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MEASUREMENT REPORT
FCC Part 22 & 27 LTE

Applicant Name:
Samsung Electronics Co., Ltd.
129, Samsung-ro, Yeongtong-gu
Suwon-city, Gyeonggi-do, 443-803
Republic of Korea

Date of Testing:
03/08 - 03/13/2013
Test Site/Location:
PCTEST Lab., Columbia, MD, USA
Test Report Serial No.:
0Y1303130490.A3L

FCC ID :	**A3LSHVE300SA**
APPLICANT:	**SAMSUNG ELECTRONICS CO., LTD.**

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s): §2; §22; §27
EUT Type: Portable Handset
Model(s): SHV-E300S, SHV-E300K
Test Device Serial No.: *identical prototype* [S/N: 95126968_1_4ID24]

Mode	Tx Frequency (MHz)	Emission Designator	Modulation	ERP/EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE Band 17	706.5 - 713.5	4M50G7D	QPSK	0.054	17.28
LTE Band 17	706.5 - 713.5	4M50W7D	16QAM	0.048	16.84
LTE Band 17	709 - 711	8M95G7D	QPSK	0.052	17.16
LTE Band 17	709 - 711	8M93W7D	16QAM	0.047	16.70
LTE Band 5	826.5 - 846.5	4M49G7D	QPSK	0.145	21.62
LTE Band 5	826.5 - 846.5	4M50W7D	16QAM	0.121	20.84
LTE Band 5	829 - 844	8M90G7D	QPSK	0.131	21.16
LTE Band 5	829 - 844	8M94W7D	16QAM	0.105	20.22

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
TESTING LABORATORY
CERTIFICATE #2041.01

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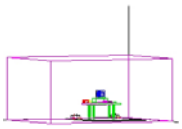
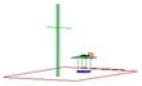


MEASUREMENT REPORT
FCC Part 22 & 27



§2.1033 General Information

APPLICANT:	Samsung Electronics Co., Ltd.
APPLICANT ADDRESS:	129, Samsung-ro, Yeongtong-gu
	Suwon-city, Gyeonggi-do, 443-803, Republic of Korea
TEST SITE:	PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS:	7185 Oakland Mills Road, Columbia, MD 21045 USA
FCC RULE PART(S):	§2; §22; §27
BASE MODEL:	SHV-E300S
FCC ID:	A3LSHVE300SA
FCC CLASSIFICATION:	PCS Licensed Transmitter Held to Ear (PCE)
FREQUENCY TOLERANCE:	±0.00025 % (2.5 ppm)
Test Device Serial No.:	95126968_1_4ID24 ☐ Production ☒ Pre-Production ☐ Engineering
DATE(S) OF TEST:	03/08 - 03/13/2013
TEST REPORT S/N:	0Y1303130490.A3L

Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab. located in Columbia, MD 21045, U.S.A.

- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC.

- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and Industry Canada Standards (RSS).
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EME) 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 Industry Canada Certification and Engineering Bureau.

1.2 Testing Facility

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (*See Figure 1-1*).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on February 15, 2012.

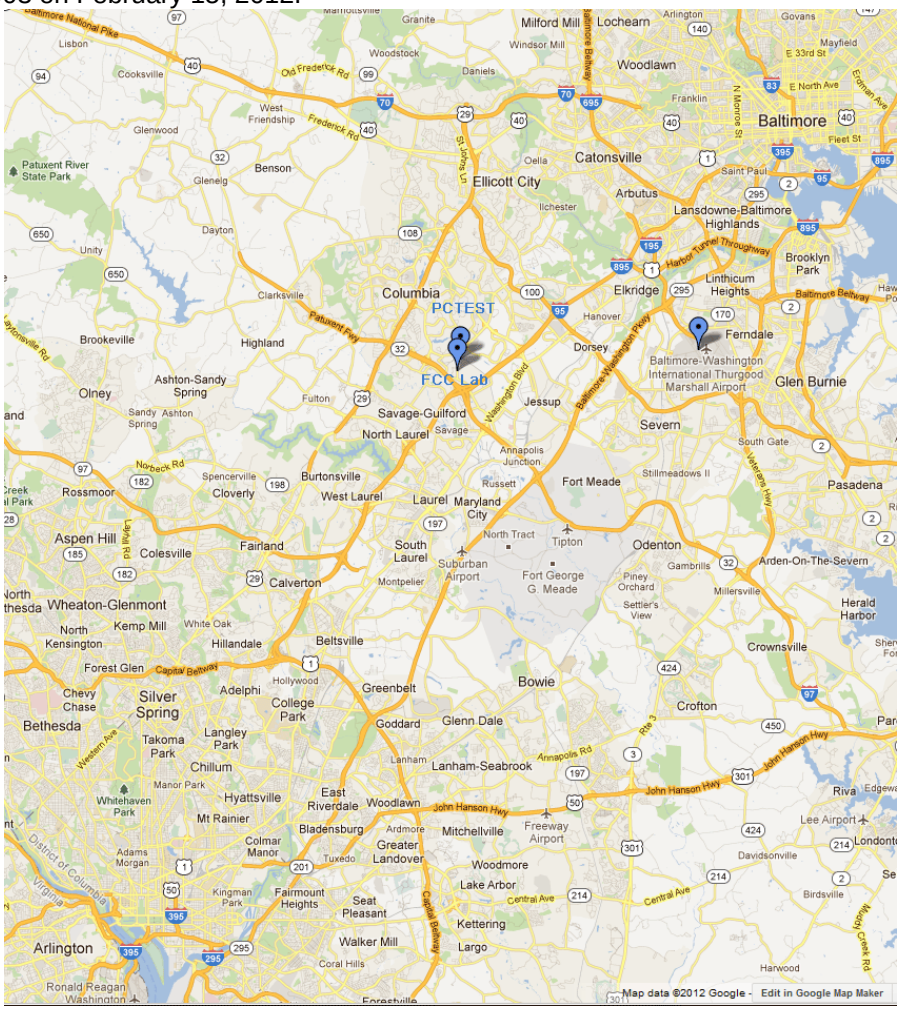


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSHVE300SA**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

2.2 Device Capabilities

This device contains the following capabilities:

1900 GSM/GPRS, 850/1900 WCDMA/HSPA, Bands 5 & 17 (5MHz BW, 10MHz BW) LTE, 802.11a/b/g/n/ac WLAN (DTS/NII), Bluetooth (1x,EDR, LE), NFC

2.3 EMI Suppression Device(s)/Modifications

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

2.4 Labeling Requirements

Per 2.925

The FCC identifier shall be permanently affixed to the equipment and shall be readily visible to the purchaser at the time of purchase.

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-C-2004) was used in the measurement of the **Samsung Portable Handset** FCC ID: **A3LSHVE300SA**.

3.2 Block A Frequency Range

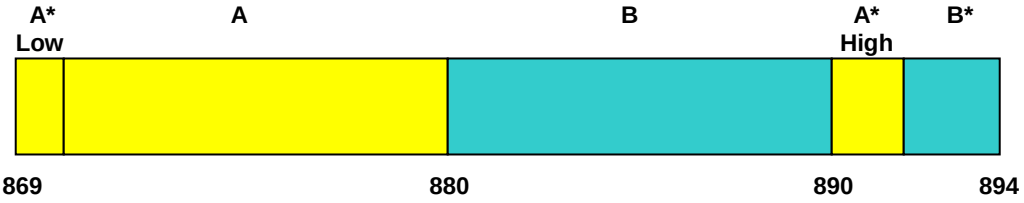
§27.5(c)

698-746 MHz band. The following frequencies are available for licensing pursuant to this part in the 698-746 MHz band: (1) Three paired channel blocks of 12 megahertz each are available for assignment as follows:

Block A: 698-704 MHz and 728-734 MHz;
Block B: 704-710 MHz and 734-740 MHz; and
Block C: 710-716 MHz and 740-746 MHz.

3.3 Cellular - Base Frequency Blocks

§24.905



BLOCK 1: 869 – 880 MHz (A* Low + A)

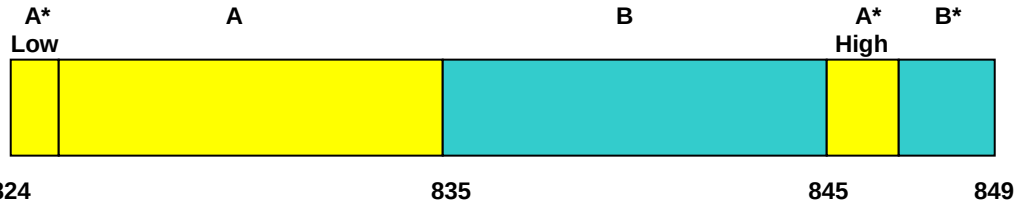
BLOCK 2: 880 – 890 MHz (B)

BLOCK 3: 890 – 891.5 MHz (A* High)

BLOCK 4: 891.5 – 894 MHz (B*)

3.4 Cellular - Mobile Frequency Blocks

§24.905



BLOCK 1: 824 – 835 MHz (A* Low + A)
BLOCK 2: 835 – 845 MHz (B)

BLOCK 3: 845 – 846.5 MHz (A* High)
BLOCK 4: 846.5 – 849 MHz (B*)

3.5 Occupied Bandwidth

§2.1049 RSS-Gen(4.6.1)

The implementation of this test is performed by the spectrum analyzer's occupied bandwidth function. 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.

3.6 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051 §22.917(a)(b) §27.53(g) RSS-132(4.5.1)

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 10^{th} harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Cell band, 698–746 MHz band,. 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 for. 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.

3.7 Radiated Power and Radiated Spurious Emissions

§2.1053 §22.913(a.2) §22.917(a) §27.50(c.10) §27.53(g) RSS-132(4.4) RSS-132(4.5.1)

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. For measurements above 1GHz 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 below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It 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. A 78cm high PVC support structure is placed on top of the turntable. A ¾" (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 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.

Per the guidance of ANSI/TIA-603-C-2004, 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 $_{[Watts]}$) specified in 22.917(a) and 24.238(a).

3.8 Frequency Stability / Temperature Variation

§2.1055 §22.863 §22.905 §27.5(c) §27.54 RSS-132(4.3)

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.

Specification – The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block for Part 27. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency for Part 22.

Time Period and Procedure:

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 one minute 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 sufficient stabilization period at each temperature shall be used prior to each frequency requirement.

4.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx1	Licensed Transmitter Cable Set	1/17/2013	Annual	1/17/2014	N/A
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	7/10/2012	Annual	7/10/2013	N/A
Agilent	E8267C	Vector Signal Generator	10/10/2011	Biennial	10/10/2013	US42340152
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561
Anritsu	MA2411B	Pulse Sensor	9/19/2012	Annual	9/19/2013	1027293
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
Espec	ESX-2CA	Environmental Chamber	4/4/2012	Annual	4/4/2013	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/22/2011	Biennial	7/22/2013	125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	11/7/2012	Biennial	11/7/2014	128338
Mini-Circuits	VHF-1200+	High Pass Filter	1/17/2013	Annual	1/17/2014	30923
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	10/7/2011	Biennial	10/7/2013	103962
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	6/26/2012	Annual	6/26/2013	100071
Rohde & Schwarz	ESU26	EMI Test Receiver	2/25/2013	Annual	2/25/2014	100342
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	10/3/2011	Biennial	10/3/2013	91052523RX
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A

Table 4-1. Test Equipment

5.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Amplitude/Angle Modulated

16QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Combination (Audio/Data)

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).

6.0 TEST RESULTS

6.1 Summary

Company Name: Samsung Electronics Co., Ltd.
FCC ID: A3LSHVE300SA
FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)
Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Result	Reference
TRANSMITTER MODE (TX)					
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.0, 8.0
2.1051 22.917(a) 27.53(g)	Band Edge / Conducted Spurious Emissions	< 43 + 10log$_{10}$ (P[Watts]) at Band Edge and for all out-of-band emissions		PASS	Section 7.0, 8.0
2.1046	Transmitter Conducted Output Power	N/A		PASS	See RF Exposure Report
22.913(a.2)	Effective Radiated Power (Band 5)	< 7 Watts max. ERP	RADIATED	PASS	Section 6.2
27.50(c.10)	Effective Radiated Power (Band 17)	< 3 Watts max. ERP		PASS	Section 6.2
2.1053 22.917(a) 27.53(g)	Undesirable Emissions	< 43 + 10log$_{10}$ (P[Watts]) for all out-of-band emissions		PASS	Section 6.3, 6.4
2.1055.22.355 22.863 22.905 27.5(c) 27.54	Frequency Stability	< 2.5 ppm (Part 22) and fundamental emissions stay within authorized frequency block (Part 24, 27)		PASS	Section 6.5, 6.6

Table 6-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in Section 7.0 8.0 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.

6.2 Effective Radiated Power (ERP)

§22.913(a.2) §27.50(c.10) RSS-132(4.4)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery	RB Size/Offset	Substitute Level [dBm]	Antenna Gain [dBd]	Pol [H/V]	ERP [dBm]	ERP [Watts]	Margin [dB]
706.50	5	QPSK	Standard	1/0	14.44	2.35	V	16.79	0.048	-17.98
710.00	5	QPSK	Standard	1/24	14.84	2.42	V	17.26	0.053	-17.51
713.50	5	QPSK	Standard	1/24	14.79	2.49	V	17.28	0.054	-17.49
706.50	5	16-QAM	Standard	1/0	13.79	2.35	V	16.14	0.041	-18.63
710.00	5	16-QAM	Standard	1/24	14.04	2.42	V	16.46	0.044	-18.31
713.50	5	16-QAM	Standard	1/24	14.35	2.49	V	16.84	0.048	-17.93
709.00	10	QPSK	Standard	1/0	14.35	2.35	V	16.70	0.047	-18.07
710.00	10	QPSK	Standard	1/24	14.74	2.42	V	17.16	0.052	-17.61
711.00	10	QPSK	Standard	1/24	14.64	2.49	V	17.13	0.052	-17.64
709.00	10	16-QAM	Standard	1/0	13.74	2.35	V	16.09	0.041	-18.68
710.00	10	16-QAM	Standard	1/24	13.98	2.42	V	16.40	0.044	-18.37
711.00	10	16-QAM	Standard	1/24	14.21	2.49	V	16.70	0.047	-18.07

Table 6-2. ERP Data (Band 17)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery	RB Size/Offset	Substitute Level [dBm]	Antenna Gain [dBd]	Pol [H/V]	ERP [dBm]	ERP [Watts]	Margin [dB]
826.50	5	QPSK	Standard	1/24	16.11	4.68	H	20.79	0.120	-17.66
836.50	5	QPSK	Standard	1/24	16.80	4.82	H	21.62	0.145	-16.83
846.50	5	QPSK	Standard	1/0	15.88	4.96	H	20.84	0.121	-17.61
826.50	5	16-QAM	Standard	1/24	14.91	4.68	H	19.59	0.091	-18.86
836.50	5	16-QAM	Standard	1/24	16.02	4.82	H	20.84	0.121	-17.61
846.50	5	16-QAM	Standard	1/0	14.94	4.96	H	19.90	0.098	-18.55
829.00	10	QPSK	Standard	1/49	16.28	4.68	H	20.96	0.125	-17.49
836.50	10	QPSK	Standard	1/49	16.14	4.82	H	20.96	0.125	-17.49
844.00	10	QPSK	Standard	1/0	16.20	4.96	H	21.16	0.131	-17.29
829.00	10	16-QAM	Standard	1/49	15.13	4.68	H	19.81	0.096	-18.64
836.50	10	16-QAM	Standard	1/49	15.40	4.82	H	20.22	0.105	-18.23
844.00	10	16-QAM	Standard	1/0	15.19	4.96	H	20.15	0.104	-18.30

Table 6-3. ERP Data (Band 5)

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported as shown in the ERP tables.

2. This unit was tested with its standard battery.

3. The worst case test configuration was found in the horizontal setup for Band 5 and vertical setup for Band 17.

6.3 Band 17 Radiated Spurious Emissions

§2.1053 §27.53(g)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	706.50	MHz		
MEASURED OUTPUT POWER:	16.79	dBm	=	0.048 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5 MHz			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	29.79	dBc	

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1413.00	-47.15	3.63	-43.52	V	60.31
2119.50	-82.00	3.90	-78.11	V	94.90
2826.00	-78.15	5.01	-73.14	V	89.93
3532.50	-81.11	6.25	-74.86	V	91.65
4239.00	-80.17	7.23	-72.93	V	89.73
4945.50	-79.72	7.86	-71.86	V	88.65

Table 6-4. Radiated Spurious Data

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported as shown in the ERP tables.

2. This unit was tested with its standard battery.

3. The worst case test configuration was found in the horizontal setup for Band 5 and vertical setup for Band 17.

Band 17 Radiated Spurious Measurements (continued)

§2.1053 §27.53(g)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	710.00	MHz		
MEASURED OUTPUT POWER:	17.26	dBm	= 0.053	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5 MHz			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	30.26	dBc	

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1420.00	-47.01	3.68	-43.33	V	60.59
2130.00	-81.99	3.92	-78.07	V	95.34
2840.00	-78.01	5.02	-72.98	V	90.25
3550.00	-81.01	6.25	-74.76	V	92.03
4260.00	-80.15	7.25	-72.90	V	90.17
4970.00	-79.74	7.90	-71.84	V	89.10

Table 6-5. Radiated Spurious Data

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported as shown in the ERP tables.

