

FCC TEST REPORT

Product Name: Smart Phone
Trade Mark: N/A
Model No.: Helium Pro
Add. Model No.: N/A
Report Number: 2209171673RFM-1
Test Standards: FCC 47 CFR Part 22
FCC 47 CFR Part 24
FCC 47 CFR Part 27
FCC ID: 2AUOUHP
Test Result: PASS
Date of Issue: November 11, 2022

Prepared for:

Rhino Mobility LLC
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Version

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Rhino Mobility LLC
Address of Applicant:	8 The Green, Suite A, Dover, Delaware,19901, USA
Manufacturer:	Rhino Mobility LLC
Address of Manufacturer:	8 The Green, Suite A, Dover, Delaware,19901, USA

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Smart Phone		
Model No.:	Helium Pro		
Add. Model No.:	N/A		
Trade Mark:	N/A		
DUT Stage:	Identical Prototype		
EUT Supports Function: (Provided by the customer)	GSM Bands:	GSM850/1900	
	UTRA Bands:	Band II/ Band IV/ Band V	
	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 5/ Band 12/ Band 17/ Band 29/ Band 30/ Band 66	
	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
		Bluetooth 5.0	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n/ac
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n/ac
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n/ac
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n/ac
RNSS Bands:	1559 MHz to 1610 MHz	GPS	
BSR:	VHF Band II	FM	
Software Version:	Helium Pro_20221022 (Provided by the customer)		
Hardware Version:	G2251E-MA-V1.1 (Provided by the customer)		
Sample Received Date:	September 17, 2022		
Sample Tested Date:	September 17, 2022 to October 19, 2022		
Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.			

1.2.2 Description of Accessories

Adapter	
Model No.:	HJ-0501000E1-US
Input:	100-240 V~50/60 Hz 0.2 A Max
Output:	5.0 V $\equiv$ 1.0 A
AC Cable:	N/A
DC Cable:	N/A

Battery	
Model No.:	THP
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.8 Vdc
Limited Charge Voltage:	4.35 Vdc
Rated Capacity:	2500 mAh

Cable	
Description:	USB Type-C Plug Cable
Cable Type:	Shielded without ferrite
Length:	1 Meter

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	Single Carrier: LTE Band 2/4/5/12/17/30/66	
Type of Modulation:	QPSK, 16QAM, 64QAM	
Antenna Type: (Provided by the customer)	PIFA Antenna	
Antenna Gain: (Provided by the customer)	LTE Band 2:	0.75 dBi
	LTE Band 4:	0.55 dBi
	LTE Band 5:	0.62 dBi
	LTE Band 12:	0.52 dBi
	LTE Band 17:	0.44 dBi
	LTE Band 30:	0.41 dBi
	LTE Band 66:	0.52 dBi
Sample No.:	Radiated: S20220917543-ZJA04/8	
	Conducted: S20220917543-ZJA05/8, S20220917543-ZJA06/8	
Normal Test Voltage:	3.8 Vdc	
Extreme Test Voltage:	3.5 to 4.35Vdc	
Extreme Test Temperature:	-30 °C to +50 °C	

Summary of Results:								
Bands	BW	Modulation	Frequency Range	Max RF Output Power (dBm)		EIRP	99% BW	Emission Designator
	(MHz)		(MHz)	Conducted (Average)	ERP/EIRP (Average)	(W)	(MHz)	
2	1.4	QPSK	1850.7-1909.3	22.01	22.76	0.1888	1.1055	1M11G7D
		16QAM		20.60	21.35	0.1365	1.1008	1M10W7D
		64QAM		19.80	20.55	0.1135	1.0975	1M10W7D
	3	QPSK	1851.5-1908.5	21.83	22.58	0.1811	2.7036	2M70G7D
		16QAM		20.81	21.56	0.1432	2.6943	2M69W7D
		64QAM		20.09	20.84	0.1213	2.6932	2M69W7D
	5	QPSK	1852.5-1907.5	21.74	22.49	0.1774	4.5098	4M51G7D
		16QAM		20.68	21.43	0.1390	4.5138	4M51W7D
		64QAM		19.94	20.69	0.1172	4.5212	4M52W7D
	10	QPSK	1855.0-1905.0	22.03	22.78	0.1897	8.9991	9M00G7D
		16QAM		21.53	22.28	0.1690	8.9976	9M00W7D
		64QAM		20.80	21.55	0.1429	8.9942	8M99W7D
	15	QPSK	1857.5-1902.5	21.82	22.57	0.1807	13.490	13M5G7D
		16QAM		21.37	22.12	0.1629	13.505	13M5W7D
		64QAM		20.66	21.41	0.1384	13.492	13M5W7D
	20	QPSK	1860.0-1900.0	22.11	22.86	0.1932	17.997	18M0G7D
		16QAM		21.31	22.06	0.1607	18.006	18M0W7D
		64QAM		20.59	21.34	0.1361	18.024	18M0W7D
4	1.4	QPSK	1710.7-1754.3	21.32	21.87	0.1538	1.1046	1M10G7D
		16QAM		20.35	20.90	0.1230	1.0997	1M10W7D
		64QAM		19.64	20.19	0.1045	1.0994	1M10W7D
	3	QPSK	1711.5-1753.5	21.19	21.74	0.1493	2.7037	2M70G7D
		16QAM		20.58	21.13	0.1297	2.6949	2M69W7D
		64QAM		19.85	20.40	0.1096	2.6926	2M69W7D
	5	QPSK	1712.5-1752.5	21.13	21.68	0.1472	4.5191	4M52G7D
		16QAM		19.99	20.54	0.1132	4.5160	4M52W7D
		64QAM		19.25	19.80	0.0955	4.5158	4M52W7D
	10	QPSK	1715-1750	21.38	21.93	0.1560	8.9891	8M99G7D
		16QAM		20.66	21.21	0.1321	8.9955	9M00W7D
		64QAM		19.87	20.42	0.1102	8.9925	8M99W7D
	15	QPSK	1717.5-1747.5	20.64	21.19	0.1315	13.475	13M5G7D
		16QAM		20.20	20.75	0.1189	13.469	13M5W7D
		64QAM		19.42	19.97	0.0993	13.488	13M5W7D
	20	QPSK	1720-1745	20.73	21.28	0.1343	17.965	18M0G7D
		16QAM		20.27	20.82	0.1208	18.007	18M0W7D
		64QAM		19.50	20.05	0.1012	18.014	18M0W7D

Bands	BW	Modulation	Frequency Range	Max RF Output Power (dBm)		EIRP (W)	99% BW (MHz)	Emission Designator
	(MHz)		(MHz)	Conducted (Average)	ERP/EIRP (Average)			
5	1.4	QPSK	824.7-848.3	21.93	20.40	0.1096	1.1051	1M11G7D
		16QAM		21.02	19.49	0.0889	1.0978	1M10W7D
		64QAM		20.24	18.71	0.0743	1.1027	1M10W7D
	3	QPSK	825.5-847.5	21.85	20.32	0.1076	2.7032	2M70G7D
		16QAM		21.32	19.79	0.0953	2.6956	2M70W7D
		64QAM		20.55	19.02	0.0798	2.6930	2M69W7D
	5	QPSK	826.5-846.5	21.68	20.15	0.1035	4.5176	4M52G7D
		16QAM		20.72	19.19	0.0830	4.5156	4M52W7D
		64QAM		19.93	18.40	0.0692	4.5192	4M52W7D
	10	QPSK	829-844	22.04	20.51	0.1125	8.9994	9M00G7D
		16QAM		21.33	19.80	0.0955	8.9964	9M00W7D
		64QAM		20.55	19.02	0.0798	8.9907	8M99W7D
12	1.4	QPSK	699.7-715.3	22.24	20.61	0.1151	1.1015	1M10G7D
		16QAM		21.31	19.68	0.0929	1.1009	1M10W7D
		64QAM		20.59	18.96	0.0787	1.1006	1M10W7D
	3	QPSK	700.5-714.5	22.08	20.45	0.1109	2.7011	2M70G7D
		16QAM		21.60	19.97	0.0993	2.6952	2M70W7D
		64QAM		20.89	19.26	0.0843	2.6985	2M70W7D
	5	QPSK	701.5-713.5	22.01	20.38	0.1091	4.5472	4M55G7D
		16QAM		20.90	19.27	0.0845	4.5537	4M55W7D
		64QAM		20.16	18.53	0.0713	4.5469	4M55W7D
	10	QPSK	704-711	22.27	20.64	0.1159	9.0408	9M04G7D
		16QAM		21.71	20.08	0.1019	9.0125	9M01W7D
		64QAM		20.95	19.32	0.0855	9.0175	9M02W7D
17	5	QPSK	706.5-713.5	22.08	20.37	0.1089	4.5323	4M53G7D
		16QAM		20.97	19.26	0.0843	4.5473	4M55W7D
		64QAM		20.26	18.55	0.0716	4.5371	4M54W7D
	10	QPSK	709-711	22.29	20.58	0.1143	9.0252	9M03G7D
		16QAM		21.85	20.14	0.1033	8.9947	8M99W7D
		64QAM		21.12	19.41	0.0873	9.0090	9M01W7D

Bands	BW	Modulation	Frequency Range	Max RF Output Power (dBm)		ERP / EIRP	99% BW	Emission Designator
	(MHz)			Conducted (Average)	ERP/EIRP (Average)			
30	5	QPSK	2307.5-2312.5	21.43	21.84	0.1528	4.5120	4M51G7D
		16QAM		20.26	20.67	0.1167	4.5198	4M52W7D
		64QAM		19.53	19.94	0.0986	4.5190	4M52W7D
	10	QPSK	2310-2310	21.09	21.50	0.1413	8.9810	9M98G7D
		16QAM		19.95	20.36	0.1086	8.9717	9M97W7D
		64QAM		19.18	19.59	0.0910	8.9775	9M98W7D
66	1.4	QPSK	1710.7-1779.3	21.43	21.95	0.1567	1.1061	1M11G7D
		16QAM		20.83	21.35	0.1365	1.1008	1M10W7D
		64QAM		20.07	20.59	0.1146	1.1006	1M10W7D
	3	QPSK	1711.5-1778.5	21.32	21.84	0.1528	2.6951	2M70G7D
		16QAM		20.71	21.23	0.1327	2.6884	2M69W7D
		64QAM		19.99	20.51	0.1125	2.6862	2M69W7D
	5	QPSK	1712.5-1777.5	21.36	21.88	0.1542	5.5427	5M54G7D
		16QAM		20.23	20.75	0.1189	4.5498	4M55W7D
		64QAM		19.48	20.00	0.1000	4.5484	4M55W7D
	10	QPSK	1715-1775	21.44	21.96	0.1570	9.0226	9M20G7D
		16QAM		20.83	21.35	0.1365	9.0156	9M20W7D
		64QAM		20.09	20.61	0.1151	9.0119	9M10W7D
	15	QPSK	1717.5-1772.5	21.36	21.88	0.1542	13.947	13M9G7D
		16QAM		20.76	21.28	0.1343	13.512	13M5W7D
		64QAM		19.97	20.49	0.1119	13.508	13M5W7D
	20	QPSK	1720-1770	21.49	22.01	0.1589	18.008	18M0G7D
		16QAM		20.42	20.94	0.1242	17.995	18M0W7D
		64QAM		19.67	20.19	0.1045	18.004	18M0W7D

1.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
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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.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China, China 518109

Telephone: +86 (0) 755 2823 0888

Fax: +86 (0) 755 2823 0886

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.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

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 Output Power	±0.7 dB
2	99%±26dB Bandwidth	±1.86 %
3	Emission Mask	±2.7 dBm
4	Spurious emissions at antenna terminals	±2.7 dBm
5	Field strength of spurious radiation	30 MHz-1 GHz: ±4.9 dB 1 GHz-18 GHz: ±4.8 dB 18 GHz-40 GHz: ±5.1 dB
6	Frequency stability	±6.5 × 10 ⁻⁸
7	Humidity	±3.9 %
8	Temperature	±0.62 °C
9	DC Voltages	±0.68 %

2. TEST SUMMARY

FCC 47 CFR Part 24 Test Cases (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 & Band 66)			
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 22 Test Cases (Band 5)			
Test Item	Test Requirement	Test Method	Result
Effective Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 22.913(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 22.913(a)	KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(a)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 22.917(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 22.917(a)(b)	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 22.355	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS

FCC 47 CFR Part 27 Test Cases (LTE Band 12& 17)			
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

FCC 47 CFR Part 27 Test Cases (LTE Band 30)			
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(a)(3)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(a)(3)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Peak-to-average ratio	FCC 47 CFR Part 27.50(a)(1)(i)(B)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) FCC 47 CFR Part 27.50(a)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(a)(4)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(a) (4)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(a) (4)	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54	ANSI/TIA-603-E-2016 & KDB 971168 D01v03r01	PASS

Disclaimer and Explanations:

The declared of product specification and data (e.g. antenna gain, RF specification, etc) for EUT presented in the report are provided by the customer, and the customer takes all the responsibilities for the accuracy of product specification.

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	Euroshiedpn-CT001270-1317	22-Jan-2021	21-Jan-2024
☒	Receiver	R&S	ESIB26	100114	5-Nov-2021	4-Nov-2022
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	11-Nov-2021	10-Nov-2023
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	11-Nov-2021	10-Nov-2023
☒	Preamplifier	HP	8447F	2805A02960	5-Nov-2021	4-Nov-2022
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	17-Apr-2022	16-Apr-2024
☒	Pre-amplifier	ETS-LINDGREN	00118385	00201874	6-Nov-2021	5-Nov-2022
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	17-Apr-2022	16-Apr-2024
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	14-Nov-2020	13-Nov-2022
☒	Pre-amplifier	ETS-LINDGREN	00118384	00202652	17-Nov-2020	16-Nov-2022
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

RF Conducted Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date	Cal. Due date
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	15-Apr-2022	14-Apr-2023
☒	EXA Spectrum Analyzer	KEYSIGHT	N9020A	MY51286807	5-Nov-2021	4-Nov-2022
☒	Spectrum analyzer	R&S	FSV40-N	101653	15-Apr-2022	14-Apr-2023
☒	DC Source	KIKUSUI	PWR400L	LK003024	20-Aug-2022	19-Aug-2023
☒	Temp & Humidity chamber	Votisch	VT4002	58566133290020	15-Apr-2022	14-Apr-2023
☒	Wideband Radio Communication Tester	R&S	CMW500	119583	15-Apr-2022	14-Apr-2023
☒	Wideband Radio Communication Tester	R&S	CMW500	120932	15-Apr-2022	14-Apr-2023

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

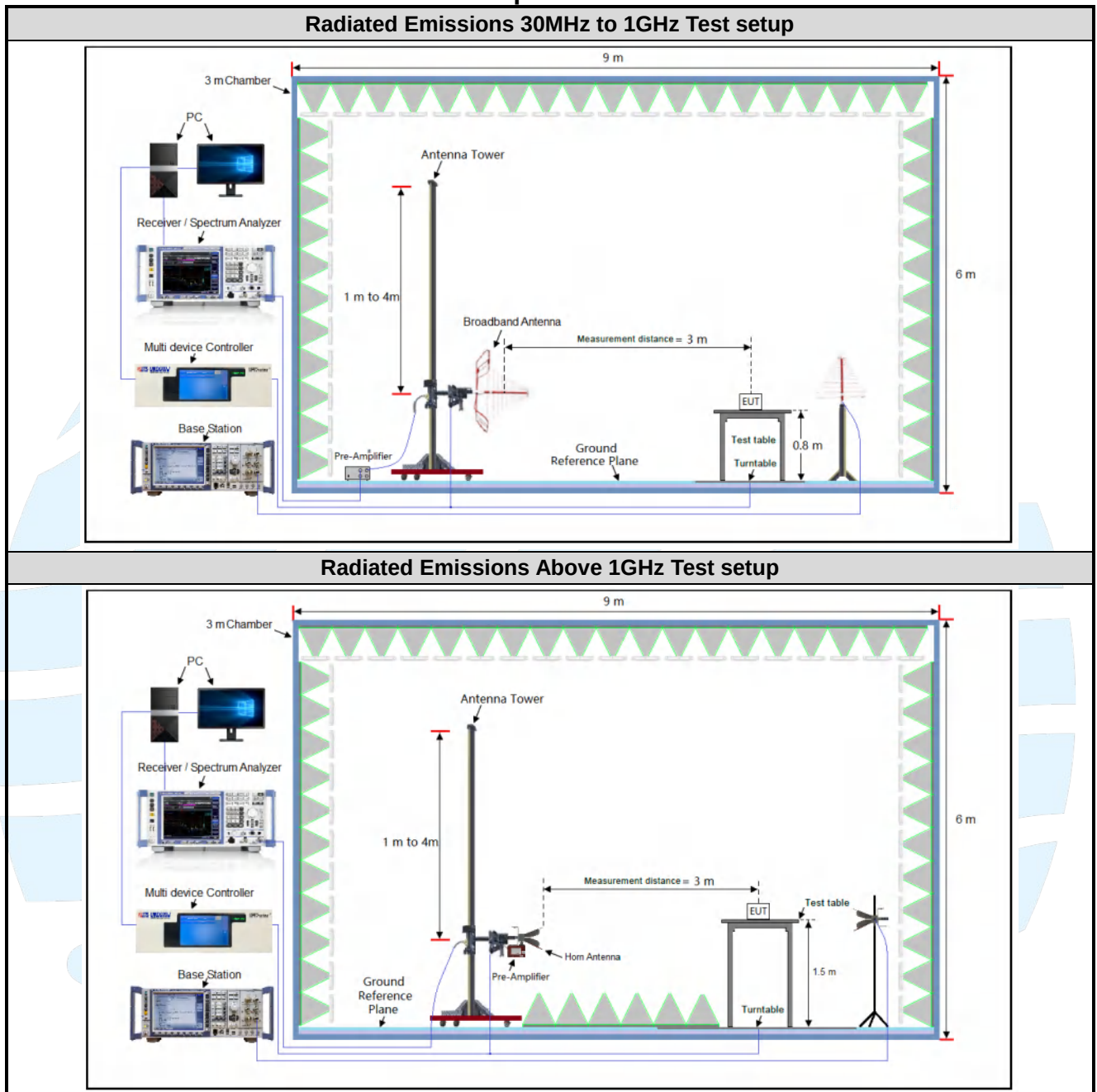
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	-30	3.5	20 to 75
TH/VL	+50	3.5	20 to 75
TL/VH	-30	4.35	20 to 75
TH/VH	+50	4.35	20 to 75

Remark:

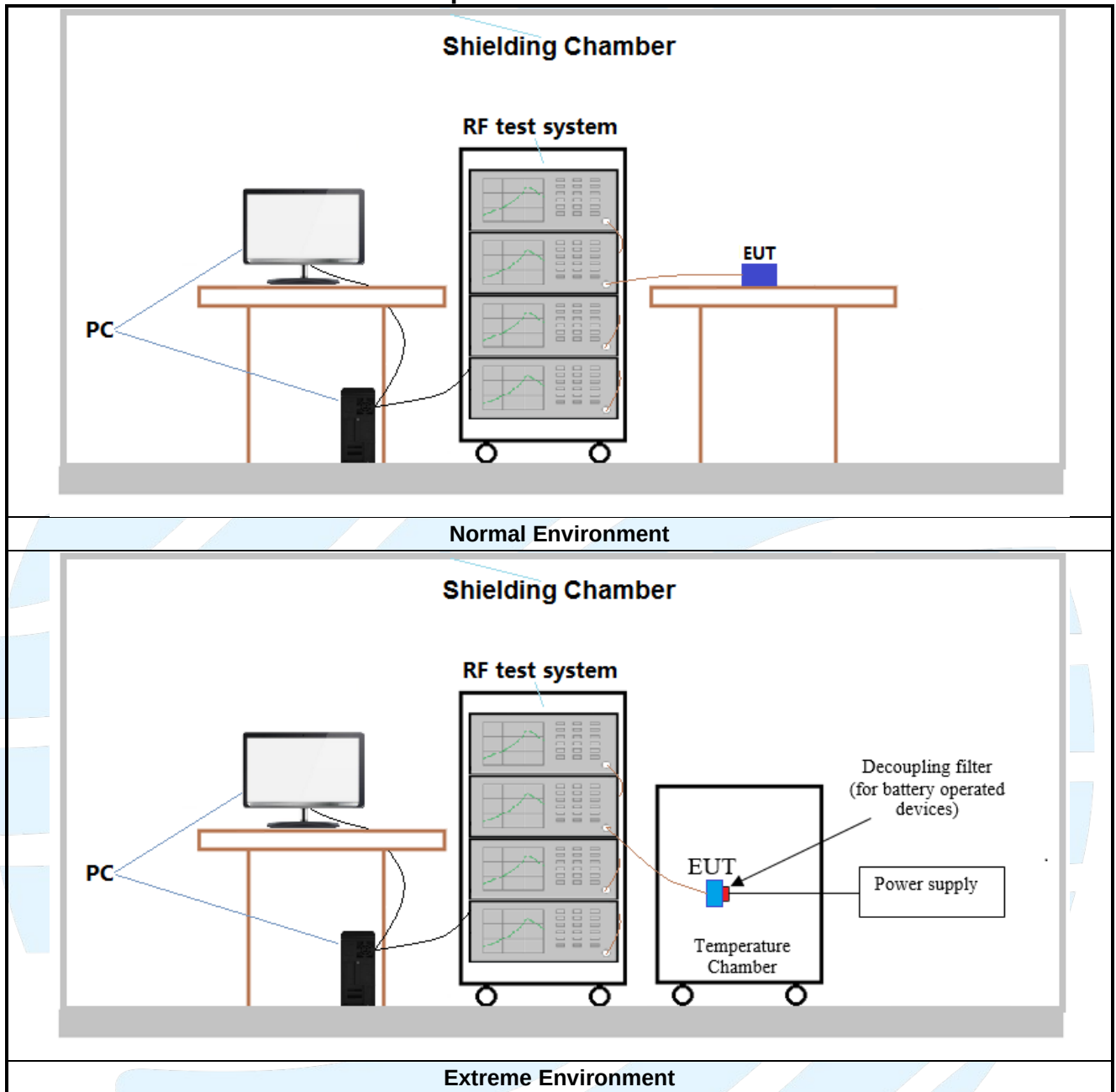
- 1) The EUT just work in such extreme temperature of -30 °C to +50 °C and the extreme voltage of 3.5 V to 4.35 V, so here the EUT is tested in the temperature of -30 °C to +50 °C and the voltage of 3.5 V to 4.35 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
TL: Low Extreme Test Temperature; TH: 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	1710.7
		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 5 TX: 824–849MHz	Low Range	1.4	20407	824.7
		3	20415	825.5
		5	20425	826.5
		10	20450	829
	Middle Range	1.4/3/5/10	20525	836.5
	High Range	1.4	20643	848.3
		3	20635	847.5
		5	20625	846.5
		10	20600	844
LTE Band 12 TX: 699-716MHz	Low Range	1.4	23017	699.7
		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
LTE Band 17 TX:704-716MHz	Low Range	5	23755	706.5
		10	23780	709
	Middle Range	5/10	23790	710
	High Range	5	23825	713.5
		10	23800	711
LTE Band 30 TX:2305-2315MHz	Low Range	5	27685	2307.5
		10	/	/
	Middle Range	5/10	27710	2310
	High Range	5	27735	2312.5
		10	/	/
LTE Band 66 TX: 1710-1780MHz	Low Range	1.4	131979	1710.7
		3	131987	1711.5
		5	131997	1712.5
		10	132022	1715
		15	132047	1717.5
		20	132072	1720
	Middle Range	1.4/3/5/10/ 15/20	132322	1745
	High Range	1.4	132665	1779.3
		3	132657	1778.5
		5	132647	1777.5
		10	132622	1775
		15	132597	1772.5
		20	132572	1770

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. It was powered by a 3.8V battery. 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.

