

FCC TEST REPORT

Product Name: Turbox-T95
Trade Mark: TURBO XTM
Model No.: T95G-NA
Report Number: 200801051RFM-2
Test Standards: FCC 47 CFR Part 24
FCC 47 CFR Part 27
FCC ID: 2AOHHT95GNA
Test Result: PASS
Date of Issue: August 23, 2021

Prepared for:

Thundercomm Technology Co., Ltd.
Building 4, No. 99, Data Valley Middle Road Xiantao District, Yubei
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UTTR-RF-RSS4G-V1.1

Version

Version No.	Date	Description
V1.0	August 23, 2021	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Thundercomm Technology Co., Ltd.
Address of Applicant:	Building 4, No. 99, Data Valley Middle Road Xiantao District, Yubei District, Chongqing
Manufacturer:	Thundercomm Technology Co., Ltd.
Address of Manufacturer:	Building 4, No. 99, Data Valley Middle Road Xiantao District, Yubei District, Chongqing

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Turbox-T95	
Model No.:	T95G-NA	
Trade Mark:	TURBOX™	
DUT Stage:	Production Unit	
EUT Supports Function:	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 12
Sample Received Date:	August 4, 2020	
Sample Tested Date:	August 4, 2020 to December 31, 2020	

1.2.2 Description of Accessories

None.

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	LTE	
Type of Modulation:	LTE Band 2/4/12	QPSK, 16QAM
Antenna Type:	External Antenna	
Antenna Gain:	LTE Band 2:	50 ohm terminal (0dBi)
	LTE Band 4:	50 ohm terminal (0dBi)
	LTE Band 12:	50 ohm terminal (0dBi)
Normal Test Voltage:	3.8 Vdc	
Extreme Test Voltage:	3.3 to 4.3Vdc	
Extreme Test Temperature:	-30 ℃ to +75 ℃	

Summary of Results:									
Bands	BW	Modulation	Frequency Range	Max RF Output Power (dBm)		EIRP (W)	99% BW (MHz)	Emission Designator	
	(MHz)		(MHz)	Conducted (Average)	ERP/EIRP (Average)				
2	1.4	QPSK	1850.7-1909.3	24.79	24.79	0.30130	1.1183	1M12G7D	
		16QAM		24.03	24.03	0.25293	0.96679	967KW7D	
	3	QPSK	1851.5-1908.5	24.74	24.74	0.29785	1.1225	1M12G7D	
		16QAM		23.56	23.56	0.22699	0.97026	970KW7D	
	5	QPSK	1852.5-1907.5	24.39	24.39	0.27479	1.251	1M25G7D	
		16QAM		24.33	24.33	0.27102	0.96810	968KW7D	
	10	QPSK	1855.0-1905.0	24.27	24.27	0.26730	1.1295	1M13G7D	
		16QAM		24.01	24.01	0.25177	0.98157	982KW7D	
	15	QPSK	1857.5-1902.5	24.59	24.59	0.28774	1.1278	1M13G7D	
		16QAM		24.20	24.20	0.26303	0.96233	962KW7D	
	20	QPSK	1860.0-1900.0	24.54	24.54	0.28445	1.1337	1M13G7D	
		16QAM		24.13	24.13	0.25882	0.96702	967KW7D	
	4	1.4	QPSK	1710.7-1754.3	24.92	24.92	0.31046	1.1189	1M12G7D
			16QAM		24.05	24.05	0.25410	0.95752	958KW7D
3		QPSK	1711.5-1753.5	24.96	24.96	0.31333	1.1179	1M12G7D	
		16QAM		24.05	24.05	0.25410	0.97547	975KW7D	
5		QPSK	1712.5-1752.5	24.83	24.83	0.30409	1.1247	1M12G7D	
		16QAM		24.67	24.67	0.29309	0.96738	967KW7D	
10		QPSK	1715-1750	24.80	24.80	0.30200	1.1304	1M13G7D	
		16QAM		24.74	24.74	0.29785	0.97158	972KW7D	
15		QPSK	1717.5-1747.5	24.82	24.82	0.30339	1.1227	1M12G7D	
		16QAM		24.97	24.97	0.31405	0.96422	964KW7D	
20		QPSK	1720-1745	24.86	24.86	0.30620	1.1287	1M13G7D	
		16QAM		24.74	24.74	0.29785	0.96741	967KW7D	
12		1.4	QPSK	699.7-715.3	25.35	25.35	0.34277	1.1111	1M11G7D
			16QAM		24.83	24.83	0.30409	0.95075	951KW7D
	3	QPSK	700.5-714.5	25.40	25.40	0.34674	1.1194	1M12G7D	
		16QAM		24.65	24.65	0.29174	0.96884	969KW7D	
	5	QPSK	701.5-713.5	25.14	25.14	0.32659	1.1255	1M13G7D	
		16QAM		25.12	25.12	0.32509	0.95499	953KW7D	
	10	QPSK	704-711	25.18	25.18	0.32961	1.1221	1M12G7D	
		16QAM		24.98	24.98	0.31477	0.96140	961KW7D	

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1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested independently

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
50 ohm terminal	N/A	N/A	N/A	UnionTrust
Notebook	Lenovo	B40-80	MP12NEQ6	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.3 Meter	UnionTrust

1.5 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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1.6 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.7 DEVIATION FROM STANDARDS

None.

1.8 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.9 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.10 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated spurious emissions 30MHz-1GHz	± 4.9 dB
4	Radiated spurious emissions 1GHz-18GHz	± 4.8 dB
5	Radiated spurious emissions 18GHz-40GHz	± 5.1 dB
6	Occupied Bandwidth	± 1.86 %
7	DC Supply Voltages	± 0.68 %
8	Temperature	± 0.62 °C
9	Humidity	± 3.9 %
10	Conducted spurious emissions	± 2.7 dB
11	DC Supply Voltages	± 0.68 %
12	AC Supply Voltages	± 1.2 %
13	Radio Frequency	± 6.5 x 10 ⁻⁸
14	RF Power, Conducted	± 0.9 dB

2. TEST SUMMARY

FCC 47 CFR Part 24 Test Cases (LTE Band 2)			
Test Item	Test Requirement	Test Method	Result
Equivalent Isotropic Radiated Power (EIRP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 24.232(d)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

FCC 47 CFR Part 27 Test Cases (LTE Band 4)			
Test Item	Test Requirement	Test Method	Result
Equivalent Isotropic Radiated Power (EIRP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(h)(1)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

FCC 47 CFR Part 27 Test Cases (LTE Band 12)			
Test Item	Test Requirement	Test Method	Result
Effective Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(c)(10)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(c)(10)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 27.53(g)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(g)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(g)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(g)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

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3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
<input checked="" type="checkbox"/>	Receiver	R&S	ESIB26	100114	Nov. 24, 2019	Nov. 23, 2020
					Nov. 18, 2020	Nov. 17, 2021
<input type="checkbox"/>	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
<input checked="" type="checkbox"/>	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
<input checked="" type="checkbox"/>	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
<input checked="" type="checkbox"/>	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2019	Nov. 23, 2020
					Nov. 10, 2020	Nov. 9, 2021
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May. 30, 2020	May. 29, 2021
<input checked="" type="checkbox"/>	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	120932	Jul. 20, 2020	Jul. 19, 2021
<input checked="" type="checkbox"/>	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
<input checked="" type="checkbox"/>	Test Software	Audix	e3	Software Version: 9.160323		

RF Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
<input checked="" type="checkbox"/>	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 24, 2019	Nov. 23, 2020
					Nov. 18, 2020	Nov. 17, 2021
<input checked="" type="checkbox"/>	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2019	Nov. 23, 2020
					Nov. 10, 2020	Nov. 9, 2021
<input checked="" type="checkbox"/>	Wideband Radio Communication Tester	R&S	CMW500	120932	Jul. 20, 2020	Jul. 19, 2021
<input checked="" type="checkbox"/>	DC Source	KIKUSUI	PWR400L	LK003024	Sep. 09, 2019	Sep. 08, 2020
					Sep. 09, 2020	Sep. 08, 2021
<input checked="" type="checkbox"/>	Temp & Humidity chamber	Votisch	VT4002	58566133290020	May 11, 2020	May 10, 2021

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

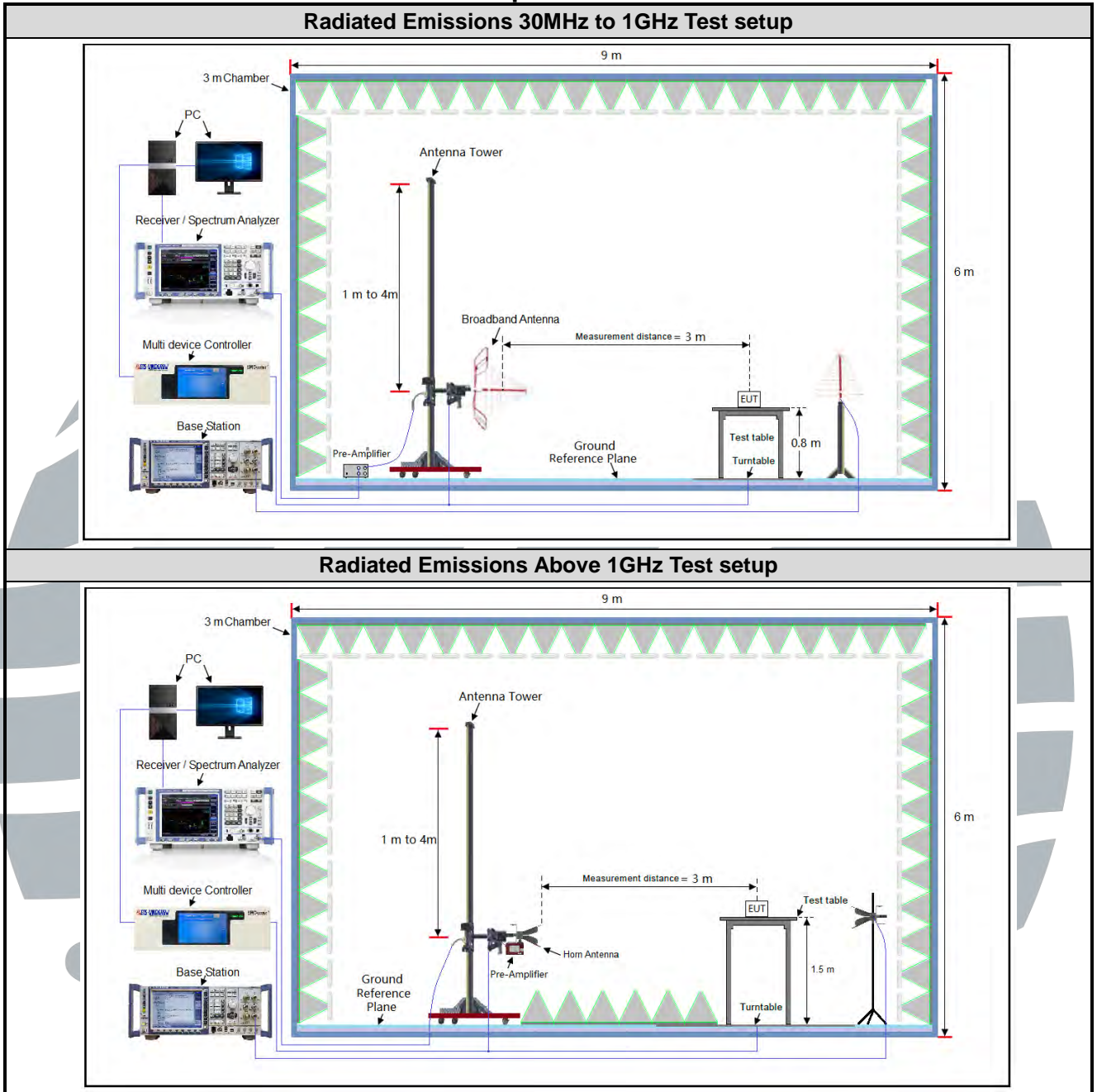
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	-30	3.3	20 to 75
TH/VL	+75	3.3	20 to 75
TL/VH	-30	4.3	20 to 75
TH/VH	+75	4.3	20 to 75

Remark:

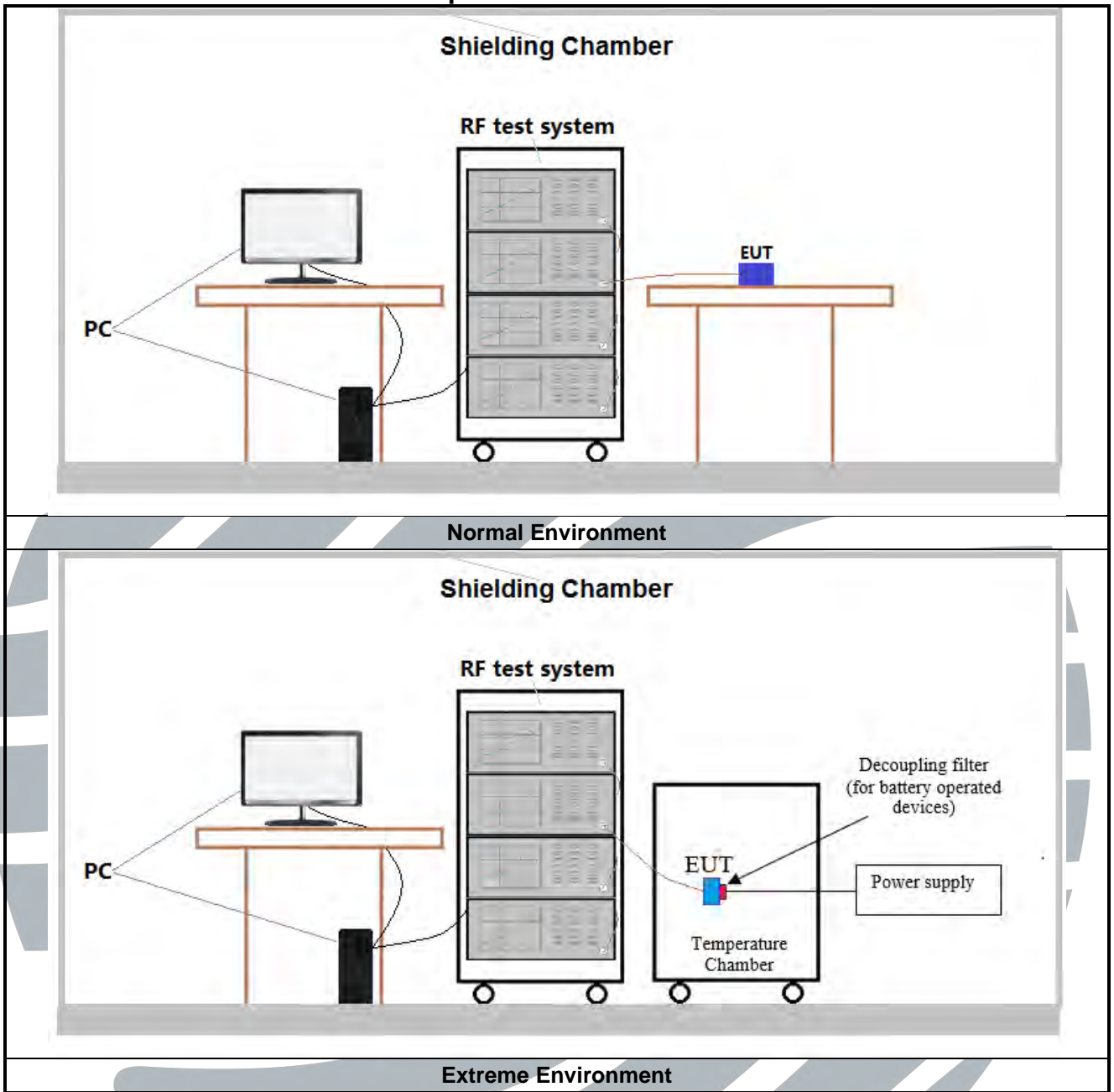
- 1) The EUT just work in such extreme temperature of -30 °C to +75 °C and the extreme voltage of 3.3 V to 4.3V, so here the EUT is tested in the temperature of -30 °C to +75 °C and the voltage of 3.3 V to 4.3V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
 TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;
 VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.

4.2 TEST SETUP

4.2.1 For Radiated Emissions test setup



4.2.2 For Conducted RF test setup



4.3 TEST CHANNELS

Band	Test Frequency ID	Bandwidth (MHz)	Number [UL]	Frequency of Uplink (MHz)
LTE Band 2 TX: 1850-1910MHz	Low Range	1.4	18607	1850.7
		3	18615	1851.5
		5	18625	1852.5
		10	18650	1855
		15	18675	1857.5
		20	18700	1860
	Middle Range	1.4/3/5/10/15/20	18900	1880
	High Range	1.4	19193	1909.3
		3	19185	1908.5
		5	19175	1907.5
		10	19150	1905
		15	19125	1902.5
		20	19100	1900
	LTE Band 4 TX: 1710-1755MHz	Low Range	1.4	19957
3			19965	1711.5
5			19975	1712.5
10			20000	1715
15			20025	1717.5
20			20050	1720
Middle Range		1.4/3/5/10/ 15/20	20175	1732.5
High Range		1.4	20393	1754.3
		3	20385	1753.5
		5	20375	1752.5
		10	20350	1750
		15	20325	1747.5
		20	20300	1745
LTE Band 12 TX: 699-716MHz		Low Range	1.4	23017
	3		23025	700.5
	5		23035	701.5
	10		23060	704
	Middle Range	1.4/3/5/10	23095	707.5
	High Range	1.4	23173	715.3
		3	23165	714.5
		5	23155	713.5
		10	23130	711

4.4 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. Only the worst case data were recorded in this test report.

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

The worst case was found when positioned as the table below.

Band	Mode	Antenna Port	Worst-case axis positioning
LTE Band 2	1TX	Chain 0	Z axis
LTE Band 4	1TX	Chain 0	Z axis
LTE Band 12	1TX	Chain 0	Z axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

4.5 PRE-SCAN

Pre-scan under all rate at lowest middle and highest channel, find the transmitter power as below.