2. This unit was tested with its standard battery.

3. The worst case test configuration was found in the horizontal setup for Band 5 and vertical setup for Band 17.

Band 17 Radiated Spurious Measurements (continued)

§2.1053 §27.53(g)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	713.50	MHz		
MEASURED OUTPUT POWER:	17.28	dBm	=	0.054 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5 MHz			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	30.28	dBc	

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1427.00	-48.05	3.73	-44.32	V	61.61
2140.50	-81.98	3.94	-78.04	V	95.32
2854.00	-77.86	5.04	-72.82	V	90.11
3567.50	-80.92	6.25	-74.67	V	91.95
4281.00	-80.11	7.25	-72.86	V	90.14
4994.50	-79.76	7.94	-71.82	V	89.11

Table 6-6. Radiated Spurious Data

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported as shown in the ERP tables.

2. This unit was tested with its standard battery.

3. The worst case test configuration was found in the horizontal setup for Band 5 and vertical setup for Band 17.

6.4 Band 5 Radiated Spurious Emissions

§2.1053 §22.917(a) RSS-132(4.5.1)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	826.50	MHz		
MEASURED OUTPUT POWER:	20.79	dBm	=	0.120 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5 MHz			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.79	dBc	

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1653.00	-45.11	2.50	-42.61	H	63.40
2479.50	-78.06	2.82	-75.24	H	96.03
3306.00	-80.14	5.52	-74.62	H	95.41
4132.50	-80.08	7.08	-72.99	H	93.79
4959.00	-79.75	7.91	-71.84	H	92.63
5785.50	-77.41	8.51	-68.90	H	89.70

Table 6-7. Radiated Spurious Data

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported as shown in the ERP tables.

2. This unit was tested with its standard battery.

3. The worst case test configuration was found in the horizontal setup for Band 5 and vertical setup for Band 17.

Band 5 Radiated Spurious Measurements (continued)

§2.1053 §22.917(a) RSS-132(4.5.1)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	836.50	MHz		
MEASURED OUTPUT POWER:	21.62	dBm	= 0.145	W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5 MHz			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	34.62	dBc	

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1673.00	-44.40	2.34	-42.06	H	63.69
2509.50	-77.90	2.84	-75.07	H	96.69
3346.00	-80.33	5.64	-74.69	H	96.31
4182.50	-80.11	7.14	-72.97	H	94.59
5019.00	-79.72	7.97	-71.76	H	93.38
5855.50	-77.08	8.46	-68.62	H	90.24

Table 6-8. Radiated Spurious Data

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported as shown in the ERP tables.

2. This unit was tested with its standard battery.

3. The worst case test configuration was found in the horizontal setup for Band 5 and vertical setup for Band 17.

Band 5 Radiated Spurious Measurements (continued)

§2.1053 §22.917(a) RSS-132(4.5.1)

Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY:	846.50	MHz		
MEASURED OUTPUT POWER:	20.84	dBm	=	0.121 W
MODULATION SIGNAL:	QPSK			
BANDWIDTH:	5 MHz			
DISTANCE:	3	meters		
LIMIT:	43 + 10 $\log_{10}$ (W) =	33.84	dBc	

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1693.00	-44.42	2.18	-42.24	H	63.08
2539.50	-78.01	3.04	-74.96	H	95.80
3386.00	-80.52	5.76	-74.75	H	95.59
4232.50	-80.15	7.20	-72.95	H	93.79
5079.00	-79.62	8.00	-71.62	H	92.46
5925.50	-76.76	8.42	-68.33	H	89.17

Table 6-9. Radiated Spurious Data

NOTES:

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported as shown in the ERP tables.

2. This unit was tested with its standard battery.

3. The worst case test configuration was found in the horizontal setup for Band 5 and vertical setup for Band 17.

6.5 Band 17 Frequency Stability Measurements

§2.1055 §22.355 §27.5(c) §27.54

OPERATING FREQUENCY: 710,000,000 Hz

CHANNEL: 23090

REFERENCE VOLTAGE: 3.8 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	709,999,998	-2	-0.00000027
100 %		- 30	709,999,997	-3	-0.00000038
100 %		- 20	709,999,987	-13	-0.00000178
100 %		- 10	709,999,983	-17	-0.00000245
100 %		0	709,999,997	-3	-0.00000047
100 %		+ 10	709,999,985	-15	-0.00000217
100 %		+ 20	709,999,985	-15	-0.00000206
100 %		+ 30	709,999,998	-2	-0.00000024
100 %		+ 40	709,999,995	-5	-0.00000075
100 %		+ 50	709,999,990	-10	-0.00000139
115 %	4.37	+ 20	709,999,982	-18	-0.00000255
BATT. ENDPOINT	3.46	+ 20	709,999,982	-18	-0.00000256

Table 6-10. Frequency Stability Data (Band 17)

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 17 Frequency Stability Measurements (Cont'd)

§2.1055 §22.355 §27.5(c) §27.54

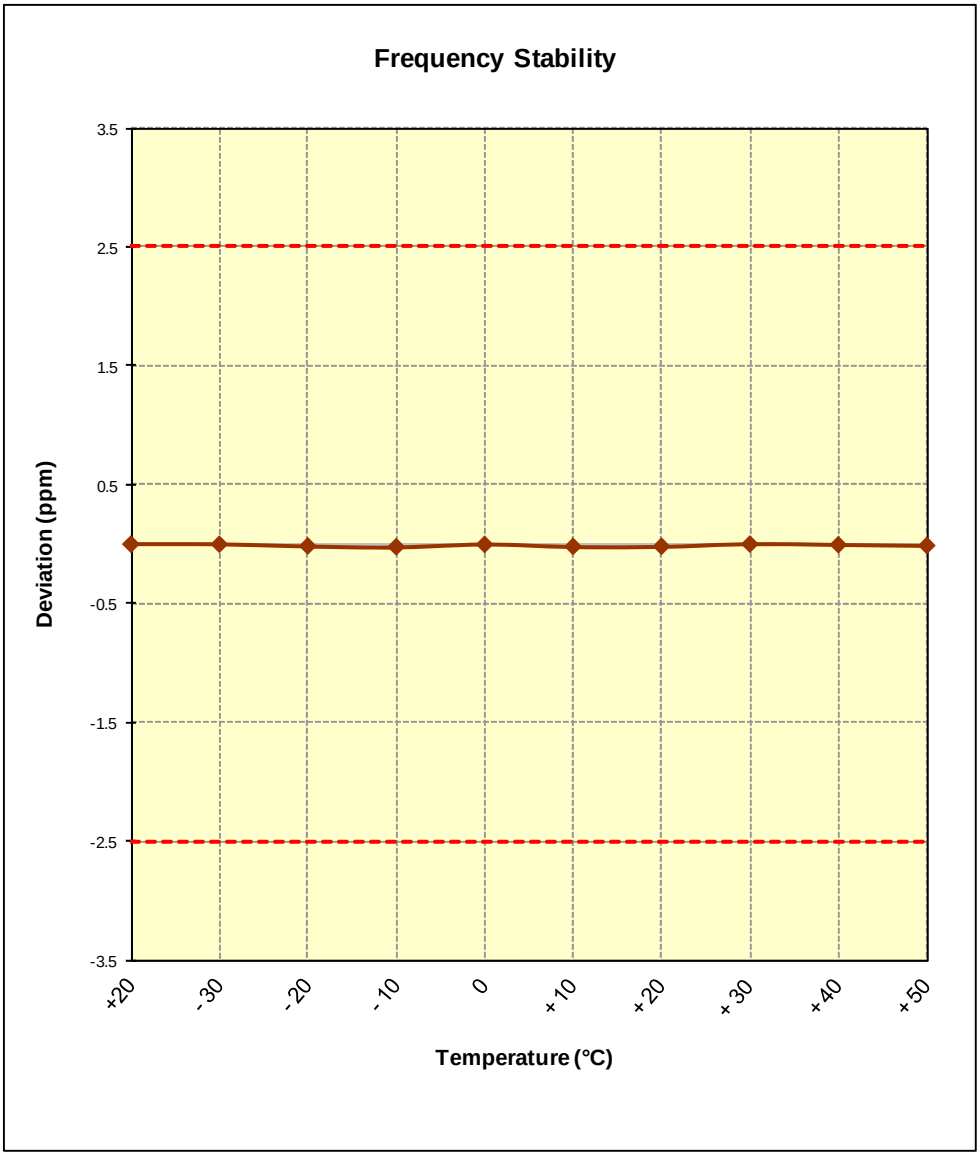


Figure 6-1. Frequency Stability Graph (Band 17)

6.6 Band 5 Frequency Stability Measurements

§2.1055 §22.355 §22.863 §22.905 RSS-132(4.3)

OPERATING FREQUENCY: 836,500,000 Hz

CHANNEL: 20525

REFERENCE VOLTAGE: 3.8 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,499,996	-4	-0.00000043
100 %		- 30	836,499,993	-7	-0.00000083
100 %		- 20	836,499,997	-3	-0.00000039
100 %		- 10	836,499,983	-17	-0.00000204
100 %		0	836,499,995	-5	-0.00000063
100 %		+ 10	836,499,996	-4	-0.00000051
100 %		+ 20	836,499,989	-11	-0.00000133
100 %		+ 30	836,499,993	-7	-0.00000079
100 %		+ 40	836,499,995	-5	-0.00000058
100 %		+ 50	836,499,990	-10	-0.00000117
115 %	4.37	+ 20	836,499,990	-10	-0.00000119
BATT. ENDPOINT	3.46	+ 20	836,499,996	-4	-0.00000047

Table 6-11. Frequency Stability Data (Band 5)

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 5 Frequency Stability Measurements (Cont'd)

§2.1055 §22.355 §22.863 §22.905 RSS-132(4.3)

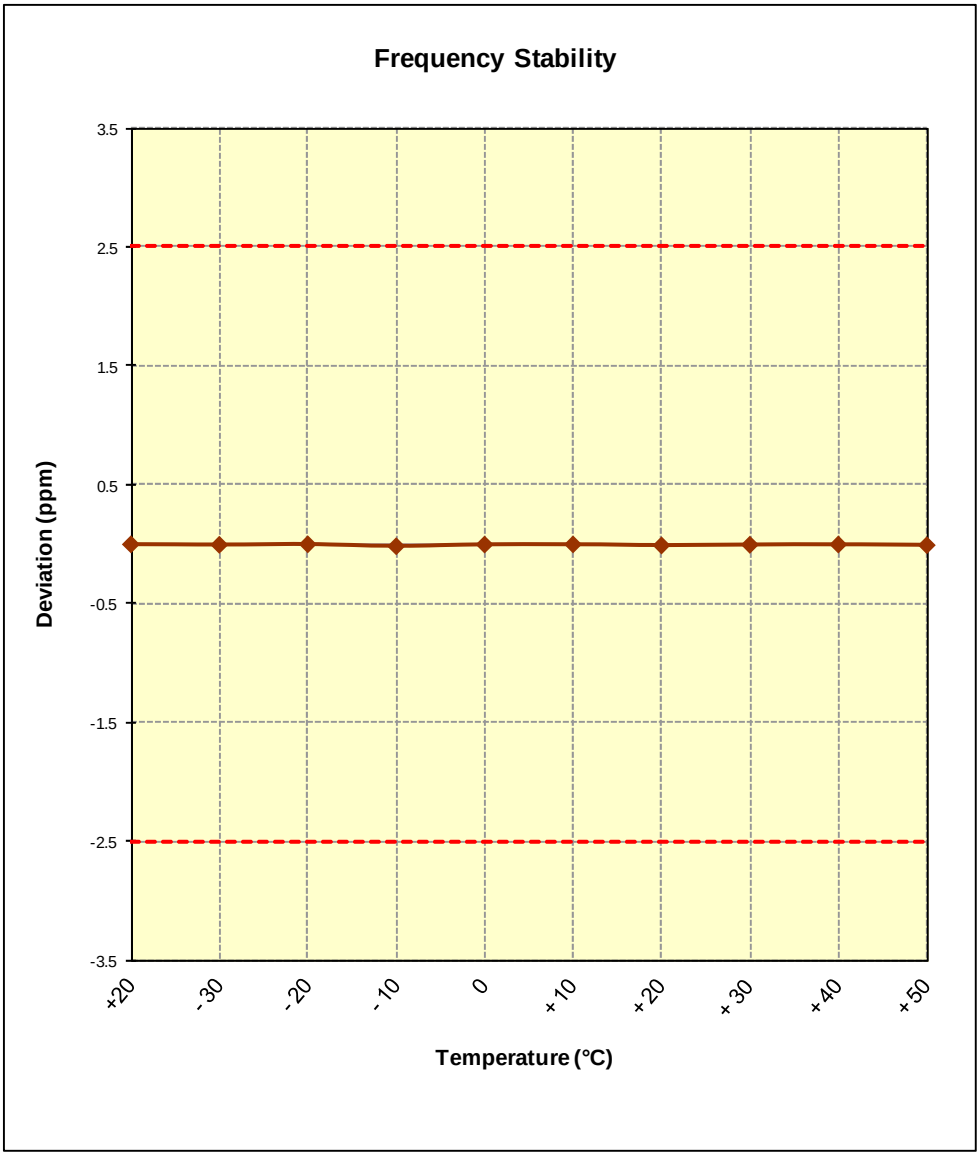
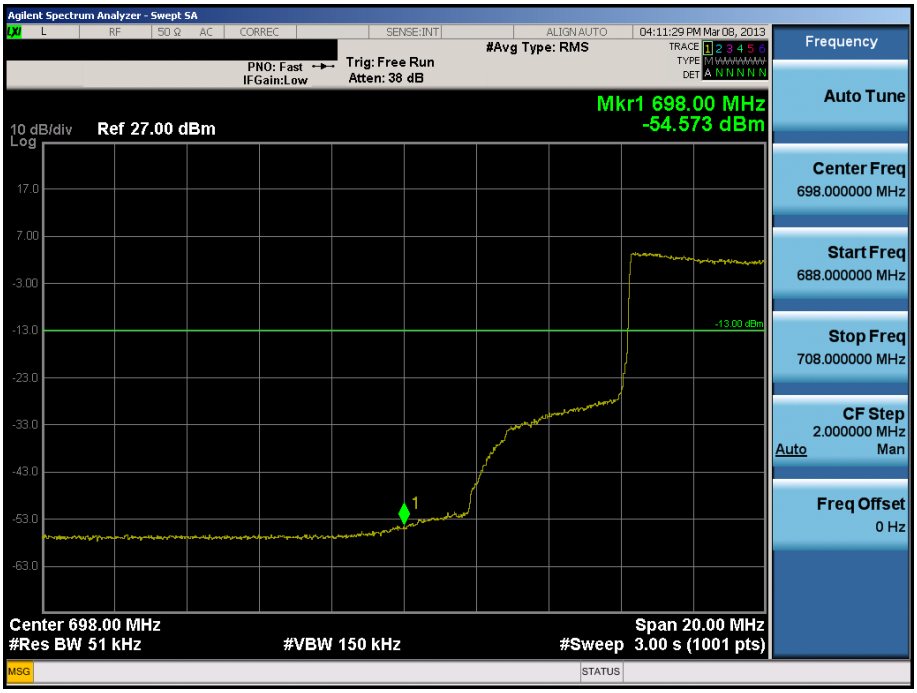


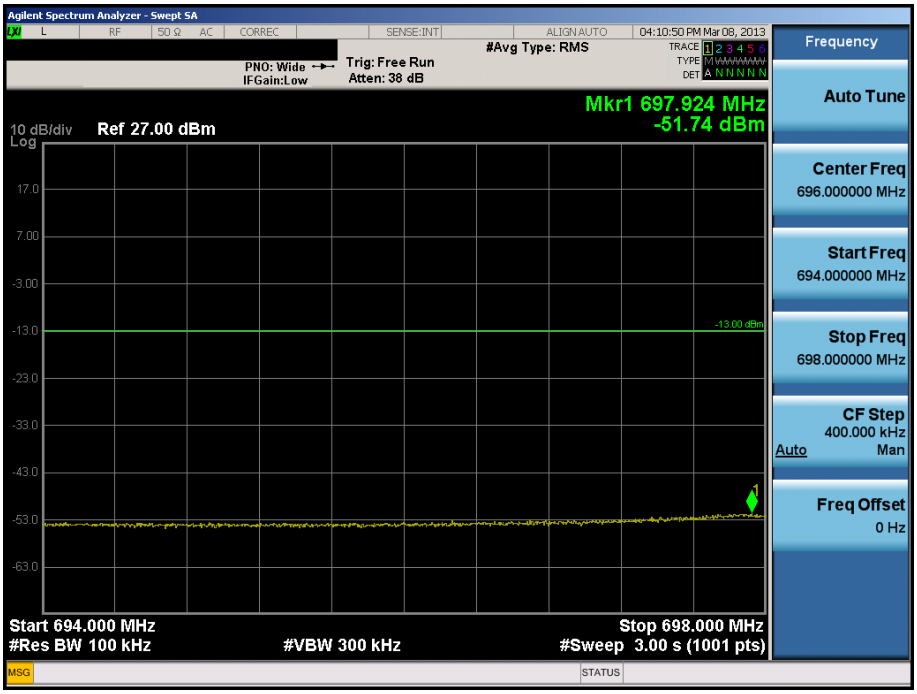
Figure 6-2. Frequency Stability Graph (Band 5)

