

FCC / ISED LTE REPORT

Certification

Applicant Name:
LG Electronics Inc.

Date of Issue:
November 29, 2016
Location:

Address:
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Gyeonggi-do, South Korea

HCT CO., LTD.,
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Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-R-1611-F012-2
HCT FRN: 0005866421

FCC ID: BEJLGAJ10N
IC: 2703H-LGAJ10N
APPLICANT: LG Electronics Inc.

FCC / IC Model(s): TM01LA-N
EUT Type: GSM/WCDMA /LTE Telematics NAD module
FCC Classification: PCS Licensed Transmitter (PCB)
FCC Rule Part(s): §27, §2
IC Rule: RSS-Gen (Issue 4), RSS-199 (Issue 2)

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	Conducted output power		EIRP	
				Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)
LTE – Band7 (5)	2502.5 – 2567.5	4M51G7D	QPSK	0.161	22.06	0.326	25.13
		4M50W7D	16QAM	0.130	21.15	0.334	25.23
LTE – Band7 (10)	2505.0 – 2565.0	8M98G7D	QPSK	0.167	22.22	0.351	25.45
		8M99W7D	16QAM	0.118	20.72	0.346	25.39
LTE – Band7 (15)	2507.5 – 2562.5	13M5G7D	QPSK	0.167	22.23	0.326	25.14
		13M4W7D	16QAM	0.130	21.14	0.332	25.21
LTE – Band7 (20)	2510.0 – 2560.0	18M0G7D	QPSK	0.166	22.20	0.324	25.10
		17M9W7D	16QAM	0.136	21.34	0.323	25.09

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section §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
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Test engineer of RF Team



Approved by
: Sang Jun Lee
Manager of RF Team

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1611-F012	November 11, 2016	- First Approval Report
HCT-R-1611-F012-1	November 15, 2016	- Included the EIRP power data ON page 1
HCT-R-1611-F012-2	November 29, 2016	- Revised the Test Equipment Page - Radiated test update (Module Stand alone)

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name: LG Electronics Inc.

Address: 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, 451-713 Gyeonggi-do, South Korea

FCC ID: BEJLGAJ10N

IC: 2703H-LGAJ10N

Application Type: Certification

FCC Classification: PCS Licensed Transmitter (PCB)

FCC Rule Part(s): §2 , §27

EUT Type: GSM/WCDMA /LTE Telematics NAD module

FCC / IC Model(s): TM01LA-N

Tx Frequency: 2502.5 MHz – 2567.5 MHz (LTE – Band 7): 5 MHz
2505.0 MHz – 2565.0 MHz (LTE – Band 7): 10 MHz
2507.5 MHz – 2562.5 MHz (LTE – Band 7): 15 MHz
2510.0 MHz – 2560.0 MHz (LTE – Band 7): 20 MHz

Conducted Output Power:

Band 7 (5 MHz) :	0.161 W (QPSK) (22.06 dBm) 0.130 W (16-QAM) (21.15 dBm)
Band 7 (10 MHz) :	0.167 W (QPSK) (22.22 dBm) 0.118 W (16-QAM) (20.72 dBm)
Band 7 (15 MHz) :	0.167 W (QPSK) (22.23 dBm) 0.130 W (16-QAM) (21.14 dBm)
Band 7 (20 MHz) :	0.166 W (QPSK) (22.20 dBm) 0.136 W (16-QAM) (21.34 dBm)

Max. RF Output Power:

Band 7 (5 MHz) :	0.326 W (QPSK) (25.13 dBm) 0.334 W (16-QAM) (25.23 dBm)
Band 7 (10 MHz) :	0.351 W (QPSK) (25.45 dBm) 0.346 W (16-QAM) (25.39 dBm)
Band 7 (15 MHz) :	0.326 W (QPSK) (25.14 dBm) 0.332 W (16-QAM) (25.21 dBm)
Band 7 (20 MHz) :	0.324 W (QPSK) (25.10 dBm) 0.323 W (16-QAM) (25.09 dBm)

Emission Designator(s):

Band 7 (5 MHz) :	4M51G7D (QPSK) / 4M50W7D (16-QAM)
Band 7 (10 MHz) :	8M98G7D (QPSK) / 8M99W7D (16-QAM)
Band 7 (15 MHz) :	13M5G7D (QPSK) / 13M4W7D (16-QAM)
Band 7 (20 MHz) :	18M0G7D (QPSK) / 17M9W7D (16-QAM)

Date(s) of Tests: June 08, 2016 ~ November 28, 2016

Antenna Specification:

Manufacturer:	Laird Technologies
Antenna type:	MIMO capable vehicle dome antenna
Peak Gain:	Band 7 : -0.22 dBi

2. INTRODUCTION

2.1. EUT DESCRIPTION

The LG Electronics Inc. TM01LA-N GSM/WCDMA /LTE Telematics NAD module consists of LTE 7.

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 chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.**

3. DESCRIPTION OF TESTS

3.1 CONDUCTED OUTPUT POWER

Test Procedure

Conducted Output Power is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 5.2. and RSS-Gen, November 2014, Issue4, Section 6.12

5.2.1 Procedure for use with a spectrum/signal analyzer when EUT can be configured to transmit continuously or when sweep triggering/signal gating can be properly implemented

The EUT is considered to transmit continuously if it can be configured to transmit at a burst duty cycle of greater than or equal to 98% throughout the duration of the measurement. If this condition can be achieved, then the following procedure can be used to measure the average output power of the EUT.

This procedure can also be used when the EUT cannot be configured to transmit continuously, provided that the measurement instrument can be configured to trigger a sweep at the beginning of each full-power transmission burst, and the sweep time is less than or equal to the minimum transmission time during each burst (*i.e.*, no burst off-time is to be included in the measurement).

- 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 $\geq 3 \times$ RBW.
- d) Set number of points in sweep $\geq 2 \times$ span / RBW.
- e) Sweep time = auto-couple.
- f) Detector = RMS (power averaging).
- g) If the EUT can be configured to transmit continuously (*i.e.*, burst duty cycle $\geq 98\%$), then set the trigger to free run.
- h) If the EUT cannot be configured to transmit continuously (*i.e.*, burst duty cycle $< 98\%$), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Ensure that the sweep time is less than or equal to the transmission burst duration.
- i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode.
- j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

3.2 EIRP RADIATED POWER AND RADIATED SPURIOUS EMISSIONS

Note: EIRP(Equivalent Isotropic Radiated Power)

Test Procedure RSS-Gen, November 2014, Issue4, Section 6.12 & 6.13

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-D-2010 Clause 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 position of the maximized emission is recorded with the spectrum analyzer using RMS 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 calculated by the following formula;

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

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

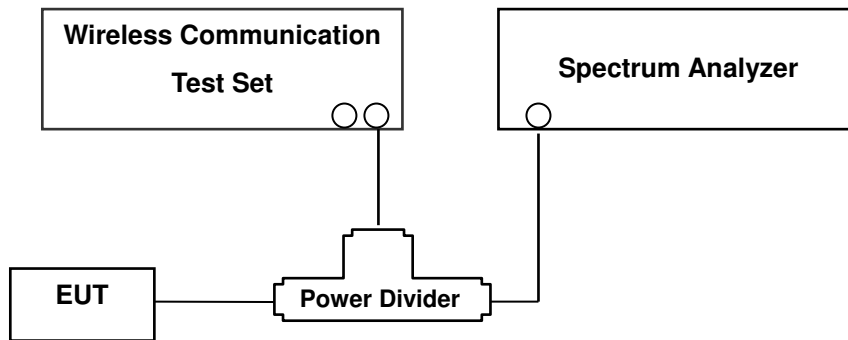
The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

Radiated spurious emissions

1. Frequency Range : 9 kHz ~ 10th Harmonics of highest channel fundamental frequency.
2. Measured distance : 30 MHz ~ 11 GHz at 3 m
11 GHz ~ 26 GHz at 1m
3. The EUT was setup to maximum output power. The 100 kHz RBW was used to scan from 30 MHz to 1 GHz. Also, the 1 MHz RBW was used to scan from 1 GHz to 26.5 GHz. And limit is -25 dBm. The high, low and a middle channel were tested for out of band measurements.

3.3 OCCUPIED BANDWIDTH.

Test set-up



(Configuration of conducted Emission measurement)

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

Test Procedure

OBW is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 4.2. and RSS-Gen, November 2014, Issue4, Section 6.6

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels(low, middle and high operational range.)

The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test Procedure

Spurious and harmonic emissions at antenna terminal is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 6.0. and RSS-Gen, November 2014, Issue4, Section 6.13

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.

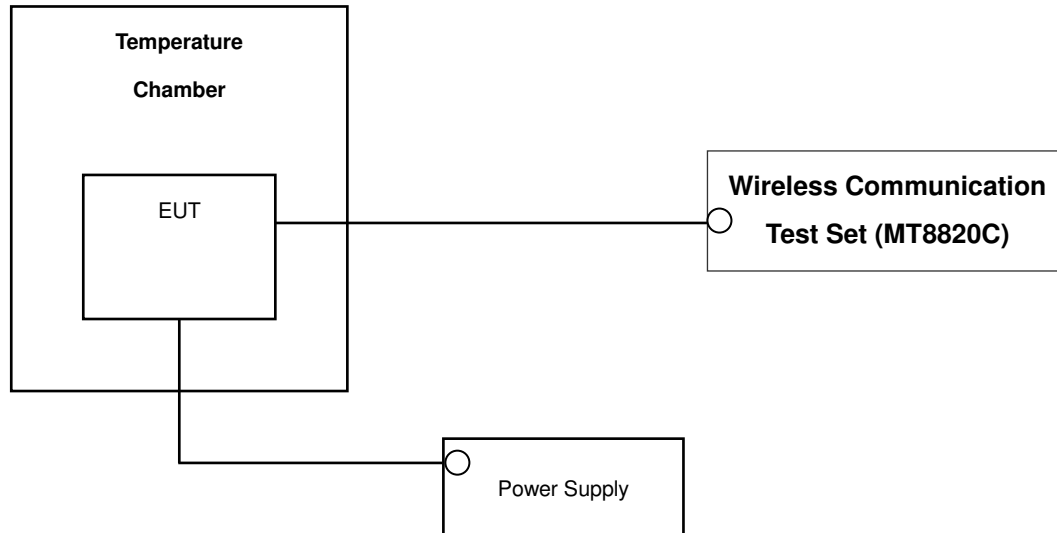
- Channel Edge Requirement : In the 1 MHz bands immediately outside and adjacent to the channel, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.

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

- For LTE Band 7, total offset 27.1 dBm = 20 dBm attenuator + 6 dBm Divider + 1.1 dBm RF cables.

3.5 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up



* Nominal Operating Voltage

Test Procedure

Frequency stability is tested in accordance with ANSI/TIA-603-D-2010 section 2.2.2. and RSS-Gen, November 2014, Issue4, Section 6.11

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 100 % 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 .

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.

NOTE: The EUT is tested down to the battery endpoint.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
REOHDE & SCHWARZ	SCU 18 / AMPLIFIER	10094	09/07/2016	Annual	09/07/2017
Wainwright	WHK1.2/15G-10EF/H.P.F	4	04/11/2016	Annual	04/11/2017
Wainwright	WHK3.3/18G-10EF/H.P.F	2	04/11/2016	Annual	04/11/2017
Hewlett Packard	11667B / Power Splitter	10545	02/15/2016	Annual	02/15/2017
Hewlett Packard	11667B / Power Splitter	11275	04/29/2016	Annual	04/29/2017
Agilent	E3632A/DC Power Supply	KR75303243	07/12/2016	Annual	07/12/2017
Schwarzbeck	UHAP/ Dipole Antenna	557	03/23/2015	Biennial	03/23/2017
Schwarzbeck	UHAP/ Dipole Antenna	558	03/23/2015	Biennial	03/23/2017
EXP	EX-TH400/ Chamber	None	05/31/2016	Annual	05/31/2017
Schwarzbeck	BBHA 9120D/ Horn Antenna	147	09/09/2016	Biennial	09/09/2018
Schwarzbeck	BBHA 9120D/ Horn Antenna	1299	05/15/2015	Biennial	05/15/2017
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/30/2015	Biennial	04/30/2017
Schwarzbeck	BBHA 9170/ Horn Antenna(15~35GHz)	BBHA9170124	04/30/2015	Biennial	04/30/2017
Agilent	N9020A/Signal Analyzer	MY52090906	05/13/2016	Annual	05/13/2017
Hewlett Packard	8493C/ATTENUATOR	17280	06/22/2016	Annual	06/22/2017
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer	1307.9002K40-100931-NK	06/15/2016	Annual	06/15/2017
Agilent	8960 (E5515C)/ Base Station(Now)	MY48360800	10/19/2016	Annual	10/19/2017
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	02/23/2016	Biennial	02/23/2018
Schwarzbeck	VULB9160/ Bilog Antenna	3150	09/30/2016	Biennial	09/30/2018
Schwarzbeck	VULB9160/ Bilog Antenna	3368	10/14/2016	Biennial	10/14/2018
CERNEX	CBLU1183540B-01/ POWER AMP	25539	05/17/2017	Annual	05/17/2018
REOHDE & SCHWARZ	ESU / EMI TEST RECEIVER	100346	08/11/2017	Annual	08/11/2018
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6200863156	02/26/2016	Annual	02/26/2017
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	02/16/2016	Annual	02/16/2017

5. 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 data shown herein 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.

Parameter	Expanded Uncertainty ($\pm$ dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	6.07

6. SUMMARY OF TEST RESULTS

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049	RSS-Gen(6.6)	Occupied Bandwidth	N/A	CONDUCTED	PASS
2.1051, 27.53(m)(4)	RSS-199(4.6)	Band Edge / Conducted Spurious Emissions.	< 40 + 10log10 (P[Watts]) at Channel edges < 43 + 10log10 (P[Watts]) between 5 and X MHz from Channel edges < 55 + 10log10 (P[Watts]) beyond X MHz beyond from Channel edges		PASS
2.1046	RSS-199(4.4)	Conducted Output Power	N/A		PASS
2.1055, 27.54	RSS-199(4.3)	Frequency stability	Emission must remain in band		PASS
27.50(h)(2)	RSS-199(4.4)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP	RADIATED	PASS
2.1053, 27.53(m)(4)	RSS-199(4.6)	Undesirable Emissions	< 40 + 10log10 (P[Watts]) at Channel edges < 43 + 10log10 (P[Watts]) between 5 and X MHz from Channel edges < 55 + 10log10 (P[Watts]) beyond X MHz beyond from Channel edges		PASS
	RSS-GEN(7)	Receiver Spurious Emissions	RSS-GEN section 7.1.2 table 2		PASS

7. SAMPLE CALCULATION

A. EIRP Sample Calculation

Mode	Ch./ Freq.		Measured	Substitute	Ant. Gain	C.L	Pol.	Limit	EIRP	
	channel	Freq.(MHz)	Level(dBm)	LEVEL(dBm)	(dBi)			W	W	dBm
LTE Band7	21100	2,535.00	-15.36	19.46	10.72	1.78	V	< 2.00	0.69	28.40

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

- 1) The EUT mounted on a wooden tripod is 2.5 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

Emission Designator = 4M48G7D

LTE BW = 4.48 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission; telemetry; telecommand

16QAM Modulation

Emission Designator = 4M48W7D

LTE BW = 4.48 MHz

W = main carrier modulated in a combination of two

or more of the following modes;

amplitude, angle, pulse

7 = Quantized/Digital Info

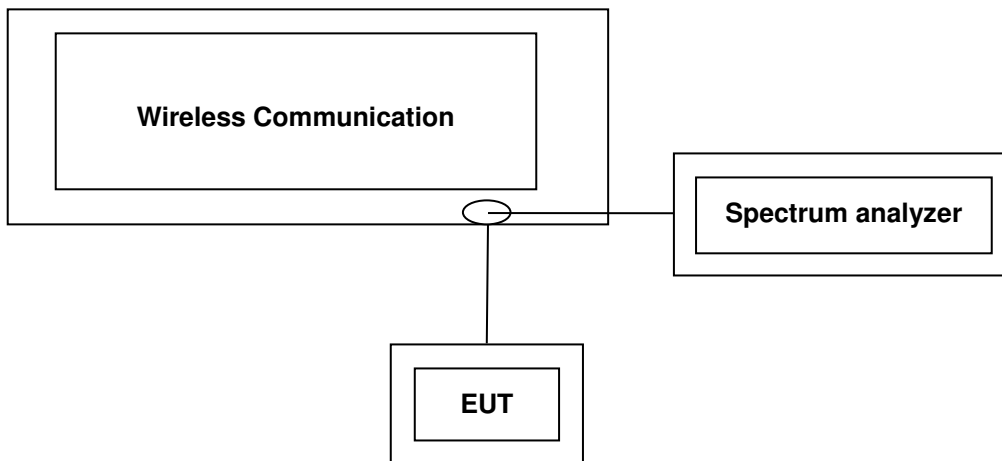
D = Data transmission; telemetry; telecommand

8. TEST DATA

8.1 CONDUCTED OUTPUT POWER

Conducted Output Power was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 5.2.

