

FCC Test Report - LTE Band 4

Report ID : 03360-RF-00019

FCC ID : AZ489FT7078

Tested Model : LEX L10i

Test Date : Nov 19, 2015 ~ Feb 24, 2016

Issued Date : 2 Mar, 2016

Applicant : Motorola Solution Malaysia Sdn Bhd

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1.0. Summary of Test Results

FCC Clause	Test Item	Results	Remarks
2.1046 27.50(d)(6)	Conducted RF Output Power	Pass	Meet the requirement of limit
27.50(d)(5)	Peak-to-Average Power Ratio	Pass	Meet the requirement of limit
2.1049 27.53(h)(3)	Occupied Bandwidth (26dBc, 99%)	Pass	Meet the requirement of limit
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit
2.1051 27.53(h)(1)(3)	Band Edge Conducted Spurious Emission	Pass	Meet the requirement of limit
2.1051 27.53(h)(1)	Conducted Spurious Emissions	Pass	Meet the requirement of limit
2.1053 27.53 (h)	Radiated Spurious Emission	Pass	Meet the requirement of limit
2.1049 27.50(d)(4)	Equivalent Isotropically Radiated Power (EIRP)	Pass	Meet the requirement of limit

1.1. Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty (k=1.96) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	5.01
	200MHz ~ 1000MHz	5.01
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.01
	18GHz ~ 25GHz	5.01

1.2. Equipment List

Description	Model	Serial Number	Calibration Date	Calibration Due Date
POWER SUPPLY	6623A	2916A01428	3-Apr-15	3-Apr-16
Wideband Radio Communication Tester	CMW500	154550	23-Jun-15	23-Jun-16
SIGNAL ANALYZER	FSV40	101431	29-Apr-15	29-Apr-16
CHAMBER	SH-641	92002651	15-Mar-15	15-Mar-16
DRG HORN FREQ.	SAS-571	566	2-Aug-15	2-Aug-16
PREAMPLIFIER	PAM-0118P	361	NA	NA
BILOG ANTENNA	CBL6112B	2964	23-Apr-14	23-Apr-16
POWER SUPPLY	6031A	3121A02341	12-Jun-14	12-Jun-16
EMI TEST RECEIVER	ESIB26	100336	17-Jun-15	17-Jun-16
MICROWAVE SIGNAL GENERATOR	SMP04	100131	25-Jun-15	25-Jun-16
SYSTEM CONTROLLER	SC104V	050806-1	NA	NA
TURNTABLE FLUSH MOUNT 2M	FM2011	NA	NA	NA
ANTENNA POSITIONING TOWER	TLT2	NA	NA	NA
TEST RECEIVER	ESIB26	827769/009	16-Jun-15	16-Jun-16
SIGNAL ANALYZER	FSV40	101103	25-Jun-15	25-Jun-16
5m Semi-anechoic Chamber	S800-HX	J2308	29-Apr-15	29-Apr-16
BILOG ANTENNA	CBL6112B	2863	24-Jul-15	24-Jul-16
DATA LOGGER	TM320	12249289	12-Apr-15	12-Apr-16
BILOG ANTENNA	CBL6112D	25516	23-Apr-15	23-Apr-16

1.3. General Information

General Description of EUT

General Description of EOT			
Product	Smart phone		
Brand	Motorola Solutions		
Test Model	LEX L10i		
Power Supply Rating	3.7Vdc (Battery), 5Vdc (Adapter)		
Mode of operation	LTE Band 4		
Modulation Type	QPSK, 16QAM		
Operating Frequency	LTE Band 4	Channel Bandwidth 1.4MHz	1710.7MHz~1754.3MHz
		Channel Bandwidth 3MHz	1711.5MHz~1753.5MHz
		Channel Bandwidth 5MHz	1712.5MHz~1752.5MHz
		Channel Bandwidth 10MHz	1715.0MHz~1750.0MHz
		Channel Bandwidth 15MHz	1717.5MHz~1747.5MHz
		Channel Bandwidth 20MHz	1720.0MHz~1745.0MHz
Max. EIRP Power	LTE Band 4 QPSK	Channel Bandwidth 1.4MHz	15.38dBm
		Channel Bandwidth 3MHz	19.59dBm
		Channel Bandwidth 5MHz	19.17dBm
		Channel Bandwidth 10MHz	18.08dBm
		Channel Bandwidth 15MHz	18.77dBm
		Channel Bandwidth 20MHz	19.12dBm
	LTE Band 4 16QAM	Channel Bandwidth 1.4MHz	14.69dBm
		Channel Bandwidth 3MHz	15.53dBm
		Channel Bandwidth 5MHz	16.96dBm
		Channel Bandwidth 10MHz	18.74dBm
		Channel Bandwidth 15MHz	16.22dBm
		Channel Bandwidth 20MHz	16.97dBm
Antenna Type	LTE Band 4	Inverted-L Monopole with 0.8 to -0.6dBi gain	
SW Version	LEXL10-INT-D17		
HW Version	Rev A		

Note:

1. The EUT contains following accessory devices and data cable.

Item	Brand	Model or P/N	Specification
Rechargeable Lithium ion battery	MOTOROLA	PMNN4472A	3.7Vdc, 2340mAh, 8.7Wh
Rechargeable Lithium ion battery	MOTOROLA	PMNN4475A	3.7Vdc, 4560mAh, 16.9Wh
ITE Power Supply	MOTOROLA	HKTN4009A	I/P: 100-240Vac, 50-60Hz, 0.2A O/P: 5Vdc, 1.2A
USB cable (CABLE: LEX USB SYNC AND CHARGE)	N/A	CB000262A01	-
Holster	N/A	HKLN4618A	-

Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	Product	Brand	Model No.	Serial No.	FCC ID
1	Wideband Radio Communication Tester	R&S	CMW500	154550	NA

NO.	Signal Cable Description of The above Support Units
1	NA

Note:

1. All power cords of the above support units are non-shielded.
2. Item 1 acted as a communication partner to transfer data.

EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

KDB 971168 D01 Power Meas License Digital Systems v02r02

KDB 971168 D02 Misc OOB License Digital Systems v01

ANSI/TIA/-603-D

NOTE: All test items have been performed and recorded as per the above standards.

1.4. Channel number and frequency info

Band	Bandwidth supported	Available Channel Number	Test Channel Number			Test Channel Frequency (MHz)		
			Low Channel	Mid Channel	High Channel	Low Channel	Mid Channel	High Channel
LTE Band 4	1.4 MHz	19957 ~ 20393	19957	20175	20393	1710.7	1732.5	1754.3
	3 MHz	19965 ~ 20386	19965	20175	20385	1711.5	1732.5	1753.5
	5 MHz	19975 ~ 20375	19975	20175	20375	1712.5	1732.5	1752.5
	10 MHz	20000 ~ 20350	20000	20175	20350	1715.0	1732.5	1750.0
	15 MHz	20025 ~ 20325	20025	20175	20325	1717.5	1732.5	1747.5
	20 MHz	20050 ~ 20300	20050	20175	20300	1720.0	1732.5	1745.0

1.5. Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports.

The Radiated Emission and Equivalent Isotropically Radiated Power (EIRP) worst case was found when positioned on Z-Plane for LTE band 4.

The following channel(s) was (were) selected for the final test as listed below:

LTE Band 4

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Conducted RF Output Power	19957 ~ 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	As per table 1.6.2
	19965 ~ 20386	19965, 20175, 20385	3 MHz		
	19975 ~ 20375	19975, 20175, 20375	5 MHz		
	20000 ~ 20350	20000, 20175, 20350	10 MHz		
	20025 ~ 20325	20025, 20175, 20325	15 MHz		
	20050 ~ 20300	20050, 20175, 20300	20 MHz		
Peak to Average Power Ratio	19957 ~ 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
	19965 ~ 20386	19965, 20175, 20385	3 MHz		15 RB / 0 RB Offset
	19975 ~ 20375	19975, 20175, 20375	5 MHz		25 RB / 0 RB Offset
	20000 ~ 20350	20000, 20175, 20350	10 MHz		50 RB / 0 RB Offset
	20025 ~ 20325	20025, 20175, 20325	15 MHz		75 RB / 0 RB Offset
	20050 ~ 20300	20050, 20175, 20300	20 MHz		100 RB / 0 RB Offset
Occupied Bandwidth	19957 ~ 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
	19965 ~ 20386	19965, 20175, 20385	3 MHz		15 RB / 0 RB Offset
	19975 ~ 20375	19975, 20175, 20375	5 MHz		25 RB / 0 RB Offset
	20000 ~ 20350	20000, 20175, 20350	10 MHz		50 RB / 0 RB Offset
	20025 ~ 20325	20025, 20175, 20325	15 MHz		75 RB / 0 RB Offset
	20050 ~ 20300	20050, 20175, 20300	20 MHz		100 RB / 0 RB Offset
Frequency Stability	19957 ~ 20393	20175	1.4 MHz	QPSK	6 RB / 0 RB Offset
	19965 ~ 20386	20175	3 MHz		15 RB / 0 RB Offset
	19975 ~ 20375	20175	5 MHz		25 RB / 0 RB Offset
	20000 ~ 20350	20175	10 MHz		50 RB / 0 RB Offset
	20025 ~ 20325	20175	15 MHz		75 RB / 0 RB Offset
	20050 ~ 20300	20175	20 MHz		100 RB / 0 RB Offset
Band Edge Conducted Spurious Emission	19957 ~ 20393	19957, 20393	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
	19965 ~ 20386	19965, 20385	3 MHz		1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
	19975 ~ 20375	19975, 20375	5 MHz		1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
	20000 ~ 20350	20000, 20350	10 MHz		1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
	20025 ~ 20325	20025, 20325	15 MHz		1 RB / 0 RB Offset 1 RB / 74 RB Offset 75 RB / 0 RB Offset
	20050 ~ 20300	20050, 20300	20 MHz		1 RB / 0 RB Offset 1 RB / 99 RB Offset 100 RB / 0 RB Offset

Conducted Spurious Emission	19957 ~ 20393	19957, 20175, 20393	1.4 MHz	QPSK	1 RB / 3 RB Offset
	19965 ~ 20386	19965, 20175, 20385	3 MHz		1 RB / 14 RB Offset
	19975 ~ 20375	19975, 20175, 20375	5 MHz		1 RB / 24 RB Offset
	20000 ~ 20350	20000, 20175, 20350	10 MHz		1 RB / 25 RB Offset
	20025 ~ 20325	20025, 20175, 20325	15 MHz		1 RB / 38 RB Offset
	20050 ~ 20300	20050, 20175, 20300	20 MHz		1 RB / 0 RB Offset
Radiated Emission	19957 ~ 20393	19957, 20175, 20393	1.4 MHz	QPSK	1 RB / 3 RB Offset
	19965 ~ 20386	19965, 20175, 20385	3 MHz		1 RB / 14 RB Offset
	19975 ~ 20375	19975, 20175, 20375	5 MHz		1 RB / 24 RB Offset
	20000 ~ 20350	20000, 20175, 20350	10 MHz		1 RB / 25 RB Offset
	20025 ~ 20325	20025, 20175, 20325	15 MHz		1 RB / 38 RB Offset
	20050 ~ 20300	20050, 20175, 20300	20 MHz		1 RB / 0 RB Offset
Equivalent Isotropically Radiated Power (EIRP)	19957 ~ 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	1 RB / 3 RB Offset
	19965 ~ 20386	19965, 20175, 20385	3 MHz		1 RB / 14 RB Offset
	19975 ~ 20375	19975, 20175, 20375	5 MHz		1 RB / 24 RB Offset
	20000 ~ 20350	20000, 20175, 20350	10 MHz		1 RB / 25 RB Offset
	20025 ~ 20325	20025, 20175, 20325	15 MHz		1 RB / 38 RB Offset
	20050 ~ 20300	20050, 20175, 20300	20 MHz		1 RB / 0 RB Offset

NOTE:

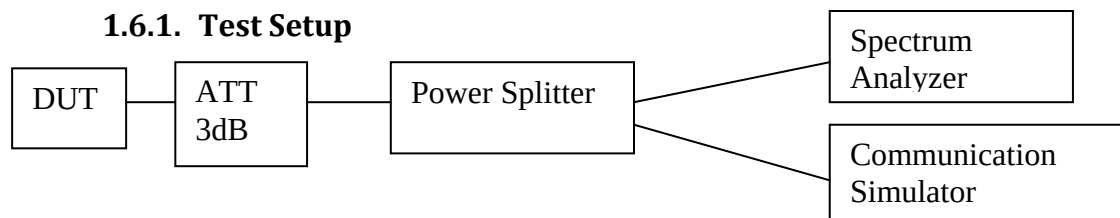
1. The Conducted RF Output Power for QPSK and 16QAM, measured value of QPSK mode is higher than 16QAM mode. Therefore, only Conducted Spurious Emission and Radiated Emission had been tested under QPSK modes.
2. Band Edge was performed with 1 and full Resource Block at the lowest and highest operating frequency band.
3. The Equivalent Isotropically Radiated Power (EIRP) was performed based on worst case mode from Conducted RF Output Power in QPSK and 16QAM modulation.
4. Peak to Average and Occupied Bandwidth were performed with full Resource Block which is the worst case.
5. Frequency stability was performed with full Resource Block in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Conducted RF Output Power	25°C, 50% RH	3.7V DC	ckchan
Peak-to-Average Power Ratio	25°C, 50% RH	3.7V DC	ckchan
Occupied Bandwidth	25°C, 50% RH	3.7V DC	ckchan
Frequency Stability	25°C, 50% RH	3.7V DC	ckchan
Band Edge Conducted Spurious Emission	25°C, 50% RH	3.7V DC	ckchan
Conducted Spurious Emission	25°C, 50% RH	3.7V DC	ckchan
Radiated Spurious Emission	25°C, 63.7% RH	3.7V DC	Nazrin/Qawiman
Equivalent Isotropically Radiated Power (EIRP)	25°C, 63.7% RH	3.7V DC	Nazrin/Qawiman

1.6. Conducted RF Output Power

1.6.1. Test Setup



1. The DUT transmitter output port was connected to communication simulator with above setup.
2. Path loss for the measurement included.
3. Set DUT to transmit maximum power through communication simulator
4. All the measurement was done at low, mid, high channel for each band and different modulation.
5. Record the average power into the test report.

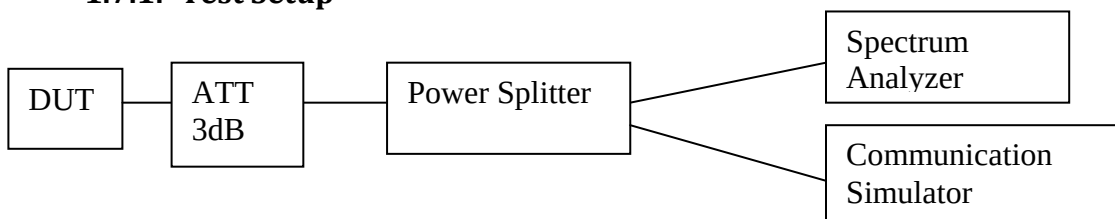
1.6.2. Conducted RF Output Power – LTE Band 4(1710-1755MHz)

LTE Band/ BW	RB Size	RB Offset	Conducted Output Power (dBm)					
			QPSK Modulation			16QAM Modulation		
			Low CH 19957	Mid CH 20175	High CH 20393	Low CH 19957	Mid CH 20175	High CH 20393
			1710.7 MHz	1732.5 MHz	1754.3 MHz	1710.7 MHz	1732.5 MHz	1754.3 MHz
Band 4 / 1.4MHz	1	0	22.622	22.756	22.166	21.575	21.990	21.229
	1	3	22.841	22.678	22.148	21.743	21.839	21.197
	1	5	22.770	22.690	22.206	21.719	21.846	21.267
	3	0	22.598	22.727	22.205	21.809	21.756	21.096
	3	2	22.685	22.658	22.241	21.898	21.704	21.066
	3	3	22.670	22.628	22.261	21.890	21.608	21.081
	6	0	21.798	21.823	21.180	20.904	20.574	20.253
LTE Band/ BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH 19965	Mid CH 20175	High CH 20385	Low CH 19965	Mid CH 20175	High CH 20385
			1711.5 MHz	1732.5 MHz	1753.5 MHz	1711.5 MHz	1732.5 MHz	1753.5 MHz
Band 4 / 3MHz	1	0	22.813	22.825	22.381	21.776	21.899	21.018
	1	7	22.866	22.677	22.168	21.734	21.770	20.893
	1	14	23.030	22.740	22.228	21.786	21.828	20.994
	8	0	21.791	21.785	21.173	20.847	20.745	20.225
	8	4	21.921	21.706	21.064	20.874	20.702	20.153
	8	7	21.983	21.675	21.130	20.889	20.641	20.165
	15	0	21.926	21.791	21.130	20.873	20.770	20.185
LTE Band/ BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH 19975	Mid CH 20175	High CH 20375	Low CH 19975	Mid CH 20175	High CH 20375
			1712.5	1732.5	1752.5	1712.5	1732.5	1752.5

			MHz	MHz	MHz	MHz	MHz	MHz
Band 4 / 5MHz	1	0	22.814	22.759	22.139	21.848	21.854	21.013
	1	13	22.943	22.576	22.170	21.873	21.708	20.930
	1	24	23.067	22.612	22.136	21.889	21.735	20.955
	12	0	21.905	21.779	21.131	20.972	20.725	20.214
	12	6	22.021	21.754	21.149	20.893	20.736	20.167
	12	13	21.992	21.592	21.097	20.881	20.618	20.148
	25	0	21.938	21.740	21.158	20.897	20.736	20.270
LTE Band/ BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH 20000	Mid CH 20175	High CH 20350	Low CH 20000	Mid CH 20175	High CH 20350
			1715.0 MHz	1732.5 MHz	1750.0 MHz	1715.0 MHz	1732.5 MHz	1750.0 MHz
Band 4 / 10MHz	1	0	22.920	22.932	22.304	21.943	22.038	21.173
	1	25	22.992	22.647	22.236	21.796	21.804	20.983
	1	49	22.945	22.432	22.189	21.757	21.584	20.947
	25	0	22.028	21.780	21.173	21.046	20.748	20.207
	25	13	22.025	21.757	21.071	21.025	20.712	20.060
	25	25	21.981	21.630	21.064	20.994	20.593	20.165
	50	0	22.006	21.789	21.178	20.941	20.726	20.194
LTE Band/ BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH 20025	Mid CH 20175	High CH 20325	Low CH 20025	Mid CH 20175	High CH 20325
			1717.5 MHz	1732.5 MHz	1747.5 MHz	1717.5 MHz	1732.5 MHz	1747.5 MHz
Band 4 / 15MHz	1	0	22.915	22.931	22.347	22.172	22.110	21.163
	1	38	23.055	22.625	22.253	22.320	21.786	21.046
	1	74	22.995	22.303	22.178	22.235	21.494	20.937
	36	0	22.051	21.808	21.268	20.943	20.785	20.239
	36	19	22.012	21.747	21.203	20.885	20.725	20.170
	36	39	21.940	21.524	21.042	20.819	20.505	20.056
	75	0	22.056	21.782	21.231	21.004	20.735	20.202
LTE Band/ BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH 20050	Mid CH 20175	High CH 20300	Low CH 20050	Mid CH 20175	High CH 20300
			1720.0 MHz	1732.5 MHz	1745.0 MHz	1720.0 MHz	1732.5 MHz	1745.0 MHz
Band 4 / 20MHz	1	0	22.566	23.066	22.393	21.938	21.981	21.645
	1	49	22.922	22.736	22.247	22.097	21.756	21.380
	1	99	22.764	22.151	22.116	21.937	21.327	21.240
	50	0	22.037	21.819	21.358	20.958	20.775	20.346
	50	25	21.985	21.729	21.193	20.885	20.686	20.236
	50	50	21.949	21.431	21.142	20.820	20.380	20.238
	100	0	21.990	21.663	21.198	20.906	20.696	20.271

1.7. Peak-to-Average Power Ratio

1.7.1. Test Setup



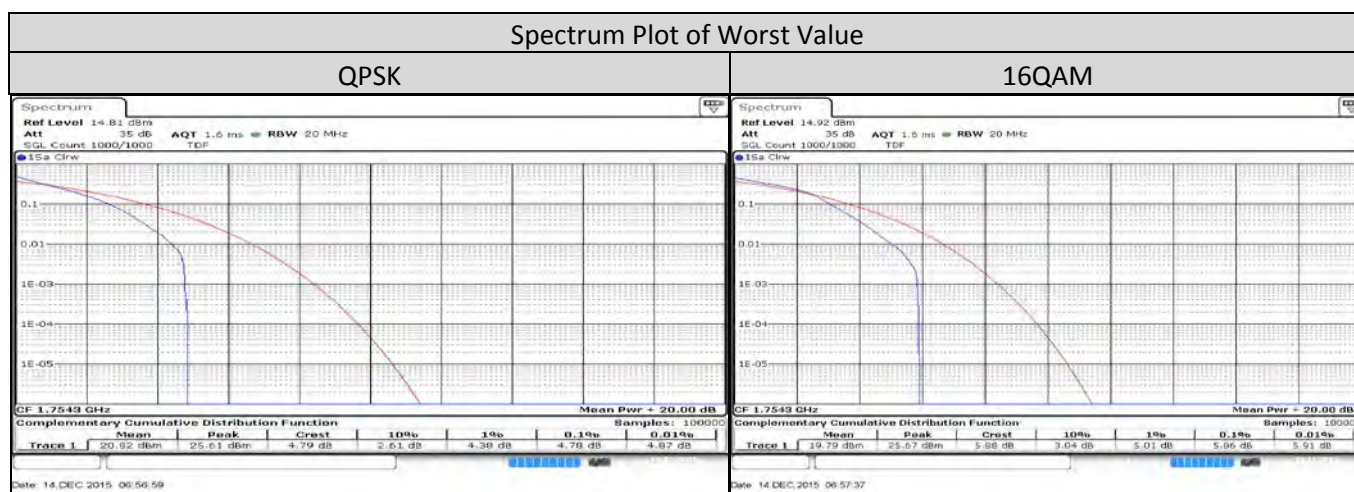
1. The DUT transmitter output port was connected to communication simulator with above setup.
2. Path loss for the measurement included.
3. Set DUT to transmit maximum power through communication simulator
4. Set the CCDF (Complementary Cumulative Distribution Function) option in the spectrum analyzer.
5. Spectrum Analyzer setting, RBW = 20MHz.
6. Recorded the maximum PAR level associated with a probability of 0.1% as Peak to Average Ratio.
7. All the measurement was done at low, mid, high channel for each band and different modulation.

