

	 MS ISO/IEC 17025 TESTING SMM 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 / ISED TEST REPORT Report Revision : Rev.A																										
<table><tr><td>Date/s Tested</td><td>: 27-Dec-2018 - 23-Jan-2019</td></tr><tr><td>Manufacturer/Location</td><td>: Motorola Solutions - Schaumburg</td></tr><tr><td>Requestor</td><td>: HOPKINS, SEAN</td></tr><tr><td>Product Type</td><td>: Hand-held</td></tr><tr><td>Product Version (PMN)</td><td>: P1B</td></tr><tr><td>Model Number (HVIN)</td><td>: H55TGT9PW8AN</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>: 109AK</td></tr><tr><td>Firmware Version (FVIN)</td><td>: D00.00.31</td></tr></table> The equipment was tested accordance to the requirement listed below: <table><tr><td>(LTE Band 4) FCC 47 CFR Part 2 / 27 ISED RSS GEN Issue 5, April 2018 ISED RSS 139 Issue 3, July 2015</td><td>PASS</td></tr></table> 		Date/s Tested	: 27-Dec-2018 - 23-Jan-2019	Manufacturer/Location	: Motorola Solutions - Schaumburg	Requestor	: HOPKINS, SEAN	Product Type	: Hand-held	Product Version (PMN)	: P1B	Model Number (HVIN)	: H55TGT9PW8AN	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	: 109AK	Firmware Version (FVIN)	: D00.00.31	(LTE Band 4) FCC 47 CFR Part 2 / 27 ISED RSS GEN Issue 5, April 2018 ISED RSS 139 Issue 3, July 2015	PASS
Date/s Tested	: 27-Dec-2018 - 23-Jan-2019																										
Manufacturer/Location	: Motorola Solutions - Schaumburg																										
Requestor	: HOPKINS, SEAN																										
Product Type	: Hand-held																										
Product Version (PMN)	: P1B																										
Model Number (HVIN)	: H55TGT9PW8AN																										
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	: 109AK																										
Firmware Version (FVIN)	: D00.00.31																										
(LTE Band 4) FCC 47 CFR Part 2 / 27 ISED RSS GEN Issue 5, April 2018 ISED RSS 139 Issue 3, July 2015	PASS																										
This report shall not be reproduced without written approval from an officially designated representative of the Motorola Penang Adv. Comm. Laboratory. The results and statements contained in this report pertain only to the device(s) evaluated.																											
Prepared By:  Maheshvaran Rajagopal Technician	Approved By:  Goh Aik Hong Responsible Engineer																										

Table of Contents

1.0.	Summary of Test Results	3
1.1.	Measurement Uncertainty	3
1.2.	Equipment List.....	3
1.3.	General Information.....	4
1.4.	Channel number and frequency info.....	5
1.5.	Test Mode Applicability and Tested Channel Detail.....	6
1.6.	Conducted RF Output Power	8
1.6.1.	Test Setup.....	8
1.6.2.	Limits	8
1.6.3.	Conducted RF Output Power – LTE Band 4(1710-1755MHz)	8
1.7.	Peak-to-Average Power Ratio.....	11
1.7.1.	Test Setup.....	11
1.7.2.	Test Limit	11
1.7.3.	Peak-to-Average Power Ratio – LTE Band 4 (1710-1755MHz).....	11
1.8.	Occupied Bandwidth.....	15
1.8.1.	Test Setup.....	15
1.8.2.	Test Limit	15
1.8.3.	Occupied Bandwidth – LTE Band 4 (1710-1755MHz).....	15
1.9.	Frequency Stability	22
1.9.1.	Test Setup.....	22
1.9.2.	Test Limit	22
1.9.3.	Frequency Stability – LTE Band 4 (1710-1755MHz)	22
1.10.	Band Edge Conducted Spurious Emission	27
1.10.1.	Test Setup	27
1.10.2.	Test Limit	27
1.10.3.	Band Edge Conducted Spurious Emission – LTE Band 4 (1710-1755MHz)	27
1.11.	Conducted Spurious Emission	36
1.11.1.	Test Setup	36
1.11.2.	Test Limit	36
1.11.3.	Conducted Spurious Emissions – LTE Band 4 (1710-1755MHz)	36
1.12.	Radiated Spurious Emission	54
1.12.1.	Test Setup	54
1.12.2.	Radiated Spurious Emission – LTE Band 4 (1710-1755MHz).....	54
1.13.	Equivalent Isotropically Radiated Power (EIRP)	55
1.13.1.	Test Setup	55
1.13.2.	Test Limit	55
1.13.3.	Equivalent Isotropically Radiated Power (EIRP) - LTE Band 4 (1710-1755MHz).....	55

REVISION HISTORY

Revision History	Description	Date	Originator
Rev A.	Initial Report	26-Feb-2019	Maheshvaran Rajagopal

1.0. Summary of Test Results

FCC Clause	ISED Clause	Test Item	Results	Remarks	Serial Number Tested
2.1046 27.50(d)(6)	RSS-Gen 6.12 RSS-139 4.1	Conducted RF Output Power	Pass	Meet the requirement of limit.	437P1B0011
27.50(d)(5)	RSS-139 6.5	Peak-to-Average Power Ratio	Pass	Meet the requirement of limit.	437P1B0011
2.1049 27.53(h)(3)	RSS-Gen 6.7	Occupied Bandwidth (26dBc, 99%)	Pass	Meet the requirement of limit.	437P1B0011
2.1055 27.54	RSS-139 6.4	Frequency Stability	Pass	Meet the requirement of limit.	437P1B0011
2.1051 27.53(h)(1)(3)	RSS-Gen 6.13 RSS-139 6.6	Band Edge Conducted Spurious Emission	Pass	Meet the requirement of limit.	437P1B0011
2.1051 27.53(h)(1)	RSS-Gen 6.13 RSS-139 6.6	Conducted Spurious Emissions	Pass	Meet the requirement of limit.	437P1B0011
2.1053 27.53 (h)	RSS-139 6.6	Radiated Spurious Emission	Not Performed.	Not Performed.	Not Performed.
2.1049 27.50(d)(4)	RSS-139 6.5	Equivalent Isotropically Radiated Power (EIRP)	Not Performed.	Not Performed.	Not Performed.

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 (Test Software Version : R&S CMWRun 1.8.9)				
Wideband Radio Communication Tester	CMW500	153174	12-Apr-17	12-Apr-19
Signal Analyzer	FSV40	101431	13-Jul-17	12-Jul-19
Chamber	SH-641	92002651	5-Mar-18	5-Mar-19
Power Supply	6623A	3417A03546	15-Nov-17	15-Nov-19

1.3. General Information

General Description of EUT

Product	Hand-held			
Brand	Motorola Solutions			
Test Model	H55TGT9PW8AN			
Power Supply Rating	7.5 Vdc			
Mode of operation	LTE Band 4			
Modulation Type	QPSK, 16QAM			
Operating Frequency	LTE Band 4	Channel Bandwidth 1.4MHz	1710.7MHz~1754.3MHz	
		Channel Bandwidth 3MHz	1711.5MHz~1753.5MHz	
		Channel Bandwidth 5MHz	1712.5MHz~1752.5MHz	
		Channel Bandwidth 10MHz	1715.0MHz~1750.0MHz	
		Channel Bandwidth 15MHz	1717.5MHz~1747.5MHz	
		Channel Bandwidth 20MHz	1720.0MHz~1745.0MHz	
Max. Conducted RF Output Power	LTE Band 4 QPSK	Channel Bandwidth 1.4MHz	22.594dBm (0.182W)	
		Channel Bandwidth 3MHz	22.716dBm (0.186W)	
		Channel Bandwidth 5MHz	22.675dBm (0.185W)	
		Channel Bandwidth 10MHz	22.693dBm (0.186W)	
		Channel Bandwidth 15MHz	22.845dBm (0.193W)	
		Channel Bandwidth 20MHz	22.766dBm (0.189W)	
	LTE Band 4 16QAM	Channel Bandwidth 1.4MHz	21.799dBm (0.151W)	
		Channel Bandwidth 3MHz	21.695dBm (0.148W)	
		Channel Bandwidth 5MHz	21.917dBm (0.155W)	
		Channel Bandwidth 10MHz	21.941dBm (0.156W)	
		Channel Bandwidth 15MHz	22.009dBm (0.158W)	
		Channel Bandwidth 20MHz	21.749dBm (0.150W)	
Emission Designator	LTE Band 4		QPSK	16QAM
		Channel Bandwidth 1.4MHz	1M07G7D	1M07D7W
		Channel Bandwidth 3MHz	2M28G7D	2M68D7W
		Channel Bandwidth 5MHz	4M48G7D	4M47D7W
		Channel Bandwidth 10MHz	8M95G7D	8M95D7W
		Channel Bandwidth 15MHz	13M40G7D	13M40D7W
		Channel Bandwidth 20MHz	17M86G7D	17M82D7W
Antenna Type	LTE Band 4	Stamped Metal with 1.02dBi gain		
SW Version	D00.00.31			
HW Version	P1B			

Note:

- The EUT contains following accessory devices and data cable.