A base station simulator was used to establish communication with the EUT, and Spectrum analyzer was used for test results. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



Test Result

Band	Band Width (MHz)	Frequency (MHz)	Channel	Resource Block Size	Resource Block Offset	Average Power [dBm]	
						QPSK	16-QAM
Band 7	5	2502.5	20775	1	0	22.05	21.11
				1	12	22.01	21.13
				1	24	22.06	21.15
				12	0	20.98	19.98
				12	6	20.93	20.03
				12	11	21.01	20.07
				25	0	20.89	19.91
		2535.0	21100	1	0	21.90	21.04
				1	12	21.96	21.12
				1	24	21.98	21.14
				12	0	20.82	19.87
				12	6	20.86	19.85
				12	11	20.84	19.92
				25	0	20.76	19.81
		2567.5	21425	1	0	21.82	20.61
				1	12	21.79	20.59
				1	24	21.69	20.53
				12	0	20.68	19.72
				12	6	20.60	19.68
				12	11	20.61	19.62
				25	0	20.56	19.56

LTE Conducted Average Output Powers (5 MHz Band 7 LTE)

Band	Band Width (MHz)	Frequency (MHz)	Channel	Resource Block Size	Resource Block Offset	Average Power [dBm]	
						QPSK	16-QAM
Band 7	10	2505.0	20800	1	0	22.15	20.72
				1	24	22.12	20.64
				1	49	22.22	20.66
				25	0	20.90	19.90
				25	12	20.82	19.92
				25	24	20.84	19.93
				50	0	20.81	19.88
		2535.0	21100	1	0	21.75	20.54
				1	24	21.84	20.65
				1	49	21.91	20.66
				25	0	20.73	19.71
				25	12	20.76	19.75
				25	24	20.82	19.81
				50	0	20.72	19.65
		2565.0	21400	1	0	21.95	20.67
				1	24	21.84	20.61
				1	49	21.72	20.50
				25	0	20.60	19.64
				25	12	20.63	19.68
				25	24	20.50	19.61
				50	0	20.46	19.54

LTE Conducted Average Output Powers (10 MHz Band 7 LTE)

Band	Band Width (MHz)	Frequency (MHz)	Channel	Resource Block Size	Resource Block Offset	Average Power [dBm]	
						QPSK	16-QAM
Band 7	15	2507.5	20825	1	0	22.12	20.86
				1	36	22.22	20.96
				1	74	22.23	21.01
				36	0	20.84	19.88
				36	18	20.97	19.90
				36	38	20.90	19.93
				75	0	20.89	19.95
		2535.0	21100	1	0	21.83	20.88
				1	36	21.92	21.03
				1	74	22.02	21.14
				36	0	20.75	19.77
				36	18	20.72	19.75
				36	38	20.82	19.84
				75	0	20.72	19.74
		2562.5	21375	1	0	21.90	21.01
				1	36	21.99	21.04
				1	74	21.81	20.79
				36	0	20.76	19.82
				36	18	20.70	19.81
				36	38	20.66	19.80
				75	0	20.75	19.77

LTE Conducted Average Output Powers (15 MHz Band 7 LTE)

Band	Band Width (MHz)	Frequency (MHz)	Channel	Resource Block Size	Resource Block Offset	Average Power [dBm]	
						QPSK	16-QAM
Band 7	20	2510.0	20850	1	0	22.02	21.13
				1	49	22.16	21.24
				1	99	22.20	21.23
				50	0	20.89	19.90
				50	25	20.80	19.85
				50	49	20.94	19.96
				100	0	20.98	19.95
		2535.0	21100	1	0	21.91	21.12
				1	49	22.04	21.18
				1	99	22.16	21.34
				50	0	20.79	19.77
				50	25	20.80	19.83
				50	49	20.91	19.95
				100	0	20.83	19.87
		2560.0	21350	1	0	21.98	20.86
				1	49	22.04	20.83
				1	99	21.93	20.73
				50	0	20.78	19.86
				50	25	20.74	19.87
				50	49	20.79	19.84
				100	0	20.69	19.81

LTE Conducted Average Output Powers (20 MHz Band 7 LTE)

Note : Detecting mode is average.

8.2 EQUIVALENT ISOTROPIC RADIATED POWER (Band 7)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
2502.5	5 MHz	QPSK	-20.60	15.83	10.95	2.87	V	< 2.00	0.246	23.91
		16-QAM	-20.76	15.67	10.95	2.87	V		0.237	23.75
2535.0		QPSK	-19.39	17.10	10.98	2.95	V		0.326	25.13
		16-QAM	-19.29	17.20	10.98	2.95	V		0.334	25.23
2567.5		QPSK	-20.06	16.72	11.00	2.97	V		0.298	24.75
		16-QAM	-19.97	16.81	11.00	2.97	V		0.305	24.84

Equivalent Isotropic Radiated Power Data (5 MHz Band 7 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

This device uses 2 m cables interchangeably.

We measured using a Peak Detector and trace Mode Max Hold (RSS-199 Section 4.4)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
2505.0	10 MHz	QPSK	-20.60	15.80	10.95	2.88	V	< 2.00	0.244	23.87
		16-QAM	-20.53	15.87	10.95	2.88	V		0.248	23.94
2535.0		QPSK	-19.07	17.42	10.98	2.95	V		0.351	25.45
		16-QAM	-19.13	17.36	10.98	2.95	V		0.346	25.39
2565.0		QPSK	-20.50	16.28	11.00	2.97	V		0.270	24.31
		16-QAM	-20.46	16.32	11.00	2.97	V		0.272	24.35

Equivalent Isotropic Radiated Power Data (10 MHz Band 7 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

This device uses 2 m cables interchangeably.

We measured using a Peak Detector and trace Mode Max Hold (RSS-199 Section 4.4)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
2507.5	15 MHz	QPSK	-20.81	15.50	10.96	2.89	V	< 2.00	0.227	23.57
		16-QAM	-20.84	15.47	10.96	2.89	V		0.226	23.54
2535.0		QPSK	-19.48	17.01	10.98	2.95	V		0.319	25.04
		16-QAM	-19.32	17.17	10.98	2.95	V		0.331	25.20
2562.5		QPSK	-19.70	17.11	11.00	2.97	V		0.326	25.14
		16-QAM	-19.63	17.18	11.00	2.97	V		0.332	25.21

Equivalent Isotropic Radiated Power Data (15 MHz Band 7 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

This device uses 2 m cables interchangeably.

We measured using a Peak Detector and trace Mode Max Hold (RSS-199 Section 4.4)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
2510.0	20 MHz	QPSK	-20.79	15.58	10.96	2.89	V	< 2.00	0.232	23.65
		16-QAM	-20.82	15.55	10.96	2.89	V		0.230	23.62
2535.0		QPSK	-19.42	17.07	10.98	2.95	V		0.324	25.10
		16-QAM	-19.43	17.06	10.98	2.95	V		0.323	25.09
2560.0		QPSK	-19.86	16.95	11.00	2.97	V		0.314	24.98
		16-QAM	-19.75	17.06	11.00	2.97	V		0.323	25.09

Equivalent Isotropic Radiated Power Data (20 MHz Band 7 LTE)

Note: All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case

This device uses 2 m cables interchangeably.

We measured using a Peak Detector and trace Mode Max Hold (RSS-199 Section 4.4)

NOTES:Equivalent Isotropic Radiated Power Measurements by Substitution Methodaccording to ANSI/TIA/EIA-603-D-2010 June 24, 2010:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For 5 MHz, 10MHz BW signals, RBW = 1-5% of the OBW, not to exceed 1MHz, VBW $\geq 3 \times$ RBW, Detector = RMS. A Horn antenna was substituted in place of the EUT. This dipole 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 x plane in LTE mode. Also worst case of detecting Antenna is vertical polarization in LTE mode.

8.3 RADIATED SPURIOUS EMISSIONS

8.3.1 RADIATED SPURIOUS EMISSIONS (5 MHz Band 7 LTE)

- OPERATING FREQUENCY : 2535.00 MHz
- MEASURED OUTPUT POWER: 25.23 dBm = 0.334 W
- MODULATION SIGNAL: 5 MHz 16QAM
- DISTANCE: 3 meters
- LIMIT: $55 + 10 \log_{10} (W) =$ 50.23 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
20775 (2502.5)	5,005.00	-54.27	12.57	-56.24	2.45	V	-46.12	71.35
	7,507.50	-55.93	11.71	-51.45	3.96	V	-43.70	68.93
	10,010.00	-54.72	11.01	-44.63	4.92	V	-38.54	63.77
21100 (2535.0)	5,070.00	-54.60	12.67	-55.61	2.49	V	-45.43	70.66
	7,605.00	-55.32	11.64	-51.10	3.94	V	-43.40	68.63
	10,140.00	-55.88	10.94	-46.08	5.00	V	-40.14	65.37
21425 (2567.5)	5,135.00	-54.57	12.75	-55.42	2.49	V	-45.16	70.39
	7,702.50	-55.90	11.56	-51.91	3.94	V	-44.29	69.52
	10,270.00	-53.64	10.87	-43.77	5.02	V	-37.92	63.15

- NOTES:
1. Radiated Spurious Emission Measurements at 1 meter and 3 meter by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:
 2. We are performed all frequency to 10th harmonics from 9 kHz. 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. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case
 5. We are performed 16QAM and QPSK modulations. The worst case data are reported in the table above.
 6. We are performed Detector = Peak trace Mode Max Hold (RSS-199 Section 4.4)
 7. This device uses 2 m cables interchangeably.

8.3.2 RADIATED SPURIOUS EMISSIONS (10 MHz Band 7 LTE)

- OPERATING FREQUENCY : 2535.00 MHz
- MEASURED OUTPUT POWER: 25.45 dBm = 0.351 W
- MODULATION SIGNAL: 10 MHz QPSK
- DISTANCE: 3 meters
- LIMIT: $55 + 10 \log_{10}(W) =$ 50.45 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
20800 12505.0)	5,010.00	-52.83	12.58	-54.73	2.45	V	-44.60	70.05
	7,515.00	-55.56	11.70	-51.21	3.95	V	-43.46	68.91
	10,020.00	-52.80	11.01	-42.71	4.92	V	-36.62	62.07
21100 (2535.0)	5,070.00	-54.16	12.67	-55.17	2.49	V	-44.99	70.44
	7,605.00	-55.30	11.64	-51.08	3.94	V	-43.38	68.83
	10,140.00	-53.91	10.94	-44.11	5.00	V	-38.17	63.62
21400 (2565.0)	5,130.00	-55.16	12.76	-56.04	2.49	V	-45.77	71.22
	7,695.00	-55.04	11.57	-50.97	3.95	V	-43.35	68.80
	10,260.00	-55.11	10.87	-45.10	5.03	V	-39.26	64.71

- NOTES: 1. Radiated Spurious Emission Measurements at 1 meter and 3 meter by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:
2. We are performed all frequency to 10th harmonics from 9 kHz. 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. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case
5. We are performed 16QAM and QPSK modulations. The worst case data are reported in the table above.
6. We are performed Detector = Peak trace Mode Max Hold (RSS-199 Section 4.4)
7. This device uses 2 m cables interchangeably.

8.3.3 RADIATED SPURIOUS EMISSIONS (15 MHz Band 7 LTE)

- OPERATING FREQUENCY : 2562.50 MHz
- MEASURED OUTPUT POWER: 25.21 dBm = 0.332 W
- MODULATION SIGNAL: 15 MHz 16QAM
- DISTANCE: 3 meters
- LIMIT: $55 + 10 \log_{10}(W) =$ 50.21 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
20825 (2507.5)	5,015.00	-53.34	12.59	-55.10	2.45	V	-44.96	70.17
	7,522.50	-56.55	11.70	-52.27	3.98	V	-44.55	69.76
	10,030.00	-54.61	11.00	-44.15	5.11	V	-38.26	63.47
21100 (2535.0)	5,070.00	-54.40	12.67	-55.41	2.49	V	-45.23	70.44
	7,605.00	-53.64	11.64	-49.42	3.94	V	-41.72	66.93
	10,140.00	-54.62	10.94	-44.82	5.00	V	-38.88	64.09
21375 (2562.5)	5,125.00	-57.07	12.75	-58.01	2.50	V	-47.76	72.97
	7,687.50	-53.53	11.57	-49.38	3.96	V	-41.77	66.98
	10,250.00	-54.29	10.88	-44.92	5.01	V	-39.05	64.26

- NOTES: 1. Radiated Spurious Emission Measurements at 1 meter and 3 meter by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:
2. We are performed all frequency to 10th harmonics from 9 kHz. 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. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case
5. We are performed 16QAM and QPSK modulations. The worst case data are reported in the table above.
6. We are performed Detector = Peak trace Mode Max Hold (RSS-199 Section 4.4)
7. This device uses 2 m cables interchangeably.

8.3.4 RADIATED SPURIOUS EMISSIONS (20 MHz Band 7 LTE)

- OPERATING FREQUENCY : 2535.00 MHz
- MEASURED OUTPUT POWER: 25.10 dBm = 0.324 W
- MODULATION SIGNAL: 20 MHz QPSK
- DISTANCE: 3 meters
- LIMIT: $55 + 10 \log_{10}(W) =$ 50.10 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
20850 (2510.0)	5,020.00	-53.07	12.60	-54.68	2.46	V	-44.54	69.64
	7,530.00	-55.24	11.69	-50.94	3.98	V	-43.23	68.33
	10,040.00	-53.16	11.00	-42.64	5.01	V	-36.65	61.75
21100 (2535.0)	5,070.00	-54.28	12.67	-55.29	2.49	V	-45.11	70.21
	7,605.00	-54.18	11.64	-49.96	3.94	V	-42.26	67.36
	10,140.00	-54.73	10.94	-44.93	5.00	V	-38.99	64.09
21350 (2560.0)	5,120.00	-54.19	12.75	-55.20	2.50	V	-44.95	70.05
	7,680.00	-55.57	11.58	-51.50	3.95	V	-43.87	68.97
	10,240.00	-55.37	10.88	-46.12	5.03	V	-40.27	65.37

- NOTES:**
1. Radiated Spurious Emission Measurements at 1 meter and 3 meter by Substitution Method according to ANSI/TIA/EIA-603-D-2010 June 24, 2010:
 2. We are performed all frequency to 10th harmonics from 9 kHz. 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. All of RB size has been tested for emissions and EIRP, with the 1RB configuration observed as the worst case
 5. We are performed 16QAM and QPSK modulations. The worst case data are reported in the table above.
 6. We are performed Detector = Peak trace Mode Max Hold (RSS-199 Section 4.4)
 7. This device uses 2 m cables interchangeably.

8.4 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
7	5 MHz	2535.0	QPSK	25	0	4.5133
			16-QAM	25	0	4.5029
	10 MHz		QPSK	50	0	8.9756
			16-QAM	50	0	8.9929
	15 MHz		QPSK	75	0	13.477
			16-QAM	75	0	13.432
	20 MHz		QPSK	100	0	17.966
			16-QAM	100	0	17.921

- Plots of the EUT's Occupied Bandwidth are shown Page 36 ~ 39.

8.5 CONDUCTED SPURIOUS EMISSIONS

■ FACTORS FOR FREQUENCY

Frequency Range (GHz)	Factor [dB]
0.03 – 1	27.145
1 – 5	26.960
5 – 10	27.542
10 – 15	28.439
15 – 20	29.144
Above 20	30.148

NOTES:

Factor(dB) = Cable Loss + Attenuator + Power Splitter

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
7	5	2502.5	6.5250	27.542	-60.434	-32.892	-25.00
		2535.0	6.5389	27.542	-59.896	-32.354	
		2567.5	3.6815	26.960	-58.718	-31.758	
	10	2505.0	3.1765	26.960	-60.026	-33.066	
		2535.0	7.2463	27.542	-60.220	-32.678	
		2565.0	3.6641	26.960	-59.064	-32.104	
	15	2507.5	3.7304	26.960	-60.251	-33.291	
		2535.0	3.7174	26.960	-60.269	-33.309	
		2562.5	7.2513	27.542	-59.765	-32.223	
	20	2510.0	3.3051	26.960	-59.717	-32.757	
		2535.0	3.7214	26.960	-59.703	-32.743	
		2560.0	6.5270	27.542	-59.770	-32.228	

NOTES:

1. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0
2. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)

- Plots of the EUT's Conducted Spurious Emissions are shown Page 48 ~ 59.

8.5.1 BAND EDGE

Band	Band Width (MHz)	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Channel Edge ~ -1MHz (Limit : -10 dBm)	-1MHz ~ -4MHz (Limit : -10 dBm)	-4MHz ~ -9.5MHz (Limit : -13 dBm)	-9.5MHz ~ (Limit : -25 dBm)
						Lower	Lower	Lower	Lower
7	5	2502.5	QPSK	25	0	-25.63	-20.59	-24.74	-41.49
	10	2505.0	QPSK	50	0	-27.94	-22.54	-25.32	-33.67
	15	2507.5	QPSK	75	0	-28.44	-24.80	-26.85	-29.80
	20	2510.0	QPSK	100	0	-28.89	-25.75	-27.46	-30.88

Band	Band Width (MHz)	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Channel Edge ~±1MHz (Limit : -10 dBm)		±1 MHz ~ ±5 MHz (Limit : -10 dBm)		±5 MHz ~ ±6 MHz (Limit : -13 dBm)		±6 MHz ~ (Limit : -25 dBm)	
						Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
7	5	2502.5	QPSK	25	0	-	-25.40	-	-21.20	-	-27.87	-	-31.51
		2535.0	QPSK	25	0	-24.96	-25.68	-20.07	-22.81	-29.32	-29.94	-32.89	-33.20
		2567.5	QPSK	25	0	-24.85	-25.34	-19.84	-21.74	-29.12	-28.47	-32.54	-32.66
	10	2505.0	QPSK	50	0	-	-27.77	-	-22.89	-	-24.41	-	-31.05
		2535.0	QPSK	50	0	-26.39	-29.64	-21.10	-25.96	-24.36	-29.05	-32.48	-33.82
		2565.0	QPSK	50	0	-25.28	-28.36	-19.89	-23.39	-23.44	-28.36	-32.22	-34.60
	15	2507.5	QPSK	75	0	-	-28.06	-	-24.84	-	-26.08	-	-33.91
		2535.0	QPSK	75	0	-26.57	-30.72	-22.17	-28.78	-24.22	-30.77	-35.02	-35.89
		2562.5	QPSK	75	0	-25.16	-28.34	-21.10	-25.72	-23.37	-29.37	-33.22	-37.81
	20	2510.0	QPSK	100	0	-	-28.28	-	-25.30	-	-26.27	-	-35.31
		2535.0	QPSK	100	0	-26.25	-32.39	-22.62	-29.91	-24.04	-31.14	-37.24	-36.96
		2560.0	QPSK	100	0	-27.01	-29.83	-23.64	-26.93	-25.76	-30.29	-34.46	-42.04

NOTES: Channel Edge was Tested QPSK Modulation and Full RB (Resource Block) Size

- Plots of the EUT's Band Edge are shown Page 40 ~ 47.

