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MEASUREMENT REPORT
LTE

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

Date of Testing:
6/11 - 8/19/2020
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2008190137-03.A3L

FCC ID:	**A3LSMF916JPN**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SCG05
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	22, 24, & 27
Test Procedure(s):	ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01, KDB 648474 D03 v01r04

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.

Randy Ortanez
President

ACCREDITED
CERT #2041.01

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MEASUREMENT REPORT
FCC Part 22, 24, & 27

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 5	10 MHz	QPSK	829.0 - 844.0	0.053	17.26	9M02G7D
		16QAM	829.0 - 844.0	0.050	17.00	8M99W7D
		64QAM	829.0 - 844.0	0.037	15.63	8M99W7D
		256QAM	829.0 - 844.0	0.022	13.45	8M98W7D
	5 MHz	QPSK	826.5 - 846.5	0.054	17.35	4M51G7D
		16QAM	826.5 - 846.5	0.050	16.98	4M51W7D
		64QAM	826.5 - 846.5	0.037	15.72	4M52W7D
		256QAM	826.5 - 846.5	0.023	13.56	4M49W7D
	3 MHz	QPSK	825.5 - 847.5	0.054	17.36	2M70G7D
		16QAM	825.5 - 847.5	0.049	16.94	2M72W7D
		64QAM	825.5 - 847.5	0.037	15.71	2M70W7D
		256QAM	825.5 - 847.5	0.022	13.38	2M71W7D
	1.4 MHz	QPSK	824.7 - 848.3	0.055	17.38	1M10G7D
		16QAM	824.7 - 848.3	0.049	16.92	1M10W7D
		64QAM	824.7 - 848.3	0.037	15.72	1M10W7D
		256QAM	824.7 - 848.3	0.022	13.41	1M09W7D

EUT Overview (Part 22)

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		ERP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
LTE Band 12	10 MHz	QPSK	704.0 - 711.0	0.088	19.42	0.053	17.27	9M01G7D
		16QAM	704.0 - 711.0	0.068	18.34	0.042	16.19	8M97W7D
		64QAM	704.0 - 711.0	0.052	17.19	0.032	15.04	8M97W7D
		256QAM	704.0 - 711.0	0.038	15.76	0.023	13.61	8M97W7D
	5 MHz	QPSK	701.5 - 713.5	0.083	19.17	0.050	17.02	4M50G7D
		16QAM	701.5 - 713.5	0.072	18.55	0.044	16.40	4M50W7D
		64QAM	701.5 - 713.5	0.048	16.79	0.029	14.64	4M52W7D
		256QAM	701.5 - 713.5	0.034	15.34	0.021	13.19	4M50W7D
	3 MHz	QPSK	700.5 - 714.5	0.081	19.07	0.049	16.92	2M70G7D
		16QAM	700.5 - 714.5	0.074	18.66	0.045	16.51	2M72W7D
		64QAM	700.5 - 714.5	0.047	16.76	0.029	14.61	2M71W7D
		256QAM	700.5 - 714.5	0.069	18.39	0.042	16.24	2M71W7D
	1.4 MHz	QPSK	699.7 - 715.3	0.080	19.02	0.049	16.87	1M10G7D
		16QAM	699.7 - 715.3	0.068	18.33	0.042	16.18	1M10W7D
		64QAM	699.7 - 715.3	0.047	16.71	0.029	14.56	1M10W7D
		256QAM	699.7 - 715.3	0.057	17.59	0.035	15.44	1M09W7D
LTE Band 13	10 MHz	QPSK	782.0	0.119	20.77	0.073	18.62	8M93G7D
		16QAM	782.0	0.103	20.13	0.063	17.98	8M98W7D
		64QAM	782.0	0.080	19.03	0.049	16.88	8M95W7D
		256QAM	782.0	0.037	15.66	0.022	13.51	8M92W7D
	5 MHz	QPSK	779.5 - 784.5	0.128	21.08	0.078	18.93	4M53G7D
		16QAM	779.5 - 784.5	0.111	20.47	0.068	18.32	4M49W7D
		64QAM	779.5 - 784.5	0.083	19.20	0.051	17.05	4M53W7D
		256QAM	779.5 - 784.5	0.038	15.81	0.023	13.66	4M50W7D

EUT Overview (Part 27 <1GHz)

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	0.295	24.70	18M0G7D
		16QAM	2506.0 - 2680.0	0.228	23.59	17M9W7D
		64QAM	2506.0 - 2680.0	0.203	23.08	18M0W7D
		256QAM	2506.0 - 2680.0	0.120	20.79	17M9W7D
	15 MHz	QPSK	2503.5 - 2682.5	0.285	24.55	13M5G7D
		16QAM	2503.5 - 2682.5	0.228	23.59	13M5W7D
		64QAM	2503.5 - 2682.5	0.181	22.58	13M5W7D
		256QAM	2503.5 - 2682.5	0.108	20.32	13M5W7D
	10 MHz	QPSK	2501.0 - 2685.0	0.294	24.68	9M00G7D
		16QAM	2501.0 - 2685.0	0.237	23.75	9M01W7D
		64QAM	2501.0 - 2685.0	0.182	22.61	9M00W7D
		256QAM	2501.0 - 2685.0	0.110	20.43	8M99W7D
	5 MHz	QPSK	2498.5 - 2687.5	0.294	24.68	4M51G7D
		16QAM	2498.5 - 2687.5	0.234	23.69	4M51W7D
		64QAM	2498.5 - 2687.5	0.186	22.69	4M54W7D
		256QAM	2498.5 - 2687.5	0.109	20.37	4M48W7D

EUT Overview (Part 27 >1GHz)

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 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility 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 PCTEST located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 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.

- PCTEST 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).

- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMF916JPN**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: N/A

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, 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.

The EUT is capable of operating in folded closed and unfolded open configurations. The worst-case configuration for radiated emissions was determined from open and closed configurations in X, Y, and Z orientations for horizontal and vertical antenna polarizations. The worst case radiated emissions data is shown in this report.

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. 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) 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 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 Measurement Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT**.**

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. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then 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 $_{[dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10 $\log_{10}$(Power $_{[Watts]}$). 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 474788 D01.

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
-	LTx2	Licensed Transmitter Cable Set	4/9/2020	Annual	4/9/2021	LTx2
Agilent	8648D	(9kHz-4GHz) Signal Generator	6/23/2020	Annual	6/23/2021	3613A00315
Anritsu	MT8821C	Radio Communication Analyzer	3/10/2020	Annual	3/10/2021	6200901190
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Espec	ESX-2CA	Environmental Chamber	8/13/2019	Annual	8/13/2020	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
ETS-Lindgren	3115	Double Ridged Guide Horn 750MHz - 18GHz	3/12/2020	Biennial	3/12/2022	150693
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			107826
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			836536/0005
Rohde & Schwarz	CMW500	Radio Communication Tester	8/26/2019	Annual	8/26/2020	100976
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	11/1/2019	Annual	11/1/2020	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/23/2019	Annual	9/23/2020	100348
Rohde & Schwarz	TC-TA18	Cross-Pol Antenna 400MHz-18GHz	7/8/2020	Biennial	7/8/2022	101058
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/21/2020	Annual	2/21/2021	102133
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/27/2019	Biennial	8/27/2021	A042511

Table 5-1. Test Equipment

Notes:

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

6.0 SAMPLE CALCULATIONS

Emission Designator

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 – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average 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 analzyer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMF916JPN

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

Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
2.1051 22.917(a) 27.53(c) 27.53(g) 27.53(h)	Out of Band Emissions	> 43 + 10 $\log_{10}$ (P[Watts]) at Band Edge and for all out-of-band emissions			Section 7.3, 7.4
27.53(m)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3, 7.4
27.53(a)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(a)			Section 7.3, 7.4
27.50	Peak-Average Ratio	< 13 dB			Section **Error! Reference source not found.**
2.1046	Transmitter Conducted Output Power	N/A			See RF Exposure Report
22.917(a) 27.53(h)	Uplink Carrier Aggregation	>43 + 10log(P[Watts]) at Band Edge and for all out-of-band emissions			Section 7.6
2.1055 22.355 27.54	Frequency Stability	< 2.5 ppm (Part 22) and fundamental emissions stay within authorized frequency block (Part 27)			Section 7.9

Table 7-1. Summary of Conducted Test Results

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
27.50(b)(10) 27.50(c)(10)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 12, 13)	< 3 Watts max. ERP	RADIATED	PASS	Section 7.7
27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 41)	< 2 Watts max. EIRP			Section 7.7
2.1053 22.917(a) 27.53(c) 27.53(g) 27.53(h)	Undesirable Emissions (Band 12, 13, 5)	> 43 + 10 $\log_{10}$ (P[Watts]) for all out-of-band emissions			Section 7.7
27.53(f)	Undesirable Emissions (Band 13)	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 – 1610 MHz			Section 7.7
27.53(m)	Undesirable Emissions (Band 41)	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.7
27.53(m) 27.53(c) 27.53(g)	Uplink Carrier Aggregation	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.9

Table 7-2. Summary of Radiated 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 (Sections 7.2, 7.3, 7.4, **Error! Reference source not found.**) 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) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "LTE Automation," Version 5.3.
5) For operation <1GHz, the EIRP limits in the table above are referenced to the specifications written in the relevant Radio Standards Specifications for Innovation, Science, and Economic Development Canada.

7.2 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

KDB 971168 D01 v03r01 – Section 4.2

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

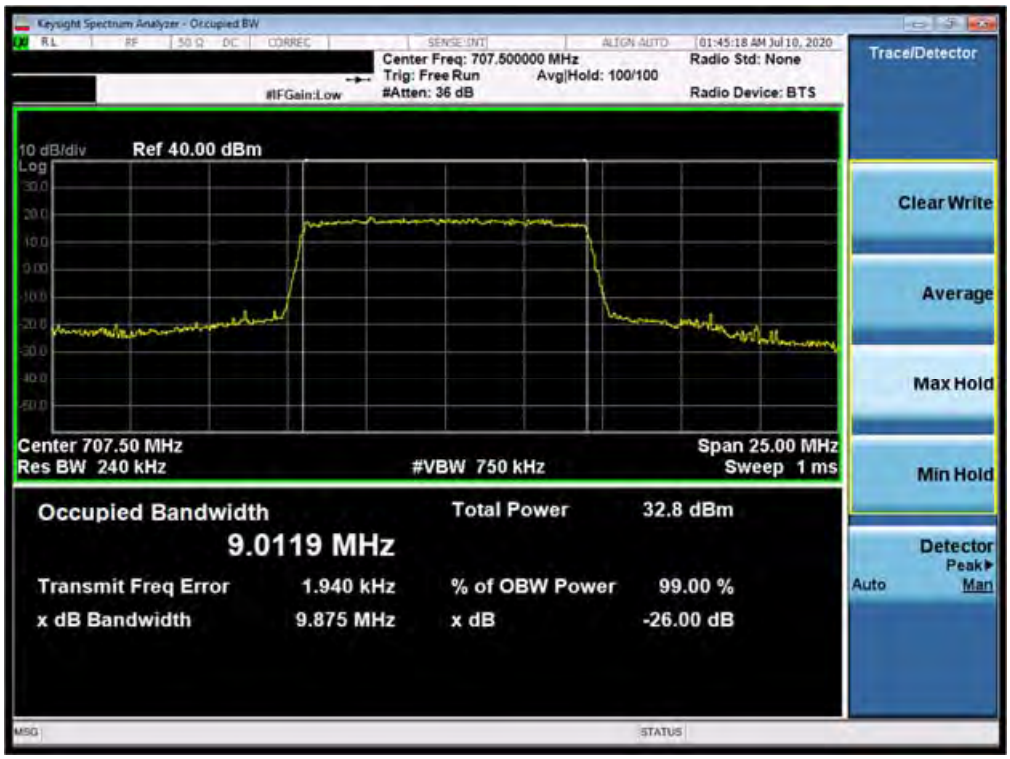
The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

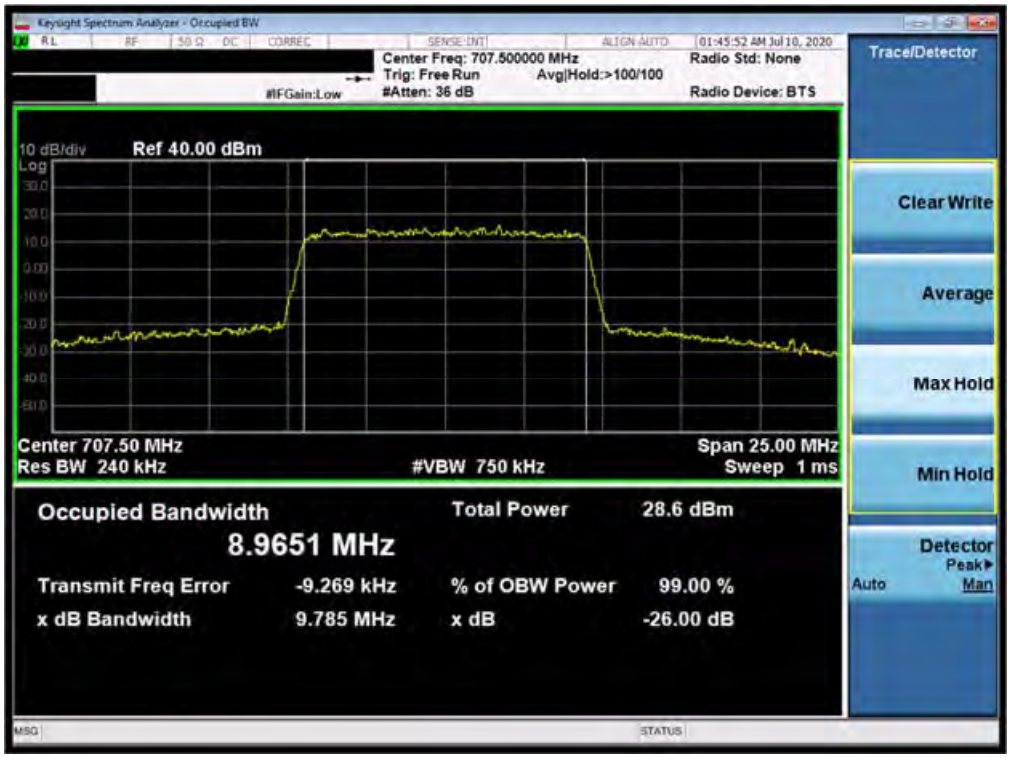
Band 12



Plot 7-1. Occupied Bandwidth Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

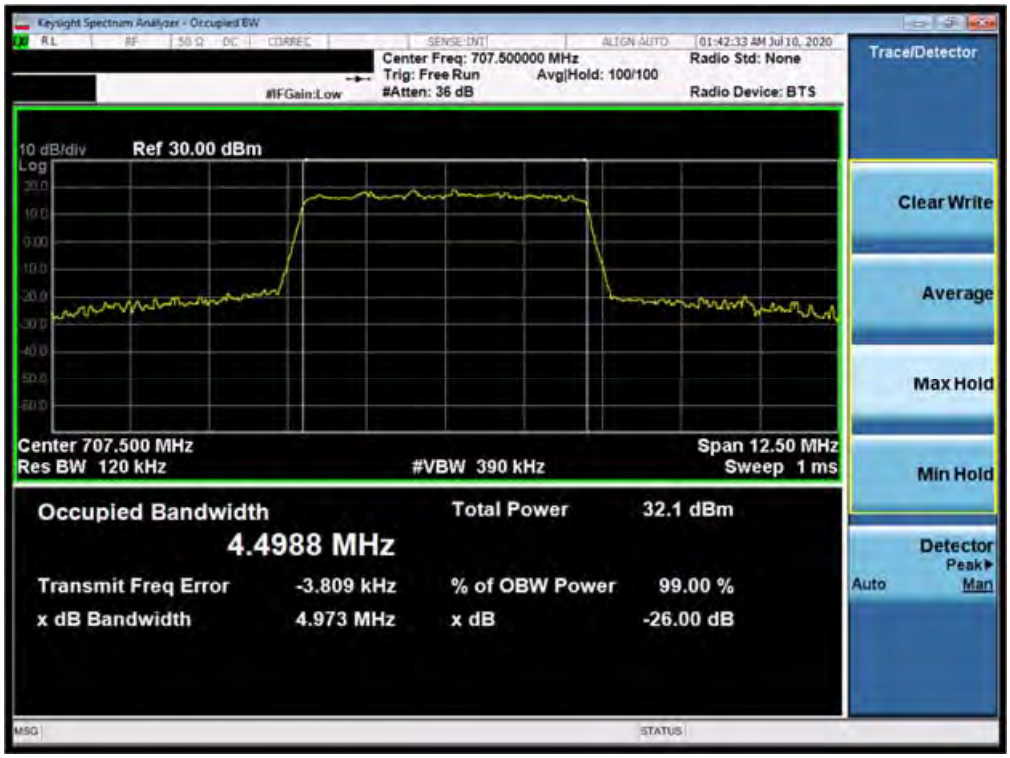
Plot 7-2. Occupied Bandwidth Plot (Band 12 - 10.0MHz 16-QAM - Full RB Configuration)

Plot 7-3. Occupied Bandwidth Plot (Band 12 - 10.0MHz 64-QAM - Full RB Configuration)



Plot 7-4. Occupied Bandwidth Plot (Band 12 - 10.0MHz 256-QAM - Full RB Configuration)

Plot 7-5. Occupied Bandwidth Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-6. Occupied Bandwidth Plot (Band 12 - 5.0MHz 16-QAM - Full RB Configuration)

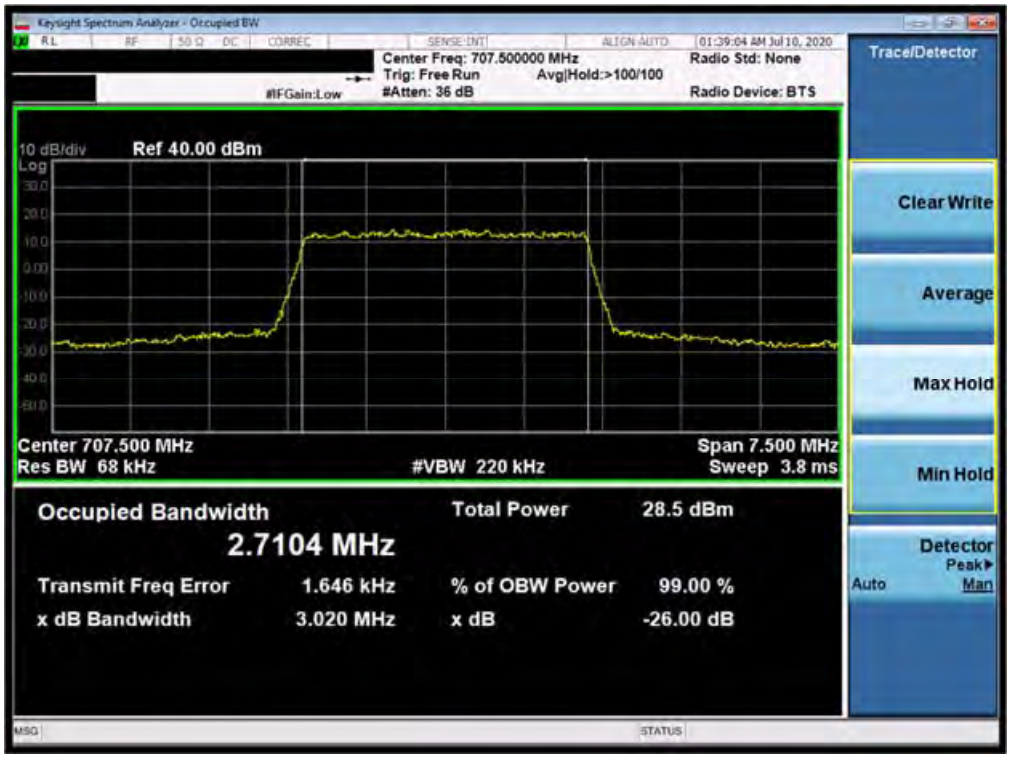
Plot 7-7. Occupied Bandwidth Plot (Band 12 - 5.0MHz 64-QAM - Full RB Configuration)

Plot 7-8. Occupied Bandwidth Plot (Band 12 - 5.0MHz 256-QAM - Full RB Configuration)

Plot 7-9. Occupied Bandwidth Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

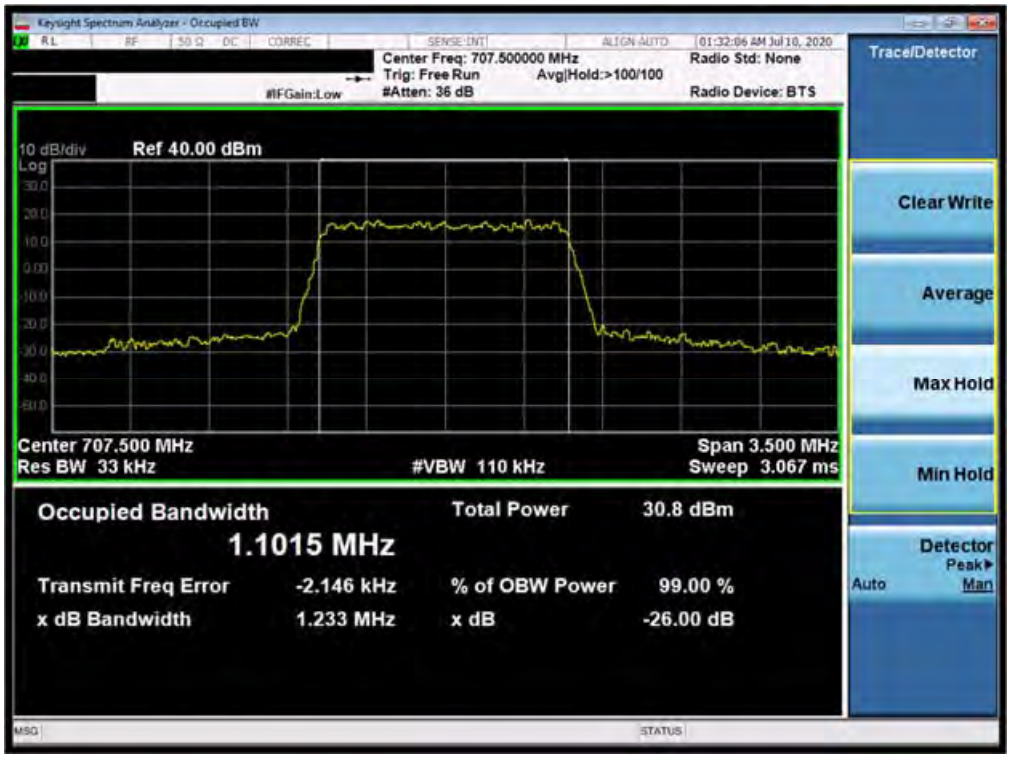
Plot 7-10. Occupied Bandwidth Plot (Band 12 - 3.0MHz 16-QAM - Full RB Configuration)

Plot 7-11. Occupied Bandwidth Plot (Band 12 - 3.0MHz 64-QAM - Full RB Configuration)

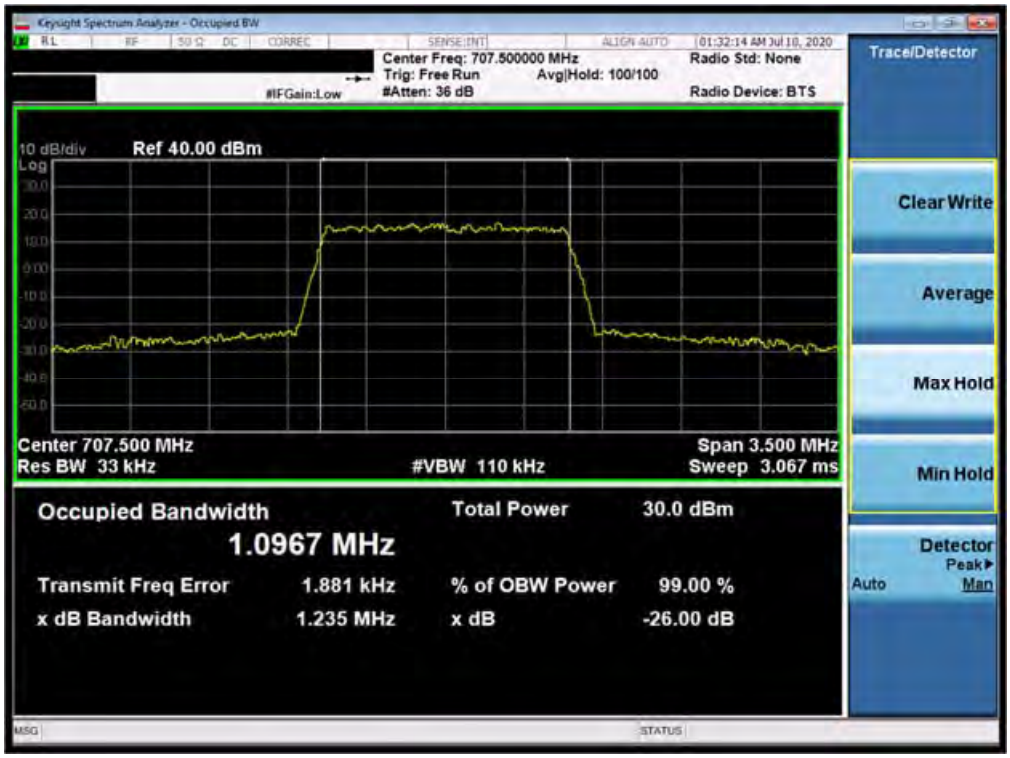


Plot 7-12. Occupied Bandwidth Plot (Band 12 - 3.0MHz 256-QAM - Full RB Configuration)

Plot 7-13. Occupied Bandwidth Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-14. Occupied Bandwidth Plot (Band 12 - 1.4MHz 16-QAM - Full RB Configuration)



Plot 7-15. Occupied Bandwidth Plot (Band 12 - 1.4MHz 64-QAM - Full RB Configuration)

Plot 7-16. Occupied Bandwidth Plot (Band 12 - 1.4MHz 256-QAM - Full RB Configuration)

Band 13

Plot 7-17. Occupied Bandwidth Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-18. Occupied Bandwidth Plot (Band 13 - 10.0MHz 16-QAM - Full RB Configuration)

Plot 7-19. Occupied Bandwidth Plot (Band 13 - 10.0MHz 64-QAM - Full RB Configuration)

Plot 7-20. Occupied Bandwidth Plot (Band 13 - 10.0MHz 256-QAM - Full RB Configuration)

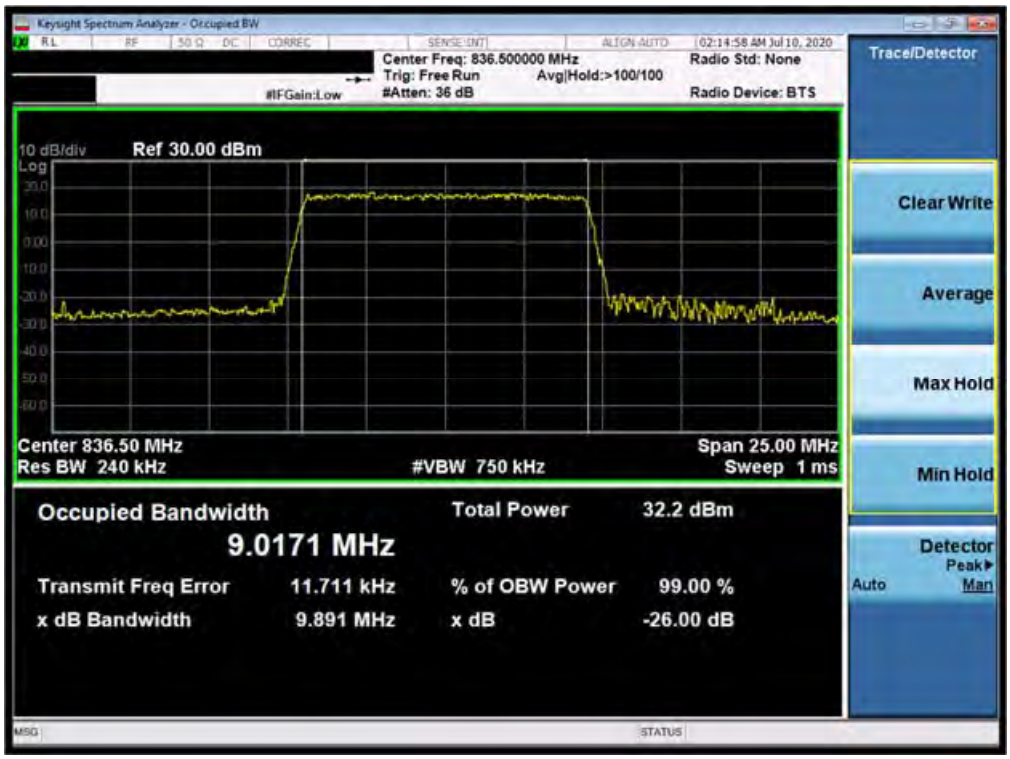
Plot 7-21. Occupied Bandwidth Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-22. Occupied Bandwidth Plot (Band 13 - 5.0MHz 16-QAM - Full RB Configuration)

Plot 7-23. Occupied Bandwidth Plot (Band 13 - 5.0MHz 64-QAM - Full RB Configuration)

Plot 7-24. Occupied Bandwidth Plot (Band 13 - 5.0MHz 256-QAM - Full RB Configuration)

Band 5



Plot 7-25. Occupied Bandwidth Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-26. Occupied Bandwidth Plot (Band 5 - 10.0MHz 16-QAM - Full RB Configuration)

Plot 7-27. Occupied Bandwidth Plot (Band 5 - 10.0MHz 64-QAM - Full RB Configuration)

Plot 7-28. Occupied Bandwidth Plot (Band 5 - 10.0MHz 256-QAM - Full RB Configuration)

Plot 7-29. Occupied Bandwidth Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-30. Occupied Bandwidth Plot (Band 5 - 5.0MHz 16-QAM - Full RB Configuration)

Plot 7-31. Occupied Bandwidth Plot (Band 5 - 5.0MHz 64-QAM - Full RB Configuration)

Plot 7-32. Occupied Bandwidth Plot (Band 5 - 5.0MHz 256-QAM - Full RB Configuration)

Plot 7-33. Occupied Bandwidth Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

Plot 7-34. Occupied Bandwidth Plot (Band 5 - 3.0MHz 16-QAM - Full RB Configuration)

Plot 7-35. Occupied Bandwidth Plot (Band 5 - 3.0MHz 64-QAM - Full RB Configuration)

Plot 7-36. Occupied Bandwidth Plot (Band 5 - 3.0MHz 256-QAM - Full RB Configuration)

Plot 7-37. Occupied Bandwidth Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)

Plot 7-38. Occupied Bandwidth Plot (Band 5 - 1.4MHz 16-QAM - Full RB Configuration)

Plot 7-39. Occupied Bandwidth Plot (Band 5 - 1.4MHz 64-QAM - Full RB Configuration)

Plot 7-40. Occupied Bandwidth Plot (Band 5 - 1.4MHz 256-QAM - Full RB Configuration)

Band 41 (PC3)

Plot 7-41. Occupied Bandwidth Plot (Band 41 (PC3) - 20.0MHz QPSK - Full RB Configuration)

Plot 7-42. Occupied Bandwidth Plot (Band 41 (PC3) - 20.0MHz 16-QAM - Full RB Configuration)

Plot 7-43. Occupied Bandwidth Plot (Band 41 (PC3) - 20.0MHz 64-QAM - Full RB Configuration)

Plot 7-44. Occupied Bandwidth Plot (Band 41 (PC3) - 20.0MHz 256-QAM - Full RB Configuration)

Plot 7-45. Occupied Bandwidth Plot (Band 41 (PC3) - 15.0MHz QPSK - Full RB Configuration)

Plot 7-46. Occupied Bandwidth Plot (Band 41 (PC3) - 15.0MHz 16-QAM - Full RB Configuration)

Plot 7-47. Occupied Bandwidth Plot (Band 41 (PC3) - 15.0MHz 64-QAM - Full RB Configuration)

Plot 7-48. Occupied Bandwidth Plot (Band 41 (PC3) - 15.0MHz 256-QAM - Full RB Configuration)

Plot 7-49. Occupied Bandwidth Plot (Band 41 (PC3) - 10.0MHz QPSK - Full RB Configuration)

Plot 7-50. Occupied Bandwidth Plot (Band 41 (PC3) - 10.0MHz 16-QAM - Full RB Configuration)

Plot 7-51. Occupied Bandwidth Plot (Band 41 (PC3) - 10.0MHz 64-QAM - Full RB Configuration)

Plot 7-52. Occupied Bandwidth Plot (Band 41 (PC3) - 10.0MHz 256-QAM - Full RB Configuration)

Plot 7-53. Occupied Bandwidth Plot (Band 41 (PC3) - 5.0MHz QPSK - Full RB Configuration)

Plot 7-54. Occupied Bandwidth Plot (Band 41 (PC3) - 5.0MHz 16-QAM - Full RB Configuration)

Plot 7-55. Occupied Bandwidth Plot (Band 41 (PC3) - 5.0MHz 64-QAM - Full RB Configuration)

Plot 7-56. Occupied Bandwidth Plot (Band 41 (PC3) - 5.0MHz 256-QAM - Full RB Configuration)

7.3 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 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.

