

	    CERTIFICATE 2518.08 MS ISO/IEC 17025 TESTING SAMM NO. 0825																												
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																												
<table><tr><td>Date/s Tested</td><td>: 10-August-2020 - 27-August-2020</td></tr><tr><td>Manufacturer/Location</td><td>: Motorola Solutions Malaysia Sdn Bhd</td></tr><tr><td>Manufacturer Address</td><td>: Plot 2A, Medan Bayan Lepas, Mukim 12 SWD, 11900 Bayan Lepas, Penang, Malaysia</td></tr><tr><td>Requestor</td><td>: SIEW KHENG TAN</td></tr><tr><td>Product Type</td><td>: Portable</td></tr><tr><td>Product Version (PMN)</td><td>: P2B</td></tr><tr><td>Model Number (HVIN)</td><td>: AAH90ZDU9RH1AN</td></tr><tr><td>Frequency Band</td><td>: Refer to section 1.4</td></tr><tr><td>Applicant Name</td><td>: Motorola Solutions Inc</td></tr><tr><td>Applicant Address</td><td>: 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322.</td></tr><tr><td>FCC Registrations</td><td>: 461337</td></tr><tr><td>ISED Registrations</td><td>: MY0001</td></tr><tr><td>Firmware Version (FVIN)</td><td>: I02.21.01.0029 (BP), D00.00.65 (AP)</td></tr></table>  The equipment was tested accordance to the requirement listed below: <table><tr><td>(LTE Band 5) FCC 47 CFR Part 2 / 22 ISED RSS GEN /132</td><td>PASS</td></tr></table>		Date/s Tested	: 10-August-2020 - 27-August-2020	Manufacturer/Location	: Motorola Solutions Malaysia Sdn Bhd	Manufacturer Address	: Plot 2A, Medan Bayan Lepas, Mukim 12 SWD, 11900 Bayan Lepas, Penang, Malaysia	Requestor	: SIEW KHENG TAN	Product Type	: Portable	Product Version (PMN)	: P2B	Model Number (HVIN)	: AAH90ZDU9RH1AN	Frequency Band	: Refer to section 1.4	Applicant Name	: Motorola Solutions Inc	Applicant Address	: 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322.	FCC Registrations	: 461337	ISED Registrations	: MY0001	Firmware Version (FVIN)	: I02.21.01.0029 (BP), D00.00.65 (AP)	(LTE Band 5) FCC 47 CFR Part 2 / 22 ISED RSS GEN /132	PASS
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Prepared By:  Lim Khay Kwang Technician	Approve Signatory:  Ho Sze Khian Technical Manager																												

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REVISION HISTORY

Revision History	Description	Date	Originator
Rev A.	Initial Report	2-September-2020	Lim Khay Kwang

1.0. Summary of Test Results

FCC Clause	ISED Clause	Test Item	Result	Remark	Serial Number Tested
2.1046	RSS-Gen 6.12 RSS-132 5.4	Conducted RF Output Power	Pass	Meet the requirement of limit	734TWP0386
--	RSS-132 5.4	Peak-to-Average Power Ratio	Pass	Meet the requirement of limit	734TWP0386
2.1049 22.917	RSS-Gen 6.6	Occupied Bandwidth (26dBc, 99%)	Pass	Meet the requirement of limit	734TWP0386
2.1055 22.355	RSS-Gen 6.11 RSS-132 5.3	Frequency Stability	Pass	Meet the requirement of limit	734TWP0386
2.1051 22.917	RSS-Gen 6.13 RSS-132 5.5	Band Edge Conducted Spurious Emission	Pass	Meet the requirement of limit	734TWP0386
2.1051 22.917	RSS-Gen 6.13 RSS-132 5.5	Conducted Spurious Emissions	Pass	Meet the requirement of limit	734TWP0386
22.913(a)(2)	RSS-132 5.4	Effective Radiated Power (ERP)	Pass	Meet the requirement of limit	734TWP0308
2.1053 22.917	RSS-132 5.5	Radiated Spurious Emissions	Pass	Meet the requirement of limit	734TWP0386

1.1. Measurement Uncertainty

Measurement	Frequency	Expanded 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); Test Software Version: CMWRun v1.8.5				
SIGNAL ANALYZER	FSV40	101431	16-Jul-19	16-Jul-21
CHAMBER	SH-641	92003150	25-Sep-19	25-Sep-20
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	154550	23-Jul-19	23-Jul-21
POWER SUPPLY	6652A	3117A00162	16-Mar-20	16-Mar-21
Radiated Spurious Emission (EMC Chamber 1); Test Software Version: EMC_FCC_RE_v1.6.2				
DRG HORN FREQ.	SAS-571	720	21-Mar-19	21-Mar-21
DRG HORN FREQ.	SAS-571	1143	14-Feb-19	14-Feb-21
POWER SUPPLY	6032A	2615A01178	21-MAY-20	21-MAY-21
SIGNAL GENERATOR	SMB 100A	181117	8-Nov-18	8-Nov-21
EMI TEST RECEIVER	ESW44	101750	24-Jul-19	24-Sep-20
EMI TEST RECEIVER	ESIB26	100017	19-Jul-19	19-Sep-20

5m Semi-anechoic Chamber	S800-HX	J2308	Not Required	Not Required
BILOG ANTENNA	CBL6112B	2964	23-Apr-19	23-Apr-21
BILOG ANTENNA	CBL6112B	2950	8-Jul-19	8-Jul-21
DATA LOGGER	SDL500	A.016776	4-Jun-20	4-Jun-21
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
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170255	27-Jan-20	27-Jan-21
18 - 40GHz PREAMPLIFIER	Miteq Hi Gain Sucoflex	001	Not Required	Not Required
PREAMPLIFIER	PAM-0118	269	24-May-19	24-May-22
LOOP ANTENNA	6502	00208416	5-Sep-19	5-Sep-20

1.3. General Information

General Description of EUT

Product	MACKENZIE UHF NAG MODEL			
Brand	Motorola Solutions			
Test Model	AAH90ZDU9RH1AN			
Power Supply Rating	7.5Vdc			
Mode of operation	LTE Band 5			
Modulation Type	QPSK, 16QAM			
Operating Frequency	LTE Band 5	Channel Bandwidth 1.4MHz	824.7MHz~848.3MHz	
		Channel Bandwidth 3MHz	825.5MHz~847.5MHz	
		Channel Bandwidth 5MHz	826.5MHz~846.5MHz	
		Channel Bandwidth 10MHz	829.0MHz~844.0MHz	
Max. ERP Power	LTE Band 5 QPSK	Channel Bandwidth 1.4MHz	22.369dBm (0.1725W)	
		Channel Bandwidth 3MHz	22.396dBm (0.1736W)	
		Channel Bandwidth 5MHz	22.29dBm (0.1694W)	
		Channel Bandwidth 10MHz	22.341dBm (0.1714W)	
	LTE Band 5 16QAM	Channel Bandwidth 1.4MHz	21.447dBm (0.1395W)	
		Channel Bandwidth 3MHz	21.416dBm (0.1385W)	
		Channel Bandwidth 5MHz	21.432dBm (0.1391W)	
		Channel Bandwidth 10MHz	21.39dBm (0.1377W)	
Emission Designator	LTE Band 5		QPSK	16QAM
		Channel Bandwidth 1.4MHz	1M07G7D	1M07D7W
		Channel Bandwidth 3MHz	2M68G7D	2M68D7W
		Channel Bandwidth 5MHz	4M48G7D	4M48D7W
		Channel Bandwidth 10MHz	8M95G7D	8M95D7W
Antenna Type	LTE Band 5	LTE LOW BAND MAIN ANTENNA (1.15dBi)		
SW Version	I02.21.01.0029 (BP), D00.00.65 (AP)			
HW Version	P2B			

Note:

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

Item	Brand	Model or P/N	Specification
Li-Ion	MOTOROLA	PMNN4804A	BATTERY PACK,BATTERY PACK,IMPRES GEN2, LIION,IP68, 2820T

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 22

KDB 971168 D01 Power Meas License Digital Systems v03r01

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 5	1.4 MHz	20407~ 20643	20407	20525	20643	824.7	836.5	848.3
	3 MHz	20415~ 20635	20415	20525	20635	825.5	836.5	847.5
	5 MHz	20425~20625	20425	20525	20625	826.5	836.5	846.5
	10 MHz	20450~ 20600	20450	20525	20600	829	836.5	844

