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Report No.: 1809TW1204-U4
Report Version: 1.0
Issue Date: 2019-04-02

MEASUREMENT REPORT
FCC PART 22H, 24E, 27

FCC ID:	2ASWQ-TW1PCSNAAT00
APPLICANT:	FLIR Systems, Inc.
Application Type:	Certification
Product:	TruWITNESS PCS for North America (ATT)
Model No.:	TW1-PCS-NAAT-00
Serial Model:	TW1-PCS-NAAT-XX, (X=0~9, A~Z or space)
Trademark:	FLIR
FCC Classification:	PCB-PCS Licensed Transmitter
FCC Rule Part(s):	Part2, Part22 Subpart H, Part24 Subpart E, Part27
Test Procedure(s):	ANSI/TIA-603-E-2016, KDB 971168 D01v03r01
Received Date:	September 4, 2018
Test Date:	October 1 ~ 22, 2018

Tested By : (Peter Syu)

Reviewed By : (Paddy Chen)

Approved By : (Chenz Ker)

Testing Laboratory 3261

The test results only relate to the tested sample.
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
1809TW1204-U4	1.0	Original Report	2019-04-02	

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Description Page

§2.1033 General Information

Applicant	FLIR Systems, Inc.
Applicant Address	65 CHALLENGER RD RIDGEFIELD PARK, NJ, 07660-2103, US
Manufacturer	FLIR Systems, Inc.
Manufacturer Address	65 CHALLENGER RD RIDGEFIELD PARK, NJ, 07660-2103, US
Test Site	MRT Technology (Taiwan) Co., Ltd
Test Site Address	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
MRT FCC Registration No.	153292
FCC Rule Part(s)	Part 22H, Part 24E, Part27
Model No.	TW1-PCS-NAAT-00
Test Device Serial No.	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations
Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan (R.O.C)

- **MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.**
- **MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.**
- **MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.**

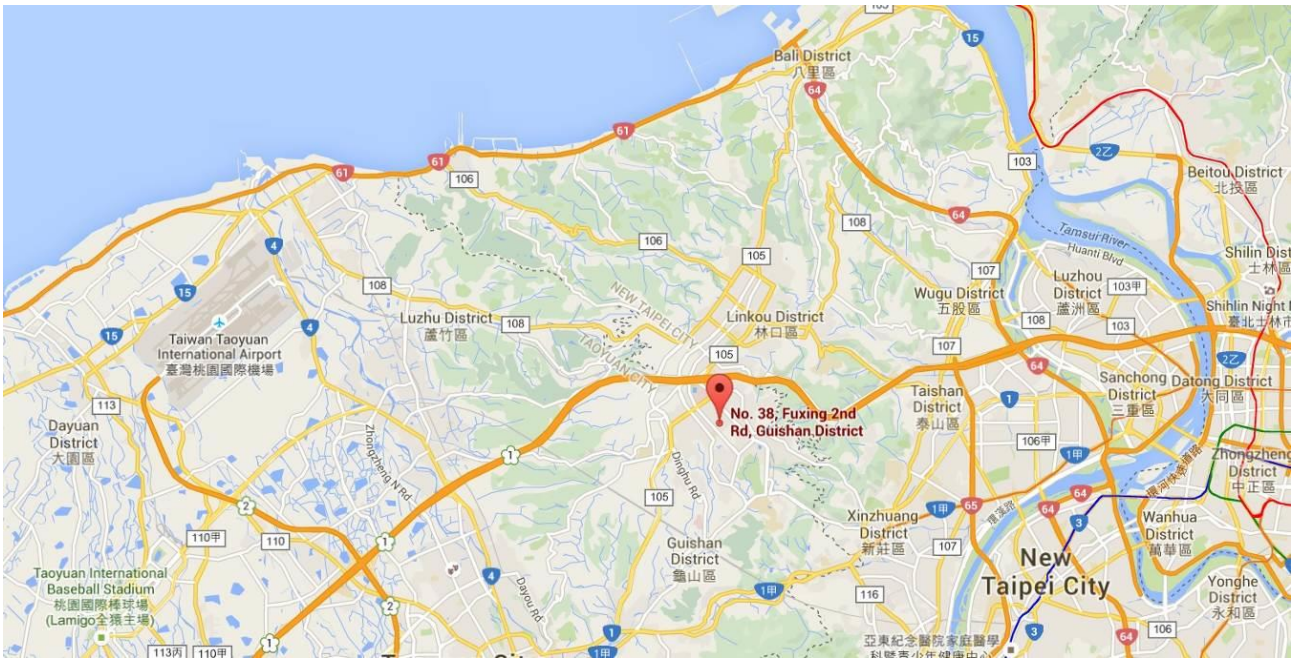
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Feature of Equipment under Test

Product Name	TruWITNESS PCS for North America (ATT)
Model No.	TW1-PCS-NAAT-00
Serial Model	TW1-PCS-NAAT-XX, (X=0~9, A~Z or space)
Trademark	FLIR
IMEI	35284808XXXXXXX
Supports Radios Spec.	WLAN: 2.4G: 802.11b/g/n-20; WWAN: 3G: WCDMA Band 2, 5 4G: FDD Band 2, 4, 5, 12
4G Operation Band (s)	Band 2, 4, 5, 12
Frequency Range	Band2: 1850MHz–1910MHz Band4: 1710MHz–1755MHz Band5: 824MHz–849MHz Band12: 699MHz–716MHz
Battery	Rating: DC 3.6V, 10050mAh, 36.18Wh

2.2. Equipment Description

Antenna Type	FPCB
Antenna Kit	Ethertronics / 1004293
Antenna Gain	Band 2: 2dBi, Band 4: 1.6dBi, Band 5: -0.2dBi, Band 12: 0.06dBi
Type of Modulation	QPSK, 16QAM

Note: The test report has showed the worst test mode.

2.3. Device Capabilities

This device contains the following capabilities:
LTE Band 2, 4, 5, 12

2.4. Test Configuration

The **TruWITNESS PCS for North America (ATT)** was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01v03r01. See section 3.0 of this report for a description of the radiated and antenna port conducted emissions tests.

2.5. EMI Suppression Device(s)/Modifications

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

3. DESCRIPTION OF TEST

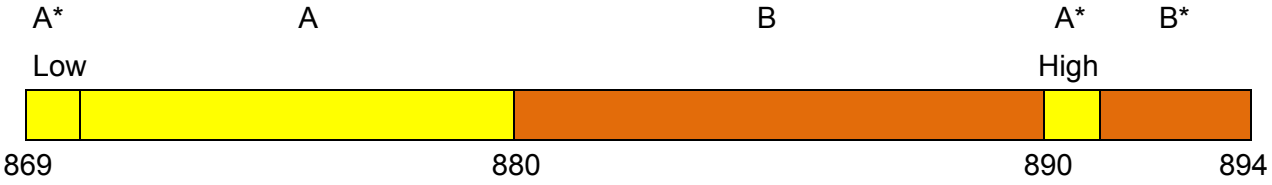
3.1. Evaluation Procedure

The measurement procedures described in the “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-E-2016) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168) were used in the measurement of the **TruWITNESS PCS for North America (ATT)**

Deviation from measurement procedure…….....None

3.2. Cellular – Base Frequency Blocks

§22.905



Block 1: 869 – 880 MHz (A* Low + A)

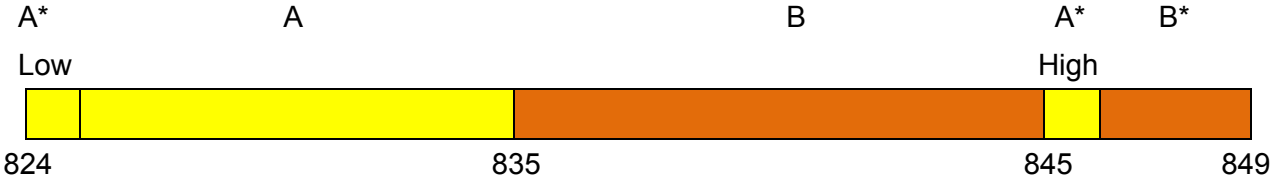
Block 2: 880 – 890 MHz (B)

Block 3: 890 – 891.5 MHz (A* High)

Block 4: 891.5 – 894 MHz (B*)

3.3. Cellular – Mobile Frequency Blocks

§22.905



Block 1: 824 – 835 MHz (A* Low + A)

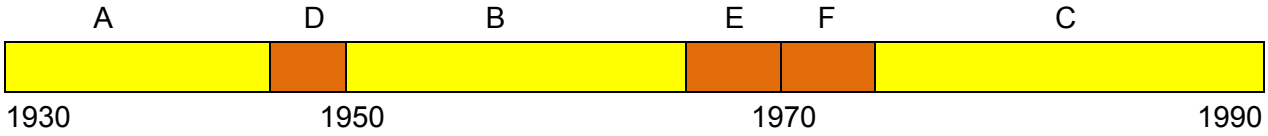
Block 2: 835 – 845 MHz (B)

Block 3: 845 – 846.5 MHz (A* High)

Block 4: 846.5 – 849 MHz (B*)

3.4. PCS – Base Frequency Blocks

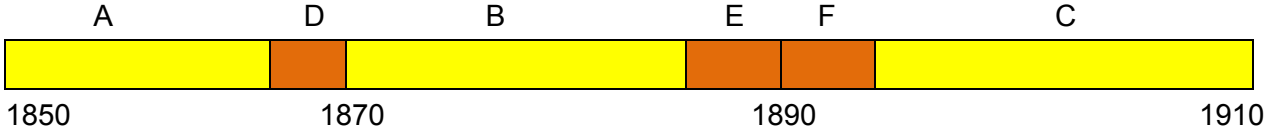
§24.229



Block 1: 1930 – 1945 MHz (A)
Block 2: 1945 – 1950 MHz (D)
Block 3: 1950 – 1965 MHz (B)
Block 4: 1965 – 1970 MHz (E)
Block 5: 1970 – 1975 MHz (F)
Block 6: 1975 – 1990 MHz (C)

3.5. PCS – Mobile Frequency Blocks

§24.229



Block 1: 1850 – 1865 MHz (A)
Block 2: 1865 – 1870 MHz (D)
Block 3: 1870 – 1885 MHz (B)
Block 4: 1885 – 1890 MHz (E)
Block 5: 1890 – 1895 MHz (F)
Block 6: 1895 – 1910 MHz (C)

3.6. Occupied Bandwidth

§2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The spectrum analyzers' "occupied bandwidth" measurement function was used to record the occupied bandwidth in accordance with KDB 971168.

3.7. Spurious and Harmonic Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(c) §27.53(h)

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10^{th} harmonic. On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

3.8. Power and Radiated Spurious Emissions

§2.1053 §22.913(a) §22.917(a) §24.232(c) §24.238(a) §27.50(b)(c)(d)(h) §27.53(m)

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurement and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 80cm high PVC support structure is placed on top of the turntable.

The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration band set to the emissions’ occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$Pd\ [dBm] = Pg\ [dBm] - \text{cable loss}\ [dB] + \text{antenna gain}\ [dBd/dBi]$$

Where, Pd is the dipole equivalent power, Pg is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to Pg [dBm] – cable loss [dB].

The calculated Pd levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + 10*log10(Power [Watts]) specified in 22.917(a).

3.9. Peak-Average Ratio

§24.232(d) §27.50(b)

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

For pulsed signals, the spectrum analyzer is set to use an internal “RF Burst” trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the “on time” of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power. For continuous signals, the trigger is set to “free run” in the CCDF measurement mode.

3.10. Frequency Stability / Temperature Variation

§2.1055 §22.355 §24.235 §27.54

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-E-2016.
The frequency stability of the transmitter is measured by:
a.) Temperature: The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
b.) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.
Specification – For Part 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.

Time Period and Procedure:
1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

4. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions – SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2019/3/20
Cable	Rosnol	N1C50-RG400-B 1C50-500CM	MRTTWE00013	1 year	2019/5/18
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2019/3/19

Radiated Emissions – AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2019/5/22
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2019/3/19
Acitve Loop Antenna	Schwarzbeck	FMZB 1519B	MRTTWA00002	1 year	2019/4/24
Broadband Horn antenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2019/4/24
Breitband Hornantenna	Schwarzbeck	BBHA 9170	MRTTWA00004	1 year	2019/4/23
Broadband Amplifier	Schwarzbeck	BBV 9721	MRTTWA00006	1 year	2019/4/23
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2019/4/23
Cable	HUBERSUHNER	SF106	MRTTWA00010	1 year	2019/5/18
Cable	Rosnol	K1K50-UP0264-K1K50-4M	MRTTWA00012	1 year	2019/7/30

Conducted Test Equipment – SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2019/7/30
USB Wideband Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2019/3/20
Wideband Radio Communication Taster	R&S	CMW 500	MRTTWA00041	1 year	2020/1/28

Test Software

Software	Version	Function
e3	9.160520a	EMI Test Software
EMI	V3	EMI Test Software

5. SAMPLE CALCULATIONS

GSM Emission Designator

Emission Designator = 250KGXW

GSM BW = 250 kHz

G = Phase Modulation

X = Cases not otherwise covered

W = Combination (Audio/Data)

EGPRS Emission Designator

Emission Designator = 250KG7W

GSM BW = 250 kHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination (Audio/Data)

WCDMA / CDMA Emission Designator

Emission Designator = 1M25F9W

WCDMA BW = 1.25 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

LTE Emission Designator

Emission Designator = QPSK 5M00G7D / 16QAM 5M00W7D

LTE BW = 1.4/3/5/10/15/20 MHz

QPSK G = Phase Modulation /

16QAM W= in a combination of two or more of the following modes: amplitude, angle, pulse

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

Spurious Radiated Emission

Example: Spurious emission at 1688.10 MHz

The receive spectrum analyzer reading at 3 meters with the EUT on the turntable was –65.0dBm. The gain of the substituted antenna is 6.5dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –65.0dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 4.5 dB at 1688.1MHz. So 2 dB is added to the signal generator reading of –25dBm yielding –23dBm. The fundamental EIRP was 24.0dBm so this harmonic was 24.0dBm – (-23) = 47dBc.

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Radiated Spurious Emission
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 3.92dB (Below 30M)
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 4.25dB (30M~1G)
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 4.40dB (1G~18G)
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 4.45dB (18G~40G)
Frequency Error
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±78.4Hz
Conducted Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 0.84dB
Conducted Spurious Emission
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):± 2.65 dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 3.3%
Temp. / Humidity
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.82°C/ ±3%
DC Voltage
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.3%

7. TEST RESULT

7.1. Summary

Company Name: **FLIR Systems, Inc.**

FCC Classification: **PCS Licensed Transmitter (PCB)**

Mode(s): **LTE Band 2, 4, 5, 12**

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
Transmitter Mode(TX)					
2.1049	Occupied bandwidth	N/A	Conducted	Pass	Section 7.2
2.1051 22.917(a) 24.238(a) 27.53(c) 27.52(h)	Conducted Spurious Emissions	> 43 + 10log$_{10}$ (P[Watts]) at for all out-of-band emissions (Band 2,4,5,12,13,17)		Pass	Section 7.3
2.1051 27.53(m)		> 55 + 10log$_{10}$ (P[Watts]) at for all out-of-band emissions (Band 7)			
2.1051 22.917(a) 24.238(a) 27.53(c) 27.52(h)	Band Edge	> 43 + 10log$_{10}$ (P[Watts]) at for all out-of-band emissions		Pass	Section 7.4
27.53(m)		27.53(m)(4)			
2.1046	Conducted Output Power	N/A		Pass	Section 7.5
22.913(a)	Radiated Output Power	< 7 Watts max. ERP (Band 5)	Radiated	Pass	Section 7.5
24.232(c) 27.50(h)		< 2 Watts max. EIRP (Band 2, 7)		Pass	
27.50(b)		< 3 Watts max. ERP (Band 12,13)		Pass	
27.50(d)		< 1 Watts max. EIRP (Band 4)		Pass	

2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(h)	Radiated Spurious Emissions	> 43 + $\log_{10}$ (P[Watts]) for all out-of-band emissions (Band 2,4,5,12,13,17)	Radiated	Pass	Section 7.5
2.1053 27.53(m)		> 55 + 10$\log_{10}$ (P[Watts]) for all out-of-band emissions (Band 7)			
24.232(d) 27.50(b)	Peak-Average Ratio	<13dB	Conducted	Pass	Section 7.6
2.1055 22.355	Frequency Stability	< 2.5 ppm		Pass	Section 7.7
2.1055 24.235 27.54		Within Authorized Band			

Notes:

1) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified(If appropriate). The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. Occupied Bandwidth

