FCC Test Report (Part 96: LTE Band 48)

Report No.:	RFBEDF-WTW-P21030921-1
FCC ID:	QI3BEC-7000R28G
Test Model:	RidgeWave® BEC 7000 R28-G
Series Model:	BEC RidgeWave® 7000 R28-G, BEC 7000 R28-G, RidgeWave® BEC 7000 R28, BEC RidgeWave® 7000 R28, BEC 7000 R28 (refer to item 3.1 for more details)
Received Date:	Mar. 25, 2021
Test Date:	May 05 ~ Jun. 07, 2021
Issued Date:	Jun. 29, 2021
Applicant:	BILLION ELECTRIC CO., LTD.
Address:	8F., No. 192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration/ Designation Number:	788550 / TW0003

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFBEDF-WTW-P21030921-1	Original release.	Jun. 29, 2021

1 Certificate of Conformity

Product:	4G LTE-A Pro Outdoor Router
Brand:	BEC, BILLION
Test Model:	RidgeWave® BEC 7000 R28-G
Series Model:	BEC RidgeWave® 7000 R28-G, BEC 7000 R28-G, RidgeWave® BEC 7000 R28, BEC RidgeWave® 7000 R28, BEC 7000 R28 (refer to item 3.1 for more details)
Sample Status:	Engineering sample
Applicant:	BILLION ELECTRIC CO., LTD.
Test Date:	May 05 ~ Jun. 07, 2021
Standards:	47 CFR FCC Part 96

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Polly Chien / Specialist , **Date:** Jun. 29, 2021

Approved by : Bruce Chen / Senior Project Engineer , **Date:** Jun. 29, 2021

2 Summary of Test Results

47 CFR FCC Part 96			
FCC Clause	Test Item	Result	Remarks
2.1046 96.41(b)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
2.1046 96.41(b)	Maximum Power Spectral Density	Pass	Meet the requirement of limit.
96.41(a) 2.1047	Modulation Characteristics	Pass	Meet the requirement
96.41(g)	Peak to Average Ration	Pass	Meet the requirement of limit.
2.1049	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1055	Frequency Stability	Pass	Meet the requirement of limit.
2.1051 96.41(e)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 96.41(e)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -3.26dB at 7395.00MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9 kHz ~ 30MHz	2.44 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	4G LTE-A Pro Outdoor Router				
Brand	BEC, BILLION				
Test Model	RidgeWave® BEC 7000 R28-G				
Series Model	BEC RidgeWave® 7000 R28-G, BEC 7000 R28-G, RidgeWave® BEC 7000 R28, BEC RidgeWave® 7000 R28, BEC 7000 R28				
Model Difference	Refer to note				
Status of EUT	Engineering sample				
Modulation Type	QPSK, 16QAM, 64QAM				
Operating Frequency	LTE Band 48	Channel Bandwidth 5MHz	TX: 3552.5 ~ 3697.5 MHz		
			RX: 3552.5 ~ 3697.5 MHz		
		Channel Bandwidth 10MHz	TX: 3555 ~ 3695 MHz		
			RX: 3555 ~ 3695 MHz		
		Channel Bandwidth 15MHz	TX: 3557.5 ~ 3692.5 MHz		
			RX: 3557.5 ~ 3692.5 MHz		
		Channel Bandwidth 20MHz	TX: 3560 ~ 3690 MHz		
			RX: 3560 ~ 3690 MHz		
Max. EIRP Power	LTE Band 48	Per 10M EIRP Power	QPSK	16QAM	64QAM
		Channel Bandwidth 5MHz	4275.629mW (36.31dBm)	3475.362mW (35.41dBm)	2558.586mW (34.08dBm)
		Channel Bandwidth 10MHz	4130.475mW (36.16dBm)	3459.394mW (35.39dBm)	2660.725mW (34.25dBm)
		Channel Bandwidth 15MHz	4168.694mW (36.20dBm)	3411.929mW (35.33dBm)	2523.481mW (34.02dBm)
		Channel Bandwidth 20MHz	4236.430mW (36.27dBm)	3459.394mW (35.39dBm)	2606.154mW (34.16dBm)
	LTE Band 48	Full EIRP Power	QPSK	16QAM	64QAM
		Channel Bandwidth 5MHz	4275.629mW (36.31dBm)	3475.362mW (35.41dBm)	2558.586mW (34.08dBm)
		Channel Bandwidth 10MHz	4130.475mW (36.16dBm)	3459.394mW (35.39dBm)	2660.725mW (34.25dBm)
		Channel Bandwidth 15MHz	4187.936mW (36.22dBm)	3467.369mW (35.40dBm)	2546.830mW (34.06dBm)
		Channel Bandwidth 20MHz	4365.158mW (36.40dBm)	3539.973mW (35.49dBm)	2630.268mW (34.20dBm)
Emission Designator	LTE Band 48	Channel Bandwidth 5MHz	4M47G7D	4M46D7W	4M47D7W
		Channel Bandwidth 10MHz	8M92G7D	8M92D7W	8M92D7W
		Channel Bandwidth 15MHz	13M4G7D	13M4D7W	13M4D7W
		Channel Bandwidth 20MHz	17M8G7D	17M9D7W	17M8D7W
Antenna Type	PCB antenna with 14.5dBi gain				
Antenna Connector	i-pex (MHF)				
Accessory Device	PoE				
Data Cable Supplied	NA				

Note:

1. All models are listed as below. Model RidgeWave® BEC 7000 R28-G is the representative for final test.

Brand	Model	Description
BEC , BILLION	RidgeWave® BEC 7000 R28-G	Main test (with GPS)
	BEC RidgeWave® 7000 R28-G	For marketing purpose with GPS
	BEC 7000 R28-G	
	RidgeWave® BEC 7000 R28	For marketing purpose without GPS
	BEC RidgeWave® 7000 R28	
	BEC 7000 R28	

2. The EUT consumes power from the following PoE.

Brand	BILLION
Model	BP035-560063PAX
Input Power	100-240Vac, 50/60Hz, 0.8A
Output Power	56Vdc, 0.625A
Powre cord	1.83m non-shielded without core

3.2 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports
The worst case was found when positioned on Z-plane. Following channel(s) was (were) selected for the final test as listed below:

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation
Maximum Output Power	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	QPSK, 16QAM, 64QAM
	55290 to 56690	55290 (3555.0MHz), 55990 (3625.0MHz), 56690 (3695.0MHz)	10MHz	QPSK, 16QAM, 64QAM
	55315 to 56665	55315 (3557.5MHz), 55990 (3625.0MHz), 56665 (3692.5MHz)	15MHz	QPSK, 16QAM, 64QAM
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	QPSK, 16QAM, 64QAM
Frequency Stability	55265 to 56715	55265 (3552.5MHz), 56715 (3697.5MHz)	5MHz	QPSK
	55290 to 56690	55290 (3555.0MHz), 56690 (3695.0MHz)	10MHz	QPSK
	55315 to 56665	55315 (3557.5MHz), 56665 (3692.5MHz)	15MHz	QPSK
	55340 to 56640	55340 (3560.0MHz), 56640 (3690.0MHz)	20MHz	QPSK
Occupied Bandwidth	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	QPSK, 16QAM, 64QAM
	55290 to 56690	55290 (3555.0MHz), 55990 (3625.0MHz), 56690 (3695.0MHz)	10MHz	QPSK, 16QAM, 64QAM
	55315 to 56665	55315 (3557.5MHz), 55990 (3625.0MHz), 56665 (3692.5MHz)	15MHz	QPSK, 16QAM, 64QAM
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	QPSK, 16QAM, 64QAM
Peak to Average Ratio	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	QPSK, 16QAM, 64QAM
	55290 to 56690	55290 (3555.0MHz), 55990 (3625.0MHz), 56690 (3695.0MHz)	10MHz	QPSK, 16QAM, 64QAM
	55315 to 56665	55315 (3557.5MHz), 55990 (3625.0MHz), 56665 (3692.5MHz)	15MHz	QPSK, 16QAM, 64QAM
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	QPSK, 16QAM, 64QAM