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

Test Procedure Used

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Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average
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.

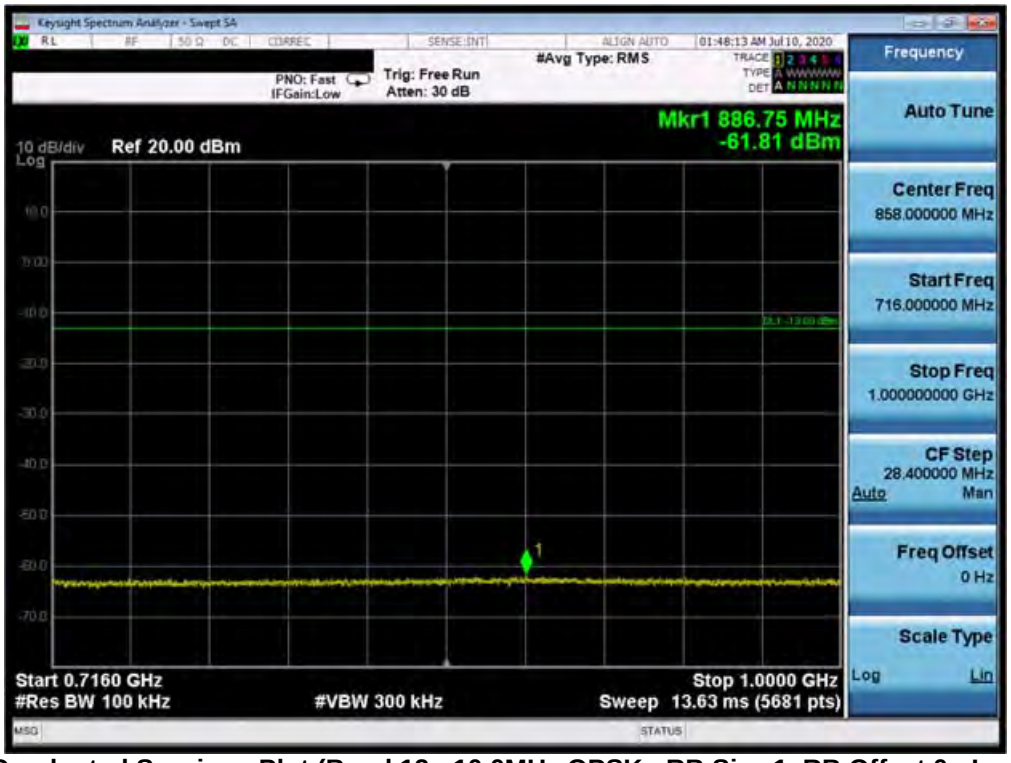
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

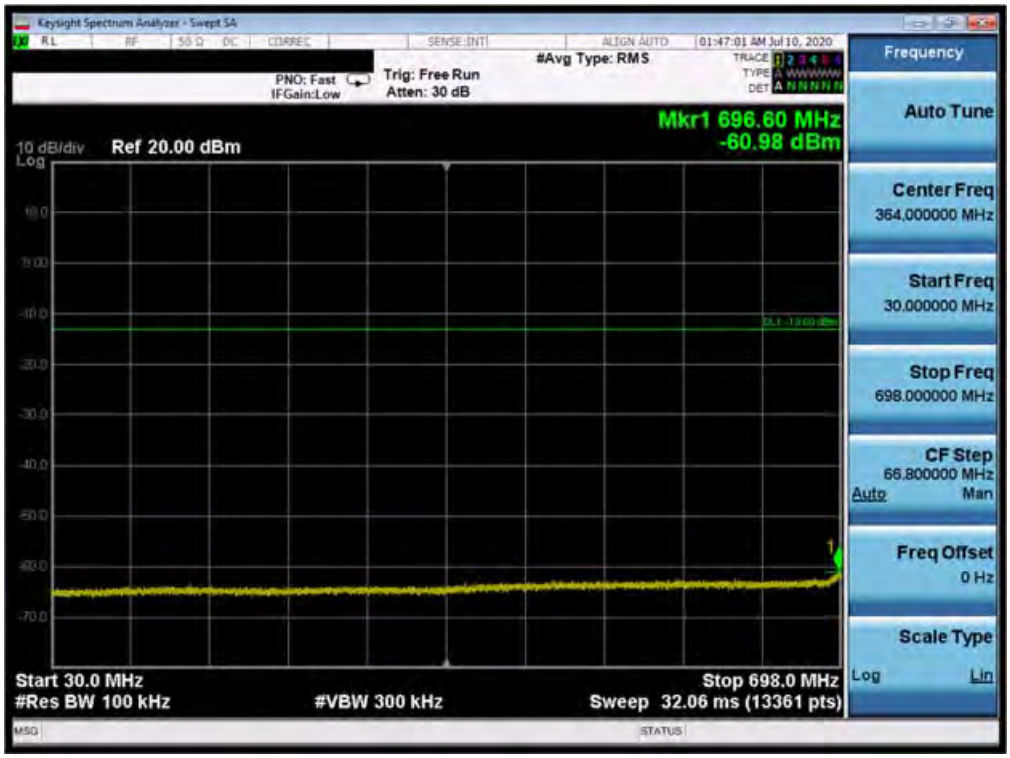
Band 12

Plot 7-57. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

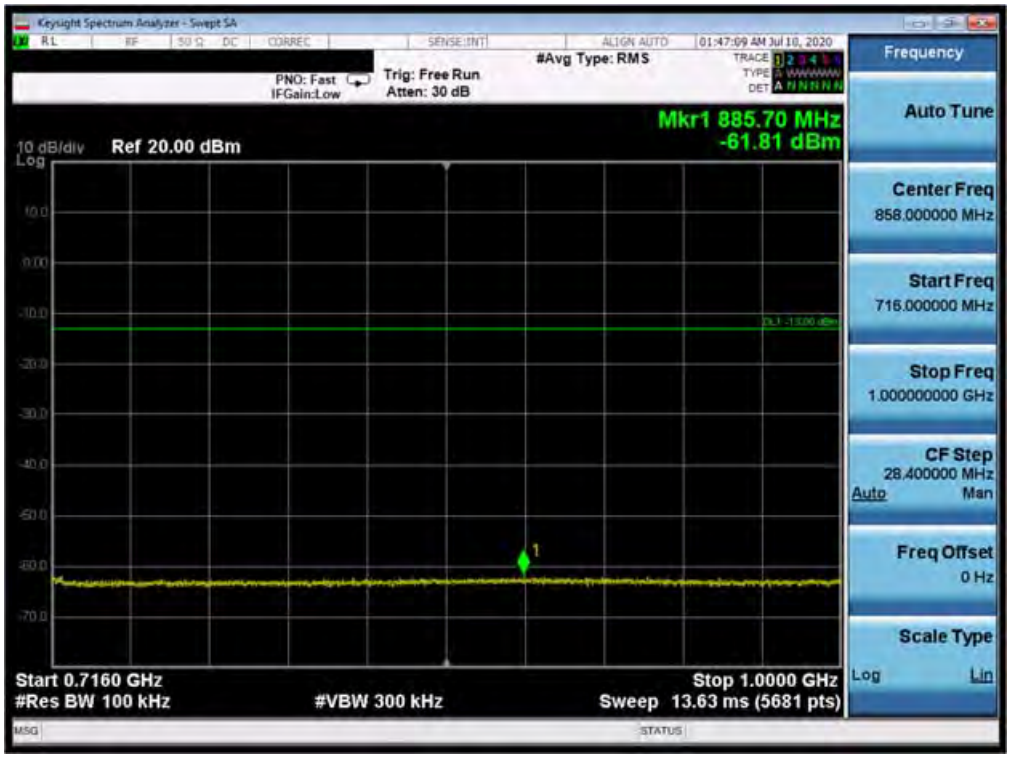


Plot 7-58. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

Plot 7-59. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

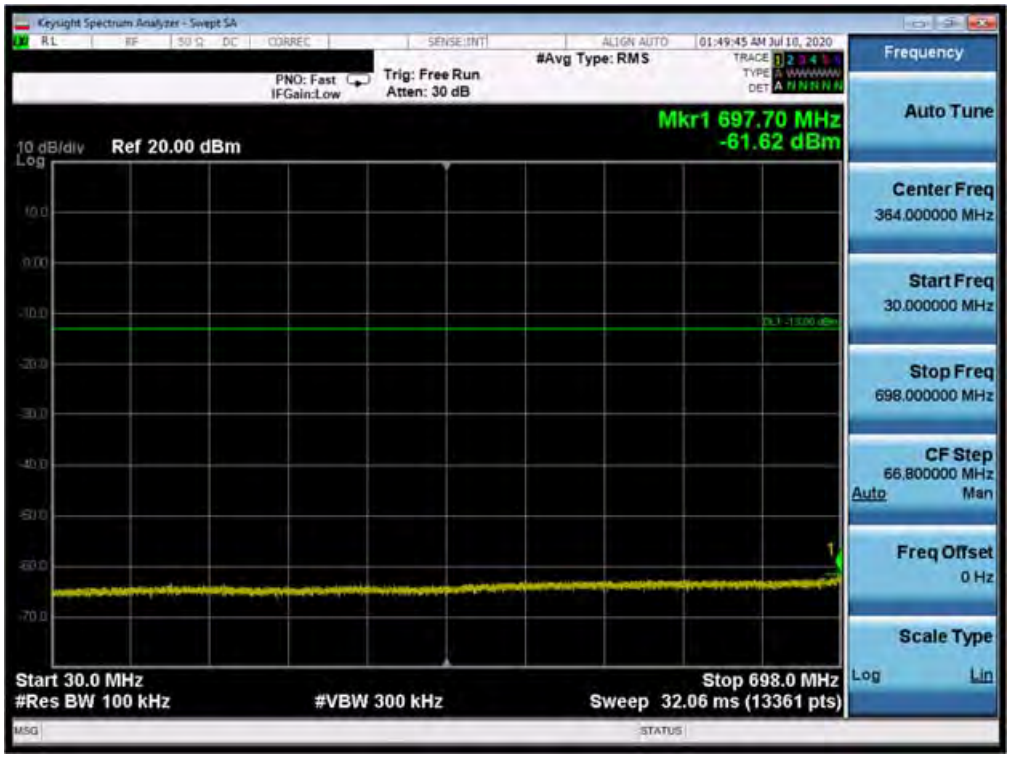


Plot 7-60. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

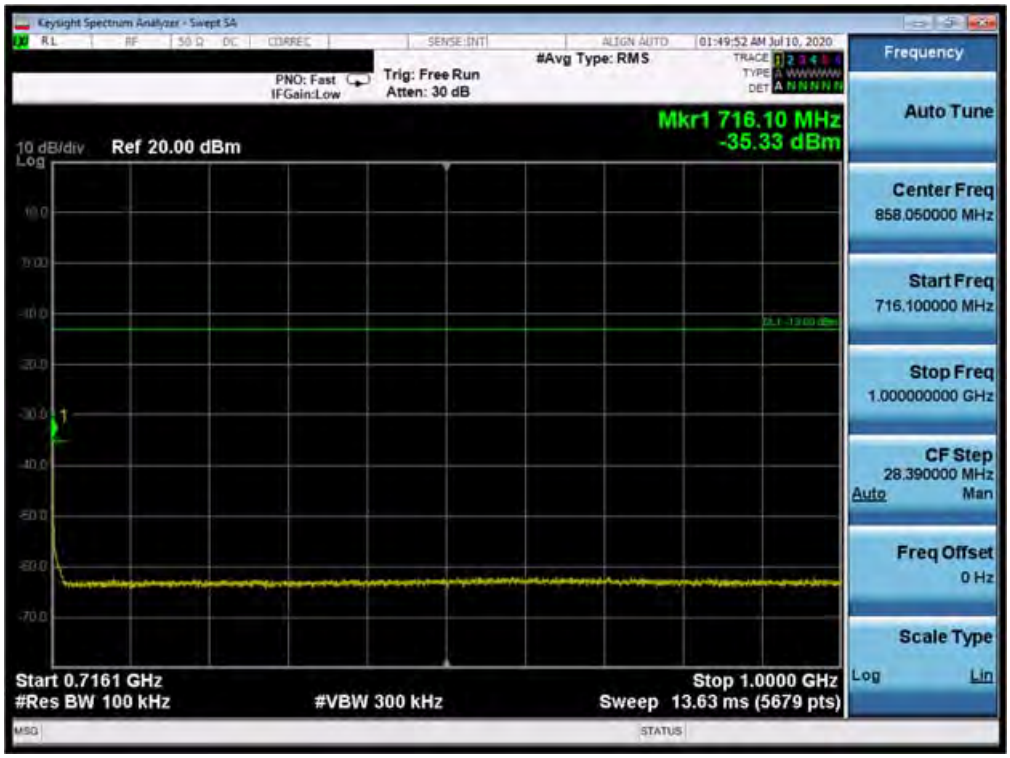


Plot 7-61. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

Plot 7-62. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



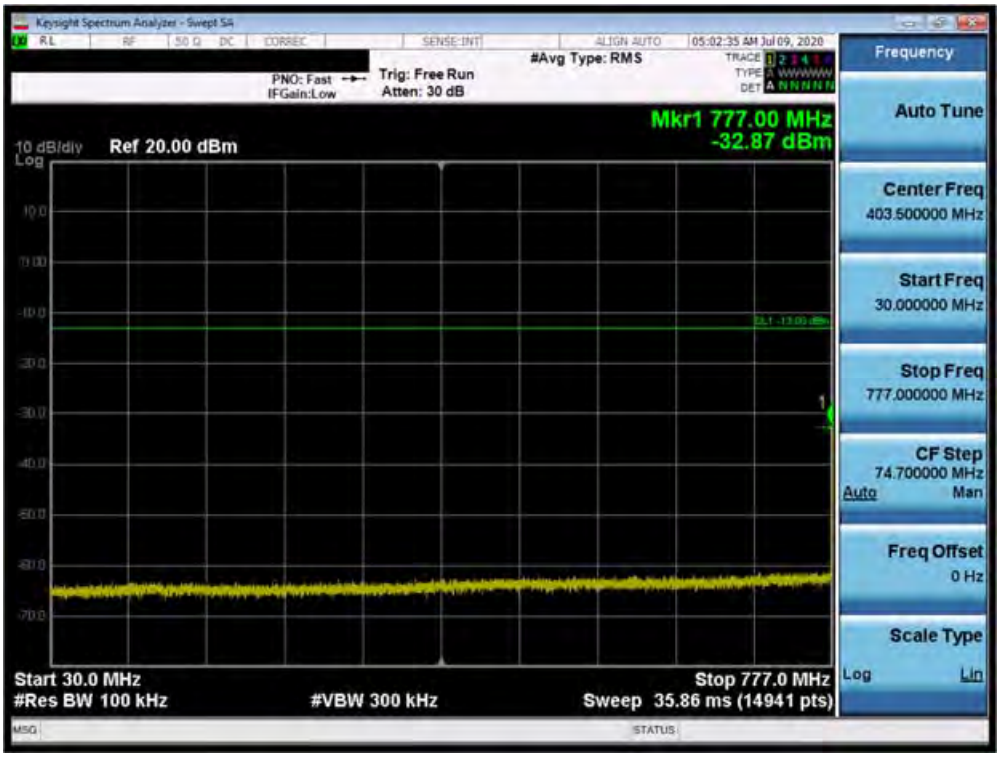
Plot 7-63. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



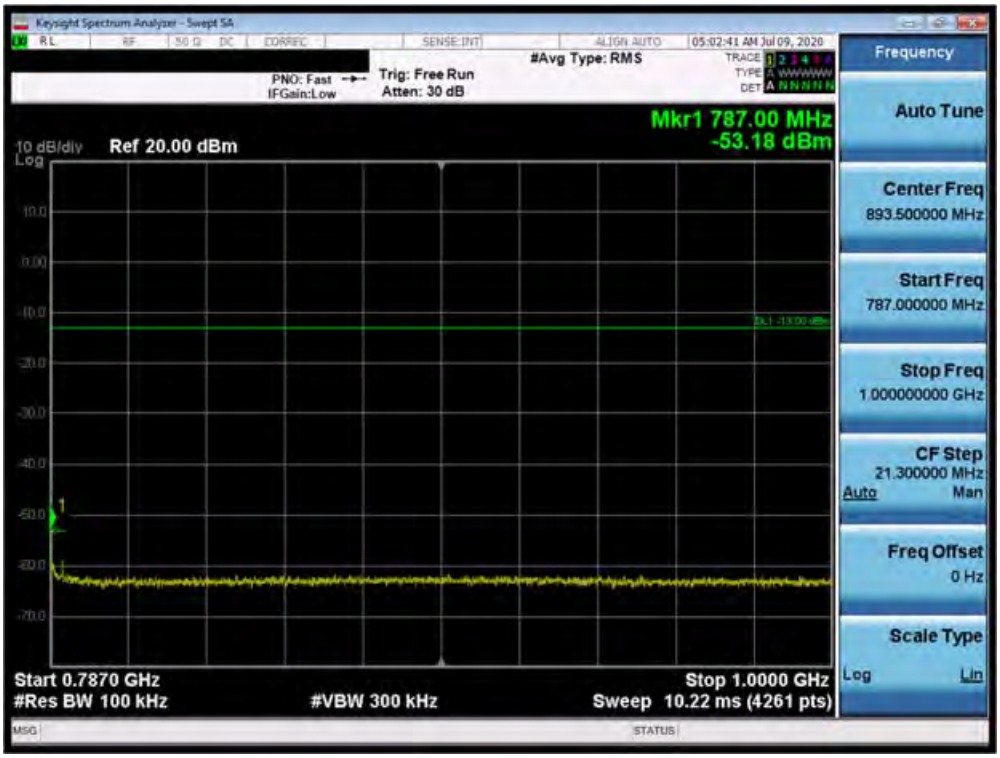
Plot 7-64. Conducted Spurious Plot (Band 12- 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

Plot 7-65. Conducted Spurious Plot (Band 12 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

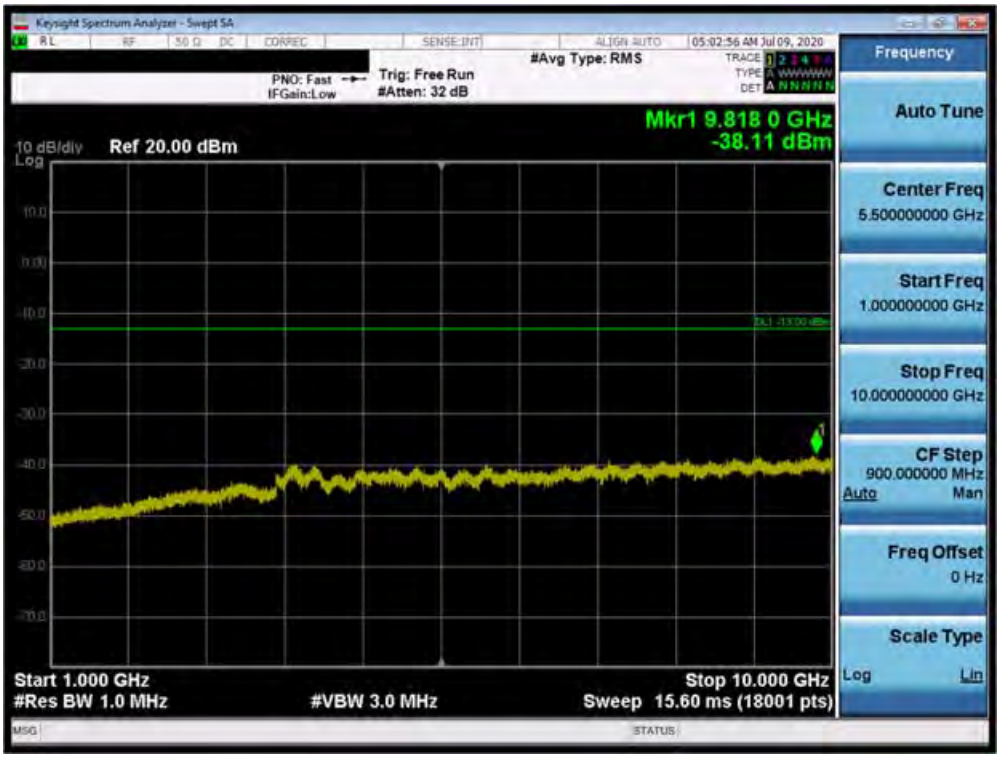
Band 13



Plot 7-66. Conducted Spurious Plot (Band 13 - 10.0MHz QPSK - RB Size 1, RB Offset 0)

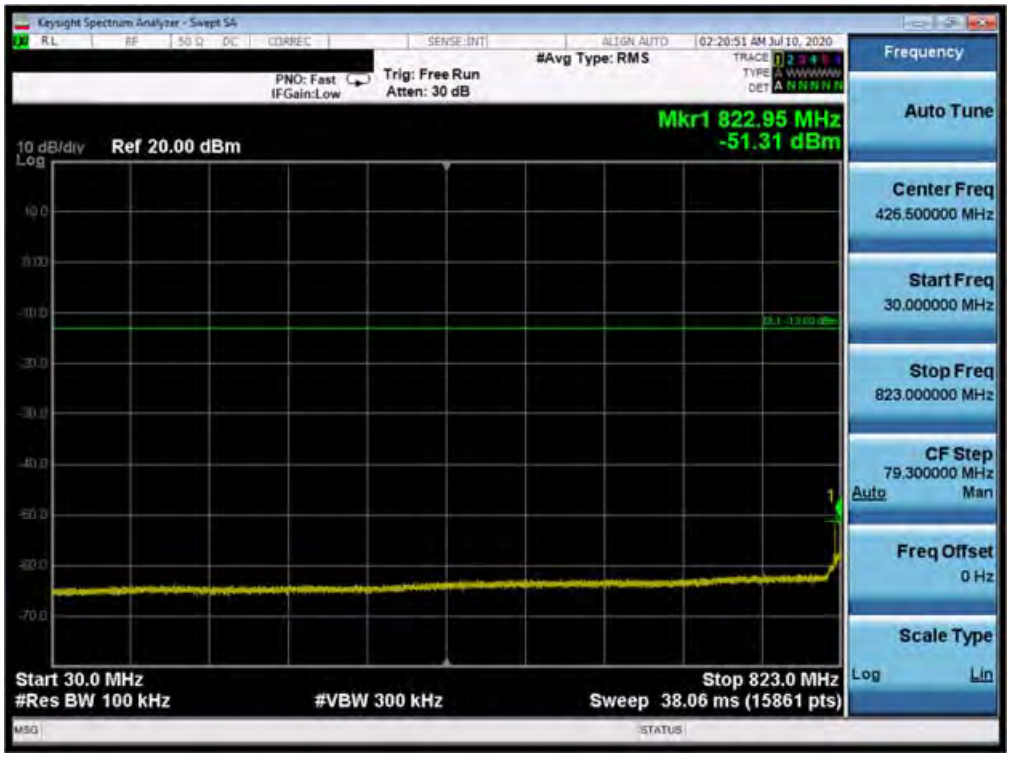


Plot 7-67. Conducted Spurious Plot (Band 13 - 10.0MHz QPSK - RB Size 1, RB Offset 0)

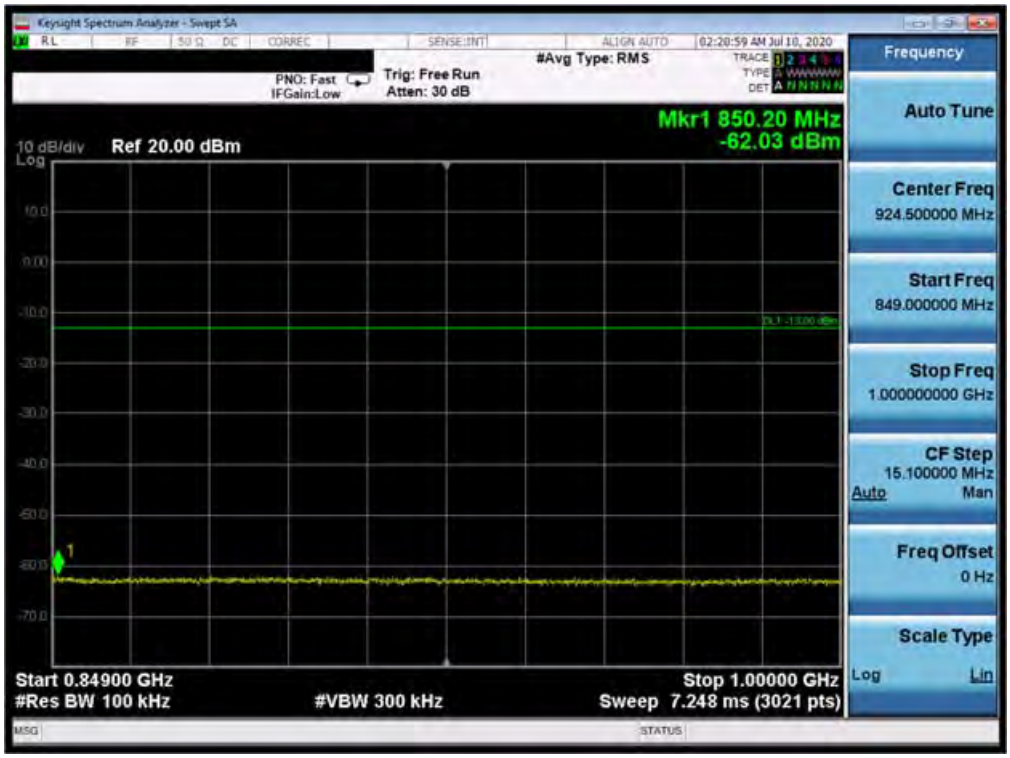


Plot 7-68. Conducted Spurious Plot (Band 13 - 10.0MHz QPSK - RB Size 1, RB Offset 0)

