

	    <p>CERTIFICATE 2518.08</p> <p>MS ISO/IEC 17025 TESTING SAMM NO. 0825</p>								
<p>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.</p>	<p>FCC / ISED TEST REPORT Report Revision : Rev.B</p>								
<table border="0"> <tr> <td style="vertical-align: top;"> <p>Date/s Tested : 31-March-2022 - 7-July-2022 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 : Hand-held Product Version (PMN) : MSLB-MKZ920 Model Number (HVIN) : AAH90UCU9RH1AN 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) : D02.22.01.0103 (BP), D00.01.86 (AP)</p> </td> <td style="vertical-align: middle; text-align: center;">  </td> </tr> </table> <p>The equipment was tested accordance to the requirement listed below:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 60%;">(LTE Band 7)</td> <td style="width: 40%;"></td> </tr> <tr> <td>FCC 47 CFR Part 2 / 27</td> <td style="text-align: center;">PASS</td> </tr> <tr> <td>ISED RSS GEN / 199</td> <td></td> </tr> </table>		<p>Date/s Tested : 31-March-2022 - 7-July-2022 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 : Hand-held Product Version (PMN) : MSLB-MKZ920 Model Number (HVIN) : AAH90UCU9RH1AN 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) : D02.22.01.0103 (BP), D00.01.86 (AP)</p>		(LTE Band 7)		FCC 47 CFR Part 2 / 27	PASS	ISED RSS GEN / 199	
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(LTE Band 7)									
FCC 47 CFR Part 2 / 27	PASS								
ISED RSS GEN / 199									
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<p>Prepared By:</p> <hr/> <p>Lim Khay Kwang Technician</p>	<p>Approve Signatory:</p> <hr/> <p>Ho Sze Khian Technical Manager</p>								

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REVISION HISTORY

Revision History	Description	Date	Originator
Rev A.	Initial Report	7-July-2022	Lim Khay Kwang
Rev B.	Update Frequency Stability Spec Limit	27-July-2022	Lim Khay Kwang

1.0. Summary of Test Results

FCC Clause	ISED Clause	Test Item	Results	Remarks	Serial Number Tested
2.1046 27.50(h)(2)	RSS-Gen 6.12 RSS – 199 4.4	Conducted RF Output Power	Pass	Meet the requirement of limit	734TYF0012
27.50(d)(5)	RSS -199 4.4	Peak-to-Average Power Ratio	Pass	Meet the requirement of limit	734TYF0012
2.1049 27.53(m)(6)	RSS-Gen 6.7	Occupied Bandwidth (26dBc, 99%)	Pass	Meet the requirement of limit	734TYF0012
2.1055 27.54	RSS – 199 4.3	Frequency Stability	Pass	Meet the requirement of limit	734TYF0012
2.1051 27.53(m)(4) (6)	RSS -Gen 6.13 RSS -199 4.5	Band Edge Conducted Spurious Emission	Pass	Meet the requirement of limit	734TYF0012
2.1051 27.53(m)(4) (6)	RSS -Gen 6.13 RSS -199 4.5	Conducted Spurious Emissions	Pass	Meet the requirement of limit	734TYF0012
2.1053 27.53(m)(4) (6)	RSS -199 4.5	Radiated Spurious Emission	Pass	Meet the requirement of limit	734TYF0069
2.1049 27.50(h)(2)	RSS -199 4.4	Equivalent Isotropically Radiated Power (EIRP)	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: Cmwrn V1.8.9				
Signal Analyzer	FSV40	101431	02-Dec-21	02-Dec-23
Chamber	SH-641	92003150	17-Sep-21	17-Sep-22
Wideband Radio Communication Tester	CMW500	154550	07-Mar-21	07-Mar-23

Power Supply	6652A	MY40001437	26-Aug-21	26-Aug-22
Radiated Spurious Emission (Emc Chamber 1); Test Software Version: Emc_Fcc_Re_V1.6.2				
Drg Horn Freq.	SAS-571	720	06-Apr-21	06-Apr-23
Drg Horn Freq.	SAS-571	719	13-Sep-21	13-Sep-22
Power Supply	N7976A	MY53410110	24-May-21	24-May-22
Signal Generator	SMB 100A	182511	4-Jun-21	4-Jun-24
Emi Test Receiver	ESW44	101731	5-Nov-21	5-Nov-22
5m Semi-Anechoic Chamber	S800-HX	J2308	No Cal. Req'd	No Cal. Req'd
Bilog Antenna	CBL6112D	55546	06-Jun-21	06-Jun-22
Bilog Antenna	CBL6112D	30991	05-Oct-21	05-Oct-22
Hygro-Thermometer	SDL500	A.016800	18-May-21	18-May-22
System Controller	SC104V	050806-1	No Cal. Req'd	No Cal. Req'd
Turntable Flush Mount 2m	FM2011	NA	No Cal. Req'd	No Cal. Req'd
Antenna Positioning Tower	TLT2	NA	No Cal. Req'd	No Cal. Req'd
Broad-Band Horn Antenna	BBHA9170	BBHA9170143	3-Aug-21	3-Aug-22
Preamplifier 18-40ghz	BBV9721	9721-007	No Cal. Req'd	No Cal. Req'd
Preamplifier	PAM-0118P	361	11-Sep-20	11-Sep-23
Loop Antenna	6502	00208416	8-Oct-21	8-Oct-22
Power Supply	N7976A	MY53410110	24-May-21	24-May-22

1.3. General Information

General Description of EUT

Product	MACKENZIE 8/900MHZ NAG MODEL		
Brand	Motorola Solutions		
Test Model	AAH90UCU9RH1AN		
Power Supply Rating	7.5VDC		
Mode of operation	LTE Band 7		
Modulation Type	QPSK, 16QAM		
Operating Frequency	LTE Band 7	Channel Bandwidth 5MHz	2502.5MHz~2567.5MHz
		Channel Bandwidth 10MHz	2505.0MHz~2565.0MHz
		Channel Bandwidth 15MHz	2507.5MHz~2562.5MHz
		Channel Bandwidth 20MHz	2510.0MHz~2560.0MHz
Max. EIRP Power	LTE Band 7 QPSK	Channel Bandwidth 5MHz	25.938dBm (0.392W)
		Channel Bandwidth 10MHz	25.77dBm (0.378W)
		Channel Bandwidth 15MHz	25.732dBm (0.374W)
		Channel Bandwidth 20MHz	25.618dBm (0.365W)
	LTE Band 7 16QAM	Channel Bandwidth 5MHz	24.996dBm (0.316W)
		Channel Bandwidth 10MHz	25.2dBm (0.331W)
		Channel Bandwidth 15MHz	25.079dBm (0.322W)
		Channel Bandwidth 20MHz	24.996dBm (0.316W)

Emission Designator	LTE Band 7		QPSK	16QAM
		Channel Bandwidth 5MHz	4M48G7D	4M48D7W
		Channel Bandwidth 10MHz	8M93G7D	8M95D7W
		Channel Bandwidth 15MHz	13M4G7D	13M4D7W
		Channel Bandwidth 20MHz	17M9G7D	17M8D7W
Antenna Type	LTE Band 7	LTE MID-HIGH BAND MAIN ANTENNA (2.81dBi)		
SW Version	D02.22.01.0103 (BP), D00.01.86 (AP)			
HW Version	P2			

