

TEST REPORT

Product Name: Cinterion PLS83-X4
Trade Mark: CINTERION
Model No. / HVIN: PLS83-X4
Report Number: 210127008RFM-1
Test Standards: FCC 47 CFR Part 27
RSS-130 Issue 2, RSS-139 Issue 3,
RSS-Gen Issue 5
FCC ID: QIPPLS83-X4
IC: 7830A-PLS83X4
Test Result: PASS
Date of Issue: March 23, 2021

Prepared for:

Thales DIS AIS Deutschland GmbH
Siemensdamm 50, 13629 Berlin, Germany

Prepared by:

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Version

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



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Thales DIS AIS Deutschland GmbH
Address of Applicant:	Siemensdamm 50, 13629 Berlin, Germany
Manufacturer:	Thales DIS AIS Deutschland GmbH
Address of Manufacturer:	Werinherstr. 81, 81541 Munich, Germany

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Cinterion PLS83-X4	
Model No.:	PLS83-X4	
Trade Mark:	CINTERION	
DUT Stage:	Production Unit	
EUT Supports Function:	E-UTRA Bands:	Band 4/ Band 13
Original Sample Received Date:	August 25, 2020	
Original Sample Tested Date:	September 1, 2020 to September 24, 2020	
Sample Received Date:	January 27, 2021	
Sample Tested Date:	January 28, 2021 to February 7, 2021	

1.2.2 Description of Accessories

None.

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Support Networks:	LTE	
Type of Modulation:	LTE Band 4/13:	QPSK, 16QAM
Antenna Type:	External Antenna	
Antenna Gain:	LTE Band 4:	50 ohm terminal (0 dBi)
	LTE Band 13:	50 ohm terminal (0 dBi)
Normal Test Voltage:	3.8 Vdc	
Extreme Test Voltage:	3.2 to 4.5Vdc	
Extreme Test Temperature:	-30 °C to +65 °C	

Summary of Results:								
Bands	BW	Modulation	Frequency Range	Max RF Output Power (dBm)		ERP/EIRP	99% BW	Emission Designator
	(MHz)		(MHz)	Conducted (Average)	ERP/EIRP (Average)	(W)	(MHz)	
4	1.4	QPSK	1710.7-1754.3	22.95	22.95	0.19724	1.1050	1M11G7D
		16QAM		21.99	21.99	0.15812	1.0997	1M10W7D
	3	QPSK	1711.5-1753.5	23.00	23.00	0.19953	2.7036	2M70G7D
		16QAM		21.85	21.85	0.15311	2.7054	2M71W7D
	5	QPSK	1712.5-1752.5	23.01	23.01	0.19999	4.5246	4M52G7D
		16QAM		21.87	21.87	0.15382	4.5368	4M54W7D
	10	QPSK	1715-1750	22.90	22.90	0.19498	8.9776	8M98G7D
		16QAM		21.75	21.75	0.14962	9.0049	9M00W7D
	15	QPSK	1717.5-1747.5	23.08	23.08	0.20324	13.479	13M5G7D
		16QAM		21.80	21.80	0.15136	13.471	13M5W7D
	20	QPSK	1720-1745	23.38	23.38	0.21777	17.961	18M0G7D
		16QAM		22.20	22.20	0.16596	17.965	18M0W7D
13	5	QPSK	779.5-784.5	23.33	21.18	0.13122	4.5279	4M53G7D
		16QAM		22.54	20.39	0.10940	4.5336	4M53W7D
	10	QPSK	782-782	23.35	21.20	0.13183	8.9627	8M96G7D
		16QAM		22.54	20.39	0.10940	8.9468	8M95W7D

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
Adaptor	N/A	CD139	20359	Applicant
PCB board	N/A	DSB75	--	Applicant
PCB board	N/A	AH8	--	Applicant
50 ohm terminal	N/A	N/A	N/A	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
--	--	--	--	--

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 518109

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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/EN 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: 2005 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.

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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 × 10 ⁻⁸
14	RF Power, Conducted	± 0.9 dB

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2. TEST SUMMARY

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) RSS-139 Issue 3, Section 6.5	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(d)(4) RSS-139 Issue 3, Section 6.5	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5) RSS-139 Issue 3, Section 6.5	KDB 971168 D01v03r01	See Note
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) FCC 47 CFR Part 27.53(h) RSS-Gen Issue 5, Section 6.7	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Band Edge at antenna terminals	FCC 47 CFR Part 27.53(h)(1) RSS-139 Issue 3, Section 6.6	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53(h) RSS-139 Issue 3, Section 6.6	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53(h) RSS-139 Issue 3, Section 6.6	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54 RSS-139 Issue 3, Section 6.4	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note

FCC 47 CFR Part 27 Test Cases (LTE Band 13)			
Test Item	Test Requirement	Test Method	Result
Effective Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(b)(10) RSS-130 Issue 2, Section 4.6	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(b)(10) RSS-130 Issue 2, Section 4.6	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Peak-to-average ratio	FCC 47 CFR Part 27.50(d)(5) RSS-130 Issue 2, Section 4.6	KDB 971168 D01v03r01	See Note
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) RSS-Gen Issue 5, Section 6.7	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Band Edge at antenna terminals	FCC 47 CFR Part 27.53 RSS-130 Issue 2, Section 4.7	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 27.53 RSS-130 Issue 2, Section 4.7	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 27.53 RSS-130 Issue 2, Section 4.7	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 27.54 RSS-130 Issue 2, Section 4.5	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note

Note:

Difference description:

- 1) There are hardware differences between PLS83-X4 and PLS83-X Module. For detailed PCB board and component differences, see the difference statement document
- 2) The UE Category level of PLS83-X4 and PLS83-X is 4

Test Plan:

- 1) According to the difference description, PLS83-X4 shares the same data from the PLS83-X original report(Report No.: 200722022RFM-2).
- 2) This report is based on the report of 200722022RFM-2, just update the operating frequency bands and Field strength of spurious radiation
- 3) The FCC ID of PLS83-X is QIPPLS83-X
- 4) The ISED NO. of PLS83-X is 7830A-PLS83X
- 5) The data of PLS83-X was used for PLS83-X4 as below:

Band	Test Item	Description
LTE Band 4	Equivalent Isotropic Radiated Power (EIRP)	Reuse
	Conducted Output Power	Reuse
	Peak-to-average ratio	Reuse
	99%&26dB Bandwidth	Reuse
	Band Edge at antenna terminals	Reuse
	Spurious emissions at antenna terminals	Updated data
	Field strength of spurious radiation	Reuse
	Frequency stability	Reuse
LTE Band 13	Effective Radiated Power (ERP)	Reuse
	Conducted Output Power	Reuse
	Peak-to-average ratio	Reuse
	99%&26dB Bandwidth	Reuse
	Band Edge at antenna terminals	Reuse
	Spurious emissions at antenna terminals	Updated data
	Field strength of spurious radiation	Reuse
	Frequency stability	Reuse

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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)
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 24, 2019	Nov. 23, 2020
					Nov. 18, 2020	Nov. 17, 2021
☐	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
☒	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2019	Nov. 23, 2020
					Nov. 10, 2020	Nov. 09, 2021
☐	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	May. 30, 2020	May. 29, 2021
☐	6dB Attenuator	Talent	RA6A5-N-18	18103002	Nov. 24, 2019	Nov. 23, 2020
					Nov. 18, 2020	Nov. 17, 2021
☐	Horn Antenna	ETS-LINDGREN	3117	00164202	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May. 30, 2020	May. 29, 2021
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jun. 19, 2020	Jun. 18, 2021
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 16, 2019	Nov. 15, 2020
					Nov. 14, 2020	Nov. 13, 2021
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	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)
☒	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 24, 2019	Nov. 23, 2020
					Nov. 18, 2020	Nov. 17, 2021
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Nov. 24, 2019	Nov. 23, 2020
					Nov. 10, 2020	Nov. 09, 2021
☒	Wideband Radio Communication Tester	R&S	CMW500	119583	Jul. 20, 2020	Jul. 19, 2021
☐	Universal Radio Communication Tester	R&S	CMU200	114713	Nov. 24, 2019	Nov. 23, 2020
					Nov. 10, 2020	Nov. 09, 2021
☒	DC Source	KIKUSUI	PWR400L	LK003024	N/A	N/A
☒	Temp & Humidity chamber	Votisch	VT4002	58566133290020	May. 11, 2020	May. 10, 2021

