

TEST REPORT

Product Name: Cinterion PLS63-X2
Trade Mark: CINTERION
Model No. / HVIN: PLS63-X2
Report Number: 210127001RFM-1
Test Standards: FCC 47 CFR Part 24
FCC 47 CFR Part 27
RSS-130 Issue 2, RSS-133 Issue 6
RSS-139 Issue 3, RSS-Gen Issue 5
FCC ID: QIPPLS63-X2
IC: 7830A-PLS63X2
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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UTTR-RF-FCC4G-V1.1

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 PLS63-X2	
Model No.:	PLS63-X2	
Trade Mark:	CINTERION	
DUT Stage:	Production Unit	
EUT Supports Function:	E-UTRA Bands:	FDD Band 2/ Band 4/ Band 12/ Band 13/ Band 14/ Band 66
Original Sample Received Date:	August 25, 2020	
Original Sample Tested Date:	September 1, 2020 to September 24, 2020	
Original Sample Received Date:	October 19, 2020	
Original Sample Tested Date:	October 19, 2020 to October 26, 2020	
New Sample Received Date:	January 27, 2021	
New 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 2/4/12/13/66:	QPSK, 16QAM
Antenna Type:	External Antenna	
Antenna Gain:	LTE Band 2:	50 ohm terminal (0 dBi)
	LTE Band 4:	50 ohm terminal (0 dBi)
	LTE Band 12:	50 ohm terminal (0 dBi)
	LTE Band 13:	50 ohm terminal (0 dBi)
	LTE Band 66:	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)	
2	1.4	QPSK	1850.7-1909.3	23.36	23.36	0.21677	1.1084	1M11G7D
		16QAM		23.03	23.03	0.20091	1.1033	1M10W7D
	3	QPSK	1851.5-1908.5	23.44	23.44	0.22080	2.7071	2M71G7D
		16QAM		22.73	22.73	0.18750	2.7119	2M71W7D
	5	QPSK	1852.5-1907.5	23.29	23.29	0.21330	4.5338	4M53G7D
		16QAM		22.89	22.89	0.19454	4.5258	4M53W7D
	10	QPSK	1855.0-1905.0	23.40	23.40	0.21878	8.9839	8M98G7D
		16QAM		22.80	22.80	0.19055	8.9949	8M99W7D
	15	QPSK	1857.5-1902.5	23.30	23.30	0.21380	13.457	13M5G7D
		16QAM		22.88	22.88	0.19409	13.476	13M5W7D
	20	QPSK	1860.0-1900.0	23.46	23.46	0.22182	17.946	17M9G7D
		16QAM		22.89	22.89	0.19454	17.969	18M0W7D
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
12	1.4	QPSK	699.7-715.3	23.34	21.19	0.13152	1.0993	1M10G7D
		16QAM		22.82	20.67	0.11668	1.0974	1M10W7D
	3	QPSK	700.5-714.5	23.32	21.17	0.13092	2.7036	2M70G7D
		16QAM		22.91	20.76	0.11912	2.7073	2M71W7D
	5	QPSK	701.5-713.5	23.33	21.18	0.13122	4.5217	4M52G7D
		16QAM		22.83	20.68	0.11695	4.5218	4M52W7D
	10	QPSK	704-711	23.40	21.25	0.13335	9.0164	9M02G7D
		16QAM		22.93	20.78	0.11967	8.9957	9M00W7D
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

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)	
66	1.4	QPSK	1710.7-1779.3	23.45	23.45	0.22131	1.1026	1M10G7D
		16QAM		22.71	22.71	0.18664	1.1052	1M11W7D
	3	QPSK	1711.5-1778.5	23.58	23.58	0.22803	2.7109	2M72G7D
		16QAM		22.47	22.47	0.17660	2.7058	2M71W7D
	5	QPSK	1712.5-1777.5	23.50	23.50	0.22387	4.5332	4M53G7D
		16QAM		22.65	22.65	0.18408	4.5309	4M53W7D
	10	QPSK	1715-1775	23.47	23.47	0.22233	8.9935	8M99G7D
		16QAM		22.50	22.50	0.17783	8.9875	8M99W7D
	15	QPSK	1717.5-1772.5	23.44	23.44	0.22080	13.480	13M5G7D
		16QAM		22.50	22.50	0.17783	13.448	13M4W7D
	20	QPSK	1720-1770	23.61	23.61	0.22961	17.933	17M9G7D
		16QAM		22.65	22.65	0.18408	17.959	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
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:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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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.

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

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) RSS-133 Issue 6, Section 6.4	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Conducted Output Power	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 24.232(c) RSS-133 Issue 6, Section 6.4	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Peak-to-average ratio	FCC 47 CFR Part 24.232(d) RSS-133 Issue 6, Section 6.4	KDB 971168 D01v03r01	See Note
99%&26dB Bandwidth	FCC 47 CFR Part 2.1049(h) & FCC 47 CFR Part 24.238(b) 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 2.1051 & FCC 47 CFR Part 24.238(a) RSS-133 Issue 6, Section 6.5	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Spurious emissions at antenna terminals	FCC 47 CFR Part 2.1051 & FCC 47 CFR Part 24.238(a)(b) RSS-133 Issue 6, Section 6.5	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note
Field strength of spurious radiation	FCC 47 CFR Part 2.1053 & FCC 47 CFR Part 24.238(a)(b) RSS-133 Issue 6, Section 6.5	ANSI C63.26-2015 & KDB 971168 D01v03r01	PASS
Frequency stability	FCC 47 CFR Part 2.1055 & FCC 47 CFR Part 24.235 RSS-133 Issue 6, Section 6.3	ANSI C63.26-2015 & KDB 971168 D01v03r01	See Note

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) 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 12)			
Test Item	Test Requirement	Test Method	Result
Effective Radiated Power (ERP)	FCC 47 CFR Part 2.1046(a) & FCC 47 CFR Part 27.50(c)(10) 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(c)(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) FCC 47 CFR Part 27.53(g) 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(g) 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(g) 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(g) 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

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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 PLS63-X2 and PLS63-X Module. For detailed PCB board and component differences, see the difference statement document
- 2) The UE Category level of PLS63-X2 and PLS63-X is 1

Test Plan:

- 1) According to the difference description, PLS63-X2 shares the same data from the PLS63-X original report(Report No.: 200722024RFM-2).
- 2) This report is based on the report of 200722024RFM-2, just update the operating frequency bands and Field strength of spurious radiation
- 3) The FCC ID of PLS63-X is QIPPLS63-X
- 4) The ISED NO. of PLS63-X is 7830A-PLS63X
- 5) The data of PLS63-X was used for PLS63-X2 as below:

Band	Test Item	Description
LTE Band 2 LTE Band 4 LTE Band 66	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 12 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