Note:

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

Item	Brand	Model or P/N	Specification
Li-Ion	MOTOROLA	PMNN4805A	BATTERY PACK,BATTERY PACK,IMPRES GEN2, LIION,IP68, 4400T

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 OOB License Digital Systems v02r01

ANSI C63.26

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

Report Template Document Number : FCD-0087
Report Template Revision Number : Rev. E

Report ID: : 27331-RF-00015
FCC ID: AZ489FT7151
IC: 109U-89FT7151

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 7	5 MHz	20775~ 21425	20775	21100	21425	2502.5	2535	2567.5
	10 MHz	20800~ 21400	20800	21100	21400	2505	2535	2565
	15 MHz	20825~ 21375	20825	21100	21375	2507.5	2535	2562.5
	20 MHz	20850~ 21350	20850	21100	21350	2510	2535	2560

1.5. Test Mode Applicability and Tested Channel Detail

LTE Band 7

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
Conducted RF Output Power	20775~ 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM	As per table 1.6.3
	20800~ 21400	20800, 21100, 21400	10 MHz		
	20825~ 21375	20825, 21100, 21375	15 MHz		
	20850~ 21350	20850, 21100, 21350	20 MHz		
Peak to Average Power Ratio	20775~ 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	20800~ 21400	20800, 21100, 21400	10 MHz		50 RB / 0 RB Offset
	20825~ 21375	20825, 21100, 21375	15 MHz		75 RB / 0 RB Offset
	20850~ 21350	20850, 21100, 21350	20 MHz		100 RB / 0 RB Offset
Occupied Bandwidth	20775~ 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	20800~ 21400	20800, 21100, 21400	10 MHz		50 RB / 0 RB Offset
	20825~ 21375	20825, 21100, 21375	15 MHz		75 RB / 0 RB Offset
	20850~ 21350	20850, 21100, 21350	20 MHz		100 RB / 0 RB Offset
Frequency Stability	20775~ 21425	20775, 21425	5 MHz	QPSK	25 RB / 0 RB Offset
	20800~ 21400	20800, 21400	10 MHz		50 RB / 0 RB Offset
	20825~ 21375	20825, 21375	15 MHz		75 RB / 0 RB Offset
	20850~ 21350	20850, 21350	20 MHz		100 RB / 0 RB Offset
Band Edge Conducted Spurious Emission	20775~ 21425	20775, 21425	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
	20800~ 21400	20800, 21400	10 MHz		1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
	20825~ 21375	20825, 21375	15 MHz		1 RB / 0 RB Offset 1 RB / 74 RB Offset 75 RB / 0 RB Offset
	20850~ 21350	20850, 21350	20 MHz		1 RB / 0 RB Offset 1 RB / 99 RB Offset

					100 RB / 0 RB Offset
Conducted Spurious Emission	20775~ 21425	20775, 21100, 21425	5 MHz	QPSK	1 RB / 13 Offset
	20800~ 21400	20800, 21100, 21400	10 MHz		1 RB / 0 Offset
	20825~ 21375	20825, 21100, 21375	15 MHz		1 RB / 0 Offset
	20850~ 21350	20850, 21100, 21350	20 MHz		1 RB / 0 Offset
Radiated Emission	20775~ 21425	20775	5 MHz	QPSK	1 RB / 13 Offset
Equivalent Isotropically Radiated Power (EIRP)	20775~ 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM	As per table 1.6.4
	20800~ 21400	20800, 21100, 21400	10 MHz		
	20825~ 21375	20825, 21100, 21375	15 MHz		
	20850~ 21350	20850, 21100, 21350	20 MHz		

NOTE:

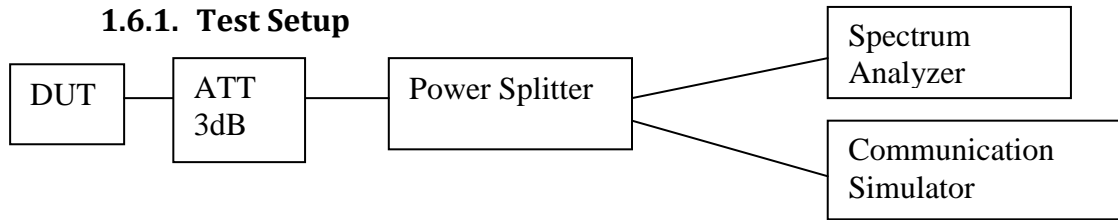
1. The Conducted RF Output Power for QPSK and 16QAM, measured value of QPSK mode is higher than 16QAM mode. Therefore, only Conducted Spurious Emission and Radiated Emission had been tested under QPSK modes.
2. Band Edge was performed with 1 and full Resource Block at the lowest and highest operating 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.
6. The LTE chipset is identical to FCC ID AZ489FT7133/IC 109U-89FT7133. Only worst case configuration of radiated emission based on FCC ID AZ489FT7151/ IC 109U-89FT7151 is tested. Spot check results showing radiated emissions is comparable. As per KDB 484596 D01v01, the applicant takes full responsibility that data referenced represents compliance to the relevant rules for this current FCC ID.

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	-30°C ~ 60°C	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	Azil&Qawiman
Equivalent Isotropically Radiated Power (EIRP)	25°C, 50% 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. Limits

FCC: Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

ISED: For mobile subscriber equipment, the e.i.r.p. shall not exceed 2 watts.

1.6.3. Conducted RF Output Power – LTE Band 7 (2500-2570MHz)

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
			20775	21100	21425	20775	21100	21425
			2502.5MHz	2535MHz	2567.5MHz	2502.5MHz	2535MHz	2567.5MHz
Band 7 / 5.0MHz	1	0	23.036	22.745	22.543	22.128	21.902	21.84
	1	13	23.128	22.841	22.592	22.186	21.98	21.875
	1	24	23.03	22.752	22.463	22.096	21.902	21.755
	12	0	22.151	21.807	21.579	21.212	20.806	20.616
	12	6	22.163	21.823	21.592	21.216	20.801	20.629
	12	13	22.096	21.756	21.558	21.154	20.771	20.575
	25	0	22.141	21.813	21.585	21.186	20.852	20.604

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
			20800	21100	21400	20800	21100	21400
			2505MHz	2535MHz	2565MHz	2505MHz	2535MHz	2565MHz
Band 7 / 10.0MHz	1	0	22.96	22.623	22.532	22.39	21.786	21.6
	1	25	22.937	22.591	22.387	22.313	21.741	21.401
	1	49	22.876	22.577	22.397	22.224	21.729	21.355
	25	0	21.962	21.618	21.473	21.089	20.756	20.59
	25	13	21.92	21.658	21.394	21.03	20.766	20.516
	25	25	21.881	21.596	21.37	20.966	20.745	20.454
	50	0	21.871	21.63	21.452	21.002	20.689	20.537

