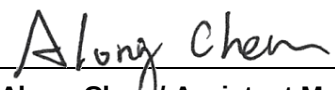


FCC Test Report

FCC ID : MXF-WLTGFC105
Equipment : LTE Small Cell Base Station (CBRS CBSD)
Model No. : WLTGFC-105 ; E1012
(For marketing difference)
Brand Name : Gemtek ; Accelleran
(For marketing difference)
Applicant : Gemtek Technology Co., Ltd.
Address : No. 15-1 Zhonghua Road, Hsinchu Industrial
Park, Hukou, Hsinchu, Taiwan, 30352.
Standard : 47 CFR FCC Part 96
Type : ☐ End User Device
☒ Category A CBSD
☐ Category B CBSD
Received Date : Oct. 22, 2018
Tested Date : Nov. 01 ~ Nov. 28, 2018

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:


Along Chen / Assistant Manager

Approved by:

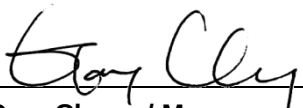

Gary Chang / Manager



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Release Record

Report No.	Version	Description	Issued Date
FG8O2201	Rev. 01	Initial issue	Jan. 08, 2019

Summary of Test Results

FCC Rules	Test Items	Measured	Result
2.1046 / 96.41(b)	Maximum RF Power Output EIRP	Power[dBm/10MHz]: 29.05	Pass
96.41(b)	Maximum Power Spectral Density	Meet the requirement of limit	Pass
96.41(g)	Peak to Average Ratio	Meet the requirement of limit	Pass
2.1053 / 96.41(e)	Radiated Spurious Emission	Meet the requirement of limit	Pass
2.1051 / 96.41(e)	Conducted Spurious Emission	Meet the requirement of limit	Pass
2.1051 / 96.41(e)	Band Edge	Meet the requirement of limit	Pass
2.1049	Emission Bandwidth	Meet the requirement of limit	Pass
2.1055 / 96.41(e)	Frequency Stability	Meet the requirement of limit	Pass
96.41(f)	Reception Limits	Meet the requirement of limit	Pass

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared values of gain for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of the gain.

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

Operating Band	Band 48 Channel Bandwidth: 10MHz: 3555.0 MHz ~ 3695.0 MHz Channel Bandwidth: 20MHz: 3560.0 MHz ~ 3690.0 MHz
Modulation Type	QPSK, 16QAM (Uplink) QPSK, 16QAM, 64QAM (Downlink)
Duplex Mode	TDD
UE Category	Cat. 5
Release	11
TX/RX function	2TX / 2RX

1.1.2 Antenna Details

Type	Connector	Gain (dBi)	Remark
omni	N type	6	---

1.1.3 EUT Operational Condition

Supply Voltage	56Vdc from PoE		
Operational Climatic	☒ Tnom (20°C)	☒ Tmax (50°C)	☒ Tmin (-40°C)

1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	PoE	Brand: PHIHONG Model: POE29U-1AT I/P: 100-240Vac, 0.8 Max, 50-60Hz O/P: 56Vdc, 0.536A Power cord: 1.8m non-shielded without core
2	RJ45(Blue)	1.5m shielded without core
3	GPS antenna	1.5m shielded without core
4	Core	Brand: King Model: KCF-130

1.1.5 Maximum EIRP and Emission Designator

Channel Bandwidth (MHz)	Modulation	Maximum EIRP (W/10MHz)	Emission Designator
10	QPSK	0.802	8M95G7D
10	16QAM	0.706	8M97W7D
10	64QAM	0.804	8M97D9W
20	QPSK	0.782	17M9G7D
20	16QAM	0.711	17M9W7D
20	64QAM	0.776	17M9D9W

Channel Bandwidth (MHz)	Modulation	Maximum EIRP (W/20MHz)	Emission Designator
20	QPSK	1.563	17M9G7D
20	16QAM	1.422	17M9W7D
20	64QAM	1.552	17M9D9W

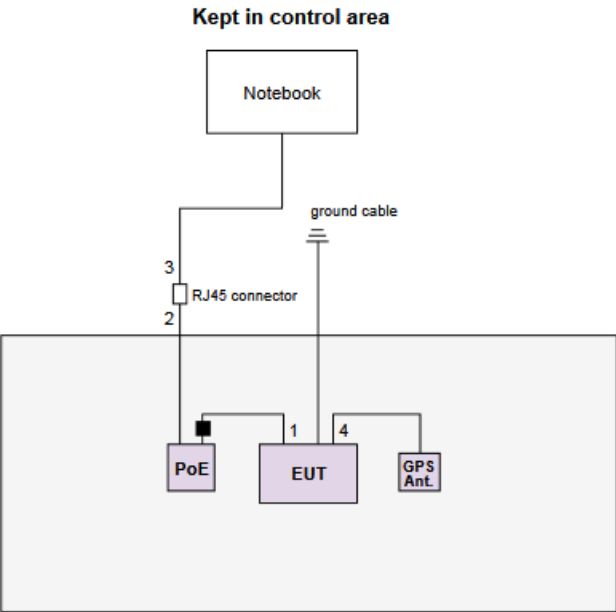
1.1.6 Operating Channel List

Channel Bandwidth (MHz)	Channel	Frequency (MHz)
10	55290	3555.0
10	55990	3625.0
10	56690	3695.0
20	55340	3560.0
20	55990	3625.0
20	56640	3690.0

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Inspiron 3000	DoC	---

1.3 Test Setup Chart

Test Setup Diagram	
Kept in control area  The diagram illustrates the test setup. A Notebook is positioned above a shaded area labeled 'Kept in control area'. A cable labeled '3' connects the Notebook to an 'RJ45 connector'. From the 'RJ45 connector', a cable labeled '2' leads to a 'PoE' (Power over Ethernet) unit. Another cable labeled '1' connects the 'PoE' unit to an 'EUT' (Equipment Under Test). A 'ground cable' is connected to the EUT. A cable labeled '4' connects the EUT to a 'GPS Ant.' (GPS Antenna). The PoE, EUT, and GPS Ant. are all located within the shaded control area.	
No.	Signal cable / Length (m)
1	RJ45, 1m shielded with one core.
2	RJ45, 1.5m shielded. (Provided by applicant.)
3	RJ45, 10m shielded.
4	RF cable, 1.5m shielded.

1.4 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2017	Dec. 03, 2018
Receiver	R&S	ESR3	101657	Jan. 05, 2018	Jan. 04, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 18, 2018	Jul. 17, 2019
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 20, 2017	Dec. 19, 2018
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2018	Nov. 14, 2019
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 09, 2018	Nov. 08, 2019
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 07, 2017	Dec. 06, 2018
Preamplifier	EMC	EMC02325	980225	Jul. 20, 2018	Jul. 19, 2019
Preamplifier	Agilent	83017A	MY39501308	Oct. 04, 2018	Oct. 03, 2019
Preamplifier	EMC	EMC184045B	980192	Aug. 09, 2018	Aug. 08, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	May 09, 2018	May 08, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 07, 2017	Dec. 06, 2018
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 07, 2017	Dec. 06, 2018
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	16052	Dec. 07, 2017	Dec. 06, 2018
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 07, 2017	Dec. 06, 2018
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 07, 2017	Dec. 06, 2018
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Apr. 16, 2018	Apr. 15, 2019
Spectrum Analyzer	Keysight	N9010A	MY54510374	Jun. 21, 2018	Jun. 20, 2019
MXG-B RF Vector Signal Generator	Agilent	N5182B	MY53050081	Apr. 16, 2018	Apr. 15, 2019
Signal Generator	R&S	SMB100A	177785	Jul. 18, 2018	Jul. 17, 2019
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Aug. 10, 2018	Aug. 09, 2019
Power Meter	Anritsu	ML2495A	1241002	Oct. 09, 2018	Oct. 08, 2019
Power Sensor	Anritsu	MA2411B	1207366	Oct. 09, 2018	Oct. 08, 2019
AC POWER SOURCE	APC	AFC-500W	F312060012	Dec. 01, 2017	Nov. 30, 2018
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards.

47 CFR FCC Part 96

ANSI C63.4-2014

ANSI C63.26-2015

FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$)).

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.033 Hz
Conducted power	± 0.607 dB
Frequency error	± 34.033 Hz
Conducted emission	± 2.771 dB
Radiated emission ≤ 1 GHz	± 3.66 dB
Radiated emission > 1 GHz	± 5.63 dB
Temperature	$\pm 4.7^{\circ}\text{C}$

2 Test Configuration

2.1 Testing Condition and Location Information

Test Item	Test Site	Ambient Condition	Tested By
RF Conducted	TH01-WS	20-24°C / 66-69%	Aska Huang
Radiated Emissions	03CH01-WS	23°C / 67%	Akun Chung

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Channel Bandwidth	Modulation	Test channel (MHz)
Equivalent Isotropically Radiated Power	10MHz 20MHz	QPSK / 16QAM / 64QAM QPSK / 16QAM / 64QAM	3555.0 / 3625.0 / 3695.0 3560.0 / 3625.0 / 3690.0
Maximum Power Spectral Density	10MHz 20MHz	QPSK / 16QAM / 64QAM QPSK / 16QAM / 64QAM	3555.0 / 3625.0 / 3695.0 3560.0 / 3625.0 / 3690.0
Radiated Emissions ≤ 1GHz	10MHz 20MHz	64QAM 64QAM	3625.0 3625.0
Radiated Emissions > 1GHz	10MHz 20MHz	64QAM 64QAM	3555.0 / 3625.0 / 3695.0 3560.0 / 3625.0 / 3690.0
Conducted Emissions	10MHz 20MHz	QPSK / 16QAM / 64QAM QPSK / 16QAM / 64QAM	3555.0 / 3625.0 / 3695.0 3560.0 / 3625.0 / 3690.0
Band Edge	10MHz 20MHz	QPSK / 16QAM / 64QAM QPSK / 16QAM / 64QAM	3555.0 / 3625.0 / 3695.0 3560.0 / 3625.0 / 3690.0
Emission Bandwidth	10MHz 20MHz	QPSK / 16QAM / 64QAM QPSK / 16QAM / 64QAM	3555.0 / 3625.0 / 3695.0 3560.0 / 3625.0 / 3690.0
Peak to Average Ratio	10MHz 20MHz	QPSK / 16QAM / 64QAM QPSK / 16QAM / 64QAM	3555.0 / 3625.0 / 3695.0 3560.0 / 3625.0 / 3690.0
Frequency Stability	10MHz 20MHz	Un-modulation	3625.0 3625.0
Reception Limits	10MHz 20MHz	QPSK QPSK	3555.0 / 3625.0 / 3695.0 3560.0 / 3625.0 / 3690.0

3 Test Results

3.1 Output Power

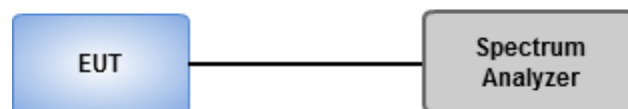
3.1.1 Limit of Output Power

Device	Maximum EIRP (dBm/10MHz)	Maximum PSD (dBm/MHz)
End User Device	23	n/a
Category A CBSD	30	20
Category B CBSD	47	37

3.1.2 Test Procedures

1. Connect the transmitter to the spectrum analyzer via coaxial cable (i.e., conducted measurement) while ensuring proper impedance matching.
2. Tune the analyzer to the nominal center frequency of the emission bandwidth.
3. Set the span to twice the nominal EBW (span = 2 x EBW).
4. Set the resolution bandwidth (RBW) to 1 MHz.
5. Set the video bandwidth (VBW) to 3 MHz
6. Select the average power (RMS) display detector.
7. Set the number of measurement points to ≥ 1001 .
8. Use auto-coupled sweep time.
9. Perform the measurement over an interval of time when the transmission is continuous and at its maximum power level.
10. Utilize trace averaging over 100 traces in the power averaging.
11. Find the maximum trace amplitude (peak search) and record.
12. Using channel power function to integrate output power
13. Adjust the recorded level by applying appropriate correction factors for the measurement set-up.
14. Determine the EIRP / Power density by adding the effective antenna gain to the adjusted power level.