7.0 BAND 17 PLOTS OF EMISSIONS

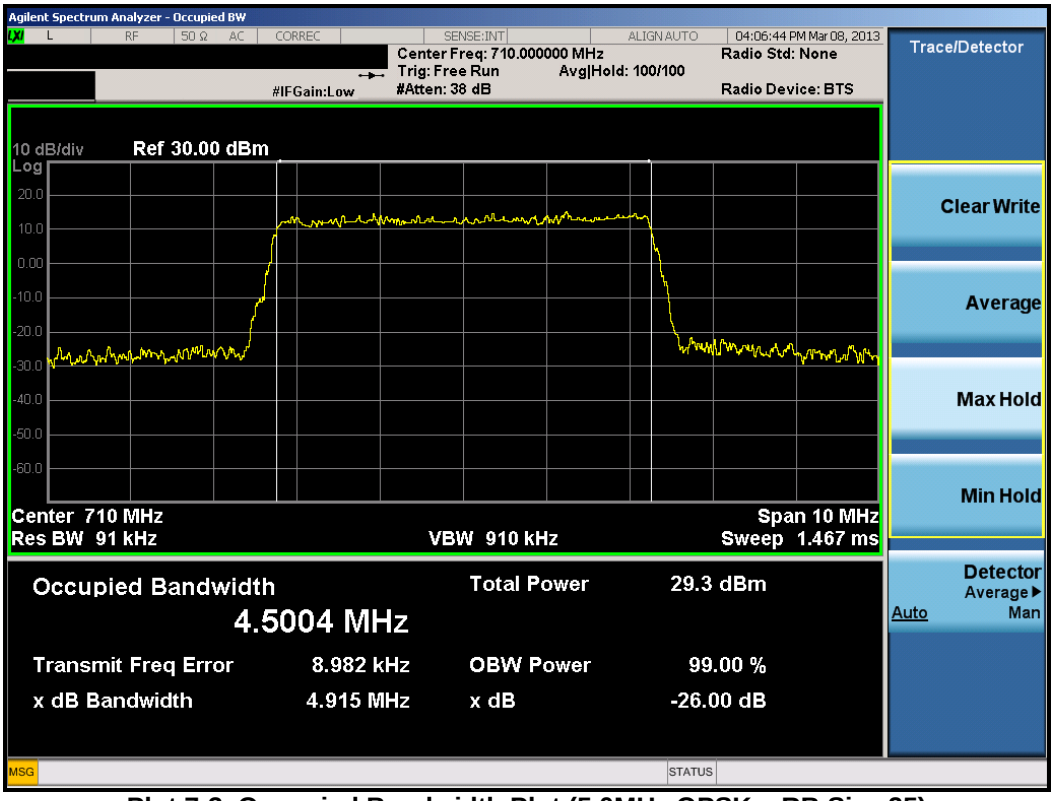
Note: All bandwidths, RB configurations, and modulations were investigated. The worst case test results are reported below.



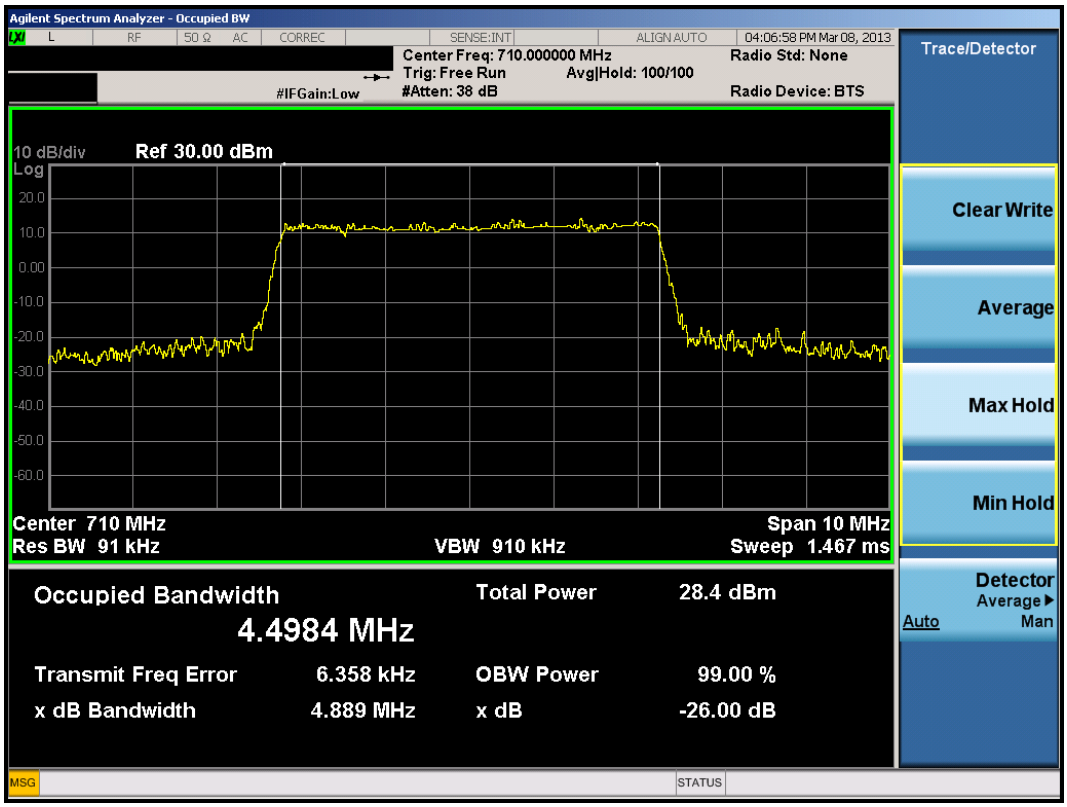
Plot 7-1. Lower Band Edge Plot (5.0MHz QPSK – RB Size 25)



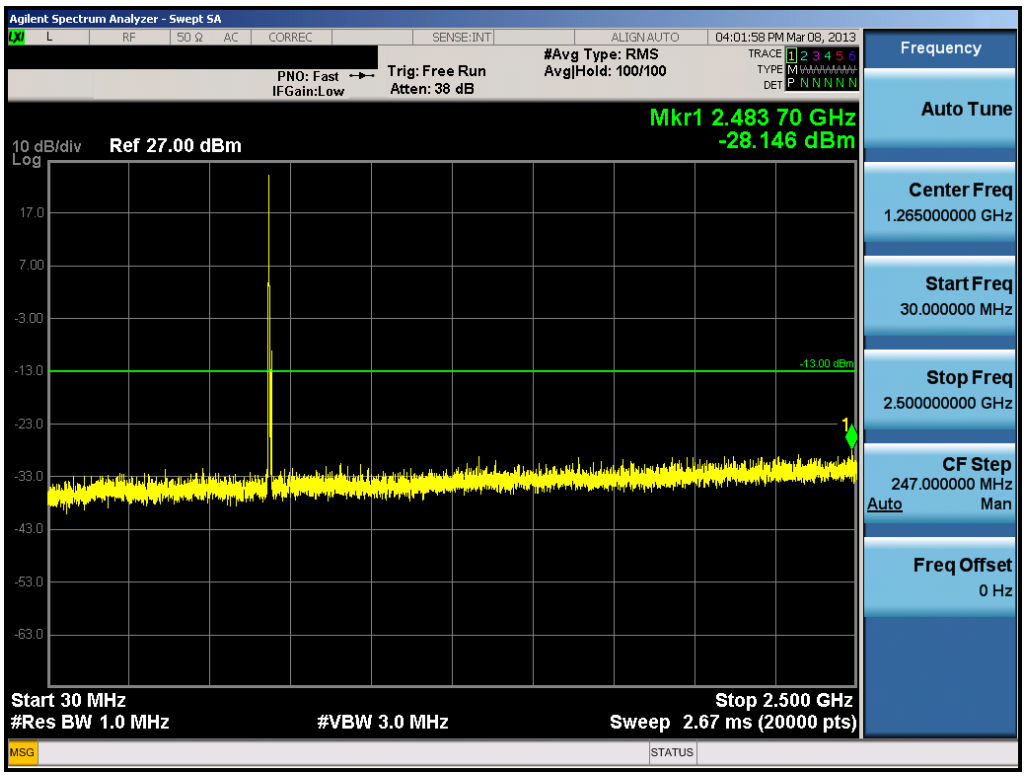
Plot 7-2. Lower Extended Band Edge Plot (5.0MHz QPSK – RB Size 25)



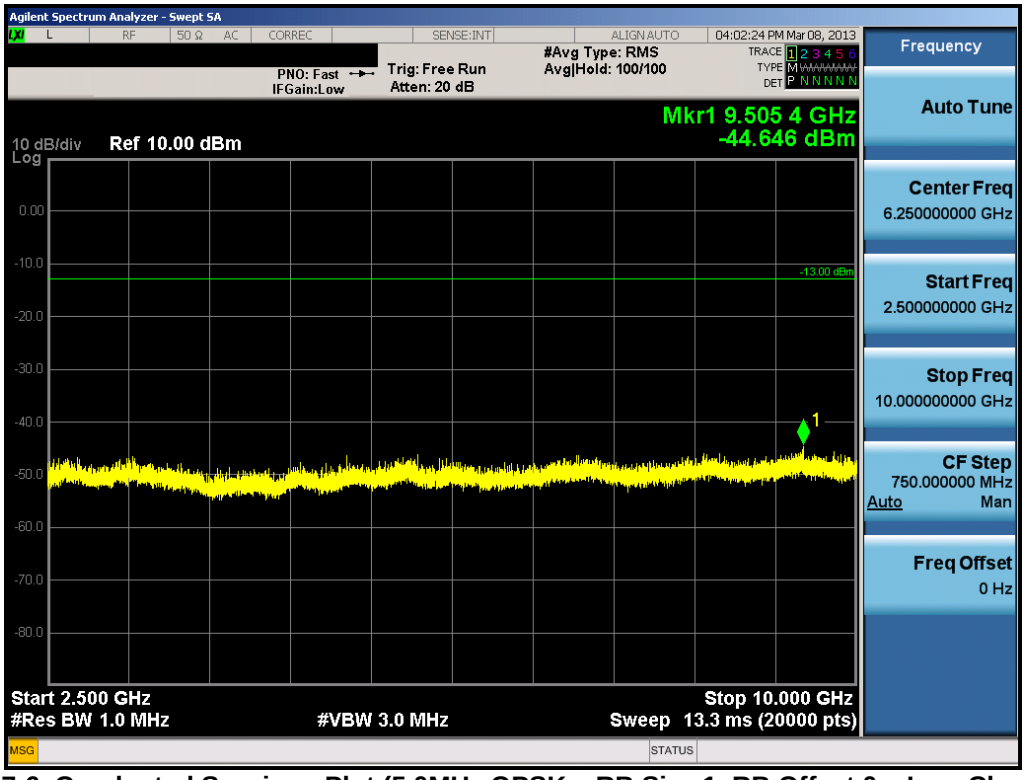
Plot 7-3. Occupied Bandwidth Plot (5.0MHz QPSK – RB Size 25)



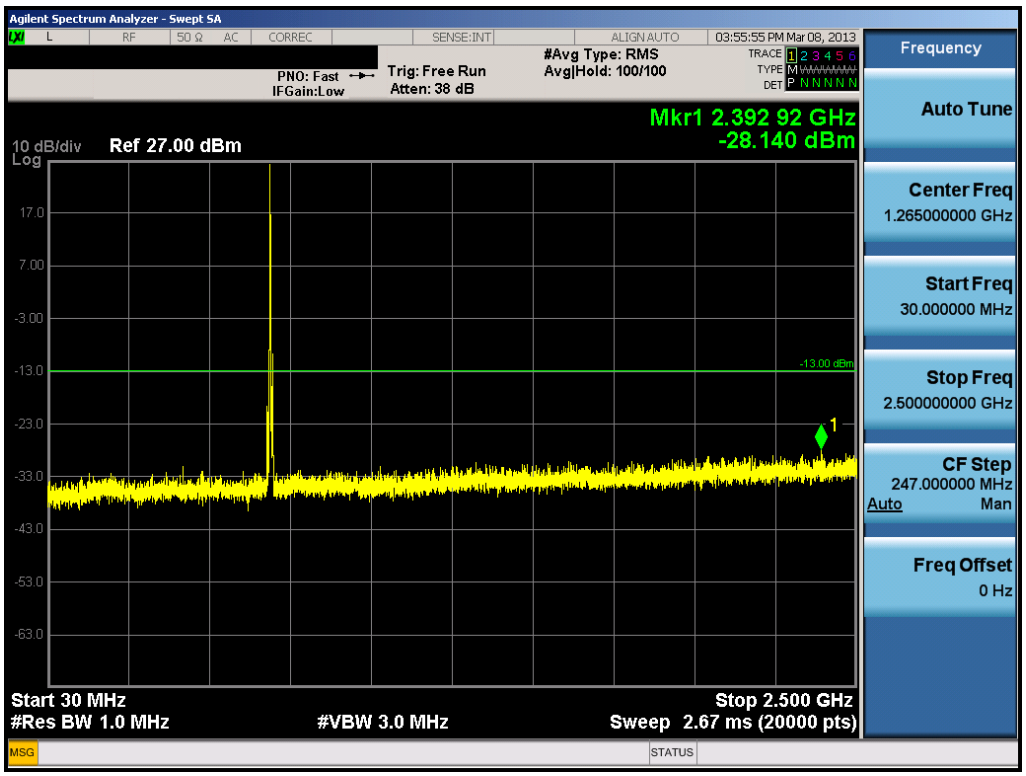
Plot 7-4. Occupied Bandwidth Plot (5.0MHz 16-QAM – RB Size 25)



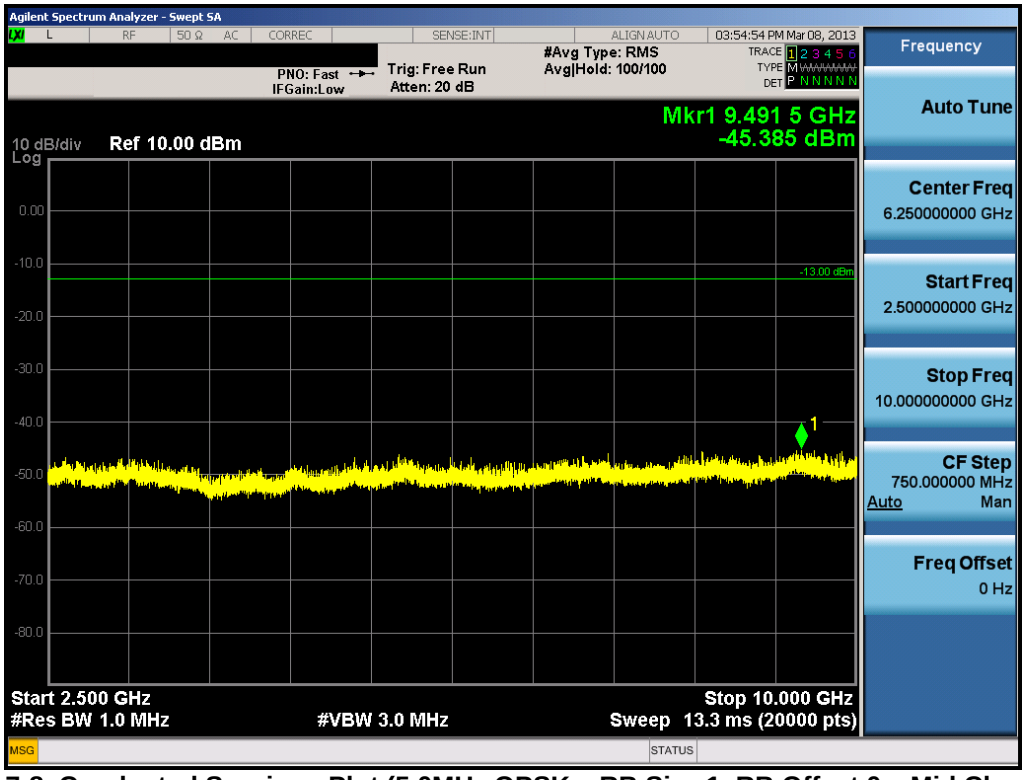
Plot 7-5. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)