Item	Brand	Model or P/N	Specification
DMR Portable Programming Cable	Motorola Solutions	PMKN4012B	-

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	153174	NA

Note:

- 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.

Deviation from standard

Not applicable as no deviation from standard test method.

1.4. Channel number and frequency info

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

1.5. Test Mode Applicability and Tested Channel Detail

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

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

LTE Band 4

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

Spurious Emission	19965 ~ 20386	19965, 20175, 20385	3 MHz		1 RB / 7 RB Offset
	19975 ~ 20375	19975, 20175, 20375	5 MHz		1 RB / 13 RB Offset
	20000 ~ 20350	20000, 20175, 20350	10 MHz		1 RB / 49 RB Offset
	20025 ~ 20325	20025, 20175, 20325	15 MHz		1 RB / 0 RB Offset
	20050 ~ 20300	20050, 20175, 20300	20 MHz		1 RB / 99 RB Offset
Radiated Spurious Emission	19957 ~ 20393	19957, 20175, 20393	1.4 MHz	QPSK	Not Performed.
	19965 ~ 20386	19965, 20175, 20385	3 MHz		
	19975 ~ 20375	19975, 20175, 20375	5 MHz		
	20000 ~ 20350	20000, 20175, 20350	10 MHz		
	20025 ~ 20325	20025, 20175, 20325	15 MHz		
	20050 ~ 20300	20050, 20175, 20300	20 MHz		
Equivalent Isotropically Radiated Power (EIRP)	19957 ~ 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	Not Performed.
	19965 ~ 20386	19965, 20175, 20385	3 MHz		
	19975 ~ 20375	19975, 20175, 20375	5 MHz		
	20000 ~ 20350	20000, 20175, 20350	10 MHz		
	20025 ~ 20325	20025, 20175, 20325	15 MHz		
	20050 ~ 20300	20050, 20175, 20300	20 MHz		

NOTE:

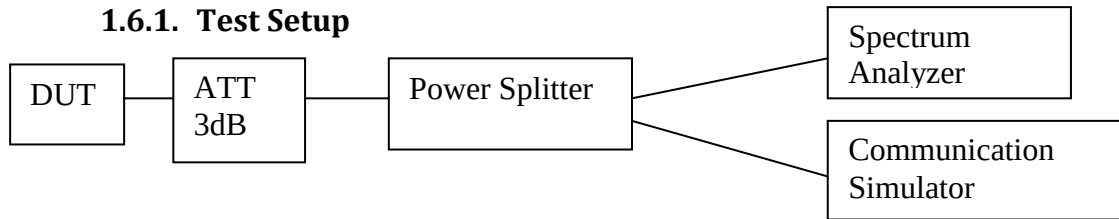
1. The Conducted RF Output Power for QPSK and 16QAM, measured value of QPSK mode is higher than 16QAM mode. Therefore, only Conducted Spurious Emission had been tested under QPSK modes.
2. Band Edge was performed with 1 and full Resource Block at the lowest and highest operating frequency band.
3. Peak to Average and Occupied Bandwidth were performed with full Resource Block which is the worst case.
4. 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	Maheshvaran
Peak-to-Average Power Ratio	25°C, 50% RH	7.5V DC	Maheshvaran
Occupied Bandwidth	25°C, 50% RH	7.5V DC	Maheshvaran
Frequency Stability	25°C, 50% RH	7.5V DC	Maheshvaran
Band Edge Conducted Spurious Emission	25°C, 50% RH	7.5V DC	Maheshvaran
Conducted Spurious Emission	25°C, 50% RH	7.5V DC	Maheshvaran
Radiated Spurious Emission	Not Performed.		
Equivalent Isotropically Radiated Power (EIRP)	Not Performed.		

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: Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.
 ISSED: The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt.

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

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
			19957	20175	20393	19957	20175	20393
			1710.7 MHz	1732.5 MHz	1754.3 MHz	1710.7 MHz	1732.5 MHz	1754.3 MHz
Band 4 / 1.4 MHz	1	0	22.388	22.543	22.494	21.539	21.528	21.594
	1	3	22.469	22.594	22.585	21.608	21.597	21.668
	1	5	22.438	22.517	22.511	21.55	21.532	21.621
	3	0	22.427	22.517	22.465	21.444	21.708	21.691
	3	2	22.473	22.587	22.513	21.523	21.799	21.731
	3	3	22.431	22.544	22.455	21.46	21.728	21.678
	6	0	21.444	21.481	21.489	20.477	20.619	20.588

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
			19965	20175	20385	19965	20175	20385
			1711.5 MHz	1732.5 MHz	1753.5 MHz	1711.5 MHz	1732.5 MHz	1753.5 MHz
Band 4 / 3MHz	1	0	22.499	22.621	22.561	21.617	21.644	21.612
	1	7	22.579	22.716	22.67	21.695	21.689	21.677
	1	14	22.521	22.628	22.568	21.618	21.592	21.597
	8	0	21.524	21.583	21.522	20.533	20.68	20.621
	8	4	21.538	21.625	21.567	20.571	20.696	20.682
	8	7	21.504	21.582	21.516	20.524	20.672	20.61
	15	0	21.499	21.61	21.531	20.544	20.677	20.639

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
			19975	20175	20375	19975	20175	20375
			1712.5MHz	1732.5MHz	1752.5MHz	1712.5MHz	1732.5MHz	1752.5MHz
Band 4 / 5MHz	1	0	22.51	22.596	22.622	21.514	21.764	21.893
	1	13	22.543	22.675	22.633	21.577	21.717	21.917
	1	25	22.485	22.634	22.589	21.542	21.722	21.854
	12	0	21.572	21.611	21.599	20.602	20.646	20.631
	12	6	21.562	21.644	21.584	20.633	20.661	20.651
	12	13	21.566	21.661	21.559	20.6	20.65	20.638
	25	0	21.544	21.626	21.625	20.587	20.725	20.698

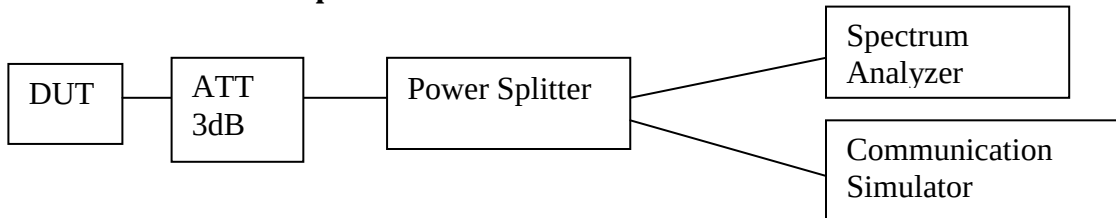
Conducted Output Power (dBm)								
LTE Band/BW	RB Size	RB Offset	QPSK Modulation			16QAM Modulation		
			Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
			20000	20175	20350	20000	20175	20350
			1715MHz	1732.5MHz	1750MHz	1715MHz	1732.5MHz	1750MHz
Band 4 / 10MHz	1	0	22.571	22.678	22.52	21.683	21.712	21.941
	1	25	22.539	22.652	22.475	21.654	21.646	21.882
	1	49	22.581	22.693	22.498	21.683	21.692	21.872
	25	0	21.597	21.637	21.587	20.701	20.776	20.693
	25	13	21.596	21.679	21.599	20.718	20.808	20.718
	25	25	21.603	21.686	21.603	20.712	20.772	20.732
	50	0	21.585	21.669	21.608	20.633	20.792	20.679

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
			20025	20175	20325	20025	20175	20325
			1717.5MHz	1732.5MHz	1747.5MHz	1717.5MHz	1732.5MHz	1747.5MHz
Band 4 / 15MHz	1	0	22.619	22.73	22.845	21.954	21.945	21.854
	1	38	22.55	22.651	22.645	21.885	21.897	21.685
	1	74	22.639	22.712	22.674	21.921	22.009	21.7
	36	0	21.623	21.643	21.7	20.714	20.783	20.828
	36	19	21.602	21.652	21.595	20.716	20.8	20.728
	36	39	21.627	21.645	21.588	20.704	20.788	20.749
	75	0	21.58	21.665	21.7	20.717	20.778	20.806

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
			20050	20175	20300	20050	20175	20300
			1720MHz	1732.5MHz	1745MHz	1720MHz	1732.5MHz	1745MHz
Band 4 / 20MHz	1	0	22.645	22.721	22.754	21.646	21.647	21.749
	1	49	22.554	22.598	22.538	21.557	21.583	21.569
	1	99	22.627	22.766	22.62	21.666	21.704	21.625
	50	0	21.654	21.723	21.792	20.736	20.766	20.848
	50	25	21.656	21.712	21.785	20.702	20.805	20.809
	50	50	21.658	21.747	21.669	20.711	20.779	20.714
	100	0	21.622	21.727	21.791	20.739	20.828	20.84