4.5.1 LTE Band 2

CAT M1 LTE Band 2 Maximum Average Power (dBm)					
Bandwidth	Channel/ Frequency(MHz)	Index	RB# RBstart	Conducted Power (dBm)	
				QPSK	16QAM
1.4MHz	18607/1850.7	0	1#0	24.79	23.17
		0	6#0/5#1	22.63	23.42
	18900/1880	0	1#0	24.32	24.03
		0	6#0/5#1	23.51	22.66
	19193/1909.3	0	1#5	23.65	22.68
0		6#0/5#1	23.67	22.79	
3MHz	8615/1851.5	0	1#0	24.74	23.56
		0	3#0	23.50	22.68
	18900/1880	0	1#0	24.46	23.12
		0	3#0	23.56	22.58
	19185/1908.5	1	1#5	24.33	23.21
1		3#0	23.32	22.31	
5MHz	18625/1852.5	3	1#0	24.25	24.22
		0	6#0/5#1	23.28	22.50
	18900/1880	0	1#0	24.39	24.33
		0	6#0/5#1	23.29	22.54
	19175/1907.5	0	1#5	24.14	24.13
3		6#0/5#1	23.31	22.47	
10MHz	18650/1855	3	1#0	24.27	24.01
		0	5#0	23.33	23.45
	18900/1880	0	1#0	24.14	23.64
		0	5#0	22.99	23.25
	19150/1905	4	1#5	23.54	23.51
7		6#0/5#1	23.05	22.92	
15MHz	18675/1857.5	3	1#0	24.56	24.20
		0	6#0/5#1	24.17	24.05
	18900/1880	0	1#0	24.59	24.12
		0	6#0/5#1	24.26	24.13
	19125/1902.5	8	1#5	24.02	23.52
11		6#0/5#1	24.26	24.01	
20MHz	18700/1860	3	1#0	24.45	23.95
		0	6#0/5#1	24.54	24.13
	18900/1880	0	1#0	24.25	23.99
		0	6#0/5#1	24.18	23.22
	19100/1900	12	1#5	24.08	23.49
15		6#0/5#1	24.17	23.82	

4.5.2 LTE Band 4

CAT M1 LTE Band 4 Maximum Average Power (dBm)					
Bandwidth	Channel/ Frequency(MHz)	Index	RB# RBstart	Conducted Power (dBm)	
				QPSK	16QAM
1.4MHz	19957 1710.7	0	1#0	24.70	24.05
		0	6#0/5#1	22.98	22.92
	20175/1732.5	0	1#0	24.92	23.88
		0	6#0/5#1	22.93	22.87
	20393/1754.3	0	1#5	24.25	23.77
		0	6#0/5#1	23.70	22.85
3MHz	19965/1711.5	0	1#0	24.96	24.05
		0	3#0	24.07	23.33
	20175/1732.5	0	1#0	24.90	23.66
		0	3#0	23.95	22.95
	20385/1753.5	1	1#5	24.43	23.75
		1	3#0	23.74	22.85
5MHz	19975/1712.5	0	1#0	24.83	24.67
		0	6#0/5#1	24.11	23.03
	20175/1732.5	0	1#0	24.60	24.23
		0	6#0/5#1	23.71	22.92
	20375/1752.5	3	1#5	24.45	24.26
		3	6#0/5#1	23.70	22.69
10MHz	20000/1715	0	1#0	24.80	24.74
		0	5#0	23.86	24.02
	20175/1732.5	0	1#0	24.45	24.21
		0	5#0	23.71	23.95
	20350/1750	7	1#5	24.24	24.45
		7	6#0/5#1	23.60	23.71
15MHz	20025/1717.5	0	1#0	24.70	24.81
		0	6#0/5#1	24.82	24.97
	20175/1732.5	0	1#0	24.64	24.13
		0	6#0/5#1	24.58	24.88
	20325/1747.5	11	1#5	24.45	24.43
		11	6#0/5#1	24.52	24.53
20MHz	20050/1720	0	1#0	24.82	24.74
		0	6#0/5#1	24.69	24.73
	20175/1732.5	0	1#0	24.86	24.68
		0	6#0/5#1	24.68	24.56
	20300/1745	15	1#5	24.37	24.28
		15	6#0/5#1	24.56	24.46

4.5.3 LTE Band 12

CAT M1 LTE Band 12 Maximum Average Power (dBm)					
Bandwidth	Channel/ Frequency(MHz)	Index	RB# RBstart	Conducted Power (dBm)	
				QPSK	16QAM
1.4MHz	23017/699.7	0	1#0	25.15	24.67
		0	6#0/5#1	24.70	23.78
	23095/707.5	0	1#0	25.35	24.83
		0	6#0/5#1	24.70	23.87
	23173/715.3	0	1#5	25.30	24.81
		0	6#0/5#1	24.76	24.15
3MHz	23025/700.5	0	1#0	25.06	24.21
		0	6#0/5#1	24.20	23.40
	23095/707.5	0	1#0	25.22	24.62
		0	6#0/5#1	24.40	23.50
	23165/714.5	1	1#5	25.40	24.65
		1	6#0/5#1	24.76	23.92
5MHz	23035/701.5	3	1#0	25.08	25.12
		0	6#0/5#1	24.28	23.40
	23095/707.5	0	1#0	25.10	24.33
		0	6#0/5#1	24.10	23.80
	23155/713.5	0	1#5	25.14	25.12
		3	6#0/5#1	24.49	23.68
10MHz	23060/704	3	1#0	24.95	24.45
		0	5#0	24.04	24.20
	23095/707.5	0	1#0	24.82	24.98
		0	5#0	24.30	24.35
	23130/711	4	1#5	25.18	24.75
		7	6#0/5#1	24.35	24.26

Pre-scan all bandwidth and RB, find worse case mode are chosen to the report, the LTE worse case mode applicability and tested channel detail as below:

Item	Band	Bandwidth(MHz)						Modulation			RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
ERP/EIRP	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	-	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Conducted output power	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	-	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
99%&26dB Bandwidth	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	-	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
peak-to-average ratio	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	-	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Band Edge at antenna terminals	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-	-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Spurious emissions at antenna terminals	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Field strength of spurious radiation	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-	-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Frequency stability	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	-	-	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Remark: The mark "☒" means is chosen for testing; The mark "☐" means is not chosen for testing; The mark "-" means is not supported bandwidth																

5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 27	Miscellaneous Wireless Communications Services
3	FCC 47 CFR Part 24	Personal Communications Services
4	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
5	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03r01

5.2 ERP OR EIRP

Test Requirement: FCC 47 CFR Part 2.1046(a)
LTE Band 2: FCC 47 CFR Part 24.232(c)
LTE Band 4: FCC 47 CFR Part 27.50(d)(4)
LTE Band 12: FCC 47 CFR Part 27.50(c)(10)

Test Method: KDB 971168 D01v03r01 Section 5.6 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 24.232(c):

Mobile and portable stations are limited to 2 watts EIRP.

FCC 47 CFR Part 27.50(d)(4):

Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

FCC 47 CFR Part 27.50(c)(10):

Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

Test Procedure:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.

2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).

3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.

In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. A amplifier should be connected to the Signal Source output port. And the cable should be connected between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAG) should be recorded after test.

The measurement results are obtained as described below:

Power(EIRP)=PMea+ PAG- Pcl+ Ga

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (0dBi) and known input power.

6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

Test Setup: Refer to section 4.2.1 for details.

Instruments Used: Refer to section 3 for details

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[Http://www.uttlab.com](http://www.uttlab.com)

UTTR-RF-RSS4G-V1.1

Test Mode: Link mode
Test Results: Pass
Test Data: See table below

5.2.1 LTE Band 2

Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	EIRP(dBm)	Limit(dBm)
1.4MHz	QPSK	18607/1850.7	1#0	0	24.79	33.01
		18900/1880	1#0	0	24.32	33.01
		19193/1909.3	6#0	0	23.67	33.01
	16QAM	18607/1850.7	6#0	0	23.42	33.01
		18900/1880	1#0	0	24.03	33.01
		19193/1909.3	6#0	0	22.79	33.01
3MHz	QPSK	18615/1851.5	1#0	0	24.74	33.01
		18900/1880	1#0	0	24.46	33.01
		19185/1908.5	1#5	1	24.33	33.01
	16QAM	18615/1851.5	1#0	0	23.56	33.01
		18900/1880	1#0	0	23.12	33.01
		19185/1908.5	1#5	1	23.21	33.01
5MHz	QPSK	18625/1852.5	1#0	3	24.25	33.01
		18900/1880	1#0	0	24.39	33.01
		19175/1907.5	1#5	0	24.14	33.01
	16QAM	18625/1852.5	1#0	3	24.22	33.01
		18900/1880	1#0	0	24.33	33.01
		19175/1907.5	1#5	0	24.13	33.01
10MHz	QPSK	18650/1855	1#0	3	24.27	33.01
		18900/1880	1#0	0	24.14	33.01
		19150/1905	1#5	4	23.54	33.01
	16QAM	18650/1855	1#0	3	24.01	33.01
		18900/1880	1#0	0	23.64	33.01
		19150/1905	1#5	4	23.51	33.01
15MHz	QPSK	18675/1857.5	1#0	3	24.56	33.01
		18900/1880	1#0	0	24.59	33.01
		19125/1902.5	6#0	11	24.26	33.01
	16QAM	18675/1857.5	1#0	3	24.20	33.01
		18900/1880	6#0	0	24.13	33.01
		19125/1902.5	6#0	11	24.01	33.01
20MHz	QPSK	18700/1860	6#0	0	24.54	33.01
		18900/1880	1#0	0	24.25	33.01
		19100/1900	6#0	15	24.17	33.01
	16QAM	18700/1860	6#0	0	24.13	33.01
		18900/1880	1#0	0	23.99	33.01
		19100/1900	6#0	15	23.82	33.01

5.2.2 LTE Band 4

Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	EIRP(dBm)	Limit(dBm)
1.4MHz	QPSK	19957 1710.7	1#0	0	24.70	30.00
		20175/1732.5	1#0	0	24.92	30.00
		20393/1754.3	1#5	0	24.25	30.00
	16QAM	19957 1710.7	1#0	0	24.05	30.00
		20175/1732.5	1#0	0	23.88	30.00
		20393/1754.3	1#5	0	23.77	30.00
3MHz	QPSK	19965/1711.5	1#0	0	24.96	30.00
		20175/1732.5	1#0	0	24.90	30.00
		20385/1753.5	1#5	1	24.43	30.00
	16QAM	19965/1711.5	1#0	0	24.05	30.00
		20175/1732.5	1#0	0	23.66	30.00
		20385/1753.5	1#5	1	23.75	30.00
5MHz	QPSK	19975/1712.5	1#0	0	24.83	30.00
		20175/1732.5	1#0	0	24.60	30.00
		20375/1752.5	1#5	3	24.45	30.00
	16QAM	19975/1712.5	1#0	0	24.67	30.00
		20175/1732.5	1#0	0	24.23	30.00
		20375/1752.5	1#5	3	24.26	30.00
10MHz	QPSK	20000/1715	1#0	0	24.80	30.00
		20175/1732.5	1#0	0	24.45	30.00
		20350/1750	1#5	7	24.24	30.00
	16QAM	20000/1715	1#0	0	24.74	30.00
		20175/1732.5	1#0	0	24.21	30.00
		20350/1750	1#5	7	24.45	30.00
15MHz	QPSK	20025/1717.5	6#0	0	24.82	30.00
		20175/1732.5	1#0	0	24.64	30.00
		20325/1747.5	6#0	11	24.52	30.00
	16QAM	20025/1717.5	6#0	0	24.97	30.00
		20175/1732.5	6#0	0	24.88	30.00
		20325/1747.5	6#0	11	24.53	30.00
20MHz	QPSK	20050/1720	1#0	0	24.82	30.00
		20175/1732.5	1#0	0	24.86	30.00
		20300/1745	6#0	15	24.56	30.00
	16QAM	20050/1720	1#0	0	24.74	30.00
		20175/1732.5	1#0	0	24.68	30.00
		20300/1745	6#0	15	24.46	30.00

5.2.3 LTE Band 12

Bandwidth	Modulation	Channel/ Frequency(MHz)	RB	Index	ERP(dBm)	Limit(dBm)
1.4MHz	QPSK	23017/699.7	1#0	0	25.15	34.77
		23095/707.5	1#0	0	25.35	34.77
		23173/715.3	1#5	0	25.30	34.77
	16QAM	23017/699.7	1#0	0	24.67	34.77
		23095/707.5	1#0	0	24.83	34.77
		23173/715.3	1#5	0	24.81	34.77
3MHz	QPSK	23025/700.5	1#0	0	25.06	34.77
		23095/707.5	1#0	0	25.22	34.77
		23165/714.5	1#5	1	25.40	34.77
	16QAM	23025/700.5	1#0	0	24.21	34.77
		23095/707.5	1#0	0	24.62	34.77
		23165/714.5	1#5	1	24.65	34.77
5MHz	QPSK	23035/701.5	1#0	3	25.08	34.77
		23095/707.5	1#0	0	25.10	34.77
		23155/713.5	1#5	0	25.14	34.77
	16QAM	23035/701.5	1#0	3	25.12	34.77
		23095/707.5	1#0	0	24.33	34.77
		23155/713.5	1#5	0	25.12	34.77
10MHz	QPSK	23060/704	1#0	3	24.95	34.77
		23095/707.5	1#0	0	24.82	34.77
		23130/711	1#5	4	25.18	34.77
	16QAM	23060/704	1#0	3	24.45	34.77
		23095/707.5	1#0	0	24.98	34.77
		23130/711	1#5	4	24.75	34.77

5.3 CONDUCTED OUTPUT POWER

FCC 47 CFR Part 2.1046(a)

Test Requirement: **LTE Band 2:** FCC 47 CFR Part 24.232(c)
LTE Band 4 : FCC 47 CFR Part 27.50(d)(4)
LTE Band 12: FCC 47 CFR Part 27.50(c)(10)

Test Method: KDB 971168 D01v03r01 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 24.232(c):

Mobile and portable stations are limited to 2 watts EIRP.

FCC 47 CFR Part 27.50(d)(4):

Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

FCC 47 CFR Part 27.50(c)(10):

Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

Test Procedure:

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

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: [The full result refer to section 4.5 for details.](#)

5.4 PEAK-TO-AVERAGE RATIO

Test Requirement: LTE Band 2: FCC 47 CFR Part 24.232(d)
 LTE Band 4: FCC 47 CFR Part 27.50(d)(5)
 LTE Band 12: FCC 47 CFR Part 27.50(d)(5)

Test Method: KDB 971168 D01v03r01 Section 5.7

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

Test Procedure:
 The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

- a) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth
- b) Set the number of counts to a value that stabilizes the measured CCDF curve
- c) Record the maximum PAPR level associated with a probability of 0.1 %

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

5.4.1 LTE Band 2

LTE Band 2 Peak-to-average ratio (dB)					
Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)	Limit (dB)	Result
1.4MHz	QPSK	18900/1880	5.31	13	Pass
	16QAM	18900/1880	5.64	13	Pass
3MHz	QPSK	18900/1880	5.15	13	Pass
	16QAM	18900/1880	5.59	13	Pass
5MHz	QPSK	18900/1880	5.19	13	Pass
	16QAM	18900/1880	5.59	13	Pass
10MHz	QPSK	18900/1880	5.34	13	Pass
	16QAM	18900/1880	5.33	13	Pass
15MHz	QPSK	18900/1880	4.49	13	Pass
	16QAM	18900/1880	4.72	13	Pass
20MHz	QPSK	18900/1880	4.44	13	Pass
	16QAM	18900/1880	4.97	13	Pass

5.4.2 LTE Band 4

LTE Band 4 Peak-to-average ratio (dB)					
Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)	Limit (dB)	Result
1.4MHz	QPSK	20175/1732.5	5.49	13	Pass
	16QAM	20175/1732.5	6.15	13	Pass
3MHz	QPSK	20175/1732.5	5.45	13	Pass
	16QAM	20175/1732.5	5.78	13	Pass
5MHz	QPSK	20175/1732.5	4.89	13	Pass
	16QAM	20175/1732.5	5.87	13	Pass
10MHz	QPSK	20175/1732.5	5.52	13	Pass
	16QAM	20175/1732.5	5.80	13	Pass
15MHz	QPSK	20175/1732.5	5.13	13	Pass
	16QAM	20175/1732.5	5.45	13	Pass
20MHz	QPSK	20175/1732.5	5.54	13	Pass
	16QAM	20175/1732.5	5.56	13	Pass

5.4.3 LTE Band 12

LTE Band 12 Peak-to-average ratio (dB)					
Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)	Limit (dB)	Result
1.4MHz	QPSK	23095/707.5	5.15	13	Pass
	16QAM	23095/707.5	5.83	13	Pass
3MHz	QPSK	23095/707.5	5.22	13	Pass
	16QAM	23095/707.5	6.13	13	Pass
5MHz	QPSK	23095/707.5	5.24	13	Pass
	16QAM	23095/707.5	5.72	13	Pass
10MHz	QPSK	23095/707.5	5.40	13	Pass
	16QAM	23095/707.5	5.31	13	Pass

5.5 99%&26DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 2.1049(h)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01 Section 4

Limit: No Limit, for reporting purposes only.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