7.2.1. Test Limit

N/A

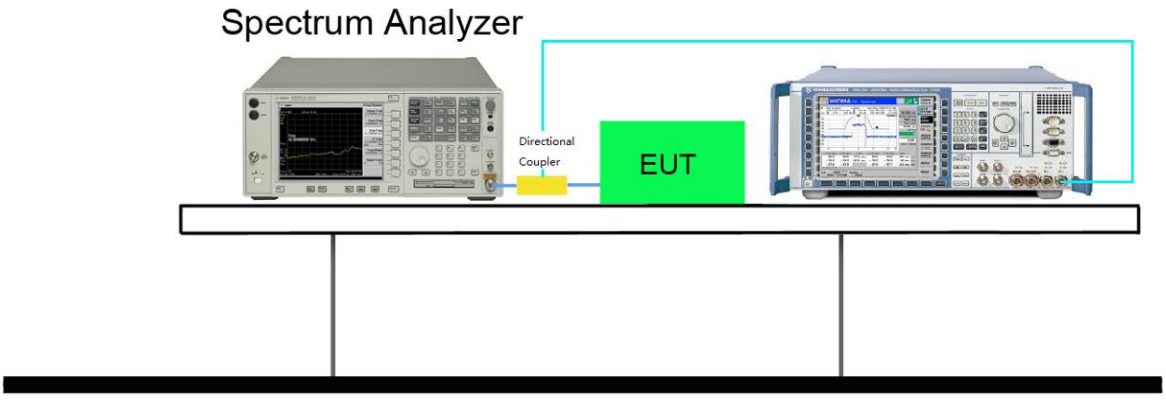
7.2.2. Test Procedure used

KDB 971168 D01v03r01 – Section 4.2 & ANSI/TIA-603-E-2016

7.2.3. Test Setting

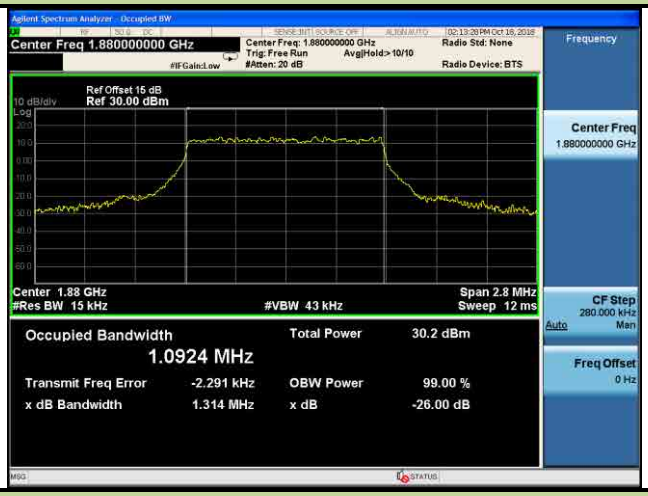
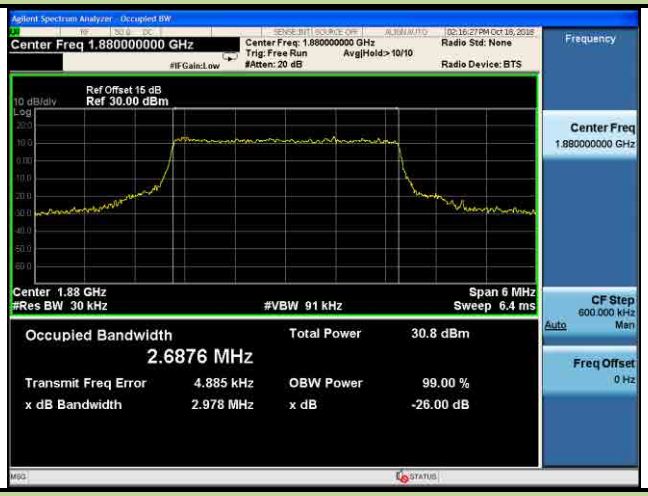
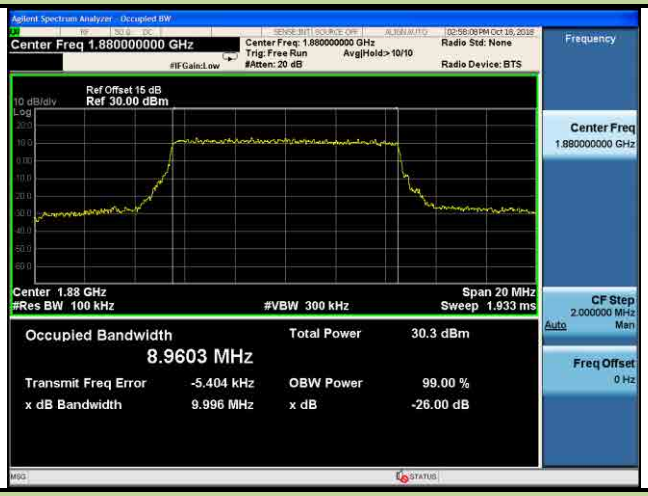
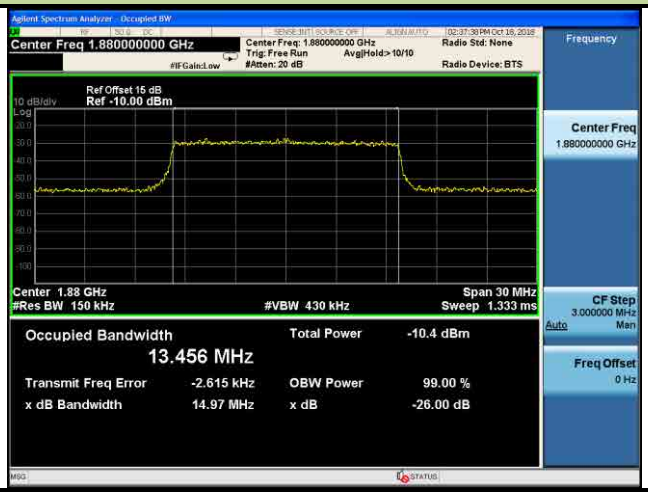
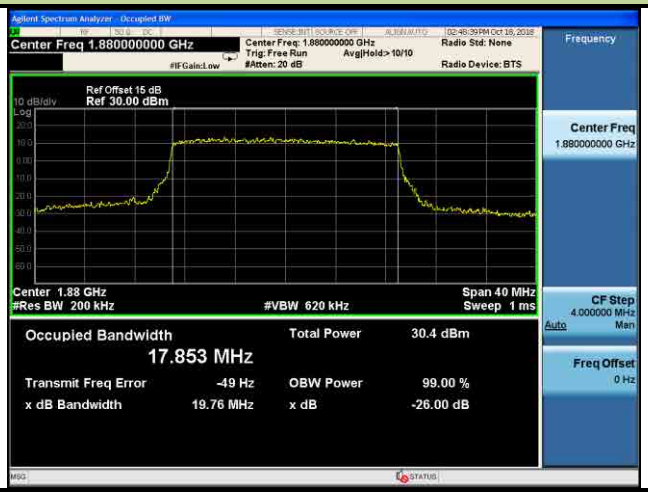
1. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
2. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW. (RBW = approximately 1% of the emission bandwidth).
3. Set the detection mode to peak, and the trace mode to max hold.
4. Use the 99 % power bandwidth function of the spectrum analyzer (if available) and report the measured bandwidth.

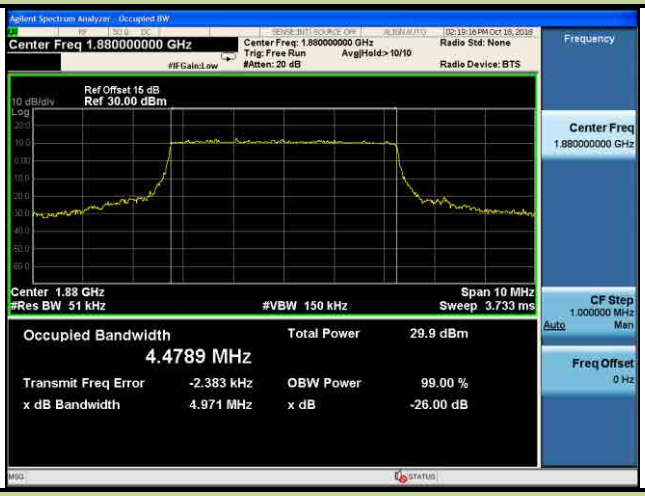
7.2.4. Test Setup



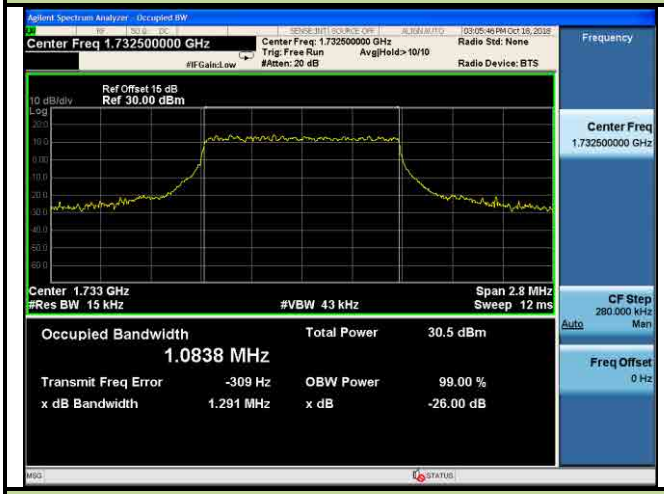
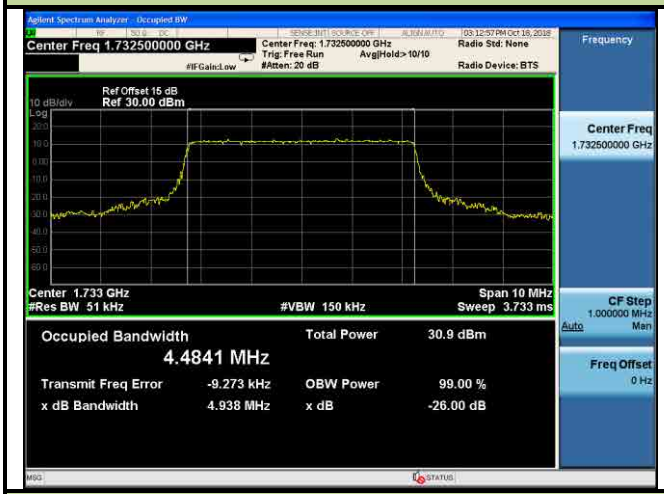
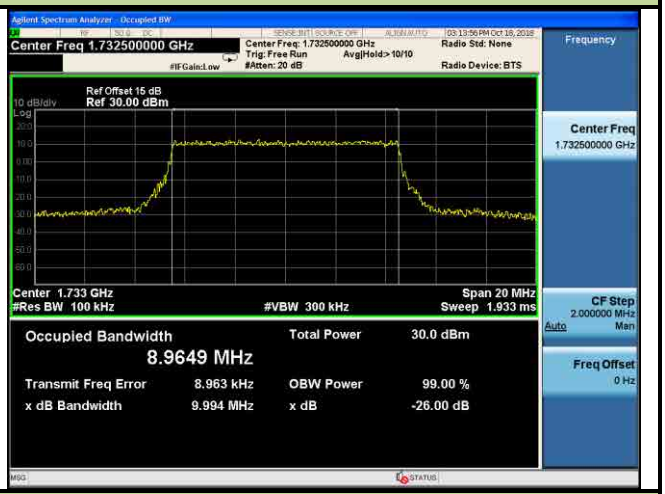
7.2.5. Test Result

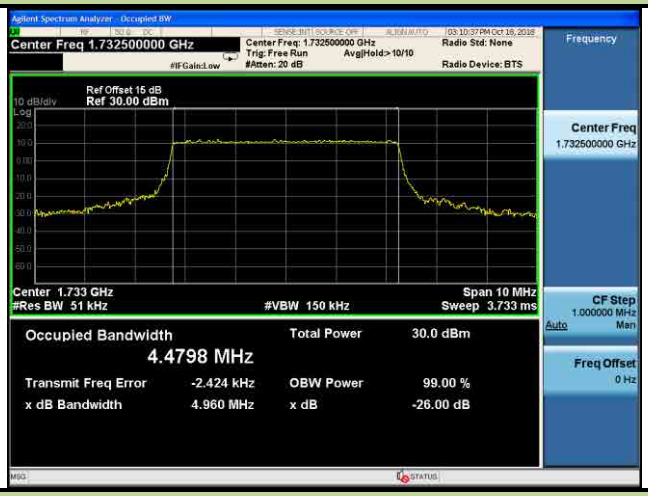
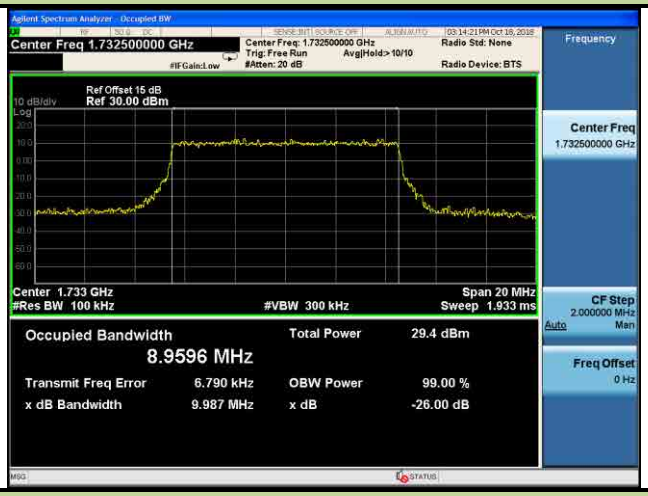
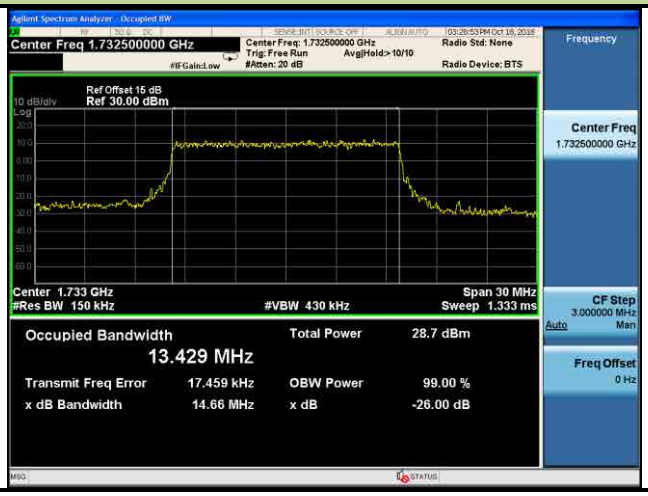
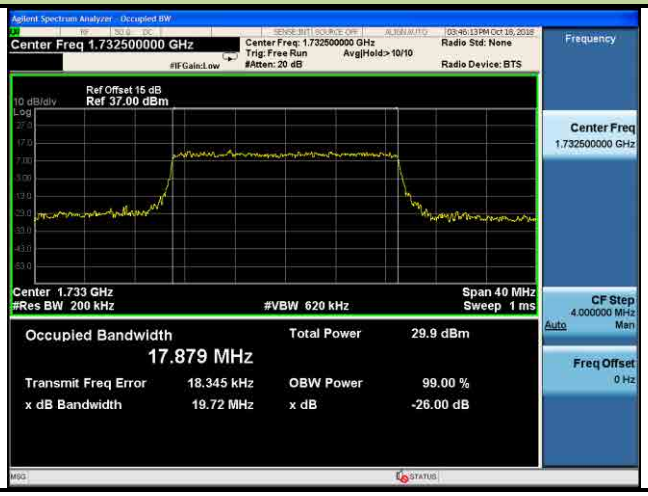
Test Mode	Channel/ Frequency (MHz)	Modulation	Bandwidth (MHz)	RB Size	RB Offset	99% Occupied Bandwidth (MHz)	-26dB Occupied Bandwidth (MHz)	Test Result
LTE Band 2	CH18900 (1880MHz)	QPSK	1.4	6	0	1.0924	1.314	Pass
			3	15	0	2.6876	2.978	Pass
			5	25	0	4.4779	4.923	Pass
			10	50	0	8.9603	9.996	Pass
			15	75	0	13.4560	14.970	Pass
			20	100	0	17.8530	19.760	Pass
		16QAM	1.4	6	0	1.0799	1.284	Pass
			3	15	0	2.6888	2.961	Pass
			5	25	0	4.4789	4.971	Pass
			10	50	0	8.9339	9.914	Pass
			15	75	0	13.4090	14.990	Pass
			20	100	0	17.8350	19.430	Pass

LTE Band 2 QPSK 1.4MHz CH18900 6RB#0	LTE Band 2 QPSK 3MHz CH18900 15RB#0
	
LTE Band 2 QPSK 5MHz CH18900 25RB#0	**LTE Band 2 QPSK 10MHz CH18900 50RB#0**
	
LTE Band 2 QPSK 15MHz CH18900 75RB#0	**LTE Band 2 QPSK 20MHz CH18900 100RB#0**
	

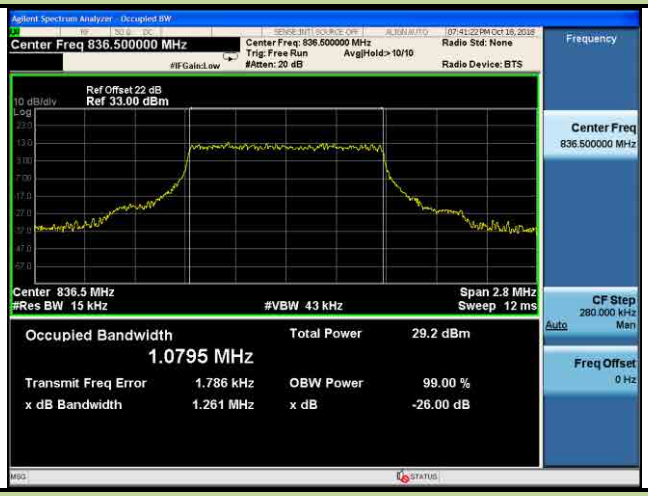
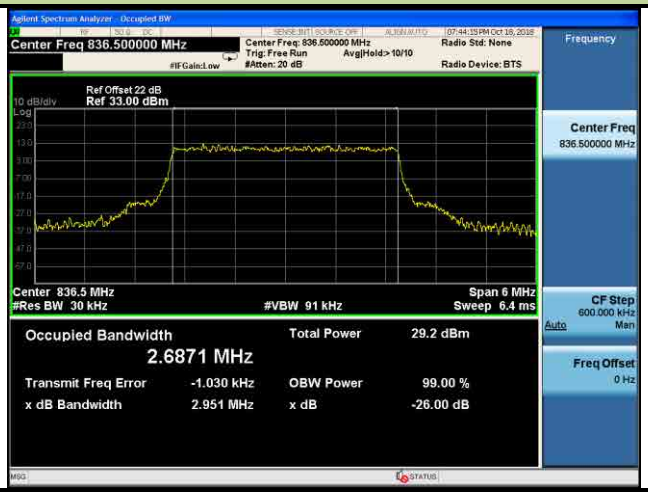
LTE Band 2 16QAM 1.4MHz CH18900 6RB#0	LTE Band 2 16QAM 3MHz CH18900 15RB#0
	