1.5. Test Mode Applicability and Tested Channel Detail

LTE Band 5

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Uplink Modulation	Mode
Conducted RF Output Power	20407~ 20643	20407, 20525, 20643	1.4 MHz	QPSK, 16QAM	As per table 1.6.3
	20415~ 20635	20415, 20525, 20635	3 MHz		
	20425~ 20625	20425, 20525, 20625	5 MHz		
	20450~ 20600	20450, 20525, 20600	10 MHz		
Peak to Average Power Ratio	20407~ 20643	20407, 20525, 20643	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
	20415~ 20635	20415, 20525, 20635	3 MHz		15 RB / 0 RB Offset
	20425~ 20625	20425, 20525, 20625	5 MHz		25 RB / 0 RB Offset
	20450~ 20600	20450, 20525, 20600	10 MHz		50 RB / 0 RB Offset
Occupied Bandwidth	20407~ 20643	20407, 20525, 20643	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset
	20415~ 20635	20415, 20525, 20635	3 MHz		15 RB / 0 RB Offset
	20425~ 20625	20425, 20525, 20625	5 MHz		25 RB / 0 RB Offset
	20450~ 20600	20450, 20525, 20600	10 MHz		50 RB / 0 RB Offset
Frequency Stability	20407~ 20643	20407, 20643	1.4 MHz	QPSK	6 RB / 0 RB Offset
	20415~ 20635	20415, 20635	3 MHz		15 RB / 0 RB Offset
	20425~ 20625	20425, 20625	5 MHz		25 RB / 0 RB Offset
	20450~ 20600	20450, 20600	10 MHz		50 RB / 0 RB Offset
Band Edge Conducted Spurious Emission	20407~ 20643	20407, 20643	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
	20415~ 20635	20415, 20635	3 MHz		1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
	20425~ 20625	20425, 20625	5 MHz		1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
	20450~ 20600	20450, 20600	10 MHz		1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
Conducted Spurious Emission	20407~ 20643	20407, 20525, 20643	1.4 MHz	QPSK	1 RB / 3 RB Offset
	20415~ 20635	20415, 20525, 20635	3 MHz		1 RB / 7 RB Offset
	20425~ 20625	20425, 20525, 20625	5 MHz		1 RB / 13 RB Offset
	20450~ 20600	20450, 20525, 20600	10 MHz		1 RB / 0 RB Offset

Radiated Spurious Emission	20407~ 20643	20407	1.4 MHz	QPSK	1 RB / 3 RB Offset
	20450~ 20600	20525	10 MHz		1 RB / 0 RB Offset
	20415~ 20635	20635	3 MHz		1 RB / 7 RB Offset
Effective Radiated Power (ERP)	20407~ 20643	20407, 20525, 20643	1.4 MHz	QPSK, 16QAM	As per table 1.6.4
	20415~ 20635	20415, 20525, 20635	3 MHz		
	20425~20625	20425, 20525, 20625	5 MHz		
	20450~ 20600	20450, 20525, 20600	10 MHz		

NOTE:

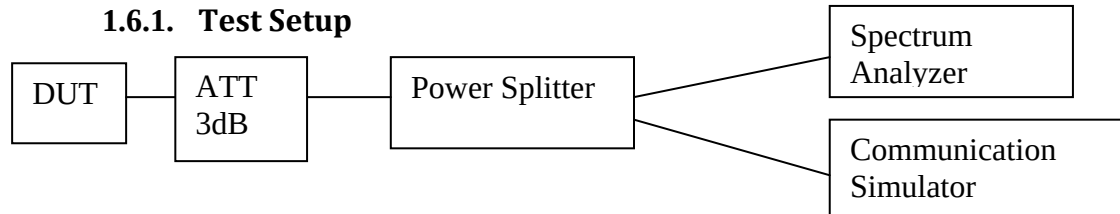
1. The Conducted RF Output Power for QPSK and 16QAM, measured value of QPSK mode is higher than 16QAM mode. Therefore, only Conducted Spurious Emission and Radiated Emission had been tested under QPSK modes.
2. Band Edge was performed with 1 and full Resource Block at the lowest and highest operating frequency band.
3. The Equivalent Isotropically Radiated Power (EIRP) 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	25°C, 50% RH	7.5V DC	Khay Kwang
Peak-to-Average Power Ratio	25°C, 50% RH	7.5V DC	Khay Kwang
Occupied Bandwidth	25°C, 50% RH	7.5V DC	Khay Kwang
Frequency Stability	25°C, 50% RH	7.5V DC	Khay Kwang
Band Edge Conducted Spurious Emission	25°C, 50% RH	7.5V DC	Khay Kwang
Conducted Spurious Emission	25°C, 50% RH	7.5V DC	Khay Kwang
Radiated Spurious Emission	25°C, 63.7% RH	7.5V DC	Nazrin&Fendi
Effective Radiated Power (ERP)	25°C, 63.7% RH	7.5V DC	Khay Kwang

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 Limit

FCC: The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

ISED: The equivalent isotropically radiated power (e.i.r.p.) for mobile equipment shall not exceed 11.5 watts.

1.6.3. Conducted RF Output Power – LTE Band 5 (824-849MHz)

LTE BW	RB Size	RB Offset	Conducted Output Power (dBm)					
			QPSK Modulation			16QAM Modulation		
			Low CH 20407	Mid CH 20525	High CH 20643	Low CH 20407	Mid CH 20525	High CH 20643
			824.7MHz	836.5MHz	848.3 MHz	824.7 MHz	836.5MHz	848.3 MHz
Band 5 /1.4MHz	1	0	23.3	22.898	22.88	22.37	21.895	21.928
	1	3	23.369	22.931	22.923	22.447	21.968	22.026
	1	5	23.305	22.899	22.883	22.38	21.92	21.943
	3	0	23.248	22.85	22.797	22.264	22.083	22.001
	3	2	23.297	22.912	22.866	22.335	22.122	22.089
	3	3	23.238	22.86	22.81	22.266	22.066	22.031
	6	0	22.279	21.847	21.86	21.329	21.005	20.928

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
			20415	20525	20635	20415	20525	20635
			825.5MHz	836.5MHz	847.5MHz	825.5 MHz	836.5MHz	847.5 MHz
Band 5 / 3MHz	1	0	23.356	22.87	22.867	22.373	22.278	21.985
	1	7	23.396	22.946	22.932	22.416	22.321	22.034
	1	14	23.252	22.835	22.826	22.244	22.139	21.934
	8	0	22.297	21.962	21.909	21.398	21.161	20.928
	8	4	22.309	21.967	21.937	21.433	21.173	20.954
	8	7	22.271	21.899	21.877	21.344	21.144	20.909
	15	0	22.269	21.954	21.92	21.404	21.09	20.948

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
			20425	20525	20625	20425	20525	20625
			826.5MHz	836.5MHz	846.5MHz	826.5 MHz	836.5MHz	846.5 MHz
Band 5 / 5MHz	1	0	23.28	22.954	22.749	22.432	22.19	21.801
	1	13	23.29	22.958	22.834	22.348	22.238	21.863
	1	25	23.127	22.825	22.732	22.242	22.099	21.748
	12	0	22.324	21.959	21.878	21.299	21.007	20.925
	12	6	22.292	21.955	21.9	21.277	21.015	20.947
	12	13	22.225	21.904	21.848	21.203	20.96	20.919
	25	0	22.272	21.936	21.914	21.367	21.017	20.924

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
			20450	20525	20600	20450	20525	20600
			829 MHz	836.5MHz	844 MHz	829 MHz	836.5MHz	844 MHz
Band 5 / 10MHz	1	0	23.341	23.003	22.897	22.367	22.39	22.047
	1	25	23.17	22.815	22.818	22.166	22.24	21.924
	1	49	23.097	22.792	22.805	22.095	22.108	21.928
	25	0	22.227	21.977	21.863	21.342	21.084	20.997
	25	13	22.218	21.943	21.875	21.303	21.069	21.029
	25	25	22.133	21.884	21.857	21.231	20.96	20.983
	50	0	22.168	21.962	21.864	21.268	21.038	20.917