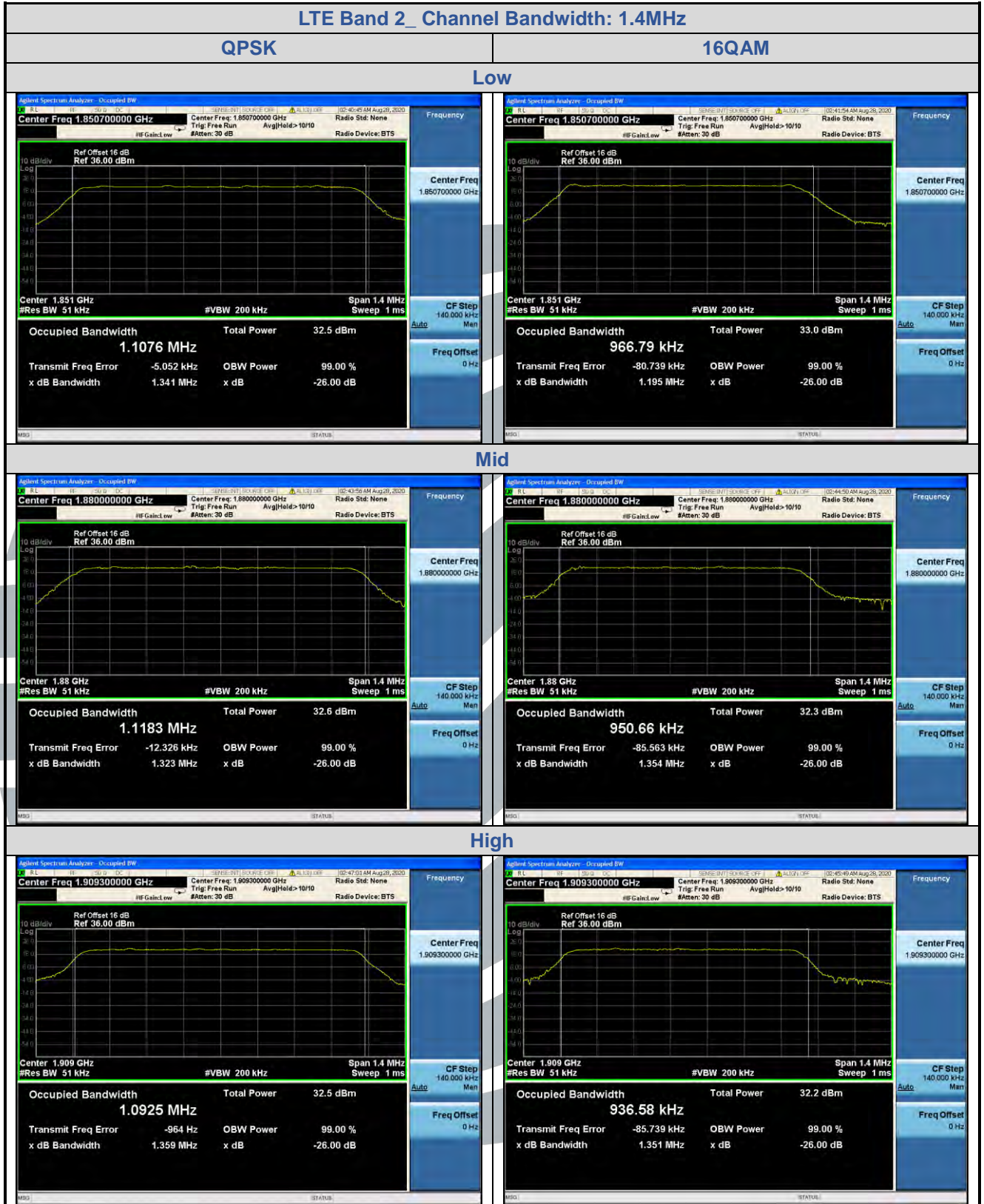
Test Mode: Link mode

Test Results: Pass

Test Data: See table below

5.5.1 LTE Band 2

LTE Band 2				
Bandwidth	Modulation	Channel	Bandwidth(MHz)	
			99% Power	-26dBc
1.4MHz	QPSK	Low	1.1076	1.341
		Mid	1.1183	1.323
		High	1.0925	1.359
	16QAM	Low	0.96679	1.195
		Mid	0.95066	1.354
		High	0.93658	1.351
3MHz	QPSK	Low	1.1225	1.385
		Mid	1.1175	1.371
		High	1.1160	1.324
	16QAM	Low	0.95376	1.166
		Mid	0.95502	1.167
		High	0.97026	1.506
5MHz	QPSK	Low	1.1118	1.327
		Mid	1.1251	1.370
		High	1.1044	1.361
	16QAM	Low	0.95617	1.199
		Mid	0.95118	1.224
		High	0.96810	1.180
10MHz	QPSK	Low	1.1178	1.333
		Mid	1.1295	1.376
		High	1.1256	1.481
	16QAM	Low	0.97105	1.197
		Mid	0.96004	1.203
		High	0.98157	1.546
15MHz	QPSK	Low	1.1223	1.334
		Mid	1.1278	1.364
		High	1.1188	1.375
	16QAM	Low	0.96210	1.195
		Mid	0.95671	1.166
		High	0.96233	1.146
20MHz	QPSK	Low	1.1220	1.332
		Mid	1.1337	1.361
		High	1.1116	1.337
	16QAM	Low	0.95715	1.189
		Mid	0.95884	1.194
		High	0.96702	1.177



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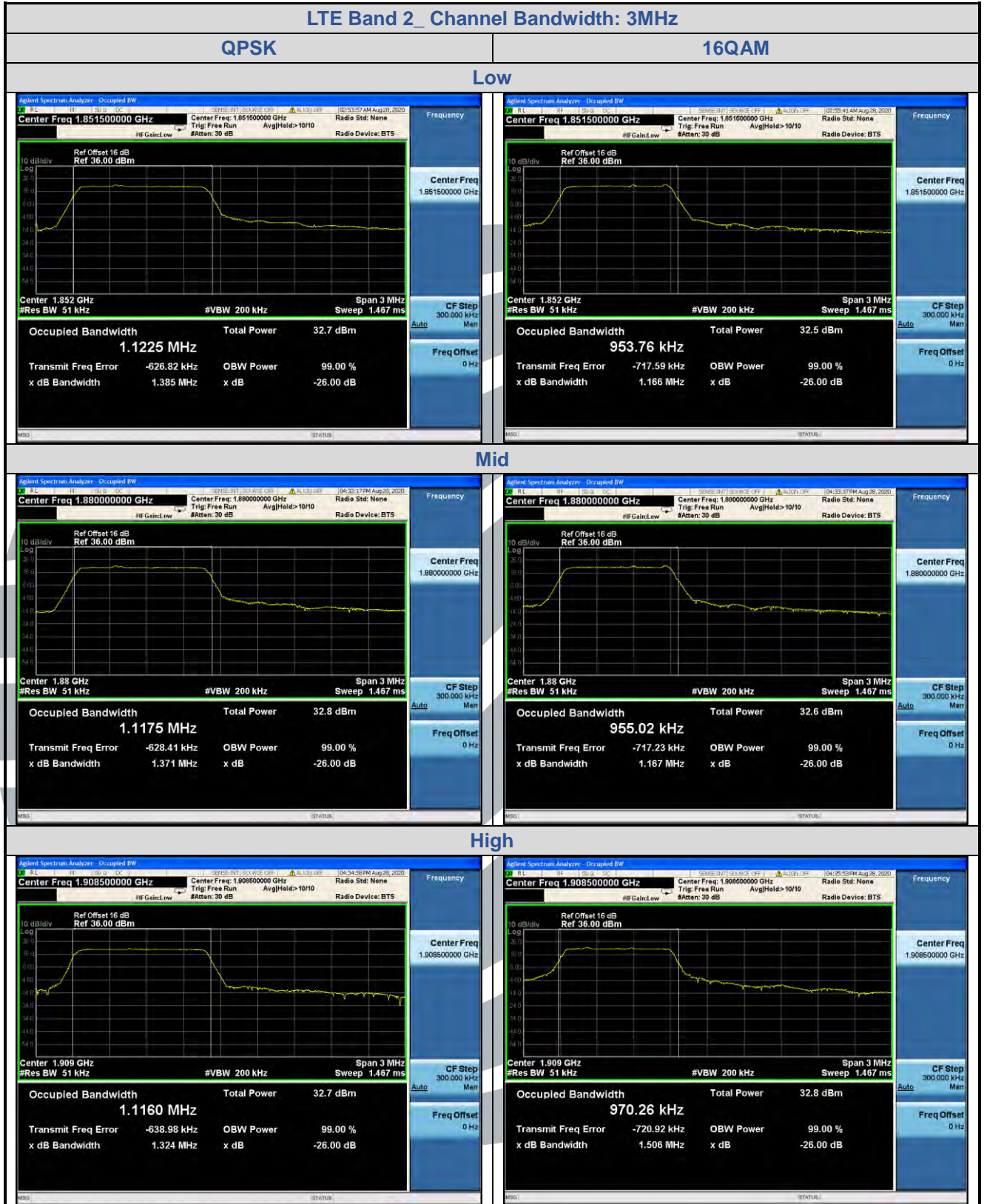
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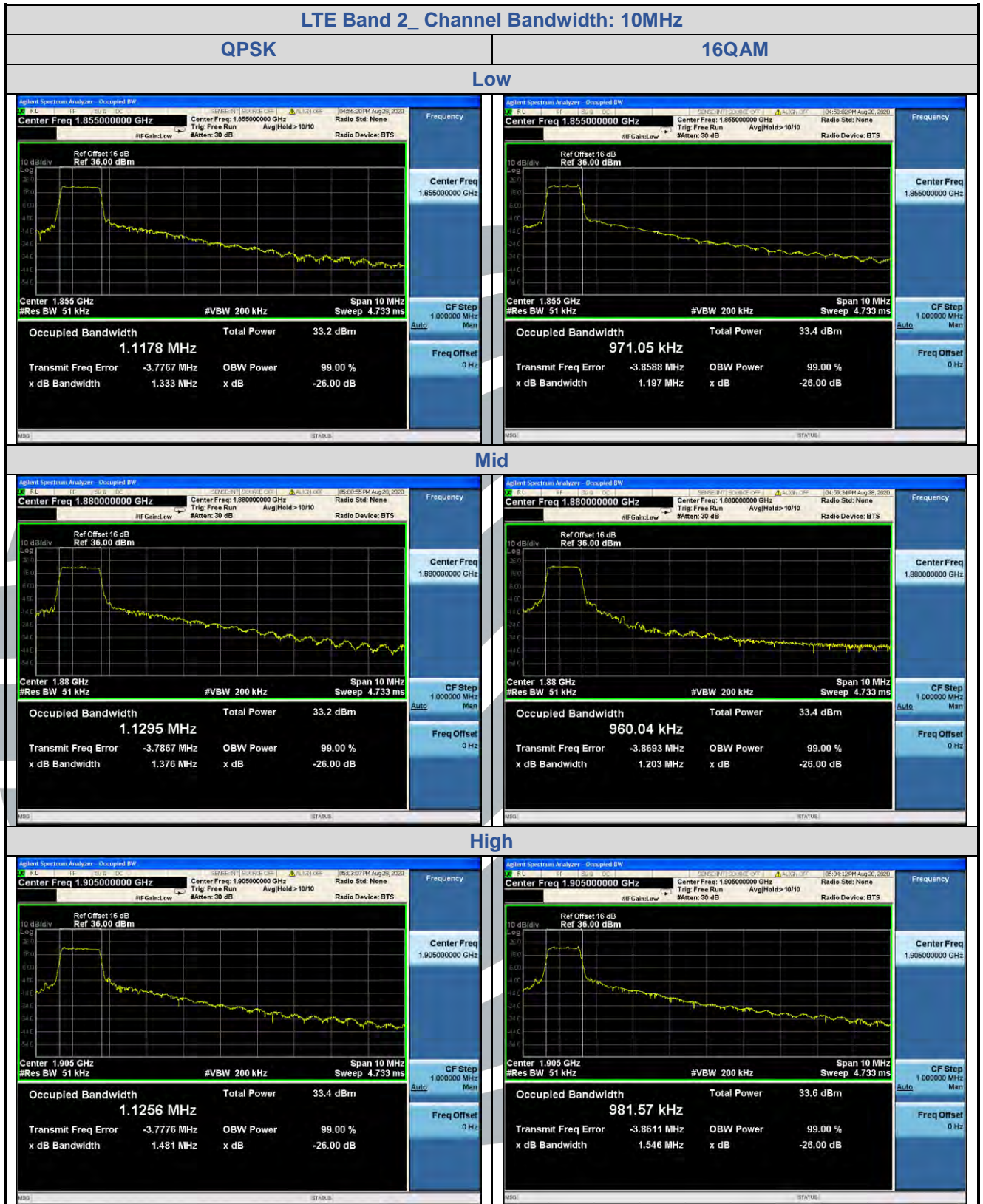
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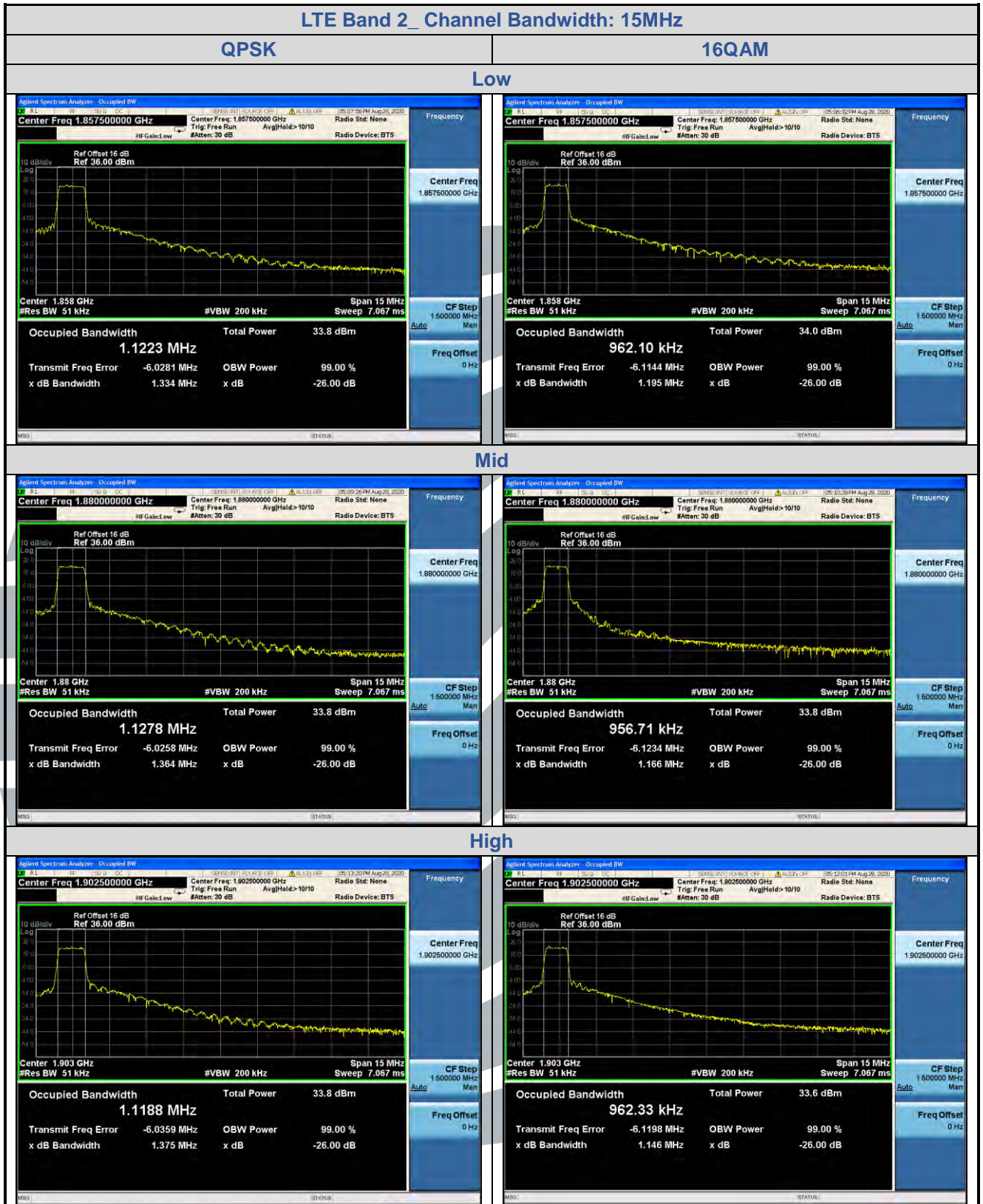
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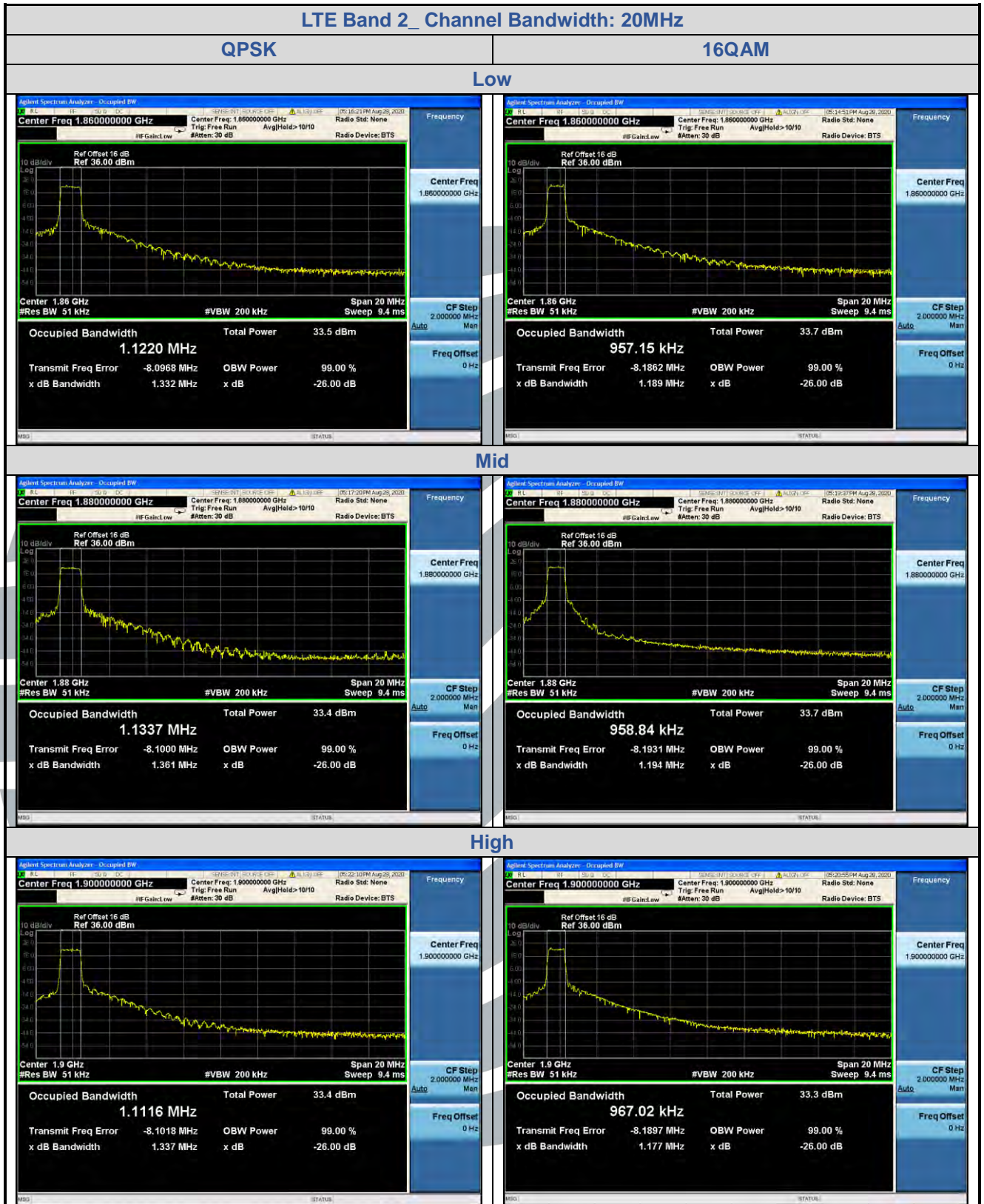
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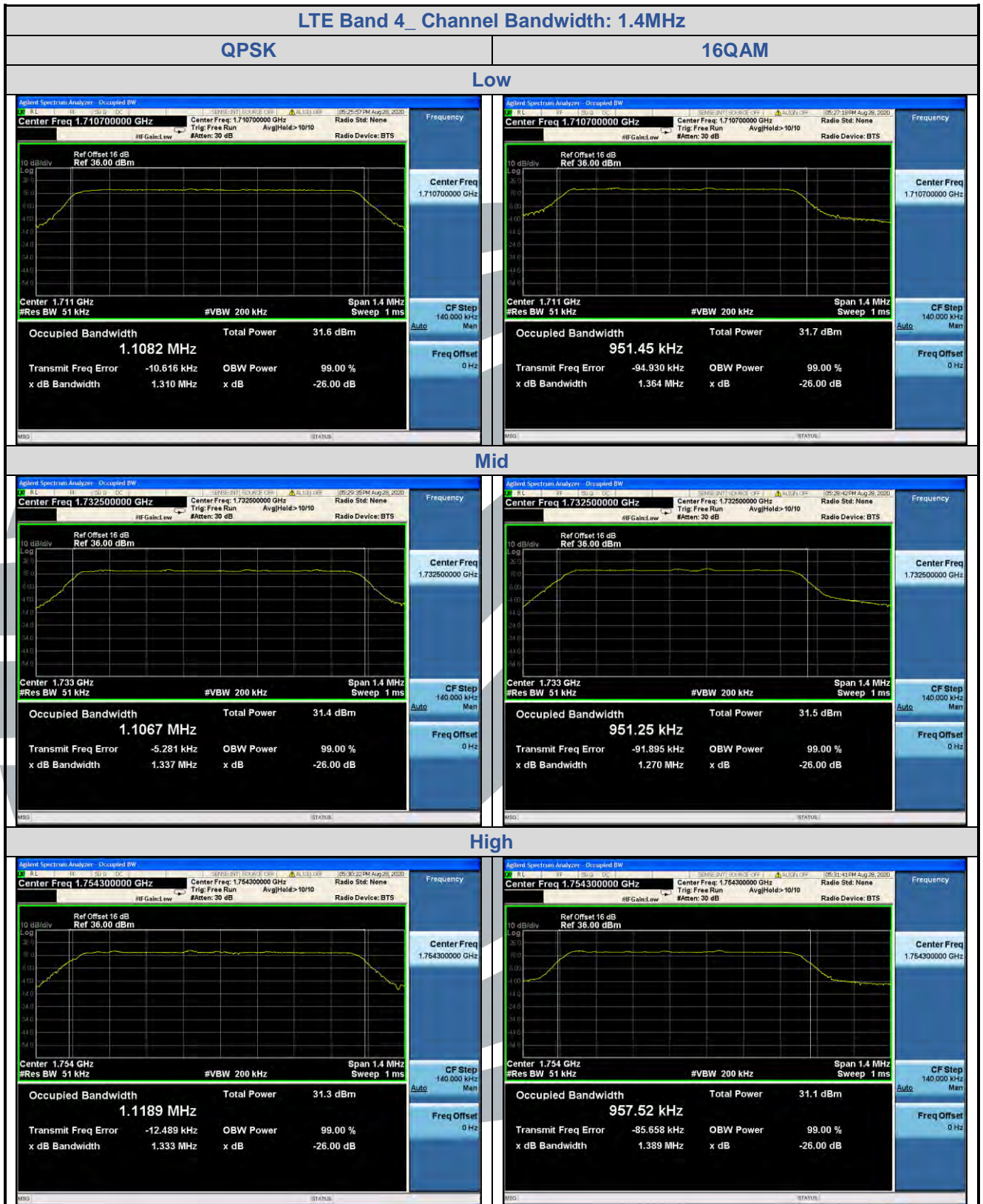
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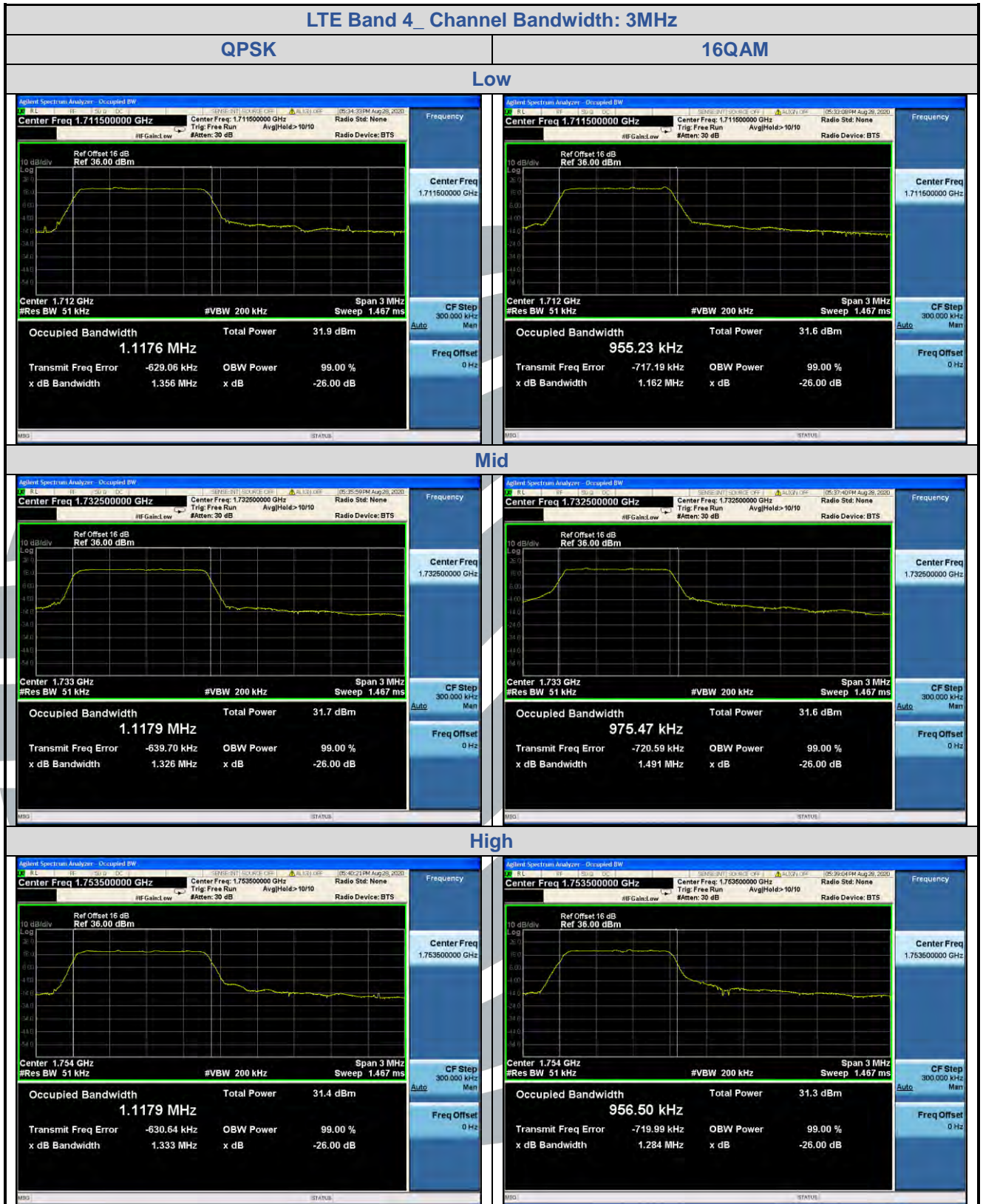
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5.5.2 LTE Band 4

