



REPORT No. : SZ23060216W11

TEST REPORT

APPLICANT : Fibocom Wireless Inc.

PRODUCT NAME : LTE Module

MODEL NAME : FG101-NA

BRAND NAME : Fibocom

FCC ID : ZMOFG101NA20

STANDARD(S) : 47 CFR Part 2
47 CFR Part 96

RECEIPT DATE : 2023-06-19

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Change History		
Version	Date	Reason for change
1.0	2023-07-20	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Fibocom Wireless Inc.
Applicant Address:	1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China
Manufacturer:	Fibocom Wireless Inc.
Manufacturer Address:	1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China

1.2. Equipment Under Test (EUT) Description

Product Name:	LTE Module	
Sample No.:	1#	
Hardware Version:	V1.2	
Software Version:	19101.1000.01.00.20.01	
Modulation Type:	QPSK, 16QAM, 64QAM	
Operation Band:	Band 48	
Frequency Range:	LTE Band 48	Tx: 3550MHz–3700MHz
		Rx: 3550MHz–3700MHz
Channel Bandwidth	LTE Band 48	5MHz, 10MHz, 15MHz, 20MHz
Antenna Type:	Fixed External Antenna	
Antenna Gain:	LTE Band 48	-1.18dBi

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



1.3. Maximum E.R.P./E.I.R.P. and Emission Designator

LTE Band 48	Maximum E.R.P./E.I.R.P. (W)			Emission Designator (99%OBW)		
BW(MHz)	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20	0.148	0.118	0.094	17M9G7D	17M9W7D	18M0W7D
15	0.147	0.119	0.095	13M5G7D	13M5W7D	13M5W7D
10	0.146	0.119	0.094	8M97G7D	8M96W7D	8M99W7D
5	0.147	0.124	0.099	4M50G7D	4M50W7D	4M50W7D



1.4. Test Standards and Results

The objective of the report is to perform testing according to Part 2 and Part 96 for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 96	CITIZENS BROADBAND RADIO SERVICE

Test detailed items/section required by FCC rules and results are as below:

Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
2.1046, 96.41(b)	Transmitter Conducted Output Power and ERP/EIRP	Jun. 29, 2023	Chen Hao Li Huaijie	PASS	No deviation
2.1049	Occupied Bandwidth	Jul. 03, 2023	Li Huaijie	PASS	No deviation
96.41(g)	Peak -Average Ratio	Jul. 03, 2023	Li Huaijie	PASS	No deviation
2.1055	Frequency Stability	Jul. 06, 2023	Li Huaijie	PASS	No deviation
2.1051, 96.41(e)	Conducted Spurious Emissions	Jul. 03, 2023	Li Huaijie	PASS	No deviation
2.1051, 96.41(e)	Band Edge	Jul. 04, 2023	Li Huaijie	PASS	No deviation
2.1053, 96.41(e)	Radiated Spurious Emissions	Jul. 01, 2023	Li Hanbin	PASS	No deviation

Note 1: The tests were performed according to the method of measurements prescribed in KDB971168 D01 v03 and ANSI/TIA-603-E-2016.

Note 2: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 24.5dB contains two parts that cable loss 14.5dB and Attenuator 10dB.

Note 3: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.



Note 4: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.5. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106

2.47 CFR Part 2, Part 96 Requirements

2.1. Transmitter Conducted Output Power and E.R.P./E.I.R.P.

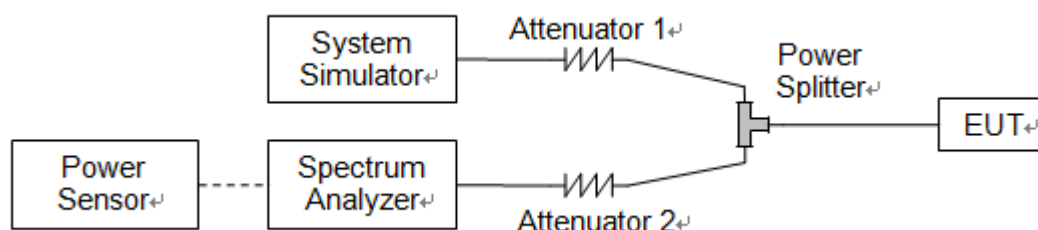
2.1.1. Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

The maximum effective isotropic radiated power (EIRP) and maximum Power Spectral Density (PSD) of any CBSD and End User Device must comply with the limits shown in the table as below. paragraph

Device	Maximum EIRP (dBm/10 megahertz)	Maximum PSD (dBm/MHz)
End User Device	23	n/a
Category A CBSD	30	20
Category B CBSD ¹	47	37

2.1.2. Test Description



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.



2.1.3. Test procedure

KDB 971168 D01v03 Section 5.2 and ANSI/TIA-603-E-2016.

$EIRP \text{ (dBm)} = \text{Conducted Output Power (dBm)} + \text{Antenna Gain (dBi)}$

$ERP \text{ (dBm)} = EIPR \text{ (dBm)} - 2.15$

2.1.4. Result

Conducted Output Power:

LTE Band 48						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				55340	55990	56640
Frequency (MHz)				3560	3625	3690
20	QPSK	1	0	22.50	22.88	22.83
20	QPSK	1	49	22.51	22.87	22.79
20	QPSK	1	99	22.60	22.63	22.68
20	QPSK	50	0	21.50	21.91	21.78
20	QPSK	50	24	21.57	21.83	21.71
20	QPSK	50	50	21.59	21.72	21.80
20	QPSK	100	0	21.64	21.81	21.78
20	16QAM	1	0	21.67	21.90	21.84
20	16QAM	1	49	21.66	21.82	21.85
20	16QAM	1	99	21.52	21.85	21.83
20	16QAM	50	0	20.55	20.98	20.92
20	16QAM	50	24	20.44	20.88	20.86
20	16QAM	50	50	20.46	20.67	20.74
20	16QAM	100	0	20.64	20.78	20.71
20	64QAM	1	0	20.79	20.92	20.92
20	64QAM	1	49	20.65	20.82	20.78
20	64QAM	1	99	20.63	20.77	20.84
20	64QAM	50	0	19.68	19.92	19.92
20	64QAM	50	24	19.51	19.92	19.92
20	64QAM	50	50	19.63	19.80	19.68
20	64QAM	100	0	19.60	19.71	19.78



LTE Band 48						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				55315	55990	56665
Frequency (MHz)				3557.5	3625	3692.5
15	QPSK	1	0	22.53	22.85	22.85
15	QPSK	1	37	22.61	22.79	22.69
15	QPSK	1	74	22.49	22.79	22.85
15	QPSK	36	0	21.62	21.85	21.84
15	QPSK	36	20	21.65	21.85	21.73
15	QPSK	36	39	21.66	21.76	21.84
15	QPSK	75	0	21.61	21.80	21.85
15	16QAM	1	0	21.68	21.92	21.91
15	16QAM	1	37	21.78	21.83	21.86
15	16QAM	1	74	21.60	21.84	21.83
15	16QAM	36	0	20.56	20.81	20.79
15	16QAM	36	20	20.66	20.79	20.74
15	16QAM	36	39	20.60	20.73	20.87
15	16QAM	75	0	20.34	20.78	20.72
15	64QAM	1	0	20.87	20.94	20.78
15	64QAM	1	37	20.58	20.81	20.83
15	64QAM	1	74	20.71	20.86	20.87
15	64QAM	36	0	19.56	19.71	19.87
15	64QAM	36	20	19.65	19.73	19.93
15	64QAM	36	39	19.53	19.73	19.72
15	64QAM	75	0	19.69	19.96	19.97



LTE Band 48						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				55290	55990	56690
Frequency (MHz)				3555	3625	3695
10	QPSK		0	22.63	22.83	22.76
10	QPSK	1	25	22.65	22.81	22.72
10	QPSK	1	49	22.51	22.74	22.70
10	QPSK	25	0	21.60	21.80	21.91
10	QPSK	25	12	21.55	21.91	21.89
10	QPSK	25	25	21.61	21.85	21.68
10	QPSK	50	0	21.51	21.83	21.72
10	16QAM	1	0	21.78	21.91	21.89
10	16QAM	1	25	21.72	21.85	21.80
10	16QAM	1	49	21.53	21.86	21.95
10	16QAM	25	0	20.73	20.82	20.73
10	16QAM	25	12	20.59	20.67	20.86
10	16QAM	25	25	20.52	20.81	20.57
10	16QAM	50	0	20.57	20.79	20.76
10	64QAM	1	0	20.75	20.90	20.84
10	64QAM	1	25	20.63	20.88	20.78
10	64QAM	1	49	20.76	20.80	20.87
10	64QAM	25	0	19.68	19.81	19.84
10	64QAM	25	12	19.57	19.86	19.74
10	64QAM	25	25	19.62	19.60	19.86
10	64QAM	50	0	19.44	19.75	19.82



LTE Band 48						
BW [MHz]	Modulation	RB Size	RB Offset	Average Power Low Ch. / Freq.	Average Power Middle Ch. / Freq.	Average Power High Ch. / Freq.
Channel				55265	55990	56175
Frequency (MHz)				3552.5	3625	3697.5
5	QPSK	1	0	22.42	22.85	22.76
5	QPSK	1	12	22.72	22.83	22.83
5	QPSK	1	24	22.42	22.79	22.70
5	QPSK	12	0	21.58	22.06	22.08
5	QPSK	12	7	21.66	21.92	21.83
5	QPSK	12	13	21.35	21.63	21.94
5	QPSK	25	0	21.40	21.89	21.72
5	16QAM	1	0	21.66	22.01	21.95
5	16QAM	1	12	21.85	22.05	22.11
5	16QAM	1	24	21.48	21.99	22.04
5	16QAM	12	0	20.67	20.89	20.83
5	16QAM	12	7	20.69	20.85	20.93
5	16QAM	12	13	20.55	20.52	20.86
5	16QAM	25	0	20.42	20.71	20.89
5	64QAM	1	0	20.87	20.94	21.12
5	64QAM	1	12	20.75	20.79	20.89
5	64QAM	1	24	20.55	20.81	20.98
5	64QAM	12	0	19.43	20.01	19.79
5	64QAM	12	7	19.50	19.75	19.95
5	64QAM	12	13	19.48	19.62	19.76
5	64QAM	25	0	19.48	19.67	19.85

