

 MOTOROLA SOLUTIONS	 MS ISO/IEC 17025 TESTING SAMM No. 0825																						
MOTOROLA PENANG ADV. COMM. LABORATORY Motorola Solutions Malaysia Sdn Bhd, Innoplex Plot 2A, Medan Bayan Lepas, Mukim 12 S.W.D, 11900 Bayan Lepas, Penang, Malaysia.	FCC / IC TEST REPORT Report Revision : Rev.B																						
<table><tr><td>Date/s Tested</td><td>: 19-November-2017 - 08-March-2018</td></tr><tr><td>Manufacturer/Location</td><td>: Motorola Solutions – Penang</td></tr><tr><td>Requestor</td><td>: RONI KOZIEL</td></tr><tr><td>Product Type</td><td>: LEX L11 Mission Critical LTE Device</td></tr><tr><td>Model Number</td><td>: LEX L11n</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>IC Registrations</td><td>: 109AK</td></tr></table> The equipment was tested accordance to the requirement listed below: <table><tr><td>(LTE Band 12) FCC 47 CFR Part 2 / 27 ISED RSS GEN Issue 4, November 2014 ISED RSS 130 Issue 1, October 2013</td><td>PASS</td></tr></table>		Date/s Tested	: 19-November-2017 - 08-March-2018	Manufacturer/Location	: Motorola Solutions – Penang	Requestor	: RONI KOZIEL	Product Type	: LEX L11 Mission Critical LTE Device	Model Number	: LEX L11n	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	IC Registrations	: 109AK	(LTE Band 12) FCC 47 CFR Part 2 / 27 ISED RSS GEN Issue 4, November 2014 ISED RSS 130 Issue 1, October 2013	PASS
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Prepared By:  Maheshvaran Rajagopal Technician	Approved By:  Goh Aik Hong Responsible Engineer																						

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REVISION HISTORY

Revision History	Description	Date	Originator
Rev A.	Initial Report	8-March-2018	Maheshvaran Rajagopal
Rev B.	i. Applicant name and address has been added. ii. The battery model number has been revised. iii. AC adapter accessories devices	30-May-2018	Maheshvaran Rajagopal

	information has been added. iv. The Test report number of page format is corrected. v. RSSs version standard have been added to the cover page. vi. Justification statement of accessory devices is included at section 1.5.		
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1.0. Summary of Test Results

FCC Clause	ISED Clause	Test Item	Results	Remarks
2.1046	RSS-Gen 6.12 RSS-130 4.1	Conducted RF Output Power	Pass	Meet the requirement of limit
-	RSS 130 4.4	Peak-to-Average Power Ratio	Pass	Meet the requirement of limit
2.1049	RSS-Gen 6.6	Occupied Bandwidth (26dBc, 99%)	Pass	Meet the requirement of limit
2.1055 27.54	RSS-130 4.3	Frequency Stability	Pass	Meet the requirement of limit
2.1051 27.53(g)	RSS-Gen 6.13 RSS-130 4.6	Band Edge Conducted Spurious Emission	Pass	Meet the requirement of limit
2.1051 27.53(g)	RSS-Gen 6.13 RSS-130 4.6	Conducted Spurious Emissions	Pass	Meet the requirement of limit
2.1053 27.53(g)	RSS-130 4.6	Radiated Spurious Emission	Pass	Meet the requirement of limit
2.1049 27.50(c)(9)(10)	RSS-130 4.4	Effective Radiated Power (ERP)	Pass	Meet the requirement of limit

1.1. Measurement Uncertainty

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

1.2. Equipment List

Description	Model	Serial Number	Calibration Date	Calibration Due Date
Broadband ATE 1				
Wideband Radio Communication Tester	CMW500	154550	14-Feb-17	14-Feb-19
Signal Analyzer	FSV40	101431	13-Jul-17	12-Jul-19
Chamber	SH-641	92002651	6-Mar-17	6-Mar-18
Power Supply	6621A	US37370810	5-Jun-17	5-Jun-18
Radiated Emission				
DRG HORN FREQ.	SAS-571	719	18-Jul-17	18-Jul-19
DRG HORN FREQ.	SAS-571	720	2-Mar-17	2-Mar-19
POWER SUPPLY	6032A	2615A01178	6-Jun-17	6-Jun-18

MICROWAVE SIGNAL GENERATOR	SMP04	100127	19-Jul-17	18-Jul-18
EMI TEST RECEIVER	ESIB26	100336	13-Jul-17	12-Jul-18
SIGNAL ANALYZER	FSV40	101103	18-Jul-17	17-Jul-18
5m Semi-anechoic Chamber	S800-HX	J2308	Not Required	Not Required
BILOG ANTENNA	CBL6112D	30991	10-Apr-17	10-Apr-18
BILOG ANTENNA	CBL6112D	25224	22-Jul-17	22-Jul-18
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170143	20-Mar-17	10-Apr-18
DATA LOGGER	SDL500	A.016776	18-Mar-17	18-Mar-18
LOOP ANTENNA	6502	208416	27-Jul-17	27-Jul-18
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
18 - 40GHz PREAMPLIFIER	BBV9721	9721-007	Not Required	Not Required
PREAMPLIFIER	PAM-0118P	361	Not Required	Not Required
Wideband Radio Communication Tester	CMW500	153174	9-Jan-17	9-Jan-19

1.3. General Information

General Description of EUT

Product	LEX L11 Mission Critical LTE Device		
Brand	Motorola Solutions		
Test Model	LEX L11n		
Power Supply Rating	3.7Vdc (Battery), 5Vdc (Adapter)		
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. ERP Power	LTE Band 12 QPSK	Channel Bandwidth 1.4MHz	22.353dBm (0.172W)
		Channel Bandwidth 3MHz	22.411dBm (0.174W)
		Channel Bandwidth 5MHz	22.375dBm (0.173W)
		Channel Bandwidth 10MHz	22.414dBm (0.174W)
	LTE Band 12 16QAM	Channel Bandwidth 1.4MHz	21.557dBm (0.143W)
		Channel Bandwidth 3MHz	21.579dBm (0.144W)
		Channel Bandwidth 5MHz	21.543dBm (0.143W)
		Channel Bandwidth 10MHz	21.538dBm (0.143W)
Antenna Type	LTE Band 12	Monopole with 0.78dBi gain	
SW Version	L11_D01.00.28		
HW Version	P3a		

Note:

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

Item	Brand	Model or P/N	Specification
Rechargeable Lithium ion battery	Motorola Solutions	PMNN4545A	2500mAh 3.7V LI-ION STD
Rechargeable Lithium ion battery	Motorola Solutions	PMNN4546A	5000mAh 3.7V LI-ION HICAP
Charger Vehicular Adapter VPA	Motorola Solutions	PMLN7779A	18W
Power Supply Adaptor, Power supply Wall cube, AC, DC (USB type A-C)	Motorola Solutions	PS000150A31 - US/JPN plug	7.5W, 100V-240V
Power Supply Adaptor (USB type C-C)	Motorola Solutions	PS000278A01 - US/JPN plug	27W
Detachable Power/Data Cable USB-A to USB-C	Motorola Solutions	CB000756A01	-
Detachable Power/Data Cable USB-C to USB-C	Motorola Solutions	CB000754A01	-

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 C63.26-2015

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

The Radiated Emission and Equivalent Isotropically Radiated Power (EIRP) worst case was found when positioned on Z-Plane for LTE Band 12.