LTE Band 4				
Bandwidth	Modulation	Channel	Bandwidth(MHz)	
			99% Power	-26dBc
1.4MHz	QPSK	Low	1.1082	1.310
		Mid	1.1067	1.337
		High	1.1189	1.333
	16QAM	Low	0.95145	1.364
		Mid	0.95125	1.270
		High	0.95752	1.389
3MHz	QPSK	Low	1.1176	1.356
		Mid	1.1179	1.326
		High	1.1179	1.333
	16QAM	Low	0.95523	1.162
		Mid	0.97547	1.491
		High	0.95650	1.284
5MHz	QPSK	Low	1.1134	1.436
		Mid	1.1247	1.365
		High	1.1015	1.372
	16QAM	Low	0.95955	1.216
		Mid	0.95420	1.221
		High	0.96738	1.170
10MHz	QPSK	Low	1.1200	1.337
		Mid	1.1304	1.378
		High	1.1156	1.377
	16QAM	Low	0.97158	1.215
		Mid	0.95961	1.203
		High	0.96084	1.158
15MHz	QPSK	Low	1.1193	1.334
		Mid	1.1227	1.349
		High	1.1178	1.390
	16QAM	Low	0.96422	1.188
		Mid	0.95254	1.165
		High	0.96240	1.147
20MHz	QPSK	Low	1.1238	1.327
		Mid	1.1287	1.365
		High	1.1069	1.325
	16QAM	Low	0.96124	1.215
		Mid	0.95561	1.176
		High	0.96741	1.183