1.7.2. Test Limit

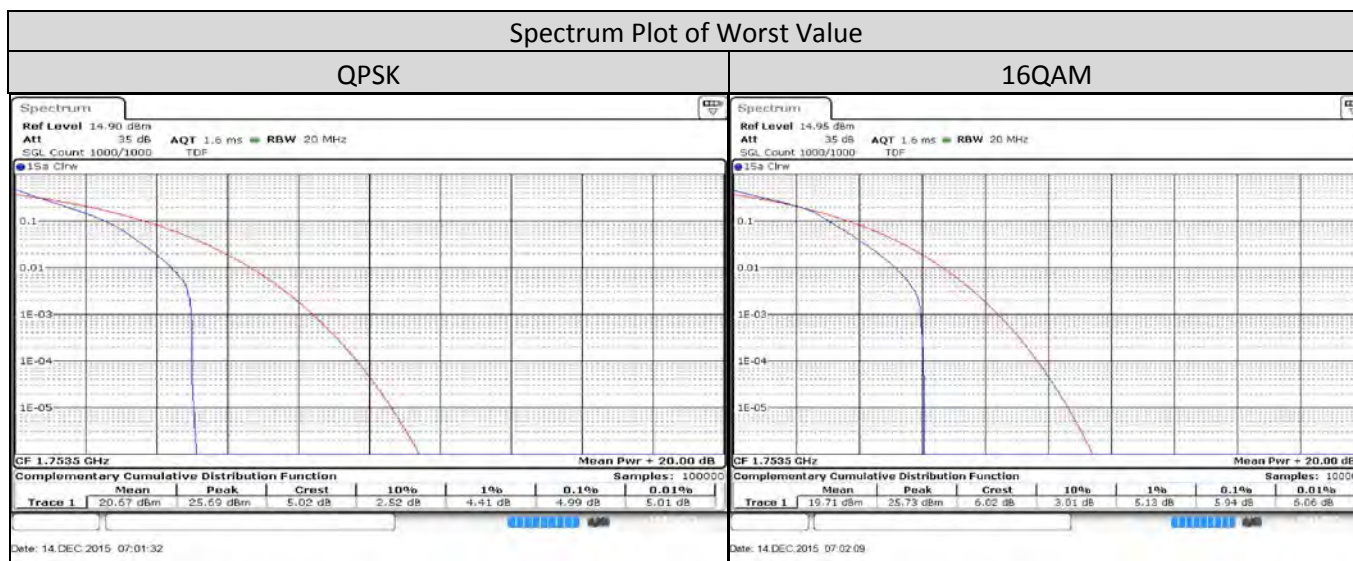
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

1.7.3. Peak-to-Average Power Ratio - LTE Band 4 (1710-1755MHz)

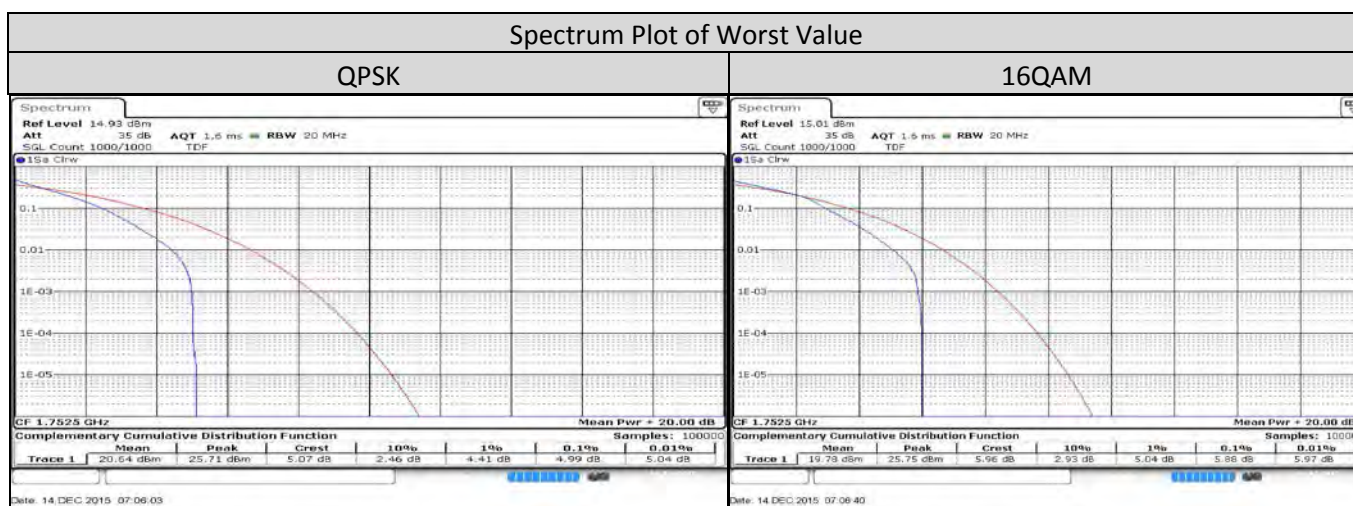
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4 / 1.4MHz/6/0	Low CH 19957	1710.7 MHz	4.32	5.28
	Mid CH 20175	1732.5 MHz	4.46	5.51
	High CH 20393	1754.3 MHz	4.78	5.86



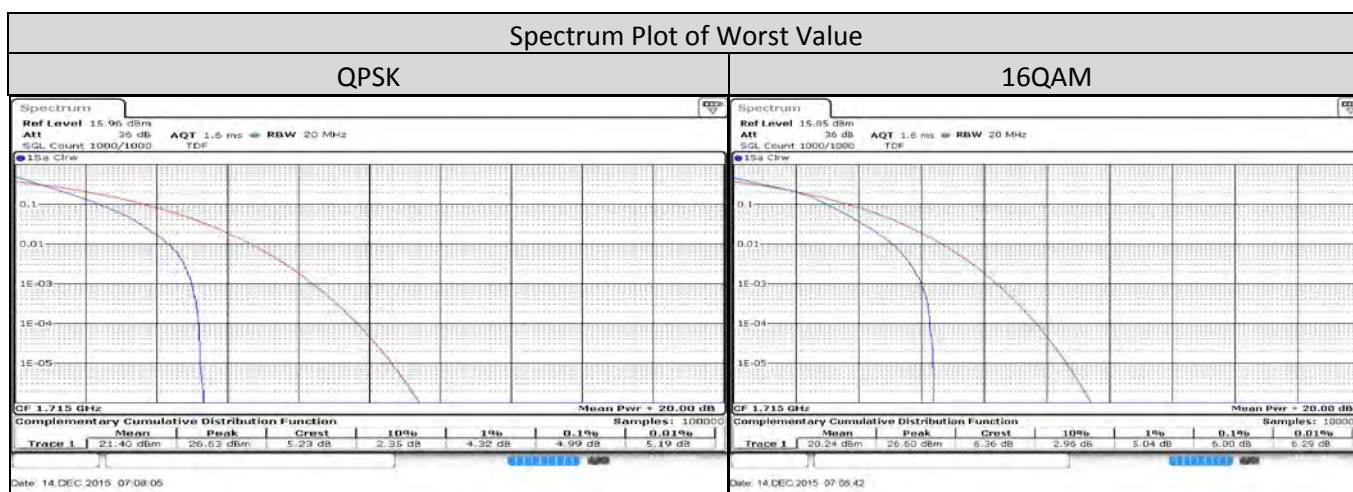
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4 / 3MHz/15/0	Low CH 19965	1711.5 MHz	4.32	5.25
	Mid CH 20175	1732.5 MHz	4.52	5.71
	High CH 20385	1753.5 MHz	4.99	5.94



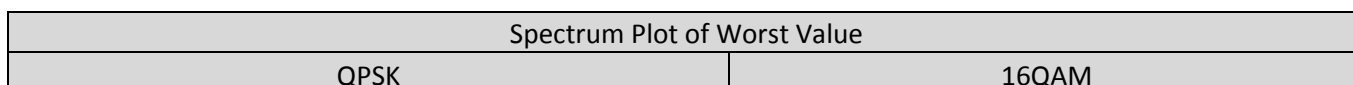
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4 / 5MHz/25/0	Low CH 19975	1712.5 MHz	4.46	5.57
	Mid CH 20175	1732.5 MHz	4.58	5.62
	High CH 20375	1752.5 MHz	4.99	5.88

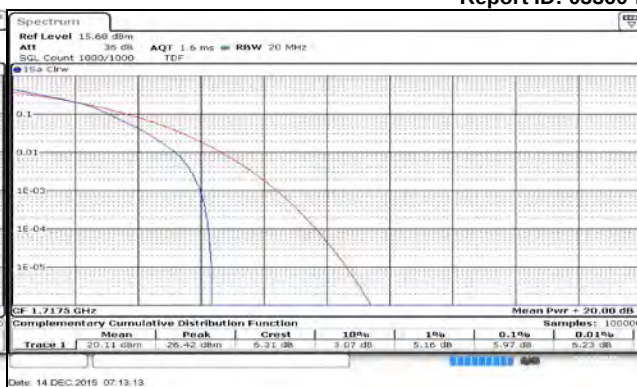
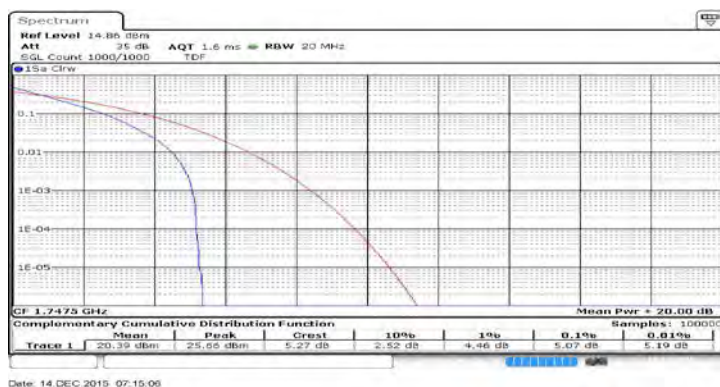


LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4 / 10MHz/50/0	Low CH 20000	1715.0 MHz	4.99	6.00
	Mid CH 20175	1732.5 MHz	4.75	5.83
	High CH 20350	1750.0 MHz	4.78	5.74

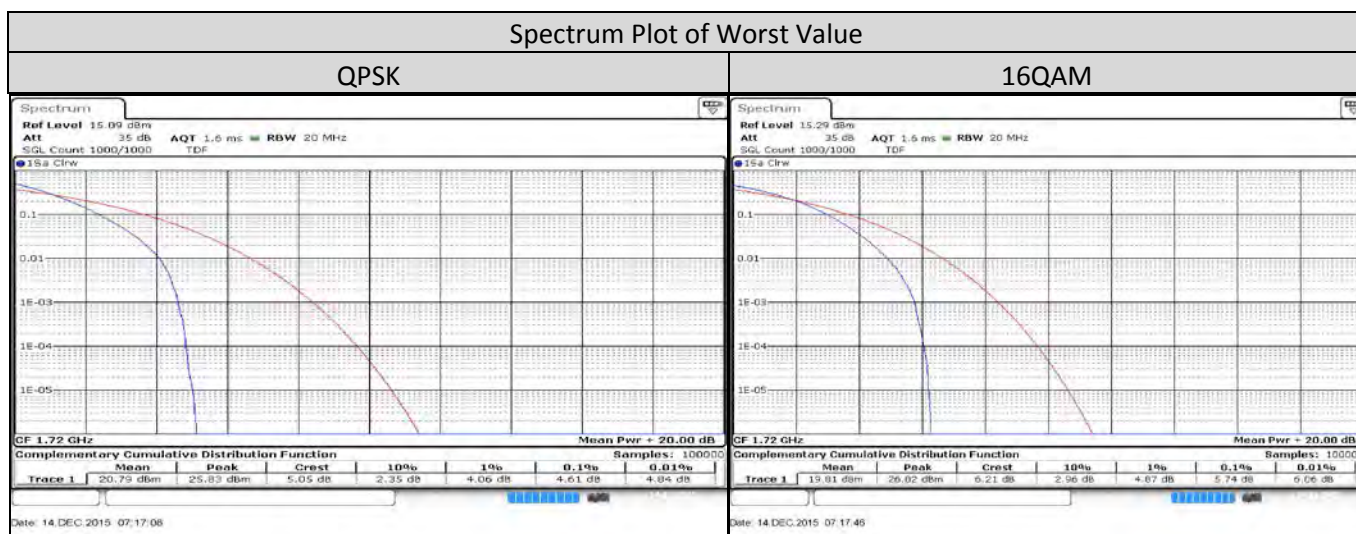


LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4 / 15MHz/75/0	Low CH 20025	1717.5 MHz	4.93	5.97
	Mid CH 20175	1732.5 MHz	4.72	5.74
	High CH 20325	1747.5 MHz	5.07	5.94



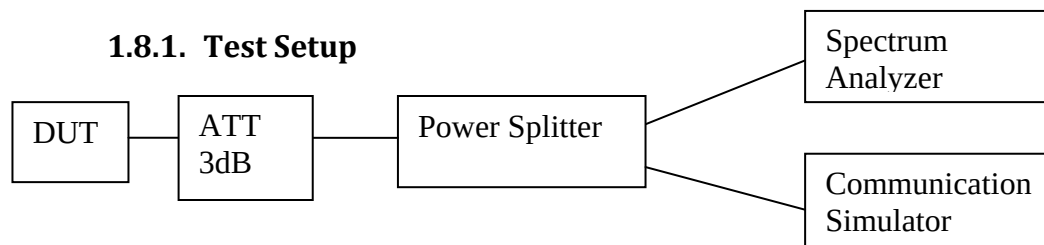


LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4 / 20MHz/100/0	Low CH 20050	1720.0 MHz	4.61	5.74
	Mid CH 20175	1732.5 MHz	4.43	5.59
	High CH 20300	1745.0 MHz	4.61	5.71



1.8. Occupied Bandwidth

1.8.1. Test Setup



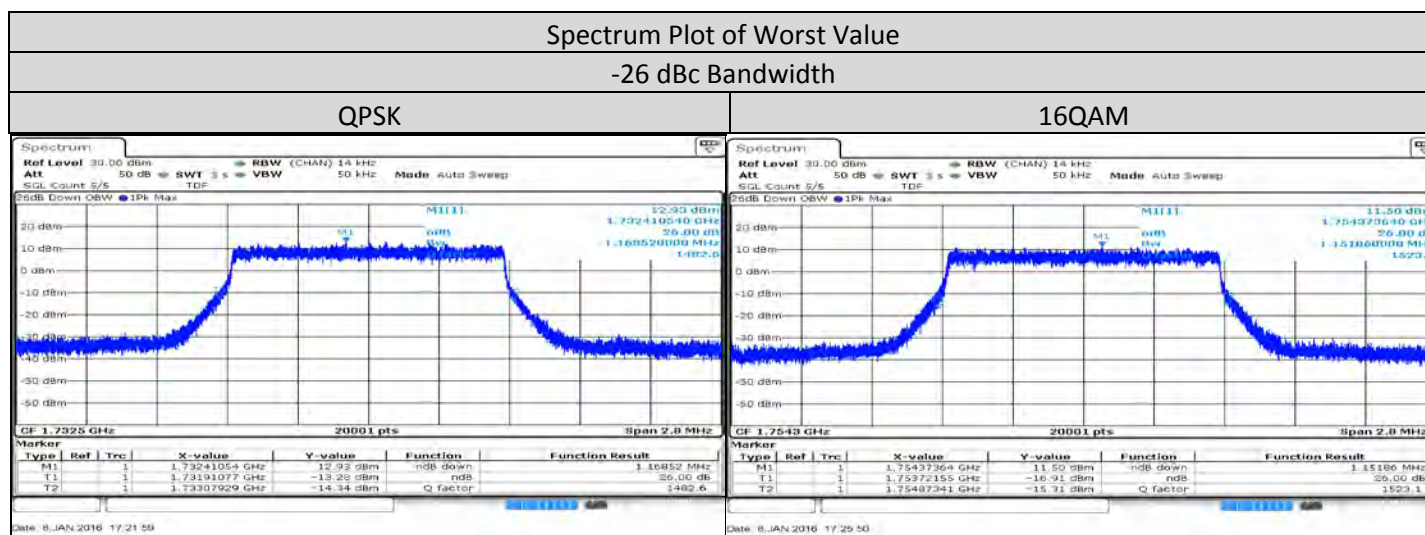
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) For LTE measurement, set DUT to transmit maximum power & full RB size through communication simulator.
- 4) For LTE measurement, set DUT to transmit maximum power through communication simulator.
- 5) Spectrum Analyzer setting, RBW is 1% of OBW and VBW is 3 times of RBW.
- 6) Measure & record -26dBc and 99% occupied bandwidth (BW).
- 7) All the measurement was done at low, mid, high channel for each band and different modulation.

1.8.2. Test Limit

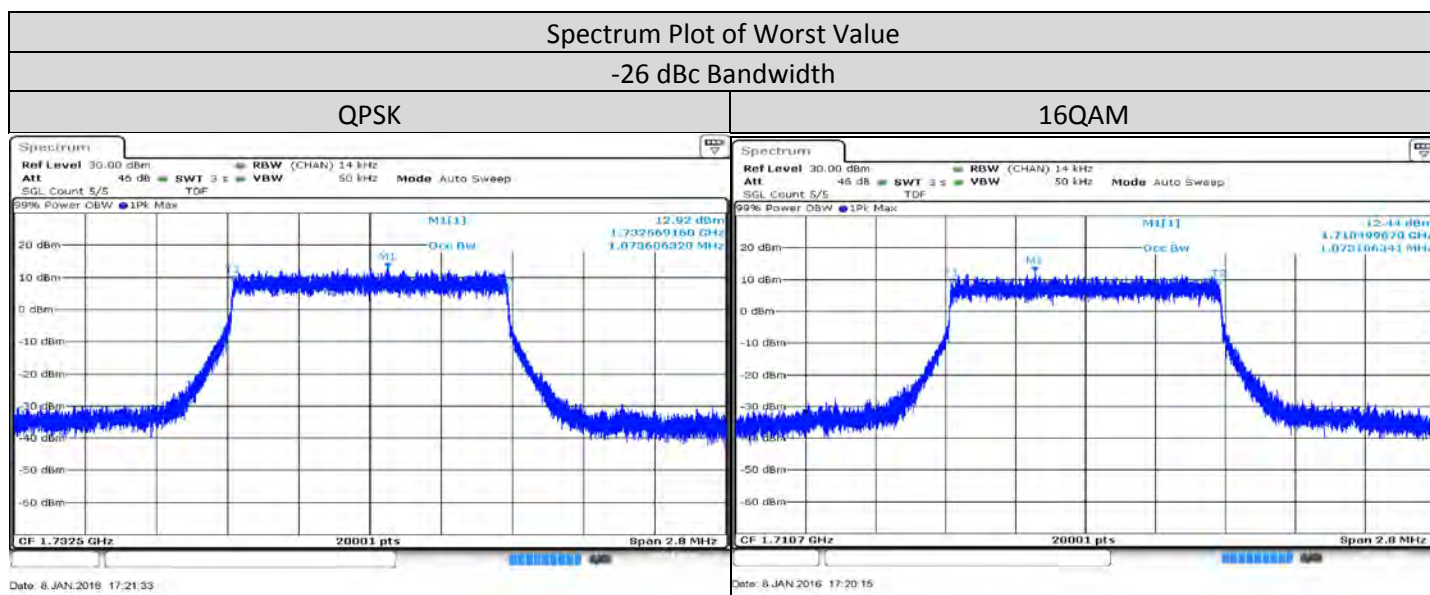
The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

1.8.3. Occupied Bandwidth – LTE Band 4 (1710-1755MHz)

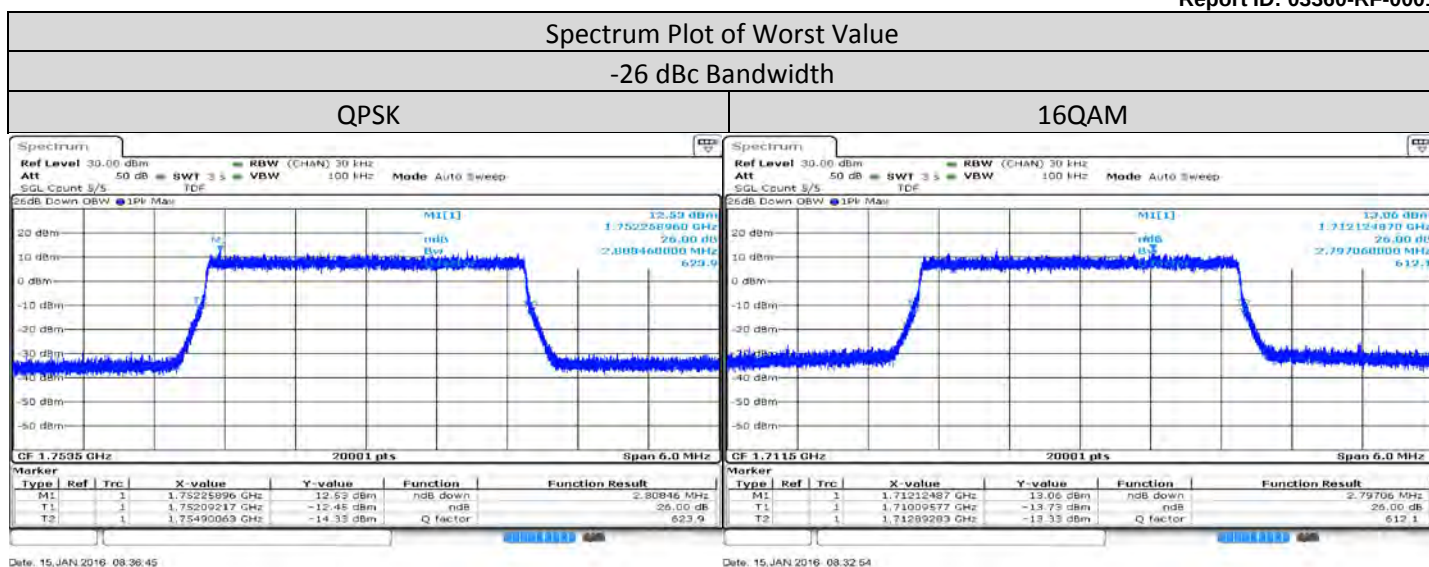
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 1.4MHz/6/0	Low CH 19957	1710.7 MHz	1.1331	1.1302
	Mid CH 20175	1732.5 MHz	1.1685	1.1512
	High CH 20393	1754.3 MHz	1.1502	1.1519



