RF TEST REPORT

Report No.: SET2020-06190

Product: 5G NR Multi model smart phone

Model No.: ZTG01

FCC ID: SRQ-ZTG01

Marketing Name: TBD

Applicant: ZTE Corporation.

Address: ZTE Plaza, Keji Road South, Shenzhen, China.

Dates of Testing: 05/20/2020 —06/15/2020

Issued by: CCIC Southern Testing Co., Ltd

Lab Location: Electronic Testing Building, No. 43 Shahe Road Xili Street,

Nanshan District Shenzhen, Guangdong 518055, China.

Tel：86 755 26627338 **Fax**：86 755 26627238

Test Report

Product ..... : 5G NR Multi model smart phone

Brand Name..... : ZTE

Trade Name ..... : ZTE

Applicant ..... : ZTE Corporation.

Applicant Address ..... : ZTE Plaza, Keji Road South, Shenzhen, China.

Manufacturer ..... : ZTE Corporation.

Manufacturer Address..... : ZTE Plaza, Keji Road South, Shenzhen, China.

Test Standards ..... : 47 CFR Part 2/22/27

Test Result..... : PASS

Tested by .....: Vincent 2020.06.15

Vincent, Test Engineer

Reviewed by.....: Chris You 2020.06.15

Chris You, Senior Engineer

Approved by.....: Shuangwen Zhang 2020.06.15

Shuangwen Zhang，Manager

Table of Contents

Change History		
Issue	Date	Reason for change
1.0	2020.06.15	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	5G NR Multi model smart phone
Hardware Version	ZTG01HW1.1
Software Version	0.4.0
EUT supports Radios application	LTE Band 5/17
Frequency Range (Test Band)	LTE Band 5: 824.7MHz~848.3MHz LTE Band 17: 706.5MHz~713.5MHz
Maximum Output Power to Antenna	LTE Band 5: 24.39 dBm LTE Band 17:24.40 dBm
Bandwidth	LTE Band 5: 1.4MHz/3MHz/5MHz/10MHz LTE Band 17: 5MHz/10MHz
Modulation Type	QPSK/16QAM/64QAM(downlink only)
Antenna Type	Internal Antenna
Power supply	DC 3.87V from battery DC 5V from adapter

1.2 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

Band	Type of Modulation	BW (MHz)	Emission Designator	Frequency Tolerance (ppm)	Maximum ERP/EIRP(W)
LTE Band 5	QPSK	1.4	1M09G7D	__	0.140
LTE Band 5	16QAM	1.4	1M09W7D	__	0.130
LTE Band 5	QPSK	3	2M68G7D	__	0.145
LTE Band 5	16QAM	3	2M68W7D	__	0.154
LTE Band 5	QPSK	5	4M49G7D	—	0.148
LTE Band 5	16QAM	5	4M49W7D	__	0.151
LTE Band 5	QPSK	10	8M94G7D	0.005	0.133
LTE Band 5	16QAM	10	8M94W7D	—	0.143
LTE Band 17	QPSK	5	4M48G7D	—	0.134
LTE Band 17	16QAM	5	4M49W7D	—	0.123
LTE Band 17	QPSK	10	8M92G7D	0.007	0.147
LTE Band 17	16QAM	10	8M91W7D	—	0.120

1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part22, Part24，Part27，for the EUT FCC ID Certification:

1. ANSI/TIA/EIA-603-D-2010

2. FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Limit	Result
1	2.1046	Conducted RF Output Power	Reporting Only	PASS
2	27.50(c)(10)	Effective Radiated Power(Band 17)	EIRP＜3Watt	PASS
	22.913(a)(2)	Effective Radiated Power(Band 5)	ERP＜7Watt	PASS
3	2.1049	Occupied Bandwidth	Reporting Only	PASS
4	2.1051 27.53(g)	Conducted Band Edge (Band 5/17)	＜43+10log10(P[watt])	PASS
5	2.1051 22.917(a) 27.53(g)	Conducted Spurious Emission (Band 5/17)	＜43+10log10(P[watt])	PASS
6	2.1053 22.917(a) 27.53(g)	Radiated Spurious Emission (Band 5/17)	＜43+10log10(P[watt])	PASS
7	2.1055, 22.355 27.54	Frequency Stability	＜2.5ppm	PASS

Remark：

1. All test items were verified and recorded according to the standards and without any deviation during the test.

2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

1.4 Test Configuration of Equipment Under Test

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

Test Items	Band	Bandwidth(MHz)						Modulation		RB#			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	5	√	√	√	√			√	√	√	√	√	√	√	√
	17			√	√			√	√	√	√	√	√	√	√
26dB and 99% Bandwidth	5	√	√	√	√			√	√			√		√	
	17			√	√			√	√			√		√	
Conducted Band Edge	5	√	√	√	√			√	√	√		√	√		√
	17			√	√			√	√	√		√	√		√
Conducted Spurious Emission	5	√						√		√			√	√	√
	17			√				√		√			√	√	√
Frequency Stability	5				√			√				√		√	
	17				√			√				√		√	
ERP/EIRP	5	√	√	√	√			√	√	√			√	√	√
	17			√	√			√	√	√			√	√	√
Radiated Spurious Emission	5	Worst case													
	17	Worst case													
Note	1. The mark "√" means that this configuration is chosen for testing. 2. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. 3. For E.R.P/E.I.R.P. measurement, the widest bandwidth and the bandwidth with the highest conducted power of each band is chosen for testing. Besides, the lowest bandwidth of each band is also measured for reporting only.														

1.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 7dB and 10dB attenuator.

Example:

Offset (dB) = RF cable loss(dB) + attenuator factor(dB).
= 7 + 10 = 17 (dB)

1.6 Facilities and Accreditations

1.6.1 Test Facilities

CNAS-Lab Code: L1659

CCIC-SET is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.

FCC-Registration No.: CN5031

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN5031, valid time is until December 31, 2020.

ISED Registration: 11185A-1

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Dec. 31, 2020.

NVLAP Lab Code: 201008-0

CCIC-SET is a third party testing organization accredited by NVLAP according to ISO/IEC 17025. The accreditation certificate number is 201008-0.

1.6.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15℃- 35℃
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa

2. 47 CFR PART 2 REQUIREMENTS

2.1 Conducted RF Output Power

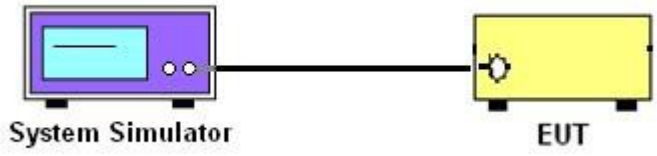
2.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

2.1.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.1.3 Test Setup



2.1.4 Test Procedures

1. The transmitter output port was connected to the system simulator.

2. Set EUT at maximum power through system simulator.

3. Select lowest, middle, and highest channels for each band and different modulation.

4. Measure and record the power level from the system simulator.

2.1.5 Test Results

Please refer to Appendix A for detail

2.2 Peak to Average Radio

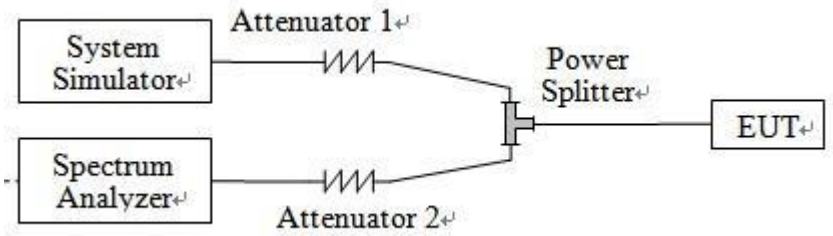
2.2.1 Definition

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

2.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.2.3 Test Description



2.2.4 Test Procedures

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

2.2.5 Test Results of Peak-to-Average Ratio

Please refer to Appendix A for detail

2.3 99% Occupied Bandwidth and 26dB Bandwidth

2.3.1 Definition

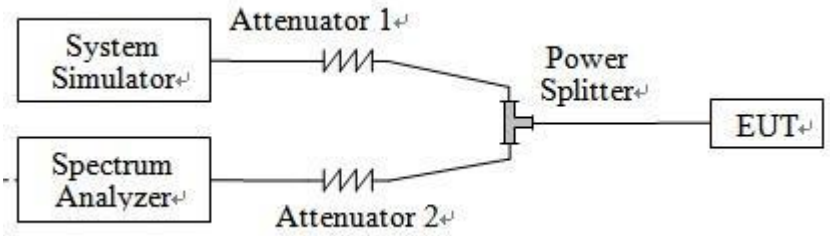
According to FCC section 2.1049, the occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

2.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.3.3 Test Setup



2.3.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.

2.3.5 Test Result of 99% Occupied Bandwidth and 26dB Bandwidth

Please refer to Appendix A for detail

2.4 Frequency Stability

2.4.1 Requirement

According to FCC requirement, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency. According to FCC section 2.1055, the test conditions are:

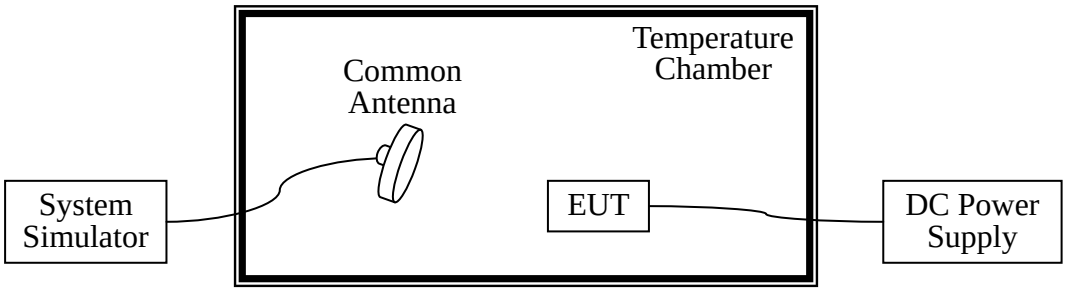
(a) The temperature is varied from -30°C to +50°C at intervals of not more than 10°C.

(b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

2.4.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.4.3 Test Setup



2.4.4 Test Procedures

1. The EUT was set up in the thermal chamber and connected with the system simulator.

2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized

before testing. Power was applied and the maximum change in frequency was recorded within one minute.

3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. The nominal, highest and lowest extreme voltages were tested, which are specified by the applicant; the normal temperature here used is 25°C.
5. The variation in frequency was measured for the worst case.

2.4.5 Test Result of Frequency Stability

Please refer to Appendix A for detail

2.5 Conducted Out of Band Emissions

2.5.1 Requirement

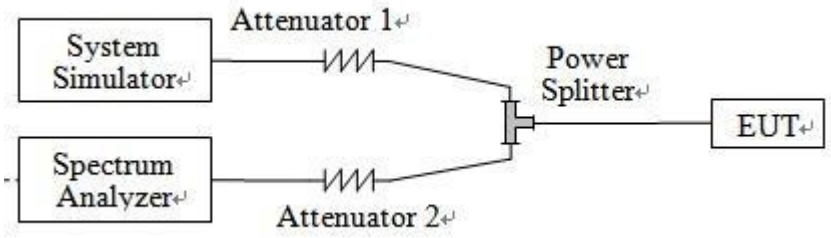
The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

2.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

2.5.3 Test Setup



2.5.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. The RF fundamental frequency should be excluded against the limit line in the operating

frequency band.

7. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

   = P(W)- [43 + 10log(P)] (dB)

   = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

   = -13dBm.

8. For 9KHz to 30MHz: the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

2.5.5 Test Result of Conducted Spurious Emission

Please refer to Appendix A for detail

2.6 Conducted Band Edge

2.6.1 Description of Conducted Band Edge Measurement

22.917(a)

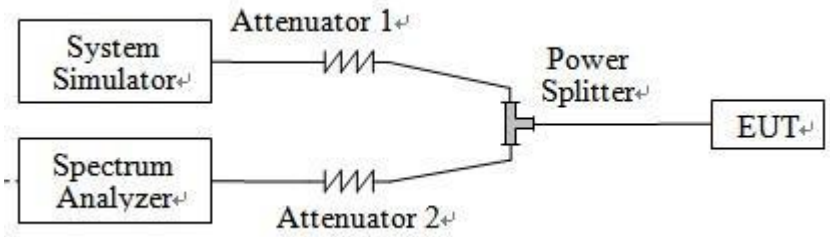
Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

2.6.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.6.3 Test Setup



2.6.4 Test Procedures

1. The testing follows FCC KDB 971168 v03r01 Section 6.0.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. The band edges of low and high channels for the highest RF powers were measured.
4. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
5. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
6. Set spectrum analyzer with RMS detector.
7. The RF fundamental frequency should be excluded against the limit line in the operating

frequency band.

8. Checked that all the results comply with the emission limit line.
   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

2.6.5 Test Result of Conducted Band Edge

Please refer to Appendix A for detail

2.7 Transmitter Radiated Power (EIRP/ERP)

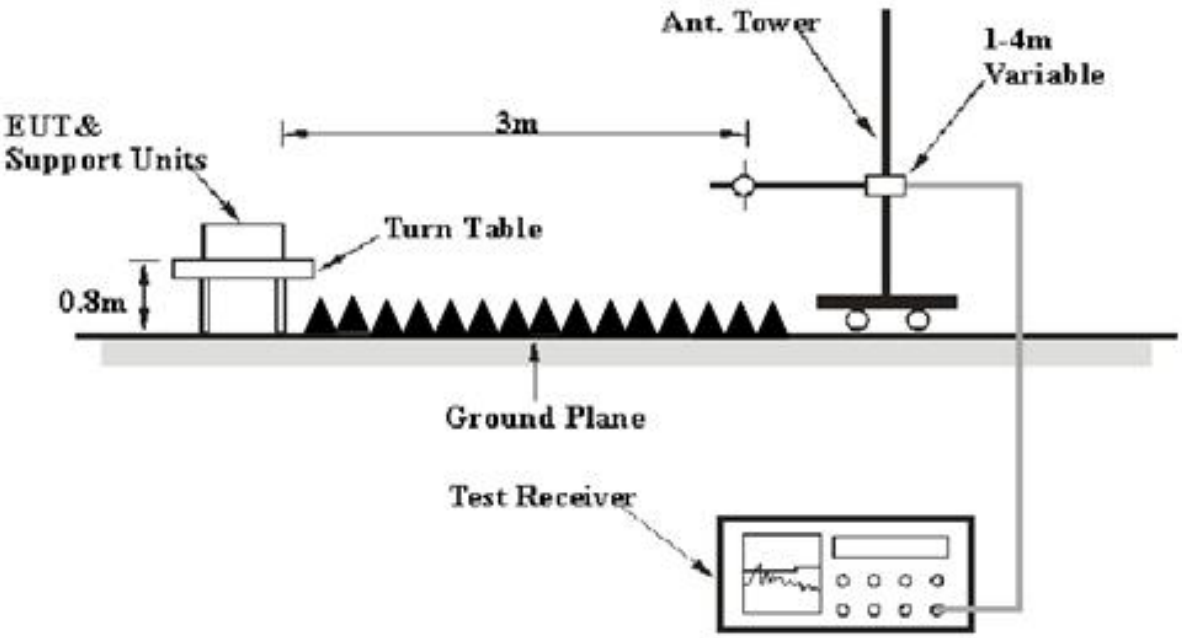
2.7.1 Requirement

Effective radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-D-2010, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v03r01. Mobile and portable (hand-held) stations operating are limited to average ERP of 7 watts with LTE band 5 and 3 watts with band 17.