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 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
Conducted output power	2	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
	5	☒	☒	☒	☒	--	--	☒	☒	☒	☒	☒	☒	☒	☒	☒
	12	☒	☒	☒	☒	-	-	☒	☒	☒	☒	☒	☒	☒	☒	☒
	17	-	-	☒	☒	-	-	☒	☒	☒	☒	☒	☒	☒	☒	☒
	30	-	-	☒	☒	-	-	☒	☒	☒	☒	☒	☒	☒	☒	☒
	66	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
99%&26dB Bandwidth	2	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
	5	☒	☒	☒	☒	--	--	☒	☒	☒	☐	☐	☒	☒	☒	☒
	12	☒	☒	☒	☒	-	-	☒	☒	☒	☐	☐	☒	☒	☒	☒
	17	-	-	☒	☒	-	-	☒	☒	☒	☐	☐	☒	☒	☒	☒
	30	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
	66	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
peak-to-average ratio	2	☐	☐	☐	☐	☐	☒	☒	☒	☒	☐	☐	☒	☐	☒	☐
	4	☐	☐	☐	☐	☐	☒	☒	☒	☒	☐	☐	☒	☐	☒	☐
	5	☐	☐	☐	☒	--	--	☒	☒	☒	☐	☐	☒	☐	☒	☐
	12	☐	☐	☐	☒	-	-	☒	☒	☒	☐	☐	☒	☐	☒	☐
	17	-	-	☐	☒	-	-	☒	☒	☒	☐	☐	☒	☐	☒	☐
	30	☐	☐	☐	☐	☐	☒	☒	☒	☒	☐	☐	☒	☐	☒	☐
	66	☐	☐	☐	☐	☐	☒	☒	☒	☒	☐	☐	☒	☐	☒	☐

Item	Band	Bandwidth(MHz)						Modulation			RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Band Edge at antenna terminals	2	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	5	☒	☒	☒	☒	--	--	☒	☒	☒	☒	☐	☒	☒	☐	☒
	12	☒	☒	☒	☒	-	-	☒	☒	☒	☒	☐	☒	☒	☐	☒
	17	-	-	☒	☒	-	-	☒	☒	☒	☒	☐	☒	☒	☐	☒
	30	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	66	☒	☒	☒	☒	☒	--	☒	☒	☒	☒	☐	☒	☒	☐	☒
Spurious emissions at antenna terminals	2	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	5	☒	☒	☒	☒	--	--	☒	☒	☒	☒	☐	☐	☒	☒	☒
	12	☒	☒	☒	☒	-	-	☒	☒	☒	☒	☐	☐	☒	☒	☒
	17	-	-	☒	☒	-	-	☒	☒	☒	☒	☐	☐	☒	☒	☒
	30	-	-	☒	☒	-	-	☒	☒	☒	☒	☐	☐	☒	☒	☒
	66	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
Field strength of spurious radiation	2	☐	☐	☐	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☒	☒
	4	☐	☐	☐	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☒	☒
	5	☐	☐	☐	☒	--	--	☒	☐	☐	☒	☐	☐	☒	☒	☒
	12	☐	☐	☐	☒	-	-	☒	☐	☐	☒	☐	☐	☒	☒	☒
	17	-	-	☒	☒	-	-	☒	☐	☐	☒	☐	☐	☐	☒	☐
	30	-	-	☒	☒	-	-	☒	☐	☐	☒	☐	☐	☐	☒	☐
	66	☐	☐	☐	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☒	☒

Item	Band	Bandwidth(MHz)						Modulation			RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Frequency stability	2	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☒	☐	☒	☐
	4	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☒	☐	☒	☐
	5	☐	☐	☐	☒	--	--	☒	☐	☐	☐	☐	☒	☐	☒	☐
	12	☐	☐	☐	☒	-	-	☒	☐	☐	☐	☐	☒	☐	☒	☐
	17	-	-	☒	☒	-	-	☒	☐	☐	☐	☐	☒	☐	☒	☐
	30	-	-	☒	☒	-	-	☒	☐	☐	☐	☐	☒	☐	☒	☐
	66	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☒	☐	☒	☐

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 22	Public Mobile Services
3	FCC 47 CFR Part 27	Miscellaneous Wireless Communications Services
4	FCC 47 CFR Part 24	Personal Communications Services
5	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
6	KDB 971168 D01	KDB 971168 D01 Power Meas License Digital Systems v03r01

5.2 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a)
LTE Band 2: FCC 47 CFR Part 24.232(c)
LTE Band 4 & LTE Band 66: FCC 47 CFR Part 27.50(d)(4)
LTE Band 5: FCC 47 CFR Part 22.913(a)
LTE Band 12 & Band 17: FCC 47 CFR Part 27.50(c)(10)
LTE Band 30: FCC 47 CFR Part 27.50(a)(3)
Test Method: KDB 971168 D01v03r01 & ANSI C63.26-2015

Limit:

FCC 47 CFR Part 22.913(a):

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

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.

FCC 47 CFR Part 27.50(a)(3): For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

Test Procedure:

The EUT was set up for the maximum power with CMW500, and 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

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UTTR-RF-FCC4G-V1.1

5.2.1 LTE Band 2

Conducted Power(dBm)											
Modulation			QPSK			16QAM			64QAM		
Band	Bandwidth	RB	18607	18900	19193	18607	18900	19193	18607	18900	19193
	(MHz)		1850.7	1880	1909.3	1850.7	1880	1909.3	1850.7	1880	1909.3
2	1.4	1@0	21.70	21.25	21.08	20.23	20.08	20.02	19.47	19.35	19.32
		1@3	22.01	21.26	21.30	20.60	20.07	20.33	19.80	19.33	19.60
		1@5	21.76	21.20	21.08	20.23	20.18	20.00	19.45	19.43	19.26
		3@0	21.73	21.32	21.04	20.25	20.52	19.99	19.45	19.78	19.27
		3@1	21.74	21.22	21.25	20.24	20.13	20.23	19.51	19.40	19.52
		3@3	21.19	21.18	20.95	20.17	20.34	19.95	19.42	19.60	19.23
		6@0	20.65	20.23	20.06	19.10	19.20	19.09	18.34	18.44	18.37
Band	Bandwidth	RB	18615	18900	19185	18615	18900	19185	18615	18900	19185
			1851.5	1880	1908.5	1851.5	1880	1908.5	1851.5	1880	1908.5
2	3	1@0	21.73	21.18	21.06	20.79	20.77	20.12	20.05	20.00	19.36
		1@8	21.76	21.14	21.13	20.79	20.81	20.07	20.08	20.04	19.31
		1@14	21.83	21.04	21.14	20.74	20.79	20.05	20.01	20.09	19.34
		8@0	20.64	20.11	19.96	19.60	19.30	19.07	18.82	18.55	18.36
		8@4	20.82	20.27	20.10	19.90	19.22	19.11	19.11	18.50	18.35
		8@7	20.67	20.19	20.05	19.61	19.87	19.01	18.84	19.13	18.29
		15@0	20.68	20.70	20.00	19.85	19.69	18.91	19.09	18.93	18.21
Band	Bandwidth	RB	18625	18900	19175	18625	18900	19175	18625	18900	19175
			1852.5	1880	1907.5	1852.5	1880	1907.5	1852.5	1880	1907.5
2	5	1@0	21.65	21.56	21.40	20.47	20.53	19.95	19.74	19.77	19.16
		1@12	21.74	21.70	21.63	20.64	20.68	20.65	19.89	19.89	19.94
		1@24	21.53	21.65	21.40	20.47	20.45	20.48	19.67	19.66	19.72
		12@0	20.68	20.63	20.58	19.62	19.51	19.61	18.89	18.79	18.81
		12@7	20.72	20.77	20.61	19.81	19.76	19.35	19.04	19.05	18.62
		12@13	20.70	20.67	20.59	19.54	19.63	19.05	18.76	18.86	18.28
		25@0	20.63	20.59	20.56	19.68	19.64	19.55	18.91	18.92	18.81
Band	Bandwidth	RB	18650	18900	19150	18650	18900	19150	18650	18900	19150
			1855	1880	1905	1855	1880	1905	1855	1880	1905
2	10	1@0	21.89	21.62	21.61	20.72	21.25	20.55	19.93	20.51	19.76
		1@25	22.03	21.78	21.77	20.96	21.53	20.66	20.25	20.80	19.90
		1@49	21.81	21.55	21.53	20.81	21.21	20.47	20.10	20.43	19.76
		25@0	20.73	20.69	20.62	19.83	19.79	19.62	19.04	19.02	18.91
		25@12	20.72	20.74	20.62	19.88	19.73	19.66	19.13	18.98	18.94
		25@25	20.80	20.69	20.56	19.89	19.72	19.63	19.19	18.95	18.87
		50@0	20.83	20.71	20.65	19.80	19.67	19.63	19.03	18.97	18.86
Band	Bandwidth	RB	18675	18900	19125	18675	18900	19125	18675	18900	19125
			1857.5	1880	1902.5	1857.5	1880	1902.5	1857.5	1880	1902.5
2	15	1@0	21.64	21.67	21.61	20.98	21.29	20.55	20.23	20.58	19.79
		1@37	21.82	21.65	21.67	21.23	21.37	20.66	20.45	20.66	19.86
		1@74	21.59	21.43	21.51	20.99	20.97	20.41	20.19	20.20	19.63
		36@0	20.67	20.78	20.67	19.64	19.69	19.70	18.94	18.91	18.97
		36@20	20.88	20.72	20.62	19.77	19.76	19.76	19.05	19.00	19.01
		36@39	20.87	20.65	20.71	19.70	19.57	19.63	18.95	18.79	18.89
		75@0	20.78	20.69	20.74	19.71	19.67	19.70	18.95	18.94	18.95
Band	Bandwidth	RB	18700	18900	19100	18700	18900	19100	18700	18900	19100
			1860	1880	1900	1860	1880	1900	1860	1880	1900
2	20	1@0	21.62	21.70	21.54	20.63	20.74	20.92	19.84	20.03	20.18
		1@49	22.11	21.98	21.91	21.09	21.00	21.31	20.38	20.22	20.59
		1@99	21.52	21.47	21.38	20.66	20.56	20.86	19.92	19.83	20.07
		50@0	20.69	20.77	20.70	19.75	19.75	19.68	19.00	19.01	18.95
		50@24	20.83	20.74	20.64	19.86	19.75	19.68	19.08	19.03	18.95
		50@50	20.74	20.60	20.58	19.73	19.50	19.63	18.99	18.73	18.90
		100@0	20.82	20.74	20.71	19.87	19.68	19.62	19.11	18.89	18.90

5.2.2 LTE Band 4

Conducted Power(dBm)											
Modulation			QPSK			16QAM			64QAM		
Band	Bandwidth	RB	19957	20175	20393	19957	20175	20393	19957	20175	20393
	(MHz)		1710.7	1732.5	1754.3	1710.7	1732.5	1754.3	1710.7	1732.5	1754.3

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4	1.4	1@0	21.10	21.03	21.02	20.06	19.90	20.03	19.34	19.20	19.30
		1@3	21.32	21.06	21.18	20.35	20.13	20.14	19.60	19.34	19.37
		1@5	21.00	21.05	21.00	20.10	19.81	19.91	19.31	19.09	19.14
		3@0	21.04	21.03	21.08	20.09	20.26	19.93	19.31	19.48	19.15
		3@1	21.14	21.07	21.21	20.12	19.99	20.34	19.36	19.26	19.64
		3@3	21.22	21.09	21.05	20.14	20.24	19.88	19.40	19.50	19.15
		6@0	20.00	19.89	20.05	18.95	19.02	19.15	18.19	18.32	18.42
Band	Bandwidth (MHz)	RB	19965	20175	20385	19965	20175	20385	19965	20175	20385
			1711.5	1732.5	1753.5	1711.5	1732.5	1753.5	1711.5	1732.5	1753.5
4	3	1@0	21.07	20.89	21.01	20.13	20.56	20.12	19.40	19.84	19.41
		1@8	21.19	20.89	21.07	20.08	20.58	20.01	19.34	19.85	19.24
		1@14	21.08	20.82	21.03	20.03	20.51	20.02	19.29	19.79	19.26
		8@0	19.96	19.95	20.06	19.02	19.11	19.02	18.27	18.36	18.29
		8@4	19.98	20.02	19.96	19.10	19.18	19.13	18.40	18.44	18.38
		8@7	19.87	19.99	19.98	19.04	19.17	19.14	18.30	18.40	18.41
		15@0	20.01	19.92	20.00	19.10	19.02	18.92	18.37	18.30	18.20
Band	Bandwidth (MHz)	RB	19975	20175	20375	19975	20175	20375	19975	20175	20375
			1712.5	1732.5	1752.5	1712.5	1732.5	1752.5	1712.5	1732.5	1752.5
4	5	1@0	20.94	20.81	20.94	19.80	19.82	19.81	19.01	19.03	19.08
		1@12	21.13	21.00	20.94	19.99	19.89	19.98	19.23	19.11	19.25
		1@24	20.82	20.79	20.97	19.84	19.76	19.91	19.11	19.02	19.12
		12@0	19.94	19.88	19.95	18.92	18.82	19.16	18.21	18.10	18.38
		12@7	20.06	19.98	20.10	19.24	19.08	19.32	18.53	18.37	18.54
		12@13	20.07	20.00	20.05	18.91	18.91	19.13	18.16	18.15	18.42
		25@0	19.91	19.94	20.04	19.04	18.95	19.10	18.31	18.21	18.31
Band	Bandwidth (MHz)	RB	20000	20175	20350	20000	20175	20350	20000	20175	20350
			1715	1732.5	1750	1715	1732.5	1750	1715	1732.5	1750
4	10	1@0	20.91	20.95	21.04	20.61	20.00	20.01	19.84	19.22	19.26
		1@25	21.38	21.22	21.25	20.66	20.18	20.37	19.87	19.39	19.62
		1@49	20.88	21.03	20.99	20.60	19.94	19.98	19.82	19.17	19.24
		25@0	19.97	19.97	20.04	19.17	19.06	19.24	18.38	18.35	18.48
		25@12	20.04	20.04	20.05	19.20	19.17	19.18	18.42	18.44	18.38
		25@25	20.12	20.06	20.10	19.20	19.01	19.24	18.41	18.24	18.48
		50@0	20.03	19.97	20.01	19.16	19.10	19.14	18.43	18.39	18.43
Band	Bandwidth (MHz)	RB	20025	20175	20325	20025	20175	20325	20025	20175	20325
			1717.5	1732.5	1747.5	1717.5	1732.5	1747.5	1717.5	1732.5	1747.5
4	15	1@0	20.43	20.45	20.52	20.05	20.15	19.58	19.32	19.39	18.83
		1@37	20.53	20.63	20.64	20.05	20.20	19.62	19.33	19.42	18.90
		1@74	20.34	20.38	20.61	19.88	20.00	19.51	19.15	19.23	18.78
		36@0	19.65	19.57	19.62	18.58	18.58	18.69	17.80	17.87	17.99
		36@20	19.71	19.74	19.65	18.62	18.66	18.69	17.83	17.89	17.95
		36@39	19.63	19.71	19.74	18.52	18.58	18.68	17.75	17.83	17.96
		75@0	19.65	19.59	19.63	18.68	18.65	18.58	17.96	17.90	17.84
Band	Bandwidth (MHz)	RB	20050	20175	20300	20050	20175	20300	20050	20175	20300
			1720	1732.5	1745	1720	1732.5	1745	1720	1732.5	1745
4	20	1@0	20.52	20.35	20.44	19.61	19.89	19.49	18.87	19.18	18.77
		1@49	20.68	20.73	20.66	19.99	20.27	19.71	19.26	19.50	18.92
		1@99	20.47	20.29	20.46	19.54	19.80	19.55	18.78	19.04	18.82
		50@0	19.53	19.46	19.60	18.53	18.48	18.60	17.82	17.70	17.88
		50@24	19.67	19.59	19.62	18.74	18.65	18.63	17.97	17.93	17.84
		50@50	19.65	19.56	19.55	18.54	18.60	18.46	17.79	17.86	17.73
		100@0	19.60	19.51	19.60	18.69	18.53	18.64	17.95	17.77	17.85

5.2.3 LTE Band 5

Conducted Power(dBm)											
Modulation			QPSK			16QAM			64QAM		
Band	Bandwidth (MHz)	RB	20407	20525	20643	20407	20525	20643	20407	20525	20643
			824.7	836.5	848.3	824.7	836.5	848.3	824.7	836.5	848.3
5	1.4	1@0	21.75	21.68	21.59	20.73	20.66	20.65	20.02	19.91	19.89
		1@3	21.91	21.77	21.87	21.02	20.89	20.81	20.24	20.16	20.09
		1@5	21.81	21.62	21.71	20.79	20.59	20.68	20.04	19.81	19.98
		3@0	21.83	21.68	21.63	20.85	20.89	20.70	20.06	20.13	19.92
		3@1	21.90	21.79	21.81	20.70	20.61	20.97	19.97	19.83	20.20
		3@3	21.93	21.79	21.71	20.78	20.92	20.46	20.02	20.16	19.70
		6@0	20.74	20.74	20.69	19.53	19.67	19.86	18.73	18.92	19.09
Band	Bandwidth (MHz)	RB	20415	20525	20635	20415	20525	20635	20415	20525	20635
			825.5	836.5	847.5	825.5	836.5	847.5	825.5	836.5	847.5
5	3	1@0	21.80	21.63	21.73	20.81	21.32	20.64	20.04	20.55	19.87
		1@8	21.85	21.64	21.71	20.78	21.13	20.61	19.99	20.38	19.89
		1@14	21.80	21.52	21.68	20.87	21.23	20.58	20.12	20.49	19.87
		8@0	20.77	20.68	20.56	19.69	19.87	19.76	18.97	19.12	18.96
		8@4	20.82	20.76	20.57	19.85	19.75	19.75	19.13	18.98	18.96
		8@7	20.69	20.57	20.64	19.72	19.82	19.68	18.92	19.05	18.93
		15@0	20.83	20.68	20.69	19.87	19.67	19.66	19.08	18.89	18.95
Band	Bandwidth (MHz)	RB	20425	20525	20625	20425	20525	20625	20425	20525	20625
			826.5	836.5	846.5	826.5	836.5	846.5	826.5	836.5	846.5
5	5	1@0	21.56	21.57	21.47	20.48	20.51	20.51	19.74	19.78	19.79
		1@12	21.66	21.68	21.61	20.63	20.63	20.72	19.85	19.86	19.93
		1@24	21.57	21.57	21.48	20.54	20.48	20.58	19.78	19.73	19.87
		12@0	20.79	20.70	20.76	19.65	19.60	19.74	18.90	18.88	18.99
		12@7	20.74	20.64	20.72	19.87	19.75	19.80	19.16	19.01	19.04
		12@13	20.73	20.75	20.62	19.56	19.51	19.76	18.83	18.80	19.05
		25@0	20.73	20.68	20.69	19.76	19.78	19.70	19.02	19.03	18.99
Band	Bandwidth (MHz)	RB	20450	20525	20600	20450	20525	20600	20450	20525	20600
			829	836.5	844	829	836.5	844	829	836.5	844
5	10	1@0	21.89	21.65	21.76	20.85	21.33	20.64	20.07	20.55	19.92
		1@25	22.04	21.79	21.89	21.01	21.26	20.80	20.26	20.50	20.05
		1@49	21.73	21.62	21.66	20.78	21.27	20.67	20.04	20.50	19.90
		25@0	20.90	20.66	20.75	20.00	19.76	19.94	19.29	19.00	19.21
		25@12	20.74	20.80	20.73	19.86	19.76	19.85	19.10	18.97	19.14
		25@25	20.86	20.75	20.64	19.95	19.78	19.63	19.20	19.02	18.90
		50@0	20.87	20.73	20.81	19.84	19.75	19.86	19.09	19.01	19.08