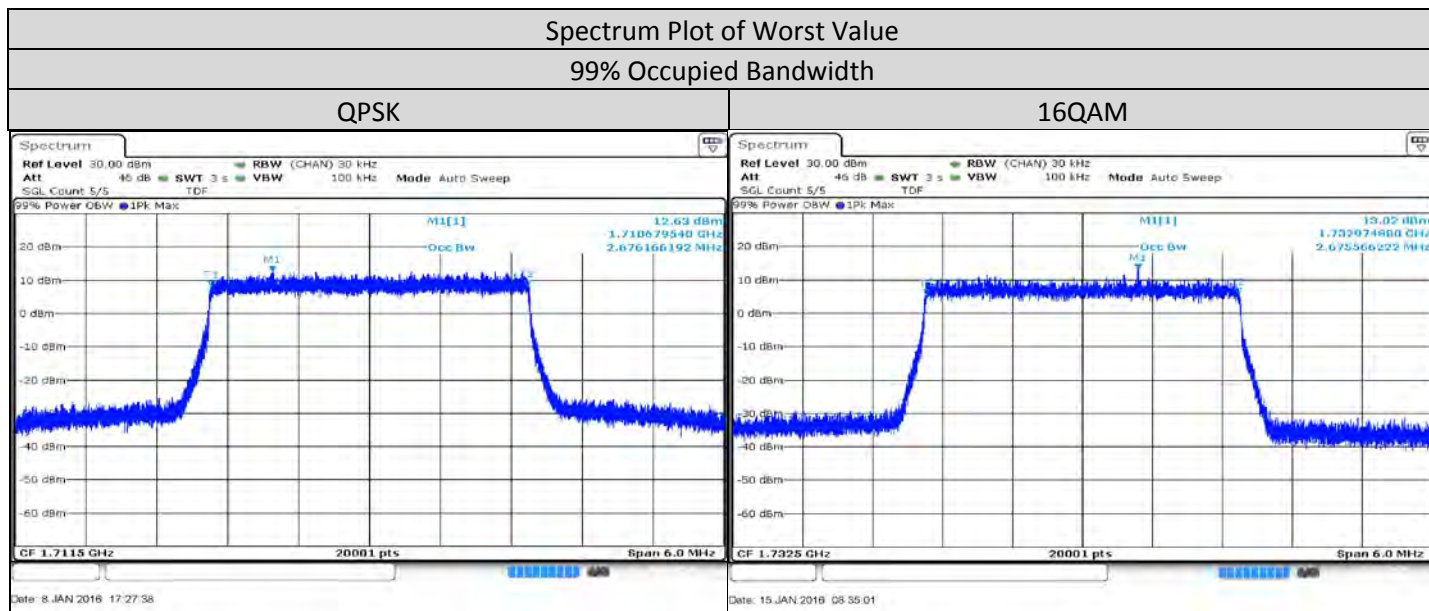
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 1.4MHz/6/0	Low CH 19957	1710.7 MHz	1.0711	1.0732
	Mid CH 20175	1732.5 MHz	1.0736	1.0714
	High CH 20393	1754.3 MHz	1.0719	1.0726



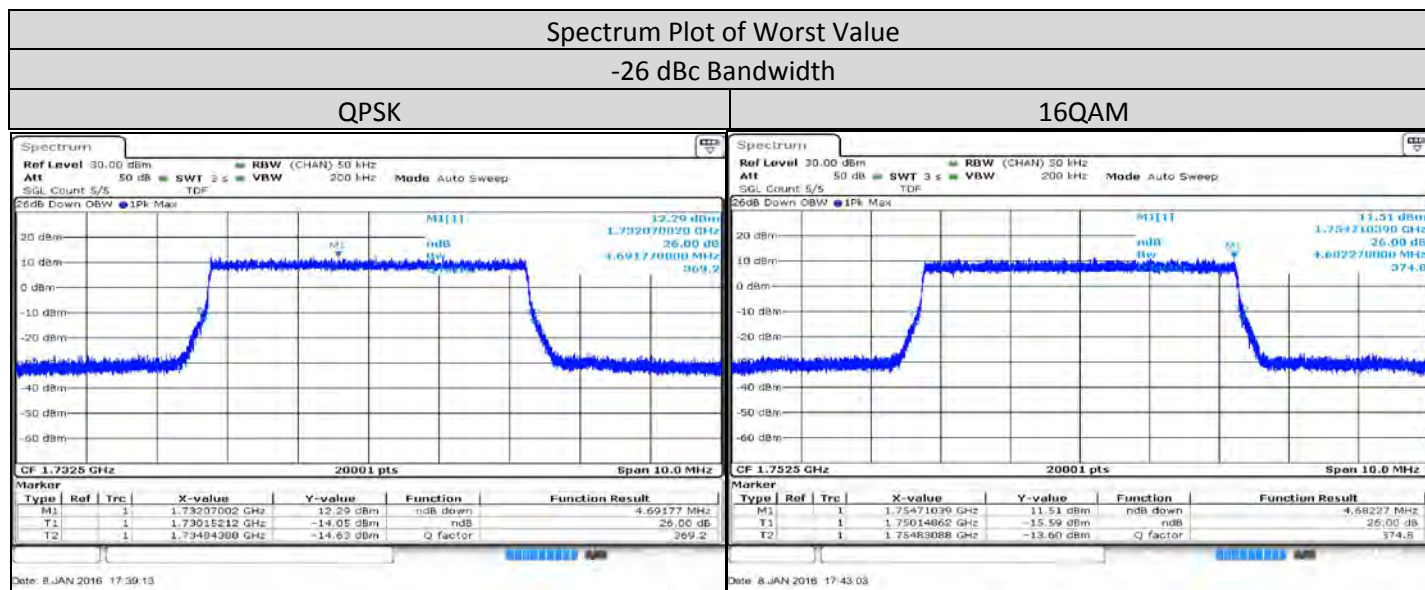
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 3MHz/15/0	Low CH 19965	1711.5 MHz	2.7998	2.7971
	Mid CH 20175	1732.5 MHz	2.7900	2.7686
	High CH 20385	1753.5 MHz	2.8085	2.7900



LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 3MHz/15/0	Low CH 19965	1711.5 MHz	2.6765	2.6756
	Mid CH 20175	1732.5 MHz	2.6744	2.6756
	High CH 20385	1753.5 MHz	2.6753	2.6738

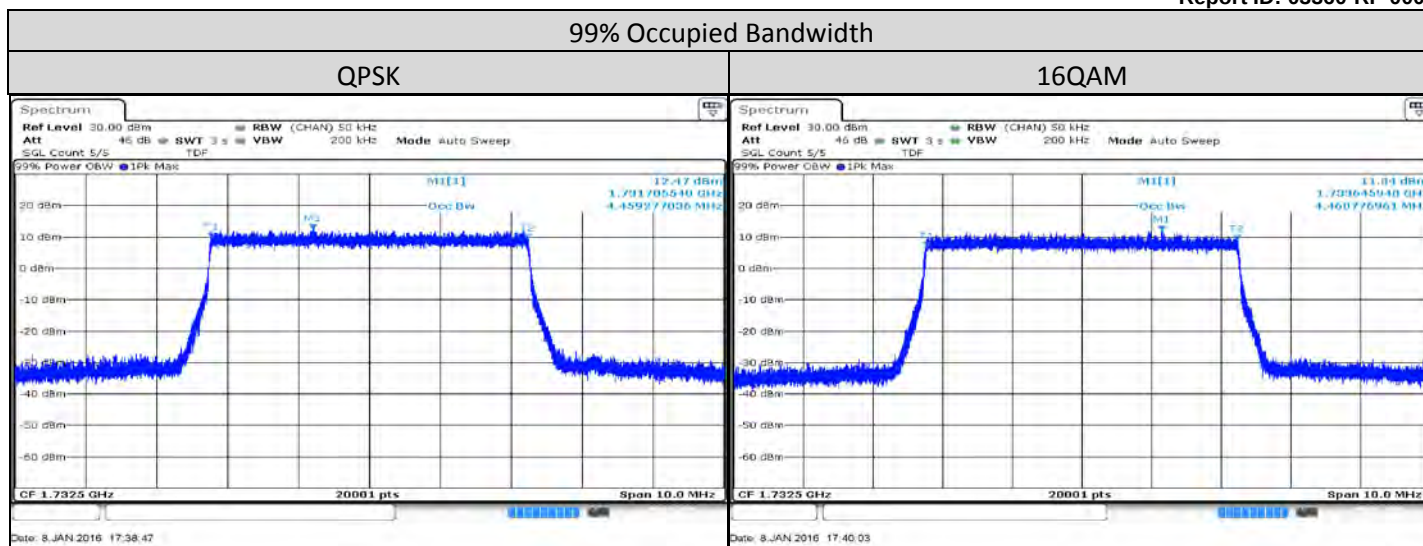


LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 5MHz/25/0	Low CH 19975	1712.5 MHz	4.6643	4.6418
	Mid CH 20175	1732.5 MHz	4.6918	4.6573
	High CH 20375	1752.5 MHz	4.6743	4.6823

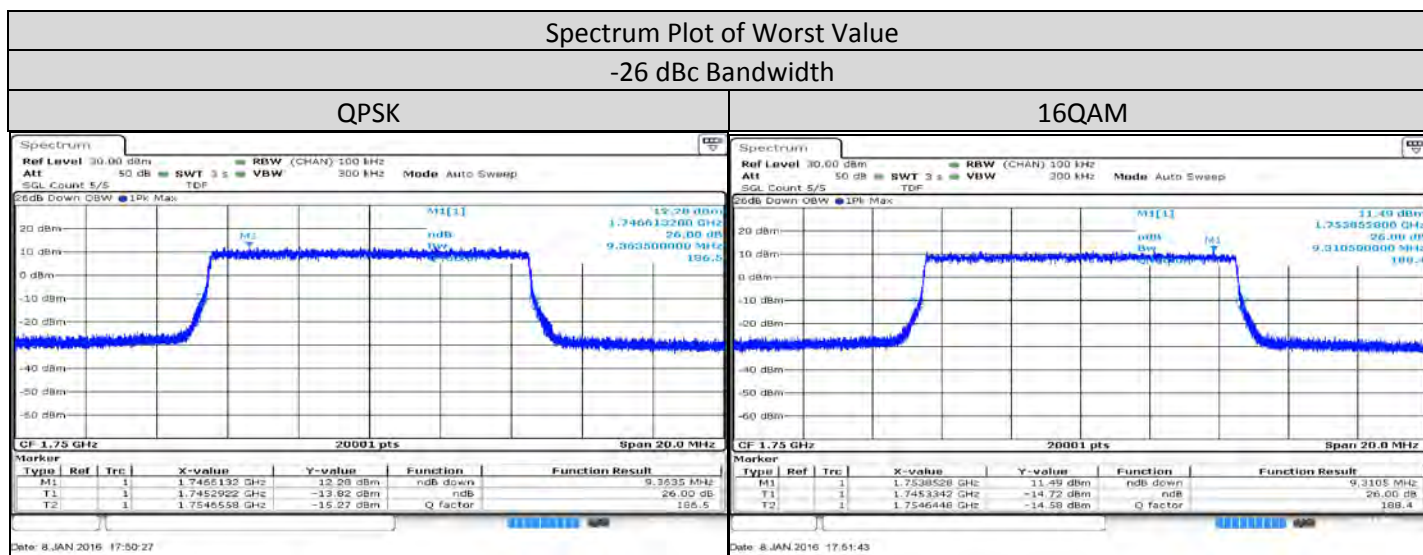


LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 5MHz/25/0	Low CH 19975	1712.5 MHz	4.4543	4.4558
	Mid CH 20175	1732.5 MHz	4.4593	4.4608
	High CH 20375	1752.5 MHz	4.4583	4.4578

Spectrum Plot of Worst Value

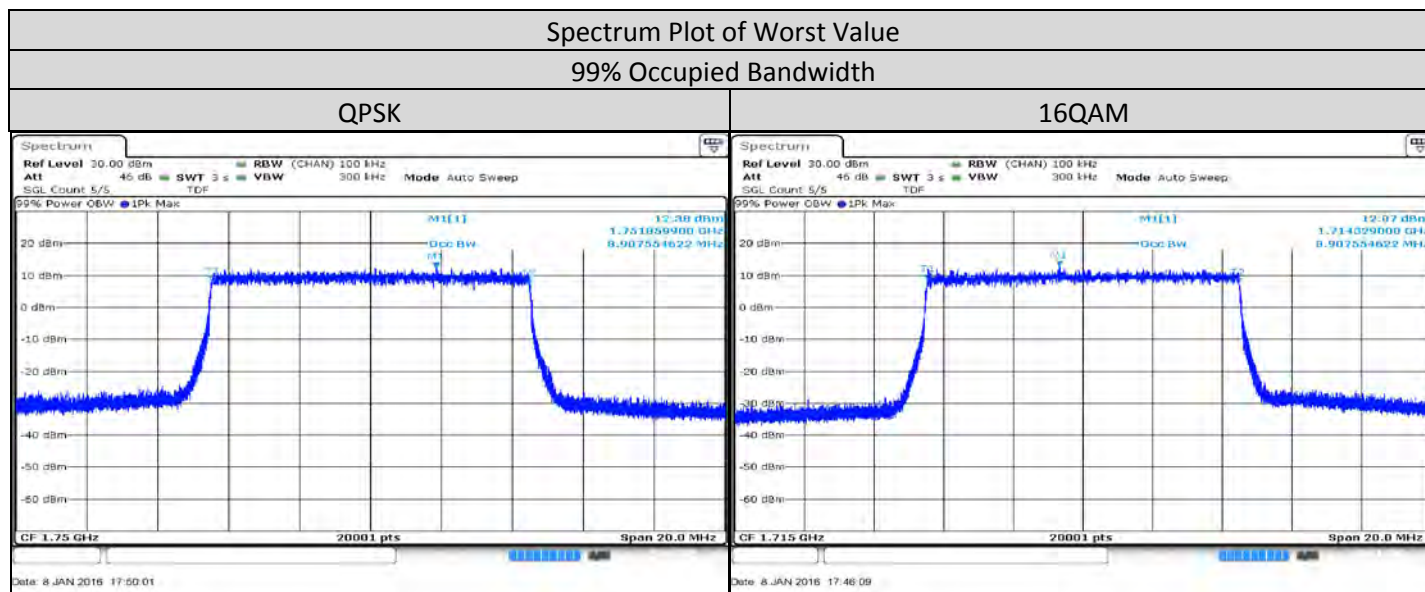


LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 10MHz/50/0	Low CH 20000	1715 MHz	9.2785	9.2595
	Mid CH 20175	1732.5 MHz	9.2805	9.2065
	High CH 20350	1750 MHz	9.3635	9.3105



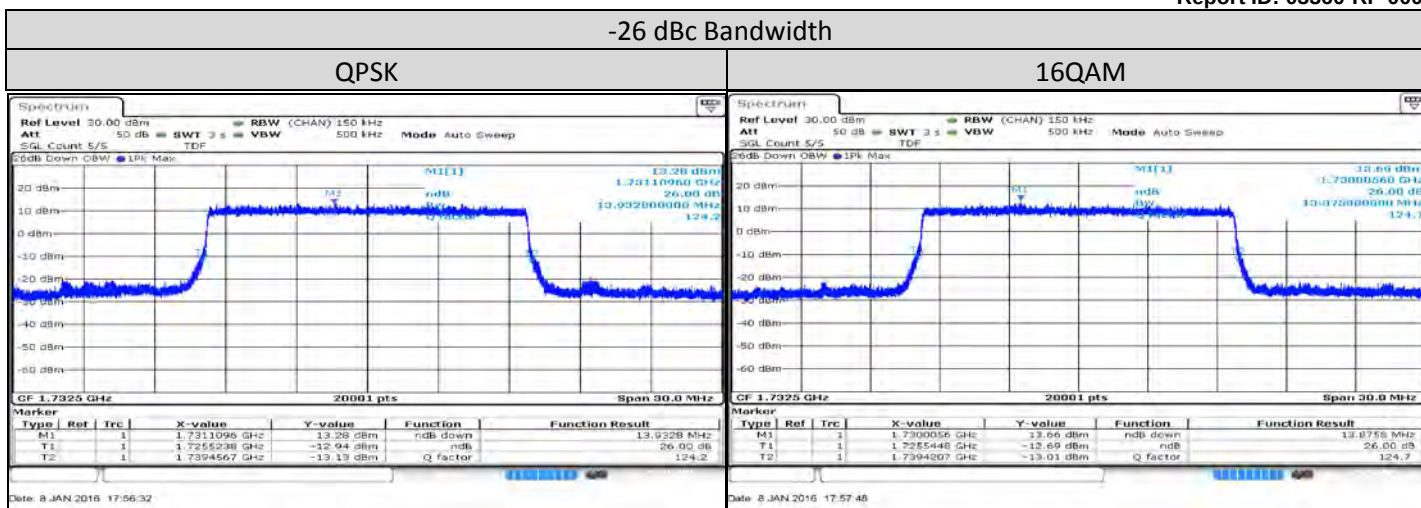
LTE Band/	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)
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BW/ RB Size/ RB Offset		(MHz)	QPSK Modulation	16QAM Modulation
Band 4 / 10MHz/50/0	Low CH 20000	1715 MHz	8.9006	8.9076
	Mid CH 20175	1732.5 MHz	8.9026	8.8956
	High CH 20350	1750 MHz	8.9076	8.9026

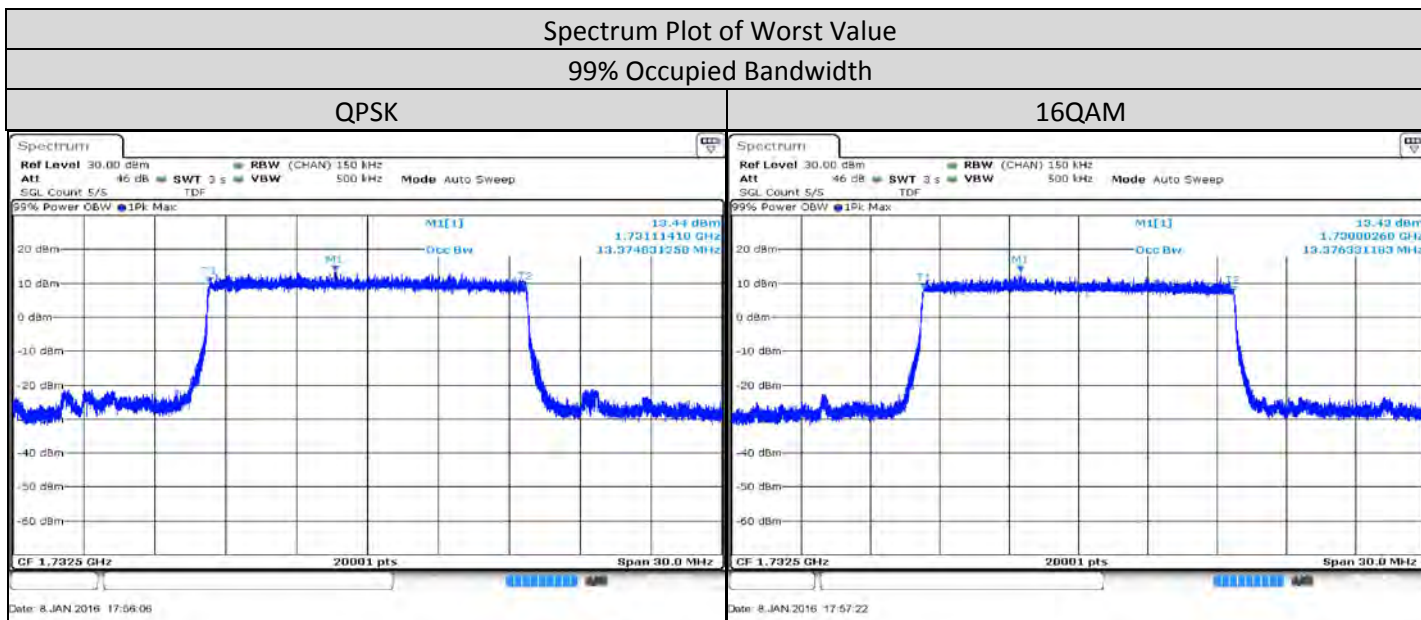


LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 15MHz/75/0	Low CH 20025	1717.5 MHz	13.9073	13.8473
	Mid CH 20175	1732.5 MHz	13.9328	13.8758
	High CH 20325	1747.5 MHz	13.9028	13.8623

Spectrum Plot of Worst Value



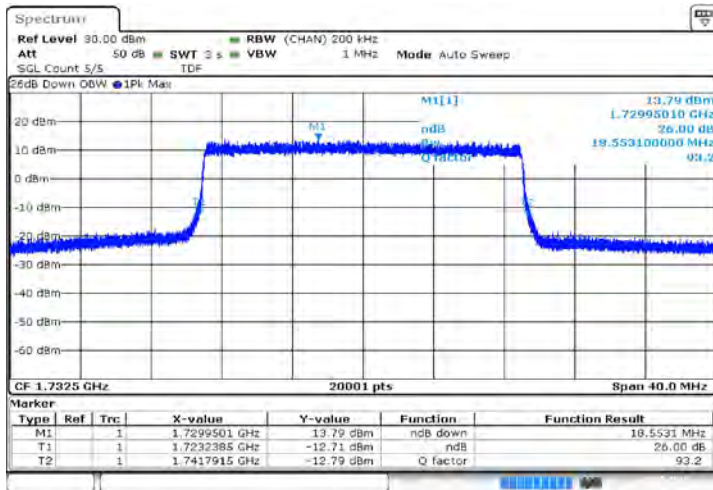
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 15MHz/75/0	Low CH 20025	1717.5 MHz	13.3703	13.3673
	Mid CH 20175	1732.5 MHz	13.3748	13.3763
	High CH 20325	1747.5 MHz	13.3703	13.3718



