



RF TEST REPORT

Report No.: SET2019-09643

Product: Handheld Data Terminal

FCC ID: HLEHT510ABTNUFL

Model No.: HT510A

Applicant: unitech Electronics Co., LTD

Address: 5F., No.136, Ln. 235, Baoqiao Rd., Xindian Dist., New Taipei
City, Taiwan

Dates of Testing: 04/21/2019 —08/07/2019

Issued by: CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd.

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Test Report

Product: Handheld Data Terminal

Brand Name.....: unitech

Trade Name: unitech

Applicant: unitech Electronics Co., LTD

Applicant Address: 5F., No.136, Ln. 235, Baoqiao Rd., Xindian Dist., New Taipei
City, Taiwan

Manufacturer: unitech Electronics Co., LTD

Manufacturer Address.....: 5F., No.136, Ln. 235, Baoqiao Rd., Xindian Dist., New Taipei
City, Taiwan.

Test Standards: 47 CFR Part 2/22/24/27

Test Result.....: PASS

Tested by

Shallwe Yang

2019.08.13

Shallwe Yang, Test Engineer

Reviewed by.....

Chris You

2019.08.13

Chris You, Senior Engineer

Approved by.....

Shuangwen Zhang

2019.08.13

Shuangwen Zhang, Manager



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Change History		
Issue	Date	Reason for change
1.0	2019.08.13	First edition



1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	Handheld Data Terminal
EUT supports Radios application	LTE Band 5/7/41
Frequency Range	LTE Band 5: 824.7MHz~848.3MHz LTE Band 7: 2502.5MHz~2567.5MHz LTE Band 41: 2498.5MHz~2687.5MHz
Maximum Output Power to Antenna	LTE Band 5: 22.80dBm LTE Band 7: 19.38dBm LTE Band 41:21.76dBm
Bandwidth	LTE Band 5: 1.4MHz/3MHz/5MHz/10MHz LTE Band 7: 5MHz/10MHz/15MHz/20MHz LTE Band 41: 5MHz/10MHz/15MHz/20MHz
Modulation Type	QPSK/16QAM/64QAM(downlink only)
Antenna Type	Internal Antenna
Power supply	DC 3.8V from battery DC 5V from adapter
Maixmum Antenna Gain	-2dBi

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	—	0.165
LTE Band 5	16QAM	1.4	1M09W7D	—	0.165
LTE Band 5	QPSK	3	2M68G7D	—	0.160
LTE Band 5	16QAM	3	2M68W7D	—	0.169
LTE Band 5	QPSK	5	4M50G7D	—	0.133
LTE Band 5	16QAM	5	4M50W7D	—	0.138
LTE Band 5	QPSK	10	8M93G7D	0.007	0.137
LTE Band 5	16QAM	10	8M92W7D	—	0.134
LTE Band 7	QPSK	5	4M53G7D	—	0.142
LTE Band 7	16QAM	5	4M52W7D	—	0.131
LTE Band 7	QPSK	10	8M96G7D	0.005	0.157
LTE Band 7	16QAM	10	8M94W7D	—	0.134
LTE Band 7	QPSK	15	13M5G7D	—	0.144
LTE Band 7	16QAM	15	13M5W7D	—	0.137
LTE Band 7	QPSK	20	17M9G7D	—	0.152
LTE Band 7	16QAM	20	17M9W7D	—	0.133
LTE Band 41	QPSK	5	4M50G7D	—	0.176
LTE Band 41	16QAM	5	4M50W7D	—	0.151
LTE Band 41	QPSK	10	8M92G7D	0.005	0.178
LTE Band 41	16QAM	10	8M92W7D	—	0.154
LTE Band 41	QPSK	15	13M5G7D	—	0.143
LTE Band 41	16QAM	15	13M5W7D	—	0.157
LTE Band 41	QPSK	20	17M9G7D	—	0.185
LTE Band 41	16QAM	20	17M9W7D	—	0.148



1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 27 for the EUT FCC ID Certification:

1.47 CFR Part 2, 22(H), 27(M)

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

3. 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(h)(2)	Effective Radiated Power(Band 7/41)	EIRP < 2Watt	PASS
	22.913(a)(2)	Effective Radiated Power(Band 5)	ERP < 7Watt	PASS
3	2.1049	Occupied Bandwidth	Reporting Only	PASS
4	2.1051 22.917(a)	Conducted Band Edge(Band 5)	< 43+10log10(P[watt])	PASS
	2.1051 27.53(i)(4)	Conducted Band Edge(Band 7)	< 5.5MHz: -13dBm ≥ 5.5MHz: -25dBm	PASS
5	2.1051 22.917(a)	Conducted Spurious Emission (Band 2/5)	< 43+10log10(P[watt])	PASS
	2.1051 27.53(i)(4)	Conducted Spurious Emission (Band 7/41)	< 55+10log10(P[watt])	PASS
6	2.1053 22.917(a)	Radiated Spurious Emission (Band 5)	< 43+10log10(P[watt])	PASS
	2.1053 27.53(i)(4)	Radiated Spurious Emission (Band 7/41)	< 55+10log10(P[watt])	PASS
7	2.1055, 22.355	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	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
	7			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	41			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
26dB and 99% Bandwidth	5	✓	✓	✓	✓			✓	✓			✓		✓	
	7			✓	✓	✓	✓	✓	✓			✓		✓	
	41			✓	✓	✓	✓	✓	✓			✓		✓	
Conducted Band Edge	5	✓	✓	✓	✓			✓	✓	✓		✓	✓		✓
	7			✓	✓	✓	✓	✓	✓	✓		✓	✓		✓
	41			✓	✓	✓	✓	✓	✓	✓		✓	✓		✓
Conducted Spurious Emission	5	✓	✓	✓	✓			✓		✓			✓	✓	✓
	7			✓	✓	✓	✓	✓		✓			✓	✓	✓
Frequency Stability	5				✓			✓				✓		✓	
	7				✓			✓				✓		✓	
	41				✓			✓				✓		✓	
ERP/EIRP	5	✓	✓	✓	✓			✓	✓	✓			✓	✓	✓
	7			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
	41			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Radiated Spurious Emission	5	✓	✓	✓	✓			✓		✓			✓	✓	✓
	7			✓	✓	✓	✓	✓		✓			✓	✓	✓
	41			✓	✓	✓	✓	✓		✓			✓	✓	✓
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:

$$\begin{aligned}\text{Offset (dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 7 + 10 = 17 \text{ (dB)}\end{aligned}$$

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 Electronic Product Testing (Shenzhen) 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, 2019.

ISED Registration: 11185A-1

CAB identifier: CN0064

CCIC Southern Electronic Product Testing (Shenzhen) 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. 03, 2019.

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

2. 47 CFR PART 2 REQUIREMENTS

2.1 Conducted RF Output Power

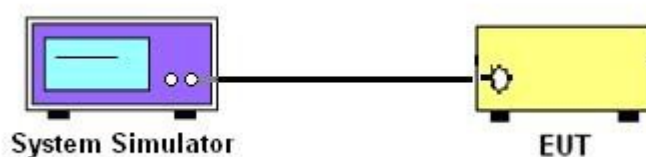
2.1.1 Requirement

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 Ratio

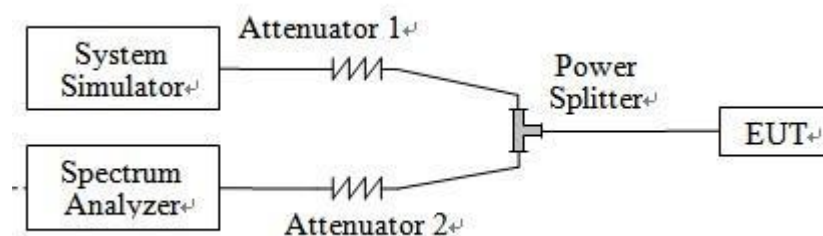
2.2.1 Definition

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

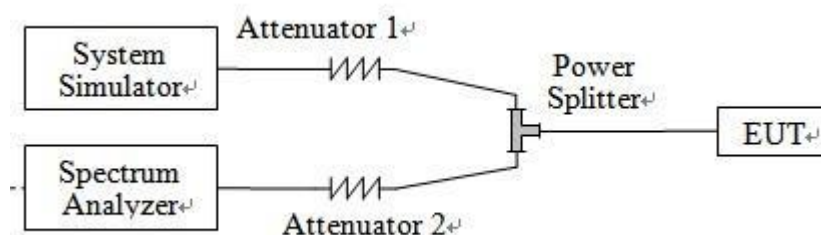
According to FCC section 2.1049, the occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

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

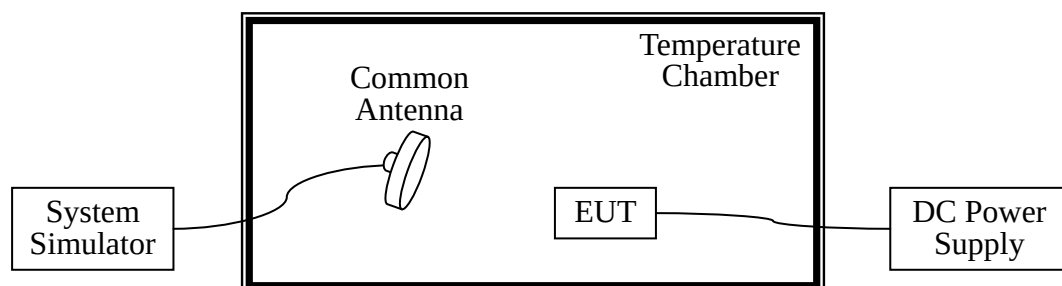
According to FCC requirement, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental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

- (a) The temperature is varied from -30°C to $+50^{\circ}\text{C}$ 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.

For Band 7/41:

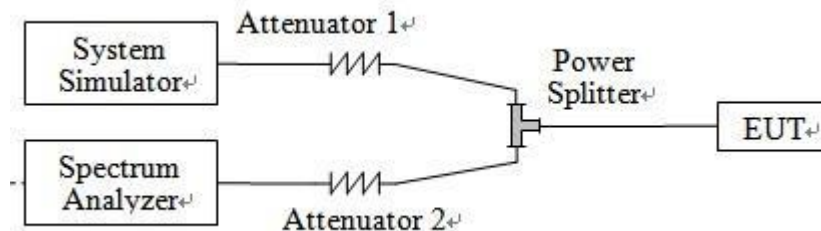
The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $55 + 10 \log (P)$ dB.

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 $43 + 10\log(P)$ dB below the transmitter power P(Watts)
$$= P(W) - [43 + 10\log(P)] \text{ (dB)}$$
$$= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$$
$$= -13\text{dBm}.$$
8. For Band 7
The limit line is derived from $55 + 10\log(P)$ dB below the transmitter power P(Watts)
$$= P(W) - [55 + 10\log(P)] \text{ (dB)}$$
$$= [30 + 10\log(P)] \text{ (dBm)} - [55 + 10\log(P)] \text{ (dB)}$$
$$= -25\text{dBm}.$$
9. 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.

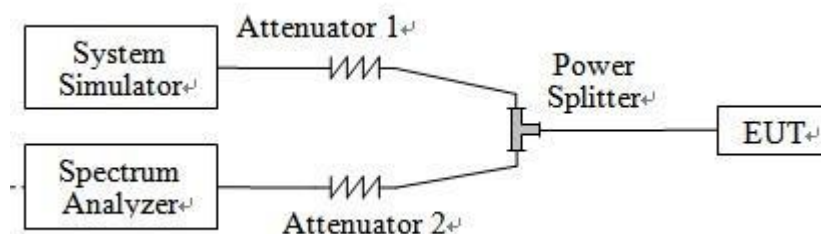
27.53m(4)

For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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 $\geq$ 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 $43 + 10\log(P)$ dB below the transmitter power P(Watts)
9. For LTE Band 7/41 the other 40 dB, and 55 dB have additionally applied same calculation above.

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

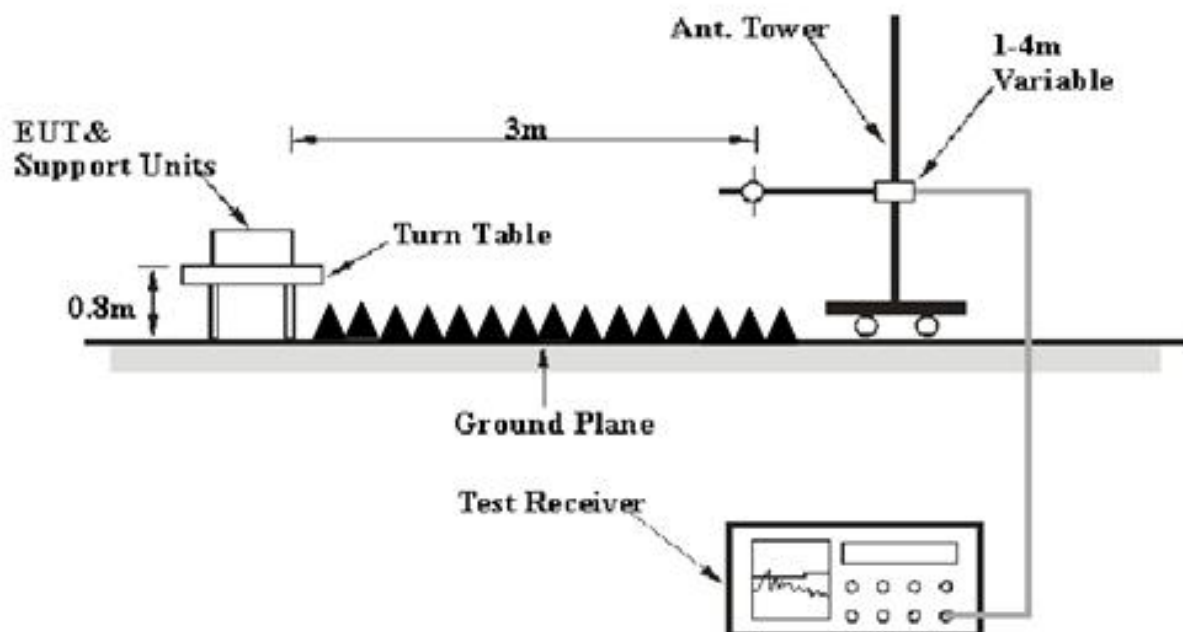
Effective radiated power output measurements by substitution method according to ANSI / TIA / EIA-603-D-2010, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v03r01. Mobile and portable (hand-held) stations operating are limited to average ERP of 7 watts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

Equivalent isotropic 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 EIRP of 2 watts with LTE band 2/7/41 and 1 watt with LTE band 4

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. $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

P_s (dBm): Input power to substitution antenna.

G_s (dBi or dBd): Substitution antenna Gain.

$E_t = R_t + AF$

$E_s = R_s + AF$

AF (dB/m): Receive antenna factor

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

R_s : 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	3	824.7	22.01	PASS
5	1.4	QPSK	1	3	836.5	21.99	PASS
5	1.4	QPSK	1	3	848.3	22.18	PASS
5	1.4	16QAM	1	3	824.7	22.01	PASS
5	1.4	16QAM	1	3	836.5	21.99	PASS
5	1.4	16QAM	1	3	848.3	22.18	PASS
5	3	QPSK	1	0	825.5	22.01	PASS
5	3	QPSK	1	0	836.5	22.05	PASS
5	3	QPSK	1	0	847.5	22.03	PASS
5	3	16QAM	1	0	825.5	22.29	PASS
5	3	16QAM	1	0	836.5	22.26	PASS
5	3	16QAM	1	0	847.5	22.27	PASS
5	5	QPSK	1	0	826.5	21.24	PASS
5	5	QPSK	1	0	836.5	21.21	PASS
5	5	QPSK	1	0	846.5	21.22	PASS
5	5	16QAM	1	0	826.5	21.39	PASS
5	5	16QAM	1	0	836.5	21.36	PASS
5	5	16QAM	1	0	846.5	21.37	PASS
5	10	QPSK	1	49	829.0	21.09	PASS
5	10	QPSK	1	49	836.5	21.10	PASS
5	10	QPSK	1	49	844.0	21.36	PASS
5	10	16QAM	1	0	829.0	20.69	PASS
5	10	16QAM	1	0	836.5	21.28	PASS
5	10	16QAM	1	0	844.0	21.15	PASS



2.LTE Band 7 Test Verdict:

LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	EIRP (dBm)	Verdict
			RB Size	RB Offset			
7	5	QPSK	1	12	2502.5	21.43	PASS
7	5	QPSK	1	0	2535	21.47	PASS
7	5	QPSK	1	24	2567.5	21.53	PASS
7	5	16QAM	1	24	2502.5	21.15	PASS
7	5	16QAM	1	24	2535	21.17	PASS
7	5	16QAM	1	0	2567.5	21.15	PASS
7	10	QPSK	1	24	2505	21.95	PASS
7	10	QPSK	1	49	2535	21.90	PASS
7	10	QPSK	1	24	2565	21.85	PASS
7	10	16QAM	1	24	2505	21.26	PASS
7	10	16QAM	1	49	2535	21.19	PASS
7	10	16QAM	1	24	2565	21.17	PASS
7	15	QPSK	1	37	2507.5	21.57	PASS
7	15	QPSK	1	74	2535	21.59	PASS
7	15	QPSK	1	0	2562.5	21.53	PASS
7	15	16QAM	1	37	2507.5	21.15	PASS
7	15	16QAM	1	18	2535	21.36	PASS
7	15	16QAM	1	0	2562.5	21.16	PASS
7	20	QPSK	1	0	2510	21.78	PASS
7	20	QPSK	1	0	2535	21.72	PASS
7	20	QPSK	1	0	2560	21.81	PASS
7	20	16QAM	1	0	2510	21.14	PASS
7	20	16QAM	1	0	2535	21.16	PASS
7	20	16QAM	1	0	2560	21.24	PASS

3.LTE Band 41 Test Verdict:

LTE Band	BW (MHz)	Modulation	RB Configuration		Freq. (MHz)	EIRP (dBm)	Verdict
			RB Size	RB Offset			
41	5	QPSK	1	0	2498.5	22.43	PASS
41	5	QPSK	1	0	2593.0	22.45	PASS
41	5	QPSK	1	0	2687.5	22.42	PASS
41	5	16QAM	1	0	2498.5	21.80	PASS
41	5	16QAM	1	0	2593.0	21.79	PASS
41	5	16QAM	1	0	2687.5	21.77	PASS
41	10	QPSK	1	49	2501.0	22.50	PASS
41	10	QPSK	1	49	2593.0	22.47	PASS
41	10	QPSK	1	49	2685.0	22.49	PASS
41	10	16QAM	1	0	2501.0	21.87	PASS
41	10	16QAM	1	0	2593.0	21.85	PASS
41	10	16QAM	1	0	2685.0	21.88	PASS
41	15	QPSK	1	0	2503.5	21.54	PASS
41	15	QPSK	1	0	2593.0	21.52	PASS
41	15	QPSK	1	0	2682.5	21.53	PASS
41	15	16QAM	1	74	2503.5	21.95	PASS
41	15	16QAM	1	74	2593.0	21.93	PASS
41	15	16QAM	1	74	2682.5	21.96	PASS
41	20	QPSK	1	0	2506.0	22.66	PASS
41	20	QPSK	1	0	2593.0	22.27	PASS
41	20	QPSK	1	0	2680.0	22.26	PASS
41	20	16QAM	1	49	2506.0	21.71	PASS
41	20	16QAM	1	49	2593.0	21.68	PASS
41	20	16QAM	1	49	2680.0	21.69	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

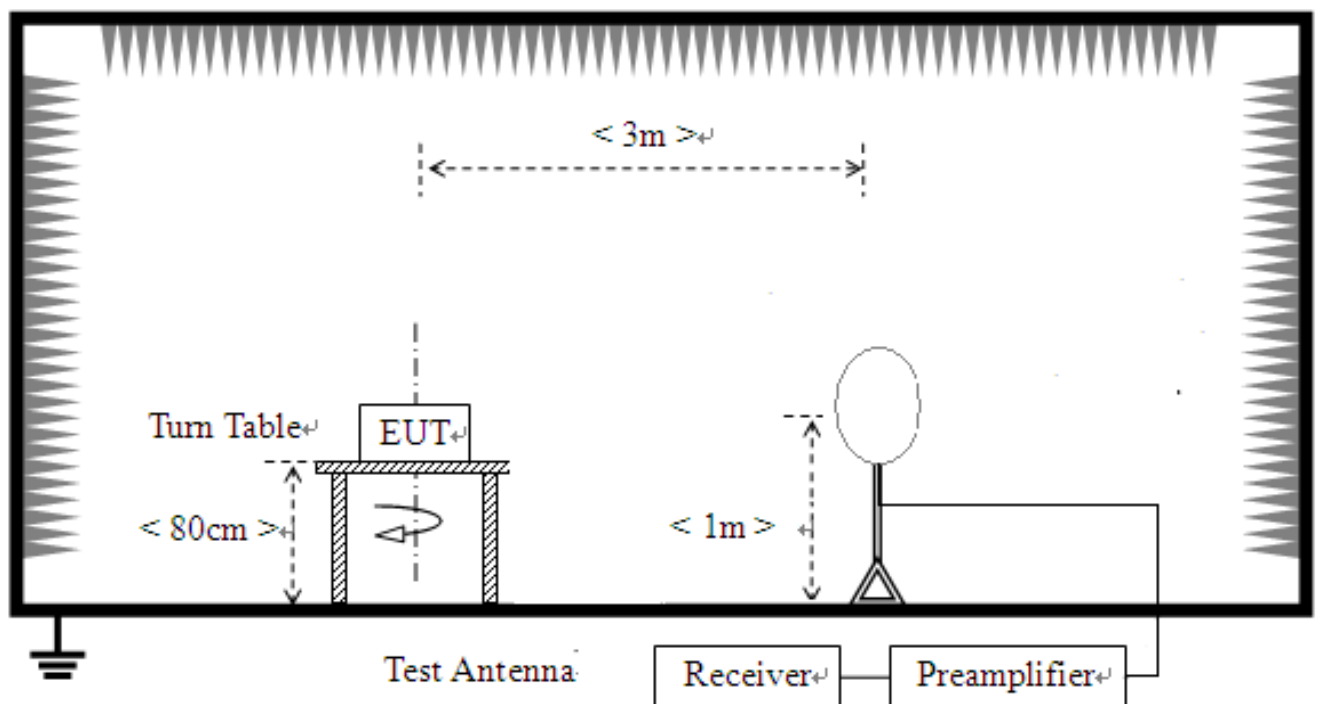
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $55 + 10 \log (P)$ dB.