8.6 RECEIVER SPURIOUS EMISSIONS

IC Rule(s)	RSS-Gen 7.1.2
Test Requirements:	Below the table
Operating conditions:	Under normal test conditions
Method of testing:	Radiated
S/A. Settings:	F < 1 GHz: RBW: 120 kHz, VBW: 300 kHz (Quasi-Peak) F > 1 GHz: RBW: 1 MHz, VBW: 1 MHz (Average)
Mode of operation:	Receive

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$ at 3 meters)
30 – 88	100
88 - 216	150
216 – 960	200
Above 960	500

Operation Mode: Receive:

30 MHz ~ 1 GHz

Frequency	Reading	Ant. factor+Cable loss- Amp Gain	Ant. POL	Total	Limit	Margin
MHz	$\text{dB } \mu\text{V}$	dB/m	(H/V)	$\text{dB } \mu\text{V}/\text{m}$	$\text{dB } \mu\text{V}/\text{m}$	dB
No Peak Found						

Above 1 GHz

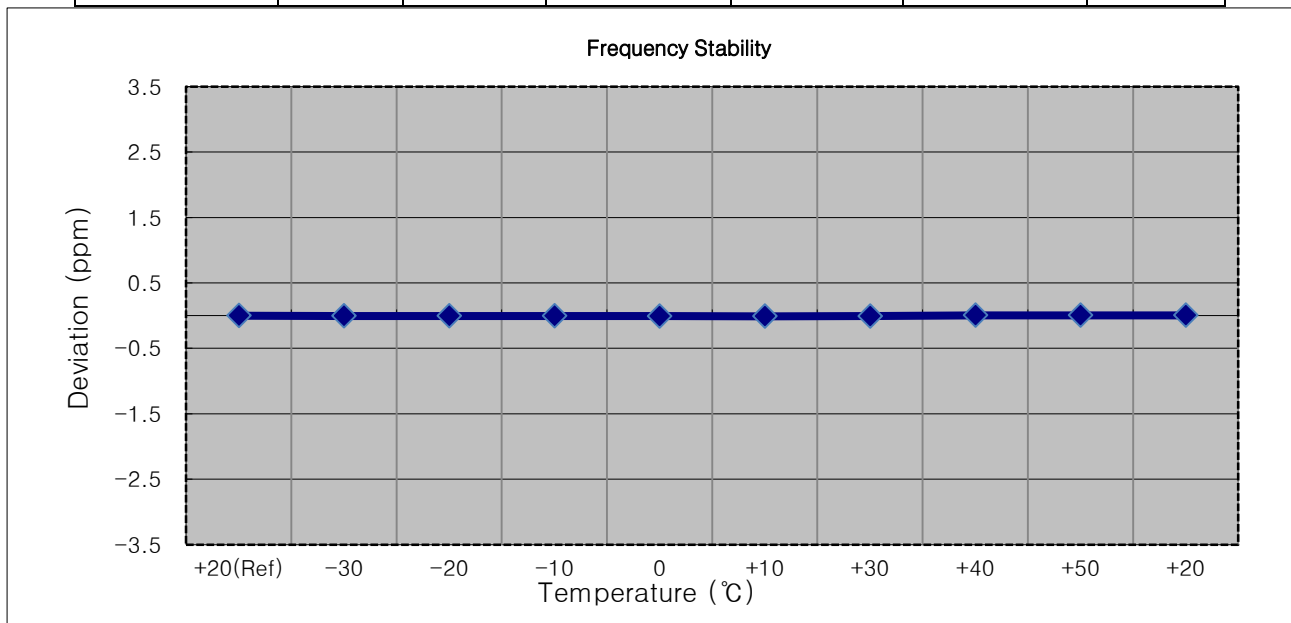
Frequency	Reading	Ant. factor+Cable loss- Amp Gain	Ant. POL	Total	Limit	Margin
MHz	$\text{dB } \mu\text{V}$	dB/m	(H/V)	$\text{dB } \mu\text{V}/\text{m}$	$\text{dB } \mu\text{V}/\text{m}$	dB
1951.0	42.53	-12.37	V	30.16	54	23.84

8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

8.7.1 FREQUENCY STABILITY (5 MHz Band 7 LTE)

- OPERATING FREQUENCY: 2,535,000,000 Hz
- CHANNEL: 21100 (5 MHz)
- REFERENCE VOLTAGE: 12.0 VDC
- DEVIATION LIMIT: Emission must remain in band

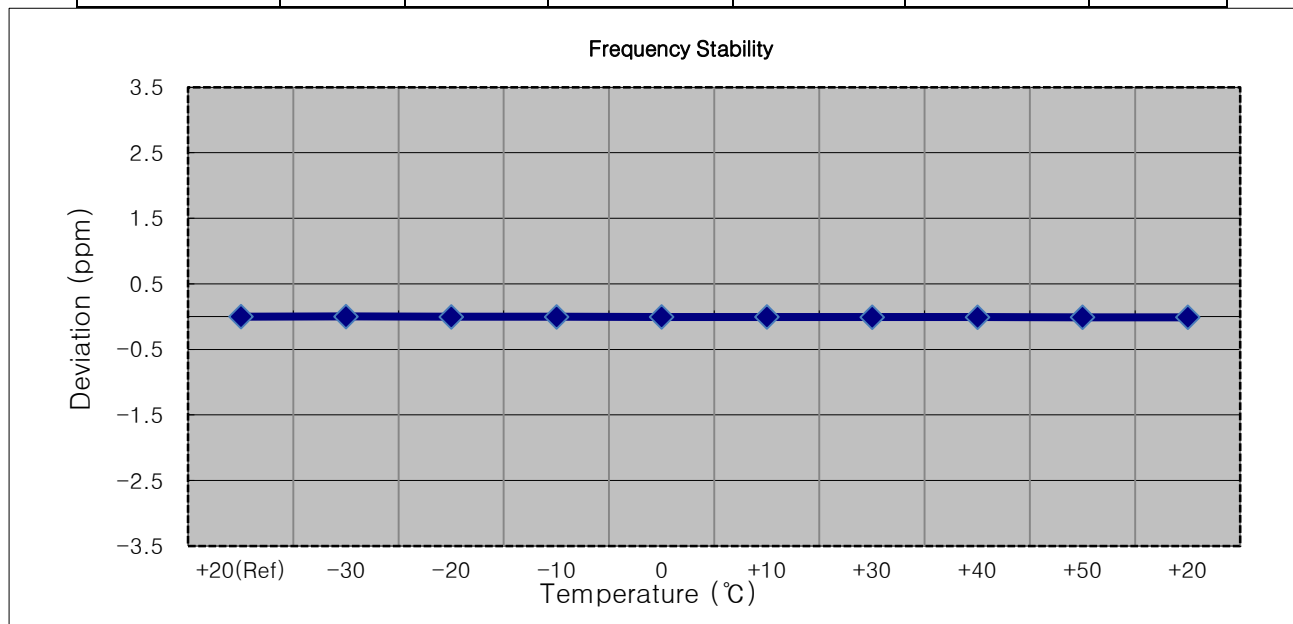
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	12.0	+20(Ref)	2535 000 007	0.0	0.000 000	0.0000
100%		-30	2534 999 996	-10.9	0.000 000	-0.0043
100%		-20	2534 999 995	-11.9	0.000 000	-0.0047
100%		-10	2534 999 993	-14.6	-0.000 001	-0.0058
100%		0	2534 999 989	-18.6	-0.000 001	-0.0073
100%		+10	2534 999 984	-23.0	-0.000 001	-0.0091
100%		+30	2534 999 986	-21.0	-0.000 001	-0.0083
100%		+40	2535 000 022	14.3	0.000 001	0.0056
100%		+50	2535 000 017	9.5	0.000 000	0.0037
Batt. Endpoint	10.2	+20	2535 000 018	11.1	0.000 000	0.0044



8.7.2 FREQUENCY STABILITY (10 MHz Band 7 LTE)

- OPERATING FREQUENCY: 2,535,000,000 Hz
- CHANNEL: 21100 (10 MHz)
- REFERENCE VOLTAGE: 12.0 VDC
- DEVIATION LIMIT: Emission must remain in band

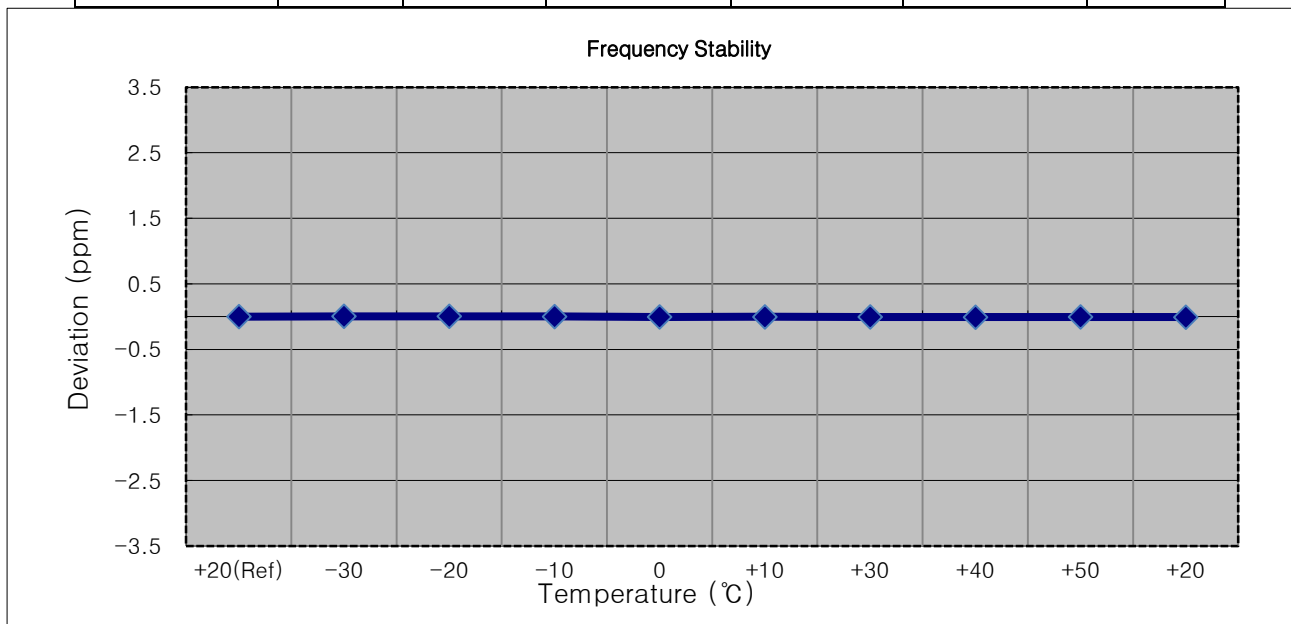
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	12.0	+20(Ref)	2535 000 009	0.0	0.000 000	0.0000
100%		-30	2535 000 017	8.7	0.000 000	0.0034
100%		-20	2535 000 002	-7.0	0.000 000	-0.0028
100%		-10	2534 999 999	-9.3	0.000 000	-0.0037
100%		0	2534 999 994	-14.3	-0.000 001	-0.0056
100%		+10	2534 999 997	-11.9	0.000 000	-0.0047
100%		+30	2534 999 989	-19.2	-0.000 001	-0.0076
100%		+40	2534 999 991	-17.7	-0.000 001	-0.0070
100%		+50	2534 999 982	-26.8	-0.000 001	-0.0106
Batt. Endpoint	10.2	+20	2534 999 983	-25.2	-0.000 001	-0.0099



8.7.3 FREQUENCY STABILITY (15 MHz Band 7 LTE)

- OPERATING FREQUENCY: 2,535,000,000 Hz
- CHANNEL: 21100 (15 MHz)
- REFERENCE VOLTAGE: 12.0 VDC
- DEVIATION LIMIT: Emission must remain in band

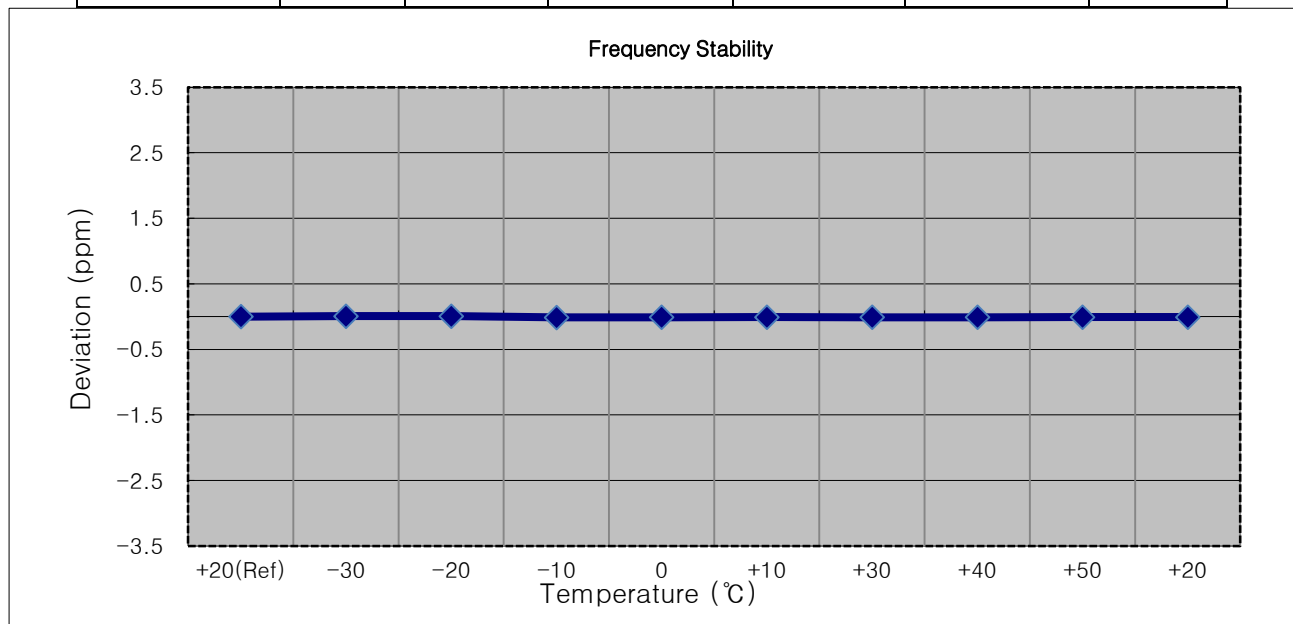
Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	12.0	+20(Ref)	2535 000 016	0.0	0.000 000	0.000
100%		-30	2535 000 026	10.2	0.000 000	0.004
100%		-20	2535 000 028	12.7	0.000 001	0.005
100%		-10	2535 000 021	5.4	0.000 000	0.002
100%		0	2535 000 002	-13.3	-0.000 001	-0.005
100%		+10	2535 000 007	-8.1	0.000 000	-0.003
100%		+30	2535 000 001	-14.2	-0.000 001	-0.006
100%		+40	2534 999 997	-18.7	-0.000 001	-0.007
100%		+50	2535 000 000	-15.3	-0.000 001	-0.006
Batt. Endpoint	10.2	+20	2534 999 999	-16.5	-0.000 001	-0.007



8.7.4 FREQUENCY STABILITY (20 MHz Band 7 LTE)

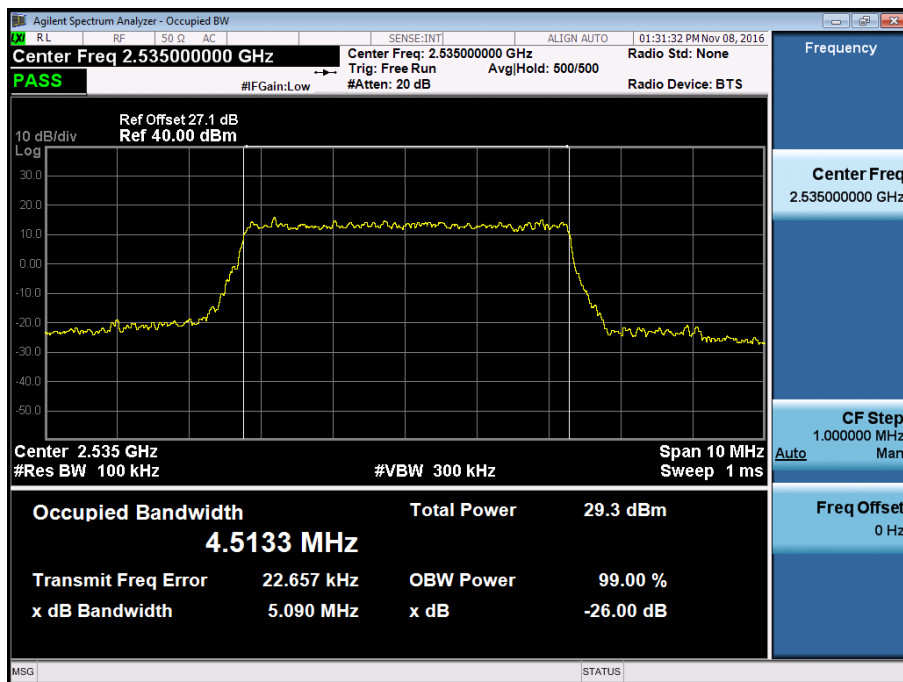
- OPERATING FREQUENCY: 2,535,000,000 Hz
- CHANNEL: 21100 (20 MHz)
- REFERENCE VOLTAGE: 12.0 VDC
- DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	12.0	+20(Ref)	2535 000 013	0.0	0.000 000	0.000
100%		-30	2535 000 032	19.5	0.000 001	0.008
100%		-20	2535 000 031	18.5	0.000 001	0.007
100%		-10	2534 999 981	-32.1	-0.000 001	-0.013
100%		0	2534 999 985	-27.7	-0.000 001	-0.011
100%		+10	2534 999 991	-21.3	-0.000 001	-0.008
100%		+30	2534 999 990	-23.1	-0.000 001	-0.009
100%		+40	2534 999 989	-23.6	-0.000 001	-0.009
100%		+50	2534 999 994	-18.5	-0.000 001	-0.007
Batt. Endpoint	10.2	+20	2534 999 993	-19.2	-0.000 001	-0.008

