TEST REPORT

Applicant Name :	INFINIX MOBILITY LIMITED
Address :	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONG KONG
Report Number :	RA230116-02640E-SA
FCC ID:	2AIZN-X678B

Test Standard (s)

FCC Part 2.1093

Sample Description

Product Type:	Mobile Phone
Model No.:	X678B
Trade Mark:	Infinix
Serial Number:	RA230116-02640E-SA-S1
Date Received:	2023/01/18
Date of Test:	2023/01/28~2023/01/29, 2023/02/04~2023/02/05, 2023/02/14~2023/02/15
Report Date:	2023/02/22

Test Result:	Pass*

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

Prepared and Checked By:

Lance Li

EMC Engineer

Approved By:

Candy Ii

EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

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Attestation of Test Results			
MODE		**Max. SAR Level(s) Reported(W/kg)**	**Limit (W/kg)**
GSM 850	1g Head SAR	0.31	**1.6**
	1g Body SAR	0.20	
PCS 1900	1g Head SAR	0.72	
	1g Body SAR	0.65	
WCDMA Band 2	1g Head SAR	0.73	
	1g Body SAR	**1.18**	
WCDMA Band 4	1g Head SAR	0.68	
	1g Body SAR	0.95	
WCDMA Band 5	1g Head SAR	0.43	
	1g Body SAR	0.22	
LTE Band 2	1g Head SAR	0.73	
	1g Body SAR	0.65	
LTE Band 4	1g Head SAR	0.60	
	1g Body SAR	0.55	
LTE Band 5	1g Head SAR	0.44	
	1g Body SAR	0.18	
LTE Band 7	1g Head SAR	**1.23**	
	1g Body SAR	0.69	
LTE Band 41&38	1g Head SAR	0.32	
	1g Body SAR	0.32	
2.4G Wi-Fi	1g Head SAR	0.30	
	1g Body SAR	**0.29**	
5.2G Wi-Fi	1g Head SAR	0.21	
	1g Body SAR	0.19	
5.8G Wi-Fi	1g Head SAR	**0.36**	
	1g Body SAR	0.19	
Bluetooth	1g Head SAR	0.17	
	1g Body SAR	0.04	
Simultaneous	1g Head SAR	**1.59**	
	1g Body SAR	**1.47**	
	1g Body SAR	**1.47(Hotspot)**	
Applicable Standards	**FCC 47 CFR part 2.1093** Radiofrequency radiation exposure evaluation: portable devices		
	RF Exposure Procedures: TCB Workshop April 2015(Overlapping LTE Bands)		
	IEEE1528:2013 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques		
	IEC 62209-1:2016 Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz)		

	KDB procedures KDB 447498 D01 General RF Exposure Guidance v06 KDB 648474 D04 Handset SAR v01r03 KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 KDB 865664 D02 RF Exposure Reporting v01r02 KDB 941225 D01 3G SAR Procedures v03r01 KDB 941225 D05 SAR for LTE Devices v02r05 KDB 941225 D06 Hotspot Mode v02r01 KDB 248227 D01 802 11 Wi-Fi SAR v02r02
Note: This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in **FCC 47 CFR part 2.1093** and has been tested in accordance with the measurement procedures specified in IEEE 1528-2013 and RF exposure KDB procedures. **The results and statements contained in this report pertain only to the device(s) evaluated.**	

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RA230116-02640E-SA	Original Report	2023/02/22

EUT DESCRIPTION

This report has been prepared on behalf of ***INFINIX MOBILITY LIMITED .*** and their product ***Mobile Phone***, Model: ***X678B***, FCC ID: ***2AIZN-X678B*** or the EUT (Equipment under Test) as referred to in the rest of this report.

Technical Specification

Device Type:	Portable
Dimension	164×75×8 mm
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
DTM Type:	Class B
Multi-slot Class:	GPRS(Class 12); EDGE(Class 12)
Power Class	LTE Band 41 for power class 3
Body-Worn Accessories:	Headset
Proximity Sensor:	None
Carrier Aggregation:	None
Operation Mode :	GSM Voice, GPRS/EDGE Data, WCDMA(R99 (Voice+Data), HSDPA/HSUPA/ HSPA+), FDD-LTE, TDD-LTE, Wi-Fi, Bluetooth, NFC and WPT
Frequency Band:	GSM 850: 824-849 MHz(TX); 869-894 MHz(RX) PCS 1900: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) WCDMA Band 4: 1710-1755 MHz(TX) ; 2110-2155 MHz(RX) WCDMA Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 2: 1850-1910 MHz(TX); 1930-1990 MHz(RX) LTE Band 4: 1710-1755 MHz(TX) ; 2110-2155 MHz(RX) LTE Band 5: 824-849 MHz(TX); 869-894 MHz(RX) LTE Band 7: 2500-2570 MHz(TX); 2620-2690 MHz(RX) LTE Band 38: 2570-2620 MHz(TX); 2570-2620 MHz(RX) LTE Band 41: 2535-2655 MHz(TX); 2535-2655 MHz(RX) Wi-Fi 2.4G: 2412 -2472 MHz(TX&RX) Wi-Fi 5.2G: 5150 -5250 MHz(TX&RX) Wi-Fi 5.8G: 5725 -5850 MHz(TX&RX) Bluetooth: 2402 -2480 MHz(TX&RX) BLE: 2402 -2480 MHz(TX&RX) NFC: 13.56MHz WPT: 110-205KHz
Power Source:	Rechargeable Battery
Normal Operation:	Head and Body-worn

REFERENCE, STANDARDS, AND GUIDELINES

FCC:

The Report and Order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mW/g average over 1 gram of tissue mass.

SAR Limits

FCC Limit (1g Tissue)

EXPOSURE LIMITS	**SAR (W/kg)**	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	**1.6**	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

FACILITIES

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358,the FCC Designation No.: CN1189.
Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01 .

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

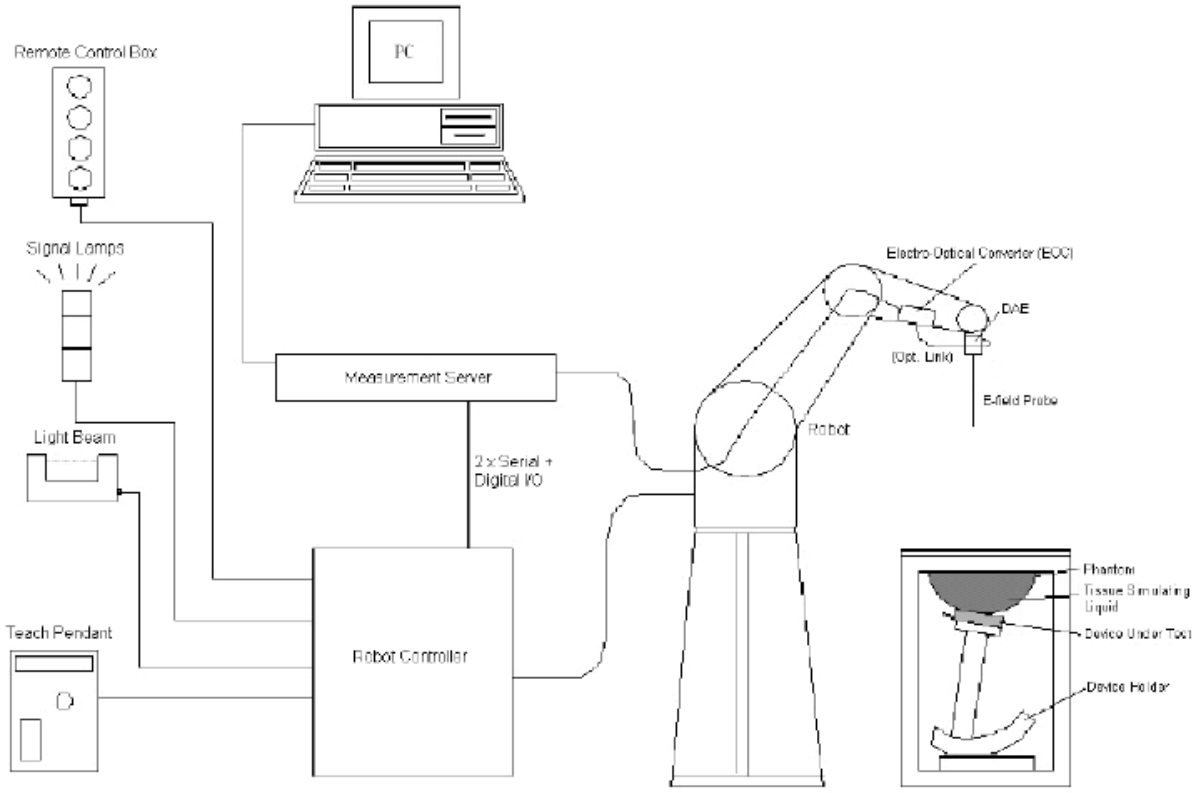
The test site has been registered with ISED Canada under ISED Canada Registration Number CN0016.

DESCRIPTION OF TEST SYSTEM

These measurements were performed with the automated near-field scanning system DASY5 from Schmid & Partner Engineering AG (SPEAG) which is the Fifth generation of the system shown in the figure hereinafter:

DASY5 System Description

The DASY5 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot (Staubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal application, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 professional operating system and the DASY52 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

DASY5 Measurement Server

The DASY5 measurement server is based on a PC/104 CPU board with a 400 MHz Intel ULV Celeron, 128 MB chip-disk and 128 MB RAM. The necessary circuits for communication with the DAE4 (or DAE3) electronics box, as well as the 16-bit AD converter system for optical detection and digital I/O interface are contained on the DASY6 I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluations of field measurements and surface detection, controls robot movements, and handles safety operations. The PC operating system cannot interfere with these time-critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program- controlled robot movements. Furthermore, the measurement server is equipped with an expansion port, which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Connection of devices from any other supplier could seriously damage the measurement server.

Data Acquisition Electronics

The data acquisition electronics (DAE4) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of both the DAE4 as well as of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

EX3DV4 E-Field Probes

Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

SAM Twin Phantom

The SAM Twin Phantom (shown in front of DASY5) is a fiberglass shell phantom with shell thickness 2 mm, except in the ear region where the thickness is increased to 6 mm..

When the phantom is mounted inside allocated slot of the DASY5 platform, phantom reference points can be taught directly in the DASY5 V5.2 software. When the DASY5 platform is used to mount the

Phantom, some of the phantom teaching points cannot be reached by the robot in DASY5 V5.2. A special tool called P1a-P2aX-Former is provided to transform two of the three points, P1 and P2, to reachable locations. To use these new teaching points, a revised phantom configuration file is required.
In addition to our standard broadband liquids, the phantom can be used with the following tissue simulating liquids:

Sugar-water-based liquids can be left permanently in the phantom. Always cover the liquid when the system is not in use to prevent changes in liquid parameters due to water evaporation.
DGBE-based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom, and the phantom should be dried when the system is not in use (desirable at least once a week).

Do not use other organic solvents without previously testing the solvent resistivity of the phantom.
Approximately 25 liters of liquid is required to fill the SAM Twin phantom.

Calibration Frequency Points for EX3DV4 E-Field Probes SN: 7441 Calibrated: 2022/05/16

Calibration Frequency Point(MHz)	Frequency Range(MHz)		Conversion Factor		
	From	To	X	Y	Z
750 Head	650	850	10.04	10.04	10.04
900 Head	850	1000	9.61	9.61	9.61
1450 Head	1350	1550	8.52	8.52	8.52
1750 Head	1650	1850	8.32	8.32	8.32
1900 Head	1850	1950	7.94	7.94	7.94
2000 Head	1950	2100	7.99	7.99	7.99
2300 Head	2200	2400	7.78	7.78	7.78
2450 Head	2400	2550	7.54	7.54	7.54
2600 Head	2550	2700	7.30	7.30	7.30
3300 Head	3200	3400	7.09	7.09	7.09
3500 Head	3400	3600	6.89	6.89	6.89
3700 Head	3600	3800	6.55	6.55	6.55
3900 Head	3800	4000	6.60	6.60	6.60
4400 Head	4300	4500	6.34	6.34	6.34
4600 Head	4500	4700	6.26	6.26	6.26
4800 Head	4700	4900	6.16	6.16	6.16
4950 Head	4900	5050	5.85	5.85	5.85
5250 Head	5140	5360	5.35	5.35	5.35
5600 Head	5490	5700	4.85	4.85	4.85
5750 Head	5700	5860	4.83	4.83	4.83

Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 15mm 2 step integral, with 1.5mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the DASY5 software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m^3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 10mm,with the side length of the 10g cube is 21.5mm.

When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 7 x7 x 7 (5mmx5mmx5mm) providing a volume of 30 mm in the X & Y & Z axis.

Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEC 62209-1:2016

Recommended Tissue Dielectric Parameters for Head

Table A.3 – Dielectric properties of the head tissue-equivalent liquid

Frequency MHz	Relative permittivity ε_r	Conductivity (σ) S/m
300	45,3	0,87
450	43,5	0,87
750	*41,9*	*0,89*
835	41,5	0,90
900	41,5	0,97
1 450	40,5	1,20
1 500	*40,4*	*1,23*
1 640	*40,2*	*1,31*
1 750	*40,1*	*1,37*
1 800	40,0	1,40
1 900	40,0	1,40
2 000	40,0	1,40
2 100	*39,8*	*1,49*
2 300	*39,5*	*1,67*
2 450	39,2	1,80
2 600	*39,0*	*1,96*
3 000	38,5	2,40
3 500	*37,9*	*2,91*
4 000	*37,4*	*3,43*
4 500	*36,8*	*3,94*
5 000	*36,2*	*4,45*
5 200	*36,0*	*4,66*
5 400	*35,8*	*4,86*
5 600	*35,5*	*5,07*
5 800	*35,3*	*5,27*
6 000	*35,1*	*5,48*

NOTE For convenience, permittivity and conductivity values at those frequencies which are not part of the original data provided by Drossos et al. [33] or the extension to 5 800 MHz are provided (i.e. the values shown *in italics*). These values were linearly interpolated between the values in this table that are immediately above and below these values, except the values at 6 000 MHz that were linearly extrapolated from the values at 3 000 MHz and 5 800 MHz.

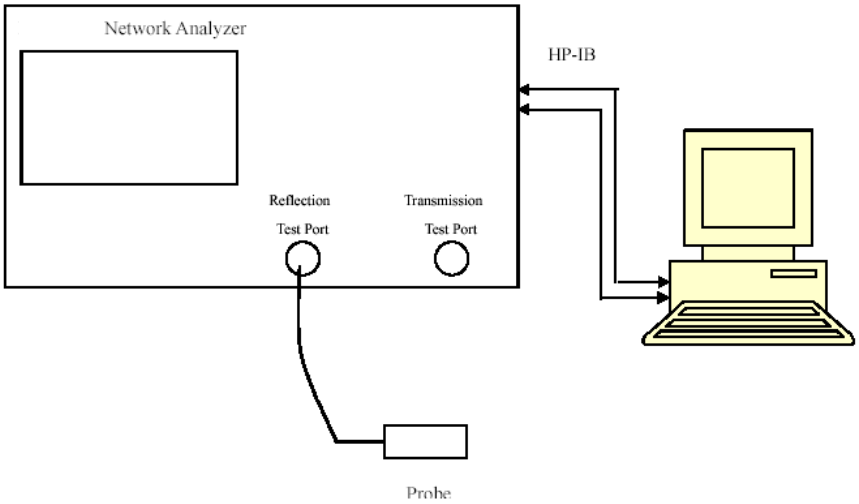
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Information

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY5 Measurement Server	DASY5 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1211	2022/03/01	2023/02/28
E-Field Probe	EX3DV4	7441	2022/05/16	2023/05/15
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V5.0	1744	NCR	NCR
Dipole,835MHz	D835V2	4d103	2021/10/27	2024/10/26
Dipole,1750MHz	D1750V2	1140	2021/06/29	2024/06/28
Dipole,1900MHz	D1900V2	5d128	2021/10/27	2024/10/26
Dipole,2450MHz	D2450V2	751	2020/10/13	2023/10/12
Dipole,2600MHz	D2600V2	1162	2022/08/22	2025/08/24
Dipole,5GHz	D5GHZV2	1296	2022/08/17	2025/08/16
Simulated Tissue Liquid Head(500-9500MHz)	HBBL600-10000V6	180622-2	Each Time	/
Network Analyzer	8753D	3410A08288	2022/07/05	2023/07/04
Dielectric Assessment Kit	DAK-3.5	1320	NCR	NCR
Signal Generator	SMB100A	108362	2022/12/13	2023/12/12
USB wideband power sensor	U2021XA	MY52350001	2022/12/13	2023/12/12
Power Amplifier	CBA 1G-070	T44328	2022/12/13	2023/12/12
Linear Power Amplifier	AS0860-40/45	1060913	2022/12/13	2023/12/12
Directional Coupler	4223-20	3.113.277	2022/12/13	2023/12/12
6dB Attenuator	8493B	2708A 04769	2022/12/13	2023/12/12
Spectrum Analyzer	FSV40	101949	2022/11/25	2023/11/24
Wideband Radio Communication Tester	CMW500	143458	2022/11/25	2023/11/24

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ (S/m)	
824.2	Simulated Tissue Liquid Head	41.595	0.894	41.55	0.9	0.11	-0.67	±5
826.4	Simulated Tissue Liquid Head	41.393	0.913	41.54	0.9	-0.35	1.44	±5
829	Simulated Tissue Liquid Head	42.289	0.921	41.53	0.9	1.83	2.33	±5
835	Simulated Tissue Liquid Head	41.398	0.917	41.5	0.9	-0.25	1.89	±5
836.5	Simulated Tissue Liquid Head	41.421	0.939	41.5	0.9	-0.19	4.33	±5
836.6	Simulated Tissue Liquid Head	41.539	0.931	41.5	0.9	0.09	3.44	±5
844	Simulated Tissue Liquid Head	41.564	0.942	41.5	0.91	0.15	3.52	±5
846.6	Simulated Tissue Liquid Head	41.682	0.934	41.5	0.91	0.44	2.64	±5
848.8	Simulated Tissue Liquid Head	41.919	0.947	41.5	0.91	1.01	4.07	±5

