

FCC TEST REPORT

(PART 27)

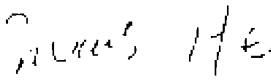
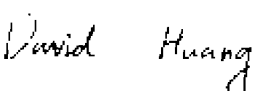
Applicant:	PUNDI X LABS PTE. LTD.
Address:	6 Raffles Boulevard,#03-308 Marina Square Singapore, 039594

Manufacturer or Supplier:	PUNDI X LABS PTE. LTD.
Address:	6 Raffles Boulevard,#03-308 Marina Square Singapore, 039594
Product:	XPOS
Brand Name:	Pundi X
Model Name:	X2
FCC ID:	2ASTH-X2
Date of tests:	Dec. 19, 2018 ~ Mar. 29, 2019

The tests have been carried out according to the requirements of the following standard:

- ☒ FCC Part 27, Subpart C, M
 ☒ ANSI/TIA/EIA-603-D
☒ FCC Part 2
 ☒ ANSI/TIA/EIA-603-E
 ☒ ANSI C63.26-2015

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Issued by Evans He Engineer / Mobile Department	Approved by David Huang Manager / Mobile Department
 Date: Mar. 07, 2019	 Date: Mar. 29, 2019

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF181102N040-9	Original release	Mar. 29, 2019
RF181102N040-9_R1	Updated the applicant and manufacturer address from "99 DUXTON ROAD 089543, Singapor" to "6 Raffles Boulevard,#03-308 Marina Square Singapore, 039594"	Apr. 24, 2019

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 27 & Part 2			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
2.1046 27.50(h)(2)	Equivalent Isotropically Radiated Power	PASS	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 27.53(m)(6)	Occupied Bandwidth	PASS	Meet the requirement of limit.
27.50(d)(5)	Peak to average ratio	PASS	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(m)(4)(6)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -20.14dB at 785.3MHz.

NOTE : Test Lab Information:

Lab: Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch

Test Lab Address: Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao'an District Shenzhen, Guangdong, 518108, People's Republic of China

1.1 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	UNCERTAINTY
Conducted emissions	9kHz~30MHz	3.11dB
Radiated emissions	9KHz ~ 30MHz	3.11dB
	30MHz ~ 1GMHz	5.12dB
	1GHz ~ 18GHz	5.34dB
	18GHz ~ 40GHz	5.02dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.2 TEST SITE AND INSTRUMENTS

Instrument	Model	Serial #	Cal Date	Cal Due
EMI test receiver	ESL6	100262	Jan. 04, 19	Jan. 03, 20
Active Antenna	AL-130	121031	Feb. 07, 19	Feb. 06, 20
3m Semi-anechoic Chamber	9m*6m*6m	N/A	Oct. 18, 18	Oct. 17, 19
Signal Amplifier	8447E	443008	Jan. 24, 19	Jan. 23, 20
MXA signal analyzer	N9020A	MY49100060	Jan. 04, 19	Jan. 03, 20
Horn Antenna	HAH-118	71259	Jan. 25, 19	Jan. 24, 20
Horn Antenna	HAH-118	71283	Feb. 01, 19	Jan. 31, 20
AMPLIFIER	EM01G26G	60613	Jan. 24, 19	Jan. 23, 20
AMPLIFIER	Emc012645	980077	Jan. 04, 19	Jan. 03, 20
Bilog Antenna (30MHz~6GHz)	JB6	A110712	Feb. 07, 19	Feb. 06, 20
DC Power Supply	E3640A	MY40004013	Jan. 04, 19	Jan. 03, 20
MXA Signal Analyzer	N9020A	MY49100060	Jan. 04, 19	Jan. 03, 20
MXG Vector Signal Generator	N5182A	MY50140530	Jan. 04, 19	Jan. 03, 20
Series Signal Generator	E4421B	US40051152	May. 12, 18	May. 11, 19
RF control unit	JS0806-0806-2	188060112	Apr. 25, 18	Apr. 24, 19
Wireless Connectivity Tester	CMW270	1201.0002K75-101 601-PE	Apr. 25, 18	Apr. 24, 19
Universal Radio Communication Tester	CMU200	121393	Jan. 04, 19	Jan. 03, 20
Programmable Temperature & Humidity Chamber	HYL-TH-225D H	DG-180746	Jul. 15, 18	Jul. 14, 19
Test Software	EZ-EMC	ver.lcp-03A1	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
 2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.
 3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 749762.

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	XPOS	
MODEL NAME	X2	
POWER SUPPLY	5.0Vdc (adapter or host equipment) 3.8Vdc (Li-ion, ion battery)	
MODULATION TECHNOLOGY	LTE Band 7	QPSK, 16QAM
FREQUENCY RANGE	LTE Band 7 Channel Bandwidth: 5MHz	2502.5MHz ~ 2567.5MHz
	LTE Band 7 Channel Bandwidth: 10MHz	2505MHz ~ 2565MHz
	LTE Band 7 Channel Bandwidth: 15MHz	2507.5MHz ~ 2562.5MHz
	LTE Band 7 Channel Bandwidth: 20MHz	2510MHz ~ 2560MHz
	LTE Band 38 Channel Bandwidth: 5MHz	2572.5MHz ~ 2617.5MHz
	LTE Band 38 Channel Bandwidth: 10MHz	2575MHz ~ 2615MHz
	LTE Band 38 Channel Bandwidth: 15MHz	2577.5MHz ~ 2612.5MHz
	LTE Band 38 Channel Bandwidth: 20MHz	2580MHz ~ 2610MHz
	LTE Band 41 Channel Bandwidth: 5MHz	2557.5MHz ~ 2652.5MHz
	LTE Band 41 Channel Bandwidth: 10MHz	2560MHz ~ 2650MHz
	LTE Band 41 Channel Bandwidth: 15MHz	2562.5MHz ~ 2647.5MHz
	LTE Band 41 Channel Bandwidth: 20MHz	2565MHz ~ 2645MHz
EMISSION DESIGNATOR	LTE Band 7 Channel Bandwidth: 5MHz	QPSK: 4M83G7D 16QAM: 4M91W7D
	LTE Band 7 Channel Bandwidth: 10MHz	QPSK: 8M95G7D 16QAM: 8M95W7D
	LTE Band 7 Channel Bandwidth: 15MHz	QPSK: 13M5G7D 16QAM: 13M5W7D
	LTE Band 7 Channel Bandwidth: 20MHz	QPSK: 17M9G7D 16QAM: 17M9W7D
	LTE Band 38 Channel Bandwidth: 5MHz	QPSK: 4M49G7D 16QAM: 4M49W7D
	LTE Band 38 Channel Bandwidth: 10MHz	QPSK: 8M95G7D 16QAM: 8M95W7D

	LTE Band 38 Channel Bandwidth: 15MHz	QPSK: 13M4G7D 16QAM: 13M4W7D
	LTE Band 38 Channel Bandwidth: 20MHz	QPSK: 17M9G7D 16QAM: 17M9W7D
	LTE Band 41 Channel Bandwidth: 5MHz	QPSK: 4M47G7D 16QAM: 4M47W7D
	LTE Band 41 Channel Bandwidth: 10MHz	QPSK: 8M93G7D 16QAM: 8M94W7D
	LTE Band 41 Channel Bandwidth: 15MHz	QPSK: 13M4G7D 16QAM: 13M4W7D
	LTE Band 41 Channel Bandwidth: 20MHz	QPSK: 17M9G7D 16QAM: 17M9W7D
MAX. EIRP POWER	LTE Band 7 Channel Bandwidth: 5MHz	185.78mW
	LTE Band 7 Channel Bandwidth: 10MHz	141.91mW
	LTE Band 7 Channel Bandwidth: 15MHz	137.4mW
	LTE Band 7 Channel Bandwidth: 20MHz	144.88mW
	LTE Band 38 Channel Bandwidth: 5MHz	144.21mW
	LTE Band 38 Channel Bandwidth: 10MHz	147.23mW
	LTE Band 38 Channel Bandwidth: 15MHz	152.41mW
	LTE Band 38 Channel Bandwidth: 20MHz	157.76mW
	LTE Band 41 Channel Bandwidth: 5MHz	204.17mW
	LTE Band 41 Channel Bandwidth: 10MHz	211.84mW
	LTE Band 41 Channel Bandwidth: 15MHz	219.79mW
	LTE Band 41 Channel Bandwidth: 20MHz	233.35mW
ANTENNA TYPE	FPC Antenna with 1.7dBi gain for LTE Band 7 FPC Antenna with 1.7dBi gain for LTE Band 38 FPC Antenna with 2.1dBi gain for LTE Band 41	
HW VERSION	JP800_MB_V1.1	
SW VERSION	JP800_MB_V1.1	



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VERITAS**

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I/O PORTS	Refer to user's manual
DATA CABLE	Power cable: non-shielded, detachable, 1.4m

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. The EUT was powered by the following adapter :

ADAPTER	
INPUT:	AC 100-240V~50/60Hz
OUTPUT:	DC 5V,2.0A

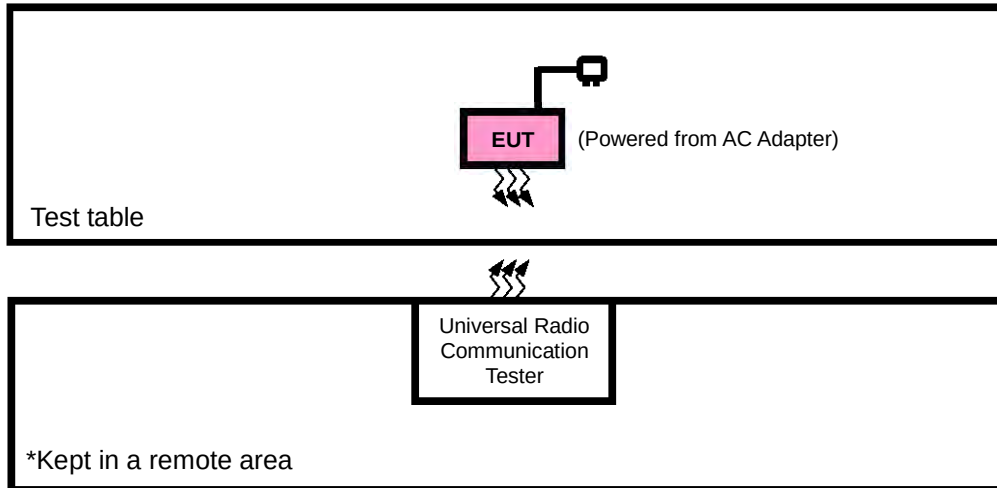
3. The EUT matched the following USB cable:

USB CABLE	
BRAND:	N/A
MODEL:	N/A
SIGNAL LINE:	1.4 METER

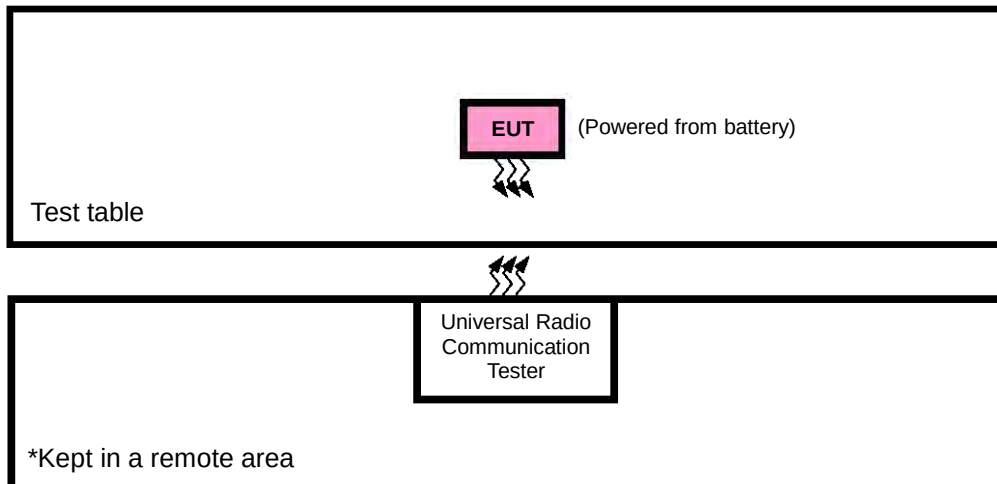
4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION TEST



FOR CONDUCTED & E.I.R.P TEST



2.3 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	N/A	N/A	N/A	N/A	N/A
2	N/A	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A
2	N/A

2.4 TEST ITEM AND TEST CONFIGURATION

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 on Y-plane for EIRP and X-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	EUT + Adapter with LTE link
B	EUT + Battery with LTE link

LTE BAND 7

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
B	EIRP	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	1 RB / 0RB Offset
		20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	20775 to 21425	20775, 21425	5MHz	QPSK	1 RB / 0 RB Offset
		20800 to 21400	20800, 21400	10MHz	QPSK	1 RB / 0RB Offset
		20825 to 21375	20825, 21375	15MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	20850, 21350	20MHz	QPSK	1 RB / 0 RB Offset
B	OCCUPIED BANDWIDTH	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
B	PEAK TO AVERAGE RATIO	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	1 RB / 0RB Offset
		20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
B	BAND EDGE	20775 to 21425	20775	5MHz	QPSK	1 RB / 0 RB Offset
			21425	5MHz	QPSK	25 RB / 0 RB Offset
		20800 to 21400	20800	10MHz	QPSK	1 RB / 24 RB Offset
			21400	10MHz	QPSK	25 RB / 0 RB Offset
		20825 to 21375	20825	15MHz	QPSK	1 RB / 0 RB Offset
			21375	15MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	20850	20MHz	QPSK	1 RB / 49 RB Offset
			21350	20MHz	QPSK	50 RB / 0 RB Offset
						1 RB / 0 RB Offset
						75 RB / 0 RB Offset
						1 RB / 74 RB Offset
						75 RB / 0 RB Offset
B	CONDCUETED EMISSION	20775 to 21425	20775, 21100, 21425	5MHz	QPSK	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10MHz	QPSK	1 RB / 0RB Offset
		20825 to 21375	20825, 21100, 21375	15MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	20775 to 21425	21100	5MHz	QPSK	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10MHz	QPSK	1 RB / 0RB Offset
		20825 to 21375	21100	15MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	21100	20MHz	QPSK	1 RB / 0 RB Offset

LTE BAND 38 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
B	EIRP	37775 to 38225	37775, 38000, 38225	5MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10MHz	QPSK, 16QAM, 64QAM	1 RB / 0RB Offset
		37825 to 38175	37825, 38000, 38175	15MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	37775 to 38225	37775, 38225	5MHz	QPSK	1 RB / 0 RB Offset
		37800 to 38200	37800, 38200	10MHz	QPSK	1 RB / 0RB Offset
		37825 to 38175	37825, 38175	15MHz	QPSK	1 RB / 0 RB Offset
		37850 to 38150	37850, 38150	20MHz	QPSK	1 RB / 0 RB Offset
B	OCCUPIED BANDWIDTH	37775 to 38225	37775, 38000, 38225	5MHz	QPSK, 16QAM, 64QAM	25 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10MHz	QPSK, 16QAM, 64QAM	50 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15MHz	QPSK, 16QAM, 64QAM	75 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20MHz	QPSK, 16QAM, 64QAM	100 RB / 0 RB Offset
B	PEAK TO AVERAGE RATIO	37775 to 38225	37775, 38000, 38225	5MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10MHz	QPSK, 16QAM, 64QAM	1 RB / 0RB Offset
		37825 to 38175	37825, 38000, 38175	15MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		37850 to 38150	37850, 38000, 38150	20MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
B	BAND EDGE	37775 to 38225	37775	5MHz	QPSK	1 RB / 0 RB Offset
			38825	5MHz	QPSK	25 RB / 0 RB Offset
		37800 to 38200	37800	10MHz	QPSK	1 RB / 24 RB Offset
			38200	10MHz	QPSK	25 RB / 0 RB Offset
		37825 to 38175	37825	15MHz	QPSK	1 RB / 0 RB Offset
			38175	15MHz	QPSK	50 RB / 0 RB Offset
		37850 to 38150	37850	20MHz	QPSK	1 RB / 49 RB Offset
			38150	20MHz	QPSK	50 RB / 0 RB Offset
		37775 to 38225	37775, 38000, 38225	5MHz	QPSK	1 RB / 0 RB Offset
			37800, 38000, 38200	10MHz	QPSK	1 RB / 0 RB Offset
		37825 to 38175	37825, 38000, 38175	15MHz	QPSK	1 RB / 0RB Offset
		37850 to 38150	37850, 38000, 38150	20MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	37775 to 38225	38000	5MHz	QPSK	1 RB / 0 RB Offset
		37800 to 38200	37800, 38000, 38200	10MHz	QPSK	1 RB / 0RB Offset
		37825 to 38175	38000	15MHz	QPSK	1 RB / 0 RB Offset
		37850 to 38150	38000	20MHz	QPSK	1 RB / 0 RB Offset

LTE BAND 41 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
B	EIRP	40265 to 41215	40265, 40585,40905 , 41215	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		40290 to 40590	40290, 40590, 40890 , 41190	10MHz	QPSK, 16QAM	1 RB / 0RB Offset
		40315 to 41165	40315, 40595,40885 , 41165	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		40340 to 40600	40340, 40600,40870 , 41140	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	40265 to 41215	40265, 41215	5MHz	QPSK	1 RB / 0 RB Offset
		40290 to 40590	40290, 41190	10MHz	QPSK	1 RB / 0RB Offset
		40315 to 41165	40315, 41165	15MHz	QPSK	1 RB / 0 RB Offset
		40340 to 40600	40340, 41140	20MHz	QPSK	1 RB / 0 RB Offset
B	OCCUPIED BANDWIDTH	40265 to 41215	40265, 40585,40905 , 41215	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		40290 to 40590	40290, 40590, 40890 , 41190	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		40315 to 41165	40315, 40595,40885 , 41165	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		40340 to 40600	40340, 40600,40870 , 41140	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
B	PEAK TO AVERAGE RATIO	40265 to 41215	40265, 40585,40905 , 41215	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		40290 to 40590	40290, 40590, 40890 , 41190	10MHz	QPSK, 16QAM	1 RB / 0RB Offset
		40315 to 41165	40315, 40595,40885 , 41165	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		40340 to 40600	40340, 40600,40870 , 41140	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
B	BAND EDGE	40265 to 41215	40265	5MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			41215	5MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		40290 to 40590	40290	10MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			41190	10MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
		40315 to 41165	40315	15MHz	QPSK	1 RB / 0 RB Offset
						75 RB / 0 RB Offset
			41165	15MHz	QPSK	1 RB / 74 RB Offset
						75 RB / 0 RB Offset
B	CONDCUDET ED EMISSION	40265 to 41215	40265, 40585,40905 , 41215	5MHz	QPSK	1 RB / 0 RB Offset



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		40290 to 40590	40290, 40590, 40890 , 41190	10MHz	QPSK	1 RB / 0RB Offset
		40315 to 41165	40315, 40595,40885 , 41165	15MHz	QPSK	1 RB / 0 RB Offset
		40340 to 40600	40340, 40600,40870 , 41140	20MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	40240 to 41240	40585,40905	5MHz	QPSK	1 RB / 0 RB Offset
		40265 to 41215	40290, 40590, 40890 , 41190	10MHz	QPSK	1 RB / 0RB Offset
		40290 to 41190	40595,40885	15MHz	QPSK	1 RB / 0 RB Offset
		40315 to 41165	40600,40870	20MHz	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	24deg. C, 57%RH	3.8Vdc from Battery	Evans He
FREQUENCY STABILITY	24deg. C, 57%RH	DC 3.3V/3.8V/4.3V	Aaron Liang
OCCUPIED BANDWIDTH	24deg. C, 57%RH	3.8Vdc from Battery	Aaron Liang
PEAK TO AVERAGE RATIO	24deg. C, 57%RH	3.8Vdc from Battery	Aaron Liang
BAND EDGE	24deg. C, 57%RH	3.8Vdc from Battery	Aaron Liang
CONDUCTED EMISSION	24deg. C, 57%RH	3.8Vdc from Battery	Evans He
RADIATED EMISSION	23deg. C, 59%RH	5Vdc from adapter	Evans He

2.5 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 v03

ANSI/TIA/EIA-603-D

ANSI/TIA/EIA-603-E

ANSI C63.26-2015

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

3 TEST TYPES AND RESULTS

3.1 OUTPUT POWER MEASUREMENT

3.1.1 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.”

3.1.2 TEST PROCEDURES

EIRP MEASUREMENT:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m 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 1m to 4m 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. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$

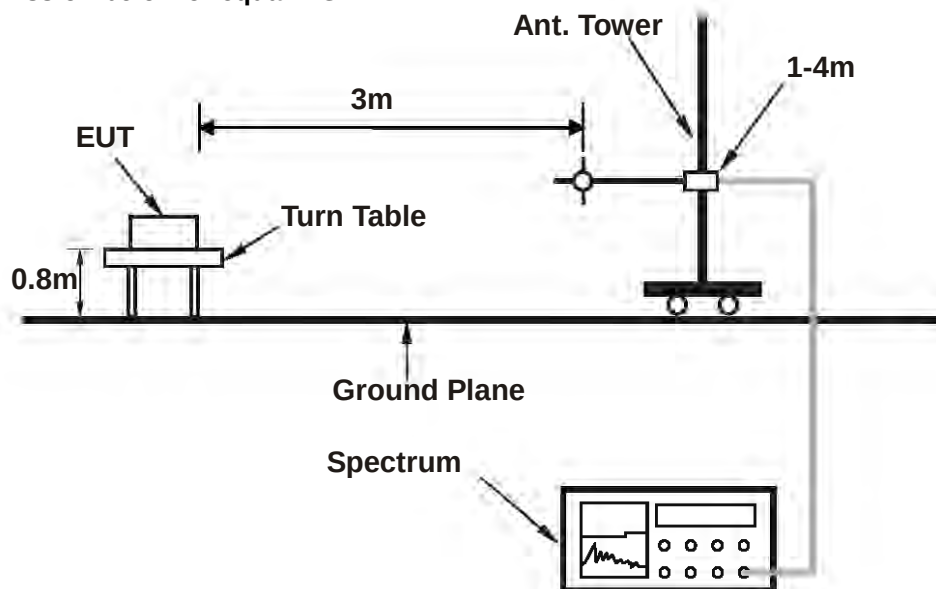
CONDUCTED POWER MEASUREMENT:

- 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.