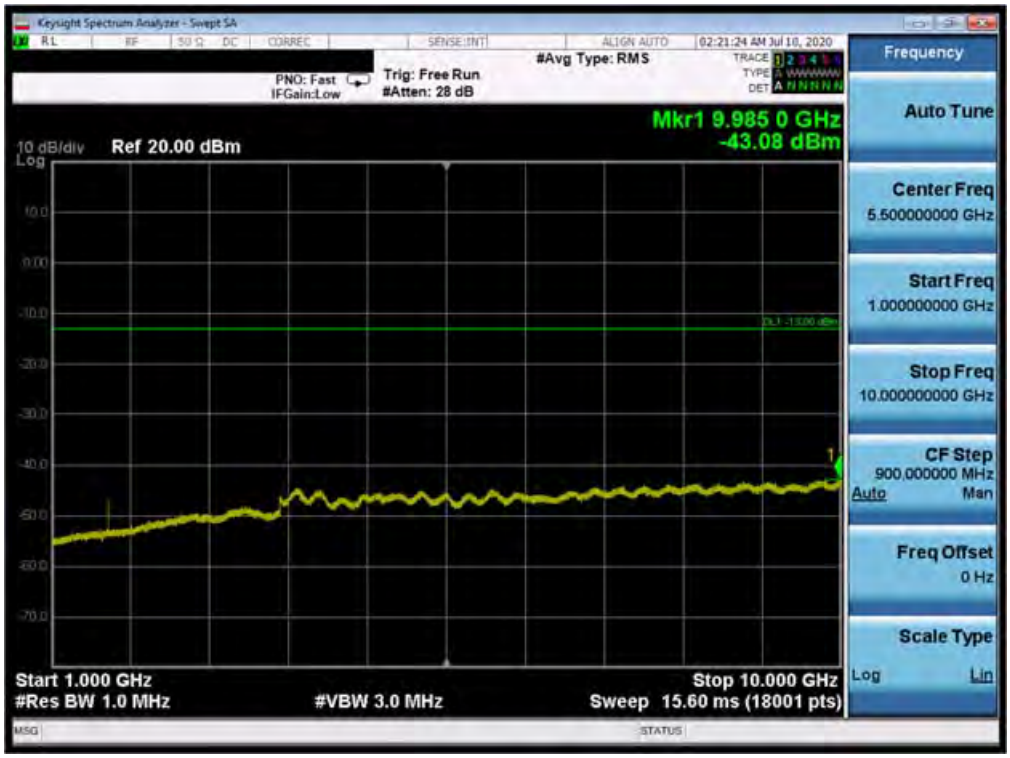
Band 5



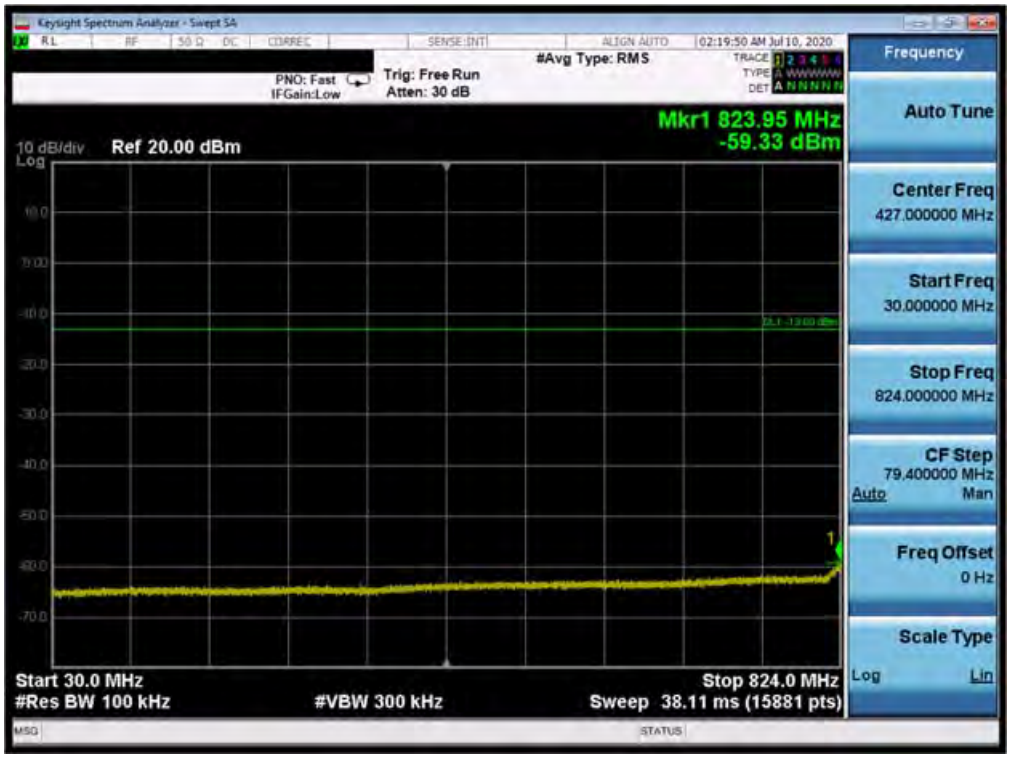
Plot 7-69. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



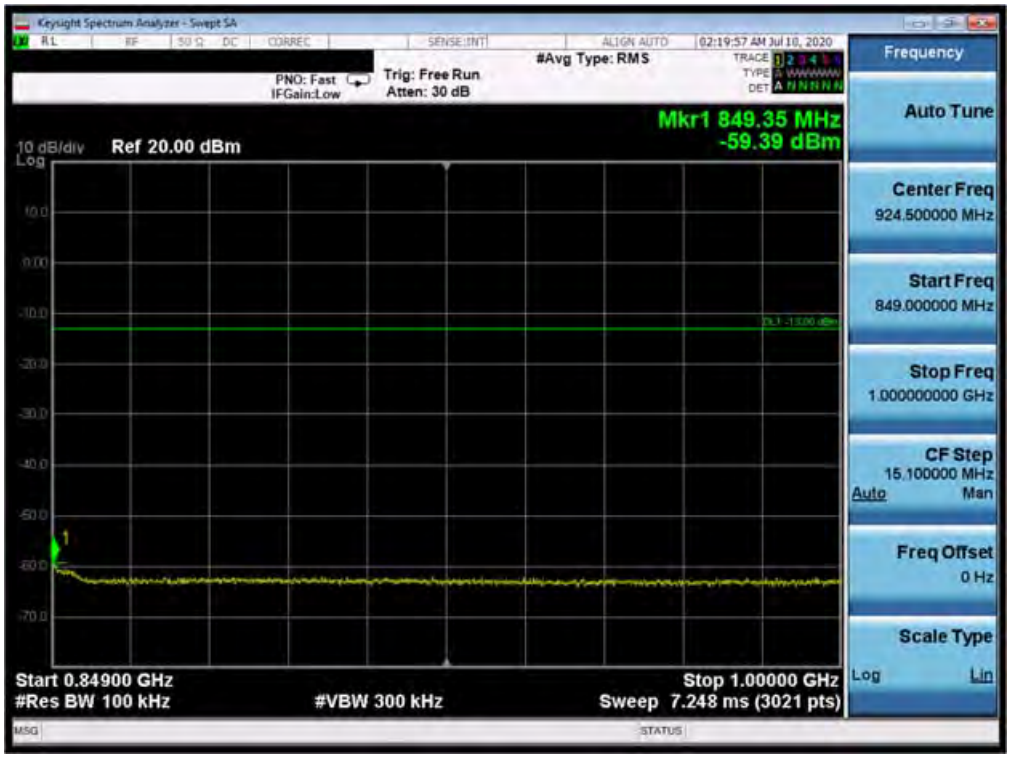
Plot 7-70. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-71. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

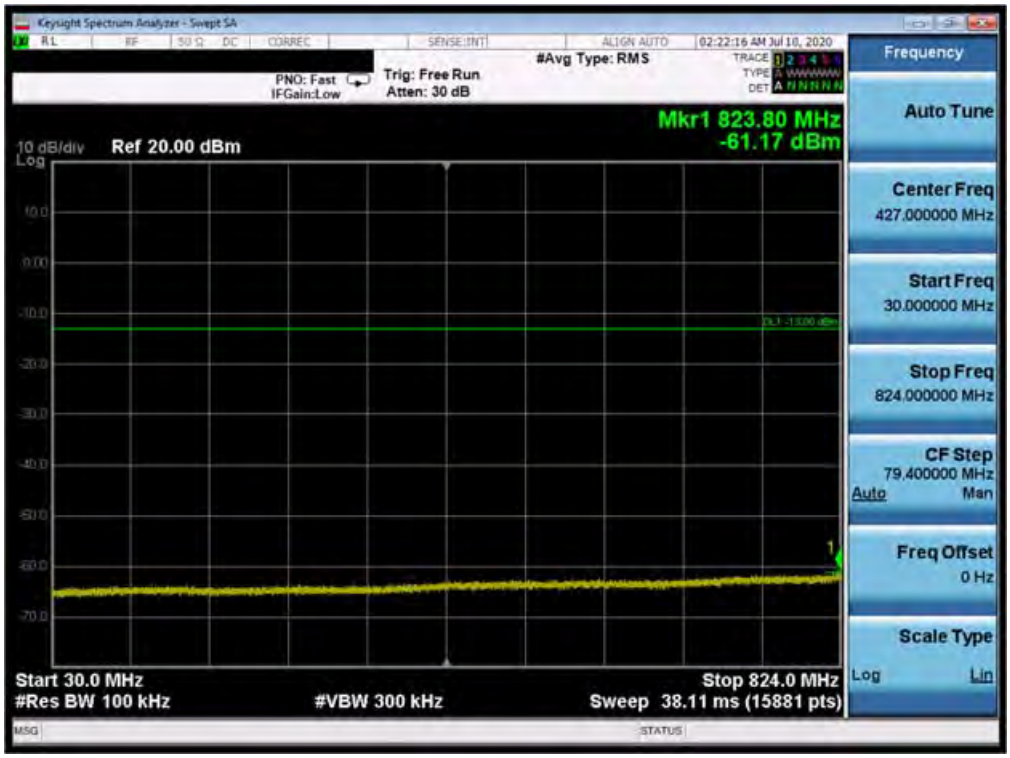


Plot 7-72. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

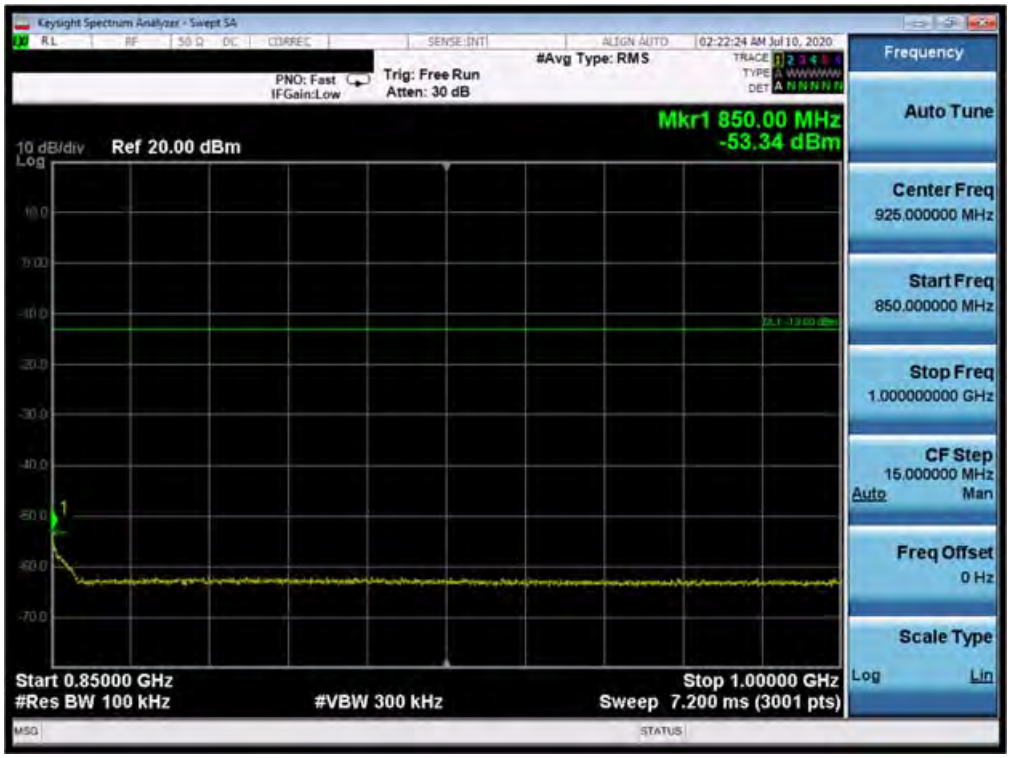


Plot 7-73. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

Plot 7-74. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



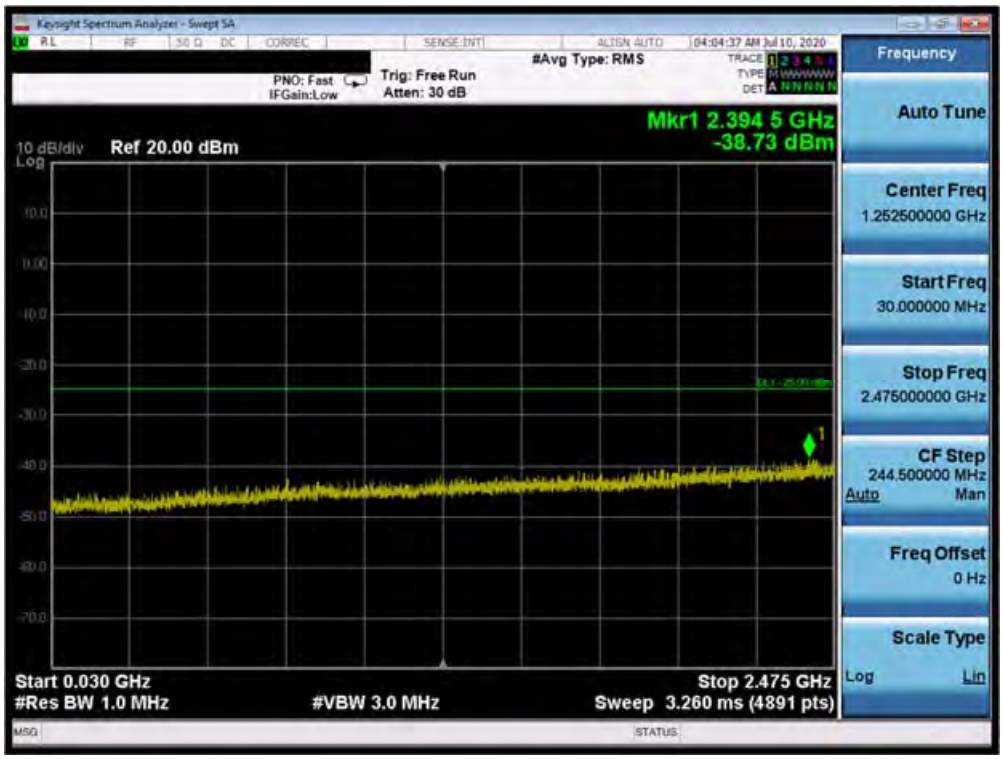
Plot 7-75. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



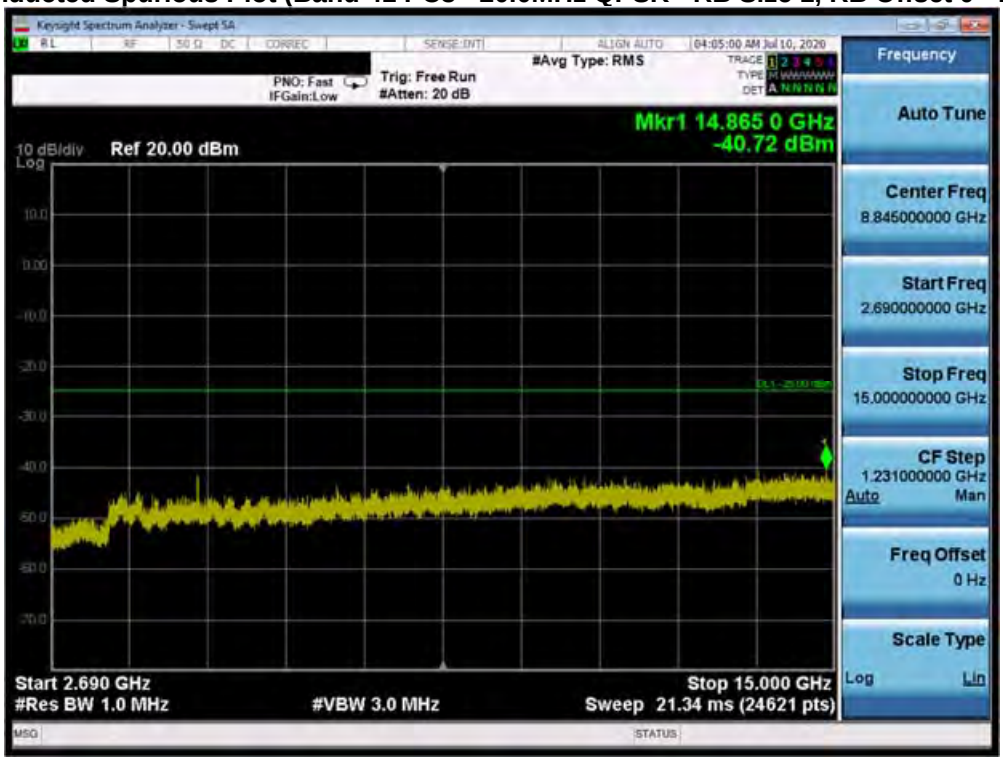
Plot 7-76. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

Plot 7-77. Conducted Spurious Plot (Band 5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

Band 41 PC3

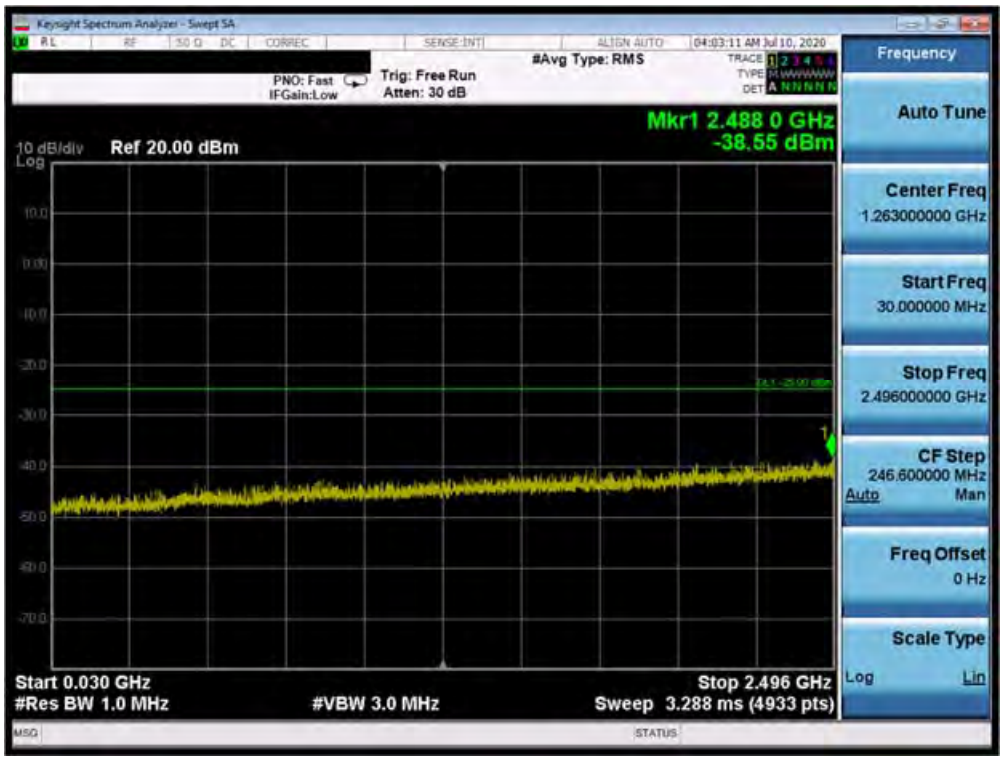


Plot 7-78. Conducted Spurious Plot (Band 41 PC3 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

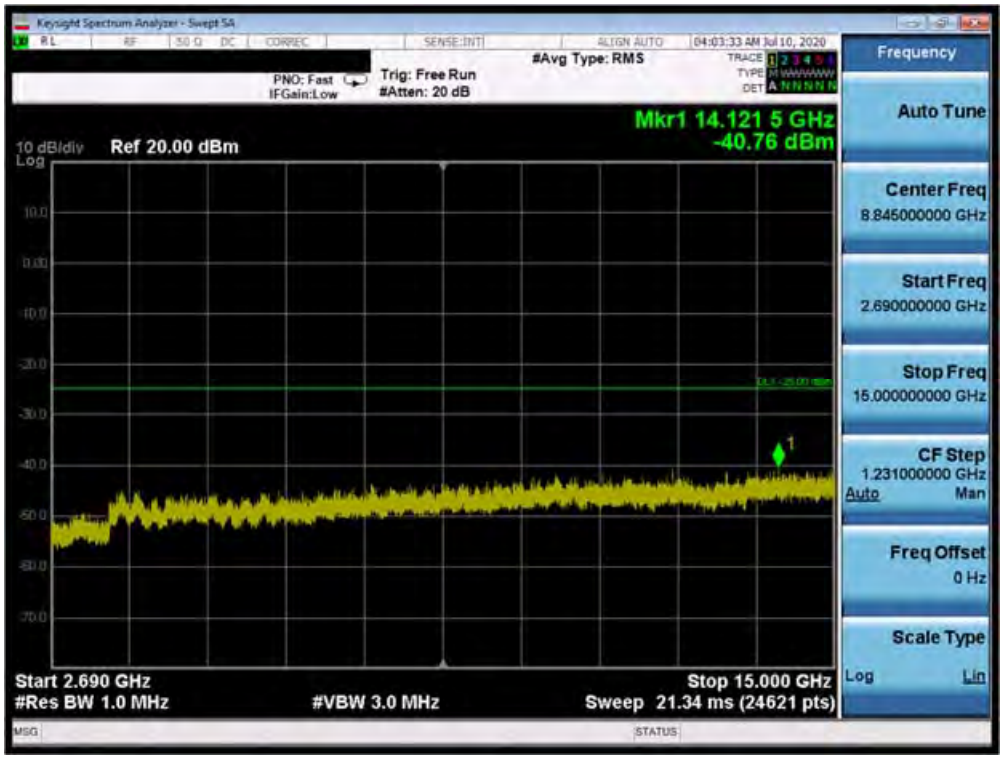


Plot 7-79. Conducted Spurious Plot (Band 41 PC3 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

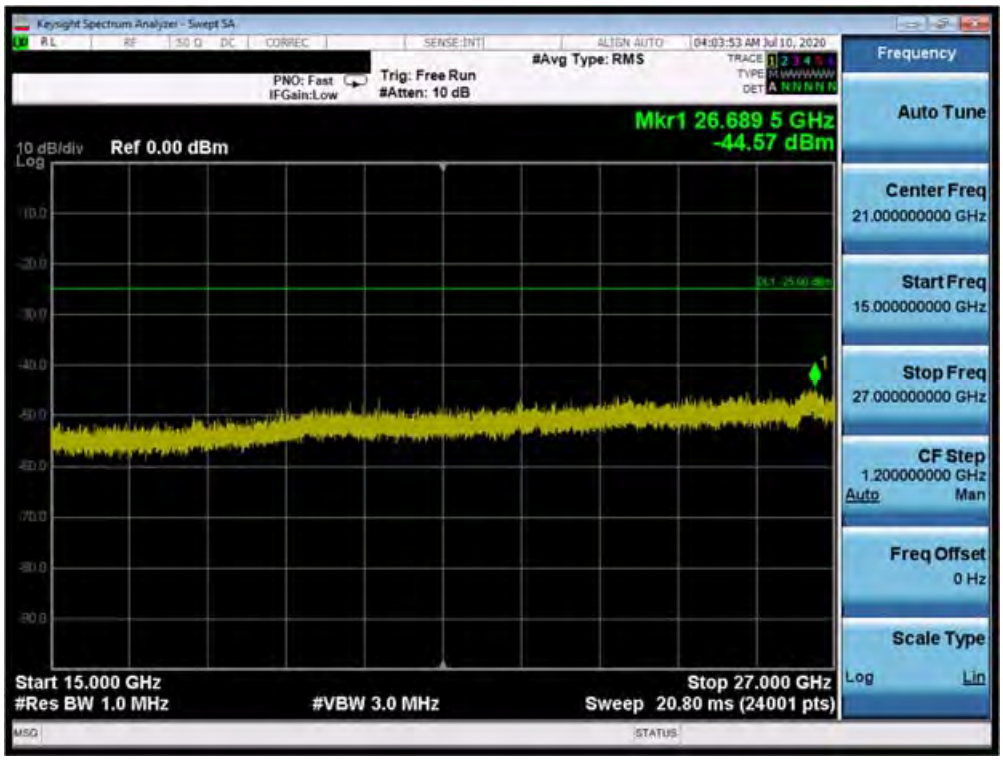
Plot 7-80. Conducted Spurious Plot (Band 41 PC3 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



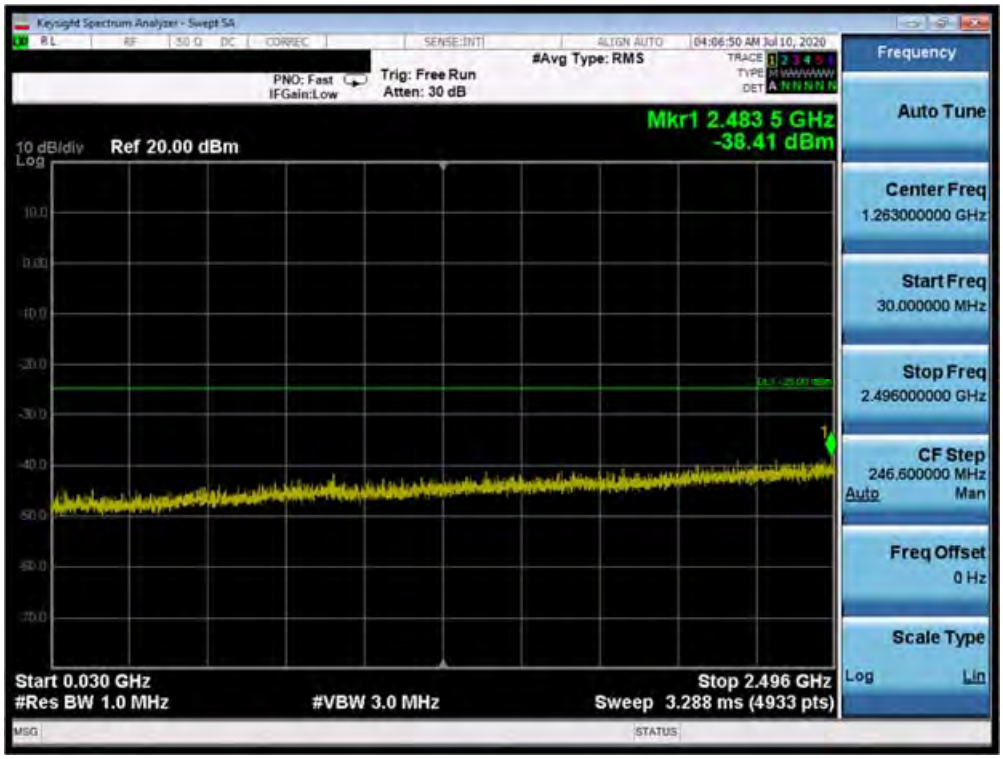
Plot 7-81. Conducted Spurious Plot (Band 41 PC3 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



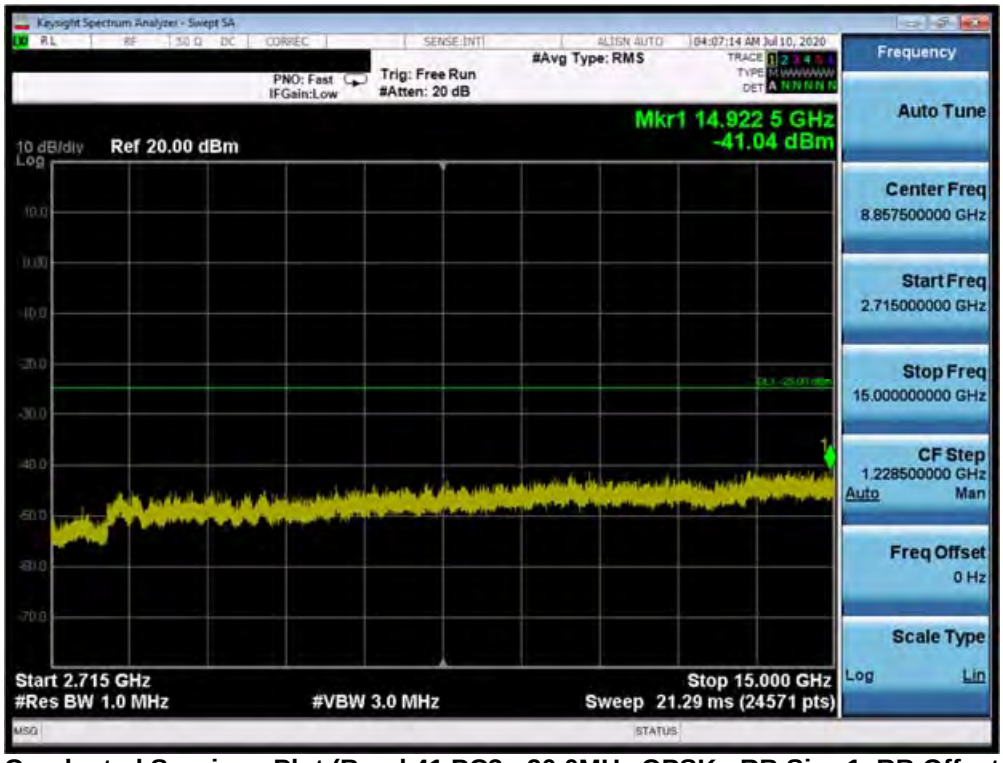
Plot 7-82. Conducted Spurious Plot (Band 41 PC3 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-83. Conducted Spurious Plot (Band 41 PC3 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-84. Conducted Spurious Plot (Band 41 PC3 - 20.0MHz QPSK - RB Size 1, RB Offset 99 - High Channel)



Plot 7-85. Conducted Spurious Plot (Band 41 PC3 - 20.0MHz QPSK - RB Size 1, RB Offset 99 – High Channel)

Plot 7-86. Conducted Spurious Plot (Band 41 PC3 - 20.0MHz QPSK - RB Size 1, RB Offset 99 - High Channel)

7.4 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 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.

