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FCC LTE REPORT

FCC Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si,
Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
June 29, 2017

Location:
HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-R-1706-F092
HCT FRN: 0005866421

FCC ID: **A3LSMJ701M**

APPLICANT: **SAMSUNG Electronics Co., Ltd.**

FCC Model(s): SM-J701M/DS
Additional FCC Model(s): SM-J701M
EUT Type: Mobile Phone
FCC Classification: Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s): §27, §2

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band66/4 (1.4)	1710.7 – 1779.3	1M10G7D	QPSK	0.114	20.57
		1M10W7D	16QAM	0.079	18.97
LTE – Band66/4 (3)	1711.5 – 1778.5	2M71G7D	QPSK	0.116	20.63
		2M71W7D	16QAM	0.080	19.01
LTE – Band66/4 (5)	1712.5 – 1777.5	4M54G7D	QPSK	0.116	20.65
		4M53W7D	16QAM	0.081	19.06
LTE – Band66/4 (10)	1715.0 – 1775.0	8M99G7D	QPSK	0.110	20.40
		9M01W7D	16QAM	0.076	18.80
LTE – Band66/4 (15)	1717.5 – 1772.5	13M5G7D	QPSK	0.108	20.34
		13M5W7D	16QAM	0.073	18.65
LTE – Band66/4 (20)	1720.0 – 1770.0	17M9G7D	QPSK	0.107	20.29
		17M9W7D	16QAM	0.072	18.58

Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	ERP	
				Max. Power (W)	Max. Power (dBm)
LTE – Band13 (5)	779.5 –784.5	4M53G7D	QPSK	0.041	16.11
		4M54W7D	16QAM	0.032	15.06
LTE – Band13 (10)	782.0	9M00G7D	QPSK	0.045	16.53
		9M02W7D	16QAM	0.031	14.91

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 : Jeong Ho Kim
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1706-F092	June 29, 2017	- First Approval Report

Table of Contents

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMJ701M
Application Type:	Certification
FCC Classification:	Licensed Portable Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§27, §2
EUT Type:	Mobile Phone
FCC Model(s):	SM-J701M/DS
Additional FCC Model(s):	SM-J701M
LTE Band 66/4 Tx Frequency :	1710.7 MHz – 1779.3 MHz (1.4 MHz) 1711.5 MHz – 1778.5 MHz (3 MHz) 1712.5 MHz – 1777.5 MHz (5 MHz) 1715.0 MHz – 1775.0 MHz (10 MHz) 1717.5 MHz – 1772.5 MHz (15 MHz) 1720.0 MHz – 1770.0 MHz (20 MHz)
LTE Band 13 Tx Frequency :	779.5 MHz –784.5 MHz (LTE – Band 13 (5MHz)) 782 MHz (LTE – Band 13 (10 MHz))

Max. RF Output Power:	Band 66/4 (1.4 MHz):	0.114 W (QPSK) (20.57 dBm) 0.079 W (16-QAM) (18.97 dBm)
	Band 66/4 (3 MHz):	0.116 W (QPSK) (20.63 dBm) 0.080 W (16-QAM) (19.01 dBm)
	Band 66/4 (5 MHz):	0.116 W (QPSK) (20.65 dBm) 0.081 W (16-QAM) (19.06 dBm)
	Band 66/4 (10 MHz):	0.110 W (QPSK) (20.40 dBm) 0.076 W (16-QAM) (18.80 dBm)
	Band 66/4 (15 MHz):	0.108 W (QPSK) (20.34 dBm) 0.073 W (16-QAM) (18.65 dBm)
	Band 66/4 (20 MHz):	0.107 W (QPSK) (20.29 dBm) 0.072 W (16-QAM) (18.58 dBm)
	Band 13 (5 MHz) :	0.041 W (QPSK) (16.11 dBm) 0.032 W (16-QAM) (15.06 dBm)
	Band 13 (10 MHz) :	0.045 W (QPSK) (16.53 dBm) 0.031 W (16-QAM) (14.91 dBm)

Emission Designator(s):	Band 66/4 (1.4 MHz):	1M10G7D (QPSK) / 1M10W7D (16-QAM)
	Band 66/4 (3 MHz):	2M71G7D (QPSK) / 2M71W7D (16-QAM)
	Band 66/4 (5 MHz):	4M54G7D (QPSK) / 4M53W7D (16-QAM)
	Band 66/4 (10 MHz):	8M99G7D (QPSK) / 9M01W7D (16-QAM)
	Band 66/4 (15 MHz):	13M5G7D (QPSK) / 13M5W7D (16-QAM)
	Band 66/4 (20 MHz):	17M9G7D (QPSK) / 17M9W7D (16-QAM)
	Band 13 (5 MHz) :	4M53G7D (QPSK) / 4M54W7D (16-QAM)
	Band 13 (10 MHz) :	9M00G7D (QPSK) / 9M02W7D (16-QAM)
Date(s) of Tests:	June 19, 2017 ~ June 27, 2017	
Device Capabilities:	LTE Band 66 (1710 - 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz). Therefore, test data provided in this report covers Band 4 as well as Band 66.	

2. INTRODUCTION

2.1. EUT DESCRIPTION

The SAMSUNG Electronics Co., Ltd. SM-J701M/DS Mobile Phone consists of LTE LTE 66 and 13.

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 ERP/EIRP RADIATED POWER AND RADIATED SPURIOUS EMISSIONS

Note: ERP(Effective Radiated Power), EIRP(Effective 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-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 a 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;

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

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

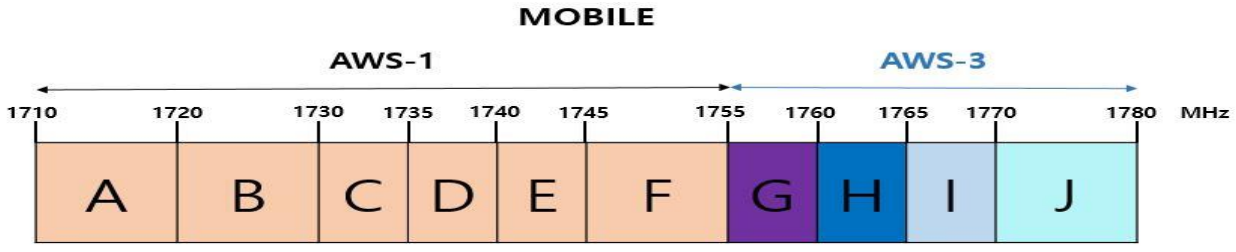
The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

Radiated spurious emissions

: Frequency Range : 9 kHz ~ 10^{th} Harmonics of highest channel fundamental frequency.

3.2 AWS – MOBILE FREQUENCY BLOCKS (1710 – 1780 MHz)

§27.5(h)



BLOCK 1 : 1710 – 1720 MHz (A)
BLOCK 2 : 1720 – 1730 MHz (B)
BLOCK 3 : 1730 – 1735 MHz (C)
BLOCK 4 : 1735 – 1740 MHz (D)
BLOCK 5 : 1740 – 1745 MHz (E)
BLOCK 6 : 1745 – 1755 MHz (F)
BLOCK 7 : 1755 – 1760 MHz (G)
BLOCK 8 : 1760 – 1765 MHz (H)
BLOCK 9 : 1765 – 1770 MHz (I)
BLOCK 10 : 1770 – 1780 MHz (J)

3.3 BLOCK B FREQUENCY RANGE (775 – 788 MHz)

§27.5(b)

746-758 MHz, 775-788 MHz, and 805-806 MHz bands. The following frequencies are available for licensing pursuant to this part in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands:

(1) Two paired channels of 1 megahertz each are available for assignment in Block A in the 757-758 MHz and 787-788 MHz bands.

(2) Two paired channels of 1 megahertz each are available for assignment in Block B in the 775-776 MHz and 805-806 MHz bands.

(3) Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746-757 MHz and 776-787 MHz bands will instead be made available for assignment at a subsequent auction as follows:

(i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746-752 MHz and 776-782 MHz bands.

(ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752-757 MHz and 782-787 MHz band.

3.4 PEAK-AVERAGE RATIO.

Test Procedure

Peak to Average Power Ratio is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, 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.

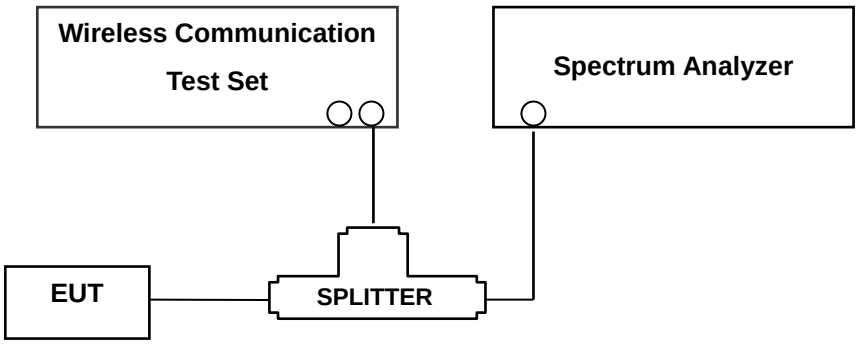
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the 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 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.

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

3.6 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.

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer.

The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. 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 1 MHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 30 kHz bandwidth may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency

Additionally, for operations in the 776-788MHz band, the power of any emission outside the licensee's frequency band of operation shall be attenuated below the transmitted power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On any frequency outside the 776-788MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43+10log(P)dB.

(2) On all frequencies between 763-775 and 793-805MHz, by a factor not less than 65+10log(P)dB in a 6.25kHz band segment.

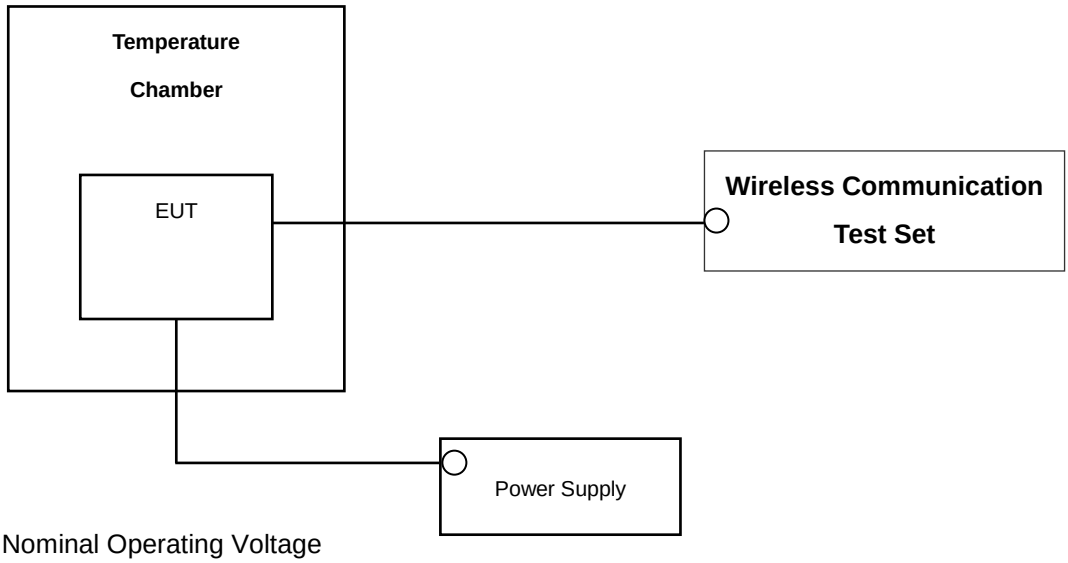
For operations in the 788–793 MHz band, the power of any emission outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(2) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB

3.7 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

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 the 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	04/24/2017	Annual	04/24/2018
Wainwright	WHK1.2/15G-10EF/H.P.F	4	04/10/2017	Annual	04/10/2018
Wainwright	WHK3.3/18G-10EF/H.P.F	2	04/10/2017	Annual	04/10/2018
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	05/04/2017	Annual	05/04/2018
Agilent	E3632A/DC Power Supply	KR75303243	07/12/2016	Annual	07/12/2017
Schwarzbeck	UHAP/ Dipole Antenna	557	03/31/2017	Biennial	03/31/2019
Schwarzbeck	UHAP/ Dipole Antenna	558	03/31/2017	Biennial	03/31/2019
ESPEC	SU-642 / Chamber	0093008124	03/31/2017	Annual	03/31/2018
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	09/09/2016	Biennial	09/09/2018
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	1298	10/14/2016	Biennial	10/14/2018
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/25/2017	Biennial	04/25/2019
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	04/25/2017	Biennial	04/25/2019
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY52090906	06/01/2017	Annual	06/01/2018
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/22/2017	Annual	06/22/2018
REOHDE & SCHWARZ	FSV40-N/Spectrum Analyzer	101068-SZ	09/23/2016	Annual	09/23/2017
Agilent	8960 (E5515C)/ Base Station	MY48360800	10/19/2016	Annual	10/19/2017
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	04/06/2017	Biennial	04/06/2019
Schwarzbeck	VULB9160/ Bilog Antenna	3150	09/30/2016	Biennial	09/30/2018
Schwarzbeck	VULB9160/ Bilog Antenna	3368	10/14/2016	Biennial	10/14/2018
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6200863156	02/15/2017	Annual	02/15/2018
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	02/13/2017	Annual	02/13/2018
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/18/2016	Annual	07/18/2017
Anritsu Corp.	MT8821C/Radio Communication Analyzer	6201502997	08/04/2016	Annual	08/04/2017

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.

Parameter	Expanded Uncertainty (±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)	Test Description	Test Limit	Test Condition	Test Result
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS
2.1051, 27.53(g), 27.53(c)	Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	< 43 +10 $\log_{10}$ (P[Watts]) at Band Edge and for all-of-band emissions		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 / variation of ambient temperature	Emission must remain in band		PASS
27.50(b)(10)	Effective Radiated Power (Band 13)	< 3 Watts max. ERP	RADIATED	PASS
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	< 1 Watts max. EIRP		PASS
2.1053, 27.53(g), 27.53(h)	Undesirable Out-of-Band Emissions	< 43 +10 $\log_{10}$ (P[Watts]) for all out-of-band emissions		PASS
2.1053, 27.53(f)	Undesirable Emissions in the 1559 – 1610 MHz band	< -70dBW/MHz EIRP (wideband) < -80dBW EIRP (narrowband)		PASS

Note regarding all Emission Mask test plots:

The FCC limit is 65 + 10$\log_{10}$($P_{[Watts]}$) = -35 dBm in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth, the limit was adjusted by 10$\log_{10}$(10 kHz/6.25 kHz) = 2.04 dB. Thus, the limit shown in all emission mask plots for all available modulation types was -35 dBm + 2.04 dB = -32.96 dBm.

*: See SAR Report

7. SAMPLE CALCULATION

A. EIRP Sample Calculation

Mode	Ch./ Freq.		Measured Level(dBm)	Substitute LEVEL(dBm)	Ant. Gain (dBi)	C.L	Pol.	Limit	EIRP	
	channel	Freq.(MHz)						W	W	dBm
LTE Band66	132322	1745.0	-15.75	18.45	9.90	1.76	H	< 1.00	0.456	26.59

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 and the antenna height 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 EQUIVALENT ISOTROPIC RADIATED POWER (Band 66/4)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1710.7	1.4 MHz	QPSK	-20.10	12.48	9.37	1.92	H	< 1.00	0.098	19.93
		16-QAM	-21.66	10.92	9.37	1.92	H		0.069	18.37
1745.0		QPSK	-20.15	12.47	9.49	1.94	H		0.100	20.02
		16-QAM	-21.75	10.87	9.49	1.94	H		0.070	18.42
1779.3		QPSK	-19.73	12.93	9.60	1.96	H		0.114	20.57
		16-QAM	-21.33	11.33	9.60	1.96	H		0.079	18.97

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

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1711.5	3 MHz	QPSK	-20.03	12.55	9.37	1.92	H	< 1.00	0.100	20.00
		16-QAM	-21.57	11.01	9.37	1.92	H		0.070	18.46
1745.0		QPSK	-20.27	12.35	9.49	1.94	H		0.098	19.90
		16-QAM	-21.86	10.76	9.49	1.94	H		0.068	18.31
1778.5		QPSK	-19.66	13.00	9.59	1.96	H		0.116	20.63
		16-QAM	-21.28	11.38	9.59	1.96	H		0.080	19.01

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

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1712.5	5 MHz	QPSK	-19.96	12.63	9.37	1.92	H	< 1.00	0.102	20.08
		16-QAM	-21.58	11.01	9.37	1.92	H		0.070	18.46
1745.0		QPSK	-20.22	12.40	9.49	1.94	H		0.099	19.95
		16-QAM	-21.78	10.84	9.49	1.94	H		0.069	18.39
1777.5		QPSK	-19.64	13.02	9.59	1.96	H		0.116	20.65
		16-QAM	-21.23	11.43	9.59	1.96	H		0.081	19.06

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

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1715.0	10 MHz	QPSK	-19.93	12.66	9.39	1.92	H	< 1.00	0.103	20.12
		16-QAM	-21.69	10.90	9.39	1.92	H		0.069	18.36
1745.0		QPSK	-20.21	12.41	9.49	1.94	H		0.099	19.96
		16-QAM	-21.88	10.74	9.49	1.94	H		0.067	18.29
1775.0		QPSK	-19.88	12.78	9.58	1.96	H		0.110	20.40
		16-QAM	-21.48	11.18	9.58	1.96	H		0.076	18.80

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

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1717.5	15 MHz	QPSK	-20.03	12.55	9.40	1.92	H	< 1.00	0.101	20.03
		16-QAM	-21.72	10.86	9.40	1.92	H		0.068	18.34
1745.0		QPSK	-20.29	12.33	9.49	1.94	H		0.097	19.88
		16-QAM	-22.02	10.60	9.49	1.94	H		0.065	18.15
1772.5		QPSK	-19.93	12.72	9.57	1.95	H		0.108	20.34
		16-QAM	-21.62	11.03	9.57	1.95	H		0.073	18.65

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

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBi)	C.L	Pol	Limit	EIRP	
								W	W	dBm
1720.0	20 MHz	QPSK	-19.98	12.61	9.40	1.92	H	< 1.00	0.102	20.09
		16-QAM	-21.66	10.93	9.40	1.92	H		0.069	18.41
1745.0		QPSK	-20.24	12.38	9.49	1.94	H		0.098	19.93
		16-QAM	-21.84	10.78	9.49	1.94	H		0.068	18.33
1770.0		QPSK	-19.98	12.67	9.57	1.95	H		0.107	20.29
		16-QAM	-21.69	10.96	9.57	1.95	H		0.072	18.58

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

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method

according 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 LTE signals, RBW = 1-5% of the OBW, not to exceed 1MHz, VBW ≥ 3 x RBW, Detector = RMS. 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 x plane in LTE mode. Also worst case of detecting Antenna is horizontal polarization in LTE mode.

8.2 EFFECTIVE RADIATED POWER (Band 13)

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
779.5	5 MHz	QPSK	-32.54	27.94	-10.58	1.27	V	< 3.00	0.041	16.09
		16-QAM	-33.92	26.56	-10.58	1.27	V		0.030	14.71
782.0		QPSK	-32.66	27.98	-10.60	1.27	V		0.041	16.11
		16-QAM	-33.71	26.93	-10.60	1.27	V		0.032	15.06
784.5		QPSK	-33.28	27.51	-10.61	1.27	V		0.037	15.63
		16-QAM	-34.78	26.01	-10.61	1.27	V		0.026	14.13

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

Freq (MHz)	Bandwidth	Modulation	Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain(dBd)	C.L	Pol	Limit	ERP	
								W	W	dBm
782.0	10 MHz	QPSK	-32.24	28.40	-10.60	1.27	V	< 3.00	0.045	16.53
		16-QAM	-33.86	26.78	-10.60	1.27	V		0.031	14.91

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

NOTES:

Effective Radiated Power Output Measurements by Substitution Method

according 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 LTE signals, RBW = 1-5% of the OBW, not to exceed 1MHz, VBW ≥ 3 x RBW, Detector = RMS. A half-wave dipole 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 dipole is measured. The ERP 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 y 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 (1.4 MHz Band 66/4 LTE)

▣ OPERATING FREQUENTY: 1779.3 MHz

▣ MEASURED OUTPUT POWER: 20.57 dBm = 0.114 W

▣ MODULATION SIGNAL: 1.4 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 33.57 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
131979 (1710.7)	3,421.40	-50.04	12.19	-57.01	2.78	H	-47.60	68.17
	5,132.10	-56.18	12.76	-56.85	3.44	V	-47.53	68.10
	6,842.80	-55.86	12.06	-51.91	3.99	H	-43.84	64.41
132322 (1745.0)	3,490.00	-53.01	12.33	-59.36	2.81	H	-49.84	70.41
	5,235.00	-56.14	12.91	-57.55	3.47	V	-48.11	68.68
	6,980.00	-55.89	11.77	-50.63	4.04	H	-42.90	63.47
132665 (1779.3)	3,558.60	-53.27	12.39	-59.40	2.85	V	-49.86	70.43
	5,337.90	-55.79	13.04	-57.28	3.52	V	-47.76	68.33
	7,117.20	-53.82	11.73	-49.31	4.06	H	-41.64	62.21

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters 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.

8.3.2 RADIATED SPURIOUS EMISSIONS (3 MHz Band 66/4 LTE)

▣ OPERATING FREQUENTY: 1778.5 MHz

▣ MEASURED OUTPUT POWER: 20.63 dBm = 0.116 W

▣ MODULATION SIGNAL: 3 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 33.63 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
131987 (1711.5)	3,423.00	-51.25	12.19	-58.20	2.78	H	-48.79	69.42
	5,134.50	-56.75	12.76	-57.40	3.44	H	-48.08	68.71
	6,846.00	-56.57	12.60	-53.21	3.99	H	-44.60	65.23
132322 (1745.0)	3,490.00	-52.22	12.33	-58.57	2.81	H	-49.05	69.68
	5,235.00	-57.20	12.90	-58.67	3.47	H	-49.24	69.87
	6,980.00	-55.53	11.77	-50.27	4.04	V	-42.54	63.17
132657 (1778.5)	3,557.00	-53.23	12.39	-59.25	2.85	H	-49.71	70.34
	5,335.50	-57.24	13.04	-58.78	3.52	H	-49.26	69.89
	7,114.00	-55.27	11.73	-50.88	4.06	V	-43.21	63.84

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters 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.

8.3.3 RADIATED SPURIOUS EMISSIONS (5 MHz Band 66/4 LTE)

▣ OPERATING FREQUENTY: 1777.5 MHz

▣ MEASURED OUTPUT POWER: 20.65 dBm = 0.116 W

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 33.65 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
131997 (1712.5)	3,425.00	-50.21	12.19	-57.16	2.78	H	-47.75	68.40
	5,137.50	-56.46	12.76	-57.11	3.44	V	-47.79	68.44
	6,850.00	-55.86	12.04	-51.75	4.00	V	-43.71	64.36
132322 (1745.0)	3,490.00	-53.22	12.33	-59.57	2.81	H	-50.05	70.70
	5,235.00	-56.88	12.90	-58.35	3.47	V	-48.92	69.57
	6,980.00	-54.80	11.77	-49.54	4.04	V	-41.81	62.46
132647 (1777.5)	3,555.00	-54.58	12.39	-60.60	2.85	H	-51.06	71.71
	5,332.50	-56.27	13.04	-57.81	3.52	V	-48.29	68.94
	7,110.00	-54.66	11.73	-50.27	4.06	V	-42.60	63.25

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters 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.

