MOTOROLA SOLUTIONS

CERTIFICATE 2518.08

SAMM 825

MOTOROLA PENANG ADV. COMM. LABORATORY
Motorola Solutions Malaysia Sdn Bhd,
Plot 2A, Medan Bayan Lepas,
Mukim 12 S.W.D, 11900 Bayan Lepas,
Penang, Malaysia.

FCC / ISED TEST REPORT

Report Revision : Rev.A

Date/s Tested	:	15-April-2024 - 28-June-2024
Report Issue Date	:	09-July-2024
Manufacturer/Location	:	Motorola Solutions Malaysia Sdn Bhd
Manufacturer Address	:	Plot 2A, Medan Bayan Lepas, Mukim 12, S.W.D. 11900 Bayan Lepas, Penang, Malaysia
Requestor	:	CADOGAN SEAN
Product Type	:	Hand-held
Product Marketing Name (PMN)	:	APX N70
Hardware Version Identification Number (HVIN)	:	H35KET9PW8AN & H35KET9PW8AN-H
Frequency Band	:	Refer to section 1.4
Rated / Max RF Output Power	:	199.53mW / 252mW
Applicant Name	:	Motorola Solutions Inc
Applicant Address	:	Plot 2A, Medan Bayan Lepas, Mukim 12, S.W.D. 11900 Bayan Lepas, Penang, Malaysia
FCC Registrations	:	461337
ISED Registrations	:	MY0001
Firmware Version Identification Number (FVIN)	:	D03.75.21 (BP), D00.00.16 (AP)

The equipment was tested accordance to the requirement listed below:

(LTE Band 12)
FCC 47 CFR Part 2 / 27
ISED RSS GEN / 130

PASS

Prepared By:

Awatif Rahman
Technician

Approve Signatory:

Maheshvaran A/L Rajagopal
Responsible Engineer

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REVISION HISTORY

Revision History	Description	Date	Originator
Rev. A	Initial Report	9 July 2024	Awatif

1.0. Summary of Test Results

FCC Clause	ISED Clause	Test Item	Results	Remarks	Serial Number Tested
2.1046	RSS-Gen 6.12 RSS-130 4.1	Conducted RF Output Power	Pass	Meet the requirement of limit	022TAD0679
-	RSS-130 4.4	Peak-to-Average Power Ratio	Pass	Meet the requirement of limit	022TAD0679
2.1046	RSS-Gen 6.7	Occupied Bandwidth (26dBc, 99%)	Pass	Meet the requirement of limit	022TAD0679
2.1055 27.54	RSS-130 4.3	Frequency Stability	Pass	Meet the requirement of limit	022TAD0679
2.1051 27.53(g)	RSS-Gen 6.13 RSS-130 4.6	Band Edge Conducted Spurious Emission	Pass	Meet the requirement of limit	022TAD0679
2.1051 27.53(g)	RSS-Gen 6.13 RSS-130 4.6	Conducted Spurious Emissions	Pass	Meet the requirement of limit	022TAD0679
2.1053 27.53(g)	RSS-130 4.6	Radiated Spurious Emission	Pass	-43.9326 dBm (Margin: 30.9326 dB, Noise Floor)	022TAF1521
2.1049 27.50(c)(9)(10)	RSS-130 4.4	Effective Radiated Power (ERP)	Pass	Meet the requirement of limit	022TAD0679

1.1. Measurement Uncertainty

Measurement	Frequency	Expended Uncertainty (k=1.96) (±dB)
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
BROADBAND ATE 1 (RF CONDUCTED TESTS)				
Wideband Radio Communication Tester	CMW500	154550	8-Aug-23	8-Aug-24
Signal Analyzer	FSV40	101431	7-Aug-23	7-Aug-24
Chamber	SH-641	92003150	15-Sep-23	15-Sep-24
Power Supply	6652A	3640A02967	15-Oct-23	15-Oct-24
Software	R&S CMWrun			
Version	V.1.9.8			
RADIATED SPURIOUS EMISSION (EMC CHAMBER 1)				
Drg Horn Freq.	SAS-571	1143	08-Mar-23	08-Mar-25
Drg Horn Freq.	SAS-571	720	18-Apr-23	18-Apr-25
Power Supply	NR973A	MY54180189	30-Aug-23	30-Aug-24
Signal Generator	SMB 100A	182511	4-Jun-21	4-Jun-24
Emi Test Receiver	ESW44	101731	11-Aug-23	11-Aug-24
Bilog Antenna	CBL6112B	2950	14-Dec-23	14-Dec-24
Bilog Antenna	CBL6112B	2964	25-Sep-23	25-Sep-24
Data Logger Thermohygrometer	SDL500	A.016800	21-Jun-23	21-Jun-24
Broad-Band Horn Antenna	BBHA9170	BBHA9170143	28-Aug-23	28-Aug-24
Preamplifier	PAM-0118P	269	28-Jun-23	28-Jun-24
Loop Antenna	6502	00208416	26-Oct-23	26-Oct-24
5m Semi-Anechoic Chamber	S800-HX	J2308	Not required	Not required
System Controller	SC104V	050806-1	Not required	Not required
Turntable Flush Mount 2m	FM2011	NA	Not required	Not required
Antenna Positioning Tower	TLT2	NA	Not required	Not required
Preamplifier 18-40Ghz	Miteq Hi Gain Sucoflex	002	Not required	Not required
Test Software	EMC_FCC_IC_BLUETOOTH_RE_TEST			
Version	EMC_FCC_RE_v1.6.5			

1.3. General Information

General Description of EUT

Product	APX N70			
Brand	Motorola Solutions			
Test Model	H35KET9PW8AN & H35KET9PW8AN-H			
Power Supply Rating	7.5 Vdc			
Mode of Operation	LTE Band 12			
Modulation Type	QPSK, 16QAM			
Operating Frequency	LTE Band 12	Channel Bandwidth 1.4MHz	699.7MHz~715.3MHz	
		Channel Bandwidth 3MHz	700.5MHz~714.5MHz	
		Channel Bandwidth 5MHz	701.5MHz~713.5MHz	
		Channel Bandwidth 10MHz	704.0MHz~711.0MHz	
Max. Conducted RF Output Power	LTE Band 12 QPSK	Channel Bandwidth 1.4MHz	23.280dBm (0.213W)	
		Channel Bandwidth 3MHz	23.241dBm (0.211W)	
		Channel Bandwidth 5MHz	23.221dBm (0.210W)	
		Channel Bandwidth 10MHz	**23.554dBm (0.227W)**	
	LTE Band 12 16QAM	Channel Bandwidth 1.4MHz	22.347dBm (0.172W)	
		Channel Bandwidth 3MHz	22.354dBm (0.172W)	
		Channel Bandwidth 5MHz	22.402dBm (0.174W)	
		Channel Bandwidth 10MHz	**22.590dBm (0.182W)**	
Emission Designator	LTE Band 12		**QPSK**	**16QAM**
		Channel Bandwidth 1.4MHz	1M09G7D	1M08D7W
		Channel Bandwidth 3MHz	2M68G7D	2M68D7W
		Channel Bandwidth 5MHz	4M47G7D	4M47D7W
		Channel Bandwidth 10MHz	8M91G7D	8M93D7W
Antenna Type	LTE Band 12	Stamped Metal, Antenna LTE Low Band 699 – 716MHz (-2.9dBi)		
SW Version	D03.75.21 (BP), D00.00.16 (AP)			
HW Version	P1			

Note:

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

Item	Brand	Model or P/N	Specification
Li-ion Battery	MOTOROLA	PMNN4818A	UL 3650mAH (using RN 2170 Li-Ion cell)

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 v03r01
KDB 971168 D02 Misc OOBE License Digital Systems v02r01
ANSI C63.26

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 12	1.4 MHz	23017 ~ 23173	23017	23095	23173	699.7	707.5	715.3
	3 MHz	23025 ~ 23165	23025	23095	23165	700.5	707.5	714.5
	5 MHz	23035 ~ 23155	23035	23095	23155	701.5	707.5	713.5
	10 MHz	23060 ~ 23130	23060	23095	23130	704.0	707.5	711.0

1.5. Test Mode Applicability and Tested Channel Detail

Pre-scan also have been conducted with the accessory devices listed in section table 1.3, only the worst case radiated emission results of the combination test configuration is reported in this report.
The following channel(s) was (were) selected for the final test as listed below:

