

TEST REPORT

SAR Test for certification of ACJ9TGRI23D

APPLICANT
Panasonic Corporation of North America

REPORT NO.
HCT-SR-2407-FC009-R3

DATE OF ISSUE
Aug. 01, 2024

Tested by
Hae sun Park

(signature)



Technical Manager
Yun Jeang, Heo

(signature)



HCT CO., LTD.
BongJai Huh
BongJai Huh / CEO



HCT CO.,LTD.

2-6, 73, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 645 6300 Fax. +82 31 645 6401

TEST REPORT

RFID SAR Test for certification

REPORT NO.
HCT-SR-2407-FC009-R3

DATE OF ISSUE
Aug. 01, 2024

FCC ID
ACJ9TGRI23D

Applicant **Panasonic Corporation of North America**
Two Riverfront Plaza, 9th Floor, Newark, NJ 07102-5490, USA

Product Name HF-RFID module
Model Name RI23D
Host Model Name CF-33

Date of Test Jun. 24, 2024

Location of Test Permanent Testing Lab On Site Testing Lab
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA)

FCC Rule Part(s) CFR §2.1093

Test Results PASS (SAR Limit: 1.6 W/kg)

This device has been performed SAR testing in accordance with FCC KDB 447498 D01 Interim General RF Exposure Guidance v06.

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	Jul. 22, 2024	Initial Release
1	Jul. 29, 2024	Revised page 7,10,18 , Section 8
2	Jul. 31, 2024	Revised page 7, Section 8
3	Aug. 01 2024	Revised Section 8

Notice

Content

The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.

The test results have only been applied with the test methods required by the standard(s).

The laboratory is not accredited for the test results marked *.

Information provided by the applicant is marked **.

Test results provided by external providers are marked ***.

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).

CONTENTS

1. Test Regulations.....	5
2. Test Location.....	6
3. Information of the EUT.....	6
4. Device Under Test Description.....	8
5. Limits.....	9
6. System Verification.....	10
7. SAR Test Data Summary.....	11
8. Simultaneous Transmission Summation.....	12
9. Measurement Uncertainty.....	23
10. SAR Test Equipment.....	24
Appendix A. DUT Ant. Information & SETUP PHOTO.....	25
Appendix B. – SAR Test Plots.....	26
Appendix C. –Verification Plots.....	28
Appendix D. – Probe Calibration Data.....	30
Appendix E. – Dipole Calibration Data.....	52

1. Test Regulations

The tests documented in this report were performed in accordance with FCC CFR § 2.1093, IEEE 1528-2013, ANSI C63.26-2015 the following FCC Published RF exposure KDB procedures:

- FCC KDB Publication 447498 D01 General RF Exposure Guidance v06
- FCC KDB Publication 616217 D04 SAR Tablets v01r02
- FCC KDB Publication 690783 D01 SAR Listings on Grants v01r03
- FCC KDB Publication 865664 D02 SAR Reporting v01r02

2. Test Location

2.1 Test Laboratory

Company Name	HCT Co., Ltd.
Address	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Telephone	031-645-6300
Fax.	031-645-6401

2.2 Test Facilities

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Korea	National Radio Research Agency (Designation No. KR0032)
	KOLAS (Testing No. KT197)

3. Information of the EUT

3.1 General Information of the EUT

Model Name	RI23D
Host Model Name	CF-33
Equipment Type	HF-RFID module
FCC ID	ACJ9TGRI23D
Application Type	Certification
Applicant	Panasonic Corporation of North America

3.2 Attestation of test result of device under test

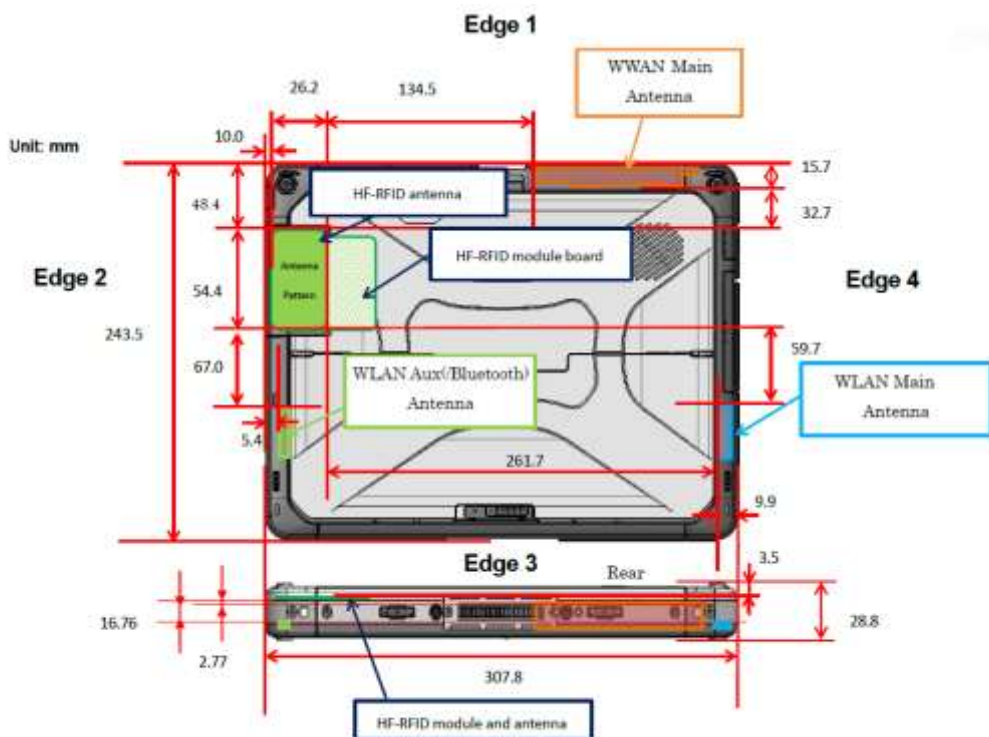
The Highest Reported SAR			
Band	Tx. Frequency	Equipment Class	Reported SAR (W/kg)
			1 g Body
RFID	13.56 MHz	PCE	0.051
Simultaneous SAR per KDB 690783 D01v01r03			1.58
Date(s) of Tests:	Jun. 24, 2024 ~ Jul. 11, 2024		

4. Device Under Test Description

4.1 DUT specification

Device Wireless specification overview	
Band & Mode	Tx Frequency
RFID	13.56 MHz
Device Serial Numbers	Serial Number
	SOP-21-03649

4.2 DUT Antenna Locations



Mode	Device Configurations for Testing							
	Rear	Front	Edge 4	Edge 2	Edge 1	Edge 3	Edge 2 Tilt	Edge 4 Tilt
RFID	Yes	No	Yes	Yes	Yes	No	Yes	Yes

5. Limits

RF Exposure Limits for Frequencies Below 6 GHz

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/kg)	CONTROLLED ENVIRONMENT Occupational (W/kg)
SPATIAL PEAK SAR * (Partial Body)	1.6	8.0
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.4
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.0	20.0

NOTES:

- * The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
- ** The Spatial Average value of the SAR averaged over the whole-body.
- *** The Spatial Peak value of the SAR averaged over any 10 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

6. System Verification

6.1 Tissue Verification

The head simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity.

Table for Head Tissue Verification									
Date of Tests	Tissue Temp. (°C)	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ϵ	Target Conductivity σ (S/m)	Target Dielectric Constant, ϵ	% dev σ	% dev ϵ
06/24/2024	22.7	13H	12	0.744	54.331	0.750	55.000	-0.80	-1.22
			13	0.724	54.349	0.750	55.000	-3.47	-1.18
			14	0.756	54.306	0.750	55.000	0.80	-1.26

The characteristics of the 13 MHz tissue were applied with reference to the calibration report of SPEAG's current loop antenna in the 13 MHz frequency band.

6.2 System Verification

Input Power: 50 mW

Freq.	Date	Probe	Dipole	Liquid	Amb. Temp.	Liquid Temp.	1 W Target SAR _{1g} (SPEAG)	50mW Measured SAR _{1g}	1 W Normalized SAR _{1g}	Deviation	Limit
[MHz]		(S/N)	(S/N)		[°C]	[°C]	[W/kg]	[W/kg]	[W/kg]	[%]	[%]
13	06/24/2024	3076	1016	Head	22.8	22.7	0.553	0.029	0.58	4.88	± 10

7. SAR Test Data Summary

7.1 Body SAR Measurement Results

RFID Body SAR							
Frequency		Mode	Power Drift	Test Position	Distance (mm)	Meas. SAR	Plot No.
MHz	Ch.		(dB)			(W/kg)	
13.56	13600	Type A	0.00	Rear	0	0.047	-
13.56	13600	Type B	0.00	Rear	0	0.048	-
13.56	13600	Felica	0.00	Rear	0	0.045	-
13.56	13600	ISO 15693	0.00	Rear	0	0.051	B1
13.56	13600	ISO 15693	0.00	Edge 4	0	0	-
13.56	13600	ISO 15693	0.00	Edge 2	0	0	-
13.56	13600	ISO 15693	0.00	Edge 1	0	0	-
13.56	13600	ISO 15693	0.00	Edge 4 Tilt	0	0	-
13.56	13600	ISO 15693	0.00	Edge 2 Tilt	0	0	-
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population				Body 1.6 W/kg Averaged over 1 gram			

8. Simultaneous Transmission Summation

The highest reported SAR for each exposure condition is used for SAR summation purpose.

The highest reported SAR for each exposure condition is used for SAR summation purpose. The WLAN/BT SAR testing results were used to perform transmission simultaneous analysis from SAR Test Report[HCT-SR-2206-FC004], Module model: WL22B with FCC: ACJ9TGWL22B

The WWAN SAR testing results and SPLSR evaluation were used to perform transmission simultaneous analysis from SAR Test Report[HCT-SR-2407-FC008], Module model: WW23B with FCC: ACJ9TGWW23B

Simultaneous Transmission Summation Table

Band	Configuration	Main	Bluetooth	2.4GHz Ant1	2.4GHz Ant2	2.4GHz MIMO	RFID	Main + 2.4GHz Ant1 + RFID	Main + 2.4GHz Ant2 + RFID	Main + 2.4GHz MIMO + RFID	Main + 2.4GHz Ant1 + BT + RFID	SPLSR
		1	2	3	4	5	12	1+3+12	1+4+12	1+5+12	1+2+3+12	
		(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	
UMTS Band 2	Rear	0.608	0.085	0.174	0.201	0.375	0.051	0.833	0.860	1.034	0.918	No
	Edge 4	1.219	0.000	1.095	0.000	1.095	0.000	2.314	1.219	2.314	2.314	Yes
	Edge 2	0.035	0.269	0.002	1.084	1.086	0.000	0.037	1.119	1.121	0.306	No
	Edge 1	0.937	0.000	0.013	0.017	0.030	0.000	0.950	0.954	0.967	0.950	No
	Edge 4 Tilt	0.821	0.000	1.317	0.007	1.324	0.000	2.138	0.828	2.145	2.138	Yes
	Edge 2 Tilt	0.025	0.292	0.007	1.133	1.140	0.000	0.032	1.158	1.165	0.324	No
UMTS Band 4	Rear	0.913	0.085	0.174	0.201	0.375	0.051	1.138	1.165	1.339	1.223	No
	Edge 4	0.556	0.000	1.095	0.000	1.095	0.000	1.651	0.556	1.651	1.651	Yes
	Edge 2	0.021	0.269	0.002	1.084	1.086	0.000	0.023	1.105	1.107	0.292	No
	Edge 1	0.628	0.000	0.013	0.017	0.030	0.000	0.641	0.645	0.658	0.641	No
	Edge 4 Tilt	0.440	0.000	1.317	0.007	1.324	0.000	1.757	0.447	1.764	1.757	Yes
	Edge 2 Tilt	0.007	0.292	0.007	1.133	1.140	0.000	0.014	1.140	1.147	0.306	No
UMTS Band 5	Rear	0.405	0.085	0.174	0.201	0.375	0.051	0.630	0.657	0.831	0.715	No
	Edge 4	0.389	0.000	1.095	0.000	1.095	0.000	1.484	0.389	1.484	1.484	No
	Edge 2	0.029	0.269	0.002	1.084	1.086	0.000	0.031	1.113	1.115	0.300	No
	Edge 1	0.957	0.000	0.013	0.017	0.030	0.000	0.970	0.974	0.987	0.970	No
	Edge 4 Tilt	0.163	0.000	1.317	0.007	1.324	0.000	1.480	0.170	1.487	1.480	No
	Edge 2 Tilt	0.044	0.292	0.007	1.133	1.140	0.000	0.051	1.177	1.184	0.343	No
LTE Band 2	Rear	0.513	0.085	0.174	0.201	0.375	0.051	0.738	0.765	0.939	0.823	No
	Edge 4	0.000	0.000	1.095	0.000	1.095	0.000	1.095	0.000	1.095	1.095	Yes
	Edge 2	0.000	0.269	0.002	1.084	1.086	0.000	0.002	1.084	1.086	0.271	No
	Edge 1	1.236	0.000	0.013	0.017	0.030	0.000	1.249	1.253	1.266	1.249	No
	Edge 4 Tilt	0.000	0.000	1.317	0.007	1.324	0.000	1.317	0.007	1.324	1.317	Yes
	Edge 2 Tilt	0.000	0.292	0.007	1.133	1.140	0.000	0.007	1.133	1.140	0.299	No
LTE Band 4	Rear	0.767	0.085	0.174	0.201	0.375	0.051	0.992	1.019	1.193	1.077	No
	Edge 4	0.000	0.000	1.095	0.000	1.095	0.000	1.095	0.000	1.095	1.095	Yes
	Edge 2	0.000	0.269	0.002	1.084	1.086	0.000	0.002	1.084	1.086	0.271	No
	Edge 1	1.032	0.000	0.013	0.017	0.030	0.000	1.045	1.049	1.062	1.045	No
	Edge 4 Tilt	0.000	0.000	1.317	0.007	1.324	0.000	1.317	0.007	1.324	1.317	Yes
	Edge 2 Tilt	0.000	0.292	0.007	1.133	1.140	0.000	0.007	1.133	1.140	0.299	No
LTE Band 5	Rear	0.422	0.085	0.174	0.201	0.375	0.051	0.647	0.674	0.848	0.732	No
	Edge 4	0.000	0.000	1.095	0.000	1.095	0.000	1.095	0.000	1.095	1.095	No
	Edge 2	0.000	0.269	0.002	1.084	1.086	0.000	0.002	1.084	1.086	0.271	No
	Edge 1	1.111	0.000	0.013	0.017	0.030	0.000	1.124	1.128	1.141	1.124	No
	Edge 4 Tilt	0.000	0.000	1.317	0.007	1.324	0.000	1.317	0.007	1.324	1.317	Yes
	Edge 2 Tilt	0.000	0.292	0.007	1.133	1.140	0.000	0.007	1.133	1.140	0.299	No
LTE Band 7	Rear	0.622	0.085	0.174	0.201	0.375	0.051	0.847	0.874	1.048	0.932	No
	Edge 4	0.308	0.000	1.095	0.000	1.095	0.000	1.403	0.308	1.403	1.403	No
	Edge 2	0.063	0.269	0.002	1.084	1.086	0.000	0.065	1.147	1.149	0.334	No
	Edge 1	0.794	0.000	0.013	0.017	0.030	0.000	0.807	0.811	0.824	0.807	No
	Edge 4 Tilt	0.257	0.000	1.317	0.007	1.324	0.000	1.574	0.264	1.581	1.574	No
	Edge 2 Tilt	0.043	0.292	0.007	1.133	1.140	0.000	0.050	1.176	1.183	0.342	No
LTE Band 12	Rear	0.261	0.085	0.174	0.201	0.375	0.051	0.486	0.513	0.687	0.571	No
	Edge 4	0.131	0.000	1.095	0.000	1.095	0.000	1.226	0.131	1.226	1.226	No
	Edge 2	0.012	0.269	0.002	1.084	1.086	0.000	0.014	1.096	1.098	0.283	No
	Edge 1	0.851	0.000	0.013	0.017	0.030	0.000	0.864	0.868	0.881	0.864	No
	Edge 4 Tilt	0.144	0.000	1.317	0.007	1.324	0.000	1.461	0.151	1.468	1.461	No
	Edge 2 Tilt	0.013	0.292	0.007	1.133	1.140	0.000	0.020	1.146	1.153	0.312	No