**Effective Radiated Power and Effective Isotropic Radiated Power:**

LTE Band 48				Measured E.I.R.P.					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				55340		55990		56640	
Frequency (MHz)				3560		3625		3690	
				dBm	W	dBm	W	dBm	W
20	QPSK	1	0	21.32	0.136	21.70	0.148	21.65	0.146
20	QPSK	1	49	21.33	0.136	21.69	0.148	21.61	0.145
20	QPSK	1	99	21.42	0.139	21.45	0.140	21.50	0.141
20	QPSK	50	0	20.32	0.108	20.73	0.118	20.60	0.115
20	QPSK	50	24	20.39	0.109	20.65	0.116	20.53	0.113
20	QPSK	50	50	20.41	0.110	20.54	0.113	20.62	0.115
20	QPSK	100	0	20.46	0.111	20.63	0.116	20.60	0.115
20	16QAM	1	0	20.49	0.112	20.72	0.118	20.66	0.116
20	16QAM	1	49	20.48	0.112	20.64	0.116	20.67	0.117
20	16QAM	1	99	20.34	0.108	20.67	0.117	20.65	0.116
20	16QAM	50	0	19.37	0.086	19.80	0.095	19.74	0.094
20	16QAM	50	24	19.26	0.084	19.70	0.093	19.68	0.093
20	16QAM	50	50	19.28	0.085	19.49	0.089	19.56	0.090
20	16QAM	100	0	19.46	0.088	19.60	0.091	19.53	0.090
20	64QAM	1	0	19.61	0.091	19.74	0.094	19.74	0.094
20	64QAM	1	49	19.47	0.089	19.64	0.092	19.60	0.091
20	64QAM	1	99	19.45	0.088	19.59	0.091	19.66	0.092
20	64QAM	50	0	18.50	0.071	18.74	0.075	18.74	0.075
20	64QAM	50	24	18.33	0.068	18.74	0.075	18.74	0.075
20	64QAM	50	50	18.45	0.070	18.62	0.073	18.50	0.071
20	64QAM	100	0	18.42	0.070	18.53	0.071	18.60	0.072



LTE Band 48				Measured E.I.R.P.					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				55315		55990		56665	
Frequency (MHz)				3557.5		3625		3692.5	
				dBm	W	dBm	W	dBm	W
15	QPSK	1	0	21.32	0.136	21.70	0.148	21.65	0.146
15	QPSK	1	37	21.33	0.136	21.69	0.148	21.61	0.145
15	QPSK	1	74	21.42	0.139	21.45	0.140	21.50	0.141
15	QPSK	36	0	20.32	0.108	20.73	0.118	20.60	0.115
15	QPSK	36	20	20.39	0.109	20.65	0.116	20.53	0.113
15	QPSK	36	39	20.41	0.110	20.54	0.113	20.62	0.115
15	QPSK	75	0	20.46	0.111	20.63	0.116	20.60	0.115
15	16QAM	1	0	20.49	0.112	20.72	0.118	20.66	0.116
15	16QAM	1	37	20.48	0.112	20.64	0.116	20.67	0.117
15	16QAM	1	74	20.34	0.108	20.67	0.117	20.65	0.116
15	16QAM	36	0	19.37	0.086	19.80	0.095	19.74	0.094
15	16QAM	36	20	19.26	0.084	19.70	0.093	19.68	0.093
15	16QAM	36	39	19.28	0.085	19.49	0.089	19.56	0.090
15	16QAM	75	0	19.46	0.088	19.60	0.091	19.53	0.090
15	64QAM	1	0	19.61	0.091	19.74	0.094	19.74	0.094
15	64QAM	1	37	19.47	0.089	19.64	0.092	19.60	0.091
15	64QAM	1	74	19.45	0.088	19.59	0.091	19.66	0.092
15	64QAM	36	0	18.50	0.071	18.74	0.075	18.74	0.075
15	64QAM	36	20	18.33	0.068	18.74	0.075	18.74	0.075
15	64QAM	36	39	18.45	0.070	18.62	0.073	18.50	0.071
15	64QAM	75	0	18.42	0.070	18.53	0.071	18.60	0.072



LTE Band 48				Measured E.I.R.P.					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				55290		55990		56690	
Frequency (MHz)				3555		3625		3695	
				dBm	W	dBm	W	dBm	W
10	QPSK	1	0	21.45	0.140	21.65	0.146	21.58	0.144
10	QPSK	1	25	21.47	0.140	21.63	0.146	21.54	0.143
10	QPSK	1	49	21.33	0.136	21.56	0.143	21.52	0.142
10	QPSK	25	0	20.42	0.110	20.62	0.115	20.73	0.118
10	QPSK	25	12	20.37	0.109	20.73	0.118	20.71	0.118
10	QPSK	25	25	20.43	0.110	20.67	0.117	20.50	0.112
10	QPSK	50	0	20.33	0.108	20.65	0.116	20.54	0.113
10	16QAM	1	0	20.60	0.115	20.73	0.118	20.71	0.118
10	16QAM	1	25	20.54	0.113	20.67	0.117	20.62	0.115
10	16QAM	1	49	20.35	0.108	20.68	0.117	20.77	0.119
10	16QAM	25	0	19.55	0.090	19.64	0.092	19.55	0.090
10	16QAM	25	12	19.41	0.087	19.49	0.089	19.68	0.093
10	16QAM	25	25	19.34	0.086	19.63	0.092	19.39	0.087
10	16QAM	50	0	19.39	0.087	19.61	0.091	19.58	0.091
10	64QAM	1	0	19.57	0.091	19.72	0.094	19.66	0.092
10	64QAM	1	25	19.45	0.088	19.70	0.093	19.60	0.091
10	64QAM	1	49	19.58	0.091	19.62	0.092	19.69	0.093
10	64QAM	25	0	18.50	0.071	18.63	0.073	18.66	0.073
10	64QAM	25	12	18.39	0.069	18.68	0.074	18.56	0.072
10	64QAM	25	25	18.44	0.070	18.42	0.070	18.68	0.074
10	64QAM	50	0	18.26	0.067	18.57	0.072	18.64	0.073



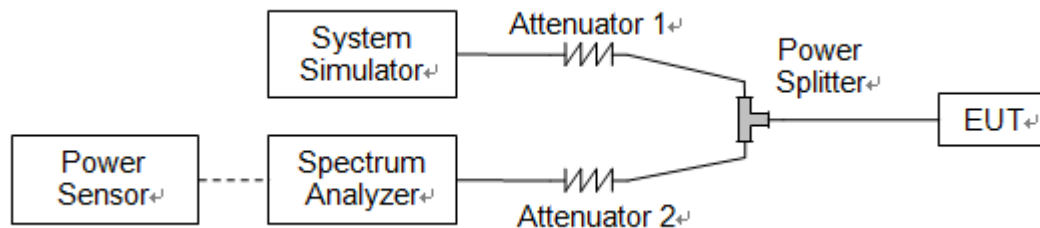
LTE Band 48				Measured E.I.R.P.					
BW [MHz]	Modulation	RB Size	RB Offset	Low Ch. / Freq.		Middle Ch. / Freq.		High Ch. / Freq.	
Channel				55265		55990		56175	
Frequency (MHz)				3552.5		3625		3697.5	
				dBm	W	dBm	W	dBm	W
5	QPSK	1	0	21.24	0.133	21.67	0.147	21.58	0.144
5	QPSK	1	12	21.54	0.143	21.65	0.146	21.65	0.146
5	QPSK	1	24	21.24	0.133	21.61	0.145	21.52	0.142
5	QPSK	12	0	20.40	0.110	20.88	0.122	20.90	0.123
5	QPSK	12	7	20.48	0.112	20.74	0.119	20.65	0.116
5	QPSK	12	13	20.17	0.104	20.45	0.111	20.76	0.119
5	QPSK	25	0	20.22	0.105	20.71	0.118	20.54	0.113
5	16QAM	1	0	20.48	0.112	20.83	0.121	20.77	0.119
5	16QAM	1	12	20.67	0.117	20.87	0.122	20.93	0.124
5	16QAM	1	24	20.30	0.107	20.81	0.121	20.86	0.122
5	16QAM	12	0	19.49	0.089	19.71	0.094	19.65	0.092
5	16QAM	12	7	19.51	0.089	19.67	0.093	19.75	0.094
5	16QAM	12	13	19.37	0.086	19.34	0.086	19.68	0.093
5	16QAM	25	0	19.24	0.084	19.53	0.090	19.71	0.094
5	64QAM	1	0	19.69	0.093	19.76	0.095	19.94	0.099
5	64QAM	1	12	19.57	0.091	19.61	0.091	19.71	0.094
5	64QAM	1	24	19.37	0.086	19.63	0.092	19.80	0.095
5	64QAM	12	0	18.25	0.067	18.83	0.076	18.61	0.073
5	64QAM	12	7	18.32	0.068	18.57	0.072	18.77	0.075
5	64QAM	12	13	18.30	0.068	18.44	0.070	18.58	0.072
5	64QAM	25	0	18.30	0.068	18.49	0.071	18.67	0.074

2.2. Occupied Bandwidth

2.2.1. Requirement

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. Occupied bandwidth is also known as the 99% emission bandwidth.

2.2.2. Test Description



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ω; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

2.2.3. Test procedure

KDB 971168 D01v03 Section 4.1 and ANSI/TIA-603-E-2016.

2.2.4. Test Result



LTE Band 48				
BW(MHz)	Channel Level	Modulation	99% BW(MHz)	26dB BW(MHz)
5	Low	QPSK	4.50	4.99
	Low	16QAM	4.50	5.00
	Low	64QAM	4.50	5.11
	Mid	QPSK	4.50	5.03
	Mid	16QAM	4.50	4.90
	Mid	64QAM	4.49	4.92
	High	QPSK	4.50	4.90
	High	16QAM	4.49	4.94
	High	64QAM	4.48	4.99
10	Low	QPSK	8.97	9.83
	Low	16QAM	8.96	9.82
	Low	64QAM	8.99	9.77
	Mid	QPSK	8.95	9.53
	Mid	16QAM	8.96	9.65
	Mid	64QAM	8.94	9.68
	High	QPSK	8.96	9.69
	High	16QAM	8.95	9.65
	High	64QAM	8.96	9.71
15	Low	QPSK	13.49	14.61
	Low	16QAM	13.46	14.66
	Low	64QAM	13.45	14.70
	Mid	QPSK	13.46	14.38
	Mid	16QAM	13.42	14.30
	Mid	64QAM	13.45	14.50
	High	QPSK	13.39	14.51
	High	16QAM	13.44	14.47
	High	64QAM	13.38	14.71
20	Low	QPSK	17.94	19.37
	Low	16QAM	17.92	19.48
	Low	64QAM	17.96	19.42
	Mid	QPSK	17.82	19.02
	Mid	16QAM	17.91	19.29
	Mid	64QAM	17.88	19.01
	High	QPSK	17.93	19.04
	High	16QAM	17.87	19.14
	High	64QAM	17.87	19.22



