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PART 27 MEASUREMENT REPORT

Applicant Name:
Samsung Electronics Co., Ltd.
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Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

Date of Testing:
9/9/2022 - 2/6/2023
Test Report Issue Date:
2/24/2023
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2212080136-04-R1.A3L

FCC ID:	**A3LSMS911JPN**
Applicant Name:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model(s):	SC-51D, SCG19
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part:	27
Test Procedure(s):	ANSI C63.26-2015, KDB 648474 D03 v01r04

Note: This revised Test Report (S/N: 1M2212080136-04-R1.A3L) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

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PART 27 MEASUREMENT REPORT

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 41(PC3)	20 MHz	QPSK	2506.0 - 2680.0	0.300	24.77	18M0G7D
		16QAM	2506.0 - 2680.0	0.247	23.93	18M0W7D
	15 MHz	QPSK	2503.5 - 2682.5	0.298	24.74	13M5G7D
		16QAM	2503.5 - 2682.5	0.248	23.95	13M5W7D
	10 MHz	QPSK	2501.0 - 2685.0	0.338	25.29	9M04G7D
		16QAM	2501.0 - 2685.0	0.290	24.62	9M05W7D
	5 MHz	QPSK	2498.5 - 2687.5	0.322	25.08	4M53G7D
		16QAM	2498.5 - 2687.5	0.261	24.17	4M54W7D
NR Band n41(PC3)	100 MHz	π/2 BPSK	2546.0 - 2640.0	0.341	25.33	97M2G7D
		QPSK	2546.0 - 2640.0	0.334	25.23	98M0G7D
		16QAM	2546.0 - 2640.0	0.261	24.16	98M0W7D
	90 MHz	π/2 BPSK	2541.0 - 2645.0	0.347	25.40	87M5G7D
		QPSK	2541.0 - 2645.0	0.337	25.27	87M8G7D
		16QAM	2541.0 - 2645.0	0.267	24.26	88M1W7D
	80 MHz	π/2 BPSK	2536.0 - 2650.0	0.346	25.39	77M5G7D
		QPSK	2536.0 - 2650.0	0.336	25.26	78M0G7D
		16QAM	2536.0 - 2650.0	0.266	24.24	77M8W7D
	70 MHz	π/2 BPSK	2531.0 - 2655.0	0.341	25.33	64M6G7D
		QPSK	2531.0 - 2655.0	0.332	25.21	67M8G7D
		16QAM	2531.0 - 2655.0	0.256	24.08	67M8W7D
	60 MHz	π/2 BPSK	2526.0 - 2660.0	0.353	25.48	58M2G7D
		QPSK	2526.0 - 2660.0	0.341	25.32	58M2G7D
		16QAM	2526.0 - 2660.0	0.269	24.30	58M2W7D
	50 MHz	π/2 BPSK	2521.0 - 2665.0	0.351	25.45	46M0G7D
		QPSK	2521.0 - 2665.0	0.346	25.39	47M8G7D
		16QAM	2521.0 - 2665.0	0.270	24.32	47M8W7D
	40 MHz	π/2 BPSK	2516.0 - 2670.0	0.359	25.55	35M9G7D
		QPSK	2516.0 - 2670.0	0.346	25.39	38M1G7D
		16QAM	2516.0 - 2670.0	0.275	24.39	38M0W7D
	30 MHz	π/2 BPSK	2511.0 - 2675.0	0.354	25.49	27M0G7D
		QPSK	2511.0 - 2675.0	0.343	25.35	28M0G7D
		16QAM	2511.0 - 2675.0	0.269	24.30	28M0W7D
	20 MHz	π/2 BPSK	2506.0 - 2680.0	0.351	25.45	18M0G7D
		QPSK	2506.0 - 2680.0	0.338	25.29	18M3G7D
		16QAM	2506.0 - 2680.0	0.275	24.39	18M3W7D
	15 MHz	π/2 BPSK	2503.5 - 2682.5	0.359	25.55	13M0G7D
		QPSK	2503.5 - 2682.5	0.348	25.41	13M7G7D
		16QAM	2503.5 - 2682.5	0.276	24.40	13M7W7D
	10 MHz	π/2 BPSK	2501.0 - 2685.0	0.336	25.26	8M69G7D
		QPSK	2501.0 - 2685.0	0.330	25.19	8M66G7D
		16QAM	2501.0 - 2685.0	0.257	24.09	8M69W7D

EUT Overview (LTE Band)

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 Element Test Location

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.

- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS911JPN**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 27.

Test Device Serial No.: 1066M, 1050M, 0227M, 0179M, 0275M, 0136M, 0227M, 0274M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-N5100 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 Software and Firmware

Testing was performed on device(s) using software/firmware version S911USQU0AVJM installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the "American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services" (ANSI C63.26-2015) were used in the measurement of the EUT**.**

Deviation from Measurement Procedure……..None

3.2 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated power measurements, substitution method is used per the guidance of ANSI C63.26-2015. For emissions below 1GHz, a half-wave dipole is substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_{d\ [dBm]} = P_{g\ [dBm]} - \text{cable loss}_{\ [dB]} + \text{antenna gain}_{\ [dBd/dBi]};$$

where P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_{g\ [dBm]}$ – cable loss $_{[dB]}$.

For radiated spurious emissions measurements, the field strength conversion method is used per the formulas in Section 5.2.7 of ANSI C63.26-2015. Field Strength (EIRP) is calculated using the following formulas:

$$E_{[dB\mu V/m]} = \text{Measured amplitude level}_{[dBm]} + 107 + \text{Cable Loss}_{[dB]} + \text{Antenna Factor}_{[dB/m]}$$

And

$$EIRP_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8;$$ where D is the measurement distance in meters.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26-2015.

4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	AP1-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP1-002
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
-	LTx1	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx1
-	LTx2	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx2
-	LTx3	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx3
-	LTx4	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx4
-	LTx5	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx5
-	LTx6-40	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx6-40
Agilent	N9020A	MXA Signal Analyzer	4/26/2022	Annual	4/26/2023	MY56470202
Agilent	N9030A	PXA Signal Analyzer (44GHz)	8/18/2022	Annual	8/18/2023	MY49430494
Anritsu	MT8821C	Radio Communication Analyzer	5/24/2022	Annual	5/24/2023	6201144418
Anritsu	MT8821C	Radio Communication Analyzer	6/27/2022	Annual	6/27/2023	6261895213
Anritsu	MT8821C	Radio Communication Analyzer	5/11/2022	Annual	5/11/2023	6262044715
Anritsu	MT8821C	Radio Communication Analyzer	1/10/2023	Annual	1/10/2024	6201524637
Anritsu	MT8821C	Radio Communication Analyzer	11/28/2022	Annual	11/28/2023	6262150047
Com-Power	AL-130R	9kHz - 30MHz Loop Antenna	1/19/2022	Biennial	1/19/2024	121085
Emco	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
ESPEC	SU-241	Temperature Chamber	11/10/2022	Annual	11/10/2023	93011064
ETS-Lindgren	3816/2NM	Line Impedance Stabilization Network	8/11/2022	Biennial	8/11/2024	00114451
Keysight Technologies	N9038A	MXE EMI Receiver	1/21/2022	Annual	1/21/2023	US46470561
Pasternack	NMLC-2	Line Conducted Emissions Cable (NM)	1/11/2023	Annual	1/11/2024	NMLC-2
Rohde & Schwarz	CMW500	Radio Communication Analyzer	10/10/2022	Annual	10/10/2023	101072
Rohde & Schwarz	CMW500	Radio Communication Analyzer	4/12/2022	Annual	4/12/2023	100059
Rohde & Schwarz	CMW500	Radio Communication Analyzer	5/17/2022	Annual	5/17/2023	100854
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/29/2022	Annual	8/29/2023	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	8/25/2022	Annual	8/25/2023	100348
Sunol Sciences	DRH-118	Horn Antenna (1-18GHz)	1/14/2022	Biennial	1/14/2024	A042511
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	8/30/2022	Biennial	8/30/2024	A051107

Table 5-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

6.0 SAMPLE CALCULATIONS

QPSK Modulation

Emission Designator = 8M62G7D
LTE BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D
LTE BW = 8.45 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

The receive spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 3700.40 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm – (-24.80) = 50.3 dBc.

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMS911JPN

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

Mode(s): LTE/NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Transmitter Conducted Output Power*	2.1046(a), 2.1046(c)	N/A	PASS	Section 7.2
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions	2.1051, 27.53(m)(4)	Undesirable emissions must meet the limits detailed in 27.53(m)(4)	PASS	Sections 7.4, 7.5
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
RADIATED	Equivalent Isotropic Radiated Power	27.50(h)(2)	≤ 2 Watts max. EIRP	PASS	Section 7.6
	Radiated Spurious Emissions	2.1053, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 7.7

* The only transmitter output conducted powers included in this report are those where the Pmax value, per the tune-up document, is higher than any of the DSI power levels. For the remaining conducted power measurements, see the **RF Exposure Report**.

Table 7-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
4) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool v1.1.

7.2 Conducted Output Power Data

Test Overview

All emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 – Section 5.2

Test Settings

1. Detector = RMS
2. Trace mode = trace average for continuous emissions, max hold for pulse emissions
3. Sweep time = auto couple
4. The trace was allowed to stabilize
5. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. Uplink carrier aggregation is only supported in this EUT while operating in Power Class 3.

2. Conducted power measurements were evaluated using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.

3. All other conducted power measurements are contained in the RF exposure report for this filing.

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	39750	2506.0	1 / 0	24.36
		40620	2593.0	1 / 50	24.26
		41490	2680.0	1 / 50	24.28
	16-QAM	41490	2680.0	1 / 50	23.18
15 MHz	QPSK	39725	2503.5	1 / 0	24.42
		40620	2593.0	1 / 37	24.43
		41515	2682.5	1 / 37	24.21
	16-QAM	41515	2682.5	1 / 37	23.20
10 MHz	QPSK	39700	2501.0	1 / 49	24.98
		40620	2593.0	1 / 49	24.98
		41540	2685.0	1 / 49	24.62
	16-QAM	40620	2593.0	1 / 49	24.08
5 MHz	QPSK	39675	2498.5	1 / 12	24.73
		40620	2593.0	1 / 0	24.50
		41565	2687.5	1 / 12	24.59
	16-QAM	39675	2498.5	1 / 12	24.14

Table 7-2. Conducted Power Data (LTE Band 41 (PC3))

Power State	Band	Bandwidth (PCC + SCC)	PCC					SCC					ULCA Tx. Power [dBm]
			Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	
Max	LTE B41 (PC3)	20MHz + 20MHz	QPSK	39750	2506.0	1	99	QPSK	39948	2525.8	1	0	24.26
				40620	2593.0	1	99		40818	2612.8	1	0	24.08
				41490	2680.0	1	0		41292	2660.2	1	99	23.78
			QPSK	39750	2506.0	100	0	QPSK	39948	2525.8	100	0	22.12
			16-QAM	39750	2506.0	100	0	16-QAM	39948	2525.8	100	0	21.10
			64-QAM	39750	2506.0	100	0	64-QAM	39948	2525.8	100	0	20.98
			256-QAM	39750	2506.0	100	0	256-QAM	39948	2525.8	100	0	19.08

Table 7-3. Conducted Power Data (ULCA LTE B41(PC3))

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.01	1 / 136	23.98
		518598	2592.99	1 / 68	24.12
		528000	2640.00	1 / 68	23.89
	QPSK	509202	2546.01	1 / 136	23.99
		518598	2592.99	1 / 68	24.14
		528000	2640.00	1 / 68	23.90
	16-QAM	528000	2640.00	1 / 68	22.71
90 MHz	π/2 BPSK	508200	2541.00	1 / 183	24.16
		518598	2592.99	1 / 61	24.15
		528996	2644.98	1 / 183	23.96
	QPSK	508200	2541.00	1 / 183	24.16
		518598	2592.99	1 / 61	24.12
		528996	2644.98	1 / 183	23.94
	16-QAM	528996	2644.98	1 / 183	22.81
80 MHz	π/2 BPSK	507204	2536.02	1 / 162	24.07
		518598	2592.99	1 / 54	24.19
		529998	2649.99	1 / 162	23.95
	QPSK	507204	2536.02	1 / 162	24.14
		518598	2592.99	1 / 54	24.13
		529998	2649.99	1 / 162	23.93
	16-QAM	529998	2649.99	1 / 162	22.79
70 MHz	π/2 BPSK	506202	2531.01	1 / 141	24.14
		518598	2592.99	1 / 47	24.13
		531000	2655.00	1 / 47	23.89
	QPSK	506202	2531.01	1 / 141	24.08
		518598	2592.99	1 / 47	24.15
		531000	2655.00	1 / 47	23.88
	16-QAM	531000	2655.00	1 / 47	22.63
60 MHz	π/2 BPSK	505200	2526.00	1 / 121	24.15
		518598	2592.99	1 / 40	24.25
		531996	2659.98	1 / 121	24.04
	QPSK	505200	2526.00	1 / 121	24.11
		518598	2592.99	1 / 40	24.25
		531996	2659.98	1 / 121	23.99
	16-QAM	505200	2526.00	1 / 121	22.87
		518598	2592.99	1 / 40	23.14
		531996	2659.98	1 / 121	22.85
50 MHz	π/2 BPSK	504204	2521.02	1 / 99	24.14
		518598	2592.99	1 / 33	24.27
		532998	2664.99	1 / 99	24.01
	QPSK	504204	2521.02	1 / 99	24.12
		518598	2592.99	1 / 33	24.27
		532998	2664.99	1 / 99	24.06
	16-QAM	532998	2664.99	1 / 99	22.87

Table 7-4. Conducted Power Data (NR Band n41 (PC3))

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
40 MHz	π/2 BPSK	503202	2516.01	1 / 79	24.15
		518598	2592.99	1 / 79	24.26
		534000	2670.00	1 / 79	24.11
	QPSK	503202	2516.01	1 / 79	24.19
		518598	2592.99	1 / 79	24.31
		534000	2670.00	1 / 79	24.06
	16-QAM	534000	2670.00	1 / 79	22.94
30 MHz	π/2 BPSK	502200	2511.00	1 / 58	24.03
		518598	2592.99	1 / 58	24.20
		534996	2674.98	1 / 58	24.05
	QPSK	502200	2511.00	1 / 58	24.02
		518598	2592.99	1 / 58	24.26
		534996	2674.98	1 / 58	24.02
	16-QAM	534996	2674.98	1 / 58	22.85
20 MHz	π/2 BPSK	501204	2506.02	1 / 37	23.87
		518598	2592.99	1 / 13	24.18
		535998	2679.99	1 / 37	24.01
	QPSK	501204	2506.02	1 / 37	23.85
		518598	2592.99	1 / 13	24.17
		535998	2679.99	1 / 37	23.96
	16-QAM	535998	2679.99	1 / 37	22.94
15 MHz	π/2 BPSK	500700	2503.50	1 / 28	23.78
		518598	2592.99	1 / 28	24.23
		536496	2682.48	1 / 9	24.11
	QPSK	500700	2503.50	1 / 28	23.74
		518598	2592.99	1 / 28	24.18
		536496	2682.48	1 / 9	24.08
	16-QAM	536496	2682.48	1 / 9	22.95
10 MHz	π/2 BPSK	500200	2501.00	1 / 17	23.88
		518598	2592.99	1 / 17	24.10
		537000	2685.00	1 / 17	23.82
	QPSK	500200	2501.00	1 / 17	23.89
		518598	2592.99	1 / 17	24.12
		537000	2685.00	1 / 17	23.86
	16-QAM	537000	2685.00	1 / 17	22.64

Table 7-5. Conducted Power Data (NR Band n41 (PC3))

NR (SCS 30kHz)						LTE						NR Conducted Power [dBm]	LTE Conducted Power [dBm]	EN-DC Total Tx. Power [dBm]
NR Band	NR Bandwidth [MHz]	NR Channel	NR Frequency [MHz]	Mod.	NR RB#/Offset	LTE Band	LTE Bandwidth [MHz]	LTE Channel	LTE Frequency [MHz]	Mod.	LTE RB#/Offset			
n41	100	Mid	2593	QPSK	270/0	B66	20	Mid	1745	QPSK	100/0	19.47	22.35	24.15
				QPSK	270/0					QPSK	1/50	18.52	23.00	24.32
				QPSK	1/136					QPSK	100/0	19.34	22.36	24.12
				QPSK	1/136					QPSK	1/50	18.38	22.36	23.82
				16Q	270/0					16Q	1/50	19.49	22.62	24.34

Table 7-6. Conducted Power Data (EN-DC Combo n41 – B66)

7.3 Occupied Bandwidth

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 – Section 5.4.4

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

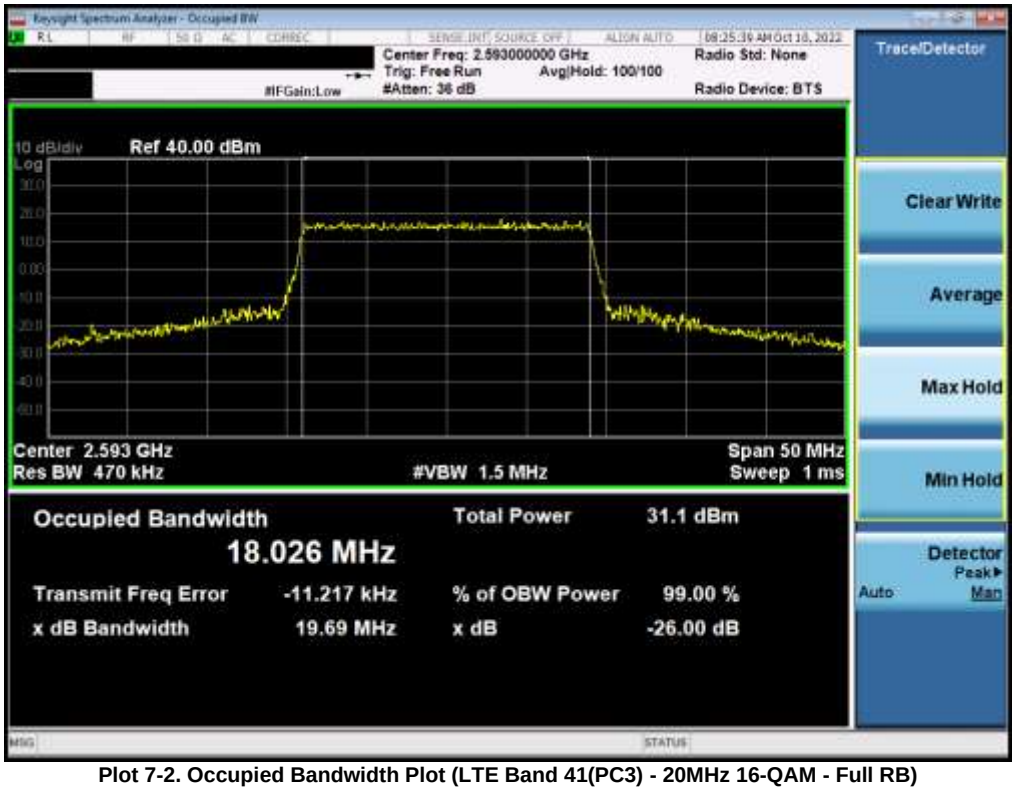
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

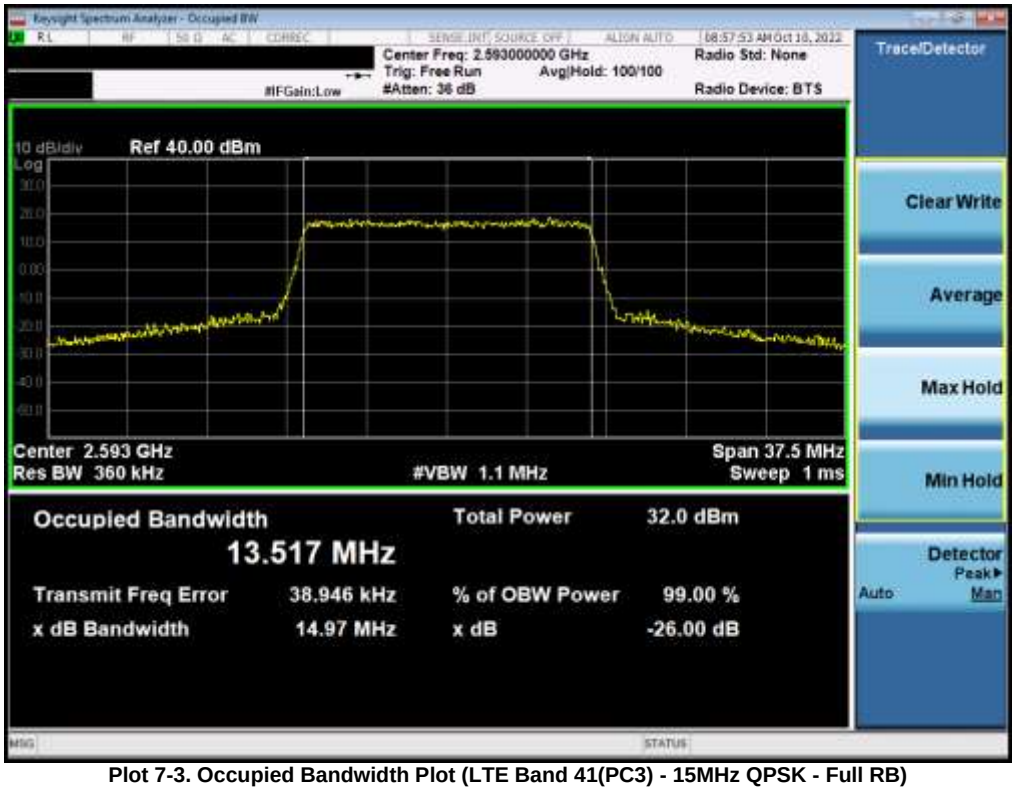
None.

LTE Band 41(PC3)

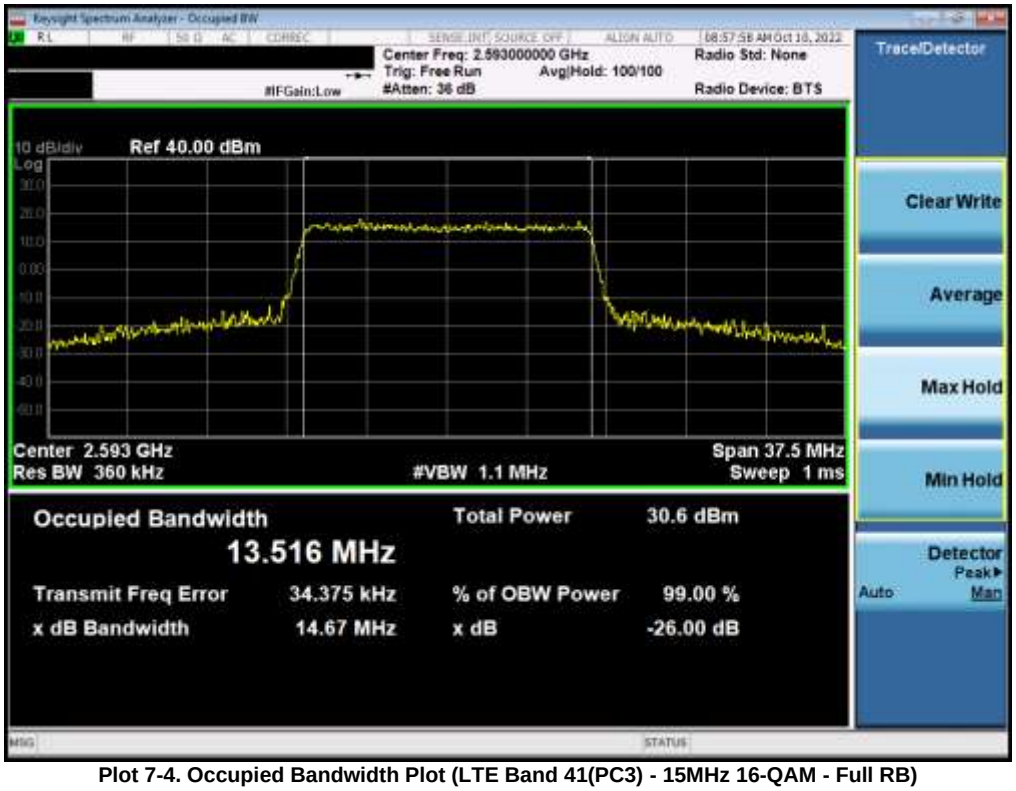
Plot 7-1. Occupied Bandwidth Plot (LTE Band 41(PC3) - 20MHz QPSK - Full RB)



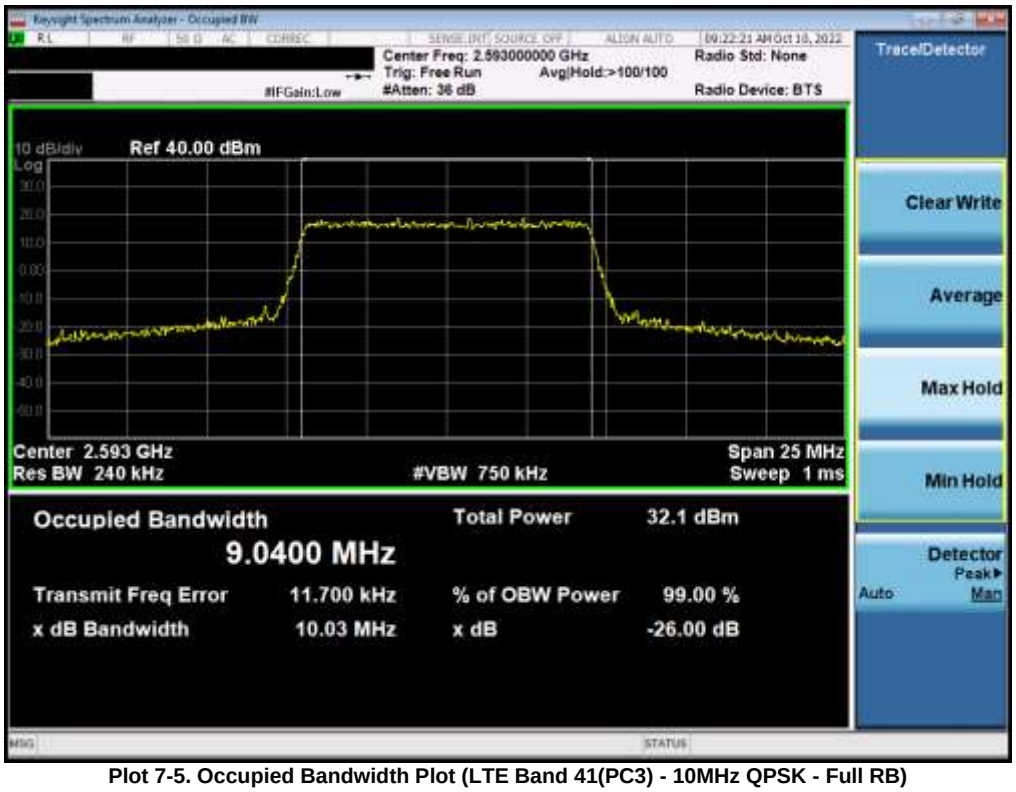
Plot 7-2. Occupied Bandwidth Plot (LTE Band 41(PC3) - 20MHz 16-QAM - Full RB)