2.8.2 Measuring Instruments

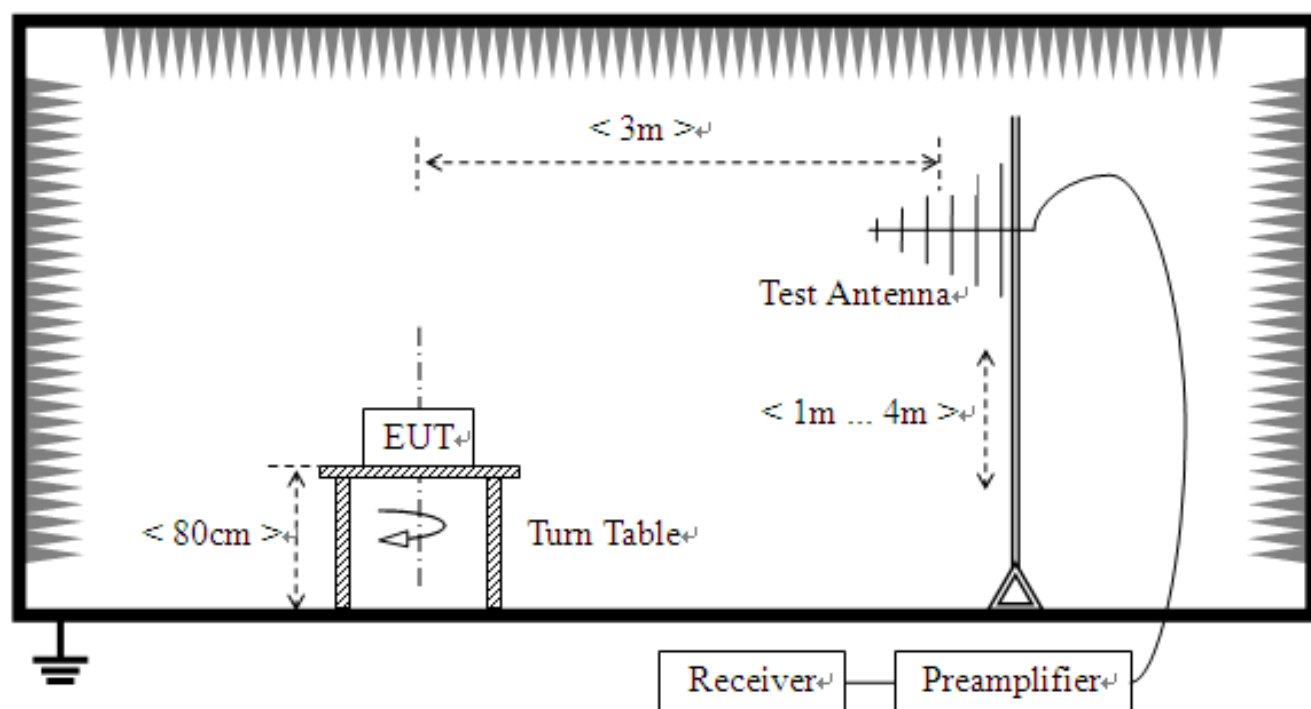
The measuring equipment is listed in the section 3 of this test report.

2.8.3 Test Setup

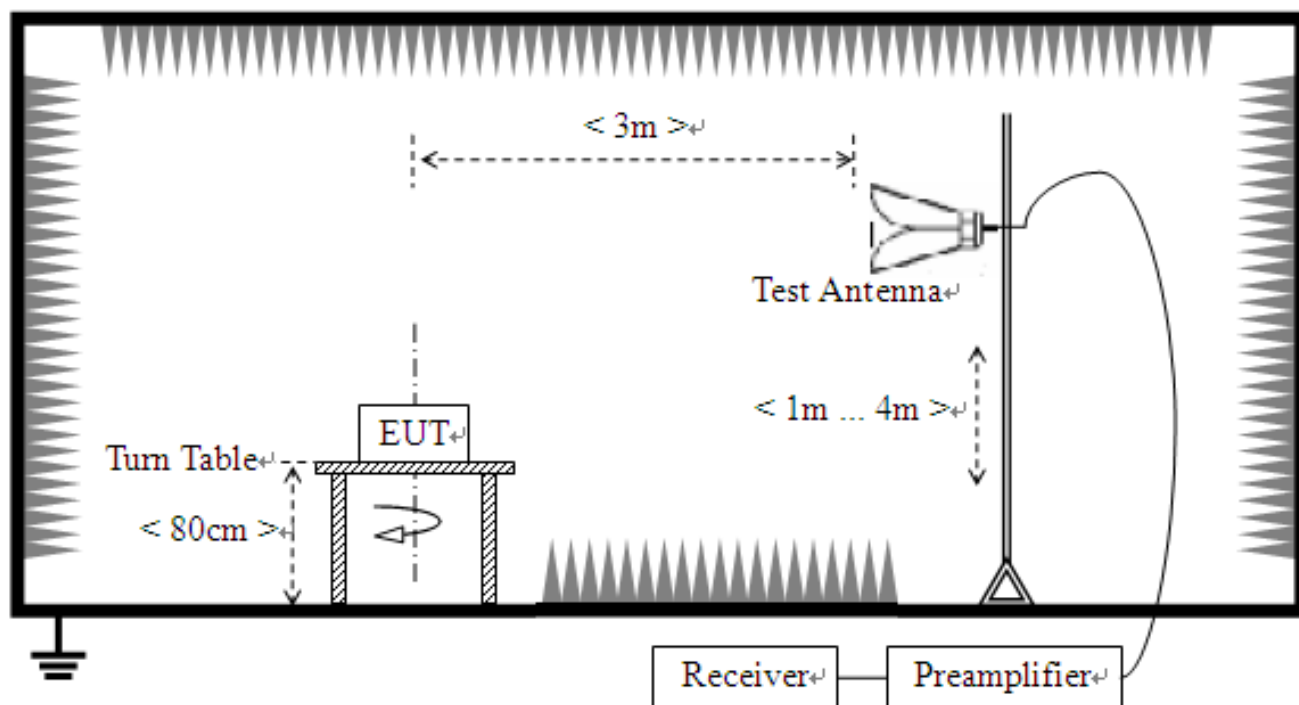
For radiated emissions from 9kHz to 30MHz



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 with 0.8 meter above ground.
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 $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[43 + 10\log(P)]$ (dB)
 $= -13$ dBm.

<For Band 7>

The limit line is derived from $55 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [55 + 10\log(P)]$ (dB)
 $= [30 + 10\log(P)]$ (dBm) - $[55 + 10\log(P)]$ (dB)
 $= -25$ dBm.

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 10th 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 10MHz BW Middle Channel

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	35.8258	-99.70	-77.66	-13.00	64.66	22.04	Horizontal
2	61.0711	-101.77	-83.15	-13.00	70.15	18.62	Horizontal
3	90.2002	-95.90	-77.29	-13.00	64.29	18.61	Horizontal
4	3177.08	-53.23	-44.70	-13.00	31.70	8.53	Horizontal
5	6126.06	-54.12	-40.01	-13.00	27.01	14.11	Horizontal
6	14062.0	-56.95	-34.40	-13.00	21.40	22.55	Horizontal

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	35.8258	-99.43	-79.25	-13.00	66.25	20.18	Vertical
2	90.2002	-97.30	-74.56	-13.00	61.56	22.74	Vertical
3	3225.11	-54.91	-46.35	-13.00	33.35	8.56	Vertical
4	3778.88	-54.31	-45.78	-13.00	32.78	8.53	Vertical
5	6576.28	-54.33	-40.29	-13.00	27.29	14.04	Vertical
6	12621.3	-56.30	-35.97	-13.00	22.97	20.33	Vertical

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

LTE Band 7 QPSK 20MHz BW Middle Channel

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	61.0711	-99.86	-81.24	-25	56.24	18.62	Horizontal
2	90.2002	-97.10	-78.49	-25	53.49	18.61	Horizontal
3	872.802	-99.06	-64.61	-25	39.61	34.45	Horizontal
4	3201.10	-54.61	-45.58	-25	20.58	9.03	Horizontal
5	3981.49	-54.42	-45.62	-25	20.62	8.80	Horizontal
6	6498.24	-55.25	-40.28	-25	15.28	14.97	Horizontal

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	61.0711	-99.72	-80.25	-25	55.25	19.47	Vertical
2	90.2002	-96.59	-73.85	-25	48.85	22.74	Vertical
3	872.802	-99.83	-66.2	-25	41.2	33.63	Vertical
4	4008.50	-54.54	-45.88	-25	20.88	8.66	Vertical
5	6612.30	-55.09	-41.06	-25	16.06	14.03	Vertical
6	12615.3	-57.04	-36.75	-25	11.75	20.29	Vertical

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

LTE Band 41 QPSK 20MHz BW Middle Channel

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	36.7968	-92.90	-67.96	-13.00	54.96	24.94	Horizontal
2	330.030	-100.70	-71.71	-13.00	58.71	28.99	Horizontal
3	872.802	-102.19	-64.15	-13.00	51.15	38.04	Horizontal
4	3889.94	-57.93	-48.31	-13.00	35.31	9.62	Horizontal
5	5101.05	-58.28	-46.11	-13.00	33.11	12.17	Horizontal
6	10610.3	-61.26	-37.18	-13.00	24.18	24.08	Horizontal

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	36.7968	-94.48	-71.30	-13.00	58.30	23.18	Vertical
2	100.880	-102.97	-76.40	-13.00	63.40	26.57	Vertical
3	364.014	-100.19	-72.27	-13.00	59.27	27.92	Vertical
4	1193.09	-57.63	-60.03	-13.00	47.03	-2.40	Vertical
5	5057.52	-59.00	-45.12	-13.00	32.12	13.88	Vertical
6	10400.2	-61.35	-37.28	-13.00	24.28	24.07	Vertical

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	ESIB26	A0304218	2018.09.03	2019.09.20	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	2017.11.10	2020.11.09	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	2018.11.15	2019.11.14	Conducted
LISN	ROHDE&SCH WARZ	ESH2-Z5	A0304221	2019.04.30	2020.04.29	Conducted
Test Receiver	R&S	ESCS30	A0304260	2019.05.25	2020.05.24	Conducted
Temperature chamber	Dongguan gaoda instrument CO.LTD	GD-7005-100	130130101	2019.04.22	2020.04.21	Conducted
Wideband Radio Communication tester	R&S	CMW500	149332	2019.04.01	2020.03.31	Conducted
Power Supply	R&S	NGMO1	101037	2019.08.03	2020.08.02	Conducted

APPENDIX A

Conducted RF (Average) Output Power

Test Result and Data

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	22.66	22.4	22.57	22.0±1.0
		1	3	22.56	22.69	22.58	
		1	5	22.43	22.43	22.4	
		3	0	22.29	22.19	22.06	21.5±1.0
		3	2	22.08	22.2	22.33	
		3	3	22.34	22.08	22.1	
		6	0	21.95	21.94	21.94	21.0±1.0
	16QAM	1	0	21.69	21.64	21.77	21.0±1.0
		1	3	21.78	21.79	21.66	
		1	5	21.82	21.85	21.73	
		3	0	21.24	21.3	21.21	20.5±1.0
		3	2	21.25	21.49	21.35	
		3	3	21.5	21.44	21.36	
		6	0	21.13	21.14	21.14	20.5±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	22.64	22.63	22.59	22.0±1.0
		1	7	22.57	22.41	22.58	
		1	14	22.6	22.48	22.57	
		8	0	22.18	22.31	22.28	21.5±1.0
		8	4	22.13	22.22	22.19	
		8	7	22.29	22.26	22.34	
		15	0	21.98	21.9	21.91	21.0±1.0
	16QAM	1	0	21.59	21.85	21.65	21.0±1.0
		1	7	21.59	21.55	21.65	
		1	14	21.62	21.7	21.66	
		8	0	21.43	21.47	21.48	20.5±1.0
		8	4	21.24	21.29	21.48	
		8	7	21.29	21.26	21.37	
		15	0	21.11	21.06	21.14	20.5±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	22.64	22.51	22.63	22.0±1.0
		1	13	22.42	22.45	22.5	
		1	24	22.63	22.48	22.41	
		12	0	22.31	22.25	22.15	21.5±1.0
		12	6	22.08	22.1	22.25	
		12	13	22.35	22.09	22.28	
		25	0	21.93	21.98	21.98	21.0±1.0
	16QAM	1	0	21.66	21.74	21.65	21.0±1.0
		1	13	21.7	21.68	21.59	
		1	24	21.56	21.77	21.76	
		12	0	21.33	21.23	21.46	20.5±1.0
		12	6	21.38	21.2	21.37	
		12	13	21.2	21.21	21.45	
		25	0	21.05	21.05	21.14	20.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20450/829	20525/836.5	20600/844	
10MHz	QPSK	1	0	22.66	22.80	22.56	22.0±1.0
		1	25	22.61	22.69	22.68	
		1	49	22.63	22.54	22.44	
		25	0	22.25	22.32	22.26	21.5±1.0
		25	13	22.21	22.16	22.16	
		25	25	22.2	22.29	22.11	
		50	0	21.97	21.95	21.97	21.0±1.0
	16QAM	1	0	21.84	21.84	21.76	21.0±1.0
		1	25	21.63	21.8	21.6	
		1	49	21.55	21.78	21.57	
		25	0	21.49	21.23	21.45	20.5±1.0
		25	13	21.22	21.32	21.49	
		25	25	21.25	21.33	21.34	
		50	0	21.06	21.1	21.1	20.5±1.0



LTE Band 7 Conducted Power Test Verdict:

LTE FDD Band 7				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20775/2502.5	21100/2535	21425/2567.5	
5MHz	QPSK	1	0	19.22	19.27	19.06	18.5±1.0
		1	13	19.25	19.19	19.2	
		1	24	19.27	19.14	19.27	
		12	0	18.8	18.92	18.95	18.0±1.0
		12	6	18.87	18.94	18.65	
		12	13	18.68	18.67	18.95	
		25	0	18.59	18.6	18.57	18.0±1.0
	16QAM	1	0	18.36	18.34	18.31	17.5±1.0
		1	13	18.19	18.25	18.41	
		1	24	18.44	18.16	18.16	
		12	0	17.99	18.08	18.01	17.5±1.0
		12	6	17.8	18.04	18.04	
		12	13	17.83	17.83	17.96	
		25	0	17.71	17.67	17.71	17.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20800/2505	21100/2535	21400/2565	
10MHz	QPSK	1	0	19.13	19.09	19.13	18.5±1.0
		1	25	19.01	19.17	19.02	
		1	49	19.12	19.3	19.21	
		25	0	18.77	18.87	18.71	18.0±1.0
		25	13	18.75	18.89	18.84	
		25	25	18.8	18.79	18.93	
		50	0	18.57	18.59	18.55	18.0±1.0
	16QAM	1	0	18.45	18.31	18.42	17.5±1.0
		1	25	18.27	18.37	18.36	
		1	49	18.28	18.4	18.16	
		25	0	17.98	18.08	17.9	17.5±1.0
		25	13	17.86	17.87	17.88	
		25	25	17.93	17.91	17.84	
		50	0	17.74	17.69	17.65	17.0±1.0



LTE FDD Band 7				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20825/2507.5	21100/2535	21375/2562.5	
15MHz	QPSK	1	0	19.12	19.02	19.07	18.5±1.0
		1	38	19.04	19.07	19.14	
		1	74	19.14	19.05	19.23	
		36	0	18.79	18.94	18.74	18.0±1.0
		36	18	18.85	18.69	18.74	
		36	39	18.81	18.66	18.74	
		75	0	18.6	18.6	18.5	18.0±1.0
	16QAM	1	0	18.36	18.35	18.15	17.5±1.0
		1	38	18.28	18.37	18.42	
		1	74	18.4	18.24	18.31	
		36	0	17.88	17.93	18.08	17.5±1.0
		36	18	17.8	17.8	17.97	
		36	39	17.94	17.8	17.9	
		75	0	17.72	17.72	17.71	17.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20850/2510	21100/2535	21350/2560	
20MHz	QPSK	1	0	19.27	19.38	19.21	18.5±1.0
		1	50	19.04	19.06	19.05	
		1	99	19.1	19.1	19.1	
		50	0	18.88	18.95	18.68	18.0±1.0
		50	25	18.65	18.87	18.85	
		50	50	18.84	18.9	18.8	
		100	0	18.5	18.58	18.5	18.0±1.0
	16QAM	1	0	18.26	18.3	18.19	17.5±1.0
		1	50	18.43	18.18	18.4	
		1	99	18.24	18.45	18.27	
		50	0	17.84	18.02	18.01	17.5±1.0
		50	25	18.01	17.82	18.1	
		50	50	18	17.98	17.86	
		100	0	17.72	17.74	17.69	17.0±1.0



LTE Band 41 Conducted Power Test Verdict:

LTE TDD Band 41				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				39675/2498.5	40620/2593	41565/2687.5	
5MHz	QPSK	1	0	21.43	21.42	21.65	21.0±1.0
		1	13	21.51	21.52	21.63	
		1	24	21.62	21.5	21.69	
		12	0	21.19	21.06	21.32	20.5±1.0
		12	6	21.3	21.34	21.11	
		12	13	21.07	21.32	21.06	
		25	0	20.9	20.98	20.95	20.0±1.0
	16QAM	1	0	20.62	20.68	20.56	20.0±1.0
		1	13	20.81	20.57	20.66	
		1	24	20.85	20.76	20.74	
		12	0	20.49	20.45	20.29	19.5±1.0
		12	6	20.49	20.28	20.38	
		12	13	20.29	20.37	20.29	
		25	0	20.15	20.06	20.14	19.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				39700/2501	40620/2593	41540/2685	
10MHz	QPSK	1	0	21.44	21.59	21.48	21.0±1.0
		1	25	21.49	21.49	21.67	
		1	49	21.55	21.57	21.45	
		25	0	21.28	21.22	21.11	20.5±1.0
		25	13	21.21	21.08	21.32	
		25	25	21.13	21.29	21.14	
		50	0	20.96	20.91	20.9	20.0±1.0
	16QAM	1	0	20.65	20.72	20.7	20.0±1.0
		1	25	20.67	20.67	20.59	
		1	49	20.84	20.56	20.58	
		25	0	20.31	20.3	20.46	19.5±1.0
		25	13	20.44	20.45	20.37	
		25	25	20.42	20.34	20.43	
		50	0	20.1	20.06	20.07	19.5±1.0



LTE TDD Band 41				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				39725/2503.5	40620/2593	41515/2682.5	
15MHz	QPSK	1	0	21.47	21.69	21.52	21.0±1.0
		1	38	21.6	21.65	21.45	
		1	74	21.59	21.45	21.62	
		36	0	21.35	21.12	21.09	20.5±1.0
		36	18	21.17	21.13	21.33	
		36	39	21.13	21.09	21.12	
		75	0	20.96	20.94	20.96	20.0±1.0
	16QAM	1	0	20.8	20.77	20.55	20.0±1.0
		1	38	20.85	20.7	20.81	
		1	74	20.74	20.61	20.56	
		36	0	20.48	20.36	20.35	19.5±1.0
		36	18	20.31	20.3	20.29	
		36	39	20.48	20.4	20.2	
		75	0	20.06	20.13	20.11	19.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				39750/2506	40620/2593	41490/2680	
20MHz	QPSK	1	0	21.71	21.76	21.68	21.0±1.0
		1	50	21.52	21.67	21.48	
		1	99	21.65	21.47	21.67	
		50	0	21.18	21.35	21.12	20.5±1.0
		50	25	21.15	21.22	21.09	
		50	50	21.1	21.3	21.12	
		100	0	20.95	20.92	20.92	20.0±1.0
	16QAM	1	0	20.65	20.82	20.64	20.0±1.0
		1	50	20.61	20.72	20.82	
		1	99	20.75	20.85	20.85	
		50	0	20.32	20.47	20.22	19.5±1.0
		50	25	20.28	20.42	20.34	
		50	50	20.47	20.32	20.5	
		100	0	20.07	20.14	20.07	19.5±1.0

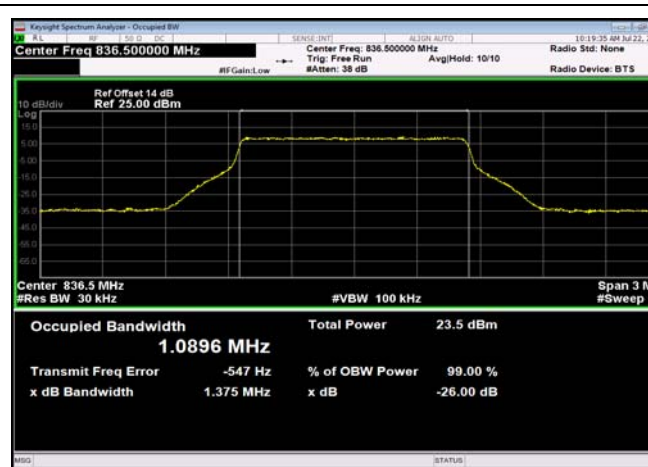
**99% Occupied Bandwidth****Test Result and Data**

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	1.092
FDD05	MidRange	3	836.5	QPSK	2.677
FDD05	MidRange	3	836.5	Q16	2.677
FDD05	MidRange	5	836.5	QPSK	4.498
FDD05	MidRange	5	836.5	Q16	4.497
FDD05	MidRange	10	836.5	QPSK	8.926
FDD05	MidRange	10	836.5	Q16	8.917
FDD07	MidRange	5	2535	QPSK	4.525
FDD07	MidRange	5	2535	Q16	4.519
FDD07	MidRange	10	2535	QPSK	8.959
FDD07	MidRange	10	2535	Q16	8.94
FDD07	MidRange	15	2535	QPSK	13.534
FDD07	MidRange	15	2535	Q16	13.503
FDD07	MidRange	20	2535	QPSK	17.923
FDD07	MidRange	20	2535	Q16	17.9
TDD41	MidRange	5	2593	QPSK	4.495
TDD41	MidRange	5	2593	Q16	4.496
TDD41	MidRange	10	2593	QPSK	8.915
TDD41	MidRange	10	2593	Q16	8.922
TDD41	MidRange	15	2593	QPSK	13.462
TDD41	MidRange	15	2593	Q16	13.454
TDD41	MidRange	20	2593	QPSK	17.884

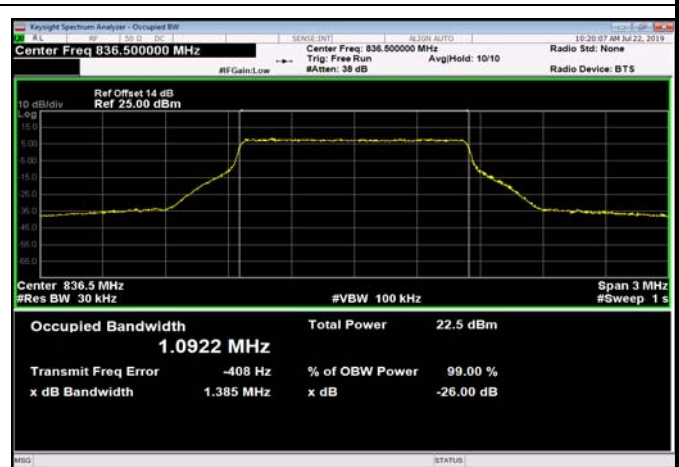
CCIC-SET/ TRF:IRF(2019-05-23)