1.7. Peak-to-Average Power Ratio

1.7.1. Test Setup



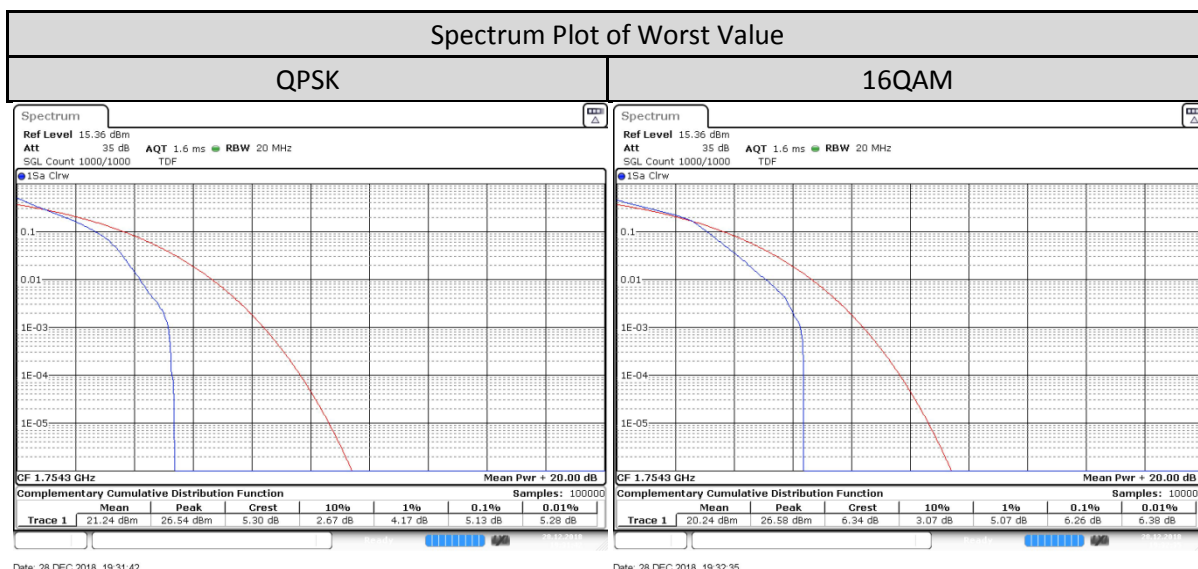
1. The DUT transmitter output port was connected to communication simulator with above setup.
2. Path loss for the measurement included.
3. Set DUT to transmit maximum power through communication simulator
4. Set the CCDF (Complementary Cumulative Distribution Function) option in the spectrum analyzer.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

1.7.2. Test Limit

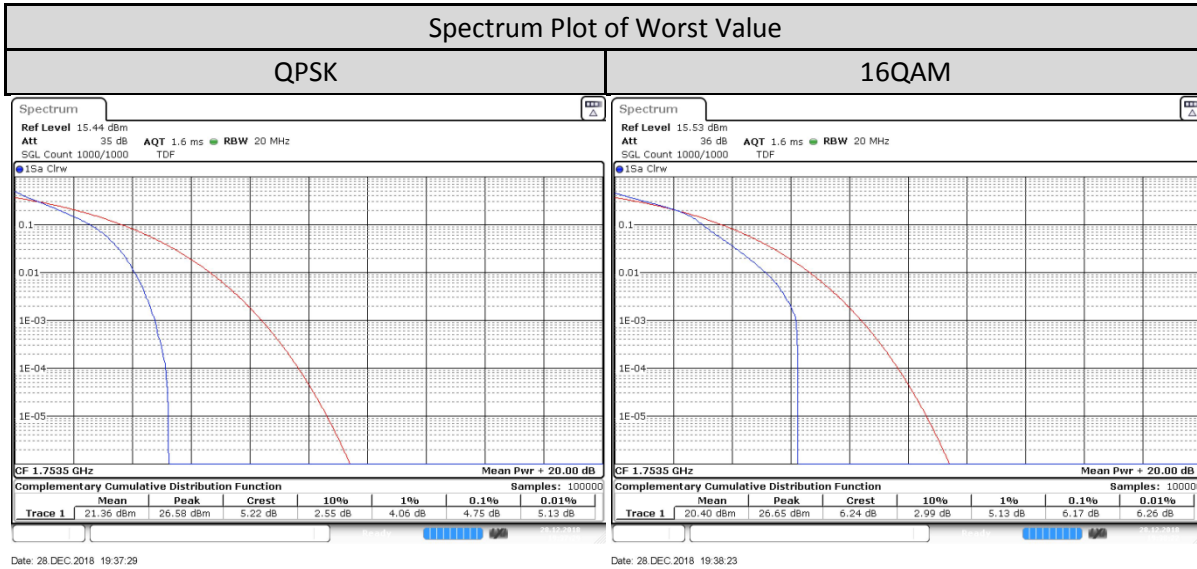
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

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

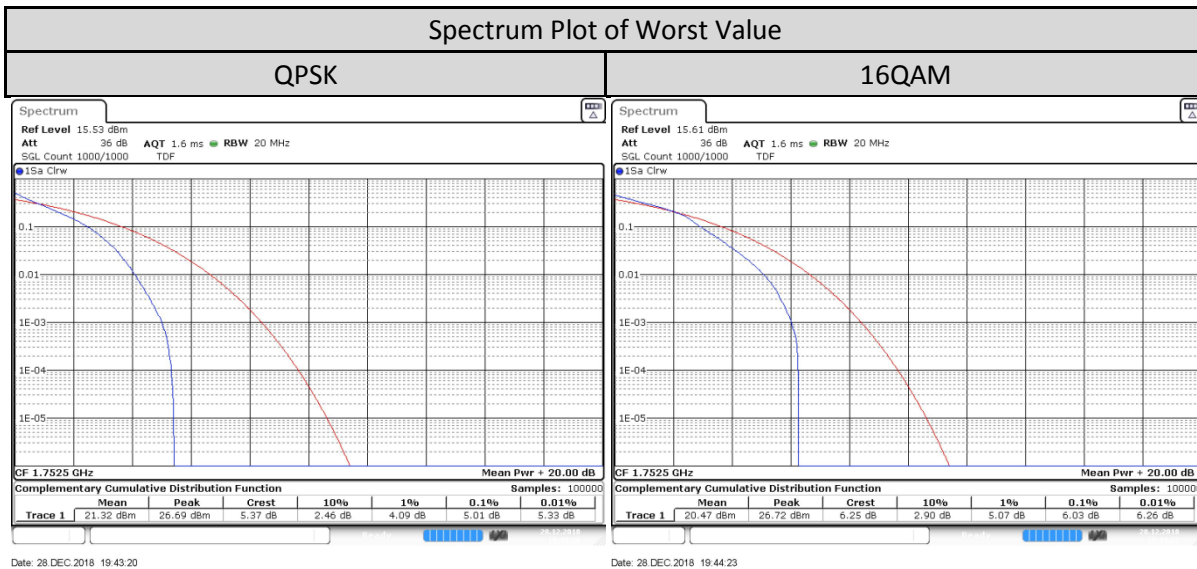
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4/1.4MHz/6/0	Low CH 19957	1710.7 MHz	4.928	6.029
	Mid CH 20175	1732.5 MHz	4.493	5.42
	High CH 20393	1754.3 MHz	5.13	6.261



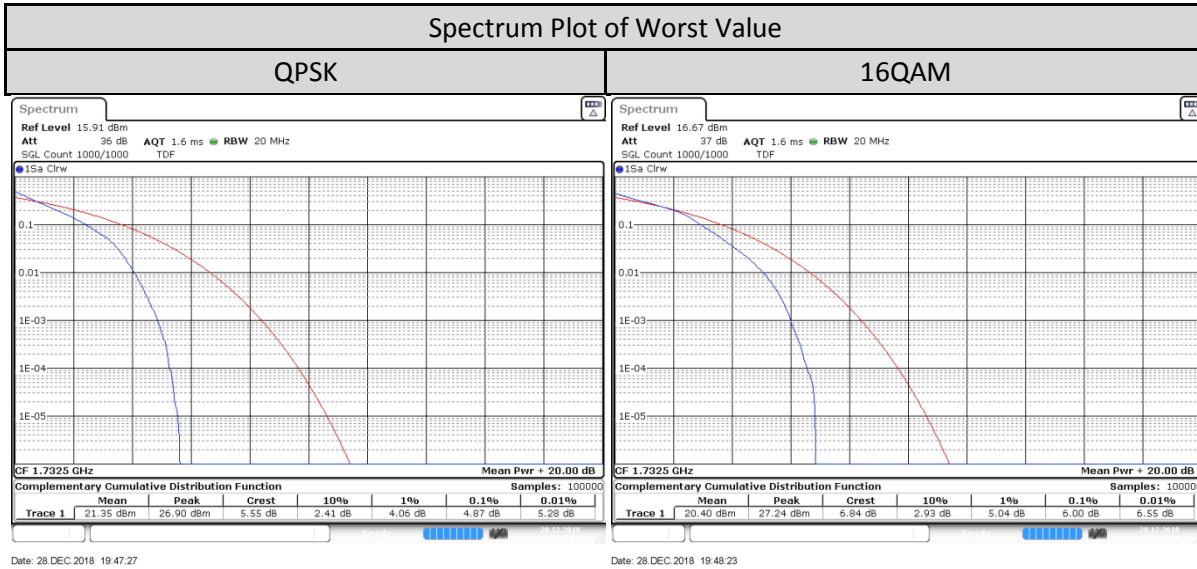
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4/3MHz/15/0	Low CH 19965	1711.5 MHz	4.667	6.029
	Mid CH 20175	1732.5 MHz	4.464	5.449
	High CH 20385	1753.5 MHz	4.754	6.174