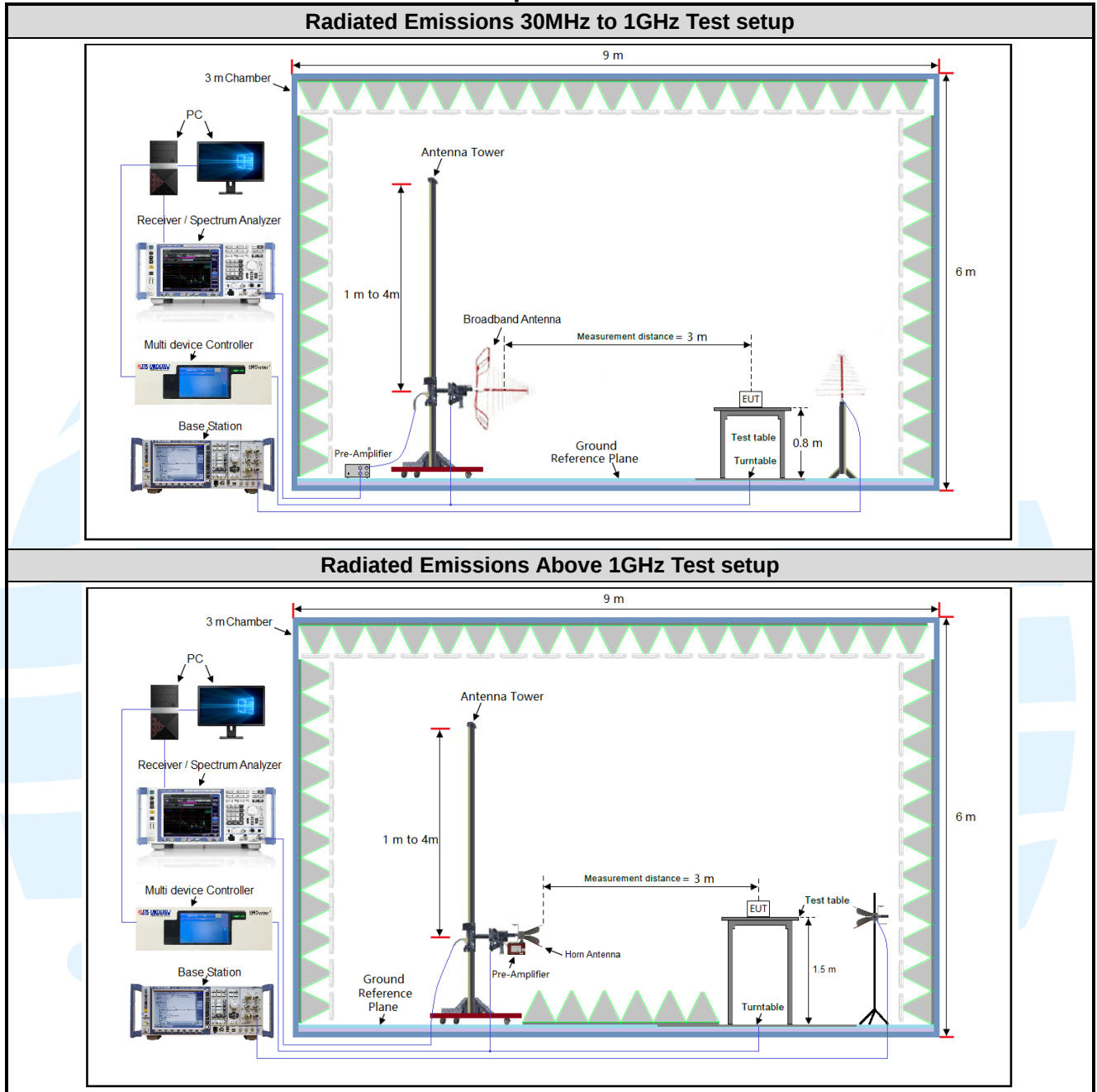
Test Environment	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
TN/VN	+15 to +35	3.8	20 to 75
TL/VL	-30	3.2	20 to 75
TH/VL	+65	3.2	20 to 75
TL/VH	-30	4.5	20 to 75
TH/VH	+65	4.5	20 to 75

Remark:

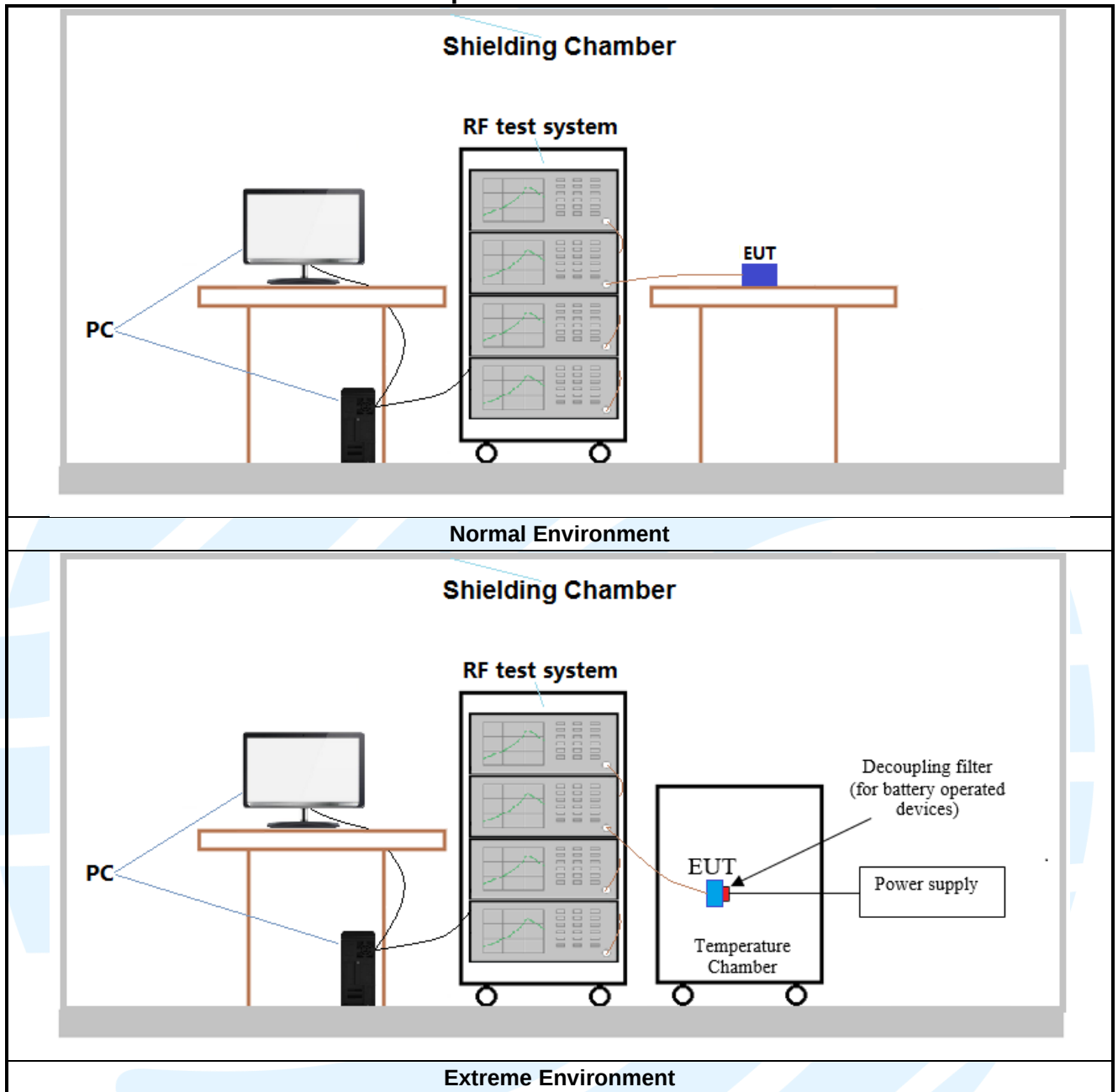
- 1) The EUT just work in such extreme temperature of -30 °C to +65 °C and the extreme voltage of 3.2 V to 4.5V, so here the EUT is tested in the temperature of -30 °C to +65 °C and the voltage of 3.2 V to 4.5 V.
- 2) VN: Normal Voltage; TN: Normal Temperature;
TL: Low Extreme Test Temperature; TH: High 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 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 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 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