**Liquid Verification above was performed on 2023/02/05.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ (S/m)	
1712.4	Simulated Tissue Liquid Head	40.126	1.353	40.13	1.35	-0.01	0.22	±5
1720	Simulated Tissue Liquid Head	40.927	1.354	40.13	1.35	1.99	0.3	±5
1732.5	Simulated Tissue Liquid Head	39.881	1.356	40.12	1.36	-0.6	-0.29	±5
1732.6	Simulated Tissue Liquid Head	39.09	1.393	40.12	1.36	-2.57	2.43	±5
1745	Simulated Tissue Liquid Head	39.845	1.385	40.1	1.37	-0.64	1.09	±5
1750	Simulated Tissue Liquid Head	40.131	1.392	40.1	1.37	0.08	1.61	±5
1752.6	Simulated Tissue Liquid Head	40.192	1.391	40.1	1.37	0.23	1.53	±5
1770	Simulated Tissue Liquid Head	41.164	1.396	40.03	1.39	2.83	0.43	±5
1800	Simulated Tissue Liquid Head	39.463	1.385	40	1.4	-1.34	-1.07	±5

**Liquid Verification above was performed on 2023/01/28.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ (S/m)	
1850.2	Simulated Tissue Liquid Head	39.635	1.418	40	1.4	-0.91	1.29	±5
1852.4	Simulated Tissue Liquid Head	40.303	1.402	40	1.4	0.76	0.14	±5
1860	Simulated Tissue Liquid Head	39.503	1.412	40	1.4	-1.24	0.86	±5
1880	Simulated Tissue Liquid Head	40.324	1.408	40	1.4	0.81	0.57	±5
1900	Simulated Tissue Liquid Head	39.326	1.428	40	1.4	-1.69	2	±5
1907.6	Simulated Tissue Liquid Head	39.039	1.443	40	1.4	-2.4	3.07	±5
1909.8	Simulated Tissue Liquid Head	39.735	1.45	40	1.4	-0.66	3.57	±5

**Liquid Verification above was performed on 2023/01/29.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
2402	Simulated Tissue Liquid Head	37.804	1.805	39.28	1.77	-3.76	1.98	±5
2412	Simulated Tissue Liquid Head	38.059	1.809	39.28	1.77	-3.11	2.2	±5
2441	Simulated Tissue Liquid Head	37.768	1.826	39.22	1.79	-3.7	2.01	±5
2442	Simulated Tissue Liquid Head	38.154	1.855	39.22	1.79	-2.72	3.63	±5
2450	Simulated Tissue Liquid Head	38.029	1.849	39.20	1.80	-2.99	2.72	±5
2472	Simulated Tissue Liquid Head	38.242	1.855	39.17	1.82	-2.37	1.92	±5
2480	Simulated Tissue Liquid Head	38.029	1.878	39.17	1.82	-2.91	3.19	±5
2510	Simulated Tissue Liquid Head	39.752	1.882	39.12	1.86	1.62	1.18	±5
2535	Simulated Tissue Liquid Head	39.647	1.92	39.09	1.89	1.42	1.59	±5
2545	Simulated Tissue Liquid Head	39.444	1.924	39.07	1.90	0.96	1.26	±5

**Liquid Verification above was performed on 2023/02/14.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ (S/m)	
2560	Simulated Tissue Liquid Head	39.464	1.937	39.05	1.92	1.06	0.89	±5
2570	Simulated Tissue Liquid Head	39.614	1.974	39.04	1.93	1.47	2.28	±5
2595	Simulated Tissue Liquid Head	38.962	1.98	39.01	1.95	-0.12	1.54	±5
2600	Simulated Tissue Liquid Head	40.092	1.966	39.00	1.96	2.8	0.31	±5
2620	Simulated Tissue Liquid Head	39.893	2.02	38.98	1.98	2.34	2.02	±5
2645	Simulated Tissue Liquid Head	39.354	2.029	38.94	2.01	1.06	0.95	±5

**Liquid Verification above was performed on 2023/02/04.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
5180	Simulated Tissue Liquid Head	35.143	4.598	36.02	4.65	-2.43	-1.12	±5
5200	Simulated Tissue Liquid Head	35.448	4.616	36.00	4.66	-1.53	-0.94	±5
5240	Simulated Tissue Liquid Head	35.228	4.662	35.96	4.70	-2.04	-0.81	±5
5250	Simulated Tissue Liquid Head	35.379	4.682	35.95	4.71	-1.59	-0.59	±5
5745	Simulated Tissue Liquid Head	34.851	5.176	35.36	5.21	-1.44	-0.65	±5
5750	Simulated Tissue Liquid Head	34.324	5.264	35.36	5.22	-2.93	0.84	±5
5785	Simulated Tissue Liquid Head	34.496	5.24	35.32	5.26	-2.33	-0.38	±5
5825	Simulated Tissue Liquid Head	34.718	5.268	35.28	5.29	-1.59	-0.42	±5

**Liquid Verification above was performed on 2023/02/15.*

System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

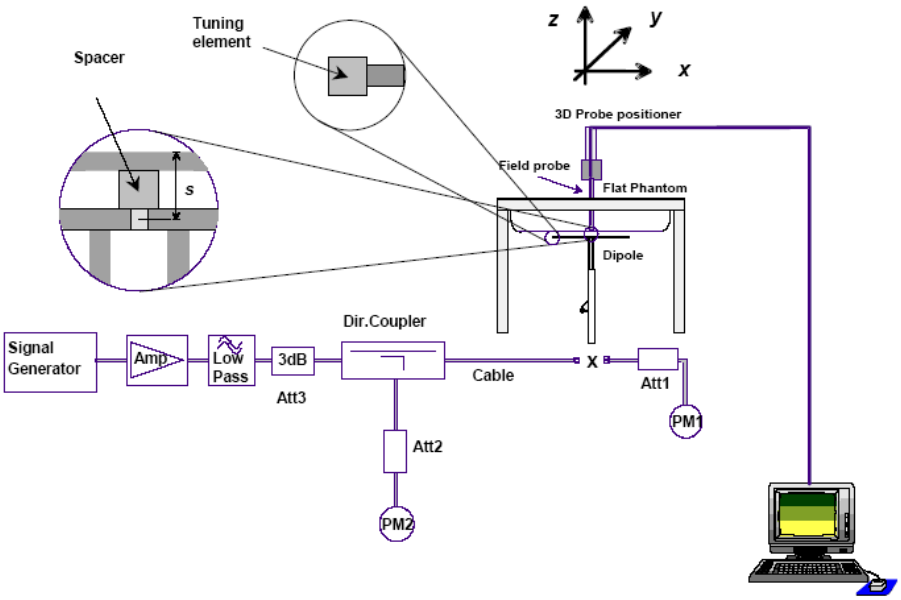
The spacing distances in the **System Verification Setup Block Diagram** is given by the following:

a) s = 15 mm ± 0,2 mm for 300 MHz ≤ f ≤ 1 000 MHz;

b) s = 10 mm ± 0,2 mm for 1 000 MHz < f ≤ 3 000 MHz;

c) s = 10 mm ± 0,2 mm for 3 000 MHz < f ≤ 6 000 MHz.

System Verification Setup Block Diagram



System Accuracy Check Results

Date	Frequency Band(MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/kg)	Delta (%)	Tolerance (%)
2023/02/05	835	Head	100	1g	0.954	9.54	9.65	-1.140	±10
2023/01/28	1750	Head	100	1g	3.54	35.4	35.9	-1.393	±10
2023/01/29	1900	Head	100	1g	4.15	41.5	40.0	3.750	±10
2023/02/14	2450	Head	100	1g	5.19	51.9	53	-1.509	±10
2023/02/04	2600	Head	100	1g	5.37	53.7	54.9	-1.457	±10
2023/02/15	5250	Head	100	1g	7.88	78.8	80.7	-2.726	±10
2023/02/15	5750	Head	100	1g	7.83	78.3	80.2	-2.618	±10

*The SAR values above are normalized to 1 Watt forward power.

SAR SYSTEM VALIDATION DATA

System Performance 835 MHz

DUT: Dipole D835V2; Type: 835MHz; Serial: 4d103

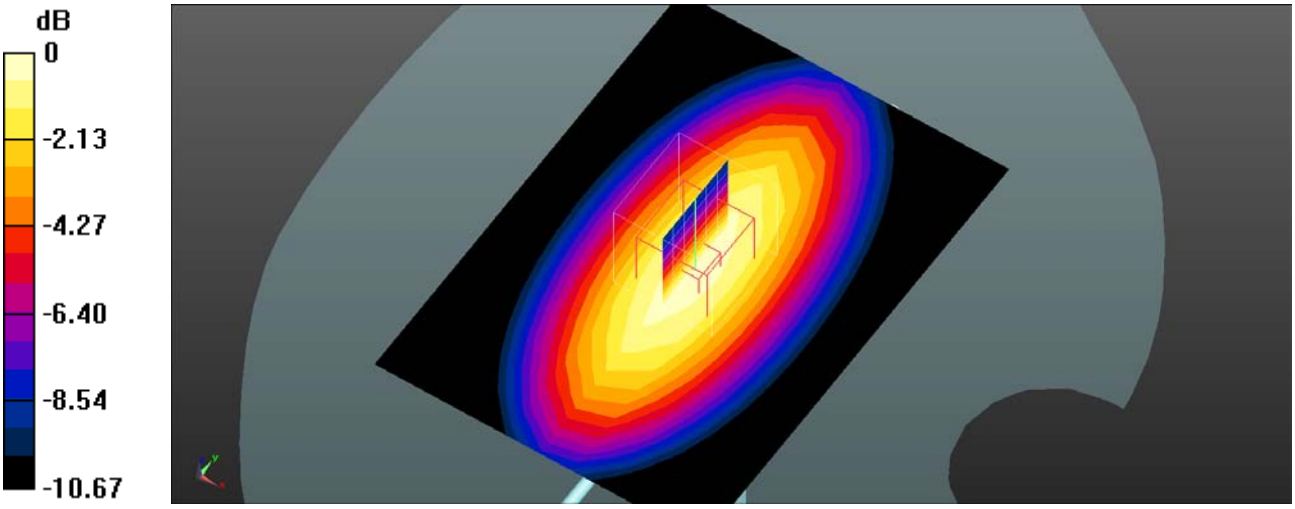
Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.917 S/m; ε_r = 41.398; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4- SN7441; ConvF(10.04, 10.04, 10.04); @835 MHz; Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: TP:1744
- Measurement SW: DASY52, Version 52.10.2; SEMCAD X Version 14.6.14 (7501)

System Performance Cheek at 835MHz/d=15mm, Pin=100mw/Area Scan (7x9x1): Measurement grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 0.968 W/kg

System Performance Cheek at 835MHz/d=15mm, Pin=100mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 35.29 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 0.954 W/kg; SAR(10 g) = 0.638 W/kg
Maximum value of SAR (measured) = 0.972 W/kg



0 dB = 0.972 W/kg = -0.12 dBW/kg

System Performance 1750 MHz

DUT: D1750V2; Type: 1750MHz; Serial: 1140

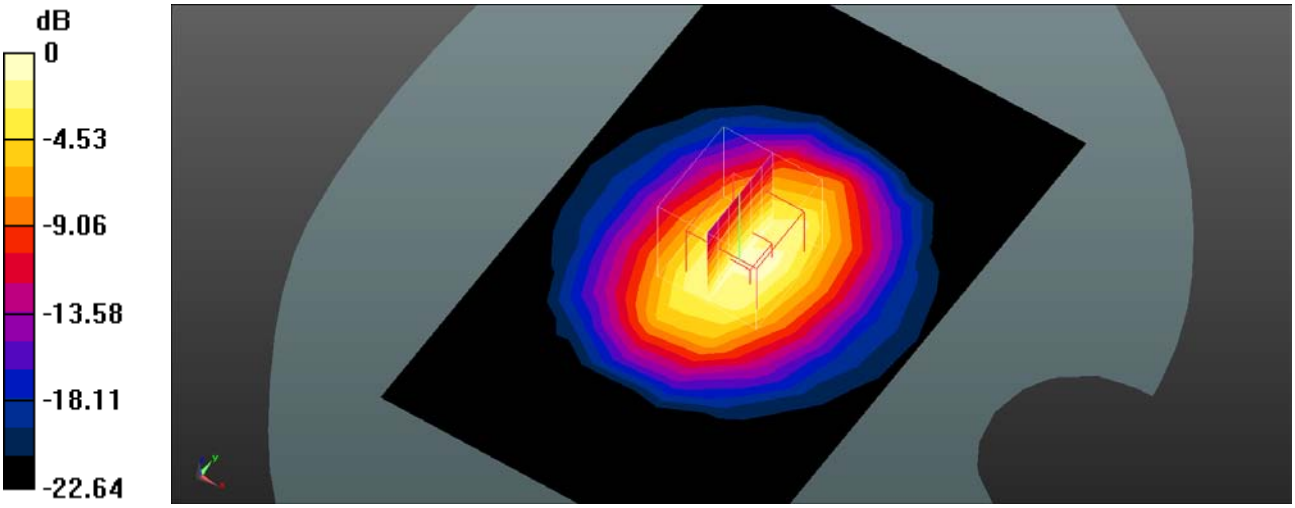
Communication System: UID 0, CW (0); Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.392 S/m; ε_r = 40.131; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4- SN7441; ConvF(8.32, 8.32, 8.32); @1750 MHz; Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: TP:1744
- Measurement SW: DASY52, Version 52.10.2; SEMCAD X Version 14.6.14 (7501)

System Performance Cheek at 1800MHz/d=10mm, Pin=100mw/Area Scan (7x11x1): Measurement grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 3.68 W/kg

System Performance Cheek at 1800MHz/d=10mm, Pin=100mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 67.14 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 4.27 W/kg
SAR(1 g) = 3.54 W/kg; SAR(10 g) = 1.65 W/kg
Maximum value of SAR (measured) = 3.76 W/kg



0 dB = 3.76 W/kg = 5.75 dBW/kg

System Performance 1900MHz

DUT: D1900V2; Type: 1900 MHz; Serial: 5d128

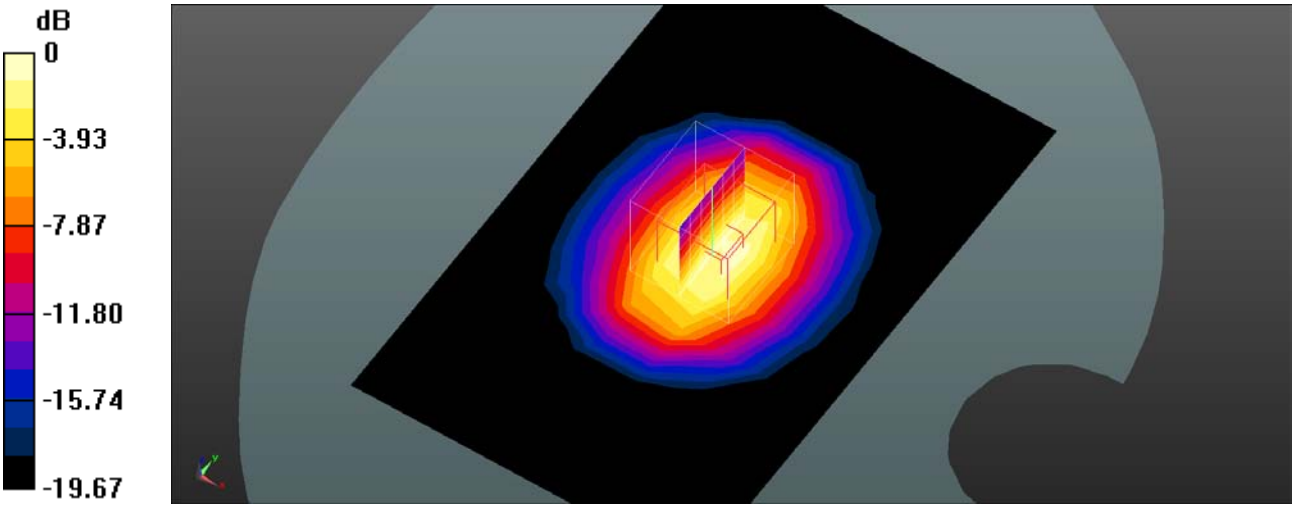
Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.428 S/m; ε_r =39.326; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4- SN7441; ConvF(7.94, 7.94, 7.94); @1900 MHz; Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: TP:1744
- Measurement SW: DASY52, Version 52.10.2; SEMCAD X Version 14.6.14 (7501)

System Performance Cheek at 1900MHz/d=10mm, Pin=100mw/Area Scan (7x11x1): Measurement grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 4.63 W/kg

System Performance Cheek at 1900MHz/d=10mm, Pin=100mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.54 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 5.37 W/kg
SAR(1 g) = 4.15 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 4.41 W/kg



0 dB = 4.41 W/kg = 6.44 dBW/kg

System Performance 2450MHz

DUT: D2450V2; Type: 2450 MHz; Serial: 751

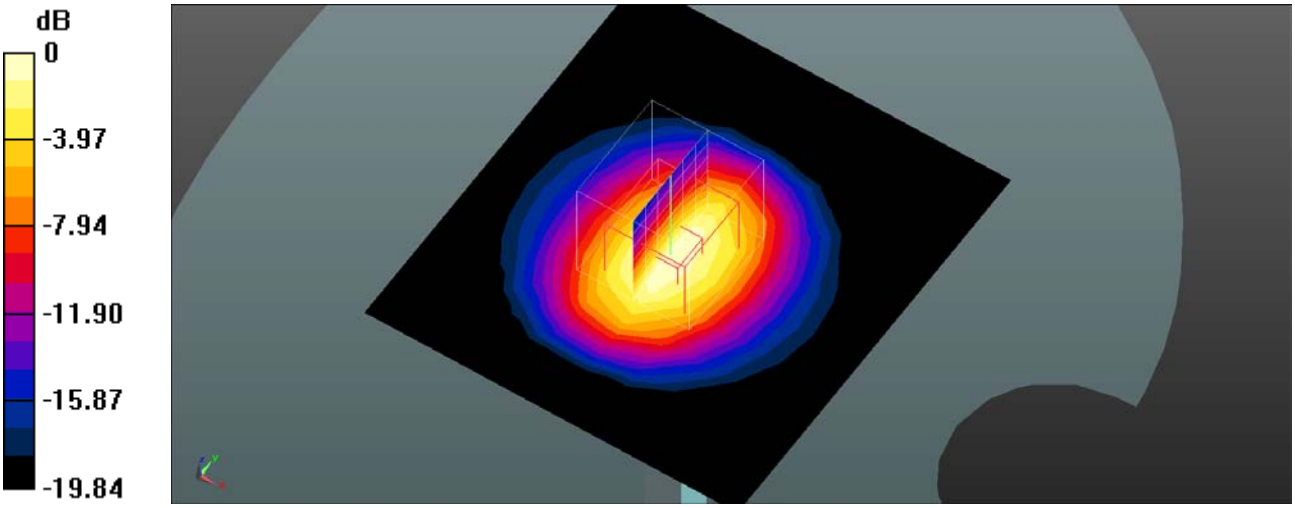
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.849 S/m; ε_r = 38.029; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4- SN7441; ConvF(7.54, 7.54, 7.54); @2450 MHz; Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: TP:1744
- Measurement SW: DASY52, Version 52.10.2; SEMCAD X Version 14.6.14 (7501)