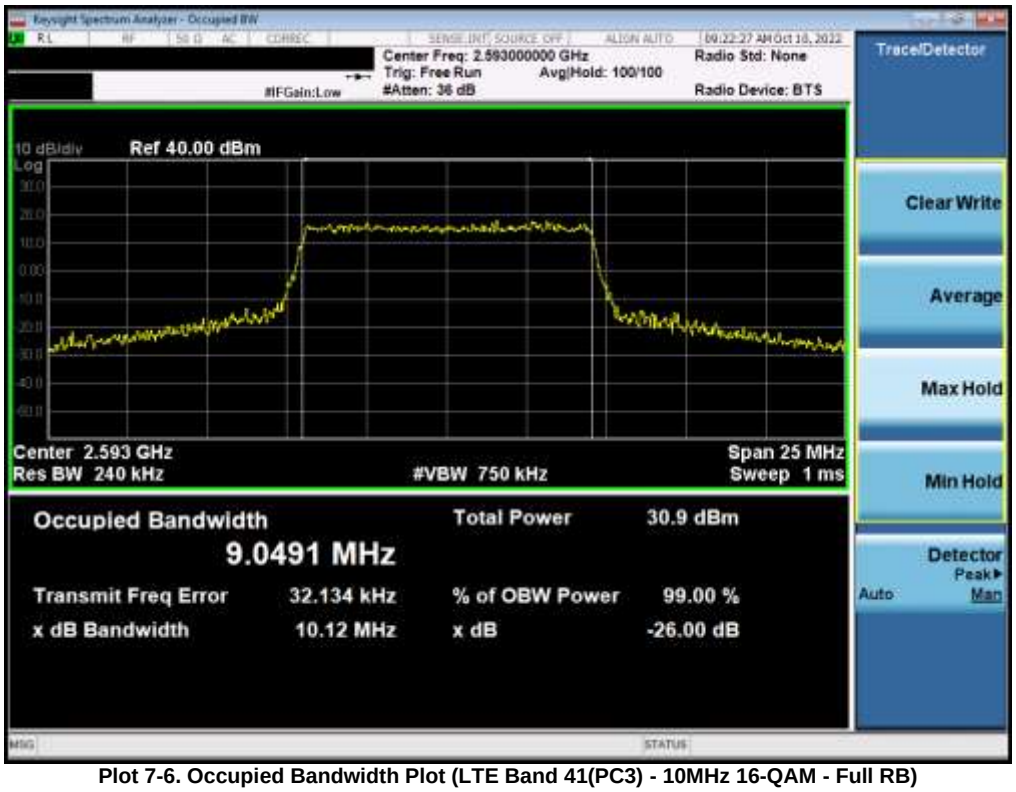
Plot 7-3. Occupied Bandwidth Plot (LTE Band 41(PC3) - 15MHz QPSK - Full RB)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 41(PC3) - 15MHz 16-QAM - Full RB)

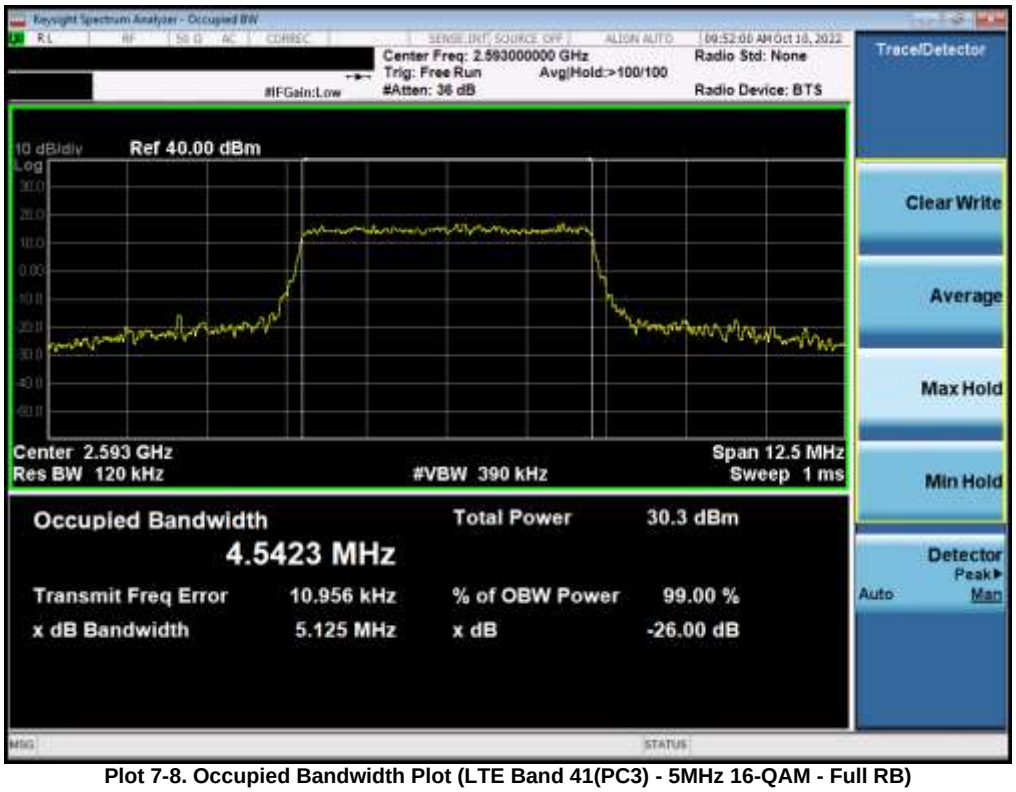


Plot 7-5. Occupied Bandwidth Plot (LTE Band 41(PC3) - 10MHz QPSK - Full RB)



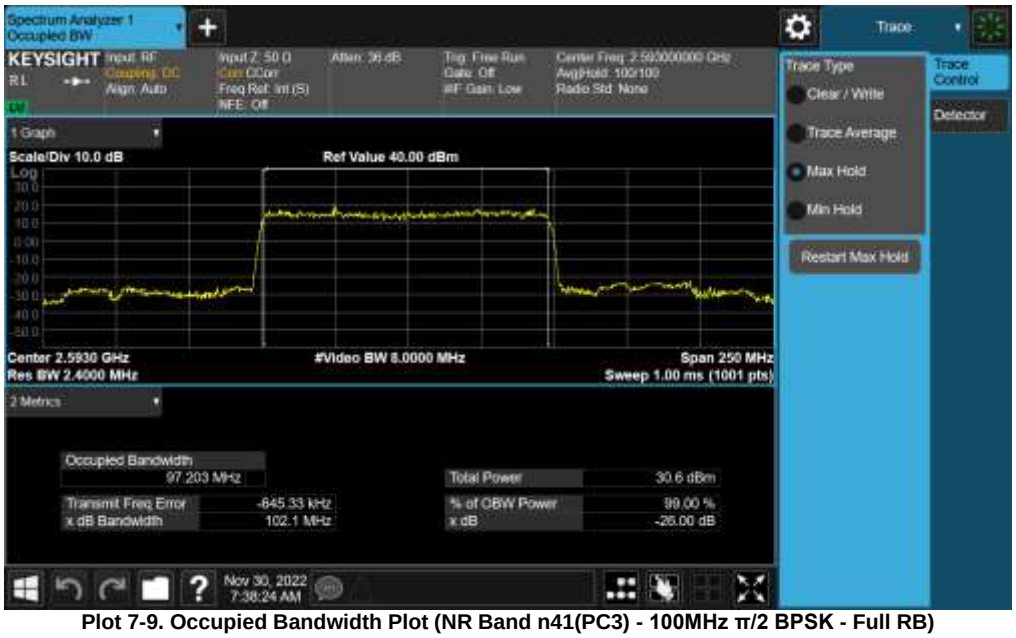
Plot 7-6. Occupied Bandwidth Plot (LTE Band 41(PC3) - 10MHz 16-QAM - Full RB)

Plot 7-7. Occupied Bandwidth Plot (LTE Band 41(PC3) - 5MHz QPSK - Full RB)

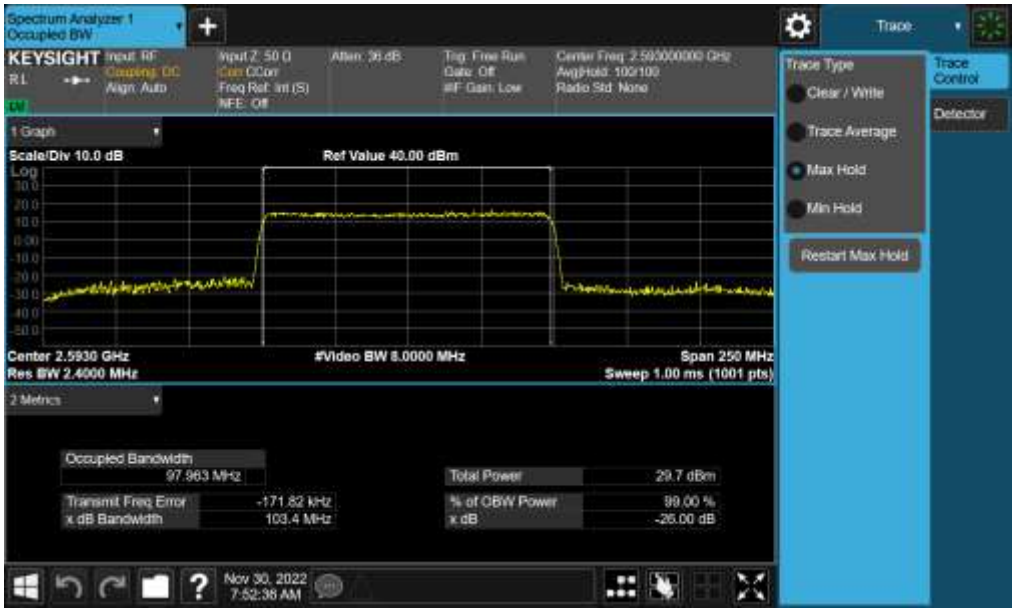


Plot 7-8. Occupied Bandwidth Plot (LTE Band 41(PC3) - 5MHz 16-QAM - Full RB)

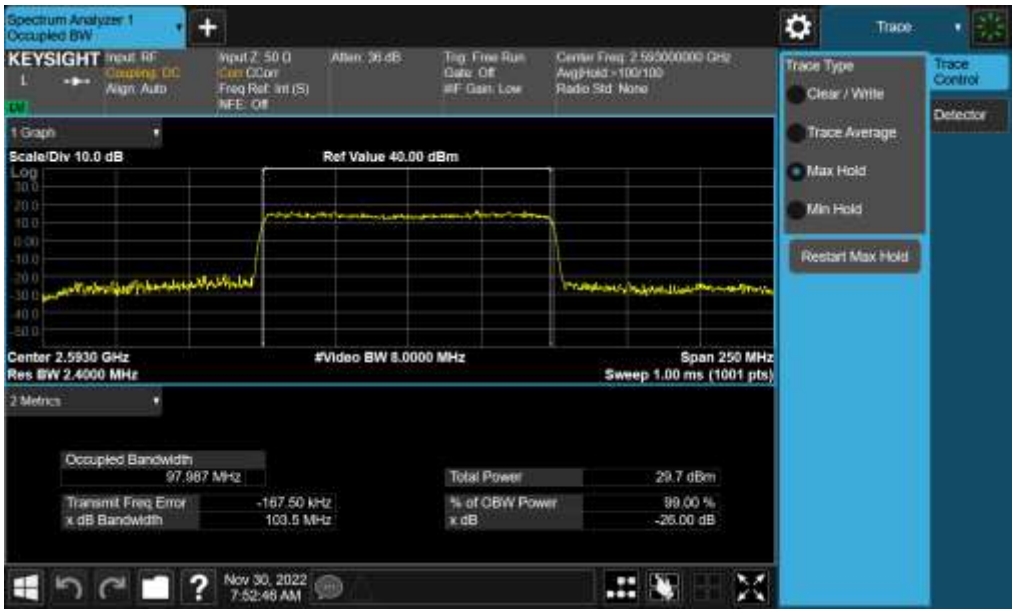
NR Band n41(PC3)



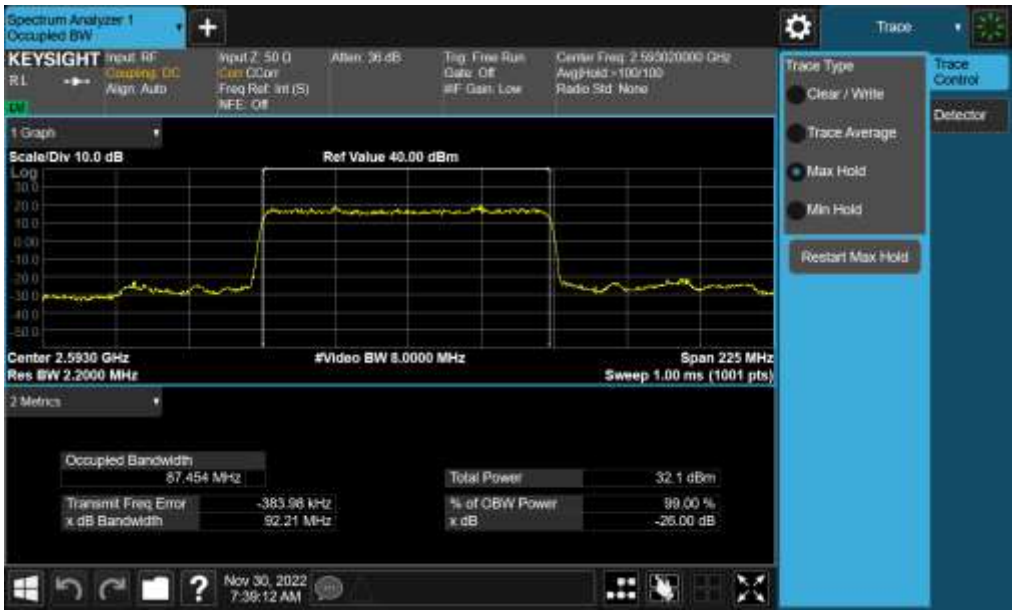
Plot 7-9. Occupied Bandwidth Plot (NR Band n41(PC3) - 100MHz π/2 BPSK - Full RB)



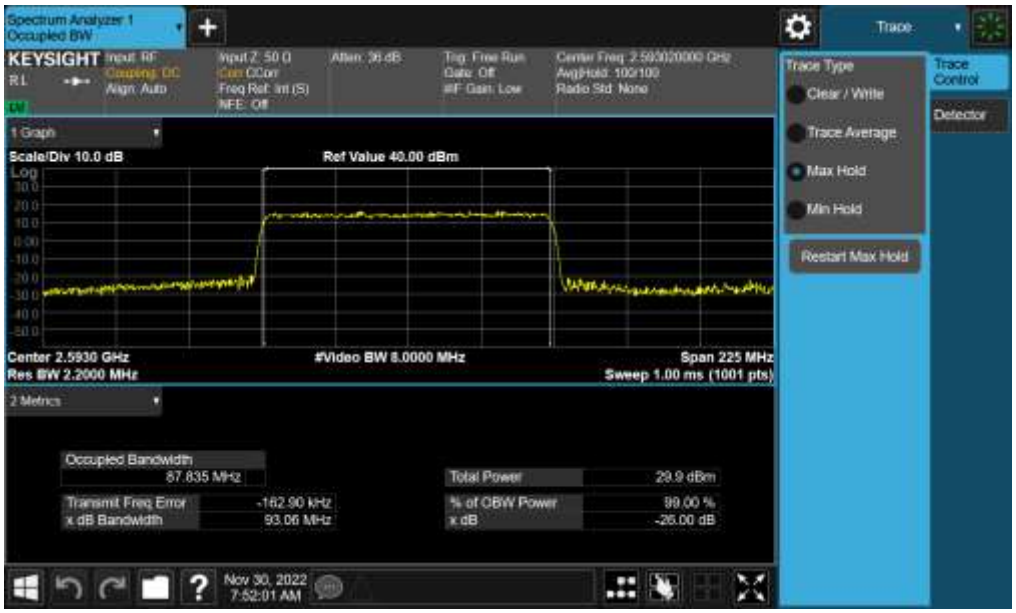
Plot 7-10. Occupied Bandwidth Plot (NR Band n41(PC3) - 100MHz QPSK - Full RB)



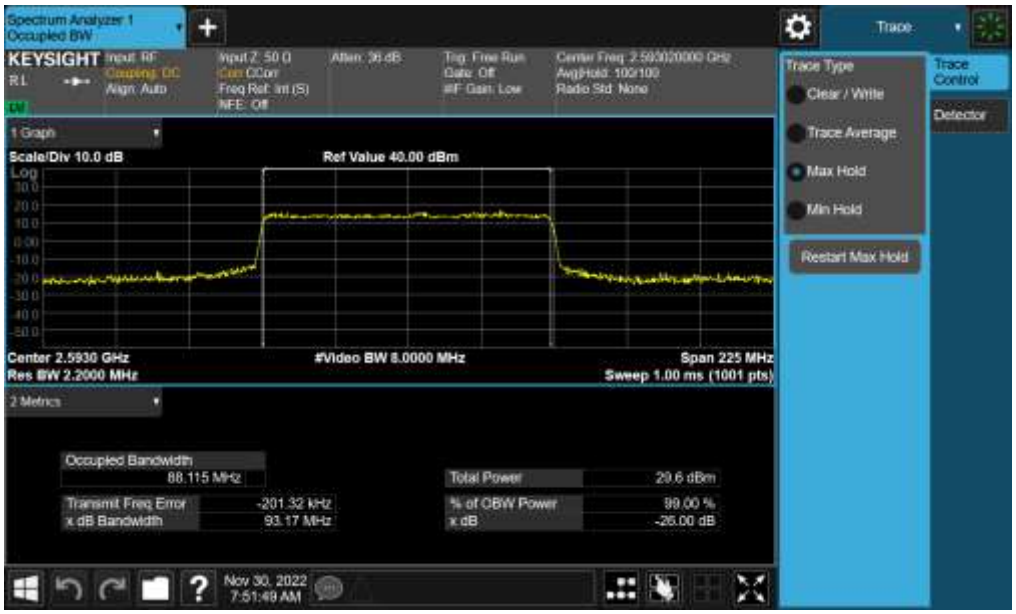
Plot 7-11. Occupied Bandwidth Plot (NR Band n41(PC3) - 100MHz 16-QAM - Full RB)



Plot 7-12. Occupied Bandwidth Plot (NR Band n41(PC3) - 90MHz π/2 BPSK - Full RB)

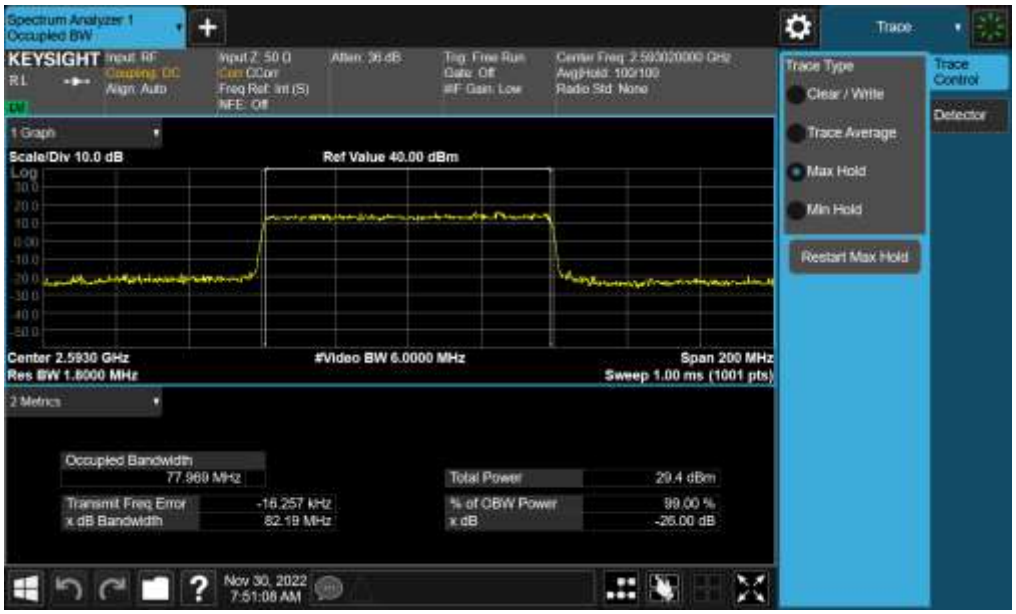


Plot 7-13. Occupied Bandwidth Plot (NR Band n41(PC3) - 90MHz QPSK - Full RB)

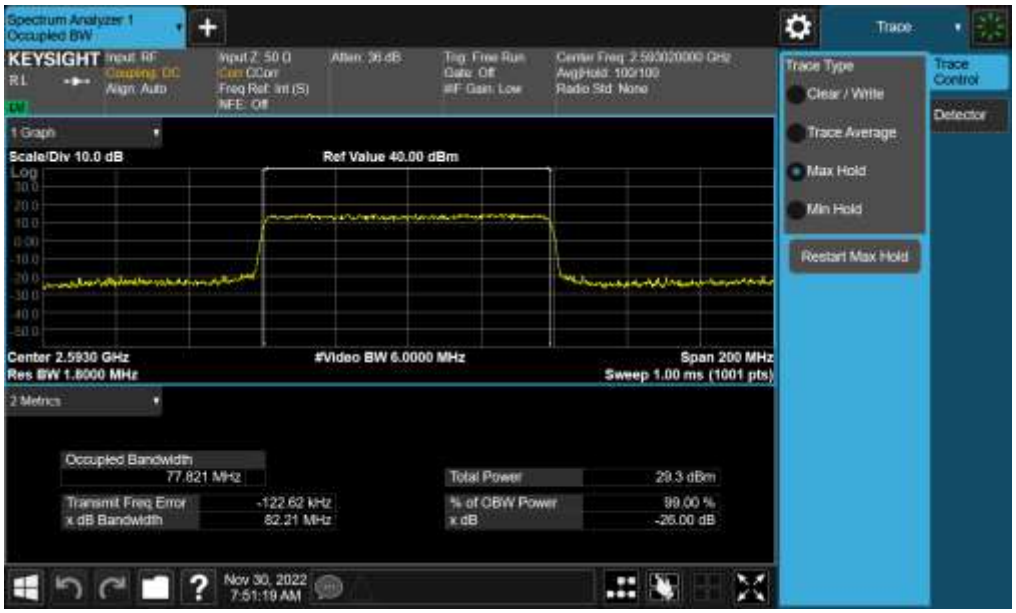


Plot 7-14. Occupied Bandwidth Plot (NR Band n41(PC3) - 90MHz 16-QAM - Full RB)

Plot 7-15. Occupied Bandwidth Plot (NR Band n41(PC3) - 80MHz π/2 BPSK - Full RB)



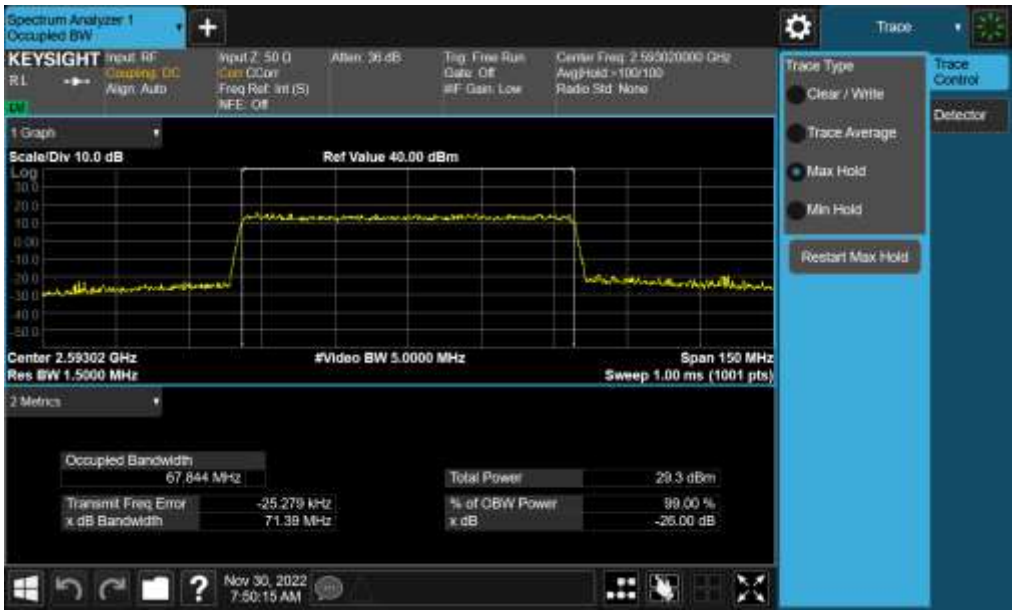
Plot 7-16. Occupied Bandwidth Plot (NR Band n41(PC3) - 80MHz QPSK - Full RB)



Plot 7-17. Occupied Bandwidth Plot (NR Band n41(PC3) - 80MHz 16-QAM - Full RB)

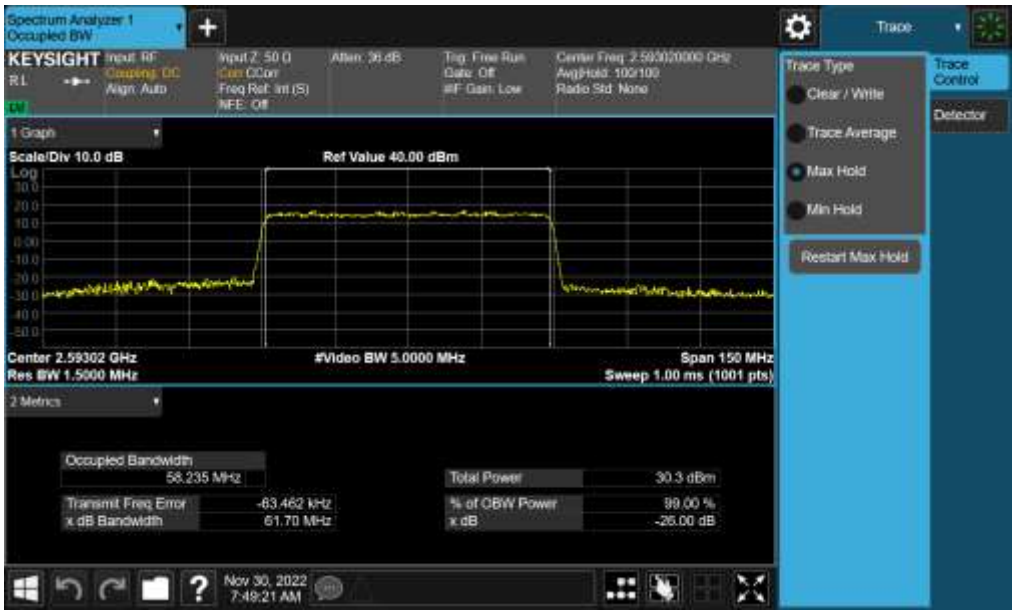
Plot 7-18. Occupied Bandwidth Plot (NR Band n41(PC3) - 70MHz π/2 BPSK - Full RB)