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

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4.4 SYSTEM TEST CONFIGURATION

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

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

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

Band	Mode	Antenna Port	Worst-case axis positioning
LTE Band 2	1TX	Chain 0	Z axis
LTE Band 4	1TX	Chain 0	Z axis
LTE Band 12	1TX	Chain 0	Z axis
LTE Band 13	1TX	Chain 0	Z axis
LTE Band 66	1TX	Chain 0	Z axis

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

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

4.5 PRE-SCAN

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

4.5.1 LTE Band 2

LTE Band 2 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	22.41	22.84	22.76	1	0	22.39	22.82	22.83
	1	2	23.36	23.24	23.03	1	7	23.44	23.17	22.95
	1	5	22.94	22.78	22.79	1	14	22.97	22.67	22.86
	3	0	22.93	23.08	23.06	8	0	21.92	22.08	22.02
	3	1	22.88	22.99	22.88	8	3	21.93	22.02	21.89
	3	3	22.85	23.04	22.92	8	7	21.84	22.04	22.01
	6	0	21.87	21.95	21.78	15	0	21.94	22.03	21.79
16QAM	1	0	21.98	22.14	21.84	1	0	22.03	22.14	21.96
	1	2	22.84	22.49	22.23	1	7	22.73	22.39	22.14
	1	5	21.69	22.06	21.27	1	14	21.55	22.23	21.26
	3	0	22.15	22.04	21.95	8	0	21.02	20.89	21.06
	3	1	23.03	22.91	22.94	8	3	22.06	21.84	22.08
	3	3	21.94	21.79	21.95	8	7	21.03	20.79	20.93
	6	0	20.93	20.79	20.95	15	0	20.86	20.84	20.89
Channel Bandwidth: 5 MHz						Channel Bandwidth: 10 MHz				
QPSK	1	0	22.45	22.85	22.85	1	0	22.51	22.73	22.83
	1	12	23.29	23.23	22.96	1	24	23.40	23.34	23.04
	1	24	23.04	22.75	22.91	1	49	22.96	22.79	22.86
	12	0	21.87	22.17	21.98	25	0	21.91	22.18	22.14
	12	6	21.80	22.00	22.03	25	12	21.93	21.99	21.95
	12	13	21.96	22.06	22.00	25	25	21.82	21.90	21.87
	25	0	21.95	21.98	21.92	50	0	21.94	21.96	21.91
16QAM	1	0	22.12	22.07	21.79	1	0	22.13	22.11	21.96
	1	12	22.89	22.56	22.16	1	24	22.80	22.37	22.11
	1	24	21.59	22.17	21.18	1	49	21.69	22.17	21.16
	12	0	21.03	21.01	21.02	25	0	21.03	20.88	21.05
	12	6	21.93	21.99	22.10	25	12	21.92	21.83	22.05
	12	13	20.90	20.87	21.06	25	25	20.95	20.81	20.90
	25	0	20.84	20.96	20.98	50	0	20.90	20.82	20.86
Channel Bandwidth: 15 MHz						Channel Bandwidth: 20 MHz				
QPSK	1	0	22.53	22.71	22.85	1	0	22.56	22.85	22.90
	1	37	23.26	23.30	22.87	1	50	23.46	23.35	23.06
	1	74	23.03	22.70	22.88	1	99	23.10	22.85	22.95
	37	0	21.93	22.15	22.03	50	0	21.97	22.23	22.16
	37	19	21.92	22.00	22.01	50	25	21.98	22.16	22.07
	37	39	21.92	22.02	21.97	50	50	21.99	22.07	22.02
	75	0	21.91	21.94	21.80	100	0	22.01	22.05	21.96
16QAM	1	0	22.08	22.09	21.88	1	0	22.15	22.18	21.98
	1	37	22.88	22.56	22.17	1	50	22.89	22.57	22.29
	1	74	21.66	22.12	21.30	1	99	21.74	22.26	21.35
	37	0	20.98	21.01	21.03	50	0	21.16	21.06	21.11
	37	19	22.05	21.94	22.04	50	25	22.07	22.03	22.11
	37	39	21.01	20.83	21.05	50	50	21.05	20.90	21.07
	75	0	20.79	20.89	20.85	100	0	20.95	20.97	20.99

4.5.2 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

4.5.3 LTE Band 12

LTE Band 12 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	23.10	23.05	23.24	1	0	23.08	22.99	23.13
	1	2	23.34	23.28	23.16	1	7	23.25	23.32	23.05
	1	5	23.16	22.81	22.95	1	14	23.19	22.87	23.05
	3	0	23.08	23.13	23.05	8	0	22.09	22.23	22.22
	3	1	23.20	23.18	23.08	8	3	22.16	22.19	22.22
	3	3	23.23	23.11	23.15	8	7	22.13	22.01	22.13
	6	0	22.10	22.13	22.20	15	0	22.15	22.18	22.23
16QAM	1	0	21.93	22.10	22.08	1	0	21.96	22.14	22.08
	1	2	22.24	22.82	22.14	1	7	22.27	22.91	22.16
	1	5	21.65	21.94	21.95	1	14	21.57	22.05	22.13
	3	0	22.13	22.08	22.14	8	0	21.19	20.99	21.04
	3	1	22.00	22.02	22.04	8	3	21.07	21.02	21.05
	3	3	22.10	22.09	22.82	8	7	21.12	21.01	21.89
	6	0	21.81	21.68	21.83	15	0	21.82	21.67	21.69
Channel Bandwidth: 5 MHz						Channel Bandwidth: 10 MHz				
QPSK	1	0	23.08	22.99	23.29	1	0	23.14	23.15	23.33
	1	12	23.28	23.33	23.14	1	24	23.40	23.38	23.22
	1	24	23.07	22.76	23.07	1	49	23.24	22.96	23.10
	12	0	22.19	22.19	22.07	25	0	22.21	22.25	22.23
	12	6	22.11	22.12	22.06	25	12	22.25	22.23	22.24
	12	13	22.07	22.16	22.01	25	25	22.27	22.20	22.15
	25	0	22.23	22.21	22.10	50	0	22.24	22.25	22.23
16QAM	1	0	22.03	22.05	22.08	1	0	22.10	22.17	22.17
	1	12	22.27	22.83	22.16	1	24	22.33	22.93	22.20
	1	24	21.51	21.92	21.98	1	49	21.65	22.08	22.14
	12	0	21.18	21.06	21.02	25	0	21.33	21.14	21.16
	12	6	21.04	21.09	21.12	25	12	21.13	21.16	21.13
	12	13	21.11	20.91	21.86	25	25	21.28	21.11	21.89
	25	0	21.72	21.65	21.76	50	0	21.84	21.83	21.85