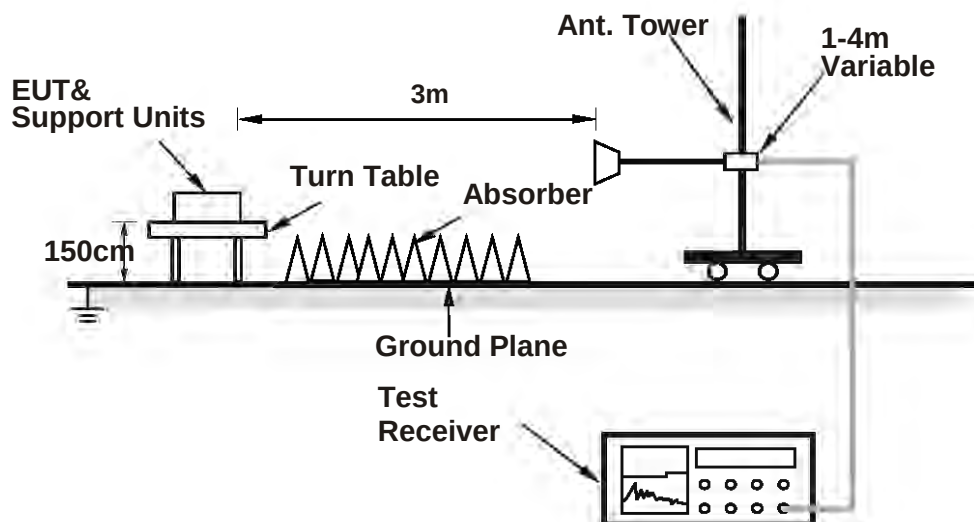
3.1.3 TEST SETUP

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

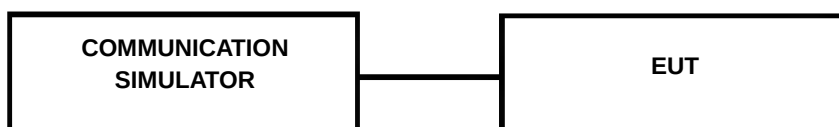


<Radiated Emission above 1 GHz>



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

CONDUCTED POWER MEASUREMENT:



3.1.4 TEST RESULTS

AVERAGE CONDUCTED OUTPUT POWER (dBm)

LTE Band 7							
BW	Modulation	RB Size	RB Offset	Low CH 20775	Mid CH 21100	High CH 21425	MPR
				Frequency 2502.5 MHz	Frequency 2535 MHz	Frequency 2567.5 MHz	
5 MHz	QPSK	1	0	23.58	24.09	23.54	0
		1	12	23.40	23.91	23.36	0
		1	24	22.93	23.44	22.89	0
		12	0	22.63	23.14	22.59	1
		12	6	22.48	22.99	22.44	1
		12	13	22.40	22.91	22.36	1
		25	0	22.47	22.98	22.43	1
	16QAM	1	0	22.43	22.94	22.39	1
		1	12	22.40	22.91	22.36	1
		1	24	22.37	22.88	22.33	1
		12	0	21.64	22.15	21.60	2
		12	6	21.50	22.01	21.46	2
		12	13	21.38	21.89	21.34	2
		25	0	21.54	22.05	21.50	2
BW	Modulation	RB Size	RB Offset	Low CH 20800	Mid CH 21100	High CH 21400	MPR
				Frequency 2505 MHz	Frequency 2535 MHz	Frequency 2565 MHz	
10 MHz	QPSK	1	0	23.62	24.13	23.58	0
		1	24	23.44	23.95	23.40	0
		1	49	22.97	23.48	22.93	0
		25	0	22.67	23.18	22.63	1
		25	12	22.52	23.03	22.48	1
		25	25	22.44	22.95	22.40	1
		50	0	22.51	23.02	22.47	1
	16QAM	1	0	22.47	22.98	22.43	1
		1	24	22.44	22.95	22.40	1
		1	49	22.41	22.92	22.37	1
		25	0	21.68	22.19	21.64	2
		25	12	21.54	22.05	21.50	2
		25	25	21.42	21.93	21.38	2
		50	0	21.58	22.09	21.54	2

LTE Band 7							
BW	Modulation	RB Size	RB Offset	Low CH 20825	Mid CH 21100	High CH 21375	MPR
				Frequency 2507.5 MHz	Frequency 2535 MHz	Frequency 2562.5 MHz	
15 MHz	QPSK	1	0	23.68	24.19	23.64	0
		1	37	23.50	24.01	23.46	0
		1	74	23.03	23.54	22.99	0
		36	0	22.73	23.24	22.69	1
		36	19	22.58	23.09	22.54	1
		36	39	22.50	23.01	22.46	1
		75	0	22.57	23.08	22.53	1
	16QAM	1	0	22.53	23.04	22.49	1
		1	37	22.50	23.01	22.46	1
		1	74	22.47	22.98	22.43	1
		36	0	21.74	22.25	21.70	2
		36	19	21.60	22.11	21.56	2
		36	39	21.48	21.99	21.44	2
		75	0	21.64	22.15	21.60	2
BW	Modulation	RB Size	RB Offset	Low CH 20850	Mid CH 21100	High CH 21350	MPR
				Frequency 2510 MHz	Frequency 2535 MHz	Frequency 2560 MHz	
20 MHz	QPSK	1	0	23.71	24.22	23.67	0
		1	50	23.53	24.04	23.49	0
		1	99	23.06	23.57	23.02	0
		50	0	22.76	23.27	22.72	1
		50	25	22.61	23.12	22.57	1
		50	50	22.53	23.04	22.49	1
		100	0	22.60	23.11	22.56	1
	16QAM	1	0	22.56	23.07	22.52	1
		1	50	22.53	23.04	22.49	1
		1	99	22.50	23.01	22.46	1
		50	0	21.77	22.28	21.73	2
		50	25	21.63	22.14	21.59	2
		50	50	21.51	22.02	21.47	2
		100	0	21.67	22.18	21.63	2

LTE Band 38							
BW	Modulation	RB Size	RB Offset	Low CH 37775	Mid CH 38000	High CH 38225	3GPP MPR (dB)
				Frequency 2572.5 MHz	Frequency 2595 MHz	Frequency 2617.5MHz	
5MHz	QPSK	1	0	24.11	24.18	24.14	0
		1	12	23.80	23.87	23.83	0
		1	24	23.72	23.79	23.75	0
		12	0	22.91	22.98	22.94	1
		12	6	22.86	22.93	22.89	1
		12	13	22.83	22.90	22.86	1
		25	0	22.90	22.97	22.93	1
	16QAM	1	0	22.94	23.01	22.97	1
		1	12	22.77	22.84	22.80	1
		1	24	22.71	22.78	22.74	1
		12	0	22.00	22.07	22.03	2
		12	6	21.91	21.98	21.94	2
		12	13	21.85	21.92	21.88	2
		25	0	21.90	21.97	21.93	2

LTE Band 38							
BW	Modulation	RB Size	RB Offset	Low CH 37800	Mid CH 38000	High CH 38200	3GPP MPR (dB)
				Frequency 2575 MHz	Frequency 2595 MHz	Frequency 2615 MHz	
10MHz	QPSK	1	0	24.15	24.22	24.18	0
		1	24	23.84	23.91	23.87	0
		1	49	23.76	23.83	23.79	0
		25	0	22.95	23.02	22.98	1
		25	12	22.90	22.97	22.93	1
		25	25	22.87	22.94	22.90	1
		50	0	22.94	23.01	22.97	1
	16QAM	1	0	22.98	23.05	23.01	1
		1	24	22.81	22.88	22.84	1
		1	49	22.75	22.82	22.78	1
		25	0	22.04	22.11	22.07	2
		25	12	21.95	22.02	21.98	2
		25	25	21.89	21.96	21.92	2
		50	0	21.94	22.01	21.97	2

LTE Band 38							
BW	Modulation	RB Size	RB Offset	Low CH 37825	Mid CH 38000	High CH 38175	3GPP MPR (dB)
				Frequency 2577.5 MHz	Frequency 2595 MHz	Frequency 2612.5MHz	
15MHz	QPSK	1	0	24.18	24.25	24.21	0
		1	37	23.87	23.94	23.90	0
		1	74	23.79	23.86	23.82	0
		36	0	22.98	23.05	23.01	1
		36	19	22.93	23.00	22.96	1
		36	39	22.90	22.97	22.93	1
		75	0	22.97	23.04	23.00	1
	16QAM	1	0	23.01	23.08	23.04	1
		1	37	22.84	22.91	22.87	1
		1	74	22.78	22.85	22.81	1
		36	0	22.07	22.14	22.10	2
		36	19	21.98	22.05	22.01	2
		36	39	21.92	21.99	21.95	2
		75	0	21.97	22.04	22.00	2

LTE Band 38							
BW	Modulation	RB Size	RB Offset	Low CH 37850	Mid CH 38000	High CH 38150	3GPP MPR (dB)
				Frequency 2580 MHz	Frequency 2595 MHz	Frequency 2610 MHz	
20MHz	QPSK	1	0	24.25	24.32	24.28	0
		1	50	23.94	24.01	23.97	0
		1	99	23.86	23.93	23.89	0
		50	0	23.05	23.12	23.08	1
		50	25	23.00	23.07	23.03	1
		50	50	22.97	23.04	23.00	1
		100	0	23.04	23.11	23.07	1
	16QAM	1	0	23.08	23.15	23.11	1
		1	50	22.91	22.98	22.94	1
		1	99	22.85	22.92	22.88	1
		50	0	22.14	22.21	22.17	2
		50	25	22.05	22.12	22.08	2
		50	50	21.99	22.06	22.02	2
		100	0	22.04	22.11	22.07	2

LTE Band 41								
BW	Modulation	RB Size	RB Offset	Low CH (40265)	Mid CH (40585)	Mid CH (40905)	High CH (41215)	3GPP MPR (dB)
				Frequency (2557.5)MHz	Frequency (2589.5)MHz	Frequency (2621.5)MHz	Frequency (2652.5)MHz	
5MHz	QPSK	1	0	23.93	23.99	23.96	23.83	0
		1	12	23.80	23.86	23.83	23.70	0
		1	24	23.72	23.78	23.75	23.62	0
		12	0	22.91	22.97	22.94	22.81	1
		12	6	22.86	22.92	22.89	22.76	1
		12	13	22.83	22.89	22.86	22.73	1
		25	0	22.90	22.96	22.93	22.80	1
	16QAM	1	0	22.94	23.00	22.97	22.84	1
		1	12	22.77	22.83	22.80	22.67	1
		1	24	22.71	22.77	22.74	22.61	1
		12	0	22.00	22.06	22.03	21.90	2
		12	6	21.91	21.97	21.94	21.81	2
		12	13	21.85	21.91	21.88	21.75	2
		25	0	21.90	21.96	21.93	21.80	2
BW	Modulation	RB Size	RB Offset	Low CH (40290)	Mid CH (40590)	Mid CH (40890)	High CH (41190)	3GPP MPR (dB)
				Frequency (2560)MHz	Frequency (2590)MHz	Frequency (2620)MHz	Frequency (2650)MHz	
10MHz	QPSK	1	0	23.98	24.04	24.01	23.88	0
		1	24	23.85	23.91	23.88	23.75	0
		1	49	23.77	23.83	23.80	23.67	0
		25	0	22.96	23.02	22.99	22.86	1
		25	12	22.91	22.97	22.94	22.81	1
		25	25	22.88	22.94	22.91	22.78	1
		50	0	22.95	23.01	22.98	22.85	1
	16QAM	1	0	22.99	23.05	23.02	22.89	1
		1	24	22.82	22.88	22.85	22.72	1
		1	49	22.76	22.82	22.79	22.66	1
		25	0	22.05	22.11	22.08	21.95	2
		25	12	21.96	22.02	21.99	21.86	2
		25	25	21.90	21.96	21.93	21.80	2
		50	0	21.95	22.01	21.98	21.85	2

LTE Band 41								
BW	Modulation	RB Size	RB Offset	Low CH (40315)	Mid CH (40595)	Mid CH (40885)	High CH (41165)	3GPP MPR (dB)
				Frequency (2562.5)MHz	Frequency (2590.5)MHz	Frequency (2619.5)MHz	Frequency (2647.5)MHz	
15MHz	QPSK	1	0	24.02	24.08	24.05	23.92	0
		1	37	23.89	23.95	23.92	23.79	0
		1	74	23.81	23.87	23.84	23.71	0
		36	0	23.00	23.06	23.03	22.90	1
		36	19	22.95	23.01	22.98	22.85	1
		36	39	22.92	22.98	22.95	22.82	1
		75	0	22.99	23.05	23.02	22.89	1
	16QAM	1	0	23.03	23.09	23.06	22.93	1
		1	37	22.86	22.92	22.89	22.76	1
		1	74	22.80	22.86	22.83	22.70	1
		36	0	22.09	22.15	22.12	21.99	2
		36	19	22.00	22.06	22.03	21.90	2
		36	39	21.94	22.00	21.97	21.84	2
		75	0	21.99	22.05	22.02	21.89	2
BW	Modulation	RB Size	RB Offset	Low CH (40340)	Mid CH (40600)	Mid CH (40870)	High CH (41140)	3GPP MPR (dB)
				Frequency (2565)MHz	Frequency (2591)MHz	Frequency (2618)MHz	Frequency (2645)MHz	
20MHz	QPSK	1	0	24.08	24.14	24.11	23.98	0
		1	50	23.95	24.01	23.98	23.85	0
		1	99	23.87	23.93	23.90	23.77	0
		50	0	23.06	23.12	23.09	22.96	1
		50	25	23.01	23.07	23.04	22.91	1
		50	50	22.98	23.04	23.01	22.88	1
		100	0	23.05	23.11	23.08	22.95	1
	16QAM	1	0	23.09	23.15	23.12	22.99	1
		1	50	22.92	22.98	22.95	22.82	1
		1	99	22.86	22.92	22.89	22.76	1
		50	0	22.15	22.21	22.18	22.05	2
		50	25	22.06	22.12	22.09	21.96	2
		50	50	22.00	22.06	22.03	21.90	2
		100	0	22.05	22.11	22.08	21.95	2

EIRP

LTE BAND 7

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
20775	2502.5	-23.01	45.7	22.69	185.78	H	2
21100	2535	-23.12	45.48	22.36	172.19	H	2
21425	2567.5	-22.89	45.43	22.54	179.47	H	2
20775	2502.5	-27.2	46.56	19.36	86.3	V	2
21100	2535	-25.38	45.48	20.1	102.33	V	2
21425	2567.5	-26.79	46.82	20.03	100.69	V	2

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
20775	2502.5	-23.54	45.22	21.68	147.23	H	2
21100	2535	-24.17	45.48	21.31	135.21	H	2
21425	2567.5	-24.65	45.81	21.16	130.62	H	2
20775	2502.5	-27.95	46.81	18.86	76.91	V	2
21100	2535	-26.77	45.48	18.71	74.3	V	2
21425	2567.5	-28.53	46.97	18.44	69.82	V	2

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
20800	2505	-24.68	46.01	21.33	135.83	H	2
21100	2535	-24.66	45.48	20.82	120.78	H	2
21400	2565	-24.15	45.67	21.52	141.91	H	2
20800	2505	-27.22	47.19	19.97	99.31	V	2
21100	2535	-26.27	45.48	19.21	83.37	V	2
21400	2565	-27.45	47.47	20.02	100.46	V	2

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
20800	2505	-23.99	45.36	21.37	137.09	H	2
21100	2535	-24.49	45.48	20.99	125.6	H	2
21400	2565	-24.56	46.01	21.45	139.64	H	2
20800	2505	-28.33	47.12	18.79	75.68	V	2
21100	2535	-27.26	45.48	18.22	66.37	V	2
21400	2565	-27.83	46.67	18.84	76.56	V	2

CHANNEL BANDWIDTH: 15MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
20825	2507.5	-24.39	45.48	21.09	128.53	H	2
21100	2535	-24.16	45.48	21.32	135.52	H	2
21375	2562.5	-25.09	46.4	21.31	135.21	H	2
20825	2507.5	-27.2	47.85	20.65	116.14	V	2
21100	2535	-26.05	45.48	19.43	87.7	V	2
21375	2562.5	-26.45	46.61	20.16	103.75	V	2

CHANNEL BANDWIDTH: 15MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
20825	2507.5	-24.59	45.97	21.38	137.4	H	2
21100	2535	-24.72	45.48	20.76	119.12	H	2
21375	2562.5	-24.64	45.79	21.15	130.32	H	2
20825	2507.5	-27.69	47.5	19.81	95.72	V	2
21100	2535	-26.58	45.48	18.9	77.62	V	2
21375	2562.5	-28.16	47.18	19.02	79.8	V	2

CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
20850	2510	-24.82	46.11	21.29	134.59	H	2
21100	2535	-24.14	45.48	21.34	136.14	H	2
21350	2560	-24.81	46	21.19	131.52	H	2
20850	2510	-28.46	47.61	19.15	82.22	V	2
21100	2535	-25.99	45.48	19.49	88.92	V	2
21350	2560	-27.51	46.64	19.13	81.85	V	2

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
20850	2510	-23.9	45.51	21.61	144.88	H	2
21100	2535	-24.34	45.48	21.14	130.02	H	2
21350	2560	-24.8	46.02	21.22	132.43	H	2
20850	2510	-28.2	47.01	18.81	76.03	V	2
21100	2535	-27.34	45.48	18.14	65.16	V	2
21350	2560	-28.44	46.61	18.17	65.61	V	2

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

LTE BAND 38

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
37775	2572.5	-19.94	45.76	19.58	90.78	H	2
38000	2595	-19.99	45.89	20.92	123.59	H	2
38225	2617.5	-21.15	46.08	20.04	100.93	H	2
37775	2572.5	-26.36	45.76	20.31	107.4	V	2
38000	2595	-26.4	45.89	21.52	141.91	V	2
38225	2617.5	-26.95	46.08	20.05	101.16	V	2

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
37775	2572.5	-20.77	45.76	19.39	86.9	H	2
38000	2595	-21.01	45.89	20.99	125.6	H	2
38225	2617.5	-22.25	46.08	20.8	120.23	H	2
37775	2572.5	-27.19	45.76	21.59	144.21	V	2
38000	2595	-27.42	45.89	21.9	154.88	V	2
38225	2617.5	-28.05	46.08	20.19	104.47	V	2

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
37800	2575	-19.75	45.85	19.79	95.28	H	2
38000	2595	-19.93	45.89	20.77	119.4	H	2
38200	2615	-21.02	46.01	20.2	104.71	H	2
37800	2575	-26.17	45.85	21.68	147.23	V	2
38000	2595	-26.34	45.89	20.51	112.46	V	2
38200	2615	-26.82	46.01	20.79	119.95	V	2

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
37800	2575	-20.9	45.85	19.22	83.56	H	2
38000	2595	-21.03	45.89	19.56	90.36	H	2
38200	2615	-22.18	46.01	19.32	85.51	H	2
37800	2575	-27.32	45.85	20.61	115.08	V	2
38000	2595	-27.44	45.89	21.59	144.21	V	2
38200	2615	-27.98	46.01	21.37	137.09	V	2

CHANNEL BANDWIDTH: 15MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
37825	2577.5	-19.76	45.86	19.04	80.17	H	2
38000	2595	-20	45.89	19.37	86.5	H	2
38175	2612.5	-21.09	45.97	19.2	83.18	H	2
37825	2577.5	-26.18	45.86	21.08	128.23	V	2
38000	2595	-26.41	45.89	21.76	149.97	V	2
38175	2612.5	-26.89	45.97	20.88	122.46	V	2

CHANNEL BANDWIDTH: 15MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
37825	2577.5	-20.62	45.86	19.82	95.94	H	2
38000	2595	-20.87	45.89	19.45	88.1	H	2
38175	2612.5	-21.94	45.97	20.18	104.23	H	2
37825	2577.5	-27.04	45.86	21.83	152.41	V	2
38000	2595	-27.28	45.89	21.18	131.22	V	2
38175	2612.5	-27.74	45.97	20.2	104.71	V	2

CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
37850	2580	-20.34	45.9	19.4	87.1	H	2
38000	2595	-20.45	45.89	19.84	96.38	H	2
38150	2610	-21.67	45.94	19.87	97.05	H	2
37850	2580	-26.76	45.9	20.91	123.31	V	2
38000	2595	-26.86	45.89	21.47	140.28	V	2
38150	2610	-27.47	45.94	21.98	157.76	V	2

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
37850	2580	-21.27	45.9	19.67	92.68	H	2
38000	2595	-21.52	45.89	19.91	97.95	H	2
38150	2610	-22.5	45.94	19.43	87.7	H	2
37850	2580	-27.69	45.9	20.78	119.67	V	2
38000	2595	-27.93	45.89	21.11	129.12	V	2
38150	2610	-28.3	45.94	20.31	107.4	V	2

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

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CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
40265	2557.5	-26.56	46.52	19.96	99.08	H	2
40585	2589.5	-26.19	46.53	20.34	108.14	H	2
40905	2621.5	-25.22	46.46	21.24	133.05	H	2
41215	2652.5	-27.19	46.44	19.25	84.14	H	2
40265	2557.5	-24.51	46.52	22.01	158.85	V	2
40585	2589.5	-24.4	46.55	22.15	164.06	V	2
40905	2621.5	-23.67	46.47	22.8	190.55	V	2
41215	2652.5	-23.37	46.39	23.02	200.45	V	2

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
40265	2557.5	-27.04	46.52	19.48	88.72	H	2
40585	2589.5	-27.14	46.53	19.39	86.9	H	2
40905	2621.5	-26.92	46.46	19.54	89.95	H	2
41215	2652.5	-25.23	46.44	21.21	132.13	H	2
40265	2557.5	-25.08	46.52	21.44	139.32	V	2
40585	2589.5	-24.78	46.55	21.77	150.31	V	2
40905	2621.5	-24.25	46.47	22.22	166.72	V	2
41215	2652.5	-23.29	46.39	23.1	204.17	V	2

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
40290	2560	-26.47	45.74	19.27	84.53	H	2
40590	2590	-25.68	45.67	19.99	99.77	H	2
40890	2620	-26.07	45.91	19.84	96.38	H	2
41190	2650	-26.15	45.72	19.57	90.57	H	2
40290	2560	-23.22	45.76	22.54	179.47	V	2
40590	2590	-22.39	45.65	23.26	211.84	V	2
40890	2620	-23.54	45.85	22.31	170.22	V	2
41190	2650	-24.03	45.76	21.73	148.94	V	2

CHANNEL BANDWIDTH: 10Mz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
40290	2560	-26.46	45.74	19.28	84.72	H	2
40590	2590	-26.23	45.67	19.44	87.9	H	2
40890	2620	-26.4	45.91	19.51	89.33	H	2
41190	2650	-24.88	45.72	20.84	121.34	H	2
40290	2560	-22.57	45.76	23.19	208.45	V	2
40590	2590	-23.28	45.65	22.37	172.58	V	2
40890	2620	-22.73	45.85	23.12	205.12	V	2
41190	2650	-22.85	45.76	22.91	195.43	V	2

CHANNEL BANDWIDTH: 15MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
40315	2562.5	-25.87	45.79	19.92	98.17	H	2
40595	2590.5	-26.03	45.65	19.62	91.62	H	2
40885	2619.5	-25.94	45.69	19.75	94.41	H	2
41165	2647.5	-25.43	45.57	20.14	103.28	H	2
40315	2562.5	-24.39	45.81	21.42	138.68	V	2
40595	2590.5	-22.75	45.71	22.96	197.7	V	2
40885	2619.5	-22.71	45.81	23.1	204.17	V	2
41165	2647.5	-23.1	45.48	22.38	172.98	V	2

CHANNEL BANDWIDTH: 15MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
40315	2562.5	-24.54	45.79	21.25	133.35	H	2
40595	2590.5	-24.81	45.65	20.84	121.34	H	2
40885	2619.5	-25.33	45.69	20.36	108.64	H	2
41165	2647.5	-25.61	45.57	19.96	99.08	H	2
40315	2562.5	-23.13	45.81	22.68	185.35	V	2
40595	2590.5	-23.12	45.71	22.59	181.55	V	2
40885	2619.5	-22.39	45.81	23.42	219.79	V	2
41165	2647.5	-22.66	45.48	22.82	191.43	V	2

CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
40340	2565	-26.18	46.32	20.14	103.28	H	2
40600	2591	-24.21	46.14	21.93	155.96	H	2
40870	2618	-25.7	46.02	20.32	107.65	H	2
41140	2645	-25.37	45.83	20.46	111.17	H	2
40340	2565	-23.45	46.33	22.88	194.09	V	2
40600	2591	-22.5	46.18	23.68	233.35	V	2
40870	2618	-23.57	46.11	22.54	179.47	V	2
41140	2645	-23.75	45.77	22.02	159.22	V	2

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	SPA LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)	Limit (W)
40340	2565	-24.18	46.32	22.14	163.68	H	2
40600	2591	-24.38	46.14	21.76	149.97	H	2
40870	2618	-25.26	46.02	20.76	119.12	H	2
41140	2645	-25.59	45.83	20.24	105.68	H	2
40340	2565	-24.1	46.33	22.23	167.11	V	2
40600	2591	-23.32	46.18	22.86	193.2	V	2
40870	2618	-23.07	46.11	23.04	201.37	V	2
41140	2645	-22.47	45.77	23.3	213.8	V	2

REMARKS: 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

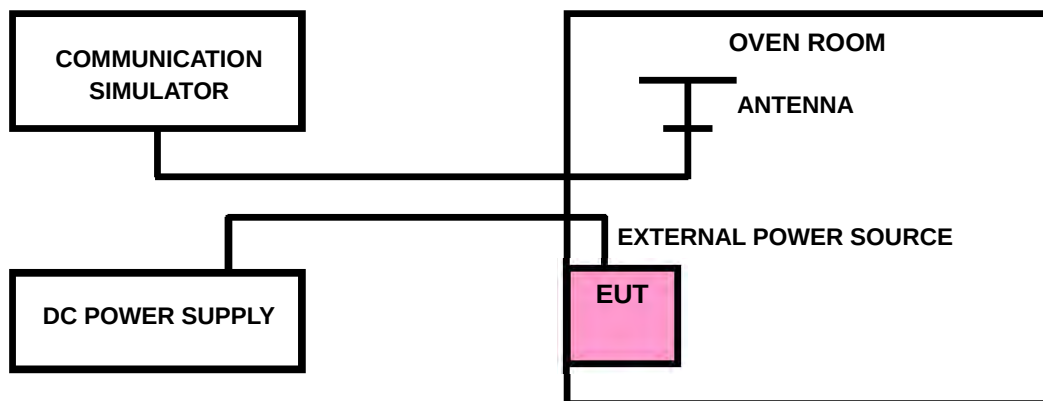
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

3.2.2 TEST PROCEDURE

- 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.
- 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.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ 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.