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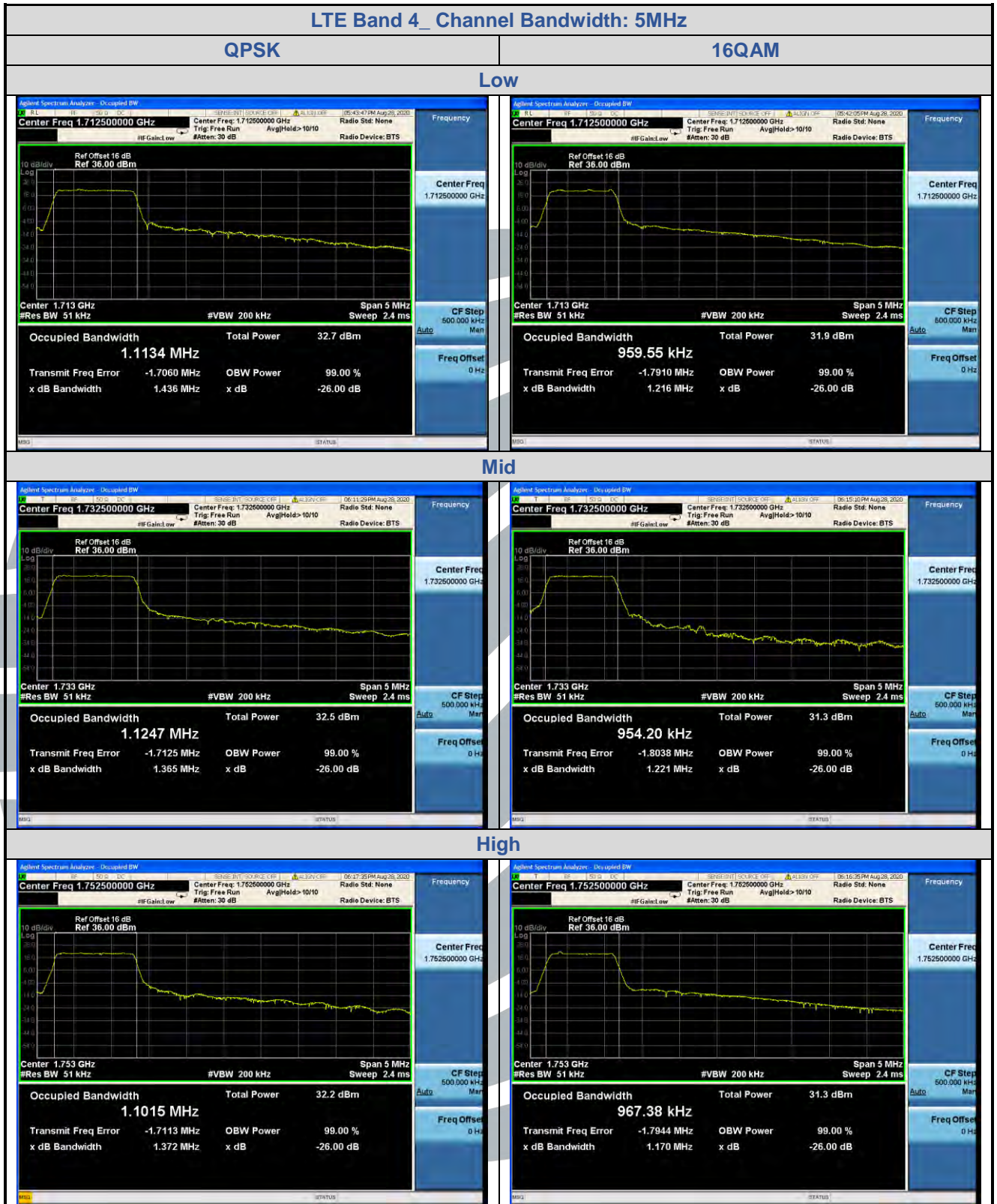
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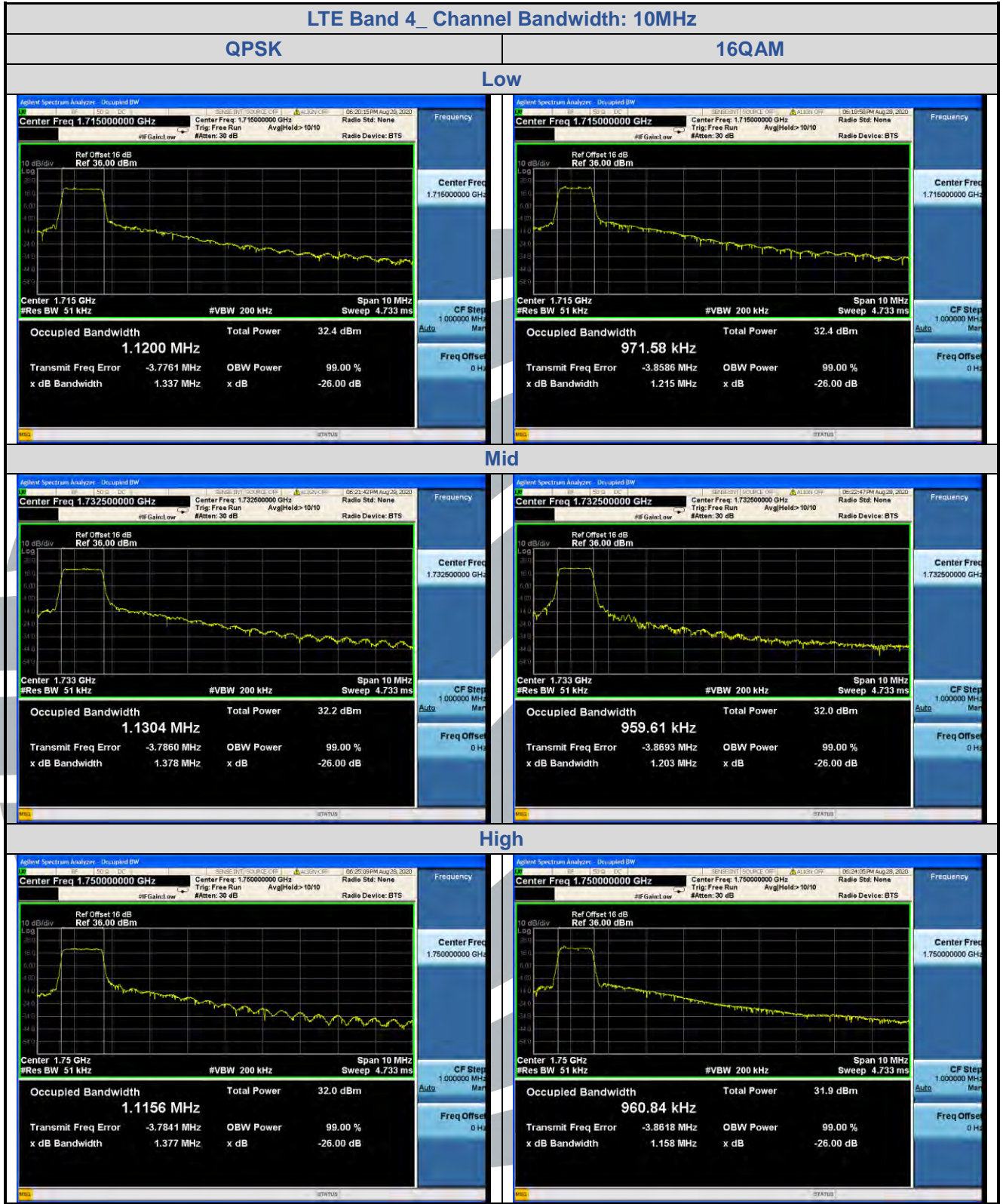
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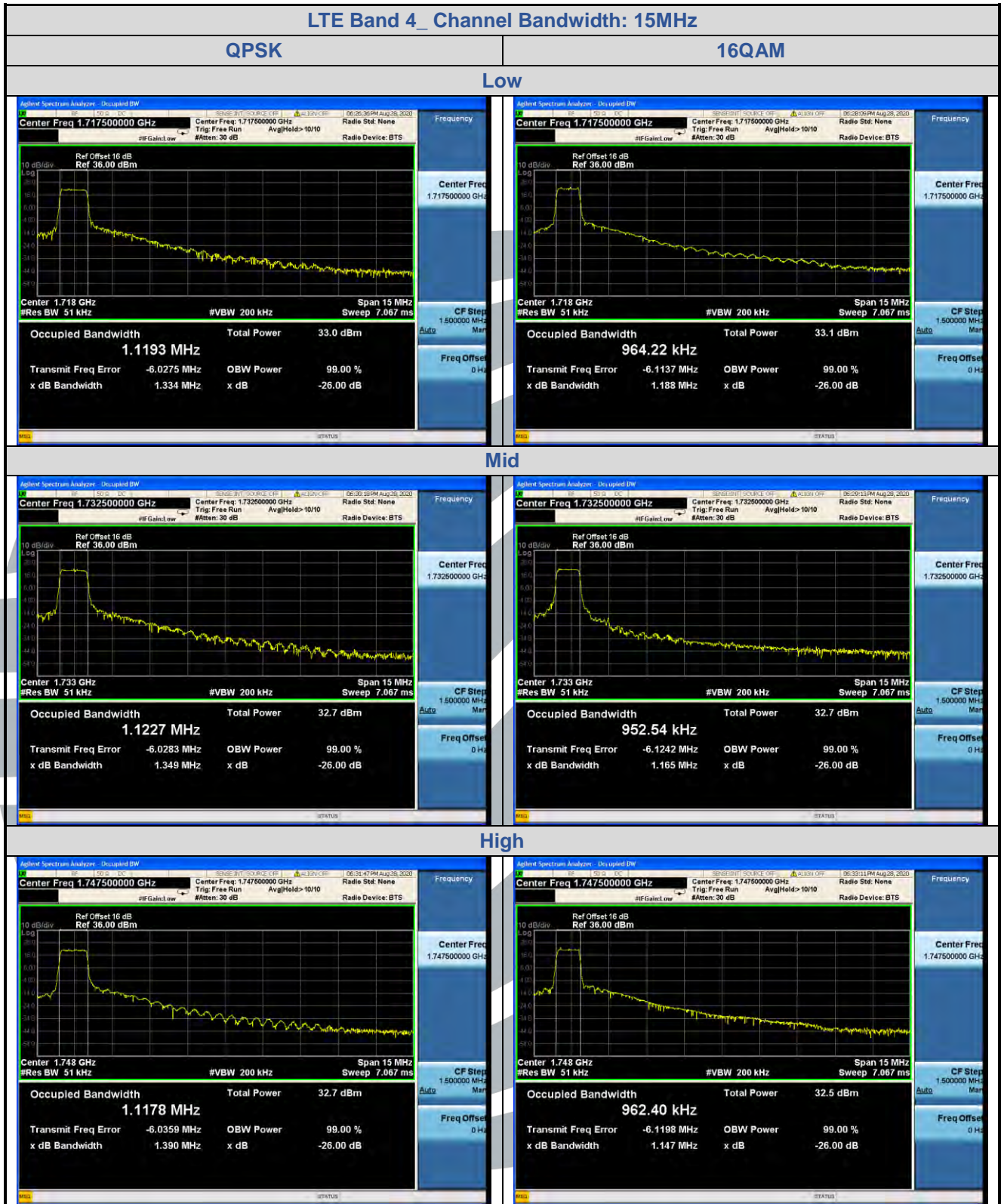
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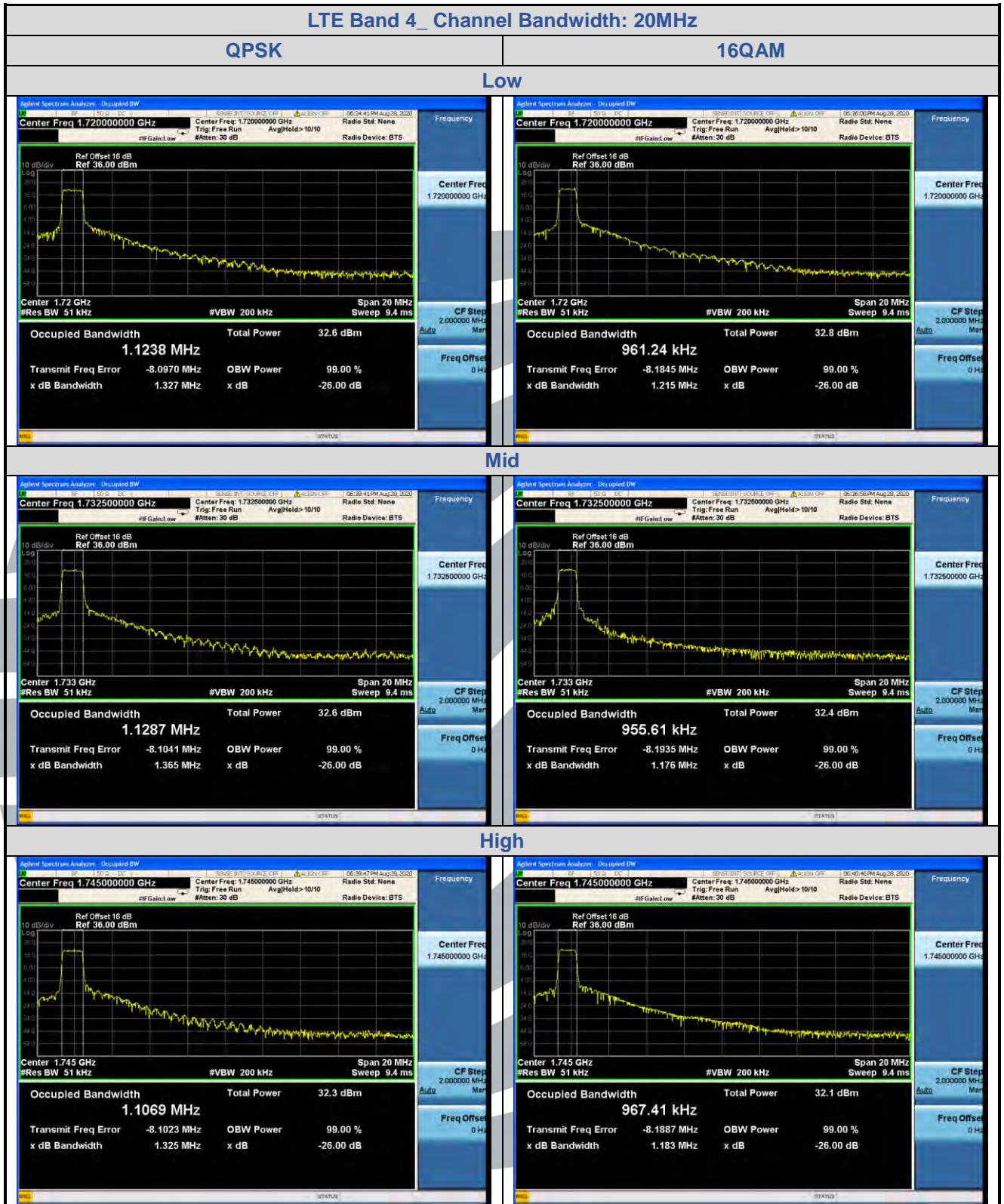
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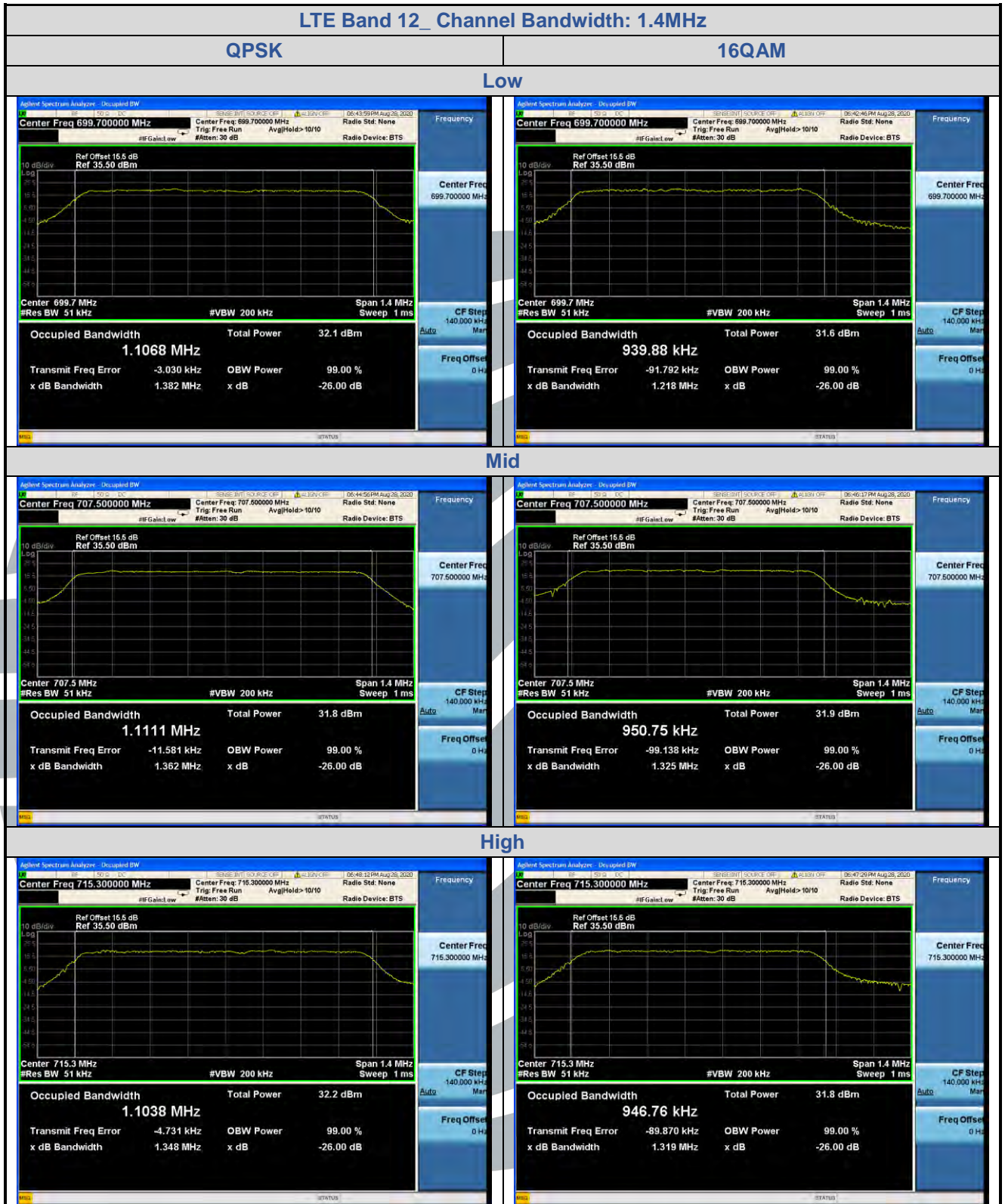
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5.5.3 LTE Band 12

LTE Band 12				
Bandwidth	Modulation	Channel	Bandwidth(MHz)	
			99% Power	-26dBc
1.4MHz	QPSK	Low	1.1068	1.382
		Mid	1.1111	1.362
		High	1.1038	1.348
	16QAM	Low	0.93988	1.218
		Mid	0.95075	1.325
		High	0.94676	1.319
3MHz	QPSK	Low	1.1133	1.402
		Mid	1.1194	1.413
		High	1.1113	1.356
	16QAM	Low	0.94662	1.219
		Mid	0.96884	1.436
		High	0.95599	1.323
5MHz	QPSK	Low	1.1095	1.364
		Mid	1.1255	1.362
		High	1.1080	1.413
	16QAM	Low	0.94921	1.225
		Mid	0.94733	1.194
		High	0.95499	1.172
10MHz	QPSK	Low	1.1145	1.347
		Mid	1.1221	1.393
		High	1.1164	1.378
	16QAM	Low	0.95979	1.231
		Mid	0.96140	1.309
		High	0.96048	1.156



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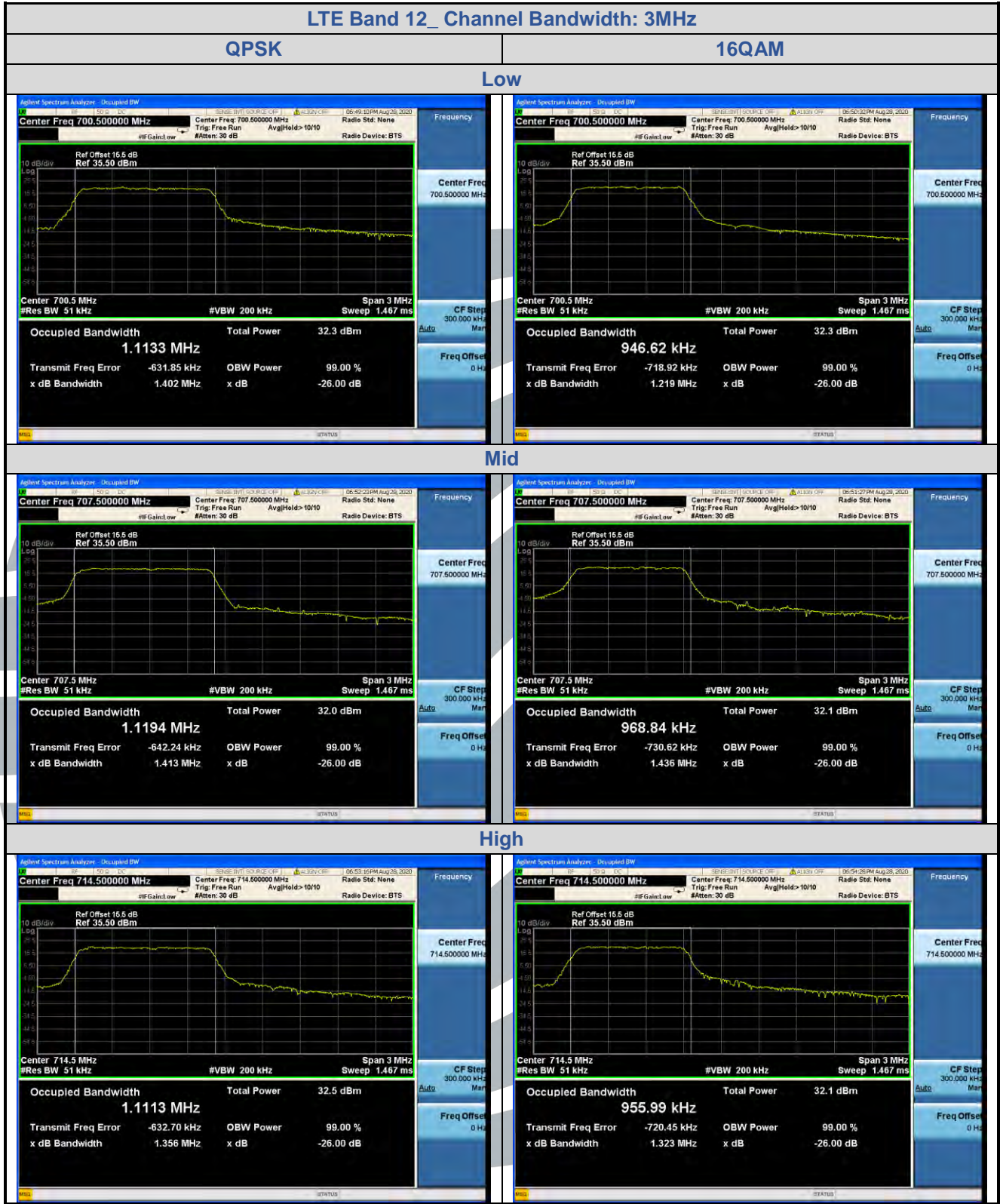
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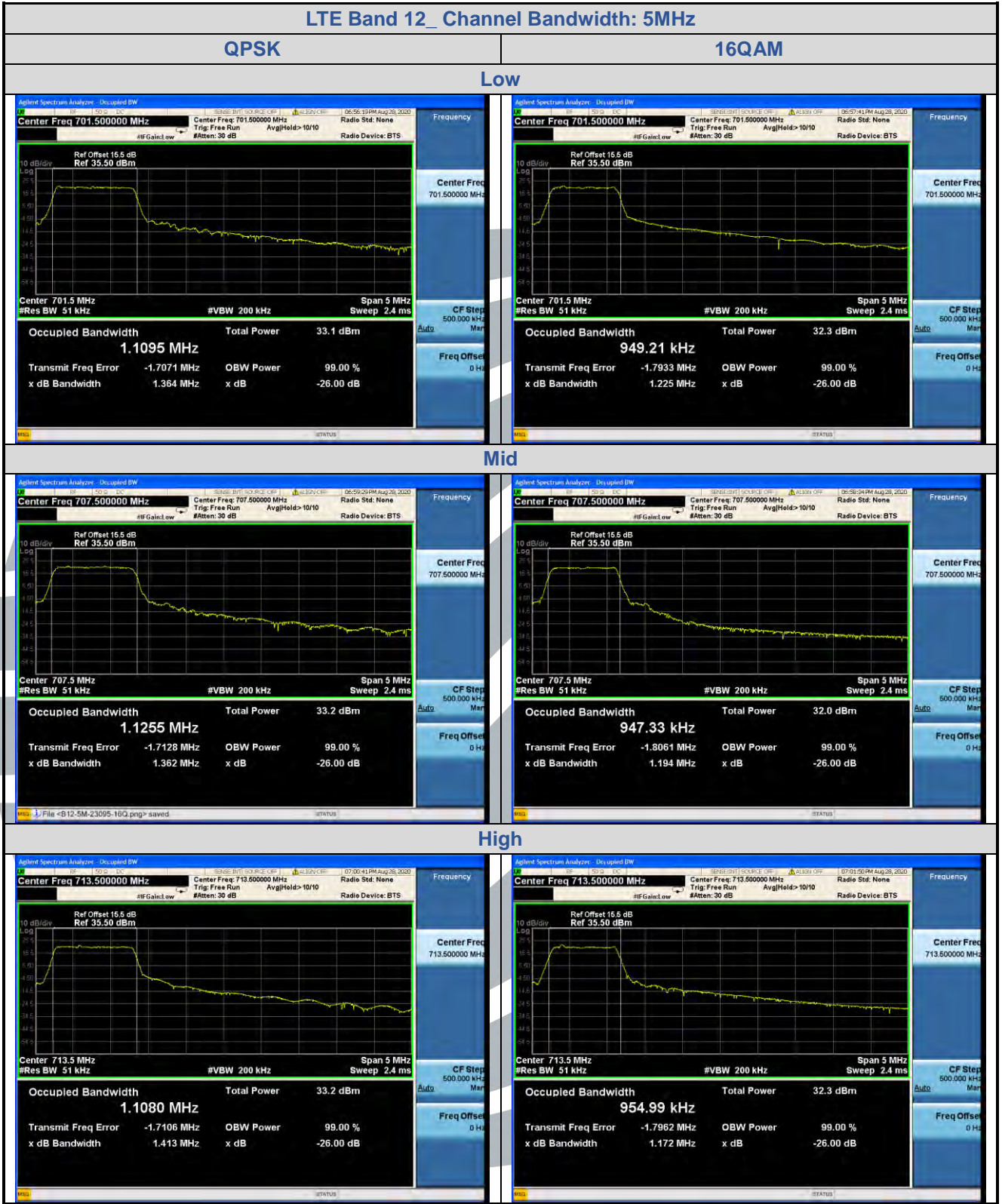
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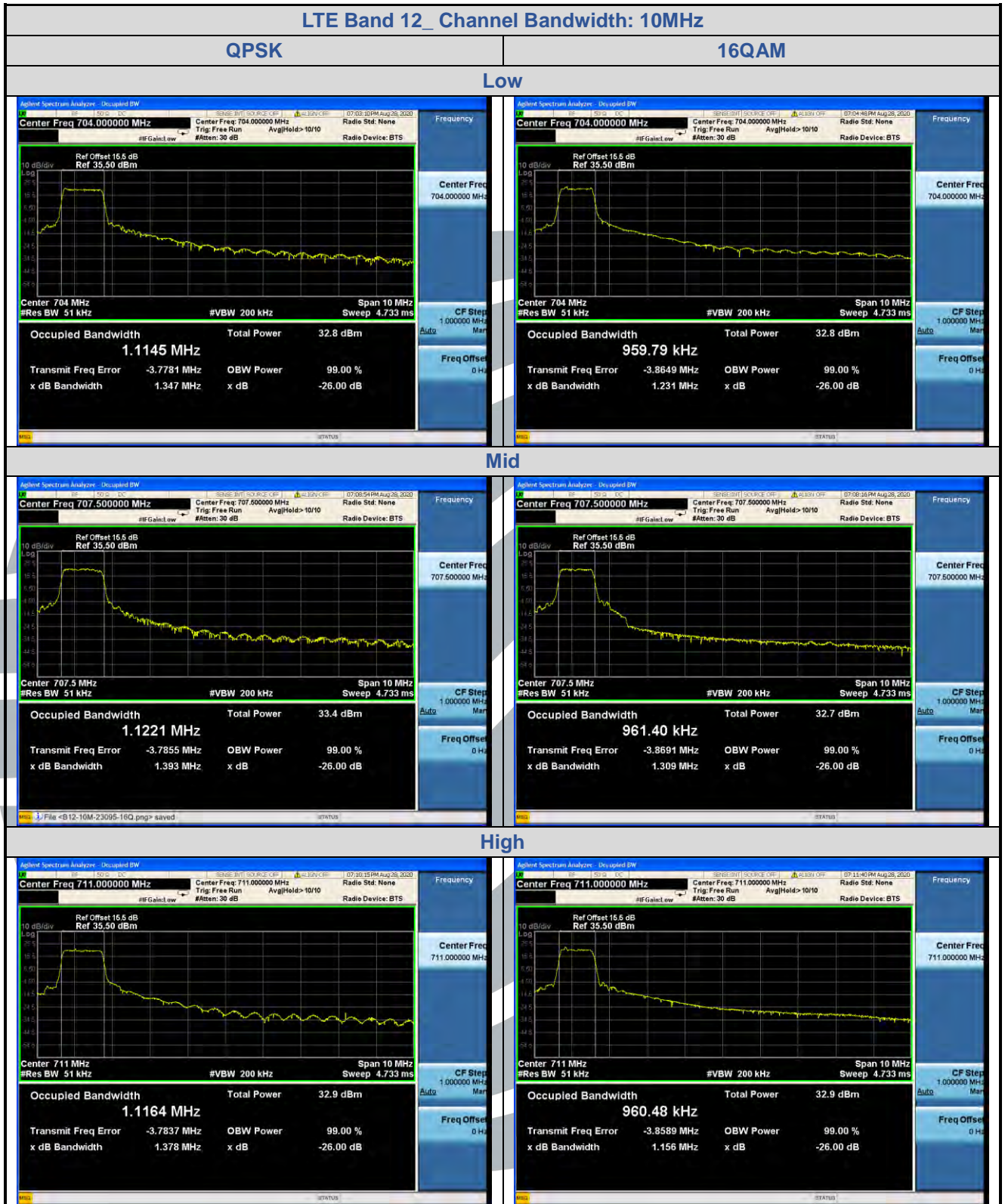
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5.6 BAND EDGE AT ANTENNA TERMINALS