5.2.4 LTE Band 12

Conducted Power(dBm)											
Modulation			QPSK			16QAM			64QAM		
Band	Bandwidth (MHz)	RB	23017	23095	23173	23017	23095	23173	23017	23095	23173
			699.7	707.5	715.3	699.7	707.5	715.3	699.7	707.5	715.3
12	1.4	1@0	21.99	22.04	21.94	20.93	20.85	20.90	20.18	20.07	20.14
		1@3	22.16	22.24	21.97	21.27	21.05	21.09	20.48	20.28	20.38
		1@5	21.92	21.93	21.89	20.98	20.95	20.86	20.28	20.19	20.13
		3@0	22.12	21.96	21.91	20.98	21.31	20.76	20.26	20.59	20.01
		3@1	22.16	21.88	21.97	21.07	20.87	21.06	20.34	20.12	20.26
		3@3	22.14	21.94	21.92	20.96	21.21	20.73	20.23	20.43	20.02
		6@0	21.02	20.97	20.97	19.94	20.04	20.01	19.19	19.28	19.24
Band	Bandwidth (MHz)	RB	23025	23095	23165	23025	23095	23165	23025	23095	23165
			700.5	707.5	714.5	700.5	707.5	714.5	700.5	707.5	714.5
12	3	1@0	22.03	21.89	21.99	21.12	21.57	20.89	20.40	20.78	20.15
		1@8	22.07	21.89	22.04	21.04	21.59	20.86	20.33	20.89	20.07
		1@14	22.08	21.87	21.96	21.09	21.60	20.92	20.37	20.83	20.15
		8@0	20.87	20.88	20.96	19.94	20.15	19.97	19.14	19.40	19.19
		8@4	20.87	20.98	20.89	20.13	20.22	19.98	19.42	19.50	19.28
		8@7	20.86	20.92	20.88	19.95	20.22	19.89	19.23	19.45	19.15
		15@0	20.94	20.91	20.97	20.14	20.11	19.89	19.41	19.35	19.16
Band	Bandwidth (MHz)	RB	23035	23095	23155	23035	23095	23155	23035	23095	23155
			701.5	707.5	713.5	701.5	707.5	713.5	701.5	707.5	713.5
12	5	1@0	21.83	21.87	21.86	20.77	20.86	20.88	20.04	20.08	20.14
		1@12	22.01	21.91	21.88	20.88	20.90	20.86	20.09	20.16	20.06
		1@24	21.88	21.77	21.76	20.66	20.87	20.79	19.95	20.15	20.02
		12@0	20.96	20.98	21.00	19.95	19.96	20.16	19.20	19.22	19.45
		12@7	20.93	20.99	20.99	20.12	20.12	20.19	19.33	19.37	19.40
		12@13	20.96	20.90	20.88	20.01	19.86	20.12	19.28	19.13	19.41
		25@0	20.94	20.96	20.91	20.01	20.10	20.05	19.23	19.33	19.35
Band	Bandwidth (MHz)	RB	23060	23095	23130	23060	23095	23130	23060	23095	23130
			704	707.5	711	704	707.5	711	704	707.5	711
12	10	1@0	22.00	22.04	21.92	20.95	21.03	21.55	20.17	20.25	20.78
		1@25	22.00	22.27	22.12	21.07	21.20	21.71	20.31	20.50	20.95
		1@49	22.08	22.09	21.81	21.01	20.98	21.44	20.22	20.26	20.65
		25@0	21.03	21.01	21.11	19.96	20.08	20.26	19.26	19.37	19.49
		25@12	21.03	21.01	20.99	20.17	20.16	20.14	19.38	19.38	19.36
		25@25	21.09	20.92	20.90	20.13	20.16	20.10	19.39	19.44	19.32
		50@0	21.05	20.87	21.04	20.14	20.04	20.11	19.41	19.27	19.37

5.2.5 LTE Band 17

Conducted Power(dBm)											
Modulation			QPSK			16QAM			64QAM		
Band	Bandwidth (MHz)	RB	23755	23790	23825	23755	23790	23825	23755	23790	23825
			706.5	710	713.5	706.5	710	713.5	706.5	710	713.5
17	5	1@0	21.85	21.93	21.90	20.73	20.79	20.85	20.00	20.07	20.12
		1@12	21.95	22.08	22.04	20.91	20.97	20.92	20.16	20.26	20.22
		1@24	21.82	21.86	21.83	20.76	20.75	20.89	19.98	20.05	20.12
		12@0	20.95	21.05	21.01	19.95	19.96	20.11	19.18	19.18	19.40
		12@7	21.05	21.00	21.06	20.13	20.13	20.15	19.41	19.36	19.39
		12@13	20.91	20.92	20.88	19.88	19.90	20.02	19.15	19.16	19.31
		25@0	20.94	21.01	21.00	20.00	20.15	20.02	19.24	19.39	19.23
Band	Bandwidth (MHz)	RB	23780	23790	23800	23780	23790	23800	23780	23790	23800
			709	710	711	709	710	711	709	710	711
17	10	1@0	21.92	21.98	21.97	21.03	21.03	21.57	20.25	20.27	20.79
		1@25	22.25	22.29	21.95	21.23	21.22	21.85	20.48	20.47	21.12
		1@49	22.01	22.01	21.96	21.05	21.01	21.46	20.27	20.23	20.70
		25@0	21.06	21.09	21.07	20.16	20.24	20.27	19.38	19.47	19.48
		25@12	21.07	21.03	21.01	20.17	20.22	20.11	19.46	19.42	19.38
		25@25	20.87	20.99	20.89	20.10	20.13	20.16	19.32	19.37	19.39
		50@0	21.03	21.04	21.04	20.14	20.15	20.11	19.42	19.45	19.38

5.2.6 LTE Band 30

Conducted Power(dBm)											
Modulation			QPSK			16QAM			64QAM		
Band	Bandwidth (MHz)	RB	27685	27710	27735	27685	27710	27735	27685	27710	27735
			2307.5	2310	2312.5	2307.5	2310	2312.5	2307.5	2310	2312.5
30	5	1@0	21.26	21.06	21.25	20.16	19.92	20.19	19.45	19.22	19.40
		1@12	21.28	21.17	21.43	20.17	19.98	20.26	19.46	19.23	19.53
		1@24	21.22	21.00	21.40	20.06	20.04	20.18	19.35	19.31	19.45
		12@0	20.37	20.15	20.36	19.25	19.08	19.31	18.48	18.36	18.56
		12@7	20.38	20.21	20.41	19.39	19.27	19.44	18.69	18.56	18.70
		12@13	20.35	20.23	20.27	19.24	19.05	19.21	18.53	18.35	18.46
		25@0	20.26	20.15	20.36	19.30	19.14	19.42	18.56	18.34	18.65
Band	Bandwidth (MHz)	RB	--	27710	--	--	27710	--	--	27710	--
			--	2310	--	--	2310	--	--	2310	--
30	10	1@0	--	20.84	--	--	19.85	--	--	19.06	--
		1@25	--	21.09	--	--	19.95	--	--	19.18	--
		1@49	--	20.80	--	--	19.74	--	--	18.96	--
		25@0	--	19.80	--	--	18.86	--	--	18.16	--
		25@12	--	19.85	--	--	18.92	--	--	18.14	--
		25@25	--	19.79	--	--	18.74	--	--	18.01	--
		50@0	--	19.73	--	--	18.87	--	--	18.10	--

5.2.7 LTE Band 66

Conducted Power(dBm)											
Modulation			QPSK			16QAM			64QAM		
Band	Bandwidth (MHz)	RB	131979	132322	132665	131979	132322	132665	131979	132322	132665
			1710.7	1745	1779.3	1710.7	1745	1779.3	1710.7	1745	1779.3
66	1.4	1@0	21.09	20.98	21.02	20.22	20.49	20.15	19.42	19.77	19.40
		1@3	21.31	21.43	21.24	20.41	20.83	20.42	19.66	20.07	19.70
		1@5	20.95	20.98	21.11	20.08	20.43	20.14	19.38	19.65	19.34
		3@0	21.30	21.18	21.28	20.26	20.37	19.83	19.52	19.63	19.06
		3@1	21.28	21.25	20.94	20.22	20.19	20.11	19.49	19.41	19.35
		3@3	21.27	21.17	21.25	20.26	20.43	19.56	19.49	19.68	18.84
		6@0	20.16	20.13	19.71	18.99	19.25	19.04	18.28	18.47	18.33
66	3	1@0	21.18	21.10	21.32	20.26	20.67	20.28	19.48	19.96	19.58
		1@8	21.26	21.07	21.32	20.30	20.71	20.28	19.56	19.99	19.51
		1@14	21.20	21.04	21.26	20.19	20.65	20.30	19.42	19.88	19.52
		8@0	20.14	20.17	20.25	19.14	19.44	18.81	18.42	18.64	18.08
		8@4	20.23	20.13	20.32	19.35	19.31	18.91	18.64	18.59	18.12
		8@7	20.17	20.16	20.26	19.18	19.45	19.38	18.45	18.68	18.65
		15@0	20.12	20.23	20.33	19.25	19.23	18.70	18.52	18.49	17.94
66	5	1@0	21.06	21.10	21.21	19.88	19.96	20.23	19.17	19.20	19.48
		1@12	21.12	21.11	21.36	20.05	20.12	19.79	19.33	19.41	19.03
		1@24	20.98	21.01	21.13	19.81	19.96	19.66	19.01	19.17	18.95
		12@0	20.10	20.07	20.36	19.05	19.07	18.95	18.25	18.33	18.19
		12@7	20.21	20.16	20.34	19.34	19.34	19.01	18.58	18.63	18.23
		12@13	20.20	20.07	20.25	19.10	19.15	18.87	18.30	18.44	18.10
		25@0	20.10	20.14	20.22	19.27	19.21	18.90	18.49	18.46	18.12
66	10	1@0	21.16	21.09	21.16	20.27	20.71	20.28	19.52	19.92	19.54
		1@25	21.32	21.21	21.44	20.23	20.83	19.88	19.49	20.09	19.10
		1@49	21.05	20.99	21.20	20.09	20.63	20.19	19.38	19.83	19.45
		25@0	20.17	20.16	20.32	19.29	19.26	19.39	18.58	18.54	18.66
		25@12	20.21	20.11	20.29	19.24	19.29	18.85	18.52	18.54	18.13
		25@25	20.12	20.12	20.27	19.41	19.16	19.32	18.68	18.43	18.56
		50@0	20.16	20.18	20.28	19.22	19.24	19.38	18.46	18.48	18.60
66	15	1@0	21.07	21.04	21.13	20.67	20.62	20.24	19.91	19.87	19.45
		1@37	21.14	21.14	21.36	20.64	20.76	20.31	19.87	19.97	19.52
		1@74	20.89	20.94	21.19	20.40	20.67	20.17	19.68	19.95	19.38
		36@0	20.23	20.19	20.36	19.20	19.26	19.36	18.49	18.53	18.60
		36@20	20.18	20.13	20.36	19.21	19.26	19.40	18.46	18.53	18.66
		36@39	20.24	20.11	20.21	19.14	19.15	19.25	18.37	18.43	18.46
		75@0	20.16	20.16	20.34	19.15	19.24	18.82	18.39	18.53	18.09
66	20	1@0	21.27	21.18	21.23	20.26	20.09	19.76	19.54	19.39	18.99
		1@49	21.42	21.20	21.49	20.42	20.40	20.13	19.65	19.67	19.40
		1@99	21.16	21.12	21.24	20.24	20.10	19.73	19.46	19.38	18.99
		50@0	19.99	20.20	20.32	19.11	19.17	19.29	18.37	18.40	18.50
		50@24	20.14	20.19	20.26	19.19	19.17	19.32	18.44	18.44	18.54
		50@50	20.14	20.07	20.15	19.10	19.09	19.08	18.37	18.33	18.35
		100@0	20.10	20.11	20.22	19.17	19.09	19.31	18.42	18.37	18.54

5.3 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 & LTE Band 66: FCC 47 CFR Part 27.50(d)(4)
LTE Band 5: FCC 47 CFR Part 22.913(a)
LTE Band 12 & Band 17: FCC 47 CFR Part 27.50(c)(10)
LTE Band 30: FCC 47 CFR Part 27.50(a)(3)

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

Limit:

FCC 47 CFR Part 22.913(a):

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

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.

1. **FCC 47 CFR Part 27.50(a)(3):** For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

Test Procedure:

According to KDB 412172 D01 Power Approach,

- **ERP or EIRP = $P_T + G_T - L_C$**
- **ERP = EIRP - 2.15**

where

- **P_T** = transmitter output power, expressed in dBW, dBm, or PSD;
- **G_T** = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
- **L_C** = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

Test Setup: Refer to section 4.2.1 for details.

Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below

Note: The maximum ERP/EIRP is calculated from max output power and antenna gain, the antenna gain provided by the customer, and the customer takes all the responsibilities for the accuracy of antenna gain.

5.3.1 LTE Band 2

Channel	Maximum EIRP (dBm)				Maximum EIRP (W)				Result
	QPSK	16QAM	64QAM	Limit (dBm)	QPSK	16QAM	64QAM	Limit (W)	
Channel Bandwidth: 1.4MHz									
Lowest	22.76	21.35	20.55	33.01	0.1888	0.1365	0.1135	2	Pass
Middle	22.07	21.27	20.53	33.01	0.1611	0.1340	0.1130	2	Pass
Highest	22.05	21.08	20.35	33.01	0.1603	0.1282	0.1084	2	Pass
Channel Bandwidth: 3MHz									
Lowest	22.58	21.54	20.83	33.01	0.1811	0.1426	0.1211	2	Pass
Middle	21.93	21.56	20.84	33.01	0.1560	0.1432	0.1213	2	Pass
Highest	21.89	20.87	20.11	33.01	0.1545	0.1222	0.1026	2	Pass
Channel Bandwidth: 5MHz									
Lowest	22.49	21.39	20.64	33.01	0.1774	0.1377	0.1159	2	Pass
Middle	22.45	21.43	20.64	33.01	0.1758	0.1390	0.1159	2	Pass
Highest	22.38	21.40	20.69	33.01	0.1730	0.1380	0.1172	2	Pass
Channel Bandwidth: 10MHz									
Lowest	22.78	21.71	21.00	33.01	0.1897	0.1483	0.1259	2	Pass
Middle	22.53	22.28	21.55	33.01	0.1791	0.1690	0.1429	2	Pass
Highest	22.52	21.41	20.65	33.01	0.1786	0.1384	0.1161	2	Pass
Channel Bandwidth: 15MHz									
Lowest	22.57	21.98	21.20	33.01	0.1807	0.1578	0.1318	2	Pass
Middle	22.42	22.12	21.41	33.01	0.1746	0.1629	0.1384	2	Pass
Highest	22.42	21.41	20.61	33.01	0.1746	0.1384	0.1151	2	Pass
Channel Bandwidth: 20MHz									
Lowest	22.86	21.84	21.13	33.01	0.1932	0.1528	0.1297	2	Pass
Middle	22.73	21.75	20.97	33.01	0.1875	0.1496	0.1250	2	Pass
Highest	22.66	22.06	21.34	33.01	0.1845	0.1607	0.1361	2	Pass

5.3.2 LTE Band 4

Channel	Maximum EIRP (dBm)				Maximum EIRP (W)				Result
	QPSK	16QAM	64QAM	Limit (dBm)	QPSK	16QAM	64QAM	Limit (W)	
Channel Bandwidth: 1.4MHz									
Lowest	21.87	20.90	20.15	30.00	0.1538	0.1230	0.1035	1	Pass
Middle	21.64	20.81	20.05	30.00	0.1459	0.1205	0.1012	1	Pass
Highest	21.76	20.89	20.19	30.00	0.1500	0.1227	0.1045	1	Pass
Channel Bandwidth: 3MHz									
Lowest	21.74	20.68	19.95	30.00	0.1493	0.1169	0.0989	1	Pass
Middle	21.44	21.13	20.40	30.00	0.1393	0.1297	0.1096	1	Pass
Highest	21.62	20.67	19.96	30.00	0.1452	0.1167	0.0991	1	Pass
Channel Bandwidth: 5MHz									
Lowest	21.68	20.54	19.78	30.00	0.1472	0.1132	0.0951	1	Pass
Middle	21.55	20.44	19.66	30.00	0.1429	0.1107	0.0925	1	Pass
Highest	21.52	20.53	19.80	30.00	0.1419	0.1130	0.0955	1	Pass
Channel Bandwidth: 10MHz									
Lowest	21.93	21.21	20.42	30.00	0.1560	0.1321	0.1102	1	Pass
Middle	21.77	20.73	19.94	30.00	0.1503	0.1183	0.0986	1	Pass
Highest	21.80	20.92	20.17	30.00	0.1514	0.1236	0.1040	1	Pass
Channel Bandwidth: 15MHz									
Lowest	21.08	20.60	19.88	30.00	0.1282	0.1148	0.0973	1	Pass
Middle	21.18	20.75	19.97	30.00	0.1312	0.1189	0.0993	1	Pass
Highest	21.19	20.17	19.45	30.00	0.1315	0.1040	0.0881	1	Pass
Channel Bandwidth: 20MHz									
Lowest	21.23	20.54	19.81	30.00	0.1327	0.1132	0.0957	1	Pass
Middle	21.28	20.82	20.05	30.00	0.1343	0.1208	0.1012	1	Pass
Highest	21.21	20.26	19.47	30.00	0.1321	0.1062	0.0885	1	Pass

5.3.3 LTE Band 5

Channel	Maximum ERP (dBm)				Maximum ERP (W)				Result
	QPSK	16QAM	64QAM	Limit (dBm)	QPSK	16QAM	64QAM	Limit (W)	
Channel Bandwidth: 1.4MHz									
Lowest	20.40	19.49	18.71	19.49	0.1096	0.0889	0.0743	7	Pass
Middle	20.26	19.39	18.63	19.39	0.1062	0.0869	0.0729	7	Pass
Highest	20.34	19.44	18.67	19.44	0.1081	0.0879	0.0736	7	Pass
Channel Bandwidth: 3MHz									
Lowest	20.32	19.34	18.59	19.49	0.1076	0.0859	0.0723	7	Pass
Middle	20.11	19.79	19.02	19.39	0.1026	0.0953	0.0798	7	Pass
Highest	20.20	19.11	18.36	19.44	0.1047	0.0815	0.0685	7	Pass
Channel Bandwidth: 5MHz									
Lowest	20.13	19.10	18.32	19.49	0.1030	0.0813	0.0679	7	Pass
Middle	20.15	19.10	18.33	19.39	0.1035	0.0813	0.0681	7	Pass
Highest	20.08	19.19	18.40	19.44	0.1019	0.0830	0.0692	7	Pass
Channel Bandwidth: 10MHz									
Lowest	20.51	19.48	18.73	19.49	0.1125	0.0887	0.0746	7	Pass
Middle	20.26	19.80	19.02	19.39	0.1062	0.0955	0.0798	7	Pass
Highest	20.36	19.27	18.52	19.44	0.1086	0.0845	0.0711	7	Pass

5.3.4 LTE Band 12

Channel	Maximum ERP (dBm)				Maximum ERP (W)				Result
	QPSK	16QAM	64QAM	Limit (dBm)	QPSK	16QAM	64QAM	Limit (W)	
Channel Bandwidth: 1.4MHz									
Lowest	20.53	19.64	18.85	34.77	0.1130	0.0920	0.0767	3	Pass
Middle	20.61	19.68	18.96	34.77	0.1151	0.0929	0.0787	3	Pass
Highest	20.34	19.46	18.75	34.77	0.1081	0.0883	0.0750	3	Pass
Channel Bandwidth: 3MHz									
Lowest	20.45	19.49	18.77	34.77	0.1109	0.0889	0.0753	3	Pass
Middle	20.26	19.97	19.26	34.77	0.1062	0.0993	0.0843	3	Pass
Highest	20.41	19.29	18.52	34.77	0.1099	0.0849	0.0711	3	Pass
Channel Bandwidth: 5MHz									
Lowest	20.38	19.25	18.46	34.77	0.1091	0.0841	0.0701	3	Pass
Middle	20.28	19.27	18.53	34.77	0.1067	0.0845	0.0713	3	Pass
Highest	20.25	19.25	18.51	34.77	0.1059	0.0841	0.0710	3	Pass
Channel Bandwidth: 10MHz									
Lowest	20.45	19.44	18.68	34.77	0.1109	0.0879	0.0738	3	Pass
Middle	20.64	19.57	18.87	34.77	0.1159	0.0906	0.0771	3	Pass
Highest	20.49	20.08	19.32	34.77	0.1119	0.1019	0.0855	3	Pass

5.3.5 LTE Band 17

Channel	Maximum ERP (dBm)				Maximum ERP (W)				Result
	QPSK	16QAM	64QAM	Limit (dBm)	QPSK	16QAM	64QAM	Limit (W)	
Channel Bandwidth: 5MHz									
Lowest	20.24	19.20	18.45	34.77	0.1057	0.0832	0.0700	3	Pass
Middle	20.37	19.26	18.55	34.77	0.1089	0.0843	0.0716	3	Pass
Highest	20.33	19.21	18.51	34.77	0.1079	0.0834	0.0710	3	Pass
Channel Bandwidth: 10MHz									
Lowest	20.54	19.52	18.77	34.77	0.1132	0.0895	0.0753	3	Pass
Middle	20.58	19.51	18.76	34.77	0.1143	0.0893	0.0752	3	Pass
Highest	20.26	20.14	19.41	34.77	0.1062	0.1033	0.0873	3	Pass

