	60.38	1.92	Z	United Propositional Proposition	10098-
196%	150,0	1	0.00	16.77	69.09	1,94	×	UMTS-FDD (HSUPA, Subject 2)	CAB
	150.0			14,59	66,08	1 82	Y		
	150.0		100	16.49	69.33	1.87	2	EDGE-EDD CTRALL BERGY TO THE	TEERS.
±88%	50.0		9.56	40,37	116,31	28,67	×	EDGE-FOD (TDMA, 8PSK, TN 0-4)	DAC
	60.0			35.83	103.14	17:22	Y		
	60.0			31.22	92.24	10.80	2	The time markets the second	10100-
±96%	150.0		0.00	17.62	72.21	3.51	X	LTE-FOD (SC-FDMA: 100% RB; 20 MHz; QPSK)	CAE
	150,0			15,85	69.12	2.94	. Y.		
	150,0			17.33	71.84	3.29	2	1 88 080 080 080 080	-5-15-1
±95%	150/3		0.00	16.44	68.37	3.42	X	LIE FOO (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	10:10:1- CAE
	150.0			15.45	66,88	1.15	4		
	150.0			16.19	58.19	3.26	12	Les rein discussion	[nann
188 K	1802.0		0,00	16.50	53.25	3.51	×	LTE-FDD (8C-FDMA, 100% RB, 20 MHz, 64-DAM)	10102- CAE
	158.0		-	15.57	56.87	3.25	Y- 1		
	150.0	- 1		18.28	88.16	3:35	Z		12122
196%	85.0	1	3.98	22.32	80,51	9.10	×	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	10103- GAG
	65.D			21.05	77.60	7.71	Y		
	65.0		-	19.85	75.86	6.72	2	140	-50101
186%	85/0		3.98	22.08	77.67	8.36	X	MHz. 16-QAM)	CAG
	65.0			21.18	75,78	7,55	· Y		
	65.0			19,84	73.78	6.54	2	1 46	10105-
10.6 %	65.0		3.98	28.27	77.35	8.22	X	LTE-TOD (SC-FOMA, 100% RB, 20 MHz. 64-QAM)	CAG
	65.0			20,84	74.28	7.00	Υ.		
	65.0			19.96	73,36	6.41	2	I be from one proper about the	10108-
±9.6 %	150,0	1	0.00	17.44	71.32	3.07	X	LTE-FDD (SC-FDMA, 100% RB, 17 MHz, QPSK)	CAG
	150,0			15.67	68.37	2.58	Y		
	150.0			17,15	71.00	2.85	- 2.	LTE-FDD (SG-FDMA, 100% RB, 10	10109-
196%	150.0		9.00	16,43	68.24	3.09	Х.	MHz. 16-QAM)	CAG
	150.0			15.30	66.64	2.80	Y		
225	150.0		0.00	16.17	70.39	2.62	X	LTE-FDD (SC-FDMA, 100% RB, 5 MHz.	10110-
9.6 %	150.0		DIN					OPSK)	CAG
	150.0	1		16.21	67.38	2.08	Y		
	150.0			16.80	70.10	2,30	Z	LTE-FDD (SC-FDMA, 100% RB, 5 MHz.	10111
19.5%	150.0	-	11.00	16,90	69,15	2.83	X	16-QAM)	DAG
	150.0	1		15.44	67.13	2.48	Y		_
	750.0	13		16.7E	69,56	271	Z		-

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10112- CAG	LTE-FDD (SC-FDMA, SIRE RB, 10 MHz, 64-QAM)	×	3.20	68.73	16.43	0.00	150,0	主导及指
	45446	Y	2.93	80.85	15.39		150.0	
2000		2	3.034	68.13	16.21		150.0	
CALL	LITE-FOID (SIC-FOIMA: 100% RB, 5 MHz. 64-DAM)	Х	2.58	69.16	16.06	G.GD	150.0	196%
	-	Y	2.64	67.31	15.63		150.0	
		Z	2.87	69.66	16.67		150.0	
10334- CAC	GEE 802:11n (HT Greenfield, 13.5 Mbos. BPSK)	Х	5.21	67.32	16.54	0.00	150.0	1984
OH 1991	- SANGE SHEET SHEET	Y	5.08	66.85	18 21		-150.0	
		Z	5.00	67.43	16.43		150.0	
10115- CAC	IEEE 802.11n (HT Grownfield, B1 Mbps, 16-QAM)	X	5.56	67.00	18.68	0.00	150.0	398 W
	7.7	Y	5.42	67.15	16.37		150.0	
		2	5:34	67.50	18.48		150.0	
10116- CAC	IEEE 802 11/n (HT GrounBeld, 135 Mbps: 64-GAM)	X	5,33	67.58	16.60	0.00	450.0	+08 G
	2. 20 402	·V	5:19	67.09	16.26		150.0	
		Z	5.15	67.61	16.44		150.0	
10117-	IEEE 802 11n (HT Mixed, 13.5 Mbds,	X	5.21	67.33	18.56	0.00	150.0	± 19.65 %
CAC	BPSKI	9	5.06	86.76	16.19	-144	150.0	
		2	5,00	67.31	16.19		150.0	_
10116-	(EEE 802 11n (HT Moont 81 Mbgs. 16-	X.	5.63	67.75	16.76	0.00	150.0	#8E =
CAC	QAMI	Y	5.56	67.54	15.45	0.47	150.0	****
			5.44	67.66	15.55		150.0	
10440	IEEE 802 11n (HT Mind, 135 Mbps, 64-	Ž X	5.20	67.52	16.58	0.00	150.0	19.6%
10119- DAG	QAM)	100		1,000	1000	0.00	100	1900
		Y	5.16	67.02	16.24		150.0	
-	Contractor of the second	Z	0.13	87.5h	16.43		150.0	
10140- DAE	LTE-FDD (SC-FDMA, 100%) RB, 15 MHz, 16-QAM)	X	3.55	80.24	16.42	0.00	150.0	±96%
A. A.	5.4.4.	Y	5.29	60.88	15.49		150.0	
To the same	CAN'T THE STREET WHEN THE	Z	1.39	08.15	10.19		150.0	
10141- CAE	LTE-FDD (50-FDMA, 100%-RB, 15 MHz, 64-QAM)	×	3.66	68,26	16.55	0.00	150.0	205%
311.34		Y	3.42	66.98	15.00		160.0	
		2	3:52	88.25	16.36	- 4	150.0	1
10142- CAE	LTE-FDD (6C-FDMA, 100% RB, 8 MHz, DPSK)	X	2.31	70.61	17.10.	0,00	150 0	195%
CITE	1	W-	4 B4	67.11	14.75		150.0	
		12	2.12	70.48	16.65	-	450 0	100
10140- CAE	LTE-FDD (SC/FDMA, 100% RB, 3 MHz, 16-DAM)	×	217	70.28	16.99	0.00	150.0	49.6%
		7	2.41	197.48	15.00	-	150.0	
		1.7	2.68	70.99	16.78		150.0	
10144 GAE	LTE-FDD (6G-FDM), 100% RB, 2 MHz, 64-GAM)	X	2.51	67.88	15.37	0.00	150.0	± 9.6 %
20,76	1	V.	234	85.60	13.59		150.0	
		2	2.29	67,85	14 87		150.0	
10145- CAF	LTE-FDD (SD-FDMA, 100% RB, 1.4 MHz, QPSK)	X	1.73	50.60	15.10	.0.50	150,0	± 0.6.%
-		Y	141	03.06	10.90	-	150.0	
		2	133	67.08	12.73	-	150.0	
10146- CAF	LTE FDD (SC-FUMA, 100% RE 1.4 MHz. 18-QAM)	K	4.24	75.06	17.12	0.00	160.0	1969
		Y.	2.48	68.71	13.45		150.0	
		2	2.38	66.35	12:25	7.0	450.0	
10147-	LTE-FDD (SC-FDMA, 100% RB; 1.4 MHz, 64-QAM)	X	5,45	81,86	19.47	0.00	1500	19.8%
DAF					1		1	
DAF	381 (2) 04-30/40)	4	3.10	71:79	14.97		200.0	

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10149= DAE	LITE FDD (SC-FDMA, 50% RB, 20 MHz, 18-CAM)	8	3,10	68.31	16.47	0.00	150.0	± 9.6 %
		8.	2.81	66.69	15.35		150.0	_
	The second secon	.Z	2.93	68.23	16.22	-	150.0	
10150- CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	3.21	68,18	18,48	0,00	150.0	±9.6 %
		Y	2.94	86.70	15.43		150.0	
		Z	3.05	68.20	16.26		150.0	
10151- CAG	LTE-TOO (SC-FDMA, 50% RB, 20 MHz. QPSK)	×	10.13	83.77	23.67	3.98	65.0	E96%
		Y	8.42	80.52	22.26		85.0	
		Z	6.89	77.61	20.59		65.0	
10152- CAG	LTE-TDD (SC-FDMA 50% RB: 20 MHz. 16-GAM)	×	8.04	78.08	22.05	3,96	65.0	±96%
		Y	7 13	75.91	20.98		65.0	
		Z	6.04	73.58	19.44		85.0	
10153 CAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	×	8.44	78,92	22.75	3.98	.65.0	19.0%
		Y	7.56	76.89	21.74	-	65.0	
	2.2	Z	6.48	74.70	20.30	1000	65.0	
10154- DAE	LTE-FDD (SG-FDMA, 50% R8, 10 MHz, GPSK)	X	2.59	70.97	17.50	0.00	150.0	± 9,6 %
		Y	2.12	67.77	15:47		160.0	-
		2	2.38	70.74	17.16		150.0	
10155- DAG	L1E-FDB (SC-FDMA, 56% RB, 10 MHz, 16-QAM)	×	2.83	89.15.	16.90	0.00	150.0	±9.6 %
		L.Y	2.49	67.14	15.45		150.0	
	The second secon	Z	2.71	89.67	16.78		150.D	
10158- CAG	LTE-FDB (SC-FDMA, 50%, RB, 5 MHz, QPSK)	X	2.21	71.19	17.23	0.00	150,0	±98%
		TY	1.68	67.01	14.46		150.0	
_	A CONTRACTOR OF THE CONTRACTOR	Z	2.01	71.01	16.65		150.0	-
10157- CAG	LTE-FDD (SC-FDMA, 50%, RB, 5 MHZ 16-QAM)	Х	2.40	88.88	15.72	.0/00	150.0	±96%
		·Y	1.95	65.89	13.48		150.0	
		2	2.19	68.70	14.94		150.0	
10158- GAG	LTE-FOO (SC-FDMA, 59% RB, 10 MHz. 64-CJAM)	X	2.98	69.22	17.01	0.00	150 0	198%
		-Y-	2.65	67.36	15.65		150.0	
177.000	the same of the sa	2	2.68	69.75	16.93		150.0	
10159: CAG	LTE-FOD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	2.54	69.44	16.05	0.00	150.0	±16%
		Y.	2.05	88.31	13.77	_	150.0	
	The second secon	2	2.34	69.42	15.34		150.0	
10160- CAE	LTE-FOID (SC-FDMA, 50% RB, 18 MHz, QPGK)	X	2.96	69.71	18.97	0.00	150.0	196%
		Y	2.82	67.67	15.60		150.0	
15.15.		Z	2.78	69.58	16.72		150.0	
10161- CAE	LTE-FDO (SC-FDMA, 50% RB, 15 MHz; 16-GAM)	X	3.11	68.11	16:44	0.00	150.0	土田,在%
		70	2.83	66.60	15.34		150.0	
	100	2	2.95	68,19	16/22		150.0	
10162- CAE	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-OAM)	X	3.21	68.15	16.50	0.00	150.0	186%
		9	2.94	66.74	15.46		150.0	
inink	VICTOR IN THE COLUMN TO THE CO	.2.	3.08	68.32	16.32		150.0	-
1018B-	LTE-FDD (SC-FDMA, 50% RB, 1,4 MHz, QPSK)	X	4.07	71.03	19.91	3.01	150.0	+9.6%
		.A.	3.79	89.95	19.36		150.0	-
On Color	the same of the sa	7	3.83	71.38	19.78		100.0	
10187- CAF	LTE-FDO (SC-FDMA, 50% RE. 1.4 MHz. 18-QAM)	×	5.42	74.80	20.07	3.01	150.0	±0.5%
N.C.		Y	4.77	72.79	19.75	_	150.0	

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10168- CAF	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	6.05	77.17	21.98	3.01	150.0	±9.6%
		Y	5.30	75.09	21.09		150.0	
		Z	6.36	79.86	22.71		150.0	
10169- CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	3.85	72.93	20.70	3.01	150.0	± 9.6 %
		Y	3.33	70.15	19.41		150.0	
		Z	3.47	72.51	20.23		150.0	
10170- CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	6.37	81.48	23.72	3.01	150.0	±9.6 %
77.57	15115060	Y	4.75	78.10	21.63		150.0	
Course and	Version of the contract of the contract of the	Z	7.01	85.04	24.72		150.0	
10171- AAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	х	4.87	75.76	20.53	3.01	150.0	±9.6 %
		Y	3.87	71.72	18.83		150.0	
	Name and the same	Z	4.54	76.13	20.23		150.0	
10172- CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	80.41	131,60	39.78	6.02	65.0	± 9.6 %
		Y.	18.51	103.18	32.14		65.0	
		Z	14.22	97.99	29.18		65.0	
10173- CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	×	100.00	127.75	36.65	6.02	65.0	±9.6 %
9901	20000000	Y	30.31	107.15	31.45		65.0	
Name of	East state each on remove that	Z	25.08	102.02	28.13	2010/09/20	65.0	0.50077
10174- CAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	60.73	116.92	33.35	8.02	65.0	± 9.6 %
		Y.	21.73	99.84	28.80		65.0	
		Z	17.08	94.57	25.40		65.0	
10175- GAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz. QPSK)	Х	3.78	72.50	20.41	3.01	150.0	± 9.6 %
	I State of the sta	Y	3.29	69.80	19.15		150.0	
-carry	I meno de sa masa de reconstruir de la constitución	Z	3.40	71.98	19.88		150.0	
10176- CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	6.38	81.51	23.73	3,01	150.0	±9.6%
	1000000	Y	4.76	76.12	21.65		150.0	
		Z	7.03	85.08	24,74		150.0	1
10177- CAL	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	3.82	72.71	20.53	3.01	150.0	±9.6 %
		Y	3.32	69.97	19.25		150.0	
		Z	3.44	72.23	20.02		150.0	
10178- CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16- QAM)	×	6.26	81.12	23,55	3.01	150.0	± 9.6 %
		Y	4.70	75.86	21.51		150.0	
loscon a c	Proposition and the control of the c	Z	6.85	84.54	24.51	-security	150.0	Constant
10179- CAG	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	5.53	78.38	21.95	3.01	150.0	± 9.6 %
-	100000	Y	4.28	73.73	20.08		150.0	
		12	5.53	80.03	22.20		150.0	
10180- CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64- QAM)	X	4.85	75.63	20.45	3.01	150.0	± 9.6 %
		Y	3.85	71.63	18.78		150.0	
		Z	4.51	75.97	20.14		150.0	
10181- CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	3.82	72.60	20.52	3.01	150.0	± 9.6 %
177.	- (ACC-100)	Y	3.31	69.95	19.24		150.0	
	Commence of the commence of th	Z	3.44	72.20	20.01	3,010	150.0	Aller Marie
10182- CAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	6.25	81.09	23.54	3.01	150.0	±9.6 %
		Y.	4.70	75.84	21.50		150.0	
		2	6.83	84.50	24.49		150.0	
10183- AAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	×	4.84	75.60	20.44	3.01	150.0	±9.6 %
-	1.000000000	Y	3.85	71.61	18.77		150.0	
							150.0	