Simultaneous Transmission Summation Table

Band	Configuration	Main	Bluetooth	2.4GHz Ant1	2.4GHz Ant2	2.4GHz MIMO	RFID	Main + 2.4GHz Ant1 + RFID	Main + 2.4GHz Ant2 + RFID	Main + 2.4GHz MIMO + RFID	Main + 2.4GHz Ant1 + BT + RFID	SPLSR
		1 (W/kg)	2 (W/kg)	3 (W/kg)	4 (W/kg)	5 (W/kg)	12 (W/kg)	1+3+12 (W/kg)	1+4+12 (W/kg)	1+5+12 (W/kg)	1+2+3+12 (W/kg)	
LTE Band 13	Rear	0.293	0.085	0.174	0.201	0.375	0.051	0.518	0.545	0.719	0.603	No
	Edge 4	0.294	0.000	1.095	0.000	1.095	0.000	1.389	0.294	1.389	1.389	No
	Edge 2	0.010	0.269	0.002	1.084	1.086	0.000	0.012	1.094	1.096	0.281	No
	Edge 1	1.067	0.000	0.013	0.017	0.030	0.000	1.080	1.084	1.097	1.080	No
	Edge 4 Tilt	0.337	0.000	1.317	0.007	1.324	0.000	1.654	0.344	1.661	1.654	Yes
LTE Band 14	Edge 2 Tilt	0.015	0.292	0.007	1.133	1.140	0.000	0.022	1.148	1.155	0.314	No
	Rear	0.328	0.085	0.174	0.201	0.375	0.051	0.553	0.580	0.754	0.638	No
	Edge 4	0.396	0.000	1.095	0.000	1.095	0.000	1.491	0.396	1.491	1.491	No
	Edge 2	0.013	0.269	0.002	1.084	1.086	0.000	0.015	1.097	1.099	0.284	No
	Edge 1	1.060	0.000	0.013	0.017	0.030	0.000	1.073	1.077	1.090	1.073	No
LTE Band 25	Edge 4 Tilt	0.338	0.000	1.317	0.007	1.324	0.000	1.655	0.345	1.662	1.655	Yes
	Edge 2 Tilt	0.016	0.292	0.007	1.133	1.140	0.000	0.023	1.149	1.156	0.315	No
	Rear	0.394	0.085	0.174	0.201	0.375	0.051	0.619	0.646	0.820	0.704	No
	Edge 4	0.820	0.000	1.095	0.000	1.095	0.000	1.915	0.820	1.915	1.915	Yes
	Edge 2	0.020	0.269	0.002	1.084	1.086	0.000	0.022	1.104	1.106	0.291	No
LTE Band 26	Edge 1	0.638	0.000	0.013	0.017	0.030	0.000	0.651	0.655	0.668	0.651	No
	Edge 4 Tilt	0.488	0.000	1.317	0.007	1.324	0.000	1.805	0.495	1.812	1.805	Yes
	Edge 2 Tilt	0.016	0.292	0.007	1.133	1.140	0.000	0.023	1.149	1.156	0.315	No
	Rear	0.324	0.085	0.174	0.201	0.375	0.051	0.549	0.576	0.750	0.634	No
	Edge 4	0.387	0.000	1.095	0.000	1.095	0.000	1.482	0.387	1.482	1.482	No
LTE Band 42	Edge 2	0.011	0.269	0.002	1.084	1.086	0.000	0.013	1.095	1.097	0.282	No
	Edge 1	1.017	0.000	0.013	0.017	0.030	0.000	1.030	1.034	1.047	1.030	No
	Edge 4 Tilt	0.362	0.000	1.317	0.007	1.324	0.000	1.679	0.369	1.686	1.679	Yes
	Edge 2 Tilt	0.018	0.292	0.007	1.133	1.140	0.000	0.025	1.151	1.158	0.317	No
	Rear	0.233	0.085	0.174	0.201	0.375	0.051	0.458	0.485	0.659	0.543	No
LTE Band 48	Edge 4	0.184	0.000	1.095	0.000	1.095	0.000	1.279	0.184	1.279	1.279	No
	Edge 2	0.017	0.269	0.002	1.084	1.086	0.000	0.019	1.101	1.103	0.288	No
	Edge 1	1.444	0.000	0.013	0.017	0.030	0.000	1.457	1.461	1.474	1.457	No
	Edge 4 Tilt	0.159	0.000	1.317	0.007	1.324	0.000	1.476	0.166	1.483	1.476	No
	Edge 2 Tilt	0.012	0.292	0.007	1.133	1.140	0.000	0.019	1.145	1.152	0.311	No
LTE Band 66	Rear	0.125	0.085	0.174	0.201	0.375	0.051	0.350	0.377	0.551	0.435	No
	Edge 4	0.085	0.000	1.095	0.000	1.095	0.000	1.180	0.085	1.180	1.180	No
	Edge 2	0.003	0.269	0.002	1.084	1.086	0.000	0.005	1.087	1.089	0.274	No
	Edge 1	1.164	0.000	0.013	0.017	0.030	0.000	1.177	1.181	1.194	1.177	No
	Edge 4 Tilt	0.067	0.000	1.317	0.007	1.324	0.000	1.384	0.074	1.391	1.384	No
LTE Band 66	Edge 2 Tilt	0.002	0.292	0.007	1.133	1.140	0.000	0.009	1.135	1.142	0.301	No
	Rear	0.671	0.085	0.174	0.201	0.375	0.051	0.896	0.923	1.097	0.981	No
	Edge 4	0.540	0.000	1.095	0.000	1.095	0.000	1.635	0.540	1.635	1.635	Yes
	Edge 2	0.011	0.269	0.002	1.084	1.086	0.000	0.013	1.095	1.097	0.282	No
	Edge 1	0.603	0.000	0.013	0.017	0.030	0.000	0.616	0.620	0.633	0.616	No
LTE Band 66	Edge 4 Tilt	0.343	0.000	1.317	0.007	1.324	0.000	1.660	0.350	1.667	1.660	Yes
	Edge 2 Tilt	0.009	0.292	0.007	1.133	1.140	0.000	0.016	1.142	1.149	0.308	No

Simultaneous Transmission Summation Table

Band	Configuration	Main	Bluetooth	5GHz Ant1	5GHz Ant2	5GHz MIMO	RFID	Main + 5GHz Ant1 + RFID	Main + 5GHz Ant2 + RFID	Main + 5GHz MIMO + RFID	Main + 5GHz Ant1 + BT + RFID	SPLSR
		1	2	6	7	8	12	1+6+12	1+7+12	1+8+12	1+2+6+12	
		(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	
UMTS Band 2	Rear	0.608	0.085	0.436	0.204	0.640	0.051	1.095	0.863	1.299	1.180	No
	Edge 4	1.219	0.000	0.827	0.000	0.827	0.000	2.046	1.219	2.046	2.046	Yes
	Edge 2	0.035	0.269	0.000	0.971	0.971	0.000	0.035	1.006	1.006	0.304	No
	Edge 1	0.937	0.000	0.056	0.021	0.077	0.000	0.993	0.958	1.014	0.993	No
	Edge 4 Tilt	0.821	0.000	1.089	0.000	1.089	0.000	1.910	0.821	1.910	1.910	Yes
	Edge 2 Tilt	0.025	0.292	0.002	1.195	1.197	0.000	0.027	1.220	1.222	0.319	No
UMTS Band 4	Rear	0.913	0.085	0.436	0.204	0.640	0.051	1.400	1.168	1.604	1.485	Yes
	Edge 4	0.556	0.000	0.827	0.000	0.827	0.000	1.383	0.556	1.383	1.383	No
	Edge 2	0.021	0.269	0.000	0.971	0.971	0.000	0.021	0.992	0.992	0.290	No
	Edge 1	0.628	0.000	0.056	0.021	0.077	0.000	0.684	0.649	0.705	0.684	No
	Edge 4 Tilt	0.440	0.000	1.089	0.000	1.089	0.000	1.529	0.440	1.529	1.529	No
	Edge 2 Tilt	0.007	0.292	0.002	1.195	1.197	0.000	0.009	1.202	1.204	0.301	No
UMTS Band 5	Rear	0.405	0.085	0.436	0.204	0.640	0.051	0.892	0.660	1.096	0.977	No
	Edge 4	0.389	0.000	0.827	0.000	0.827	0.000	1.216	0.389	1.216	1.216	No
	Edge 2	0.029	0.269	0.000	0.971	0.971	0.000	0.029	1.000	1.000	0.298	No
	Edge 1	0.957	0.000	0.056	0.021	0.077	0.000	1.013	0.978	1.034	1.013	No
	Edge 4 Tilt	0.163	0.000	1.089	0.000	1.089	0.000	1.252	0.163	1.252	1.252	No
	Edge 2 Tilt	0.044	0.292	0.002	1.195	1.197	0.000	0.046	1.239	1.241	0.338	No
LTE Band 2	Rear	0.513	0.085	0.436	0.204	0.640	0.051	1.000	0.768	1.204	1.085	No
	Edge 4	0.000	0.000	0.827	0.000	0.827	0.000	0.827	0.000	0.827	0.827	Yes
	Edge 2	0.000	0.269	0.000	0.971	0.971	0.000	0.000	0.971	0.971	0.269	No
	Edge 1	1.236	0.000	0.056	0.021	0.077	0.000	1.292	1.257	1.313	1.292	No
	Edge 4 Tilt	0.000	0.000	1.089	0.000	1.089	0.000	1.089	0.000	1.089	1.089	No
	Edge 2 Tilt	0.000	0.292	0.002	1.195	1.197	0.000	0.002	1.195	1.197	0.294	No
LTE Band 4	Rear	0.767	0.085	0.436	0.204	0.640	0.051	1.254	1.022	1.458	1.339	No
	Edge 4	0.000	0.000	0.827	0.000	0.827	0.000	0.827	0.000	0.827	0.827	No
	Edge 2	0.000	0.269	0.000	0.971	0.971	0.000	0.000	0.971	0.971	0.269	No
	Edge 1	1.032	0.000	0.056	0.021	0.077	0.000	1.088	1.053	1.109	1.088	No
	Edge 4 Tilt	0.000	0.000	1.089	0.000	1.089	0.000	1.089	0.000	1.089	1.089	No
	Edge 2 Tilt	0.000	0.292	0.002	1.195	1.197	0.000	0.002	1.195	1.197	0.294	No
LTE Band 5	Rear	0.422	0.085	0.436	0.204	0.640	0.051	0.909	0.677	1.113	0.994	No
	Edge 4	0.000	0.000	0.827	0.000	0.827	0.000	0.827	0.000	0.827	0.827	No
	Edge 2	0.000	0.269	0.000	0.971	0.971	0.000	0.000	0.971	0.971	0.269	No
	Edge 1	1.111	0.000	0.056	0.021	0.077	0.000	1.167	1.132	1.188	1.167	No
	Edge 4 Tilt	0.000	0.000	1.089	0.000	1.089	0.000	1.089	0.000	1.089	1.089	No
	Edge 2 Tilt	0.000	0.292	0.002	1.195	1.197	0.000	0.002	1.195	1.197	0.294	No
LTE Band 7	Rear	0.622	0.085	0.436	0.204	0.640	0.051	1.109	0.877	1.313	1.194	No
	Edge 4	0.308	0.000	0.827	0.000	0.827	0.000	1.135	0.308	1.135	1.135	No
	Edge 2	0.063	0.269	0.000	0.971	0.971	0.000	0.063	1.034	1.034	0.332	No
	Edge 1	0.794	0.000	0.056	0.021	0.077	0.000	0.850	0.815	0.871	0.850	No
	Edge 4 Tilt	0.257	0.000	1.089	0.000	1.089	0.000	1.346	0.257	1.346	1.346	No
	Edge 2 Tilt	0.043	0.292	0.002	1.195	1.197	0.000	0.045	1.238	1.240	0.337	No
LTE Band 12	Rear	0.261	0.085	0.436	0.204	0.640	0.051	0.748	0.516	0.952	0.833	No
	Edge 4	0.131	0.000	0.827	0.000	0.827	0.000	0.958	0.131	0.958	0.958	No
	Edge 2	0.012	0.269	0.000	0.971	0.971	0.000	0.012	0.983	0.983	0.281	No
	Edge 1	0.851	0.000	0.056	0.021	0.077	0.000	0.907	0.872	0.928	0.907	No
	Edge 4 Tilt	0.144	0.000	1.089	0.000	1.089	0.000	1.233	0.144	1.233	1.233	No
	Edge 2 Tilt	0.013	0.292	0.002	1.195	1.197	0.000	0.015	1.208	1.210	0.307	No

Simultaneous Transmission Summation Table

Band	Configuration	Main	Bluetooth	5GHz Ant1	5GHz Ant2	5GHz MIMO	RFID	Main + 5GHz Ant1 + RFID	Main + 5GHz Ant2 + RFID	Main + 5GHz MIMO + RFID	Main + 5GHz Ant1 + BT + RFID	SPLSR
		1	2	6	7	8	12	1+6+12	1+7+12	1+8+12	1+2+6+12	
		(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	
LTE Band 13	Rear	0.293	0.085	0.436	0.204	0.640	0.051	0.780	0.548	0.984	0.865	No
	Edge 4	0.294	0.000	0.827	0.000	0.827	0.000	1.121	0.294	1.121	1.121	No
	Edge 2	0.010	0.269	0.000	0.971	0.971	0.000	0.010	0.981	0.981	0.279	No
	Edge 1	1.067	0.000	0.056	0.021	0.077	0.000	1.123	1.088	1.144	1.123	No
	Edge 4 Tilt	0.337	0.000	1.089	0.000	1.089	0.000	1.426	0.337	1.426	1.426	No
	Edge 2 Tilt	0.015	0.292	0.002	1.195	1.197	0.000	0.017	1.210	1.212	0.309	No
LTE Band 14	Rear	0.328	0.085	0.436	0.204	0.640	0.051	0.815	0.583	1.019	0.900	No
	Edge 4	0.396	0.000	0.827	0.000	0.827	0.000	1.223	0.396	1.223	1.223	No
	Edge 2	0.013	0.269	0.000	0.971	0.971	0.000	0.013	0.984	0.984	0.282	No
	Edge 1	1.060	0.000	0.056	0.021	0.077	0.000	1.116	1.081	1.137	1.116	No
	Edge 4 Tilt	0.338	0.000	1.089	0.000	1.089	0.000	1.427	0.338	1.427	1.427	No
	Edge 2 Tilt	0.016	0.292	0.002	1.195	1.197	0.000	0.018	1.211	1.213	0.310	No
LTE Band 25	Rear	0.394	0.085	0.436	0.204	0.640	0.051	0.881	0.649	1.085	0.966	No
	Edge 4	0.820	0.000	0.827	0.000	0.827	0.000	1.647	0.820	1.647	1.647	Yes
	Edge 2	0.020	0.269	0.000	0.971	0.971	0.000	0.020	0.991	0.991	0.289	No
	Edge 1	0.638	0.000	0.056	0.021	0.077	0.000	0.694	0.659	0.715	0.694	No
	Edge 4 Tilt	0.488	0.000	1.089	0.000	1.089	0.000	1.577	0.488	1.577	1.577	No
	Edge 2 Tilt	0.016	0.292	0.002	1.195	1.197	0.000	0.018	1.211	1.213	0.310	No
LTE Band 26	Rear	0.324	0.085	0.436	0.204	0.640	0.051	0.811	0.579	1.015	0.896	No
	Edge 4	0.387	0.000	0.827	0.000	0.827	0.000	1.214	0.387	1.214	1.214	No
	Edge 2	0.011	0.269	0.000	0.971	0.971	0.000	0.011	0.982	0.982	0.280	No
	Edge 1	1.017	0.000	0.056	0.021	0.077	0.000	1.073	1.038	1.094	1.073	No
	Edge 4 Tilt	0.362	0.000	1.089	0.000	1.089	0.000	1.451	0.362	1.451	1.451	No
	Edge 2 Tilt	0.018	0.292	0.002	1.195	1.197	0.000	0.020	1.213	1.215	0.312	No
LTE Band 42	Rear	0.233	0.085	0.436	0.204	0.640	0.051	0.720	0.488	0.924	0.805	No
	Edge 4	0.184	0.000	0.827	0.000	0.827	0.000	1.011	0.184	1.011	1.011	No
	Edge 2	0.017	0.269	0.000	0.971	0.971	0.000	0.017	0.988	0.988	0.286	No
	Edge 1	1.444	0.000	0.056	0.021	0.077	0.000	1.500	1.465	1.521	1.500	No
	Edge 4 Tilt	0.159	0.000	1.089	0.000	1.089	0.000	1.248	0.159	1.248	1.248	No
	Edge 2 Tilt	0.012	0.292	0.002	1.195	1.197	0.000	0.014	1.207	1.209	0.306	No
LTE Band 48	Rear	0.125	0.085	0.436	0.204	0.640	0.051	0.612	0.380	0.816	0.697	No
	Edge 4	0.085	0.000	0.827	0.000	0.827	0.000	0.912	0.085	0.912	0.912	No
	Edge 2	0.003	0.269	0.000	0.971	0.971	0.000	0.003	0.974	0.974	0.272	No
	Edge 1	1.164	0.000	0.056	0.021	0.077	0.000	1.220	1.185	1.241	1.220	No
	Edge 4 Tilt	0.067	0.000	1.089	0.000	1.089	0.000	1.156	0.067	1.156	1.156	No
	Edge 2 Tilt	0.002	0.292	0.002	1.195	1.197	0.000	0.004	1.197	1.199	0.296	No
LTE Band 66	Rear	0.671	0.085	0.436	0.204	0.640	0.051	1.158	0.926	1.362	1.243	No
	Edge 4	0.540	0.000	0.827	0.000	0.827	0.000	1.367	0.540	1.367	1.367	No
	Edge 2	0.011	0.269	0.000	0.971	0.971	0.000	0.011	0.982	0.982	0.280	No
	Edge 1	0.603	0.000	0.056	0.021	0.077	0.000	0.659	0.624	0.680	0.659	No
	Edge 4 Tilt	0.343	0.000	1.089	0.000	1.089	0.000	1.432	0.343	1.432	1.432	No
	Edge 2 Tilt	0.009	0.292	0.002	1.195	1.197	0.000	0.011	1.204	1.206	0.303	No