4.5.4 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	/

4.5.5 LTE Band 66

LTE Band 66 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	23.24	23.40	23.45	1	0	23.20	23.49	23.58
	1	2	23.35	23.40	23.37	1	7	23.47	23.34	23.38
	1	5	23.06	23.20	23.36	1	14	23.05	23.11	23.25
	3	0	23.14	23.14	23.17	8	0	22.22	22.16	22.11
	3	1	23.25	23.25	23.11	8	3	22.18	22.27	22.25
	3	3	23.10	23.10	23.26	8	7	22.00	22.12	22.21
	6	0	22.21	22.19	22.23	15	0	22.30	22.13	22.21
16QAM	1	0	22.10	22.38	22.10	1	0	22.17	22.47	22.12
	1	2	22.35	22.60	22.24	1	7	22.47	22.47	22.31
	1	5	22.36	22.25	22.02	1	14	22.32	22.26	22.01
	3	0	22.61	22.58	22.50	8	0	21.55	21.58	21.50
	3	1	22.63	22.33	22.11	8	3	21.64	21.30	21.22
	3	3	22.51	22.71	22.14	8	7	21.49	21.70	21.25
	6	0	21.38	21.50	21.21	15	0	21.54	21.53	21.24
Channel Bandwidth: 5 MHz						Channel Bandwidth: 10 MHz				
QPSK	1	0	23.24	23.37	23.50	1	0	23.24	23.37	23.47
	1	12	23.45	23.34	23.35	1	24	23.36	23.38	23.37
	1	24	23.10	23.27	23.35	1	49	23.10	23.10	23.27
	12	0	22.33	22.11	22.10	25	0	22.20	22.13	22.24
	12	6	22.13	22.21	22.22	25	12	22.13	22.16	22.23
	12	13	22.01	22.28	22.17	25	25	22.11	22.14	22.15
	25	0	22.26	22.13	22.28	50	0	22.21	22.05	22.24
16QAM	1	0	22.21	22.47	22.09	1	0	22.19	22.42	22.16
	1	12	22.31	22.65	22.25	1	24	22.34	22.50	22.37
	1	24	22.39	22.28	22.02	1	49	22.26	22.18	21.96
	12	0	21.57	21.65	21.65	25	0	21.61	21.63	21.64
	12	6	21.53	21.36	21.14	25	12	21.48	21.32	21.22
	12	13	21.49	21.75	21.28	25	25	21.49	21.75	21.23
	25	0	21.54	21.47	21.27	50	0	21.51	21.49	21.24
Channel Bandwidth: 15 MHz						Channel Bandwidth: 20 MHz				
QPSK	1	0	23.28	23.48	23.44	1	0	23.32	23.53	23.61
	1	37	23.30	23.45	23.44	1	50	23.47	23.50	23.48
	1	74	22.92	23.22	23.40	1	99	23.12	23.29	23.42
	37	0	22.15	22.07	22.21	50	0	22.33	22.25	22.24
	37	19	22.24	22.27	22.24	50	25	22.31	22.28	22.25
	37	39	21.98	22.19	22.24	50	50	22.12	22.29	22.27
	75	0	22.23	22.11	22.25	100	0	22.32	22.24	22.30
16QAM	1	0	22.09	22.44	22.12	1	0	22.26	22.48	22.22
	1	37	22.49	22.50	22.30	1	50	22.49	22.65	22.42
	1	74	22.35	22.17	22.11	1	99	22.43	22.31	22.14
	37	0	21.69	21.58	21.52	50	0	21.70	21.71	21.68
	37	19	21.53	21.29	21.22	50	25	21.68	21.47	21.27
	37	39	21.38	21.77	21.15	50	50	21.57	21.83	21.29
	75	0	21.36	21.58	21.11	100	0	21.55	21.59	21.27

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

Item	Band	Bandwidth(MHz)						Modulation			RB			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
ERP/EIRP	2	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	12	☒	☒	☒	☒	-	-	☒	☒	☒	☒	☐	☐	☒	☒	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☒	☐	☐	☒	☒	☒
	66	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
Conducted output power	2	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒
	12	☒	☒	☒	☒	-	-	☒	☒	☒	☒	☒	☒	☒	☒	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☒	☒	☒	☒	☒	☒
	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
99%&26dB Bandwidth	2	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
	12	☒	☒	☒	☒	-	-	☒	☒	☒	☐	☐	☒	☒	☒	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☐	☐	☒	☒	☒	☒
	66	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒
peak-to-average ratio	2	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	4	☐	☐	☐	☐	☐	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	12	☐	☐	☐	☒	-	-	☒	☒	☒	☒	☐	☒	☒	☐	☒
	13	-	-	☐	☒	-	-	☒	☒	☒	☒	☐	☒	☒	☐	☒
	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	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
	12	☒	☒	☒	☒	-	-	☒	☒	☒	☒	☐	☒	☒	☐	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☒	☐	☒	☒	☐	☒
	66	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☒	☒	☐	☒
Spurious emissions at antenna terminals	2	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	4	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒
	12	☒	☒	☒	☒	-	-	☒	☒	☒	☒	☐	☐	☒	☒	☒
	13	-	-	☒	☒	-	-	☒	☒	☒	☒	☐	☐	☒	☒	☒
	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
Field strength of spurious radiation	2	☐	☐	☐	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☒	☒
	4	☐	☐	☐	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☒	☒
	12	☐	☐	☐	☒	-	-	☒	☐	☐	☒	☐	☐	☒	☒	☒
	13	-	-	☐	☒	-	-	☒	☐	☐	☒	☐	☐	☒	☒	☒
	66	☐	☐	☐	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☒	☒
Frequency stability	2	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☒	☐	☒	☐
	4	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☒	☐	☒	☐
	12	☐	☐	☐	☒	-	-	☒	☐	☐	☐	☐	☒	☐	☒	☐
	13	-	-	☐	☒	-	-	☒	☐	☐	☐	☐	☒	☐	☒	☐
	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 27	Miscellaneous Wireless Communications Services
3	FCC 47 CFR Part 24	Personal Communications Services
4	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
5	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
7	RSS-133 Issue 6	2 GHz Personal Communications Services Aussi disponible
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 2: FCC 47 CFR Part 24.232(c), RSS-133 Issue 6, Section 6.4
LTE Band 4 & LTE Band 66: FCC 47 CFR Part 27.50(d)(4), RSS-139 Issue 3, Section 6.5
LTE Band 12: FCC 47 CFR Part 27.50(c)(10), RSS-130 Issue 2, Section 4.6
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 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(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-133 Issue 6, Section 6.4

The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510. Moreover, base station transmitters operating in the band 1930-1995 MHz shall not have output power exceeding 100 watts.

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UTTR-RF-FCC4G-V1.1

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.

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 2

LTE Band 2 Maximum EIRP (dBm)					
Channel	QPSK; RB:1	16QAM; RB:1	64QAM; RB:1	Limit (dBm)	Result
Channel Bandwidth: 1.4MHz					
Lowest	23.36	23.03	/	33.01	Pass
Middle	23.24	22.91	/	33.01	Pass
Highest	23.03	22.94	/	33.01	Pass
Channel Bandwidth: 3MHz					
Lowest	23.44	22.73	/	33.01	Pass
Middle	23.17	22.39	/	33.01	Pass
Highest	22.95	22.14	/	33.01	Pass
Channel Bandwidth: 5MHz					
Lowest	23.29	22.89	/	33.01	Pass
Middle	23.23	22.56	/	33.01	Pass
Highest	22.96	22.16	/	33.01	Pass
Channel Bandwidth: 10MHz					
Lowest	23.40	22.80	/	33.01	Pass
Middle	23.34	22.37	/	33.01	Pass
Highest	23.04	22.11	/	33.01	Pass
Channel Bandwidth: 15MHz					
Lowest	23.26	22.88	/	33.01	Pass
Middle	23.30	22.56	/	33.01	Pass
Highest	22.87	22.17	/	33.01	Pass
Channel Bandwidth: 20MHz					
Lowest	23.46	22.89	/	33.01	Pass
Middle	23.35	22.57	/	33.01	Pass
Highest	23.06	22.29	/	33.01	Pass