8.3.4 RADIATED SPURIOUS EMISSIONS (10 MHz Band 66/4 LTE)

▣ OPERATING FREQUENTY: 1775.00 MHz

▣ MEASURED OUTPUT POWER: 20.40 dBm = 0.110 W

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 33.40 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
132022 (1715.0)	3,430.00	-50.10	12.21	-57.25	2.78	H	-47.82	68.22
	5,145.00	-56.06	12.77	-56.84	3.40	V	-47.47	67.87
	6,860.00	-56.12	12.01	-51.88	4.02	H	-43.89	64.29
132322 (1745.0)	3,490.00	-51.76	12.33	-58.11	2.81	H	-48.59	68.99
	5,235.00	-55.45	12.90	-56.92	3.47	V	-47.49	67.89
	6,980.00	-55.43	11.77	-50.17	4.04	V	-42.44	62.84
132622 (1775.0)	3,550.00	-52.91	12.39	-58.93	2.85	H	-49.39	69.79
	5,325.00	-56.70	13.03	-58.34	3.52	V	-48.83	69.23
	7,100.00	-55.27	11.73	-51.30	4.08	V	-43.65	64.05

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters 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.

8.3.5 RADIATED SPURIOUS EMISSIONS (15 MHz Band 66/4 LTE)

▣ OPERATING FREQUENTY: 1772.50 MHz

▣ MEASURED OUTPUT POWER: 20.34 dBm = 0.108 W

▣ MODULATION SIGNAL: 15 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 33.34 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
132047 (1717.5)	3,435.00	-50.58	12.21	-57.73	2.78	H	-48.30	68.64
	5,152.50	-56.60	12.79	-56.99	3.45	V	-47.65	67.99
	6,870.00	-55.65	11.99	-51.68	4.03	H	-43.72	64.06
132322 (1745.0)	3,490.00	-49.47	12.33	-55.82	2.81	H	-46.30	66.64
	5,235.00	-56.93	12.90	-58.40	3.47	V	-48.97	69.31
	6,980.00	-55.59	11.77	-50.33	4.04	V	-42.60	62.94
132597 (1772.5)	3,545.00	-52.98	12.39	-59.28	2.85	H	-49.74	70.08
	5,317.50	-56.01	13.02	-57.58	3.52	V	-48.08	68.42
	7,090.00	-54.09	11.73	-50.29	4.10	V	-42.66	63.00

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters 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.

8.3.6 RADIATED SPURIOUS EMISSIONS (20 MHz Band 66/4 LTE)

▣ OPERATING FREQUENTY: 1770.00 MHz

▣ MEASURED OUTPUT POWER: 20.29 dBm = 0.107 W

▣ MODULATION SIGNAL: 20 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 33.29 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	EIRP (dBm)	dBc
132072 (1720.0)	3,440.00	-49.89	12.23	-56.81	2.77	H	-47.35	67.64
	5,160.00	-56.52	12.80	-57.35	3.46	H	-48.01	68.30
	6,880.00	-56.34	11.97	-52.33	4.04	H	-44.40	64.69
132322 (1745.0)	3,490.00	-50.45	12.33	-56.80	2.81	H	-47.28	67.57
	5,235.00	-57.16	12.90	-58.63	3.47	H	-49.20	69.49
	6,980.00	-55.61	11.77	-50.35	4.04	H	-42.62	62.91
132572 (1770.0)	3,540.00	-53.47	12.39	-59.77	2.85	H	-50.23	70.52
	5,310.00	-55.75	13.02	-57.32	3.52	V	-47.82	68.11
	7,080.00	-54.41	11.73	-50.37	4.11	V	-42.75	63.04

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters 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.

8.3.7 RADIATED SPURIOUS EMISSIONS (5 MHz Band 13 LTE)

▣OPERATING FREQUENTY: 782.00 MHz

▣ MEASURED OUTPUT POWER: 16.11 dBm = 0.041 W

▣ MODULATION SIGNAL: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 29.11 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitute Level (dBm)	C.L	Pol	ERP (dBm)	dBc
23205 (779.5)	2,338.5	-56.41	10.77	-63.91	2.27	V	-55.41	71.52
	3,118.0	-53.93	11.54	-60.59	2.65	H	-51.70	67.81
23230 (782.0)	2,346.0	-55.86	10.78	-63.23	2.27	H	-54.72	70.83
	3,128.0	-53.94	11.56	-60.59	2.65	H	-51.68	67.79
23255 (784.5)	2,353.5	-55.79	10.78	-63.15	2.27	V	-54.64	70.75
	3,138.0	-56.02	11.58	-62.71	2.66	H	-53.79	69.90

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters 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 ERP, 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.

8.3.8 RADIATED SPURIOUS EMISSIONS (10 MHz Band 13 LTE)

▣OPERATING FREQUENTY: 782.00 MHz

▣ MEASURED OUTPUT POWER: 16.53 dBm = 0.045 W

▣ MODULATION SIGNAL: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 lo_{g10} (W) = 29.53 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitute Level (dBm)	C.L	Pol	ERP (dBm)	dBc
23230 (782.00)	2,346.0	-56.36	10.78	-64.80	2.27	V	-56.29	72.82
	3,128.0	-53.36	11.56	-61.13	2.65	H	-52.22	68.75

NOTES:

1. Radiated Spurious Emission Measurements at 3 meters 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 ERP, 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.

8.3.8.1 RADIATED SPURIOUS EMISSIONS (1559 ~ 1610 MHz Band)

▣ OPERATING FREQUENTY: 779.5 MHz, 782.0 MHz, 784.5 MHz

▣ MEASURED OUTPUT POWER: 5 MHz QPSK

▣ DISTANCE: 3 meters

▣ WIDEBAND EMISSION LIMIT: -70 dBW/ MHz (= -40 dBm/ MHz)

Operating Frequency (MHz)	Measured Frequency (MHz)	EMISSION TYPE	Measured Level (dBm)	Ant. Gain (dBd)	Substitute Level (dBm)	C.L	Pol	ERP (dBm)	MARGIN (dB)
779.5	1606.62	WIDEBAND	-54.94	8.99	-69.32	1.86	H	-62.19	22.19
782.0	1564.17		-54.81	8.83	-68.86	1.83	V	-61.86	21.86
784.5	1577.42		-54.60	8.90	-68.71	1.84	V	-61.65	21.65

8.3.8.2 RADIATED SPURIOUS EMISSIONS (1559 ~ 1610 MHz Band)

▣ OPERATING FREQUENTY: 782.00 MHz

▣ MEASURED OUTPUT POWER: 10 MHz QPSK

▣ DISTANCE: 3 meters

▣ WIDEBAND EMISSION LIMIT: -70 dBW/ MHz (= -40 dBm/ MHz)

Operating Frequency (MHz)	Measured Frequency (MHz)	EMISSION TYPE	Measured Level (dBm)	Ant. Gain (dBd)	Substitute Level (dBm)	C.L	Pol	ERP (dBm)	MARGIN (dB)
782.0	1566.58	WIDEBAND	-55.00	8.84	-69.10	1.83	V	-62.09	22.09

8.4 PEAK-TO-AVERAGE RATIO

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (dB)
66/4	1.4 MHz	1745.0	QPSK	6	0	5.89
			16-QAM	6		6.74
	3 MHz		QPSK	15		5.90
			16-QAM	15		6.64
	5 MHz		QPSK	25		5.83
			16-QAM	25		6.56
	10 MHz		QPSK	50		5.85
			16-QAM	50		6.51
	15 MHz		QPSK	75		5.80
			16-QAM	75		6.51
	20 MHz		QPSK	100		5.70
			16-QAM	100		6.52

- Plots of the EUT's Peak- to- Average Ratio are shown Page 55~ 60.

8.5 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
66/4	1.4 MHz	1745.0	QPSK	6	0	1.1047
			16-QAM	6	0	1.0998
	3 MHz		QPSK	15	0	2.7080
			16-QAM	15	0	2.7102
	5 MHz		QPSK	25	0	4.5351
			16-QAM	25	0	4.5265
	10 MHz		QPSK	50	0	8.9919
			16-QAM	50	0	9.0056
	15 MHz		QPSK	75	0	13.477
			16-QAM	75	0	13.498
	20 MHz		QPSK	100	0	17.912
			16-QAM	100	0	17.915

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)
13	5 MHz	782.0	QPSK	25	0	4.5310
			16-QAM	25	0	4.5387
	10 MHz		QPSK	50	0	9.0021
			16-QAM	50	0	9.0177

- Plots of the EUT's Occupied Bandwidth are shown Page 47 ~ 54.

8.6 CONDUCTED SPURIOUS EMISSIONS

▣FACTORS FOR FREQUENCY

Frequency Range (GHz)	Factor [dB]
0.03 – 1	25.270
1 – 5	27.976
5 – 10	28.591
10 – 15	29.116
15 – 20	29.489
Above 20	30.131

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)
66/4	1.4	1710.7	18.9410	29.489	-63.08	-33.591	-13.00
		1745.0	18.9205	29.489	-63.30	-33.811	
		1779.3	18.9330	29.489	-63.20	-33.711	
	3	1711.5	18.9150	29.489	-62.94	-33.451	
		1745.0	18.9475	29.489	-62.98	-33.491	
		1778.5	18.9410	29.489	-63.14	-33.651	
	5	1712.5	18.9100	29.489	-63.18	-33.691	
		1745.0	18.9270	29.489	-62.97	-33.481	
		1777.5	18.9230	29.489	-63.19	-33.701	
	10	1715.0	18.9380	29.489	-63.13	-33.641	
		1745.0	18.9320	29.489	-63.02	-33.531	
		1775.0	18.9115	29.489	-62.95	-33.461	
	15	1717.5	18.9250	29.489	-63.18	-33.691	
		1745.0	18.9275	29.489	-62.84	-33.351	
		1772.5	18.8980	29.489	-63.11	-33.621	
	20	1720.0	18.9000	29.489	-63.06	-33.571	
		1745.0	18.9260	29.489	-63.03	-33.541	
		1770.0	18.9185	29.489	-63.08	-33.591	

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
13	5	779.5	3.69711	27.976	-67.65	-39.674	-13.00
		782.0	3.70308	27.976	-67.35	-39.374	
		784.5	3.70333	27.976	-67.33	-39.354	
	10	782.0	3.71352	27.976	-67.435	-39.459	

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 85 ~ 106.

8.6.1 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 61 ~ 84.

8.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

8.7.1 FREQUENCY STABILITY (1.4 MHz Band 66 LTE)

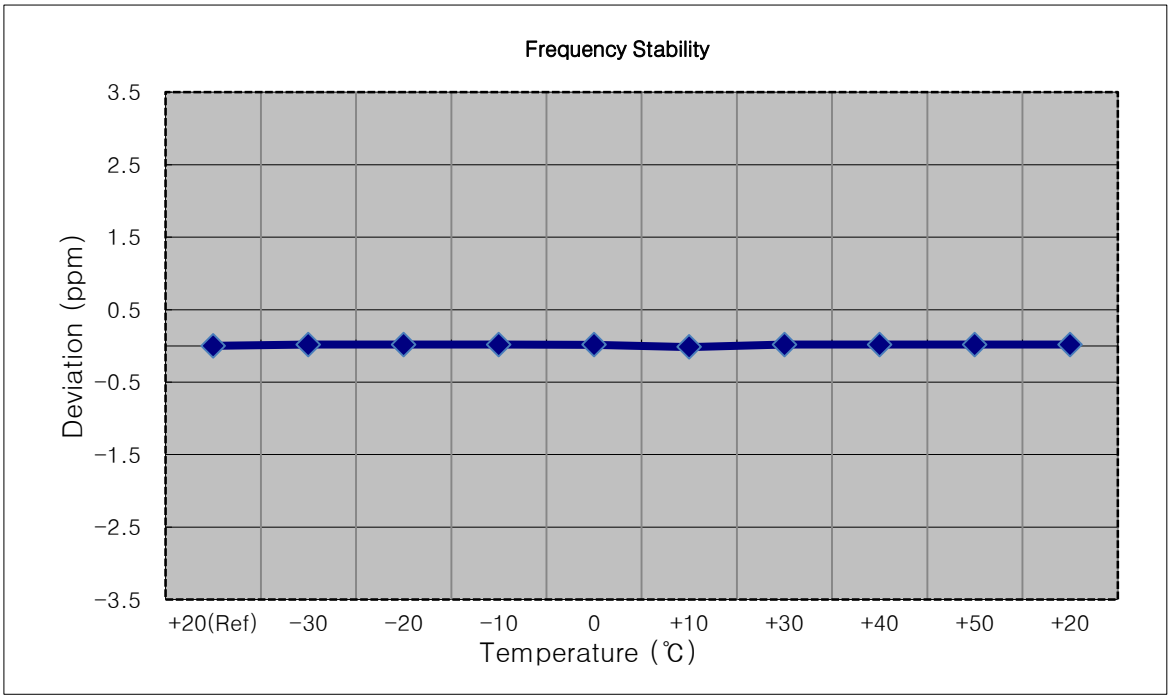
▣ OPERATING FREQUENCY: 1745.000,000 Hz

▣ CHANNEL: 132322 (1.4 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.85	+20(Ref)	1745 000 031	0.0	0.000 000	0.000
100%		-30	1745 000 063	32.3	0.000 002	0.019
100%		-20	1745 000 060	29.5	0.000 002	0.017
100%		-10	1745 000 060	29.4	0.000 002	0.017
100%		0	1745 000 057	26.3	0.000 002	0.015
100%		+10	1745 000 003	-28.0	-0.000 002	-0.016
100%		+30	1745 000 063	31.8	0.000 002	0.018
100%		+40	1745 000 060	29.4	0.000 002	0.017
100%		+50	1745 000 060	28.8	0.000 002	0.017
Batt. Endpoint	3.60	+20	1745 000 061	29.7	0.000 002	0.017



8.7.2 FREQUENCY STABILITY (3 MHz Band 66 LTE)

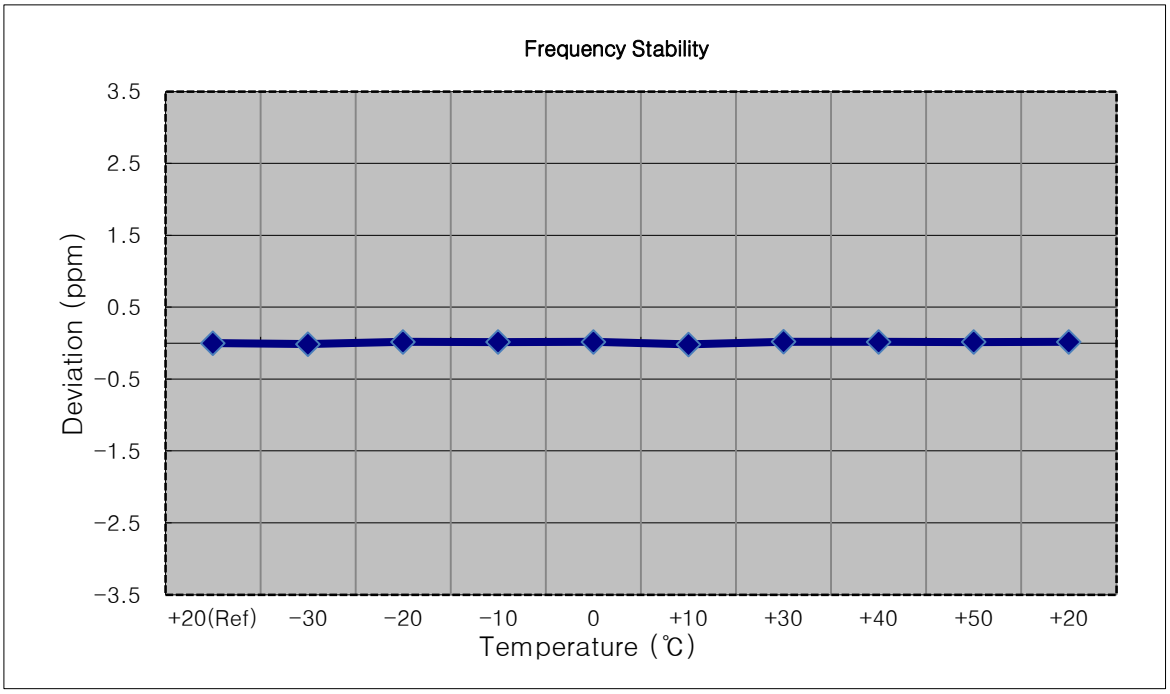
▣ OPERATING FREQUENCY: 1745.000,000 Hz

▣ CHANNEL: 132322 (3 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.85	+20(Ref)	1745 000 029	0.0	0.000 000	0.000
100%		-30	1745 000 003	-25.2	-0.000 001	-0.014
100%		-20	1745 000 059	29.9	0.000 002	0.017
100%		-10	1745 000 056	27.4	0.000 002	0.016
100%		0	1745 000 057	28.7	0.000 002	0.016
100%		+10	1744 999 998	-31.0	-0.000 002	-0.018
100%		+30	1745 000 060	31.6	0.000 002	0.018
100%		+40	1745 000 057	28.1	0.000 002	0.016
100%		+50	1745 000 055	26.6	0.000 002	0.015
Batt. Endpoint	3.60	+20	1745 000 057	28.3	0.000 002	0.016



8.7.3 FREQUENCY STABILITY (5 MHz Band 66 LTE)

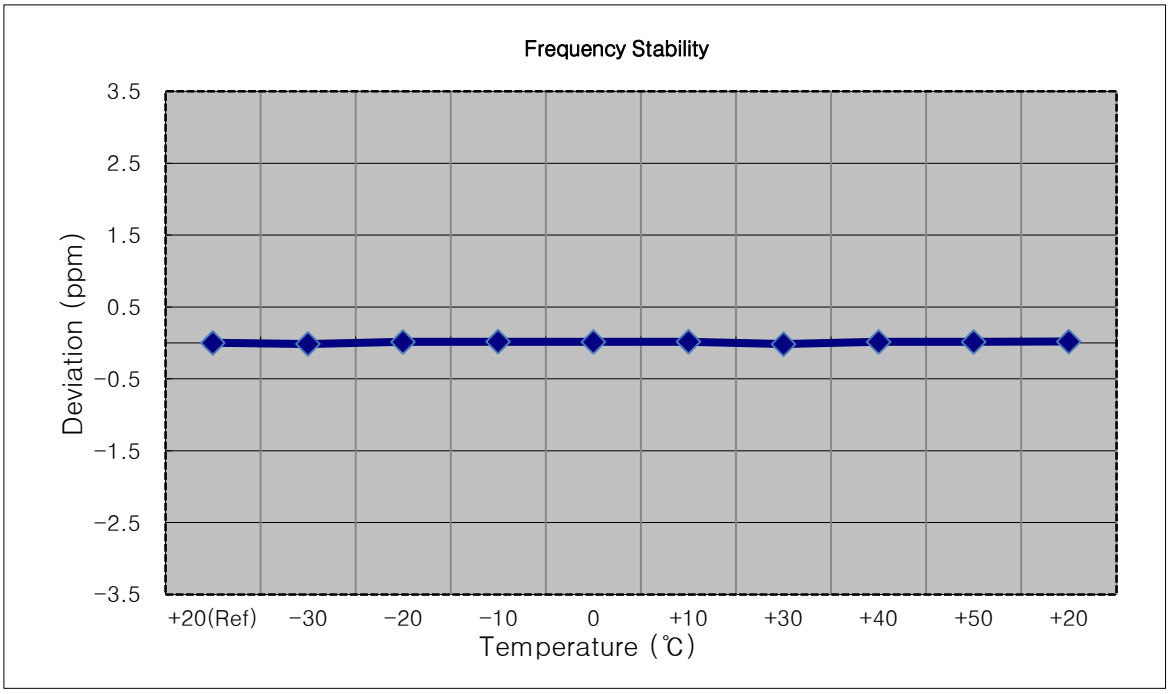
▣ OPERATING FREQUENCY: 1745.000,000 Hz

▣ CHANNEL: 132322 (5 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.85	+20(Ref)	1745 000 026	0.0	0.000 000	0.000
100%		-30	1745 000 001	-24.7	-0.000 001	-0.014
100%		-20	1745 000 052	26.1	0.000 001	0.015
100%		-10	1745 000 055	29.1	0.000 002	0.017
100%		0	1745 000 052	25.9	0.000 001	0.015
100%		+10	1745 000 054	27.8	0.000 002	0.016
100%		+30	1744 999 998	-28.2	-0.000 002	-0.016
100%		+40	1745 000 052	26.0	0.000 001	0.015
100%		+50	1745 000 050	24.5	0.000 001	0.014
Batt. Endpoint	3.60	+20	1745 000 057	30.9	0.000 002	0.018



8.7.4 FREQUENCY STABILITY (10 MHz Band 66 LTE)

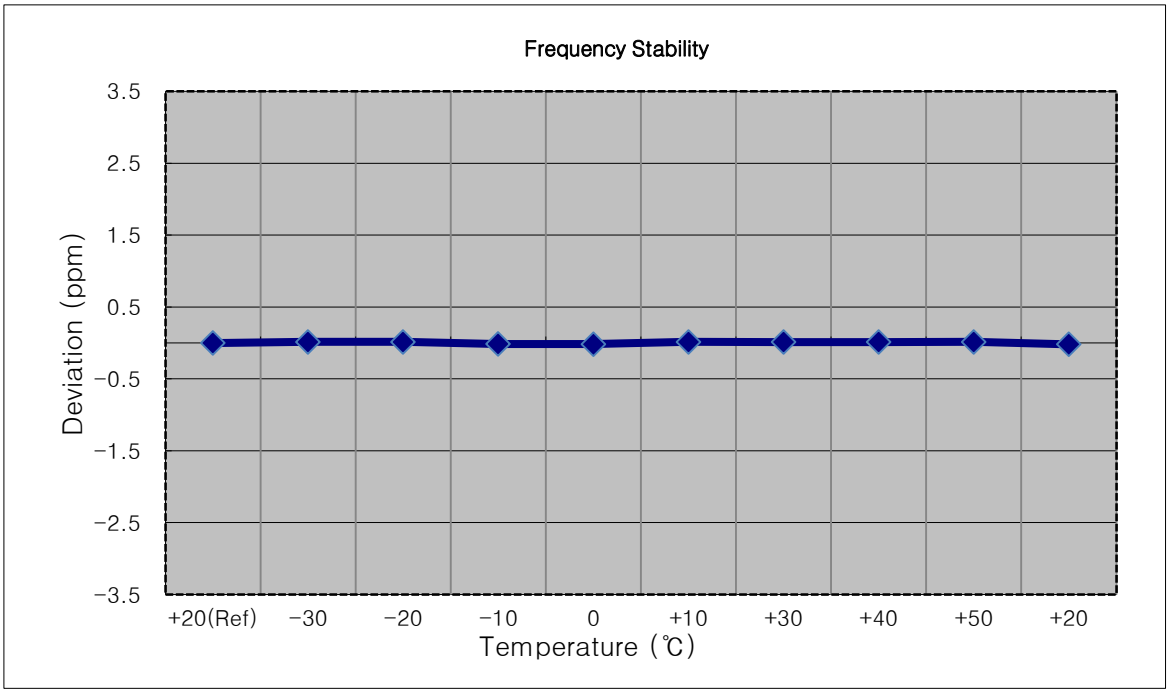
▣ OPERATING FREQUENCY: 1745.000,000 Hz

▣ CHANNEL: 132322 (10 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.85	+20(Ref)	1745 000 029	0.0	0.000 000	0.000
100%		-30	1745 000 057	28.0	0.000 002	0.016
100%		-20	1745 000 057	28.3	0.000 002	0.016
100%		-10	1745 000 003	-25.4	-0.000 001	-0.015
100%		0	1745 000 001	-27.5	-0.000 002	-0.016
100%		+10	1745 000 057	28.3	0.000 002	0.016
100%		+30	1745 000 050	21.8	0.000 001	0.012
100%		+40	1745 000 052	23.1	0.000 001	0.013
100%		+50	1745 000 054	25.3	0.000 001	0.014
Batt. Endpoint	3.60	+20	1744 999 998	-31.0	-0.000 002	-0.018