System Performance Cheek at 2450MHz/d=10mm, Pin=100mw/Area Scan (10x11x1): Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 5.27 W/kg

System Performance Cheek at 2450MHz/d=10mm, Pin=100mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.36 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 6.67 W/kg
SAR(1 g) = 5.19 W/kg; SAR(10 g) = 2.15 W/kg
Maximum value of SAR (measured) = 5.49 W/kg



0 dB = 5.49 W/kg = 7.40 dBW/kg

System Performance 2600MHz

DUT: D2600V2; Type: 2600 MHz; Serial: 1162

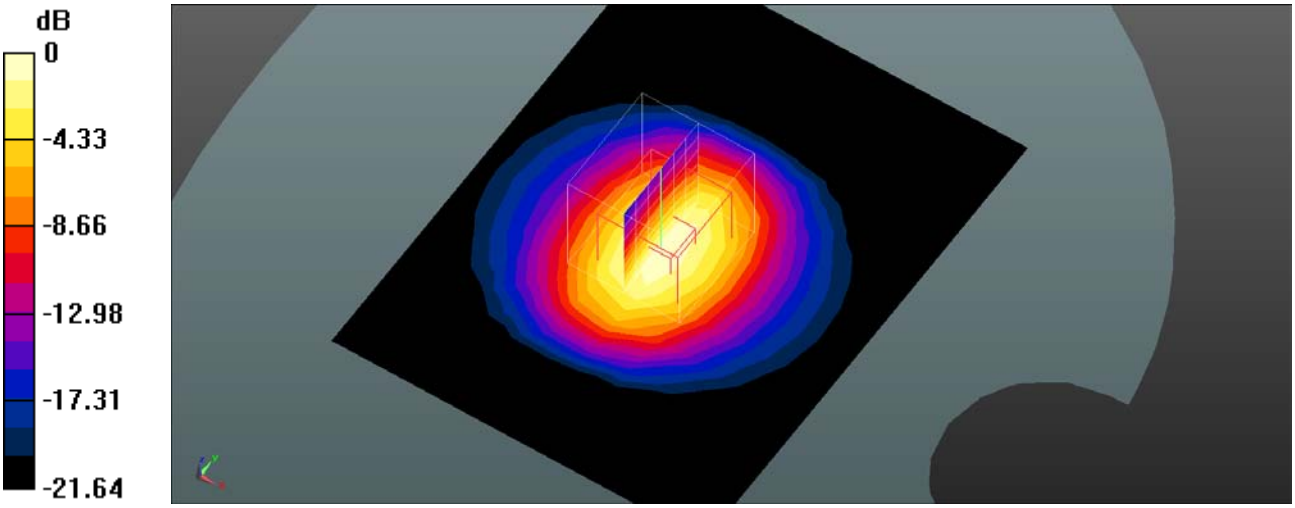
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 1.966 S/m; ε_r = 40.092; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4- SN7441; ConvF(7.3, 7.3, 7.3); @2600 MHz; Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: TP:1744
- Measurement SW: DASY52, Version 52.10.2; SEMCAD X Version 14.6.14 (7501)

System Performance Cheek at 2600MHz/d=10mm, Pin=100mw/Area Scan (10x13x1): Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 6.06 W/kg

System Performance Cheek at 2600MHz/d=10mm, Pin=100mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 64.88 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 10.6 W/kg
SAR(1 g) = 5.37 W/kg; SAR(10 g) = 1.94 W/kg
Maximum value of SAR (measured) = 7.37 W/kg



0 dB = 7.37 W/kg = 8.67 dBW/kg

System Performance 5250 MHz

DUT: Dipole 5GHz Type: D5GHZV2; Serial: 1296

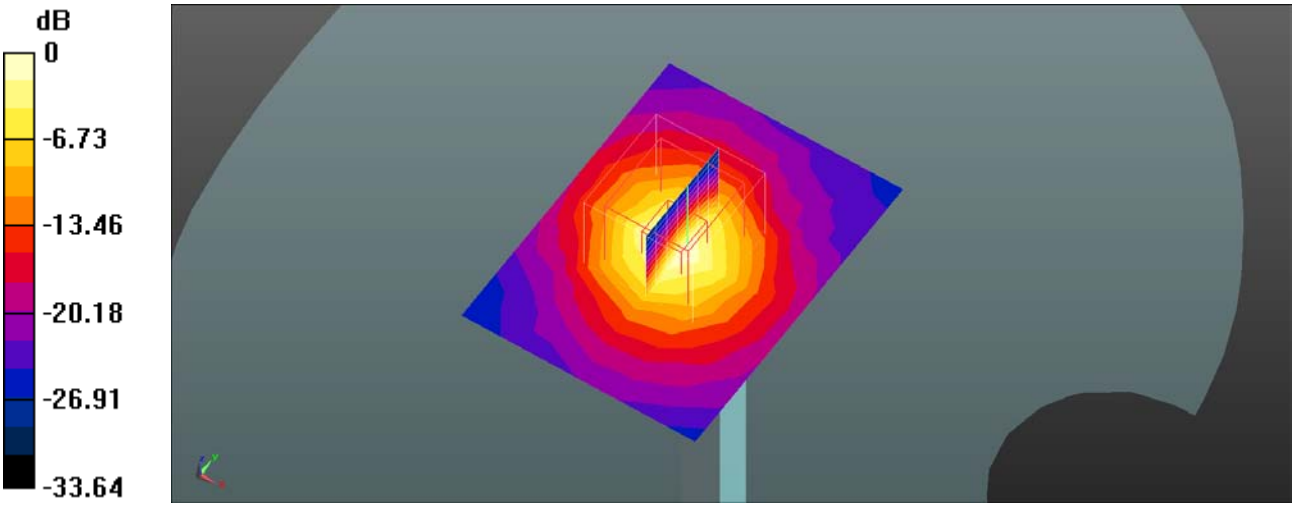
Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.682 S/m; ε_r = 35.379; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4- SN7441; ConvF(5.35, 5.35, 5.35); @5250 MHz; Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: 1744
- Measurement SW: DASY52, Version 52.10.2; SEMCAD X Version 14.6.14 (7501)

System Performance Cheek at 5250MHz/d=10mm, Pin=100mw/Area Scan (6x8x1): Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 15.1 W/kg

System Performance Cheek at 5250MHz/d=10mm, Pin=100mw/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 42.48 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 22.6 W/kg
SAR(1 g) = 7.88 W/kg; SAR(10 g) = 2.46 W/kg
Maximum value of SAR (measured) = 14.4 W/kg



0 dB = 14.4 W/kg = 11.58 dBW/kg

System Performance 5750 MHz

DUT: Dipole 5GHz Type: D5GHZV2; Serial: 1296

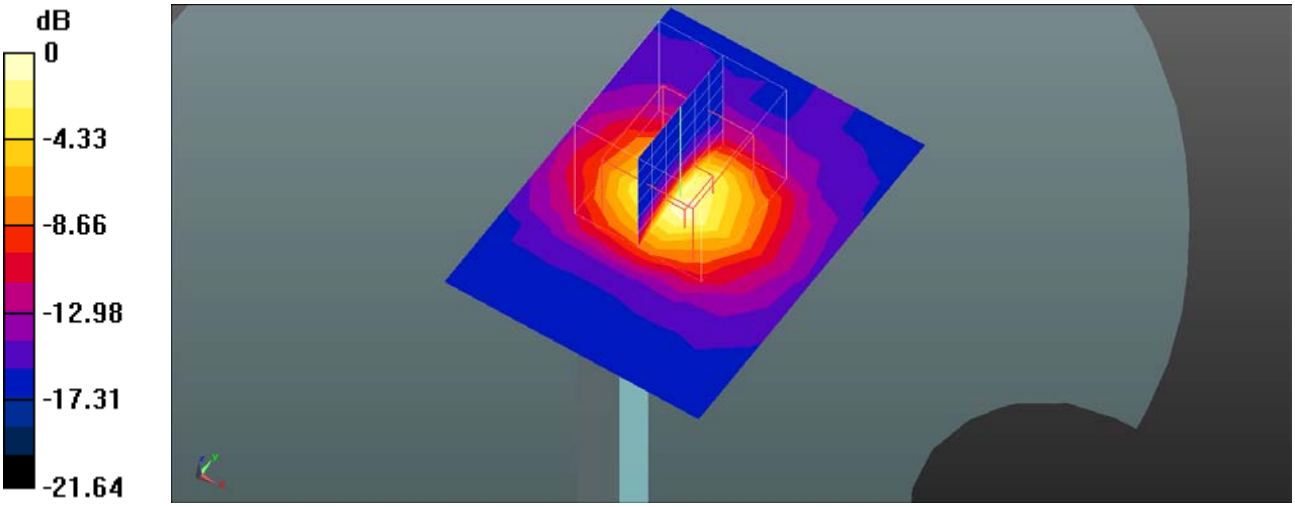
Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.264 S/m; ε_r = 34.324; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4- SN7441; ConvF(4.83, 4.83, 4.83); @5750 MHz; Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: 1744
- Measurement SW: DASY52, Version 52.10.2; SEMCAD X Version 14.6.14 (7501)

System Performance Cheek at 5750MHz/d=10mm, Pin=100mw/Area Scan (6x8x1): Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 9.1 W/kg

System Performance Cheek at 5750MHz/d=10mm, Pin=100mw/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 38.72 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 18.9 W/kg
SAR(1 g) = 7.83 W/kg; SAR(10 g) = 2.42 W/kg
Maximum value of SAR (measured) = 9.16 W/kg



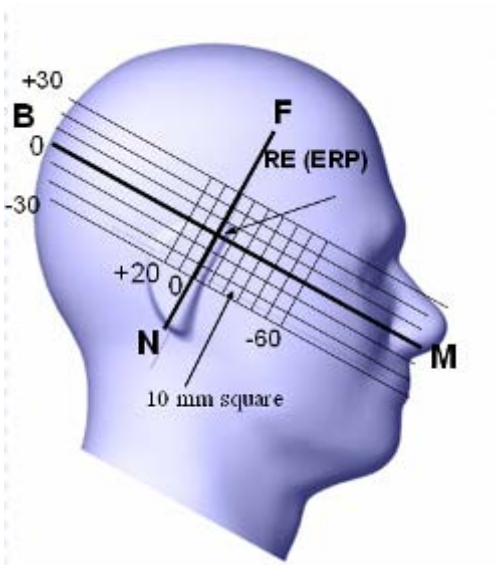
0 dB = 9.16 W/kg = 9.62 dBW/kg

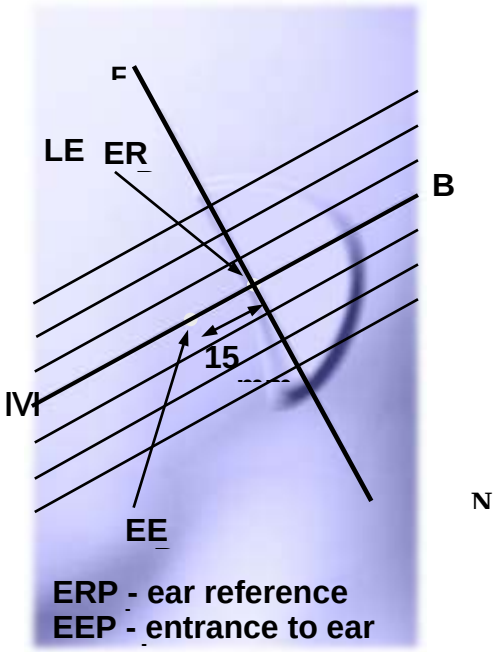
EUT TEST STRATEGY AND METHODOLOGY

Test Positions for Device Operating Next to a Person's Ear

This category includes most wireless handsets with fixed, retractable or internal antennas located toward the top half of the device, with or without a foldout, sliding or similar keypad cover. The handset should have its earpiece located within the upper ¼ of the device, either along the centerline or off-centered, as perceived by its users. This type of handset should be positioned in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point". The "test device reference point" should be located at the same level as the center of the earpiece region. The "vertical centerline" should bisect the front surface of the handset at its top and bottom edges. A "ear reference point" is located on the outer surface of the head phantom on each ear spacer. It is located 1.5 cm above the center of the ear canal entrance in the "phantom reference plane" defined by the three lines joining the center of each "ear reference point" (left and right) and the tip of the mouth.

A handset should be initially positioned with the earpiece region pressed against the ear spacer of a head phantom. For the SCC-34/SC-2 head phantom, the device should be positioned parallel to the "N-F" line defined along the base of the ear spacer that contains the "ear reference point". For interim head phantoms, the device should be positioned parallel to the cheek for maximum RF energy coupling. The "test device reference point" is aligned to the "ear reference point" on the head phantom and the "vertical centerline" is aligned to the "phantom reference plane". This is called the "initial ear position". While maintaining these three alignments, the body of the handset is gradually adjusted to each of the following positions for evaluating SAR:





Cheek/Touch Position

The device is brought toward the mouth of the head phantom by pivoting against the “ear reference point” or along the “N-F” line for the SCC-34/SC-2 head phantom.

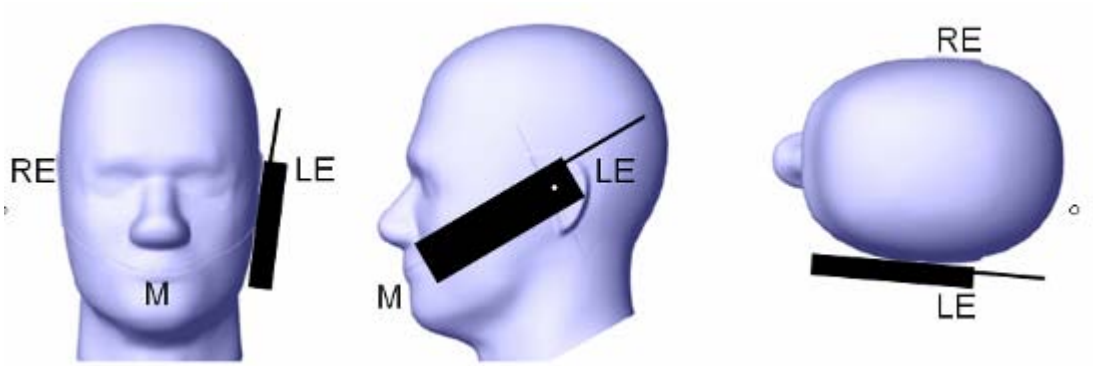
This test position is established:

When any point on the display, keypad or mouthpiece portions of the handset is in contact with the phantom.

(or) When any portion of a foldout, sliding or similar keypad cover opened to its intended self-adjusting normal use position is in contact with the cheek or mouth of the phantom.

For existing head phantoms – when the handset loses contact with the phantom at the pivoting point, rotation should continue until the device touches the cheek of the phantom or breaks its last contact from the ear spacer.

Cheek /Touch Position



Ear/Tilt Position

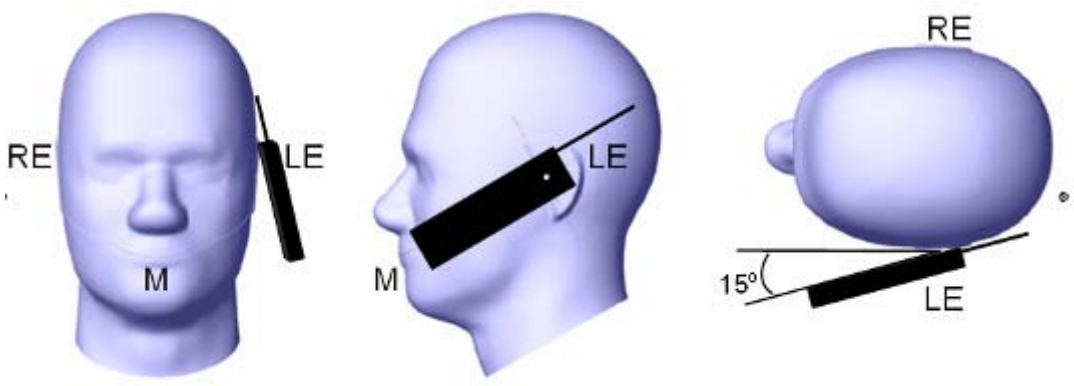
With the handset aligned in the “Cheek/Touch Position”:

1) If the earpiece of the handset is not in full contact with the phantom’s ear spacer (in the “Cheek/Touch position”) and the peak SAR location for the “Cheek/Touch” position is located at the ear spacer region or corresponds to the earpiece region of the handset, the device should be returned to the “initial ear position” by rotating it away from the mouth until the earpiece is in full contact with the ear spacer.

2) (otherwise) The handset should be moved (translated) away from the cheek perpendicular to the line passes through both “ear reference points” (note: one of these ear reference points may not physically exist on a split head model) for approximate 2-3 cm. While it is in this position, the device handset is tilted away from the mouth with respect to the “test device reference point” until the inside angle between the vertical centerline on the front surface of the phone and the horizontal line passing through the ear reference point is by 15 80°. After the tilt, it is then moved (translated) back toward the head perpendicular to the line passes through both “ear reference points” until the device touches the phantom or the ear spacer. If the antenna touches the head first, the positioning process should be repeated with a tilt angle less than 15° so that the device and its antenna would touch the phantom simultaneously. This test position may require a device holder or positioner to achieve the translation and tilting with acceptable positioning repeatability.