Simultaneous Transmission Summation Table

Band	Configuration	Main	Bluetooth	WI-FI 6E Ant1	WI-FI 6E Ant2	WI-FI 6E MIMO	RFID	Main + 6E Ant1 + RFID	Main + 6E Ant2 + RFID	Main + 6E MIMO + RFID	Main + 6E Ant1 + BT + RFID	SPLSR
		1	2	9	10	11	12	1+9+12	1+10+12	1+11+12	1+2+9+12	
		(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	
UMTS Band 2	Rear	0.608	0.085	0.056	0.126	0.182	0.051	0.715	0.785	0.841	0.800	No
	Edge 4	1.219	0.000	0.431	0.000	0.431	0.000	1.650	1.219	1.650	1.650	Yes
	Edge 2	0.035	0.269	0.000	0.447	0.447	0.000	0.035	0.482	0.482	0.304	No
	Edge 1	0.937	0.000	0.008	0.000	0.008	0.000	0.945	0.937	0.945	0.945	No
	Edge 4 Tilt	0.821	0.000	0.627	0.000	0.627	0.000	1.448	0.821	1.448	1.448	No
	Edge 2 Tilt	0.025	0.292	0.003	0.644	0.647	0.000	0.028	0.669	0.672	0.320	No
UMTS Band 4	Rear	0.913	0.085	0.056	0.126	0.182	0.051	1.020	1.090	1.146	1.105	No
	Edge 4	0.556	0.000	0.431	0.000	0.431	0.000	0.987	0.556	0.987	0.987	No
	Edge 2	0.021	0.269	0.000	0.447	0.447	0.000	0.021	0.468	0.468	0.290	No
	Edge 1	0.628	0.000	0.008	0.000	0.008	0.000	0.636	0.628	0.636	0.636	No
	Edge 4 Tilt	0.440	0.000	0.627	0.000	0.627	0.000	1.067	0.440	1.067	1.067	No
	Edge 2 Tilt	0.007	0.292	0.003	0.644	0.647	0.000	0.010	0.651	0.654	0.302	No
UMTS Band 5	Rear	0.405	0.085	0.056	0.126	0.182	0.051	0.512	0.582	0.638	0.597	No
	Edge 4	0.389	0.000	0.431	0.000	0.431	0.000	0.820	0.389	0.820	0.820	No
	Edge 2	0.029	0.269	0.000	0.447	0.447	0.000	0.029	0.476	0.476	0.298	No
	Edge 1	0.957	0.000	0.008	0.000	0.008	0.000	0.965	0.957	0.965	0.965	No
	Edge 4 Tilt	0.163	0.000	0.627	0.000	0.627	0.000	0.790	0.163	0.790	0.790	No
	Edge 2 Tilt	0.044	0.292	0.003	0.644	0.647	0.000	0.047	0.688	0.691	0.339	No
LTE Band 2	Rear	0.513	0.085	0.056	0.126	0.182	0.051	0.620	0.690	0.746	0.705	No
	Edge 4	0.000	0.000	0.431	0.000	0.431	0.000	0.431	0.000	0.431	0.431	No
	Edge 2	0.000	0.269	0.000	0.447	0.447	0.000	0.000	0.447	0.447	0.269	No
	Edge 1	1.236	0.000	0.008	0.000	0.008	0.000	1.244	1.236	1.244	1.244	No
	Edge 4 Tilt	0.000	0.000	0.627	0.000	0.627	0.000	0.627	0.000	0.627	0.627	No
	Edge 2 Tilt	0.000	0.292	0.003	0.644	0.647	0.000	0.003	0.644	0.647	0.295	No
LTE Band 4	Rear	0.767	0.085	0.056	0.126	0.182	0.051	0.874	0.944	1.000	0.959	No
	Edge 4	0.000	0.000	0.431	0.000	0.431	0.000	0.431	0.000	0.431	0.431	No
	Edge 2	0.000	0.269	0.000	0.447	0.447	0.000	0.000	0.447	0.447	0.269	No
	Edge 1	1.032	0.000	0.008	0.000	0.008	0.000	1.040	1.032	1.040	1.040	No
	Edge 4 Tilt	0.000	0.000	0.627	0.000	0.627	0.000	0.627	0.000	0.627	0.627	No
	Edge 2 Tilt	0.000	0.292	0.003	0.644	0.647	0.000	0.003	0.644	0.647	0.295	No
LTE Band 5	Rear	0.422	0.085	0.056	0.126	0.182	0.051	0.529	0.599	0.655	0.614	No
	Edge 4	0.000	0.000	0.431	0.000	0.431	0.000	0.431	0.000	0.431	0.431	No
	Edge 2	0.000	0.269	0.000	0.447	0.447	0.000	0.000	0.447	0.447	0.269	No
	Edge 1	1.111	0.000	0.008	0.000	0.008	0.000	1.119	1.111	1.119	1.119	No
	Edge 4 Tilt	0.000	0.000	0.627	0.000	0.627	0.000	0.627	0.000	0.627	0.627	No
	Edge 2 Tilt	0.000	0.292	0.003	0.644	0.647	0.000	0.003	0.644	0.647	0.295	No
LTE Band 7	Rear	0.622	0.085	0.056	0.126	0.182	0.051	0.729	0.799	0.855	0.814	No
	Edge 4	0.308	0.000	0.431	0.000	0.431	0.000	0.739	0.308	0.739	0.739	No
	Edge 2	0.063	0.269	0.000	0.447	0.447	0.000	0.063	0.510	0.510	0.332	No
	Edge 1	0.794	0.000	0.008	0.000	0.008	0.000	0.802	0.794	0.802	0.802	No
	Edge 4 Tilt	0.257	0.000	0.627	0.000	0.627	0.000	0.884	0.257	0.884	0.884	No
	Edge 2 Tilt	0.043	0.292	0.003	0.644	0.647	0.000	0.046	0.687	0.690	0.338	No
LTE Band 12	Rear	0.261	0.085	0.056	0.126	0.182	0.051	0.368	0.438	0.494	0.453	No
	Edge 4	0.131	0.000	0.431	0.000	0.431	0.000	0.562	0.131	0.562	0.562	No
	Edge 2	0.012	0.269	0.000	0.447	0.447	0.000	0.012	0.459	0.459	0.281	No
	Edge 1	0.851	0.000	0.008	0.000	0.008	0.000	0.859	0.851	0.859	0.859	No
	Edge 4 Tilt	0.144	0.000	0.627	0.000	0.627	0.000	0.771	0.144	0.771	0.771	No
	Edge 2 Tilt	0.013	0.292	0.003	0.644	0.647	0.000	0.016	0.657	0.660	0.308	No

Simultaneous Transmission Summation Table

Band	Configuration	Main	Bluetooth	WI-FI 6E Ant1	WI-FI 6E Ant2	WI-FI 6E MIMO	RFID	Main + 6E Ant1 + RFID	Main + 6E Ant2 + RFID	Main + 6E MIMO + RFID	Main + 6E Ant1 + BT + RFID	SPLSR
		1	2	9	10	11	12	1+9+12	1+10+12	1+11+12	1+2+9+12	
		(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	
LTE Band 13	Rear	0.293	0.085	0.056	0.126	0.182	0.051	0.400	0.470	0.526	0.485	No
	Edge 4	0.294	0.000	0.431	0.000	0.431	0.000	0.725	0.294	0.725	0.725	No
	Edge 2	0.010	0.269	0.000	0.447	0.447	0.000	0.010	0.457	0.457	0.279	No
	Edge 1	1.067	0.000	0.008	0.000	0.008	0.000	1.075	1.067	1.075	1.075	No
	Edge 4 Tilt	0.337	0.000	0.627	0.000	0.627	0.000	0.964	0.337	0.964	0.964	No
	Edge 2 Tilt	0.015	0.292	0.003	0.644	0.647	0.000	0.018	0.659	0.662	0.310	No
LTE Band 14	Rear	0.328	0.085	0.056	0.126	0.182	0.051	0.435	0.505	0.561	0.520	No
	Edge 4	0.396	0.000	0.431	0.000	0.431	0.000	0.827	0.396	0.827	0.827	No
	Edge 2	0.013	0.269	0.000	0.447	0.447	0.000	0.013	0.460	0.460	0.282	No
	Edge 1	1.060	0.000	0.008	0.000	0.008	0.000	1.068	1.060	1.068	1.068	No
	Edge 4 Tilt	0.338	0.000	0.627	0.000	0.627	0.000	0.965	0.338	0.965	0.965	No
	Edge 2 Tilt	0.016	0.292	0.003	0.644	0.647	0.000	0.019	0.660	0.663	0.311	No
LTE Band 25	Rear	0.394	0.085	0.056	0.126	0.182	0.051	0.501	0.571	0.627	0.586	No
	Edge 4	0.820	0.000	0.431	0.000	0.431	0.000	1.251	0.820	1.251	1.251	No
	Edge 2	0.020	0.269	0.000	0.447	0.447	0.000	0.020	0.467	0.467	0.289	No
	Edge 1	0.638	0.000	0.008	0.000	0.008	0.000	0.646	0.638	0.646	0.646	No
	Edge 4 Tilt	0.488	0.000	0.627	0.000	0.627	0.000	1.115	0.488	1.115	1.115	No
	Edge 2 Tilt	0.016	0.292	0.003	0.644	0.647	0.000	0.019	0.660	0.663	0.311	No
LTE Band 26	Rear	0.324	0.085	0.056	0.126	0.182	0.051	0.431	0.501	0.557	0.516	No
	Edge 4	0.387	0.000	0.431	0.000	0.431	0.000	0.818	0.387	0.818	0.818	No
	Edge 2	0.011	0.269	0.000	0.447	0.447	0.000	0.011	0.458	0.458	0.280	No
	Edge 1	1.017	0.000	0.008	0.000	0.008	0.000	1.025	1.017	1.025	1.025	No
	Edge 4 Tilt	0.362	0.000	0.627	0.000	0.627	0.000	0.989	0.362	0.989	0.989	No
	Edge 2 Tilt	0.018	0.292	0.003	0.644	0.647	0.000	0.021	0.662	0.665	0.313	No
LTE Band 42	Rear	0.233	0.085	0.056	0.126	0.182	0.051	0.340	0.410	0.466	0.425	No
	Edge 4	0.184	0.000	0.431	0.000	0.431	0.000	0.615	0.184	0.615	0.615	No
	Edge 2	0.017	0.269	0.000	0.447	0.447	0.000	0.017	0.464	0.464	0.286	No
	Edge 1	1.444	0.000	0.008	0.000	0.008	0.000	1.452	1.444	1.452	1.452	No
	Edge 4 Tilt	0.159	0.000	0.627	0.000	0.627	0.000	0.786	0.159	0.786	0.786	No
	Edge 2 Tilt	0.012	0.292	0.003	0.644	0.647	0.000	0.015	0.656	0.659	0.307	No
LTE Band 48	Rear	0.125	0.085	0.056	0.126	0.182	0.051	0.232	0.302	0.358	0.317	No
	Edge 4	0.085	0.000	0.431	0.000	0.431	0.000	0.516	0.085	0.516	0.516	No
	Edge 2	0.003	0.269	0.000	0.447	0.447	0.000	0.003	0.450	0.450	0.272	No
	Edge 1	1.164	0.000	0.008	0.000	0.008	0.000	1.172	1.164	1.172	1.172	No
	Edge 4 Tilt	0.067	0.000	0.627	0.000	0.627	0.000	0.694	0.067	0.694	0.694	No
	Edge 2 Tilt	0.002	0.292	0.003	0.644	0.647	0.000	0.005	0.646	0.649	0.297	No
LTE Band 66	Rear	0.671	0.085	0.056	0.126	0.182	0.051	0.778	0.848	0.904	0.863	No
	Edge 4	0.540	0.000	0.431	0.000	0.431	0.000	0.971	0.540	0.971	0.971	No
	Edge 2	0.011	0.269	0.000	0.447	0.447	0.000	0.011	0.458	0.458	0.280	No
	Edge 1	0.603	0.000	0.008	0.000	0.008	0.000	0.611	0.603	0.611	0.611	No
	Edge 4 Tilt	0.343	0.000	0.627	0.000	0.627	0.000	0.970	0.343	0.970	0.970	No
	Edge 2 Tilt	0.009	0.292	0.003	0.644	0.647	0.000	0.012	0.653	0.656	0.304	No

8.1 SAR to Peak Location Separation Ratio (SPLSR)

FCC KDB 447498 D01v06 General RF Exposure Guidance introduces a new formula for calculating the SAR a Peak Location Separation Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$$SPLSR_i = (SAR_1 + SAR_2)^{1.5} / R_i$$

Where:

SAR₁ is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR₂ is the highest measured or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

R_i is the separation distance between the pair of simultaneous transmitting antennas, When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $[(X_1 - X_2)^2 + (Y_1 - Y_2)^2 + (Z_1 - Z_2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum 1-g of SAR > 1.6 W/kg and with the sum 10-g of SAR > 4 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$(SAR_1 + SAR_2)^{1.5} / R_i \leq 0.04 \text{ for 1g SAR and } (SAR_1 + SAR_2)^{1.5} / R_i \leq 0.1 \text{ for 10g SAR}$$

SPLSR Evaluation

Position	Mode/Band	X(mm)	Y(mm)	Z(mm)	Reported SAR [W/kg]
Rear	UMTS Band 4	118	-115	-174	0.913
	WLAN 5 GHz MIMO	-84	-152	-177	0.640
	RFID	46	145	-178	0.051
Left	UMTS Band 2	-6.0	99.0	-174.0	1.219
	UMTS Band 4	-1.5	101.5	-174.0	0.556
	LTE Band 25	-12.0	99.5	-178.0	0.820
	LTE Band 66	-15.0	101.0	-178.0	0.540
	WLAN 2.4 GHz Main	12.0	-67.8	-178.0	1.095
	WLAN 5 GHz Main	12.0	-68.0	-178.0	0.827
	WLAN 6 GHz Main	11.1	-55.2	-178.0	0.431
Left Tilt	UMTS Band 2	-4.2	101.5	-174.0	0.821
	UMTS Band 4	-9.0	101.5	-174.0	0.440
	LTE Band 13	-13.5	87.5	-179.0	0.337
	LTE Band 14	-13.5	87.5	-179.0	0.338
	LTE Band 25	-12.0	95.0	-179.0	0.488
	LTE Band 26	-13.5	78.5	-179.0	0.362
	LTE Band 66	-15.0	92.0	-179.0	0.343
	WLAN 2.4 GHz Main	-2.4	-69.8	-178.0	1.317
	WLAN 5 GHz Main	0.0	-80.0	-178.0	1.089

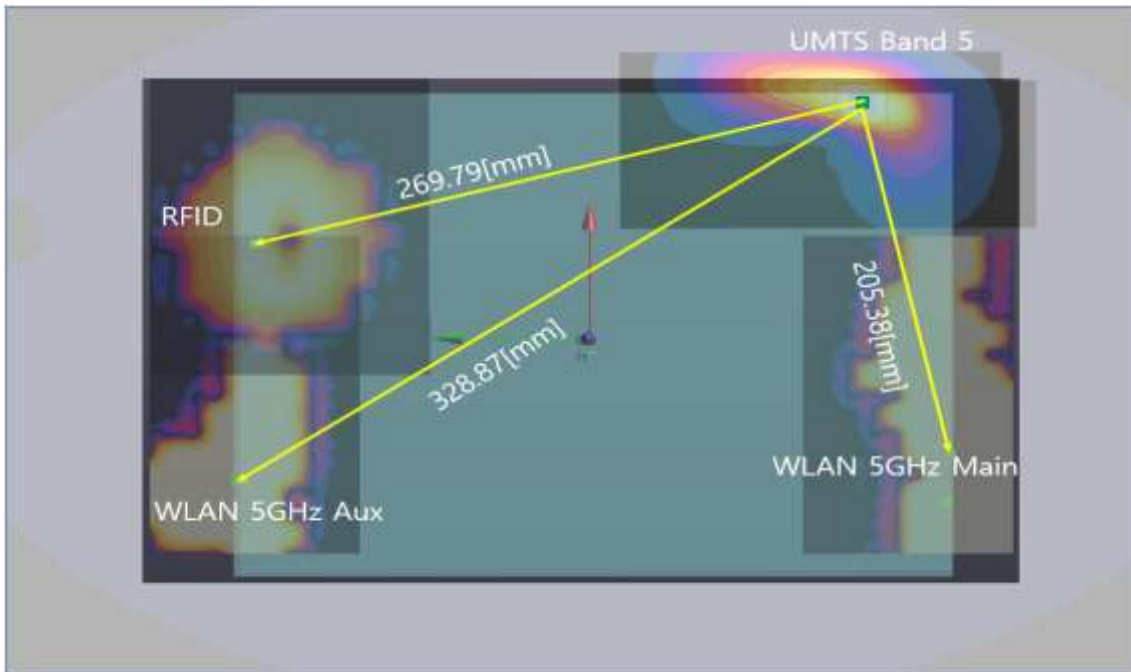
Position	Max Mode		Sum 1g SAR	Peak SAR Separation Distance	SPLSR
				[mm]	
	1	2	1+2	1+2	
Rear	UMTS Band 4	WLAN 5GHz MIMO+RFID	1.604	205.38	0.009

Position	Max Mode		Sum 1g SAR	Peak SAR Separation Distance	SPLSR
				[mm]	
	1	2	1+2	1+2	
Left	UMTS Band 2	WLAN 2.4 GHz Main	2.314	167.82	0.021
	UMTS Band 4	WLAN 2.4 GHz Main	1.651	169.88	0.012
	LTE Band 25	WLAN 2.4 GHz Main	1.915	169.01	0.016
	LTE Band 66	WLAN 2.4 GHz Main	1.635	170.95	0.012
	UMTS Band 2	WLAN 5 GHz Main	2.046	167.02	0.018
	LTE Band 25	WLAN 5 GHz Main	1.647	168.221	0.013
	UMTS Band 2	WLAN 6 GHz Main	1.650	155.20	0.014

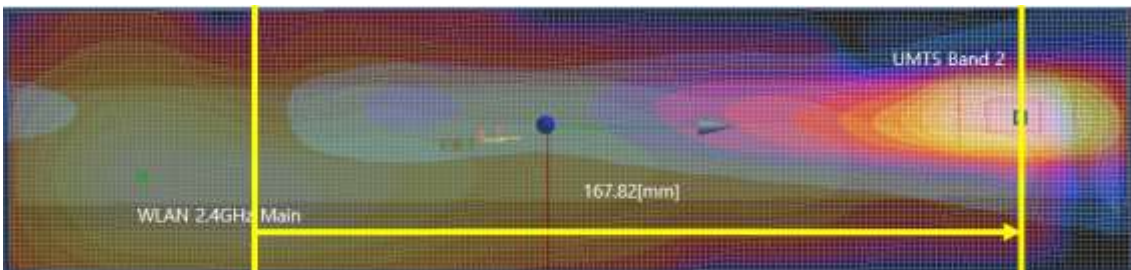
Position	Max Mode		Sum 1g SAR	Peak SAR Separation Distance	SPLSR
				[mm]	
	1	2	1+2	1+2	
Left Tilt	UMTS Band 2	WLAN 2.4 GHz Main	2.138	171.36	0.018
	UMTS Band 4	WLAN 2.4 GHz Main	1.757	171.47	0.014
	LTE Band 13	WLAN 2.4 GHz Main	1.654	157.69	0.014
	LTE Band 14	WLAN 2.4 GHz Main	1.655	157.69	0.014
	LTE Band 25	WLAN 2.4 GHz Main	1.805	165.08	0.015
	LTE Band 26	WLAN 2.4 GHz Main	1.679	148.72	0.015
	LTE Band 66	WLAN 2.4 GHz Main	1.660	162.29	0.013
	UMTS Band 2	WLAN 5 GHz Main	1.910	181.59	0.015

SPLSR Plot

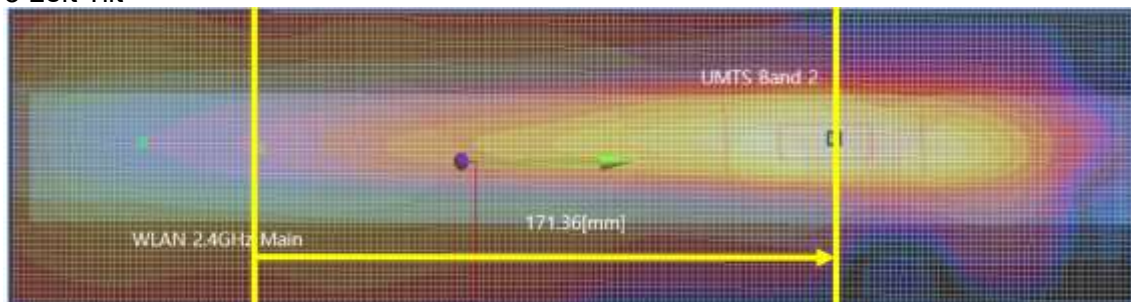
1.Rear



2 Left



3 Left Tilt



8.2 Simultaneous Transmission Conclusion

The above numerical summed SAR Results are sufficient to determine that simultaneous transmission cases will not exceed the SAR Limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and the IEEE1528-2013.