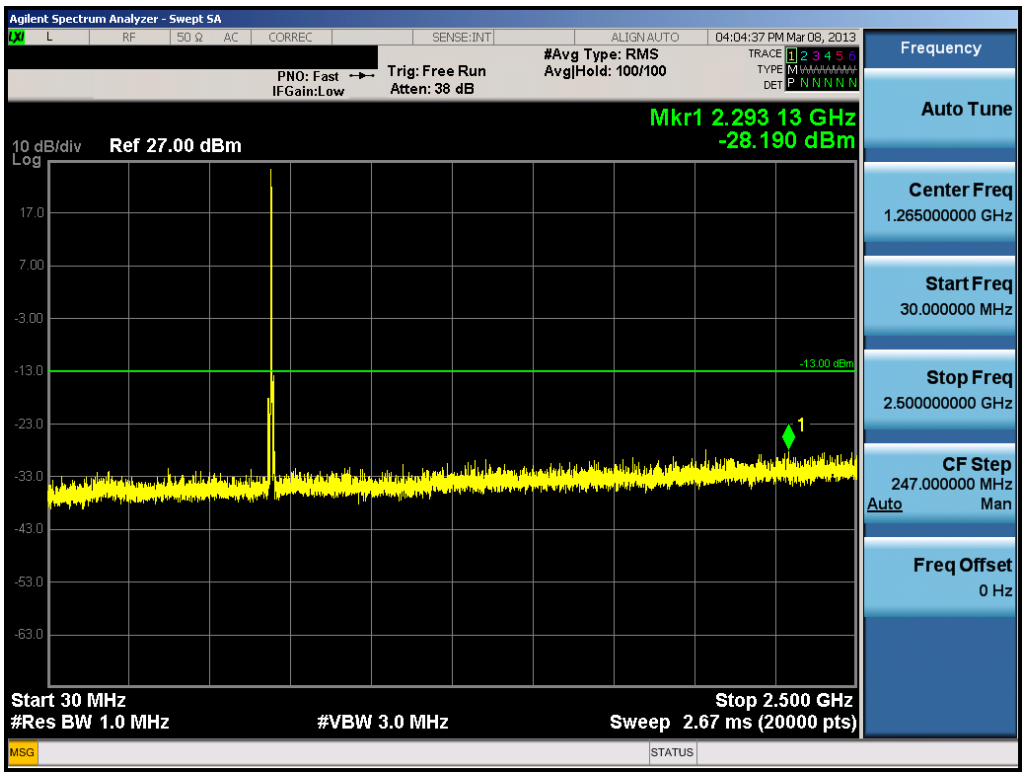
Plot 7-6. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)



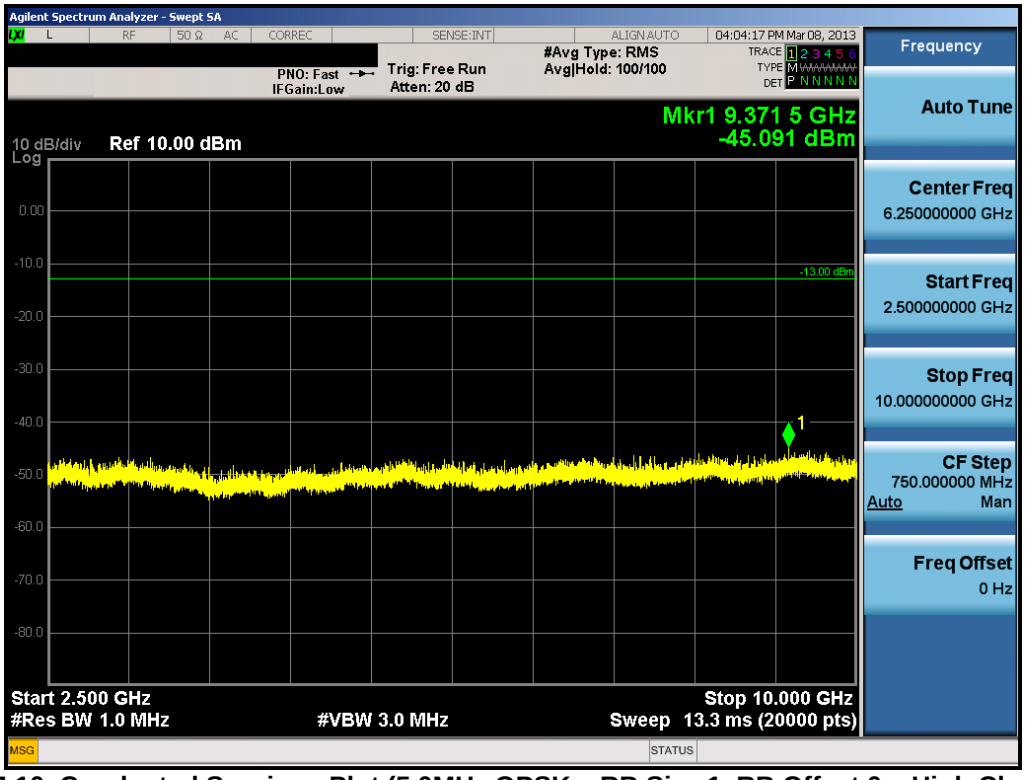
Plot 7-7. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)



Plot 7-8. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)



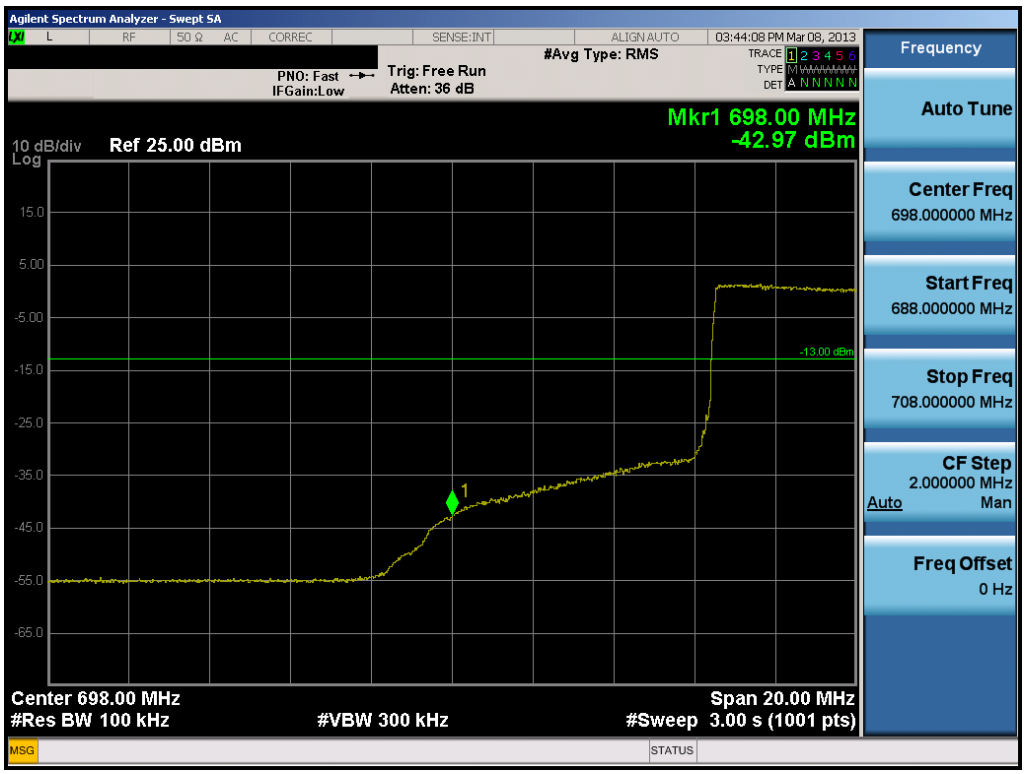
Plot 7-9. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 7-10. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

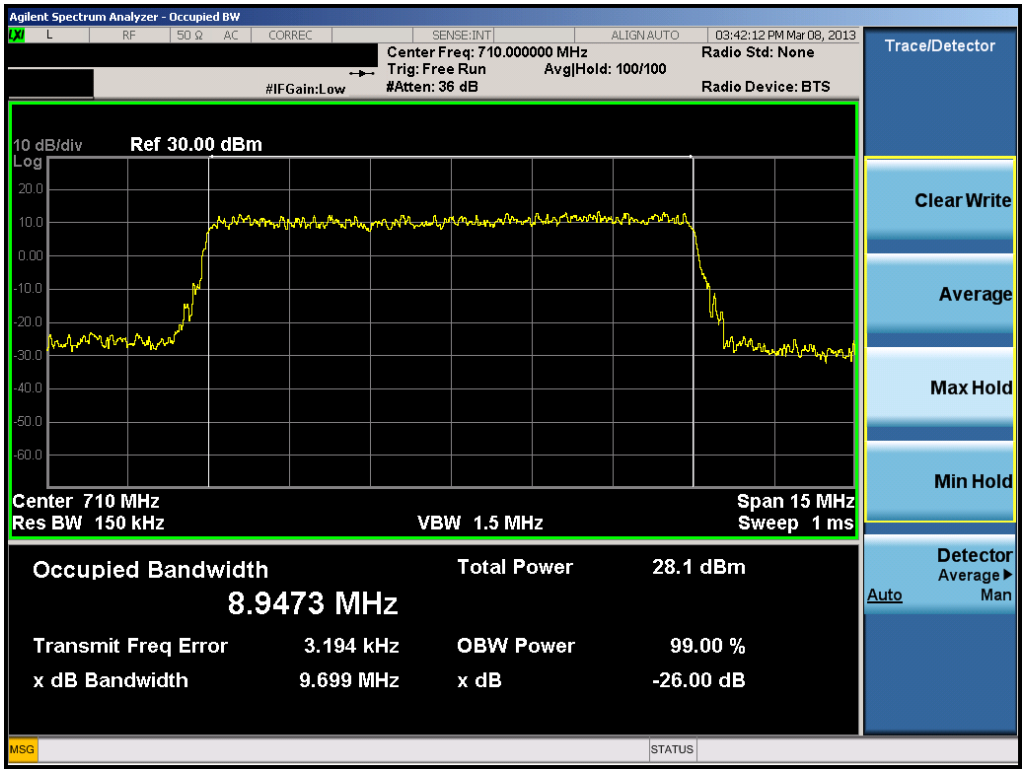
Plot 7-11. Upper Band Edge Plot (5.0MHz QPSK – RB Size 25)

Plot 7-12. Upper Extended Band Edge Plot (5.0MHz QPSK – RB Size 25)

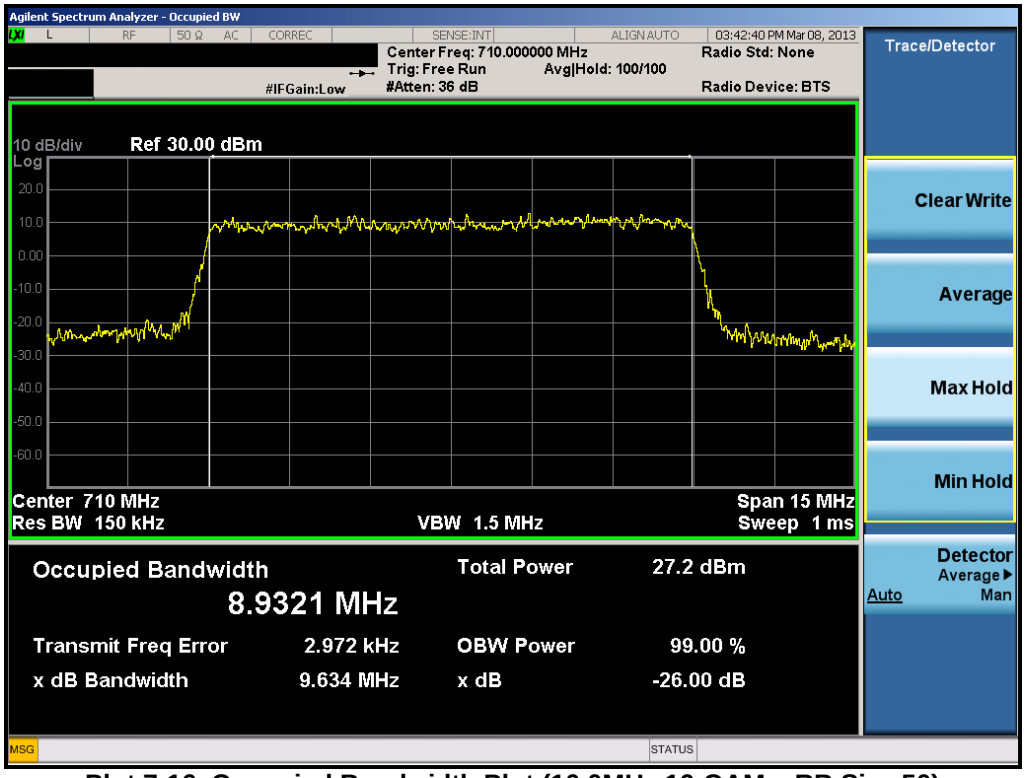


Plot 7-13. Lower Band Edge Plot (10.0MHz QPSK – RB Size 50)

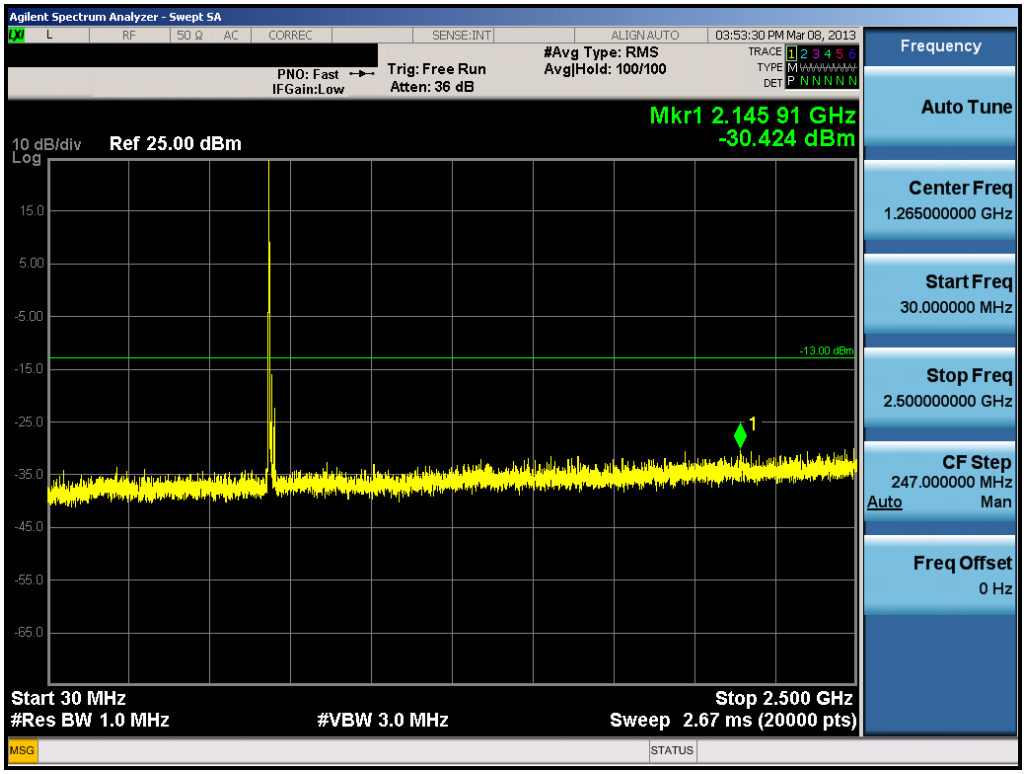
Plot 7-14. Lower Extended Band Edge Plot (10.0MHz QPSK – RB Size 50)



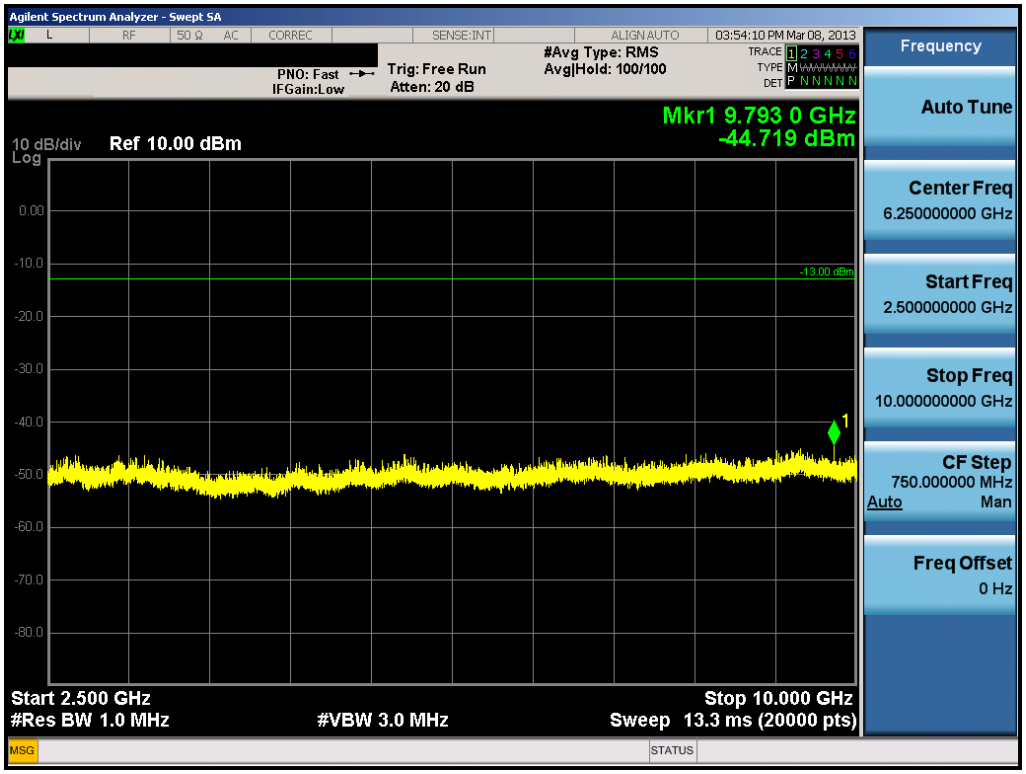
Plot 7-15. Occupied Bandwidth Plot (10.0MHz QPSK – RB Size 50)