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10184- GAE	LTE-FDD (SC-FDMA, 1 RB.3 MHz, QPSK)	×	3.83	72.74	20.54	3.01	150.0	±9.6 %
1		4	3.32	70.00	19.27		150.0	
	Land Town of the Control of the Cont	Z	3.45	72.28	20.04		150.0	
CAE	LTE-FOD (SIG-FDMA, 1 RB. 3 MHz. 16- QAM)	X	6.29	81.18	23.58	3.01	150.0	±8,6%
		Y	4.72	75.91	21.53		150.0	
		2	5.88	84.63	24.55		150.0	
10186	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-	X	4.86	75.68	20.48	3.01	150.0	29.6%
AAE	QAMI	Y	3.87	71.68	18.80	1,447	1500	20.9 8
		1.2	4.53	76.04	20.17		150.0	-
10187- CAF	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz. QPSK)	×	3.86	72.79	20.60	3.01	150 D	19.6 %
		Y	3.33	70.05	19.33	_	150.0	-
-		7	3.46	72.24	20.11	-		_
161188-	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz,	X	8.59	82.17		20.04	150,0	200
ZAF	16-CAM)		4.88		24,08	3.01	150.0	#96%
_		Y		76.63	21.93		150,0	
THE COME.	a Tr. effection ground a page a color-	2	7.44	86.21	25,23	- 4 -	150.0	
10.199 AAF	LTE-FDO (SC-FDMA, 1 RB, 1.4 MHz, Bit-QAM)	×	5,01	76.28	20.81	3.01	150.0	±96%
		Y	3.96	72.12	19.08		150.0	
		2	4.72	76.84	20.60		150.0	
00193- GAC	(EEE BOZ 11n (HT Greenfield, 6.5 Mbps, BPSK)	X	4.64	66.78	16.35	0,00	150.0	196%
		Y	4.48	66.22	15.91		150.0	
	THE RELEASE OF THE PARTY OF THE	Z	4.48	66.93	16.19		150.0	
10194- CAC	(ESE 802.11n (HT Greenfield 39 Mops: 16-QAM)	X	4.84	67.15	16.46	0.00	150.0	#96 N
		8	4.66	86 55	16.03		160.0	
		Z	4.65	67.23	16.31		150.0	
CAC:	IEEE 802 11n (HT Grountield, 65 Mbps, 64-QAM)	X	4.88	87.16	16.47	0,00	150.0	±9.6 %
		Y	4.70	66.58	16.05		150.0	_
		2	4.69	87.26	16.32		150.0	
1019II	IEEE 802 f1n (HT Mixed, 6.5 Mbps, BRSK)	X	4.66	88.88	15.38	0.00	150,0	£9.6%
		Y	4.49	66.29	15.03		150.0	
		Z	4.48	66.99	16.21		150.0	
10197 DAC	GEE 802 11n (HT Mixed 30 Mbgs. 16- GAM)	X	4,85	67.17	16.47	0.00	150.0	± 9.6 %
		N	4.67	86.56	36.04		150.0	
	the second second second	2	4.86	67.25	16.32		150.0	
TOTHS-	IEEE 802,11n (HT Mixed, 86 Mbps, 64- QAMI	X	4.89	87 18	16.48	0.00	150,0	±9.6 %
		Y	4.70	66.60	16.06	-	*60.6	-
		Z	4.88	67.27	16.06	-	750.0	
10219i CACI	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	X-	4.61	66.90	18,35	0,00	150.0	± 9.6 %
		Y	4.43	66.30	15.89		150.0	
		ż	4.42	67.01	16.10			
10220-	EEE 802.11n IHT Maed 43.3 Mopt 16-	X	4,86	57.15	16.10	8.00	100.0	
CAC	(QAM)	· ·		12,000	1000	0.00	150,0	±9.5%
			4.67	68,56	16.04		150.0	
10221	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-	Z X	4,65	67.22 67.10	16.31	0.00	150.0 150.0	±911%
CAG	QAM)	V.	4.71	86.53	16.05	11.00		2447
		2	4.70	67.20	16.31		160.0	
10222- CAC	(EEE 802.11n (HT Mixed, 15 Mbps) BPSk)	×	5.19	87.35	16.57	0.00	150.0	E86%
		Y	5.03	56.77	10 10		400.0	
		Z			16.18	-	150.0	-
			5.01	67.33	16.30		150.0	

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10223- GAC	JEEE 802 11n (HT Mixed, 90 Mbbs, 15-	X	5,54	67.61	16.71	0.00	150.0	£ 5.0 %
	1	Y	6.35	66.99	16:32		150.0	
		2	5.29	67,45	16.47		150.0	
10224- CAG	JEEE 802 11n JHT Marie, 150 Maps, 64- QAM)	X	5.24	67,46	16,55	.0.00	150.0	196%
27152	tar unit	Y	5.08	66.87	16.16		150.0	
	+	2	5.06	67.45	16:38		150.0	
0225-	UMTS-FDO (HSPA+)	X	2.94	66.51	15.90	0.00	150.0	598%
CAB		¥	2.72	65.45	14.90		150.0	
		Z	2.80	66.78	15.59	11000	150.0	
10226- CAA	LTE-TDD (SC-FDWA, 1 RB, 1.4 MHz, 16-QAM)	X	100,00	127.97	36.79	5.02	65.0	29.6%
	10000	Y	33.01	106.86	32.02		65.0	
		Z	28.60	104.35	28.88		65.0	
10227- CAA	LTE-TOD (SC-FDWA, 1 RB, 1.4 MHz, 64-GAM)	Х	71.64	120.02	34.24	6.02	65.0	1963
CV, V 1	105 MC487	· Y	27.56	104.08	30.11		65.0	
		Z	21.67	98 19	26.50		85 D	
10228-	LTE-TOD (SC-FDMA, 1 RB, 1.4 MHz.	X	83.78	133.19	40.33	8.02	65.0	±9.6%
CAA	QPSK)					0.04	44.0	xam s
			27.23	111,37	34.65		65.0	
-		Z	14,82	99.20	29.65	7.00	65.0	11000
10229- CAC	LTE-TOD (SC-FDMA, 1 RB, 3 MHz, 16- QAM)	×	100.00	127.75	36.66	5.02	65.0	± 9,0 %
		Y	30.45	107.22	31.48		65.0	
	A STATE OF THE REAL PROPERTY.	7	25.36	102.20	28.19		65.0	
10230- DAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz. 64- QAM)	X	64.64	118.06	33.66	6.02	65.0	± 9,6 %
		Y	25.67	102,71	29.64		65,0	
		Z	19.55	96.45	25.91	11 - 71	55.0	
10231- CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, CPSK)	×	74.78	130.72	39.63	6.02	65.0	196%
write	- Service	Y	25.26	109.74	34.10		65.0	
		Z	13.84	97.69	29.10		65.0	
10232- CAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16- DAM)	X	100.00	127.76	36.66	8.02	85.0	#96 W
CONF	- WANT	· v	30.44	107.22	31,48		85.0	
		Z	25:32	102.18	28.18		85.0	
10233- GAF	LTE-TOD (SC-FDMA, 1 RB, 5 MHz, 54-	X.	64.74	118.10	33.67	8,02	65.0	#86%
CMI	Labrain 1	Y	25.00	102.71	29.64		85.0	
		Z	19.51	96.43	25.91		65.0	
10234- GAF	LTE-TOD (SC-FDMA, 1 RB, 5 MHz GPSK)	X	68.79	128.16	38.87	B.02	65.0	±9.6%
10FIL	Set SIG	Y	23.59	108.16	33.53		65.0	
		Z	12.92	98.23	28.52		65.0	-
10235- CAF	LTE-TDD (SC-FDMA, 1 RE, 10 MHz, 18-QAM)	×	100,00	127.77	36,66	6.02	65.0	196%
PAGE.	12 (200)	Y =	30.53	107.29	31.50		65.0	
_		2	25.37	102.23	28.19	-	65.0	
10238-	LTE-TOO ISC-FOMA, 1 RB, 18 MHz,	X	65.78	118.34	33.73	5.02	05.0	1965
CAF	84-QAM)	Y	25.93	102.87	29.68	10.000	65.D	1765
		Z	19.72	96.57	29,66	-	66.0	
10237-	LTE-TOD (SC-FOMA, 1 RB, 10 MHz.	X	78.22	131.13	39.74	6.02	66.0	19.65
CAF	QPSK)	-37	05.40	109.93	34.16	-	65.0	-
		Y.	25.46					-
- 12		2	13.89	97.78	29.12		65.0	+ 5 0 0
10238- CAF	LTE-TDB (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	×	100.00	127.7E	36,66	6.02	65.0	± 9.6 %
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Y	30.42	107.23	31,48		65.0	
		1.2	25.26	102.15	28.17		65.0	

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10239- CAF	LTE-TDD (SID-FDMA, 1 RB, 15 MHz. 64-CIAM)	X	64.82	118.13	33.68	8.02	65.0	±9.6%
		Y	25.62	102.71	29.04		66.0	
	The state of the s	Z	19.45	98,40	25.90		65.0	
10240; CAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	×	75.84	131.04	39,71	6.02	65.0	±9.6 %
		Y	25.37	109.88	34.14	4	55.0	
		2	13.84	97.74	29.11		65.0	
18241- CAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	x	12.34	87.77	28.08	6.98	65.0	±9.8%
		Y	10.07	84,69	26.80		65.0	
		2	9.45	E3.27	25.34	1000	85.0	
10242- CAA	LTE-TOD (SC-FDMA, 50% RB, 1.4 MHz, 64-DAN)	×	11.90	86.96	27 88	9,98	65.0	2305
		Y	9.43	62.13	25.70		65.0	
	The second secon	7	8.88	82.07	24.81		66.0	
10243- CAA	LTE-TOD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	3	9,29	E3.62	27.37	6.98	85.0	296%
		8	7.60	79.19	25,41		65.0	1
	AND THE PROPERTY AND THE PARTY	Z	6.90	78.26	24.23	1.0.1	85.0	
EAC.	LTE-TOD (SC-FDMA, 50% RB, 3 MHz. 16-DAM).	×	11.62	86.25	22.95	3,98	85.0	± 9.6 %
		. Y	9.03	81.02	21.07		65.0	
		Z	5.90	74.19	17.01		65.0	
10245- CAC	LTE-TDD (SC-FDMA, 50% R9, 3 MHz: 64-GAM)	X	11,21	B4.37	22.59	3.98	85.0	19,6%
		Y	8.74	80.23	20.72		85.0	
	And the second s	- 2	5.76	73.60	16.72		65.0	
10246- CAC	LTE-TOD (SC-FDMA, 60% RB, 3 MHz, QPSK)	×	13.76	91.33	25.01	3.98	85.0	19.6%
		Y	8.27	82.50	21.35		85.0	
		2	5/24	75.79	17.95		65.0	
10247- DAF	LTE-TOD (SC-FDMA, 50%, RB, 5 MHz, 16-CAM)	×	8.15	80.38	21.81	3.98	65.0	19.6 %
		Y	6.57	78.53	19.78		88.0	
	The Secretary Community of the second	.2	5.10	72.95	17.52		85.0	
10248- DAF	LTE-TDD (SC-FDMA, 50% RE, 5 MHz, 64-QAM)	-8	7.96	79.46	21.43	3.93	65.0	196%
		Y	6.50	75.8E	19.49		85.0	
	A STATE OF THE STA	2	5.09	72.45	17.30		85.0	1
10249- CAF	LTE-TOO (SC-FDWA, 50% FIB 5 MHZ CPSK)	X	14.67	92.89	20.21	3.90	65,0	195%
	And the second s	Y	9.72	85.51	23.23		65.0	
-	The second secon	2	B.59	79.52	20.29		65.0	
10250- CAF	LTE-TOD (SG-FDMA, SO% RB, 10 MHz. 16-QAM)	X	8.79	81.74	23.60	3.98	65.0	196%
		. 4	7.53	78.89	22.19		65.0	
-	AND THE RESERVE	2	6:20	78.02	20.42		65.0	-
10251- CAF	LTE-TOD (SC-FDMA, 50% RB, 16 MHz., 54 QAM)	×	8.02	78.77	22.12	3.98	65.0	± 9.6 %
		Y	7.01	78:38	20.84		65.0	
-		7.	5.03	73.77	19.14		65.0	
10252 DAF	LTE-TOD (SC-FDMA, 50% RB, 10 MHz, DPSK)	×	12.21	89.16	25,66	3.58	65.0	195%
		Y	8.34	84.33	23.86		85.0	
	1-2	2	7.08	80.08	21.46		.65.0	
10253- CAF	LTE-TDD (SC-FDMA, 50% RB. 15 MHz, 16-QAM)	×	7.75	77.29	21.77	5.98	65,0	19,6%
		Y	6.93	75:28	20.72		65.0	
and a	Les este de Secretario	2	5.92	73,10	19.23		65.0	
0254) CAF	LTE-TOD (SC-FDMA, 50% RB; 15 MHz; 04-QAM)	×	9.1E	78,13	22.42	3,98	65.0	±96%
		N	7.34	76.22	21.42		85.0	
		Z.T	5.32					

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10255-	LTE-TDD (BC-FOMA, SOR FIB. 15 MHz.	X	0.52	62.96	23.60	3.58	65.0	+9.6%
CAF	QPSK)	N.	0.00	40.44				-
		Z	0.00	79 93	29.27		65,0	
10255-	LTE-TOD ISC-FDMA, 100W RB, 1.4	8	6.80	77.07	20.60	4.00	65.0	1000
GAA	MHz, 16-0AM)	K.	10:25	82.65	21.18	3.96	-05.0	±8.6%
		1.9	7,42	77.45	18.77		65.0	
	Particular approximation of the second	Z	4.37	69.73	14.00		65.0	
10257- CAA	LTE-TOD (SC-FDMA, 100%) RB, 1.4 MHz, 64-QAM)	8	11.67	81,35	20.00	3.98	65.0	#86 W
		W-	7.07	76.38	19.24		65.0	
		2	ol.27	69,13	13.71		65.0	
1025B-	LTE-TOD (5C-PDMA: 100% RB: 1.4 MFIZ, GPSK)	00	11.24	87.41	23 96	3.90	65.0	1965
		Υ.	6.32	77,82	18.86		65,0	
	And the officers of the second	Z	3.88	71.16	15.20		65.0	
10259- CAC	LTE-TDD (SC-FDMA, 100% RB; 4 MHz, 16-DAM)	X	8:37	80,75	22.38	-3.98	65.0	1861
		N.	6.95	TT:37	20.63		55.U	
	Land Table Control of the	Z	5.55	74,09	18.58		65.0	
10250- DAC	LTE-TDD (SC-FDMA, 100% RB, 3 MHz. 64-DAM)	X	8.81	80.29	22.23	3.98	65.0	196%
		Y	8.94	27,04	20.51		65.0	
		2	5.55	73.86	18.49	Lynn.	65.0	
10261- CAC	LTE-TOD (SC-FDMA_100% R8_3 MHz GPSK)	X	1247	89,95	25.58	3.98	65.0	E863
		Y	0.00	84.05	23.10		85.0	
	The state of the s	7.	6.47	78.99	20.51		85.0	1000
10262- CAF	LTE-TOD (SC-FDMA, 100% RB, 5 MHz.	×	E78	81,66	23.50	3.98	65.0	#8.6 %
	1.7	Y	7.52	78.83	22.15		65.0	
	C 100 C C C C C C C C C C C C C C C C C	Z	6.19	75.95	20.38		65.0	
10263- CAF	LTE-TOD (SC-FDMA: 100% RB, 5 MHz) 64-GAM)	3.	6.01	7a.76	22.12	3.88	65.0	±9.6 S
		L.Y.	1.00	76.35	70.63		65.0	
	The second second second second	12	5.82	73.75	19.13		65.0	
10264- CAF	LTE-TOD (SC-FDMA, 100% RB, 5 MHz, QPSK)	3.	12:07	88.92	35,56	1.98	650	1965
20.0	1 2 2	I.V.	8.25	34.11	23.56		68.0	
		2	7.01	79.85	21:36		65.0	
10266- CAF	LIE-TOD (SC FDMA, 100% RB 10 MHS, 16-DAM)	X	8.704	78.00	22.05	3.93	85.0	+ 9.E M
SAFE	THOSE TO SECURE	V	7.13	75.81	20.07		65.0	
		艺	6.04	73.58	19.44		65.0	
10266 CAF	LTE-TDD (SC-FDMA, 1005 RB 10 MHz, 64 GAM)	X,	8 VI4	79.91	22.74	3.90	65.0	1965
		×	7.55	76.88	21.73		85.0	
	The second secon	Z	6.47	74.09	20.29		66.0	1
10267- DAF	LTE-TDD (SC-FDMA: 100N RIS 10 MHz QPSK)	×	10.11	92.13	23,66	3,98	85,0	19.65
		¥	841	101.47	22.26		86.0	
	AND ASSESSMENT OF THE PARTY OF	Z	0.67	77.07	20.67	1	.85.0	-
10268- CAF	LTE-TOO (SIG-FLIMA, NUTLINE 15) MHz 10-QAM)	2	8.39	17.18	22.02	3.96	88.0	2000
		- V	7.65	75.61	21.20		85.0	1
	the second second	2	6.70	73.87	19.92	1000	85.0	
10289- DAF	LITE-TOD (SC-FDMA, 100% RB, 19 MHz; 84-DAW)	×	11.28	76.63	21,88	3.98	85.0	1 9,0 %
		V	7,58	75.05	21.07	1	66.0	
		2	6.67	73.30	19.83		85/0	
CAE	L'TE-TOD (ISC-FOMA, 100% RB: 15 MHz, CIPSK)	×	88.8	79.53	32.20	5.98	95.0	± 9.6%
		Y	7.84	77,34	21,20	-	fatf U	-
		2	6.74	75.30	10.88		95.0	