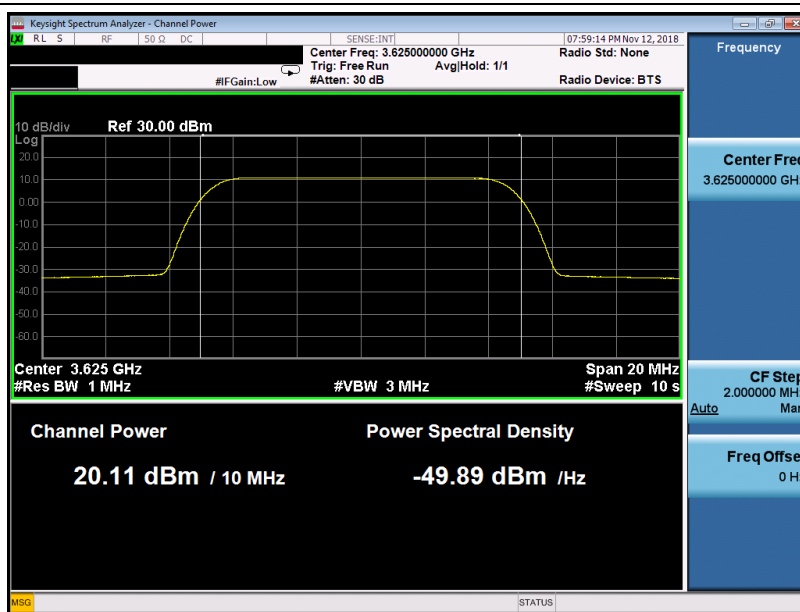
3.1.3 Test Setup



3.1.4 Test Result of EIRP

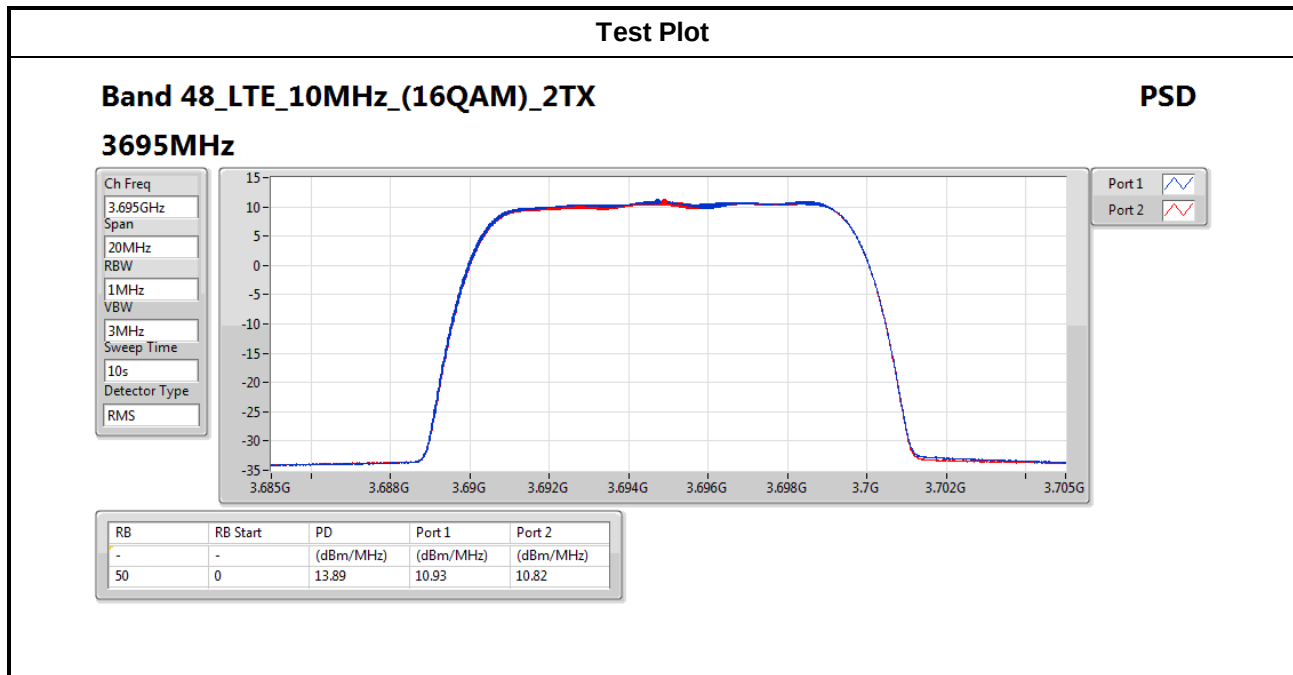
CB: 10MHz Modulation	Frequency (MHz)	Port 1 Conducted Average Power (dBm/10MHz)	Port 2 Conducted Average Power (dBm/10MHz)	Total Conducted Average Power (dBm/10MHz)	Directional Gain (dBi)	EIRP Bandwidth Correction (dB)	E.I.R.P (dBm/10MHz)	E.I.R.P Limit (dBm/10MHz)
QPSK	3555.0	20.05	20	23.04	6	0	29.04	30
QPSK	3625.0	19.88	19.72	22.81	6	0	28.81	30
QPSK	3695.0	19.79	20.03	22.92	6	0	28.92	30
16QAM	3555.0	19.46	19.29	22.39	6	0	28.39	30
16QAM	3625.0	19.46	19.21	22.35	6	0	28.35	30
16QAM	3695.0	19.57	19.38	22.49	6	0	28.49	30
64QAM	3555.0	20.07	19.99	23.04	6	0	29.04	30
64QAM	3625.0	20.11	19.97	23.05	6	0	29.05	30
64QAM	3695.0	19.84	19.96	22.91	6	0	28.91	30

Test Plot

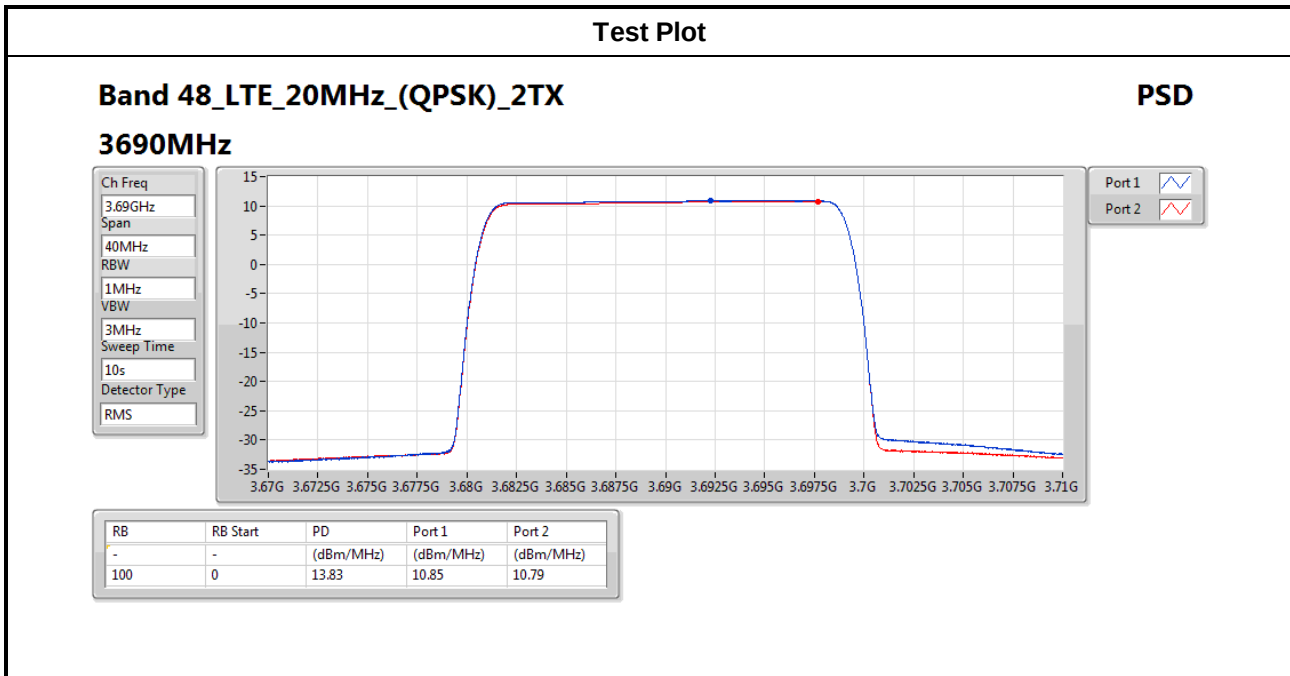


3.1.5 Test Result of PSD

CB: 10MHz Modulation	Frequency (MHz)	Total Conducted Power Density (dBm/MHz)	Max Antenna Gain (dBi)	EIRP Power Density (dBm/MHz)	Limit (dBm/MHz)
QPSK	3555.0	13.88	6	19.88	20.00
QPSK	3625.0	13.76	6	19.76	20.00
QPSK	3695.0	13.82	6	19.82	20.00
16QAM	3555.0	13.79	6	19.79	20.00
16QAM	3625.0	13.71	6	19.71	20.00
16QAM	3695.0	13.89	6	19.89	20.00
64QAM	3555.0	13.86	6	19.86	20.00
64QAM	3625.0	13.73	6	19.73	20.00
64QAM	3695.0	13.77	6	19.77	20.00



CB: 20MHz Modulation	Frequency (MHz)	Total Conducted Power Density (dBm/MHz)	Max Antenna Gain (dBi)	EIRP Power Density (dBm/MHz)	Limit (dBm/MHz)
QPSK	3560.0	13.73	6	19.73	20.00
QPSK	3625.0	13.74	6	19.74	20.00
QPSK	3690.0	13.83	6	19.83	20.00
16QAM	3560.0	13.65	6	19.65	20.00
16QAM	3625.0	13.73	6	19.73	20.00
16QAM	3690.0	13.67	6	19.67	20.00
64QAM	3560.0	13.76	6	19.76	20.00
64QAM	3625.0	13.74	6	19.74	20.00
64QAM	3690.0	13.68	6	19.68	20.00



3.2 Radiated Emissions

3.2.1 Limit of Radiated Emissions

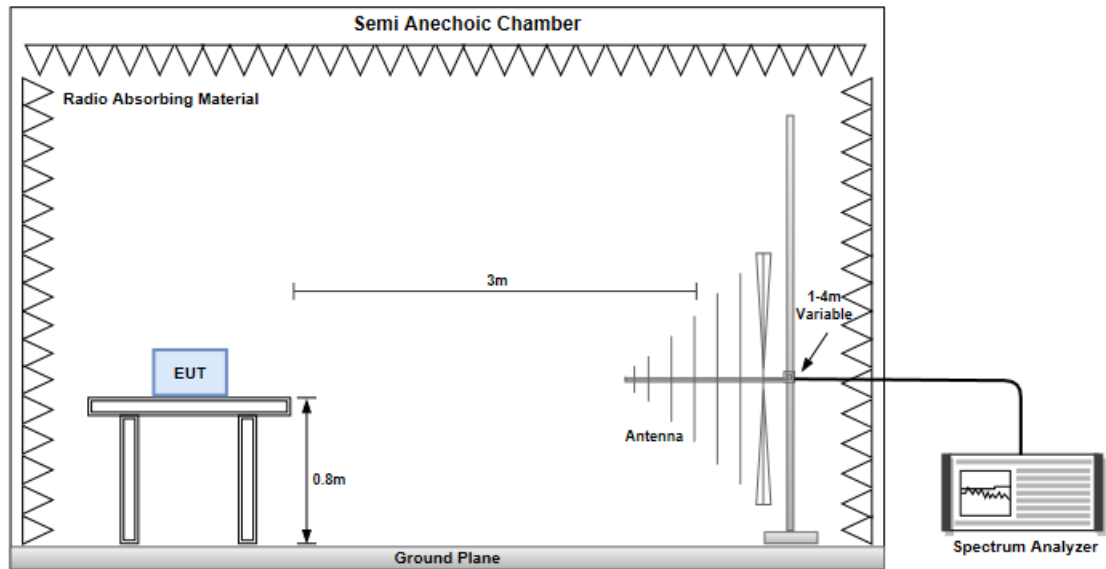
Frequency range	Limit (dBm/MHz)
Within 0-10 MHz above the Assigned Channel Within 0-10 MHz below the assigned Channel	-13
Greater than 10 MHz above the Assigned Channel Greater than 10 MHz below the Assigned Channel	-25
Power of any Emission below 3530 MHz Power of any Emission above 3720 MHz	-40

