

FCC Test Report

(PART 27)

Report No.: RF180207C11-9

FCC ID: MSQZ01RD

Test Model: ASUS_Z01RD / ASUS_Z01RS

Received Date: Feb. 07, 2018

Test Date: Mar. 02, 2018 ~ Apr. 04, 2018

Issued Date: May 02, 2018

Applicant: ASUSTek COMPUTER INC.

Address: 4F, No. 150, LI-TE Rd., PEITOU, TAIPEI 112, TAIWAN

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C)

Test Location (1): No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

Test Location (2): No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan, R.O.C

**FCC Registration /
Designation Number:** 427177 / TW0011



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Release Control Record

Issue No.	Description	Date Issued
RF180207C11-9	Original Release	May 02, 2018

1 Certificate of Conformity

Product: ASUS Phone

Brand: ASUS

Test Model: ASUS_Z01RD / ASUS_Z01RS


Sample Status: Production Unit


Applicant: ASUSTek COMPUTER INC.

Test Date: Mar. 02, 2018 ~ Apr. 04, 2018

Standards: FCC Part 27, Subpart C, M

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : , **Date:** May 02, 2018
Ivonne Wu / Supervisor

Approved by : , **Date:** May 02, 2018
Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(h)	Equivalent Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
--	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1051 27.53(l)	Out-of-Band Emissions Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(m)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(m)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -14.01 dB at 7605.00 MHz.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY52260177	Jul. 05, 2017	Jul. 04, 2018
Spectrum Analyzer ROHDE & SCHWARZ	F5U43	101261	Jan. 11, 2018	Jan. 10, 2019
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
Fixed Attenuator Mini-Circuits	BW-N10W5+	NA	Jul. 07, 2017	Jul. 06, 2018
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Preamplifier Agilent	310N	187226	Jun. 23, 2017	Jun. 22, 2018
Preamplifier Agilent	83017A	MY39501357	Jun. 23, 2017	Jun. 22, 2018
Power Meter Anritsu	ML2495A	1012010	Aug. 15, 2017	Aug. 14, 2018
Power Sensor Anritsu	MA2411B	1315050	Aug. 15, 2017	Aug. 14, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 26, 2017	Jun. 25, 2018
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 26, 2017	Jun. 25, 2018
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Communications Tester-Wireless Agilent	8960 Series 10	MY53201073	Jun. 28, 2017	Jun. 27, 2019
Radio Communication Analyzer Anritsu	MT8820C	6201010284	Dec. 28, 2017	Dec. 27, 2018
Temperature & Humidity Chamber	GTH-120-40-CP-A R	MAA1306-019	Sep. 08, 2017	Sep. 07, 2018
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jun. 30, 2017	Jun. 29, 2018

- Note:
1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HsinTien Chamber 1.
 3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
 4. The IC Site Registration No. is IC7450I-1.

3 General Information

3.1 General Description of EUT

Product	ASUS Phone	
Brand	ASUS	
Test Model	ASUS_Z01RD / ASUS_Z01RS	
Status of EUT	Production Unit	
Power Supply Rating	5.0 Vdc or 9.0 Vdc (adapter) 5.0 Vdc (host equipment) 3.85 Vdc (battery)	
Modulation Type	QPSK, 16QAM, 64QAM	
Frequency Range	LTE Band 7 (Channel Bandwidth: 5 MHz)	2502.5 ~ 2567.5 MHz
	LTE Band 7 (Channel Bandwidth: 10 MHz)	2505 ~ 2565 MHz
	LTE Band 7 (Channel Bandwidth: 15 MHz)	2507.5 ~ 2562.5 MHz
	LTE Band 7 (Channel Bandwidth: 20 MHz)	2510 ~ 2560 MHz
	LTE Band 38 (Channel Bandwidth: 5 MHz)	2572.5 ~ 2617.5 MHz
	LTE Band 38 (Channel Bandwidth: 10 MHz)	2575.0 ~ 2615.0 MHz
	LTE Band 38 (Channel Bandwidth: 15 MHz)	2577.5 ~ 2612.5 MHz
	LTE Band 38 (Channel Bandwidth: 20 MHz)	2580.0 ~ 2610.0 MHz
	LTE Band 41 (Channel Bandwidth: 5 MHz)	2498.5 ~ 2687.5 MHz
	LTE Band 41 (Channel Bandwidth: 10 MHz)	2501.0 ~ 2685.0 MHz
	LTE Band 41 (Channel Bandwidth: 15 MHz)	2503.5 ~ 2682.5 MHz
	LTE Band 41 (Channel Bandwidth: 20 MHz)	2506.0 ~ 2680.0 MHz
Max. EIRP Power	LTE Band 7 (Channel Bandwidth: 5 MHz)	178.53 mW
	LTE Band 7 (Channel Bandwidth: 10 MHz)	179.51 mW
	LTE Band 7 (Channel Bandwidth: 15 MHz)	180.22 mW
	LTE Band 7 (Channel Bandwidth: 20 MHz)	181.97 mW
	LTE Band 38 (Channel Bandwidth: 5 MHz)	159.88 mW
	LTE Band 38 (Channel Bandwidth: 10 MHz)	159.85 mW
	LTE Band 38 (Channel Bandwidth: 15 MHz)	162.07 mW
	LTE Band 38 (Channel Bandwidth: 20 MHz)	165.08 mW
	LTE Band 41 (Channel Bandwidth: 5 MHz)	225.27 mW
	LTE Band 41 (Channel Bandwidth: 10 MHz)	226.83 mW
	LTE Band 41 (Channel Bandwidth: 15 MHz)	228.93 mW
	LTE Band 41 (Channel Bandwidth: 20 MHz)	232.65 mW

Emission Designator	LTE Band 7 (Channel Bandwidth: 5 MHz)	4M49W7D
	LTE Band 7 (Channel Bandwidth: 10 MHz)	8M98W7D
	LTE Band 7 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 7 (Channel Bandwidth: 20 MHz)	18M0W7D
	LTE Band 38 (Channel Bandwidth: 5 MHz)	4M49G7D
	LTE Band 38 (Channel Bandwidth: 10 MHz)	8M97W7D
	LTE Band 38 (Channel Bandwidth: 15 MHz)	13M5G7D
	LTE Band 38 (Channel Bandwidth: 20 MHz)	17M9W7D
	LTE Band 41 (Channel Bandwidth: 5 MHz)	4M49G7D
	LTE Band 41 (Channel Bandwidth: 10 MHz)	8M97W7D
	LTE Band 41 (Channel Bandwidth: 15 MHz)	13M4G7D
	LTE Band 41 (Channel Bandwidth: 20 MHz)	17M9W7D
Antenna Type	PIFA Antenna	
Antenna Gain	LTE Band 7	-0.2 dBi gain (Main) -3 dBi gain (Aux.)
	LTE Band 38	-1.2 dBi gain (Main) -3 dBi gain (Aux.)
	LTE Band 41	-0.2 dBi gain (Main) -1.5 dBi gain (Aux.)
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

Note:

- All models are listed as below.

Brand	SKU	Model	Difference
ASUS	WW-5CA	ASUS_Z01RD	Dual SIM
	WW Operator-5CA	ASUS_Z01RS	Single SIM

* The models have the same layout, circuit, and components, but different SIM card slot, therefore, only ASUS_Z01RD was chosen for the final test.

- There're 2 configurations for the EUT listed as below.

Main Sample: EUT + CPU 1 + Rear Camera 1 + Front Camera 1 + UFS 3 + DDR 3

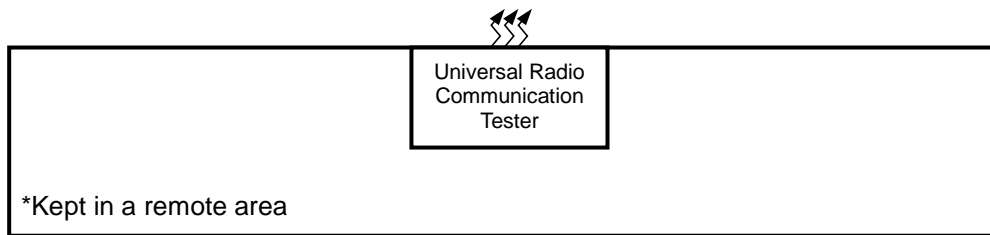
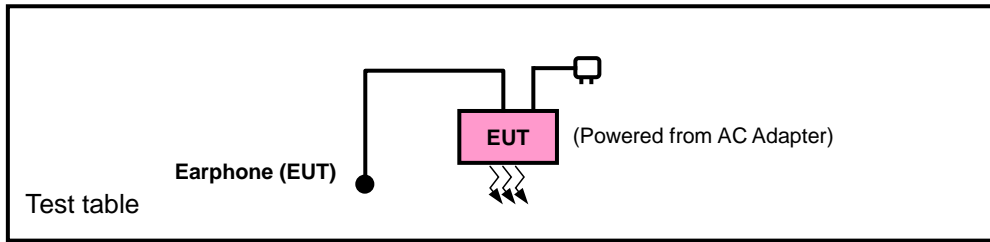
2nd Sample: EUT + CPU 2 + Rear Camera 2 + Front Camera 2 + UFS 3 + DDR 3

✧ Only the worst test data was presented in the report.

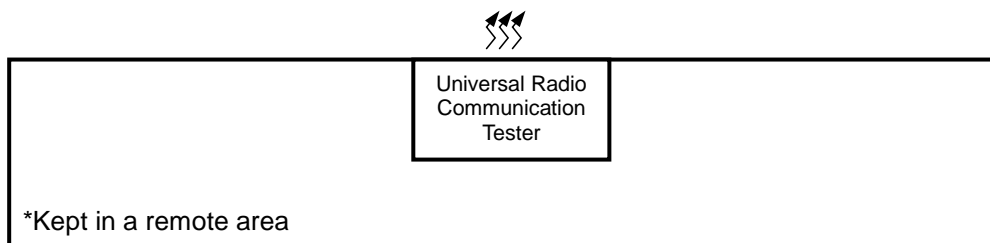
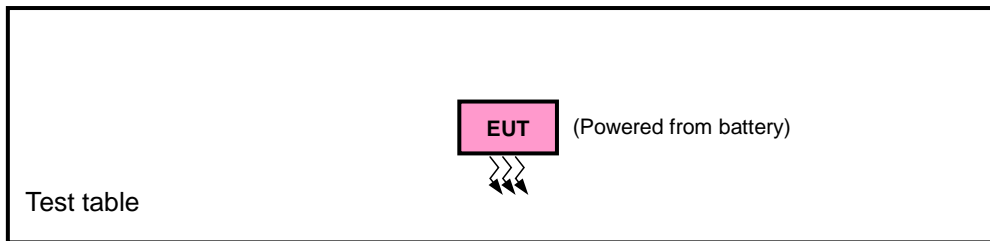
- The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test

<Radiated Emission Test>



<E.I.R.P. Test>



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3 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 worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

EUT Configure Mode	Description
A	Main Sample
B	2 nd Sample

SIM	Band	EIRP	Radiated Emission
1	LTE Band 7	X-plane	Y-axis
	LTE Band 38	X-plane	Z-axis
	LTE Band 41	X-plane	Y-axis

LTE Band 7

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	EIRP	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 24 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 49 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 74 RB Offset
		20850 to 21350	20850, 21100 21350	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 99 RB Offset
A	Frequency Stability	20775 to 21425	20775, 21425	5 MHz	QPSK	1 RB / 24 RB Offset
		20800 to 21400	20800, 21400	10 MHz	QPSK	1 RB / 49 RB Offset
		20825 to 21375	20825, 21375	15 MHz	QPSK	1 RB / 74 RB Offset
		20850 to 21350	20850, 21350	20 MHz	QPSK	1 RB / 99 RB Offset
A	Occupied Bandwidth	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		20850 to 21350	20850, 21100 21350	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
A	Peak to Average Ratio	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 24 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 49 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 74 RB Offset
		20850 to 21350	20850, 21100 21350	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 99 RB Offset

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	Out-of-Band Emissions	20775 to 21425	20775, 21425	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		20800 to 21400	20800, 21400	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		20825 to 21375	20825, 21375	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		20850 to 21350	20850, 21350	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
A	Conducted Emission	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK	1 RB / 24 RB Offset
		20800 to 21400	20800, 21100, 21400	10 MHz	QPSK	1 RB / 49 RB Offset
		20825 to 21375	20825, 21100, 21375	15 MHz	QPSK	1 RB / 74 RB Offset
		20850 to 21350	20850, 21100 21350	20 MHz	QPSK	1 RB / 99 RB Offset
A	Radiated Emission	20775 to 21425	20775, 21100, 21425	5 MHz	QPSK	1 RB / 24 RB Offset
20850 to 21350		20850, 21100 21350	20 MHz	QPSK	1 RB / 99 RB Offset	
B		20850 to 21350	21100	20 MHz	QPSK	1 RB / 99 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

LTE Band 38

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	EIRP	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
A	Frequency Stability	37775 to 38225	37775, 38225	5 MHz	QPSK	1 RB / 0 RB Offset
		37800 to 38200	37800, 38200	10 MHz	QPSK	1 RB / 0 RB Offset
		37825 to 38175	37825, 38175	15 MHz	QPSK	1 RB / 0 RB Offset
		37850 to 38150	37850, 38150	20 MHz	QPSK	1 RB / 0 RB Offset
A	Occupied Bandwidth	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
A	Peak to Average Ratio	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
A	Out-of-Band Emissions	37775 to 38225	37775, 38225	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		37800 to 38200	37800, 38200	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		37825 to 38175	37825, 38175	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		37850 to 38150	37850, 38150	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
A	Conducted Emission	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK	1 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10 MHz	QPSK	1 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15 MHz	QPSK	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK	1 RB / 0 RB Offset
A	Radiated Emission	37775 to 38225	37775, 38000, 38225	5 MHz	QPSK	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20 MHz	QPSK	1 RB / 0 RB Offset
B		37850 to 38150	38000	20 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

LTE Band 41

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
A	EIRP	39675 to 41565	39675, 40620, 41565	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		39700 to 41540	39700, 40620, 41540	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		39725 to 41515	39725, 40620, 41515	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		39750 to 41490	39750, 40620, 41490	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
A	Frequency Stability	39675 to 41565	39675, 41565	5 MHz	QPSK	1 RB / 0 RB Offset
		39700 to 41540	39700, 41540	10 MHz	QPSK	1 RB / 0 RB Offset
		39725 to 41515	39725, 41515	15 MHz	QPSK	1 RB / 0 RB Offset
		39750 to 41490	39750, 41490	20 MHz	QPSK	1 RB / 0 RB Offset
A	Occupied Bandwidth	39675 to 41565	39675, 40620, 41565	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		39700 to 41540	39700, 40620, 41540	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		39725 to 41515	39725, 40620, 41515	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		39750 to 41490	39750, 40620, 41490	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
A	Peak to Average Ratio	39675 to 41565	39675, 40620, 41565	5 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		39700 to 41540	39700, 40620, 41540	10 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		39725 to 41515	39725, 40620, 41515	15 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		39750 to 41490	39750, 40620, 41490	20 MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
A	Out-of-Band Emissions	39675 to 41565	39675, 41565	5 MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		39700 to 41540	39700, 41540	10 MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		39725 to 41515	39725, 41515	15 MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		39750 to 41490	39750, 41490	20 MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
A	Conducted Emission	39675 to 41565	39675, 40620, 41565	5 MHz	QPSK	1 RB / 0 RB Offset
		39700 to 41540	39700, 40620, 41540	10 MHz	QPSK	1 RB / 0 RB Offset
		39725 to 41515	39725, 40620, 41515	15 MHz	QPSK	1 RB / 0 RB Offset
		39750 to 41490	39750, 40620, 41490	20 MHz	QPSK	1 RB / 0 RB Offset
A	Radiated Emission	39675 to 41565	39675, 40620, 41565	5 MHz	QPSK	1 RB / 0 RB Offset
		39750 to 41490	39750, 40620, 41490	20 MHz	QPSK	1 RB / 0 RB Offset
B		39750 to 41490	40620	20 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25 deg. C, 65 % RH	3.85 Vdc	Karl Lee
Frequency Stability	25 deg. C, 65 % RH	3.85 Vdc	Vincent Huang
Occupied Bandwidth	25 deg. C, 65 % RH	3.85 Vdc	Vincent Huang
Out-of-Band Emissions	25 deg. C, 65 % RH	3.85 Vdc	Vincent Huang
Peak to Average Ratio	25 deg. C, 65 % RH	3.85 Vdc	Vincent Huang
Conducted Emission	25 deg. C, 65 % RH	3.85 Vdc	Vincent Huang
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee / Charles Hsiao

3.4 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

3.5 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 v02r02

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

4.1.2 Test Procedures

EIRP Measurement:

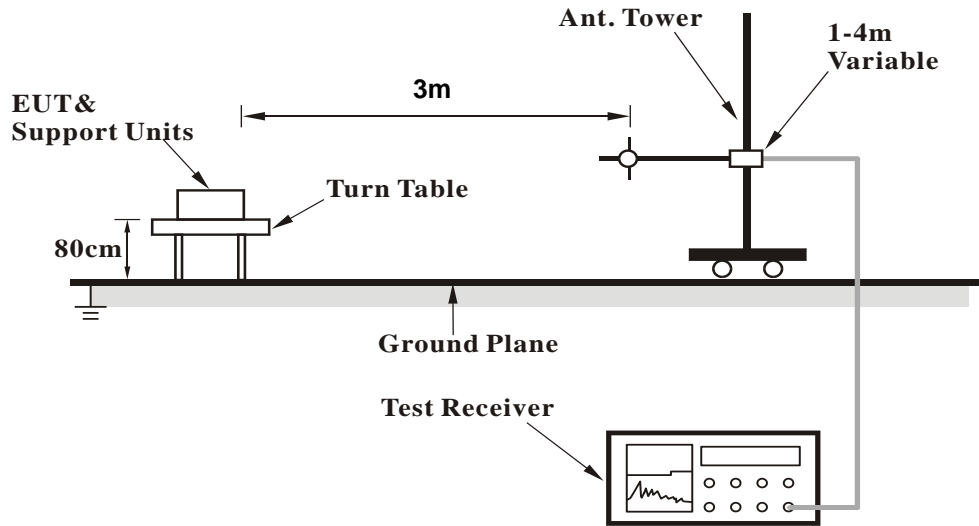
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value“ of step b. Record the power level of S.G.
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$

Conducted Power Measurement:

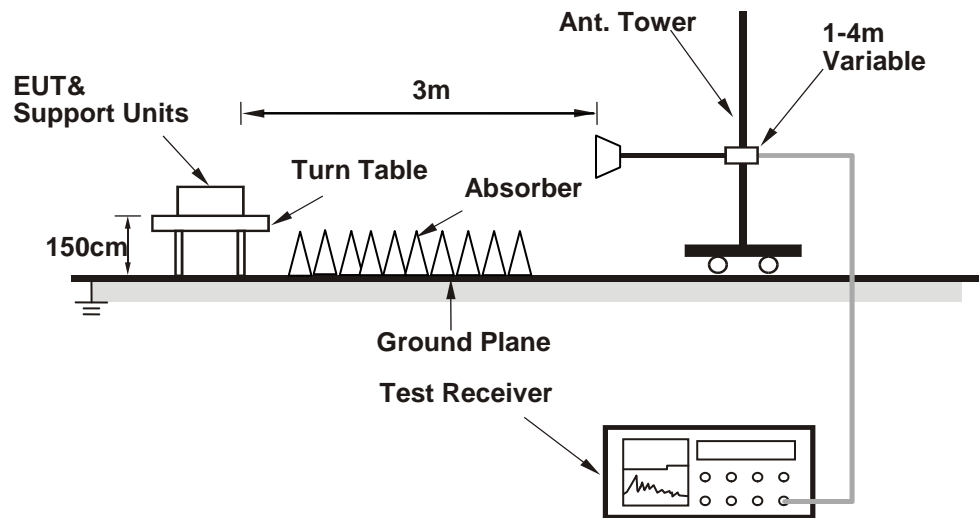
- a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
- b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 Test Setup

**EIRP / ERP Measurement:
<Radiated Emission below or equal 1 GHz>**

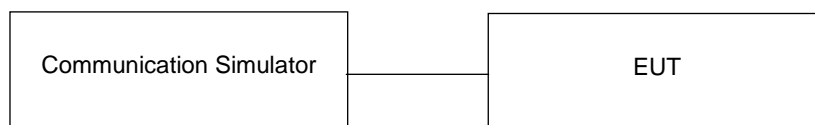


<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Conducted Power Measurement:



4.1.4 Test Results

Conducted Output Power (dBm)

LTE Band 7															
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
				20850	21100	21350						20825	21100	21375	
		Channel Frequency (MHz)	2510.0	2535.0	2560.0	Channel Frequency (MHz)	2507.5			2535.0	2562.5				
20M	QPSK	1	0	22.78	22.86	22.84	0	15M	QPSK	1	0	22.65	22.73	22.71	0
		1	50	22.96	22.93	22.92	0			1	37	22.83	22.80	22.79	0
		1	99	22.97	22.98	22.99	0			1	74	22.84	22.85	22.86	0
		50	0	21.89	21.96	21.97	1			36	0	21.76	21.83	21.84	1
		50	25	21.92	21.94	21.95	1			36	19	21.79	21.81	21.82	1
		50	50	21.96	21.98	21.99	1			36	39	21.83	21.85	21.86	1
	16QAM	100	0	21.93	21.94	21.96	1		75	0	21.80	21.81	21.83	1	
		1	0	21.75	21.83	21.81	1		16QAM	1	0	21.62	21.70	21.68	1
		1	50	21.93	21.90	21.89	1			1	37	21.80	21.77	21.76	1
		1	99	21.94	21.95	21.96	1			1	74	21.81	21.82	21.83	1
		50	0	20.86	20.93	20.94	2			36	0	20.73	20.80	20.81	2
		50	25	20.89	20.91	20.92	2			36	19	20.76	20.78	20.79	2
	50	50	20.93	20.95	20.96	2	36			39	20.80	20.82	20.83	2	
	64QAM	100	0	20.90	20.91	20.93	2		75	0	20.77	20.78	20.80	2	
		1	0	20.72	20.80	20.78	2		64QAM	1	0	20.59	20.67	20.65	2
		1	50	20.90	20.87	20.86	2			1	37	20.77	20.74	20.73	2
		1	99	20.91	20.92	20.93	2			1	74	20.78	20.79	20.80	2
		50	0	19.83	19.90	19.91	3			36	0	19.70	19.77	19.78	3
		50	25	19.86	19.88	19.89	3			36	19	19.73	19.75	19.76	3
	50	50	19.90	19.92	19.93	3	36			39	19.77	19.79	19.80	3	
	100	0	19.87	19.88	19.90	3	75		0	19.74	19.75	19.77	3		
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
				20800	21100	21400						20775	21100	21425	
		Channel Frequency (MHz)	2505.0	2535.0	2565.0	Channel Frequency (MHz)	2502.5			2535.0	2567.5				
10M	QPSK	1	0	21.85	21.93	21.91	0	5M	QPSK	1	0	21.74	21.82	21.80	0
		1	24	22.03	22.00	21.99	0			1	12	21.92	21.89	21.88	0
		1	49	22.04	22.05	22.06	0			1	24	21.93	21.94	21.95	0
		25	0	20.96	21.03	21.04	1			12	0	20.85	20.92	20.93	1
		25	12	20.99	21.01	21.02	1			12	6	20.88	20.90	20.91	1
		25	25	21.03	21.05	21.06	1			12	13	20.92	20.94	20.95	1
	16QAM	50	0	21.00	21.01	21.03	1		25	0	20.89	20.90	20.92	1	
		1	0	20.82	20.90	20.88	1		16QAM	1	0	20.71	20.79	20.77	1
		1	24	21.00	20.97	20.96	1			1	12	20.89	20.86	20.85	1
		1	49	21.01	21.02	21.03	1			1	24	20.90	20.91	20.92	1
		25	0	19.93	20.00	20.01	2			12	0	19.82	19.89	19.90	2
		25	12	19.96	19.98	19.99	2			12	6	19.85	19.87	19.88	2
	25	25	20.00	20.02	20.03	2	12			13	19.89	19.91	19.92	2	
	64QAM	50	0	19.97	19.98	20.00	2		25	0	19.86	19.87	19.89	2	
		1	0	19.79	19.87	19.85	2		64QAM	1	0	19.68	19.76	19.74	2
		1	24	19.97	19.94	19.93	2			1	12	19.86	19.83	19.82	2
		1	49	19.98	19.99	20.00	2			1	24	19.87	19.88	19.89	2
		25	0	18.90	18.97	18.98	3			12	0	18.79	18.86	18.87	3
		25	12	18.93	18.95	18.96	3			12	6	18.82	18.84	18.85	3
	25	25	18.97	18.99	19.00	3	12			13	18.86	18.88	18.89	3	
	50	0	18.94	18.95	18.97	3	25		0	18.83	18.84	18.86	3		

LTE Band 38																	
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)		
				37850	38000	38150						37825	38000	38175			
				Channel Frequency (MHz)	2580.0	2595.0						2610.0	2577.5	2595.0		2612.5	
20M	QPSK	1	0	23.57	23.59	23.52	0	15M	QPSK	1	0	23.43	23.45	23.38	0		
		1	50	23.54	23.52	23.29	0			1	37	23.40	23.38	23.15	0		
		1	99	23.51	23.51	23.23	0			1	74	23.37	23.37	23.09	0		
		50	0	22.56	22.64	22.51	1			36	0	22.42	22.50	22.37	1		
		50	25	22.54	22.59	22.45	1			36	19	22.40	22.45	22.31	1		
		50	50	22.51	22.51	22.33	1			36	39	22.37	22.37	22.19	1		
		100	0	22.55	22.62	22.41	1			75	0	22.41	22.48	22.27	1		
	16QAM	1	0	22.52	22.54	22.47	1		16QAM	1	0	22.38	22.40	22.33	1		
		1	50	22.49	22.47	22.24	1			1	37	22.35	22.33	22.10	1		
		1	99	22.46	22.46	22.18	1			1	74	22.32	22.32	22.04	1		
		50	0	21.51	21.59	21.46	2			36	0	21.37	21.45	21.32	2		
		50	25	21.49	21.54	21.40	2			36	19	21.35	21.40	21.26	2		
		50	50	21.46	21.46	21.28	2			36	39	21.32	21.32	21.14	2		
		100	0	21.50	21.57	21.36	2			75	0	21.36	21.43	21.22	2		
	64QAM	1	0	21.47	21.49	21.42	2		64QAM	1	0	21.33	21.35	21.28	2		
		1	50	21.44	21.42	21.19	2			1	37	21.30	21.28	21.05	2		
		1	99	21.41	21.41	21.13	2			1	74	21.27	21.27	20.99	2		
		50	0	20.46	20.54	20.41	3			36	0	20.32	20.40	20.27	3		
		50	25	20.44	20.49	20.35	3			36	19	20.30	20.35	20.21	3		
		50	50	20.41	20.41	20.23	3			36	39	20.27	20.27	20.09	3		
		100	0	20.45	20.52	20.31	3			75	0	20.31	20.38	20.17	3		
	BW	MCS Index	RB Size	RB Offset	Low	Mid	High		3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)
					37800	38000	38200							37775	38000	38225	
					Channel Frequency (MHz)	2575.0	2595.0							2615.0	2572.5	2595.0	
10M	QPSK	1	0	23.35	23.37	23.30	0	5M	QPSK	1	0	23.23	23.25	23.18	0		
		1	24	23.32	23.30	23.07	0			1	12	23.20	23.18	22.95	0		
		1	49	23.29	23.29	23.01	0			1	24	23.17	23.17	22.89	0		
		25	0	22.34	22.42	22.29	1			12	0	22.22	22.30	22.17	1		
		25	12	22.32	22.37	22.23	1			12	6	22.20	22.25	22.11	1		
		25	25	22.29	22.29	22.11	1			12	13	22.17	22.17	21.99	1		
		50	0	22.33	22.40	22.19	1			25	0	22.21	22.28	22.07	1		
	16QAM	1	0	22.30	22.32	22.25	1		16QAM	1	0	22.18	22.20	22.13	1		
		1	24	22.27	22.25	22.02	1			1	12	22.15	22.13	21.90	1		
		1	49	22.24	22.24	21.96	1			1	24	22.12	22.12	21.84	1		
		25	0	21.29	21.37	21.24	2			12	0	21.17	21.25	21.12	2		
		25	12	21.27	21.32	21.18	2			12	6	21.15	21.20	21.06	2		
		25	25	21.24	21.24	21.06	2			12	13	21.12	21.12	20.94	2		
		50	0	21.28	21.35	21.14	2			25	0	21.16	21.23	21.02	2		
	64QAM	1	0	21.25	21.27	21.20	2		64QAM	1	0	21.13	21.15	21.08	2		
		1	24	21.22	21.20	20.97	2			1	12	21.10	21.08	20.85	2		
		1	49	21.19	21.19	20.91	2			1	24	21.07	21.07	20.79	2		
		25	0	20.24	20.32	20.19	3			12	0	20.12	20.20	20.07	3		
		25	12	20.22	20.27	20.13	3			12	6	20.10	20.15	20.01	3		
		25	25	20.19	20.19	20.01	3			12	13	20.07	20.07	19.89	3		
		50	0	20.23	20.30	20.09	3			25	0	20.11	20.18	19.97	3		