LTE Band 2 16QAM 5MHz CH18900 25RB#0	**LTE Band 2 16QAM 10MHz CH18900 50RB#0**
	
LTE Band 2 16QAM 15MHz CH18900 75RB#0	**LTE Band 2 16QAM 20MHz CH18900 100RB#0**
	

Test Mode	Channel/ Frequency (MHz)	Modulation	Bandwidth (MHz)	RB Size	RB Offset	99% Occupied Bandwidth (MHz)	-26dB Occupied Bandwidth (MHz)	Test Result
LTE Band 4	CH20175 (1732.5MHz)	QPSK	1.4	6	0	1.0838	1.291	Pass
			3	15	0	2.6868	2.965	Pass
			5	25	0	4.4841	4.938	Pass
			10	50	0	8.9649	9.994	Pass
			15	75	0	13.4240	14.920	Pass
			20	100	0	17.9360	20.140	Pass
		16QAM	1.4	6	0	1.0825	1.297	Pass
			3	15	0	2.6887	2.947	Pass
			5	25	0	4.4798	4.960	Pass
			10	50	0	8.9596	9.987	Pass
			15	75	0	13.4290	14.660	Pass
			20	100	0	17.8790	19.720	Pass

LTE Band 4 QPSK 1.4MHz CH20175 6RB#0	LTE Band 4 QPSK 3MHz CH20175 15RB#0
	
LTE Band 4 QPSK 5MHz CH20175 25RB#0	**LTE Band 4 QPSK 10MHz CH20175 50RB#0**
	
LTE Band 4 QPSK 15MHz CH20175 75RB#0	**LTE Band 4 QPSK 20MHz CH20175 100RB#0**
	

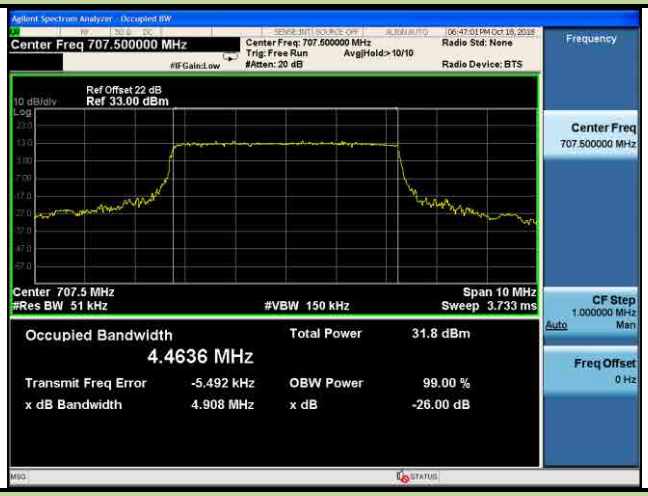
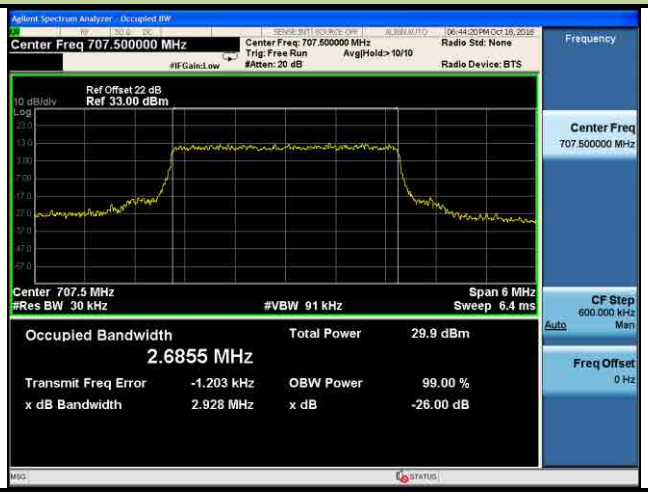
LTE Band 4 16QAM 1.4MHz CH20175 6RB#0	LTE Band 4 16QAM 3MHz CH20175 15RB#0
	
LTE Band 4 16QAM 5MHz CH20175 25RB#0	**LTE Band 4 16QAM 10MHz CH20175 50RB#0**
	
LTE Band 4 16QAM 15MHz CH20175 75RB#0	**LTE Band 4 16QAM 20MHz CH20175 100RB#0**
	

Test Mode	Channel/ Frequency (MHz)	Modulation	Bandwidth (MHz)	RB Size	RB Offset	99% Occupied Bandwidth (MHz)	-26dB Occupied Bandwidth (MHz)	Test Result
LTE Band 5	CH20525 (836.5MHz)	QPSK	1.4	6	0	1.0795	1.261	Pass
			3	15	0	2.6845	2.942	Pass
			5	25	0	4.4754	5.009	Pass
			10	50	0	8.9669	10.110	Pass
		16QAM	1.4	6	0	1.0822	1.275	Pass
			3	15	0	2.6871	2.951	Pass
			5	25	0	4.4617	4.900	Pass
			10	50	0	8.9599	10.050	Pass

LTE Band 5 QPSK 1.4MHz CH20525 6RB#0	LTE Band 5 QPSK 3MHz CH20525 15RB#0
	
LTE Band 5 QPSK 5MHz CH20525 25RB#0	**LTE Band 5 QPSK 10MHz CH20525 50RB#0**
	
LTE Band 5 16QAM 1.4MHz CH20525 6RB#0	**LTE Band 5 16QAM 3MHz CH20525 15RB#0**
	

LTE Band 5 16QAM 5MHz CH20525 25RB#0	LTE Band 5 16QAM 10MHz CH20525 50RB#0
	

Test Mode	Channel/ Frequency (MHz)	Modulation	Bandwidth (MHz)	RB Size	RB Offset	99% Occupied Bandwidth (MHz)	-26dB Occupied Bandwidth (MHz)	Test Result
LTE Band 12	CH23095 (707.5MHz)	QPSK	1.4	6	0	1.0819	1.280	Pass
			3	15	0	2.6905	2.947	Pass
			5	25	0	4.4636	4.908	Pass
			10	50	0	8.9347	10.010	Pass
		16QAM	1.4	6	0	1.0861	1.310	Pass
			3	15	0	2.6855	2.928	Pass
			5	25	0	4.4480	4.897	Pass
			10	50	0	8.9391	9.783	Pass

LTE Band 12 QPSK 1.4MHz CH23095 6RB#0	LTE Band 12 QPSK 3MHz CH23095 15RB#0
	
LTE Band 12 QPSK 5MHz CH23095 25RB#0	**LTE Band 12 QPSK 10MHz CH23095 50RB#0**
	
LTE Band 12 16QAM 1.4MHz CH23095 6RB#0	**LTE Band 12 16QAM 3MHz CH23095 15RB#0**
	

LTE Band 12 16QAM 5MHz CH23095 25RB#0	LTE Band 12 16QAM 10MHz CH23095 50RB#0
	

7.3. Conducted Spurious Emissions

7.3.1. Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + $10\log_{10}$(P) dB for Band 2,4,5,12,13,17/ 55+$10\log_{10}$(P) dB for Band7.

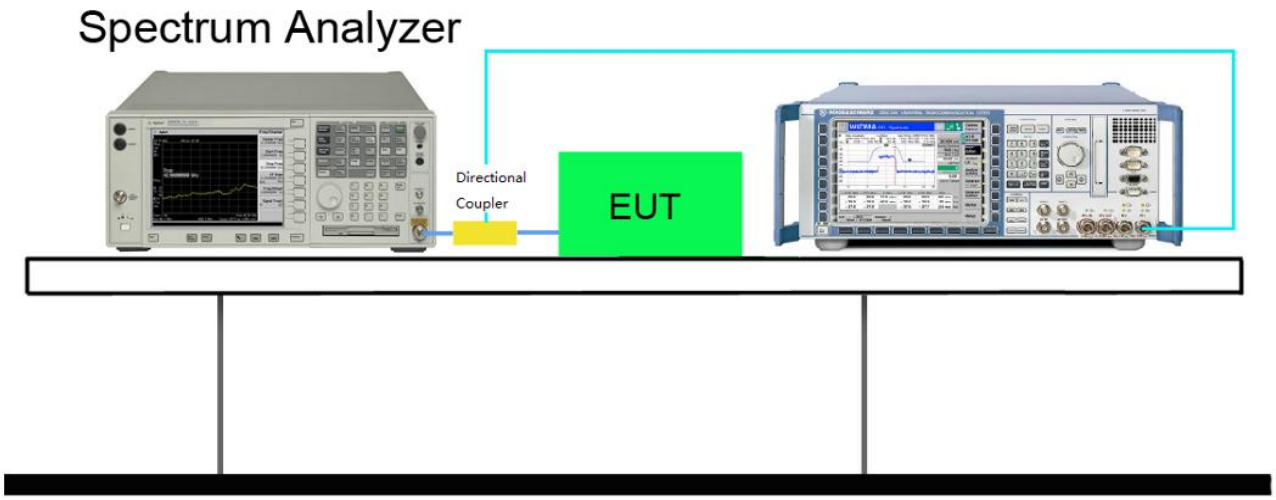
7.3.2. Test Procedure Used

KDB 971168 D01v03r01 – Section 6.0 & ANSI/TIA-603-E-2016

7.3.3. Test Setting

Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz is at or below 1GHz and 1MHz is above 1GHz, If any, up to 10th harmonic.

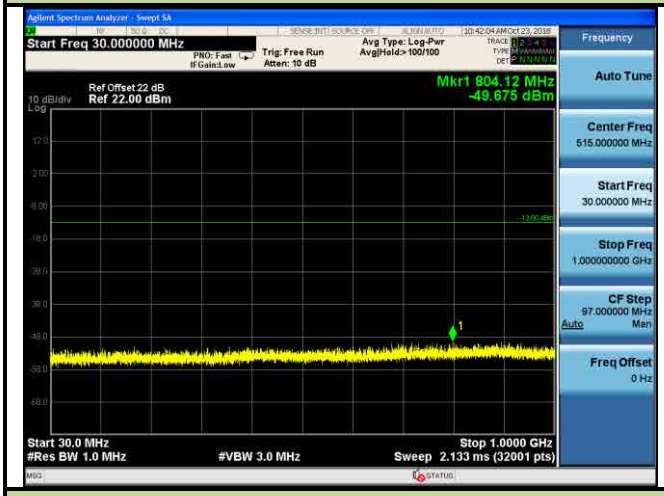
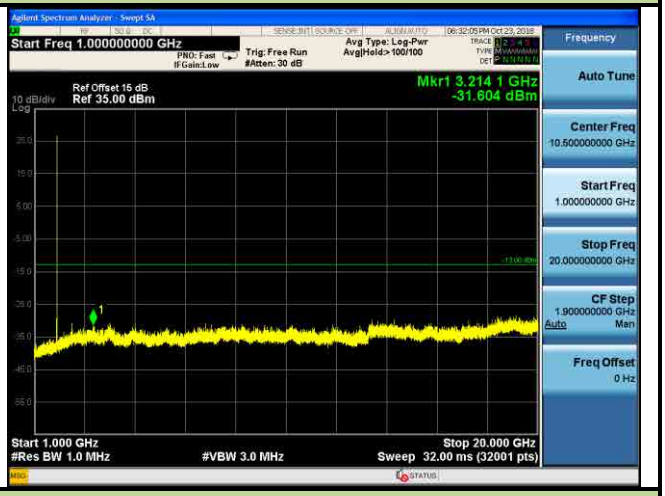
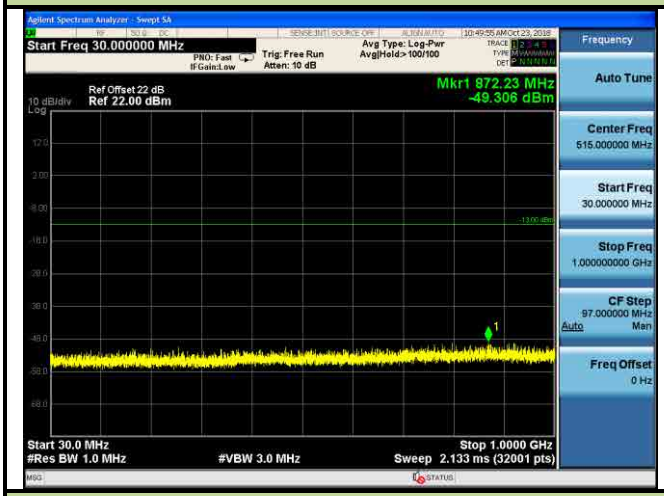
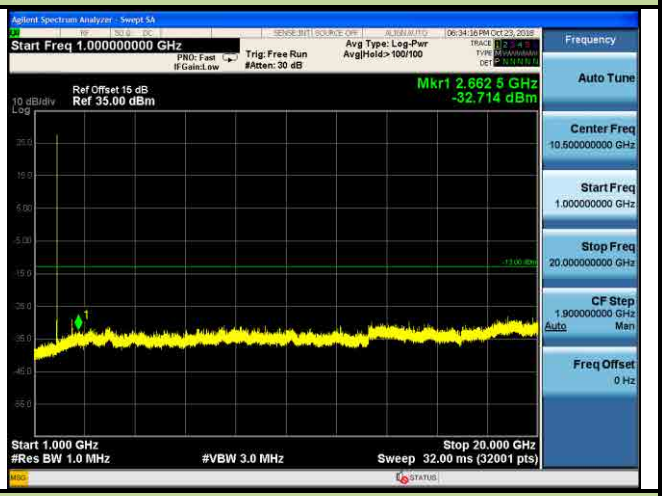
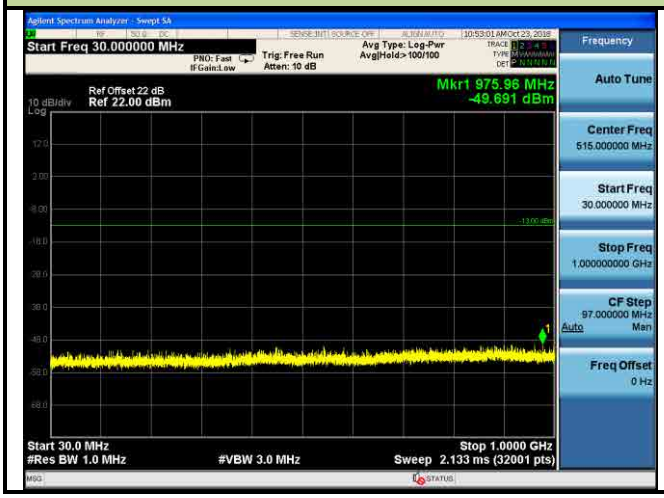
7.3.4. Test Setup

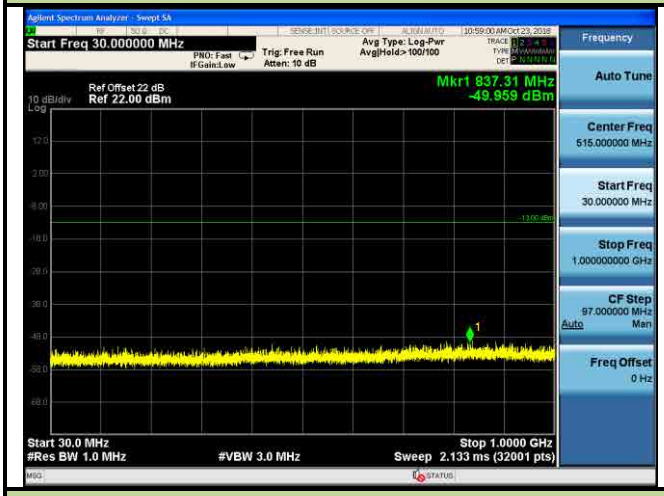
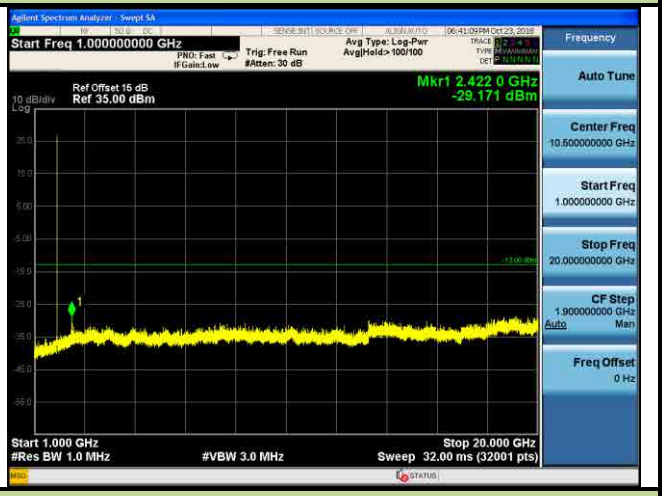
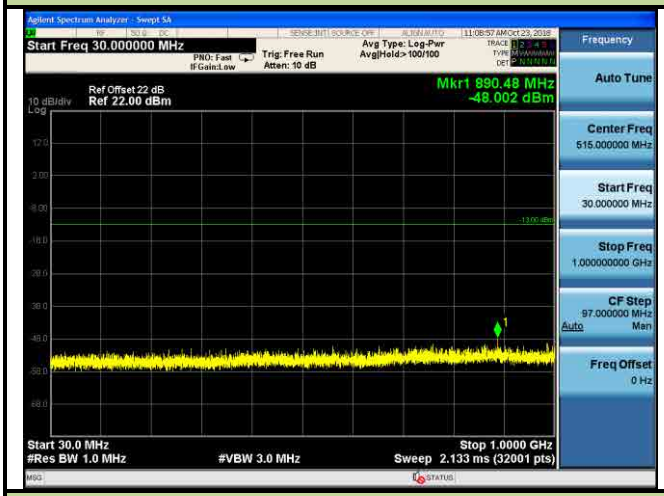
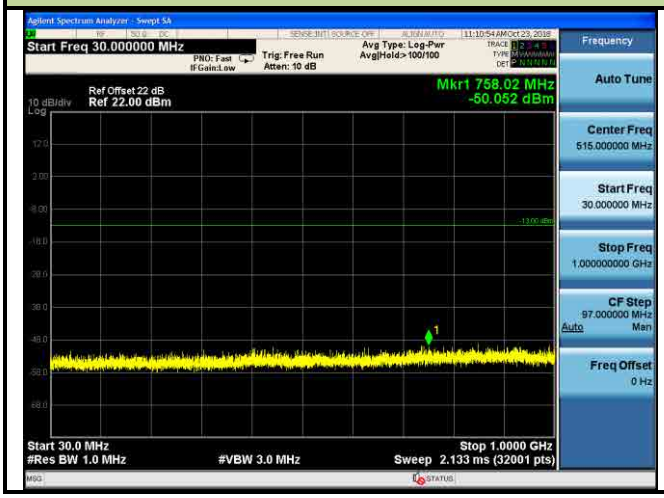