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation
Conducted Emission	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	QPSK
	55290 to 56690	55290 (3555.0MHz), 55990 (3625.0MHz), 56690 (3695.0MHz)	10MHz	QPSK
	55315 to 56665	55315 (3557.5MHz), 55990 (3625.0MHz), 56665 (3692.5MHz)	15MHz	QPSK
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	QPSK
Radiated Emission Below 1GHz	55265 to 56715	56715 (3697.5MHz)	5MHz	QPSK
Radiated Emission Above 1GHz	55265 to 56715	55265 (3552.5MHz), 55990 (3625.0MHz), 56715 (3697.5MHz)	5MHz	QPSK
	55340 to 56640	55340 (3560.0MHz), 55990 (3625.0MHz), 56640 (3690.0MHz)	20MHz	QPSK

Note:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission below 1GHz, low, mid and high channels were pre-tested in chamber. High channel in 5MHz was found to be the worst case and therefore had been chosen for all final tests.
3. For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5MHz & highest channel bandwidth for final test.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Maximum Output Power	25deg. C, 63%RH	56Vdc	James Yang
Frequency Stability	25deg. C, 63%RH	56Vdc	James Yang
Occupied Bandwidth	25deg. C, 63%RH	56Vdc	James Yang
Peak to Average Ratio	25deg. C, 63%RH	56Vdc	James Yang
Condcudeted Emission	25deg. C, 63%RH	56Vdc	James Yang
Radiated Emission	23deg. C, 69%RH	56Vdc	Tim Chen

3.3 Description of Support Units

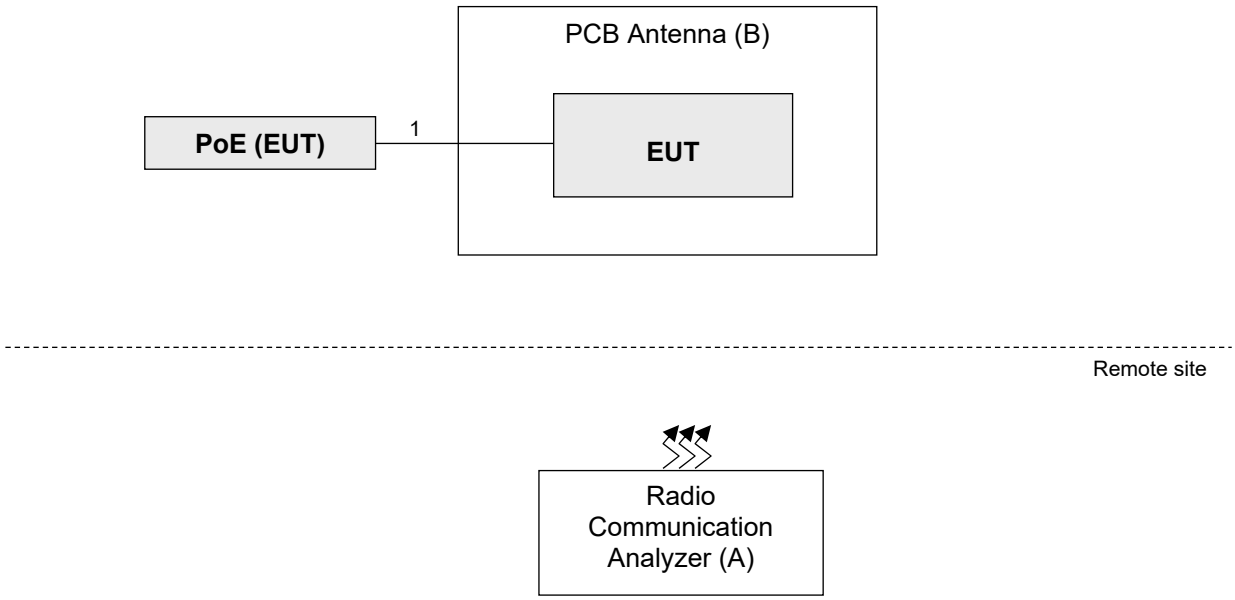
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	NA	-
B.	PCB Antenna	Grand-Tek Technology	DA B4243G 15 05 BL	N/A	N/A	Accessory (Gain: 14.5dBi)

Note:
1. All power cords of the above support units are non-shielded (1.8m).
2. Items A acted as communication partners to transfer data.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45 Cable	1	1.5	N	0	Accessory of EUT

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2
FCC 47 CFR Part 96
KDB 971168 D01 Power Meas License Digital Systems v03r01
KDB 940660 D01 Part 96 CBRS Eqpt v02
ANSI/TIA/EIA-603-D-2010

All test items have been performed and recorded as per the above standards.

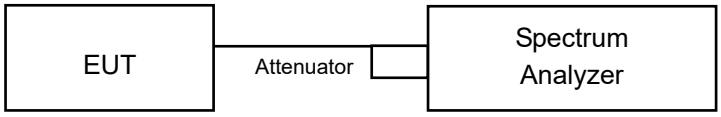
4 Test Types and Results

4.1 Maximum Output Power Measurement

4.1.1 Limits of Maximum Output Power Measurement

Device		Maximum Output Power (dBm/10 MHz)
☐	End User Device	23
☐	Category A CBSD	30
☒	Category B CBSD	47

4.1.2 Test Setup



4.1.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer KEYSIGHT	N9030B	MY57140953	Jul. 02, 2020	Jul. 01, 2021
Radio Communication Analyzer Anritsu	MT8821C	6201462755	Feb. 07, 2021	Feb. 07, 2022
RF cable	JB200	Cable-OVEN-02	NA	NA
DC-6GHz 20dB 50W Fixed attenuator Woken	MDC9331N-20	0724	Jun. 24, 2020	Jun. 23, 2022
STANDARD TEMPERATURE &HUMIDITY CHAMBER TERCHY	MHU-225AU	911033	Nov. 24, 2020	Nov. 23, 2021
DC power supply Keysight	U8002A	MY56330015	NA	NA
Digital Multimeter Fluke	87-III	70360742	Jun. 23, 2020	Jun. 22, 2021

Note: 1. The calibration interval of the above test instruments is 12/24 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1.4 Test Procedures

Conducted output power measurement

1. Connect the DUT transmitter output to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.
2. Set span to at least 1.5 times the OBW.
3. Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
4. Set VBW ≥ 3 × RBW.
5. Set number of points in sweep ≥ 2 × span / RBW.
6. Sweep time = auto-couple.
7. Detector = RMS (power averaging).
8. If the EUT can be configured to transmit continuously (i.e., burst duty cycle ≥ 98%), then set the trigger to free run.
9. If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98 %), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Ensure that the sweep time is less than or equal to the transmission burst duration.
10. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
11. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
12. For per 10MHz method, channel power integrating bandwidth 10MHz is used for bandwidth 5M, 10M, 15M and 20M. For full power method, channel power integrating bandwidth 10MHz is used for bandwidth 5M, 10M, integrating bandwidth 15MHz is used for bandwidth 15M, integrating bandwidth 20MHz is used for bandwidth 20M.

Maximum EIRP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

ERP or EIRP = P_{Meas} + G_T
where

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

4.1.5 Deviation from Test Standard

No deviation.