LTE Band 41																
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	BW	MCS Index	RB Size	RB Offset	Low	Mid	High	3GPP MPR (dB)	
				39750	40620	41490						39725	40620	41515		
				Channel Frequency (MHz)	2506.0	2593.0						2680.0	Channel Frequency (MHz)	2503.5		2593.0
20M	QPSK	1	0	23.85	23.67	23.44	0	15M	QPSK	1	0	23.71	23.53	23.30	0	
		1	50	23.76	23.58	23.35	0			1	37	23.62	23.44	23.21	0	
		1	99	23.74	23.56	23.33	0			1	74	23.60	23.42	23.19	0	
		50	0	22.89	22.71	22.48	1			36	0	22.75	22.57	22.34	1	
		50	25	22.76	22.58	22.35	1			36	19	22.62	22.44	22.21	1	
		50	50	22.74	22.56	22.33	1			36	39	22.60	22.42	22.19	1	
	100	0	22.85	22.67	22.44	1	75		0	22.71	22.53	22.30	1			
	16QAM	1	0	22.80	22.62	22.39	1		16QAM	1	0	22.66	22.48	22.25	1	
		1	50	22.71	22.53	22.30	1			1	37	22.57	22.39	22.16	1	
		1	99	22.69	22.51	22.28	1			1	74	22.55	22.37	22.14	1	
		50	0	21.84	21.66	21.43	2			36	0	21.70	21.52	21.29	2	
		50	25	21.71	21.53	21.30	2			36	19	21.57	21.39	21.16	2	
		50	50	21.69	21.51	21.28	2			36	39	21.55	21.37	21.14	2	
	100	0	21.80	21.62	21.39	2	75		0	21.66	21.48	21.25	2			
	64QAM	1	0	21.78	21.60	21.37	2		64QAM	1	0	21.64	21.46	21.23	2	
		1	50	21.69	21.51	21.28	2			1	37	21.55	21.37	21.14	2	
		1	99	21.67	21.49	21.26	2			1	74	21.53	21.35	21.12	2	
		50	0	20.82	20.64	20.41	3			36	0	20.68	20.50	20.27	3	
		50	25	20.69	20.51	20.28	3			36	19	20.55	20.37	20.14	3	
		50	50	20.67	20.49	20.26	3			36	39	20.53	20.35	20.12	3	
	100	0	20.78	20.60	20.37	3	75		0	20.64	20.46	20.23	3			
39700	40620	41540	39675	40620	41565											
Channel Frequency (MHz)	2501.0	2593.0	2685.0	Channel Frequency (MHz)	2498.5	2593.0	2687.5									
10M	QPSK	1	0	23.59	23.41	23.18	0	5M	QPSK	1	0	23.51	23.33	23.10	0	
		1	24	23.50	23.32	23.09	0			1	12	23.42	23.24	23.01	0	
		1	49	23.48	23.30	23.07	0			1	24	23.40	23.22	22.99	0	
		25	0	22.63	22.45	22.22	1			12	0	22.55	22.37	22.14	1	
		25	12	22.50	22.32	22.09	1			12	6	22.42	22.24	22.01	1	
		25	25	22.48	22.30	22.07	1			12	13	22.40	22.22	21.99	1	
	50	0	22.59	22.41	22.18	1	25		0	22.51	22.33	22.10	1			
	16QAM	1	0	22.54	22.36	22.13	1		16QAM	1	0	22.46	22.28	22.05	1	
		1	24	22.45	22.27	22.04	1			1	12	22.37	22.19	21.96	1	
		1	49	22.43	22.25	22.02	1			1	24	22.35	22.17	21.94	1	
		25	0	21.58	21.40	21.17	2			12	0	21.50	21.32	21.09	2	
		25	12	21.45	21.27	21.04	2			12	6	21.37	21.19	20.96	2	
		25	25	21.43	21.25	21.02	2			12	13	21.35	21.17	20.94	2	
	50	0	21.54	21.36	21.13	2	25		0	21.46	21.28	21.05	2			
	64QAM	1	0	21.52	21.34	21.11	2		64QAM	1	0	21.44	21.26	21.03	2	
		1	24	21.43	21.25	21.02	2			1	12	21.35	21.17	20.94	2	
		1	49	21.41	21.23	21.00	2			1	24	21.33	21.15	20.92	2	
		25	0	20.56	20.38	20.15	3			12	0	20.48	20.30	20.07	3	
		25	12	20.43	20.25	20.02	3			12	6	20.35	20.17	19.94	3	
		25	25	20.41	20.23	20.00	3			12	13	20.33	20.15	19.92	3	
	50	0	20.52	20.34	20.11	3	25		0	20.44	20.26	20.03	3			

EIRP Power (dBm)

LTE Band 7							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20775	2502.5	-21.73	44.24	22.51	178.16	H
	21100	2535.0	-21.68	44.20	22.52	178.53	
	21425	2567.5	-22.31	44.80	22.49	177.46	
	20775	2502.5	-24.67	44.19	19.52	89.56	V
	21100	2535.0	-24.58	44.09	19.51	89.29	
	21425	2567.5	-25.03	44.50	19.47	88.49	
Channel Bandwidth: 5 MHz / 16QAM							
X	20775	2502.5	-22.75	44.24	21.49	140.86	H
	21100	2535.0	-22.69	44.20	21.51	141.48	
	21425	2567.5	-23.32	44.80	21.48	140.64	
	20775	2502.5	-25.65	44.19	18.54	71.47	V
	21100	2535.0	-25.60	44.09	18.49	70.60	
	21425	2567.5	-26.07	44.50	18.43	69.65	
Channel Bandwidth: 5 MHz / 64QAM							
X	20775	2502.5	-23.71	44.24	20.53	112.93	H
	21100	2535.0	-23.65	44.20	20.55	113.42	
	21425	2567.5	-24.36	44.80	20.44	110.69	
	20775	2502.5	-26.66	44.19	17.53	56.64	V
	21100	2535.0	-26.57	44.09	17.52	56.47	
	21425	2567.5	-27.05	44.50	17.45	55.58	

LTE Band 7							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20800	2505.0	-21.80	44.34	22.54	179.51	H
	21100	2535.0	-21.70	44.20	22.50	177.71	
	21400	2565.0	-22.19	44.72	22.53	179.18	
	20800	2505.0	-24.68	44.23	19.55	90.07	V
	21100	2535.0	-24.58	44.09	19.51	89.29	
	21400	2565.0	-24.89	44.41	19.52	89.45	
Channel Bandwidth: 10 MHz / 16QAM							
X	20800	2505.0	-22.83	44.34	21.51	141.61	H
	21100	2535.0	-22.71	44.20	21.49	140.83	
	21400	2565.0	-23.20	44.72	21.52	142.00	
	20800	2505.0	-25.65	44.23	18.58	72.04	V
	21100	2535.0	-25.63	44.09	18.46	70.11	
	21400	2565.0	-25.93	44.41	18.48	70.40	
Channel Bandwidth: 10 MHz / 64QAM							
X	20800	2505.0	-23.85	44.34	20.49	111.97	H
	21100	2535.0	-23.70	44.20	20.50	112.12	
	21400	2565.0	-24.21	44.72	20.51	112.54	
	20800	2505.0	-26.68	44.23	17.55	56.83	V
	21100	2535.0	-26.64	44.09	17.45	55.56	
	21400	2565.0	-26.95	44.41	17.46	55.67	

LTE Band 7							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20825	2507.5	-21.76	44.32	22.56	180.22	H
	21100	2535.0	-21.68	44.20	22.52	178.53	
	21375	2562.5	-22.30	44.85	22.55	179.80	
	20825	2507.5	-24.43	43.99	19.56	90.41	V
	21100	2535.0	-24.55	44.09	19.54	89.91	
	21375	2562.5	-24.98	44.51	19.53	89.74	
Channel Bandwidth: 15 MHz / 16QAM							
X	20825	2507.5	-22.75	44.32	21.57	143.48	H
	21100	2535.0	-22.63	44.20	21.57	143.45	
	21375	2562.5	-23.32	44.85	21.53	142.17	
	20825	2507.5	-25.46	43.99	18.53	71.32	V
	21100	2535.0	-25.57	44.09	18.52	71.09	
	21375	2562.5	-25.99	44.51	18.52	71.12	
Channel Bandwidth: 15 MHz / 64QAM							
X	20825	2507.5	-23.71	44.32	20.61	115.03	H
	21100	2535.0	-23.65	44.20	20.55	113.42	
	21375	2562.5	-24.28	44.85	20.57	113.97	
	20825	2507.5	-26.48	43.99	17.51	56.39	V
	21100	2535.0	-26.58	44.09	17.51	56.34	
	21375	2562.5	-27.02	44.51	17.49	56.10	

LTE Band 7							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20850.0	2510.0	-21.56	44.16	22.60	181.97	H
	21100.0	2535.0	-21.62	44.20	22.58	181.01	
	21350.0	2560.0	-22.26	44.81	22.55	179.76	
	20850.0	2510.0	-25.16	44.78	19.62	91.62	V
	21100.0	2535.0	-24.48	44.09	19.61	91.37	
	21350.0	2560.0	-25.16	44.72	19.56	90.36	
Channel Bandwidth: 20 MHz / 16QAM							
X	20850.0	2510.0	-22.54	44.16	21.62	145.21	H
	21100.0	2535.0	-22.60	44.20	21.60	144.44	
	21350.0	2560.0	-23.25	44.81	21.56	143.12	
	20850.0	2510.0	-26.10	44.78	18.68	73.79	V
	21100.0	2535.0	-25.43	44.09	18.66	73.42	
	21350.0	2560.0	-26.11	44.72	18.61	72.61	
Channel Bandwidth: 20 MHz / 64QAM							
X	20850.0	2510.0	-23.52	44.16	20.64	115.88	H
	21100.0	2535.0	-23.59	44.20	20.61	115.00	
	21350.0	2560.0	-24.22	44.81	20.59	114.47	
	20850.0	2510.0	-27.14	44.78	17.64	58.08	V
	21100.0	2535.0	-26.46	44.09	17.63	57.92	
	21350.0	2560.0	-27.15	44.72	17.57	57.15	

LTE Band 38							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	37775	2572.5	-22.20	44.24	22.04	159.88	H
	38000	2595.0	-22.16	44.20	22.04	159.85	
	38225	2617.5	-22.83	44.80	21.97	157.43	
	37775	2572.5	-25.18	44.19	19.01	79.63	V
	38000	2595.0	-25.06	44.09	19.03	79.95	
	38225	2617.5	-25.52	44.50	18.98	79.05	
Channel Bandwidth: 5 MHz / 16QAM							
X	37775	2572.5	-23.21	44.24	21.03	126.71	H
	38000	2595.0	-23.18	44.20	21.02	126.39	
	38225	2617.5	-23.85	44.80	20.95	124.48	
	37775	2572.5	-26.17	44.19	18.02	63.40	V
	38000	2595.0	-26.08	44.09	18.01	63.21	
	38225	2617.5	-26.55	44.50	17.95	62.36	
Channel Bandwidth: 5 MHz / 64QAM							
X	37775	2572.5	-24.22	44.24	20.02	100.42	H
	38000	2595.0	-24.17	44.20	20.03	100.62	
	38225	2617.5	-24.83	44.80	19.97	99.33	
	37775	2572.5	-27.18	44.19	17.01	50.25	V
	38000	2595.0	-27.09	44.09	17.00	50.10	
	38225	2617.5	-27.52	44.50	16.98	49.88	

LTE Band 38							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	37800	2575.0	-22.31	44.34	22.03	159.62	H
	38000	2595.0	-22.16	44.20	22.04	159.85	
	38200	2615.0	-22.72	44.72	22.00	158.60	
	37800	2575.0	-25.20	44.23	19.03	79.91	V
	38000	2595.0	-25.04	44.09	19.05	80.32	
	38200	2615.0	-25.40	44.41	19.01	79.54	
Channel Bandwidth: 10 MHz / 16QAM							
X	37800	2575.0	-23.32	44.34	21.02	126.50	H
	38000	2595.0	-23.18	44.20	21.02	126.39	
	38200	2615.0	-23.71	44.72	21.01	126.27	
	37800	2575.0	-26.22	44.23	18.01	63.18	V
	38000	2595.0	-26.05	44.09	18.04	63.65	
	38200	2615.0	-26.43	44.41	17.98	62.75	
Channel Bandwidth: 10 MHz / 64QAM							
X	37800	2575.0	-24.31	44.34	20.03	100.72	H
	38000	2595.0	-24.17	44.20	20.03	100.62	
	38200	2615.0	-24.73	44.72	19.99	99.84	
	37800	2575.0	-27.20	44.23	17.03	50.42	V
	38000	2595.0	-27.04	44.09	17.05	50.68	
	38200	2615.0	-27.45	44.41	16.96	49.61	

LTE Band 38							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	37825	2577.5	-22.24	44.32	22.08	161.36	H
	38000	2595.0	-22.10	44.20	22.10	162.07	
	38175	2612.5	-22.80	44.85	22.05	160.25	
	37825	2577.5	-24.92	43.99	19.07	80.76	V
	38000	2595.0	-25.01	44.09	19.08	80.87	
	38175	2612.5	-25.46	44.51	19.05	80.35	
Channel Bandwidth: 15 MHz / 16QAM							
X	37825	2577.5	-23.27	44.32	21.05	127.29	H
	38000	2595.0	-23.12	44.20	21.08	128.14	
	38175	2612.5	-23.85	44.85	21.00	125.83	
	37825	2577.5	-25.91	43.99	18.08	64.30	V
	38000	2595.0	-26.05	44.09	18.04	63.65	
	38175	2612.5	-26.48	44.51	18.03	63.53	
Channel Bandwidth: 15 MHz / 64QAM							
X	37825	2577.5	-24.25	44.32	20.07	101.58	H
	38000	2595.0	-24.10	44.20	20.10	102.26	
	38175	2612.5	-24.86	44.85	19.99	99.72	
	37825	2577.5	-26.93	43.99	17.06	50.84	V
	38000	2595.0	-27.01	44.09	17.08	51.03	
	38175	2612.5	-27.49	44.51	17.02	50.35	

LTE Band 38							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	37850	2580.0	-22.02	44.16	22.14	163.68	H
	38000	2595.0	-22.02	44.20	22.18	165.08	
	38150	2610.0	-22.70	44.81	22.11	162.44	
	37850	2580.0	-25.62	44.78	19.16	82.41	V
	38000	2595.0	-24.90	44.09	19.19	82.95	
	38150	2610.0	-25.64	44.72	19.08	80.91	
Channel Bandwidth: 20 MHz / 16QAM							
X	37850	2580.0	-23.04	44.16	21.12	129.42	H
	38000	2595.0	-23.05	44.20	21.15	130.23	
	38150	2610.0	-23.74	44.81	21.07	127.85	
	37850	2580.0	-26.64	44.78	18.14	65.16	V
	38000	2595.0	-25.94	44.09	18.15	65.28	
	38150	2610.0	-26.66	44.72	18.06	63.97	
Channel Bandwidth: 20 MHz / 64QAM							
X	37850	2580.0	-24.02	44.16	20.14	103.28	H
	38000	2595.0	-24.03	44.20	20.17	103.92	
	38150	2610.0	-24.71	44.81	20.10	102.26	
	37850	2580.0	-27.63	44.78	17.15	51.88	V
	38000	2595.0	-26.92	44.09	17.17	52.10	
	38150	2610.0	-27.64	44.72	17.08	51.05	

LTE Band 41							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	39675	2498.5	-20.72	44.24	23.52	224.80	H
	40620	2593.0	-20.67	44.20	23.53	225.27	
	41565	2687.5	-21.30	44.80	23.50	224.03	
	39675	2498.5	-23.68	44.19	20.51	112.49	V
	40620	2593.0	-23.54	44.09	20.55	113.45	
	41565	2687.5	-24.02	44.50	20.48	111.66	
Channel Bandwidth: 5 MHz / 16QAM							
X	39675	2498.5	-21.74	44.24	22.50	177.75	H
	40620	2593.0	-21.68	44.20	22.52	178.53	
	41565	2687.5	-22.32	44.80	22.48	177.05	
	39675	2498.5	-24.69	44.19	19.50	89.15	V
	40620	2593.0	-24.55	44.09	19.54	89.91	
	41565	2687.5	-25.04	44.50	19.46	88.29	
Channel Bandwidth: 5 MHz / 64QAM							
X	39675	2498.5	-22.71	44.24	21.53	142.17	H
	40620	2593.0	-22.65	44.20	21.55	142.79	
	41565	2687.5	-23.31	44.80	21.49	140.96	
	39675	2498.5	-25.68	44.19	18.51	70.97	V
	40620	2593.0	-25.53	44.09	18.56	71.75	
	41565	2687.5	-26.02	44.50	18.48	70.45	

LTE Band 41							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	39700	2501.0	-20.81	44.34	23.53	225.48	H
	40620	2593.0	-20.64	44.20	23.56	226.83	
	41540	2685.0	-21.18	44.72	23.54	226.10	
	39700	2501.0	-23.71	44.23	20.52	112.62	V
	40620	2593.0	-23.53	44.09	20.56	113.71	
	41540	2685.0	-23.88	44.41	20.53	112.88	
Channel Bandwidth: 10 MHz / 16QAM							
X	39700	2501.0	-21.82	44.34	22.52	178.69	H
	40620	2593.0	-21.66	44.20	22.54	179.35	
	41540	2685.0	-22.20	44.72	22.52	178.77	
	39700	2501.0	-24.72	44.23	19.51	89.25	V
	40620	2593.0	-24.56	44.09	19.53	89.70	
	41540	2685.0	-24.90	44.41	19.51	89.25	
Channel Bandwidth: 10 MHz / 64QAM							
X	39700	2501.0	-22.81	44.34	21.53	142.27	H
	40620	2593.0	-22.64	44.20	21.56	143.12	
	41540	2685.0	-23.21	44.72	21.51	141.68	
	39700	2501.0	-25.73	44.23	18.50	70.73	V
	40620	2593.0	-25.54	44.09	18.55	71.58	
	41540	2685.0	-25.93	44.41	18.48	70.40	

LTE Band 41							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	39725	2503.5	-20.76	44.32	23.56	226.88	H
	40620	2593.0	-20.60	44.20	23.60	228.93	
	41515	2682.5	-21.30	44.85	23.55	226.36	
	39725	2503.5	-23.44	43.99	20.55	113.55	V
	40620	2593.0	-23.50	44.09	20.59	114.50	
	41515	2682.5	-23.99	44.51	20.52	112.72	
Channel Bandwidth: 15 MHz / 16QAM							
X	39725	2503.5	-21.77	44.32	22.55	179.80	H
	40620	2593.0	-21.62	44.20	22.58	181.01	
	41515	2682.5	-22.33	44.85	22.52	178.57	
	39725	2503.5	-24.45	43.99	19.54	89.99	V
	40620	2593.0	-24.53	44.09	19.56	90.32	
	41515	2682.5	-25.02	44.51	19.49	88.92	
Channel Bandwidth: 15 MHz / 64QAM							
X	39725	2503.5	-22.73	44.32	21.59	144.15	H
	40620	2593.0	-22.54	44.20	21.66	146.45	
	41515	2682.5	-23.31	44.85	21.54	142.50	
	39725	2503.5	-25.43	43.99	18.56	71.81	V
	40620	2593.0	-25.51	44.09	18.58	72.08	
	41515	2682.5	-26.05	44.51	18.46	70.15	

LTE Band 41							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	39750	2506.0	-20.54	44.16	23.62	230.14	H
	40620	2593.0	-20.53	44.20	23.67	232.65	
	41490	2680.0	-21.20	44.81	23.61	229.46	
	39750	2506.0	-24.12	44.78	20.66	116.41	V
	40620	2593.0	-23.40	44.09	20.69	117.17	
	41490	2680.0	-24.10	44.72	20.62	115.35	
Channel Bandwidth: 20 MHz / 16QAM							
X	39750	2506.0	-21.55	44.16	22.61	182.39	H
	40620	2593.0	-21.53	44.20	22.67	184.80	
	41490	2680.0	-22.23	44.81	22.58	181.01	
	39750	2506.0	-25.16	44.78	19.62	91.62	V
	40620	2593.0	-24.42	44.09	19.67	92.64	
	41490	2680.0	-25.13	44.72	19.59	90.99	
Channel Bandwidth: 20 MHz / 64QAM							
X	39750	2506.0	-22.51	44.16	21.65	146.22	H
	40620	2593.0	-22.50	44.20	21.70	147.81	
	41490	2680.0	-23.21	44.81	21.60	144.44	
	39750	2506.0	-26.12	44.78	18.66	73.45	V
	40620	2593.0	-25.40	44.09	18.69	73.93	
	41490	2680.0	-26.11	44.72	18.61	72.61	

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

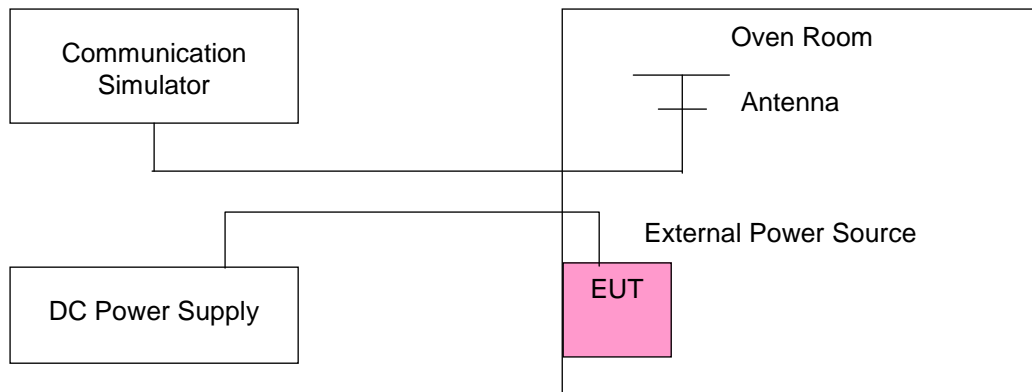
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

4.2.2 Test Procedure

- a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ± 0.5 °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2502.500002	0.0009	2567.500002	0.0009	2.5
3.6	2502.500002	0.0009	2567.500001	0.0005	2.5
4.38	2502.500001	0.0005	2567.500003	0.0011	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2502.500003	0.0011	2567.500002	0.0008	2.5
-20	2502.500002	0.0008	2567.500003	0.0013	2.5
-10	2502.500003	0.0012	2567.500003	0.0013	2.5
0	2502.500003	0.0011	2567.500002	0.0007	2.5
10	2502.499996	-0.0015	2567.499997	-0.0011	2.5
20	2502.499999	-0.0005	2567.499998	-0.0009	2.5
30	2502.499998	-0.0008	2567.499998	-0.0007	2.5
40	2502.499999	-0.0006	2567.499998	-0.0007	2.5
50	2502.499997	-0.0011	2567.499997	-0.0011	2.5
55	2502.500001	0.0004	2567.500001	0.0005	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2505.000001	0.0004	2565.000004	0.0014	2.5
3.6	2505.000003	0.0012	2565.000003	0.0012	2.5
4.38	2505.000004	0.0014	2565.000003	0.0011	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2505.000001	0.0004	2565.000001	0.0005	2.5
-20	2505.000003	0.0011	2565.000002	0.0007	2.5
-10	2505.000003	0.0012	2565.000003	0.0010	2.5
0	2505.000004	0.0016	2565.000002	0.0009	2.5
10	2504.999997	-0.0012	2564.999997	-0.0010	2.5
20	2504.999998	-0.0006	2564.999997	-0.0011	2.5
30	2504.999998	-0.0006	2564.999996	-0.0014	2.5
40	2504.999998	-0.0009	2564.999998	-0.0007	2.5
50	2504.999998	-0.0009	2564.999996	-0.0016	2.5
55	2505.000003	0.0013	2565.000002	0.0008	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2507.500002	0.0007	2562.500002	0.0008	2.5
3.6	2507.500001	0.0006	2562.500003	0.0012	2.5
4.38	2507.500002	0.0006	2562.500004	0.0014	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2507.500001	0.0005	2562.500003	0.0012	2.5
-20	2507.500004	0.0016	2562.500004	0.0014	2.5
-10	2507.500003	0.0012	2562.500004	0.0014	2.5
0	2507.500004	0.0015	2562.500004	0.0015	2.5
10	2507.499997	-0.0014	2562.499999	-0.0005	2.5
20	2507.499997	-0.0013	2562.499996	-0.0015	2.5
30	2507.499996	-0.0016	2562.499999	-0.0005	2.5
40	2507.499998	-0.0009	2562.499996	-0.0016	2.5
50	2507.499997	-0.0014	2562.499997	-0.0010	2.5
55	2507.500002	0.0009	2562.500002	0.0007	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2510.000004	0.0016	2560.000002	0.0008	2.5
3.6	2510.000002	0.0006	2560.000001	0.0004	2.5
4.38	2510.000002	0.0006	2560.000004	0.0016	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 7				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2510.000004	0.0014	2560.000003	0.0013	2.5
-20	2510.000003	0.0013	2560.000002	0.0009	2.5
-10	2510.000004	0.0014	2560.000003	0.0010	2.5
0	2510.000001	0.0004	2560.000003	0.0011	2.5
10	2509.999998	-0.0006	2559.999998	-0.0009	2.5
20	2509.999999	-0.0006	2559.999999	-0.0005	2.5
30	2509.999998	-0.0010	2559.999997	-0.0012	2.5
40	2509.999997	-0.0013	2559.999999	-0.0005	2.5
50	2509.999997	-0.0012	2559.999997	-0.0011	2.5
55	2510.000003	0.0011	2560.000002	0.0007	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2572.500004	0.0016	2617.500001	0.0005	2.5
3.6	2572.500003	0.0013	2617.500004	0.0015	2.5
4.38	2572.500002	0.0009	2617.500002	0.0008	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2572.500002	0.0009	2617.500003	0.0011	2.5
-20	2572.500001	0.0004	2617.500004	0.0013	2.5
-10	2572.500002	0.0006	2617.500002	0.0007	2.5
0	2572.500002	0.0009	2617.500002	0.0009	2.5
10	2572.499997	-0.0012	2617.499999	-0.0004	2.5
20	2572.499997	-0.0011	2617.499997	-0.0013	2.5
30	2572.499997	-0.0012	2617.499997	-0.0013	2.5
40	2572.499997	-0.0011	2617.499998	-0.0009	2.5
50	2572.499998	-0.0009	2617.499996	-0.0015	2.5
55	2572.500003	0.0012	2617.500004	0.0014	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2575.000003	0.0011	2615.000004	0.0014	2.5
3.6	2575.000003	0.0011	2615.000004	0.0013	2.5
4.38	2575.000003	0.0012	2615.000002	0.0007	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2575.000003	0.0010	2615.000002	0.0007	2.5
-20	2575.000004	0.0015	2615.000002	0.0008	2.5
-10	2575.000002	0.0009	2615.000002	0.0009	2.5
0	2575.000003	0.0010	2615.000002	0.0007	2.5
10	2574.999997	-0.0010	2614.999999	-0.0005	2.5
20	2574.999998	-0.0009	2614.999997	-0.0012	2.5
30	2574.999998	-0.0007	2614.999998	-0.0008	2.5
40	2574.999999	-0.0004	2614.999999	-0.0006	2.5
50	2574.999998	-0.0009	2614.999999	-0.0005	2.5
55	2575.000001	0.0005	2615.000001	0.0004	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2577.500002	0.0007	2612.500002	0.0009	2.5
3.6	2577.500002	0.0008	2612.500004	0.0015	2.5
4.38	2577.500003	0.0011	2612.500002	0.0006	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2577.500003	0.0010	2612.500003	0.0011	2.5
-20	2577.500003	0.0010	2612.500004	0.0015	2.5
-10	2577.500004	0.0016	2612.500002	0.0008	2.5
0	2577.500001	0.0005	2612.500004	0.0015	2.5
10	2577.499998	-0.0007	2612.499999	-0.0006	2.5
20	2577.499998	-0.0009	2612.499997	-0.0013	2.5
30	2577.499997	-0.0013	2612.499997	-0.0012	2.5
40	2577.499997	-0.0010	2612.499998	-0.0006	2.5
50	2577.499997	-0.0013	2612.499998	-0.0006	2.5
55	2577.500002	0.0009	2612.500004	0.0014	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2580.000002	0.0006	2610.000002	0.0008	2.5
3.6	2580.000004	0.0016	2610.000003	0.0010	2.5
4.38	2580.000002	0.0009	2610.000001	0.0004	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 38				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2580.000004	0.0014	2610.000002	0.0007	2.5
-20	2580.000002	0.0009	2610.000003	0.0010	2.5
-10	2580.000001	0.0005	2610.000002	0.0006	2.5
0	2580.000002	0.0006	2610.000002	0.0006	2.5
10	2579.999997	-0.0011	2609.999999	-0.0005	2.5
20	2579.999998	-0.0008	2609.999996	-0.0015	2.5
30	2579.999997	-0.0013	2609.999997	-0.0011	2.5
40	2579.999999	-0.0004	2609.999998	-0.0009	2.5
50	2579.999997	-0.0012	2609.999998	-0.0007	2.5
55	2580.000002	0.0008	2610.000004	0.0013	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 41				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2498.500003	0.0012	2687.500002	0.0008	2.5
3.6	2498.500003	0.0011	2687.500002	0.0009	2.5
4.38	2498.500003	0.0014	2687.500002	0.0007	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 41				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2498.500004	0.0014	2687.500003	0.0012	2.5
-20	2498.500004	0.0016	2687.500002	0.0006	2.5
-10	2498.500002	0.0007	2687.500003	0.0010	2.5
0	2498.500004	0.0015	2687.500002	0.0008	2.5
10	2498.499998	-0.0008	2687.499998	-0.0009	2.5
20	2498.499997	-0.0011	2687.499999	-0.0005	2.5
30	2498.499999	-0.0005	2687.499998	-0.0009	2.5
40	2498.499999	-0.0006	2687.499998	-0.0009	2.5
50	2498.499999	-0.0005	2687.499996	-0.0014	2.5
55	2498.500002	0.0008	2687.500003	0.0013	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 41				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2501.000004	0.0016	2685.000003	0.0012	2.5
3.6	2501.000004	0.0015	2685.000001	0.0005	2.5
4.38	2501.000001	0.0004	2685.000001	0.0005	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 41				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2501.000004	0.0015	2685.000002	0.0006	2.5
-20	2501.000004	0.0015	2685.000002	0.0008	2.5
-10	2501.000001	0.0005	2685.000002	0.0009	2.5
0	2501.000002	0.0008	2685.000002	0.0008	2.5
10	2500.999998	-0.0008	2684.999998	-0.0006	2.5
20	2500.999996	-0.0015	2684.999996	-0.0014	2.5
30	2500.999999	-0.0006	2684.999997	-0.0012	2.5
40	2500.999998	-0.0010	2684.999996	-0.0014	2.5
50	2500.999998	-0.0009	2684.999997	-0.0010	2.5
55	2501.000004	0.0014	2685.000004	0.0014	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 41				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2503.500003	0.0013	2682.500003	0.0010	2.5
3.6	2503.500003	0.0012	2682.500002	0.0006	2.5
4.38	2503.500002	0.0008	2682.500002	0.0009	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 41				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2503.500002	0.0008	2682.500004	0.0013	2.5
-20	2503.500004	0.0014	2682.500003	0.0010	2.5
-10	2503.500003	0.0010	2682.500002	0.0008	2.5
0	2503.500002	0.0008	2682.500001	0.0005	2.5
10	2503.499999	-0.0006	2682.499997	-0.0013	2.5
20	2503.499998	-0.0006	2682.499997	-0.0010	2.5
30	2503.499998	-0.0008	2682.499997	-0.0012	2.5
40	2503.499996	-0.0015	2682.499998	-0.0007	2.5
50	2503.499997	-0.0012	2682.499998	-0.0007	2.5
55	2503.500003	0.0012	2682.500003	0.0012	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 41				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.85	2506.000001	0.0005	2680.000001	0.0004	2.5
3.6	2506.000001	0.0005	2680.000002	0.0008	2.5
4.38	2506.000003	0.0012	2680.000002	0.0006	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.6 Vdc to 4.38 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 41				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2506.000002	0.0006	2680.000001	0.0005	2.5
-20	2506.000002	0.0006	2680.000001	0.0004	2.5
-10	2506.000002	0.0008	2680.000004	0.0013	2.5
0	2506.000001	0.0005	2680.000002	0.0006	2.5
10	2505.999997	-0.0014	2679.999998	-0.0009	2.5
20	2505.999997	-0.0010	2679.999996	-0.0015	2.5
30	2505.999999	-0.0004	2679.999998	-0.0008	2.5
40	2505.999997	-0.0010	2679.999999	-0.0004	2.5
50	2505.999998	-0.0009	2679.999997	-0.0012	2.5
55	2506.000003	0.0010	2680.000001	0.0005	2.5