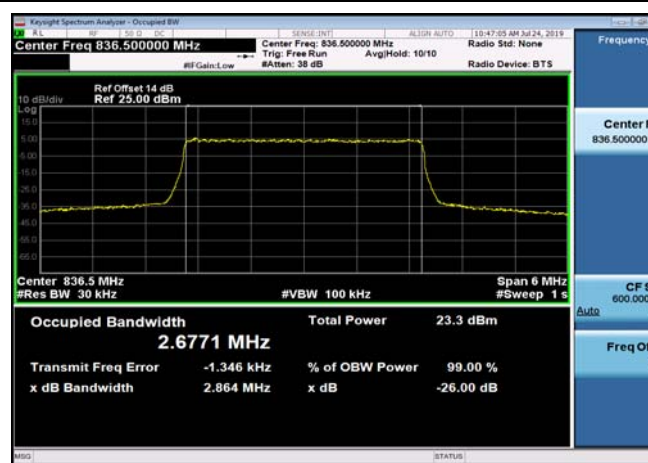
FDD05_MidRange_1.4_836.5_QPSK



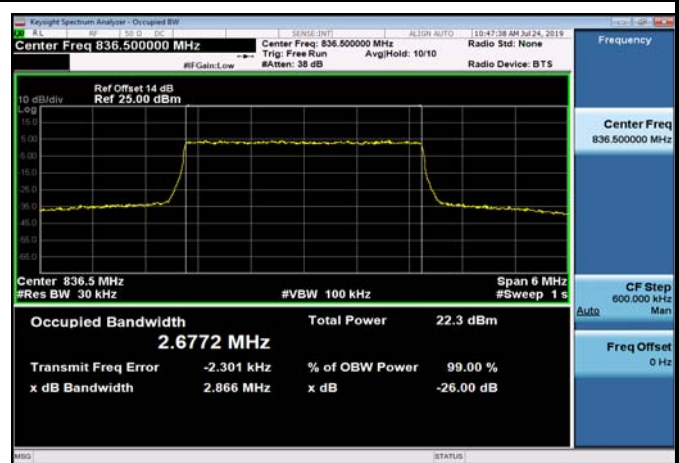
FDD05_MidRange_1.4_836.5_Q16



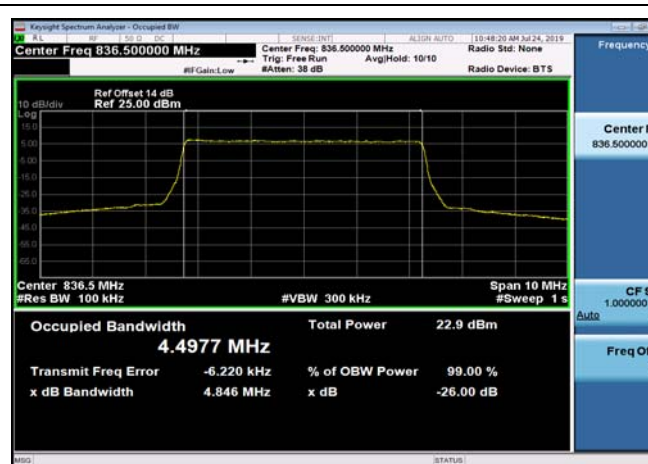
FDD05_MidRange_3_836.5_QPSK



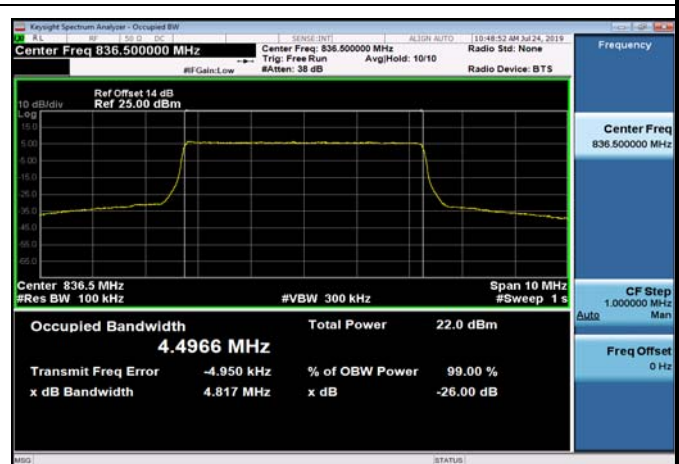
FDD05_MidRange_3_836.5_Q16



FDD05_MidRange_5_836.5_QPSK



FDD05_MidRange_5_836.5_Q16





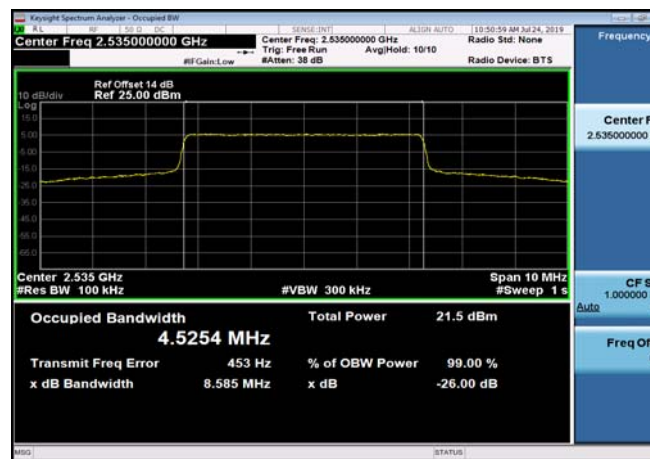
FDD05_MidRange_10_836.5_QPSK



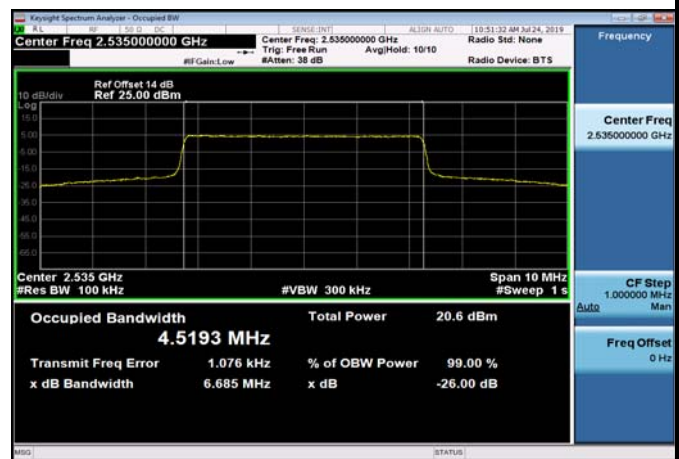
FDD05_MidRange_10_836.5_Q16



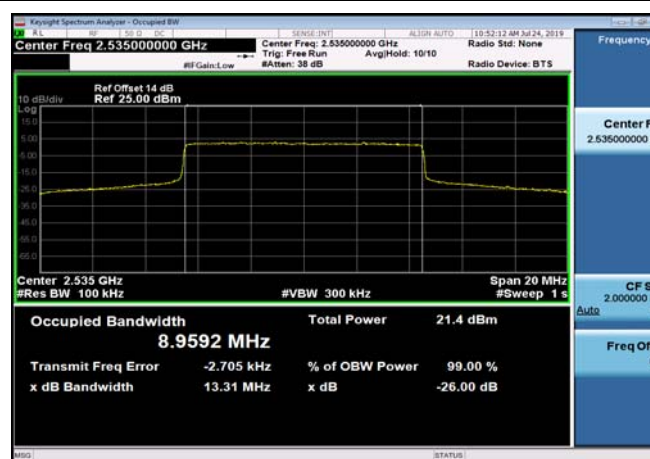
FDD07_MidRange_5_2535_QPSK



FDD07_MidRange_5_2535_Q16



FDD07_MidRange_10_2535_QPSK

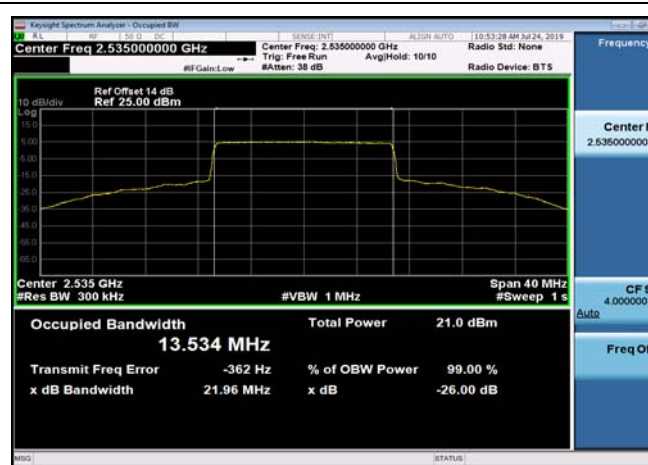


FDD07_MidRange_10_2535_Q16





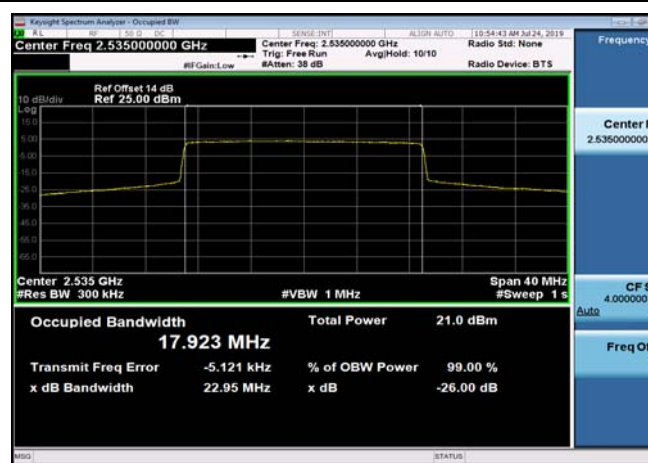
FDD07_MidRange_15_2535_QPSK



FDD07_MidRange_15_2535_Q16



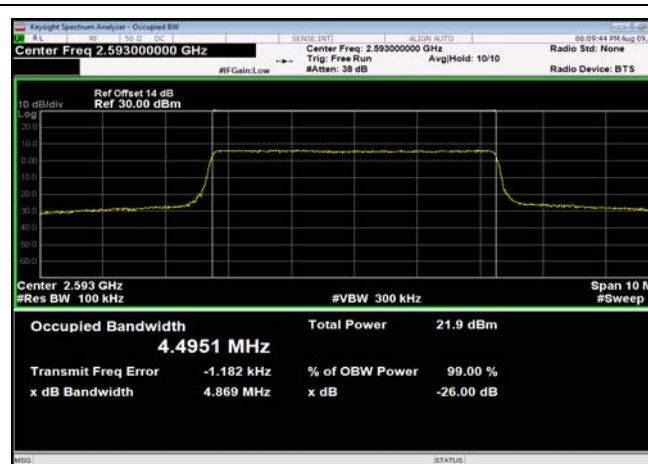
FDD07_MidRange_20_2535_QPSK



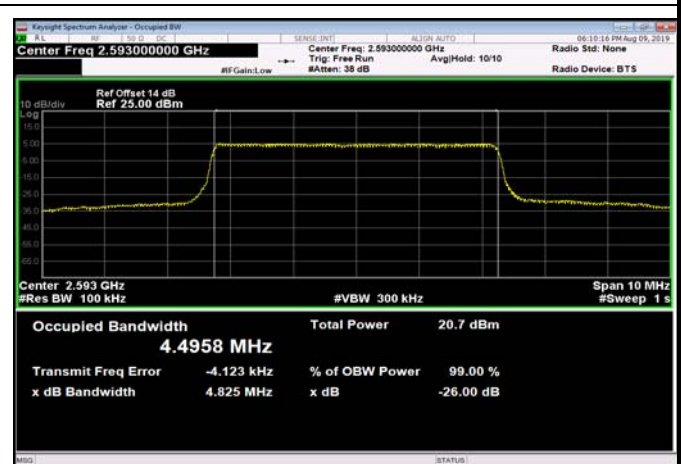
FDD07_MidRange_20_2535_Q16



TDD41_MidRange_5_2593_QPSK

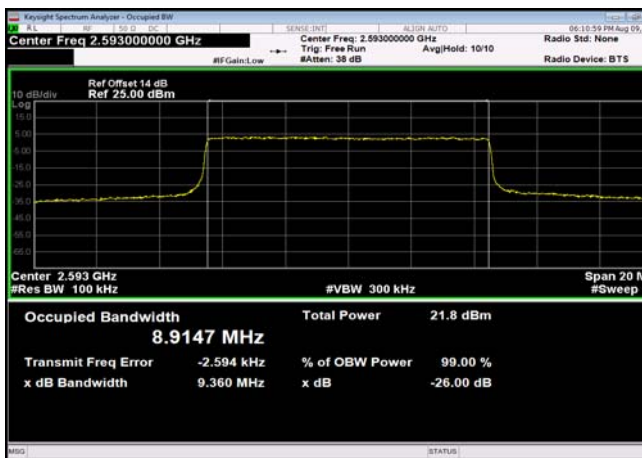


TDD41_MidRange_5_2593_Q16

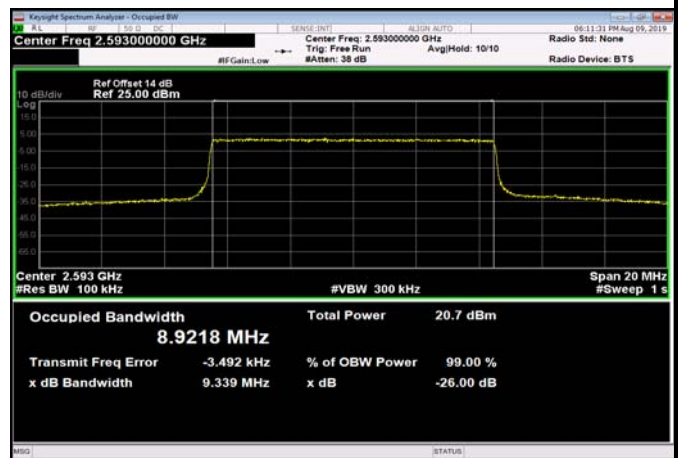




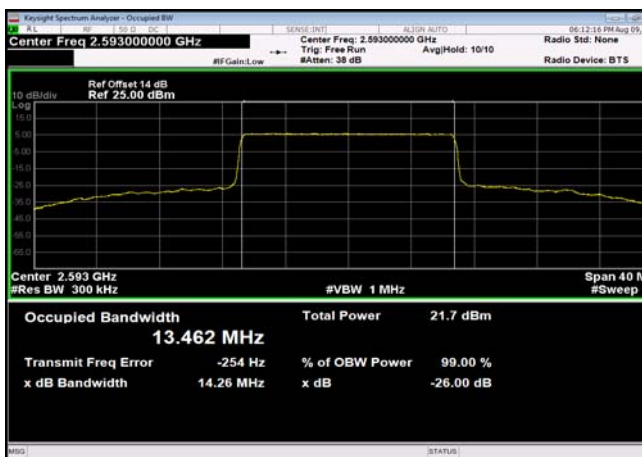
TDD41_MidRange_10_2593_QPSK



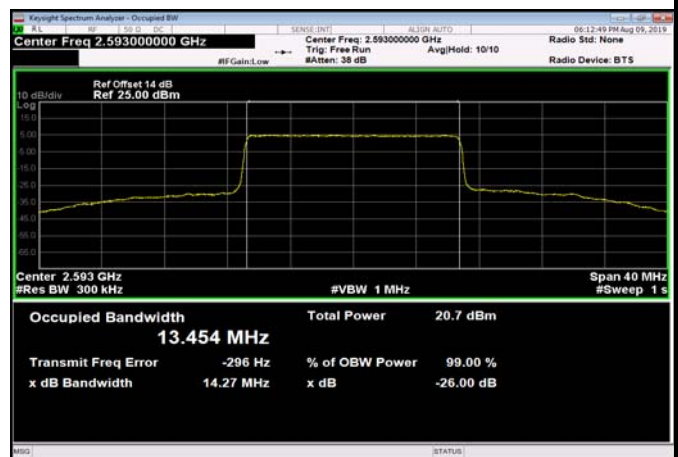
TDD41_MidRange_10_2593_Q16



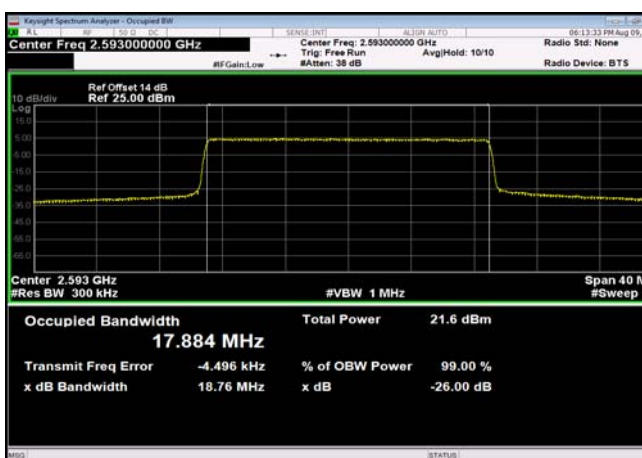
TDD41_MidRange_15_2593_QPSK



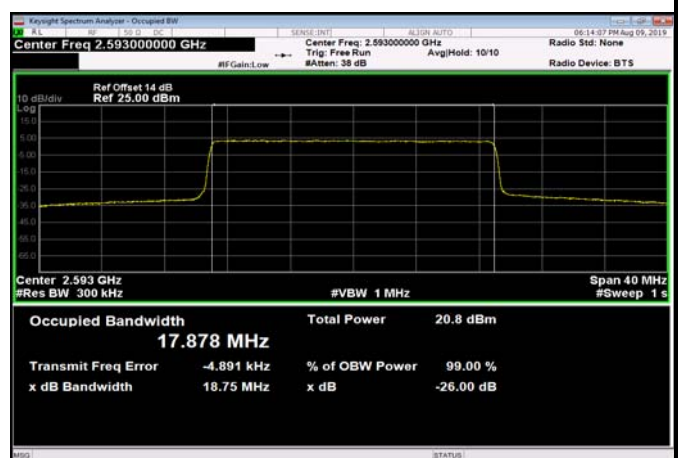
TDD41_MidRange_15_2593_Q16



TDD41_MidRange_20_2593_QPSK

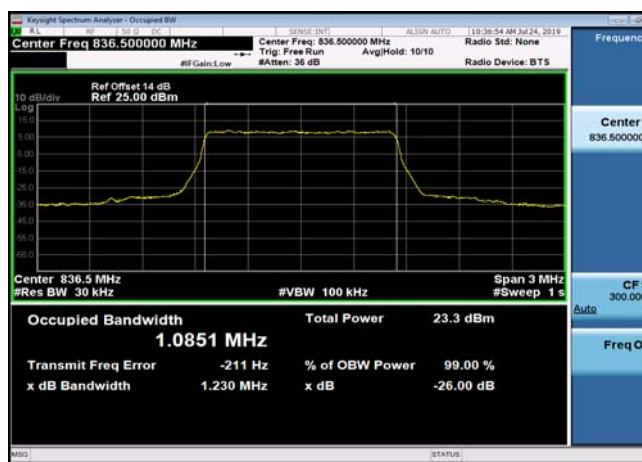


TDD41_MidRange_20_2593_Q16

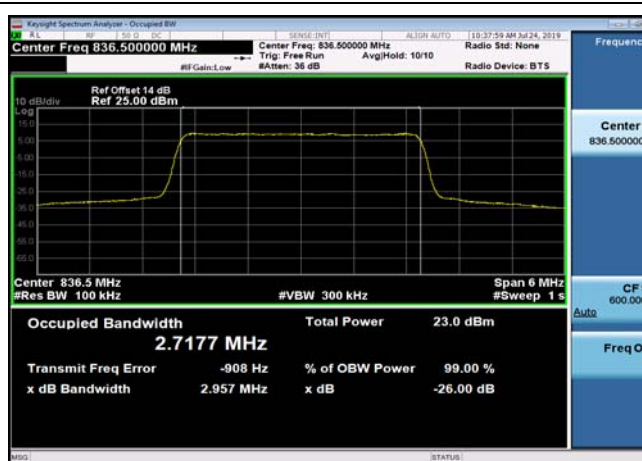


**26dB Bandwidth****Test Result and Data**

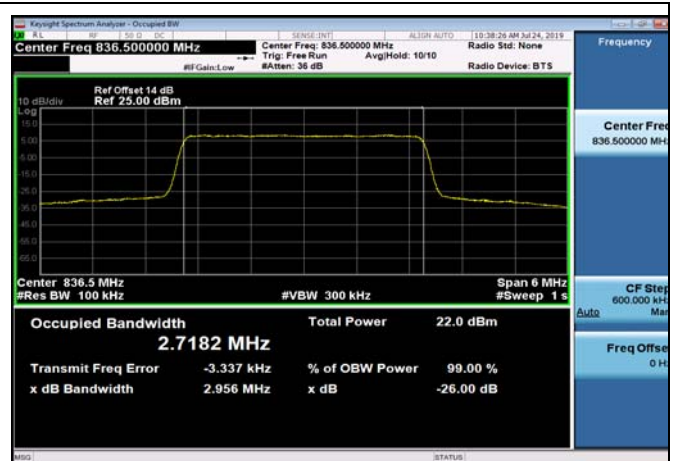
Emission Bandwidth NormalTC_NormalVol					
Band	Range	BandWidth	Frequency (MHz)	Modulation	EmissionBandwidth (MHz)
FDD05	MidRange	1.4	836.5	QPSK	1.23
FDD05	MidRange	1.4	836.5	Q16	1.24
FDD05	MidRange	3	836.5	QPSK	2.96
FDD05	MidRange	3	836.5	Q16	2.96
FDD05	MidRange	5	836.5	QPSK	4.86
FDD05	MidRange	5	836.5	Q16	4.83
FDD05	MidRange	10	836.5	QPSK	9.37
FDD05	MidRange	10	836.5	Q16	9.36
FDD07	MidRange	5	2535	QPSK	8.74
FDD07	MidRange	5	2535	Q16	7.43
FDD07	MidRange	10	2535	QPSK	14.35
FDD07	MidRange	10	2535	Q16	12.66
FDD07	MidRange	15	2535	QPSK	22.42
FDD07	MidRange	15	2535	Q16	19.35
FDD07	MidRange	20	2535	QPSK	23.74
FDD07	MidRange	20	2535	Q16	20.41
TDD41	MidRange	5	2593	QPSK	4.88
TDD41	MidRange	5	2593	Q16	4.84
TDD41	MidRange	10	2593	QPSK	9.36
TDD41	MidRange	10	2593	Q16	9.37
TDD41	MidRange	15	2593	QPSK	14.27
TDD41	MidRange	15	2593	Q16	14.26
TDD41	MidRange	20	2593	QPSK	18.77
TDD41	MidRange	20	2593	Q16	18.75