5.3.6 LTE Band 30

Channel	Maximum EIRP (dBm)				Maximum EIRP (W)				Result
	QPSK	16QAM	64QAM	Limit (dBm)	QPSK	16QAM	64QAM	Limit (W)	
Channel Bandwidth: 5MHz									
Lowest	21.69	20.58	19.87	23.98	0.1476	0.1143	0.0971	0.25	Pass
Middle	21.58	20.45	19.72	23.98	0.1439	0.1109	0.0938	0.25	Pass
Highest	21.84	20.67	19.94	23.98	0.1528	0.1167	0.0986	0.25	Pass
Channel Bandwidth: 10MHz									
Lowest	0.41	0.41	0.41	23.98	0.0011	0.0011	0.0011	0.25	Pass
Middle	21.50	20.36	19.59	23.98	0.1413	0.1086	0.0910	0.25	Pass
Highest	0.41	0.41	0.41	23.98	0.0011	0.0011	0.0011	0.25	Pass

5.3.7 LTE Band 66

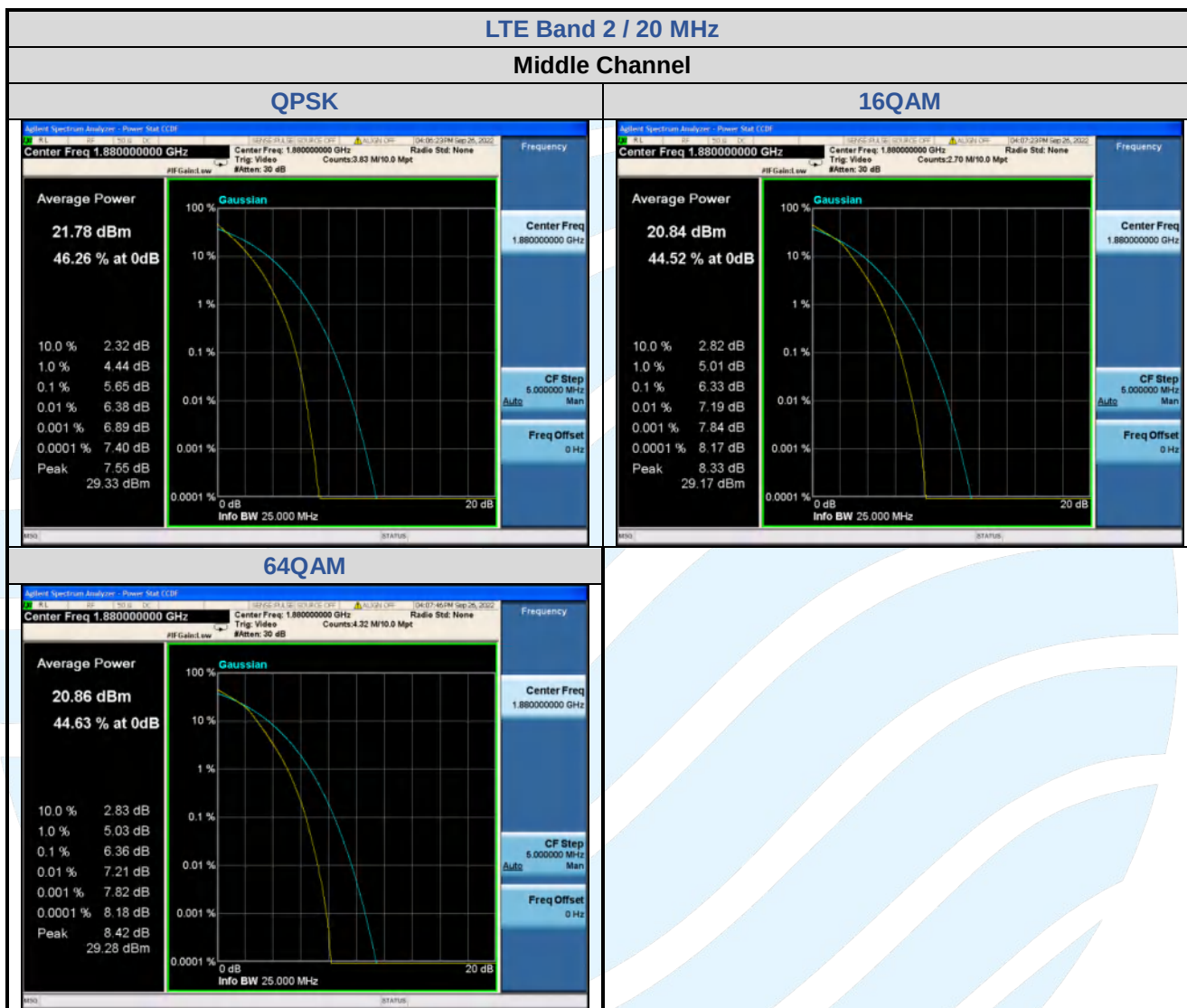
Channel	Maximum EIRP (dBm)				Maximum EIRP (W)				Result
	QPSK	16QAM	64QAM	Limit (dBm)	QPSK	16QAM	64QAM	Limit (W)	
Channel Bandwidth: 1.4MHz									
Lowest	21.83	20.93	20.18	30.00	0.1524	0.1239	0.1042	1	Pass
Middle	21.95	21.35	20.59	30.00	0.1567	0.1365	0.1146	1	Pass
Highest	21.80	20.94	20.22	30.00	0.1514	0.1242	0.1052	1	Pass
Channel Bandwidth: 3MHz									
Lowest	21.78	20.82	20.08	30.00	0.1507	0.1208	0.1019	1	Pass
Middle	21.62	21.23	20.51	30.00	0.1452	0.1327	0.1125	1	Pass
Highest	21.84	20.82	20.10	30.00	0.1528	0.1208	0.1023	1	Pass
Channel Bandwidth: 5MHz									
Lowest	21.64	20.57	19.85	30.00	0.1459	0.1140	0.0966	1	Pass
Middle	21.63	20.64	19.93	30.00	0.1455	0.1159	0.0984	1	Pass
Highest	21.88	20.75	20.00	30.00	0.1542	0.1189	0.1000	1	Pass
Channel Bandwidth: 10MHz									
Lowest	21.84	20.79	20.04	30.00	0.1528	0.1199	0.1009	1	Pass
Middle	21.73	21.35	20.61	30.00	0.1489	0.1365	0.1151	1	Pass
Highest	21.96	20.80	20.06	30.00	0.1570	0.1202	0.1014	1	Pass
Channel Bandwidth: 15MHz									
Lowest	21.66	21.19	20.43	30.00	0.1466	0.1315	0.1104	1	Pass
Middle	21.66	21.28	20.49	30.00	0.1466	0.1343	0.1119	1	Pass
Highest	21.88	20.83	20.04	30.00	0.1542	0.1211	0.1009	1	Pass
Channel Bandwidth: 20MHz									
Lowest	21.94	20.94	20.17	30.00	0.1563	0.1242	0.1040	1	Pass
Middle	21.72	20.92	20.19	30.00	0.1486	0.1236	0.1045	1	Pass
Highest	22.01	20.65	19.92	30.00	0.1589	0.1161	0.0982	1	Pass

5.4 PEAK-TO-AVERAGE RATIO

Test Requirement:	LTE Band 2: FCC 47 CFR Part 24.232(d)
	LTE Band 4 & LTE Band 66: FCC 47 CFR Part 27.50(d)(5)
	LTE Band 5: FCC 47 CFR Part 22.913(a)
	LTE Band 12 & Band 17: FCC 47 CFR Part 27.50(d)(5)
	LTE Band 30: FCC 47 CFR Part 27.50(a)(1)(i)(B)
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 $\geq$ 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

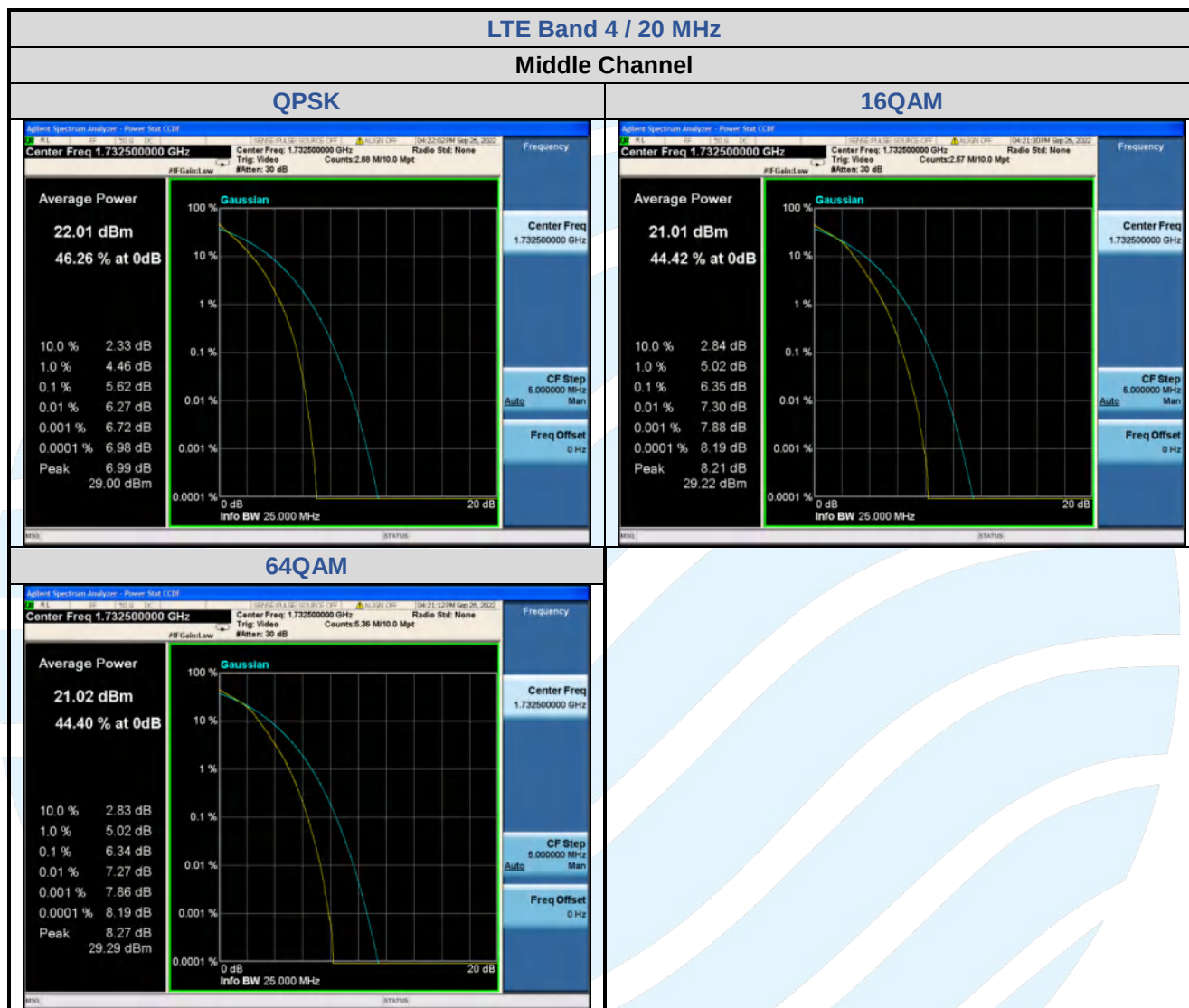
5.4.1 LTE Band 2

Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Middle	Full RB	5.65	6.33	6.36	13	Pass



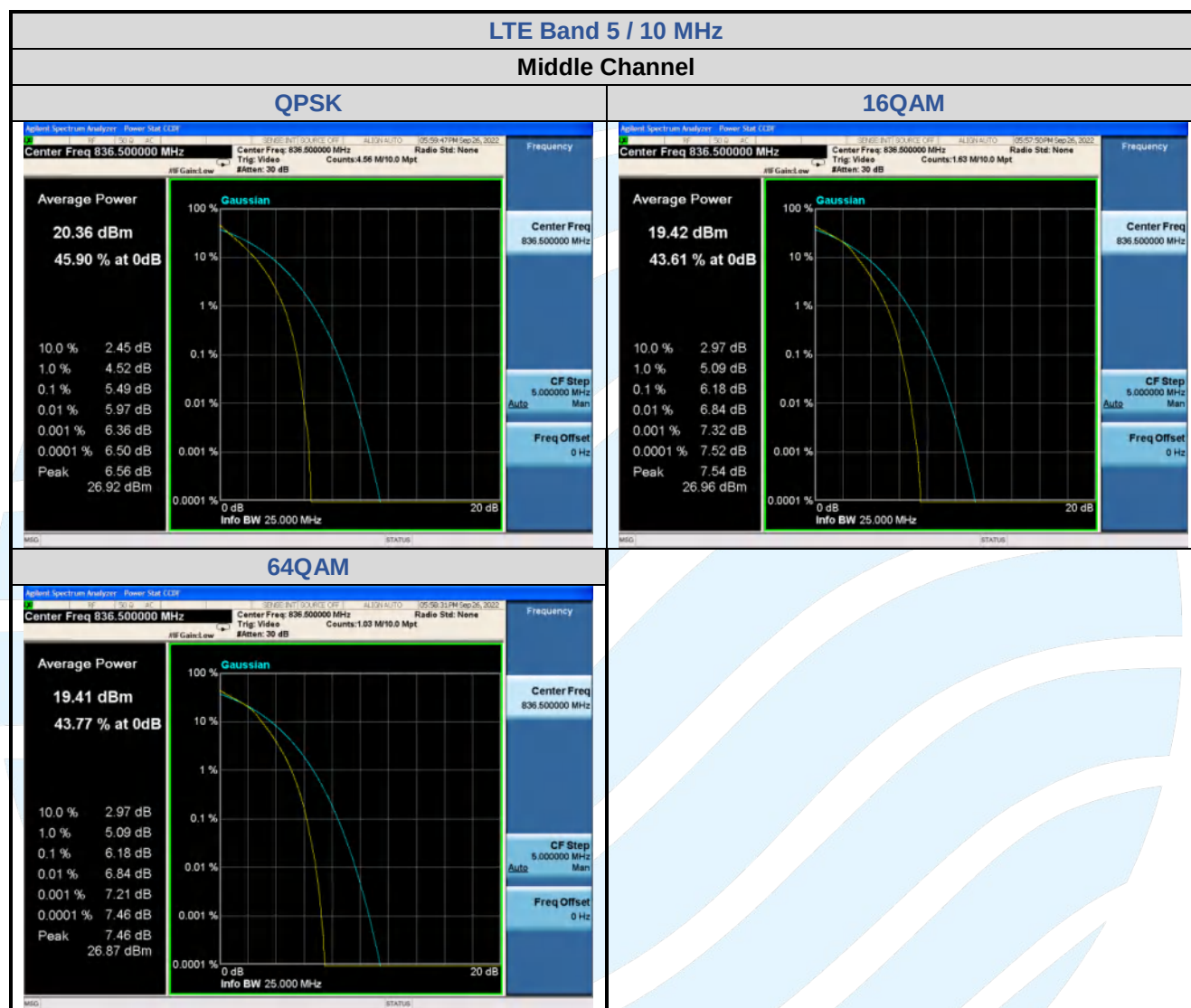
5.4.2 LTE Band 4

Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Middle	Full RB	5.62	6.35	6.34	13	Pass



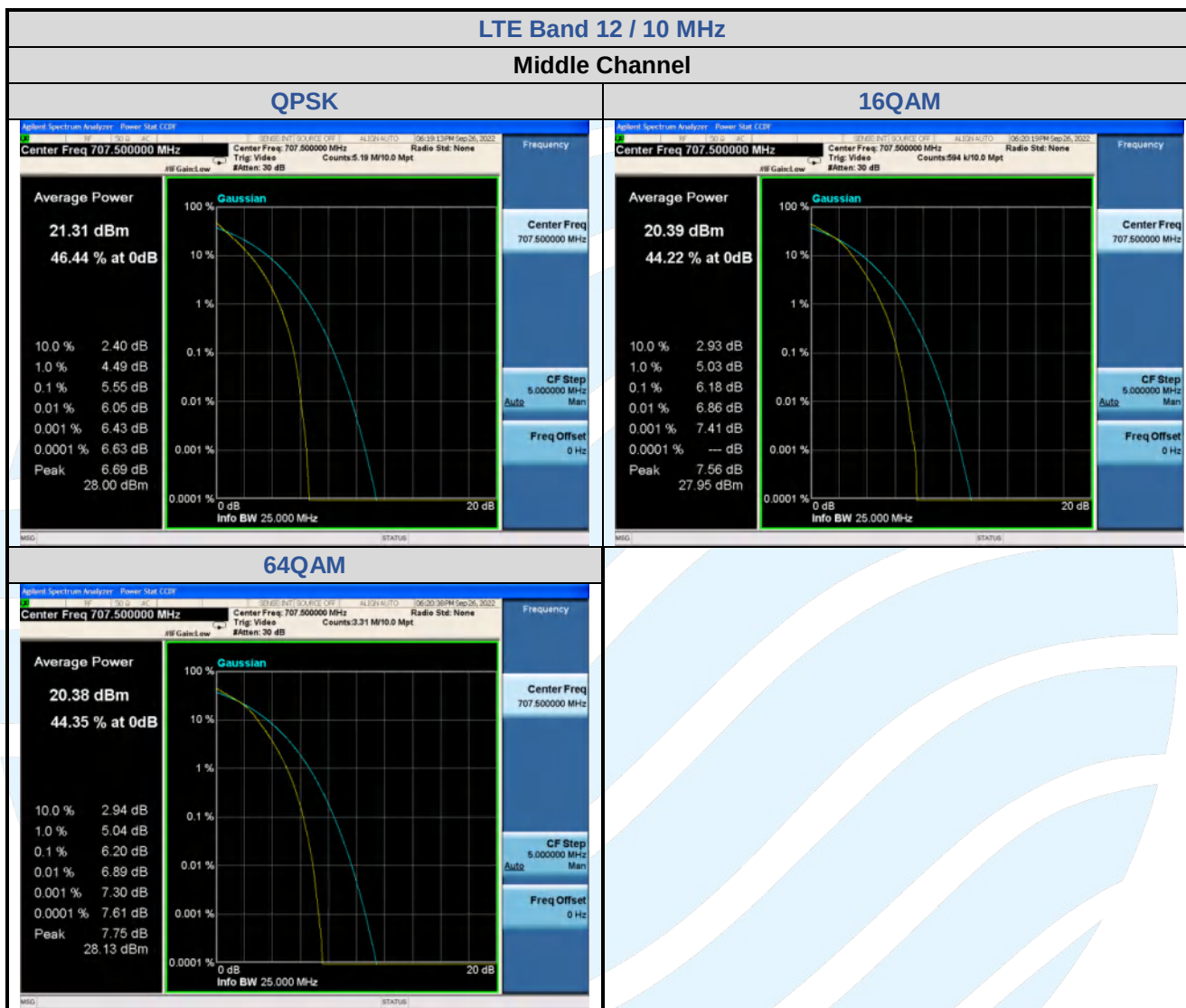
5.4.3 LTE Band 5

Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 10 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Middle	Full RB	5.49	6.18	6.18	13	Pass



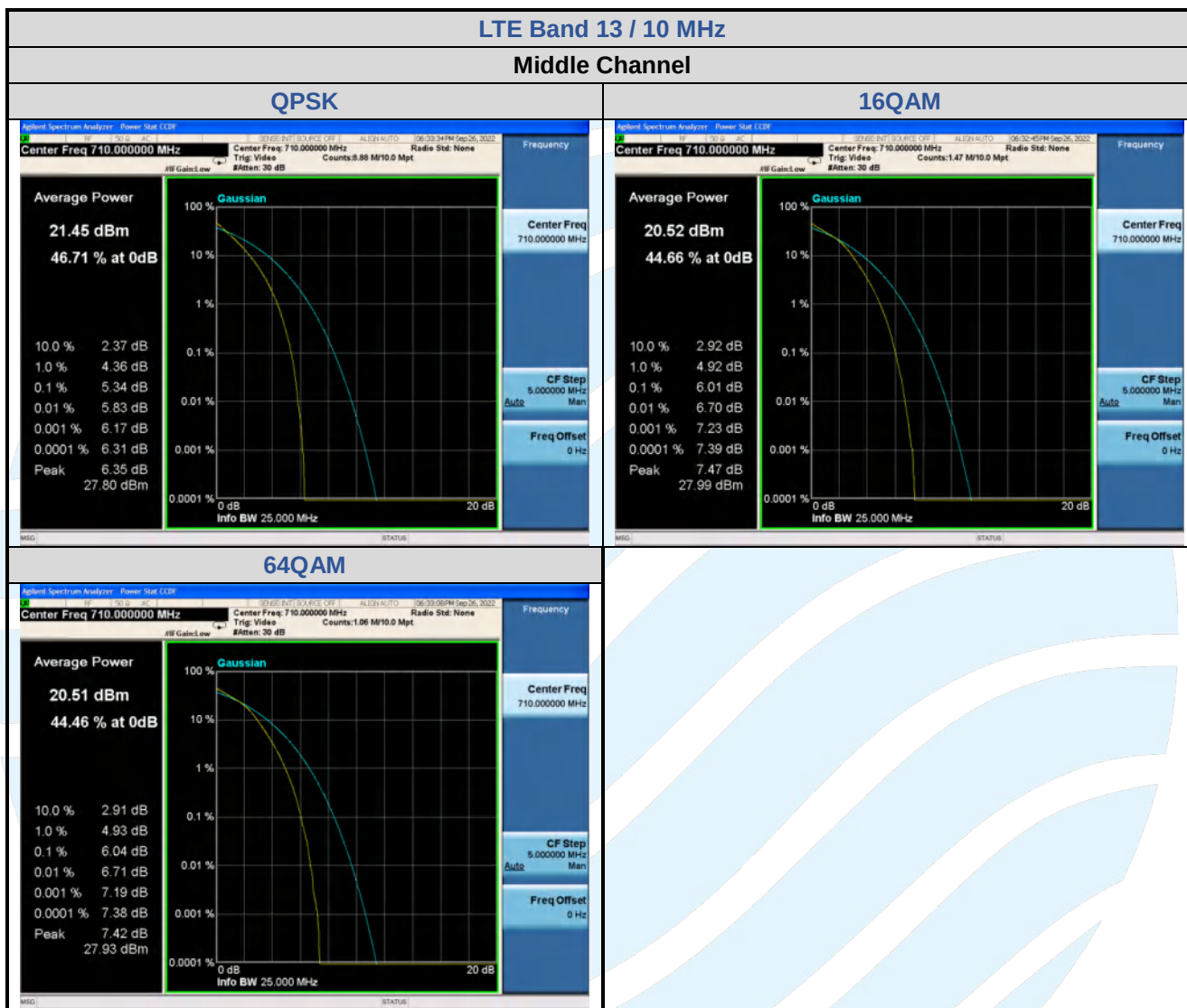
5.4.4 LTE Band 12

Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 10 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Middle	Full RB	5.55	6.18	6.20	13	Pass