Test Requirement: LTE Band 2: FCC 47 CFR Part 24.238(a)
LTE Band 4: FCC 47 CFR Part 27.53(h)(1)
LTE Band 12 : FCC 47 CFR Part 27.53(g)

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

FCC 47 CFR Part 24.238(a), 27.53(h)(1) :

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13 dBm.

FCC 47 CFR Part 27.53(g):

For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Test Procedure:

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer.

For each band edge measurement:

- 1) Set the spectrum analyzer span to include the block edge frequency.
- 2) Set a marker to point the corresponding band edge frequency in each test case.
- 3) Set display line at -13 dBm
- 4) Set resolution bandwidth to at least 1% of emission bandwidth.
- 5) Set spectrum analyzer with RMS detector.
- 6) Record the max trace plot into the test report

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

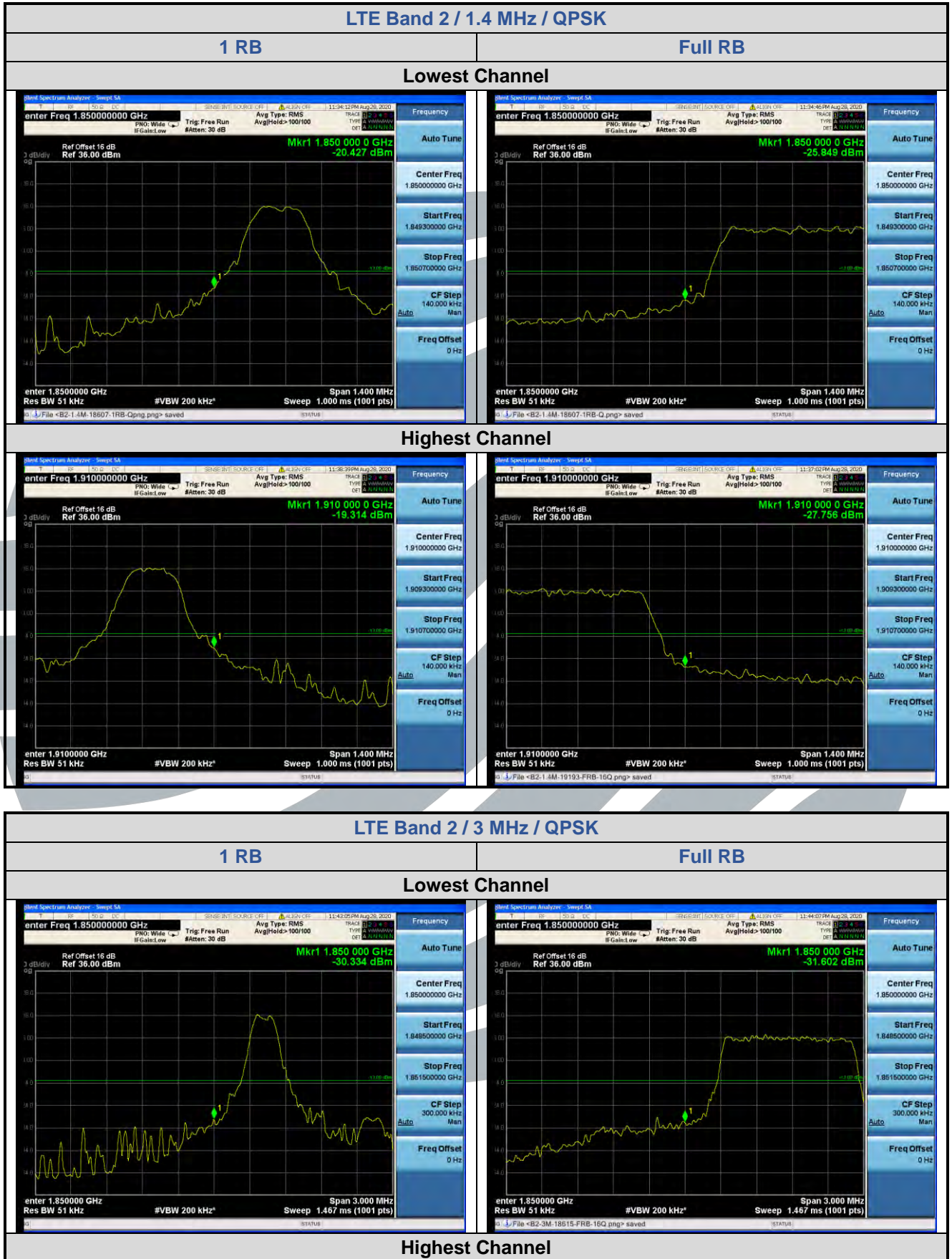
Test Setup: Refer to section 4.2.2 for details.

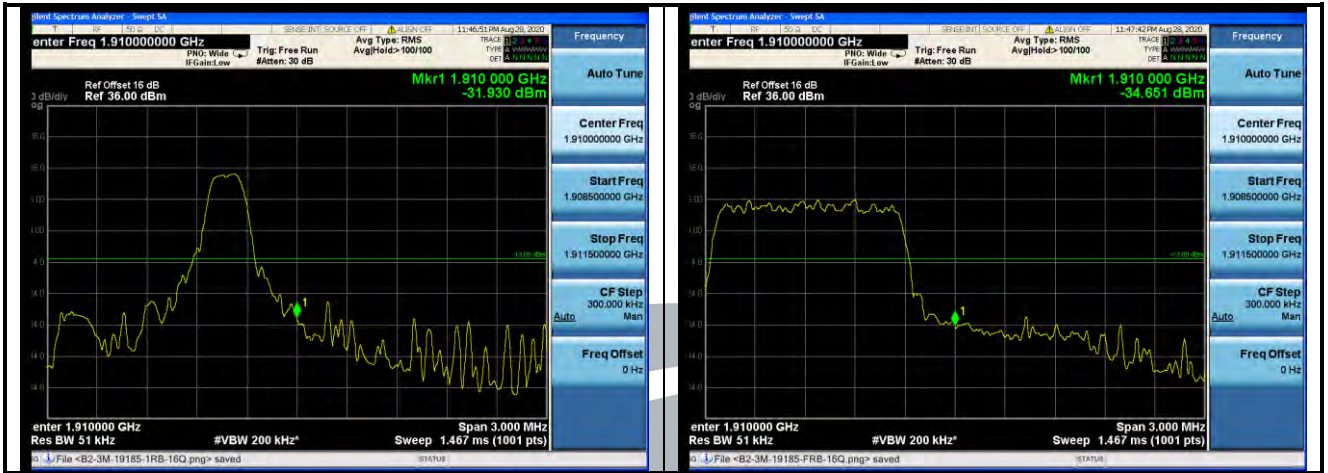
Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