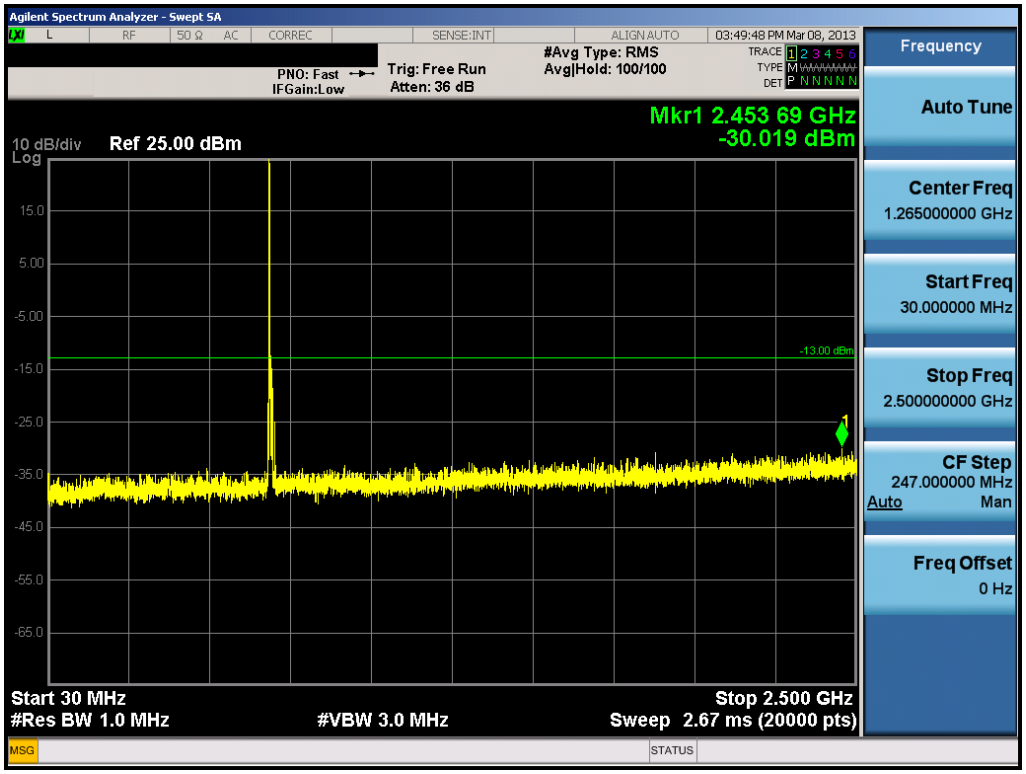
Plot 7-16. Occupied Bandwidth Plot (10.0MHz 16-QAM – RB Size 50)



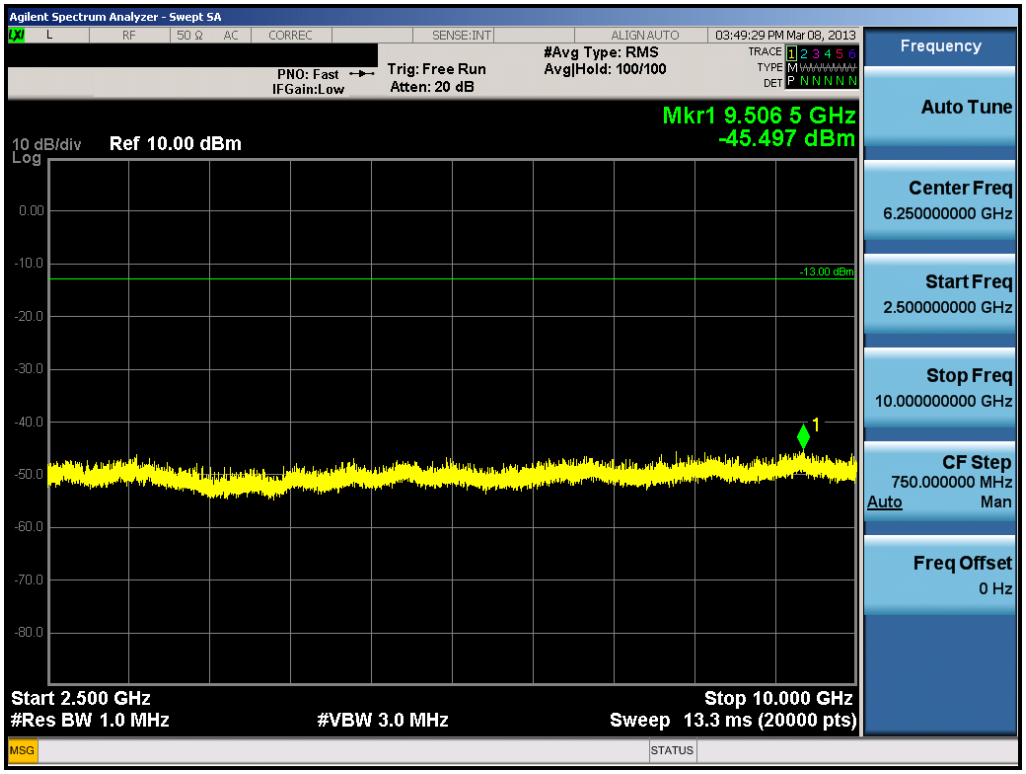
Plot 7-17. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)



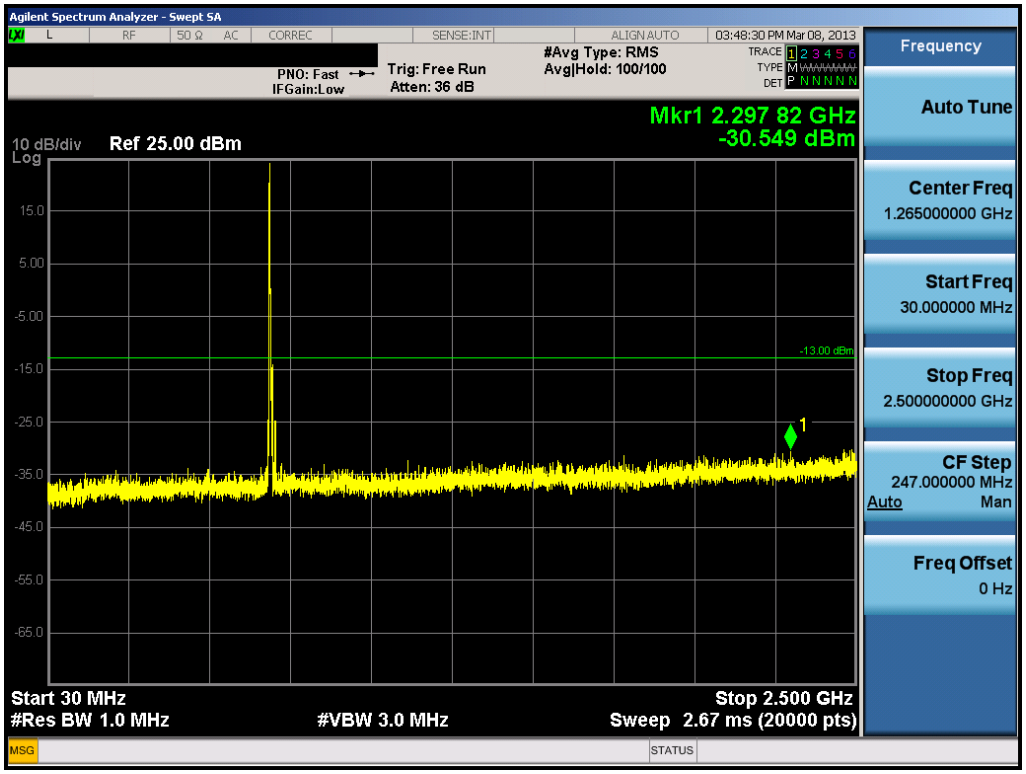
Plot 7-18. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)



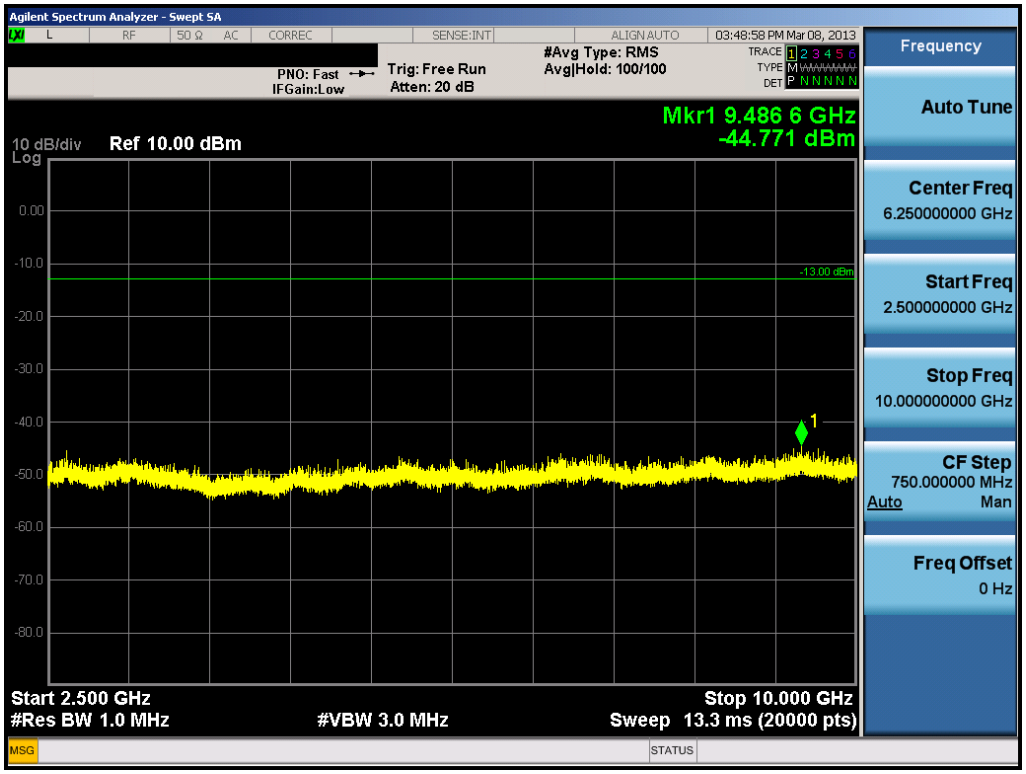
Plot 7-19. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)



Plot 7-20. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

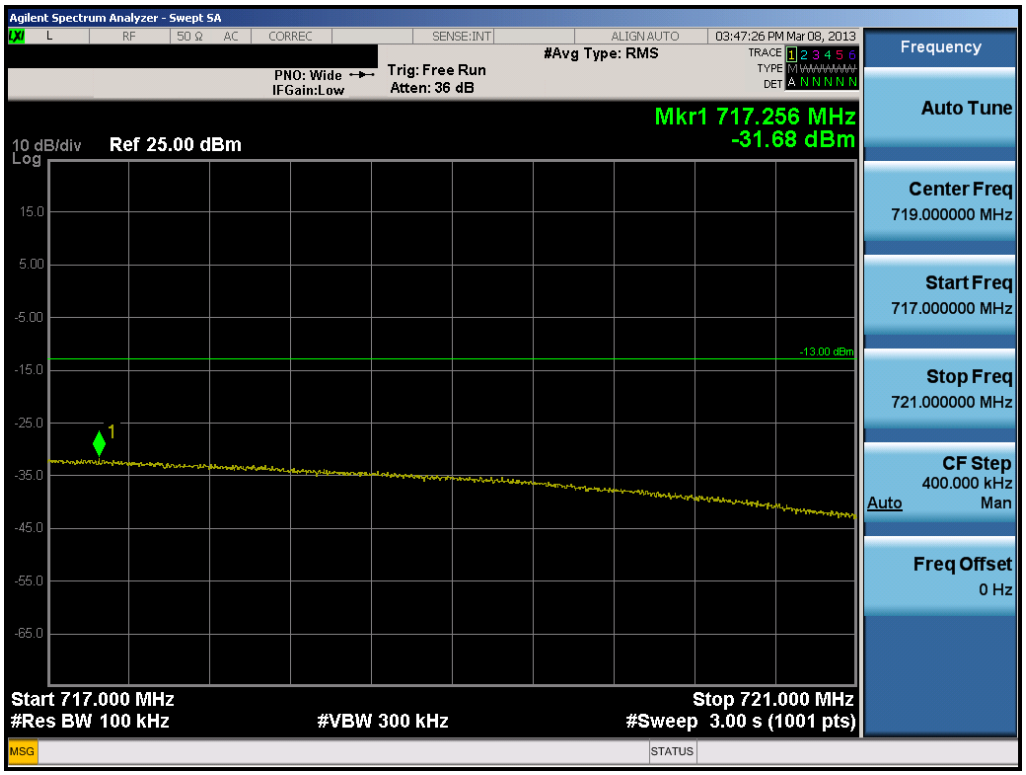


Plot 7-21. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 7-22. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

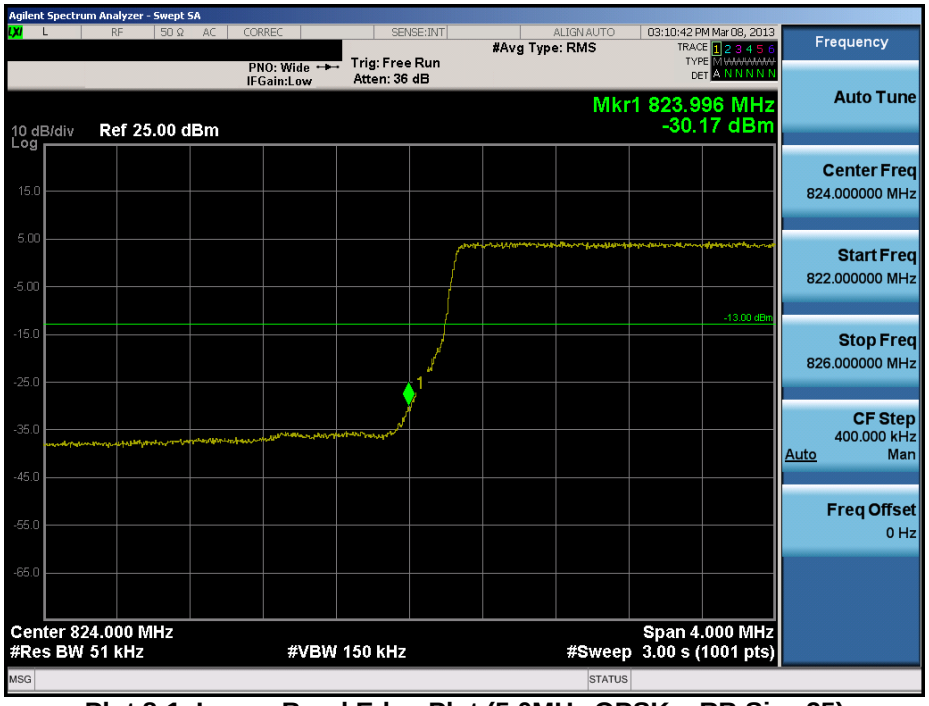
Plot 7-23. Upper Band Edge Plot (10.0MHz QPSK – RB Size 50)