1.6.4. Effective Radiated Power (ERP) - LTE Band 5 (824-849MHz)

Effective Radiated 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
			20407	20525	20643	20407	20525	20643
			824.7MHz	836.5MHz	848.3 MHz	824.7 MHz	836.5MHz	848.3 MHz
Band 5 / 1.4 MHz	1	0	22.3	21.898	21.88	21.37	20.895	20.928
	1	3	22.369	21.931	21.923	21.447	20.968	21.026
	1	5	22.305	21.899	21.883	21.38	20.92	20.943
	3	0	22.248	21.85	21.797	21.264	21.083	21.001
	3	2	22.297	21.912	21.866	21.335	21.122	21.089
	3	3	22.238	21.86	21.81	21.266	21.066	21.031
	6	0	21.279	20.847	20.86	20.329	20.005	19.928

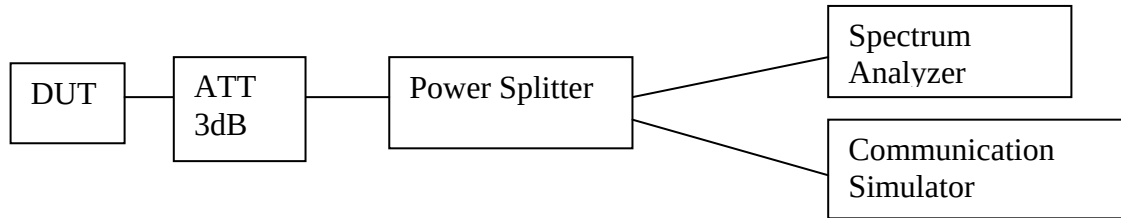
Effective Radiated Power (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			20415	20525	20635	20415	20525	20635
			825.5MHz	836.5MHz	847.5MHz	825.5 MHz	836.5MHz	847.5 MHz
Band 5 / 3MHz	1	0	22.356	21.87	21.867	21.373	21.278	20.985
	1	7	22.396	21.946	21.932	21.416	21.321	21.034
	1	14	22.252	21.835	21.826	21.244	21.139	20.934
	8	0	21.297	20.962	20.909	20.398	20.161	19.928
	8	4	21.309	20.967	20.937	20.433	20.173	19.954
	8	7	21.271	20.899	20.877	20.344	20.144	19.909
	15	0	21.269	20.954	20.92	20.404	20.09	19.948

Effective Radiated 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
			20425	20525	20625	20425	20525	20625
			826.5MHz	836.5MHz	846.5MHz	826.5 MHz	836.5MHz	846.5 MHz
Band 5 / 5MHz	1	0	22.28	21.954	21.749	21.432	21.19	20.801
	1	13	22.29	21.958	21.834	21.348	21.238	20.863
	1	25	22.127	21.825	21.732	21.242	21.099	20.748
	12	0	21.324	20.959	20.878	20.299	20.007	19.925
	12	6	21.292	20.955	20.9	20.277	20.015	19.947
	12	13	21.225	20.904	20.848	20.203	19.96	19.919
	25	0	21.272	20.936	20.914	20.367	20.017	19.924

Effective Radiated 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
			20450	20525	20600	20450	20525	20600
			829 MHz	836.5MHz	844 MHz	829 MHz	836.5MHz	844 MHz
Band 5 / 10MHz	1	0	22.341	22.003	21.897	21.367	21.39	21.047
	1	25	22.17	21.815	21.818	21.166	21.24	20.924
	1	49	22.097	21.792	21.805	21.095	21.108	20.928
	25	0	21.227	20.977	20.863	20.342	20.084	19.997
	25	13	21.218	20.943	20.875	20.303	20.069	20.029
	25	25	21.133	20.884	20.857	20.231	19.96	19.983
	50	0	21.168	20.962	20.864	20.268	20.038	19.917

1.7. Peak-to-Average Power Ratio

1.7.1. Test Setup



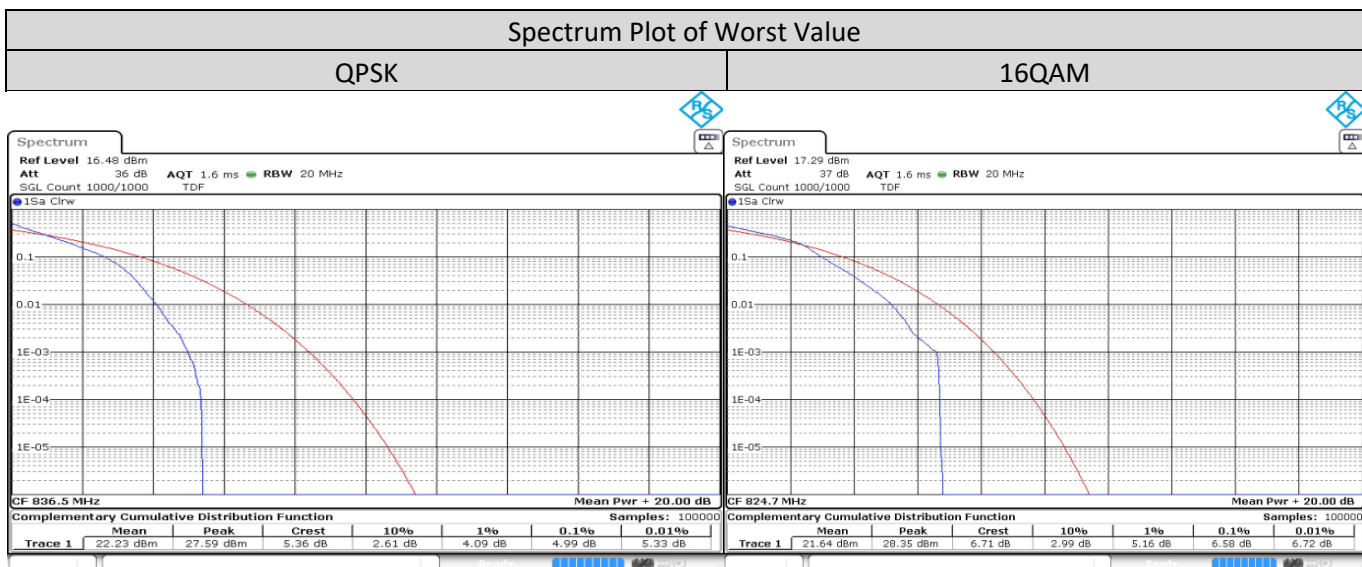
1. The DUT transmitter output port was connected to communication simulator with above setup.
2. Path loss for the measurement included.
3. Set DUT to transmit maximum power through communication simulator
4. Set the CCDF (Complementary Cumulative Distribution Function) option in the spectrum analyzer.
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

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

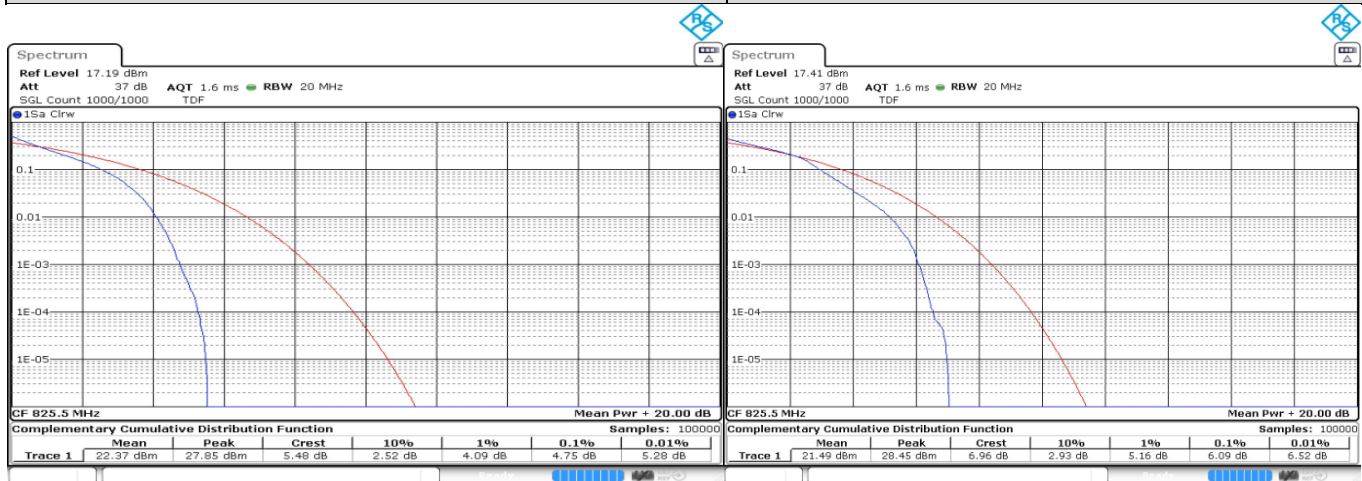
1.7.3. Peak To Average Power Ratio - LTE Band 5 (824-849MHz)

LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 5 / 1.4MHz/6/0	Low CH 20407	824.7 MHz	4.899	6.58
	Mid CH 20525	836.5 MHz	4.986	6
	High CH 20643	848.3 MHz	4.957	5.826



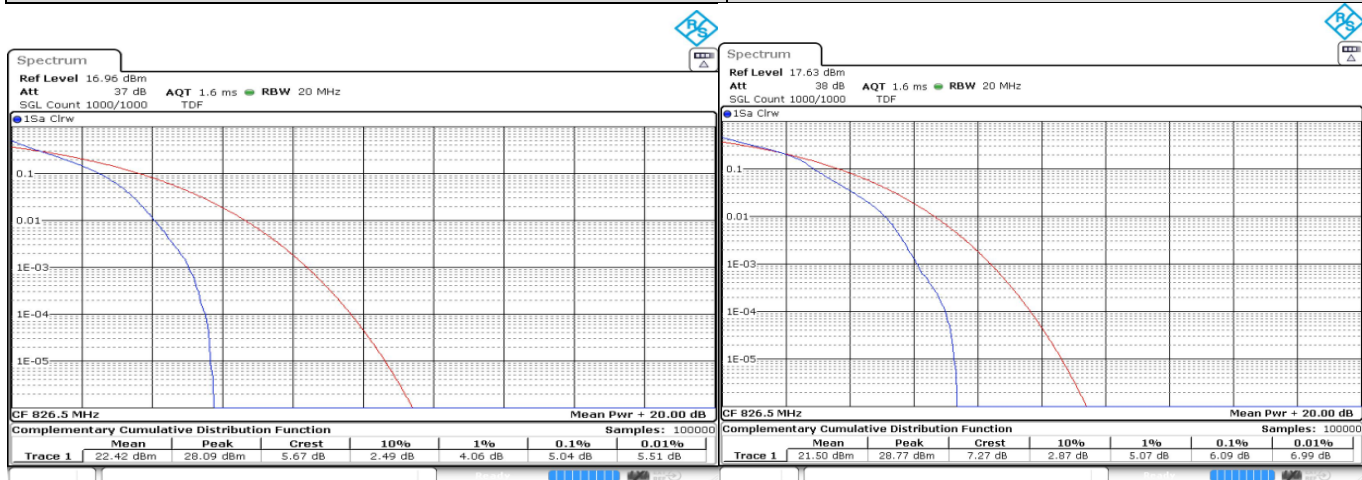
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 5 / 3MHz/15/0	Low CH 20415	825.5 MHz	4.754	6.087
	Mid CH 20525	836.5 MHz	4.696	6
	High CH 20635	847.5 MHz	4.696	5.884

Spectrum Plot of Worst Value	
QPSK	16QAM



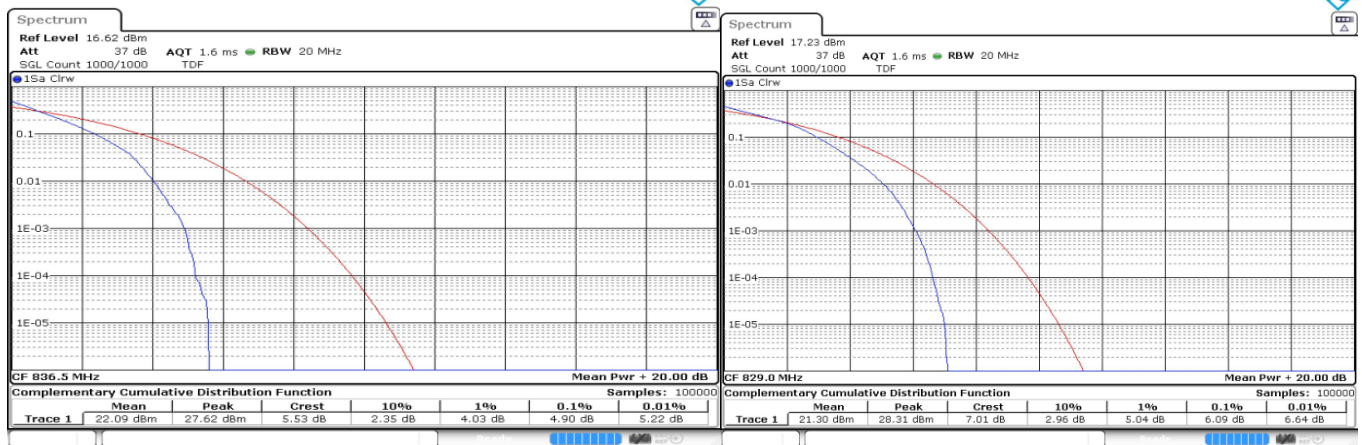
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 5 / 5MHz/25/0	Low CH 20425	826.5 MHz	5.043	6.087
	Mid CH 20525	836.5 MHz	4.986	6.029
	High CH 20625	846.5 MHz	4.841	6.058

Spectrum Plot of Worst Value	
QPSK	16QAM



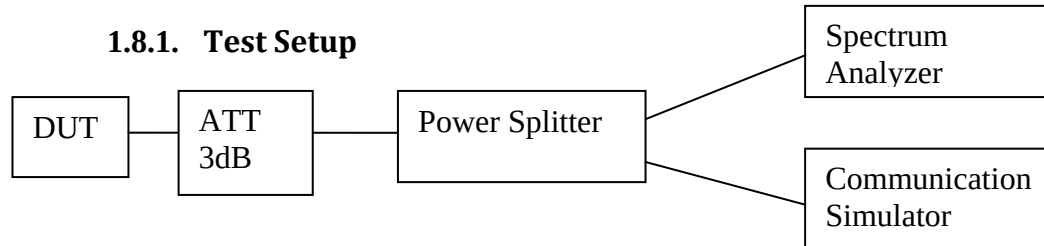
LTE Band/ BW/ RB Size/ RB Offset	Channel Number	Tx Frequency (MHz)	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 5 / 10MHz/50/0	Low CH 20450	829.0 MHz	4.87	6.087
	Mid CH 20525	836.5 MHz	4.899	6.058
	High CH 20600	844.0 MHz	4.725	6.087

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.

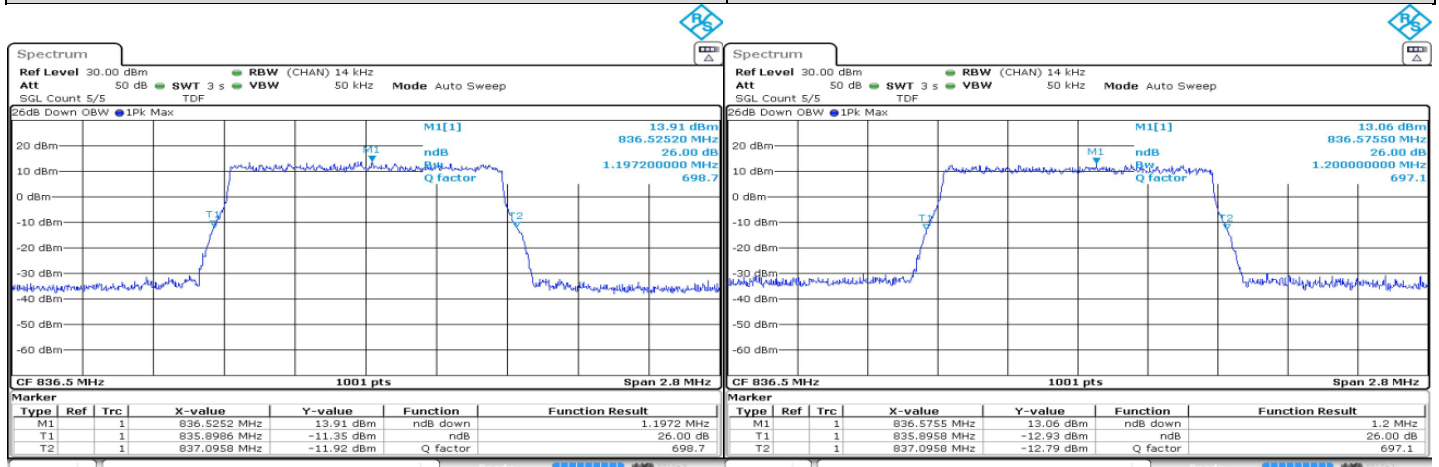
1.8.2. Test Limit

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 5 (824-849MHz)