5.6.1 LTE Band 2



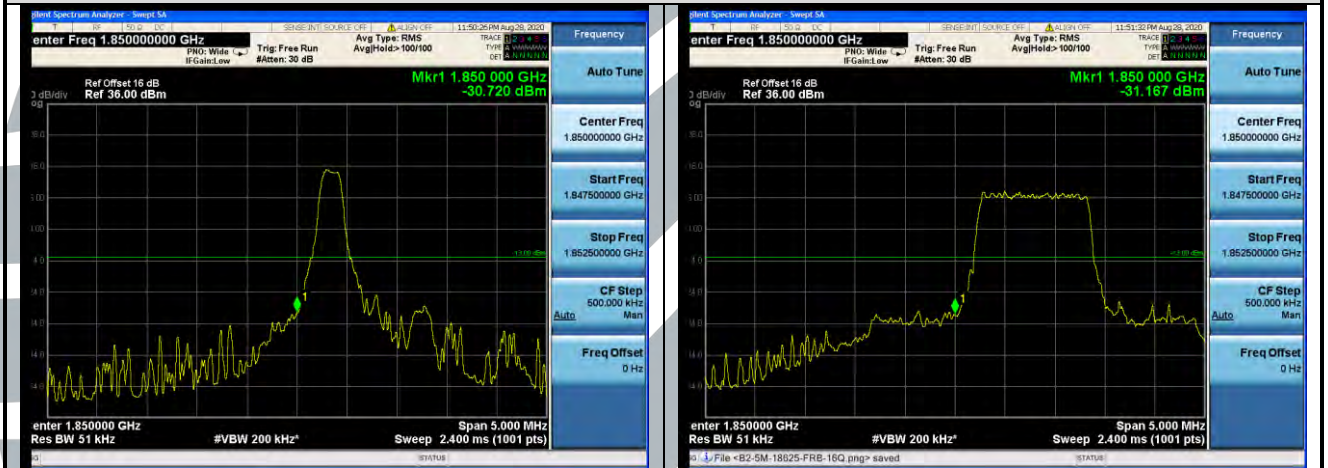


LTE Band 2 / 5 MHz / QPSK

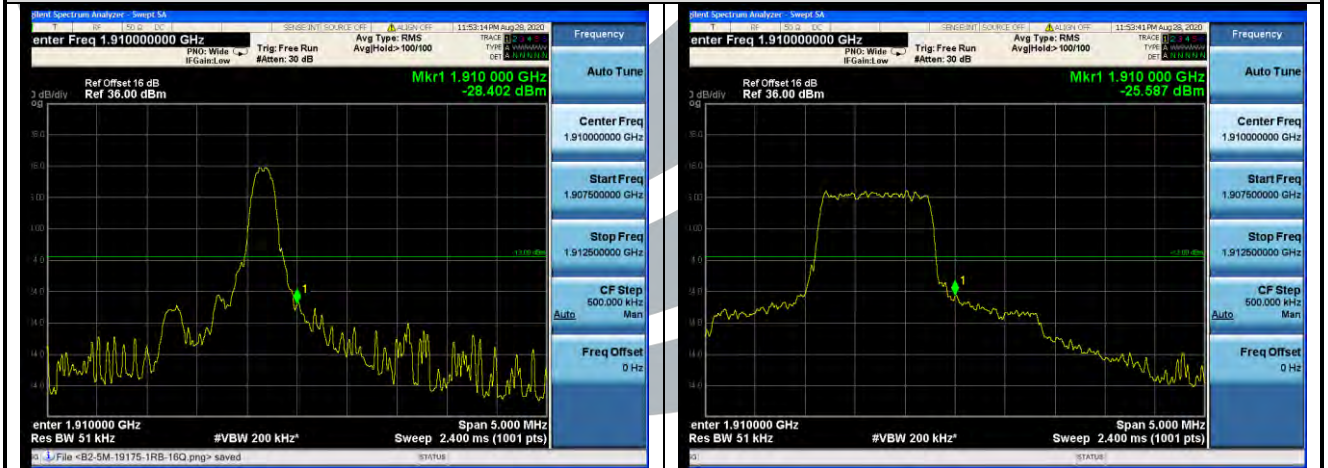
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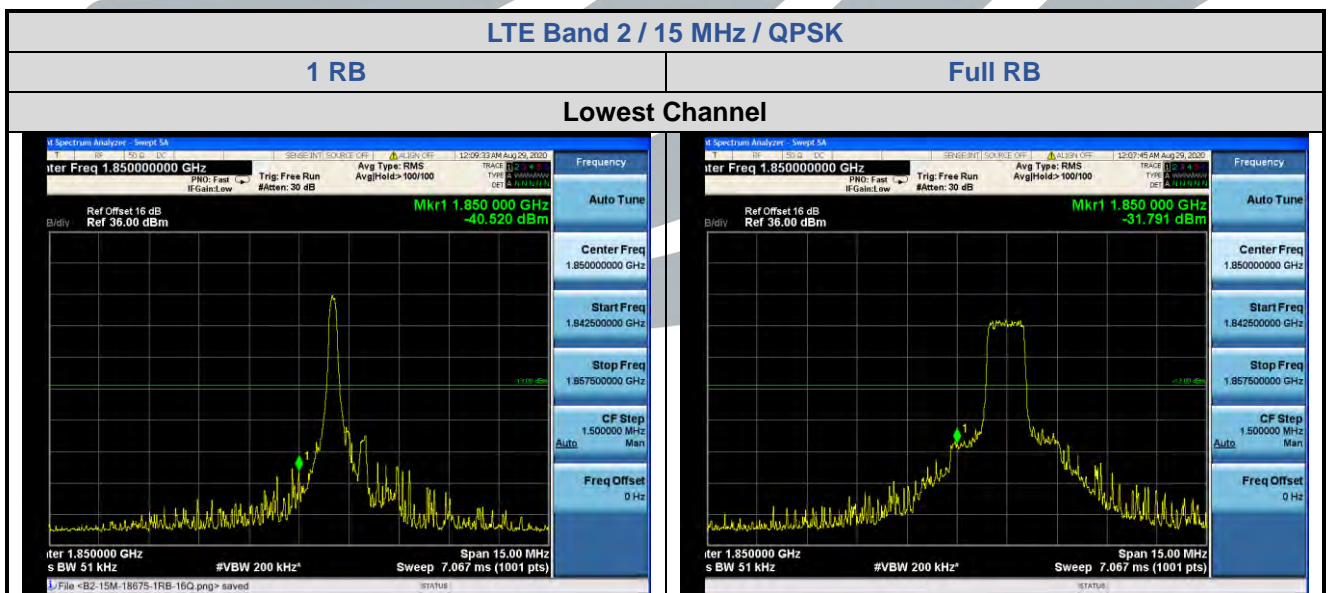
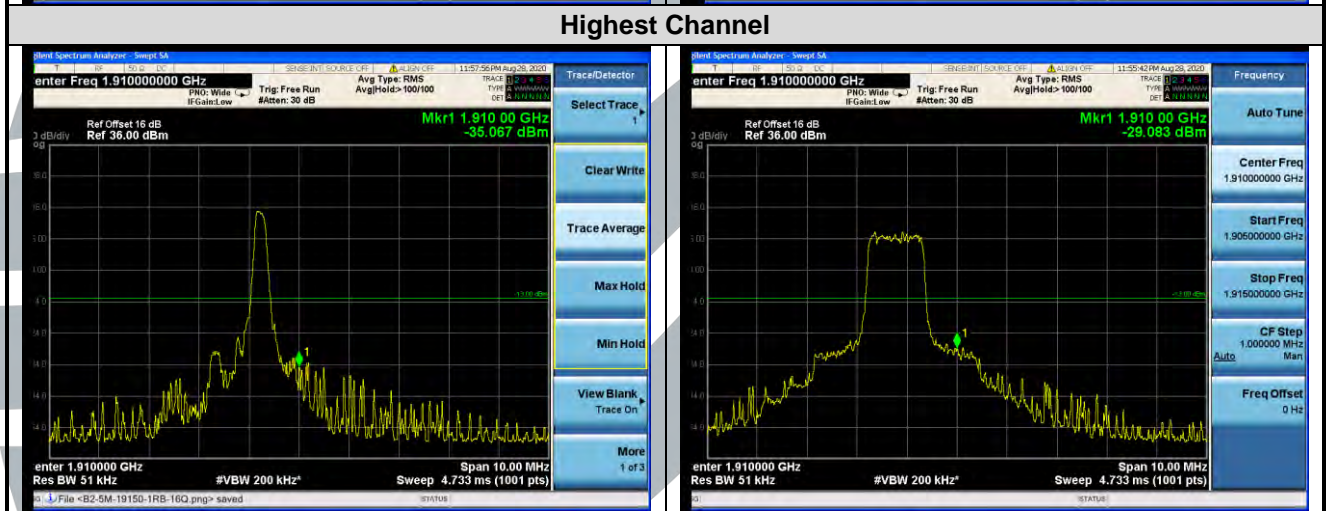
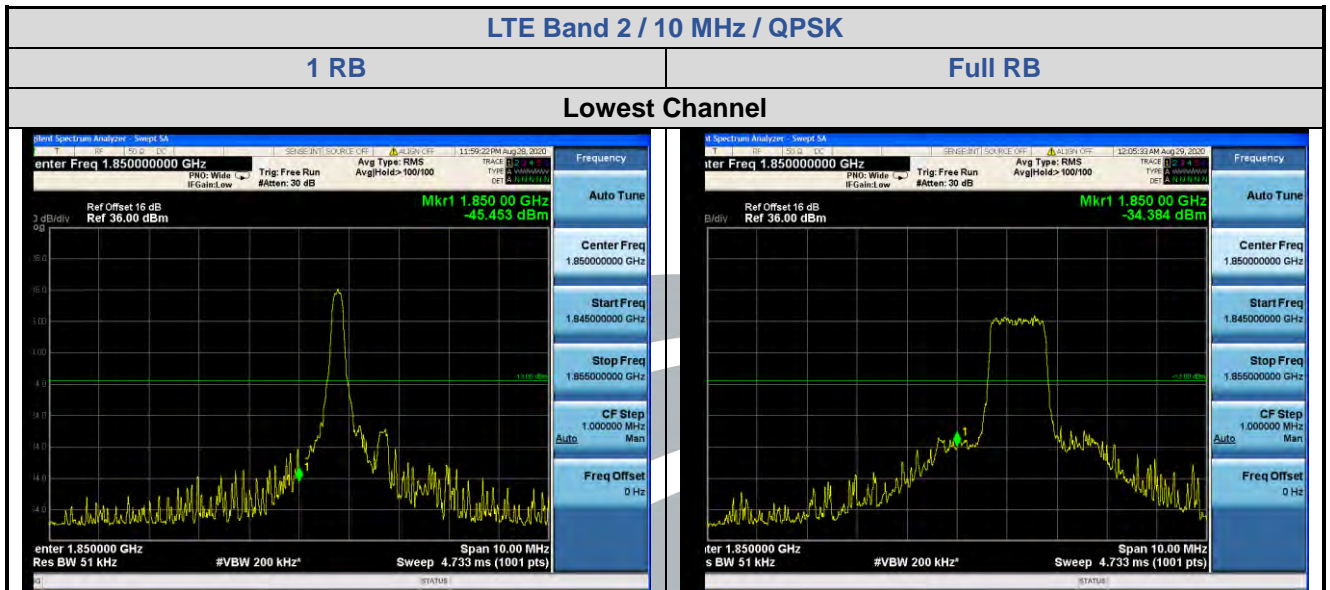
Full RB

Lowest Channel



Highest Channel





Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China

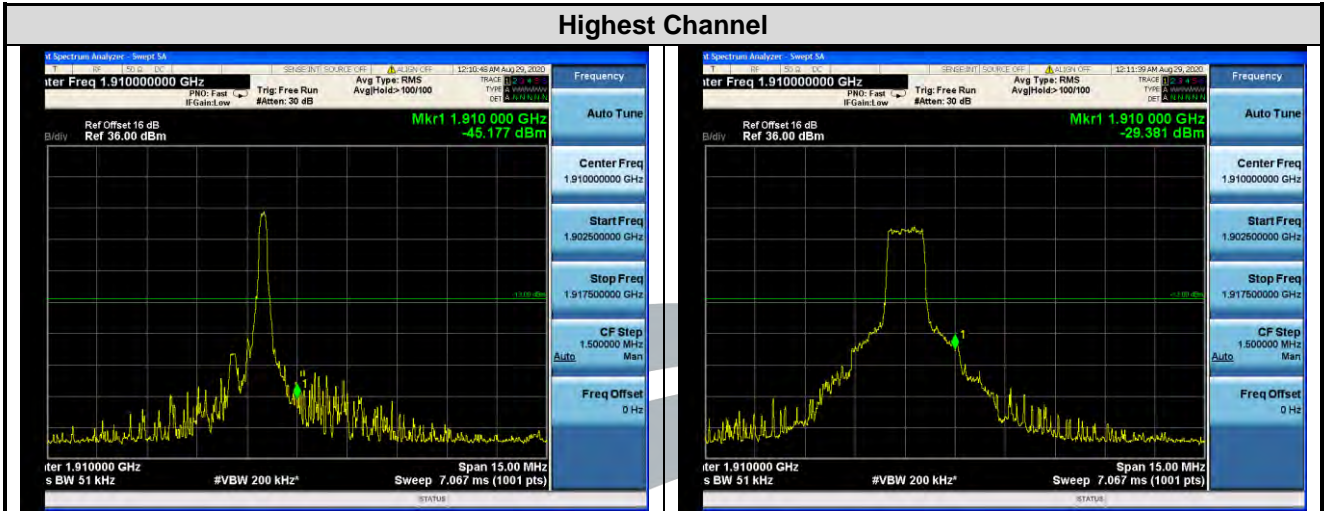
Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

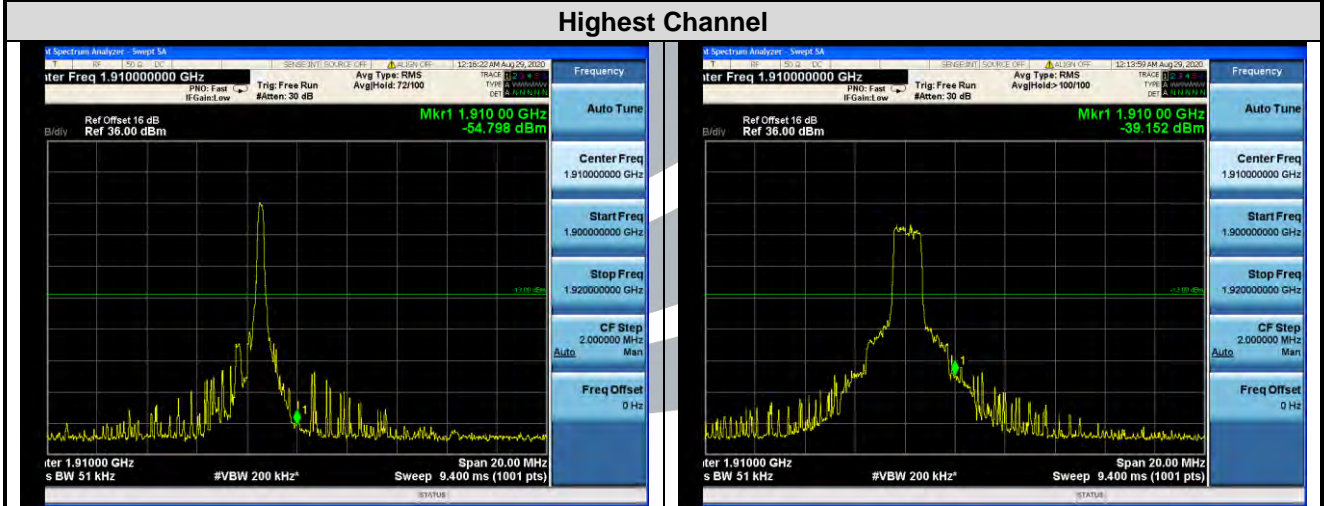
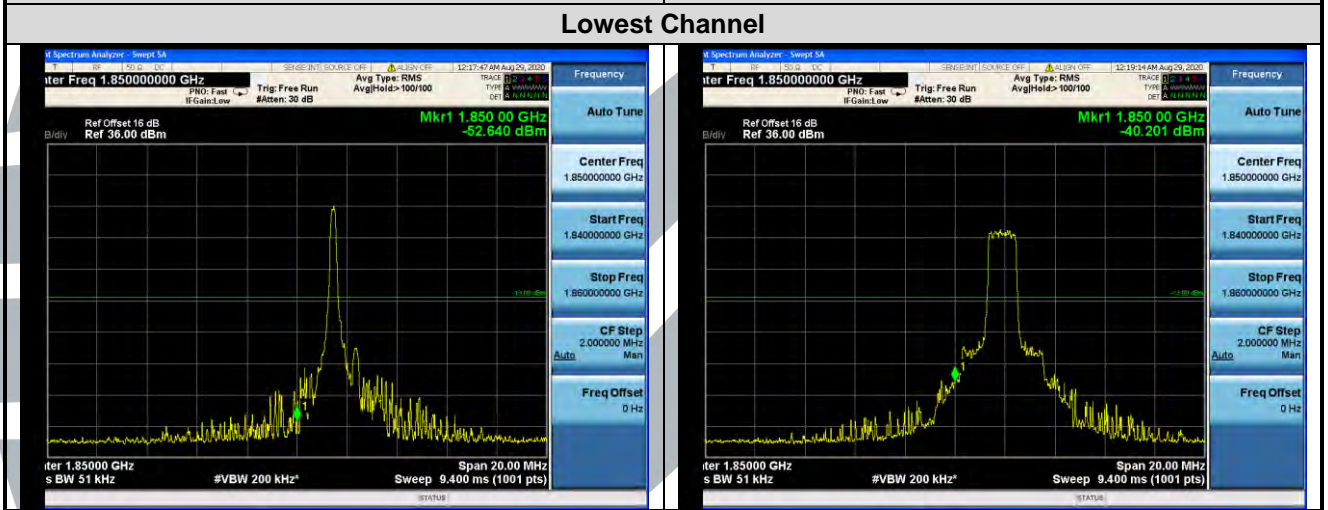
[Http://www.uttlab.com](http://www.uttlab.com)