5.2.2 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

5.2.3 LTE Band 12

LTE Band 12 Maximum ERP (dBm)					
Channel	QPSK; RB:1	16QAM; RB:1	64QAM; RB:1	Limit (dBm)	Result
Channel Bandwidth: 1.4MHz					
Lowest	21.19	20.09	/	34.77	Pass
Middle	21.13	20.67	/	34.77	Pass
Highest	21.01	19.99	/	34.77	Pass
Channel Bandwidth: 3MHz					
Lowest	21.10	20.12	/	34.77	Pass
Middle	21.17	20.76	/	34.77	Pass
Highest	20.90	20.01	/	34.77	Pass
Channel Bandwidth: 5MHz					
Lowest	21.13	20.12	/	34.77	Pass
Middle	21.18	20.68	/	34.77	Pass
Highest	20.99	20.01	/	34.77	Pass
Channel Bandwidth: 10MHz					
Lowest	21.25	20.18	/	34.77	Pass
Middle	21.23	20.78	/	34.77	Pass
Highest	21.07	20.05	/	34.77	Pass

5.2.4 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

5.2.5 LTE Band 66

LTE Band 66 Maximum EIRP (dBm)					
Channel	QPSK; RB:1	16QAM; RB:1	64QAM; RB:1	Limit (dBm)	Result
Channel Bandwidth: 1.4MHz					
Lowest	23.24	22.51	/	30.00	Pass
Middle	23.40	22.71	/	30.00	Pass
Highest	23.45	22.14	/	30.00	Pass
Channel Bandwidth: 3MHz					
Lowest	23.20	22.47	/	30.00	Pass
Middle	23.49	22.47	/	30.00	Pass
Highest	23.58	22.31	/	30.00	Pass
Channel Bandwidth: 5MHz					
Lowest	23.24	22.31	/	30.00	Pass
Middle	23.37	22.65	/	30.00	Pass
Highest	23.50	22.25	/	30.00	Pass
Channel Bandwidth: 10MHz					
Lowest	23.24	22.34	/	30.00	Pass
Middle	23.37	22.50	/	30.00	Pass
Highest	23.47	22.37	/	30.00	Pass
Channel Bandwidth: 15MHz					
Lowest	23.28	22.49	/	30.00	Pass
Middle	23.48	22.50	/	30.00	Pass
Highest	23.44	22.30	/	30.00	Pass
Channel Bandwidth: 20MHz					
Lowest	23.32	22.49	/	30.00	Pass
Middle	23.53	22.65	/	30.00	Pass
Highest	23.61	22.42	/	30.00	Pass

5.3 CONDUCTED OUTPUT POWER

Test Requirement: FCC 47 CFR Part 2.1046(a),
LTE Band 2: FCC 47 CFR Part 24.232(c), RSS-133 Issue 6, Section 6.4
LTE Band 4 & LTE Band 66: FCC 47 CFR Part 27.50(d)(4), RSS-139 Issue 3, Section 6.5
LTE Band 12: FCC 47 CFR Part 27.50(c)(10), RSS-130 Issue 2, Section 4.6
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 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(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-133 Issue 6, Section 6.4
The equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510. Moreover, base station transmitters operating in the band 1930-1995 MHz shall not have output power exceeding 100 watts.

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 2: FCC 47 CFR Part 24.232(d), RSS-133 Issue 6, Section 6.4
 LTE Band 4 & LTE Band 66: FCC 47 CFR Part 27.50(d)(5), RSS-139 Issue 3, Section 6.5
 LTE Band 12: FCC 47 CFR Part 27.50(d)(5), RSS-130 Issue 2, Section 4.6
 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