3.2.3 TEST SETUP



3.2.4 TEST RESULTS

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FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0049	-0.0025	2.5
3.3(BEP)	0.0005	-0.0043	2.5
4.3	0.0047	0.0016	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0027	0.0021	2.5
-20	0.0011	0.0001	2.5
-10	0.0043	0.0045	2.5
0	0.0001	-0.0025	2.5
10	-0.0019	0.0029	2.5
20	0.0079	-0.0006	2.5
30	0.0007	0.0044	2.5
40	-0.0049	0.0020	2.5
50	0.0039	0.0021	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	0.0038	-0.0001	2.5
3.3(BEP)	-0.0038	-0.0040	2.5
4.3	0.0019	0.0025	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	0.0004	-0.0026	2.5
-20	0.0044	-0.0019	2.5
-10	0.0032	0.0047	2.5
0	-0.0048	0.0045	2.5
10	0.0020	-0.0002	2.5
20	0.0043	-0.0009	2.5
30	0.0010	-0.0001	2.5
40	-0.0035	0.0006	2.5
50	0.0021	0.0004	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0042	0.0035	2.5
3.3(BEP)	-0.0029	-0.0037	2.5
4.3	0.0062	-0.0020	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	0.0054	0.0054	2.5
-20	0.0015	0.0026	2.5
-10	0.0036	-0.0031	2.5
0	0.0025	0.0027	2.5
10	0.0007	0.0007	2.5
20	0.0090	-0.0033	2.5
30	-0.0008	0.0027	2.5
40	-0.0041	-0.0002	2.5
50	0.0011	0.0026	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	0.0013	-0.0044	2.5
3.3(BEP)	-0.0038	-0.0015	2.5
4.3	0.0030	0.0011	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0028	0.0047	2.5
-20	0.0033	0.0050	2.5
-10	0.0058	-0.0006	2.5
0	-0.0044	0.0020	2.5
10	0.0034	0.0038	2.5
20	0.0027	0.0020	2.5
30	-0.0020	0.0027	2.5
40	-0.0036	-0.0001	2.5
50	0.0073	0.0044	2.5

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FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0045	-0.0029	2.5
3.3(BEP)	0.0048	0.0019	2.5
4.3	0.0022	0.0016	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	0.0005	-0.0023	2.5
-20	0.0031	-0.0041	2.5
-10	0.0022	-0.0003	2.5
0	-0.0002	0.0044	2.5
10	-0.0041	-0.0049	2.5
20	0.0051	0.0004	2.5
30	-0.0007	0.0005	2.5
40	0.0035	-0.0018	2.5
50	0.0043	0.0027	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	0.0018	0.0046	2.5
3.3(BEP)	-0.0032	0.0037	2.5
4.3	0.0039	0.0033	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0035	0.0007	2.5
-20	0.0011	-0.0014	2.5
-10	0.0079	0.0024	2.5
0	0.0039	-0.0041	2.5
10	-0.0044	-0.0011	2.5
20	0.0082	0.0028	2.5
30	-0.0045	-0.0035	2.5
40	0.0037	0.0026	2.5
50	0.0039	-0.0012	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0053	0.0028	2.5
3.3(BEP)	-0.0047	-0.0005	2.5
4.3	0.0022	0.0050	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0025	0.0024	2.5
-20	-0.0052	0.0054	2.5
-10	0.0030	0.0015	2.5
0	0.0015	-0.0012	2.5
10	-0.0028	-0.0004	2.5
20	0.0042	0.0015	2.5
30	0.0000	0.0014	2.5
40	0.0015	-0.0040	2.5
50	0.0046	-0.0013	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0046	-0.0045	2.5
3.3(BEP)	0.0031	-0.0036	2.5
4.3	0.0018	0.0029	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0050	0.0025	2.5
-20	0.0042	-0.0045	2.5
-10	0.0036	-0.0025	2.5
0	-0.0027	-0.0016	2.5
10	-0.0025	0.0014	2.5
20	0.0071	0.0049	2.5
30	-0.0017	0.0002	2.5
40	0.0031	-0.0012	2.5
50	0.0066	0.0026	2.5

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FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	0.0042	-0.0053	2.5
3.3	0.0045	0.0020	2.5
4.3	0.0031	-0.0003	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	5MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0032	0.0019	2.5
-20	-0.0044	-0.0012	2.5
-10	0.0071	-0.0021	2.5
0	0.0022	-0.0005	2.5
10	-0.0051	0.0028	2.5
20	0.0025	-0.0011	2.5
30	-0.0037	0.0029	2.5
40	-0.0005	-0.0027	2.5
50	0.0042	0.0049	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0018	-0.0022	2.5
3.3	-0.0010	-0.0055	2.5
4.3	0.0061	-0.0046	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	10MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0017	0.0041	2.5
-20	0.0033	-0.0023	2.5
-10	0.0071	-0.0001	2.5
0	-0.0034	-0.0024	2.5
10	0.0053	0.0004	2.5
20	0.0032	0.0034	2.5
30	-0.0052	0.0026	2.5
40	-0.0012	0.0025	2.5
50	0.0049	0.0010	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0023	-0.0034	2.5
3.3	-0.0005	0.0021	2.5
4.3	0.0061	-0.0015	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

TEMP. (°C)	15MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0021	-0.0006	2.5
-20	0.0004	0.0031	2.5
-10	0.0070	0.0055	2.5
0	-0.0028	0.0025	2.5
10	-0.0004	-0.0047	2.5
20	0.0047	-0.0055	2.5
30	0.0013	0.0048	2.5
40	-0.0007	-0.0001	2.5
50	0.0041	-0.0027	2.5

FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
3.8	-0.0047	0.0025	2.5
3.3	-0.0002	-0.0021	2.5
4.3	0.0071	0.0027	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.3Vdc to 4.3Vdc.

FREQUENCY ERROR vs. TEMPERATURE.

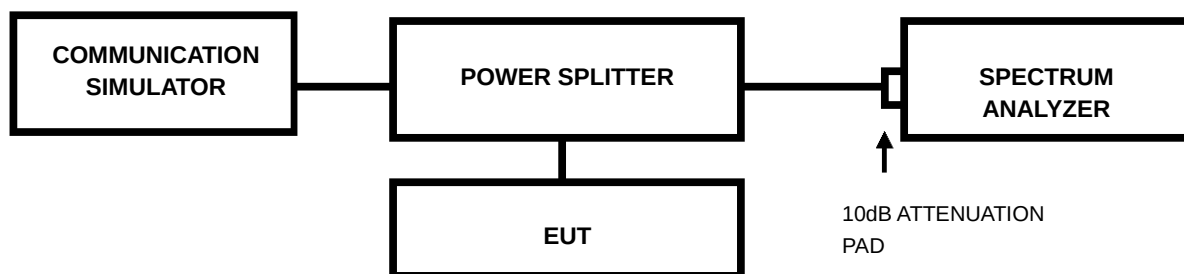
TEMP. (°C)	20MHz		LIMIT (ppm)
	FREQUENCY ERROR (ppm)		
	Low Channel	High Channel	
-30	-0.0005	0.0015	2.5
-20	-0.0006	0.0009	2.5
-10	0.0069	-0.0009	2.5
0	-0.0036	-0.0035	2.5
10	0.0025	-0.0003	2.5
20	0.0037	-0.0005	2.5
30	0.0010	-0.0029	2.5
40	-0.0030	-0.0049	2.5
50	0.0087	-0.0037	2.5

3.3 OCCUPIED BANDWIDTH MEASUREMENT

3.3.1 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.

3.3.2 TEST SETUP

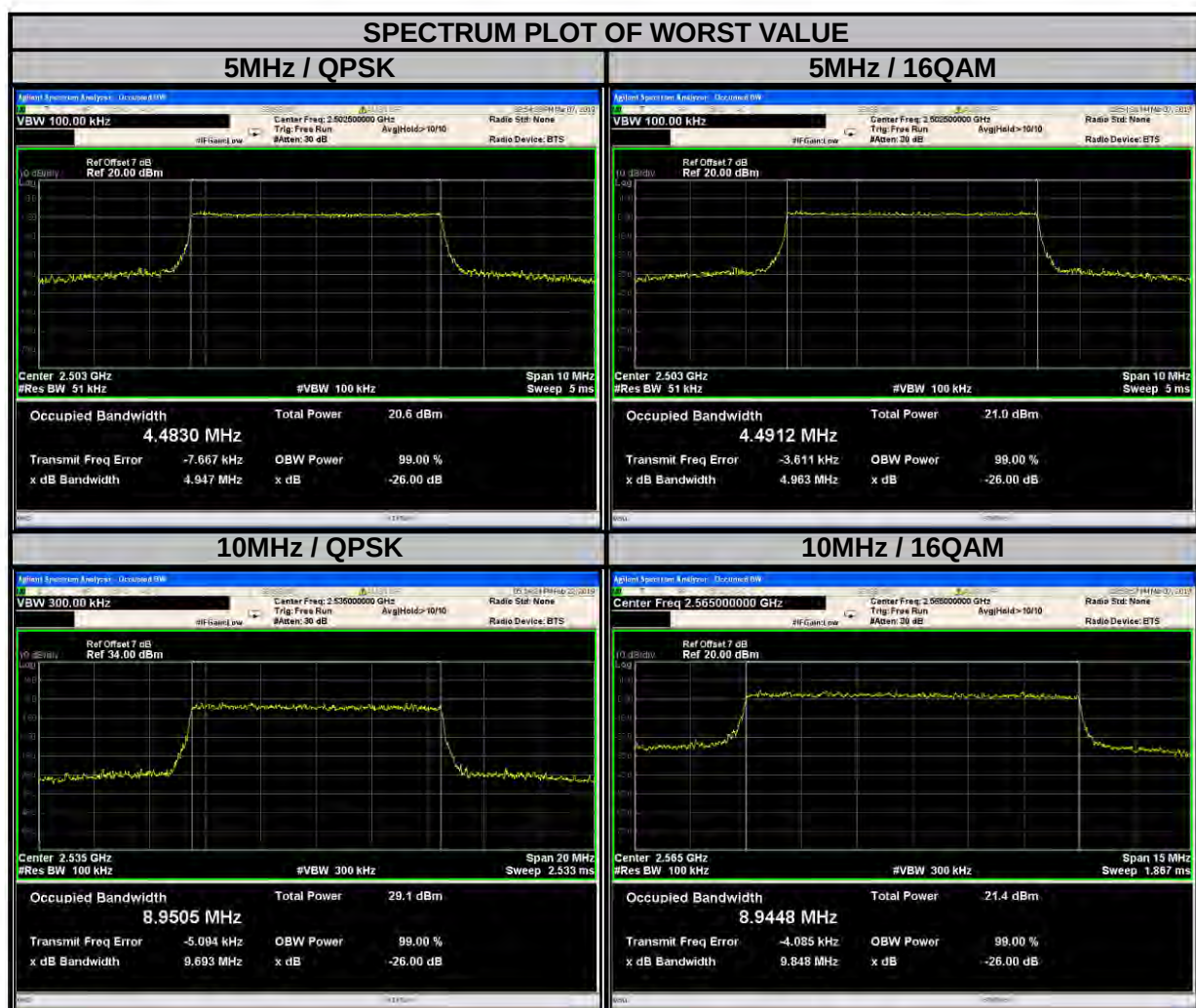


3.3.3 TEST PROCEDURES

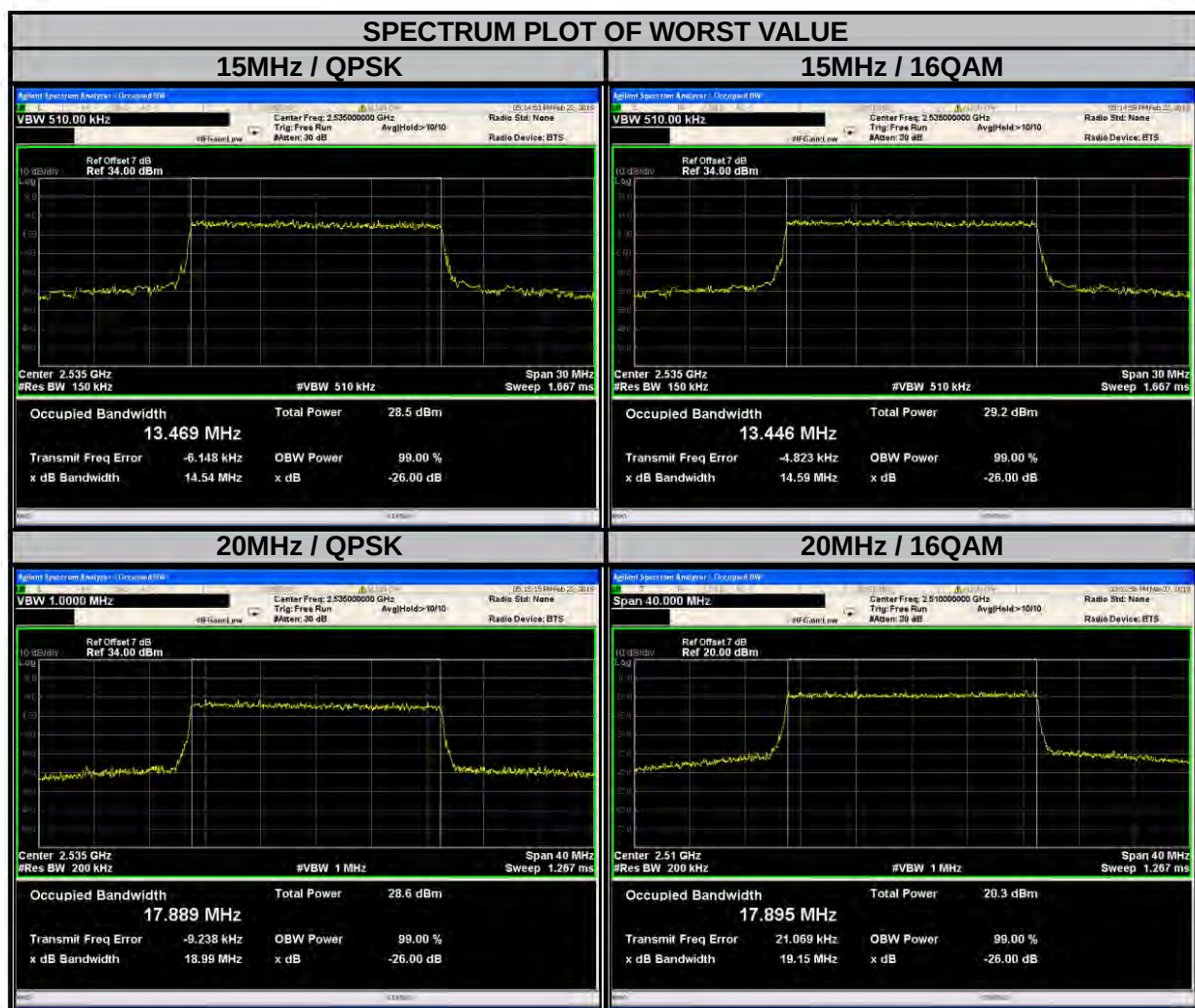
- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

3.3.4 TEST RESULTS

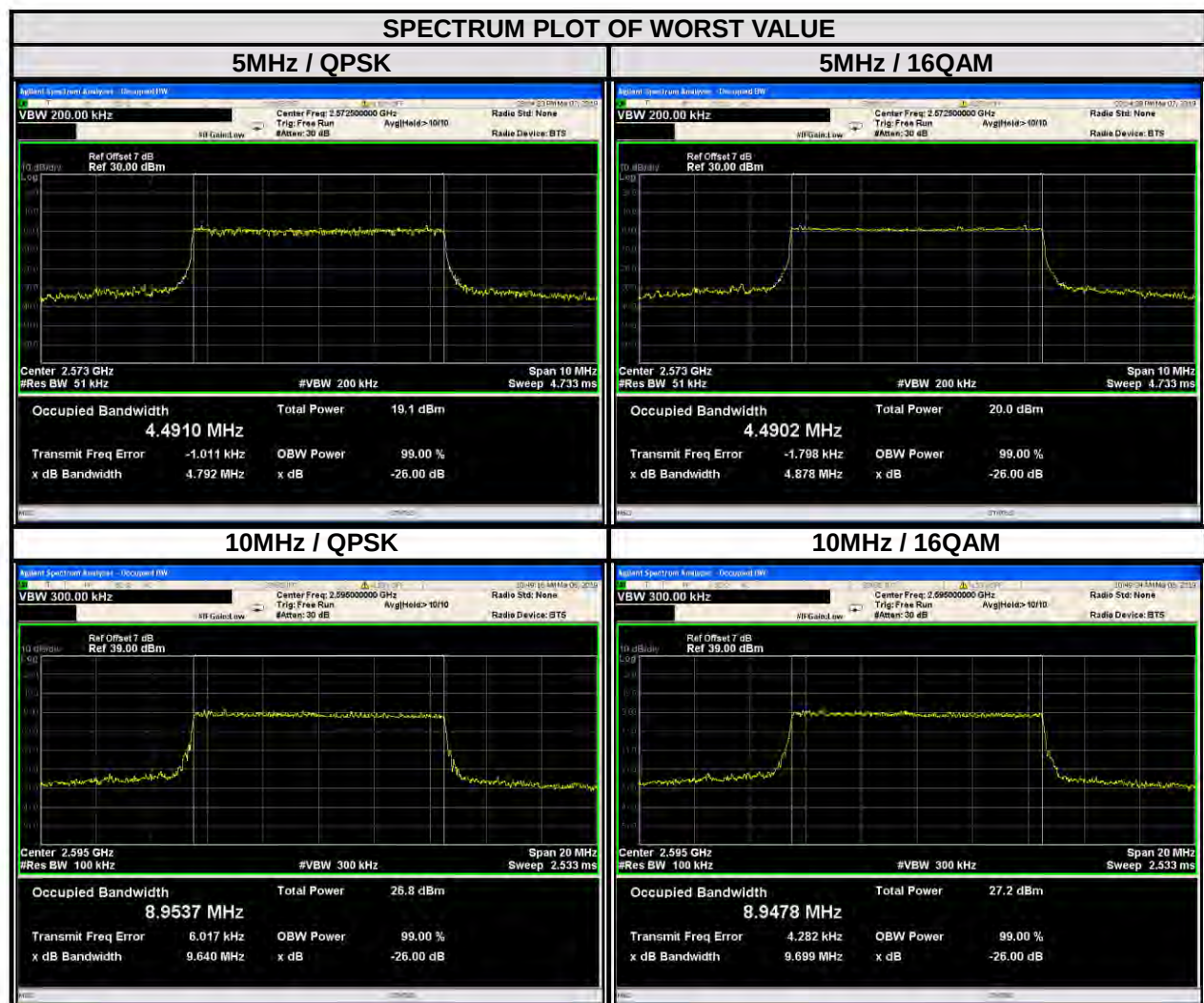
LTE BAND 7							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
20775	2502.5	4.830	4.912	20800	2505	8.943	8.942
21100	2535	4.471	4.473	21100	2535	8.951	8.944
21425	2567.5	4.472	4.475	21400	2565	8.936	8.945



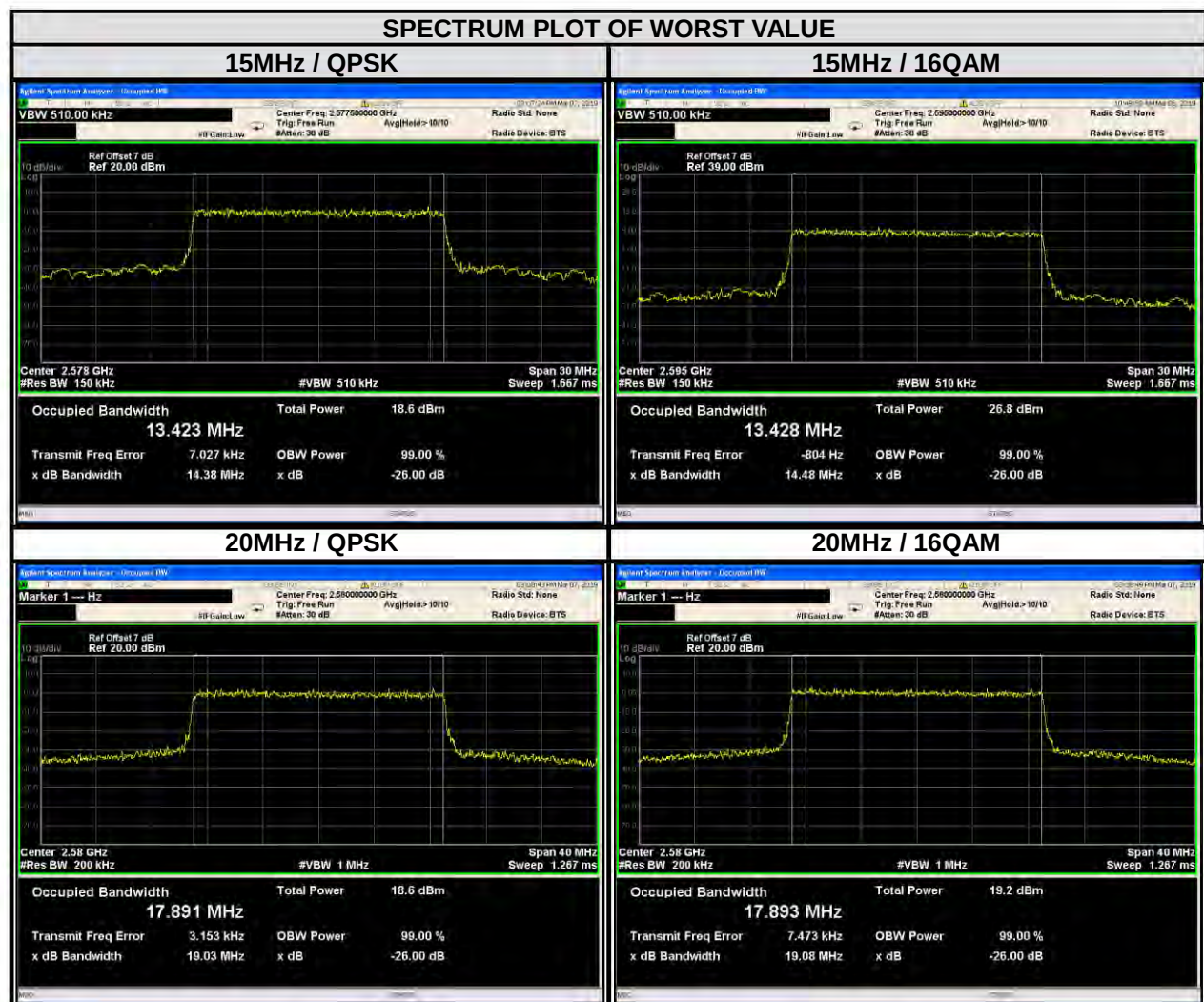
LTE BAND 7							
CHANNEL BANDWIDTH: 15MHz				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
20825	2507.5	13.425	13.424	20850	2510	17.851	17.895
21100	2535	13.469	13.446	21100	2535	17.889	17.894
21375	2562.5	13.394	13.388	21350	2560	17.871	17.862