If a device is also designed to transmit with its keypad cover closed for operating in the head position, such positions should also be considered in the SAR evaluation. The device should be tested on the left and right side of the head phantom in the “Cheek/Touch” and “Ear/Tilt” positions. When applicable, each configuration should be tested with the antenna in its fully extended and fully retracted positions. These test configurations should be tested at the high, middle and low frequency channels of each operating mode; for example, AMPS, CDMA, and TDMA. If the SAR measured at the middle channel for each test configuration (left, right, Cheek/Touch, Tilt/Ear, extended and retracted) is at least 2.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s). If the transmission band of the test device is less than 10 MHz, testing at the high and low frequency channels is optional.

Ear /Tilt 15° Position



Test positions for body-worn and other configurations

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

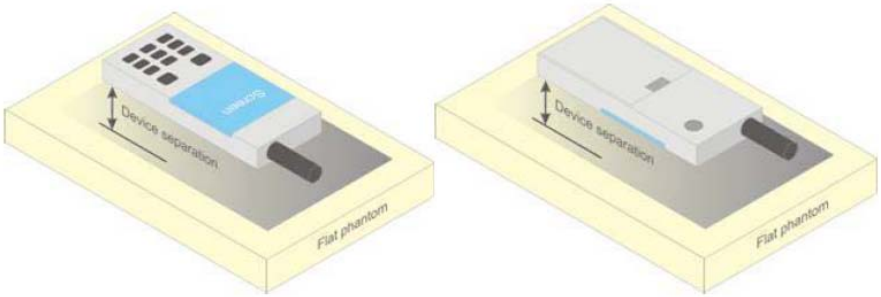


Figure 5 – Test positions for body-worn devices

Test Distance for SAR Evaluation

For this case the EUT(Equipment Under Test) is set 10mm away from the phantom, the test distance is 10mm.

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop. The SAR at this point is measured at the start of the test and then again at the end of the testing.

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or radiating structures of the EUT, the horizontal grid spacing was 15 mm x 15 mm, and the SAR distribution was determined by integrated grid of 1.5mm x 1.5mm. Based on these data, the area of the maximum absorption was determined by spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the “Not a knot"-condition (in x, y and z-directions). The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

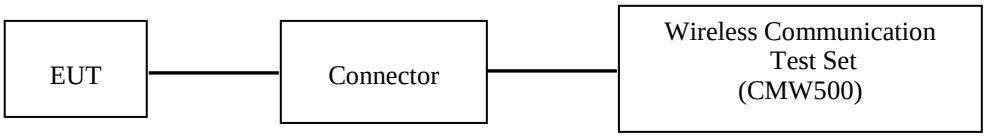
All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

CONDUCTED OUTPUT POWER MEASUREMENT

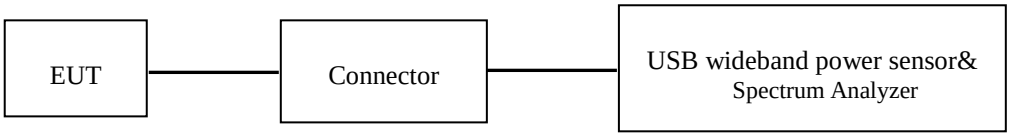
Test Procedure

The RF output of the transmitter was connected to the input of the Wireless Communication through Connector.



GSM/WCDMA/LTE

The RF output of the transmitter was connected to the input of the Spectrum Analyzer through Connector.



WLAN/BT

Radio Configuration

The power measurement was configured by the Wireless Communication Test Set.

GSM/GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection Press Signal Off to turn off the signal and change settings
Network Support > GSM + GPRS or GSM + EGSM
Main Service > Packet Data
Service selection > Test Mode A – Auto Slot Config. off
MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting
> Slot configuration > Uplink/Gamma
> 33 dBm for GPRS 850
> 30 dBm for GPRS 1900
> 27 dBm for EGPRS 850
> 26 dBm for EGPRS 1900
BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset > + 0 Hz
Mode > BCCH and TCH
BCCH Level > -85 dBm (May need to adjust if link is not stabe)
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off
P0 > 4 dB
Slot Config >Unchanged (if already set under MS signal)
TCH > choose desired test channel
Hopping > Off

Main Timeslot > 3
Network Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)
Bit Stream >2E9-1 PSR Bit Stream
AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection Press Signal on to turn on the signal and change settings

WCDMA Release 99

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c/β_d	8/15

HSDPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	β_c	2/15	12/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d(SF)	64			
	β_c/β_d	2/15	12/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs=βhs/ βc	30/15			

HSUPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	**HSUPA**	**HSUPA**	**HSUPA**	**HSUPA**	**HSUPA**
	Subset	**1**	**2**	**3**	**4**	**5**
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/ β_d	11/15	6/15	15/9	2/15	-
	β_{hs}	22/15	12/15	30/15	4/15	5/15
	CM(dB)	1.0	3.0	2.0	3.0	1.0
	MPR(dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	Ahs=β_{hs}/ β_c	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_FCls	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	

HSPA+

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	$\beta_{ed}1$: 30/15 $\beta_{ed}2$: 30/15	$\beta_{ed}3$: 24/15 $\beta_{ed}4$: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .
Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.
Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

FDD-LTE

For UE Power Class 1 and 3, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2-1due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

For UE Power Class 1 and 3 the specific requirements and identified sub clauses are specified in Table 6.2.4-1 along with the allowed A-MPR values that may be used to meet these requirements. The allowed A-MPR values specified below in Table 6.2.4.-1 to 6.2.4-15 are in addition to the allowed MPR requirements specified in sub clause 6.2.3.

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	N/A
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	
NS_11	6.6.2.2.1	23	1.4, 3, 5, 10, 15, 20	Table 6.2.4-5	
NS_12	6.6.3.3.5	26	1.4, 3, 5	Table 6.2.4-6	
NS_13	6.6.3.3.6	26	5	Table 6.2.4-7	
NS_14	6.6.3.3.7	26	10, 15	Table 6.2.4-8	
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15	Table 6.2.4-9 Table 6.2.4-10	
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4-11, Table 6.2.4-12, Table 6.2.4-13	
NS_17	6.6.3.3.10	28	5, 10	Table 5.6-1	N/A
NS_18	6.6.3.3.11	28	5	≥ 2	≤ 1
			10, 15, 20	≥ 1	≤ 4
NS_19	6.6.3.3.12	44	10, 15, 20	Table 6.2.4-14	
NS_20	6.2.2 6.6.2.2.1 6.6.3.2	23	5, 10, 15, 20	Table 6.2.4-15	
...					
NS_32	-	-	-	-	-

TDD-LTE

LTE TDD Band 41 supports 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Note: This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used for SAR Testing: configuration 0 at 63.33% duty cycle.

Maximum Target Output Power

Max Target Power(dBm)			
Mode/Band	**Channel**		
	Low	**Middle**	**High**
GSM 850	33	33	33
GPRS 1 TX Slot	33	33	33
GPRS 2 TX Slot	32	32	32
GPRS 3 TX Slot	30.5	30.5	30.5
GPRS 4 TX Slot	29	29	29
EDGE 1 TX Slot	27.5	27.5	27.5
EDGE 2 TX Slot	26	26	26
EDGE 3 TX Slot	24	24	24
EDGE 4 TX Slot	23	23	23
PCS 1900	30.5	30.5	30.5
GPRS 1 TX Slot	30.5	30.5	30.5
GPRS 2 TX Slot	29	29	29
GPRS 3 TX Slot	27	27	27
GPRS 4 TX Slot	26	26	26
EDGE 1 TX Slot	26	26	26
EDGE 2 TX Slot	25	25	25
EDGE 3 TX Slot	23	23	23
EDGE 4 TX Slot	21.5	21.5	21.5
WCDMA Band 2	23.5	23.5	23.5
WCDMA Band 4	23.5	23.5	23.5
WCDMA Band 5	24	24	24
LTE Band 2	22	22	22
LTE Band 4	22	22	22
LTE Band 5	23	23	23
LTE Band 7	21	21	21
LTE Band 38	21.5	21.5	21.5
LTE Band 41	21.5	21.5	21.5
Main WLAN 2.4G	14	14	14
Main WLAN 5.2G	11.5	11.5	11.5
Main WLAN 5.8G	8.5	9	10
Main Bluetooth BDR/EDR	10	10	10
Main BLE	-3	-3	-3
AUX WLAN 2.4G	14	14	14
AUX WLAN 5.2G	10.5	10.5	10.5
AUX WLAN 5.8G	9.5	9.5	9.5
AUX Bluetooth BDR/EDR	10	10	10
AUX BLE	-3	-3	-3

Test Results:

GSM:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)
GSM 850	128	824.2	32.74
	190	836.6	32.86
	251	848.8	32.96
PCS 1900	512	1850.2	30.06
	661	1880	30.16
	810	1909.8	30.05

GPRS:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	32.76	31.73	29.79	28.87
	190	836.6	32.91	**31.98**	30.06	28.87
	251	848.8	32.78	31.94	30.04	28.94
PCS 1900	512	1850.2	30.11	28.96	26.66	25.47
	661	1880	30.07	**28.94**	26.62	25.65
	810	1909.8	30.02	28.92	26.71	25.51

EDGE:

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	26.92	25.55	23.55	22.21
	190	836.6	27.04	25.78	23.68	22.52
	251	848.8	27.16	25.87	23.75	22.62
PCS 1900	512	1850.2	25.45	24.41	22.32	21.13
	661	1880	25.69	24.62	22.56	21.38
	810	1909.8	25.55	24.54	22.63	21.34

For SAR, the time based average power is relevant, the difference in between depends on the duty cycle of the TDMA signal.

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.25 dB	-3 dB
Crest Factor	8	4	2.66	2

The time based average power for GPRS

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	23.76	25.73	25.54	25.87
	190	836.6	23.91	**25.98**	25.81	25.87
	251	848.8	23.78	25.94	25.79	25.94
PCS 1900	512	1850.2	21.11	**22.96**	22.41	22.47
	661	1880	21.07	22.94	22.37	22.65
	810	1909.8	21.02	22.92	22.46	22.51

The time based average power for EDGE

Band	Channel No.	Frequency (MHz)	RF Output Power (dBm)			
			1 slot	2 slots	3 slots	4 slots
GSM 850	128	824.2	17.92	19.55	19.30	19.21
	190	836.6	18.04	19.78	19.43	19.52
	251	848.8	18.16	19.87	19.50	19.62
PCS 1900	512	1850.2	16.45	18.41	18.07	18.13
	661	1880	16.69	18.62	18.31	18.38
	810	1909.8	16.55	18.54	18.38	18.34

Note:

1. Rohde & Schwarz Radio Communication Tester (CMU500) was used for the measurement of GSM peak and average output power for active timeslots.
2 .For GSM voice, 1 timeslot has been activated with power level 5 (850 MHz band) and 0 (1900 MHz band).
3 .For GPRS, 1, 2, 3 and 4 timeslots has been activated separately with power level 2 (850 MHz band) and 3(1900 MHz band).

WCDMA Band 2:

Test Condition	Test Mode	3GPP Sub Test	Averaged Mean Power (dBm)		
			Low Frequency	Mid Frequency	High Frequency
Normal	RMC12.2k		23.48	23.49	23.44
	HSDPA	1	22.46	22.40	22.47
		2	22.35	22.28	22.46
		3	22.50	22.50	22.22
		4	22.40	22.23	22.37
	HSUPA	1	22.14	22.13	21.94
		2	22.06	22.14	21.93
		3	21.97	22.12	21.96
		4	22.07	22.12	22.03
		5	22.27	22.05	22.02
	HSPA+	1	22.21	22.01	22.01

WCDMA Band 4:

Test Condition	Test Mode	3GPP Sub Test	Averaged Mean Power (dBm)		
			Low Frequency	Mid Frequency	High Frequency
Normal	RMC12.2k		23.38	23.43	23.44
	HSDPA	1	22.36	22.37	22.44
		2	22.42	22.17	22.28
		3	22.20	22.31	22.30
		4	22.27	22.21	22.28
	HSUPA	1	22.09	21.95	22.01
		2	22.09	22.04	21.80
		3	22.06	21.93	21.83
		4	21.97	21.77	21.95
		5	22.07	22.05	21.85
	HSPA+	1	22.06	21.91	21.96

WCDMA Band 5:

Test Condition	Test Mode	3GPP Sub Test	Averaged Mean Power (dBm)		
			Low Frequency	Mid Frequency	High Frequency
Normal	RMC12.2k		23.36	23.45	23.54
	HSDPA	1	22.45	22.46	22.43
		2	22.30	22.33	22.44
		3	22.19	22.32	22.33
		4	22.15	22.27	22.26
	HSUPA	1	21.57	21.64	21.51
		2	21.55	21.55	21.43
		3	21.31	21.50	21.44
		4	21.65	21.57	21.36
		5	21.20	21.51	21.44
	HSPA+	1	21.29	21.48	21.31

Note:

1. The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement Channel) Configured in Test Loop Model 1.
2. KDB 941225 D01-Body SAR is not required for HSDPA/HSUPA/ HSPA+ when the maximum average output of each RF channel is less than ¼ dB higher than measured 12.2kbps RMC or the maximum SAR for 12.2kbps RMC is < 75% of SAR limit.

LTE Band 2:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	21.36	21.43	21.35
		RB1#3	0	0	21.31	21.32	21.20
		RB1#5	0	0	21.35	21.44	21.15
		RB3#0	1	1	21.35	21.42	21.34
		RB3#3	1	1	21.30	21.31	21.19
		RB6#0	1	1	21.34	21.43	21.14
	16-QAM	RB1#0	1	1	21.15	21.16	20.92
		RB1#3	1	1	21.09	21.09	20.82
		RB1#5	1	1	21.09	21.16	20.82
		RB3#0	2	2	21.13	21.14	20.90
		RB3#3	2	2	21.07	21.07	20.80
		RB6#0	2	2	21.07	21.14	20.80
3M	QPSK	RB1#0	0	0	21.39	21.46	21.38
		RB1#8	0	0	21.34	21.35	21.23
		RB1#14	0	0	21.38	21.47	21.18
		RB6#0	1	1	21.17	21.27	21.05
		RB6#9	1	1	21.33	21.21	21.07
		RB15#0	1	1	21.21	21.20	20.98
	16-QAM	RB1#0	1	1	21.18	21.19	20.95
		RB1#8	1	1	21.12	21.12	20.85
		RB1#14	1	1	21.12	21.19	20.85
		RB6#0	2	2	21.00	21.13	20.84
		RB6#9	2	2	21.04	21.13	20.74
		RB15#0	2	2	20.97	21.01	20.73
5M	QPSK	RB1#0	0	0	21.42	21.49	21.41
		RB1#13	0	0	21.37	21.38	21.26
		RB1#24	0	0	21.41	21.50	21.21
		RB15#0	1	1	21.20	21.30	21.08
		RB15#10	1	1	21.36	21.24	21.10
		RB25#0	1	1	21.24	21.23	21.01
	16-QAM	RB1#0	1	1	21.21	21.22	20.98
		RB1#13	1	1	21.15	21.15	20.88
		RB1#24	1	1	21.15	21.22	20.88
		RB15#0	2	2	21.03	21.16	20.87
		RB15#10	2	2	21.07	21.16	20.77
		RB25#0	2	2	21.00	21.04	20.76

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	21.44	21.51	21.43
		RB1#25	0	0	21.39	21.40	21.28
		RB1#49	0	0	21.43	21.52	21.23
		RB25#0	1	1	21.22	21.32	21.10
		RB25#25	1	1	21.38	21.26	21.12
		RB50#0	1	1	21.26	21.25	21.03
	16-QAM	RB1#0	1	1	21.23	21.24	21.00
		RB1#25	1	1	21.17	21.17	20.90
		RB1#49	1	1	21.17	21.24	20.90
		RB25#0	2	2	21.05	21.18	20.89
		RB25#25	2	2	21.09	21.18	20.79
		RB50#0	2	2	21.02	21.06	20.78
15M	QPSK	RB1#0	0	0	21.47	21.54	21.46
		RB1#38	0	0	21.42	21.43	21.31
		RB1#74	0	0	21.46	21.55	21.26
		RB36#0	1	1	21.25	21.35	21.13
		RB36#39	1	1	21.41	21.29	21.15
		RB75#0	1	1	21.29	21.28	21.06
	16-QAM	RB1#0	1	1	21.26	21.27	21.03
		RB1#38	1	1	21.20	21.20	20.93
		RB1#74	1	1	21.20	21.27	20.93
		RB36#0	2	2	21.08	21.21	20.92
		RB36#39	2	2	21.12	21.21	20.82
		RB75#0	2	2	21.05	21.09	20.81
20M	QPSK	RB1#0	0	0	21.65	**21.70**	21.53
		RB1#50	0	0	21.60	21.66	21.45
		RB1#99	0	0	21.51	21.59	21.36
		RB50#0	1	1	21.48	21.53	21.29
		RB50#50	1	1	21.45	21.47	21.22
		RB100#0	1	1	21.36	21.44	21.14
	16-QAM	RB1#0	1	1	21.30	21.38	21.08
		RB1#50	1	1	21.27	21.35	21.05
		RB1#99	1	1	21.26	21.34	21.04
		RB50#0	2	2	21.18	21.26	20.96
		RB50#50	2	2	21.17	21.25	20.95
		RB100#0	2	2	21.12	21.20	20.90

LTE Band 4:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	21.06	21.22	21.09
		RB1#3	0	0	21.14	21.36	21.11
		RB1#5	0	0	21.03	21.22	20.88
		RB3#0	1	1	21.04	21.20	21.07
		RB3#3	1	1	21.12	21.34	21.09
		RB6#0	1	1	21.01	21.20	20.86
	16-QAM	RB1#0	1	1	20.87	21.03	20.75
		RB1#3	1	1	20.83	20.96	20.73
		RB1#5	1	1	20.79	20.95	20.76
		RB3#0	2	2	20.86	21.02	20.74
		RB3#3	2	2	20.82	20.95	20.72
		RB6#0	2	2	20.78	20.94	20.75
3M	QPSK	RB1#0	0	0	21.07	21.23	21.10
		RB1#8	0	0	21.15	21.37	21.12
		RB1#14	0	0	21.04	21.23	20.89
		RB6#0	1	1	21.05	21.16	20.90
		RB6#9	1	1	20.98	21.16	20.89
		RB15#0	1	1	20.91	21.13	20.82
	16-QAM	RB1#0	1	1	20.88	21.04	20.76
		RB1#8	1	1	20.84	20.97	20.74
		RB1#14	1	1	20.80	20.96	20.77
		RB6#0	2	2	20.71	20.92	20.71
		RB6#9	2	2	20.76	20.90	20.67
		RB15#0	2	2	20.68	20.88	20.62
5M	QPSK	RB1#0	0	0	21.10	21.26	21.13
		RB1#13	0	0	21.18	21.40	21.15
		RB1#24	0	0	21.07	21.26	20.92
		RB15#0	1	1	21.08	21.19	20.93
		RB15#10	1	1	21.01	21.19	20.92
		RB25#0	1	1	20.94	21.16	20.85
	16-QAM	RB1#0	1	1	20.91	21.07	20.79
		RB1#13	1	1	20.87	21.00	20.77
		RB1#24	1	1	20.83	20.99	20.80
		RB15#0	2	2	20.74	20.95	20.74
		RB15#10	2	2	20.79	20.93	20.70
		RB25#0	2	2	20.71	20.91	20.65