4.3 Occupied Bandwidth Measurement

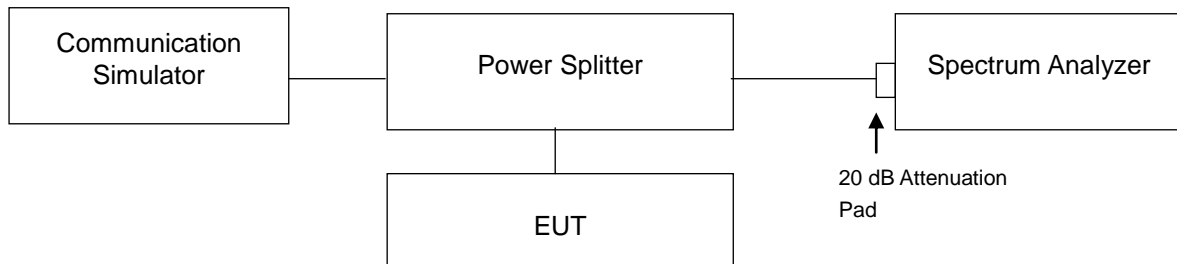
4.3.1 Limits of Occupied Bandwidth Measurement

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.3.2 Test Procedure

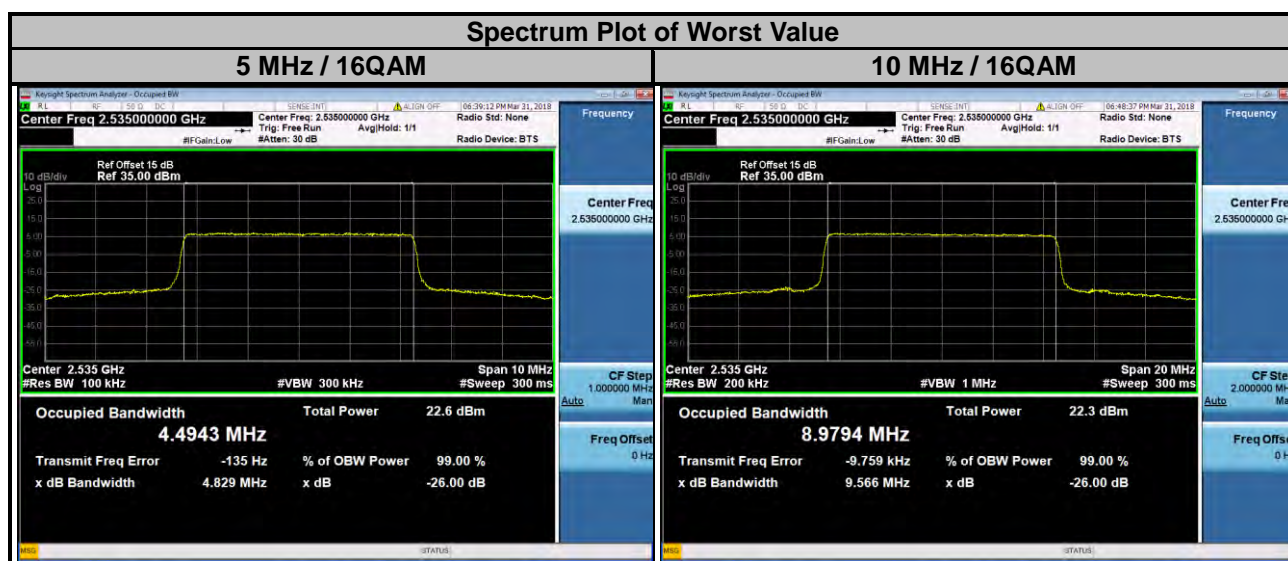
- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.3 Test Setup



4.3.4 Test Result

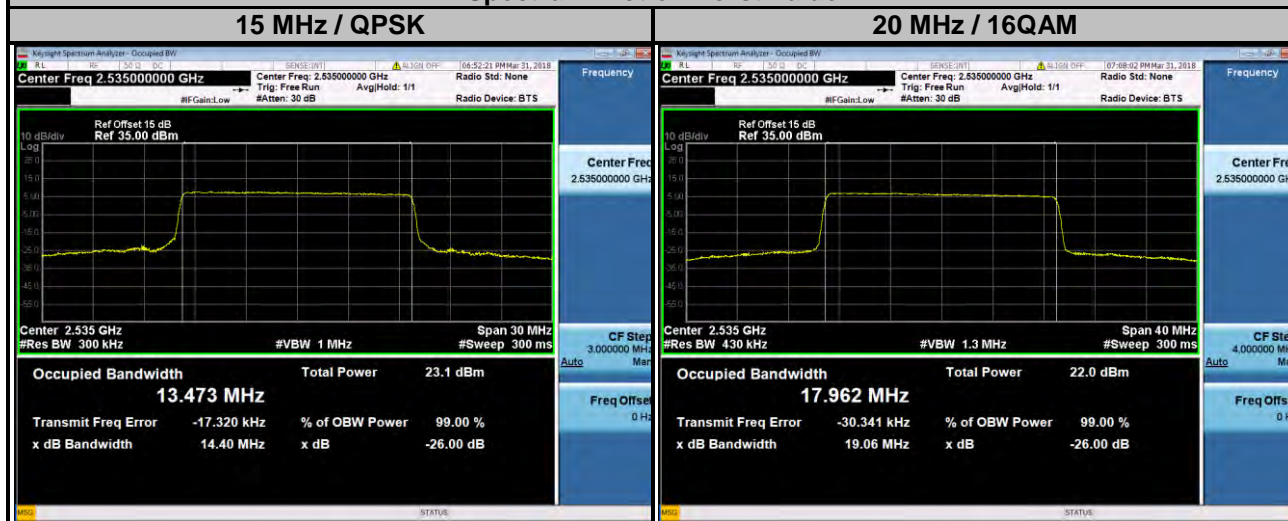
LTE Band 7									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20775	2502.5	4.4895	4.4911	4.4895	20800	2505.0	8.9674	8.9734	8.9699
21100	2535.0	4.4916	4.4943	4.4933	21100	2535.0	8.9761	8.9794	8.9719
21425	2567.5	4.4883	4.4906	4.4932	21400	2565.0	8.9596	8.9656	8.9640



LTE Band 7

Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20825	2507.5	13.455	13.450	13.443	20850	2510.0	17.913	17.931	17.932
21100	2535.0	13.473	13.466	13.454	21100	2535.0	17.940	17.962	17.954
21375	2562.5	13.444	13.434	13.431	21350	2560.0	17.891	17.918	17.909

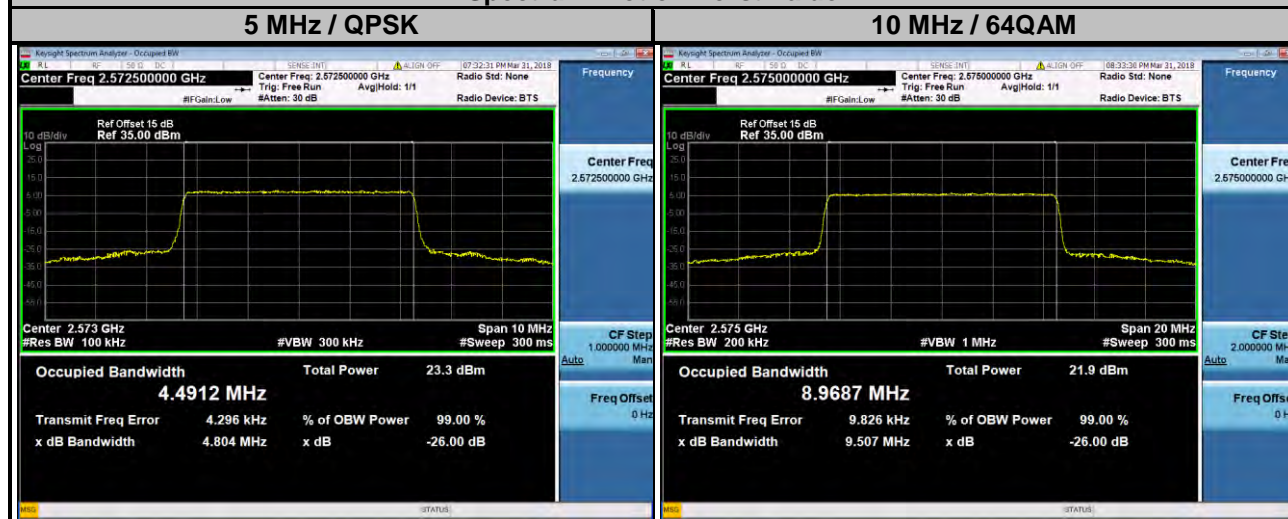
Spectrum Plot of Worst Value



LTE Band 38

Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
37775	2572.5	4.4912	4.4907	4.4869	37800	2575.0	8.9538	8.9668	8.9687
38000	2595.0	4.4886	4.4893	4.4813	38000	2595.0	8.9555	8.9626	8.9651
38225	2617.5	4.4904	4.4892	4.4861	38200	2615.0	8.9557	8.9636	8.9650

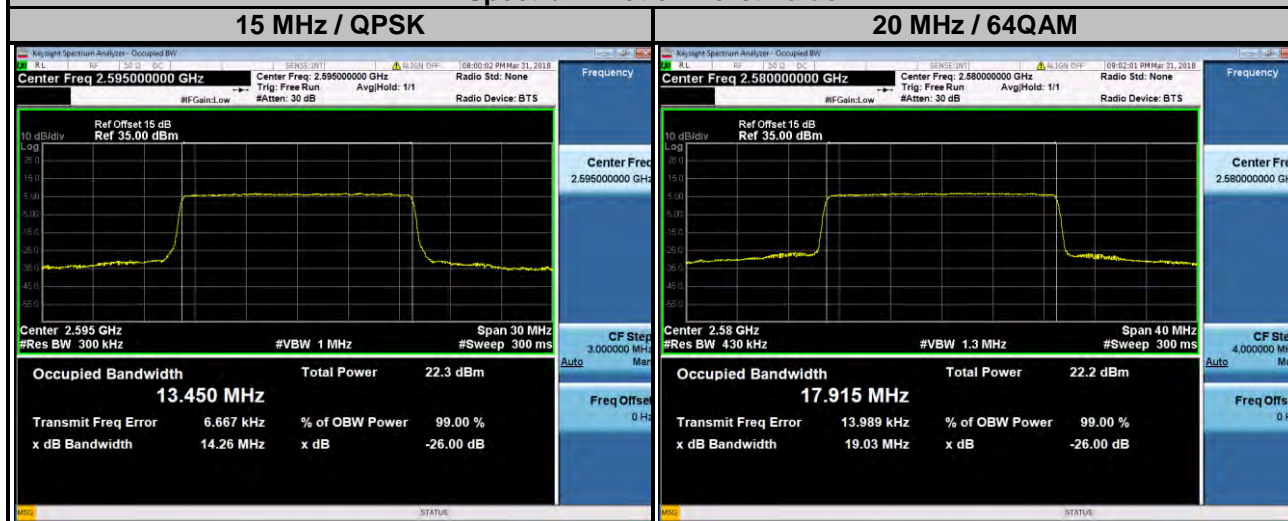
Spectrum Plot of Worst Value



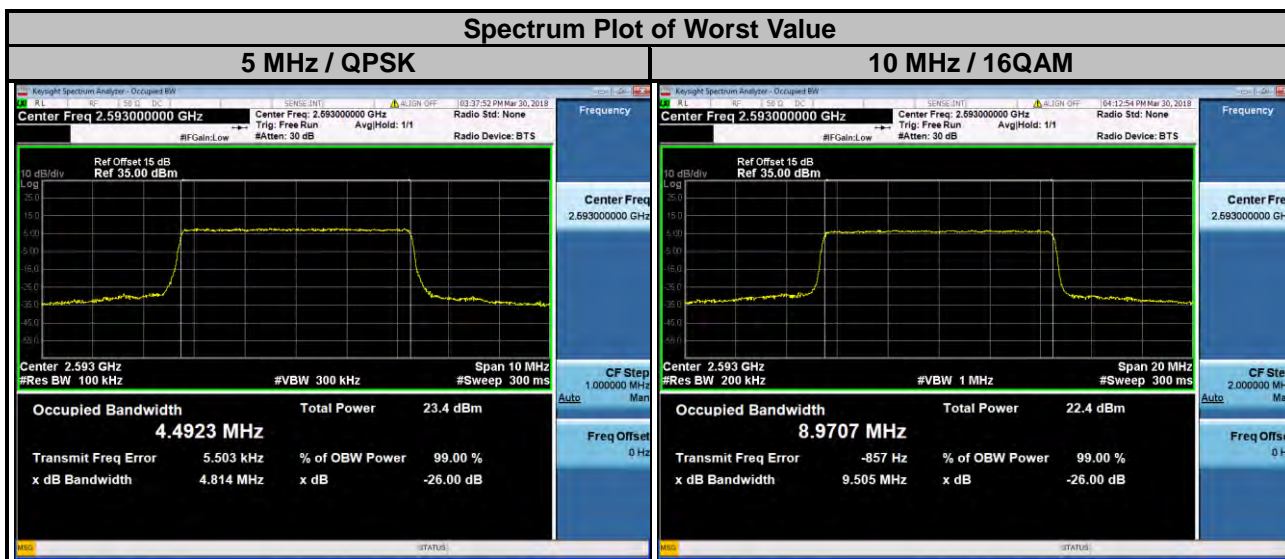
LTE Band 38

Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
37825	2577.5	13.448	13.442	13.439	37850	2580.0	17.906	17.903	17.915
38000	2595.0	13.450	13.437	13.435	38000	2595.0	17.905	17.901	17.911
38175	2612.5	13.436	13.437	13.435	38150	2610.0	17.909	17.907	17.914

Spectrum Plot of Worst Value



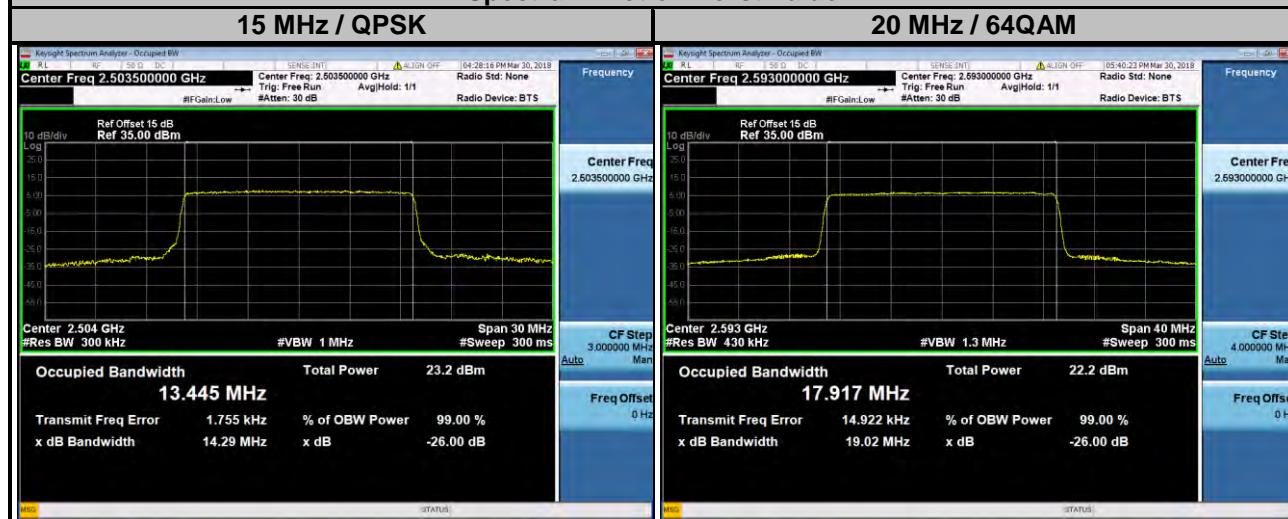
LTE Band 41									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
39675	2498.5	4.4887	4.4892	4.4851	39700	2501.0	8.9471	8.9650	8.9636
40620	2593.0	4.4923	4.4892	4.4845	40620	2593.0	8.9558	8.9707	8.9643
41565	2687.5	4.4914	4.4909	4.4861	41540	2685.0	8.9500	8.9621	8.9648



LTE Band 41

Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)			Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
39725	2503.5	13.445	13.423	13.434	39750	2506.0	17.901	17.884	17.897
40620	2593.0	13.440	13.432	13.438	40620	2593.0	17.907	17.911	17.917
41515	2682.5	13.440	13.443	13.434	41490	2680.0	17.865	17.857	17.871

Spectrum Plot of Worst Value

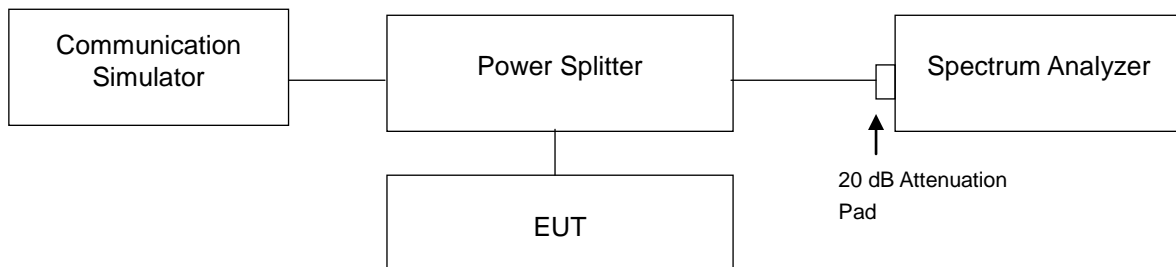


4.4 Out-of-Band Emissions Measurement

4.4.1 Limits of Out-of-Band Emissions Measurement

According to FCC 27.53(l)(4) specified that power of any emission outside of the channel edge must be attenuated below the transmitting power (P) by a 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. In addition, the attenuation factor shall not be less that $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed.

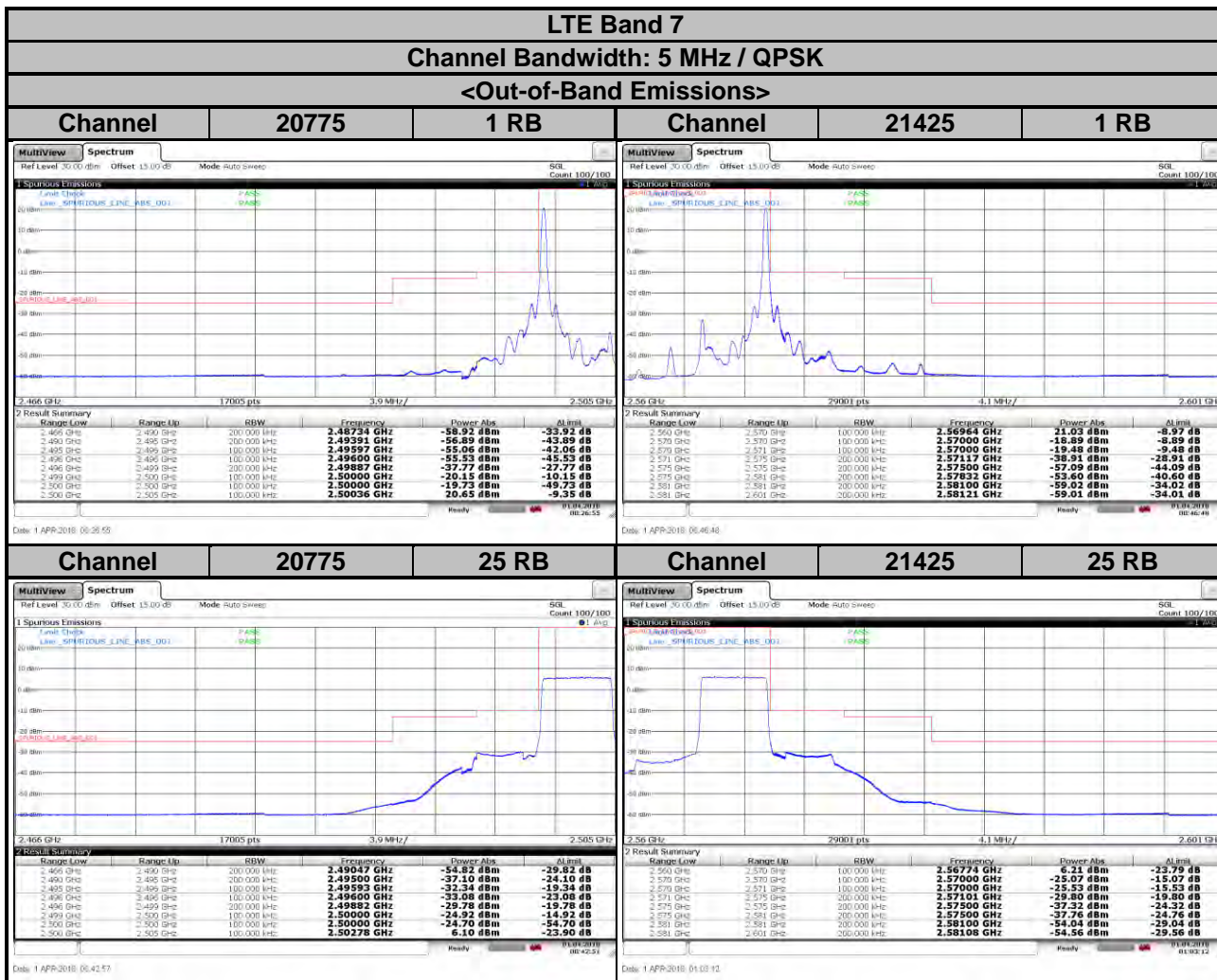
4.4.2 Test Setup



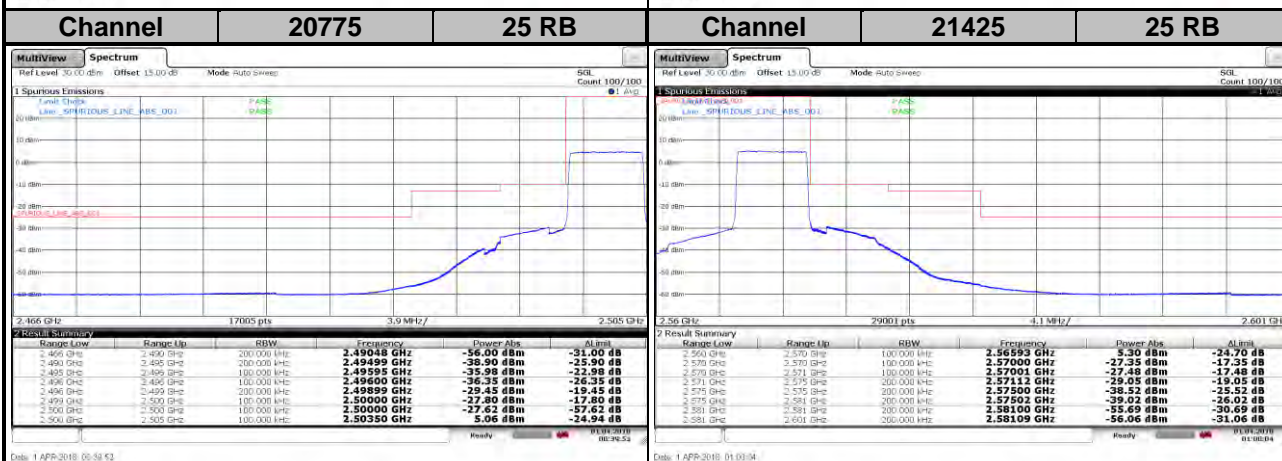
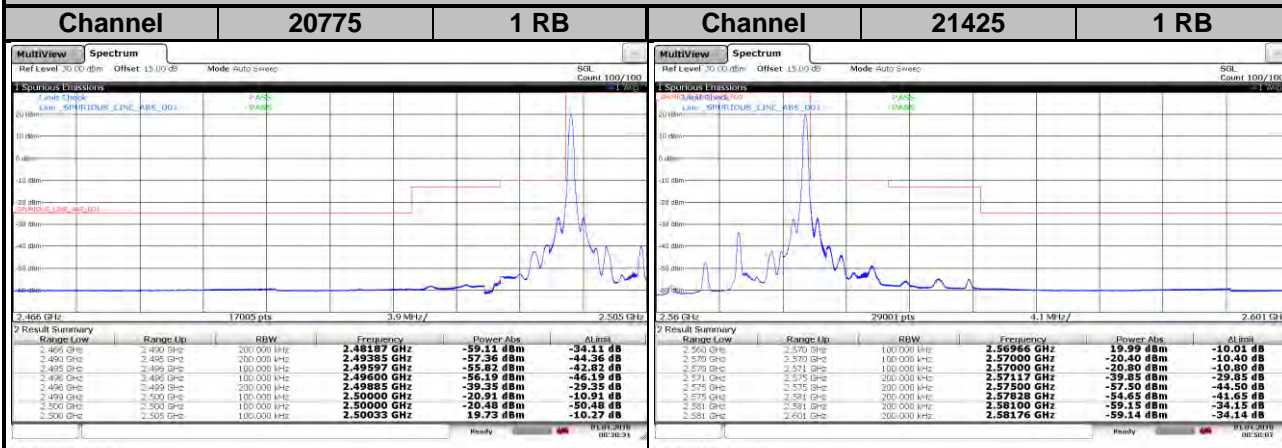
4.4.3 Test Procedures

- a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range).
- b. The out-of-band emissions measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. Record the max. trace plot into the test report.