2.7.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.7.3 Test Setup



2.7.4 Test Procedures

1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer which used a channel power option across EUT's signal bandwidth per section 4.0 of KDB 971168 D01v03r01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10. ERP/EIRP = Ps + Et – Es + Gs = Ps + Rt – Rs + Gs

    Ps (dBm)：Input power to substitution antenna.

    Gs (dBi or dBd)：Substitution antenna Gain.

    Et = Rt + AF

    Es = Rs + AF

    AF (dB/m)：Receive antenna factor

    Rt：The highest received signal in spectrum analyzer for EUT.

    Rs：The highest received signal in spectrum analyzer for substitution antenna.

2.7.5 Test Result of ERP/EIRP

1 LTE Band 5 Test Verdict:

LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	ERP (dBm)	Verdict
			RB Size	RB Offset			
5	1.4	QPSK	1	5	824.7	21.45	PASS
5	1.4	QPSK	1	2	836.5	21.36	PASS
5	1.4	QPSK	1	5	848.3	21.31	PASS
5	1.4	16QAM	1	5	824.7	21.10	PASS
5	1.4	16QAM	1	2	836.5	21.14	PASS
5	1.4	16QAM	1	0	848.3	21.15	PASS
5	3	QPSK	1	5	825.5	21.42	PASS
5	3	QPSK	1	5	836.5	21.61	PASS
5	3	QPSK	1	5	848.3	21.29	PASS
5	3	16QAM	1	5	825.5	21.87	PASS
5	3	16QAM	1	14	836.5	21.80	PASS
5	3	16QAM	1	5	848.3	21.88	PASS
5	5	QPSK	1	14	826.5	21.32	PASS
5	5	QPSK	1	14	836.5	21.71	PASS
5	5	QPSK	1	14	846.5	21.65	PASS
5	5	16QAM	1	12	826.5	21.67	PASS
5	5	16QAM	1	24	836.5	21.80	PASS
5	5	16QAM	1	0	846.5	21.74	PASS
5	10	QPSK	1	24	829	21.24	PASS
5	10	QPSK	1	24	836.5	21.19	PASS
5	10	QPSK	1	24	844	21.10	PASS
5	10	16QAM	1	24	829	21.40	PASS
5	10	16QAM	1	49	836.5	21.22	PASS
5	10	16QAM	1	24	844	21.55	PASS

2. LTE Band 17 Test Verdict:

LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	ERP (dBm)	Verdict
			RB Size	RB Offset			
17	5	QPSK	1	24	706.5	21.18	PASS
17	5	QPSK	1	24	710	21.24	PASS
17	5	QPSK	1	12	713.5	21.26	PASS
17	5	16QAM	1	24	706.5	20.74	PASS
17	5	16QAM	1	24	710	20.59	PASS
17	5	16QAM	1	12	713.5	20.89	PASS
17	10	QPSK	1	49	709	21.32	PASS
17	10	QPSK	1	49	710	21.68	PASS
17	10	QPSK	1	49	711	21.62	PASS
17	10	16QAM	1	24	709	20.23	PASS
17	10	16QAM	1	49	710	20.37	PASS
17	10	16QAM	1	24	711	20.78	PASS

2.8 Radiated Out of Band Emissions

2.8.1 Requirement

The radiated spurious emission was measured by substitution method according to ANSI / TIA /EIA-603-C-2004. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

For Band 7

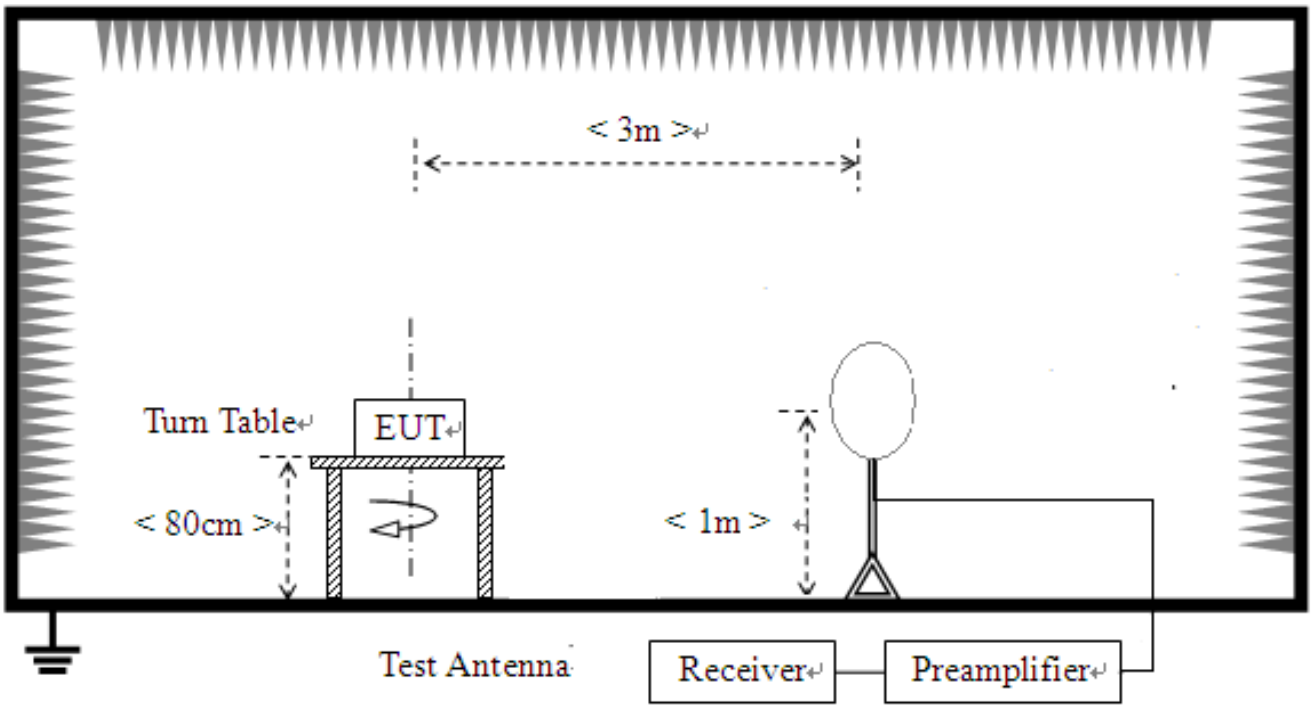
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 55 + 10 log (P) dB.

2.8.2 Measuring Instruments

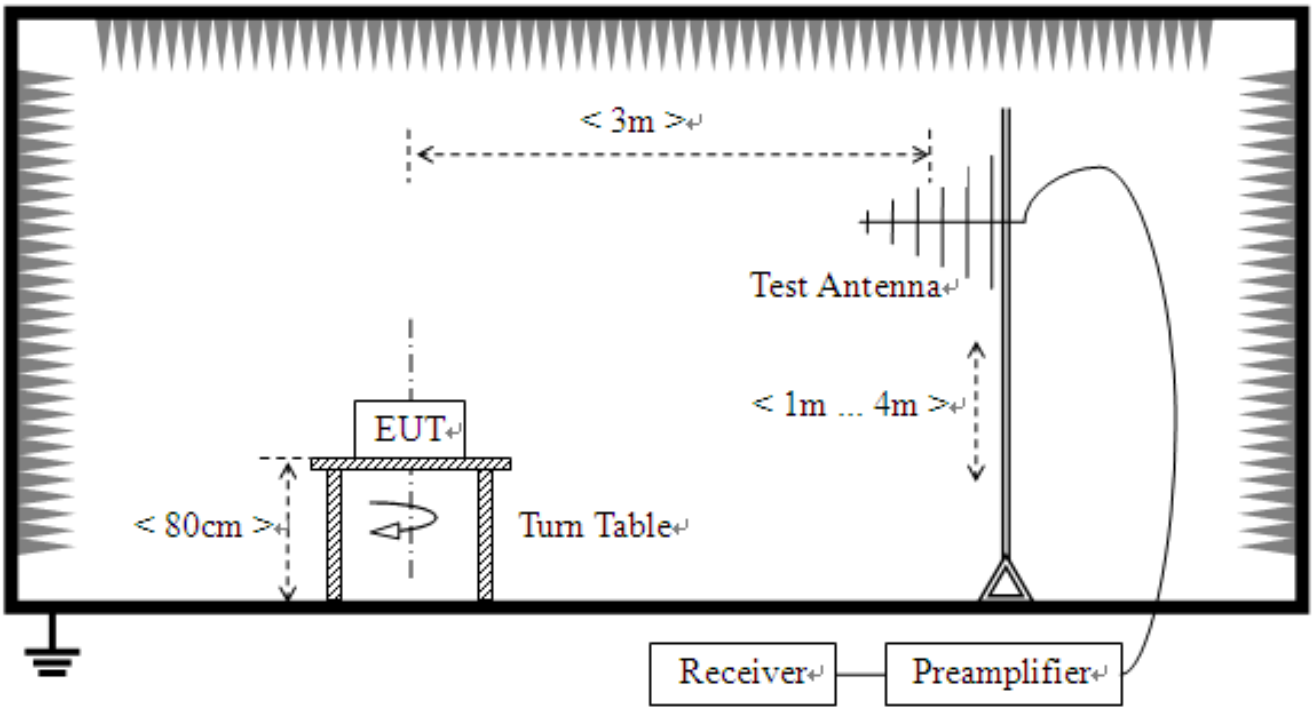
The measuring equipment is listed in the section 3 of this test report.

2.8.3 Test Setup

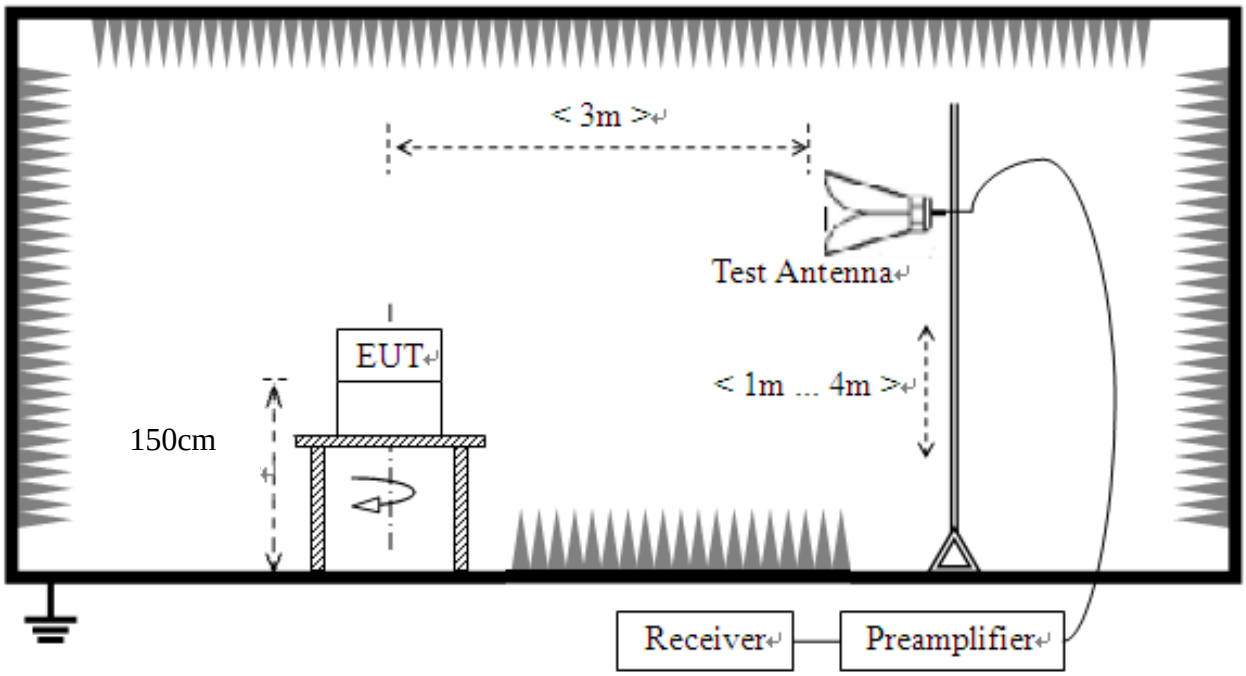
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



2.8.4 Test Procedures

1. The EUT was placed on a rotatable wooden table 0.8 meters above the ground(below 1GHz) and 1.5meter above 1GH
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.
11. All Spurious Emission tests were performed in X, Y, Z axis direction and low, middle, high channel. And only the worst axis test condition was recorded in this test report.
12. The spectrum is measured from 9 KHz to the 10^{th} harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. The worst case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.
13. The maximum RB configurations of the Radiated Spurious Emissions as RB Size 1, RB Offset 0

2.8.5 Test Result (Plots) of Radiated Spurious Emission

Note: 1. within 30MHz-1GHz were found more than 20dB below limit line

Note: 2. Absolute Level=Reading Level + Factor

LTE Band 5 QPSK 20MHz BW Middle Channel

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	36.7934	-89.38	-65.02	-13.00	52.02	24.36	Horizontal
2	47.9540	-90.38	-68.65	-13.00	55.65	21.73	Horizontal
3	74.1571	-79.47	-58.21	-13.00	45.21	21.26	Horizontal
4	122.196	-100.32	-78.30	-13.00	65.30	22.02	Horizontal
5	1779.38	-52.92	-51.65	-13.00	38.65	1.27	Horizontal
6	3900.45	-59.23	-49.52	-13.00	36.52	9.71	Horizontal

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	35.3377	-89.98	-67.20	-13.00	54.20	22.78	Vertical
2	48.4392	-88.95	-67.90	-13.00	54.90	21.05	Vertical
3	121.710	-100.37	-75.90	-13.00	62.90	24.47	Vertical
4	257.578	-106.04	-79.92	-13.00	66.92	26.12	Vertical
5	1778.38	-56.96	-56.40	-13.00	43.40	0.56	Vertical
6	3172.58	-59.15	-50.17	-13.00	37.17	8.98	Vertical