4.1.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.1.7 Test Results

Conducted Output Power (dBm) Per 10M

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55265	Mid CH 55990	High CH 56715	Low CH 55265	Mid CH 55990	High CH 56715	Low CH 55265	Mid CH 55990	High CH 56715
			3552.5 MHz	3625 MHz	3697.5 MHz	3552.5 MHz	3625 MHz	3697.5 MHz	3552.5 MHz	3625 MHz	3697.5 MHz
48 / 5M	1	0	21.19	20.30	21.40	20.51	19.53	20.61	19.33	18.12	19.31
	1	12	21.61	20.63	**21.81**	20.82	19.86	**20.91**	19.56	18.46	**19.58**
	1	24	21.37	20.55	21.42	20.62	19.66	20.64	19.45	18.26	19.35
	12	0	20.85	19.95	20.93	20.02	18.89	20.00	19.02	17.82	18.98
	12	6	20.59	19.44	20.61	19.73	18.62	19.64	18.72	17.51	18.64
	12	13	20.57	19.46	20.57	19.60	18.61	19.61	18.71	17.52	18.61
	25	0	20.56	19.44	20.59	19.60	18.60	19.64	18.70	17.50	18.60

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55290	Mid CH 55990	High CH 56690	Low CH 55290	Mid CH 55990	High CH 56690	Low CH 55290	Mid CH 55990	High CH 56690
			3555 MHz	3625 MHz	3695 MHz	3555 MHz	3625 MHz	3695 MHz	3555 MHz	3625 MHz	3695 MHz
48 / 10M	1	0	21.37	20.41	21.48	20.60	19.59	20.68	19.46	18.22	19.38
	1	24	21.55	20.55	21.56	20.79	19.75	20.79	19.61	18.38	19.60
	1	49	21.44	20.66	**21.66**	20.73	19.85	**20.89**	19.55	18.48	**19.75**
	25	0	20.81	19.79	20.85	20.02	18.81	19.86	18.98	17.74	18.89
	25	12	20.87	19.81	20.84	20.05	18.85	19.90	19.01	17.81	18.90
	25	25	20.82	19.90	20.89	20.00	18.95	19.92	18.94	17.87	19.06
	50	0	20.86	19.83	20.86	20.10	18.89	19.90	18.97	17.77	18.86

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55315	Mid CH 55990	High CH 56665	Low CH 55315	Mid CH 55990	High CH 56665	Low CH 55315	Mid CH 55990	High CH 56665
			3557.5 MHz	3625 MHz	3692.5 MHz	3557.5 MHz	3625 MHz	3692.5 MHz	3557.5 MHz	3625 MHz	3692.5 MHz
48 / 15M	1	0	21.32	20.54	21.50	20.54	19.66	20.69	19.42	18.25	19.33
	1	37	21.44	20.53	21.58	20.70	19.72	20.72	19.44	18.35	19.40
	1	74	21.23	20.55	**21.70**	20.53	19.78	**20.83**	19.15	18.44	**19.52**
	36	0	20.63	19.63	20.63	19.72	18.50	19.65	18.62	17.34	18.65
	36	19	20.60	19.77	20.78	19.73	18.66	19.59	18.73	17.55	18.70
	36	39	20.66	19.78	20.77	19.67	18.67	19.62	18.77	17.59	18.78
	75	0	19.35	18.21	19.25	18.67	17.14	18.13	17.65	16.13	17.23

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55340 3560 MHz	Mid CH 55990 3625 MHz	High CH 56640 3690 MHz	Low CH 55340 3560 MHz	Mid CH 55990 3625 MHz	High CH 56640 3690 MHz	Low CH 55340 3560 MHz	Mid CH 55990 3625 MHz	High CH 56640 3690 MHz
48 / 20M	1	0	21.30	20.44	21.66	20.61	19.63	20.79	19.54	18.24	19.43
	1	50	21.33	20.48	21.52	20.52	19.71	20.74	19.26	18.33	19.35
	1	99	21.22	20.61	**21.77**	20.38	19.77	**20.89**	19.20	18.46	**19.66**
	50	0	20.69	19.72	20.81	19.82	18.70	19.87	18.78	17.60	18.68
	50	25	20.63	19.68	20.67	19.55	18.69	19.82	18.61	17.52	18.61
	50	50	20.60	19.78	20.63	19.56	18.82	19.88	18.65	17.68	18.55
	100	0	18.32	17.02	18.20	17.32	15.98	17.21	16.44	14.98	16.16

Maximum EIRP (dBm/ 10MHz)

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55265	Mid CH 55990	High CH 56715	Low CH 55265	Mid CH 55990	High CH 56715	Low CH 55265	Mid CH 55990	High CH 56715
			3552.5 MHz	3625 MHz	3697.5 MHz	3552.5 MHz	3625 MHz	3697.5 MHz	3552.5 MHz	3625 MHz	3697.5 MHz
48 / 5M	1	0	35.69	34.80	35.90	35.01	34.03	35.11	33.83	32.62	33.81
	1	12	36.11	35.13	**36.31**	35.32	34.36	**35.41**	34.06	32.96	**34.08**
	1	24	35.87	35.05	35.92	35.12	34.16	35.14	33.95	32.76	33.85
	12	0	35.35	34.45	35.43	34.52	33.39	34.50	33.52	32.32	33.48
	12	6	35.09	33.94	35.11	34.23	33.12	34.14	33.22	32.01	33.14
	12	13	35.07	33.96	35.07	34.10	33.11	34.11	33.21	32.02	33.11
	25	0	35.06	33.94	35.09	34.10	33.10	34.14	33.20	32.00	33.10

*Note: EIRP (dBm / 10MHz) = Conducted Output Power (dBm / 10MHz) + Antenna Gain (14.5dBi)

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55290	Mid CH 55990	High CH 56690	Low CH 55290	Mid CH 55990	High CH 56690	Low CH 55290	Mid CH 55990	High CH 56690
			3555 MHz	3625 MHz	3695 MHz	3555 MHz	3625 MHz	3695 MHz	3555 MHz	3625 MHz	3695 MHz
48 / 10M	1	0	35.87	34.91	35.98	35.10	34.09	35.18	33.96	32.72	33.88
	1	24	36.05	35.05	36.06	35.29	34.25	35.29	34.11	32.88	34.10
	1	49	35.94	35.16	**36.16**	35.23	34.35	**35.39**	34.05	32.98	**34.25**
	25	0	35.31	34.29	35.35	34.52	33.31	34.36	33.48	32.24	33.39
	25	12	35.37	34.31	35.34	34.55	33.35	34.40	33.51	32.31	33.40
	25	25	35.32	34.40	35.39	34.50	33.45	34.42	33.44	32.37	33.56
	50	0	35.36	34.33	35.36	34.60	33.39	34.40	33.47	32.27	33.36

*Note: EIRP (dBm / 10MHz) = Conducted Output Power (dBm / 10MHz) + Antenna Gain (14.5dBi)

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55315	Mid CH 55990	High CH 56665	Low CH 55315	Mid CH 55990	High CH 56665	Low CH 55315	Mid CH 55990	High CH 56665
			3557.5 MHz	3625 MHz	3692.5 MHz	3557.5 MHz	3625 MHz	3692.5 MHz	3557.5 MHz	3625 MHz	3692.5 MHz
48 / 15M	1	0	35.82	35.04	36.00	35.04	34.16	35.19	33.92	32.75	33.83
	1	37	35.94	35.03	36.08	35.20	34.22	35.22	33.94	32.85	33.90
	1	74	35.73	35.05	**36.20**	35.03	34.28	**35.33**	33.65	32.94	**34.02**
	36	0	35.13	34.13	35.13	34.22	33.00	34.15	33.12	31.84	33.15
	36	19	35.10	34.27	35.28	34.23	33.16	34.09	33.23	32.05	33.20
	36	39	35.16	34.28	35.27	34.17	33.17	34.12	33.27	32.09	33.28
	75	0	33.85	32.71	33.75	33.17	31.64	32.63	32.15	30.63	31.73