FDD05_MidRange_1.4MHz_836.5MHz
_QPSKFDD05_MidRange_1.4MHz_836.5MHz
_Q16

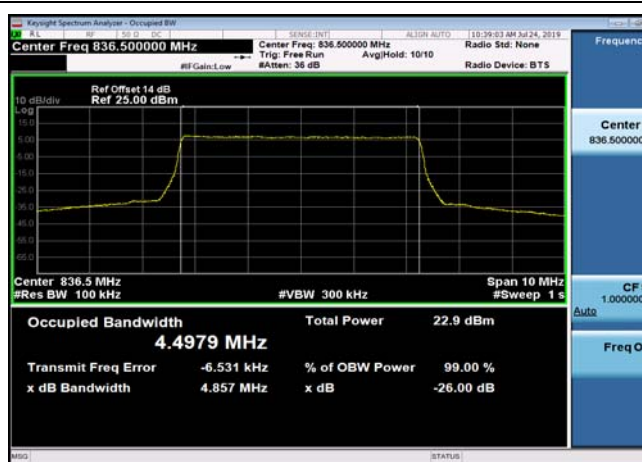
FDD05_MidRange_3MHz_836.5MHz_QPSK



FDD05_MidRange_3MHz_836.5MHz_Q16



FDD05_MidRange_5MHz_836.5MHz_QPSK

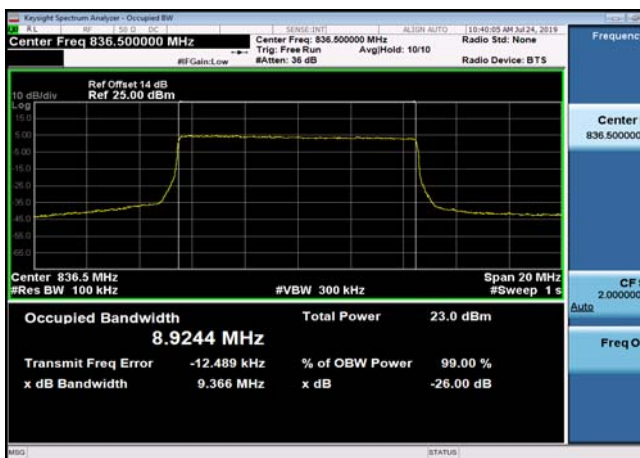


FDD05_MidRange_5MHz_836.5MHz_Q16





FDD05_MidRange_10MHz_836.5MHz_QPSK



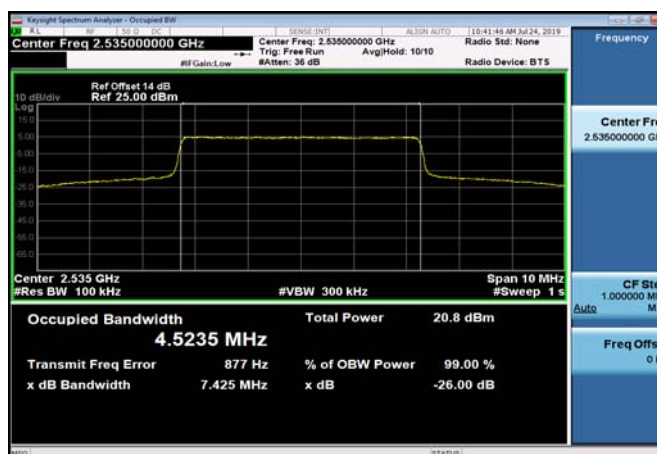
FDD05_MidRange_10MHz_836.5MHz_Q16



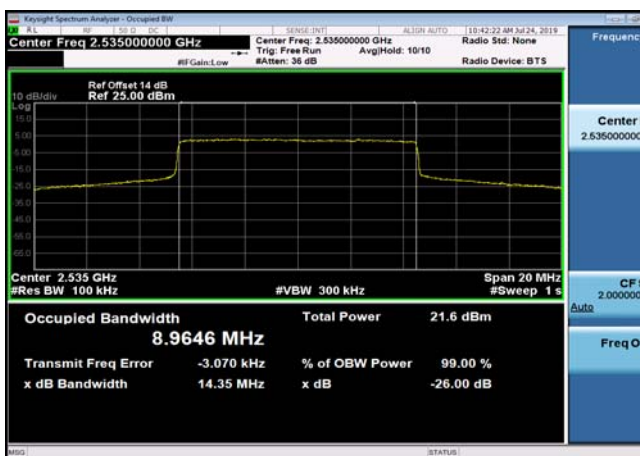
FDD07_MidRange_5MHz_2535MHz_QPSK



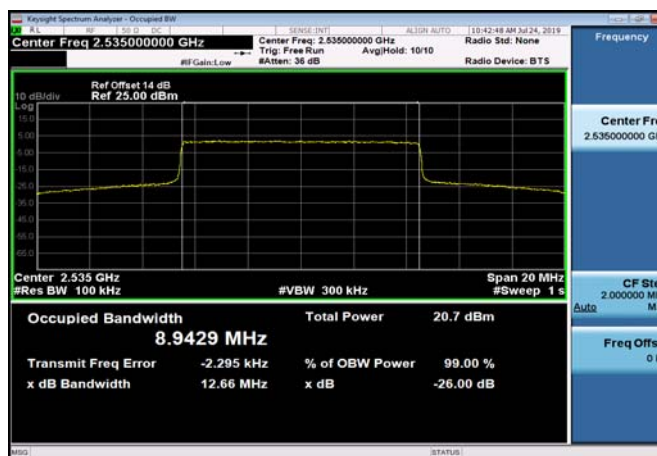
FDD07_MidRange_5MHz_2535MHz_Q16



FDD07_MidRange_10MHz_2535MHz_QPSK

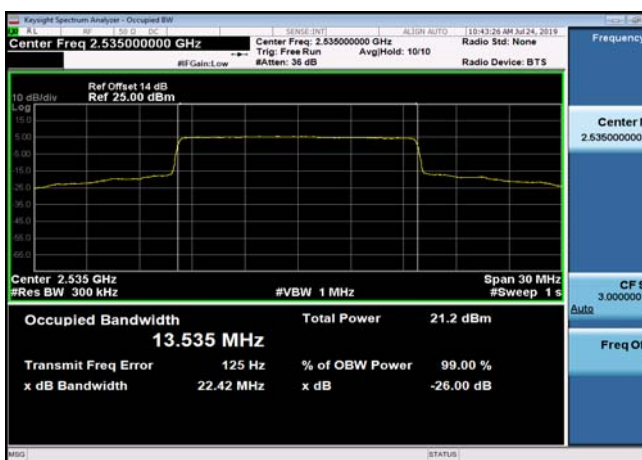


FDD07_MidRange_10MHz_2535MHz_Q16





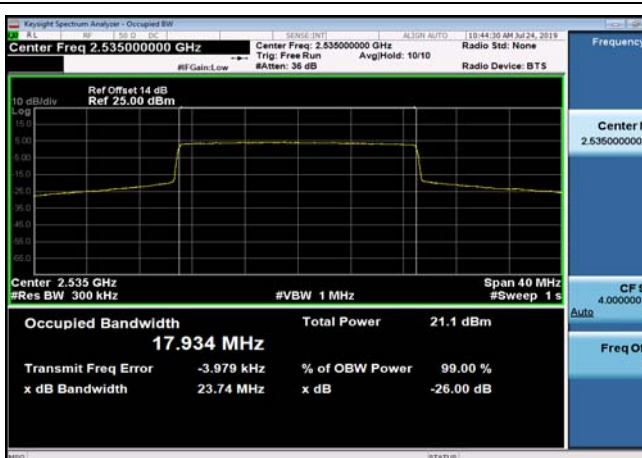
FDD07_MidRange_15MHz_2535MHz_QPSK



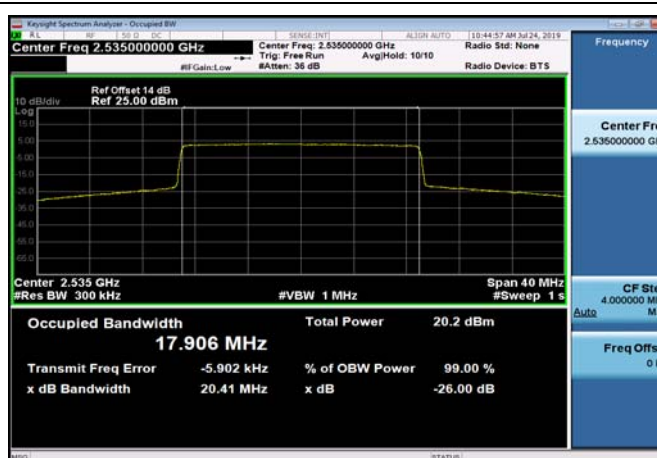
FDD07_MidRange_15MHz_2535MHz_Q16



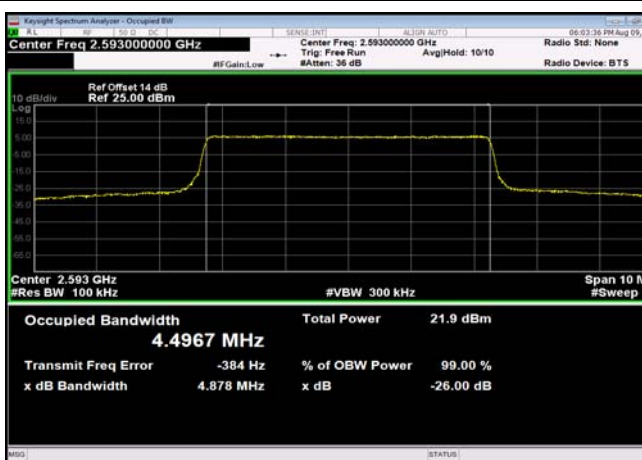
FDD07_MidRange_20MHz_2535MHz_QPSK



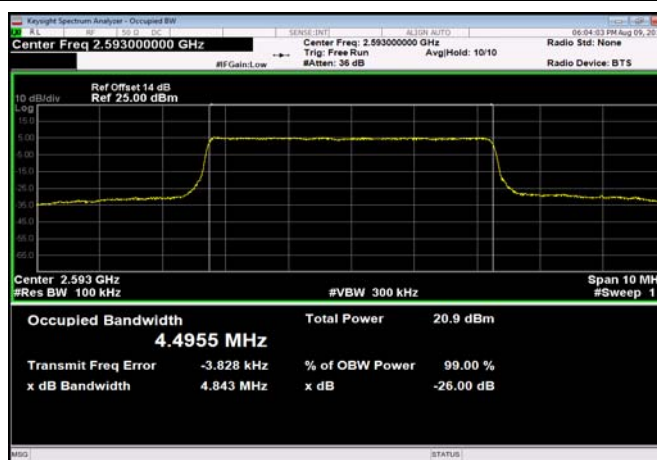
FDD07_MidRange_20MHz_2535MHz_Q16



TDD41_MidRange_5MHz_2593MHz_QPSK

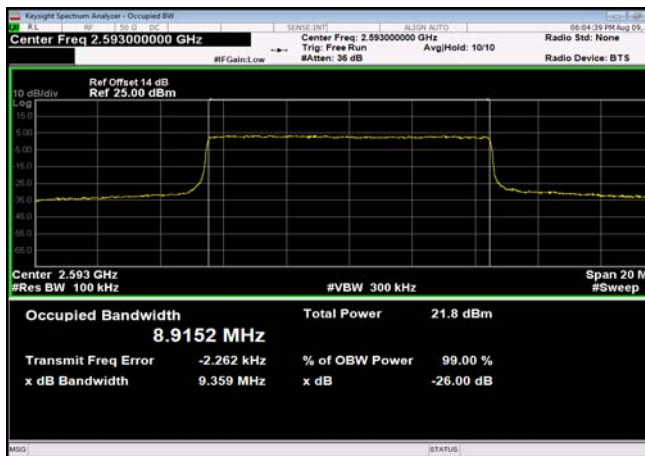


TDD41_MidRange_5MHz_2593MHz_Q16

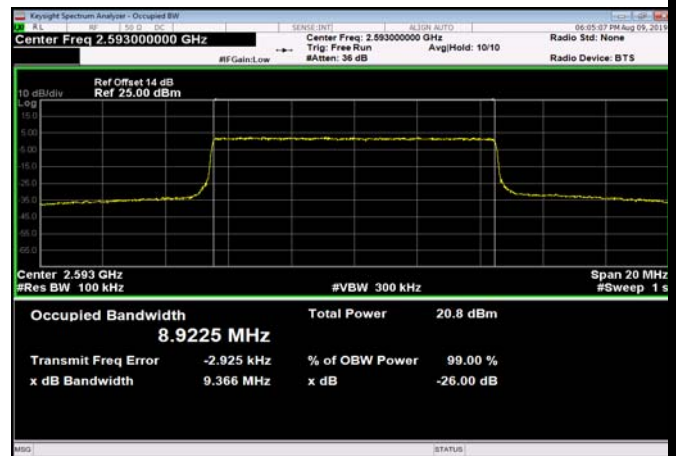




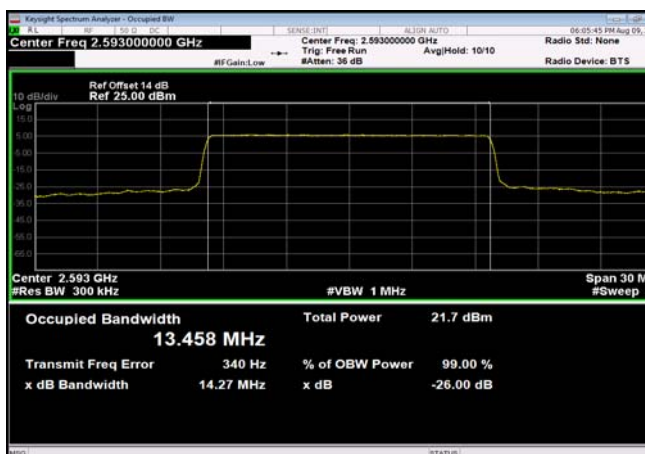
TDD41_MidRange_10MHz_2593MHz_QPSK



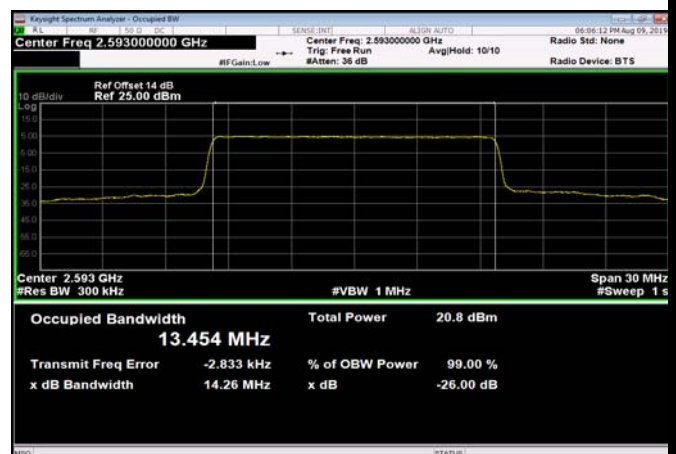
TDD41_MidRange_10MHz_2593MHz_Q16



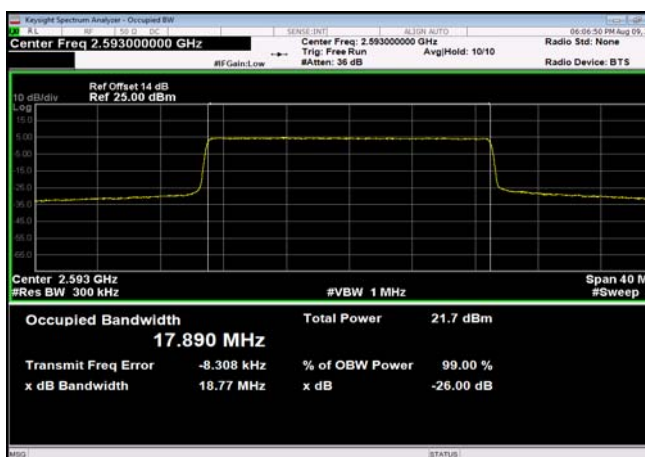
TDD41_MidRange_15MHz_2593MHz_QPSK



TDD41_MidRange_15MHz_2593MHz_Q16



TDD41_MidRange_20MHz_2593MHz_QPSK



TDD41_MidRange_20MHz_2593MHz_Q16



**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	2.260	0.003	0.10	Pass
Normal	Normal	FDD05	10	fullRB	QPSK	-3.405	0.004	0.10	Pass
Normal	High	FDD05	10	fullRB	QPSK	-3.519	0.004	0.10	Pass
50	Normal	FDD05	10	fullRB	QPSK	-3.090	0.004	0.10	Pass
40	Normal	FDD05	10	fullRB	QPSK	5.579	0.007	0.10	Pass
30	Normal	FDD05	10	fullRB	QPSK	3.333	0.004	0.10	Pass
20	Normal	FDD05	10	fullRB	QPSK	3.705	0.004	0.10	Pass
10	Normal	FDD05	10	fullRB	QPSK	3.290	0.004	0.10	Pass
0	Normal	FDD05	10	fullRB	QPSK	-3.691	0.004	0.10	Pass
-10	Normal	FDD05	10	fullRB	QPSK	-4.020	0.005	0.10	Pass
-20	Normal	FDD05	10	fullRB	QPSK	-3.862	0.005	0.10	Pass
-30	Normal	FDD05	10	fullRB	QPSK	2.661	0.003	0.10	Pass
Normal	Low	FDD07	10	fullRB	QPSK	13.003	0.005	0.10	Pass
Normal	Normal	FDD07	10	fullRB	QPSK	7.739	0.003	0.10	Pass
Normal	High	FDD07	10	fullRB	QPSK	7.353	0.003	0.10	Pass
50	Normal	FDD07	10	fullRB	QPSK	7.639	0.003	0.10	Pass
40	Normal	FDD07	10	fullRB	QPSK	6.709	0.003	0.10	Pass
30	Normal	FDD07	10	fullRB	QPSK	9.384	0.004	0.10	Pass
20	Normal	FDD07	10	fullRB	QPSK	9.112	0.004	0.10	Pass
10	Normal	FDD07	10	fullRB	QPSK	7.496	0.003	0.10	Pass
0	Normal	FDD07	10	fullRB	QPSK	7.896	0.003	0.10	Pass
-10	Normal	FDD07	10	fullRB	QPSK	7.095	0.003	0.10	Pass
-20	Normal	FDD07	10	fullRB	QPSK	8.297	0.003	0.10	Pass
-30	Normal	FDD07	10	fullRB	QPSK	8.526	0.003	0.10	Pass
Normal	Low	TDD41	10	fullRB	QPSK	-11.816	0.005	0.10	Pass
Normal	Normal	TDD41	10	fullRB	QPSK	8.311	0.003	0.10	Pass
Normal	High	TDD41	10	fullRB	QPSK	-8.855	0.003	0.10	Pass



50	Normal	TDD41	10	fullRB	QPSK	-9.456	0.004	0.10	Pass
40	Normal	TDD41	10	fullRB	QPSK	-11.272	0.004	0.10	Pass
30	Normal	TDD41	10	fullRB	QPSK	-8.054	0.003	0.10	Pass
20	Normal	TDD41	10	fullRB	QPSK	8.225	0.003	0.10	Pass
10	Normal	TDD41	10	fullRB	QPSK	8.912	0.003	0.10	Pass
0	Normal	TDD41	10	fullRB	QPSK	9.012	0.003	0.10	Pass
-10	Normal	TDD41	10	fullRB	QPSK	8.526	0.003	0.10	Pass
-20	Normal	TDD41	10	fullRB	QPSK	8.383	0.003	0.10	Pass
-30	Normal	TDD41	10	fullRB	QPSK	8.340	0.003	0.10	Pass