9. Measurement Uncertainty

Measurement Uncertainty for DUT SAR test								
<i>a</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	$\frac{h}{c \times f / e}$	$\frac{i}{c \times g / e}$	<i>k</i>
Source of uncertainty	Uncertainty ± %	Probability distribution	Div.	<i>c_i</i>	<i>c_i</i>	Standard Uncertainty	Standard Uncertainty	<i>v_i</i> or <i>v_{eff}</i>
				(1 g)	(10 g)	± % (1 g)	± % (10 g)	
Measurement system								
Probe calibration	6.65	N	1	1	1	6.65	6.65	∞
Axial isotropy	4.70	R	1.73	0.71	0.71	1.92	1.92	∞
Hemispherical isotropy	9.60	R	1.73	0.71	0.71	3.92	3.92	∞
Boundary effect	2.00	R	1.73	1	1	1.15	1.15	∞
Linearity	4.70	R	1.73	1	1	2.71	2.71	∞
Detection limits	1.00	R	1.73	1	1	0.58	0.58	∞
Readout electronics	0.30	N	1	1	1	0.30	0.30	∞
Response time	0.80	R	1.73	1	1	0.46	0.46	∞
Integration time	2.60	R	1.73	1	1	1.50	1.50	∞
RF ambient conditions - noise	3.00	R	1.73	1	1	1.73	1.73	∞
RF ambient conditions - reflections	3.00	R	1.73	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	0.80	R	1.73	1	1	0.46	0.46	∞
Probe positioning with respect to phantom shell	6.70	R	1.73	1	1	3.87	3.87	∞
Max. SAR Evaluation	4.00	R	1.73	1	1	2.31	2.31	∞
Test sample related								
Test sample positioning	3.50	N	1	1	1	3.50	3.50	∞
Device holder uncertainty	2.01	N	1	1	1	2.01	2.01	∞
SAR drift measurement	5.00	R	1.73	1	1	2.89	2.89	∞
SAR scaling	0.00	R	1.73	1	1	0.00	0.00	∞
Phantom and set-up								
Phantom uncertainty (shape and thickness uncertainty)	7.60	R	1.73	1	1	4.39	4.39	∞
Liquid conductivity (measured)	0.25	N	1	0.78	0.71	0.20	0.18	∞
Liquid permittivity (measured)	1.51	N	1	0.23	0.26	0.22	0.25	∞
Liquid conductivity (temperature uncertainty)	0.52	R	1.73	0.78	0.71	0.23	0.21	∞
Liquid permittivity (temperature uncertainty)	1.21	R	1.73	0.23	0.26	0.16	0.18	∞
Liquid conductivity - deviation from target	5.00	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid permittivity - deviation from target	5.00	R	1.73	0.6	0.49	1.73	1.41	∞
Combined standard uncertainty		RSS				12.32	12.20	
Expanded uncertainty (95% confidence interval)		<i>k</i> = 2				24.64	24.40	

10. SAR Test Equipment

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	ELI Phantom	-	N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F11/ 5K3RA1/C/01	N/A	N/A	N/A
Staubli	TX90 XLspeag	F11/ 5K3RA1/A/01	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	S-1203 0309	N/A	N/A	N/A
TESTO	175-H1/Thermometer	40331936309	12/26/2023	Annual	12/26/2024
SPEAG	DAE4	504	01/30/2024	Annual	01/30/2025
SPEAG	E-Field Probe ES3DV3	3076	07/18/2023	Annual	07/18/2024
SPEAG	Dipole CLA13	1016	09/21/2023	Annual	09/21/2024
Agilent	WIRELESS COMMUNICATION E5515C	MY48361100	09/21/2023	Annual	09/21/2024
Agilent	Power Meter E4419B	MY41291386	09/21/2023	Annual	09/21/2024
Agilent	Power Meter N1911A	MY45101406	05/21/2024	Annual	05/21/2025
Agilent	Power Sensor 8481A	SG1091286	09/21/2023	Annual	09/21/2024
H.P	Power Sensor 8481A	MY41090675	09/21/2023	Annual	09/21/2024
Agilent	Wideband Power Sensor N1921A	MY55220026	07/28/2023	Annual	07/28/2024
Agilent	11636B/Power Divider	58698	01/15/2024	Annual	01/15/2025
SPEAG	DAKS 3.5	1038	01/22/2024	Annual	01/22/2025
SPEAG	Vector Reflectometer	0141013	01/11/2024	Annual	01/11/2025
H.P	Network Analyzer /8753ES	JP39240221	12/26/2023	Annual	12/26/2024
Agilent	SIGNAL GENERATOR N5182A	MY47070230	03/19/2024	Annual	03/19/2025
Keysight	PSG Vector Signal Generator	MY50350097	03/05/2024	Annual	03/05/2025
EMPOWER	RF Power Amplifier	1084	05/21/2024	Annual	05/21/2025
EMPOWER	RF Power Amplifier	1041D/C0508	05/21/2024	Annual	05/21/2025
EMPOWER	RF Power Amplifier	1011	09/21/2023	Annual	09/21/2024
MICRO LAB	LP Filter / LA-15N	10453	09/21/2023	Annual	09/21/2024
MICRO LAB	LP Filter / LA-30N	-	09/21/2023	Annual	09/21/2024
MICRO LAB	LP Filter / LA-60N	32011	09/21/2023	Annual	09/21/2024
Agilent	Attenuator (3dB) 8693B	MY39260298	08/22/2023	Annual	08/22/2024
HP	Attenuator (3dB) 33340A	02427	08/22/2023	Annual	08/22/2024
HP	Attenuator (20dB) 8493C	09271	08/22/2023	Annual	08/22/2024
Agilent	Directional Bridge 86205A	3140A04581	04/22/2024	Annual	04/22/2025
HP	Dual Directional Coupler	16072	09/21/2023	Annual	09/21/2024

Appendix A. DUT Ant. Information & SETUP PHOTO

Please refer to test DUT Ant. Information & setup photo file no. as follows:

Report No.
HCT-SR-2407-FC009-P

Appendix B. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: RFID Module
Liquid Temperature: 22.7 °C
Ambient Temperature: 22.8 °C
Test Date: 06/24/2024
Plot No.: B1

Communication System: UID 0, RFID (0); Frequency: 13.56 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 14 \text{ MHz}$; $\sigma = 0.756 \text{ S/m}$; $\epsilon_r = 54.306$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3076; ConvF(5.8, 5.8, 5.8) @ 13.56 MHz; Calibrated: 2023-07-18
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn504; Calibrated: 2024-01-30
- Phantom: ELI V4.0 (20deg probe tilt); Type: QD OVA 001 Bx; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

RFID Body Rear ISO15693 26.48kbps/Area Scan (16x13x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.0475 W/kg

RFID Body Rear ISO15693 26.48kbps/Zoom Scan (9x9x8)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$

Reference Value = 0 V/m; Power Drift = 0.00 dB

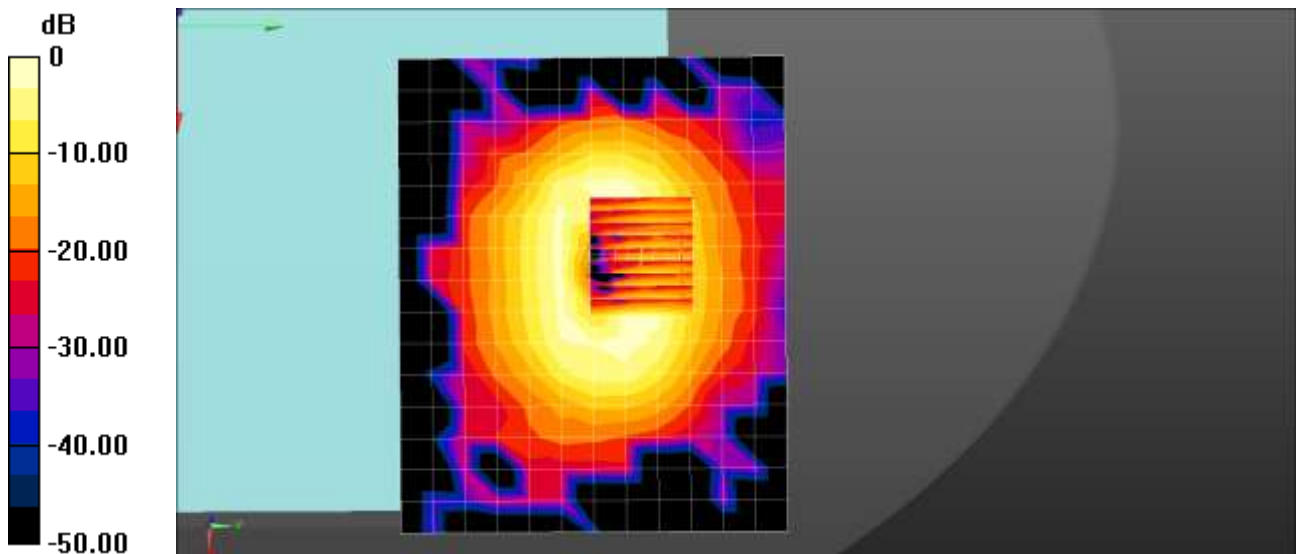
Peak SAR (extrapolated) = 0.212 W/kg

SAR(1 g) = 0.051 W/kg; SAR(10 g) = 0.019 W/kg

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 68.1%

Maximum value of SAR (measured) = 0.0698 W/kg



0 dB = 0.0698 W/kg = -11.56 dBW/kg

Appendix C. –Verification Plots

■ Verification Data (13 MHz)

Test Laboratory: HCT CO., LTD
Input Power: 50 mW
Liquid Temp: 22.7 °C
Test Date: 06/24/2024

DUT: CLA-13 - SN1016; Type: CLA-13; Serial: SN1016

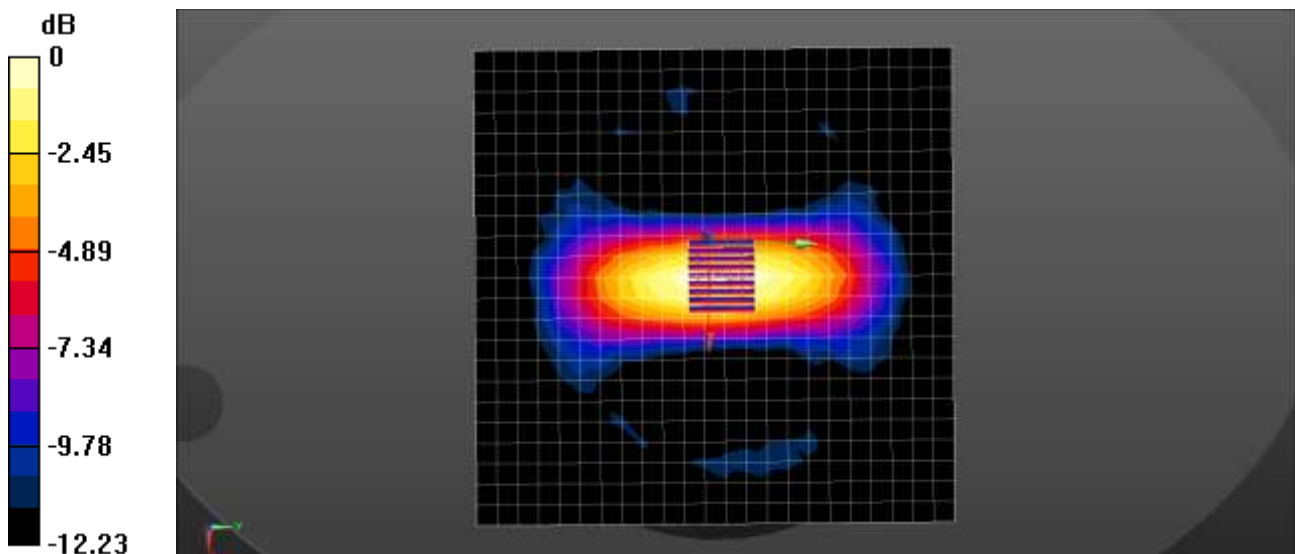
Communication System: UID 0, RFID (0); Frequency: 13 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 13$ MHz; $\sigma = 0.724$ S/m; $\epsilon_r = 54.349$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3076; ConvF(5.8, 5.8, 5.8) @ 13 MHz; Calibrated: 2023-07-18
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn504; Calibrated: 2024-01-30
- Phantom: ELI V4.0 (20deg probe tilt); Type: QD OVA 001 Bx; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

13MHz Head Verification/Area Scan (24x24x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.0328 W/kg

13MHz Head Verification/Zoom Scan (9x9x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 6.770 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.0570 W/kg
SAR(1 g) = 0.029 W/kg; SAR(10 g) = 0.018 W/kg
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 83%
Maximum value of SAR (measured) = 0.0337 W/kg



Appendix D. – Probe Calibration Data

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



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

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

Accreditation No.: **SCS 0108**

Client **HCT**
 Gyeonggi-do, Republic of Korea

Certificate No. **ES-3076_Jul23**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3076**

Calibration procedure(s) **QA CAL-01.v10, QA CAL-12.v10, QA CAL-23.v6, QA CAL-25.v8**
Calibration procedure for dosimetric E-field probes

Calibration date **July 18, 2023**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.
 All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3) °C and humidity < 70%.
 Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	30-Mar-23 (No. 217-03804/03805)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-22 (OCP-DAK3.5-1249_Oct22)	Oct-23
OCP DAK-12	SN: 1016	20-Oct-22 (OCP-DAK12-1016_Oct22)	Oct-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	30-Mar-23 (No. 217-03809)	Mar-24
DAE4	SN: 660	16-Mar-23 (No. DAE4-660_Mar23)	Mar-24
Reference Probe ES3DV2	SN: 3013	06-Jan-23 (No. ES3-3013_Jan23)	Jan-24

Secondary Standards	ID	Check Date (In house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by	Jeffrey Katzman	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: July 18, 2023

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

결	담	담	과	과
재				
직위/일명	DL / U5762	CS / H13076		
일	2023 / 08.03	2023 / 08.03		

Certificate No: ES-3076_Jul23

Page 1 of 21

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



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

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

Accreditation No.: **SCS 0108**

Glossary

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

Calibration is Performed According to the Following Standards:

- a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices – Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- **NORM_{x,y,z}**: Assessed for E-field polarization $\theta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- **NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response** (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- **DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal. DCP does not depend on frequency nor media.
- **PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- **A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- **ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- **Spherical Isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- **Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- **Connector Angle**: The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

ES3DV3 - SN:3076

July 18, 2023

Parameters of Probe: ES3DV3 - SN:3076
Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k = 2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.21	1.24	1.18	$\pm 10.1\%$
DCP (mV) ^B	106.0	105.0	104.0	$\pm 4.7\%$

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Max Unc ^E k = 2
0	CW	X	0.00	0.00	1.00	0.00	209.5	$\pm 3.0\%$	$\pm 4.7\%$
		Y	0.00	0.00	1.00		208.5		
		Z	0.00	0.00	1.00		199.2		
10352	Pulse Waveform (200Hz, 10%)	X	12.55	85.70	23.45	10.00	60.0	$\pm 1.6\%$	$\pm 9.6\%$
		Y	12.36	85.52	23.29		60.0		
		Z	14.22	87.77	23.67		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	20.00	94.07	24.61	6.99	80.0	$\pm 2.5\%$	$\pm 9.6\%$
		Y	20.00	94.11	24.55		80.0		
		Z	20.00	93.40	23.84		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	20.00	95.82	23.46	3.98	95.0	$\pm 3.7\%$	$\pm 9.6\%$
		Y	20.00	96.10	23.57		95.0		
		Z	20.00	94.83	22.58		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	20.00	99.55	23.57	2.22	120.0	$\pm 3.9\%$	$\pm 9.6\%$
		Y	20.00	100.53	24.06		120.0		
		Z	20.00	97.63	22.25		120.0		
10387	QPSK Waveform, 1 MHz	X	1.96	67.22	16.17	1.00	150.0	$\pm 2.5\%$	$\pm 9.6\%$
		Y	2.02	68.40	16.83		150.0		
		Z	1.76	66.00	15.20		150.0		
10388	QPSK Waveform, 10 MHz	X	2.71	70.78	17.03	0.00	150.0	$\pm 1.0\%$	$\pm 9.6\%$
		Y	2.87	72.05	17.80		150.0		
		Z	2.37	68.73	15.94		150.0		
10396	64-QAM Waveform, 100 kHz	X	4.51	75.83	21.27	3.01	150.0	$\pm 0.6\%$	$\pm 9.6\%$
		Y	4.70	77.67	22.25		150.0		
		Z	3.75	72.58	19.73		150.0		
10399	64-QAM Waveform, 40 MHz	X	3.67	67.81	16.18	0.00	150.0	$\pm 1.8\%$	$\pm 9.6\%$
		Y	3.74	68.30	16.53		150.0		
		Z	3.60	67.47	15.91		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	5.05	65.79	15.84	0.00	150.0	$\pm 3.8\%$	$\pm 9.6\%$
		Y	5.07	66.04	15.84		150.0		
		Z	5.02	65.86	15.63		150.0		

Note: For details on UID parameters see Appendix

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

^A The uncertainties of Norm X,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Page 5).