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10274- CAB	UMTS FDD (HSUPA Subtest 5, 30PP Rel8.10)	×	2.69	67.00	15.83	0.00	150.0	19.0%
		Y	2.47	65.81	14.87		150.0	
Conces	100000000000000000000000000000000000000	7	2.60	67.27	15.58		150.0	
10275- CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Refit 4)	X	1.83	70.14	16.96	0.00	150.0	± 8.6 %
		15	1,44	86.20	14.31		150.0	
		Z.	1,70	69.74	16.44		150.0	
10277- CAA	PHS (QPSK)	×	3,93	66.44	11.35	9.03	50.0	19,0%
		· Y	3.47	64.75	10.20		50.0	
	A Committee of the Comm	I Z	2.62	62.17	7.82	100	50.0	
10278- CAA	PHS (QPSK, BW 884MHz, Rolloff 0.6)	×	14,82	89.25	23.47	9.03	50.0	19.8%
		9	7.61	78.00	18:87		50.0	
		_ Z	4.20	69.20	13.78		50.0	
10279 CAA	PHS (QPSK, BIV 884MHz, Rolloff 0.38)	X	14,85	89.41	23.56	5.03	50.0	29.6%
		2	7.77	76.24	18.99		50.0	
John .	CONTRACTOR OF THE PARTY OF THE		4.39	69.44	13.93		50.0	
10290- AAB	CDMA2000, RC1; SQ55, Full River	*	2.10	73.72	17.08	0.00	150,0	±9.6%
		70	1.20	65.83	12.24		150.0	
(metan)	Legalitation and State (12)	Z	1.79	72:49	15.56	1000	150.0	
AAB	CDMA2000, RC3, S055, Full Rate	×	1 16	70.51	15,66	0.00	150.0	2.9.6 %
		Y	0.67	63.17	10.49	7	150.0	
- delicate	The state of the s	2	0.94	38.71	13.80		150.0	
10292- AAB	CDMA2000, RC3, SO32, Full Rate	×	1.93	79.24	19.72	0.00	150/0	± 9.6%
		Y.	0.78	85.41	12.01		150.0	
	SERVICE MANAGEMENT AND ADDRESS OF THE PARTY	Z	2.01	B0.04	18.65		150.0	
til293- AAB	COMA2000, RC3, SO3, Full Rate	×	4.24	91.88	24.62	0.00	150.0	19.6%
		. Y.	0.99	63.94	14.19		150.0	
-	The second secon	2	16.88	110.82	28.51		150.0	
1(1295- AAB	CDMA2000, RC1, SQS, 1/8th Rate 25 fr.	X	12.27	89.66	25,50	9,08	3D.0	÷06%
		- Y	10.64	85.72	24.40		50.0	
	Manager Street, Street	2	6.39	77.74	20.11		50.0	
AAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz. DPSK)	8	3.09	Y1.44	17.51	0.00	350.0	19.6%
		Y	2.59	68.47	15.73		150.0	
	Commence of the second second	Z	2.87	71.14	17.24		150.0	
10298- AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	X	2.03	71.12	18.52	0,00	150.0	19.6%
_		Y	1.39	65.78	12.91		150.0	
Zohoe.		Z	1.75	70.22	15.26		150.0	
10299- NAD	LTE-FOD (SC-FDMA, 60% RB, 3 MHz, 16-QAM)	×	4,66	77,12	18.36	0.00	150 0	19,8%
		Y.	3.14	71.60	15,64		150.0	
10300-	1 PE roo ido Polis Tolis Tolis Tolis	2	8,75	74.00	15.70		130.0	
10300- AAD	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	Х	2.97	89.66	14.52	0.00	100.0	±9.6.%
		Y.	2.26	88.29	12.46		150.0	
10301-	IEEE SITS 41% WHILE & SHILLS F.	2	2.17	96.32	11.62		150.0	
AAA	IEEE 802.166 WWAX (29:16, 5ms, 10MHz, DPSK, PUSC)	X	6.32	86.88	15.36	4.17	50,0	<b>±</b> 5.8%
_		Y	T-22	66,68	18,11		50.0	
10302-	IEEE SILT IN MINERS ON THE	2	4.67	65.61	17.38		50.0	
AAA	IEEE 802 Tibe WIMAX (29:18,5ms, 10MHz: OPSK, PUSC, 3 CTRL symbols)	X	5,74	67.34	16.93	4:96	- 50.0	± 9.6 %
		Y	5,58	66.87	18.46		50.0	
		7	5.18	66:25	18.09		50.0	

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10303- AAA	IEEE 802.16e WIMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	Х	5.54	67.22	18.91	4.96	50.0	±9.6 %
	- Walter Control Contr	Y	5.37	66.70	18,39		50.0	
		Z	4.93	65.95	17.95		50.0	
10304- 4,4,4	IEEE 802.16e WIMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	Х	5.28	66.83	18.25	4.17	50.0	±9.6 %
		Y	5.10	66,29	17.74		50.0	
		Z	4.73	65.82	17.46		50.0	
10305- AAA	IEEE 802.16e WIMAX (31:15, 10ms, 10MHz, 64QAM, PUSC, 15 symbols)	Х	5.67	72.27	22.34	6.02	35.0	±9.6%
500 N	3400 (1800) (1400) (1600) (1600) (1600)	Y	5.72	72.48	21.90		35.0	
2020000	Charles of the Control of the Contro	Z	4.66	68.90	20.05	200000	35.0	- VIII 014
10306- AAA	IEEE 802.16a WIMAX (29:18, 10ms, 10MHz, 64QAM, PUSC, 18 symbols)	Х	5.47	68.37	20.21	6.02	35.0	±9.6 %
		Y	5.52	69.50	20.64		35.0	
		Z	4.82	67.24	19.32		35.0	
10307- AAA	IEEE 802.16e WIMAX (29:18, 10ms, 10MHz, QPSK, PUSC, 18 symbols)	X	5.58	70.12	21.19	6.02	35.0	±9.6 %
	1	Y	5.54	70.11	20.79		35.0	
SCONU.		Z	4.75	67.57	19.37		35.0	
10308- AAA	IEEE 802.16e WIMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	X	5,58	70.46	21.39	6,02	35.0	± 9.6 %
74 TAV	BR-0-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-	Y	5.56	70.49	21.00		35.0	
		Z	4.74	67.84	19.54	0.00	35.0	
10309- AAA	IEEE 802.16e WIMAX (29:18, 10ms, 10MHz, 16QAM, AMC 2x3, 18 symbols)	X	5.56	68.68	20.38	6.02	35.0	±9,6%
		Y	5.61	69.80	20.81		35.0	
	1999	Z	4.87	67.43	19.45	E 0.0	35.0	1 70 70 70
10310- AAA	IEEE 802.16e WIMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3, 18 symbols)	Х	5.54	69.67	21.04	6.02	35.0	± 9.6 %
2000		Y	5.51	69.73	20.68		35.0	
		Z	4.78	67.38	19.33		35.0	-
10311- AAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	×	3.47	70.67	17.10	0.00	150.0	± 9.5 %
		Y	2.93	87.81	15.46		150.0	
		Z	3.26	70.40	16.86		150.0	
10313- AAA	IDEN 1:3	X	10.55	84.71	20.54	6.99	70.0	±9.6 %
		Y	5.52	75.51	16.93		70.0	
ALCONO DO	00.0000	Z	3.35	69.99	14.11		70.0	
10314- AAA	IDEN 1:6	×	24.93	102.67	28.79	10.00	30.0	±9.6 %
10/01		Y	8.40	84.46	22.81		30.0	
		Z	4.59	75.67	18.98	1.00	30.0	Fallson.
10315- AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	X	1.16	65.40	16.44	0.17	150.0	± 9.6 %
		Y	1.01	63.11	14.44		150.0	
		Z	1,08	64.77	15.73	2.10	150.0	C 80 8 50
10316- AAB	IEEE 802.11g WiFi 2.4 GHz (ERP- OFDM, 6 Mbps, 96pc duty cycle)	X	4.72	66.92	16.53	0.17	150.0	± 9.6 %
South	PERSONAL PROPERTY OF THE PROPERTY OF THE PERSONAL PROPERTY OF THE PERSO	Y	4.56	66.38	16.12		150.0	
03706237-		Z	4.51	66.86	16.22		150.0	2 10 m m
10317- AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	×	4.72	66.92	16.53	0.17	150.0	±9.6%
	The same of the sa	Y	4.56	66.38	16.12		150.0	
		Z	4.51	66.86	16.22	0.77	150.0	
10400- AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc duty cycle)	×	4.84	67.20	16.45	0.00	150.0	±9.6 %
		Y	4.66	66.61	16.02		150.0	_
		Z	4.63	67.25	16.28	0.75	150.0	7000
10401- AAD	IEEE 802,11ac WiFi (40MHz, 64-QAM, 99pc duty cycle)	×	5.48	67.20	16.49	0.00	150.0	±9.6 %
- N. I. U		Y	5.35	66.85	16.23		150.0	
		Z	5.28	67.24	16.32		150.0	1

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10402 AAD	IEEE BUZ 11ac WIFI (89MHz, 64-QAM, 890c duly cycle)	-8	6.76	67.76	16.80	0.00	350.0	+9,6%
10-21	angle and cycle)	Y	5.61	67.21	16.26		150.0	-
		Z	5.57	67.70	16.42		150 0	1
AAE	CDMA2000 (DEV-DD, Rev. 0)	X	2.10	73.72	17.08	0.00	115.0	2 9.0 %
		-Y	1.20	85.83	12:24		115.0	
		Z	1.79	72.49	15.56		115.0	_
10404- AAS	CDMAZUIII (fvEV-DD, Rev. A)	X	210	73.72	17.06	0.00	115.0	29.8%
		Y.	1.20	65.83	12.24		115.0	
Lacronia		Z	1.79	72.49	15,56		115.0	7
AAE	CBMA2000, RC3, S032, SCH0, Full Rate	×	100.00	122.19	31,29	0.00	100.0	±9.6 %
_		Ŷ	29.24	105.80	27.50		100.0	
10410- AAF	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, U. Sublame=2.3.4,7.8,9, Subframe Conf=4)	X	100.00	121.06	27.11 30.81	3.23	90.0	196%
		Y	100.00	121.88	31:03		80.0	
		12	83.71	111.58	25.89		30.0	
10415- AAA	IEEE 802.11b W/F/ 2.4 GHz (DSSS: 1 Mbps: 99pc duty cycle)	×	1,63	63.90	15,54	0.00	150.0	±9.6%
	1 1 1 1 1 1 1 1 1	Y	0.91	61.92	13.65		150.0	-
	The second secon	-2	0.99	63.88	15.24		150.0	
10416- AAA	DEEE 802 11g WIFT 2.4 GHz (EHP) DEDM, 8 Mbps, 99pc duty cyce()	×	4,64	66.82	18.39	0.00	150,0	±9.6%
		*	4.48	66.26	15.97		150.0	
10417-	Mark and a comment of the comment	2	-0.48	86.96	16.25		150.0	
AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	×	4.84	65,82	16,39	0,00	150.0	±9.6 %
_		Y	4,48	66.26	15.97		150.0	
10416	IEEE 802 11g WIFI 2.4 GHz (DSSS-	Z	4.48	66.96	16,25	-	150.0	
AAA	OFDM, 6 Maps, 190c duty cycle, Long preservoire)	Α.	4.53	88.97	10,41	0,00	150.0	±26%
		Y	4.47	86.40	15.97		150.0	
-		Z	4.47	97.14	10.29		150.0	
10419 AAA	CEEE 802,11g WIFT 2.4 GHz (DSSS) OFDM 6 Milps, 99pc duty cycle: Short greenbule)	×	4.65	96.92	16.41	0.00	150.0	± 8.6 %
		Y.	4.49	66.36	15.96	-	150.0	
	Table of the control	Z.	4.48	67.08	16.28		150.0	
10422- AAE	IEEE 802.11(r/HT Greenfield, 7.2 Mbgs BPSK)	×	4.78	86,82	16.42	0.00	150.0	198%
_		Y	4.51	68.37	16;01		150.0	
10423-	IEEE 802.1 in IHT Greenfield, 43.3	2	4.51	07,05	16.28		150.0	
AAB	Mbos: 16-QAMI	X	4.98	67.29	16.55	0.00	150.0	±9.8%
		Y	4.79	88,71	16:13		150 0	-
10424-	IEEE 802.11n (HT Greenfield, 72.2	X	4.89	67.38	16.39	0.00	150.0	100
AAB	Mbps, 64-QAMI	A.	4.70	67.24 86.65	18.52	0.00	150.0	8.0.76
		2	4.69		16.10		150.0	
10425- AAB	IEEE 802.11n (HT Greenfield, 15 Mbps. BPSK)	*	5,44	67.32	16.62	0,00	150.0	±9.9 %
		Y	5.32	67.05	16.33		150.0	
		Z	5.25	67.48	16.46		150.0	
10426 AAB	IEEE 802.11n (HT Greenfield, 90 Mbps: 16-QAM)	×	5.45	67,50	16.63	0.00	150.0	190%
		Y	5.32	67.06	16.33	-	150.0	
		Z	5.26	67.50	15.45		150.0	

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18427- AAS	IEEE 802 11n (HT Greenheld, 150 Mps., 64-QAM)	*	547	87,62	10.61	0.00	150 0	196%
		Y	5.33	87:04	15.31		150,0	
	A Theory Theory and American Company	Ž.	5.28	67.50	16.46		450.0	
ID430- AAD	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	8	4.44	70.94	18.00	11.00	150.0	世 0.任 %
		V	4.14	70.00	17.76		150.0	
	The state of the s	Z.	4.53	72.71	19.04		150.0	
HD#31-	LITE-FDD (OFDMA, 10 MHz, E-TM 3.1).	×	4,38	67.45	16.50	0.00	160.0	49.6%
		V	4.17	05.74	16.93		150.0	
		Z	4.70	67.60	16.51		150.0	
10432- AAC	LIE-FDD (OCDMA, 15 MHz, E-TM 2-1)	3	4.87	87.30	16.51	0.00	150.0	± 9.0 %
-		Y	4.47	66.66	10.03		150.0	
		Z	9,47	67.41	16:54		150.0	
10433- AAC	LTE FOD (OFDMA, 20 NHz E-TM 3 I)	×	4.90	87,28	16,55	0,00	150.0	196%
		Y.	4.72	60.69	16,12		150,0	
	CONTRACTOR OF STREET	12	471	57.3h	16.31		150.0	1000
10434- AAA	V/-CDMA (BS Test Model 1, 64 DPCH).	X	4.58	71,86	18.83	0.00	150.0	+00g
		V	4.21	70.69	17.87		150.0	
	The state of the s	Z	4.78	74.00	19.21		150.0	1
10435 AAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, Ut. Subhame=2.3,4,7,8,9)	×	100.00	120.88	30.73	3.22	80.0	39.6%
		Y.	100.00	121.69	30,95		80.0	
		T.	66.38	108.66	25.18	100	80.0	
10447 AAD	LTE-FDD (OFDMAL5 MHz, E-TM 3/1, Glosing 44%)	76	3,72	67.65	48/50	0.00	150.0	±0.6%
		Y	3.44	66.55	15.18		150.0	
		7	3.50	67.81	15.74	0.50	150.0	
AAEI	LTE-FDD (QFDMA: 10 MHz, E-TM 3.1, Clupto 44%)	×	421	67.23	16.37	0.00	150.0	±9.6 %
		I.V.	6.00	66.50	15.77		150.0	
		Z	4/02	.67.40	16.13		150.0	100
AAC	LTE-FDD (OFDMA: 15 MHz, E-TM 3-1 Cliping 44 %)	×	4,46	67,14	16:42	0.00	150.0	± 9.6 %
		Y	4.27	66.48	15.91		150.0	
	The state of the s	Z	4.28	67.27	16.26		150.0	1
10450- AAG	LTE-FDD (OFDMA, 20 MHz. E-TM 3.1 Clipping 44%)	X	4.64	67.06	16.42	0.00	150.0	±86%
		Y.	4.47	66,43	15:96		150.0	
		2	4.47	67.16	15.26		150.0	
10451- AAA	W-CDMA (BS Test Model 1, 64 DPCH, Capping 44%)	×	3.06	68.00	15,99	0.00	150.0	186%
11 40	The second second	Ψ.	3.33	66,69	14.77		150.0	
		1 2	3.40	68.00	15.28		150.0	
10458 AAB	IEEE 802.11ac W/D (188MHz: 64-DAM) 99pc duty cycle)	26	8.29	68.08	16.78	0.00	150.0	295%
		X	6.17	67.63	15.50		150.0	
	Liver and the second	7.	6.11	10.83	16.58		150.0	
10457- AAA	UMTS-FOD (DC-HSDPA)	X	3.63	66,45	10.13	0.60	150.0	±0.6%
		A	3.72	64.89	15.67		150.0	
	Transcription of the second	Z	3.74	95,60	15.95	100	150.0	-
10458- AAA	CDMA2000 (1xEV-DO; Rev B,2 carries)	X	4.10	70.93	18,07	0.00	150.0	£ 9.6 %
	1 1 2	Y	3.83	69.00	17.01		150.0	
	The same of the sa	Z	4.25	73.12	18:40		150.0	-
10459- AAA	CDMA2000 (1sEV-DO, Rev. B. 3 carners)	×	5.20	68.00	18:25	0.00	150.0	+964
		-	de belle	67.77	17.91		1.50.0	
7000		W	5.01	09.00	16.70		150.0	