Band48 / 5MHz / QPSK/ Low CH



Band48 / 5MHz / 16QAM/ Low CH



Band48 / 5MHz / 64QAM/ Low CH



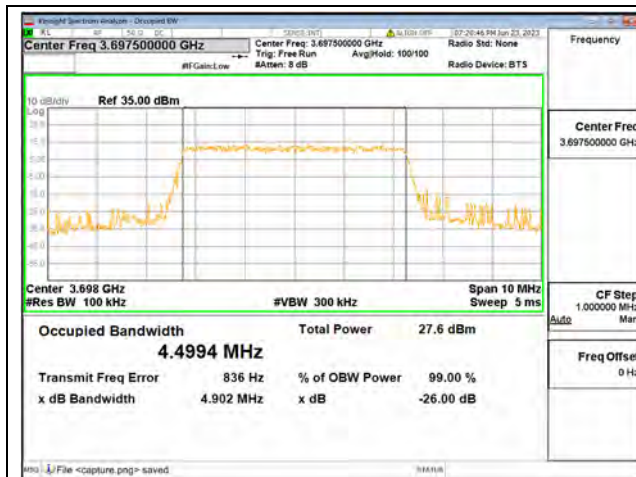
Band48 / 5MHz / QPSK/ Mid CH



Band48 / 5MHz / 16QAM/ Mid CH



Band48 / 5MHz / 64QAM/ Mid CH



Band48 / 5MHz / QPSK/ High CH



Band48 / 5MHz / 16QAM/ High CH



Band48 / 5MHz / 64QAM/ High CH



Band48 / 10MHz / QPSK/ Low CH



Band48 / 10MHz / 16QAM/ Low CH



Band48 / 10MHz / 64QAM/ Low CH



Band48 / 10MHz / QPSK/ Mid CH



Band48 / 10MHz / 16QAM/ Mid CH



Band48 / 10MHz / 64QAM/ Mid CH



Band48 / 10MHz / QPSK/ High CH



Band48 / 10MHz / 16QAM/ High CH



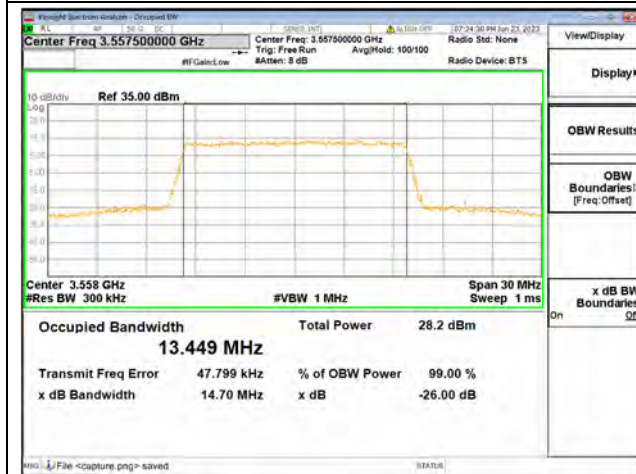
Band48 / 10MHz / 64QAM/ High CH



Band48 / 15MHz / QPSK/ Low CH



Band48 / 15MHz / 16QAM/ Low CH



Band48 / 15MHz / 64QAM/ Low CH



Band48 / 15MHz / QPSK/ Mid CH



Band48 / 15MHz / 16QAM/ Mid CH



Band48 / 15MHz / 64QAM/ Mid CH



Band48 / 15MHz / QPSK/ High CH



Band48 / 15MHz / 16QAM/ High CH



Band48 / 15MHz / 64QAM/ High CH



Band48 / 20MHz / QPSK/ Low CH



Band48 / 20MHz / 16QAM/ Low CH



Band48 / 20MHz / 64QAM/ Low CH



Band48 / 20MHz / QPSK/ Mid CH



Band48 / 20MHz / 16QAM/ Mid CH



Band48 / 20MHz / 64QAM/ Mid CH



Band48 / 20MHz / QPSK/ High CH



Band48 / 20MHz / 16QAM/ High CH



Band48 / 20MHz / 64QAM/ High CH

2.3. Frequency Stability

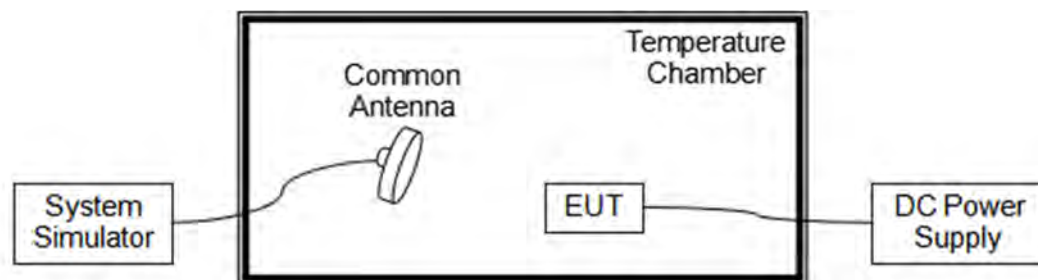
2.3.1. Requirement

According to FCC section 2.1055 & 90.213, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from -30°C to $+50^{\circ}\text{C}$ at intervals of not more than 10°C .
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

Note: The operating temperature of EUT is from -30°C to 75°C , which are specified by the applicant.

2.3.2. Test Description



The EUT which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power. A call is established between the EUT and the SS via a Common Antenna.

2.3.3. Test procedure

KDB 971168 D01v03 Section 9.0 and ANSI/TIA-603-E-2016.

**2.3.4.Test Result**

The nominal, highest and lowest extreme voltages are separately 3.8V, 4.3V and 3.4V, which are specified by the applicant; the normal temperature here used is 20°C.

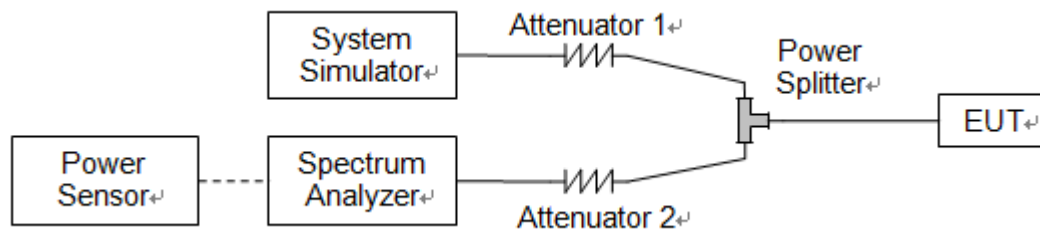
LTE Band 48, QPSK, Channel 55990, Frequency 3625.0MHz					
Limit =Within Authorized Band					
Voltage (%)	Power (VDC)	Temp(°C)	Fre. Dev.(Hz)	Deviation (ppm)	Result
Normal	3.80	+20(Ref)	18	0.005	PASS
Normal		-30	-3	-0.001	
Normal		-20	14	0.004	
Normal		-10	18	0.005	
Normal		0	-16	-0.004	
Normal		+10	-11	-0.003	
Normal		+20	15	0.004	
Normal		+30	19	0.005	
Normal		+40	13	0.004	
Normal		+50	19	0.005	
Normal		+60	6	0.002	
Normal		+70	16	0.004	
Normal		+75	16	0.004	
High	4.30	+20	2	0.001	
BATT.ENDPOINT	3.40	+20	-14	-0.004	

2.4. Peak to Average Radio

2.4.1. Requirement

According to FCC 96.41(g), the peak-to-average power ratio (PAPR) of any CBSD transmitter output power must not exceed 13 dB.

2.4.2. Test Description



The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

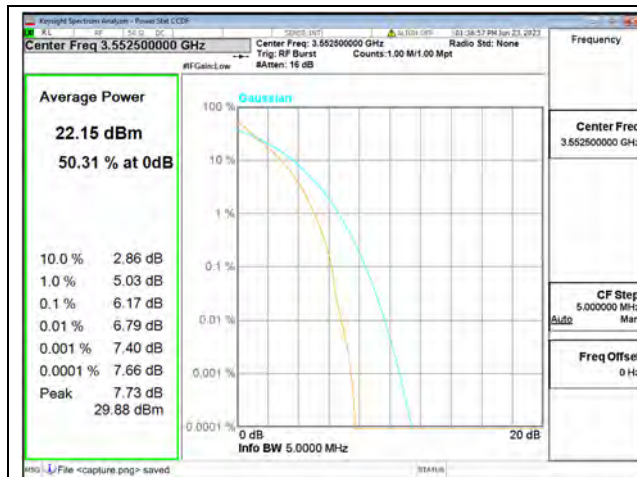
2.4.3. Test procedure

KDB 971168 D01v03 Section 5.7 and ANSI/TIA-603-E-2016.

2.4.4. Test Result



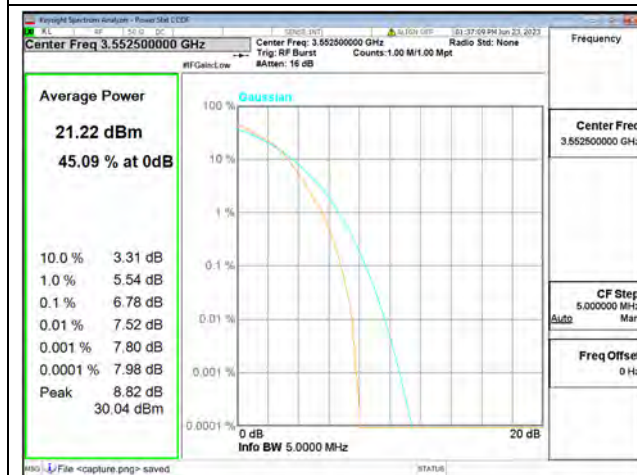
LTE Band 48					
BW(MHz)	Channel Level	Modulation	PAR Radio(dB)	Limit(dB)	Verdict
5	Low	QPSK	6.17	<=13	PASS
	Low	16QAM	6.74	<=13	PASS
	Low	64QAM	6.78	<=13	PASS
	Mid	QPSK	6.04	<=13	PASS
	Mid	16QAM	6.61	<=13	PASS
	Mid	64QAM	6.60	<=13	PASS
	High	QPSK	5.93	<=13	PASS
	High	16QAM	6.90	<=13	PASS
	High	64QAM	6.75	<=13	PASS
10	Low	QPSK	5.59	<=13	PASS
	Low	16QAM	6.33	<=13	PASS
	Low	64QAM	6.58	<=13	PASS
	Mid	QPSK	5.65	<=13	PASS
	Mid	16QAM	6.35	<=13	PASS
	Mid	64QAM	6.82	<=13	PASS
	High	QPSK	5.68	<=13	PASS
	High	16QAM	6.41	<=13	PASS
	High	64QAM	6.88	<=13	PASS
15	Low	QPSK	5.49	<=13	PASS
	Low	16QAM	6.33	<=13	PASS
	Low	64QAM	6.33	<=13	PASS
	Mid	QPSK	5.50	<=13	PASS
	Mid	16QAM	6.29	<=13	PASS
	Mid	64QAM	6.34	<=13	PASS
	High	QPSK	5.44	<=13	PASS
	High	16QAM	6.36	<=13	PASS
	High	64QAM	6.34	<=13	PASS
20	Low	QPSK	5.58	<=13	PASS
	Low	16QAM	6.40	<=13	PASS
	Low	64QAM	6.36	<=13	PASS
	Mid	QPSK	5.58	<=13	PASS
	Mid	16QAM	6.38	<=13	PASS
	Mid	64QAM	6.32	<=13	PASS
	High	QPSK	5.44	<=13	PASS
	High	16QAM	6.33	<=13	PASS
	High	64QAM	6.30	<=13	PASS