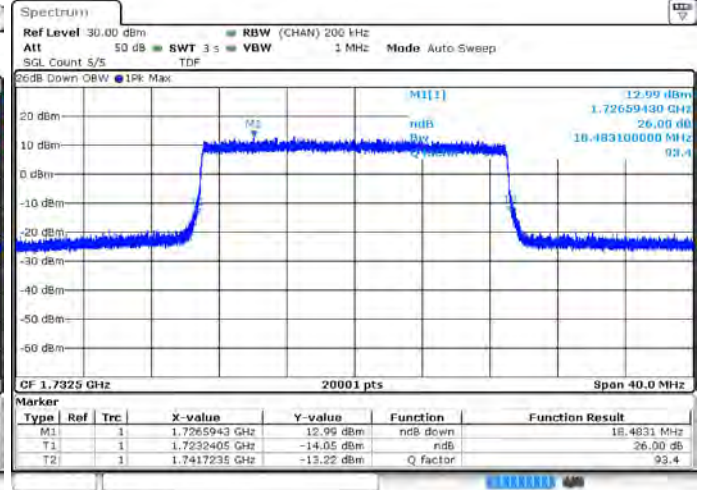
LTE Band/	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)
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BW/ RB Size/ RB Offset		(MHz)	QPSK Modulation	16QAM Modulation
Band 4 / 20MHz/100/0	Low CH 20050	1720 MHz	18.5051	18.4171
	Mid CH 20175	1732.5 MHz	18.5531	18.4831
	High CH 20300	1745 MHz	18.4331	18.3971

Spectrum Plot of Worst Value	
-26 dBc Bandwidth	
QPSK	16QAM



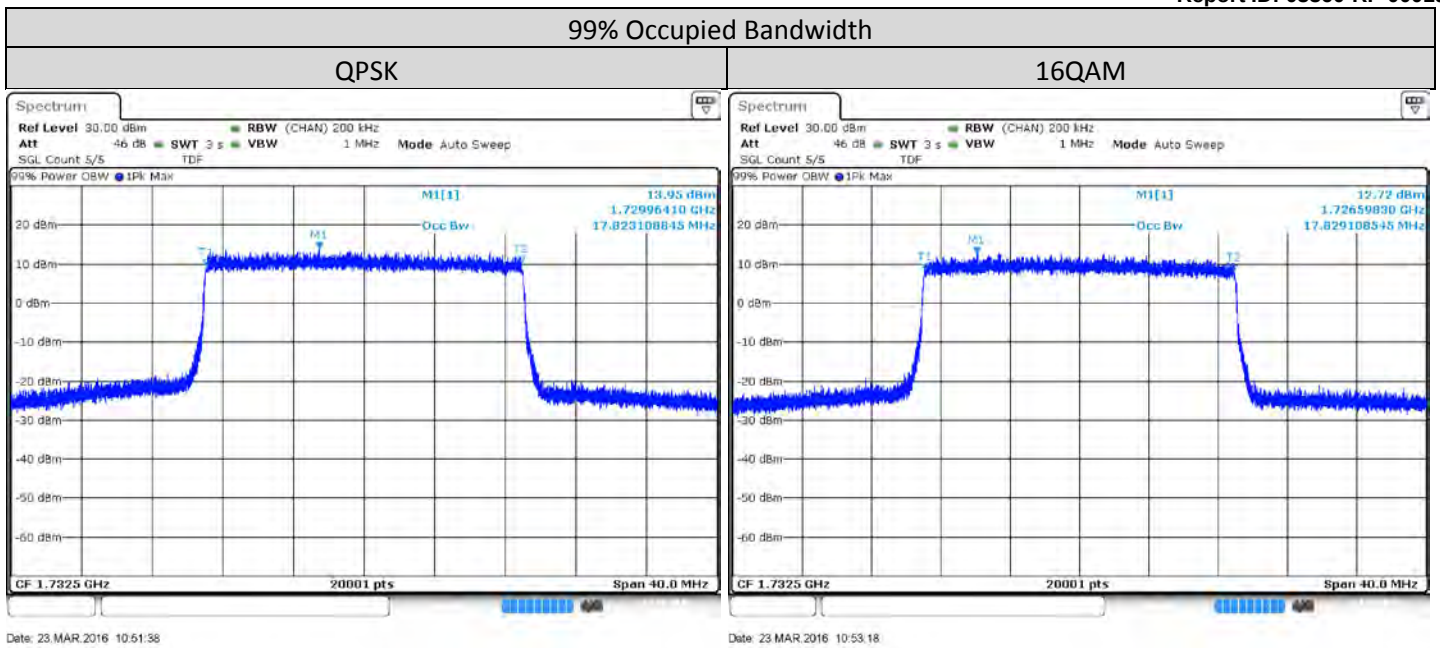
Date: 23.MAR.2016 11:14:59



Date: 23.MAR.2016 11:16:18

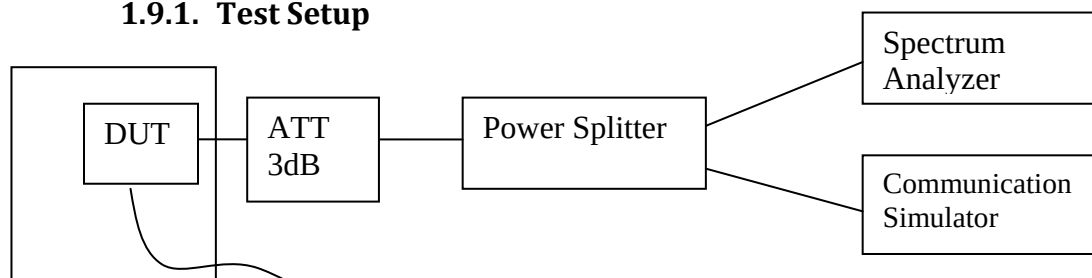
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4 / 20MHz/100/0	Low CH 20050	1720 MHz	17.8131	17.7991
	Mid CH 20175	1732.5 MHz	17.8231	17.8291
	High CH 20300	1745 MHz	17.8151	17.8191

Spectrum Plot of Worst Value



1.9. Frequency Stability

1.9.1. Test Setup



- 1) The DUT is placed in the temperature chamber and DUT is power up by external power supply to control the DC input voltage.
- 2) The temperature chamber could control the temperature and humidity and external power supply could control the test voltage range from minimum to maximum operating voltage.
- 3) Measured frequency error from the communication simulator by vary below step :
 - i. Vary temperature of the temperature chamber from -10 ~ 60 deg C (10 deg C / Step) and set external supply voltage constant at nominal voltage.
 - ii. Vary external supply voltage from minimum to maximum operation voltage support by DUT and set temperature chamber constant at room temp.
- 4) All the measurement was done at mid channel for each band.

1.9.2. Test Limit

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

1.9.3. Frequency Stability – LTE Band 4 (1710-1755MHz)

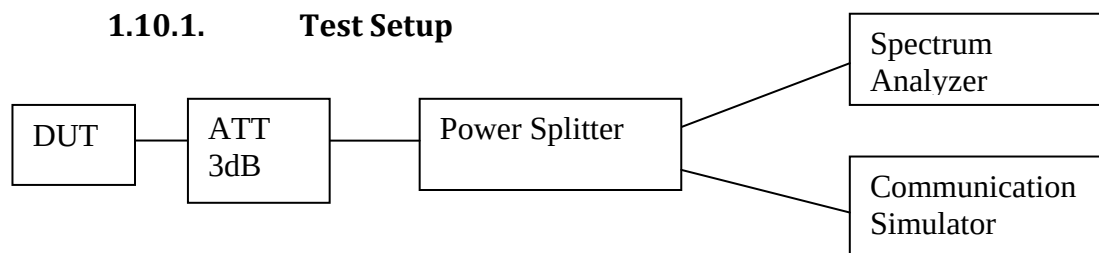
LTE Band/ Modulation/ RB Size/ RB Offset	Frequency Error VS Temperature						
	Temp (Deg C)	Frequency Error (ppm)					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz
Band 4 QPSK RB Size= 100% RB Offset = 0	60	0.0053	0.0048	0.0065	0.0044	0.0043	-0.0045
	50	0.0046	0.0040	-0.0040	0.0038	0.0036	0.0052
	40	0.0041	-0.0040	0.0040	0.0038	0.0044	0.0049
	30	0.0038	0.0046	0.0039	0.0041	0.0047	0.0041
	20	0.0042	0.0055	0.0051	0.0043	0.0052	0.0047
	10	0.0047	0.0039	0.0044	0.0041	0.0046	0.0046
	0	0.0045	0.0056	0.0044	0.0047	0.0044	0.0046
	-10	0.0042	0.0048	0.0044	0.0054	0.0048	0.0038
	-20	0.0035	0.0048	0.0046	0.0042	0.0047	0.0045
	-30	0.0037	0.0045	0.0043	0.0039	0.0040	0.0042

LTE Band/ Modulation/ RB Size/ RB Offset	Frequency Error VS Voltage						
	Voltage (V)	Frequency Error (ppm)					
		1.4MHz	3MHz	5MHz	10MHz	15MHz	20MHz

Band 4 QPSK RB Size= 100% RB Offset = 0	4.1	0.0057	0.0047	0.0052	0.0048	0.0046	0.0049
	3.7	0.0046	0.0045	0.0058	0.0047	0.0044	0.0044
	3.5	0.0044	0.0035	0.0056	0.0048	0.0046	0.0049

1.10. Band Edge Conducted Spurious Emission

1.10.1. Test Setup

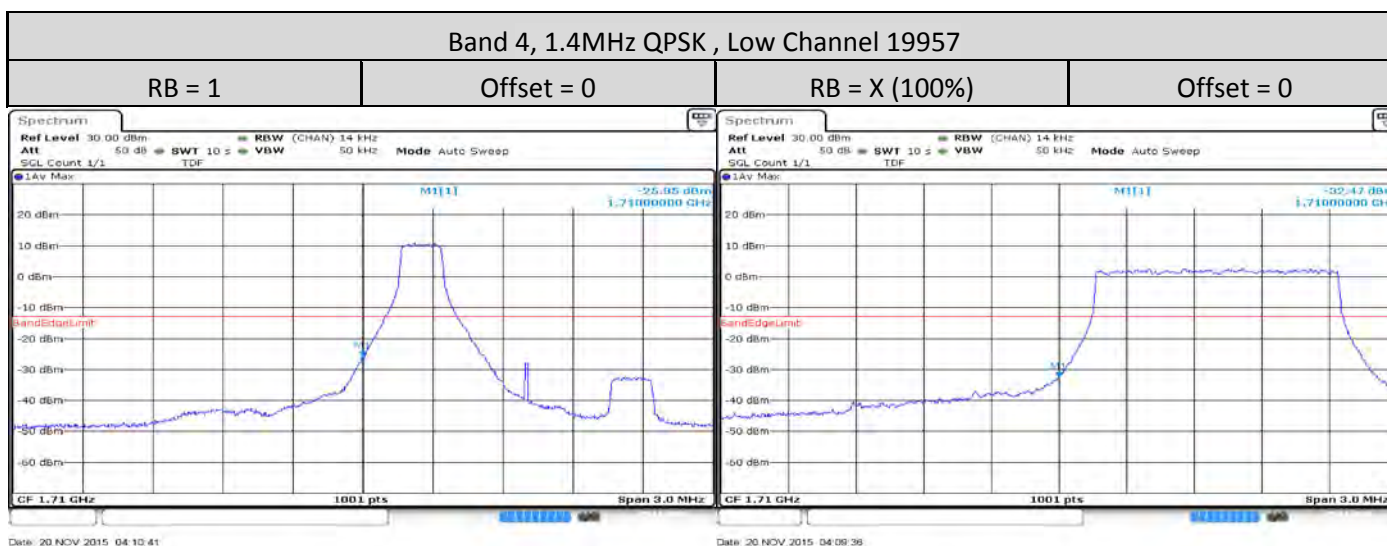


- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) Set DUT to transmit maximum power through communication simulator.
- 4) The band edges of lowest and highest channels with the highest RF powers were measured.
- 5) The center frequency of spectrum is the band edge frequency, span is 3MHz, RBW is 1~3% of OBW and VBW is at least 3 times of RBW.
- 6) Record the maximum trace plot into the test report.

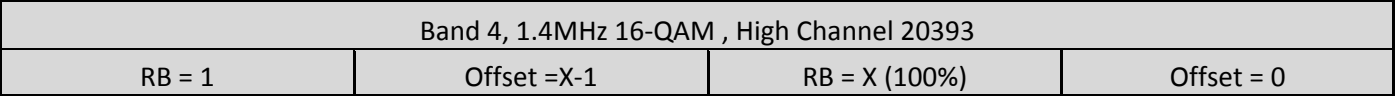
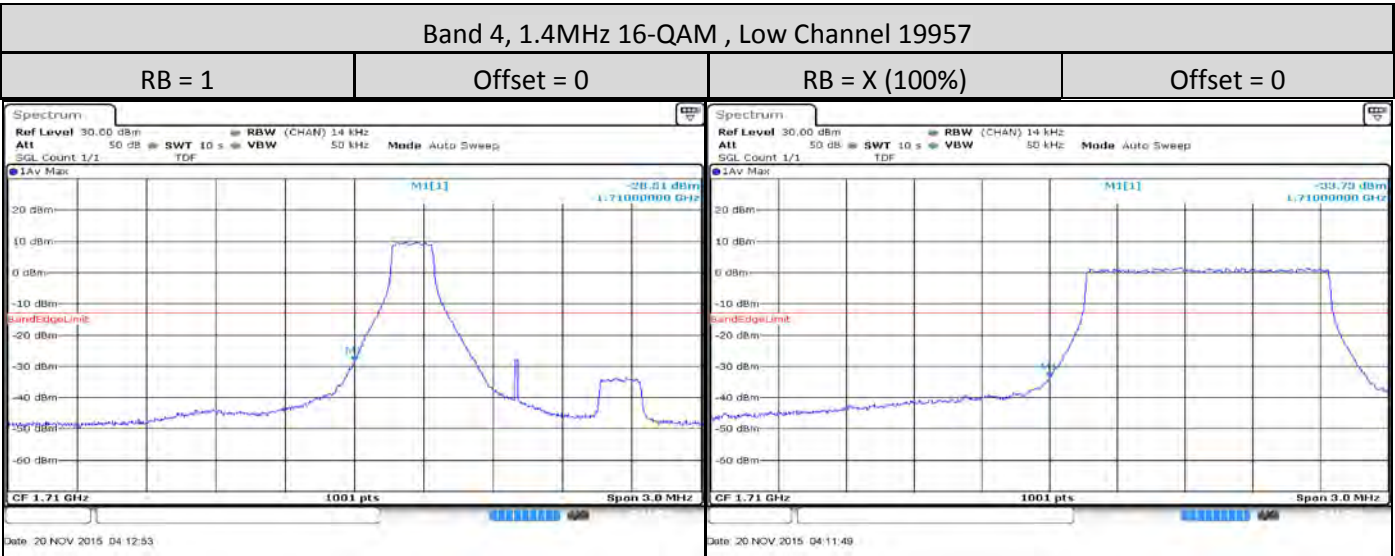
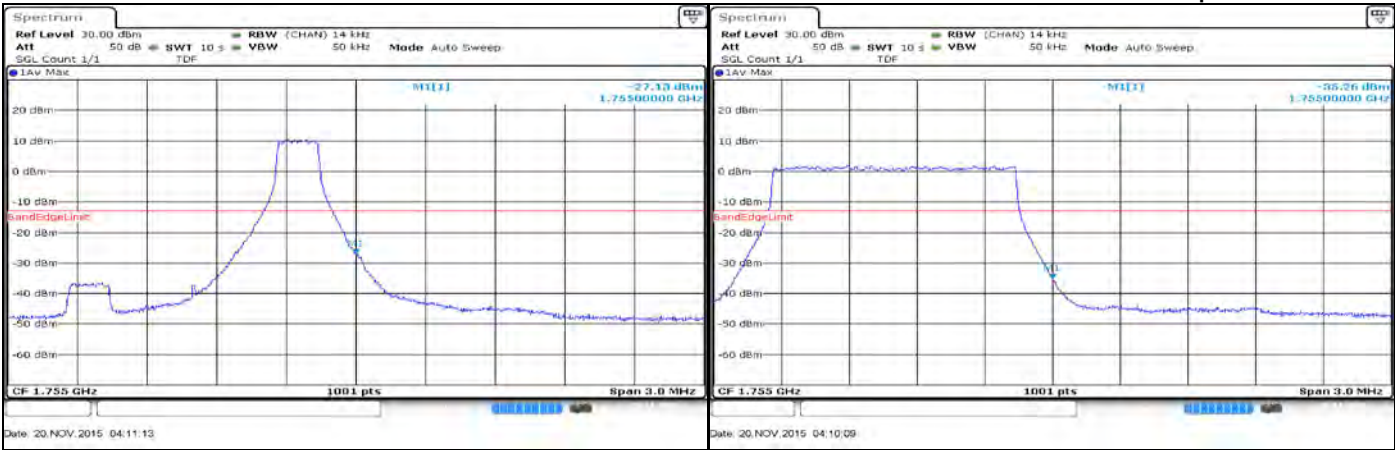
1.10.2. Test Limit

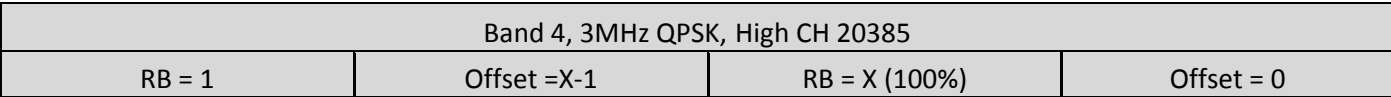
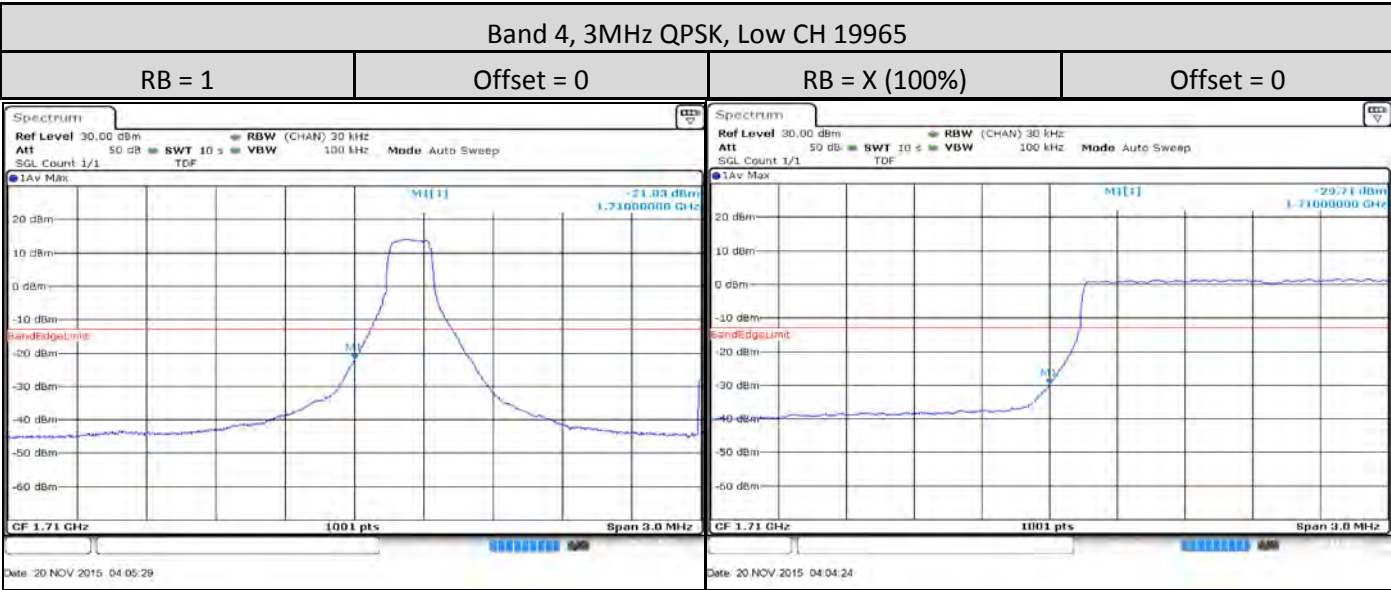
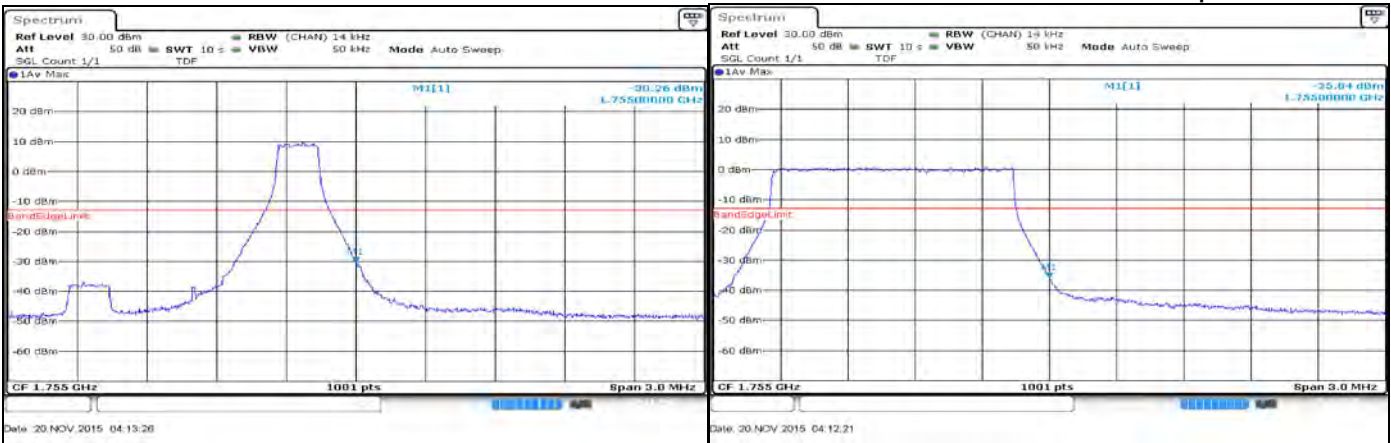
For operations in the 1710-1755 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB. In the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