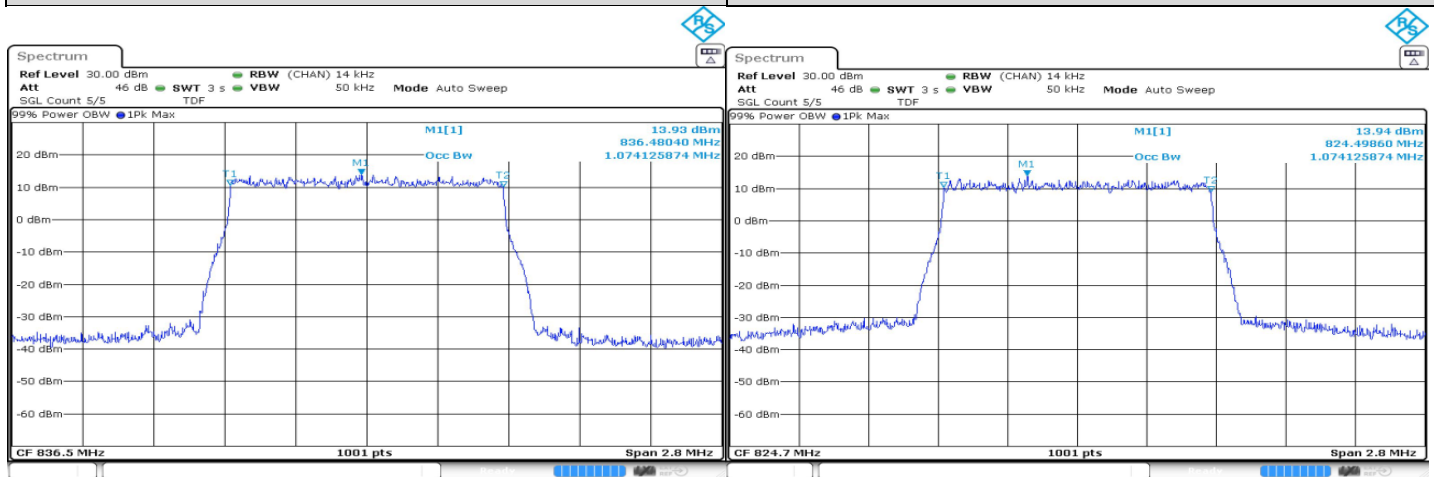
LTE Band/BW/RB size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 5 / 1.4MHz/6/0	Low CH 20407	824.7 MHz	1.189	1.186
	Mid CH 20525	836.5 MHz	1.197	1.2
	High CH 20643	848.3 MHz	1.197	1.172

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



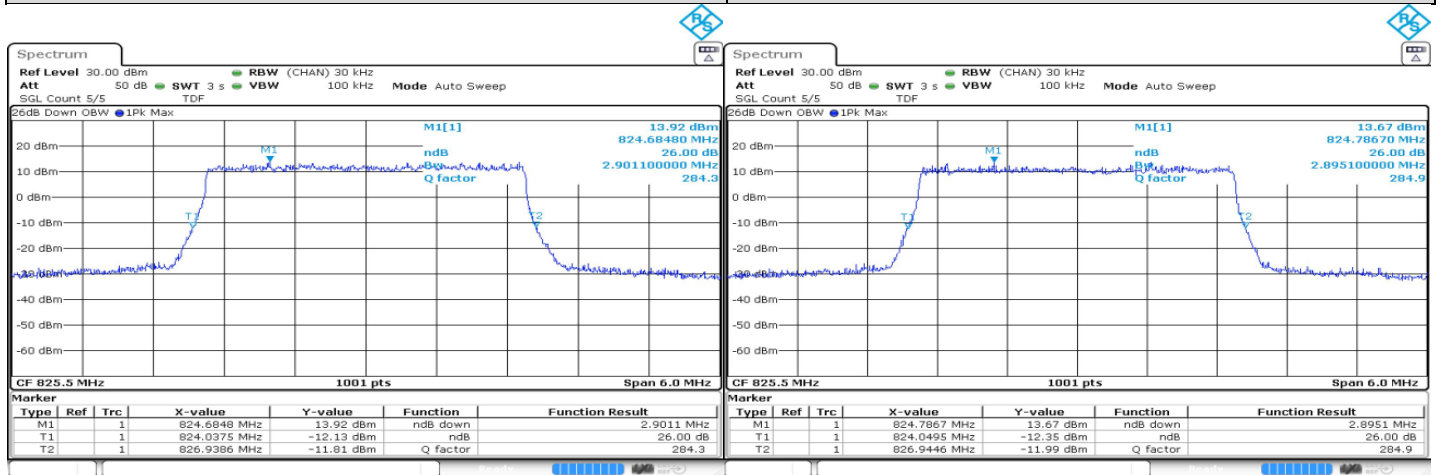
LTE Band/BW/RB size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 5 / 1.4MHz/6/0	Low CH 20407	824.7 MHz	1.071	1.074
	Mid CH 20525	836.5 MHz	1.074	1.074
	High CH 20643	848.3 MHz	1.071	1.071

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



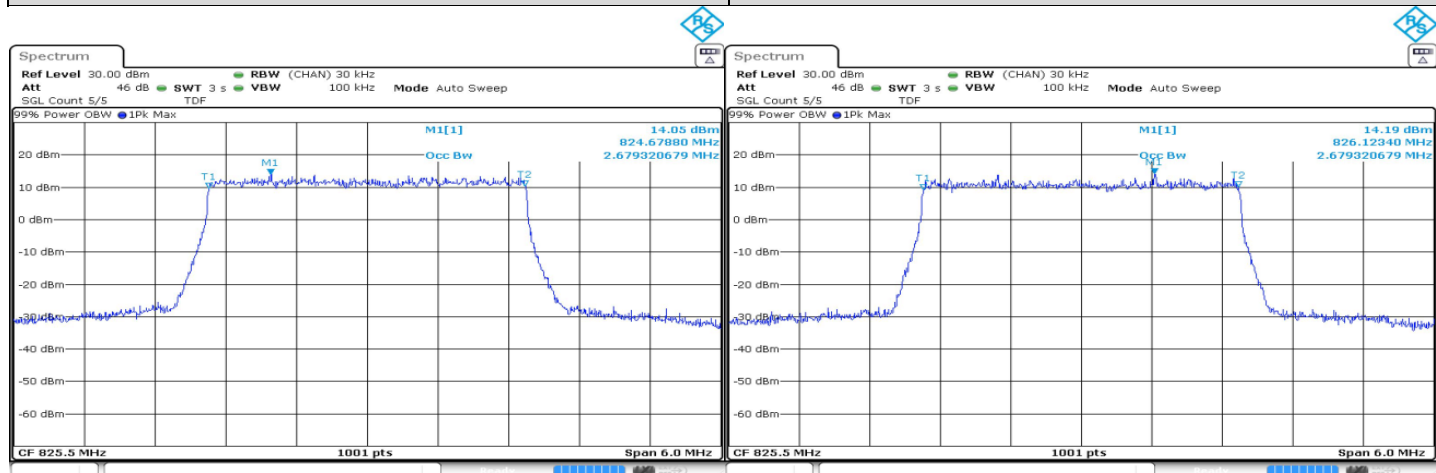
LTE Band/BW/RB size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 5 / 3MHz/15/0	Low CH 20415	825.5 MHz	2.901	2.895
	Mid CH 20525	836.5 MHz	2.883	2.895
	High CH 20635	847.5 MHz	2.877	2.871