3.2.2 Test Procedures

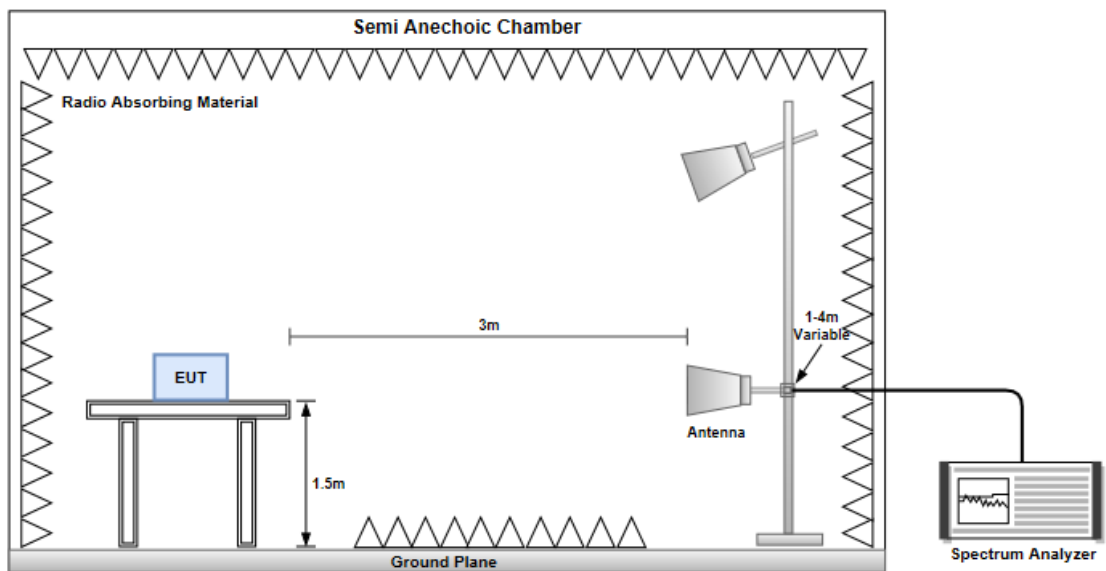
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.
4. After finding the max radiated emission, substitution method will be used for getting effective radiated power. EUT will be removed and substitution antenna will be placed at same position. Signal generator will output CW signal to substitution antenna through a RF cable. Rotate turntable and move antenna to find maximum radiated emission. Adjust output power of signal generator to let the maximum radiated emission is same as step 3. Record the output power level.
5. E.I.R.P = output power of step 4 + gain of substitution antenna – cable loss of RF cable. ERP can be calculated by below formula:

3.2.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.2.4 Test Result of Radiated Emissions below 1GHz

Mode	LTE Band 48, 64QAM, CB: 10MHz, Channel: 55990						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
69.77	H	-52.46	-40.00	-12.46	-52.68	-46.92	-5.54
89.17	H	-62.02	-40.00	-22.02	-49.05	-62.14	0.12
102.75	H	-61.62	-40.00	-21.62	-50.11	-61.65	0.03
187.14	H	-65.50	-40.00	-25.50	-54.85	-68.09	2.59
349.13	H	-63.56	-40.00	-23.56	-60.10	-67.76	4.20
450.01	H	-58.05	-40.00	-18.05	-62.24	-61.82	3.77
45.52	V	-54.99	-40.00	-14.99	-52.68	-43.31	-11.68
61.04	V	-52.18	-40.00	-12.18	-49.05	-43.68	-8.50
76.56	V	-53.02	-40.00	-13.02	-50.11	-49.79	-3.23
102.75	V	-55.77	-40.00	-15.77	-54.85	-55.80	0.03
210.42	V	-58.83	-40.00	-18.83	-60.10	-62.88	4.05
450.01	V	-59.09	-40.00	-19.09	-62.24	-62.86	3.77

NOTE: EIRP = S.G power value + correction factor

Mode	LTE Band 48, 64QAM, CB: 20MHz, Channel: 55990						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
69.77	H	-53.22	-40.00	-13.22	-51.38	-47.68	-5.54
90.14	H	-61.71	-40.00	-21.71	-59.53	-62.03	0.32
102.75	H	-62.89	-40.00	-22.89	-61.01	-62.92	0.03
182.29	H	-65.83	-40.00	-25.83	-63.80	-67.88	2.05
349.13	H	-63.87	-40.00	-23.87	-65.06	-68.07	4.20
450.01	H	-58.60	-40.00	-18.60	-61.65	-62.37	3.77
61.04	V	-51.95	-40.00	-11.95	-48.82	-43.45	-8.50
76.56	V	-52.90	-40.00	-12.90	-49.99	-49.67	-3.23
89.17	V	-55.50	-40.00	-15.50	-53.64	-55.62	0.12
208.48	V	-57.62	-40.00	-17.62	-58.85	-61.67	4.05
450.01	V	-57.56	-40.00	-17.56	-60.71	-61.33	3.77
502.39	V	-61.10	-40.00	-21.10	-65.22	-64.98	3.88

NOTE: EIRP = S.G power value + correction factor

3.2.5 Test Result of Radiated Emissions above 1GHz

Mode	LTE Band 48, 64QAM, CB: 10MHz, Channel: 55290						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
7110.00	H	-56.42	-40.00	-16.42	-74.92	-60.27	3.85
10665.00	H	-53.12	-40.00	-13.12	-75.26	-53.92	0.80
14220.00	H	-51.22	-40.00	-11.22	-75.53	-51.35	0.13
7110.00	V	-55.43	-40.00	-15.43	-75.13	-59.28	3.85
10665.00	V	-53.20	-40.00	-13.20	-74.69	-54.00	0.80
14220.00	V	-49.14	-40.00	-9.14	-74.41	-49.27	0.13

Mode	LTE Band 48, 64QAM, CB: 10MHz, Channel: 55990						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
7250.00	H	-56.65	-40.00	-16.65	-75.48	-60.29	3.64
10875.00	H	-53.12	-40.00	-13.12	-75.28	-53.78	0.66
14500.00	H	-51.09	-40.00	-11.09	-74.69	-50.84	-0.25
7250.00	V	-55.17	-40.00	-15.17	-75.28	-58.81	3.64
10875.00	V	-53.40	-40.00	-13.40	-75.33	-54.06	0.66
14500.00	V	-49.19	-40.00	-9.19	-74.59	-48.94	-0.25

Mode	LTE Band 48, 64QAM, CB: 10MHz, Channel: 56690						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
7390.00	H	-55.83	-40.00	-15.83	-75.46	-59.22	3.39
11085.00	H	-52.98	-40.00	-12.98	-75.31	-53.62	0.64
14780.00	H	-51.07	-40.00	-11.07	-75.40	-51.42	0.35
7390.00	V	-55.74	-40.00	-15.74	-75.73	-59.13	3.39
11085.00	V	-53.17	-40.00	-13.17	-75.64	-53.81	0.64
14780.00	V	-48.66	-40.00	-8.66	-75.42	-49.01	0.35

NOTE: EIRP = S.G power value + correction factor

Mode	LTE Band 48, 64QAM, CB: 20MHz, Channel: 55340						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
7120.00	H	-56.91	-40.00	-16.91	-75.41	-60.75	3.84
10680.00	H	-52.96	-40.00	-12.96	-75.11	-53.75	0.79
14240.00	H	-50.32	-40.00	-10.32	-74.58	-50.42	0.10
7120.00	V	-55.61	-40.00	-15.61	-75.36	-59.45	3.84
10680.00	V	-53.53	-40.00	-13.53	-75.05	-54.32	0.79
14240.00	V	-49.41	-40.00	-9.41	-74.69	-49.51	0.10

Mode	LTE Band 48, 64QAM, CB: 20MHz, Channel: 55990						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
7250.00	H	-56.67	-40.00	-16.67	-75.50	-60.31	3.64
10875.00	H	-53.03	-40.00	-13.03	-75.19	-53.69	0.66
14500.00	H	-50.85	-40.00	-10.85	-74.45	-50.60	-0.25
7250.00	V	-55.05	-40.00	-15.05	-75.16	-58.69	3.64
10875.00	V	-53.01	-40.00	-13.01	-74.94	-53.67	0.66
14500.00	V	-49.13	-40.00	-9.13	-74.53	-48.88	-0.25

Mode	LTE Band 48, 64QAM, CB: 20MHz, Channel: 56640						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
7380.00	H	-55.85	-40.00	-15.85	-75.42	-59.26	3.41
11070.00	H	-52.76	-40.00	-12.76	-75.06	-53.39	0.63
14760.00	H	-50.42	-40.00	-10.42	-74.70	-50.73	0.31
7380.00	V	-55.08	-40.00	-15.08	-75.08	-58.49	3.41
11070.00	V	-52.84	-40.00	-12.84	-75.26	-53.47	0.63
14760.00	V	-48.11	-40.00	-8.11	-74.77	-48.42	0.31

NOTE: EIRP = S.G power value + correction factor

3.3 Conducted Emissions & Band Edge

3.3.1 Limit of Conducted Emissions & Band Edge

Frequency range	Limit (dBm/MHz)
Within 0-10 MHz above the Assigned Channel Within 0-10 MHz below the assigned Channel	-13
Greater than 10 MHz above the Assigned Channel Greater than 10 MHz below the Assigned Channel	-25
Power of any Emission below 3530 MHz Power of any Emission above 3720 MHz	-40

3.3.2 Test Procedures

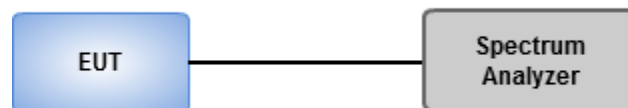
Emission below 3530 MHz / Emission above 3720 MHz

1. Lowest, middle and highest operating channels are tested for this item.
2. Scan frequency range is from 30 MHz ~ 37 GHz.
3. Set RBW = 1MHz, VBW = 3MHz, detector = RMS, sweep time = auto.
4. Record the max trace value and capture the test plot of each sub frequency band.

3530 MHz ~ $(F_c - BW/2) / (F_c + BW/2)$ ~ 3720 MHz

1. Lowest /middel / highest operating channels are tested for this item.
2. The center frequency of spectrum analyzer will be set to Lowest /middel / highest operating channels.
3. Set RBW = 100 kHz, VBW = 300 kHz, detector = RMS, sweep time = auto.
4. Using channel power function to measure test result and record the max trace value and capture the test plot.

3.3.3 Test Setup



3.3.4 Test Result of Conducted Emissions & Band Edge

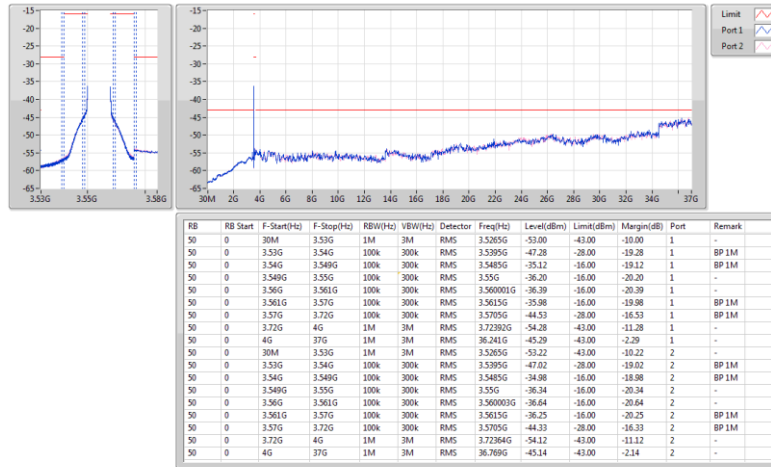
Summary

Mode	Result	RB	RB Start	F-Start (Hz)	F-Stop (Hz)	RBW (Hz)	Detector	Freq (Hz)	Level (dBm)	Limit (dBm)	Margin (dB)	Port	Remark
Band 48	-	-	-	-	-	-	-	-	-	-	-	-	-
Band 48_LTE_20MHz_(64QAM)_2TX	Pass	100	0	4G	37G	1M	RMS	36.307G	-44.76	-43	-1.76	1	-