LTE Band 12

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Uplink Modulation	Mode
Conducted RF Output Power	23017 ~ 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	As per table 1.6.3
	23025 ~ 23165	23025, 23095, 23165	3 MHz		
	23035 ~ 23155	23035, 23095, 23155	5 MHz		
	23060 ~ 23130	23060, 23095, 23130	10 MHz		
Peak to Average Power Ratio	23017 ~ 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
	23025 ~ 23165	23025, 23095, 23165	3 MHz		15 RB / 0 RB Offset
	23035 ~ 23155	23035, 23095, 23155	5 MHz		25 RB / 0 RB Offset
	23060 ~ 23130	23060, 23095, 23130	10 MHz		50 RB / 0 RB Offset
Occupied Bandwidth	23017 ~ 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
	23025 ~ 23165	23025, 23095, 23165	3 MHz		15 RB / 0 RB Offset
	23035 ~ 23155	23035, 23095, 23155	5 MHz		25 RB / 0 RB Offset
	23060 ~ 23130	23060, 23095, 23130	10 MHz		50 RB / 0 RB Offset
Frequency Stability	23017 ~ 23173	23017, 23173	1.4 MHz	QPSK	6 RB / 0 RB Offset
	23025 ~ 23165	23025, 23165	3 MHz		15 RB / 0 RB Offset
	23035 ~ 23155	23035, 23155	5 MHz		25 RB / 0 RB Offset
	23060 ~ 23130	23060, 23130	10 MHz		50 RB / 0 RB Offset
Band Edge Conducted Spurious Emission	23017 ~ 23173	23017, 23173	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
					1 RB / 5 RB Offset
					6 RB / 0 RB Offset
	23025 ~ 23165	23025, 23165	3 MHz		1 RB / 0 RB Offset
					1 RB / 14 RB Offset
					15 RB / 0 RB Offset
	23035 ~ 23155	23035, 23155	5 MHz		1 RB / 0 RB Offset
					1 RB / 24 RB Offset
					25 RB / 0 RB Offset
	23060 ~ 23130	23060, 23130	10 MHz		1 RB / 0 RB Offset
					1 RB / 49 RB Offset

					50 RB / 0 RB Offset
Conducted Spurious Emission	23017 ~ 23173	23017, 23095, 23173	1.4 MHz	QPSK	3 RB / 2 RB Offset
	23025 ~ 23165	23025, 23095, 23165	3 MHz		1 RB / 0 RB Offset
	23035 ~ 23155	23035, 23095, 23155	5 MHz		1 RB / 0 RB Offset
	23060 ~ 23130	23060, 23095, 23130	10 MHz		1 RB / 0 RB Offset
Radiated Spurious Emission	23035 ~ 23155	23035	5 MHz	QPSK	1 RB / 0 RB Offset
	23060 ~ 23130	23095	10 MHz		1 RB / 0 RB Offset
	23060 ~ 23130	23130	10 MHz		1 RB / 0 RB Offset
Effective Radiated Power (ERP)	23017 ~ 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	As per table 1.6.4
	23025 ~ 23165	23025, 23095, 23165	3 MHz		
	23035 ~ 23155	23035, 23095, 23155	5 MHz		
	23060 ~ 23130	23060, 23095, 23130	10 MHz		

NOTE:

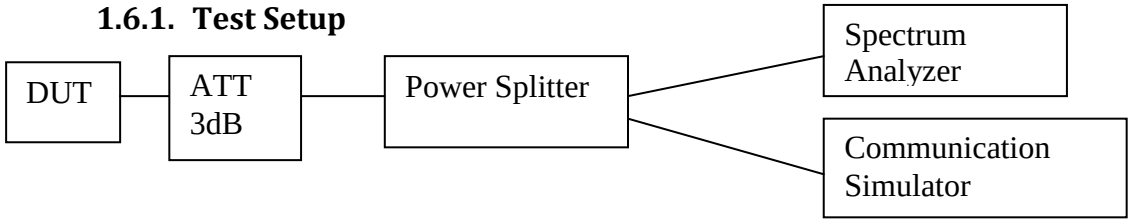
1. The Conducted RF Output Power for QPSK and 16QAM, measured value of QPSK mode is higher than 16QAM mode. Therefore, only Conducted Spurious Emission and Radiated Emission had been tested under QPSK modes.
2. Band Edge was performed with 1 and full Resource Block at the lowest and highest operating frequency band.
3. The Effective Radiated Power (ERP) was calculated from Conducted RF Output Power results 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	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Peak-to-Average Power Ratio	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Occupied Bandwidth	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Frequency Stability	-30ºC ~ 60ºC	7.5 Vdc	Awatif Rahman
Band Edge Conducted Spurious Emission	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Conducted Spurious Emission	25ºC, 50% RH	7.5 Vdc	Awatif Rahman
Radiated Spurious Emission	23.4ºC, 69.3% RH	7.5 Vdc	Rezza & Fuad
Effective Radiated Power (ERP)	25ºC, 50% RH	7.5 Vdc	Awatif Rahman

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. Test Limits

FCC: Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

ISED: The e.i.r.p. shall not exceed 50 watts for mobile equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equipment or for indoor fixed subscriber equipment.

1.6.3. Conducted RF Output Power – LTE Band 12 (699-716MHz)

Conducted Output Power (dBm)									
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation			
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH	
			23017	23095	23173	23017	23095	23173	
			699.7 MHz	707.5 MHz	715.3 MHz	699.7 MHz	707.5 MHz	715.3 MHz	
Band 12 / 1.4 MHz	**1**	**0**	23.157	23.109	23.256	22.12	22.062	22.222	
	1	**3**	23.173	23.078	23.276	22.136	22.023	22.327	
	1	**5**	23.101	23.13	23.193	22.081	22.059	22.204	
	3	**0**	23.137	23.041	23.219	22.064	22.256	22.3	
	3	**2**	23.064	23.047	**23.28**	22.037	22.242	**22.347**	
	3	**3**	23.001	22.985	23.189	22.004	22.191	22.275	
	6	**0**	22.137	21.98	22.023	21.103	21.025	21.162	

Conducted Output Power (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23025	23095	23165	23025	23095	23165
			700.5 MHz	707.5 MHz	714.5 MHz	700.5 MHz	707.5 MHz	714.5 MHz
Band 12 / 3MHz	**1**	**0**	**23.241**	23.049	23.06	22.165	22.343	22.146
	1	**7**	23.171	23.096	23.098	22.163	**22.354**	22.182
	1	**14**	23.221	23.051	23.01	22.034	22.326	22.097
	8	**0**	22.088	22.146	22.044	21.074	21.281	21.009
	8	**4**	22.098	22.114	22.162	21.115	21.282	21.132
	8	**7**	22.138	22.151	22.14	21.123	21.273	21.125
	15	**0**	22.132	22.121	22.133	21.086	21.155	21.133

Conducted Output Power (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23035	23095	23155	23035	23095	23155
			701.5 MHz	707.5 MHz	713.5 MHz	701.5 MHz	707.5 MHz	713.5 MHz
Band 12 / 5MHz	**1**	**0**	23.157	**23.211**	23.086	22.275	**22.402**	22.117
	1	**13**	23.112	23.157	23.043	22.164	22.389	22.062
	1	**25**	23.036	23.114	23.117	22.117	22.353	22.027
	12	**0**	22.174	22.107	22.134	21.021	21.164	21.102
	12	**6**	22.122	22.078	22.04	21.023	21.106	21.085
	12	**13**	22.17	22.094	22.062	21.096	21.113	21.168
	25	**0**	22.148	22.119	22.098	21.152	21.119	21.005

Conducted Output Power (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23060	23095	23130	23060	23095	23130
			704.0 MHz	707.5 MHz	711.0 MHz	704.0 MHz	707.5MHz	711.0 MHz
Band 12 / 10MHz	**1**	**0**	**23.554**	23.193	23.431	22.326	**22.59**	22.448
	1	**25**	23.114	23.035	23.075	22.092	22.355	22.173
	1	**49**	23.282	23.192	23.209	22.209	22.524	22.314
	25	**0**	22.172	22.231	22.175	21.295	21.264	21.266
	25	**13**	22.194	22.167	22.218	21.268	21.174	21.278
	25	**25**	22.143	22.104	22.256	21.189	21.123	21.222
	50	**0**	22.183	22.201	22.158	21.151	21.216	21.14

1.6.4. Effective Radiated Power – LTE Band 12 (699-716MHz)

ERP (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23017	23095	23173	23017	23095	23173
			699.7 MHz	707.5 MHz	715.3 MHz	699.7 MHz	707.5 MHz	715.3 MHz
Band 12 / 1.4 MHz	**1**	**0**	18.107	18.059	18.206	17.07	17.012	17.172
	1	**3**	18.123	18.028	18.226	17.086	16.973	17.277
	1	**5**	18.051	18.08	18.143	17.031	17.009	17.154
	3	**0**	18.087	17.991	18.169	17.014	17.206	17.25
	3	**2**	18.014	17.997	**18.23**	16.987	17.192	**17.297**
	3	**3**	17.951	17.935	18.139	16.954	17.141	17.225
	6	**0**	17.087	16.93	16.973	16.053	15.975	16.112

ERP (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23025	23095	23165	23025	23095	23165
			700.5 MHz	707.5 MHz	714.5 MHz	700.5 MHz	707.5 MHz	714.5 MHz
Band 12 / 3MHz	**1**	**0**	**18.191**	17.999	18.01	17.115	17.293	17.096
	1	**7**	18.121	18.046	18.048	17.113	**17.304**	17.132
	1	**14**	18.171	18.001	17.96	16.984	17.276	17.047
	8	**0**	17.038	17.096	16.994	16.024	16.231	15.959
	8	**4**	17.048	17.064	17.112	16.065	16.232	16.082
	8	**7**	17.088	17.101	17.09	16.073	16.223	16.075
	15	**0**	17.082	17.071	17.083	16.036	16.105	16.083