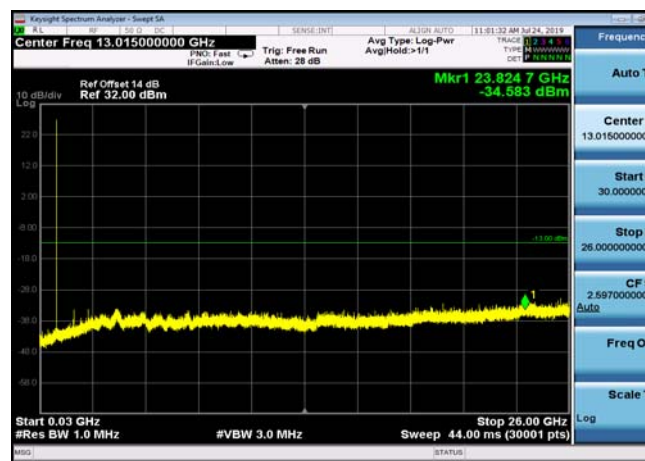
Note: Normal=3.8V, Low=3.5V, High=4.2V



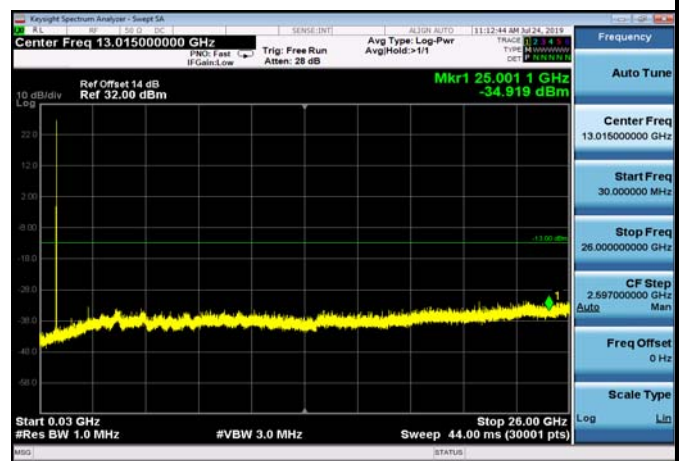
Conducted Out of Band Emissions

Test Result and Data

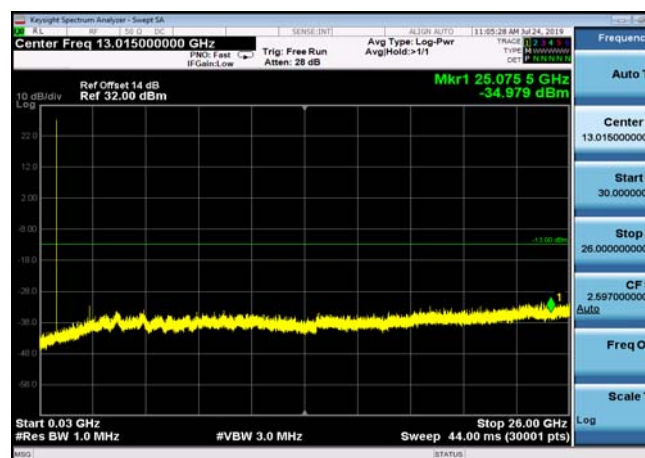
FDD05_HighRange_1.4MHz_30MHz~26GHz



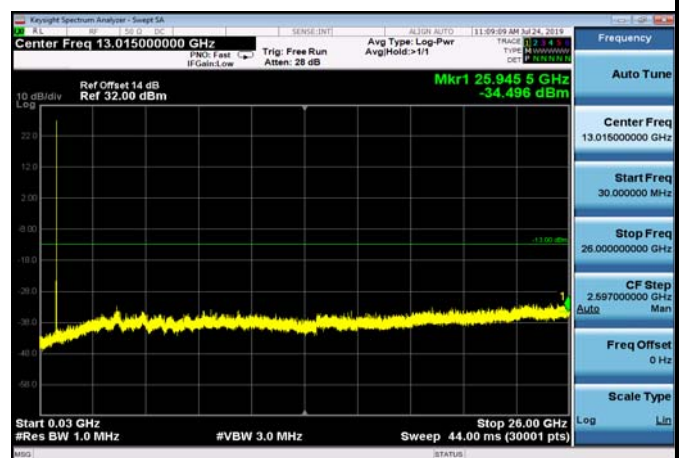
FDD05_HighRange_10MHz_30MHz~26GHz



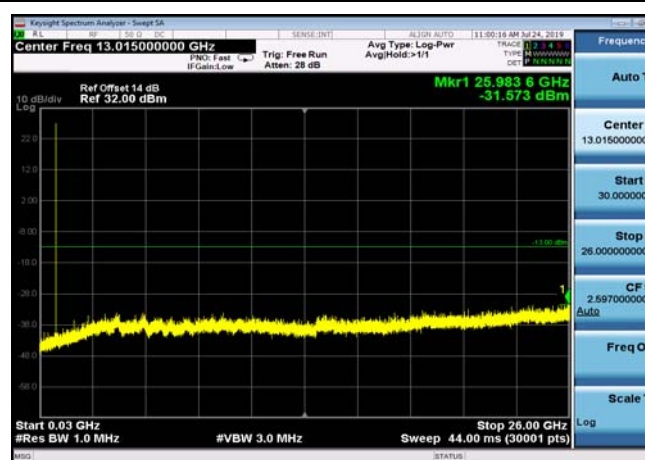
FDD05_HighRange_3MHz_30MHz~26GHz



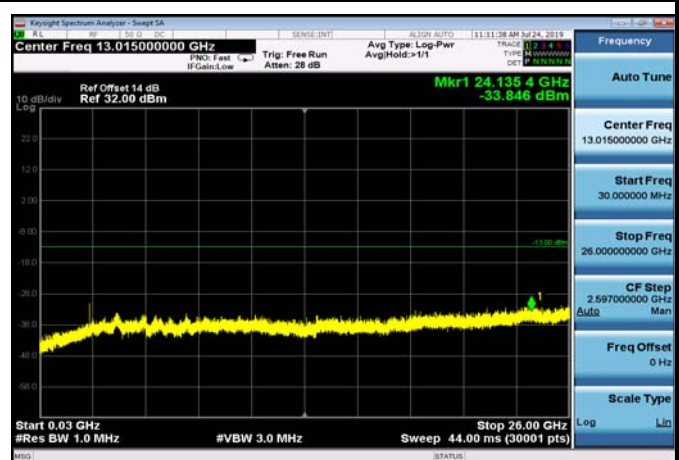
FDD05_HighRange_5MHz_30MHz~26GHz



FDD05_LowRange_1.4MHz_30MHz~26GHz

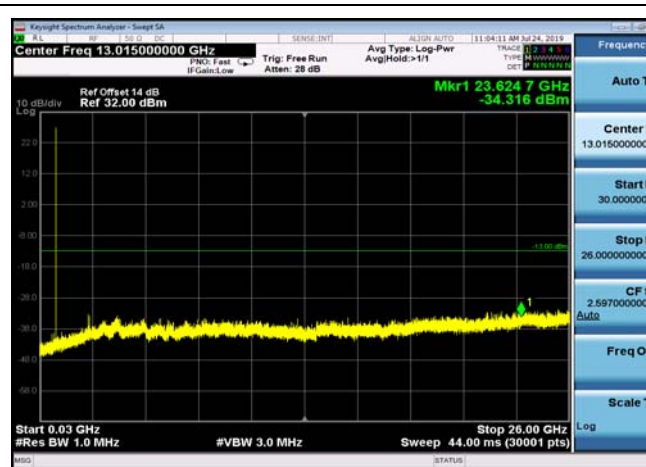


FDD05_LowRange_10MHz_30MHz~26GHz

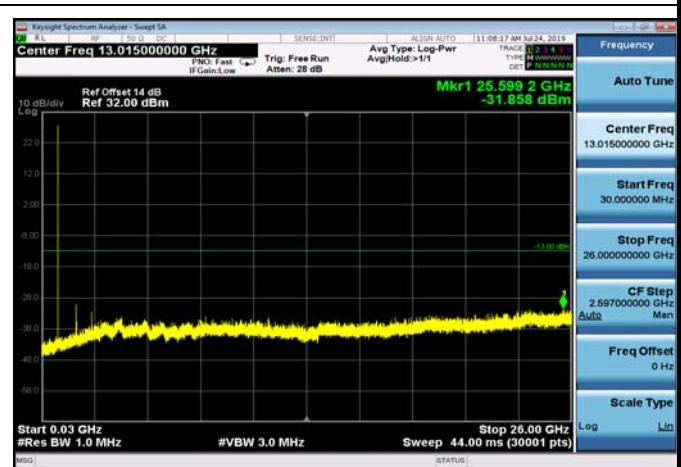




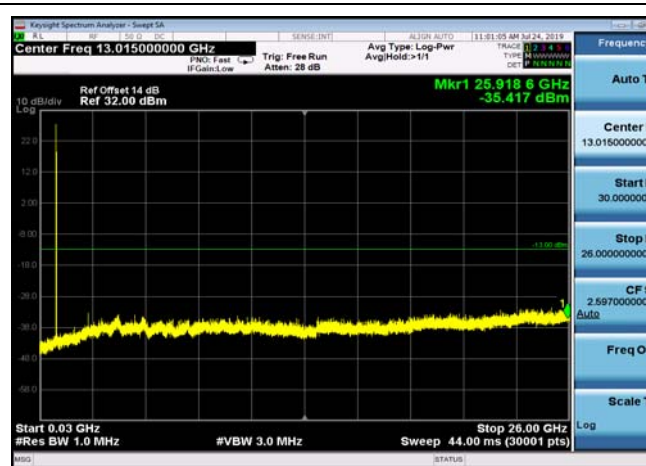
FDD05_LowRange_3MHz_30MHz~26GHz



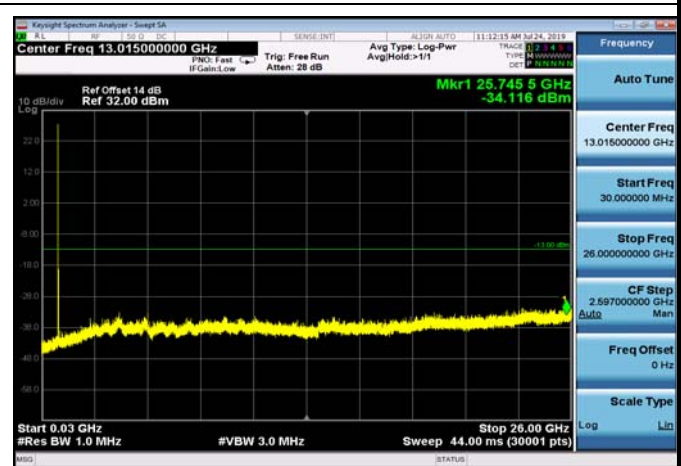
FDD05_LowRange_5MHz_30MHz~26GHz



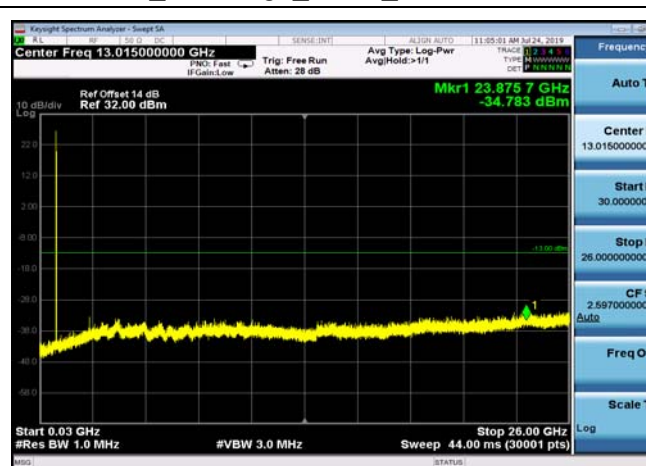
FDD05_MidRange_1.4MHz_30MHz~26GHz



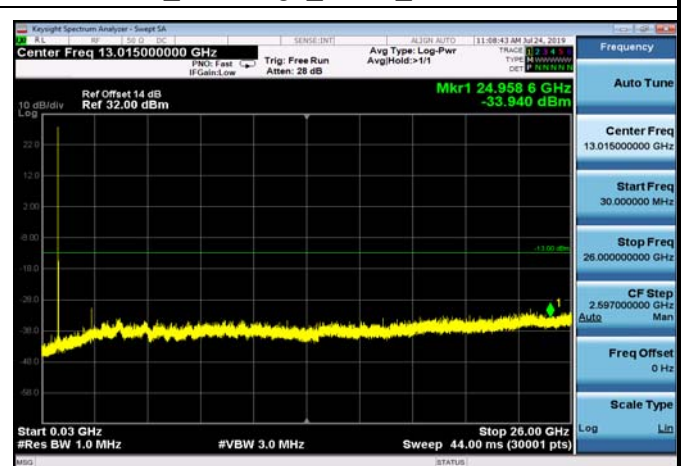
FDD05_MidRange_10MHz_30MHz~26GHz



FDD05_MidRange_3MHz_30MHz~26GHz

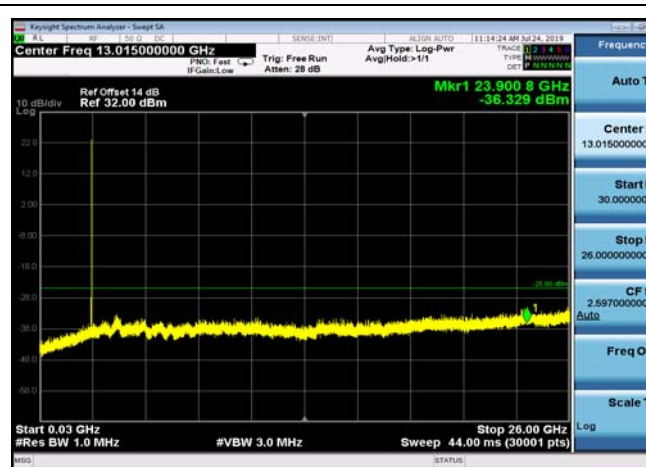


FDD05_MidRange_5MHz_30MHz~26GHz

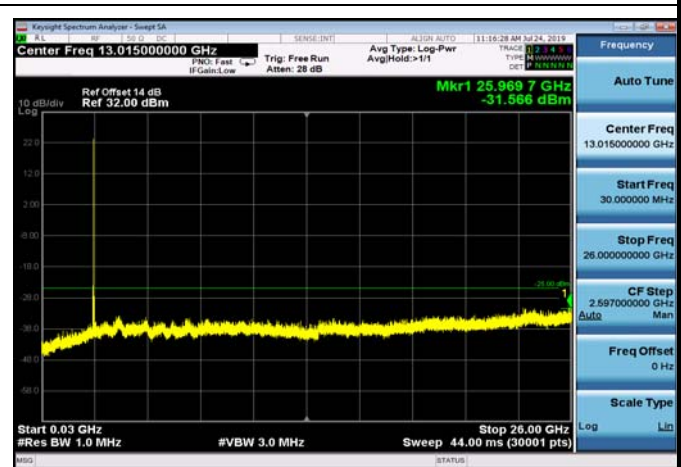




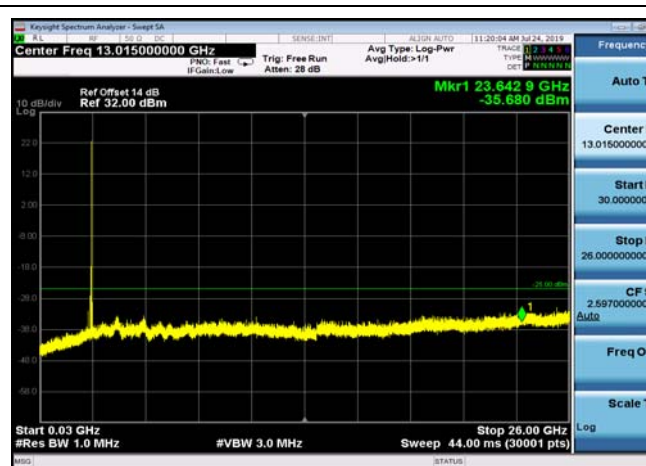
FDD07_HighRange_10MHz_30MHz~26GHz



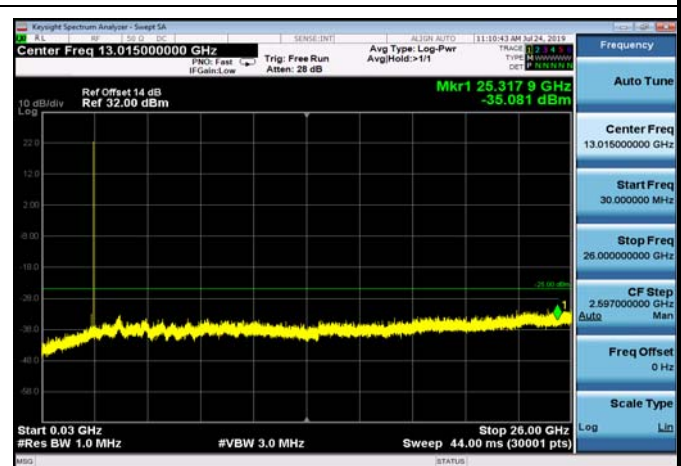
FDD07_HighRange_15MHz_30MHz~26GHz



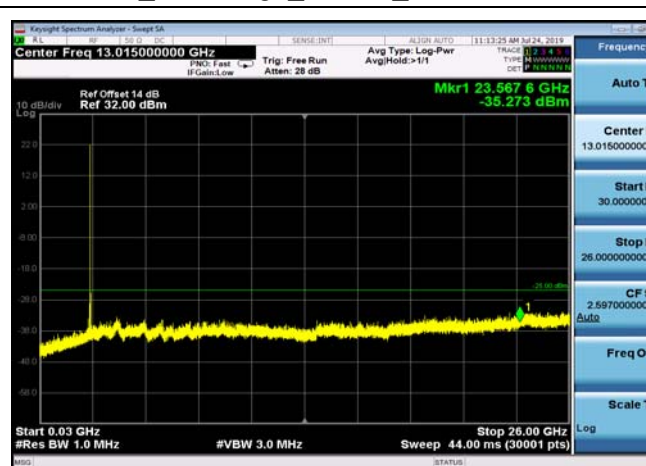
FDD07_HighRange_20MHz_30MHz~26GHz



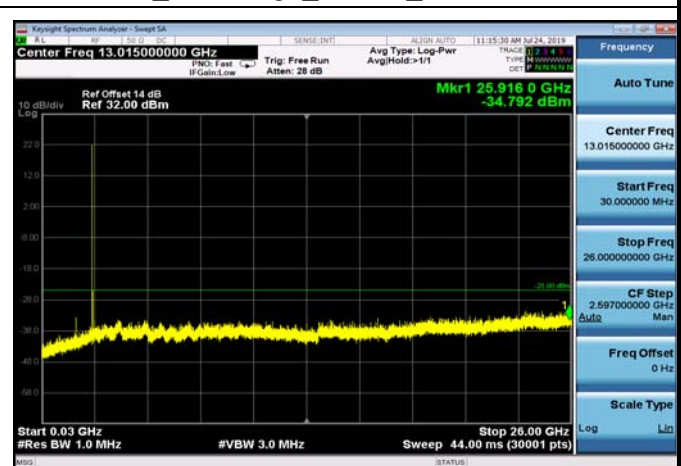
FDD07_HighRange_5MHz_30MHz~26GHz



FDD07_LowRange_10MHz_30MHz~26GHz

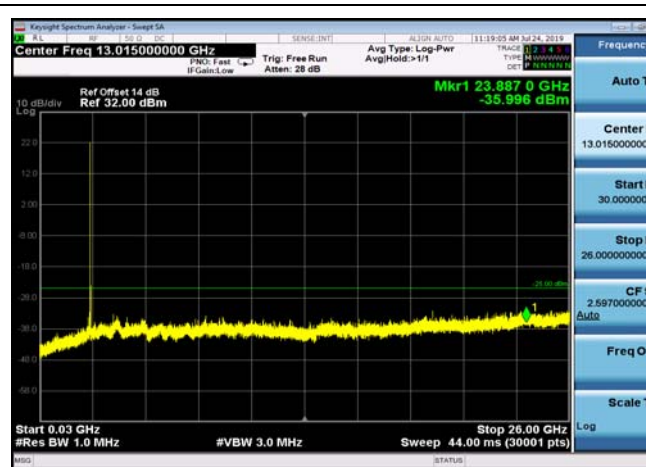


FDD07_LowRange_15MHz_30MHz~26GHz

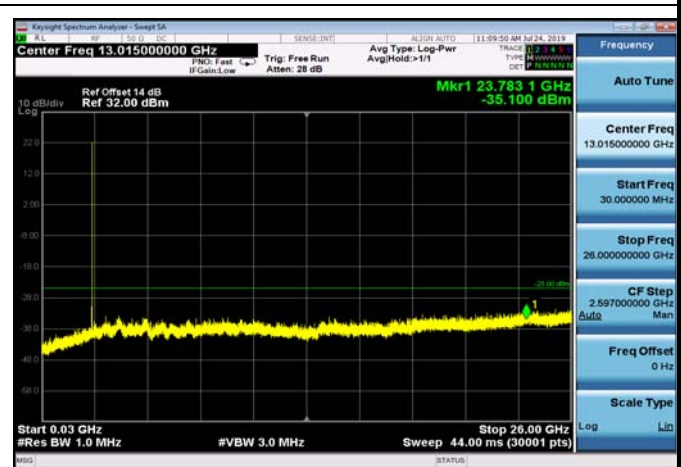




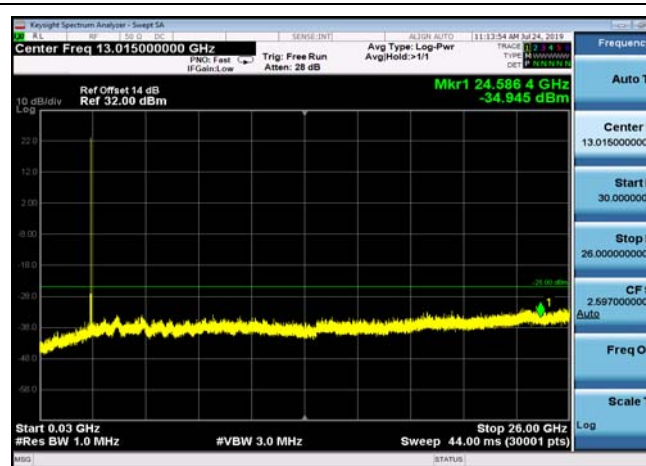
FDD07_LowRange_20MHz_30MHz~26GHz



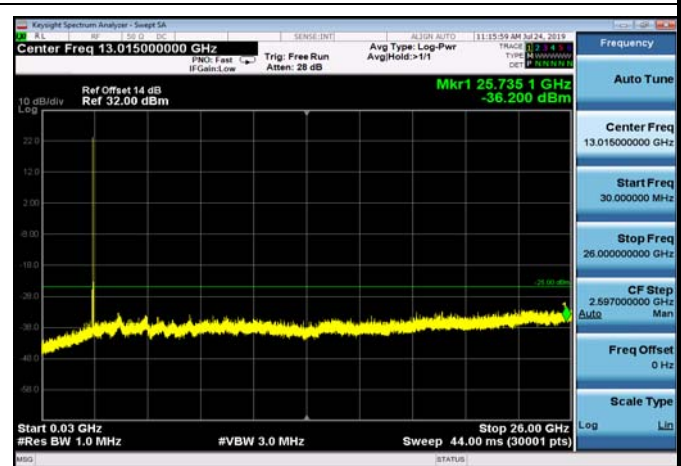