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
			20825	21100	21375	20825	21100	21375
			2507.5MHz	2535MHz	2562.5 MHz	2507.5MHz	2535MHz	2562.5MHz
Band 7 / 15.0MHz	1	0	22.922	22.714	22.46	22.269	21.78	21.476
	1	38	22.824	22.637	22.355	22.176	21.693	21.374
	1	74	22.725	22.521	22.212	22.086	21.592	21.217
	36	0	21.853	21.584	21.426	20.969	20.718	20.522
	36	19	21.865	21.589	21.455	20.971	20.727	20.549
	36	39	21.806	21.546	21.305	20.919	20.672	20.389
	75	0	21.817	21.546	21.411	20.927	20.64	20.486

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
			20850	21100	21350	20850	21100	21350
			2510 MHz	2535MHz	2560MHz	2510MHz	2535MHz	2560MHz
Band 7 / 20.0MHz	1	0	22.808	22.586	22.33	21.898	22.186	21.832
	1	49	22.748	22.506	22.34	21.782	22.087	21.82
	1	99	22.512	22.399	22.113	21.568	21.977	21.572
	50	0	21.834	21.578	21.452	20.896	20.64	20.513
	50	25	21.852	21.61	21.471	20.916	20.667	20.524
	50	50	21.663	21.525	21.398	20.728	20.615	20.457
	100	0	21.788	21.558	21.388	20.904	20.652	20.512

1.6.4. Equivalent Isotropically Radiated Power (EIRP) - LTE Band 7 (2500 - 2570MHz)

Equivalent Isotropically 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
			20775	21100	21425	20775	21100	21425
			2502.5MHz	2535MHz	2567.5MHz	2502.5MHz	2535MHz	2567.5MHz
Band 7 / 5.0MHz	1	0	25.846	25.555	25.353	24.938	24.712	24.65
	1	13	25.938	25.651	25.402	24.996	24.79	24.685
	1	24	25.84	25.562	25.273	24.906	24.712	24.565
	12	0	24.961	24.617	24.389	24.022	23.616	23.426
	12	6	24.973	24.633	24.402	24.026	23.611	23.439
	12	13	24.906	24.566	24.368	23.964	23.581	23.385
	25	0	24.951	24.623	24.395	23.996	23.662	23.414

Equivalent Isotropically 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
			20800	21100	21400	20800	21100	21400
			2505MHz	2535MHz	2565MHz	2505MHz	2535MHz	2565MHz
Band 7 / 10.0MHz	1	0	25.77	25.433	25.342	25.2	24.596	24.41
	1	25	25.747	25.401	25.197	25.123	24.551	24.211
	1	49	25.686	25.387	25.207	25.034	24.539	24.165
	25	0	24.772	24.428	24.283	23.899	23.566	23.4
	25	13	24.73	24.468	24.204	23.84	23.576	23.326
	25	25	24.691	24.406	24.18	23.776	23.555	23.264
	50	0	24.681	24.44	24.262	23.812	23.499	23.347

Equivalent Isotropically 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
			20825	21100	21375	20825	21100	21375
			2507.5MHz	2535MHz	2562.5 MHz	2507.5MHz	2535MHz	2562.5MHz
Band 7 / 15.0MHz	1	0	25.732	25.524	25.27	25.079	24.59	24.286
	1	38	25.634	25.447	25.165	24.986	24.503	24.184
	1	74	25.535	25.331	25.022	24.896	24.402	24.027
	36	0	24.663	24.394	24.236	23.779	23.528	23.332
	36	19	24.675	24.399	24.265	23.781	23.537	23.359
	36	39	24.616	24.356	24.115	23.729	23.482	23.199
	75	0	24.627	24.356	24.221	23.737	23.45	23.296

Equivalent Isotropically 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
			20850	21100	21350	20850	21100	21350
			2510 MHz	2535MHz	2560MHz	2510MHz	2535MHz	2560MHz
Band 7 / 20.0MHz	1	0	25.618	25.396	25.14	24.708	24.996	24.642
	1	49	25.558	25.316	25.15	24.592	24.897	24.63
	1	99	25.322	25.209	24.923	24.378	24.787	24.382
	50	0	24.644	24.388	24.262	23.706	23.45	23.323
	50	25	24.662	24.42	24.281	23.726	23.477	23.334
	50	50	24.473	24.335	24.208	23.538	23.425	23.267
	100	0	24.598	24.368	24.198	23.714	23.462	23.322

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

$$EIRP = P_{Meas} + GT$$

$$ERP = EIRP - 2.15$$

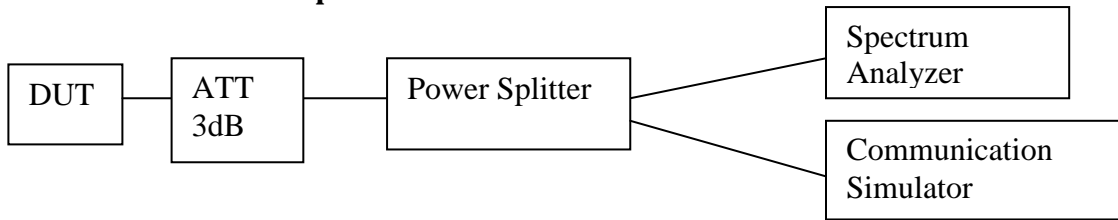
Where, ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively
 (Expressed in the same units as P_{Meas}, e.g., dBm)

P_{Meas} measured transmitter output power, in dBm

GT gain of the transmitting antenna, in dBi (EIRP)

1.7. Peak-to-Average Power Ratio

1.1.1. 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.

1.1.2. Test Limit

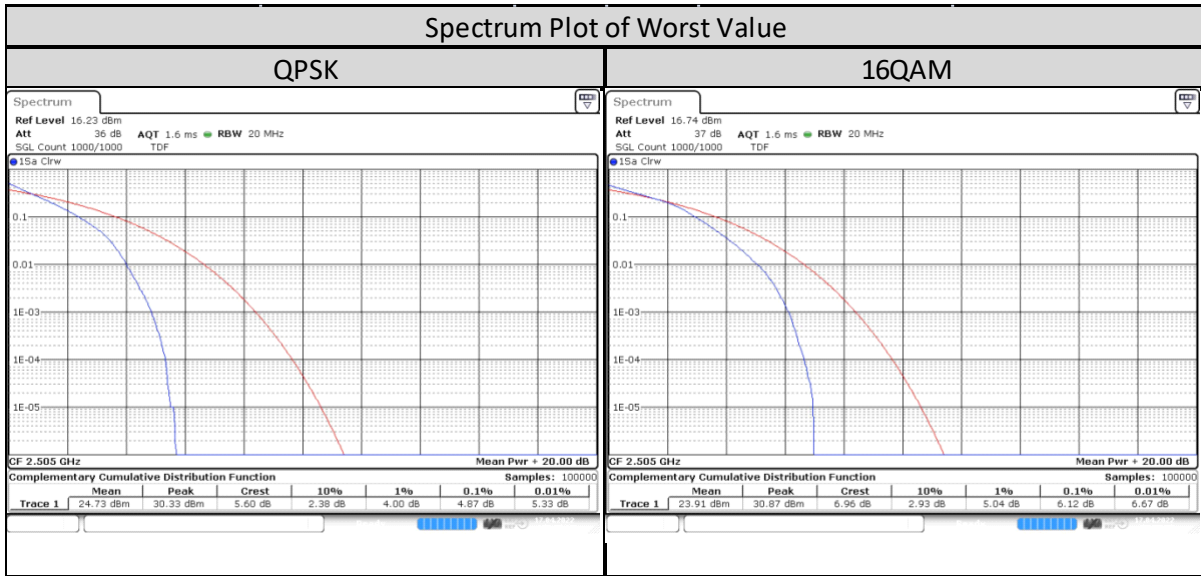
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