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



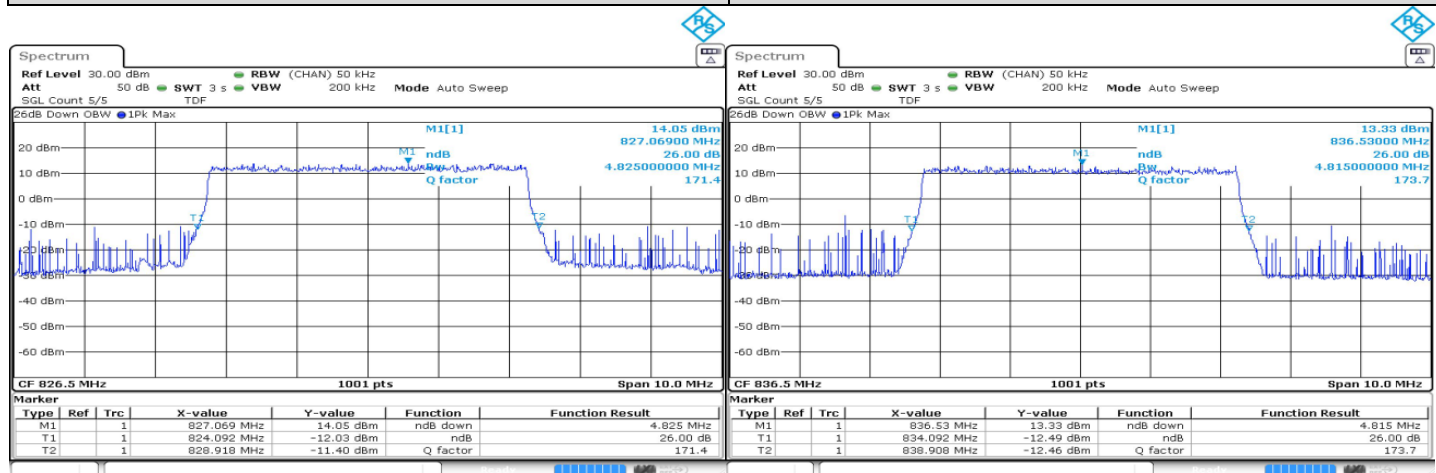
LTE Band/BW/RB size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 5 / 3MHz/15/0	Low CH 20415	825.5 MHz	2.679	2.679
	Mid CH 20525	836.5 MHz	2.673	2.673
	High CH 20635	847.5 MHz	2.679	2.679

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



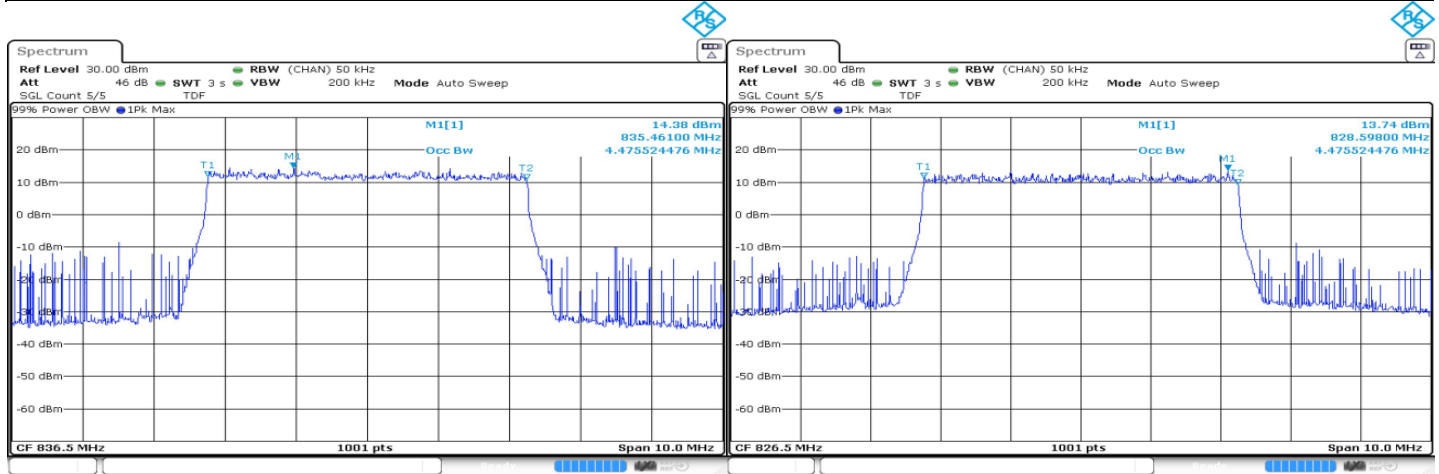
LTE Band/BW/RB size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 5 / 5MHz/25/0	Low CH 20425	826.5 MHz	4.825	4.785
	Mid CH 20525	836.5 MHz	4.795	4.815
	High CH 20625	846.5 MHz	4.805	4.815

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



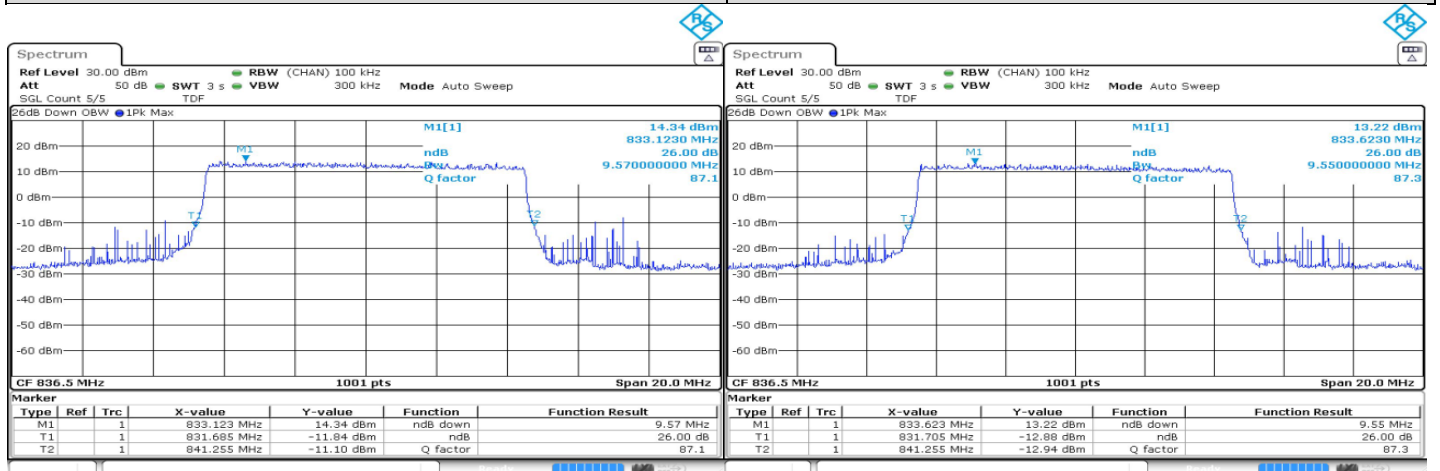
LTE Band/BW/RB size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 5 / 5MHz/25/0	Low CH 20425	826.5 MHz	4.466	4.476
	Mid CH 20525	836.5 MHz	4.476	4.476
	High CH 20625	846.5 MHz	4.466	4.466

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



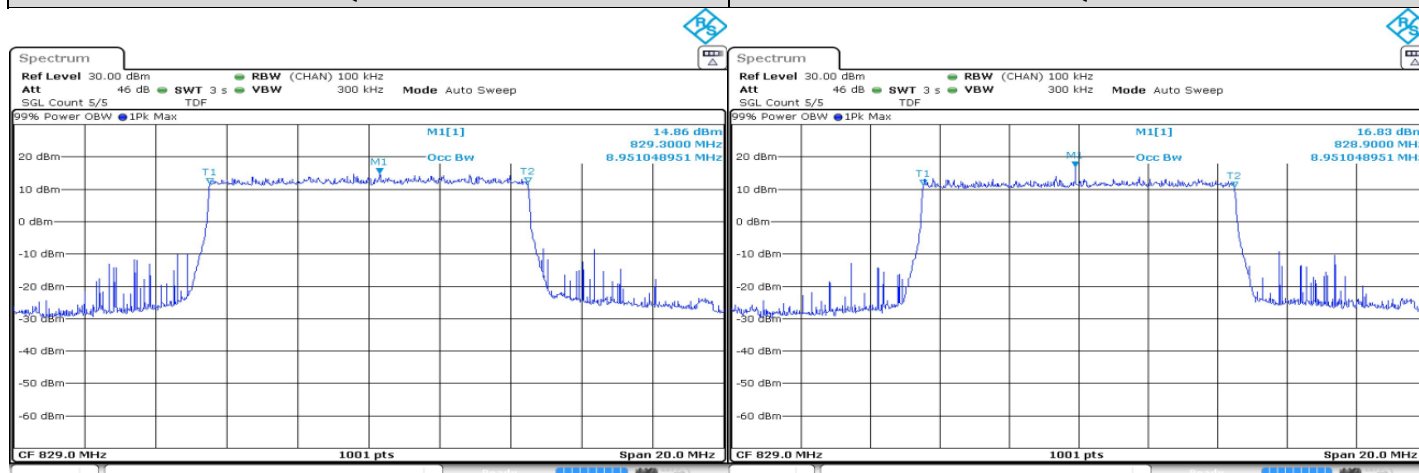
LTE Band/BW/RB size/ RB Offset	Channel Number	Tx Frequency (MHz)	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 5 / 10MHz/50/0	Low CH 20450	829 MHz	9.391	9.331
	Mid CH 20525	836.5 MHz	9.57	9.55
	High CH 20600	844 MHz	9.451	9.53