4.4.4 Test Results

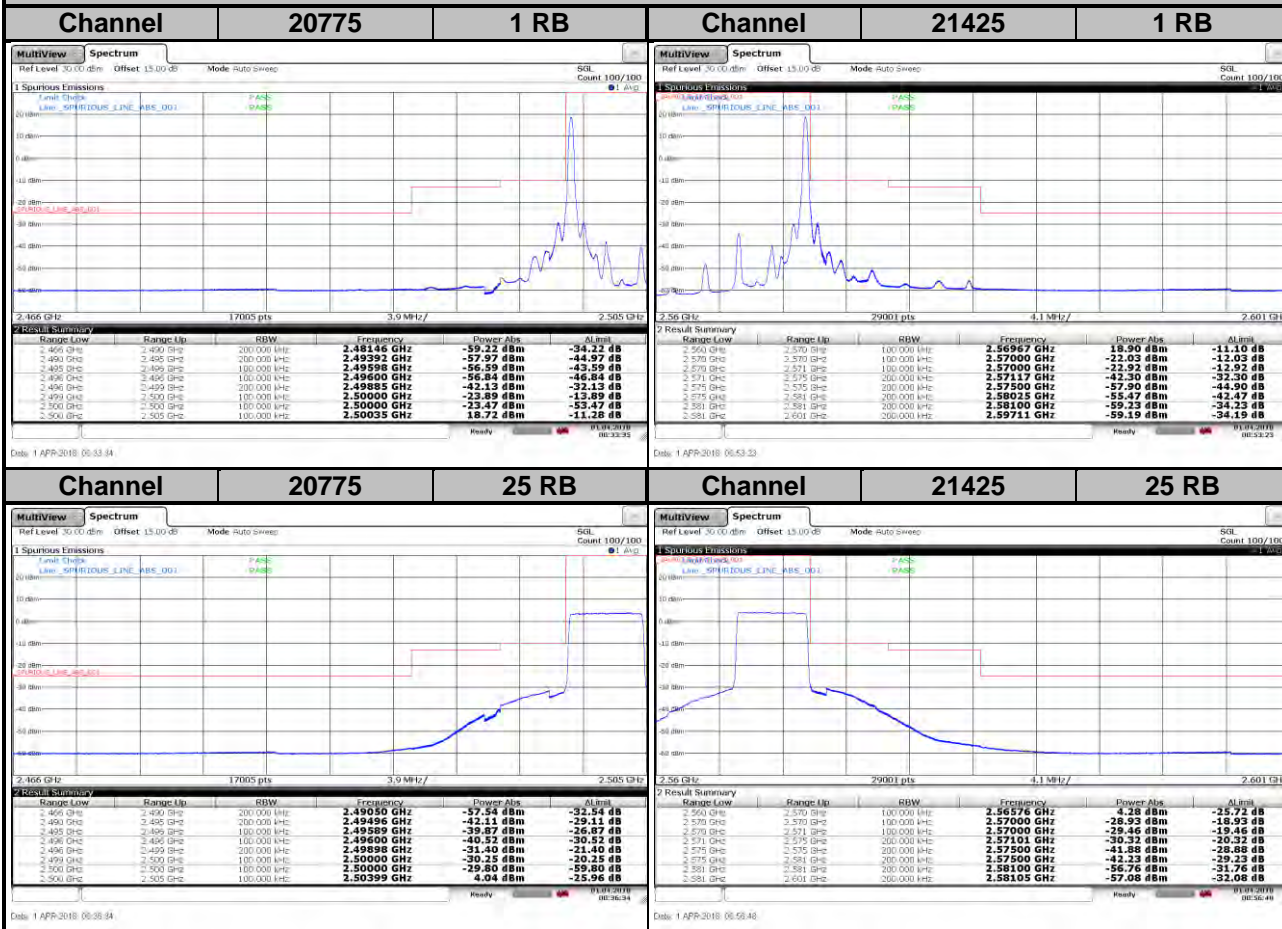


LTE Band 7
Channel Bandwidth: 5 MHz / 16QAM
<Out-of-Band Emissions>



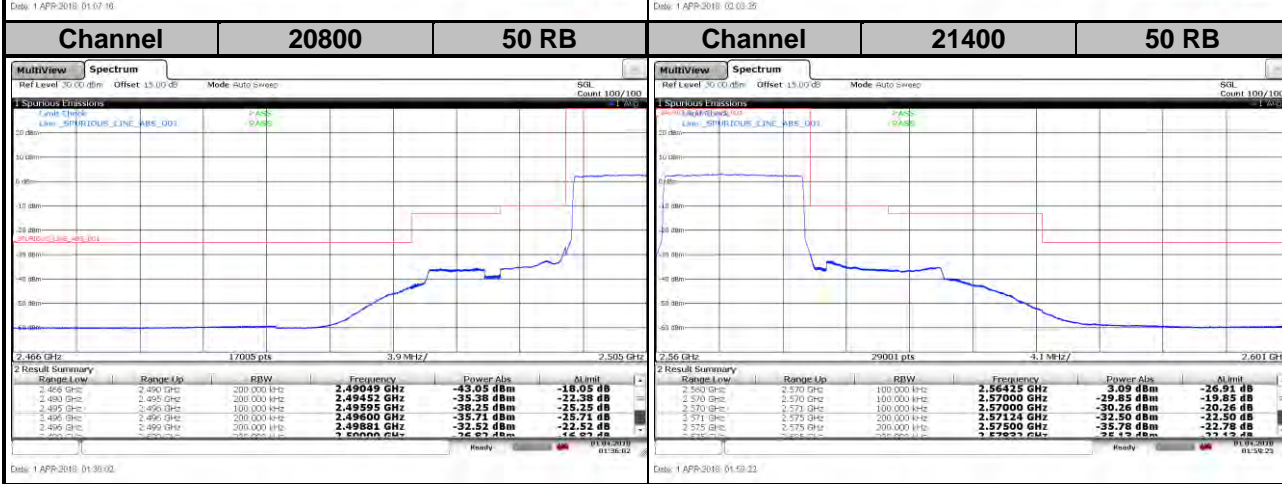
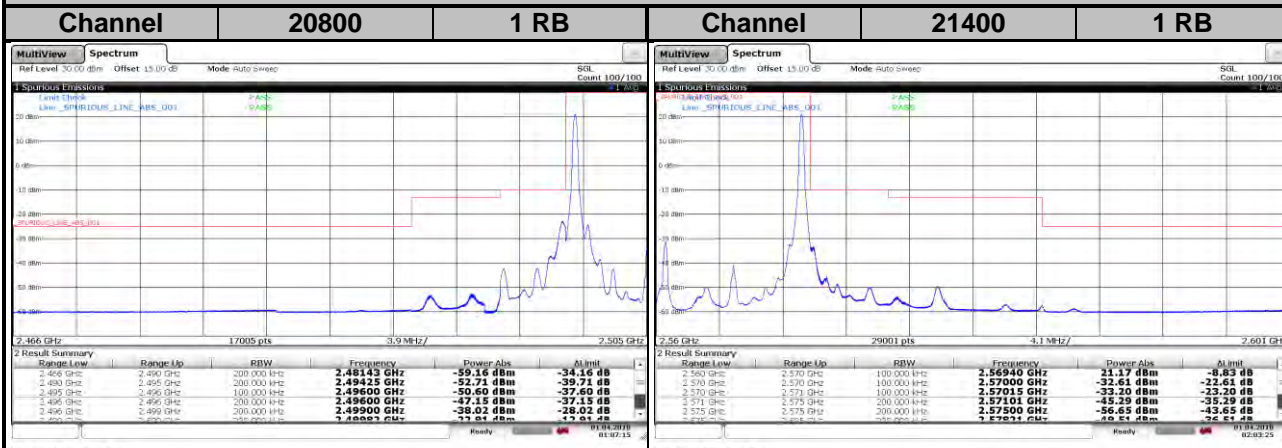
LTE Band 7
Channel Bandwidth: 5 MHz / 64QAM

<Out-of-Band Emissions>

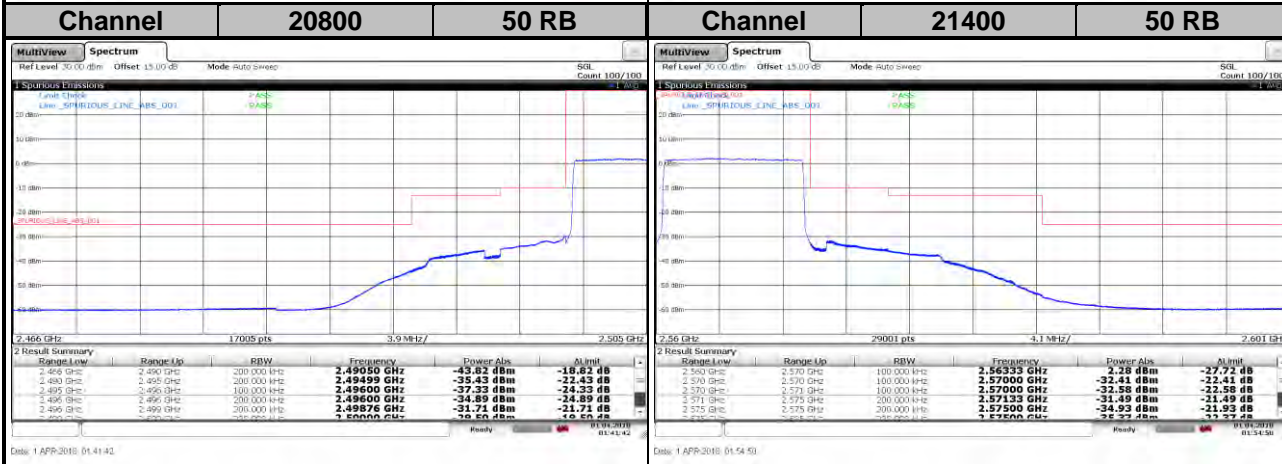
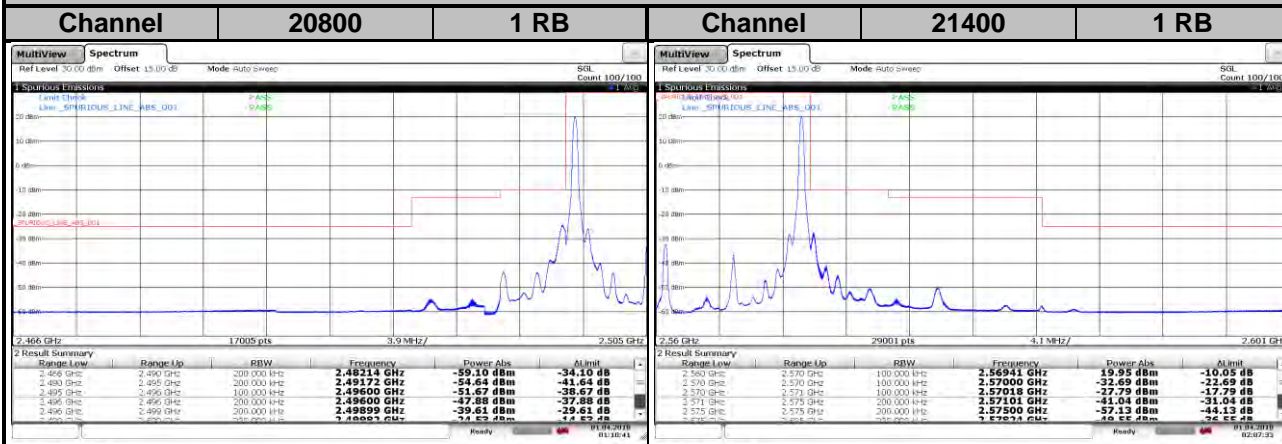


LTE Band 7
Channel Bandwidth: 10 MHz / QPSK

<Out-of-Band Emissions>

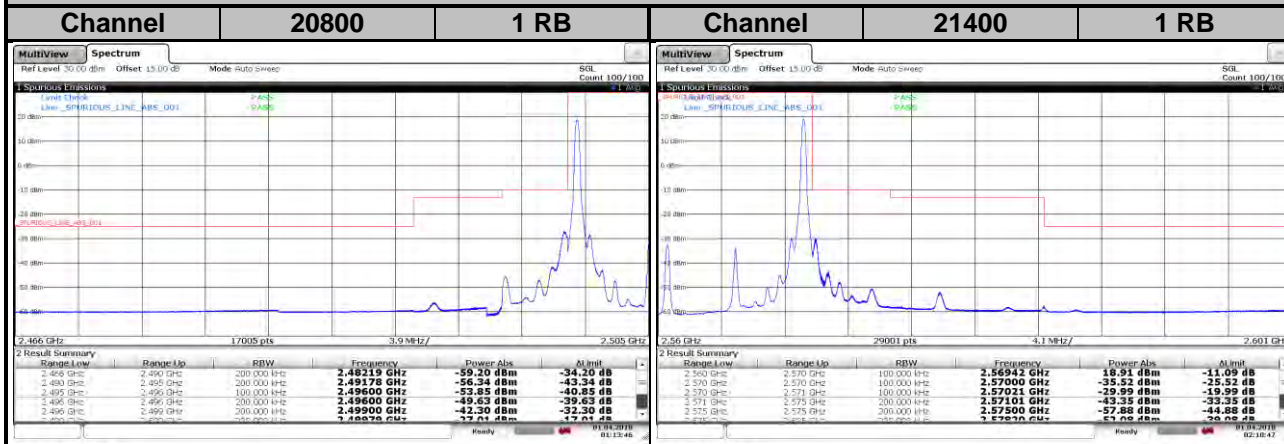


LTE Band 7
Channel Bandwidth: 10 MHz / 16QAM
<Out-of-Band Emissions>

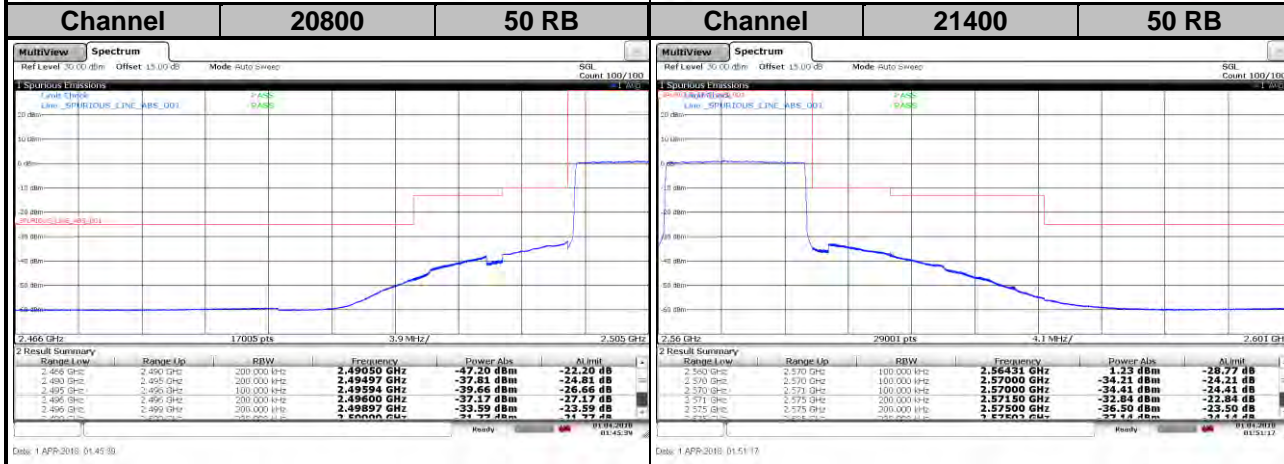


LTE Band 7
Channel Bandwidth: 10 MHz / 64QAM

<Out-of-Band Emissions>

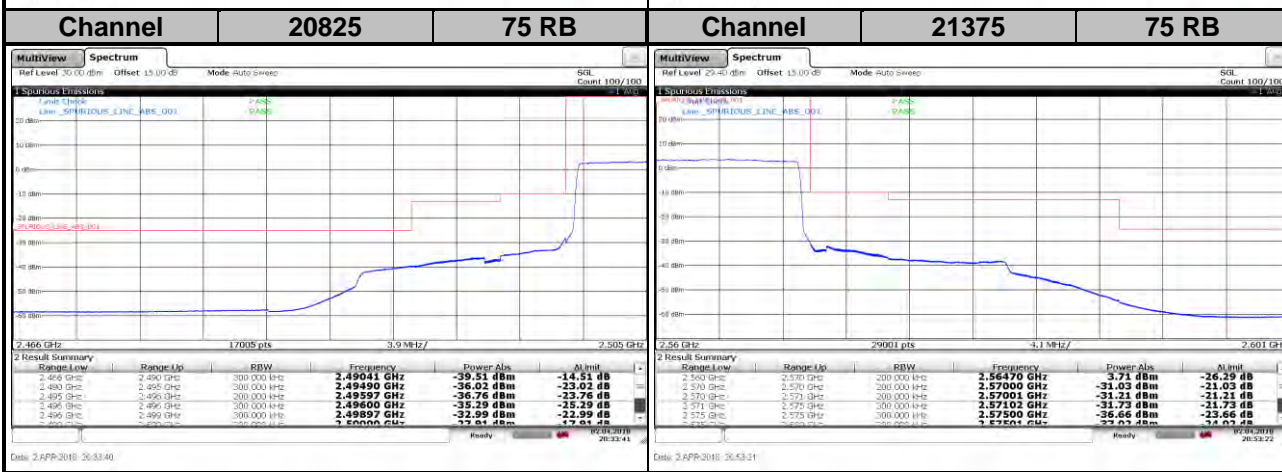
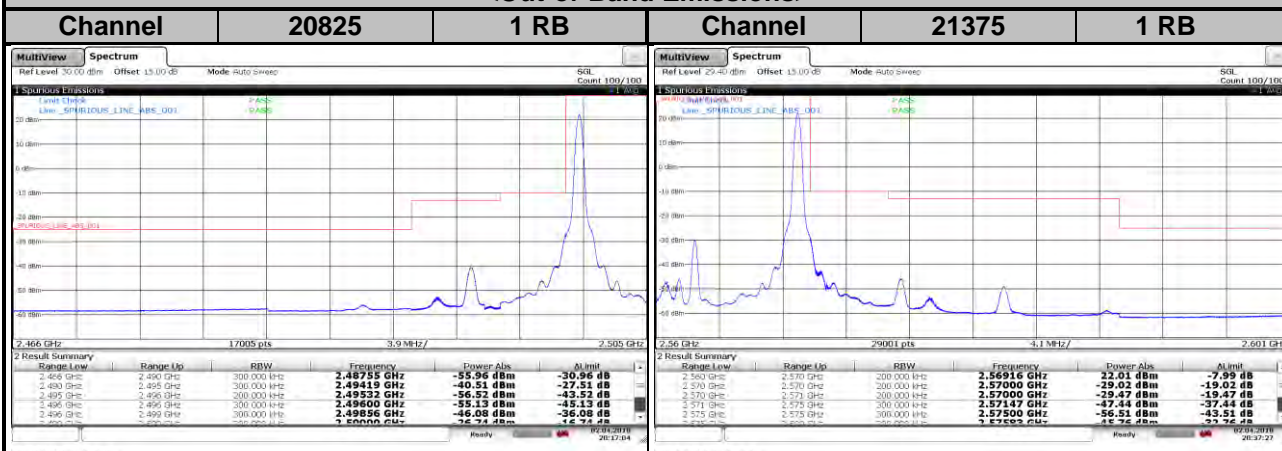


Date: 1 APR 2018 01:13:48 | Date: 1 APR 2018 02:10:47

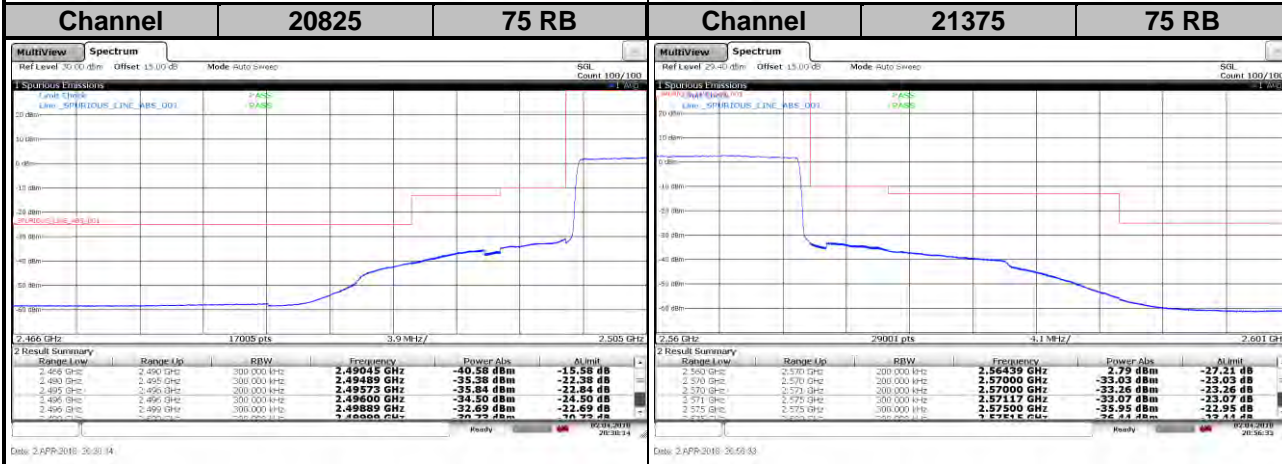
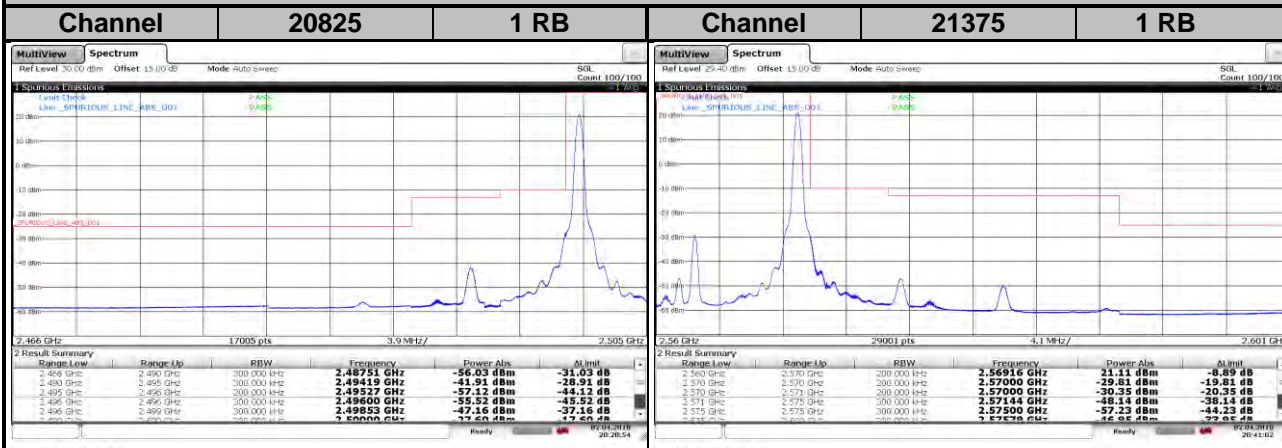


Date: 1 APR 2018 01:45:30 | Date: 1 APR 2018 01:51:17

LTE Band 7
Channel Bandwidth: 15 MHz / QPSK
<Out-of-Band Emissions>

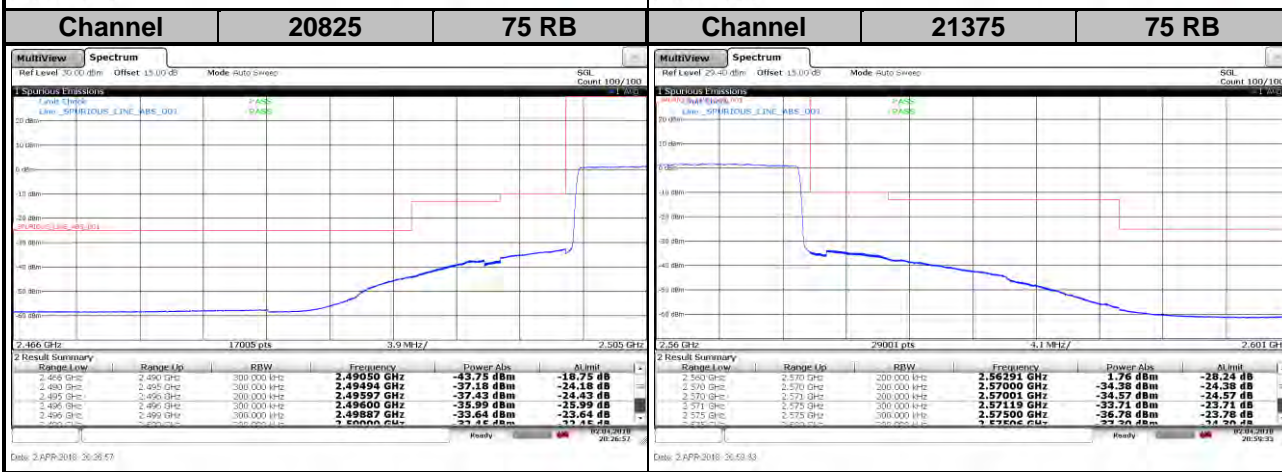
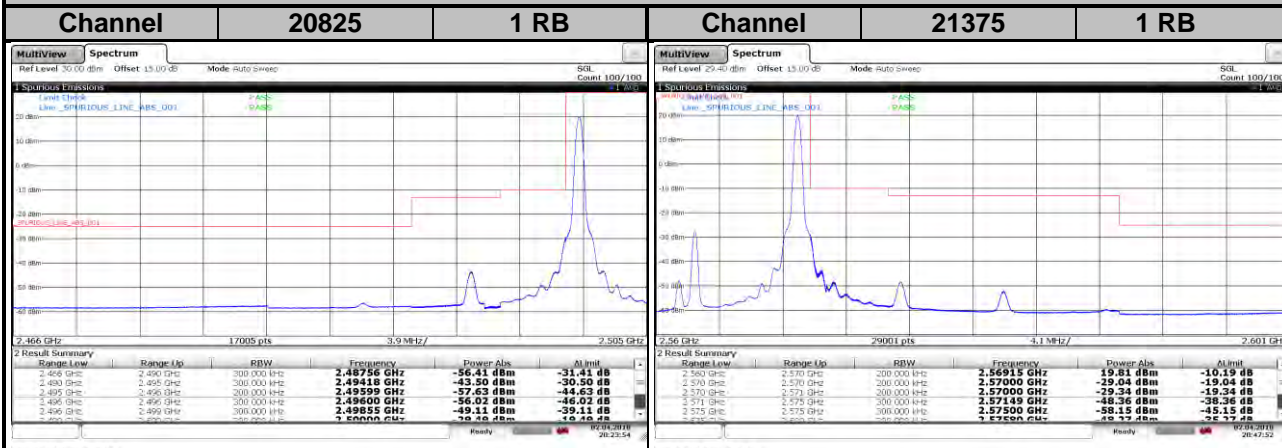


LTE Band 7
Channel Bandwidth: 15 MHz / 16QAM
<Out-of-Band Emissions>



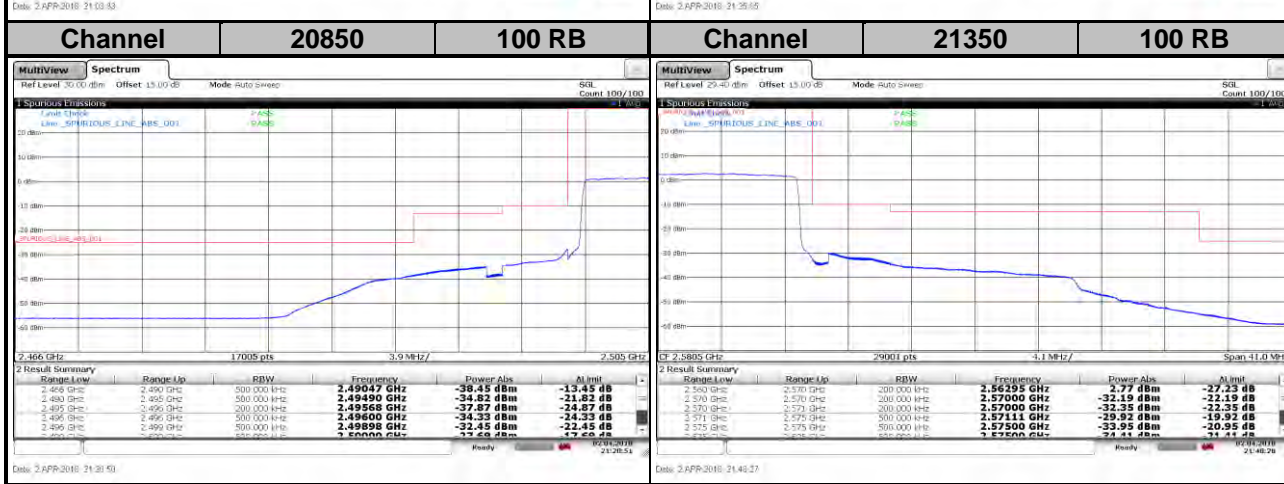
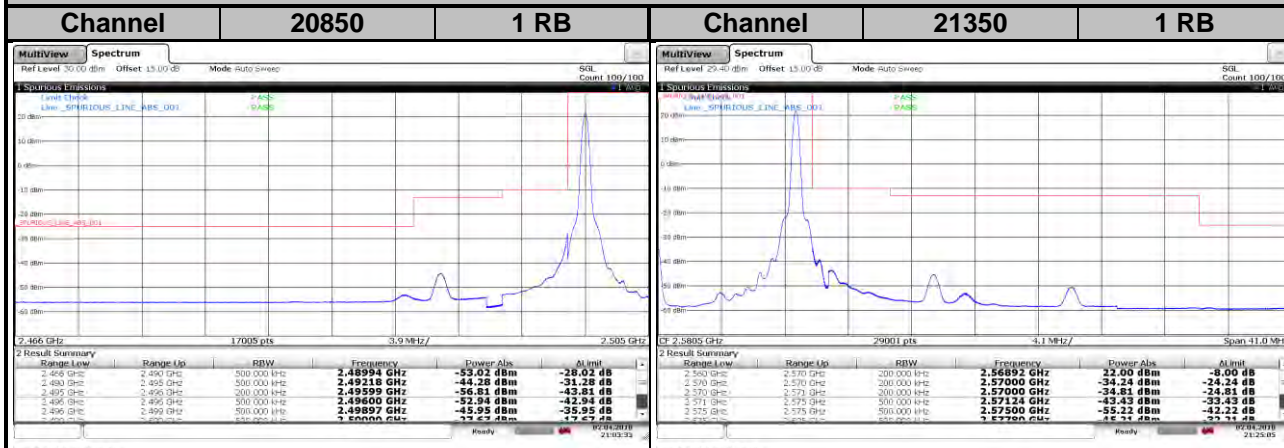
LTE Band 7
Channel Bandwidth: 15 MHz / 64QAM

