

TEST REPORT

Application No.: SZEM2009009689CR
Applicant: Mavenir Systems, Inc.
Address of Applicant: 1700 International Parkway, Ste 200, Richardson, Texas 75081 USA
Manufacturer: Mavenir Systems, Inc.
Address of Manufacturer: 1700 International Parkway, Ste 200, Richardson, Texas 75081 USA
Factory: Sunwave Communications Co., Ltd.
Address of Factory: 581 Huoju Avenue, Binjiang District, Hangzhou, P.R.China Zip: 310053
Equipment Under Test (EUT):
EUT Name: Remote Radio Unit
Model No.: DRRU-R3184848
FCC ID: 2AWAS-910-00027
Trade Mak: MAVENIR
Standard(s) : 47 CFR Part 2
 47 CFR Part 96
Date of Receipt: 2020-10-09
Date of Test: 2020-10-10 to 2020-10-23
Date of Issue: 2020-10-23

Test Result:	Pass
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager



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<i>Revision Record</i>				
<i>Version</i>	<i>Chapter</i>	<i>Date</i>	<i>Modifier</i>	<i>Remark</i>
01		2020-10-23		Original

Authorized for issue by:			
		Edison Li	
		Edison Li /Project Engineer	
		Eric Fu	
		Eric Fu /Reviewer	



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2 Test Summary

Test Item	FCC Rule No.	Verdict
Effective (Isotropic) Radiated Output Power	§2.1046, §96.41	PASS
Peak-Average Ratio	§96.41	PASS
Modulation Characteristics	§2.1047	PASS
Bandwidth	§96.41	PASS
Band Edge Compliance	§2.1051, §96.41	PASS
Spurious emissions at antenna terminals	§2.1051, §96.41	PASS
Field strength of spurious radiation	§2.1051, §96.41	PASS
Frequency stability	§2.1055,	PASS



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4 General Information

4.1 Details of E.U.T.

Product Name:	Remote Unit
Model No.:	DRRU-R3184848
Trade Mark:	MAVENIR
Sample Type:	Fixed production
Antenna Gain:	Antenna gain=6dBi
Power Supply:	DC48V
Optical Fiber:	200cm (unshielded)
DC Cable:	200cm (unshielded)
RF Cable:	200cm (shielded)
Type of Modulation	TDD
Frequency Band:	Downlink 3550MHz to 3700MHz
Modulation Type:	QPSK, 16QAM, 64QAM, 256QAM
Normal Output Power:	37dBm
System Gain:	37Db
CA Capability:	NA
MIMO:	2x2MIMO 4x4MIMO
Power Control Method:	ALC



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4.2 Test Frequency

Configuration	Carrier	Carrier Bandwidth	Carrier Frequency Configuration (MHz)		
			Low(L)	Middle(M)	High(H)
LTE_5MHz	1C	5MHz	3552.5	3625	3697.5
LTE_10MHz	1C	10MHz	3555	3625	3695
LTE_15MHz	1C	15MHz	3557.5	3625	3692.5
LTE_20MHz	1C	20MHz	3560	3625	3690



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4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF conducted power	$\pm 0.75\text{dB}$
5	RF power density	$\pm 2.84\text{dB}$
6	Conducted Spurious emissions	$\pm 0.75\text{dB}$
7	RF Radiated power	$\pm 4.5\text{dB}$ (below 1GHz)
		$\pm 4.8\text{dB}$ (above 1GHz)
8	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
9	Temperature test	$\pm 1^\circ\text{C}$
10	Humidity test	$\pm 3\%$
11	Supply voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$



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4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

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

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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 Shenzhen Branch EMC Laboratory

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5 Equipment List

RF test system					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
Shielding Room	SAEMC	MSR733	SEM001-09	2019-06-13	2022-06-12
MXA Signal Analyzer	KEYSIGHT	N9020A	SEM004-17	2020-05-21	2021-05-20
MXG Vector Signal Generator	KEYSIGHT	N5182A	SEM006-14	2020-03-23	2021-03-22
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2020-10-09	2021-10-08
MXG Vector Signal Generator	KEYSIGHT	N5182B	MT-W840	2020-07-03	2021-07-02
MXA Signal Analyzer	KEYSIGHT	N9020B	MT-W841	2020-07-11	2021-07-10
DC Power Supply	Chroma	62012P-80-60	03780	2020-06-02	2021-06-01
Attenuator	HUAXIANG	10048953	MT-W504	2018-11-15	2020-11-14
Temperature chamber	ESPEC	EW1040	MT-X003	2019-11-03	2020-11-02

RE in Chamber (Above 1GHz)						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date	Cal. Due date
1	3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2020-05-10	2021-05-09
2	EXA Spectrum Analyzer	Agilent Technologies Inc	N9010A	SEM004-09	2020-07-19	2021-07-18
3	Log Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2017-11-15	2020-11-14
4	Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2019-10-09	2020-10-08
					2020-10-09	2021-10-08
5	Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-06-14	2021-06-13
6	Horn Antenna (18-26GHz)	ETS-Lindgren	3160	SEM003-12	2017-11-24	2020-11-23
7	Horn Antenna (26GHz-40GHz)	A.H.Systems, inc.	SAS-573	SEM003-13	2018-02-12	2021-02-11
8	Low Noise Amplifier	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2019-10-09	2020-10-08
					2020-10-09	2021-10-08
9	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A
10	Coaxial Cable	SGS	N/A	SEM026-01	2020-07-13	2021-07-12



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RE in Chamber (Below 1GHz)						
Item	Test Equipment	Manufacturer	Model No.	Inventory No	Cal. Date	Cal. Due date
1	10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2020-05-10	2021-05-09
2	EMI Test Receiver (9k-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2020-04-25	2021-04-24
3	log-Broadband Antenna(30M-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2019-06-29	2022-06-28
4	Pre-amplifier	Sonoma Instrument Co	310N	SEM005-03	2020-06-05	2021-06-04
5	Loop Antenna	ETS-Lindgren	6502	SEM003-08	2018-08-14	2021-08-13
6	Coaxial Cable	SGS	N/A	SEM029-01	2020-07-13	2021-07-12



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6 Radio Spectrum Matter Test Results

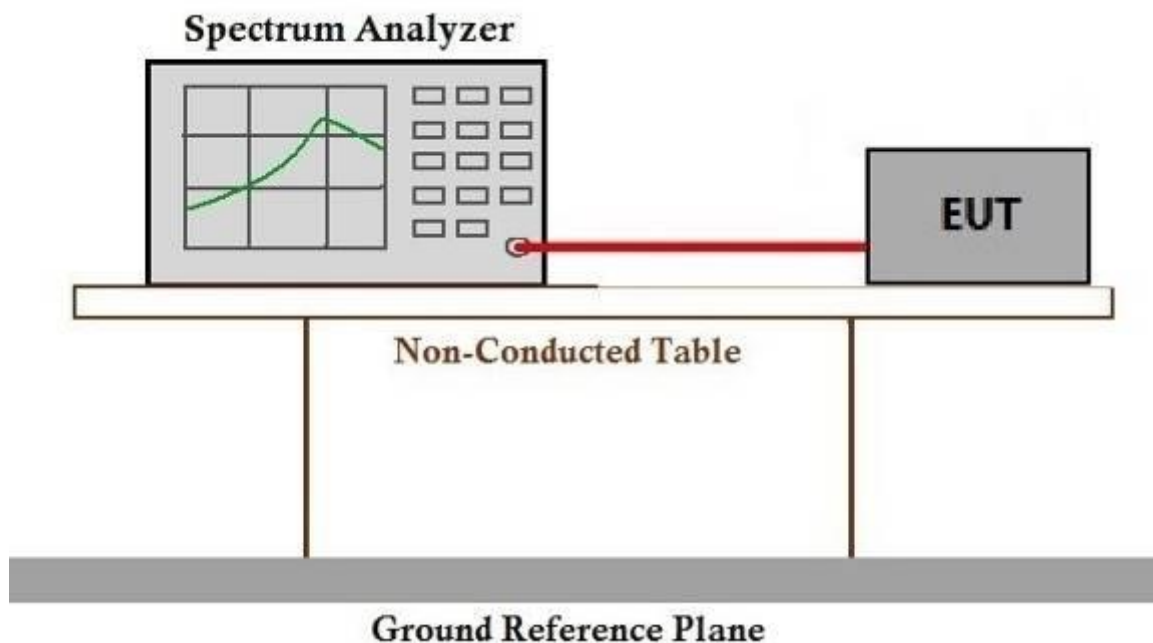
6.1 Effective (Isotropic) Radiated Output Power

Test Requirement: §2.1046, §96.41
 Test Method: ANSI C63.26, KDB 971168 D01 v03
 Limit: EIRP \leq 47dBm/10MHz, PSD \leq 37dBm/MHz (LTE Band 48)

6.1.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.7 °C Humidity: 68.2 % RH Atmospheric Pressure: 1030 mbar
 Test mode: m: Tx mode, Keep the EUT in transmitting mode.

