HCT CO., LTD.

CERTIFICATE OF COMPLIANCE
FCC Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 443-742 Rep. of Korea

Date of Issue:
February 13, 2014

Test Site/Location:
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea.

Report No.: HCT-R-1402-F015

HCT FRN: 0005866421

FCC ID:	**A3LSMN7506V**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

FCC Model(s):	SM-N7506V	
EUT Type:	Mobile Phone	
FCC Classification:	Licensed Portable Transmitter Held to Ear (PCE)	
FCC Rule Part(s):	§2 , §27	
Tx Frequency:	2501.0 MHz – 2685.0 MHz (LTE – Band 41): 10 MHz 2503.5 MHz – 2682.5 MHz (LTE – Band 41): 15 MHz 2506.0 MHz – 2680.0 MHz (LTE – Band 41): 20 MHz	
Max. RF Output Power:	Band 41 (10 MHz) :	0.307 W (QPSK) (24.87 dBm) 0.295 W (16-QAM) (24.70 dBm)
	Band 41 (15 MHz) :	0.309 W (QPSK) (24.90 dBm) 0.269 W (16-QAM) (24.29 dBm)
	Band 41 (20 MHz) :	0.290 W (QPSK) (24.63 dBm) 0.275 W (16-QAM) (24.40 dBm)
Emission Designator(s):	Band 41 (10 MHz) :	9M00G7D (QPSK) / 8M97W7D (16-QAM)
	Band 41 (15 MHz) :	13M5G7D (QPSK) / 13M5W7D (16-QAM)
	Band 41 (20 MHz) :	17M9G7D (QPSK) / 17M9W7D (16-QAM)

The measurements shown in this report were made in accordance with the procedures specified in §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by
: Kyung Soo Kang
Test engineer of RF Team

Approved by
: Chang Seok Choi
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1402-F015	February 13, 2014	First Approval Report

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 443-742 Rep. of Korea
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Date(s) of Tests:	February 02, 2014 ~ February 13, 2014
Antenna Specification	Manufacturer: Partron Antenna type: LDS Antenna Peak Gain: LTE Band 41 : -4.12 dBi

2. INTRODUCTION

2.1. EUT DESCRIPTION

The SAMSUNG Electronics Co., Ltd. Mobile Phone consists of LTE 41..

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, Korea.

3. DESCRIPTION OF TESTS

3.1 ERP/EIRP RADIATED POWER AND RADIATED SPURIOUS EMISSIONS

ERP/EIRP

Note: ERP(Effective Radiated Power), EIRP(Equivalent Isotropic Radiated Power)

Test Procedure

Radiated emission measurements are performed in the Fully-anechoic chamber. The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-C-2004 Clasue 2.2.17. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission. The level and postion of the maximized emission is recorded with the spectrum analyzer using a positive peak detector.
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 and the previously recorded signal was duplicated.
The power is caculated by the following formula;

$$P_{d(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dB)}$$

Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

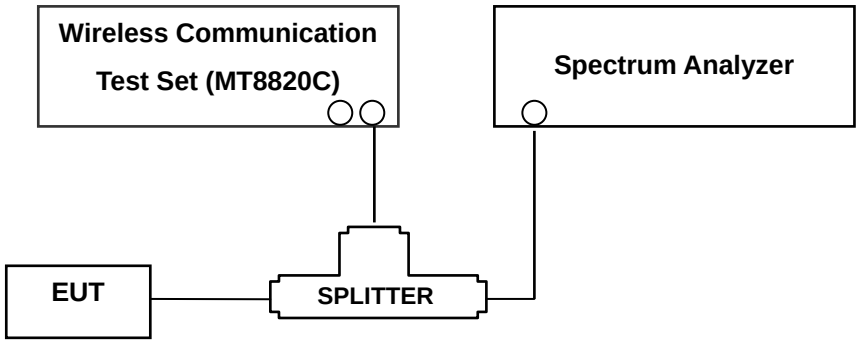
The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

Radiated spurious emissions

1. Frequency Range : 30 MHz ~ 10th Harmonics of highest channel fundamental frequency.
2. Measured distance : 30 MHz ~ 11 GHz at 3 m
   11 GHz ~ 27 GHz at 1m
3. The EUT was setup to maximum output power.
4. The high, low and a middle channel were tested for out of band measurements.

3.2 OCCUPIED BANDWIDTH.

Test set-up



(Configuration of conducted Emission measurement)
Test Procedure

The EUT was setup to maximum output power at its lowest channel. The occupied bandwidth was measured using a spectrum analyzer. The measurements are repeated for the highest and a middle channel. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Plots of the EUT's occupied bandwidth are shown herein.

3.3 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer.
The EUT was setup to maximum output power. The 1 MHz RBW was used to scan from 30 MHz to 26.5 GHz. And limit is -25 dBm. The high, low and a middle channel were tested for out of band measurements.

- Channel Edge Requirement : In the 1MHz bands immediately outside and adjacent to the channel, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit is -13dBm at channel edge and -25dBm at up to 5.5MHz from the channel edge.

NOTES: The analyzer plot offsets were determined by below conditions.

- For LTE Band 41, total offset 31.9 dBm = 20 dBm attenuator + 6 dBm Divider + 5.9 dBm RF cables.

3.4 PEAK-AVERAGE RATIO.

Test Procedure

Peak to Average Power Ratio is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r01, June 7, 2013, Section 5.7.

- Section 5.7.1 CCDF Procedure

a) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
b) Set the number of counts to a value that stabilizes the measured CCDF curve;
c) Set the measurement interval as follows:
   1) for continuous transmissions, set to 1 ms,
   2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
d) Record the maximum PAPR level associated with a probability of 0.1%.

- Section 5.7.2 Alternate Procedure

Use one of the procedures presented in 5.1 to measure the total peak power and record as P_{Pk}. Use one of the applicable procedures presented 5.2 to measure the total average power and record as P_{Avg}. Determine the P.A.R. from: $P.A.R_{(dB)} = P_{Pk\ (dBm)} - P_{Avg\ (dBm)}$ (P_{Avg} = Average Power + Duty cycle Factor)

5.1.1 Peak power measurements with a spectrum/signal analyzer or EMI receiver

The following procedure can be used to determine the total peak output power.

a) Set the RBW ≥ OBW.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 2 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Ensure that the number of measurement points ≥ span/RBW.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the peak amplitude level.

5.2.2 Procedures for use with a spectrum/signal analyzer when EUT cannot be configured to transmit continuously and sweep triggering/signal gating cannot be properly implemented

If the EUT cannot be configured to transmit continuously (burst duty cycle < 98%), then one of the following procedures can be used. The selection of the applicable procedure will depend on the characteristics of the measured burst duty cycle.

Measure the burst duty cycle with a spectrum/signal analyzer or EMC receiver can be used in zero-span mode if the response time and spacing between bins on the sweep are sufficient to permit accurate measurement of the burst on/off time of the transmitted signal.

5.2.2.2 Constant burst duty cycle

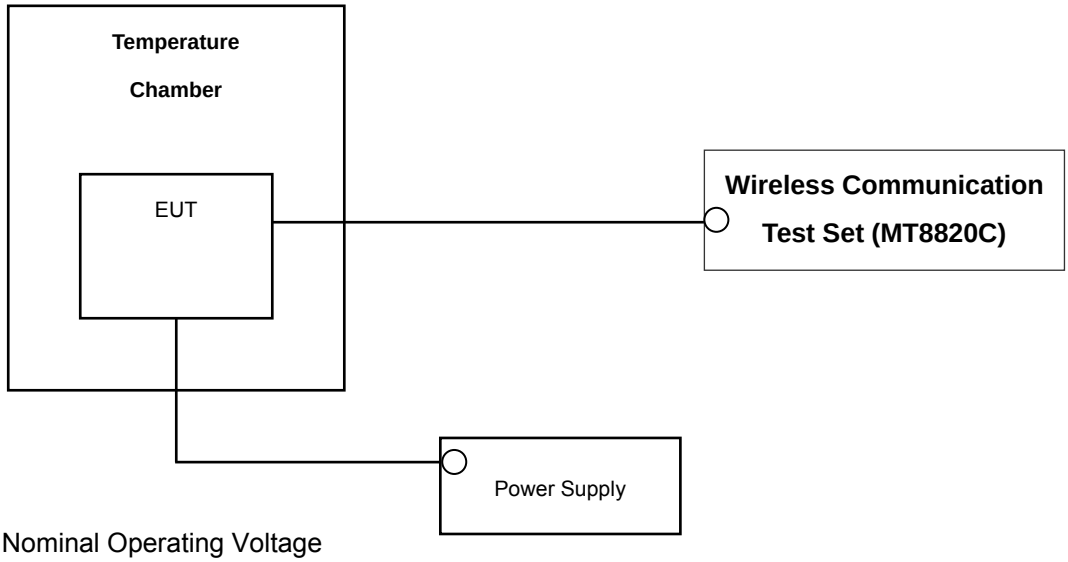
If the measured burst duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent), then:

a) Set span to at least 1.5 times the OBW.
b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
c) Set VBW ≥ 3 x RBW.
d) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
e) Sweep time = auto.
f) Detector = RMS (power averaging).
g) Set sweep trigger to “free run”.
h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
j) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission).

For example, add 10 log (1/0.25) = 6 dB if the duty cycle is a constant 25%.

3.5 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up



* Nominal Operating Voltage

Test Procedure

The frequency stability of the transmitter is measured by:
a.) **Temperature:** The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from battery end point to 115 % of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification — the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ± 0.000 25 %(± 2.5 ppm) of the center frequency.

Time Period and Procedure:

The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
1. 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.

2. 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.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Interval	Calibration Due
Agilent	E9327A/ Power Sensor	MY4442009	Annual	04/16/2014
MITEQ	AMF-6D-001180-35-20P/AMP	1081666	Annual	09/12/2014
CERNEX	CBL18265035/AMP	22966	Annual	07/24/2014
Wainwright	WHK1.2/15G-10EF/H.P.F	2	Annual	04/25/2014
Wainwright	WHK3.3/18G-10EF/H.P.F	1	Annual	04/25/2014
Hewlett Packard	11667B / Power Splitter	11275	Annual	05/13/2014
Digital	EP-3010/ Power Supply	3110117	Annual	10/29/2014
Schwarzbeck	UHAP/ Dipole Antenna	557	Biennial	03/05/2015
Schwarzbeck	UHAP/ Dipole Antenna	558	Biennial	05/03/2015
Korea Engineering	KR-1005L / Chamber	KRAB05063-3CH	Annual	10/30/2014
Schwarzbeck	BBHA 9120D/ Horn Antenna	147	Biennial	05/15/2014
Schwarzbeck	BBHA 9120D/ Horn Antenna	1151	Biennial	10/05/2015
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	BBHA9170124	Biennial	10/30/2014
Agilent	E9020A/Spectrum Analyzer	MY51110063	Annual	05/14/2014
WEINSCHEL	ATTENUATOR	BR0592	Annual	10/28/2014
REOHDE&SCHWARZ	FSV40/Spectrum Analyzer	1307.9002K40-100931-NK	Annual	06/10/2014
ANRITSU	MT8820C / Wideband Radio Communication Tester	6200863156	Annual	03/25/2014

5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049,	Occupied Bandwidth	N/A	CONDUCTED	PASS
2.1051, 27.53(m)(4)	Band Edge / Conducted Spurious Emissions.	< 43 +10 $\log_{10}$ (P[Watts]) at Band Edge and < 55 +10 $\log_{10}$ (P[Watts]) at 5.5MHz from the Band Edges.		PASS
27.50(d)(5)	Peak-Average Ratio	< 13 dB		PASS
*2.1046	Conducted Output Power	N/A		PASS
2.1055, 27.54	Frequency stability	< 2.5 ppm		PASS
27.50(h)(2)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP	RADIATED	PASS
2.1053, 27.53(m)(4)	Undesirable Emissions	< 43 +10 $\log_{10}$ (P[Watts]) for all out-of-band emissions		PASS

*See SAR Report

6. SAMPLE CALCULATION

A. EIRP Sample Calculation

Mode	Ch./ Freq.		Measured Level(dBm)	Substitude LEVEL(dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
	channel	Freq.(MHz)						W	dBm
LTE Band 41	40620.0	2,593.0	-16.35	18.26	10.72	1.38	V	**0.575**	**27.60**

EIRP = SubstitudeLEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a wooden tripod is 0.8 meter above test site ground level.
2) During the test , the turn table is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain and cable loss are the rating of Equivalent Isotropic Radiated Power (**EIRP**).