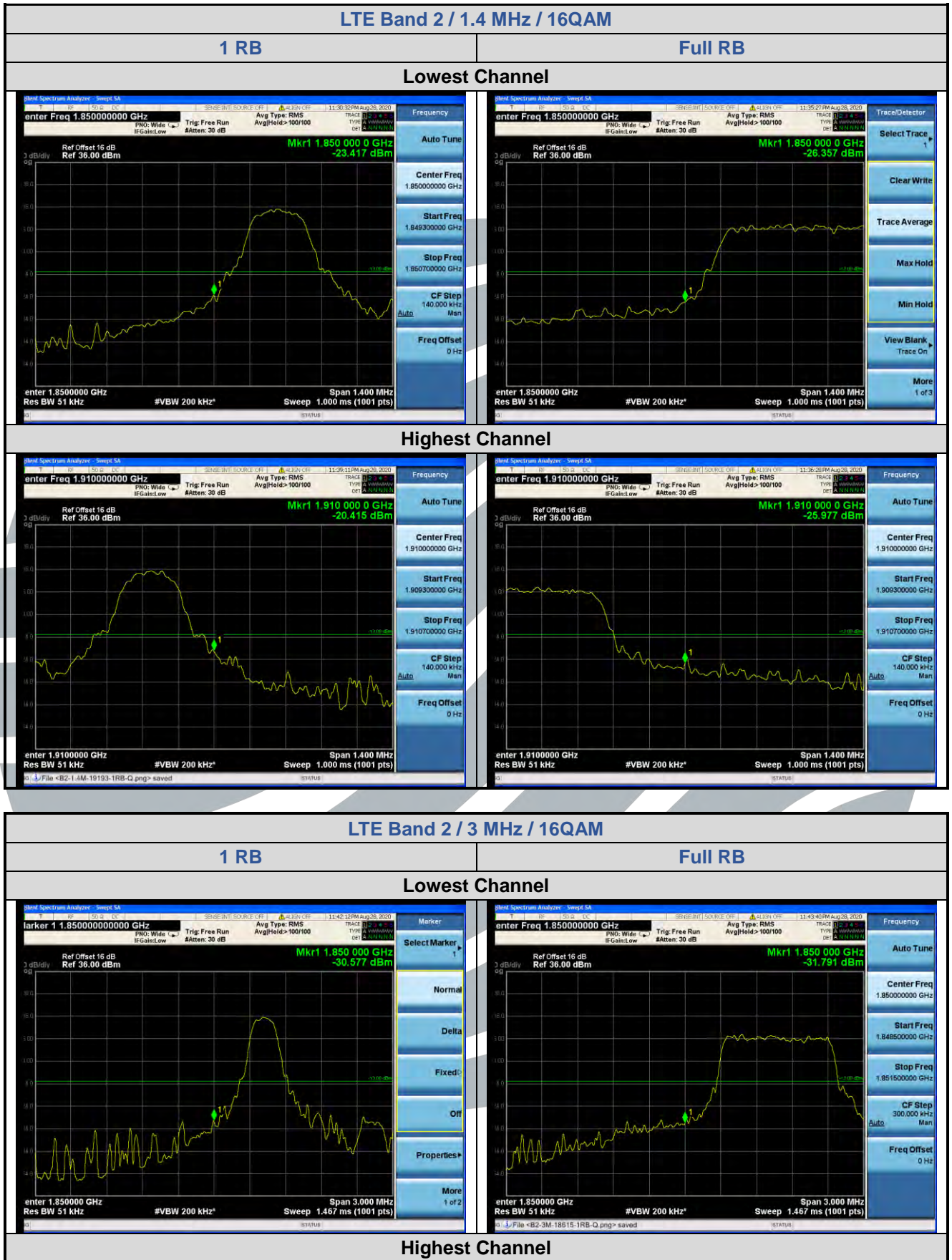
UTTR-RF-RSS4G-V1.1

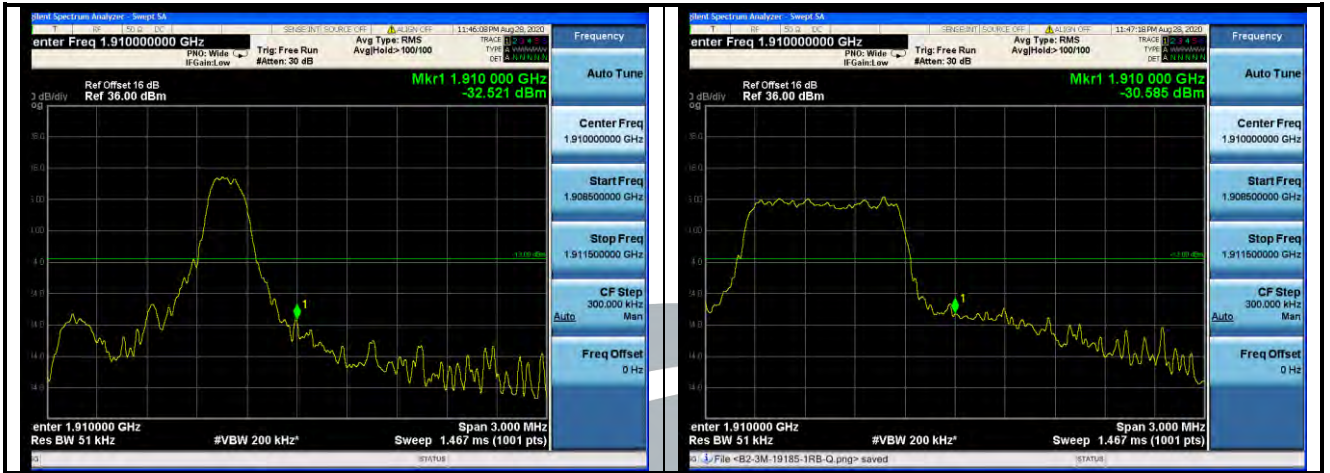


LTE Band 2 / 20 MHz / QPSK

1 RB
Full RB





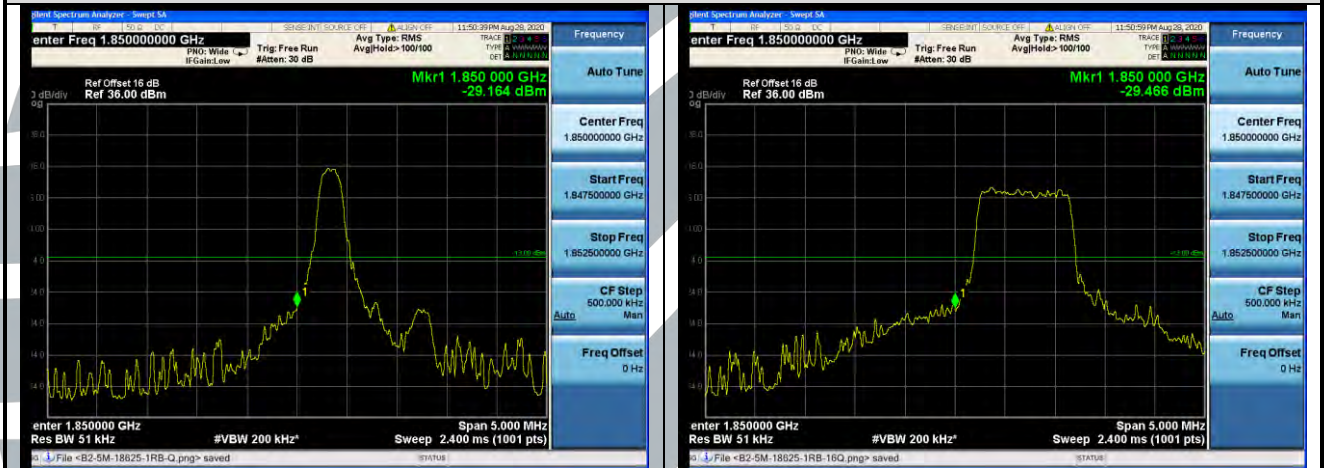


LTE Band 2 / 5 MHz / 16QAM

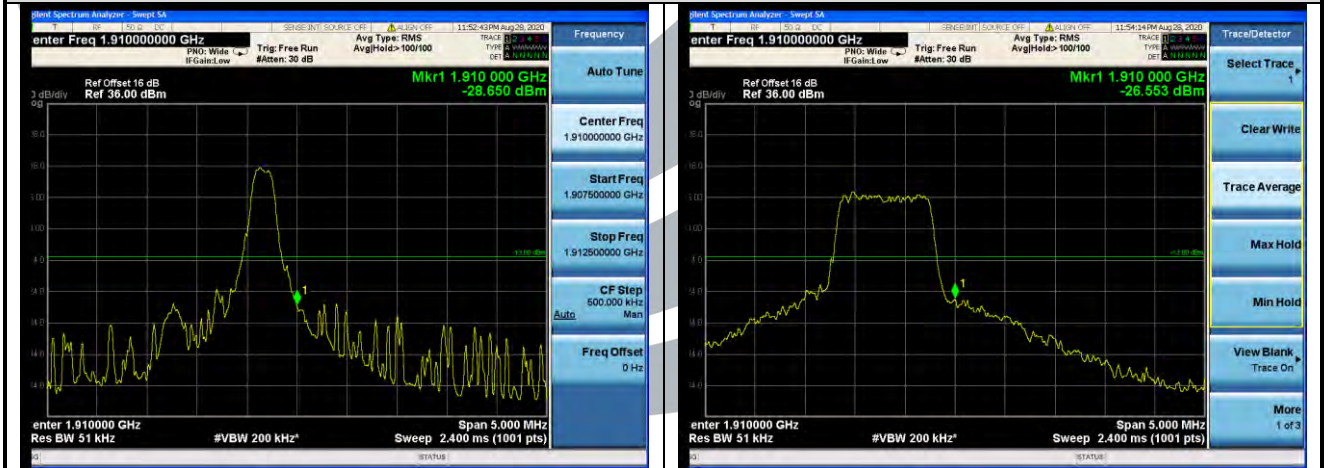
1 RB

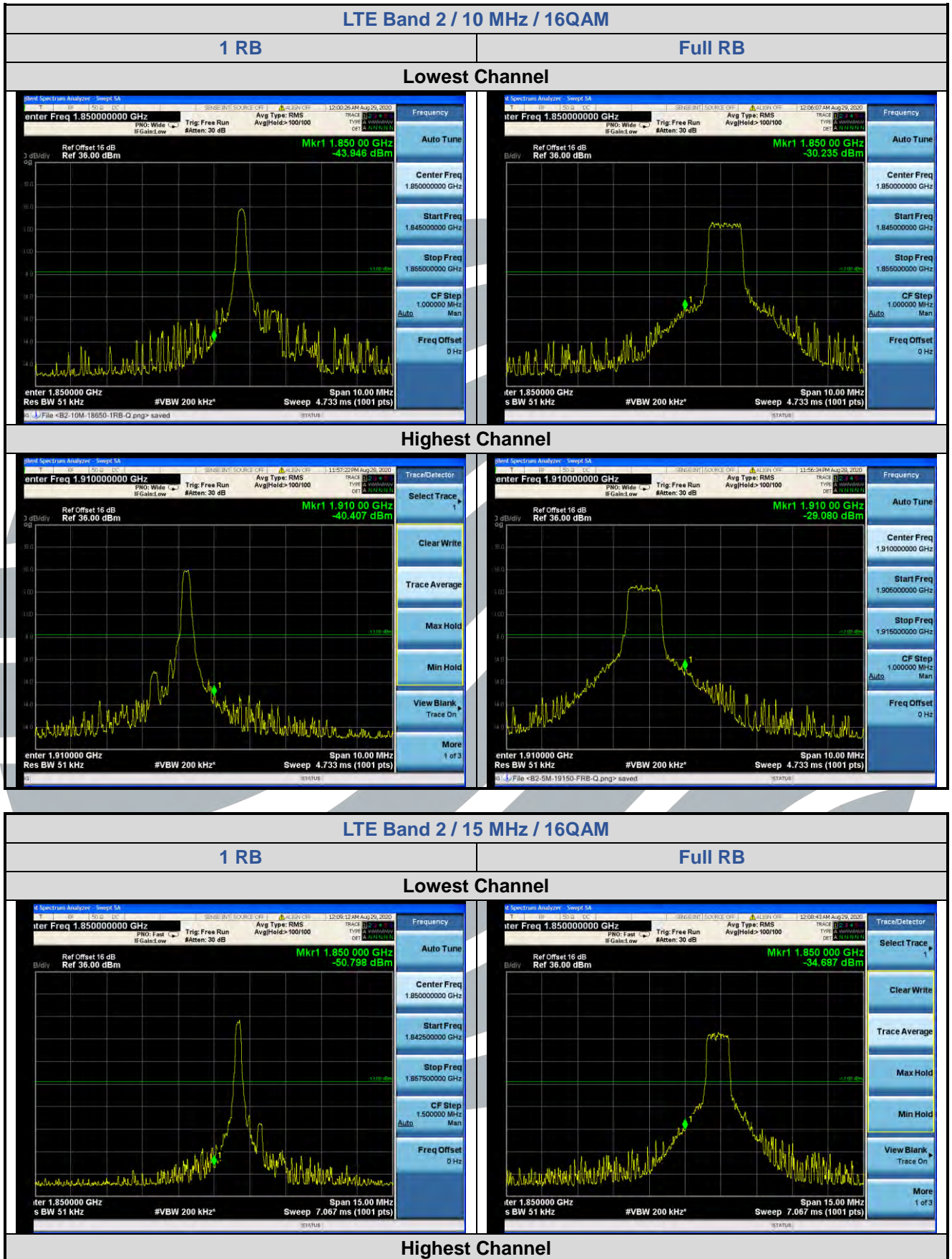
Full RB

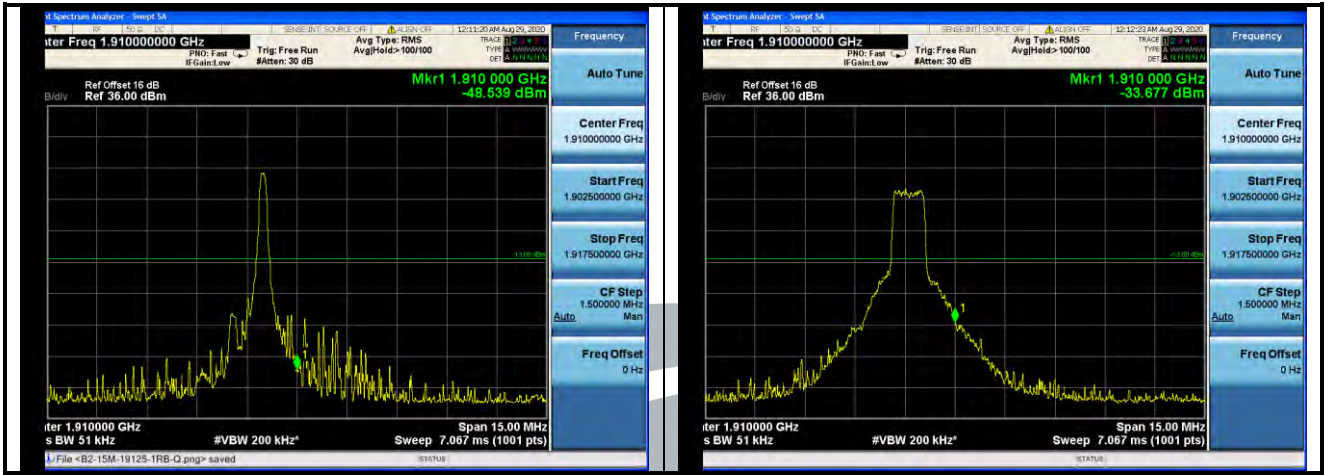
Lowest Channel



Highest Channel





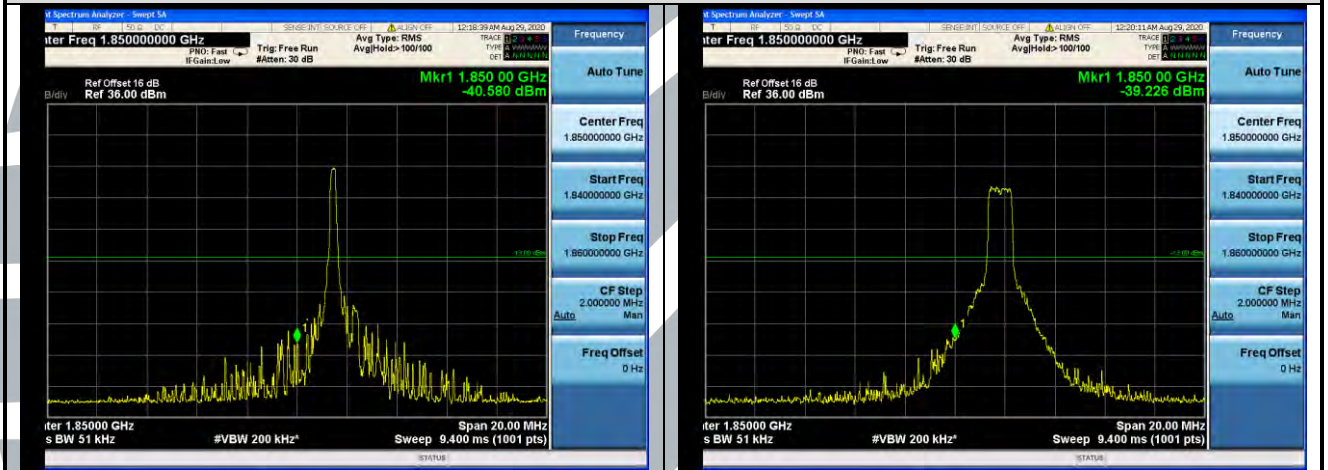


LTE Band 2 / 20 MHz / 16QAM

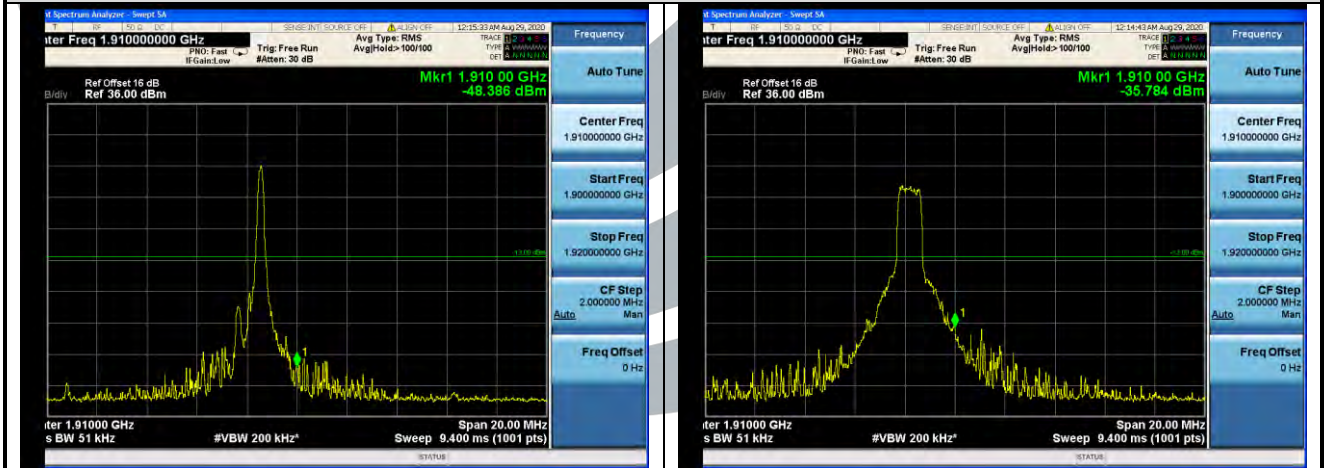
1 RB

Full RB

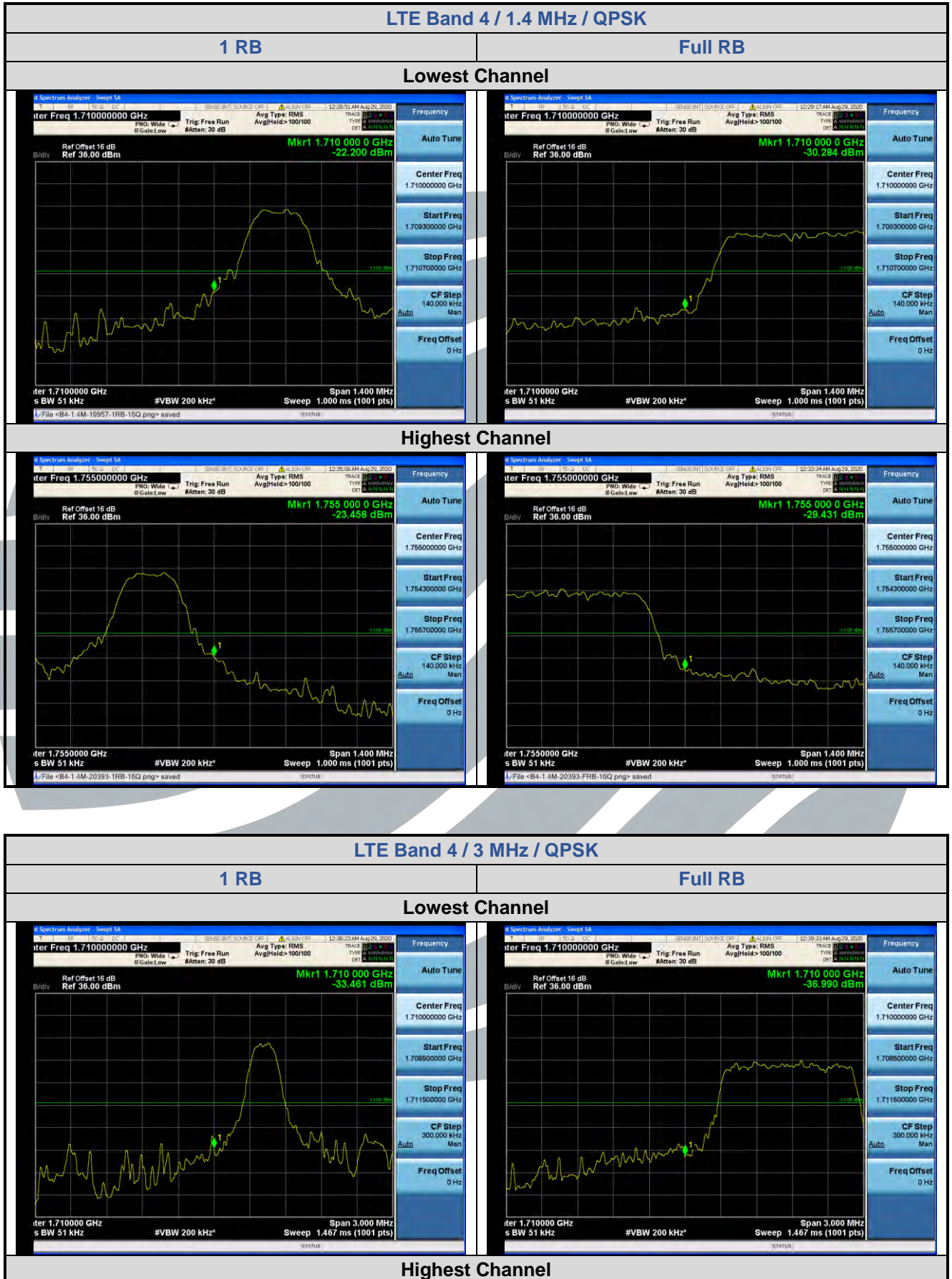
Lowest Channel



Highest Channel



5.6.2 LTE Band 4



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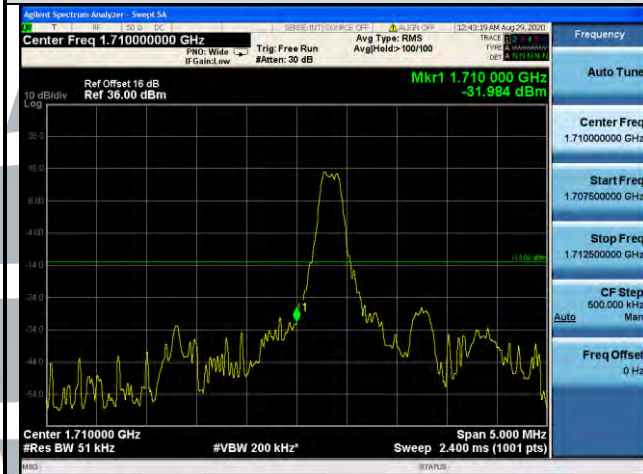


LTE Band 4 / 5 MHz / QPSK

1 RB

Full RB

Lowest Channel



Highest Channel