FDD07_LowRange_5MHz_30MHz~26GHz



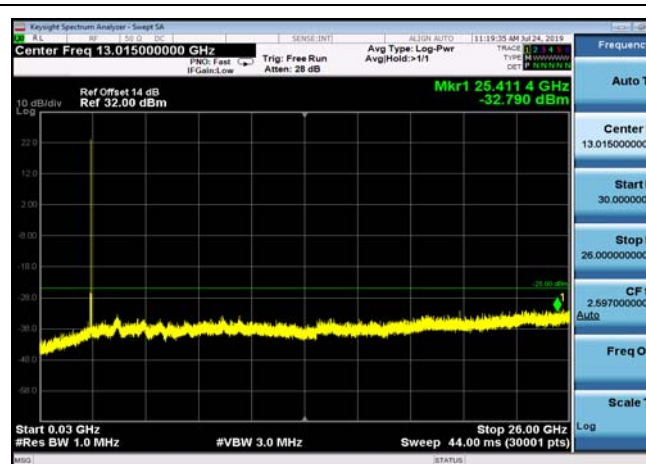
FDD07_MidRange_10MHz_30MHz~26GHz



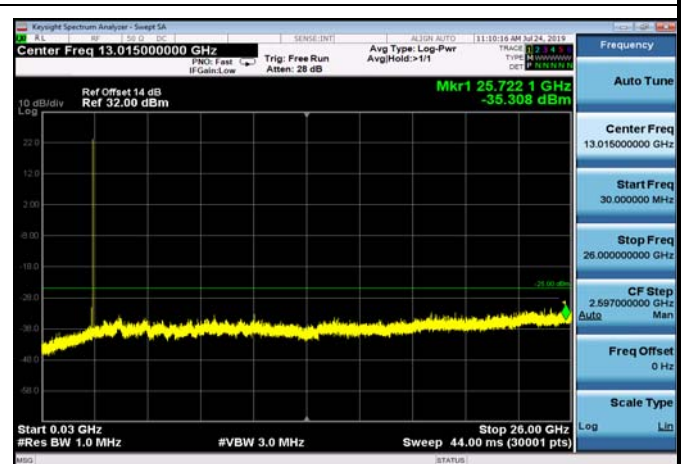
FDD07_MidRange_15MHz_30MHz~26GHz



FDD07_MidRange_20MHz_30MHz~26GHz

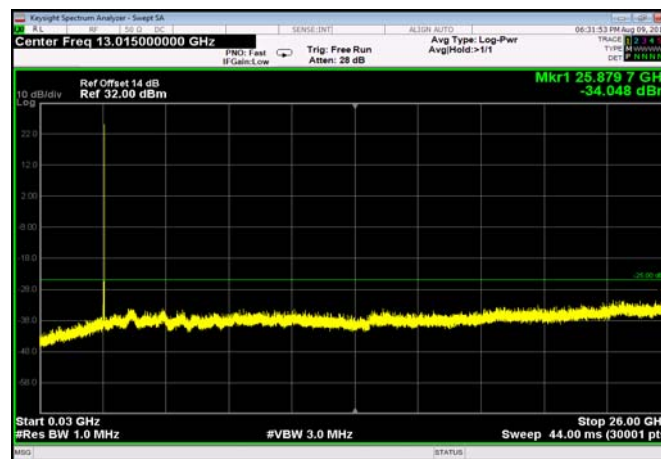


FDD07_MidRange_5MHz_30MHz~26GHz

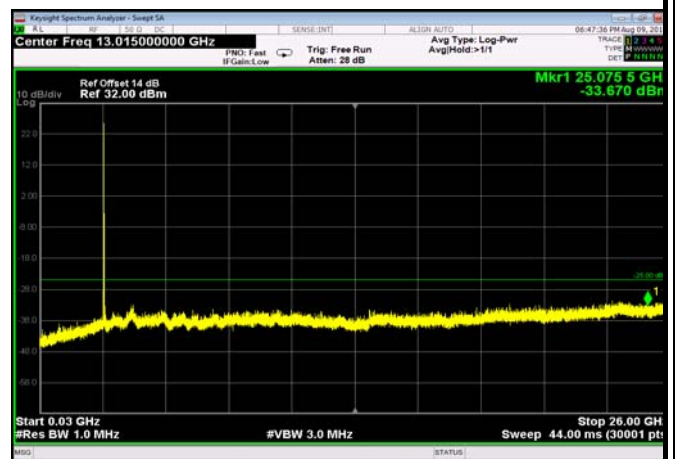




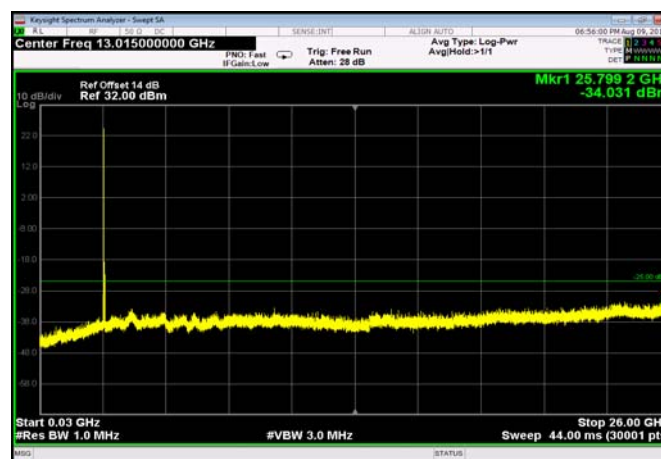
TDD41_HighRange_10MHz_30MHz~26GHz



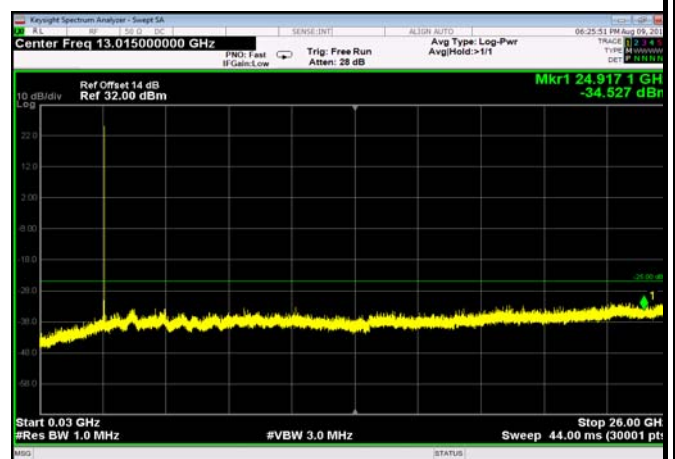
TDD41_HighRange_15MHz_30MHz~26GHz



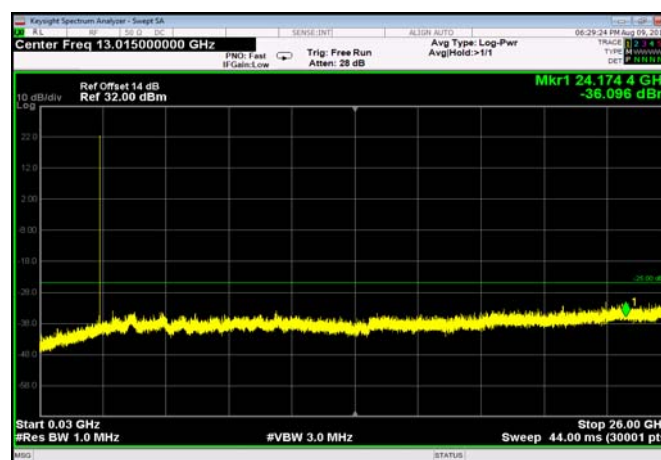
TDD41_HighRange_20MHz_30MHz~26GHz



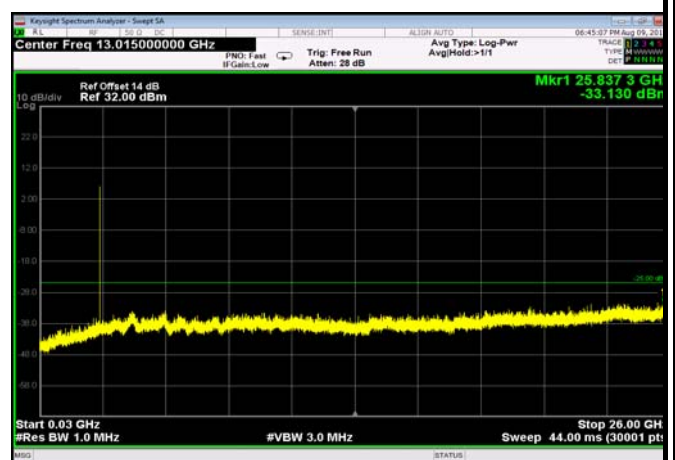
TDD41_HighRange_5MHz_30MHz~26GHz



TDD41_LowRange_10MHz_30MHz~26GHz



TDD41_LowRange_15MHz_30MHz~26GHz





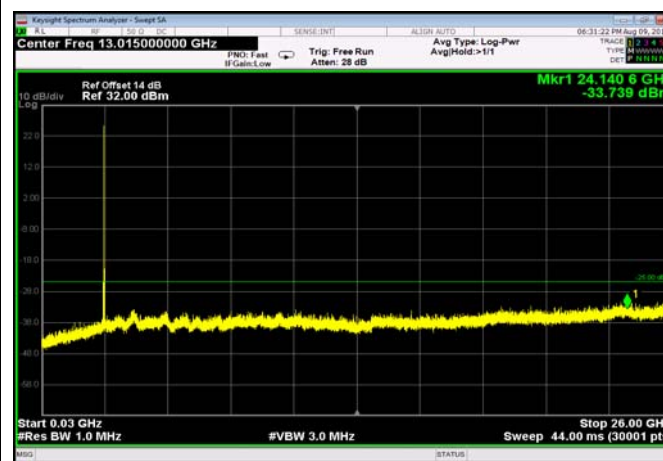
TDD41_LowRange_20MHz_30MHz~26GHz



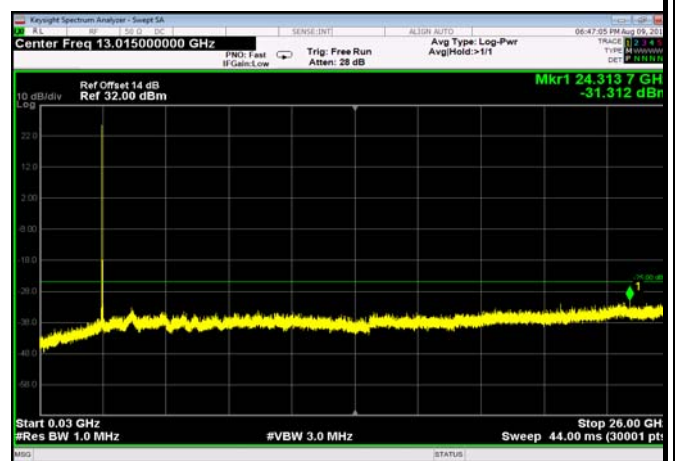
TDD41_LowRange_5MHz_30MHz~26GHz



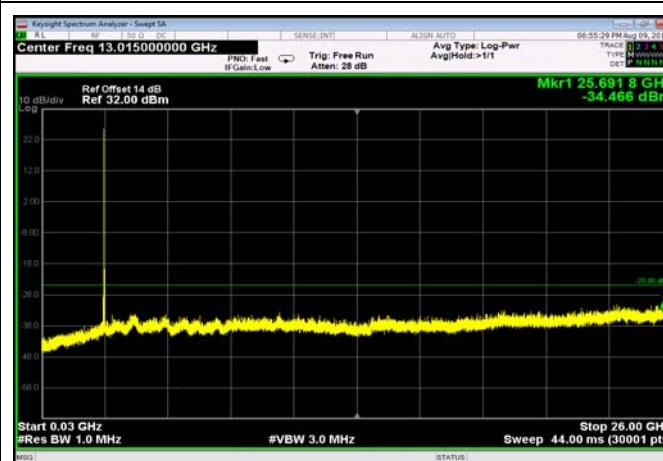
TDD41_MidRange_10MHz_30MHz~26GHz



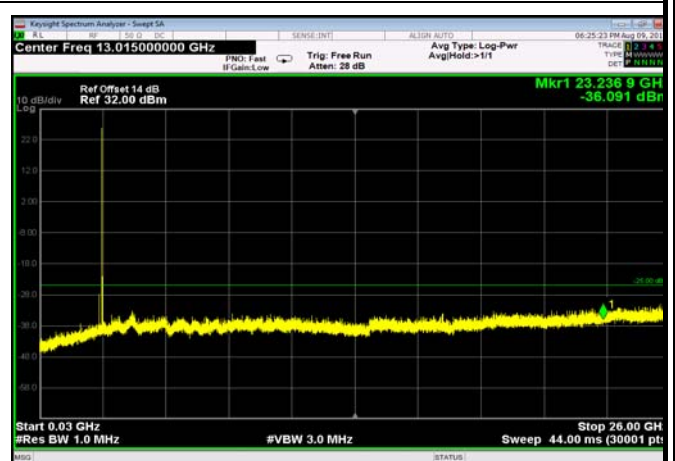
TDD41_MidRange_15MHz_30MHz~26GHz



TDD41_MidRange_20MHz_30MHz~26GHz



TDD41_MidRange_5MHz_30MHz~26GHz

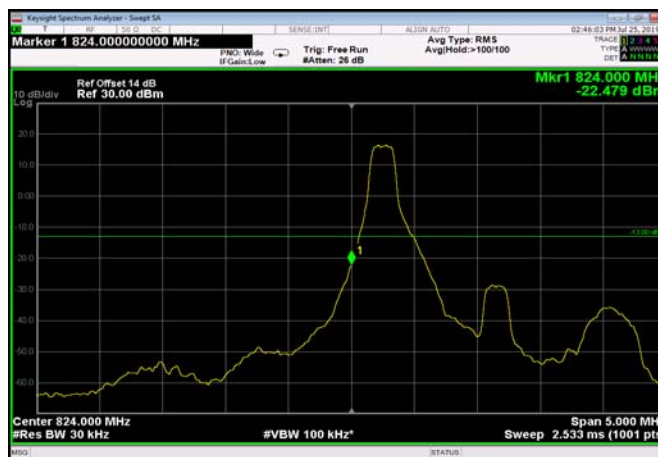




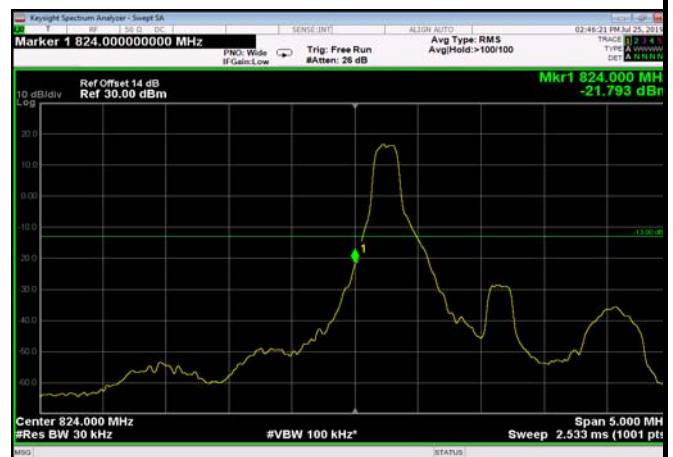
Conducted Band Edge

Test Result and Data

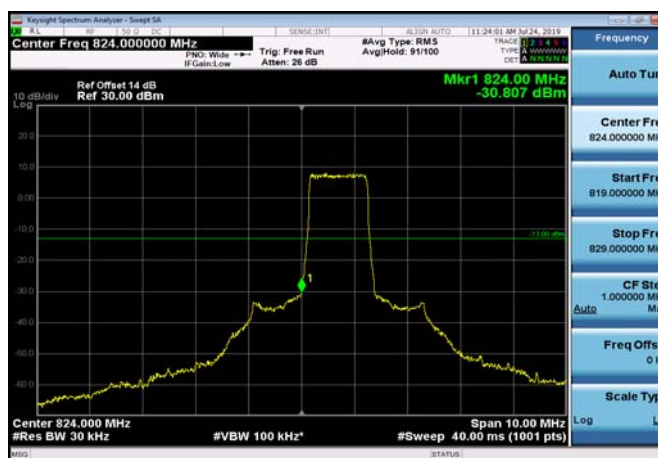
LowRange_FDD05_1.4MHz_824.7_OneRB
_low_QPSK



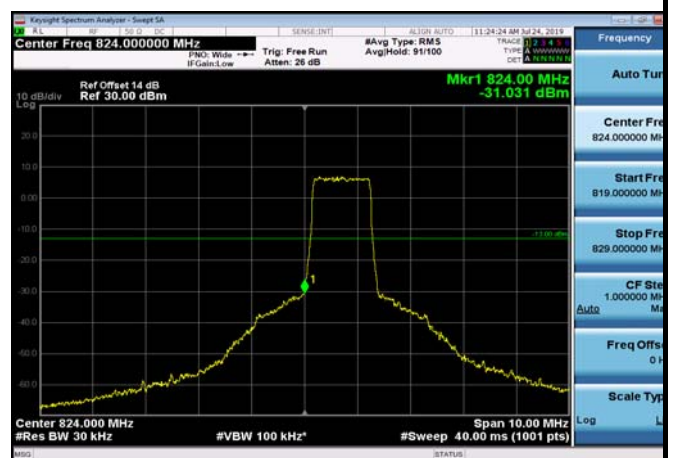
LowRange_FDD05_1.4MHz_824.7_OneRB
_low_Q16

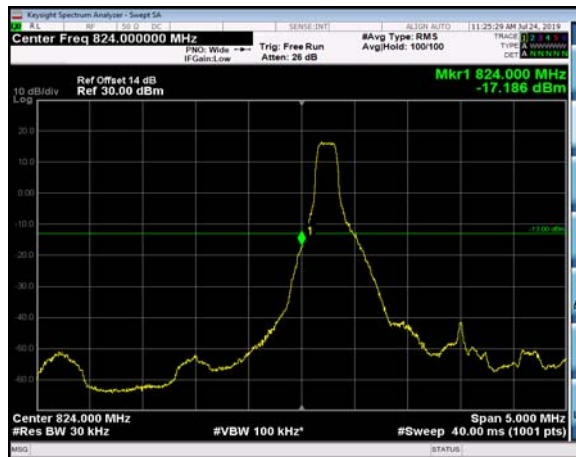
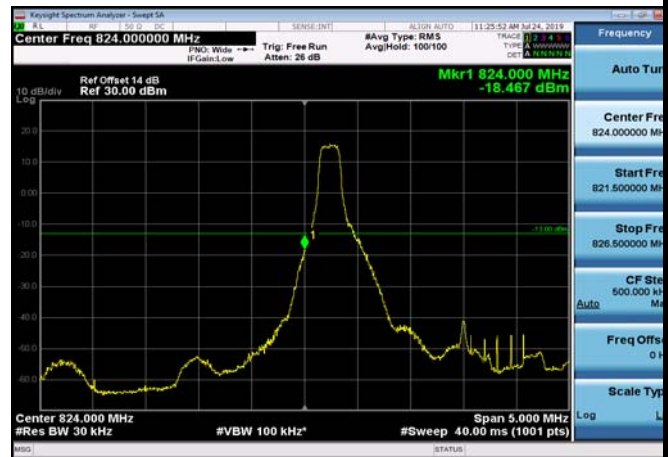
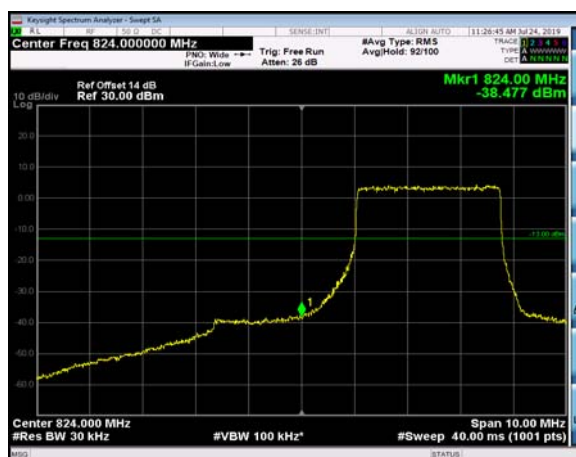
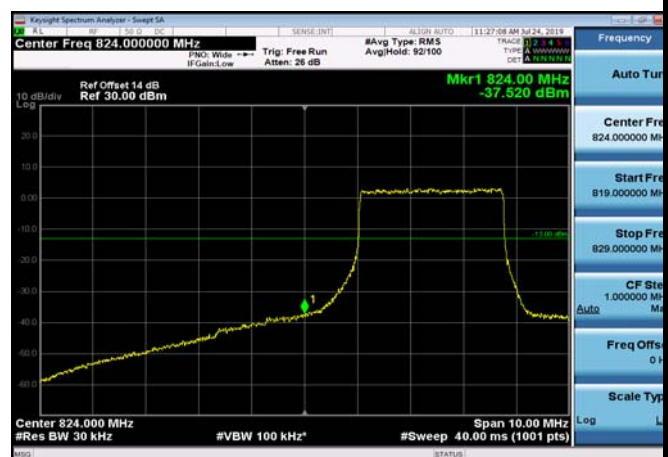
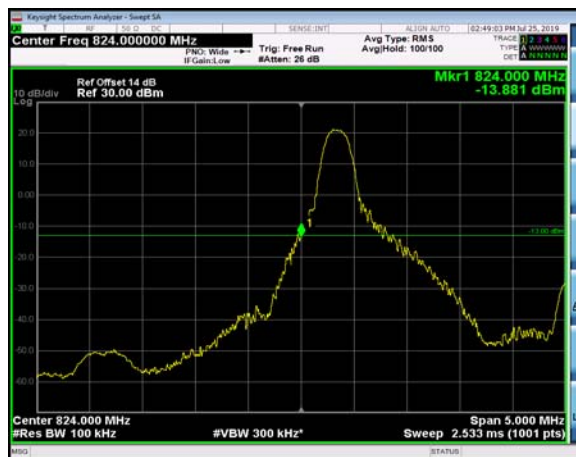
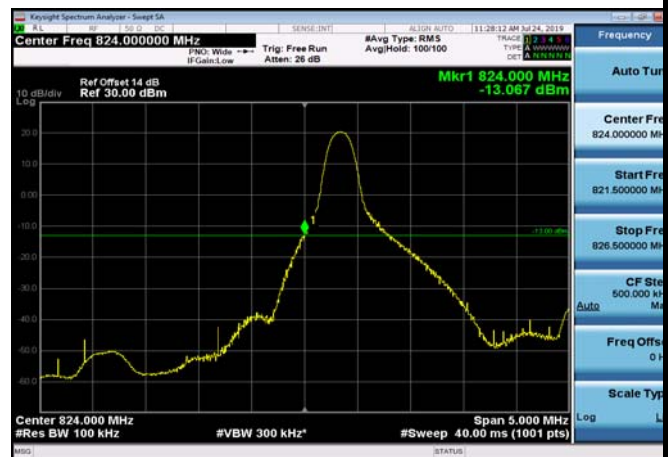