6.1.2 Test Setup Diagram



6.1.3 Measurement Data

Please refer to Appendix A-Output power

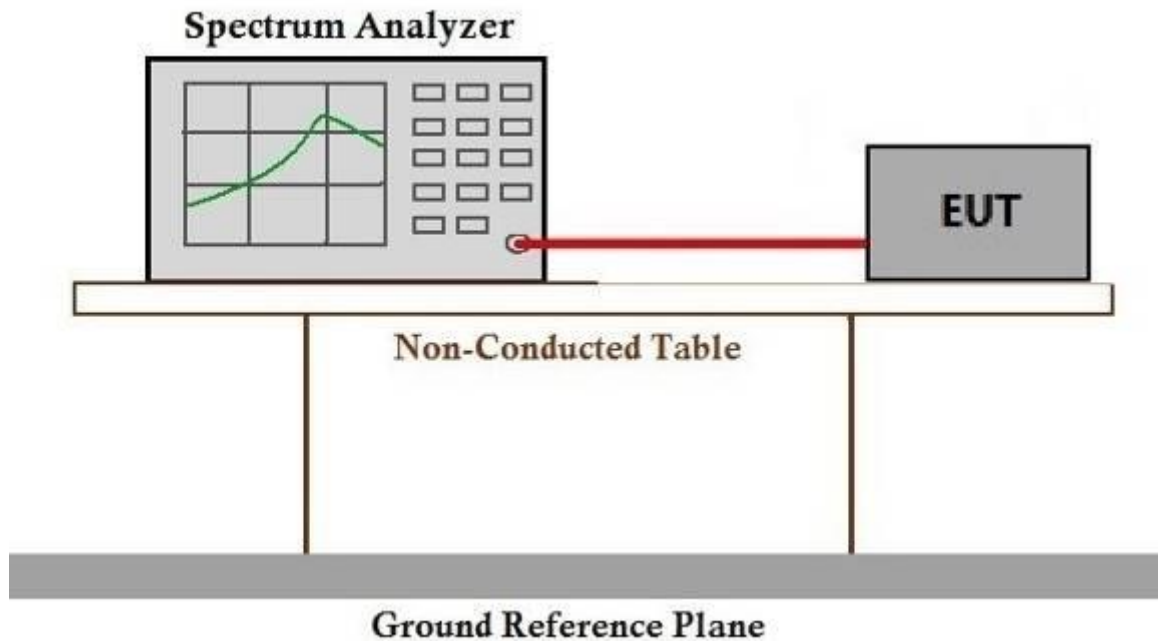
6.2 Peak-Average Ratio

Test Requirement: §96.41
 Test Method: ANSI C63.26, KDB 971168 D01 v03
 Limit: ≤13dB

6.2.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.7 °C Humidity: 68.2 % RH Atmospheric Pressure: 1030 mbar
 Test mode: m: Tx mode, Keep the EUT in transmitting mode.

6.2.2 Test Setup Diagram



6.2.3 Measurement Data

Please refer to Appendix B- Peak-Average Ratio



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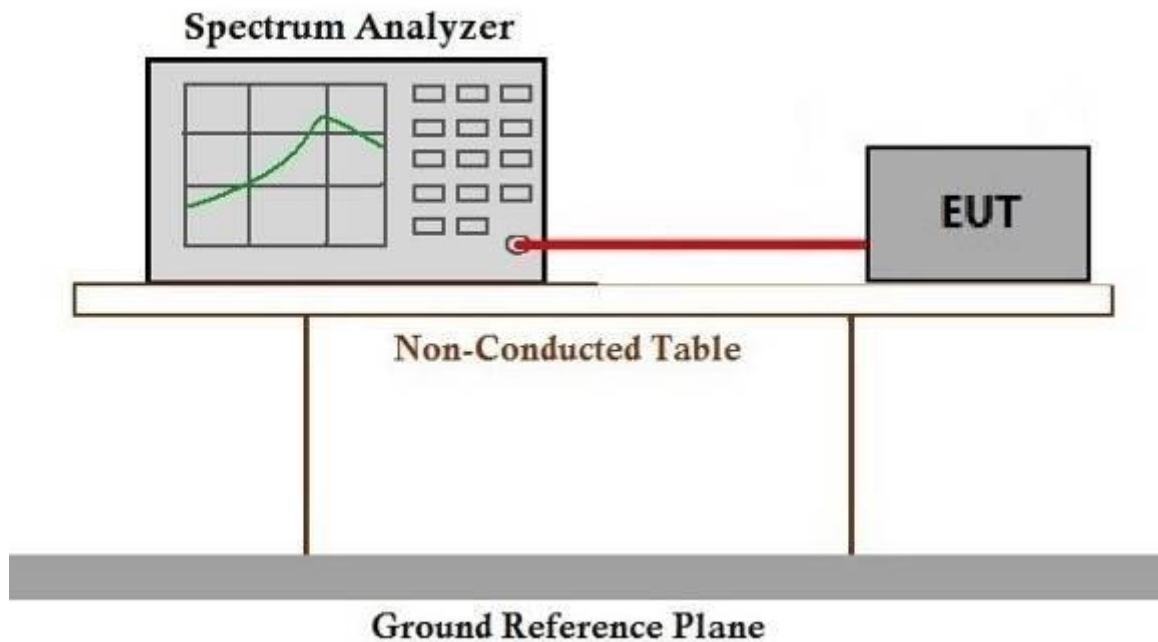
6.3 Bandwidth

Test Requirement: §2.1049(h)
 Test Method: ANSI C63.26, KDB 971168 D01 v03
 Limit: OBW: No limit
 EBW: No limit

6.3.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.7 °C Humidity: 68.2 % RH Atmospheric Pressure: 1030 mbar
 Test mode: m: Tx mode, Keep the EUT in transmitting mode.

6.3.2 Test Setup Diagram



6.3.3 Measurement Data

Please refer to Appendix C- Bandwidth



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6.4 Band Edge Compliance

Test Requirement: §2.1051, §96.41

Test Method: ANSI C63.26, KDB 971168 D01 v03

Limit: Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

6.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22.7 °C Humidity: 68.2 % RH Atmospheric Pressure: 1030 mbar

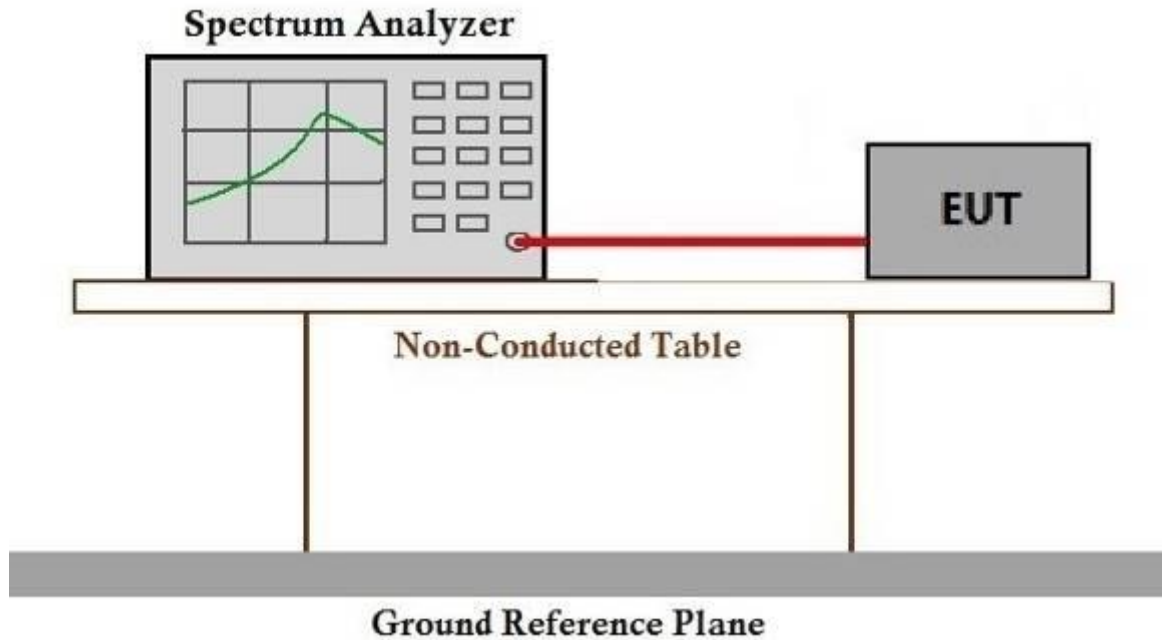
Test mode: m: Tx mode, Keep the EUT in transmitting mode.



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6.4.2 Test Setup Diagram



6.4.3 Measurement Data

Please refer to Appendix D- Conducted band edge



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6.5 Spurious emissions at antenna terminals

Test Requirement: §2.1051, §96.41

Test Method: ANSI C63.26, KDB 971168 D01 v03

Limit: Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

6.5.1 E.U.T. Operation

Operating Environment:

Temperature: 22.7 °C Humidity: 68.2 % RH Atmospheric Pressure: 1030 mbar

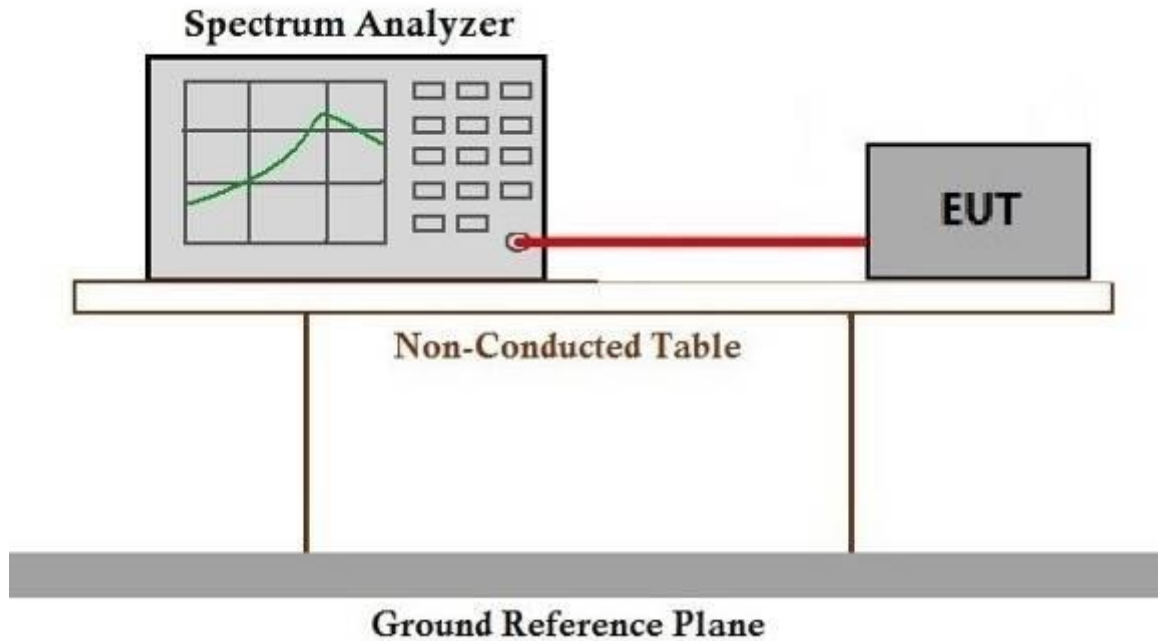
Test mode: m: Tx mode, Keep the EUT in transmitting mode.