ERP (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23035	23095	23155	23035	23095	23155
			701.5 MHz	707.5 MHz	713.5 MHz	701.5 MHz	707.5 MHz	713.5 MHz
Band 12 / 5MHz	**1**	**0**	18.107	**18.161**	18.036	17.225	**17.352**	17.067
	1	**13**	18.062	18.107	17.993	17.114	17.339	17.012
	1	**25**	17.986	18.064	18.067	17.067	17.303	16.977
	12	**0**	17.124	17.057	17.084	15.971	16.114	16.052
	12	**6**	17.072	17.028	16.99	15.973	16.056	16.035
	12	**13**	17.12	17.044	17.012	16.046	16.063	16.118
	25	**0**	17.098	17.069	17.048	16.102	16.069	15.955

ERP (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			23060	23095	23130	23060	23095	23130
			704.0 MHz	707.5 MHz	711.0 MHz	704.0 MHz	707.5MHz	711.0 MHz
Band 12 / 10MHz	**1**	**0**	**18.504**	18.143	18.381	17.276	**17.54**	17.398
	1	**25**	18.064	17.985	18.025	17.042	17.305	17.123
	1	**49**	18.232	18.142	18.159	17.159	17.474	17.264
	25	**0**	17.122	17.181	17.125	16.245	16.214	16.216
	25	**13**	17.144	17.117	17.168	16.218	16.124	16.228
	25	**25**	17.093	17.054	17.206	16.139	16.073	16.172
	50	**0**	17.133	17.151	17.108	16.101	16.166	16.09

The maximum ERP/EIRP from the measured RF output power is given in Equation as follows:

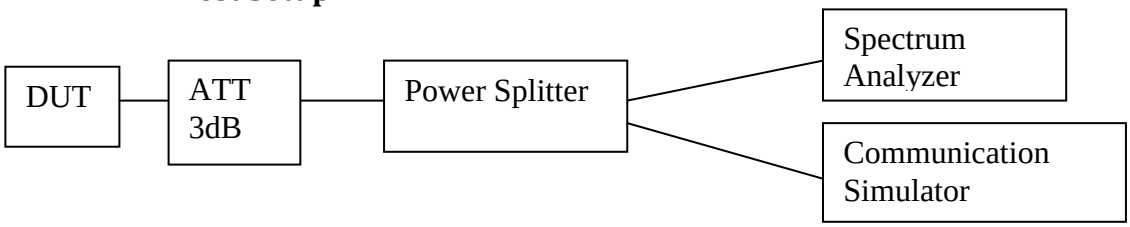
$$\mathbf{EIRP} = \mathbf{P_{Meas}} + \mathbf{G_T}$$
$$\mathbf{ERP} = \mathbf{EIRP} - \mathbf{2.15}$$

Where, ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (Expressed in the same units as PMeas, e.g., dBm)

$\mathbf{P_{Meas}}$ measured transmitter output power, in dBm
$\mathbf{G_T}$ gain of the transmitting antenna, in dBi (EIRP)

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.

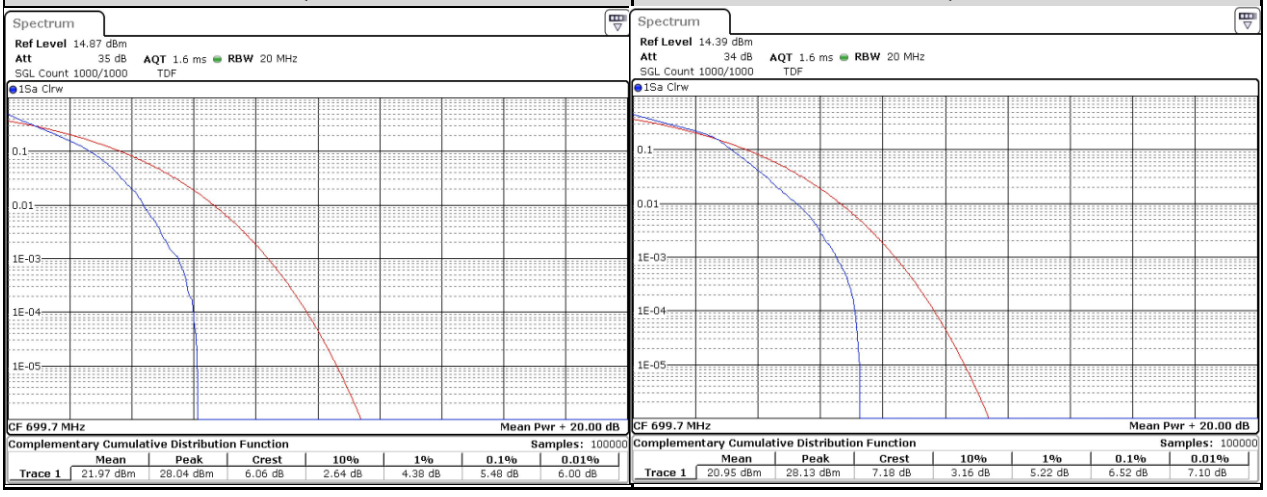
1.7.2. Test Limit

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 12 (699-716MHz)

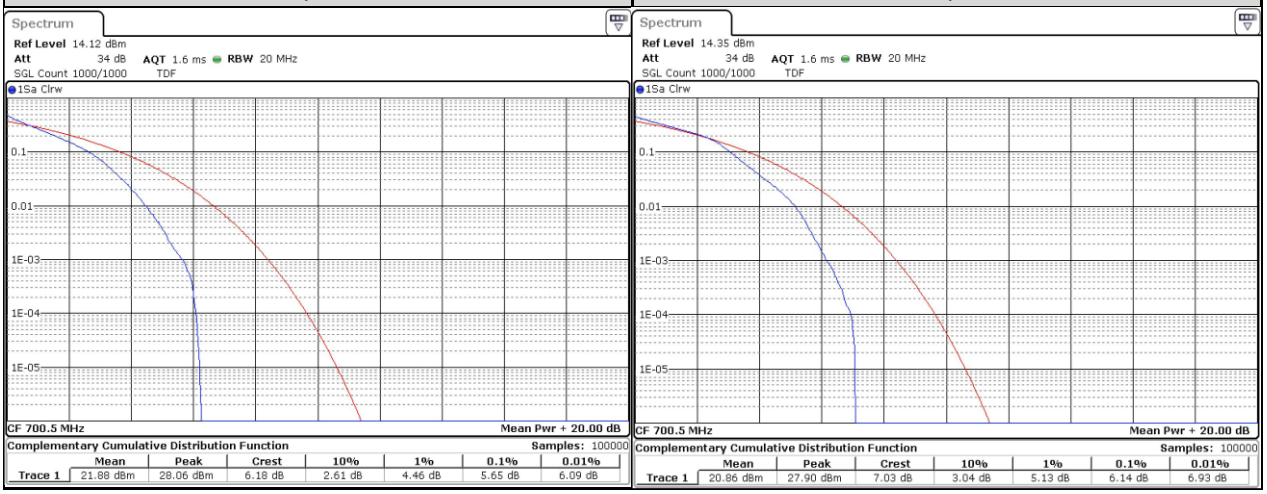
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 12/1.4MHz/6/0	Low CH 23017	699.7 MHz	**5.478**	**6.522**
	Mid CH 23095	707.5 MHz	5.188	5.826
	High CH 23173	715.3 MHz	5.159	5.884

Spectrum Plot of Worst Value	
QPSK	16QAM



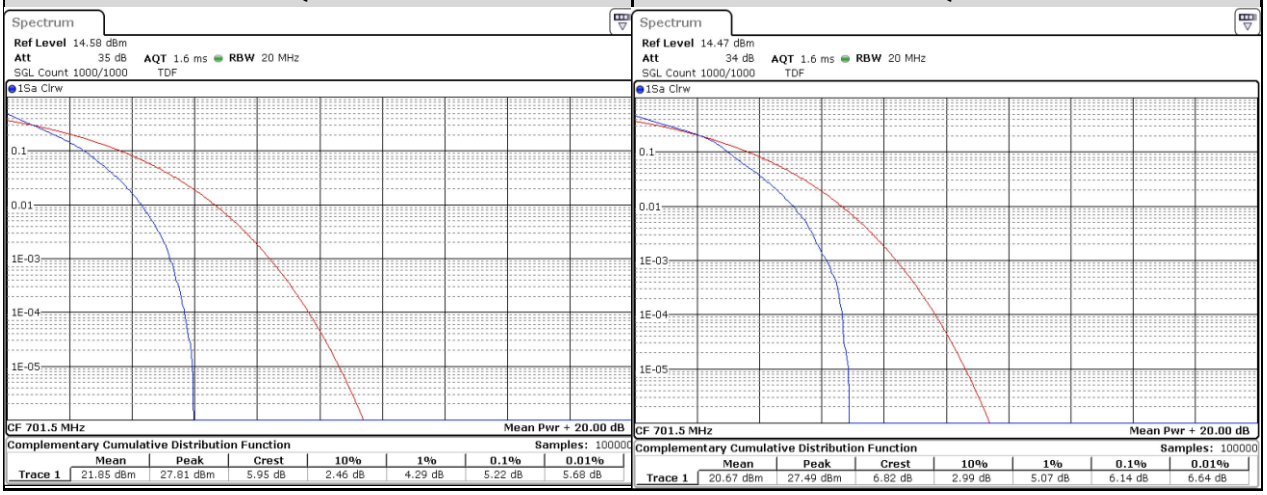
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 12/3MHz/15/0	Low CH 23025	700.5 MHz	**5.652**	**6.145**
	Mid CH 23095	707.5 MHz	5.304	6.058
	High CH 23165	714.5 MHz	5.014	5.971