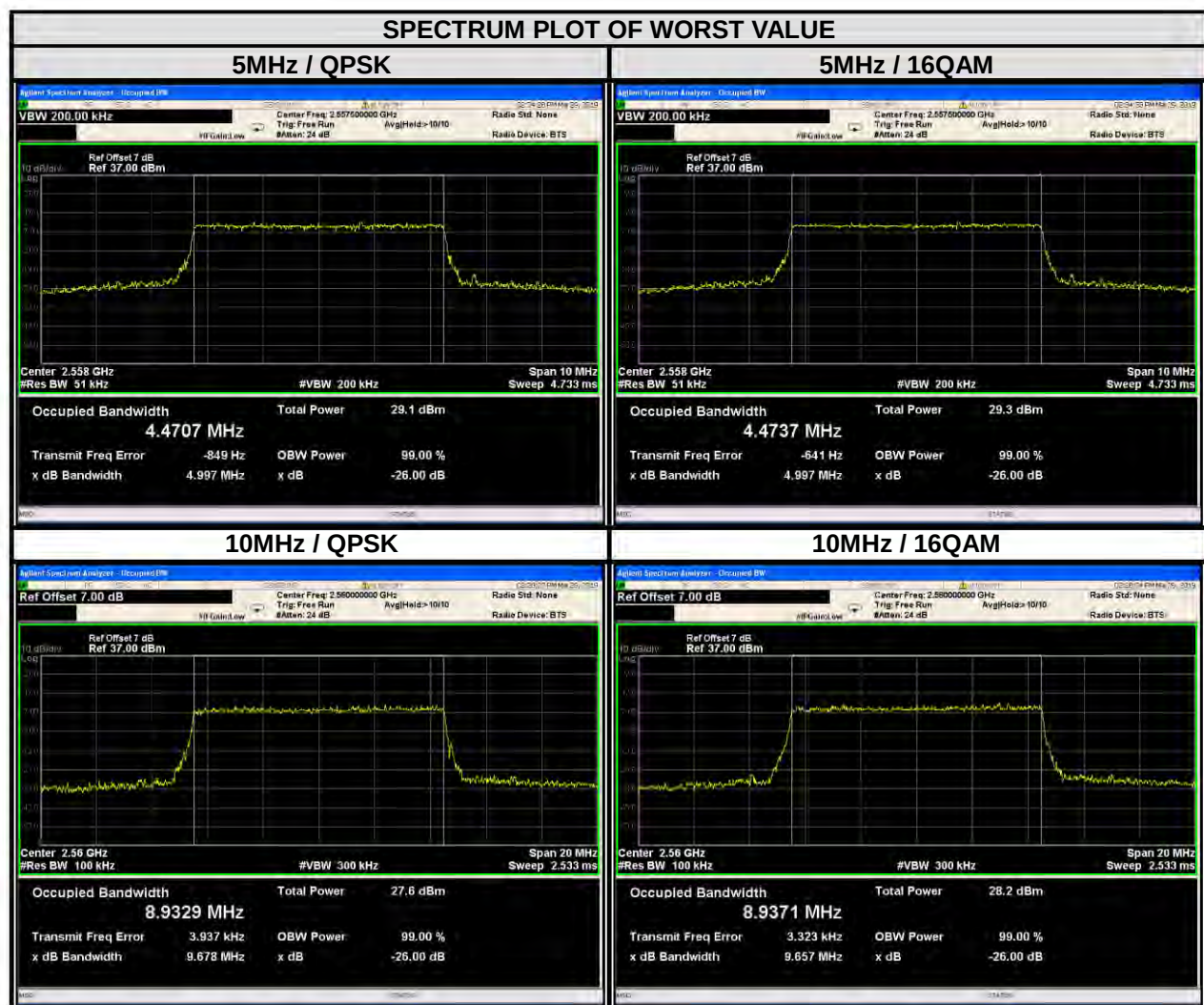
LTE BAND 38							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
37775	2572.5	4.491	4.490	37800	2575	8.936	8.939
38000	2595	4.475	4.475	38000	2595	8.954	8.948
38225	2617.5	4.479	4.472	38200	2615	8.935	8.931



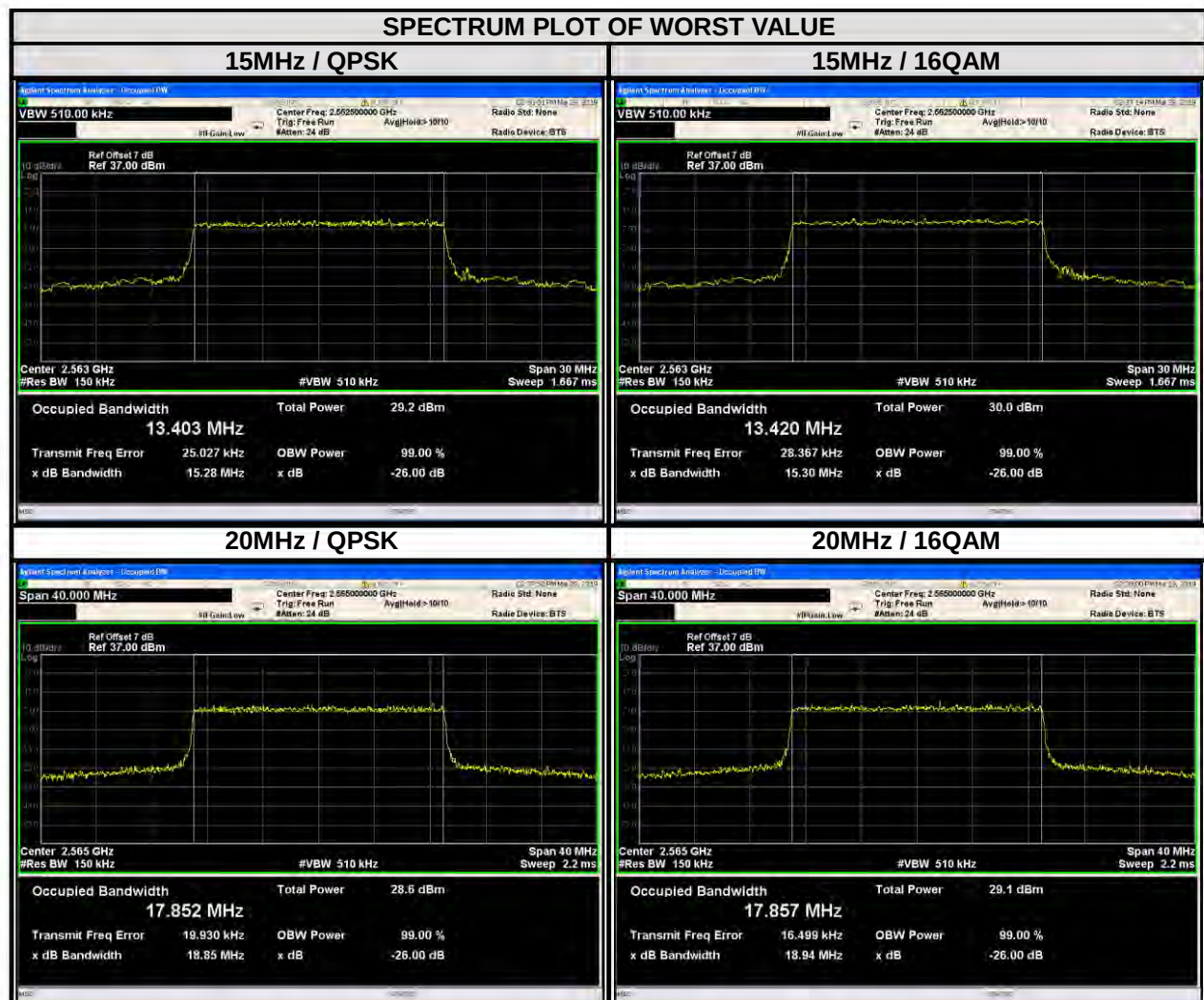
LTE BAND 38							
CHANNEL BANDWIDTH: 15MHZ				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
37825	2577.5	13.423	13.418	37850	2580	17.891	17.893
38000	2595	13.417	13.428	38000	2595	17.850	17.856
38175	2612.5	13.414	13.390	38150	2610	17.867	17.879



LTE BAND 41							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
40265	2557.5	4.4707	4.4737	40290	2560	8.9329	8.9371
40585	2589.5	4.4653	4.4654	40590	2590	8.9287	8.9311
40905	2621.5	4.4657	4.4666	40890	2620	8.9314	8.9321
41215	2652.5	4.4624	4.4521	41190	2650	8.9275	8.9257



LTE BAND 41							
CHANNEL BANDWIDTH: 15MHZ				CHANNEL BANDWIDTH: 20MHZ			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
40315	2562.5	13.403	13.420	40340	2565	17.852	17.857
40595	2590.5	13.381	13.387	40600	2591	17.877	17.862
40885	2619.5	13.392	13.367	40870	2618	17.857	17.721
41165	2647.5	13.377	13.384	41140	2645	17.837	17.745

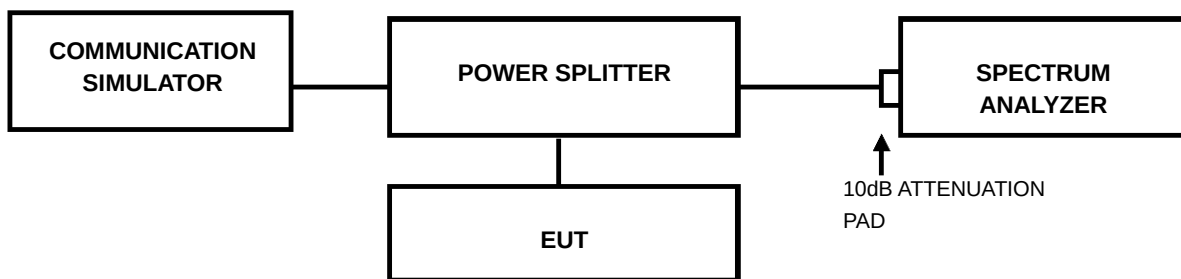


3.4 PEAK TO AVERAGE RATIO

3.4.1 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.

3.4.2 TEST SETUP



3.4.3 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%.

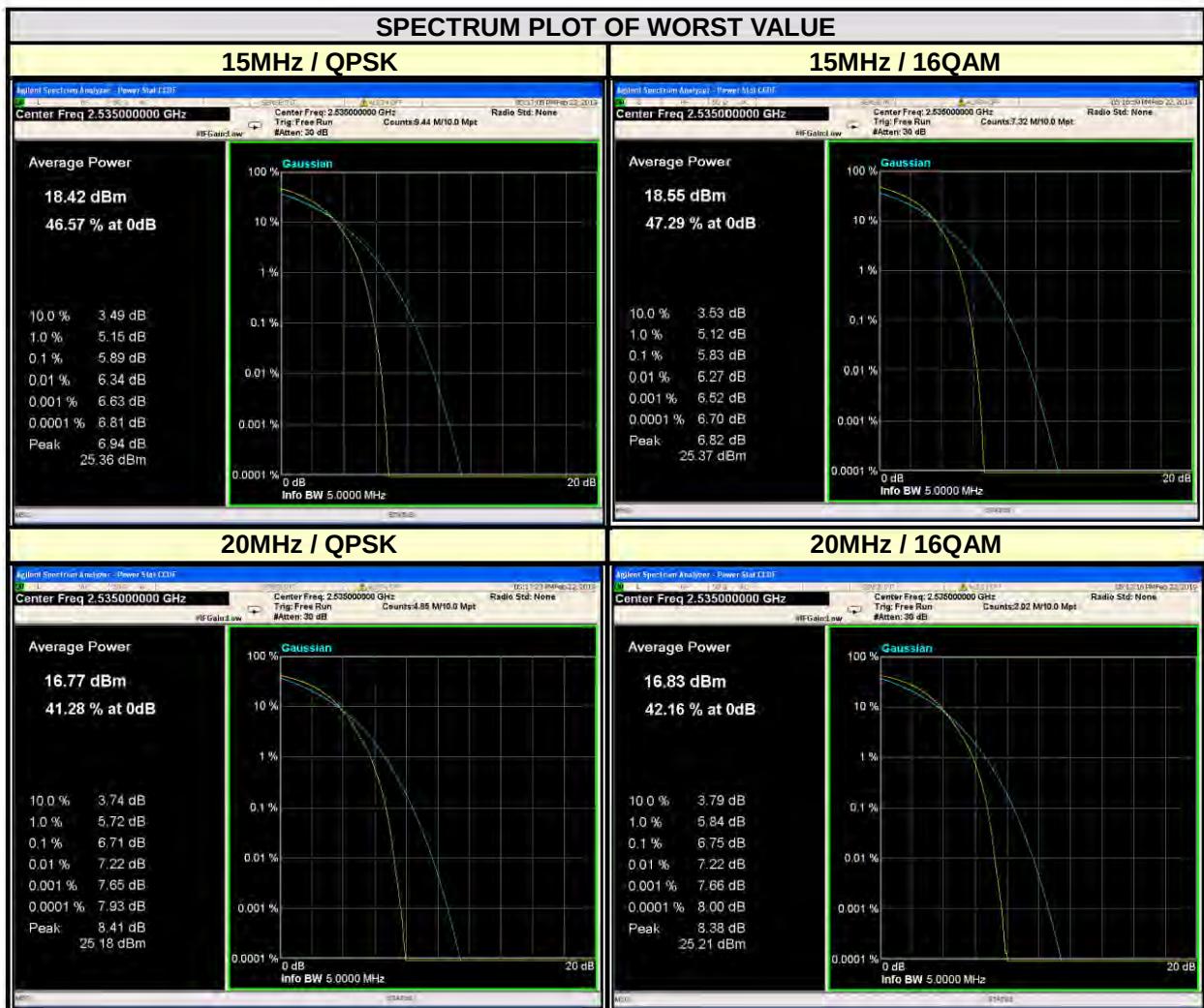
3.4.4 TEST RESULTS

LTE BAND 7

CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
20775	2502.5	4.62	4.18	20800	2505	4.25	4.51
21100	2535	5.08	5.08	21100	2535	4.63	4.68
21425	2567.5	4.35	4.87	21400	2565	4.37	4.22

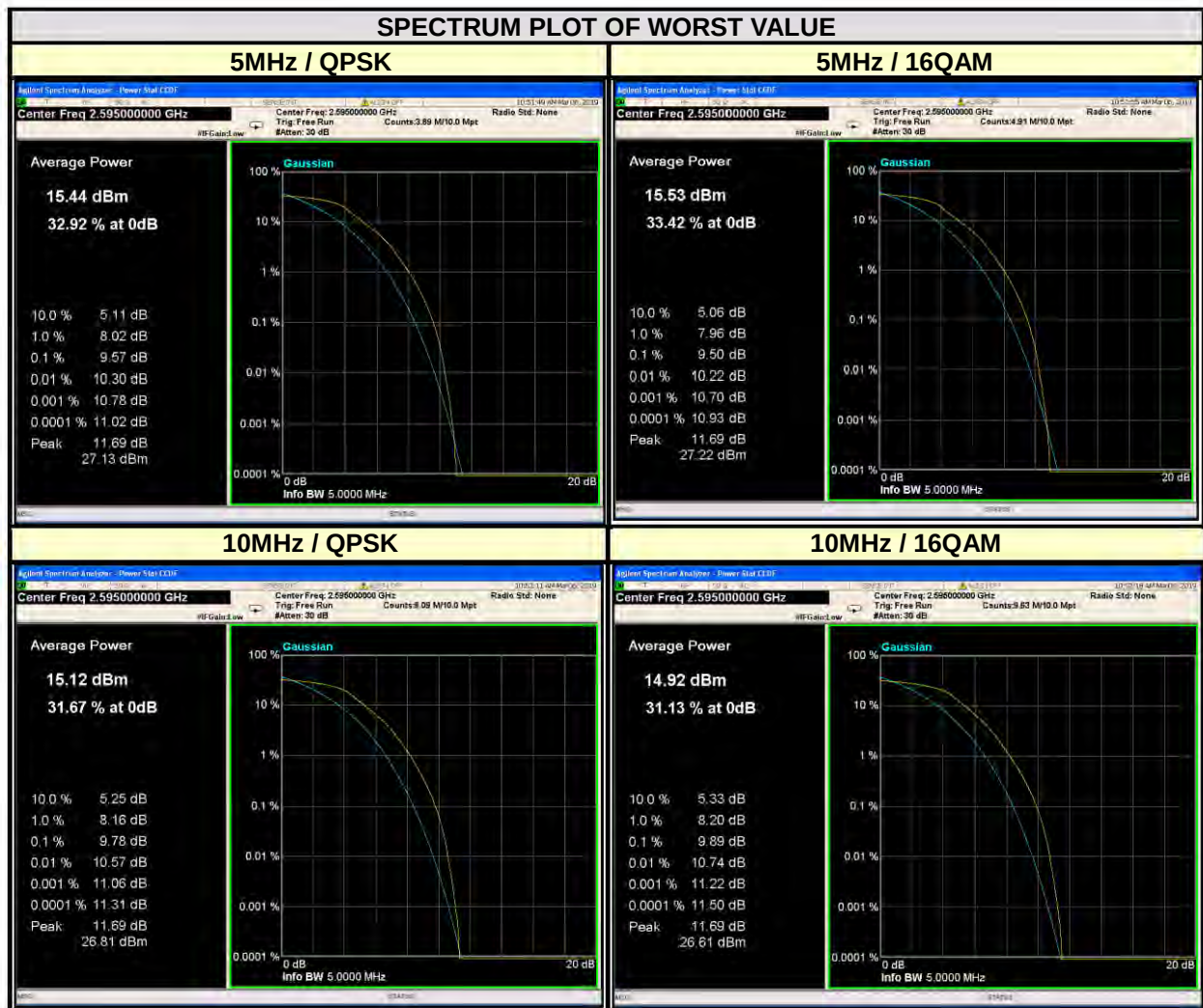


CHANNEL BANDWIDTH: 15MHz				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
20825	2507.5	5.21	5.35	20850	2510	6.17	6.67
21100	2535	5.83	5.89	21100	2535	6.75	6.71
21375	2562.5	5.47	5.68	21350	2560	6.35	6.42

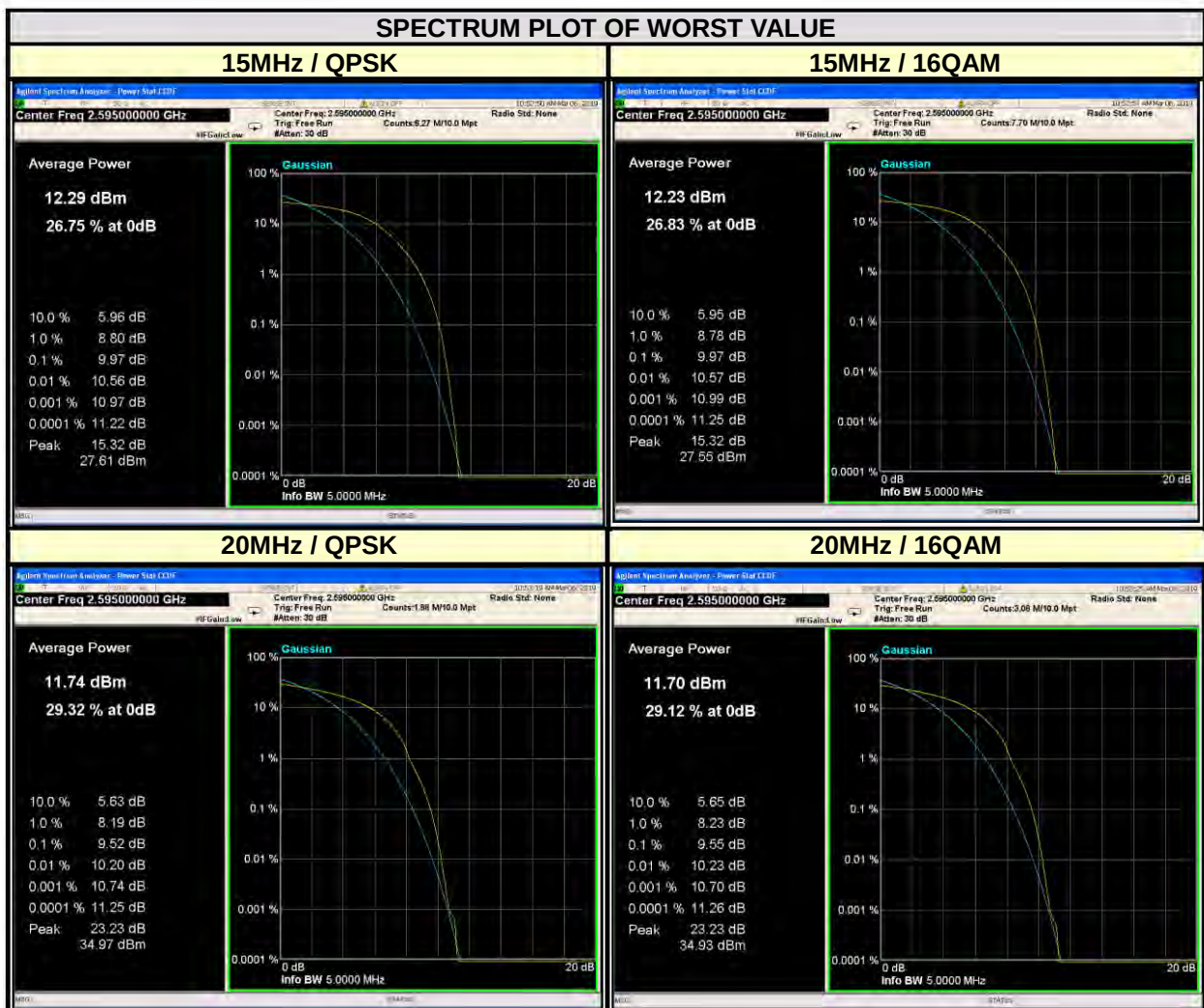


LTE BAND 38

CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
37775	2572.5	9.32	9.10	37800	2575	9.42	9.45
38000	2595	9.57	9.50	38000	2595	9.78	9.89
38225	2617.5	9.12	8.82	38200	2615	9.35	8.67



CHANNEL BANDWIDTH: 15MHz				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
37825	2577.5	9.57	8.47	37850	2580	9.12	9.42
38000	2595	9.97	9.97	38000	2595	9.52	9.55
38175	2612.5	8.63	8.43	38150	2610	8.68	9.02



LTE BAND 41

CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
40265	2557.5	9.39	8.80	40290	2560	8.81	8.60
40585	2589.5	9.21	8.56	40590	2590	8.22	8.54
40905	2621.5	8.44	8.79	40890	2620	8.32	8.25
41215	2652.5	8.81	8.77	41190	2650	8.45	8.36



CHANNEL BANDWIDTH: 15MHz				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
40315	2562.5	9.70	9.82	40340	2565	9.72	10.02
40595	2590.5	9.54	9.21	40600	2591	9.35	9.67
40885	2619.5	9.33	9.57	40870	2618	9.24	9.57
41165	2647.5	8.67	9.79	41140	2645	9.64	9.78

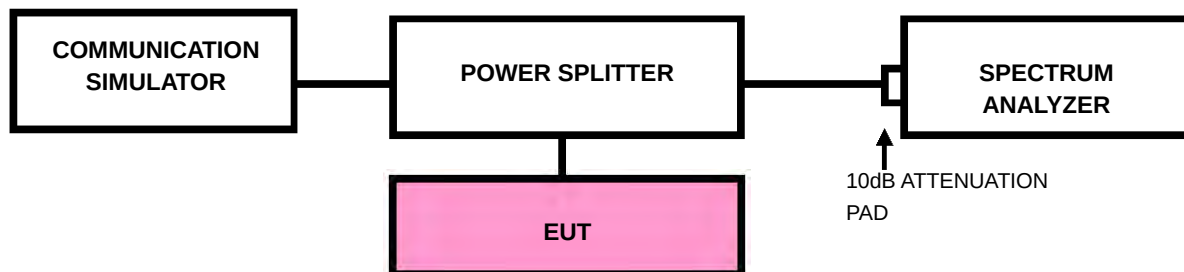


3.5 BAND EDGE MEASUREMENT

3.5.1 LIMITS OF BAND EDGE MEASUREMENT

According to FCC 27.53(m)(4) specified that For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less 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. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. For mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed.