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6.5.2 Test Setup Diagram



6.5.3 Measurement Data

Please refer to Appendix D- Conducted Spurious Emission



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6.6 Field strength of spurious radiation

Test Requirement: §2.1051, §96.41

Test Method: ANSI C63.26, KDB 971168 D01 v03

Limit: Except as otherwise specified in paragraph (e)(2) of this section, for channel and frequency assignments made by the SAS to CBSDs, the conducted power of any CBSD emission outside the fundamental emission bandwidth as specified in paragraph (e)(3) of this section (whether the emission is inside or outside of the authorized band) shall not exceed -13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any CBSD emission shall not exceed -25 dBm/MHz. The upper and lower SAS assigned channel edges are the upper and lower limits of any channel assigned to a CBSD by an SAS, or in the case of multiple contiguous channels, the upper and lower limits of the combined contiguous channels.

Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed -25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz.

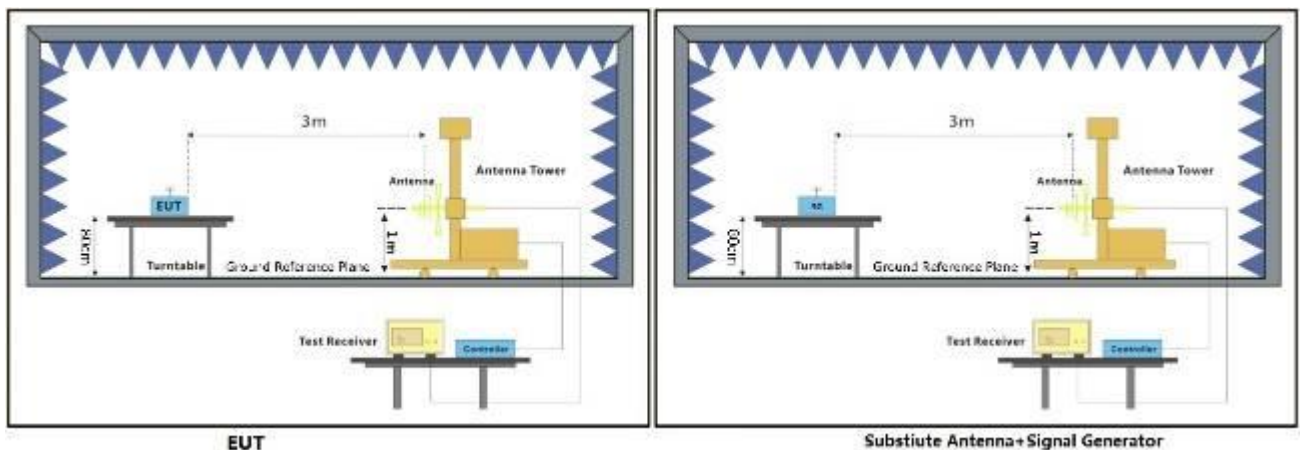
6.6.1 E.U.T. Operation

Operating Environment:

Temperature: 22.7 °C Humidity: 68.2 % RH Atmospheric Pressure: 1030 mbar

Test mode: m: Tx mode, Keep the EUT in transmitting mode.

6.6.2 Test Setup Diagram



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6.6.3 Measurement Procedure and Data

Test Procedure:

- (1) On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
- (2) The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
- (3) The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- (4) The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- (5) The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- (6) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- (7) The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- (8) The maximum signal level detected by the measuring receiver shall be noted.
- (9) The measurement shall be repeated with the test antenna set to horizontal polarization.
- (10) Replace the antenna with a proper Antenna (substitution antenna).
- (11) The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
- (12) The substitution antenna shall be connected to a calibrated signal generator.
- (13) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- (14) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- (15) The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- (16) The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- (17) The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.



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Lowest Channel						
Frequency (MHz)	Spurious Emission Level			Limit dBm	Over limit dB	Result
	(Deg)	Polaxis	(dBm)			
57.37500	54.0	H	-68.33	-40	-28.33	Pass
276.90000	225.0	H	-63.36	-40	-23.36	Pass
1799.50000	266.0	H	-51.23	-40	-11.23	Pass
2983.00000	62.0	H	-45.22	-40	-5.22	Pass
7864.27500	154.0	H	-46.57	-40	-6.57	Pass
11796.77500	165.0	H	-48.22	-40	-8.22	Pass

Lowest Channel						
Frequency (MHz)	Spurious Emission Level			Limit dBm	Over limit dB	Result
	(Deg)	Polaxis	(dBm)			
68.90000	51.0	V	-72.13	-40	-32.13	Pass
254.37500	197.0	V	-69.38	-40	-29.38	Pass
2977.62500	124.0	V	-46.94	-40	-6.94	Pass
5843.00000	108.0	V	-54.51	-40	-14.51	Pass
7899.75000	151.0	V	-46.10	-40	-6.10	Pass
10586.02500	175.0	V	-48.48	-40	-8.48	Pass

Middle Channel						
Frequency (MHz)	Spurious Emission Level			Limit dBm	Over limit dB	Result
	(Deg)	Polaxis	(dBm)			
258.65000	36.0	H	-68.43	-40	-28.43	Pass
634.29583	0.0	H	-60.38	-40	-20.38	Pass
2352.50000	186.0	H	-47.45	-40	-7.45	Pass
5898.02500	164.0	H	-51.18	-40	-11.18	Pass
7864.27500	322.0	H	-46.55	-40	-6.55	Pass
10467.20000	358.0	H	-51.96	-40	-11.96	Pass

Middle Channel						
Frequency (MHz)	Spurious Emission Level			Limit dBm	Over limit dB	Result
	(Deg)	Polaxis	(dBm)			
751.58333	312.0	V	-63.45	-40	-23.45	Pass
896.41666	169.0	V	-63.35	-40	-23.35	Pass
1380.00000	41.0	V	-53.71	-40	-13.71	Pass
2201.50000	264.0	V	-47.44	-40	-7.44	Pass
7864.27500	151.0	V	-44.33	-40	-4.33	Pass
11796.77500	173.0	V	-49.36	-40	-9.36	Pass



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Highest Channel						
Frequency (MHz)	Spurious Emission Level			Limit dBm	Over limit dB	Result
	(Deg)	Polaxis	(dBm)			
263.35000	106.0	H	-68.28	-40	-28.28	Pass
624.07500	0.0	H	-60.21	-40	-20.21	Pass
866.53333	225.0	H	-62.91	-40	-22.91	Pass
2245.00000	307.0	H	-47.01	-40	-7.01	Pass
7864.27500	154.0	H	-46.21	-40	-6.21	Pass
11796.45000	166.0	H	-49.52	-40	-9.52	Pass

Highest Channel						
Frequency (MHz)	Spurious Emission Level			Limit dBm	Over limit dB	Result
	(Deg)	Polaxis	(dBm)			
744.57083	298.0	V	-62.98	-40	-22.98	Pass
867.31250	338.0	V	-64.00	-40	-24.00	Pass
1582.00000	298.0	V	-53.28	-40	-13.28	Pass
2299.50000	0.0	V	-46.93	-40	-6.93	Pass
7864.27500	151.0	V	-44.90	-40	-4.49	Pass
11796.77500	140.0	V	-47.79	-40	-7.79	Pass

Remark:

- 1) Pretest with normal and extreme conditions, only the worst case data was showed in the test report.
- 2) We have tested all modulation and all Channel, but only the worst case data displayed in this report.



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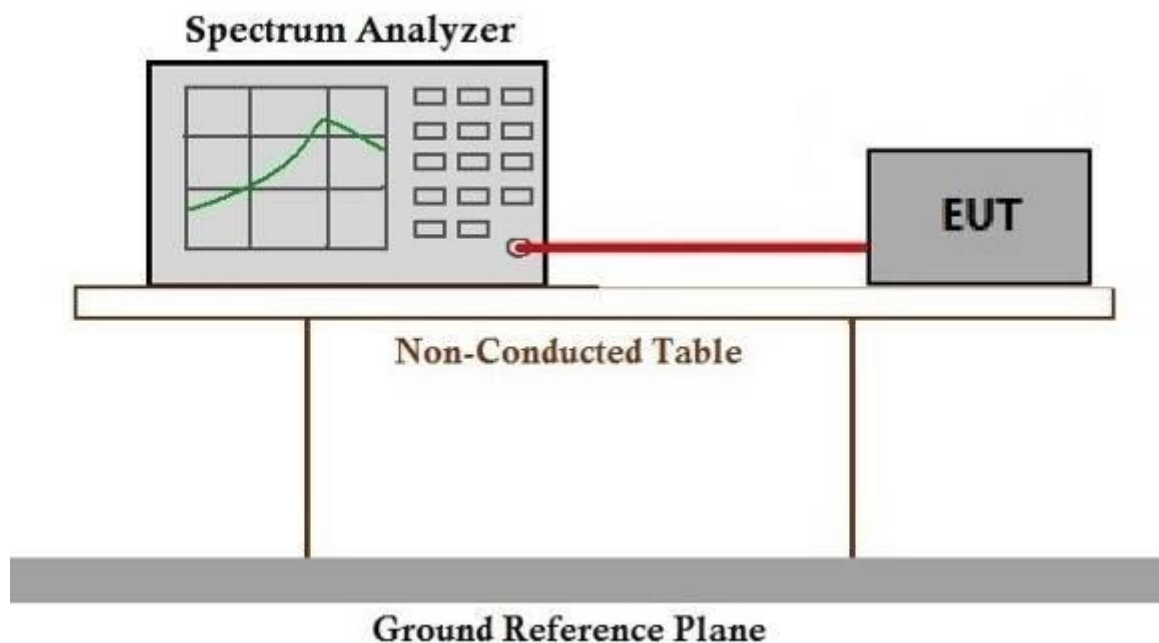
6.7 Frequency stability

Test Requirement: §2.1055
 Test Method: ANSI C63.26, KDB 971168 D01 v03
 Limit: Fundamental emission stays within authorized frequency block

6.7.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.7 °C Humidity: 68.2 % RH Atmospheric Pressure: 1030 mbar
 Test mode: m: Tx mode, Keep the EUT in transmitting mode.