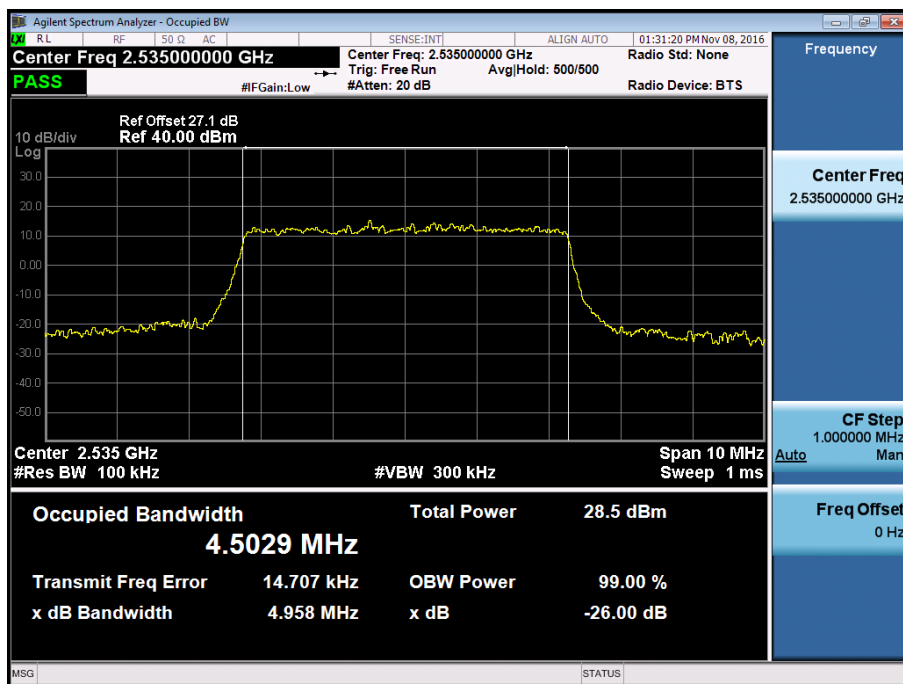


9. TEST PLOTS

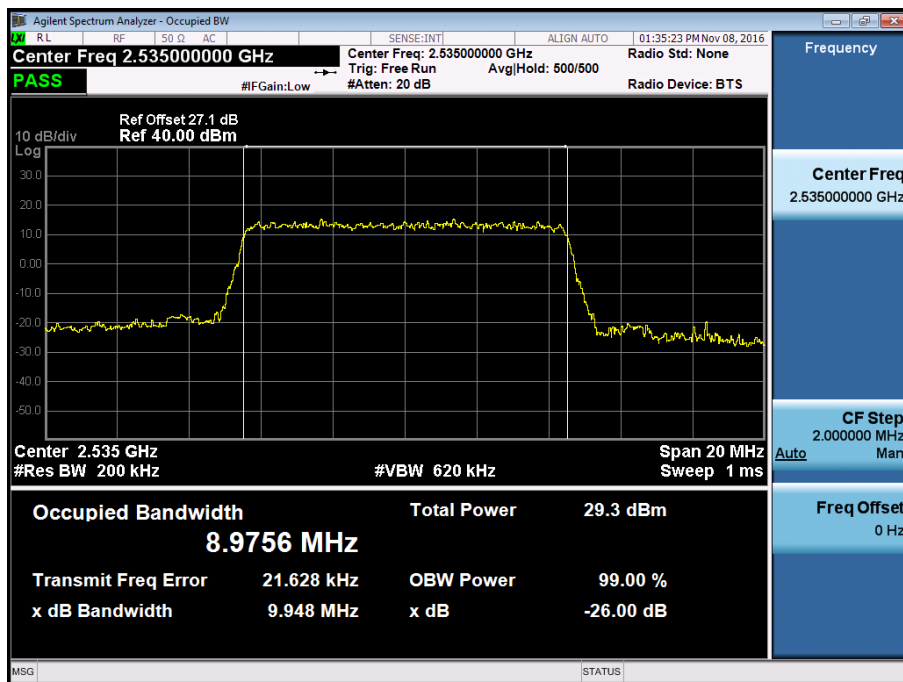
BAND7. Occupied Bandwidth Plot (5MHz Ch.21100 QPSK RB 25)



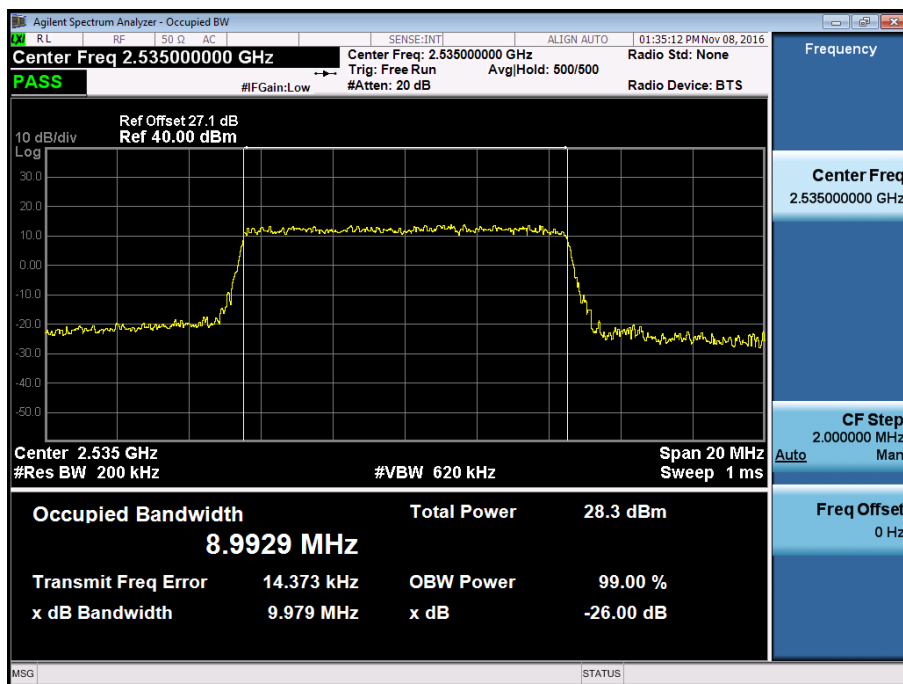
BAND7. Occupied Bandwidth Plot (5MHz Ch.21100 16-QAM RB 25)



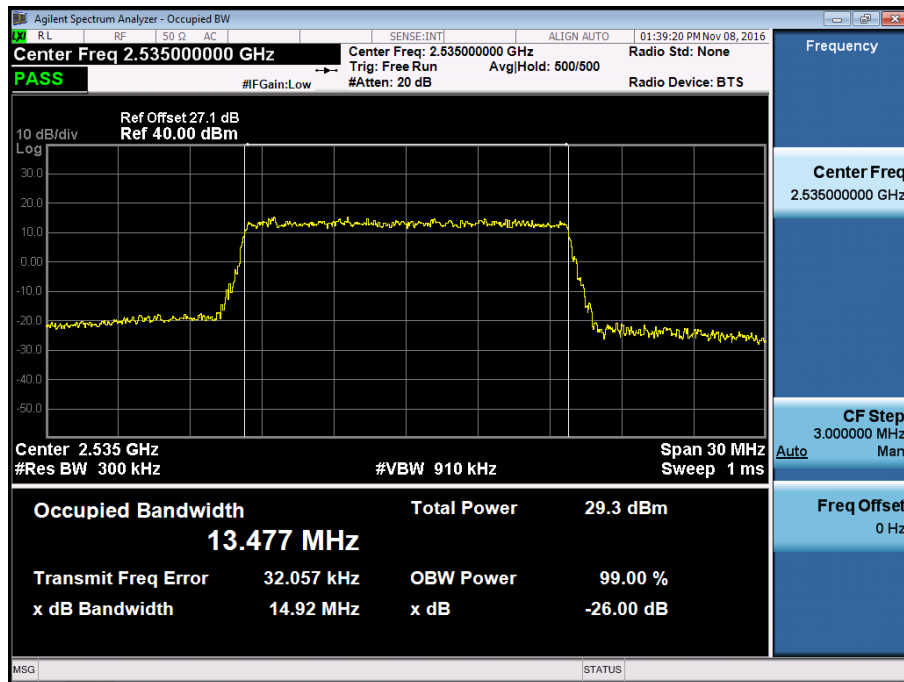
BAND7. Occupied Bandwidth Plot (10MHz Ch.21100 QPSK RB 50)



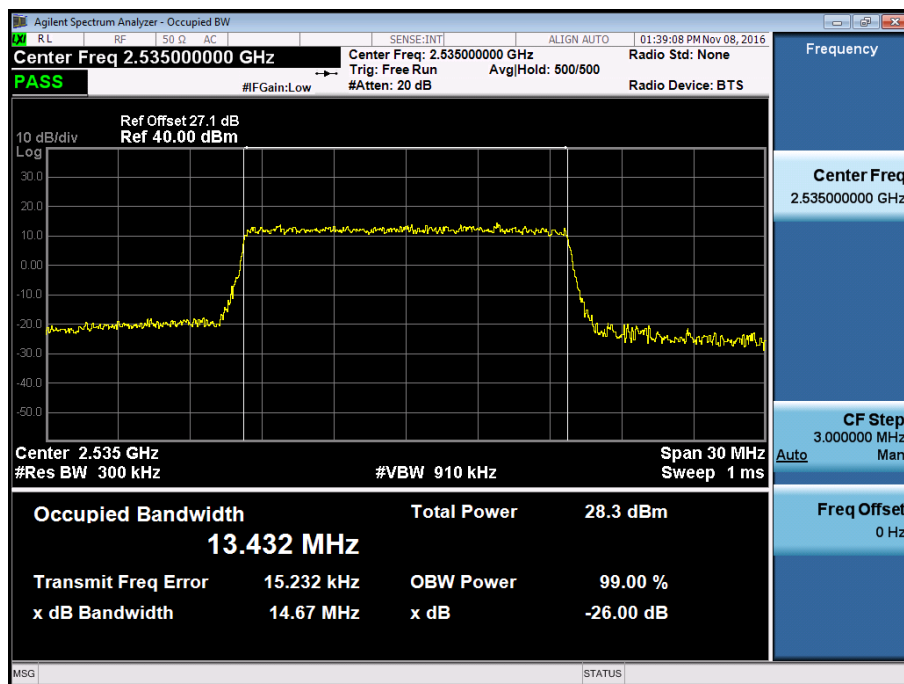
BAND7. Occupied Bandwidth Plot (10MHz Ch.21100 16-QAM RB 50)



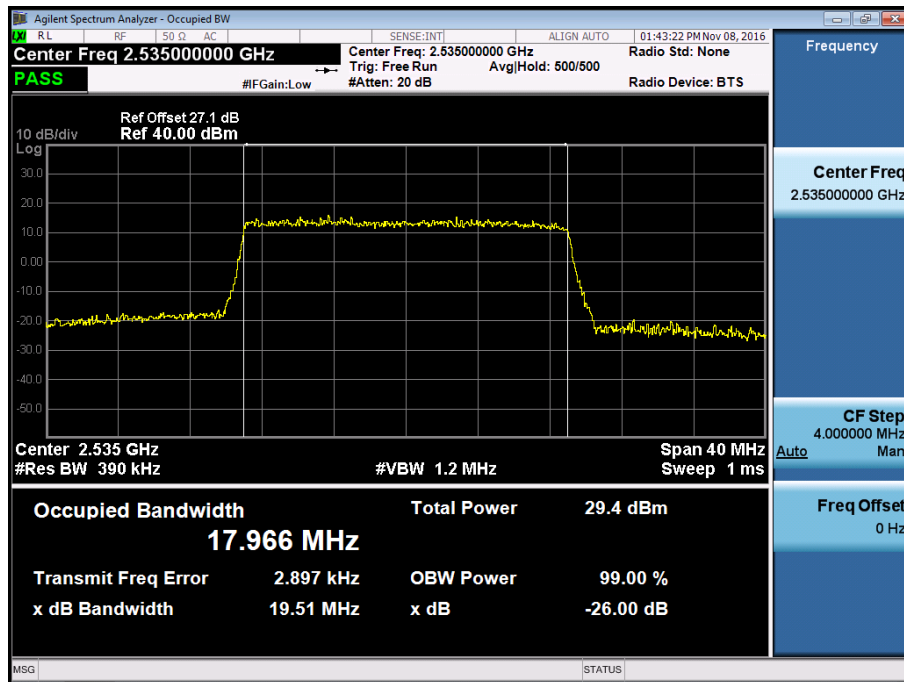
BAND7. Occupied Bandwidth Plot (15MHz Ch.21100 QPSK RB 75)



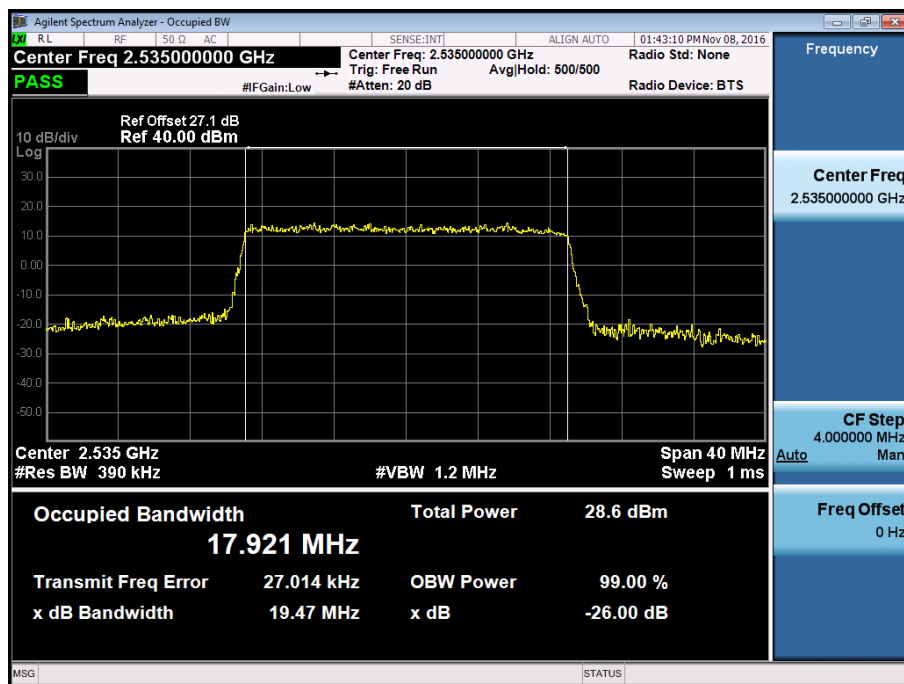
BAND7. Occupied Bandwidth Plot (15MHz Ch.21100 16-QAM RB 75)



BAND7. Occupied Bandwidth Plot (20MHz Ch.21100 QPSK RB 100)



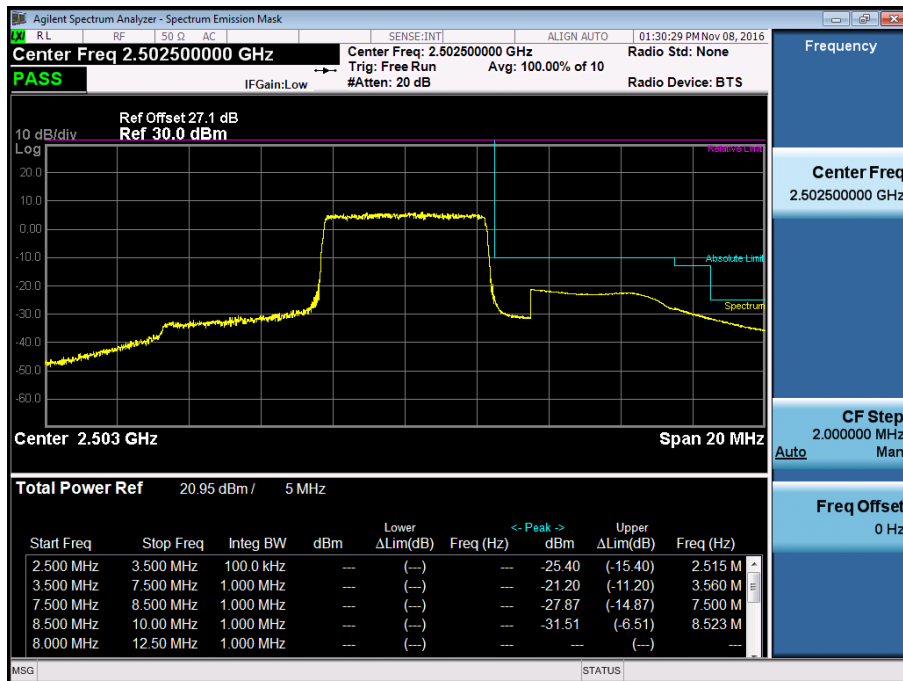
BAND7. Occupied Bandwidth Plot (20MHz Ch.21100 16-QAM RB 100)