Spectrum Plot of Worst Value	
QPSK	16QAM



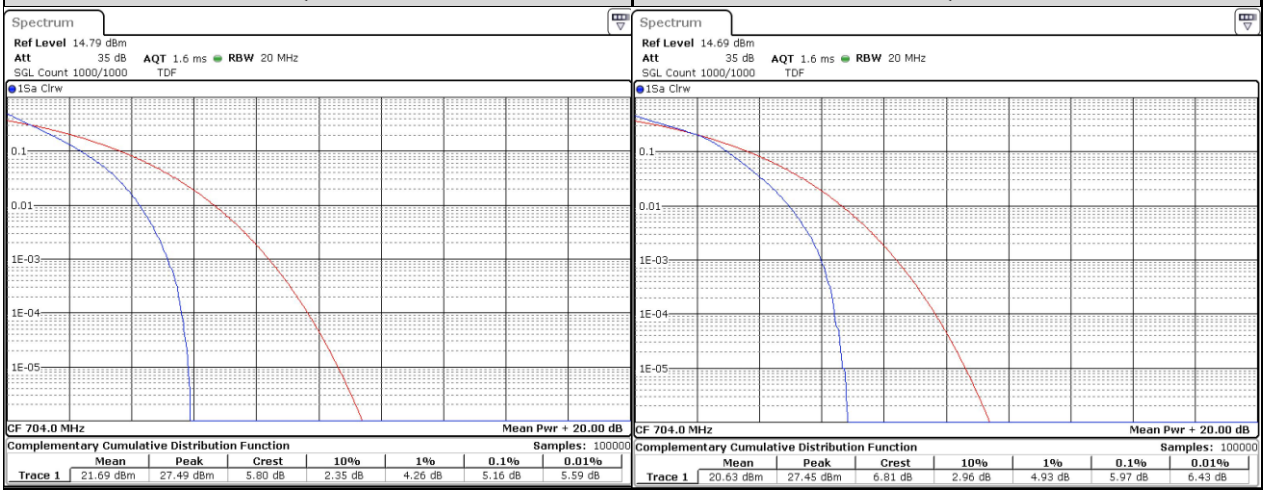
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 12/5MHz/25/0	Low CH 23035	701.5 MHz	**5.217**	**6.145**
	Mid CH 23095	707.5 MHz	5.043	5.826
	High CH 23155	713.5 MHz	5.043	5.855

Spectrum Plot of Worst Value	
QPSK	16QAM



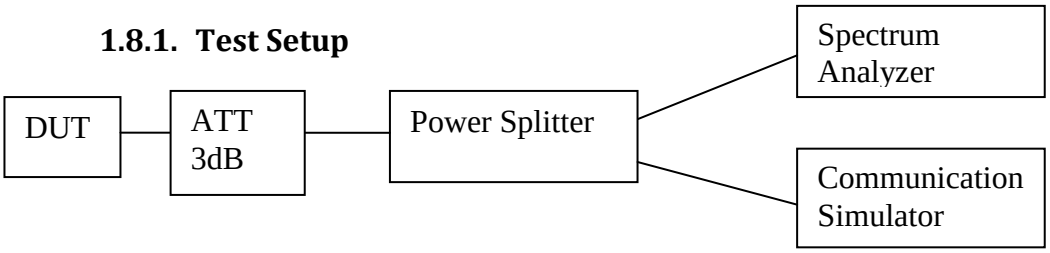
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 12/10MHz/50/0	Low CH 23060	704 MHz	**5.159**	**5.971**
	Mid CH 23095	707.5 MHz	4.986	5.797
	High CH 23130	711 MHz	5.014	5.884

Spectrum Plot of Worst Value	
QPSK	16QAM



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

For measurement 99% of occupied bandwidth that is required by FCC 2.1046 and RSS Gen 6.7.

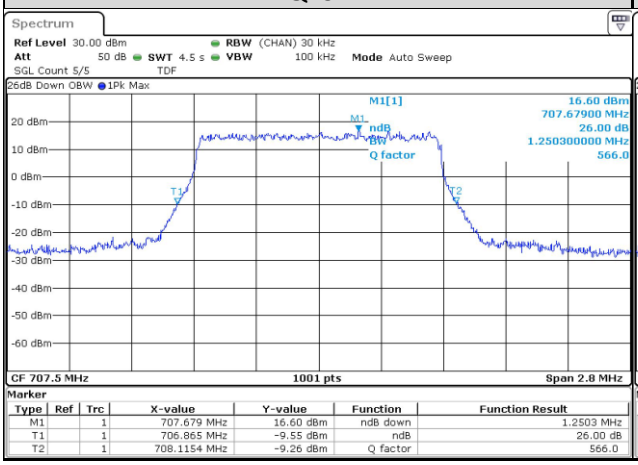
1.8.3. Occupied Bandwidth – LTE Band 12 (699-716MHz)

LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/1.4MHz/6/0	Low CH 23017	699.7 MHz	1.228	**1.242**
	Mid CH 23095	707.5 MHz	**1.25**	1.239
	High CH 23173	715.3 MHz	1.242	1.234

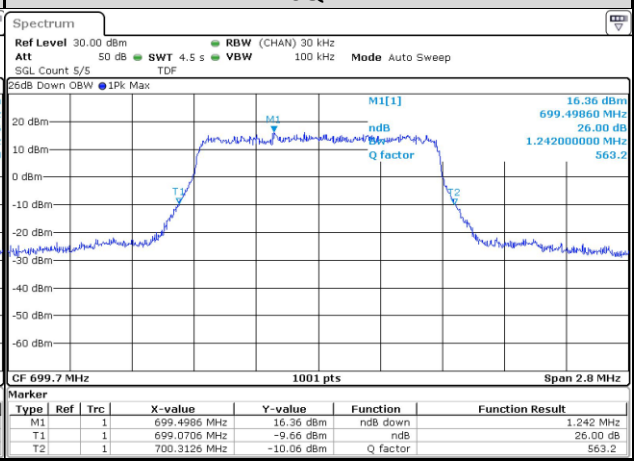
Spectrum Plot of Worst Value

-26 dBC Bandwidth

QPSK

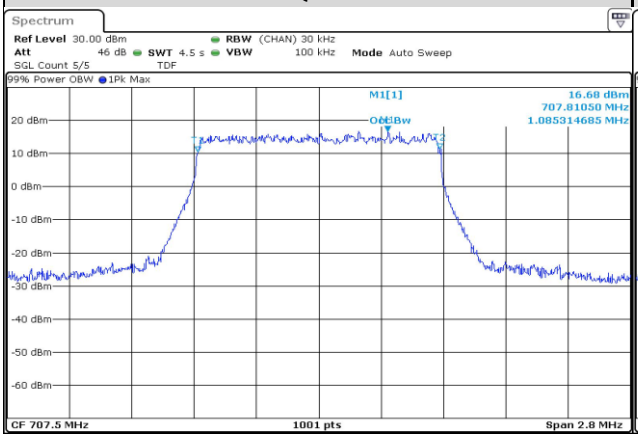


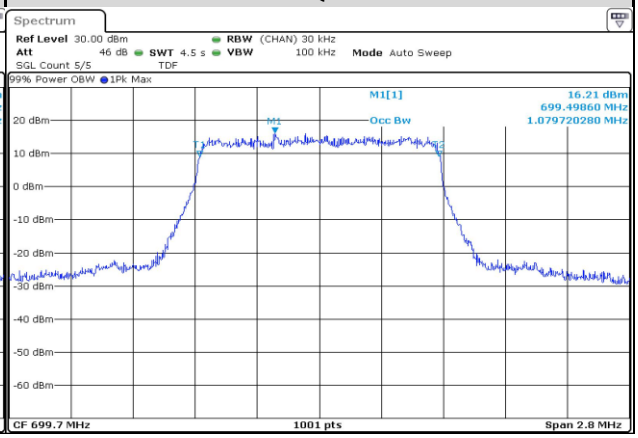
16QAM



LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/1.4MHz/6/0	Low CH 23017	699.7 MHz	1.08	**1.08**
	Mid CH 23095	707.5 MHz	**1.085**	1.08
	High CH 23173	715.3 MHz	1.085	1.077