8.7.5 FREQUENCY STABILITY (15 MHz Band 66 LTE)

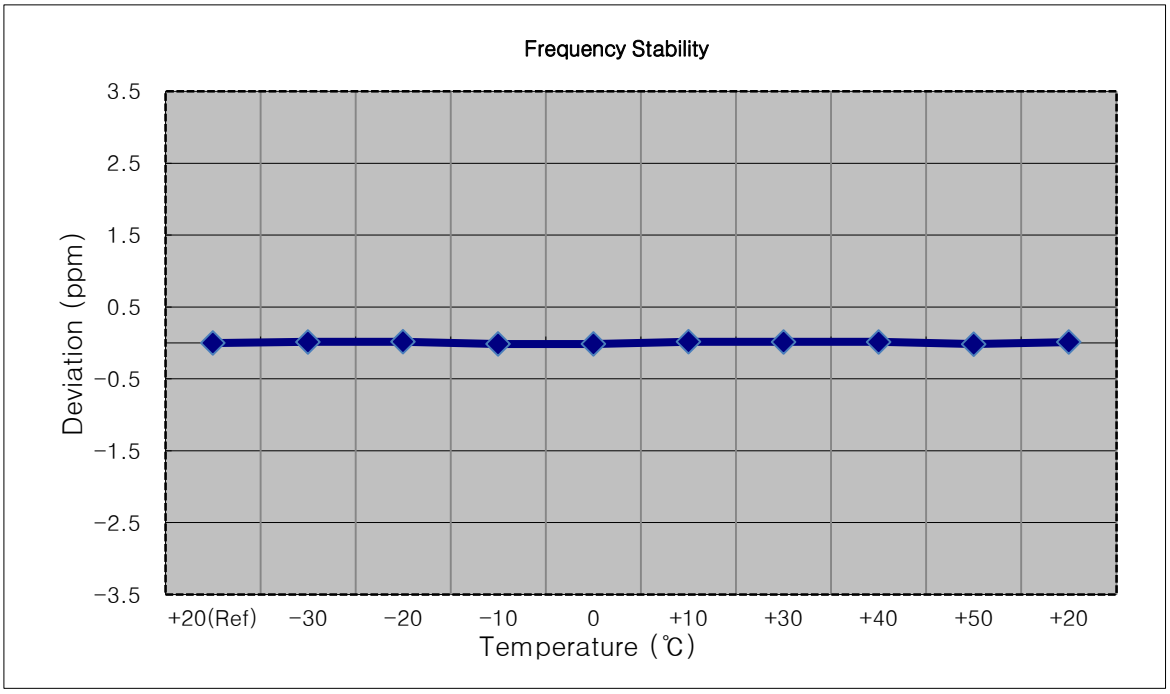
▣ OPERATING FREQUENCY: 1745.000,000 Hz

▣ CHANNEL: 132322 (15 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.85	+20(Ref)	1745 000 026	0.0	0.000 000	0.000
100%		-30	1745 000 053	26.7	0.000 002	0.015
100%		-20	1745 000 055	29.0	0.000 002	0.017
100%		-10	1745 000 001	-25.1	-0.000 001	-0.014
100%		0	1745 000 001	-25.1	-0.000 001	-0.014
100%		+10	1745 000 056	29.8	0.000 002	0.017
100%		+30	1745 000 052	25.8	0.000 001	0.015
100%		+40	1745 000 052	25.8	0.000 001	0.015
100%		+50	1744 999 999	-26.9	-0.000 002	-0.015
Batt. Endpoint	3.60	+20	1745 000 050	24.0	0.000 001	0.014



8.7.6 FREQUENCY STABILITY (20 MHz Band 66 LTE)

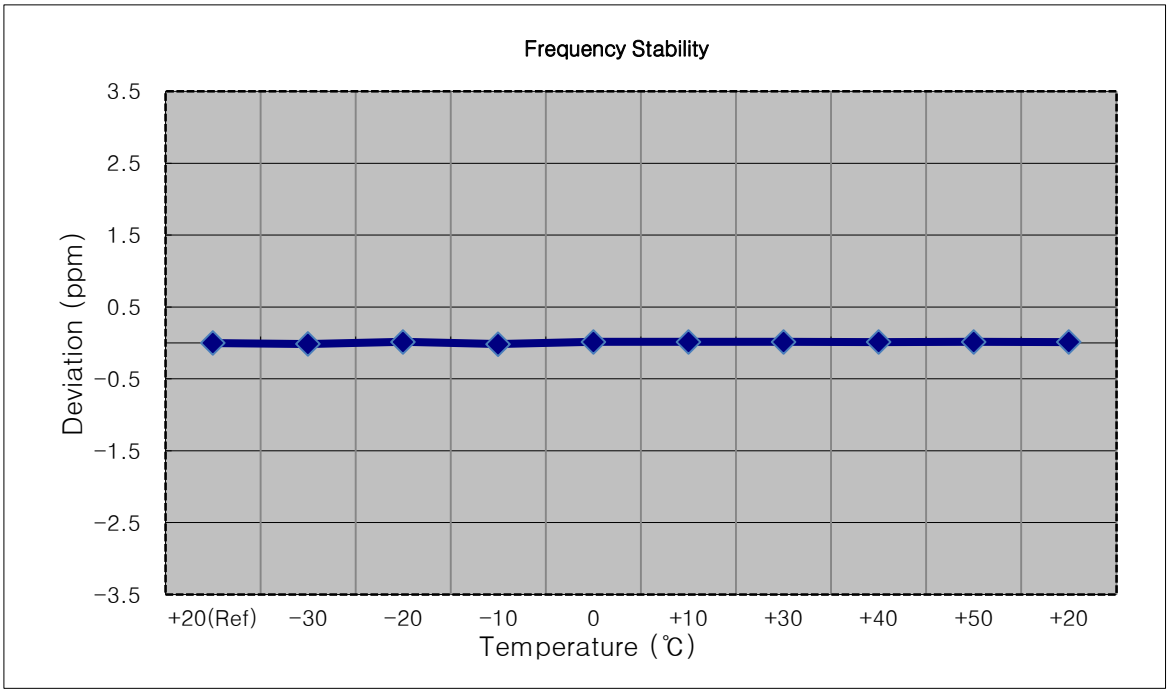
▣ OPERATING FREQUENCY: 1745.000,000 Hz

▣ CHANNEL: 132322 (20 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣ DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.85	+20(Ref)	1745 000 031	0.0	0.000 000	0.000
100%		-30	1745 000 006	-24.8	-0.000 001	-0.014
100%		-20	1745 000 057	25.6	0.000 001	0.015
100%		-10	1745 000 005	-26.6	-0.000 002	-0.015
100%		0	1745 000 057	25.4	0.000 001	0.015
100%		+10	1745 000 059	28.0	0.000 002	0.016
100%		+30	1745 000 056	24.7	0.000 001	0.014
100%		+40	1745 000 055	23.7	0.000 001	0.014
100%		+50	1745 000 057	26.2	0.000 002	0.015
Batt. Endpoint	3.60	+20	1745 000 054	23.0	0.000 001	0.013



8.7.7 FREQUENCY STABILITY (5 MHz Band 13 LTE)

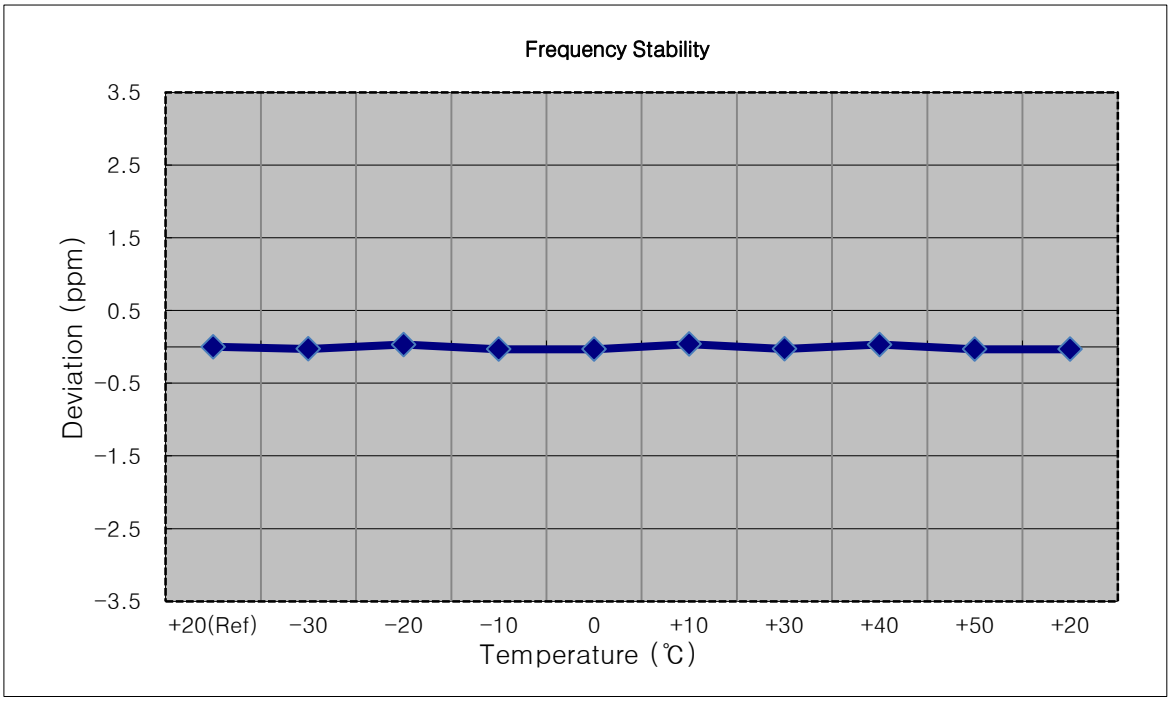
▣OPERATING FREQUENCY: 782,000,000 Hz

▣CHANNEL: 23230 (5 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

▣DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.85	+20(Ref)	781 999 978	0.00	0.000 000	0.0000
100%		-30	781 999 955	-22.70	-0.000 003	-0.0290
100%		-20	782 000 002	24.20	0.000 003	0.0309
100%		-10	781 999 952	-26.10	-0.000 003	-0.0334
100%		0	781 999 953	-25.10	-0.000 003	-0.0321
100%		+10	782 000 007	29.20	0.000 004	0.0373
100%		+30	781 999 956	-22.00	-0.000 003	-0.0281
100%		+40	782 000 003	25.00	0.000 003	0.0320
100%		+50	781 999 952	-25.60	-0.000 003	-0.0327
Batt. Endpoint	3.60	+20	781 999 952	-25.60	-0.000 003	-0.0327



8.7.8 FREQUENCY STABILITY (10 MHz Band 13 LTE)

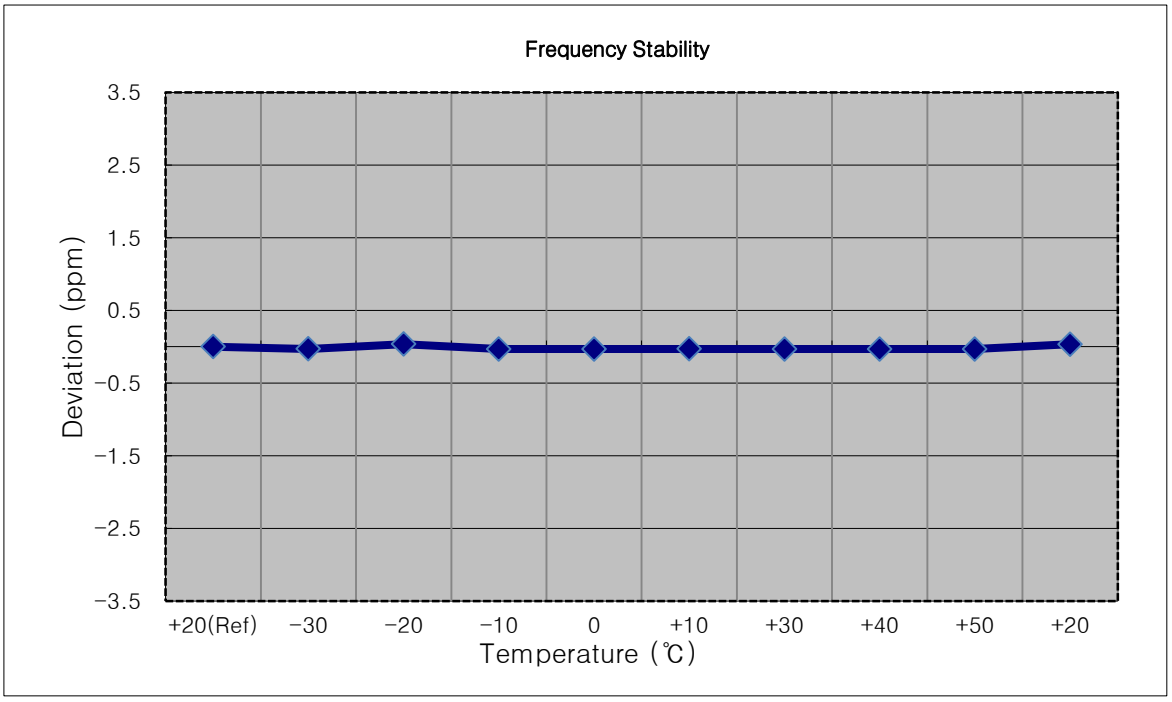
▣OPERATING FREQUENCY: 782,000,000 Hz

▣CHANNEL: 23230 (10 MHz)

▣ REFERENCE VOLTAGE: 3.85 VDC

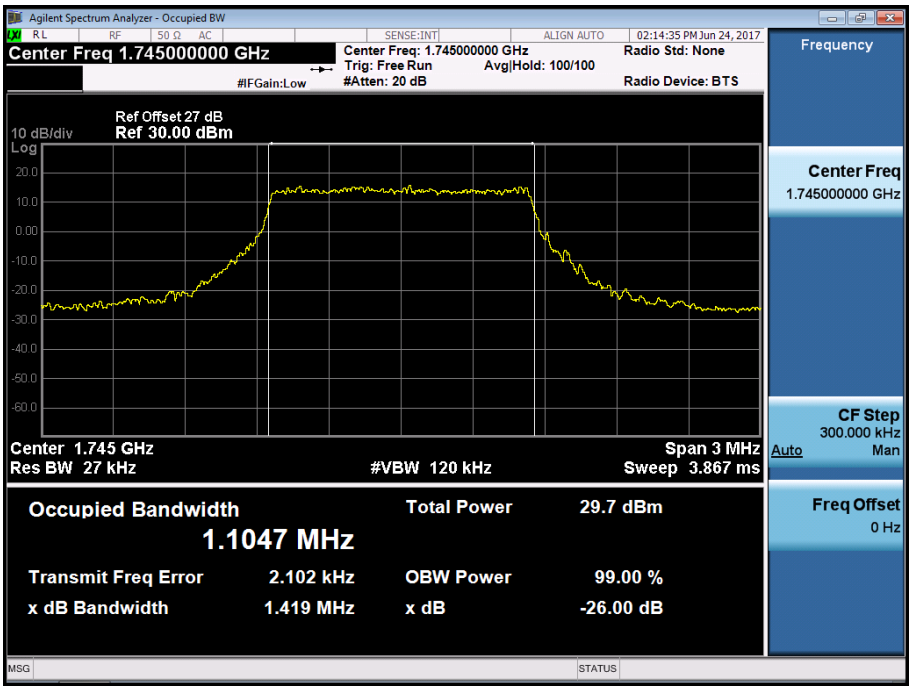
▣DEVIATION LIMIT: Emission must remain in band

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.85	+20(Ref)	781 999 972	0.00	0.000 000	0.0000
100%		-30	781 999 948	-23.90	-0.000 003	-0.0306
100%		-20	781 999 998	26.70	0.000 003	0.0341
100%		-10	781 999 945	-26.40	-0.000 003	-0.0338
100%		0	781 999 946	-26.10	-0.000 003	-0.0334
100%		+10	781 999 947	-24.30	-0.000 003	-0.0311
100%		+30	781 999 946	-25.80	-0.000 003	-0.0330
100%		+40	781 999 945	-26.40	-0.000 003	-0.0338
100%		+50	781 999 946	-25.60	-0.000 003	-0.0327
Batt. Endpoint	3.60	+20	781 999 996	24.80	0.000 003	0.0317

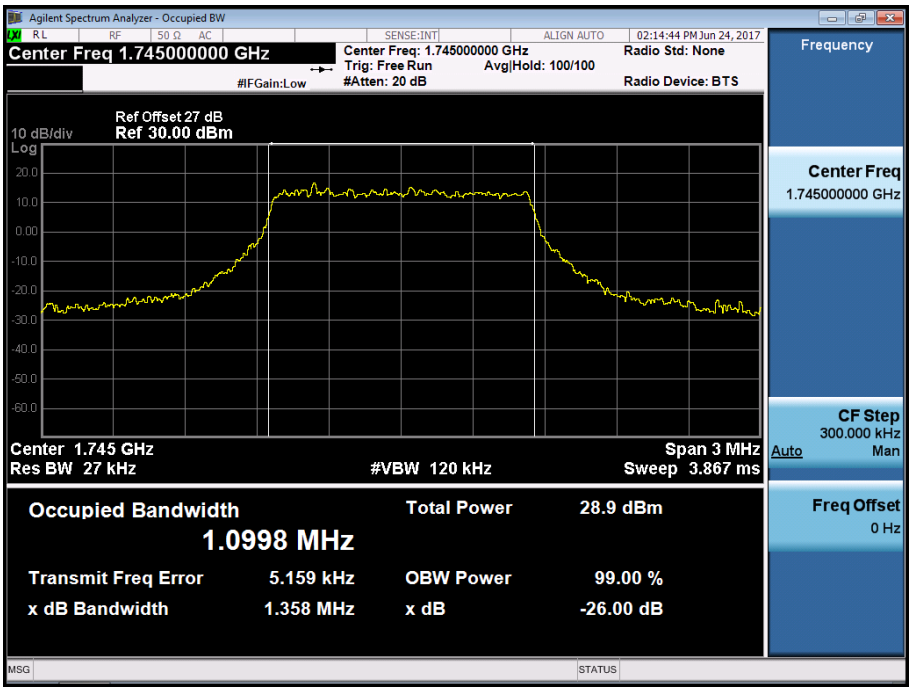


9. TEST PLOTS

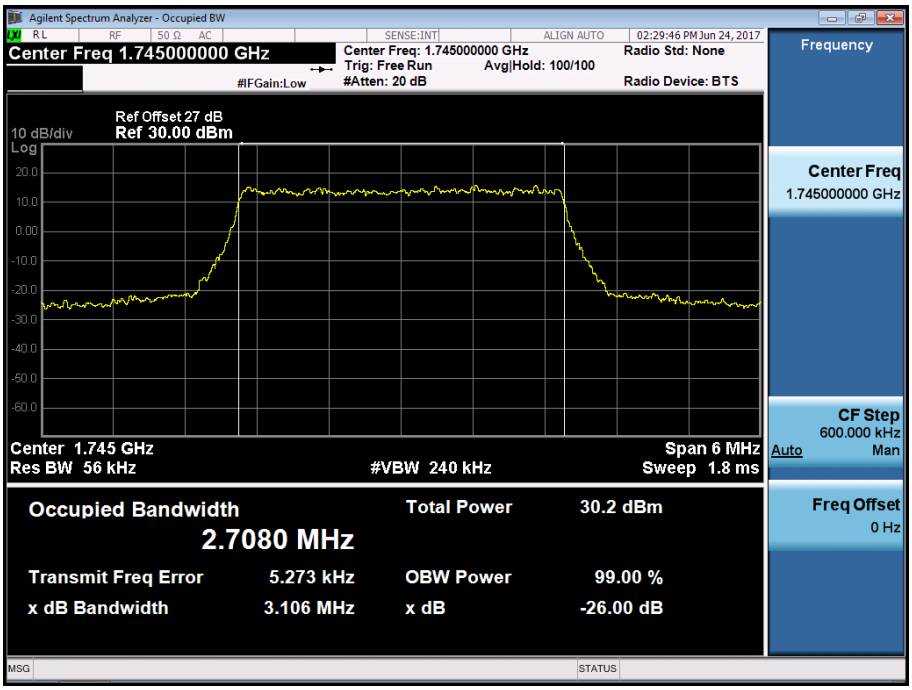
BAND 66/4. Occupied Bandwidth Plot (1.4M BW Ch.132322 QPSK RB 6)



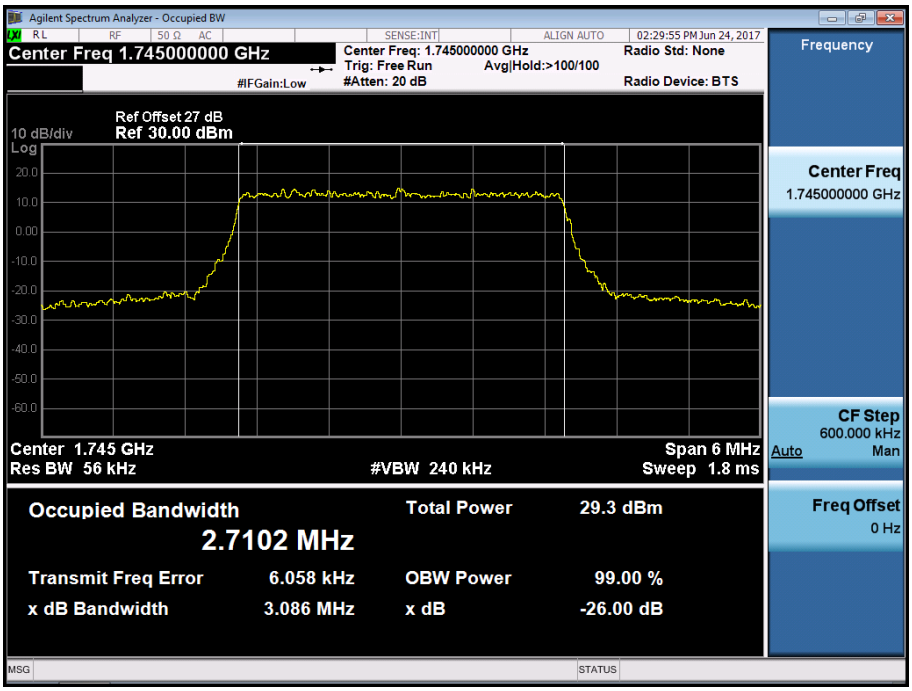
BAND 66/4. Occupied Bandwidth Plot (1.4M BW Ch.132322 16QAM RB 6)