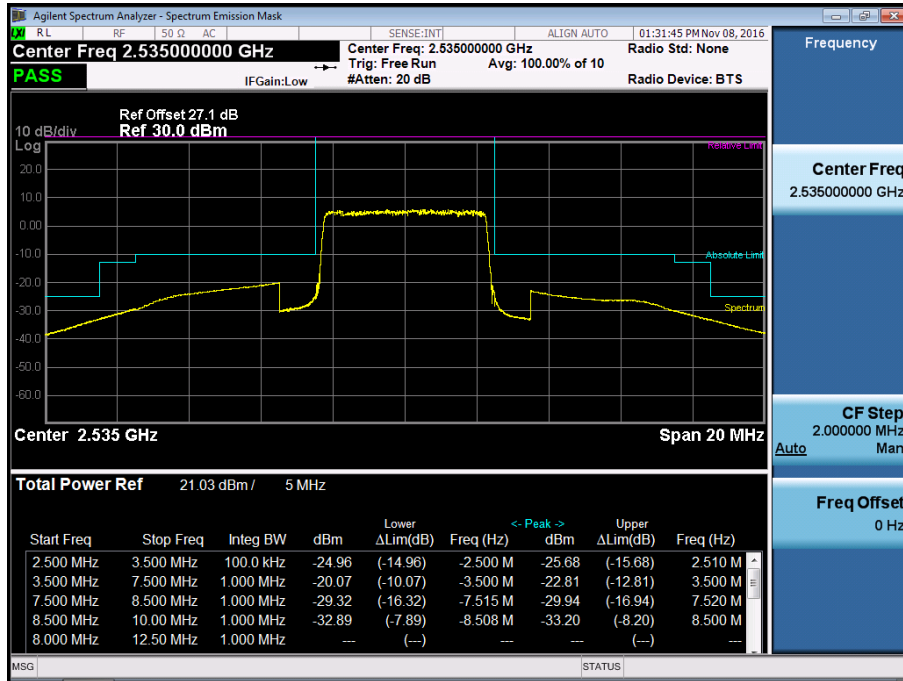
BAND7. Low Channel Edge Plot (5MHz Ch.20775 QPSK RB 25)-1



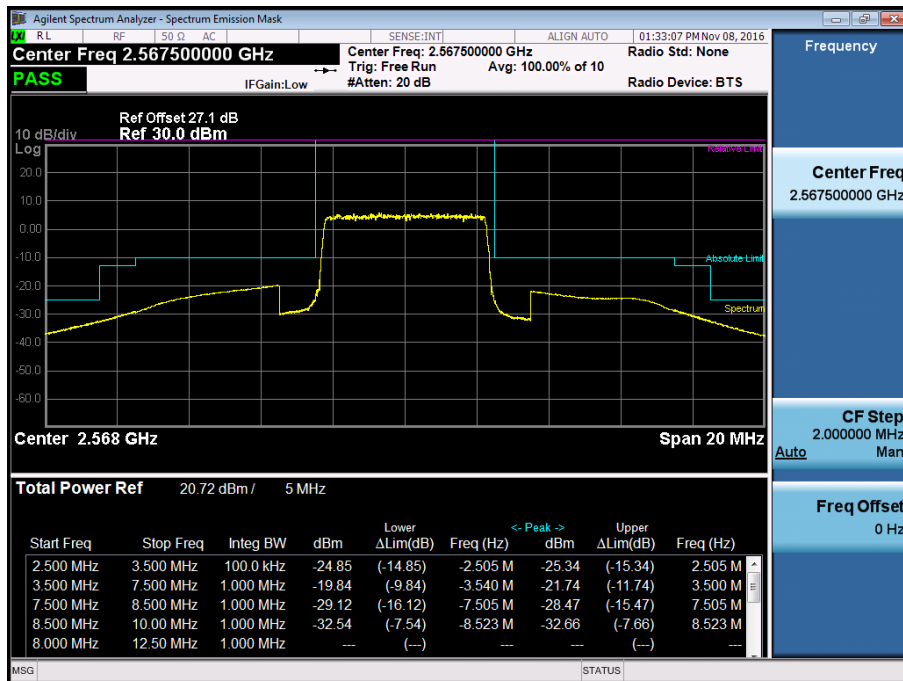
BAND7. Low Channel Edge Plot (5MHz Ch.20775 QPSK RB 25)-2



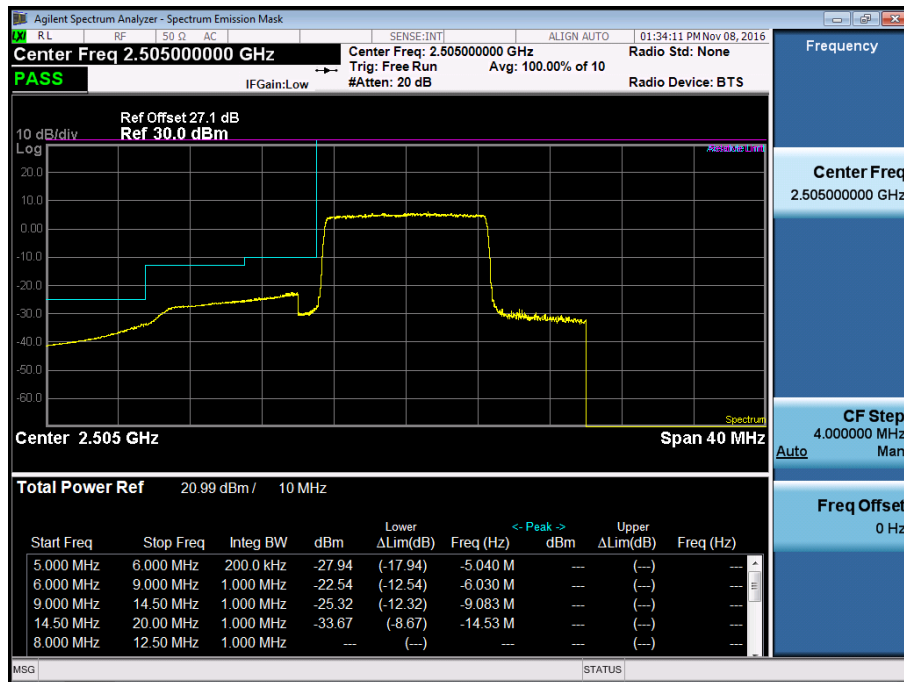
BAND7. Mid Channel Edge Plot (5MHz Ch.21100 QPSK RB 25)



BAND7. High Channel Edge Plot (5MHz Ch.21425 QPSK RB 25)



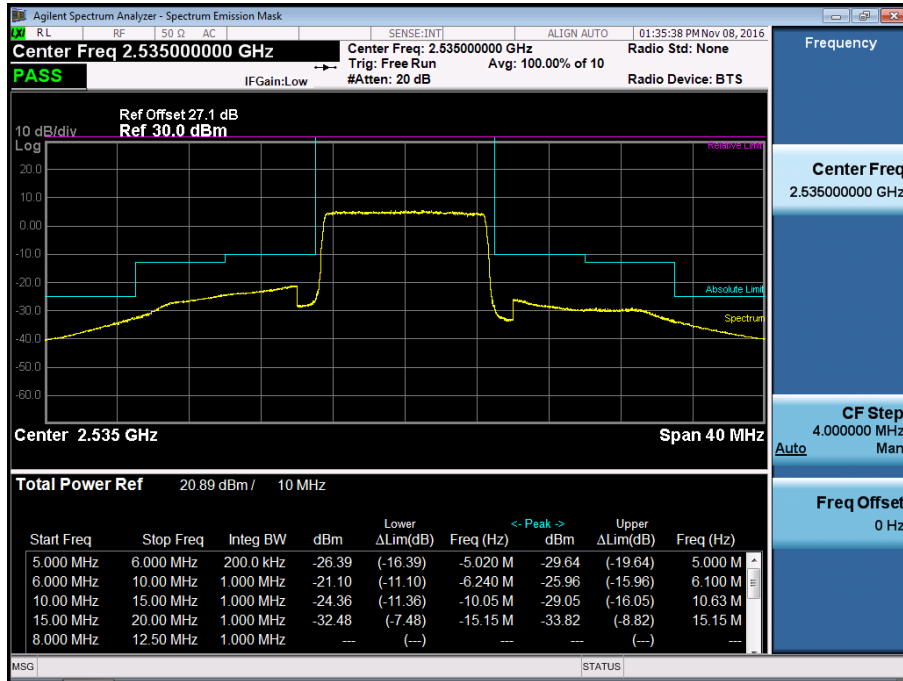
BAND7. Low Channel Edge Plot (10MHz Ch.20800 QPSK RB 50)-1



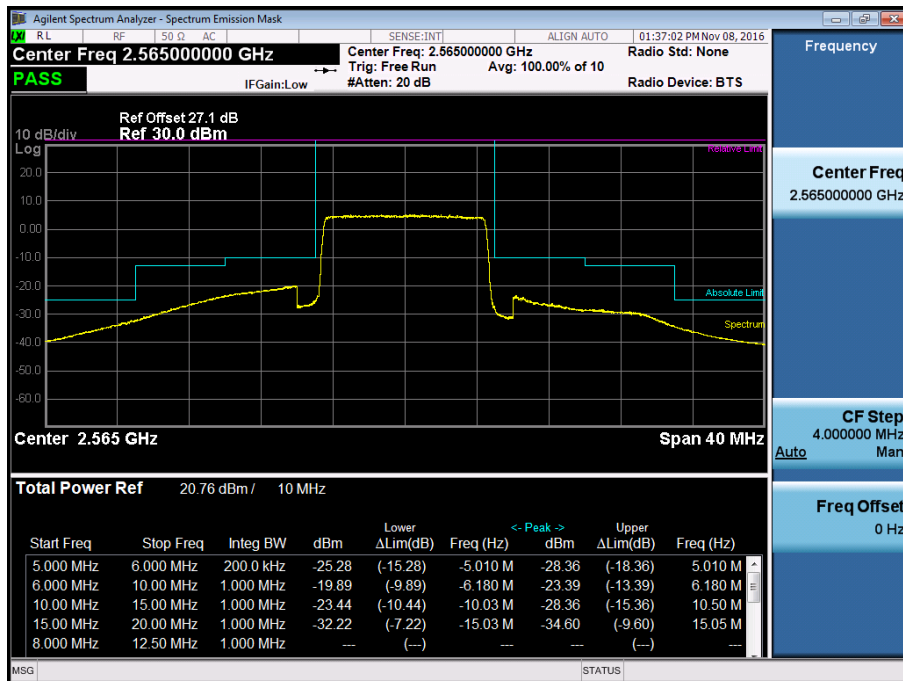
BAND7. Low Channel Edge Plot (10MHz Ch.20800 QPSK RB 50)-2



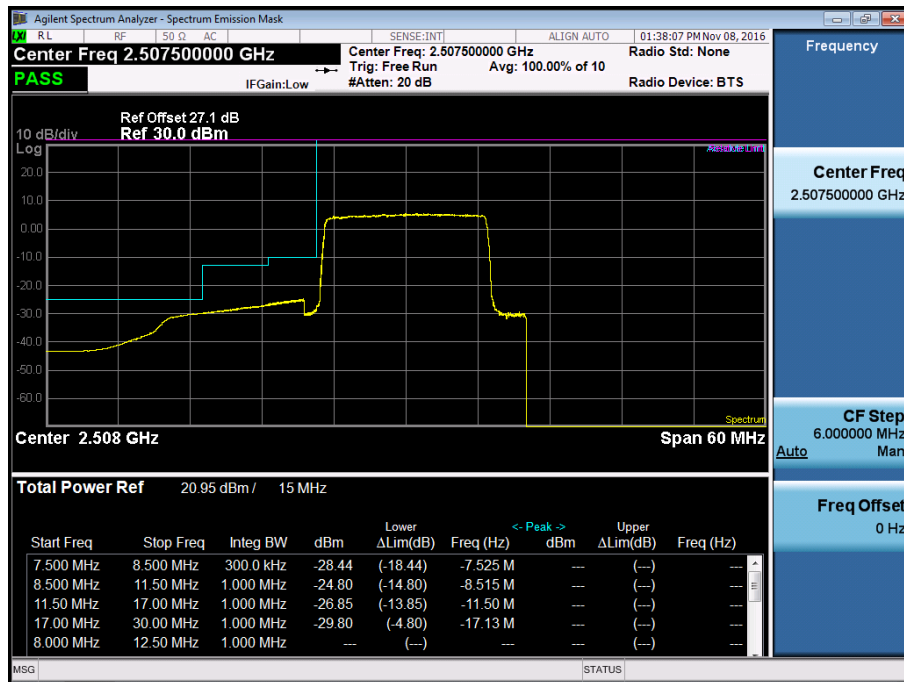
BAND7. Mid Channel Edge Plot (10MHz Ch.21100 QPSK RB 50)



BAND7. High Channel Edge Plot (10MHz Ch.21400 QPSK RB 50)



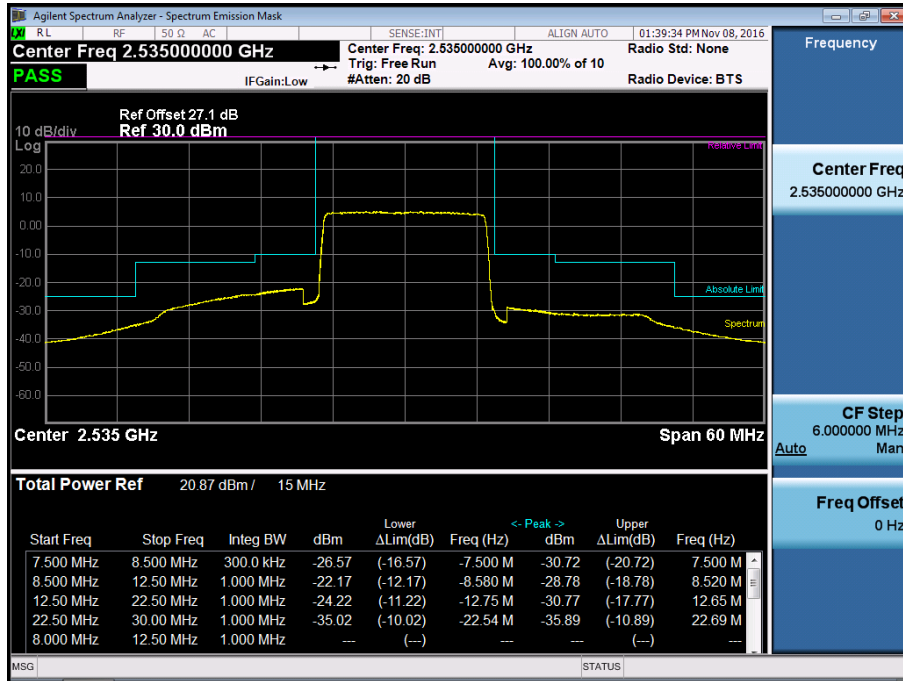
BAND7. Low Channel Edge Plot (15MHz Ch.20825 QPSK RB 75)-1



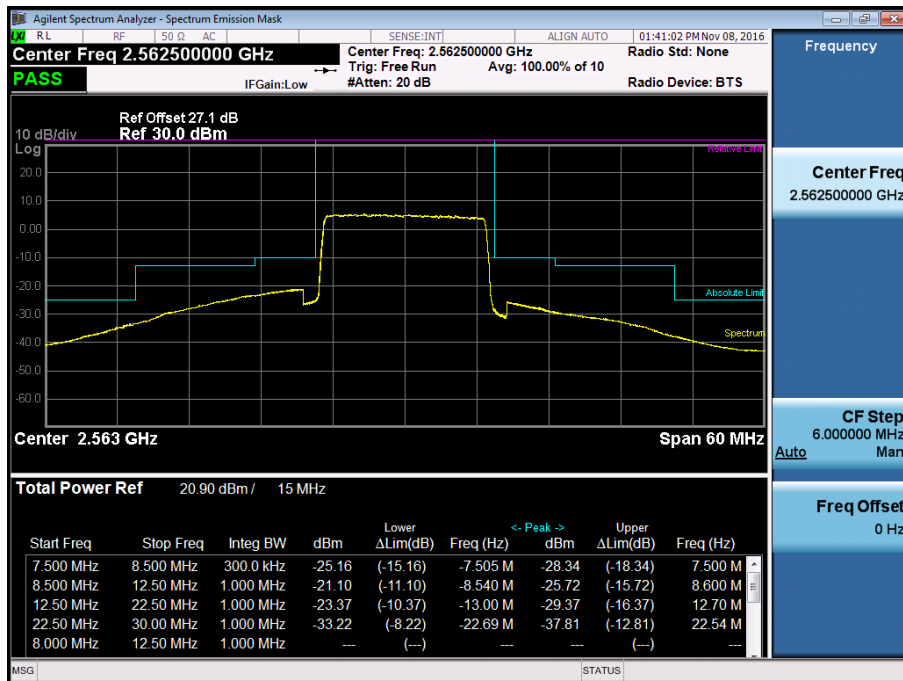
BAND7. Low Channel Edge Plot (15MHz Ch.20825 QPSK RB 75)-1



BAND7. Mid Channel Edge Plot (15MHz Ch.21100 QPSK RB 75)



BAND7. High Channel Edge Plot (15MHz Ch.21375 QPSK RB 75)