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	21.14	21.30	21.17
		RB1#25	0	0	21.22	21.44	21.19
		RB1#49	0	0	21.11	21.30	20.96
		RB25#0	1	1	21.12	21.23	20.97
		RB25#25	1	1	21.05	21.23	20.96
		RB50#0	1	1	20.98	21.20	20.89
	16-QAM	RB1#0	1	1	20.95	21.11	20.83
		RB1#25	1	1	20.91	21.04	20.81
		RB1#49	1	1	20.87	21.03	20.84
		RB25#0	2	2	20.78	20.99	20.78
		RB25#25	2	2	20.83	20.97	20.74
		RB50#0	2	2	20.75	20.95	20.69
15M	QPSK	RB1#0	0	0	21.20	21.36	21.23
		RB1#38	0	0	21.28	21.50	21.25
		RB1#74	0	0	21.17	21.36	21.02
		RB36#0	1	1	21.18	21.29	21.03
		RB36#39	1	1	21.11	21.29	21.02
		RB75#0	1	1	21.04	21.26	20.95
	16-QAM	RB1#0	1	1	21.01	21.17	20.89
		RB1#38	1	1	20.97	21.10	20.87
		RB1#74	1	1	20.93	21.09	20.90
		RB36#0	2	2	20.84	21.05	20.84
		RB36#39	2	2	20.89	21.03	20.80
		RB75#0	2	2	20.81	21.01	20.75
20M	QPSK	RB1#0	0	0	21.42	**21.58**	21.36
		RB1#50	0	0	21.38	21.54	21.31
		RB1#99	0	0	21.30	21.50	21.24
		RB50#0	1	1	21.25	21.42	21.18
		RB50#50	1	1	21.19	21.37	21.12
		RB100#0	1	1	21.15	21.30	21.08
	16-QAM	RB1#0	1	1	21.10	21.25	21.03
		RB1#50	1	1	21.07	21.22	21.00
		RB1#99	1	1	21.06	21.21	20.99
		RB50#0	2	2	20.98	21.13	20.91
		RB50#50	2	2	20.97	21.12	20.90
		RB100#0	2	2	20.92	21.07	20.85

LTE Band 5:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4M	QPSK	RB1#0	0	0	22.10	22.37	22.28
		RB1#3	0	0	22.14	22.25	22.16
		RB1#5	0	0	22.01	22.22	22.13
		RB3#0	1	1	22.08	22.35	22.26
		RB3#3	1	1	22.12	22.23	22.14
		RB6#0	1	1	21.99	22.20	22.11
	16-QAM	RB1#0	1	1	21.83	22.07	21.91
		RB1#3	1	1	21.83	22.12	21.91
		RB1#5	1	1	21.78	22.07	21.85
		RB3#0	2	2	21.82	22.06	21.90
		RB3#3	2	2	21.82	22.11	21.90
		RB6#0	2	2	21.77	22.06	21.84
3M	QPSK	RB1#0	0	0	22.14	22.41	22.32
		RB1#8	0	0	22.18	22.29	22.20
		RB1#14	0	0	22.05	22.26	22.17
		RB6#0	1	1	21.98	22.21	22.11
		RB6#9	1	1	21.97	22.21	22.02
		RB15#0	1	1	21.92	22.16	22.04
	16-QAM	RB1#0	1	1	21.87	22.11	21.95
		RB1#8	1	1	21.87	22.16	21.95
		RB1#14	1	1	21.82	22.11	21.89
		RB6#0	2	2	21.51	21.76	21.64
		RB6#9	2	2	21.51	21.80	21.59
		RB15#0	2	2	21.50	21.73	21.57
5M	QPSK	RB1#0	0	0	22.20	22.47	22.38
		RB1#13	0	0	22.24	22.35	22.26
		RB1#24	0	0	22.11	22.32	22.23
		RB15#0	1	1	22.04	22.27	22.17
		RB15#10	1	1	22.03	22.27	22.08
		RB25#0	1	1	21.98	22.22	22.10
	16-QAM	RB1#0	1	1	21.93	22.17	22.01
		RB1#13	1	1	21.93	22.22	22.01
		RB1#24	1	1	21.88	22.17	21.95
		RB15#0	2	2	21.57	21.82	21.70
		RB15#10	2	2	21.57	21.86	21.65
		RB25#0	2	2	21.56	21.79	21.63

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
10M	QPSK	RB1#0	0	0	22.34	**22.55**	22.48
		RB1#25	0	0	22.31	22.50	22.39
		RB1#49	0	0	22.23	22.46	22.35
		RB25#0	1	1	22.16	22.41	22.27
		RB25#25	1	1	22.11	22.38	22.21
		RB50#0	1	1	22.07	22.34	22.16
	16-QAM	RB1#0	1	1	22.02	22.29	22.11
		RB1#25	1	1	21.99	22.26	22.08
		RB1#49	1	1	21.98	22.25	22.07
		RB25#0	2	2	21.69	21.96	21.78
		RB25#25	2	2	21.68	21.95	21.77
		RB50#0	2	2	21.63	21.90	21.72

LTE Band 7:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	RB1#0	0	0	20.58	20.63	20.48
		RB1#13	0	0	20.46	20.60	20.41
		RB1#24	0	0	20.50	20.60	20.32
		RB15#0	1	1	20.44	20.51	20.30
		RB15#10	1	1	20.33	20.53	20.18
		RB25#0	1	1	20.27	20.40	20.14
	16-QAM	RB1#0	1	1	20.29	20.42	20.14
		RB1#13	1	1	20.28	20.43	20.10
		RB1#24	1	1	20.27	20.38	20.09
		RB15#0	2	2	20.15	20.34	20.02
		RB15#10	2	2	20.17	20.33	20.05
		RB25#0	2	2	20.13	20.24	19.95
10M	QPSK	RB1#0	0	0	20.62	20.67	20.52
		RB1#25	0	0	20.50	20.64	20.45
		RB1#49	0	0	20.54	20.64	20.36
		RB25#0	1	1	20.48	20.55	20.34
		RB25#25	1	1	20.37	20.57	20.22
		RB50#0	1	1	20.31	20.44	20.18
	16-QAM	RB1#0	1	1	20.33	20.46	20.18
		RB1#25	1	1	20.32	20.47	20.14
		RB1#49	1	1	20.31	20.42	20.13
		RB25#0	2	2	20.19	20.38	20.06
		RB25#25	2	2	20.21	20.37	20.09
		RB50#0	2	2	20.17	20.28	19.99
15M	QPSK	RB1#0	0	0	20.68	20.73	20.58
		RB1#38	0	0	20.56	20.70	20.51
		RB1#74	0	0	20.60	20.70	20.42
		RB36#0	1	1	20.54	20.61	20.40
		RB36#39	1	1	20.43	20.63	20.28
		RB75#0	1	1	20.37	20.50	20.24
	16-QAM	RB1#0	1	1	20.39	20.52	20.24
		RB1#38	1	1	20.38	20.53	20.20
		RB1#74	1	1	20.37	20.48	20.19
		RB36#0	2	2	20.25	20.44	20.12
		RB36#39	2	2	20.27	20.43	20.15
		RB75#0	2	2	20.23	20.34	20.05

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
20M	QPSK	RB1#0	0	0	20.74	**20.86**	20.63
		RB1#50	0	0	20.68	20.79	20.56
		RB1#99	0	0	20.65	20.75	20.52
		RB50#0	1	1	20.63	20.70	20.47
		RB50#50	1	1	20.56	20.68	20.42
		RB100#0	1	1	20.50	20.64	20.36
	16-QAM	RB1#0	1	1	20.45	20.59	20.31
		RB1#50	1	1	20.42	20.56	20.28
		RB1#99	1	1	20.41	20.55	20.27
		RB50#0	2	2	20.33	20.47	20.19
		RB50#50	2	2	20.32	20.46	20.18
		RB100#0	2	2	20.27	20.41	20.13

LTE Band 38:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5M	QPSK	RB1#0	0	0	21.19	21.34	21.27
		RB1#13	0	0	21.05	21.23	21.12
		RB1#24	0	0	20.92	21.08	21.00
		RB15#0	1	1	20.83	21.02	20.94
		RB15#10	1	1	20.77	20.96	20.89
		RB25#0	1	1	20.72	20.89	20.85
	16-QAM	RB1#0	1	1	20.71	20.83	20.80
		RB1#13	1	1	20.70	20.82	20.78
		RB1#24	1	1	20.66	20.66	20.63
		RB15#0	2	2	20.64	20.64	20.61
		RB15#10	2	2	20.59	20.57	20.51
		RB25#0	2	2	20.53	20.50	20.47
10M	QPSK	RB1#0	0	0	21.22	21.37	21.30
		RB1#25	0	0	21.08	21.26	21.15
		RB1#49	0	0	20.95	21.11	21.03
		RB25#0	1	1	20.86	21.05	20.97
		RB25#25	1	1	20.80	20.99	20.92
		RB50#0	1	1	20.75	20.92	20.88
	16-QAM	RB1#0	1	1	20.74	20.86	20.83
		RB1#25	1	1	20.73	20.85	20.81
		RB1#49	1	1	20.69	20.69	20.66
		RB25#0	2	2	20.67	20.67	20.64
		RB25#25	2	2	20.62	20.60	20.54
		RB50#0	2	2	20.56	20.53	20.50
15M	QPSK	RB1#0	0	0	21.26	21.41	21.34
		RB1#38	0	0	21.12	21.30	21.19
		RB1#74	0	0	20.99	21.15	21.07
		RB36#0	1	1	20.90	21.09	21.01
		RB36#39	1	1	20.84	21.03	20.96
		RB75#0	1	1	20.79	20.96	20.92
	16-QAM	RB1#0	1	1	20.78	20.90	20.87
		RB1#38	1	1	20.77	20.89	20.85
		RB1#74	1	1	20.73	20.73	20.70
		RB36#0	2	2	20.71	20.71	20.68
		RB36#39	2	2	20.66	20.64	20.58
		RB75#0	2	2	20.60	20.57	20.54

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
20M	QPSK	RB1#0	0	0	21.32	**21.45**	21.39
		RB1#50	0	0	21.18	21.36	21.25
		RB1#99	0	0	21.05	21.21	21.13
		RB50#0	1	1	20.96	21.15	21.07
		RB50#50	1	1	20.90	21.09	21.02
		RB100#0	1	1	20.85	21.02	20.98
	16-QAM	RB1#0	1	1	20.84	20.96	20.93
		RB1#50	1	1	20.83	20.95	20.91
		RB1#99	1	1	20.79	20.79	20.76
		RB50#0	2	2	20.77	20.77	20.74
		RB50#50	2	2	20.72	20.70	20.64
		RB100#0	2	2	20.70	20.68	20.62

LTE Band 41:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Low-Mid Channel (dBm)	Mid Channel (dBm)	Mid-High Channel (dBm)	High Channel (dBm)
5M	QPSK	RB1#0	0	0	21.23	21.25	21.37	21.20	21.13
		RB1#13	0	0	21.20	21.12	21.21	21.01	21.09
		RB1#24	0	0	21.14	21.05	21.10	20.87	21.04
		RB15#0	1	1	21.05	20.95	21.07	20.83	20.95
		RB15#10	1	1	21.02	20.89	20.98	20.82	20.90
		RB25#0	1	1	20.99	20.81	20.92	20.79	20.85
	16-QAM	RB1#0	1	1	20.98	20.79	20.89	20.77	20.84
		RB1#13	1	1	20.96	20.75	20.87	20.76	20.81
		RB1#24	1	1	20.89	20.61	20.77	20.70	20.75
		RB15#0	2	2	20.88	20.59	20.76	20.68	20.72
		RB15#10	2	2	20.85	20.45	20.71	20.60	20.60
		RB25#0	2	2	20.78	20.38	20.68	20.54	20.56
10M	QPSK	RB1#0	0	0	21.26	21.28	21.40	21.23	21.16
		RB1#25	0	0	21.23	21.15	21.24	21.04	21.12
		RB1#49	0	0	21.17	21.08	21.13	20.90	21.07
		RB25#0	1	1	21.08	20.98	21.10	20.86	20.98
		RB25#25	1	1	21.05	20.92	21.01	20.85	20.93
		RB50#0	1	1	21.02	20.84	20.95	20.82	20.88
	16-QAM	RB1#0	1	1	21.01	20.82	20.92	20.80	20.87
		RB1#25	1	1	20.99	20.78	20.90	20.79	20.84
		RB1#49	1	1	20.92	20.64	20.80	20.73	20.78
		RB25#0	2	2	20.91	20.62	20.79	20.71	20.75
		RB25#25	2	2	20.88	20.48	20.74	20.63	20.63
		RB50#0	2	2	20.81	20.41	20.71	20.57	20.59

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel (dBm)	Low-Mid Channel (dBm)	Mid Channel (dbm)	Mid-High Channel (dBm)	High Channel (dBm)
15M	QPSK	RB1#0	0	0	21.30	21.32	21.44	21.27	21.20
		RB1#38	0	0	21.27	21.19	21.28	21.08	21.16
		RB1#74	0	0	21.21	21.12	21.17	20.94	21.11
		RB36#0	1	1	21.12	21.02	21.14	20.90	21.02
		RB36#39	1	1	21.09	20.96	21.05	20.89	20.97
		RB75#0	1	1	21.06	20.88	20.99	20.86	20.92
	16-QAM	RB1#0	1	1	21.05	20.86	20.96	20.84	20.91
		RB1#38	1	1	21.03	20.82	20.94	20.83	20.88
		RB1#74	1	1	20.96	20.68	20.84	20.77	20.82
		RB36#0	2	2	20.95	20.66	20.83	20.75	20.79
		RB36#39	2	2	20.92	20.52	20.78	20.67	20.67
		RB75#0	2	2	20.85	20.45	20.75	20.61	20.63
20M	QPSK	RB1#0	0	0	21.35	21.38	**21.48**	21.32	21.26
		RB1#50	0	0	21.33	21.25	21.34	21.14	21.22
		RB1#99	0	0	21.27	21.18	21.23	21.00	21.17
		RB50#0	1	1	21.18	21.08	21.20	20.96	21.08
		RB50#50	1	1	21.15	21.02	21.11	20.95	21.03
		RB100#0	1	1	21.12	20.94	21.05	20.92	20.98
	16-QAM	RB1#0	1	1	21.11	20.92	21.02	20.90	20.97
		RB1#50	1	1	21.09	20.88	21.00	20.89	20.94
		RB1#99	1	1	21.02	20.74	20.90	20.83	20.88
		RB50#0	2	2	21.01	20.72	20.89	20.81	20.85
		RB50#50	2	2	20.98	20.58	20.84	20.73	20.73
		RB100#0	2	2	20.96	20.57	20.82	20.72	20.71

Note:

1. *The frequency range of LTE Band 41 is 2535 ~ 2655MHz. Per KDB 447498 D01, according to the following formula Calculate N_c is 4, We chose to test 5 frequency points.*

   KDB procedures, the following should be applied to determine the number of required test channels. The test channels should be evenly spread across the transmission frequency band of each wireless mode.[14]

   $$N_c = Round\left\{\left[100\left(f_{high} - f_{low}\right)/f_c\right]^{0.5} \times \left(f_c/100\right)^{0.2}\right\},$$

   where

   - N_c is the number of test channels, rounded to the nearest integer,
   - f_{high} and f_{low} are the highest and lowest channel frequencies within the transmission band,
   - f_c is the mid-band channel frequency,
   - all frequencies are in MHz.