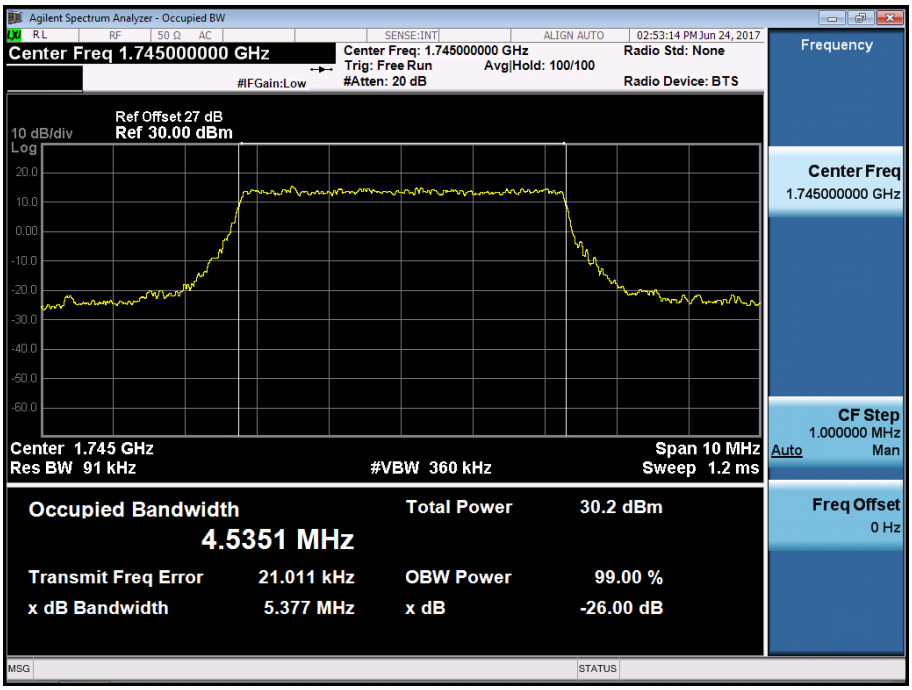
BAND 66/4. Occupied Bandwidth Plot (3M BW Ch.132322 QPSK RB 15)



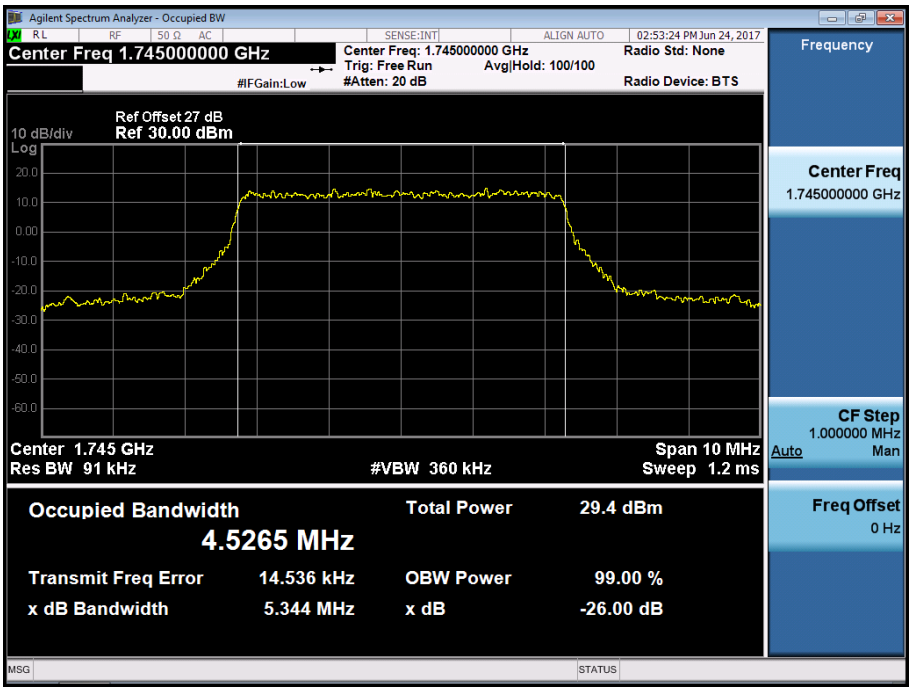
BAND 66/4. Occupied Bandwidth Plot (3M BW Ch.132322 16QAM RB 15)



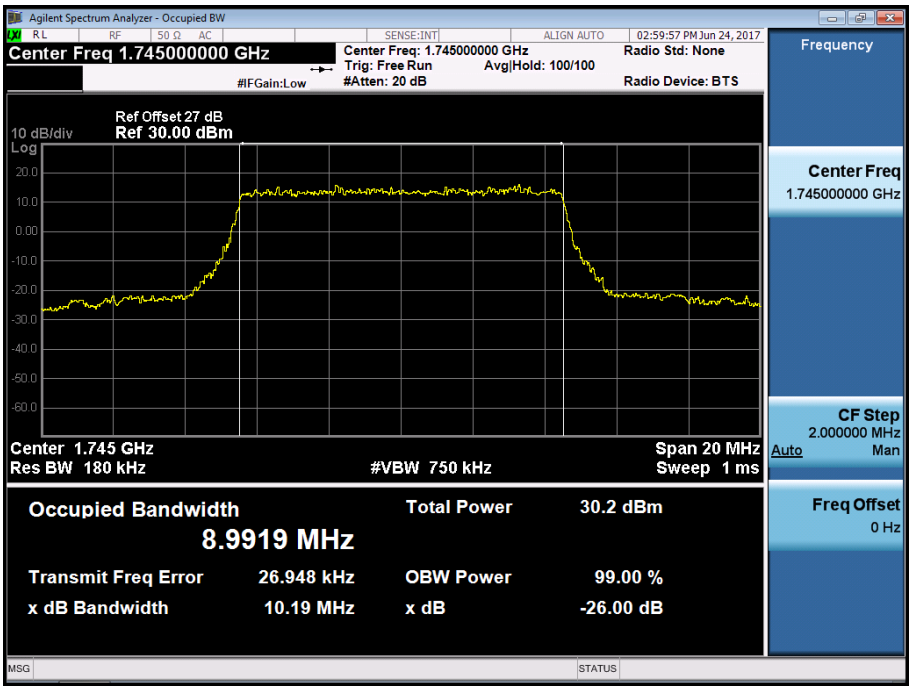
BAND 66/4. Occupied Bandwidth Plot (5M BW Ch.132322 QPSK RB 25)



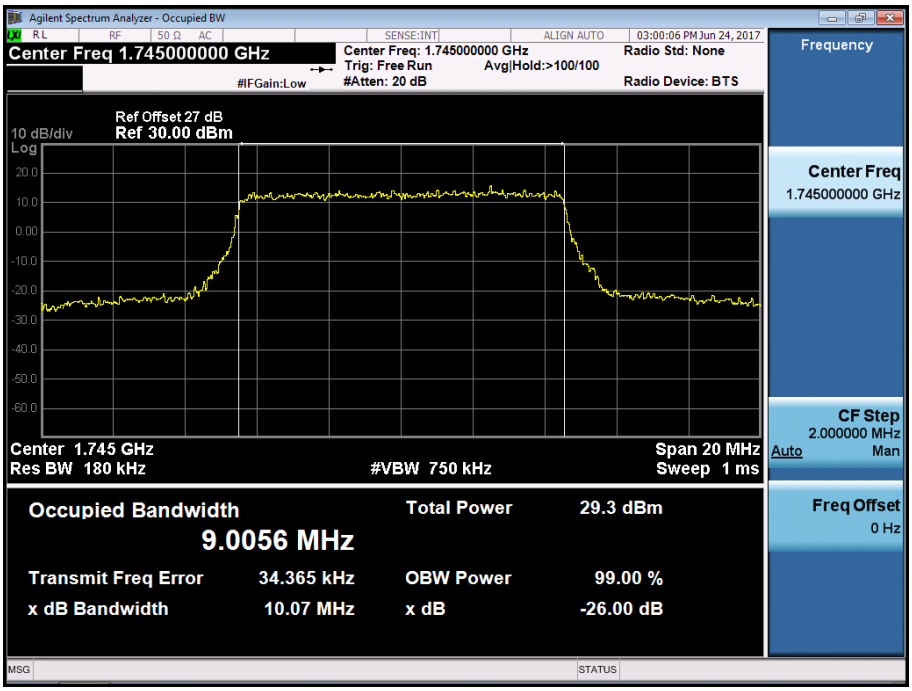
BAND 66/4. Occupied Bandwidth Plot (5M BW Ch.132322 16QAM RB 25)



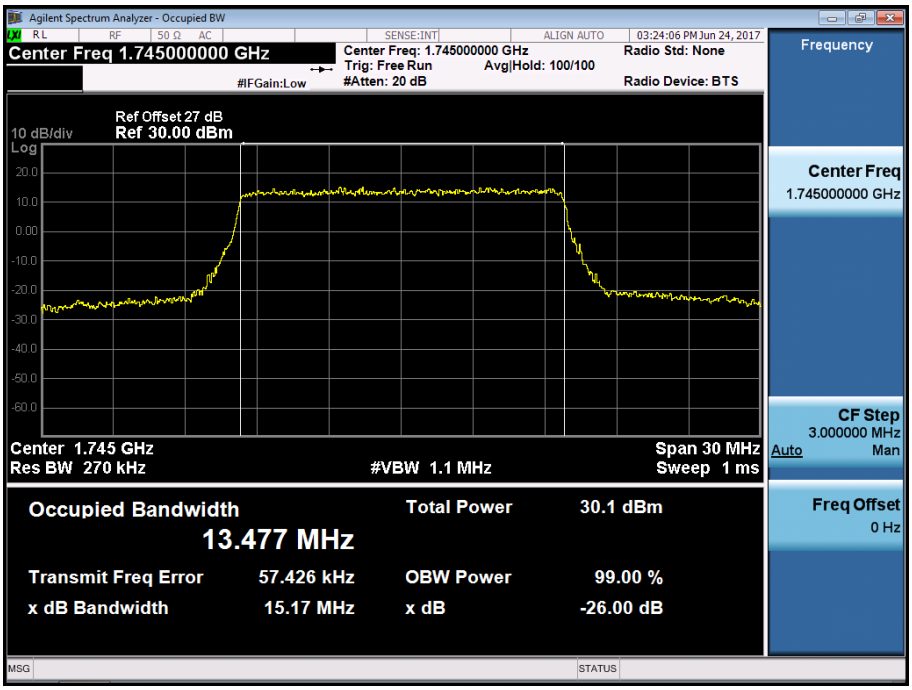
BAND 66/4. Occupied Bandwidth Plot (10M BW Ch.132322 QPSK RB 50)



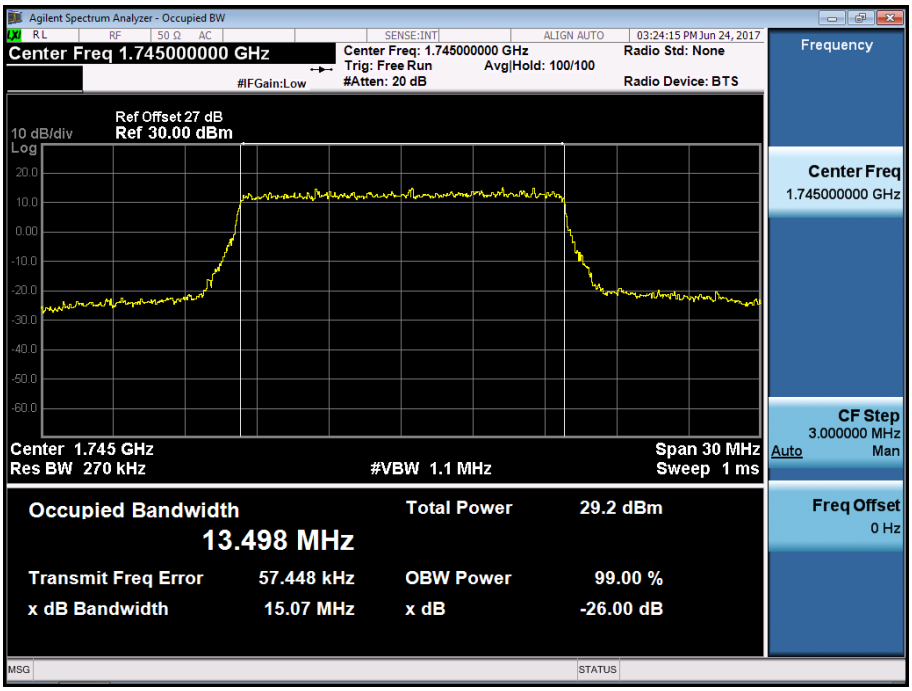
BAND 66/4. Occupied Bandwidth Plot (10M BW Ch.132322 16QAM RB 50)



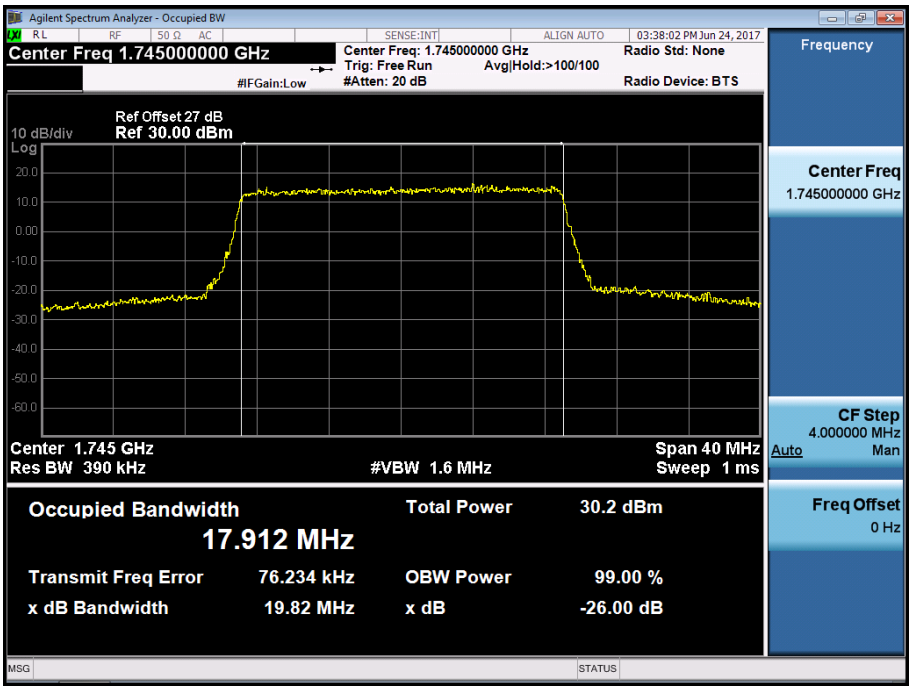
BAND 66/4. Occupied Bandwidth Plot (15M BW Ch.132322 QPSK RB 75)



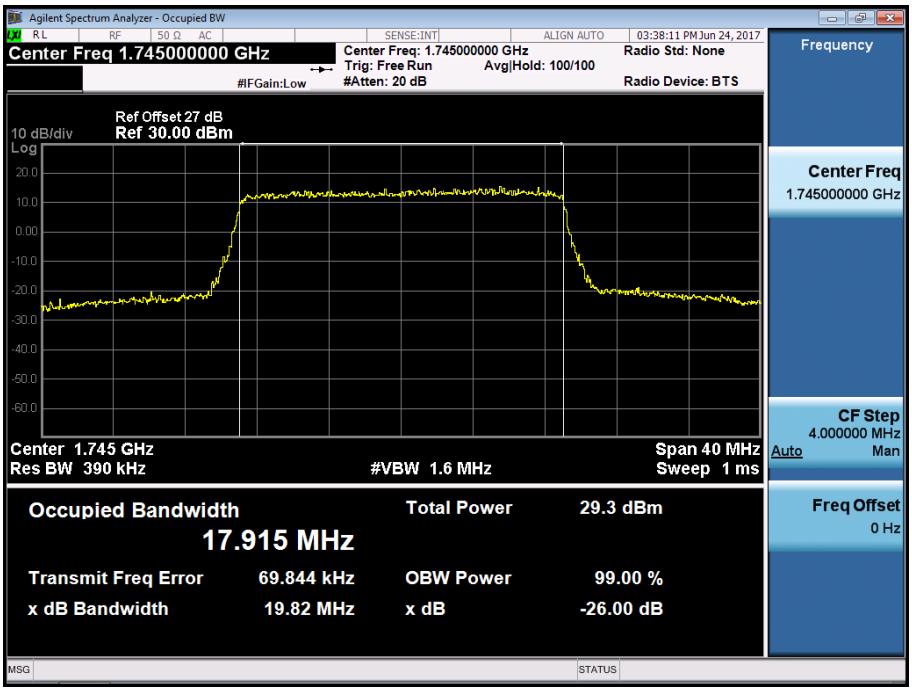
BAND 66/4. Occupied Bandwidth Plot (15M BW Ch.132322 16QAM RB 75)



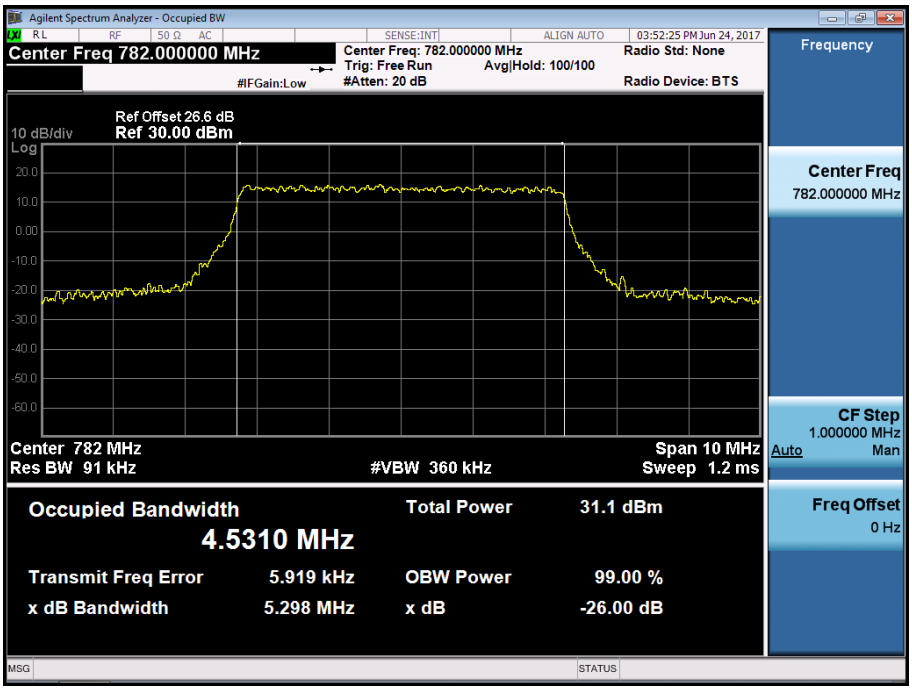
BAND 66/4. Occupied Bandwidth Plot (20M BW Ch.132322 QPSK RB 100)



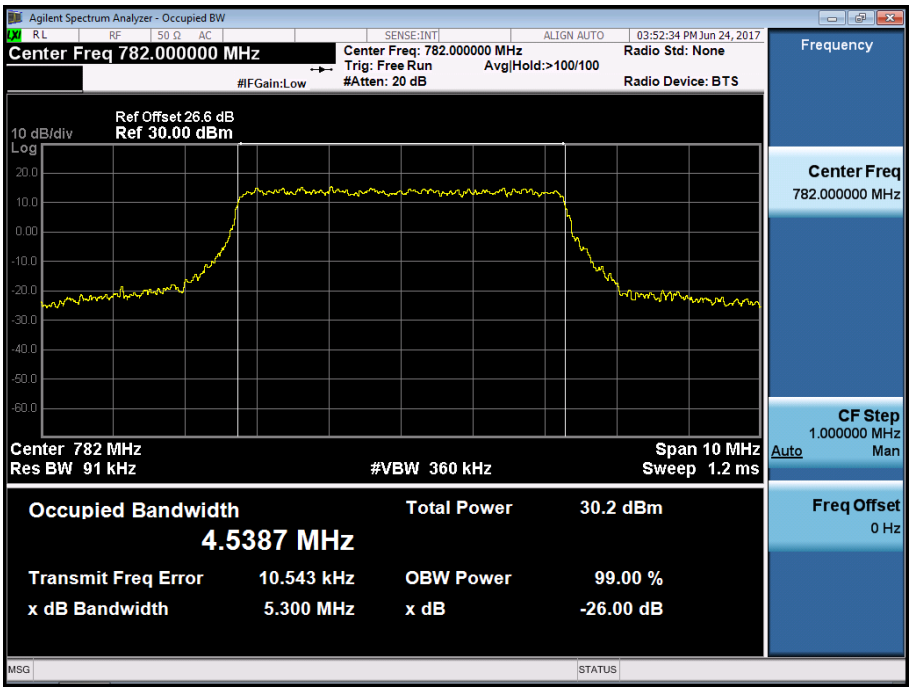
BAND 66/4. Occupied Bandwidth Plot (20M BW Ch.132322 16QAM RB 100)



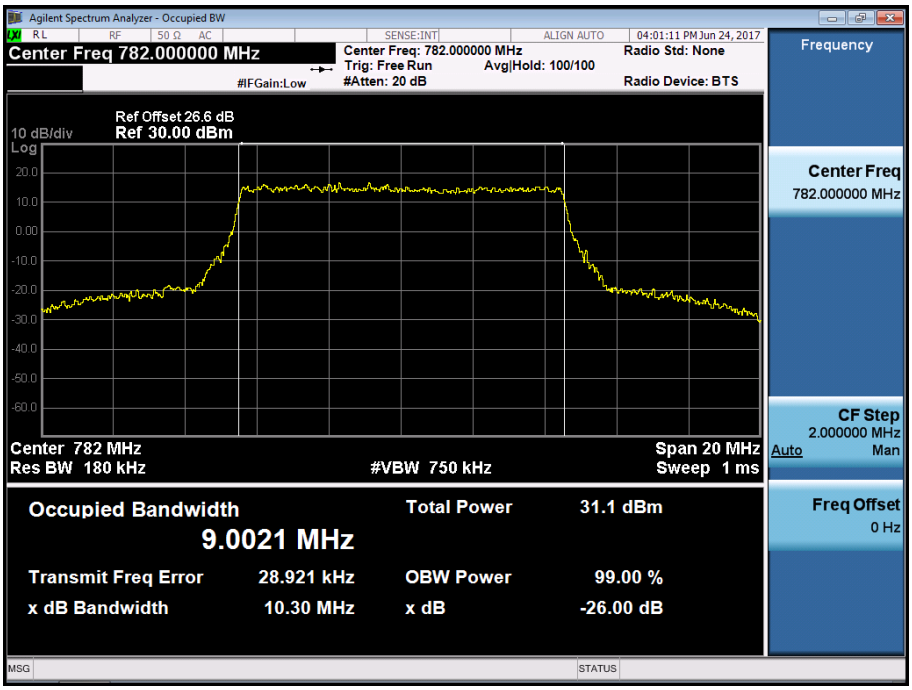
BAND 13. Occupied Bandwidth Plot (Ch.23230 QPSK RB 25) 5 MHz