B. Emission Designator

QPSK Modulation

10MHz Bandwidth

Emission Designator = 8M95G7D

LTE BW = 8.95 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

15MHz Bandwidth

Emission Designator = 13M5G7D

LTE BW = 13.47 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

20MHz Bandwidth

Emission Designator = 18M0G7D

LTE BW = 18.03 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

16QAM Modulation

10MHz Bandwidth

Emission Designator = 8M94W7D

LTE BW = 8.94 MHz

W = main carrier modulated in a combination of two or more of the following modes; amplitude, angle, pulse

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

15MHz Bandwidth

Emission Designator = 13M5W7D

LTE BW = 13.47MHz

W = main carrier modulated in a combination of two or more of the following modes; amplitude, angle, pulse

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

20MHz Bandwidth

Emission Designator = 18M0W7D

LTE BW = 18.03 MHz

W = main carrier modulated in a combination of two or more of the following modes; amplitude, angle, pulse

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

7. TEST DATA

7.1 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
Band 41	10 MHz	2593.0	QPSK	50	0	9.87
			16-QAM	50	0	10.38
	15 MHz	2593.0	QPSK	75	0	9.94
			16-QAM	75	0	10.86
	20 MHz	2593.0	QPSK	100	0	9.57
			16-QAM	100	0	10.79

- Plots of the EUT's Peak- to- Average Ratio are shown Page 30 ~ 32

7.2 OCCUPIED BANDWIDTH

Band	Band Width (MHz)	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
Band 41	10	2593.0	QPSK	50	0	9.0010
			16-QAM	50	0	8.9708
	15	2593.0	QPSK	75	0	13.4980
			16-QAM	75	0	13.4790
	20	2593.0	QPSK	100	0	17.9370
			16-QAM	100	0	17.9290

- Plots of the EUT's Occupied Bandwidth are shown Page 27 ~ 29

7.3 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (Mhz)	Modulation	Resource Block Size	Resource Block Offset	Frequency of Maximum Harmonic (GHz)	Maximum Data [dBm]
Band 41	10	2501.0	QPSK	1	0	4.993553	-27.553
		2593.0		1	0	25.6344	-32.412
		2685.0		1	0	25.8832	-31.883
	15	2503.5		1	0	4.994052	-28.408
		2593.0		1	0	25.5276	-31.559
		2682.5		1	0	25.6484	-32.903
	20	2506.0		1	0	4.994551	-26.453
		2593.0		1	0	25.6412	-32.482
		2680.0		1	0	25.5512	-32.353

- Plots of the EUT's Conducted Spurious Emissions are shown Page 38 ~ 46

7.3.1 BAND EDGE

Band	Band Width (MHz)	Frequency (Mhz)	Modulation	Resource Block Size	Resource Block Offset	Channel Edge Data [dBm]			
						Channel Edge (Limit: -13dBm)		At 5.5MHz from Channel Edge (Limit: -25dBm)	
						Lower	Upper	Lower	Upper
Band 41	10	2501.0	QPSK	50	0	-25.33	-23.06	-29.77	-27.80
		2593.0		50	0	-23.05	-25.09	-35.61	-35.05
		268530		50	0	-22.32	-23.61	-27.95	-28.02
	15	2503.5		75	0	-24.95	-24.57	-28.01	-28.15
		2593.0		75	0	-21.53	-23.61	-25.62	-28.11
		2682.5		75	0	-24.65	-27.19	-27.34	-30.01
	20	2506.0		100	0	-26.81	-26.98	-30.37	-29.87
		2593.0		100	0	-25.73	-30.15	-28.21	-31.30
		2680.0		100	0	-26.12	-29.97	-28.86	-31.22

- Plots of the EUT's Band Edge are shown Page 33~37

7.4 EQUIVALENT ISOTROPIC RADIATED POWER OUTPUT

Effective Radiated Power Data (Band 41 – 10 MHz)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBi)	C.L	Pol	EIRP	
								W	dBm
2501.0	10 MHz	QPSK	-19.47	14.93	10.63	1.35	V	0.264	24.21
		16-QAM	-19.54	14.86	10.63	1.35	V	0.259	24.14
2593.0		QPSK	-19.08	15.53	10.72	1.38	V	0.307	24.87
		16-QAM	-19.25	15.36	10.72	1.38	V	0.295	24.70
2685.0		QPSK	-24.80	10.15	10.74	1.35	V	0.090	19.54
		16-QAM	-25.33	9.62	10.74	1.35	V	0.080	19.01

Note: Worst case is 1 resource block.

Effective Radiated Power Data (Band 41 – 15 MHz)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBi)	C.L	Pol	EIRP	
								W	dBm
2503.5	15 MHz	QPSK	-19.37	15.00	10.63	1.35	V	0.268	24.28
		16-QAM	-19.50	14.87	10.63	1.35	V	0.260	24.15
2593.0		QPSK	-19.05	15.56	10.72	1.38	V	0.309	24.90
		16-QAM	-19.66	14.95	10.72	1.38	V	0.269	24.29
2682.5		QPSK	-24.34	10.34	10.74	1.37	V	0.094	19.71
		16-QAM	-24.93	9.75	10.74	1.37	V	0.082	19.12

Note: Worst case is 1 resource block.

Effective Radiated Power Data (Band 41 – 20 MHz)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitude Level (dBm)	Ant. Gain(dBi)	C.L	Pol	EIRP	
								W	dBm
2506.0	20 MHz	QPSK	-20.44	13.84	10.64	1.35	V	0.206	23.13
		16-QAM	-19.21	15.07	10.64	1.35	V	0.273	24.36
2593.0		QPSK	-19.32	15.29	10.72	1.38	V	0.290	24.63
		16-QAM	-19.55	15.06	10.72	1.38	V	0.275	24.40
2680.0		QPSK	-24.06	10.62	10.74	1.41	V	0.099	19.95
		16-QAM	-24.21	10.47	10.74	1.41	V	0.095	19.80

Note: Worst case is 1 resource block.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method

according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. Turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For LTE signals, a peak detector is used, with RBW ≥ OBW, VBW ≥ 3 x RBW. A Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is z plane in LTE mode. Also worst case of detecting Antenna is vertical polarization in LTE mode.

7.6 RADIATED SPURIOUS EMISSIONS

7.6.1 RADIATED SPURIOUS EMISSIONS (Band 41_10M)

▣ OPERATING FREQUENCY : 2593.00 MHz

▣ MEASURED OUTPUT POWER: 24.87 dBm = 0.307W

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 37.87 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitude Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
39700.0 (2501.0)	5,002.0	-52.29	12.41	-53.56	2.00	V	-43.15	**68.02**
	7,503.0	-58.35	11.05	-48.93	2.36	V	-40.24	**65.11**
	10,004.0	-57.15	11.68	-43.48	3.31	V	-35.11	**59.98**
40620.0 (2593.0)	5,186.0	-48.44	12.57	-49.02	2.05	H	-38.50	**63.37**
	7,779.0	-58.05	11.36	-48.50	2.47	H	-39.61	**64.48**
	10,372.0	-55.54	11.25	-41.40	3.15	V	-33.30	**58.17**
41540.0 (2685.0)	5,370.0	-55.51	13.01	-56.30	2.08	H	-45.37	**70.24**
	8,055.0	-57.50	11.08	-45.15	2.63	V	-36.70	**61.57**
	10,740.0	-55.09	11.05	-40.41	3.30	H	-32.66	**57.53**

NOTES:

1. Radiated Spurious Emission Measurements at 1 meter and 3 meter by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. Worst case is 1 resource block.

7.6.1.3 RADIATED SPURIOUS EMISSIONS (Band 41_15M)

▣ OPERATING FREQUENCY : 2593.00 MHz

▣ MEASURED OUTPUT POWER: 24.90 dBm = 0.309 W

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 $\log_{10}$ (W) = 37.90 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitude Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
39725.0 (2503.5)	5,007.0	-51.13	12.40	-51.91	2.00	H	-41.51	**66.41**
	7,510.5	-56.44	11.07	-46.83	2.35	H	-38.11	**63.01**
	10,014.0	-55.09	11.68	-41.46	3.34	V	-33.12	**58.02**
40620.0 (2593.0)	5,186.0	-48.27	12.57	-48.85	2.05	H	-38.33	**63.23**
	7,779.0	-58.44	11.36	-48.89	2.47	H	-40.00	**64.90**
	10,372.0	-56.94	11.25	-42.80	3.15	H	-34.70	**59.60**
41515.0 (2682.5)	5,365.0	-54.38	13.01	-55.16	2.09	H	-44.24	**69.14**
	8,047.5	-56.27	11.06	-44.10	2.64	V	-35.68	**60.58**
	10,730.0	-56.41	11.07	-41.62	3.21	V	-33.76	**58.66**

NOTES:

1. Radiated Spurious Emission Measurements at 1 meter and 3 meter by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. Worst case is 1 resource block.

7.6.1.4 RADIATED SPURIOUS EMISSIONS (Band 41_20M)

▣ OPERATING FREQUENCY : 2593.00 MHz

▣ MEASURED OUTPUT POWER: 24.63 dBm = 0.290 W

▣ MODULATION SIGNAL: 20 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 37.63 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitude Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
39750.0 (2506.0)	5,012.0	-50.53	12.39	-51.29	2.01	H	-40.91	**65.54**
	7,518.0	-57.70	11.09	-48.57	2.35	H	-39.83	**64.46**
	10,024.0	-55.95	11.69	-42.84	3.60	H	-34.75	**59.38**
40620.0 (2593.0)	5,186.0	-48.31	12.57	-48.89	2.05	H	-38.37	**63.00**
	7,779.0	-58.80	11.36	-49.25	2.47	V	-40.36	**64.99**
	10,372.0	-58.26	11.25	-44.12	3.15	H	-36.02	**60.65**
41490.0 (2680.0)	5,360.0	-53.78	13.01	-55.10	2.10	H	-44.19	**68.82**
	8,040.0	-58.42	11.06	-46.73	2.67	V	-38.34	**62.97**
	10,720.0	-56.20	11.08	-41.71	3.22	H	-33.85	**58.48**

NOTES:

1. Radiated Spurious Emission Measurements at 1 meter and 3 meter by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:
2. We are performed all frequency to 10th harmonics from 30 MHz. Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. Worst case is 1 resource block.

7.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

7.7.1 FREQUENCY STABILITY (LTE Band 41_10M)

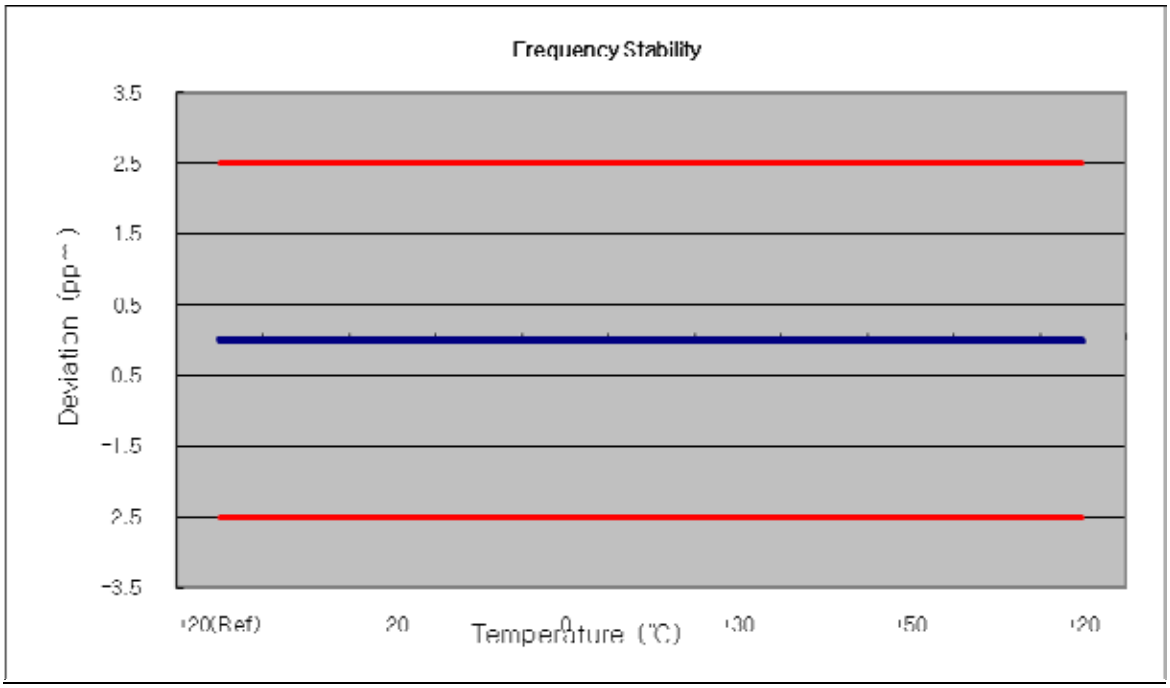
▣ OPERATING FREQUENCY: 2593.000,000 Hz

▣ CHANNEL: 40620 (10 MHz)

▣ REFERENCE VOLTAGE: 3.8 VDC

▣ DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.800	+20(Ref)	2593 000 010	13	0.000 001	0.005
100%		-30	2592 999 998	-12.4	0.000 000	-0.005
100%		-20	2592 999 991	-19.0	-0.000 001	-0.007
100%		-10	2593 000 027	16.9	0.000 001	0.007
100%		0	2592 999 994	-16.2	-0.000 001	-0.006
100%		+10	2593 000 023	12.7	0.000 000	0.005
100%		+30	2593 000 023	12.4	0.000 000	0.005
100%		+40	2592 999 997	-13.6	-0.000 001	-0.005
100%		+50	2592 999 996	-14.0	-0.000 001	-0.005
115%	4.370	+20	2592 999 993	-17.3	-0.000 001	-0.007
Batt. Endpoint	3.500	+20	2592 999 999	-11.4	0.000 000	-0.004



7.7.2 FREQUENCY STABILITY (LTE Band 41_15M)

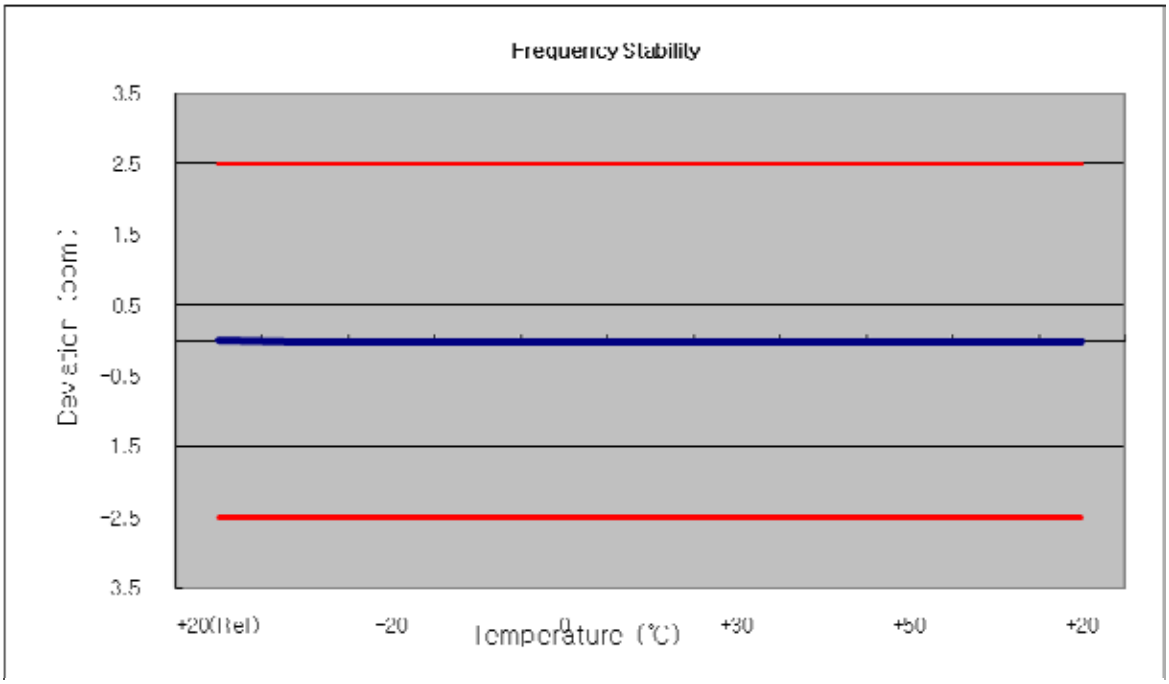
▣ OPERATING FREQUENCY: 2593.000,000 Hz

▣ CHANNEL: 40620 (15 MHz)