Note:other spurious emissions are 20dB below limit line and no need to report

LTE Band 17 QPSK 10MHz BW Middle Channel

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	36.7934	-87.93	-67.18	-13.00	54.18	20.75	Vertical
2	47.9540	-89.67	-70.36	-13.00	57.36	19.31	Vertical
3	121.710	-101.67	-78.80	-13.00	65.80	22.87	Vertical
4	402.666	-105.20	-76.07	-13.00	63.07	29.13	Vertical
5	2711.85	-57.41	-50.94	-13.00	37.94	6.47	Vertical
6	4950.97	-58.93	-45.85	-13.00	32.85	13.08	Vertical

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	36.7934	-87.75	-65.24	-13.00	52.24	22.51	Horizontal
2	48.4392	-90.71	-70.90	-13.00	57.90	19.81	Horizontal
3	123.651	-101.32	-80.83	-13.00	67.83	20.49	Horizontal
4	514.757	-104.17	-71.06	-13.00	58.06	33.11	Horizontal
5	1781.39	-56.35	-55.02	-13.00	42.02	1.33	Horizontal
6	3862.93	-58.76	-49.38	-13.00	36.38	9.38	Horizontal

Note:other spurious emissions are 20dB below limit line and no need to report

3. LIST OF MEASURING EQUIPMENT

Description	Manufacturer	Model	Serial No.	Cal. Date	Due Date	Remark
EMI Test Receiver	R&S	ESIB7	A0501375	2019.07.30	2020.07.29	Radiation
Loop Antenna	Schwarz beck	HFH2-Z2	100047	2019.04.26	2022.04.25	Radiation
Broadband antenna (30MHz~1GHz)	R&S	HL562	101341	2017.07.14	2020.07.13	Radiation
Broadband antenna (30MHz~1GHz)	R&S	HL562	101339	2017.07.14	2020.07.13	Radiation
Double ridge horn antenna (1GHz~18GHz)	R&S	HF906	100150	2019.04.27	2022.04.26	Radiation
Double ridge horn antenna (1GHz~18GHz)	R&S	HF906	100149	2019.04.17	2022.04.16	Radiation
Horn antenna (18GHz~26.5GHz)	AR	AT4002A	305753	2017.07.12	2020.07.11	Radiation
Horn antenna (18GHz~26.5GHz)	AR	AT4003A	0329293	2018.09.17	2020.09.16	Radiation
Amplifier 1GHz-18GHz	AR	25S1G4AM1	22018	2018.09.17	2020.09.16	Radiation
Ampilier 20M~3GHz	MILMEGA	80RF1000-250	1064573	2017.10.09	2020.10.08	Radiation
Spectrum Analyzer	KEYSIGHT	N9030A	A160702554	2019.06.05	2020.06.04	Conducted
Test Receiver	R&S	ESCI	A0902601	2019.07.02	2020.07.01	Conducted
Temperature chamber	welissom Inc.	SU-642	A150802409	2019.07.18	2020.07.17	Conducted
Wideband Radio Communication tester	R&S	CMW500	A130101034	2019.07.30	2021.07.29	Conducted
Power Supply	R&S	NGMO1	101037	2019.08.03	2020.08.02	Conducted

4. UNCERTAINTY OF EVALUATION

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence . The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Emission Measurement (150KHz~30MHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	2.6dB

Uncertainty of Radiated Emission Measurement (30MHz~1GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	2.4dB

Uncertainty of Radiated Emission Measurement (1GHz~40GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	2.8dB

APPENDIX A

Conducted RF (Average) Output Power

Test Result and Data

1. LTE Band 5 Conducted Power Test Verdict:

LTE FDD Band 5				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20407/824.7	20525/836.5	20643/848.3	
1.4MHz	QPSK	1	0	24.13	24.11	24.02	23.5±1.0
		1	3	23.93	23.93	23.77	
		1	5	24.03	23.97	23.82	
		3	0	23.67	23.82	23.64	23.0±1.0
		3	2	23.63	23.37	23.31	
		3	3	23.54	23.35	23.56	
		6	0	23.09	23.23	23.1	22.5±1.0
	16QAM	1	0	22.85	22.86	22.75	22.5±1.0
		1	3	22.65	22.68	22.5	
		1	5	22.75	22.72	22.55	
		3	0	22.39	22.57	22.37	22.0±1.0
		3	2	22.35	22.12	22.04	
		3	3	22.26	22.1	22.29	
		6	0	21.81	21.98	21.83	21.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20415/825.5	20525/836.5	20635/847.5	
3MHz	QPSK	1	0	24.26	24.19	24.16	23.5±1.0
		1	7	24.06	24.01	23.91	
		1	14	24.16	24.05	23.96	
		8	0	23.8	23.9	23.78	23.0±1.0
		8	4	23.76	23.45	23.45	
		8	7	23.67	23.43	23.7	
		15	0	23.22	23.31	23.24	22.5±1.0
	16QAM	1	0	22.98	22.94	22.89	22.5±1.0
		1	7	22.78	22.76	22.64	
		1	14	22.88	22.8	22.69	
		8	0	22.52	22.65	22.51	22.0±1.0
		8	4	22.48	22.2	22.18	
		8	7	22.39	22.18	22.43	
		15	0	21.94	22.06	21.97	21.5±1.0

LTE FDD Band 5				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20425/826.5	20525/836.5	20625/846.5	
5MHz	QPSK	1	0	24.3	24.22	24.22	23.5±1.0
		1	13	24.19	24.25	24	
		1	24	24.18	24.17	24.07	
		12	0	23.84	23.93	23.84	23.0±1.0
		12	6	23.52	23.83	23.49	
		12	13	23.69	23.65	23.59	
		25	0	23.27	23.22	23.31	22.5±1.0
	16QAM	1	0	23.02	22.97	22.95	22.5±1.0
		1	13	22.91	23	22.73	
		1	24	22.9	22.92	22.8	
		12	0	22.56	22.68	22.57	22.0±1.0
		12	6	22.24	22.58	22.22	
		12	13	22.41	22.4	22.32	
		25	0	21.99	21.97	22.04	21.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20450/829	20525/836.5	20600/844	
10MHz	QPSK	1	0	24.39	24.27	24.30	23.5±1.0
		1	25	24.25	24.06	24.15	
		1	49	24.29	24.03	24.29	
		25	0	23.88	23.92	23.91	23.0±1.0
		25	13	23.81	23.65	23.56	
		25	25	23.73	23.66	23.62	
		50	0	23.27	23.28	23.32	22.5±1.0
	16QAM	1	0	23.11	23.02	23.03	22.5±1.0
		1	25	22.82	22.88	22.84	
		1	49	22.99	22.94	22.95	
		25	0	22.65	22.73	22.65	22.0±1.0
		25	13	22.53	22.4	22.29	
		25	25	22.45	22.41	22.35	
		50	0	22.12	22.05	22.08	21.5±1.0

2. LTE Band 17 Conducted Power Test Verdict:

LTE FDD Band 17				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				23755/706.5	23790/710	23825/713.5	
5MHz	QPSK	1	0	24.24	24.35	24.15	23.5±1.0
		1	13	24.14	24.01	23.99	
		1	24	24.13	24.05	24.04	
		12	0	23.84	23.93	23.84	23.0±1.0
		12	6	23.77	23.48	23.63	
		12	13	23.45	23.46	23.61	
		25	0	23.24	23.35	23.28	22.5±1.0
	16QAM	1	0	22.96	23.1	22.88	22.5±1.0
		1	13	22.76	22.77	22.68	
		1	24	22.85	22.81	22.86	
		12	0	22.56	22.68	22.57	22.0±1.0
		12	6	22.49	22.23	22.36	
		12	13	22.17	22.21	22.34	
		25	0	21.92	22	22.05	21.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				23780/709	23790/710	23800/711	
10MHz	QPSK	1	0	24.33	24.40	24.23	23.5±1.0
		1	25	24.23	24.06	24.07	
		1	49	24.22	24.1	24.12	
		25	0	23.93	23.98	23.92	23.0±1.0
		25	13	23.86	23.53	23.71	
		25	25	23.54	23.51	23.69	
		50	0	23.33	23.4	23.36	22.5±1.0
	16QAM	1	0	23.05	23.15	22.96	22.5±1.0
		1	25	22.85	22.82	22.76	
		1	49	22.94	22.86	22.94	
		25	0	22.65	22.73	22.65	22.0±1.0
		25	13	22.58	22.28	22.44	
		25	25	22.26	22.26	22.42	
		50	0	22.01	22.05	22.13	21.5±1.0

99% Occupied Bandwidth

Test Result and Data

Occupied Bandwidth NormalTC_NormalVol					
Band	Range	BandWidth	Frequency (MHz)	Modulation	Occupied Bandwidth(99%) (MHz)
FDD05	MidRange	1.4	836.5	QPSK	1.09
FDD05	MidRange	1.4	836.5	Q16	1.087
FDD05	MidRange	3	836.5	QPSK	2.679
FDD05	MidRange	3	836.5	Q16	2.678
FDD05	MidRange	5	836.5	QPSK	4.494
FDD05	MidRange	5	836.5	Q16	4.492
FDD05	MidRange	10	836.5	QPSK	8.942
FDD05	MidRange	10	836.5	Q16	8.935
FDD17	MidRange	5	710	QPSK	4.483
FDD17	MidRange	5	710	Q16	4.489
FDD17	MidRange	10	710	QPSK	8.918
FDD17	MidRange	10	710	Q16	8.912

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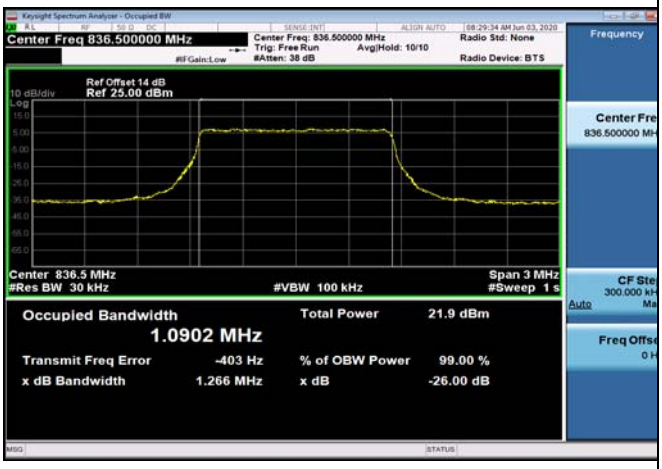	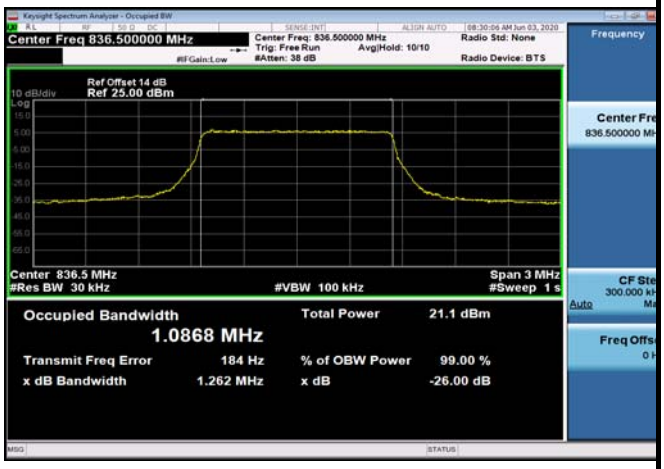
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	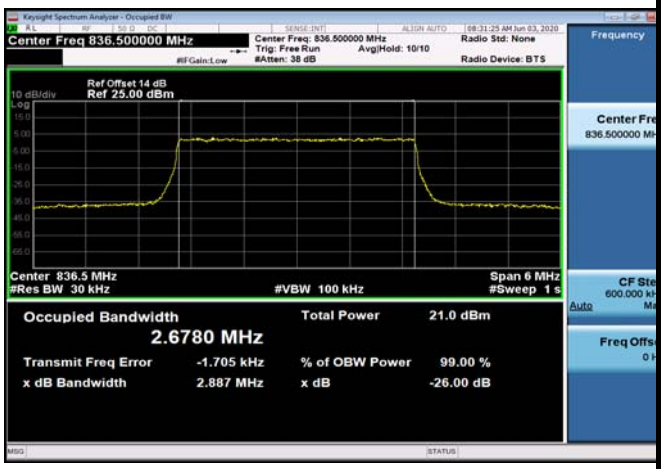
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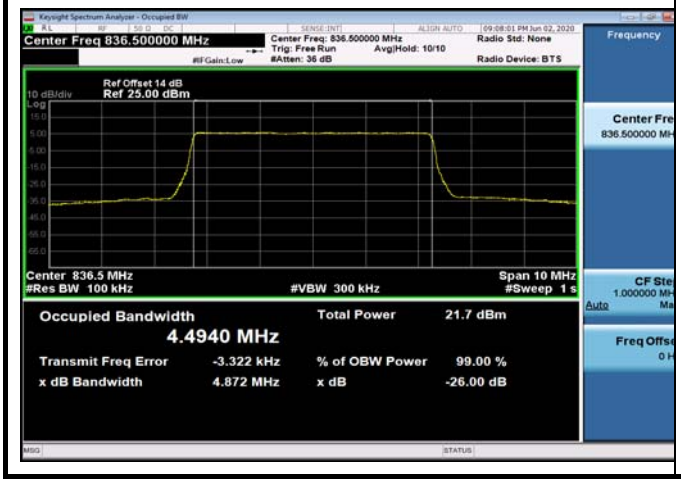	