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

Test Procedure Used

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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
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

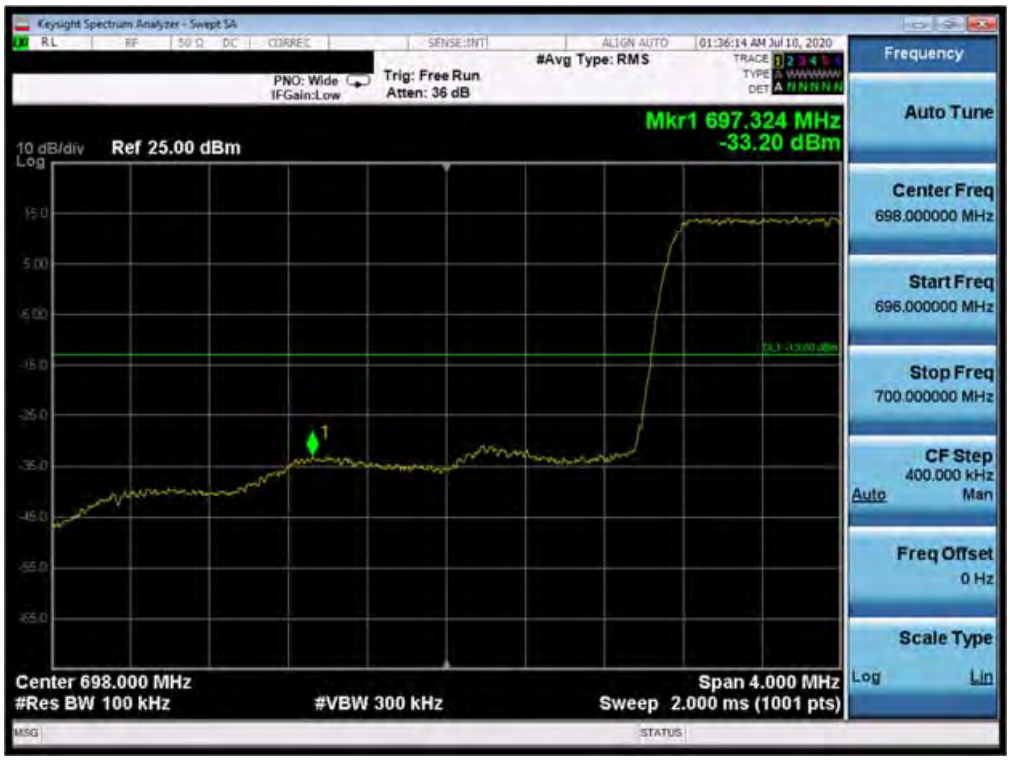
The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-3. Test Instrument & Measurement Setup

Test Notes

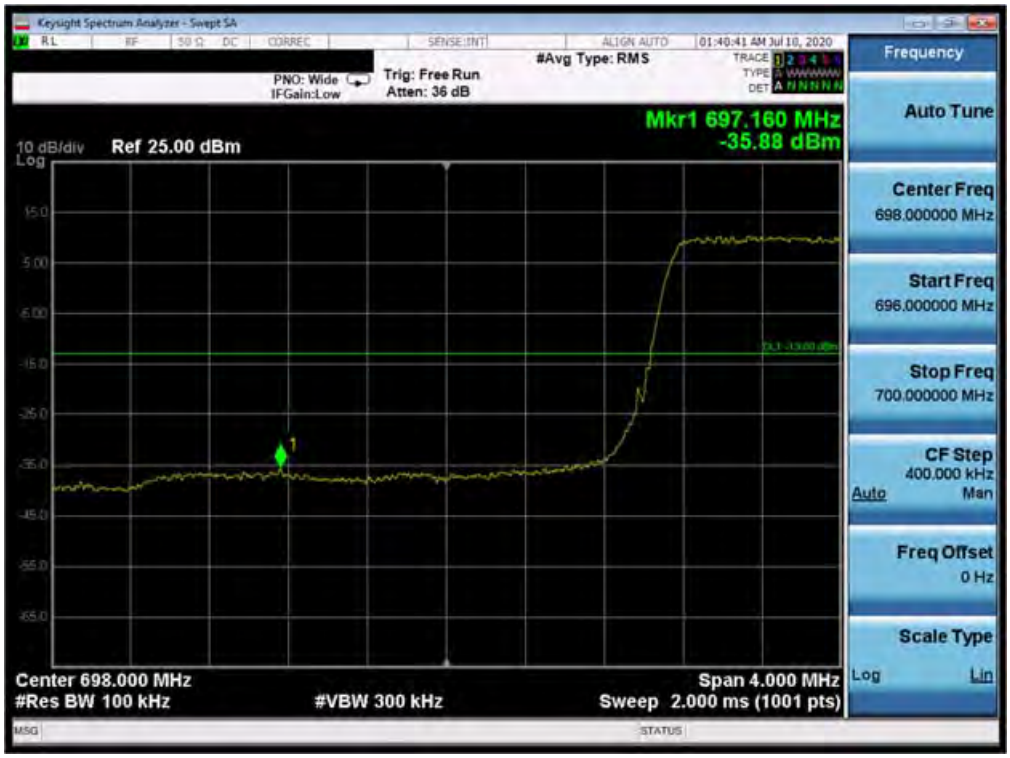
Per 22.917(b) in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

Band 12



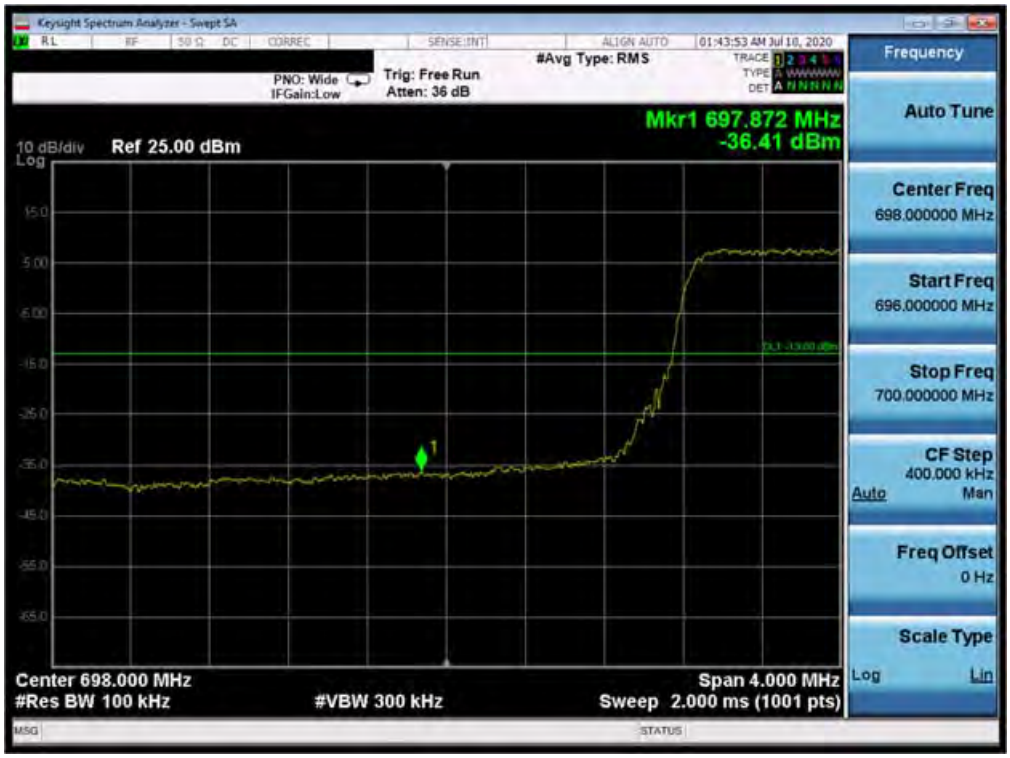
Plot 7-87. Lower Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)

Plot 7-88. Upper Band Edge Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)



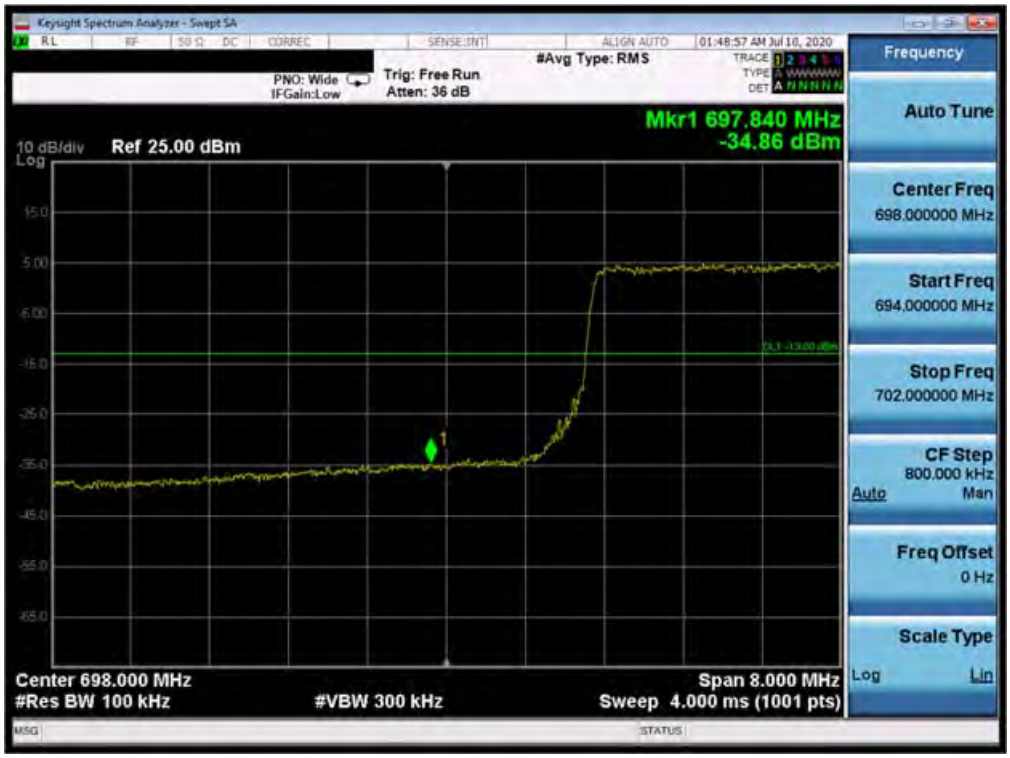
Plot 7-89. Lower Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

Plot 7-90. Upper Band Edge Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)

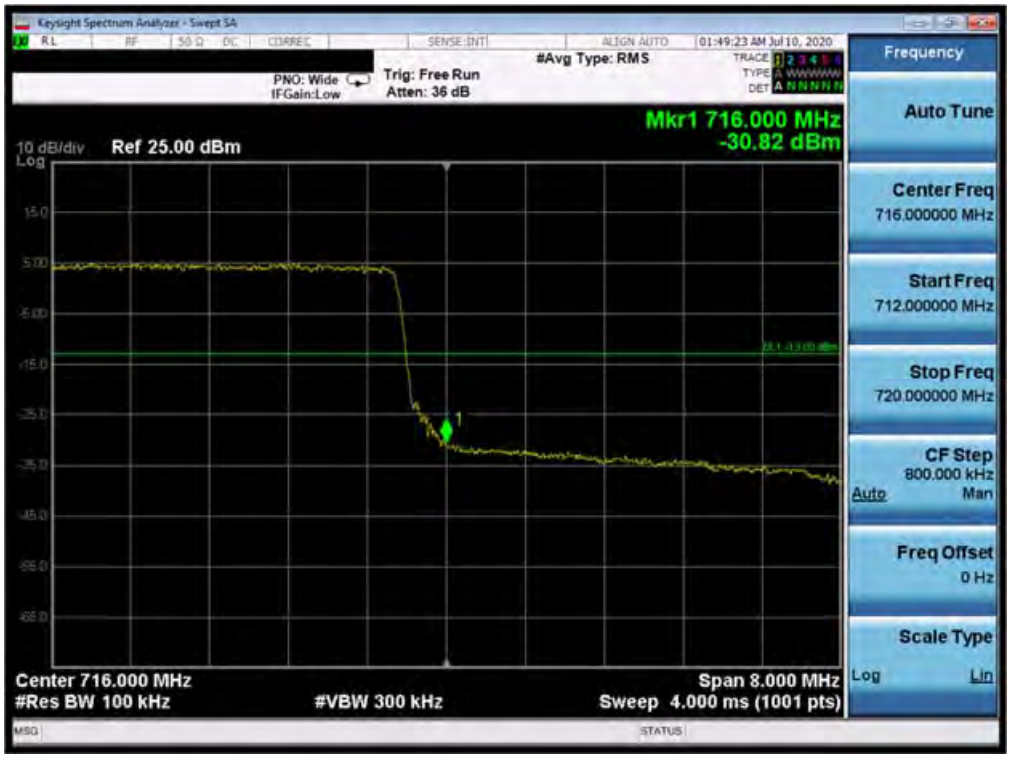


Plot 7-91. Lower Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)

Plot 7-92. Upper Band Edge Plot (Band 12 - 5.0MHz QPSK - Full RB Configuration)



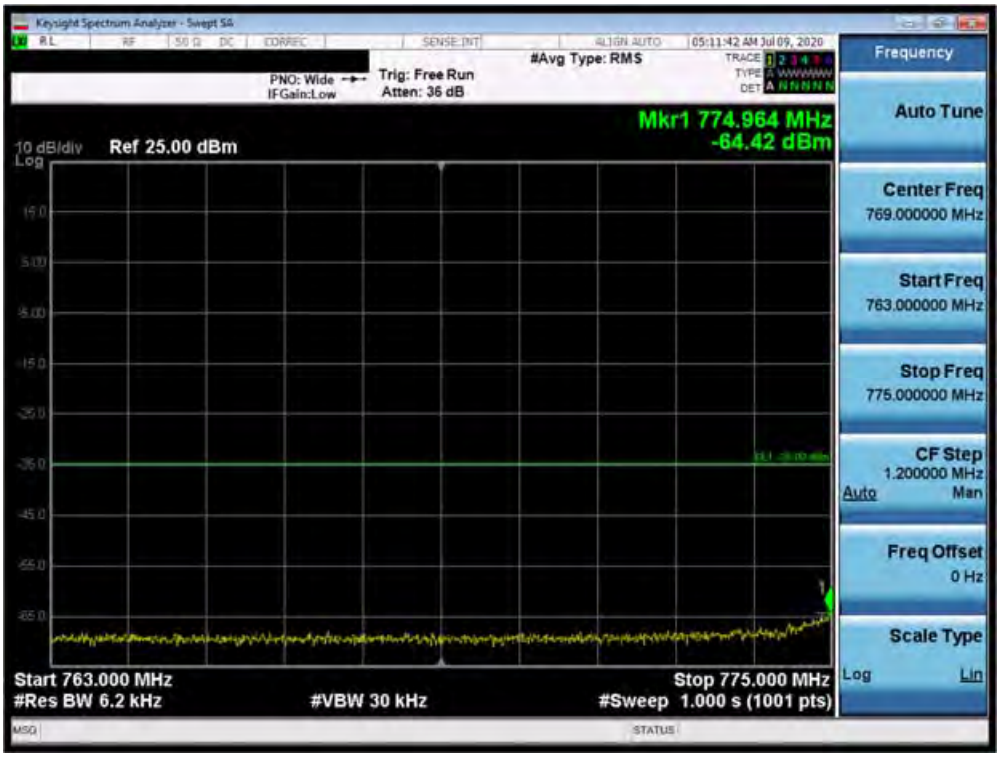
Plot 7-93. Lower Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)



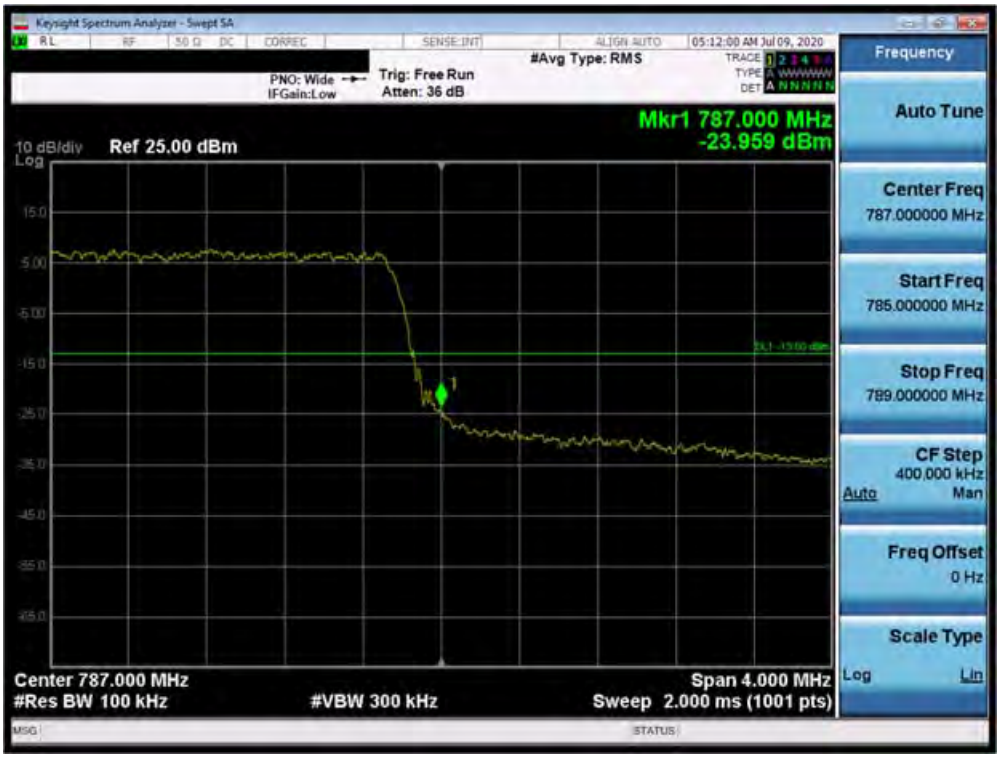
Plot 7-94. Upper Band Edge Plot (Band 12 - 10.0MHz QPSK - Full RB Configuration)

Band 13

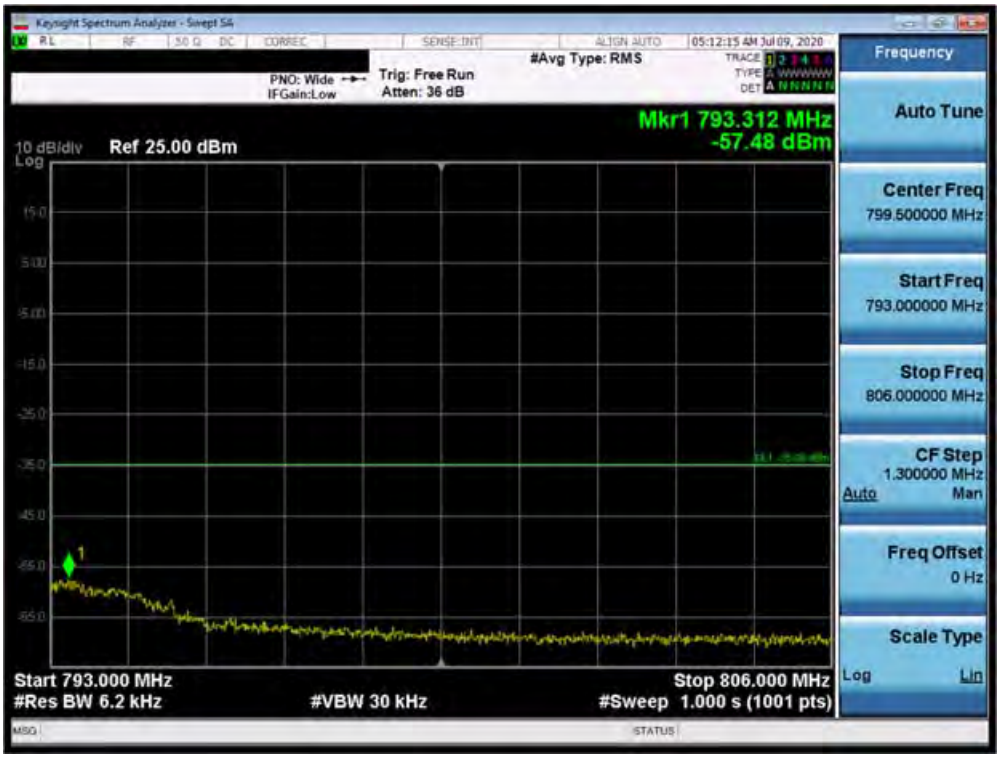
Plot 7-95. Lower Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



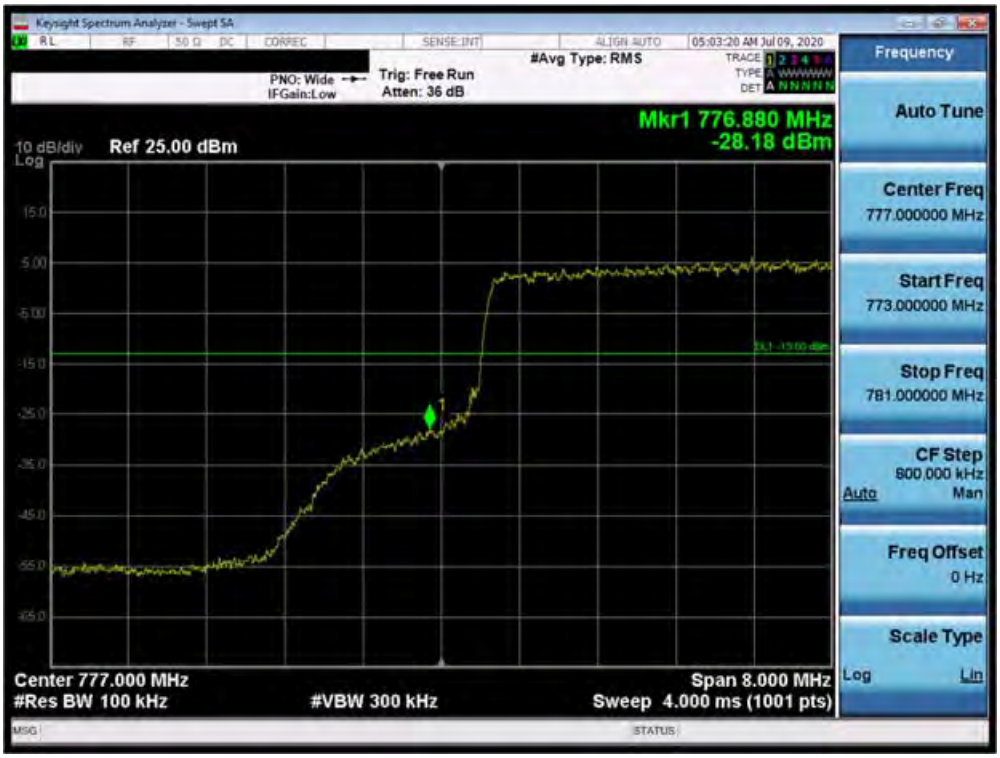
Plot 7-96. Lower Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



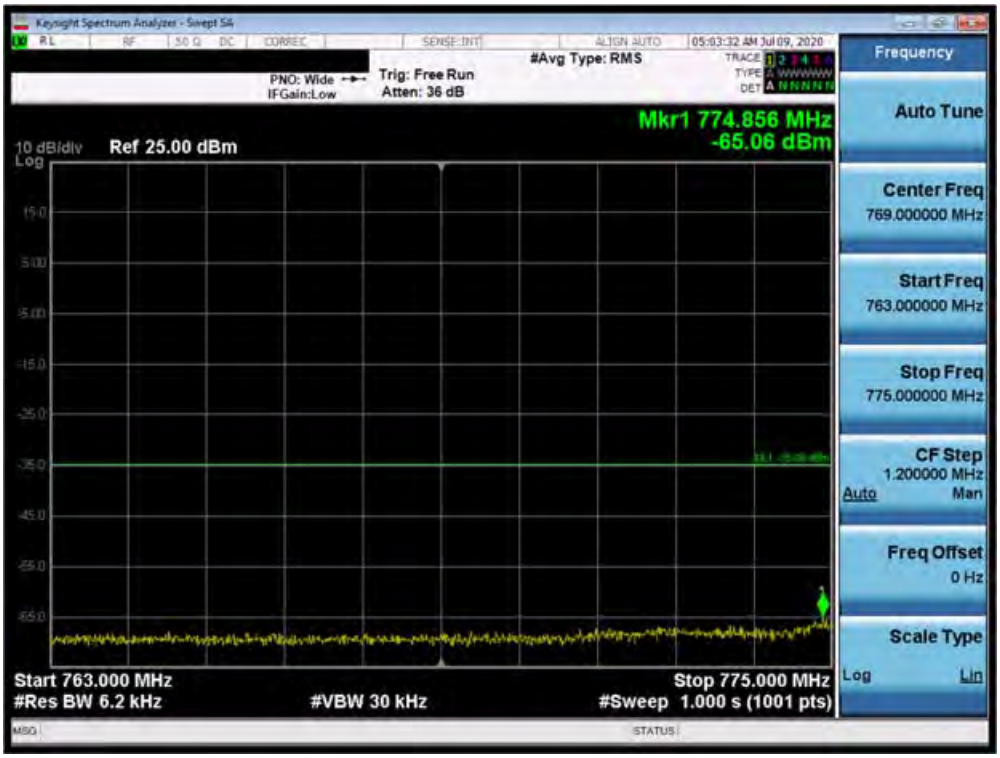
Plot 7-97. Upper Band Edge Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



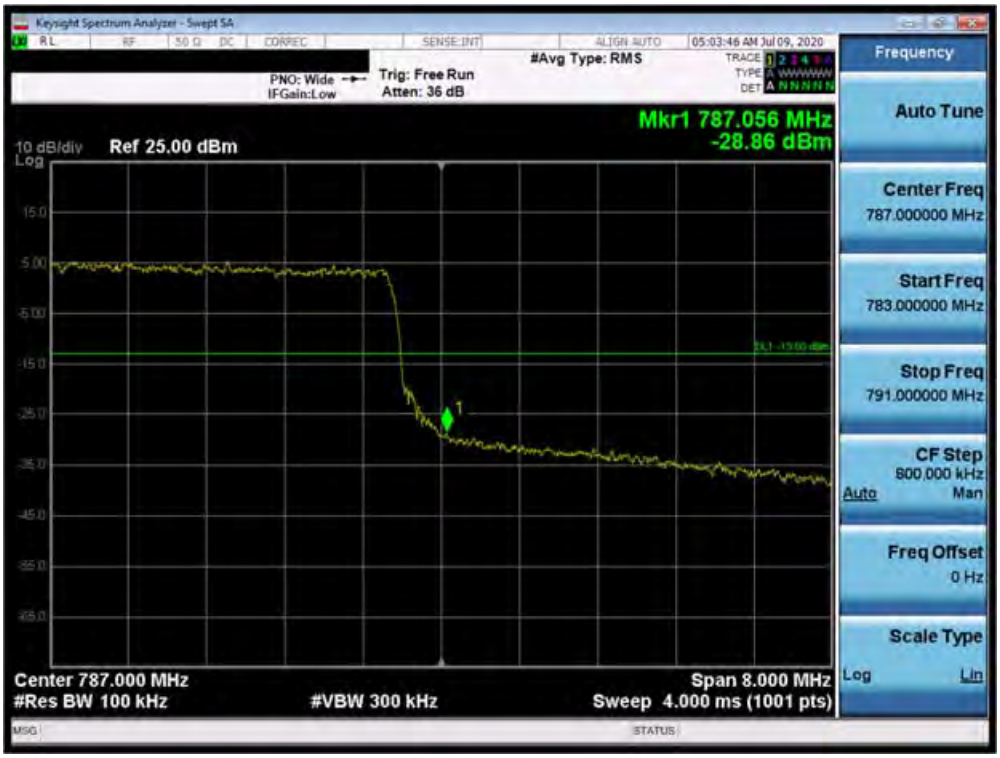
Plot 7-98. Upper Emission Mask Plot (Band 13 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-99. Lower Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-100. Lower Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