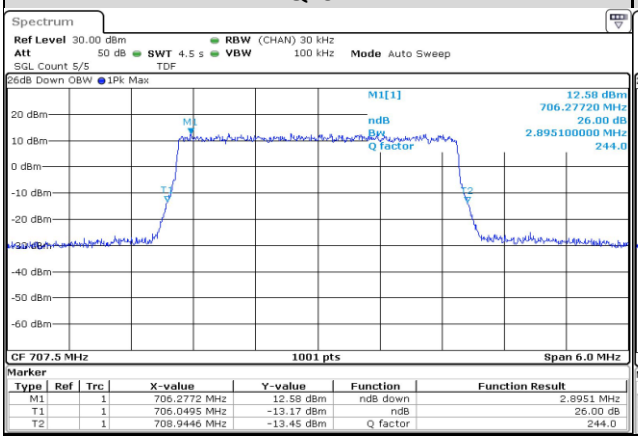
Spectrum Plot of Worst Value	
99% Occupied Bandwidth	
QPSK	16QAM

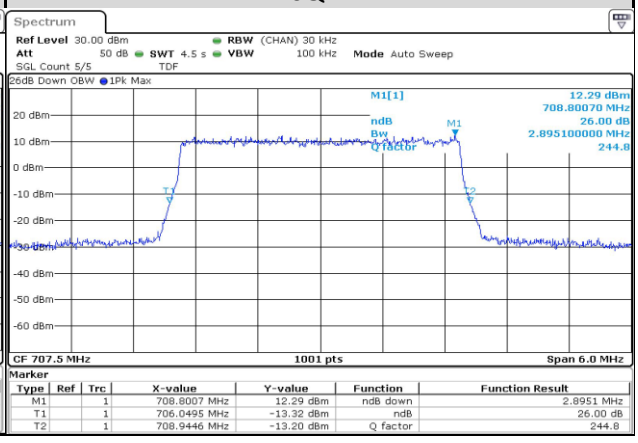




LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/3MHz/15/0	Low CH 23025	700.5 MHz	2.877	2.877
	Mid CH 23095	707.5 MHz	**2.895**	**2.895**
	High CH 23165	714.5 MHz	2.877	2.889

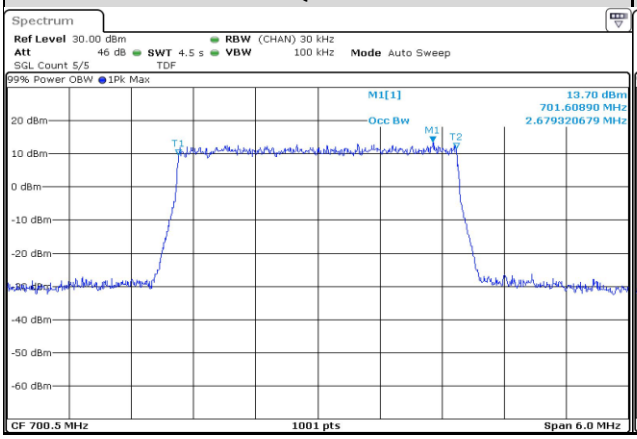
Spectrum Plot of Worst Value	
-26 dBC Bandwidth	
QPSK	16QAM

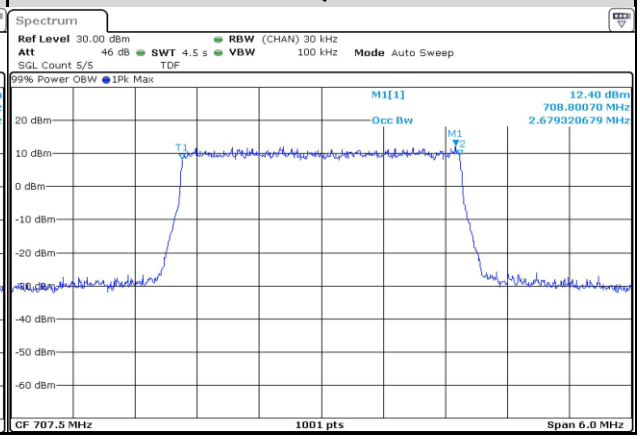




LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/3MHz/15/0	Low CH 23025	700.5 MHz	**2.679**	2.673
	Mid CH 23095	707.5 MHz	2.679	**2.679**
	High CH 23165	714.5 MHz	2.673	2.673

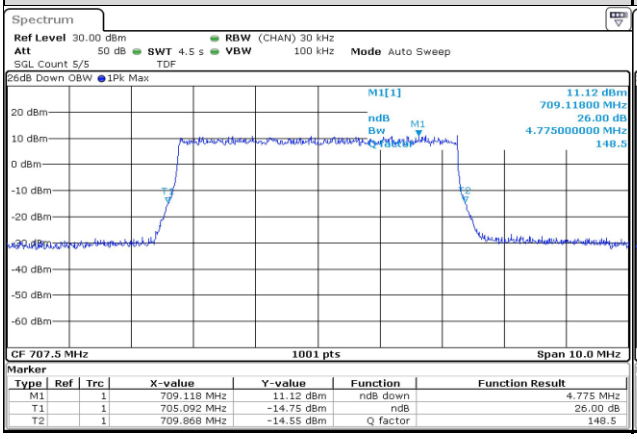
Spectrum Plot of Worst Value	
99% Occupied Bandwidth	
QPSK	16QAM

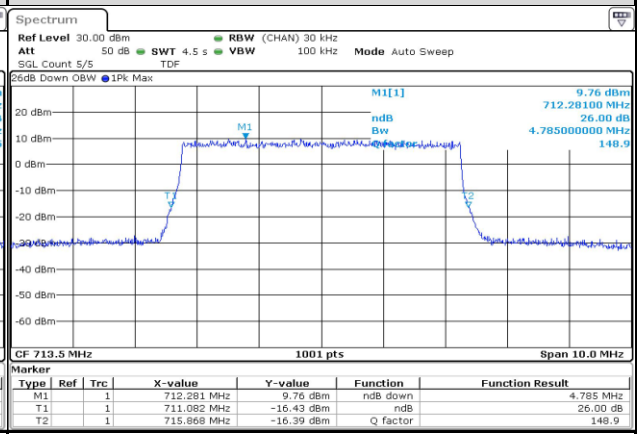




LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/5MHz/25/0	Low CH 23035	701.5 MHz	4.755	4.735
	Mid CH 23095	707.5 MHz	**4.775**	4.745
	High CH 23155	713.5 MHz	4.765	**4.785**

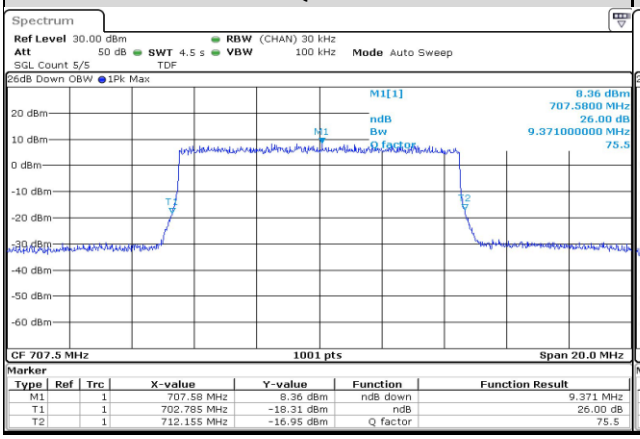
Spectrum Plot of Worst Value	
-26 dBC Bandwidth	
QPSK	16QAM

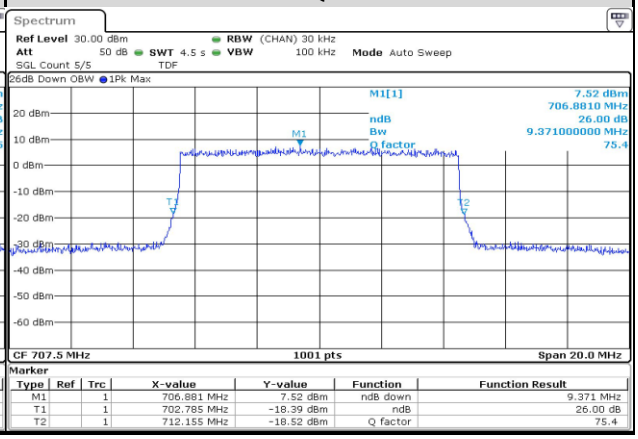




LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/10MHz/50/0	Low CH 23060	704 MHz	9.331	9.311
	Mid CH 23095	707.5 MHz	**9.371**	**9.371**
	High CH 23130	711 MHz	9.291	9.291

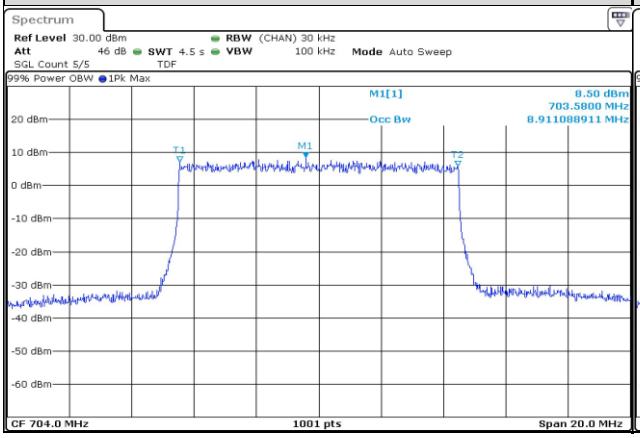
Spectrum Plot of Worst Value	
-26 dBC Bandwidth	
QPSK	16QAM