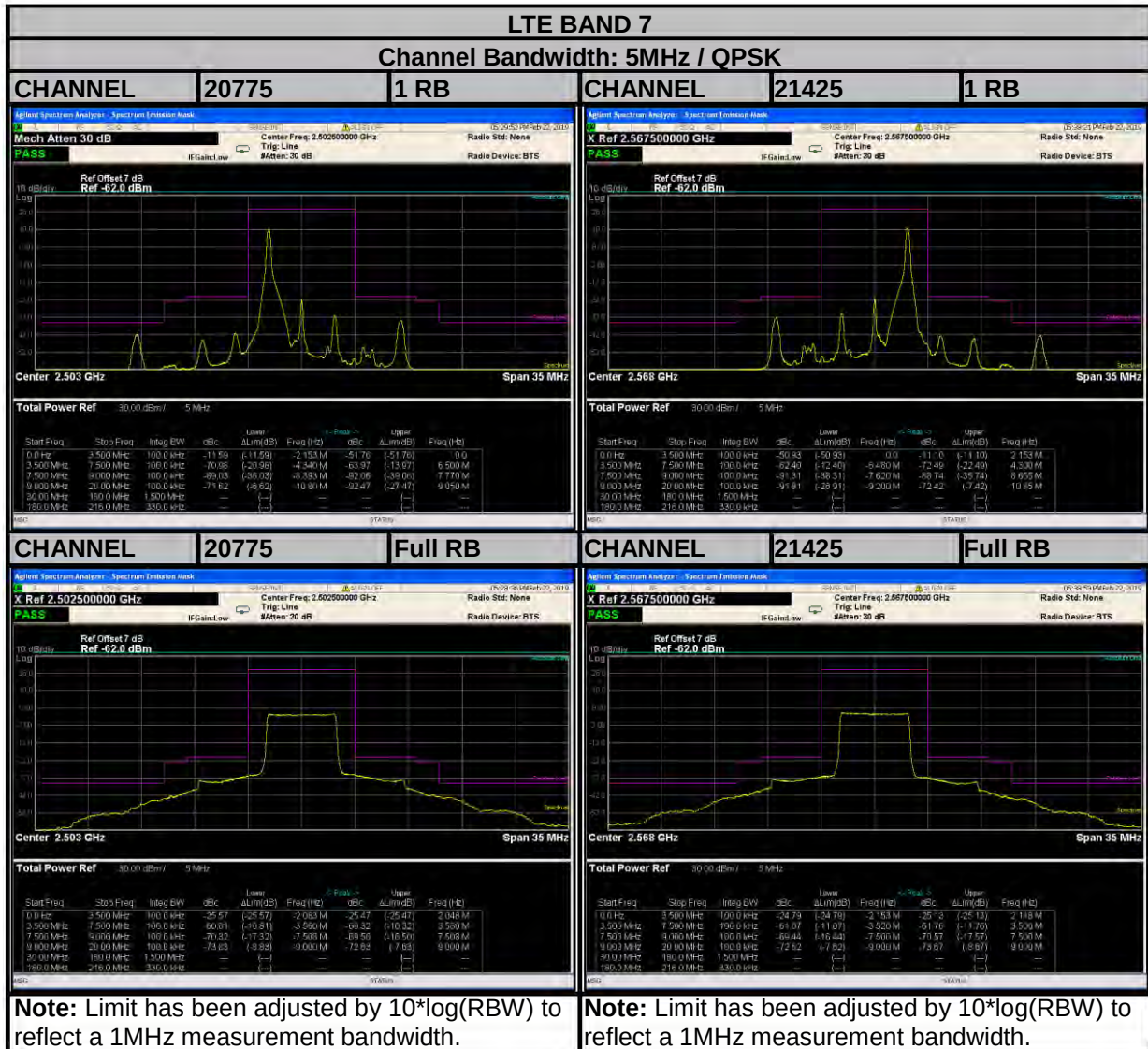
3.5.2 TEST SETUP

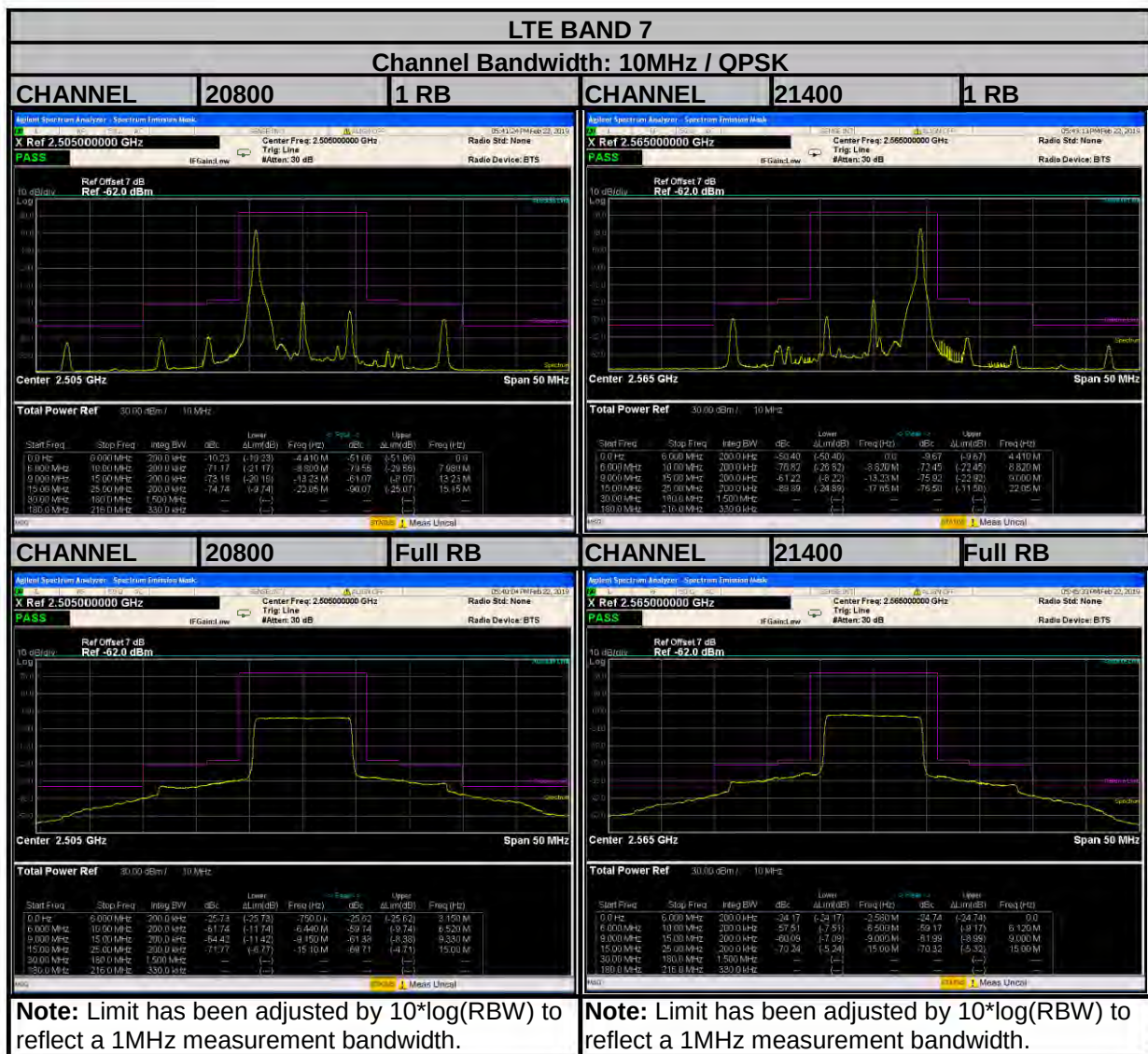


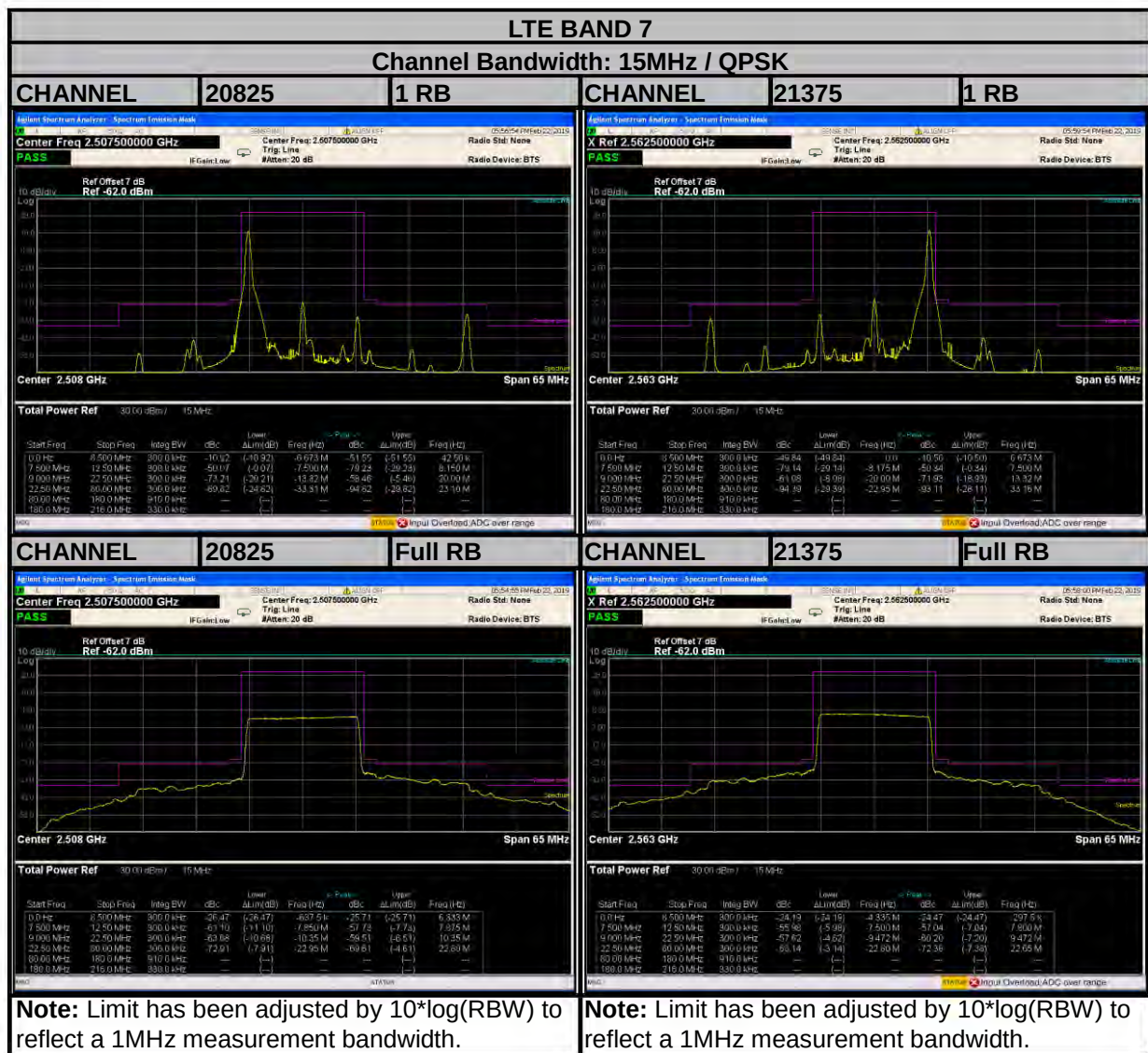
3.5.3 TEST PROCEDURES

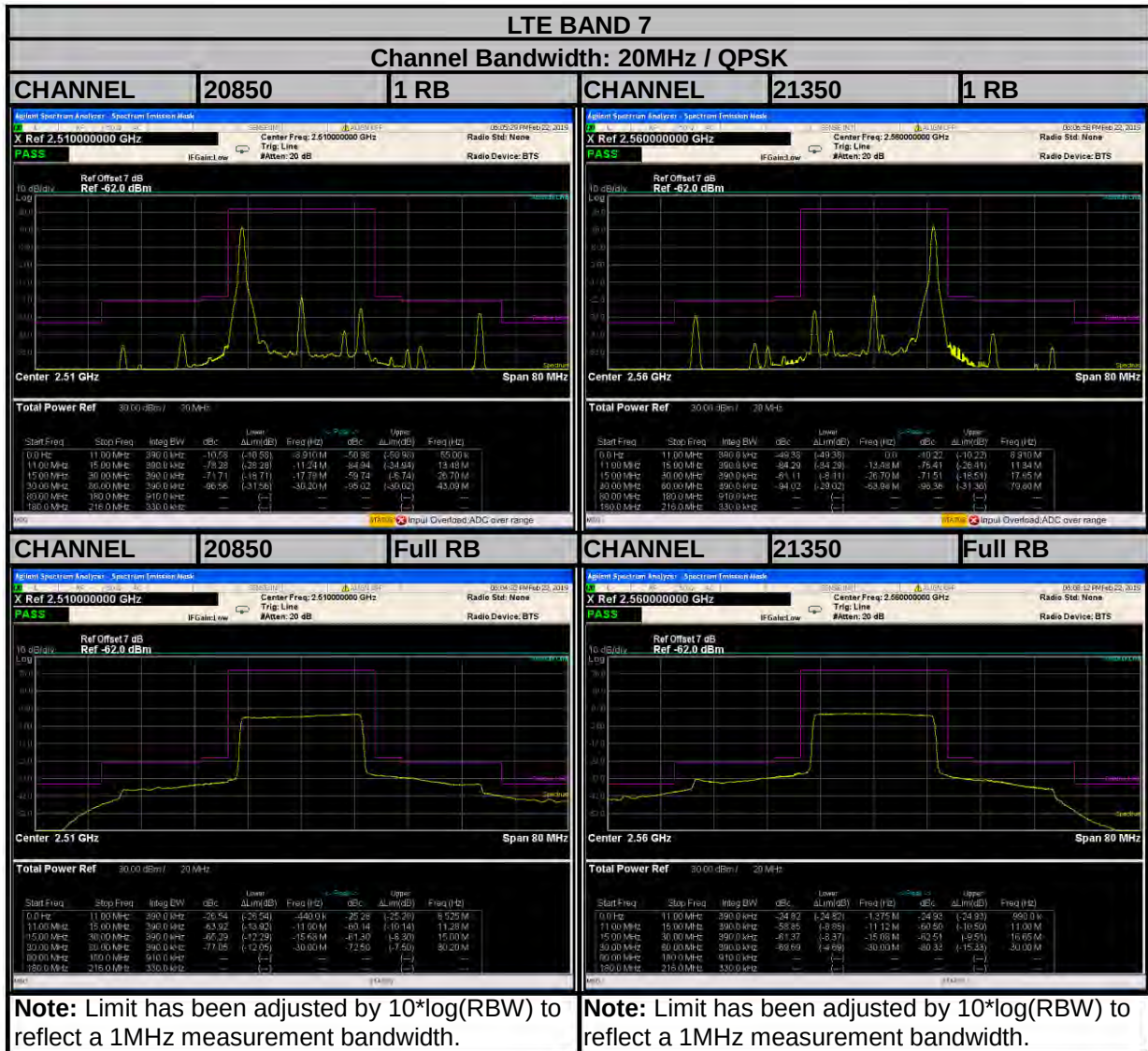
- a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. The center frequency of spectrum is the band edge frequency and span is 35MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz (Channel bandwidth 5MHz).
- d. The center frequency of spectrum is the band edge frequency and span is 50MHz. RBW of the spectrum is 200kHz and VBW of the spectrum is 1MHz (Channel bandwidth 10MHz).
- e. The center frequency of spectrum is the band edge frequency and span is 60MHz. RBW of the spectrum is 300kHz and VBW of the spectrum is 1MHz (Channel bandwidth 15MHz).
- f. The center frequency of spectrum is the band edge frequency and span is 80MHz. RBW of the spectrum is 500kHz and VBW of the spectrum is 2MHz (Channel bandwidth 20MHz).
- g. Record the max trace plot into the test report.