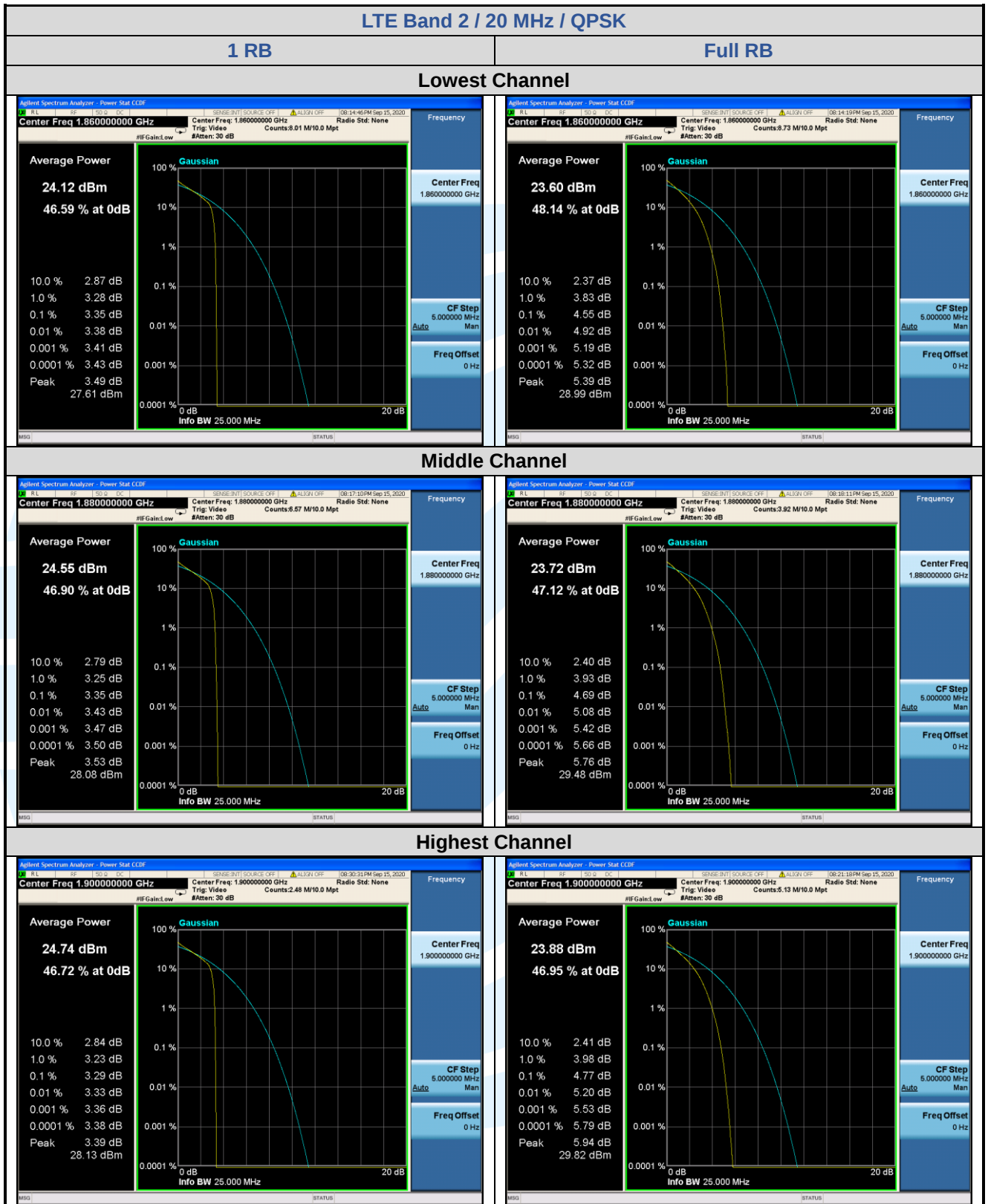
Test Mode: Link mode

Test Results: Pass

Test Data: See table below

5.4.1 LTE Band 2

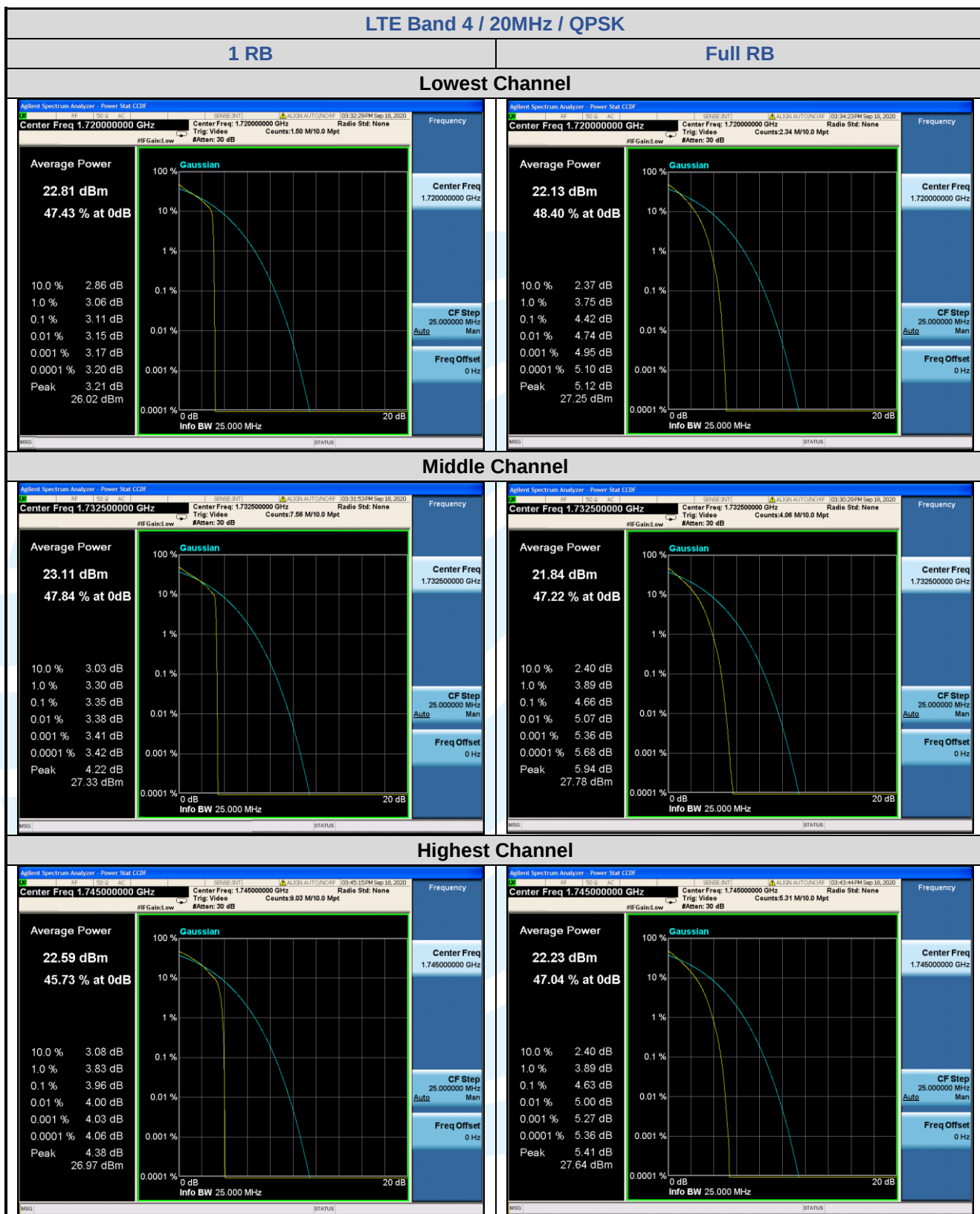
LTE Band 2 Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Lowest	1 RB	3.35	4.34	/	13	Pass
	Full RB	4.55	5.34	/	13	Pass
Middle	1 RB	3.35	4.29	/	13	Pass
	Full RB	4.69	5.48	/	13	Pass
Highest	1 RB	3.29	4.34	/	13	Pass
	Full RB	4.77	5.53	/	13	Pass