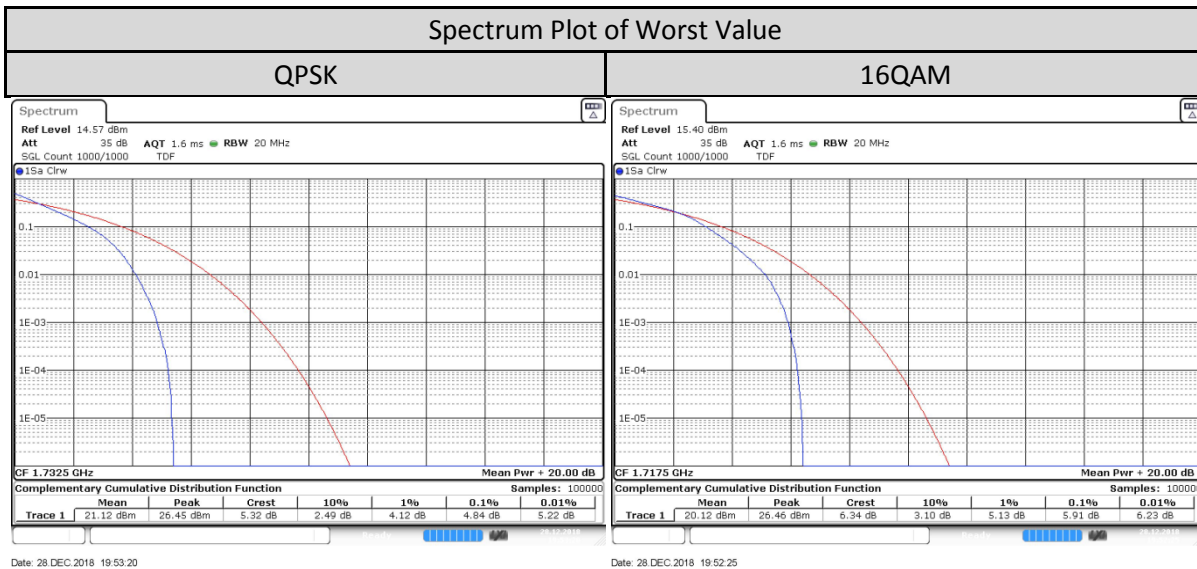
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4/5MHz/25/0	Low CH 19975	1712.5 MHz	4.841	6
	Mid CH 20175	1732.5 MHz	4.464	5.42
	High CH 20375	1752.5 MHz	5.014	6.029



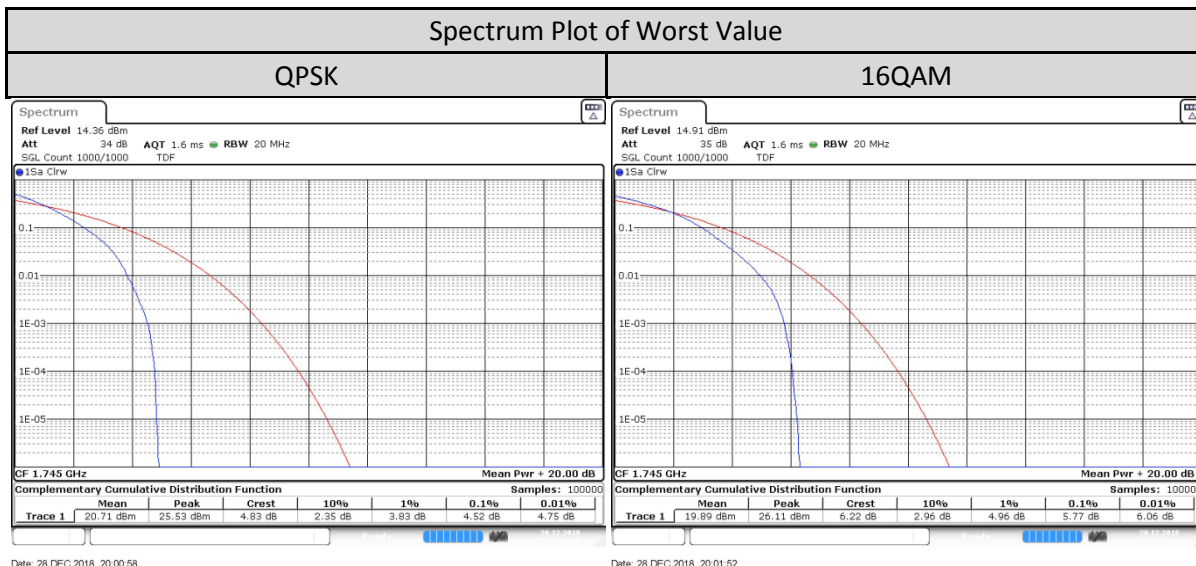
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4/10MHz/50/0	Low CH 20000	1715 MHz	4.783	5.971
	Mid CH 20175	1732.5 MHz	4.87	6
	High CH 20350	1750 MHz	4.812	5.971



LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4/15MHz/75/0	Low CH 20025	1717.5 MHz	4.754	5.913
	Mid CH 20175	1732.5 MHz	4.841	5.507
	High CH 20325	1747.5 MHz	4.783	5.855

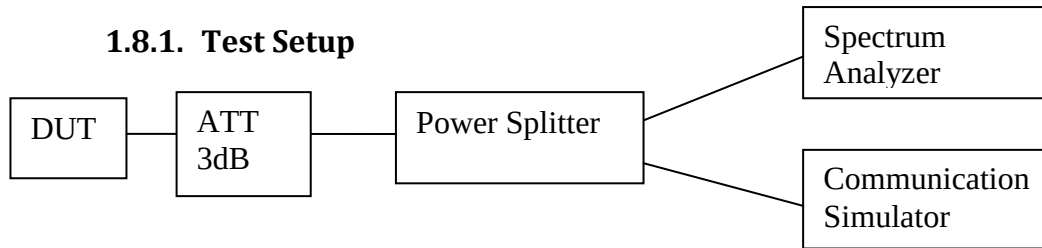


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	Peak To Average (dB)	
			QPSK Modulation	16QAM Modulation
Band 4/ 20MHz/100/0	Low CH 20050	1720 MHz	4.406	5.739
	Mid CH 20175	1732.5 MHz	4.319	5.478
	High CH 20300	1745 MHz	4.522	5.768



1.8. Occupied Bandwidth

1.8.1. Test Setup



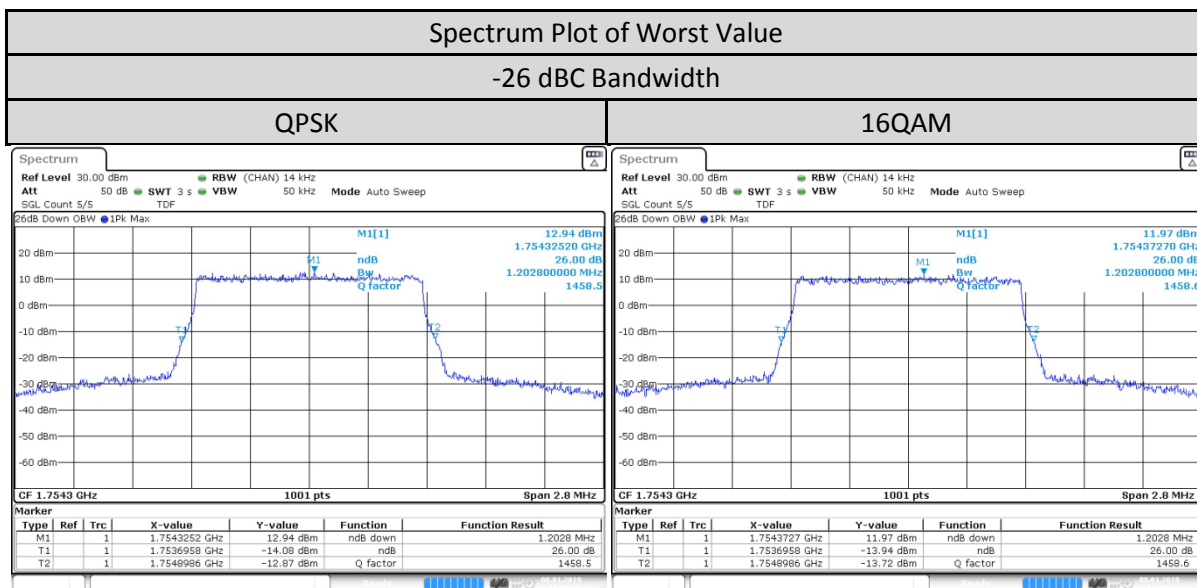
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) For LTE measurement, set DUT to transmit maximum power & full RB size through communication simulator.
- 4) For LTE measurement, set DUT to transmit maximum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