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/ Effective Radiated Power (ERP)	23017 ~ 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	As per table 1.6.2 & 1.6.4
	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	1 RB / 3 RB Offset
	23025 ~ 23165	23025, 23095, 23165	3 MHz		1 RB / 7 RB Offset
	23035 ~ 23155	23035, 23095, 23155	5 MHz		1 RB / 13 RB Offset
	23060 ~ 23130	23060, 23095, 23130	10 MHz		1 RB / 0 RB Offset
Radiated Spurious Emission	23017 ~ 23173	23017, 23095, 23173	1.4 MHz	QPSK	1 RB / 3 RB Offset
	23025 ~ 23165	23025, 23095, 23165	3 MHz		1 RB / 7 RB Offset
	23035 ~ 23155	23035, 23095, 23155	5 MHz		1 RB / 13 RB Offset
	23060 ~ 23130	23060, 23095, 23130	10 MHz		1 RB / 0 RB Offset

NOTE:

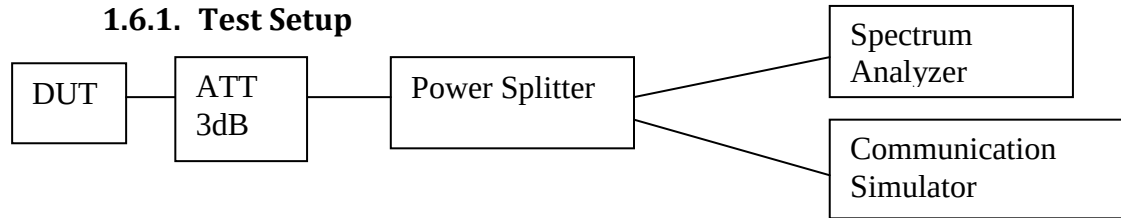
1. The Conducted RF Output Power for QPSK and 16QAM, measured value of QPSK is higher than 16QAM mode. Therefore, only Conducted Spurious Emission and Radiated Emission had been tested under QPSK modes.
2. Band Edge was performed with 1 and full Resource Block at the lowest and highest operating frequency 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/ Effective Radiated Power	25°C, 50% RH	3.7V DC	Maheshvaran
Peak-to-Average Power Ratio	25°C, 50% RH	3.7V DC	Maheshvaran
Occupied Bandwidth	25°C, 50% RH	3.7V DC	Maheshvaran
Frequency Stability	25°C, 50% RH	3.7V DC	Maheshvaran
Band Edge Conducted Spurious Emission	25°C, 50% RH	3.7V DC	Maheshvaran
Conducted Spurious Emission	25°C, 50% RH	3.7V DC	Maheshvaran
Radiated Spurious Emission	25°C, 63.7% RH	3.7V DC	Nazrin/Qawiman

1.6. Conducted RF Output Power

1.6.1. Test Setup



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

1.6.2. 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 (698-716MHz)

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	23.573	23.64	23.588	22.531	22.882	22.583
	1	3	23.637	23.712	23.634	22.583	22.927	22.621
	1	5	23.576	23.676	23.557	22.538	22.854	22.539
	3	0	23.574	23.685	23.53	22.695	22.806	22.496
	3	2	23.611	23.723	23.589	22.757	22.865	22.562
	3	3	23.576	23.657	23.523	22.712	22.827	22.51
	6	0	22.553	22.644	22.591	21.582	21.644	21.536

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	23.681	23.612	23.687	22.641	22.949	22.71
	1	7	23.781	23.704	23.733	22.684	22.83	22.765
	1	14	23.66	23.6	23.578	22.562	22.904	22.573
	8	0	22.644	22.723	22.637	21.655	21.85	21.594

	8	4	22.658	22.7	22.667	21.681	21.857	21.622
	8	7	22.657	22.664	22.645	21.622	21.836	21.588
	15	0	22.63	22.697	22.617	21.626	21.745	21.598

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	23.696	23.709	23.634	22.847	22.697	22.714
	1	13	23.707	23.745	23.732	22.88	22.682	22.809
	1	25	23.695	23.612	23.641	22.913	22.574	22.719
	12	0	22.633	22.729	22.71	21.638	21.73	21.636
	12	6	22.675	22.761	22.698	21.648	21.714	21.636
	12	13	22.63	22.719	22.654	21.613	21.676	21.578
	25	0	22.619	22.696	22.67	21.665	21.682	21.635

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	23.648	23.678	23.784	22.81	22.714	22.705
	1	25	23.675	23.665	23.668	22.84	22.718	22.568
	1	49	23.581	23.567	23.65	22.908	22.653	22.556
	25	0	22.722	22.763	22.69	21.744	21.807	21.713
	25	13	22.822	22.713	22.662	21.826	21.795	21.693
	25	25	22.749	22.646	22.651	21.775	21.732	21.716
	50	0	22.808	22.726	22.653	21.792	21.687	21.676

1.6.4. Effective Radiated Power – LTE Band 12 (698-716MHz)

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	22.203	22.27	22.218	21.161	21.512	21.213
	1	3	22.267	22.342	22.264	21.213	21.557	21.251
	1	5	22.206	22.306	22.187	21.168	21.484	21.169
	3	0	22.204	22.315	22.16	21.325	21.436	21.126
	3	2	22.241	22.353	22.219	21.387	21.495	21.192
	3	3	22.206	22.287	22.153	21.342	21.457	21.14
	6	0	21.183	21.274	21.221	20.212	20.274	20.166

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	22.311	22.242	22.317	21.271	21.579	21.34
	1	7	22.411	22.334	22.363	21.314	21.46	21.395
	1	14	22.29	22.23	22.208	21.192	21.534	21.203
	8	0	21.274	21.353	21.267	20.285	20.48	20.224
	8	4	21.288	21.33	21.297	20.311	20.487	20.252
	8	7	21.287	21.294	21.275	20.252	20.466	20.218
	15	0	21.26	21.327	21.247	20.256	20.375	20.228

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	22.326	22.339	22.264	21.477	21.327	21.344
	1	13	22.337	22.375	22.362	21.51	21.312	21.439
	1	25	22.325	22.242	22.271	21.543	21.204	21.349
	12	0	21.263	21.359	21.34	20.268	20.36	20.266
	12	6	21.305	21.391	21.328	20.278	20.344	20.266