Plot 7-19. Occupied Bandwidth Plot (NR Band n41(PC3) - 70MHz QPSK - Full RB)

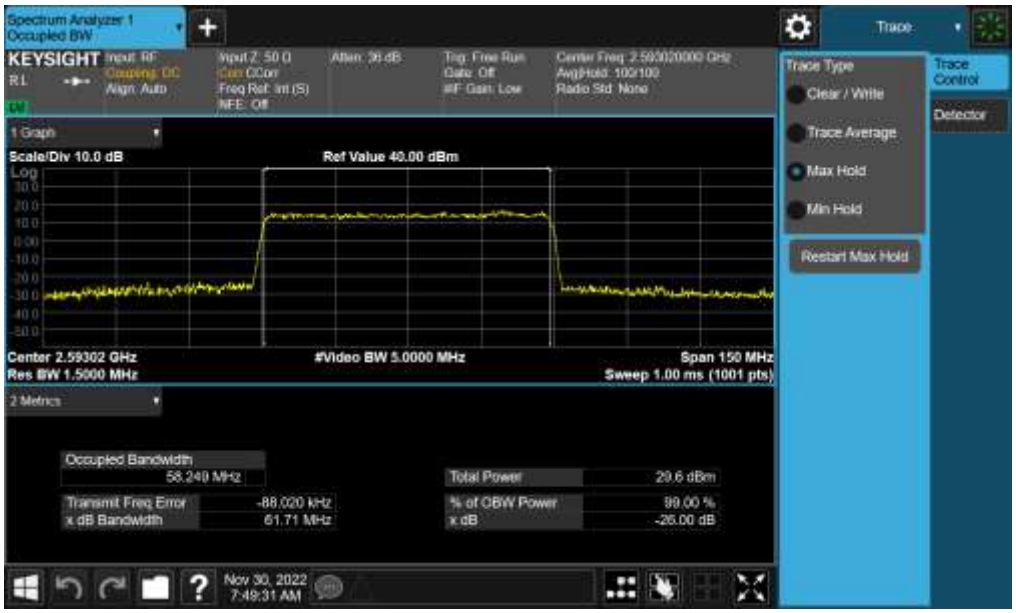


Plot 7-20. Occupied Bandwidth Plot (NR Band n41(PC3) - 70MHz 16-QAM - Full RB)

Plot 7-21. Occupied Bandwidth Plot (NR Band n41(PC3) - 60MHz π/2 BPSK - Full RB)



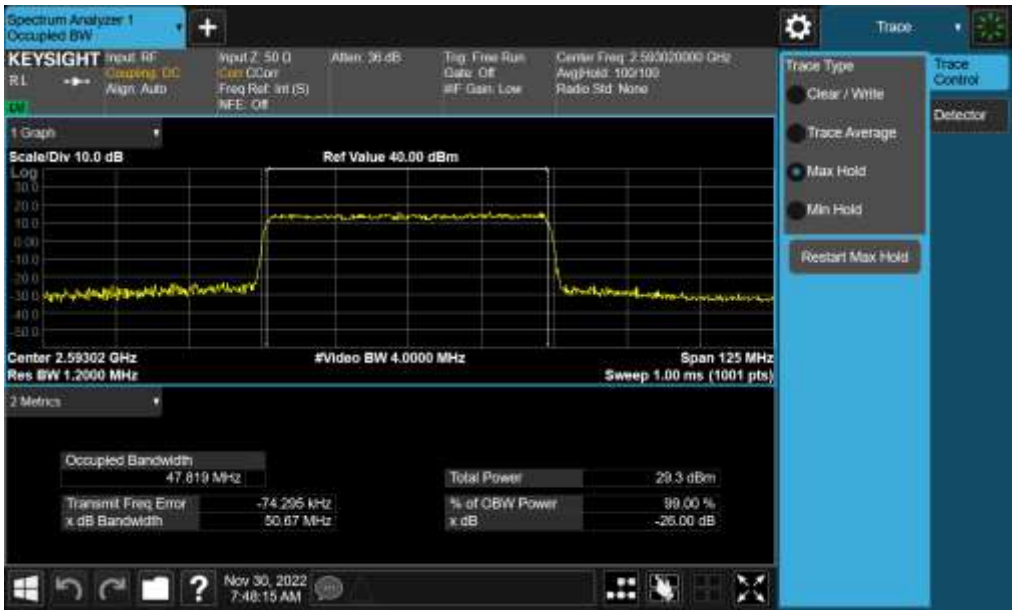
Plot 7-22. Occupied Bandwidth Plot (NR Band n41(PC3) - 60MHz QPSK - Full RB)



Plot 7-23. Occupied Bandwidth Plot (NR Band n41(PC3) - 60MHz 16-QAM - Full RB)

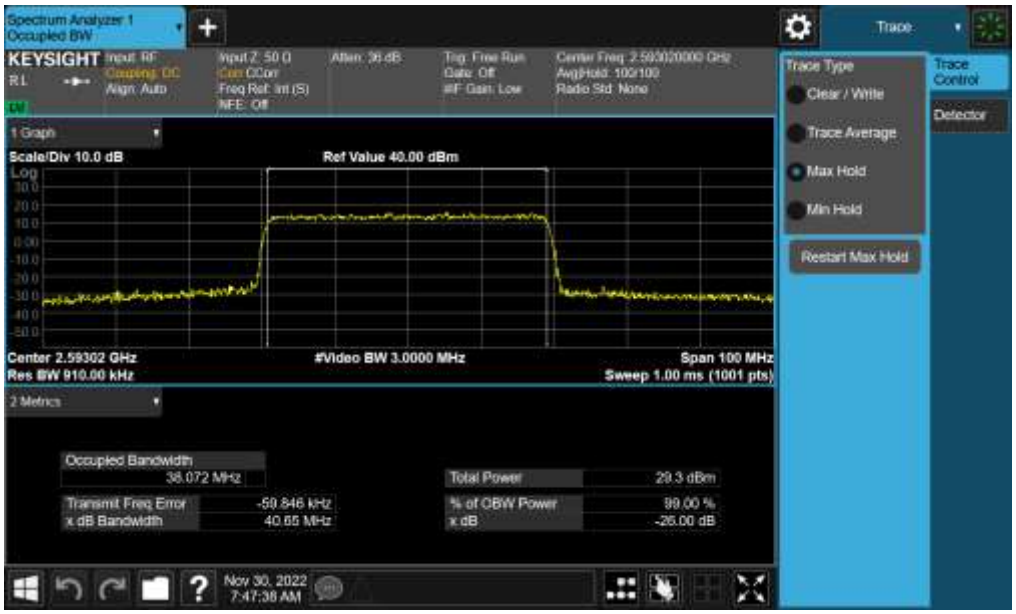
Plot 7-24. Occupied Bandwidth Plot (NR Band n41(PC3) - 50MHz π/2 BPSK - Full RB)

Plot 7-25. Occupied Bandwidth Plot (NR Band n41(PC3) - 50MHz QPSK - Full RB)



Plot 7-26. Occupied Bandwidth Plot (NR Band n41(PC3) - 50MHz 16-QAM - Full RB)

Plot 7-27. Occupied Bandwidth Plot (NR Band n41(PC3) - 40MHz π/2 BPSK - Full RB)

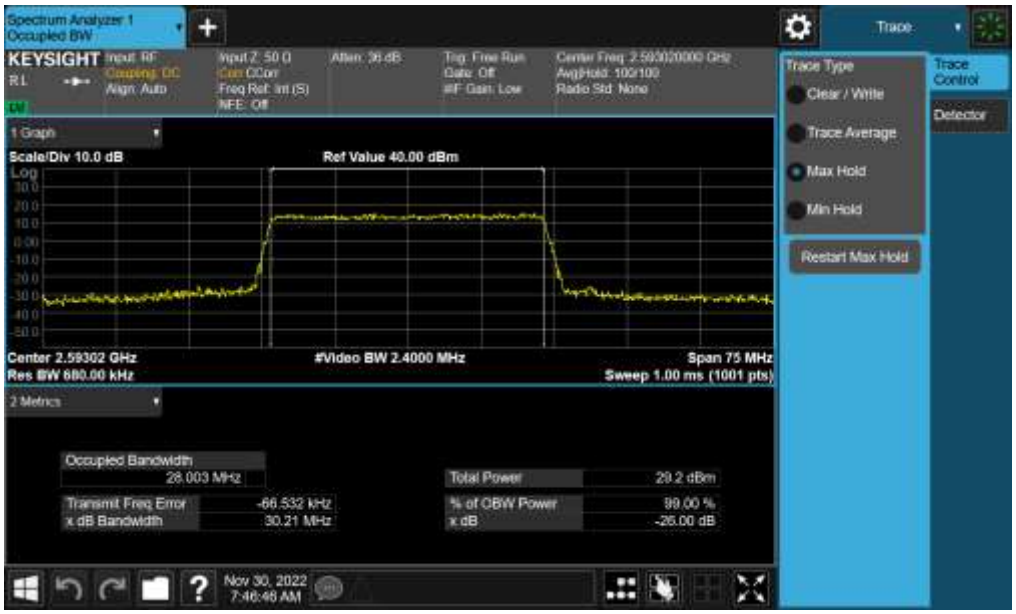


Plot 7-28. Occupied Bandwidth Plot (NR Band n41(PC3) - 40MHz QPSK - Full RB)

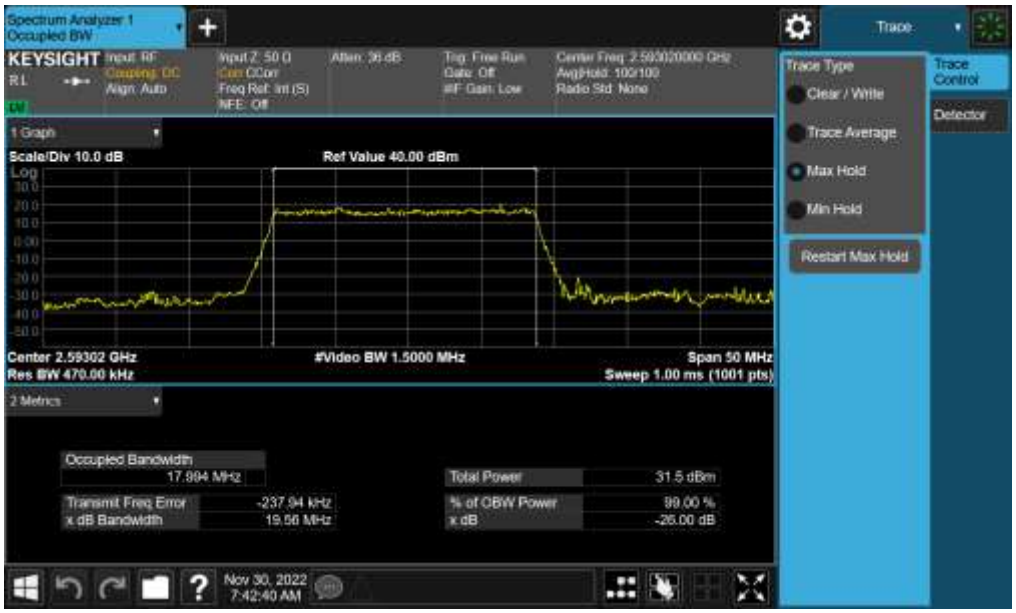
Plot 7-29. Occupied Bandwidth Plot (NR Band n41(PC3) - 40MHz 16-QAM - Full RB)

Plot 7-30. Occupied Bandwidth Plot (NR Band n41(PC3) - 30MHz π/2 BPSK - Full RB)

Plot 7-31. Occupied Bandwidth Plot (NR Band n41(PC3) - 30MHz QPSK - Full RB)

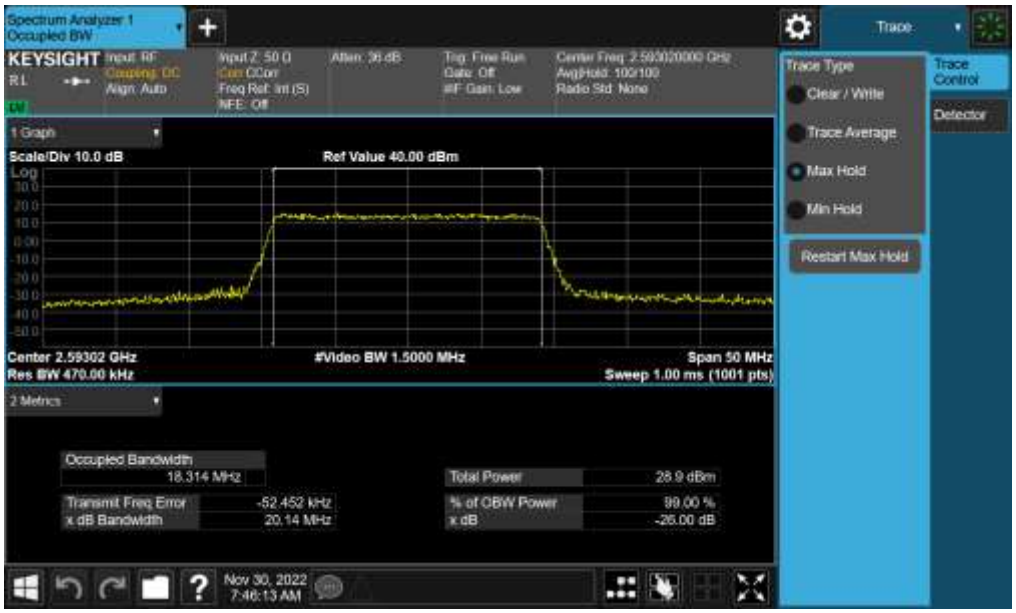


Plot 7-32. Occupied Bandwidth Plot (NR Band n41(PC3) - 30MHz 16-QAM - Full RB)

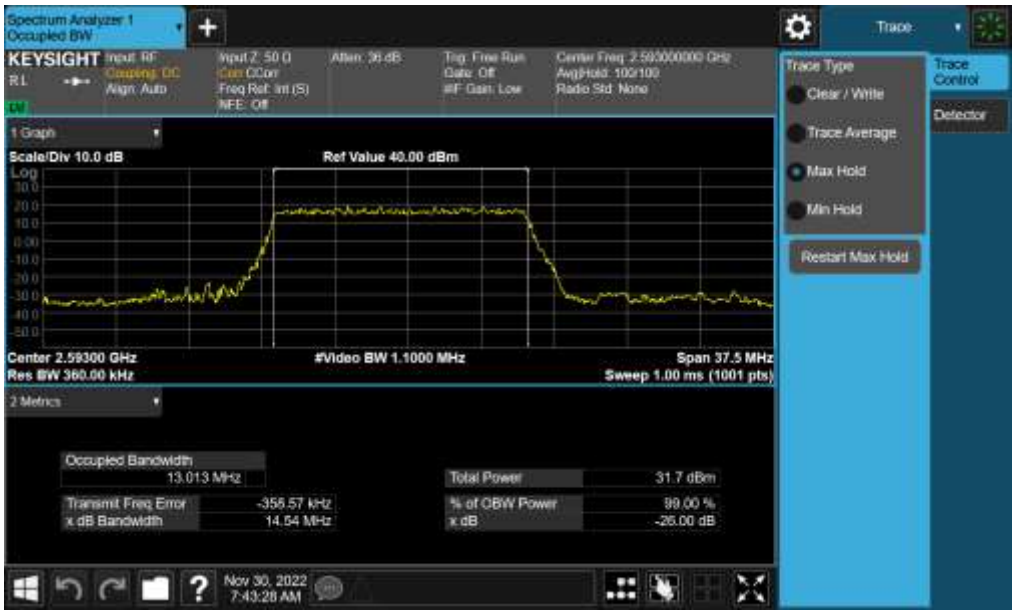


Plot 7-33. Occupied Bandwidth Plot (NR Band n41(PC3) - 20MHz π/2 BPSK - Full RB)

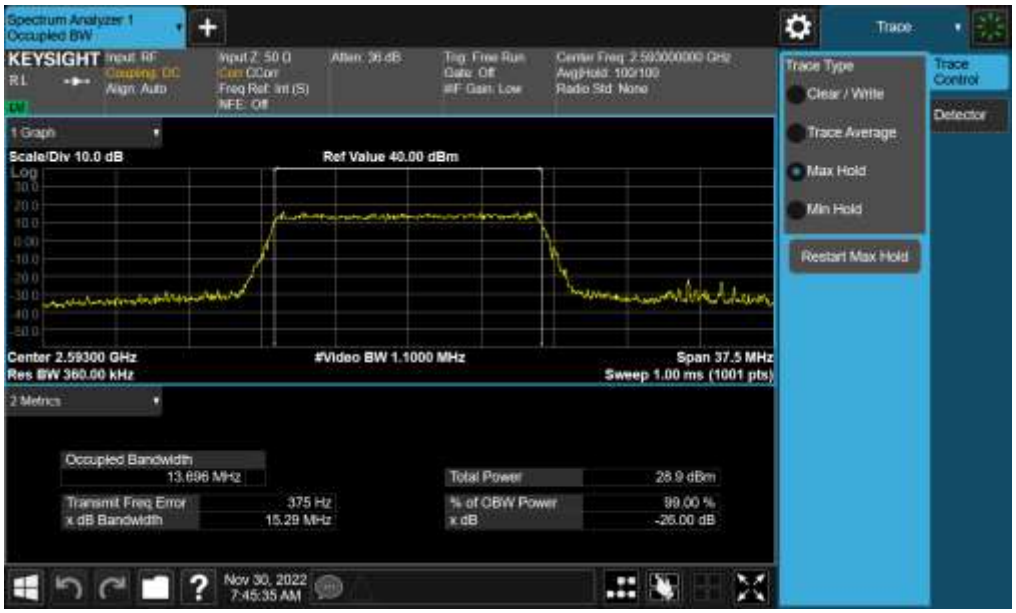
Plot 7-34. Occupied Bandwidth Plot (NR Band n41(PC3) - 20MHz QPSK - Full RB)



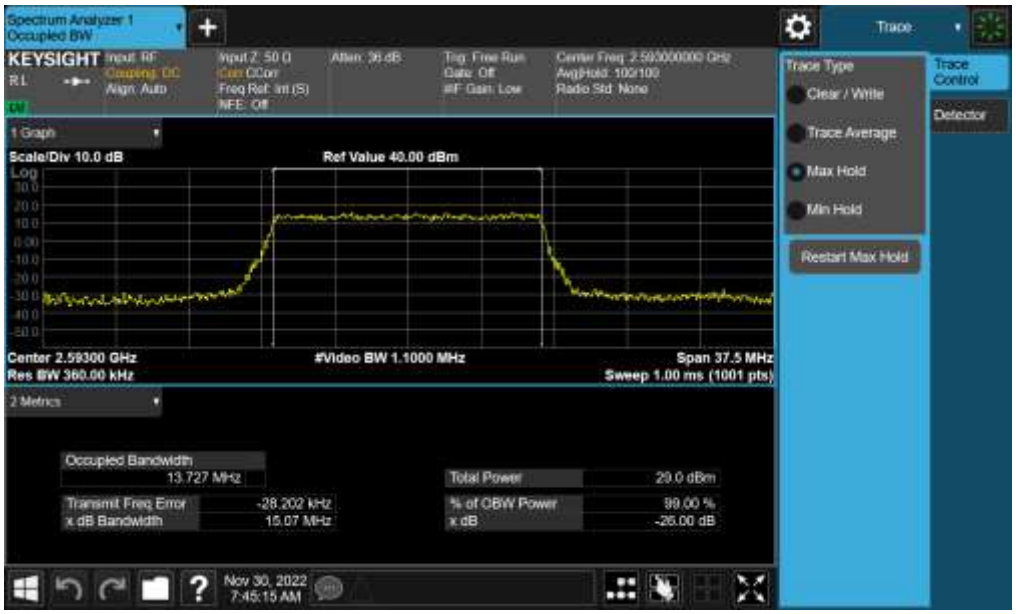
Plot 7-35. Occupied Bandwidth Plot (NR Band n41(PC3) - 20MHz 16-QAM - Full RB)



Plot 7-36. Occupied Bandwidth Plot (NR Band n41(PC3) - 15MHz π/2 BPSK - Full RB)

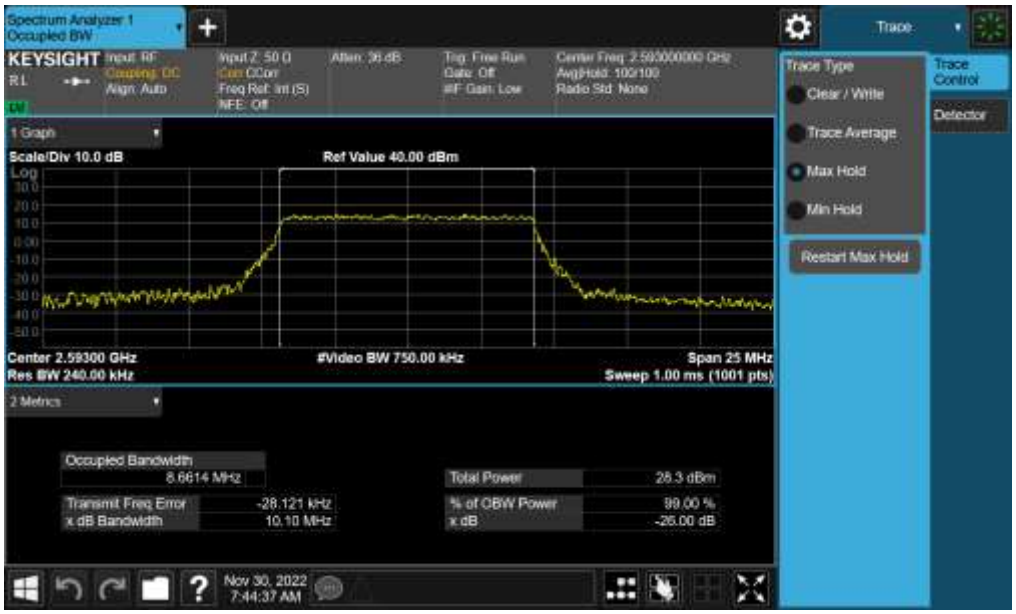


Plot 7-37. Occupied Bandwidth Plot (NR Band n41(PC3) - 15MHz QPSK - Full RB)

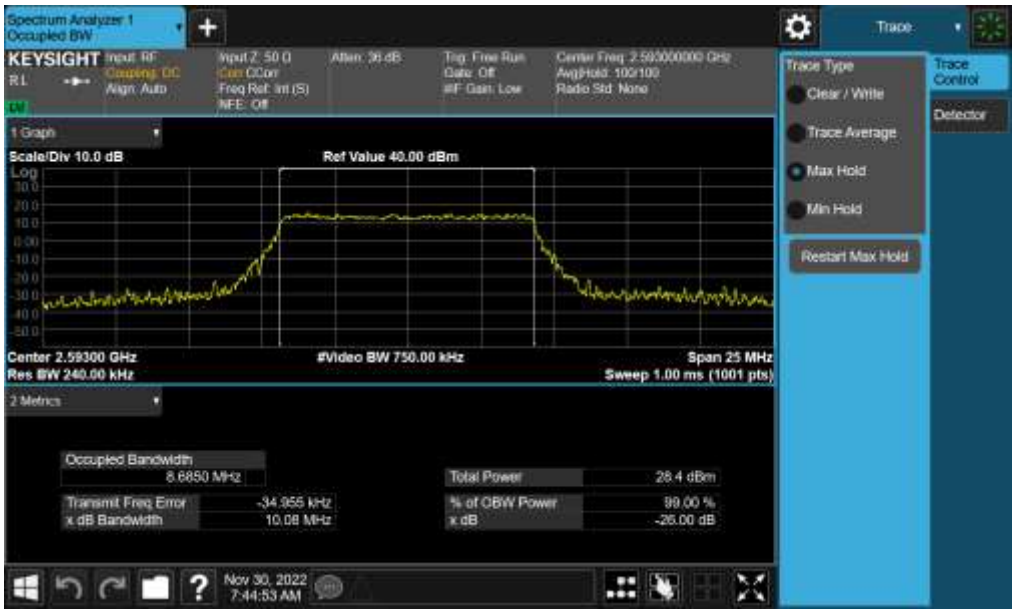


Plot 7-38. Occupied Bandwidth Plot (NR Band n41(PC3) - 15MHz 16-QAM - Full RB)

Plot 7-39. Occupied Bandwidth Plot (NR Band n41(PC3) - 10MHz π/2 BPSK - Full RB)



Plot 7-40. Occupied Bandwidth Plot (NR Band n41(PC3) - 10MHz QPSK - Full RB)



Plot 7-41. Occupied Bandwidth Plot (NR Band n41(PC3) - 10MHz 16-QAM - Full RB)

7.4 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is 43 + 10 $log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

For LTE/NR 41, the minimum permissible attenuation level of any spurious emission is 55 + 10$log_{10}(P_{[Watts]})$.