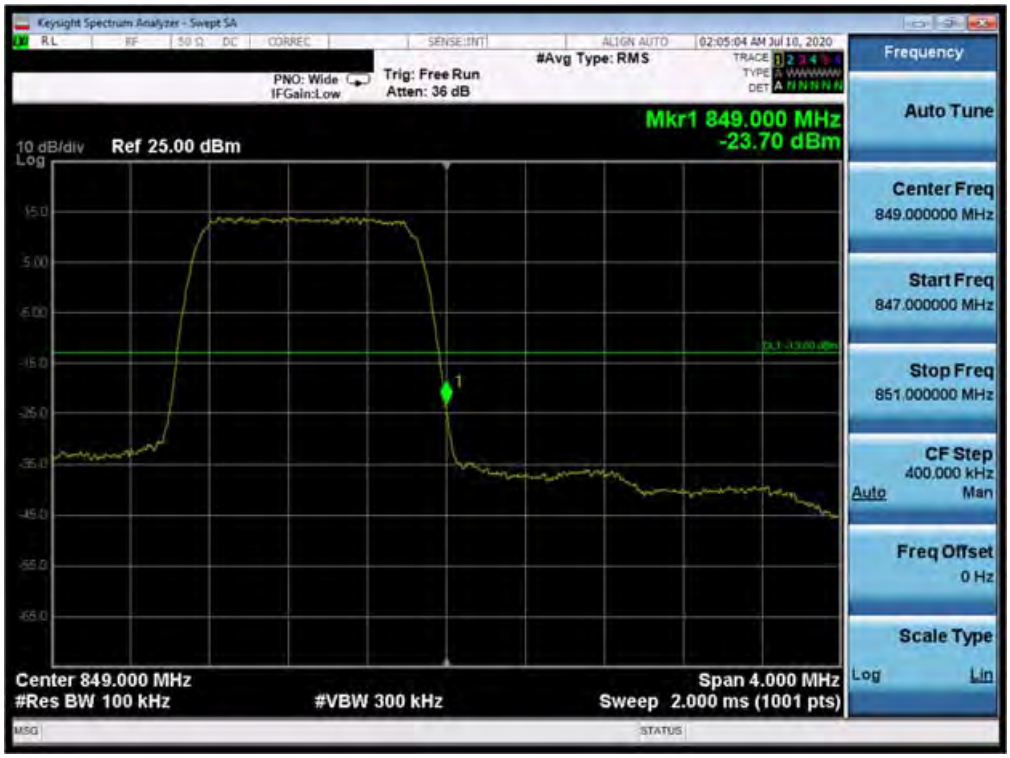


Plot 7-101. Upper Band Edge Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

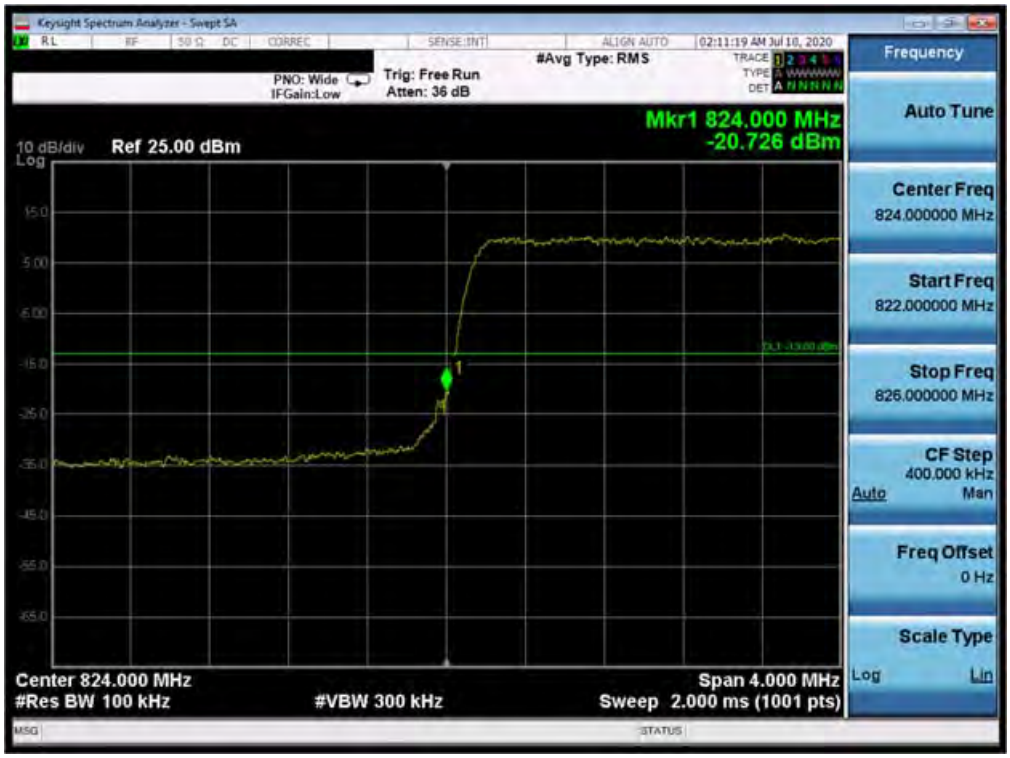
Plot 7-102. Upper Emission Mask Plot (Band 13 - 10.0MHz QPSK - Full RB Configuration)

Band 5

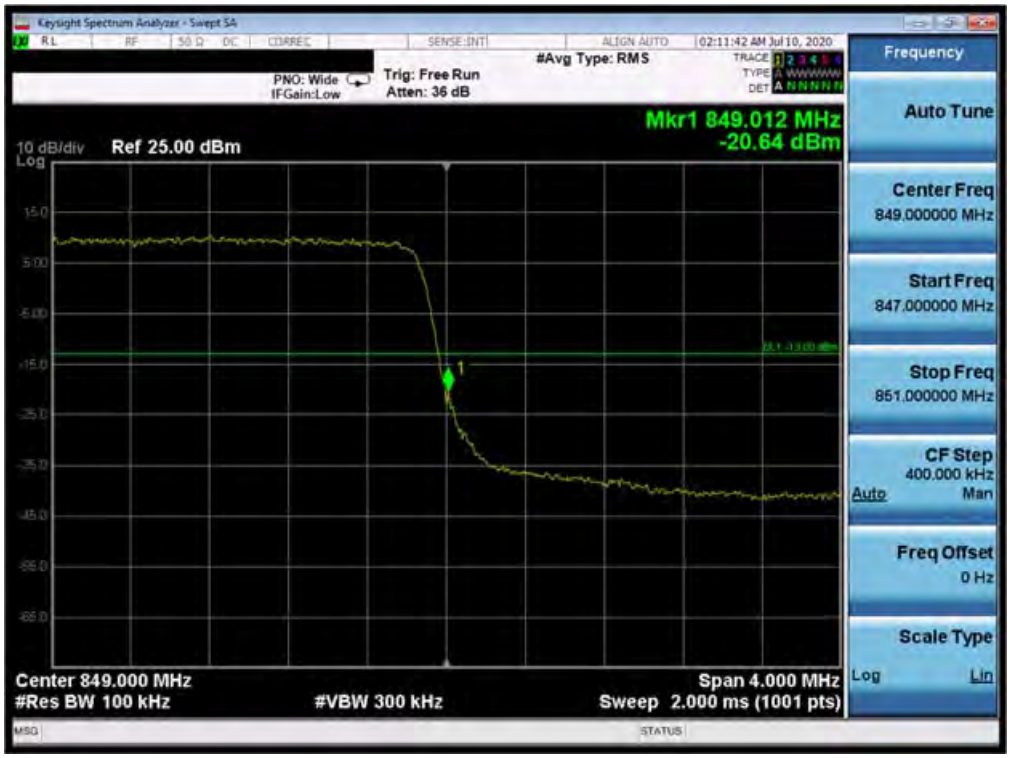
Plot 7-103. Lower Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



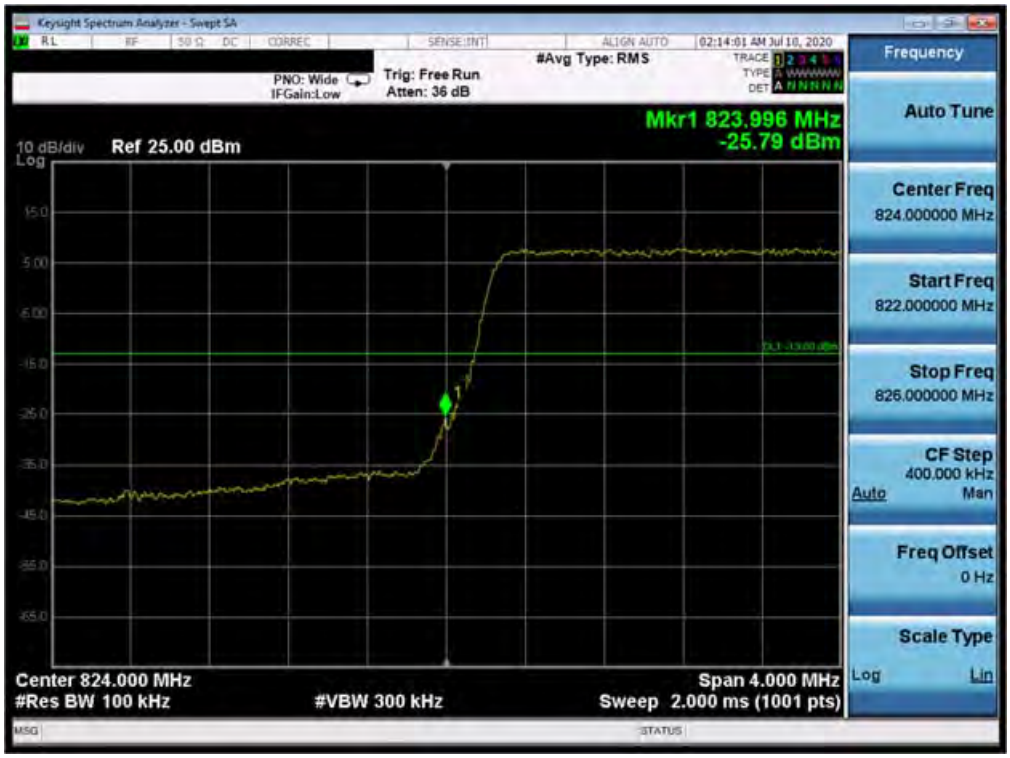
Plot 7-104. Upper Band Edge Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)



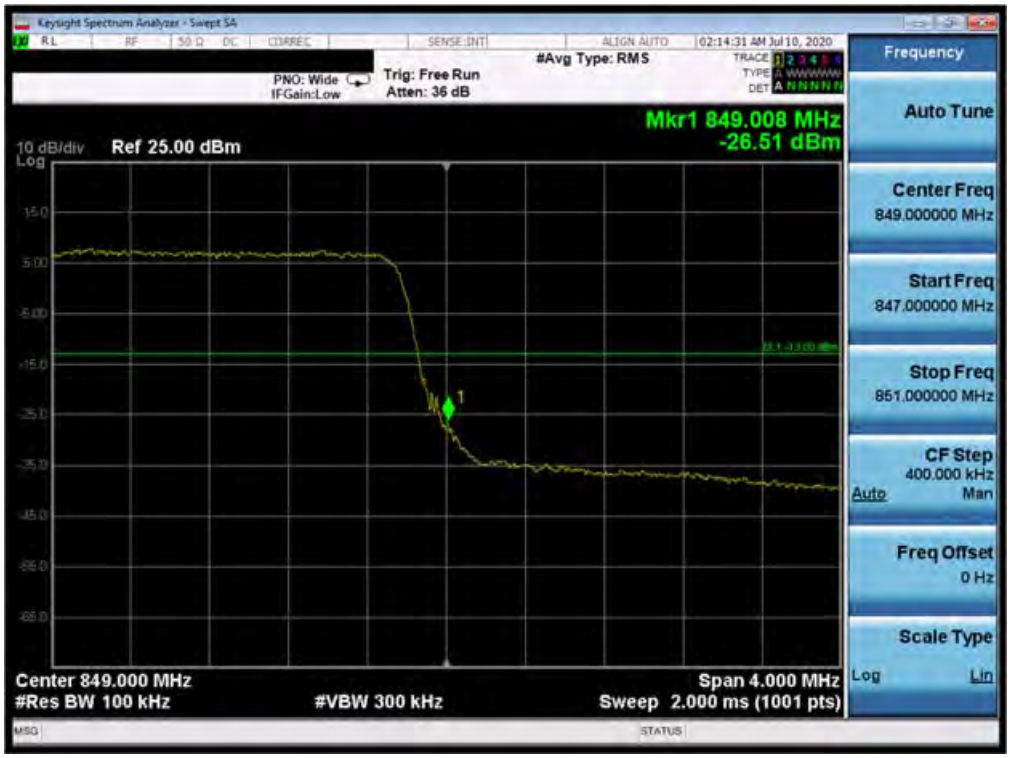
Plot 7-105. Lower Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-106. Upper Band Edge Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)

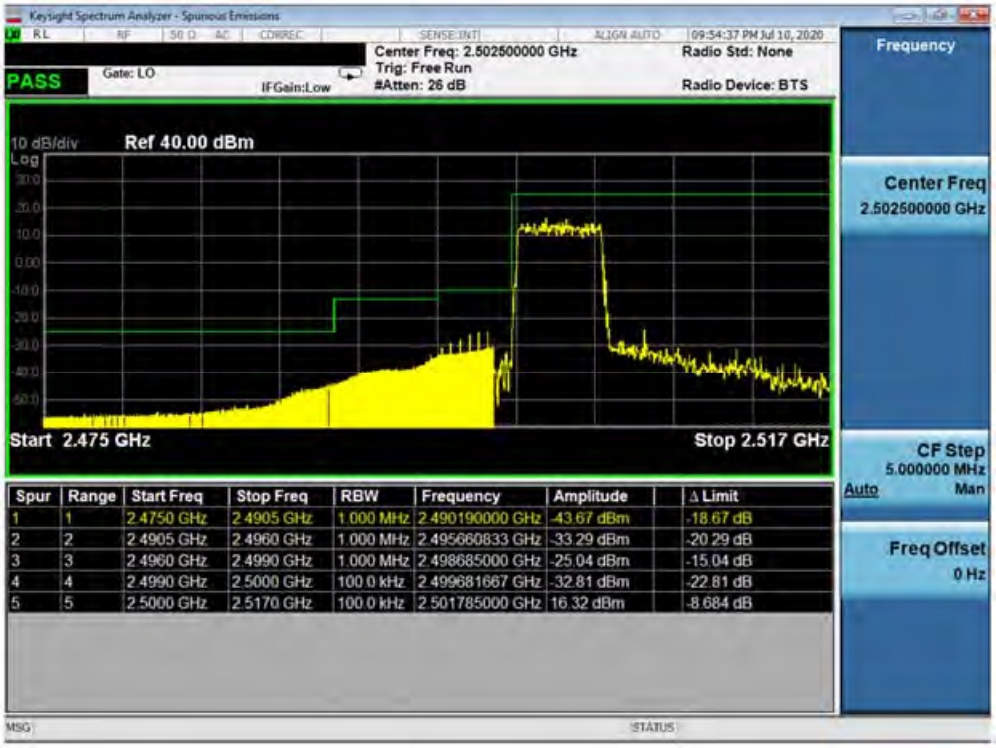


Plot 7-107. Lower Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)



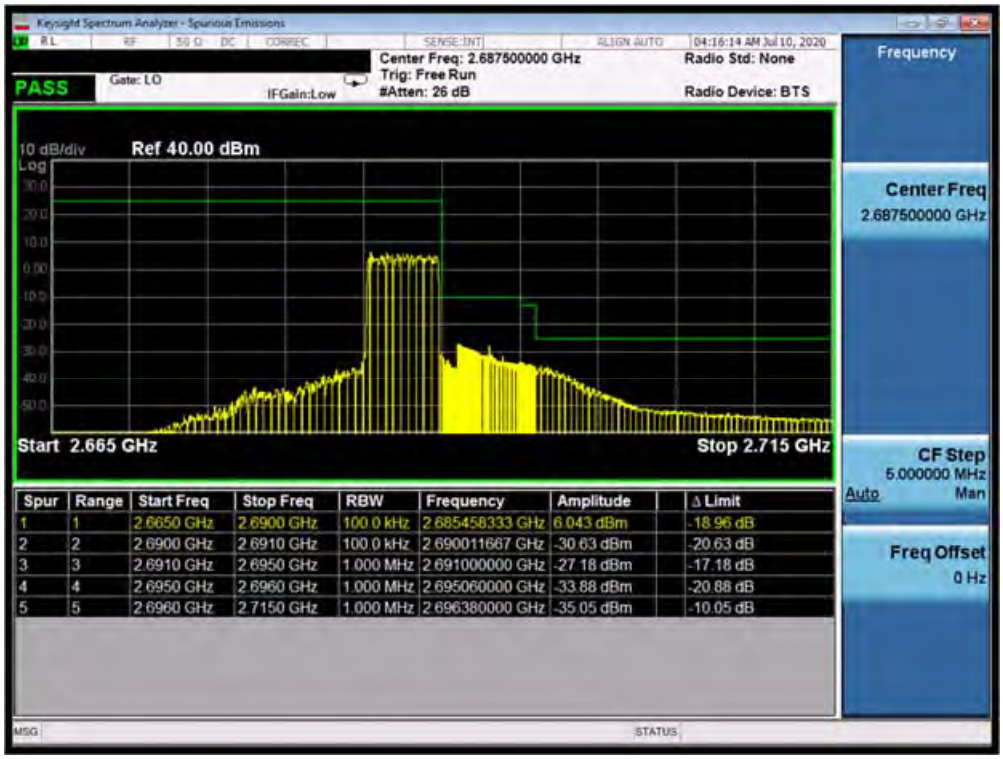
Plot 7-108. Upper Band Edge Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)

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	2.490190000 GHz	-43.67 dBm	-18.67 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.495660833 GHz	-33.29 dBm	-20.29 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498685000 GHz	-25.04 dBm	-15.04 dB
4	4	2.4990 GHz	2.5000 GHz	100.0 kHz	2.499681667 GHz	-32.81 dBm	-22.81 dB
5	5	2.5000 GHz	2.5170 GHz	100.0 kHz	2.501785000 GHz	16.32 dBm	-8.684 dB

Plot 7-109. Lower ACP Plot at 2500 MHz (Band 41 PC3- 5.0MHz QPSK - Full RB Configuration)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	100.0 kHz	2.685458333 GHz	6.043 dBm	-18.96 dB
2	2	2.6900 GHz	2.6910 GHz	100.0 kHz	2.690011667 GHz	-30.63 dBm	-20.63 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691000000 GHz	-27.18 dBm	-17.18 dB
4	4	2.6950 GHz	2.6960 GHz	1.000 MHz	2.695060000 GHz	-33.88 dBm	-20.88 dB
5	5	2.6960 GHz	2.7150 GHz	1.000 MHz	2.696380000 GHz	-35.05 dBm	-10.05 dB

Plot 7-110. Upper ACP Plot (Band 41 PC3- 5.0MHz QPSK - Full RB Configuration)

Plot 7-111. Lower ACP Plot at 2500 MHz (Band 41 PC3- 10.0MHz QPSK - Full RB Configuration)

Plot 7-112. Upper ACP Plot (Band 41 PC3- 10.0MHz QPSK - Full RB Configuration)

Plot 7-113. Lower ACP Plot at 2500 MHz (Band 41 PC3- 15.0MHz QPSK - Full RB Configuration)

Plot 7-114. Upper ACP Plot (Band 41 PC3- 15.0MHz QPSK - Full RB Configuration)

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4750 GHz	2.4905 GHz	1.000 MHz	2.489673333 GHz	-35.11 dBm	-10.11 dB
2	2	2.4905 GHz	2.4960 GHz	1.000 MHz	2.494579167 GHz	-32.39 dBm	-19.39 dB
3	3	2.4960 GHz	2.4990 GHz	1.000 MHz	2.498095000 GHz	-29.36 dBm	-19.36 dB
4	4	2.4990 GHz	2.5000 GHz	390.0 kHz	2.499991667 GHz	-32.36 dBm	-22.36 dB
5	5	2.5000 GHz	2.5170 GHz	390.0 kHz	2.514620000 GHz	16.10 dBm	-8.897 dB

Plot 7-115. Lower ACP Plot at 2496 MHz (Band 41 PC3 - 20.0MHz QPSK - Full RB Configuration)

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	390.0 kHz	2.677333333 GHz	5.472 dBm	-19.53 dB
2	2	2.6900 GHz	2.6910 GHz	390.0 kHz	2.690218333 GHz	-33.71 dBm	-23.71 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691340000 GHz	-32.41 dBm	-22.41 dB
4	4	2.6950 GHz	2.7096 GHz	1.000 MHz	2.695584240 GHz	-34.77 dBm	-21.77 dB
5	5	2.7096 GHz	2.7150 GHz	1.000 MHz	2.711799560 GHz	-39.29 dBm	-14.29 dB

Plot 7-116. Upper ACP Plot (Band 41 PC3 - 20.0MHz QPSK - Full RB Configuration)

7.5 Uplink Carrier Aggregation

§27.53(m)

Test Overview

The EUT is set up to transmit two contiguous LTE channels. The power level of both carriers 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 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.

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

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (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 7-4. Test Instrument & Measurement Setup

Test Notes

1. Conducted power and 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. The worst case (highest) powers were found while operating with QPSK modulation with both carriers set to transmit using 1RB.

2. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

Uplink CA Configuration 41C

Power State	PCC							SCC							Power
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	ULCA Tx.Power (dBm)
Max	LTE B41	20	39750	2506	QPSK	1	99	LTE B41	20	39948	2525.8	QPSK	1	0	24.11
Max	LTE B41	20	40620	2593	QPSK	1	99	LTE B41	20	40818	2612.8	QPSK	1	0	23.69
Max	LTE B41	20	41490	2680	QPSK	1	0	LTE B41	20	41292	2660.2	QPSK	1	99	23.98

Table 7-3. Conducted Powers (B41 – Left Carrier: RB Size 1 Offset Max Right Carrier: RB Size 1 Offset 0)

Power State	PCC							SCC							Power
	PCC Band	PCC Bandwidth [MHz]	PCC (UL) Channel	PCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	SCC Band	SCC Bandwidth [MHz]	SCC (UL) Channel	SCC (UL) Frequency [MHz]	Modulation	PCC UL# RB	PCC UL RB Offset	ULCA Tx.Power (dBm)
Max	LTE B41	20	39750	2506	QPSK	100	0	LTE B41	20	39948	2525.8	QPSK	100	0	21.99
Max	LTE B41	20	39750	2506	16-QAM	100	0	LTE B41	20	39948	2525.8	16-QAM	100	0	20.92
Max	LTE B41	20	39750	2506	64-QAM	100	0	LTE B41	20	39948	2525.8	64-QAM	100	0	20.21
Max	LTE B41	20	39750	2506	256-QAM	100	0	LTE B41	20	39948	2525.8	256-QAM	100	0	18.94

Table 7-4. Conducted Powers (B41 with Various Combinations for 20MHz Channel Bandwidth)

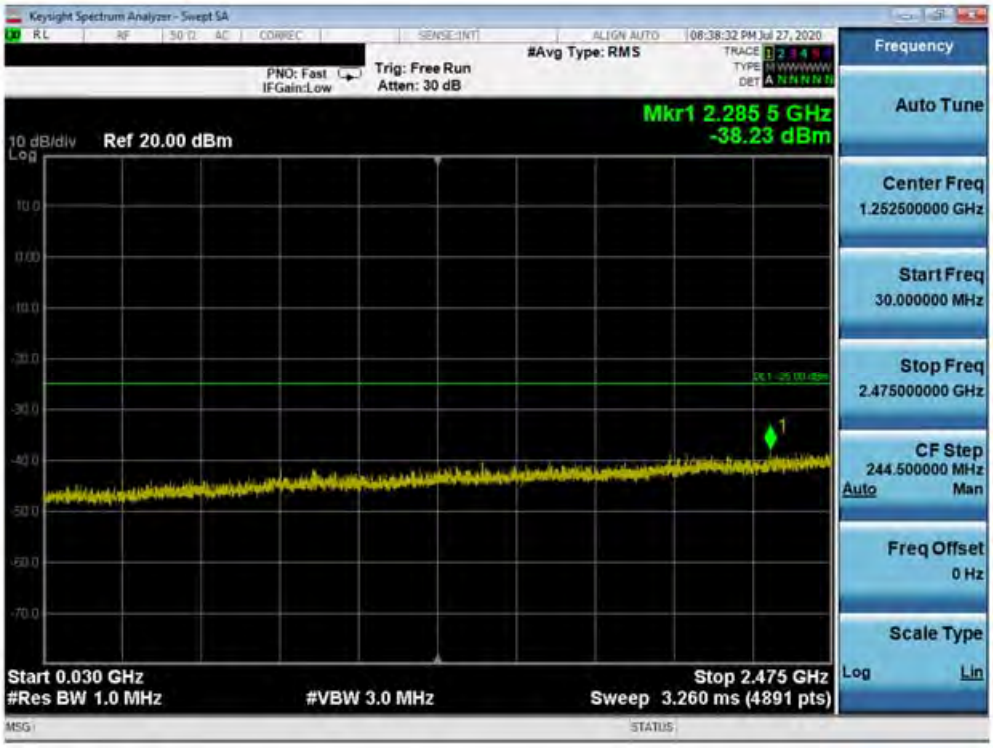


Table 7-117. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – Low Channel)

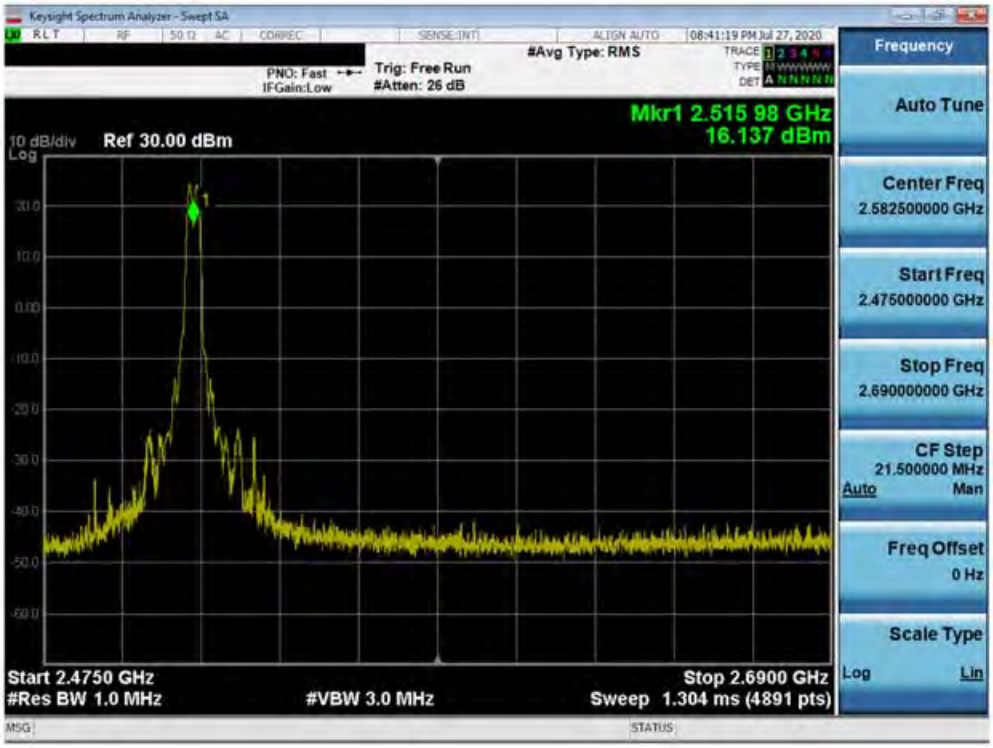


Table 7-118. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – Low Channel)

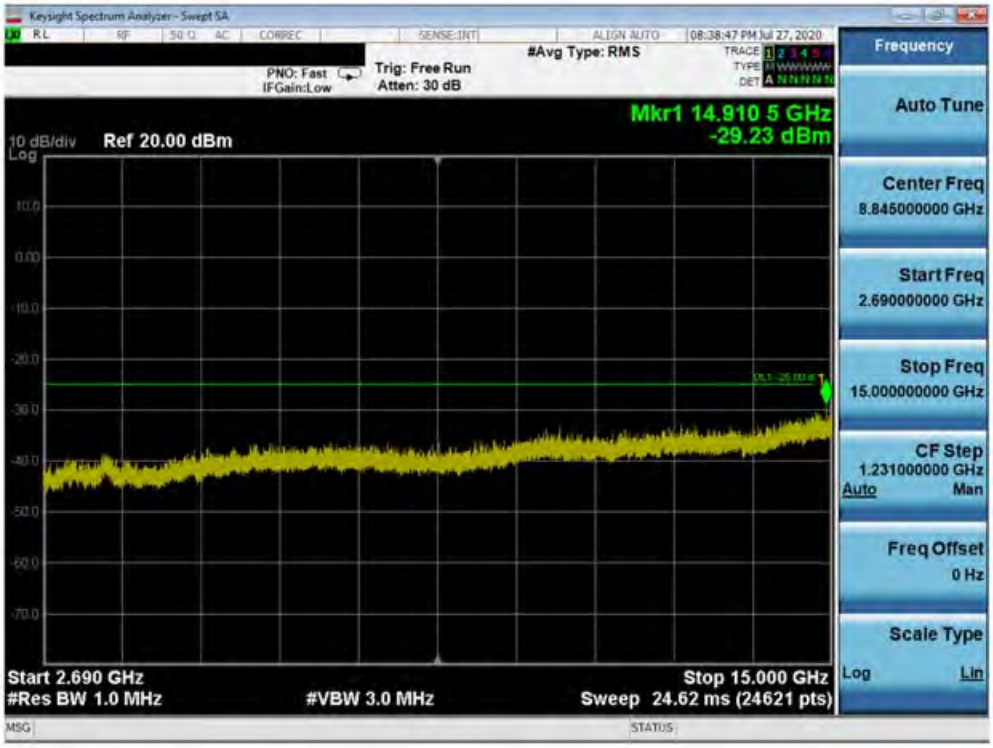


Table 7-119. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – Low Channel)

Table 7-120. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – Low Channel)