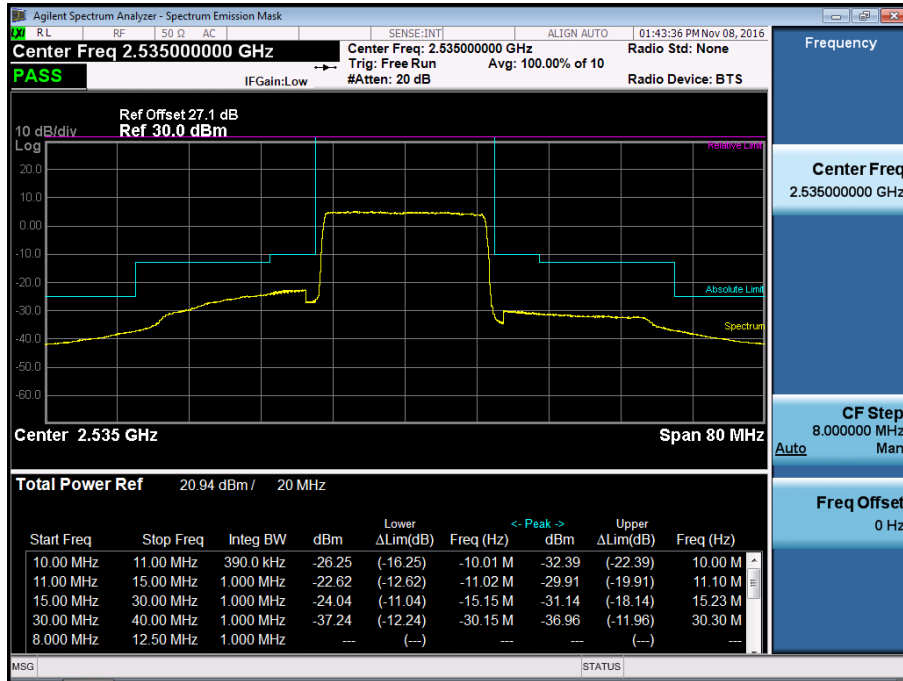
BAND7. Low Channel Edge Plot (20MHz Ch.20850 QPSK RB 100)-1



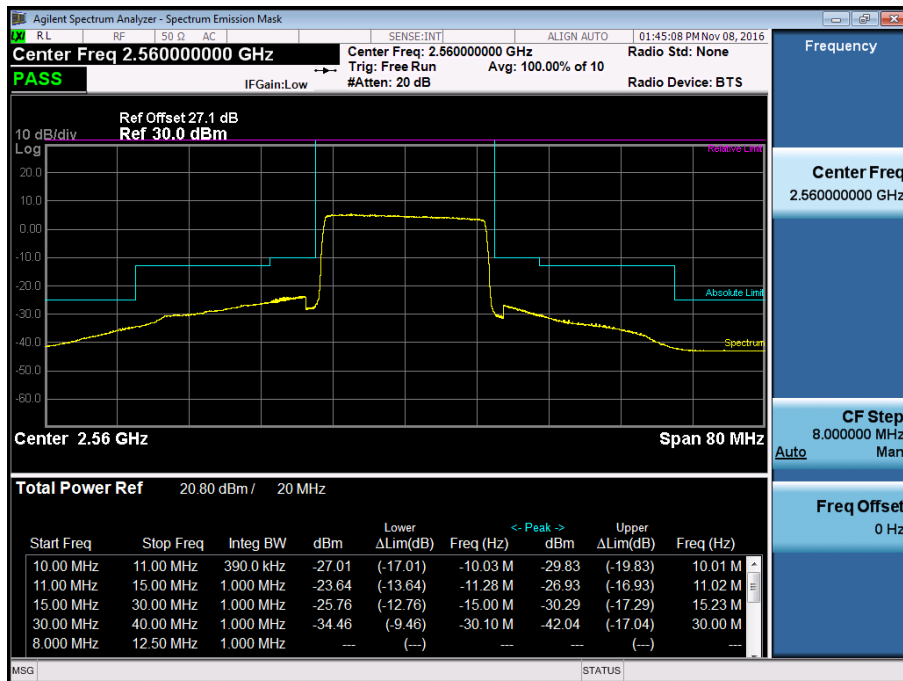
BAND7. Low Channel Edge Plot (20MHz Ch.20850 QPSK RB 100)-2



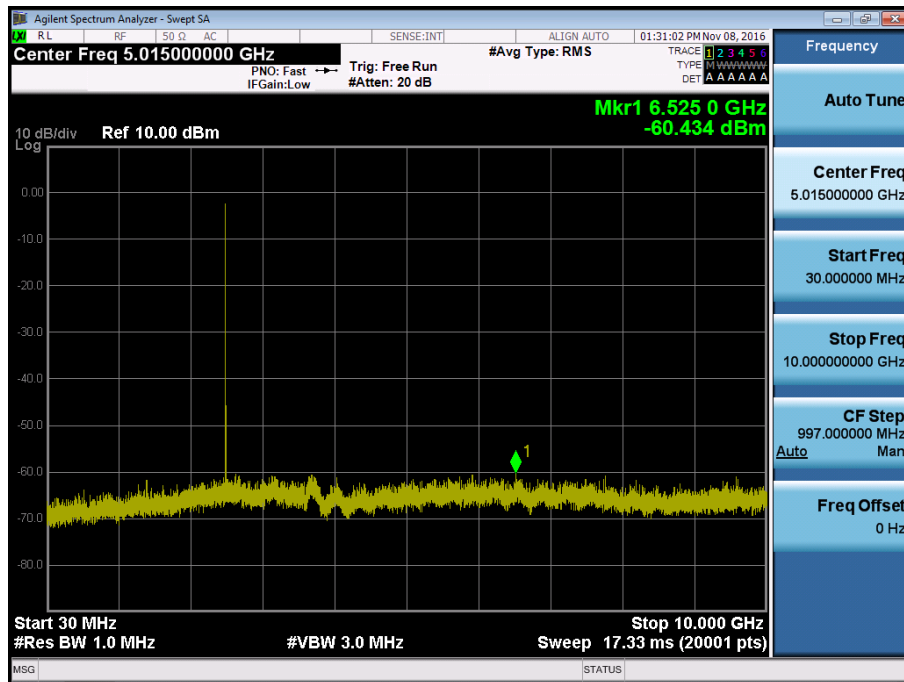
BAND7. Mid Channel Edge Plot (20MHz Ch.21100 QPSK RB 100)



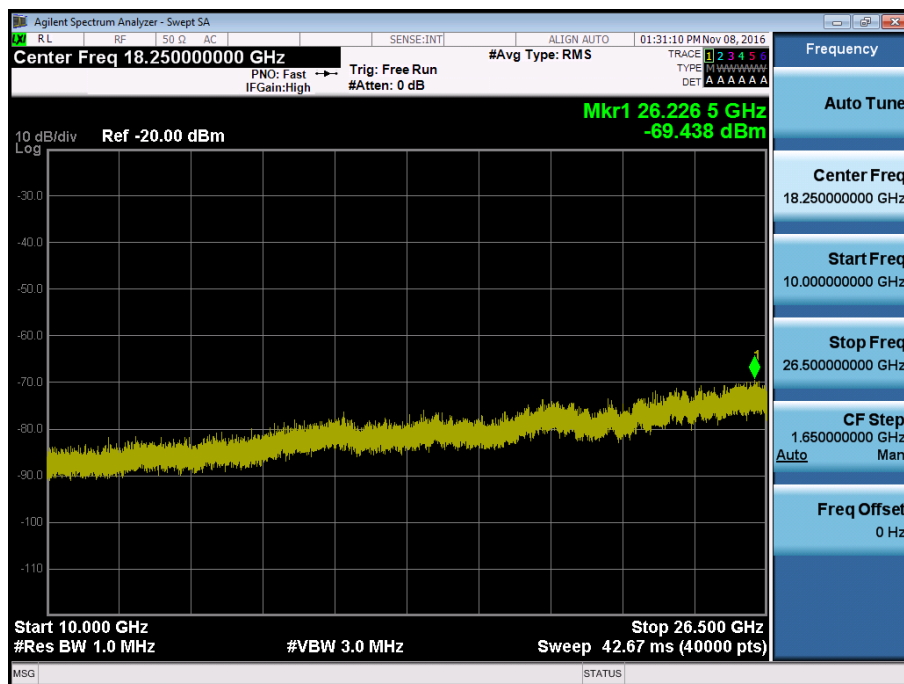
BAND7. High Channel Edge Plot (20MHz Ch.21350 QPSK RB 100)



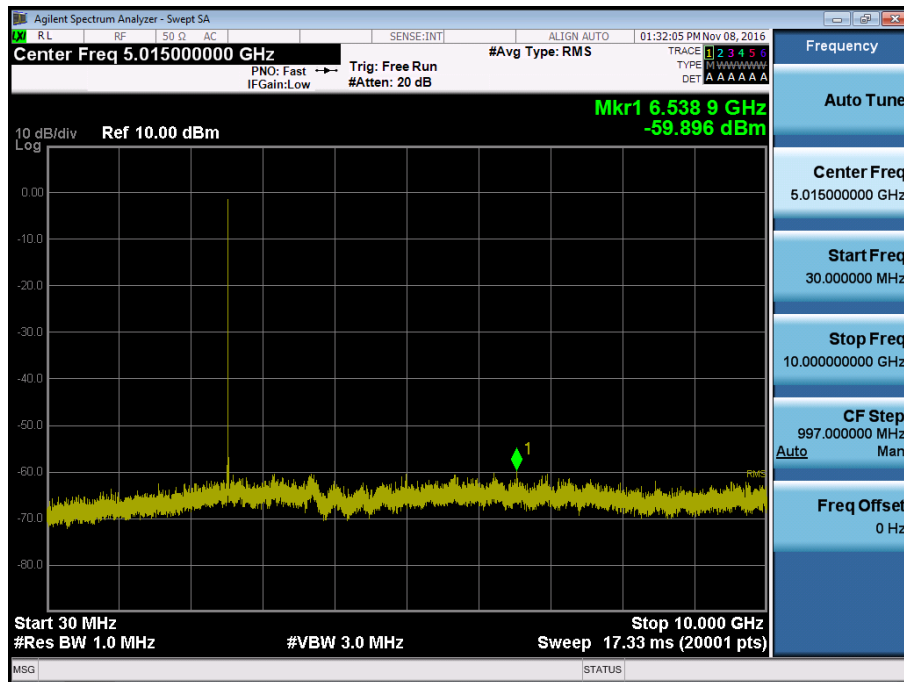
BAND7. Conducted Spurious Plot 1 (5MHz Ch.20775 QPSK RB 1, Offset 0)



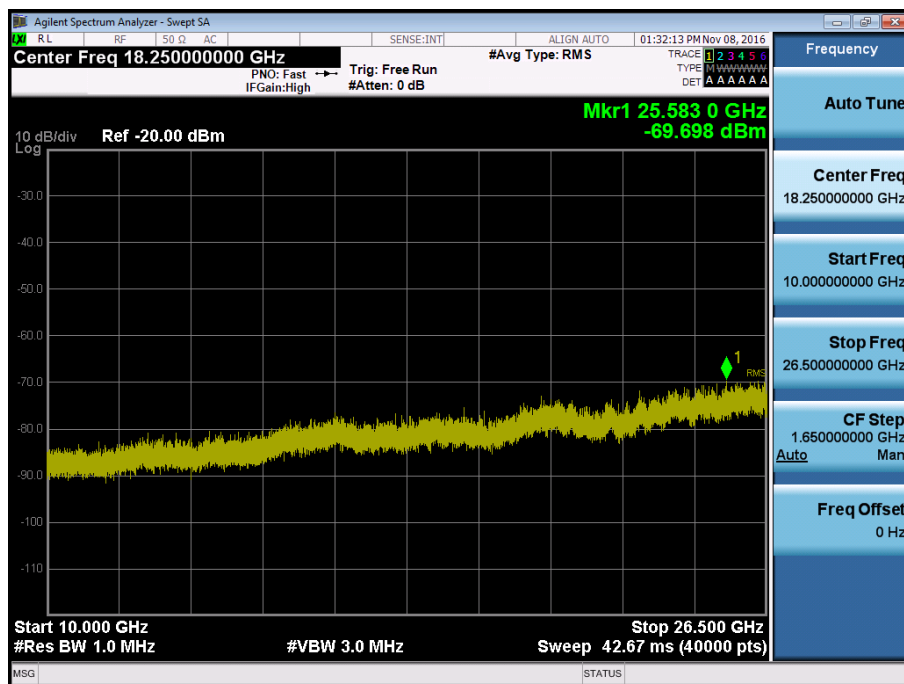
BAND7. Conducted Spurious Plot 2 (5MHz Ch.20775 QPSK RB 1, Offset 0)



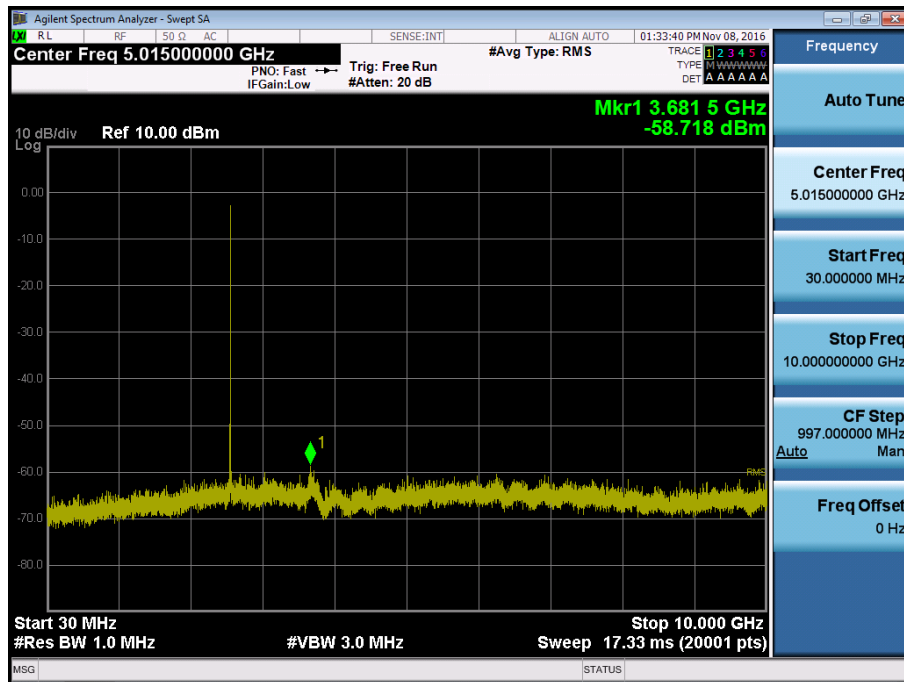
BAND7. Conducted Spurious Plot 1 (5MHz Ch.21100 QPSK RB 1, Offset 0)



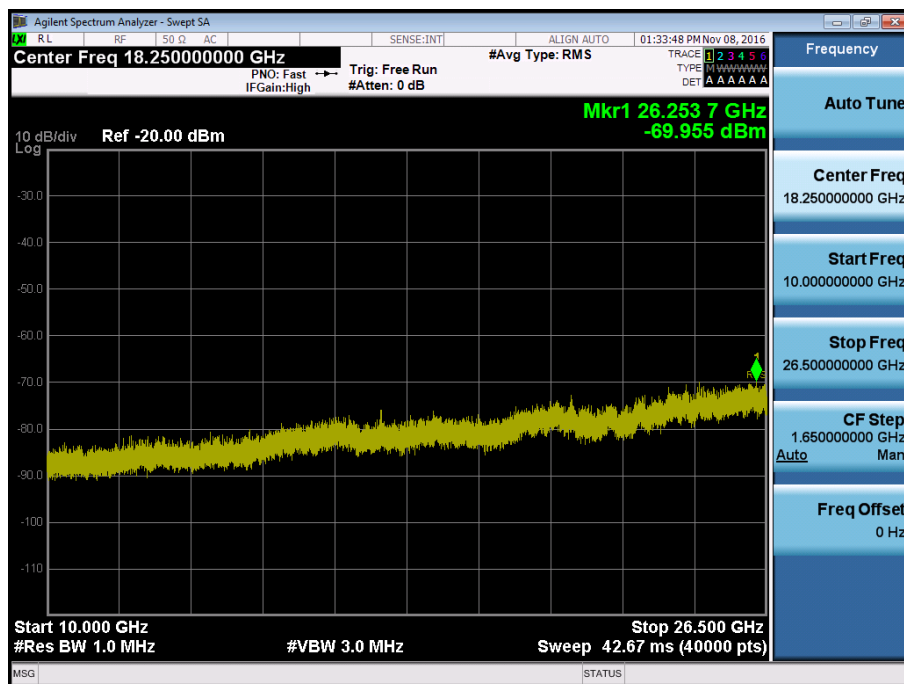
BAND7. Conducted Spurious Plot 2 (5MHz Ch.21100 QPSK RB 1, Offset 0)



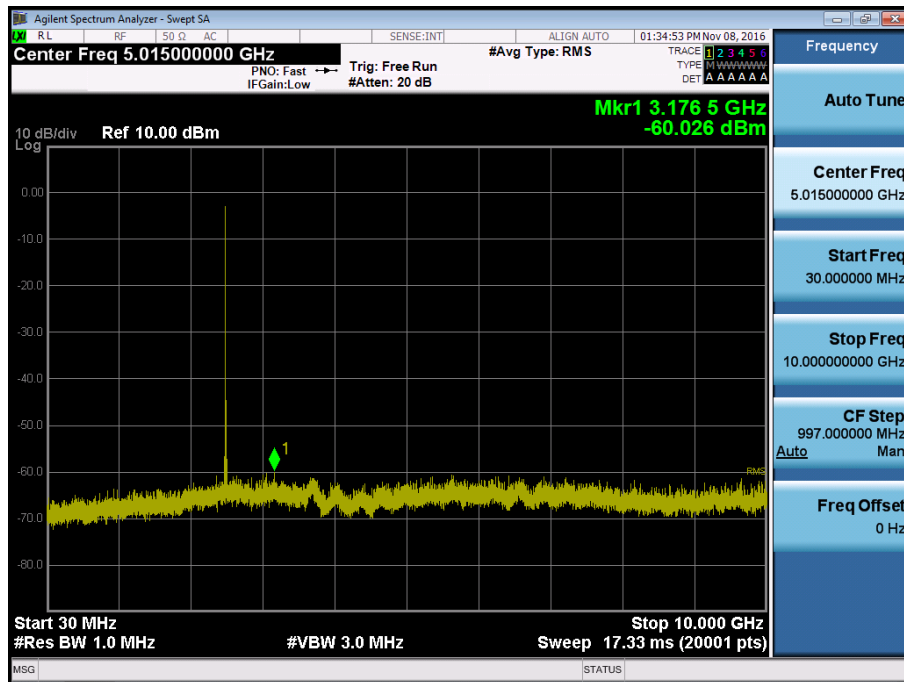
BAND7. Conducted Spurious Plot 1 (5MHz Ch.21425 QPSK RB 1, Offset 0)