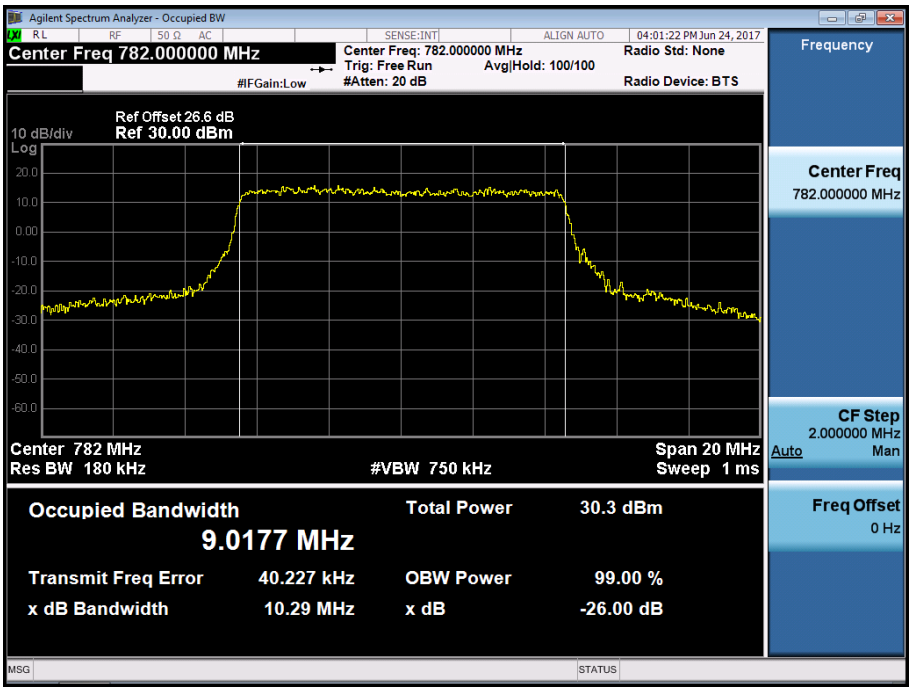
BAND 13. Occupied Bandwidth Plot (Ch.23230 16-QAM RB 25) 5 MHz



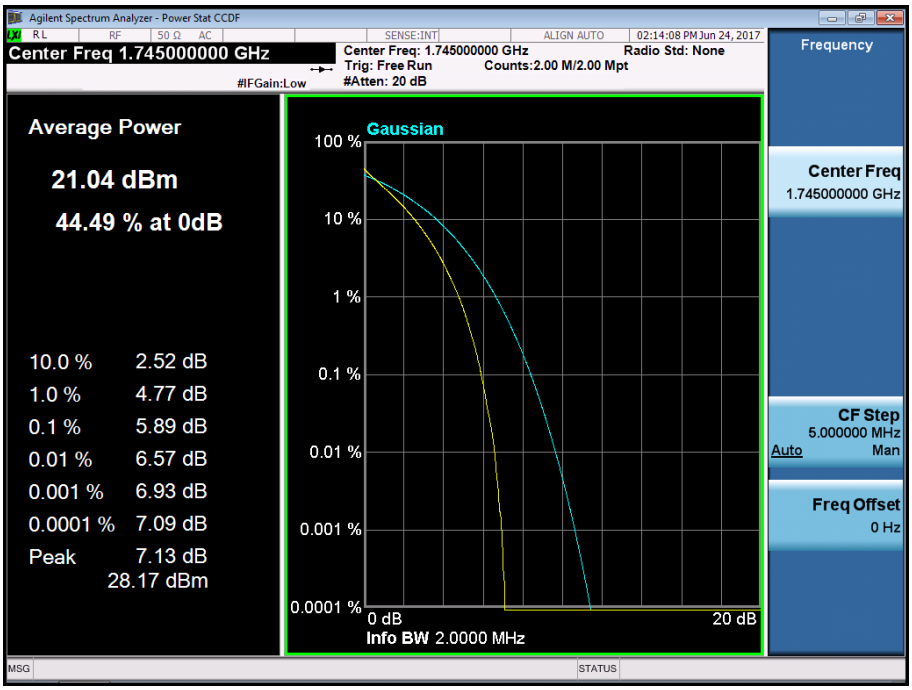
BAND 13. Occupied Bandwidth Plot (Ch.23230 QPSK RB 50) 10 MHz



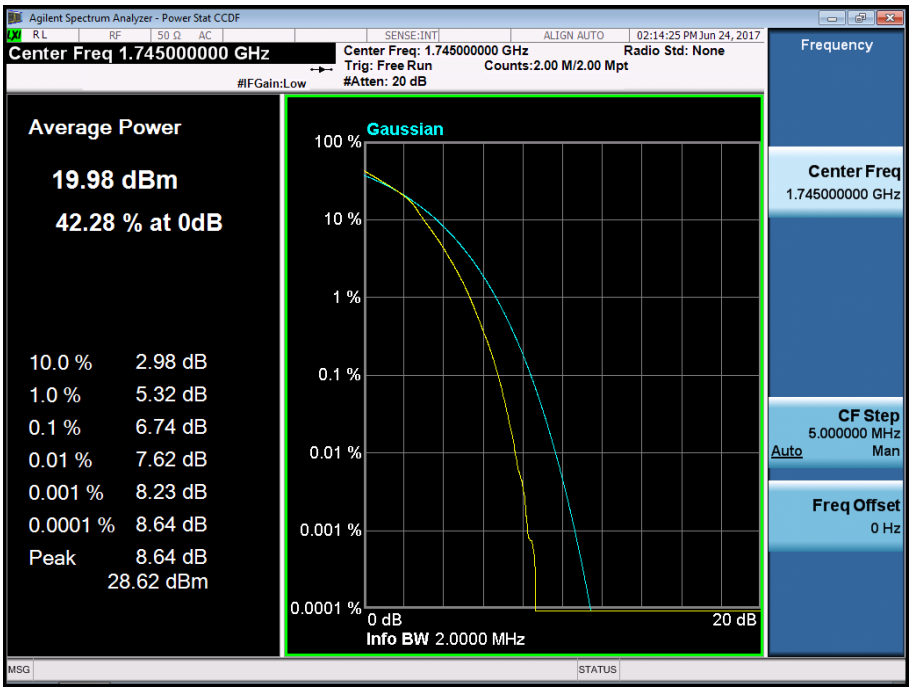
BAND 13. Occupied Bandwidth Plot (Ch.23230 16-QAM RB 50) 10 MHz



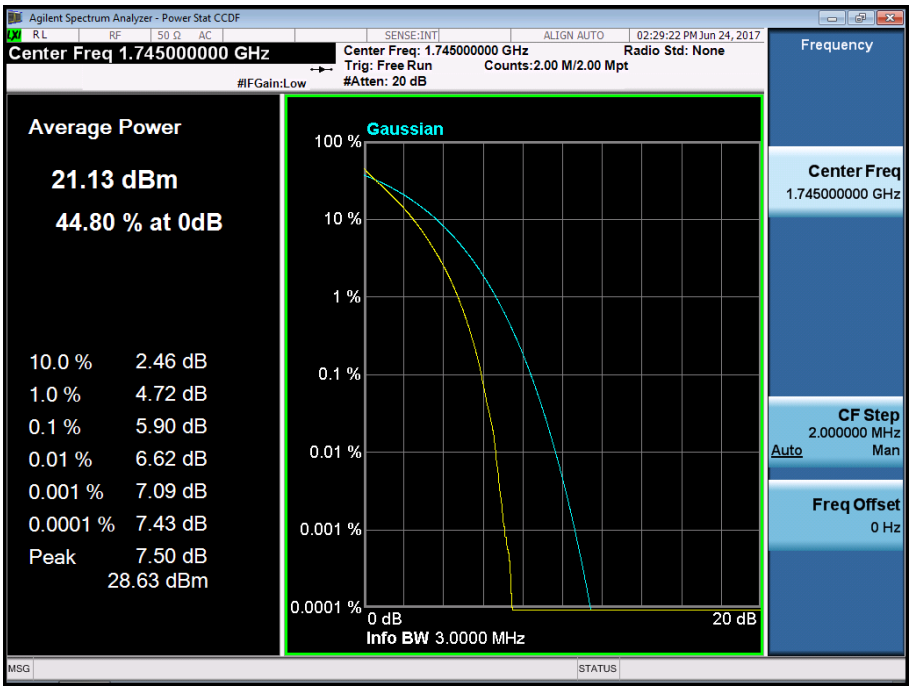
BAND 66/4. PAR Plot (1.4M BW_Ch.132322_QPSK_RB6_0)



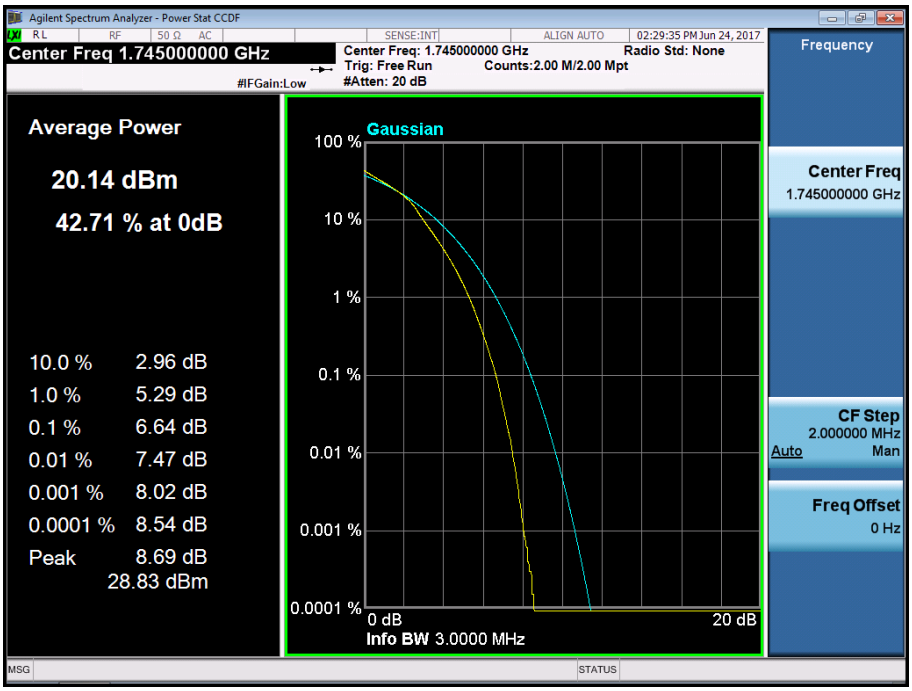
BAND 66/4. PAR Plot (1.4M BW_Ch.132322_16QAM_RB6_0)



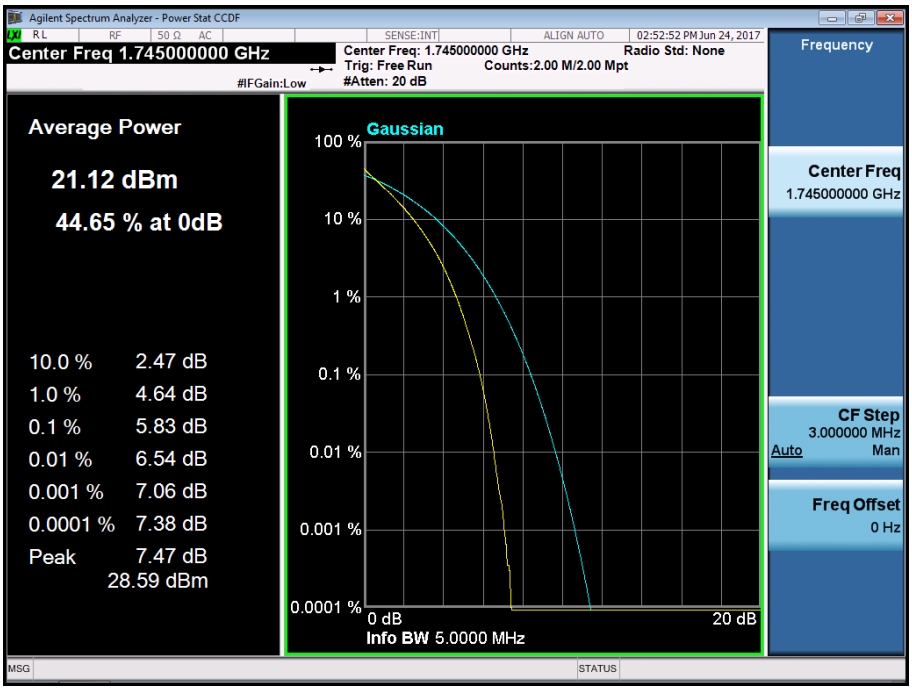
BAND 66/4. PAR Plot (3M BW_Ch.132322_QPSK_RB15_0)



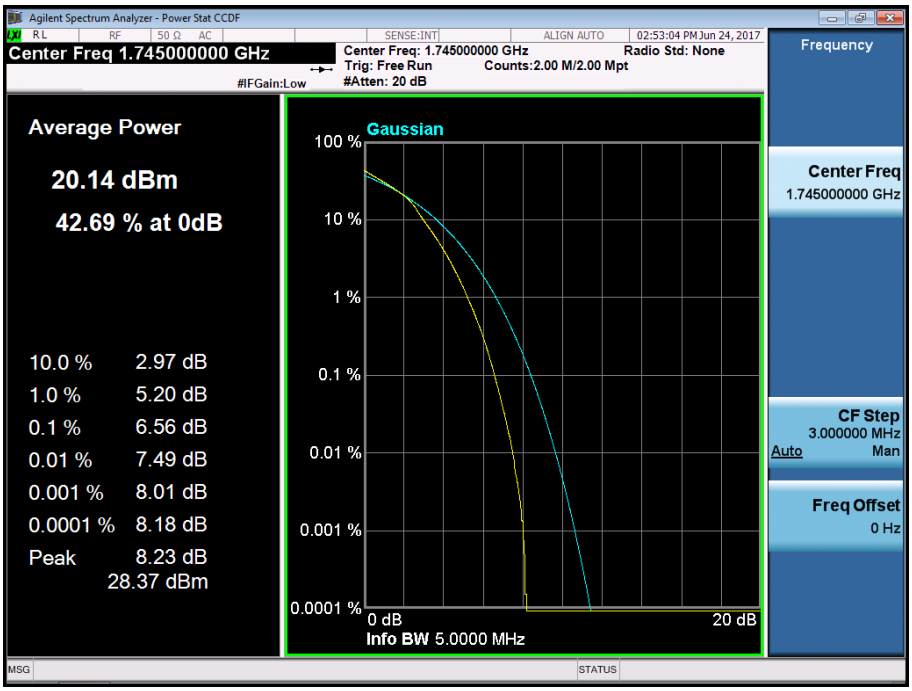
BAND 66/4. PAR Plot (3M BW_Ch.132322_16QAM_RB15_0)



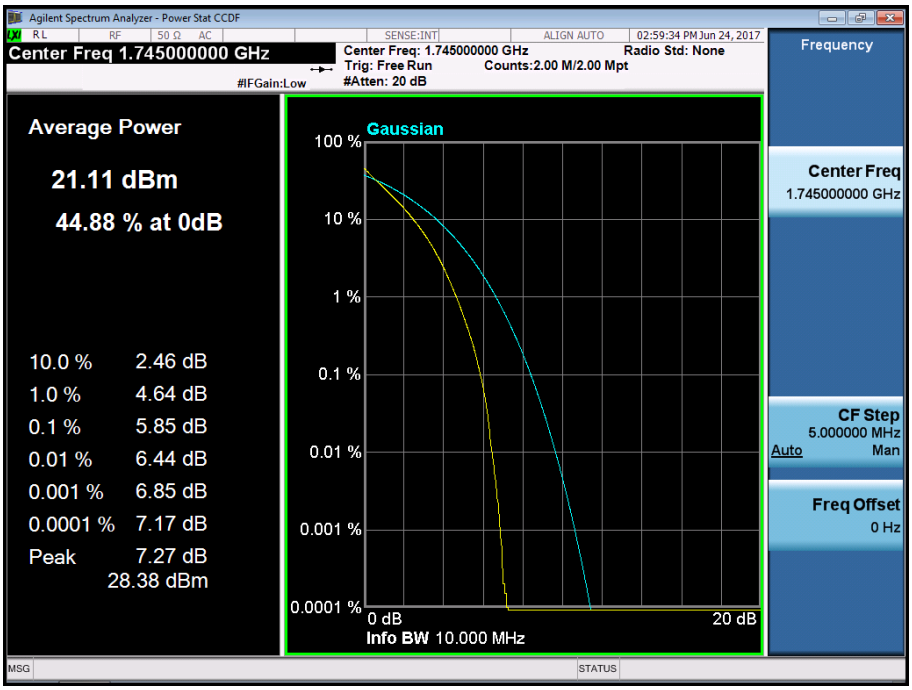
BAND 66/4. PAR Plot (5M BW_Ch.132322_QPSK_RB25_0)



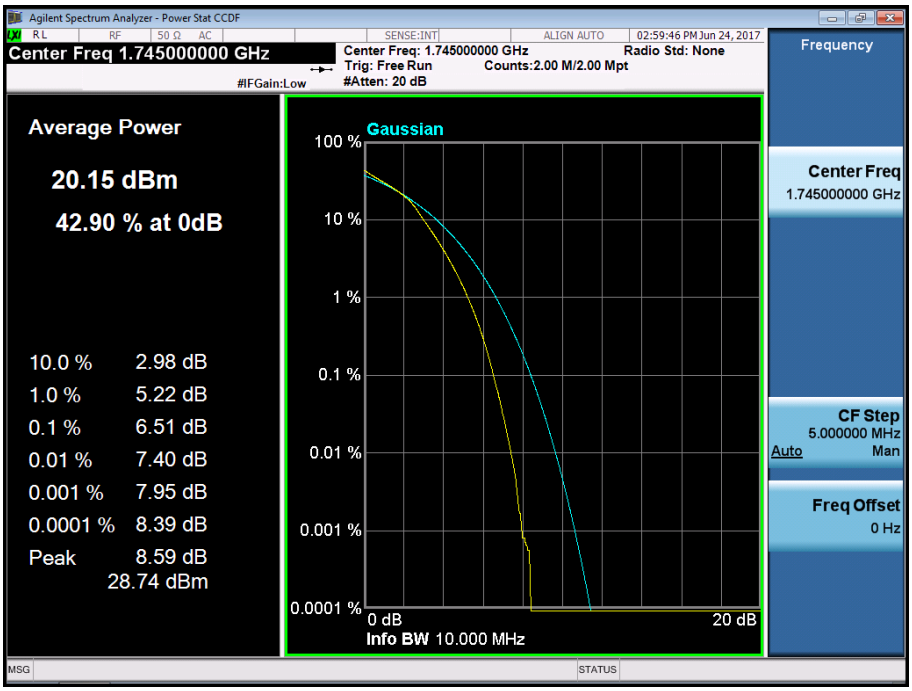
BAND 66/4. PAR Plot (5M BW_Ch.132322_16QAM_RB25_0)



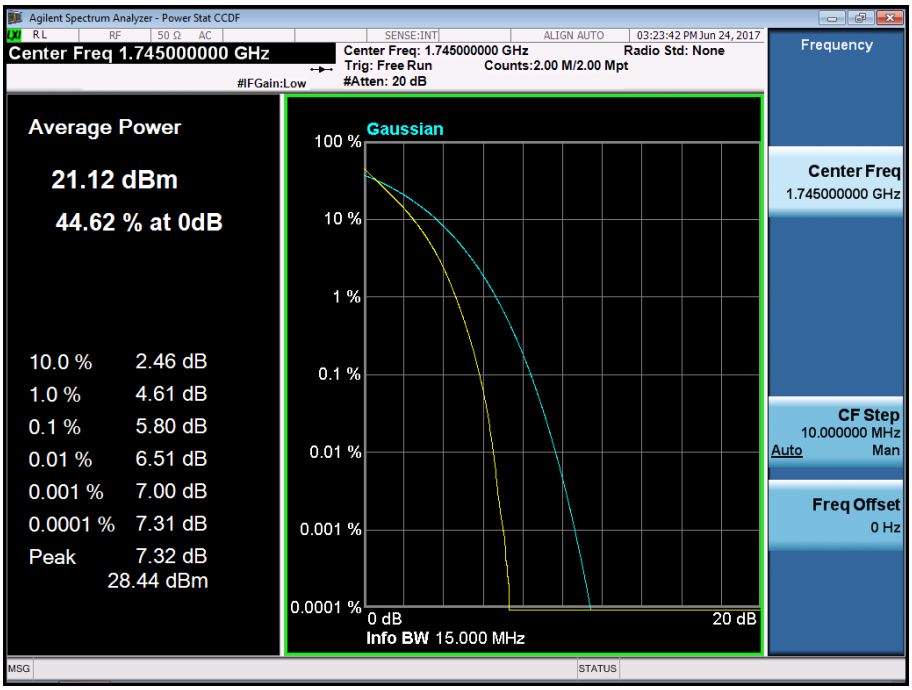
BAND 66/4. PAR Plot (10M BW_Ch.132322_QPSK_RB50_0)



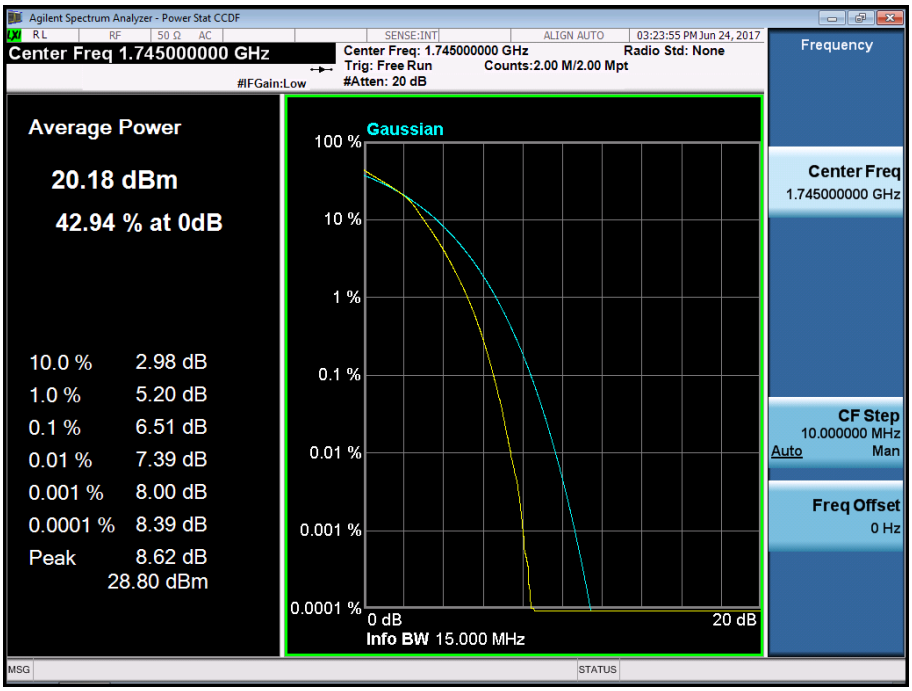
BAND 66/4. PAR Plot (10M BW_Ch.132322_16QAM_RB50_0)