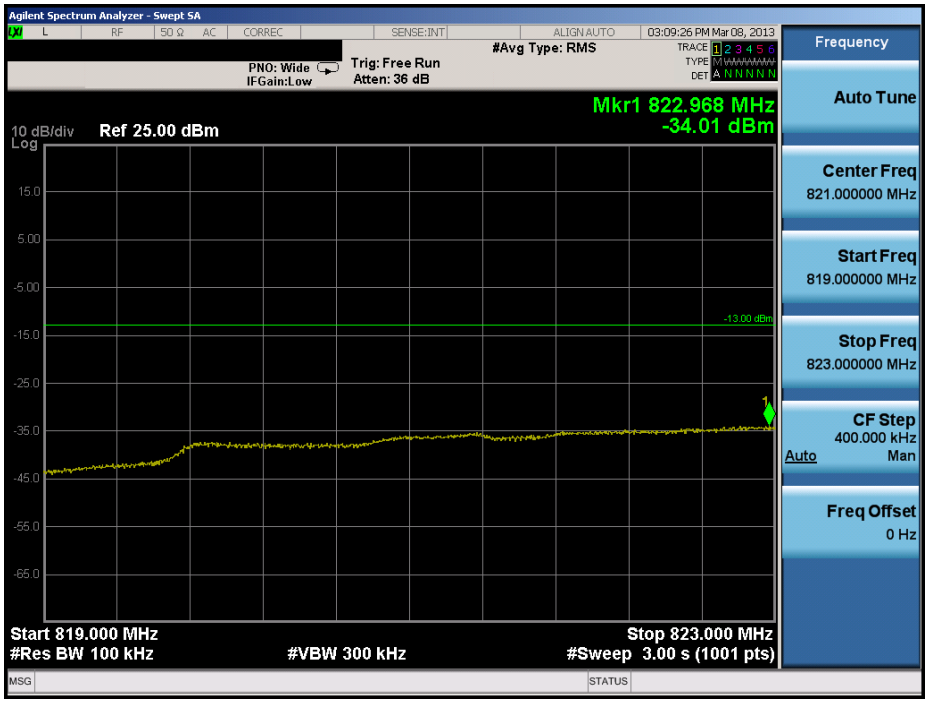
Plot 7-24. Upper Extended Band Edge Plot (10.0MHz QPSK – RB Size 50)

8.0 BAND 5 PLOTS OF EMISSIONS

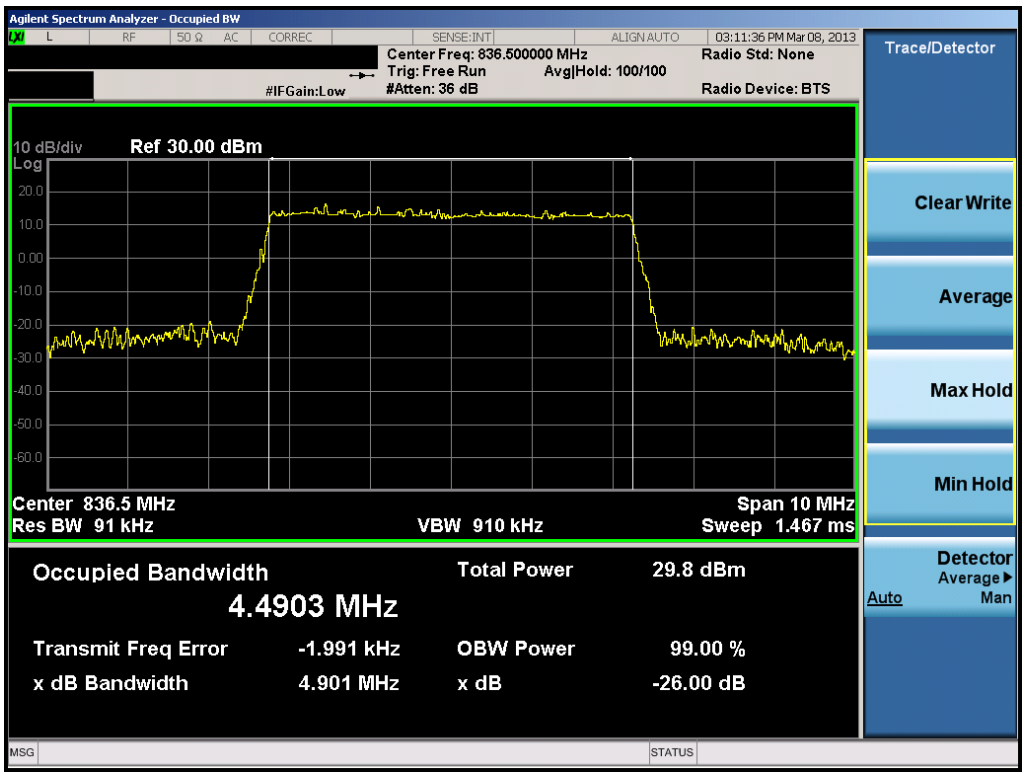
Note: All bandwidths, RB configurations, and modulations were investigated. The worst case test results are reported below.



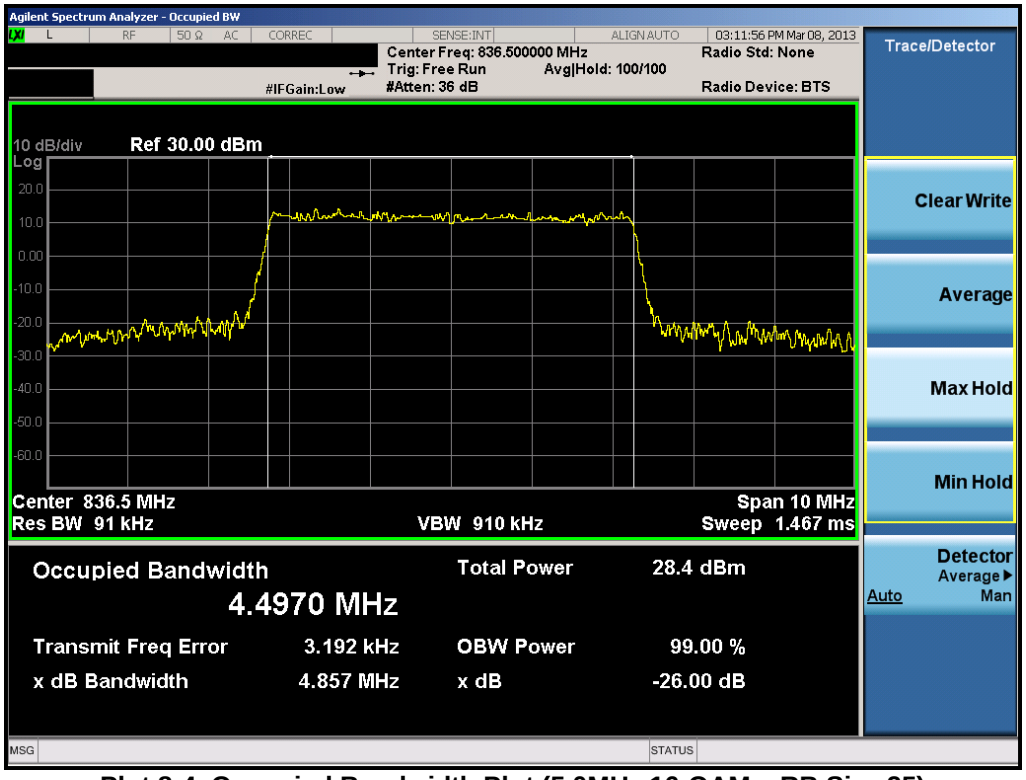
Plot 8-1. Lower Band Edge Plot (5.0MHz QPSK – RB Size 25)



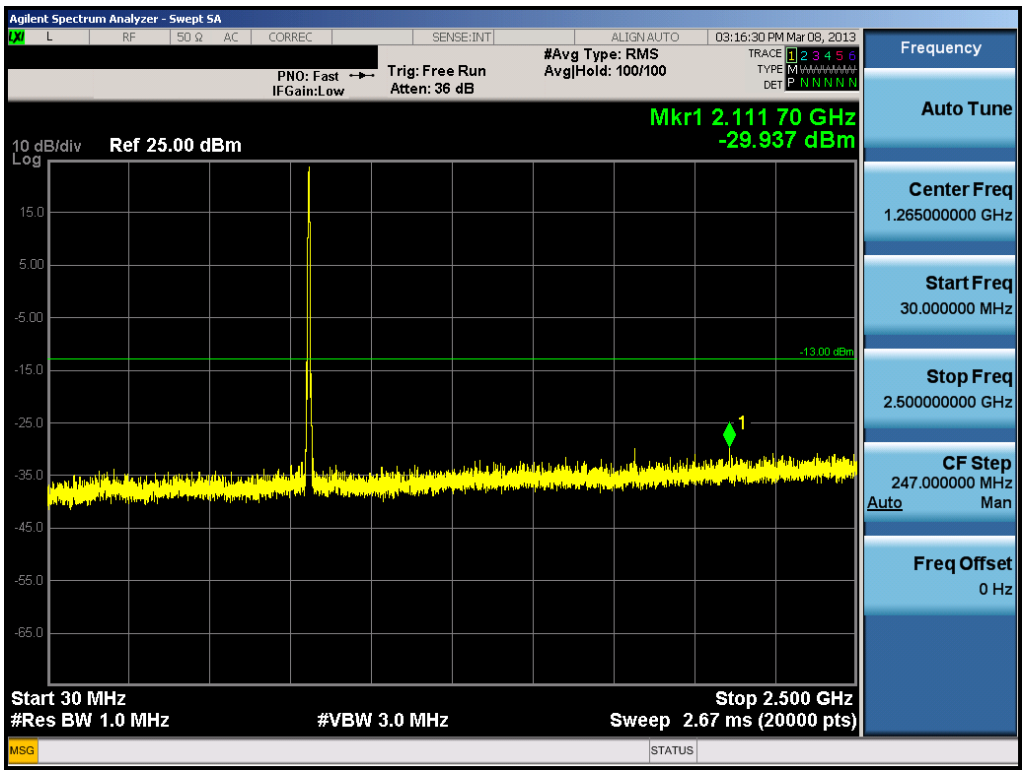
Plot 8-2. Lower Extended Band Edge Plot (5.0MHz QPSK – RB Size 25)



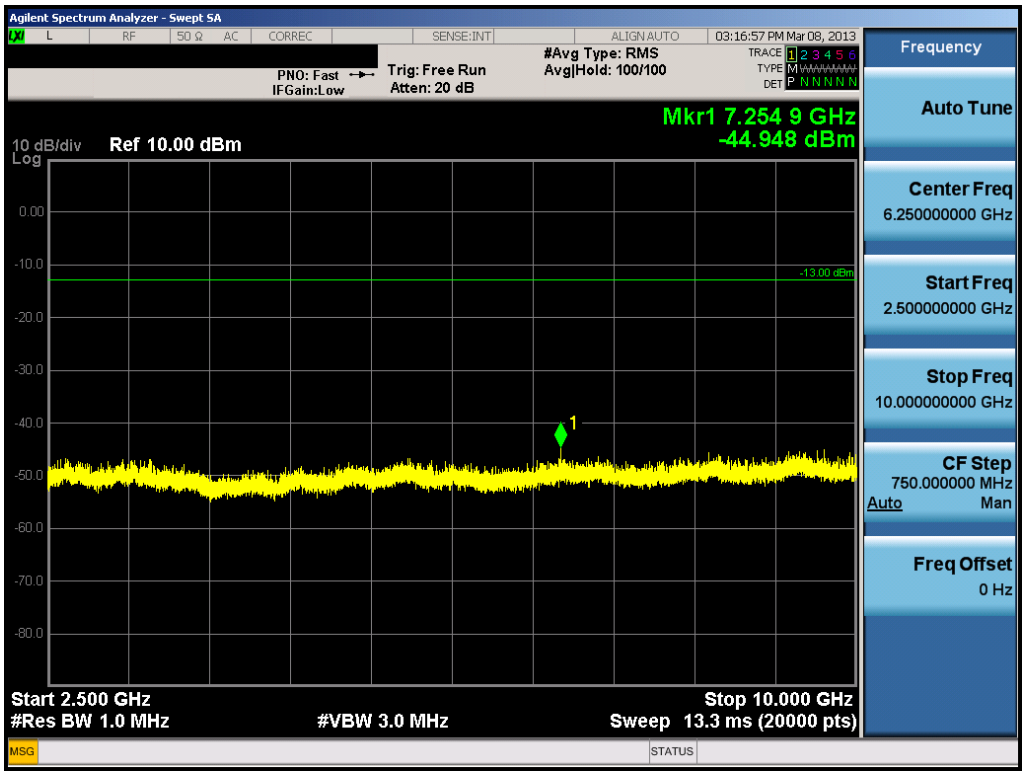
Plot 8-3. Occupied Bandwidth Plot (5.0MHz QPSK – RB Size 25)



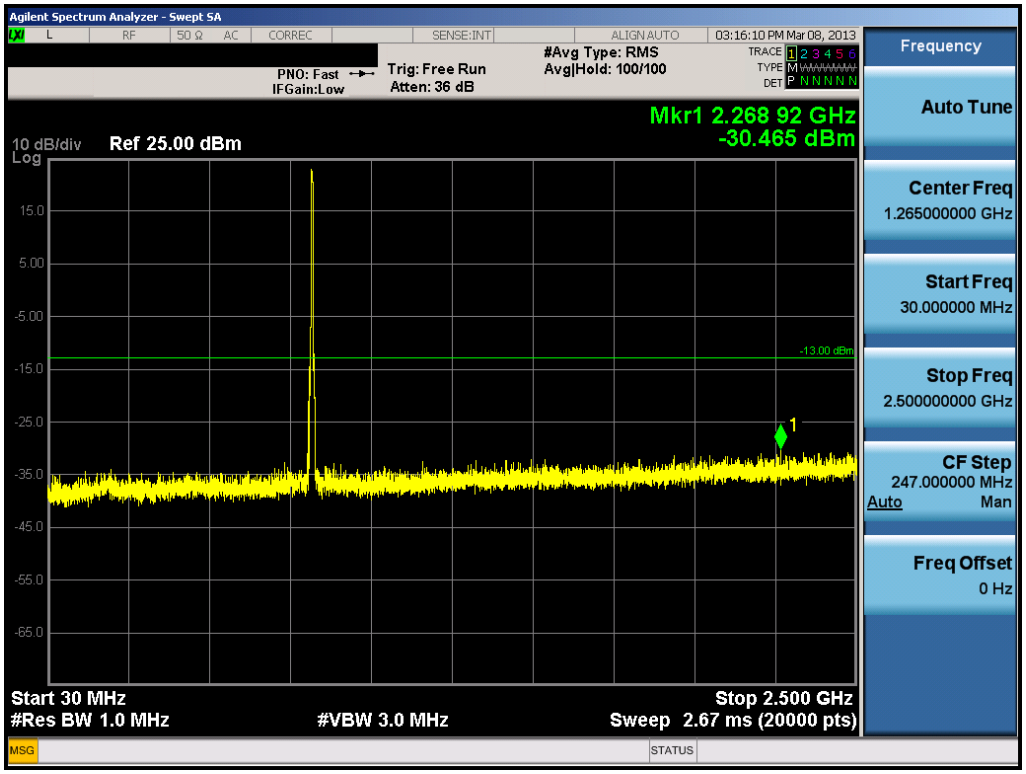
Plot 8-4. Occupied Bandwidth Plot (5.0MHz 16-QAM – RB Size 25)



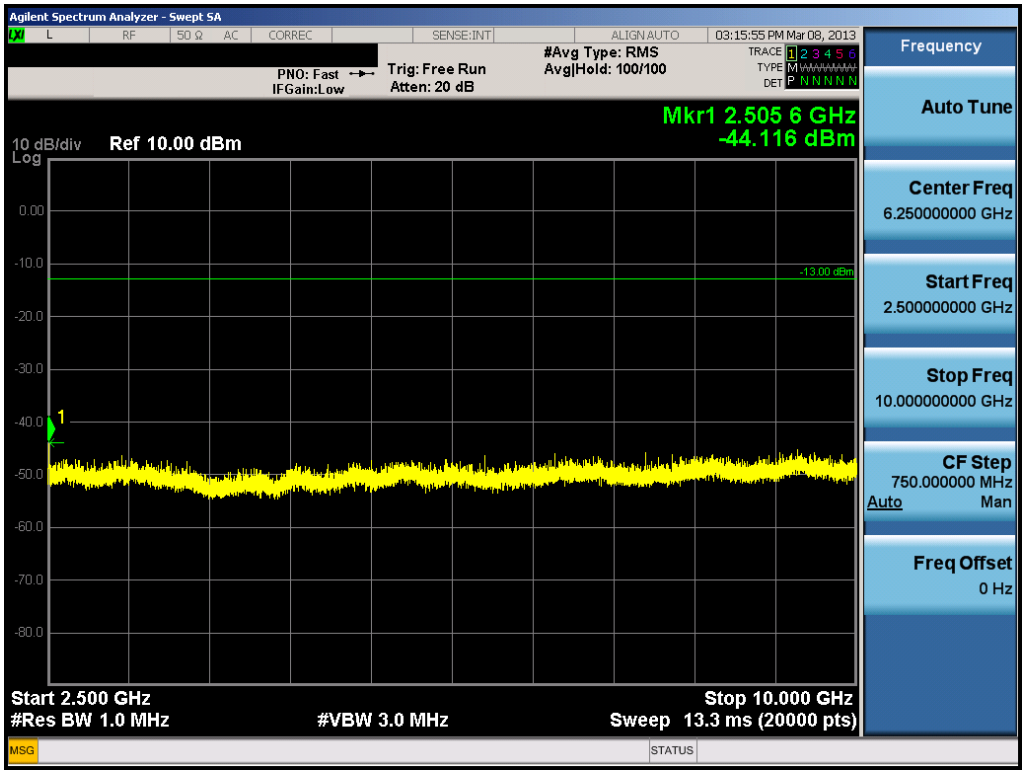
Plot 8-5. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)