	12	13	21.26	21.349	21.284	20.243	20.306	20.208
	25	0	21.249	21.326	21.3	20.295	20.312	20.265

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	22.278	22.308	22.414	21.44	21.344	21.335
	1	25	22.305	22.295	22.298	21.47	21.348	21.198
	1	49	22.211	22.197	22.28	21.538	21.283	21.186
	25	0	21.352	21.393	21.32	20.374	20.437	20.343
	25	13	21.452	21.343	21.292	20.456	20.425	20.323
	25	25	21.379	21.276	21.281	20.405	20.362	20.346
	50	0	21.438	21.356	21.283	20.422	20.317	20.306

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

$$\mathbf{EIRP} = \mathbf{P_{Meas}} + \mathbf{G_T}$$

$$\mathbf{ERP} = \mathbf{EIRP} - 2.15$$

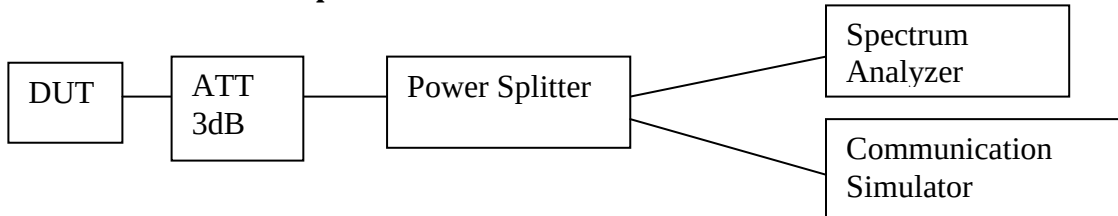
Where, ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively
 (Expressed in the same units as P_{Meas}, e.g., dBm)

P_{Meas} measured transmitter output power, in dBm

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

1.7. Peak-to-Average Power Ratio

1.7.1. Test Setup



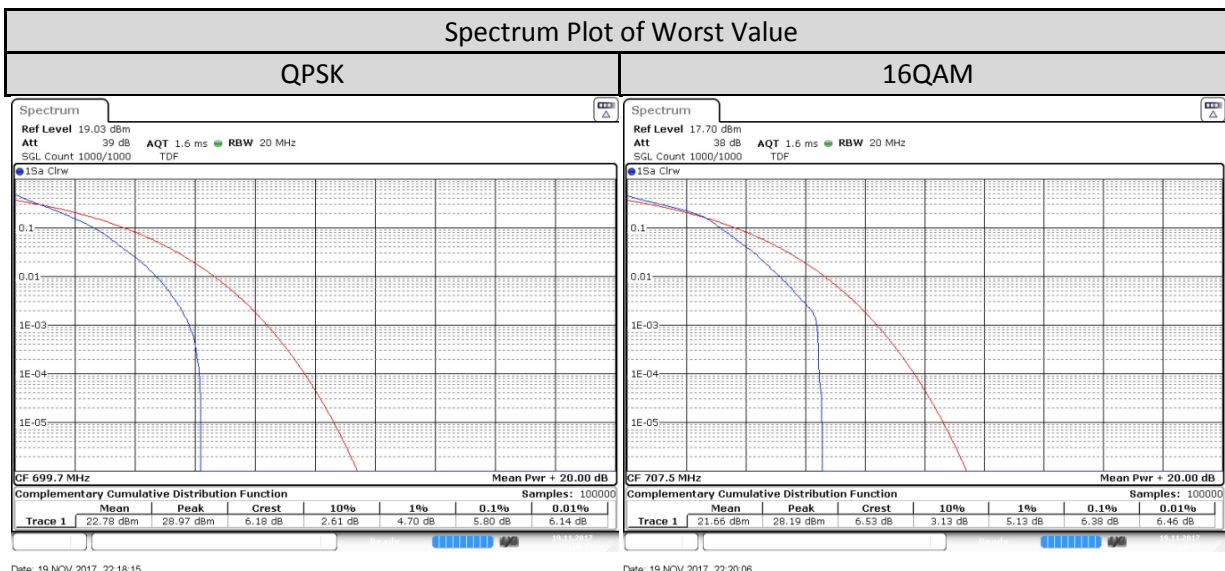
1. The DUT transmitter output port was connected to communication simulator with above setup.
2. Path loss for the measurement included.
3. Set DUT to transmit maximum power through communication simulator
4. Set the CCDF (Complementary Cumulative Distribution Function) option in the spectrum analyzer.
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 (698-716MHz)

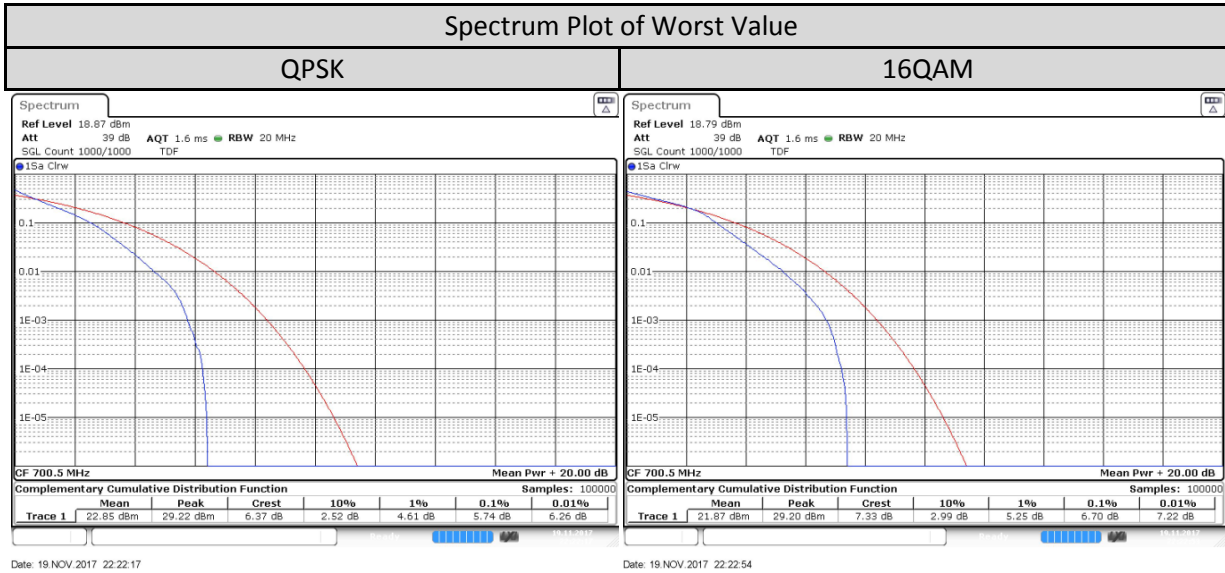
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 12/1.4MHz/6/0	Low CH 23017	699.7 MHz	5.797	6.116
	Mid CH 23095	707.5 MHz	5.333	6.377
	High CH 23173	715.3 MHz	4.841	6