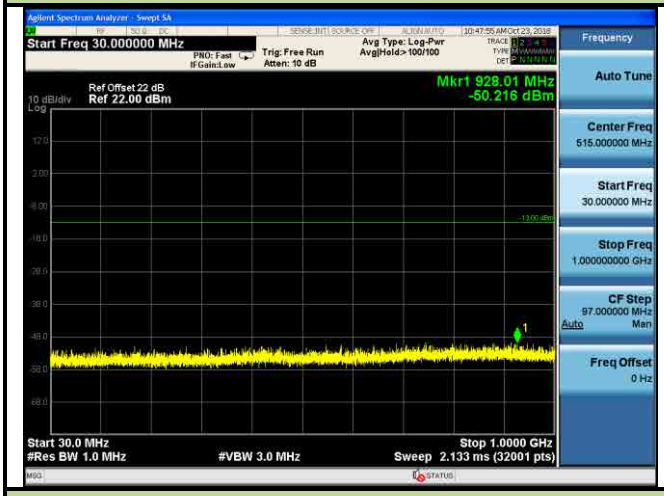
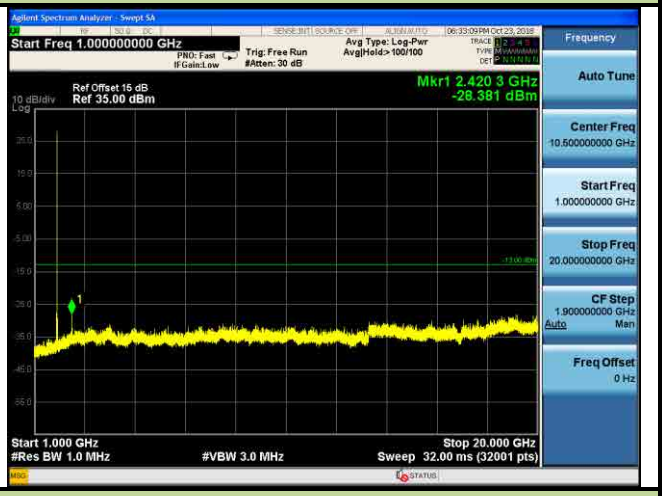
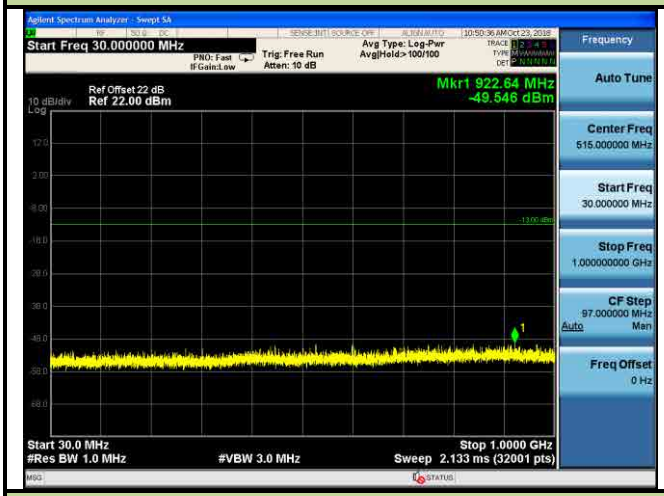
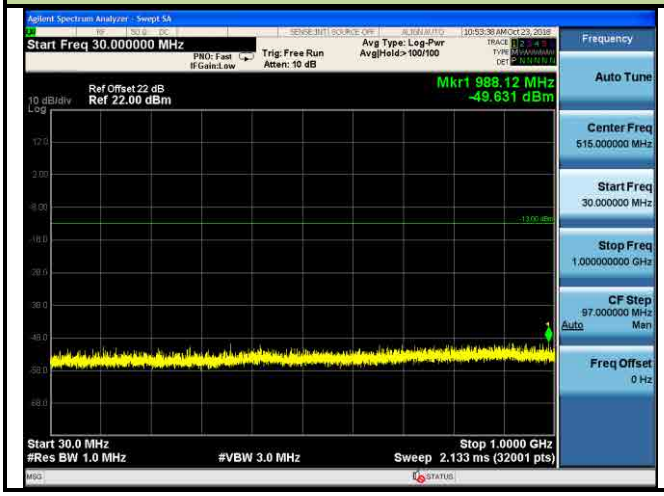
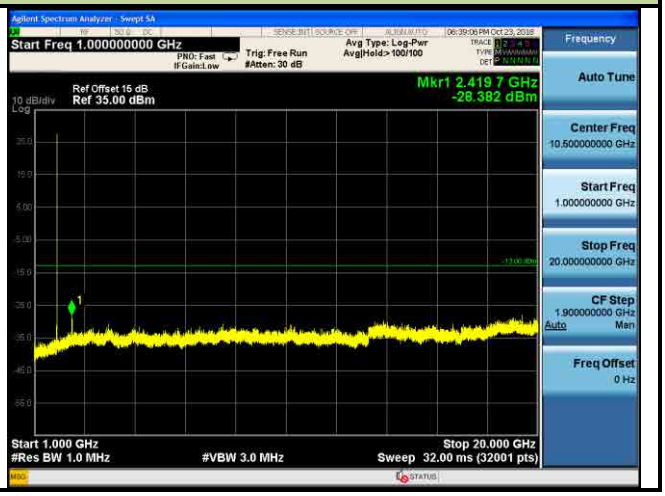
7.3.5. Test Result

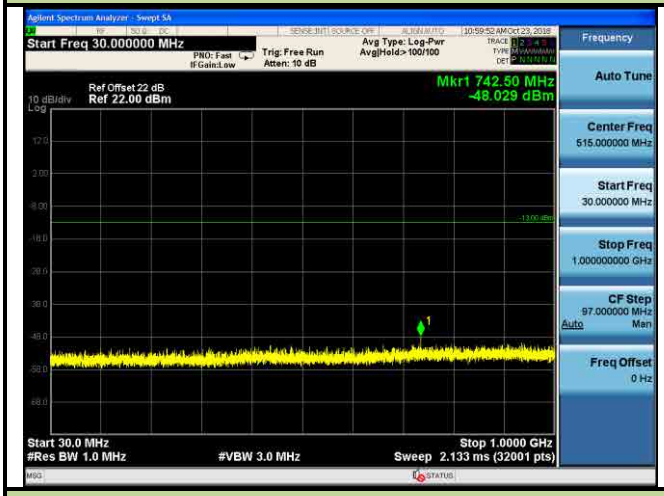
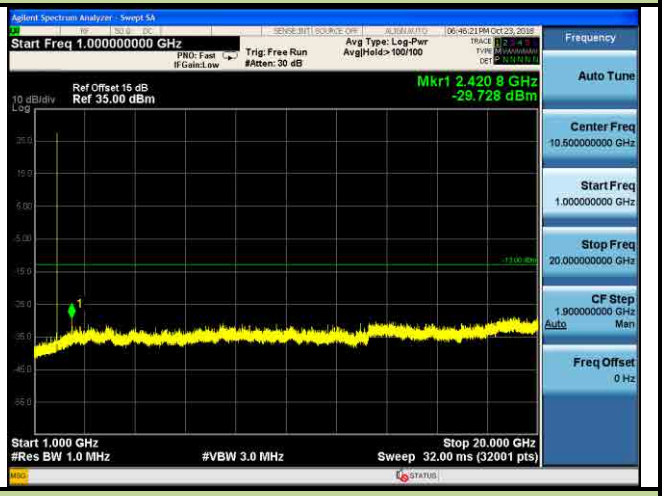
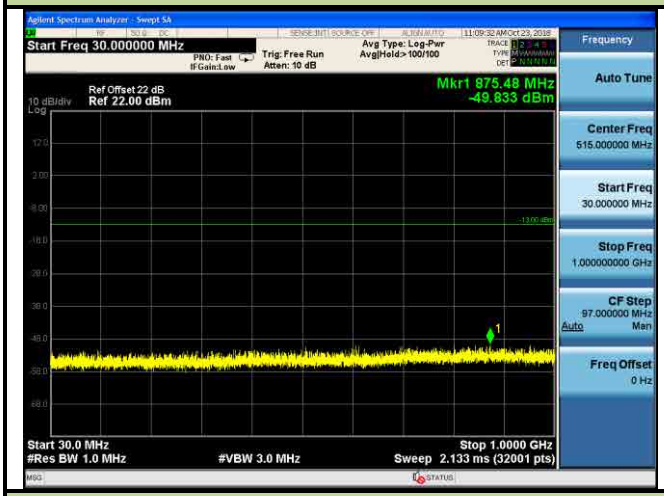
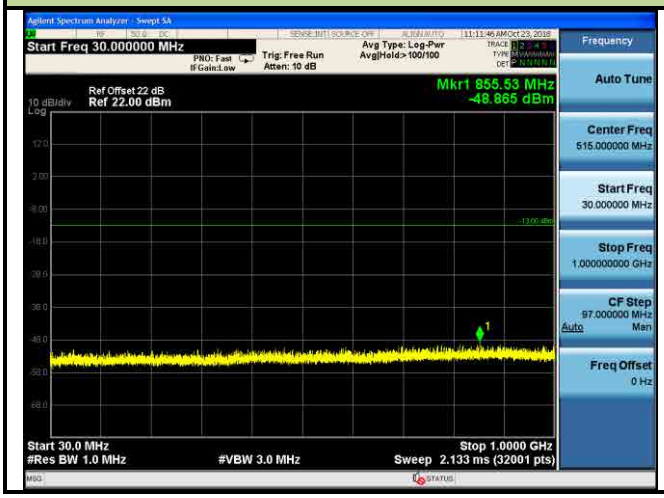
Test Mode	Modulation	Channel/ Frequency (MHz)	Bandwidth (MHz)	RB Size	RB Offset	Test Result
LTE Band 2 (Low Channel)	QPSK	CH18607 / 1850.7MHz	1.4	1	2	Pass
		CH18615 / 1851.5MHz	3	1	7	Pass
		CH18625 / 1852.5MHz	5	1	12	Pass
		CH18650 / 1855MHz	10	1	25	Pass
		CH18675 / 1857.5MHz	15	1	36	Pass
		CH18700 / 1860MHz	20	1	49	Pass
	16QAM	CH18607 / 1850.7MHz	1.4	1	2	Pass
		CH18615 / 1851.5MHz	3	1	7	Pass
		CH18625 / 1852.5MHz	5	1	12	Pass
		CH18650 / 1855MHz	10	1	25	Pass
		CH18675 / 1857.5MHz	15	1	36	Pass
		CH18700 / 1860MHz	20	1	49	Pass
LTE Band 2 (Middle Channel)	QPSK	CH18900 / 1880MHz	1.4	1	2	Pass
			3	1	7	Pass
			5	1	12	Pass
			10	1	25	Pass
			15	1	36	Pass
			20	1	49	Pass
	16QAM		1.4	1	2	Pass
			3	1	7	Pass
			5	1	12	Pass
			10	1	25	Pass
			15	1	36	Pass
			20	1	49	Pass

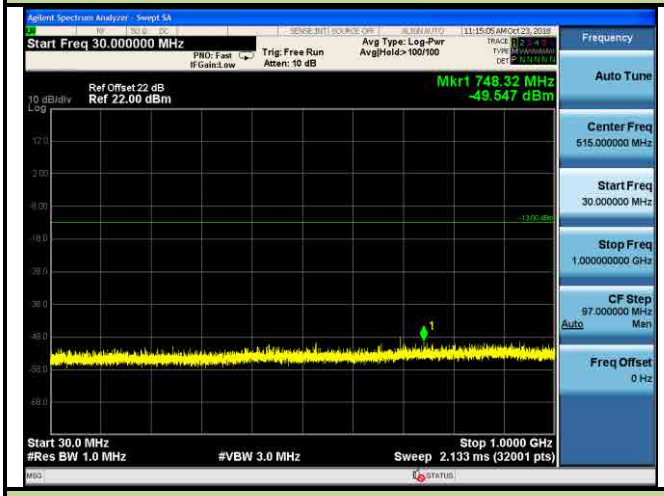
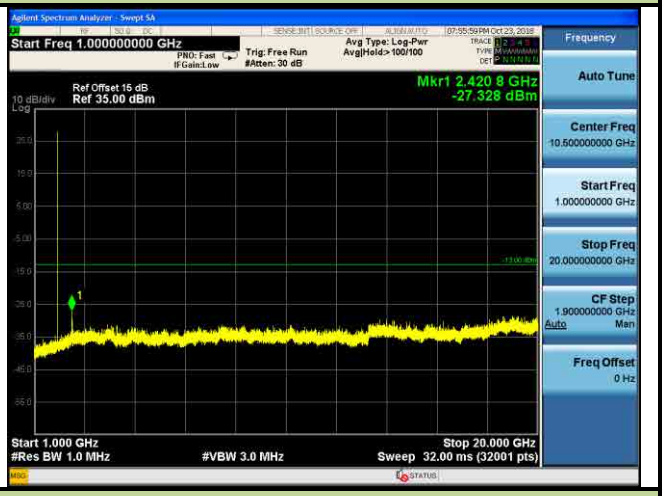
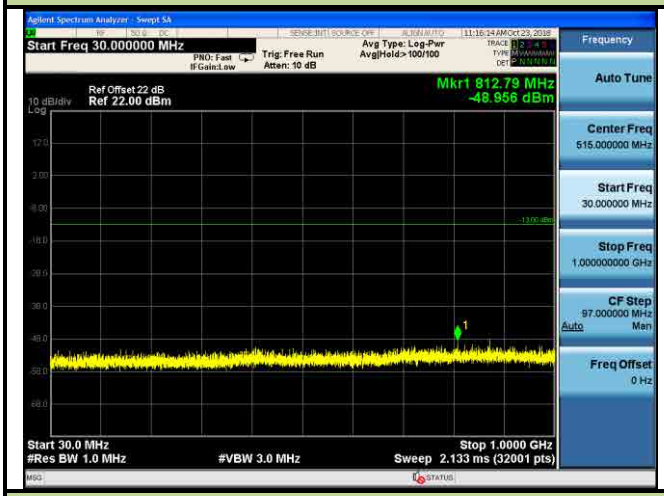
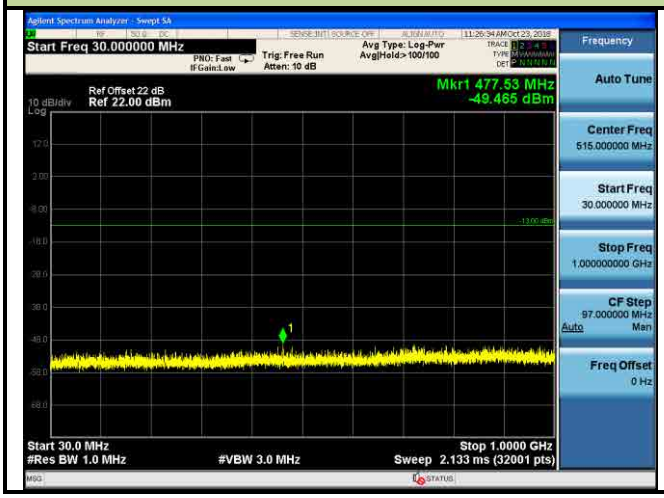
Test Mode	Modulation	Channel/ Frequency (MHz)	Bandwidth (MHz)	RB Size	RB Offset	Test Result
LTE Band 2 (High Channel)	QPSK	CH19193 / 1909.3MHz	1.4	1	2	Pass
		CH19185 / 1908.5MHz	3	1	7	Pass
		CH19175 / 1907.5MHz	5	1	12	Pass
		CH19150 / 1905MHz	10	1	25	Pass
		CH19125 / 1902.5MHz	15	1	36	Pass
		CH19100 / 1900MHz	20	1	49	Pass
	16QAM	CH19193 / 1909.3MHz	1.4	1	2	Pass
		CH19185 / 1908.5MHz	3	1	7	Pass
		CH19175 / 1907.5MHz	5	1	12	Pass
		CH19150 / 1905MHz	10	1	25	Pass
		CH19125 / 1902.5MHz	15	1	36	Pass
		CH19100 / 1900MHz	20	1	49	Pass