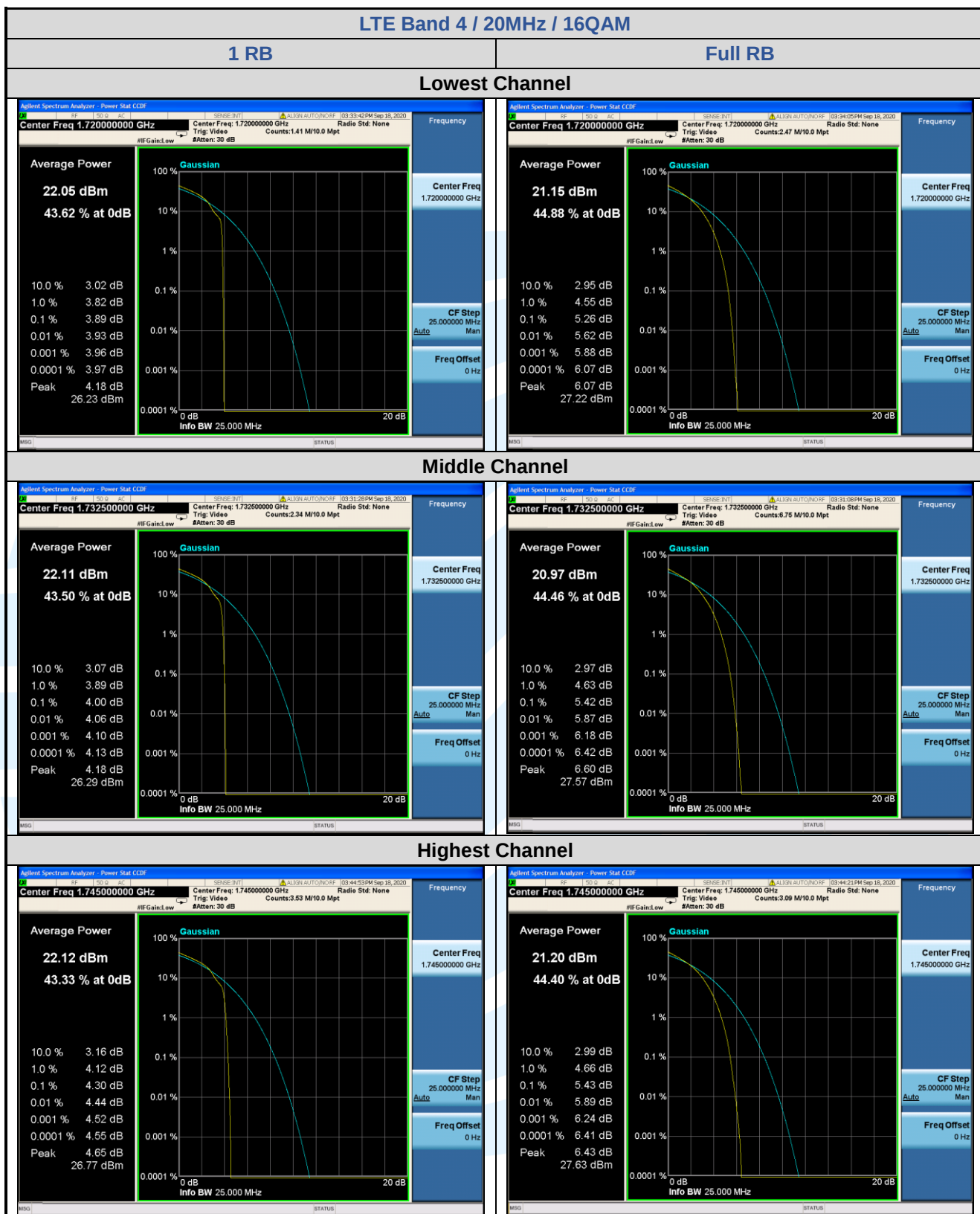




5.4.2 LTE Band 4

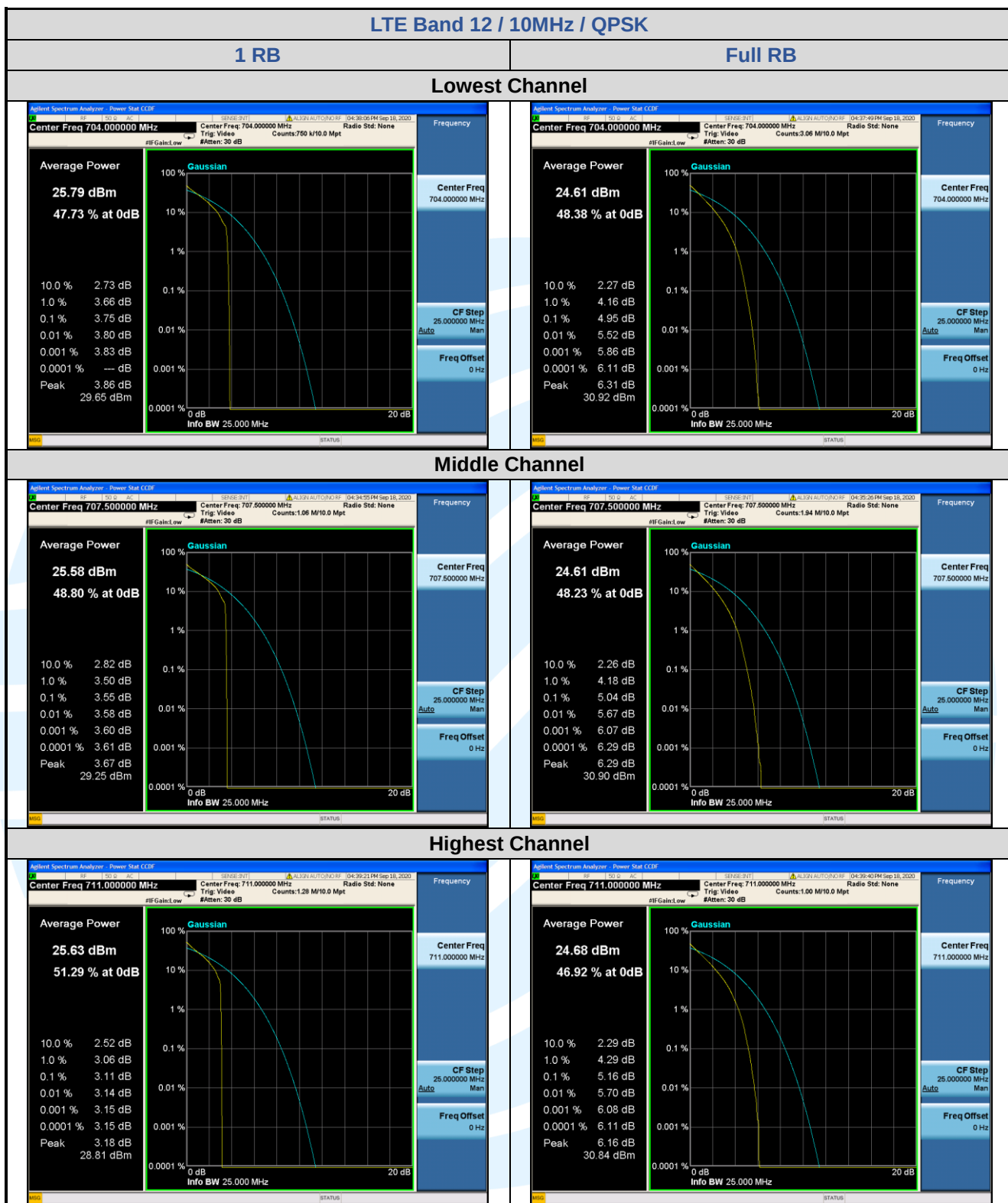
LTE Band 4 Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Lowest	1 RB	3.11	3.89	/	13	Pass
	Full RB	4.42	5.26	/	13	Pass
Middle	1 RB	3.35	4.00	/	13	Pass
	Full RB	4.66	5.42	/	13	Pass
Highest	1 RB	3.96	4.30	/	13	Pass
	Full RB	4.63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