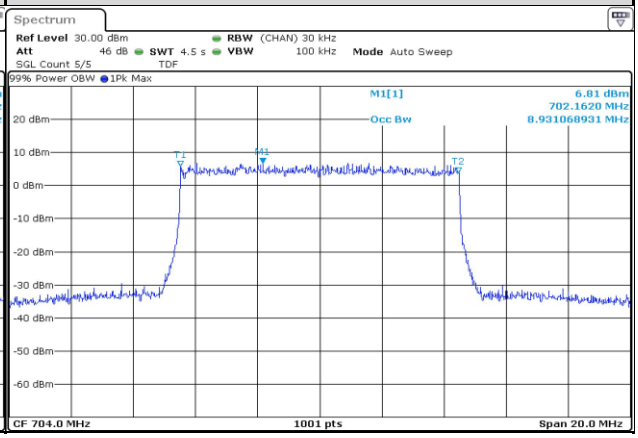




LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/10MHz/50/0	Low CH 23060	704 MHz	**8.911**	**8.931**
	Mid CH 23095	707.5 MHz	8.911	8.911
	High CH 23130	711 MHz	8.911	8.911

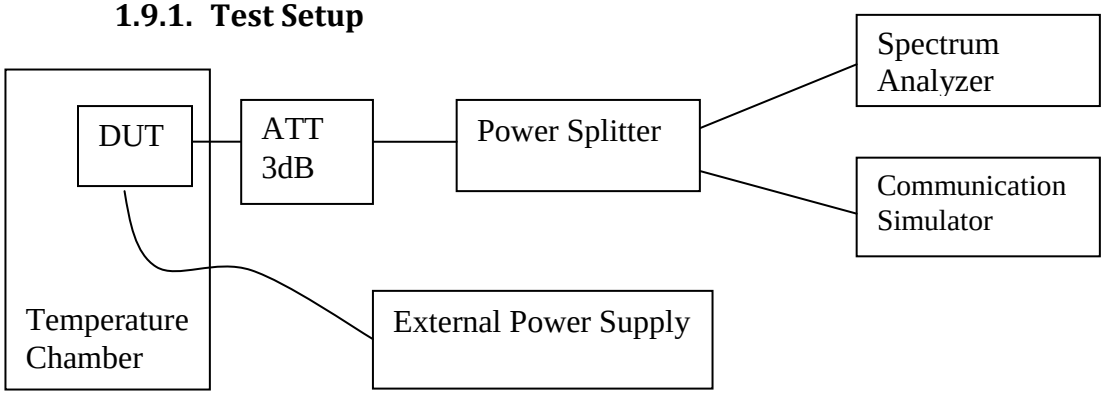
Spectrum Plot of Worst Value	
99% Occupied Bandwidth	
QPSK	16QAM





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 -30 ~ 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

As per manufacturer declared product operating at -30 to 60 deg C with spec of +/- 0.1ppm.

1.9.3. Frequency Stability – LTE Band 12 (699-716MHz)

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 1.4 MHz			
		Low Channel		High Channel	
		699.7MHz		715.3MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 12	**60**	699.699995	-0.006583	715.299994	-0.008079
	50	699.699995	-0.006563	715.299995	-0.0075
	40	699.699995	-0.007462	715.299994	-0.008479
	30	699.699995	-0.006624	715.299995	-0.00692
	20	699.699995	-0.007544	715.299995	-0.00654
	10	699.700007	0.010284	715.299995	-0.0076
	0	699.699995	-0.006461	715.299995	-0.00676
	-10	699.700005	0.007278	715.300005	0.00688
	-20	699.699995	-0.006931	715.299996	-0.00592
	-30	699.700005	0.007626	715.300004	0.0061

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 1.4 MHz			
		Low Channel		High Channel	
		699.7MHz		715.3MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 12	**9**	699.706453	-0.008812	715.306954	-0.00734
	7.5	699.700568	-0.00736	715.300356	-0.006
	6	699.700003	-0.006338	715.300096	-0.00788

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 3 MHz			
		Low Channel		High Channel	
		700.5MHz		714.5MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 12	**60**	700.500005	0.007719	714.500006	0.007788
	50	700.500006	0.007903	714.500007	0.00929
	40	700.500006	0.009128	714.500009	0.012533
	30	700.500004	0.005983	714.500006	0.007748
	20	700.500005	0.007209	714.500006	0.008269
	10	700.500005	0.006984	714.500008	0.010912
	0	700.500035	0.008414	714.500007	0.010471
	-10	700.500007	0.009333	714.500008	0.011612
	-20	700.500006	0.00874	714.500006	0.007788
	-30	700.500007	0.009394	714.500007	0.010271

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 3 MHz			
		Low Channel		High Channel	
		700.5MHz		714.5MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 12	**9**	700.503565	0.006739	714.506646	0.008289
	7.5	700.500352	-0.005514	714.500356	0.007568
	6	700.500364	0.008046	714.500036	0.009971

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		701.5MHz		713.5MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 12	**60**	701.500006	0.008932	713.500005	0.007619
	50	701.500007	0.009462	713.500005	0.007017
	40	701.500005	0.006933	713.499975	-0.034525
	30	701.500008	0.010951	713.500008	0.010887
	20	701.500007	0.009911	713.500005	0.007278
	10	701.500035	0.008789	713.500255	0.006235
	0	701.500025	0.008605	713.505446	0.00802
	-10	701.500009	0.012786	713.500006	0.008882
	-20	701.500009	0.012133	713.500006	0.00832
	-30	701.500006	0.009013	713.500006	0.008521

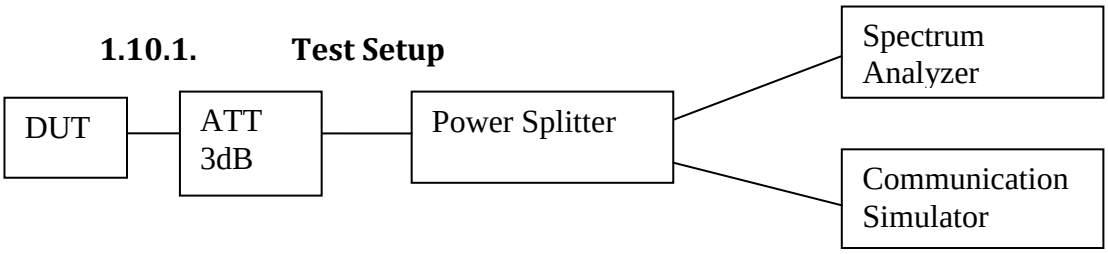
Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		701.5MHz		713.5MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 12	**9**	701.500365	0.007096	713.503654	0.006997
	7.5	701.500364	0.008279	713.500046	0.007278
	6	701.500365	0.007708	713.500364	0.005614

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		704MHz		711MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 12	**60**	704.000005	0.006766	710.999995	-0.00676
	50	704.000005	0.006421	710.999995	-0.006458
	40	704.000005	0.007254	711.000004	0.00507
	30	703.999995	-0.007031	710.999996	-0.005955
	20	704.000005	0.006706	710.999996	-0.005835
	10	704.000365	0.007031	711.000354	-0.005392
	0	704.000546	0.008006	711.003565	0.006982
	-10	704.000006	0.008169	711.000004	0.006297
	-20	704.000006	0.007945	711.000254	0.006157
	-30	704.000005	0.007417	711.000005	0.006499

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		704MHz		711MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 12	**9**	704.003656	0.005852	711.000035	-0.006821
	7.5	704.006857	0.00636	711.002564	-0.005955
	6	704.003565	-0.005263	711.003546	0.006619

1.10. Band Edge Conducted Spurious Emission

1.10.1. Test Setup



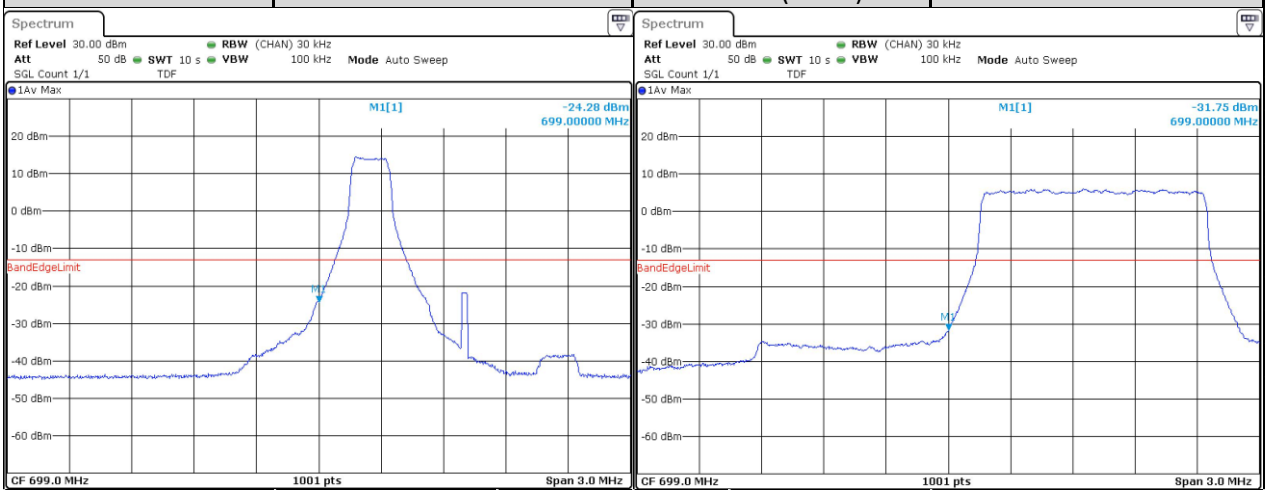
1) The DUT transmitter output port was connected to communication simulator with above setup.
2) Path loss for the measurement included.
3) Set DUT to transmit maximum power through communication simulator.
4) The band edges of lowest and highest channels with the highest RF powers were measured.
5)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