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4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

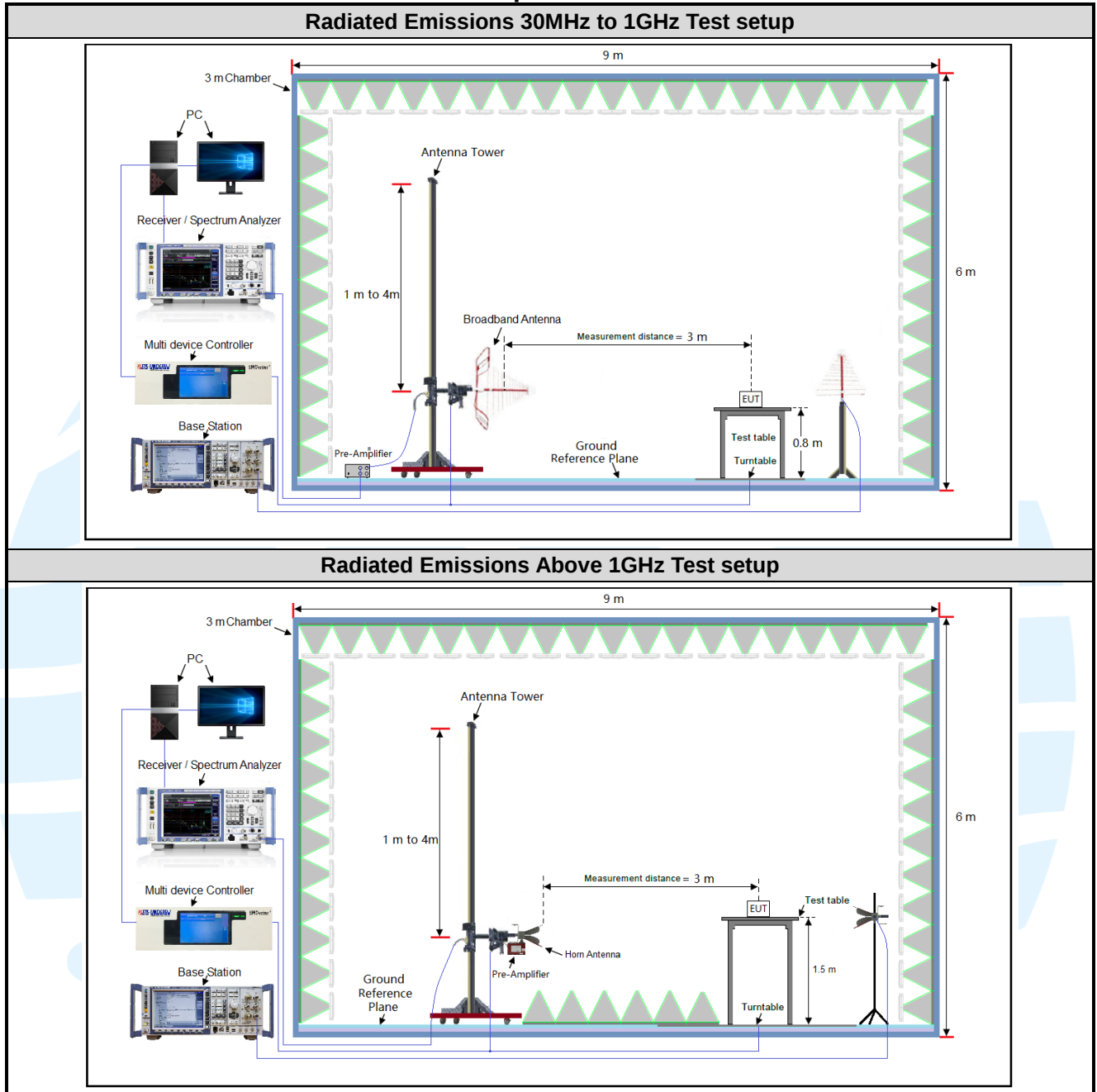
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	-30	3.2	20 to 75
TH/VL	+65	3.2	20 to 75
TL/VH	-30	4.5	20 to 75
TH/VH	+65	4.5	20 to 75

Remark:

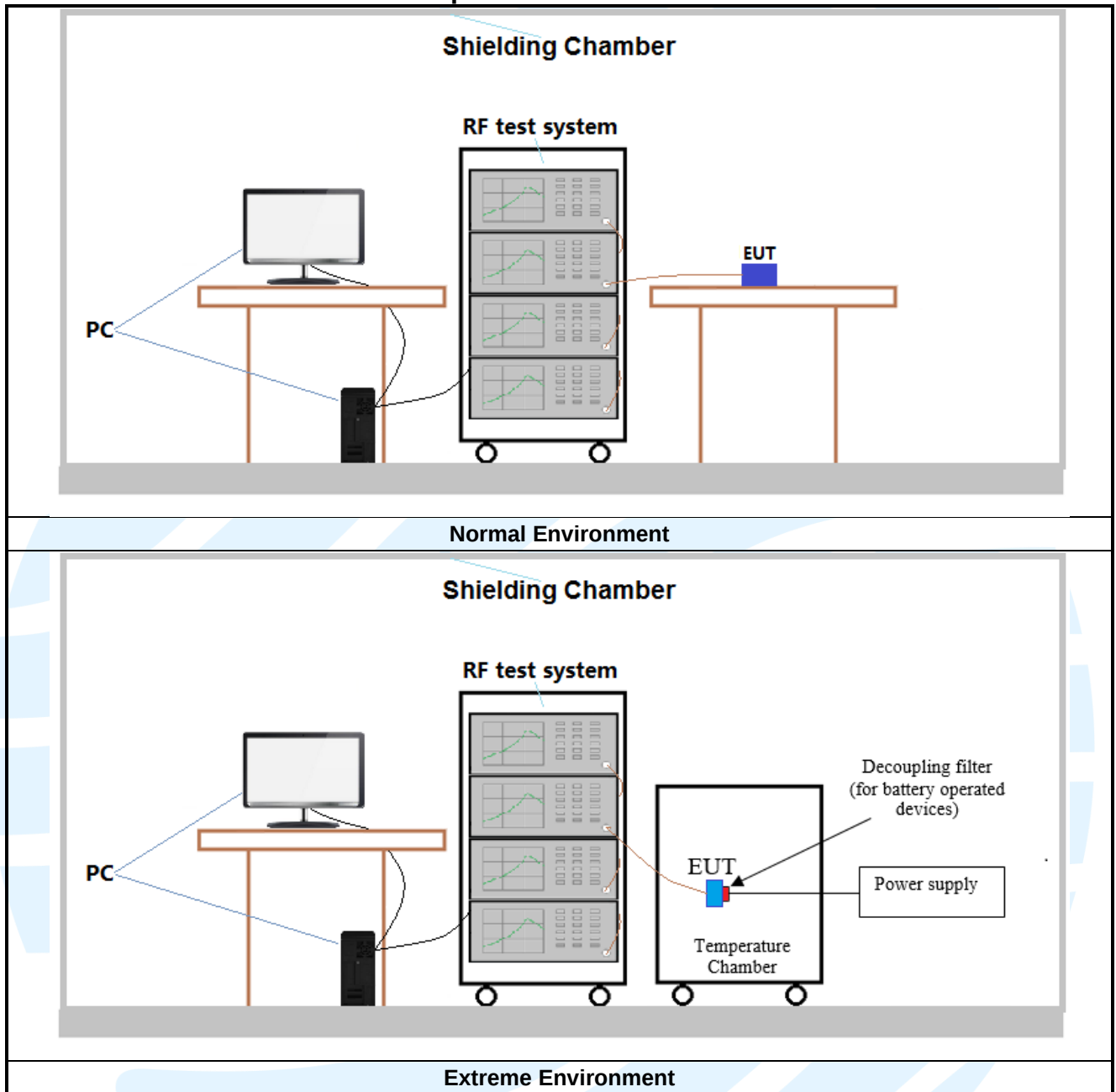
- 1) The EUT just work in such extreme temperature of -30 °C to +65 °C and the extreme voltage of 3.2 V to 4.5V, so here the EUT is tested in the temperature of -30 °C to +65 °C and the voltage of 3.2 V to 4.5 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
TL: Low Extreme Test Temperature; TH: High 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 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 13 TX: 777-787MHz	Low Range	5	23205	779.5
		10	23230	782
	Middle Range	5/10	23230	782
	High Range	5	23255	784.5
		10	23230	782