▣ REFERENCE VOLTAGE: 3.8 VDC

▣ DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.800	+20(Ref)	2593 000 018	1	0.000 000	0.001
100%		-30	2592 999 998	-20.3	-0.000 001	-0.008
100%		-20	2593 000 001	-17.3	-0.000 001	-0.007
100%		-10	2593 000 012	-6.7	0.000 000	-0.003
100%		0	2593 000 004	-14.3	-0.000 001	-0.006
100%		+10	2592 999 998	-20.3	-0.000 001	-0.008
100%		+30	2593 000 007	-11.6	0.000 000	-0.004
100%		+40	2593 000 003	-15.6	-0.000 001	-0.006
100%		+50	2592 999 997	-21.1	-0.000 001	-0.008
115%	4.370	+20	2593 000 003	-15.4	-0.000 001	-0.006
Batt. Endpoint	3.500	+20	2593 000 006	-12.0	0.000 000	-0.005



7.7.3 FREQUENCY STABILITY (LTE Band 41_20M)

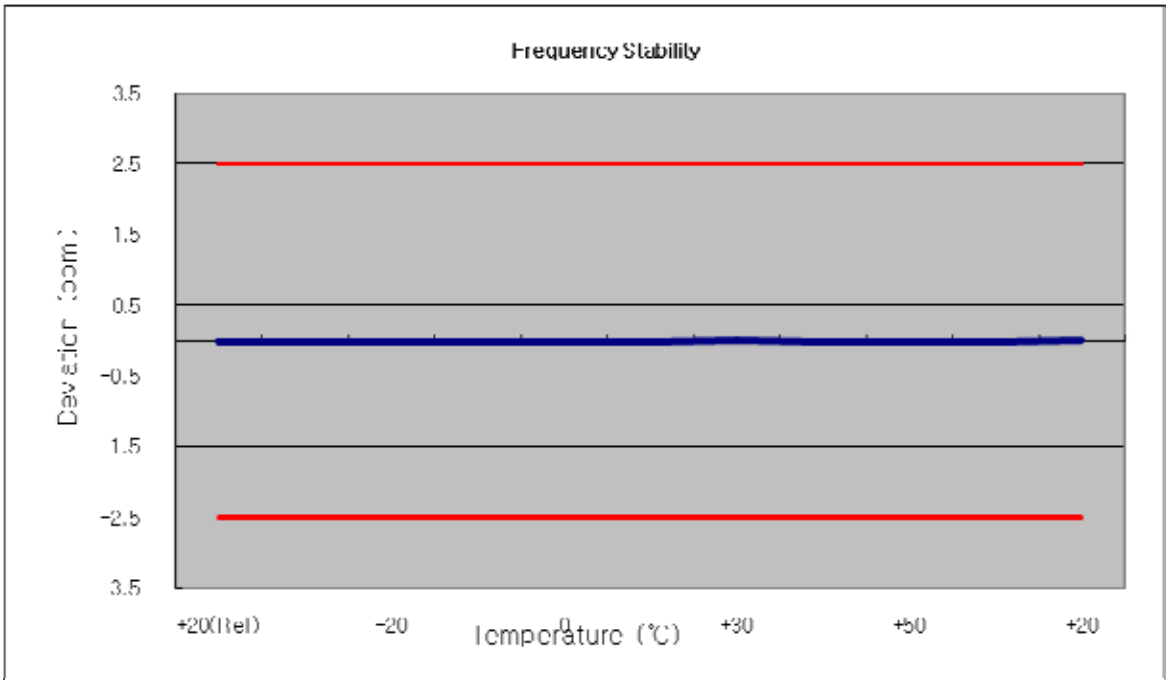
▣ OPERATING FREQUENCY: 2593.000,000 Hz

▣ CHANNEL: 40620 (20 MHz)

▣ REFERENCE VOLTAGE: 3.8 VDC

▣ DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.800	+20(Ref)	2593 000 015	-7	0.000 000	-0.003
100%		-30	2593 000 000	-14.4	-0.000 001	-0.006
100%		-20	2592 999 999	-15.7	-0.000 001	-0.006
100%		-10	2593 000 002	-12.7	0.000 000	-0.005
100%		0	2593 000 003	-11.3	0.000 000	-0.004
100%		+10	2593 000 005	-9.6	0.000 000	-0.004
100%		+30	2593 000 023	8.4	0.000 000	0.003
100%		+40	2593 000 010	-4.9	0.000 000	-0.002
100%		+50	2592 999 997	-18.0	-0.000 001	-0.007
115%	4.370	+20	2592 999 989	-25.7	-0.000 001	-0.010
Batt. Endpoint	3.500	+20	2593 000 024	9.4	0.000 000	0.004



8. TEST PLOTS

Occupied Bandwidth Plot (10MHz QPSK – RB Size 50)

Occupied Bandwidth Plot (10MHz 16-QAM – RB Size 50)

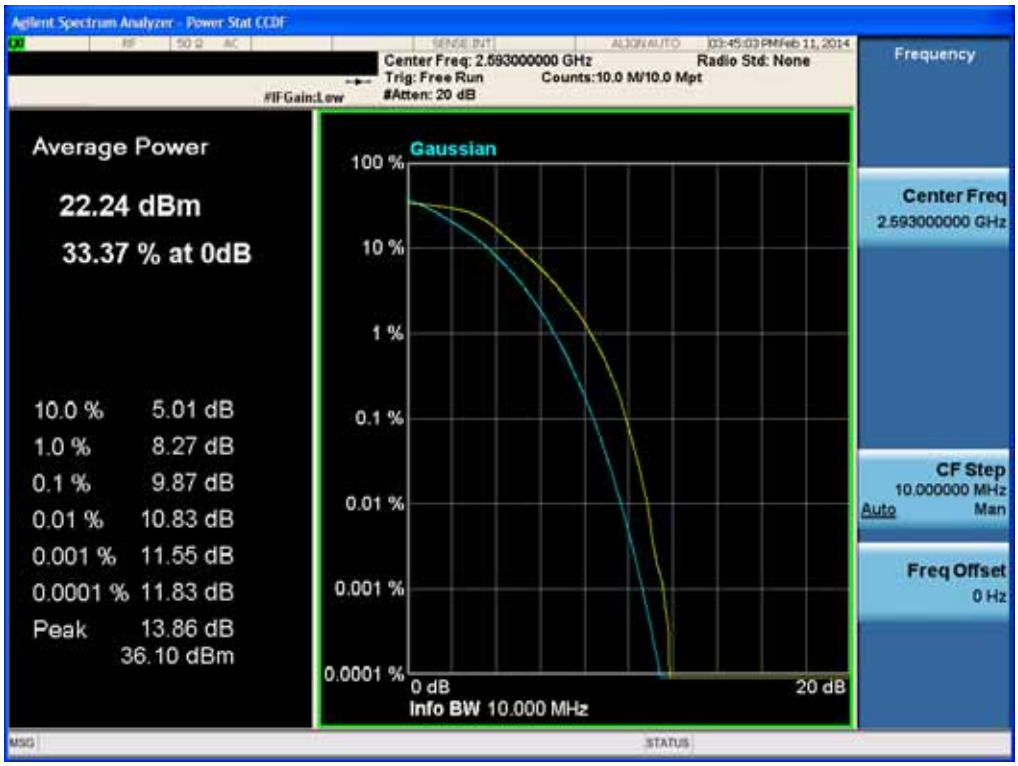
Occupied Bandwidth Plot (15MHz QPSK – RB Size 75)

Occupied Bandwidth Plot (15MHz 16-QAM – RB Size 75)

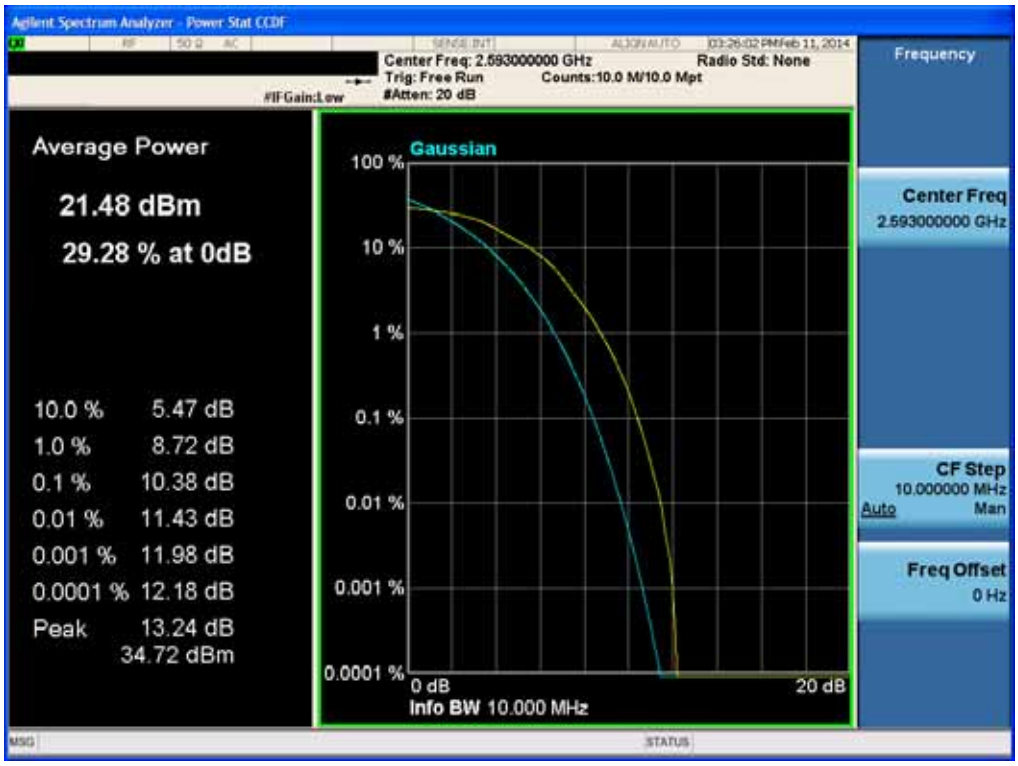
Occupied Bandwidth Plot (20MHz QPSK – RB Size 100)

Occupied Bandwidth Plot (20MHz 16-QAM – RB Size 100)

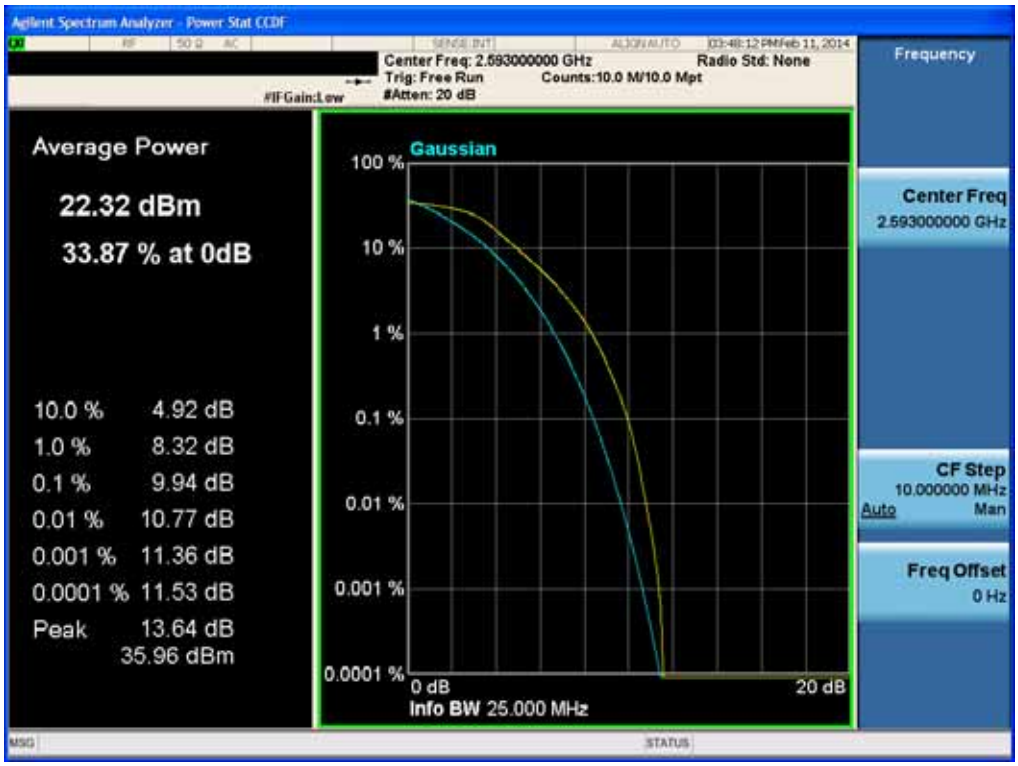
PAR Plot (10MHz QPSK – RB Size 50)



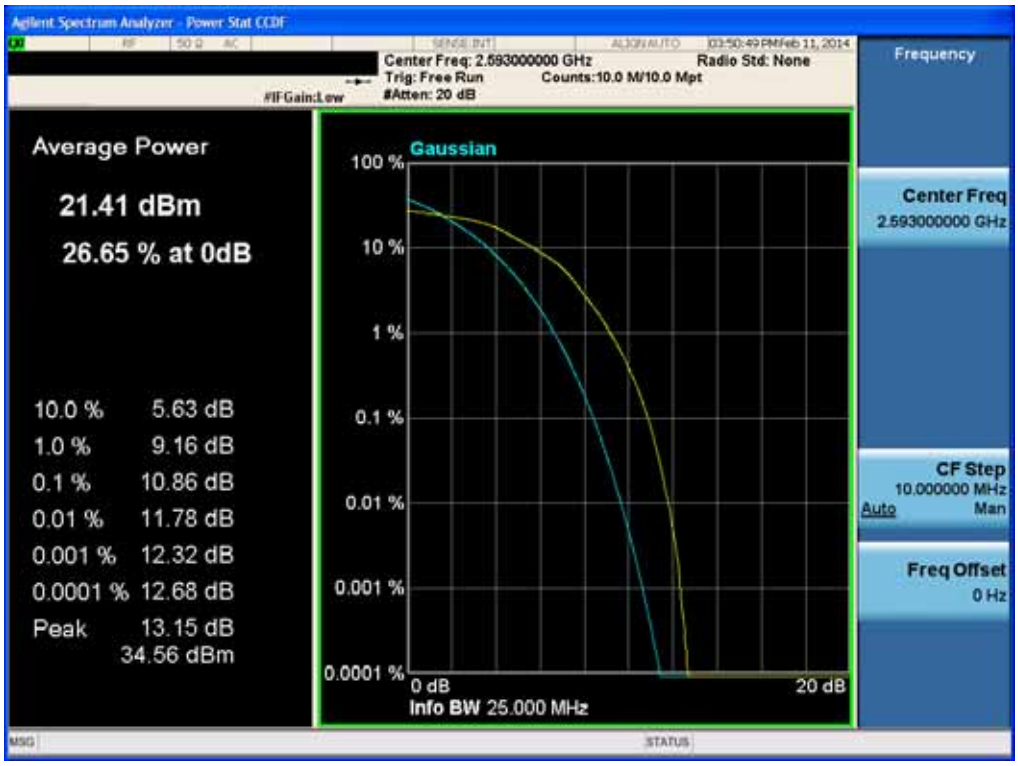
PAR Plot (10MHz 16-QAM – RB Size 50)