1.8.2. Test Limit

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

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

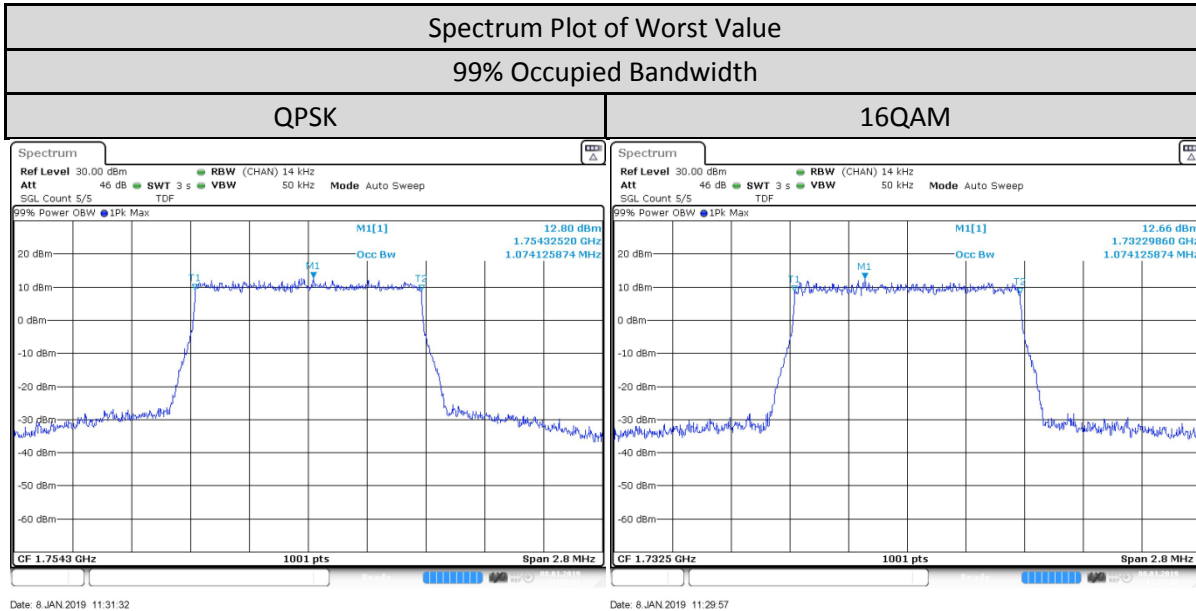
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/1.4MHz/6/0	Low CH 19957	1710.7 MHz	1.194	1.172
	Mid CH 20175	1732.5 MHz	1.192	1.186
	High CH 20393	1754.3 MHz	1.203	1.203



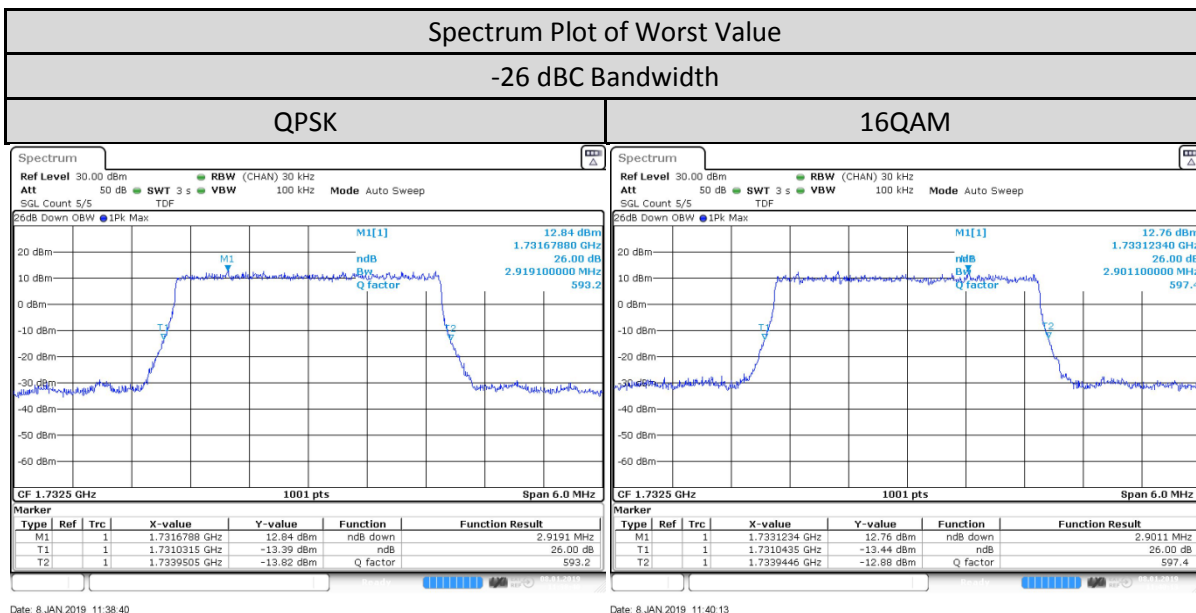
Date: 8 JAN 2019 11:31:56

Date: 8 JAN 2019 11:33:32

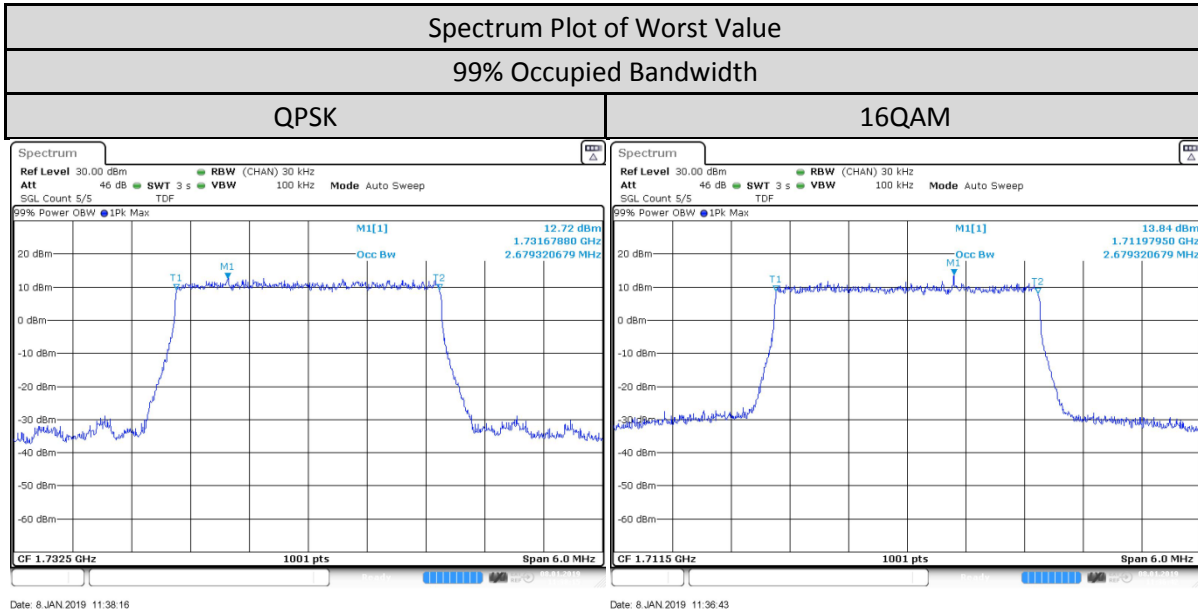
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/1.4MHz/6/0	Low CH 19957	1710.7 MHz	1.071	1.071
	Mid CH 20175	1732.5 MHz	1.071	1.074
	High CH 20393	1754.3 MHz	1.074	1.074



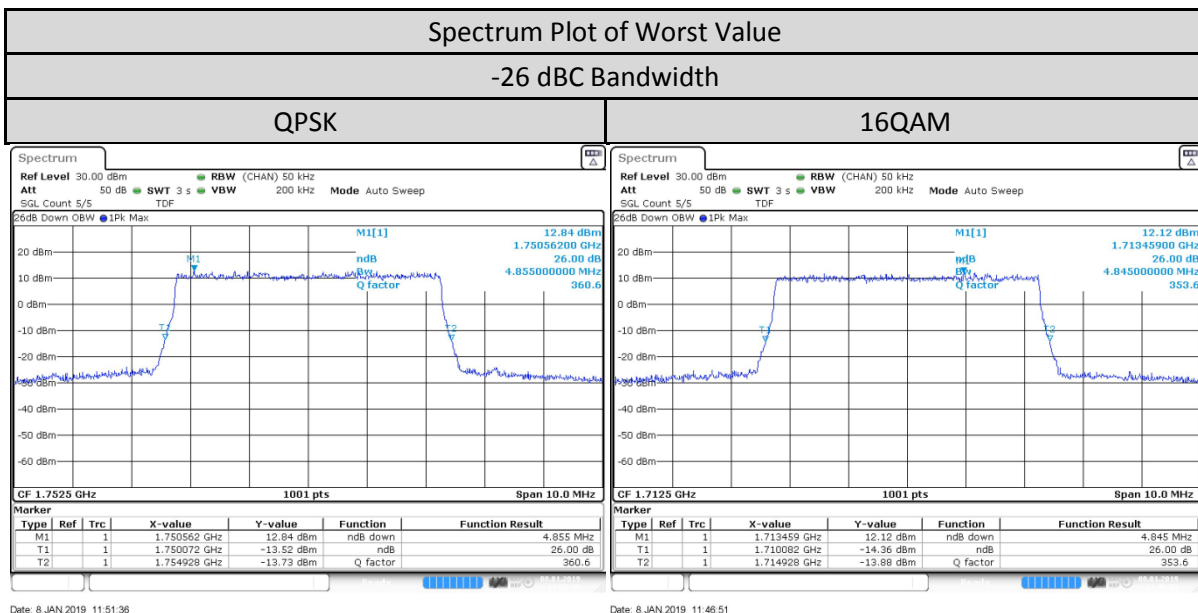
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/3MHz/15/0	Low CH 19965	1711.5 MHz	2.883	2.865
	Mid CH 20175	1732.5 MHz	2.919	2.901
	High CH 20385	1753.5 MHz	2.883	2.889