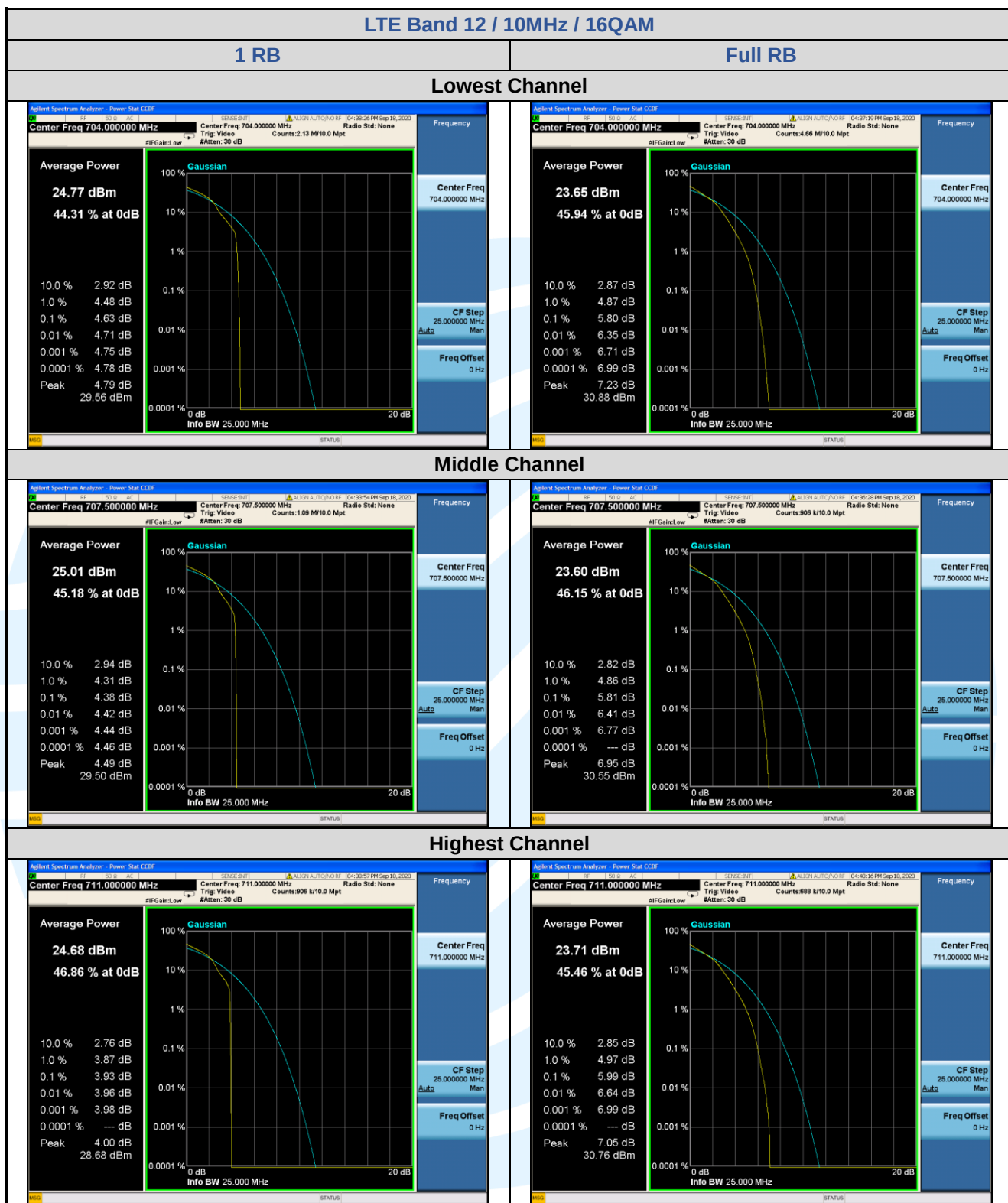




5.4.3 LTE Band 12

LTE Band 12 Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 10 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Lowest	1 RB	3.75	4.63	/	13	Pass
	Full RB	4.95	5.80	/	13	Pass
Middle	1 RB	3.55	4.38	/	13	Pass
	Full RB	5.04	5.81	/	13	Pass
Highest	1 RB	3.11	3.93	/	13	Pass
	Full RB	5.16	5.99	/	13	Pass

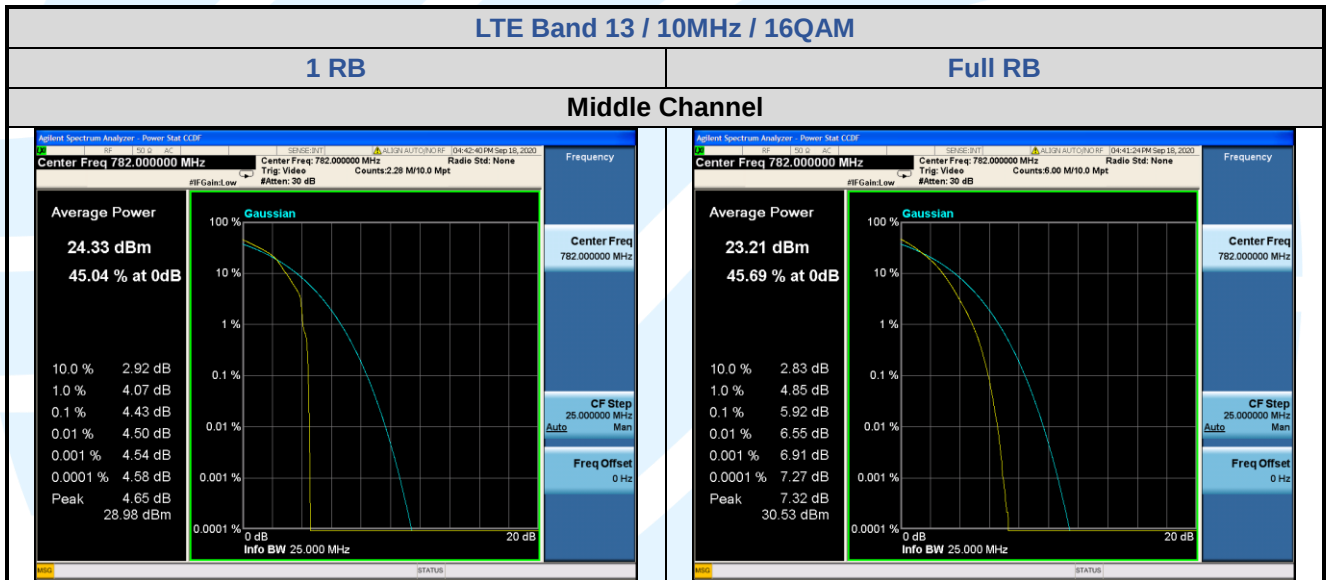
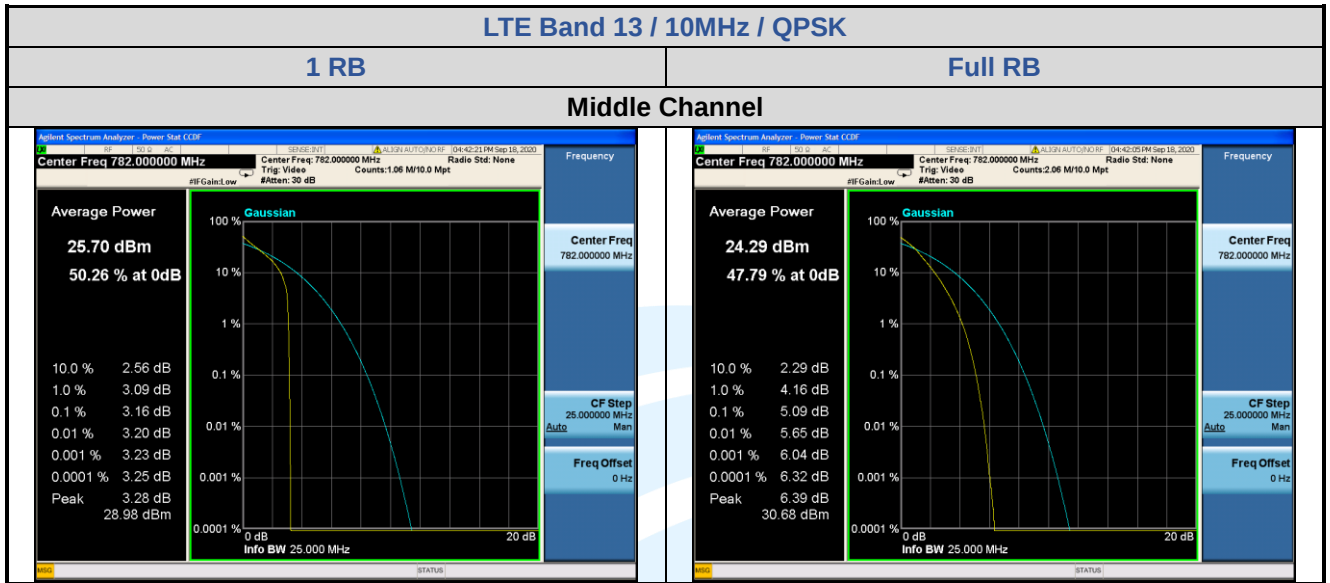




5.4.4 LTE Band 13

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





5.4.5 LTE Band 66

LTE Band 66 Peak-to-average ratio (dB)						
Channel	RB Configuration	Channel Bandwidth: 20 MHz			Limit (dB)	Result
		QPSK	16QAM	64QAM		
Lowest	1 RB	4.83	5.75	/	13	Pass
	Full RB	5.24	6.16	/	13	Pass
Middle	1 RB	4.89	5.88	/	13	Pass
	Full RB	5.28	6.22	/	13	Pass
Highest	1 RB	4.56	5.50	/	13	Pass
	Full RB	5.39	6.24	/	13	Pass