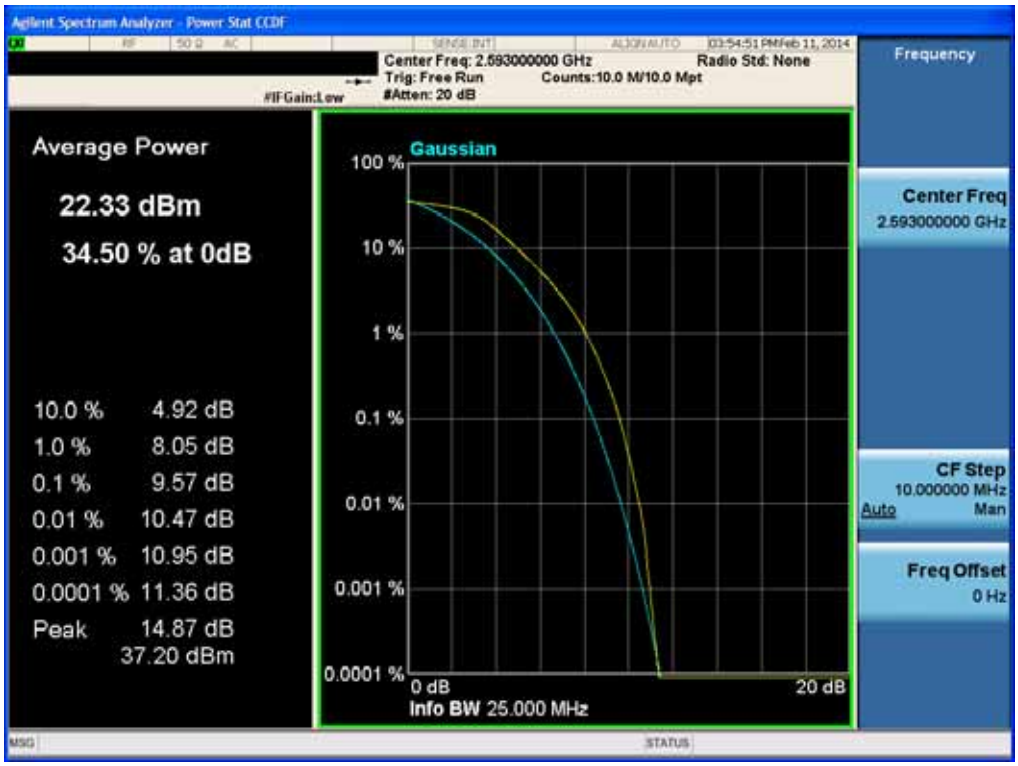
PAR Plot (15MHz QPSK – RB Size 75)



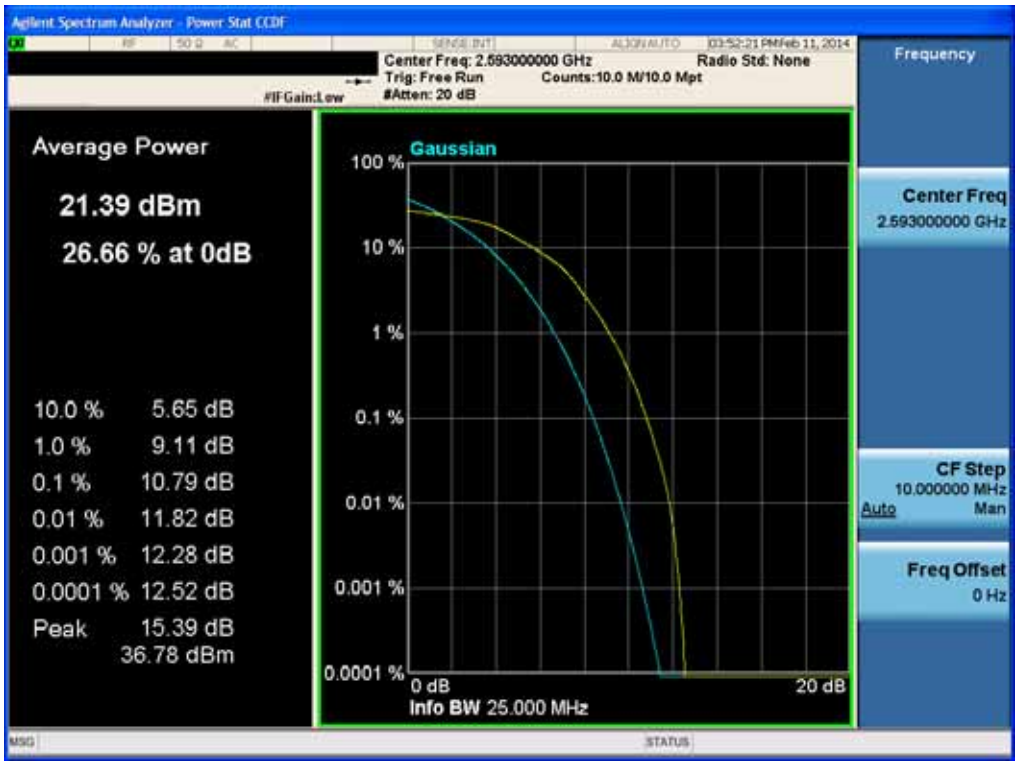
PAR Plot (15MHz 16-QAM – RB Size 75)



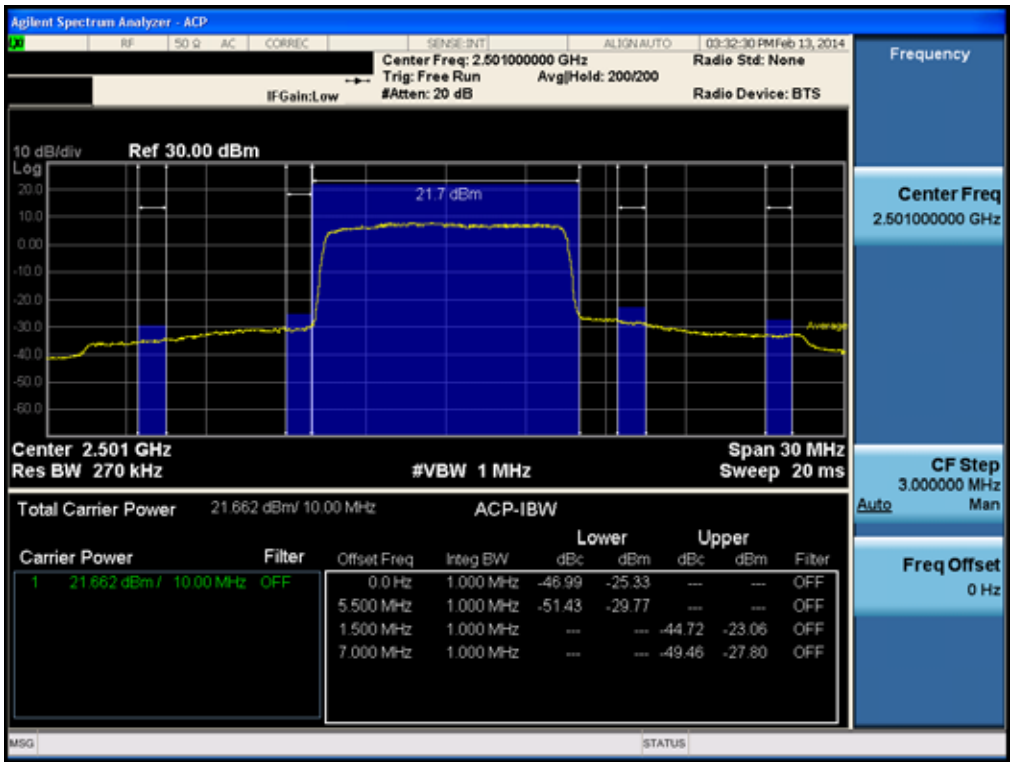
PAR Plot (20MHz QPSK – RB Size 100)



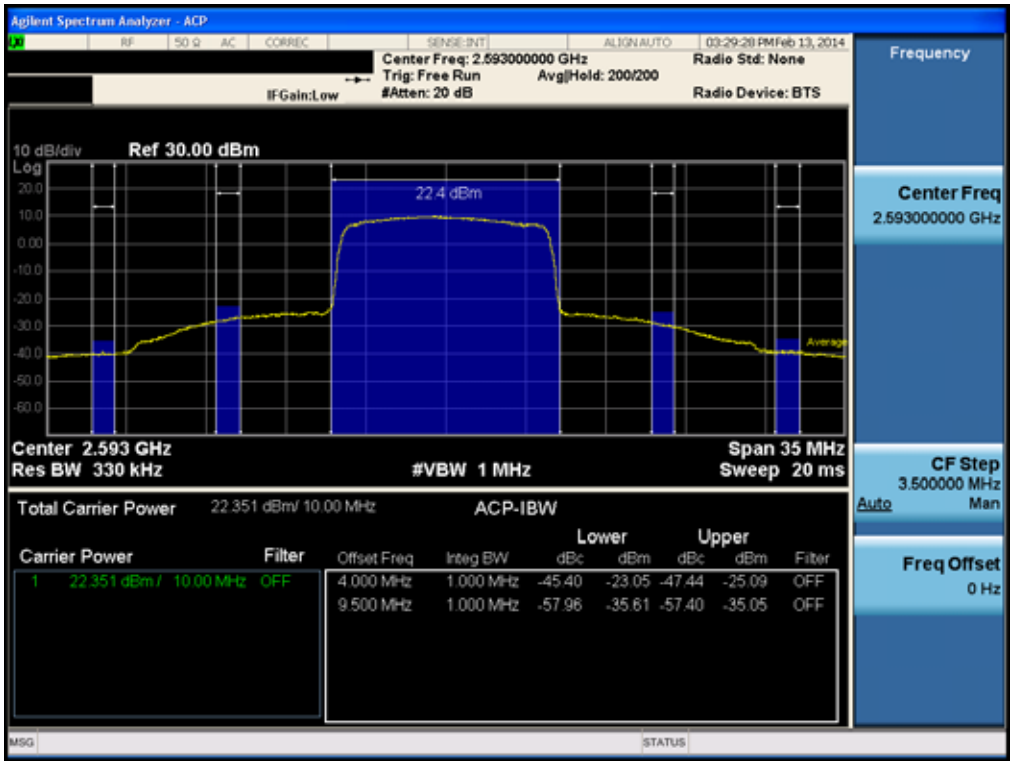
PAR Plot (20MHz 16-QAM – RB Size 100)



Channel Edge Plot (10MHz QPSK - RB Size 50 – Low Ch.)

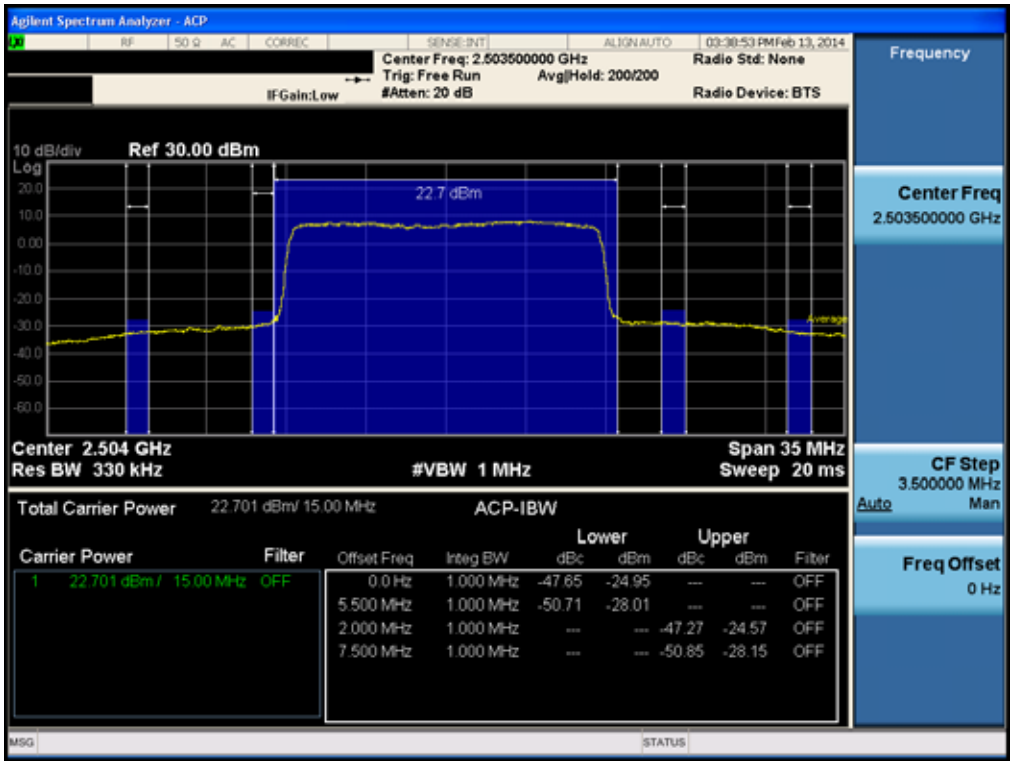


Channel Edge Plot (10MHz QPSK - RB Size 50 – Mid Ch.)