1.10.2. Test Limit

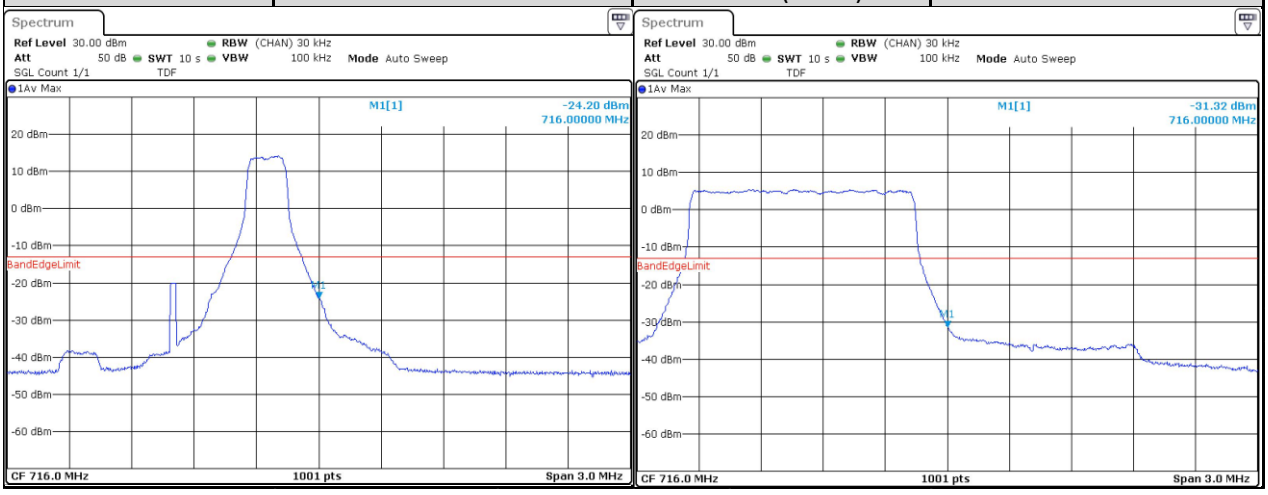
For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this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

1.10.3. Band Edge Conducted Spurious Emission – LTE Band 12 (699-716MHz)

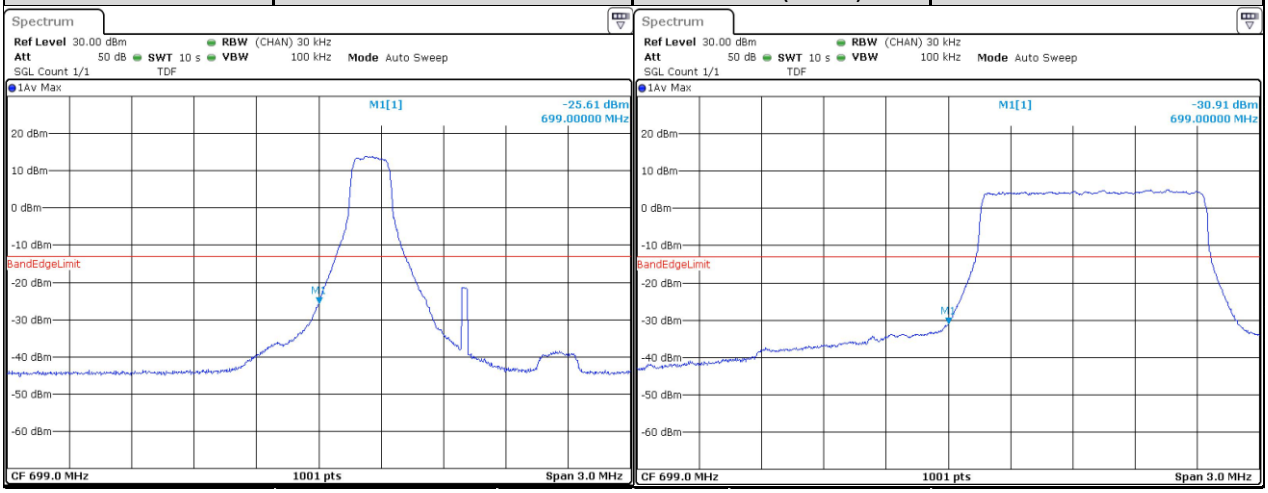
Band 12, 1.4MHz QPSK , Low Channel 23017			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



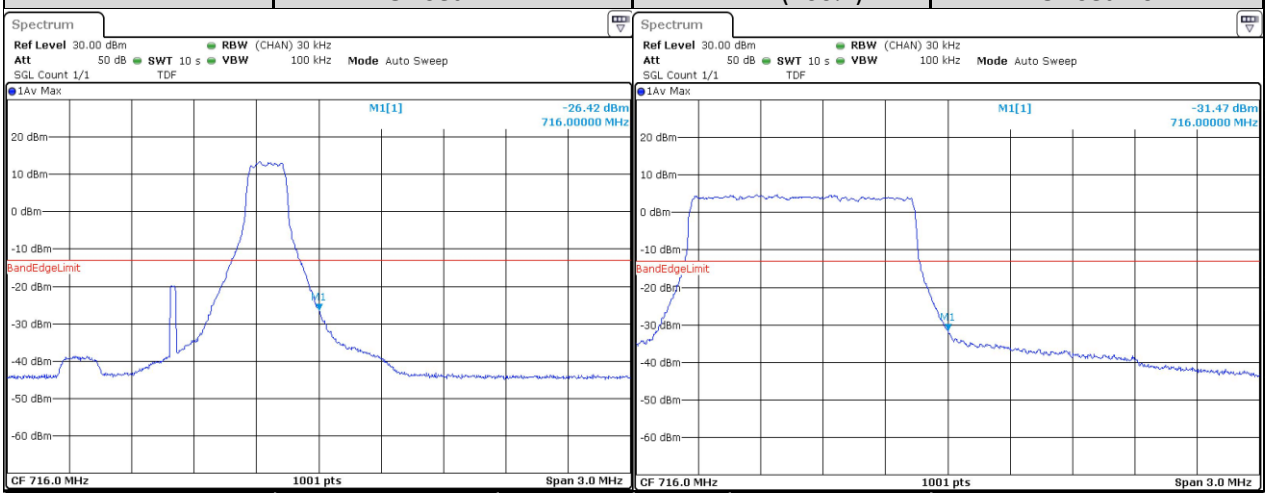
Band 12, 1.4MHz QPSK , High Channel 23173			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



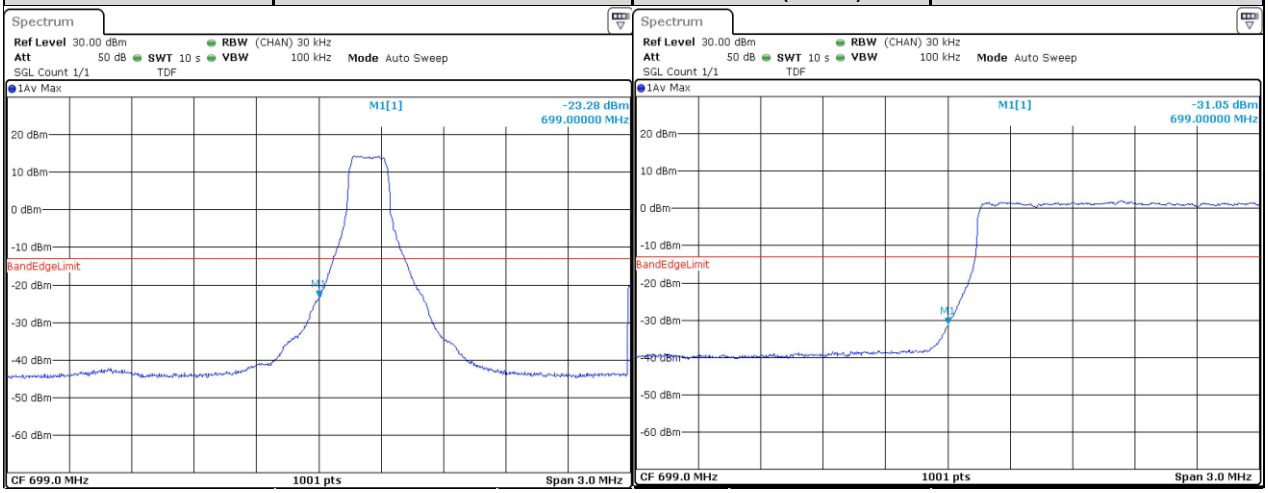
Band 12, 1.4MHz 16-QAM , Low Channel 23017			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