<Out-of-Band Emissions>



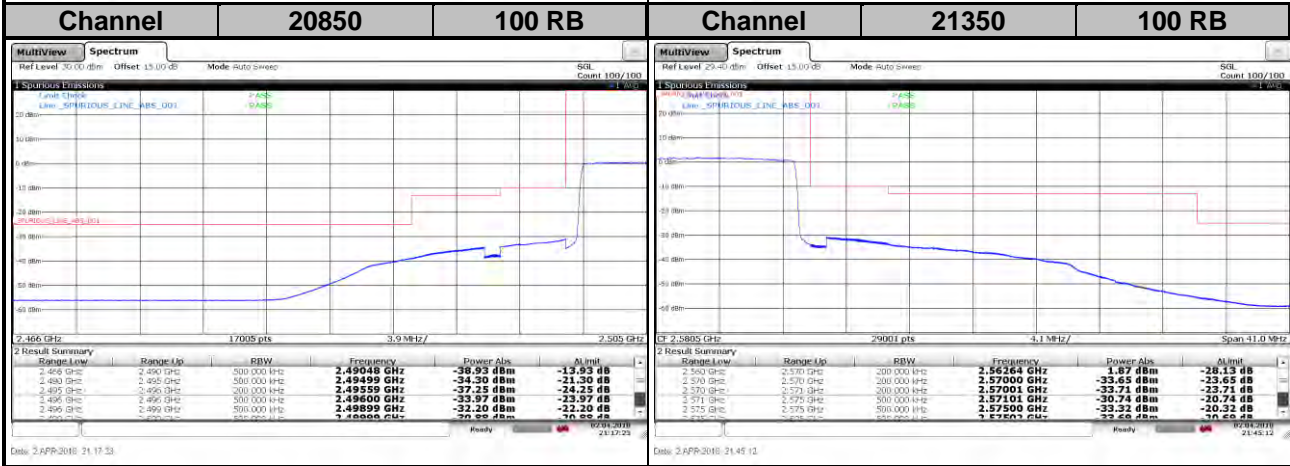
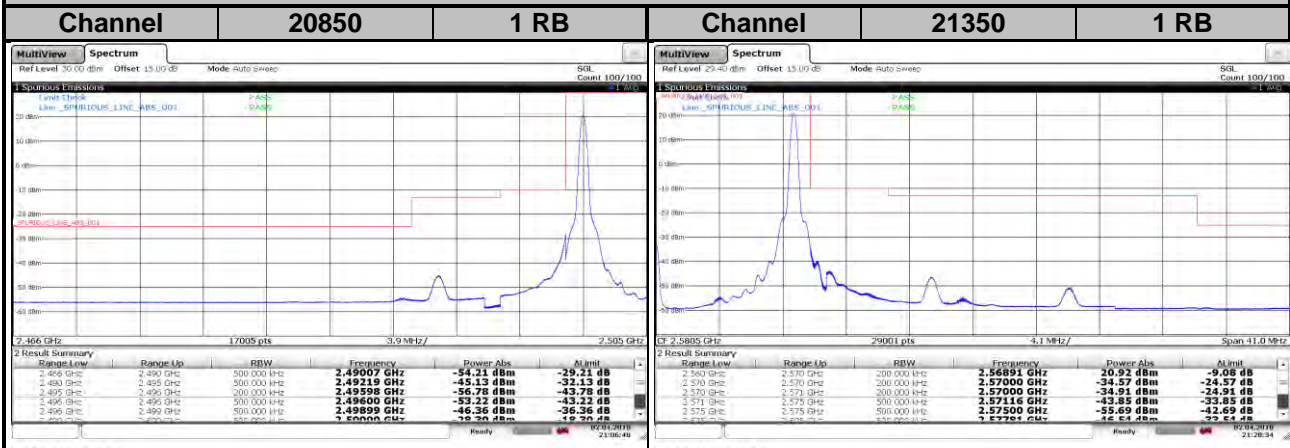
LTE Band 7
Channel Bandwidth: 20 MHz / QPSK

<Out-of-Band Emissions>



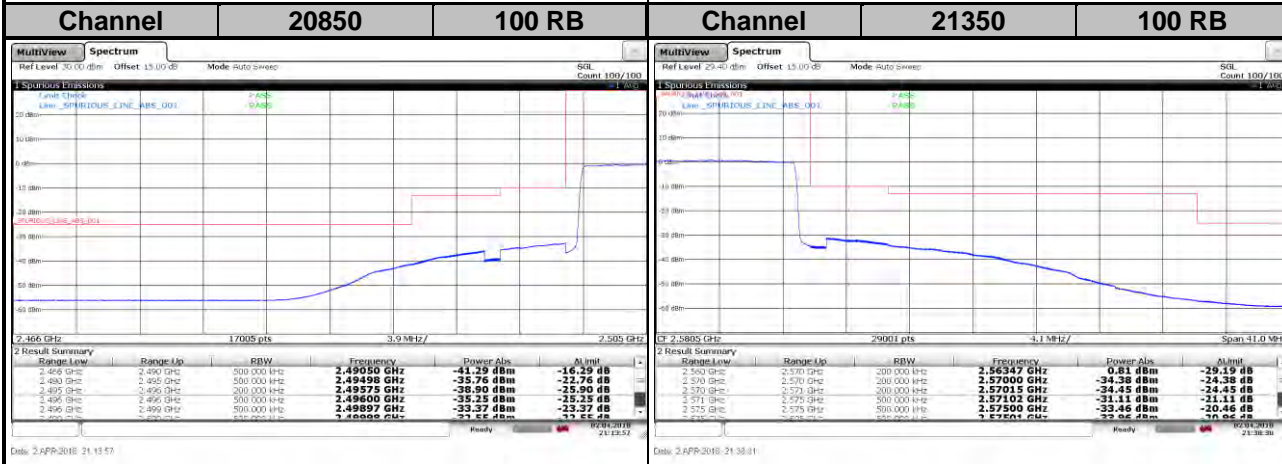
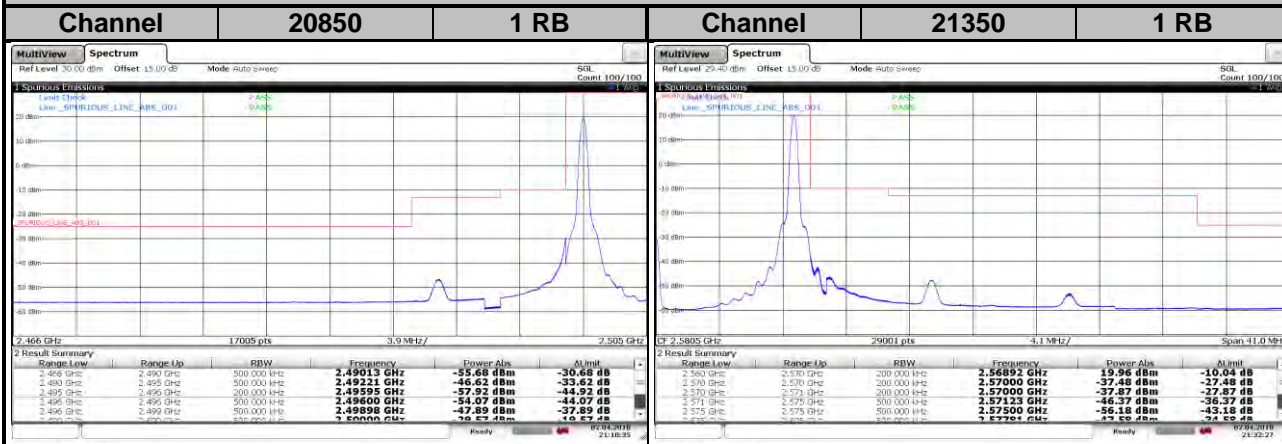
LTE Band 7
Channel Bandwidth: 20 MHz / 16QAM

<Out-of-Band Emissions>



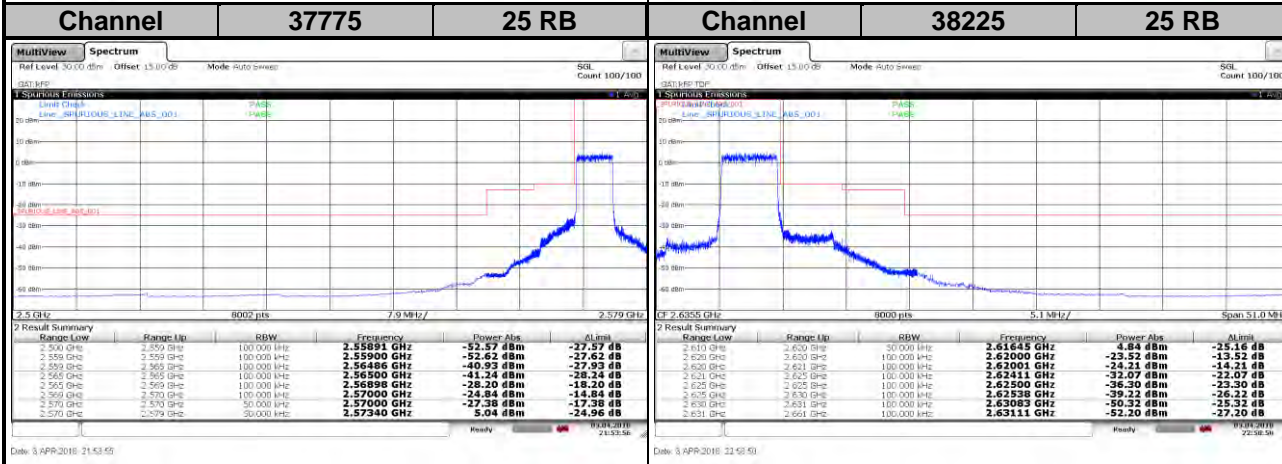
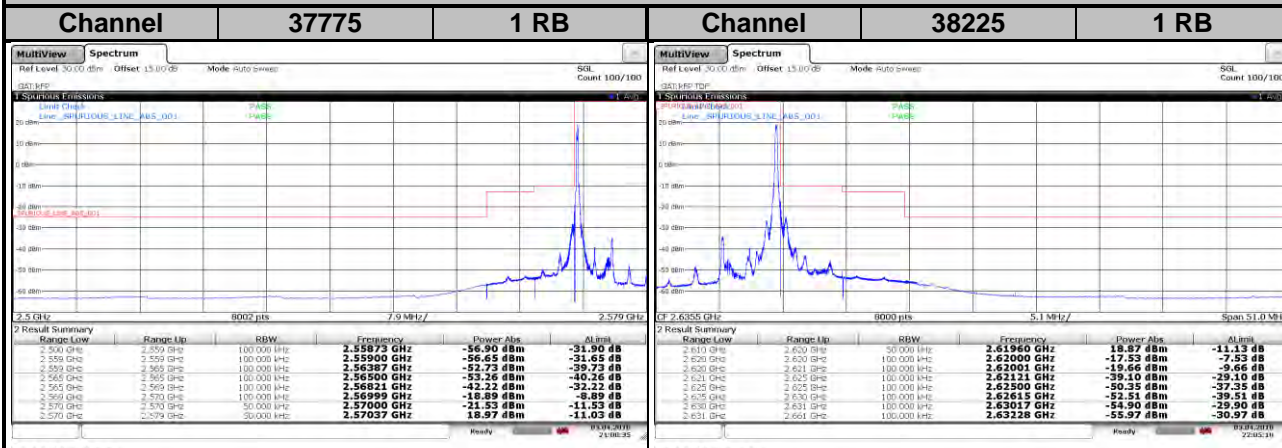
LTE Band 7
Channel Bandwidth: 20 MHz / 64QAM

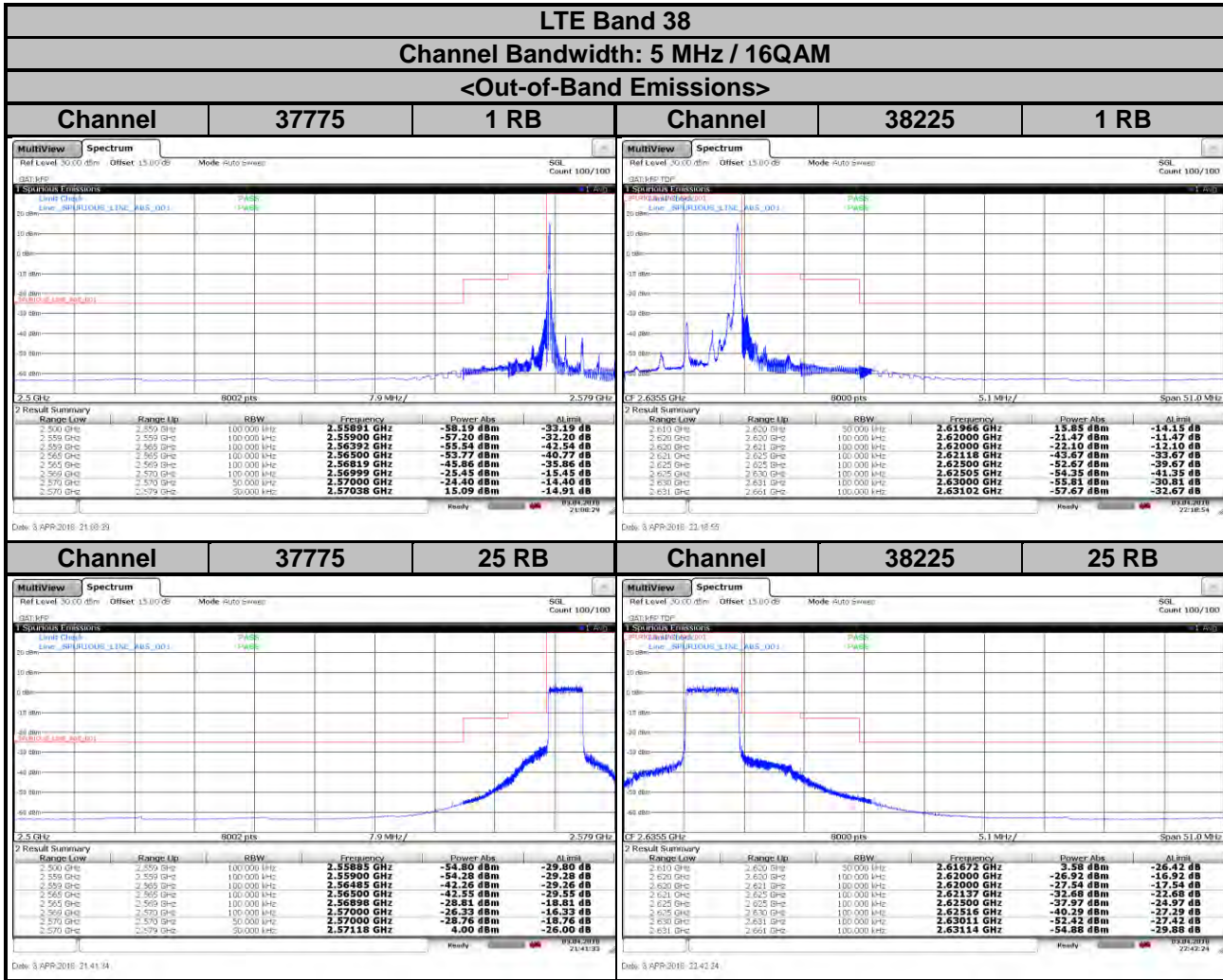
<Out-of-Band Emissions>



LTE Band 38
Channel Bandwidth: 5 MHz / QPSK

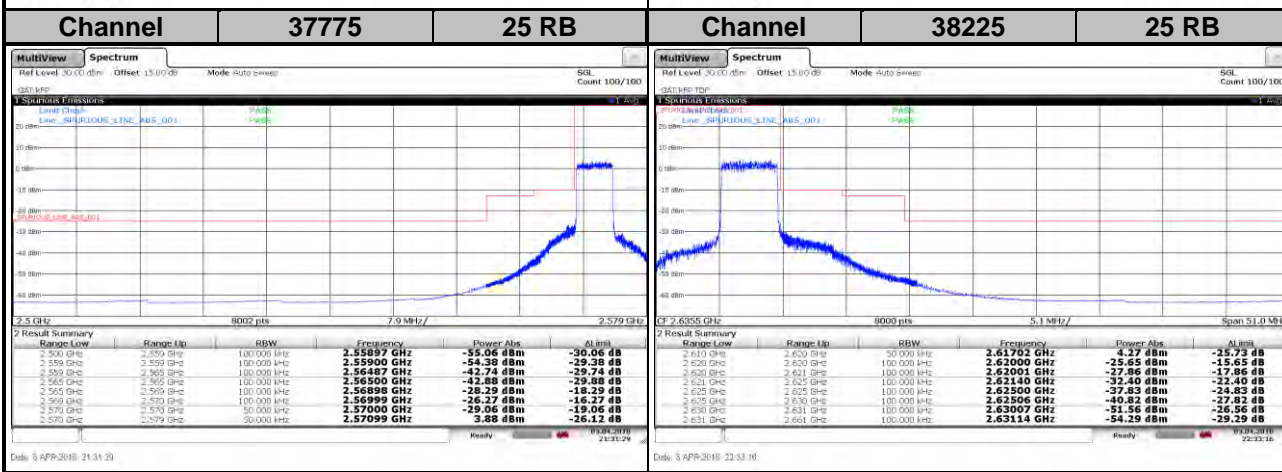
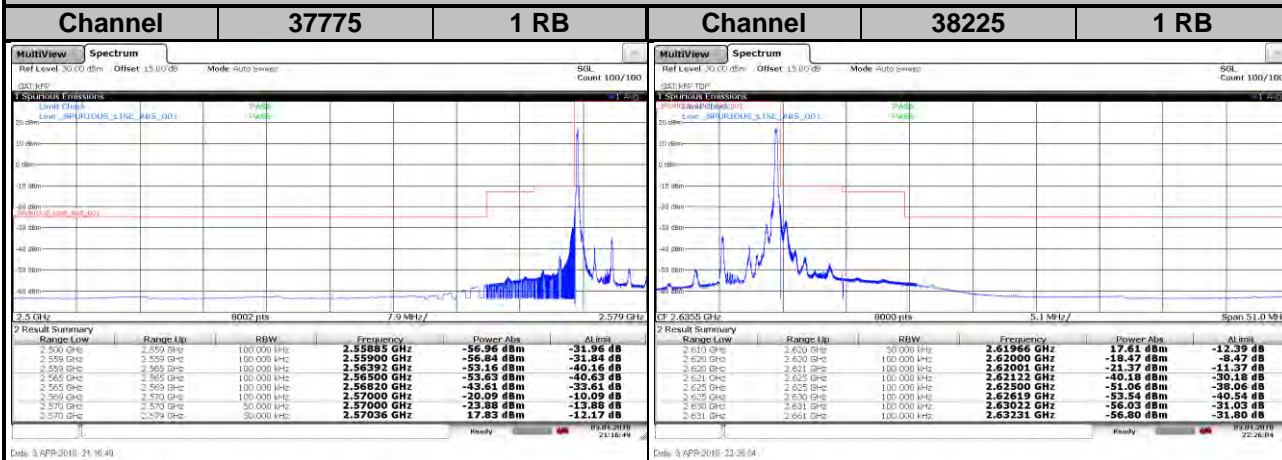
<Out-of-Band Emissions>





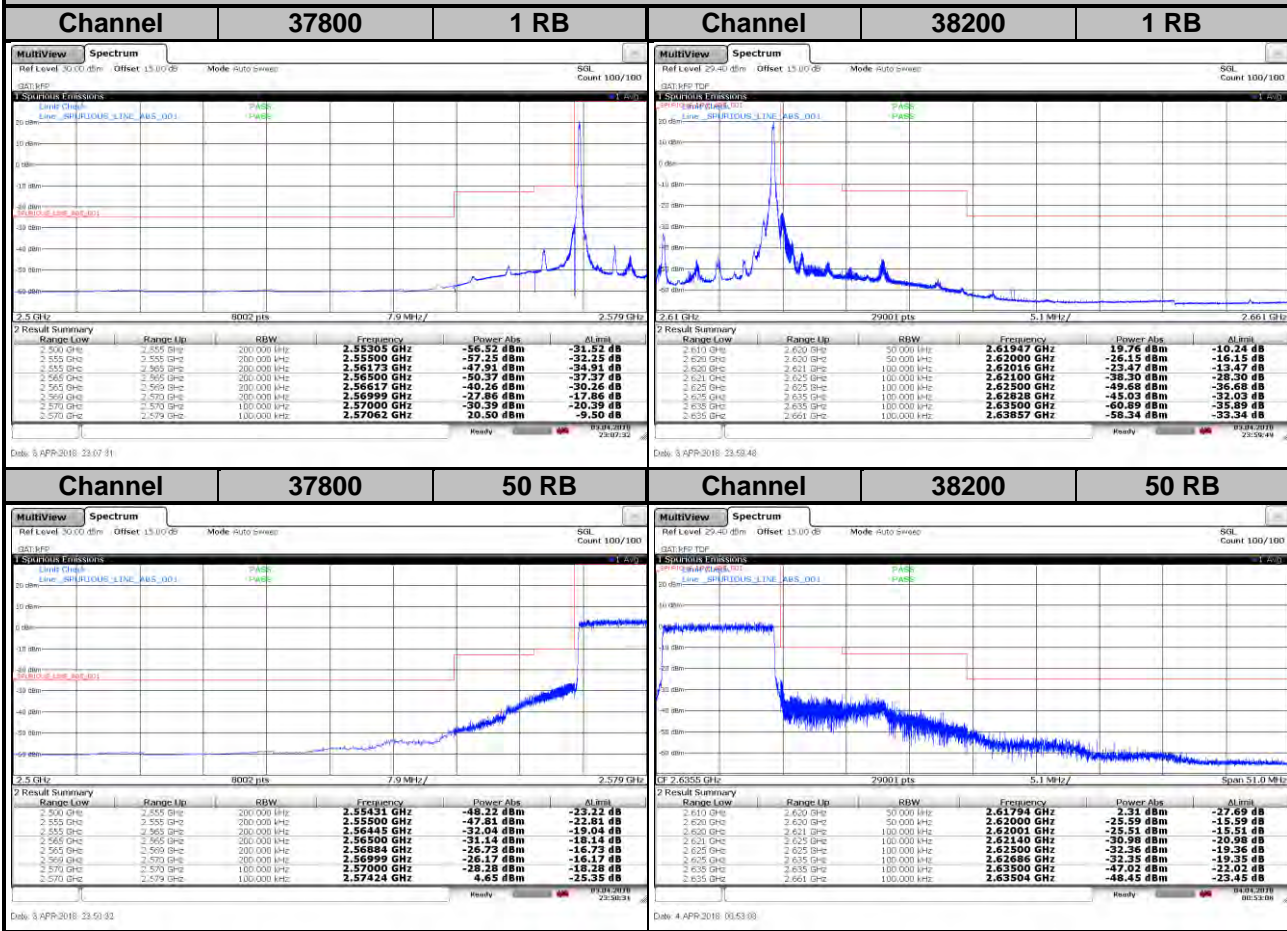
LTE Band 38
Channel Bandwidth: 5 MHz / 64QAM

<Out-of-Band Emissions>



LTE Band 38
Channel Bandwidth: 10 MHz / QPSK

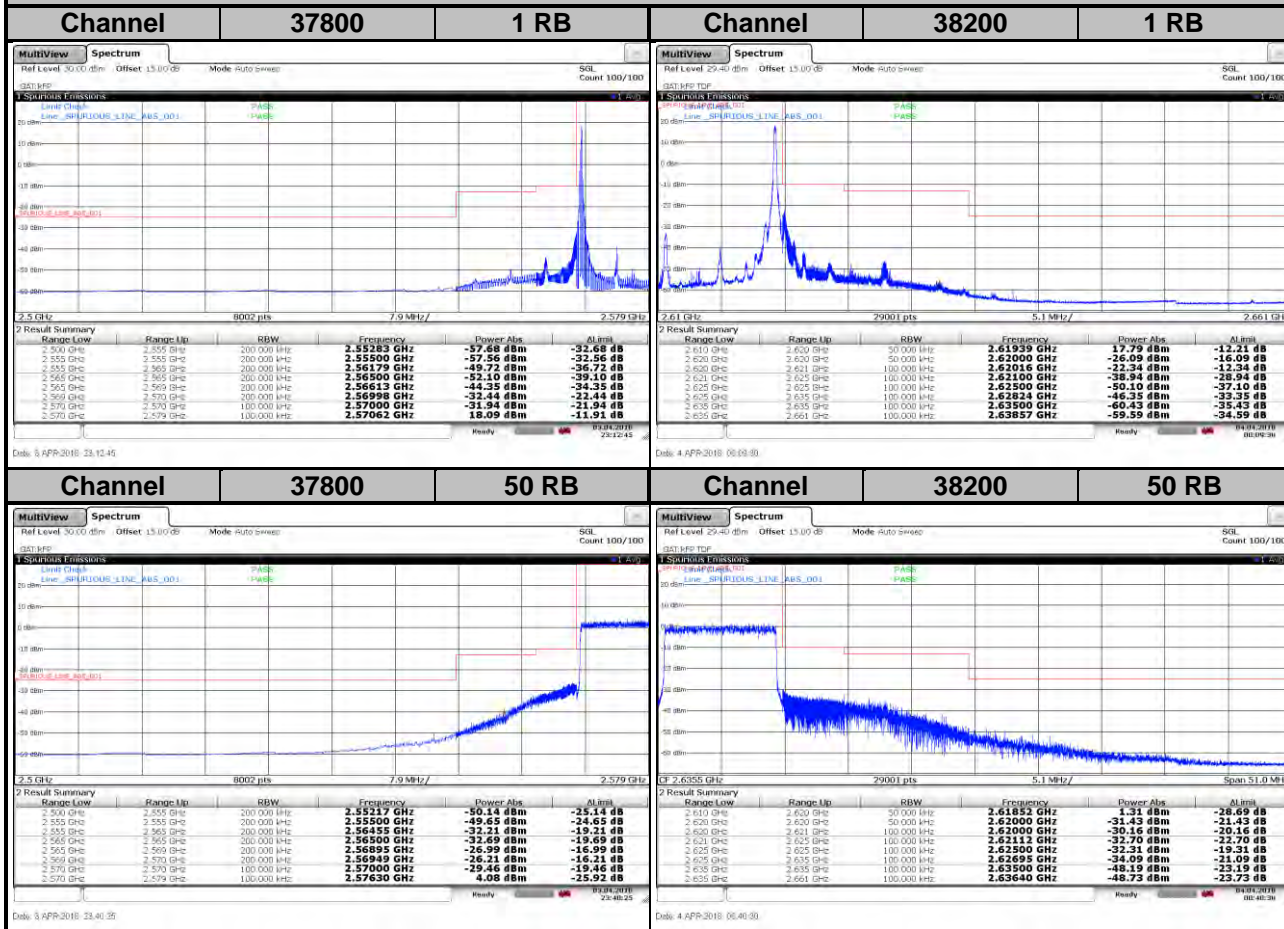
<Out-of-Band Emissions>



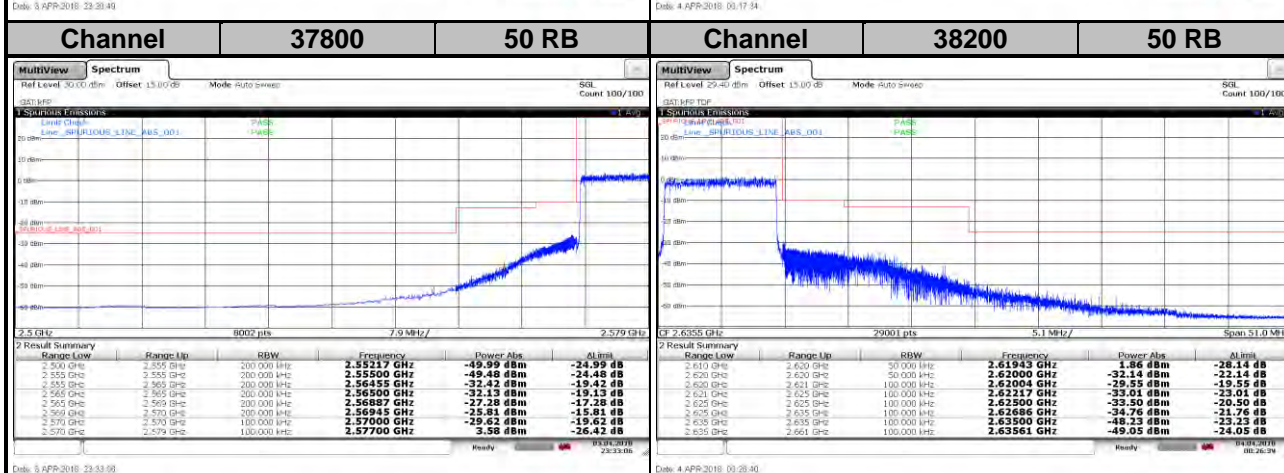
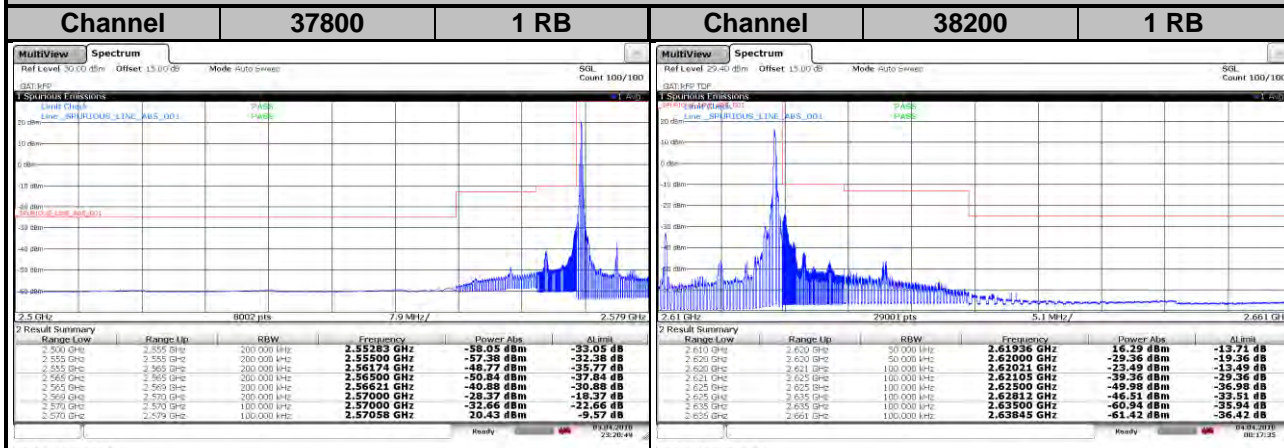
LTE Band 38