2. *This device only support Power Class 3.*

Main Wi-Fi 2.4G:

Mode	Channel frequency (MHz)	Data Rate	Conducted Average Output(dBm)
802.11b	2412	1Mbps	13.76
	2442		13.63
	2472		13.08
802.11g	2412	6Mbps	7.61
	2442		8.30
	2472		7.55
802.11n HT20	2412	MCS0	7.38
	2442		8.06
	2472		7.48
802.11n HT40	2422	MCS0	8.36
	2442		8.31
	2462		8.06

Main WLAN 5.2G:

Mode	Channel frequency (MHz)	Data Rate	Conducted Average Output(dBm)
802.11a	5180	6Mbps	10.33
	5200		10.71
	5240		11.13
802.11n HT20	5180	MCS0	10.23
	5200		10.69
	5240		11.15
802.11n HT40	5190	MCS0	9.31
	5230		10.17
802.11AC20	5180	MCS0	10.39
	5200		10.66
	5240		11.24
802.11AC40	5190	MCS0	9.55
	5230		10.35
802.11AC80	5210	MCS0	9.90

Main WLAN 5.8G:

Mode	Channel frequency (MHz)	Data Rate	Conducted Average Output(dBm)
802.11a	5745	6Mbps	8.27
	5785		8.62
	5825		9.62
802.11n HT20	5745	MCS0	8.02
	5785		8.40
	5825		9.65
802.11n HT40	5755	MCS0	7.46
	5795		7.90
802.11AC20	5745	MCS0	8.37
	5785		8.68
	5825		9.73
802.11AC40	5755	MCS0	7.54
	5795		7.84
802.11AC80	5775	MCS0	7.64

Main Bluetooth:

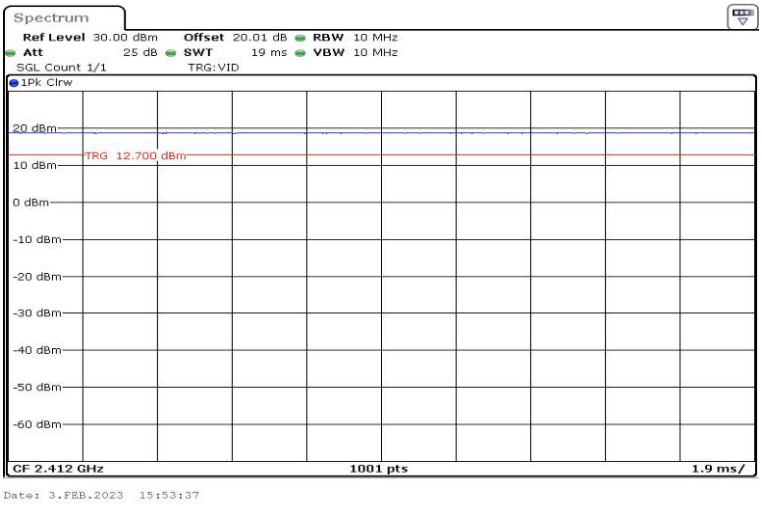
Mode	Channel frequency (MHz)	RF Output Power (dBm)
BDR(GFSK)	2402	9.17
	2441	9.04
	2480	8.00
EDR(π/4-DQPSK)	2402	9.09
	2441	8.16
	2480	7.18
EDR(8DPSK)	2402	9.17
	2441	8.15
	2480	7.23
BLE_1M	2402	-4.04
	2440	-3.52
	2480	-4.52
BLE_2M	2402	-4.17
	2440	-3.51
	2480	-4.47

Main Duty Cycle:

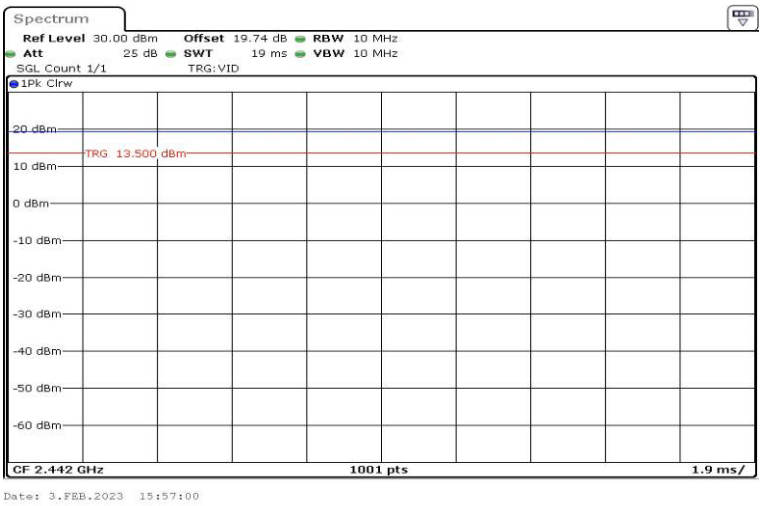
Test Mode	Duty Cycle [%]
802.11b	100.00
802.11g	100.00
802.11n HT20	100.00
802.11n HT40	100.00

Test Graphs

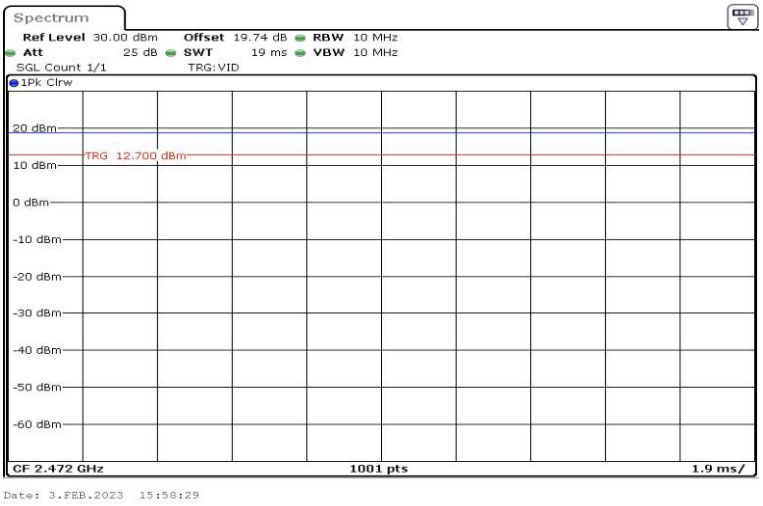
11B_Ant1_2412



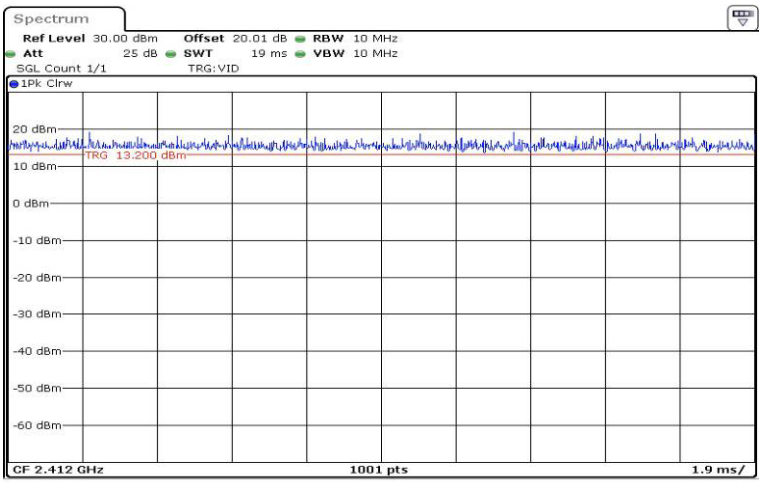
11B_Ant1_2442



11B_Ant1_2472

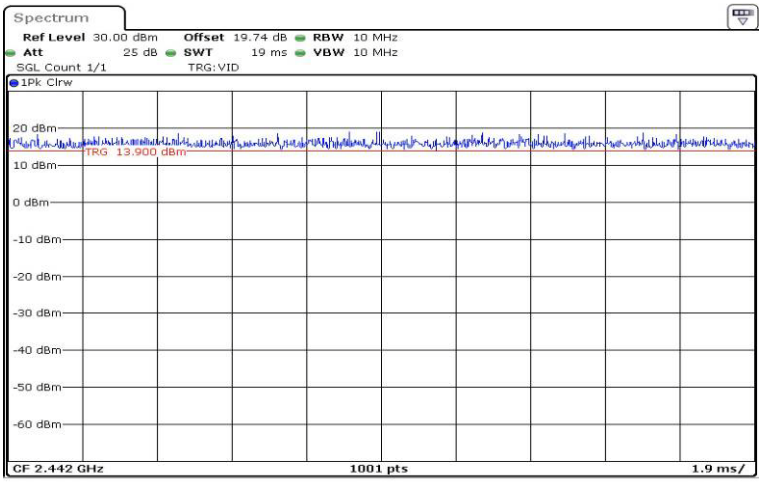

Spectrum
Ref Level 30.00 dBm Offset 19.74 dB RBW 10 MHz
Att 25 dB SWT 19 ms VBW 10 MHz
SGL Count 1/1 TRG:VID
1Pk Clrw
20 dBm
TRG 12.700 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.472 GHz
1001 pts
1.9 ms/
Date: 3.FEB.2023 15:58:29

11G_Ant1_2412



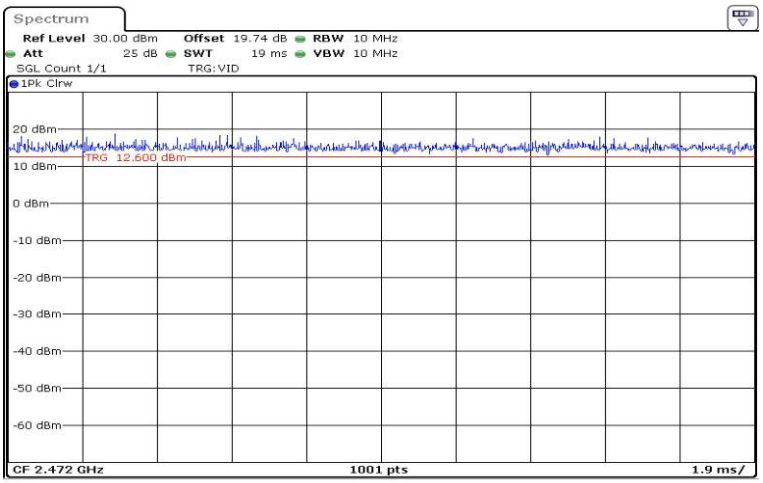
Date: 3.FEB.2023 16:00:28

11G_Ant1_2442



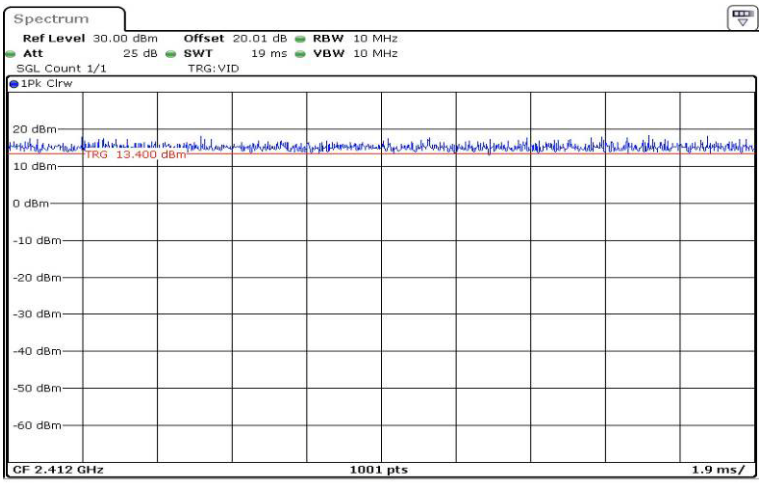
Date: 3.FEB.2023 16:03:03

11G_Ant1_2472



Date: 3.FEB.2023 16:10:18

11N20SISO_Ant1_2412



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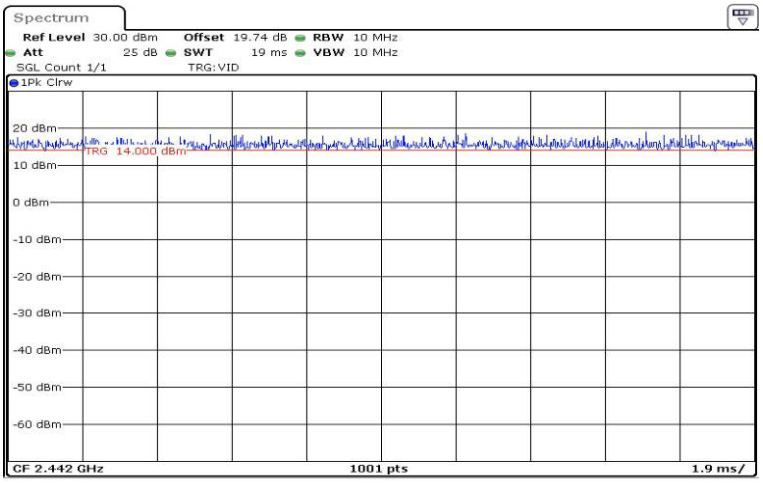
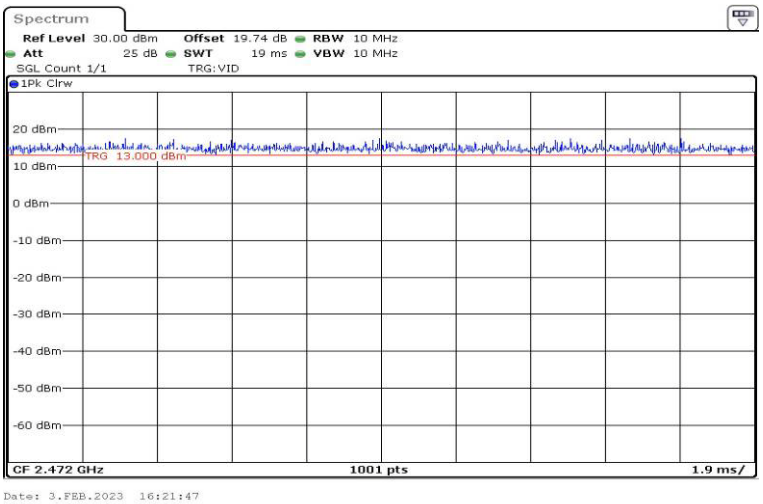
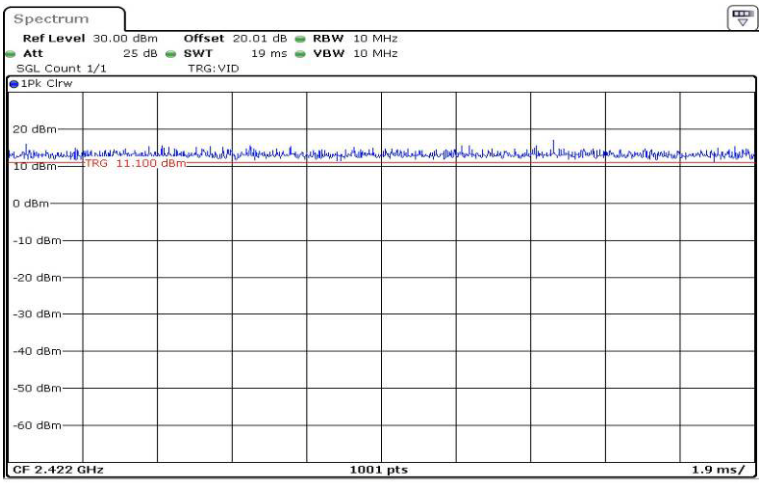


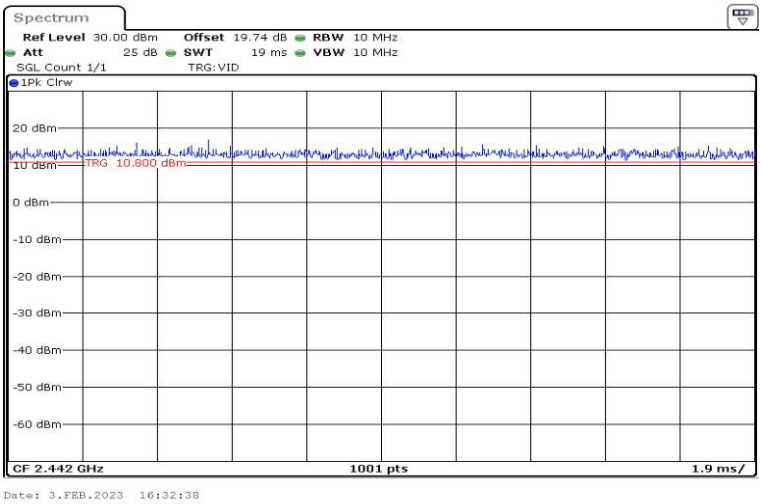
11N20SISO_Ant1_2472



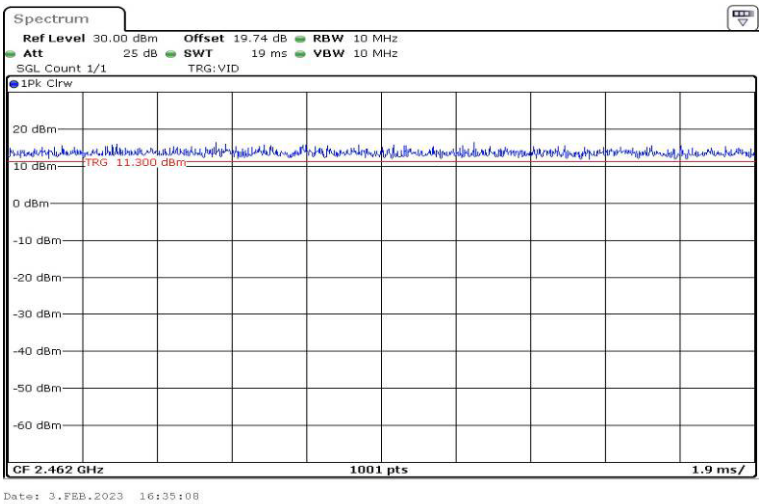
11N40SISO_Ant1_2422



11N40SISO_Ant1_2442



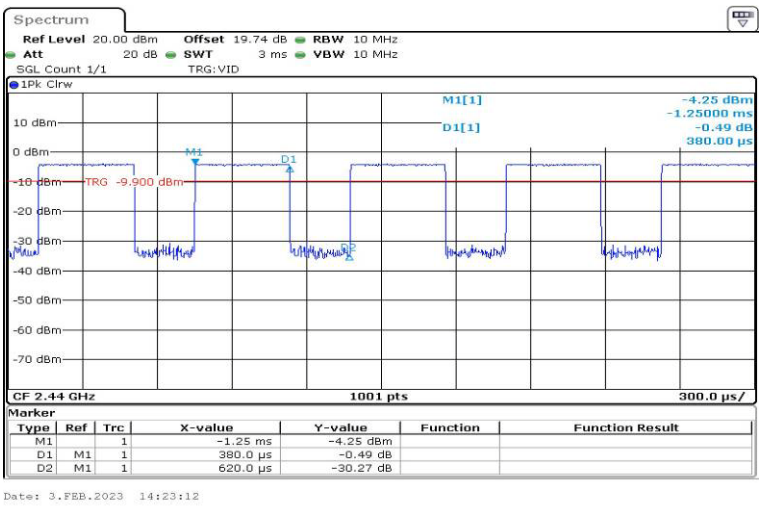
11N40SISO_Ant1_2462



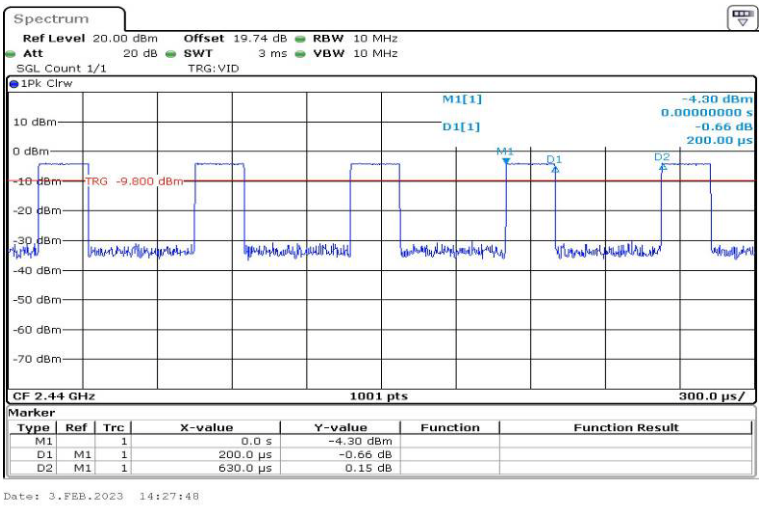
Test Mode	Duty Cycle [%]
BLE_1M	61.29
BLE_2M	31.75