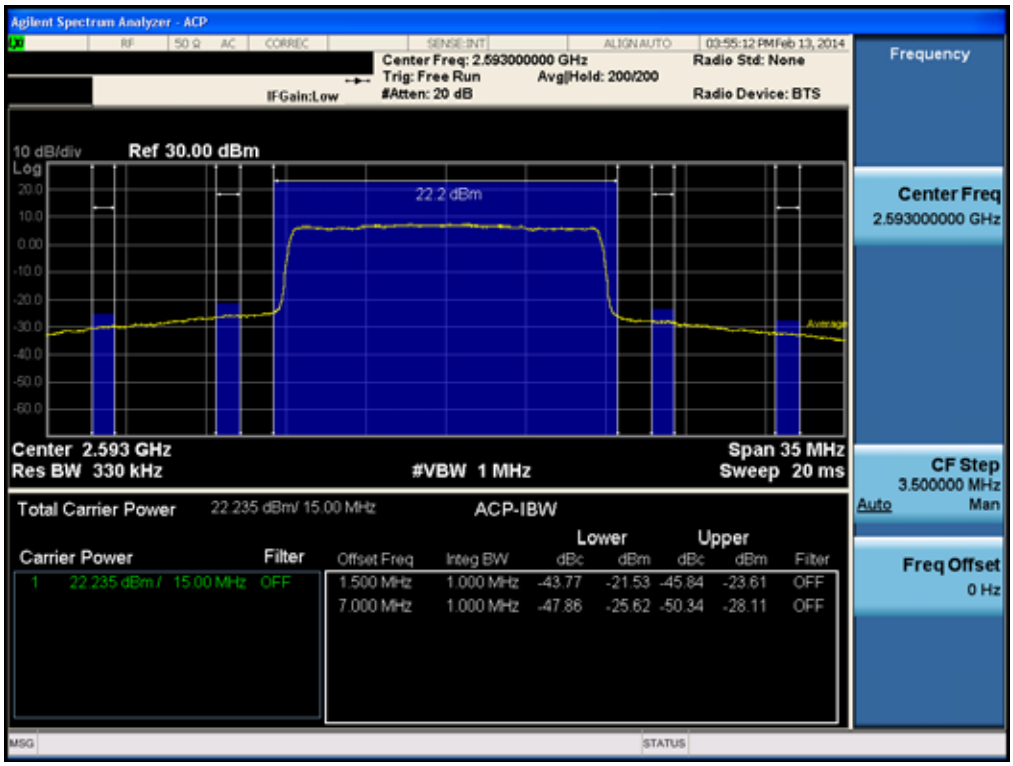


Channel Edge Plot (10MHz QPSK - RB Size 50 – High Ch.)

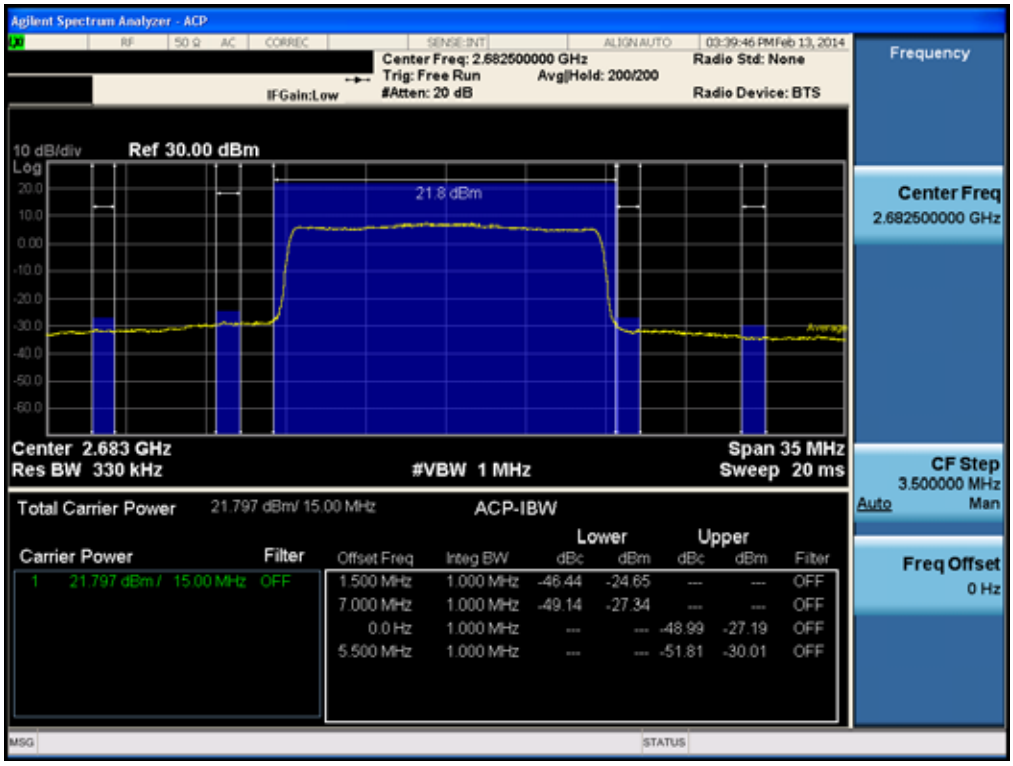
Channel Edge Plot (15MHz QPSK - RB Size 75 – Low Ch.)



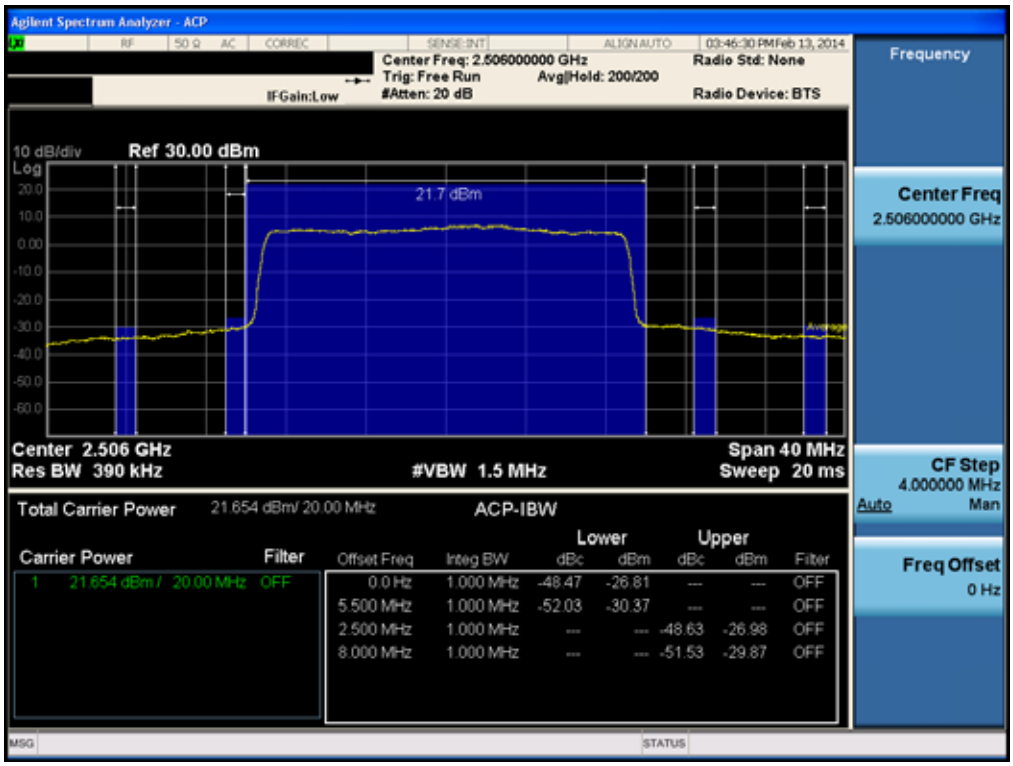
Channel Edge Plot (15MHz QPSK - RB Size 75 – Mid Ch.)



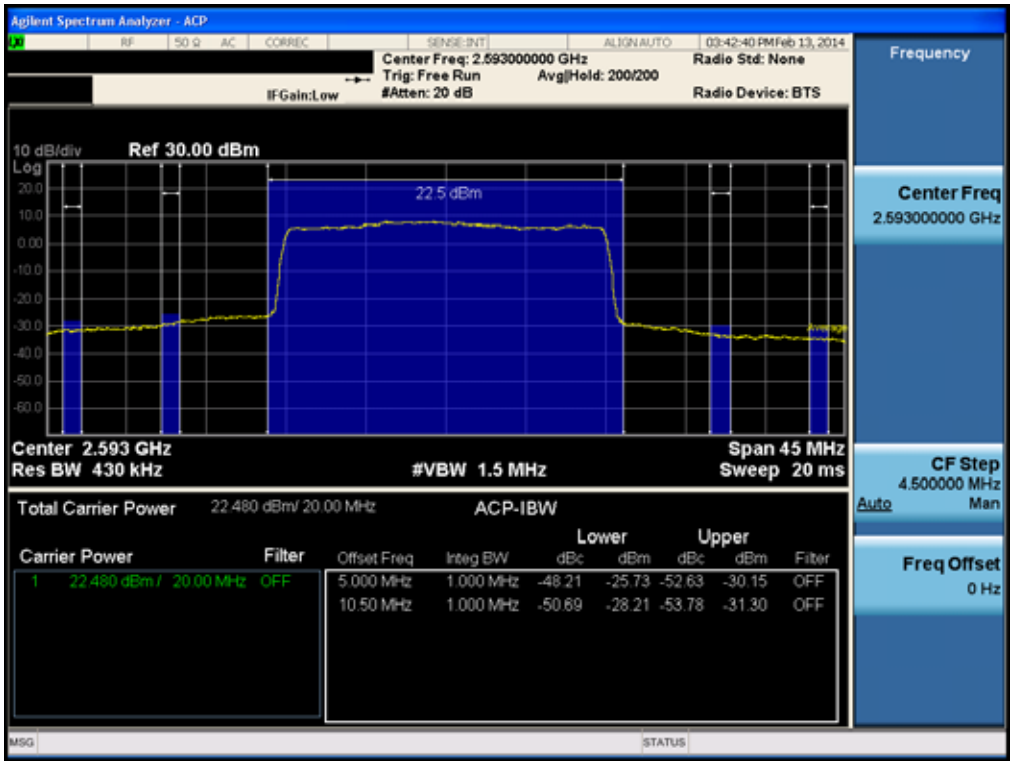
Channel Edge Plot (15MHz QPSK - RB Size 75 – High Ch.)



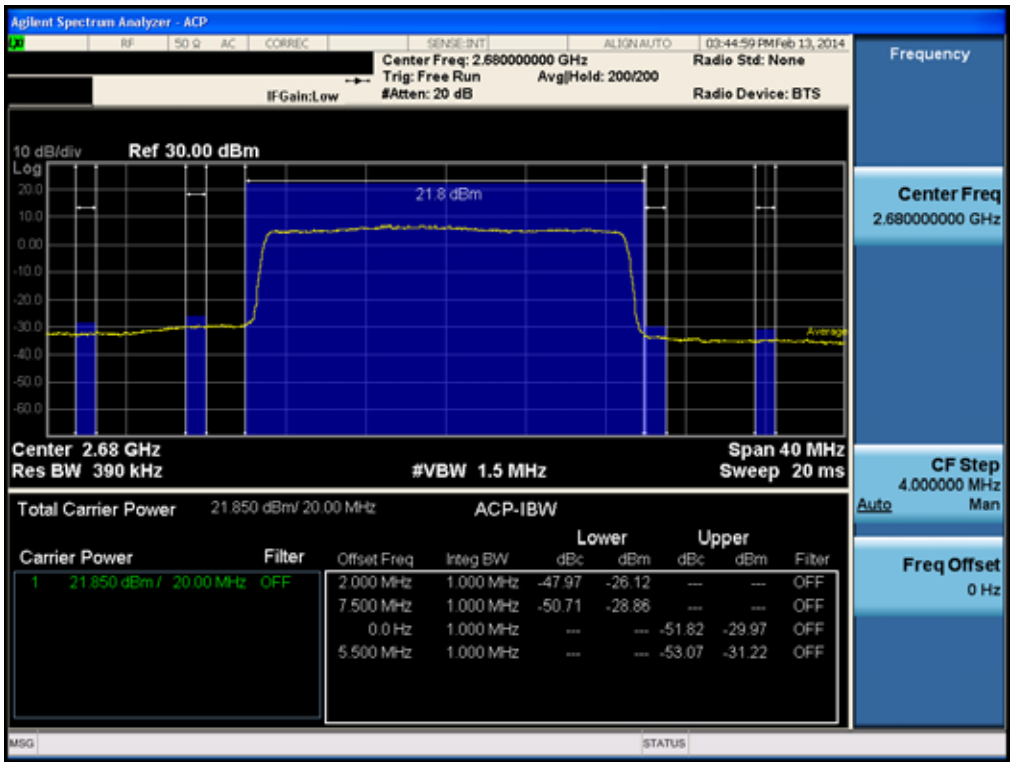
Channel Edge Plot (20MHz QPSK - RB Size 100 – Low Ch.)



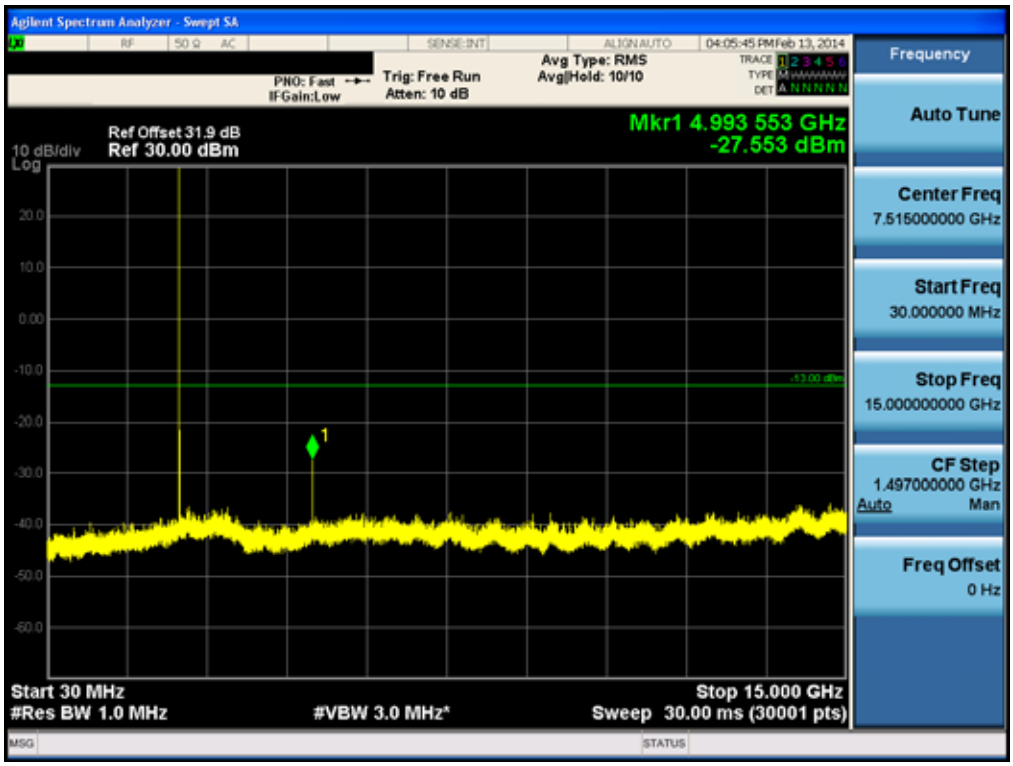
Channel Edge Plot (20MHz QPSK - RB Size 100 – Mid Ch.)