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10460.	LIMTS-FDD (WODMA, AMR)	X	1.12	72.77	16.83	0.00	150.0	-000
AAA	DIA SELECTION CANADA		LAST.	0,000	Çina	anut.	10.00	29,65
_		Y	0.73	ftp.44	13.95	_	150.0	
10461-	LTE TROUGO STORE A DOLLAR MAL	T.	1.01	71.76	19.00		150.0	-
AAA	CPSK, UL Subrame=2.3,4,7,8,9)	X	100.00	126,43	33.93	3.26	80.0	29.63
		Y	100.00	125.87	32.93		80.0	
10482-	1 May 1990 1970 1970 1970 1970 1970 1970 1970	Z	90.37	116,03	27.82	-	80.0	
AAA	LTE-TDD (SC-FDMA, 1 RB, 1,4 MHz, 16-QAM, UL Subframer 2.3.4.7,8,9)	X	100.00	109.88	25.58	3.23	80,0	干部区场
_		Y	100,00	109,45	₹5.28		80.0	
10463-	LITE-TOD (SC-FDMA, 1 RS, 1.4 MHz.	2	1.10	60.79	7.88		80.0	
AAA	64-QAM, UL Subframe=2.3.4,7.8.9)	×	100,00	106.70	24.02	3.23	80.41	± 9.67 %
		-Y	49.13	98.79	22.03		20.0	
10464-	Lat abbridge toking their same	12	4.03	60.00	7.05		80.0	-
AAB.	LTE-TOD (SC-FDMA, 1 RB, 3 MHz DPSK, UL Subtrame=2.3,4.7.8.9)	×	100,00	124,44	32.24	3.23	80.0	±06%
_		1.4	100:00	123.71	31,77		80.0	1
10460-	A PER TEND COC PERMANA A DISCUSSION OF THE PERMANANA A DISCUSSION	Z	25,98	98.94	23.07		80.0	
AAB	LTE-TOD (SC-FDMA, 1 R9, 3 MHz, 16- QAM, UL Subframe=2.3,4,7,8,0)	×	100.00	109.41	25.30	3,23	10.0	±9.6 %
		8	100,00	108.89	24.99		80.0	
10466-	LECTRO OF SHIP LINE - LINE - LINE	Z	1.05	80.34	7.60		80.0	
AAB.	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64 QAM, UL Subtrame=2,3,4,7,8,9)	*	100.00	106,17	23.77	3.23	80.0	495%
		Y	17.42	87.73	19.15		80.0	
10467	LTE-TED (SC-FDMA, 1 RB, 5 MHz.	Z	1.03	60,00	7,00	ered of	80.0	
AAE	CPSK, LIL Subframe=2,3,4,7,9,9)	×	100.00	124.87	32.33	3.23	90.0	± 9/8/6
		Y	100.00	123.85	31.88		0.08	
1040E	LTE-TOD (SC-FDMA, 1 HB 3 MHz 18-	Z	34.96	102.47	23.96		0,06	
AAE	QAM, UL Subframe 2,3.4,7,8,9)	×	100,00	109,58	25.58	3.23	80.0	1989
		·Y	108:00	109.06	25.07	1	80.0	
10mm	LTE-TOD (SC-FDMA, 1 RB, 5 MHz, 64-	Z	1.06	60.45	7.57		80.0	
ARE	GAM, UL Subframo=2 3.4 7.8,9	×	100,00	106.18	23.77	3.23	80.0	#98%
_		Y	18,04	88.11	19.26		80.0	
10470-	LTS-TOD (SC-FDMA, 1 RB, 18 MHz	2	(.03)	60.00	7.00	1000	80.0	
MAE	OPSK, UL Subframo=2,3,4,7,8,8)	8.	100,00	124.71	32.35	3.23	0.00	#9.6 W
_		. K	100.00	123.98	31,88		80.0	
10471-	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-	2 X	35,24	102:56	23.97		50.0	
AAE	QAM, UL Subtramo=2,3,4,7,8,9)	1	100.00	109.53	25.35	3,23	80.0	±9.8%
		Y	100.00	109.01	25.04		60.0	
10472	LTF-TOD (SC-FDMA, 1 RB, 10 MHz, 64-	Z	1.05	60.40	7.64	2.5	80.0	
AAE	DAM, UL Subframe-2.3.4.7.8,9)	*	100,00	106/13	23.74	3.73	80:0	土瓦在別
		Ä.	17.90	.88.00	19,21		80.0	
10473	LTE-TDD (SC-FDMA, 1 RB, 15 MHz.	X	1.02	60.00	8.09		90.0	
AAE	GPSK, LiL Stellrame=2,3,4,7,8,9)		100.00	124.67	32,34	3.23	86.0	:26%
		Y	100.00	123.95	31.87		0.08	
10474	LTE-TOD (SC-FDMA, 1 RB. 15 MHz, 16-	2	34.67	102:34	23/81	770	90,8	
MAE	QAM, UL Subtraine=2.3,4,7,0,9)		100.00	109.54	25.35	3.23	80,0	+9.6%
		Y	100,00	109.01	25,04		-80.0	-
11475-	LTE TOD (SC-FDMA, 1 RB, 15 MHz, 64-	Z	1.05	80.39	7.63		80,0	
SA	GAM, UL Subframe=2 3,4,7,8,9)	×	100.00	196,14	23.74	3,23	80.0	196%
		Y	17.52	67.78	19.16		80,0	
		7	1.03	60.00	6.00		80.0	

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10480- LTE-TI AAF DAM, 1 10490- LTE-TI AAA DPSK, 10480- LTE-TI AAA B4-QA 10482- LTE-TI AAB GPSK 10483- LTE-TI AAB GPSK 10483- LTE-TI AAB LTE-TI	, U.L. Subframe = 2,7,4,7,8.9)	8	100.00	100.37	25.27	3.22	HIV.O.	± 0.8 %
AAF QAM, 1 10479 LTE-TI AAA QPSK, 10480 LTE-TI AAA 16-CAI 10480 LTE-TI AAA 16-CAI 10482 LTE-TI AAB 16-QAI 10483 LTE-TI AAB 16-QAI 10483 LTE-TI AAB 16-QAI 10485 LTE-TI AAE GPSK 10486 LTE-TI AAE GPSK 10487 LTE-TI AAE GPSK 10488 LTE-TI AAE GPSK 10488 LTE-TI AAE GPSK 10488 LTE-TI AAE GPSK 10488 LTE-TI AAE GPSK 10489 LTE-TI AAE LTE-T		Y	100.00	108.84	24.96		80.0	
00480- LTE-TI AAA UPSK, 10480- LTE-TI AAB UPSK, 10480- LTE-TI AAB UPSK, 10480- LTE-TI AAE UPSK, 10480- LTE-TI		12	1.00	80.28	7.55	2.70	80.0	-
0480- LTE-TI AAA 10480- LTE-TI AAA 10480- LTE-TI AAA 10480- LTE-TI AAB 10480- LTE-TI	TDD (SC-FDWA_1 RB, 20 MHz, 64- , UL Subframe=2,3,4.7,0,9)	8	400,00	108.79	23.72	3.22	80.0	±9.6%
0480- LTE-TI AAA 10480- LTE-TI AAA 10480- LTE-TI AAA 10480- LTE-TI AAB 10481- LTE-TI		-Y-	17:03	07.46	19,06	= -	H0.0	
0480- LTE-TI AAA 10480- LTE-TI AAA 10480- LTE-TI AAA 10480- LTE-TI AAB 10481- LTE-TI		Z	1.03	80.00	0.90		80.0	
10480- LTE-TI AAA 18-QAI 10482- LTE-TI AAA 04-QAI 10482- LTE-TI AAB 16-QAI 10483- LTE-TI AAB 16-QAI 10483- LTE-TI AAB 16-QAI 10483- LTE-TI AAB 16-QAI 10483- LTE-TI AAB 16-QAI 10488- LTE-TI AAB 16-QAI 10488- LTE-TI AAB 10488- LTE-TI	TDD (80 FDMA, 50% RB, 1 4 MHz K, UL Subtrame=2,3,4,7,8,9)	75	32A7	108.40	30.35	3.23	80.0	±9.6 %
AAA 18-GAI 10481- LTE-TI AAA 04-GAI 10482- LTE-TI AAB 16-GAI 10483- LTE	3	4	23.42	102.56	26:35		80.0	
AAA 18-GAI 10482- LTE-TI AAA 04-GAI 10482- LTE-TI AAB 16-GAI 10483- LTE		7	8.33	85.84	29.97		BDG	
10481- LTE-TI AAA 04-QAI 10482- LTE-TI AAB QPSA 10483- LTE-TI AAB 16-QAI 10483- LTE-TI AAB 04-QAI 10483- LTE-TI AAB 16-QAI 10483- LTE-TI AAE 16-QAI 10488- LTE-TI AAE 16-QAI 10488- LTE-TI AAE 16-QAI 10488- LTE-TI AAE 16-QAI 10489- LTE-TI AAE 16-QAI 10489- LTE-TI AAE 16-QAI 10489- LTE-TI AAE 16-QAI 10489- LTE-TI AAE 16-QAI 10491- LTE-TI	TDD (SC-FDMA - 90% RB. 1.4 MHz. AM, UL Subframe=2,3,4,7,8,9)	X	42.90	105.02	27.50	3.23	80.0	29,65
AAA 04-QA  10482- LTE-TI AAB 04-QA  10483- LTE-TI AAB 16-QA  10484- LTE-TI AAB 04-QA  10488- LTE-TI AAE 16-QA  10488- LTE-TI AAE 16-QA  10488- LTE-TI AAE 16-QA  10488- LTE-TI AAE 16-QA	- Harding	Ψ.	20.70	94.12	24.14		80.0	
AAA 04-QA  10482- LTE-TI AAB 04-QA  10483- LTE-TI AAB 16-QA  10484- LTE-TI AAB 04-QA  10488- LTE-TI AAE 16-QA  10488- LTE-TI AAE 16-QA  10488- LTE-TI AAE 16-QA  10488- LTE-TI AAE 16-QA		7	6.08	76.74	17.00		80.0	
10482- LTE-TI AAB QPSA 10483- LTE-TI AAB 16-QA 10484- LTE-TI AAB 64-QA 10484- LTE-TI AAB 16-QA 10488- LTE-TI AAE 16-QA 10488- LTE-TI AAE 16-QA 10488- LTE-TI AAE 16-QA	TOD (SC-FDMA 50% RB, 1.4 MHz,	×	32.63	100001	25.80	3.23	80.0	17,6%
AAB QPSA.  10483- LTE-TI AAB 16-QA  10484- LTE-TI AAB 04-QA  10485- LTE-TI AAB 10488- LTE-TI	AM, UL Subframer2,3,4,7,8,9)		25,63	2000	340.00	3.63	34-33	2 0,0 %
AAB QPSA, 10483- LTE-TI AAB 16-QA 10484- LTE-TI AAB 04-QA 10485- LTE-TI AAB 16-QA 10486- LTE-TI AAB 16-QA 10488- LTE-TI AAB 10488- LTE-TI AAB 16-QA 10488- LTE-TI AAB 16-QA		Y	15,67	59.36	22.38		80.0	
AAB QPSA, 10483- LTE-TI AAB 16-QA 10484- LTE-TI AAB 04-QA 10485- LTE-TI AAB 16-QA 10486- LTE-TI AAB 16-QA 10488- LTE-TI AAB 10488- LTE-TI AAB 16-QA 10488- LTE-TI AAB 16-QA		Z	4,46	72.49	15.13	-	80.0	10.30
AAE 16-QA 10484- LTE-TI AAB 84-QA 10485- LTE-TI AAE 16-QA 10488- LTE-TI AAE 16-QA 10488- LTE-TI AAE 16-QA 10488- LTE-TI AAE 16-QA 10489- LTE-TI AAE 16-QA	TOD (SC-FDMA, 50% RB, 3 MHz, rt, UL Subframe=2,3,4,7,6,9)	×	0.30	87.38	23.04	2.23	80.0	10.6%
AAE 16-QA 10484- LTE-TI AAB 84-QA 10485- LTE-TI AAE 16-QA 10488- LTE-TI AAE 16-QA 10488- LTE-TI AAE 16-QA 10488- LTE-TI AAE 16-QA 10489- LTE-TI AAE 16-QA		Y	3.94	74.35	17.65		60.0	
16-QA	ALLES AND	7.	2.70	70.00	15.33		30.0	-
10484 LTE-TI AAB 94-DA 10485 LTE-TI AAE GPSK 10488- LTE-TI B4-DA 10488- LTE-TI B4-DA 10488- LTE-TI AAE GPSK 10489- LTE-TI AAE GPSK 10489- LTE-TI AAE 10491- LTE-TI AAE 10491- LTE-TI AAE 10491- LTE-TI	TDD (SC-FDMA, 50% RB, 3 MHz. AM, UL Subframe=2.3,4,7,9,9)	9.	15.24	90,75	23,81	2.23	80.0	19.6%
AAB 04-DA 10485- LTE-TI AAE QPSK. 10488- LTE-TI B4-DA 10487- LTE-TI B4-DA 10488- LTE-TI AAE GPSK 10489- LTE-TI AAE 16-DA		W.	9.75	83.78	21:08		B0 0	
AAB 04-DA 10495- LTE-TI AAE QPSK. 10498- LTE-TI B4-DA 10488- LTE-TI B4-DA 10488- LTE-TI AAE LTE-TI		7	3.87	71:00	15 th		80.0	
10485- LTE-TI AAE GPSK  10488- LTE-TI AAE 18-GA  10488- LTE-TI AAE GPSK  10488- LTE-TI AAE 16-QA  10489- LTE-TI AAE 16-QA	TDD (SC-FDMA: 50% RB; 3 MHz: AM; UL Subtraine=2.3.4,7,8,9)	×	12.87	88.08	23.00	2.23	90.DE	± 0.6 %
AAE QPSK.  10498- LTE-TI AAE 16-DA  10498- LTE-TI AAE QPSK  10489- LTE-TI AAE 16-DA  10490- LTE-TI AAE 16-DA	Pont the deleter with which he party	4	8.49	81.59	20.85		80.0	
AAE QPSK.  10498- LTE-TI AAE 16-DA  10498- LTE-TI AAE QPSK  10489- LTE-TI AAE 16-DA  10490- LTE-TI AAE 16-DA		12	3.66	70.14	14.84		80.0	_
10498- LTE-TI AAE 10487- LTE-TI AAE 64-DA 10488- LTE-TI AAE 10489- LTE-TI B-QA 10489- LTE-TI B-QA	TDD (SC-FDMA, 50% RB, 5 MHz K, UL Sutriame=2.3.4.7.8.9)	×	7.98	PE.70	23.25	2.23	80.0	±9.6%
AAE 18-GA 10407- LTE-TI AAE 84-DA 10488- LTE-TI AAE 16-DA 10489- LTE-TI AAE 16-DA 10490- LTE-TI AAE 10490- LTE-TI	P. Ar Shillians-1940 Bis	V.	4.36	75.94	19.15		80.0	_
AAE 16-0A 10487- LTE-TI AAE 64-0A 10488- LTE-TI AAE 16-0A 10489- LTE-TI AAE 16-0A 10490- LTE-TI AAE 16-0A					17.26	_		-
10407- LTE-TI AAE 54-DA 10488- LTE-TI AAE 16-DA 10489- LTE-TI AAE 64-DA	TDD (SC-FDMA, 50% RB, 5 MHz	2	3.77	72.53 76.17	19.55	2.23	80.0	1964
AAE 64-0A  10488- LTE-T AAE GPSK  10489- LTE-T AAE 16-0A  10490- LTE-T AAE 94-0A	AM, UL Subframe 2,3,4,7;8,9)	1					-	
AAE 64-0A  10488- LTE-T AAE GPSK  10489- LTE-T AAE 16-0A  10490- LTE-T AAE 64-0A		1.7	3.78	70.74	18.72		B0.0	
AAE 64-0A  10488- LTE-T AAE GPSK  10489- LTE-T AAE 16-0A  10490- LTE-T AAE 64-0A		2	3.08	68.57	15.26		80.0	10000
10488- LTE-T AAE QPSK 10489- LTE-T AAE 16-QA 10490- LTE-T AAE 04-QA	TOD (\$C-FDMA, 50% RB, 5 MHz. AM, UL Subframe=2.3.4.7.6.9)	×	5.22	75.40	19.25	2.23	80.0	±9:0%
AAE QPSK 16489- LTE-T AAE 16-QA 10490- LTE-T AAE 64-QA	And the second s	Y	3.77	70.31	16.54		60.0	
AAE QPSK 16489- LTE-T AAE 16-QA 10490- LTE-T AAE 64-QA		12	3.08	88.23	157.40	5	80.0	-
10489- LTE-T AAE 16-QA 10490- LTE-T AAE 64-QA	TDD (SC-FDMA, 50% RB, 10 MHz, K, UL Subtrame=2.3.4,7.8,9)	3.	6.58	80.18	22.14	2.23	60.0	±.D.E 9
10490- LTE-T AAE 64-QA		Υ.	4.49	74.73	19.35		8073	
10490- LTE-T AAE 64-QA		Z	3.08	72.12	17/94	-	80.0	
1049U- LTE-T AAE 64-QA	TDD (SC-FDMA, 50% RB, 10 MHz. MM, UL Subframes 2.3.4.7.8.7)	Х	4.88	73.47	19,42	2.23	90,0	±0.61
AAE 64 QA 10491- LTE-T	The second section of the second	Y	4.01	70.32	17,71		80.0	1
AAE 64 QA 10491- LTE-T			3.48	00.92	16.70		80.0	
AAE 64 QA 10491- LTE-T	TDD (SC-FDMA, 50% F/B, 10 MHz	2 8	136	72.95	19.23	2.25	80.0	+5.65
	AM, UL Schrame 23,4,7,8,9	V	1000	75 40	17.64	224	80.0	200
	The second second		4.10	70.09				-
	TOD ISC-FDMA, 50% FIB, 15 MHz.	X	5.95	76.95	76.66 20.70	2.25	80.0 80.0	±9.6 %
AAE QPSK	K. UL Sunhaver 2.3.4.7.8.91	1			-	-		
1		Y	4.52	72.00	18.69		80.0	
- L	THE R. P. LEWIS CO., LANSING, MICH.	Z	-0.02	70.84	17.60	1	90.0	
	TDD (BC-FUMA, 50% RB, 15 MHz; JAM: UL Subframe 2,3.4,7.8.0)	×	4.04	71/68	18.90	223	80,0	±8,64
10.00	Will UL Soundine Cart Lean	4.0	4.21	09.40	17.83		0.05	
	ANIC OL Submeme-2,3,4,7,6,80						80.0	