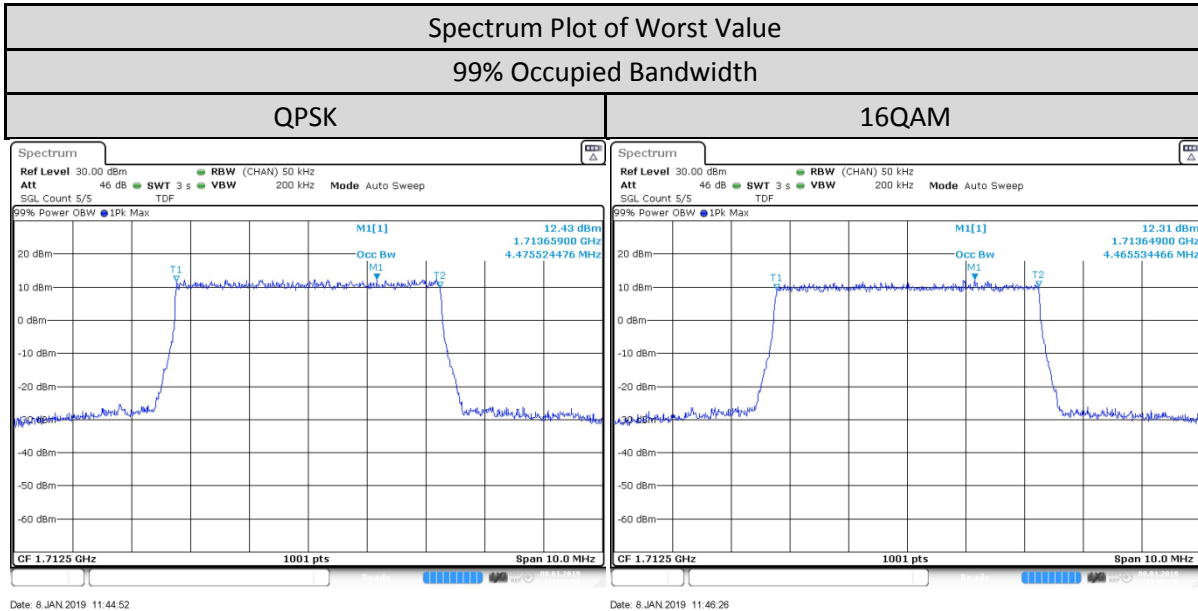
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/3MHz/15/0	Low CH 19965	1711.5 MHz	2.673	2.679
	Mid CH 20175	1732.5 MHz	2.679	2.679
	High CH 20385	1753.5 MHz	2.679	2.679



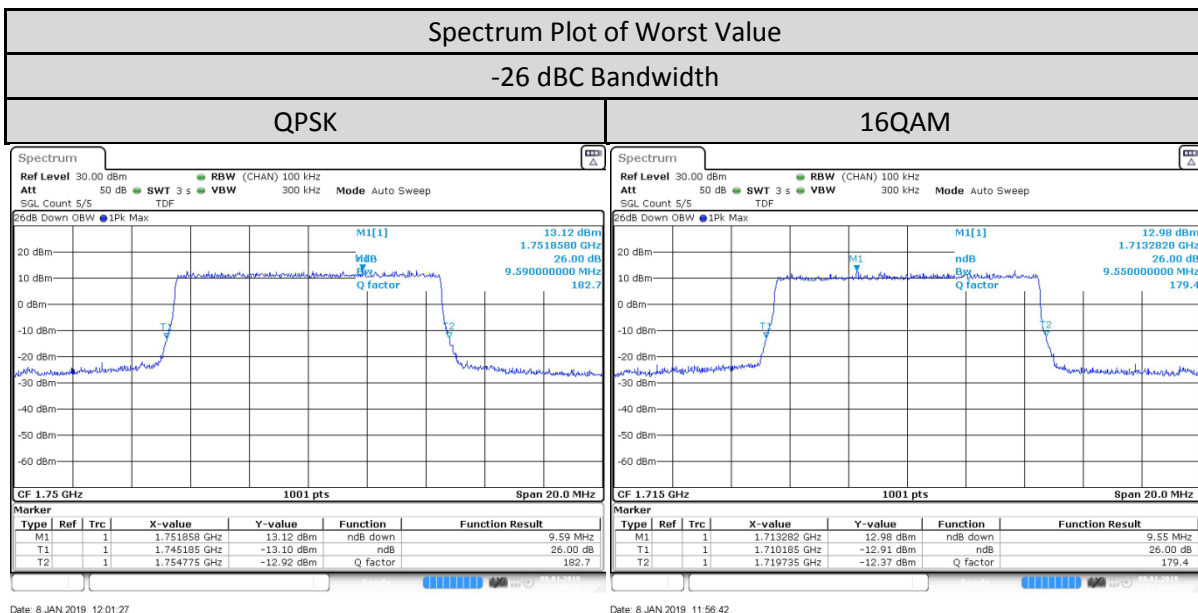
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/5MHz/25/0	Low CH 19975	1712.5 MHz	4.825	4.845
	Mid CH 20175	1732.5 MHz	4.815	4.785
	High CH 20375	1752.5 MHz	4.855	4.815



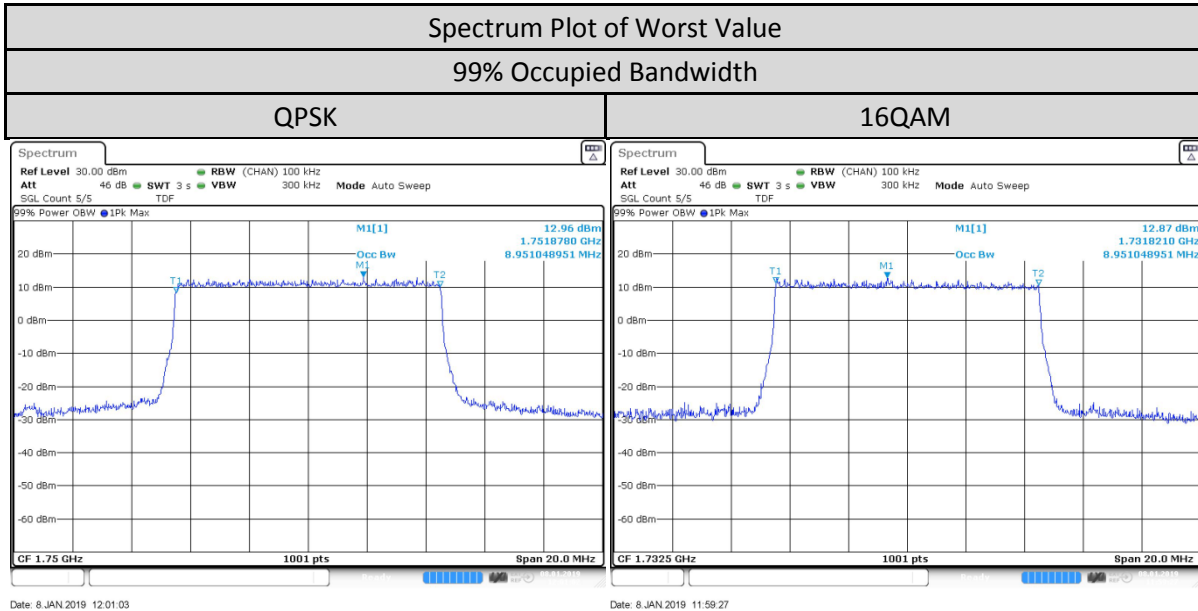
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/5MHz/25/0	Low CH 19975	1712.5 MHz	4.476	4.466
	Mid CH 20175	1732.5 MHz	4.456	4.466
	High CH 20375	1752.5 MHz	4.476	4.466