1.1.3. Peak-to-Average Power Ratio - LTE Band 7 (2500-2570MHz)

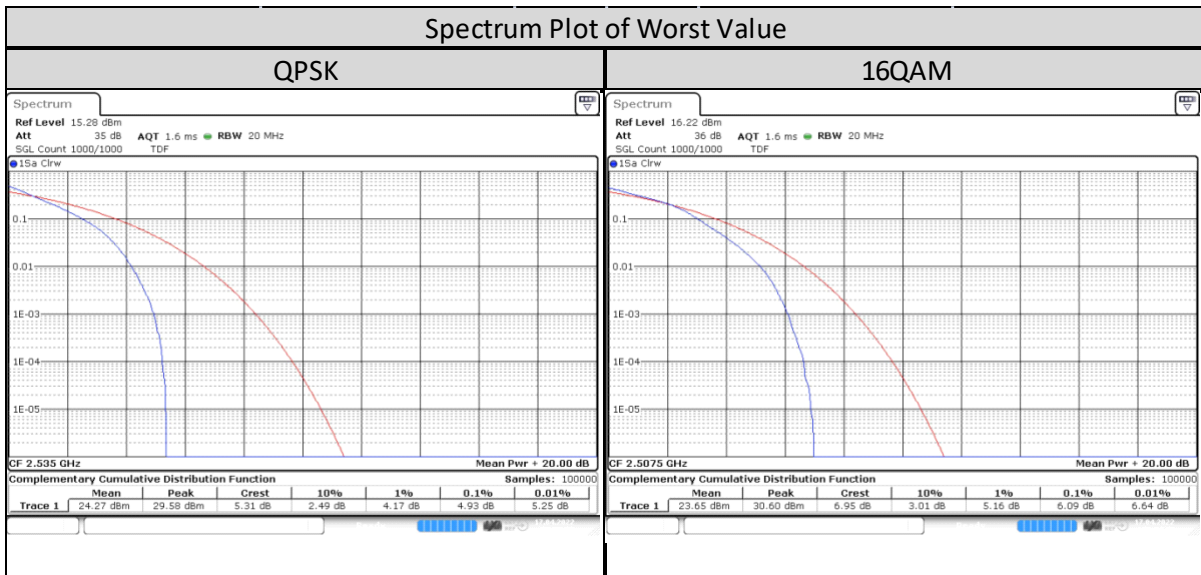
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 7/5MHz/25/0	Low CH 20775	2502.5 MHz	4.957	6.058
	Mid CH 21100	2535 MHz	5.043	6.203
	High CH 21425	2567.5 MHz	4.899	5.942



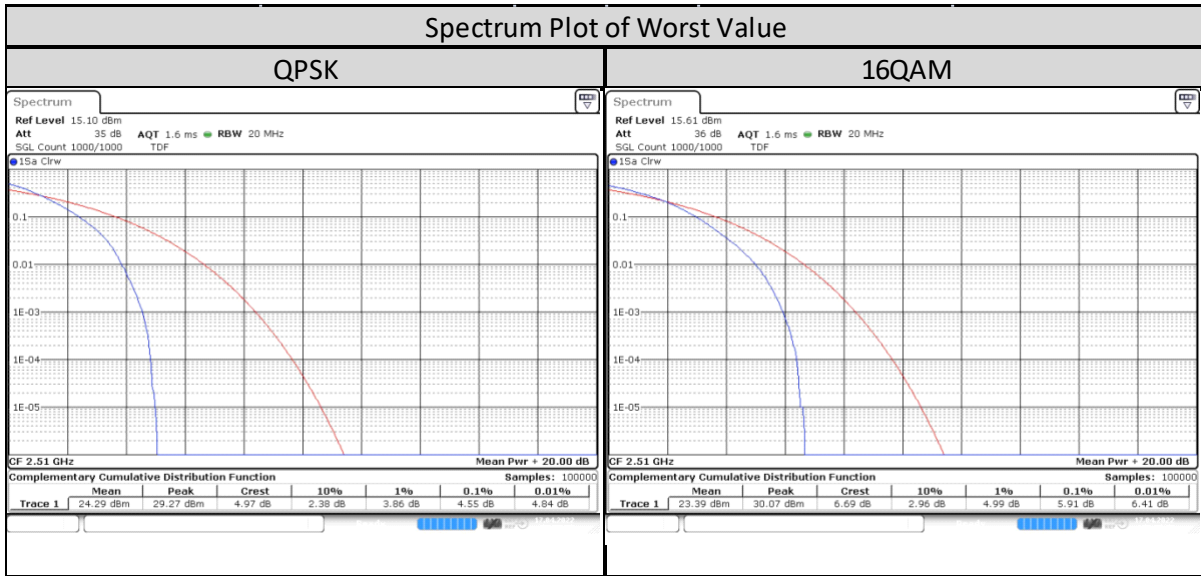
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 7/10MHz/50/0	Low CH 20800	2505 MHz	4.87	6.116
	Mid CH 21100	2535 MHz	4.812	6.029
	High CH 21400	2565 MHz	4.812	5.971



LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 7/15MHz/75/0	Low CH 20825	2507.5 MHz	4.87	6.087
	Mid CH 21100	2535 MHz	4.928	6
	High CH 21375	2562.5 MHz	4.841	5.971

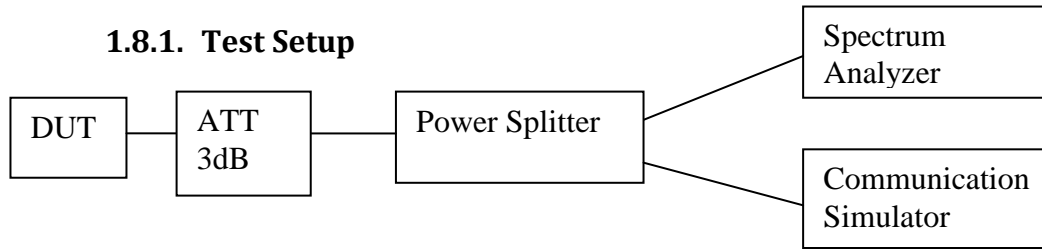


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 7/ 20MHz/100/0	Low CH 20850	2510 MHz	4.551	5.913
	Mid CH 21100	2535 MHz	4.551	5.797
	High CH 21350	2560 MHz	4.435	5.797