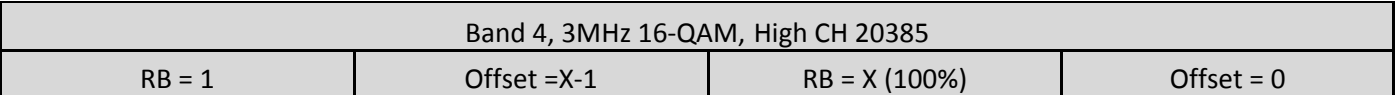
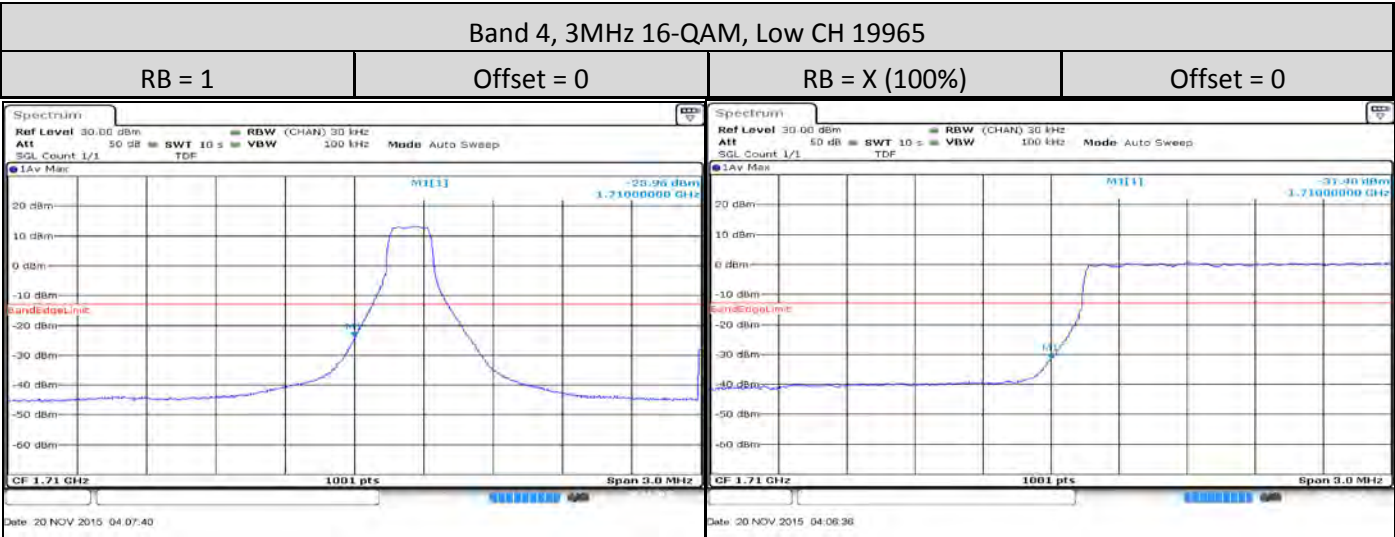
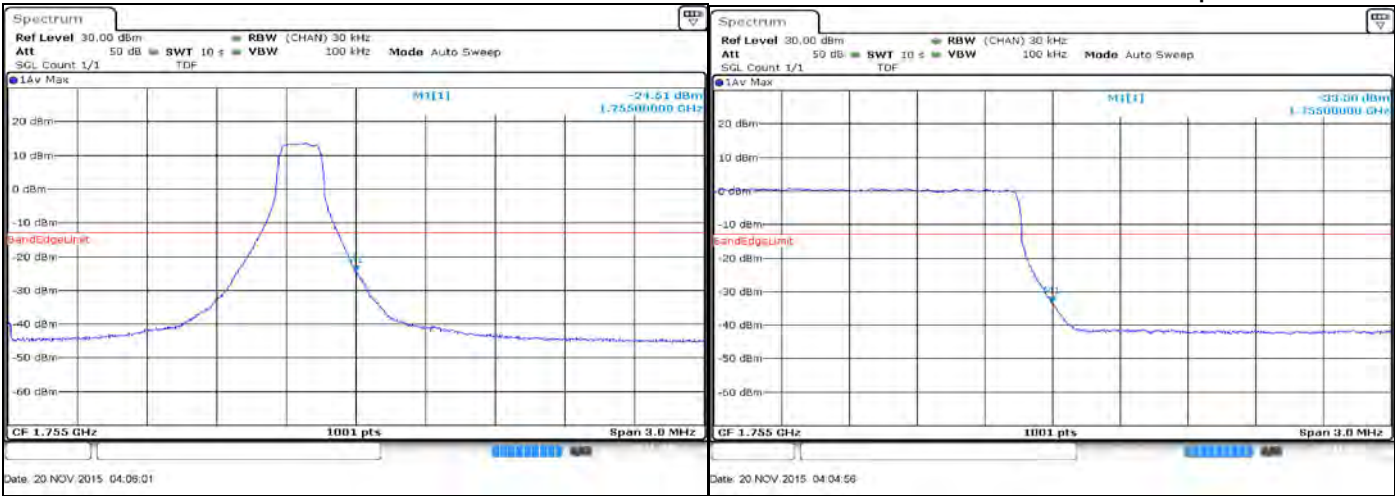
1.10.3. Band Edge Conducted Spurious Emission – LTE Band 4 (1710-1755MHz)

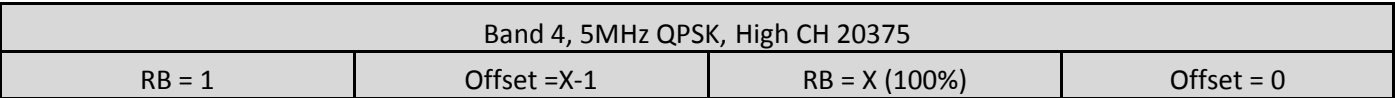
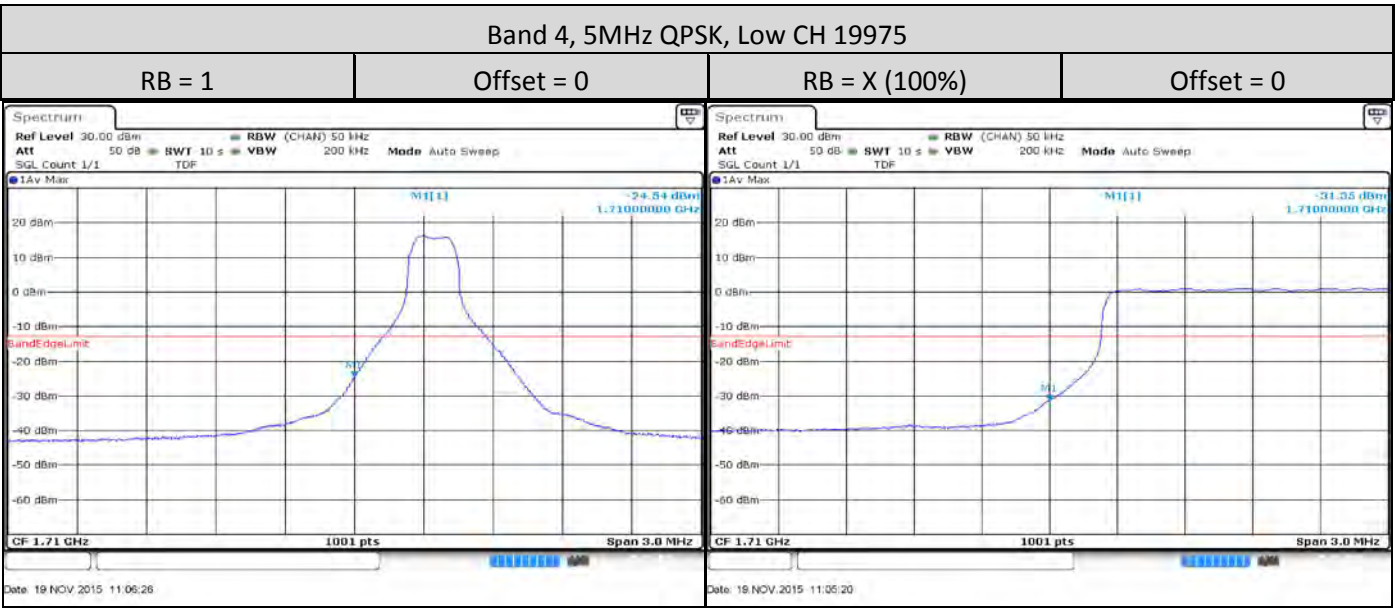
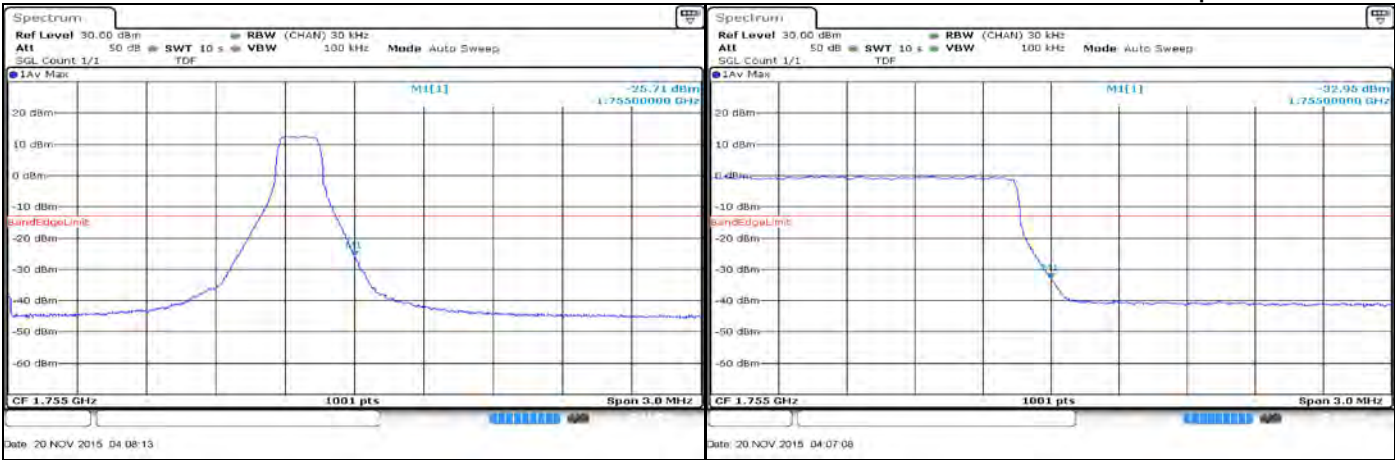


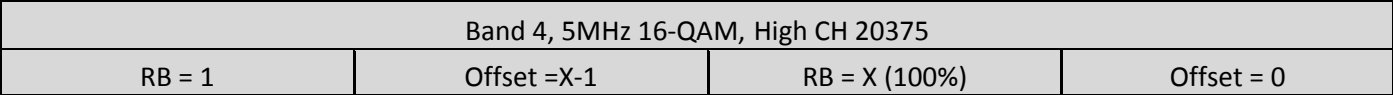
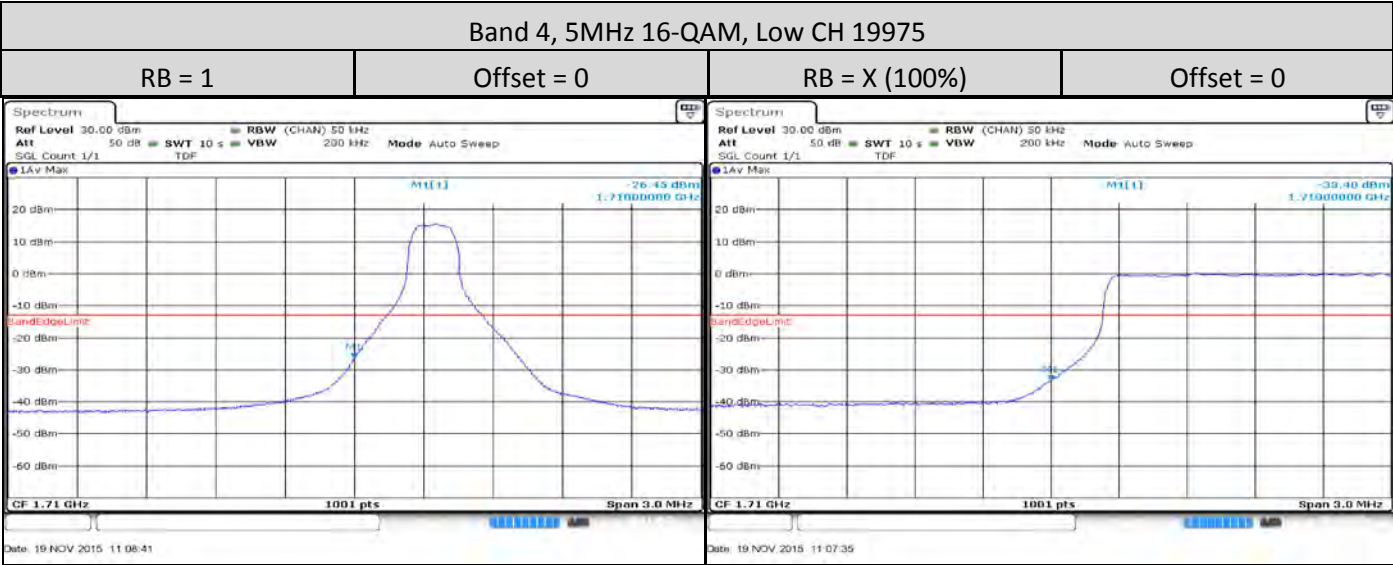
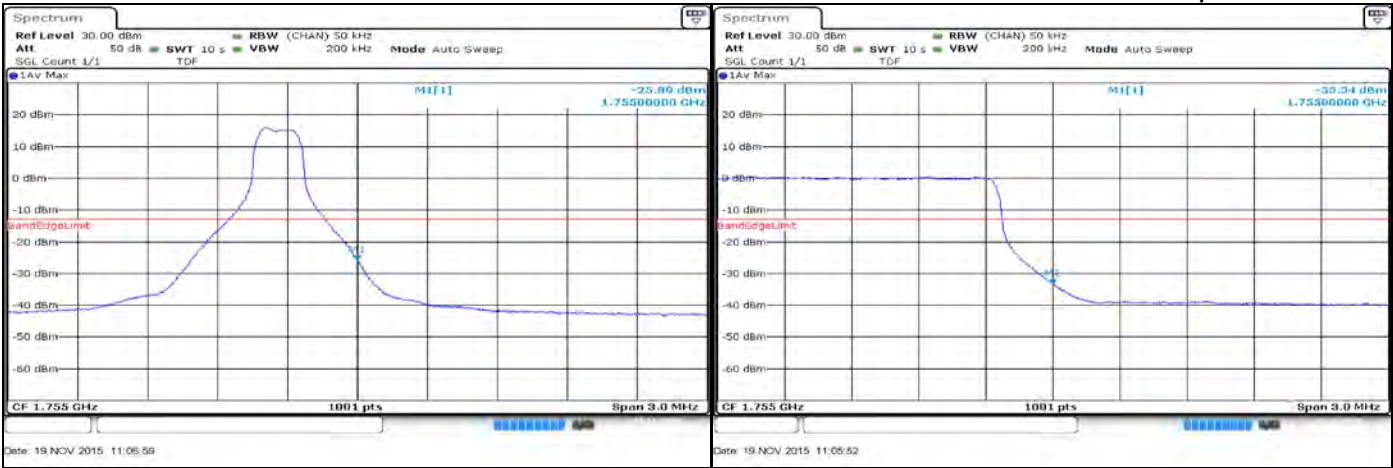
Band 4, 1.4MHz QPSK , High Channel 20393			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0

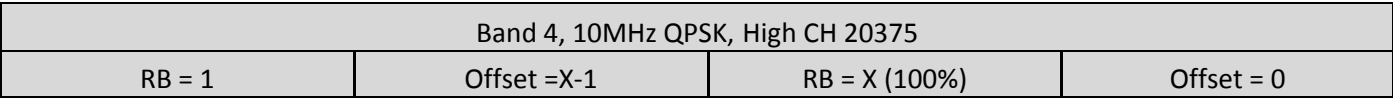
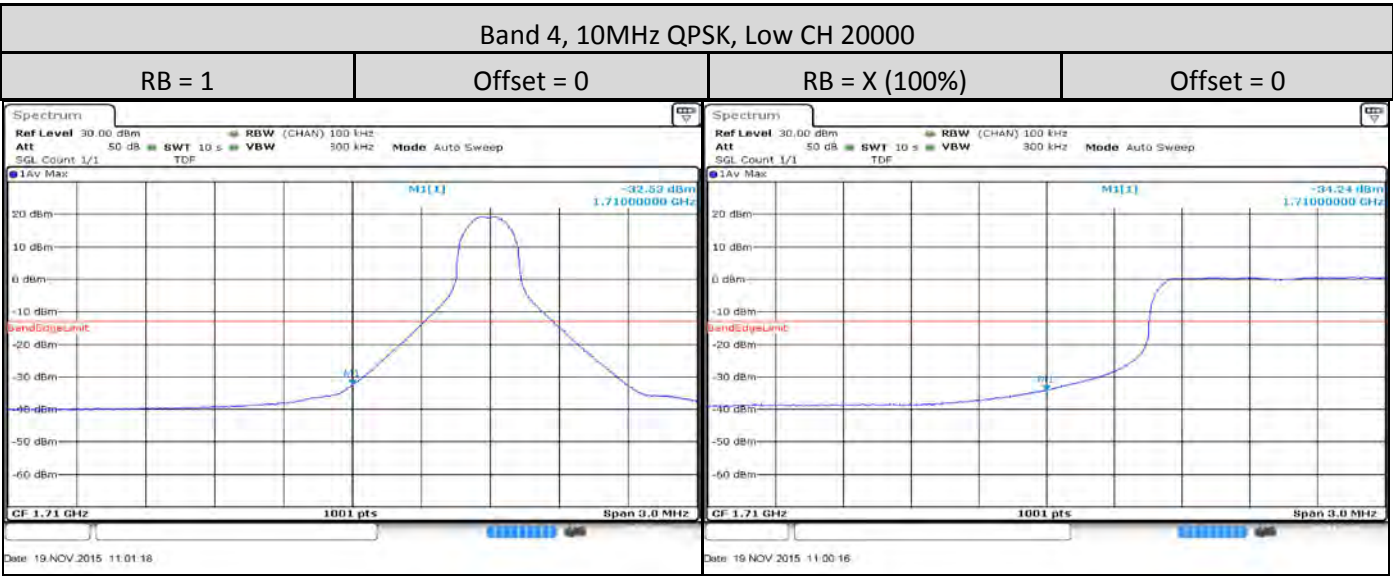
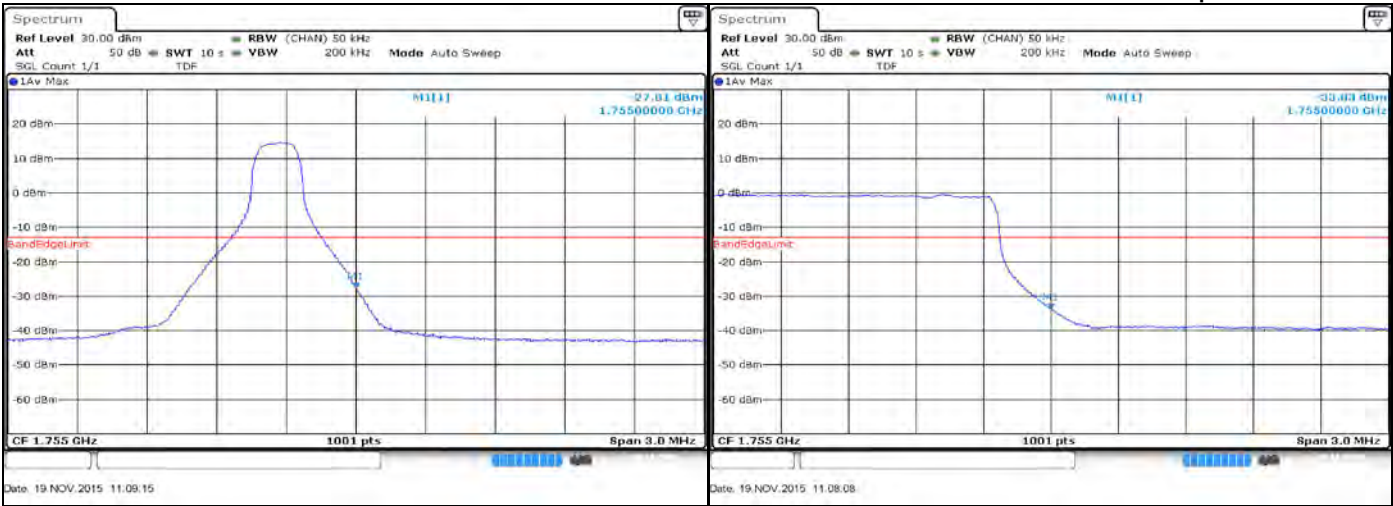