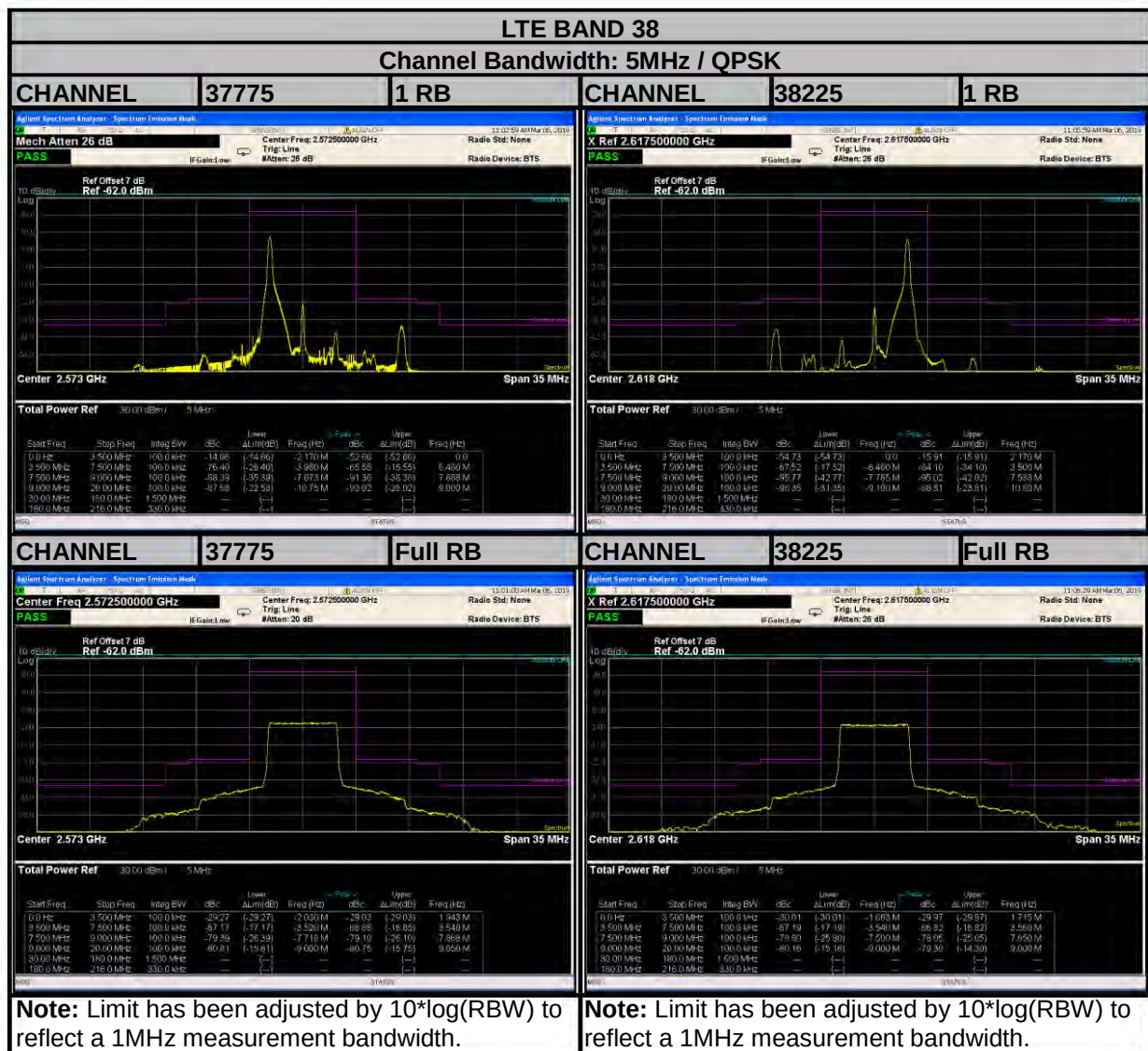
3.5.4 TEST RESULTS

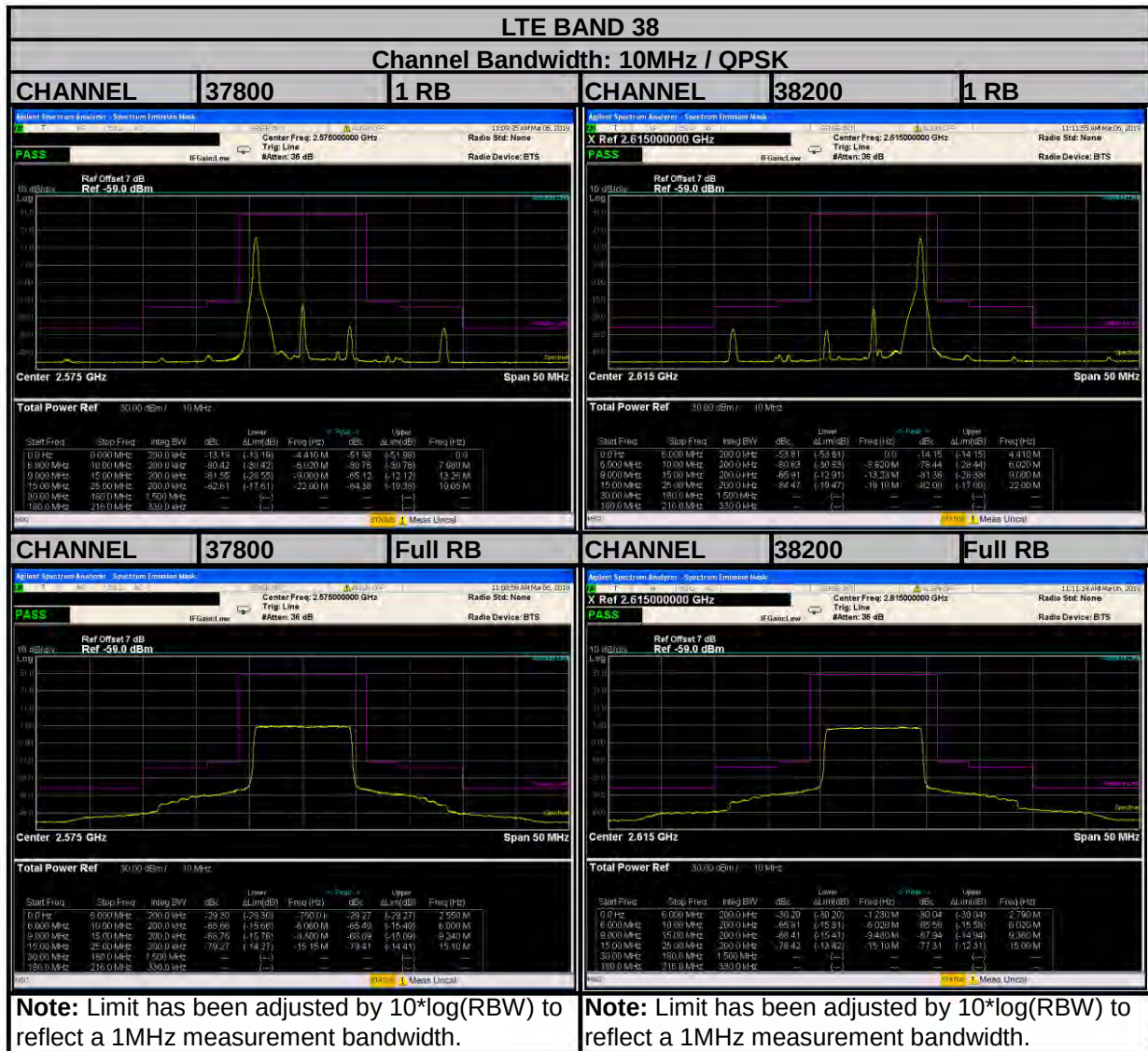


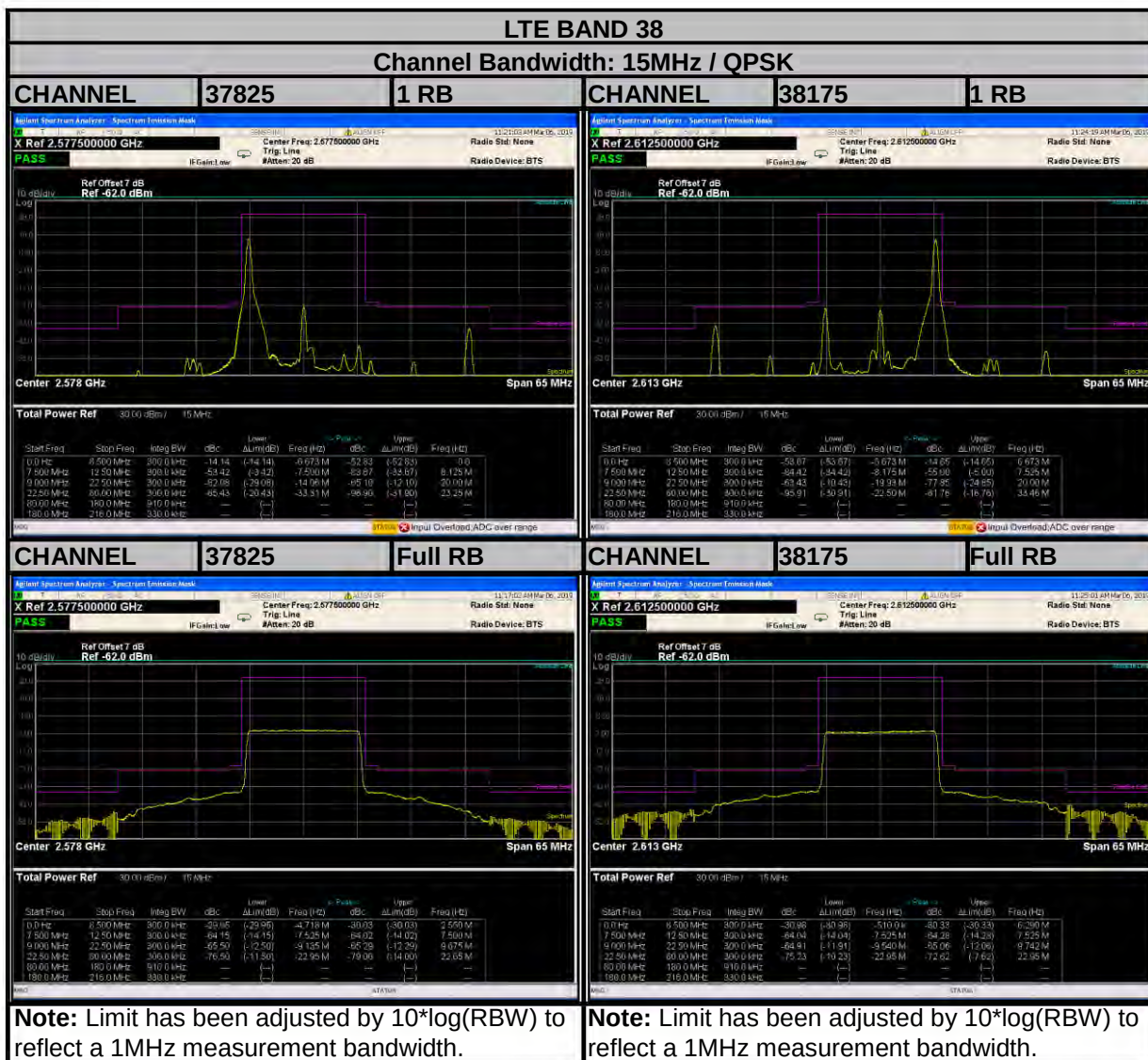


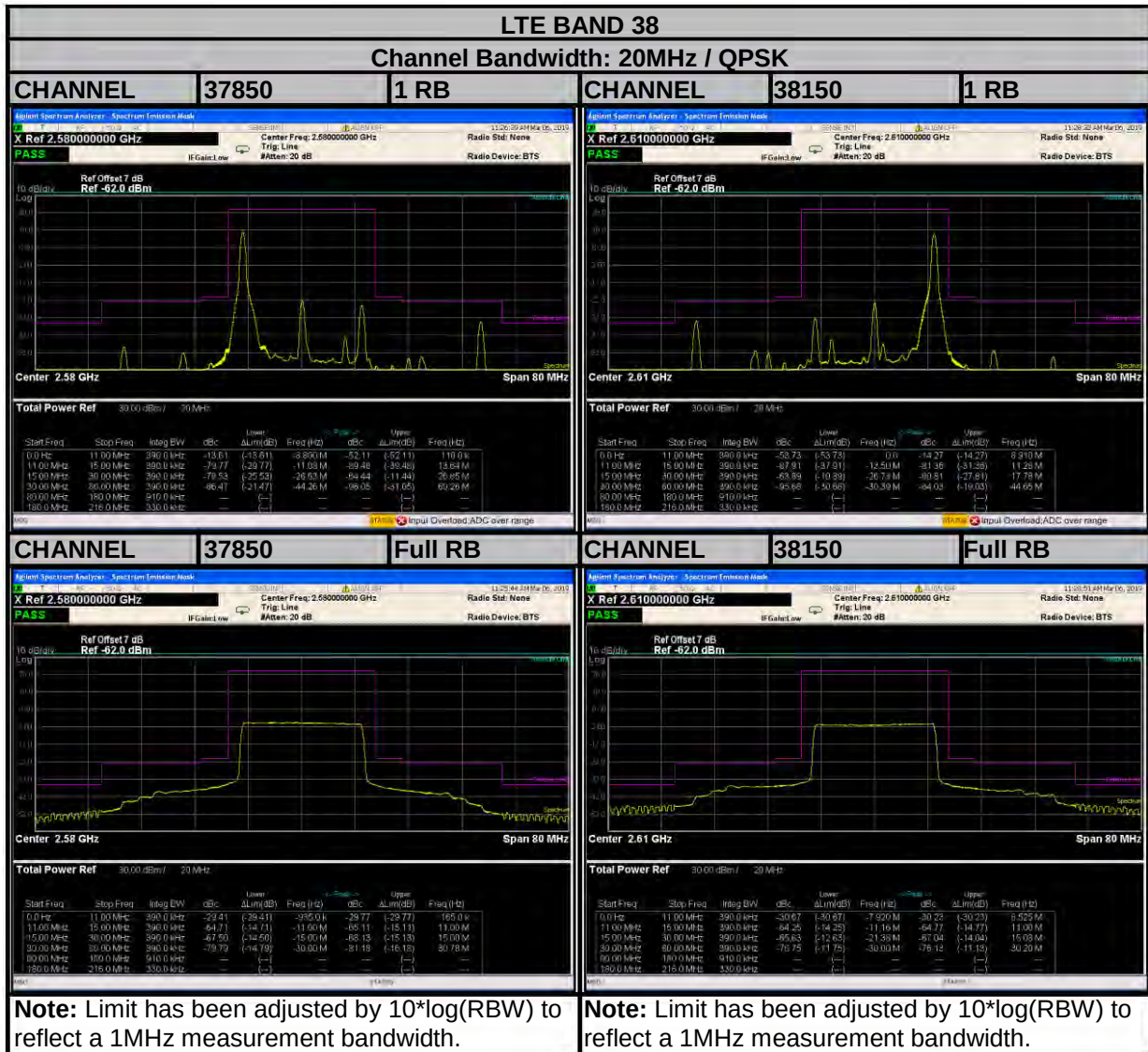


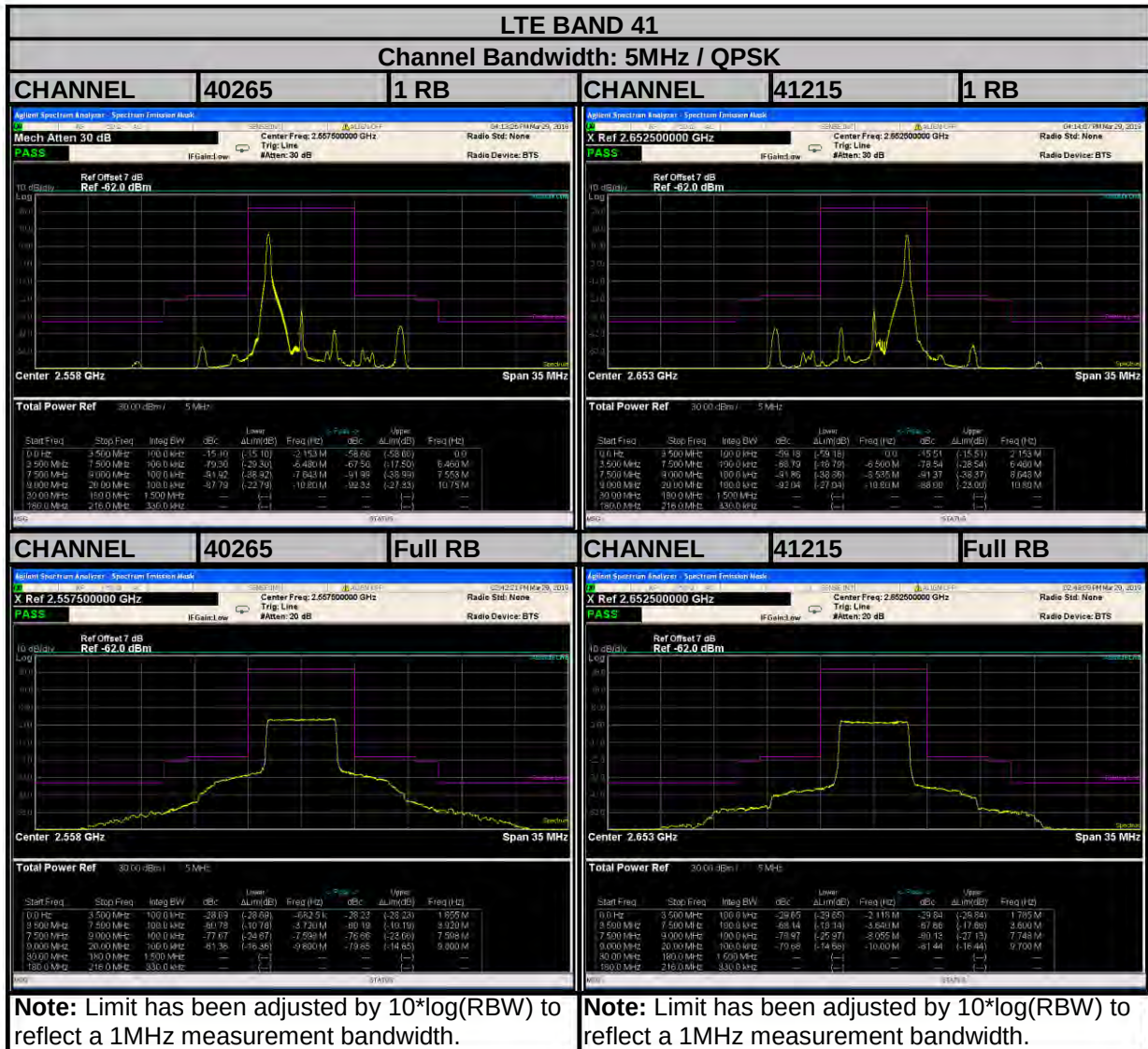


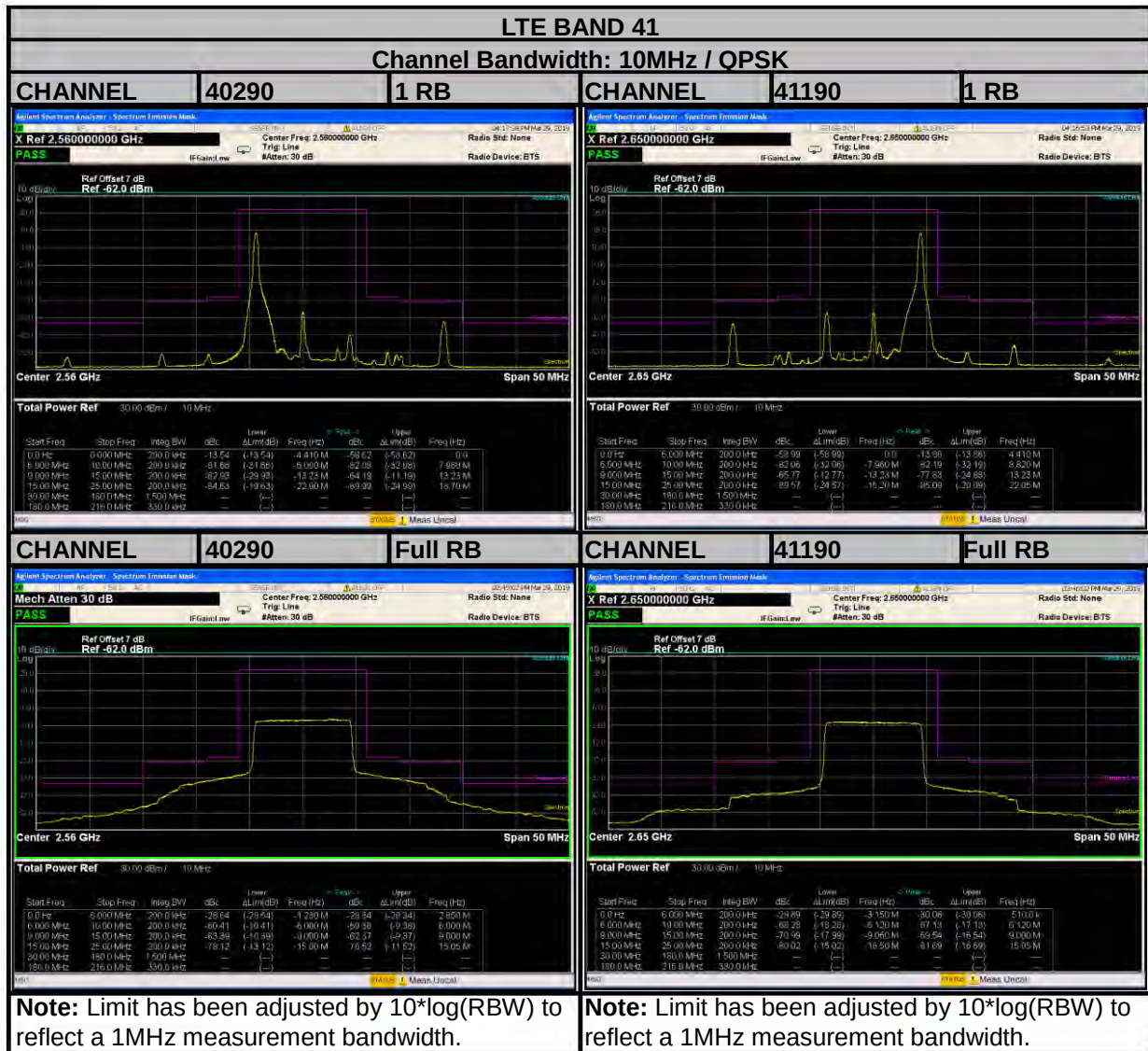


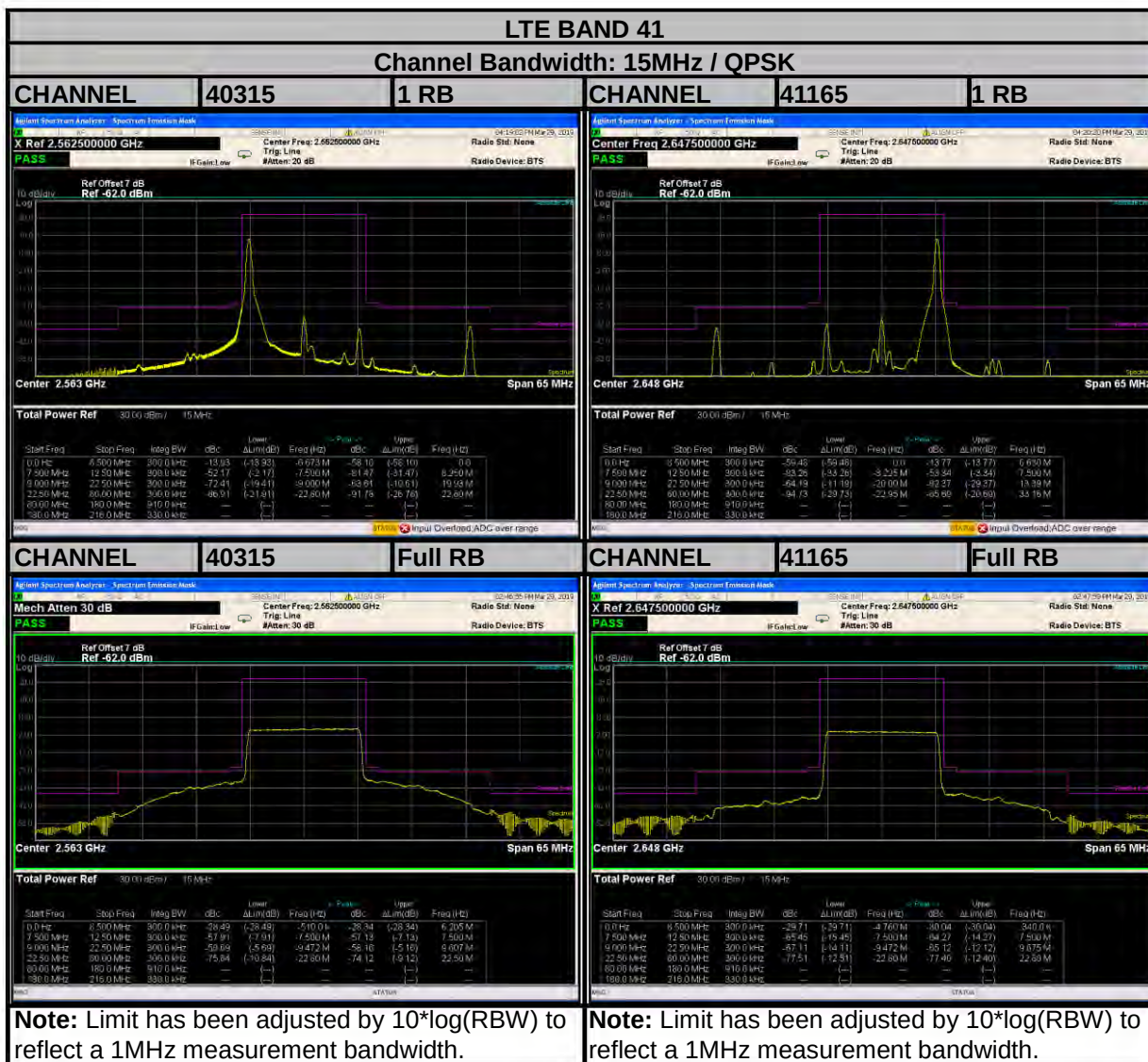


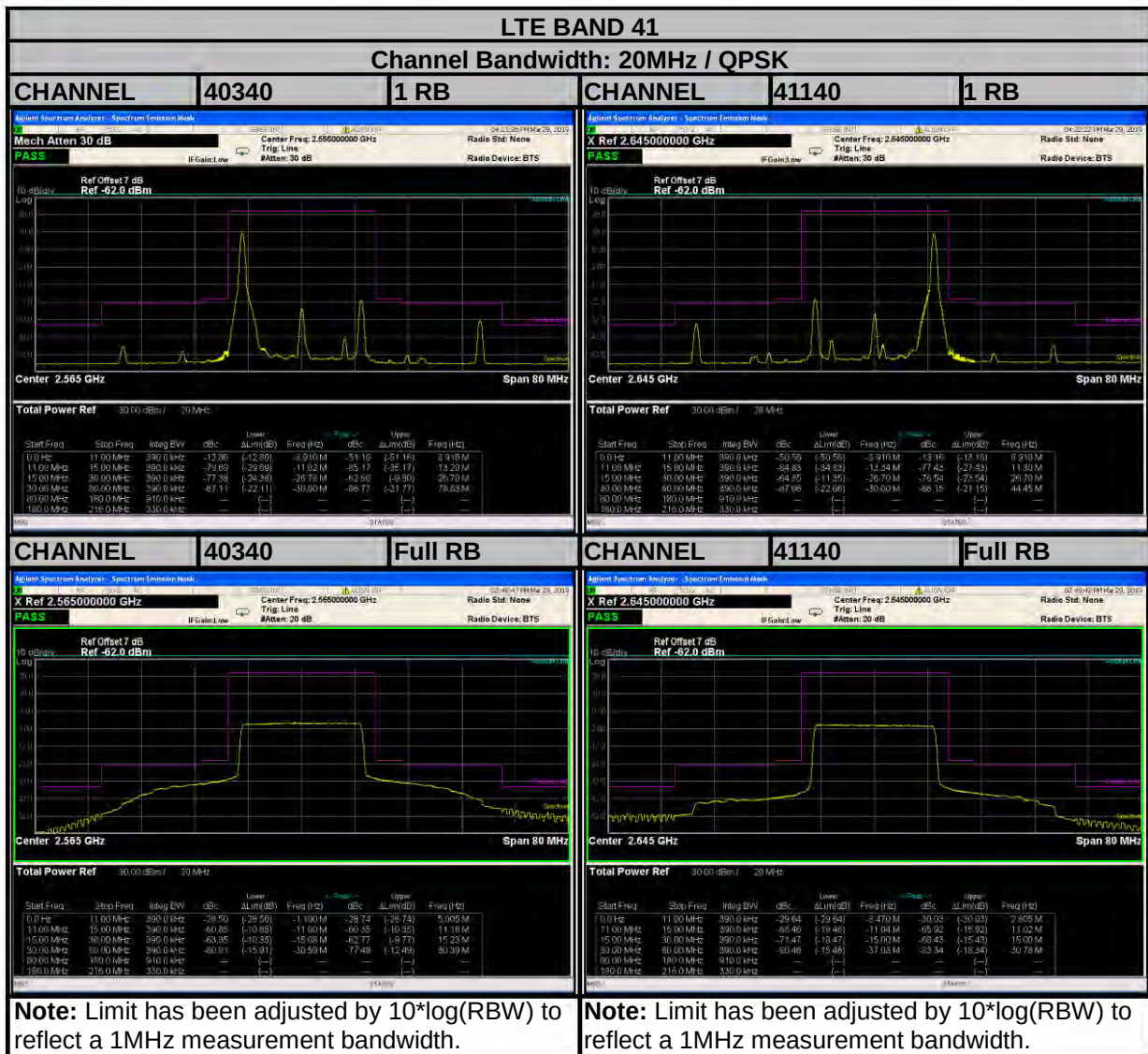












3.6 CONDUCTED SPURIOUS EMISSIONS

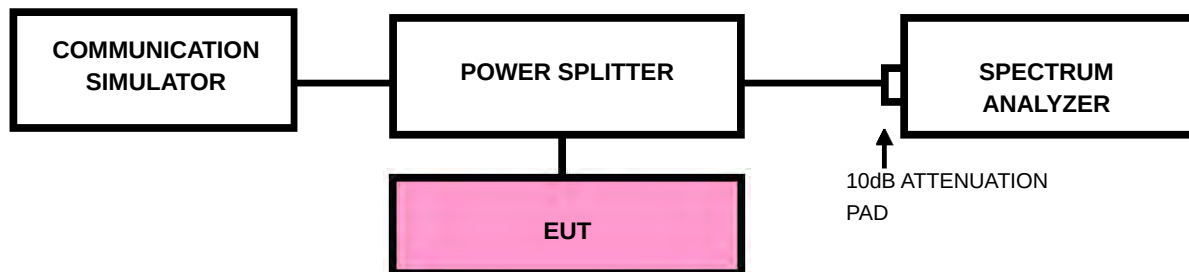
3.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $55 + 10 \log_{10}(P)$ dB. The limit of emission is equal to -25dBm.