Band48 / 5MHz / Low CH / QPSK



Band48 / 5MHz / Low CH / 16QAM



Band48 / 5MHz / Low CH / 64QAM



Band48 / 5MHz / Mid CH / QPSK



Band48 / 5MHz / Mid CH / 16QAM



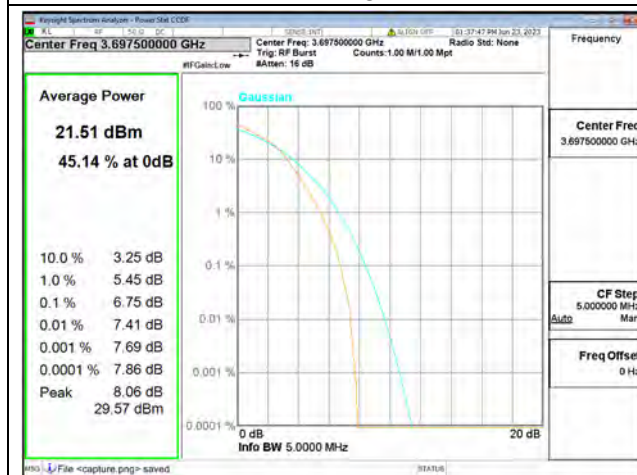
Band48 / 5MHz / Mid CH / 64QAM



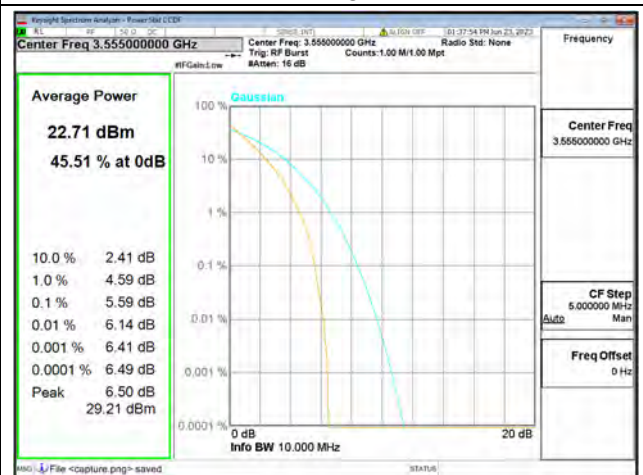
Band48 / 5MHz / High CH / QPSK



Band48 / 5MHz / High CH / 16QAM



Band48 / 5MHz / High CH / 64QAM



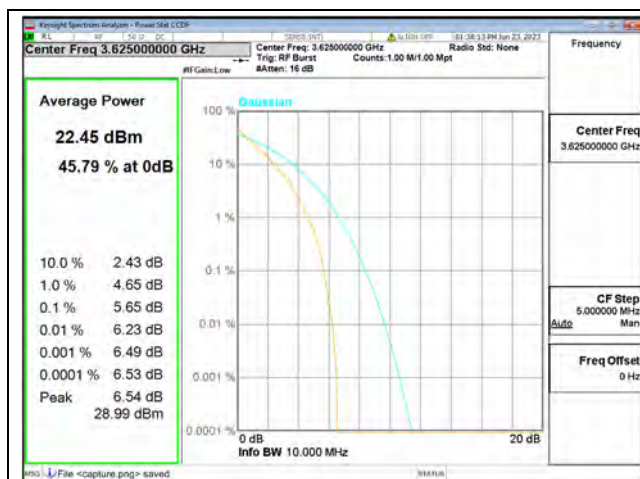
Band48 / 10MHz / Low CH / QPSK



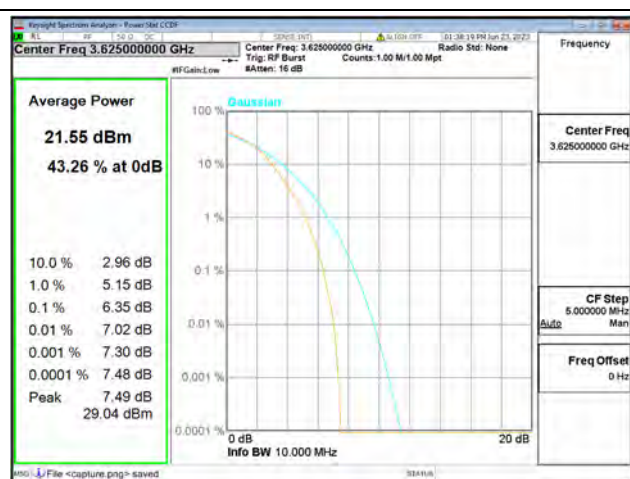
Band48 / 10MHz / Low CH / 16QAM



Band48 / 10MHz / Low CH / 64QAM



Band48 / 10MHz / Mid CH / QPSK



Band48 / 10MHz / Mid CH / 16QAM



Band48 / 10MHz / Mid CH / 64QAM



Band48 / 10MHz / High CH / QPSK



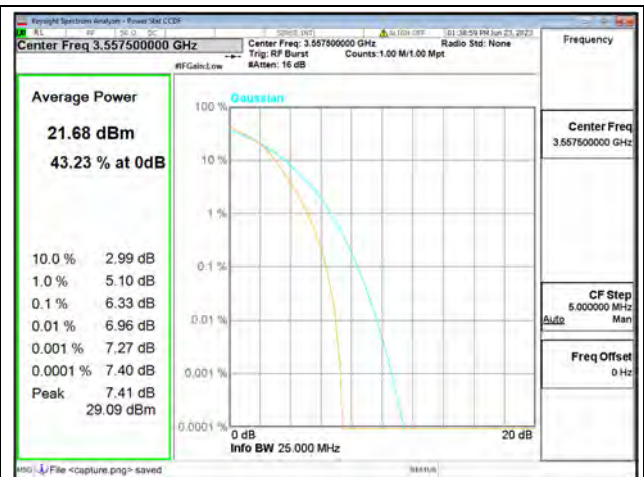
Band48 / 10MHz / High CH / 16QAM



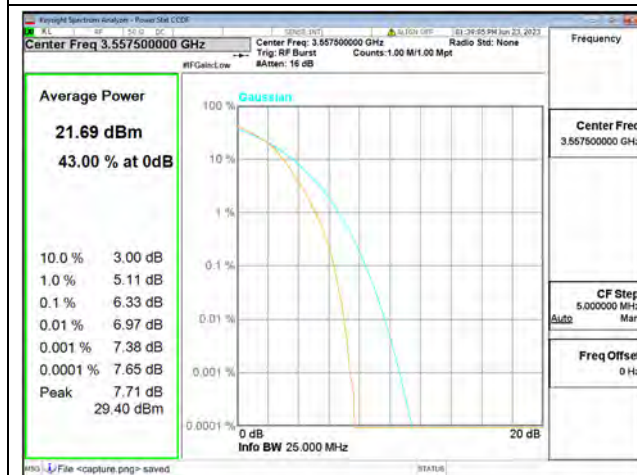
Band48 / 10MHz / High CH / 64QAM



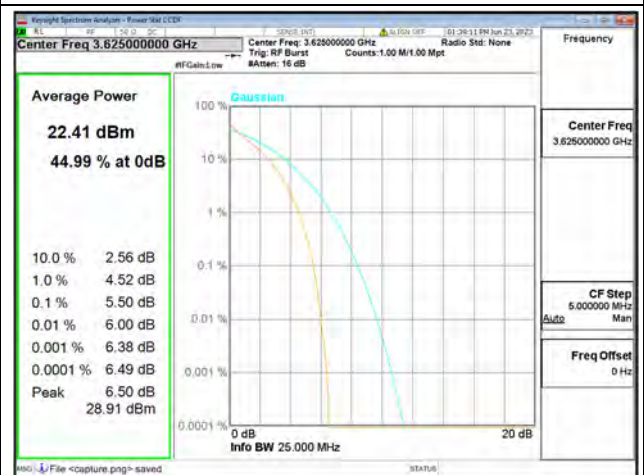
Band48 / 15MHz / Low CH / QPSK



Band48 / 15MHz / Low CH / 16QAM



Band48 / 15MHz / Low CH / 64QAM



Band48 / 15MHz / Mid CH / QPSK



Band48 / 15MHz / Mid CH / 16QAM



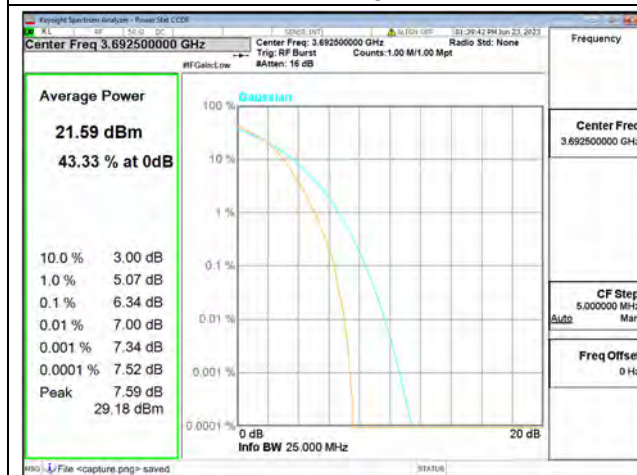