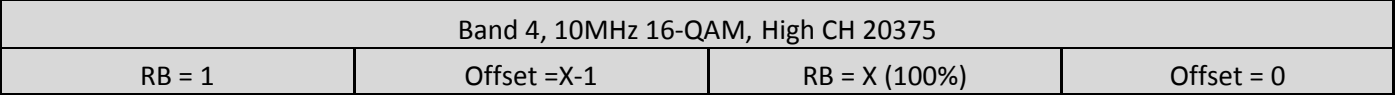
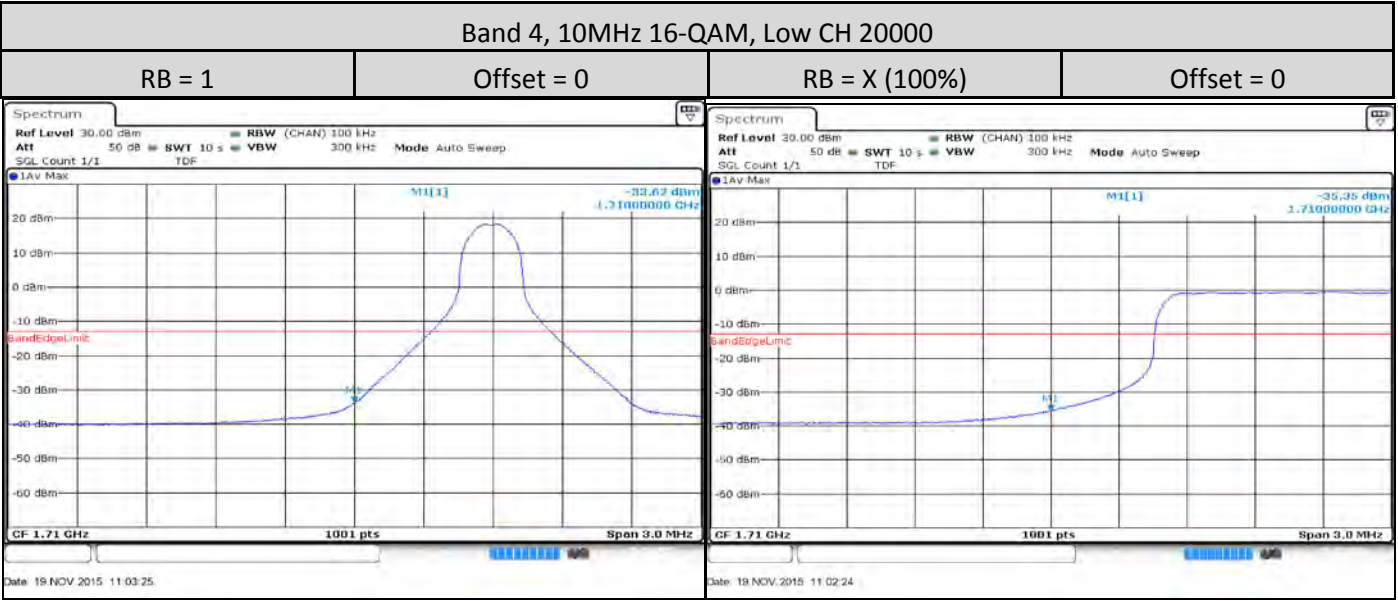
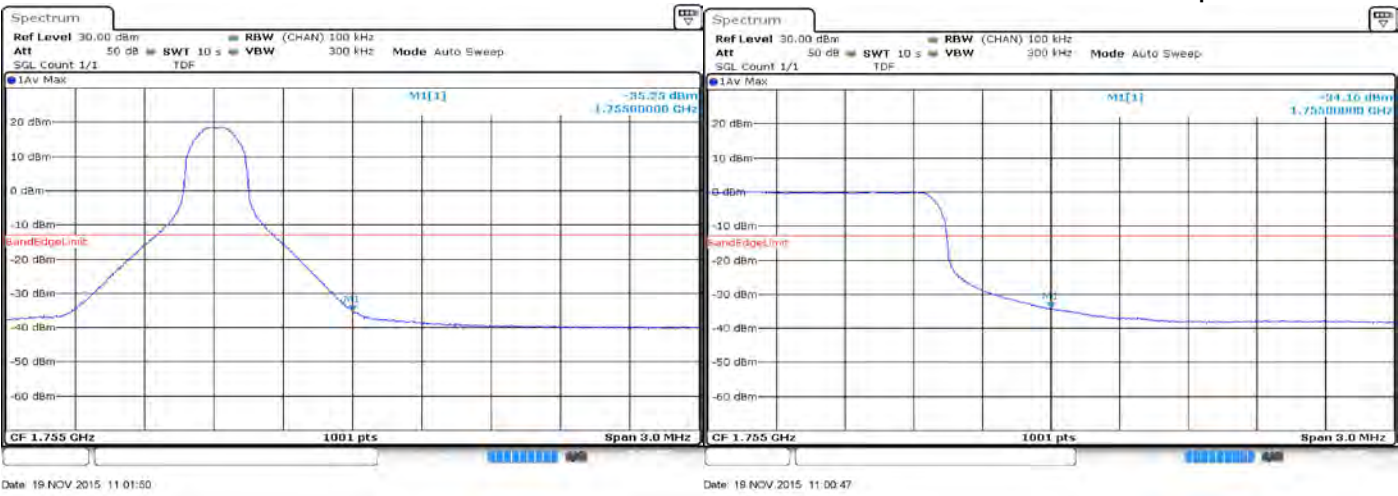


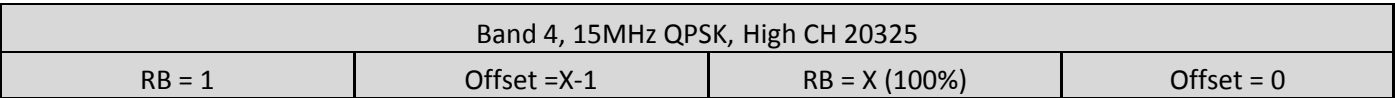
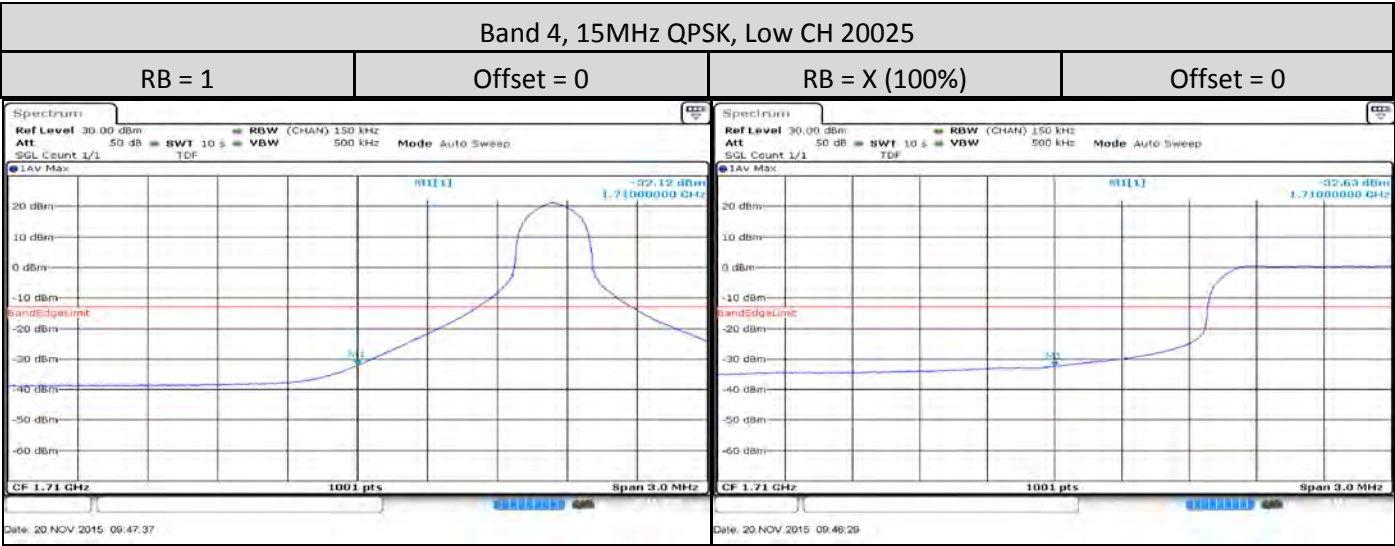
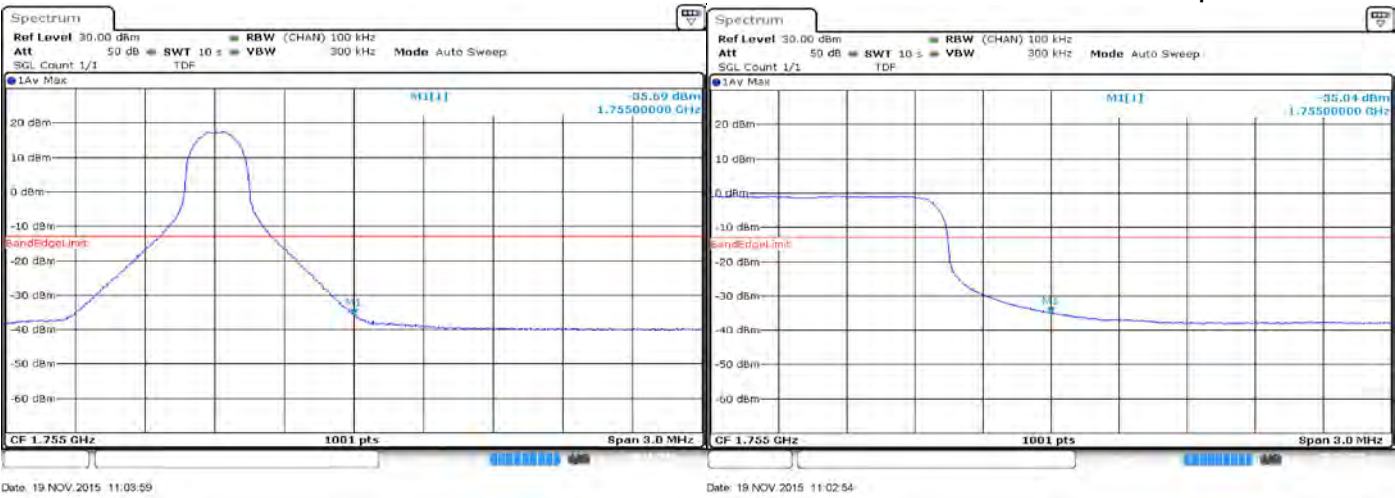


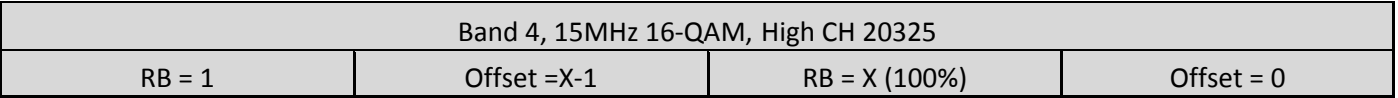
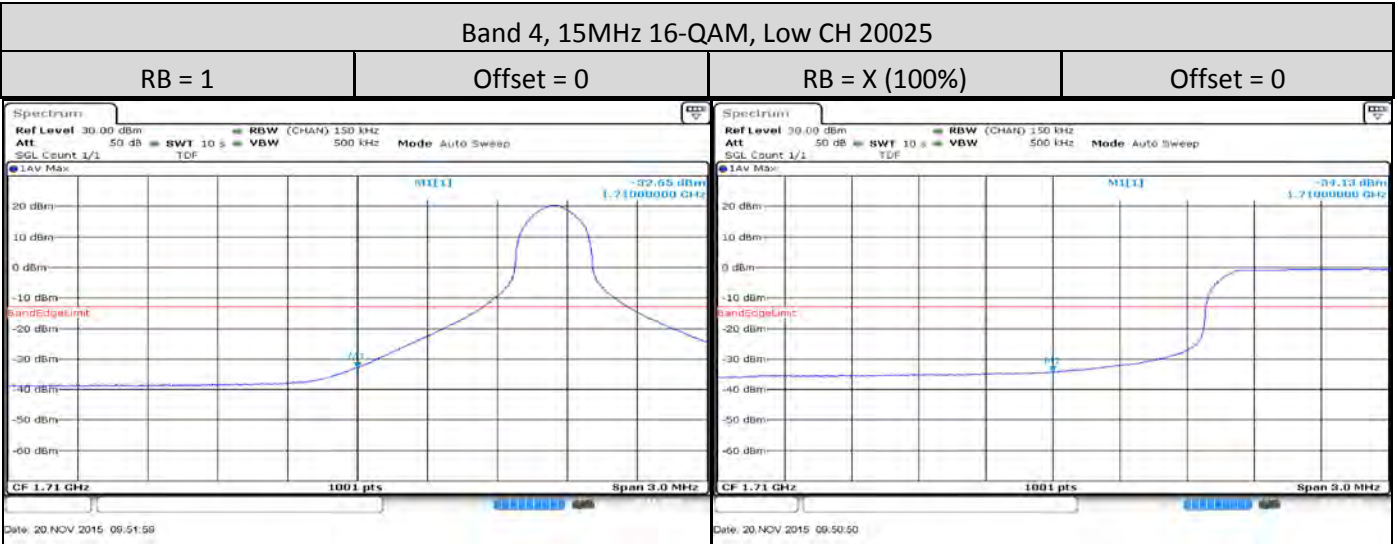
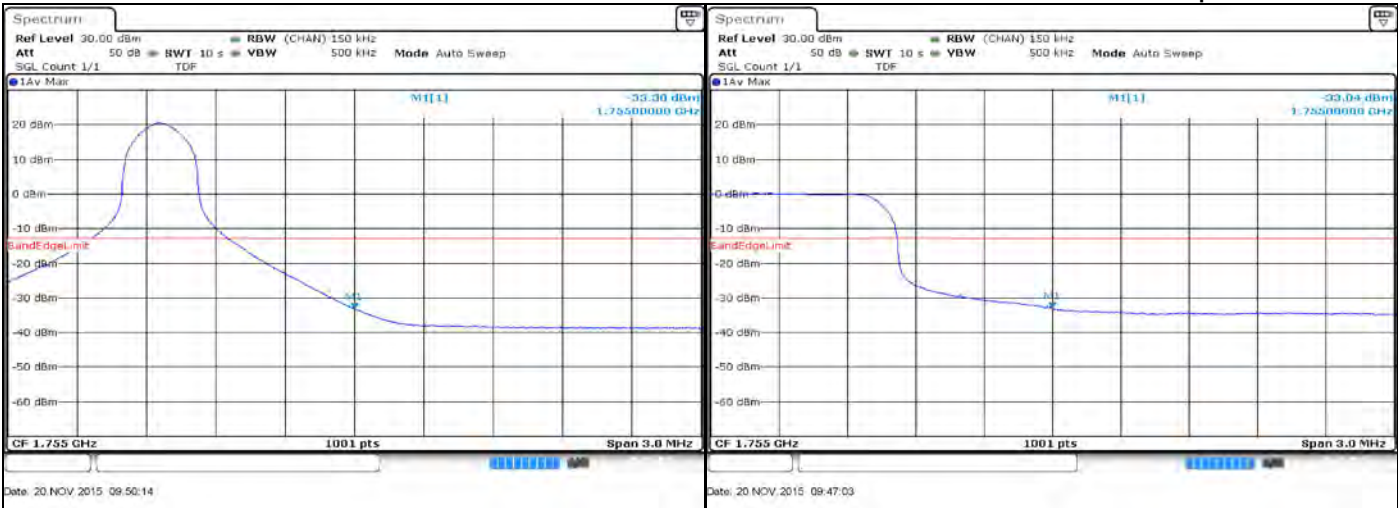


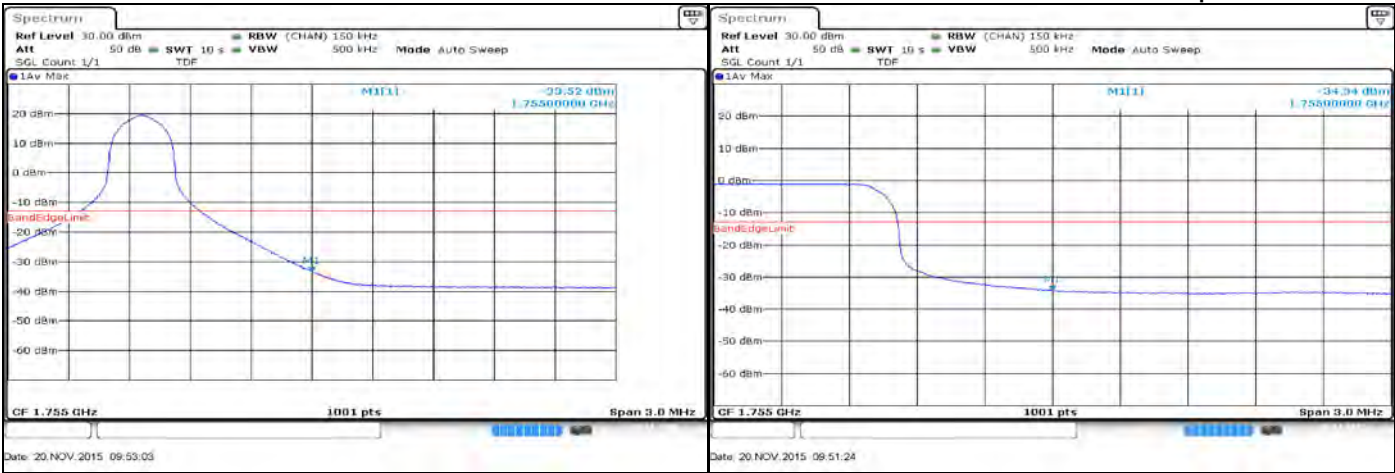












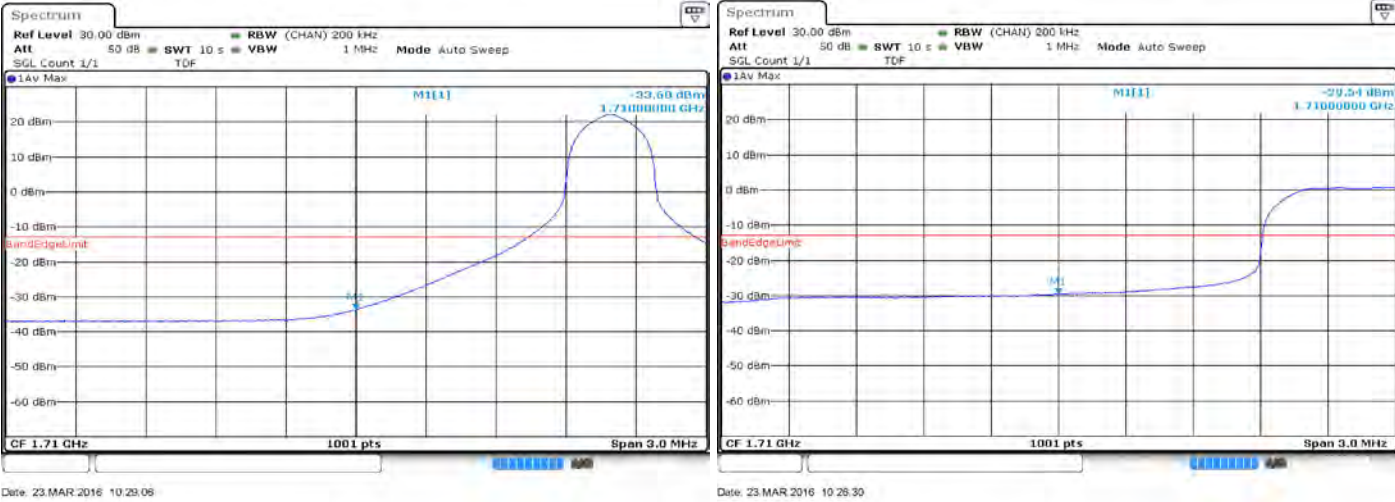
Band 4, 20MHz QPSK, Low CH 20050

RB = 1

Offset = 0

RB = X (100%)

Offset = 0



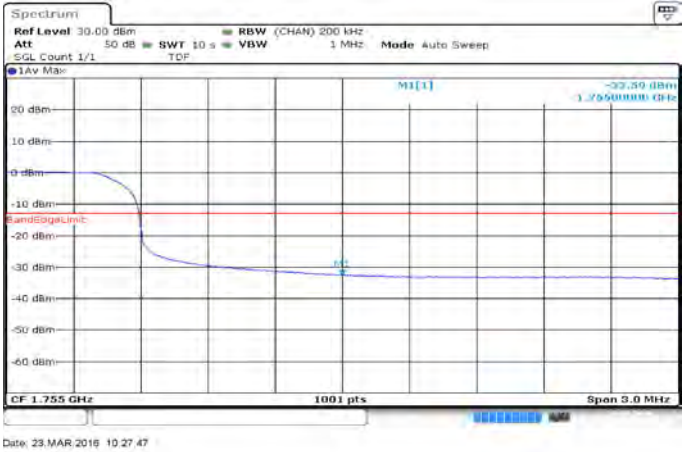
Band 4, 20MHz QPSK, High CH 20300

RB = 1

Offset = X-1

RB = X (100%)

Offset = 0



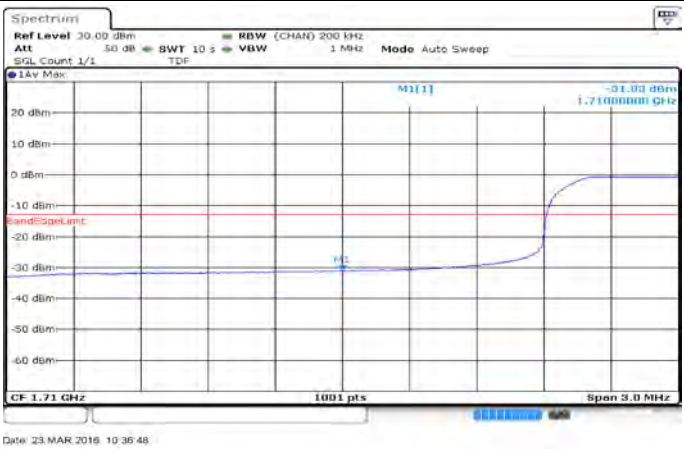
Band 4, 20MHz 16-QAM, Low CH 20050

RB = 1

Offset = 0

RB = X (100%)

Offset = 0



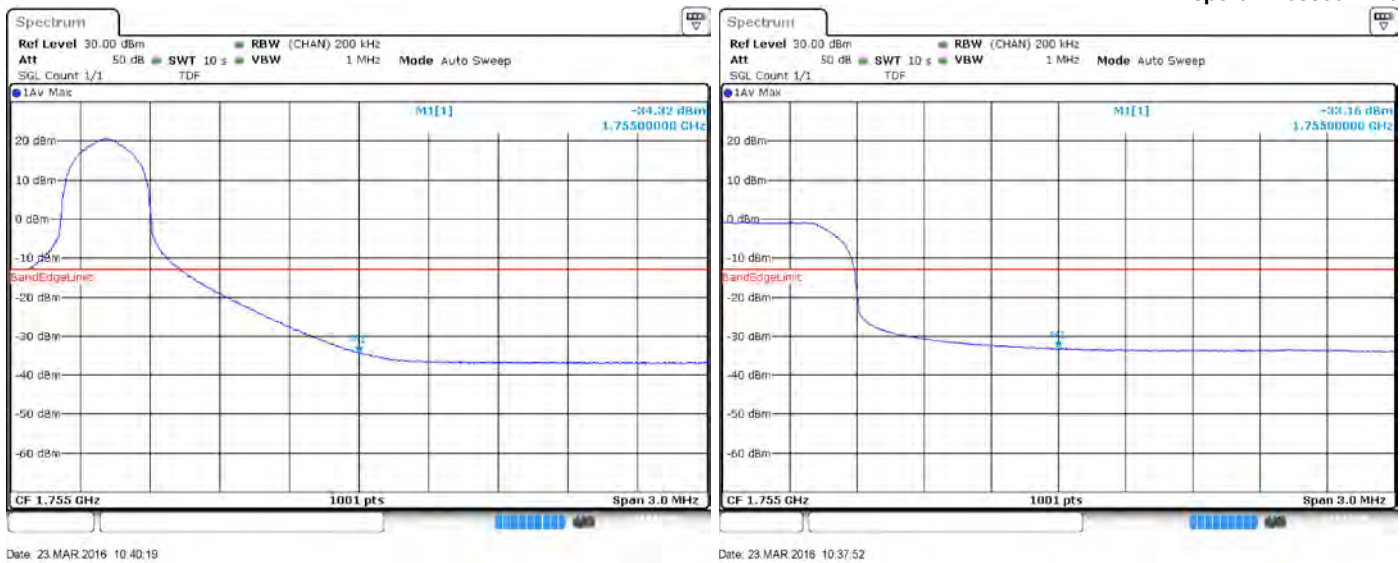
Band 4, 20MHz 16-QAM, High CH 20300

RB = 1

Offset = X-1

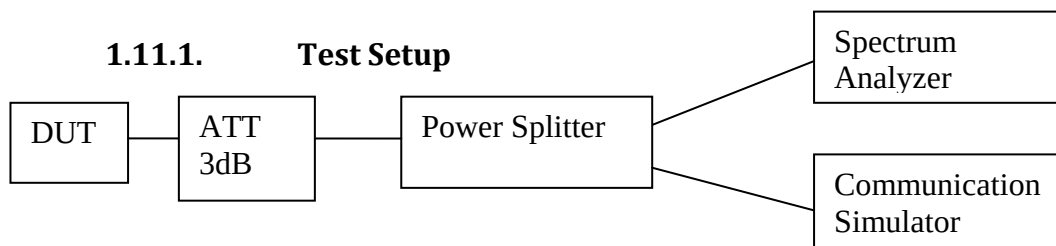
RB = X (100%)