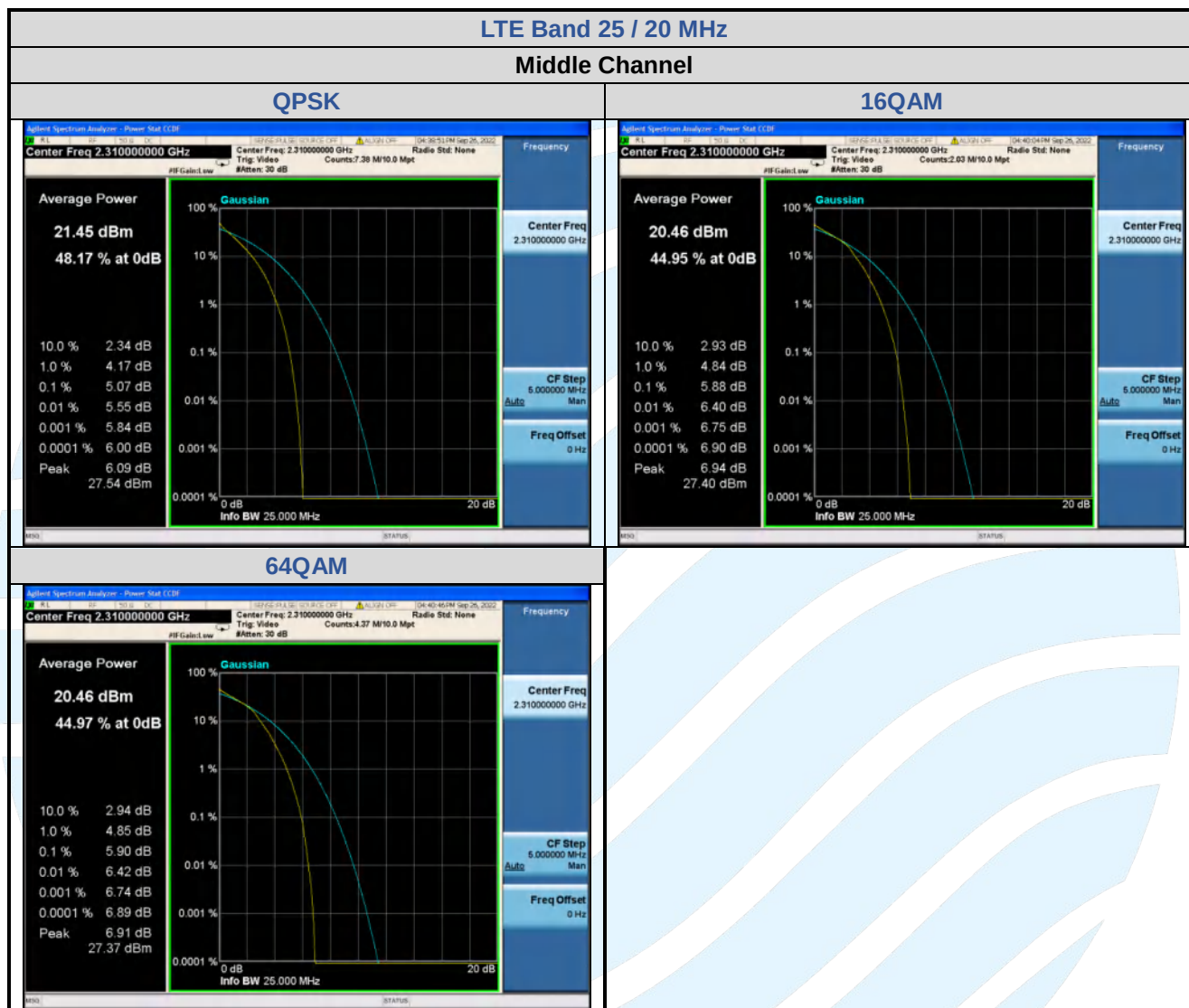
5.4.5 LTE Band 17

Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 10 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Middle	Full RB	5.34	6.01	6.04	13	Pass



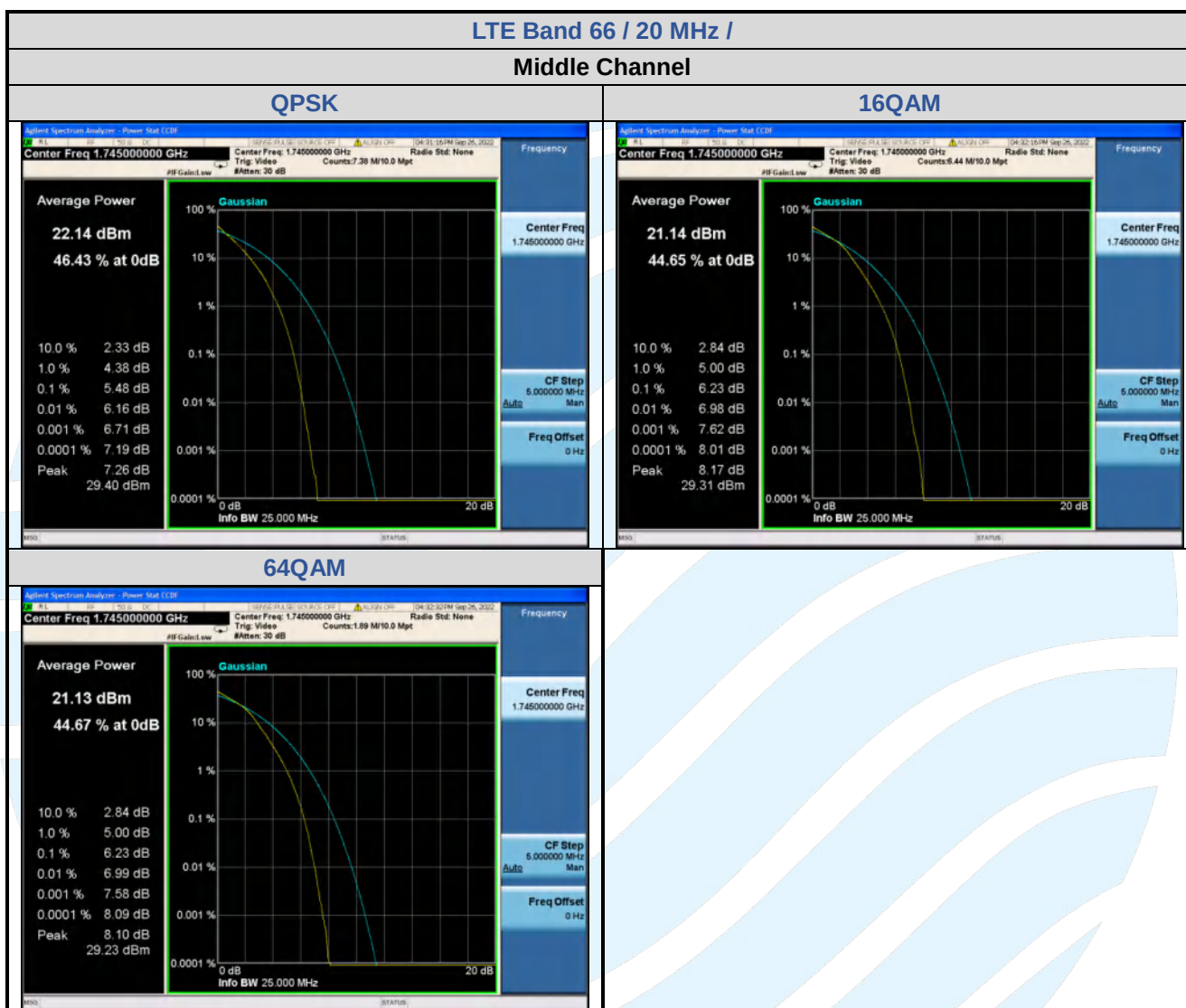
5.4.6 LTE Band 30

Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Middle	Full RB	5.07	5.88	5.90	13	Pass



5.4.7 LTE Band 66

Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Middle	Full RB	5.48	6.23	6.23	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