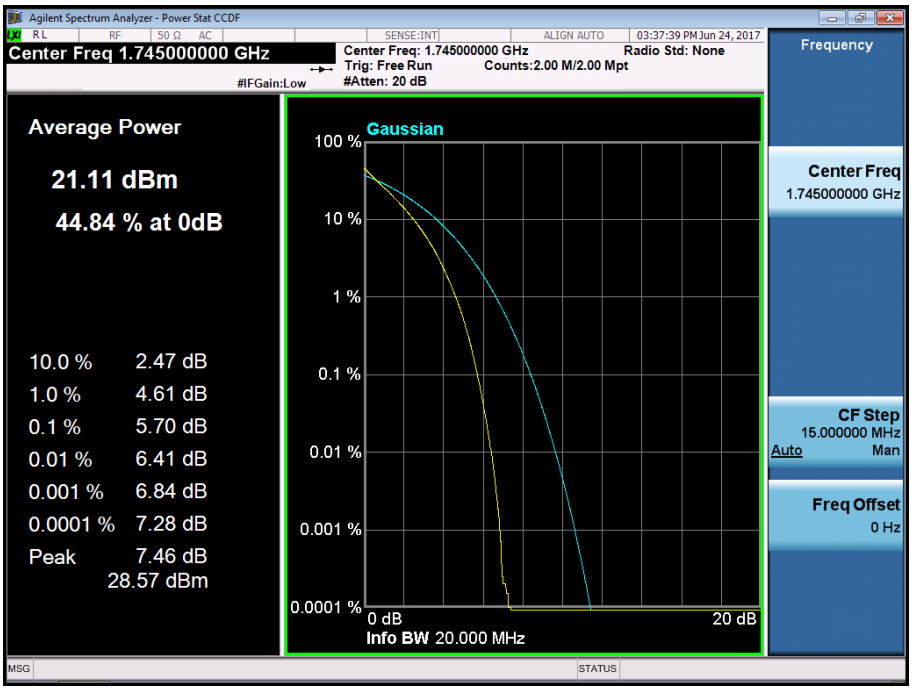
BAND 66/4. PAR Plot (15M BW_Ch.132322_QPSK_RB75_0)



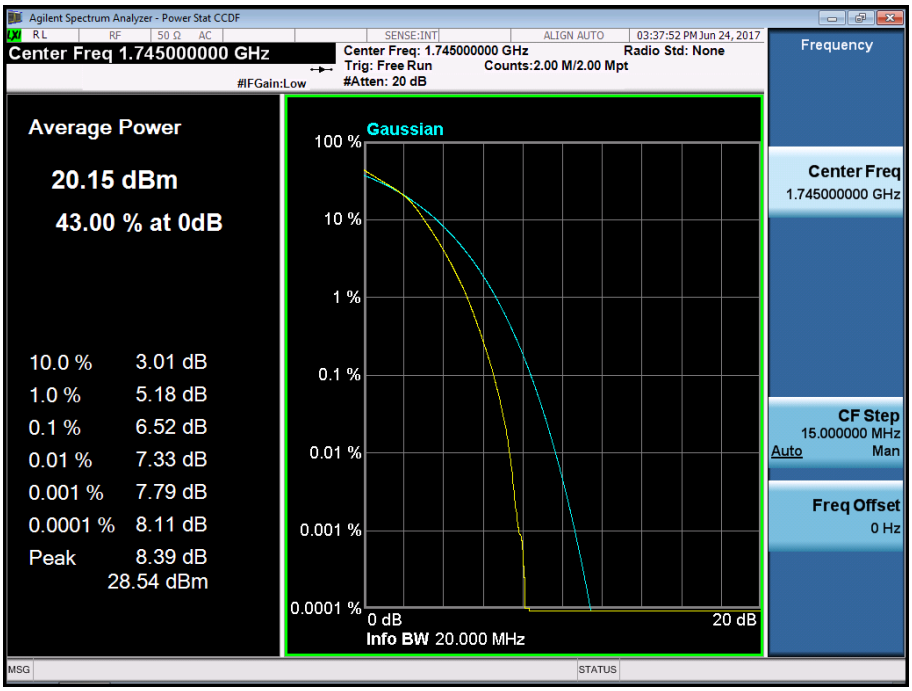
BAND 66/4. PAR Plot (15M BW_Ch.132322_16QAM_RB75_0)



BAND 66/4. PAR Plot (20M BW_Ch.132322_QPSK_RB100_0)



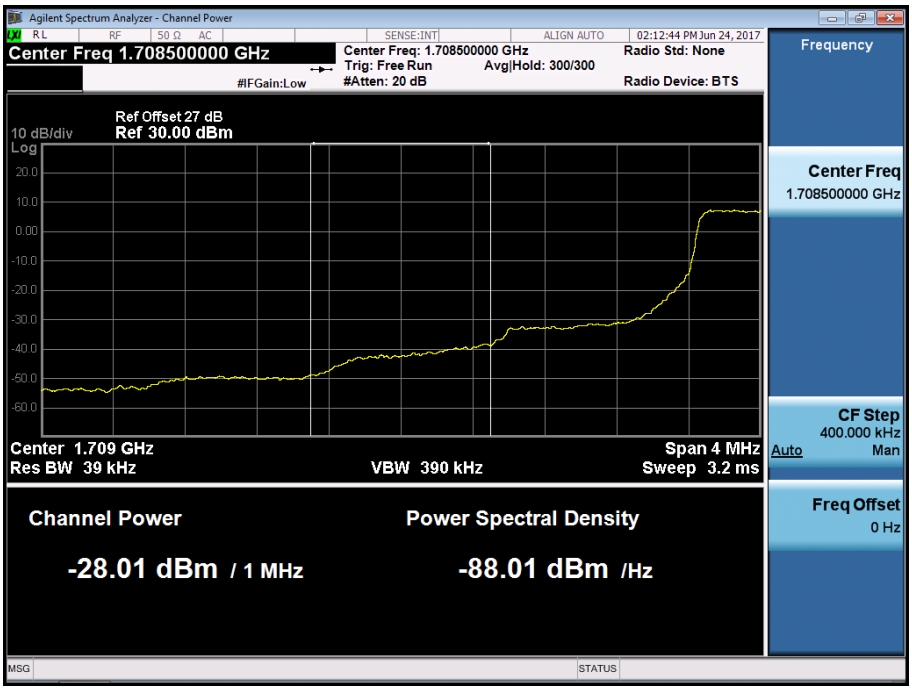
BAND 66/4. PAR Plot (20M BW_Ch.132322_16QAM_RB100_0)



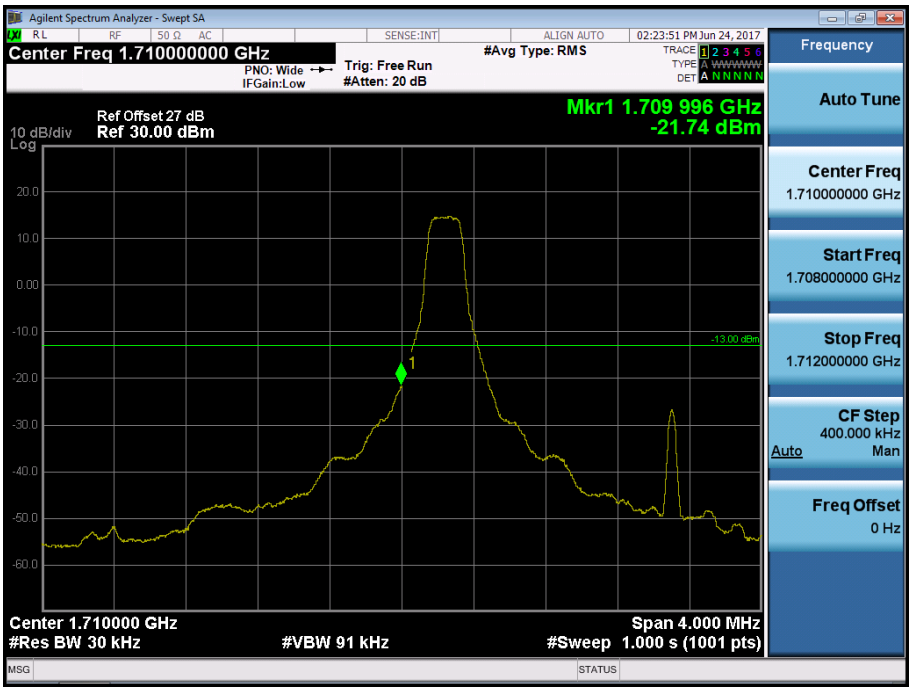
BAND 66/4. Lower Band Edge Plot (1.4M BW Ch.131979 QPSK RB 1, Offset 0) -1