Offset = 0



1.11. Conducted Spurious Emission

1.11.1. Test Setup



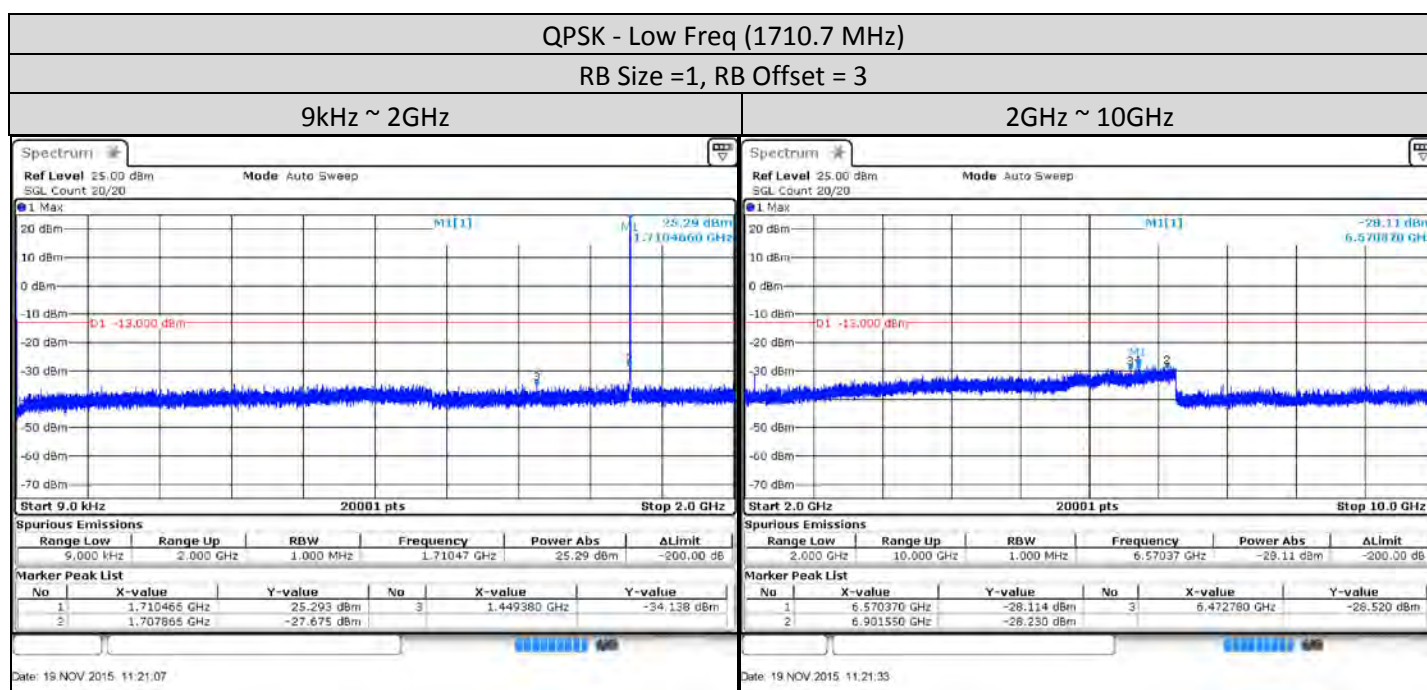
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) Set DUT to transmit maximum power through communication simulator.
- 4) Spectrum Analyzer setting, RBW = 1 MHz, VBW = 3 MHz.
- 5) The spurious emission of lowest, middle and highest channels with the highest RF powers were measured.
- 6) Record the maximum trace plot into the test report.

1.11.2. Test Limit

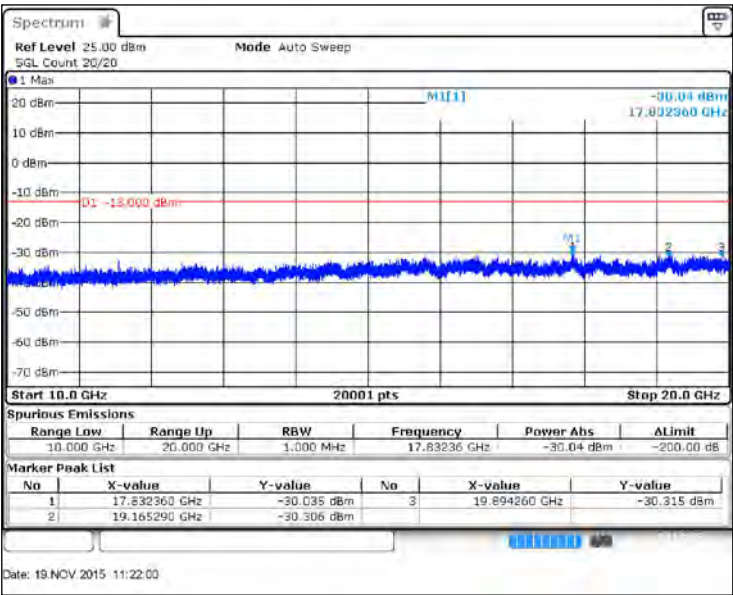
For operations in the 1710-1755 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB. The measurement instrumentation is employing a resolution bandwidth of 1 megahertz or greater.

1.11.3. Conducted Spurious Emissions - LTE Band 4 (1710-1755MHz)

1.4MHz



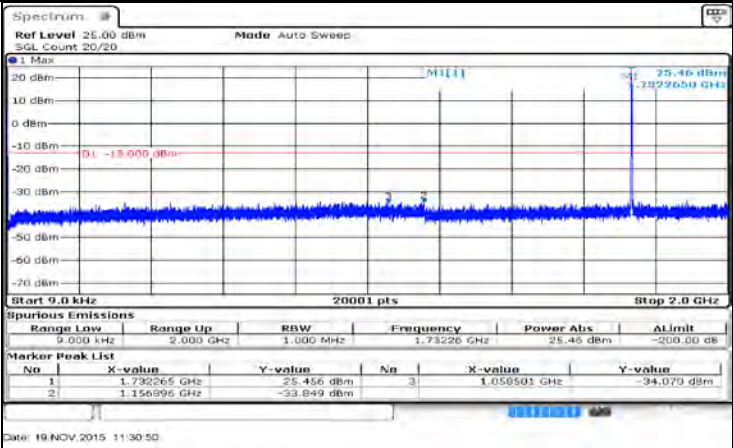
10kHz ~ 20GHz



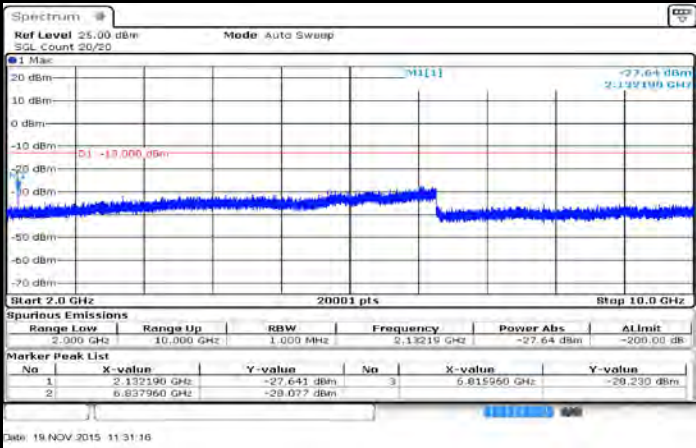
QPSK - Mid Freq (1732.5 MHz)

RB Size =1, RB Offset = 3

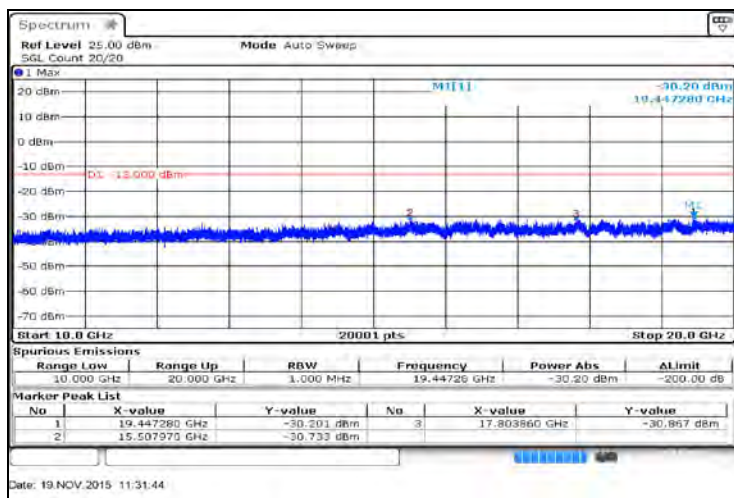
9kHz ~ 2GHz



2GHz ~ 10GHz



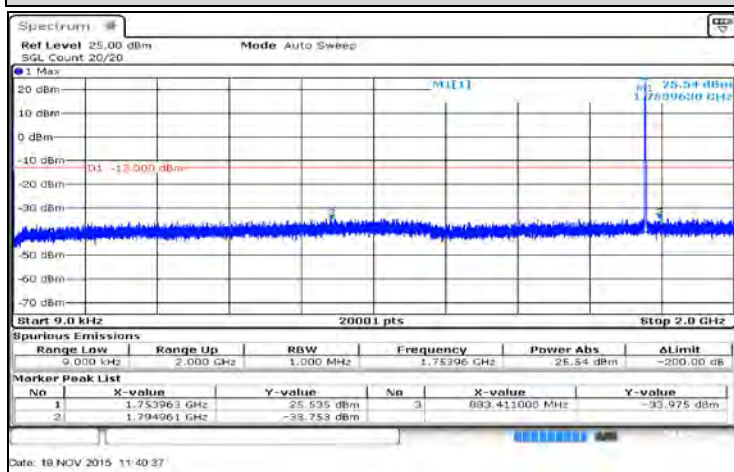
10kHz ~ 20GHz



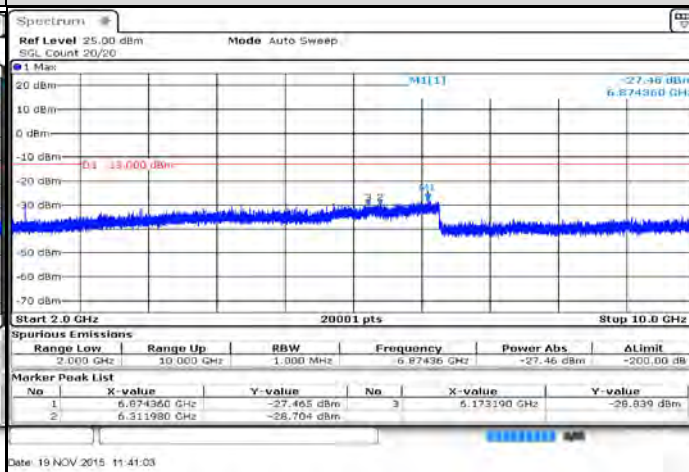
QPSK - High Freq (1754.3 MHz)

RB Size =1, RB Offset = 3

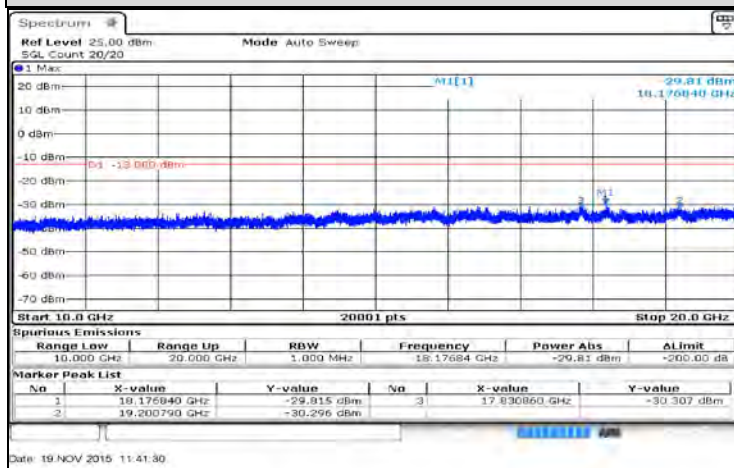
9kHz ~ 2GHz



2GHz ~ 10GHz



10kHz ~ 20GHz

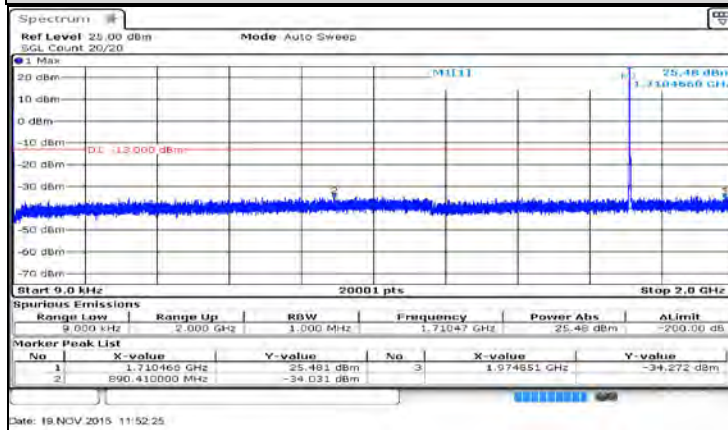


3MHz

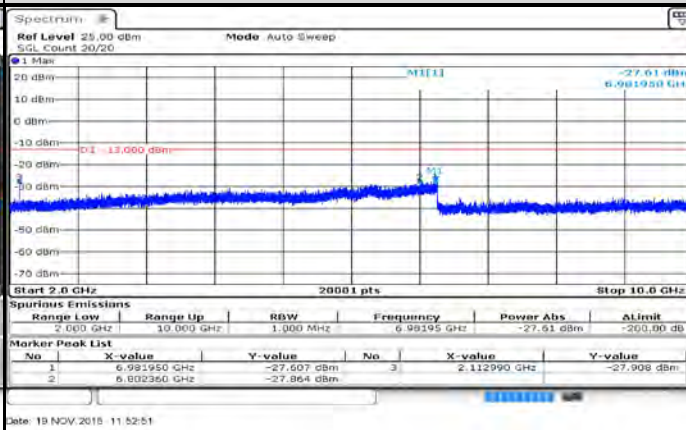
QPSK - Low Freq (1711.5 MHz)

RB Size =1, RB Offset = 14

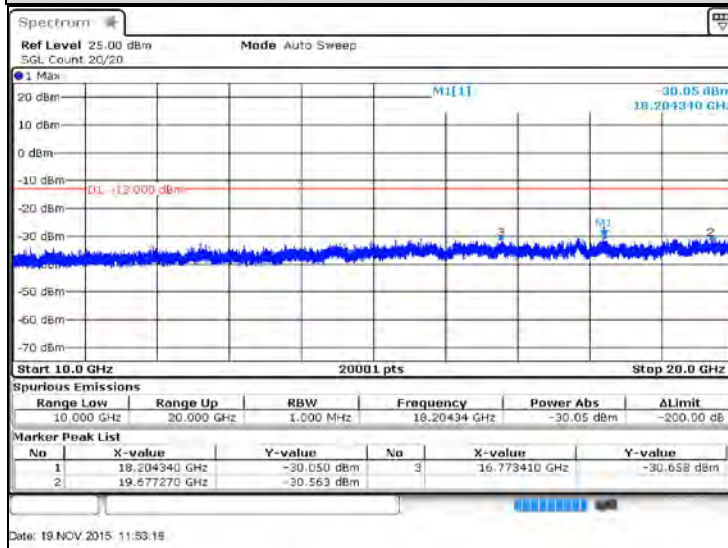
9kHz ~ 2GHz



2GHz ~ 10GHz



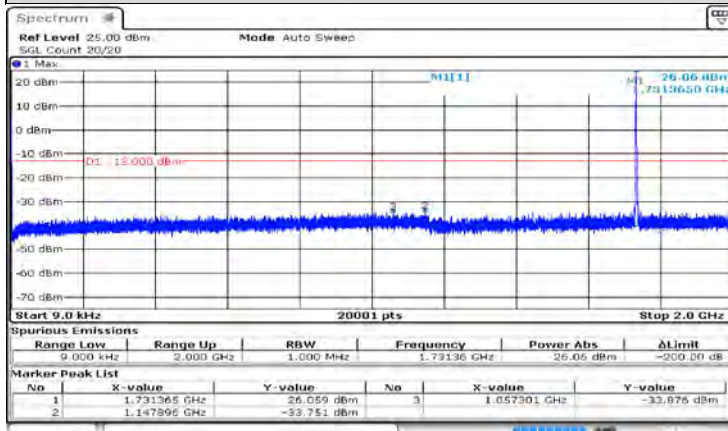
10kHz ~ 20GHz



QPSK - Mid Freq (1732.5 MHz)

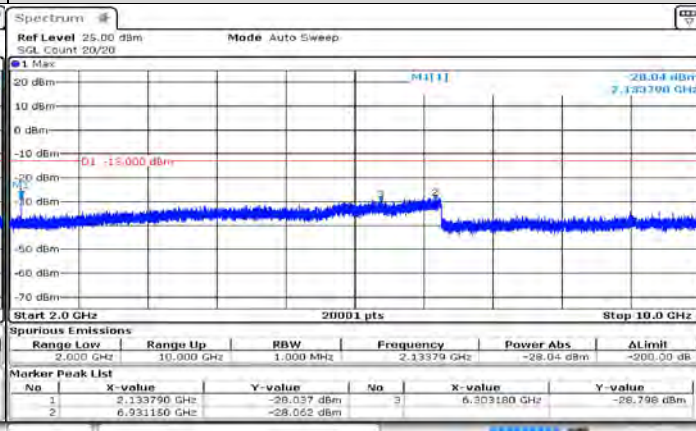
RB Size =1, RB Offset = 14

9kHz ~ 2GHz



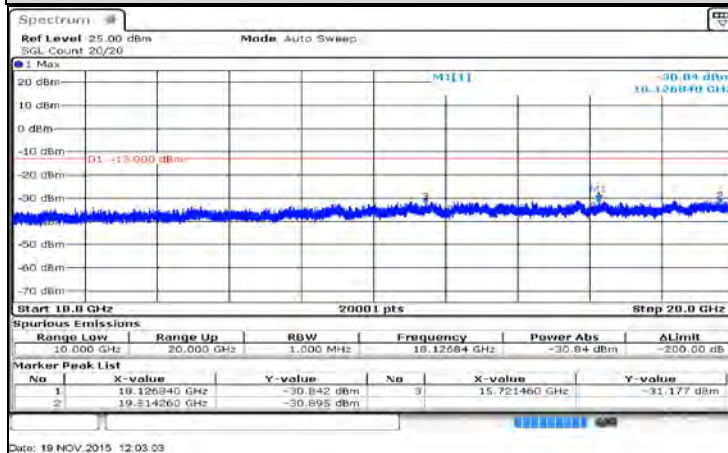
Date: 19 NOV 2015 12:02:10

2GHz ~ 10GHz



Date: 19 NOV 2015 12:02:36

10kHz ~ 20GHz



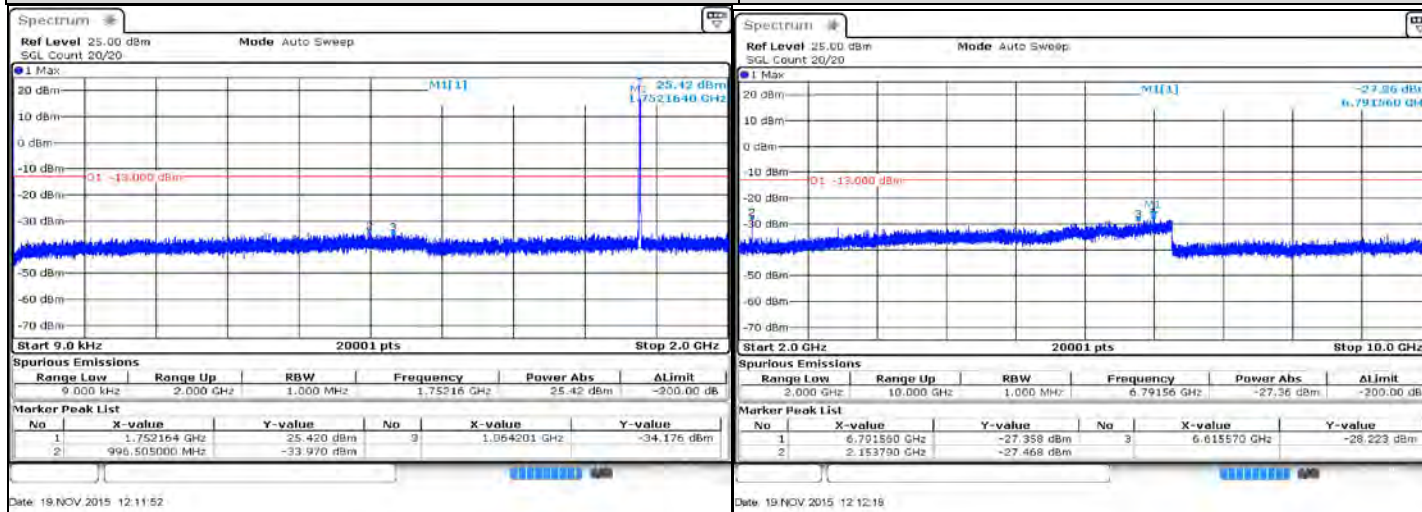
Date: 19 NOV 2015 12:03:03

QPSK - High Freq (1753.5 MHz)