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.4

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 10GHz (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

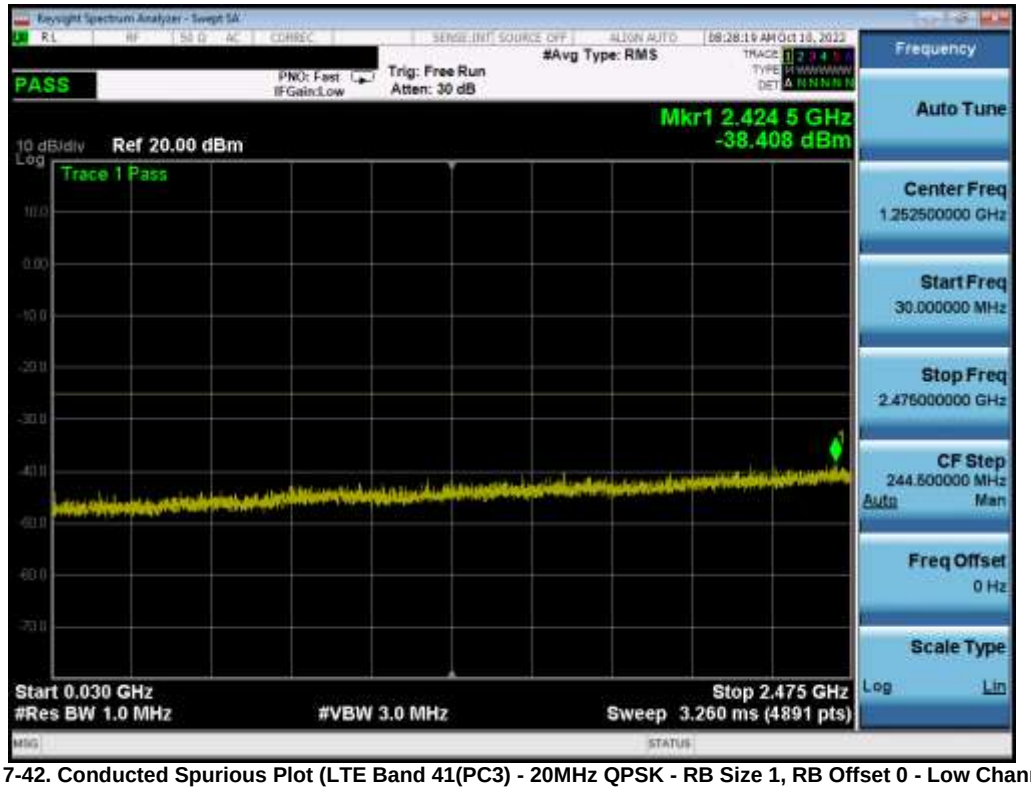
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

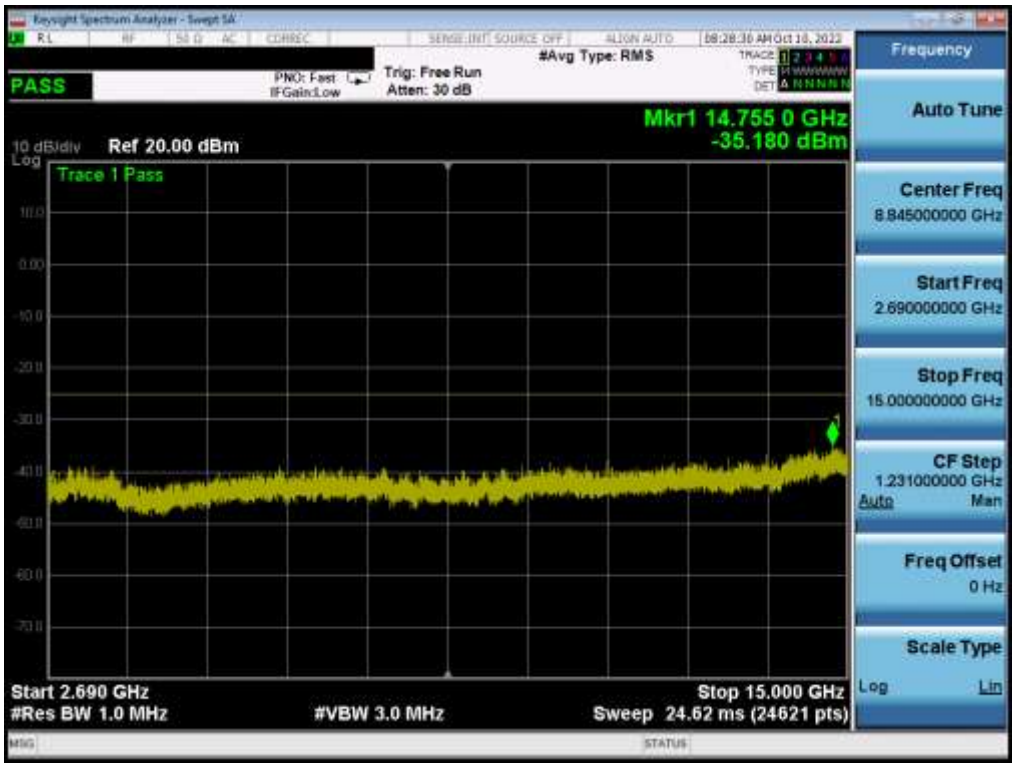
1. Per Part 27, RSS-195 and RSS-199, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz.

2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

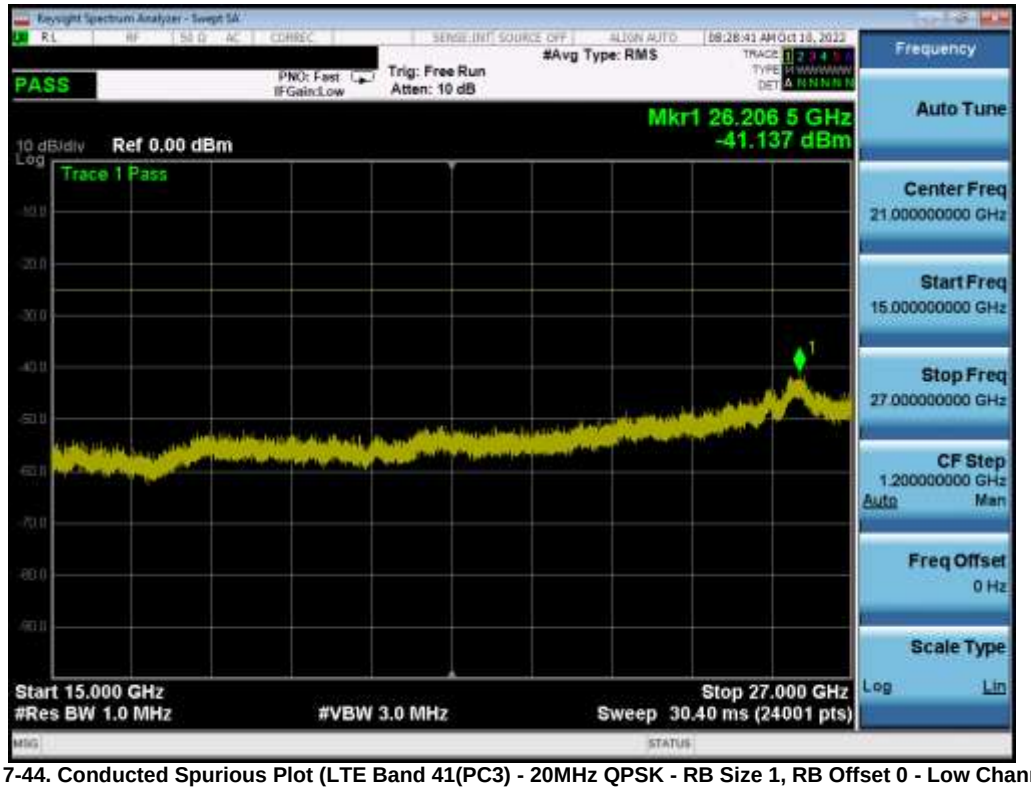
LTE Band 41(PC3)



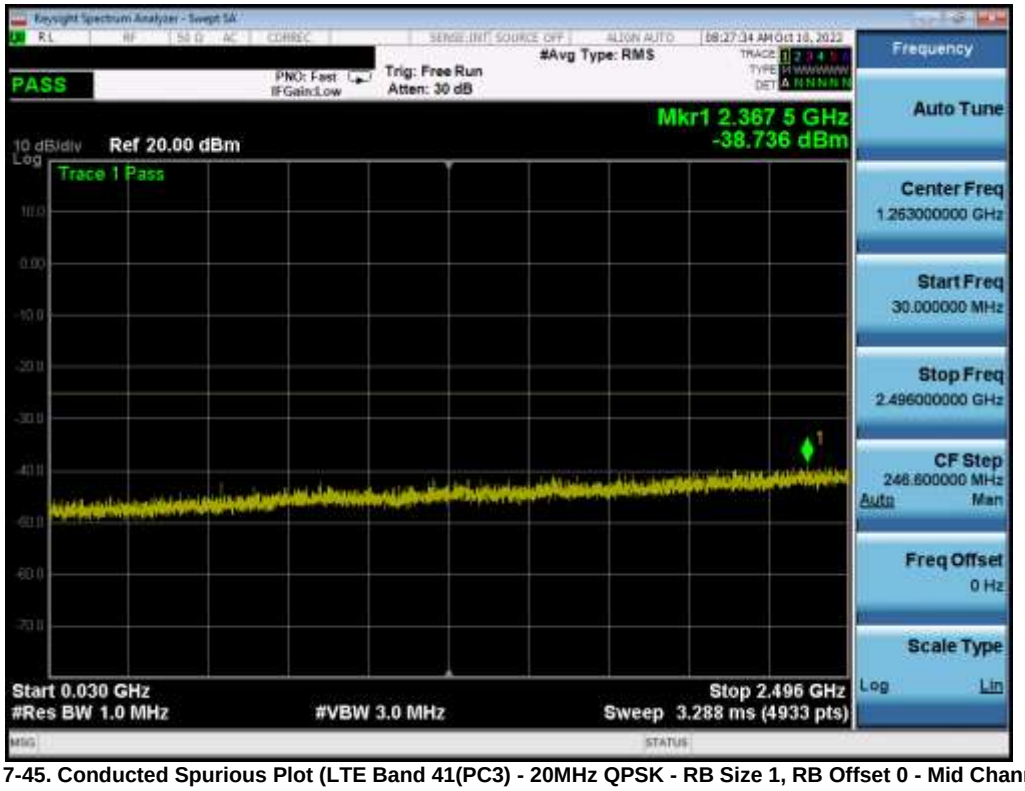
Plot 7-42. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



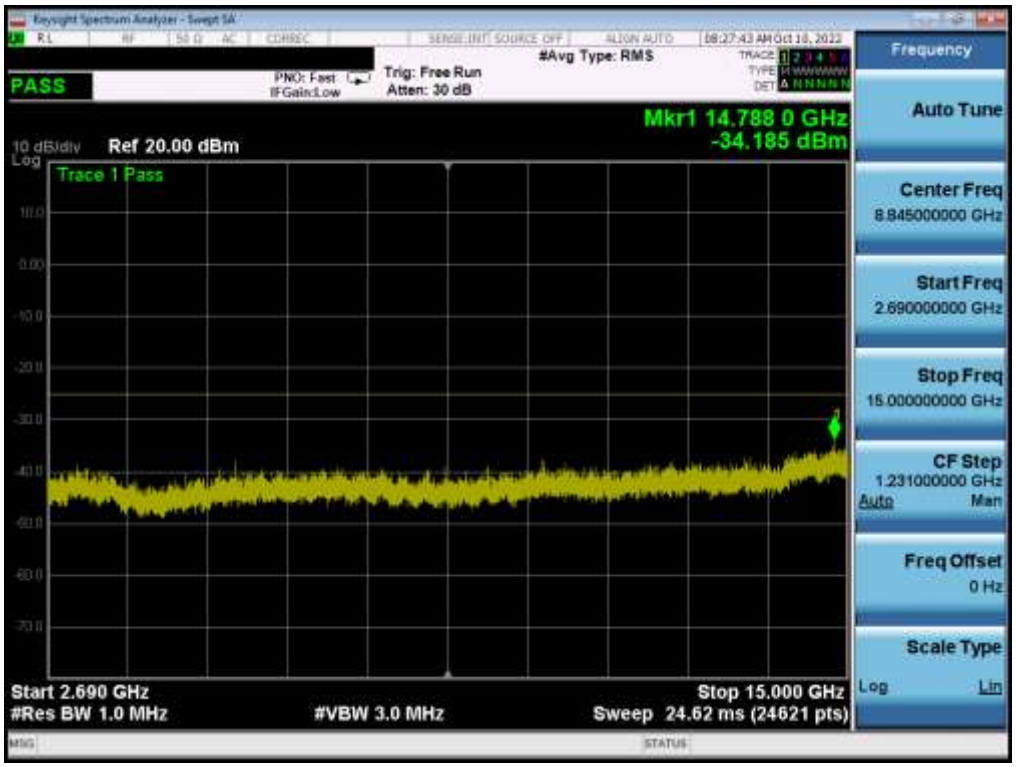
Plot 7-43. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-44. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

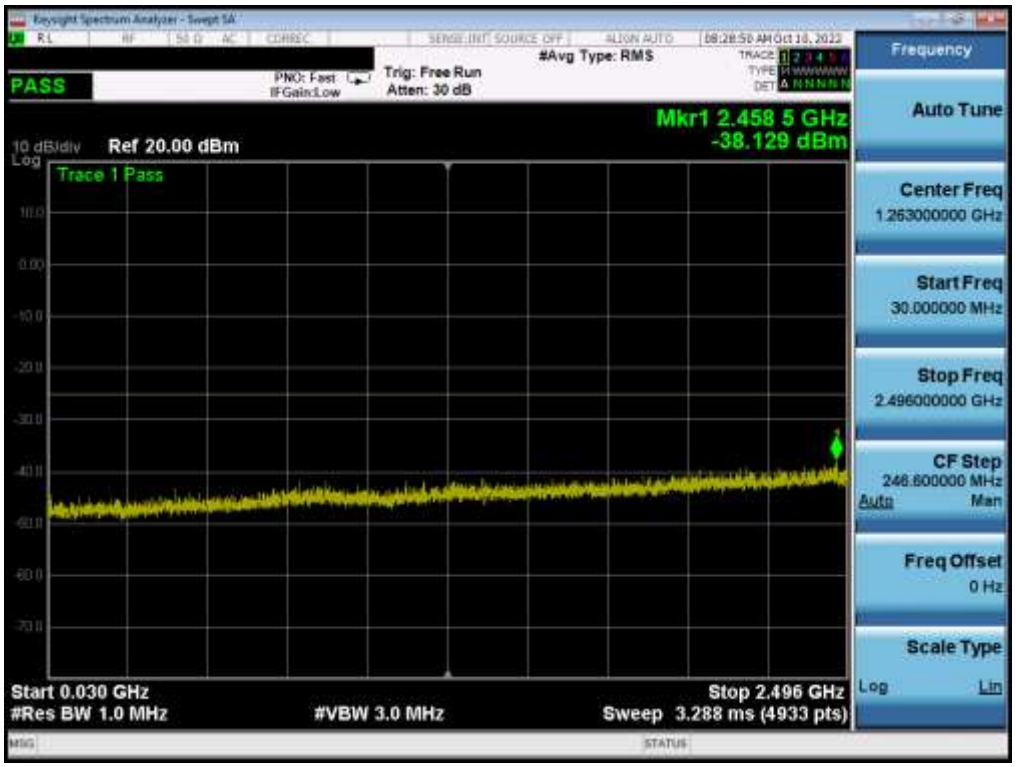


Plot 7-45. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

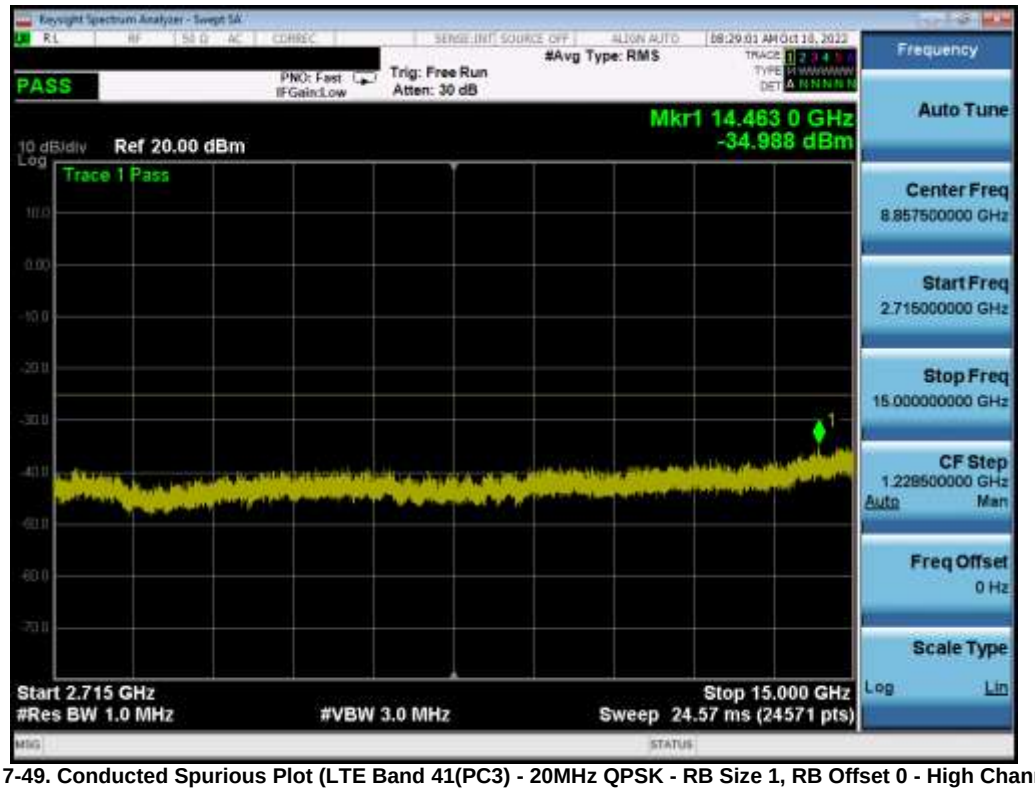


Plot 7-46. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

Plot 7-47. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-48. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-49. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

Plot 7-50. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

NR Band n41(PC3)

Plot 7-51. Conducted Spurious Plot (NR Band n41(PC3) - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

Plot 7-52. Conducted Spurious Plot (NR Band n41(PC3) - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

Plot 7-53. Conducted Spurious Plot (NR Band n41(PC3) - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

Plot 7-54. Conducted Spurious Plot (NR Band n41(PC3) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

Plot 7-55. Conducted Spurious Plot (NR Band n41(PC3) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

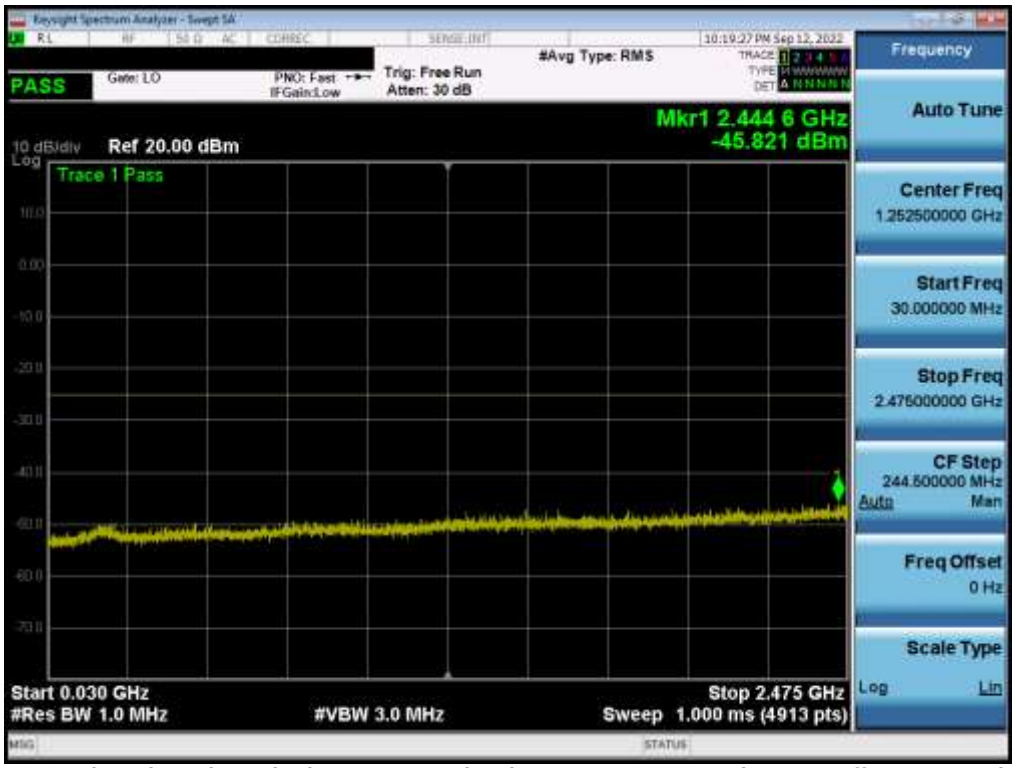
Plot 7-56. Conducted Spurious Plot (NR Band n41(PC3) - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

Plot 7-57. Conducted Spurious Plot (NR Band n41(PC3) - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

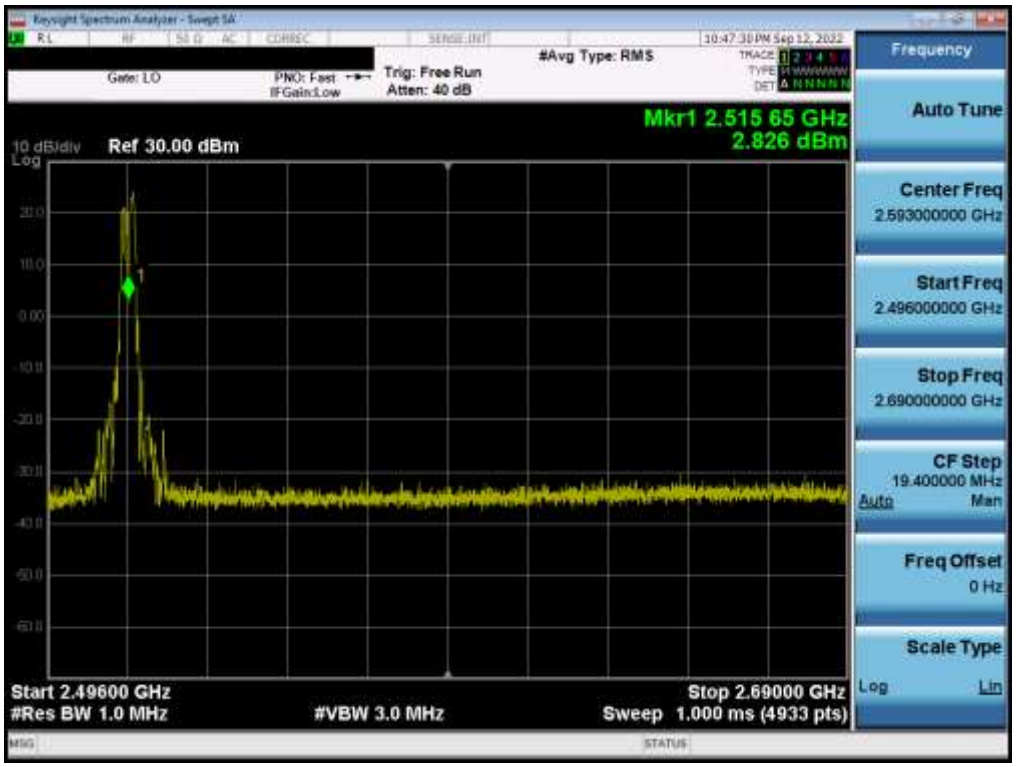
Plot 7-58. Conducted Spurious Plot (NR Band n41(PC3) - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

Plot 7-59. Conducted Spurious Plot (NR Band n41(PC3) - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

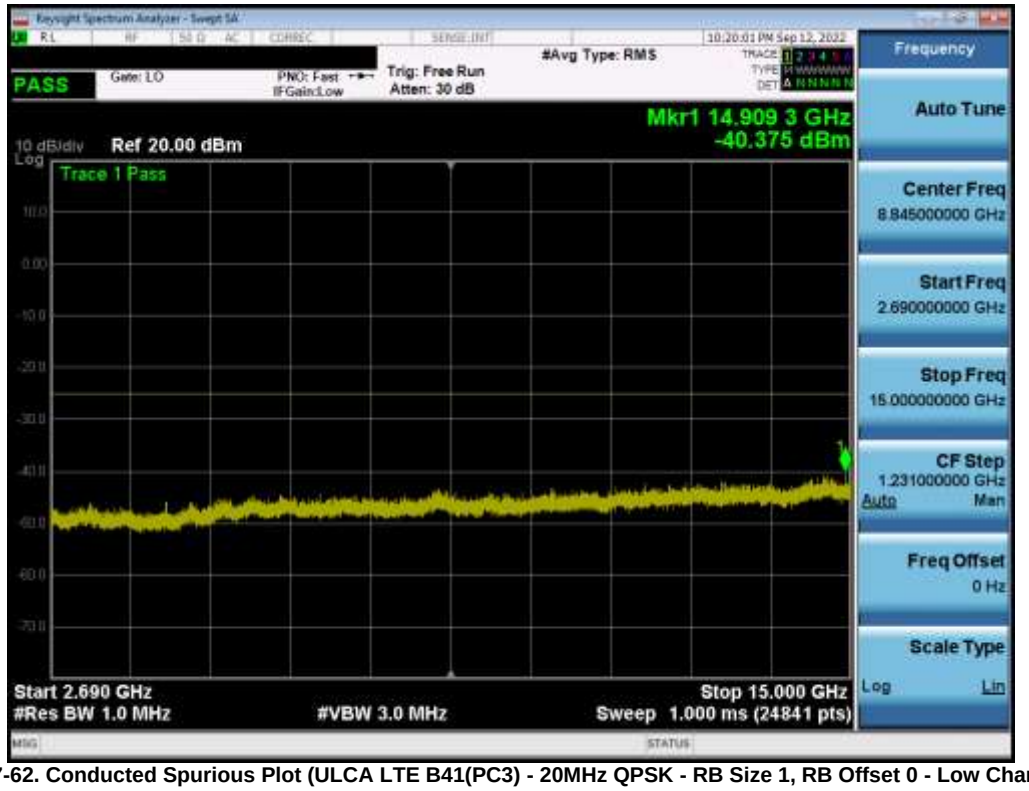
ULCA - LTE B41(PC3)