1.8. Occupied Bandwidth

1.8.1. Test Setup



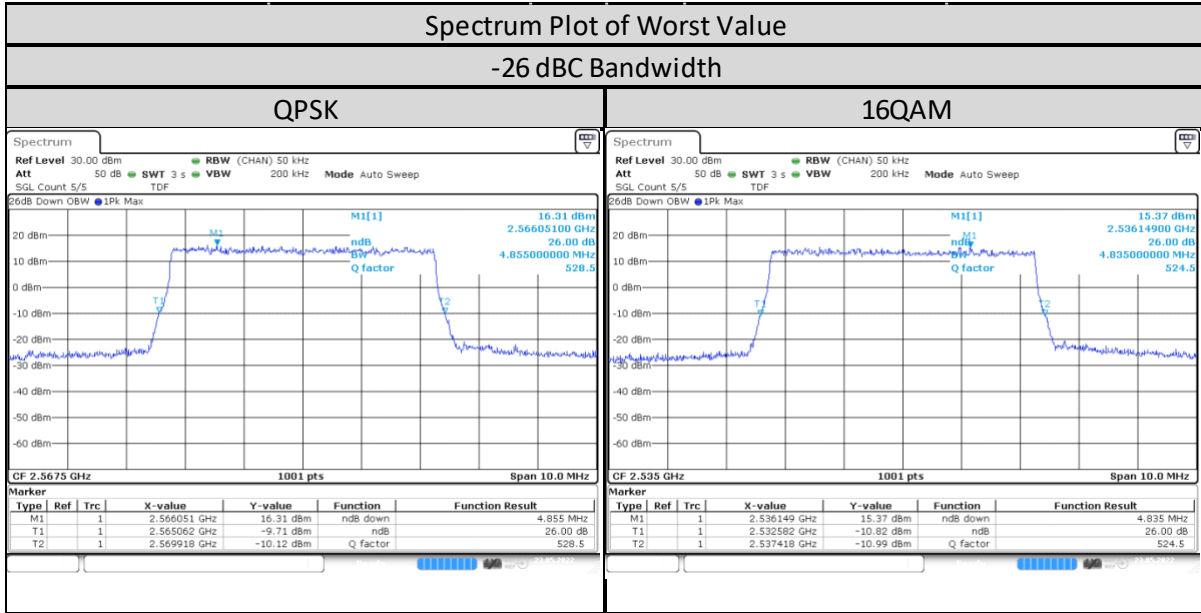
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) For LTE measurement, set DUT to transmit maximum power & full RB size through communication simulator.
- 4) For LTE measurement, set DUT to transmit maximum 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

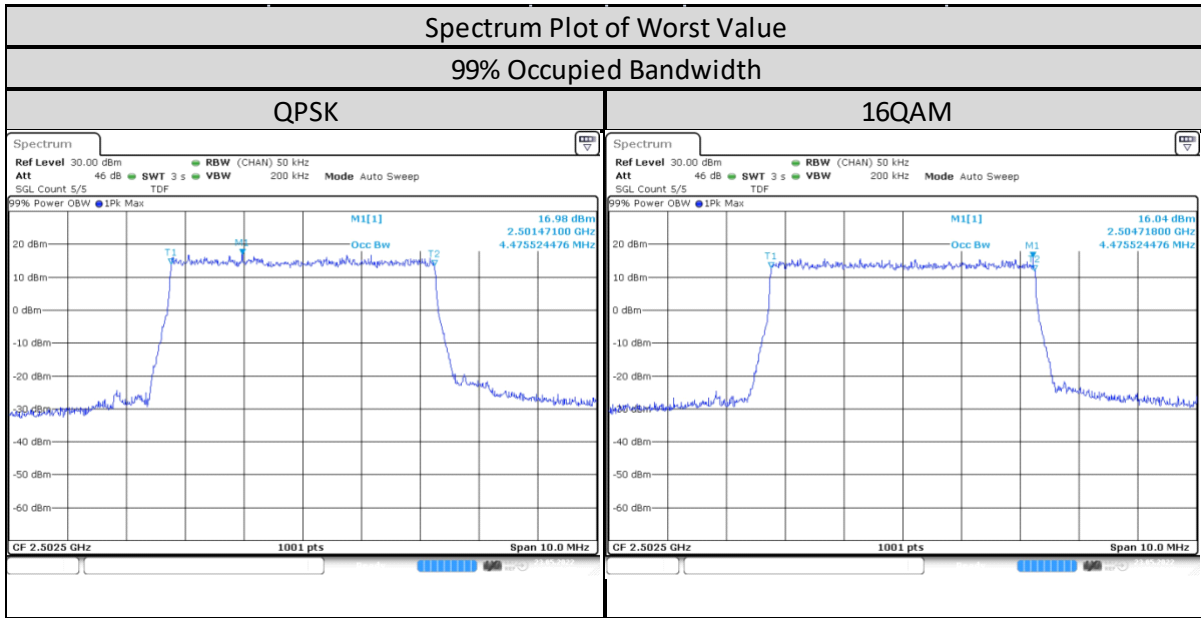
The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

1.8.3. Occupied Bandwidth - LTE Band 7 (2500-2570MHz)

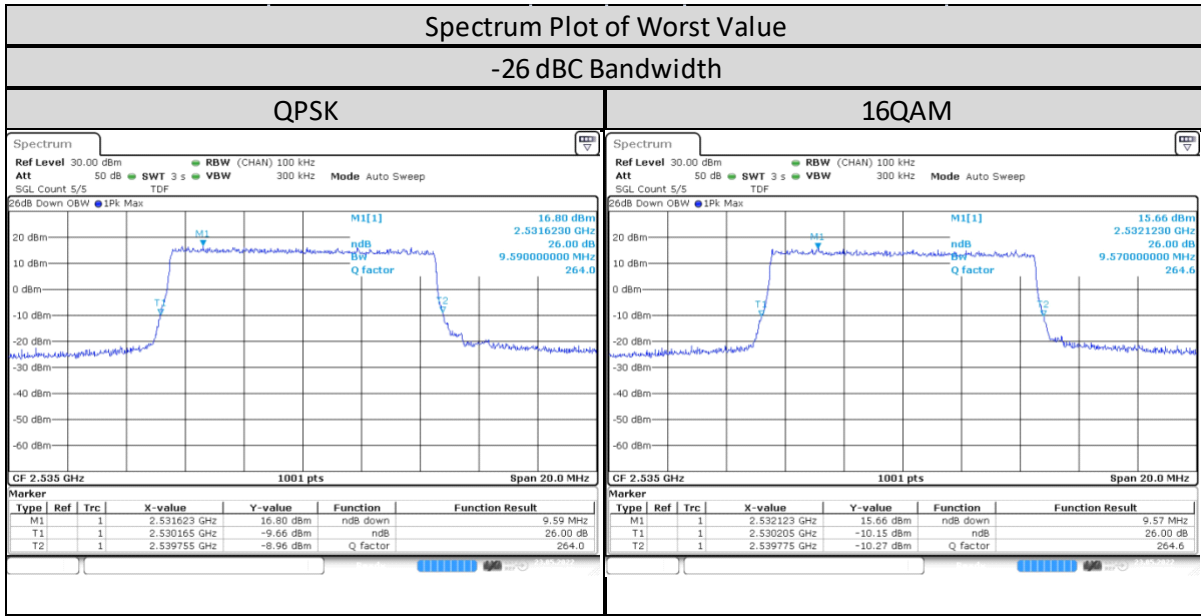
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 7/5MHz/25/0	Low CH 20775	2502.5 MHz	4.835	4.825
	Mid CH 21100	2535 MHz	4.835	4.835
	High CH 21425	2567.5 MHz	4.855	4.795