Band48 / 15MHz / Mid CH / 64QAM



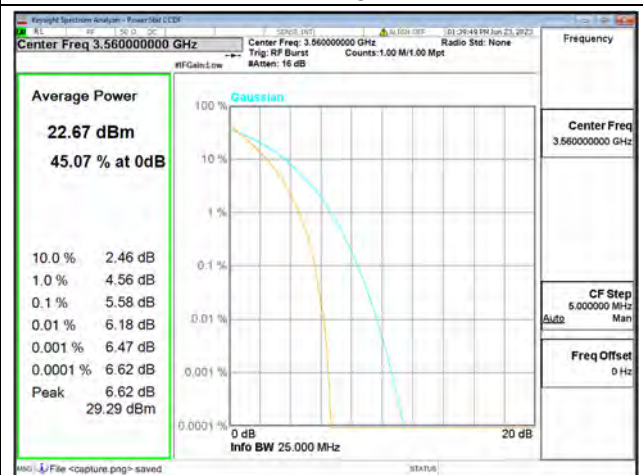
Band48 / 15MHz / High CH / QPSK



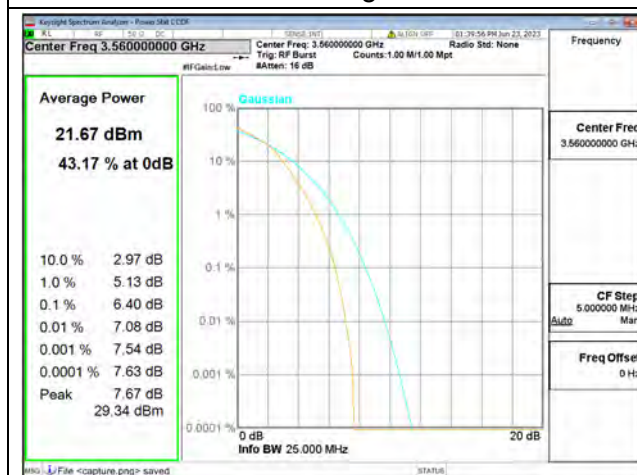
Band48 / 15MHz / High CH / 16QAM



Band48 / 15MHz / High CH / 64QAM



Band48 / 20MHz / Low CH / QPSK



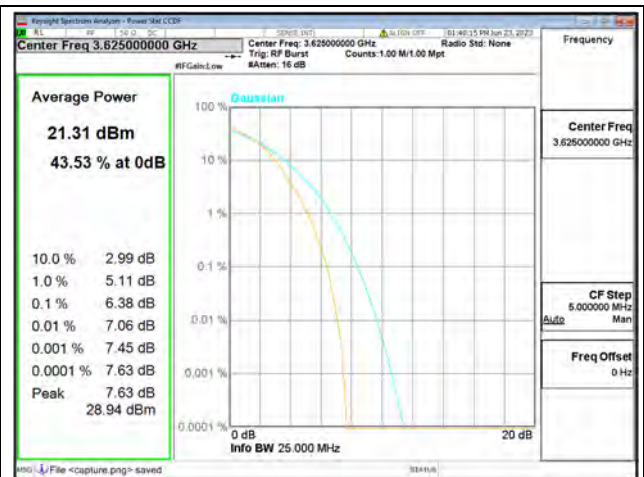
Band48 / 20MHz / Low CH / 16QAM



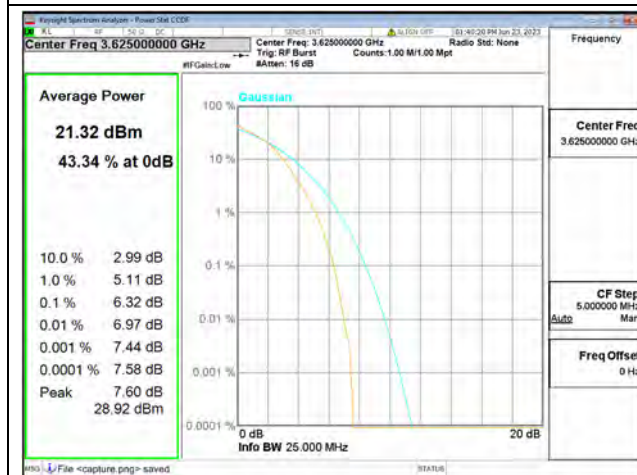
Band48 / 20MHz / Low CH / 64QAM



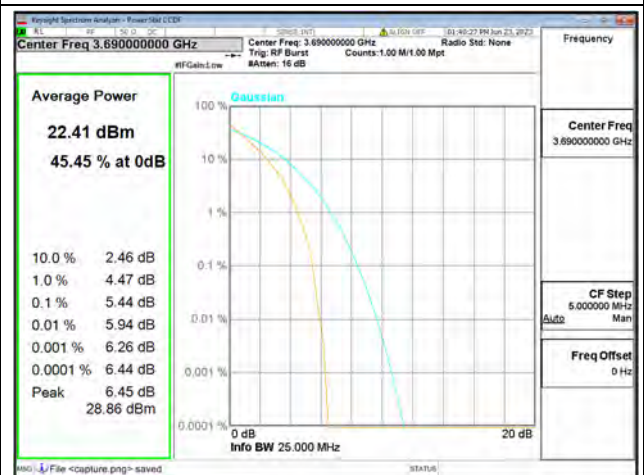
Band48 / 20MHz / Mid CH / QPSK



Band48 / 20MHz / Mid CH / 16QAM



Band48 / 20MHz / Mid CH / 64QAM



Band48 / 20MHz / High CH / QPSK



Band48 / 20MHz / High CH / 16QAM



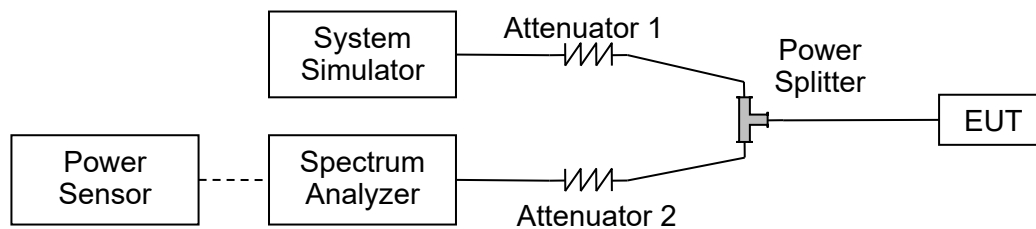
Band48 / 20MHz / High CH / 64QAM

2.5. Conducted Spurious Emissions

2.5.1. Requirement

According to FCC section 96.41(e), the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz .

2.5.2. Test Description



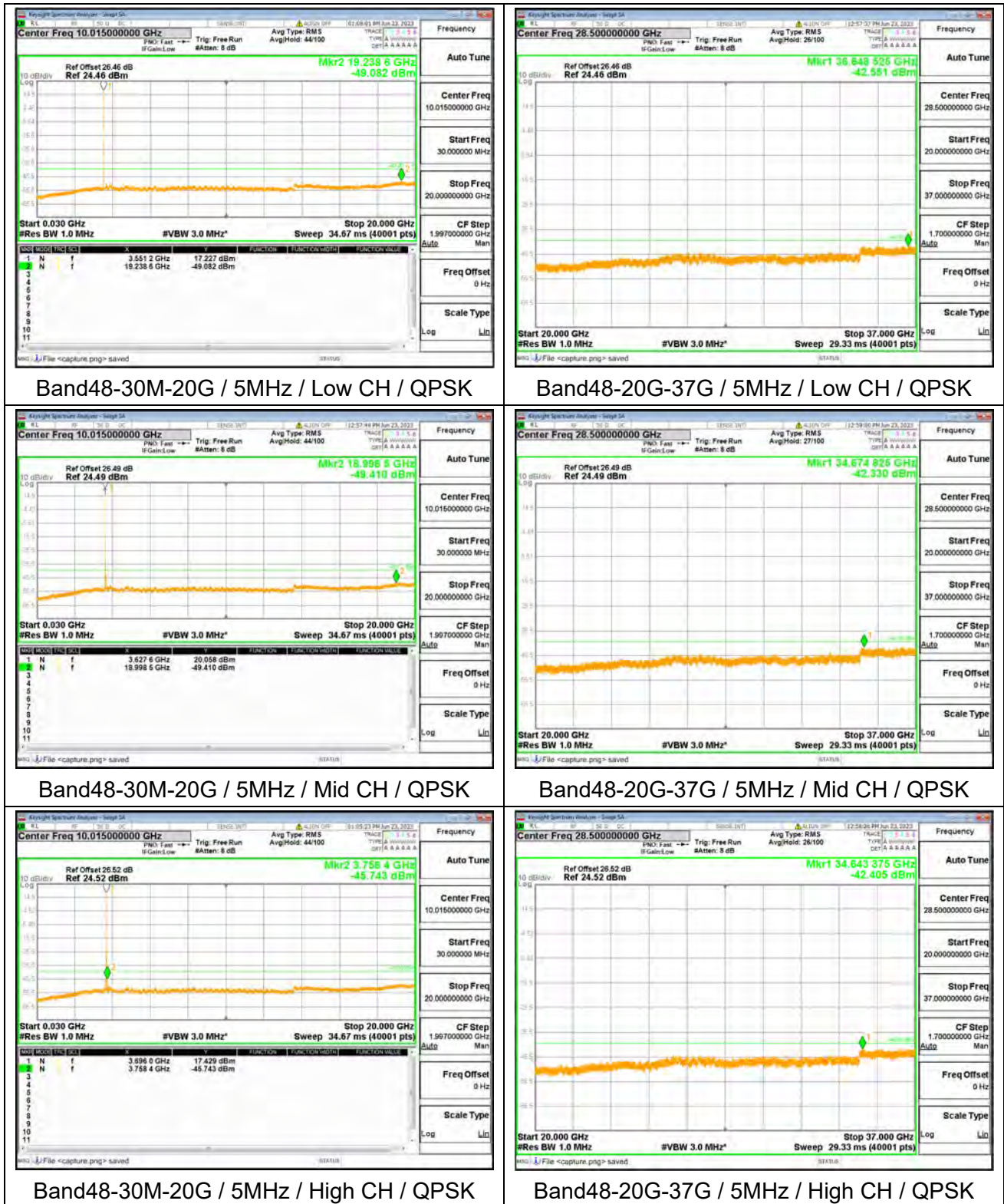
The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

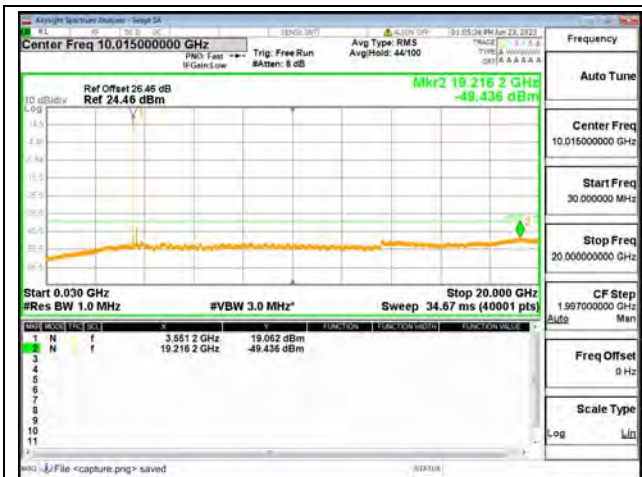
2.5.1. Test procedure

KDB 971168 D01v03 Section 6.0 and ANSI/TIA-603-E-2016.