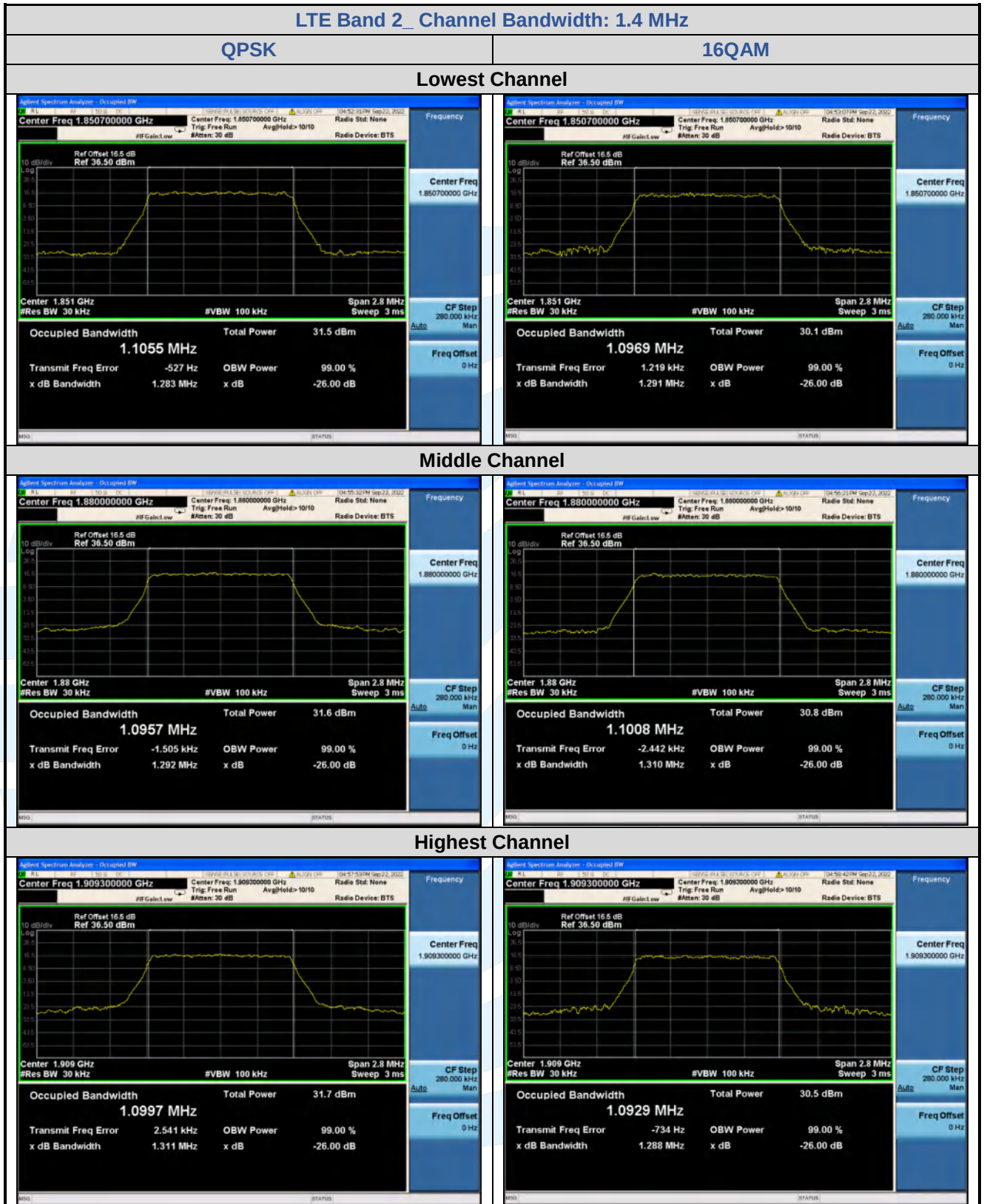
Test Mode: Link mode

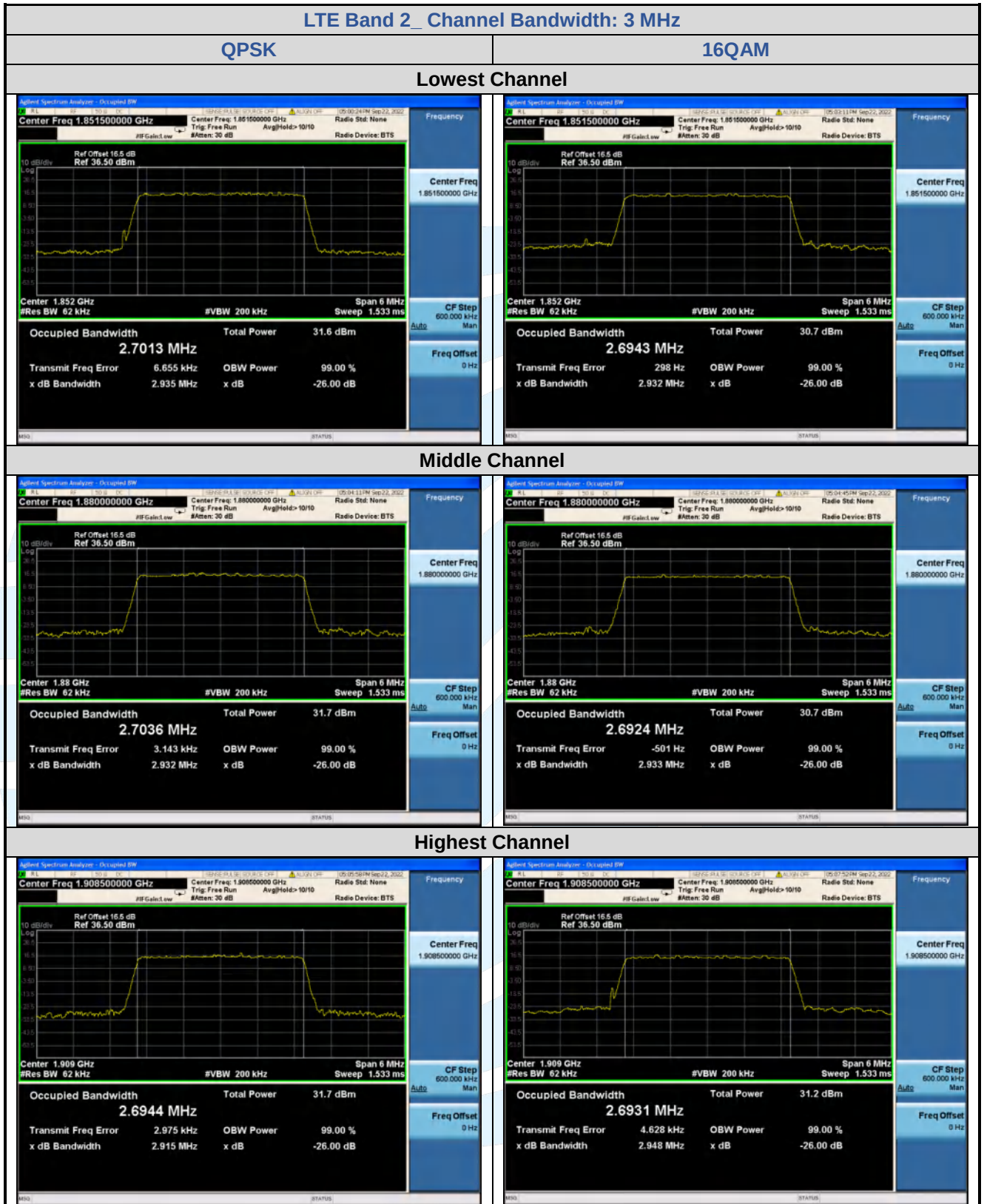
Test Results: Pass

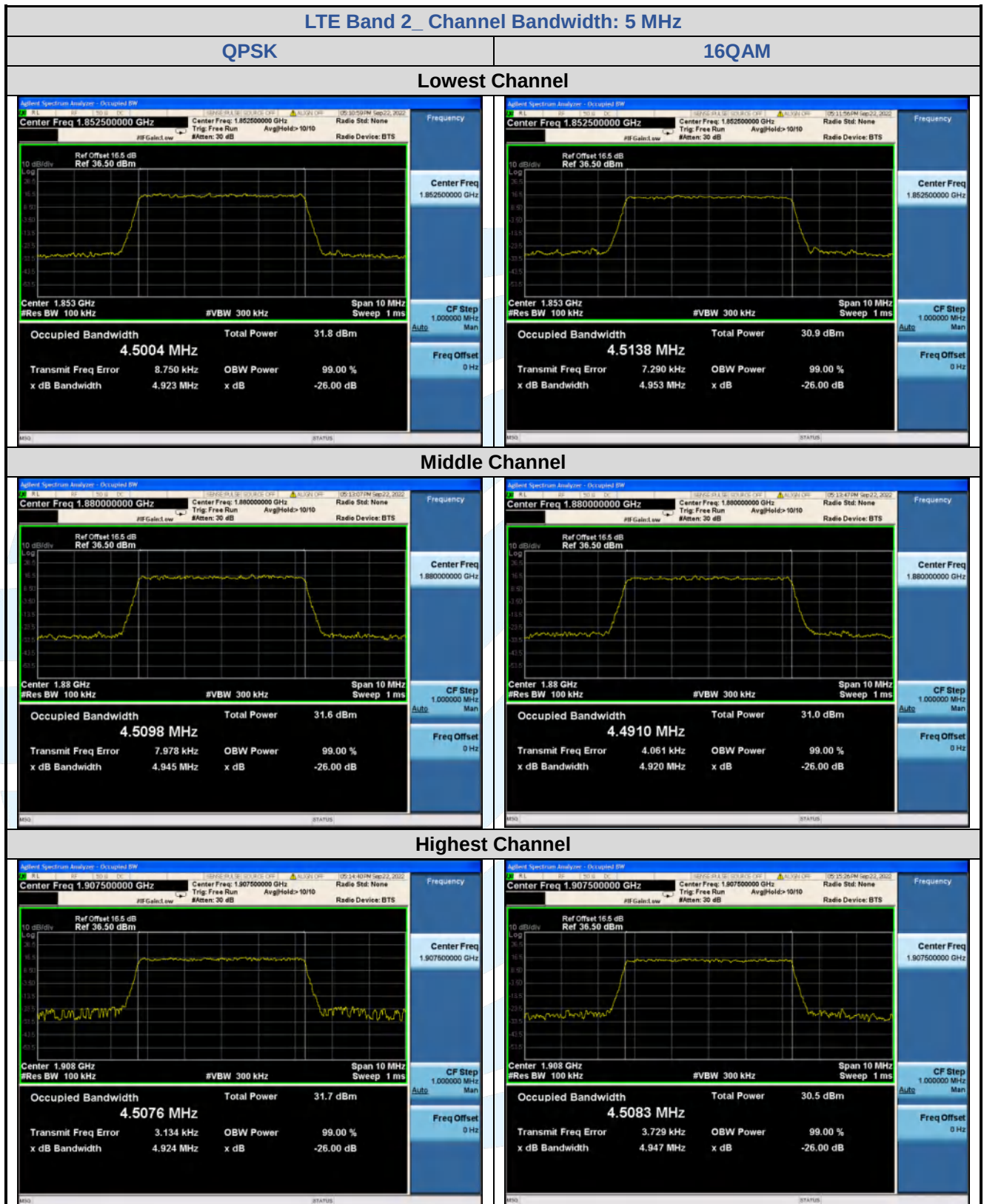
Test Data: See table below

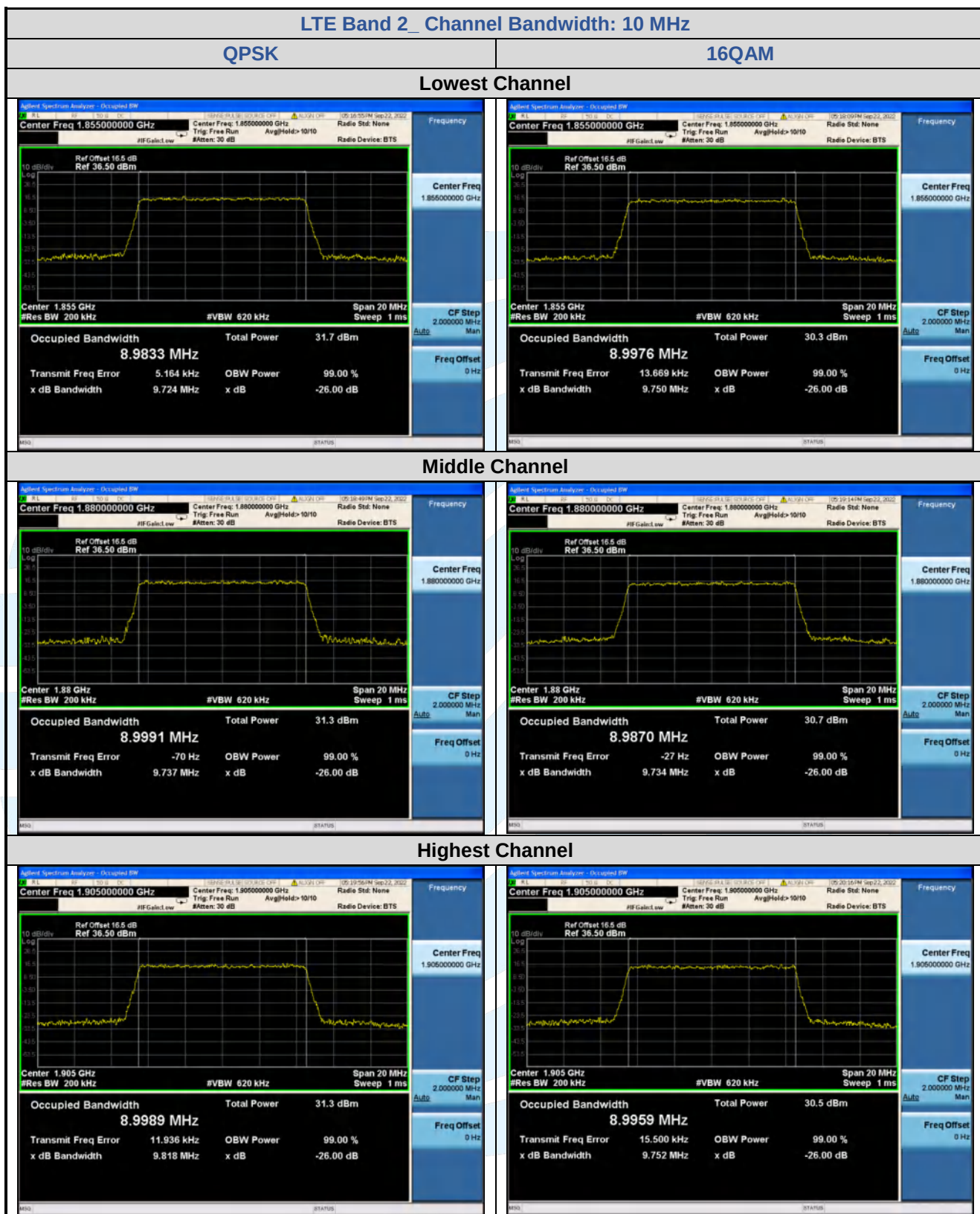
5.5.1 LTE Band 2

LTE Band 2								
Channel	RB Configuration		26 dB BW (MHz)			99% BW (MHz)		
	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Channel Bandwidth: 1.4 MHz								
Lowest	6	0	1.283	1.291	1.279	1.1055	1.0969	1.0934
Middle	6	0	1.292	1.310	1.299	1.0957	1.1008	1.0975
Highest	6	0	1.311	1.288	1.280	1.0997	1.0929	1.0917
Channel Bandwidth: 3 MHz								
Lowest	15	0	2.935	2.932	2.916	2.7013	2.6943	2.6932
Middle	15	0	2.932	2.933	2.943	2.7036	2.6924	2.6852
Highest	15	0	2.915	2.948	2.941	2.6944	2.6931	2.6918
Channel Bandwidth: 5 MHz								
Lowest	25	0	4.923	4.953	4.961	4.5004	4.5138	4.5119
Middle	25	0	4.945	4.920	4.917	4.5098	4.4910	4.4921
Highest	25	0	4.924	4.947	4.951	4.5076	4.5083	4.5212
Channel Bandwidth: 10 MHz								
Lowest	50	0	9.724	9.750	9.685	8.9833	8.9976	8.9942
Middle	50	0	9.737	9.734	9.763	8.9991	8.9870	8.9928
Highest	50	0	9.818	9.752	9.711	8.9989	8.9959	8.9782
Channel Bandwidth: 15 MHz								
Lowest	75	0	14.73	14.60	14.59	13.490	13.486	13.482
Middle	75	0	14.55	14.53	14.57	13.436	13.457	13.473
Highest	75	0	14.61	14.63	14.50	13.467	13.505	13.492
Channel Bandwidth: 20 MHz								
Lowest	100	0	19.40	19.46	19.31	17.967	18.006	18.024
Middle	100	0	19.35	19.39	19.33	17.953	17.935	17.925
Highest	100	0	19.49	19.30	19.22	17.997	17.988	17.972







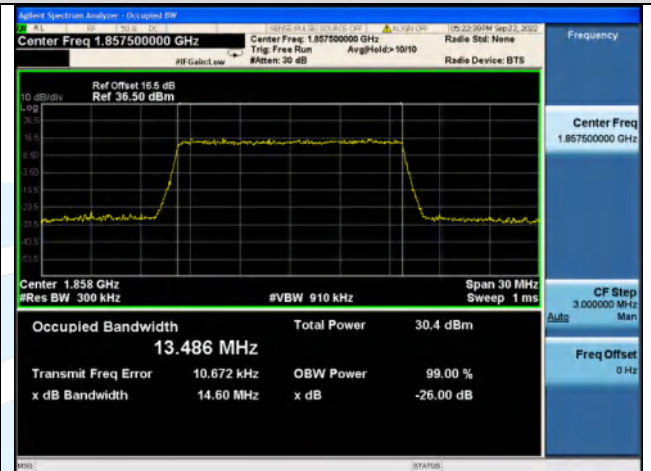
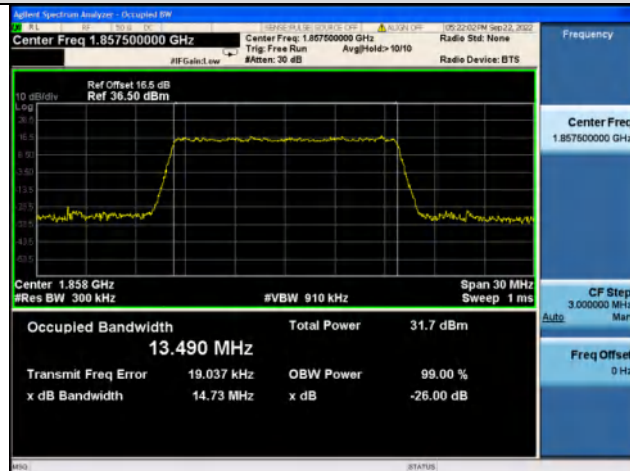


LTE Band 2_ Channel Bandwidth: 15 MHz

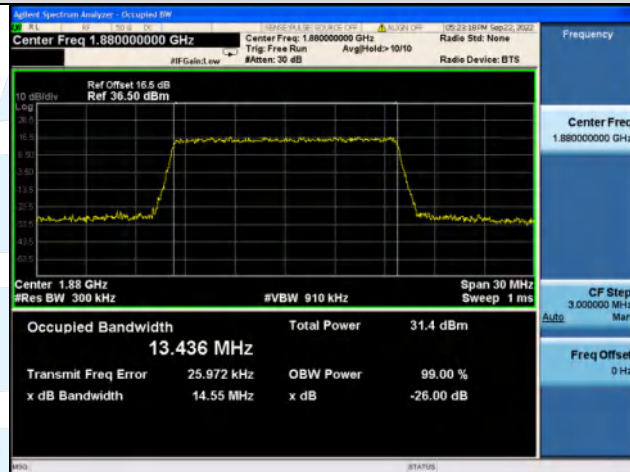
QPSK

16QAM

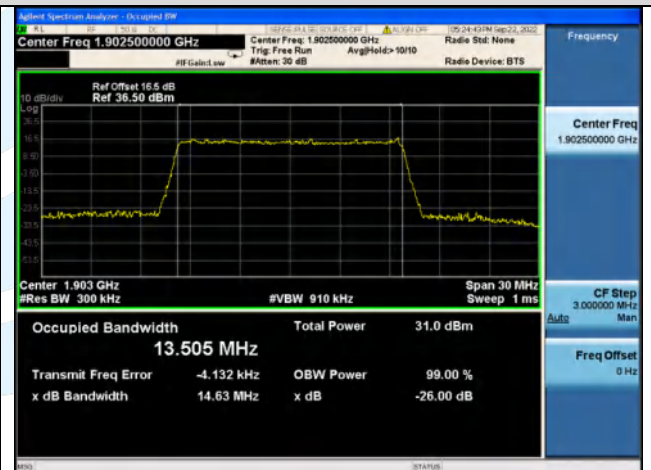
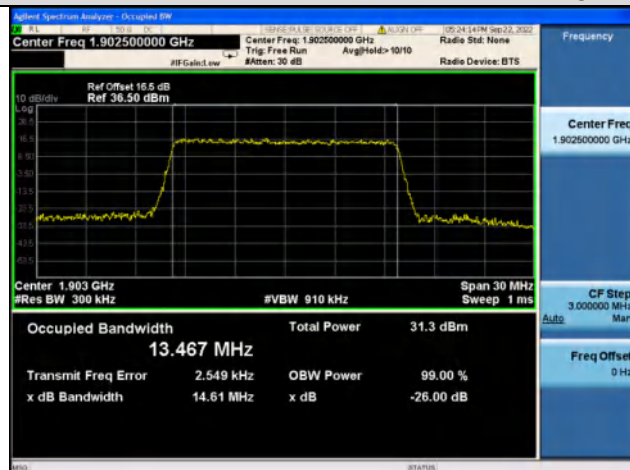
Lowest Channel