^B Linearization parameter uncertainty for maximum specified field strength.

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

ES3DV3 - SN:3076

July 18, 2023

Parameters of Probe: ES3DV3 - SN:3076

Sensor Model Parameters

	C1 fF	C2 fF	α V ⁻¹	T1 ms V ⁻²	T2 ms V ⁻¹	T3 ms	T4 V ⁻²	T5 V ⁻¹	T6
x	69.3	493.88	35.07	29.81	3.34	5.10	0.66	0.66	1.01
y	63.3	451.09	35.12	29.79	3.18	5.10	1.05	0.51	1.01
z	60.7	436.50	35.52	29.40	2.83	5.10	0.34	0.69	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	145.0°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

ES3DV3 - SN:3076

July 18, 2023

Parameters of Probe: ES3DV3 - SN:3076
Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity ^F (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unc (k = 2)
6	55.0	0.75	5.33	5.33	5.33	0.00	1.00	±13.3%
13	55.0	0.75	5.80	5.80	5.80	0.00	1.00	±13.3%
750	41.9	0.89	6.37	6.37	6.37	0.40	1.64	±12.0%
835	41.5	0.90	6.11	6.11	6.11	0.62	1.28	±12.0%
900	41.5	0.97	5.98	5.98	5.98	0.66	1.25	±12.0%
1450	40.5	1.20	5.53	5.53	5.53	0.34	1.71	±12.0%
1750	40.1	1.37	5.35	5.35	5.35	0.74	1.11	±12.0%
1900	40.0	1.40	5.05	5.05	5.05	0.80	1.13	±12.0%
2300	39.5	1.67	5.00	5.00	5.00	0.53	1.47	±12.0%
2450	39.2	1.80	4.81	4.81	4.81	0.73	1.31	±12.0%
2600	39.0	1.96	4.59	4.59	4.59	0.80	1.27	±12.0%

^C Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–8 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

^F The probes are calibrated using tissue simulating liquids (TSL) that deviate for ϵ and σ by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10%. If TSL with deviations from the target of less than ±5% are used, the calibration uncertainties are 11.1% for 0.7 - 3 GHz and 13.1% for 3 - 6 GHz.

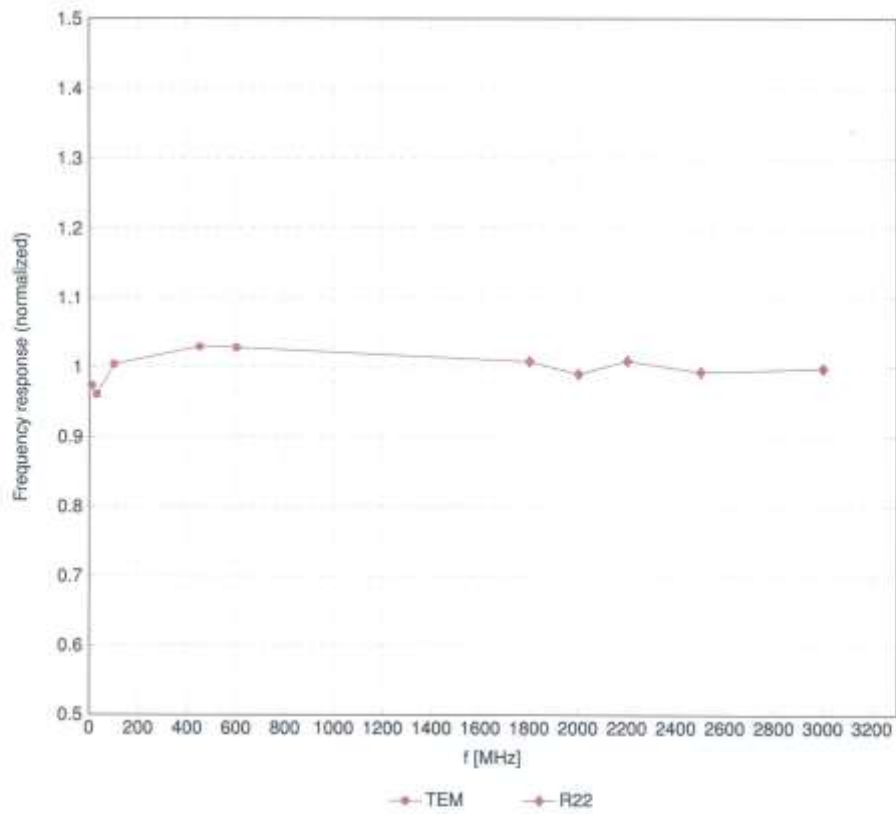
^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for frequencies between 3–6 GHz at any distance larger than half the probe tip diameter from the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

ES3DV3 - SN:3076

July 18, 2023

Frequency Response of E-Field

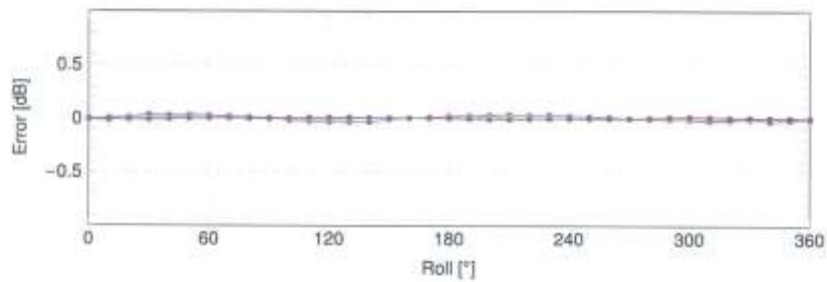
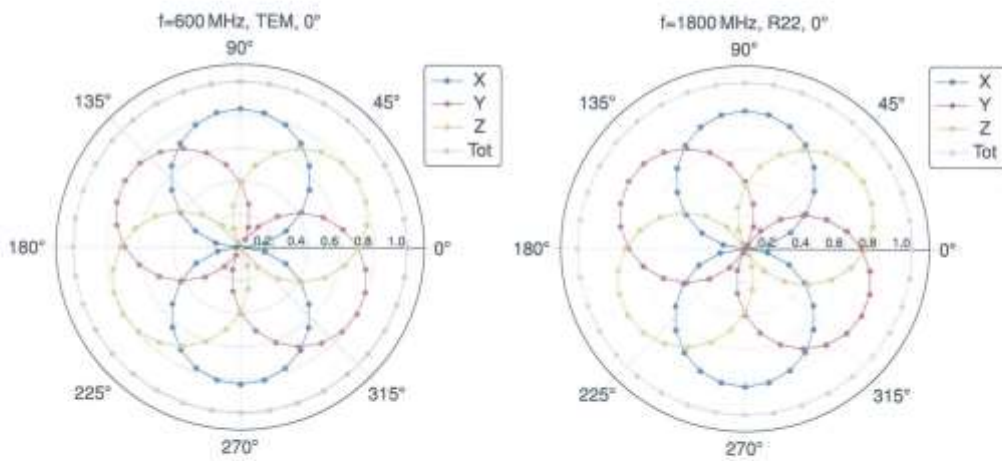
(TEM-Cell:ifi110 EXX, Waveguide:R22)



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

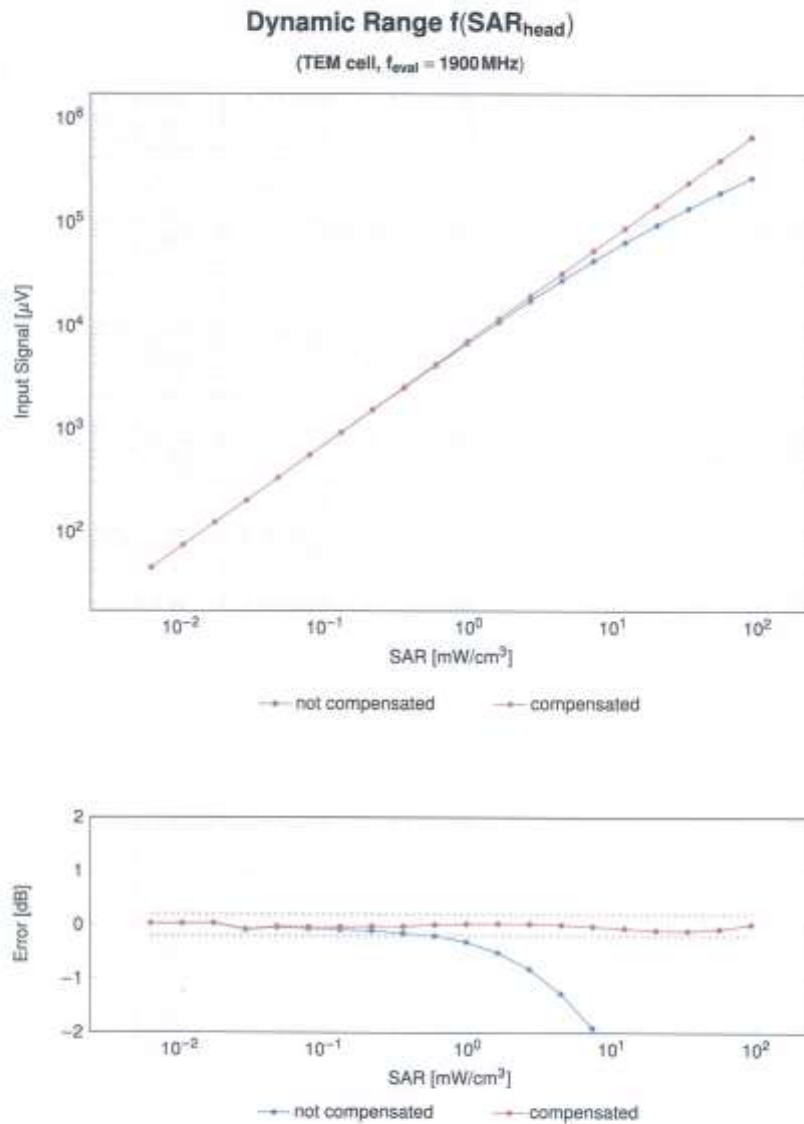
ES3DV3 - SN:3076

July 18, 2023

Receiving Pattern (ϕ), $\theta = 0^\circ$

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

ES3DV3 - SN:3076

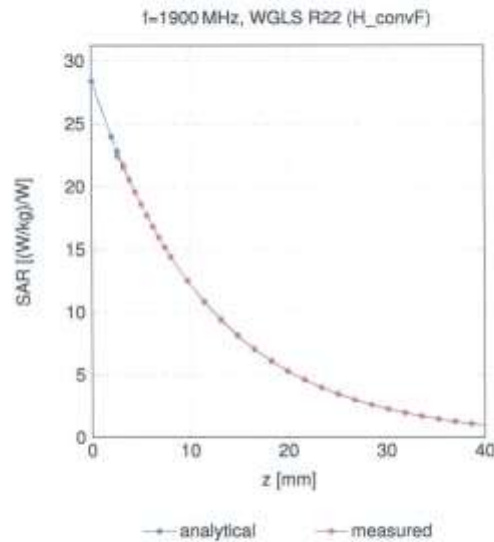
July 18, 2023


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

ES3DV3 - SN:3076

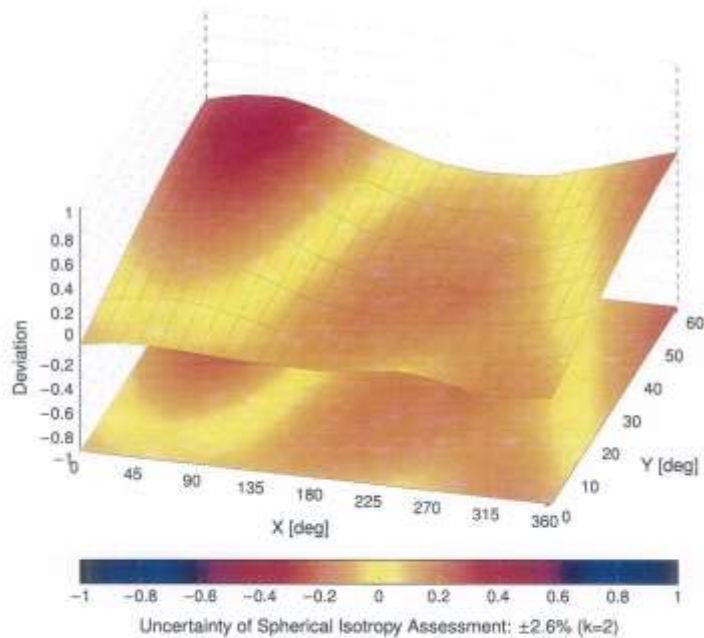
July 18, 2023

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), f = 900 MHz



ES3DV3 - SN:3076

July 18, 2023

Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^k k = 2
0		CW	CW	0.00	±4.7
10010	CAB	SAR Validation (Square, 100 ms, 10 ms)	Test	10.00	±9.6
10011	CAC	UMTS-FDD (WCDMA)	WCDMA	2.91	±9.6
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	±9.6
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	±9.6
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	±9.6
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	±9.6
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	±9.6
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	±9.6
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	±9.6
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	±9.6
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	±9.6
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	±9.6
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	±9.6
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	±9.6
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	±9.6
10033	CAA	IEEE 802.15.1 Bluetooth (PI4-DQPSK, DH1)	Bluetooth	7.74	±9.6
10034	CAA	IEEE 802.15.1 Bluetooth (PI4-DQPSK, DH3)	Bluetooth	4.53	±9.6
10035	CAA	IEEE 802.15.1 Bluetooth (PI4-DQPSK, DH5)	Bluetooth	3.83	±9.6
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	±9.6
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	±9.6
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	±9.6
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	±9.6
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI4-DQPSK, Halfrate)	AMPS	7.78	±9.6
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	±9.6
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	±9.6
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	±9.6
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	±9.6
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	±9.6
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	±9.6
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	±9.6
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.50	±9.6
10062	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	6.88	±9.6
10063	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	±9.6
10064	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	±9.6
10065	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	±9.6
10066	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.39	±9.6
10067	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	±9.6
10068	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	±9.6
10069	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	±9.6
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	±9.6
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	±9.6
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	±9.6
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	±9.6
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	±9.6
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	±9.6
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	±9.6
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	±9.6
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI4-DQPSK, Fullrate)	AMPS	4.77	±9.6
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	±9.6
10097	CAC	UMTS-FDD (HSDPA)	WCDMA	3.98	±9.6
10098	CAC	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	±9.6
10099	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	±9.6
10100	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	±9.6
10101	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	±9.6
10102	CAF	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.80	±9.6
10103	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	±9.6
10104	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	±9.6
10105	CAH	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	±9.6
10106	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	±9.6
10109	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10110	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	±9.6
10111	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	±9.6

ES3DV3 - SN:3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^k k = 2
10112	CAH	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	±9.6
10113	CAH	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	±9.6
10114	CAD	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	±9.6
10115	CAD	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	±9.6
10116	CAD	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	±9.6
10117	CAD	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	±9.6
10118	CAD	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	±9.6
10119	CAD	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	±9.6
10140	CAF	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	±9.6
10141	CAF	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	±9.6
10142	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	±9.6
10143	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	±9.6
10144	CAF	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	±9.6
10145	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	±9.6
10146	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	±9.6
10147	CAG	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	±9.6
10149	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	±9.6
10150	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	±9.6
10151	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	±9.6
10152	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	±9.6
10153	CAH	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	±9.6
10154	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	±9.6
10155	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10156	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	±9.6
10157	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	±9.6
10158	CAH	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	±9.6
10159	CAH	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	±9.6
10160	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	±9.6
10161	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	±9.6
10162	CAF	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	±9.6
10166	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	±9.6
10167	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	±9.6
10168	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	±9.6
10169	CAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	±9.6
10170	CAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10171	AAF	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.48	±9.6
10172	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	±9.6
10173	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10174	CAH	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10175	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	±9.6
10176	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10177	CAJ	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	±9.6
10178	CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10179	CAH	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10180	CAH	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10181	CAF	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	±9.6
10182	CAF	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10183	AAE	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10184	CAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	±9.6
10185	CAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	±9.6
10186	AAF	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10187	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	±9.6
10188	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	±9.6
10189	AAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	±9.6
10193	CAD	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	±9.6
10194	CAD	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	±9.6
10196	CAD	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	±9.6
10196	CAD	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	±9.6
10197	CAD	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	±9.6
10198	CAD	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	±9.6
10219	CAD	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	±9.6
10220	CAD	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	±9.6
10221	CAD	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	±9.6
10222	CAD	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	±9.6
10223	CAD	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	±9.6
10224	CAD	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	±9.6