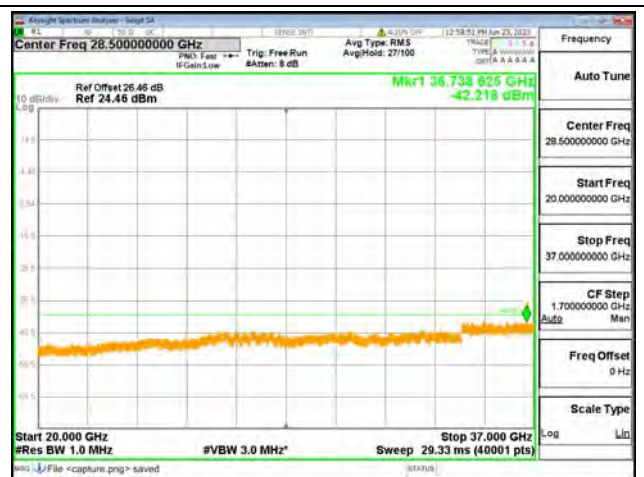


2.5.2. Test Result

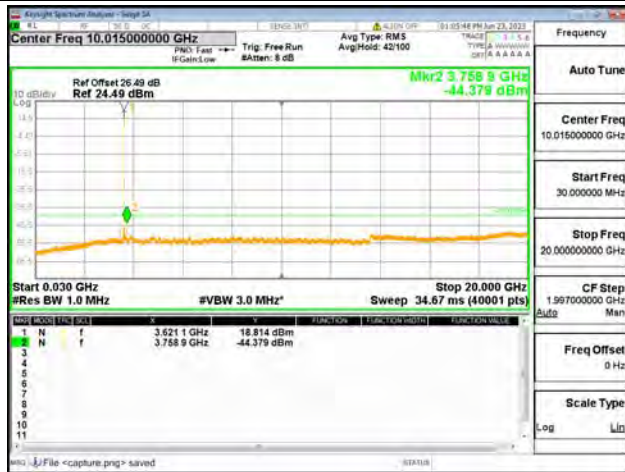




Band48-30M-20G / 10MHz / Low CH / QPSK



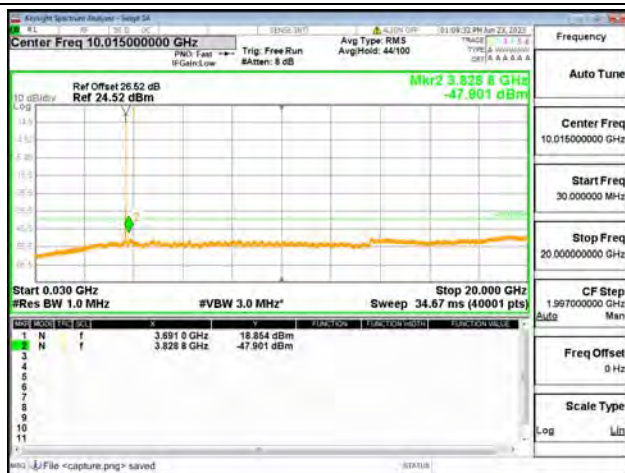
Band48-20G-37G / 10MHz / Low CH / QPSK



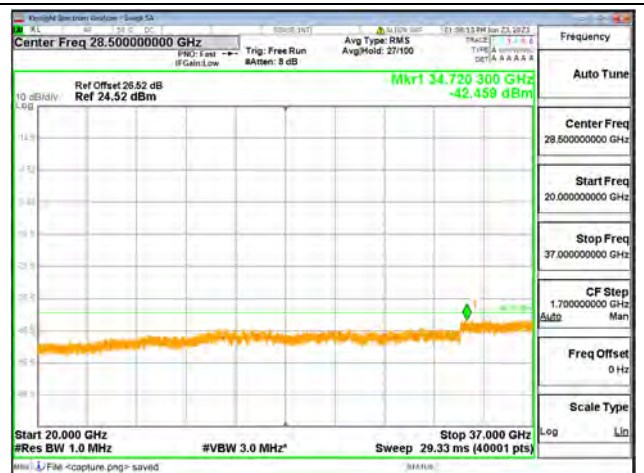
Band48-30M-20G / 10MHz / Mid CH / QPSK



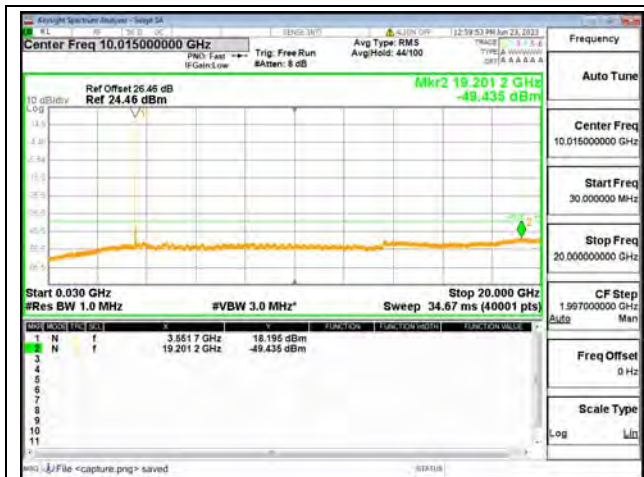
Band48-20G-37G / 10MHz / Mid CH / QPSK



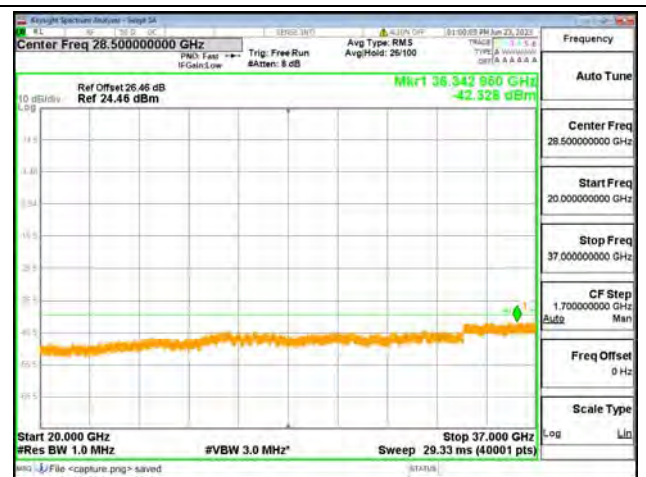
Band48-30M-20G / 10MHz / High CH / QPSK



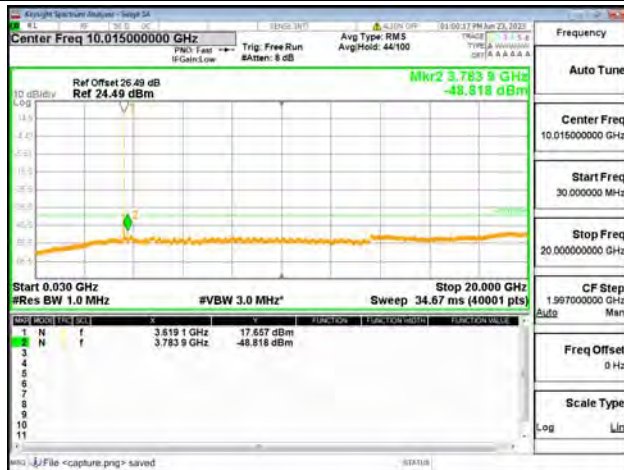
Band48-20G-37G / 10MHz / High CH / QPSK



Band48-30M-20G / 15MHz / Low CH / QPSK



Band48-20G-37G / 15MHz / Low CH / QPSK



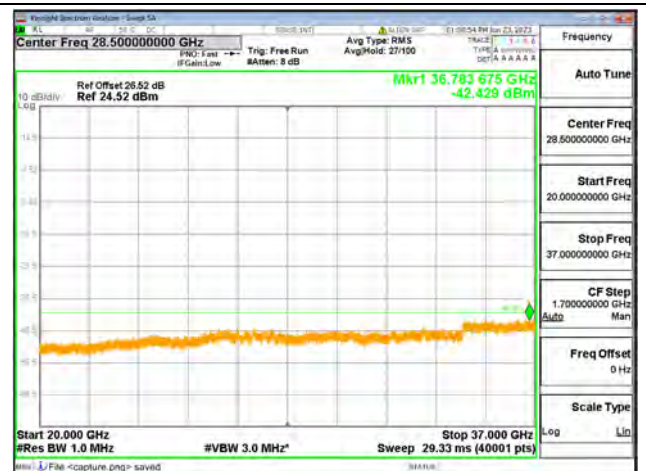
Band48-30M-20G / 15MHz / Mid CH / QPSK



Band48-20G-37G / 15MHz / Mid CH / QPSK



Band48-30M-20G / 15MHz / High CH / QPSK



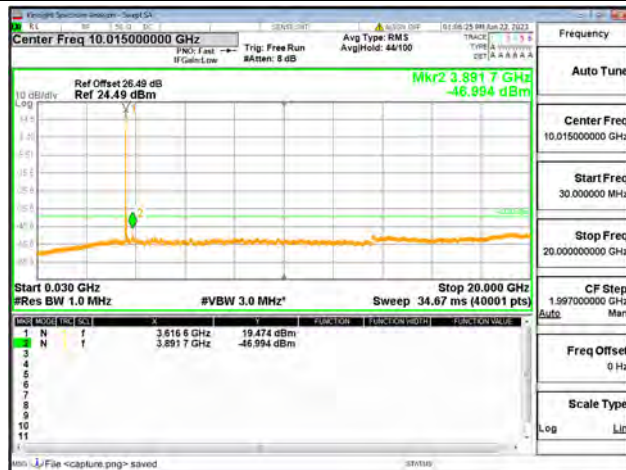
Band48-20G-37G / 15MHz / High CH / QPSK



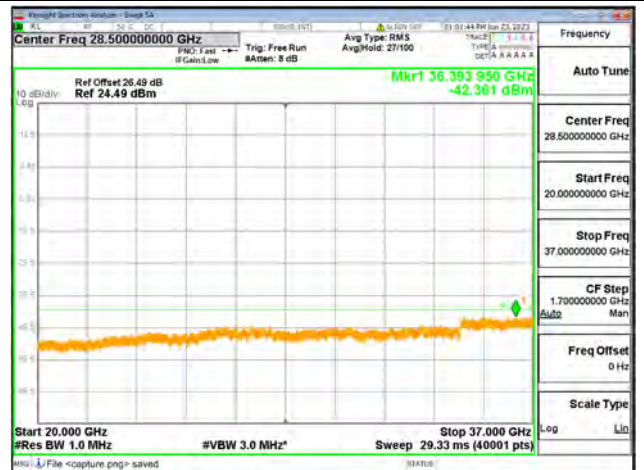
Band48-30M-20G / 20MHz / Low CH / QPSK



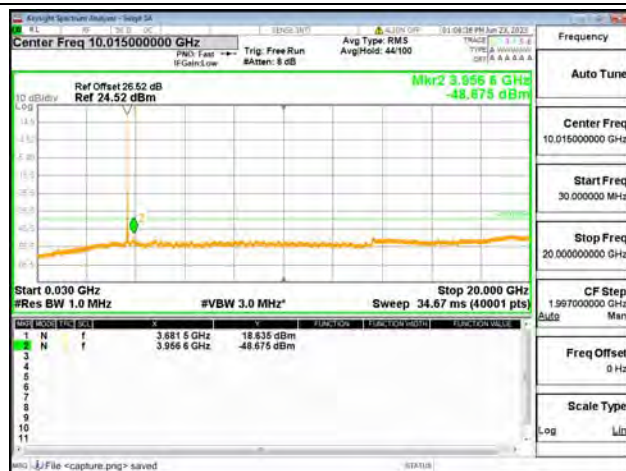
Band48-20G-37G / 20MHz / Low CH / QPSK



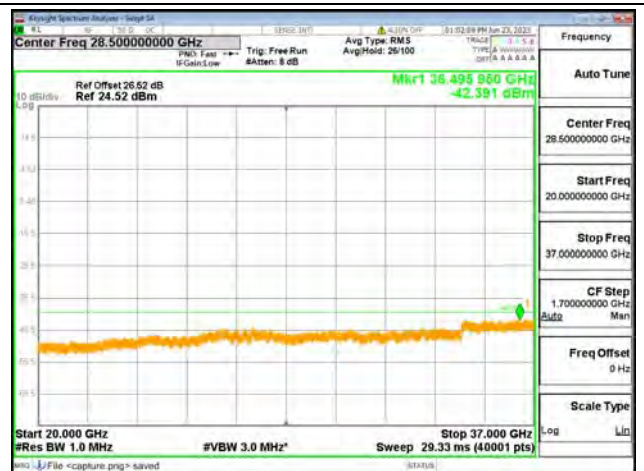
Band48-30M-20G / 20MHz / Mid CH / QPSK



Band48-20G-37G / 20MHz / Mid CH / QPSK



Band48-30M-20G / 20MHz / High CH / QPSK



Band48-20G-37G / 20MHz / High CH / QPSK



2.6. Band Edge

2.6.1. Requirement

Part 96.41(e)(1)(i)

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.