Test Graphs

BLE_1M_Ant1_2440



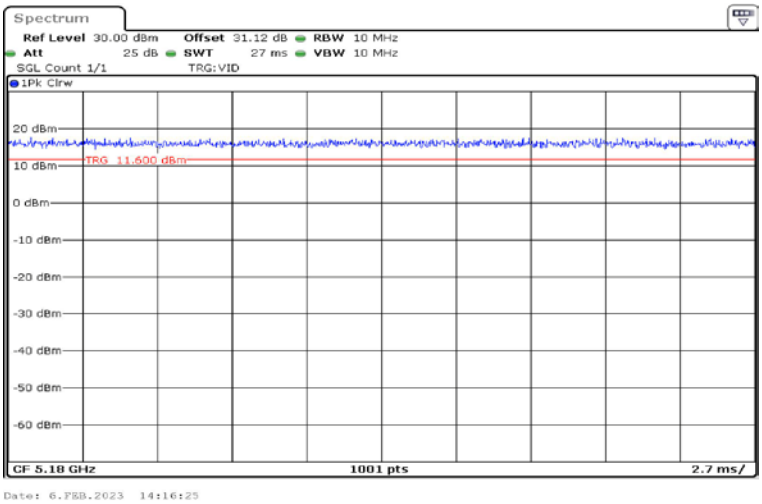
BLE_2M_Ant1_2440



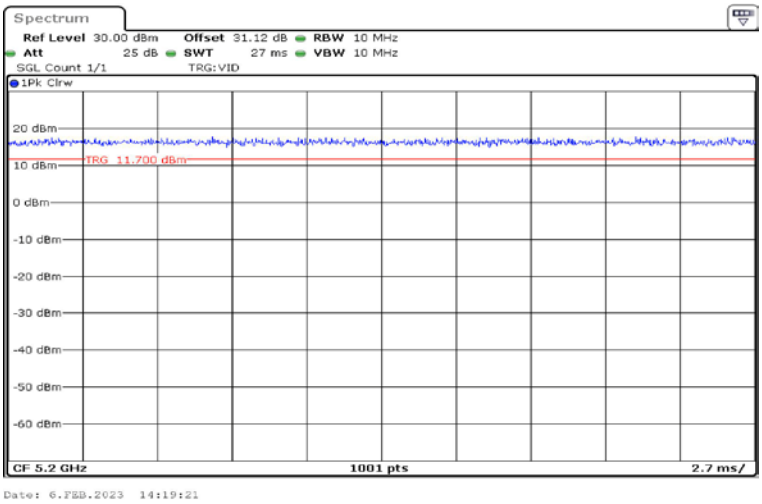
Test Mode	Duty Cycle [%]
11A	100.00
	100.00
11N20SISO	100.00
	100.00
11N40SISO	100.00
	100.00
11AC20SISO	100.00
	100.00
11AC40SISO	100.00
	100.00
11AC80SISO	100.00
	100.00

Test Graphs

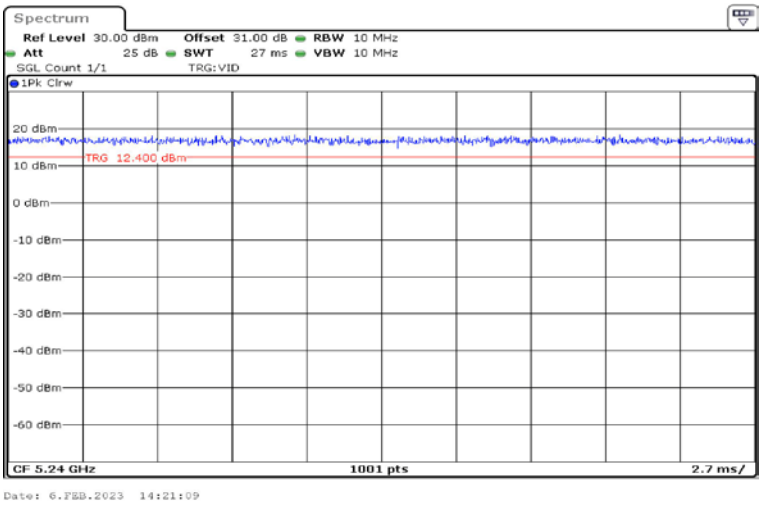
11A_Ant1_5180



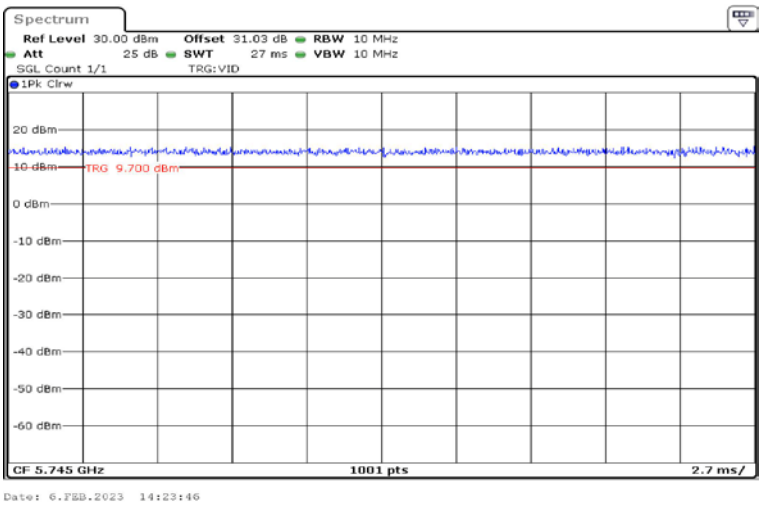
11A_Ant1_5200



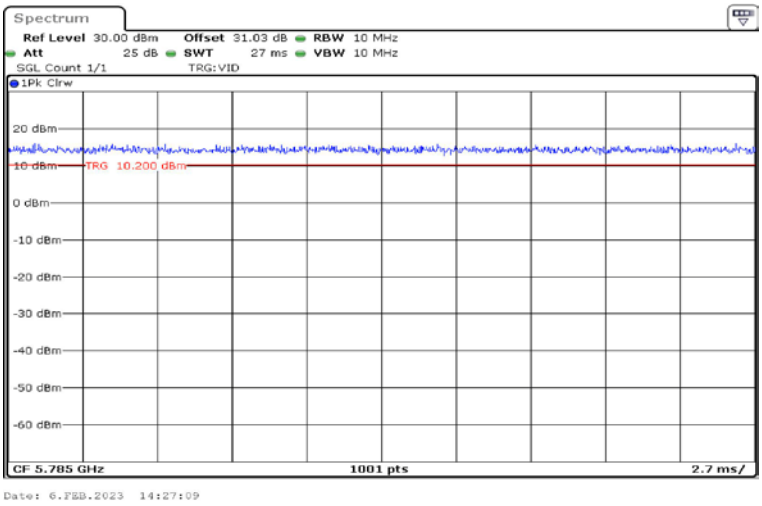
11A_Ant1_5240


Spectrum
Ref Level 30.00 dBm Offset 31.00 dB RBW 10 MHz
Att 25 dB SWT 27 ms VBW 10 MHz
SGL Count 1/1 TRG:VID
1Pk Clrw
20 dBm
TRG 12.400 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 5.24 GHz
1001 pts
2.7 ms/
Date: 6.FEB.2023 14:21:09

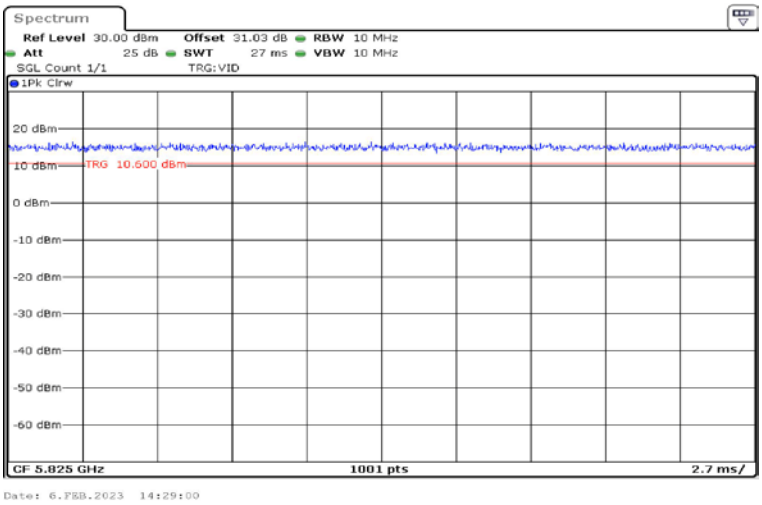
11A_Ant1_5745



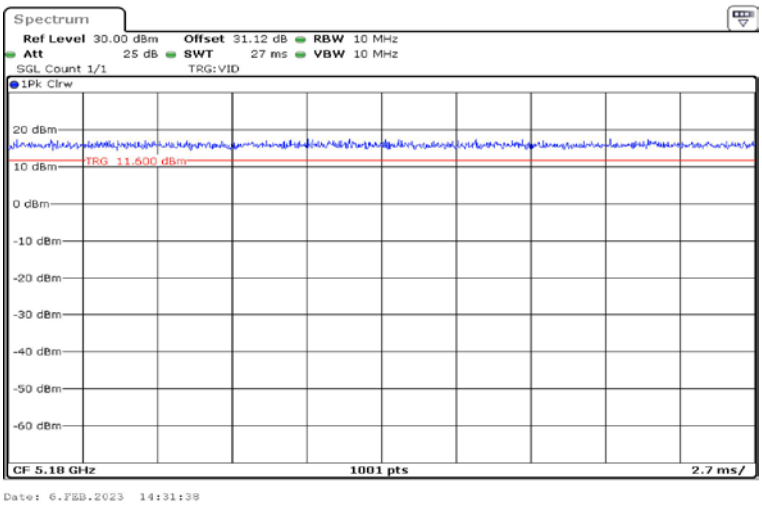
11A_Ant1_5785



11A_Ant1_5825



11N20SISO_Ant1_5180



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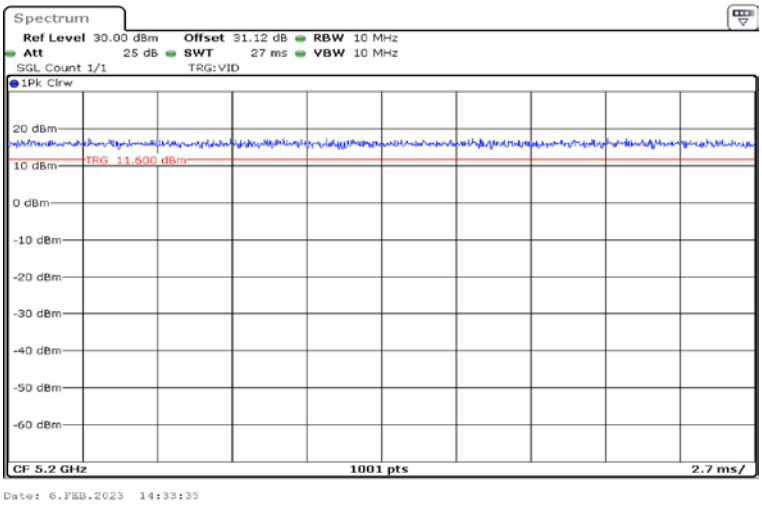
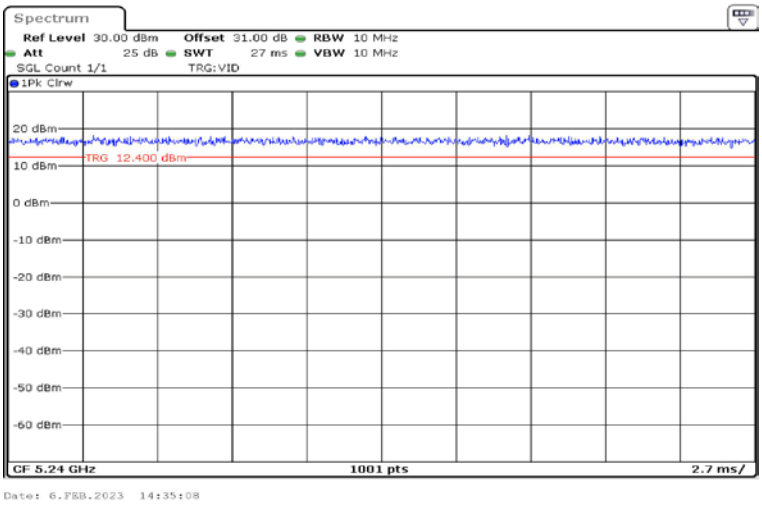


11N20SISO_Ant1_5240



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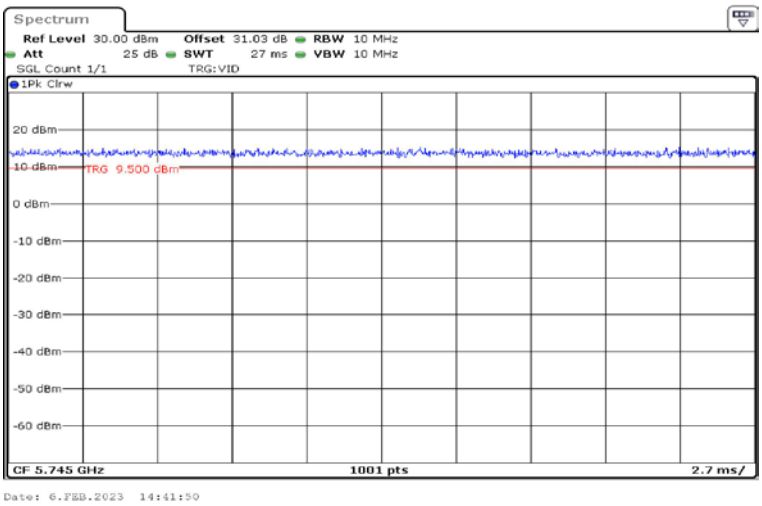

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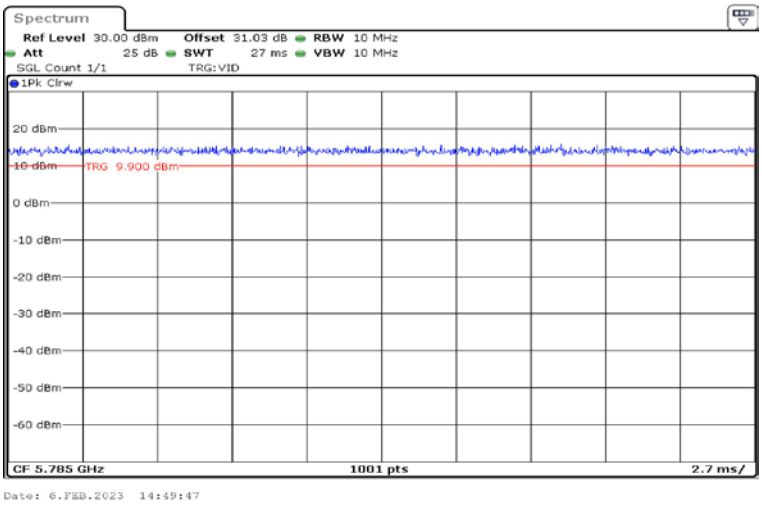

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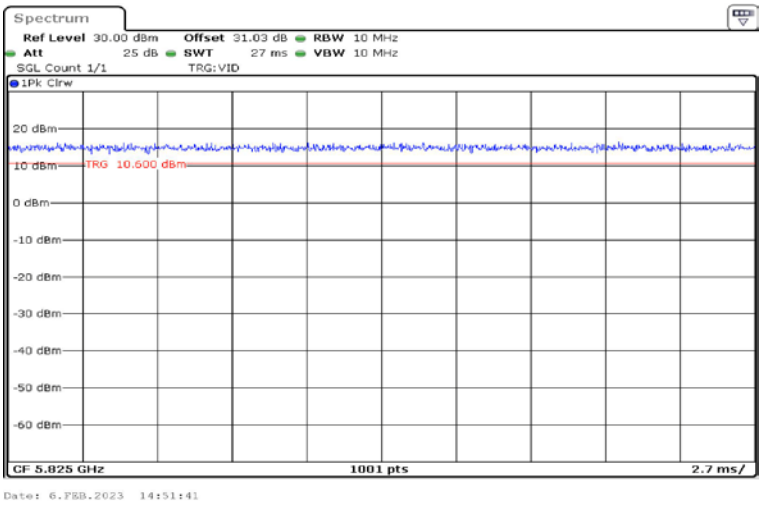
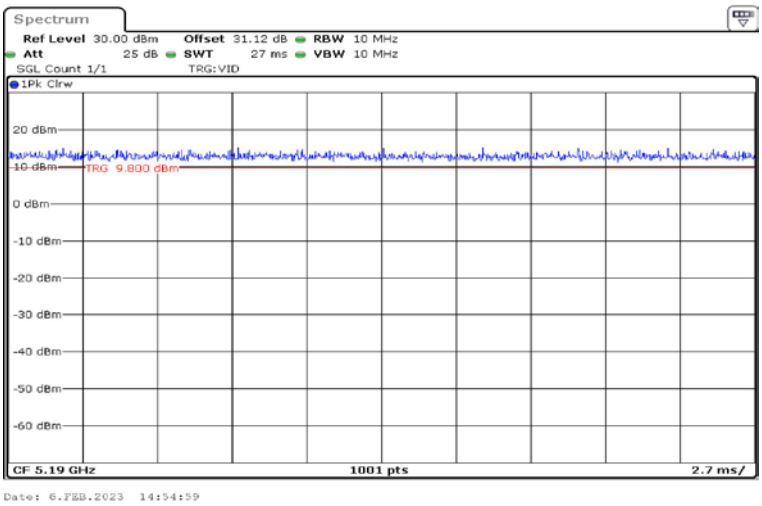