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



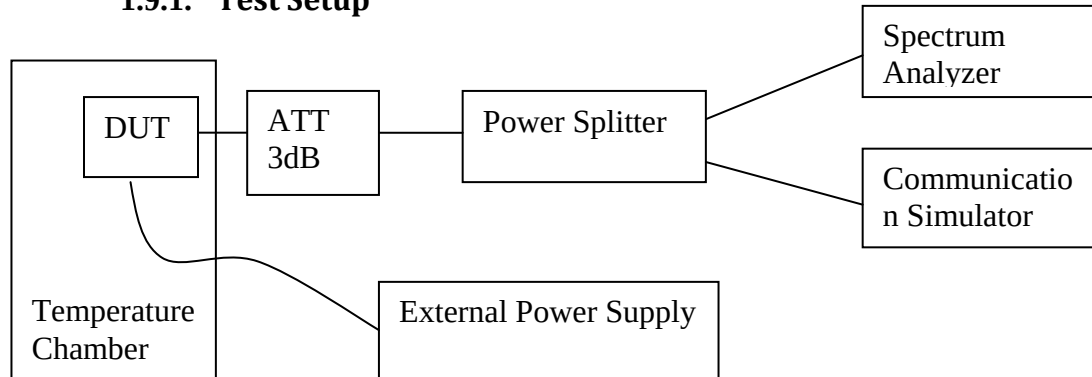
LTE Band/BW/RB size/ RB Offset	Channel Number	Tx Frequency (MHz)	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 5 / 10MHz/50/0	Low CH 20450	829 MHz	8.951	8.951
	Mid CH 20525	836.5 MHz	8.931	8.931
	High CH 20600	844 MHz	8.911	8.911

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 ~ 50 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 -20 to 60 deg C with spec of +/- 0.1ppm.

1.9.3. Frequency Stability - LTE Band 5 (824-849MHz)

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 1.4 MHz			
		Low Channel		High Channel	
		824.7MHz		848.3MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 5	60	824.699991	-0.010945	848.300013	0.015346
	50	824.700007	0.008378	848.29999	-0.01172
	40	824.69999	-0.011587	848.299987	-0.015767
	30	824.699986	-0.016496	848.299989	-0.01312
	20	824.699989	-0.013235	848.299983	-0.019932
	10	824.69999	-0.012211	848.299993	-0.008347
	0	824.699988	-0.014796	848.299992	-0.009747
	-10	824.700005	0.006539	848.299987	-0.015177
	-20	824.699992	-0.010009	848.299989	-0.012732

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 1.4 MHz			
		Low Channel		High Channel	
		824.7MHz		848.3MHz	
LTE Band 5		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	824.699992	-0.009436	848.299991	-0.010843
	7.5	824.700007	0.008881	848.29999	-0.011298
	6	824.699992	-0.009766	848.299992	-0.009039

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 3 MHz			
		Low Channel		High Channel	
		825.5MHz		847.5MHz	
LTE Band 5		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	60	825.500011	0.012893	847.499995	-0.006009
	50	825.50001	0.011818	847.500008	0.009756
	40	825.50001	0.012338	847.500008	0.009587
	30	825.50001	0.012096	847.500009	0.010347
	20	825.500013	0.015336	847.499992	-0.009064
	10	825.500013	0.01544	847.500008	0.00898
	0	825.500011	0.013621	847.500009	0.010465
	-10	825.50001	0.011541	847.500009	0.010668
	-20	825.500013	0.015735	847.49999	-0.012052

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 3 MHz			
		Low Channel		High Channel	
		825.5MHz		847.5MHz	
LTE Band 5		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	825.50001	0.0122	847.500009	0.01082
	7.5	825.500012	0.014002	847.500008	0.009655
	6	825.500008	0.009098	847.500009	0.011174

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		826.5MHz		846.5MHz	
LTE Band 5		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	60	826.499992	-0.009416	846.500013	0.014821
	50	826.500007	0.007996	846.500011	0.013384
	40	826.499993	-0.008914	846.500001	0.011424
	30	826.500001	0.012583	846.500012	0.01428
	20	826.500008	0.009433	846.500012	0.014364
	10	826.500008	0.009727	846.500013	0.015344
	0	826.500007	0.008758	846.500011	0.012624
	-10	826.500013	0.015733	846.500013	0.015395
	-20	826.500007	0.00881	846.500001	0.011542

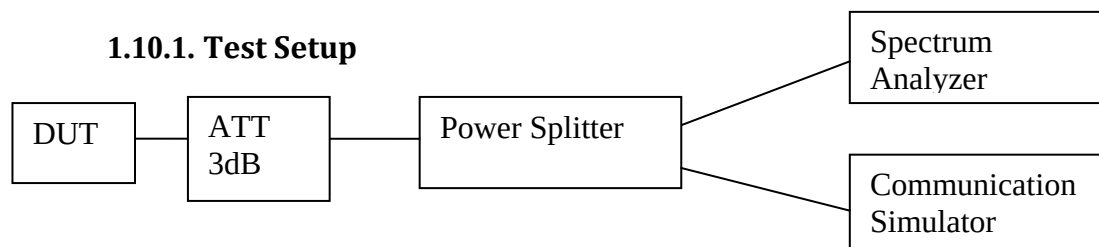
Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		826.5MHz		846.5MHz	
LTE Band 5		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	826.500007	0.008654	846.500001	0.01166
	7.5	826.500008	0.010281	846.500012	0.013807
	6	826.500009	0.011493	846.500011	0.013486

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		829MHz		844MHz	
LTE Band 5		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	60	828.999992	-0.009939	843.999991	-0.010542
	50	828.999991	-0.011372	843.99999	-0.011898
	40	828.999991	-0.011337	843.999987	-0.015525
	30	828.999989	-0.013183	843.99999	-0.011339
	20	828.999988	-0.013908	843.999992	-0.010034
	10	828.99999	-0.011682	843.999989	-0.012661
	0	829.000005	0.005608	843.999991	-0.010136
	-10	828.999989	-0.013201	843.999991	-0.010441
	-20	828.999991	-0.011423	844.000011	0.012864

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		829MHz		844MHz	
LTE Band 5		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	828.999991	-0.011268	843.99999	-0.012085
	7.5	828.999991	-0.01113	843.999991	-0.010627
	6	828.999989	-0.013391	843.999983	-0.019644