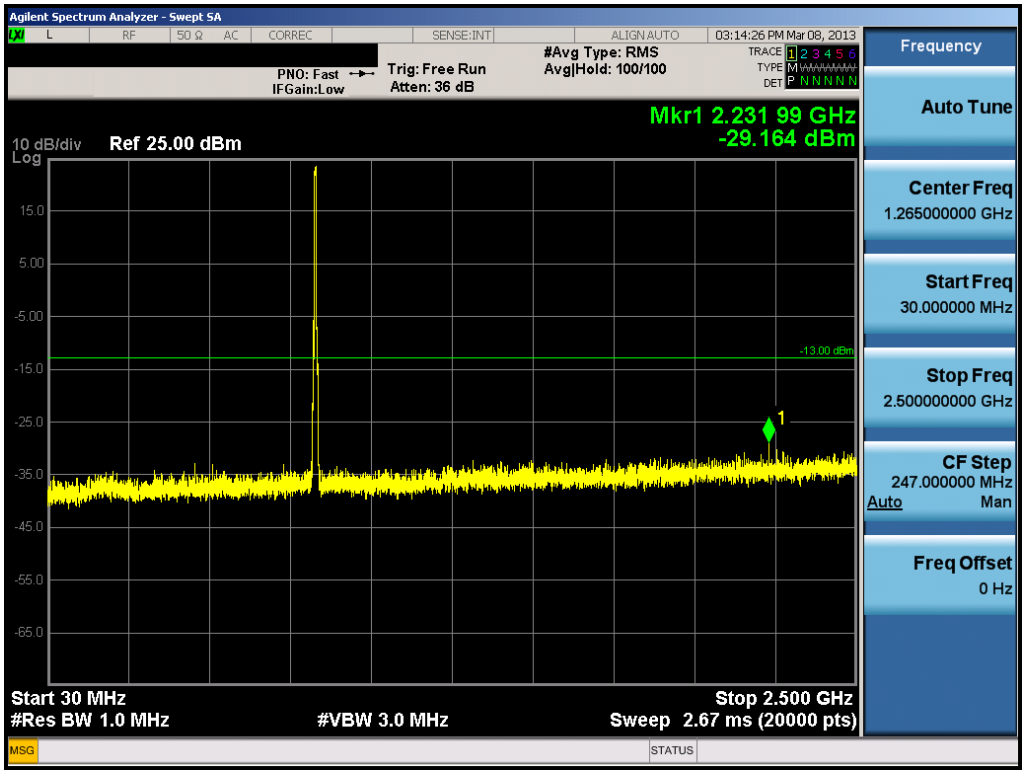
Plot 8-6. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)



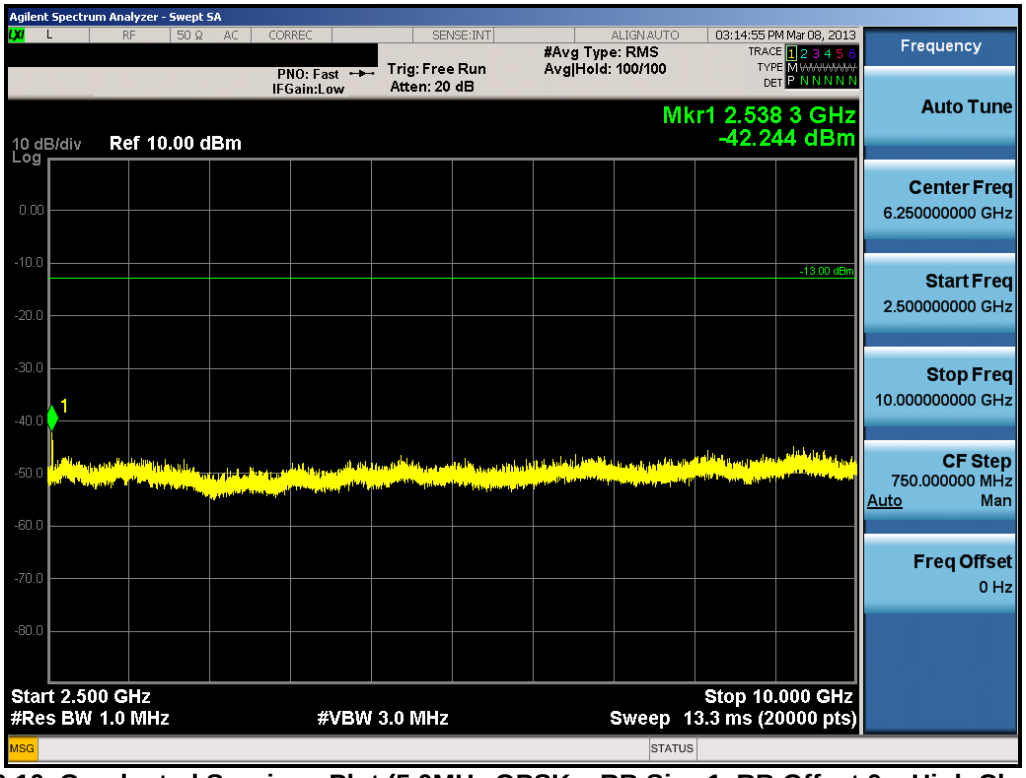
Plot 8-7. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)



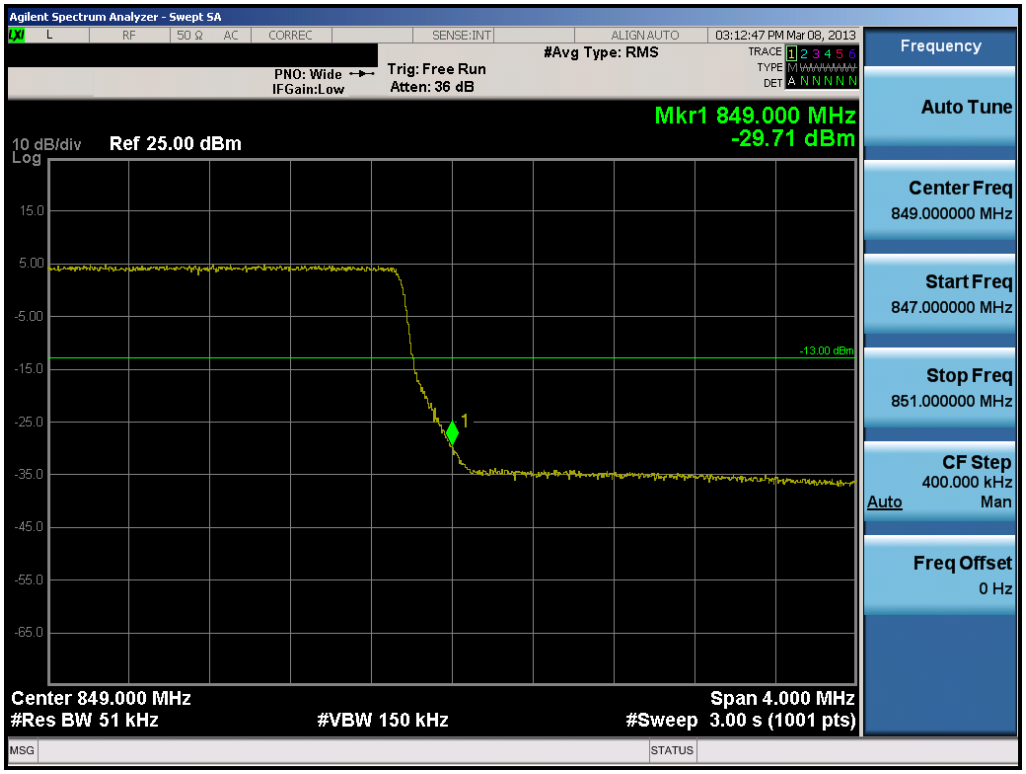
Plot 8-8. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)



Plot 8-9. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

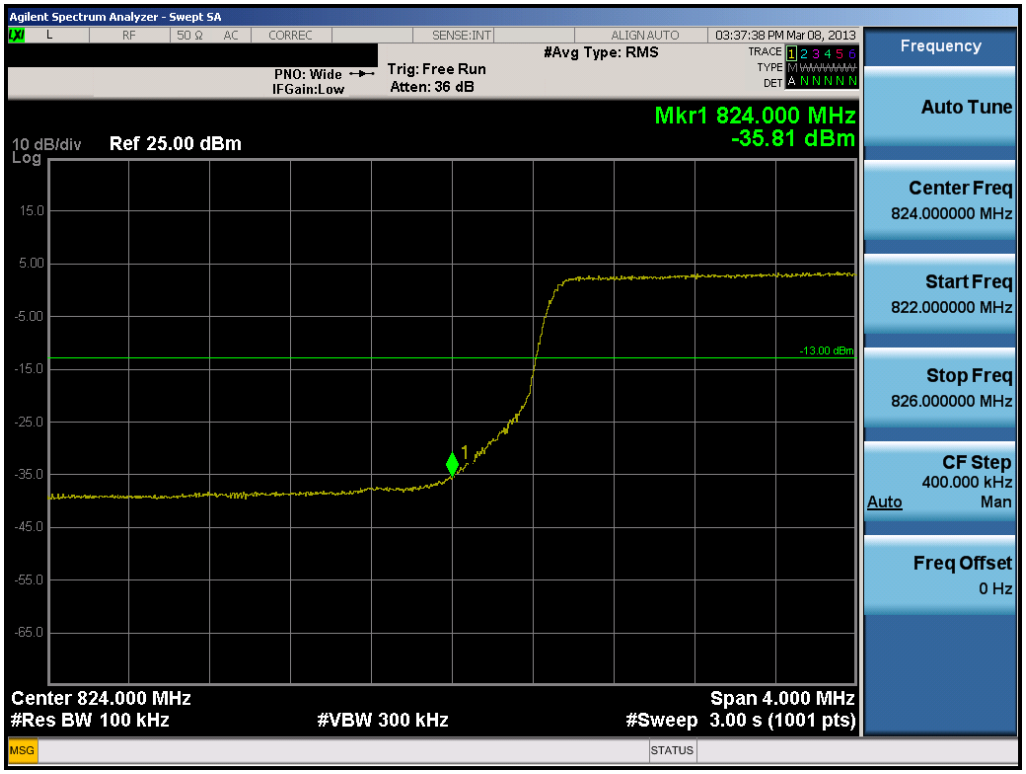


Plot 8-10. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



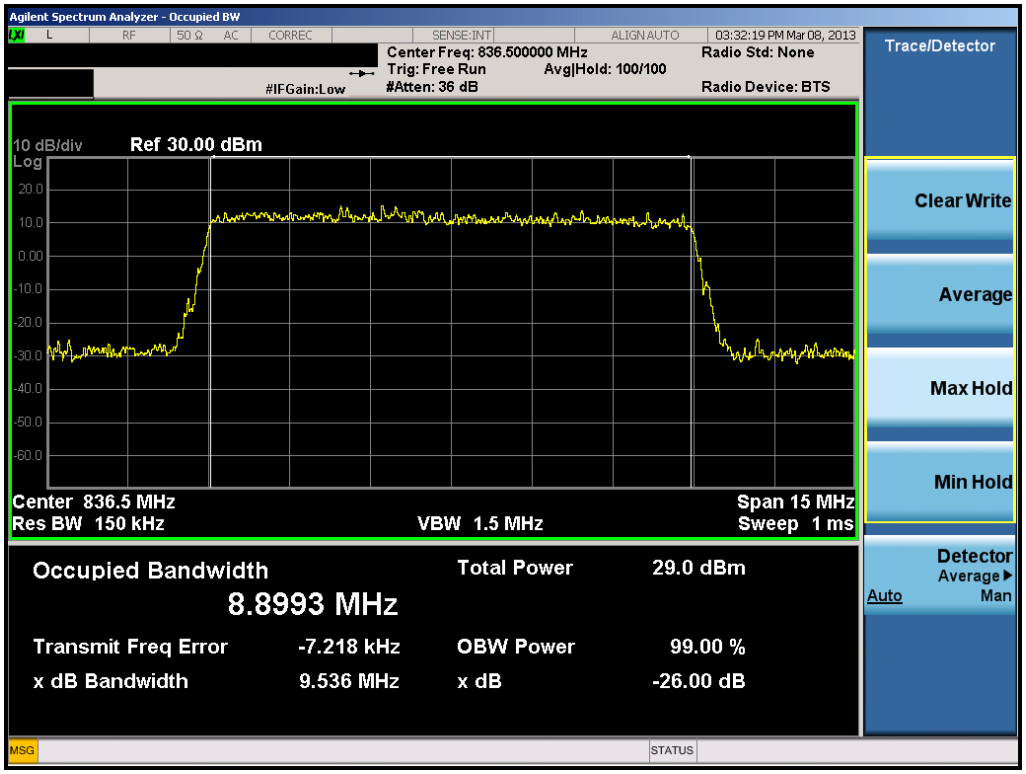
Plot 8-11. Upper Band Edge Plot (5.0MHz QPSK – RB Size 25)

Plot 8-12. Upper Extended Band Edge Plot (5.0MHz QPSK – RB Size 25)

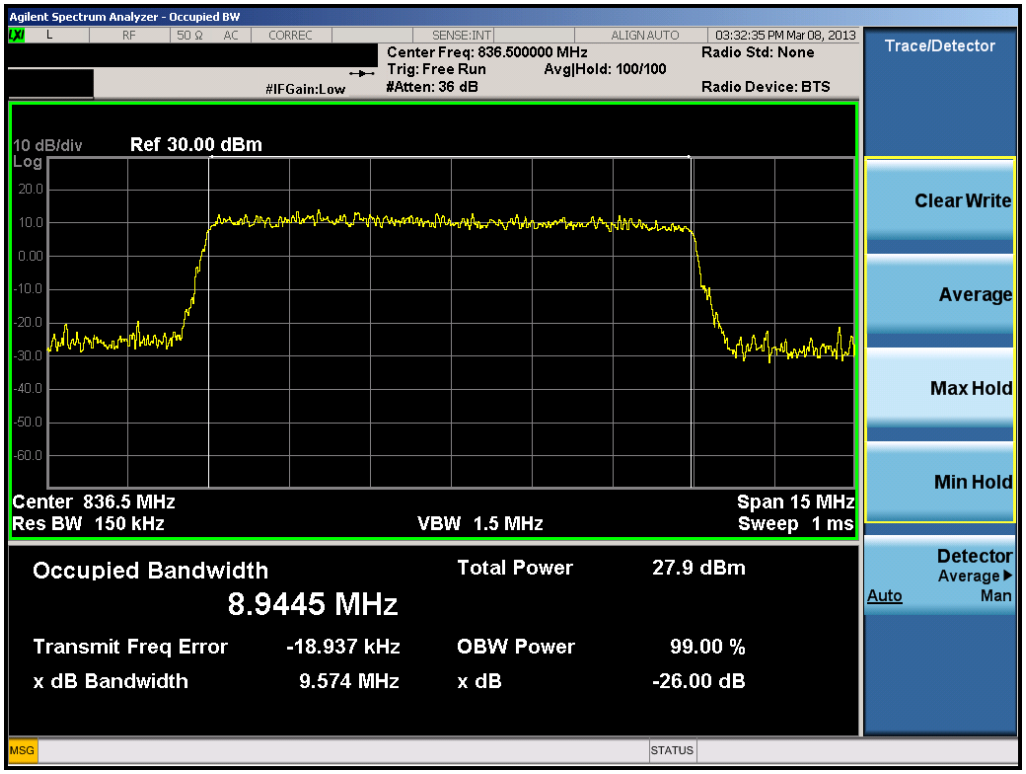


Plot 8-13. Lower Band Edge Plot (10.0MHz QPSK – RB Size 50)

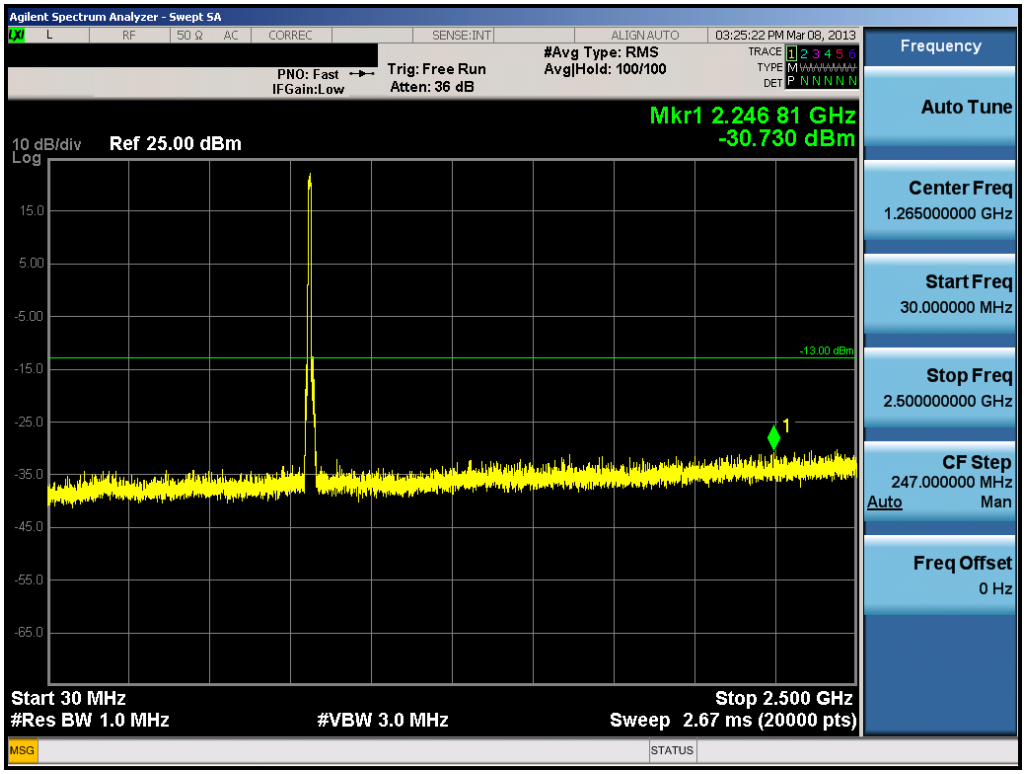
Plot 8-14. Lower Extended Band Edge Plot (10.0MHz QPSK – RB Size 50)