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 4	1TX	Chain 0	Z axis
LTE Band 13	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 4

LTE Band 4 Maximum Average Power (dBm)										
Modulation	RB		Test Channel			RB		Test Channel		
	Size	Offset	Low	Mid	High	Size	Offset	Low	Mid	High
Channel Bandwidth: 1.4 MHz						Channel Bandwidth: 3 MHz				
QPSK	1	0	22.73	22.63	22.35	1	0	22.72	22.62	22.39
	1	2	22.85	22.91	22.79	1	7	23.00	22.99	22.90
	1	5	22.59	22.95	22.60	1	14	22.76	22.94	22.71
	3	0	22.70	22.70	22.68	8	0	21.71	21.78	21.65
	3	1	22.62	22.81	22.87	8	3	21.61	21.75	21.92
	3	3	22.74	22.68	22.78	8	7	21.76	21.75	21.95
	6	0	21.64	21.66	21.71	15	0	21.54	21.80	21.77
16QAM	1	0	21.05	21.51	21.64	1	0	20.96	21.40	21.64
	1	2	21.43	21.56	21.73	1	7	21.47	21.54	21.85
	1	5	21.43	21.59	21.82	1	14	21.37	21.58	21.83
	3	0	21.67	21.82	21.96	8	0	20.64	20.73	20.89
	3	1	21.85	21.68	21.96	8	3	20.78	20.69	21.01
	3	3	21.75	21.80	21.99	8	7	20.83	20.85	20.99
	6	0	20.77	20.66	20.84	15	0	20.73	20.68	20.93
Channel Bandwidth: 5 MHz						Channel Bandwidth: 10 MHz				
QPSK	1	0	22.77	22.67	22.41	1	0	22.82	22.66	22.32
	1	12	23.01	22.92	22.82	1	24	22.86	23.02	22.87
	1	24	22.61	22.95	22.59	1	49	22.66	22.90	22.57
	12	0	21.76	21.78	21.56	25	0	21.79	21.81	21.77
	12	6	21.70	21.69	22.04	25	12	21.73	21.69	21.96
	12	13	21.60	21.81	21.94	25	25	21.70	21.78	21.96
	25	0	21.56	21.80	21.77	50	0	21.54	21.69	21.66
16QAM	1	0	21.10	21.57	21.63	1	0	21.11	21.45	21.63
	1	12	21.47	21.63	21.87	1	24	21.38	21.48	21.75
	1	24	21.47	21.69	21.64	1	49	21.50	21.56	21.74
	12	0	20.65	20.64	21.01	25	0	20.69	20.73	20.95
	12	6	20.74	20.60	20.93	25	12	20.84	20.69	21.01
	12	13	20.80	20.73	21.01	25	25	20.72	20.71	20.92
	25	0	20.63	20.75	20.91	50	0	20.71	20.70	20.83
Channel Bandwidth: 15 MHz						Channel Bandwidth: 20 MHz				
QPSK	1	0	22.72	22.55	22.34	1	0	22.83	23.01	22.92
	1	37	22.90	23.08	22.91	1	50	23.18	23.38	23.32
	1	74	22.69	22.85	22.58	1	99	22.68	22.97	22.90
	37	0	21.68	21.69	21.58	50	0	21.95	21.85	22.06
	37	19	21.65	21.72	22.04	50	25	21.90	22.00	22.01
	37	39	21.70	21.67	21.82	50	50	21.87	21.96	21.91
	75	0	21.68	21.72	21.68	100	0	22.06	21.76	21.94
16QAM	1	0	20.98	21.49	21.66	1	0	21.56	21.68	21.40
	1	37	21.45	21.58	21.74	1	50	21.96	21.92	22.18
	1	74	21.48	21.63	21.80	1	99	22.20	22.14	21.45
	37	0	20.75	20.79	20.94	50	0	21.36	21.10	21.18
	37	19	20.79	20.66	20.96	50	25	21.04	21.10	21.02
	37	39	20.81	20.84	20.87	50	50	21.12	21.09	20.99
	75	0	20.75	20.67	20.88	100	0	21.09	20.89	21.04

4.5.2 LTE Band 13

LTE Band 13 Maximum Average Power (dBm)										
Modulation	RB		Test Channel			RB		Test Channel		
	Size	Offset	Low	Mid	High	Size	Offset	Low	Mid	High
Channel Bandwidth: 5 MHz						Channel Bandwidth: 10 MHz				
QPSK	1	0	23.25	23.32	23.33	1	0	/	23.35	/
	1	12	23.19	23.15	23.17	1	24	/	23.24	/
	1	24	22.97	23.14	23.06	1	49	/	23.15	/
	12	0	22.07	22.22	22.13	25	0	/	22.22	/
	12	6	22.18	22.07	22.05	25	12	/	22.19	/
	12	13	22.06	21.94	22.03	25	25	/	22.13	/
	25	0	21.97	21.99	22.07	50	0	/	22.14	/
16QAM	1	0	22.12	22.08	22.13	1	0	/	22.18	/
	1	12	22.38	22.54	22.49	1	24	/	22.54	/
	1	24	21.98	22.13	22.09	1	49	/	22.16	/
	12	0	21.00	21.04	21.10	25	0	/	21.16	/
	12	6	21.04	21.11	21.18	25	12	/	21.19	/
	12	13	21.17	21.11	21.01	25	25	/	21.20	/
	25	0	21.10	21.15	21.17	50	0	/	21.18	/

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	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☒	☐	☐	☒	☒	☒
Conducted output power	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☒	☒	☒	☒	☒	☒

Item	Band	Bandwidth(MHz)						Modulation			RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
99%&26dB Bandwidth	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☐	☐	☒	☒	☒	☒
peak-to-average ratio	4	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	13	-	-	☐	☒	-	-	☒	☒	☒	☒	☐	☒	☒	☐	☒

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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	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☒	☐	☒	☒	☐	☒
Spurious emissions at antenna terminals	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☒	☐	☐	☒	☒	☒

Item	Band	Bandwidth(MHz)						Modulation			RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Field strength of spurious radiation	4	☐	☐	☐	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☒	☒
	13	-	-	☐	☒	-	-	☒	☐	☐	☒	☐	☐	☒	☒	☒
Frequency stability	4	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☒	☐	☒	☐
	13	-	-	☐	☒	-	-	☒	☐	☐	☐	☐	☒	☐	☒	☐
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
4	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
5	RSS-Gen Issue 5	General Requirements for Compliance of Radio Apparatus
6	RSS-130 Issue 2	Equipment Operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz
8	RSS-139 Issue 3	Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz
9	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 4 : FCC 47 CFR Part 27.50(d)(4), RSS-139 Issue 3, Section 6.5
LTE Band 13: FCC 47 CFR Part 27.50(b)(10), RSS-130 Issue 2, Section 4.6
Test Method: KDB 971168 D01v03r01 Section 5.6 & ANSI C63.26-2015
Limit:

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(b)(10):

Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

RSS-130 Issue 2, Section 4.6,

4.6.2 Frequency bands 617-652 MHz and 663-698 MHz

The e.r.p. shall not exceed 3 watts for mobile equipment, fixed subscriber equipment and portable equipment.