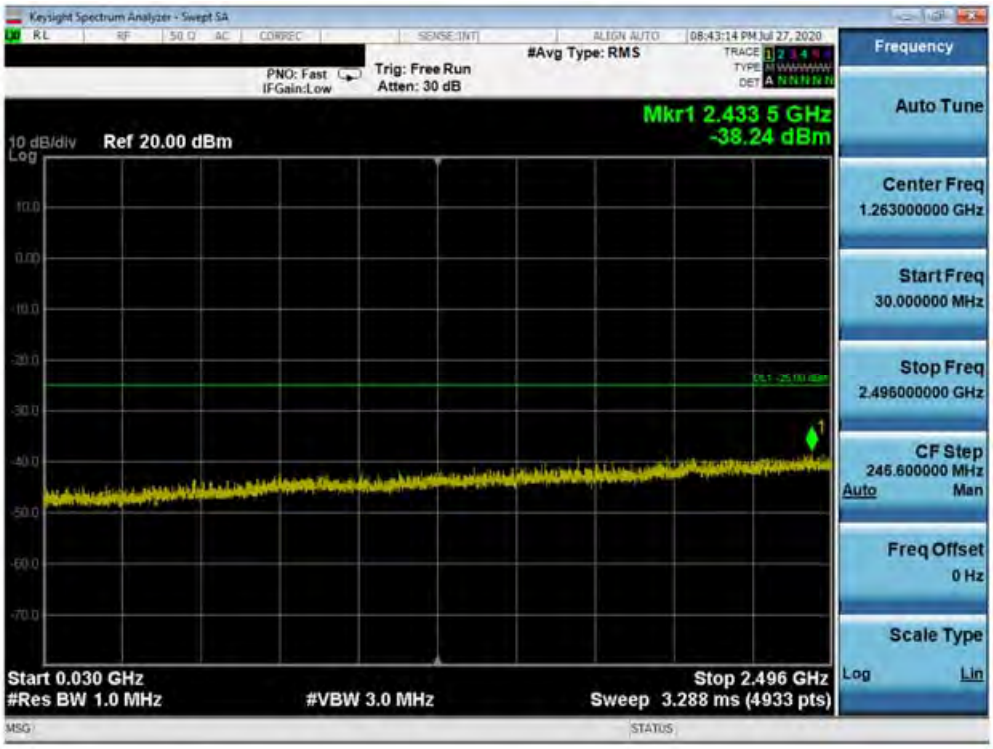


Table 7-121. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – Mid Channel)

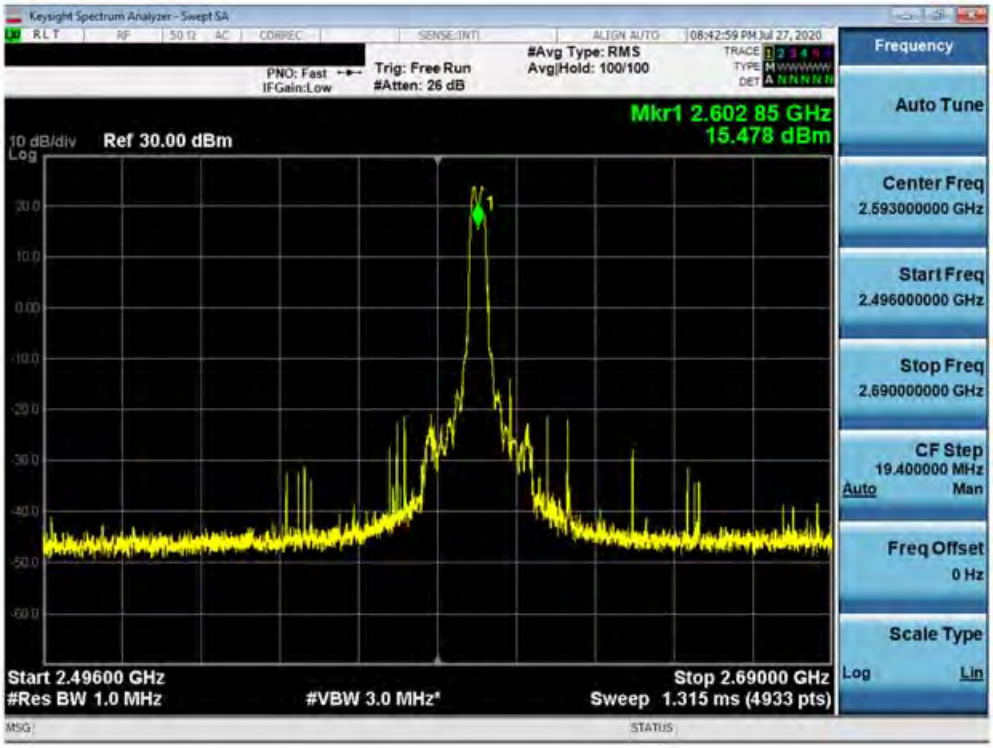


Table 7-122. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – Mid Channel)

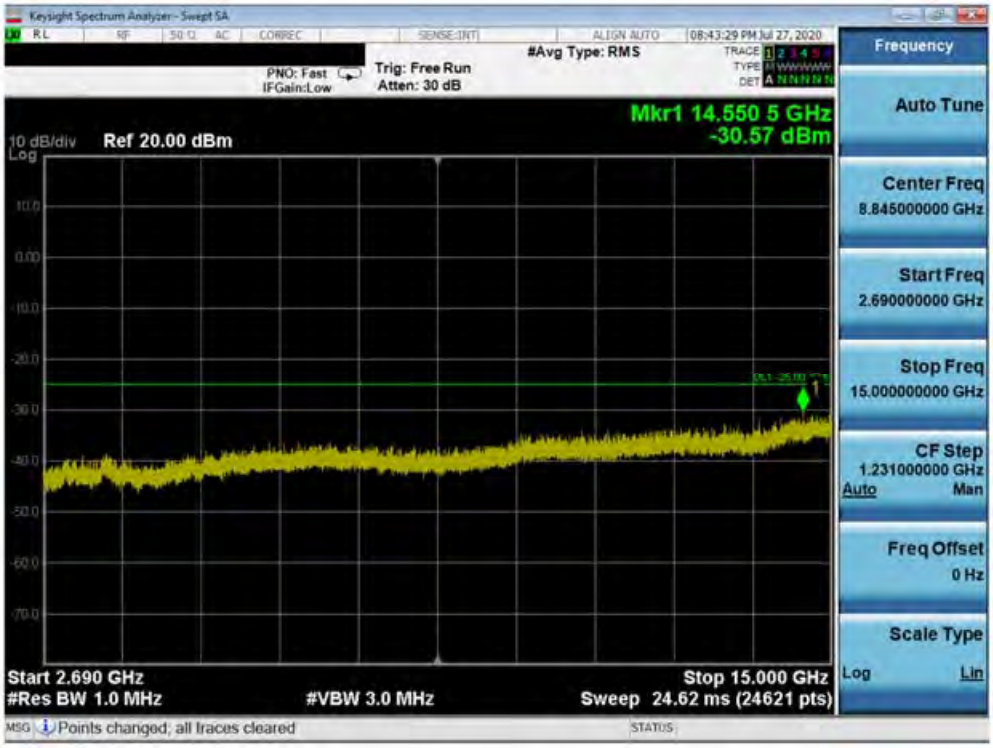


Table 7-123. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – Mid Channel)

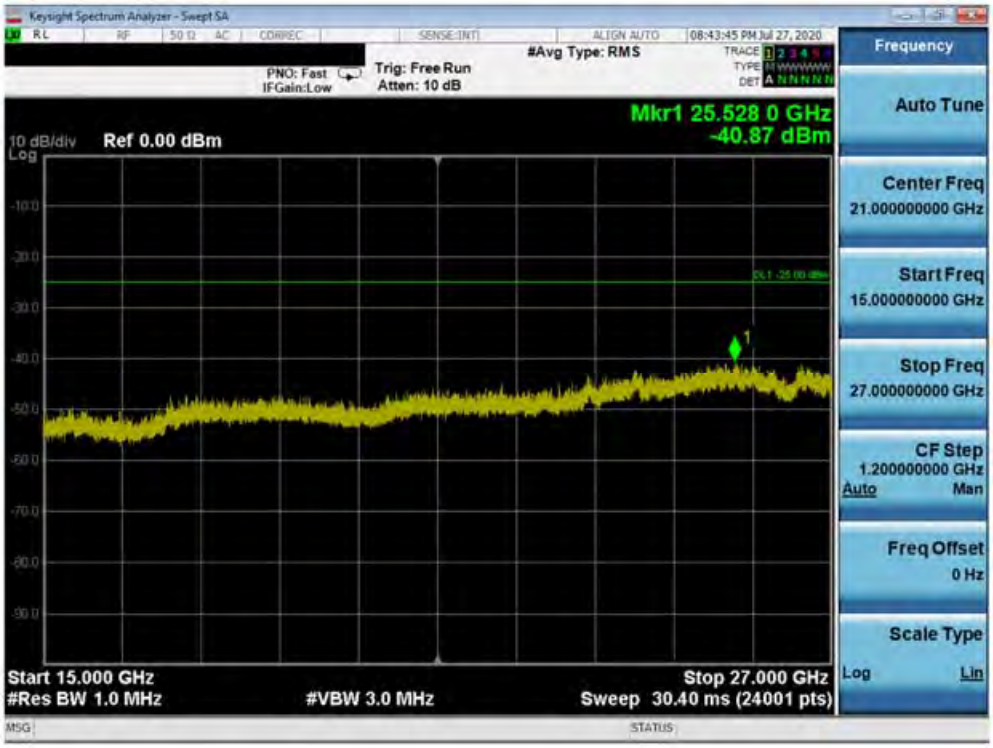


Table 7-124. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – Mid Channel)

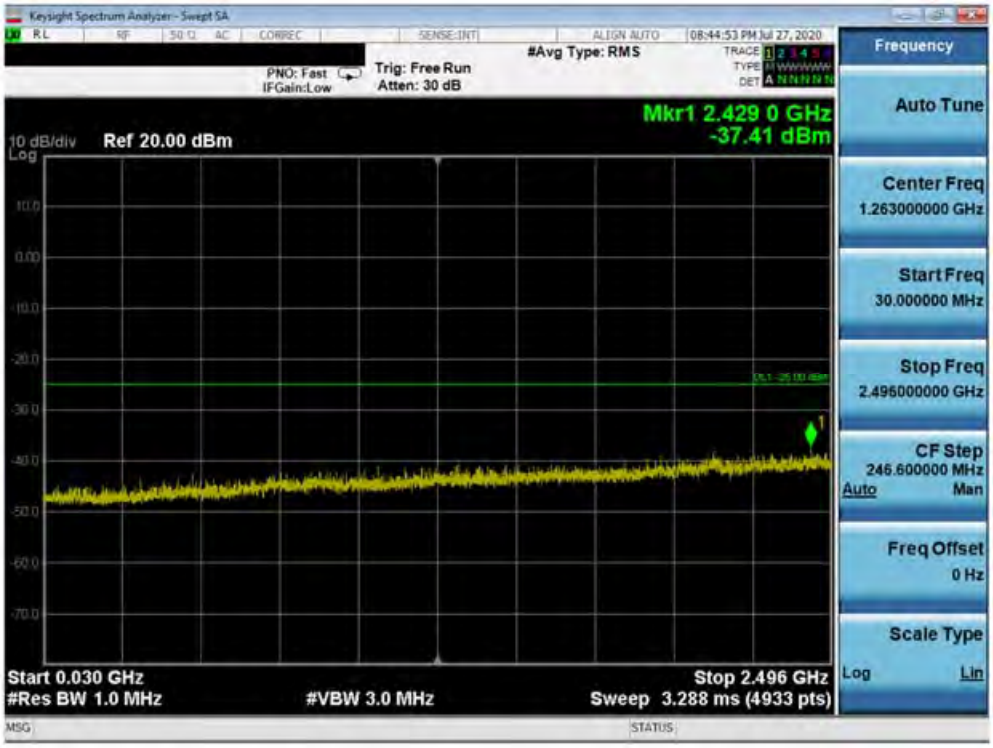


Table 7-125. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – High Channel)

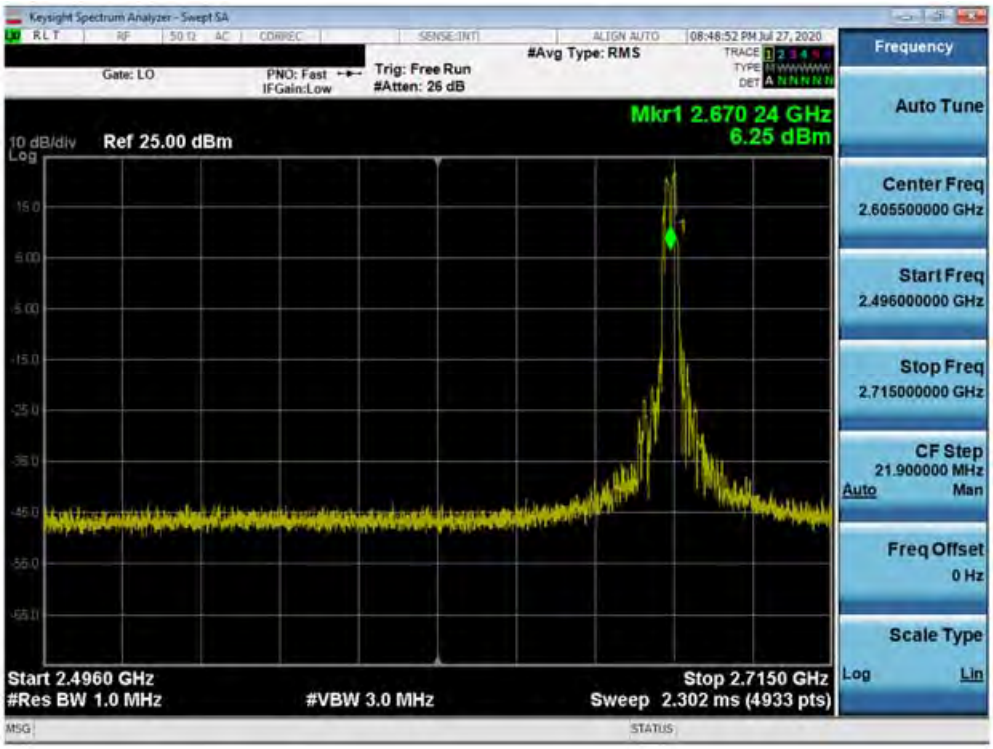


Table 7-126. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – High Channel)

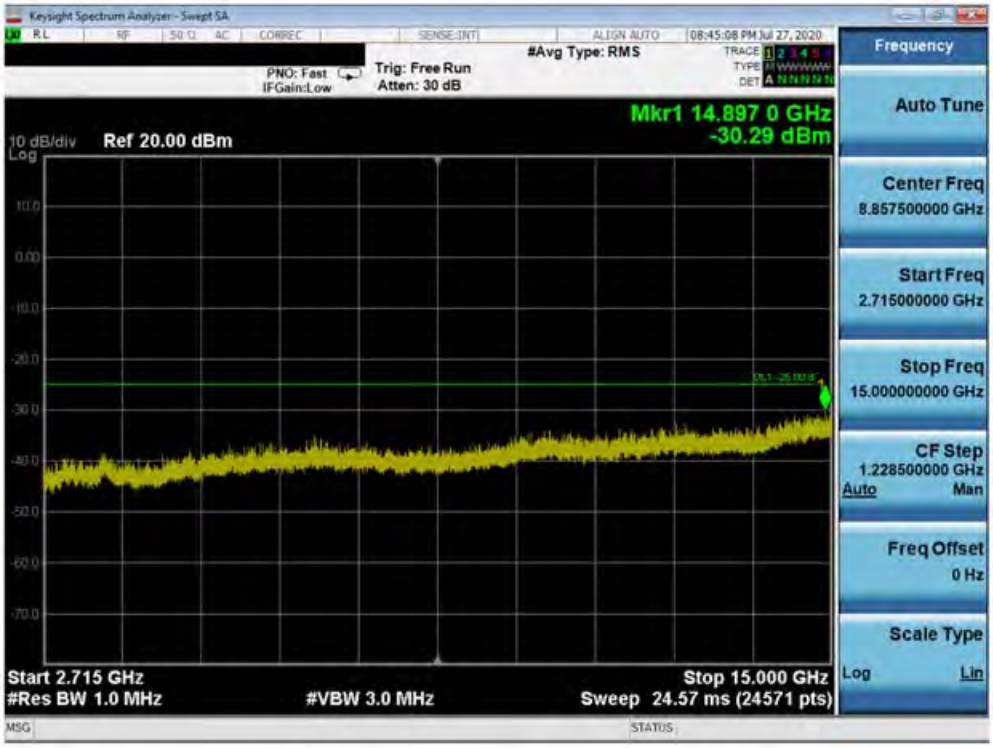


Table 7-127. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – High Channel)

Table 7-128. Conducted Spurious Plot (Band 41 – 20.0MHz QPSK – Left Carrier 1/99 Right Carrier 1/0 – High Channel)

Table 7-129. Lower ACP Plot (Band 41 QPSK – Left Carrier:20 MHz Right Carrier:20 MHz – Full RB)

Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6450 GHz	2.6900 GHz	820.0 kHz	2.675600000 GHz	4.201 dBm	-20.80 dB
2	2	2.6900 GHz	2.6910 GHz	820.0 kHz	2.690031667 GHz	-31.56 dBm	-21.56 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.693913333 GHz	-31.02 dBm	-21.02 dB
4	4	2.6950 GHz	2.7100 GHz	1.000 MHz	2.695700000 GHz	-31.09 dBm	-18.09 dB
5	5	2.7100 GHz	2.7300 GHz	1.000 MHz	2.710300000 GHz	-33.71 dBm	-8.706 dB

Table 7-130. Upper ACP Plot (Band 41 QPSK – Left Carrier:20 MHz Right Carrier:20 MHz – Full RB)

7.6 Radiated Power (ERP/EIRP)

Test Overview

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.2.1

ANSI/TIA-603-E-2016 – Section 2.2.17

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
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".
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
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.

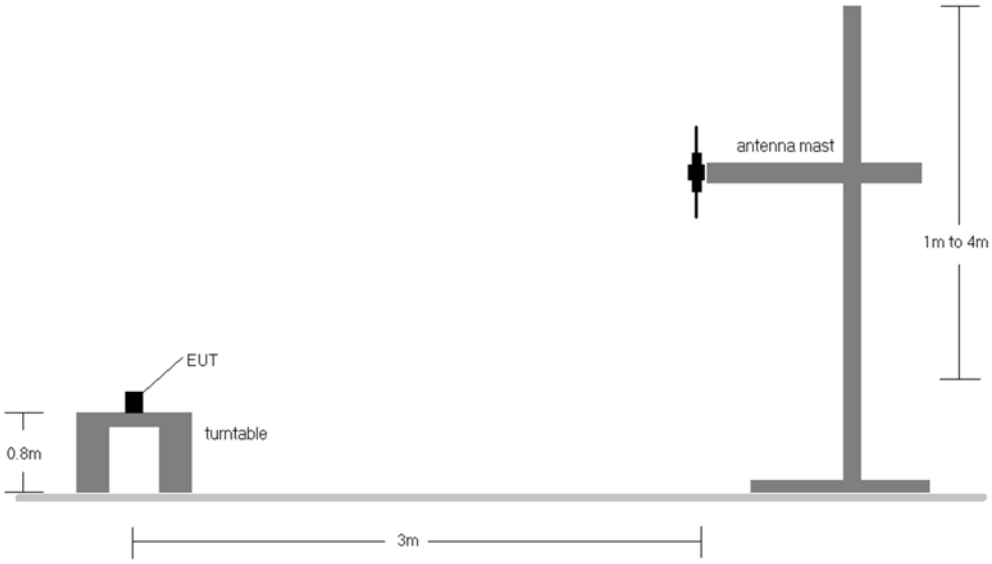


Figure 7-5. Radiated Test Setup <1GHz

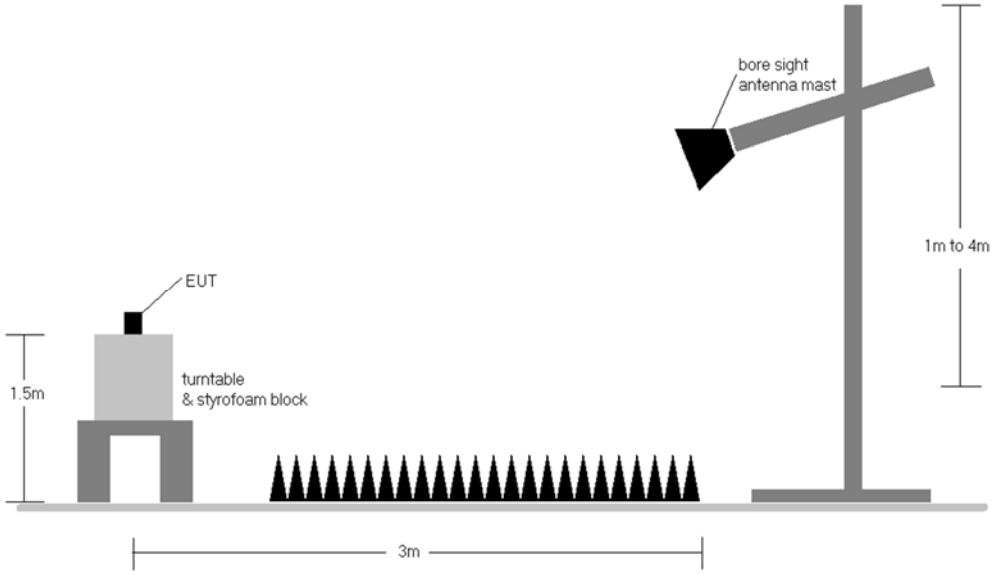


Figure 7-6. Radiated Test Setup >1GHz

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.

7.6.1 Antenna-0 Radiated Power (ERP/EIRP)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	704.0	V	386.0	70.0	4.58	1 / 49	14.32	16.75	0.047	34.77	-18.02
		707.5	V	395.0	57.0	4.62	1 / 49	14.80	**17.27**	0.053	34.77	-17.50
		711.0	V	168.0	139.0	4.67	1 / 49	13.15	15.67	0.037	34.77	-19.10
	16-QAM	707.5	V	395.0	57.0	4.62	1 / 49	13.72	**16.19**	0.042	34.77	-18.58
	64-QAM	707.5	V	395.0	57.0	4.62	1 / 49	12.57	**15.04**	0.032	34.77	-19.73
	256-QAM	707.5	V	395.0	57.0	4.62	1 / 49	11.14	**13.61**	0.023	34.77	-21.16
5 MHz	QPSK	701.5	V	386.0	70.0	4.60	1 / 12	13.83	16.28	0.042	34.77	-18.49
		707.5	V	395.0	57.0	4.62	1 / 24	14.55	**17.02**	0.050	34.77	-17.75
		713.5	V	168.0	139.0	4.70	1 / 24	12.91	15.46	0.035	34.77	-19.31
	16-QAM	707.5	V	395.0	57.0	4.62	1 / 24	13.93	**16.40**	0.044	34.77	-18.37
	64-QAM	707.5	V	395.0	57.0	4.62	1 / 24	12.17	**14.64**	0.029	34.77	-20.13
	256-QAM	713.5	V	168.0	139.0	4.70	1 / 24	10.64	**13.19**	0.021	34.77	-21.58
3 MHz	QPSK	700.5	V	386.0	70.0	4.59	1 / 14	13.88	16.32	0.043	34.77	-18.45
		707.5	V	395.0	57.0	4.62	1 / 14	14.45	**16.92**	0.049	34.77	-17.85
		714.5	V	168.0	139.0	4.71	1 / 14	12.85	15.41	0.035	34.77	-19.36
	16-QAM	707.5	V	395.0	57.0	4.62	1 / 14	14.04	**16.51**	0.045	34.77	-18.26
	64-QAM	707.5	V	395.0	57.0	4.62	1 / 14	12.14	**14.61**	0.029	34.77	-20.16
	256-QAM	707.5	V	395.0	57.0	4.62	1 / 14	10.61	**13.08**	0.020	34.77	-21.69
1.4 MHz	QPSK	699.7	V	386.0	70.0	4.56	1 / 5	13.83	16.24	0.042	34.77	-18.53
		707.5	V	395.0	57.0	4.62	1 / 5	14.40	**16.87**	0.049	34.77	-17.90
		715.3	V	168.0	139.0	4.72	1 / 2	12.77	15.34	0.034	34.77	-19.43
	16-QAM	707.5	V	395.0	57.0	4.62	1 / 5	13.71	**16.18**	0.042	34.77	-18.59
	64-QAM	707.5	V	395.0	57.0	4.62	1 / 5	12.09	**14.56**	0.029	34.77	-20.21
	256-QAM	715.3	V	168.0	139.0	4.72	1 / 2	10.46	**13.03**	0.020	34.77	-21.74
	Opposite Pol.	707.5	H	201.0	333.0	4.62	1 / 49	12.97	15.44	0.035	34.77	-19.33
	WCP	707.5	V	224.0	167.0	4.62	1 / 49	12.12	14.59	0.029	34.77	-20.18

Table 7-5. ERP Data (Band 12)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]
10 MHz	QPSK	782.0	V	240.0	14.0	5.79	1 / 49	14.98	**18.62**	0.073	34.77	-16.15
	16-QAM	782.0	V	240.0	14.0	5.79	1 / 49	14.34	**17.98**	0.063	34.77	-16.79
	64-QAM	782.0	V	240.0	14.0	5.79	1 / 49	13.24	**16.88**	0.049	34.77	-17.89
	256-QAM	782.0	V	240.0	14.0	5.79	1 / 49	9.87	**13.51**	0.022	34.77	-21.26
5 MHz	QPSK	779.5	V	240.0	14.0	5.77	1 / 24	14.81	18.43	0.070	34.77	-16.35
		782.0	V	240.0	14.0	5.79	1 / 24	14.85	18.49	0.071	34.77	-16.28
		784.5	V	240.0	14.0	5.82	1 / 24	15.26	**18.93**	0.078	34.77	-15.84
	16-QAM	784.5	V	240.0	14.0	5.82	1 / 24	14.65	**18.32**	0.068	34.77	-16.45
	64-QAM	784.5	V	240.0	14.0	5.82	1 / 24	13.38	**17.05**	0.051	34.77	-17.72
	256-QAM	784.5	V	240.0	14.0	5.82	1 / 24	9.99	**13.66**	0.023	34.77	-21.11
	Opposite Pol.	784.5	H	211.0	300.0	5.79	1 / 24	14.56	18.20	0.066	34.77	-16.57
	WCP	784.5	V	244.0	56.0	5.79	1 / 24	14.44	18.08	0.064	34.77	-16.69

Table 7-6. ERP Data (Band 13)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
10 MHz	QPSK	829.0	V	195.0	59.0	6.43	1 / 49	12.86	17.14	0.052	38.45	-21.31	19.29	0.085	40.61	-21.32
		836.5	V	186.0	61.0	6.38	1 / 0	13.03	**17.26**	0.053	38.45	-21.19	**19.41**	0.087	40.61	-21.20
		844.0	V	201.0	57.0	6.43	1 / 0	12.70	16.98	0.050	38.45	-21.47	19.13	0.082	40.61	-21.48
	16-QAM	836.5	V	186.0	61.0	6.38	1 / 0	12.77	**17.00**	0.050	38.45	-21.45	**19.15**	0.082	40.61	-21.46
	64-QAM	836.5	V	186.0	61.0	6.38	1 / 0	11.40	**15.63**	0.037	38.45	-22.82	**17.78**	0.060	40.61	-22.83
	256-QAM	836.5	V	186.0	61.0	6.38	1 / 0	9.22	**13.45**	0.022	38.45	-25.00	**15.60**	0.036	40.61	-25.01
5 MHz	QPSK	826.5	V	195.0	59.0	6.43	1 / 12	12.83	17.11	0.051	38.45	-21.34	19.26	0.084	40.61	-21.35
		836.5	V	186.0	61.0	6.38	1 / 12	13.12	**17.35**	0.054	38.45	-21.10	**19.50**	0.089	40.61	-21.11
		846.5	V	201.0	57.0	6.43	1 / 0	12.60	16.88	0.049	38.45	-21.57	19.03	0.080	40.61	-21.58
	16-QAM	836.5	V	186.0	61.0	6.38	1 / 12	12.75	**16.98**	0.050	38.45	-21.47	**19.13**	0.082	40.61	-21.48
	64-QAM	836.5	V	186.0	61.0	6.38	1 / 12	11.49	**15.72**	0.037	38.45	-22.73	**17.87**	0.061	40.61	-22.74
	256-QAM	836.5	V	186.0	61.0	6.38	1 / 12	9.33	**13.56**	0.023	38.45	-24.89	**15.71**	0.037	40.61	-24.90
3 MHz	QPSK	825.5	V	195.0	59.0	6.43	1 / 14	12.73	17.01	0.050	38.45	-21.44	19.16	0.082	40.61	-21.45
		836.5	V	186.0	61.0	6.38	1 / 14	13.13	**17.36**	0.054	38.45	-21.09	**19.51**	0.089	40.61	-21.10
		847.5	V	201.0	57.0	6.43	1 / 0	12.72	17.00	0.050	38.45	-21.45	19.15	0.082	40.61	-21.46
	16-QAM	836.5	V	186.0	61.0	6.38	1 / 14	12.71	**16.94**	0.049	38.45	-21.51	**19.09**	0.081	40.61	-21.52
	64-QAM	836.5	V	186.0	61.0	6.38	1 / 14	11.48	**15.71**	0.037	38.45	-22.74	**17.86**	0.061	40.61	-22.75
	256-QAM	836.5	V	186.0	61.0	6.38	1 / 14	9.15	**13.38**	0.022	38.45	-25.07	**15.53**	0.036	40.61	-25.08
1.4 MHz	QPSK	824.7	V	195.0	59.0	6.43	1 / 2	12.59	16.87	0.049	38.45	-21.58	19.02	0.080	40.61	-21.59
		836.5	V	186.0	61.0	6.38	1 / 2	13.15	**17.38**	0.055	38.45	-21.07	**19.53**	0.090	40.61	-21.08
		848.3	V	201.0	57.0	6.43	1 / 2	12.63	16.91	0.049	38.45	-21.54	19.06	0.081	40.61	-21.55
	16-QAM	836.5	V	186.0	61.0	6.38	1 / 2	12.69	**16.92**	0.049	38.45	-21.53	**19.07**	0.081	40.61	-21.54
	64-QAM	836.5	V	186.0	61.0	6.38	1 / 2	11.49	**15.72**	0.037	38.45	-22.73	**17.87**	0.061	40.61	-22.74
	256-QAM	836.5	V	186.0	61.0	6.38	1 / 2	9.18	**13.41**	0.022	38.45	-25.04	**15.56**	0.036	40.61	-25.05
	Opposite Pol.	836.5	H	214.0	62.0	6.38	1 / 0	10.70	17.08	0.051	38.45	-21.37	19.23	0.084	40.61	-21.38
	WCP	836.5	V	132.0	213.0	6.38	1 / 0	7.40	13.78	0.024	38.45	-24.67	15.93	0.039	40.61	-24.68