Plot 7-60. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

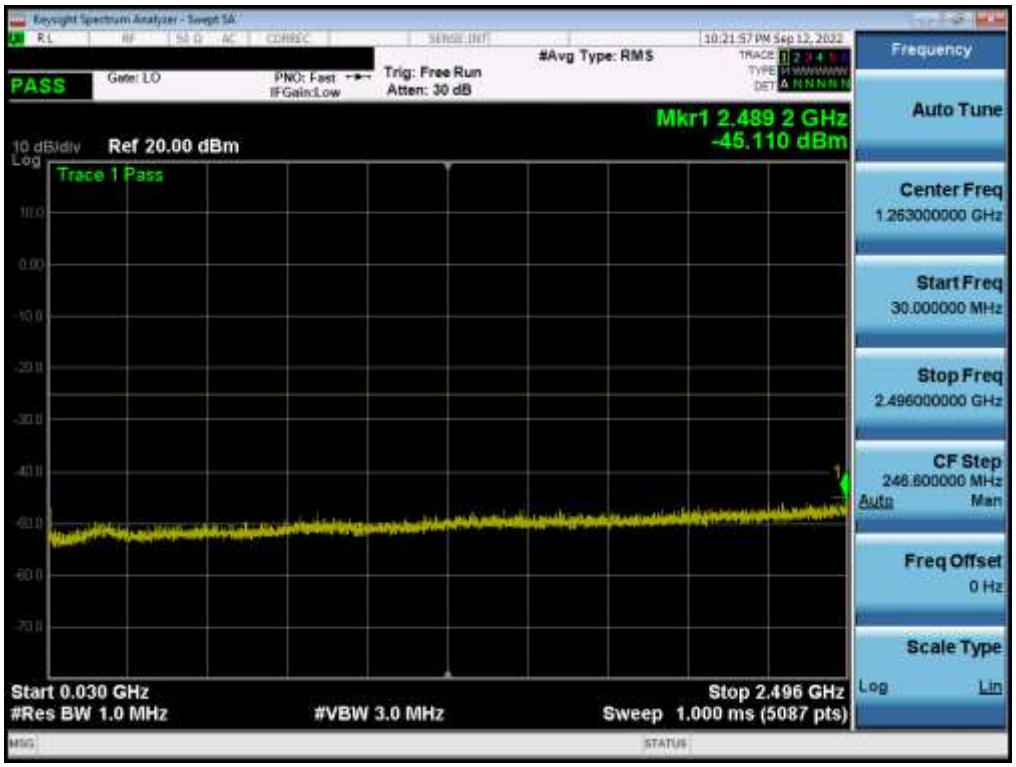


Plot 7-61. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

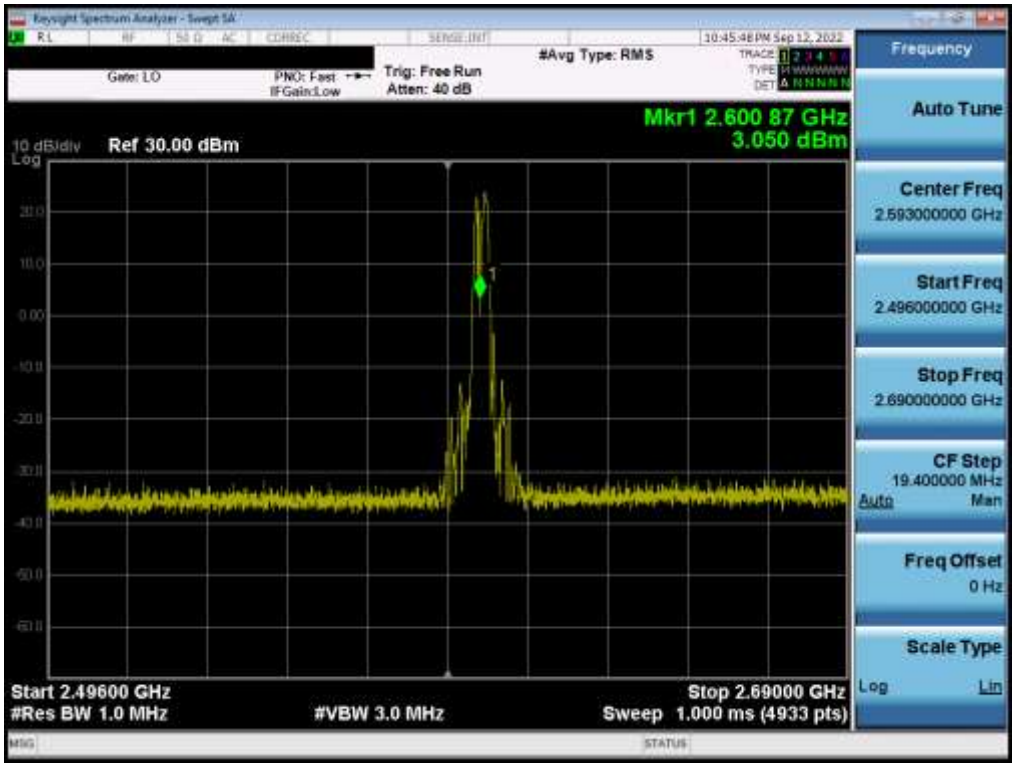


Plot 7-62. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

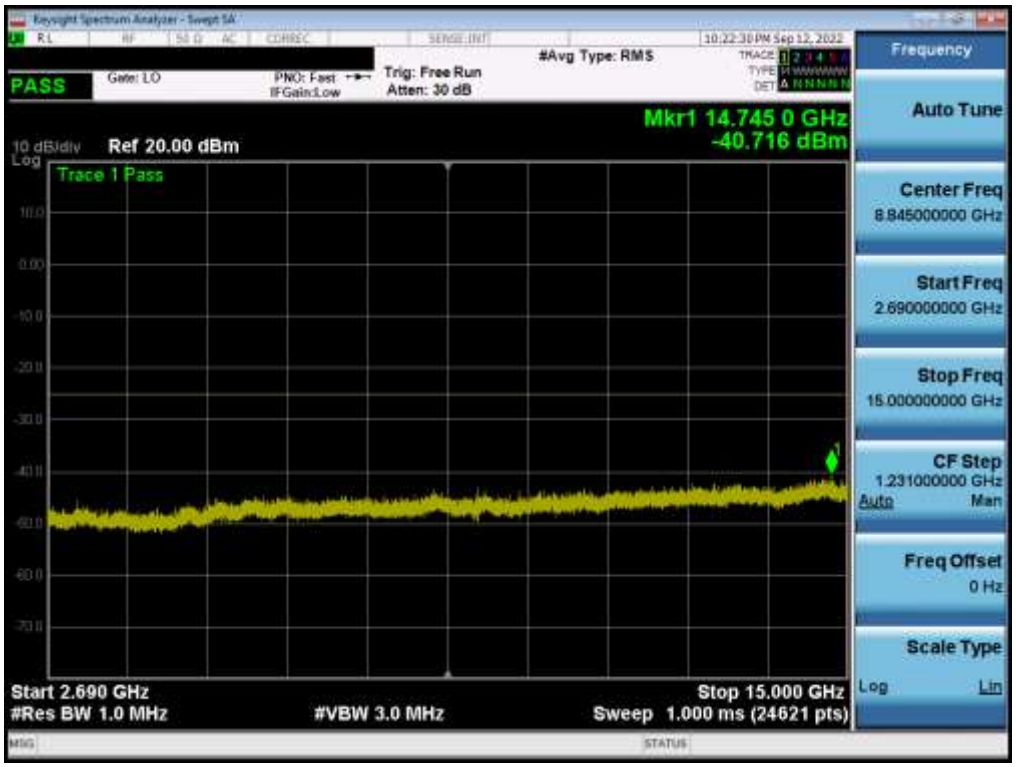
Plot 7-63. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



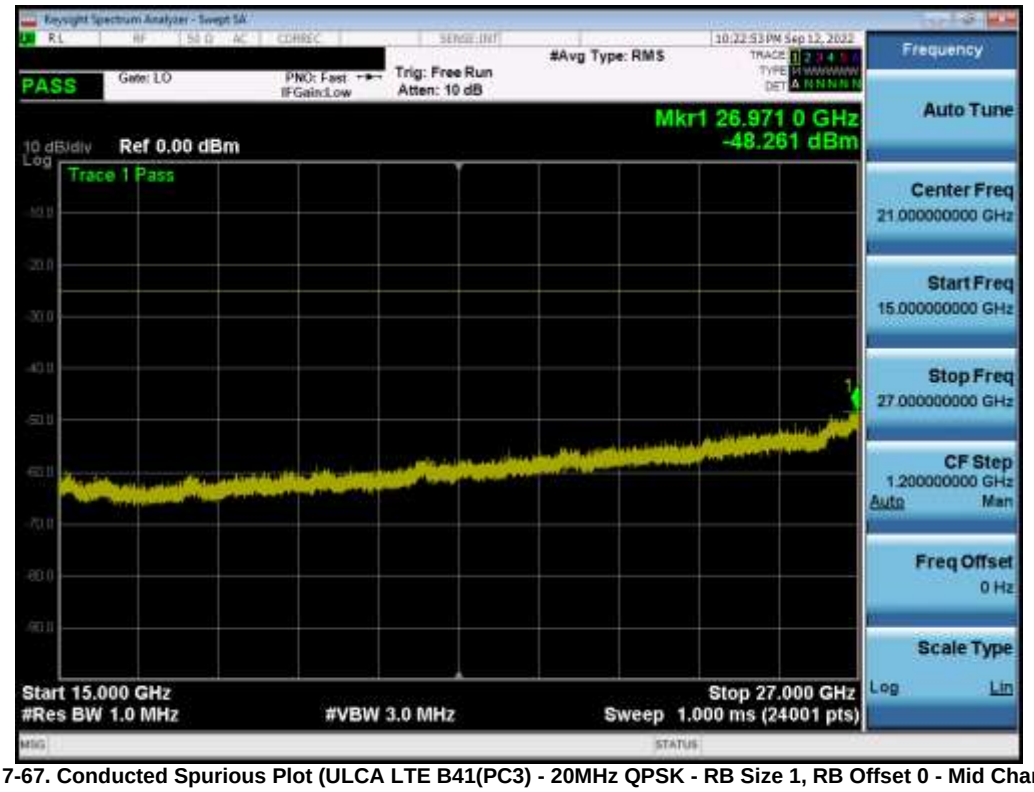
Plot 7-64. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



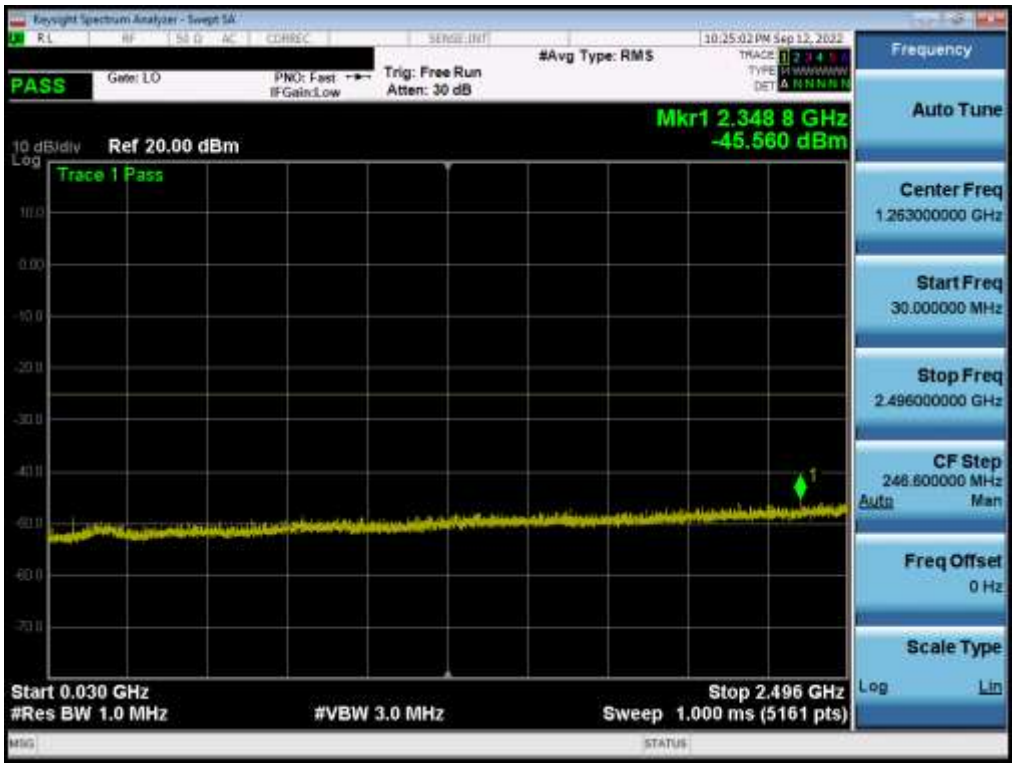
Plot 7-65. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



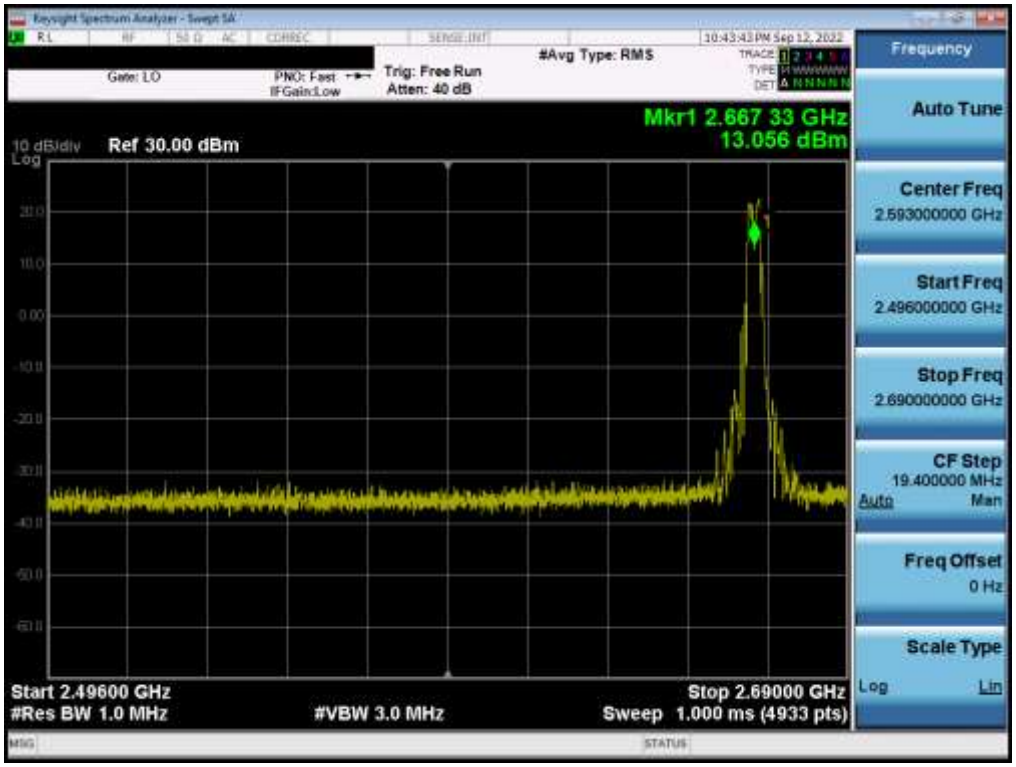
Plot 7-66. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant B)



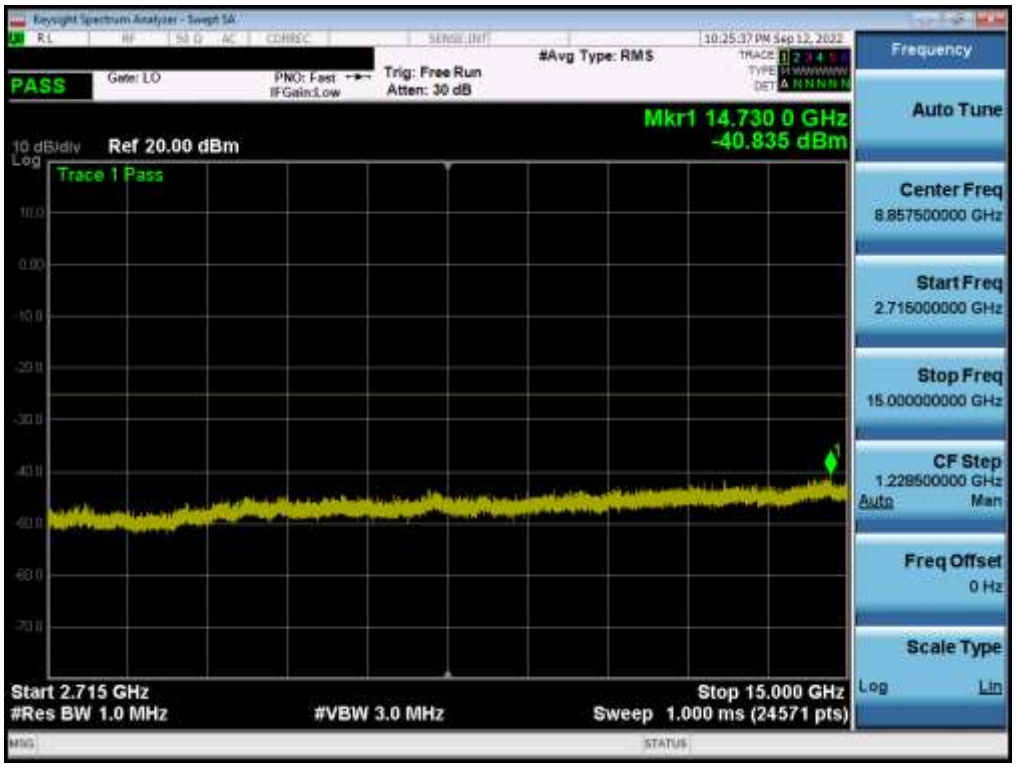
Plot 7-67. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



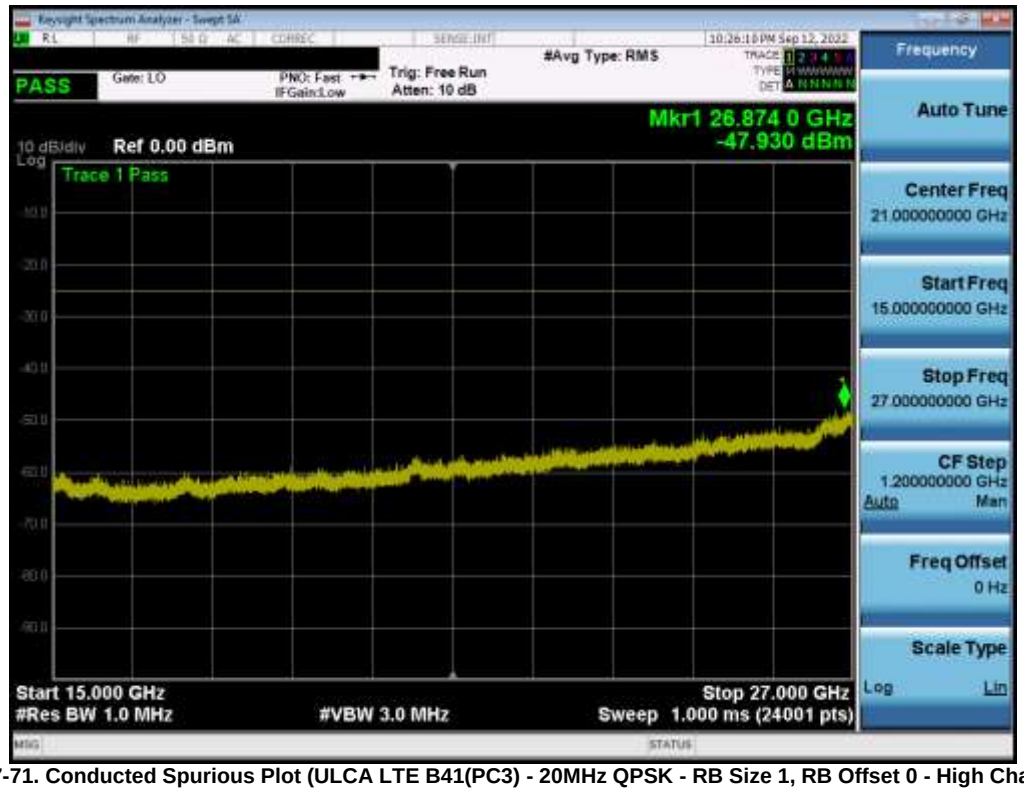
Plot 7-68. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-69. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-70. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-71. Conducted Spurious Plot (ULCA LTE B41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

7.5 Band Edge Emissions at Antenna Terminal

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

The minimum permissible attenuation level for LTE/NR and 41 is as noted in the Test Notes on the following page.

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.3

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

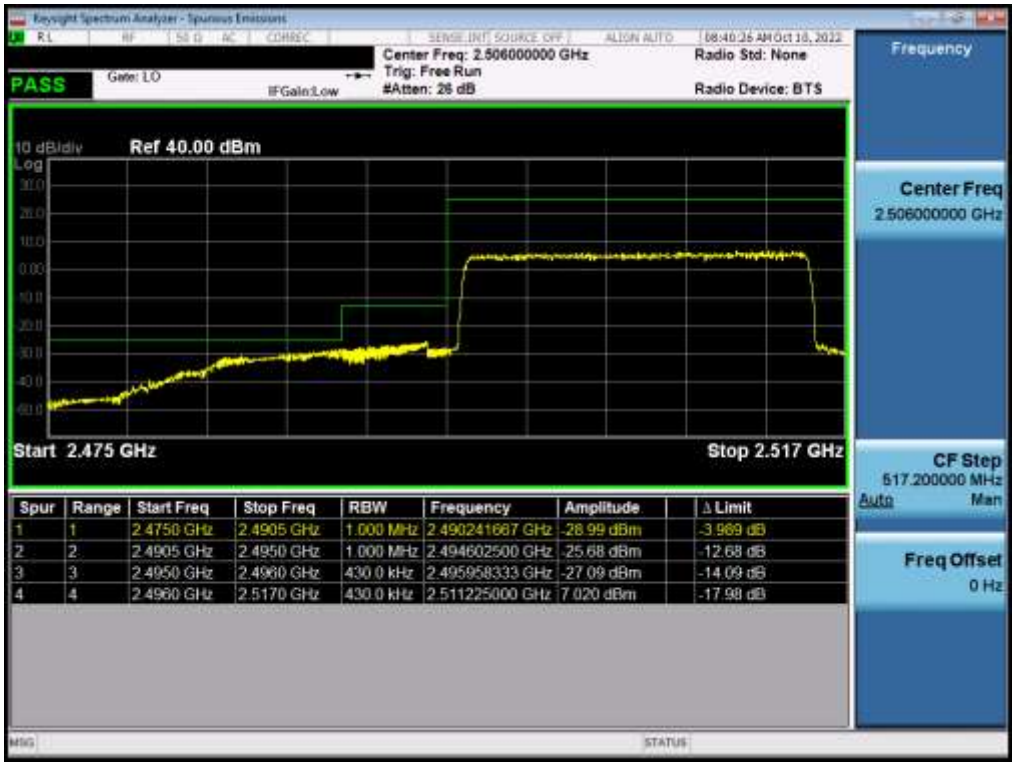
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

1. Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

LTE Band 41(PC3)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.490241667 GHz	-28.99 dBm	-3.989 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494602500 GHz	-25.68 dBm	-12.68 dB
3	3	2.4950 GHz	2.4960 GHz	430.0 kHz	2.495958333 GHz	-27.09 dBm	-14.09 dB
4	4	2.4960 GHz	2.5170 GHz	430.0 kHz	2.511225000 GHz	7.020 dBm	-17.98 dB

Plot 7-72. Lower ACP Plot (LTE Band 41(PC3) - 20MHz QPSK – Full RB - Ant B)

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	430.0 kHz	2.673208333 GHz	6.457 dBm	-18.54 dB
2	2	2.6900 GHz	2.6910 GHz	430.0 kHz	2.690090000 GHz	-29.01 dBm	-19.01 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691073333 GHz	-27.33 dBm	-17.33 dB
4	4	2.6950 GHz	2.7108 GHz	1.000 MHz	2.695342333 GHz	-30.02 dBm	-17.02 dB
5	5	2.7108 GHz	2.7150 GHz	1.000 MHz	2.711906000 GHz	-42.43 dBm	-17.43 dB

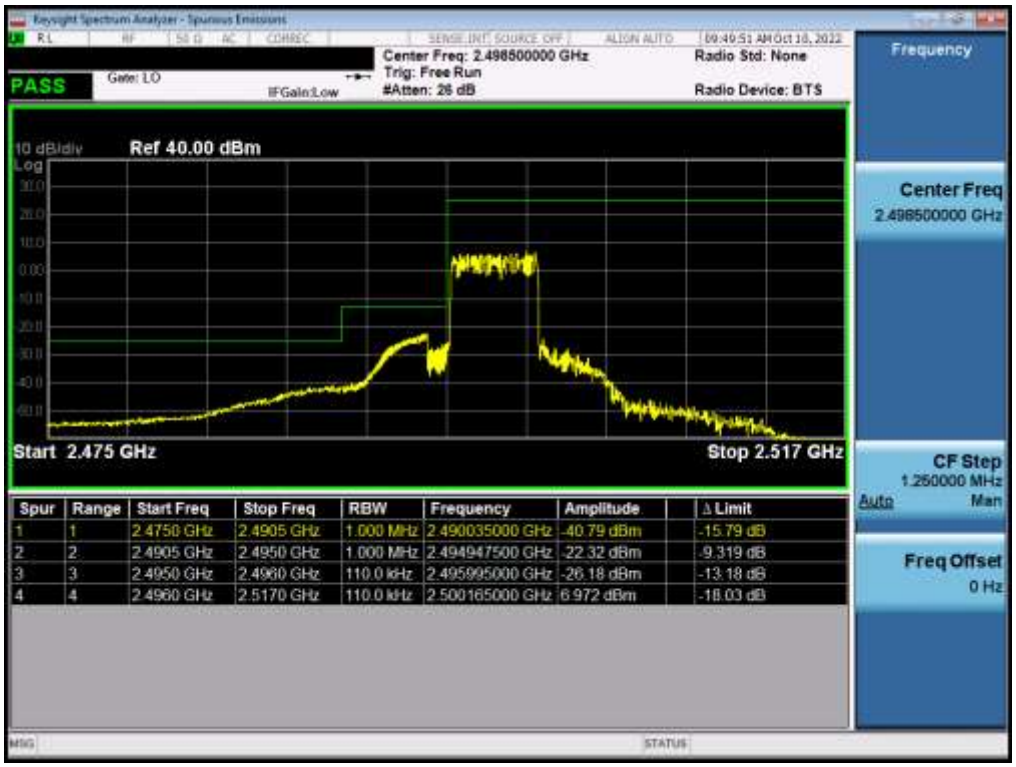
Plot 7-73. Upper ACP Plot (LTE Band 41(PC3) - 20MHz QPSK – Full RB - Ant B)

Plot 7-74. Lower ACP Plot (LTE Band 41(PC3) - 15MHz QPSK – Full RB - Ant B)

Plot 7-75. Upper ACP Plot (LTE Band 41(PC3) - 15MHz QPSK – Full RB - Ant B)

Plot 7-76. Lower ACP Plot (LTE Band 41(PC3) - 10MHz QPSK – Full RB - Ant B)

Plot 7-77. Upper ACP Plot (LTE Band 41(PC3) - 10MHz QPSK – Full RB - Ant B)