*Note: EIRP (dBm / 10MHz) = Conducted Output Power (dBm / 10MHz) + Antenna Gain (14.5dBi)

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55340 3560 MHz	Mid CH 55990 3625 MHz	High CH 56640 3690 MHz	Low CH 55340 3560 MHz	Mid CH 55990 3625 MHz	High CH 56640 3690 MHz	Low CH 55340 3560 MHz	Mid CH 55990 3625 MHz	High CH 56640 3690 MHz
48 / 20M	1	0	35.80	34.94	36.16	35.11	34.13	35.29	34.04	32.74	33.93
	1	50	35.83	34.98	36.02	35.02	34.21	35.24	33.76	32.83	33.85
	1	99	35.72	35.11	**36.27**	34.88	34.27	**35.39**	33.70	32.96	**34.16**
	50	0	35.19	34.22	35.31	34.32	33.20	34.37	33.28	32.10	33.18
	50	25	35.13	34.18	35.17	34.05	33.19	34.32	33.11	32.02	33.11
	50	50	35.10	34.28	35.13	34.06	33.32	34.38	33.15	32.18	33.05
	100	0	32.82	31.52	32.70	31.82	30.48	31.71	30.94	29.48	30.66

*Note: EIRP (dBm / 10MHz) = Conducted Output Power (dBm / 10MHz) + Antenna Gain (14.5dBi)

Conducted Output Power

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55265	Mid CH 55990	High CH 56715	Low CH 55265	Mid CH 55990	High CH 56715	Low CH 55265	Mid CH 55990	High CH 56715
			3552.5 MHz	3625 MHz	3697.5 MHz	3552.5 MHz	3625 MHz	3697.5 MHz	3552.5 MHz	3625 MHz	3697.5 MHz
48 / 5M	1	0	21.19	20.30	21.40	20.51	19.53	20.61	19.33	18.12	19.31
	1	12	21.61	20.63	**21.81**	20.82	19.86	**20.91**	19.56	18.46	**19.58**
	1	24	21.37	20.55	21.42	20.62	19.66	20.64	19.45	18.26	19.35
	12	0	20.85	19.95	20.93	20.02	18.89	20.00	19.02	17.82	18.98
	12	6	20.59	19.44	20.61	19.73	18.62	19.64	18.72	17.51	18.64
	12	13	20.57	19.46	20.57	19.60	18.61	19.61	18.71	17.52	18.61
	25	0	20.56	19.44	20.59	19.60	18.60	19.64	18.70	17.50	18.60

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55290	Mid CH 55990	High CH 56690	Low CH 55290	Mid CH 55990	High CH 56690	Low CH 55290	Mid CH 55990	High CH 56690
			3555 MHz	3625 MHz	3695 MHz	3555 MHz	3625 MHz	3695 MHz	3555 MHz	3625 MHz	3695 MHz
48 / 10M	1	0	21.37	20.41	21.48	20.60	19.59	20.68	19.46	18.22	19.38
	1	24	21.55	20.55	21.56	20.79	19.75	20.79	19.61	18.38	19.60
	1	49	21.44	20.66	**21.66**	20.73	19.85	**20.89**	19.55	18.48	**19.75**
	25	0	20.81	19.79	20.85	20.02	18.81	19.86	18.98	17.74	18.89
	25	12	20.87	19.81	20.84	20.05	18.85	19.90	19.01	17.81	18.90
	25	25	20.82	19.90	20.89	20.00	18.95	19.92	18.94	17.87	19.06
	50	0	20.86	19.83	20.86	20.10	18.89	19.90	18.97	17.77	18.86

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55315	Mid CH 55990	High CH 56665	Low CH 55315	Mid CH 55990	High CH 56665	Low CH 55315	Mid CH 55990	High CH 56665
			3557.5 MHz	3625 MHz	3692.5 MHz	3557.5 MHz	3625 MHz	3692.5 MHz	3557.5 MHz	3625 MHz	3692.5 MHz
48 / 15M	1	0	21.38	20.60	21.55	20.60	19.68	20.75	19.50	18.31	19.37
	1	37	21.47	20.58	21.67	20.73	19.73	20.75	19.55	18.40	19.46
	1	74	21.28	20.63	**21.72**	20.48	19.81	**20.90**	19.20	18.45	**19.56**
	36	0	20.68	19.64	20.67	19.76	18.52	19.67	18.72	17.41	18.72
	36	19	20.67	19.81	20.80	19.79	18.69	19.67	18.76	17.59	18.70
	36	39	20.69	19.84	20.87	19.69	18.73	19.78	18.78	17.64	18.82
	75	0	20.78	19.77	20.86	19.91	18.80	19.80	18.85	17.67	18.79

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55340 3560 MHz	Mid CH 55990 3625 MHz	High CH 56640 3690 MHz	Low CH 55340 3560 MHz	Mid CH 55990 3625 MHz	High CH 56640 3690 MHz	Low CH 55340 3560 MHz	Mid CH 55990 3625 MHz	High CH 56640 3690 MHz
48 / 20M	1	0	21.45	20.52	21.70	20.65	19.69	20.88	19.61	18.33	19.47
	1	50	21.41	20.56	21.60	20.56	19.73	20.80	19.33	18.38	19.41
	1	99	21.23	20.67	**21.90**	20.47	19.85	**20.99**	19.21	18.50	**19.70**
	50	0	20.74	19.75	20.88	19.87	18.75	19.89	18.80	17.64	18.74
	50	25	20.62	19.73	20.77	19.61	18.74	19.82	18.64	17.60	18.63
	50	50	20.64	19.87	20.97	19.57	18.88	19.90	18.63	17.74	18.83
	100	0	20.75	19.90	20.93	19.73	18.89	19.96	18.77	17.75	18.83

Full EIRP (dBm / 10MHz)

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55265	Mid CH 55990	High CH 56715	Low CH 55265	Mid CH 55990	High CH 56715	Low CH 55265	Mid CH 55990	High CH 56715
			3552.5 MHz	3625 MHz	3697.5 MHz	3552.5 MHz	3625 MHz	3697.5 MHz	3552.5 MHz	3625 MHz	3697.5 MHz
48 / 5M	1	0	35.69	34.80	35.90	35.01	34.03	35.11	33.83	32.62	33.81
	1	12	36.11	35.13	**36.31**	35.32	34.36	**35.41**	34.06	32.96	**34.08**
	1	24	35.87	35.05	35.92	35.12	34.16	35.14	33.95	32.76	33.85
	12	0	35.35	34.45	35.43	34.52	33.39	34.50	33.52	32.32	33.48
	12	6	35.09	33.94	35.11	34.23	33.12	34.14	33.22	32.01	33.14
	12	13	35.07	33.96	35.07	34.10	33.11	34.11	33.21	32.02	33.11
	25	0	35.06	33.94	35.09	34.10	33.10	34.14	33.20	32.00	33.10

*Note: Full EIRP = Full Conducted Output Power (dBm / 10MHz) + Antenna Gain (14.5dBi)

Full EIRP (dBm / 10MHz)