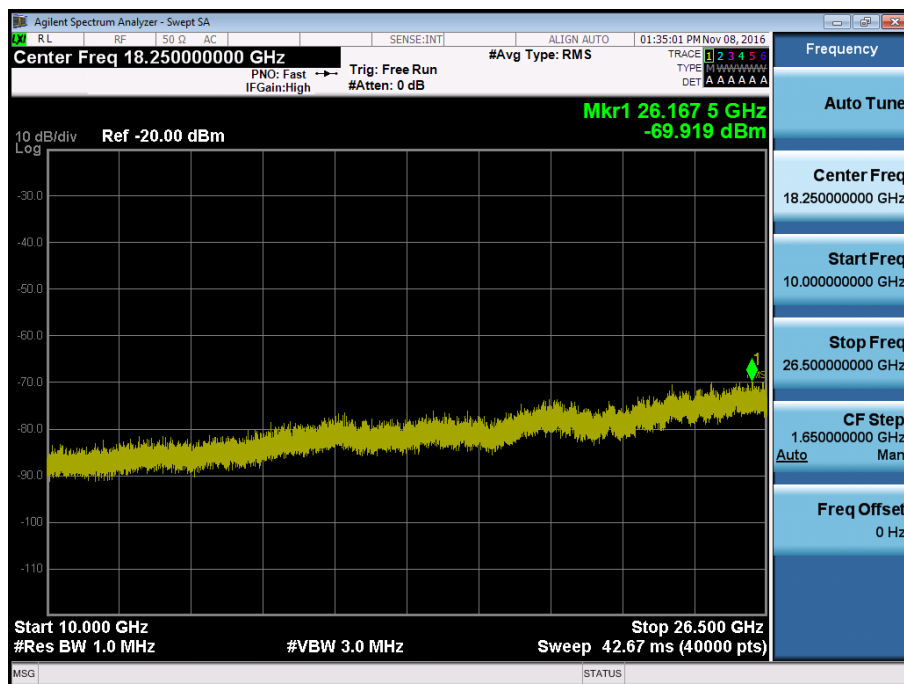
BAND7. Conducted Spurious Plot 2 (5MHz Ch.21425 QPSK RB 1, Offset 0)



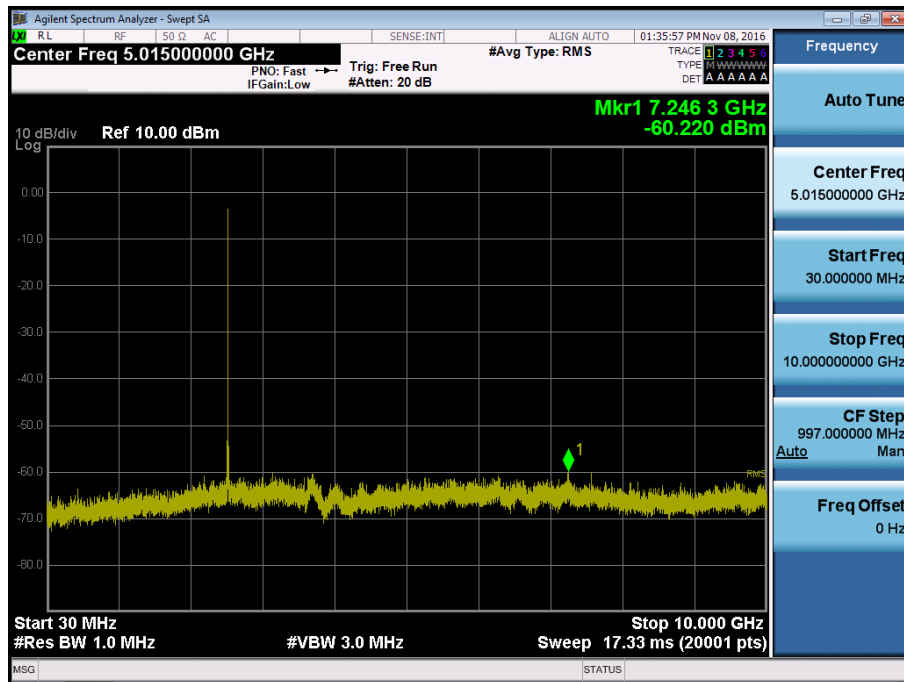
BAND7. Conducted Spurious Plot 1 (10MHz Ch.20800 QPSK RB 1, Offset 0)



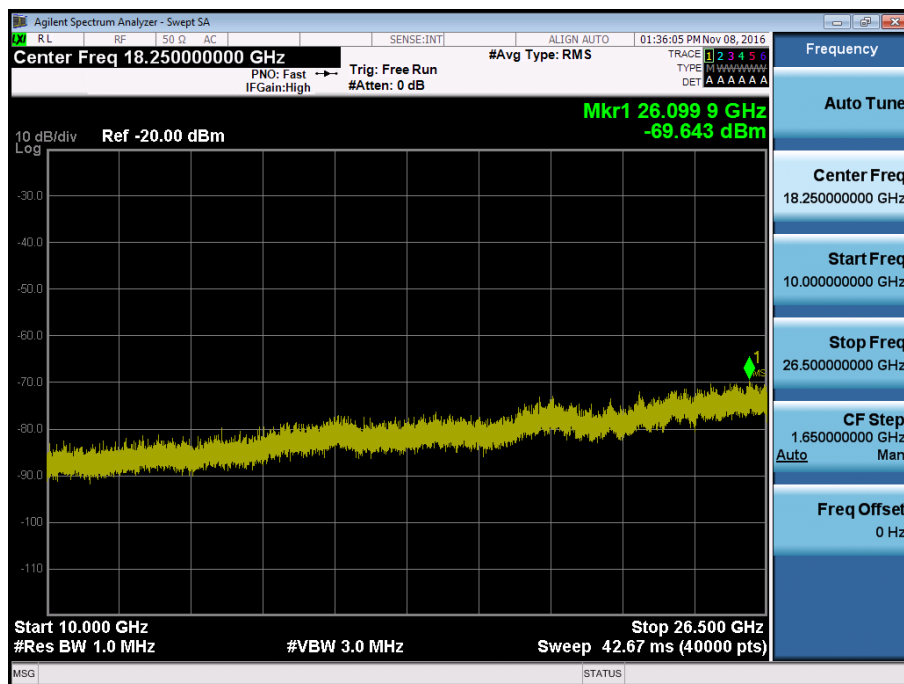
BAND7. Conducted Spurious Plot 2 (10MHz Ch.20800 QPSK RB 1, Offset 0)



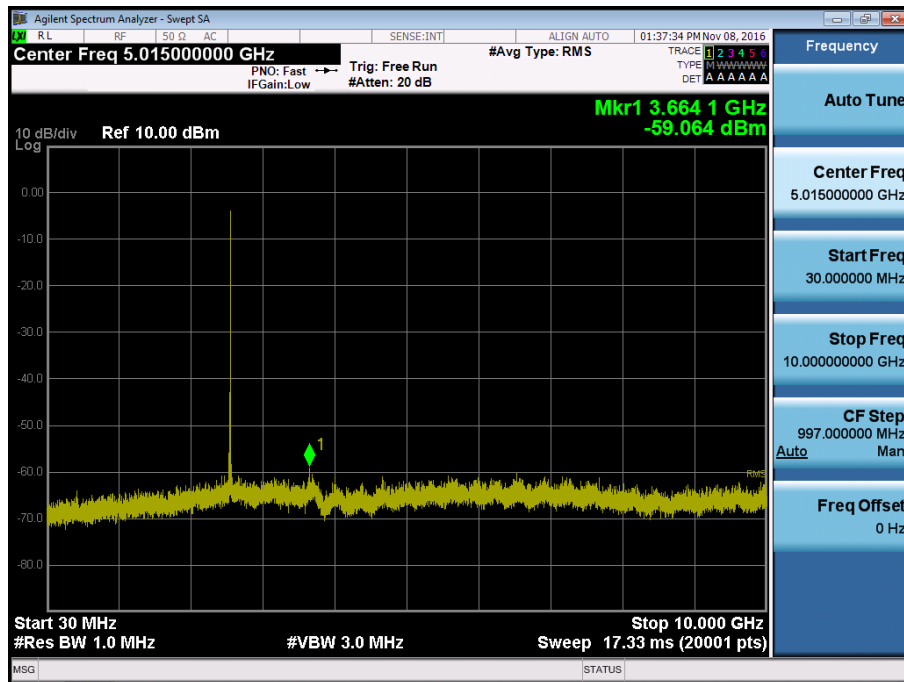
BAND7. Conducted Spurious Plot 1 (10MHz Ch.21100 QPSK RB 1, Offset 0)



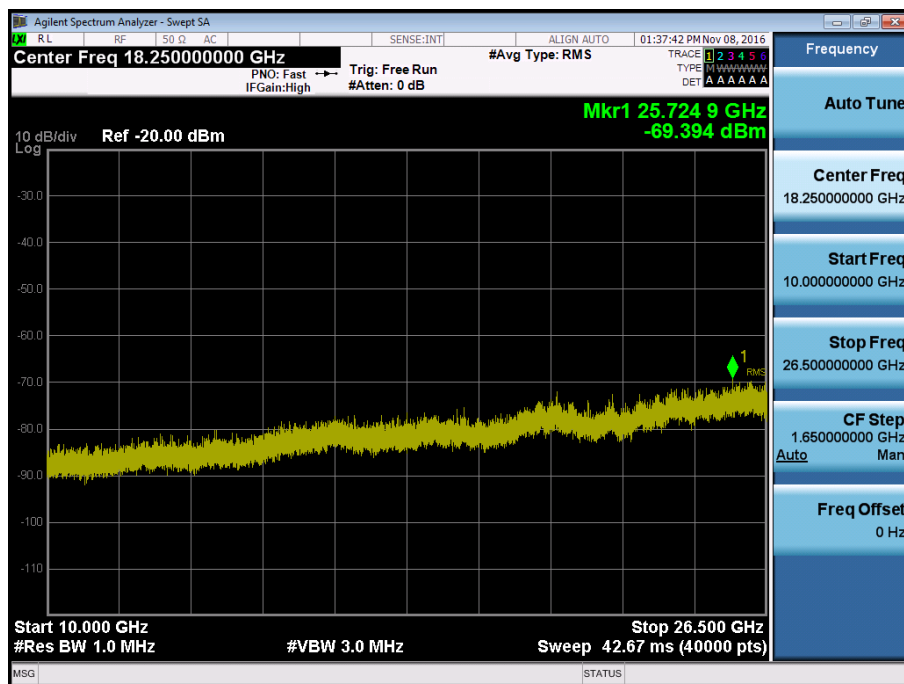
BAND7. Conducted Spurious Plot 2 (10MHz Ch.21100 QPSK RB 1, Offset 0)



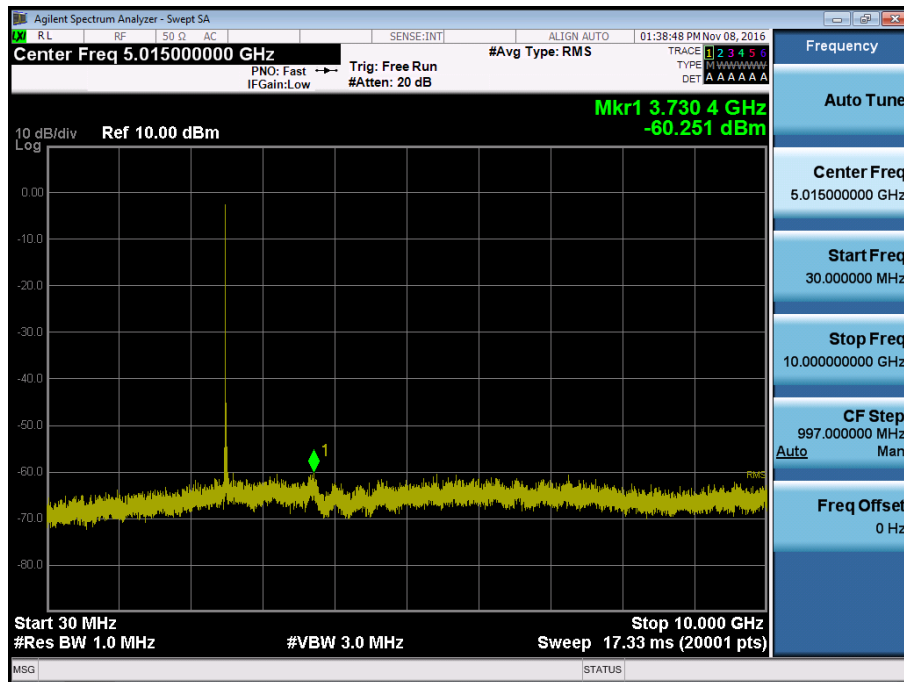
BAND7. Conducted Spurious Plot 1 (10MHz Ch.21400 QPSK RB 1, Offset 0)



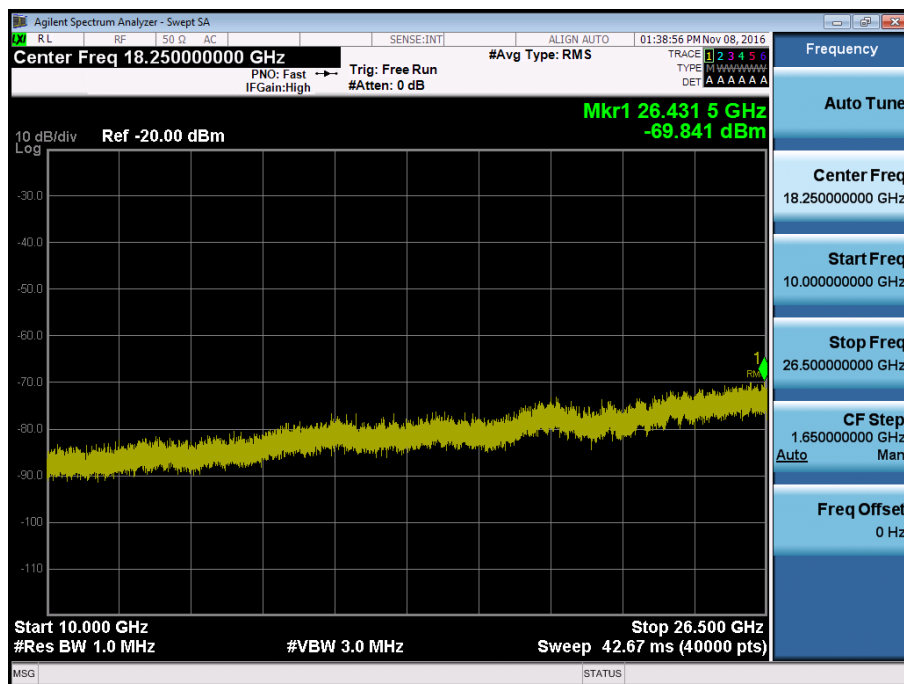
BAND7. Conducted Spurious Plot 2 (10MHz Ch.21400 QPSK RB 1, Offset 0)



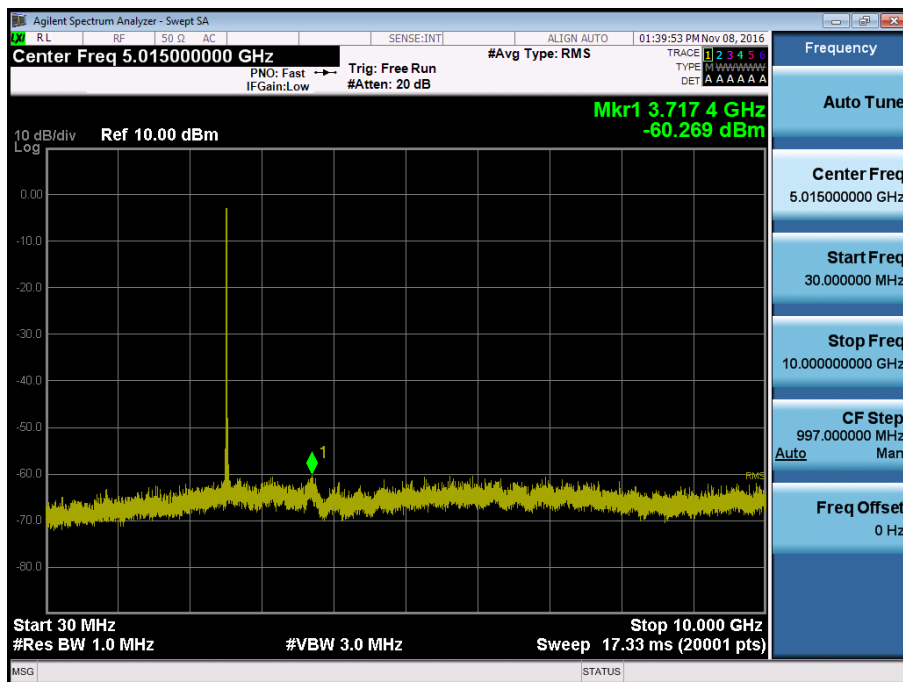
BAND7. Conducted Spurious Plot 1 (15MHz Ch.20825 QPSK RB 1, Offset 0)