6.7.2 Test Setup Diagram



6.7.3 Measurement Data

Please refer to Appendix F

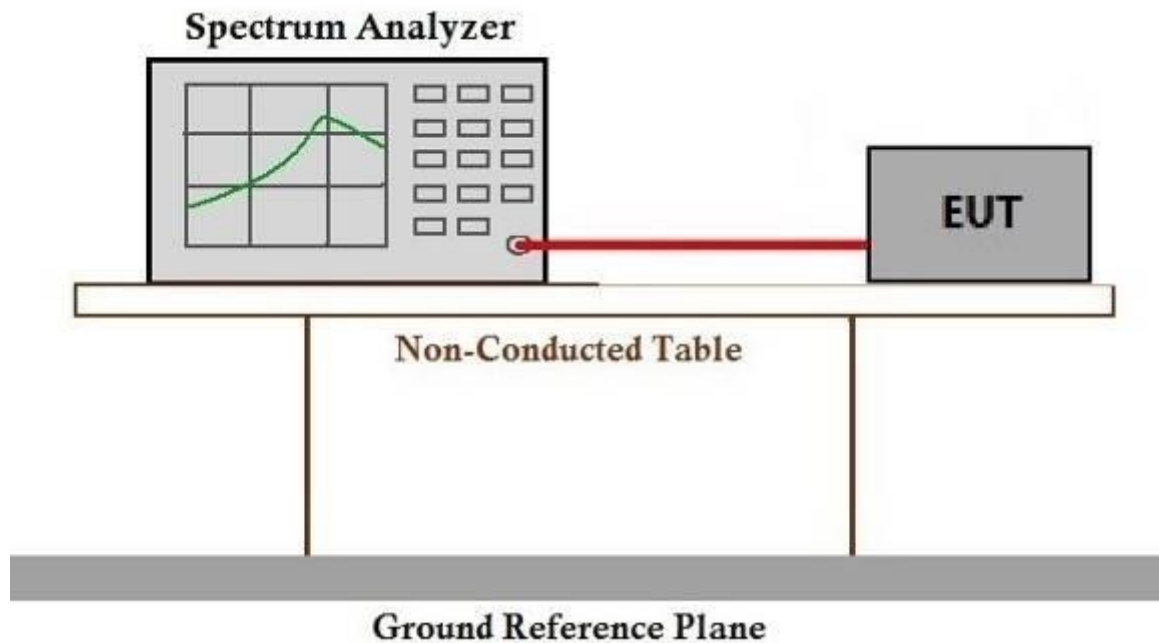
6.8 Modulation Characteristics

Test Requirement: §2.1047
 Test Method: ANSI C63.26, KDB 971168 D01 v03
 Limit: Digital modulation

6.8.1 E.U.T. Operation

Operating Environment:
 Temperature: 22.7 °C Humidity: 68.2 % RH Atmospheric Pressure: 1030 mbar
 Test mode: m: Tx mode, Keep the EUT in transmitting mode.

6.8.2 Test Setup Diagram



6.8.3 Measurement Data

Please refer to Appendix F



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7 Photographs

7.1 Setup photo

Please refer to setup photos.

7.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.



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8 Appendix F

8.1 Frequency stability

Test Band: 48 _ 5MHz Bandwidth (Frequency Error VS. Voltage)												
Test Mode	RB Allocation		Temp. (°C)	Volt. (Vdc)	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
	Size	Offset			LCH	MCH	HCH	LCH	MCH	HCH		
QPSK	25	0	20	38.4	6.0	5.4	3.9	0.00169	0.00149	0.00105	2.50	PASS
				48.0	3.2	3.8	4.7	0.00090	0.00105	0.00127	2.50	PASS
				57.6	5.6	2.7	2.4	0.00158	0.00074	0.00065	2.50	PASS
16QAM	25	0	20	38.4	3.6	5.5	2.1	0.00101	0.00152	0.00057	2.50	PASS
				48.0	4.8	3.2	3.9	0.00135	0.00088	0.00105	2.50	PASS
				57.6	4.8	5.8	2.4	0.00135	0.00160	0.00065	2.50	PASS
64QAM	25	0	20	38.4	3.0	3.4	5.8	0.00084	0.00094	0.00157	2.50	PASS
				48.0	4.3	2.2	3.3	0.00121	0.00061	0.00089	2.50	PASS
				57.6	4.6	3.7	5.0	0.00129	0.00102	0.00135	2.50	PASS
256QAM	25	0	20	38.4	4.1	5.7	3.4	0.00115	0.00157	0.00092	2.50	PASS
				48.0	2.4	2.1	3.8	0.00068	0.00058	0.00103	2.50	PASS
				57.6	2.3	4.0	4.4	0.00065	0.00110	0.00119	2.50	PASS

Test Band: 48 _ 5MHz Bandwidth (Frequency Error VS. Temperature)												
Test Mode	RB Allocation		Volt. (Vdc)	Temp. (°C)	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
	Size	Offset			LCH	MCH	HCH	LCH	MCH	HCH		
QPSK	25	0	48	-30.00	4.5	2.2	2.5	0.00127	0.00061	0.00068	2.50	PASS
				-20.00	6.0	3.9	3.8	0.00169	0.00108	0.00103	2.50	PASS
				-10.00	4.9	5.3	2.8	0.00138	0.00146	0.00076	2.50	PASS
				0.00	4.8	3.6	2.5	0.00135	0.00099	0.00068	2.50	PASS
				10.00	2.7	5.5	5.1	0.00076	0.00152	0.00138	2.50	PASS
				20.00	3.5	2.8	4.5	0.00099	0.00077	0.00122	2.50	PASS
				30.00	3.4	2.5	2.5	0.00096	0.00069	0.00068	2.50	PASS
				40.00	6.0	2.7	4.3	0.00169	0.00074	0.00116	2.50	PASS
				50.00	4.7	5.8	3.7	0.00132	0.00160	0.00100	2.50	PASS
16QAM	25	0	48	-30.00	2.1	2.4	2.6	0.00059	0.00066	0.00070	2.50	PASS
				-20.00	2.9	2.5	4.3	0.00082	0.00069	0.00116	2.50	PASS
				-10.00	3.2	5.2	3.5	0.00090	0.00143	0.00095	2.50	PASS
				0.00	5.9	5.8	4.5	0.00166	0.00160	0.00122	2.50	PASS
				10.00	2.1	5.3	5.4	0.00059	0.00146	0.00146	2.50	PASS
				20.00	5.9	3.4	3.6	0.00166	0.00094	0.00097	2.50	PASS



				30.00	5.4	3.5	5.1	0.00152	0.00097	0.00138	2.50	PASS
				40.00	2.2	2.3	2.5	0.00062	0.00063	0.00068	2.50	PASS
				50.00	2.3	2.8	4.6	0.00065	0.00077	0.00124	2.50	PASS
64QAM	25	0	48	-30.00	4.5	4.8	4.8	0.00127	0.00132	0.00130	2.50	PASS
				-20.00	3.9	4.8	3.3	0.00110	0.00132	0.00089	2.50	PASS
				-10.00	3.1	5.7	3.7	0.00087	0.00157	0.00100	2.50	PASS
				0.00	4.1	3.7	4.6	0.00115	0.00102	0.00124	2.50	PASS
				10.00	2.5	2.4	2.4	0.00070	0.00066	0.00065	2.50	PASS
				20.00	4.0	3.1	2.6	0.00113	0.00086	0.00070	2.50	PASS
				30.00	5.7	5.2	5.7	0.00160	0.00143	0.00154	2.50	PASS
				40.00	4.4	2.3	4.0	0.00124	0.00063	0.00108	2.50	PASS
				50.00	4.0	5.3	4.1	0.00113	0.00146	0.00111	2.50	PASS
256QAM	25	0	48	-30.00	5.4	3.5	2.0	0.00152	0.00097	0.00054	2.50	PASS
				-20.00	4.7	4.9	3.0	0.00132	0.00135	0.00081	2.50	PASS
				-10.00	6.0	5.1	4.5	0.00169	0.00141	0.00122	2.50	PASS
				0.00	2.2	3.3	3.5	0.00062	0.00091	0.00095	2.50	PASS
				10.00	5.8	3.9	5.4	0.00163	0.00108	0.00146	2.50	PASS
				20.00	3.9	3.5	3.1	0.00110	0.00097	0.00084	2.50	PASS
				30.00	4.4	2.8	5.1	0.00124	0.00077	0.00138	2.50	PASS
				40.00	5.5	5.4	3.7	0.00155	0.00149	0.00100	2.50	PASS
				50.00	2.5	5.6	4.9	0.00070	0.00154	0.00133	2.50	PASS

Test Band: 48 _ 10MHz Bandwidth (Frequency Error VS. Voltage)

Test Mode	RB Allocation		Temp. (°C)	Volt. (Vdc)	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
	Size	Offset			LCH	MCH	HCH	LCH	MCH	HCH		
QPSK	50	0	20	38.4	3.1	5.0	4.7	0.00087	0.00138	0.00127	2.50	PASS
				48.0	5.9	5.6	2.6	0.00166	0.00154	0.00070	2.50	PASS
				57.6	4.0	3.3	2.5	0.00113	0.00091	0.00068	2.50	PASS
16QAM	50	0	20	38.4	2.5	2.8	5.6	0.00070	0.00077	0.00152	2.50	PASS
				48.0	3.5	5.9	3.5	0.00098	0.00163	0.00095	2.50	PASS
				57.6	2.9	5.4	5.8	0.00082	0.00149	0.00157	2.50	PASS
64QAM	50	0	20	38.4	3.7	5.2	2.4	0.00104	0.00143	0.00065	2.50	PASS
				48.0	2.8	5.7	3.2	0.00079	0.00157	0.00087	2.50	PASS
				57.6	4.1	3.1	5.7	0.00115	0.00086	0.00154	2.50	PASS
256QAM	50	0	20	38.4	3.6	4.0	4.3	0.00101	0.00110	0.00116	2.50	PASS
				48.0	3.2	5.0	2.5	0.00090	0.00138	0.00068	2.50	PASS
				57.6	4.1	3.5	5.6	0.00115	0.00097	0.00152	2.50	PASS