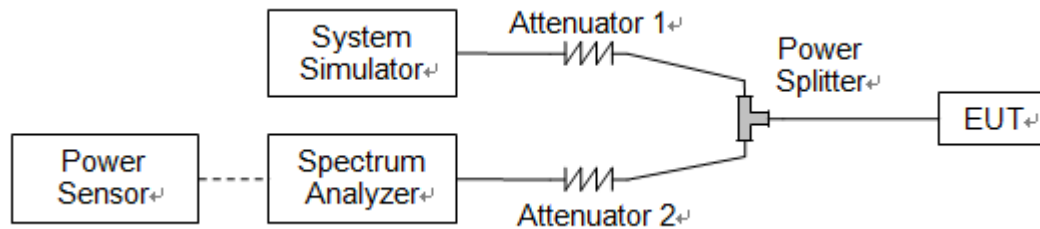
Part 96.41(e)(1)(ii)

For channel and frequency assignments made by a CBSD to End User Devices, the conducted power of any End User Device emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed -13 dBm/MHz within 0 to B megahertz (where B is the bandwidth in megahertz of the assigned channel or multiple contiguous channels of the End User Device) above the upper CBSD-assigned channel edge and within 0 to B megahertz below the lower CBSD-assigned channel edge. At all frequencies greater than B megahertz above the upper CBSD assigned channel edge and less than B megahertz below the lower CBSD-assigned channel edge, the conducted power of any End User Device emission shall not exceed -25 dBm/MHz.

Part 96.41(e)(2)

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 -40 dBm/MHz.

2.6.2.Test Description



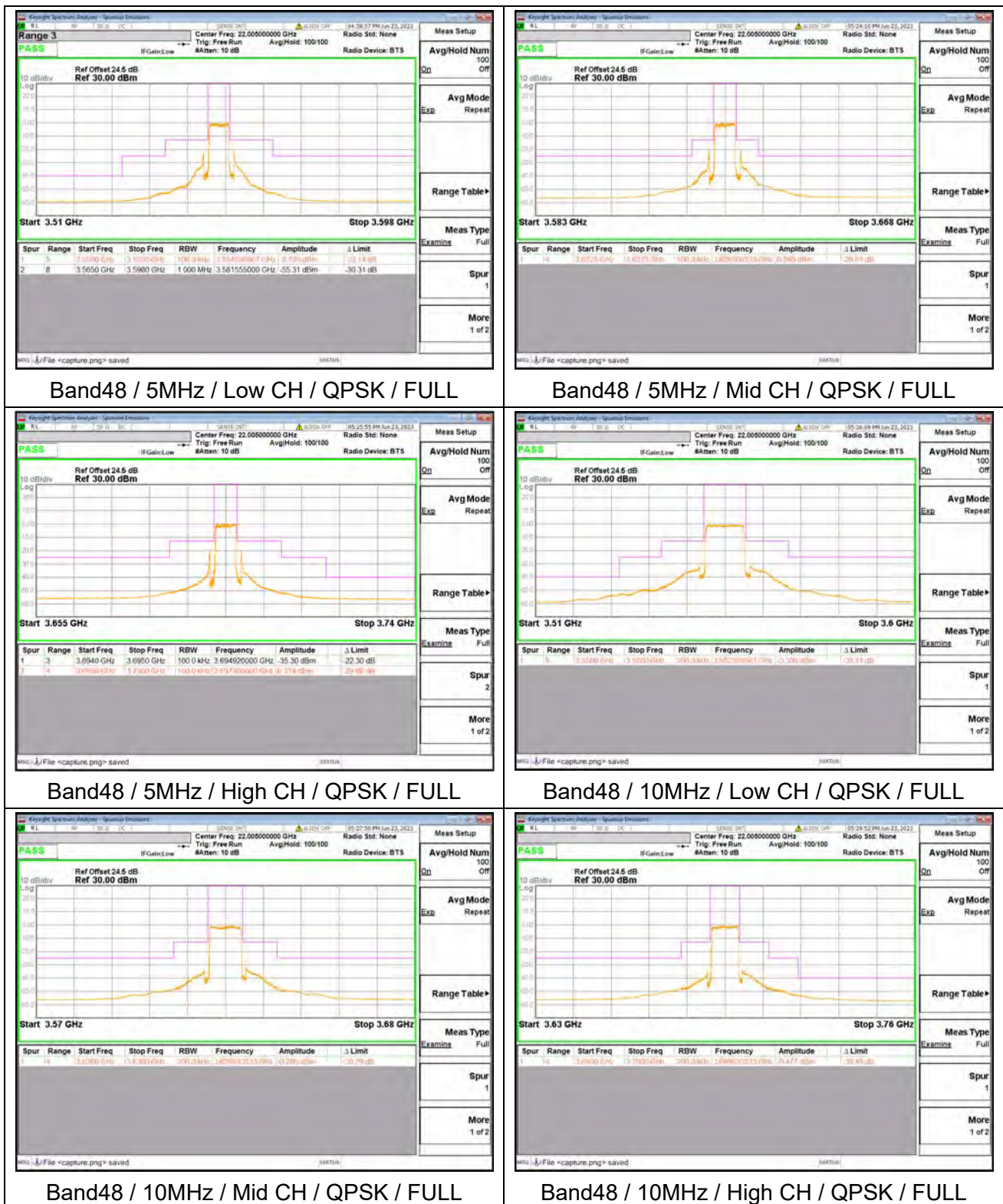
The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

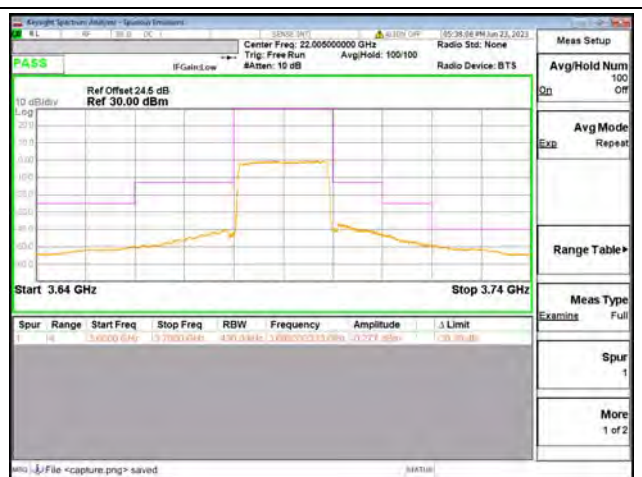
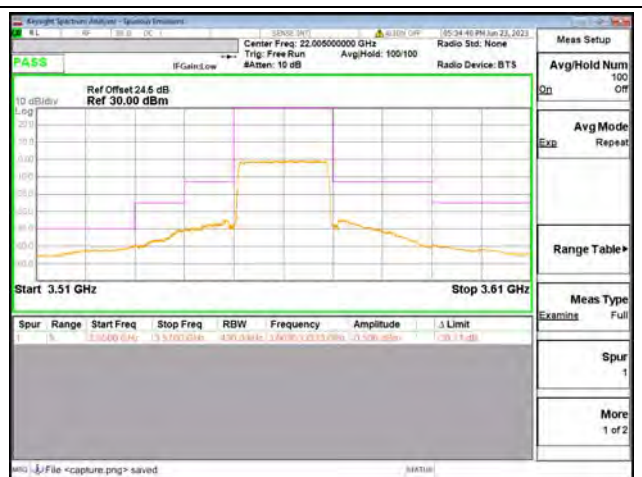
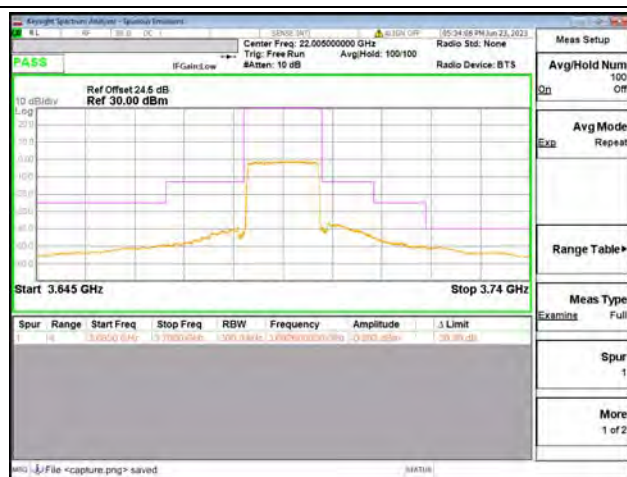
2.6.3.Test procedure

KDB 971168 D01v03 Section 6.0 and ANSI/TIA-603-E-2016.