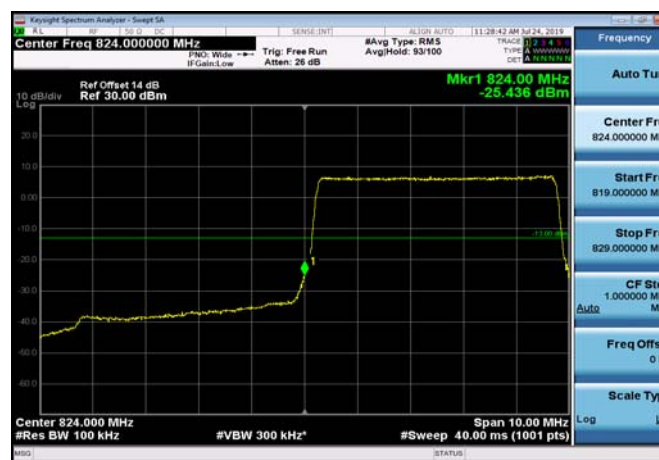
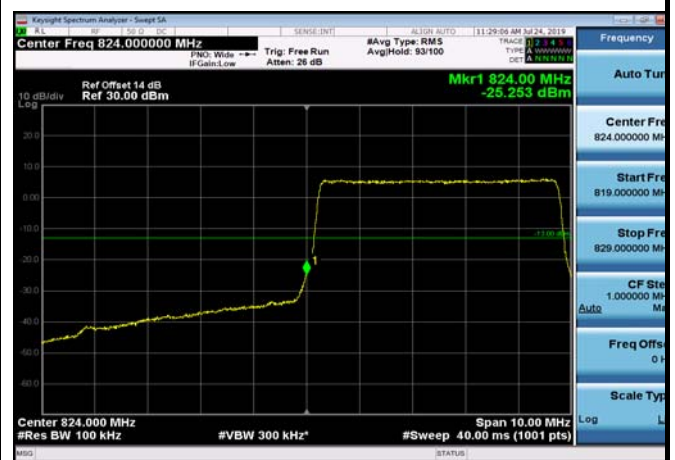
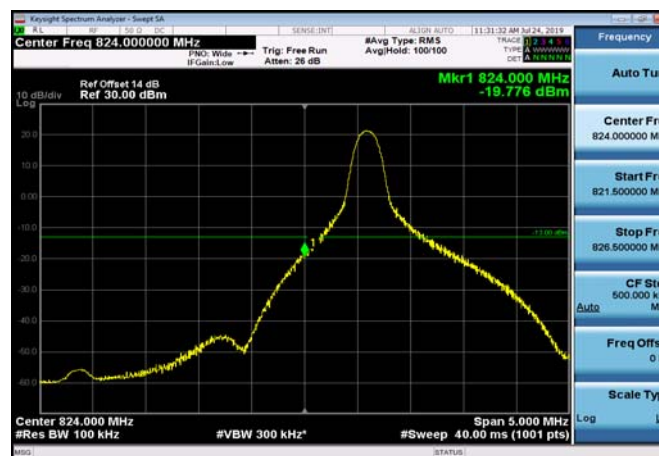
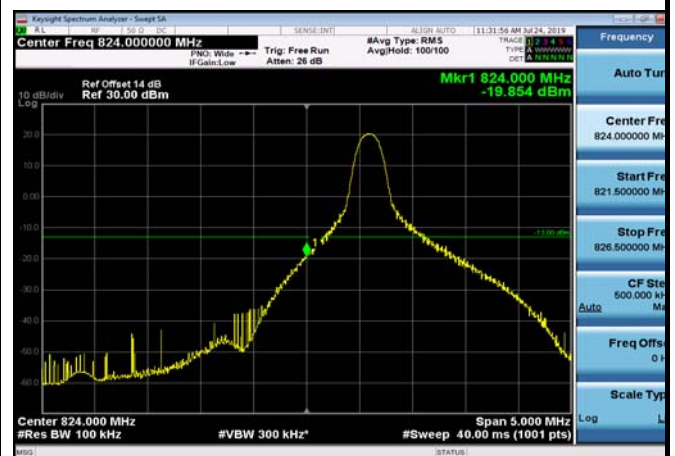
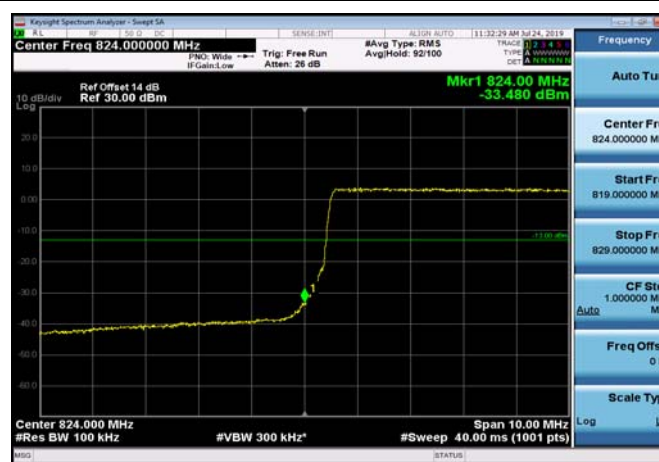
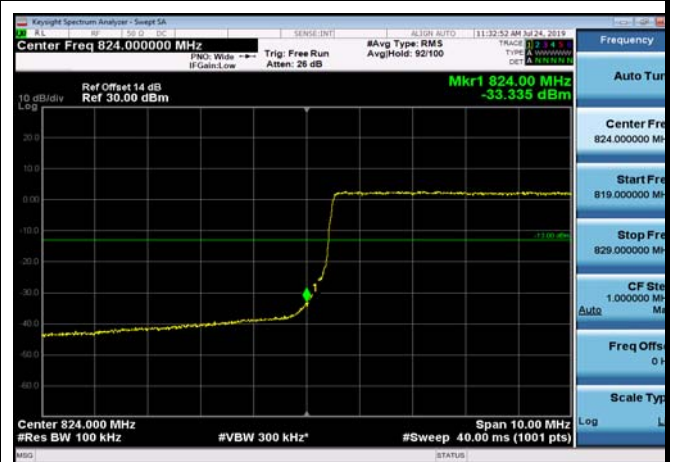
LowRange_FDD05_1.4MHz_824.7_fullIRB
_Low_QPSK

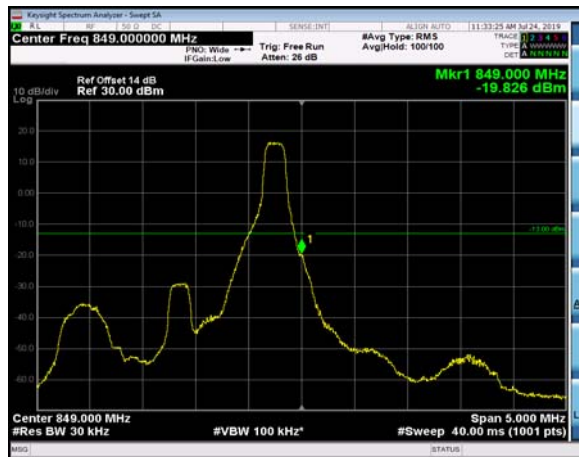
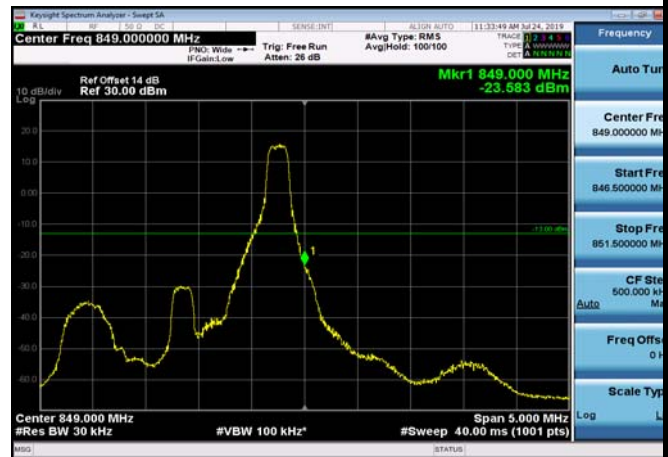
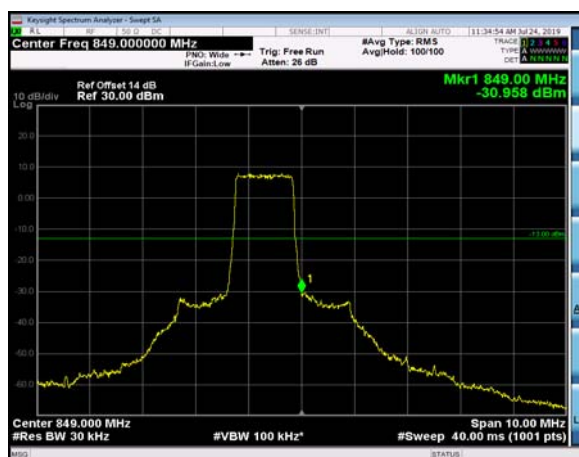
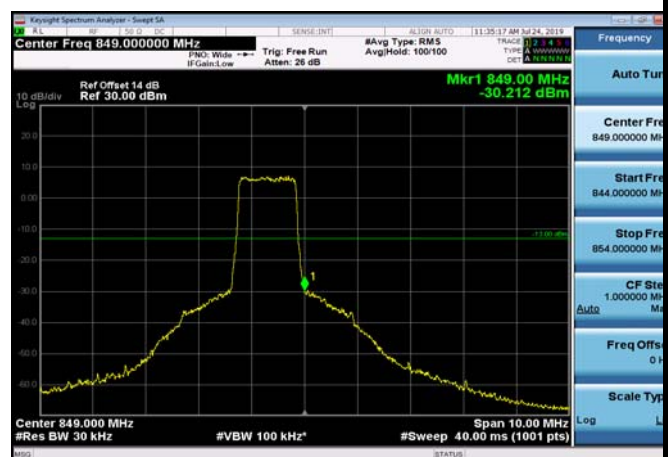
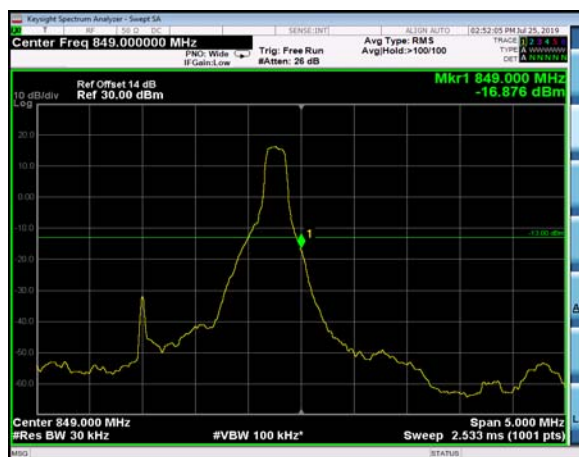
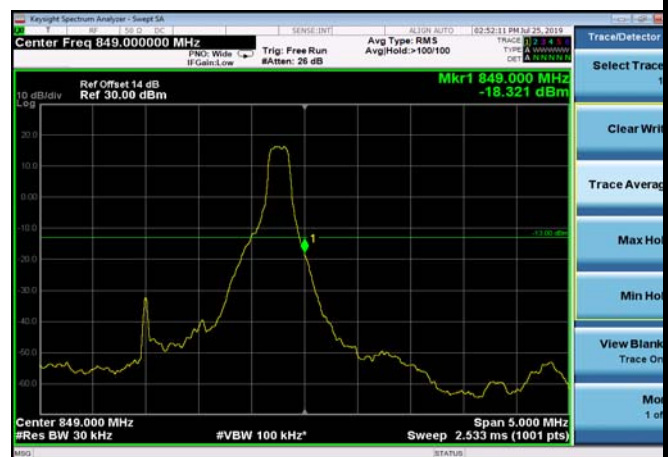


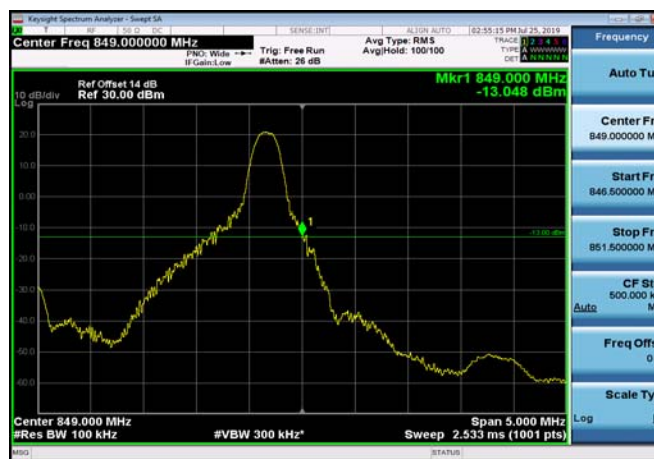
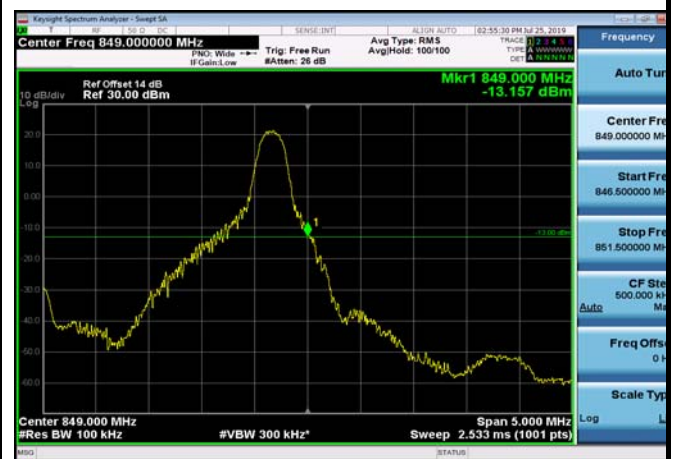
LowRange_FDD05_1.4MHz_824.7_fullIRB
_Low_Q16

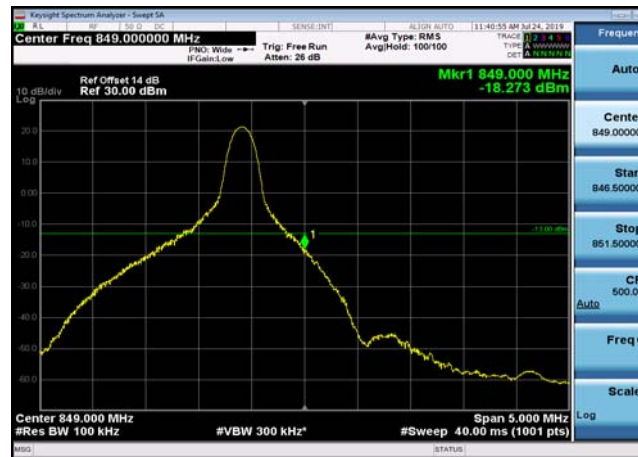
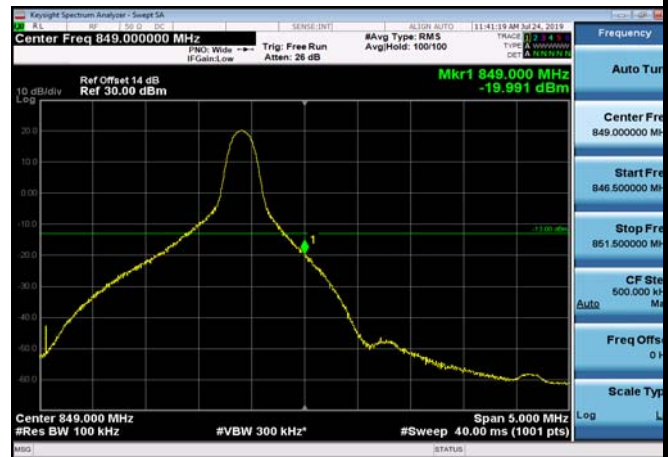
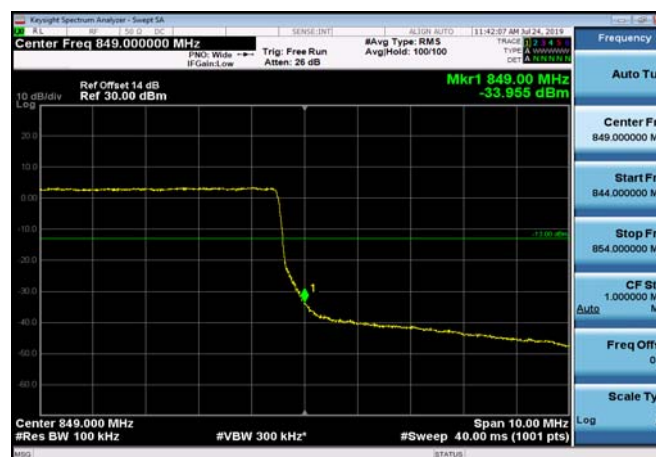
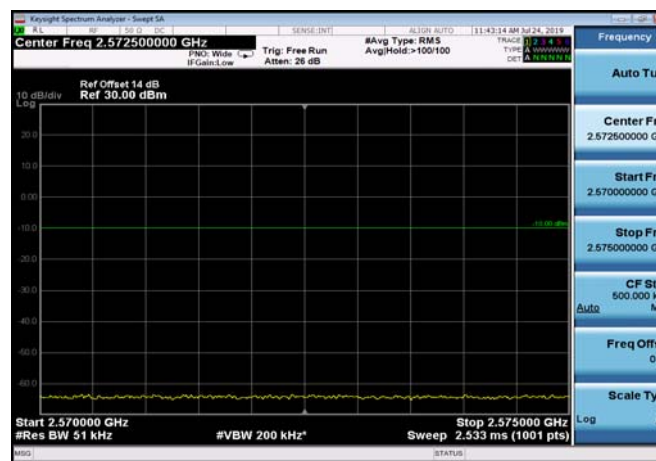
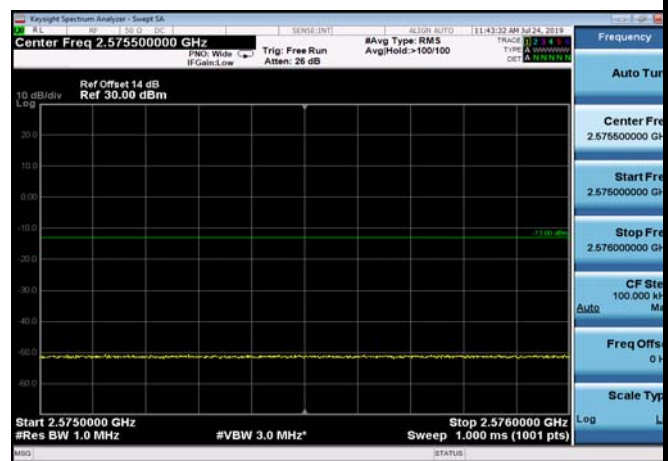


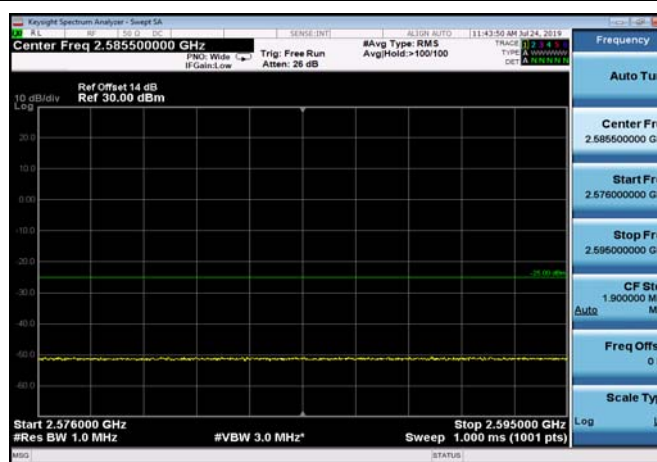
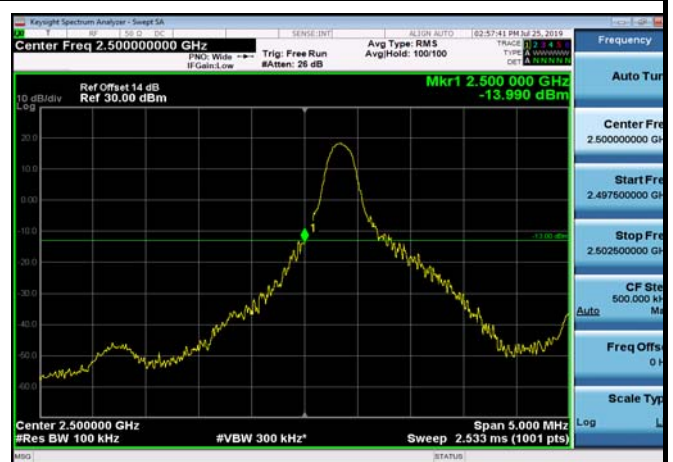
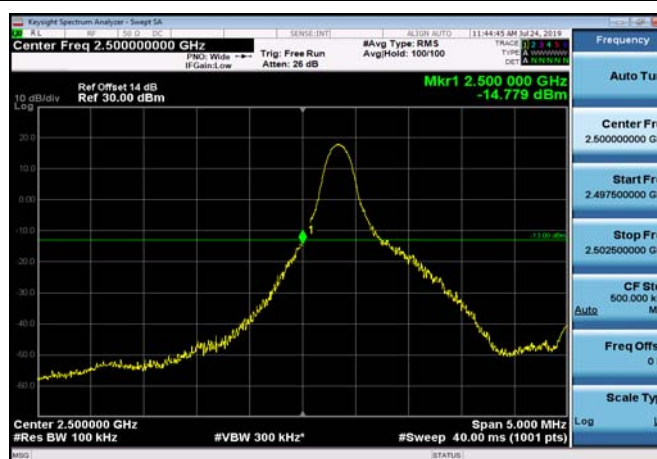
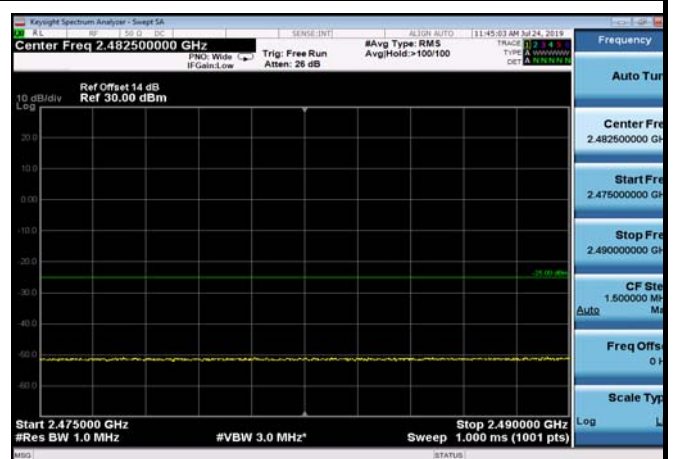
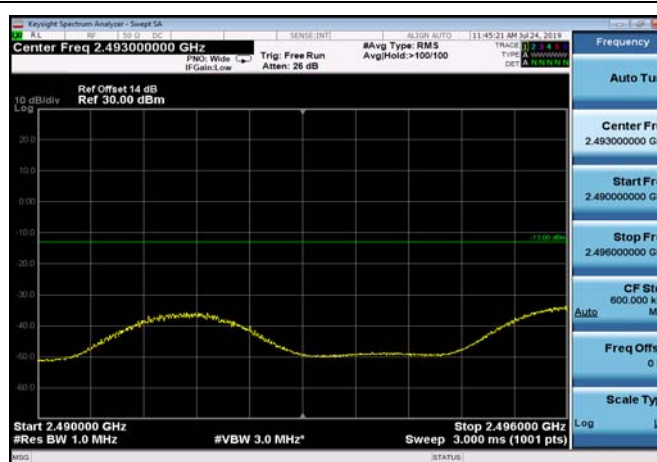
LowRange_FDD05_3MHz_825.5_OneRB
_low_QPSKLowRange_FDD05_3MHz_825.5_OneRB
_low_Q16LowRange_FDD05_3MHz_825.5_fullRB
_Low_QPSKLowRange_FDD05_3MHz_825.5_fullRB
_Low_Q16LowRange_FDD05_5MHz_826.5_OneRB
_low_QPSKLowRange_FDD05_5MHz_826.5_OneRB
_low_Q16