3.6.2 TEST PROCEDURE

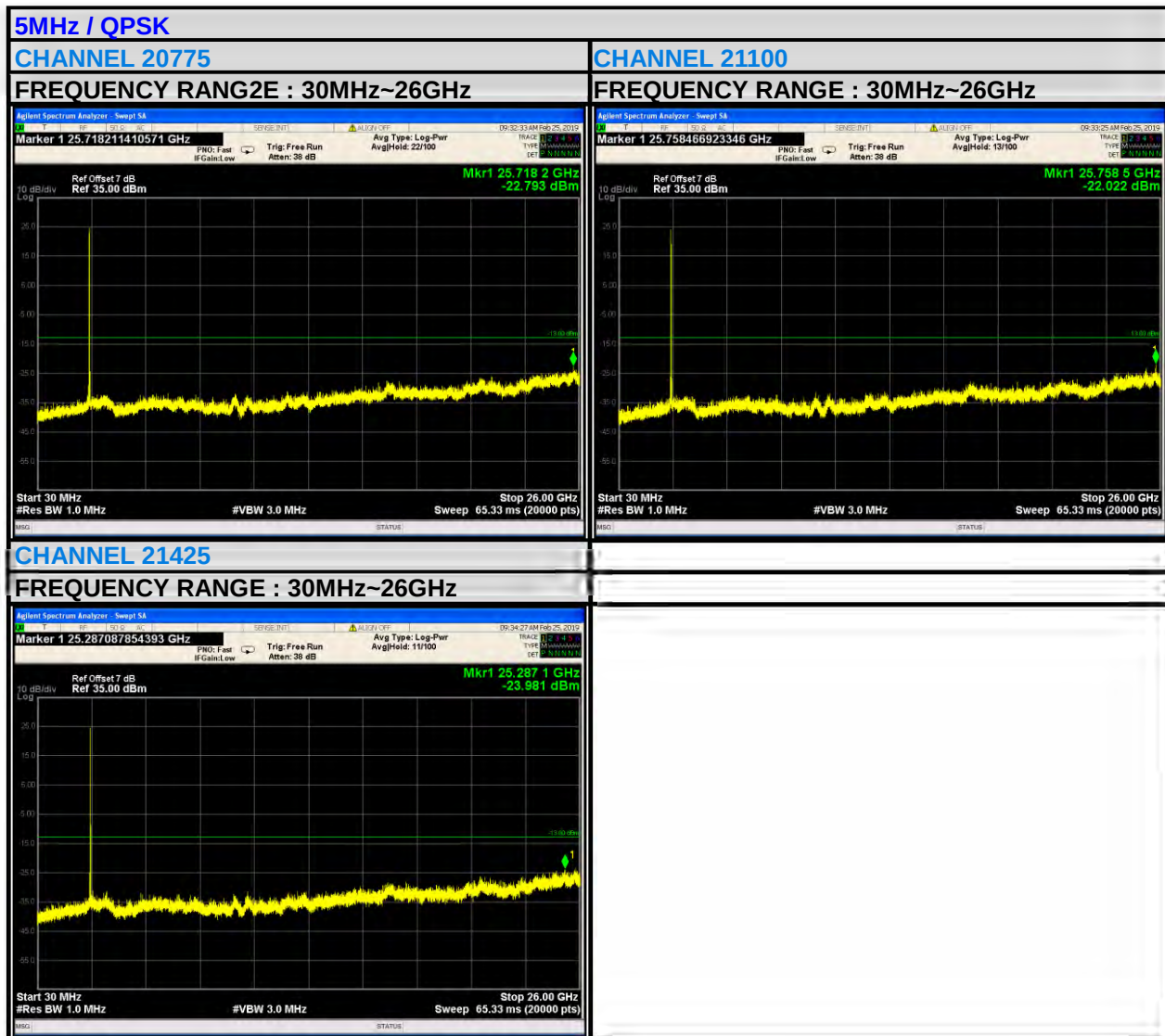
- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 30MHz to 26GHz for LTE Band 7. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