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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10493- AAE	LTE-TDD (SC-FDMA_50'S RB_15 MHz_ 84-QAM, LL Subframe=2.3,4,7,8,9)	×	4.97	71.38	18,79	2.23	B0.0	1985
		×.	4.37	89.24	17.58	-	80.0	
	The second secon	Z	3.90	88.20	16.76		80.0	
10494- AAF	LTE-TDD (SC-FDMA, 50%, FIB, 20 MHz. QPSK, UL Subheme=2,3,4,7,9,9).	X	6.95	79.86	21.58	2.23	90,0	1964
		Y	4.99	74.37	19.18		90.0	
	Control of the Contro	Z	4.13	72.26	18.02		80.0	
40495 AAF	LTE-TDD (SC-FDMA, 50% RB, 20 Met., 15-QAM, UL Subframe=2,3.4,7,8,9)	×	5.07	72,39	18.10	2.23	90.0	±96%
		Y	4.37	89.87	17:34		80.0	
20100	The last of the last	Z	3.87	88.70	16.98		80.0	
AAF	LTE-TDD (SC.=DMA, 50%, RB, 20 MHz, 54-QAM, UL Subframe=2,3,4,7,8.9)	Х	5.07	71.80	18.98	2.23	30.0	±9.6%
		Y	4.43	69.53	17.74		80.0	
10497-	LATE TRADE SPECIFICATION AND ADDRESS OF THE PARTY OF THE	Z	3.96	68.45	18.92		80.0	
AAA	LTE-TDD (SC FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe+2.3,4.7,6,8)	X	1 77	64.28	21.25	2.23	80.0	196%
		Y	2.76	69.51	14.63		80.0	-
10498-	LTE-TDD (SC-FDMA, 100% RB, 1.4	2	1.83	65.26	12.27		80.0	-
AAA	WHz, 16-QAM, UL Subframo=2,3,4,7,8,9)	×	4.10	72.22	15.94	2.23	80.0	¥86.2
		Y .	2.08	.63.53	14.20		80.0	
	The state of the s	Z	1.49	60.84	9.11		80.0	
10499 AAA	HTE TDD (SC FDMA, 100% RB, 1/4 MHz, 64-CAM, LT, 3-6/(sma-2,3,4,7,8.9)	×	3.88	73.34	15.38	2,23	80.0	196%
		Y	2.02	62.98	10.80		0.08	
4.4	A COLUMN TO STATE OF THE STATE	Z	1.45	60,40	8.75		80.0	
10900- AAB	LTE-TDD (SC-FDMA: 100% RB, 3 MHz, QPBK, UL Subframe=2.3,4,7,8,9)	Х	6.85	82.59	72.44	2.23	0.08	±8.6%
		8	4.30	75.01	19.09		0.06	
	Andrew Construction	Z	3.32	71.99	17.46		80.0	
10001- AAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, LIL Subfalme=2.3,4.7,8.9).	8	5.08	74.80	19.39	2.23	0.08	±9.6 %
		Y.	3,90	70.59	17.11		80.0	
Tanan.	The second secon	2 8	3.27	68.63	15.87		0.08	11
10502- AAB	LTE-TDID (SC-FDMA, 100% RB, 3 MHz. B4-GAM, UL Subtrame=2,3,4,7,8,9)	- 1	5,08	74.42	19,19	2.23	80.0	±9.6 %
_		Y	3.94	70,38	16.86		80.0	
inena	A Review of the control of the contr	Z	3.32	56.58	15.78		80.0	100
10503- AAE	CPSK, UL Subframe=2,3,4,7,8,9)	X	5.47	80.7E	22.03	2.23	0.08	± 5.8 %
_		Y	4.42	74.51	19.24		0.00	
10604-	LYP YOU AND THANK ASSOCIATE VALUE	Z	3,53	71.90	17.84		80,0	
AAE	LTE-7DD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2 3 4 7.8 9)	×	4 84	73.36	19.37	2.23	2,06	±9.6%
		8	3.50	70.22	17.65		60.0	-
10505-	LTE-TOD (SC FDMA, 100% RB, 5 MHz.	2	3.46	68.82	10.64	-	80.0	
AAE	B4-QAM, UL Subirame=2.3.4.7.8.9)	9		72.84	19:17	2.23	0,08	∓ 8'€ W
			3.55	80.03	17.58	-	80.0	
10506	LTE-TDO ISC-FDMA, 100% F68, 10	2 X		68.67	16.80	M 200	80.0	
AAE	MHz. QPSK, UL SuVienne=2,3,4,7,8,9)	Y	0.87	79.65	21.49	2,23	80.0	+88#
		2	4.10		19.10	1	80.0	
0507-	LTE-TOD (SC-FDMA, 100% RB. 10.	X	5,05	72.10	17,94	2.44	0.08	
AAE	MHz. 16-QAM, UL. Subframe=2.3.4 7,8,9)	~	9700	72.32	19.14	2.23	80.0	19,6%
		Y	4.35	69.81	17.80		60.0	
				68.63				

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10508- AAE	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	X	5.05	71.72	18.93	2.23	80.0	±9.6 %
		Y	4.41	69.46	17.70		80.0	
operanci-	The second state of the se	Z	3.93	68.38	15.87	DERCH	80.0	-3:31,2:55
10609- AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	6.42	76.31	20.23	2.23	80.0	±9.6%
		Y	5.10	72.45	18.45		80.0	
		Z	4,44	71.04	17.56		0.08	
10510- AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	X	5.41	71.43	18.82	2.23	80.0	± 9.6 %
	1	Y	4.81	69.39	17.73		80.0	
		Z	4.34	68.44	16.99	Transport	80.0	1 11 11
10511- AAE	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3.4,7.8,9)	X	5.40	70.96	18.67	2.23	0.08	± 9.6 %
		Y	4.84	69.09	17.65		80.0	
		Z	4.39	68.21	16.94		80.0	
10512- AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	X	7.47	79.47	21.24	2.23	80.0	±9.5%
		Y	5.46	74.25	18.99		80.0	
-		Z	4.64	72.47	17.97		80.0	
10513- AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	Х	5.39	72.08	19.07	2.23	80.0	±9.6%
	The state of the s	Y	4.72	69.76	17.86		80.0	
3022007	PRODUCTION AND AND ADDRESS OF THE PROPERTY OF	Z	4.23	68.69	17.07	-0000	80.0	Jones Ave.
10514- AAF	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3.4,7,8.9)	×	5.30	71.34	18.83	2.23	80.0	±9.6 %
		Y	4.71	69.27	17.73		80.0	
		2	4.25	68.30	16.97		80.0	
10515- AAA	IEEE 802.11b WIFI 2.4 GHz (DSSS, 2 Mbps, 99pc duty cycle)	X	0.99	64.18	15.67	0.00	150.0	±9.6 %
100.80	THE RESERVE TO THE PARTY OF THE	Y	0.87	62.03	13.65		150.0	
5000000		Z	0.96	64.13	15.35	- (4004)	150.0	150000
10516- AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 99pc duty cycle)	×	1.07	82.62	23.29	0.00	150.0	± 9.6 %
		Y	0.42	66.18	13.67		150.0	
		Z	0.79	78.03	21.08		150.0	
10517- AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	X	0.89	67.34	17.01	0.00	150.0	± 9.6 %
		Y	0.70	63,35	13.75		150.0	
	WEEK NOO 14 - E. INIEL E COLL. (CERNA C	Z	0.83	66.82	16.43	0.00	150.0	± 9.6 %
10518- AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	100	4.64	66.90		0.00	150.0	1 9.0 %
		Y	4.47	66.33	15.94		150.0	
10519- AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	X	4.85	67.18	16.51	0.00	150.0	±9.6 %
7010	mayor volo and spany	Y	4.67	66.59	16.08		150.0	
		L	4.65	67.25	16.34		150.0	
10520- AAB	IEEE 902.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	X	4.71	67.17	16.45	0.00	150.0	±9.6%
77.11		Y	4.52	66.54	15.99		150.0	
Section 1		Z	4.51	67.23	16.28		150.0	
10521- AAB	IEEE 802,11a/h WIFI 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	X	4.64	67.19	16.44	0.00	150.0	± 9.6 %
	The same and the s	Y	4.45	66.53	15.97		150.0	
		Z	4.44	67.24	16.27	20.00	150.0	
10522- AAB	IEEE 802.11a/h WIFI 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	×	4.69	67.17	16.48	0.00	150.0	± 9.6 %
		Y	4.51	66.60	16.04		150.0	-
		Z	4.50	67.33	16.35		150.0	

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10523- AAB	IEEE 802 11am WHI 5 GHz (OEDM, 48 Mbps, 98pc duty cycle)	X	4.56	67.00	16.34	0,00	150.0	+8.6%
		9	4.18	66.45	15/88		150.0	
		2	4.39	67.23	16.22		150.0	
10524- AAU	IEEE 802 11ah W.F. 5 GHz (OFDM, 54 Mbps, 99pc duty sycis)	8	4.64	67.13	16.40	0.00	150.0	+9.6%
	11/2/11/2019	Y.	4.45	56.52	16.01		150.0	
	the factor of the second second second second	Z	4.44	67.24	16:32	-	150.0	1
AAEL	(EEE 802.11ac WiFi (20MHz, MCSO) (Spc duty cycle)	8	4.60	06.17	16.06	0.00	150,0	±9.6%
_		1 4	4.43	65.55	15:60	-	150.0	
10000		Z	4.44	86.33	15.94		150.0	
10526- AAH	IEEE 802, Trac WIFF (20MH2, MCS1, 39pc thirty rydie)	×	4.80	06.57	10.20	0.00	150.0	3962
		Ž	#80	85.93	15.75		150.0	
10527-	IFFF only a True manual trans		4.61	86.68	16.07		150.0	Mr. C.E.
AAB	IEEE 802.11ac W.F. (20MHz, MCS2, 99pc duty dyore)	X.	4.72	66.55	16.16	0.00	150,0	398%
_		Y	4.52	65.88	15,69		150.0	
10528-	THE SOUTH AND WATER THE	2:	4.53	96,66	16.02		150.0	
AAB	(EEE 802.11ac WIF: (20MHz, MOS3, 99pc duty cycle)	X	4.73	66,57	16.19	0.00	150.0	1988
		Y	4.54	85.90	15.72		150,0	
10529-	THE COLUMN THE PERSON OF THE P	Z	4.55	88.67	16:05		150.0	Lauri II
AAB.	IEEE 802.11ac WIFI (20MHz, MCS4, 99pc duty cycle).	Х	4.73	68.57	16.19	0.00	150.0	± 9.6 %
_		Y	4.54	05/90	15.72	-	150,0	
*****	Service Many Adv Address of the Control of the C	2	4.55	86.67	16.05	100	150.0	
10031- AAB	(EEE 802 11ac WIFI (20MHz, MCSS) 99pc duty cycle)	×	4.74	86.72	16,22	0,00	150.0	19.6 %
		Y	4.53	68.01	15.73		150.0	
-		- Z	4.53	66.77	18.00		150.0	
10532- AAB	IEEE 802,11ac WIFI (20MHz, MCS7, 99pc duty cycle)	8	# 60	66.69	16.17	0.00	156.0	196%
		Y	4.39	65.86	15.66	-	150.0	
-		Z	4.40	66.64	16.01		150.0	
AAB	(EEE 802,11ac WF) (20MHz, MCS8, 98pc duty cycle)	X	4.75	68,80	16.17	0.00	150.0	±96%
		Y	4.55	65.94	15.70		150.0	
	The state of the s	2	4.56	66.73	18.05		150.0	
AAB	EEE 802 11ac WiFI (40MHz, MCS0, 99bc duty cycle)	X	5.24	66.67	16.21	0.00	150.0	19.6%
		A.	5,08	66.08	15.82		150.0	
		Z	5.06	66.70	#8.06		150.0	
10535- NAE	IEEE 802 11sc WiFr(40MHz, MCS1, 99pc duty cycle)	X	5/31	06.61	18.26	0.00	150.0	19.8%
	1	Y	5.14	66.24	15:88		150.0	
10536-	DEPT AND ALC: IND	Z	5 12	86.85	16.13	Det.	150.0	
AAB	IEEE 802,114c Wify (ADMHz, MCS2, 99pc chily cycle)	X	5.13	66.81	16.25	0.00	150.0	198%
		Y	5,01	86.19	15.84		150.0	
0637	EEE and the committee or a very	2	8.00	98,34	16 11		130.0	
AAB	IEEE 802 11ac VIIFI (48MHz, MCS3, 69pc duty cycle)	X	5.24	68,77	16.23	0.00	150.0	主 8 臣 86
		Y	5.07	66.17	15.84		150.0	
0538-	TEEE AND AND ARREST AND	Z	5.08	86.79	16.08		150.0	
VAE.	IEEE 002.11ac WIFI (40MHz, MCS4, HBpc duty cycle)	×	5.35	66.82	16.29	0,00	150.0	29.6%
		Y	5.17	86,21	15.90		150.0	
0540	TEEF 600 ++ Investigation 1	2	8.14	66,79	16.12		150.0	
AAE	IEEE 802 Than WIFI (#8MHz, MCSB, 99pc duty cycle)	×	5.25	56,76	16.29	0.00	150.0	196W
-		Y	5.09	66.21	15.91		150.0	
		2	5.07	86.78	16.13		150.0	