4.6.3 Frequency bands 698-756 MHz and 777-787 MHz

The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

RSS-139 Issue 3, Section 6.5

The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1710-1780 MHz shall not exceed one watt.

Test Procedure:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_T - L_C$$

where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

1) 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.

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Instruments Used: Refer to section 3 for details

Test Mode: Link mode

Test Results: Pass

Test Data: See table below



5.2.1 LTE Band 4

LTE Band 4 Maximum EIRP (dBm)					
Channel	QPSK; RB:1	16QAM; RB:1	64QAM; RB:1	Limit (dBm)	Result
Channel Bandwidth: 1.4MHz					
Lowest	22.59	21.75	/	30.00	Pass
Middle	22.95	21.80	/	30.00	Pass
Highest	22.60	21.99	/	30.00	Pass
Channel Bandwidth: 3MHz					
Lowest	23.00	21.47	/	30.00	Pass
Middle	22.99	21.54	/	30.00	Pass
Highest	22.90	21.85	/	30.00	Pass
Channel Bandwidth: 5MHz					
Lowest	23.01	21.47	/	30.00	Pass
Middle	22.92	21.63	/	30.00	Pass
Highest	22.82	21.87	/	30.00	Pass
Channel Bandwidth: 10MHz					
Lowest	22.66	21.38	/	30.00	Pass
Middle	22.90	21.48	/	30.00	Pass
Highest	22.57	21.75	/	30.00	Pass
Channel Bandwidth: 15MHz					
Lowest	22.90	21.48	/	30.00	Pass
Middle	23.08	21.63	/	30.00	Pass
Highest	22.91	21.80	/	30.00	Pass
Channel Bandwidth: 20MHz					
Lowest	23.18	22.20	/	30.00	Pass
Middle	23.38	22.14	/	30.00	Pass
Highest	23.32	21.45	/	30.00	Pass

5.2.2 LTE Band 13

LTE Band 13 Maximum ERP (dBm)					
Channel	QPSK; RB:1	16QAM; RB:1	64QAM; RB:1	Limit (dBm)	Result
Channel Bandwidth: 5MHz					
Lowest	21.10	20.23	/	34.77	Pass
Middle	21.17	20.39	/	34.77	Pass
Highest	21.18	20.34	/	34.77	Pass
Channel Bandwidth: 10MHz					
Lowest	/	/	/	34.77	Pass
Middle	21.20	20.39	/	34.77	Pass
Highest	/	/	/	34.77	Pass

5.3 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a),
LTE Band 4: FCC 47 CFR Part 27.50(d)(4), RSS-139 Issue 3, Section 6.5
LTE Band 13: FCC 47 CFR Part 27.50(b)(10), RSS-130 Issue 2, Section 4.6
Test Method: KDB 971168 D01v03r01 & ANSI C63.26-2015
Limit:

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(b)(10):

Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

RSS-130 Issue 2, Section 4.6,

4.6.2 Frequency bands 617-652 MHz and 663-698 MHz

The e.r.p. shall not exceed 3 watts for mobile equipment, fixed subscriber equipment and portable equipment.

4.6.3 Frequency bands 698-756 MHz and 777-787 MHz

The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

RSS-139 Issue 3, Section 6.5

The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1710-1780 MHz shall not exceed one watt.

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 4: FCC 47 CFR Part 27.50(d)(5), RSS-139 Issue 3, Section 6.5
LTE Band 13: FCC 47 CFR Part 27.50(d)(5), RSS-130 Issue 2, Section 4.6

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.

- Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth
- Set the number of counts to a value that stabilizes the measured CCDF curve
- 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