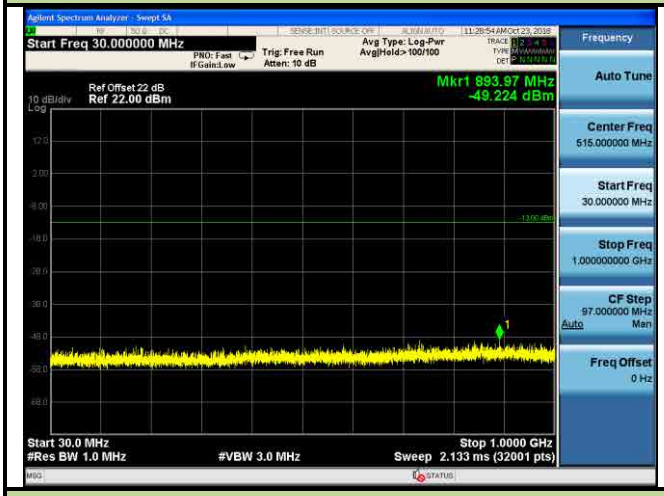
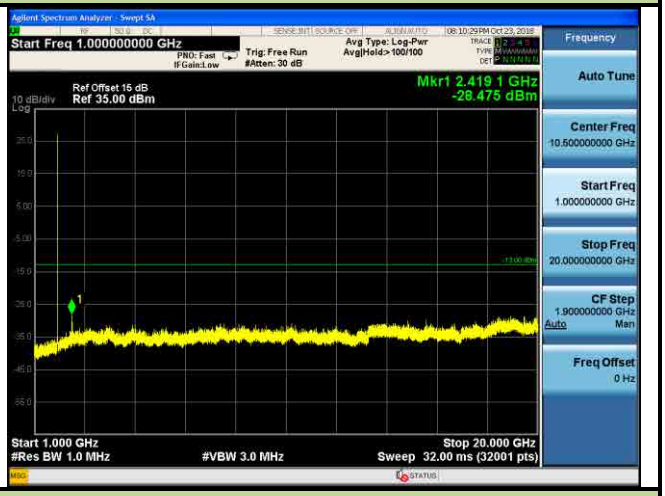
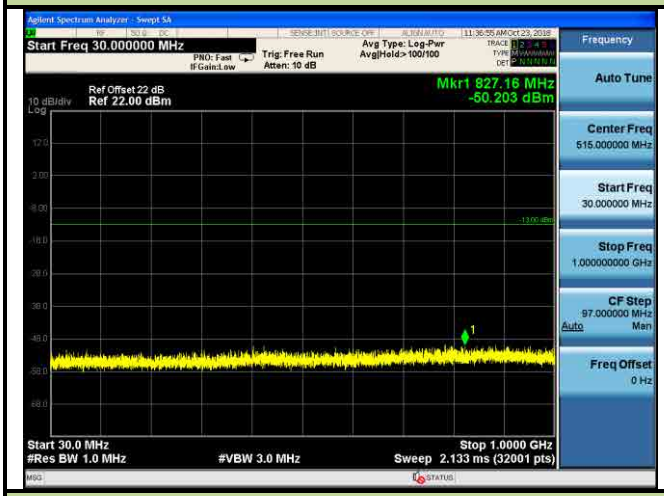
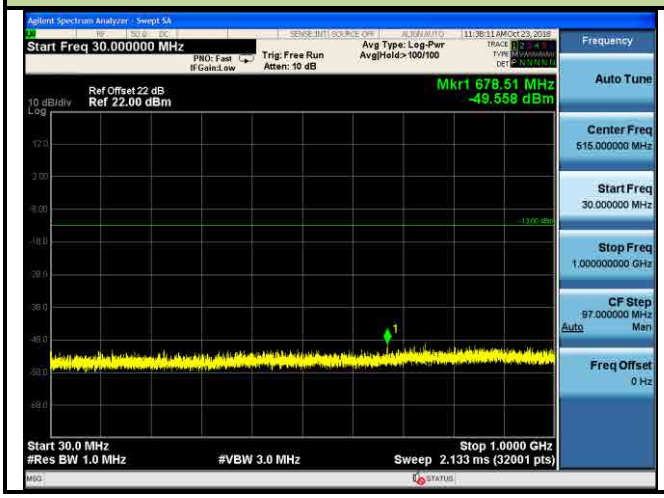
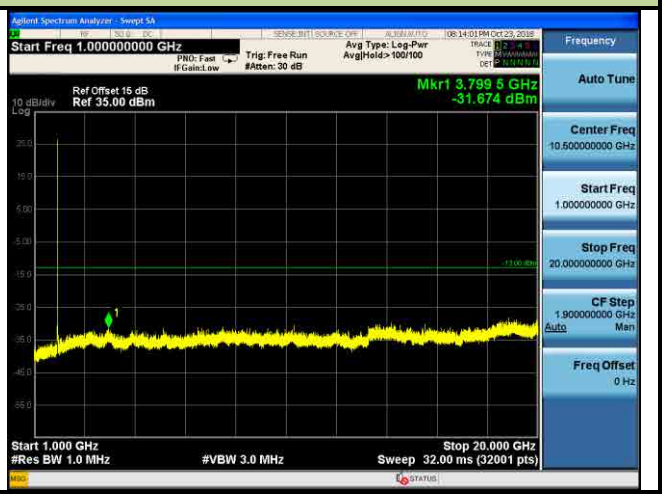
LTE Band 2 QPSK 1.4MHz CH18607 1RB#2_30MHz-1GHz	LTE Band 2 QPSK 1.4MHz CH18607 1RB#2_1GHz-20GHz
	
LTE Band 2 QPSK 3MHz CH18615 1RB#7_30MHz-1GHz	**LTE Band 2 QPSK 3MHz CH18615 1RB#7_1GHz-20GHz**
	
LTE Band 2 QPSK 5MHz CH18625 1RB#12_30MHz-1GHz	**LTE Band 2 QPSK 5MHz CH18625 1RB#12_1GHz-20GHz**
	

LTE Band 2 QPSK 10MHz CH18650 1RB#25_30MHz-1GHz	LTE Band 2 QPSK 10MHz CH18650 1RB#25_1GHz-20GHz
	
LTE Band 2 QPSK 15MHz CH18675 1RB#36_30MHz-1GHz	**LTE Band 2 QPSK 15MHz CH18675 1RB#36_1GHz-20GHz**
	
LTE Band 2 QPSK 20MHz CH18700 1RB#49_30MHz-1GHz	**LTE Band 2 QPSK 20MHz CH18700 1RB#49_1GHz-20GHz**
	

LTE Band 2 16QAM 1.4MHz CH18607 1RB#2_30MHz-1GHz	LTE Band 2 16QAM 1.4MHz CH18607 1RB#2_1GHz-20GHz
	
LTE Band 2 16QAM 3MHz CH18615 1RB#7_30MHz-1GHz	**LTE Band 2 16QAM 3MHz CH18615 1RB#7_1GHz-20GHz**
	
LTE Band 2 16QAM 5MHz CH18625 1RB#12_30MHz-1GHz	**LTE Band 2 16QAM 5MHz CH18625 1RB#12_1GHz-20GHz**
	

LTE Band 2 16QAM 10MHz CH18650 1RB#25_30MHz-1GHz	LTE Band 2 16QAM 10MHz CH18650 1RB#25_1GHz-20GHz
	
LTE Band 2 16QAM 15MHz CH18675 1RB#36_30MHz-1GHz	**LTE Band 2 16QAM 15MHz CH18675 1RB#36_1GHz-20GHz**
	
LTE Band 2 16QAM 20MHz CH18700 1RB#49_30MHz-1GHz	**LTE Band 2 16QAM 20MHz CH18700 1RB#49_1GHz-20GHz**
	

LTE Band 2 QPSK 1.4MHz CH18900 1RB#2_30MHz-1GHz	LTE Band 2 QPSK 1.4MHz CH18900 1RB#2_1GHz-20GHz
	
LTE Band 2 QPSK 3MHz CH18900 1RB#7_30MHz-1GHz	**LTE Band 2 QPSK 3MHz CH18900 1RB#7_1GHz-20GHz**
	
LTE Band 2 QPSK 5MHz CH18900 1RB#12_30MHz-1GHz	**LTE Band 2 QPSK 5MHz CH18900 1RB#12_1GHz-20GHz**
	

LTE Band 2 QPSK 10MHz CH18900 1RB#25_30MHz-1GHz	LTE Band 2 QPSK 10MHz CH18900 1RB#25_1GHz-20GHz
	
LTE Band 2 QPSK 15MHz CH18900 1RB#36_30MHz-1GHz	**LTE Band 2 QPSK 15MHz CH18900 1RB#36_1GHz-20GHz**
	
LTE Band 2 QPSK 20MHz CH18900 1RB#49_30MHz-1GHz	**LTE Band 2 QPSK 20MHz CH18900 1RB#49_1GHz-20GHz**
	

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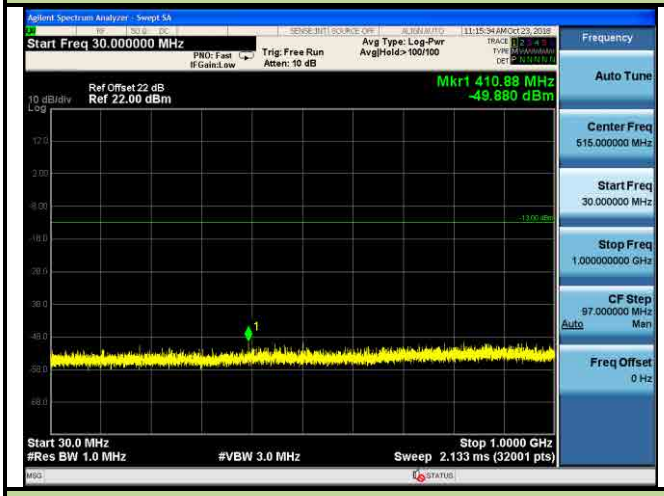	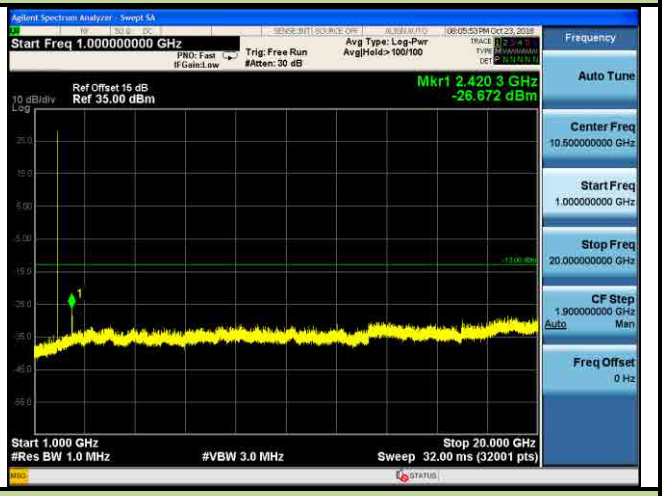
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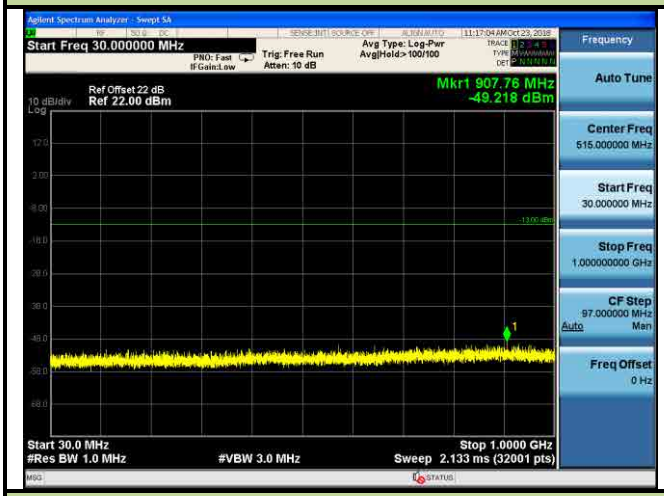	
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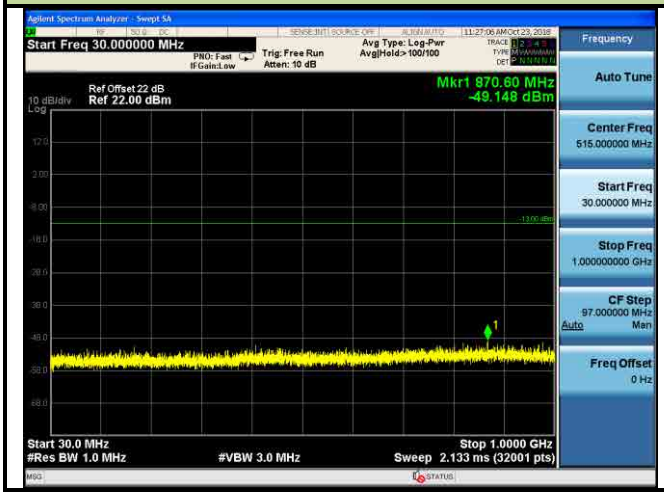	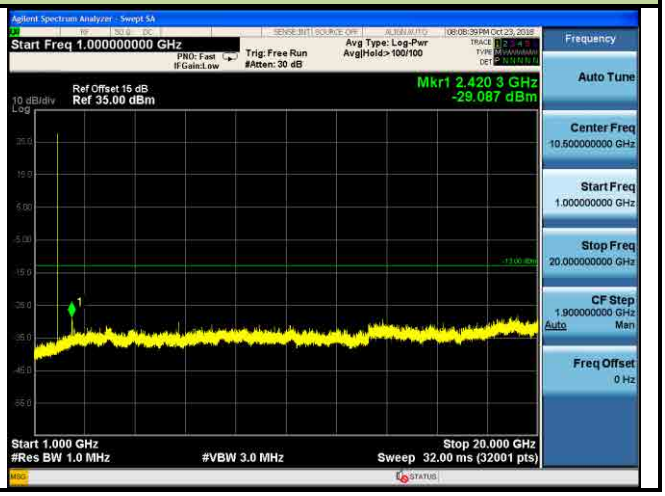

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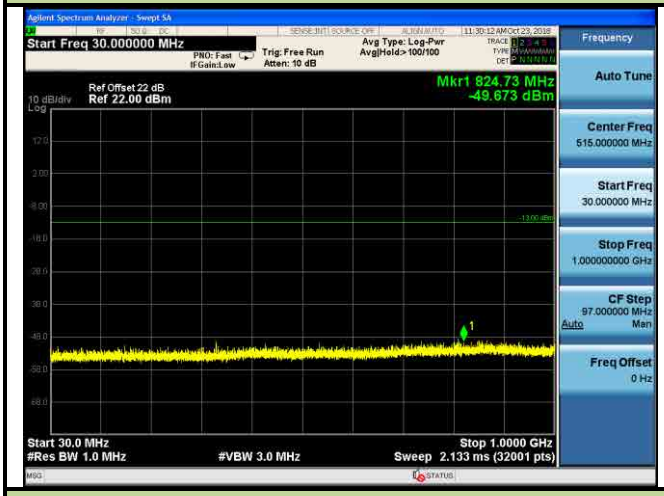	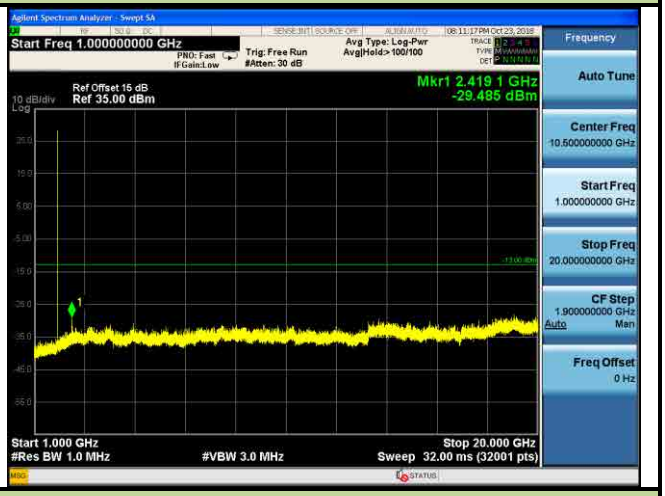
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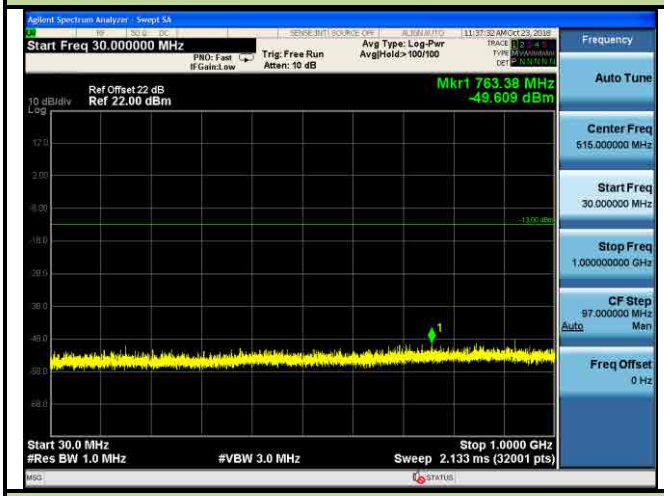	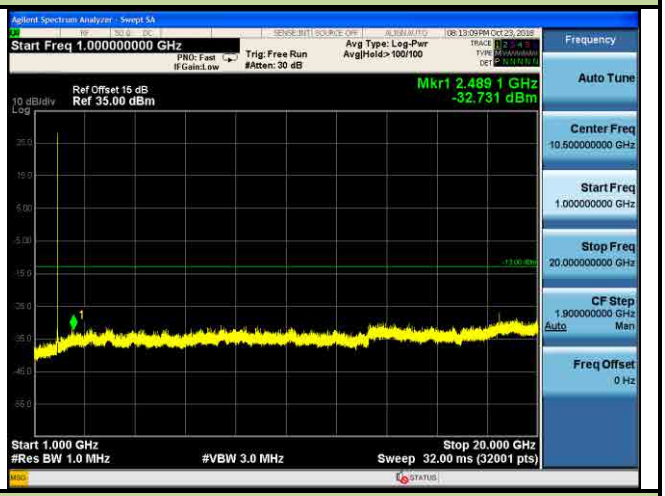
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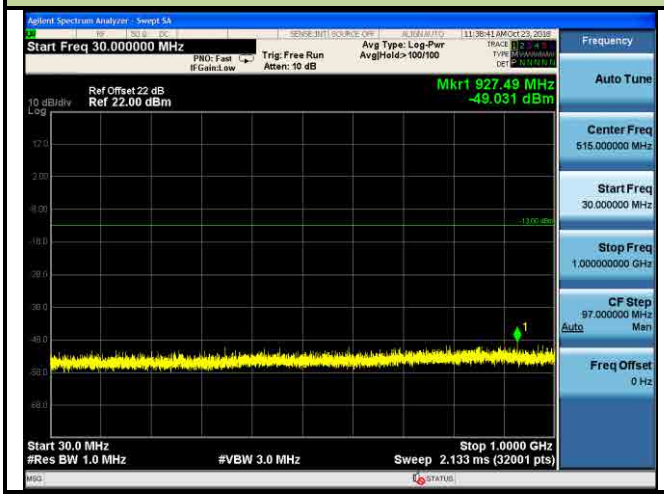	