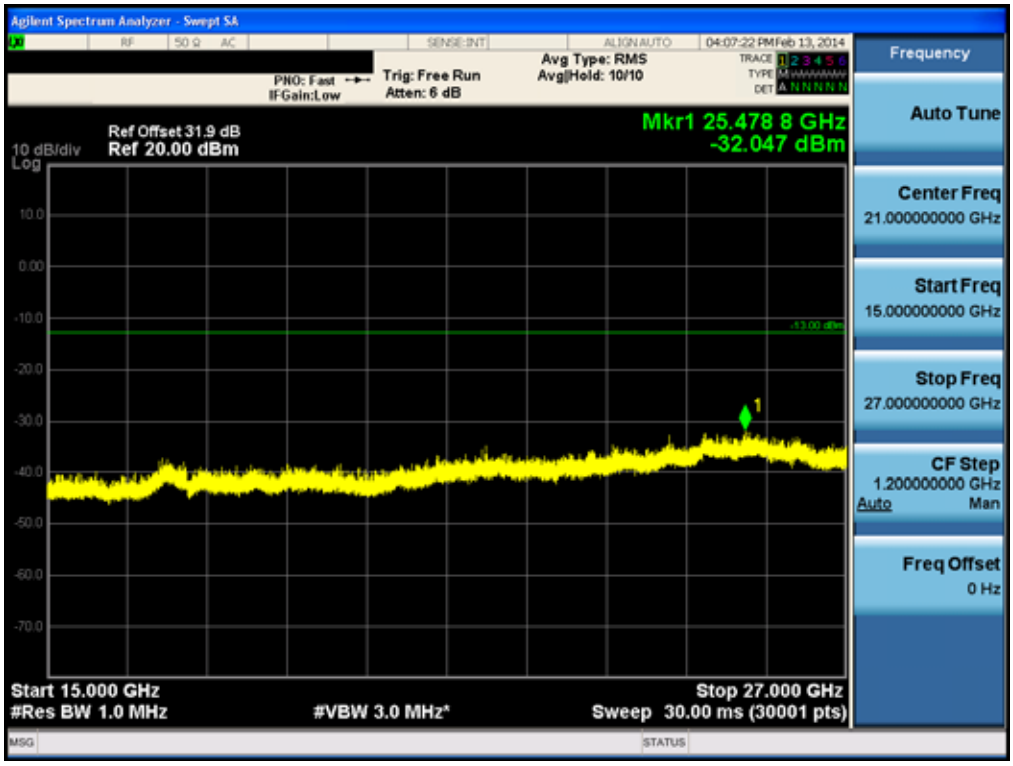
Channel Edge Plot (20MHz QPSK - RB Size 100 – High Ch.)



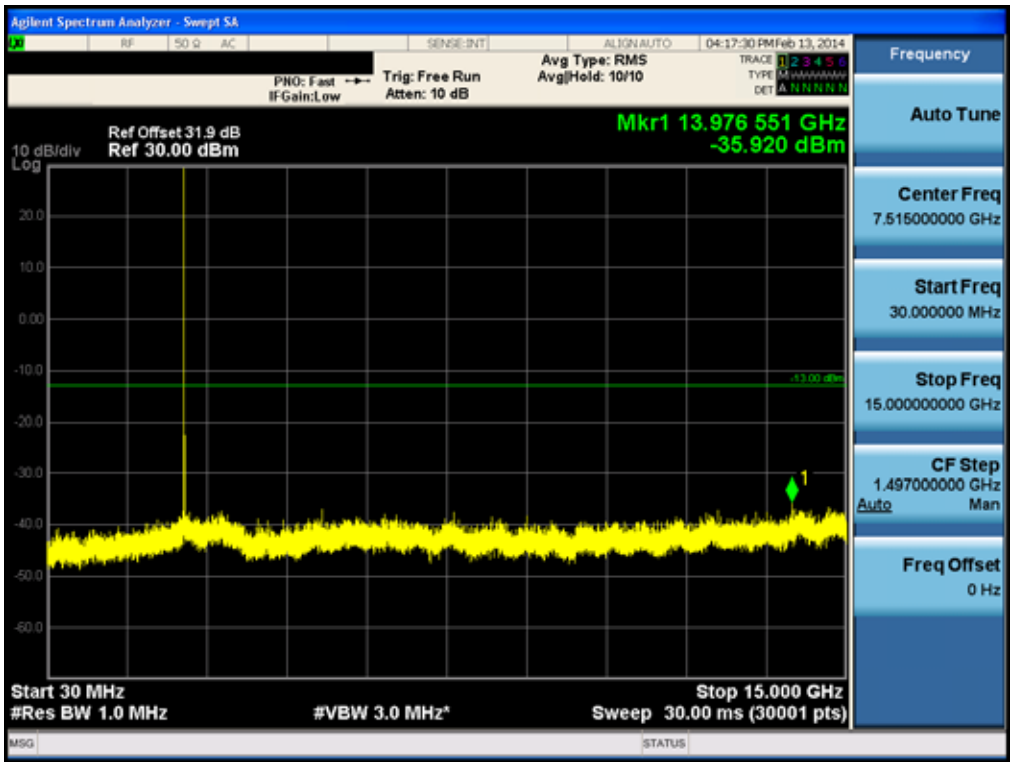
Conducted Spurious Plot_1 (Low ch_10 MHz_QPSK_RB 1_0).



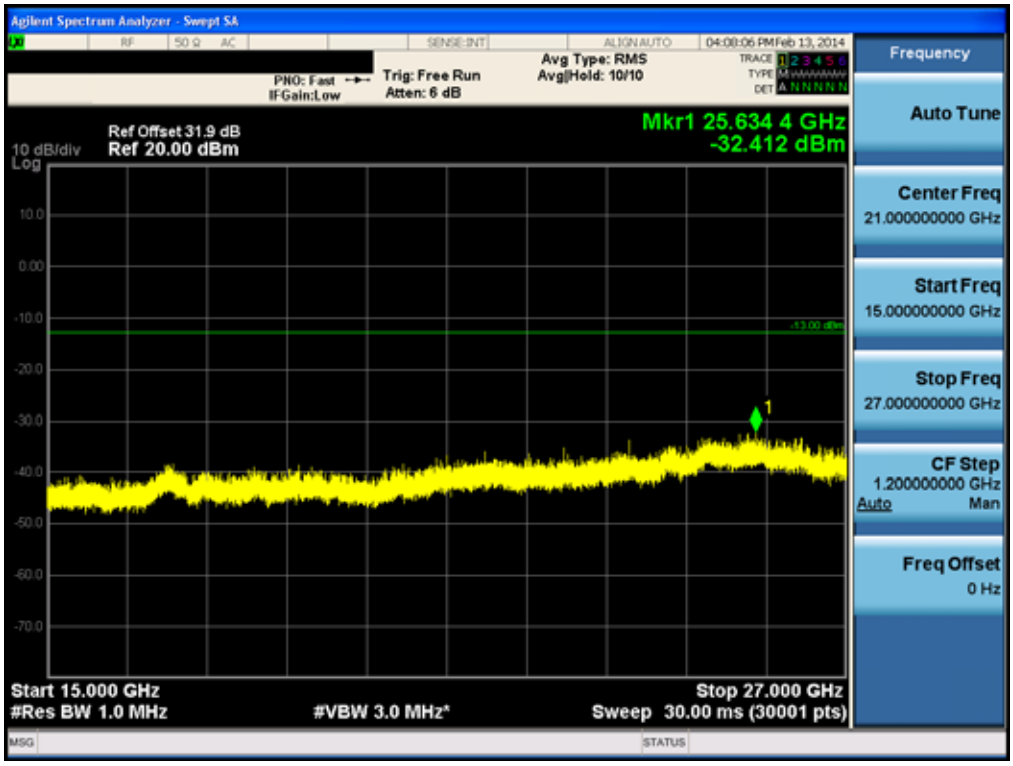
Conducted Spurious Plot_2 (Low ch_10 MHz_QPSK_RB 1_0).



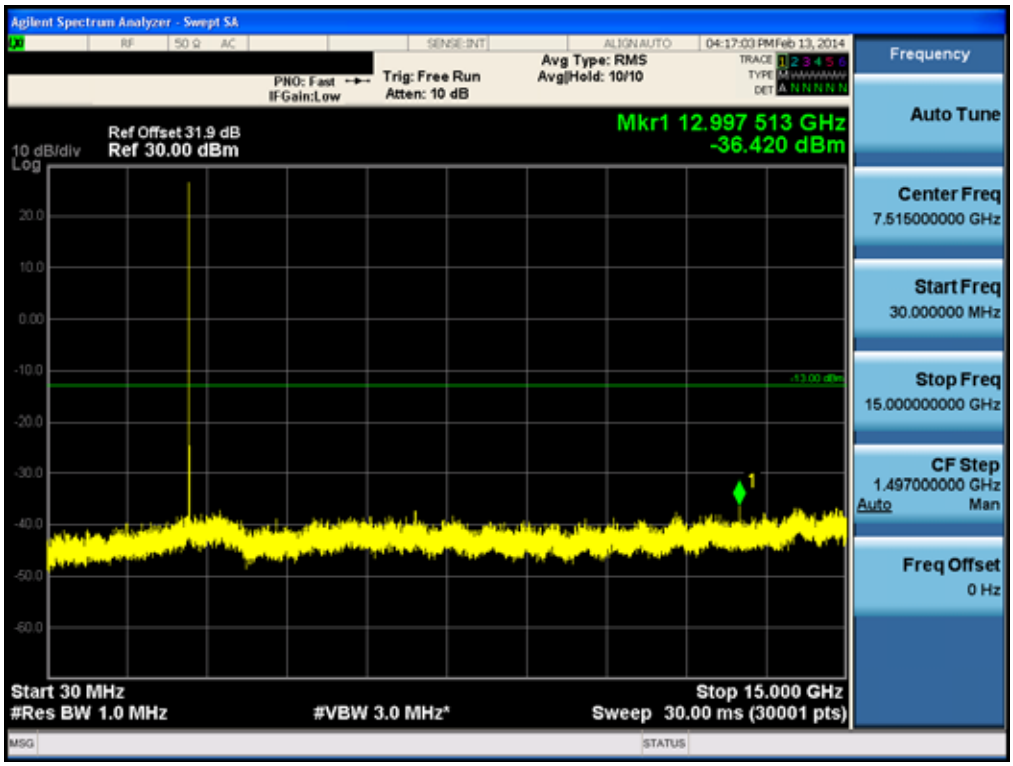
Conducted Spurious Plot_1 (Mid ch_10 MHz_QPSK_RB 1_0)



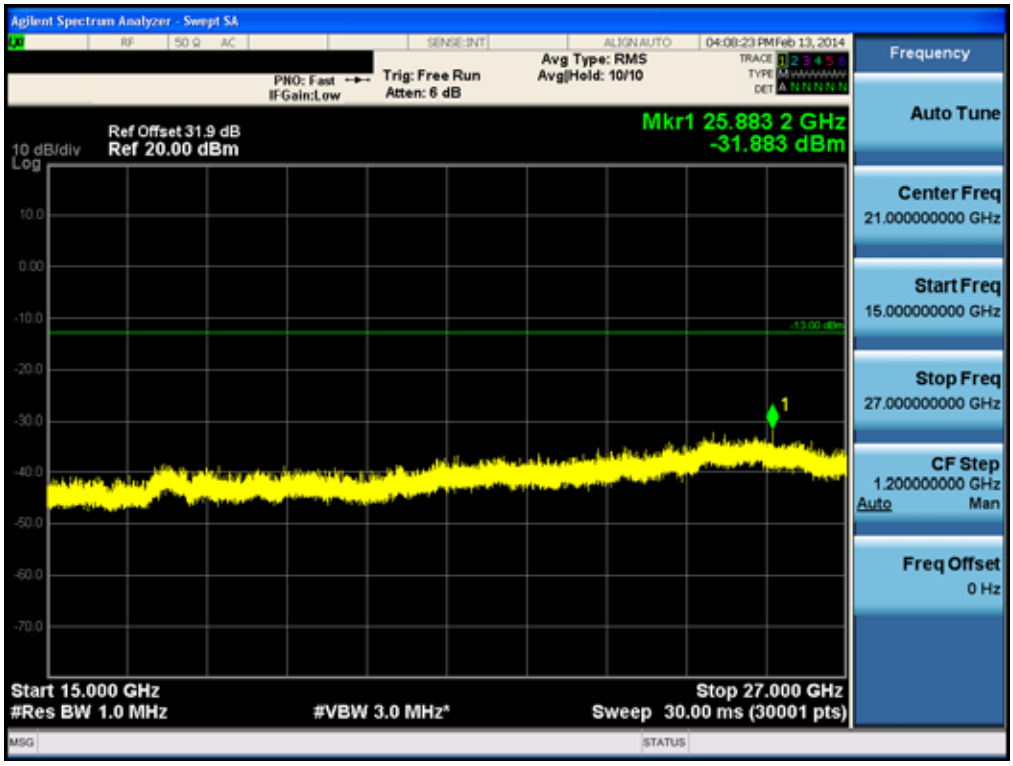
Conducted Spurious Plot_2 (Mid ch_10 MHz_QPSK_RB 1_0)