BAND 66/4. Lower Band Edge Plot (1.4M BW Ch. 131979 QPSK RB 6) -2

BAND 66/4. Lower Extended Band Edge Plot (1.4M BW Ch. 131979 QPSK_RB6_0) -3

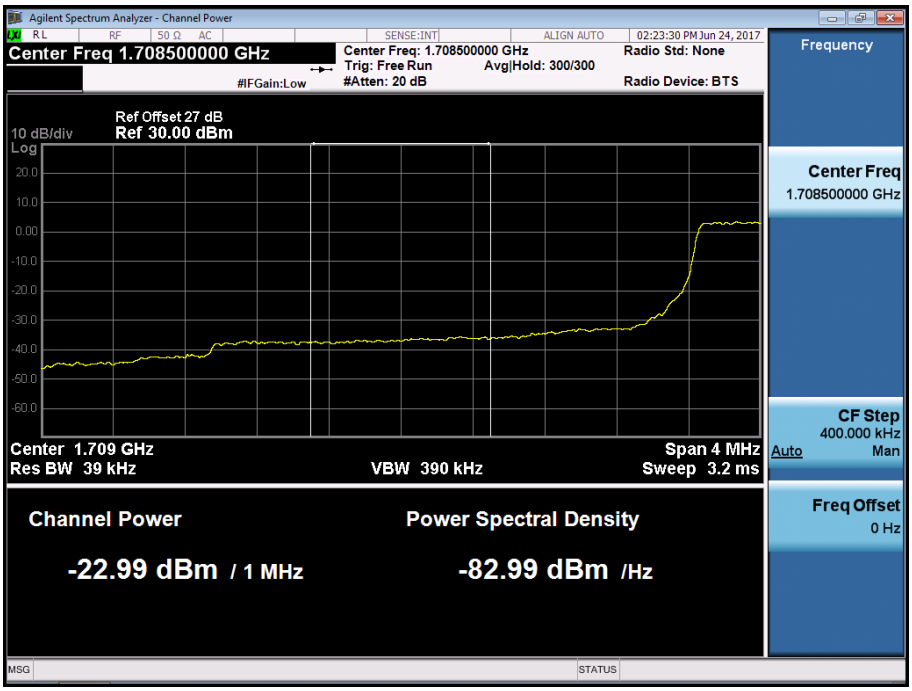


BAND 66/4. Lower Band Edge Plot (3M BW Ch. 131987 QPSK RB 1, Offset 0) -1

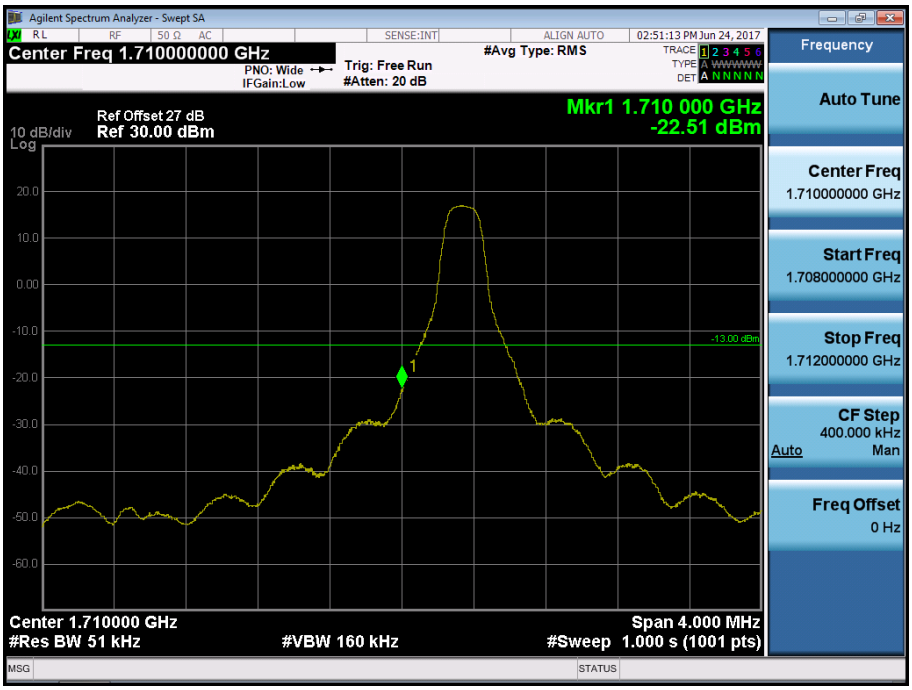


BAND 66/4. Lower Band Edge Plot (3M BW Ch. 131987 QPSK RB 15) -2

BAND 66/4. Lower Extended Band Edge Plot (3M BW Ch. 131987 QPSK_RB15_0) -3

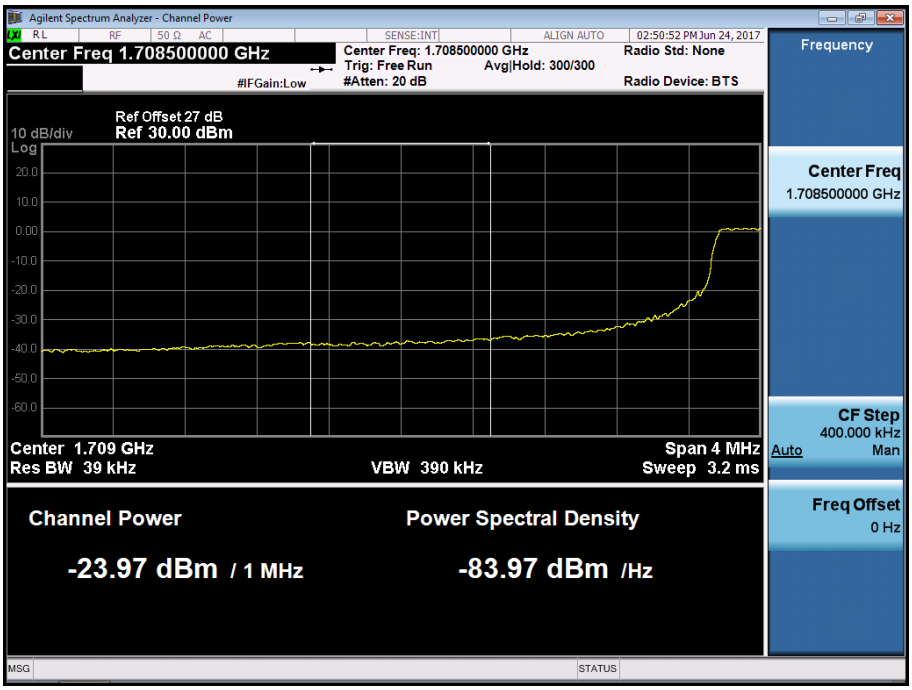


BAND 66/4. Lower Band Edge Plot (5M BW Ch. 131997 QPSK RB 1, Offset 0) -1

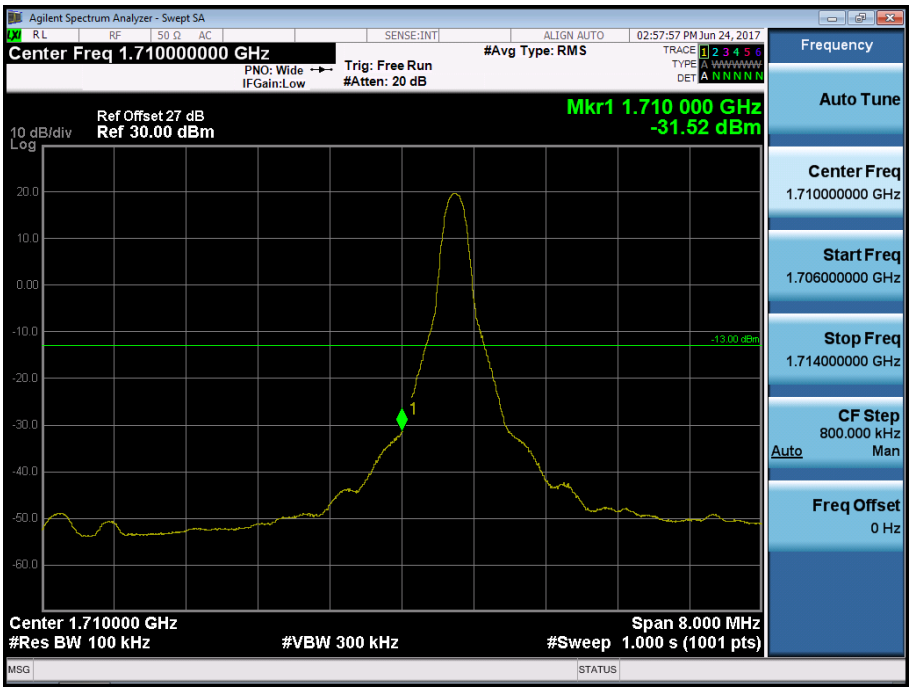


BAND 66/4. Lower Band Edge Plot (5M BW Ch. 131997 QPSK RB 25) -2

BAND 66/4. Lower Extended Band Edge Plot (5M BW Ch. 131997 QPSK_RB25_0) -3

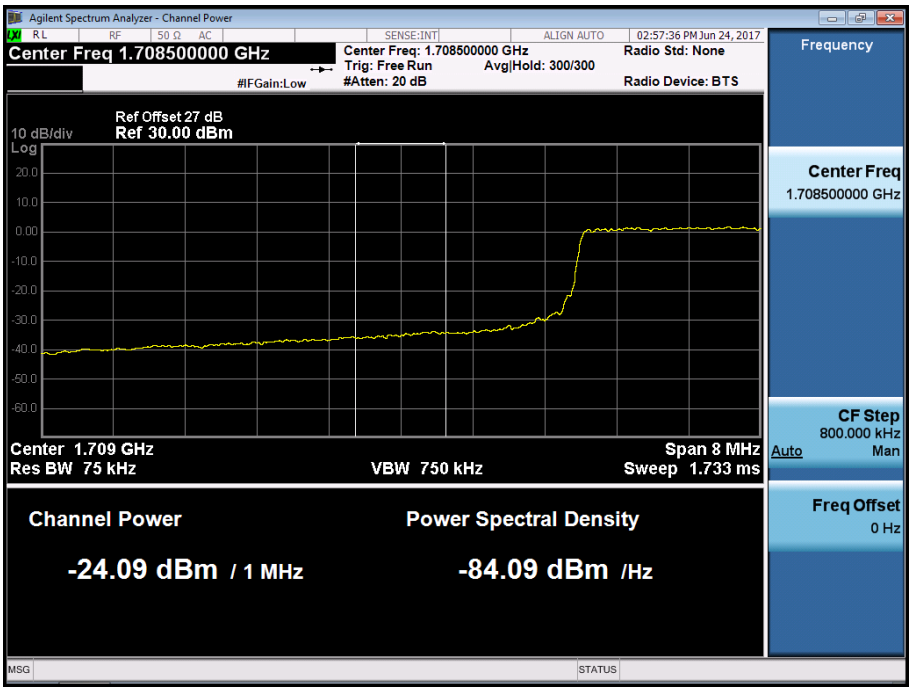


BAND 66/4. Lower Band Edge Plot (10M BW Ch. 132022 QPSK RB 1, Offset 0) -1

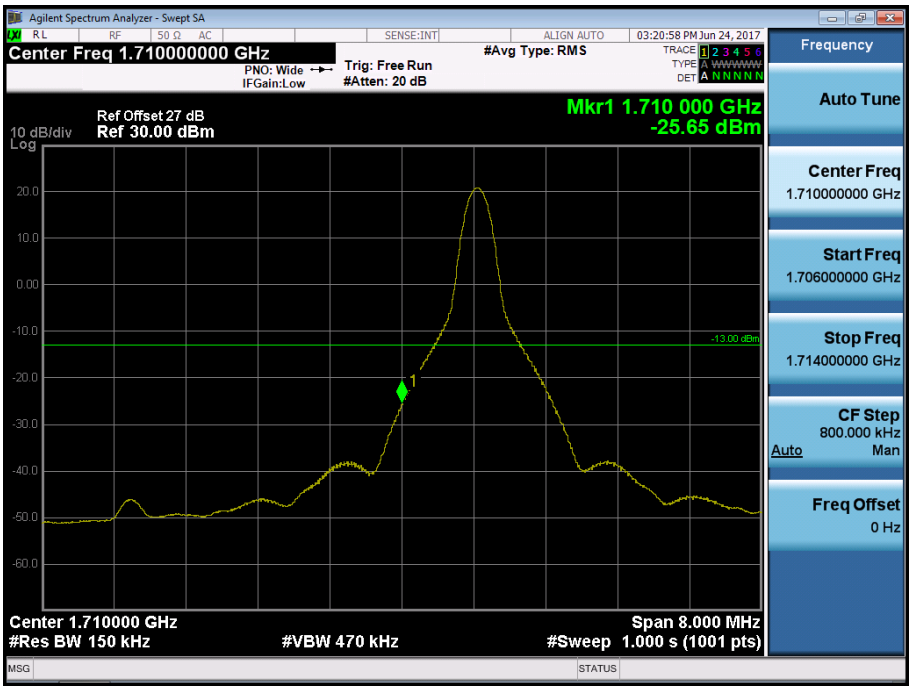


BAND 66/4. Lower Band Edge Plot (10M BW Ch. 132022 QPSK RB 50) -2

BAND 66/4. Lower Extended Band Edge Plot (10M BW Ch. 132022 QPSK_RB50_0) -3

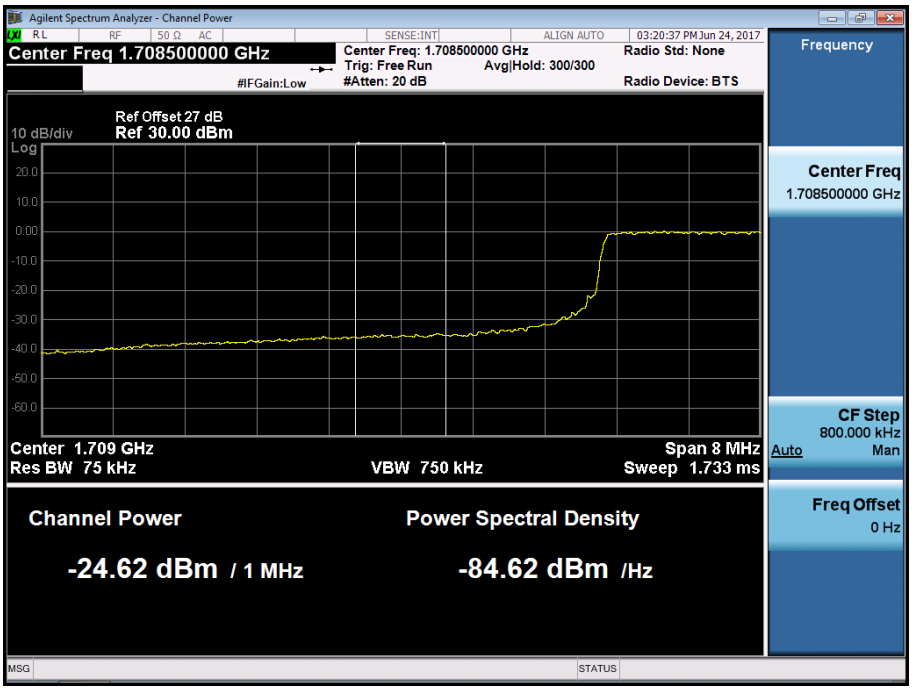


BAND 66/4. Lower Band Edge Plot (15M BW Ch. 132047 QPSK RB 1, Offset 0) -1

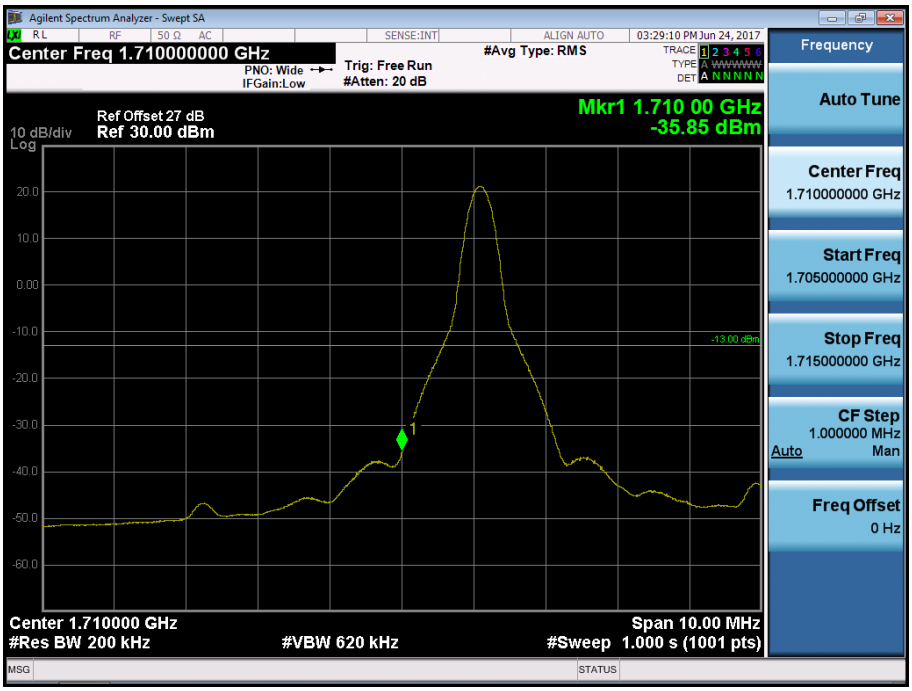


BAND 66/4. Lower Band Edge Plot (15M BW Ch. 132047 QPSK RB 75) -2

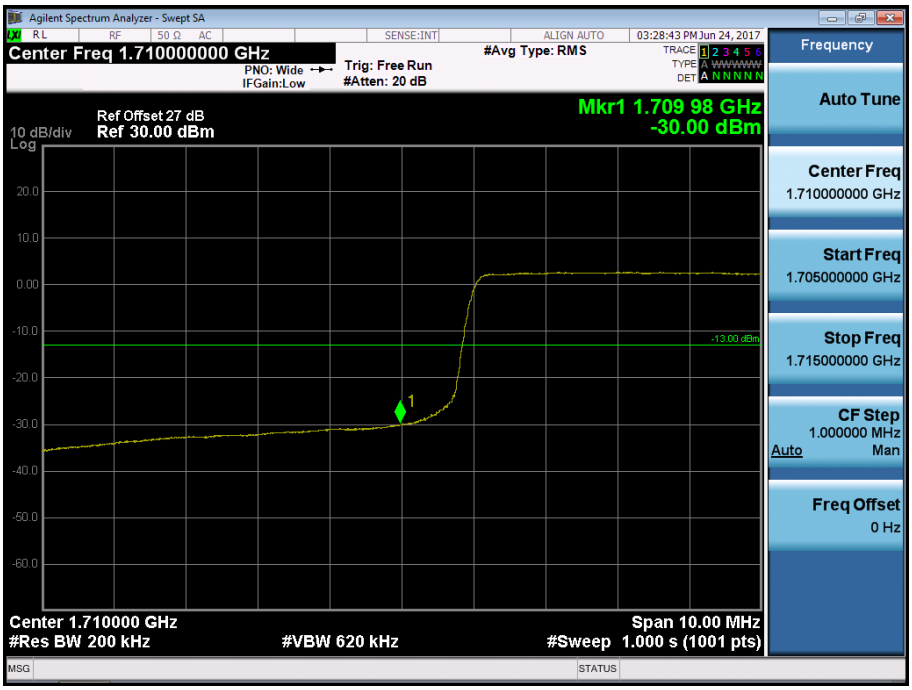
BAND 66/4. Lower Extended Band Edge Plot (15M BW Ch. 132047 QPSK_RB75_0) -3



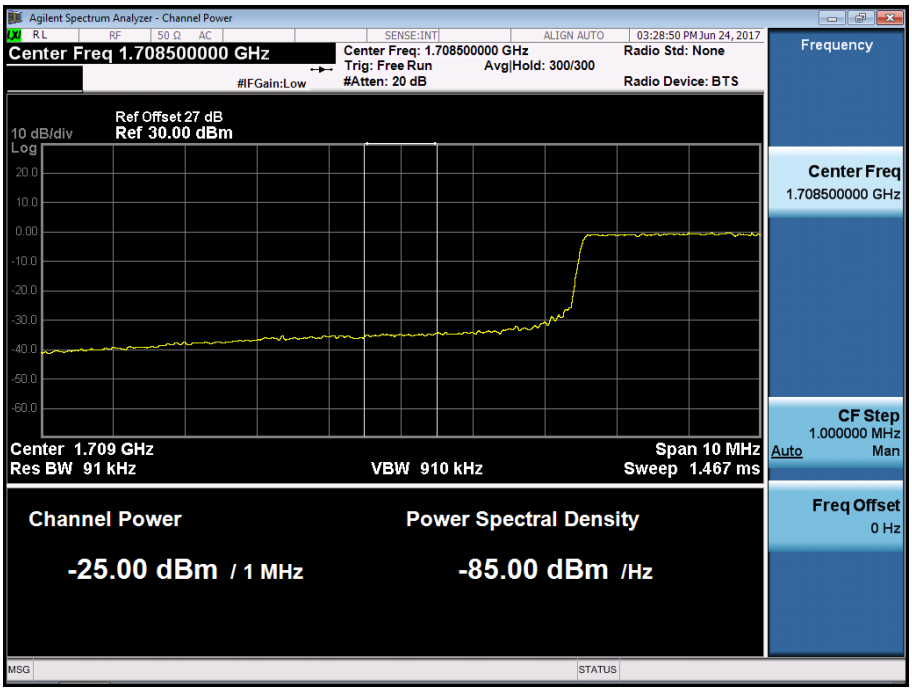
BAND 66/4. Lower Band Edge Plot (20M BW Ch. 132072 QPSK RB 1, Offset 0) -1



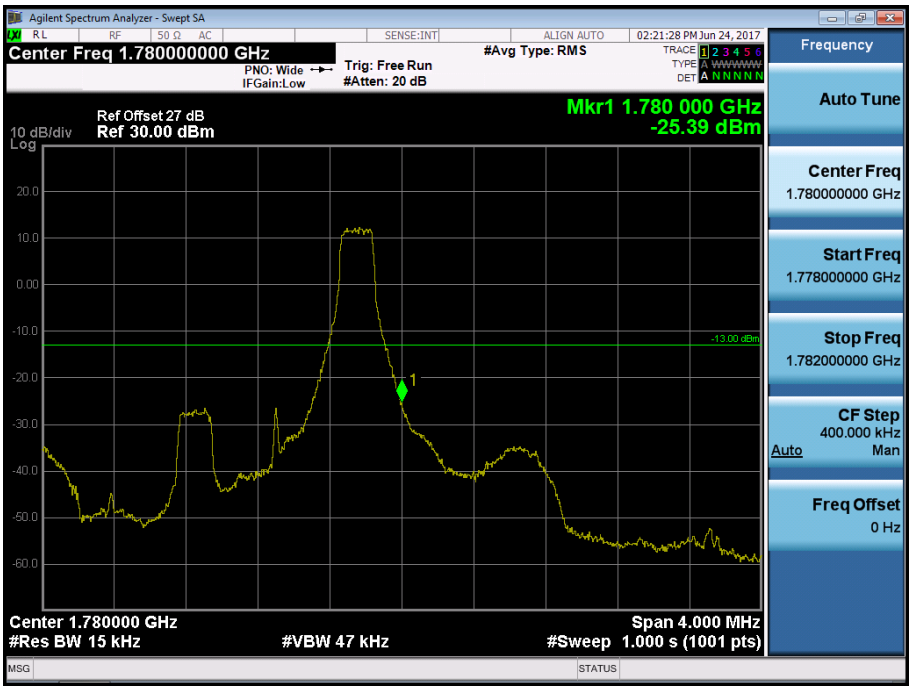
BAND 66/4. Lower Band Edge Plot (20M BW Ch. 132072 QPSK RB 100) -2