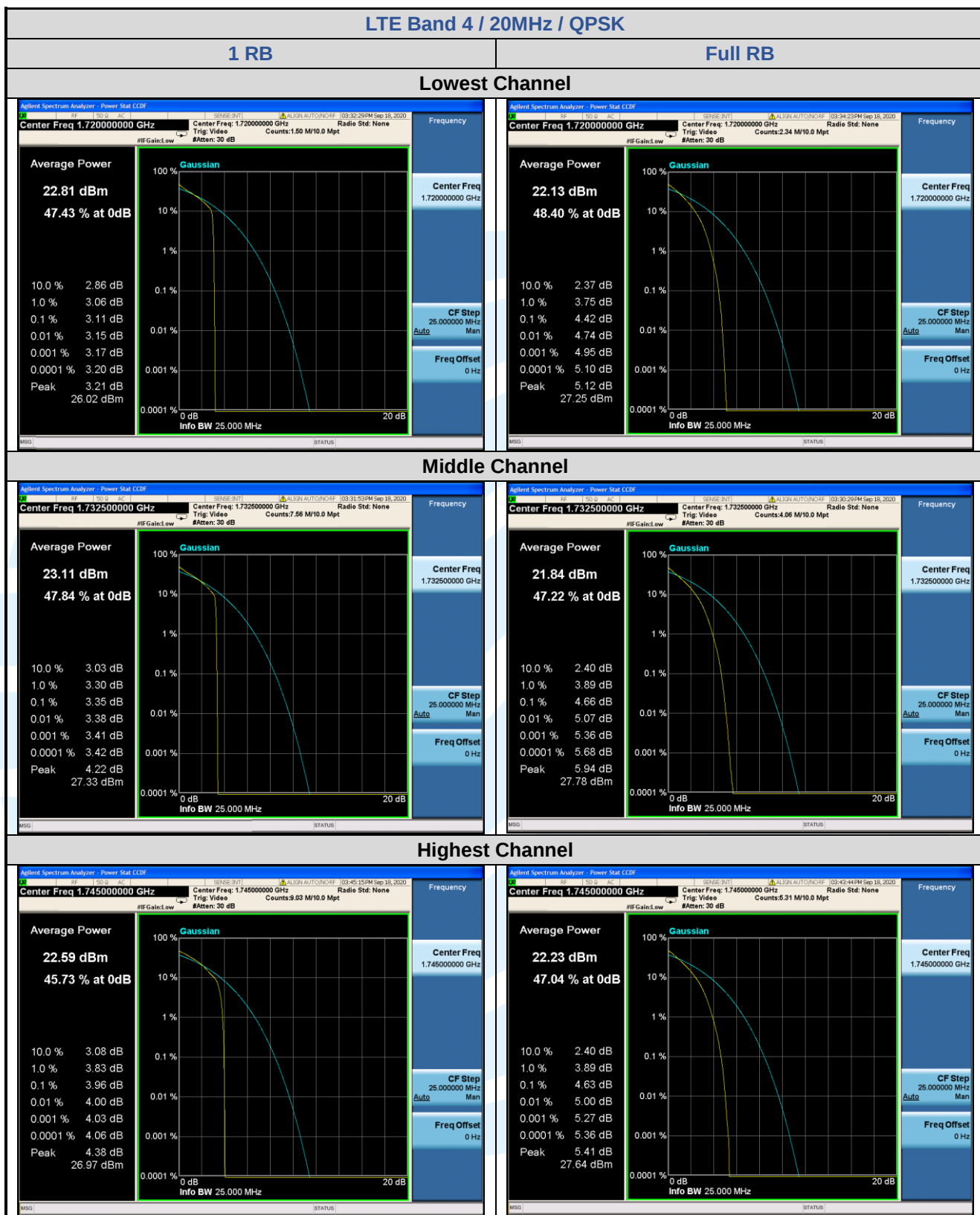
Test Mode: Link mode

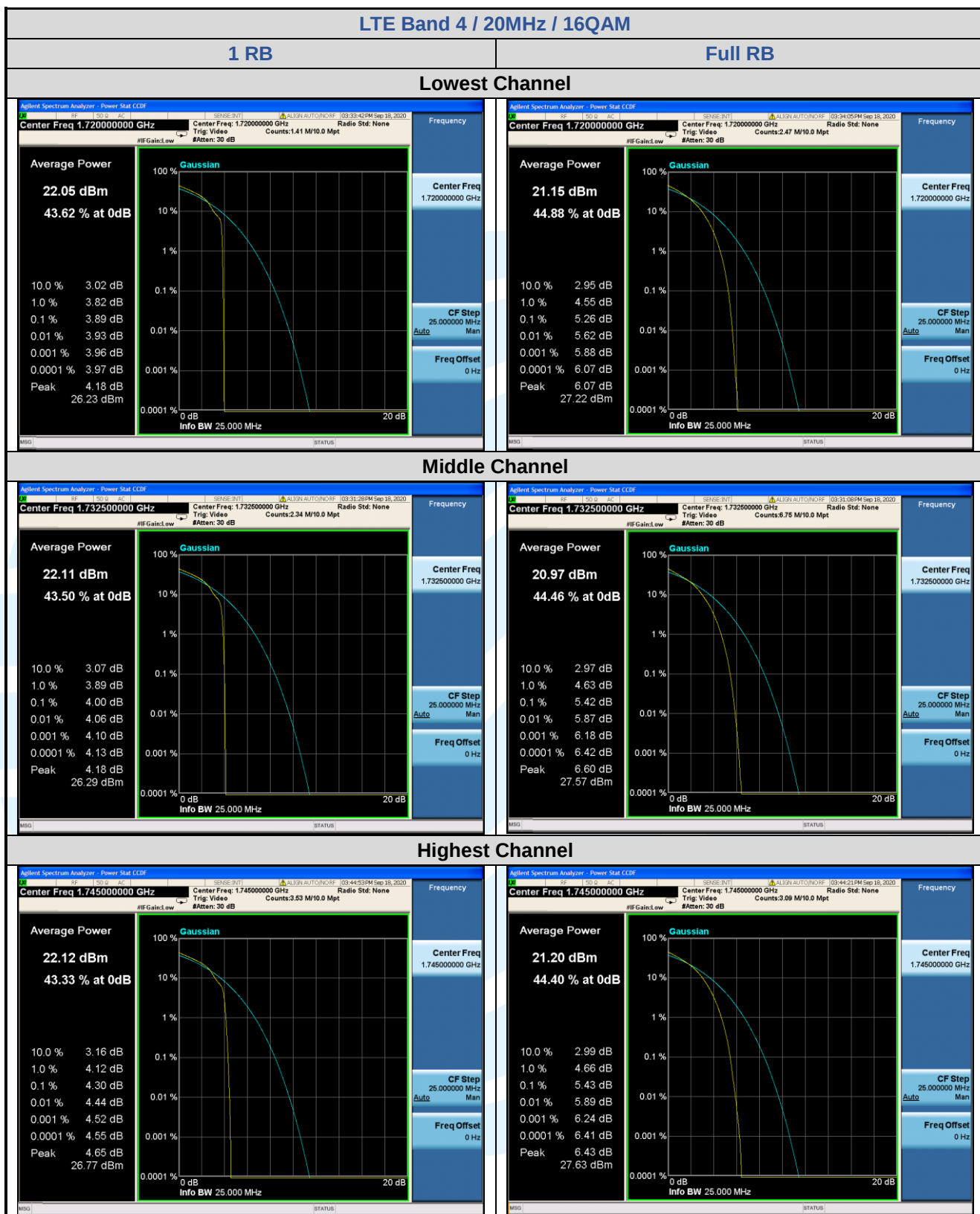
Test Results: Pass

Test Data: See table below

5.4.1 LTE Band 4

LTE Band 4 Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Lowest	1 RB	3.11	3.89	/	13	Pass
	Full RB	4.42	5.26	/	13	Pass
Middle	1 RB	3.35	4.00	/	13	Pass
	Full RB	4.66	5.42	/	13	Pass
Highest	1 RB	3.96	4.30	/	13	Pass
	Full RB	4.63	5.43	/	13	Pass

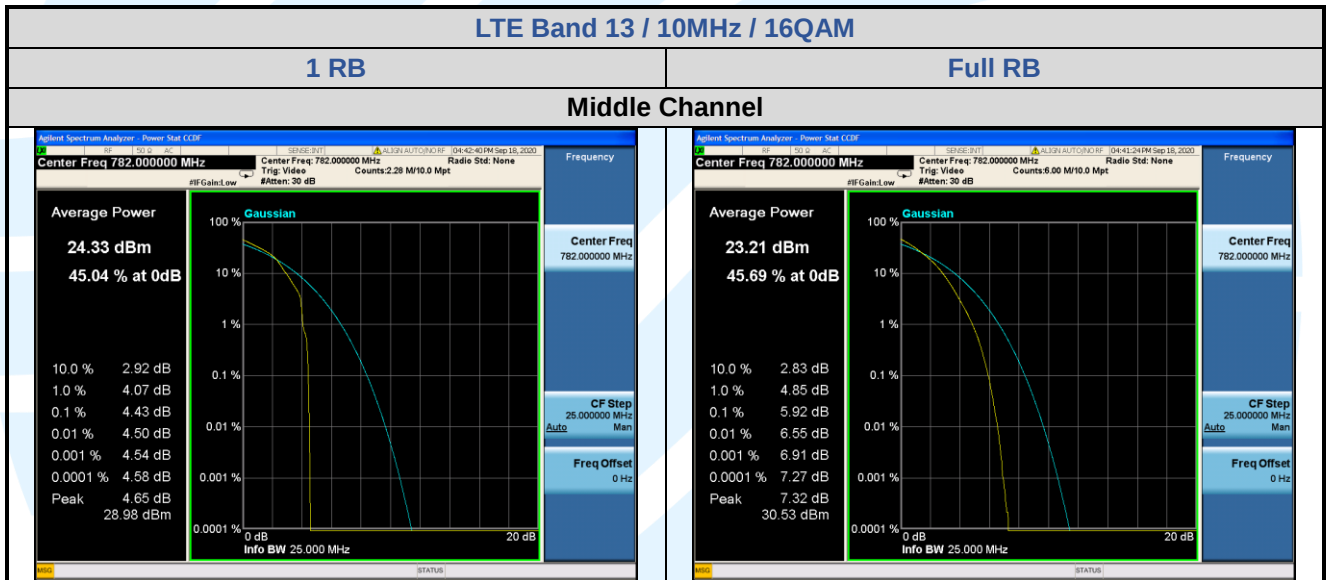
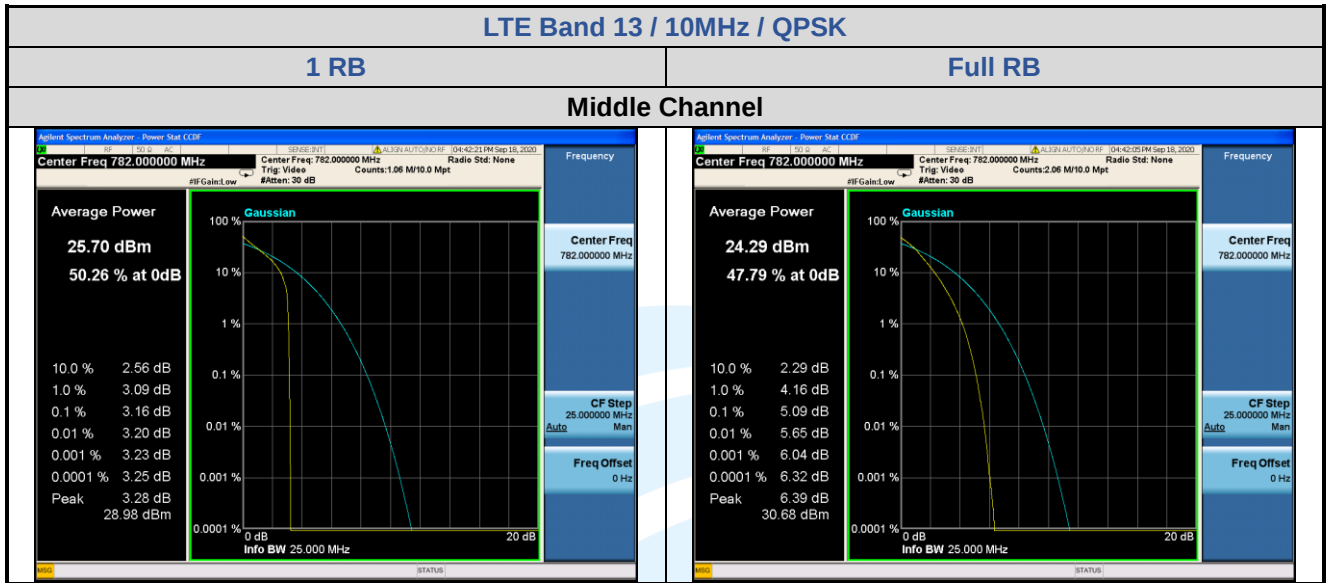