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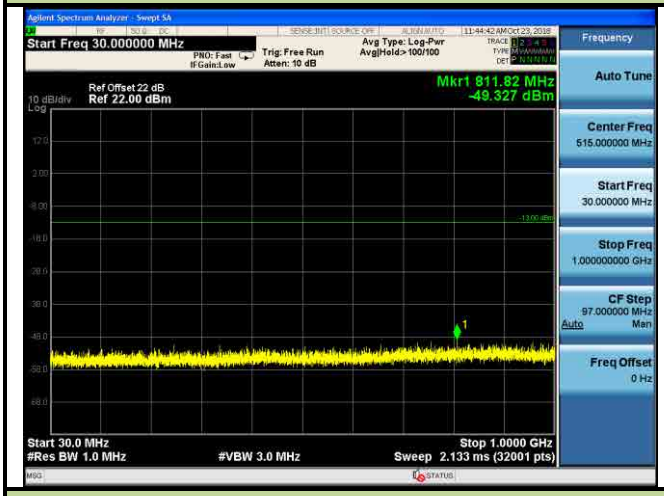	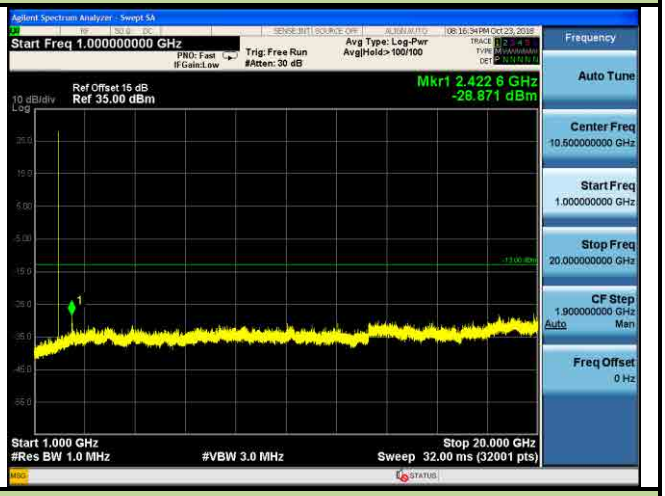
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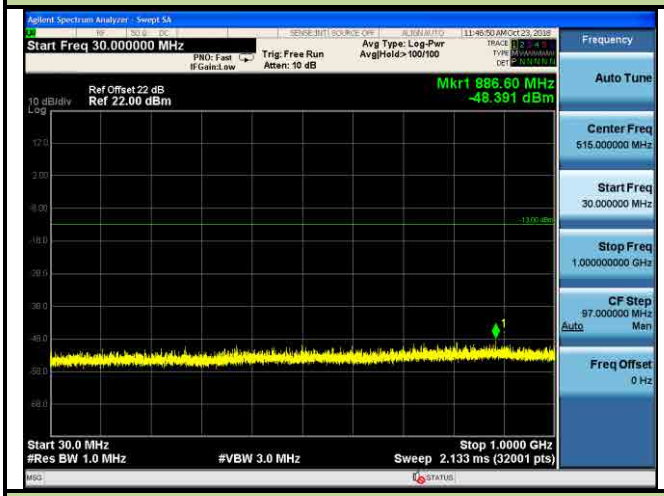	
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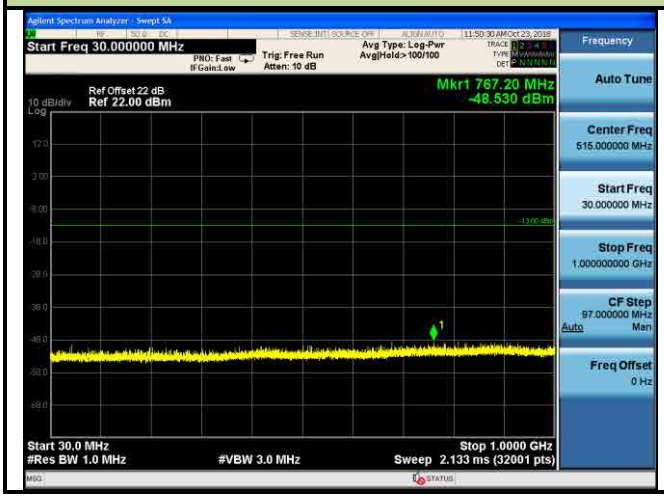	

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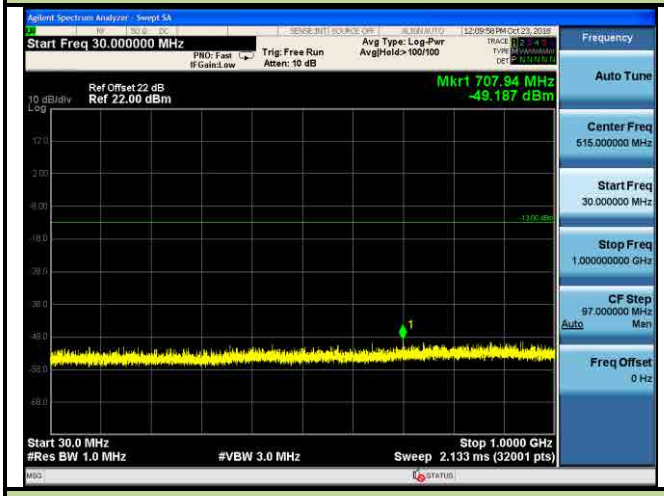	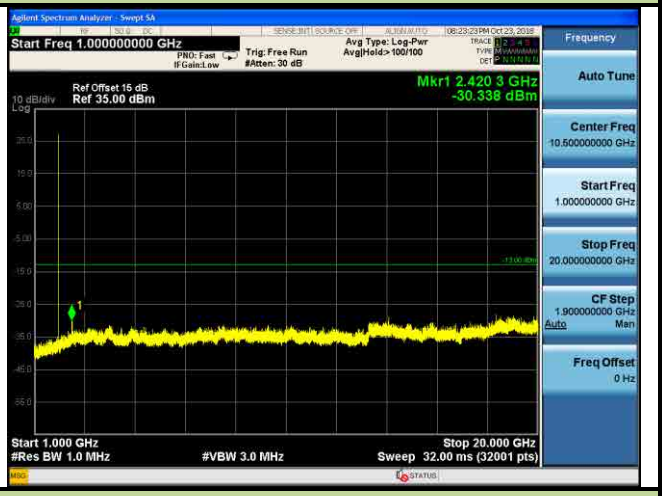
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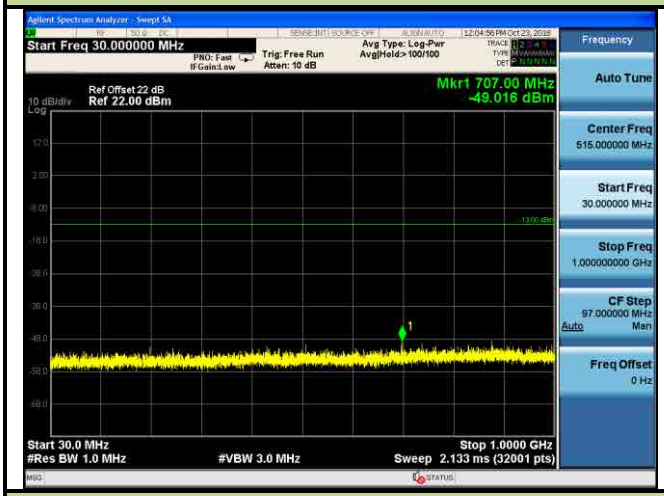	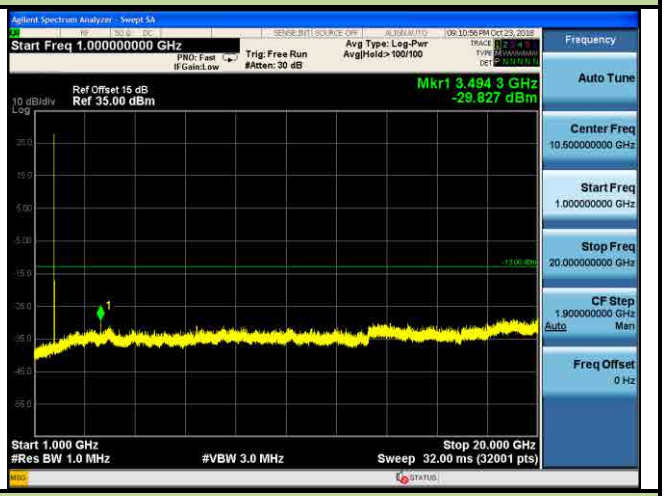
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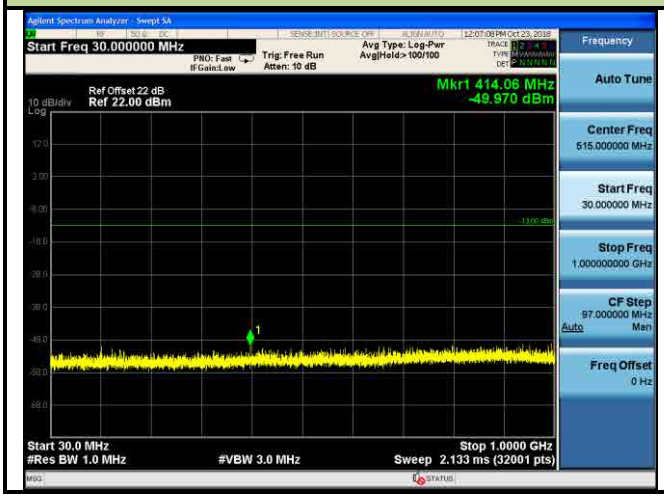
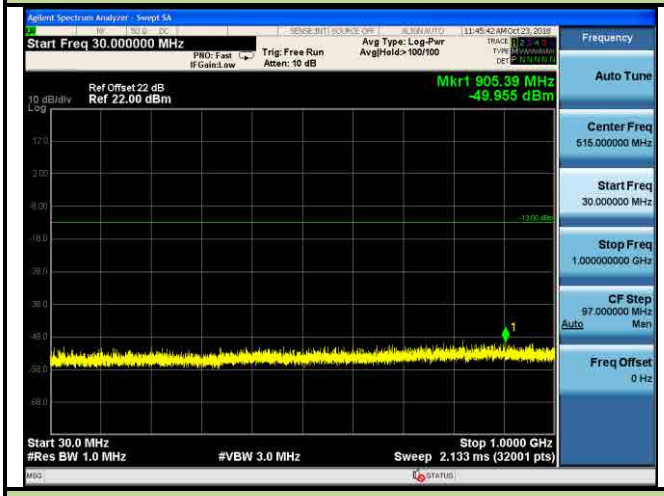
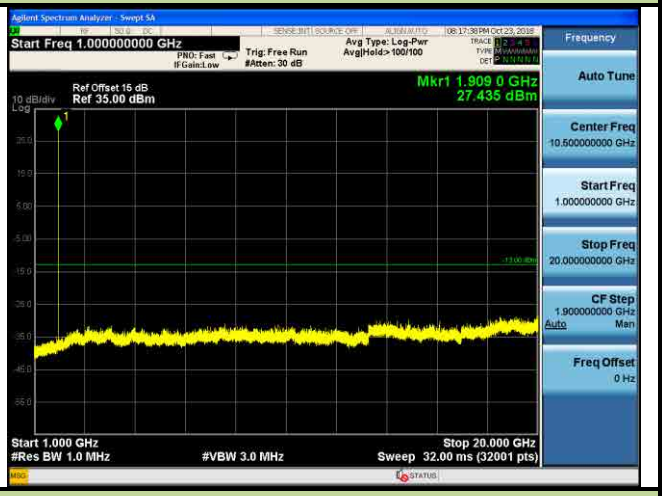
	

LTE Band 2 16QAM 1.4MHz CH19193 1RB#2_30MHz-1GHz	LTE Band 2 16QAM 1.4MHz CH19193 1RB#2_1GHz-20GHz
	
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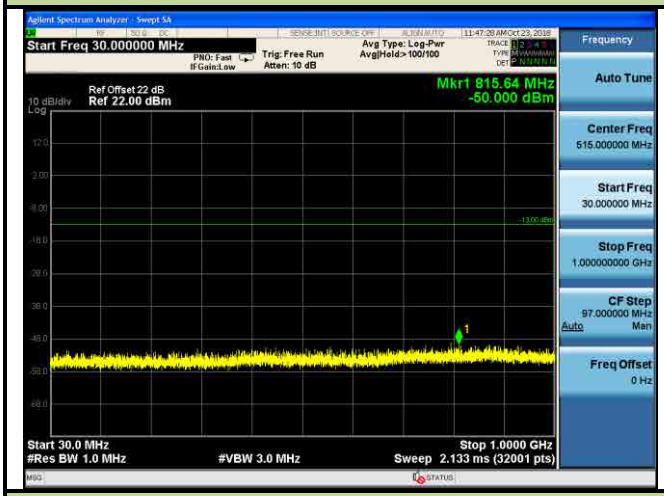	
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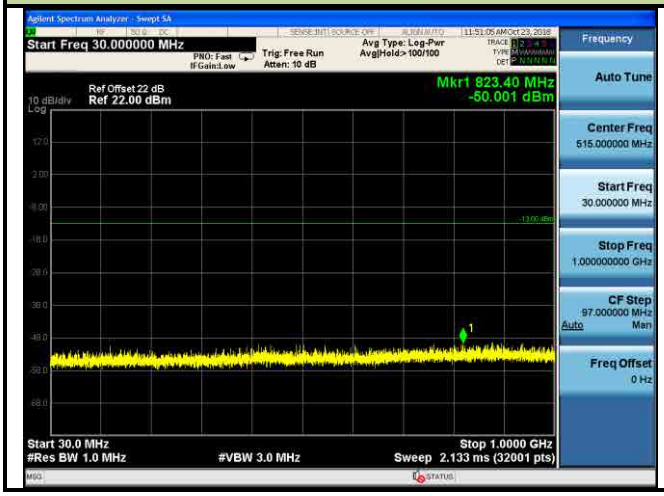	