Certificate No: ES-3076_Jul23

Page 11 of 21

ES3DV3 - SN:3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^k k = 2
10225	CAC	UMTS-FDD (HSPA+)	WCDMA	5.07	±9.6
10226	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	±9.6
10227	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	±9.6
10228	CAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	±9.6
10229	CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10230	CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10231	CAE	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	±9.6
10232	CAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10233	CAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10234	CAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	±9.6
10235	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10236	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10237	CAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	±9.6
10238	CAG	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	±9.6
10239	CAG	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	±9.6
10240	CAG	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	±9.6
10241	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	±9.6
10242	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	±9.6
10243	CAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.48	±9.6
10244	CAE	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	±9.6
10245	CAE	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	±9.6
10246	CAE	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	±9.6
10247	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	±9.6
10248	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	±9.6
10249	CAH	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	±9.6
10250	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	±9.6
10251	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	±9.6
10252	CAH	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	±9.6
10253	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	±9.6
10254	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	±9.6
10255	CAG	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	±9.6
10256	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.86	±9.6
10257	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	±9.6
10258	CAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	±9.6
10259	CAE	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	±9.6
10260	CAE	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	±9.6
10261	CAE	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	±9.6
10262	CAH	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	±9.6
10263	CAH	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	±9.6
10264	CAH	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	±9.6
10265	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	±9.6
10266	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	±9.6
10267	CAH	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	±9.6
10268	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	±9.6
10269	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	±9.6
10270	CAG	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	±9.6
10274	CAC	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	±9.6
10275	CAC	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	±9.6
10277	CAA	PHS (QPSK)	PHS	11.81	±9.6
10278	CAA	PHS (QPSK, BW 894 MHz, Rolloff 0.5)	PHS	11.81	±9.6
10279	CAA	PHS (QPSK, BW 894 MHz, Rolloff 0.38)	PHS	12.18	±9.6
10290	AAB	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	±9.6
10291	AAB	CDMA2000, RC3, SO65, Full Rate	CDMA2000	3.46	±9.6
10292	AAB	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	±9.6
10293	AAB	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	±9.6
10295	AAB	CDMA2000, RC1, SO3, 1/8th Rate 25 ft.	CDMA2000	12.49	±9.6
10297	AAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	±9.6
10298	AAE	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	±9.6
10299	AAE	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	±9.6
10300	AAE	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.00	±9.6
10301	AAA	IEEE 802.16e WIMAX (29:18, 5 ms, 10 MHz, QPSK, PUSC)	WIMAX	12.03	±9.6
10302	AAA	IEEE 802.16e WIMAX (29:18, 5 ms, 10 MHz, QPSK, PUSC, 3 CTRL symbols)	WIMAX	12.57	±9.6
10303	AAA	IEEE 802.16e WIMAX (31:15, 5 ms, 10 MHz, 64QAM, PUSC)	WIMAX	12.52	±9.6
10304	AAA	IEEE 802.16e WIMAX (29:18, 5 ms, 10 MHz, 64QAM, PUSC)	WIMAX	11.86	±9.6
10305	AAA	IEEE 802.16e WIMAX (31:15, 10 ms, 10 MHz, 64QAM, PUSC, 15 symbols)	WIMAX	15.24	±9.6
10306	AAA	IEEE 802.16e WIMAX (29:18, 10 ms, 10 MHz, 64QAM, PUSC, 18 symbols)	WIMAX	14.67	±9.6

Certificate No: ES-3076_Jul23

Page 12 of 21

ES3DV3 - SN:3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^k k = 2
10307	AAA	IEEE 802.16e WIMAX (29:18, 10 ms, 10 MHz, QPSK, PUSC, 18 symbols)	WIMAX	14.49	±9.6
10308	AAA	IEEE 802.16e WIMAX (29:18, 10 ms, 10 MHz, 16QAM, PUSC)	WIMAX	14.46	±9.6
10309	AAA	IEEE 802.16e WIMAX (29:18, 10 ms, 10 MHz, 16QAM, AMC 2x3, 18 symbols)	WIMAX	14.58	±9.6
10310	AAA	IEEE 802.16e WIMAX (29:18, 10 ms, 10 MHz, QPSK, AMC 2x3, 18 symbols)	WIMAX	14.57	±9.6
10311	AAE	LTE-FDD (SC-FDMA, 100% RB, 15MHz, QPSK)	LTE-FDD	6.06	±9.6
10313	AAA	IDEN 1:3	IDEN	10.51	±9.6
10314	AAA	IDEN 1:6	IDEN	13.48	±9.6
10315	AAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	WLAN	1.71	±9.6
10316	AAB	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6
10317	AAD	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle)	WLAN	8.36	±9.6
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	±9.6
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.90	±9.6
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	±9.6
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	±9.6
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	±9.6
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	±9.6
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	±9.6
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	±9.6
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	±9.6
10400	AAE	IEEE 802.11ac WiFi (20 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.37	±9.6
10401	AAE	IEEE 802.11ac WiFi (40 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.60	±9.6
10402	AAE	IEEE 802.11ac WiFi (80 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.53	±9.6
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	±9.6
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	±9.6
10406	AAB	CDMA2000, RCS, SC32, SCH0, Full Rate	CDMA2000	5.22	±9.6
10410	AAH	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9, Subframe Conf=4)	LTE-TDD	7.82	±9.6
10414	AAA	WLAN CCDF, 64-QAM, 40 MHz	Generic	6.54	±9.6
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc duty cycle)	WLAN	1.54	±9.6
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6
10417	AAC	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Long preamble)	WLAN	8.14	±9.6
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc duty cycle, Short preamble)	WLAN	8.19	±9.6
10422	AAC	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	±9.6
10423	AAC	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	±9.6
10424	AAC	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	±9.6
10425	AAC	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	±9.6
10426	AAC	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	±9.6
10427	AAC	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	±9.6
10430	AAE	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	±9.6
10431	AAE	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	±9.6
10432	AAD	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	±9.6
10433	AAD	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	±9.6
10434	AAB	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	±9.6
10435	AAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10447	AAE	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	±9.6
10448	AAE	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.53	±9.6
10449	AAD	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.51	±9.6
10450	AAD	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	±9.6
10451	AAB	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	±9.6
10453	AAE	Validation (Square, 10 ms, 1 ms)	Test	10.00	±9.6
10456	AAC	IEEE 802.11ac WiFi (160 MHz, 64-QAM, 99pc duty cycle)	WLAN	8.63	±9.6
10457	AAB	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	±9.6
10458	AAA	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	±9.6
10459	AAA	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	±9.6
10460	AAB	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	±9.6
10461	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10462	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.30	±9.6
10463	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	±9.6
10464	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10465	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10466	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10467	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10468	AAG	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10469	AAQ	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.56	±9.6
10470	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10471	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6

Certificate No: ES-3076_Jul23

Page 13 of 21

ES3DV3 - SN:3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E k = 2
10472	AAG	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10473	AAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.82	±9.6
10474	AAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10475	AAF	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10477	AAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.32	±9.6
10478	AAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.57	±9.6
10479	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10480	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.18	±9.6
10481	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	±9.6
10482	AAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.71	±9.6
10483	AAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.39	±9.6
10484	AAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.47	±9.6
10485	AAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.59	±9.6
10486	AAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.38	±9.6
10487	AAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.60	±9.6
10488	AAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.70	±9.6
10489	AAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	±9.6
10490	AAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	±9.6
10491	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10492	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.41	±9.6
10493	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.65	±9.6
10494	AAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10495	AAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.37	±9.6
10496	AAG	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	±9.6
10497	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	±9.6
10498	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.40	±9.6
10499	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.68	±9.6
10500	AAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.67	±9.6
10501	AAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.44	±9.6
10502	AAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.52	±9.6
10503	AAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.72	±9.6
10504	AAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.31	±9.6
10505	AAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.54	±9.6
10506	AAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10507	AAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.36	±9.6
10508	AAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.55	±9.6
10509	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.99	±9.6
10510	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.49	±9.6
10511	AAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.51	±9.6
10512	AAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK, UL Subframe=2,3,4,7,8,9)	LTE-TDD	7.74	±9.6
10513	AAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.42	±9.6
10514	AAG	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM, UL Subframe=2,3,4,7,8,9)	LTE-TDD	8.45	±9.6
10515	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2Mbps, 99pc duty cycle)	WLAN	1.58	±9.6
10516	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5Mbps, 89pc duty cycle)	WLAN	1.57	±9.6
10517	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 99pc duty cycle)	WLAN	1.58	±9.6
10518	AAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.23	±9.6
10519	AAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.39	±9.6
10520	AAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.12	±9.6
10521	AAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps, 99pc duty cycle)	WLAN	7.97	±9.6
10522	AAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.45	±9.6
10523	AAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.08	±9.6
10524	AAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.27	±9.6
10525	AAC	IEEE 802.11ac WiFi (20 MHz, MCS0, 99pc duty cycle)	WLAN	8.36	±9.6
10526	AAC	IEEE 802.11ac WiFi (20 MHz, MCS1, 99pc duty cycle)	WLAN	8.42	±9.6
10527	AAC	IEEE 802.11ac WiFi (20 MHz, MCS2, 99pc duty cycle)	WLAN	8.21	±9.6
10528	AAC	IEEE 802.11ac WiFi (20 MHz, MCS3, 99pc duty cycle)	WLAN	8.36	±9.6
10529	AAC	IEEE 802.11ac WiFi (20 MHz, MCS4, 99pc duty cycle)	WLAN	8.36	±9.6
10531	AAC	IEEE 802.11ac WiFi (20 MHz, MCS6, 99pc duty cycle)	WLAN	8.33	±9.6
10532	AAC	IEEE 802.11ac WiFi (20 MHz, MCS7, 99pc duty cycle)	WLAN	8.43	±9.6
10533	AAC	IEEE 802.11ac WiFi (20 MHz, MCS8, 99pc duty cycle)	WLAN	8.29	±9.6
10534	AAC	IEEE 802.11ac WiFi (40 MHz, MCS0, 99pc duty cycle)	WLAN	8.38	±9.6
10535	AAC	IEEE 802.11ac WiFi (40 MHz, MCS1, 99pc duty cycle)	WLAN	8.45	±9.6
10536	AAC	IEEE 802.11ac WiFi (40 MHz, MCS2, 99pc duty cycle)	WLAN	8.45	±9.6
10537	AAC	IEEE 802.11ac WiFi (40 MHz, MCS3, 99pc duty cycle)	WLAN	8.32	±9.6
10538	AAC	IEEE 802.11ac WiFi (40 MHz, MCS4, 99pc duty cycle)	WLAN	8.44	±9.6
10540	AAC	IEEE 802.11ac WiFi (40 MHz, MCS6, 99pc duty cycle)	WLAN	8.54	±9.6
10540	AAC	IEEE 802.11ac WiFi (40 MHz, MCS6, 99pc duty cycle)	WLAN	8.39	±9.6

Certificate No: ES-3076_Jul23

Page 14 of 21

ES3DV3 - SN:3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^F k = 2
10541	AAC	IEEE 802.11ac WiFi (40 MHz, MCS7, 99pc duty cycle)	WLAN	8.45	±0.6
10542	AAC	IEEE 802.11ac WiFi (40 MHz, MCS8, 99pc duty cycle)	WLAN	8.65	±0.6
10543	AAC	IEEE 802.11ac WiFi (40 MHz, MCS9, 99pc duty cycle)	WLAN	8.65	±0.6
10544	AAC	IEEE 802.11ac WiFi (80 MHz, MCS0, 99pc duty cycle)	WLAN	8.47	±0.6
10545	AAC	IEEE 802.11ac WiFi (80 MHz, MCS1, 99pc duty cycle)	WLAN	8.55	±0.6
10546	AAC	IEEE 802.11ac WiFi (80 MHz, MCS2, 99pc duty cycle)	WLAN	8.35	±0.6
10547	AAC	IEEE 802.11ac WiFi (80 MHz, MCS3, 99pc duty cycle)	WLAN	8.49	±0.6
10548	AAC	IEEE 802.11ac WiFi (80 MHz, MCS4, 99pc duty cycle)	WLAN	8.37	±0.6
10550	AAC	IEEE 802.11ac WiFi (80 MHz, MCS6, 99pc duty cycle)	WLAN	8.38	±0.6
10551	AAC	IEEE 802.11ac WiFi (80 MHz, MCS7, 99pc duty cycle)	WLAN	8.50	±0.6
10552	AAC	IEEE 802.11ac WiFi (80 MHz, MCS8, 99pc duty cycle)	WLAN	8.42	±0.6
10553	AAC	IEEE 802.11ac WiFi (80 MHz, MCS9, 99pc duty cycle)	WLAN	8.45	±0.6
10554	AAD	IEEE 802.11ac WiFi (160 MHz, MCS0, 99pc duty cycle)	WLAN	8.48	±0.6
10555	AAD	IEEE 802.11ac WiFi (160 MHz, MCS1, 99pc duty cycle)	WLAN	8.47	±0.6
10556	AAD	IEEE 802.11ac WiFi (160 MHz, MCS2, 99pc duty cycle)	WLAN	8.50	±0.6
10557	AAD	IEEE 802.11ac WiFi (160 MHz, MCS3, 99pc duty cycle)	WLAN	8.52	±0.6
10558	AAD	IEEE 802.11ac WiFi (160 MHz, MCS4, 99pc duty cycle)	WLAN	8.61	±0.6
10560	AAD	IEEE 802.11ac WiFi (160 MHz, MCS6, 99pc duty cycle)	WLAN	8.73	±0.6
10561	AAD	IEEE 802.11ac WiFi (160 MHz, MCS7, 99pc duty cycle)	WLAN	8.56	±0.6
10562	AAD	IEEE 802.11ac WiFi (160 MHz, MCS8, 99pc duty cycle)	WLAN	8.69	±0.6
10563	AAD	IEEE 802.11ac WiFi (160 MHz, MCS9, 99pc duty cycle)	WLAN	8.77	±0.6
10564	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 99pc duty cycle)	WLAN	8.25	±0.6
10565	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 99pc duty cycle)	WLAN	8.45	±0.6
10566	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 99pc duty cycle)	WLAN	8.13	±0.6
10567	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 99pc duty cycle)	WLAN	8.00	±0.6
10568	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 99pc duty cycle)	WLAN	8.37	±0.6
10569	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 99pc duty cycle)	WLAN	8.10	±0.6
10570	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 99pc duty cycle)	WLAN	8.30	±0.6
10571	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 90pc duty cycle)	WLAN	1.99	±0.6
10572	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps, 80pc duty cycle)	WLAN	1.99	±0.6
10573	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps, 90pc duty cycle)	WLAN	1.98	±0.6
10574	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle)	WLAN	1.98	±0.6
10575	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 8 Mbps, 90pc duty cycle)	WLAN	8.59	±0.6
10576	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	±0.6
10577	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	±0.6
10578	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	±0.6
10579	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	±0.6
10580	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	±0.6
10581	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	±0.6
10582	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	±0.6
10583	AAC	IEEE 802.11ah WiFi 5 GHz (OFDM, 6 Mbps, 90pc duty cycle)	WLAN	8.59	±0.6
10584	AAC	IEEE 802.11ah WiFi 5 GHz (OFDM, 9 Mbps, 90pc duty cycle)	WLAN	8.60	±0.6
10585	AAC	IEEE 802.11ah WiFi 5 GHz (OFDM, 12 Mbps, 90pc duty cycle)	WLAN	8.70	±0.6
10586	AAC	IEEE 802.11ah WiFi 5 GHz (OFDM, 18 Mbps, 90pc duty cycle)	WLAN	8.49	±0.6
10587	AAC	IEEE 802.11ah WiFi 5 GHz (OFDM, 24 Mbps, 90pc duty cycle)	WLAN	8.36	±0.6
10588	AAC	IEEE 802.11ah WiFi 5 GHz (OFDM, 36 Mbps, 90pc duty cycle)	WLAN	8.76	±0.6
10589	AAC	IEEE 802.11ah WiFi 5 GHz (OFDM, 48 Mbps, 90pc duty cycle)	WLAN	8.35	±0.6
10590	AAC	IEEE 802.11ah WiFi 5 GHz (OFDM, 54 Mbps, 90pc duty cycle)	WLAN	8.67	±0.6
10591	AAC	IEEE 802.11n (HT Mixed, 20 MHz, MCS0, 90pc duty cycle)	WLAN	8.63	±0.6
10592	AAC	IEEE 802.11n (HT Mixed, 20 MHz, MCS1, 90pc duty cycle)	WLAN	8.79	±0.6
10593	AAC	IEEE 802.11n (HT Mixed, 20 MHz, MCS2, 90pc duty cycle)	WLAN	8.64	±0.6
10594	AAC	IEEE 802.11n (HT Mixed, 20 MHz, MCS3, 90pc duty cycle)	WLAN	8.74	±0.6
10595	AAC	IEEE 802.11n (HT Mixed, 20 MHz, MCS4, 90pc duty cycle)	WLAN	8.74	±0.6
10596	AAC	IEEE 802.11n (HT Mixed, 20 MHz, MCS5, 90pc duty cycle)	WLAN	8.71	±0.6
10597	AAC	IEEE 802.11n (HT Mixed, 20 MHz, MCS6, 90pc duty cycle)	WLAN	8.72	±0.6
10598	AAC	IEEE 802.11n (HT Mixed, 20 MHz, MCS7, 90pc duty cycle)	WLAN	8.50	±0.6
10599	AAC	IEEE 802.11n (HT Mixed, 40 MHz, MCS0, 90pc duty cycle)	WLAN	8.79	±0.6
10600	AAC	IEEE 802.11n (HT Mixed, 40 MHz, MCS1, 90pc duty cycle)	WLAN	8.88	±0.6
10601	AAC	IEEE 802.11n (HT Mixed, 40 MHz, MCS2, 90pc duty cycle)	WLAN	8.82	±0.6
10602	AAC	IEEE 802.11n (HT Mixed, 40 MHz, MCS3, 90pc duty cycle)	WLAN	8.94	±0.6
10603	AAC	IEEE 802.11n (HT Mixed, 40 MHz, MCS4, 90pc duty cycle)	WLAN	8.03	±0.6
10604	AAC	IEEE 802.11n (HT Mixed, 40 MHz, MCS5, 90pc duty cycle)	WLAN	8.76	±0.6
10605	AAC	IEEE 802.11n (HT Mixed, 40 MHz, MCS6, 90pc duty cycle)	WLAN	8.97	±0.6
10606	AAC	IEEE 802.11n (HT Mixed, 40 MHz, MCS7, 90pc duty cycle)	WLAN	8.82	±0.6
10607	AAC	IEEE 802.11ac WiFi (20 MHz, MCS0, 90pc duty cycle)	WLAN	8.64	±0.6
10608	AAC	IEEE 802.11ac WiFi (20 MHz, MCS1, 90pc duty cycle)	WLAN	8.77	±0.6