5.4.2 LTE Band 13

LTE Band 13 Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 10 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Middle	1 RB	3.16	4.43	/	13	Pass
	Full RB	5.09	5.92	/	13	Pass





5.5 99%&26DB BANDWIDTH

Test Requirement: FCC 47 CFR Part 2.1049(h), RSS-Gen Issue 5, Section 6.7

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 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	1.332	1.282	/	1.0991	1.0996	/
Middle	6	0	1.308	1.297	/	1.1022	1.0989	/
Highest	6	0	1.315	1.300	/	1.1050	1.0997	/
Channel Bandwidth: 3 MHz								
Lowest	15	0	2.991	2.979	/	2.7012	2.6894	/
Middle	15	0	2.975	2.986	/	2.6934	2.7042	/
Highest	15	0	2.974	2.993	/	2.7036	2.7054	/
Channel Bandwidth: 5 MHz								
Lowest	25	0	5.012	5.032	/	4.5065	4.5340	/
Middle	25	0	5.031	5.012	/	4.5246	4.5368	/
Highest	25	0	4.990	5.013	/	4.5122	4.5180	/
Channel Bandwidth: 10 MHz								
Lowest	50	0	9.897	9.843	/	8.9512	8.9539	/
Middle	50	0	9.975	9.917	/	8.9776	9.0049	/
Highest	50	0	9.902	9.847	/	8.9707	8.9592	/
Channel Bandwidth: 15 MHz								
Lowest	75	0	14.58	14.60	/	13.417	13.431	/
Middle	75	0	14.70	14.58	/	13.472	13.471	/
Highest	75	0	14.61	14.51	/	13.479	13.439	/
Channel Bandwidth: 20 MHz								
Lowest	100	0	19.32	19.40	/	17.803	17.885	/
Middle	100	0	19.39	19.39	/	17.961	17.965	/
Highest	100	0	19.48	19.31	/	17.923	17.906	/