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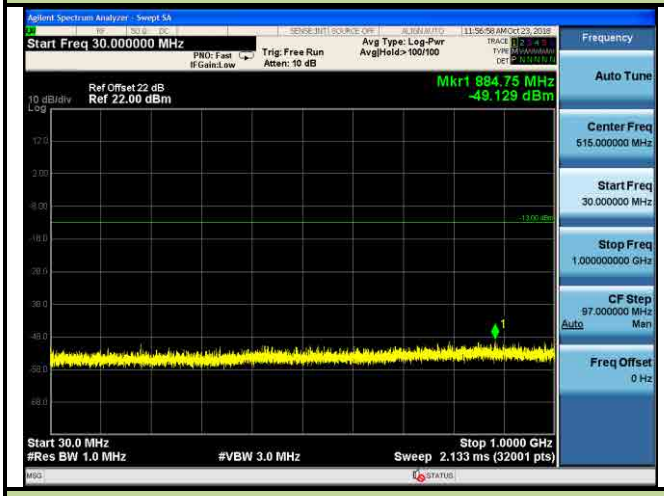	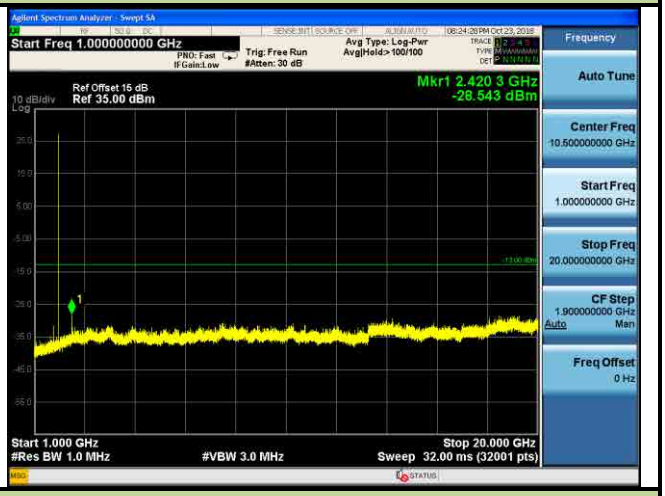
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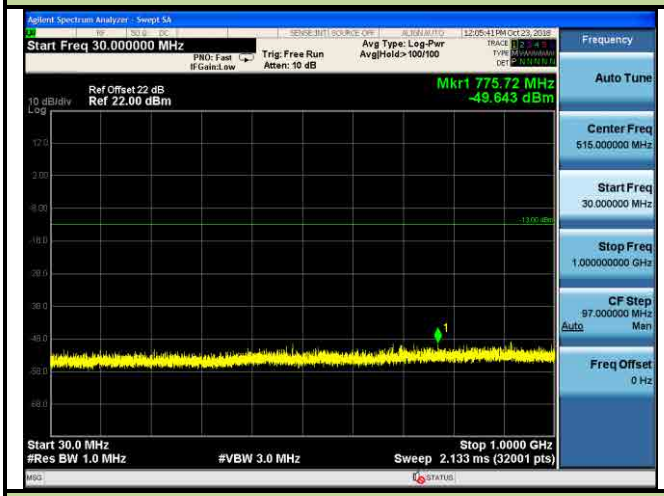	
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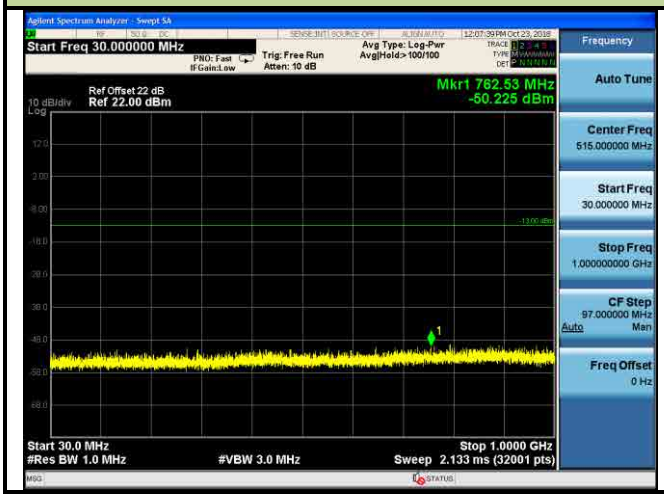
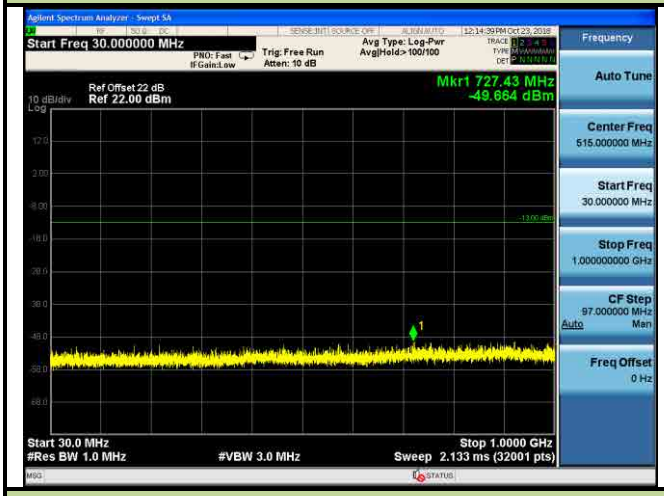
	

Test Mode	Modulation	Channel/ Frequency (MHz)	Bandwidth (MHz)	RB Size	RB Offset	Test Result
LTE Band 4 (Low Channel)	QPSK	CH19957 / 1710.7MHz	1.4	1	2	Pass
		CH19965 / 1711.5MHZ	3	1	7	Pass
		CH19975 / 1712.5MHz	5	1	12	Pass
		CH20000 / 1715MHz	10	1	25	Pass
		CH20025 / 1717.5MHz	15	1	36	Pass
		CH20050 / 1720MHz	20	1	49	Pass
	16QAM	CH19957 / 1710.7MHz	1.4	1	2	Pass
		CH19965 / 1711.5MHZ	3	1	7	Pass
		CH19975 / 1712.5MHz	5	1	12	Pass
		CH20000 / 1715MHz	10	1	25	Pass
		CH20025 / 1717.5MHz	15	1	36	Pass
		CH20050 / 1720MHz	20	1	49	Pass
LTE Band 4 (Middle Channel)	QPSK	CH20175 /1732.5MHz	1.4	1	2	Pass
			3	1	7	Pass
			5	1	12	Pass
			10	1	25	Pass
			15	1	36	Pass
			20	1	49	Pass
	16QAM		1.4	1	2	Pass
			3	1	7	Pass
			5	1	12	Pass
			10	1	25	Pass
			15	1	36	Pass
			20	1	49	Pass

Test Mode	Modulation	Channel/ Frequency (MHz)	Bandwidth (MHz)	RB Size	RB Offset	Test Result
LTE Band 4 (High Channel)	QPSK	CH20393 / 1754.3MHz	1.4	1	2	Pass
		CH20385 / 1753.5MHz	3	1	7	Pass
		CH20375 / 1752.5MHz	5	1	12	Pass
		CH20350 / 1750MHz	10	1	25	Pass
		CH20325 / 1747.5MHz	15	1	36	Pass
		CH20300 / 1745MHz	20	1	49	Pass
	16QAM	CH20393 / 1754.3MHz	1.4	1	2	Pass
		CH20385 / 1753.5MHz	3	1	7	Pass
		CH20375 / 1752.5MHz	5	1	12	Pass
		CH20350 / 1750MHz	10	1	25	Pass
		CH20325 / 1747.5MHz	15	1	36	Pass
		CH20300 / 1745MHz	20	1	49	Pass

LTE Band 4 QPSK 1.4MHz CH19957 1RB#2_30MHz-1GHz	LTE Band 4 QPSK 1.4MHz CH19957 1RB#2_1GHz-20GHz
	
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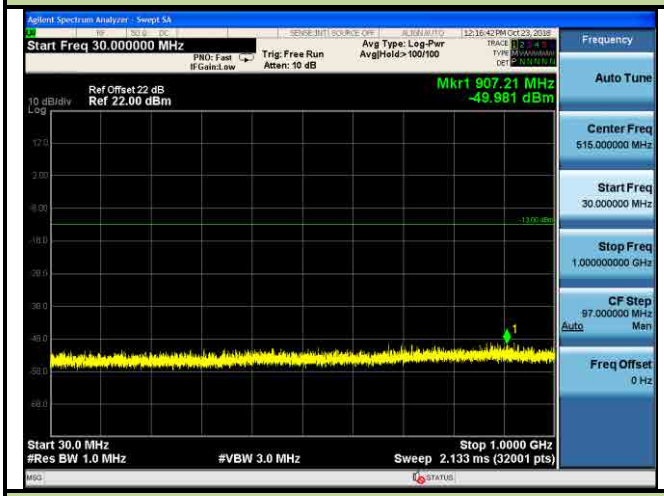	
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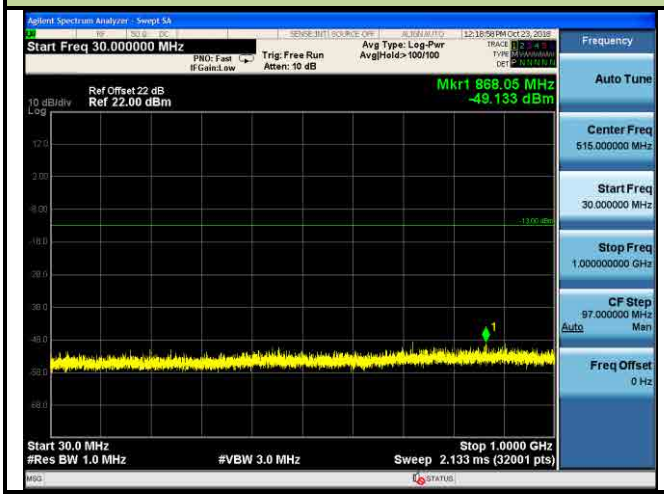	

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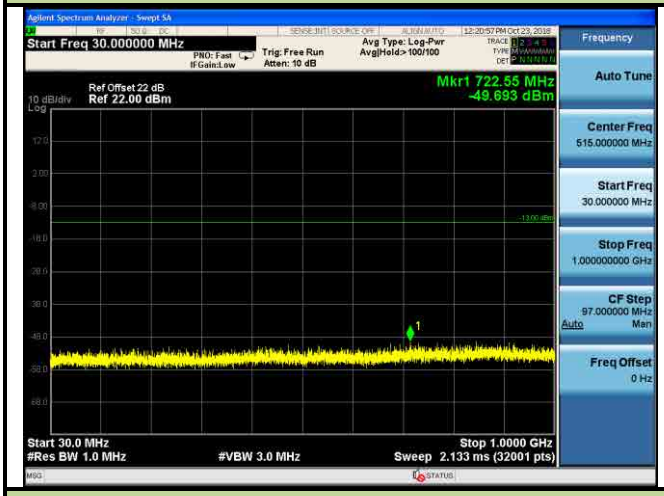	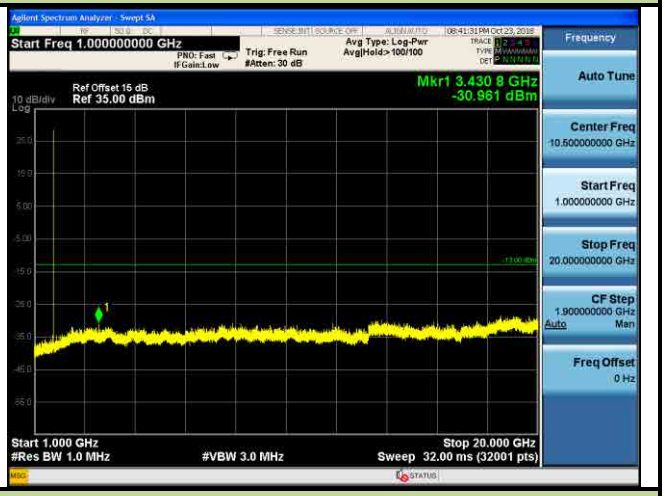
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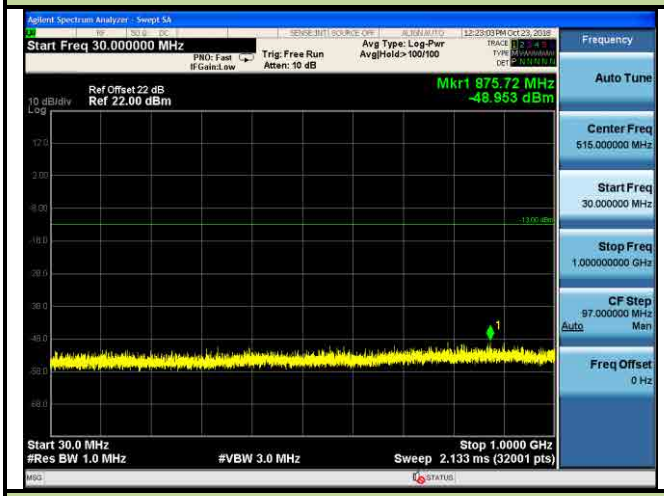
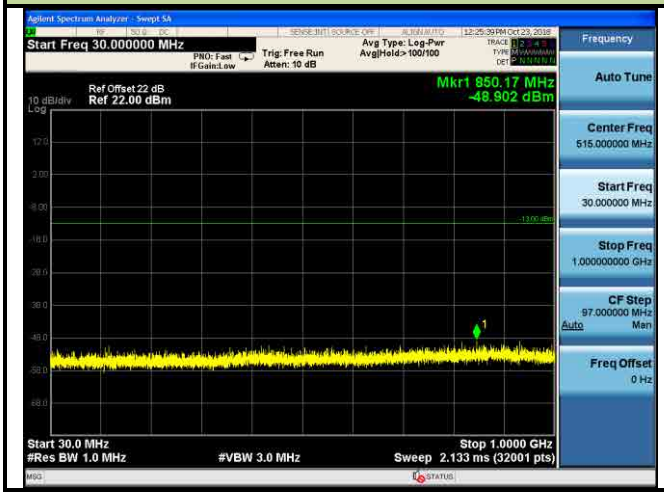
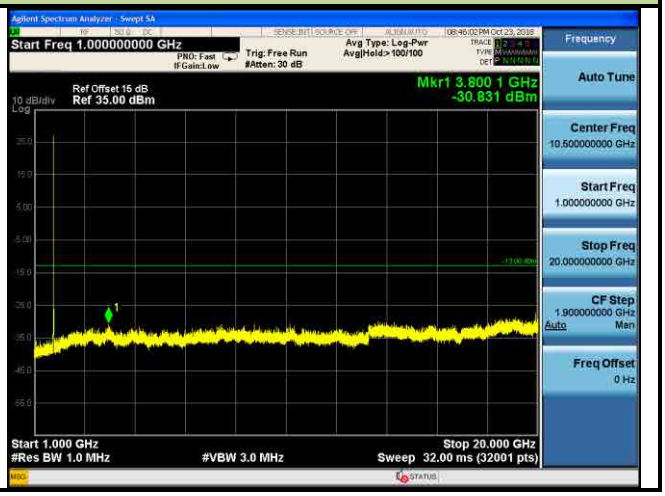
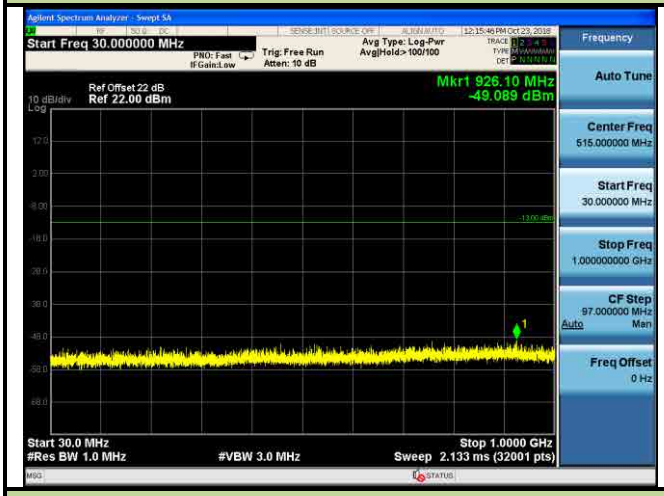
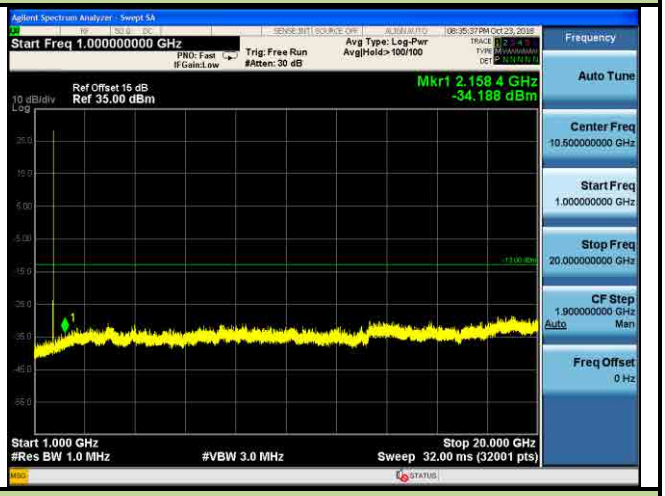
	
LTE Band 4 QPSK 20MHz CH20050 1RB#49_30MHz-1GHz	**LTE Band 4 QPSK 20MHz CH20050 1RB#49_1GHz-20GHz**
	

LTE Band 4 16QAM 1.4MHz CH19957 1RB#2_30MHz-1GHz	LTE Band 4 16QAM 1.4MHz CH19957 1RB#2_1GHz-20GHz
	