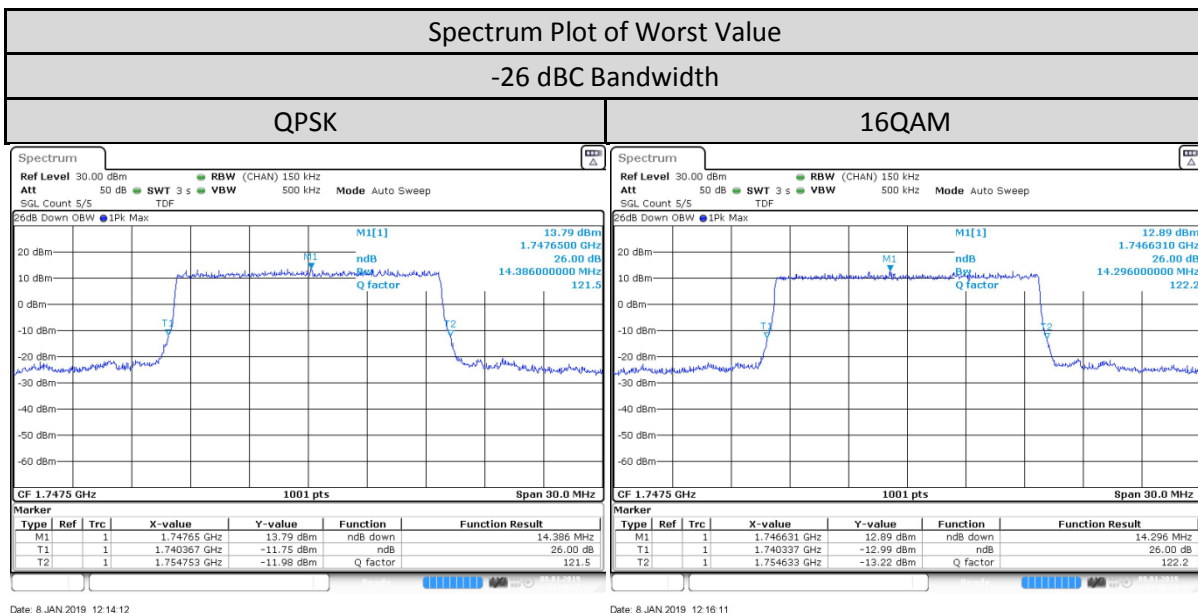
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/10MHz/50/0	Low CH 20000	1715 MHz	9.51	9.55
	Mid CH 20175	1732.5 MHz	9.53	9.53
	High CH 20350	1750 MHz	9.59	9.53



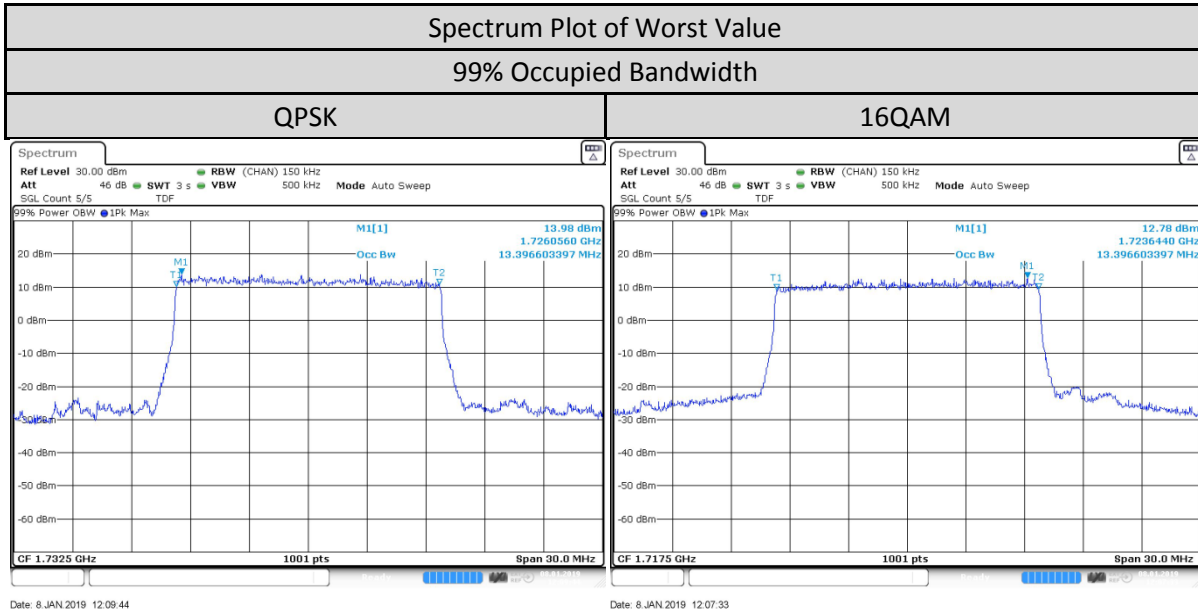
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/10MHz/50/0	Low CH 20000	1715 MHz	8.931	8.911
	Mid CH 20175	1732.5 MHz	8.931	8.951
	High CH 20350	1750 MHz	8.951	8.931



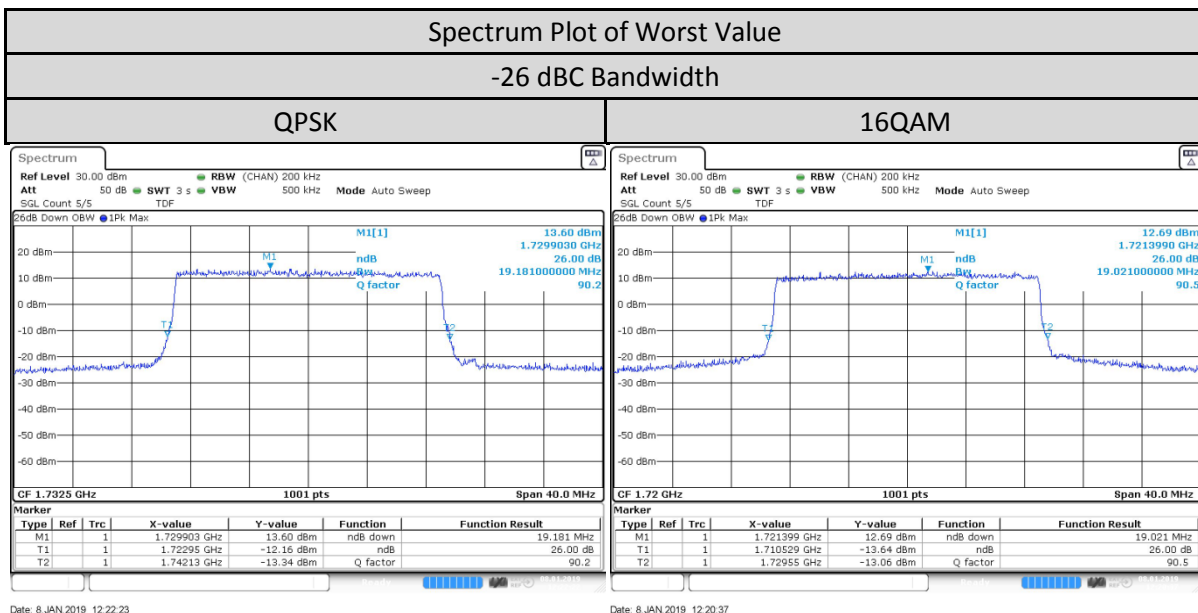
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/15MHz/75/0	Low CH 20025	1717.5 MHz	14.326	14.266
	Mid CH 20175	1732.5 MHz	14.296	14.236
	High CH 20325	1747.5 MHz	14.386	14.296



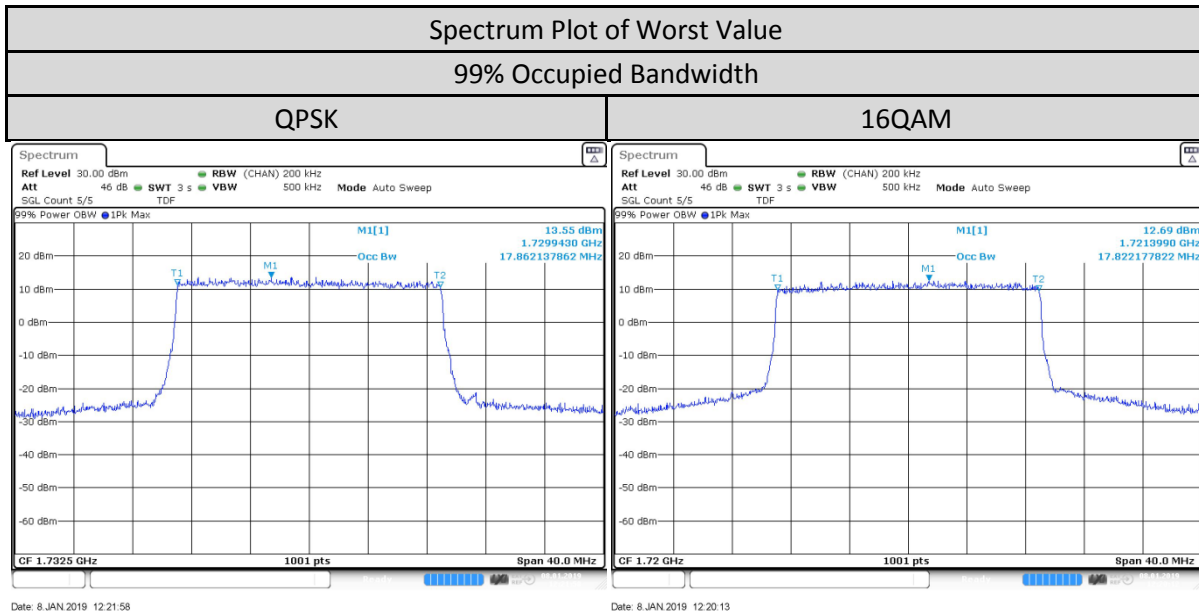
LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/15MHz/75/0	Low CH 20025	1717.5 MHz	13.367	13.397
	Mid CH 20175	1732.5 MHz	13.397	13.397
	High CH 20325	1747.5 MHz	13.367	13.367



LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	-26 dBc Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/20MHz/100/0	Low CH 20050	1720 MHz	19.021	19.021
	Mid CH 20175	1732.5 MHz	19.181	18.861
	High CH 20300	1745 MHz	18.821	18.861

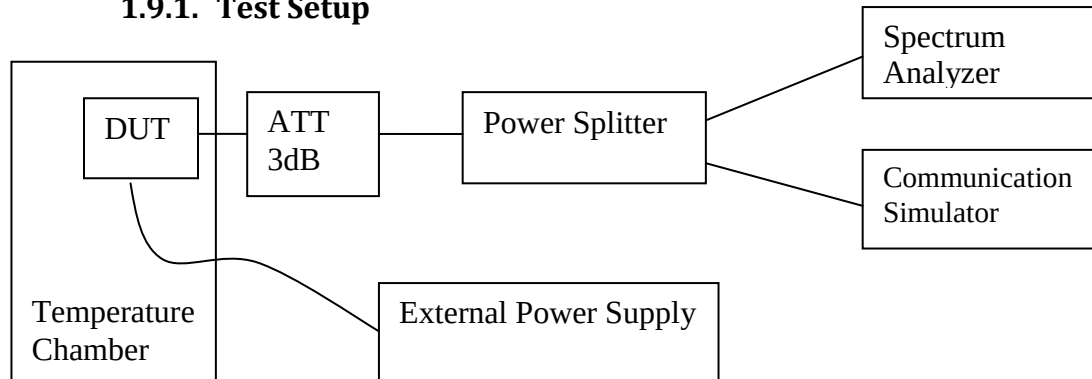


LTE Band/BW/RB Size/RB Offset	Channel Number	Tx Frequency	99% Occupied Bandwidth (MHz)	
			QPSK Modulation	16QAM Modulation
Band 4/20MHz/100/0	Low CH 20050	1720 MHz	17.782	17.822
	Mid CH 20175	1732.5 MHz	17.862	17.822
	High CH 20300	1745 MHz	17.822	17.822



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 4 (1710-1755MHz)

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 1.4 MHz			
		Low Channel		High Channel	
		1710.7MHz		1754.3MHz	
		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
LTE Band 4	50	1710.699972	-0.016482	1754.299974	-0.014686
	40	1710.699974	-0.014993	1754.299985	-0.008383
	30	1710.699985	-0.008521	1754.299986	-0.00791
	20	1710.699985	-0.008705	1754.300028	0.015942
	10	1710.700021	0.012292	1754.300016	0.0091
	0	1710.699987	-0.007317	1754.299988	-0.006589
	-10	1710.699972	-0.016105	1754.299986	-0.007763
	-20	1710.69999	-0.005594	1754.299982	-0.010511
	-30	1710.69999	-0.005686	1754.299985	-0.008432

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 1.4 MHz			
		Low Channel		High Channel	
		1710.7MHz		1754.3MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	1710.699966	-0.020103	1754.299986	-0.007942
	7.5	1710.699989	-0.006681	1754.299985	-0.008423
	6	1710.700012	0.006899	1754.299981	-0.011049

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 3 MHz			
		Low Channel		High Channel	
		1711.5MHz		1753.5MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	50	1711.500017	0.009921	1753.500019	0.010907
	40	1711.500018	0.010439	1753.500019	0.010671
	30	1711.500018	0.01064	1753.500017	0.009904
	20	1711.500018	0.010356	1753.500018	0.010026
	10	1711.500019	0.011142	1753.500017	0.009863
	0	1711.50002	0.011576	1753.500019	0.010842
	-10	1711.500018	0.010573	1753.500008	0.004601
	-20	1711.50002	0.011543	1753.50002	0.011209
	-30	1711.50001	0.005667	1753.50002	0.011593

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 3 MHz			
		Low Channel		High Channel	
		1711.5MHz		1753.5MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	1711.500018	0.010264	1753.500019	0.010556
	7.5	1711.500018	0.01023	1753.500011	0.006208
	6	1711.500014	0.007915	1753.500017	0.009651

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		1712.5MHz		1752.5MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	50	1712.499984	-0.009356	1752.49999	-0.005657
	40	1712.499984	-0.009606	1752.500012	0.006669
	30	1712.499976	-0.0139	1752.499988	-0.006751
	20	1712.499985	-0.008838	1752.500013	0.007428
	10	1712.499987	-0.007526	1752.500011	0.006
	0	1712.499992	-0.004511	1752.500007	0.004253
	-10	1712.49999	-0.006065	1752.499994	-0.003657
	-20	1712.499996	-0.002615	1752.499993	-0.003739
	-30	1712.499988	-0.006783	1752.499993	-0.004163

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 5 MHz			
		Low Channel		High Channel	
		1712.5MHz		1752.5MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	1712.499985	-0.009038	1752.500011	0.006081
	7.5	1712.499986	-0.008328	1752.499988	-0.006971
	6	1712.499984	-0.009256	1752.499989	-0.006449

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		1715MHz		1750MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	50	1714.999987	-0.007524	1749.999985	-0.008624
	40	1714.999989	-0.00664	1749.999983	-0.009523
	30	1714.999989	-0.006523	1749.999983	-0.009875
	20	1715.000012	0.006881	1749.999984	-0.009024
	10	1715.000014	0.007949	1749.999985	-0.008796
	0	1715.000012	0.007082	1749.999987	-0.007455
	-10	1714.999983	-0.009793	1749.999984	-0.008894
	-20	1714.999993	-0.00402	1749.999987	-0.007463
	-30	1715.000012	0.00694	1749.999984	-0.009229

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 10 MHz			
		Low Channel		High Channel	
		1715MHz		1750MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	1715.000011	0.006481	1749.999989	-0.006335
	7.5	1714.999988	-0.006982	1749.999984	-0.009294
	6	1715.000012	0.00679	1749.999984	-0.009106

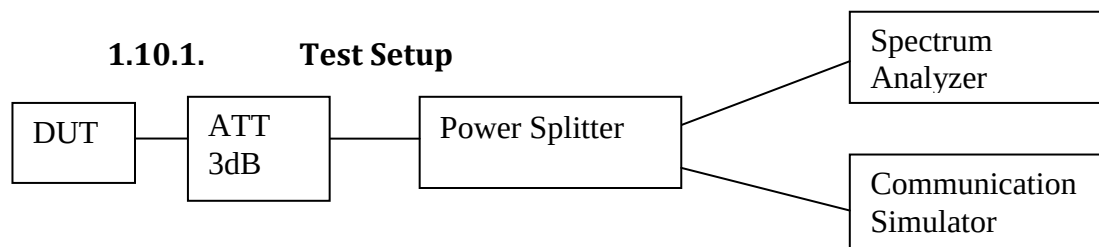
Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 15 MHz			
		Low Channel		High Channel	
		1717.5MHz		1747.5MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	50	1717.500016	0.009129	1747.500015	0.008661
	40	1717.49998	-0.011877	1747.500018	0.010265
	30	1717.500014	0.008346	1747.500016	0.00898
	20	1717.500018	0.010428	1747.500016	0.009316
	10	1717.500017	0.010045	1747.500017	0.009561
	0	1717.500017	0.010103	1747.500017	0.009479
	-10	1717.500017	0.009978	1747.500019	0.010814
	-20	1717.500018	0.010286	1747.500018	0.010077
	-30	1717.500017	0.00977	1747.500018	0.010282

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 15 MHz			
		Low Channel		High Channel	
		1717.5MHz		1747.5MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	1717.500017	0.009812	1747.500015	0.008865
	7.5	1717.500015	0.008721	1747.500013	0.007556
	6	1717.500017	0.010028	1747.500018	0.010421

Band	Temp (Deg C)	Frequency Error VS Temperature			
		Channel Bandwidth: 20 MHz			
		Low Channel		High Channel	
		1720MHz		1745MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	50	1719.999983	-0.00998	1744.999986	-0.007837
	40	1719.999981	-0.011028	1744.999988	-0.006796
	30	1719.999983	-0.009914	1744.999988	-0.007042
	20	1719.999985	-0.008749	1745.000012	0.00678
	10	1719.999984	-0.009257	1745.000012	0.00664
	0	1719.999984	-0.009223	1745.000012	0.007017
	-10	1719.999985	-0.008949	1745.000013	0.007378
	-20	1719.999985	-0.008799	1745.000013	0.007362
	-30	1719.999985	-0.008724	1745.000013	0.007263

Band	Voltage (V)	Frequency Error VS Voltage			
		Channel Bandwidth: 20 MHz			
		Low Channel		High Channel	
		1720MHz		1745MHz	
LTE Band 4		Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
	9	1719.999981	-0.010829	1745.000012	0.006632
	7.5	1719.999984	-0.009348	1744.999989	-0.006525
	6	1719.999983	-0.010022	1745.000016	0.009182

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

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