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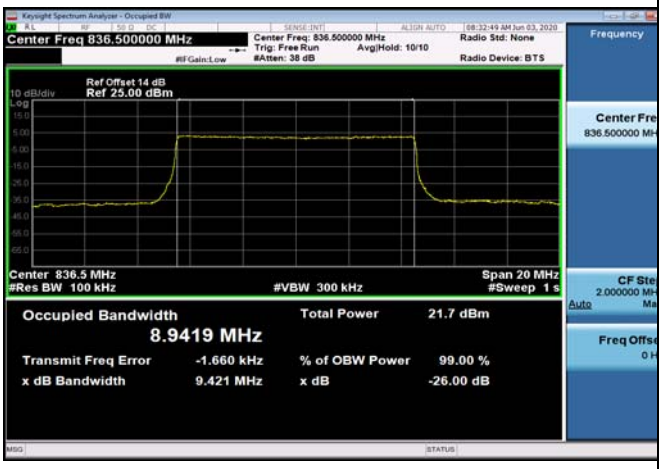	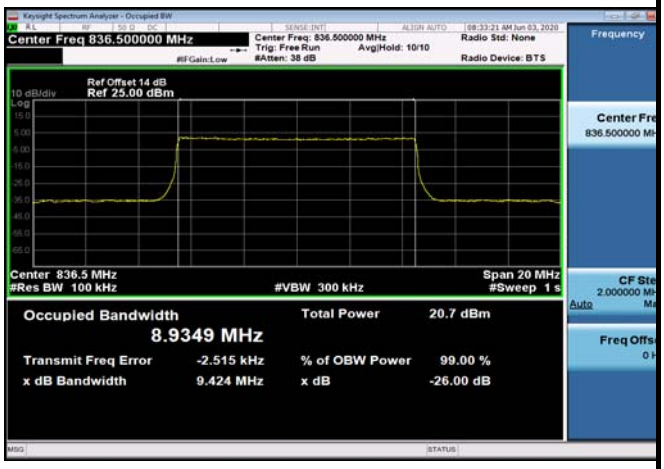
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	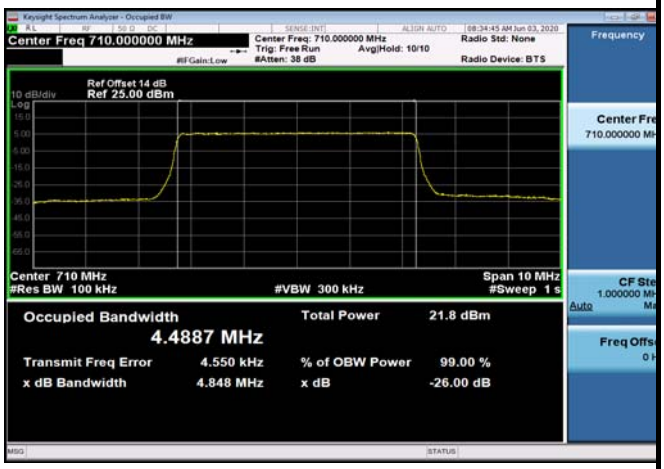
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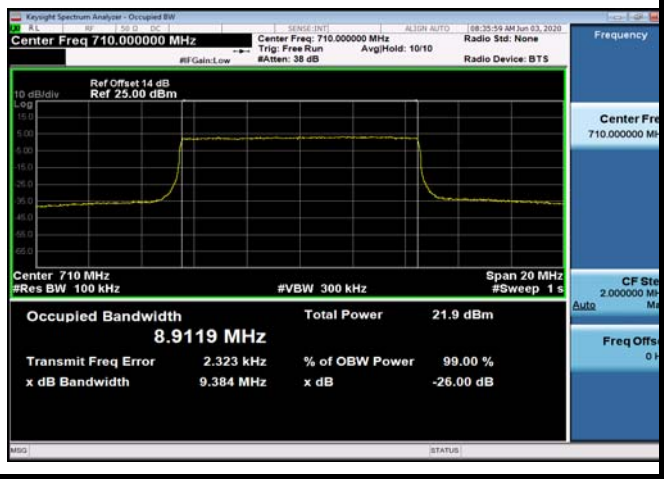
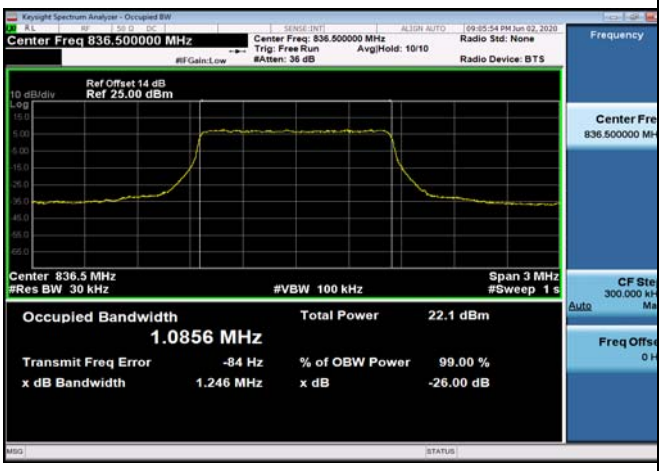
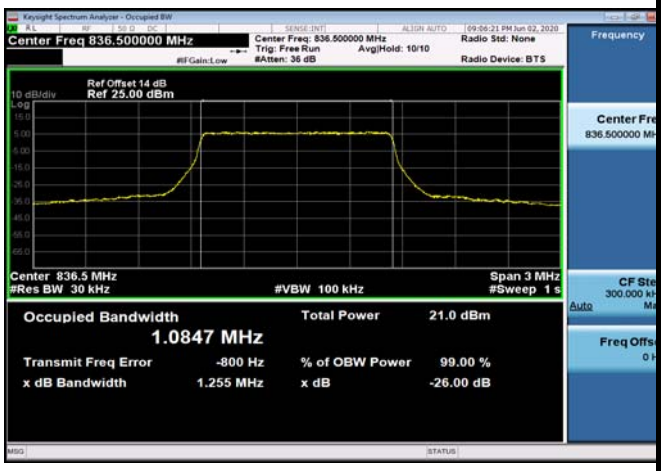
	

26dB Bandwidth

Test Result and Data

Emission Bandwidth NormalTC_NormalVol					
Band	Range	BandWidth	Frequency (MHz)	Modulation	EmissionBandwidth (MHz)
FDD05	MidRange	1.4	836.5	QPSK	1.25
FDD05	MidRange	1.4	836.5	Q16	1.26
FDD05	MidRange	3	836.5	QPSK	2.97
FDD05	MidRange	3	836.5	Q16	2.97
FDD05	MidRange	5	836.5	QPSK	4.87
FDD05	MidRange	5	836.5	Q16	4.82
FDD05	MidRange	10	836.5	QPSK	9.43
FDD05	MidRange	10	836.5	Q16	9.42
FDD17	MidRange	5	710	QPSK	4.84
FDD17	MidRange	5	710	Q16	4.84
FDD17	MidRange	10	710	QPSK	9.41
FDD17	MidRange	10	710	Q16	9.37

FDD05_MidRange_1.4MHz_836.5MHz_QPSK	FDD05_MidRange_1.4MHz_836.5MHz_Q16
	
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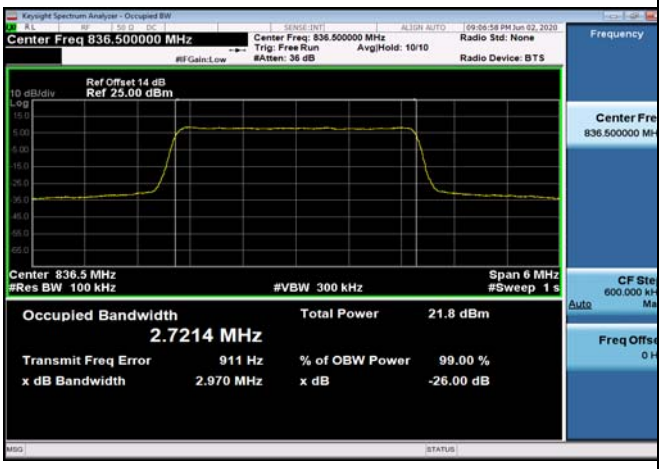	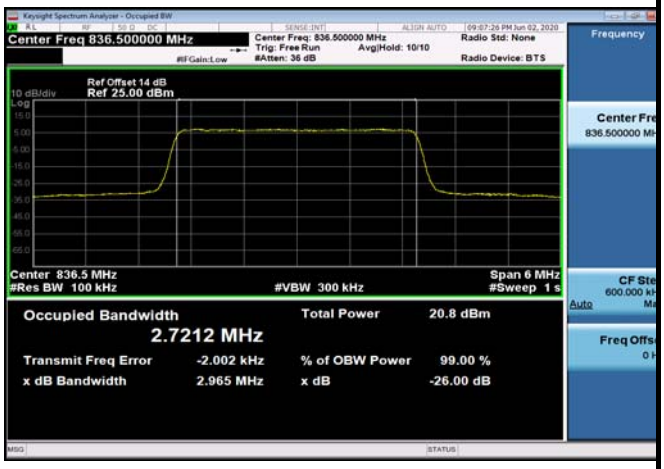
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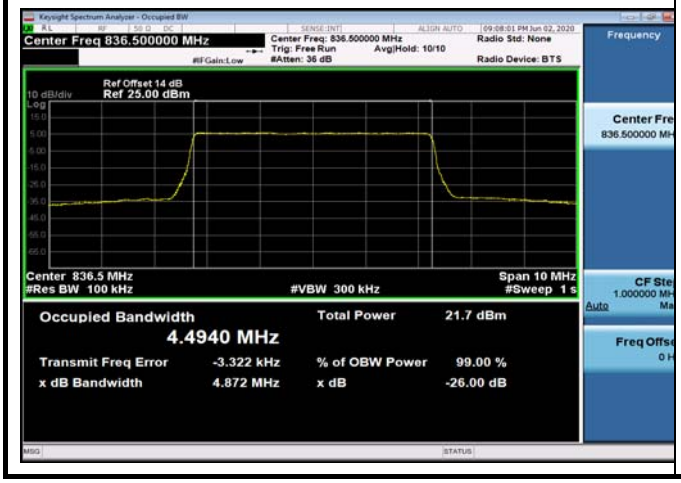	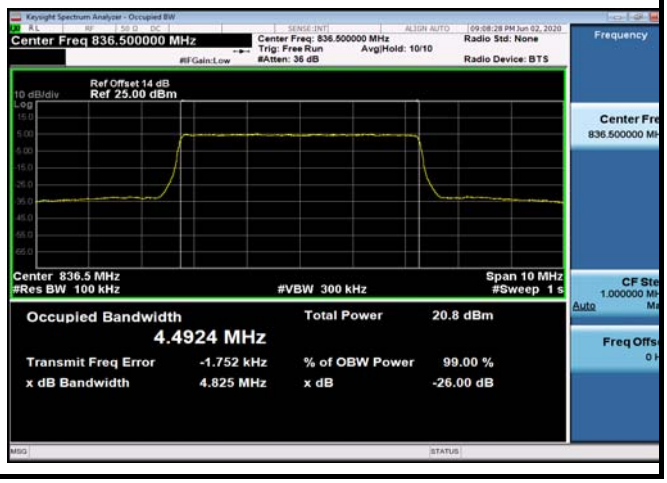

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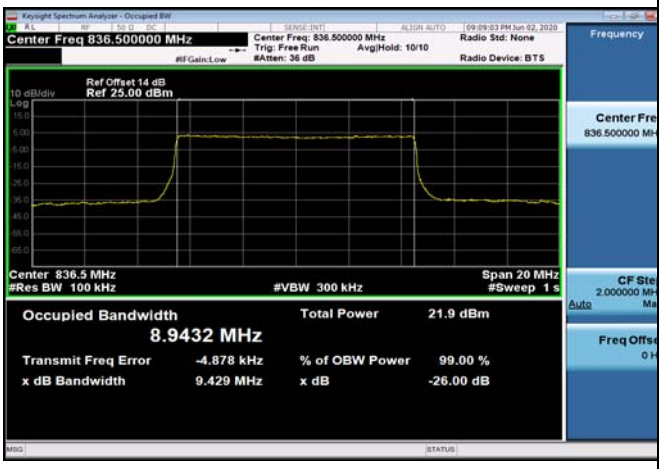	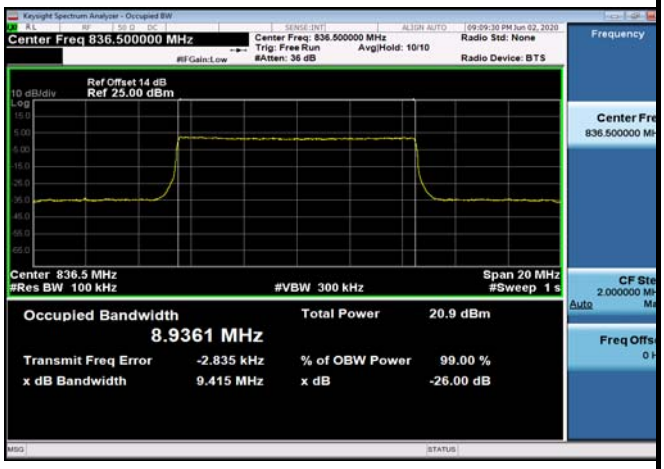
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	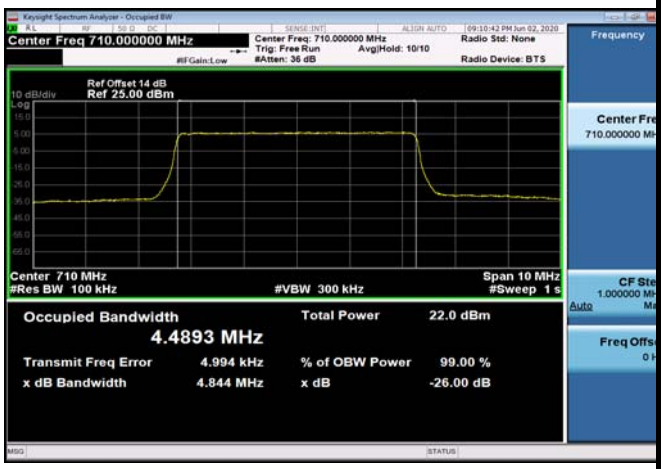
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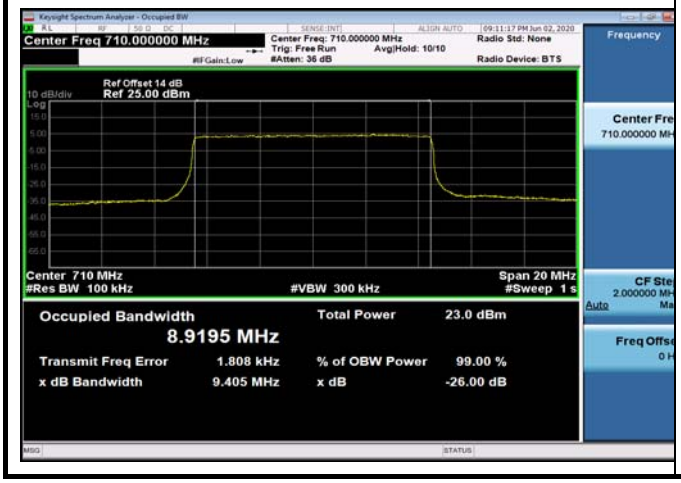
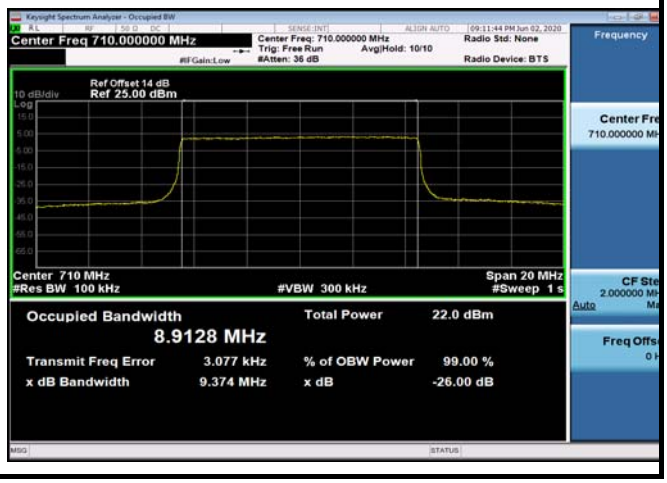
	