Band 48_LTE_10MHz_(QPSK)_2TX

CSE-TX

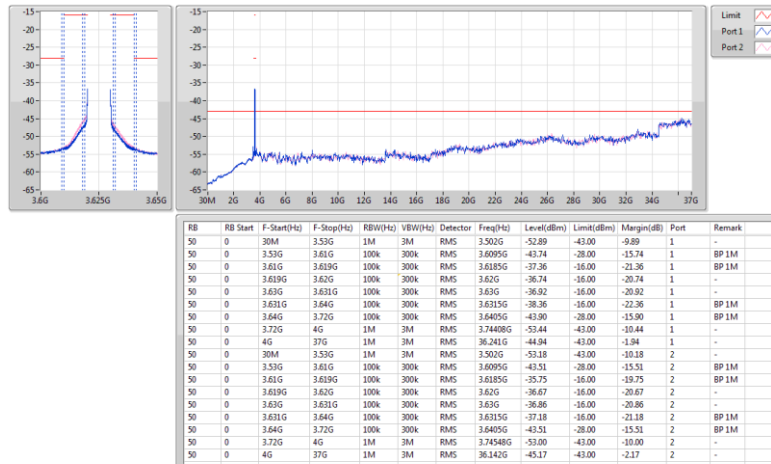
3555MHz



Band 48_LTE_10MHz_(QPSK)_2TX

CSE-TX

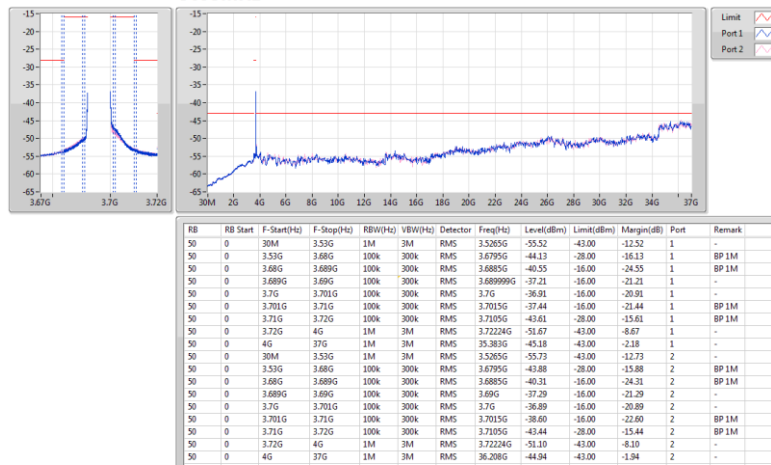
3625MHz



Band 48_LTE_10MHz_(QPSK)_2TX

CSE-TX

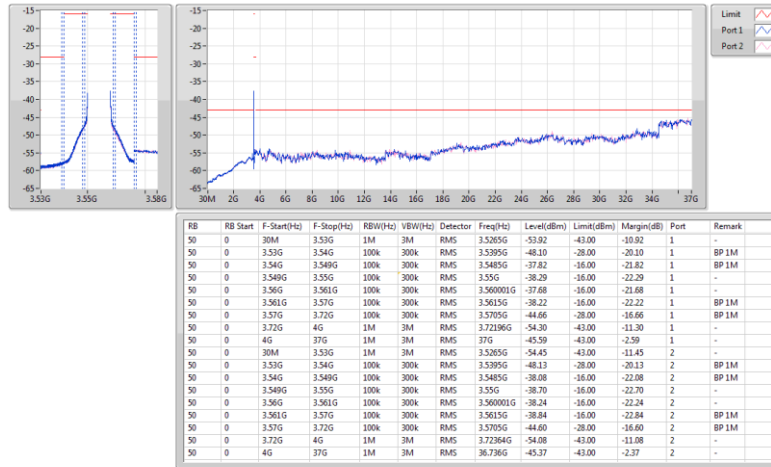
3695MHz



Band 48_LTE_10MHz_(16QAM)_2TX

CSE-TX

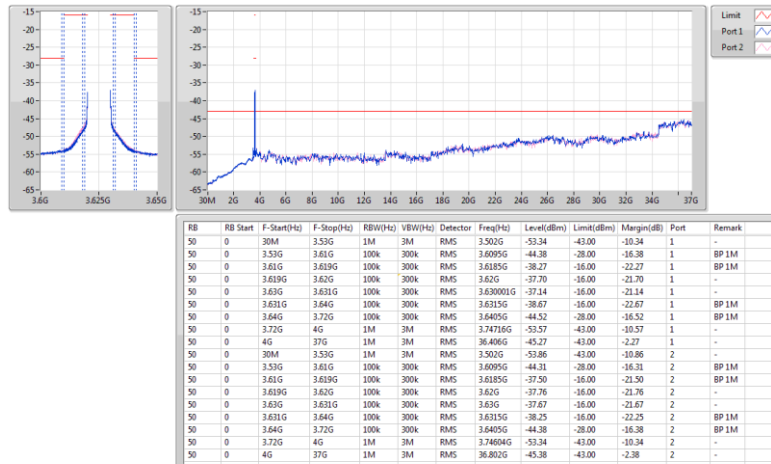
3555MHz



Band 48_LTE_10MHz_(16QAM)_2TX

CSE-TX

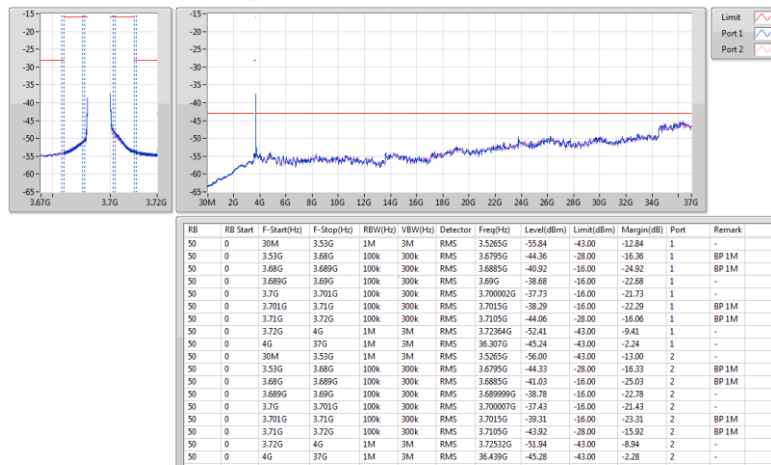
3625MHz



Band 48_LTE_10MHz_(16QAM)_2TX

CSE-TX

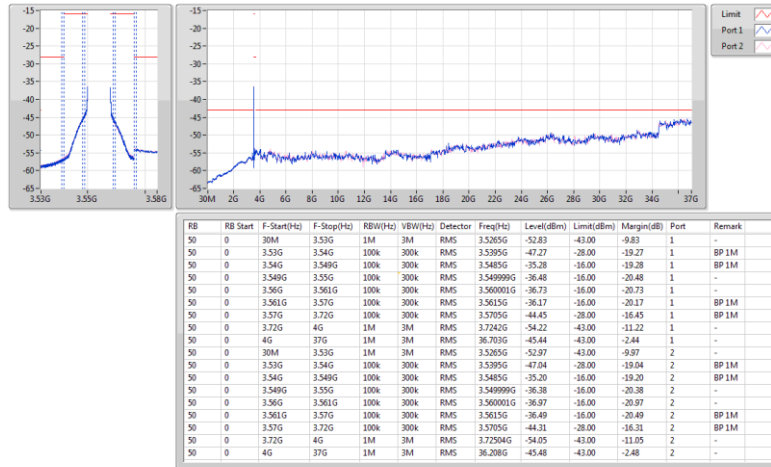
3695MHz



Band 48_LTE_10MHz_(64QAM)_2TX

CSE-TX

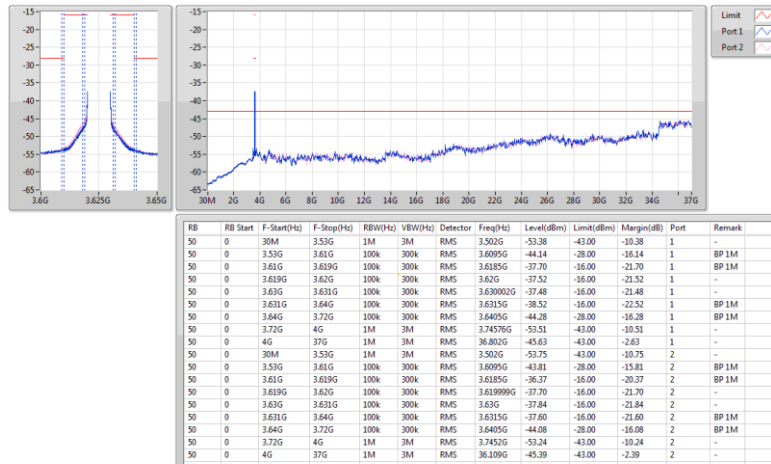
3555MHz



Band 48_LTE_10MHz_(64QAM)_2TX

CSE-TX

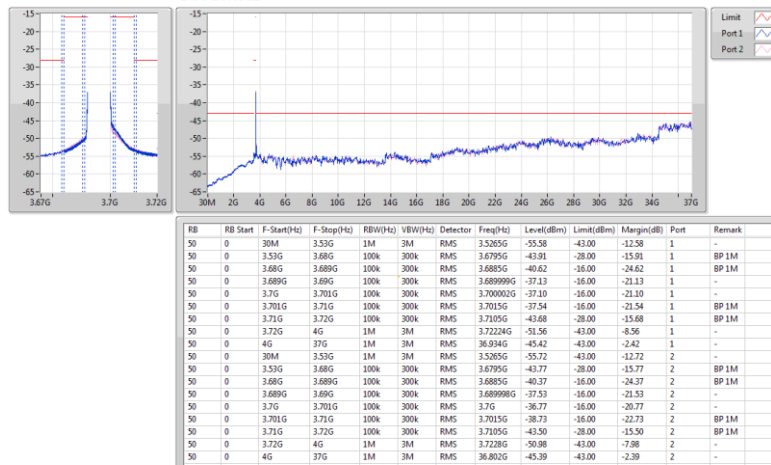
3625MHz



Band 48_LTE_10MHz_(64QAM)_2TX

CSE-TX

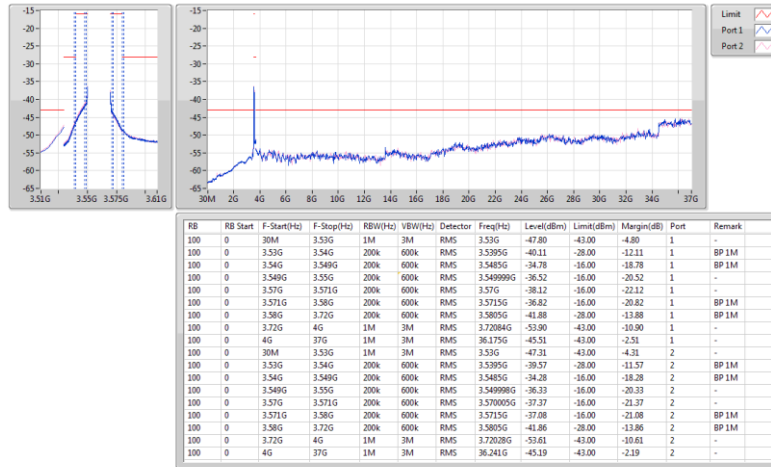
3695MHz



Band 48_LTE_20MHz_(QPSK)_2TX

CSE-TX

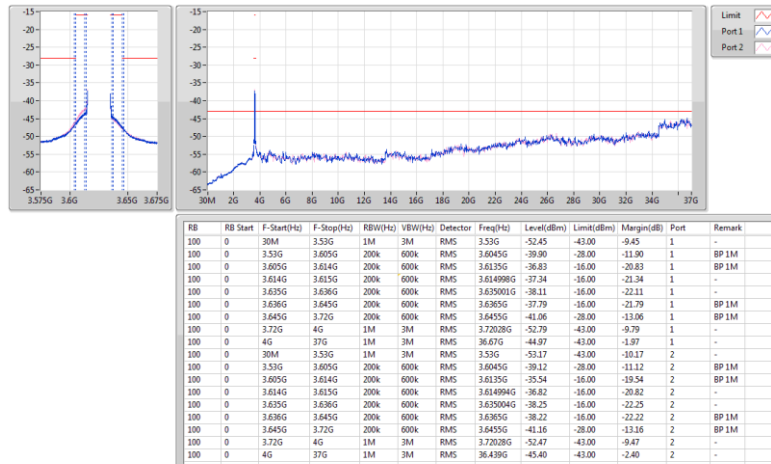
3560MHz



Band 48_LTE_20MHz_(QPSK)_2TX

CSE-TX

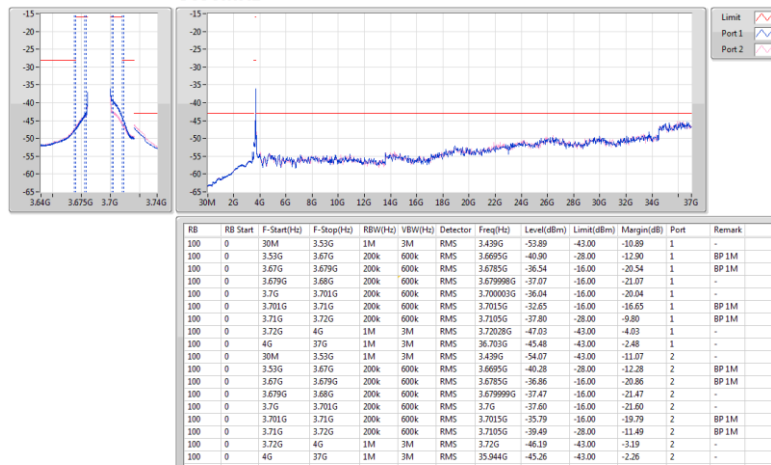
3625MHz



Band 48_LTE_20MHz_(QPSK)_2TX

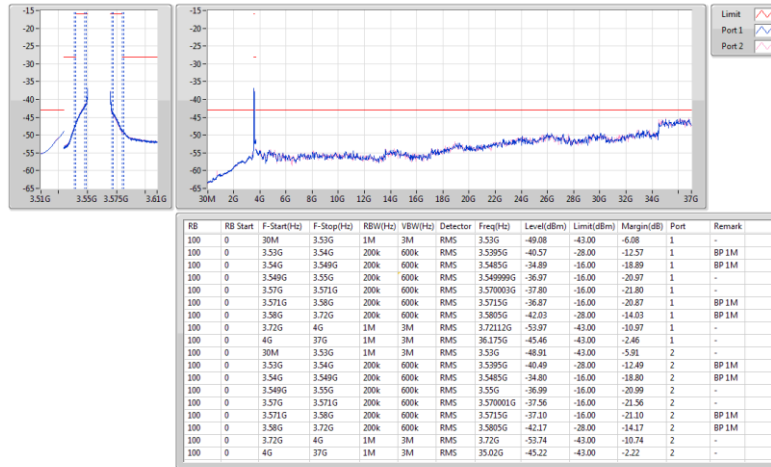
CSE-TX

3690MHz



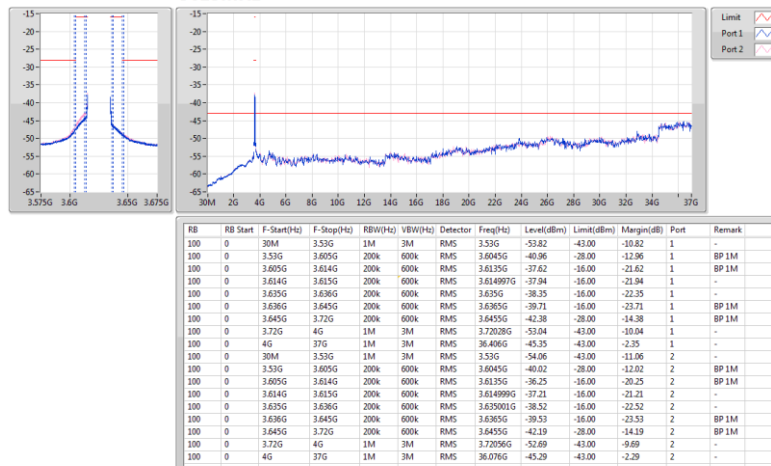
Band 48_LTE_20MHz_(16QAM)_2TX
3560MHz

CSE-TX



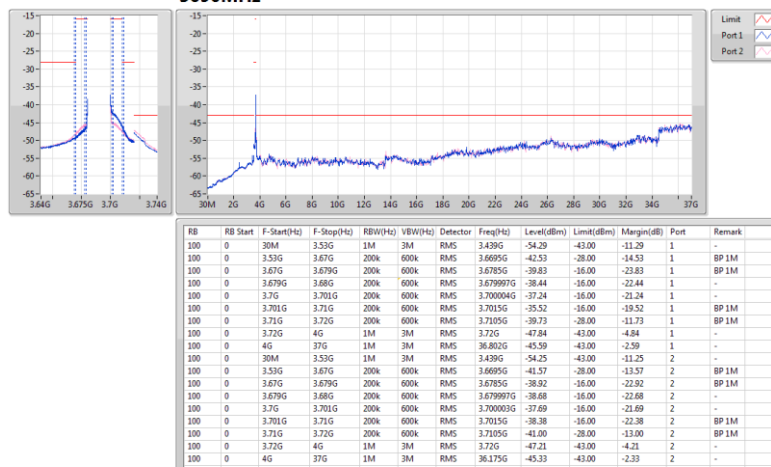
Band 48_LTE_20MHz_(16QAM)_2TX
3625MHz

CSE-TX



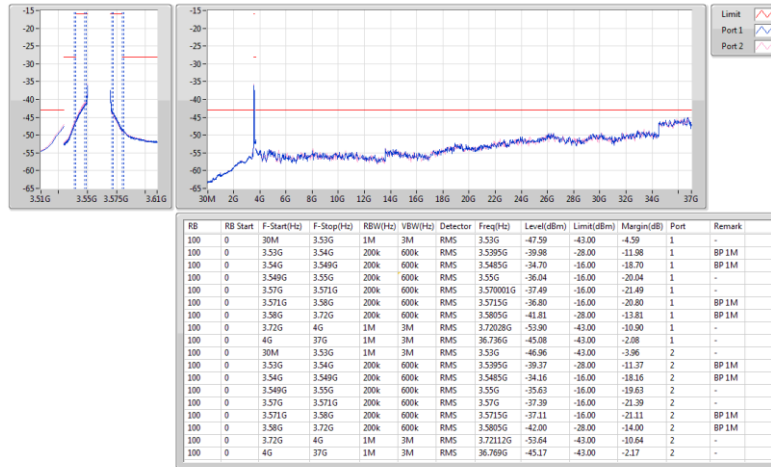
Band 48_LTE_20MHz_(16QAM)_2TX
3690MHz

CSE-TX



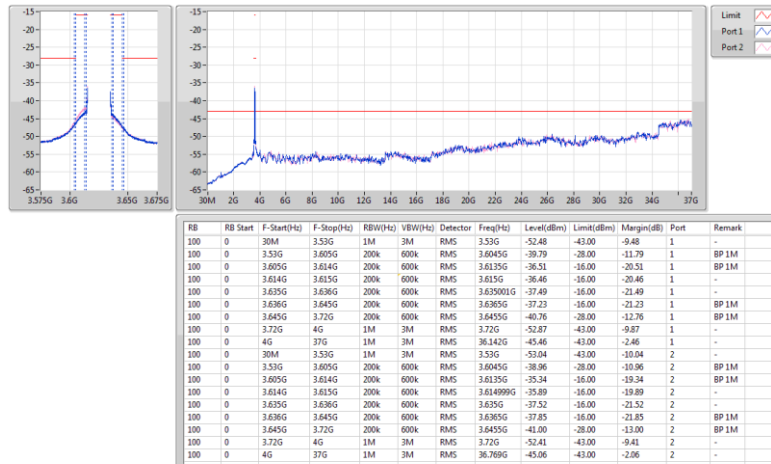
Band 48_LTE_20MHz_(64QAM)_2TX
3560MHz

CSE-TX



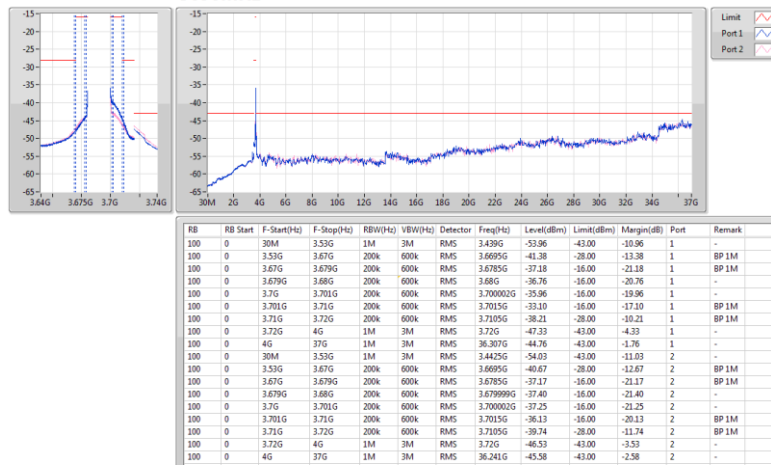
Band 48_LTE_20MHz_(64QAM)_2TX
3625MHz

CSE-TX



Band 48_LTE_20MHz_(64QAM)_2TX
3690MHz

CSE-TX

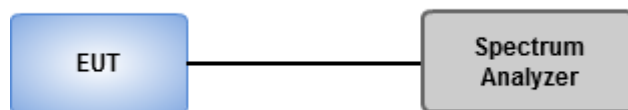


3.4 Emission Bandwidth

3.4.1 Test Procedures

1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz for CB: 10MHz.
Set resolution bandwidth (RBW) = 200 kHz, Video bandwidth = 1 MHz for CB: 20MHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 26dB relative to the maximum level measured in the fundamental emission.
5. Measure the occupied bandwidth.

3.4.2 Test Setup



3.4.3 Test Result of Occupied Bandwidth