1.10. Band Edge Conducted Spurious Emission

1.10.1. Test Setup

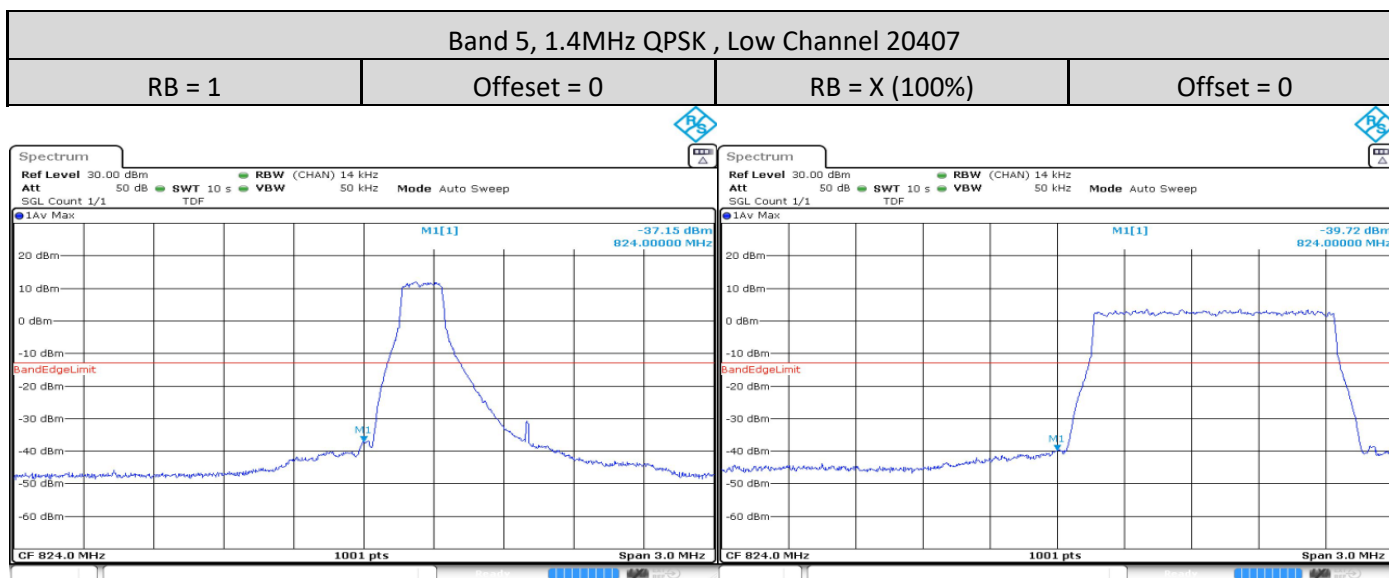


- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) Set DUT to transmit maximum power through communication simulator.
- 4) The band edges of lowest and highest channels with the highest RF powers were measured.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

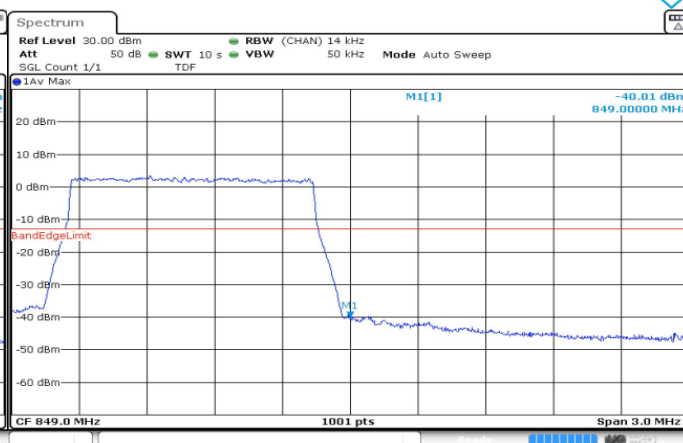
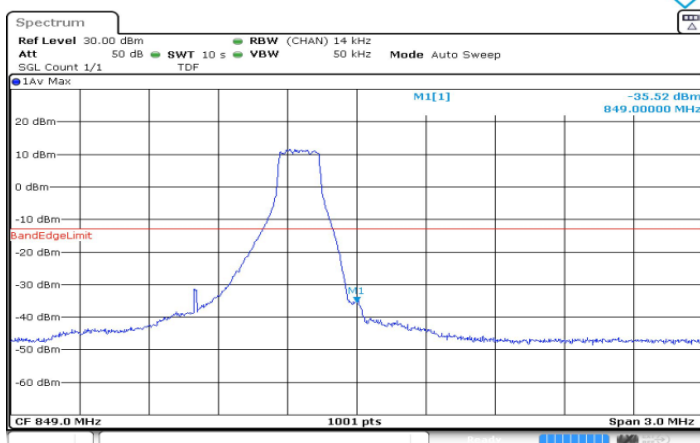
1.10.2. Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed

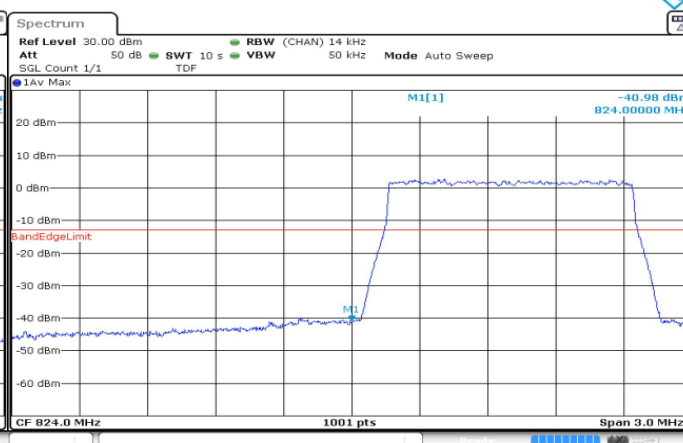
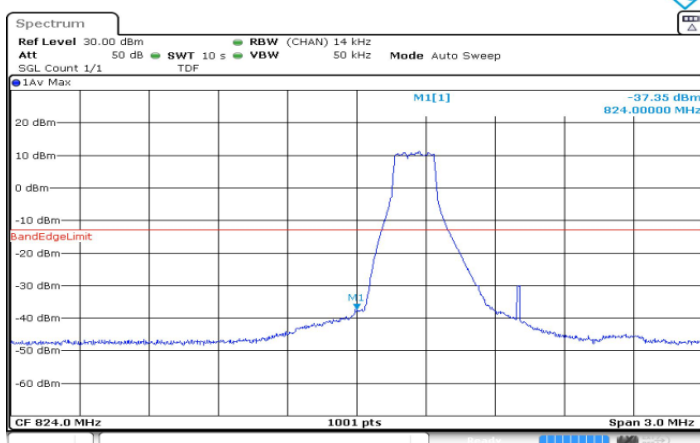
1.10.3. Band Edge Conducted Spurious Emission - LTE Band 5 (824-849MHz)



Band 5, 1.4MHz QPSK , High Channel 20643			
RB = 1	Offset = X-1	RB = X (100%)	Offset = 0



Band 5, 1.4MHz 16-QAM , Low Channel 20407			
RB = 1	Offset = 0	RB = X (100%)	Offset = 0



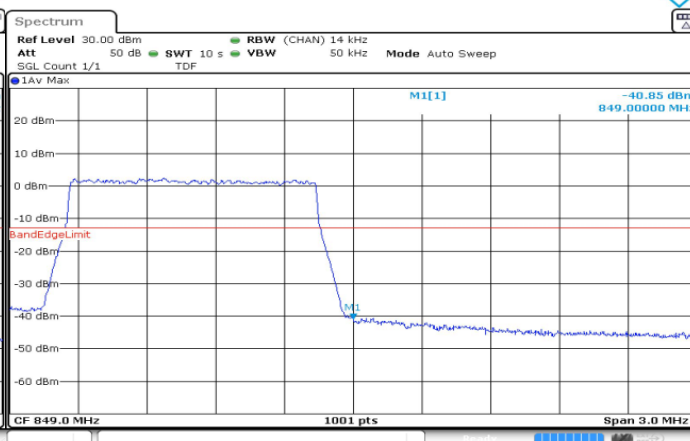
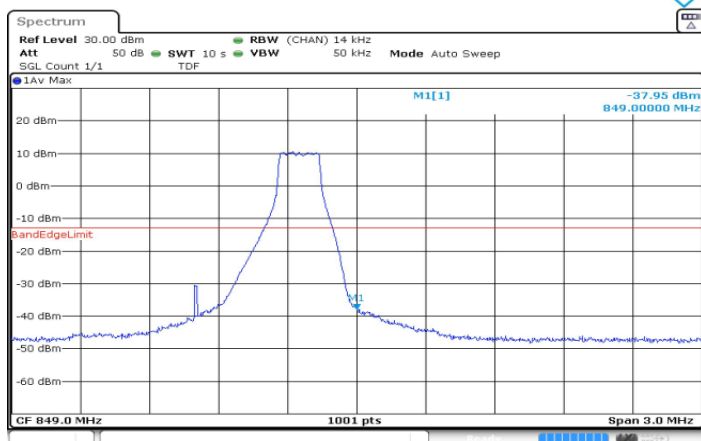
Band 5, 1.4MHz 16-QAM, High Channel 20643

RB = 1

Offset = X-1

RB = X (100%)

Offset = 0



Band 5, 3MHz QPSK, Low CH 20415

RB = 1

Offset = 0

RB = X (100%)

Offset = 0