Test Band: 48 _ 10MHz Bandwidth (Frequency Error VS. Temperature)												
Test Mode	RB Allocation		Volt. (Vdc)	Temp. (°C)	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
	Size	Offset			LCH	MCH	HCH	LCH	MCH	HCH		
QPSK	50	0	48	-30.00	4.6	5.2	3.7	0.00129	0.00143	0.00100	2.50	PASS
				-20.00	2.6	2.4	5.3	0.00073	0.00066	0.00143	2.50	PASS
				-10.00	2.5	5.7	3.5	0.00070	0.00157	0.00095	2.50	PASS
				0.00	2.5	5.8	3.0	0.00070	0.00160	0.00081	2.50	PASS
				10.00	4.4	3.2	4.0	0.00124	0.00088	0.00108	2.50	PASS
				20.00	4.0	2.4	2.2	0.00113	0.00066	0.00060	2.50	PASS
				30.00	5.4	2.9	4.6	0.00152	0.00080	0.00124	2.50	PASS
				40.00	2.8	3.4	5.4	0.00079	0.00094	0.00146	2.50	PASS
16QAM	50	0	48	-30.00	5.5	5.9	5.0	0.00155	0.00163	0.00135	2.50	PASS
				-20.00	5.5	3.2	2.5	0.00155	0.00088	0.00068	2.50	PASS
				-10.00	5.6	4.7	3.7	0.00158	0.00130	0.00100	2.50	PASS
				0.00	3.9	2.2	2.4	0.00110	0.00061	0.00065	2.50	PASS
				10.00	3.4	2.1	4.4	0.00096	0.00058	0.00119	2.50	PASS
				20.00	4.3	5.5	5.2	0.00121	0.00152	0.00141	2.50	PASS
				30.00	5.5	5.5	3.5	0.00155	0.00152	0.00095	2.50	PASS
				40.00	3.4	2.1	4.9	0.00096	0.00058	0.00133	2.50	PASS
64QAM	50	0	48	-30.00	3.4	3.2	4.8	0.00096	0.00088	0.00130	2.50	PASS
				-20.00	5.4	3	2.8	0.00152	0.00083	0.00076	2.50	PASS
				-10.00	2.1	3.6	5.3	0.00059	0.00099	0.00143	2.50	PASS
				0.00	3.1	2.9	3.4	0.00087	0.00080	0.00092	2.50	PASS
				10.00	2.7	3.7	3.2	0.00076	0.00102	0.00087	2.50	PASS
				20.00	3.5	3.7	3.2	0.00098	0.00102	0.00087	2.50	PASS
				30.00	4.6	2.7	2.1	0.00129	0.00074	0.00057	2.50	PASS
				40.00	4.6	3.2	3.1	0.00129	0.00088	0.00084	2.50	PASS
256QAM	50	0	48	-30.00	2.1	4.2	5.5	0.00059	0.00116	0.00149	2.50	PASS
				-20.00	3.1	4.4	3.1	0.00087	0.00121	0.00084	2.50	PASS
				-10.00	4.8	3.9	4.3	0.00135	0.00108	0.00116	2.50	PASS
				0.00	5.2	5.0	2.8	0.00146	0.00138	0.00076	2.50	PASS
				10.00	4.0	3.2	4.2	0.00113	0.00088	0.00114	2.50	PASS
				20.00	5.5	5.6	3.2	0.00155	0.00154	0.00087	2.50	PASS
				30.00	4.3	5.4	5.2	0.00121	0.00149	0.00141	2.50	PASS
				40.00	4.4	4.4	2.8	0.00124	0.00121	0.00076	2.50	PASS
				50.00	5.6	5.8	3.3	0.00158	0.00160	0.00089	2.50	PASS



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Test Band: 48 _ 15MHz Bandwidth (Frequency Error VS. Voltage)												
Test Mode	RB Allocation		Temp. (°C)	Volt. (Vdc)	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
	Size	Offset			LCH	MCH	HCH	LCH	MCH	HCH		
QPSK	75	0	20	38.4	3.8	3.7	3.2	0.00107	0.00102	0.00087	2.50	PASS
				48.0	5.5	4.8	3.5	0.00155	0.00132	0.00095	2.50	PASS
				57.6	3.6	5.5	5.0	0.00101	0.00152	0.00135	2.50	PASS
16QAM	75	0	20	38.4	5.1	5.6	5.3	0.00143	0.00154	0.00144	2.50	PASS
				48.0	4.3	4.6	2.8	0.00121	0.00127	0.00076	2.50	PASS
				57.6	4.7	3.8	4.4	0.00132	0.00105	0.00119	2.50	PASS
64QAM	75	0	20	38.4	4.7	3.7	4.4	0.00132	0.00102	0.00119	2.50	PASS
				48.0	2.1	2.4	3.9	0.00059	0.00066	0.00106	2.50	PASS
				57.6	4.5	5.1	3.8	0.00126	0.00141	0.00103	2.50	PASS
256QAM	75	0	20	38.4	5.2	5.3	2.3	0.00146	0.00146	0.00062	2.50	PASS
				48.0	3.0	2.3	3.9	0.00084	0.00063	0.00106	2.50	PASS
				57.6	4.1	5.5	3.4	0.00115	0.00152	0.00092	2.50	PASS

Test Band: 48 _ 15MHz Bandwidth (Frequency Error VS. Temperature)												
Test Mode	RB Allocation		Volt. (Vdc)	Temp. (°C)	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict
	Size	Offset			LCH	MCH	HCH	LCH	MCH	HCH		
QPSK	75	0	48	-30.00	4.0	2.2	2.6	0.00112	0.00061	0.00070	2.50	PASS
				-20.00	3.0	4.2	4.9	0.00084	0.00116	0.00133	2.50	PASS
				-10.00	5.3	2.3	5.5	0.00149	0.00063	0.00149	2.50	PASS
				0.00	4.9	3.9	5.7	0.00138	0.00108	0.00154	2.50	PASS
				10.00	2.4	6.0	4.9	0.00067	0.00166	0.00133	2.50	PASS
				20.00	4.1	3.2	4.6	0.00115	0.00088	0.00125	2.50	PASS
				30.00	2.2	3.8	3.7	0.00062	0.00105	0.00100	2.50	PASS
				40.00	3.2	5.4	4.8	0.00090	0.00149	0.00130	2.50	PASS
				50.00	2.4	4.1	5.7	0.00067	0.00113	0.00154	2.50	PASS
16QAM	75	0	48	-30.00	5.2	2.2	5	0.00146	0.00061	0.00135	2.50	PASS
				-20.00	4.4	5.9	3.6	0.00124	0.00163	0.00097	2.50	PASS
				-10.00	5.8	3.7	3.5	0.00163	0.00102	0.00095	2.50	PASS
				0.00	3.4	6.0	6.0	0.00096	0.00166	0.00162	2.50	PASS
				10.00	3.6	5.7	4.1	0.00101	0.00157	0.00111	2.50	PASS
				20.00	4.3	2.2	3.0	0.00121	0.00061	0.00081	2.50	PASS
				30.00	4.4	2.8	2.2	0.00124	0.00077	0.00060	2.50	PASS
				40.00	4.2	2.1	4.5	0.00118	0.00058	0.00122	2.50	PASS
				50.00	3.1	2.2	2.5	0.00087	0.00061	0.00068	2.50	PASS
64QAM	75	0	48	-30.00	2.5	4.7	5.4	0.00070	0.00130	0.00146	2.50	PASS



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				-20.00	4.9	2.5	4.2	0.00138	0.00069	0.00114	2.50	PASS
				-10.00	2.8	3.0	2.8	0.00079	0.00083	0.00076	2.50	PASS
				0.00	3.7	4.7	2.9	0.00104	0.00130	0.00079	2.50	PASS
				10.00	3.8	6.0	5.4	0.00107	0.00166	0.00146	2.50	PASS
				20.00	5.0	5.3	4.3	0.00141	0.00146	0.00116	2.50	PASS
				30.00	3.4	5.7	3.2	0.00096	0.00157	0.00087	2.50	PASS
				40.00	3.5	5.0	2.2	0.00098	0.00138	0.00060	2.50	PASS
				50.00	2.1	4.6	4.9	0.00059	0.00127	0.00133	2.50	PASS
256QAM	75	0	48	-30.00	4.1	5.2	4.3	0.00115	0.00143	0.00116	2.50	PASS
				-20.00	3.4	2.8	2.5	0.00096	0.00077	0.00068	2.50	PASS
				-10.00	3.5	5.2	2.1	0.00098	0.00143	0.00057	2.50	PASS
				0.00	5.8	5.9	5.5	0.00163	0.00163	0.00149	2.50	PASS
				10.00	2.9	3.2	3.7	0.00082	0.00088	0.00100	2.50	PASS
				20.00	5.0	3.6	3.5	0.00141	0.00099	0.00095	2.50	PASS
				30.00	2.1	3.6	3.3	0.00059	0.00099	0.00089	2.50	PASS
				40.00	2.8	6.0	4.0	0.00079	0.00166	0.00108	2.50	PASS
				50.00	3.5	5.6	2.7	0.00098	0.00154	0.00073	2.50	PASS

Test Band: 48 _ 20MHz Bandwidth (Frequency Error VS. Voltage)

Test Mode	RB Allocation		Temp. (°C)	Volt. (Vdc)	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict	
	Size	Offset			LCH	MCH	HCH	LCH	MCH	HCH			
QPSK	100	0	20		38.4	2.4	4.8	5.4	0.00067	0.00132	0.00146	2.50	PASS
					48.0	5.4	3.6	2.9	0.00152	0.00099	0.00079	2.50	PASS
					57.6	5.6	5.2	5.2	0.00157	0.00143	0.00141	2.50	PASS
16QAM	100	0	20		38.4	4.3	5.9	3.6	0.00121	0.00163	0.00098	2.50	PASS
					48.0	3.2	3.8	4.9	0.00090	0.00105	0.00133	2.50	PASS
					57.6	3.5	6.0	3.3	0.00098	0.00166	0.00089	2.50	PASS
64QAM	100	0	20		38.4	3.1	2.5	5.7	0.00087	0.00069	0.00154	2.50	PASS
					48.0	4.6	4.2	4.8	0.00129	0.00116	0.00130	2.50	PASS
					57.6	5.3	5.4	3.5	0.00149	0.00149	0.00095	2.50	PASS
256QAM	100	0	20		38.4	2.6	5.3	5.2	0.00073	0.00146	0.00141	2.50	PASS
					48.0	3.5	2.9	2.4	0.00098	0.00080	0.00065	2.50	PASS
					57.6	3.5	4.6	3.9	0.00098	0.00127	0.00106	2.50	PASS

Test Band: 48 _ 20MHz Bandwidth (Frequency Error VS. Temperature)