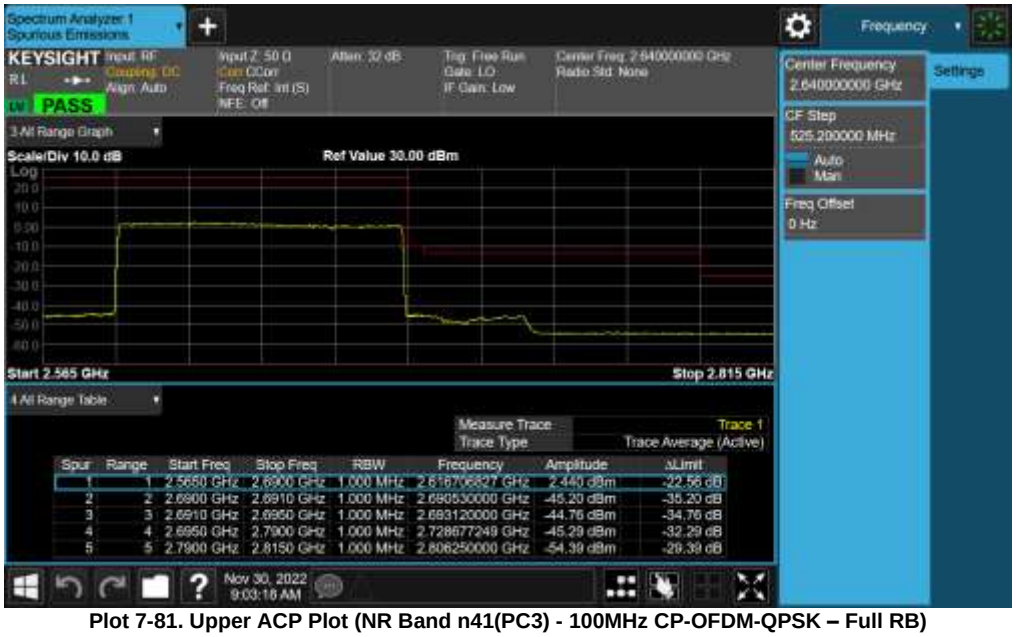


Plot 7-78. Lower ACP Plot (LTE Band 41(PC3) - 5MHz QPSK – Full RB - Ant B)

Plot 7-79. Upper ACP Plot (LTE Band 41(PC3) - 5MHz QPSK – Full RB - Ant B)

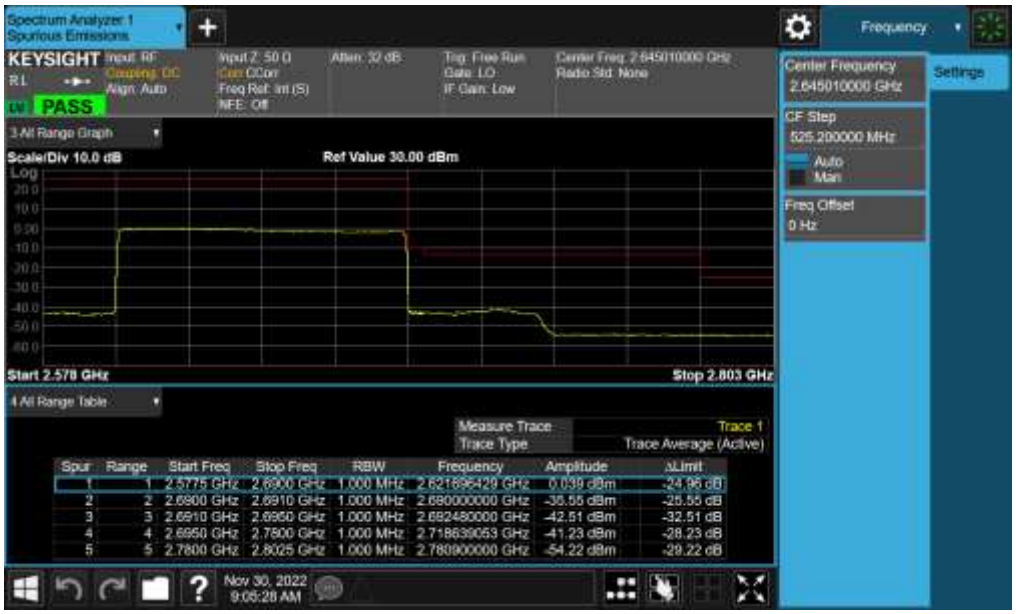
NR Band n41(PC3)

Plot 7-80. Lower ACP Plot (NR Band n41(PC3) - 100MHz CP-OFDM-QPSK – Full RB)



Plot 7-81. Upper ACP Plot (NR Band n41(PC3) - 100MHz CP-OFDM-QPSK – Full RB)

Plot 7-82. Lower ACP Plot (NR Band n41(PC3) - 90MHz CP-OFDM-QPSK – Full RB)



Plot 7-83. Upper ACP Plot (NR Band n41(PC3) - 90MHz CP-OFDM-QPSK – Full RB)

Plot 7-84. Lower ACP Plot (NR Band n41(PC3) - 80MHz CP-OFDM-QPSK – Full RB)

Plot 7-85. Upper ACP Plot (NR Band n41(PC3) - 80MHz CP-OFDM-QPSK – Full RB)

Plot 7-86. Lower ACP Plot (NR Band n41(PC3) - 70MHz CP-OFDM-QPSK – Full RB)

Plot 7-87. Upper ACP Plot (NR Band n41(PC3) - 70MHz CP-OFDM-QPSK – Full RB)

Plot 7-88. Lower ACP Plot (NR Band n41(PC3) - 60MHz CP-OFDM-QPSK – Full RB)

Plot 7-89. Upper ACP Plot (NR Band n41(PC3) - 60MHz CP-OFDM-QPSK – Full RB)

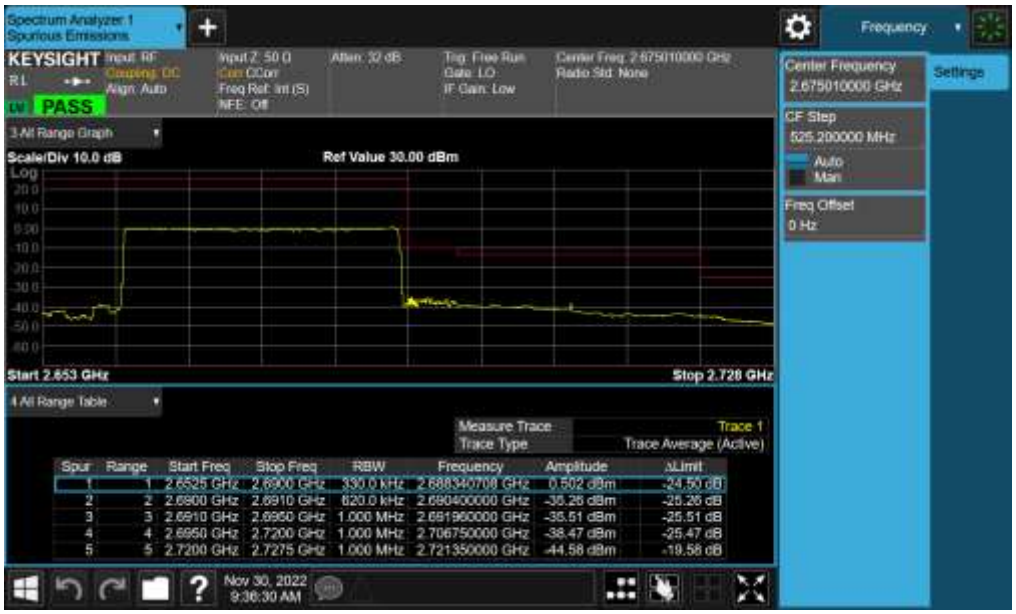
Plot 7-90. Lower ACP Plot (NR Band n41(PC3) - 50MHz CP-OFDM-QPSK – Full RB)

Plot 7-91. Upper ACP Plot (NR Band n41(PC3) - 50MHz CP-OFDM-QPSK – Full RB)

Plot 7-92. Lower ACP Plot (NR Band n41(PC3) - 40MHz CP-OFDM-QPSK – Full RB)

Plot 7-93. Upper ACP Plot (NR Band n41(PC3) - 40MHz CP-OFDM-QPSK – Full RB)

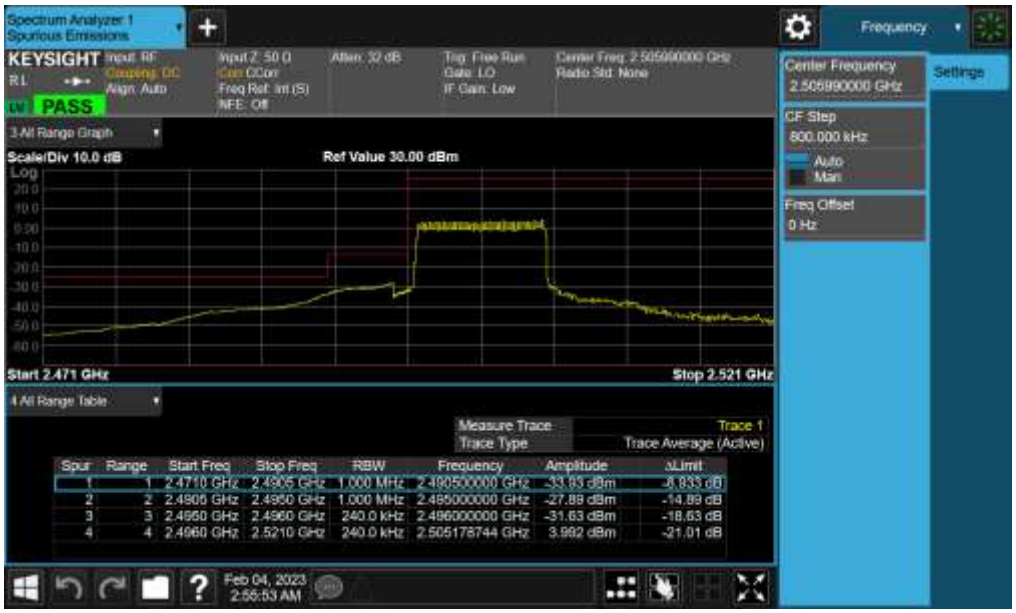
Plot 7-94. Lower ACP Plot (NR Band n41(PC3) - 30MHz CP-OFDM-QPSK – Full RB)



Plot 7-95. Upper ACP Plot (NR Band n41(PC3) - 30MHz CP-OFDM-QPSK – Full RB)

Plot 7-96. Lower ACP Plot (NR Band n41(PC3) - 20MHz CP-OFDM-QPSK – Full RB)

Plot 7-97. Upper ACP Plot (NR Band n41(PC3) - 20MHz CP-OFDM-QPSK – Full RB)



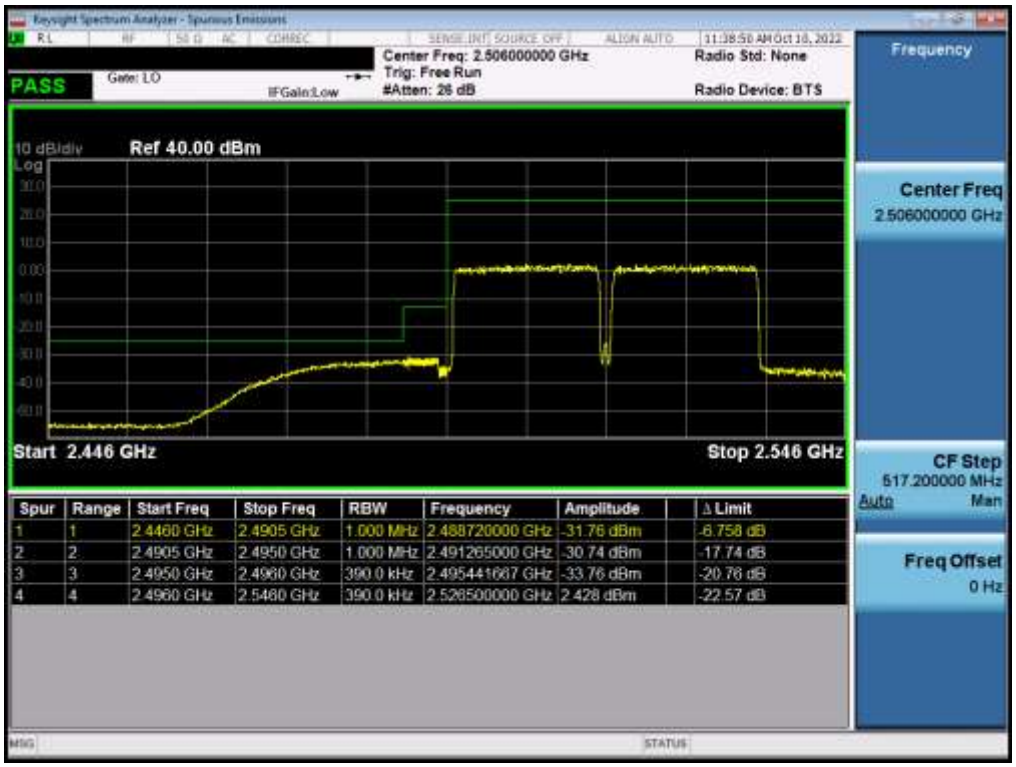
Plot 7-98. Lower ACP Plot (NR Band n41(PC3) - 15MHz DFTs-OFDM-QPSK – Full RB)

Plot 7-99. Upper ACP Plot (NR Band n41(PC3) - 15MHz CP-OFDM-QPSK – Full RB)

Plot 7-100. Lower ACP Plot (NR Band n41(PC3) - 10MHz CP-OFDM-QPSK – Full RB)

Plot 7-101. Upper ACP Plot (NR Band n41(PC3) - 10MHz CP-OFDM-QPSK – Full RB)

ULCA - LTE Band 41(PC3)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4460 GHz	2.4905 GHz	1.000 MHz	2.488720000 GHz	-31.76 dBm	-6.758 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.491265000 GHz	-30.74 dBm	-17.74 dB
3	3	2.4950 GHz	2.4960 GHz	390.0 kHz	2.495441667 GHz	-33.76 dBm	-20.76 dB
4	4	2.4960 GHz	2.5460 GHz	390.0 kHz	2.526500000 GHz	2.428 dBm	-22.57 dB

Plot 7-102. Lower ACP Plot (ULCA LTE B41(PC3) - 20MHz QPSK – Full RB)

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6400 GHz	2.6900 GHz	390.0 kHz	2.688166667 GHz	2.393 dBm	-22.61 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690936667 GHz	-32.93 dBm	-22.93 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692920000 GHz	-29.61 dBm	-19.61 dB
4	4	2.6950 GHz	2.7100 GHz	1.000 MHz	2.697400000 GHz	-30.92 dBm	-17.92 dB
5	5	2.7100 GHz	2.7400 GHz	1.000 MHz	2.710400000 GHz	-36.34 dBm	-11.34 dB

Plot 7-103. Upper ACP Plot (ULCA LTE B41(PC3) - 20MHz QPSK – Full RB)

7.6 Radiated Power (EIRP)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 – Section 5.2.4.4

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration.
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

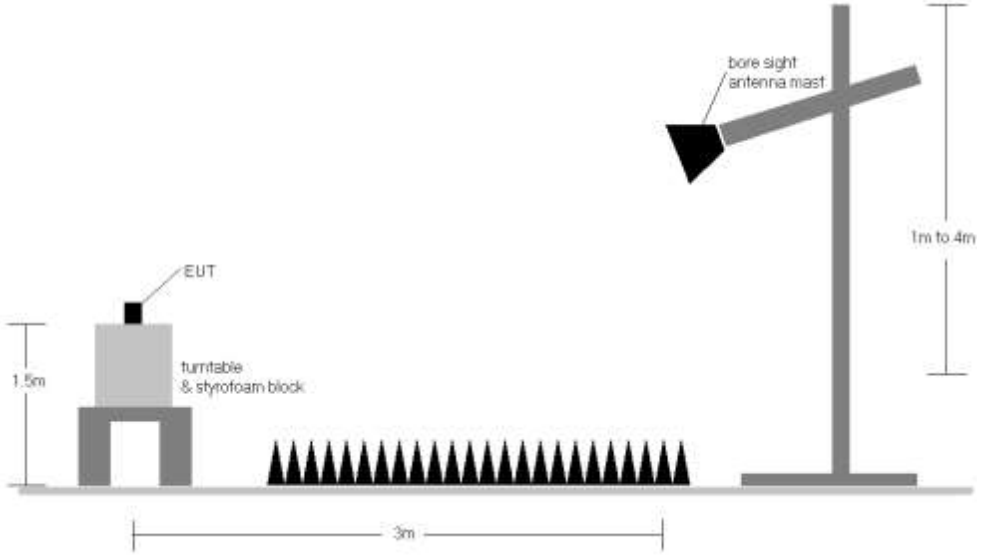


Figure 7-5. Radiated Test Setup >1GHz

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst-case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) This unit was tested with its standard battery.

3) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
20 MHz	QPSK	2506.0	H	165	29	9.50	1 / 50	14.68	24.18	0.262	33.01	-8.83
	QPSK	2593.0	H	112	225	9.49	1 / 99	15.08	24.57	0.286	33.01	-8.44
	QPSK	2680.0	H	125	106	9.87	1 / 99	14.90	**24.77**	0.300	33.01	-8.24
	16-QAM	2680.0	H	125	106	9.87	1 / 99	14.06	23.93	0.247	33.01	-9.08
15 MHz	QPSK	2503.5	H	165	29	9.50	1 / 0	14.75	24.25	0.266	33.01	-8.76
	QPSK	2593.0	H	112	225	9.49	1 / 37	15.25	**24.74**	0.298	33.01	-8.27
	QPSK	2682.5	H	125	106	9.87	1 / 37	14.83	24.69	0.295	33.01	-8.32
	16-QAM	2682.5	H	125	106	9.87	1 / 37	14.08	23.95	0.248	33.01	-9.06
10 MHz	QPSK	2501.0	H	165	29	9.49	1 / 49	15.31	24.80	0.302	33.01	-8.21
	QPSK	2593.0	H	112	225	9.49	1 / 49	15.80	**25.29**	0.338	33.01	-7.72
	QPSK	2685.0	H	125	106	9.86	1 / 49	15.25	25.11	0.324	33.01	-7.90
	16-QAM	2593.0	H	112	225	9.49	1 / 49	15.13	24.62	0.290	33.01	-8.39
5 MHz	QPSK	2498.5	H	165	29	9.49	1 / 12	15.07	24.56	0.286	33.01	-8.45
	QPSK	2593.0	H	112	225	9.49	1 / 0	15.31	24.81	0.302	33.01	-8.20
	QPSK	2687.5	H	125	106	9.86	1 / 12	15.22	**25.08**	0.322	33.01	-7.93
	16-QAM	2498.5	H	165	29	9.49	1 / 12	14.68	24.17	0.261	33.01	-8.84
20 MHz	Opposite Pol.	2680.0	V	115	90	9.51	1 / 0	15.25	24.76	0.299	33.01	-8.25
	WCP	2680.0	H	133	214	9.87	1 / 12	13.46	23.33	0.215	33.01	-9.68

Table 7-7. EIRP Data (LTE Band 41(PC3))

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
100 MHz	π/2 BPSK	2546.01	V	130	56	9.40	1 / 136	13.84	23.24	0.211	33.01	-9.77
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 204	14.54	24.00	0.251	33.01	-9.01
	π/2 BPSK	2640.00	V	125	42	9.50	1 / 204	15.83	**25.33**	0.341	33.01	-7.68
	QPSK	2546.01	V	130	56	9.40	1 / 136	13.80	23.20	0.209	33.01	-9.81
	QPSK	2592.99	V	144	43	9.46	1 / 204	14.53	23.99	0.251	33.01	-9.02
	QPSK	2640.00	V	125	42	9.50	1 / 204	15.73	25.23	0.334	33.01	-7.78
	16-QAM	2640.00	V	125	42	9.50	1 / 204	14.66	24.16	0.261	33.01	-8.85
90 MHz	π/2 BPSK	2541.00	V	130	56	9.46	1 / 183	13.96	23.42	0.220	33.01	-9.59
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 61	14.57	24.03	0.253	33.01	-8.98
	π/2 BPSK	2644.98	V	125	42	9.51	1 / 183	15.89	**25.40**	0.347	33.01	-7.61
	QPSK	2541.00	V	130	56	9.46	1 / 183	13.91	23.37	0.217	33.01	-9.64
	QPSK	2592.99	V	144	43	9.46	1 / 61	14.51	23.97	0.250	33.01	-9.04
	QPSK	2644.98	V	125	42	9.51	1 / 183	15.76	25.27	0.337	33.01	-7.74
	16-QAM	2644.98	V	125	42	9.51	1 / 183	14.75	24.26	0.267	33.01	-8.75
80 MHz	π/2 BPSK	2536.02	V	130	56	9.49	1 / 162	13.84	23.33	0.215	33.01	-9.68
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 54	14.61	24.07	0.255	33.01	-8.94
	π/2 BPSK	2649.99	V	125	42	9.52	1 / 162	15.88	**25.39**	0.346	33.01	-7.62
	QPSK	2536.02	V	130	56	9.49	1 / 162	13.86	23.35	0.216	33.01	-9.66
	QPSK	2592.99	V	144	43	9.46	1 / 54	14.52	23.98	0.250	33.01	-9.03
	QPSK	2649.99	V	125	42	9.52	1 / 162	15.75	25.26	0.336	33.01	-7.75
	16-QAM	2649.99	V	125	42	9.52	1 / 162	14.73	24.24	0.266	33.01	-8.77
70 MHz	π/2 BPSK	2531.01	V	130	56	9.51	1 / 141	13.88	23.40	0.219	33.01	-9.61
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 47	14.55	24.01	0.252	33.01	-9.00
	π/2 BPSK	2655.00	V	125	42	9.51	1 / 47	15.82	25.33	0.341	33.01	-7.68
	QPSK	2531.01	V	130	56	9.51	1 / 141	13.77	23.29	0.213	33.01	-9.72
	QPSK	2592.99	V	144	43	9.46	1 / 47	14.54	24.00	0.251	33.01	-9.01
	QPSK	2655.00	V	125	42	9.51	1 / 47	15.70	25.21	0.332	33.01	-7.80
	16-QAM	2655.00	V	125	42	9.51	1 / 47	14.57	24.08	0.256	33.01	-8.93
60 MHz	π/2 BPSK	2526.00	V	130	56	9.52	1 / 121	13.89	23.41	0.219	33.01	-9.60
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 40	14.67	24.13	0.259	33.01	-8.88
	π/2 BPSK	2659.98	V	125	42	9.50	1 / 121	15.98	**25.48**	0.353	33.01	-7.53
	QPSK	2526.00	V	130	56	9.52	1 / 121	13.80	23.32	0.215	33.01	-9.69
	QPSK	2592.99	V	144	43	9.46	1 / 40	14.64	24.10	0.257	33.01	-8.91
	QPSK	2659.98	V	125	42	9.50	1 / 121	15.82	25.32	0.341	33.01	-7.69
	16-QAM	2526.00	V	130	56	9.52	1 / 121	12.92	22.44	0.175	33.01	-10.57
	16-QAM	2592.99	V	144	43	9.46	1 / 40	13.91	23.37	0.217	33.01	-9.64
	16-QAM	2659.98	V	125	42	9.50	1 / 121	14.80	24.30	0.269	33.01	-8.71
50 MHz	π/2 BPSK	2521.02	V	130	56	9.51	1 / 99	13.89	23.40	0.219	33.01	-9.61
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 33	14.69	24.15	0.260	33.01	-8.86
	π/2 BPSK	2664.99	V	125	42	9.51	1 / 99	15.94	**25.45**	0.351	33.01	-7.56
	QPSK	2521.02	V	130	56	9.51	1 / 99	13.82	23.33	0.215	33.01	-9.68
	QPSK	2592.99	V	144	43	9.46	1 / 33	14.66	24.12	0.258	33.01	-8.89
	QPSK	2664.99	V	125	42	9.51	1 / 99	15.88	25.39	0.346	33.01	-7.62
	16-QAM	2664.99	V	125	42	9.51	1 / 99	14.81	24.32	0.270	33.01	-8.69

Table 7-8. EIRP Data (NR Band n41(PC3))

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
40 MHz	π/2 BPSK	2516.01	V	130	56	9.52	1 / 79	13.88	23.41	0.219	33.01	-9.60
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 79	14.68	24.14	0.260	33.01	-8.87
	π/2 BPSK	2670.00	V	125	42	9.52	1 / 79	16.03	**25.55**	0.359	33.01	-7.46
	QPSK	2516.01	V	130	56	9.52	1 / 79	13.87	23.40	0.219	33.01	-9.61
	QPSK	2592.99	V	144	43	9.46	1 / 79	14.70	24.16	0.261	33.01	-8.85
	QPSK	2670.00	V	125	42	9.52	1 / 79	15.87	25.39	0.346	33.01	-7.62
	16-QAM	2670.00	V	125	42	9.52	1 / 79	14.87	24.39	0.275	33.01	-8.62
30 MHz	π/2 BPSK	2511.00	V	130	56	9.54	1 / 58	13.75	23.29	0.213	33.01	-9.72
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 58	14.62	24.08	0.256	33.01	-8.93
	π/2 BPSK	2674.98	V	125	42	9.52	1 / 58	15.98	**25.49**	0.354	33.01	-7.52
	QPSK	2511.00	V	130	56	9.54	1 / 58	13.69	23.23	0.210	33.01	-9.78
	QPSK	2592.99	V	144	43	9.46	1 / 58	14.65	24.11	0.258	33.01	-8.90
	QPSK	2674.98	V	125	42	9.52	1 / 58	15.84	25.35	0.343	33.01	-7.66
	16-QAM	2674.98	V	125	42	9.52	1 / 58	14.79	24.30	0.269	33.01	-8.71
20 MHz	π/2 BPSK	2506.02	V	130	56	9.54	1 / 37	13.58	23.13	0.205	33.01	-9.88
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 13	14.60	24.06	0.255	33.01	-8.95
	π/2 BPSK	2679.99	V	125	42	9.51	1 / 37	15.94	25.45	0.351	33.01	-7.56
	QPSK	2506.02	V	130	56	9.54	1 / 37	13.51	23.06	0.202	33.01	-9.95
	QPSK	2592.99	V	144	43	9.46	1 / 13	14.56	24.02	0.252	33.01	-8.99
	QPSK	2679.99	V	125	42	9.51	1 / 37	15.78	25.29	0.338	33.01	-7.72
	16-QAM	2679.99	V	125	42	9.51	1 / 37	14.88	24.39	0.275	33.01	-8.62
15 MHz	π/2 BPSK	2503.50	V	130	56	9.54	1 / 28	13.50	23.04	0.201	33.01	-9.97
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 28	14.65	24.11	0.258	33.01	-8.90
	π/2 BPSK	2682.48	V	125	42	9.52	1 / 9	16.04	**25.55**	0.359	33.01	-7.46
	QPSK	2503.50	V	130	56	9.54	1 / 28	13.41	22.95	0.197	33.01	-10.06
	QPSK	2592.99	V	144	43	9.46	1 / 28	14.57	24.03	0.253	33.01	-8.98
	QPSK	2682.48	V	125	42	9.52	1 / 9	15.90	25.41	0.348	33.01	-7.60
	16-QAM	2682.48	V	125	42	9.52	1 / 9	14.89	24.40	0.276	33.01	-8.61
10 MHz	π/2 BPSK	2501.00	V	130	56	9.54	1 / 17	13.59	23.14	0.206	33.01	-9.87
	π/2 BPSK	2592.99	V	144	43	9.46	1 / 17	14.52	23.98	0.250	33.01	-9.03
	π/2 BPSK	2685.00	V	125	42	9.51	1 / 17	15.75	25.26	0.336	33.01	-7.75
	QPSK	2501.00	V	130	56	9.54	1 / 17	13.55	23.10	0.204	33.01	-9.91
	QPSK	2592.99	V	144	43	9.46	1 / 17	14.51	23.97	0.250	33.01	-9.04
	QPSK	2685.00	V	125	42	9.51	1 / 17	15.68	25.19	0.330	33.01	-7.82
	16-QAM	2685.00	V	125	42	9.51	1 / 17	14.58	24.09	0.257	33.01	-8.92
100 MHz	QPSK (CP-OFDM)	2640.00	V	125	41	9.50	1 / 204	14.01	23.51	0.224	33.01	-9.50
	QPSK (Opposite Pol.)	2640.00	H	101	322	9.50	1 / 136	14.42	23.92	0.247	33.01	-9.09
	QPSK (WCP)	2640.00	V	144	22	9.50	1 / 136	13.39	22.89	0.195	33.01	-10.12