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55290	Mid CH 55990	High CH 56690	Low CH 55290	Mid CH 55990	High CH 56690	Low CH 55290	Mid CH 55990	High CH 56690
			3555 MHz	3625 MHz	3695 MHz	3555 MHz	3625 MHz	3695 MHz	3555 MHz	3625 MHz	3695 MHz
48 / 10M	1	0	35.87	34.91	35.98	35.10	34.09	35.18	33.96	32.72	33.88
	1	24	36.05	35.05	36.06	35.29	34.25	35.29	34.11	32.88	34.10
	1	49	35.94	35.16	**36.16**	35.23	34.35	**35.39**	34.05	32.98	**34.25**
	25	0	35.31	34.29	35.35	34.52	33.31	34.36	33.48	32.24	33.39
	25	12	35.37	34.31	35.34	34.55	33.35	34.40	33.51	32.31	33.40
	25	25	35.32	34.40	35.39	34.50	33.45	34.42	33.44	32.37	33.56
	50	0	35.36	34.33	35.36	34.60	33.39	34.40	33.47	32.27	33.36

*Note: Full EIRP = Full Conducted Output Power (dBm / 10MHz) + Antenna Gain (14.5dBi)

Full EIRP (dBm / 15MHz)

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55315	Mid CH 55990	High CH 56665	Low CH 55315	Mid CH 55990	High CH 56665	Low CH 55315	Mid CH 55990	High CH 56665
			3557.5 MHz	3625 MHz	3692.5 MHz	3557.5 MHz	3625 MHz	3692.5 MHz	3557.5 MHz	3625 MHz	3692.5 MHz
48 / 15M	1	0	35.88	35.10	36.05	35.10	34.18	35.25	34.00	32.81	33.87
	1	37	35.97	35.08	36.17	35.23	34.23	35.25	34.05	32.90	33.96
	1	74	35.78	35.13	**36.22**	34.98	34.31	**35.40**	33.70	32.95	**34.06**
	36	0	35.18	34.14	35.17	34.26	33.02	34.17	33.22	31.91	33.22
	36	19	35.17	34.31	35.30	34.29	33.19	34.17	33.26	32.09	33.20
	36	39	35.19	34.34	35.37	34.19	33.23	34.28	33.28	32.14	33.32
	75	0	35.28	34.27	35.36	34.41	33.30	34.30	33.35	32.17	33.29

*Note: Full EIRP = Full Conducted Output Power (dBm / 15MHz) + Antenna Gain (14.5dBi)

Full EIRP (dBm / 20MHz)

Band / BW	RB Size	RB Offset	QPSK			16QAM			64QAM		
			Low CH 55340	Mid CH 55990	High CH 56640	Low CH 55340	Mid CH 55990	High CH 56640	Low CH 55340	Mid CH 55990	High CH 56640
			3560 MHz	3625 MHz	3690 MHz	3560 MHz	3625 MHz	3690 MHz	3560 MHz	3625 MHz	3690 MHz
48 / 20M	1	0	35.95	35.02	36.20	35.15	34.19	35.38	34.11	32.83	33.97
	1	50	35.91	35.06	36.10	35.06	34.23	35.30	33.83	32.88	33.91
	1	99	35.73	35.17	**36.40**	34.97	34.35	**35.49**	33.71	33.00	**34.20**
	50	0	35.24	34.25	35.38	34.37	33.25	34.39	33.30	32.14	33.24
	50	25	35.12	34.23	35.27	34.11	33.24	34.32	33.14	32.10	33.13
	50	50	35.14	34.37	35.47	34.07	33.38	34.40	33.13	32.24	33.33
	100	0	35.25	34.40	35.43	34.23	33.39	34.46	33.27	32.25	33.33

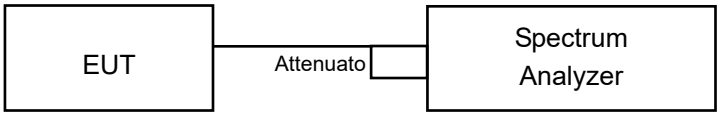
*Note: Full EIRP = Full Conducted Output Power (dBm / 20MHz) + Antenna Gain (14.5dBi)

4.2 Maximum Power Spectral Density Measurement

4.2.1 Limits of Maximum Power Spectral Density Measurement

Device	Maximum Radiated PSD (dBm/MHz)
End User Device	n/a
Category A CBSD	20
Category B CBSD	37

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.2.4 Test Procedure

1. Connect the transmitter to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.
2. Tune the analyzer to the nominal center frequency of the emission bandwidth (EBW).
3. Set the resolution bandwidth (RBW) to 1MHZ.
4. Set the video bandwidth (VBW) to ≧3 x RBW.
5. Select the average power (RMS) display detector.
6. Set number of points in sweep ≥ 2 × span / RBW.
7. Use auto-coupled sweep time.
8. Perform the measurement over an interval of time when the transmission is continuous and at its maximum power level.

Maximum EIRP (dBm/MHz)

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

ERP or EIRP = P_{Meas} + G_T
where

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

4.2.5 Deviation from Test Standard

No deviation.

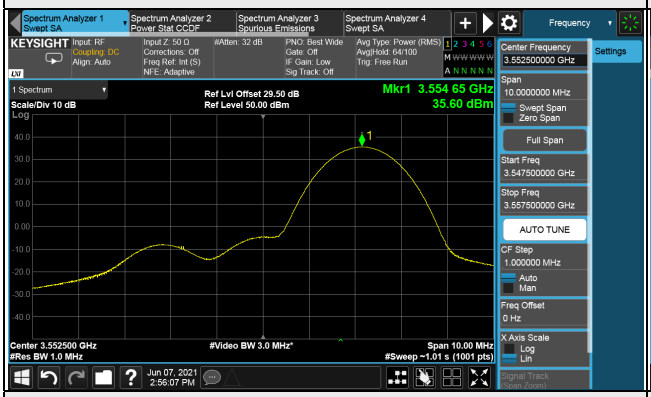
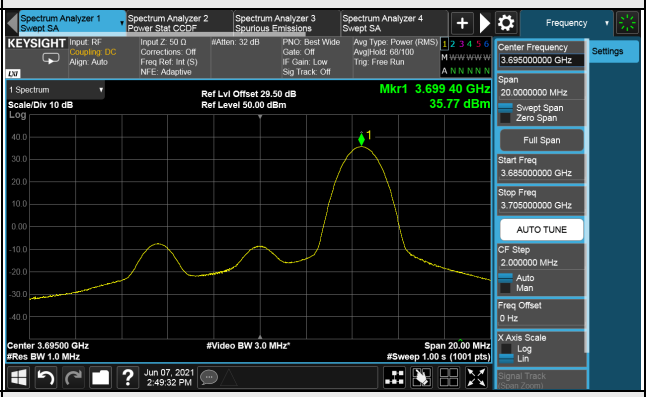
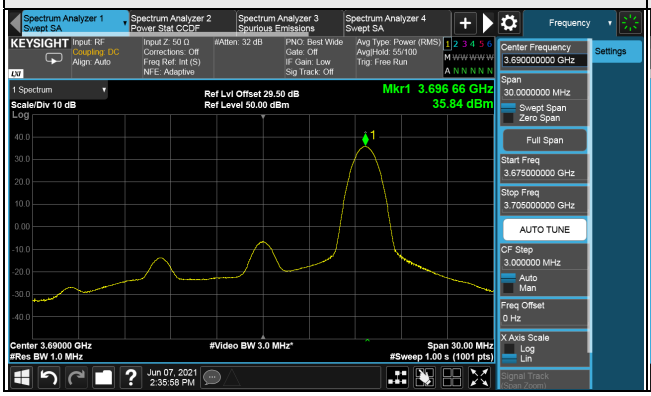
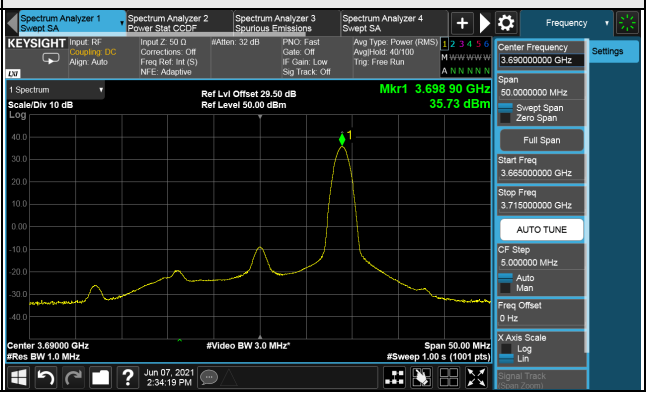
4.2.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.2.7 Test Results