Table 7-7. ERP Data (Band 5)

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	155.0	147.0	9.42	1 / 50	13.59	23.01	0.200	33.01	-10.00
		2593.0	H	147.0	150.0	9.59	1 / 50	15.11	**24.70**	0.295	33.01	-8.31
		2680.0	H	141.0	144.0	9.71	1 / 0	14.88	24.59	0.288	33.01	-8.42
	16-QAM	2593.0	H	147.0	150.0	9.59	1 / 50	14.00	**23.59**	0.228	33.01	-9.42
	64-QAM	2593.0	H	147.0	150.0	9.59	1 / 50	13.49	**23.08**	0.203	33.01	-9.93
	256-QAM	2593.0	H	147.0	150.0	9.59	1 / 50	11.20	**20.79**	0.120	33.01	-12.22
15 MHz	QPSK	2503.5	H	155.0	147.0	9.42	1 / 0	13.49	22.91	0.196	33.01	-10.10
		2593.0	H	147.0	150.0	9.59	1 / 36	14.96	**24.55**	0.285	33.01	-8.46
		2682.5	H	141.0	144.0	9.71	1 / 36	14.82	24.53	0.284	33.01	-8.48
	16-QAM	2593.0	H	147.0	150.0	9.59	1 / 36	14.00	**23.59**	0.228	33.01	-9.42
	64-QAM	2593.0	H	147.0	150.0	9.59	1 / 36	12.99	**22.58**	0.181	33.01	-10.43
	256-QAM	2593.0	H	147.0	150.0	9.59	1 / 36	10.73	**20.32**	0.108	33.01	-12.69
10 MHz	QPSK	2501.0	H	155.0	147.0	9.42	1 / 0	13.56	22.98	0.199	33.01	-10.03
		2593.0	H	147.0	150.0	9.59	1 / 25	15.09	**24.68**	0.294	33.01	-8.33
		2685.0	H	141.0	144.0	9.71	1 / 25	14.79	24.50	0.282	33.01	-8.51
	16-QAM	2593.0	H	147.0	150.0	9.59	1 / 25	14.16	**23.75**	0.237	33.01	-9.26
	64-QAM	2593.0	H	147.0	150.0	9.59	1 / 25	13.02	**22.61**	0.182	33.01	-10.40
	256-QAM	2593.0	H	147.0	150.0	9.59	1 / 25	10.84	**20.43**	0.110	33.01	-12.58
5 MHz	QPSK	2498.5	H	155.0	147.0	9.43	1 / 0	13.54	22.97	0.198	33.01	-10.04
		2593.0	H	147.0	150.0	9.59	1 / 0	15.09	**24.68**	0.294	33.01	-8.33
		2687.5	H	141.0	144.0	9.71	1 / 0	14.84	24.55	0.285	33.01	-8.46
	16-QAM	2593.0	H	147.0	150.0	9.59	1 / 0	14.10	**23.69**	0.234	33.01	-9.32
	64-QAM	2593.0	H	147.0	150.0	9.59	1 / 0	13.10	**22.69**	0.186	33.01	-10.32
	256-QAM	2593.0	H	147.0	150.0	9.59	1 / 0	10.78	**20.37**	0.109	33.01	-12.64
	Opposite Pol.	2593.0	V	229.0	305.0	9.42	1 / 50	15.10	24.52	0.283	33.01	-8.49
	WCP	2593.0	H	169.0	222.0	9.42	1 / 50	14.70	24.12	0.258	33.01	-8.89

Table 7-8. EIRP Data (Band 41 PC3)

7.6.2 Antenna-1 Radiated Power (ERP/EIRP)

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	ERP [dBm]	ERP [Watts]	ERP Limit [dBm]	Margin [dB]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
10 MHz	QPSK	829.0	H	247.0	183.0	6.80	1 / 25	7.88	12.53	0.018	38.45	-25.92	14.68	0.029	40.61	-25.93
		836.5	H	226.0	194.0	6.68	1 / 25	8.08	**12.61**	0.018	38.45	-25.84	**14.76**	0.030	40.61	-25.85
		844.0	H	231.0	184.0	6.66	1 / 25	7.66	12.17	0.016	38.45	-26.28	14.32	0.027	40.61	-26.29
	16-QAM	829.0	H	247.0	183.0	6.80	1 / 25	7.37	**12.02**	0.016	38.45	-26.43	**14.17**	0.026	40.61	-26.44
		836.5	H	226.0	194.0	6.68	1 / 25	7.33	11.86	0.015	38.45	-26.59	14.01	0.025	40.61	-26.60
		844.0	H	231.0	184.0	6.66	1 / 25	7.00	11.51	0.014	38.45	-26.94	13.66	0.023	40.61	-26.95
	64-QAM	829.0	H	247.0	183.0	6.80	1 / 25	6.18	**10.83**	0.012	38.45	-27.62	**12.98**	0.020	40.61	-27.63
		836.5	H	226.0	194.0	6.68	1 / 25	6.09	10.62	0.012	38.45	-27.83	12.77	0.019	40.61	-27.84
		844.0	H	231.0	184.0	6.66	1 / 25	5.76	10.27	0.011	38.45	-28.18	12.42	0.017	40.61	-28.19
	256-QAM	829.0	H	247.0	183.0	6.80	1 / 25	3.28	**7.93**	0.006	38.45	-30.52	**10.08**	0.010	40.61	-30.53
		836.5	H	226.0	194.0	6.68	1 / 25	2.99	7.52	0.006	38.45	-30.93	9.67	0.009	40.61	-30.94
		844.0	H	231.0	184.0	6.66	1 / 25	2.76	7.27	0.005	38.45	-31.18	9.42	0.009	40.61	-31.19
5 MHz	QPSK	829.0	H	247.0	183.0	6.80	1/0	7.75	12.40	0.017	38.45	-26.05	14.55	0.029	40.61	-26.06
		836.5	H	226.0	194.0	6.68	1/12	7.88	**12.41**	0.017	38.45	-26.04	**14.56**	0.029	40.61	-26.05
		844.0	H	231.0	184.0	6.66	1/12	7.36	11.87	0.015	38.45	-26.58	14.02	0.025	40.61	-26.59
	16-QAM	829.0	H	247.0	183.0	6.80	1/12	7.00	11.65	0.015	38.45	-26.80	13.80	0.024	40.61	-26.81
		836.5	H	226.0	194.0	6.68	1/12	7.14	**11.67**	0.015	38.45	-26.78	**13.82**	0.024	40.61	-26.79
		844.0	H	231.0	184.0	6.66	1/24	6.49	11.00	0.013	38.45	-27.45	13.15	0.021	40.61	-27.46
	64-QAM	829.0	H	247.0	183.0	6.80	1/12	6.29	**10.94**	0.012	38.45	-27.51	**13.09**	0.020	40.61	-27.52
		836.5	H	226.0	194.0	6.68	1/12	6.29	10.82	0.012	38.45	-27.63	12.97	0.020	40.61	-27.64
		844.0	H	231.0	184.0	6.66	1/12	5.40	9.91	0.010	38.45	-28.54	12.06	0.016	40.61	-28.55
	256-QAM	829.0	H	247.0	183.0	0.00	1/24	10.12	**7.97**	0.006	38.45	-30.48	**10.12**	0.010	40.61	-30.49
		836.5	H	226.0	194.0	0.00	1/12	9.64	7.49	0.006	38.45	-30.96	9.64	0.009	40.61	-30.97
		844.0	H	231.0	184.0	0.00	1/12	9.17	7.02	0.005	38.45	-31.43	9.17	0.008	40.61	-31.44
3 MHz	QPSK	829.0	H	247.0	183.0	6.80	1/0	7.74	**12.39**	0.017	38.45	-26.06	**14.54**	0.028	40.61	-26.07
		836.5	H	226.0	194.0	6.68	1/14	7.80	12.33	0.017	38.45	-26.12	14.48	0.028	40.61	-26.13
		844.0	H	231.0	184.0	6.66	1/7	7.42	11.93	0.016	38.45	-26.52	14.08	0.026	40.61	-26.53
	16-QAM	829.0	H	247.0	183.0	6.80	1/0	7.24	**11.89**	0.015	38.45	-26.56	**14.04**	0.025	40.61	-26.57
		836.5	H	226.0	194.0	6.68	1/7	6.84	11.37	0.014	38.45	-27.08	13.52	0.022	40.61	-27.09
		844.0	H	231.0	184.0	6.66	1/7	6.84	11.35	0.014	38.45	-27.10	13.50	0.022	40.61	-27.11
	64-QAM	829.0	H	247.0	183.0	6.80	1/0	6.32	**10.97**	0.013	38.45	-27.48	**13.12**	0.021	40.61	-27.49
		836.5	H	226.0	194.0	6.68	1/7	5.66	10.19	0.010	38.45	-28.26	12.34	0.017	40.61	-28.27
		844.0	H	231.0	184.0	6.66	1/7	5.37	9.88	0.010	38.45	-28.57	12.03	0.016	40.61	-28.58
	256-QAM	829.0	H	247.0	183.0	0.00	1/0	9.83	**7.68**	0.006	38.45	-30.77	**9.83**	0.010	40.61	-30.78
		836.5	H	226.0	194.0	0.00	1/7	9.61	7.46	0.006	38.45	-30.99	9.61	0.009	40.61	-31.00
		844.0	H	231.0	184.0	0.00	1/7	9.68	7.53	0.006	38.45	-30.92	9.68	0.009	40.61	-30.93
1.4 MHz	QPSK	829.0	H	247.0	183.0	6.80	1/2	7.72	12.37	0.017	38.45	-26.08	14.52	0.028	40.61	-26.09
		836.5	H	226.0	194.0	6.68	1/2	7.96	**12.49**	0.018	38.45	-25.96	**14.64**	0.029	40.61	-25.97
		844.0	H	231.0	184.0	6.66	1/2	7.48	11.99	0.016	38.45	-26.46	14.14	0.026	40.61	-26.47
	16-QAM	829.0	H	247.0	183.0	6.80	1/2	7.28	**11.93**	0.016	38.45	-26.52	**14.08**	0.026	40.61	-26.53
		836.5	H	226.0	194.0	6.68	1/2	6.96	11.49	0.014	38.45	-26.96	13.64	0.023	40.61	-26.97
		844.0	H	231.0	184.0	6.66	1/2	6.42	10.93	0.012	38.45	-27.52	13.08	0.020	40.61	-27.53
	64-QAM	829.0	H	247.0	183.0	6.80	1/2	6.22	**10.87**	0.012	38.45	-27.58	**13.02**	0.020	40.61	-27.59
		836.5	H	226.0	194.0	6.68	1/2	6.10	10.63	0.012	38.45	-27.82	12.78	0.019	40.61	-27.83
		844.0	H	231.0	184.0	6.66	1/2	5.25	9.76	0.009	38.45	-28.69	11.91	0.016	40.61	-28.70
	256-QAM	829.0	H	247.0	183.0	0.00	1/2	9.88	**7.73**	0.006	38.45	-30.72	**9.88**	0.010	40.61	-30.73
		836.5	H	226.0	194.0	0.00	1/2	9.54	7.39	0.005	38.45	-31.06	9.54	0.009	40.61	-31.07
		844.0	H	231.0	184.0	0.00	1/2	9.11	6.96	0.005	38.45	-31.49	9.11	0.008	40.61	-31.50
	Opposite Pol.	836.5	V	216.0	180.0	6.68	1 / 25	-1.07	5.61	0.004	38.45	-32.84	7.76	0.006	40.61	-32.85
	WCP	836.5	H	181.0	323.0	6.68	1 / 25	6.49	13.17	0.021	38.45	-25.28	15.32	0.034	40.61	-25.29

Table 7-9. EIRP Data (Band 5)

7.7 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-E-2016 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 5.8

ANSI/TIA-603-E-2016 – Section 2.2.12

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.

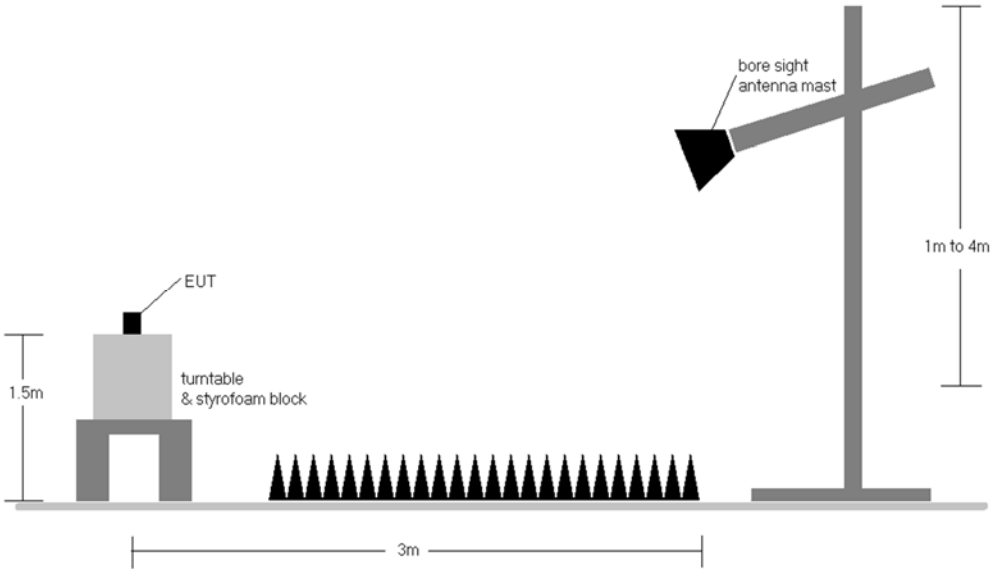


Figure 7-7. Test Instrument & Measurement Setup

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.

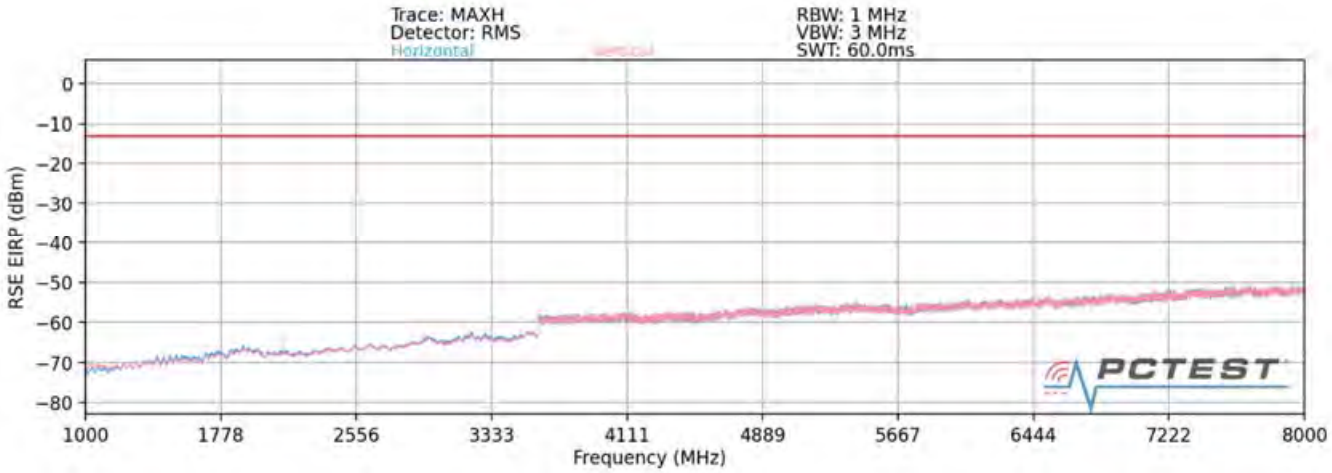
3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

4) 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.

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

7.7.1 Antenna-0 Radiated Spurious Emissions Measurements

Band 12



Plot 7-131. Radiated Spurious Plot above 1GHz (Band 12)

OPERATING FREQUENCY:	704.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1408.00	H	400	370	-59.13	2.30	-56.83	-43.8
2112.00	H	398	249	-56.63	3.12	-53.51	-40.5
2816.00	H	-	-	-58.39	4.82	-53.57	-40.6
3520.00	H	-	-	-59.07	6.48	-52.59	-39.6

Table 7-10. Radiated Spurious Data (Band 12 – Low Channel)

OPERATING FREQUENCY:	707.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1415.00	H	171	42	-60.69	2.39	-58.30	-45.3
2122.50	H	370	233	-53.67	3.14	-50.53	-37.5
2830.00	H	-	-	-59.37	4.87	-54.51	-41.5
3537.50	H	-	-	-60.43	6.45	-53.98	-41.0

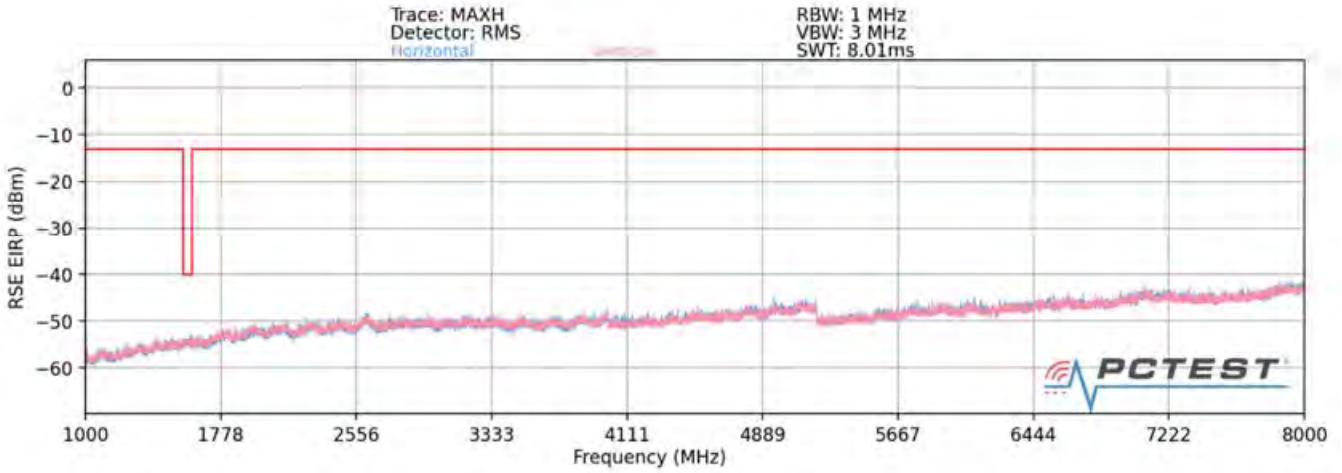
Table 7-11. Radiated Spurious Data (Band 12 – Mid Channel)

OPERATING FREQUENCY:	711.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1422.00	H	-	-	-61.23	2.53	-58.71	-45.7
2133.00	H	367	44	-53.16	3.11	-50.05	-37.1
2844.00	H	-	-	-58.61	4.91	-53.70	-40.7
3555.00	H	-	-	-59.42	6.46	-52.97	-40.0

Table 7-12. Radiated Spurious Data (Band 12 – High Channel)

Band 13



Plot 7-132. Radiated Spurious Plot above 1GHz (Band 13)

OPERATING FREQUENCY:	782.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
2346.00	V	398	213	-53.88	3.64	-50.24	-37.2
3128.00	V	-	-	-55.17	5.73	-49.43	-36.4
3910.00	V	-	-	-56.21	7.25	-48.96	-36.0

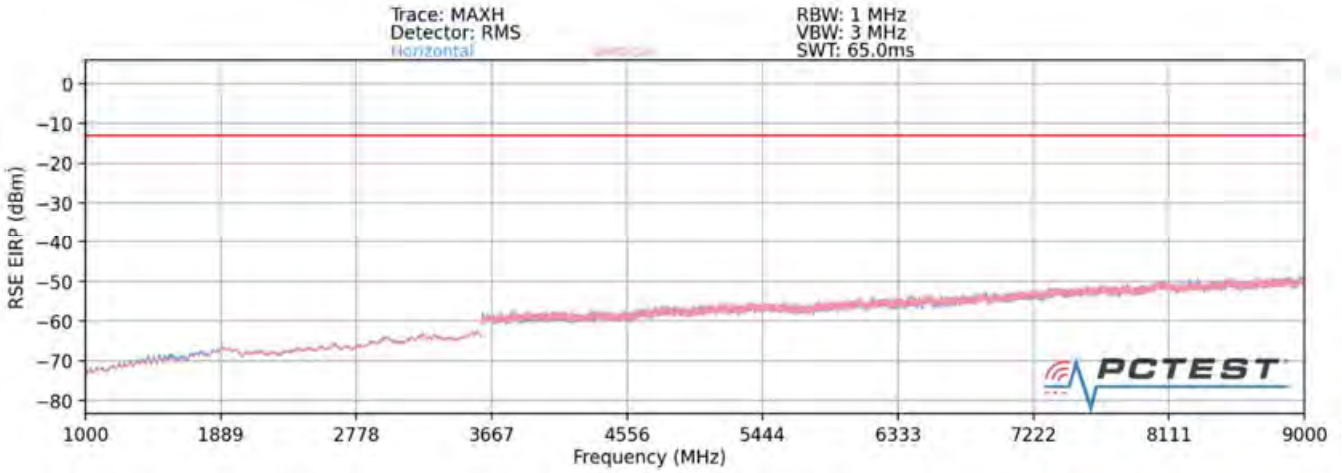
Table 7-13. Radiated Spurious Data (Band 13 – Mid Channel)

MODULATION SIGNAL:	QPSK	
BANDWIDTH:	5.00	MHz
DISTANCE:	3	meters
NARROWBAND EMISSION LIMIT:	-50	dBm
WIDEBAND EMISSION LIMIT:	-40	dBm/MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1564.00	V	373	199	-55.79	2.93	-52.86	-12.9

Table 7-14. Radiated Spurious Data (Band 13 – 1559-1610MHz Band)

Band 5



Plot 7-133. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY:	829.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1658.00	V	275	97	-69.77	8.98	-60.79	-47.8
2487.00	V	397	291	-68.01	9.76	-58.25	-45.2
3316.00	V	-	-	-70.97	9.62	-61.35	-48.3

Table 7-15. Radiated Spurious Data (Band 5 – Low Channel)

OPERATING FREQUENCY:	836.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	V	261	125	-69.45	8.98	-60.47	-47.5
2509.50	V	159	259	-64.64	9.78	-54.86	-41.9
3346.00	V	-	-	-65.47	9.63	-55.84	-42.8
4182.50	V	-	-	-71.68	10.37	-61.31	-48.3

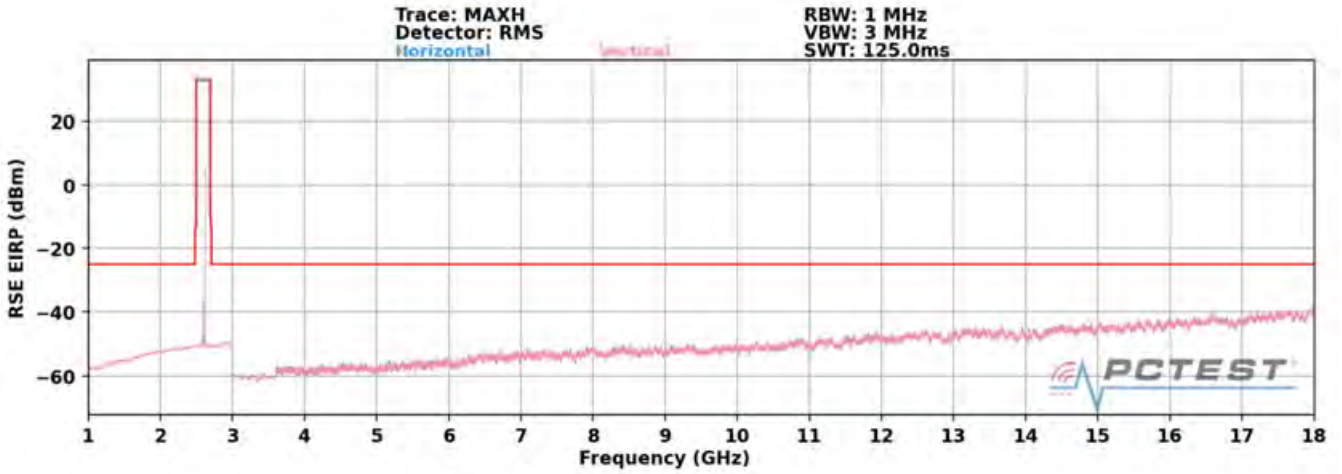
Table 7-16. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY:	844.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

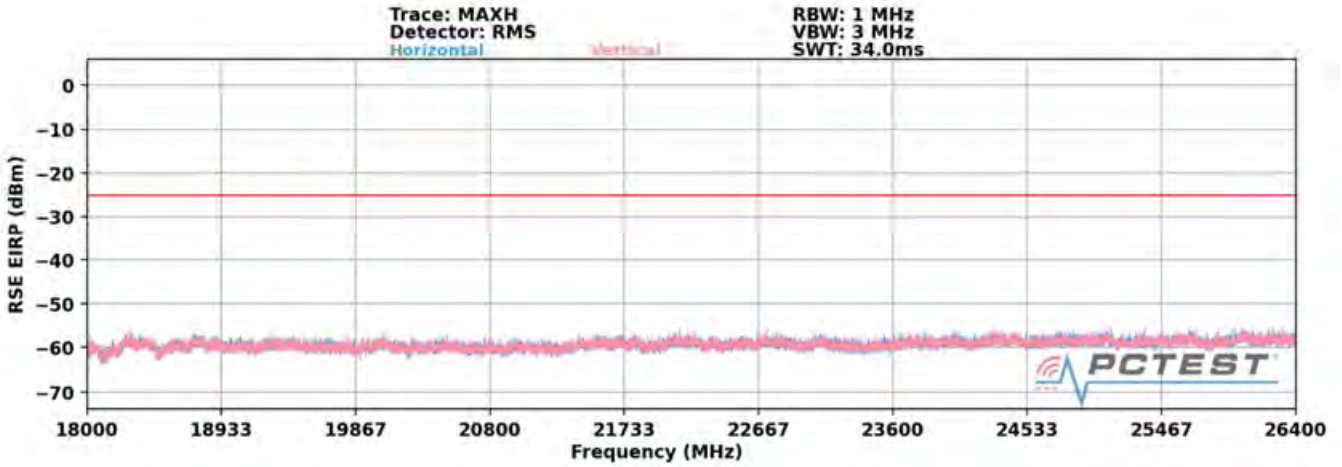
Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1688.00	V	351	97	-69.05	8.98	-60.07	-47.1
2532.00	V	112	323	-64.96	9.78	-55.18	-42.2
3376.00	V	-	-	-65.85	9.70	-56.15	-43.2
4220.00	V	-	-	-72.03	10.47	-61.56	-48.6
5064.00	V	-	-	-70.27	10.83	-59.44	-46.4

Table 7-17. Radiated Spurious Data (Band 5 – High Channel)

Band 41



Plot 7-134. Radiated Spurious Plot above 1GHz (Band 41)



Plot 7-135. Radiated Spurious Plot 18GHz – 26.5GHz (Band 41)

OPERATING FREQUENCY:	2506.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5012.00	H	351	58	-56.37	8.56	-47.81	-22.8
7518.00	H	345	67	-45.75	8.49	-37.25	-12.3
10024.00	H	287	327	-56.10	9.85	-46.25	-21.2
12530.00	H	170	75	-49.72	9.07	-40.65	-15.7
15036.00	H	-	-	-49.60	8.77	-40.83	-15.8
17542.00	H	-	-	-45.84	7.64	-38.20	-13.2

Table 7-18. Radiated Spurious Data (Band 41 – Low Channel)

OPERATING FREQUENCY:	2593.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	H	183	7	-58.28	8.70	-49.58	-24.6
7779.00	H	197	356	-43.81	8.69	-35.12	-10.1
10372.00	H	184	356	-55.55	9.62	-45.93	-20.9
12965.00	H	125	305	-52.52	8.99	-43.53	-18.5
15558.00	H	-	-	-48.43	8.32	-40.11	-15.1

Table 7-19. Radiated Spurious Data (Band 41 – Mid Channel)