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10541- AAB	IEEE 802.11ec WIFI (40MHz, MCS7) 99pc duty cycle)	×	5.24	66.69	16.24	0.00	150.0	±9,8%
		Y	5.05	66.08	15.84		150.0	
		Z	5.05	66.69	16.08		150.0	
10542- NAB	(EEE 802,11ac WF) (40MHz, MCS8, 99pc duty cycle)	X	5.30	66.72	16.27	0.00	150.0	#9.8 %
		Y-	5.22	86.16	15.50		150.0	
		Z	5.20	66.74	16:12		150.0	
10543- AAB	IEEE 802.11ec WFi (40MHz, MCS9 89pc duty cycle)	X	5.47	66.74	16.29	0.00	150.0	±9.6%
		Y	5.30	66.21	15.95		150.0	
		Z	5.27	66.76	16.14		150.0	
10544- AAB	IEEE 802.11ec WIFI (80MHz, MCS0, 19pc duty cycle)	X	5.52	66,77	16.19	0.00	150.0	18.6%
		Y	5.38	66:20	15.82		750.0	
		2	5.37	66.80	16.04		150.0	
10545- AAB	IEEE 802.11ac-WiFi (80WHz, MCS1 99pc duty cycle)	×	5.72	67.14	16,31	0.00	150.0	主男.改%
		Y	5.58	66.63	15.99		150,0	
	I TO A SECOND SECOND	Z	5.53	67.12	16.15	1000	150.0	
10546- AAB	IEEE 802.11ec WIFI (80MHz, MC62, 99pc duty cycle)	×	5.61	67,04	16.28	0.00	150/0	±9.6 %
70		Y	5.45	66.44	15.91		150.0	
		2	5.43	66.99	16.10		150.0	
10547- AAB	IEEE 802.11ac WiFI (80MHz, MCB3, 99pc duty cycle)	X	5.70	67.12	16,31	0.00	150.0	±9.8%
		Y	5.53	66.49	15.92		150.0	-
		2	5.50	67/02	15.11		150.0	
10548- AAB	IEEE 802 11ac W/FI (89MHz, MCS4, 99pc duty cycle)	×	5.83	67.96	16.70	0.00	150.0	±9.6%
		Y	5.82	87.53	16.41		150.0	
		2	5.64	67.B3	16.39		150.0	100
10550- AAB	IEEE 802 11ac WFI (80MHz, MCS6, 99pc duty cycle)	Z X	3.63	67.00	16.27	0.00	150.0	±9.6 %
		9	5.47	66.43	15.95		150.0	
		2	5.45	67.00	16.12		150.0	
10551- AAB	IEEE 802.11ac WIFI (BOMHz, MCS7, 99pc duty cycle)	×	5,65	67.07	18.26	0,00	150.0	≥9.6 %
		1.8	5.48	66.48	15.89		150.0	
		- 2	5.46	67.04	18.10		150.0	
10552- AAB	IEEE 802 11ac WIFI (80MHz, MCS8 99pc duty cycle)	×	5.55	66.86	18.18	0.00	150.0	19.8%
	and class	- 4	5.39	66.26	15.80		150.0	
		Z	5.39	66.89	16.04		150.0	1
10553- AAB	IEEE 802 Tlac WIFI (80MHz, MCS9, 99pc duty bydie)	X	5.00	66.91	16.22	0,00	150,0	± 9.6 %
		Y	5,48	58.32	15.86	-	150.0	
		2	5.47	66.91	16.07		150.0	1.3
10554- AAC	IEEE 802 11ac WIFI (160MHz, MCS0, 99pc duly cyde)	X	5.92	67.13	16.27	0.00	150.0	±9.6%
		. Y.	5.78	68.58	15,93		150,0	
	The Report of the Control of the Con	12	5.77	87.13	16.11		150.0	
10555- AAC	IEEE 802 11ac W/FI (100MHz, MCS1, 90pc duty uyde)	Х	8.06	87,44	16,39	0.00	150,0	± 9.6 %
		Y	5.92	88 88	16.06		150.0	
		- 2	5.88	67.38	18.21	-	150.0	
10056+ AAC	IEEE 502.11ac WIFI (160MHz, MCS2. 99pc duty cycle)	X	6,07	67.47	16.40	0.00	150,0	±88%
		Y	5,94	66.94	16.07	-	150.0	
		-Z	5.90	67.42	16.23		150.0	
10557- AAC	IEEE 502.11ac WiFi (160MHz, MCS3, 99pc duty syde)	×	8.08	67.43	16,40	0.00	150.0	±9.6 %
	and and days	· Y	5.91	66.85	16.05		150.0	

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10558: AAC	(EEE BIX 11ac WIFI (180MHz, MCS4, 99pc duty cycle)	×	5.11	67.60	16.50	-0.00	150,0	19.6%
rono	CODE GLEY LYME!	Ý	5.96	67.02	16.15		150.0	
1		2	5.91	67.50	16.30		150.0	
10560- AAG	IEEE 802.11ag WIFT (160MHz, MCSS, 99pg blus byde)	×	6.11	67.46	16.47	0,00	150.0	± 9.6 %
	1 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	Y.	5.95	66.87	18.11		150.0	
	the second secon	2	5.92	67.38	16.28		150.0	
1056) AAC	(EEE 802.11ac WIFI (160MHz MCS7, \$50c duty cycle)	×	8,02	67.40	16.48	0.00	150.0	±9.6%
	I I I I I I I I I I I I I I I I I I I	8	5.87	EE.BA	16:13		150.0	
-		12	5.84	67.33	15.29		150.0	
AAC AAC	IEEE 802,11ac WIFT (160MHz, MCSS, 99pc duty cycle)	Х	6.16	67.62	16.69	0.00	150.0	工具有多
-		-35	6.01	67.26	16.35		150.0	
10563-		2	5.93	67.63	15.44		150.0	
AAC:	IEEE 802:11ae WiFi   160MHz, MCE3 99pc duty ayole)	*	9,47	88,29	16.83	0.00	150.0	2985
		¥ -	6.34	67.82	15.58		150.0	
10564-	If the man as a function is a root or com-	2.	6.09	87.70	16.43	-	150.0	
AAA	IEEE 802,11g WIFI 2.4 GHz (DSSS- DFDM, 9 Mbps, 98pc duty cycle)	×	4.97	68.98	16.53	0,46	150 0	E 3.6 #
		Y	4.81	68,46	15.14		150.0	
10565-	UEST AND ALL HOSE A VISIO INCOME.	2	4.78	67.02	16.32	-	150.0	
AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS- OFDM: 12 Mops: 98pp duty o/de)	*	5.23	B7.46	16.85	0.46	150.0	196%
_	1	Y	5.05	86.93	16.47		150.0	
10566-	IEEE 802 11g Wil-12.4 GHz (DS85-	2	5.01	67.49	16.66		150.0	
AAA	OFDM, 18 Mbps, 39pc & (y cycle)	×	5.00	67.34	16.69	0.46	150,0	19.6%
		Y	4.88	96.77	16.28		150.0	
10567	(EEF 802 11g WF/ 2.4 GHz (DSSS-	Z	4.84	87.32	16.46		150.0	
AAA	OFDM, 24 Mbps, 56pc duty cycle)	×	D.09	67.74	17.04	0.46	150.0	19.6%
_		· P	4.91	87.15	16.63		150.0	
10568-	SEEE BOOKS AND MEET OF A COLUMNIAN	2	4.85	87.80	16:87		150.0	
AAA	OFOM, 38 Mbps, 95pc duty cycle)	×	4.97	67.07	16,45	D.46	150.0	19.6 %
_		Y.	4.80	68.54	16.05		150,0	
10589-	WELL BUILD AND HARE OF A COLUMN TO SERVICE	Z	4.74	67.03	10.19		150.0	27.7
AAA	DEDM. 48 Mbps: 39pc date cycle)	8.	5.03	67.78	17.08	0.46	150,0	± 9,8 %
_		Y	4.86	67.22	18.68		150,0	
10570- AAA	IEEE 802 11g WF/ 2.4 CHz (DSSS- OFDM, 54 Mbp). 30bs duty cyclej	Z K	9.85	67.93 87.62	17,01	0.46	150.0 150.0	1965
	and alvest	Ŷ	4.90	67.08	16.82		150.0	
	The state of the s	2	4.88	67.73	16.86		150.0	-
10571- AAA	IEEE 802,11b WIFI 2.4 GHz (DS8S, 1 Wbps: 90pc duty cycle)	K	1.32	55.77	17 12	0.46	130,0	± 9.6 %
		Y	1,14	64.23	15.06		130.0	
***		- 2	1,17	05:20	15.80		130.0	
10572- AAA	IEEE 802,116 WIFI 2.4 GHz (DSSS, 2 Mbps, 90pc duty cycle)	X.	1,36	67.80	17.58	0.46	130.0	€ 9.6 %
		4	1.16	64.80	15.38		120.0	
10573	Provide Accordance and Accordance an	T	1.19	65.98	18.20	100	130.0	
NAA.	(EEE 802,11b WIFI 2.4 GHz (DSSS, 5.6 Mbps, 90ps duty cycle)	×	100,00	100.25	40,35	0.46	130.0	£8.6 %
		Y.	1.94	61,80	20:21		138,8	-
11574	inter too day tile of I was been been	Z	5:37	101.40	27.76	12 1	130.0	
MA	IEEE 802,116 WIFI 2.4 SHz (DSSS, 11 Mines 90po duty cycle)	X	1.88	77.53	22:17	0.46	130.0	+ 2 E %
		Y	1,28	7031	17.98	100	130.0	
		7.1	1,45	73.83	20.12		13000	

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10575- AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS- OFDM, 6 Mbps, 90pc duty cycle)	X	4.77	66.82	16.63	0.46	130.0	±9.6 %
-	ar and a maker ask and alone	Y	4.62	66.32	16.23		130.0	
	trescent and the later to the second	Z	4.56	66.75	16.29		130.0	
10575- AAA	IEEE 802.11g WIFI 2.4 GHz (DSSS- OFDM, 9 Mbps, 90pc duty cycle)	X	4.80	66.99	16.69	0.46	130.0	± 9.6 %
		Y	4.64	66.47	16.29		130.0	
		Z	4.59	66.94	16.38		130.0	
10577- NAA	IEEE 802.11g WiFi 2.4 GHz (DSSS- OFDM, 12 Mbps, 90pc duty cycle)	X	5.03	67.31	16.86	0.46	130.0	±9.6%
		Y	4.85	66.78	16.47		130.0	
	A CONTRACTOR OF THE SECRETARY AND A SECRETARY	2	4.78	67.21	16.54		130.0	
10578- AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS- OFDM, 18 Mbps, 90pc duty cycle)	X	4.93	67.50	16,98	0.46	130.0	± 9.6 %
		Y	4.75	66.94	16.57		130.0	
		Z	4.69	67.42	16.68		130.0	
10579- AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS- OFDM, 24 Mbps, 90pc duty cycle)	X.	4.69	66,84	16.33	0.46	130.0	±9.6 %
		Y	4.52	66.24	15.89		130.0	
		Z	4.43	88.57	15.89		130.0	
10580-	IEEE 802.11g WiFi 2.4 GHz (DSSS-	X	4.74	66.81	16.32	0.46	130.0	±9.6 %
AAA	OFDM, 36 Mbps, 90pc duty cycle)			0.000				2007
		Y	4.57	66.26	15.90		130.0	
		Z	4.47	66.59	15.90	0.40	130.0	1000
10581- AAA	IEEE 802.11g WIFi 2.4 GHz (DSSS- OFDM, 48 Mbps, 90pc duty cycle)	Х	4.83	67.59	16.95	0.46	130.0	±9.6%
		Y	4.65	86.98	16.51		130.0	
		Z	4.59	67.47	16.62		130.0	
10582- AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS- OFDM, 54 Mbps, 90pc duty cycle)	X	4.64	66.58	16.12	0.46	130.0	±9.6 %
		Y	4.47	66.00	15.67		130.0	
	Contract of the second	Z	4.36	66.28	15.65		130.0	
10583- AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	×	4.77	66.82	16.63	0.46	130.0	±9.6 %
And a second		Y	4.62	66.32	16.23		130.0	
		Z	4.56	66.75	16.29		130.0	
10584- AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	X	4.80	66.99	16.69	0.46	130.0	± 9.6 %
11.00	mape, cope and agency	Y.	4.64	66.47	16.29		130.0	
		Z	4.59	66.94	16.38		130.0	
10585- AAB	IEEE 802.11a/h W/Fi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	X	5.03	67.31	16.86	0.46	130.0	± 9.6 %
reno	mago, over easy agera;	Y	4.85	66.78	16.47		130.0	
	factor of the same	Z	4.78	67.21	16.54		130.0	1000
10586- AAB	IEEE 802.11a/h WFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	X	4.93	67.50	16.98	0.46	130.0	± 9.6 %
1010	standard action and advantage	Y	4.75	66.94	16.57		130.0	
		Z	4.69	67.42	16.68		130.0	
10587- AAB	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	X	4.69	66.84	16.33	0.46	130.0	±9.6 %
10.00	and a superior	Y	4.52	66.24	15.89		130.0	
		Z	4.43	66.57	15.89		130.0	0
10588-	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36	X	4.74	66.81	16.32	0.48	130.0	± 58.85 %
AAB	Mbps, 90pc duty cycle)	Y	4.57	66.26	15.90	MAS.	130.0	
		Z	4.47	66.59	15.90		130.0	
10589-	IEEE 802.11a/h WIFi 5 GHz (OFDM, 48	X	4.83	67.59	16.95	0.46	130.0	± 9.6 %
BAA	Mbps, 90pc duty cycle)	Y	4.65	66.98	16.51		130.0	-
		2	4.59	67.47	16.82		130.0	
10590-	IEEE 802 11a/h WFI 5 GHz (OFDM, 54	X	4.69	66.58	16.12	0.46	130.0	±9.6%
10590- AAB	Mbps, 90pc duty cycle)					U.M.C.	130.0	1.0.0.8
	THE PROPERTY OF THE PARTY OF TH	Y	4.47	66.00	15.67		130.0	

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10591- AAB	MCSC 90 no duty cycle)	×	4.02	66.87	16.71	0.46	130.0	19.6%
		4	4.77	E6.38	16:34		130.0	
		- 7	4,71	66.82	16.40		130.0	
10592- AAB	(EEE 802.11h (HT Mixed, 20MHz, MC31, 90pp duty pyde)	8	5.09	67.22	16.84	0.46	130.0	19.6%
		8	4.93	66:72	16.47		130.0	-
	at the same of the	2	4.86	87.15	16.53		130.0	
10593- AAE	IEEE 802:11th (HT Mixed, 20MHz, MGS2, 90pc duty cycle)	2 X	5.02	67.17	16.74	11.46	130.0	29.6%
		- Y	4.85	88.64	16.36		130.0	
		- 2	4.77	87.04	16.40		130.0	
10594- AAB	IEEE 802.11n (HT Mixed, 20MHz, MCS3, 80pc duty cycle)	2	5.07	67.32	16.89	0.46	130.0	19.6%
		Y	4.90	66.80	15.51		130.0	
		- 2	4.83	67.23	16.57		130.0	
10685- AAB	(EEE 802.11n (HT Mostd, D0MHz, MCS4, 90pc duty cycle)	×	5.05	67.29	16.79	0.46	130.0	196 W
		Y	4.87	66.75	76.40	Y	130.0	
	and the second second	2	4.80	67.17	16.45		130.0	-
10596- AAB	MCS5, 90pp duty cycle)	×	4,98	67.29	16.80	0.46	130.0	± 9.6 %
		Y	4.81	86.75	16,40		130.0	
	The second secon	Z	4.73	57.16	16.45		130.0	
10597- AAB	IEEE 802 11n (HT Mixed, SDMHz, MCS5, 90pc duty cycle)	×	4.94	67.23	16,70	0.46	130.0	196%
177		- Y	4.76	66.66	16.29	_	130.0	
			4.68	67.05	19,33		130.0	
10598- AAB	IEEE 802.TTn (HT Mixed, 26Mile, MCS7, SOperaley cycle)	*	4.82	67.49	18.98	0.46	130.0	198%
		14	4.74	86.90	18.55		130.0	
	Annual Control of the	Z .	4.68	67,34	16.63		130.0	
10599- AAB	IEEE 802.11 in (HT Mixed, 40MHz, MGS0, 90pc duty cycle)	×	5.58	87.43	16,88	0.46	130.0	±98%
		- Y	5.44	56.96	18:56		130.0	
		2	5.34	67.25	16.55		130.B	_
10600- AAB	MCS1, 90pc duty cycle)	X	5.74	67.88	17:07	0.46	139,0	198%
		18	5.60	57.47	18.79		130.0	
	Land to the same of the same o	- 2	5:43	67.51	16.64		130.0	
TOBE III	IEEE 802.11n (HT Mored, 40MHz; MCS2, 90pc duty syde)	×	5,81	67.61	16.95	0.46	130.0	±0,8%
		4	5.48	67.17	16.66	_	130.0	
11///		2	5,35	67.37	15.60		130.0	
10602- AAB	IEEE 802.11n (HT Mixed, 40MHz, MCS3, 90pc duty pycle)	X	15,70	87.58	15.86	0.46	130.0	±9.6 %
		Y	5.58	67.17	18.58		130,0	
-		2	5.45	67,40	16.52		130.0	-
10603- AAB	MCS4, 90pc duty cycle)	X	5.B0	67.93	17.16	0.46	130.0	± 9,6 %
		Y	5,65	67.48	16.87		-130.0	
-		1.2	5.52	67.69	10.01	-	130.0	
10604- AAB	(EEE 802.11n (HT Mixed, 30MHz, MCS6, 90pc duty cycle)	X	5.58	67.37	76,87	0.46.	130.0	±96%
		Y	5.44	86.52	16.57		130.0	
		21	5.37	67.27	16.59		130.0	
10995 AABI	MCS6, 90pc duty cycle)	×	B.88	67.64	17.00	0.46	130.0	±9.6 %
		Y	5.56	67,28	16.75		130.0	
		7	5.48	67.44	16.88		130.0	
IDEOE-	MCS7, 90pc duty cycle)	×	5,46	57.15	16,84	0.46	150,0	± 9.6 %
		Y	5.33	66.89	16.32		150.0	_
		7	5.20	86.87	16.23		150.0	