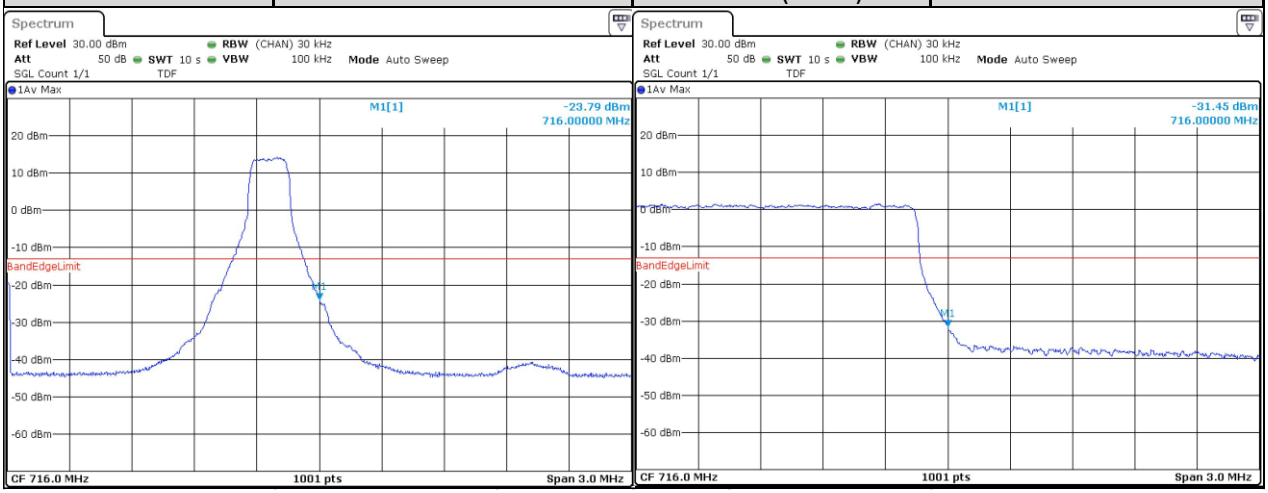
Band 12, 1.4MHz 16-QAM, High Channel 23173			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



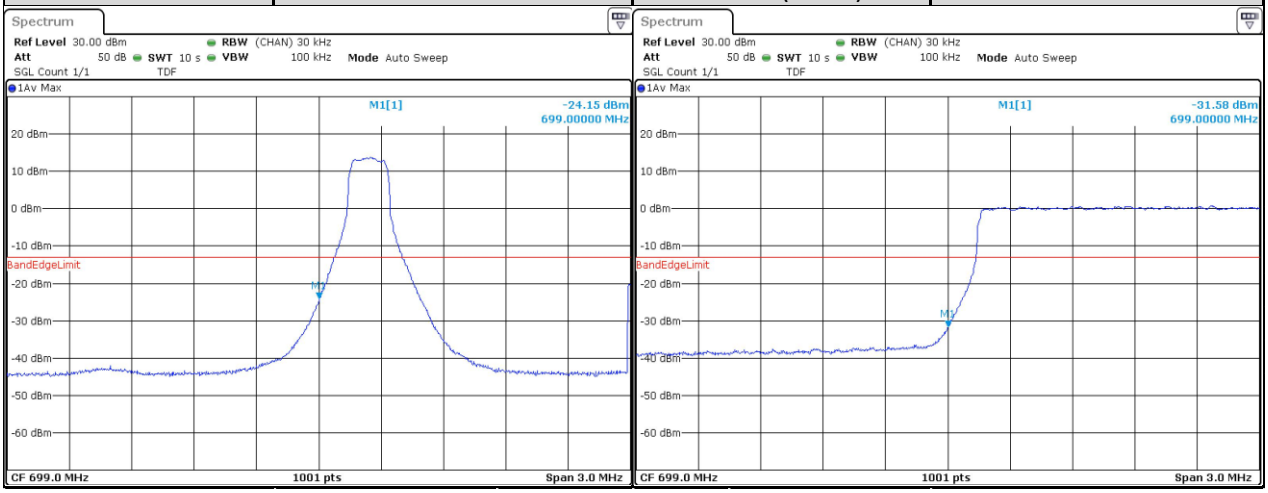
Band 12, 3MHz QPSK, Low CH 23025			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



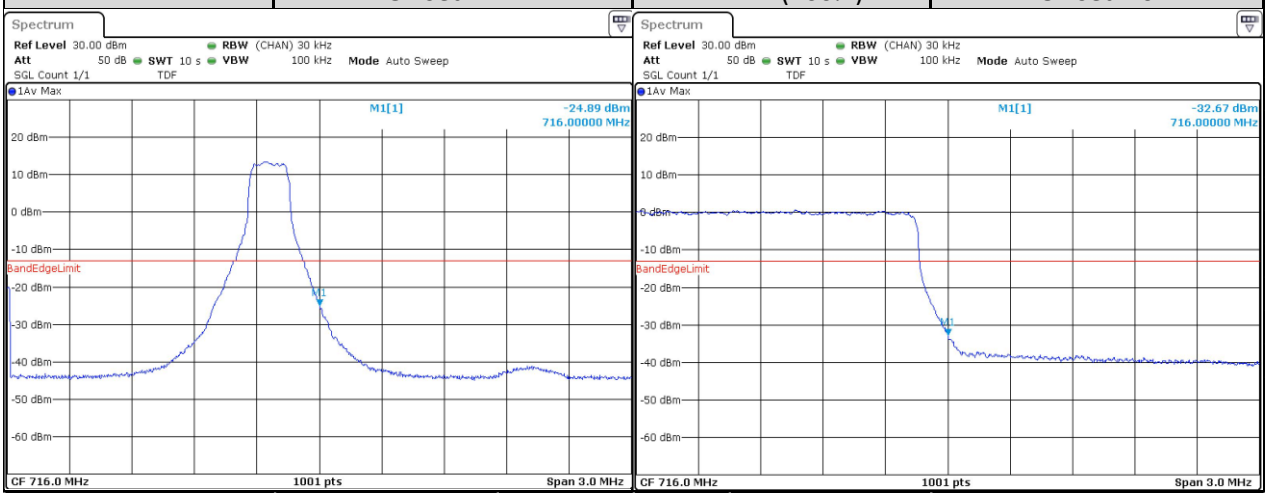
Band 12, 3MHz QPSK, High CH 23165			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



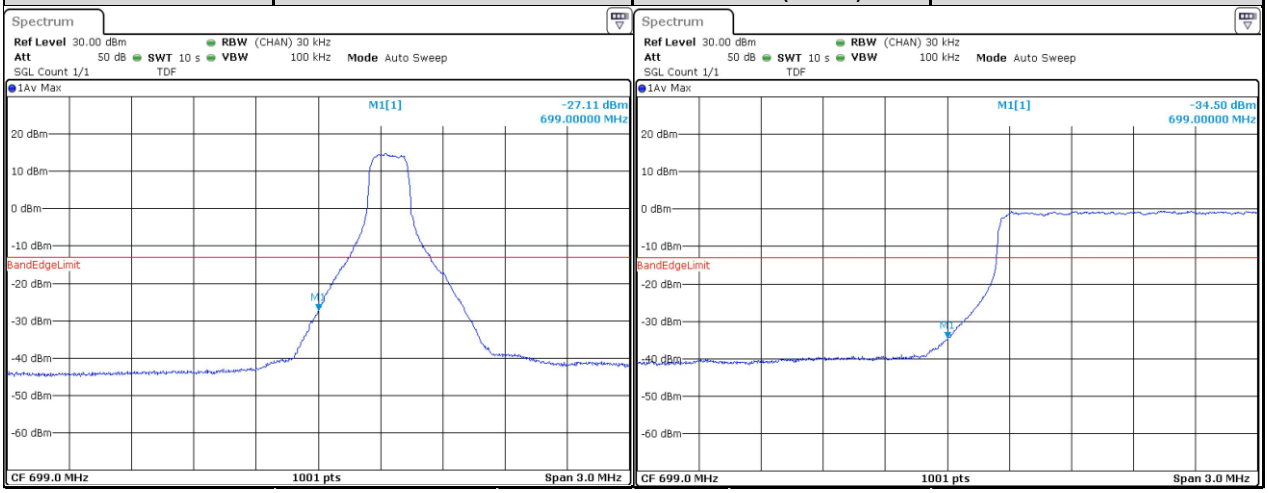
Band 12, 3MHz 16-QAM, Low CH 23025			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



Band 12, 3MHz 16-QAM, High CH 23165			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0



Band 12, 5MHz QPSK, Low CH 23035			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



Band 12, 5MHz QPSK, High CH 23155			
RB = 1	Offset =X-1	RB = X (100%)	Offset = 0