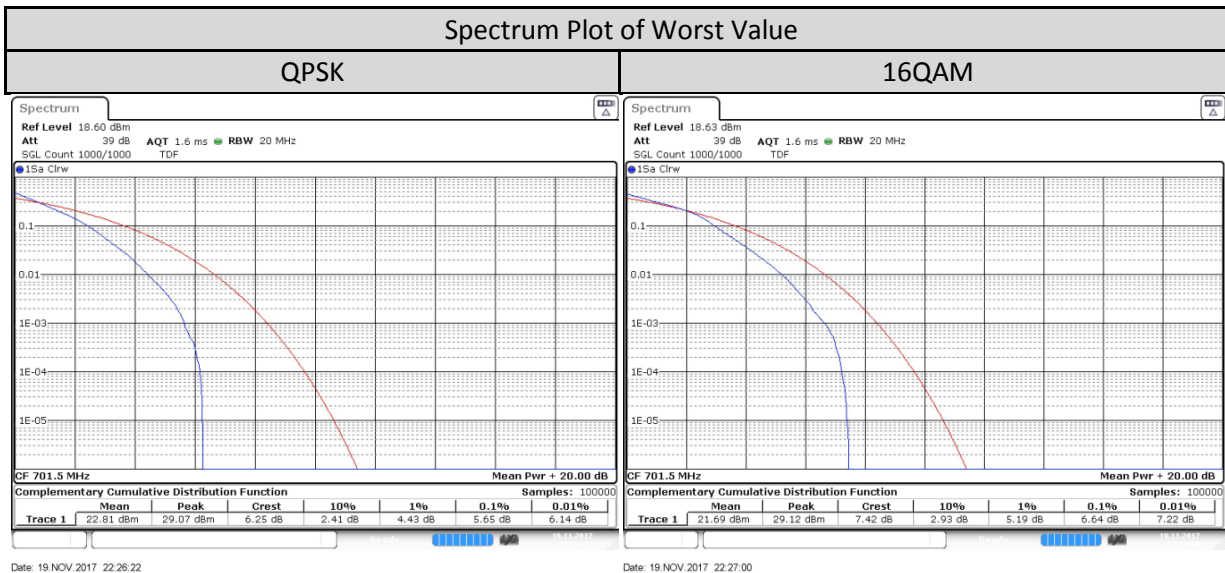
Date: 19 NOV 2017 22:18:15

Date: 19 NOV 2017 22:20:06

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	5.739	6.696
	Mid CH 23095	707.5 MHz	5.42	6.406
	High CH 23165	714.5 MHz	5.101	6.261

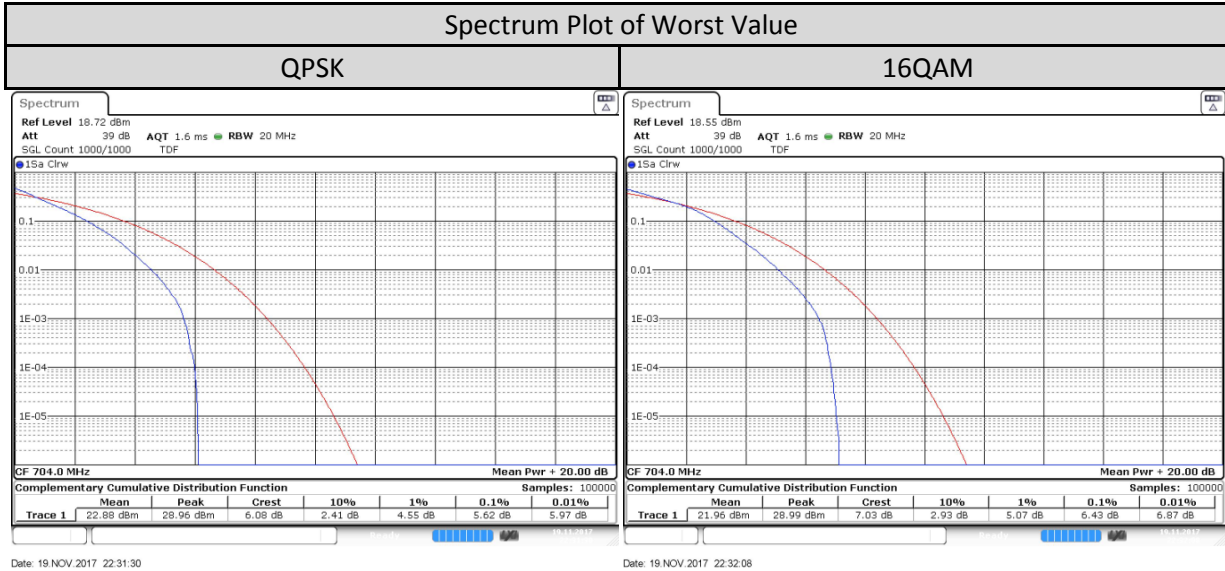


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 12/5MHz/25/0	Low CH 23035	701.5 MHz	5.652	6.638
	Mid CH 23095	707.5 MHz	5.594	6.377
	High CH 23155	713.5 MHz	5.565	6.464



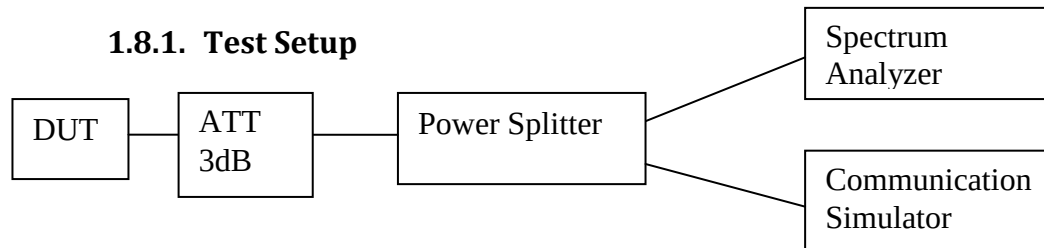
LTE Band/BW/RB	Channel Number	Tx	Peak To Average (dB)
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Size/RB Offset		Frequency	QPSK Modulation	16QAM Modulation
Band 12/10MHz/50/0	Low CH 23060	704 MHz	5.623	6.435
	Mid CH 23095	707.5 MHz	5.507	6.435
	High CH 23130	711 MHz	5.246	6.261