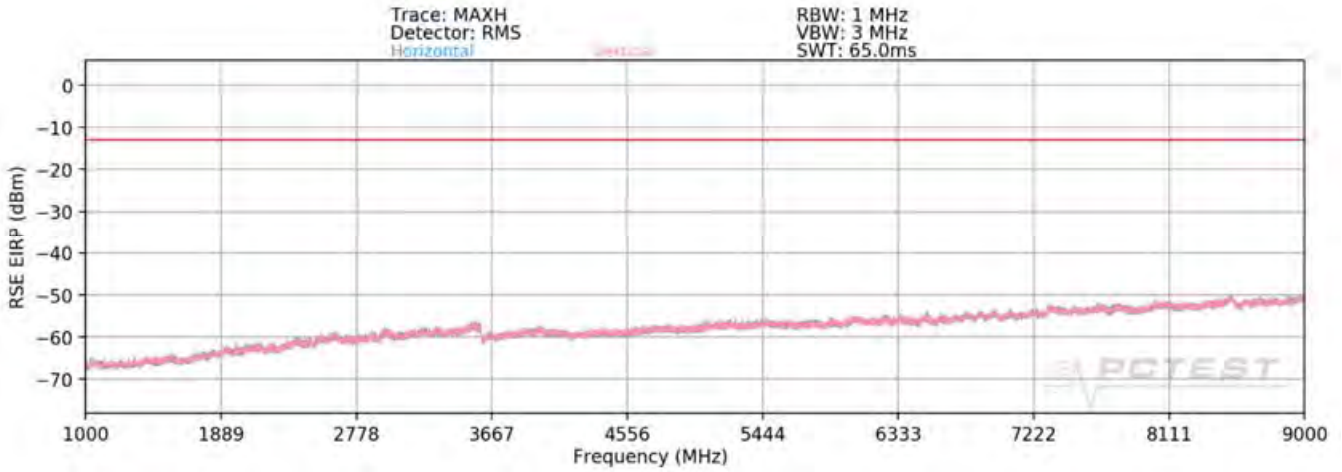
OPERATING FREQUENCY:	2680.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5360.00	H	112	264	-58.67	8.70	-49.98	-25.0
8040.00	H	109	334	-44.96	8.95	-36.01	-11.0
10720.00	H	154	347	-55.78	9.32	-46.46	-21.5
13400.00	H	128	355	-51.68	8.77	-42.90	-17.9
16080.00	H	-	-	-48.22	8.01	-40.22	-15.2

Table 7-20. Radiated Spurious Data (Band 41 – High Channel)

7.7.2 Antenna-1 Radiated Spurious Emissions Measurements

Band 5



Plot 7-136. Radiated Spurious Plot above 1GHz (Band 5)

OPERATING FREQUENCY:	829.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1658.00	H	-	-	-67.32	8.88	-58.44	-45.4
2487.00	H	-	-	-64.75	9.23	-55.52	-42.5

Table 7-21. Radiated Spurious Data (Band 5 –Low Channel)

OPERATING FREQUENCY:	836.50	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1673.00	H	-	-	-66.71	8.78	-57.93	-44.9
2509.50	H	-	-	-64.57	9.27	-55.30	-42.3

Table 7-22. Radiated Spurious Data (Band 5 –Mid Channel)

OPERATING FREQUENCY:	844.00	MHz
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	10.0	MHz
DISTANCE:	3	meters
LIMIT:	-13	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
1688.00	H	-	-	-67.92	8.68	-59.24	-46.2
2532.00	H	-	-	-63.63	9.28	-54.36	-41.4

Table 7-23. Radiated Spurious Data (Band 5 –High Channel)

7.8 Uplink Carrier Aggregation Radiated Measurements

§2.1053

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using vertically and horizontally polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v02r02 – Section 5.8

ANSI/TIA-603-D-2010 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. No. of sweep points ≥ 2 x span / RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. The trace was allowed to stabilize

Test Setup

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

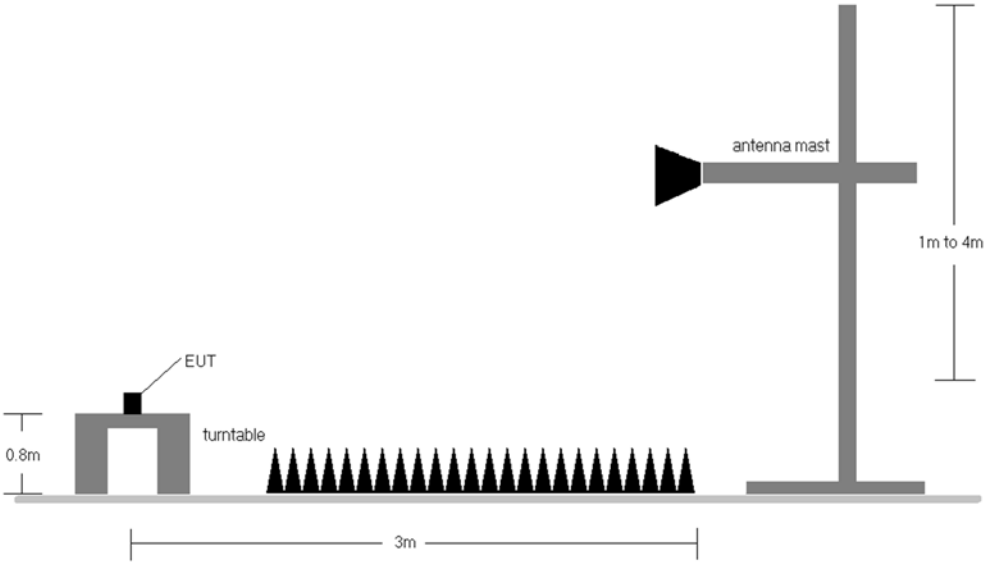


Figure 7-8. Test Instrument & Measurement Setup

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.

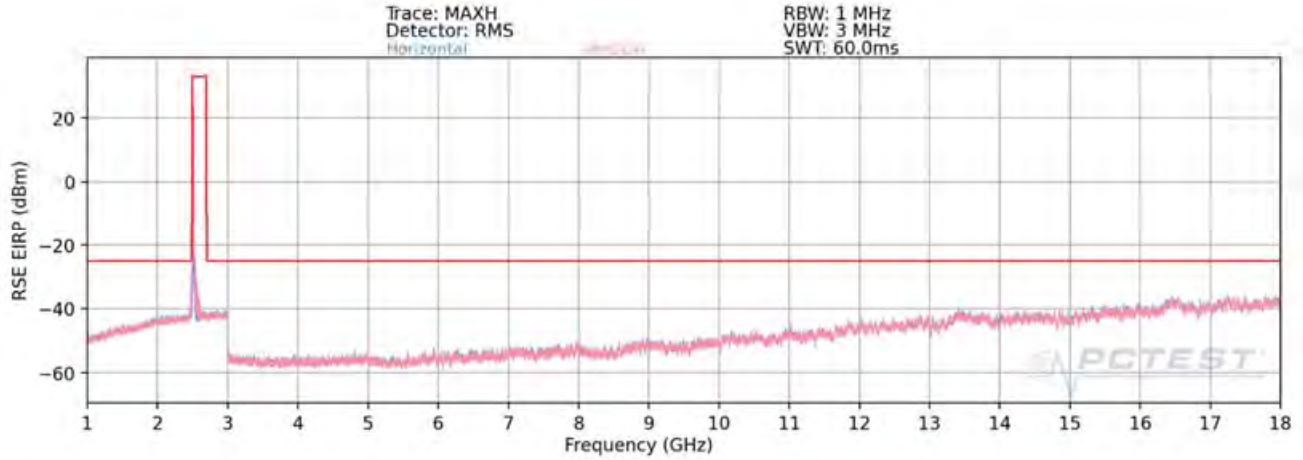
3) Radiated spurious emissions measurements were evaluated for the two contiguous channels using various combinations of RB size, RB offset, modulation, and channel bandwidth. The worst case (highest) emissions were found while operating with QPSK modulation with both carriers set to transmit using 1RB.

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

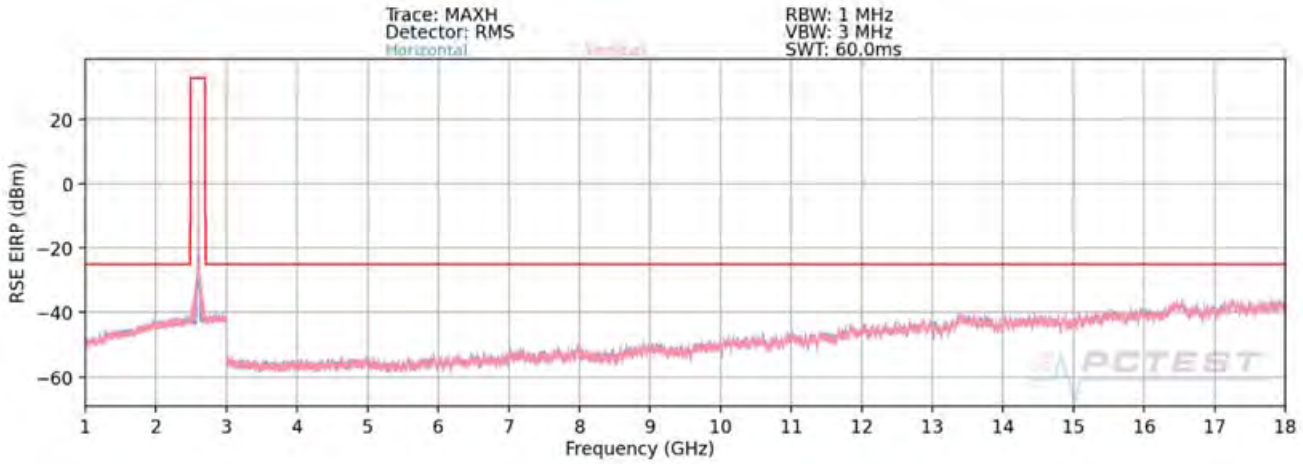
5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

6) No significant emissions were found as a result of two uplink carriers operating contiguously.

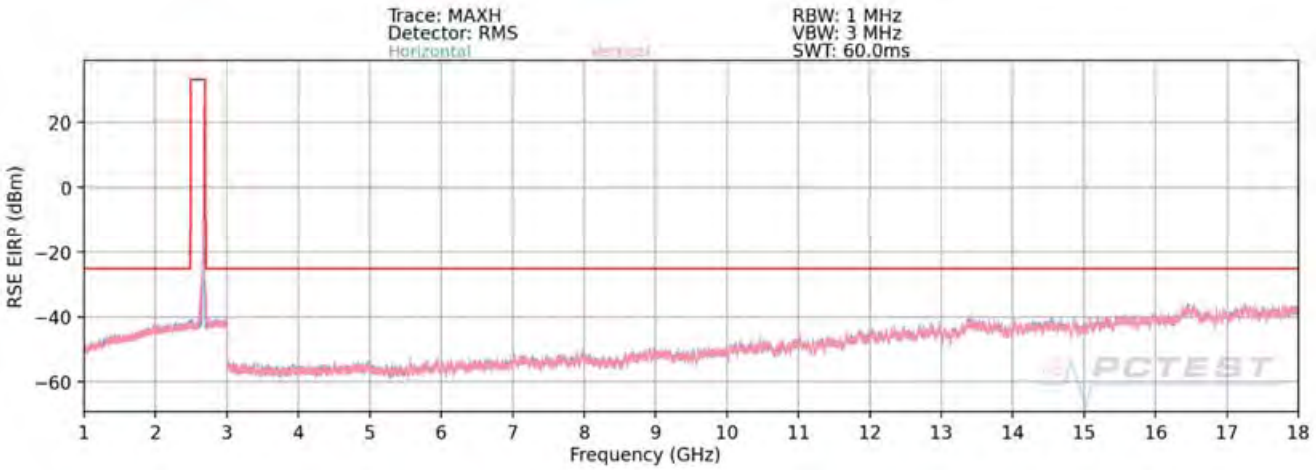
ULCA Band 41



Plot 7-137. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 Low Channel – PCC/SCC: 1RB)



Plot 7-138. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 Mid Channel – PCC/SCC: 1RB)



Plot 7-139. Radiated Spurious Plot 1GHz - 18GHz (ULCA Band 41 High Channel – PCC/SCC: 1RB)

OPERATING FREQUENCY (PCC):	2506.00	MHz
OPERATING FREQUENCY (SCC):	2525.80	MHz
CHANNEL (PCC):	39750	
CHANNEL (SCC):	39948	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5012.00	V	233	339	-56.61	8.56	-48.05	-23.0
7518.00	V	123	353	-43.27	8.49	-34.77	-9.8
10024.00	V	200	358	-61.79	9.85	-51.94	-26.9
12530.00	V	211	347	-50.24	9.07	-41.17	-16.2
15036.00	V	-	-	-54.45	8.77	-45.68	-20.7
17542.00	V	-	-	-50.38	7.64	-42.74	-17.7

Plot 7-24. Radiated Spurious Plot (ULCA B41 Left Carrier: RB 1 Offset 99, Right Carrier: RB 1 Offset 0)

OPERATING FREQUENCY (PCC):	2593.00	MHz
OPERATING FREQUENCY (SCC):	2612.80	MHz
CHANNEL (PCC):	40620	
CHANNEL (SCC):	40818	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5186.00	V	219	334	-58.08	8.70	-49.38	-24.4
7779.00	V	115	345	-43.51	8.69	-34.82	-9.8
10372.00	V	208	336	-58.36	9.62	-48.74	-23.7
12965.00	V	200	349	-53.02	8.99	-44.03	-19.0
15558.00	V	-	-	-53.72	8.32	-45.40	-20.4

Plot 7-25. Radiated Spurious Plot (ULCA B41 Left Carrier: RB 100 Offset 0, Right Carrier: RB 100 Offset 0)

OPERATING FREQUENCY (PCC):	2680.00	MHz
OPERATING FREQUENCY (SCC):	2660.20	MHz
CHANNEL (PCC):	41490	
CHANNEL (SCC):	41292	
MODULATION SIGNAL:	QPSK	
BANDWIDTH:	20.0	MHz
DISTANCE:	3	meters
LIMIT:	-25	dBm

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Margin [dB]
5360.00	V	230	355	-59.89	8.70	-51.20	-26.2
8040.00	V	101	342	-45.28	8.95	-36.33	-11.3
10720.00	V	190	338	-53.40	9.32	-44.08	-19.1
13400.00	V	200	330	-55.23	8.77	-46.45	-21.5
16080.00	V	-	-	-53.39	8.01	-45.39	-20.4

Plot 7-26. Radiated Spurious Data (ULCA B41 Left Carrier: RB 1 Offset 0, Right Carrier: RB 1 Offset 99)

7.9 Frequency Stability / Temperature Variation

Test Overview and Limit

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016. 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.

Test Procedure Used

ANSI/TIA-603-E-2016

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

Band 12 Frequency Stability Measurements

OPERATING FREQUENCY:	707,500,000	Hz
CHANNEL:	23790	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	+ 20 (Ref)	707,500,007	7	0.0000010
100 %		- 30	707,499,999	-1	-0.0000001
100 %		- 20	707,500,175	175	0.0000247
100 %		- 10	707,500,116	116	0.0000164
100 %		0	707,499,985	-15	-0.0000021
100 %		+ 10	707,500,203	203	0.0000287
100 %		+ 20	707,499,943	-57	-0.0000081
100 %		+ 30	707,499,911	-89	-0.0000126
100 %		+ 40	707,499,835	-165	-0.0000233
100 %		+ 50	707,500,182	182	0.0000257
BATT. ENDPOINT	3.85	+ 20	707,499,726	-274	-0.0000387

Table 7-27. Frequency Stability Data (Band 12)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 12 Frequency Stability Measurements

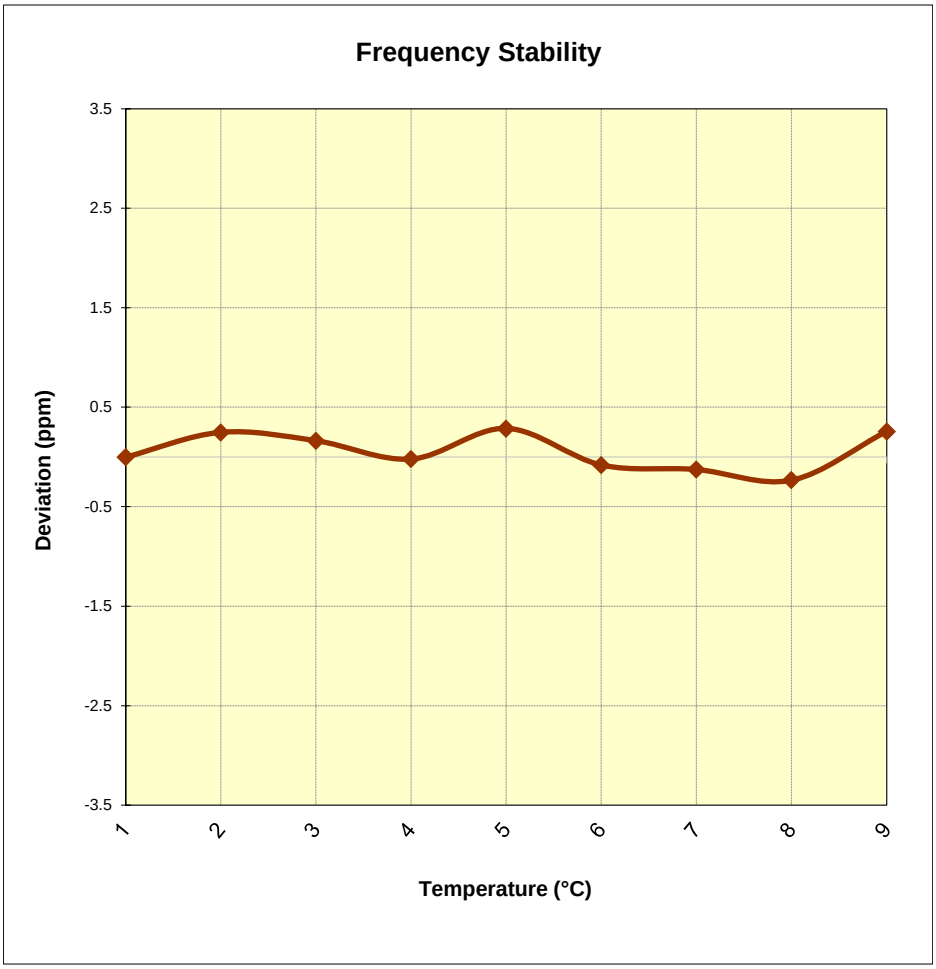


Figure 7-9. Frequency Stability Graph (Band 12)

Band 13 Frequency Stability Measurements

OPERATING FREQUENCY:	782,000,000	Hz
CHANNEL:	23230	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	+ 20 (Ref)	781,999,826	-174	-0.0000223
100 %		- 30	782,000,117	117	0.0000150
100 %		- 20	782,000,135	135	0.0000173
100 %		- 10	782,000,147	147	0.0000188
100 %		0	781,999,838	-162	-0.0000207
100 %		+ 10	782,000,120	120	0.0000153
100 %		+ 20	782,000,016	16	0.0000020
100 %		+ 30	782,000,006	6	0.0000008
100 %		+ 40	781,999,966	-34	-0.0000043
100 %		+ 50	781,999,946	-54	-0.0000069
BATT. ENDPOINT	3.85	+ 20	782,000,014	14	0.0000018

Table 7-28. Frequency Stability Data (Band 13)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 13 Frequency Stability Measurements

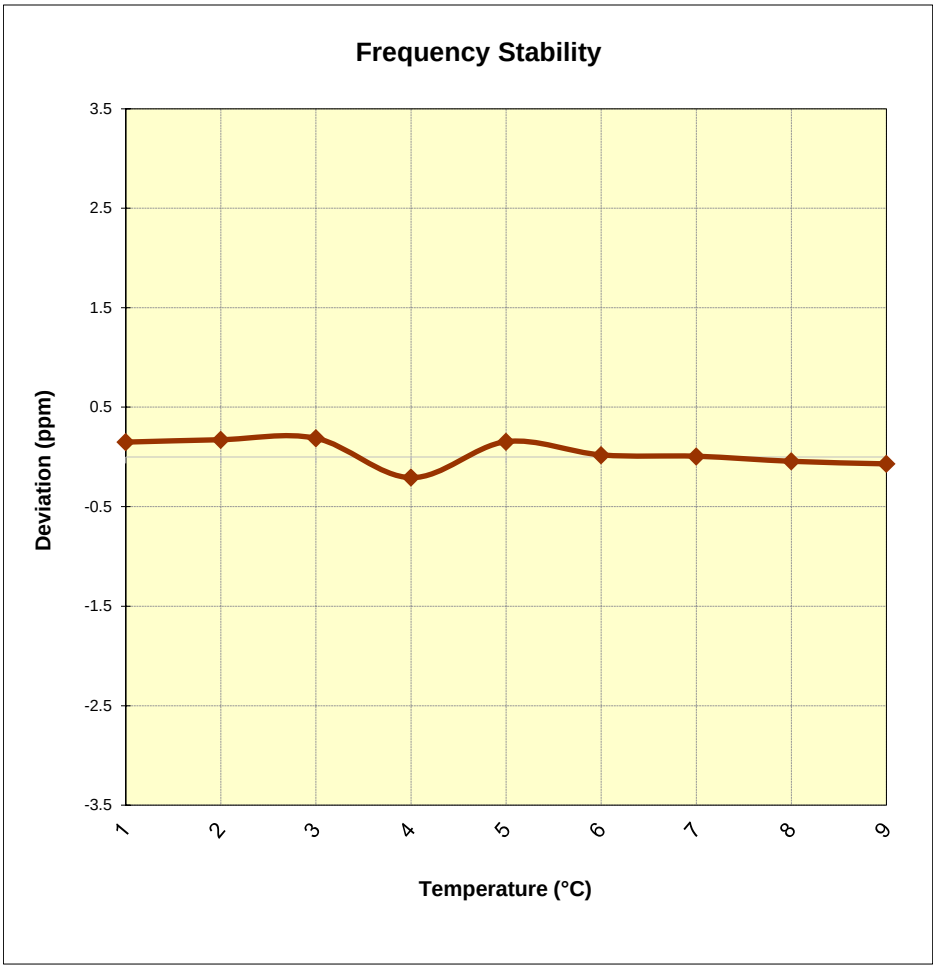


Figure 7-10. Frequency Stability Graph (Band 13)

Band 5 Frequency Stability Measurements

OPERATING FREQUENCY:	831,500,000	Hz
CHANNEL:	26865	
REFERENCE VOLTAGE:	4.21	VDC
DEVIATION LIMIT:	± 0.00025 % or 2.5 ppm	

VOLTAGE (%)	POWER (VDC)	TEMP (^{0}C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	+ 20 (Ref)	831,499,998	-2	-0.0000002
100 %		- 30	831,499,680	-320	-0.0000385
100 %		- 20	831,499,915	-85	-0.0000102
100 %		- 10	831,499,671	-329	-0.0000396
100 %		0	831,499,739	-261	-0.0000314
100 %		+ 10	831,500,190	190	0.0000229
100 %		+ 20	831,499,793	-207	-0.0000249
100 %		+ 30	831,500,319	319	0.0000384
100 %		+ 40	831,500,190	190	0.0000229
100 %		+ 50	831,500,102	102	0.0000123
BATT. ENDPOINT	3.85	+ 20	831,499,872	-128	-0.0000154

Table 7-29. Frequency Stability Data (Band 5)

Band 5 Frequency Stability Measurements

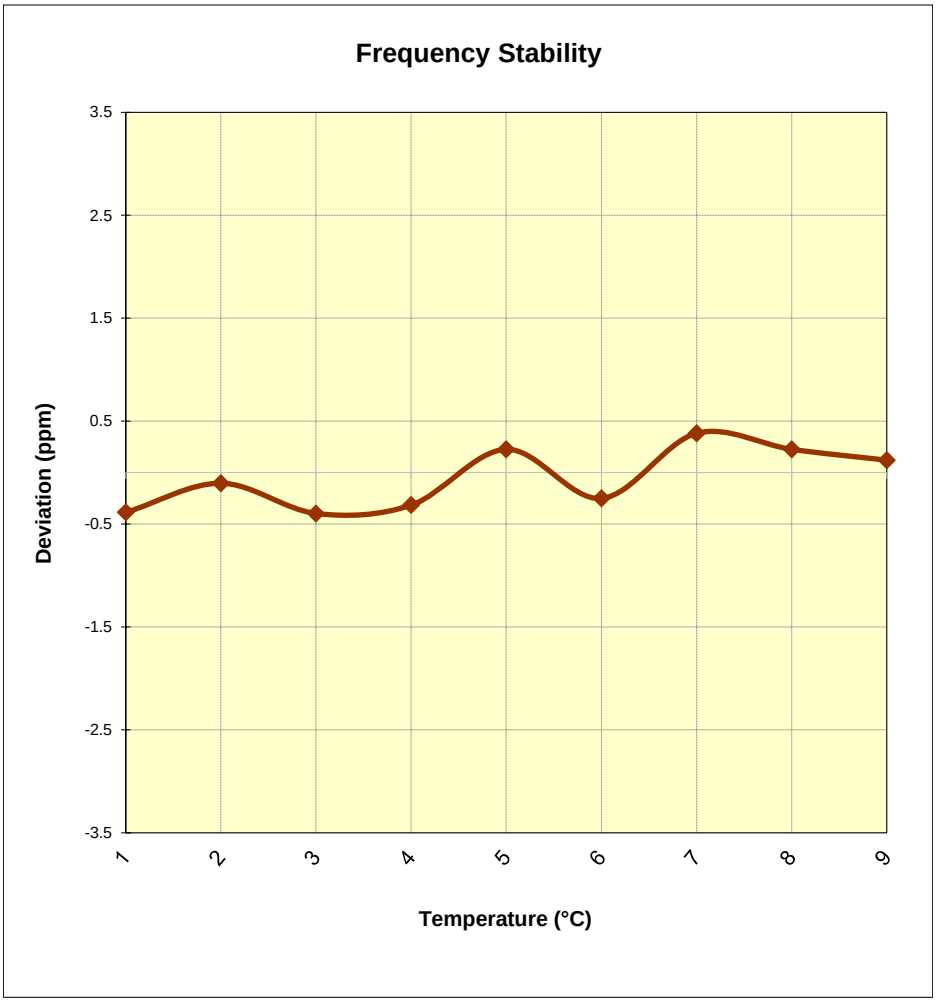


Figure 7-11. Frequency Stability Graph (Band 5)

Band 41 Frequency Stability Measurements

OPERATING FREQUENCY:	2,593,000,000	Hz
CHANNEL:	40620	
REFERENCE VOLTAGE:	4.21	VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	4.21	+ 20 (Ref)	2,592,999,994	-6	-0.0000002
100 %		- 30	2,593,000,040	40	0.0000015
100 %		- 20	2,592,999,780	-220	-0.0000085
100 %		- 10	2,593,000,058	58	0.0000022
100 %		0	2,593,000,017	17	0.0000007
100 %		+ 10	2,592,999,969	-31	-0.0000012
100 %		+ 20	2,593,000,035	35	0.0000013
100 %		+ 30	2,593,000,039	39	0.0000015
100 %		+ 40	2,592,999,967	-33	-0.0000013
100 %		+ 50	2,592,999,921	-79	-0.0000030
BATT. ENDPOINT	3.85	+ 20	2,592,999,655	-345	-0.0000133

Table 7-30. Frequency Stability Data (Band 41)

Note:

Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

Band 41 Frequency Stability Measurements

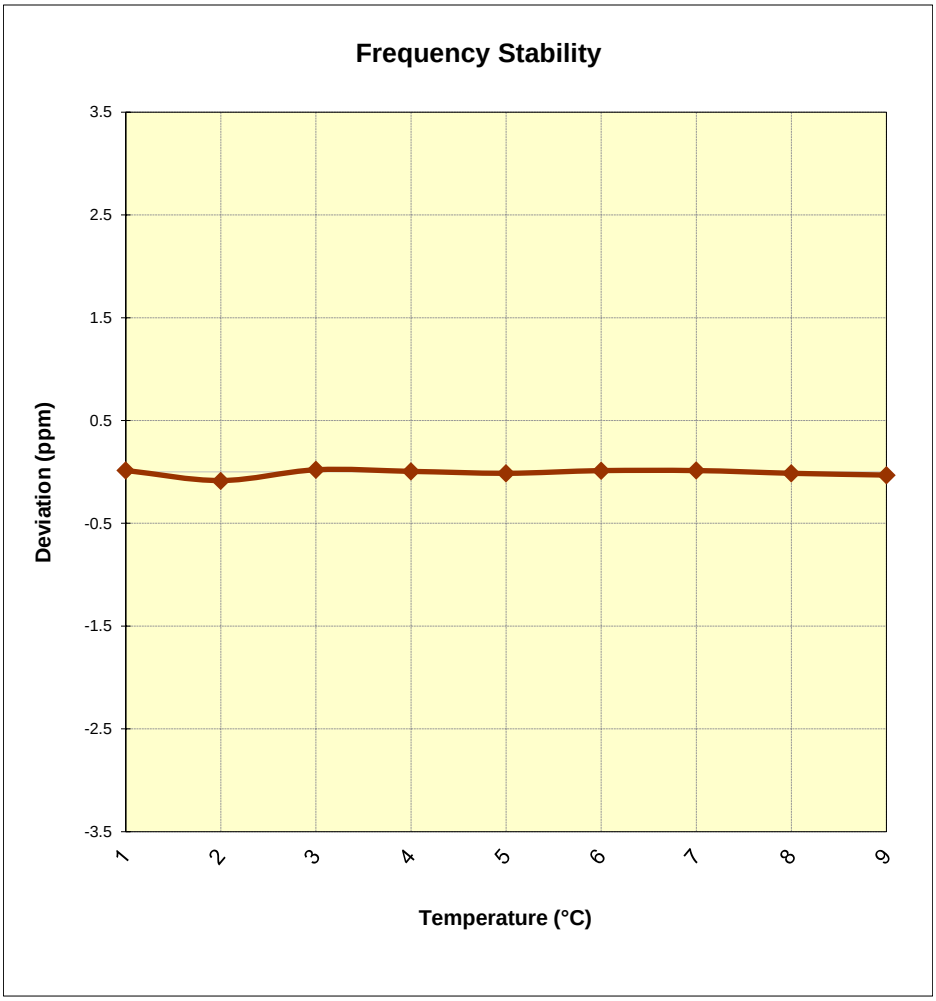


Figure 7-12. Frequency Stability Graph (Band 41)

8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMF916JPN** complies with all the requirements of Part 22, 24, & 27 of the FCC Rules for LTE operation only.