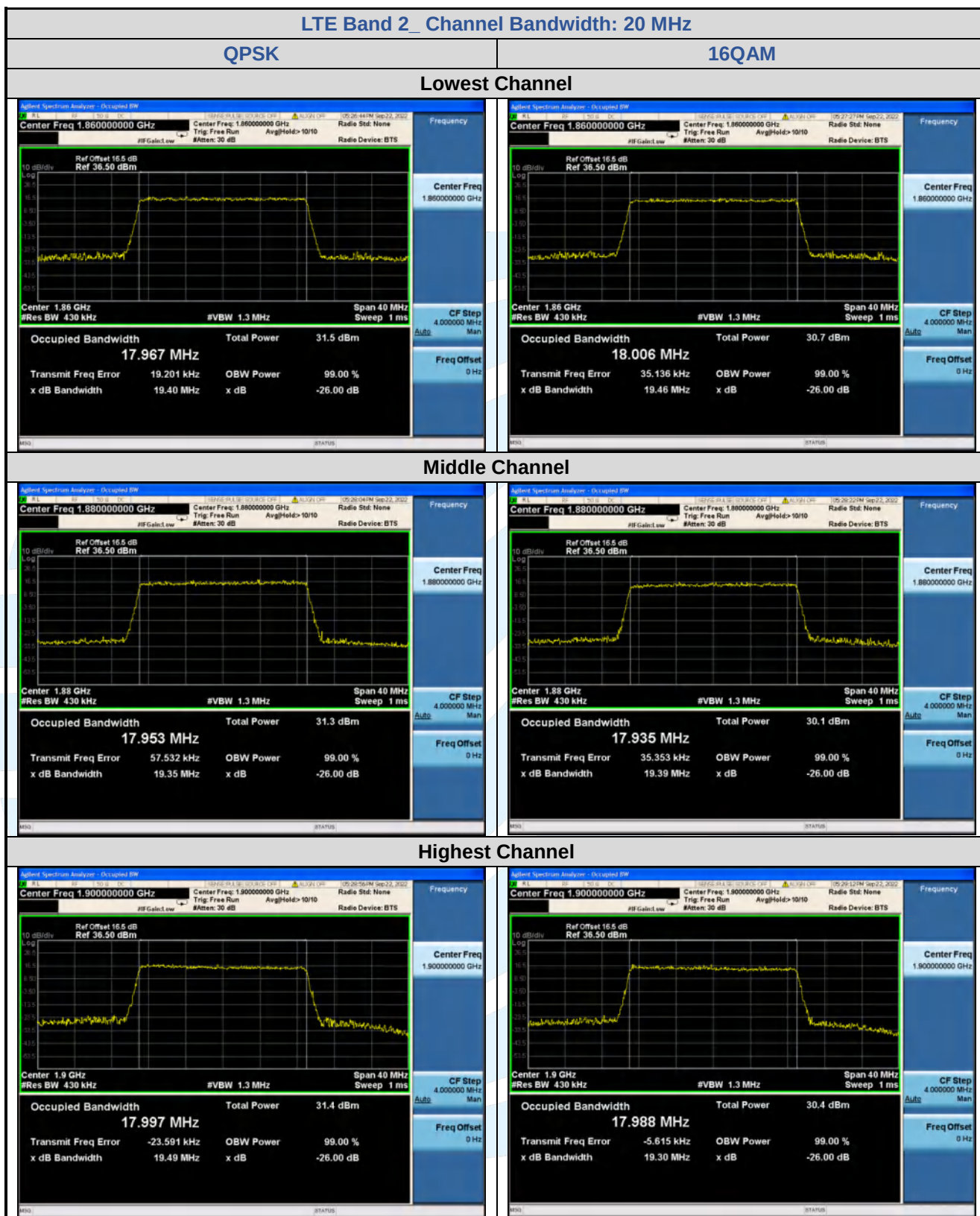


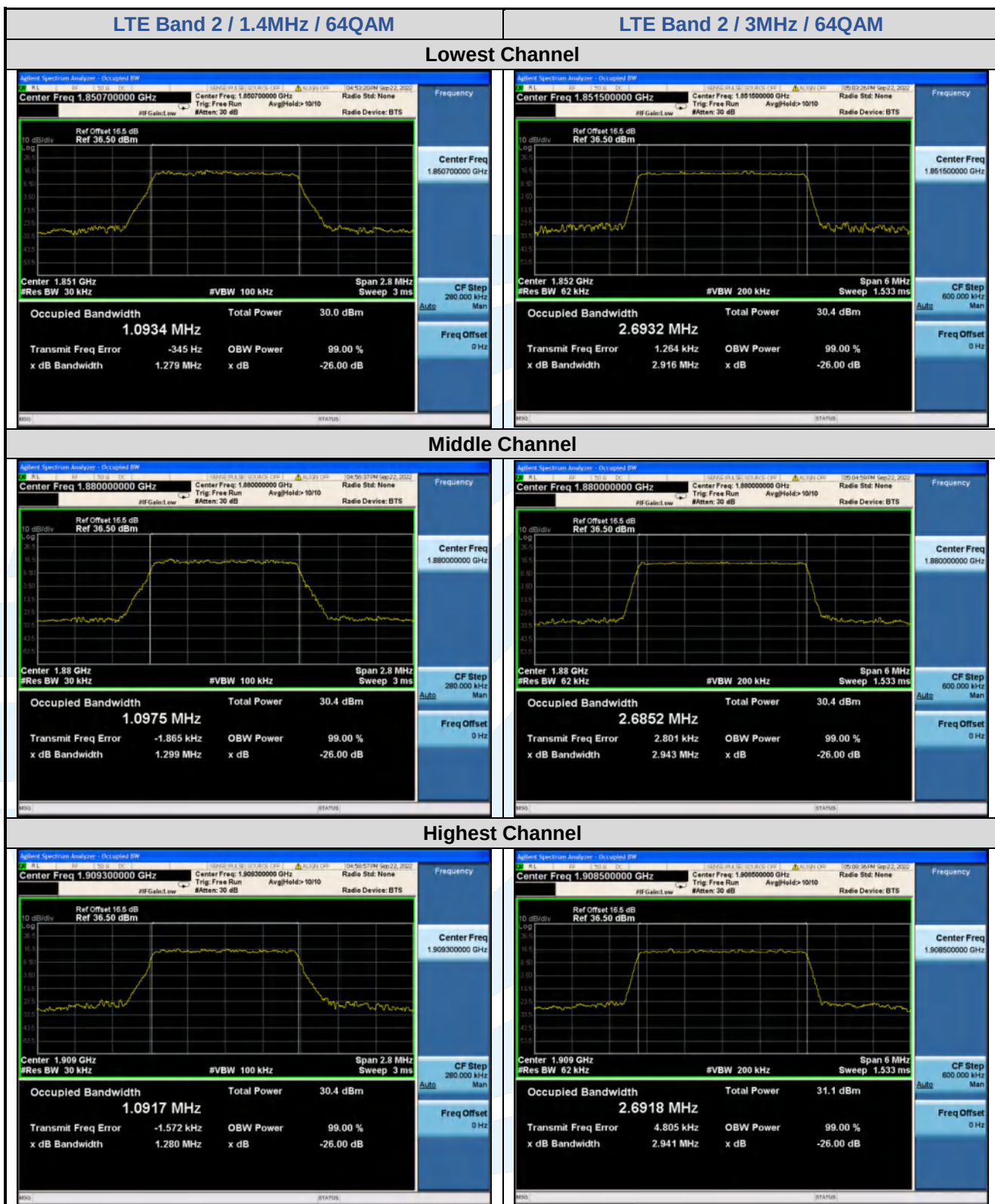
Middle Channel

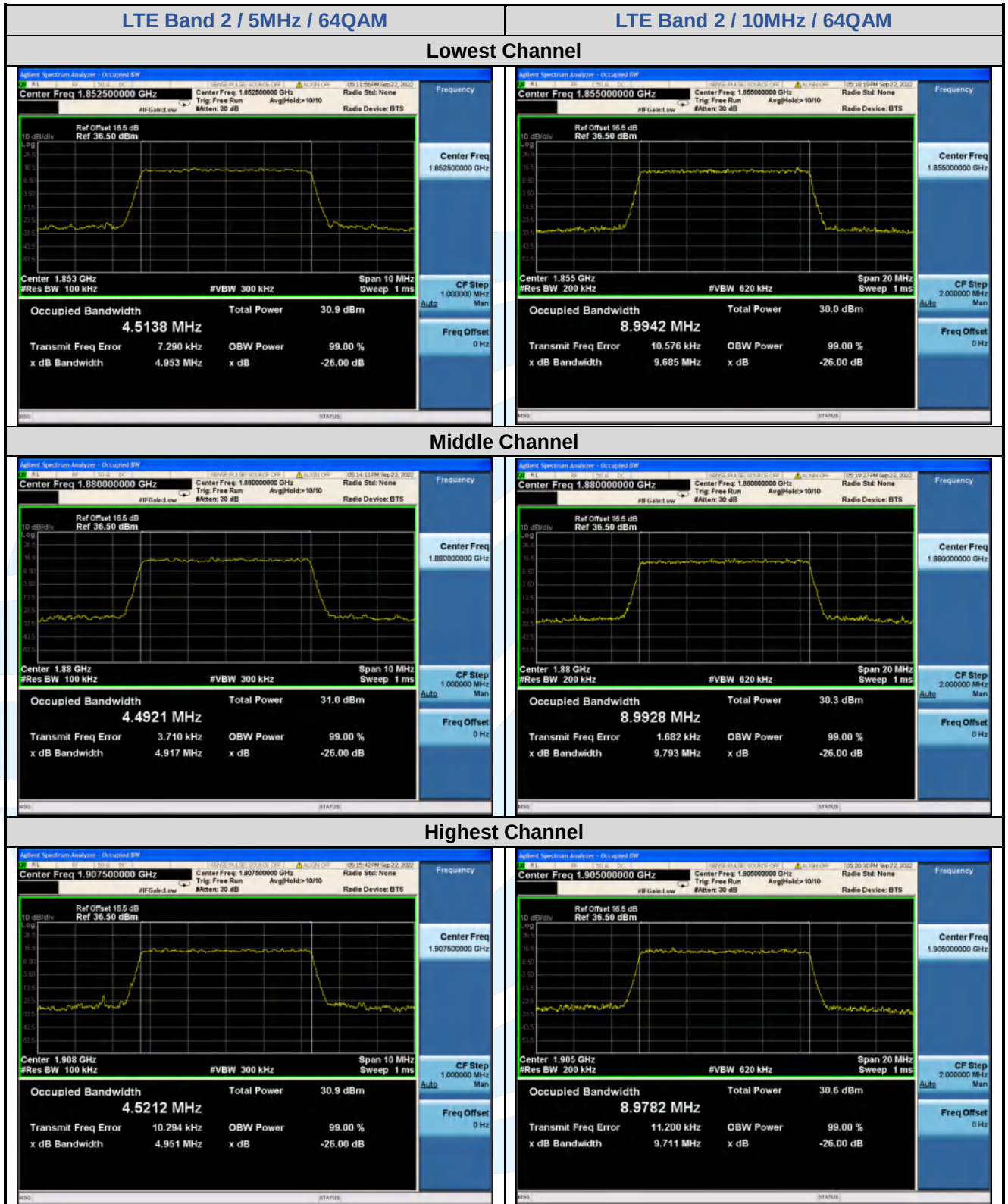


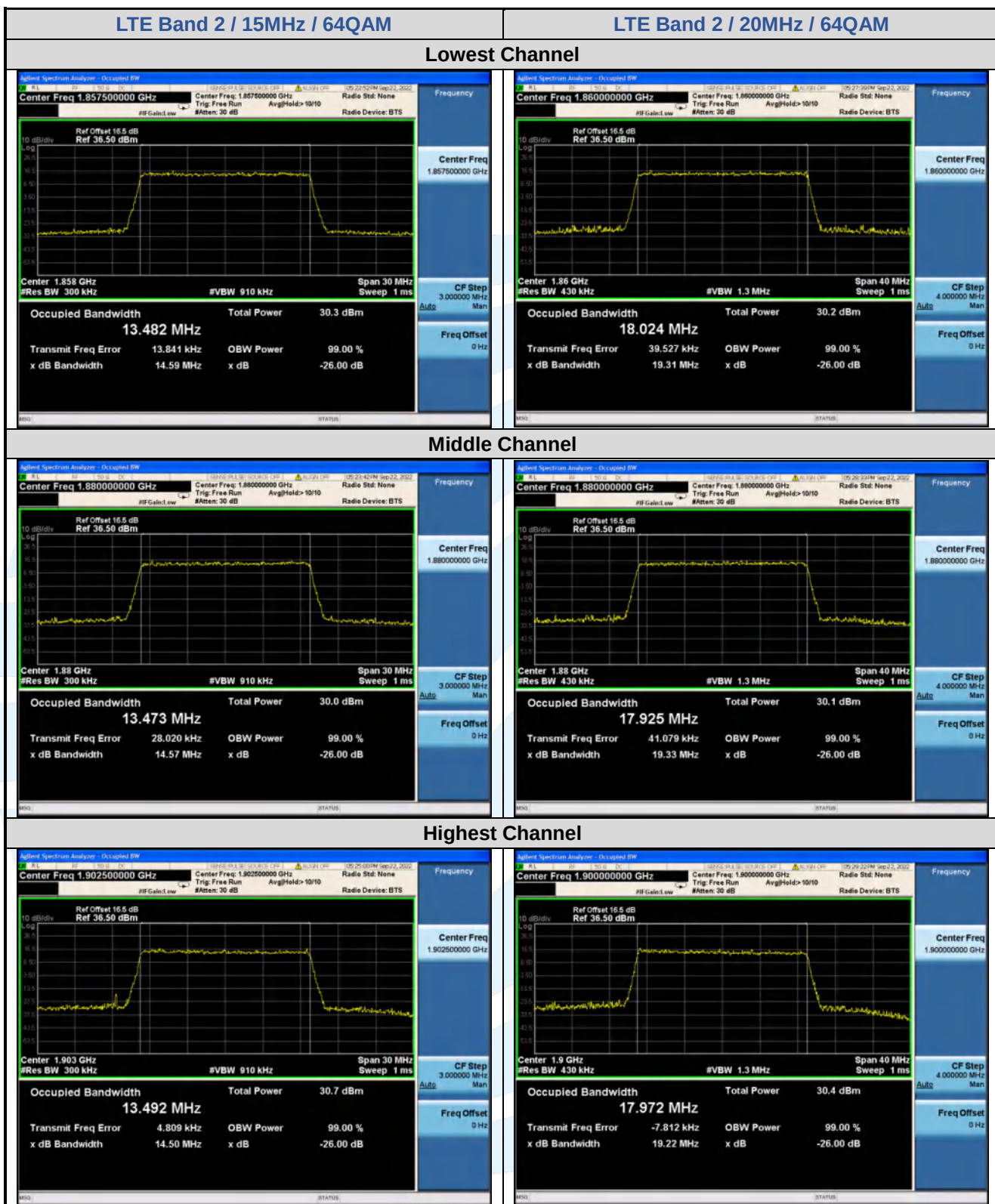
Highest Channel





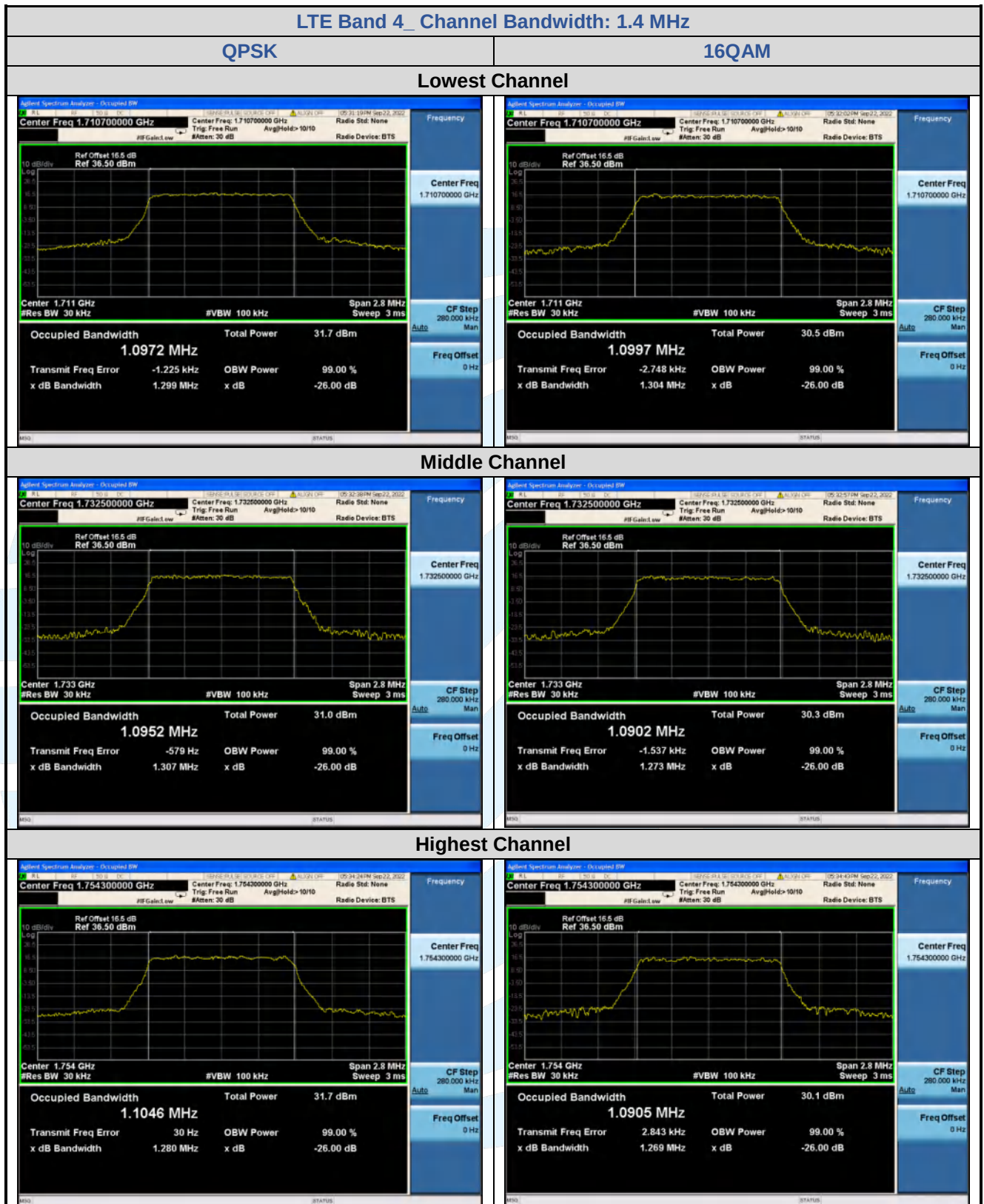


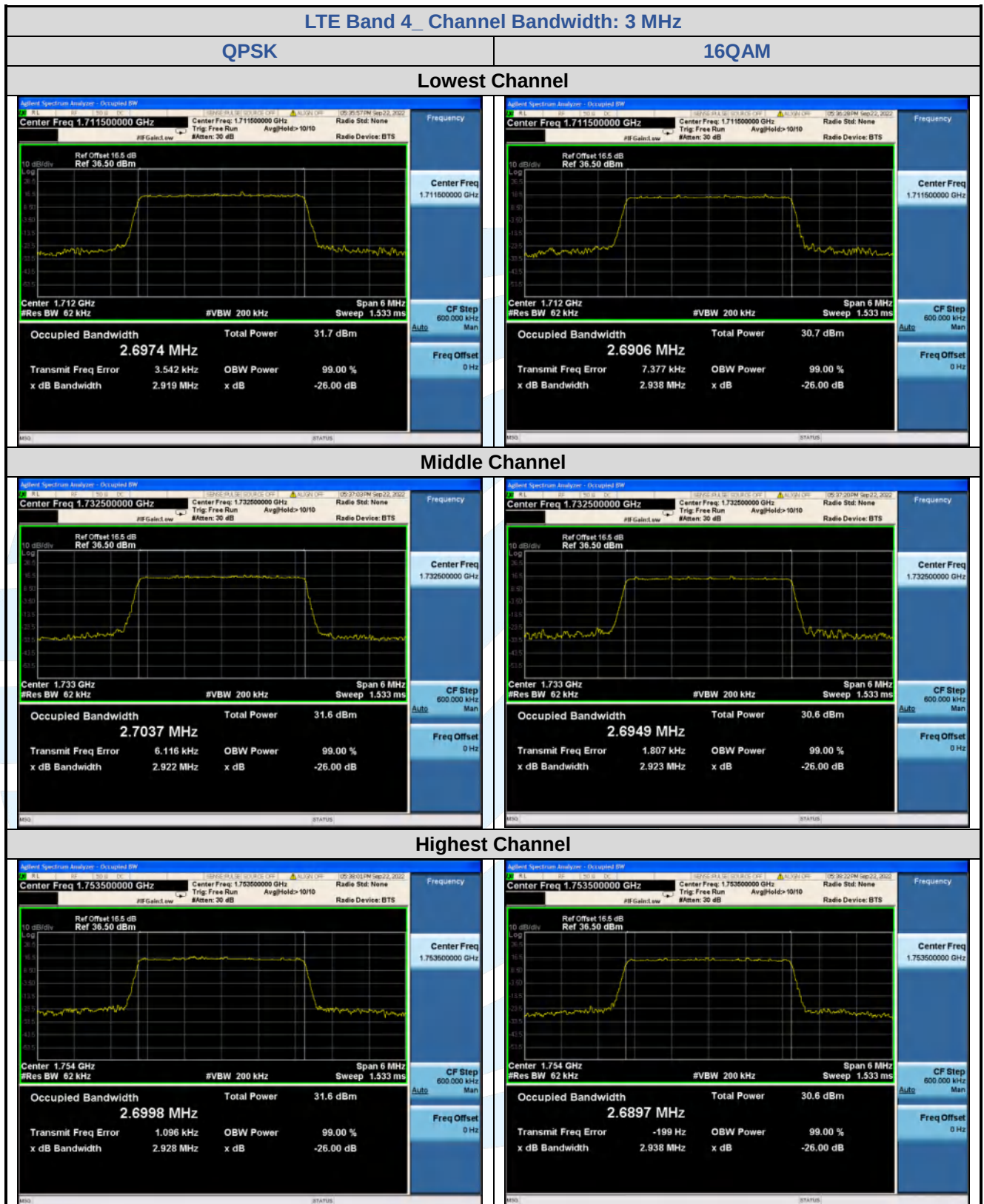


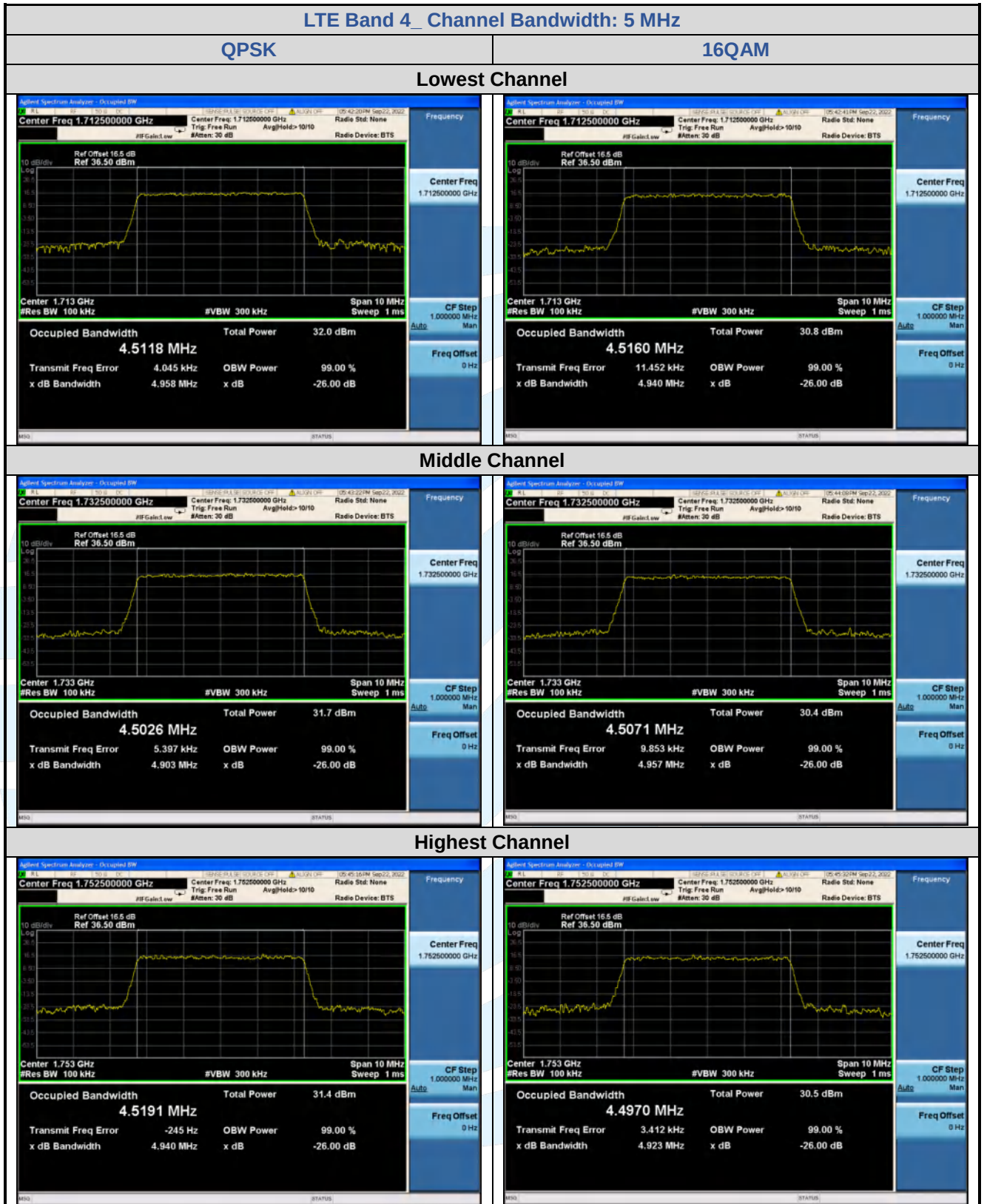


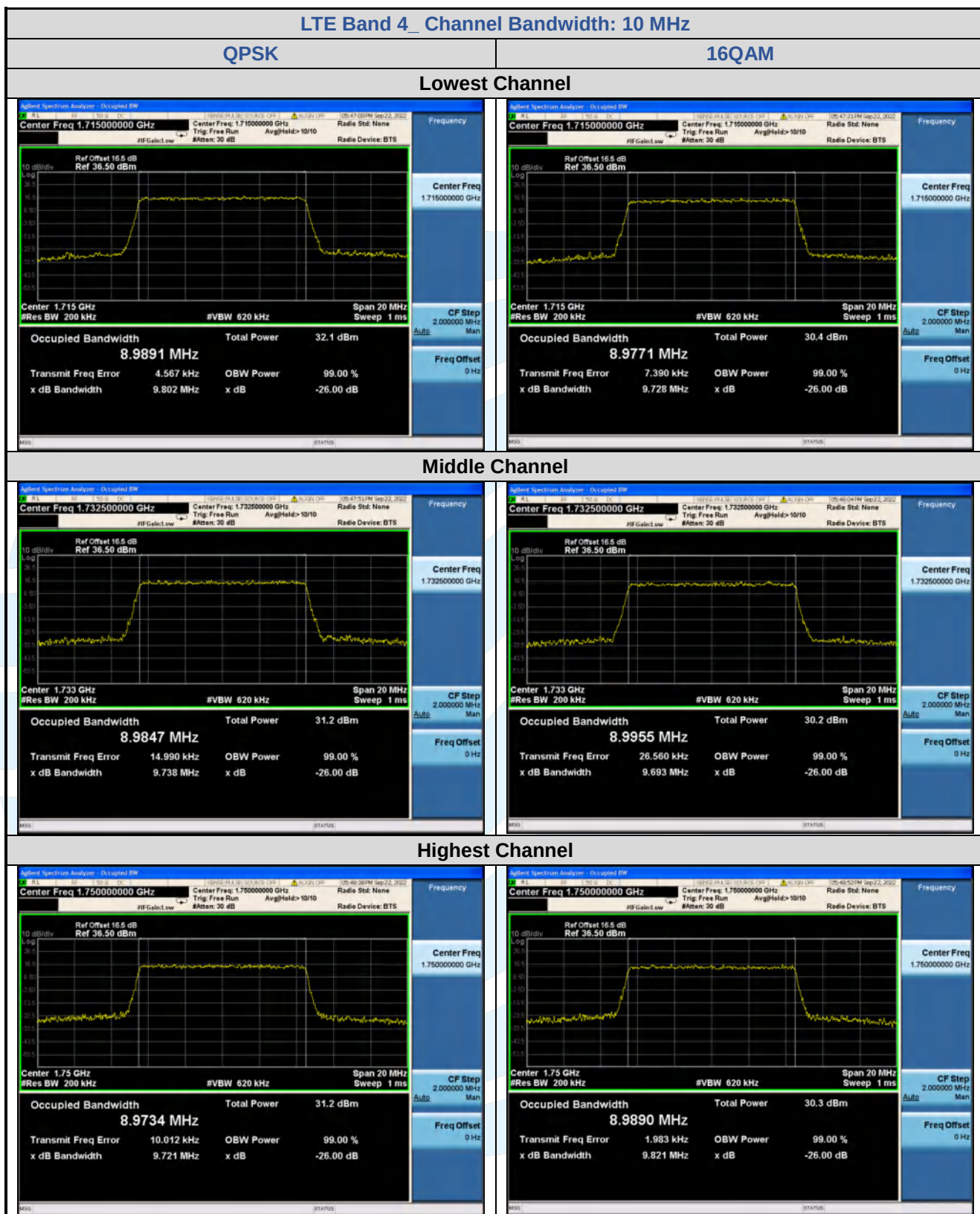
5.5.2 LTE Band 4

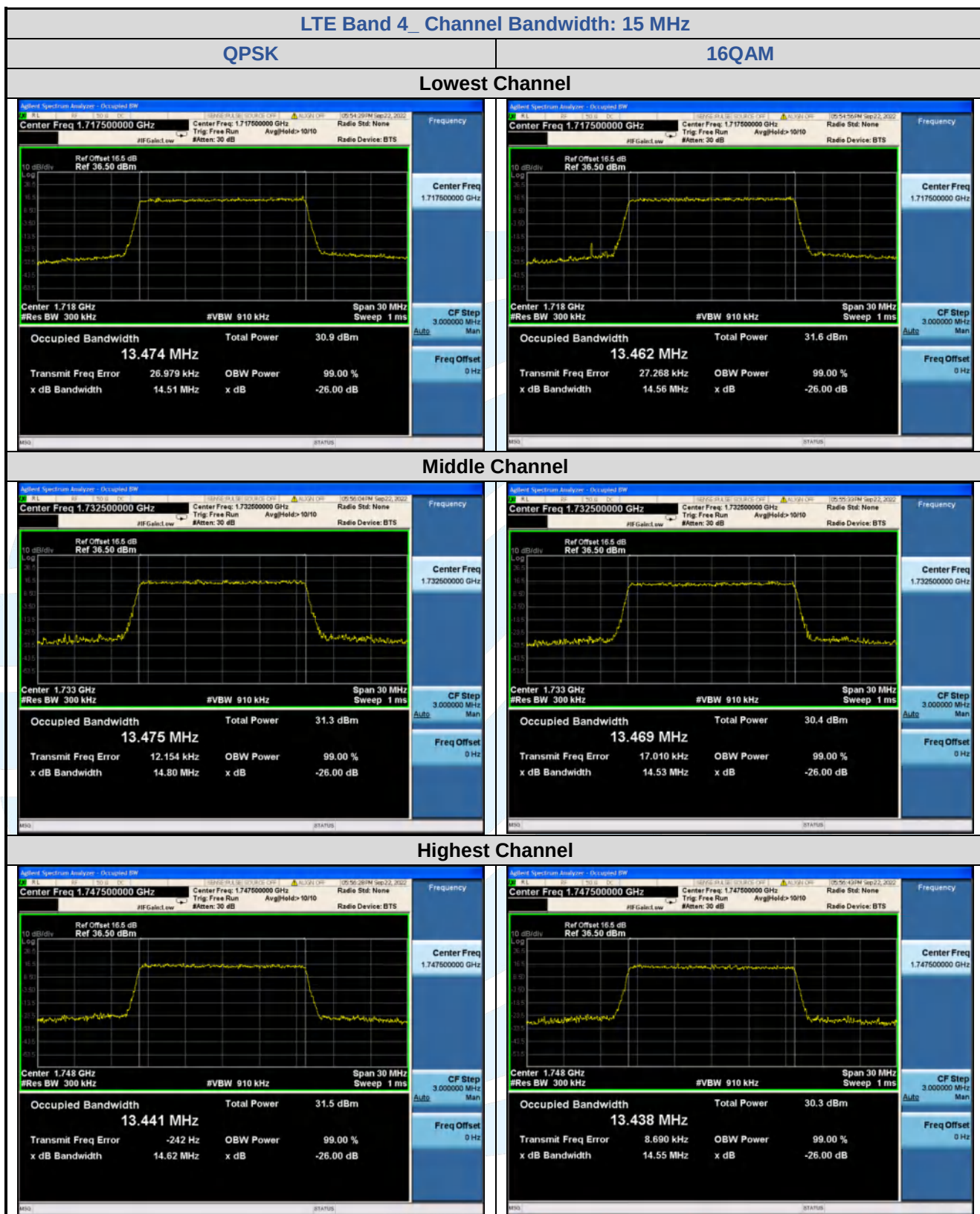
LTE Band 4								
Channel	RB Configuration		26 dB BW (MHz)			99% BW (MHz)		
	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Channel Bandwidth: 1.4 MHz								
Lowest	6	0	1.299	1.304	1.315	1.0972	1.0997	1.0994
Middle	6	0	1.307	1.273	1.279	1.0952	1.0902	1.0923
Highest	6	0	1.280	1.269	1.277	1.1046	1.0905	1.0951
Channel Bandwidth: 3 MHz								
Lowest	15	0	2.919	2.938	2.923	2.6974	2.6906	2.6831
Middle	15	0	2.922	2.923	2.921	2.7037	2.6949	2.6926
Highest	15	0	2.928	2.938	2.927	2.6998	2.6897	2.6827
Channel Bandwidth: 5 MHz								
Lowest	25	0	4.958	4.940	4.937	4.5118	4.5160	4.5158
Middle	25	0	4.903	4.957	4.965	4.5026	4.5071	4.5038
Highest	25	0	4.940	4.923	4.935	4.5191	4.4970	4.4943
Channel Bandwidth: 10 MHz								
Lowest	50	0	9.802	9.728	9.775	8.9891	8.9771	8.9856
Middle	50	0	9.738	9.693	9.745	8.9847	8.9955	8.9817
Highest	50	0	9.721	9.821	9.829	8.9734	8.9890	8.9925
Channel Bandwidth: 15 MHz								
Lowest	75	0	14.51	14.56	14.54	13.474	13.462	13.458
Middle	75	0	14.80	14.53	14.64	13.475	13.469	13.456
Highest	75	0	14.62	14.55	14.60	13.441	13.438	13.488
Channel Bandwidth: 20 MHz								
Lowest	100	0	19.63	19.24	19.42	17.949	17.934	17.954
Middle	100	0	19.14	19.40	19.47	17.965	18.007	18.014
Highest	100	0	19.44	19.36	19.41	17.961	17.924	17.945