Channel Bandwidth: 10 MHz / 16QAM

<Out-of-Band Emissions>



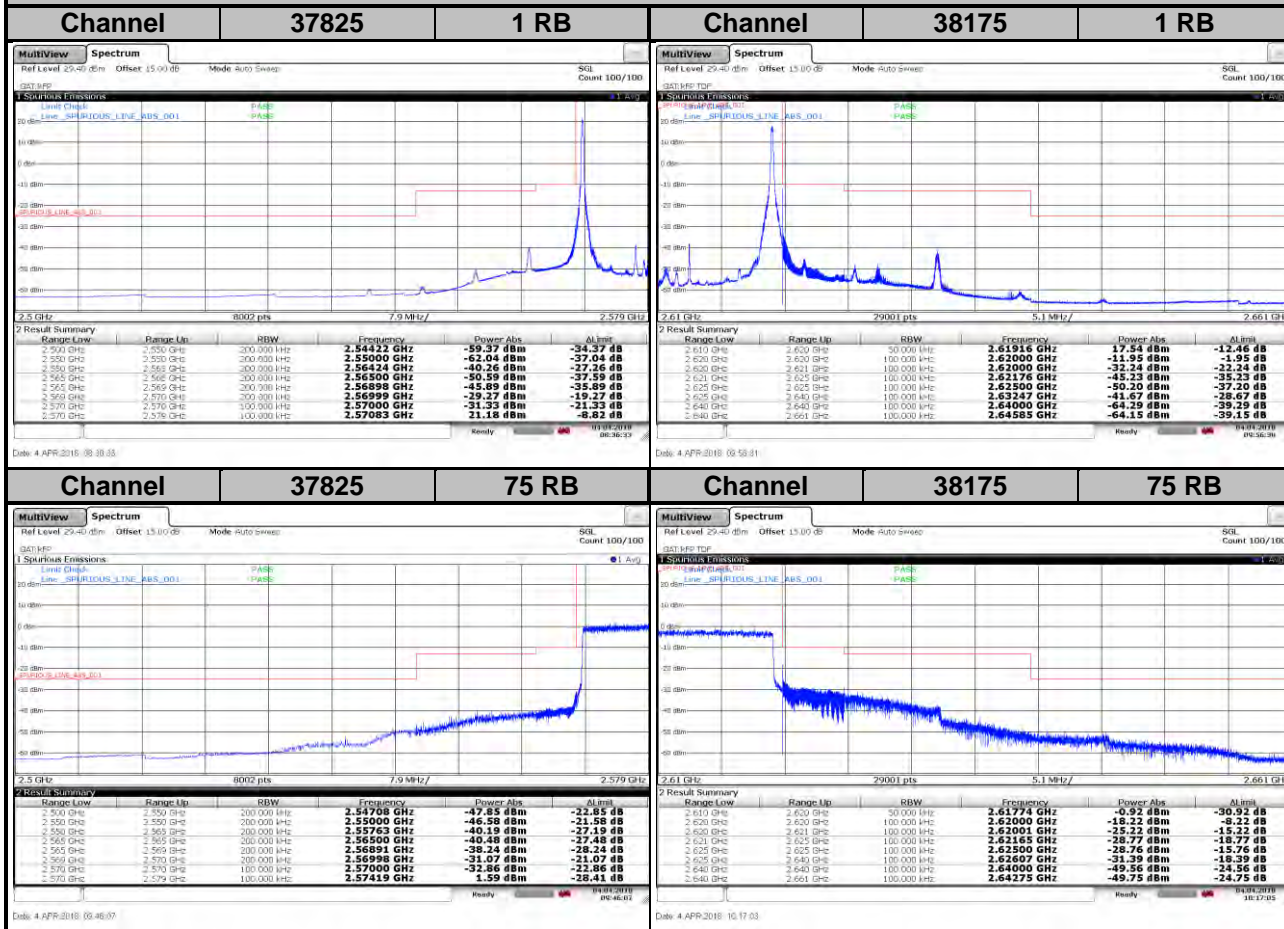
LTE Band 38
Channel Bandwidth: 10 MHz / 64QAM
<Out-of-Band Emissions>



Range Low	Range Up	RBW	Frequency	Power Abs.	Alim
2.550 GHz	2.555 GHz	200.000 kHz	2.55283 GHz	-58.05 dBm	-32.05 dB
2.555 GHz	2.555 GHz	200.000 kHz	2.55500 GHz	-57.38 dBm	-32.28 dB
2.555 GHz	2.565 GHz	200.000 kHz	2.56174 GHz	-48.77 dBm	-35.77 dB
2.565 GHz	2.565 GHz	200.000 kHz	2.56500 GHz	-50.84 dBm	-37.84 dB
2.565 GHz	2.569 GHz	200.000 kHz	2.56621 GHz	-40.88 dBm	-30.88 dB
2.569 GHz	2.570 GHz	200.000 kHz	2.57000 GHz	-28.37 dBm	-18.37 dB
2.570 GHz	2.570 GHz	100.000 kHz	2.57000 GHz	-21.66 dBm	-11.66 dB
2.570 GHz	2.570 GHz	100.000 kHz	2.57058 GHz	20.43 dBm	-9.57 dB

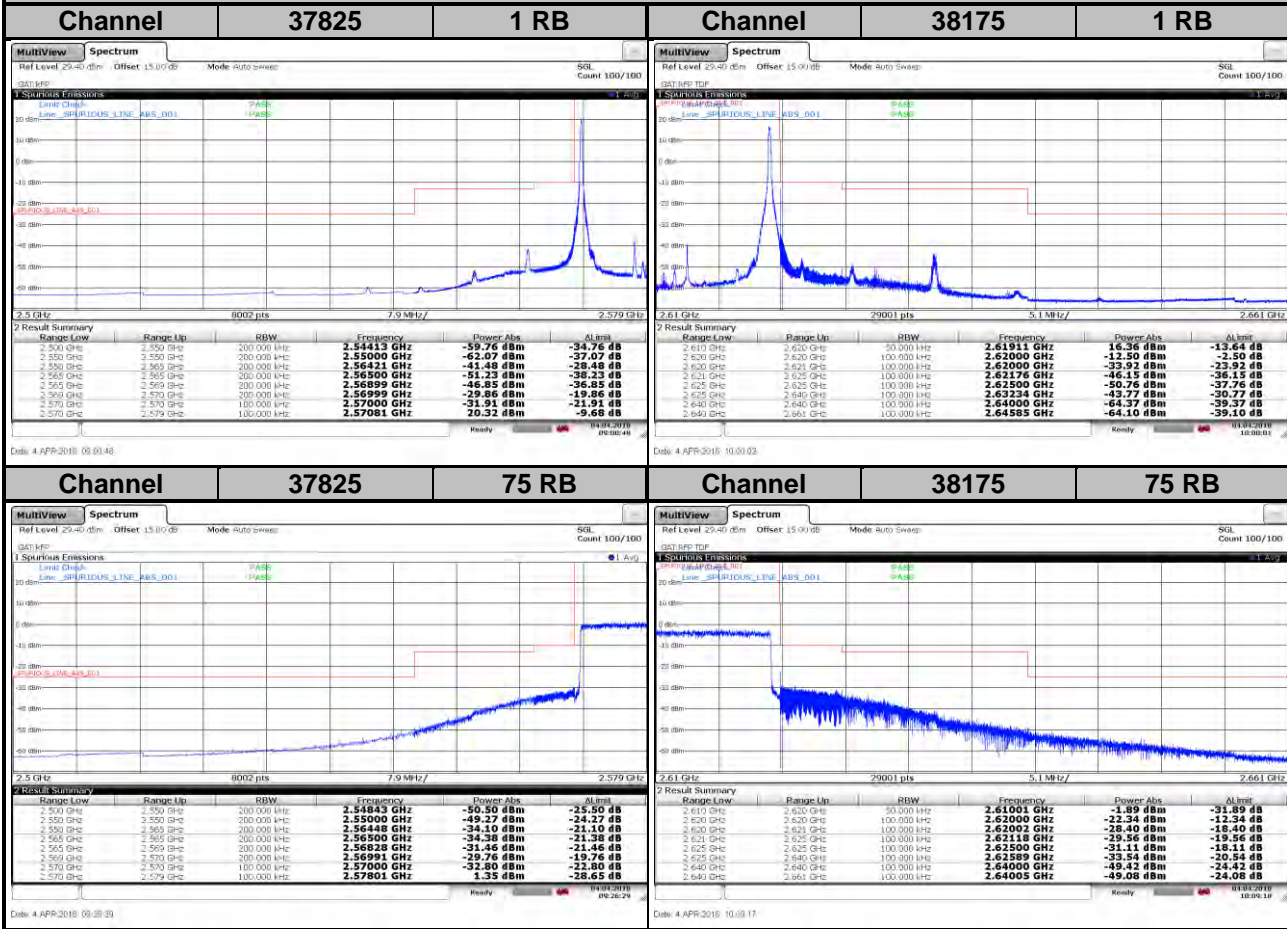
LTE Band 38
Channel Bandwidth: 15 MHz / QPSK

<Out-of-Band Emissions>



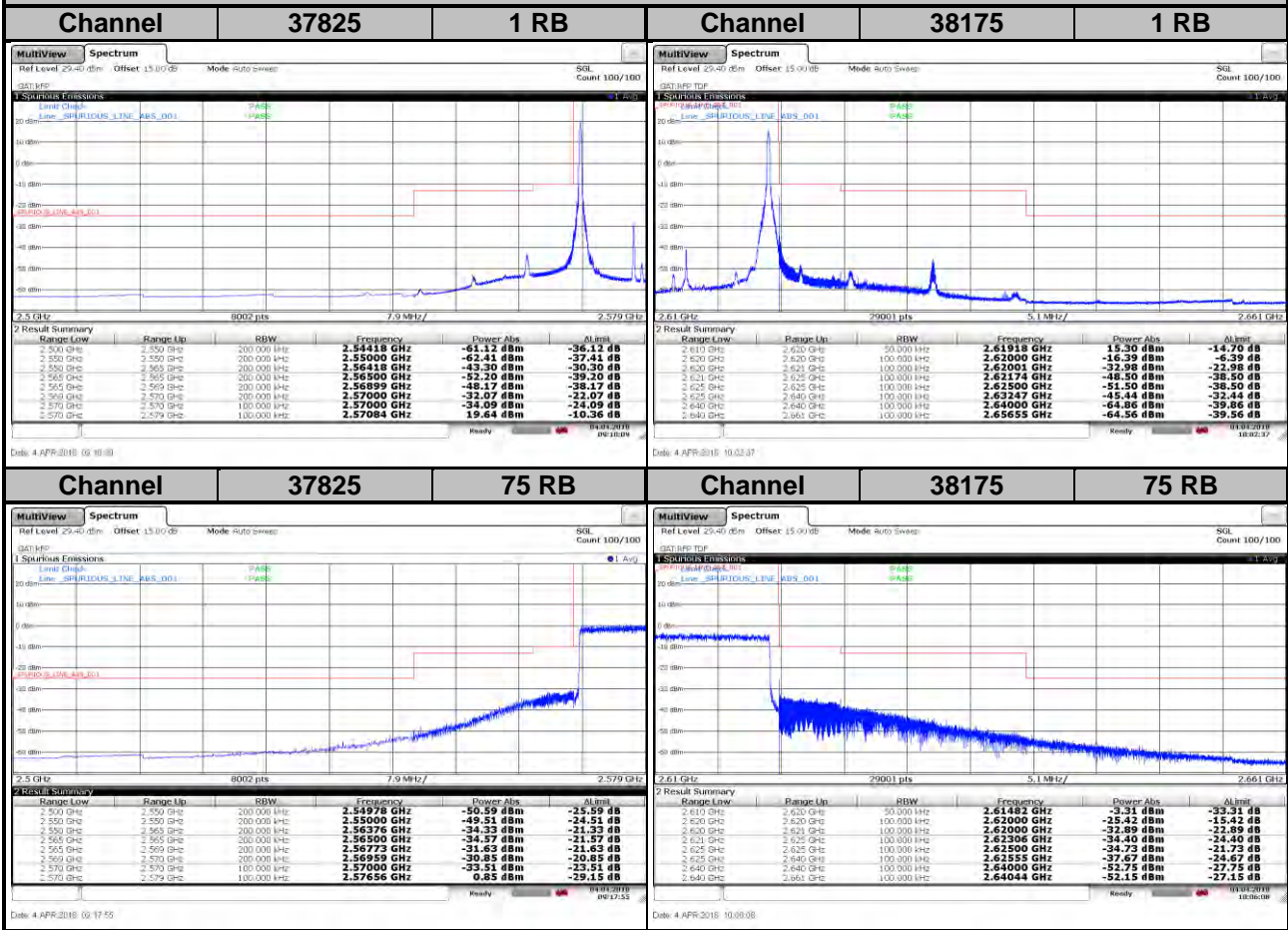
LTE Band 38
Channel Bandwidth: 15 MHz / 16QAM

<Out-of-Band Emissions>



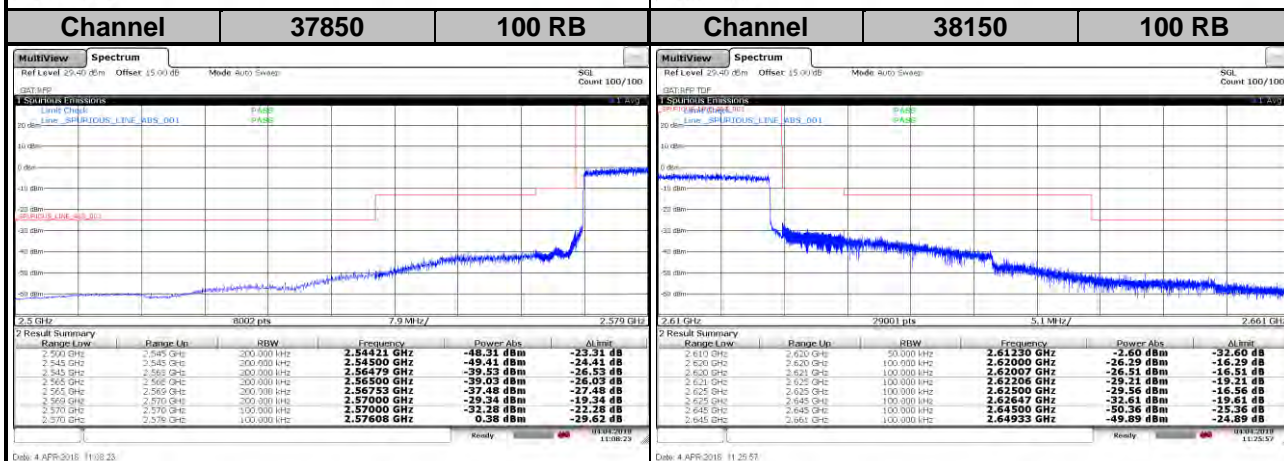
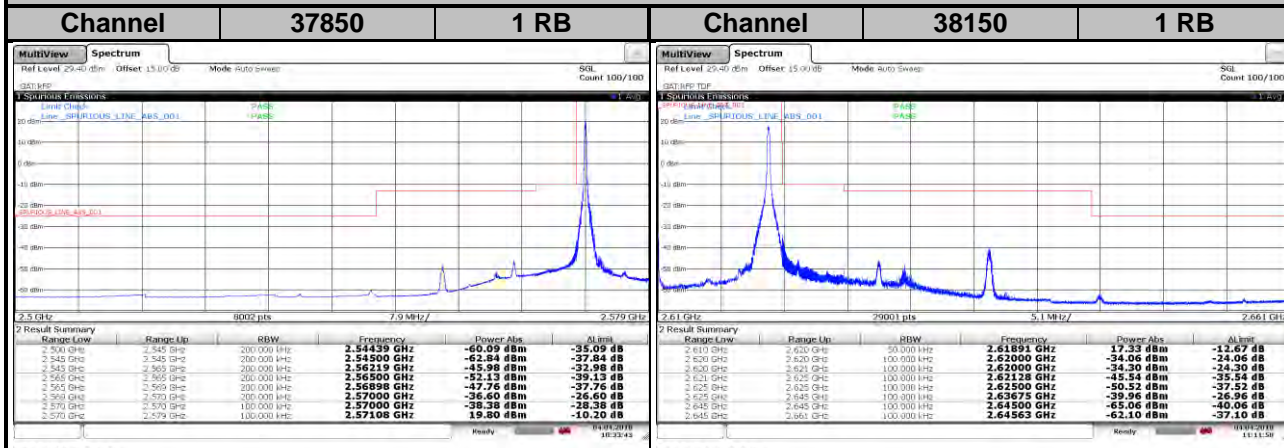
LTE Band 38
Channel Bandwidth: 15 MHz / 64QAM

<Out-of-Band Emissions>



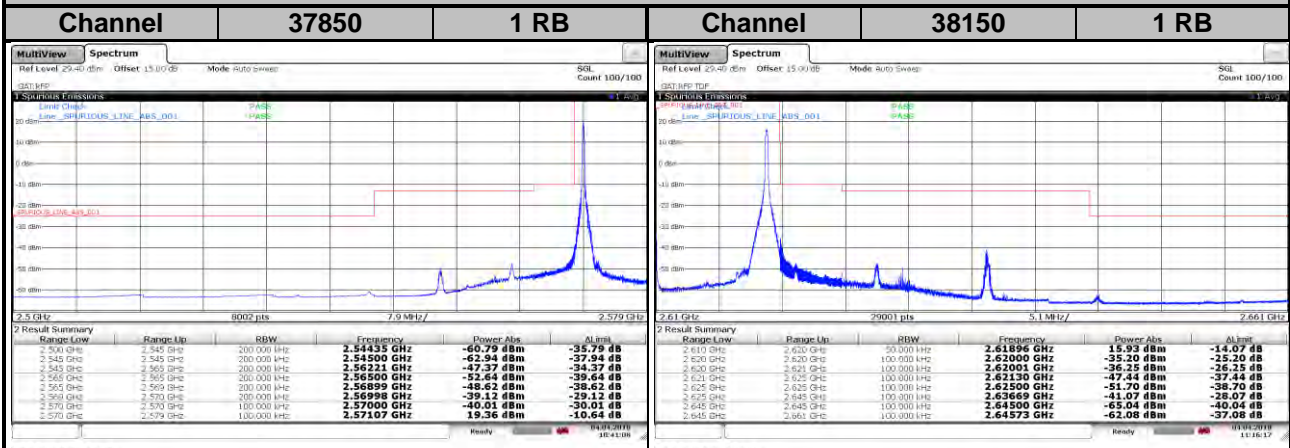
LTE Band 38
Channel Bandwidth: 20 MHz / QPSK

<Out-of-Band Emissions>

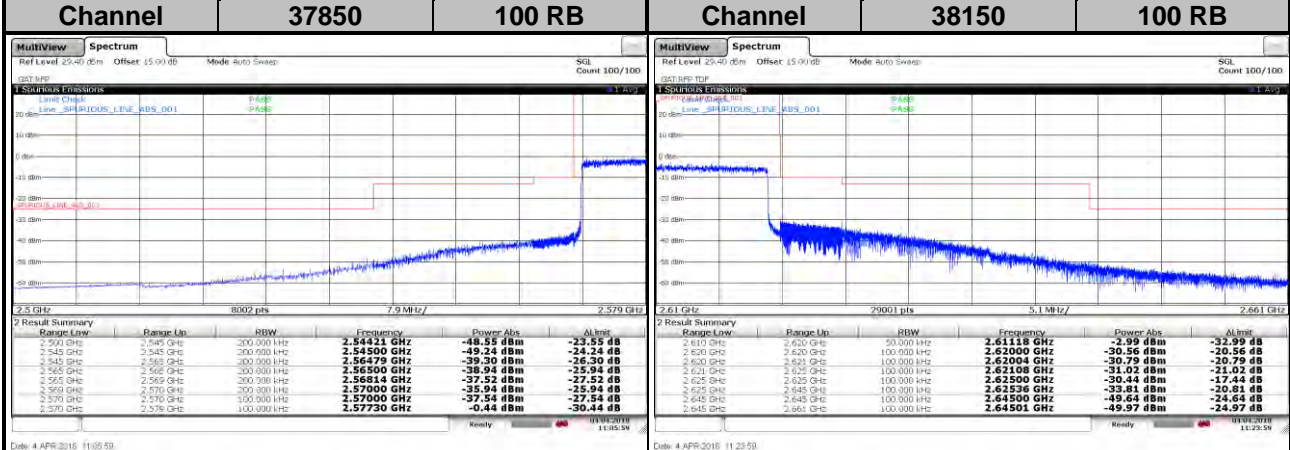


LTE Band 38
Channel Bandwidth: 20 MHz / 16QAM

<Out-of-Band Emissions>



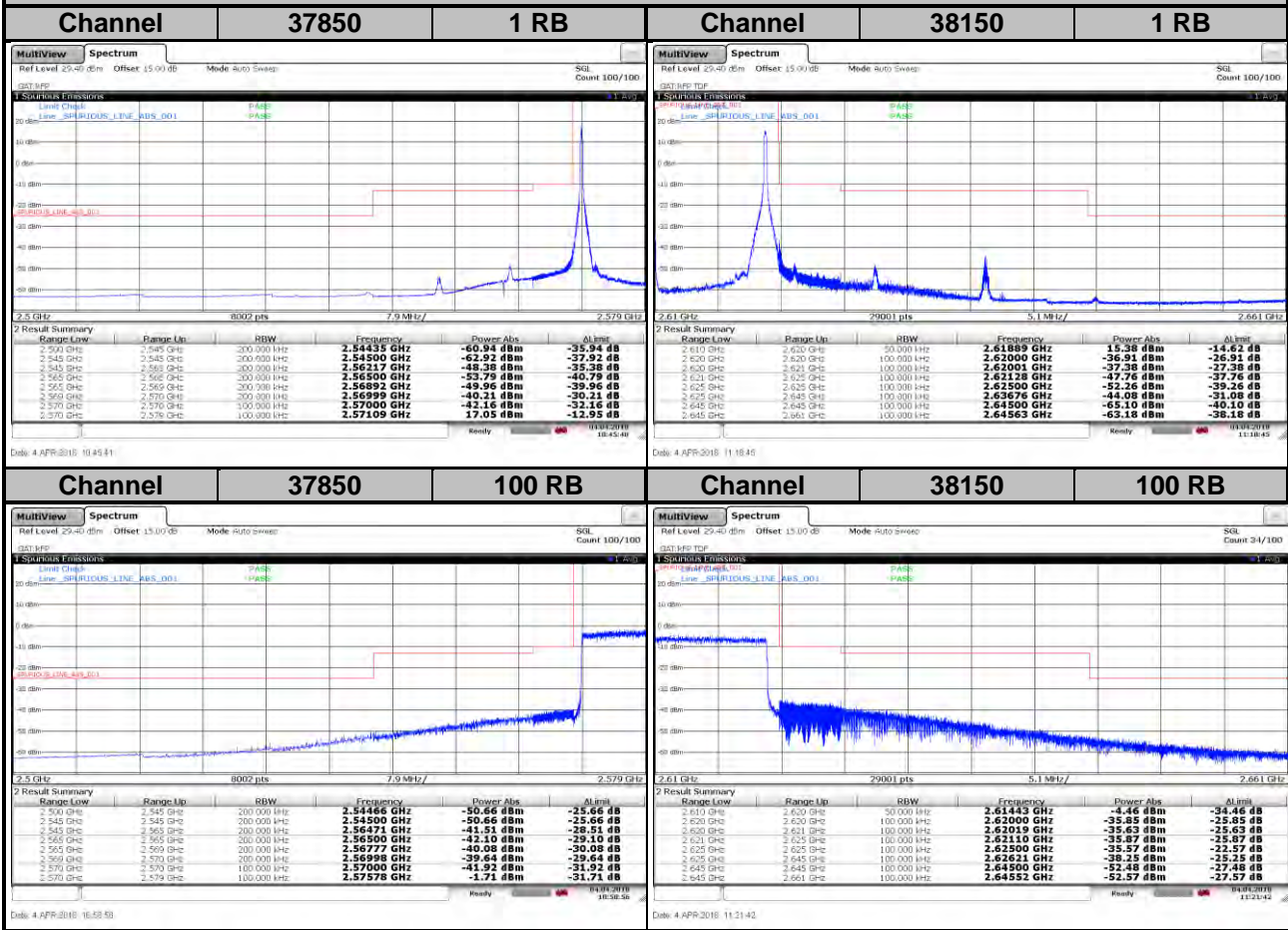
Date: 4 APR 2018 16:41:58 Date: 4 APR 2018 11:16:17



Date: 4 APR 2018 11:05:59 Date: 4 APR 2018 11:23:53

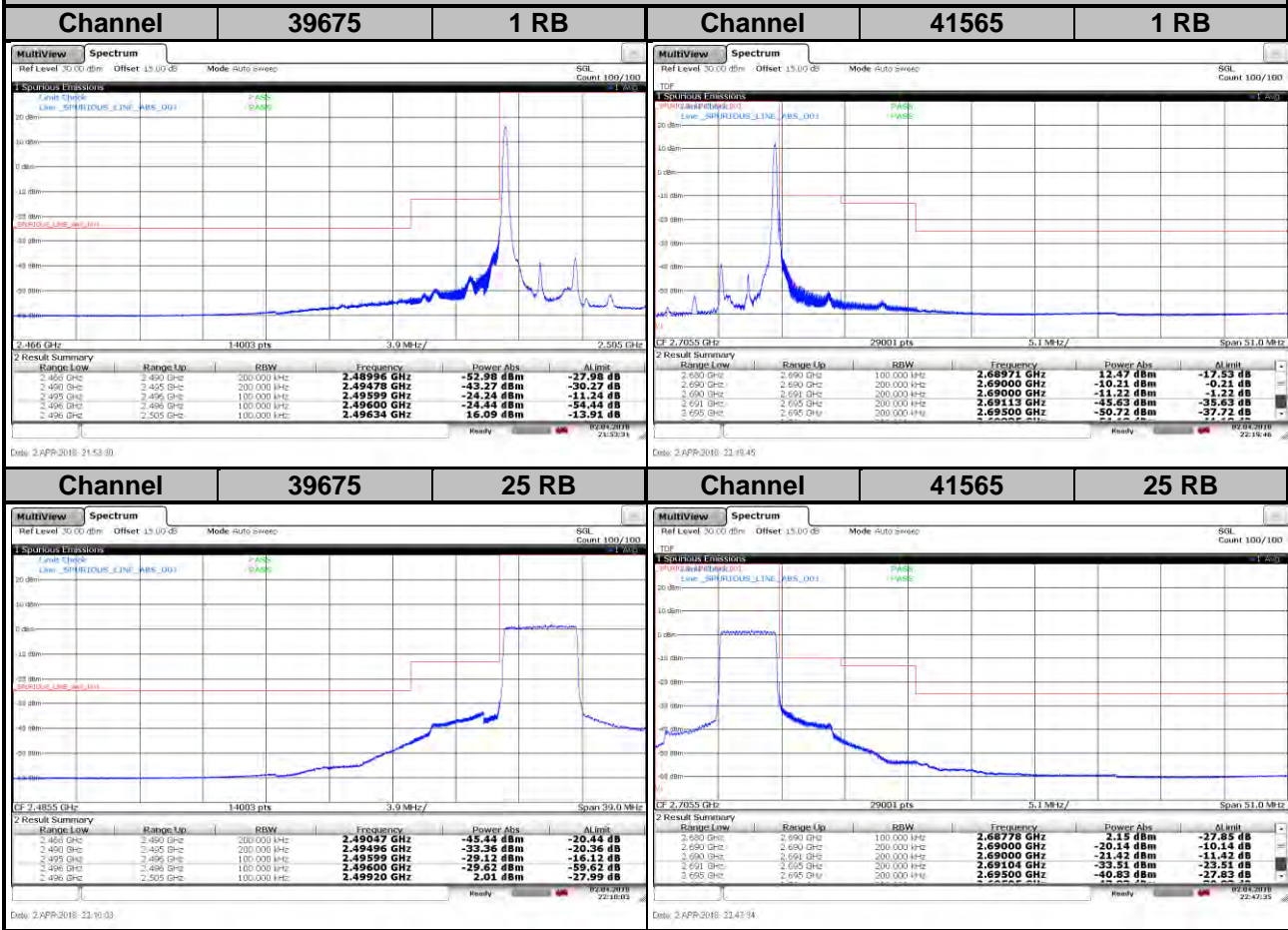
LTE Band 38
Channel Bandwidth: 20 MHz / 64QAM