2.6.4. Test Result



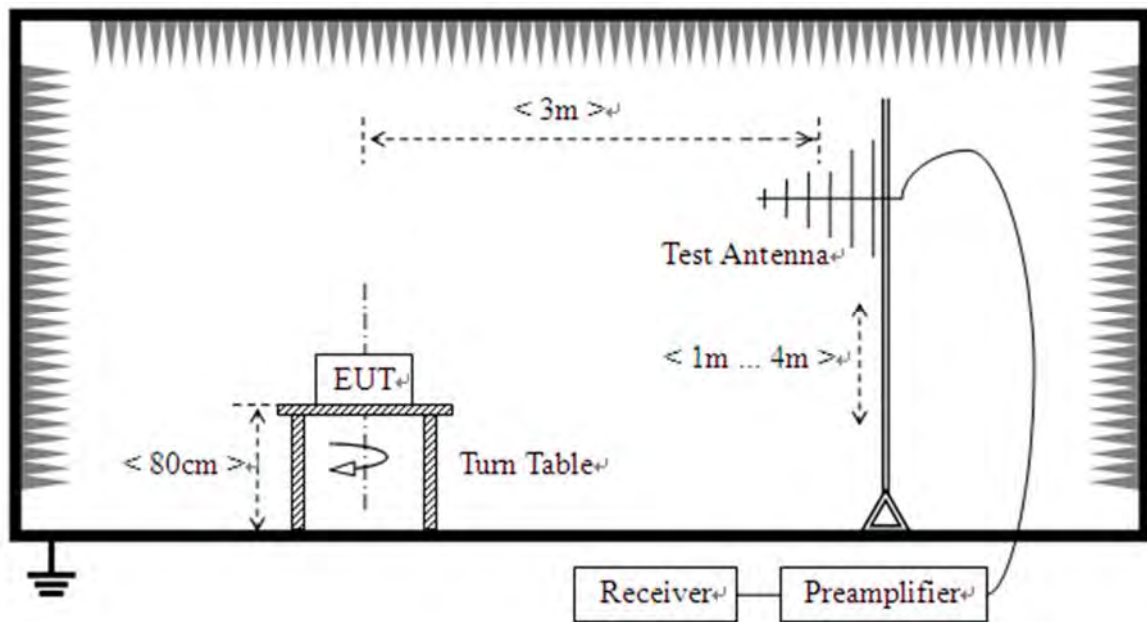


2.7. Radiated Spurious Emissions

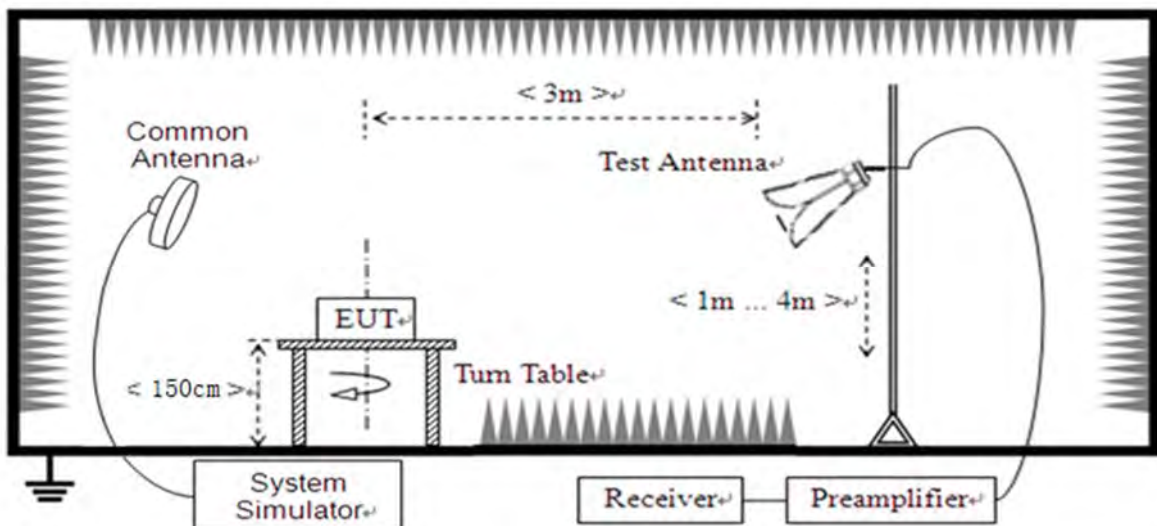
2.7.1. Requirement

The power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40dBm/MHz .

2.7.2. Test Description



(For the test frequency from 30MHz to 1GHz)



(For the test frequency above 1GHz)



The EUT is located in a 3m Full-Anechoic Chamber, the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading.

A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power, and only the test result of the maximum output power was recorded.

In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground and the Turn Table is actuated to turn from 0° to 360° to determine the maximum value of the radiated power. The emission levels at both horizontal and vertical polarizations should be tested. The Filters consists of Notch Filters and High Pass Filter.

Note: when doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna during horizontal antenna.

2.7.3.Test procedure

KDB 971168 D01v03 Section 5.8 and ANSI/TIA-603-E-2016.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements.



2.7.4. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested to verify the out of band emissions.

The substitution corrections are obtained as described below:

$$A_{\text{SUBST}} = P_{\text{SUBST_TX}} - P_{\text{SUBST_RX}} - L_{\text{SUBST_CABLES}} + G_{\text{SUBST_TX_ANT}}$$

$$A_{\text{TOT}} = L_{\text{CABLES}} + A_{\text{SUBST}}$$

Where A_{SUBST} is the final substitution correction including receive antenna gain.

$P_{\text{SUBST_TX}}$ is signal generator level,

$P_{\text{SUBST_RX}}$ is receiver level,

$L_{\text{SUBST_CABLES}}$ is cable losses including TX cable,

$G_{\text{SUBST_TX_ANT}}$ is substitution antenna gain.

A_{TOT} is total correction factor including cable loss and substitution correction

During the test, the data of A_{TOT} was added in the test spectrum analyze, so spectrum analyze reading is the final values which contain the data of A_{TOT} .

Note1: The power of the EUT transmitting frequency should be ignored.

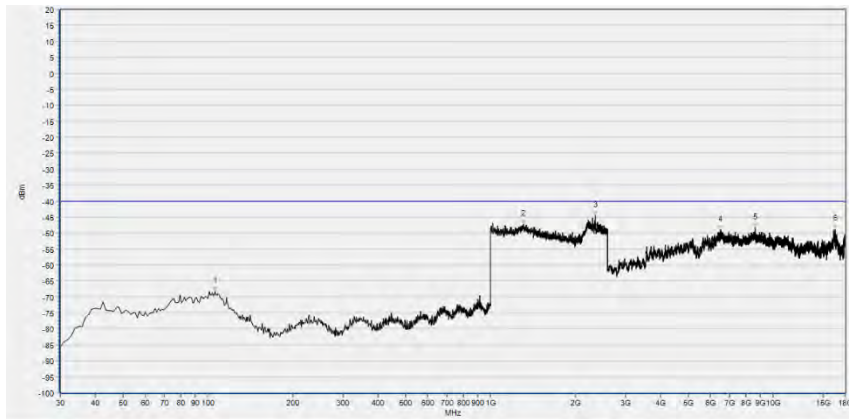
Note2: All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note3: All bandwidth and modulation were considered and evaluated respectively by performing full test for each band, only the worst cases (Max Bandwidth and QPSK mode) were recorded in this test report.

Note 4: N/A means the frequency is the basic frequency or the base station frequency, they are no need to verdict.

Note5: The amplitude of emissions(18GHz to 10th harmonics) which are attenuated more than 20 dB below the limit are not be reported.

LTE Band 48, 20MHz BW, Low Channel, QPSK



No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	105.736	-68.36	-40.00	Horizontal	PASS
2	1304.304	-47.28	-40.00	Horizontal	PASS
3	2345.345	-44.59	-40.00	Horizontal	PASS
4	6521.624	-49.14	-40.00	Horizontal	PASS
5	8656.491	-48.43	-40.00	Horizontal	PASS
6	16549.030	-48.89	-40.00	Horizontal	PASS



No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	106.707	-67.36	-40.00	Vertical	PASS
2	1326.727	-46.66	-40.00	Vertical	PASS
3	2396.597	-45.97	-40.00	Vertical	PASS
4	3554.991	-49.65	-40.00	Vertical	N/A
5	6515.463	-48.61	-40.00	Vertical	PASS
6	16419.644	-48.41	-40.00	Vertical	PASS

LTE Band 48, 20MHz BW, Mid Channel, QPSK



No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	105.736	-68.03	-40.00	Horizontal	PASS
2	1270.671	-46.51	-40.00	Horizontal	PASS
3	2346.947	-46.08	-40.00	Horizontal	PASS
4	6549.350	-48.61	-40.00	Horizontal	PASS
5	8447.009	-48.67	-40.00	Horizontal	PASS
6	16425.805	-49.02	-40.00	Horizontal	PASS



No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	108.649	-68.67	-40.00	Vertical	PASS
2	1291.491	-45.76	-40.00	Vertical	PASS
3	2250.851	-45.73	-40.00	Vertical	PASS
4	3628.926	-52.27	-40.00	Vertical	N/A
5	6518.544	-48.57	-40.00	Vertical	PASS
6	16521.304	-49.05	-40.00	Vertical	PASS

LTE Band 48, 20MHz BW, High Channel, QPSK



No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	101.852	-67.64	-40.00	Horizontal	PASS
2	1310.711	-45.65	-40.00	Horizontal	PASS
3	2340.541	-44.38	-40.00	Horizontal	PASS
4	3696.699	-50.24	-40.00	Horizontal	N/A
5	6533.947	-49.25	-40.00	Horizontal	PASS
6	16388.838	-48.76	-40.00	Horizontal	PASS



No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	110.591	-68.67	-40.00	Vertical	PASS
2	1318.719	-45.93	-40.00	Vertical	PASS
3	2262.062	-45.21	-40.00	Vertical	PASS
4	3687.457	-51.34	-40.00	Vertical	N/A
5	6521.624	-49.10	-40.00	Vertical	PASS
6	16441.208	-49.76	-40.00	Vertical	PASS



Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test Items	Uncertainty
Output Power	± 2.22 dB
Bandwidth	$\pm 5\%$
Conducted Spurious Emission	± 2.77 dB
Band Edge	± 2.77 dB
Equivalent Isotropic Radiated Power	± 2.22 dB
Radiated Spurious Emissions	± 6 dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.



Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.



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4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
EXA Signal Analyzer	MY51511149	N9020A	Agilent	2022.07.04	2023.07.03
				2023.06.21	2024.06.20
Communication Test Station	6200995016	MT8820C	Anritsu	2022.10.11	2023.10.10
Temperature Chamber	S022177101 00089002	KMT-36LF 1A0	KOMEG	2022.11.18	2023.11.17

4.2 List of Software Used

Description	Manufacturer	Software Version
Morlab FCC LTE Test System	MORLAB	V6.65
MORLAB EMCR	MORLAB	V1.2

**4.3 Radiated Test Equipments**

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
System Simulator	152038	CMW500	R&S	2022.10.11	2023.10.10
Receiver	MY54130016	N9038A	Agilent	2022.07.07	2023.07.06
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2022.05.25	2025.05.24
Test Antenna - Horn	9120D-963	BBHA 9120D	Schwarzbeck	2022.05.23	2025.05.24
RF Coaxial Cable (DC-18GHz)	MRE001	PE330	Pasternack	2022.07.08	2023.07.07
RF Coaxial Cable (DC-18GHz)	MRE002	CLU18	Pasternack	2022.07.08	2023.07.07
RF Coaxial Cable (DC-18GHz)	MRE003	CLU18	Pasternack	2022.07.08	2023.07.07
RF Coaxial Cable (DC-40GHz)	22290045	QA360-40-KK-0.5	Qualwave	2022.07.08	2023.07.07
RF Coaxial Cable (DC-40GHz)	22290046	QA360-40-KK F-2	Qualwave	2022.07.08	2023.07.07
Preamplifier (10MHz-6GHz)	46732	S10M100L380 2	LUCIX CORP.	2022.07.08	2023.07.07
Preamplifier (2GHz-18GHz)	61171/61172	S020180L320 3	LUCIX CORP.	2022.07.08	2023.07.07
Preamplifier (18GHz-40GHz)	DS77209	DCLNA0118-4 0C-S	Decentest	2022.07.23	2023.07.22
Notch Filter	N/A	WRCGV -LTE B48	Wainwright	2022.07.08	2023.07.07
Anechoic Chamber	N/A	9m*6m*6m	CRT	2022.05.10	2025.05.09

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