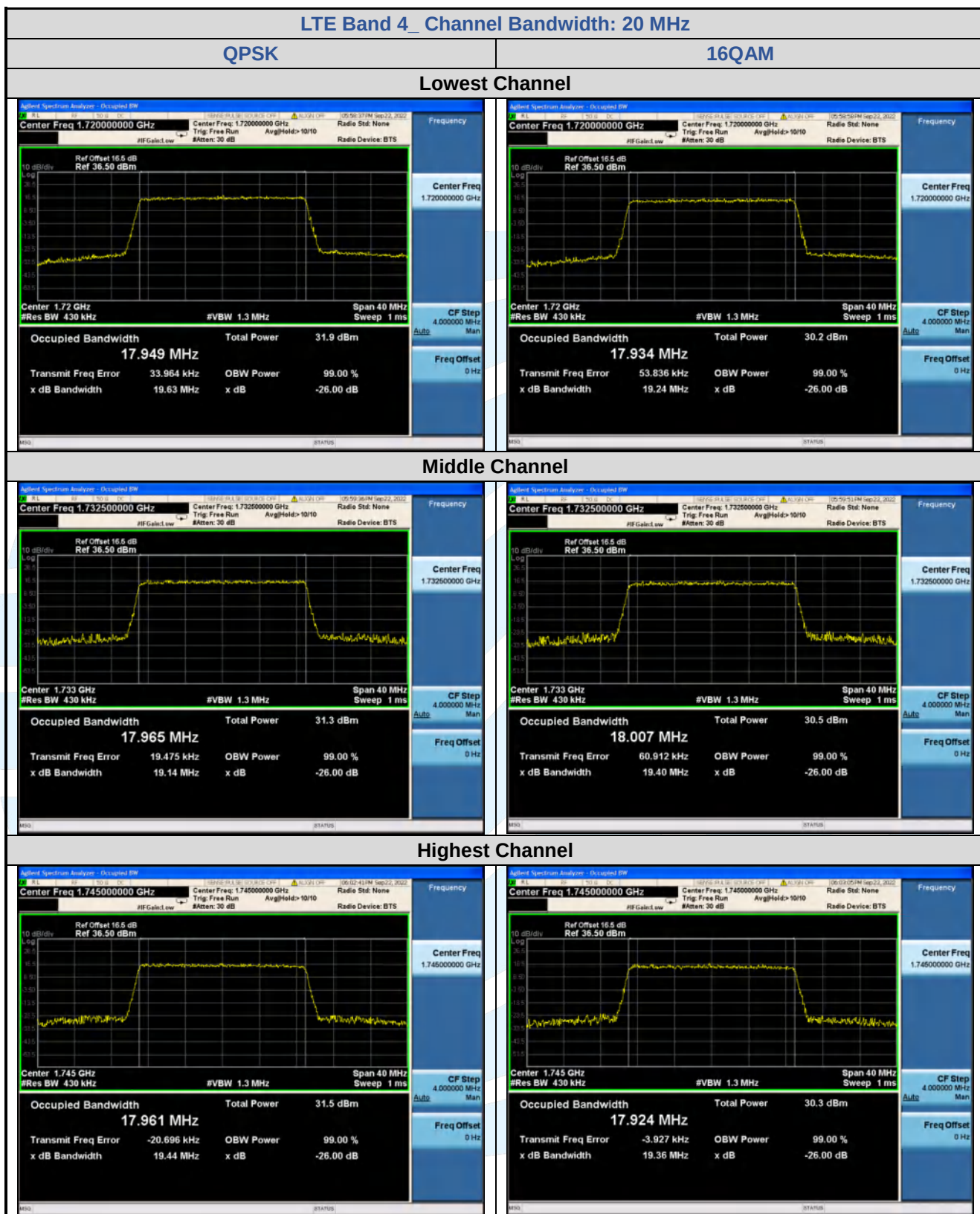


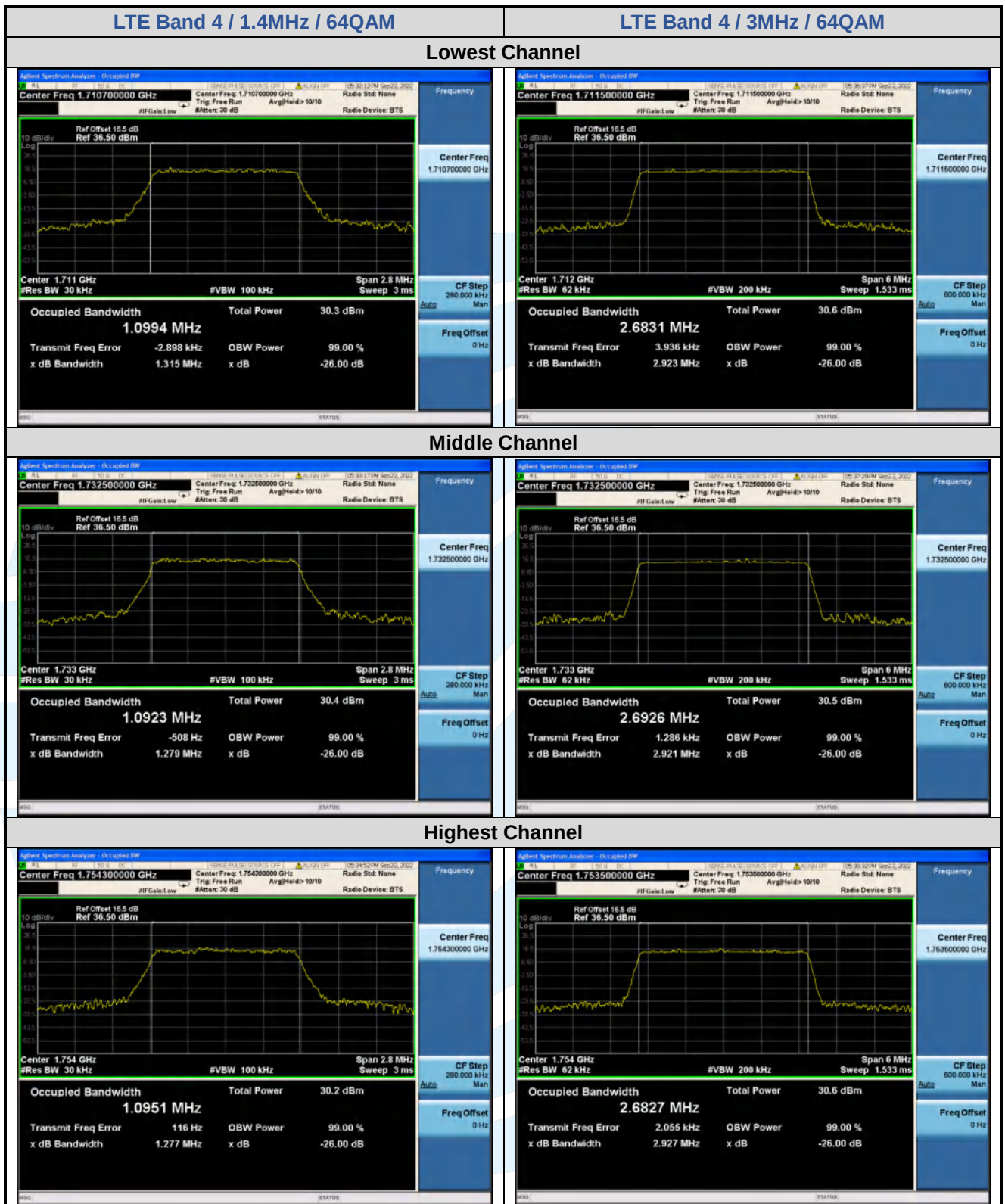


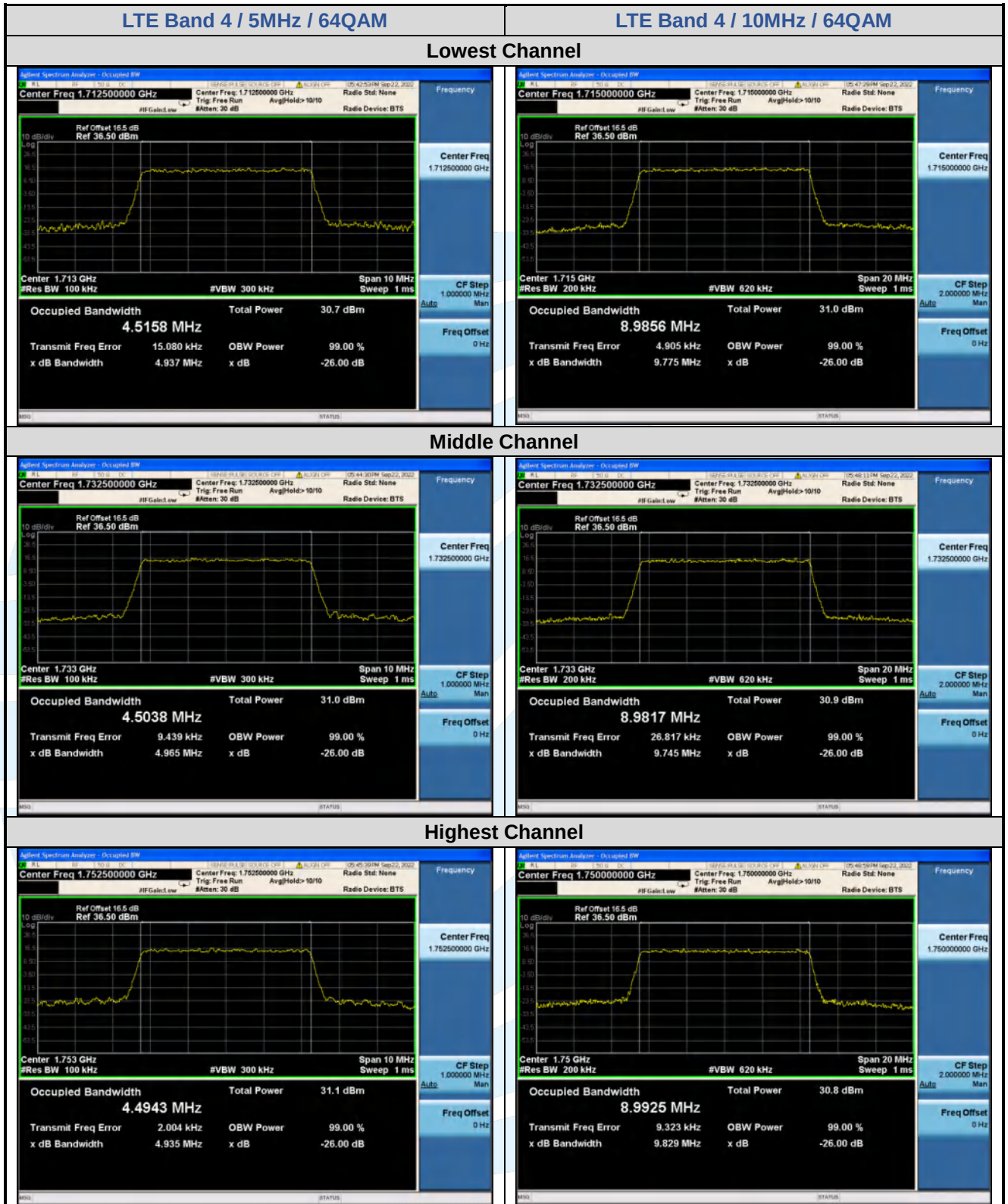


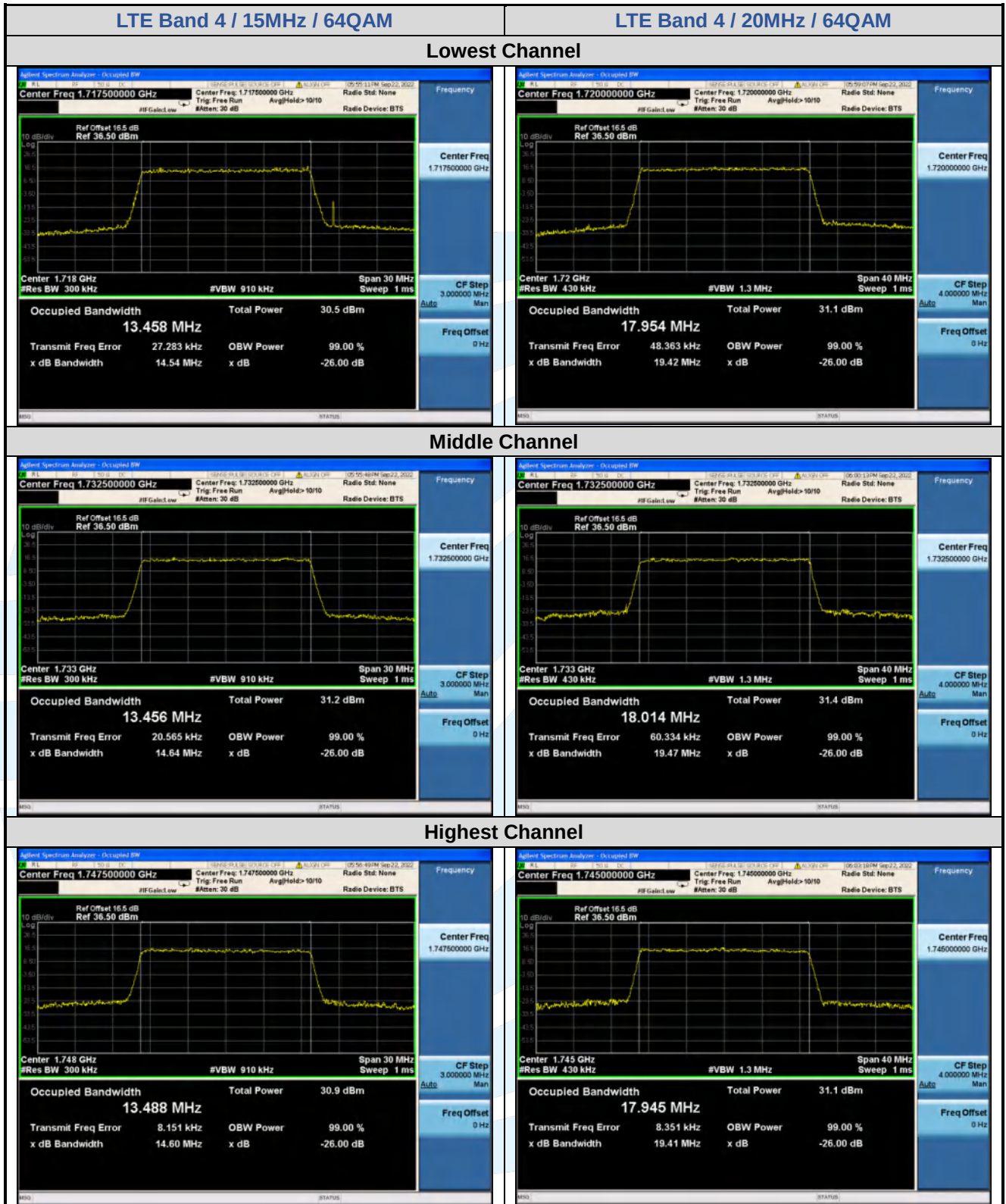












5.5.3 LTE Band 5

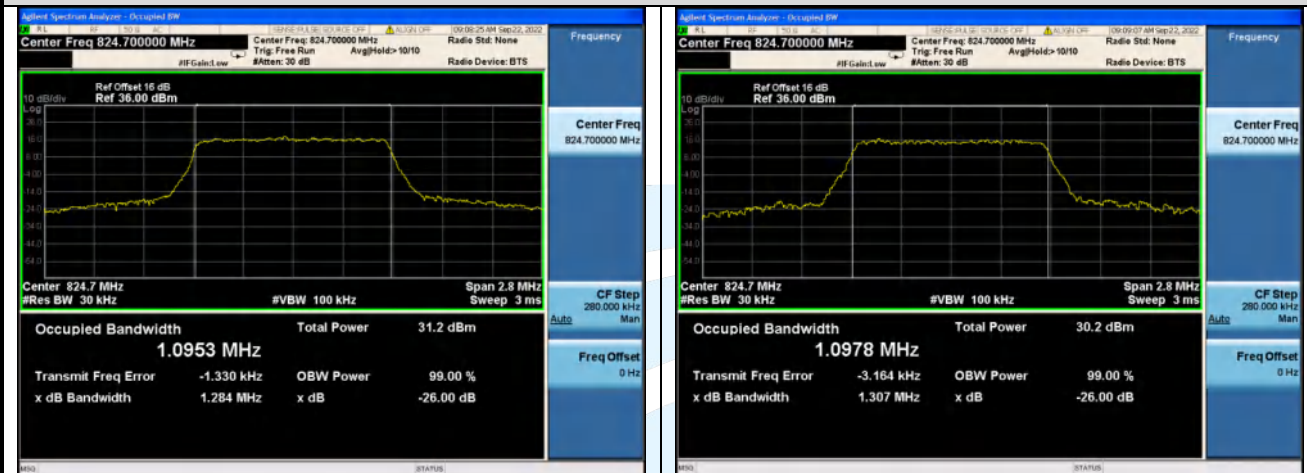
LTE Band 5								
Channel	RB Configuration		26 dB BW (MHz)			99% BW (MHz)		
	Size	Offset	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
Channel Bandwidth: 1.4 MHz								
Lowest	6	0	1.284	1.307	1.306	1.0953	1.0978	1.1027
Middle	6	0	1.305	1.279	1.279	1.1000	1.0965	1.0955
Highest	6	0	1.285	1.297	1.288	1.1051	1.0973	1.0936
Channel Bandwidth: 3 MHz								
Lowest	15	0	2.935	2.946	2.948	2.6948	2.6894	2.6919
Middle	15	0	2.935	2.933	2.927	2.7018	2.6956	2.6930
Highest	15	0	2.940	2.935	2.936	2.7032	2.6908	2.6872
Channel Bandwidth: 5 MHz								
Lowest	25	0	4.922	4.933	4.950	4.5001	4.5156	4.5132
Middle	25	0	4.950	4.955	4.914	4.5176	4.5014	4.4941
Highest	25	0	4.968	4.928	4.931	4.5125	4.5082	4.5192
Channel Bandwidth: 10 MHz								
Lowest	50	0	9.751	9.642	9.681	8.9768	8.9964	8.9907
Middle	50	0	9.781	9.888	9.778	8.9873	8.9782	8.9822
Highest	50	0	9.836	9.698	9.680	8.9994	8.9719	8.9804

LTE Band 5_ Channel Bandwidth: 1.4 MHz

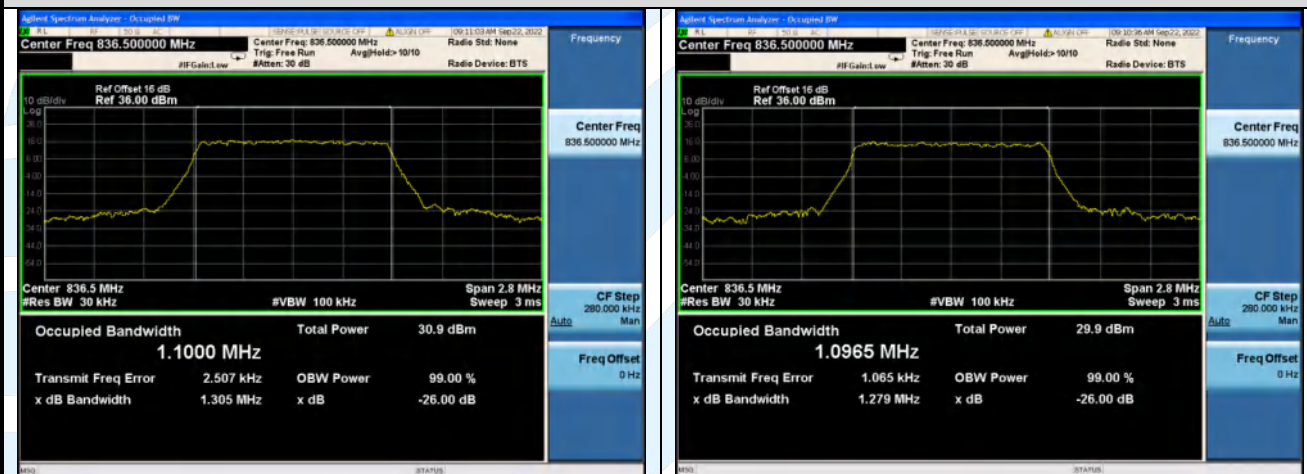
QPSK

16QAM

Lowest Channel



Middle Channel



Highest Channel