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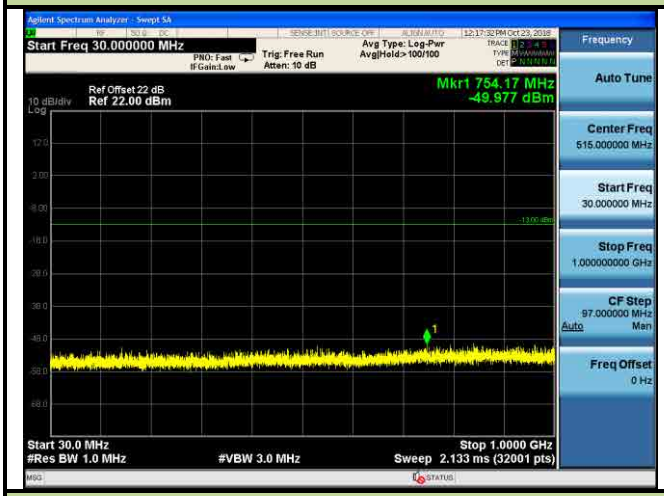
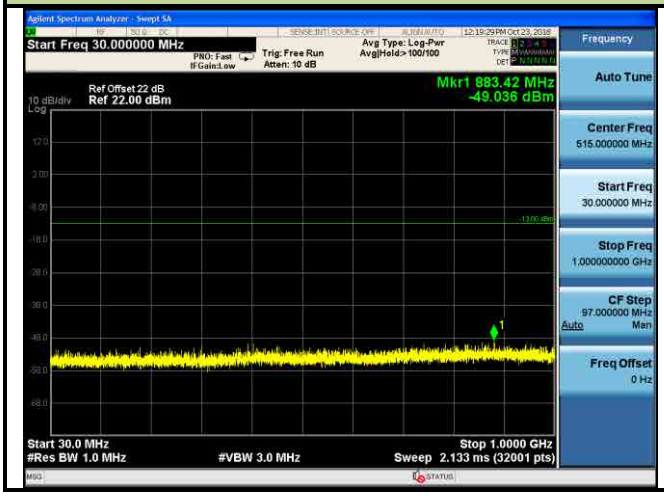
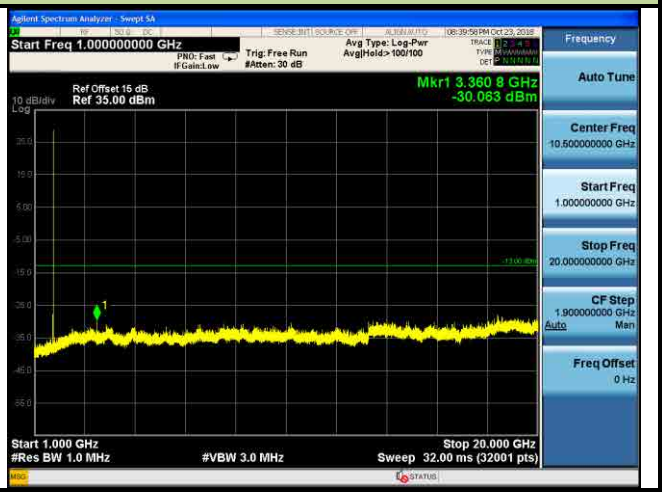
	
LTE Band 4 16QAM 5MHz CH19975 1RB#12_30MHz-1GHz	**LTE Band 4 16QAM 5MHz CH19975 1RB#12_1GHz-20GHz**
	

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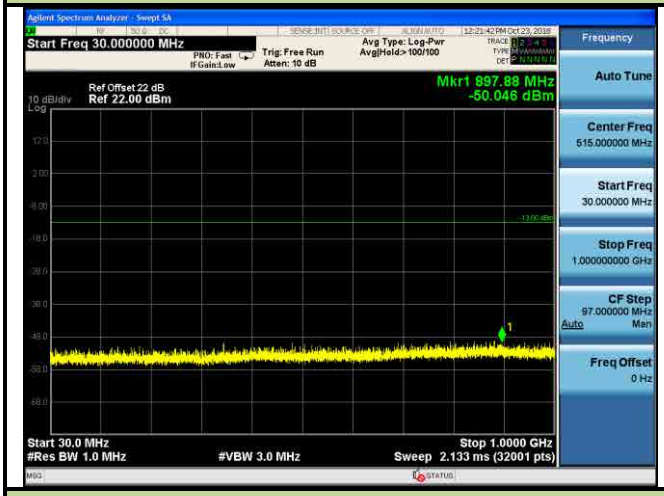
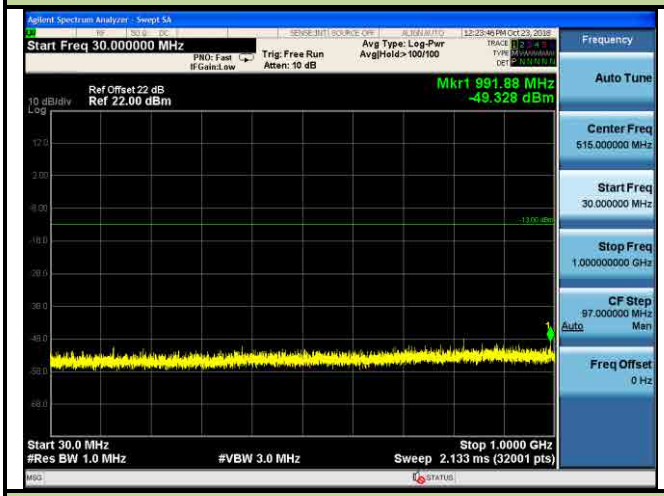
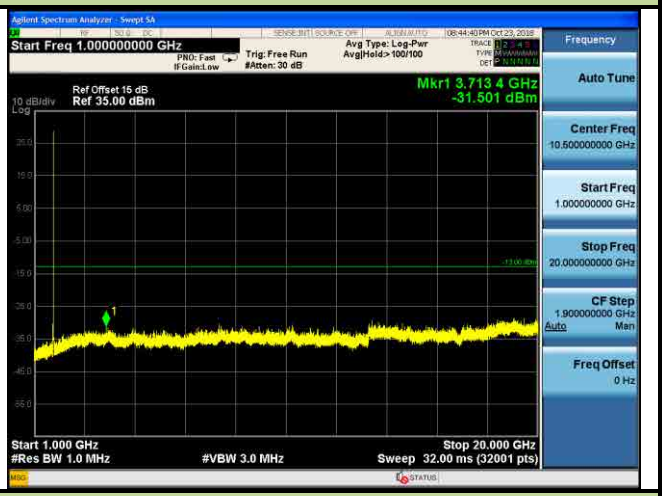
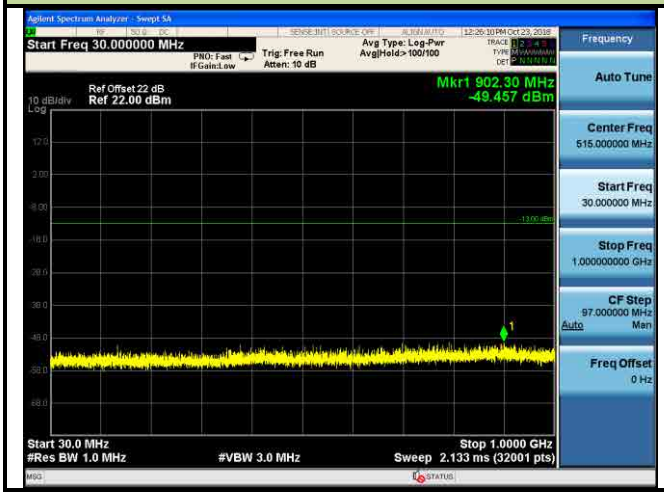
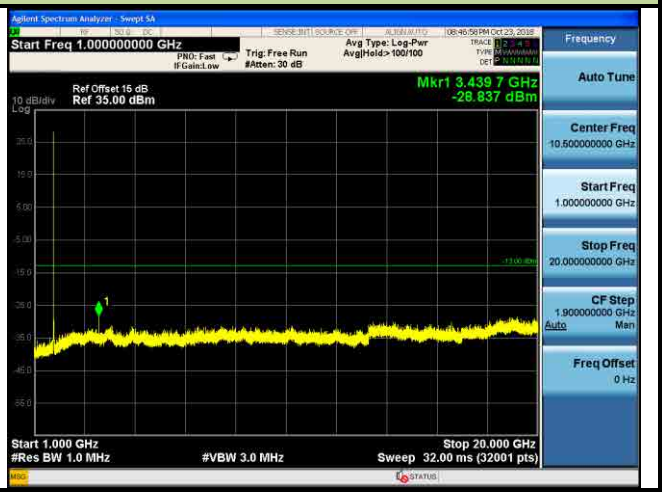
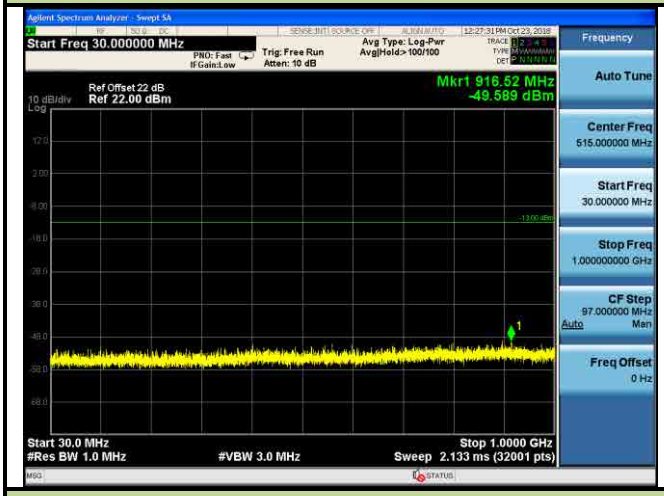
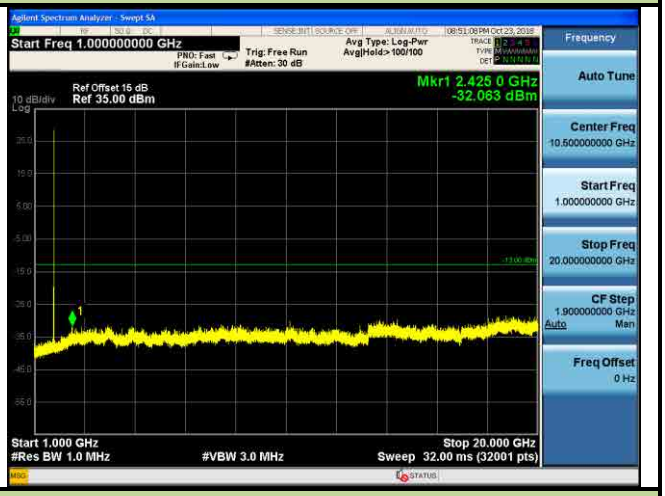
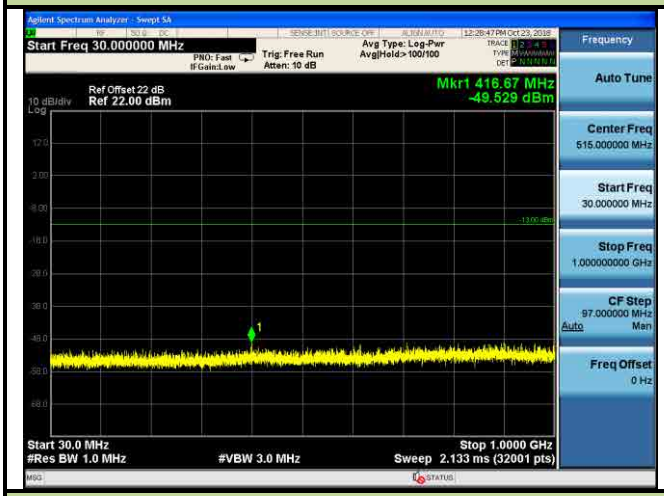
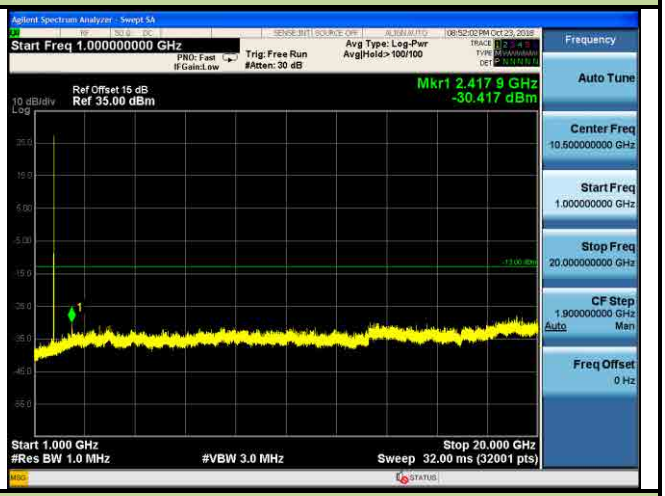
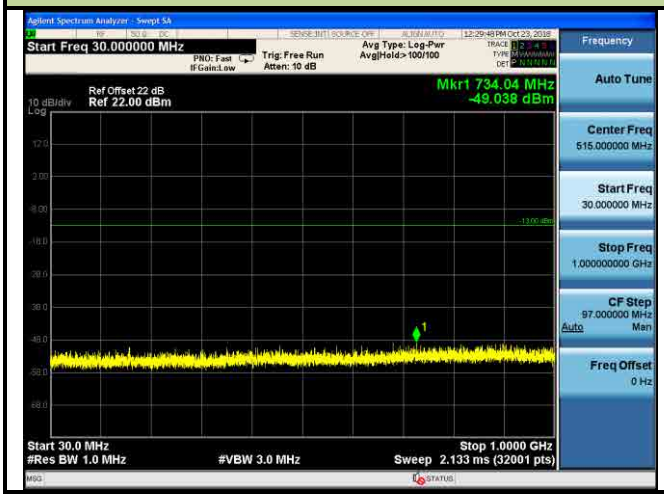
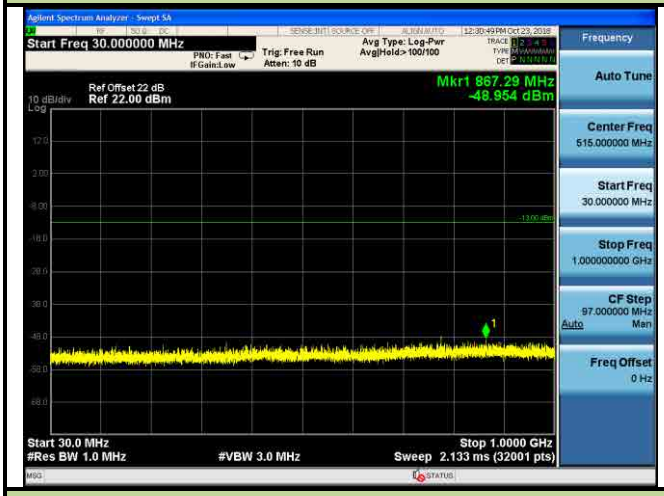
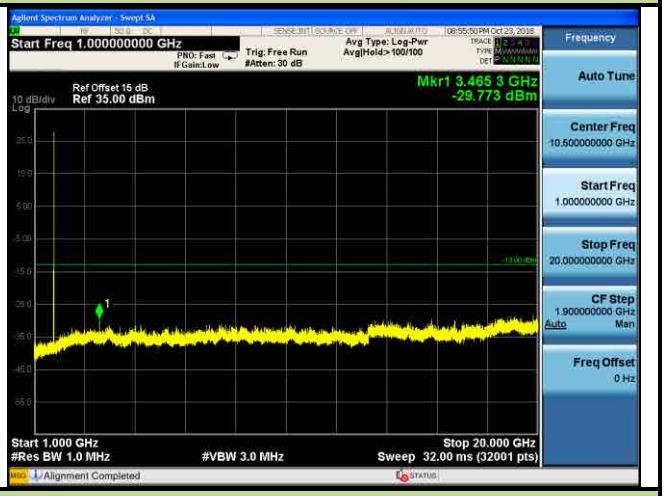
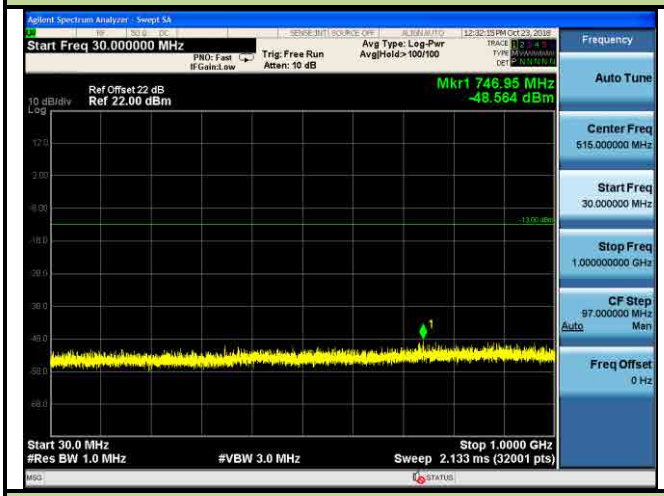
	
LTE Band 4 16QAM 15MHz CH20025 1RB#36_30MHz-1GHz	**LTE Band 4 16QAM 15MHz CH20025 1RB#36_1GHz-20GHz**
	
LTE Band 4 16QAM 20MHz CH20050 1RB#49_30MHz-1GHz	**LTE Band 4 16QAM 20MHz CH20050 1RB#49_1GHz-20GHz**
	

LTE Band 4 QPSK 1.4MHz CH20175 1RB#2_30MHz-1GHz	LTE Band 4 QPSK 1.4MHz CH20175 1RB#2_1GHz-20GHz
	
LTE Band 4 QPSK 3MHz CH20175 1RB#7_30MHz-1GHz	**LTE Band 4 QPSK 3MHz CH20175 1RB#7_1GHz-20GHz**
	
LTE Band 4 QPSK 5MHz CH20175 1RB#12_30MHz-1GHz	**LTE Band 4 QPSK 5MHz CH20175 1RB#12_1GHz-20GHz**
	

LTE Band 4 QPSK 10MHz CH20175 1RB#25_30MHz-1GHz	LTE Band 4 QPSK 10MHz CH20175 1RB#25_1GHz-20GHz
	
LTE Band 4 QPSK 15MHz CH20175 1RB#36_30MHz-1GHz	**LTE Band 4 QPSK 15MHz CH20175 1RB#36_1GHz-20GHz**
	
LTE Band 4 QPSK 20MHz CH20175 1RB#49_30MHz-1GHz	**LTE Band 4 QPSK 20MHz CH20175 1RB#49_1GHz-20GHz**