11N40SISO_Ant1_5190



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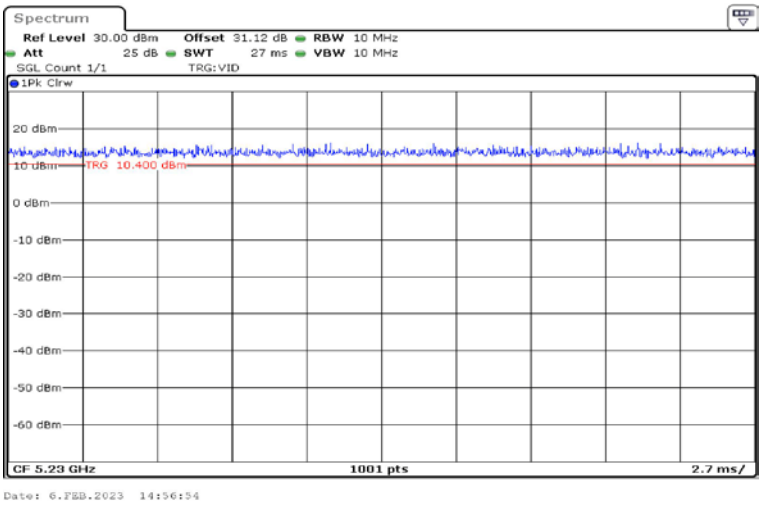

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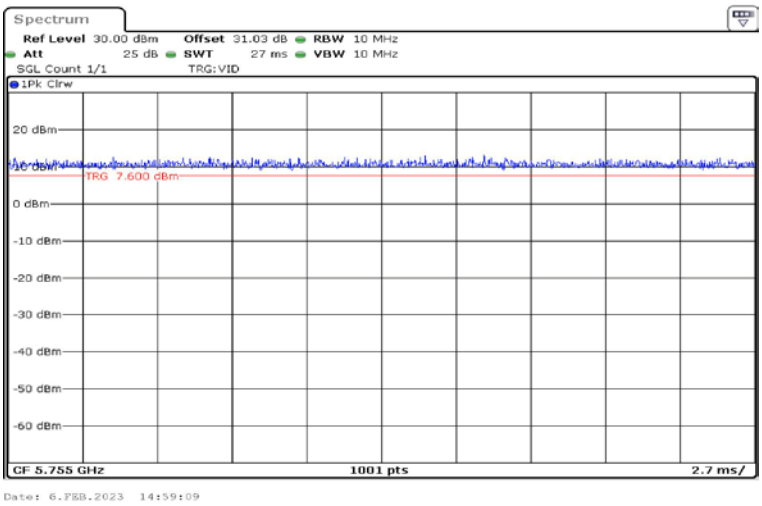

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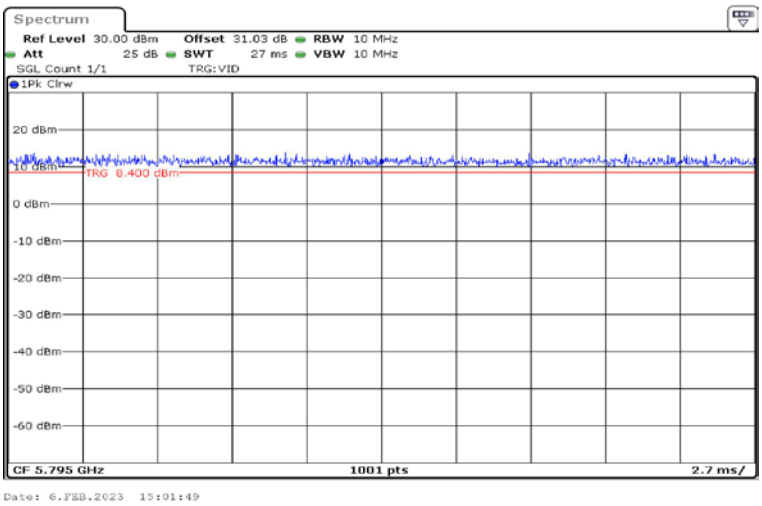
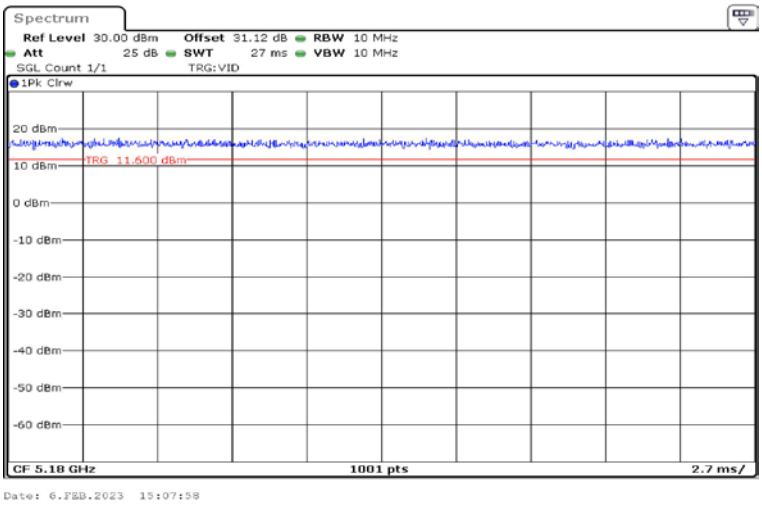


11AC20SISO_Ant1_5180



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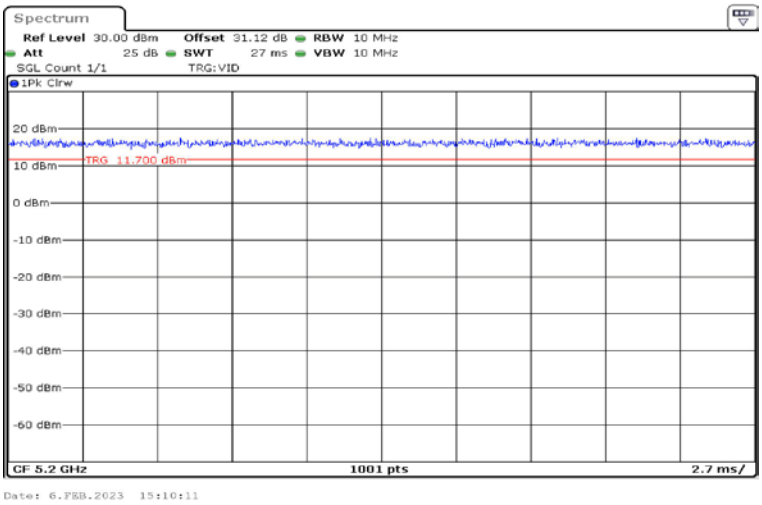

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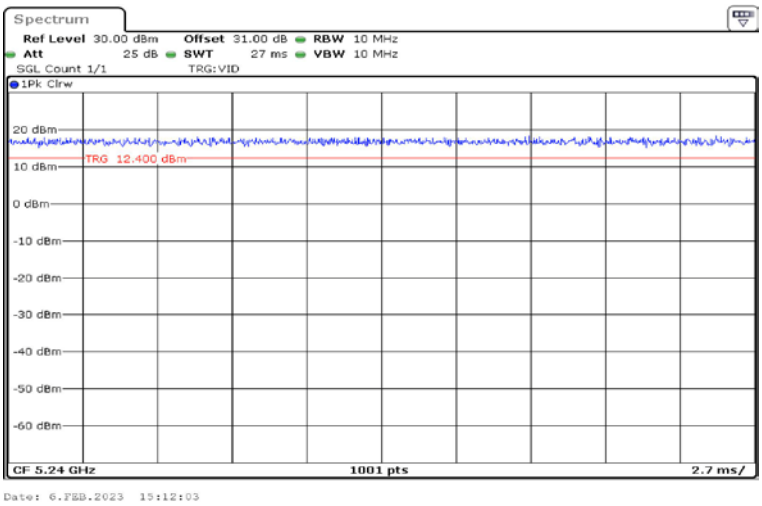

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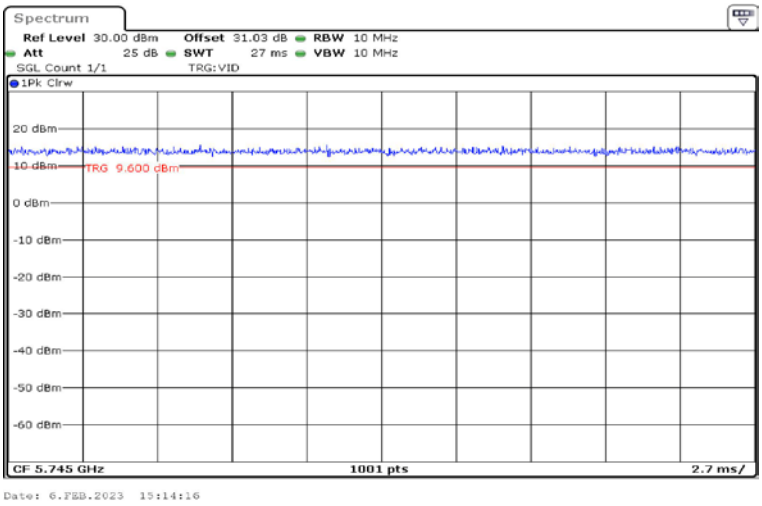

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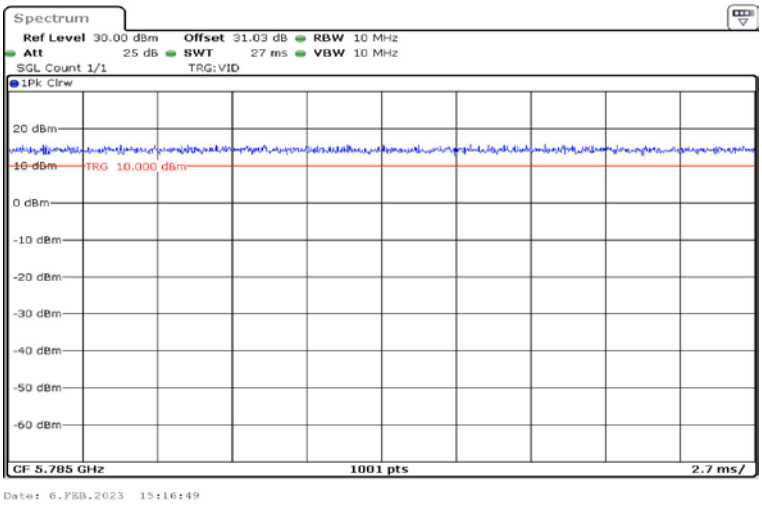

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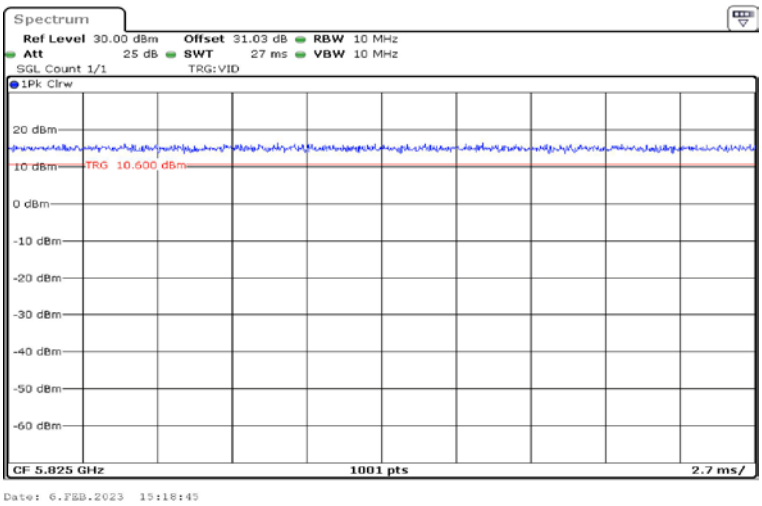

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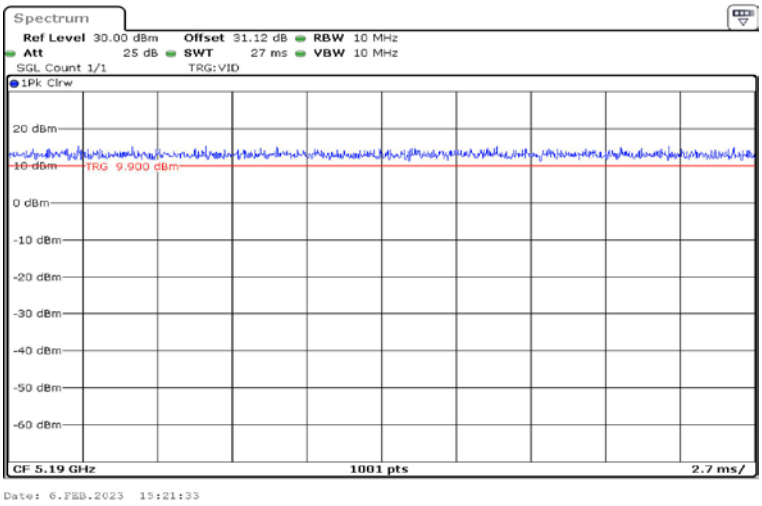

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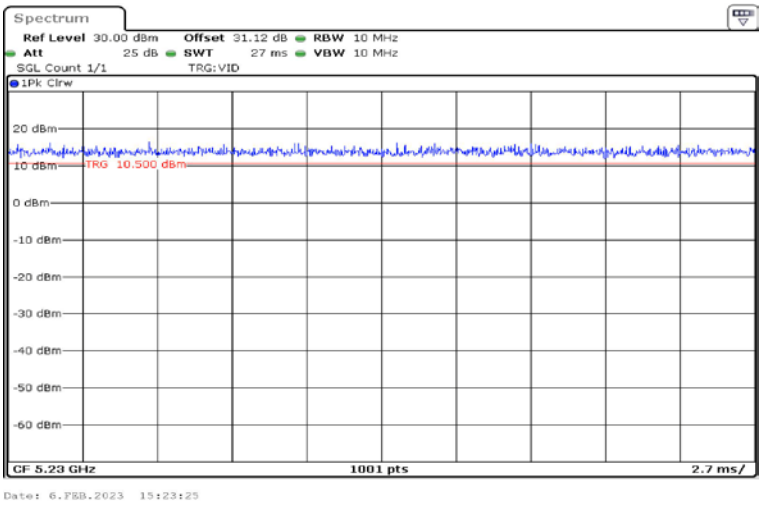

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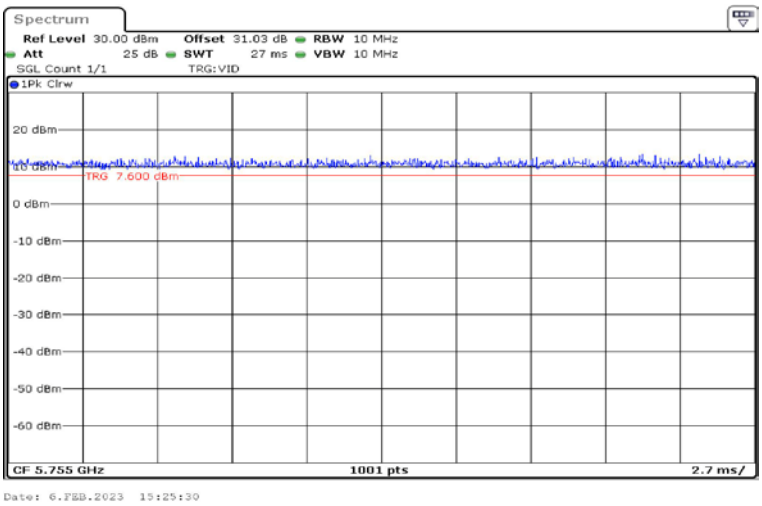

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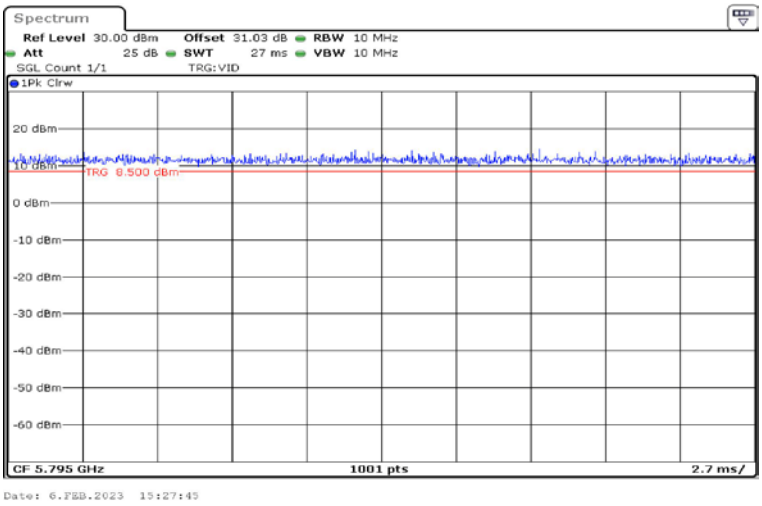
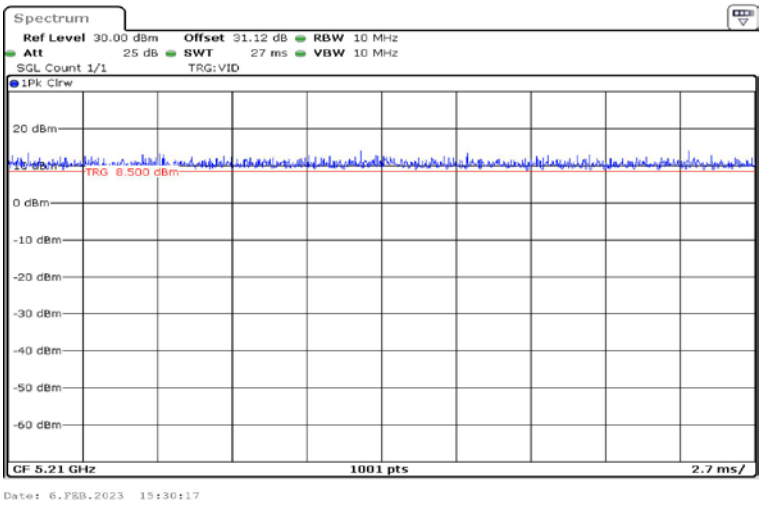
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