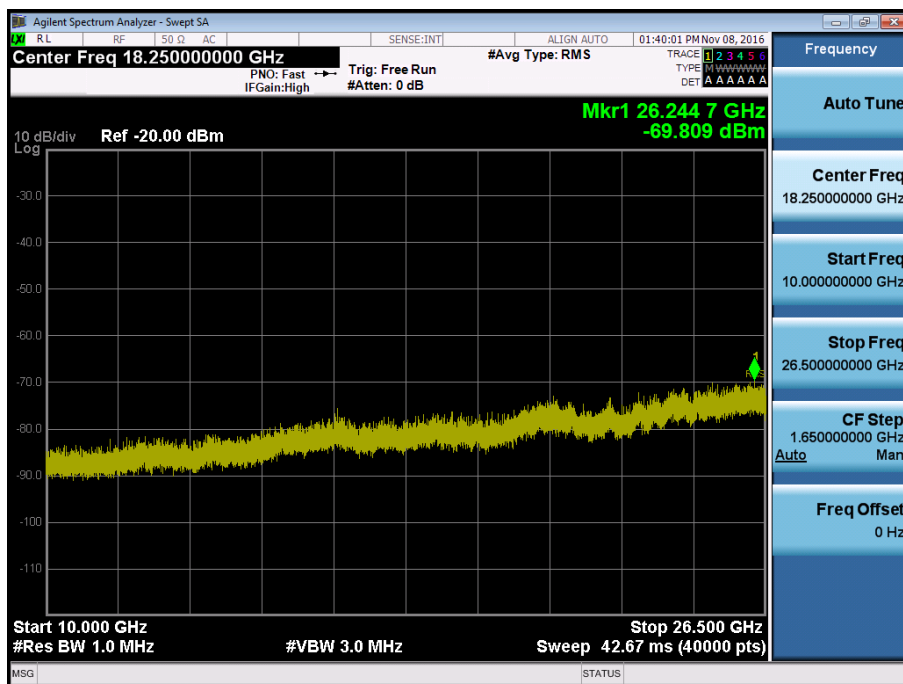
BAND7. Conducted Spurious Plot 2 (15MHz Ch.20825 QPSK RB 1, Offset 0)



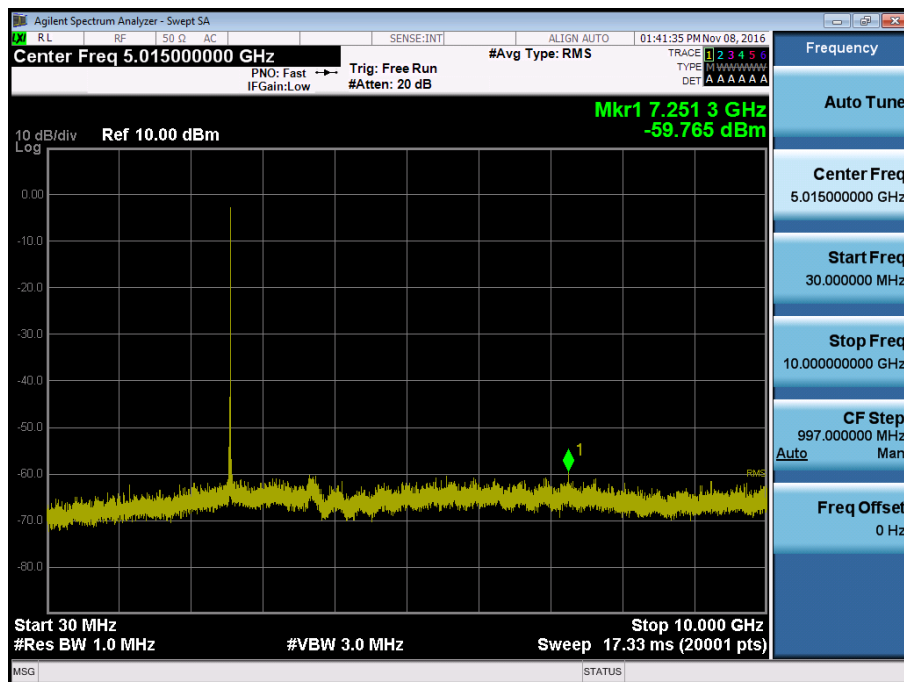
BAND7. Conducted Spurious Plot 1 (15MHz Ch.21100 QPSK RB 1, Offset 0)



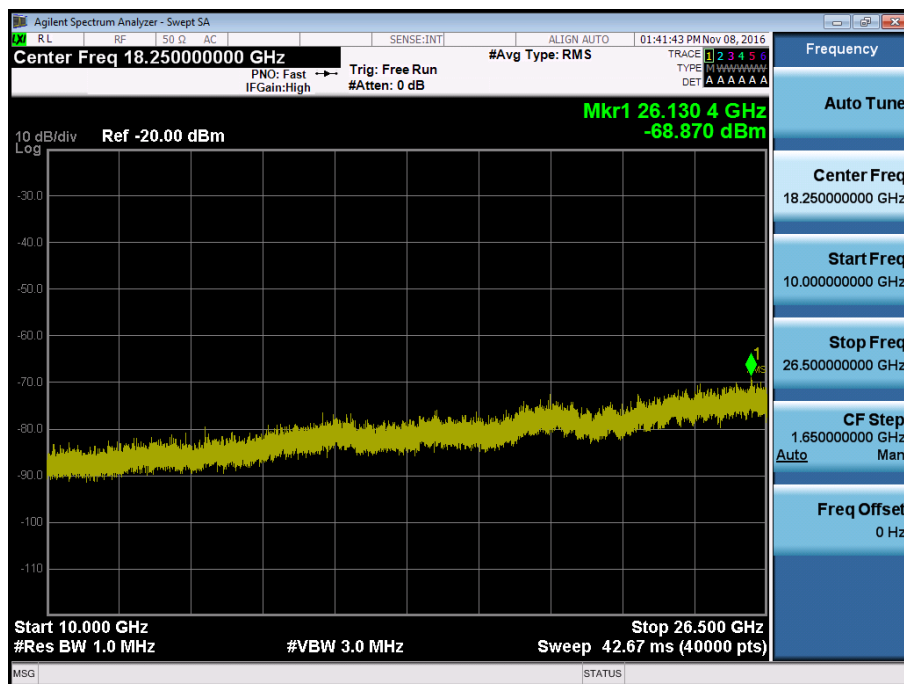
BAND7. Conducted Spurious Plot 2 (15MHz Ch.21100 QPSK RB 1, Offset 0)



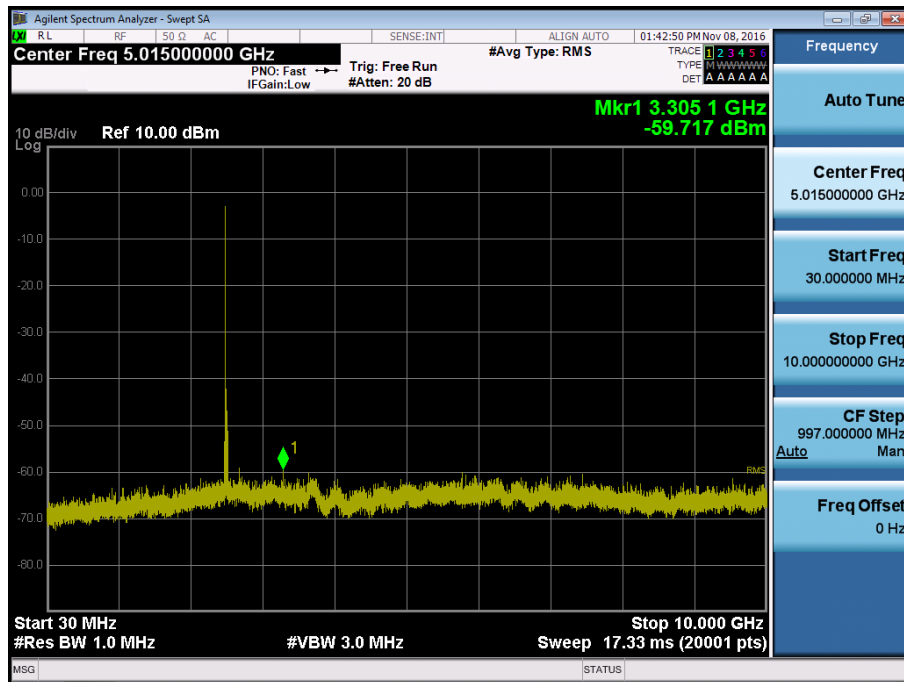
BAND7. Conducted Spurious Plot 1 (15MHz Ch.21375 QPSK RB 1, Offset 0)



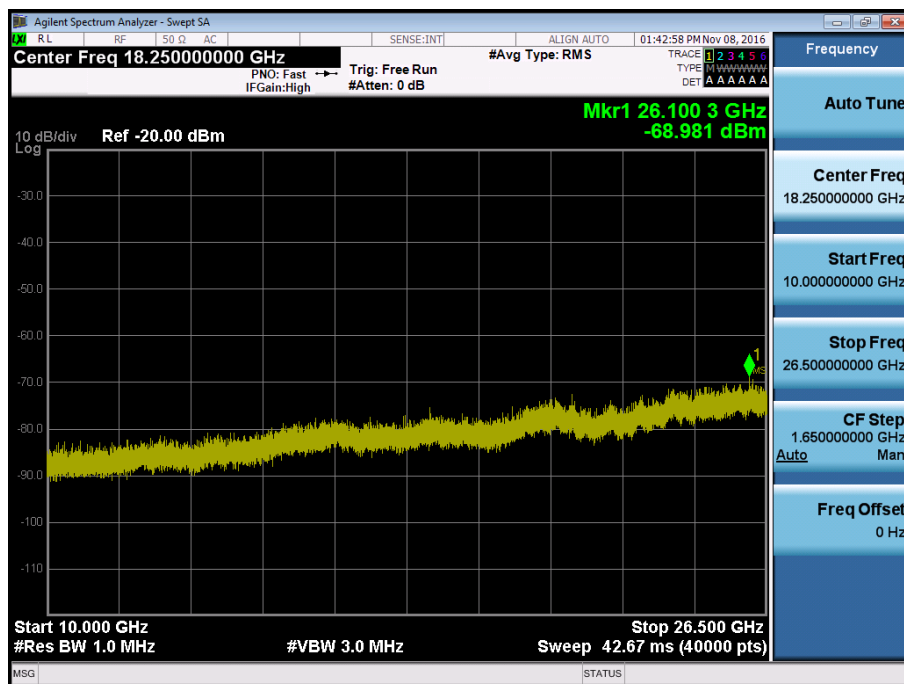
BAND7. Conducted Spurious Plot 2 (15MHz Ch.21375 QPSK RB 1, Offset 0)



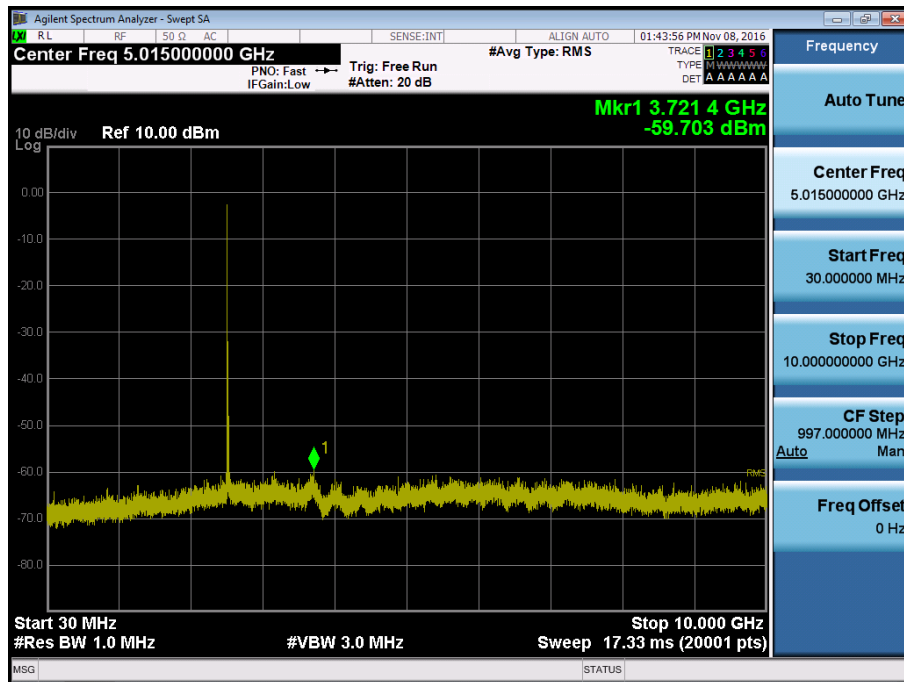
BAND7. Conducted Spurious Plot 1 (20MHz Ch.20850 QPSK RB 1, Offset 0)



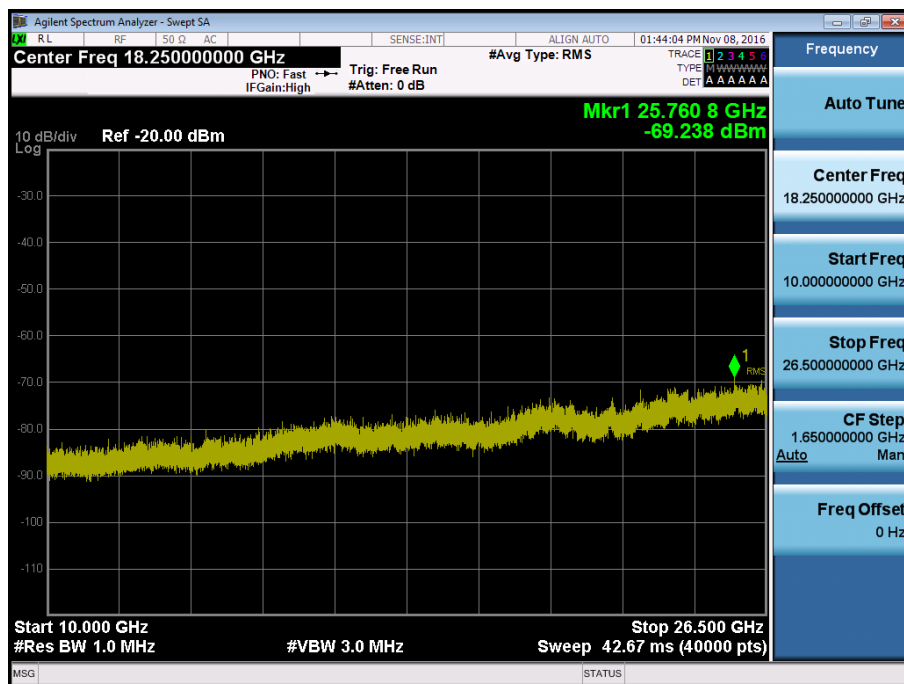
BAND7. Conducted Spurious Plot 2 (20MHz Ch.20850 QPSK RB 1, Offset 0)



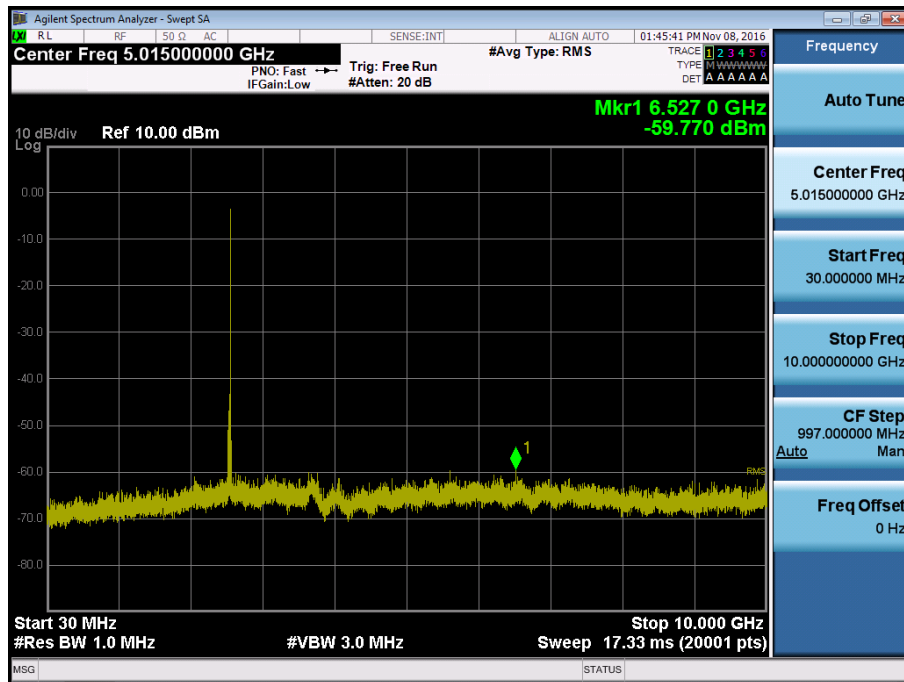
BAND7. Conducted Spurious Plot 1 (20MHz Ch.21100 QPSK RB 1, Offset 0)



BAND7. Conducted Spurious Plot 2 (20MHz Ch.21100 QPSK RB 1, Offset 0)



BAND7. Conducted Spurious Plot 1 (20MHz Ch.21350 QPSK RB 1, Offset 0)



BAND7. Conducted Spurious Plot 2 (20MHz Ch.21350 QPSK RB 1, Offset 0)