1.8. Occupied Bandwidth

1.8.1. Test Setup



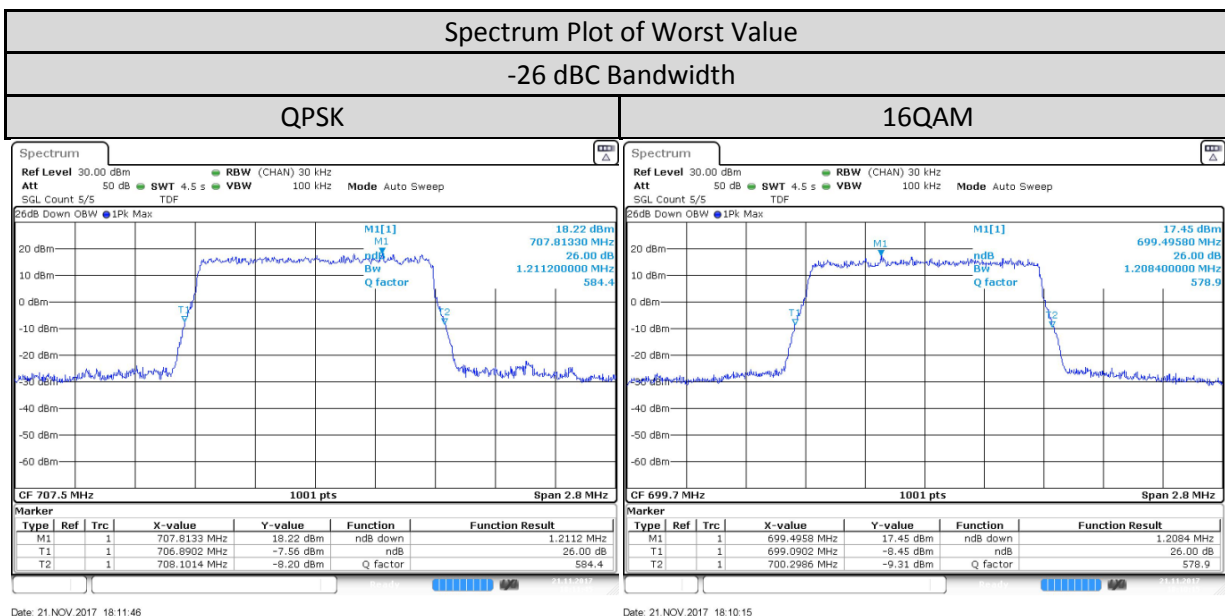
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) For LTE measurement, set DUT to transmit maximum power & full RB size through communication simulator.
- 4) For LTE measurement, set DUT to transmit maximum 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 2.1049 and RSS Gen 6.6.

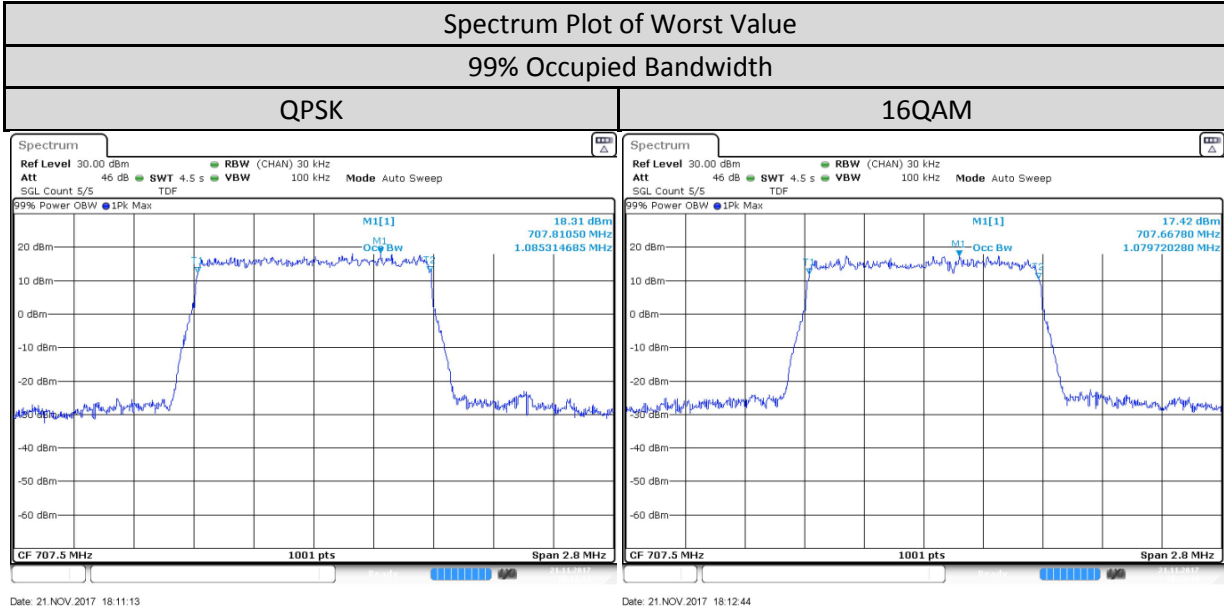
1.8.3. Occupied Bandwidth - LTE Band 12 (698-716MHz)

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	1.208	1.208
	Mid CH 23095	707.5 MHz	1.211	1.208
	High CH 23173	715.3 MHz	1.211	1.197