LTE Band 48, Channel Bandwidth 5MHz						
Channel	Frequency (MHz)	Conducted PSD (dBm/MHz)	Antenna Gain (dBi)	Radiated PSD (dBm/MHz)	Limit (dBm/MHz)	Pass/Fail
55265	3552.5	21.10	14.5	35.60	37	Pass
55990	3625.0	19.95	14.5	34.45	37	Pass
56715	3697.5	21.04	14.5	35.54	37	Pass
LTE Band 48, Channel Bandwidth 10MHz						
Channel	Frequency (MHz)	Conducted PSD (dBm/MHz)	Antenna Gain (dBi)	Radiated PSD (dBm/MHz)	Limit (dBm/MHz)	Pass/Fail
55290	3555.0	21.19	14.5	35.69	37	Pass
55990	3625.0	20.16	14.5	34.66	37	Pass
56690	3695.0	21.27	14.5	35.77	37	Pass
LTE Band 48, Channel Bandwidth 15MHz						
Channel	Frequency (MHz)	Conducted PSD (dBm/MHz)	Antenna Gain (dBi)	Radiated PSD (dBm/MHz)	Limit (dBm/MHz)	Pass/Fail
55315	3557.5	21.09	14.5	35.59	37	Pass
55990	3625.0	20.24	14.5	34.74	37	Pass
56665	3692.5	21.34	14.5	35.84	37	Pass
LTE Band 48, Channel Bandwidth 20MHz						
Channel	Frequency (MHz)	Conducted PSD (dBm/MHz)	Antenna Gain (dBi)	Radiated PSD (dBm/MHz)	Limit (dBm/MHz)	Pass/Fail
55340	3560.0	20.91	14.5	35.41	37	Pass
55990	3625.0	20.09	14.5	34.59	37	Pass
56640	3690.0	21.23	14.5	35.73	37	Pass

*Note: Radiated PSD= Conducted PSD (dBm/ MHz) + Antenna Gain (14.5dBi)

Spectrum Plot of Worst Value (Total PSD)	
5MHz	10MHz
	
15MHz	20MHz
	

*The measurement value of the above instrument already includes antenna gain.

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stabiliity Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency band.

4.3.2 Test Procedure

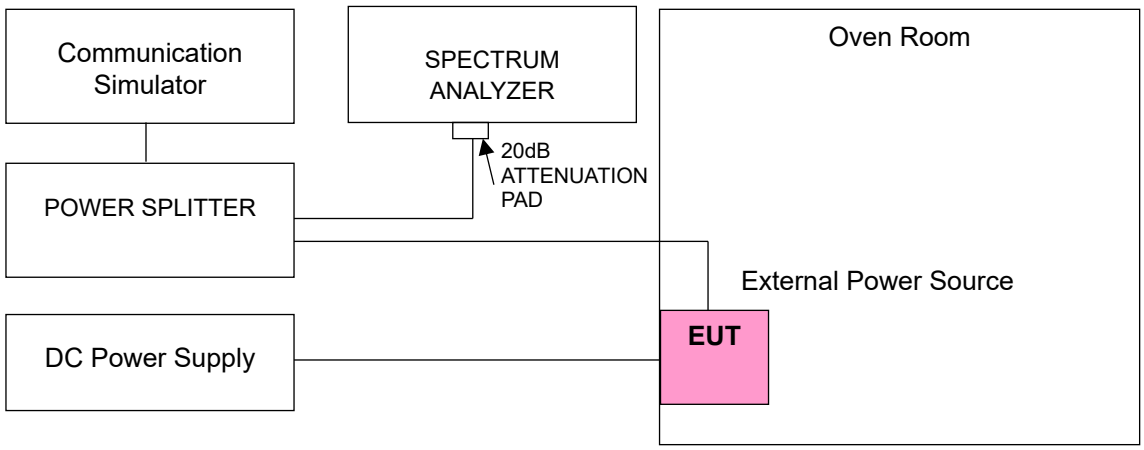
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 48, Channel Bandwidth: 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50.4	3652.500019	0.005	3697.500040	0.011
56.0	3652.500012	0.003	3697.500011	0.003
61.6	3652.500026	0.007	3697.500031	0.008

Note: The applicant defined the normal working voltage is from 50.4Vdc to 61.6Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 48, Channel Bandwidth: 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	3652.500014	0.004	3697.500037	0.010
-20	3652.500011	0.003	3697.500025	0.007
-10	3652.500023	0.006	3697.500017	0.005
0	3652.500028	0.008	3697.500026	0.007
10	3652.500025	0.007	3697.500037	0.010
20	3652.499988	-0.003	3697.499963	-0.010
30	3652.499970	-0.008	3697.499969	-0.008
40	3652.499982	-0.005	3697.499987	-0.004
50	3652.499975	-0.007	3697.499971	-0.008

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 48, Channel Bandwidth: 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50.4	3555.000028	0.008	3695.000027	0.007
56.0	3555.000038	0.011	3695.000015	0.004
61.6	3555.000021	0.006	3695.000019	0.005

Note: The applicant defined the normal working voltage is from 50.4Vdc to 61.6Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 48, Channel Bandwidth: 10MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	3555.000021	0.006	3695.000032	0.009
-20	3555.000021	0.006	3695.000037	0.010
-10	3555.000021	0.006	3695.000033	0.009
0	3555.000034	0.010	3695.000040	0.011
10	3555.000039	0.011	3695.000012	0.003
20	3554.999977	-0.006	3694.999983	-0.005
30	3554.999981	-0.005	3694.999976	-0.006
40	3554.999973	-0.008	3694.999962	-0.010
50	3554.999961	-0.011	3694.999988	-0.003

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 48, Channel Bandwidth: 15MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50.4	3557.500022	0.006	3692.500024	0.006
56.0	3557.500023	0.006	3692.500016	0.004
61.6	3557.500040	0.011	3692.500020	0.005

Note: The applicant defined the normal working voltage is from 50.4Vdc to 61.6Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 48, Channel Bandwidth: 15MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	3557.500027	0.008	3692.500017	0.005
-20	3557.500028	0.008	3692.500033	0.009
-10	3557.500013	0.004	3692.500016	0.004
0	3557.500013	0.004	3692.500020	0.005
10	3557.500023	0.006	3692.500020	0.005
20	3557.499972	-0.008	3692.499985	-0.004
30	3557.499980	-0.006	3692.499990	-0.003
40	3557.499987	-0.004	3692.499977	-0.006
50	3557.499990	-0.003	3692.499981	-0.005

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 48, Channel Bandwidth: 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
50.4	3560.000026	0.007	3690.000036	0.010
56.0	3560.000017	0.005	3690.000028	0.008
61.6	3560.000020	0.006	3690.000013	0.004

Note: The applicant defined the normal working voltage is from 50.4Vdc to 61.6Vdc.