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
Band 48	-	-	-	-	-
Band 48_LTE_10MHz_Nss1,(QPSK)_2TX	9.763M	8.951M	8M95G7D	9.65M	8.929M
Band 48_LTE_10MHz_Nss1,(16QAM)_2TX	9.713M	8.974M	8M97W7D	9.575M	8.945M
Band 48_LTE_10MHz_Nss1,(64QAM)_2TX	9.813M	8.973M	8M97D9W	9.65M	8.944M
Band 48_LTE_20MHz_Nss1,(QPSK)_2TX	19.375M	17.888M	17M9G7D	19.1M	17.837M
Band 48_LTE_20MHz_Nss1,(16QAM)_2TX	19.35M	17.884M	17M9W7D	18.9M	17.855M
Band 48_LTE_20MHz_Nss1,(64QAM)_2TX	19.5M	17.911M	17M9D9W	18.975M	17.864M

Max-N dB = Maximum26dB downbandwidth; **Max-OBW** = Maximum99% occupied bandwidth;

Min-N dB = Minimum26dB downbandwidth; **Min-OBW** = Minimum99% occupied bandwidth;

Result

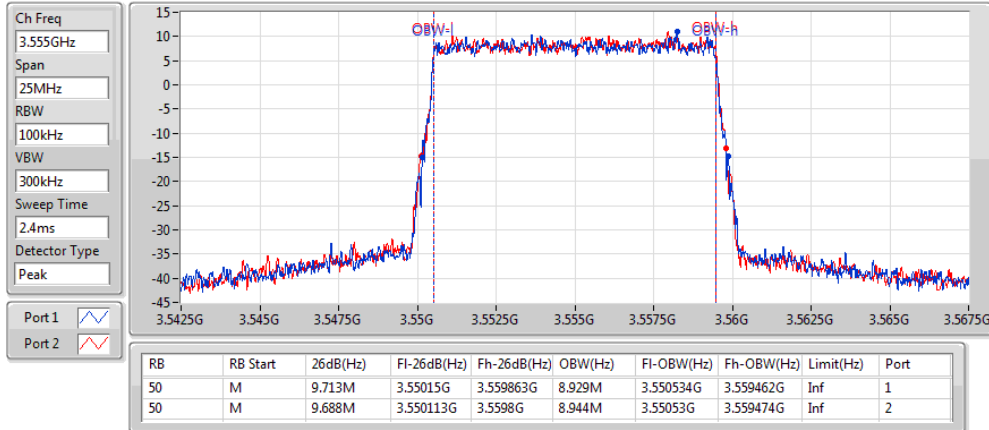
Mode	Result	RB	RB Start	Limit	P1-N dB (Hz)	P1-OBW (Hz)	P2-N dB (Hz)	P2-OBW (Hz)
LTE_10MHz_Nss1,(QPSK)_2TX	-	-	-	-	-	-	-	-
3555MHz	Pass	50	M	Inf	9.713M	8.929M	9.688M	8.944M
3625MHz	Pass	50	M	Inf	9.763M	8.951M	9.688M	8.949M
3695MHz	Pass	50	M	Inf	9.763M	8.95M	9.65M	8.948M
LTE_10MHz_Nss1,(16QAM)_2TX	-	-	-	-	-	-	-	-
3555MHz	Pass	50	M	Inf	9.663M	8.945M	9.575M	8.95M
3625MHz	Pass	50	M	Inf	9.65M	8.965M	9.65M	8.955M
3695MHz	Pass	50	M	Inf	9.7M	8.968M	9.713M	8.974M
LTE_10MHz_Nss1,(64QAM)_2TX	-	-	-	-	-	-	-	-
3555MHz	Pass	50	M	Inf	9.763M	8.944M	9.813M	8.962M
3625MHz	Pass	50	M	Inf	9.738M	8.961M	9.775M	8.956M
3695MHz	Pass	50	M	Inf	9.675M	8.973M	9.65M	8.947M
LTE_20MHz_Nss1,(QPSK)_2TX	-	-	-	-	-	-	-	-
3560MHz	Pass	100	M	Inf	19.175M	17.879M	19.375M	17.857M
3625MHz	Pass	100	M	Inf	19.175M	17.874M	19.1M	17.837M
3690MHz	Pass	100	M	Inf	19.15M	17.878M	19.3M	17.888M
LTE_20MHz_Nss1,(16QAM)_2TX	-	-	-	-	-	-	-	-
3560MHz	Pass	100	M	Inf	18.9M	17.884M	19.175M	17.859M
3625MHz	Pass	100	M	Inf	18.925M	17.86M	19.35M	17.855M
3690MHz	Pass	100	M	Inf	18.9M	17.879M	19.025M	17.858M
LTE_20MHz_Nss1,(64QAM)_2TX	-	-	-	-	-	-	-	-
3560MHz	Pass	100	M	Inf	19.325M	17.864M	19.5M	17.891M
3625MHz	Pass	100	M	Inf	19.275M	17.871M	19.325M	17.911M
3690MHz	Pass	100	M	Inf	19.3M	17.868M	18.975M	17.888M

Port X-N dB = Port X26dB down bandwidth; **Port X-OBW** = Port X99% occupied bandwidth;