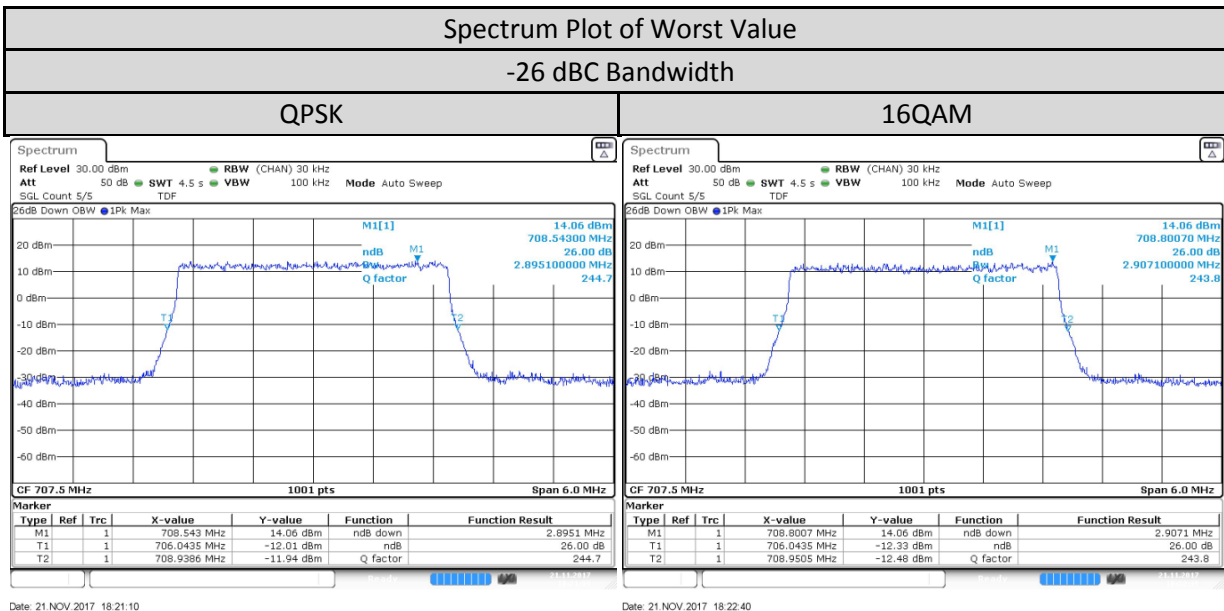


LTE Band/BW/RB	Channel Number	Tx	99% Occupied Bandwidth (MHz)
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Size/RB Offset		Frequency	QPSK Modulation	16QAM Modulation
Band 12/1.4MHz/6/0	Low CH 23017	699.7 MHz	1.077	1.077
	Mid CH 23095	707.5 MHz	1.085	1.08
	High CH 23173	715.3 MHz	1.085	1.077

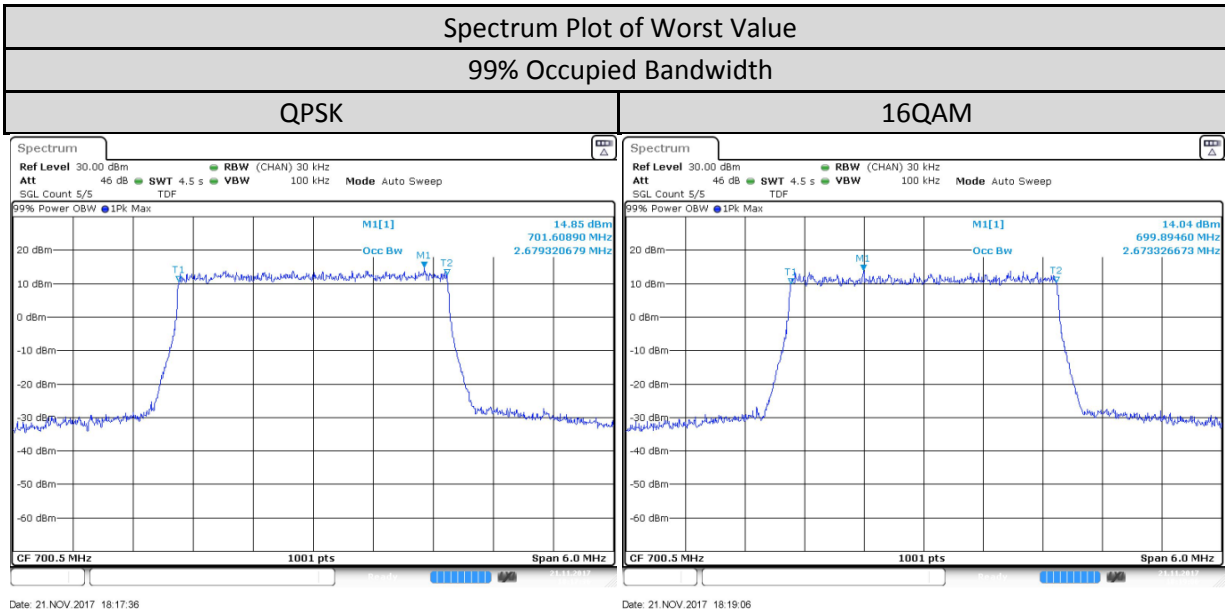


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/3MHz/15/0	Low CH 23025	700.5 MHz	2.883	2.883
	Mid CH 23095	707.5 MHz	2.895	2.907
	High CH 23165	714.5 MHz	2.889	2.895

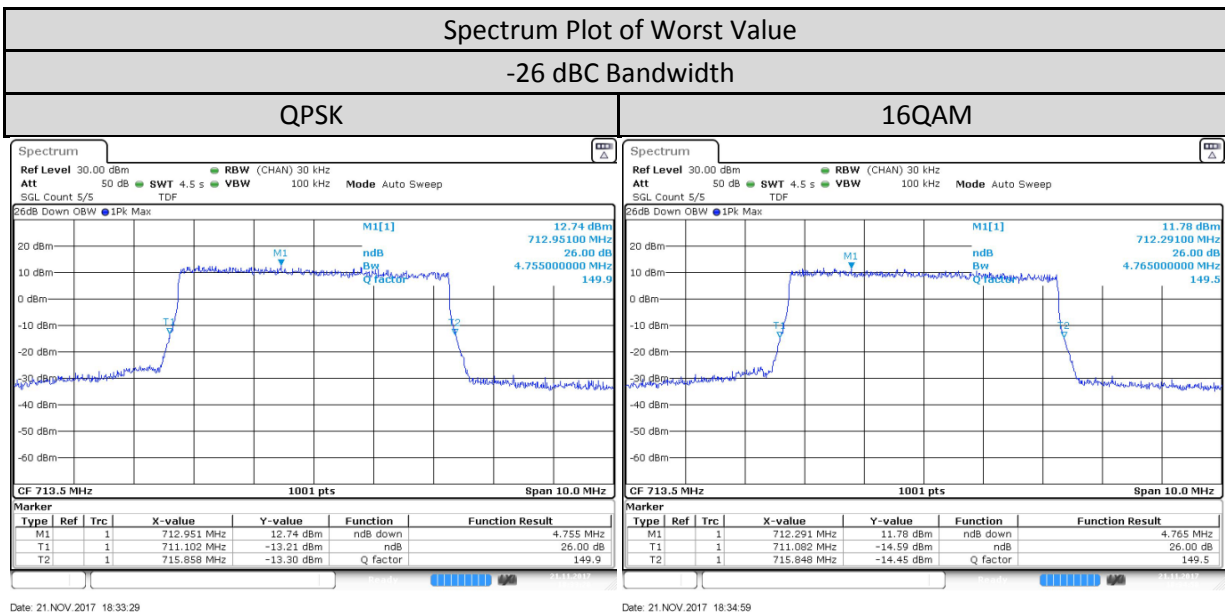


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation

Band 12/3MHz/15/0	Low CH 23025	700.5 MHz	2.679	2.673
	Mid CH 23095	707.5 MHz	2.679	2.673
	High CH 23165	714.5 MHz	2.679	2.673