Test Mode	RB Allocation		Volt. (Vdc)	Temp. (°C)	Freq. Error (Hz)			Freq. vs. rated (ppm)			Limit (ppm)	Verdict	
	Size	Offset			LCH	MCH	HCH	LCH	MCH	HCH			
QPSK	100	0	48		-30.00	2.8	5.6	4.4	0.00079	0.00154	0.00119	2.50	PASS
					-20.00	2.1	3.0	5.7	0.00059	0.00083	0.00154	2.50	PASS



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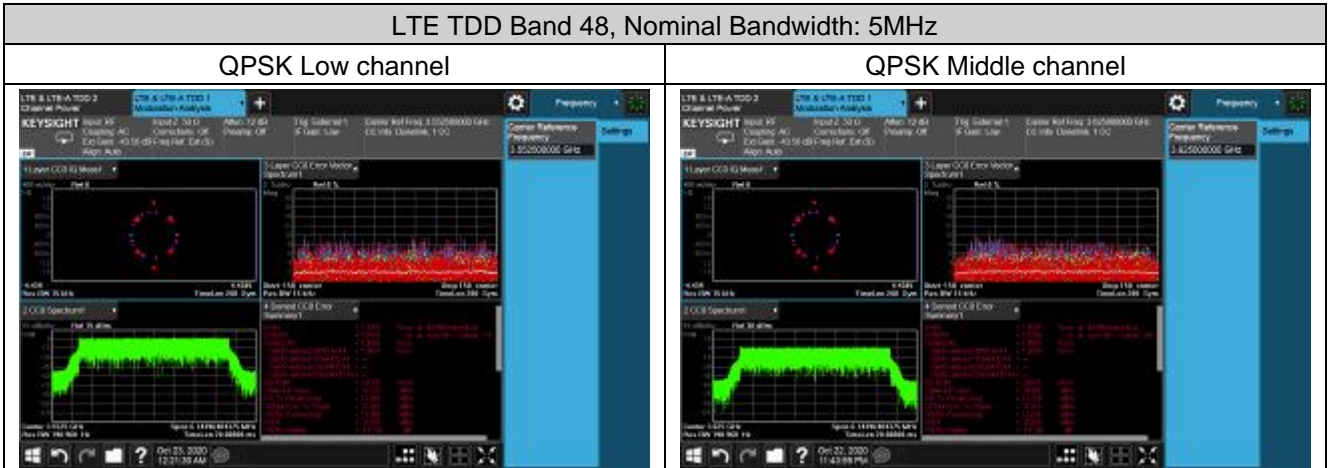
				-10.00	3.5	4.2	6.0	0.00098	0.00116	0.00163	2.50	PASS
				0.00	4.7	5.8	4.3	0.00132	0.00160	0.00117	2.50	PASS
				10.00	4.2	5.4	4.4	0.00118	0.00149	0.00119	2.50	PASS
				20.00	2.2	5.0	3.7	0.00062	0.00138	0.00100	2.50	PASS
				30.00	4.3	3.0	2.3	0.00121	0.00083	0.00062	2.50	PASS
				40.00	3.0	2.9	4.2	0.00084	0.00080	0.00114	2.50	PASS
				50.00	3.9	2.3	4.4	0.00110	0.00063	0.00119	2.50	PASS
16QAM	100	0	48	-30.00	3.8	2.0	6.0	0.00107	0.00055	0.00163	2.50	PASS
				-20.00	3.5	2.3	4.9	0.00098	0.00063	0.00133	2.50	PASS
				-10.00	3.1	3.9	4.2	0.00087	0.00108	0.00114	2.50	PASS
				0.00	3.2	4.3	4.0	0.00090	0.00119	0.00108	2.50	PASS
				10.00	2.4	5.0	4.2	0.00067	0.00138	0.00114	2.50	PASS
				20.00	3.1	4.3	5.9	0.00087	0.00119	0.00160	2.50	PASS
				30.00	2.4	2.6	3.5	0.00067	0.00072	0.00095	2.50	PASS
				40.00	2.9	5.7	2.8	0.00081	0.00157	0.00076	2.50	PASS
64QAM	100	0	48	-30.00	5.2	6	2.9	0.00146	0.00166	0.00079	2.50	PASS
				-20.00	3.7	5.8	4.1	0.00104	0.00160	0.00111	2.50	PASS
				-10.00	5.0	4.6	3.7	0.00140	0.00127	0.00100	2.50	PASS
				0.00	6.0	3.2	3.2	0.00169	0.00088	0.00087	2.50	PASS
				10.00	5.6	2.3	3.7	0.00157	0.00063	0.00100	2.50	PASS
				20.00	6.0	4.8	3.4	0.00169	0.00132	0.00092	2.50	PASS
				30.00	5.1	3.0	2.3	0.00143	0.00083	0.00062	2.50	PASS
				40.00	4.6	3.0	5.1	0.00129	0.00083	0.00138	2.50	PASS
256QAM	100	0	48	-30.00	3.9	5.5	5.0	0.00110	0.00152	0.00136	2.50	PASS
				-20.00	3.6	2.1	4.1	0.00101	0.00058	0.00111	2.50	PASS
				-10.00	2.9	4.2	2.5	0.00081	0.00116	0.00068	2.50	PASS
				0.00	4.2	5.3	2.6	0.00118	0.00146	0.00070	2.50	PASS
				10.00	5.2	4.4	2.5	0.00146	0.00121	0.00068	2.50	PASS
				20.00	3.9	5.8	5.4	0.00110	0.00160	0.00146	2.50	PASS
				30.00	4.9	2.2	4.4	0.00138	0.00061	0.00119	2.50	PASS
				40.00	4.1	2.2	4.7	0.00115	0.00061	0.00127	2.50	PASS
				50.00	4.8	6.0	5.4	0.00135	0.00166	0.00146	2.50	PASS

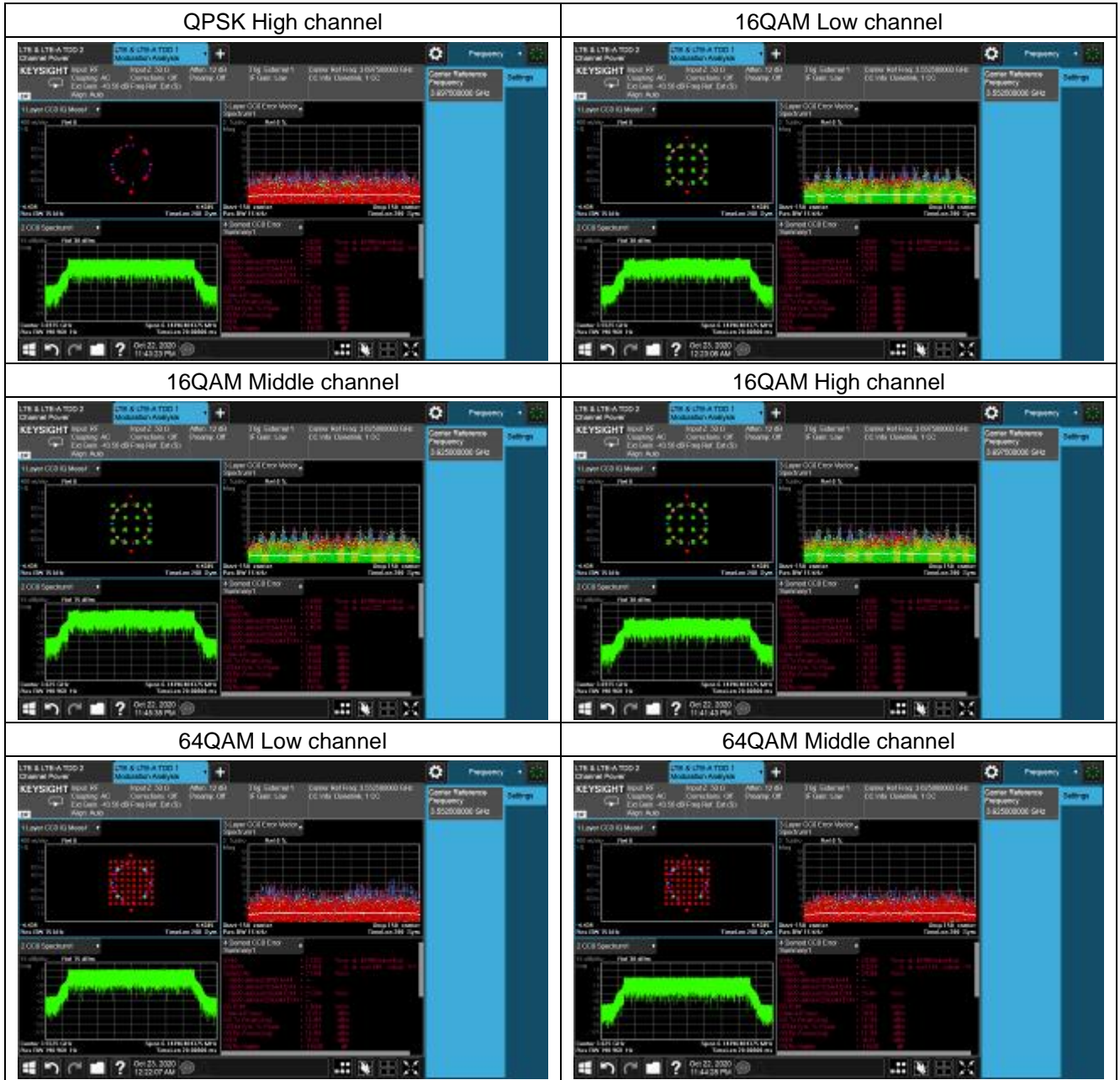


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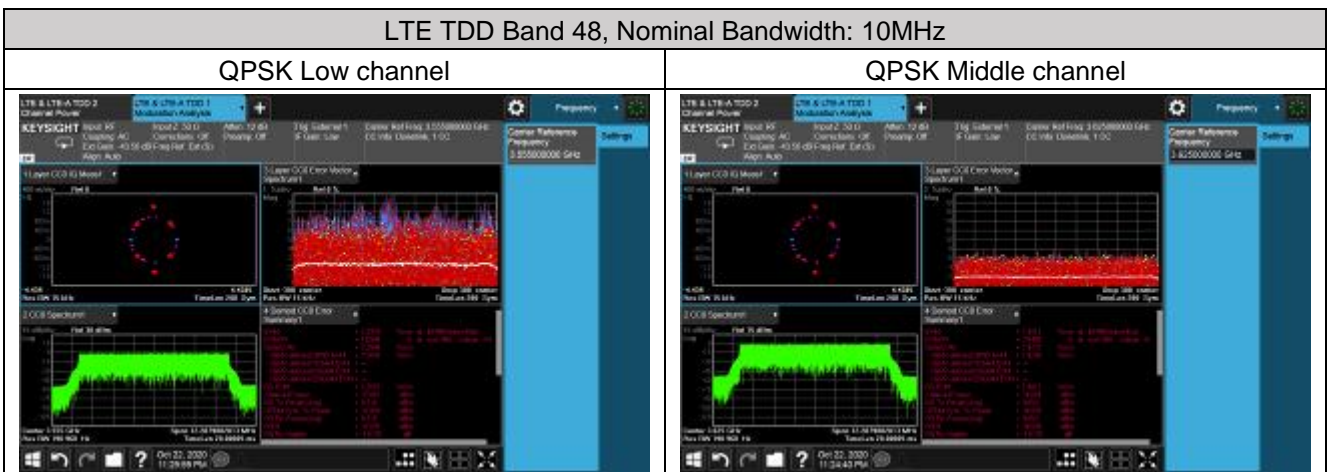
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8.2 Modulation Characteristics