Frequency Stability

Test Result and Data

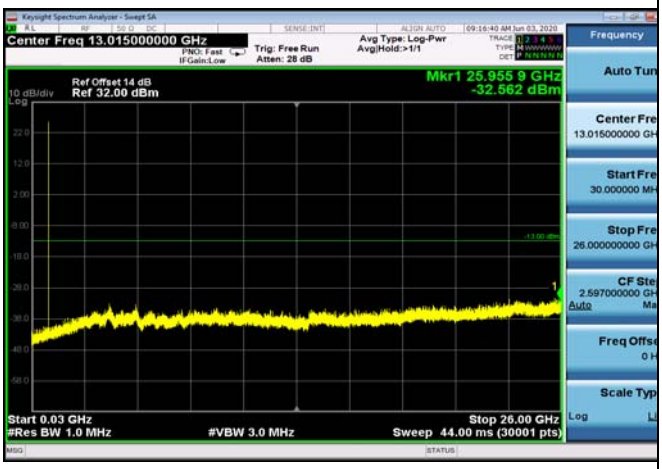
Frequency Stability NormalTC_NormalVol									
Temperature	Voltage	Band	BandWidth (MHz)	RbMode	Modulation	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Result
Normal	Low	FDD05	10	fullRB	QPSK	-2.947	0.004	±25	Pass
Normal	Normal	FDD05	10	fullRB	QPSK	-2.575	0.003	±25	Pass
Normal	High	FDD05	10	fullRB	QPSK	-3.090	0.004	±25	Pass
50	Normal	FDD05	10	fullRB	QPSK	-2.804	0.003	±25	Pass
40	Normal	FDD05	10	fullRB	QPSK	-3.090	0.004	±25	Pass
30	Normal	FDD05	10	fullRB	QPSK	-2.017	0.002	±25	Pass
20	Normal	FDD05	10	fullRB	QPSK	-2.775	0.003	±25	Pass
10	Normal	FDD05	10	fullRB	QPSK	-4.191	0.005	±25	Pass
0	Normal	FDD05	10	fullRB	QPSK	-2.446	0.003	±25	Pass
-10	Normal	FDD05	10	fullRB	QPSK	-1.831	0.002	±25	Pass
-20	Normal	FDD05	10	fullRB	QPSK	3.362	0.004	±25	Pass
-30	Normal	FDD05	10	fullRB	QPSK	-2.418	0.003	±25	Pass
Normal	Low	FDD17	10	fullRB	QPSK	-2.131	0.003	±25	Pass
Normal	Normal	FDD17	10	fullRB	QPSK	-2.747	0.004	±25	Pass
Normal	High	FDD17	10	fullRB	QPSK	2.375	0.003	±25	Pass
50	Normal	FDD17	10	fullRB	QPSK	-2.875	0.004	±25	Pass
40	Normal	FDD17	10	fullRB	QPSK	-4.363	0.006	±25	Pass
30	Normal	FDD17	10	fullRB	QPSK	-2.618	0.004	±25	Pass
20	Normal	FDD17	10	fullRB	QPSK	-3.047	0.004	±25	Pass
10	Normal	FDD17	10	fullRB	QPSK	-3.104	0.004	±25	Pass
0	Normal	FDD17	10	fullRB	QPSK	-3.862	0.005	±25	Pass
-10	Normal	FDD17	10	fullRB	QPSK	-4.892	0.007	±25	Pass
-20	Normal	FDD17	10	fullRB	QPSK	-3.290	0.005	±25	Pass
-30	Normal	FDD17	10	fullRB	QPSK	2.847	0.004	±25	Pass

Note：Normal=3.8V, Low=3.6V, High=4.2V

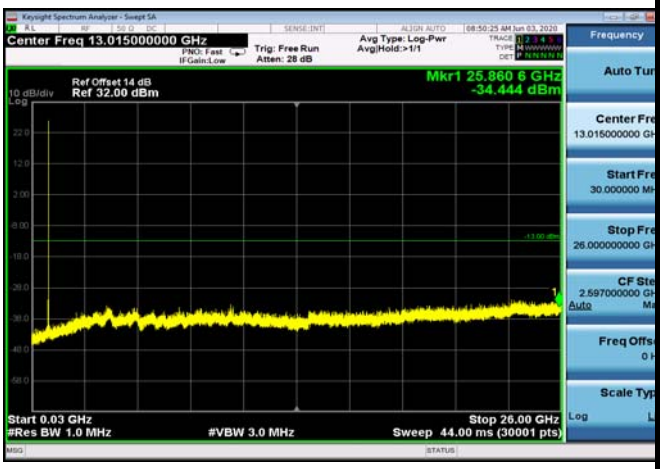
Conducted Out of Band Emissions

Test Result and Data

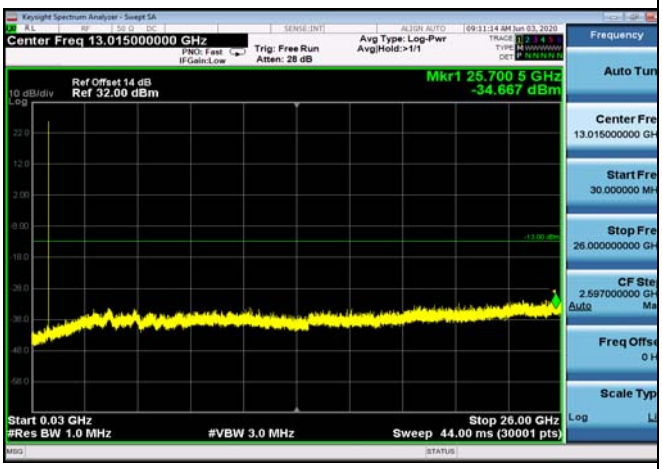
FDD05_HighRange_1.4MHz_30MHz~26GHz



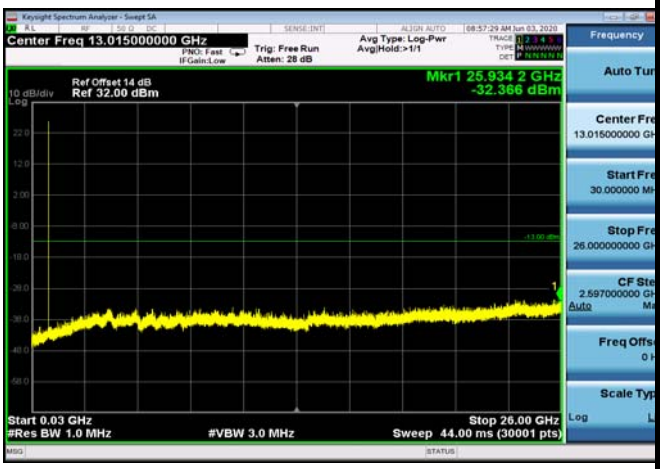
FDD05_HighRange_10MHz_30MHz~26GHz



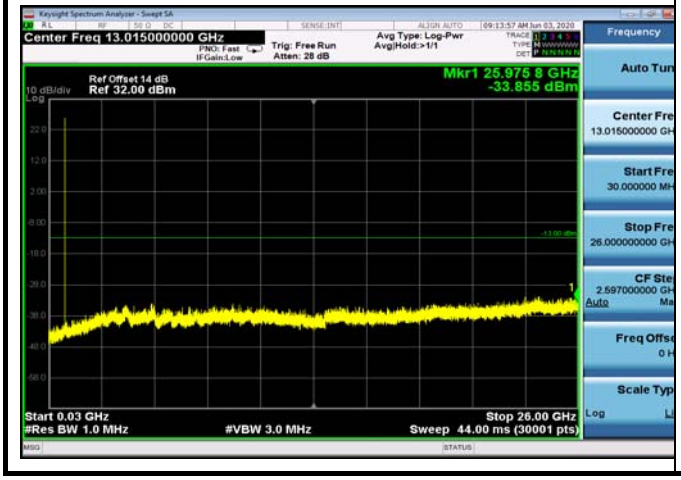
FDD05_HighRange_3MHz_30MHz~26GHz



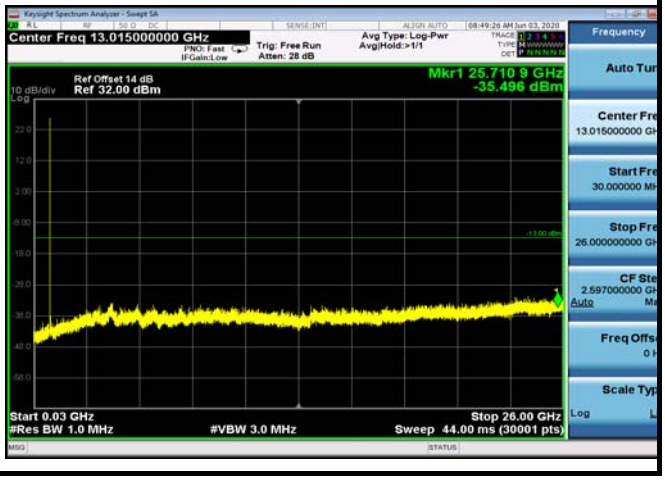
FDD05_HighRange_5MHz_30MHz~26GHz

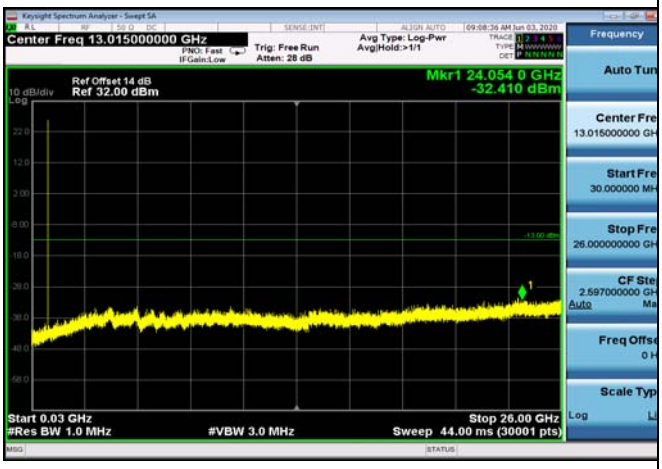
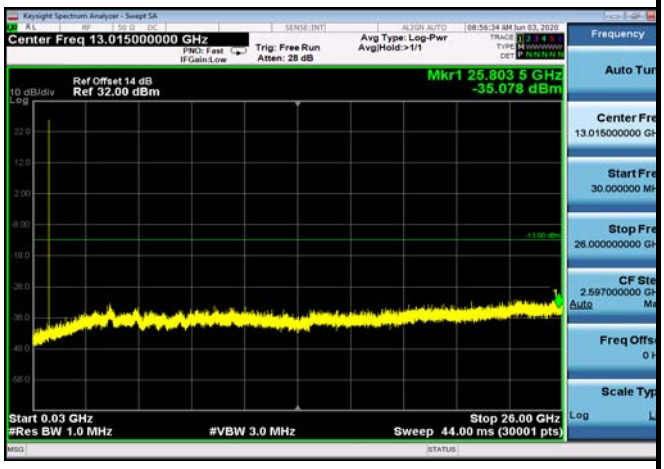
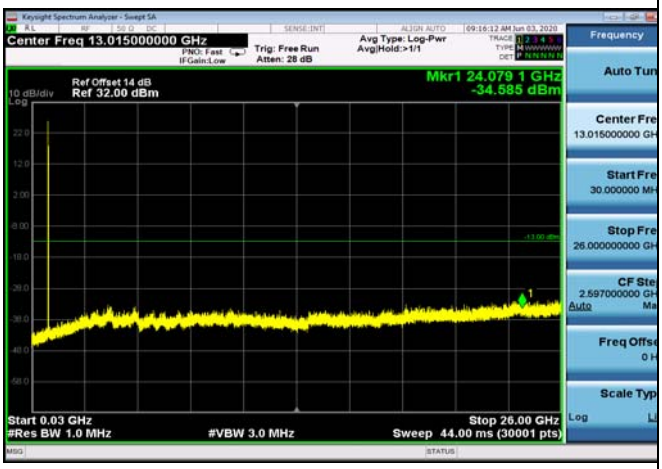
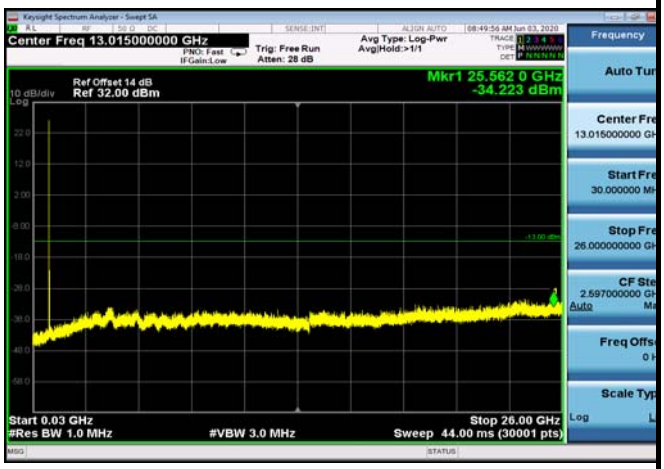
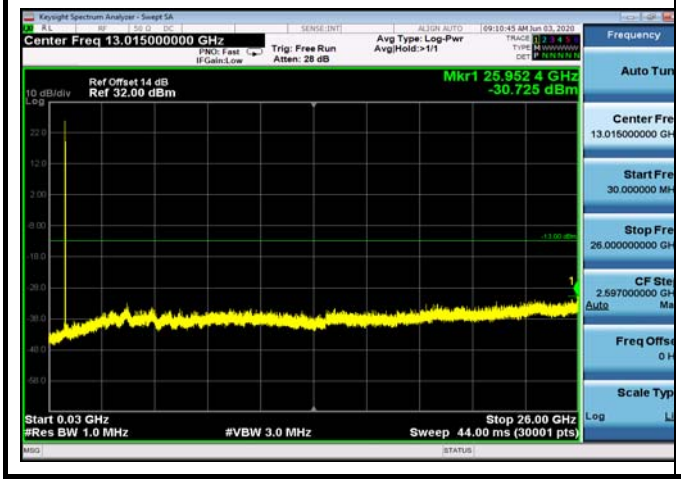
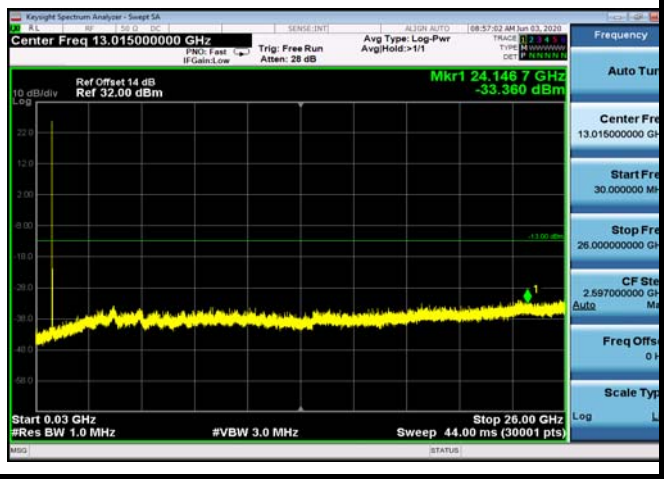