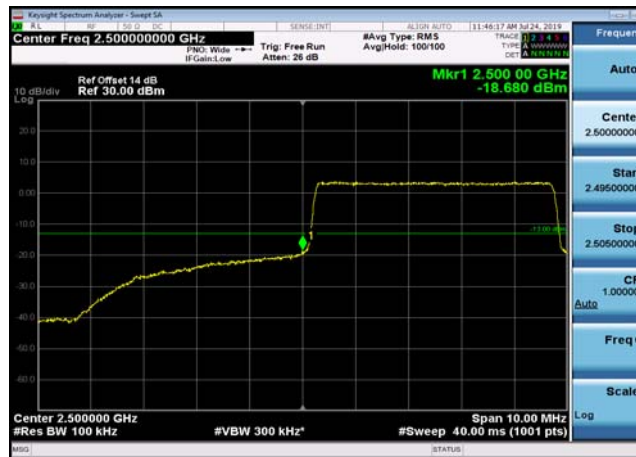
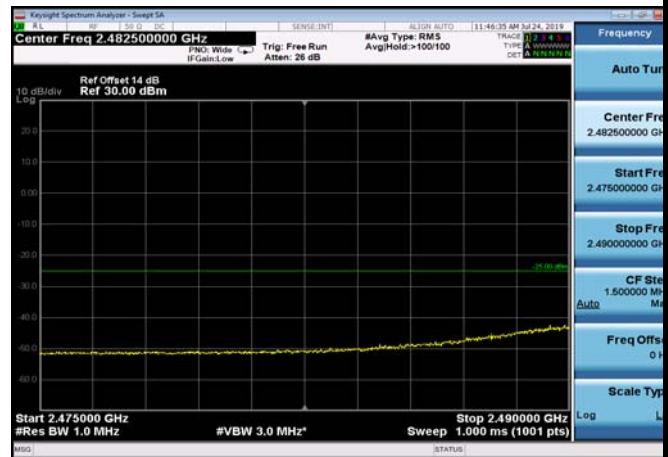
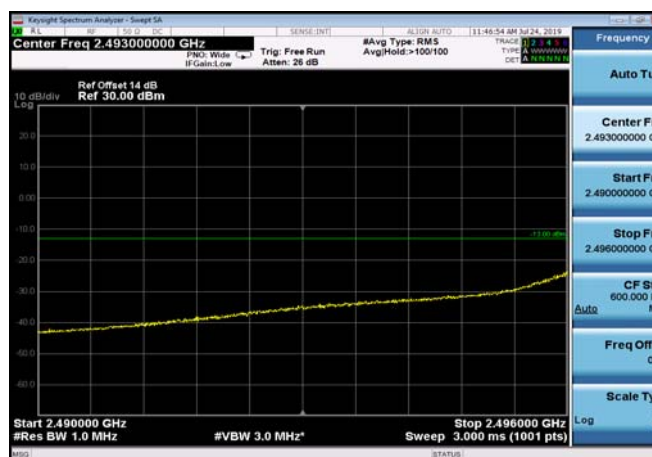
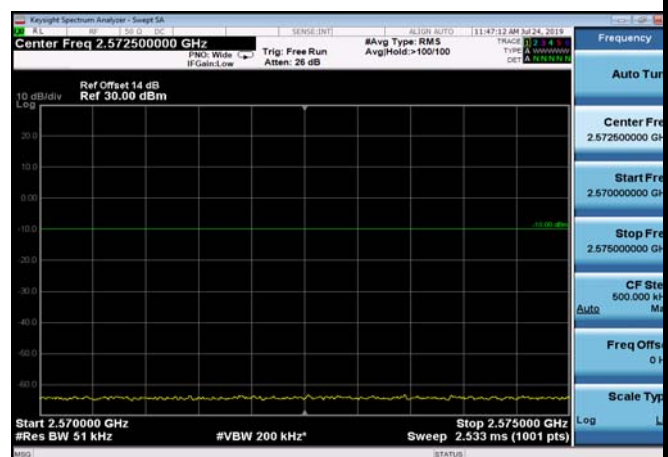
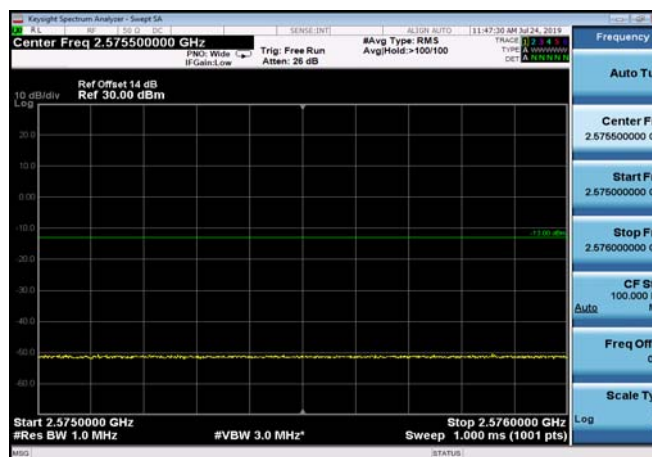
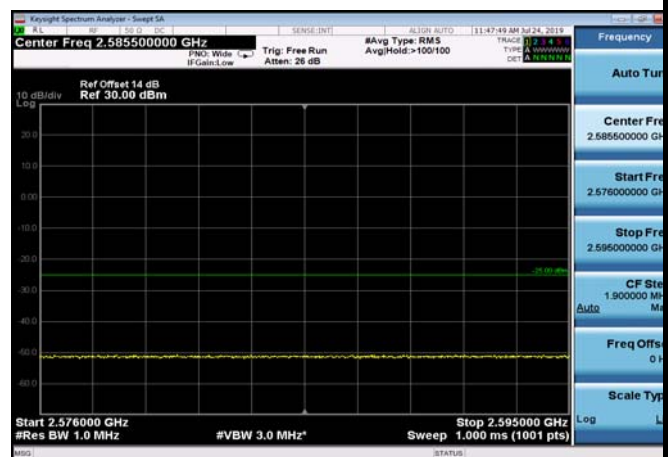
LowRange_FDD05_5MHz_826.5_fullRB
_Low_QPSKLowRange_FDD05_5MHz_826.5_fullRB
_Low_Q16LowRange_FDD05_10MHz_829_OneRB
_low_QPSKLowRange_FDD05_10MHz_829_OneRB
_low_Q16LowRange_FDD05_10MHz_829_fullRB
_Low_QPSKLowRange_FDD05_10MHz_829_fullRB
_Low_Q16

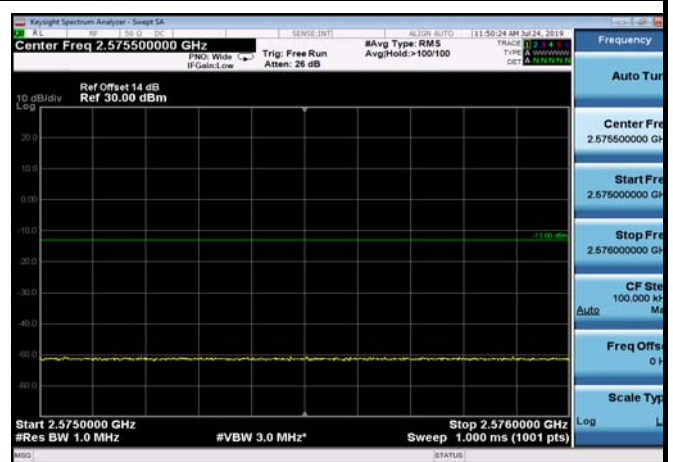
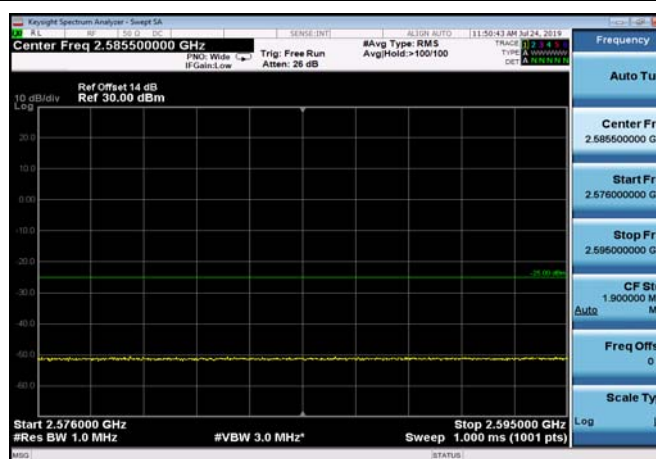
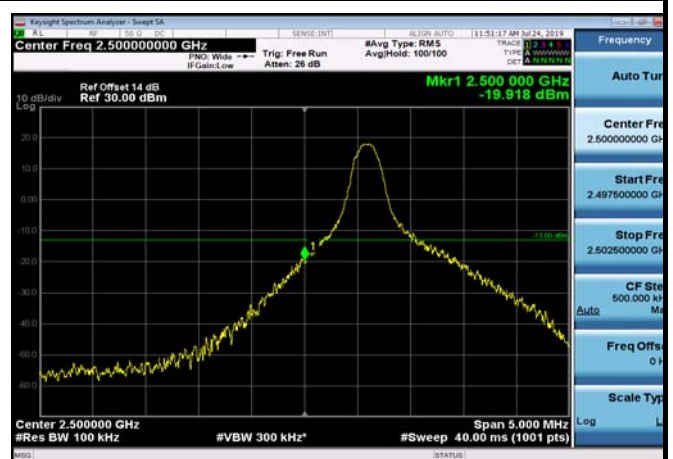
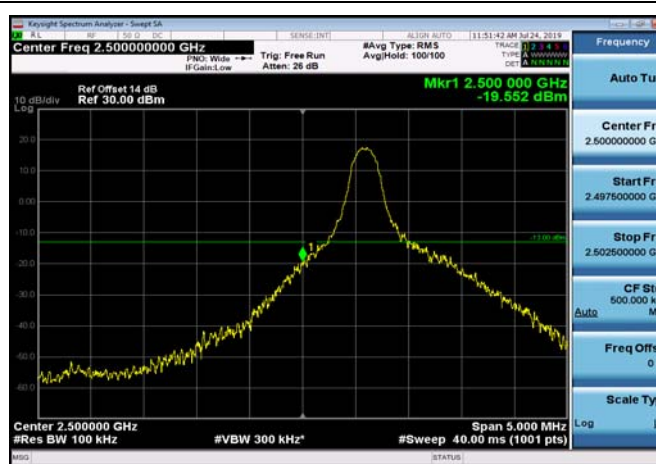
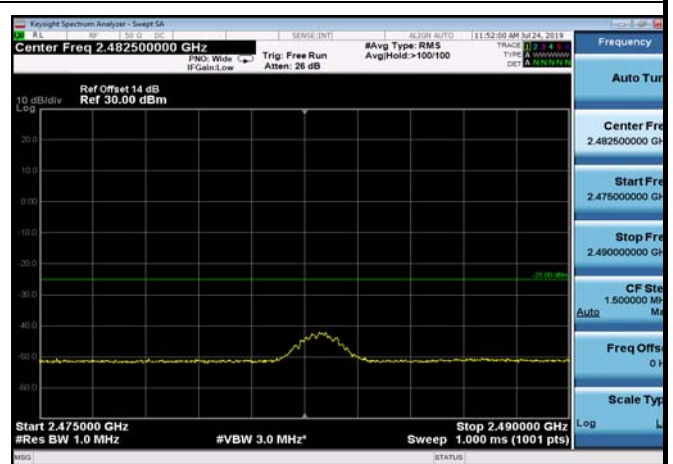
HighRange_FDD05_1.4MHz_848.3_OneRB
_high_QPSKHighRange_FDD05_1.4MHz_848.3_OneRB
_high_Q16HighRange_FDD05_1.4MHz_848.3_fullRB
_High_QPSKHighRange_FDD05_1.4MHz_848.3_fullRB
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_high_Q16

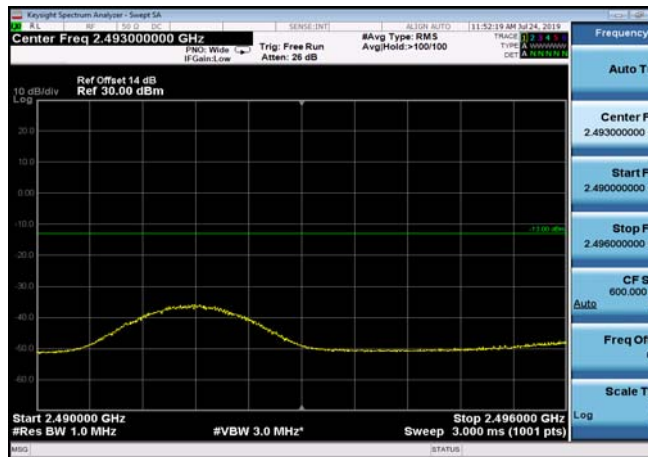
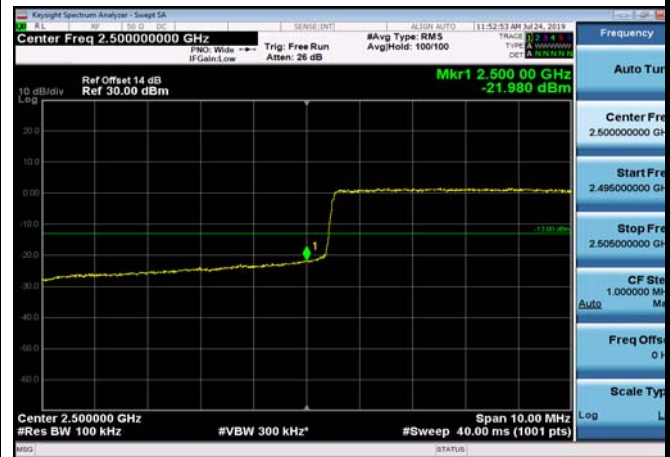
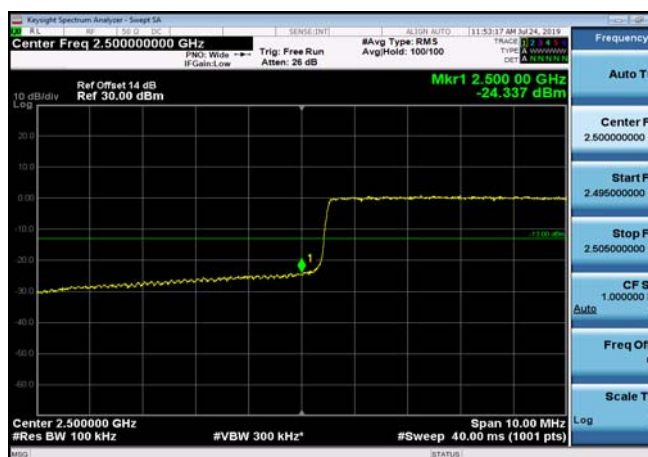
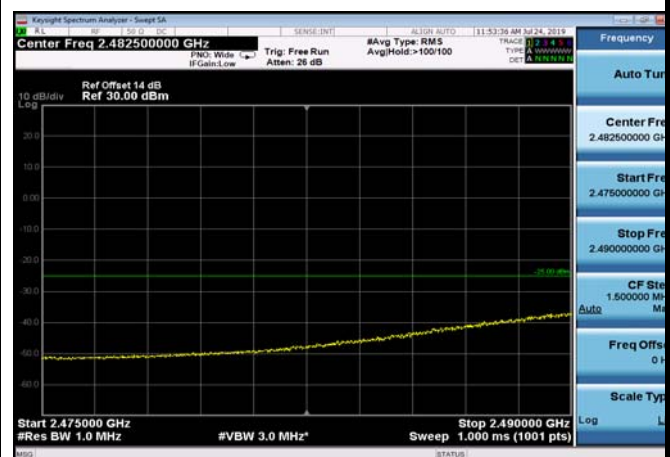
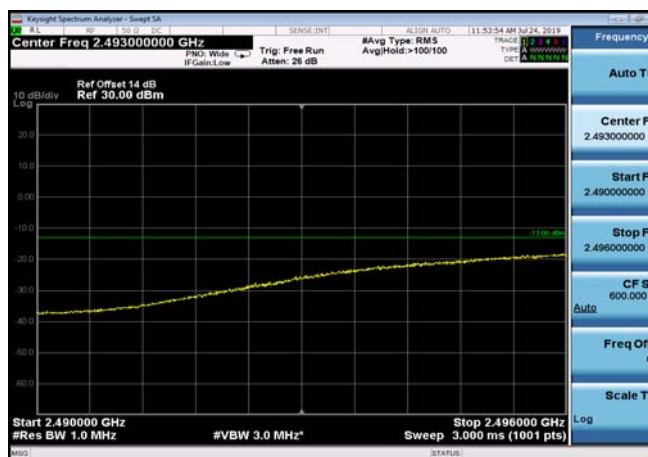
HighRange_FDD05_3MHz_847.5_fullRB
_High_QPSKHighRange_FDD05_3MHz_847.5_fullRB
_High_Q16HighRange_FDD05_5MHz_846.5_OneRB
_high_QPSKHighRange_FDD05_5MHz_846.5_OneRB
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_High_QPSKHighRange_FDD05_5MHz_846.5_fullRB
_High_Q16

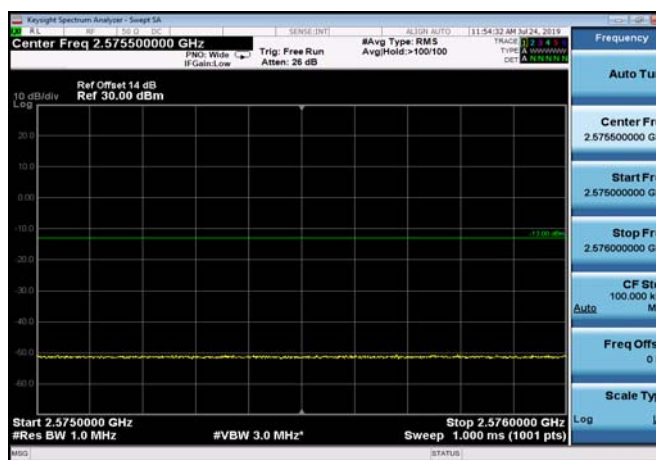
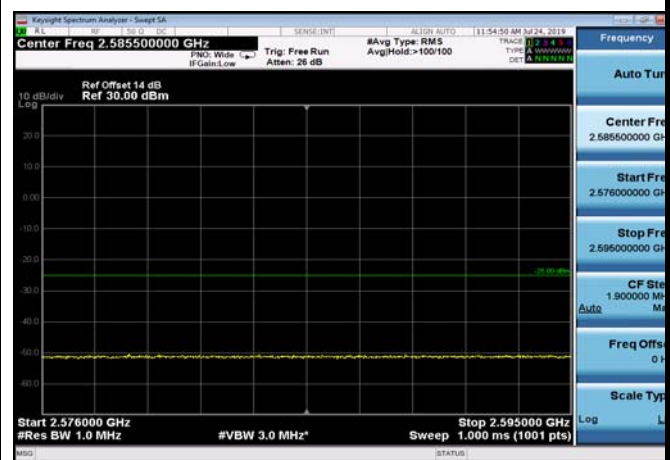
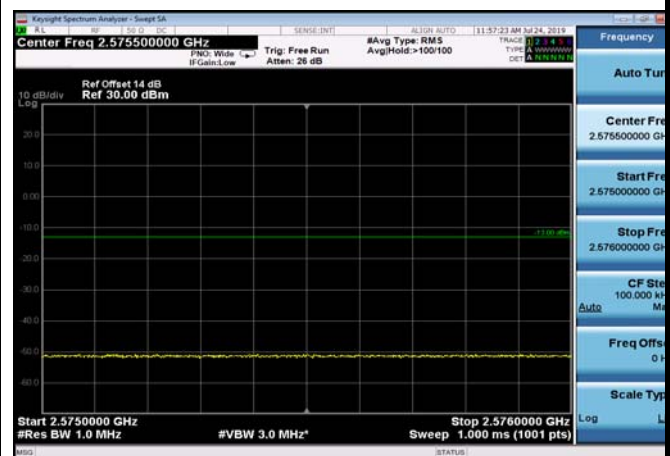
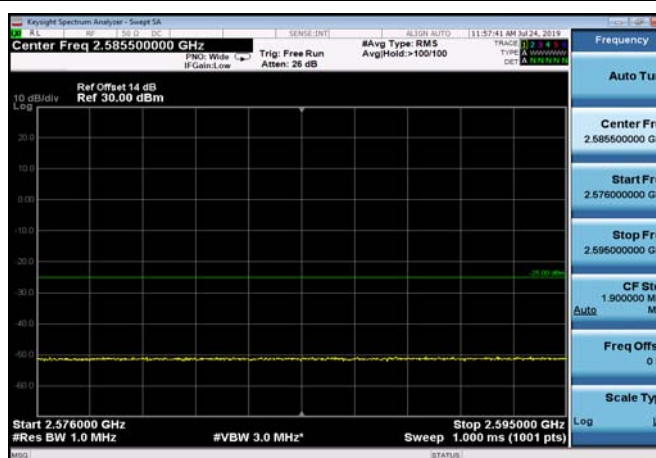
HighRange_FDD05_10MHz_844_OneRB
_high_QPSKHighRange_FDD05_10MHz_844_OneRB
_high_Q16HighRange_FDD05_10MHz_844_fullRB
_High_QPSKHighRange_FDD05_10MHz_844_fullRB
_High_Q16FDD07_5MHz_2502.5_QPSK_OneRB_high
_ExtraBands_Range_2570~2575FDD07_5MHz_2502.5_QPSK_OneRB_high
_ExtraBands_Range_2575~2576

FDD07_5MHz_2502.5_QPSK_OneRB_high
_ExtraBands_Range_2576~2595LowRange_FDD07_5MHz_2502.5_OneRB
_low_QPSKLowRange_FDD07_5MHz_2502.5_OneRB
_low_Q16FDD07_5MHz_2502.5_Q16_OneRB_low
_ExtraBands_Range_2475~2490FDD07_5MHz_2502.5_Q16_OneRB_low
_ExtraBands_Range_2490~2496LowRange_FDD07_5MHz_2502.5_fullRB
_Low_QPSK

LowRange_ FDD07_5MHz_2502.5_fullIRB
_Low_Q16FDD07_5MHz_2502.5_Q16_fullIRB_ExtraBan
ds_Range_2475~2490FDD07_5MHz_2502.5_Q16_fullIRB_ExtraBan
ds_Range_2490~2496FDD07_5MHz_2502.5_Q16_fullIRB_ExtraBan
ds_Range_2570~2575FDD07_5MHz_2502.5_Q16_fullIRB_ExtraBan
ds_Range_2575~2576FDD07_5MHz_2502.5_Q16_fullIRB_ExtraBan
ds_Range_2576~2595

FDD07_10MHz_2505_QPSK_OneRB_high
_ExtraBands_Range_2570~2575FDD07_10MHz_2505_QPSK_OneRB_high
_ExtraBands_Range_2575~2576FDD07_10MHz_2505_QPSK_OneRB_high
_ExtraBands_Range_2576~2595LowRange_FDD07_10MHz_2505_OneRB
_low_QPSKLowRange_FDD07_10MHz_2505_OneRB
_low_Q16FDD07_10MHz_2505_Q16_OneRB_low
_ExtraBands_Range_2475~2490

FDD07_10MHz_2505_Q16_OneRB_low
_ExtraBands_Range_2490~2496LowRange_ FDD07_10MHz_2505_fullRB
_Low_QPSKLowRange_ FDD07_10MHz_2505_fullRB
_Low_Q16FDD07_10MHz_2505_Q16_fullRB_ExtraBand
s_Range_2475~2490FDD07_10MHz_2505_Q16_fullRB_ExtraBand
s_Range_2490~2496FDD07_10MHz_2505_Q16_fullRB_ExtraBand
s_Range_2570~2575

FDD07_10MHz_2505_Q16_fullIRB_ExtraBand
s_Range_2575~2576FDD07_10MHz_2505_Q16_fullIRB_ExtraBand
s_Range_2576~2595FDD07_15MHz_2507.5_QPSK_OneRB_high
_ExtraBands_Range_2570~2575FDD07_15MHz_2507.5_QPSK_OneRB_high
_ExtraBands_Range_2575~2576FDD07_15MHz_2507.5_QPSK_OneRB_high
_ExtraBands_Range_2576~2595LowRange_FDD07_15MHz_2507.5_OneRB
_low_QPSK