Band 48_LTE_10MHz_(QPSK)_2TX

EBW

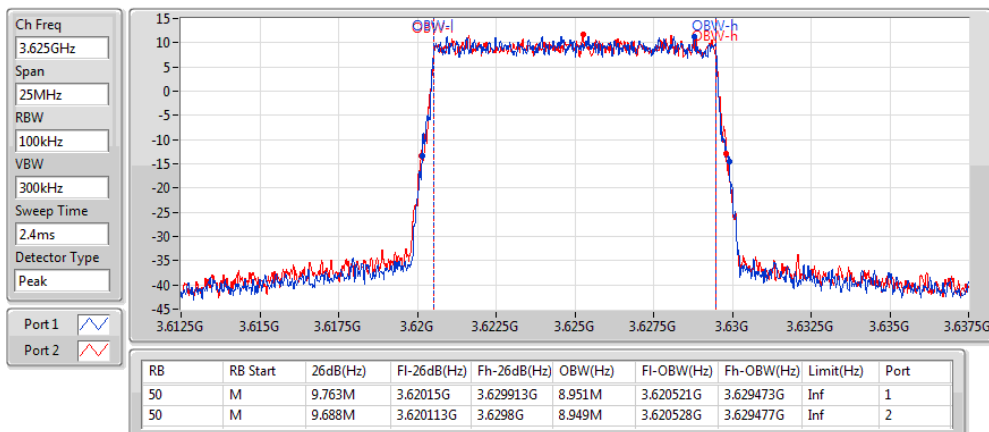
3555MHz



Band 48_LTE_10MHz_(QPSK)_2TX

EBW

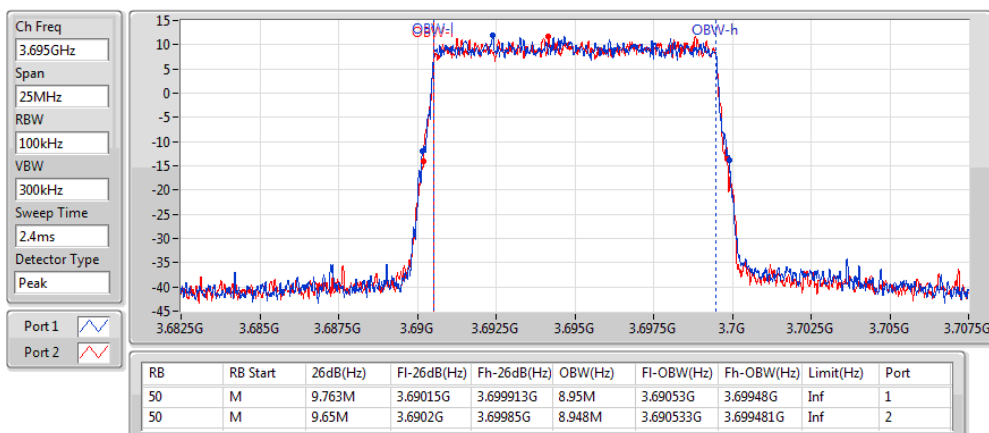
3625MHz



Band 48_LTE_10MHz_(QPSK)_2TX

EBW

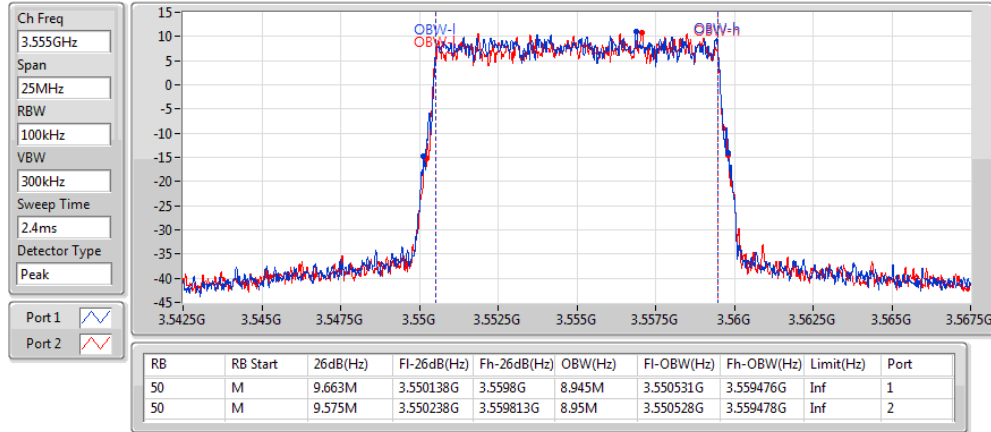
3695MHz



Band 48_LTE_10MHz_(16QAM)_2TX

EBW

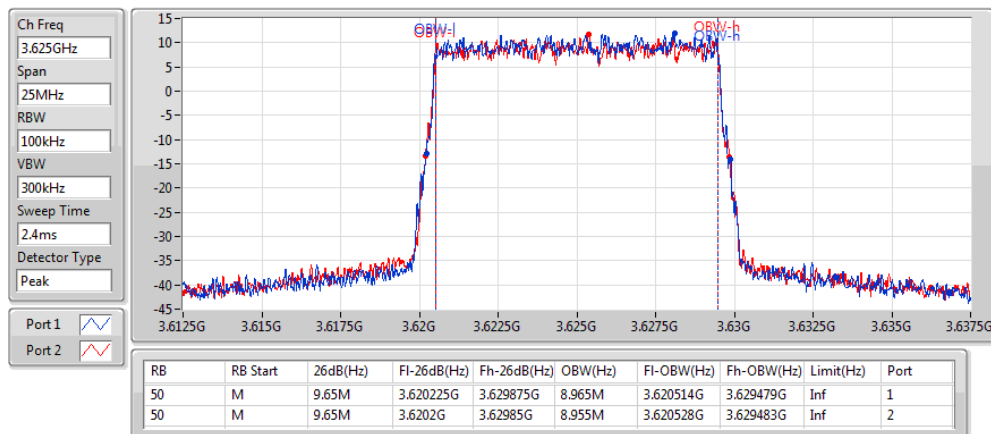
3555MHz



Band 48_LTE_10MHz_(16QAM)_2TX

EBW

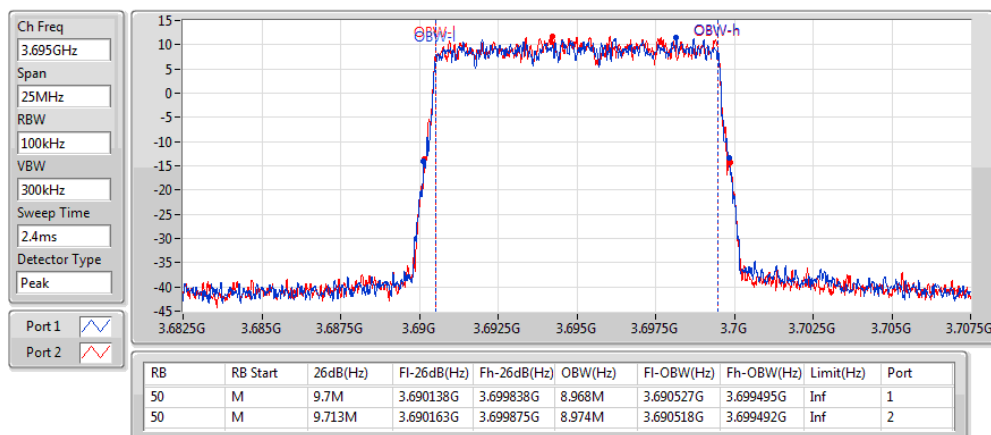
3625MHz



Band 48_LTE_10MHz_(16QAM)_2TX

EBW

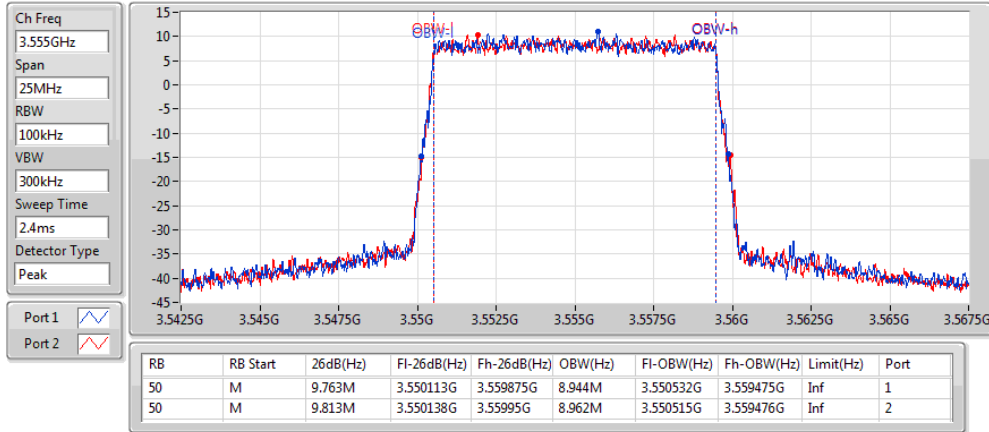
3695MHz



Band 48_LTE_10MHz_(64QAM)_2TX

EBW

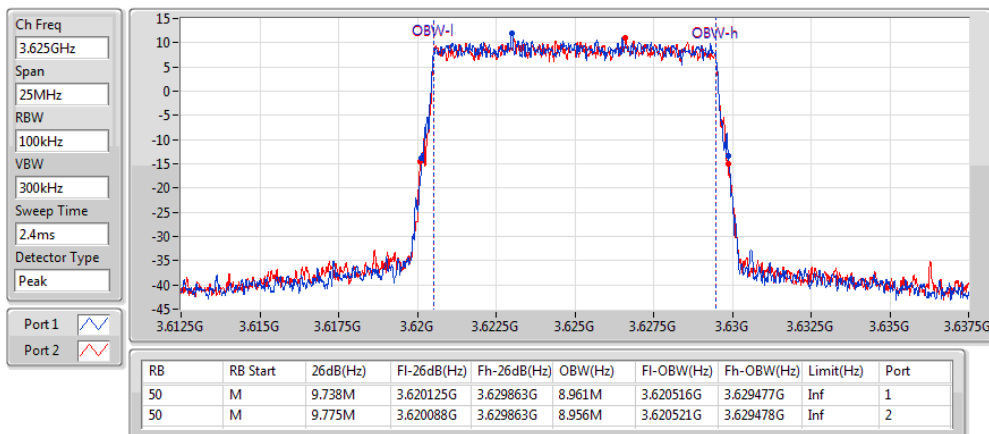
3555MHz



Band 48_LTE_10MHz_(64QAM)_2TX

EBW

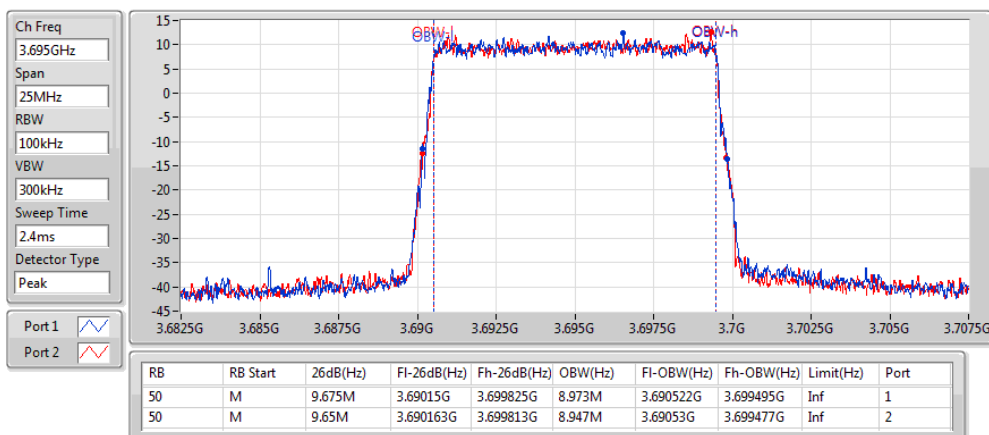
3625MHz



Band 48_LTE_10MHz_(64QAM)_2TX

EBW

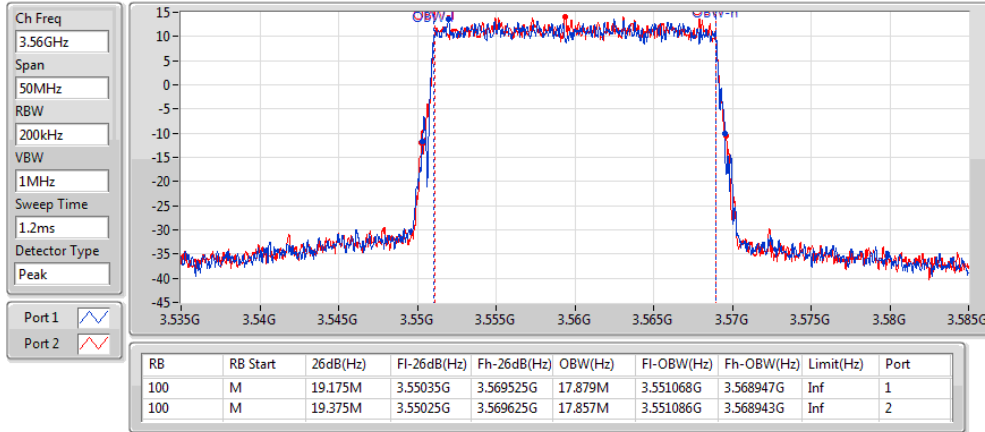
3695MHz



Band 48_LTE_20MHz_(QPSK)_2TX

EBW

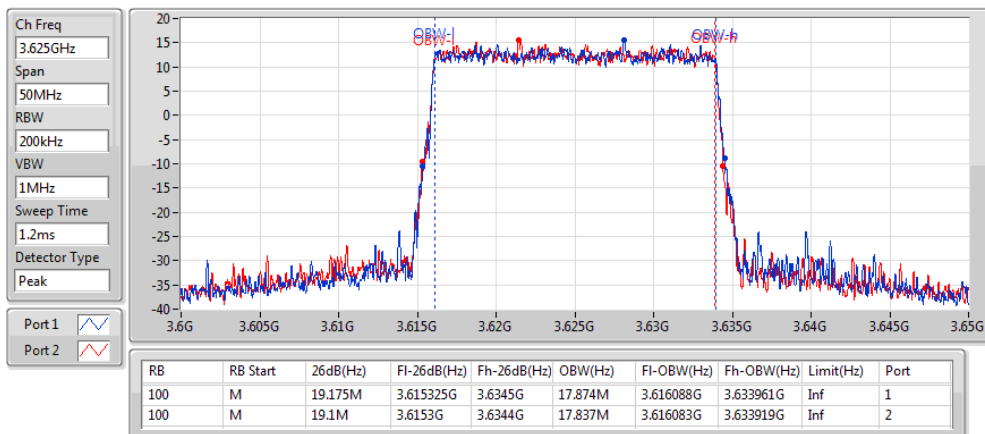
3560MHz



Band 48_LTE_20MHz_(QPSK)_2TX

EBW

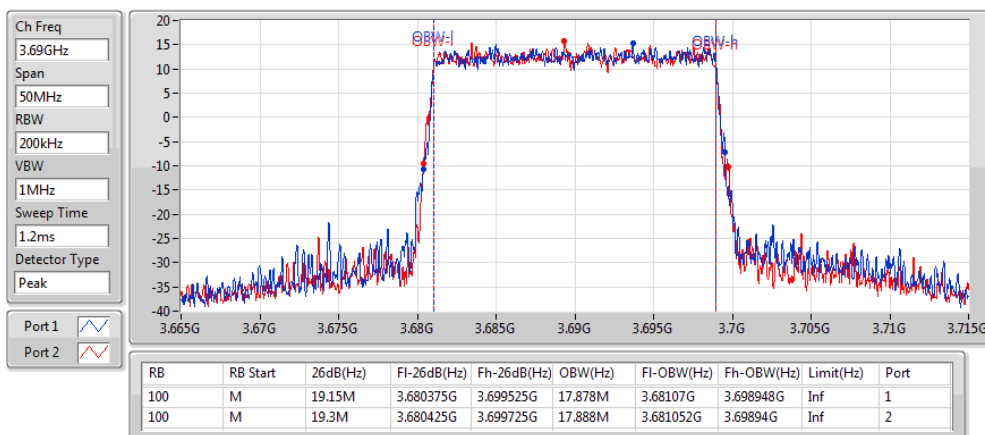