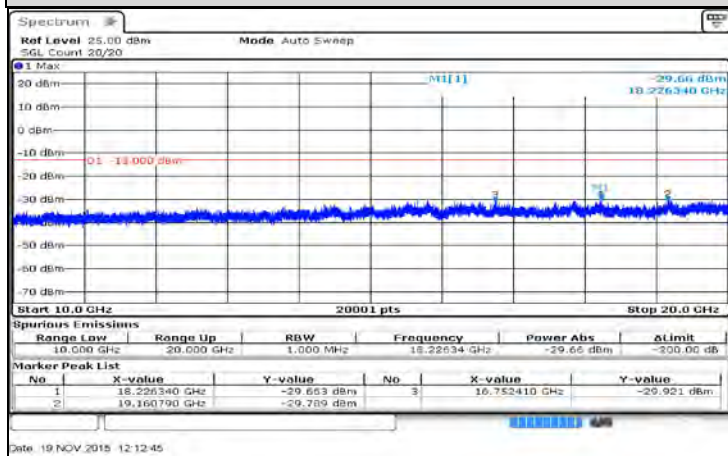
RB Size =1, RB Offset = 14

9kHz ~ 2GHz

2GHz ~ 10GHz



10kHz ~ 20GHz

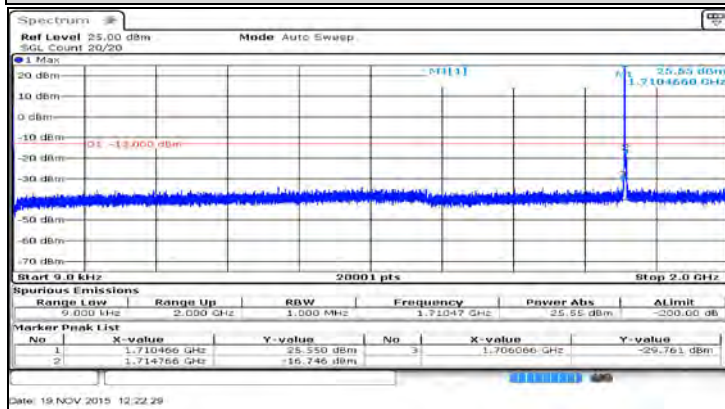


5MHz

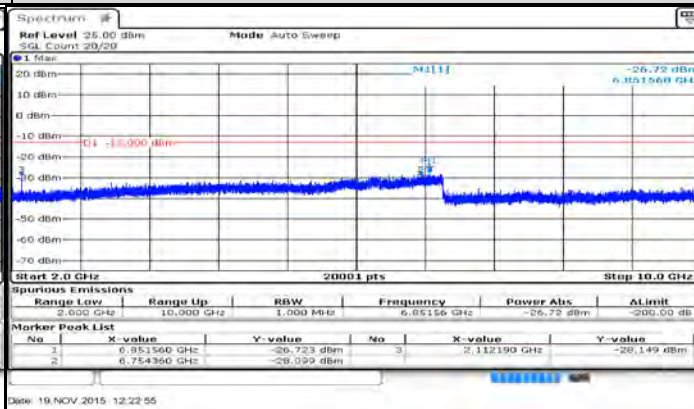
QPSK - Low Freq (1712.5 MHz)

RB Size =1, RB Offset = 24

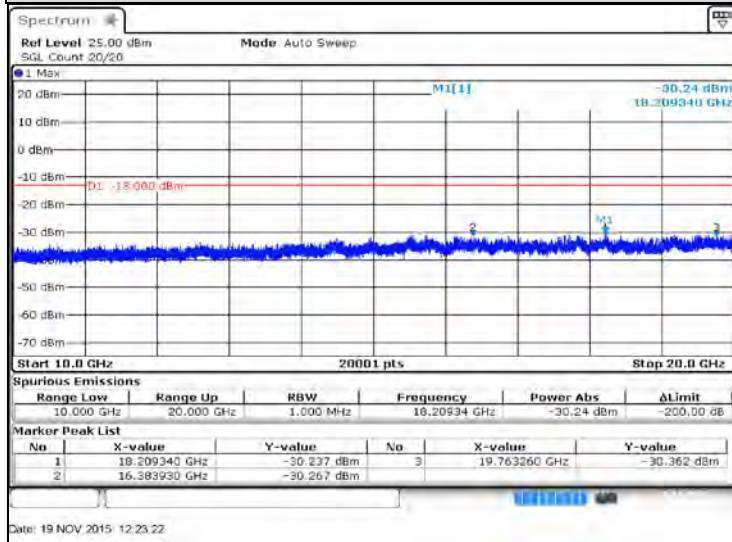
9kHz ~ 2GHz



2GHz ~ 10GHz



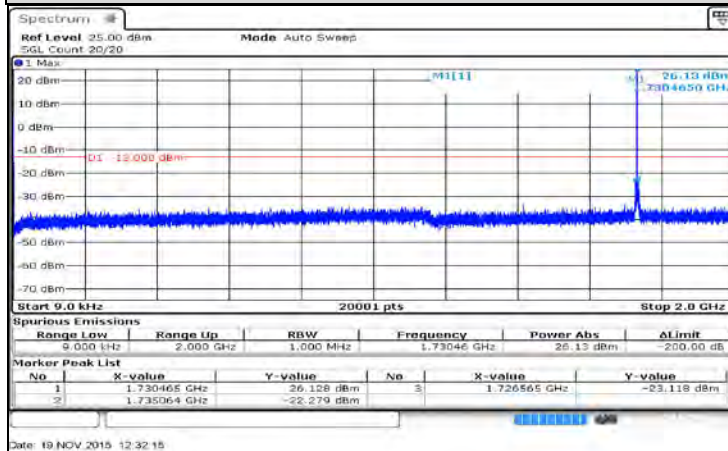
10kHz ~ 20GHz



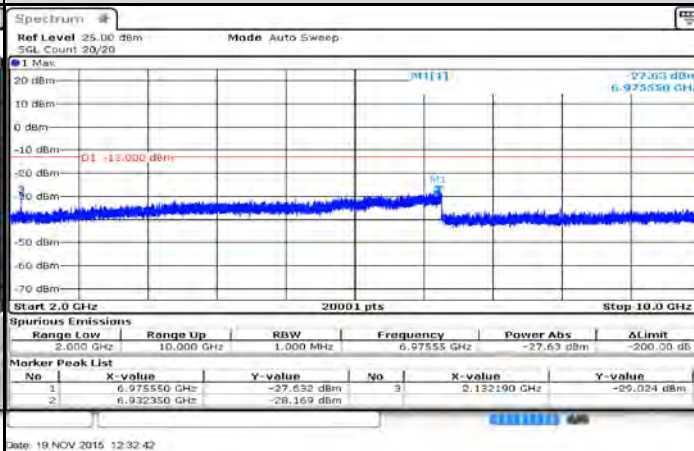
QPSK - Mid Freq (1732.5 MHz)

RB Size =1, RB Offset = 24

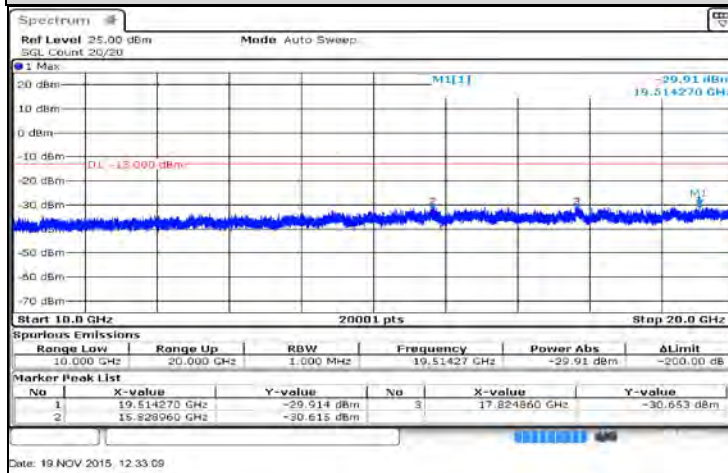
9kHz ~ 2GHz



2GHz ~ 10GHz



10kHz ~ 20GHz

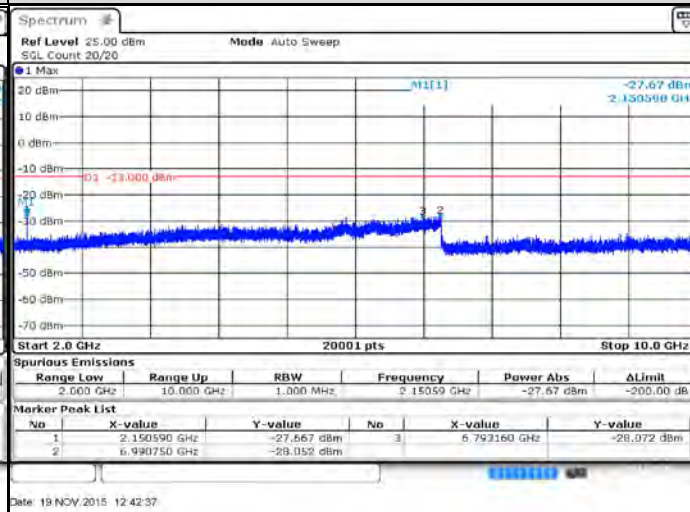
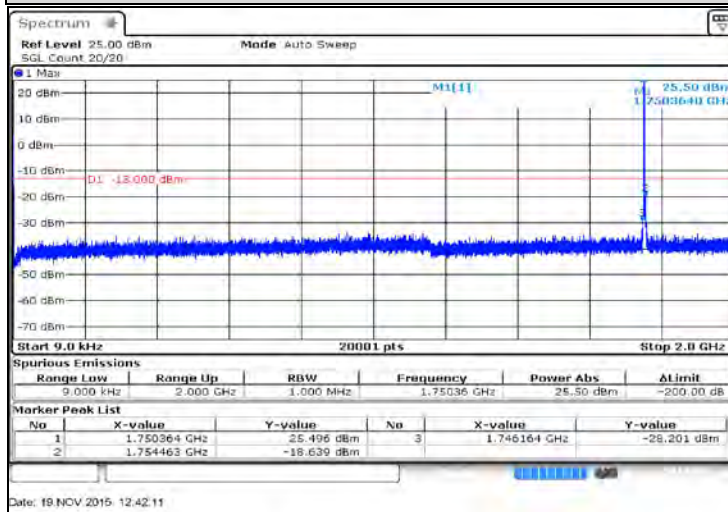


QPSK - High Freq (1752.5 MHz)

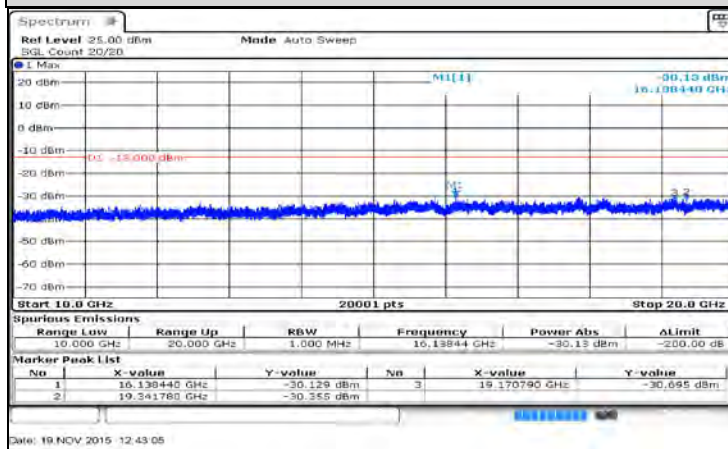
RB Size =1, RB Offset = 24

9kHz ~ 2GHz

2GHz ~ 10GHz



10kHz ~ 20GHz

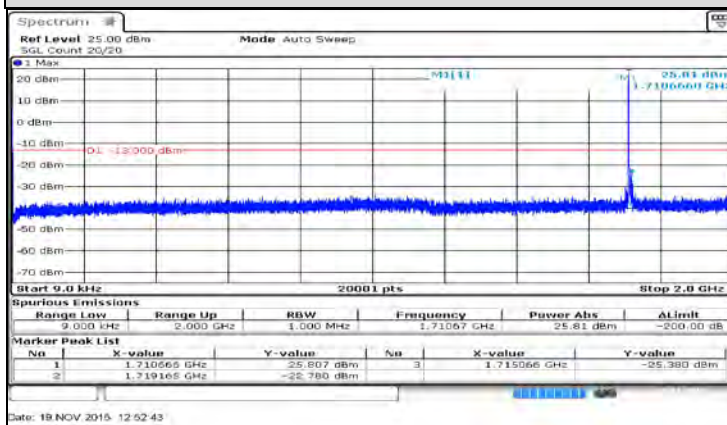


10MHz

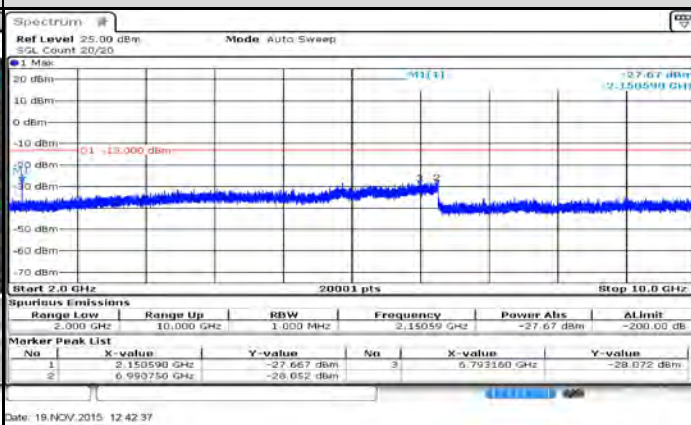
QPSK - Low Freq (1715.0 MHz)

RB Size =1, RB Offset = 25

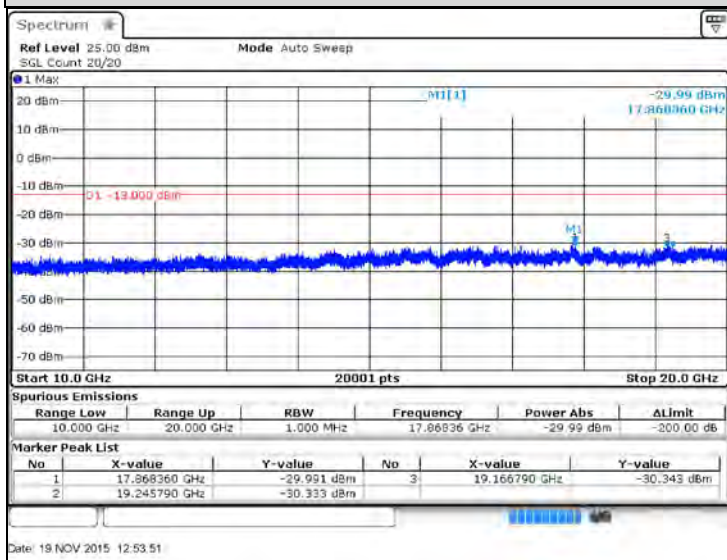
9kHz ~ 2GHz



2GHz ~ 10GHz

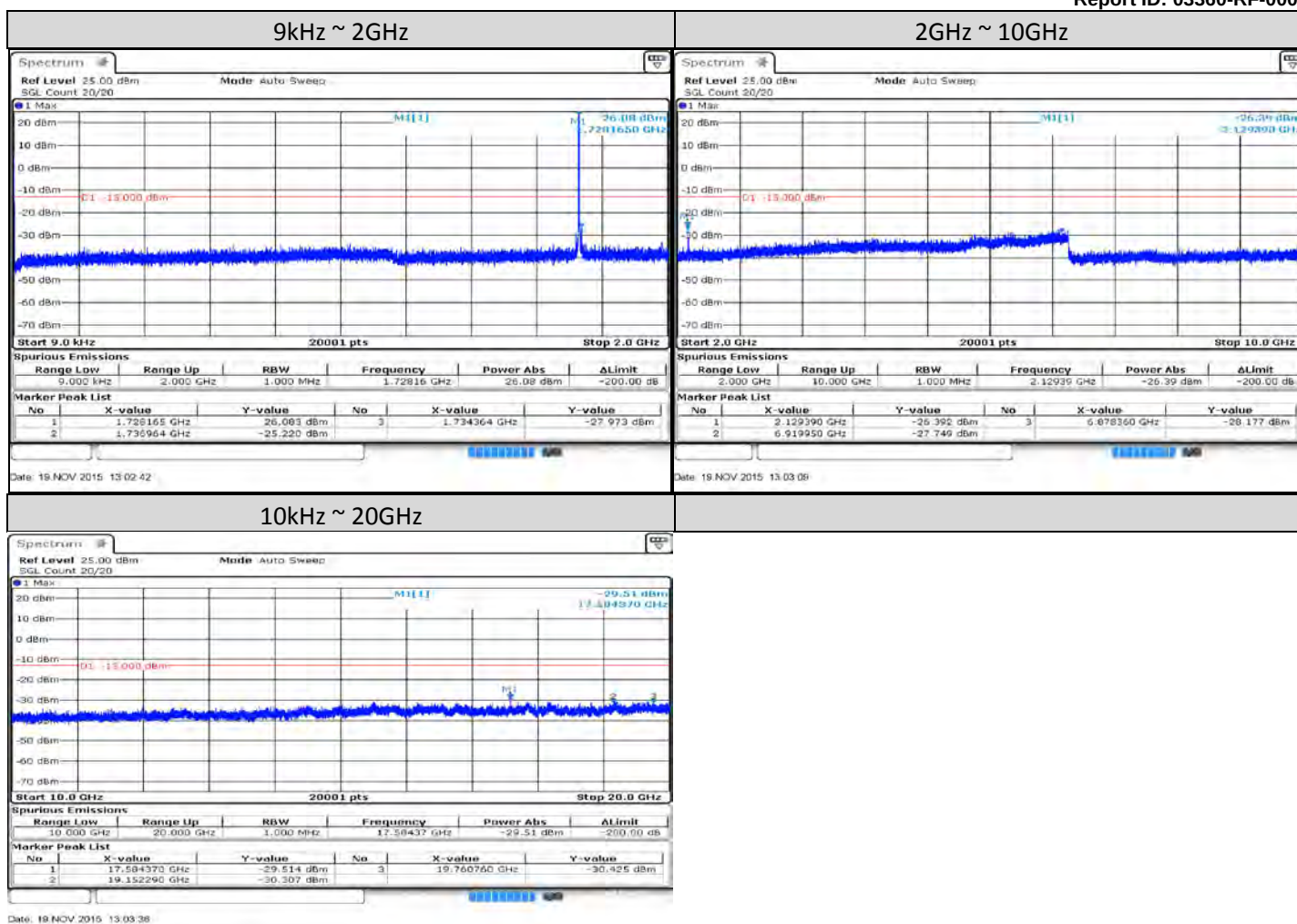


10kHz ~ 20GHz



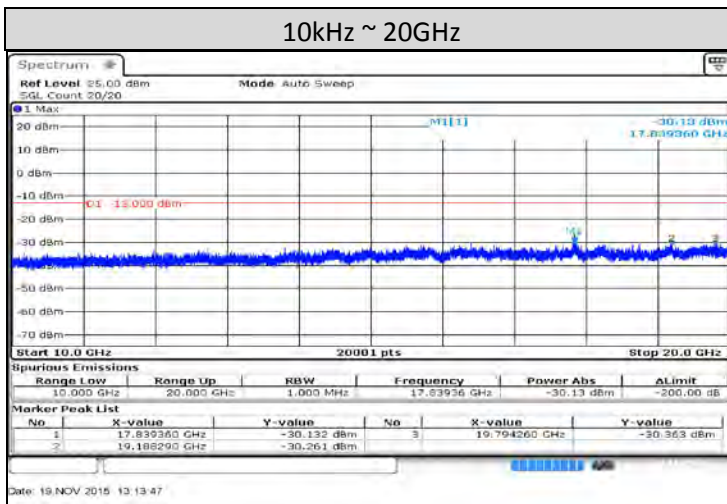
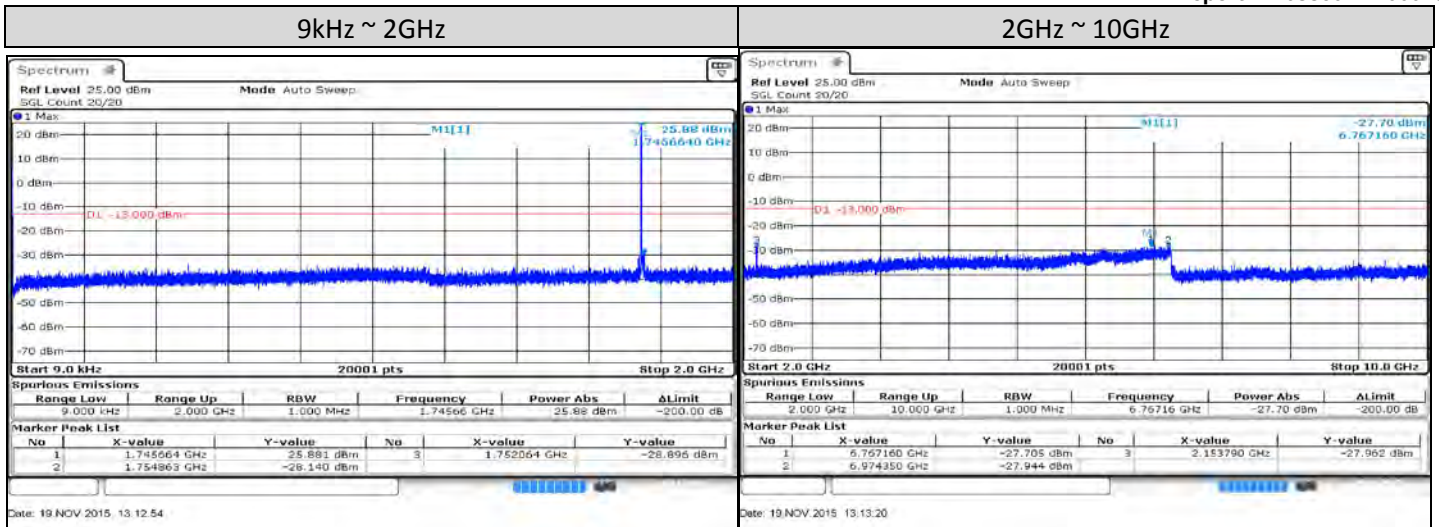
QPSK - Mid Freq (1732.5 MHz)

RB Size =1, RB Offset = 25



QPSK - High Freq (1750.0 MHz)

RB Size =1, RB Offset = 25



15MHz

QPSK - Low Freq (1717.5 MHz)
RB Size =1, RB Offset = 38