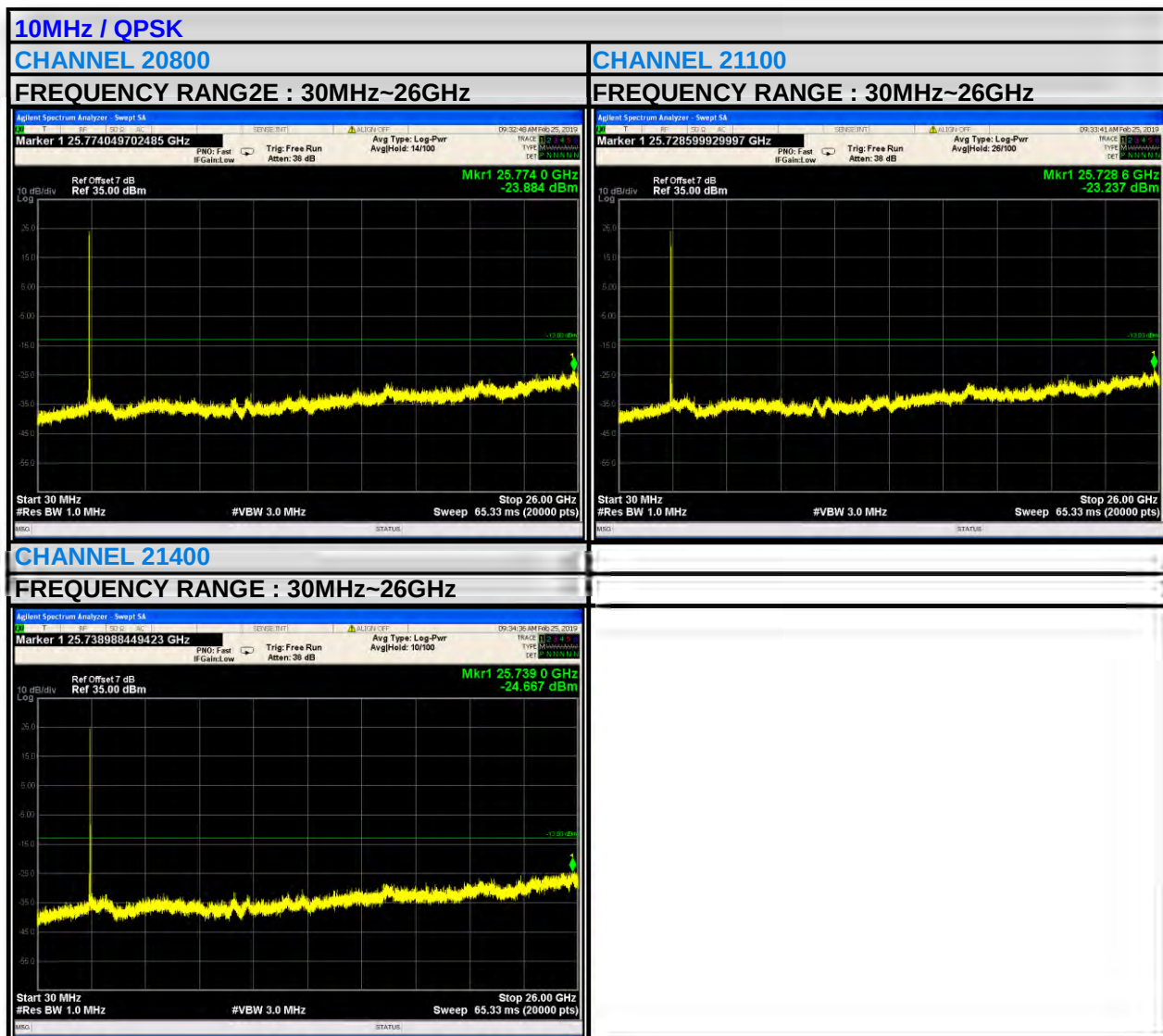
3.6.3 TEST SETUP

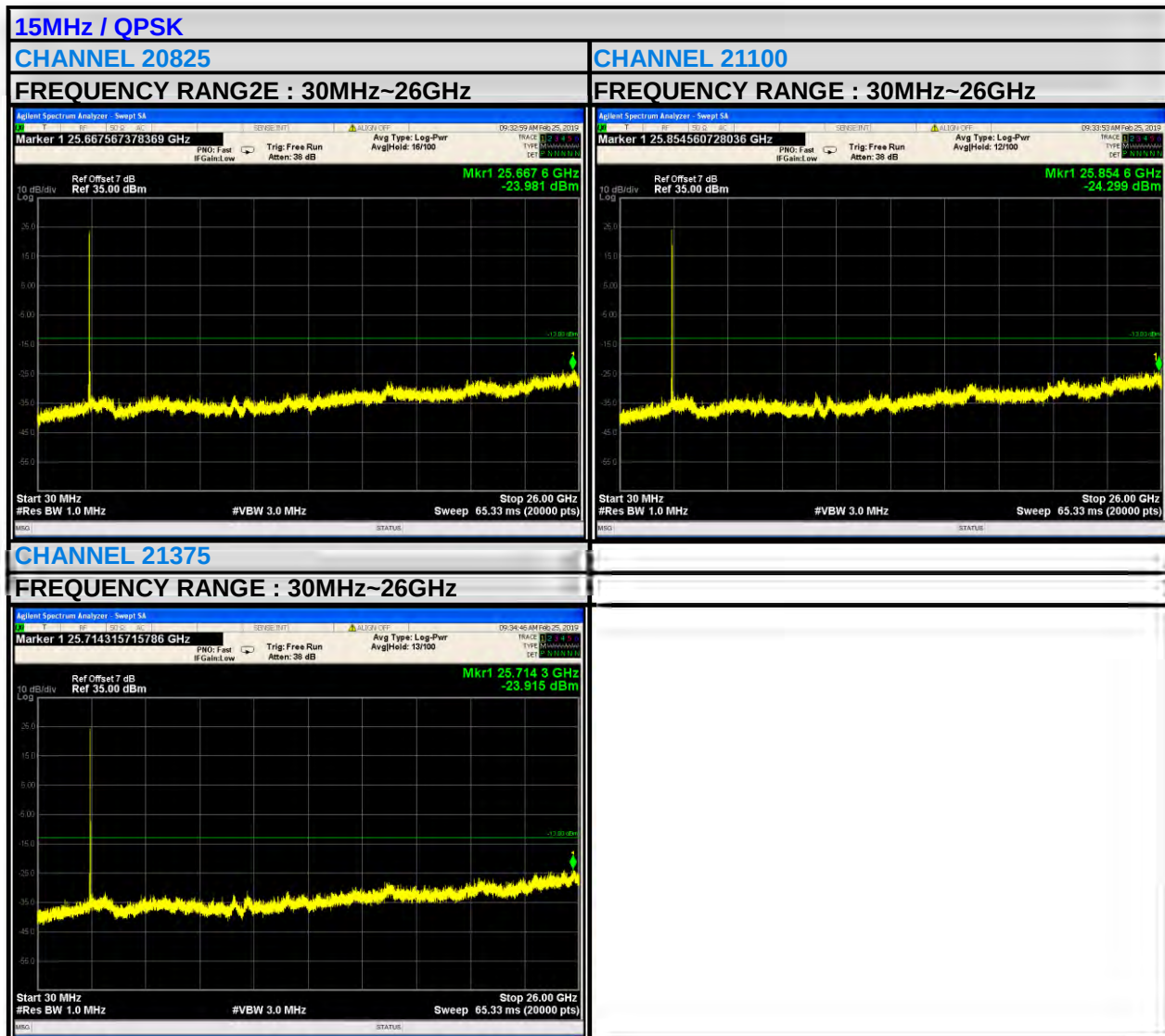


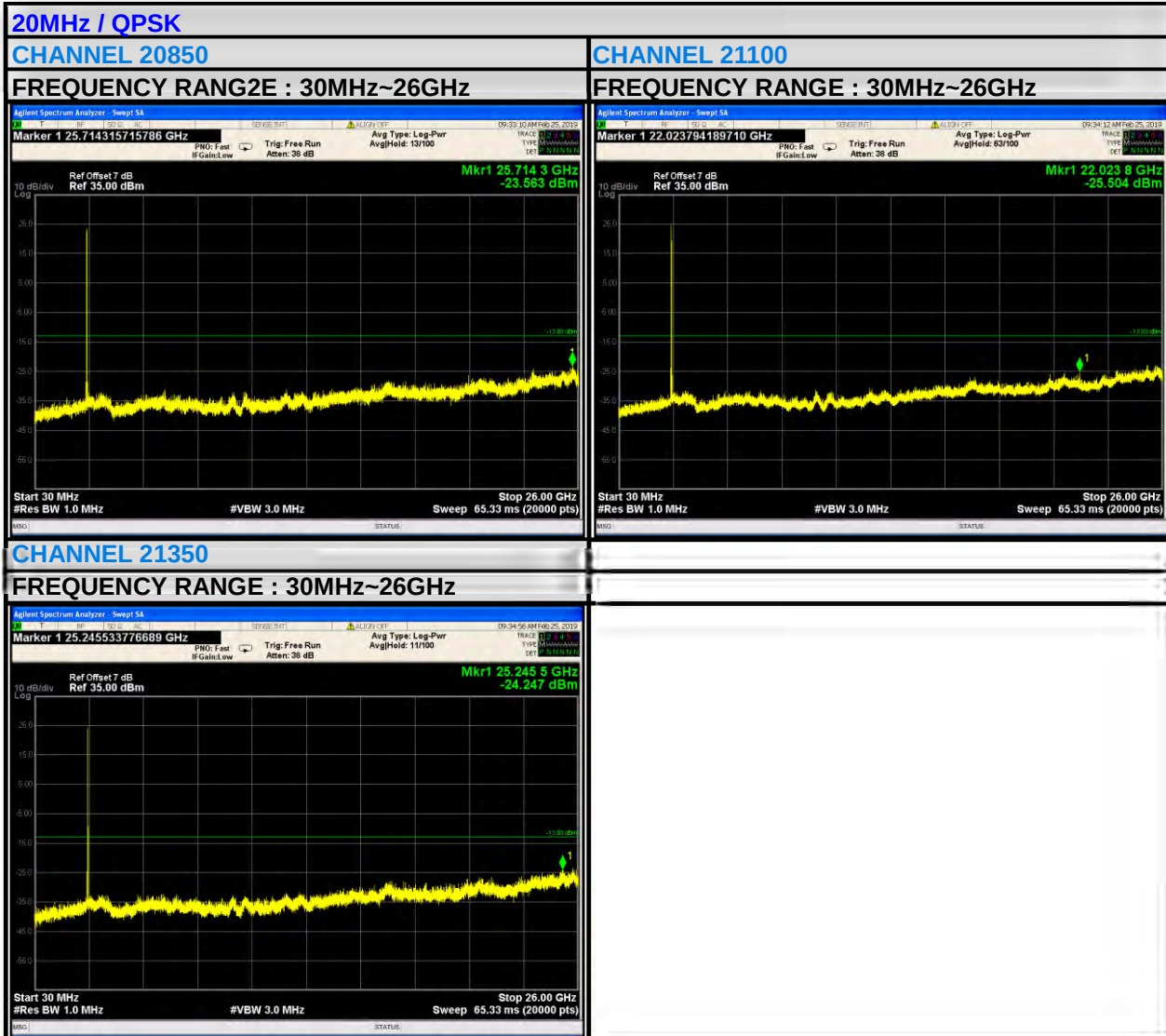
3.6.4 TEST RESULTS

LTE BAND 7







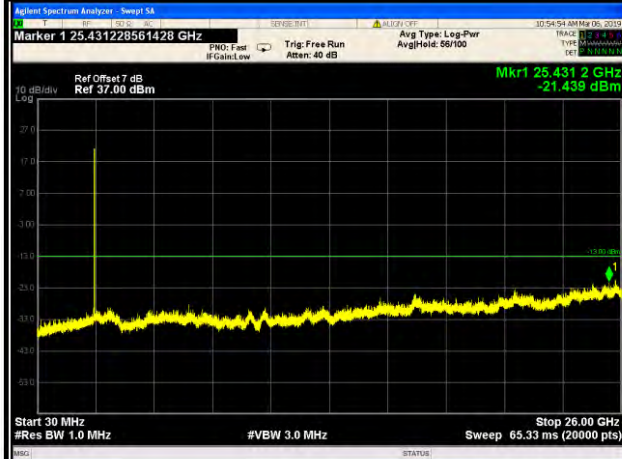


LTE BAND 38

5MHz / QPSK

CHANNEL 37775

FREQUENCY RANGE : 30MHz~25.7GHz



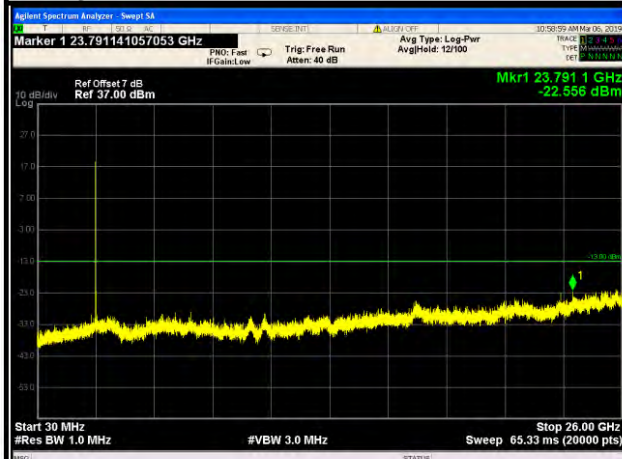
CHANNEL 38000

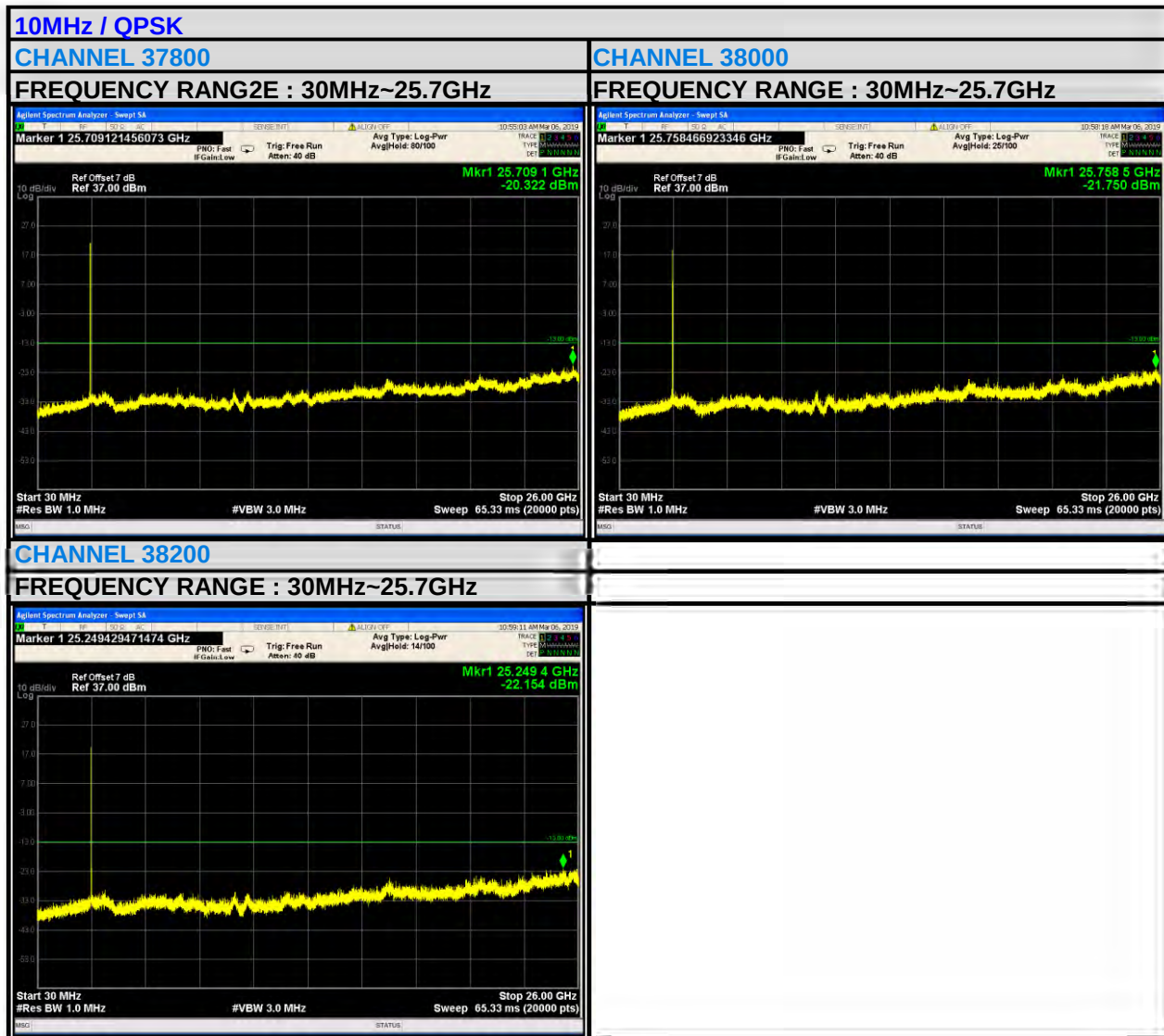
FREQUENCY RANGE : 30MHz~25.7GHz

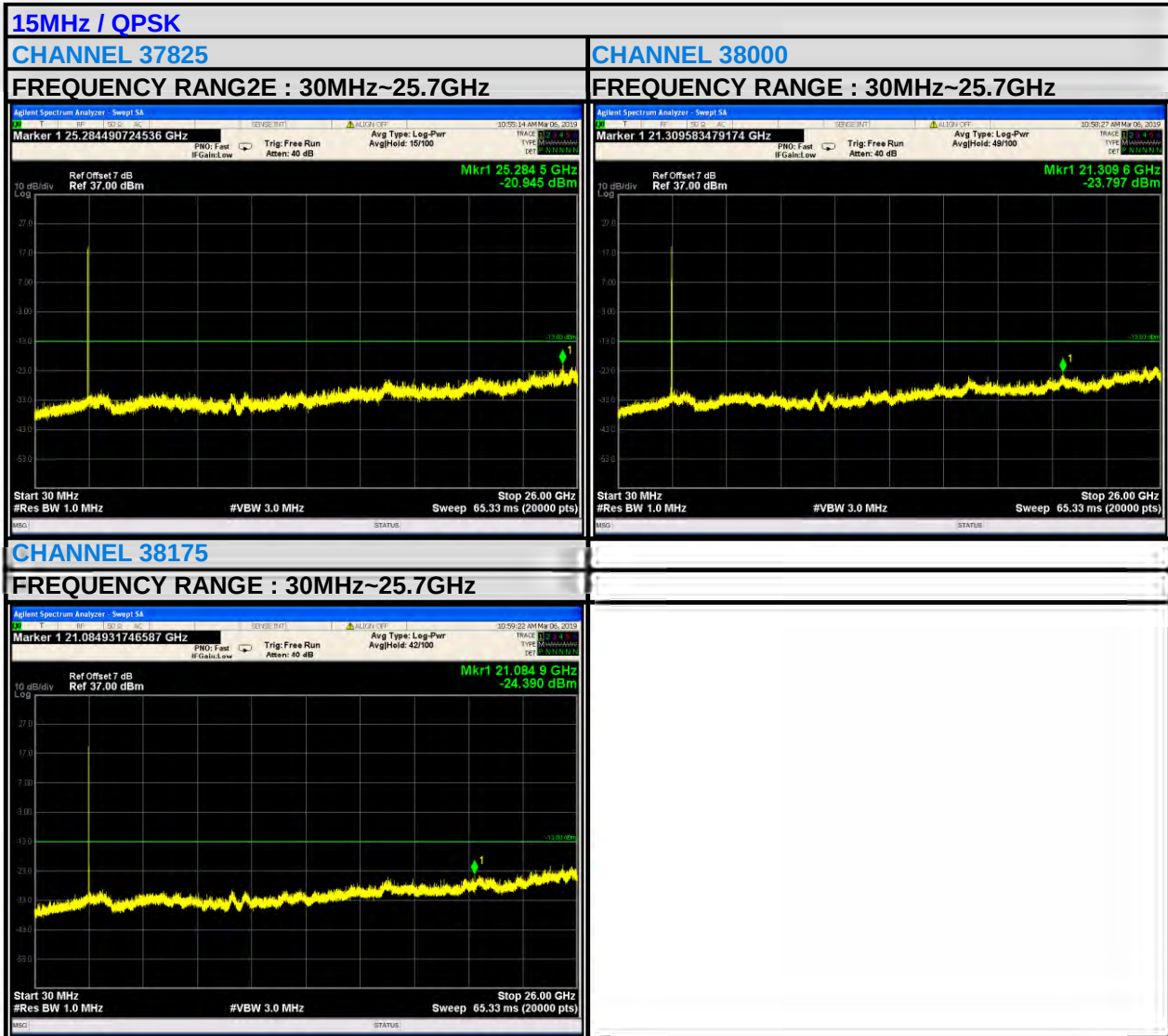


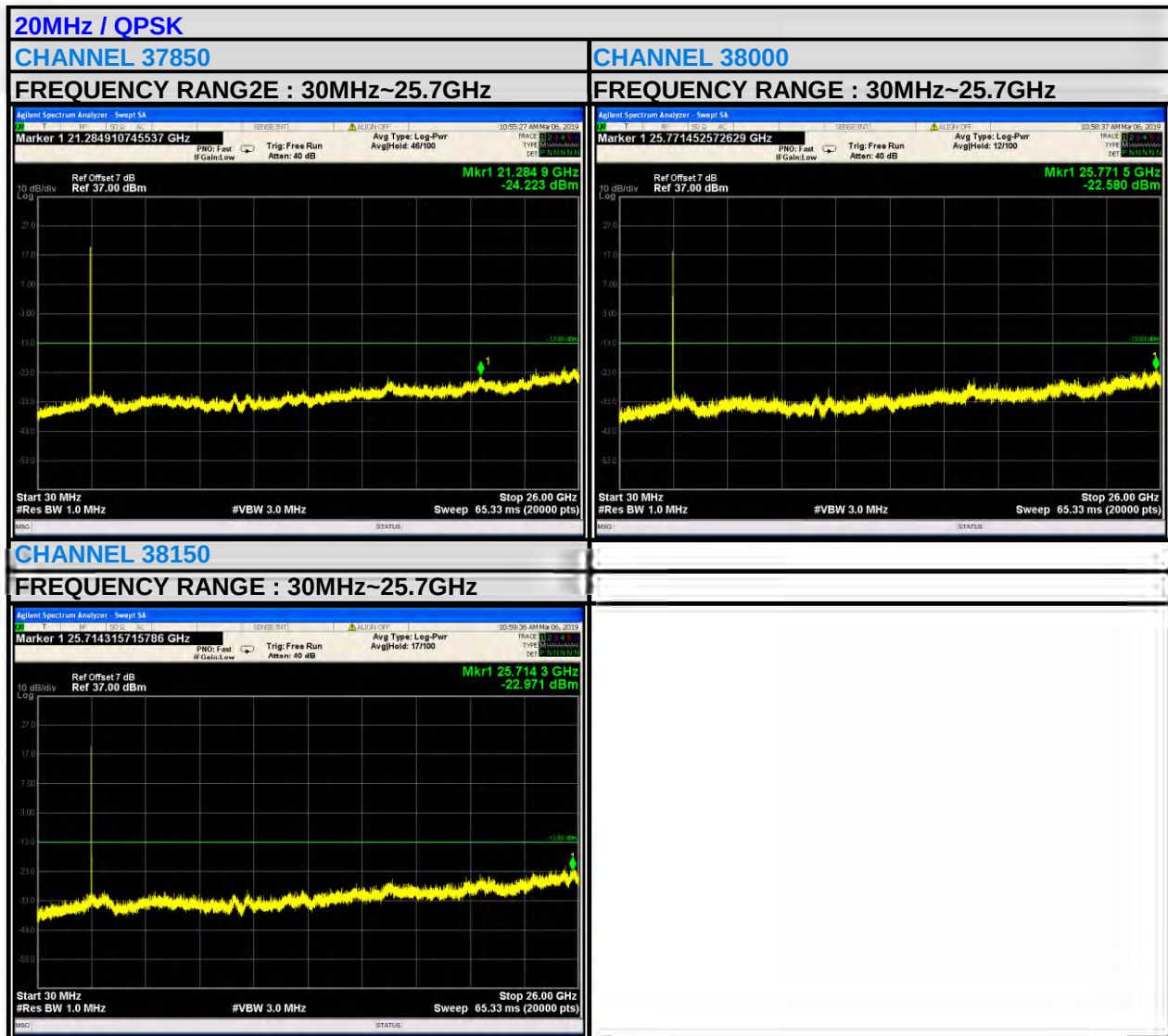
CHANNEL 38225

FREQUENCY RANGE : 30MHz~25.7GHz









LTE BAND 41

5MHz / QPSK

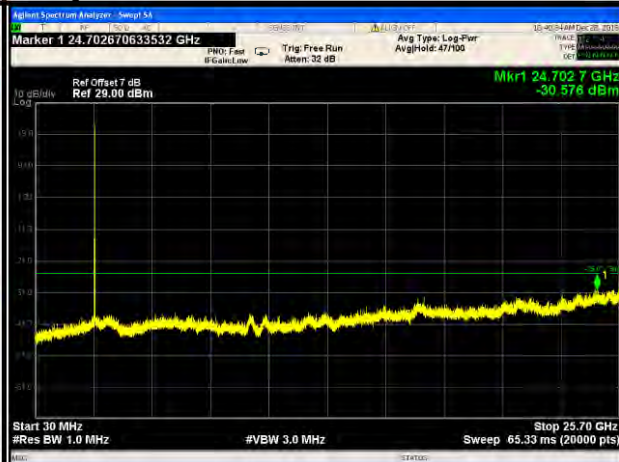
CHANNEL 40265

FREQUENCY RANGE: 30MHz~25.7GHz



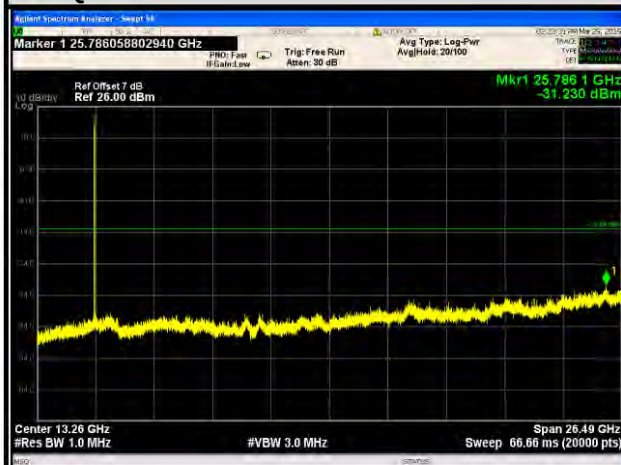
CHANNEL 40585

FREQUENCY RANGE: 30MHz~25.7GHz



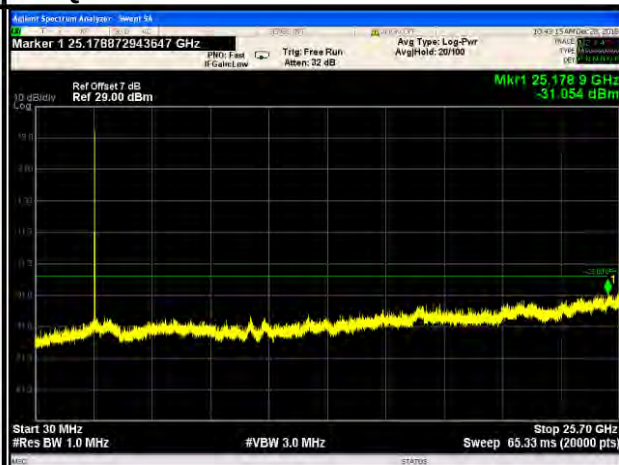
CHANNEL 40905

FREQUENCY RANGE: 30MHz~25.7GHz



CHANNEL 41215

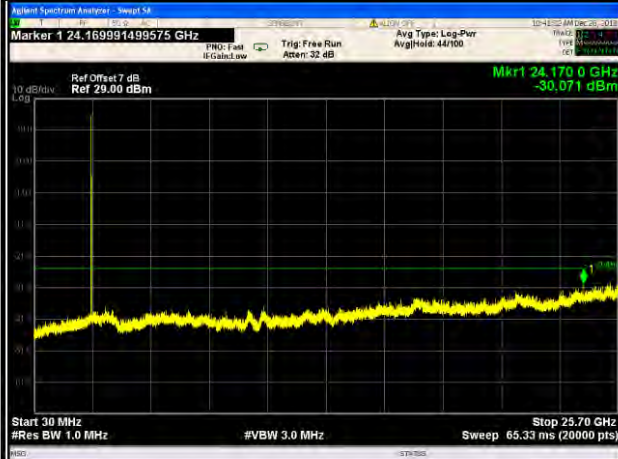
FREQUENCY RANGE: 30MHz~25.7GHz



10MHz / QPSK

CHANNEL 40290

FREQUENCY RANG2E : 30MHz~25.7GHz



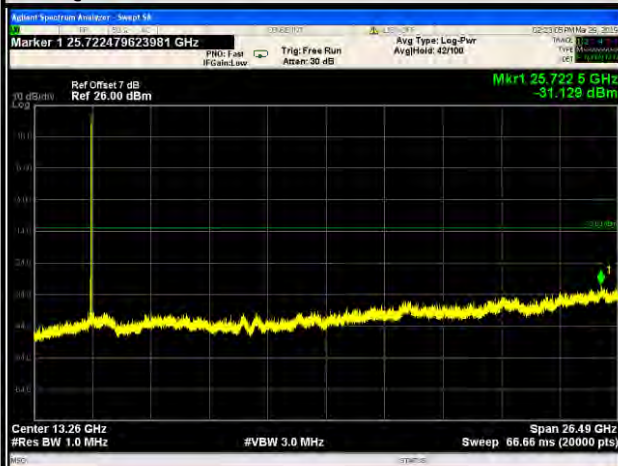
CHANNEL 40590

FREQUENCY RANGE : 30MHz~25.7GHz



CHANNEL 40890

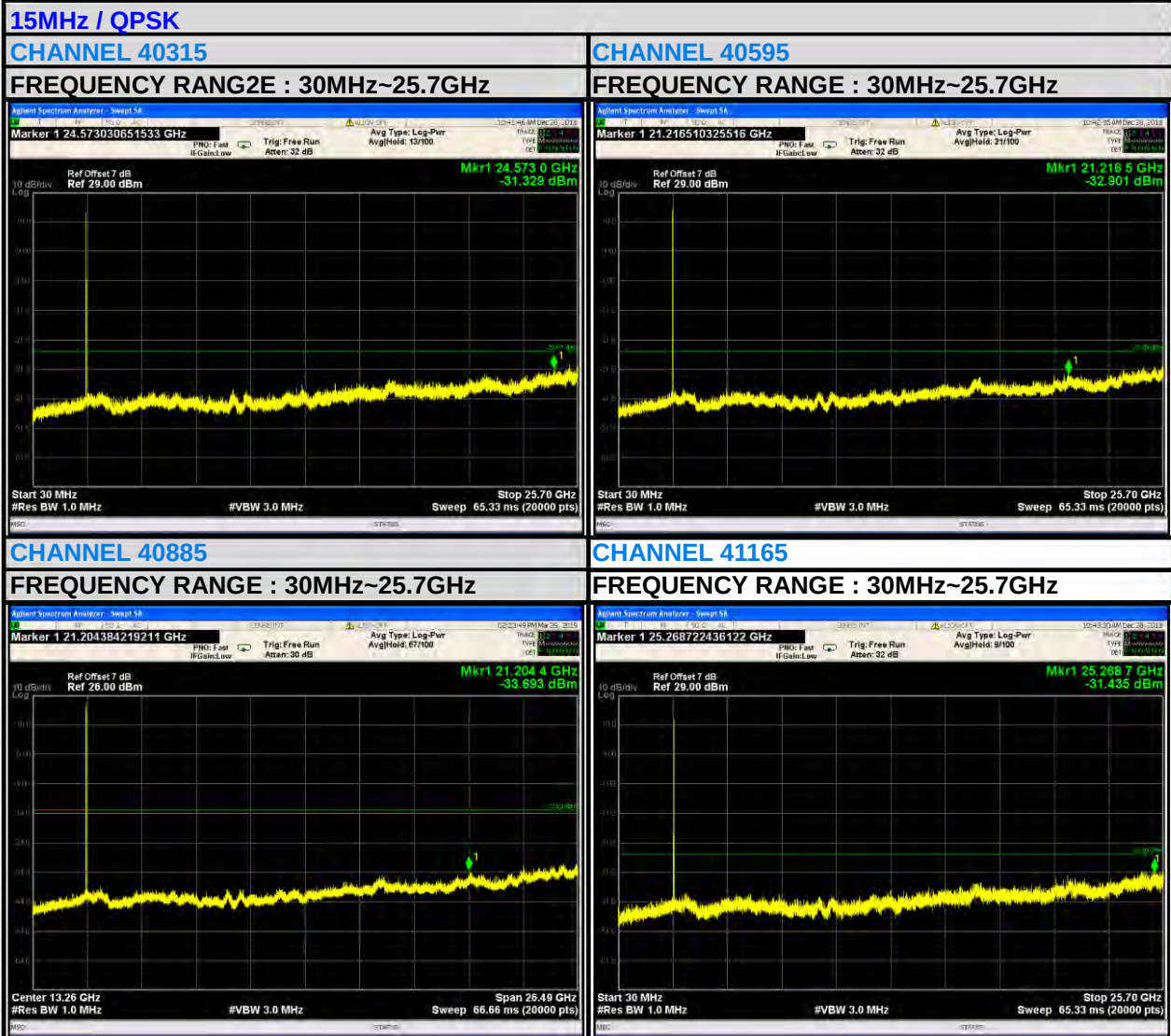
FREQUENCY RANGE : 30MHz~25.7GHz

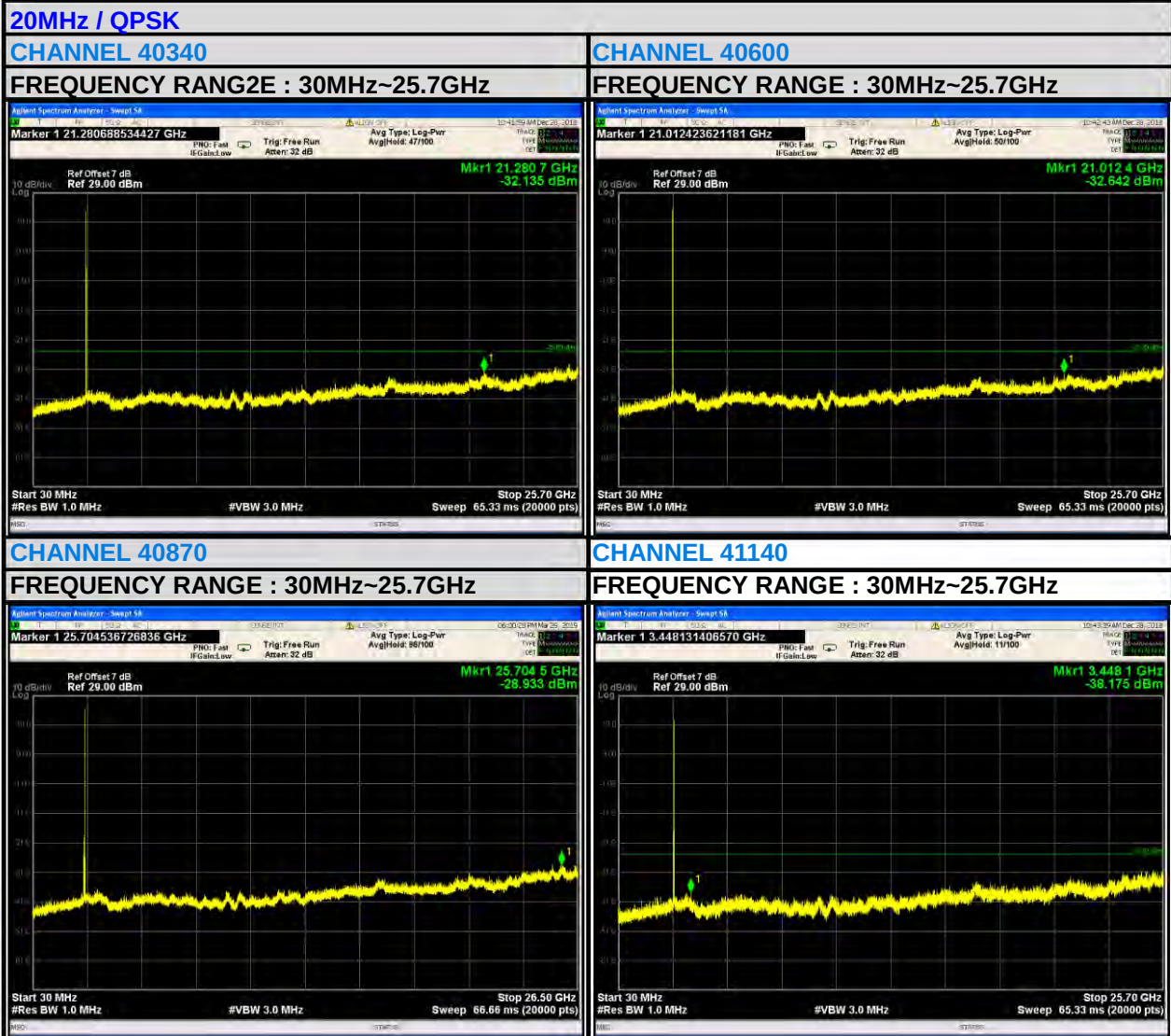


CHANNEL 41190

FREQUENCY RANGE : 30MHz~25.7GHz







3.7 RADIATED EMISSION MEASUREMENT

3.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $55 + 10 \log_{10}(P)$ dB. The limit of emission is equal to -25dBm.

3.7.2 TEST PROCEDURES

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m 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 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. 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 a. Record the power level of S.G.
- c. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,
 $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15\text{dBi}.$

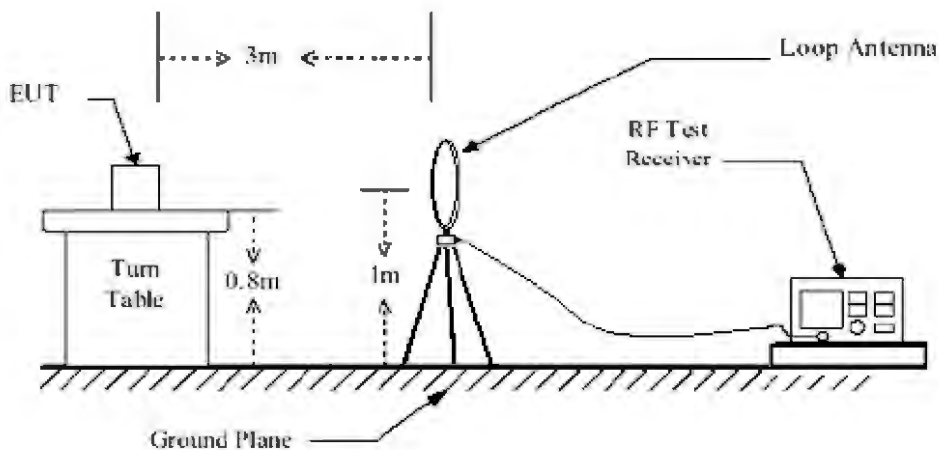
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.7.3 DEVIATION FROM TEST STANDARD

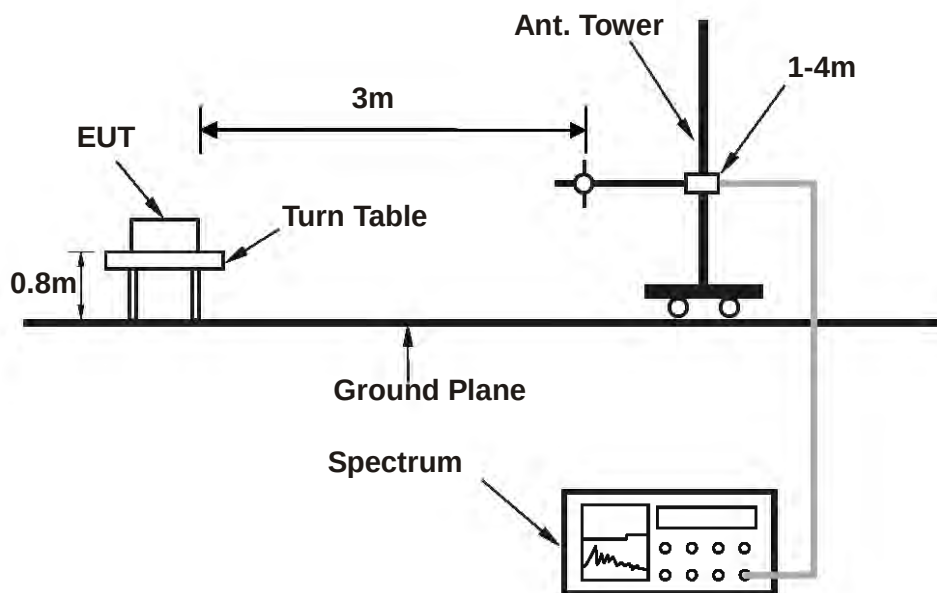
No deviation

3.7.4 TEST SETUP

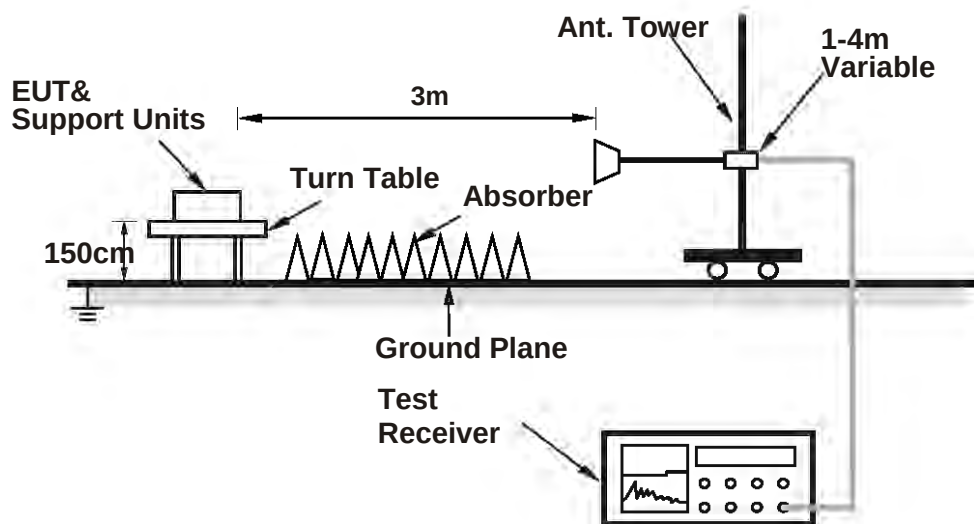
<Below 30MHz>



< Frequency Range 30MHz~1GHz >



< Frequency Range above 1GHz >



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

3.7.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

9 KHz – 30 KHz data: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

30 MHz – 1GHz data:

LTE Band 41:

MODE	TX channel 40740	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 58%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Simon Lin		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			



No.	Frequency (MHz)	Reading (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
1	207.1226	-62.34	-62.03	-13.00	-49.03
2	30.0000	-73.06	-58.94	-13.00	-45.94
3	74.1351	-70.74	-73.42	-13.00	-60.42
4	159.2251	-69.22	-68.66	-13.00	-55.66
5	136.4598	-71.47	-71.56	-13.00	-58.56
6	216.7828	-64.82	-64.37	-13.00	-51.37

MODE	TX channel 40740	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 58%RH	INPUT POWER	DC 5V from adapter
TESTED BY	Simon Lin		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			



No.	Frequency (MHz)	Reading (dBm)	Result (dBm)	Limit (dBm)	Margin (dB)
1	207.8501	-61.04	-57.94	-13.00	-44.94
2	117.3603	-66.24	-60.95	-13.00	-47.95
3	58.2030	-61.55	-65.11	-13.00	-52.11
4	67.2022	-63.92	-65.80	-13.00	-52.80
5	137.4202	-67.66	-62.61	-13.00	-49.61
6	747.4826	-72.77	-60.37	-13.00	-47.37

ABOVE 1GHz DATA

Note: For higher frequency, the emission is too low to be detected.

LTE Band 41:

5M QPSK

Middle channel (40585)

Frequency (MHz)	Antenna Polarization (H/V)	-36.51 -36.94	Limit (dBm)	Margin (dB)
792.7	V	-42.21	-13	-29.21
377.4	H	-34.98	-13	-21.98
347.3	V	-34.87	-13	-21.87
889.7	H	-34.79	-13	-21.79

10M QPSK

Low channel (40290)

Frequency (MHz)	Antenna Polarization (H/V)	-36.51 -36.94	Limit (dBm)	Margin (dB)
655.1	V	-35.96	-13	-22.96
698.5	H	-33.85	-13	-20.85
483.6	V	-33.15	-13	-20.15
656.3	H	-35.37	-13	-22.37

15M QPSK

Low channel (40315)

Frequency (MHz)	Antenna Polarization (H/V)	-36.51 -36.94	Limit (dBm)	Margin (dB)
400.2	V	-39.17	-13	-26.17
154.9	H	-33.18	-13	-20.18
855	V	-33.22	-13	-20.22
238.2	H	-36.63	-13	-23.63

20M QPSK

High channel (41140)

Frequency (MHz)	Antenna Polarization (H/V)	-36.51 -36.94	Limit (dBm)	Margin (dB)
913.1	V	-36.71	-13	-23.71
785.3	H	-33.14	-13	-20.14
967.1	V	-40.72	-13	-27.72
588.3	H	-41.71	-13	-28.71

Note:

- 1, The testing has been conformed to $10 \times 2645 \text{ MHz} = 26,450 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.
- 4, The radiated spurious test above 18GHz is subcontracted to Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch Laboratories and found 30dB below the limit at least.



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4 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---