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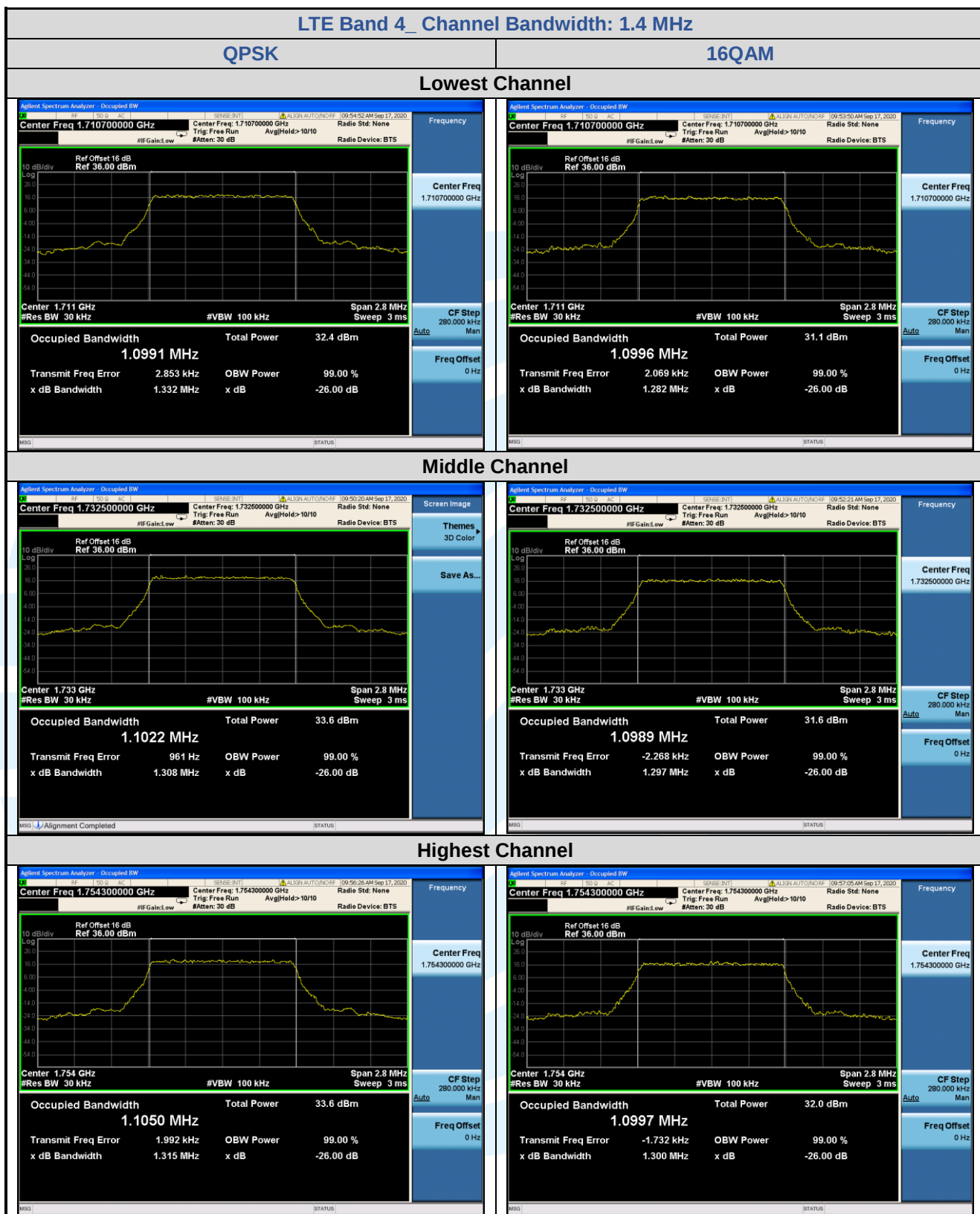
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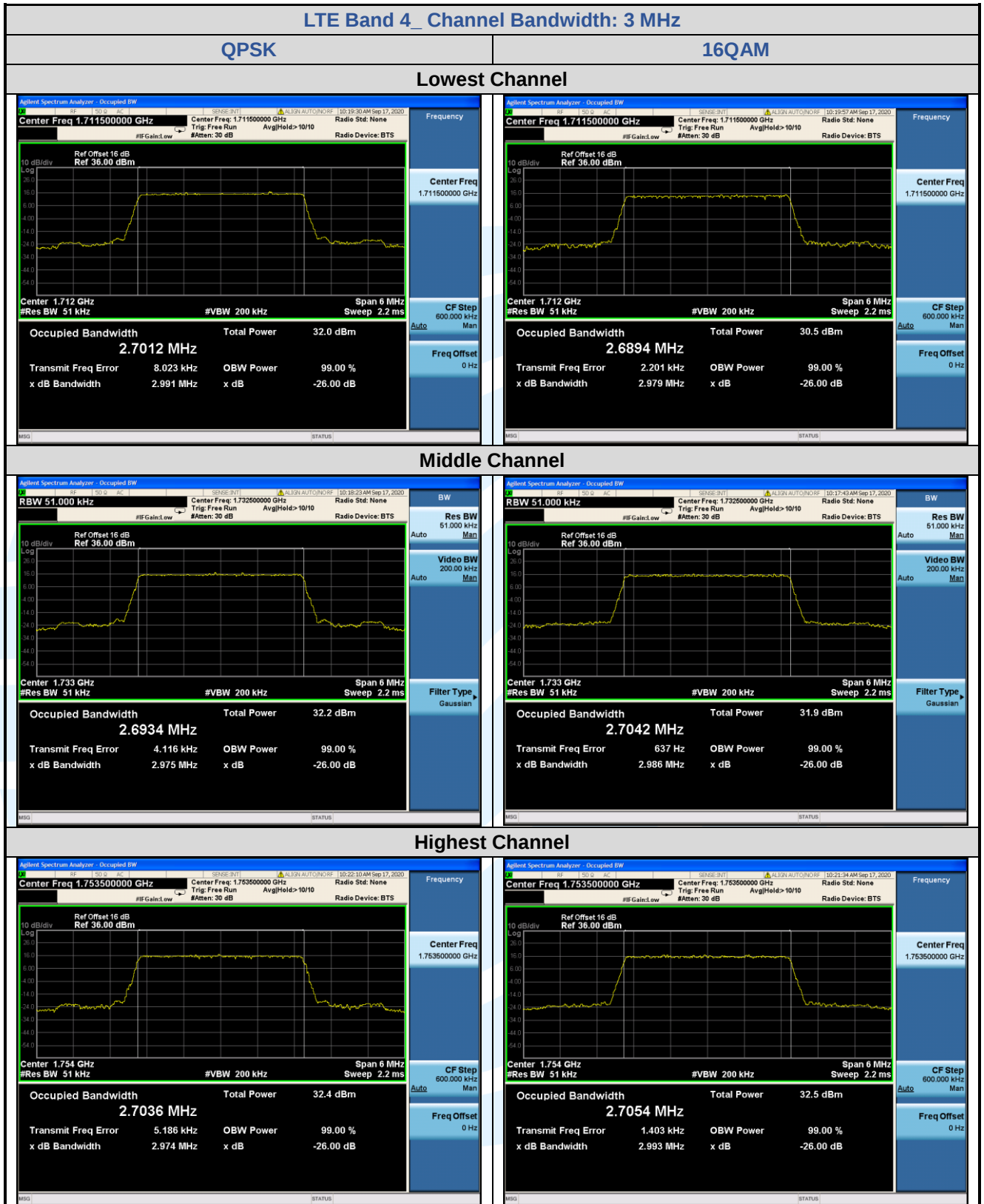
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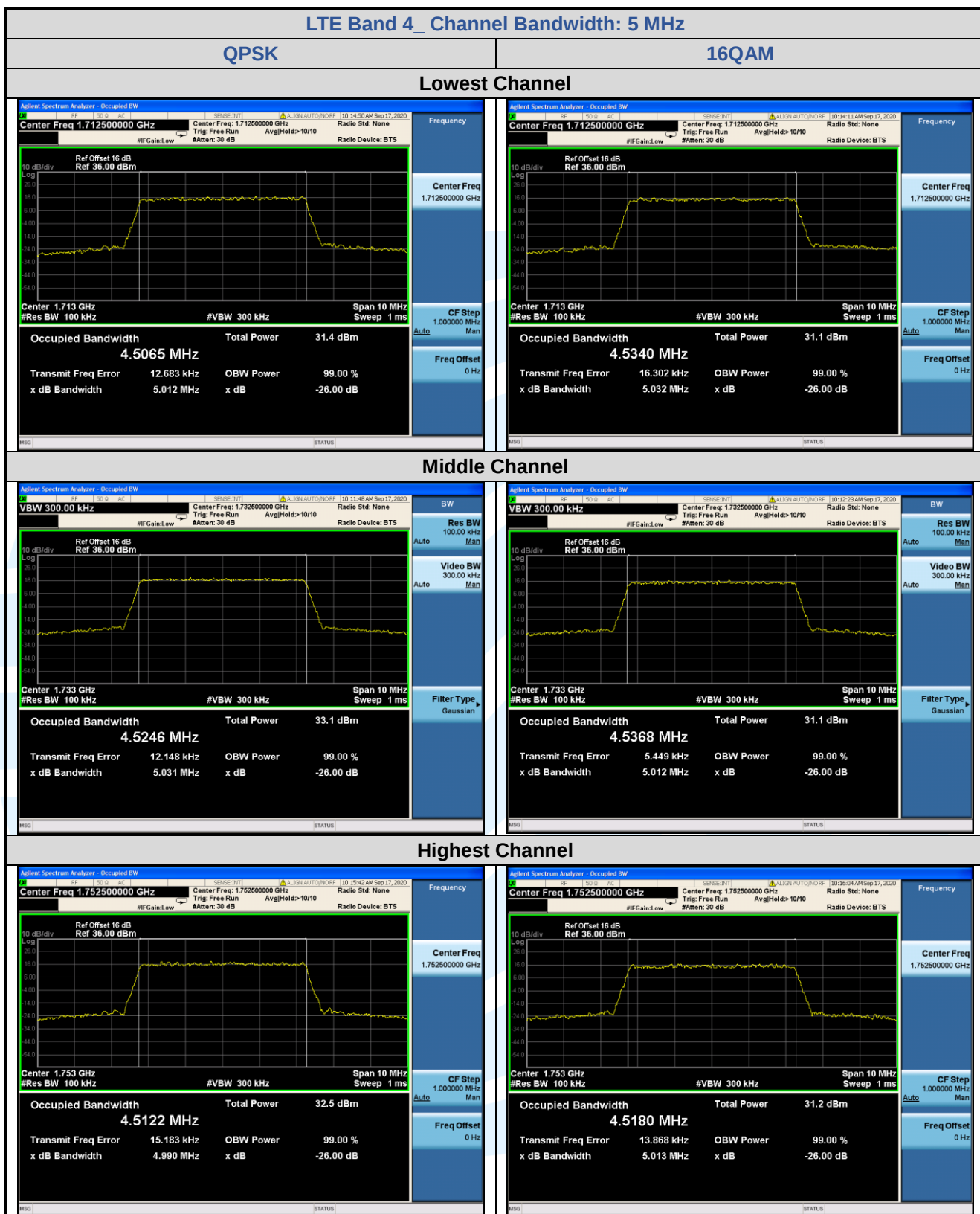