BAND 66/4. Lower Extended Band Edge Plot (20M BW Ch. 132072 QPSK_RB100_0) -3

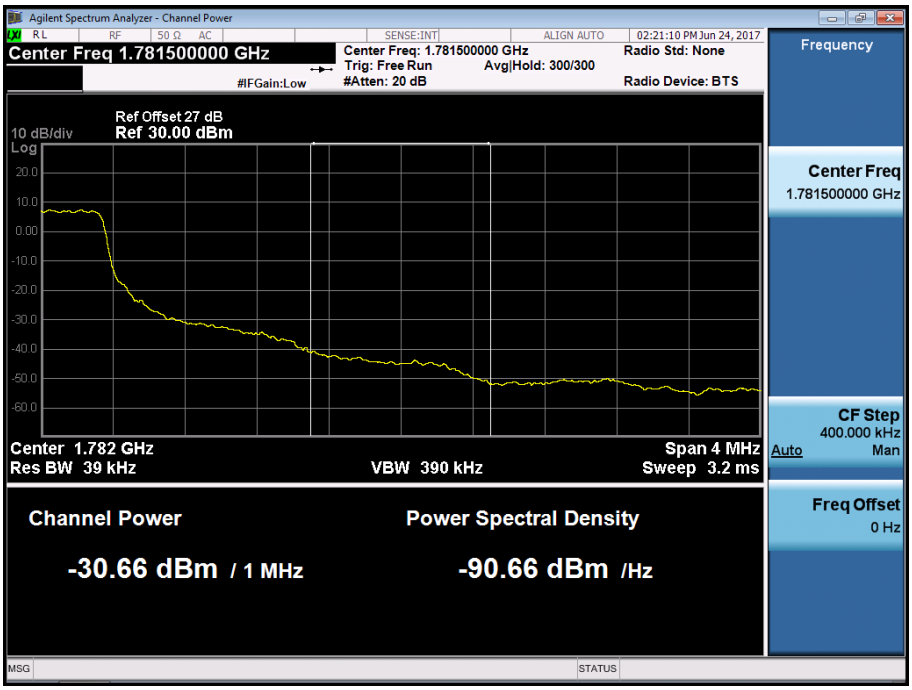


BAND 66/4. Upper Band Edge Plot (1.4M BW Ch. 132665 QPSK_RB1_Offset 5) -1

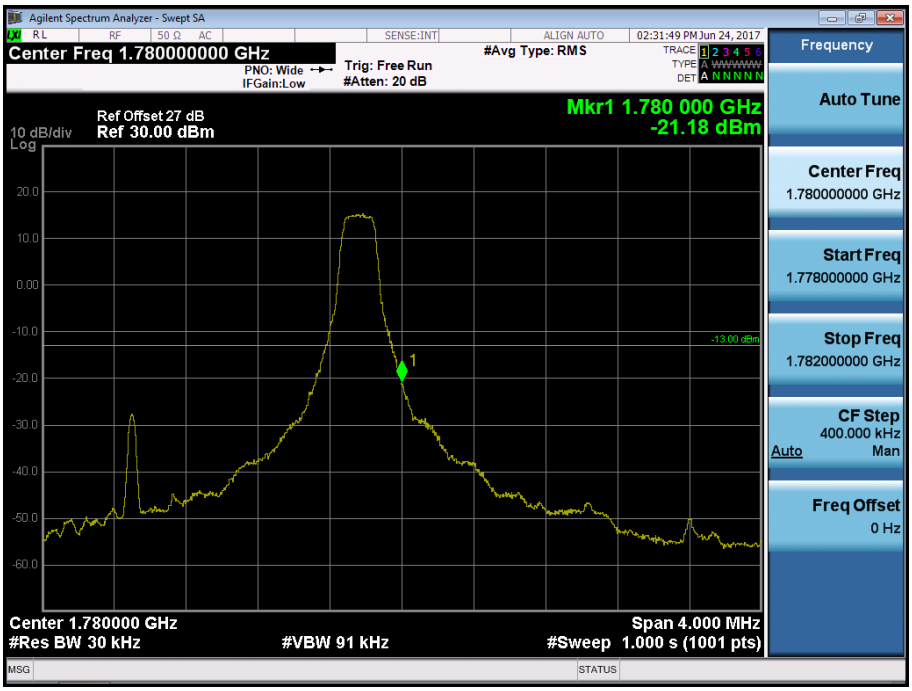


BAND 66/4. Upper Band Edge Plot (1.4M BW Ch. 132665 QPSK_RB6) -2

BAND 66/4. Upper Extended Band Edge Plot (1.4M BW Ch. 132665 QPSK_RB6_0) -3

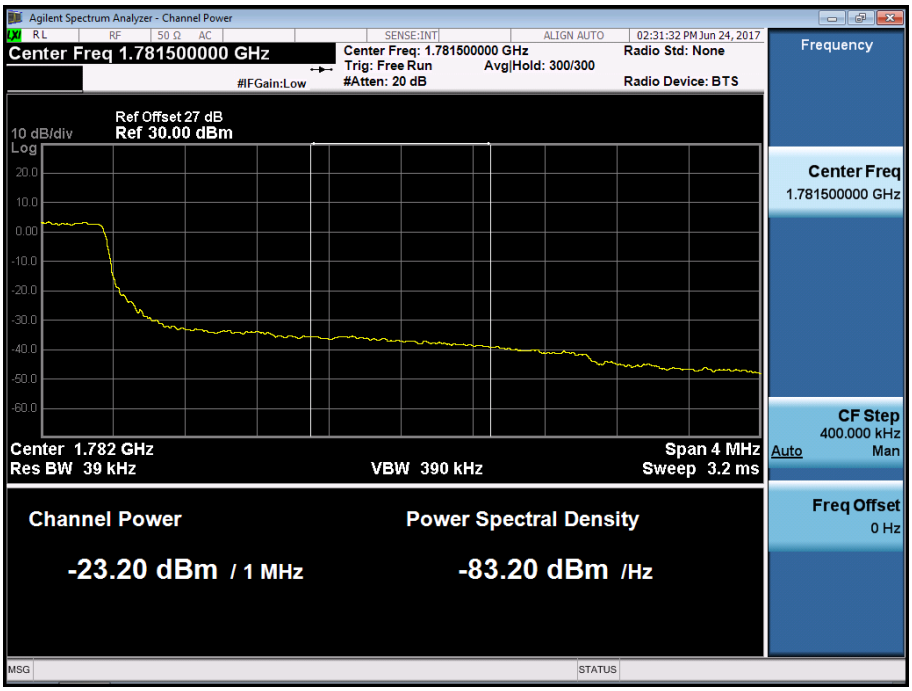


BAND 66/4. Upper Band Edge Plot (3M BW Ch. 132657 QPSK_RB1_Offset 14) -1

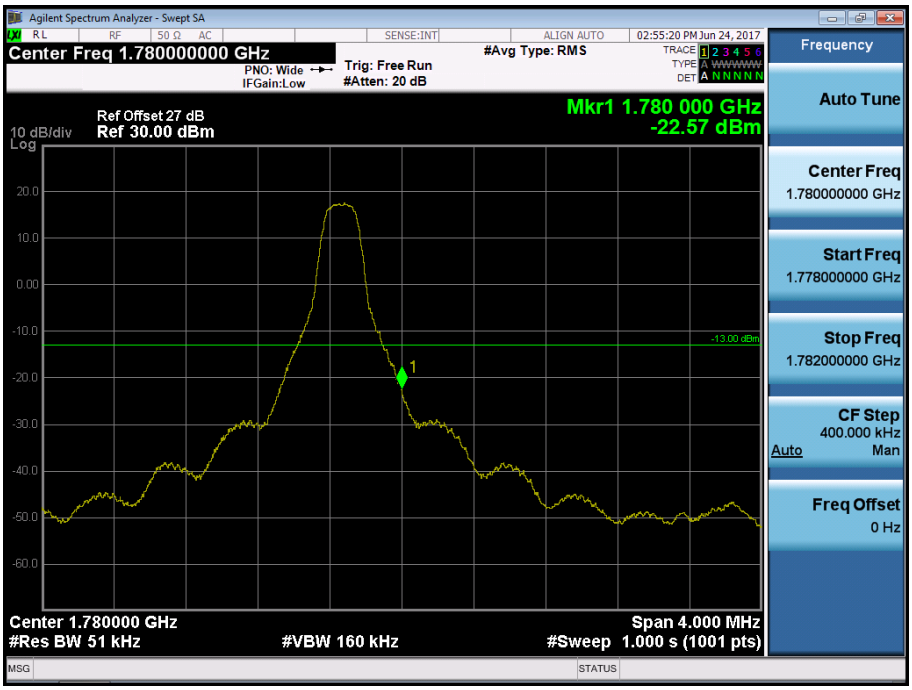


BAND 66/4. Upper Band Edge Plot (3M BW Ch. 132657 QPSK_RB15) -2

BAND 66/4. Upper Extended Band Edge Plot (3M BW Ch. 132657 QPSK_RB15_0) -3

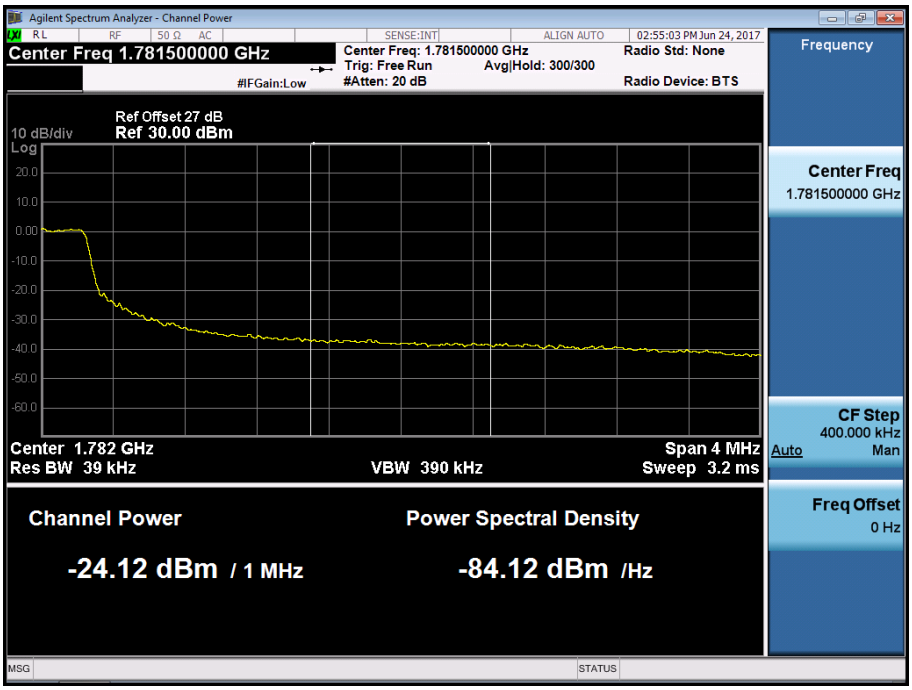


BAND 66/4. Upper Band Edge Plot (5M BW Ch. 132647 QPSK_RB1_Offset 24) -1

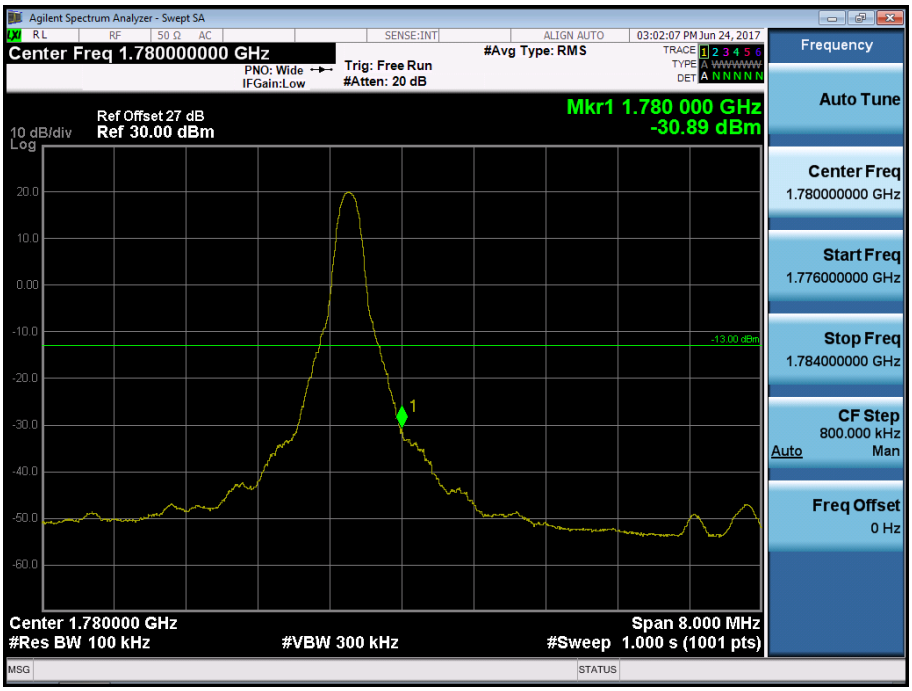


BAND 66/4. Upper Band Edge Plot (5M BW Ch. 132647 QPSK_RB25) -2

BAND 66/4. Upper Extended Band Edge Plot (5M BW Ch. 132647 QPSK_RB25) -3

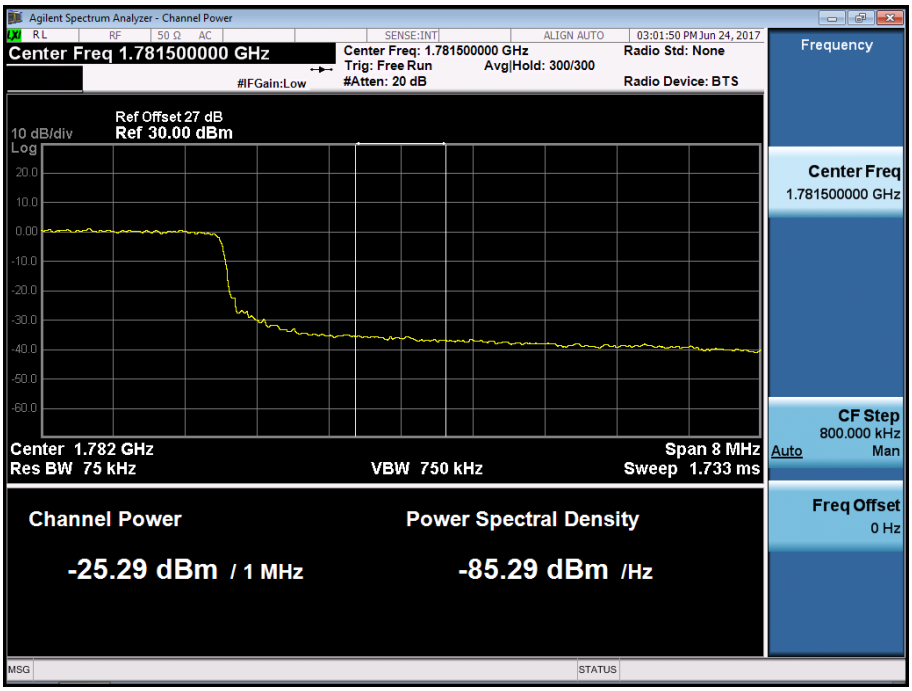


BAND 66/4. Upper Band Edge Plot (10M BW Ch. 132622 QPSK_RB1_Offset 49) -1

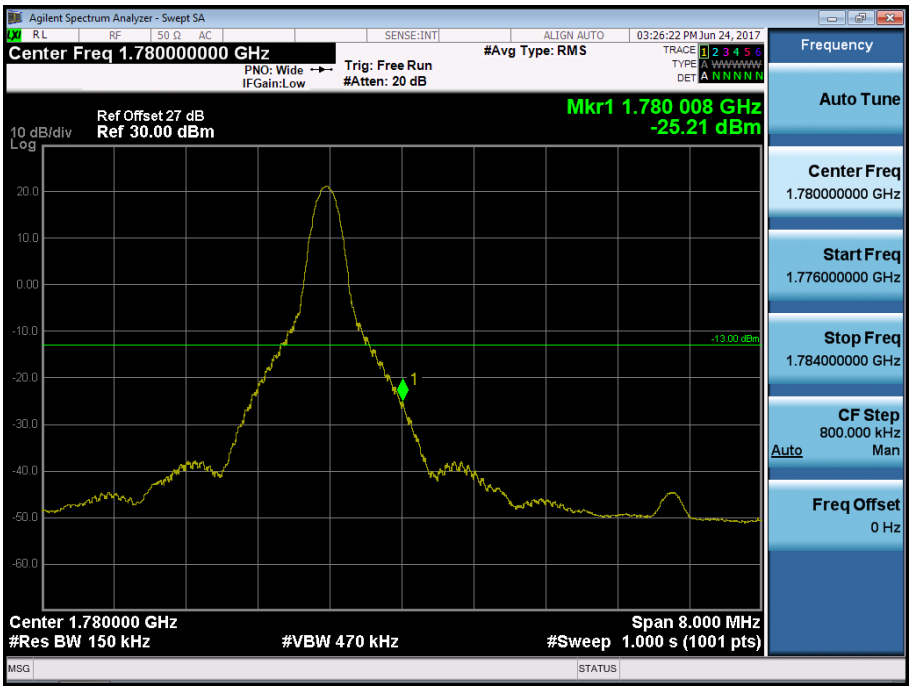


BAND 66/4. Upper Band Edge Plot (10M BW Ch. 132622 QPSK_RB50) -2

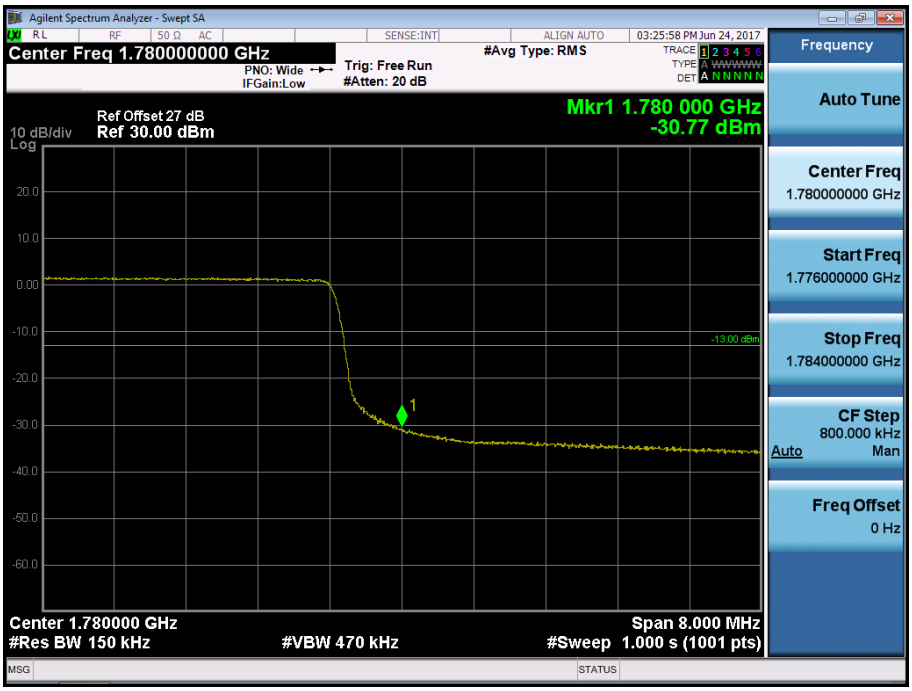
BAND 66/4. Upper Extended Band Edge Plot (10M BW Ch. 132622 QPSK_RB50) -3



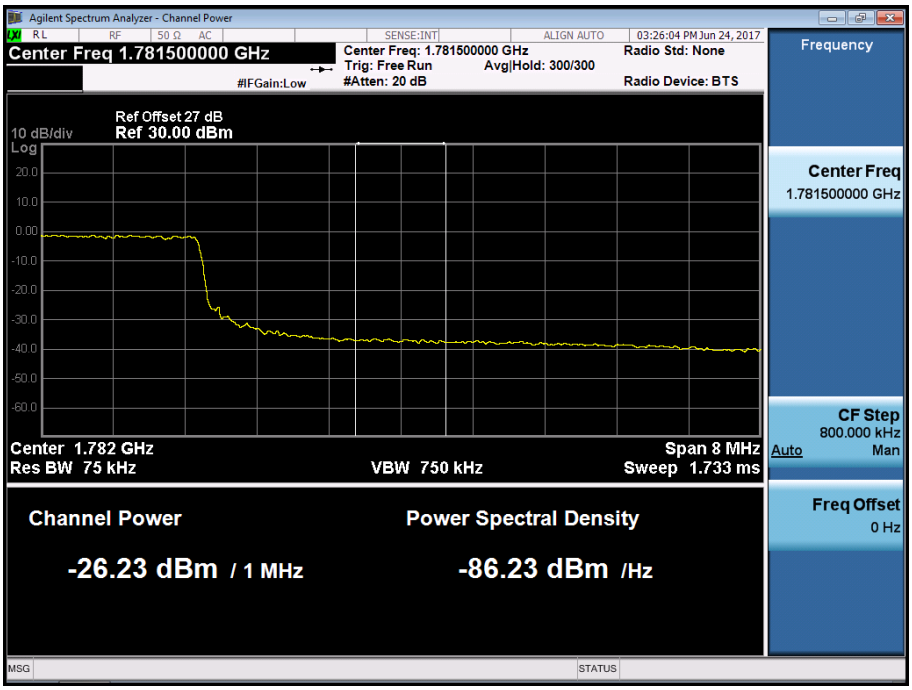
BAND 66/4. Upper Band Edge Plot (15M BW Ch. 132597 QPSK_RB1_Offset 74) -1



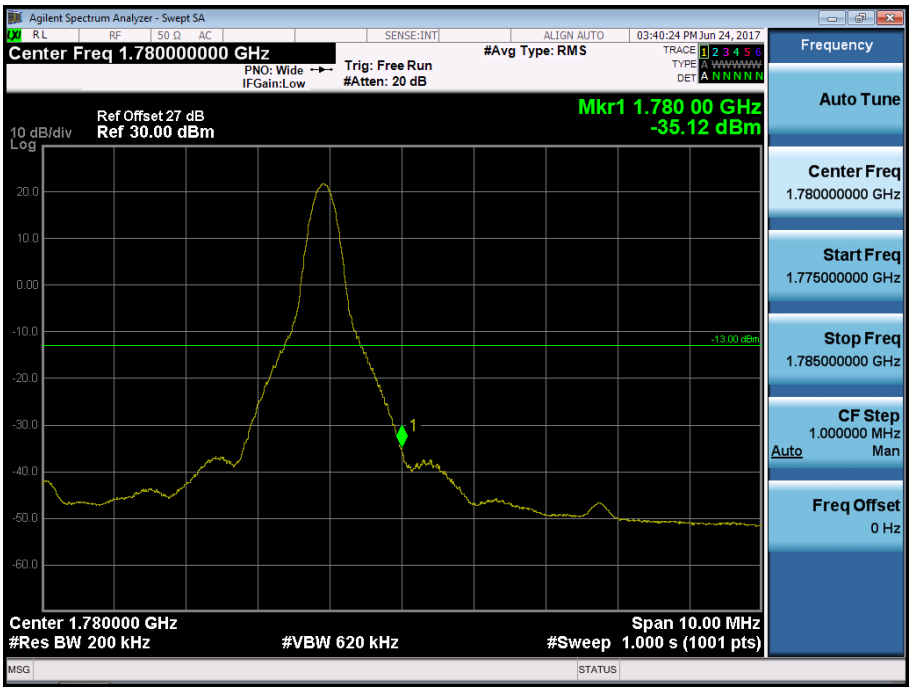
BAND 66/4. Upper Band Edge Plot (15M BW Ch. 132597 QPSK_RB75) -2



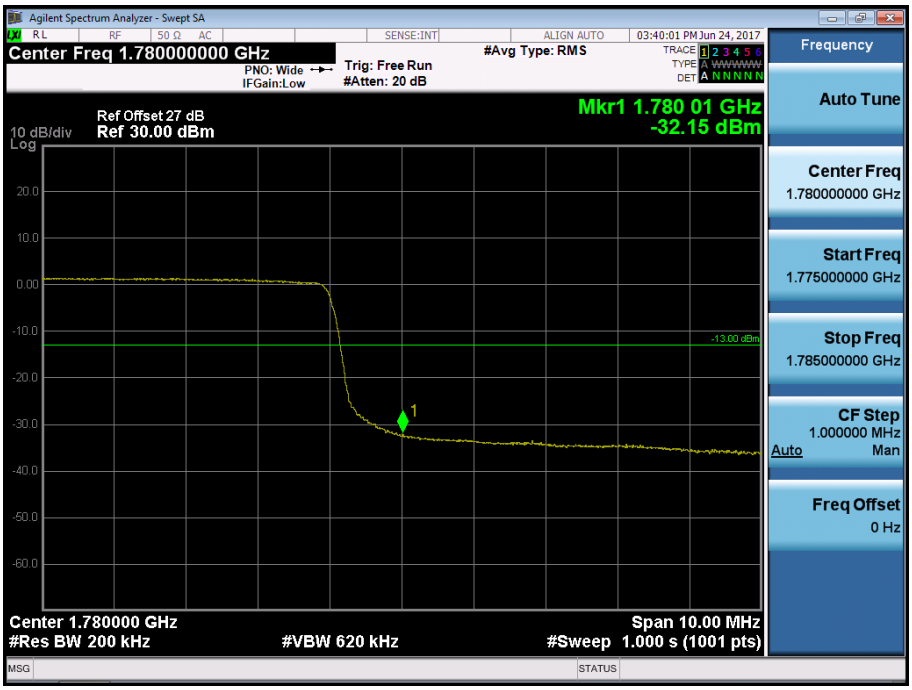
BAND 66/4. Upper Extended Band Edge Plot (15M BW Ch. 132597 QPSK_RB75) -3



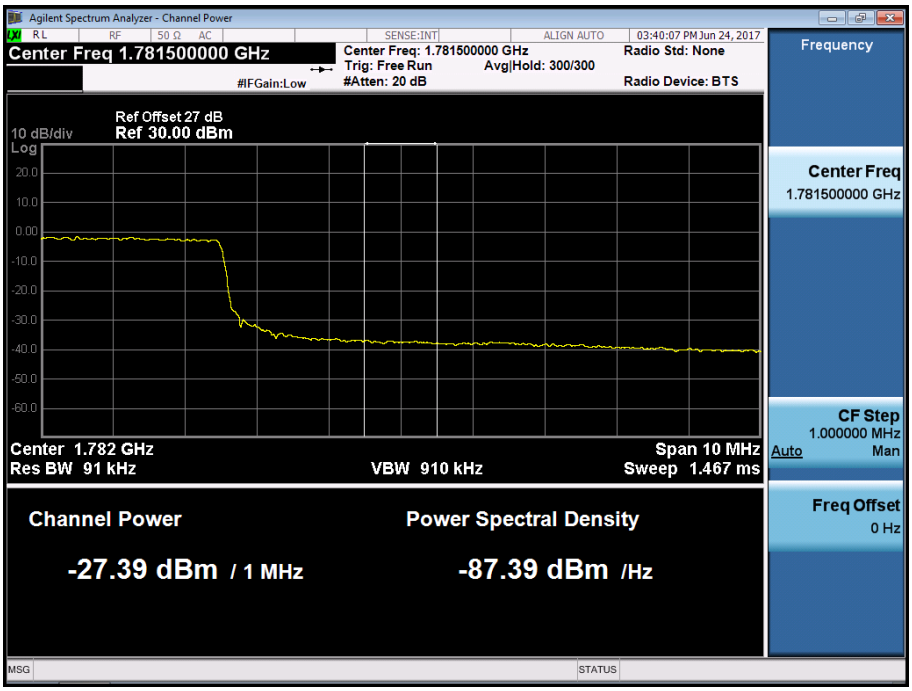
BAND 66/4. Upper Band Edge Plot (20M BW Ch. 132572 QPSK_RB1_Offset 99) -1



BAND 66/4. Upper Band Edge Plot (20M BW Ch. 132572 QPSK_RB100) -2

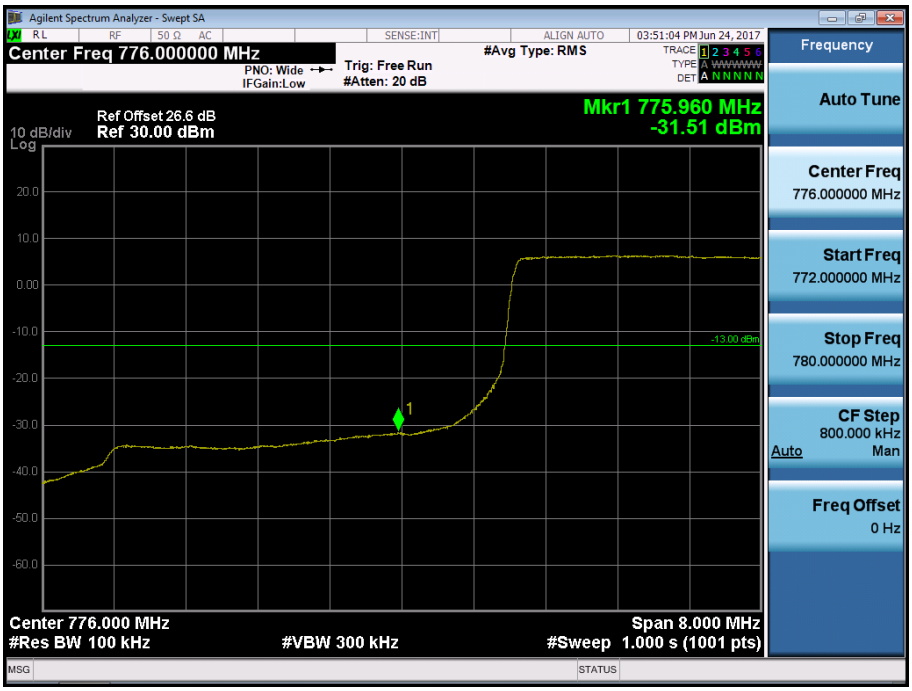


BAND 66/4. Upper Extended Band Edge Plot (20M BW Ch. 132572 QPSK_RB100) -3



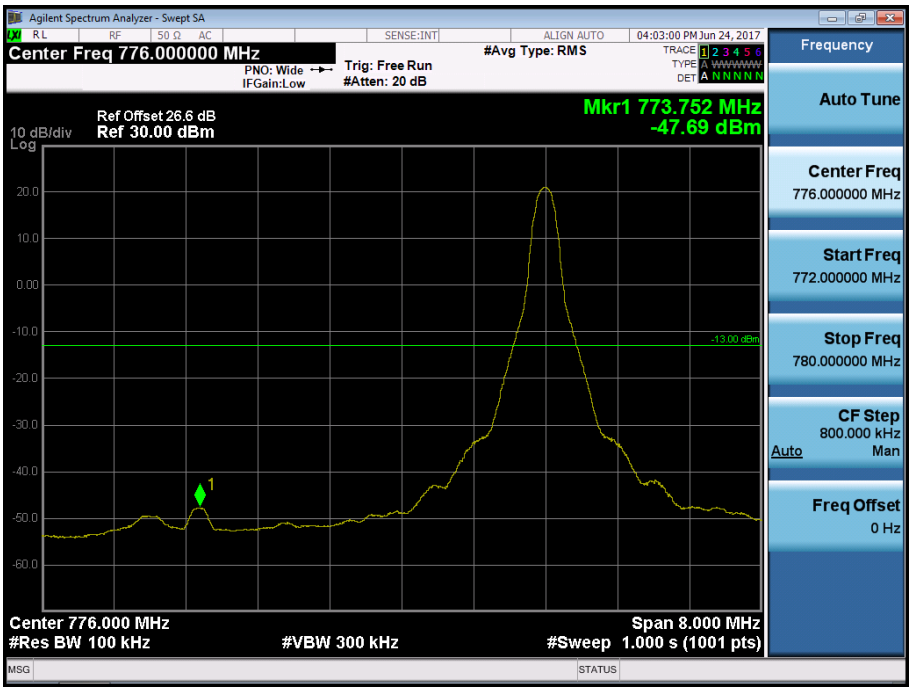
Band 13 Lower Band Edge Plot (5M BW Ch.23205 QPSK_RB1 OFFSET0)

Band 13 Lower Band Edge Plot (5M BW Ch.23205 QPSK_RB25)



Band 13 Lower Emission Mask (763 MHz ~ 775 MHz) Plot (5M BW Ch.23205 QPSK_RB25_0)

Band 13 Lower Band Edge Plot (10M BW Ch.23230 QPSK_RB1 OFFSET0)



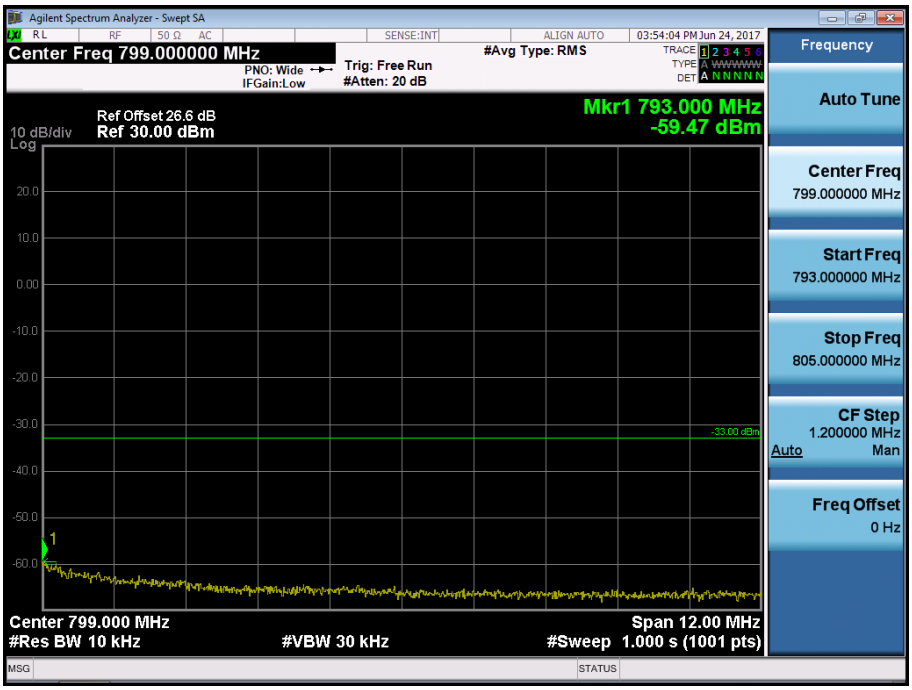
BAND 13. Lower & Upper Band Edge Plot (10M BW Ch.23230 QPSK RB 50)

Band 13 Lower Emission Mask (763 MHz ~ 775 MHz) Plot (10M BW Ch.23230 QPSK_RB50_0)

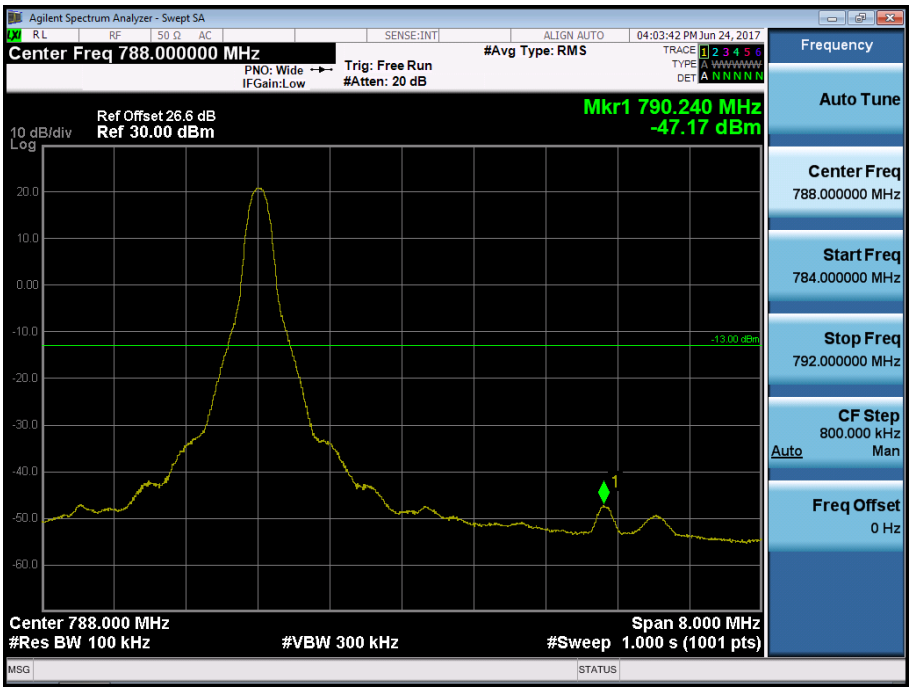
Band 13 Upper Band Edge Plot (5M BW Ch.23255 QPSK_RB1_Offset 24)

Band 13 Upper Band Edge Plot (5M BW Ch.23255 QPSK_RB25)

Band 13 Upper Emission Mask (793 MHz ~805 MHz) Plot (5M BW Ch.23255 QPSK_RB25_0)



Band 13 Upper Band Edge Plot (10M BW Ch.23230 QPSK_RB1_Offset 49)



Band 13 Upper Band Edge Plot (10M BW Ch.23230 QPSK_RB50)

Band 13 Upper Emission Mask (793 MHz ~805 MHz) Plot (10M BW Ch.23230 QPSK_RB50_0)

BAND 66/4. Conducted Spurious Plot_1 (131979ch_1.4MHz_QPSK_RB 1_0)

BAND 66/4. Conducted Spurious Plot_2 (131979ch_1.4MHz_QPSK_ RB 1_0)