<Out-of-Band Emissions>



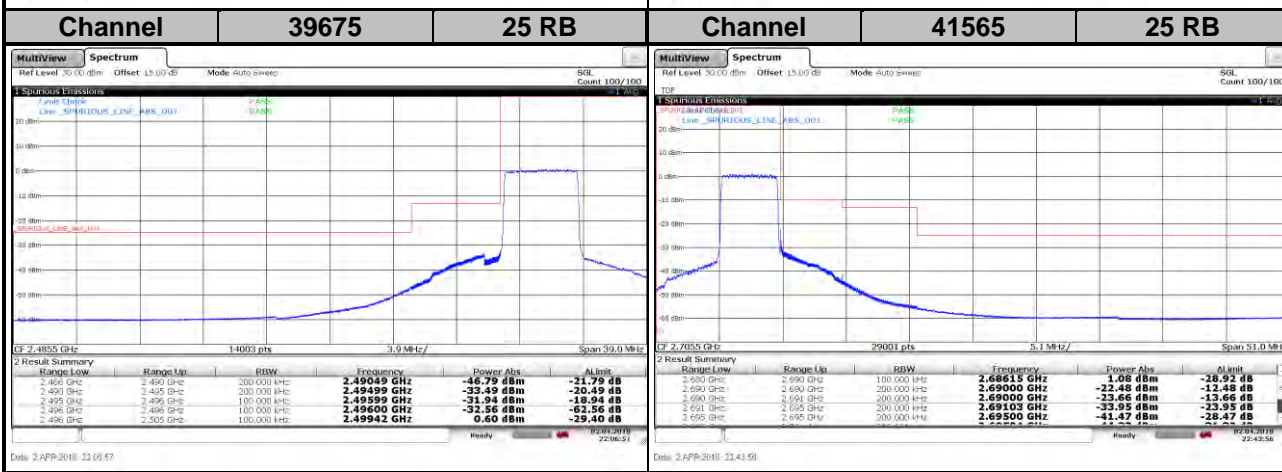
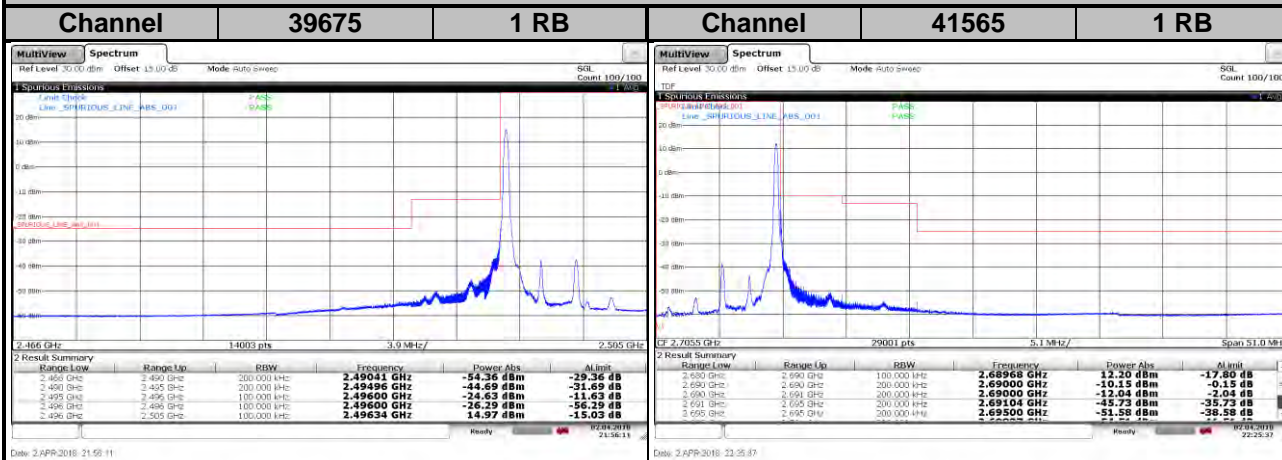
LTE Band 41
Channel Bandwidth: 5 MHz / QPSK

<Out-of-Band Emissions>



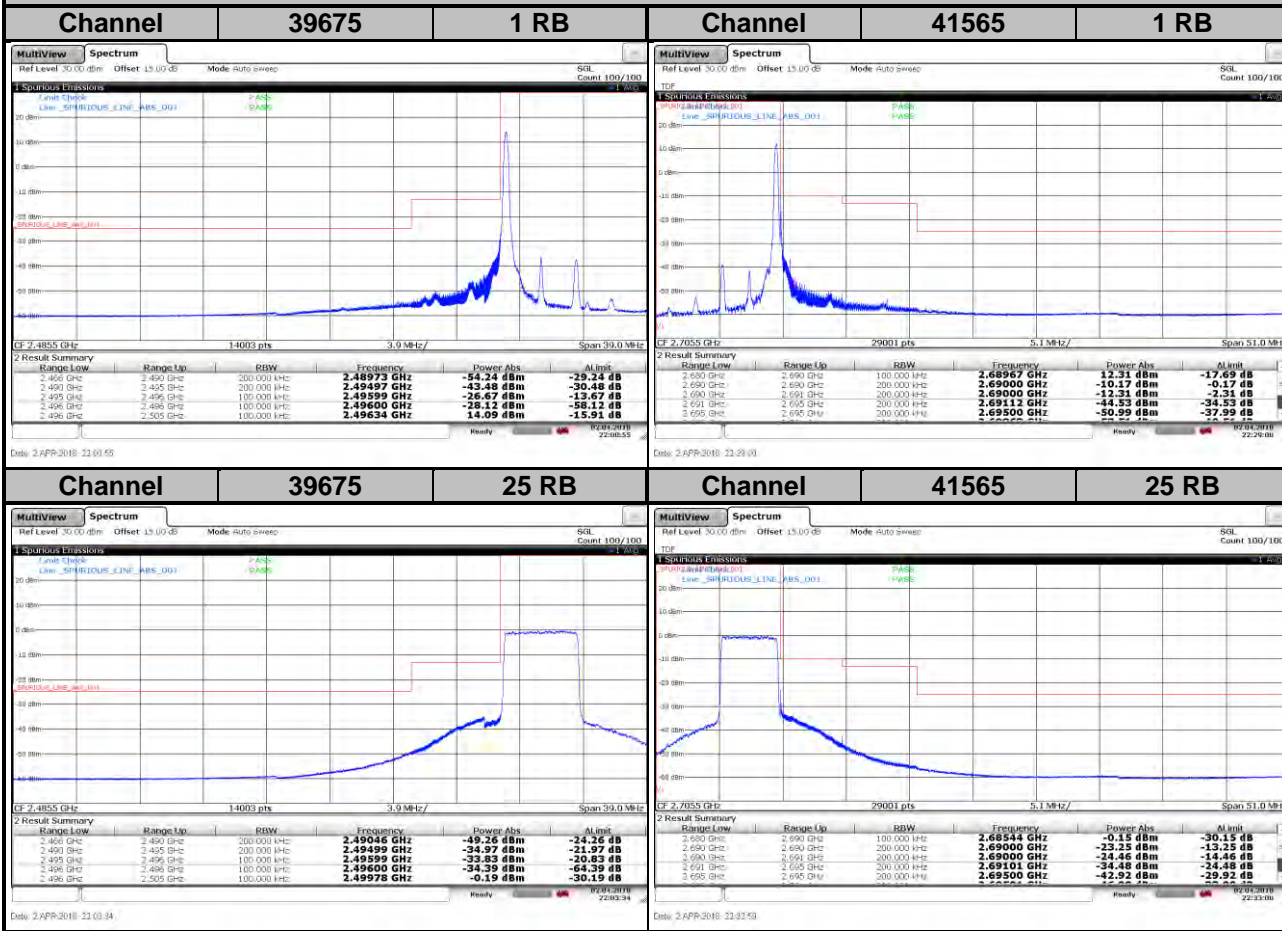
LTE Band 41
Channel Bandwidth: 5 MHz / 16QAM

<Out-of-Band Emissions>



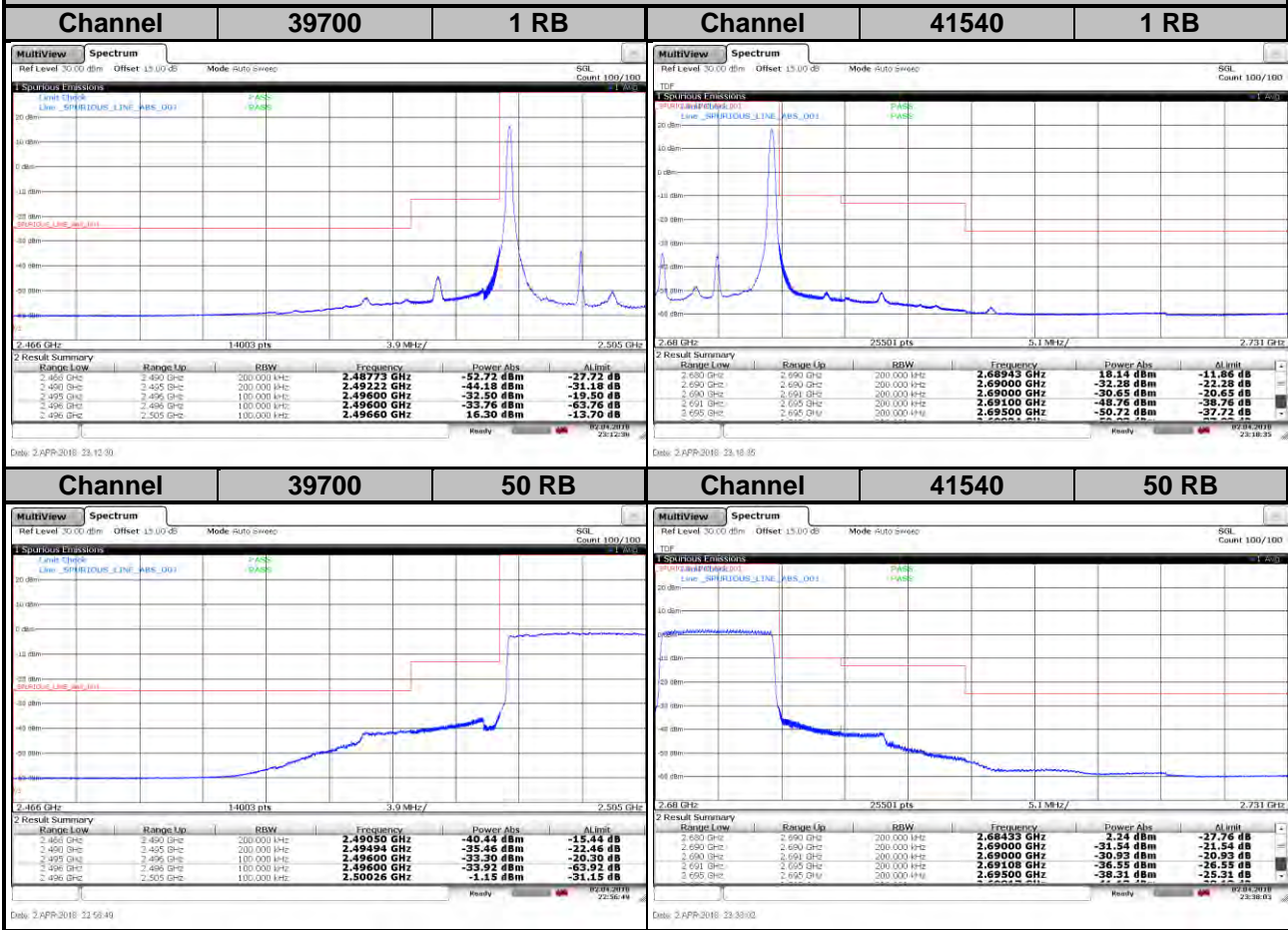
LTE Band 41
Channel Bandwidth: 5 MHz / 64QAM

<Out-of-Band Emissions>



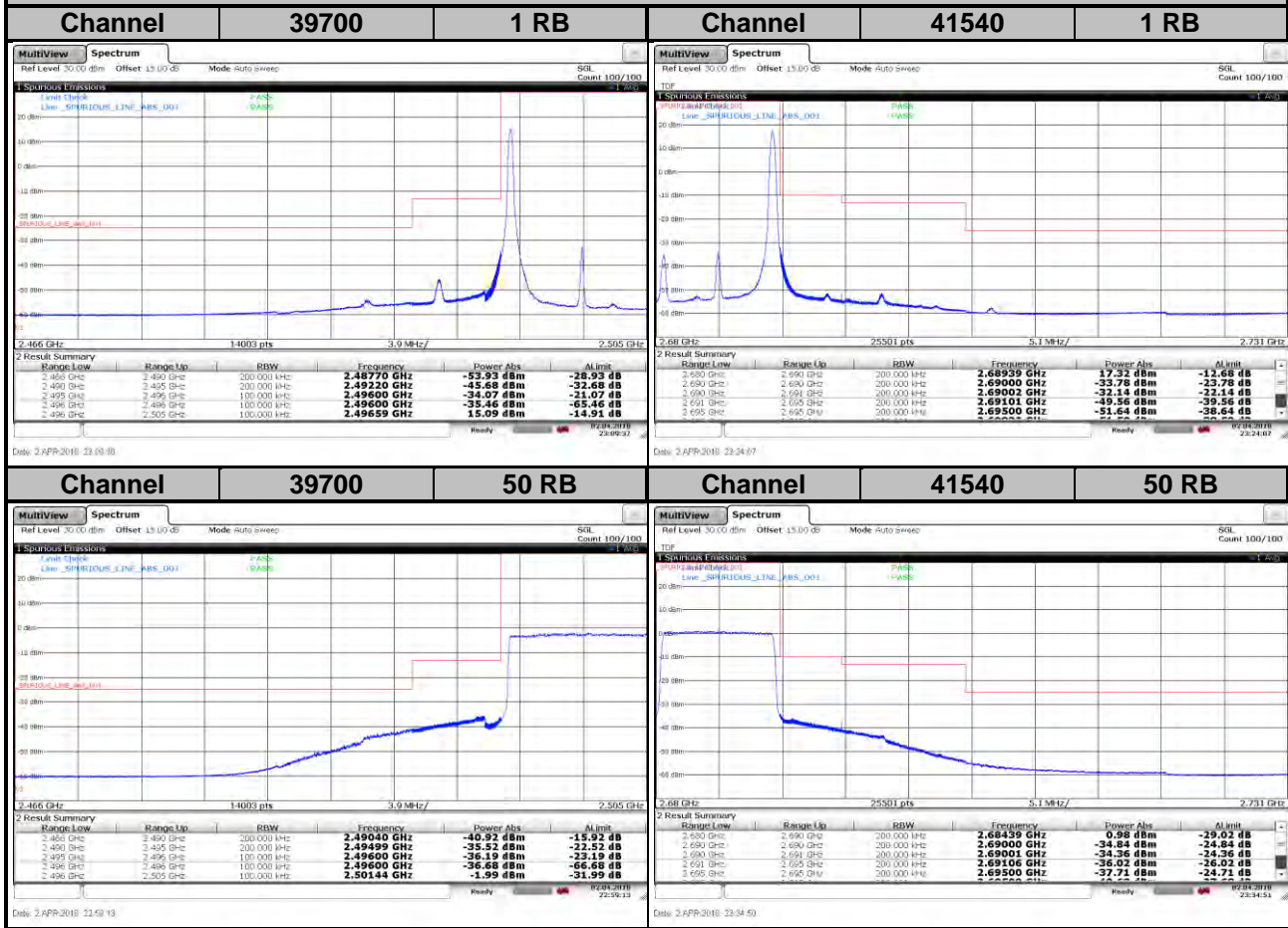
LTE Band 41
Channel Bandwidth: 10 MHz / QPSK

<Out-of-Band Emissions>



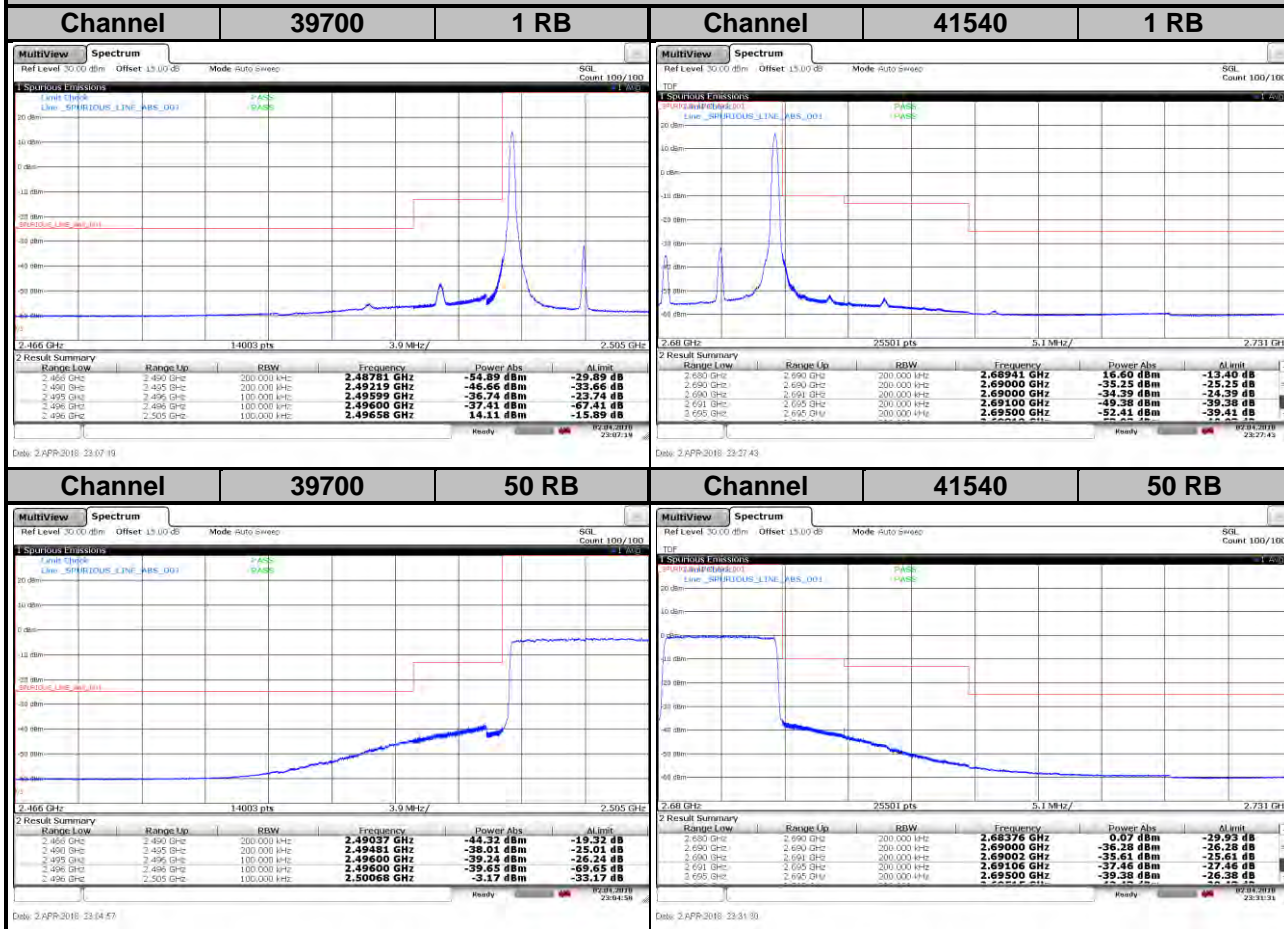
LTE Band 41
Channel Bandwidth: 10 MHz / 16QAM

<Out-of-Band Emissions>



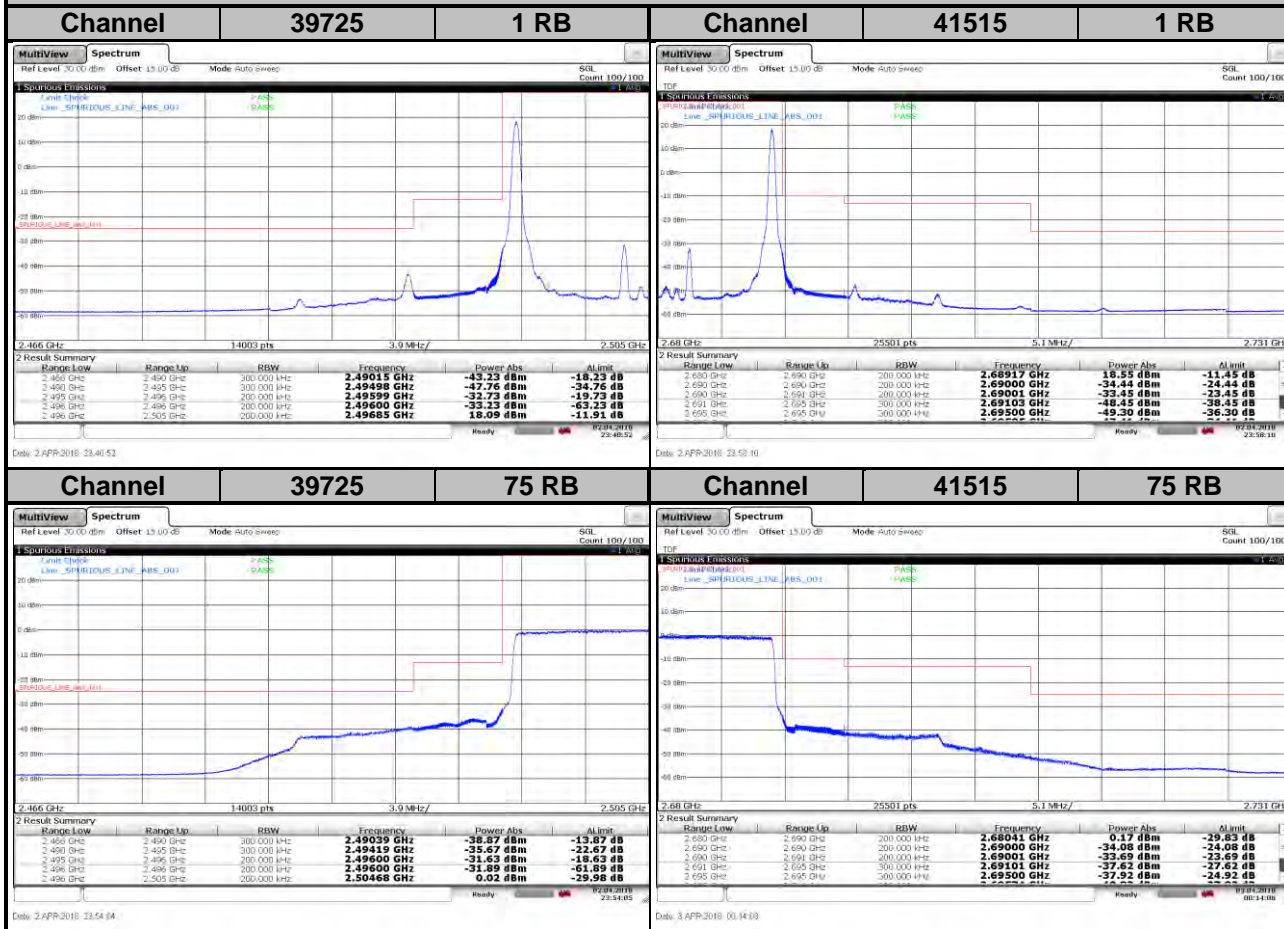
LTE Band 41
Channel Bandwidth: 10 MHz / 64QAM

<Out-of-Band Emissions>



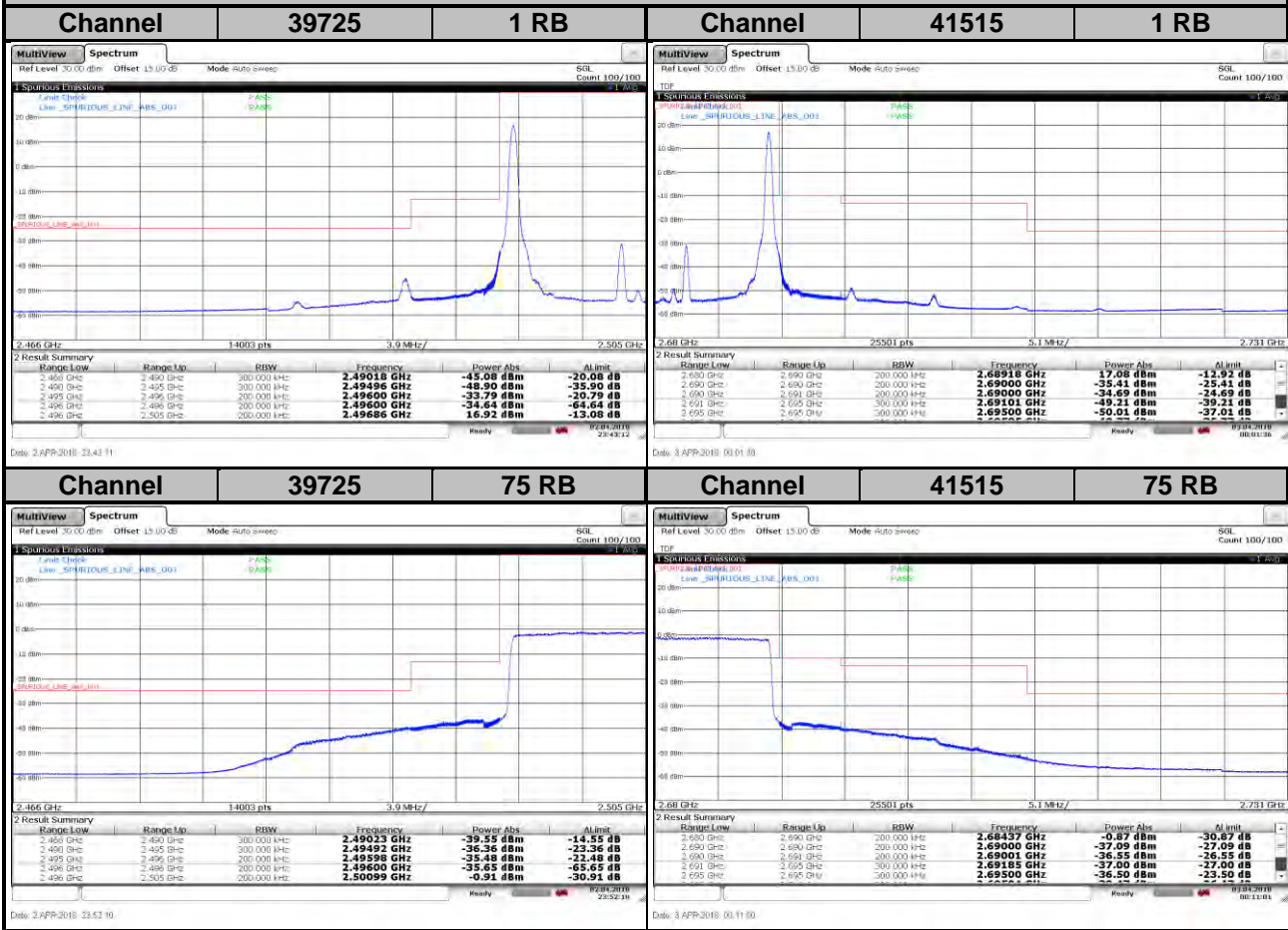
LTE Band 41
Channel Bandwidth: 15 MHz / QPSK