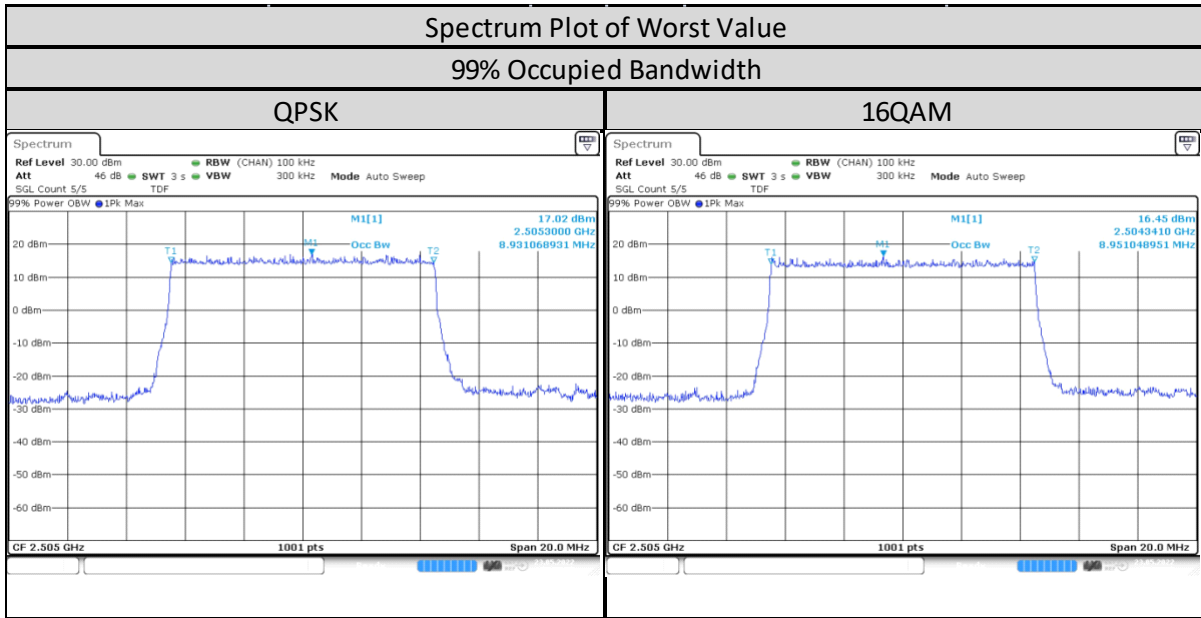
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 7/5MHz/25/0	Low CH 20775	2502.5 MHz	4.476	4.476
	Mid CH 21100	2535 MHz	4.466	4.476
	High CH 21425	2567.5 MHz	4.456	4.466



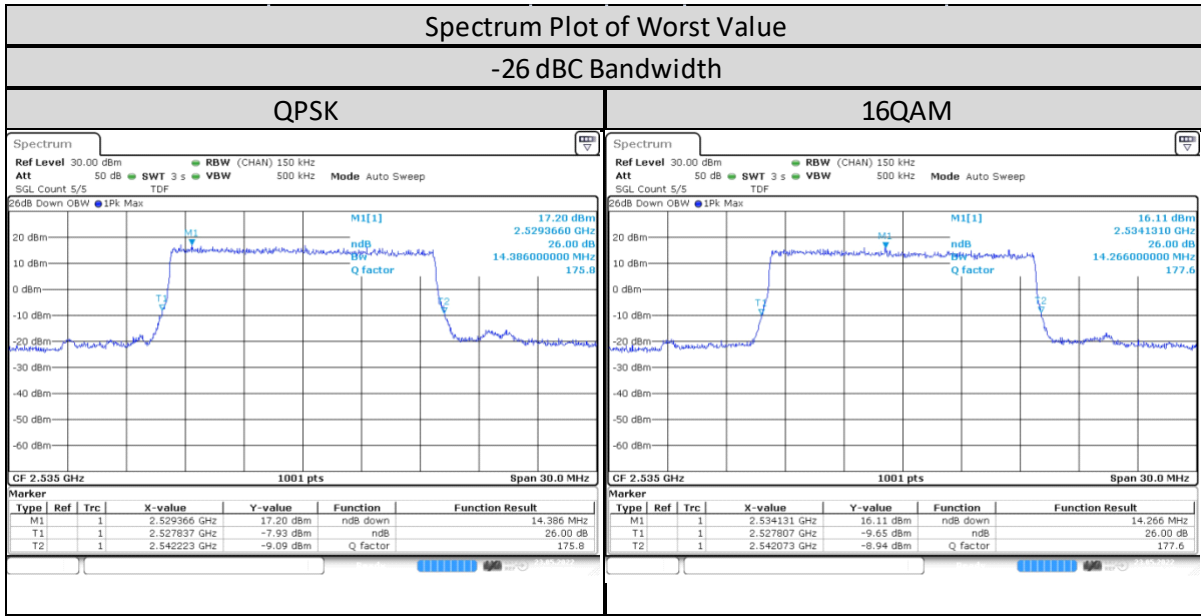
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 7/10MHz/50/0	Low CH 20800	2505 MHz	9.53	9.53
	Mid CH 21100	2535 MHz	9.59	9.57
	High CH 21400	2565 MHz	9.491	9.491