Frequency Error vs. Temperature

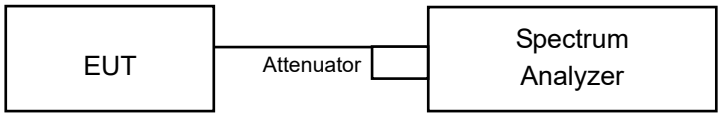
Temp. (℃)	LTE Band 48, Channel Bandwidth: 20MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	3560.000013	0.004	3690.000021	0.006
-20	3560.000021	0.006	3690.000010	0.003
-10	3560.000018	0.005	3690.000010	0.003
0	3560.000010	0.003	3690.000016	0.004
10	3560.000019	0.005	3690.000032	0.009
20	3559.999986	-0.004	3689.999978	-0.006
30	3559.999972	-0.008	3689.999960	-0.011
40	3559.999974	-0.007	3689.999985	-0.004
50	3559.999970	-0.008	3689.999990	-0.003

4.4 Emission Bandwidth Measurement

4.4.1 Limits of Emission Bandwidth Measurement

Reference only

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.4.4 Test Procedure

Occupied Bandwdith & 26dBc Bandwidth

1. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
2. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
3. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
   NOTE—Step 1), step 2), and step 3) may require iteration to adjust within the specified tolerances.
4. The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “−X dB” requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
5. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
6. Determine the reference value by either of the following:
   a) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
   b) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
7. Determine the “−X dB amplitude” as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

4.4.5 Deviation fromTest Standard

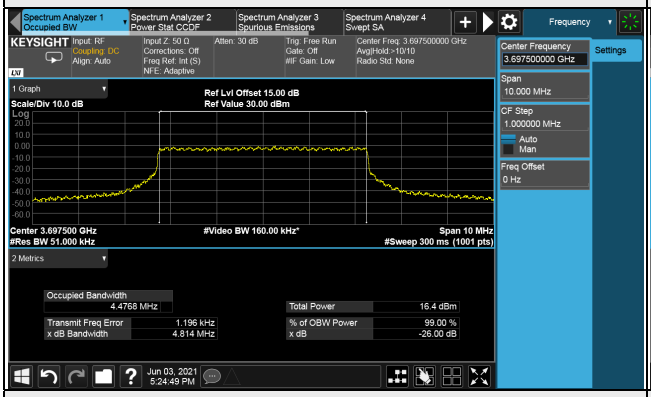
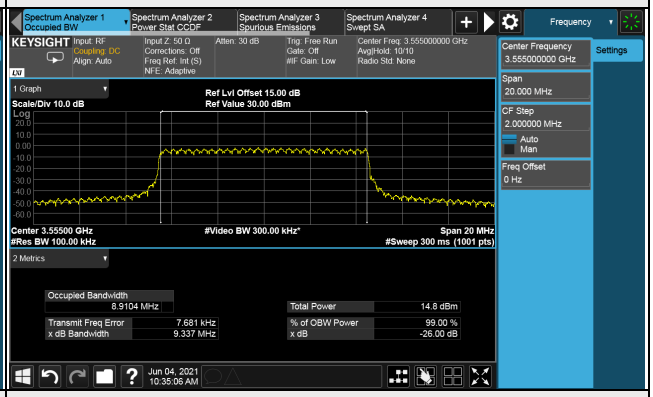
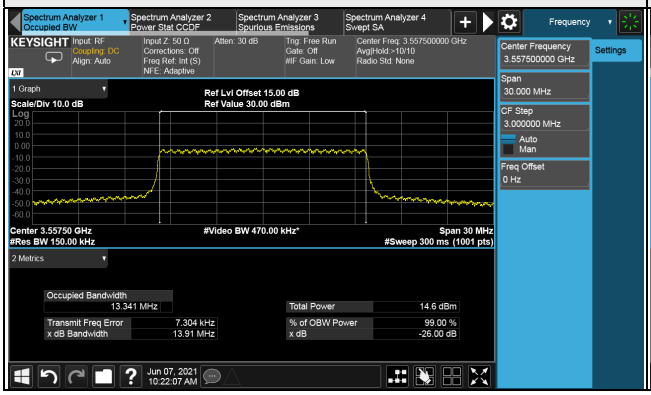
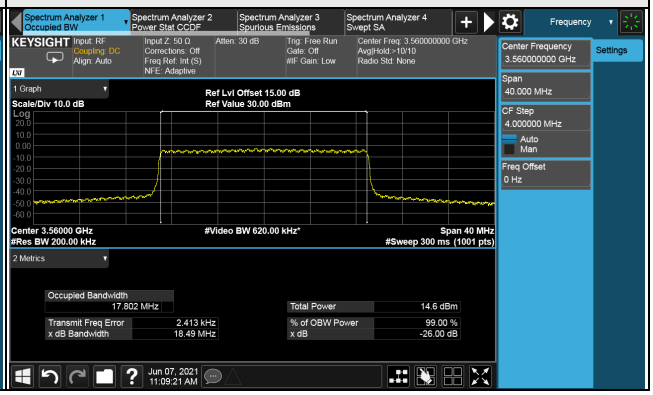
No deviation.

4.4.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

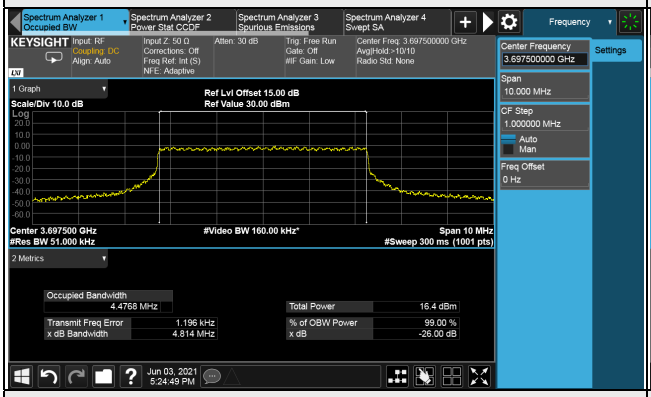
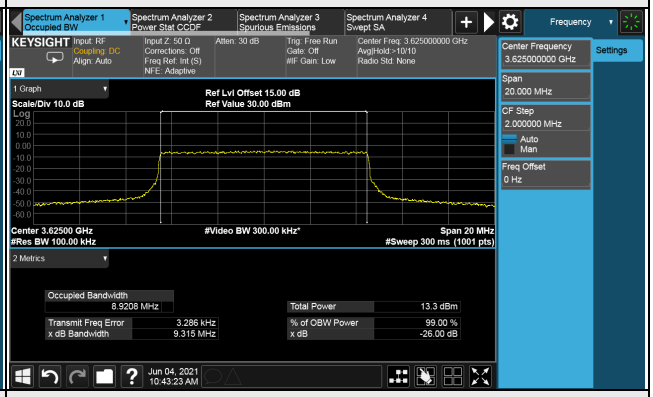
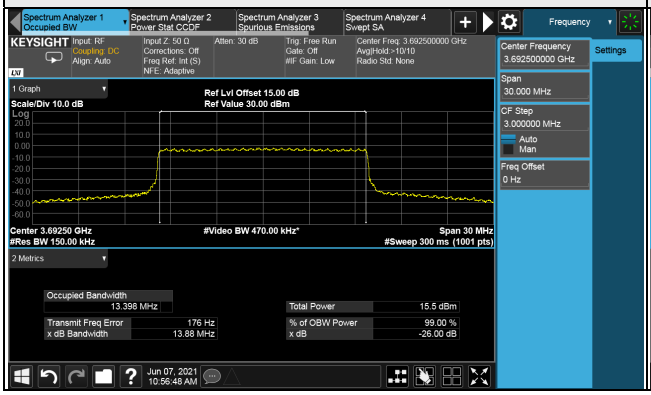
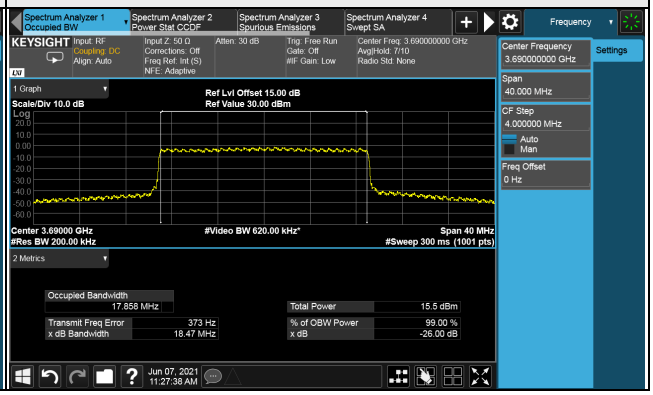
4.4.7 Test Result (-26dB Bandwidth)