<Out-of-Band Emissions>



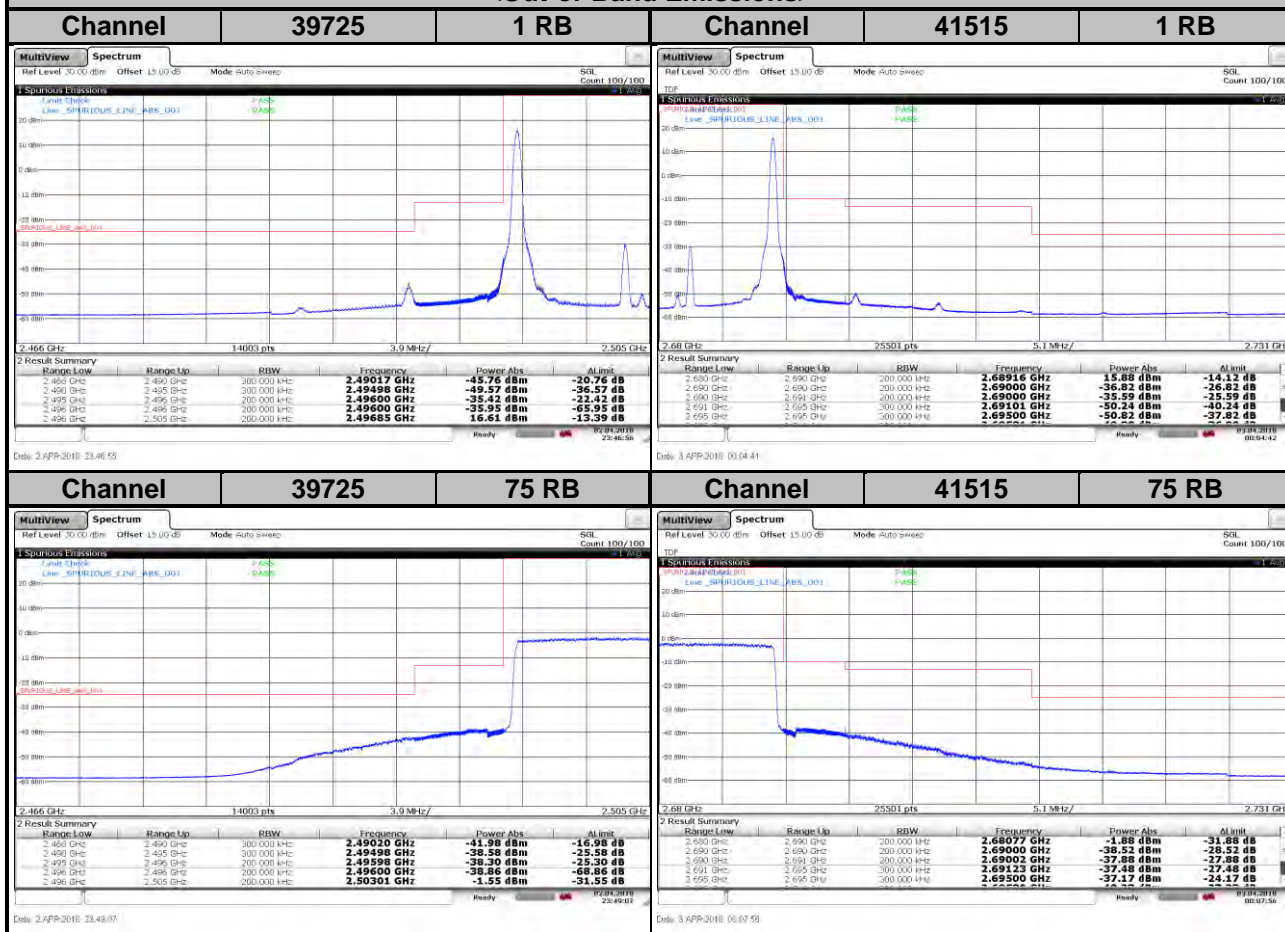
LTE Band 41
Channel Bandwidth: 15 MHz / 16QAM

<Out-of-Band Emissions>



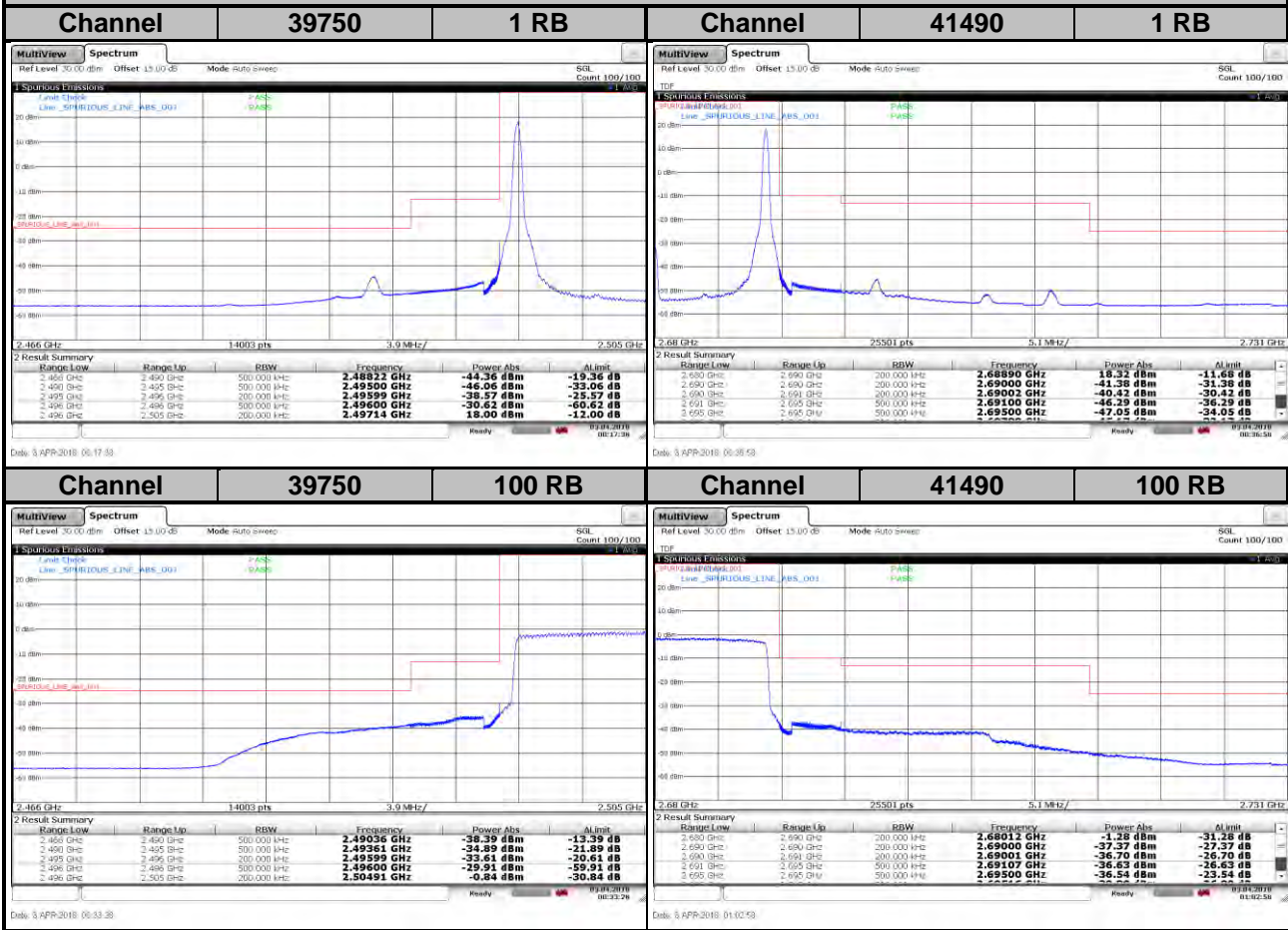
LTE Band 41
Channel Bandwidth: 15 MHz / 64QAM

<Out-of-Band Emissions>



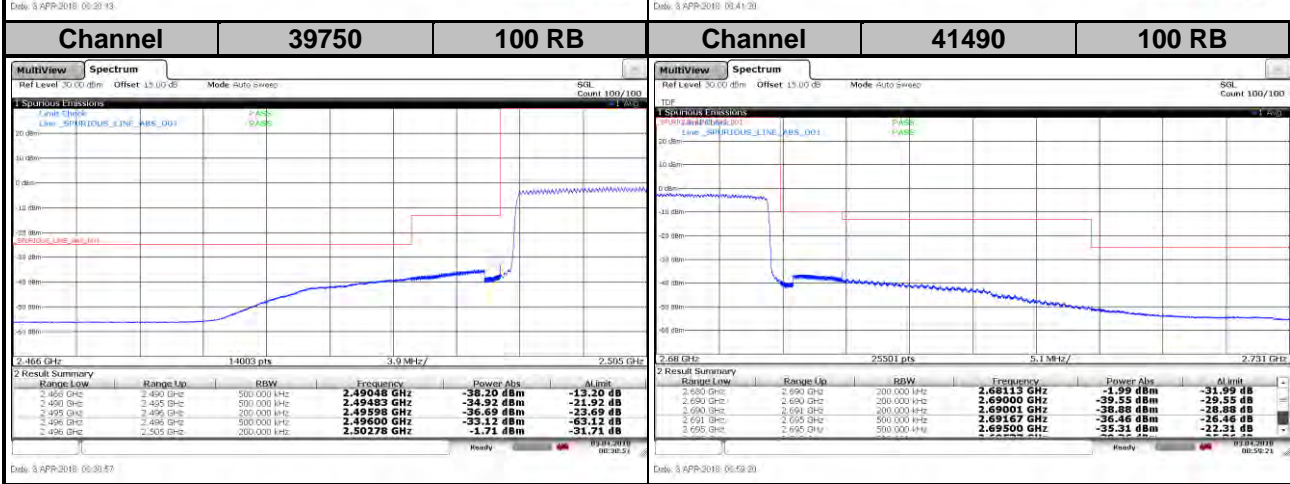
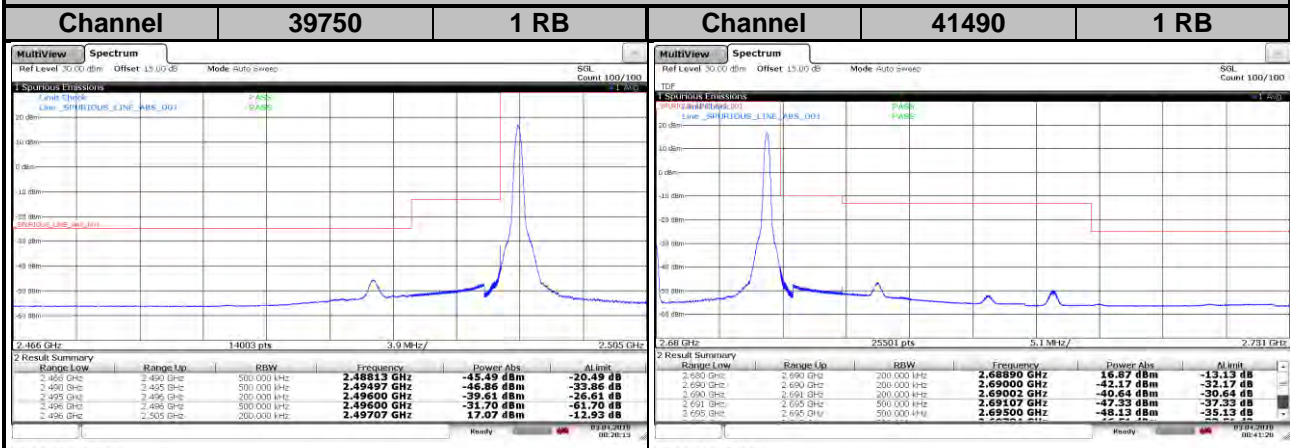
LTE Band 41
Channel Bandwidth: 20 MHz / QPSK

<Out-of-Band Emissions>

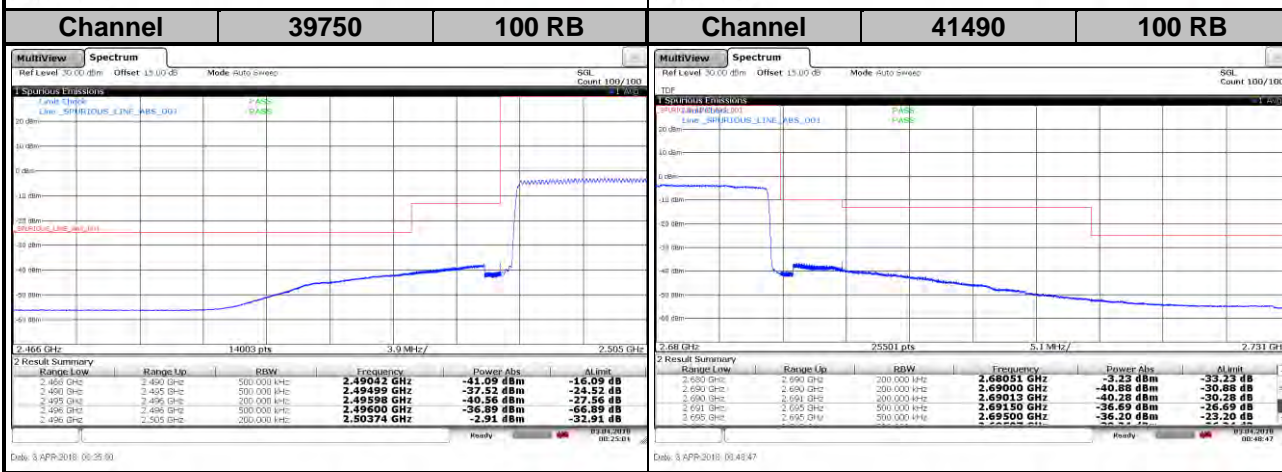
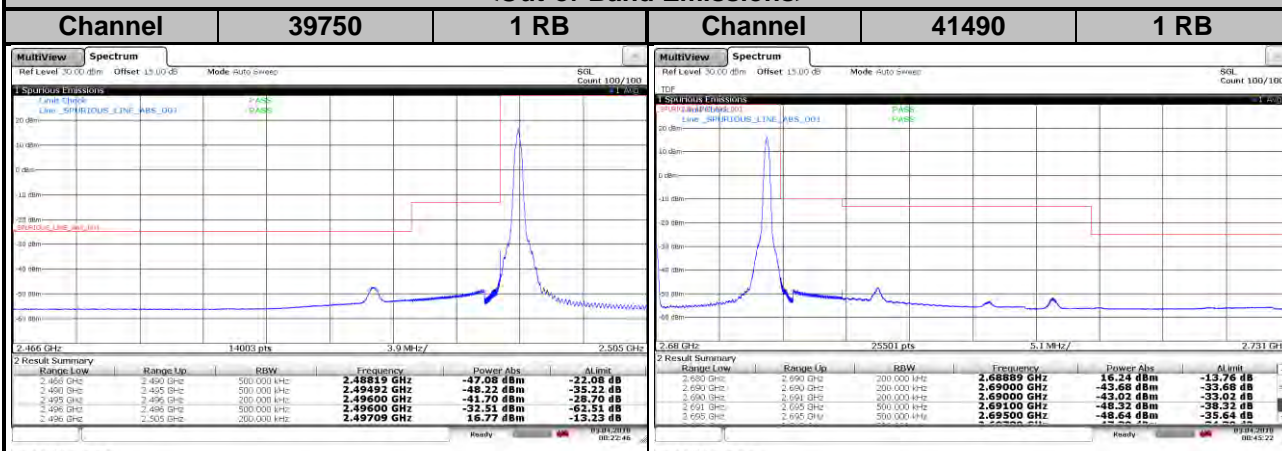


LTE Band 41
Channel Bandwidth: 20 MHz / 16QAM

<Out-of-Band Emissions>



LTE Band 41
Channel Bandwidth: 20 MHz / 64QAM
<Out-of-Band Emissions>

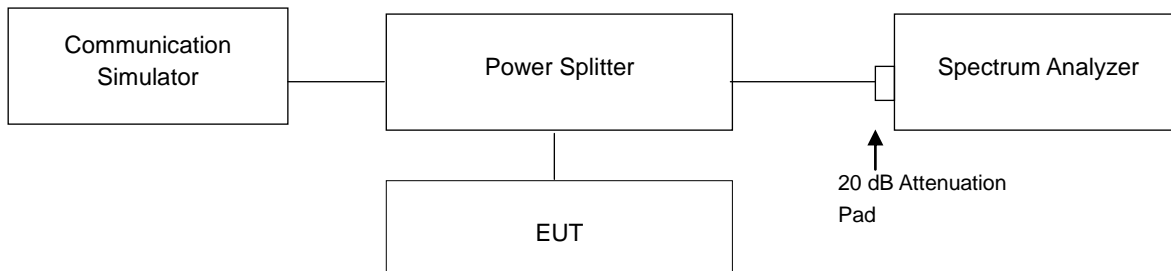


4.5 Peak to Average Ratio

4.5.1 Limits of Peak to Average Ratio Measurement

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.

4.5.2 Test Setup

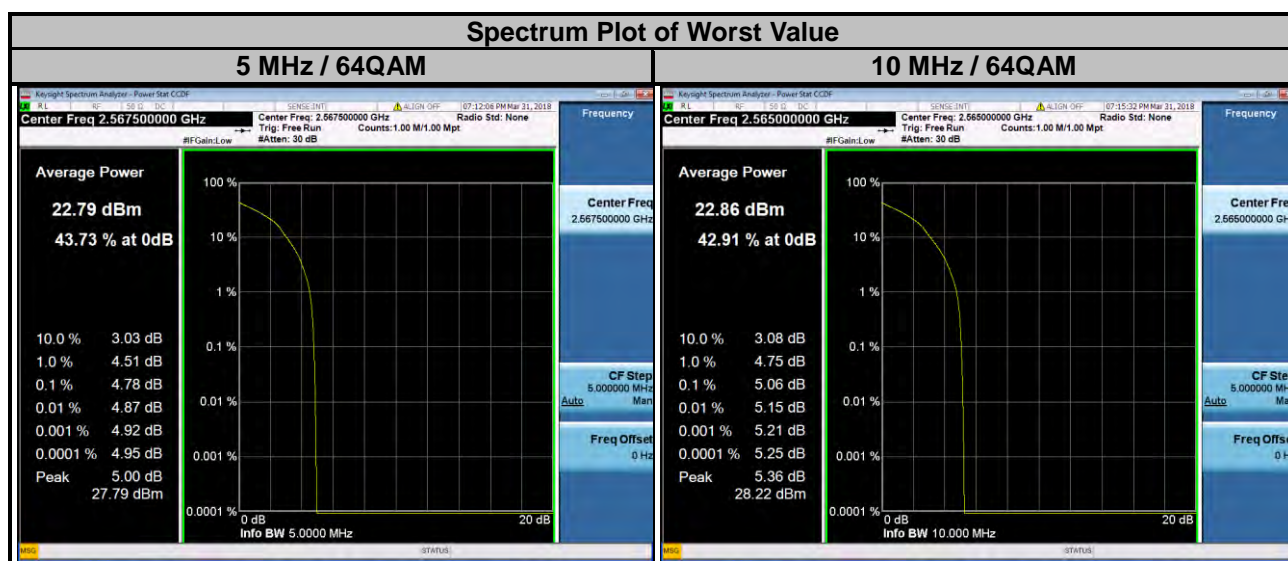


4.5.3 Test Procedures

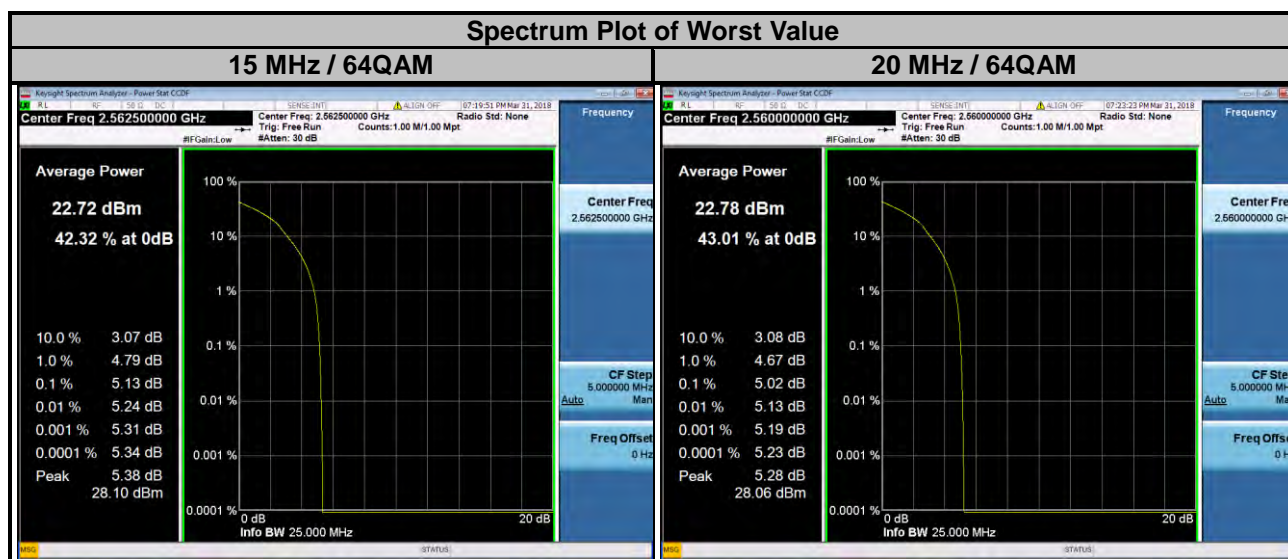
1. Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.5.4 Test Results

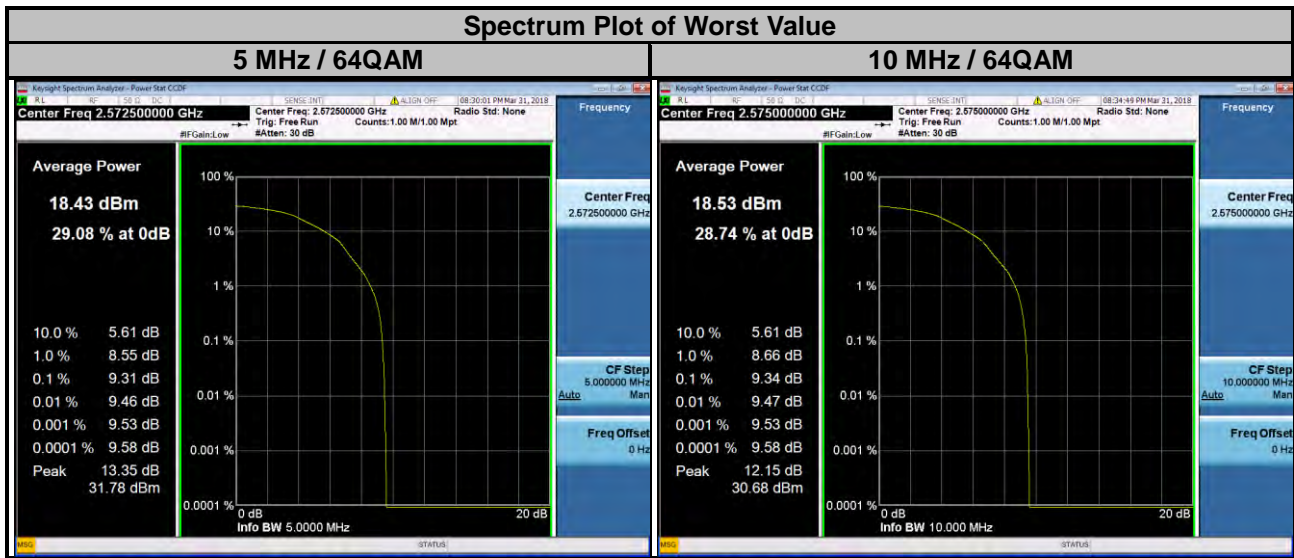
LTE Band 7									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20775	2502.5	2.83	4.02	4.12	20800	2505.0	2.90	4.02	4.15
21100	2535.0	2.65	3.81	3.98	21100	2535.0	2.53	3.69	3.88
21425	2567.5	3.33	4.60	4.78	21400	2565.0	3.47	4.87	5.06



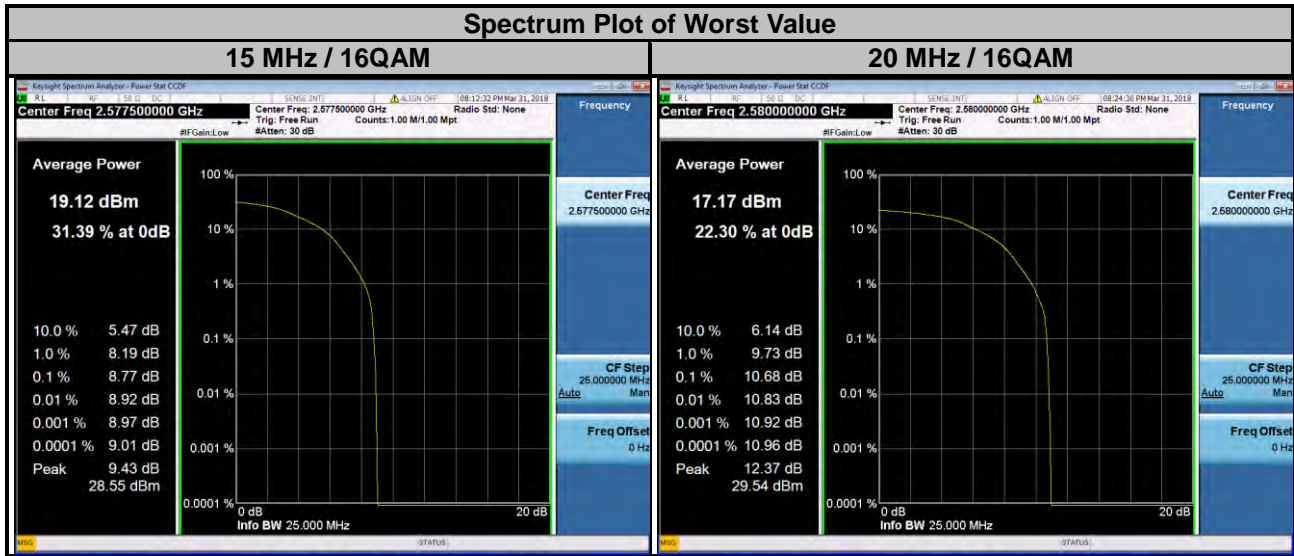
LTE Band 7									
Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
20825	2507.5	2.97	4.05	4.07	20850	2510.0	3.06	4.04	4.02
21100	2535.0	2.61	3.76	3.94	21100	2535.0	2.60	3.91	3.99
21375	2562.5	3.50	4.87	5.13	21350	2560.0	3.54	4.91	5.02



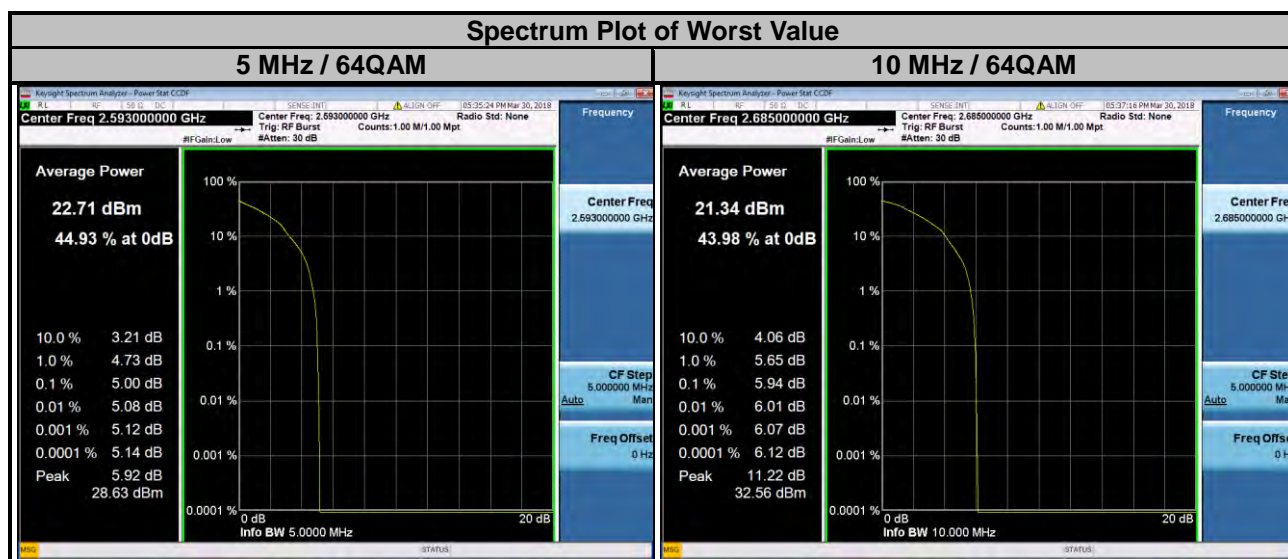
LTE Band 38									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
37775	2572.5	7.86	9.14	9.31	37800	2575.0	7.45	8.78	9.34
38000	2595.0	7.28	9.15	9.01	38000	2595.0	7.25	9.08	9.14
38225	2617.5	7.35	8.28	8.18	38200	2615.0	6.63	7.70	8.88



LTE Band 38									
Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
37825	2577.5	8.62	8.77	8.51	37850	2580.0	7.82	10.68	8.84
38000	2595.0	7.80	8.37	8.19	38000	2595.0	8.06	9.81	8.02
38175	2612.5	6.00	7.91	8.12	38150	2610.0	8.11	8.21	8.94



LTE Band 41									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
39675	2498.5	3.29	4.76	4.81	39700	2501.0	3.20	5.34	4.76
40620	2593.0	3.47	4.87	5.00	40620	2593.0	3.35	5.48	4.79
41565	2687.5	3.39	4.85	4.76	41540	2685.0	3.24	5.56	5.94



LTE Band 41									
Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
39725	2503.5	3.18	5.44	5.53	39750	2506.0	3.20	5.27	5.52
40620	2593.0	3.30	5.84	5.80	40620	2593.0	7.74	5.61	5.58
41515	2682.5	3.58	6.54	5.49	41490	2680.0	7.71	5.13	4.42