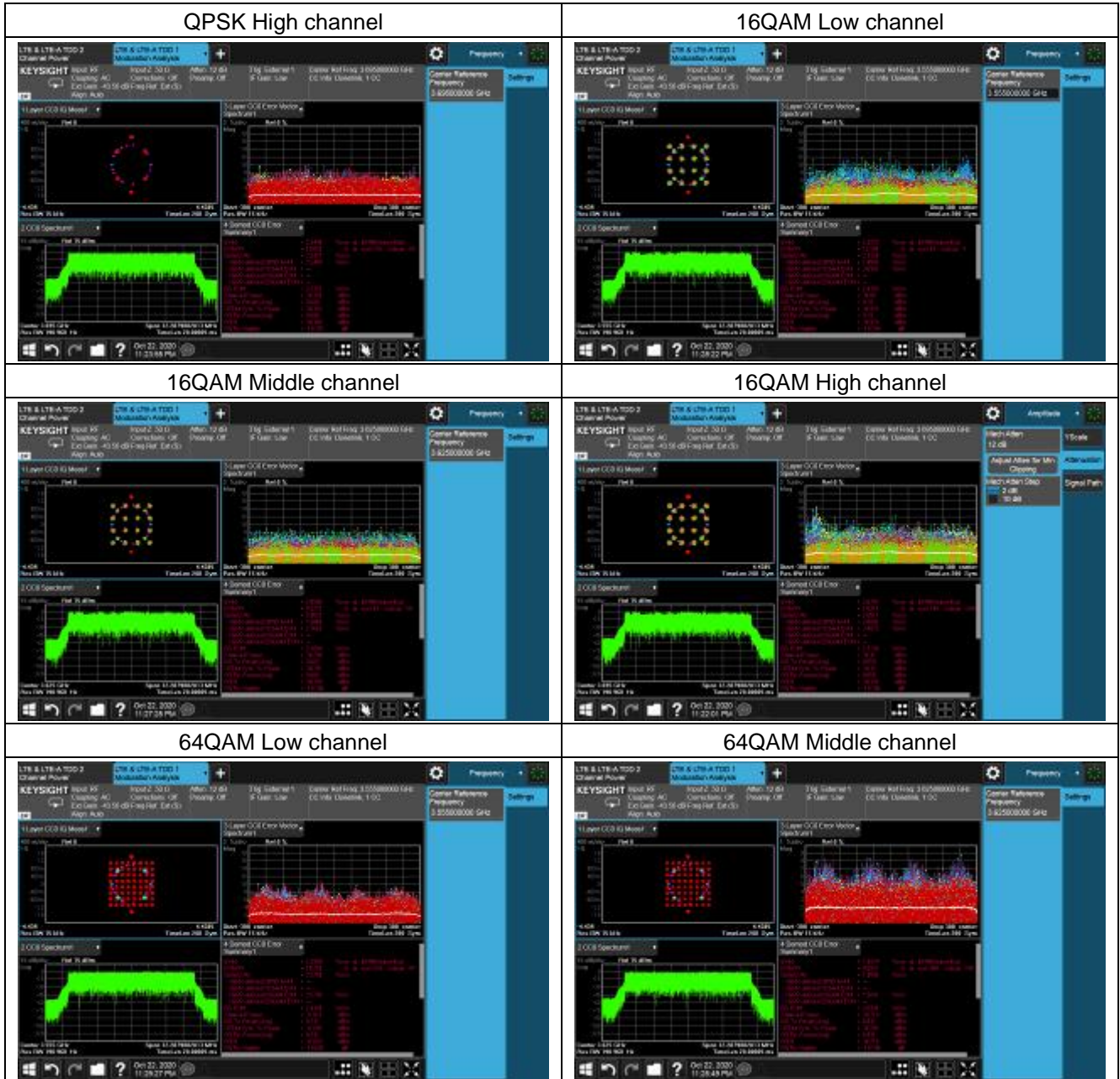




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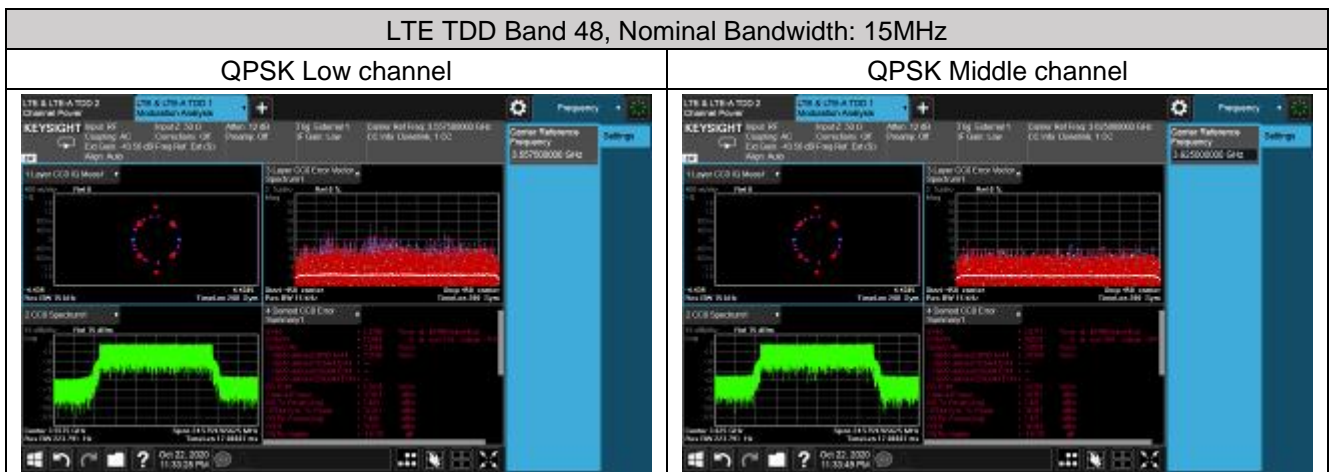


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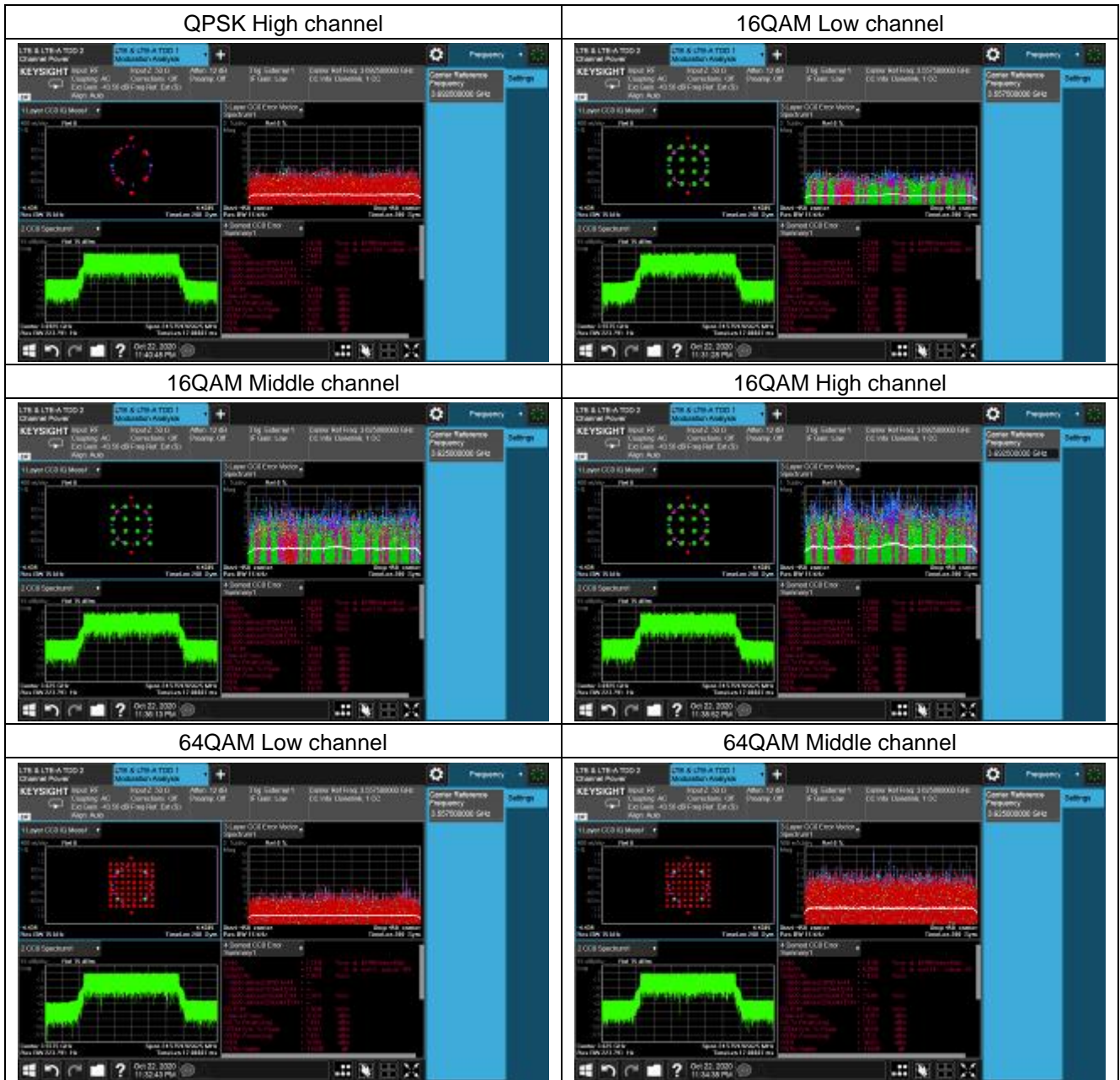
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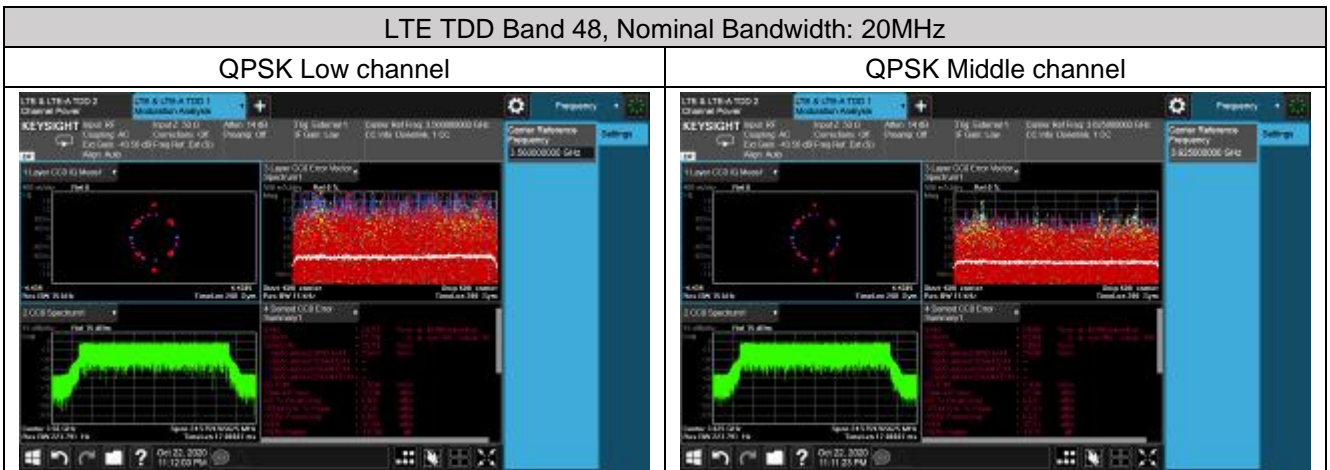