Table 7-9. EIRP Data (NR Band n41(PC3))

7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26-2015 – Section 5.5.4

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

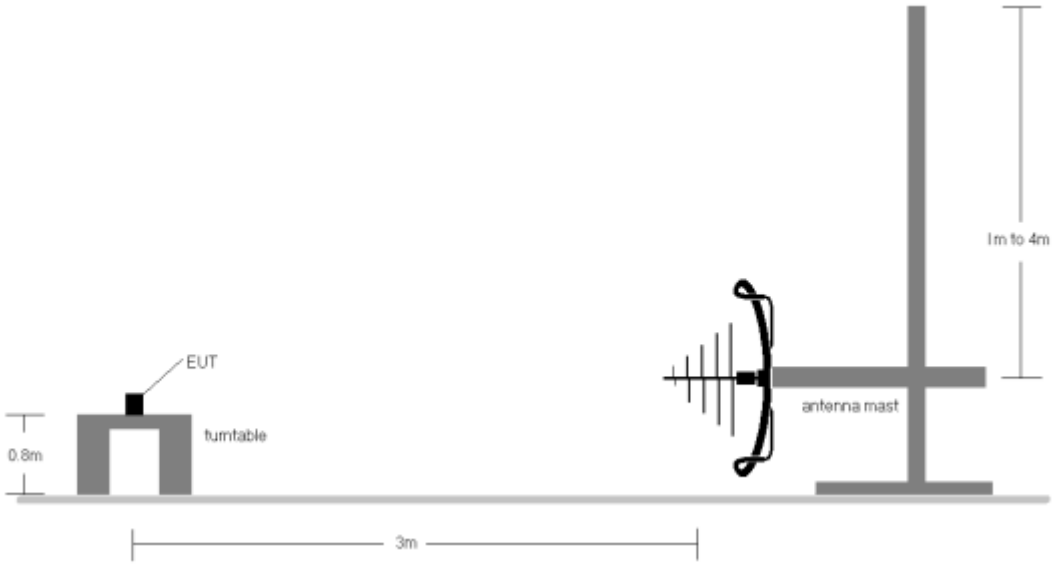


Figure 7-6. Test Instrument & Measurement Setup < 1GHz

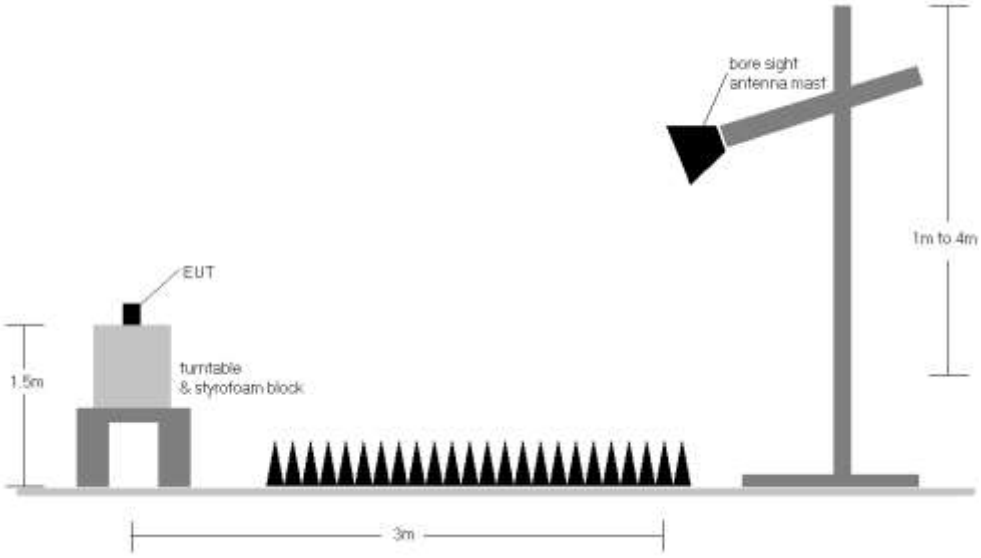


Figure 7-7. Test Instrument & Measurement Setup >1 GHz

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26-2015 Section 5.2.7:
   a) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   b) EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst-case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

3) This unit was tested with its standard battery.

4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

5) Emissions below 18GHz were measured at a 3-meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

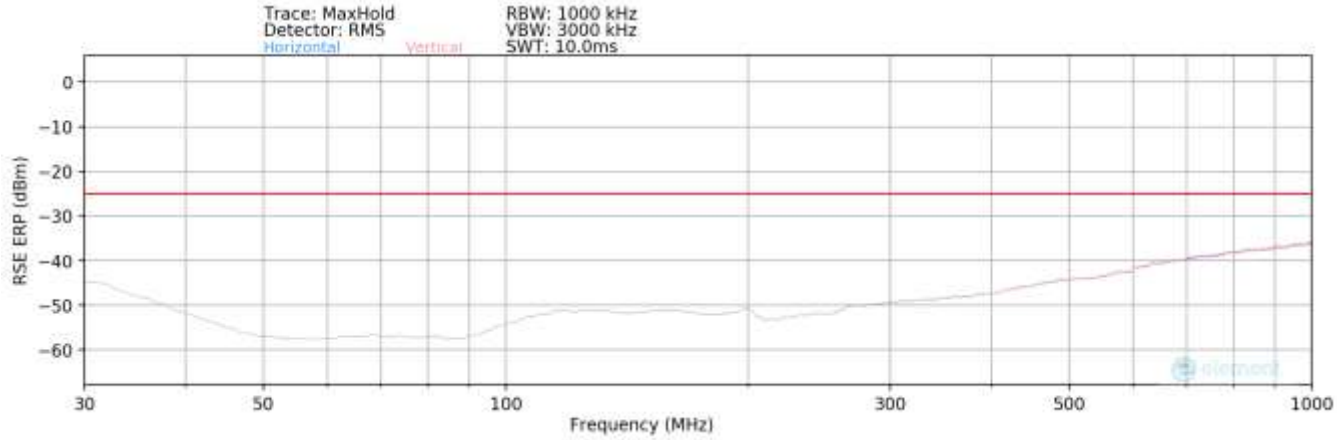
6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

7) ULCA spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.

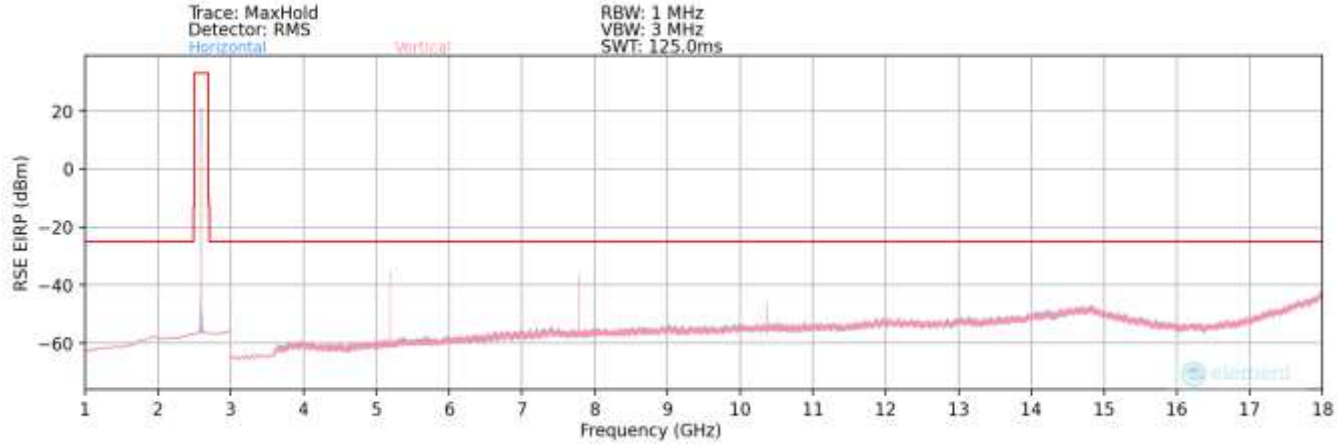
8) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

9) Spurious emissions shown in this section are measured while operating in EN-DC mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor). Spurious emissions from the NR carrier device, is subject to the rules under which the NR carrier operates. Spurious emissions caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

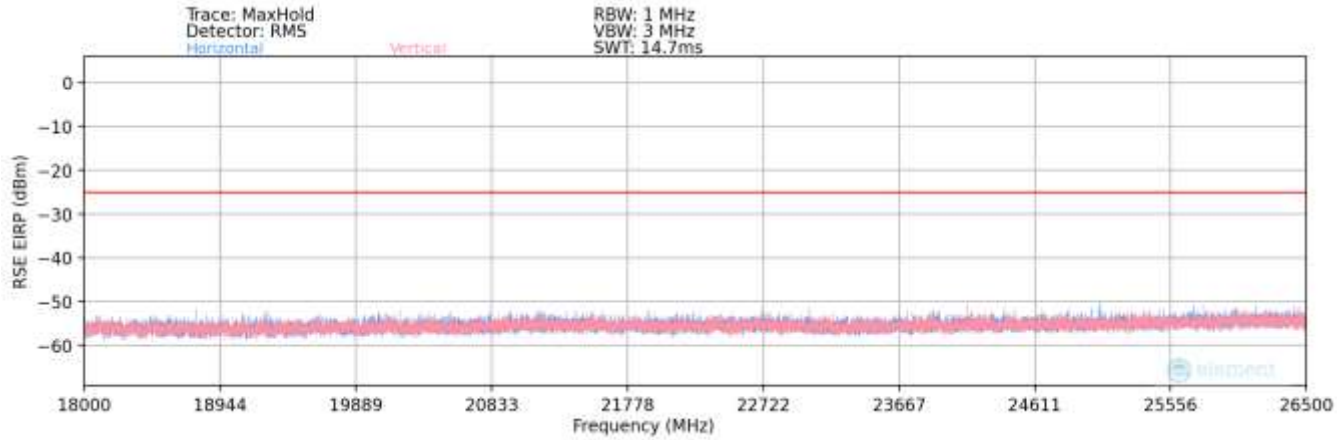
LTE Band 41(PC3)



Plot 7-104. Radiated Spurious Plot (LTE Band 41(PC3))



Plot 7-105. Radiated Spurious Plot (LTE Band 41(PC3))



Plot 7-106. Radiated Spurious Plot (LTE Band 41(PC3))

Bandwidth (MHz):	20
Frequency (MHz):	2593.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
61.33	V	-	-	-84.24	14.37	37.13	-60.27	-25.00	-35.27
100.68	V	-	-	-84.16	17.68	40.52	-56.89	-25.00	-31.89
297.31	V	-	-	-84.07	21.28	44.21	-53.19	-25.00	-28.19

Table 7-10. Radiated Spurious Data Below 1GHz (LTE Band 41(PC3) – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2506.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5012.00	V	121	28	-48.45	-0.47	58.08	-37.17	-25.00	-12.17
7518.00	V	111	296	-50.91	4.19	60.28	-34.98	-25.00	-9.98
10024.00	V	123	91	-72.49	8.01	42.52	-52.74	-25.00	-27.74
12530.00	V	186	244	-76.91	9.81	39.90	-55.35	-25.00	-30.35
15036.00	V	-	-	-78.06	12.60	41.54	-53.72	-25.00	-28.72
17542.00	V	-	-	-78.53	14.18	42.65	-52.61	-25.00	-27.61
20048.00	V	-	-	-65.24	2.99	44.75	-60.05	-25.00	-35.05

Table 7-11. Radiated Spurious Data (LTE Band 41(PC3) – Low Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2593.0
RB / Offset:	1 / 50

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5186.00	V	129	21	-47.10	-0.18	59.72	-35.54	-25.00	-10.54
7779.00	V	115	300	-47.34	4.76	64.42	-30.84	-25.00	-5.84
10372.00	V	135	80	-73.95	8.25	41.30	-53.96	-25.00	-28.96
12965.00	V	-	-	-78.22	10.41	39.19	-56.07	-25.00	-31.07
15558.00	V	-	-	-78.60	10.44	38.84	-56.42	-25.00	-31.42
18151.00	V	-	-	-65.34	1.37	43.03	-61.77	-25.00	-36.77

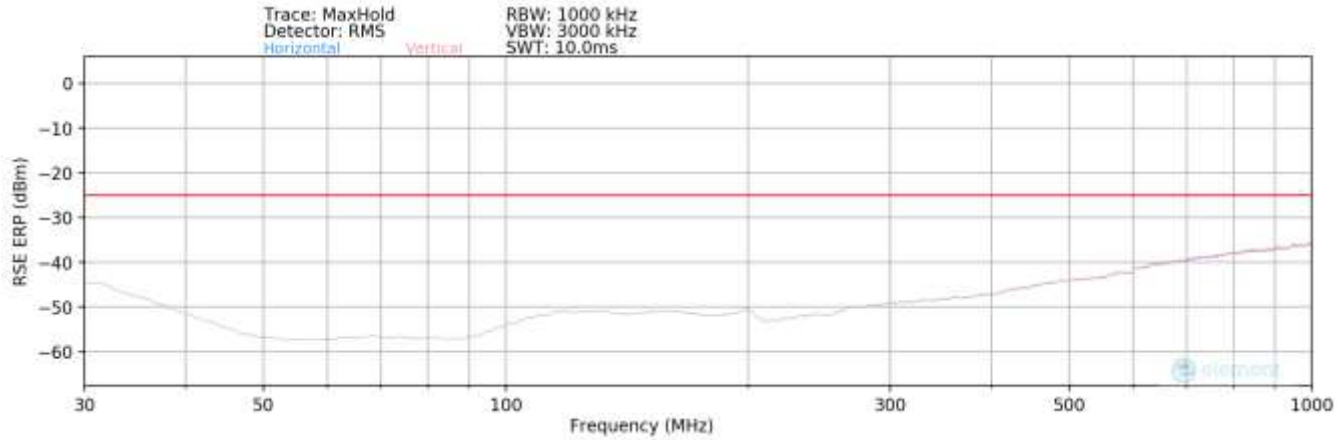
Table 7-12. Radiated Spurious Data (LTE Band 41(PC3) – Mid Channel)

Bandwidth (MHz):	20
Frequency (MHz):	2680.0
RB / Offset:	1 / 50

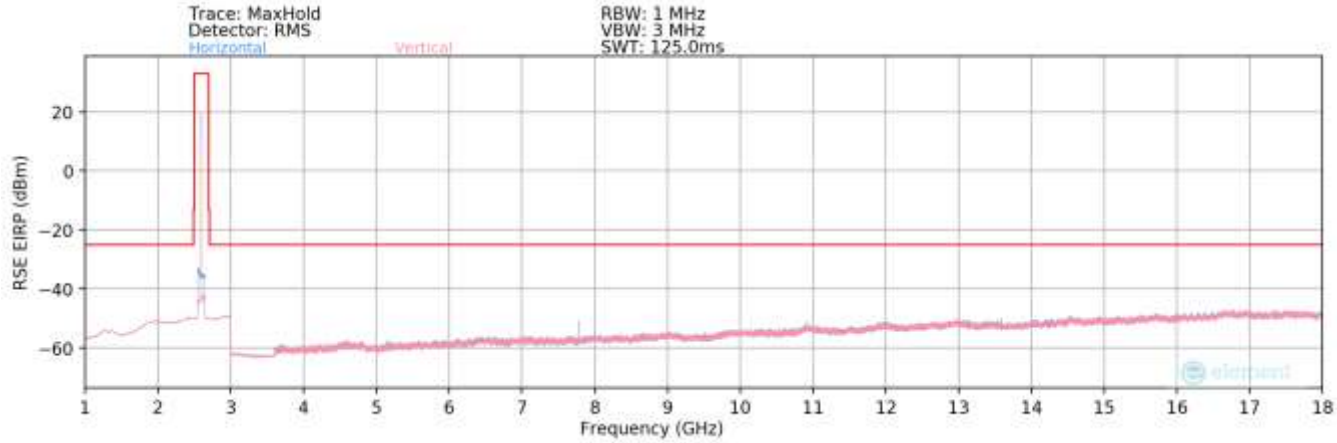
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5360.00	V	137	19	-56.06	0.31	51.25	-44.01	-25.00	-19.01
8040.00	V	129	303	-70.94	5.57	41.63	-53.63	-25.00	-28.63
10720.00	V	129	297	-78.02	8.53	37.51	-57.75	-25.00	-32.75
13400.00	V	-	-	-78.41	10.78	39.37	-55.89	-25.00	-30.89
16080.00	V	-	-	-77.50	8.02	37.52	-57.74	-25.00	-32.74
18760.00	V	-	-	-65.00	1.80	43.81	-60.99	-25.00	-35.99

Table 7-13. Radiated Spurious Data (LTE Band 41(PC3) – High Channel)

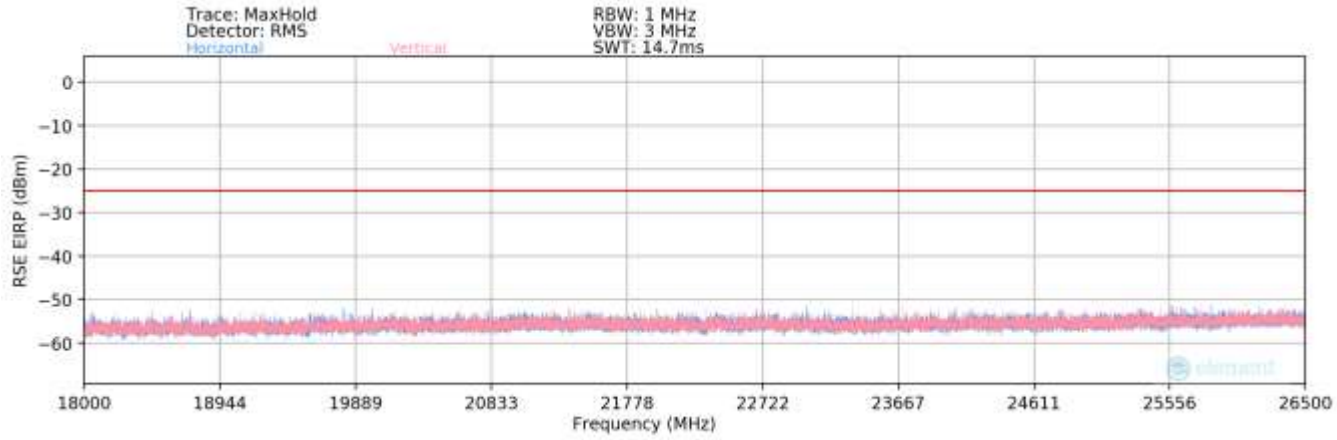
NR Band n41(PC3)



Plot 7-107. Radiated Spurious Plot (NR Band n41(PC3))



Plot 7-108. Radiated Spurious Plot (NR Band n41(PC3))



Plot 7-109. Radiated Spurious Plot (NR Band n41(PC3))

Bandwidth (MHz):	100
Frequency (MHz):	2592.99
RB / Offset:	1 / 136

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
124.43	H	-	-	-80.87	20.55	46.68	-50.72	-25.00	-25.72
281.89	H	-	-	-80.79	20.81	47.02	-50.39	-25.00	-25.39
420.75	H	-	-	-80.68	24.12	50.44	-46.96	-25.00	-21.96

Table 7-14. Radiated Spurious Data (NR Band n41(PC3) – Mid Channel)

Bandwidth (MHz):	100
Frequency (MHz):	2550.00
RB / Offset:	1 / 136

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5100.00	H	158	322	-75.23	4.75	36.52	-58.73	-25.00	-33.73
7650.00	H	149	11	-68.93	7.70	45.77	-49.49	-25.00	-24.49
10200.00	H	-	-	-78.17	11.01	39.84	-55.42	-25.00	-30.42
12750.00	H	-	-	-78.47	13.94	42.47	-52.79	-25.00	-27.79
15300.00	H	-	-	-79.14	15.84	43.70	-51.55	-25.00	-26.55

Table 7-15. Radiated Spurious Data (NR Band n41(PC3) – Low Channel)

Bandwidth (MHz):	100
Frequency (MHz):	2592.99
RB / Offset:	1 / 136

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5185.98	H	167	328	-74.80	5.06	37.26	-57.99	-25.00	-32.99
7778.97	H	143	24	-65.97	7.29	48.32	-46.93	-25.00	-21.93
10371.96	H	-	-	-77.84	11.01	40.17	-55.09	-25.00	-30.09
12964.95	H	-	-	-78.10	14.59	43.49	-51.77	-25.00	-26.77
15557.94	H	-	-	-78.27	15.64	44.37	-50.89	-25.00	-25.89

Table 7-16. Radiated Spurious Data (NR Band n41(PC3) – Mid Channel)

Bandwidth (MHz):	100
Frequency (MHz):	2640.00
RB / Offset:	1 / 136

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5280.00	H	164	173	-75.70	4.75	36.05	-59.21	-25.00	-34.21
7920.00	H	161	328	-70.55	8.35	44.80	-50.46	-25.00	-25.46
10560.00	H	-	-	-78.75	11.58	39.83	-55.43	-25.00	-30.43
13200.00	H	-	-	-78.46	13.82	42.36	-52.89	-25.00	-27.89
15840.00	H	-	-	-78.78	16.90	45.12	-50.14	-25.00	-25.14

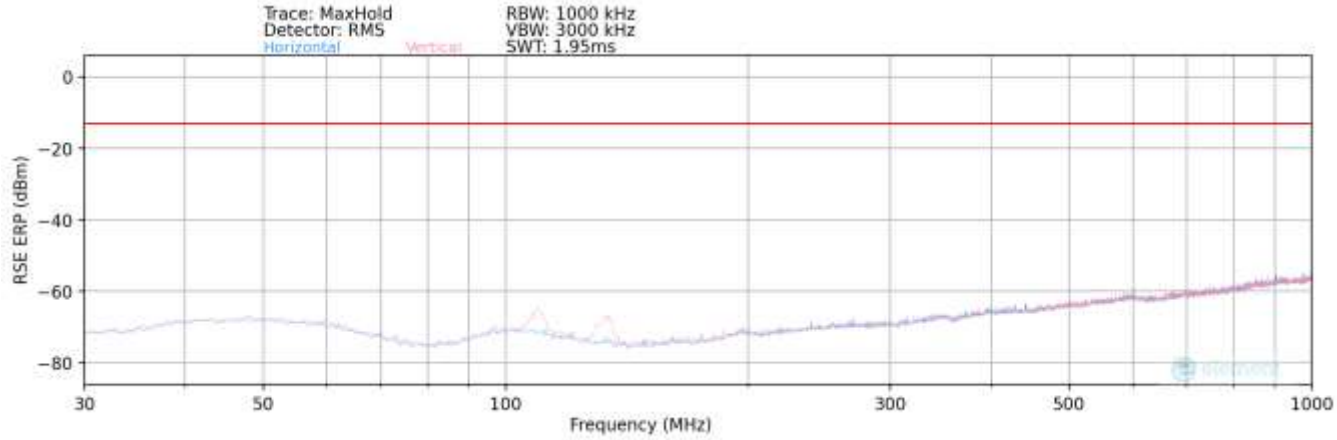
Table 7-17. Radiated Spurious Data (NR Band n41(PC3) – High Channel)

Case:	w/ Wireless Charging Pad
Bandwidth (MHz):	100
Frequency (MHz):	2593.0
RB / Offset:	1 / 136

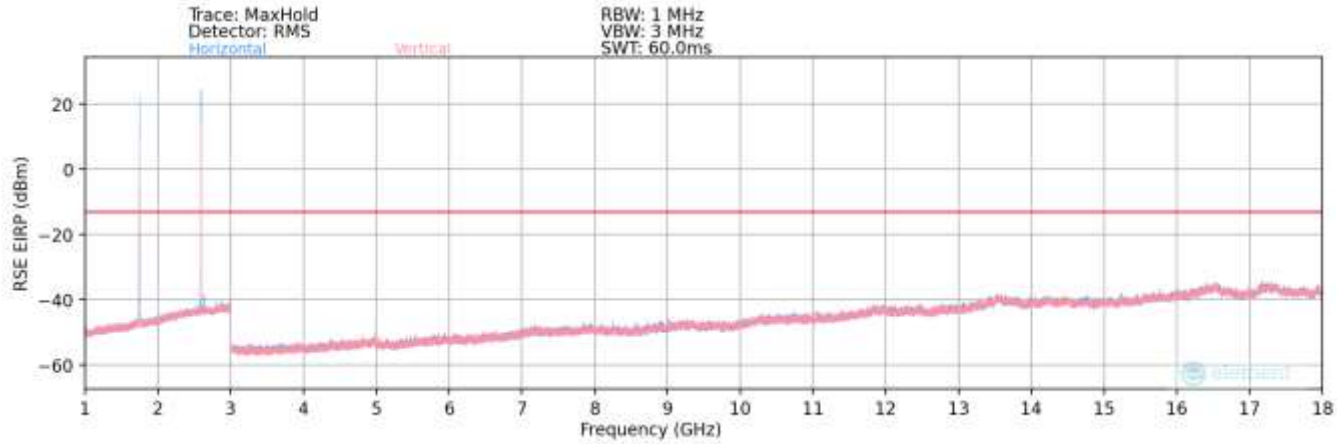
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5185.98	H	334	207	-72.86	5.06	39.20	-56.05	-25.00	-31.05
7778.97	H	122	196	-70.33	7.29	43.96	-51.29	-25.00	-26.29
10371.96	H	-	-	-78.12	11.01	39.89	-55.37	-25.00	-30.37
12964.95	H	-	-	-78.62	14.59	42.97	-52.29	-25.00	-27.29
15557.94	H	-	-	-78.49	15.64	44.15	-51.11	-25.00	-26.11