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10607- AAB	1EEE 902 Tinc WIFI (20MHz, MCS), 80pc duty sycle)	X	4.76	95.21	16.35	17.46	130/0	19.6%
		A.	4.60	35.56	15.94		130,0	
		7	455	56.17	16.05	_	130.0	
AUB:	IEEE BIJZ 1 (ac WIFI (20MHz MGS1), 90pc duty cycle)	X	4.97	85.64	16.51	0.46	130.0	# 9 B 19
		Y.	4.79	65.07	18.11		130.0	
		Z	4.73	86.56	16.21		130.0	
AAE	BEE BOZ 11ac W/Fr (20MHz, MCS2, 90ps duty cycle)	×	4.86	88,52	18,38	0.46	130.0	#95 W
		Y	4.63	85.92	15,94		130.0	
		2	4.62	06.40	10.04		130.0	
TOSTO- AAB	IEEE 802 11ac WFI (20MHz, MCS3, 189pt duty cycle)	×	4.91	88.88	16,54	0.46	130.0	396%
		Y	4.73	66.08	16:11		130.0	
		2	447	86.55	16:22		120.0	3000
10011 AAB	IEEE 802,11ac WFI (20MHz; MCS4 90pc duty cyclol	×	4 53	66.50	16,39	0.46	130,0	498 W
		Y	4,65	65.89	46.96		130.0	
		Z	4.59	66.36	16.65	100	130.0	
10612.	IEEE 802.11ac WIFI (20MHz, MCS5.	30	4.85	96.66	16.44	0.46	130.0	± 9.6 %
BAA	90pc duty cycle)			0.000	V 2005		11111	- 355,00
		Y	4,66	99.04	16.00		130.0	
		- Z	4.59	86.49	16.08	0.34	130 D	11000
10fi13- AAB	IEEE 802 11ac WiFi (20MHz, MCS6) 90pc duty cycle)	X	4,00	66.57	16.33	0.46	130.0	± 9.6 %
	13.110.110.110.	Y	4.67	55.94	15.89	_	750.0	_
		Z	4,69	65.36	15,95		130,0	The second
MB14-	(EEE 802.11ac WIFI (20MHz, MCS7) 90pc duty cycle)	×	4.80	68.77	15.57	0.48	130.0	±0.6 %
7		Y	4.00	66.11	16.11		130.0	
	The state of the s	1.2	4.55	86:63	19:24		130.0	
AAB	REEE BOZ 11mp WiFr (20MHz, MCS8, 90pp duty cyclé)	×	A 83	66,31	16.17	0,48	130.0	±0.6 %
		4	4.65	65.72	15.74		130.0	
		Z	4.57	66.14	15.79		130.0	
AAE	IEEE 902.1 (ac WIFI (40MHz, MCSD, 90pc duly cycle)	8	5.40	66,72	16.51	0.46	130.0	=96%
	1	- V	5.25	66:20	16.17		130.0	
		1.2	5.18	68.58	16.21	100	1300	
10617- AAB	IEEE 902 trac WiFi (38MHz, MCS1) 90cc duty cycle)	X	5.46	66.82	16,52	0.46	120.0	±9.6 %
1,4 144	with a soft of south	- Y	5.32	66.35	16.21		130.0	
		12	5.23	66.70	1E.24		130.0	
1061B- AAB	IEEE 802 1 Inc WIFI (10Mitz, MCS2, 90pc daty cycle)	×	5.36	96.91	16.59	0.46	130.0	19.6%
		Y	5.20	66.37	16.23		130.0	
		- 3	5.13	66,77	16.30		130.0	
10819- AAB	IEEE BUZ 11ac WIFI (ADMHZ, MCS3, 90cc duty cycle)	X	E.38	56.73	16.44	0.46	130.0	198%
		Y	5.23	66.21	16.09		130.0	
		1.2	5.14	86.53	16.10		130.0	
10620-	IEEE EDE. Hap W.Fr (40MHz, MCS4.	X	5.40	66.81	16.52	0.48	138.0	士學技術
AAB	9(ipc duty cycle)	- X	5.33	66.26	18.17	77.0	130.0	-
		1 7	5.23	66.56	16.17		130.0	
1D6Z1 -	TEEE 802.11ac WF (40MHz; MCSS). Digg duty ovolut	×	5,47	66.89	53.61	0.46	130,0	1966
Court.	Bullicooty creas	- 4	5.31	66:35	16.33		130.0	
		Z	5.24	66.76	16.40		130.0	
10622-	IEEE 802.11pg WIFI (40MHz, MG56)	X	5.47	67.00	18.72	DAB	130.0	+9.61
AAEI	Sope outy cycle!	100	11,22579	66.52	16.41	(JAC)	130.0	
		Y	5.33	66.89	16.45		130.0	

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10823- AAB	IEEE 802,1 had WIFI (40MHz, MCS7, 90pc tluty pynle)	×	5.38	68.59	16.41	0.46	130.0	19.6%
		Y .	5.20	66.04	16.05		130.0	
		Z	5.12	68.39	16.07		#30.0	
10624- AAE	IEEE 802.118c WEI (60WHz, MESS 90pc duty syste)	36	5.54	66.74	16.54	0.46	130.0	19.6%
		Y	5.40	66.26	16.22		130.0	
	the second secon	7	5.31	66.66	16.23		130.0	
AAE	IEEE S02 11ec WE (AUMHz, MCSE, 30pc duty cycle)	×	5.91	67.68	17.05	0,46	130.0	±9.6 %
		Y	5.81	67.35	16.82		130.6	
-		. 7.	5.60	87.33	16.65		130.0	1
10628 AAB	JEEE 902.11m WFi (BOMHz, MGS6, 90pc duty cycle)	х	5,66	86.70	16,44	.Cl.4fi	130.0	19.5%
		Y	6.54	68.25	16.12		130,0	
			5.47	66.64	16.16		130.0	
10627- AAB	VEEE 802.11ab WIFI (80MHz, MCS1, 90bb duty cycle)	X	5.90	57.28	16,64	0.40	130.0	±9.6%
_		Y	5.79	96.84	16.38		130.0	
		2	5,67	67.08	16:34		130.0	1.0
AAB	(EEE 802 113c W/IT (80MHz, MCS2, 90bc duty cycle)	X	5.73	56.91	16.42	0.46	130.0	1.06%
		Y	5.58	86.38	16.08		130.0	-
7000	THE STATE OF THE S	12	5.49	66.66	18.06		130.0	
10629- AAB	IEEE 802.11ac WiFI (BDMH2, MCSS) 90pc daty cycle)	Х.	5.81	66.97	18.43	0.46	130.0	注明股格
		- Y	5.67	86.48	18.18		130.0	
-	The same of the sa	1.2	5.56	66.69	16.07		130.0	
10630 AAB	IEEE 882.1186 W/Fi (90MHz, MCE4. 90pc duty cycle)	18	6.26	08,50	17.18	0,46	130.0	19.6%
		Y	6.18	BB 17	18.96		130.0	
-	1	Z	5,83	67.70	16.58		130.0	
IDEST- AAB	(EEE 802.11ac WFI (80MHz, MCS5, 90pa duty cycle)	×	6.19	66.38	17.32	0.46	130.0	198%
		Y	8.03	67.83	18.99		130.0	
		Z	5.88	67.92	16.89		130.0	
MAB	GEE 802 11sc WiFi (80MHz MCS6) 90pc duly cycle)	×	5.89	67:37	16,83	0.46	130.0	1969
		1.30	5.75	86.88	16.53		130.0	
	The second second second	1 2	5,87	67.23	16.57		130.0	
10833 AAH	IEEE 802 11ac WiFi (80MHz, MICS7 80pc duty cycle)	X	5.81	67.14	16.55	0,46	130.0	289.8
	A CAMPAGE AND A CONTRACT OF THE PARTY OF THE	1.76	5,84	86.53	18.18		130.0	
	The state of the s	Z	5.57	66.88	18.21	-	130.0	
10834- AAE	IEEE 802,11ac WF (BIIMHz, MCS8, 90pc duty cycle)	×	5.79	67.15	16.62	0.48	130.0	主机放牧
		Y	5.63	66.56	16.26		130.0	
		2	5,56	66.96	16.31		130.0	
10635- AAB	EEE 802,11sc Willi (88MHz, MC89, 90pc duty cycle)	X	0.68	88.88	16.03	0.48	130,0	23 E &
		Y.	5,52	65.82	15.67		130.0	
	Leave to the second sec	12	10.4	66.16	15.02		130.0	
10836- AAC	IEEE BID. Trac WIFI (180MHz MCS). 90pc duty cydle)	×	6.07	67.13	18.52	0.46	130.0	+88H
		- Y-1	5.85	86:65	16.23		130.0	
0037	INTER COR AL THE STREET	2.	5.87	68,97	16,23		130.0	
AAC	IEEE.802.11ac WIFI (160MHz, MCS1, BUpc daty cycle)	X	6.23	fi7.50	16.68	.0,4B	130.0	±9.6%
		Y	5.11	67.04	15.40		130.0	
Danie	week ado du . Dile .	Z	6.00	57.28	16.35		130.0	
AAG	REEE 802.11ac.WiFI (160MHz, MCS2, 90pc duty cycle)	X	6.23	67,47	16.65	0.46	130.0	+0.6%
		8.9	min 2	W. W. C. C.				_
		Y	6.01	67.00	16.38		130 (1	

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VVC-	JEEE BDZ 11ac WIFI (160MHz, MCS3) 90pc duty dycle)	×	6.25	67 /49	18.70	0,46	+100.D	196%
		Y	6.09	66.97 67.25	16.39		130.0	
0640	TEEF 802 THE WIFT/160MHz, MCS4.	8	6.25	87.50	16.67	11.46	130.0	= 0.6 %
WC	90pc duty cycle)	100	10.46	10,14,4	10.0	111.10	11000	200.0
		Ψ.	6.41	67.01	16.35		130.0	
10641-	see has the time treatment treat	. 2	5.99	87.21	16.25	WIT	130.0	
AAC	BEE BOZ 11ac WIFI (160MHz, MCS5, 90pc cuty cycle)	8	825	87.31	16.67	0.46	100.0	#89#
		Y.	0.13	66.85	16.30		130.0	
10642-	EEE 802 11ec WFI (160MHz, MCS6,	X	6,03 8,63	67.11 67.65	16,26	11.46	120.0	43.6%
AAC:	30pc duty cycle)	4	8-13	100		12,40	-	4943
		Z	6.10	67.47	16.62		130.0	
10643-	IEEE 802 1186 WFI (160MHz, MCS7	×	6.15	67:31	16.65	0.46	130.0	498%
AAC	Bopo duty-cycles	8	6.02	06.62	1000	0.40	130.0	2986
		Z	5.91	87.00	16:30		120.0	
10644	IEEE 802.11se WIFI (160MHz, MCSS.	X	8.35	87.93	16,98	0.48	130.0	49.0%
MAC	90pc duty cycle)	100	mer.	2,14		Mide		2347
		. A.	6.21	87.40	15.65		139.0	
10646-	THE PARK AND A STREET CHARACTER AND ADDRESS OF THE PARK AND ADDRESS OF THE PAR	Z	6.05	67.49	16.53	70.10	130.0	
10646- AAC	IEEE 802 11ac WFI (160MHz, MCS9, 80pc duty cyde)	X	8.71	88.51	17.21	11.46	130.0	4965
		18	8.88	68,36	17:09		15010	
(min a m	There are in the country of the second	1.7	6.25	67.70	16.50	0.70	130.0	1000
10846- AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz OPSK, UL Subframe=2,7)	X	86.17	140.32	45.40	£30	60.0	土电影物
		Y.	39.04	122.44	40.63		60.0	
A NOVE TOWN	Lancasca and tracks a see and the	7	18.10	10A.43	33:83		60.0	2.00
10647- AAF	LTE-TOD (SG-FDMA, 1 RB, 20 MHz. DPSK, UL Subfrance 2.7)	X	80.45	139.77	45.45	9.30	60.0	± 95 %
		V	36.72	121.04	40.66		60.0	
. Water		2	16.41	102,96	33.52	- mail	60.0	1000
10648- AAA	COMA2000 (1s Advinced)	X	1):87	96.51	13.20	0.00	150.0	土里市市
		Α.	0.58	61.72	9.15		150 0	
*0000	CONTROL CONTROL CARLO CONTROL	Z X	0.69	64.60 69.00	11.24	2.23	150.0	-86%
10652: AAD	(TE-TOD (OFDMA 6 MHz 6-TM 3.1) Clipping 44%)	177		40700		2.23		1000
_		Y Z	3.89	67.20	16.71	_	80.0	-
10653- AAD	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1. Clipping 44%).	X	4.72	67,40 07,91	17.64	2.22	80,0	398%
restri	-diffusit as all	Y	4.40	66.72	16.87		HD.D	
	and the second second second	1.	4.16	66.48	10.48	1000	80.0	-
1085¥-	LTE-TDØ (OFDMA 15 MHz E-TM 3.1 Cloping 44%)	X	4,64	67.52	17,60	2.25	80.0	1968
10.00	Separation of the separation o	Y	4.35	60.39	18.88		80.0	
	-8-3 - 97 St. Con	Z	6.16	65.16	16.50	4.2	80.0	1.7. 9
10655- AAE	LTE-TDD (GFDMA, 20 MHz, E-TM 3.1, Oligony 44%)	X	4.69	87.54	17.64	2,23	60.0	± 9.6 %
		4	4.42	66.40	16.92		60.0	
		Z	4.19	66.14	16.53	-	80.0	
1065B- AAA	Palas Weieform (200Hz, 10%)	8	100.00	116.82	30 15	10.00	50.0	+9.6%
- 1 - 1		Y	27.27	97.34	24.81		50,0	
		12	5.41	73.00	11.99		50.0	
10fffb-	Fülse Waveform (200Hz, 20%)	8	100.00	114.08	97.78	9.99	0,00	+0.6%
100		·Y	100.00	111.99	26.70		0.00	
		Z	5.06	74.90	14.50		BUU	

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October 24, 2018

10660- AAA	Pulse Waveform (200Hz, 40%)	×	100.00	113.57	26.20	3.98	80.0	± 9.6 %
		Y	100.00	108.48	23.71		80.0	
		2	17.55	86.88	16.64		80.0	
10661- AAA	Pulse Waveform (200Hz, 60%)	X	100.00	116.76	26.28	2.22	100.0	± 9.6 %
		Y	100.00	105.43	21.11		100.0	
		Z	100.00	100.82	18.62		100.0	
10662- AAA	Pulse Waveform (200Hz, 80%)	×	100.00	127.89	28.96	0.97	120.0	± 9.6 %
		Y	3.43	74.94	10.68		120.0	
Mark Street	DANAGE OF GROUNDS COM-	Z.	100.00	98.67	16.42		120.0	
10670- AAA	Bluetooth Low Energy	×	100.00	117.22	26.83	2.19	100.0	±9.6 %
		Y	100:00	107.88	22.47		100.0	
		Z	100.00	104.58	20.49		100.0	

Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and its expressed for the square of the

Certificate No: EX3-3938\_Oct18

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# 8. Uncertainty Budget

Measurement Uncertainty evaluation template for DUT SAR test (0.3-3G)

A	С	D	е		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability Distributio	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.00%	N	1	1	1	1	6.00%	6.00%	8
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom shell	2.90%	R	√3	1.732	1	1	1.67%	1.67%	8
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	8
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	1.92%	N	1	1	0.64	0.43	1.23%	0.83%	М
Liquid Conductivity (mea.)	1.59%	N	1	1	0.6	0.49	0.95%	0.78%	М
Combined standard uncertainty		RSS					11.52%	11.46%	
Expant uncertainty (95% confidence interval), K=2							23.05%	22.93%	

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# 9. Phantom Description

Schmid & Parmer Engineering AG e Zeughausstraser 43, 8004 Zurich, Switzelfan Phona +41 1 245 9700, Fax +41 1 245 9779 Intolkpase com, http://www.ageag.com Certificate of Conformity / First Article Inspection SAM Twin Phantom V4.0 QD 000 P40 C Type No TP-1150 and higher Manufacture Zeughausstrasse 43 CH-8004 Zürich Switzenand Tests Tests.