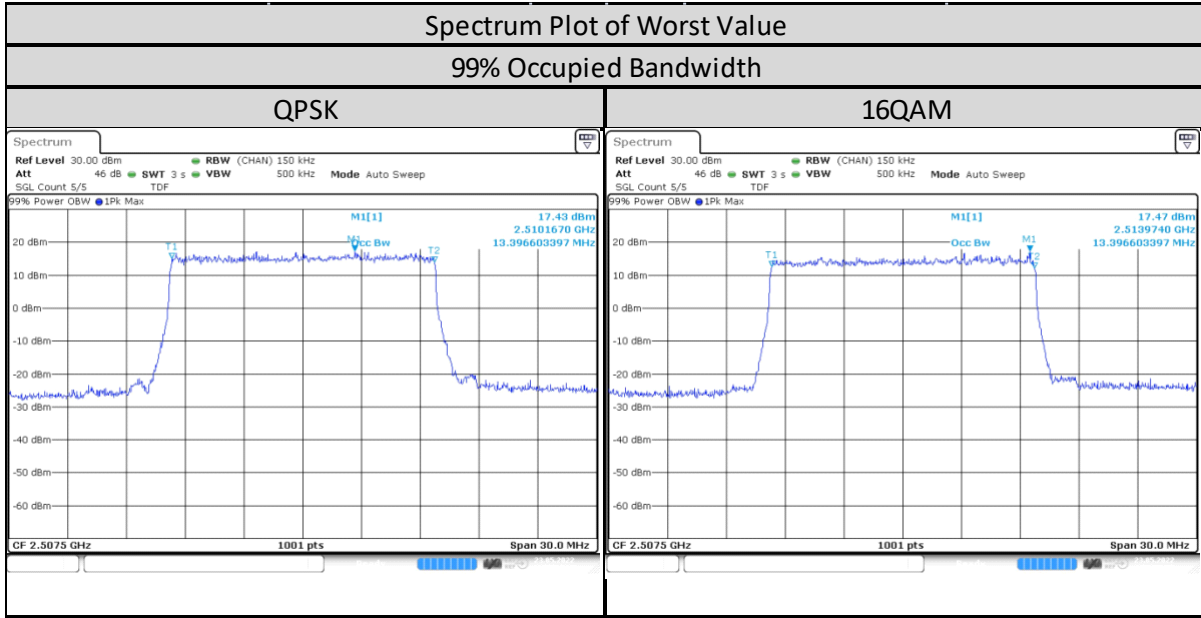
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 7/10MHz/50/0	Low CH 20800	2505 MHz	8.931	8.951
	Mid CH 21100	2535 MHz	8.931	8.931
	High CH 21400	2565 MHz	8.931	8.891



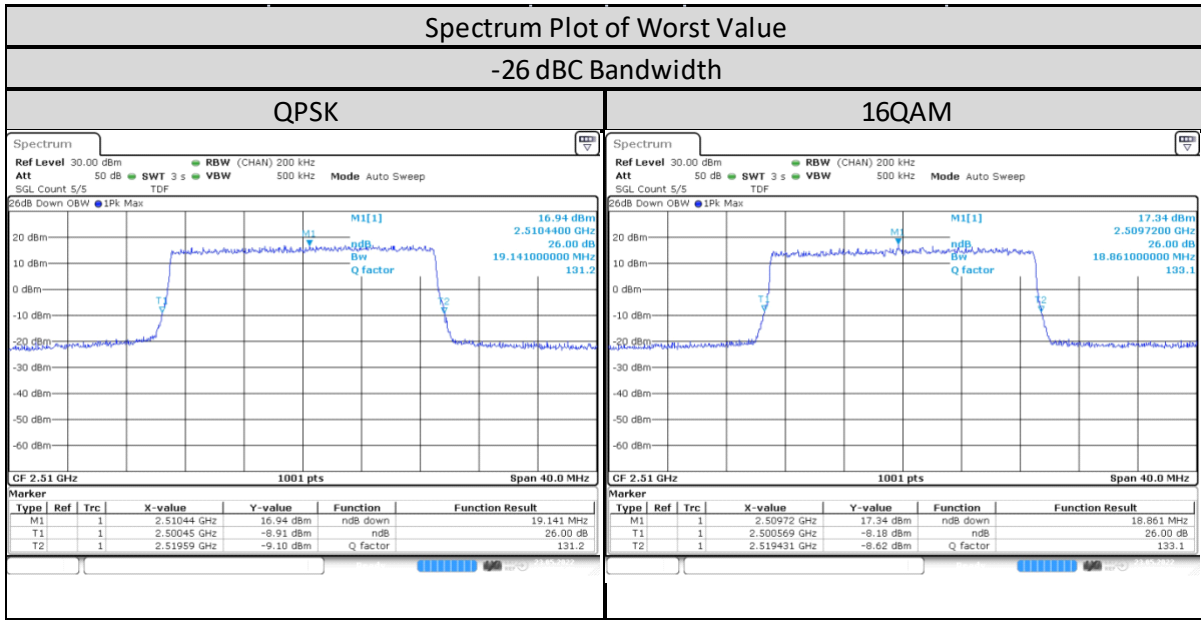
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 7/15MHz/75/0	Low CH 20825	2507.5 MHz	14.296	14.176
	Mid CH 21100	2535 MHz	14.386	14.266
	High CH 21375	2562.5 MHz	14.266	14.176



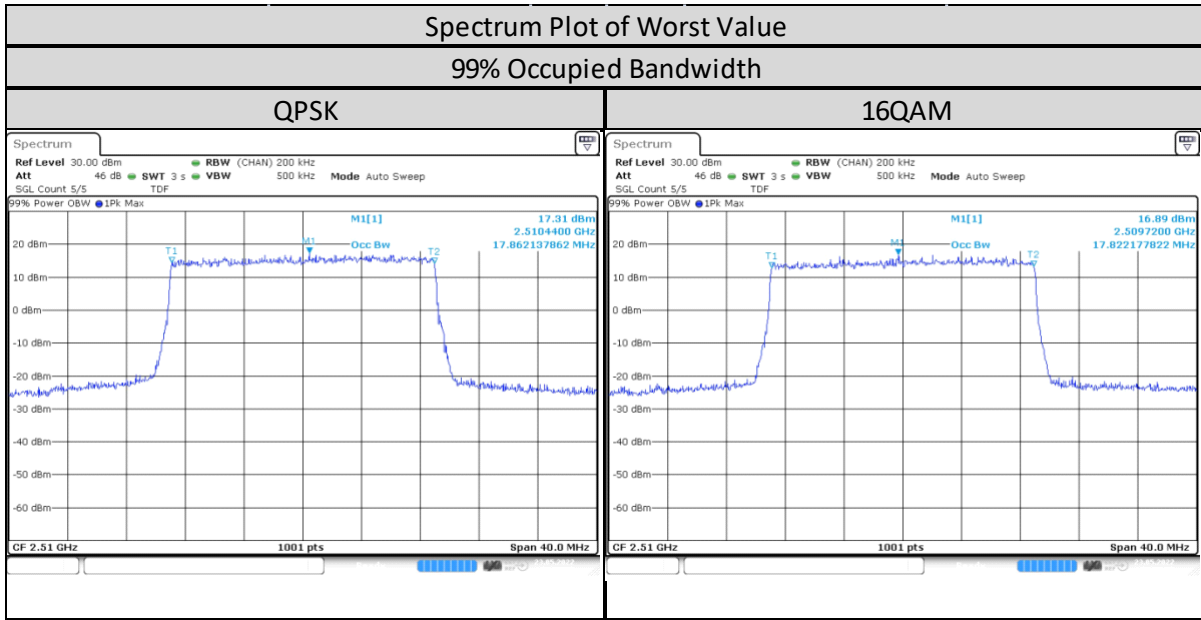
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 7/15MHz/75/0	Low CH 20825	2507.5 MHz	13.397	13.397
	Mid CH 21100	2535 MHz	13.397	13.397
	High CH 21375	2562.5 MHz	13.397	13.367



LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 7/20MHz/100/0	Low CH 20850	2510 MHz	19.141	18.861
	Mid CH 21100	2535 MHz	18.941	18.861
	High CH 21350	2560 MHz	18.941	18.861

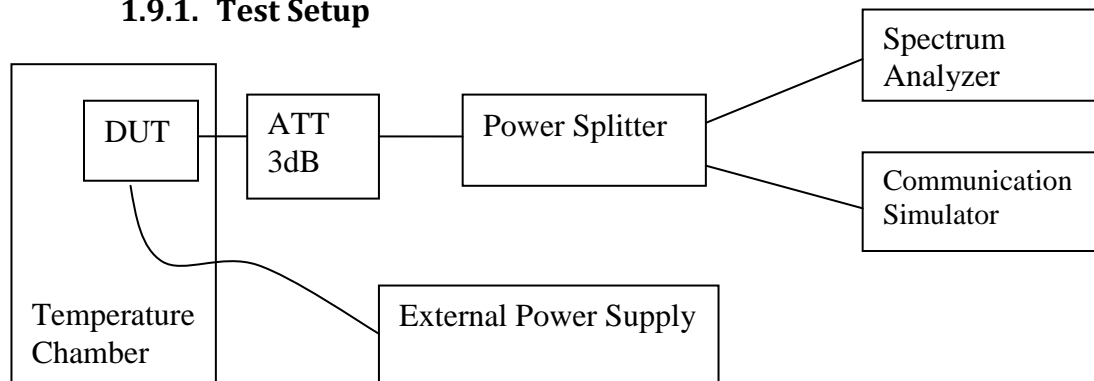


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 7/20MHz/100/0	Low CH 20850	2510 MHz	17.862	17.822
	Mid CH 21100	2535 MHz	17.862	17.822
	High CH 21350	2560 MHz	17.822	17.782



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 7 (2500-2570MHz)

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		2502.5MHz		2567.5MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 7	60	2502.499969	-0.012336	2567.499978	-0.008703
	50	2502.499957	-0.017132	2567.499969	-0.012035
	40	2502.499975	-0.010152	2567.499979	-0.008135
	30	2502.49998	-0.007991	2567.49998	-0.007745
	20	2502.499981	-0.007791	2567.500017	0.006692
	10	2502.499978	-0.00874	2567.50002	0.007772
	0	2502.499978	-0.008809	2567.49998	-0.007611
	-10	2502.49998	-0.007803	2567.500022	0.008608
	-20	2502.499983	-0.006608	2567.499981	-0.007405
	-30	2502.49998	-0.00782	2567.499982	-0.006836

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		2502.5MHz		2567.5MHz	
LTE Band 7		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9V	2502.499977	-0.009175	2567.499983	-0.006647
	7.5V	2502.499977	-0.00902	2567.500026	0.010073
	6V	2502.499977	-0.009209	2567.500022	0.008714

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		2505MHz		2565MHz	
LTE Band 7		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	60	2505.000026	0.010211	2564.999976	-0.00923
	50	2504.999984	-0.006265	2565.000024	0.009169
	40	2505.000016	0.006533	2565.000029	0.011416
	30	2504.999981	-0.007572	2565.000019	0.007406
	20	2504.999975	-0.009782	2565.000023	0.009158
	10	2505.000019	0.007749	2564.999982	-0.006971
	0	2505.000017	0.006818	2565.000019	0.007312
	-10	2505.000022	0.008709	2565.000021	0.008315
	-20	2504.99998	-0.007806	2564.99998	-0.007791
	-30	2504.999979	-0.008537	2564.999979	-0.00817

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		2505MHz		2565MHz	
LTE Band 7		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9V	2504.999981	-0.007738	2564.999985	-0.005967
	7.5V	2504.999985	-0.006162	2564.999976	-0.009353
	6V	2504.999978	-0.008869	2565.000028	0.01097

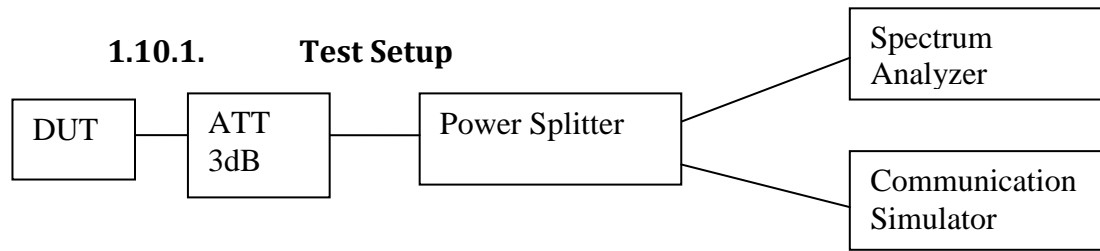
Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 15 MHz			
		Low Channel		High Channel	
		2507.5MHz		2562.5MHz	
LTE Band 7		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	60	2507.500025	0.009773	2562.499979	-0.008385
	50	2507.500027	0.010879	2562.499972	-0.011042
	40	2507.500022	0.008706	2562.499979	-0.008016
	30	2507.500043	0.016978	2562.499978	-0.008742
	20	2507.500022	0.008637	2562.499979	-0.008178
	10	2507.500024	0.009522	2562.499974	-0.010099
	0	2507.500023	0.009276	2562.499975	-0.009881
	-10	2507.500024	0.009721	2562.499979	-0.008061
	-20	2507.500023	0.009077	2562.499978	-0.00848
	-30	2507.500038	0.015204	2562.49998	-0.007877

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 15 MHz			
		Low Channel		High Channel	
		2507.5MHz		2562.5MHz	
LTE Band 7		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9V	2507.500023	0.009042	2562.499977	-0.008915
	7.5V	2507.500022	0.008706	2562.499976	-0.009468
	6V	2507.500031	0.012351	2562.499973	-0.010523

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 20 MHz			
		Low Channel		High Channel	
		2510MHz		2560MHz	
LTE Band 7		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	60	2509.999975	-0.009865	2560.000021	0.008371
	50	2509.999983	-0.00685	2560.000023	0.008902
	40	2510.000018	0.007329	2560.000022	0.008784
	30	2510.000023	0.009102	2560.000028	0.010958
	20	2510.000018	0.007084	2560.000021	0.008058
	10	2509.99998	-0.007791	2560.000033	0.012964
	0	2510.000017	0.006885	2560.00002	0.007655
	-10	2509.999982	-0.007244	2560.000025	0.00979
	-20	2509.999981	-0.007586	2560.000022	0.008728
	-30	2510.000017	0.006702	2560.000025	0.009712

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 20 MHz			
		Low Channel		High Channel	
		2510MHz		2560MHz	
LTE Band 7		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9V	2510.000016	0.0064	2560.000021	0.008203
	7.5V	2509.999982	-0.007175	2560.000025	0.009678
	6V	2510.000024	0.009609	2560.000034	0.013193

1.10. Band Edge Conducted Spurious Emission



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

1.10.3. Band Edge / Emission Mask Conducted Spurious Emission - LTE Band 7 (2500-2570MHz)