3625MHz



Band 48_LTE_20MHz_(QPSK)_2TX

EBW

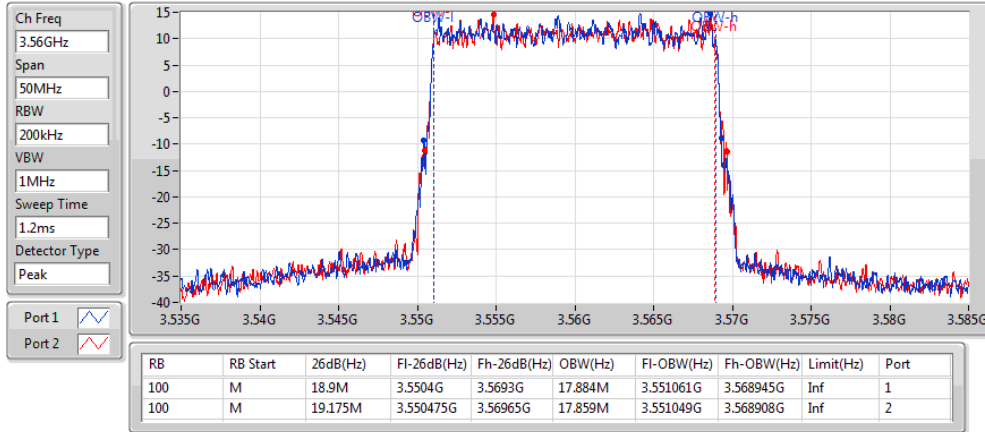
3690MHz



Band 48_LTE_20MHz_(16QAM)_2TX

EBW

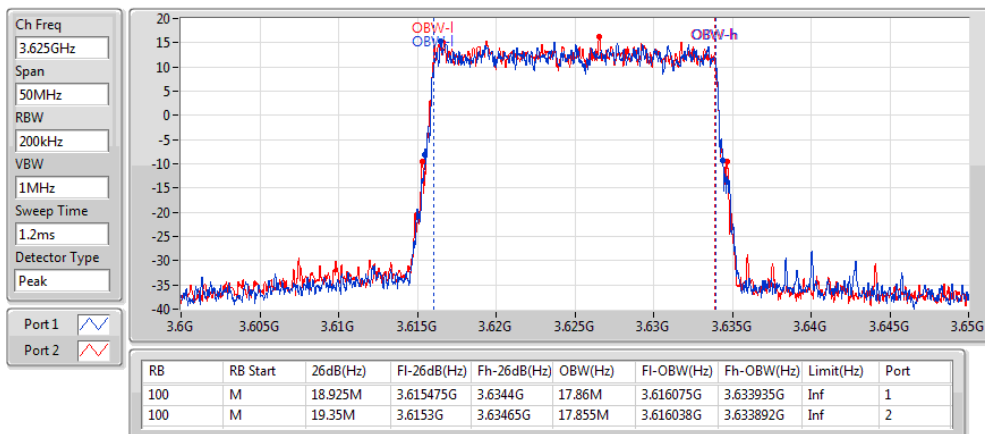
3560MHz



Band 48_LTE_20MHz_(16QAM)_2TX

EBW

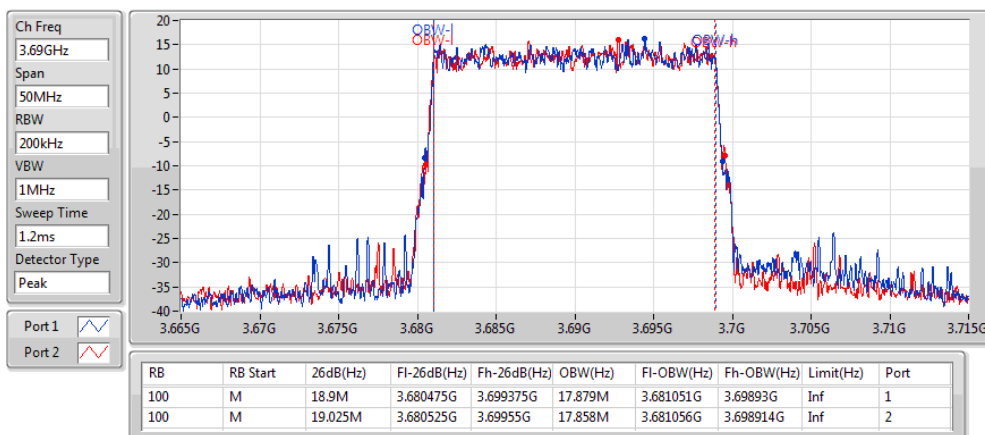
3625MHz



Band 48_LTE_20MHz_(16QAM)_2TX

EBW

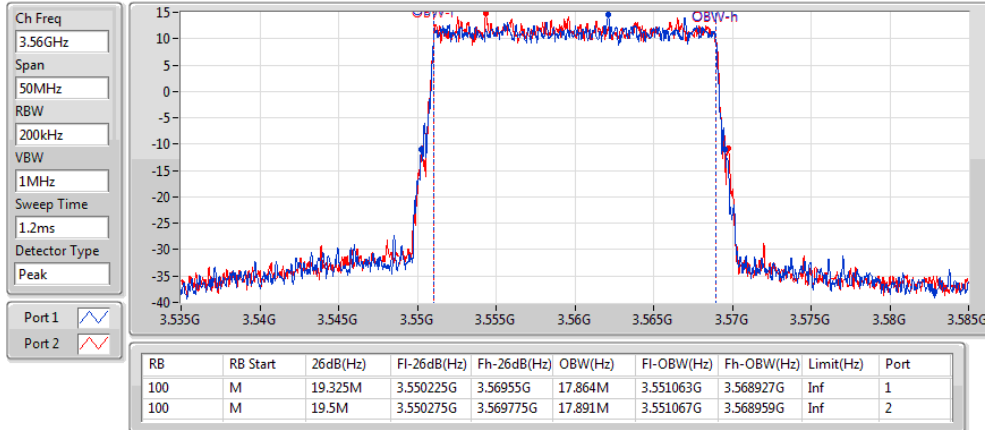
3690MHz



Band 48_LTE_20MHz_(64QAM)_2TX

EBW

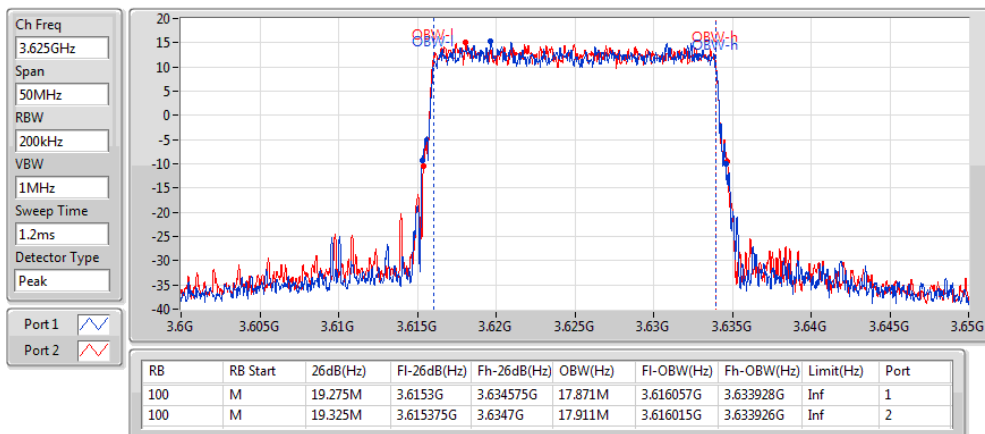
3560MHz



Band 48_LTE_20MHz_(64QAM)_2TX

EBW

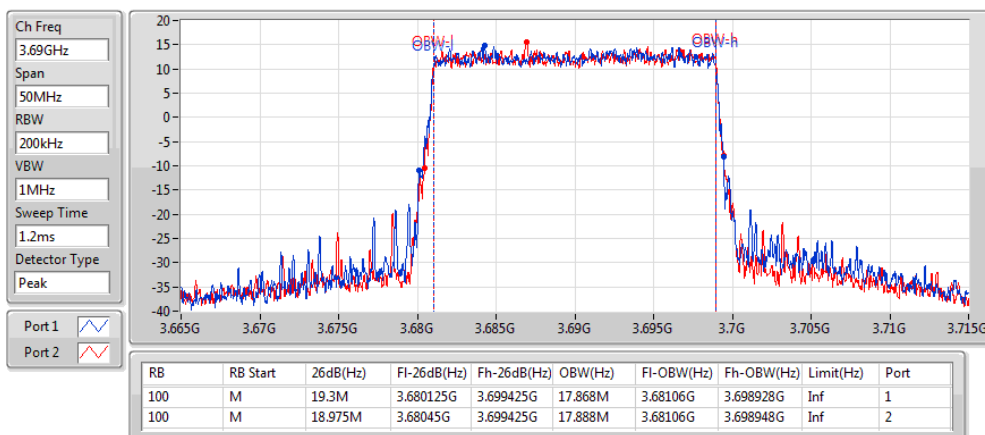
3625MHz



Band 48_LTE_20MHz_(64QAM)_2TX

EBW

3690MHz



3.5 Peak to Average Ratio

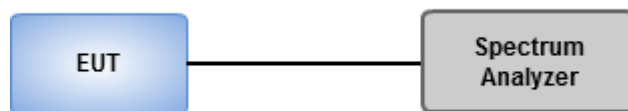
3.5.1 Limit of Peak to Average Ratio

Peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

3.5.2 Test Procedures

1. Enable CCDF function of spectrum analyzer and set RBW=10MHz.
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Record the maximum PAPR level associated with a probability of 0.1%.