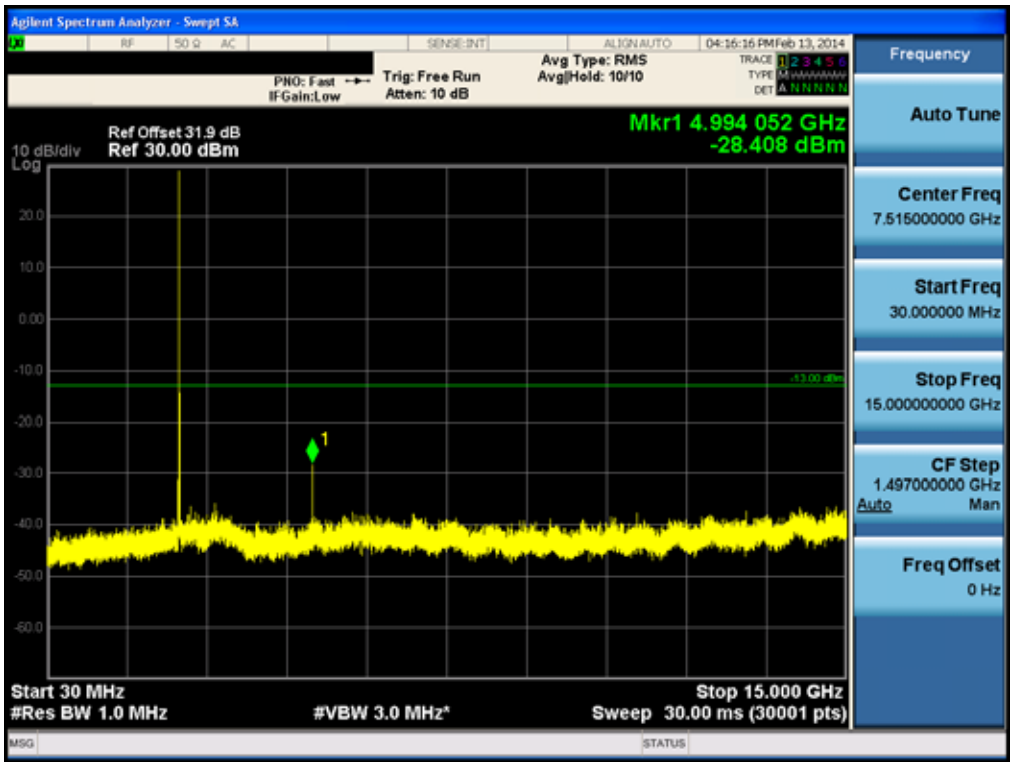
Conducted Spurious Plot_1 (High ch_10 MHz_QPSK_RB 1_0)



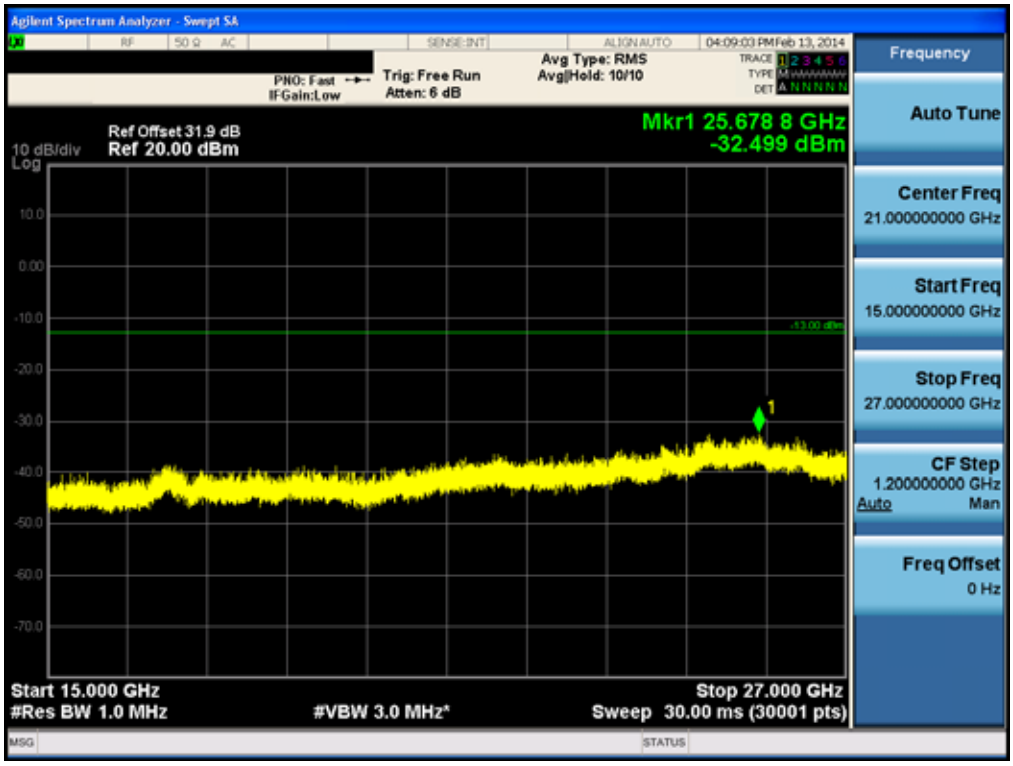
Conducted Spurious Plot_2 (High ch_10 MHz_QPSK_RB 1_0)



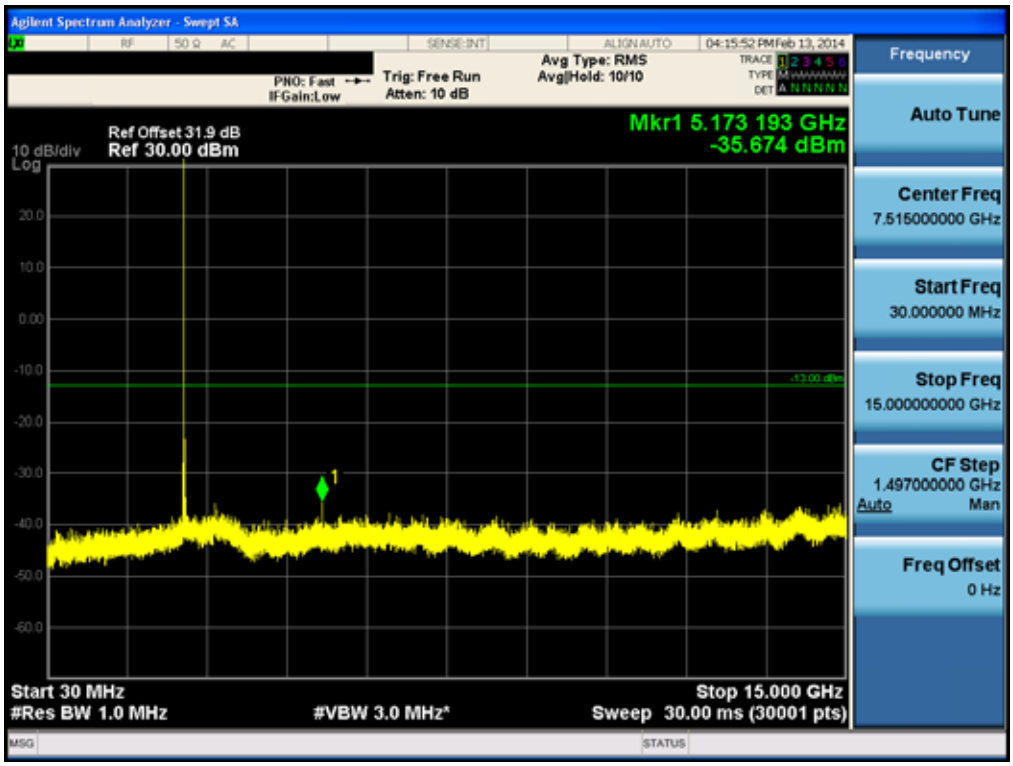
Conducted Spurious Plot_1 (Low ch_15 MHz_QPSK_RB 1_0)



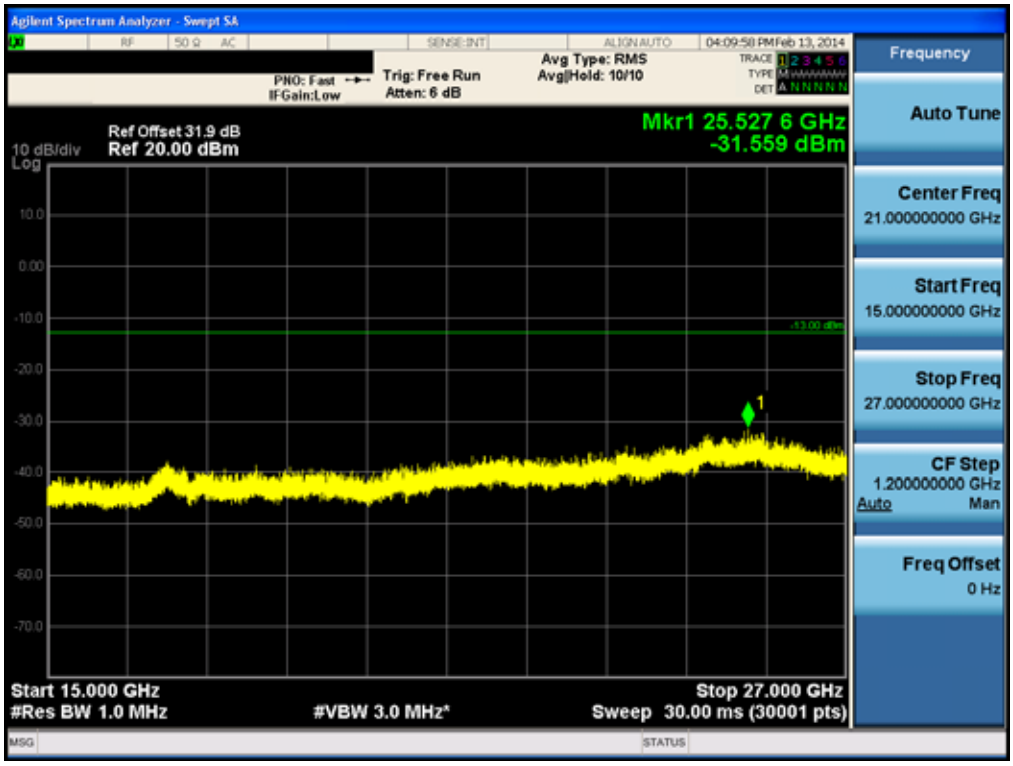
Conducted Spurious Plot_2 (Low ch_15 MHz_QPSK_RB 1_0)



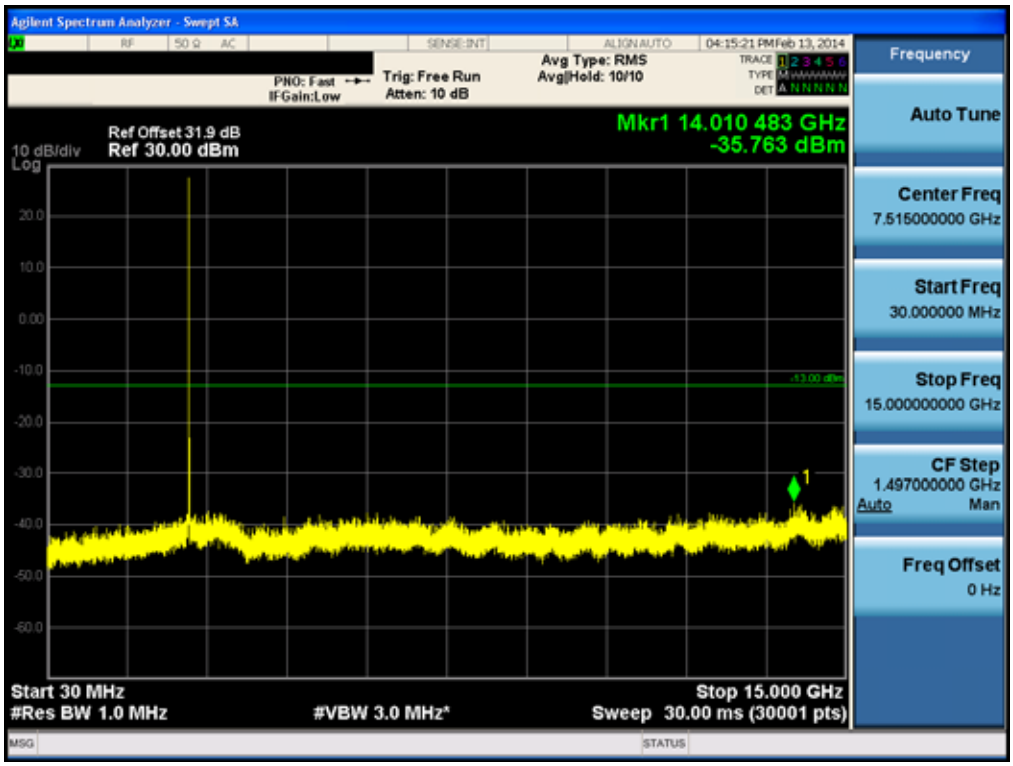
Conducted Spurious Plot_1 (Mid ch_15 MHz_QPSK_RB 1_0)



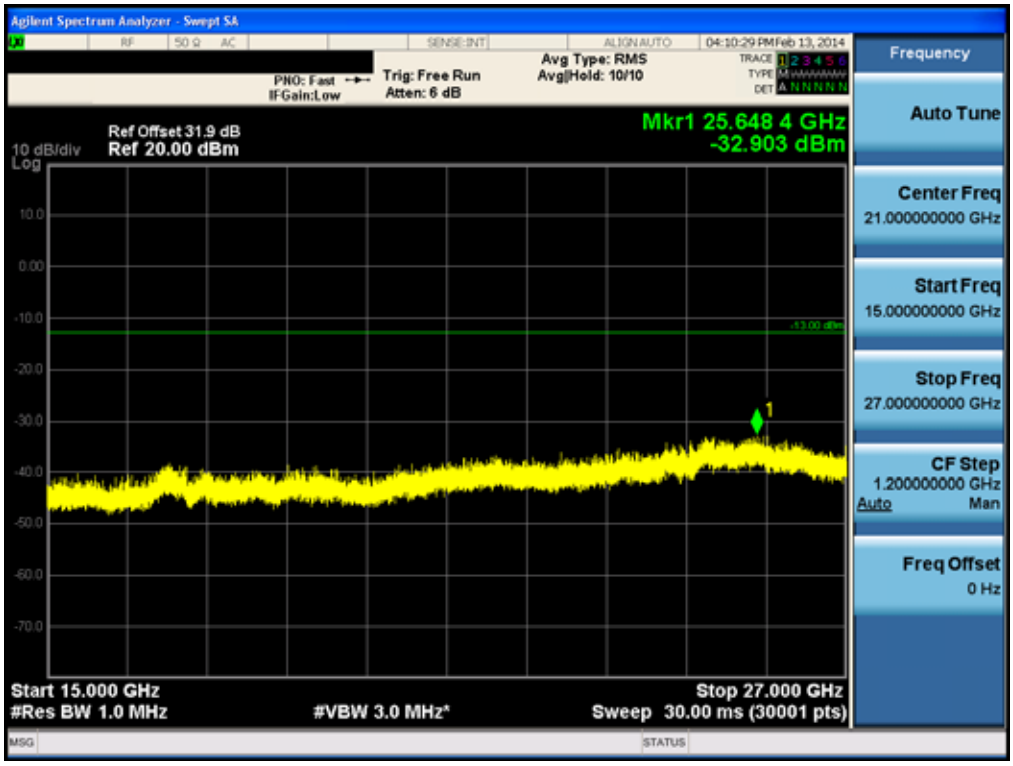
Conducted Spurious Plot_2 (Mid ch_15 MHz_QPSK_RB 1_0)