Certificate No: ES-3076_Jul23

Page 15 of 21

ES30V3 - SN:3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^k k = 2
10609	AAC	IEEE 802.11ac WiFi (20 MHz, MCS2, 90pc duty cycle)	WLAN	8.57	±9.6
10610	AAC	IEEE 802.11ac WiFi (20 MHz, MCS3, 90pc duty cycle)	WLAN	8.78	±9.6
10611	AAC	IEEE 802.11ac WiFi (20 MHz, MCS4, 90pc duty cycle)	WLAN	8.70	±9.6
10612	AAC	IEEE 802.11ac WiFi (20 MHz, MCS5, 90pc duty cycle)	WLAN	8.77	±9.6
10613	AAC	IEEE 802.11ac WiFi (20 MHz, MCS6, 90pc duty cycle)	WLAN	8.94	±9.6
10614	AAC	IEEE 802.11ac WiFi (20 MHz, MCS7, 90pc duty cycle)	WLAN	8.59	±9.6
10615	AAC	IEEE 802.11ac WiFi (20 MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6
10616	AAC	IEEE 802.11ac WiFi (40 MHz, MCS9, 90pc duty cycle)	WLAN	9.82	±9.6
10617	AAC	IEEE 802.11ac WiFi (40 MHz, MCS1, 90pc duty cycle)	WLAN	8.81	±9.6
10618	AAC	IEEE 802.11ac WiFi (40 MHz, MCS2, 90pc duty cycle)	WLAN	8.58	±9.6
10619	AAC	IEEE 802.11ac WiFi (40 MHz, MCS3, 90pc duty cycle)	WLAN	8.86	±9.6
10620	AAC	IEEE 802.11ac WiFi (40 MHz, MCS4, 90pc duty cycle)	WLAN	8.87	±9.6
10621	AAC	IEEE 802.11ac WiFi (40 MHz, MCS5, 90pc duty cycle)	WLAN	8.77	±9.6
10622	AAC	IEEE 802.11ac WiFi (40 MHz, MCS6, 90pc duty cycle)	WLAN	8.88	±9.6
10623	AAC	IEEE 802.11ac WiFi (40 MHz, MCS7, 90pc duty cycle)	WLAN	8.82	±9.6
10624	AAC	IEEE 802.11ac WiFi (40 MHz, MCS8, 90pc duty cycle)	WLAN	8.96	±9.6
10625	AAC	IEEE 802.11ac WiFi (40 MHz, MCS9, 90pc duty cycle)	WLAN	8.96	±9.6
10626	AAC	IEEE 802.11ac WiFi (80 MHz, MCS9, 90pc duty cycle)	WLAN	8.83	±9.6
10627	AAC	IEEE 802.11ac WiFi (80 MHz, MCS1, 90pc duty cycle)	WLAN	8.88	±9.6
10628	AAC	IEEE 802.11ac WiFi (80 MHz, MCS2, 90pc duty cycle)	WLAN	8.71	±9.6
10629	AAC	IEEE 802.11ac WiFi (80 MHz, MCS3, 90pc duty cycle)	WLAN	8.85	±9.6
10630	AAC	IEEE 802.11ac WiFi (80 MHz, MCS4, 90pc duty cycle)	WLAN	8.72	±9.6
10631	AAC	IEEE 802.11ac WiFi (80 MHz, MCS5, 90pc duty cycle)	WLAN	8.81	±9.6
10632	AAC	IEEE 802.11ac WiFi (80 MHz, MCS6, 90pc duty cycle)	WLAN	8.74	±9.6
10633	AAC	IEEE 802.11ac WiFi (80 MHz, MCS7, 90pc duty cycle)	WLAN	8.83	±9.6
10634	AAC	IEEE 802.11ac WiFi (80 MHz, MCS8, 90pc duty cycle)	WLAN	8.80	±9.6
10635	AAC	IEEE 802.11ac WiFi (80 MHz, MCS9, 90pc duty cycle)	WLAN	8.81	±9.6
10636	AAD	IEEE 802.11ac WiFi (160 MHz, MCS9, 90pc duty cycle)	WLAN	8.83	±9.6
10637	AAD	IEEE 802.11ac WiFi (160 MHz, MCS1, 90pc duty cycle)	WLAN	8.79	±9.6
10638	AAD	IEEE 802.11ac WiFi (160 MHz, MCS2, 90pc duty cycle)	WLAN	8.86	±9.6
10639	AAD	IEEE 802.11ac WiFi (160 MHz, MCS3, 90pc duty cycle)	WLAN	8.85	±9.6
10640	AAD	IEEE 802.11ac WiFi (160 MHz, MCS4, 90pc duty cycle)	WLAN	8.98	±9.6
10641	AAD	IEEE 802.11ac WiFi (160 MHz, MCS5, 90pc duty cycle)	WLAN	9.06	±9.6
10642	AAD	IEEE 802.11ac WiFi (160 MHz, MCS6, 90pc duty cycle)	WLAN	9.06	±9.6
10643	AAD	IEEE 802.11ac WiFi (160 MHz, MCS7, 90pc duty cycle)	WLAN	8.89	±9.6
10644	AAD	IEEE 802.11ac WiFi (160 MHz, MCS8, 90pc duty cycle)	WLAN	9.05	±9.6
10645	AAD	IEEE 802.11ac WiFi (160 MHz, MCS9, 90pc duty cycle)	WLAN	9.11	±9.6
10646	AAH	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	±9.6
10647	AAG	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Subframe=2,7)	LTE-TDD	11.96	±9.6
10648	AAA	CDMA2000 (1x Advanced)	CDMA2000	3.45	±9.6
10652	AAF	LTE-TDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.91	±9.6
10653	AAF	LTE-TDD (OFDMA, 10 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.42	±9.6
10654	AAE	LTE-TDD (OFDMA, 15 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	6.96	±9.6
10655	AAF	LTE-TDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-TDD	7.21	±9.6
10658	AAB	Pulse Waveform (200Hz, 10%)	Test	10.00	±9.6
10659	AAB	Pulse Waveform (200Hz, 20%)	Test	6.99	±9.6
10660	AAB	Pulse Waveform (200Hz, 40%)	Test	3.98	±9.6
10661	AAB	Pulse Waveform (200Hz, 60%)	Test	2.22	±9.6
10662	AAB	Pulse Waveform (200Hz, 80%)	Test	0.97	±9.6
10670	AAA	Bluetooth Low Energy	Bluetooth	2.19	±9.6
10671	AAC	IEEE 802.11ax (20 MHz, MCS9, 90pc duty cycle)	WLAN	9.09	±9.6
10672	AAC	IEEE 802.11ax (20 MHz, MCS1, 90pc duty cycle)	WLAN	8.57	±9.6
10673	AAC	IEEE 802.11ax (20 MHz, MCS2, 90pc duty cycle)	WLAN	8.78	±9.6
10674	AAC	IEEE 802.11ax (20 MHz, MCS3, 90pc duty cycle)	WLAN	8.74	±9.6
10675	AAC	IEEE 802.11ax (20 MHz, MCS4, 90pc duty cycle)	WLAN	8.90	±9.6
10676	AAC	IEEE 802.11ax (20 MHz, MCS5, 90pc duty cycle)	WLAN	8.77	±9.6
10677	AAC	IEEE 802.11ax (20 MHz, MCS6, 90pc duty cycle)	WLAN	8.73	±9.6
10678	AAC	IEEE 802.11ax (20 MHz, MCS7, 90pc duty cycle)	WLAN	8.78	±9.6
10679	AAC	IEEE 802.11ax (20 MHz, MCS8, 90pc duty cycle)	WLAN	8.89	±9.6
10680	AAC	IEEE 802.11ax (20 MHz, MCS9, 90pc duty cycle)	WLAN	8.80	±9.6
10681	AAC	IEEE 802.11ax (20 MHz, MCS10, 90pc duty cycle)	WLAN	8.82	±9.6
10682	AAC	IEEE 802.11ax (20 MHz, MCS11, 90pc duty cycle)	WLAN	8.83	±9.6
10683	AAC	IEEE 802.11ax (20 MHz, MCS9, 99pc duty cycle)	WLAN	8.42	±9.6
10684	AAC	IEEE 802.11ax (20 MHz, MCS1, 99pc duty cycle)	WLAN	8.26	±9.6
10685	AAC	IEEE 802.11ax (20 MHz, MCS2, 99pc duty cycle)	WLAN	8.33	±9.6
10686	AAC	IEEE 802.11ax (20 MHz, MCS3, 99pc duty cycle)	WLAN	8.28	±9.6

Certificate No: ES-3076_Jul23

Page 16 of 21

ES3DV3 - SN-3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^k k = 2
10687	AAC	IEEE 802.11ax (20 MHz, MCS4, 99pc duty cycle)	WLAN	8.45	±9.6
10688	AAC	IEEE 802.11ax (20 MHz, MCS5, 99pc duty cycle)	WLAN	8.29	±9.6
10689	AAC	IEEE 802.11ax (20 MHz, MCS6, 99pc duty cycle)	WLAN	8.55	±9.6
10690	AAC	IEEE 802.11ax (20 MHz, MCS7, 99pc duty cycle)	WLAN	8.29	±9.6
10691	AAC	IEEE 802.11ax (20 MHz, MCS8, 99pc duty cycle)	WLAN	8.25	±9.6
10692	AAC	IEEE 802.11ax (20 MHz, MCS9, 99pc duty cycle)	WLAN	8.29	±9.6
10693	AAC	IEEE 802.11ax (20 MHz, MCS10, 99pc duty cycle)	WLAN	8.25	±9.6
10694	AAC	IEEE 802.11ax (20 MHz, MCS11, 99pc duty cycle)	WLAN	8.57	±9.6
10695	AAC	IEEE 802.11ax (40 MHz, MCS0, 90pc duty cycle)	WLAN	8.78	±9.6
10696	AAC	IEEE 802.11ax (40 MHz, MCS1, 90pc duty cycle)	WLAN	8.91	±9.6
10697	AAC	IEEE 802.11ax (40 MHz, MCS2, 90pc duty cycle)	WLAN	8.61	±9.6
10698	AAC	IEEE 802.11ax (40 MHz, MCS3, 90pc duty cycle)	WLAN	8.80	±9.6
10699	AAC	IEEE 802.11ax (40 MHz, MCS4, 90pc duty cycle)	WLAN	8.82	±9.6
10700	AAC	IEEE 802.11ax (40 MHz, MCS5, 90pc duty cycle)	WLAN	8.73	±9.6
10701	AAC	IEEE 802.11ax (40 MHz, MCS6, 90pc duty cycle)	WLAN	8.86	±9.6
10702	AAC	IEEE 802.11ax (40 MHz, MCS7, 90pc duty cycle)	WLAN	8.70	±9.6
10703	AAC	IEEE 802.11ax (40 MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6
10704	AAC	IEEE 802.11ax (40 MHz, MCS9, 90pc duty cycle)	WLAN	8.56	±9.6
10705	AAC	IEEE 802.11ax (40 MHz, MCS10, 90pc duty cycle)	WLAN	8.69	±9.6
10706	AAC	IEEE 802.11ax (40 MHz, MCS11, 90pc duty cycle)	WLAN	8.66	±9.6
10707	AAC	IEEE 802.11ax (40 MHz, MCS0, 99pc duty cycle)	WLAN	8.32	±9.6
10708	AAC	IEEE 802.11ax (40 MHz, MCS1, 99pc duty cycle)	WLAN	8.55	±9.6
10709	AAC	IEEE 802.11ax (40 MHz, MCS2, 99pc duty cycle)	WLAN	8.33	±9.6
10710	AAC	IEEE 802.11ax (40 MHz, MCS3, 99pc duty cycle)	WLAN	8.29	±9.6
10711	AAC	IEEE 802.11ax (40 MHz, MCS4, 99pc duty cycle)	WLAN	8.39	±9.6
10712	AAC	IEEE 802.11ax (40 MHz, MCS5, 99pc duty cycle)	WLAN	8.67	±9.6
10713	AAC	IEEE 802.11ax (40 MHz, MCS6, 99pc duty cycle)	WLAN	8.33	±9.6
10714	AAC	IEEE 802.11ax (40 MHz, MCS7, 99pc duty cycle)	WLAN	8.26	±9.6
10715	AAC	IEEE 802.11ax (40 MHz, MCS8, 99pc duty cycle)	WLAN	8.45	±9.6
10716	AAC	IEEE 802.11ax (40 MHz, MCS9, 99pc duty cycle)	WLAN	8.30	±9.6
10717	AAC	IEEE 802.11ax (40 MHz, MCS10, 99pc duty cycle)	WLAN	8.48	±9.6
10718	AAC	IEEE 802.11ax (40 MHz, MCS11, 99pc duty cycle)	WLAN	8.24	±9.6
10719	AAC	IEEE 802.11ax (80 MHz, MCS0, 90pc duty cycle)	WLAN	8.81	±9.6
10720	AAC	IEEE 802.11ax (80 MHz, MCS1, 90pc duty cycle)	WLAN	8.87	±9.6
10721	AAC	IEEE 802.11ax (80 MHz, MCS2, 90pc duty cycle)	WLAN	8.76	±9.6
10722	AAC	IEEE 802.11ax (80 MHz, MCS3, 90pc duty cycle)	WLAN	8.55	±9.6
10723	AAC	IEEE 802.11ax (80 MHz, MCS4, 90pc duty cycle)	WLAN	8.70	±9.6
10724	AAC	IEEE 802.11ax (80 MHz, MCS5, 90pc duty cycle)	WLAN	8.90	±9.6
10725	AAC	IEEE 802.11ax (80 MHz, MCS6, 90pc duty cycle)	WLAN	8.74	±9.6
10726	AAC	IEEE 802.11ax (80 MHz, MCS7, 90pc duty cycle)	WLAN	8.72	±9.6
10727	AAC	IEEE 802.11ax (80 MHz, MCS8, 90pc duty cycle)	WLAN	8.66	±9.6
10728	AAC	IEEE 802.11ax (80 MHz, MCS9, 90pc duty cycle)	WLAN	8.65	±9.6
10729	AAC	IEEE 802.11ax (80 MHz, MCS10, 90pc duty cycle)	WLAN	8.84	±9.6
10730	AAC	IEEE 802.11ax (80 MHz, MCS11, 90pc duty cycle)	WLAN	8.67	±9.6
10731	AAC	IEEE 802.11ax (80 MHz, MCS0, 99pc duty cycle)	WLAN	8.42	±9.6
10732	AAC	IEEE 802.11ax (80 MHz, MCS1, 99pc duty cycle)	WLAN	8.46	±9.6
10733	AAC	IEEE 802.11ax (80 MHz, MCS2, 99pc duty cycle)	WLAN	8.40	±9.6
10734	AAC	IEEE 802.11ax (80 MHz, MCS3, 99pc duty cycle)	WLAN	8.25	±9.6
10735	AAC	IEEE 802.11ax (80 MHz, MCS4, 99pc duty cycle)	WLAN	8.33	±9.6
10736	AAC	IEEE 802.11ax (80 MHz, MCS5, 99pc duty cycle)	WLAN	8.27	±9.6
10737	AAC	IEEE 802.11ax (80 MHz, MCS6, 99pc duty cycle)	WLAN	8.36	±9.6
10738	AAC	IEEE 802.11ax (80 MHz, MCS7, 99pc duty cycle)	WLAN	8.42	±9.6
10739	AAC	IEEE 802.11ax (80 MHz, MCS8, 99pc duty cycle)	WLAN	8.29	±9.6
10740	AAC	IEEE 802.11ax (80 MHz, MCS9, 99pc duty cycle)	WLAN	8.48	±9.6
10741	AAC	IEEE 802.11ax (80 MHz, MCS10, 99pc duty cycle)	WLAN	8.40	±9.6
10742	AAC	IEEE 802.11ax (80 MHz, MCS11, 99pc duty cycle)	WLAN	8.43	±9.6
10743	AAC	IEEE 802.11ax (160 MHz, MCS0, 90pc duty cycle)	WLAN	8.94	±9.6
10744	AAC	IEEE 802.11ax (160 MHz, MCS1, 90pc duty cycle)	WLAN	9.16	±9.6
10745	AAC	IEEE 802.11ax (160 MHz, MCS2, 90pc duty cycle)	WLAN	8.93	±9.6
10746	AAC	IEEE 802.11ax (160 MHz, MCS3, 90pc duty cycle)	WLAN	9.11	±9.6
10747	AAC	IEEE 802.11ax (160 MHz, MCS4, 90pc duty cycle)	WLAN	9.04	±9.6
10748	AAC	IEEE 802.11ax (160 MHz, MCS5, 90pc duty cycle)	WLAN	8.93	±9.6
10749	AAC	IEEE 802.11ax (160 MHz, MCS6, 90pc duty cycle)	WLAN	8.90	±9.6
10750	AAC	IEEE 802.11ax (160 MHz, MCS7, 90pc duty cycle)	WLAN	8.79	±9.6
10751	AAC	IEEE 802.11ax (160 MHz, MCS8, 90pc duty cycle)	WLAN	8.82	±9.6
10752	AAC	IEEE 802.11ax (160 MHz, MCS9, 90pc duty cycle)	WLAN	8.81	±9.6