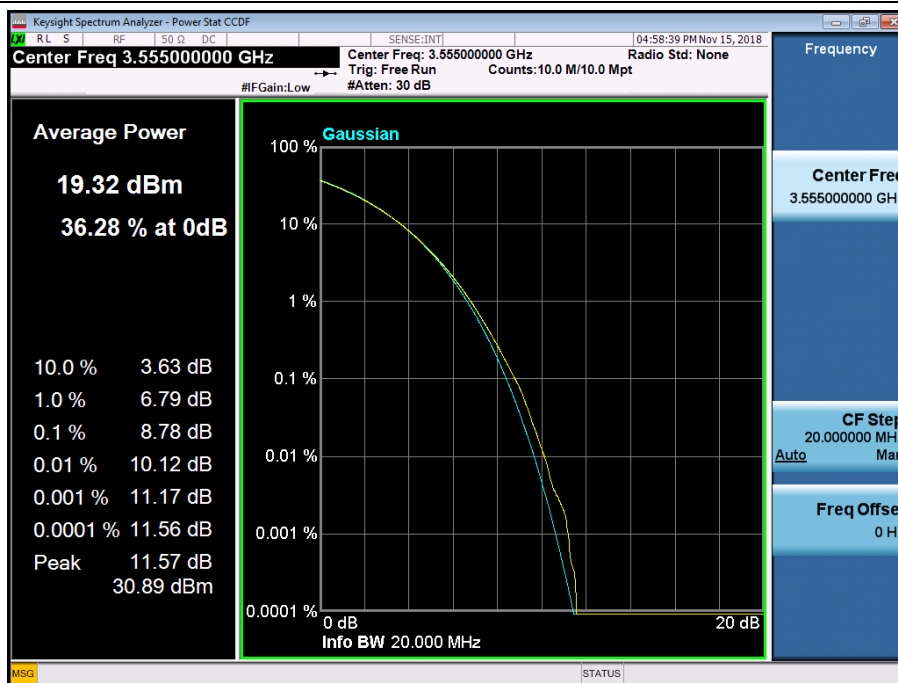
3.5.3 Test Setup



3.5.4 Test Result of Peak to Average Ratio

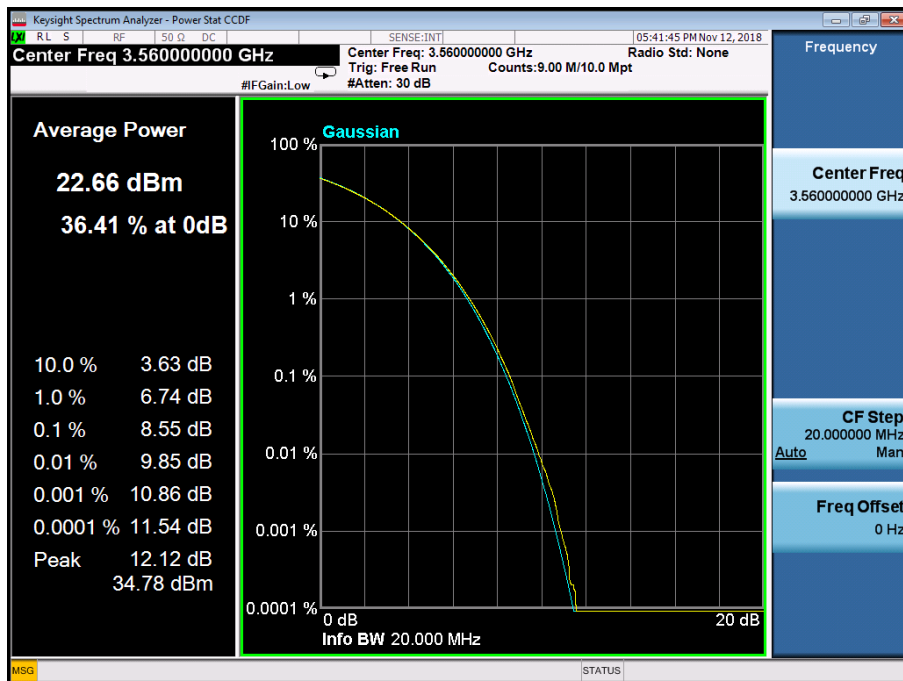
Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	Antenna Port	0.1% (dB)	Limit (dB)
CB:10MHz	QPSK	3555.0	Port 1	8.64	13
			Port 2	8.65	13
CB:10MHz	QPSK	3625.0	Port 1	8.54	13
			Port 2	8.56	13
CB:10MHz	QPSK	3695.0	Port 1	8.47	13
			Port 2	8.45	13
CB:10MHz	16QAM	3555.0	Port 1	8.78	13
			Port 2	8.78	13
CB:10MHz	16QAM	3625.0	Port 1	8.76	13
			Port 2	8.76	13
CB:10MHz	16QAM	3695.0	Port 1	8.61	13
			Port 2	8.60	13
CB:10MHz	64QAM	3555.0	Port 1	8.61	13
			Port 2	8.61	13
CB:10MHz	64QAM	3625.0	Port 1	8.54	13
			Port 2	8.57	13
CB:10MHz	64QAM	3695.0	Port 1	8.43	13
			Port 2	8.41	13

Worst plot



Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	Antenna Port	0.1% (dB)	Limit (dB)
CB:20MHz	QPSK	3560.0	Port 1	8.55	13
			Port 2	8.53	13
CB:20MHz	QPSK	3625.0	Port 1	8.32	13
			Port 2	8.32	13
CB:20MHz	QPSK	3690.0	Port 1	8.25	13
			Port 2	8.31	13
CB:20MHz	16QAM	3560.0	Port 1	8.52	13
			Port 2	8.52	13
CB:20MHz	16QAM	3625.0	Port 1	8.36	13
			Port 2	8.36	13
CB:20MHz	16QAM	3690.0	Port 1	8.26	13
			Port 2	8.29	13
CB:20MHz	64QAM	3560.0	Port 1	8.47	13
			Port 2	8.47	13
CB:20MHz	64QAM	3625.0	Port 1	8.29	13
			Port 2	8.29	13
CB:20MHz	64QAM	3690.0	Port 1	8.22	13
			Port 2	8.26	13

Worst plot



3.6 Frequency Stability

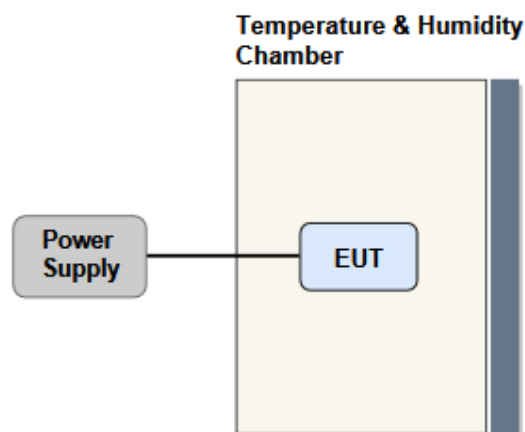
3.6.1 Limit of Frequency Stability

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation

3.6.2 Test Procedures

1. EUT was placed at temperature chamber and connected to an external power supply.
2. Temperature and voltage condition shall be tested to confirm frequency stability.
3. Temperature range is from -40 ~ 50 °C and voltage range is from lowest to highest working voltage.
4. Tem Link up EUT and simulator. Confirm frequency drift value of simulator and record it.

3.6.3 Test Setup



3.6.4 Test Result of Frequency Stability

Channel Bandwidth: 10MHz

Frequency: 3625 MHz	Frequency Drift (ppm)	
Temperature (°C)	Frequency Error (ppm)	Limit (ppm)
T20°C Vmax	-0.3	2.5
T20°C Vmin	-0.4	2.5
T50°C Vnom	-0.6	2.5
T40°C Vnom	-0.6	2.5
T30°C Vnom	-0.6	2.5
T20°C Vnom	-0.4	2.5
T10°C Vnom	-0.3	2.5
T0°C Vnom	-0.1	2.5
T-10°C Vnom	0.2	2.5
T-20°C Vnom	0.2	2.5
T-30°C Vnom	0.3	2.5
T-40°C Vnom	0.5	2.5
Vnom [V]: 110	Vmax [V]: 126.5	Vmin [V]: 93.5
Tnom [°C]: 20	Tmax [°C]: 50	Tmin [°C]: -40

Channel Bandwidth: 20MHz

Frequency: 3625 MHz	Frequency Drift (ppm)	
Temperature (°C)	Frequency Error (ppm)	Limit (ppm)
T20°C Vmax	-0.3	2.5
T20°C Vmin	-0.4	2.5
T50°C Vnom	-0.6	2.5
T40°C Vnom	-0.6	2.5
T30°C Vnom	-0.6	2.5
T20°C Vnom	-0.4	2.5
T10°C Vnom	-0.3	2.5
T0°C Vnom	-0.1	2.5
T-10°C Vnom	0.2	2.5
T-20°C Vnom	0.2	2.5
T-30°C Vnom	0.3	2.5
T-40°C Vnom	0.5	2.5
Vnom [V]: 110	Vmax [V]: 126.5	Vmin [V]: 93.5
Tnom [°C]: 20	Tmax [°C]: 50	Tmin [°C]: -40

3.7 Reception Limits

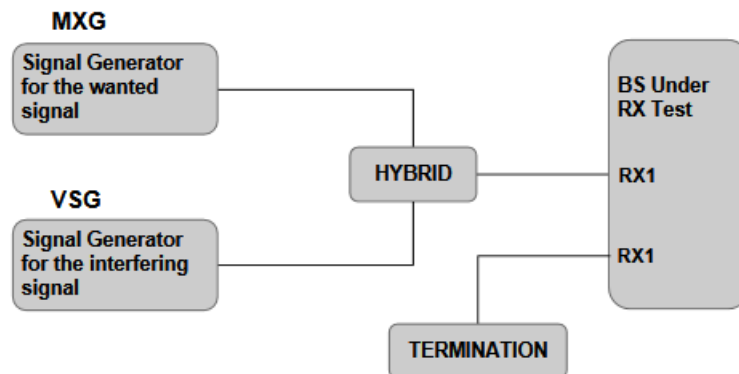
3.7.1 Description of Reception Limits

Priority Access Licensees must accept adjacent channel and in-band blocking interference (emissions from other authorized Priority Access or GAA CBSDs transmitting between 3550 and 3700 MHz) up to a power spectral density level not to exceed -40dBm in any direction with greater than 99% probability when integrated over a 10 megahertz reference bandwidth.

3.7.2 Test Procedures

1. Generate the wanted signal and adjust the input level to specified power level.
2. Select low, middle and high channels for each modulation.
3. For adjacent channel interference, set up the interfering signals at the adjacent channel frequency and adjust the interfering signal level to -40dBm at receiver antenna ports.
4. For in-band blocking interference, set up the interfering signal in the frequency range from 3550MHz to 3700MHz and adjust the interfering signal level to -40dBm at receiver antenna ports.
5. Measure and check the throughput of the EUT greater than 99% probability.

3.7.3 Test Setup



3.7.4 Test Result of Reception Limits

Mode	Interference Power Level (dBm)	Port 1 wanted signal power Level (dBm)	Port 1 Adjacent Channel selectivity Throughput (%)	Port 1 In-Band blocking Throughput (%)	Port 2 wanted signal power Level (dBm)	Port 2 Adjacent Channel selectivity Throughput (%)	Port 2 In-Band blocking Throughput (%)	Limit (%)
CB:10MHz,3555MHz RB offset=0	-40	-87.5	100	100	-87.5	100	100	99
CB:10MHz,3555MHz RB offset=25	-40	-87.5	100	100	-87.5	100	100	99
CB:10MHz,3625MHz RB offset=0	-40	-87.5	100	100	-87.5	100	100	99
CB:10MHz,3625MHz RB offset=25	-40	-87.5	100	100	-87.5	100	100	99
CB:10MHz,3695MHz RB offset=0	-40	-87.5	100	100	-87.5	100	100	99
CB:10MHz,3695MHz RB offset=25	-40	-87.5	100	100	-87.5	100	100	99

Mode	Interference Power Level (dBm)	Port 1 wanted signal power Level (dBm)	Port 1 Adjacent Channel selectivity Throughput (%)	Port 1 In-Band blocking Throughput (%)	Port 2 wanted signal power Level (dBm)	Port 2 Adjacent Channel selectivity Throughput (%)	Port 2 In-Band blocking Throughput (%)	Limit (%)
CB:20MHz,3560MHz RB offset=0	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3560MHz RB offset=25	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3560MHz RB offset=50	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3560MHz RB offset=75	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3625MHz RB offset=0	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3625MHz RB offset=25	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3625MHz RB offset=50	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3625MHz RB offset=75	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3690MHz RB offset=0	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3690MHz RB offset=25	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3690MHz RB offset=50	-40	-84.5	100	100	-84.5	100	100	99
CB:20MHz,3690MHz RB offset=75	-40	-84.5	100	100	-84.5	100	100	99

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

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Kwei Shan District, Tao Yuan City
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Kwei Shan Site II

Tel: 886-3-271-8640

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St., Kwei Shan District, Tao Yuan
City 333, Taiwan, R.O.C..

If you have any suggestion, please feel free to contact us as below information

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