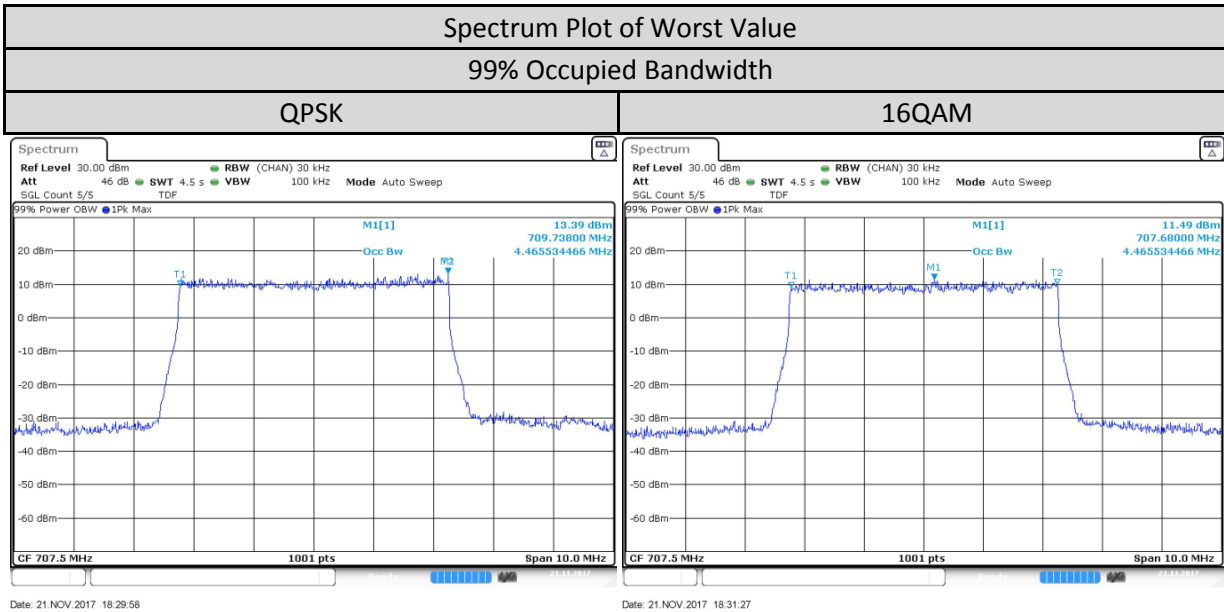


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/5MHz/25/0	Low CH 23035	701.5 MHz	4.735	4.715
	Mid CH 23095	707.5 MHz	4.735	4.745
	High CH 23155	713.5 MHz	4.755	4.765

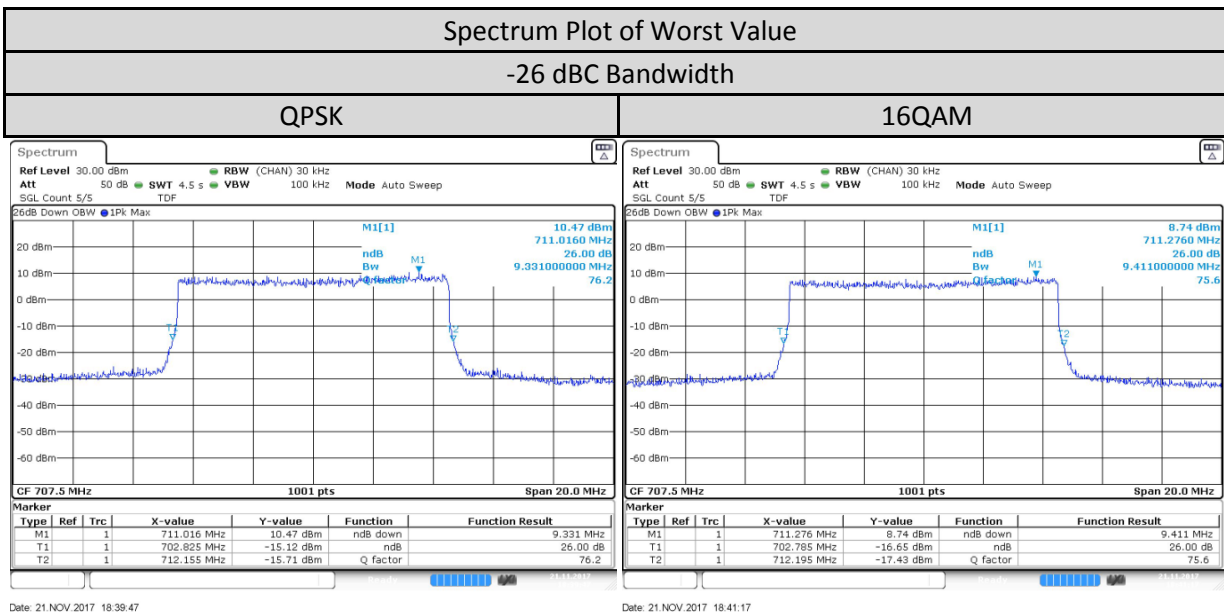


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band	Low CH 23035	701.5 MHz	4.446	4.456

12/5MHz/25/0	Mid CH 23095	707.5 MHz	4.466	4.466
	High CH 23155	713.5 MHz	4.466	4.466



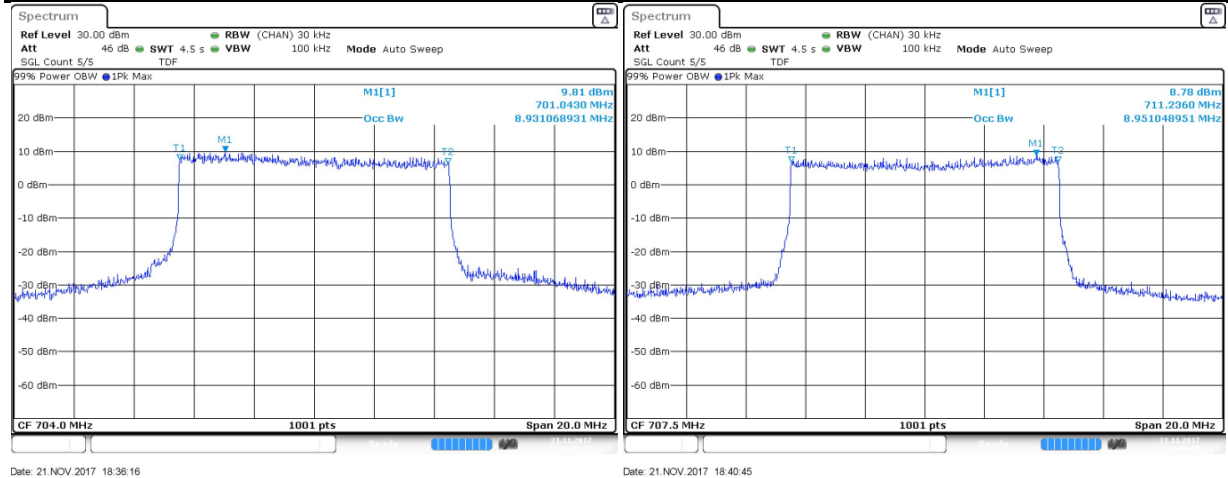
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 12/10MHz/50/0	Low CH 23060	704 MHz	9.311	9.311
	Mid CH 23095	707.5 MHz	9.331	9.411
	High CH 23130	711 MHz	9.251	9.271