Certificate No: ES-3076_Jul23

Page 17 of 21

ES3DV3 - SN:3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E k = 2
10753	AAC	IEEE 802.11ax (160 MHz, MCS10, 80pc duty cycle)	WLAN	9.00	±9.6
10754	AAC	IEEE 802.11ax (160 MHz, MCS11, 80pc duty cycle)	WLAN	8.94	±9.6
10755	AAC	IEEE 802.11ax (160 MHz, MCS0, 89pc duty cycle)	WLAN	8.64	±9.6
10756	AAC	IEEE 802.11ax (160 MHz, MCS1, 99pc duty cycle)	WLAN	8.77	±9.6
10757	AAC	IEEE 802.11ax (160 MHz, MCS2, 99pc duty cycle)	WLAN	8.77	±9.6
10758	AAC	IEEE 802.11ax (160 MHz, MCS3, 99pc duty cycle)	WLAN	8.69	±9.6
10759	AAC	IEEE 802.11ax (160 MHz, MCS4, 99pc duty cycle)	WLAN	8.58	±9.6
10760	AAC	IEEE 802.11ax (160 MHz, MCS5, 99pc duty cycle)	WLAN	8.49	±9.6
10761	AAC	IEEE 802.11ax (160 MHz, MCS6, 99pc duty cycle)	WLAN	8.58	±9.6
10762	AAC	IEEE 802.11ax (160 MHz, MCS7, 99pc duty cycle)	WLAN	8.49	±9.6
10763	AAC	IEEE 802.11ax (160 MHz, MCS8, 99pc duty cycle)	WLAN	8.53	±9.6
10764	AAC	IEEE 802.11ax (160 MHz, MCS9, 99pc duty cycle)	WLAN	8.54	±9.6
10765	AAC	IEEE 802.11ax (160 MHz, MCS10, 99pc duty cycle)	WLAN	8.54	±9.6
10766	AAC	IEEE 802.11ax (160 MHz, MCS11, 99pc duty cycle)	WLAN	8.51	±9.6
10767	AAE	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	7.99	±9.6
10768	AAD	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	±9.6
10769	AAD	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.01	±9.6
10770	AAD	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	±9.6
10771	AAD	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	±9.6
10772	AAD	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.23	±9.6
10773	AAD	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.03	±9.6
10774	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.02	±9.6
10775	AAD	5G NR (CP-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	±9.6
10776	AAD	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	±9.6
10777	AAC	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.30	±9.6
10778	AAD	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.34	±9.6
10779	AAC	5G NR (CP-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.42	±9.6
10780	AAD	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	±9.6
10781	AAD	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.38	±9.6
10782	AAD	5G NR (CP-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.43	±9.6
10783	AAE	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.31	±9.6
10784	AAD	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.29	±9.6
10785	AAD	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.40	±9.6
10786	AAD	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.35	±9.6
10787	AAD	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.44	±9.6
10788	AAD	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	±9.6
10789	AAD	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.37	±9.6
10790	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	8.39	±9.6
10791	AAE	5G NR (CP-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.83	±9.6
10792	AAD	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	±9.6
10793	AAD	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.95	±9.6
10794	AAD	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	±9.6
10795	AAD	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.84	±9.6
10796	AAD	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.82	±9.6
10797	AAD	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.01	±9.6
10798	AAD	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	±9.6
10799	AAD	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	±9.6
10801	AAD	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.89	±9.6
10802	AAD	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.87	±9.6
10803	AAD	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	7.93	±9.6
10805	AAD	5G NR (CP-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.6
10806	AAD	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.37	±9.6
10809	AAD	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.6
10810	AAD	5G NR (CP-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.6
10812	AAD	5G NR (CP-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	±9.6
10817	AAE	5G NR (CP-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.35	±9.6
10818	AAD	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.34	±9.6
10819	AAD	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.33	±9.6
10820	AAD	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.30	±9.6
10821	AAD	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	±9.6
10822	AAD	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	±9.6
10823	AAD	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.36	±9.6
10824	AAD	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.39	±9.6
10825	AAD	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.41	±9.6
10827	AAD	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.42	±9.6
10828	AAD	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.43	±9.6

ES3DV3 - SN.3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E k = 2
10829	AA0	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	8.40	±9.6
10830	AA0	5G NR (CP-OFDM, 1 RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.63	±9.6
10831	AA0	5G NR (CP-OFDM, 1 RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.73	±9.6
10832	AA0	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.74	±9.6
10833	AA0	5G NR (CP-OFDM, 1 RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	±9.6
10834	AA0	5G NR (CP-OFDM, 1 RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.75	±9.6
10835	AA0	5G NR (CP-OFDM, 1 RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	±9.6
10836	AA0	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.68	±9.6
10837	AA0	5G NR (CP-OFDM, 1 RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.68	±9.6
10838	AA0	5G NR (CP-OFDM, 1 RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.70	±9.6
10840	AA0	5G NR (CP-OFDM, 1 RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.67	±9.6
10841	AA0	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	7.71	±9.6
10843	AA0	5G NR (CP-OFDM, 50% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.49	±9.6
10844	AA0	5G NR (CP-OFDM, 50% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	±9.6
10846	AA0	5G NR (CP-OFDM, 50% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
10854	AA0	5G NR (CP-OFDM, 100% RB, 10 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	±9.6
10855	AA0	5G NR (CP-OFDM, 100% RB, 15 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	±9.6
10856	AA0	5G NR (CP-OFDM, 100% RB, 20 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	±9.6
10857	AA0	5G NR (CP-OFDM, 100% RB, 25 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.35	±9.6
10858	AA0	5G NR (CP-OFDM, 100% RB, 30 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.36	±9.6
10859	AA0	5G NR (CP-OFDM, 100% RB, 40 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.34	±9.6
10860	AA0	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
10861	AA0	5G NR (CP-OFDM, 100% RB, 60 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.40	±9.6
10863	AA0	5G NR (CP-OFDM, 100% RB, 80 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
10864	AA0	5G NR (CP-OFDM, 100% RB, 90 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.37	±9.6
10865	AA0	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 60 kHz)	5G NR FR1 TDD	8.41	±9.6
10866	AA0	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10868	AA0	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.89	±9.6
10869	AAE	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.75	±9.6
10870	AAE	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.86	±9.6
10871	AAE	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	5.75	±9.6
10872	AAE	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.52	±9.6
10873	AAE	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	±9.6
10874	AAE	5G NR (DFT-s-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	±9.6
10875	AAE	5G NR (CP-OFDM, 1 RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	±9.6
10876	AAE	5G NR (CP-OFDM, 100% RB, 100 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.39	±9.6
10877	AAE	5G NR (CP-OFDM, 1 RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	7.95	±9.6
10878	AAE	5G NR (CP-OFDM, 100% RB, 100 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.41	±9.6
10879	AAE	5G NR (CP-OFDM, 1 RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.12	±9.6
10880	AAE	5G NR (CP-OFDM, 100% RB, 100 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.38	±9.6
10881	AAE	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.78	±9.6
10882	AAE	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	5.98	±9.6
10883	AAE	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.57	±9.6
10884	AAE	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	6.53	±9.6
10885	AAE	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.61	±9.6
10886	AAE	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	6.65	±9.6
10887	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	7.78	±9.6
10888	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, QPSK, 120 kHz)	5G NR FR2 TDD	8.35	±9.6
10889	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.02	±9.6
10890	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, 16QAM, 120 kHz)	5G NR FR2 TDD	8.40	±9.6
10891	AAE	5G NR (CP-OFDM, 1 RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.13	±9.6
10892	AAE	5G NR (CP-OFDM, 100% RB, 50 MHz, 64QAM, 120 kHz)	5G NR FR2 TDD	8.41	±9.6
10897	AAC	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10898	AAB	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	±9.6
10899	AAB	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	±9.6
10900	AAB	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10901	AAB	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10902	AAB	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10903	AAB	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10904	AAB	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10905	AAB	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10906	AAB	5G NR (DFT-s-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	±9.6
10907	AAC	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.78	±9.6
10908	AAB	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	±9.6
10909	AAB	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.96	±9.6
10910	AAB	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	±9.6

Certificate No: ES-3076_Jul23

Page 19 of 21

ES3DV3 - SN:3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^k k = 2
10911	AAB	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	±9.6
10912	AAB	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10913	AAB	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10914	AAB	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	±9.6
10915	AAB	5G NR (DFT-s-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	±9.6
10916	AAB	5G NR (DFT-s-OFDM, 50% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	±9.6
10917	AAB	5G NR (DFT-s-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	±9.6
10918	AAC	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	±9.6
10919	AAB	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	±9.6
10920	AAB	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	±9.6
10921	AAB	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10922	AAB	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	±9.6
10923	AAB	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10924	AAB	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10925	AAB	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.95	±9.6
10926	AAB	5G NR (DFT-s-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	±9.6
10927	AAB	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	±9.6
10928	AAC	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6
10929	AAC	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6
10930	AAC	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	±9.6
10931	AAC	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10932	AAC	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10933	AAC	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10934	AAC	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10935	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	±9.6
10936	AAC	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	±9.6
10937	AAC	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.77	±9.6
10938	AAC	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	±9.6
10939	AAC	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.82	±9.6
10940	AAC	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	±9.6
10941	AAC	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	±9.6
10942	AAC	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	±9.6
10943	AAD	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.95	±9.6
10944	AAC	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.81	±9.6
10945	AAC	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	±9.6
10946	AAC	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	±9.6
10947	AAC	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	±9.6
10948	AAC	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	±9.6
10949	AAC	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	±9.6
10950	AAC	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	±9.6
10951	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.92	±9.6
10952	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.25	±9.6
10953	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.15	±9.6
10954	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.23	±9.6
10955	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.42	±9.6
10956	AAA	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.14	±9.6
10957	AAA	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.31	±9.6
10958	AAA	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.61	±9.6
10959	AAA	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.33	±9.6
10960	AAC	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.32	±9.6
10961	AAB	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.36	±9.6
10962	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.40	±9.6
10963	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.55	±9.6
10964	AAC	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.29	±9.6
10965	AAB	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.37	±9.6
10966	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	±9.6
10967	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.42	±9.6
10968	AAB	5G NR DL (CP-OFDM, TM 3.1, 100 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.49	±9.6
10972	AAB	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	11.59	±9.6
10973	AAB	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	9.06	±9.6
10974	AAB	5G NR (CP-OFDM, 100% RB, 100 MHz, 256-QAM, 30 kHz)	5G NR FR1 TDD	10.26	±9.6
10978	AAA	ULLA BDR	ULLA	1.16	±9.6
10979	AAA	ULLA HDR4	ULLA	8.58	±9.6
10980	AAA	ULLA HDR8	ULLA	10.32	±9.6
10981	AAA	ULLA HDRp4	ULLA	3.19	±9.6
10982	AAA	ULLA HDRp8	ULLA	3.43	±9.6

Certificate No: ES-3076_Jul23

Page 20 of 21

ES3DV3 - SN:3076

July 18, 2023

UID	Rev	Communication System Name	Group	PAR (dB)	Unc ^E k = 2
10983	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.31	±9.6
10984	AAA	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.42	±9.6
10985	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.54	±9.6
10986	AAA	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.90	±9.6
10987	AAA	5G NR DL (CP-OFDM, TM 3.1, 60 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.53	±9.6
10988	AAA	5G NR DL (CP-OFDM, TM 3.1, 70 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.38	±9.6
10989	AAA	5G NR DL (CP-OFDM, TM 3.1, 80 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.33	±9.6
10990	AAA	5G NR DL (CP-OFDM, TM 3.1, 90 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.52	±9.6
11003	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	10.24	±9.6
11004	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	10.73	±9.6
11005	AAA	5G NR DL (CP-OFDM, TM 3.1, 25 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.70	±9.6
11006	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.55	±9.6
11007	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.46	±9.6
11008	AAA	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.51	±9.6
11009	AAA	5G NR DL (CP-OFDM, TM 3.1, 25 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.76	±9.6
11010	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.95	±9.6
11011	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.96	±9.6
11012	AAA	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.88	±9.6
11013	AAA	IEEE 802.11be (320 MHz, MCS1, 99pc duty cycle)	WLAN	8.47	±9.6
11014	AAA	IEEE 802.11be (320 MHz, MCS2, 99pc duty cycle)	WLAN	8.45	±9.6
11015	AAA	IEEE 802.11be (320 MHz, MCS3, 99pc duty cycle)	WLAN	8.44	±9.6
11016	AAA	IEEE 802.11be (320 MHz, MCS4, 99pc duty cycle)	WLAN	8.44	±9.6
11017	AAA	IEEE 802.11be (320 MHz, MCS5, 99pc duty cycle)	WLAN	8.41	±9.6
11018	AAA	IEEE 802.11be (320 MHz, MCS6, 99pc duty cycle)	WLAN	8.40	±9.6
11019	AAA	IEEE 802.11be (320 MHz, MCS7, 99pc duty cycle)	WLAN	8.29	±9.6
11020	AAA	IEEE 802.11be (320 MHz, MCS8, 99pc duty cycle)	WLAN	8.27	±9.6
11021	AAA	IEEE 802.11be (320 MHz, MCS9, 99pc duty cycle)	WLAN	8.46	±9.6
11022	AAA	IEEE 802.11be (320 MHz, MCS10, 99pc duty cycle)	WLAN	8.36	±9.6
11023	AAA	IEEE 802.11be (320 MHz, MCS11, 99pc duty cycle)	WLAN	8.09	±9.6
11024	AAA	IEEE 802.11be (320 MHz, MCS12, 99pc duty cycle)	WLAN	8.42	±9.6
11025	AAA	IEEE 802.11be (320 MHz, MCS13, 99pc duty cycle)	WLAN	8.37	±9.6
11026	AAA	IEEE 802.11be (320 MHz, MCS0, 99pc duty cycle)	WLAN	8.39	±9.6

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

Appendix E. – Dipole Calibration Data

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



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

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 calibration certificates

Client **HCT**
Gyeonggi-do, Republic of Korea

Certificate No. **CLA13-1016_Sep23**

CALIBRATION CERTIFICATE

Object: **CLA13 - SN: 1016**

Calibration procedure(s): **QA CAL-15.v10
Calibration Procedure for SAR Validation Sources below 700 MHz**

Calibration date: **September 21, 2023**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	30-Mar-23 (No. 217-03804-03805)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
Power sensor NRP-Z91	SN: 103245	30-Mar-23 (No. 217-03805)	Mar-24
Reference 20 dB Attenuator	SN: CC2552 (20x)	30-Mar-23 (No. 217-03809)	Mar-24
Type-N mismatch combination	SN: 310982 / 06327	30-Mar-23 (No. 217-03810)	Mar-24
Reference Probe EX3DV4	SN: 3877	06-Jan-23 (No. EX3-3877_Jan23)	Jan-24
DAE4	SN: 654	27-Jan-23 (No. DAE4-654_Jan23)	Jan-24
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter NRP2	SN: 107193	08-Nov-21 (in house check Dec-22)	in house check: Dec-24
Power sensor NRP-Z91	SN: 100922	15-Dec-09 (in house check Dec-22)	in house check: Dec-24
Power sensor NRP-Z91	SN: 100418	01-Jan-04 (in house check Dec-22)	in house check: Dec-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-98 (in house check Jun-22)	in house check: Jun-24
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	in house check: Oct-24

Calibrated by: **Jeton Kastrati** (Name), **Laboratory Technician** (Function), *[Signature]* (Signature)

Approved by: **Sven Köhn** (Name), **Technical Manager** (Function), *[Signature]* (Signature)

Issued: September 21, 2023

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

2023	10	11	2023	12	11
2023	10	11	2023	12	11

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



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

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

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	ELI4 Flat Phantom	Shell thickness: 2 ± 0.2 mm
EUT Positioning	Touch Position	
Zoom Scan Resolution	$dx, dy = 4.0$ mm, $dz = 1.4$ mm	Graded Ratio = 1.4 (Z direction)
Frequency	13 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	55.0	0.75 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	53.1 ± 6 %	0.72 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	1 W input power	0.539 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	0.553 W/kg ± 18.4 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	1 W input power	0.335 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	0.343 W/kg ± 18.0 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	51.3 Ω + 0.0 j Ω
Return Loss	-37.8 dB

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------

DASY5 Validation Report for Head TSL

Date: 21.09.2023

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: CLA13; Type: CLA13; Serial: CLA13 - SN: 1016

Communication System: UID 0 - CW; Frequency: 13 MHz

Medium parameters used: $f = 13 \text{ MHz}$; $\sigma = 0.72 \text{ S/m}$; $\epsilon_r = 53.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: EX3DV4 - SN3877; ConvF(15.33, 15.33, 15.33) @ 13 MHz; Calibrated: 06.01.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn654; Calibrated: 27.01.2023
- Phantom: ELI v6.0; Type: QDOVA003AA; Serial: TP:2034
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

CLA Calibration for HSL-LF Tissue/CLA-13, touch configuration, Pin=1W/Zoom Scan,**dist=1.4mm (8x10x8)/Cube 0:** Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$

Reference Value = 30.91 V/m; Power Drift = 0.05 dB

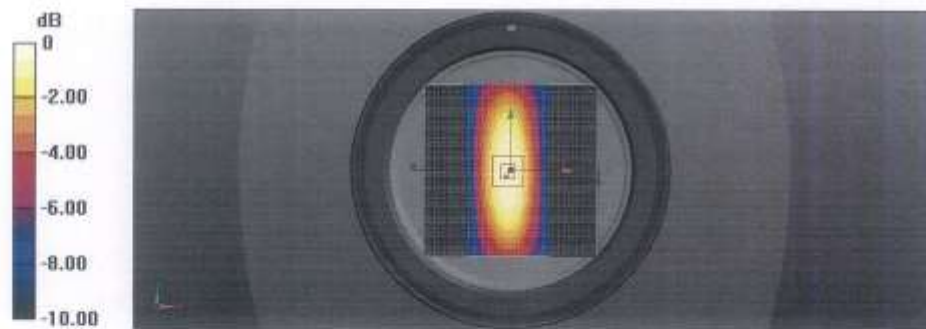
Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.539 W/kg; SAR(10 g) = 0.335 W/kg

Smallest distance from peaks to all points 3 dB below = 17.6 mm

Ratio of SAR at M2 to SAR at M1 = 78.6%

Maximum value of SAR (measured) = 0.796 W/kg



Impedance Measurement Plot for Head TSL