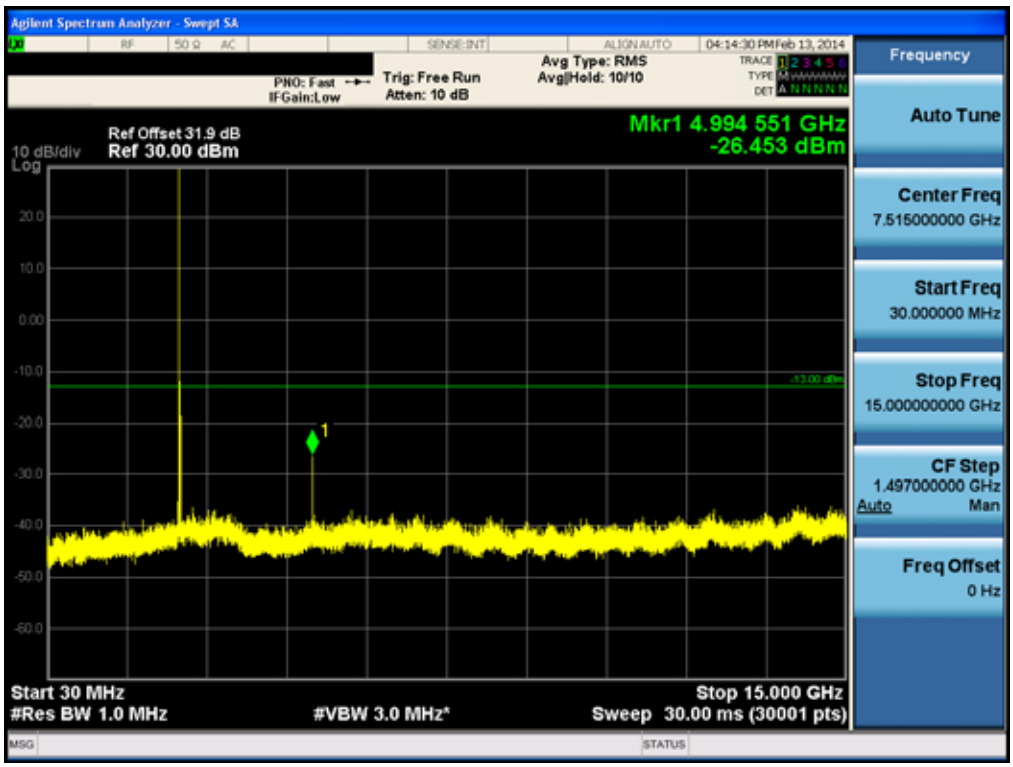
Conducted Spurious Plot_1 (High ch_15 MHz_QPSK_RB 1_0)



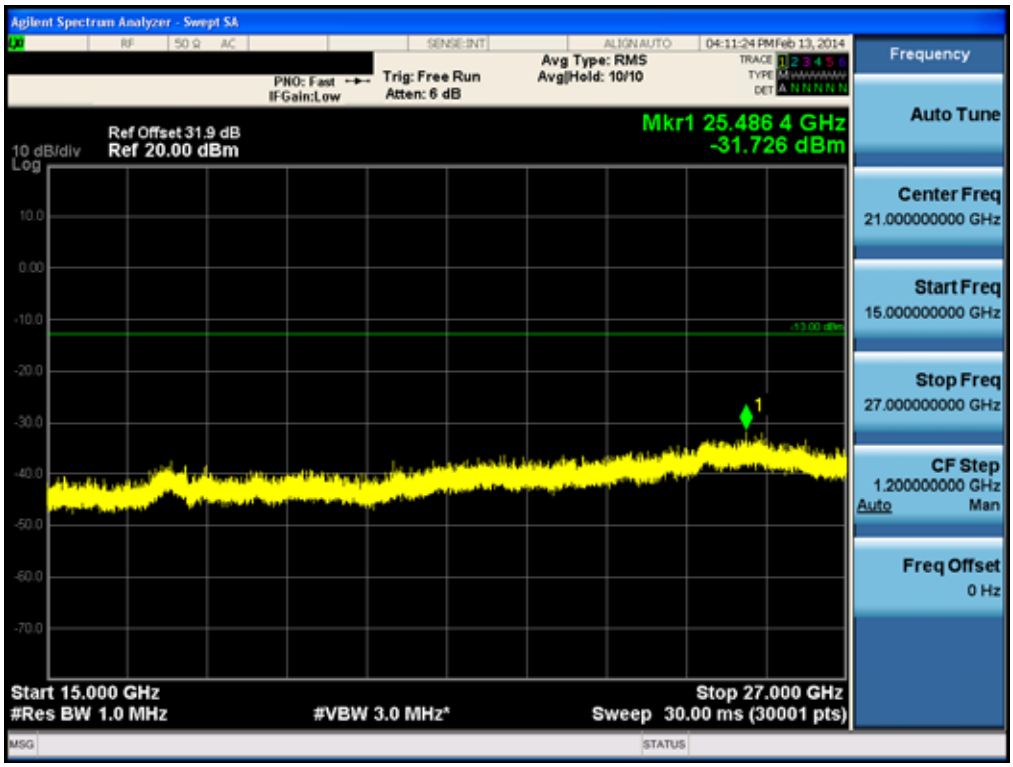
Conducted Spurious Plot_2 (High ch_15 MHz_QPSK_RB 1_0)



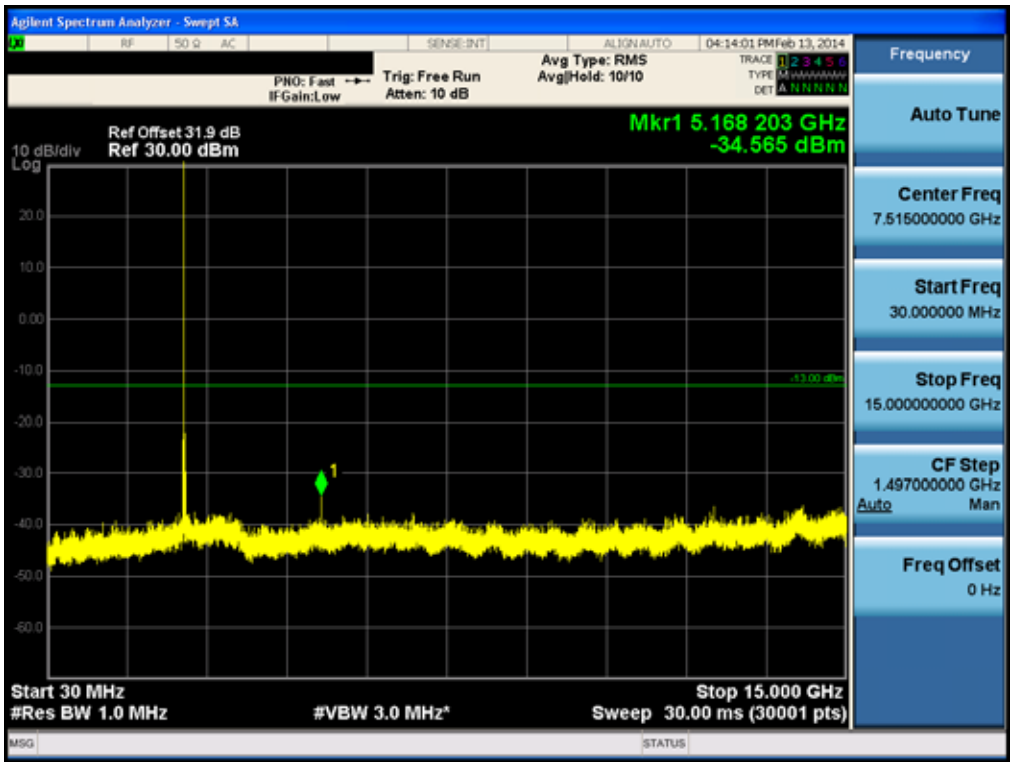
Conducted Spurious Plot_1 (Low ch_20 MHz_QPSK_RB 1_0)



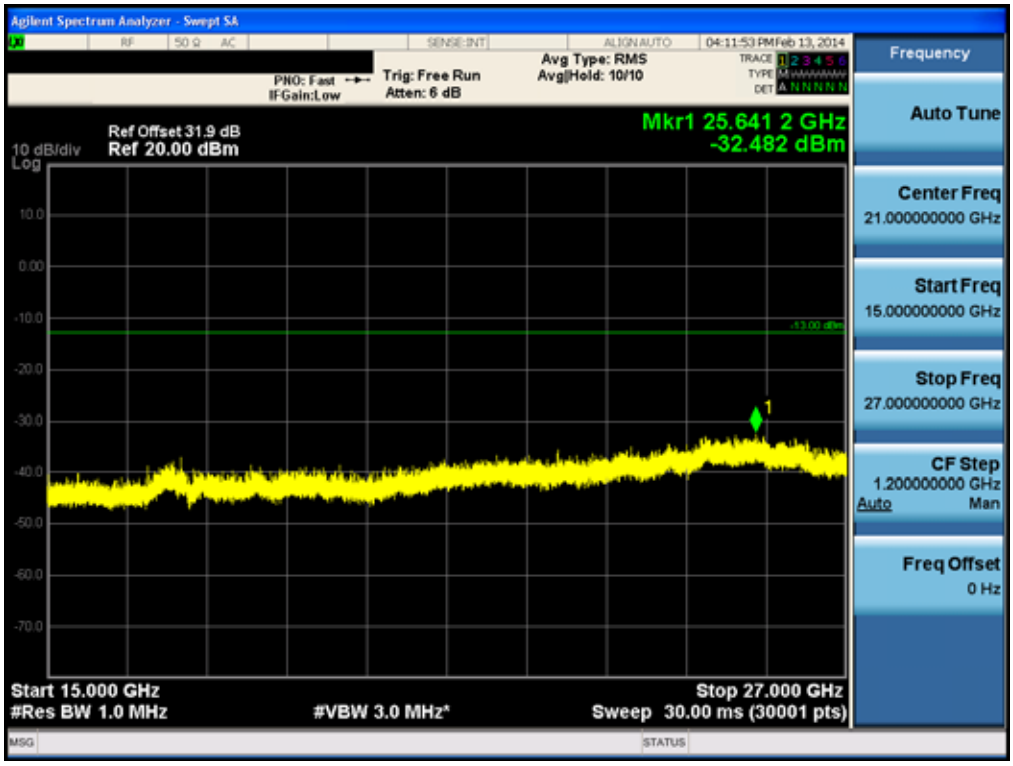
Conducted Spurious Plot_2 (Low ch_20 MHz_QPSK_RB 1_0)



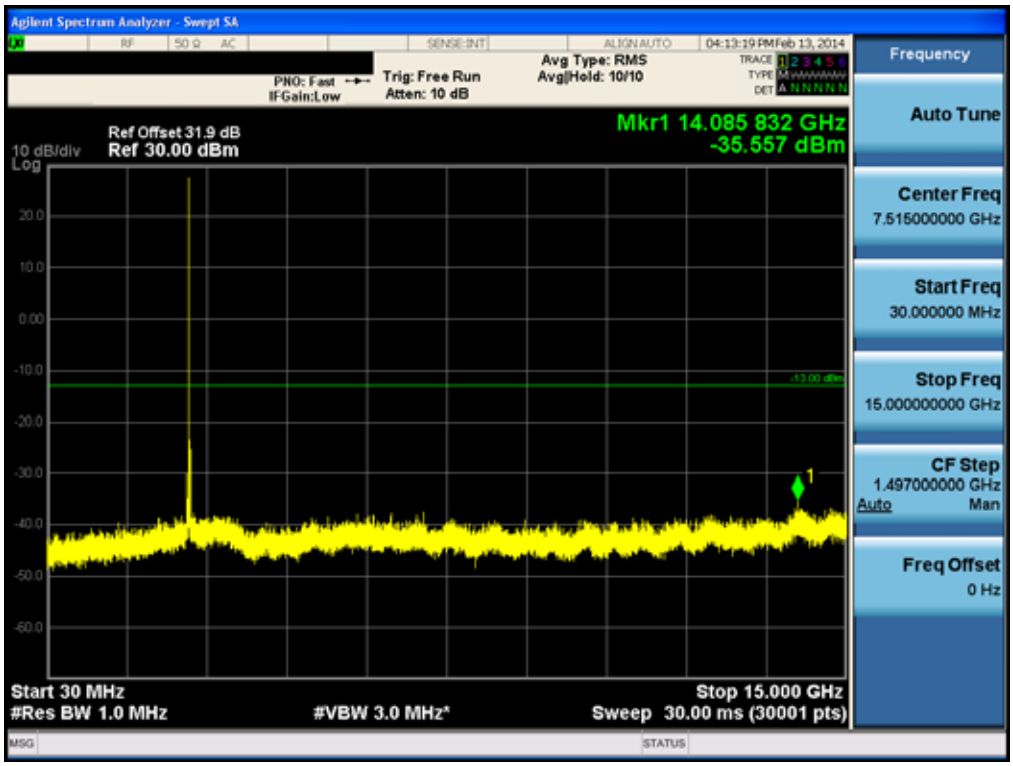
Conducted Spurious Plot_1 (Mid ch_20 MHz_QPSK_RB 1_0)



Conducted Spurious Plot_2 (Mid ch_20 MHz_QPSK_RB 1_0)



Conducted Spurious Plot_1 (High ch_20 MHz_QPSK_RB 1_0)



Conducted Spurious Plot_2 (High ch_20 MHz_QPSK_RB 1_0)