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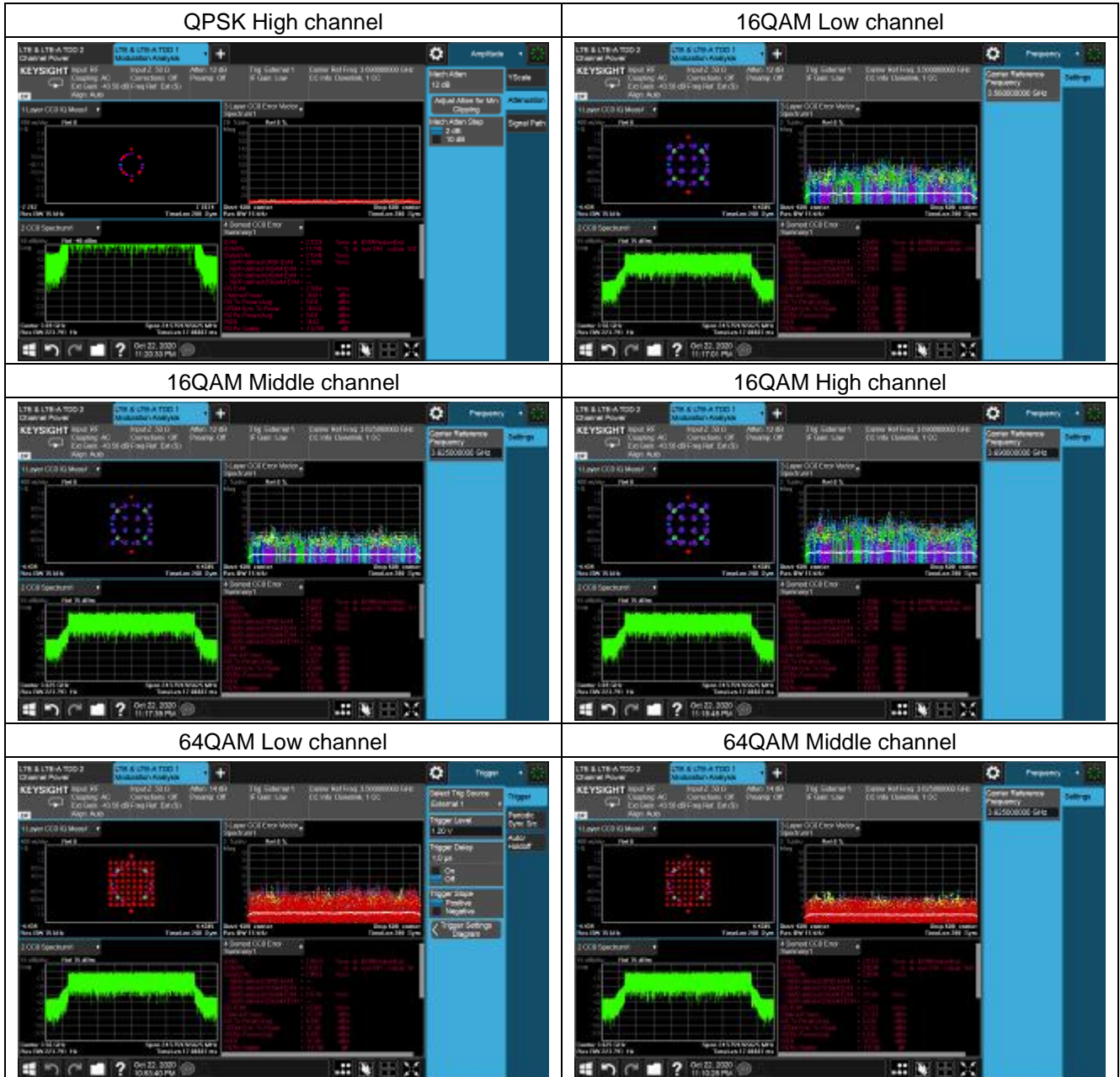
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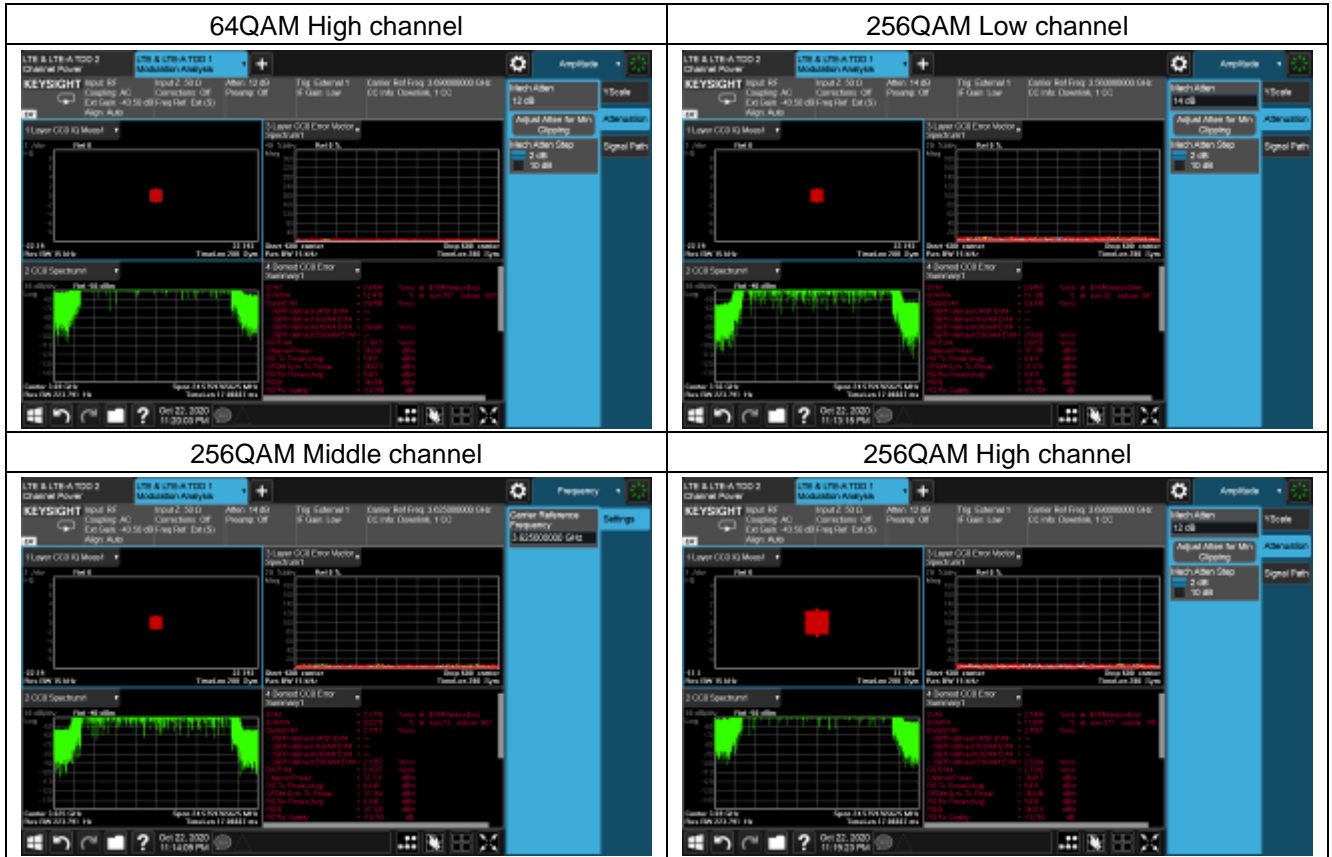
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