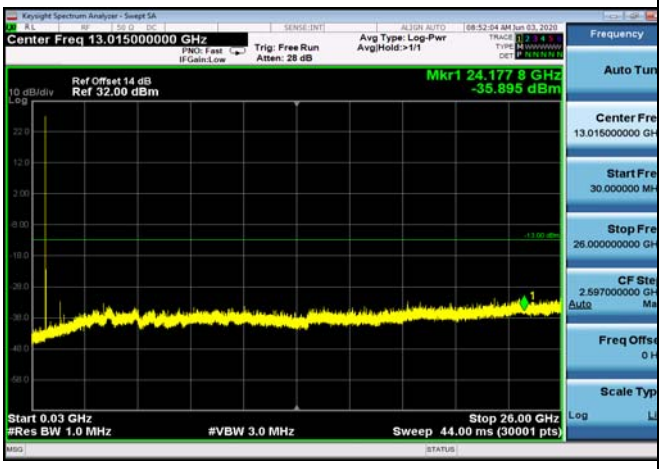
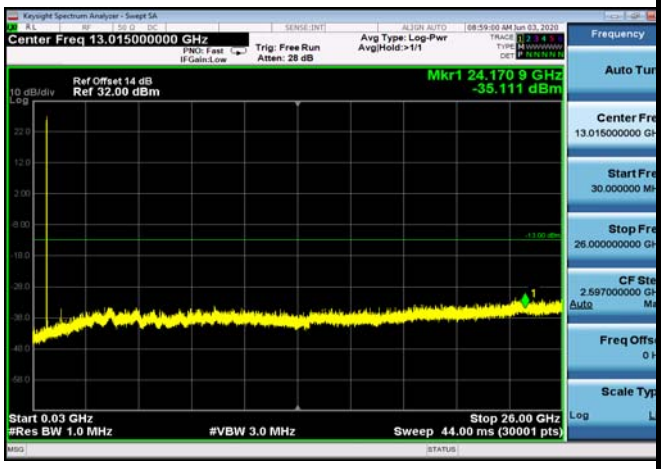
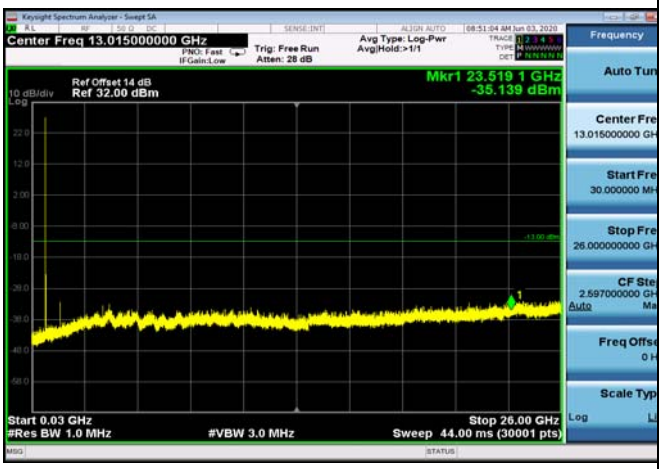
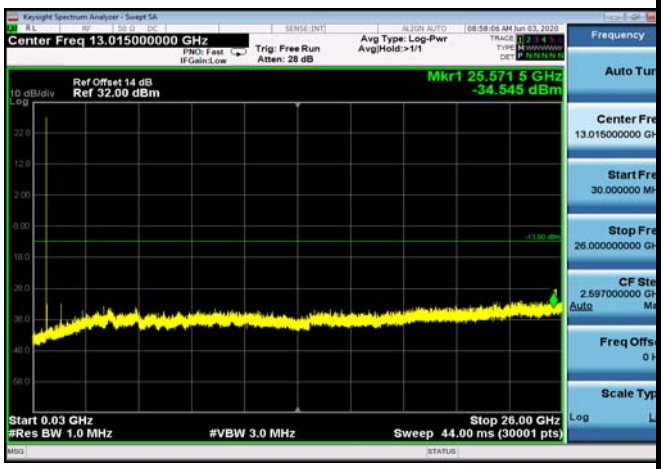
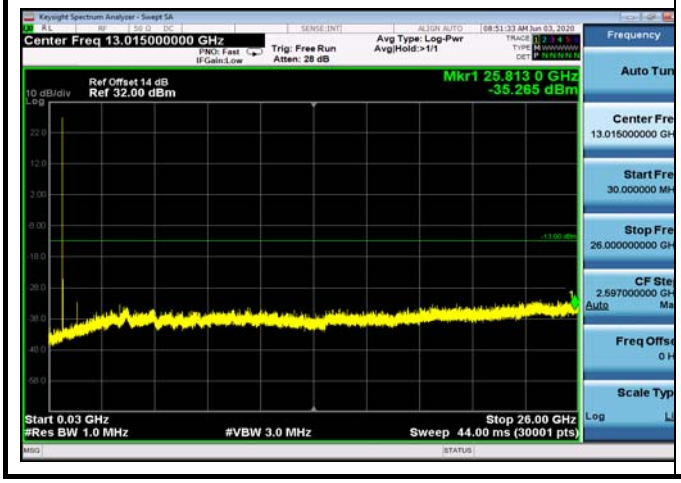
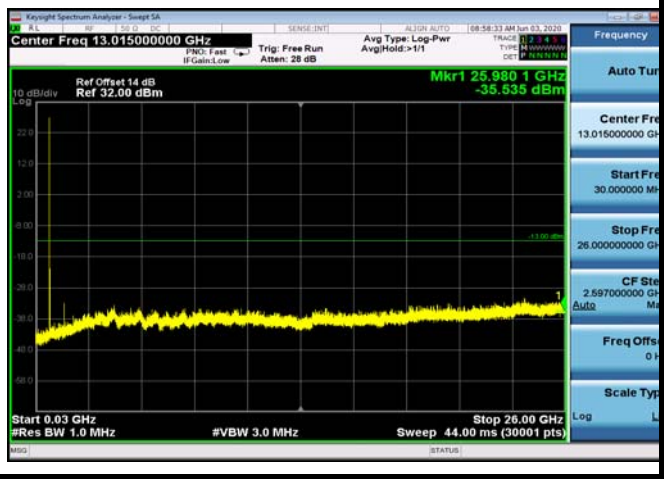
FDD05_LowRange_1.4MHz_30MHz~26GHz



FDD05_LowRange_10MHz_30MHz~26GHz

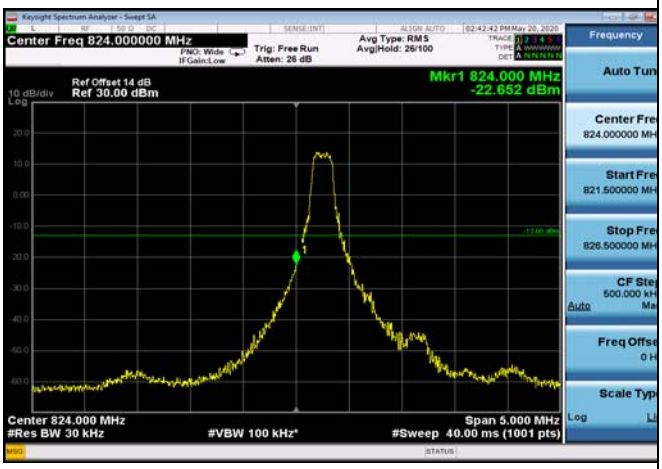
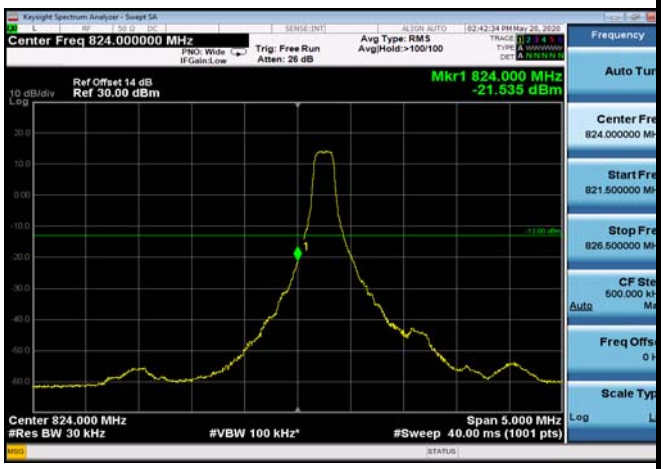


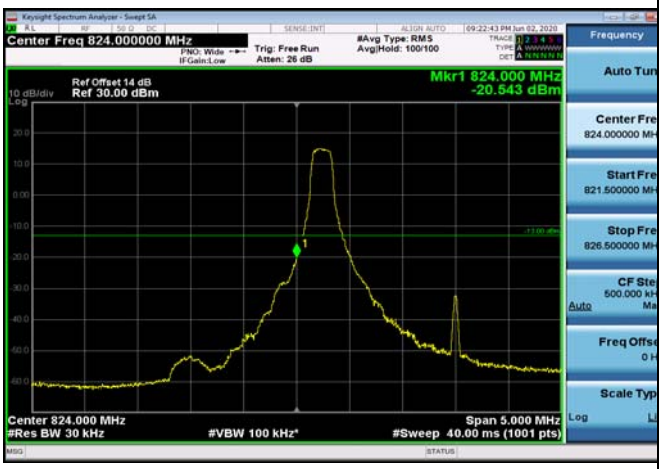
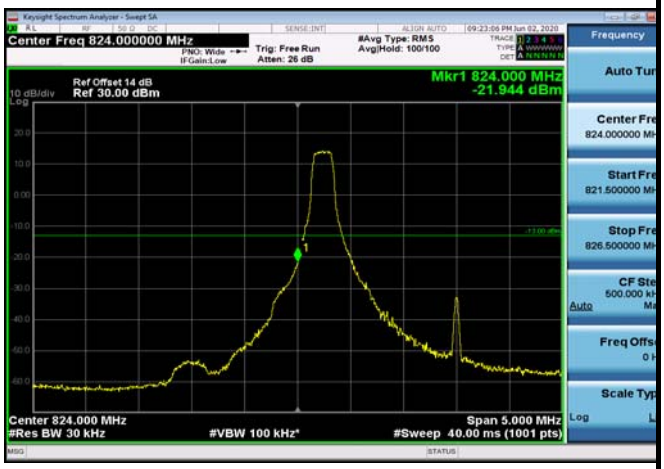
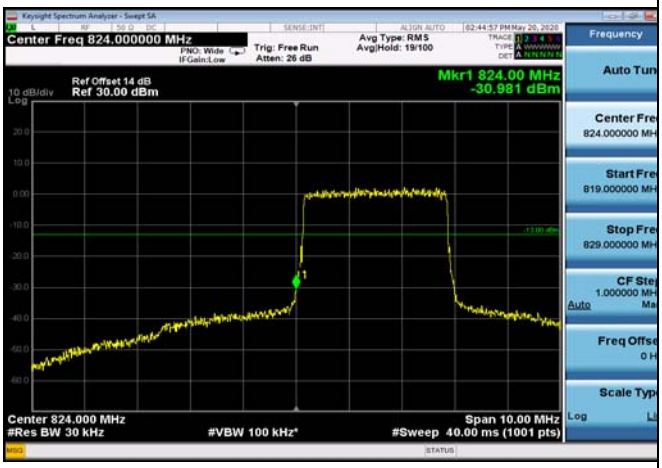
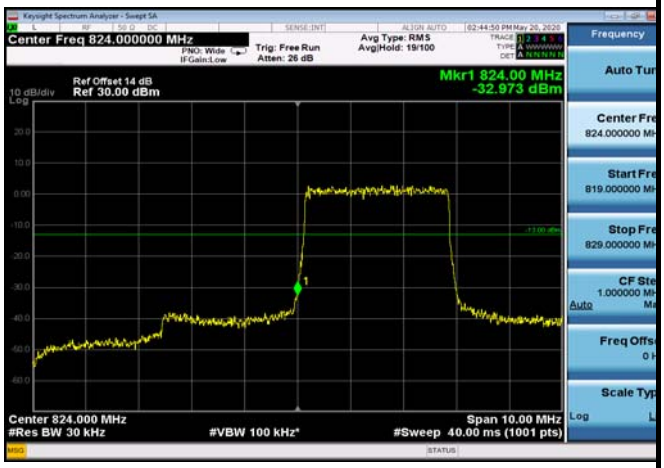
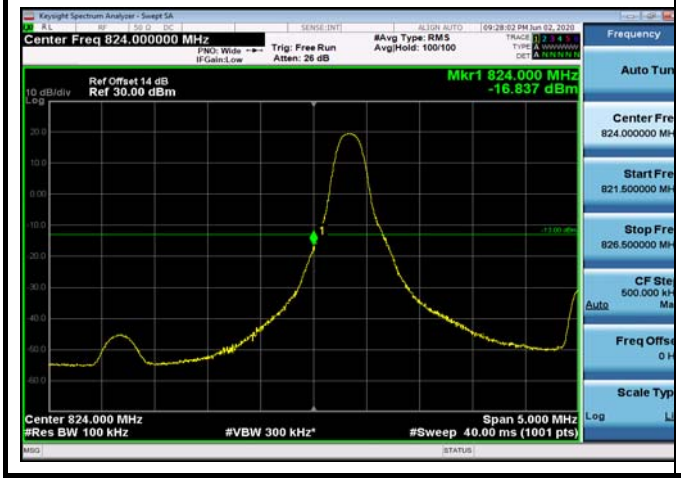
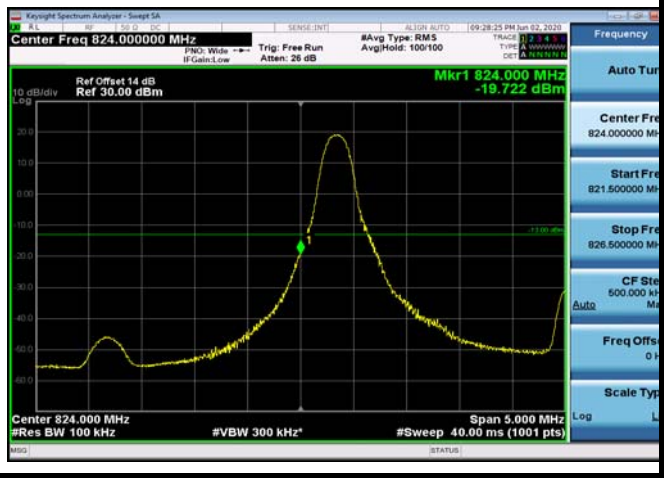
FDD05_LowRange_3MHz_30MHz~26GHz	FDD05_LowRange_5MHz_30MHz~26GHz
	