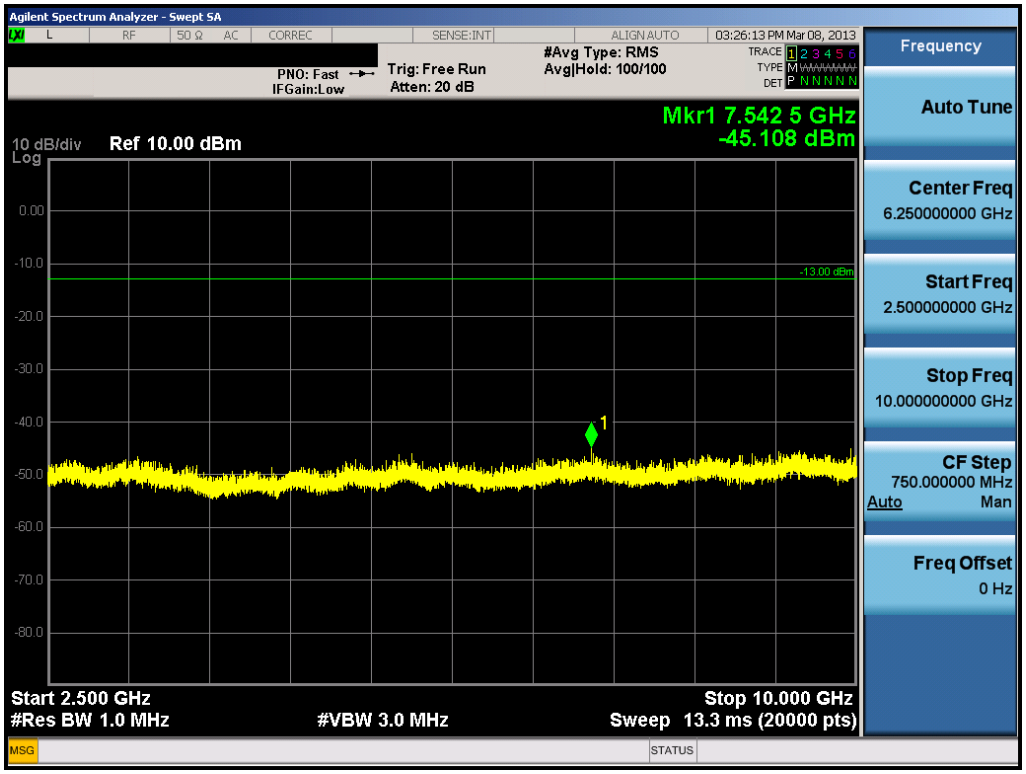
Plot 8-15. Occupied Bandwidth Plot (10.0MHz QPSK – RB Size 50)



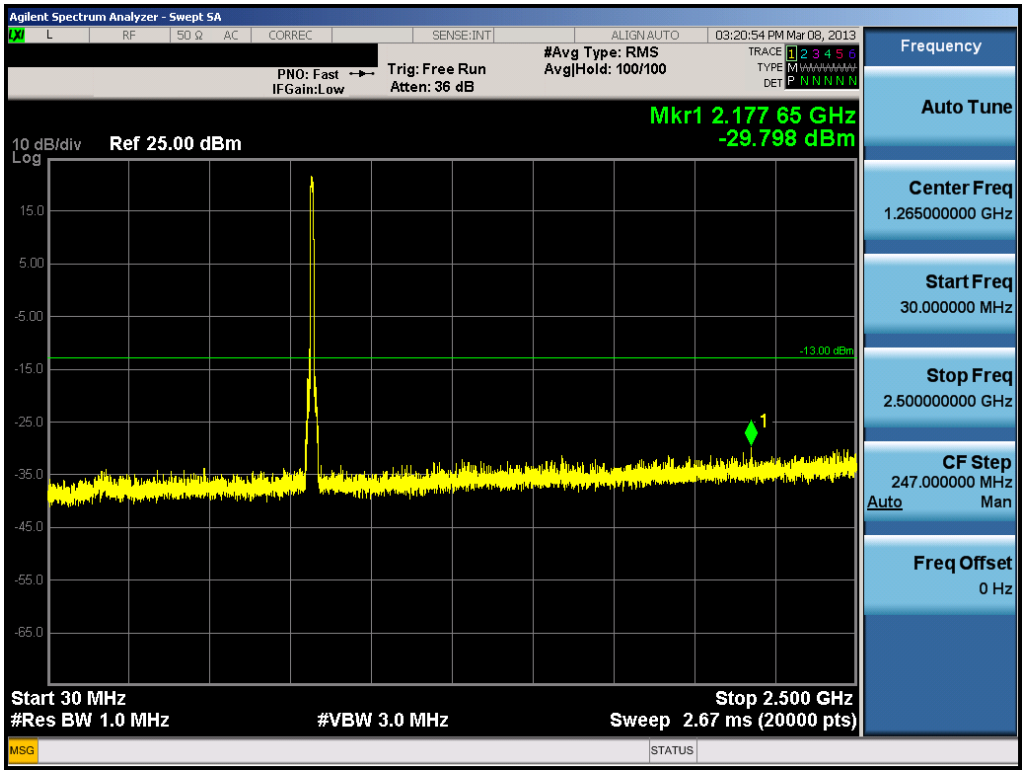
Plot 8-16. Occupied Bandwidth Plot (10.0MHz 16-QAM – RB Size 50)



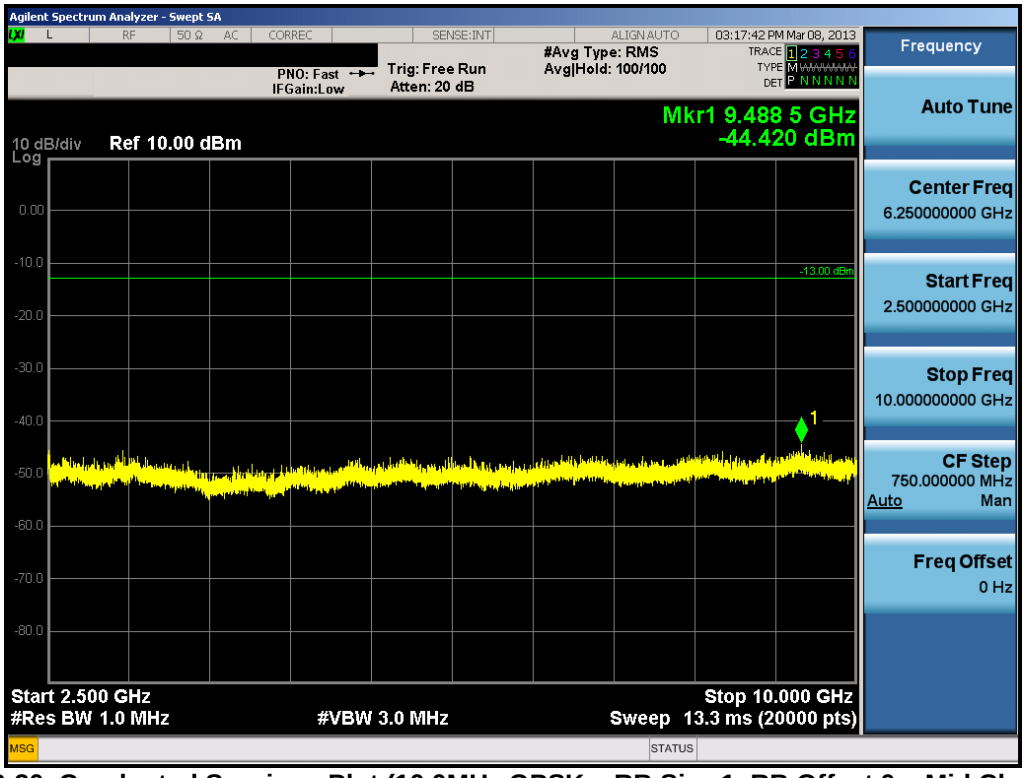
Plot 8-17. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)



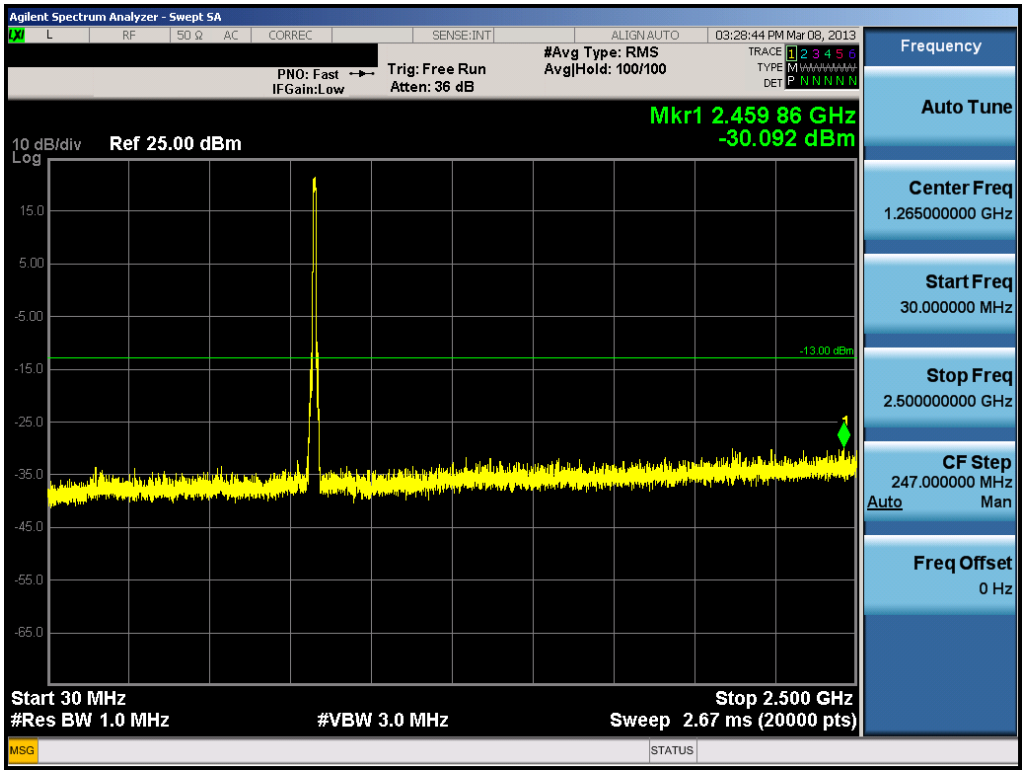
Plot 8-18. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)



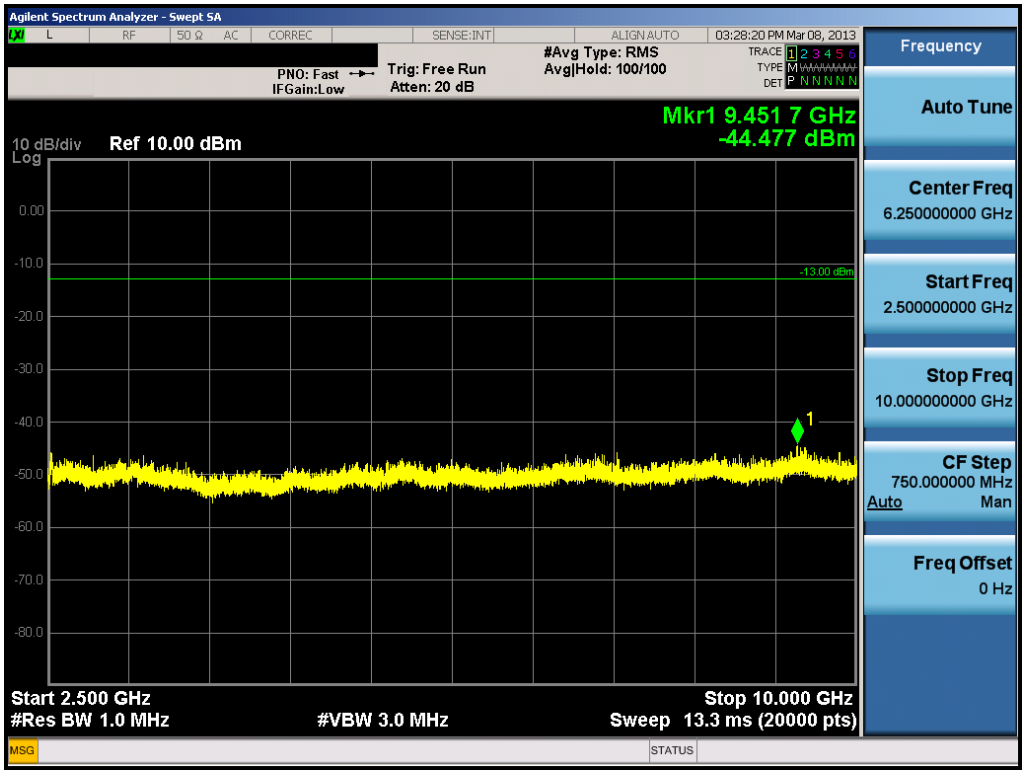
Plot 8-19. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)



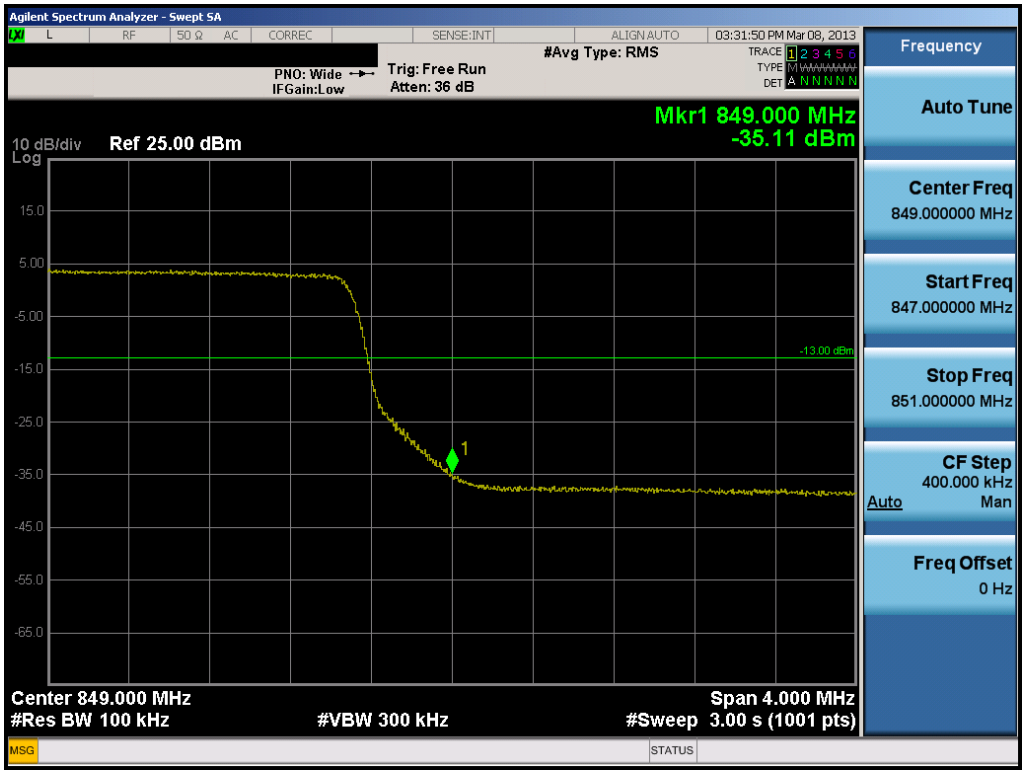
Plot 8-20. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)



Plot 8-21. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 8-22. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 8-23. Upper Band Edge Plot (10.0MHz QPSK – RB Size 50)

Plot 8-24. Upper Extended Band Edge Plot (10.0MHz QPSK – RB Size 50)

9.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSHVE300SA** complies with all the requirements of Parts 2, 22, 27 of the FCC rules for LTE operation only.