LTE Band 48, Channel Bandwidth 5MHz				
Channel	Frequency (MHz)	26dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM
55265	3552.5	4.81	4.72	4.78
55990	3625.0	4.80	4.75	4.81
56715	3697.5	4.81	4.76	4.76
LTE Band 48, Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	26dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM
55290	3555.0	9.31	9.27	9.33
55990	3625.0	9.32	9.27	9.31
56690	3695.0	9.27	9.29	9.31
LTE Band 48, Channel Bandwidth 15MHz				
Channel	Frequency (MHz)	26dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM
55315	3557.5	13.87	13.89	13.91
55990	3625.0	13.91	13.87	13.89
56665	3692.5	13.90	13.88	13.88
LTE Band 48, Channel Bandwidth 20MHz				
Channel	Frequency (MHz)	26dB Bandwidth (MHz)		
		QPSK	16QAM	64QAM
55340	3560.0	18.47	18.47	18.49
55990	3625.0	18.49	18.49	18.48
56640	3690.0	18.47	18.47	18.49

Spectrum Plot of Worst Value	
5MHz / QPSK	10MHz / 64QAM
	
15MHz / 64QAM	20MHz / 64QAM
	

4.4.8 Test Result (Occupied Bandwidth)

LTE Band 48, Channel Bandwidth 5MHz				
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM
55265	3552.5	4.47	4.46	4.46
55990	3625.0	4.46	4.45	4.47
56715	3697.5	4.47	4.46	4.45
LTE Band 48, Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM
55290	3555.0	8.89	8.90	8.91
55990	3625.0	8.91	8.92	8.92
56690	3695.0	8.92	8.90	8.91
LTE Band 48, Channel Bandwidth 15MHz				
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM
55315	3557.5	13.39	13.37	13.34
55990	3625.0	13.35	13.35	13.38
56665	3692.5	13.33	13.39	13.39
LTE Band 48, Channel Bandwidth 20MHz				
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		
		QPSK	16QAM	64QAM
55340	3560.0	17.78	17.83	17.80
55990	3625.0	17.78	17.81	17.81
56640	3690.0	17.83	17.85	17.82

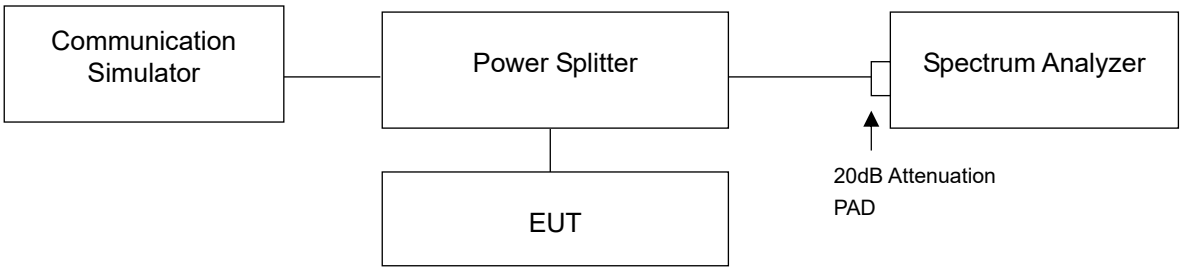
Spectrum Plot of Worst Value	
5MHz / QPSK	10MHz / 64QAM
	
15MHz / 16QAM	20MHz / 16QAM
	

4.5 Peak to Average Ratio Measurement

4.5.1 Limits of Peak to Average Ratio Measurement

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

4.5.2 Test Setup



4.5.3 Test Procedures

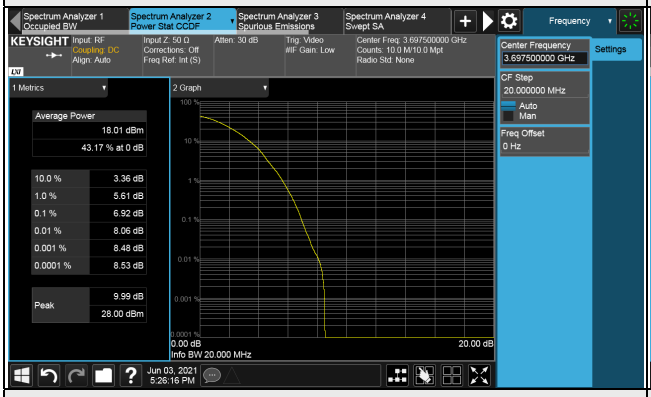
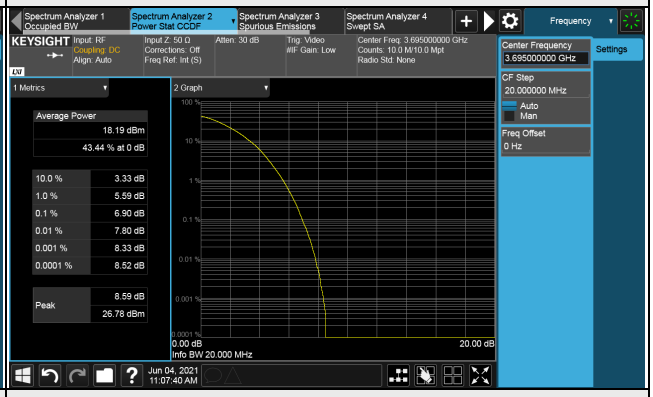
a. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;

b. Set the number of counts to a value that stabilizes the measured CCDF curve;

c. Record the maximum PAPR level associated with a probability of 0.1%.

4.5.4 Test Results

LTE Band 48, Channel Bandwidth 5MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
55265	3552.5	6.08	6.67	6.74
55990	3625.0	6.11	6.69	6.70
56715	3697.5	6.03	6.77	6.92
LTE Band 48, Channel Bandwidth 10MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
55290	3555.0	6.00	6.61	6.81
55990	3625.0	6.01	6.53	6.85
56690	3695.0	6.60	6.60	6.90
LTE Band 48, Channel Bandwidth 15MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
55315	3557.5	5.93	6.62	6.98
55990	3625.0	5.83	6.57	6.74
56665	3692.5	5.91	6.52	6.94
LTE Band 48, Channel Bandwidth 20MHz				
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		QPSK	16QAM	64QAM
55340	3560.0	5.97	6.75	6.91
55990	3625.0	5.85	6.67	6.87
56640	3690.0	5.97	6.67	6.89

Spectrum Plot of Worst Value	
5MHz / 64QAM	10MHz / 64QAM
	
15MHz / 64QAM	20MHz / 64QAM