FDD05_MidRange_1.4MHz_30MHz~26GHz	FDD05_MidRange_10MHz_30MHz~26GHz
	
FDD05_MidRange_3MHz_30MHz~26GHz	FDD05_MidRange_5MHz_30MHz~26GHz
	

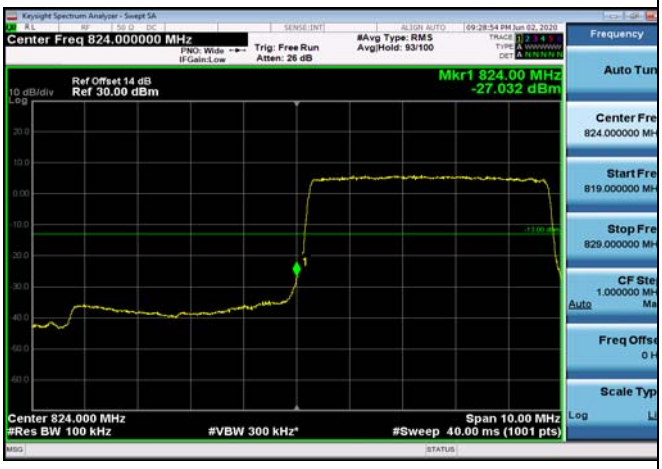
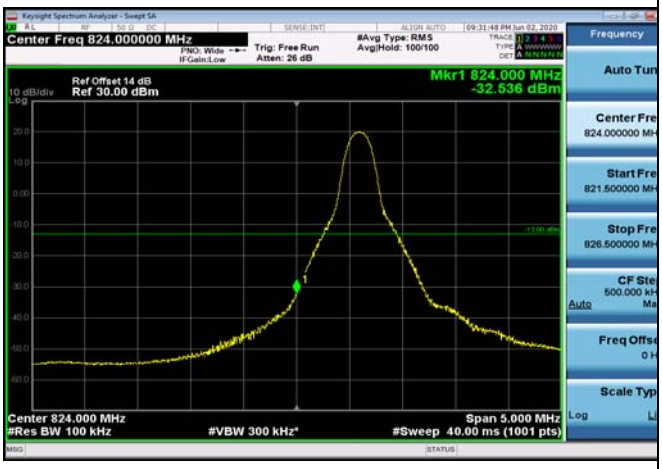
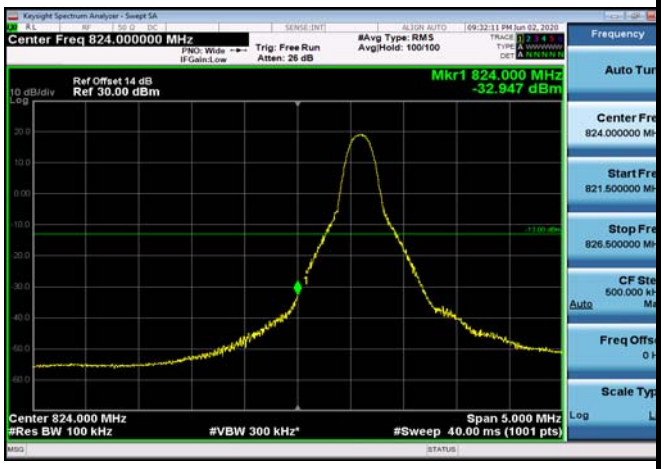
FDD17_HighRange_10MHz_30MHz~26GHz	FDD17_HighRange_5MHz_30MHz~26GHz
	
FDD17_LowRange_10MHz_30MHz~26GHz	FDD17_LowRange_5MHz_30MHz~26GHz
	
FDD17_MidRange_10MHz_30MHz~26GHz	FDD17_MidRange_5MHz_30MHz~26GHz
	

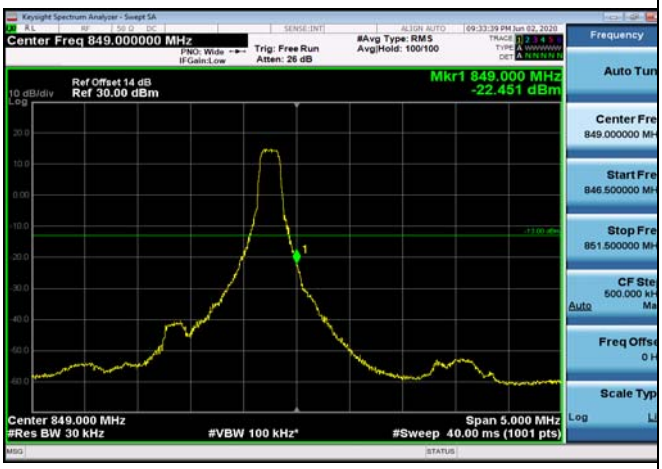
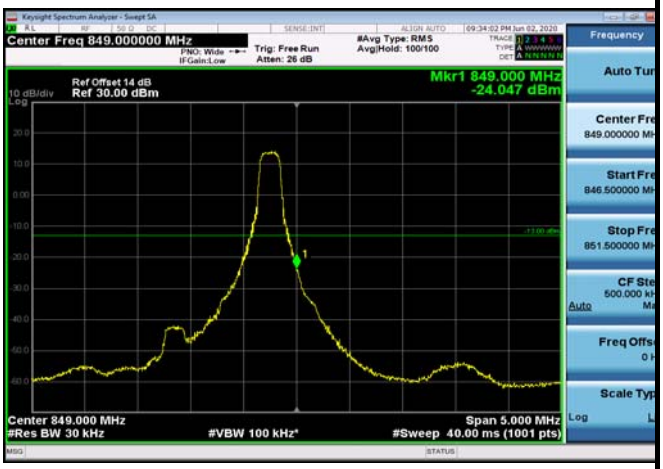
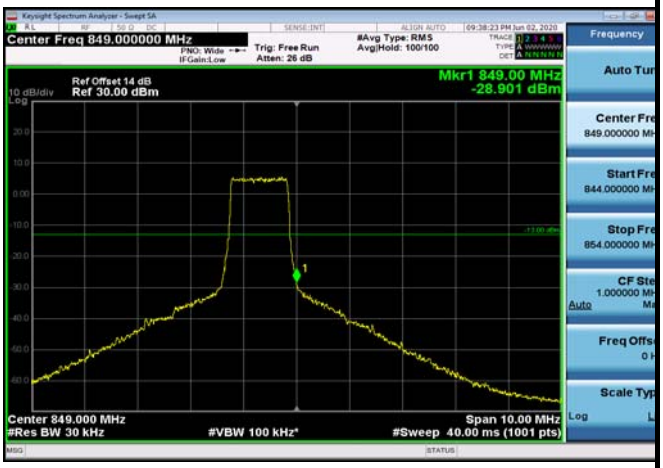
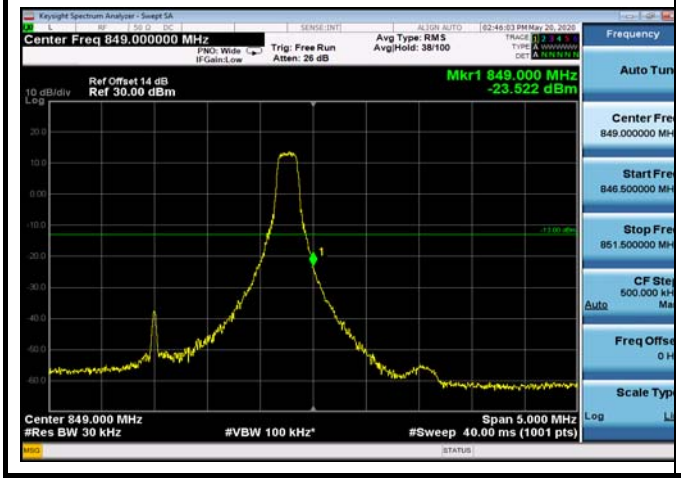
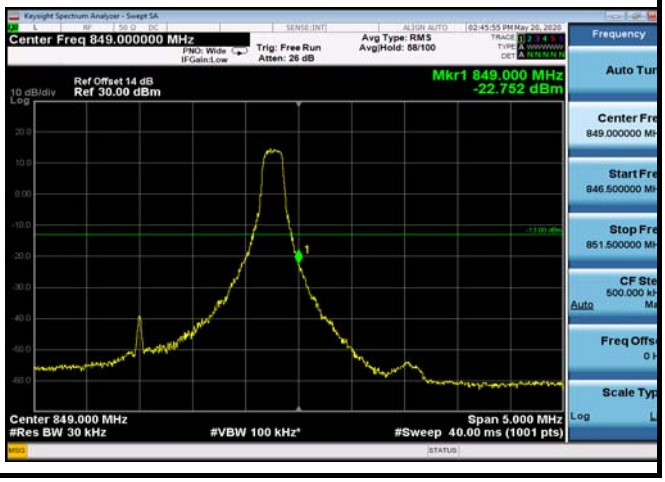
Conducted Band Edge

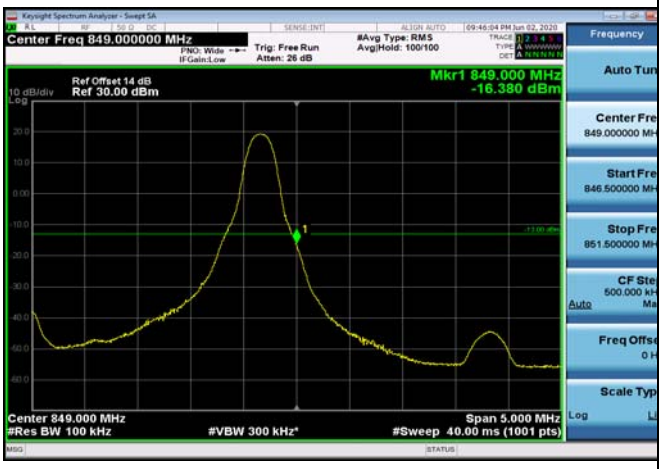
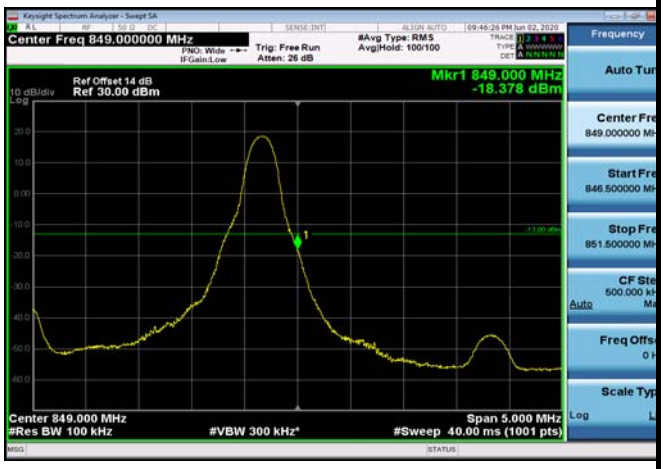
Test Result and Data

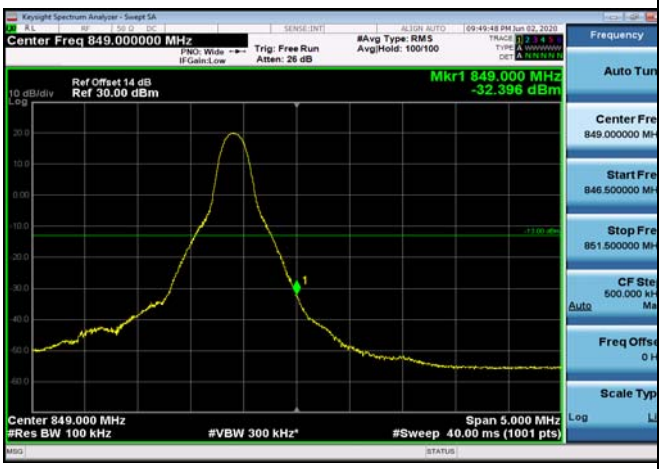
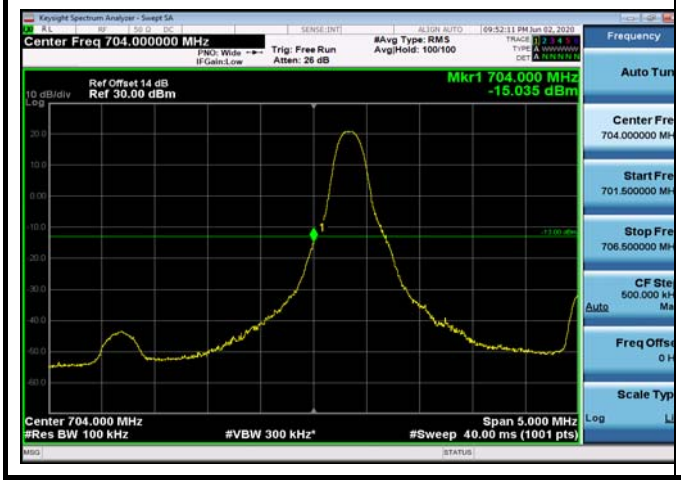
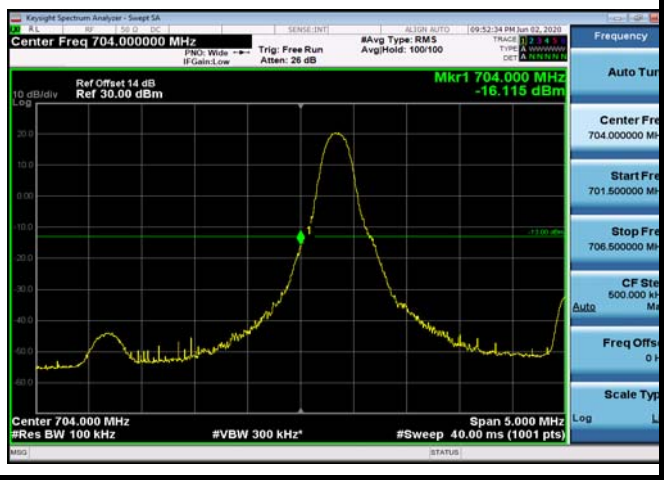
LowRange_FDD05_1.4MHz_824.7_OneRB _low_QPSK	LowRange_FDD05_1.4MHz_824.7_OneRB _low_Q16
	