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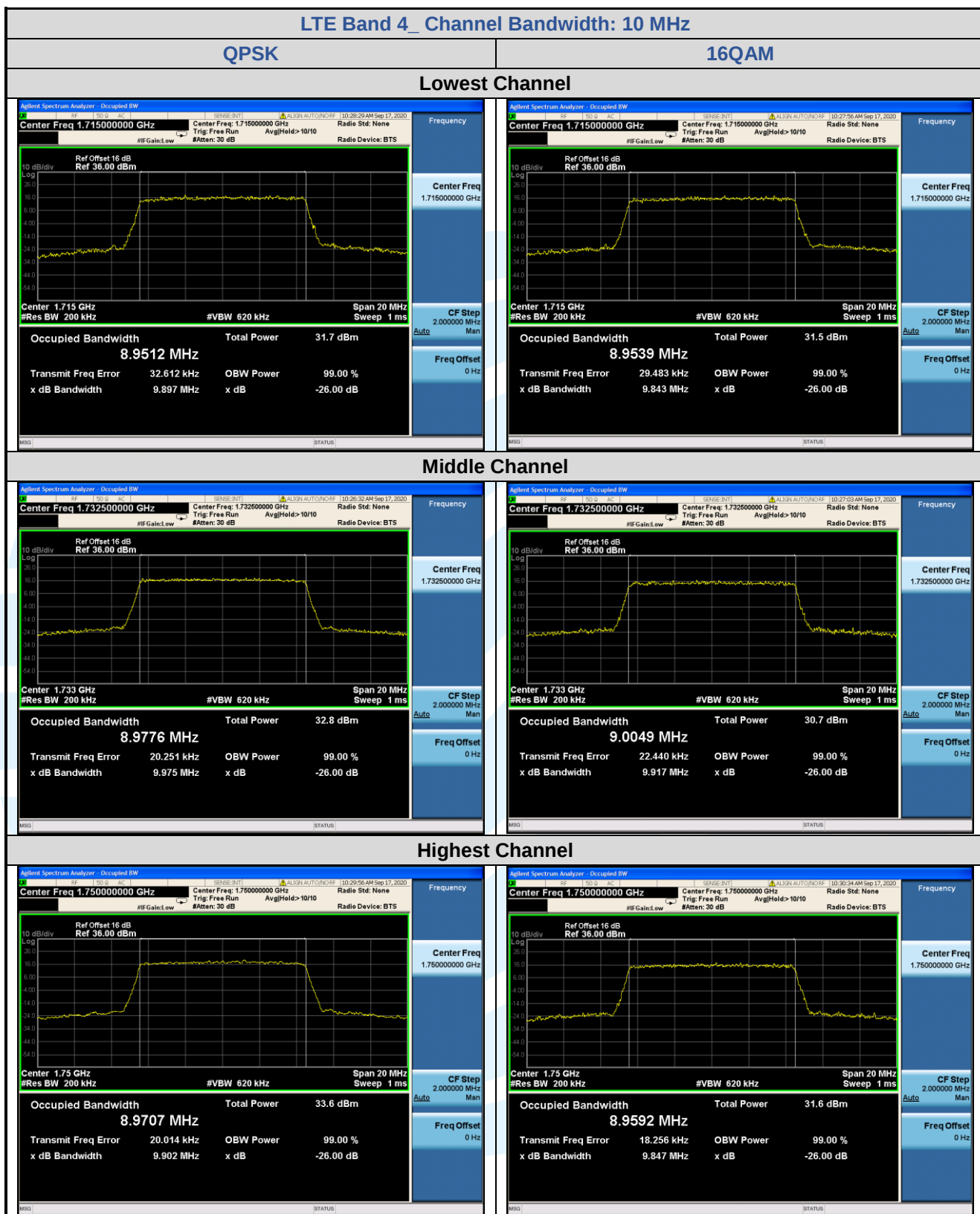
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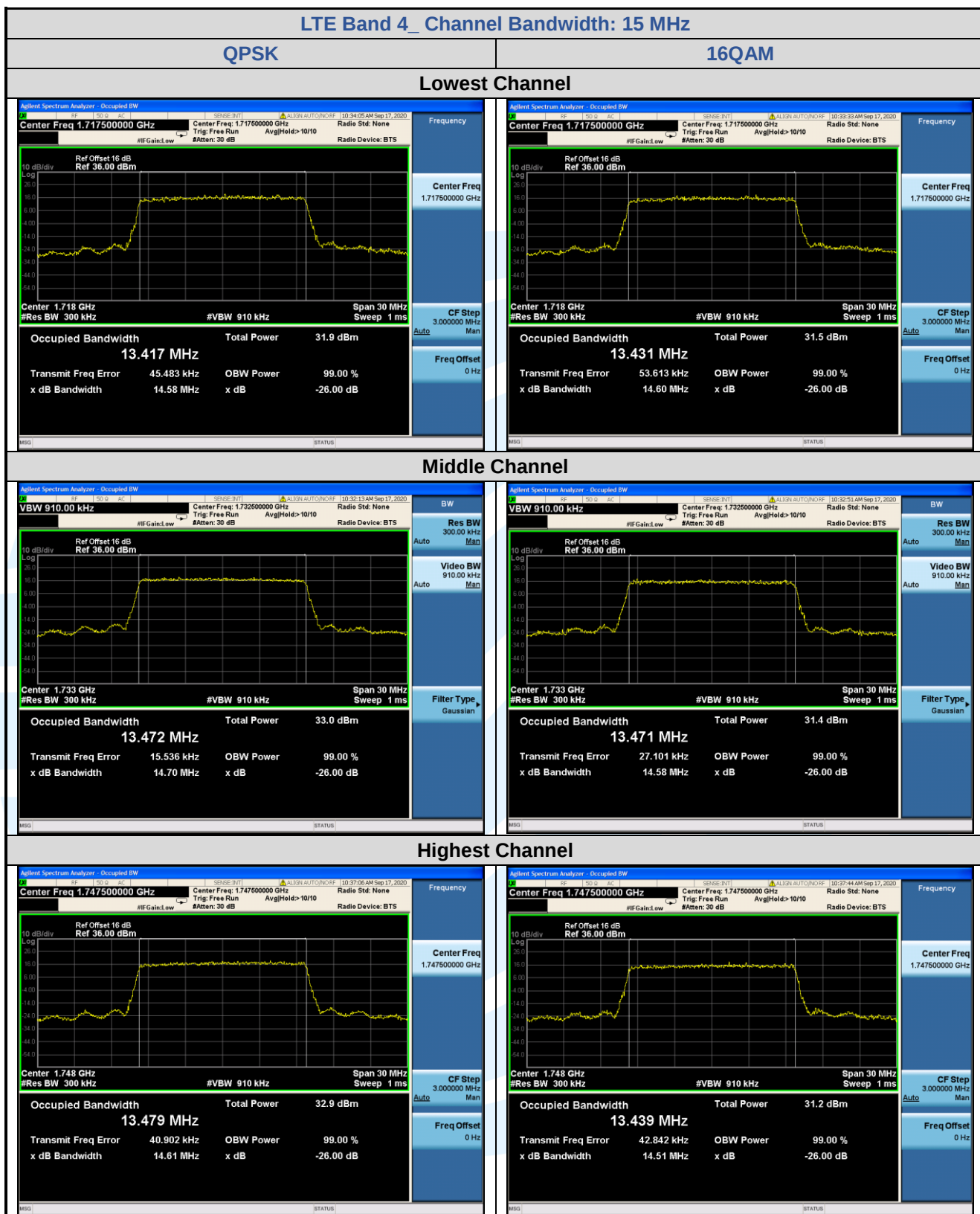
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