Table 7-18. Radiated Spurious Data with WCP (NR Band n41(PC3))

EN-DC n41(PC3) – Band 66



Plot 7-110. Radiated Spurious Plot Below 1GHz (NR 41(PC3) – Band 66)



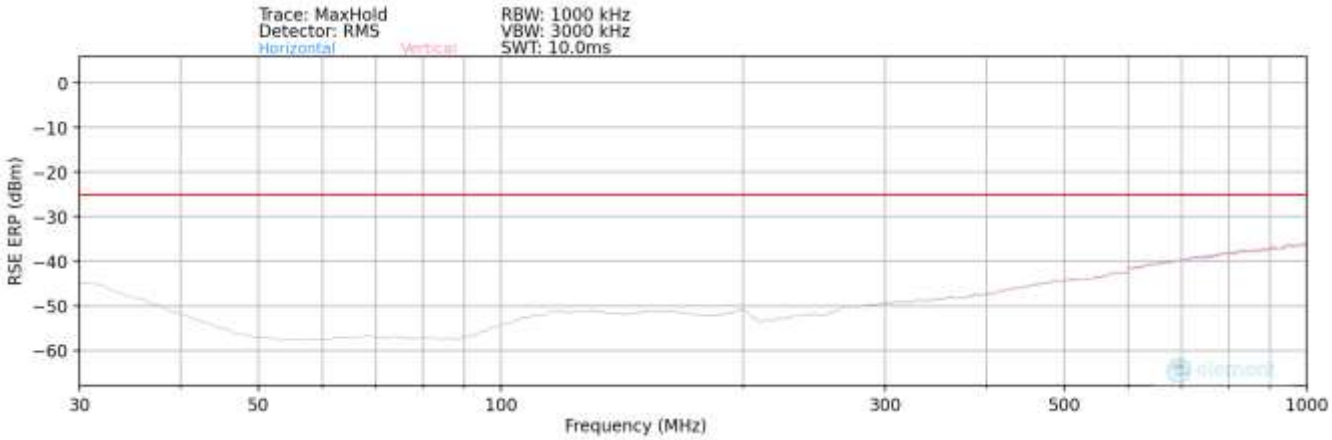
Plot 7-111. Radiated Spurious Plot (NR 41(PC3) – Band 66)

Bandwidth (MHz):	100 & 20
Frequency (MHz):	2593 & 1745
RB / Offset:	1/136 & 1/50
Mode:	EN-DC
Anchor Band:	B66

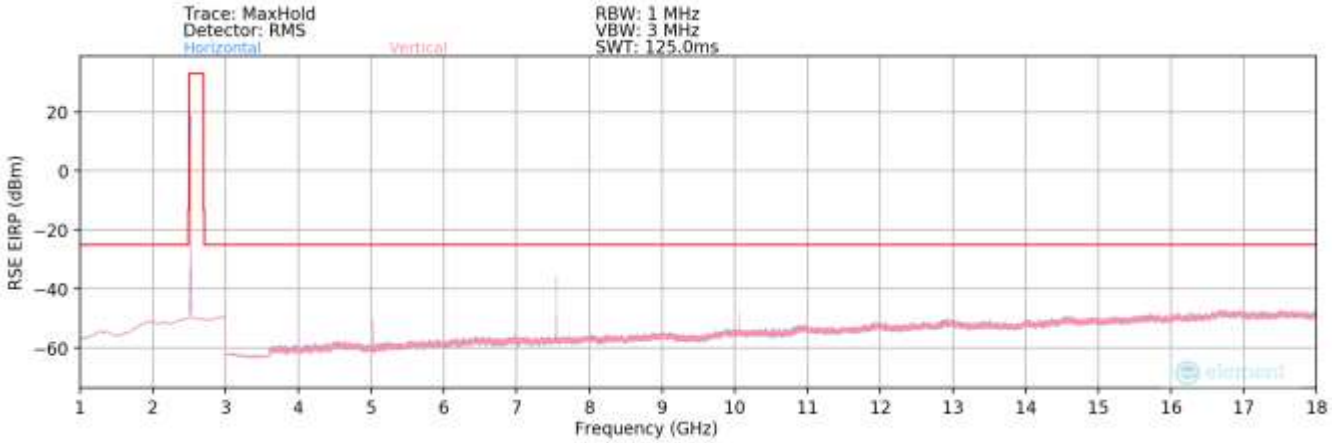
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
109.00	V	322	78	-63.36	-16.53	27.11	-68.15	-13.00	-55.15
134.00	V	120	287	-60.41	-19.60	26.99	-68.27	-13.00	-55.27
799.00	V	-	-	-71.80	-4.64	30.56	-64.70	-13.00	-51.70
5137.00	V	-	-	-73.57	11.12	44.55	-50.71	-13.00	-37.71
8774.00	V	-	-	-75.02	16.80	48.78	-46.48	-13.00	-33.48
13063.00	V	-	-	-75.98	24.01	55.03	-40.23	-13.00	-27.23

Table 7-19 . Radiated Spurious Data (NR 41(PC3) – Band 66)

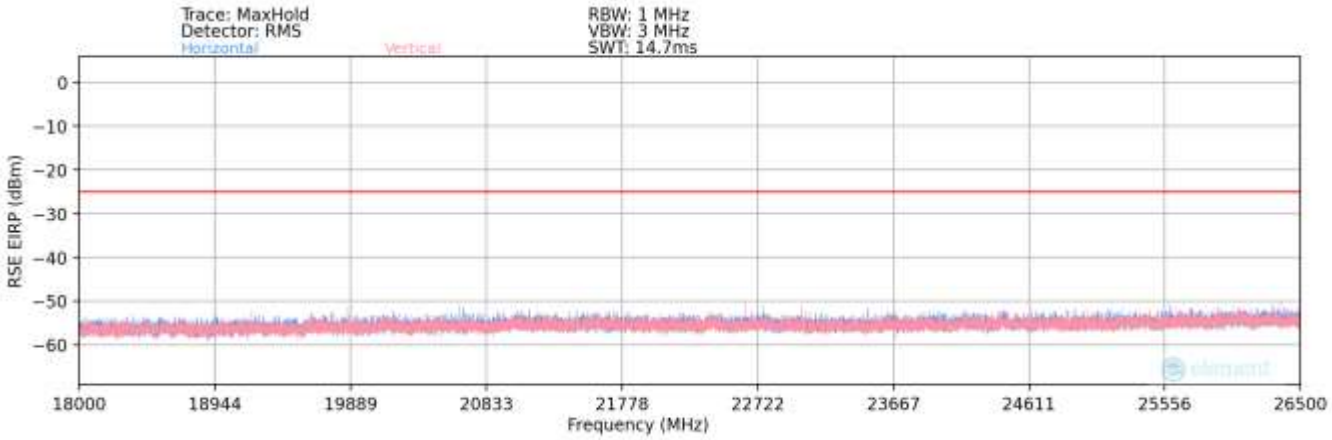
ULCA - LTE B41(PC3)



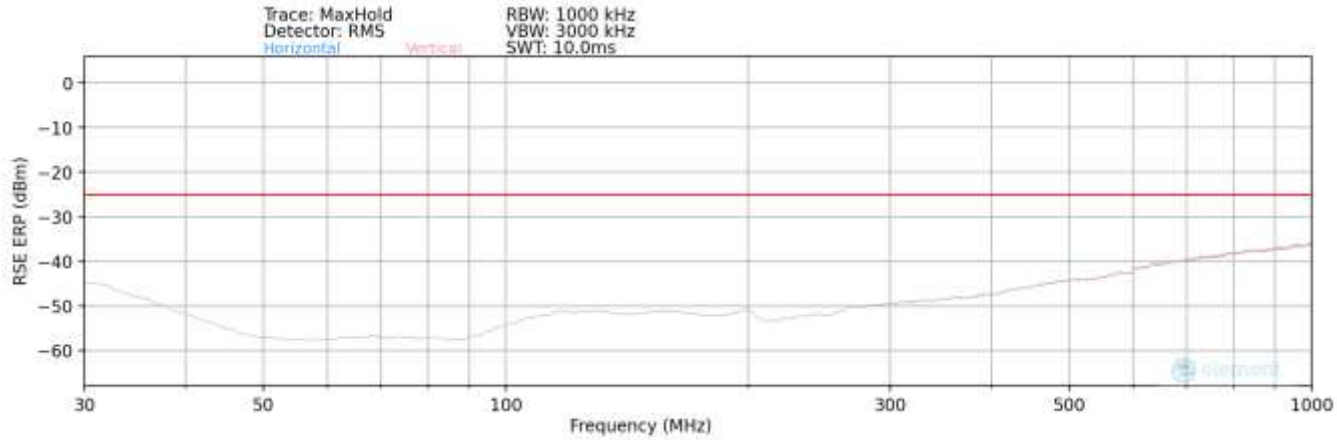
Plot 7-112. Radiated Spurious Plot (ULCA LTE B41(PC3) – Low Channel)



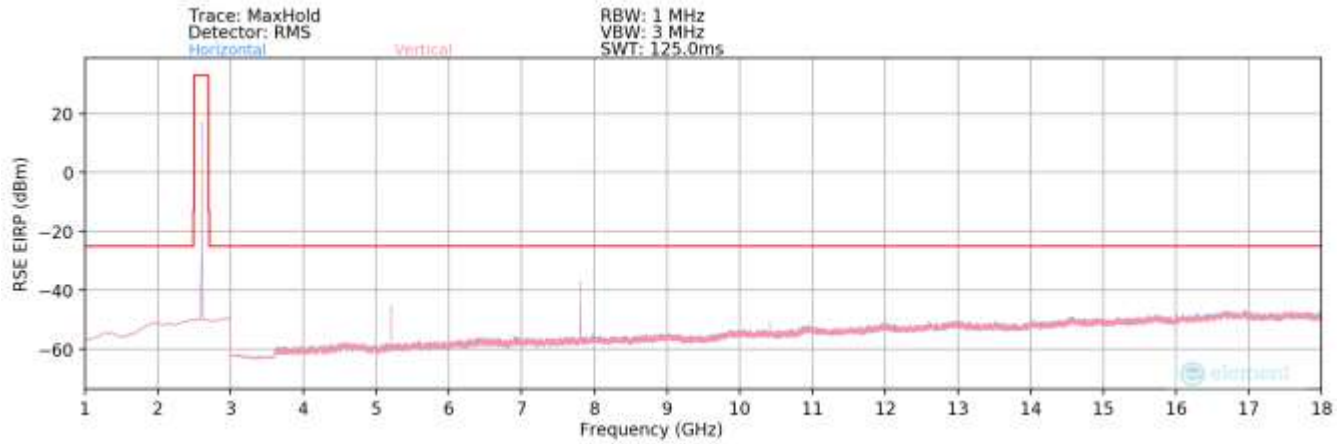
Plot 7-113. Radiated Spurious Plot (ULCA LTE B41(PC3) – Low Channel)



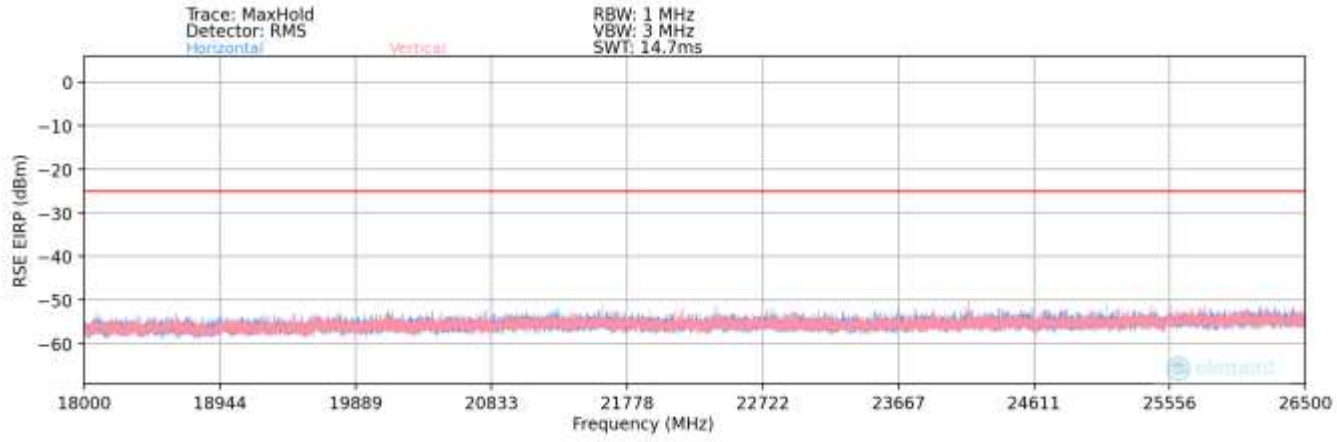
Plot 7-114. Radiated Spurious Plot (ULCA LTE B41(PC3) – Low Channel)



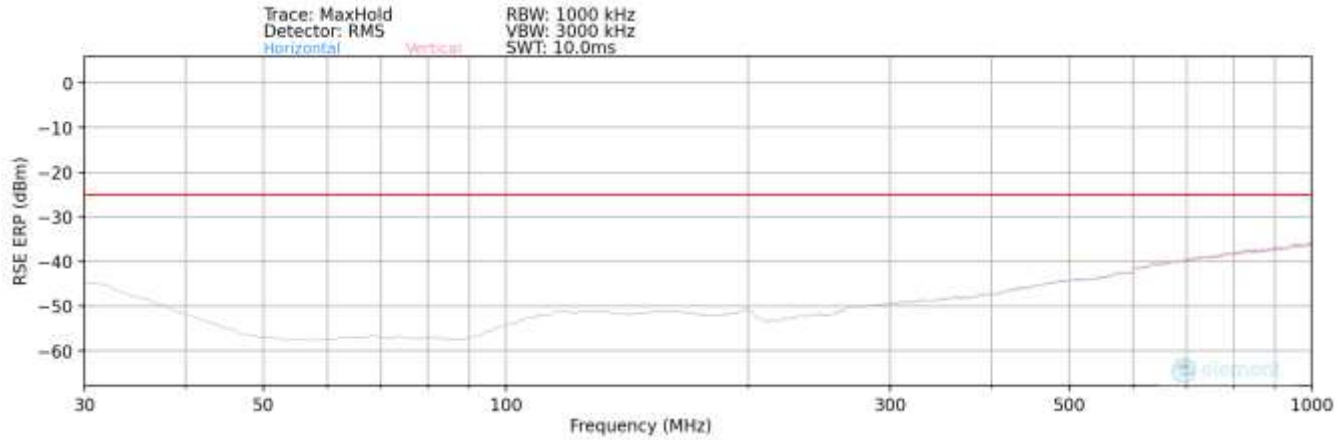
Plot 7-115. Radiated Spurious Plot (ULCA LTE B41(PC2) – Mid Channel)



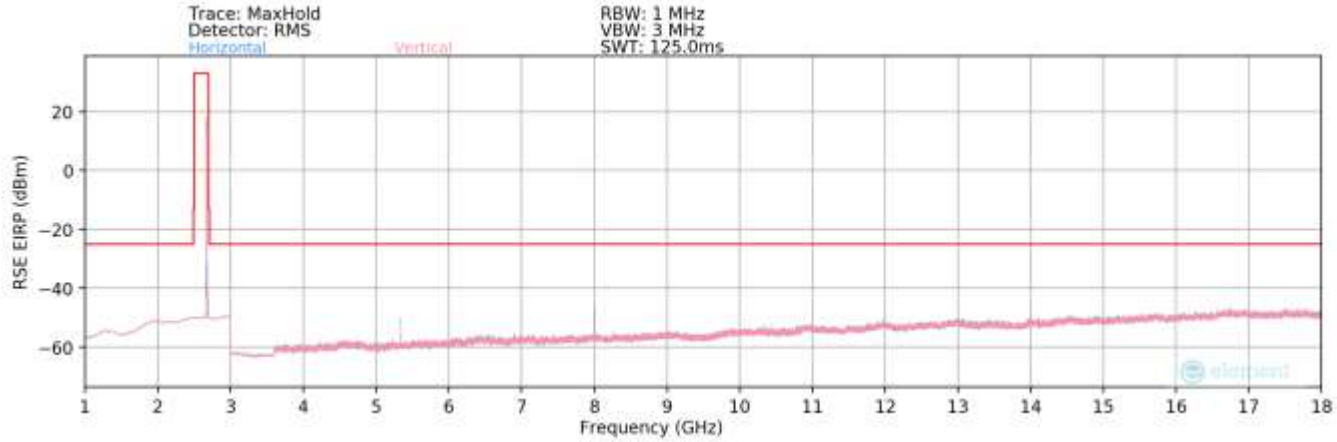
Plot 7-116. Radiated Spurious Plot (ULCA LTE B41(PC3) – Mid Channel)



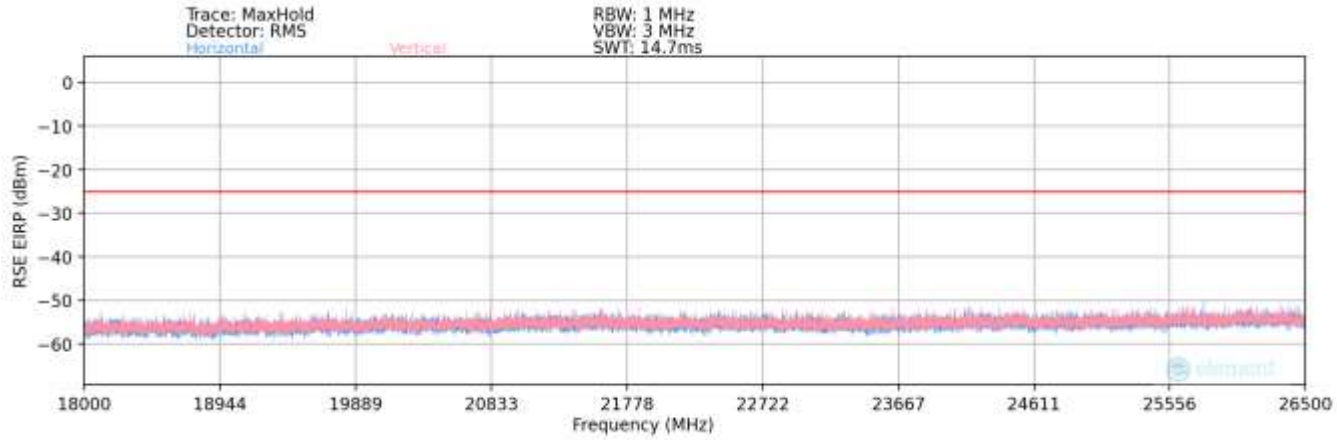
Plot 7-117. Radiated Spurious Plot (ULCA LTE B41(PC3) – Mid Channel)



Plot 7-118. Radiated Spurious Plot (ULCA LTE B41(PC3) – High Channel)



Plot 7-119. Radiated Spurious Plot (ULCA LTE B41(PC3) – High Channel)



Plot 7-120. Radiated Spurious Plot (ULCA LTE B41(PC3) – High Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2593.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2612.8
SCC RB / Offset:	1 / 0

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
95.27	H	-	-	-81.04	15.99	41.95	-55.46	-25.00	-30.46
305.76	H	-	-	-80.70	21.28	47.58	-49.83	-25.00	-24.83
485.65	H	-	-	-81.05	25.96	51.91	-45.50	-25.00	-20.50

Table 7-20. Radiated Spurious Data Below 1GHz (ULCA LTE B41(PC3) – Mid Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2506.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2525.8
SCC RB / Offset:	1 / 0

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5012.00	H	120	25	-58.70	4.36	52.66	-42.60	-25.00	-17.60
7518.00	H	139	332	-57.06	7.50	57.44	-37.82	-25.00	-12.82
10024.00	H	197	47	-65.85	10.28	51.43	-43.83	-25.00	-18.83
12530.00	H	-	-	-69.74	13.59	50.85	-44.41	-25.00	-19.41
15036.00	H	-	-	-69.77	15.29	52.52	-42.73	-25.00	-17.73
17542.00	H	-	-	-69.60	17.15	54.55	-40.71	-25.00	-15.71

Table 7-21. Radiated Spurious Data (ULCA LTE B41(PC3) – Low Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2593.0
PCC RB / Offset:	1 / 99
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2612.8
SCC RB / Offset:	1 / 0

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5186.00	H	120	135	-48.25	5.06	63.81	-31.44	-25.00	-6.44
7779.00	H	120	328	-53.68	7.29	60.61	-34.64	-25.00	-9.64
10372.00	H	119	351	-68.98	11.01	49.03	-46.23	-25.00	-21.23
12965.00	H	-	-	-69.50	14.59	52.09	-43.17	-25.00	-18.17
15558.00	H	-	-	-69.10	15.64	53.54	-41.72	-25.00	-16.72
18151.00	H	-	-	-59.12	1.37	49.25	-55.55	-25.00	-30.55

Table 7-22. Radiated Spurious Data (ULCA LTE B41(PC3) – Mid Channel)

PCC Bandwidth (MHz):	20
PCC Frequency (MHz):	2680.0
PCC RB / Offset:	1 / 0
SCC Bandwidth (MHz):	20
SCC Frequency (MHz):	2660.2
SCC RB / Offset:	1 / 99

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
5360.00	H	120	312	-55.92	4.86	55.94	-39.32	-25.00	-14.32
8040.00	H	120	275	-56.75	8.14	58.39	-36.87	-25.00	-11.87
10720.00	H	119	52	-67.47	11.70	51.23	-44.03	-25.00	-19.03
13400.00	H	-	-	-69.50	13.81	51.31	-43.94	-25.00	-18.94
16080.00	H	-	-	-69.94	16.85	53.91	-41.34	-25.00	-16.34
18760.00	H	-	-	-59.02	1.80	49.78	-55.02	-25.00	-30.02

Table 7-23. Radiated Spurious Data (ULCA LTE B41(PC3) – High Channel)

7.8 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015. The frequency stability of the transmitter is measured by:

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

For Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI C63.26-2015 – Section 5.6

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

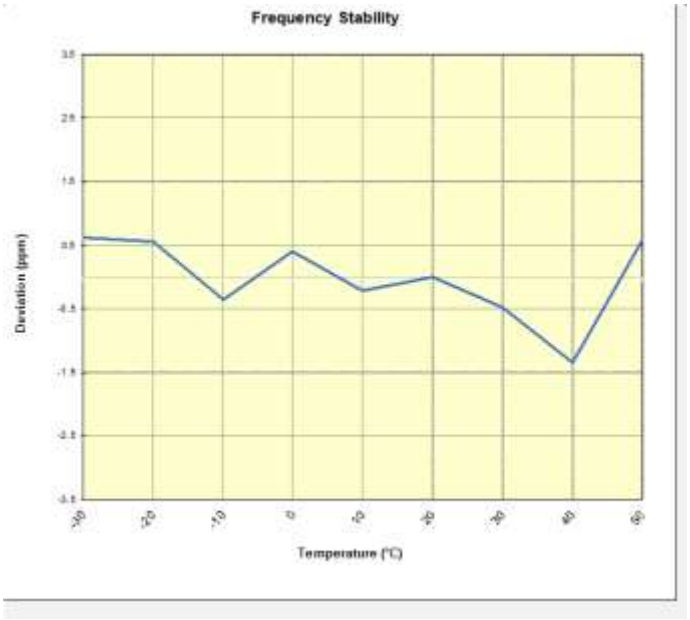
None

LTE Band 41/38

Operating Frequency (Hz):	2,593,000,000
Ref. Voltage (VDC):	4.34

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.34	- 30	2,593,090,866	1,614	0.0000622
		- 20	2,593,090,684	1,432	0.0000552
		- 10	2,593,088,314	-938	-0.0000362
		0	2,593,090,315	1,062	0.0000410
		+ 10	2,593,088,695	-558	-0.0000215
		+ 20 (Ref)	2,593,089,252	0	0.0000000
		+ 30	2,593,087,988	-1,264	-0.0000487
		+ 40	2,593,085,752	-3,501	-0.0001350
		+ 50	2,593,090,781	1,529	0.0000590
Battery Endpoint	3.71	+ 20	2,593,088,825	-427	-0.0000165

Table 7-24. LTE Band 41(PC3) Frequency Stability Data



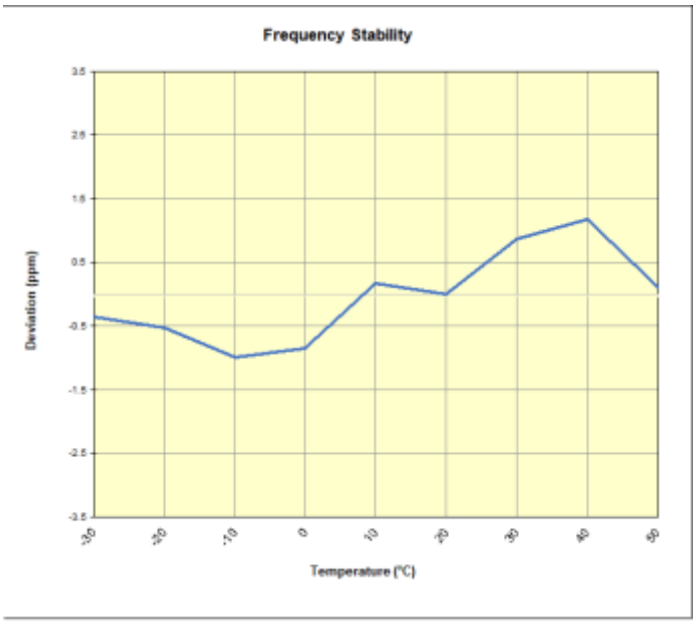
Plot 7-121. LTE Band 41(PC3) Frequency Stability Chart

NR Band n41

Operating Frequency (Hz):	2,593,000,000
Ref. Voltage (VDC):	4.34

Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.34	- 30	2,592,975,115	-930	-0.0000359
		- 20	2,592,974,669	-1,377	-0.0000531
		- 10	2,592,973,479	-2,566	-0.0000990
		0	2,592,973,850	-2,196	-0.0000847
		+ 10	2,592,976,479	434	0.0000167
		+ 20 (Ref)	2,592,976,046	0	0.0000000
		+ 30	2,592,978,277	2,231	0.0000860
		+ 40	2,592,979,079	3,034	0.0001170
		+ 50	2,592,976,322	277	0.0000107
Battery Endpoint	3.71	+ 20	2,592,974,564	-1,481	-0.0000571

Table 7-25. NR Band n41(PC3) Frequency Stability Data



Plot 7-122. NR Band n41(PC3) Frequency Stability Chart

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMS911JPN** complies with all the requirements of Part 27 of the FCC rules.