LowRange_ FDD05_1.4MHz_824.7_fullRB _Low_QPSK	LowRange_ FDD05_1.4MHz_824.7_fullRB _Low_Q16
	

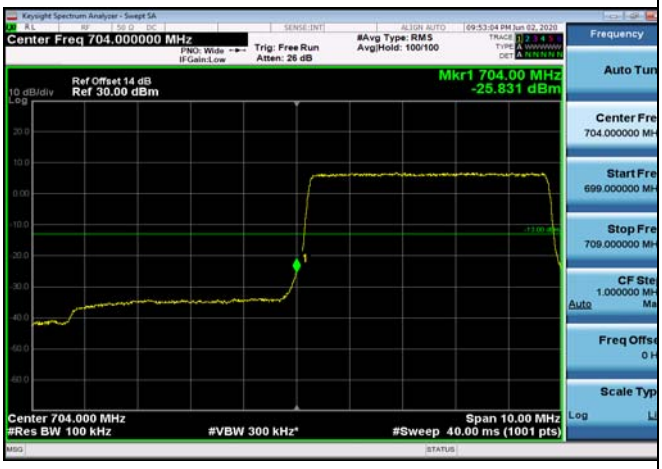
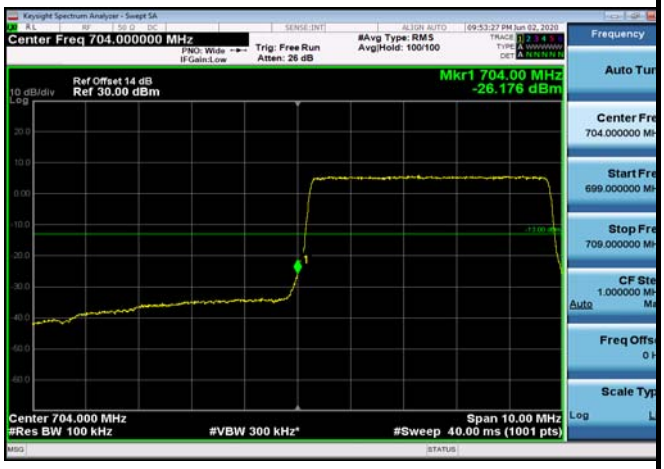
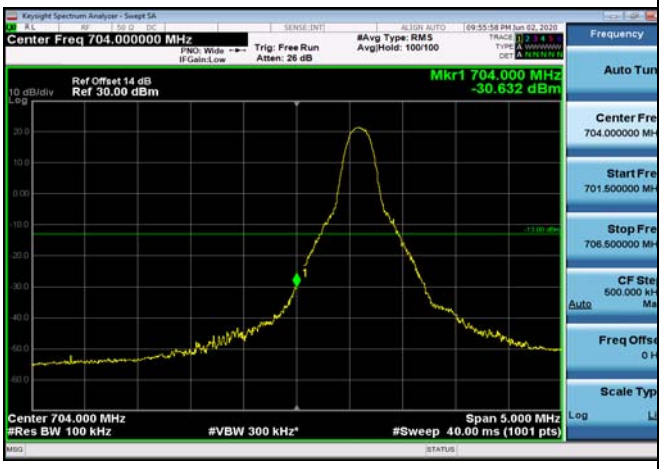
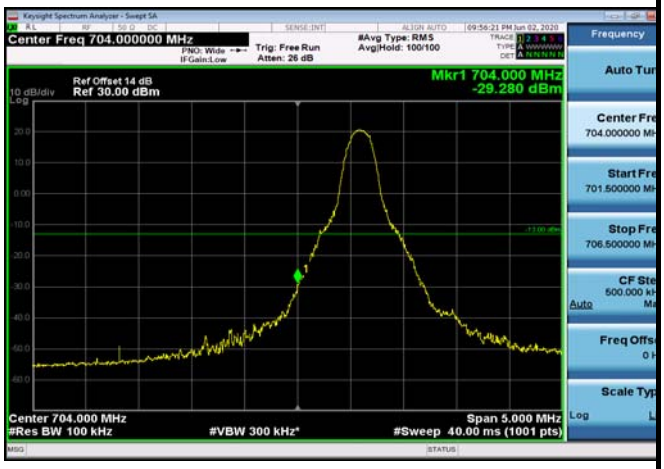
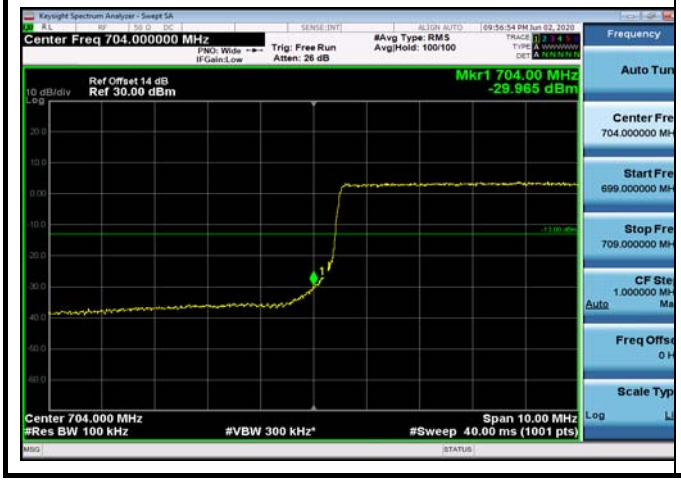
LowRange_FDD05_3MHz_825.5_OneRB_low_QPSK	LowRange_FDD05_3MHz_825.5_OneRB_low_Q16
	
LowRange_ FDD05_3MHz_825.5_fullRB_Low_QPSK	LowRange_ FDD05_3MHz_825.5_fullRB_Low_Q16
	
LowRange_FDD05_5MHz_826.5_OneRB_low_QPSK	LowRange_FDD05_5MHz_826.5_OneRB_low_Q16
	

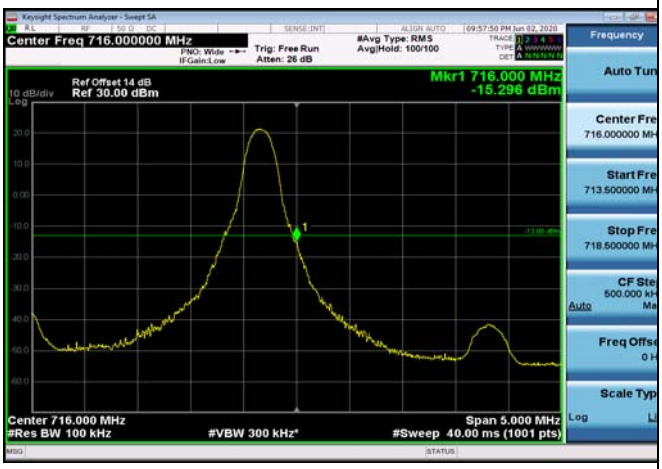
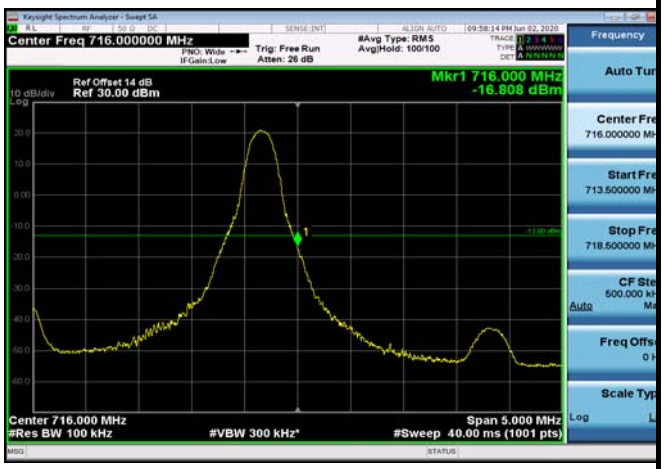
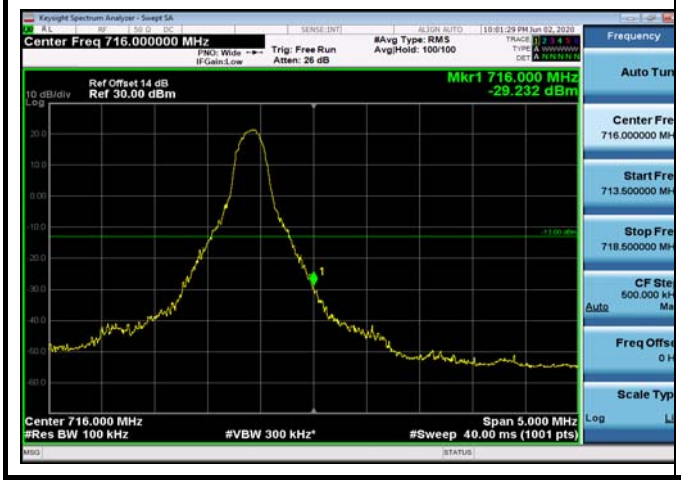
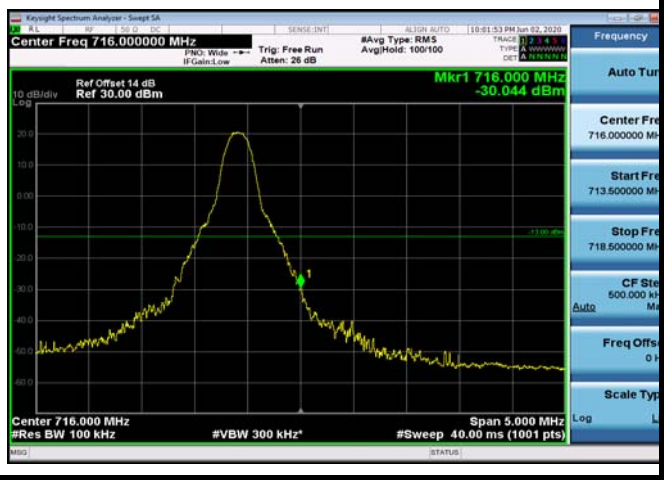
LowRange_ FDD05_5MHz_826.5_fullRB _Low_QPSK	LowRange_ FDD05_5MHz_826.5_fullRB _Low_Q16
	
LowRange_FDD05_10MHz_829_OneRB _low_QPSK	LowRange_FDD05_10MHz_829_OneRB _low_Q16
	
LowRange_ FDD05_10MHz_829_fullRB _Low_QPSK	LowRange_ FDD05_10MHz_829_fullRB _Low_Q16
	

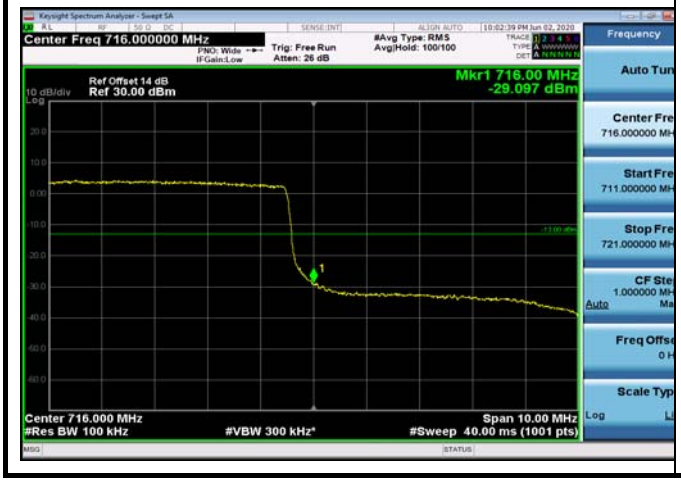
HighRange_FDD05_1.4MHz_848.3_OneRB _high_QPSK	HighRange_FDD05_1.4MHz_848.3_OneRB _high_Q16
	
HighRange_ FDD05_1.4MHz_848.3_fullRB _High_QPSK	HighRange_ FDD05_1.4MHz_848.3_fullRB _High_Q16
	
HighRange_FDD05_3MHz_847.5_OneRB _high_QPSK	HighRange_FDD05_3MHz_847.5_OneRB _high_Q16
	

HighRange_ FDD05_3MHz_847.5_fullRB _High_QPSK	HighRange_ FDD05_3MHz_847.5_fullRB _High_Q16
	
HighRange_FDD05_5MHz_846.5_OneRB _high_QPSK	HighRange_FDD05_5MHz_846.5_OneRB _high_Q16
	
HighRange_ FDD05_5MHz_846.5_fullRB _High_QPSK	HighRange_ FDD05_5MHz_846.5_fullRB _High_Q16
	

HighRange_FDD05_10MHz_844_OneRB_high_QPSK	HighRange_FDD05_10MHz_844_OneRB_high_Q16
	
HighRange_ FDD05_10MHz_844_fullRB_High_QPSK	HighRange_ FDD05_10MHz_844_fullRB_High_Q16
	
LowRange_FDD17_5MHz_706.5_OneRB_low_QPSK	LowRange_FDD17_5MHz_706.5_OneRB_low_Q16
	

LowRange_ FDD17_5MHz_706.5_fullRB _Low_QPSK	LowRange_ FDD17_5MHz_706.5_fullRB _Low_Q16
	
LowRange_FDD17_10MHz_709_OneRB _low_QPSK	LowRange_FDD17_10MHz_709_OneRB _low_Q16
	
LowRange_ FDD17_10MHz_709_fullRB _Low_QPSK	LowRange_ FDD17_10MHz_709_fullRB _Low_Q16
	

HighRange_FDD17_5MHz_713.5_OneRB _high_QPSK	HighRange_FDD17_5MHz_713.5_OneRB _high_Q16
	
HighRange_ FDD17_5MHz_713.5_fullRB _High_QPSK	HighRange_ FDD17_5MHz_713.5_fullRB _High_Q16
	
HighRange_FDD17_10MHz_711_OneRB _high_QPSK	HighRange_FDD17_10MHz_711_OneRB _high_Q16
	

HighRange_ FDD17_10MHz_711_fullRB _High_QPSK	HighRange_ FDD17_10MHz_711_fullRB _High_Q16
	

****END OF REPORT ****