The series production process used allows the limitation to test of first articles.

Complete tests were made on the pre-series Type No. CD 000 P40 AA. Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1008. Certain parameters have been retested using further series items (called samples) or are tested at each item. Units tested Test Requirement Details IT'IS CAD File (\*) requirement the geometry according to the CAD model. Compliant with the requireme according to the standards Dimensions First article Samples Material thickness 2mm +/- 0.2mm in flat First article of shell and specific areas of Samples. head section 6mm +/- 0.2mm at ERP TP-1314 ff. Material thickness Compliant with the requirements First article, at ERP Material scoording to the standards Až ilems 300 MHz - 6 GHz: Material Dielectric parameters for required Relative permittivity < 5. Loss tangent < 0.05 DEGMBE based parameters Material resistivity The material has been tested to be Pre-series. competible with the liquids defined in First article, simulating liquids the standards if handled and cleaned according to the instructions. Material namples Observe technical Note for material Observe technical Note for material compatibility
Compliant with the requirements according to the standards.
Sagging of the flat section when filled with tissue simulating liquid. < 1% typical < 0.8% if filled with 155mm of HSL900 and without Sagging Prototypes. Sample testing DUT below Standards [1] CENELEC EN 50361

IEEE Std 1526-2003 IEC 62209 Part I

FCC OET Builetin 65, Supplement C, Edition 01-01

The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standards [1] to [4]

07.07.2005

Signature / Stamp

Segreto & Parcial Engineering A/Q Zydythausgriesen 43, 8094, 2 under Switzerland Phone y-1, 2 and 9790/ Earlist 1-24s 9779 Inholf Spining, com. http://www.stining.com

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# 10. System Validation from Original Equipment Supplier

Calibration Laboratory of S Schmid & Partner ilac-MR/ C Engineering AG Servizio svizzero di tareture Swiss Calibration Service Accredited by the Swiss Accreditation Service (SAS) Accreditation No.: SCS 0108 The Swise Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates SGS-TW (Auden) Certificate No: D835V2-4d063\_Aug18 CALIBRATION CERTIFICATE D835V2 - SN:4d063 Calibration procedure(s) QA CAL-05,V10 Calibration procedure for dipole validation kits above 700 MHz August 23, 2018 This calibration certificate documents the traceability to national standards, which realize the physical units of inequaments, (SI), ments and the uncortainties with confidence probability are given on the following pages and are part of the pertitions All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and running < 70%. Calibration Equipment used (M&TE critical for calibration) 10.6 Cal Date (Cartificate No.) Primary Standards Scheduled Calibratio Power meter NRP SN: 104778 04-Apr-15 (No. 217-02672/02673)

04-Apr-18 (No. 217-02672) Power sensor NRP (291 SN: 103244 Apr-19 Power sensor NRP-Z91 SN: 103245 04-Apr-18 (No. 217-02673) Apr-19 Reference 20 dB Attenuator SN: 5058 (20k) 04-Apr-16 (No. 217-02682) Apr-18 Type-N mismatch combination SN: 5047-2 / 06327 04-April 18 (No. 217-02683) Apr.19 Retaience Probe EX3DV4 30-Dec-17 (No. EX3-7349\_Dec17) SN: 7349 Dec-18 DAE4 26-Gc)-17 (No. DAE4-601\_Oc)17) BN: 601 Oct-18 Secundary Standards Check Date (in house) Scheduled Check SN: GB37490704 07-Oct-15 (in house check Oct-16) Power meter EPM-442A In house check: Oct-18 Power sensor HP 8481A SN: US37292783 07-Oct-15 (in house check Oct-16) in house check: Oct-18 Power sensor HP 8481A SN: MY41092317 07-Oct-16 (in house check Oct-16) In house check: Oct-18 RF contrator BAS SMT-06 SN: 100972 15 Jun 15 (in house check Oct 16) In house check: Oct.18 SN: U541080477 Network Analyzer Agilent E83584 31-Mar-14 (in house check Oct-17) In ficuse check: Oct-18 **Function** Calibrated by: Michael Websi Laboratory Technician Kaya Pokovic Technical Manager Approved by: This collicration certricate shall not be reproduced except in full without written approval of the laboratory

Certificate No. D835V2-4d063\_Aug18

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Calibration Laboratory of Schmid & Partner

Engineering AG ughtusstrasee 43, 8004 Zurich, Switzerland





Schweizerischer Katinnerdienst Service suisse d'Malonnage C Servizio svizzero di locabina Swice Calibration Service

Accreditation No.: SCS 0108

According by the Swiss Accreditation Service (SAS)

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

#### Glossary:

flasue simulating liquid TSL

ConvF sensitivity in TSL / NORM x,y,z not applicable or not measured

### 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
- 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"

## Additional Documentation:

e) 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%.

Certificate No. D635V2-4d063, Aug 16

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#### Measurement Conditions

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

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantóm	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz. = 5 mm	
Frequency	835 MHz = 1 MHz	

# **Head TSL parameters**

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	month 0e,0
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.7 ± 6 %	0.92 mho/m ± 8 %
Head TSL temperature change during test	< 0.5 °C	_	-

# SAR result with Head TSL

SAR averaged over 1 cm <sup>1</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.48 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm² (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6,10 W/kg ± 16.5 % (k=2)

# **Body TSL parameters**

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.9±6%	0.99 mha/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

# SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input pawer	2.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.56 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.28 W/kg ± 16.5 % (k=2)

Certificate No. DB35V2-4d063 Aug 18

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

#### Antenna Parameters with Head TSL

Inpudance, transformed to feed point.	51.3 \( \Omega - 1.8 \)
Relum Loss	- 33.3 dB

#### Antenna Parameters with Body TSL

impedance, transformed to feed point	47.7 \( \Omega = 4.4 \) \( \Omega \)	
Return Loss	-25,8 dB	

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.393 ns

After long term use with 100W radiated power, only a slight warming of the cipole near the leedpoint can be measured.

The dipole is made of standard semirigid coaxiel cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged

#### Additional EUT Data

Manufactured by	SPEAG		
Manufactured on	November 27, 2006		

Certificate No: D835V2-4d063\_Aup18

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#### **DASY5 Validation Report for Head TSL**

Date: 22.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

## DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d063

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz;  $\sigma = 0.92$  S/m;  $\varepsilon_c = 40.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

#### DASY52 Configuration:

- Probe; EX3DV4 SN7349; ConvF(9.9, 9.9, 9.9) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10,2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

#### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0;

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 62,96 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 3.70 W/kg SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.55 W/kgMaximum value of SAR (measured) = 3.25 W/kg



0 dB = 3.25 W/kg = 5.12 dBW/kg

Certificate No: D835V2-4d063\_Aug18

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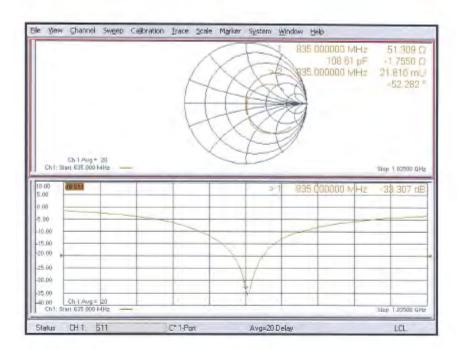
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## Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d063\_Aug18

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#### DASY5 Validation Report for Body TSL

Date: 23.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

## DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d063

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz;  $\sigma = 0.99 \text{ S/m}$ ;  $\epsilon_0 = 54.9$ ;  $\rho = 1000 \text{ kg/m}^4$ 

Phantom section: Flat Section

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

#### DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(10.05, 10.05, 10.05) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: L4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

# Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 60.67 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.61 W/kg

SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.59 W/kg

Maximum value of SAR (measured) = 3.23 W/kg



0 dB = 3.23 W/kg = 5.09 dBW/kg

Certificate No: D635V2-4d063\_Aug18

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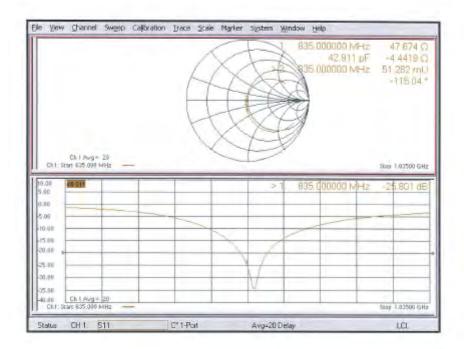
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#### Impedance Measurement Plot for Body TSL



Certificate No: D835V2-4d063 Aug18

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Accreditation No. SCS 0108

Multilateral Agreement for the recognition of calibration certificates SGS-TW (Auden)

The Swiss Accreditation Service is one of the signaturies to the EA

Certificate No: D1900V2-5d173 Apr18

Object	D1900V2 - SN-5	d173	
	277.12. 20110	011/2	
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Calibration Equipment used (M&	TE entical for cultimation)		
rimary Standards	ID#	Cal Date (Certificate No.)	Scheduel Calebraton
Power meter NRP	SN: 104776	04-Apr-18 (No. 217-08672/02673)	Apr-19
ower sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-13
ower sensor NRP-Z91	SN 108245	04-Apr-16 (No. 217-02573)	Apr-19
Reference 20 dB Altenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02882)	Apr-19
	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02883)	Apr-19
	SN: 7349	30-Dec-17 (No. EX3-7349 Dec17)	Dec-18
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Certificate No: D1900V2-5c173\_Apr16

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Glossary:

TSL ConvF tissue simulating liquid

sensitivity in TSL / NORM x,y,z not applicable or not measured

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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

# Additional Documentation:

e) 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%.

Cuminate No. (31900V2-5d173, Aprill)

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#### Measurement Conditions

DASY system configuration, as far as not given on page

Advanced Extrapolation	
Anadiceo Evitaboration	
Modular Fist Phantom	
10 mm	with Spacer
ctx, dy, dz = 5 mm	
1900 MHz ± T MHz	
	10 mm OX, dy, dz = 5 mm

## Head TSL parameters

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Messured Head TSL parameters	(22.0 ± 0.2) °C	41 1 ± 8 %	1,35 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		-

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>2</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.89 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.7 W/kg = 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	opridition	
SAR measured	250 mW input power	5.21 W/kg
SAR for nominal Head TSL parameters	normalized to fW.	21.2 W/kg ± 16.5 % (k=2)

# **Body TSL parameters**

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.3 ± 6.%	1.47 mho/m ± 6 %
Body TSL temperature change during test	€ 0.5 °C	-	-

#### SAR result with Body TSL

SAR averaged over 1 cm <sup>2</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.93 W/kg
SAR for nominal Body TSL parameters	nomalized to TW	40.9 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm² (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.30 W/kg
SAR for nominal Body TSL parameters	normalized to TW	21.6 W/kg ± 16.5 % (k=2)

Certificate No: D1900V2-5d173\_Ajir.18

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

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	514 \O + 5 1 \O
Return Loss	- 25,6 dB

#### Antenna Parameters with Body TSL

Impedance, transformed to feed pully	47.341 + 7.2 (Ω	
Return Loss	- 22 1 dB	

## General Antenna Parameters and Design

1,195 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals, On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurament 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 that feedpoint may be damaged.

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	June 08, 2012

Certificate No. D1900V2-5d173\_Apr1ff

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#### **DASY5 Validation Report for Head TSL**

Date: 25.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

# DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d173

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz;  $\sigma = 1.35 \text{ S/m}$ ;  $\varepsilon_c = 41.1$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

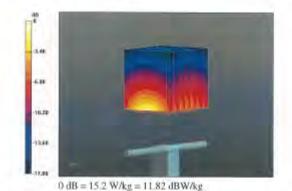
#### DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.18, 8.18, 8.18); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26,10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

# Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 110.9 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 18.3 W/kg SAR(1 g) = 9.89 W/kg; SAR(10 g) = 5.21 W/kg

Maximum value of SAR (measured) = 15.2 W/kg



Certificate No: D1900V2-5d173\_Apr18

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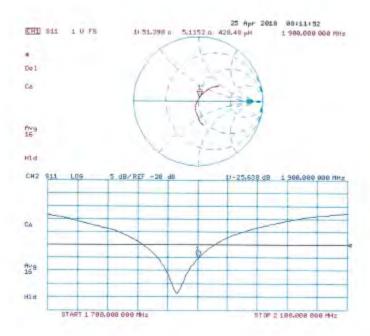
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#### Impedance Measurement Plot for Head TSL



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# DASY5 Validation Report for Body TSL

Date: 25.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d173

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz;  $\sigma = 1.47 \text{ S/m}$ ;  $s_f = 55.3$ ;  $p = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

#### DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.15, 8.15, 8.15); Calibrated: 30.12.2017;
- · Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- · Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

# Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 104.6 V/m; Power Drift = -0.09 dB Peak SAR (extrapolated) = 17.7 W/kg SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.3 W/kg

Maximum value of SAR (measured) = 14.7 W/kg.



0 dB = 14.7 W/kg = 11.67 dBW/kg

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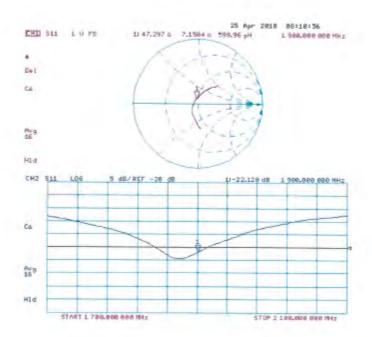
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# Impedance Measurement Plot for Body TSL



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#### Calibration Laboratory of

Schmid & Partner Engineering AG astrases 43, 8004 Zurich, Switzerland





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Accreditation No.: SCS 0108

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 colliberation commissions

#### Glossary:

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

# 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
- 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.
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

e) 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%.

Conflicate No: 02450V2-727\_Apr 18

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## Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz. = 5 mm	
Frequency	2450 MHz = 1 MHz	

#### Head TSL parameters

The following parameters and calculations were applied.

2 - 0 3 - F	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22,0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.3 ± 8 %	1.86 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>5</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13,3 W/kg
SAR for nominal Head TSL parameters	hormalized to 1W	52.1 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW Input power	8.16 W/kg
SAR for nominal Head TSL parameters	normalized to TW	24.3 W/kg ± 16.5 % (k=2)

# **Body TSL parameters**

eters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	2.01 mha/m = 6 %
Body TSL temperature change during test	< 0,5 °C		-

# SAR result with Body TSL

SAR sveraged over 1 cm <sup>2</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	50.8 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.00 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.8 W/kg ± 16.5 % (k=2)

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

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.2 \Omega + 2.7 \mu	
Return Loss	= 25.1 dB	

# Antenna Parameters with Body TSL

Impledance, transformed to feed point	51.2 (2 × 5.8   C)
Return Loss	- 25.0 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard seminoid 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 capeare 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 emis, because they might bend or the soldered connections near the feedpoint may be damaged.

#### Additional EUT Data

Manufactured by	SPEAG	
Manufactured on	January 09, 2003	

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### **DASY5 Validation Report for Head TSL**

Date: 24.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz;  $\sigma = 1.86 \text{ S/m}$ ;  $\epsilon_t = 38.3$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

#### DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(7.88, 7.88, 7.88); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10,2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 116.0 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 26.7 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.16 W/kg Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

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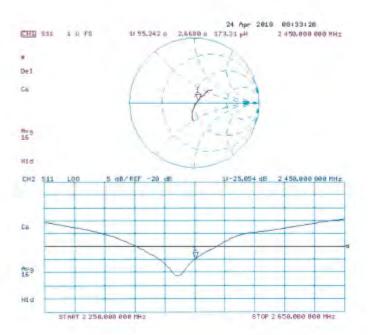
SGS Taiwan Ltd. 台灣檢驗科技股份有限公司

No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號



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# Impedance Measurement Plot for Head TSL



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#### DASY5 Validation Report for Body TSL

Date: 24.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727

Communication System: UID 0 - CW; Frequency: 2450 MHz.

Medium parameters used: f = 2450 MHz;  $\sigma = 2.01$  S/m;  $\varepsilon_r = 52.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

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

#### DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.01, 8.01, 8.01); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002.
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

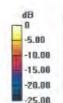
# Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 108.4 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 25.5 W/kg

SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6 W/kgMaximum value of SAR (measured) = 21.1 W/kg





0 dB = 21.1 W/kg = 13.24 dBW/kg

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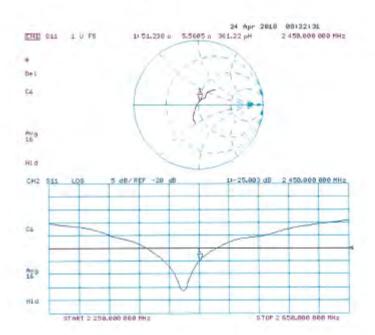
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### Impedance Measurement Plot for Body TSL



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# - End of report -

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