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	8.931	8.931
	Mid CH 23095	707.5 MHz	8.931	8.951

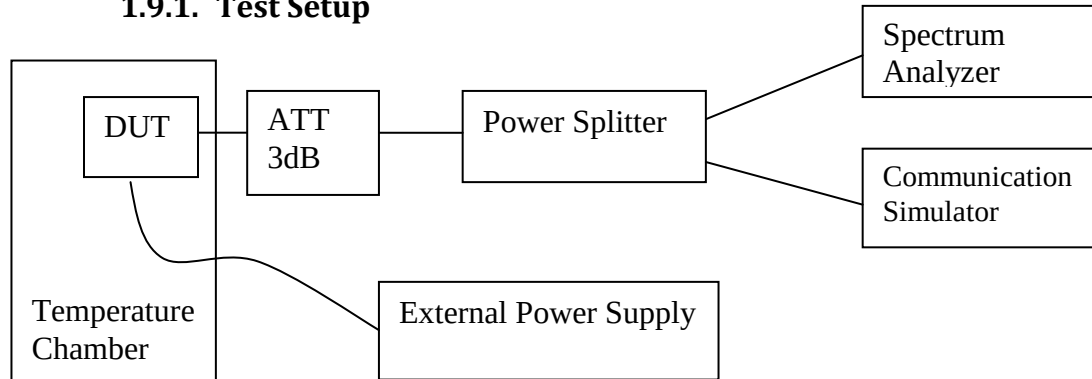
	High CH 23130	711 MHz	8.911	8.911
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Spectrum Plot of Worst Value	
99% Occupied Bandwidth	
QPSK	16QAM



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

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

1.9.3. Frequency Stability – LTE Band 12 (698-716MHz)

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	50	699.699996	-0.005847	715.299991	-0.012619
	40	699.699991	-0.012614	715.299991	-0.012839
	30	699.69999	-0.014516	715.300011	0.015639
	20	699.699991	-0.012185	715.300008	0.011359
	10	699.699983	-0.02392	715.299993	-0.009319
	0	699.699993	-0.010079	715.299992	-0.011139
	-10	699.699986	-0.020547	715.299993	-0.009379
	-20	699.700014	0.019872	715.299996	-0.0055
	-30	699.699992	-0.01102	715.300008	0.011419
Band	Voltage	Frequency Error VS Voltage			

	(V)	Channel Bandwidth: 1.4 MHz			
		Low Channel		High Channel	
		699.7MHz		715.3MHz	
LTE Band 12		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	4.35	699.699993	-0.010631	715.299996	-0.00608
	3.7	699.699991	-0.012533	715.299992	-0.010679
	3.2	699.700008	0.011347	715.300003	0.0047

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 3 MHz			
		Low Channel		High Channel	
		700.5MHz		714.5MHz	
LTE Band 12		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	50	700.500003	0.004942	714.50001	0.014355
	40	700.499992	-0.010905	714.500012	0.016257
	30	700.500006	0.009087	714.500012	0.017078
	20	700.500011	0.015765	714.500011	0.014856
	10	700.500009	0.013172	714.500013	0.01876
	0	700.50001	0.014969	714.500011	0.015176
	-10	700.50001	0.014213	714.500012	0.017238
	-20	700.50001	0.014724	714.500012	0.016177
	-30	700.50001	0.013621	714.500011	0.015496

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 3 MHz			
		Low Channel		High Channel	
		700.5MHz		714.5MHz	
LTE Band 12		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	4.35	700.50001	0.01405	714.500012	0.017478
	3.7	700.500009	0.012396	714.500011	0.015877
	3.2	700.50001	0.014765	714.500013	0.017599

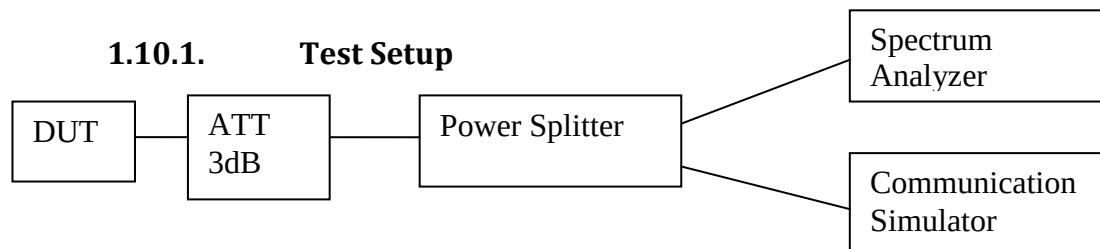
Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		701.5MHz		713.5MHz	
LTE Band 12		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	50	701.499999	-0.014866	713.499994	-0.008381
	40	701.499988	-0.016558	713.499992	-0.011588
	30	701.499989	-0.015253	713.499988	-0.01618
	20	701.499999	-0.014193	713.499993	-0.010245
	10	701.499992	-0.011991	713.499999	-0.013794
	0	701.499992	-0.011991	713.499994	-0.009102
	-10	701.499992	-0.010706	713.499993	-0.010265
	-20	701.499992	-0.010767	713.499999	-0.013633
	-30	701.499999	-0.014009	713.499991	-0.01203

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		701.5MHz		713.5MHz	
LTE Band 12		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	4.35	701.499995	-0.006729	713.500007	0.010085
	3.7	701.499993	-0.00987	713.499993	-0.009323
	3.2	701.499996	-0.006322	713.499992	-0.010646

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		704MHz		711MHz	
LTE Band 12		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	50	704.000009	0.013289	711.000006	0.008551
	40	704.000011	0.01524	710.999994	-0.008732
	30	704.000011	0.015707	710.999993	-0.009215
	20	704.000013	0.018166	711.000008	0.011468
	10	704.000011	0.015402	711.000008	0.011207
	0	704.000011	0.015849	711.000008	0.010845
	-10	704.000009	0.012517	710.999995	-0.007022
	-20	704.000012	0.016804	711.000009	0.012474
	-30	704.000011	0.015585	711.000008	0.01175

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		704MHz		711MHz	
LTE Band 12		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	4.35	704.000012	0.016398	711.000006	0.009094
	3.7	704.000011	0.01522	711.000006	0.008551
	3.2	704.000011	0.016276	711.000007	0.010402

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 30kHz 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 (698-716MHz)

