FCC TEST REPORT

Applicant	:	Atop Technologies, Inc.
Address	:	1F, No. 30 R&D Rd. II, Science-Based Industrial Park, Hsinchu 30076, Taiwan, R.O.C.
Equipment	:	Industrial LTE Cat M1 Low Power IoT Gateway
Model No.	:	SE5201B-Q-T-M1-DB-US SE5201B-Q-T-M1-TB-US
Trade Name	:	ATOP
FCC ID	:	RPV-SE5201B-M1

I HEREBY CERTIFY THAT :

The sample was received on Mar. 12, 2024 and the testing was completed on May. 22, 2024 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:

Mark Liao / Supervisor

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory

CONTENTS

History of this test report

Report No.	Issued Date	Description
24010312-TRFCC05	May. 23, 2024	Original

1. Summary of Test Procedure and Test Results

47 CFR FCC Part 90
ANSI C63.26:2015
KDB 971168 Power Meas License Digital Systems

FCC Rule	. Description of Test	Result
2.1046 / 90.635(b)	. Effective Radiated Power	Pass
2.1053 / 90.691	. Radiated Emissions	Pass
2.1051 / 90.691	. Conducted Emissions	Pass
2.1051 / 90.691	. Band Edge	Pass
2.1049 / 90.209	.Emission Bandwidth & Occupied Bandwidth	Pass
2.1055 / 90.213	. Frequency Stability	Pass

2. Test Configuration of Equipment under Test

2.1. Feature of Equipment under Test

Band	B2, B4, B5, B12, B13, B25, B26, B66, B85
Antenna Type	Dipole
Antenna Gain	LTE Cat M1 Band 2: 0.46dBi LTE Cat M1 Band 4: 0.46dBi LTE Cat M1 Band 5: -0.89dBi LTE Cat M1 Band 12: -0.89dBi LTE Cat M1 Band 13: -0.89dBi LTE Cat M1 Band 25: 0.46dBi LTE Cat M1 Band 26: -0.89dBi LTE Cat M1 Band 66: 0.46dBi LTE Cat M1 Band 85: -0.89dBi
Antenna Cable Loss	0.67dB
Antenna	Brand: Quectel /Model: YE0042AA

Note: For more details, please refer to the User's manual of the EUT.

Difference description

Model	4G LTE Module	ANT Qty	GPS	LAN Ports	SIM Slot	Serial Port	SD
SE5201B-Q-T-M1-DB-US	BG95-M2	1	N/A	2	2	1*DB	1
SE5201B-Q-T-M1-TB-US	BG95-M2	1	N/A	2	2	1*TB	1

2.2. Carrier Frequency of Channels

Band	UL Frequency (MHz)	Modulation
LTE Cat M1 Band 26 (Part 90S)	814.7 ~ 823.3	QPSK, 16QAM

2.3. Test Mode and Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.26.
b. The complete test system included Remote workstation and EUT for RF test. The Remote workstation included Notebook.
c. The following test modes were performed for the test:

Test Mode	Operating Description
1	LTE Cat M1 Band 26 (Part 90S)

2.4. Description of Test System

Radiated Emissions				
Equipment	Brand	Model	Length/Type	Power cord/Length/Type
Power Supply	MEAN WELL	SDR-120-24	N/A	N/A

2.5. General Information of Test

Test Site	**Cerpass Technology Corporation Test Laboratory** Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel: +886-3-3226-888 Fax: +886-3-3226-881	
	FCC	TW1439, TW1079
	IC	4934E-1, 4934E-2
Frequency Range Investigated:	Radiation: from 30 MHz to 20,000MHz	
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.	

Test Item	Test Site	Test Period	Environmental Conditions	Tested By
RF Conducted	RFCON01-NK	2024/04/25	25.6°C / 49%	Bart Tsai
RF Conducted	RFCON01-NK	2024/05/17	23.7°C / 37%	Bart Tsai
Radiated Emissions	3M02-NK	2024/05/22	21.9°C / 46%	Park Chen

2.6. 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 Item	Uncertainty
Equivalent Isotropically Radiated Power (Radiated)	±5.6dB
Conducted Spurious Emission	±2.2dB
Output Power(Conducted)	±1.07dB
Frequency Error	±0.22KHz
Occupied Channel Bandwidth	±4.4%
26dB Bandwidth	±4.4%
Peak to average ratio	±2.0dB
Temperature	±1.4°C
Humidity	±2.8%
Voltages(DC)	±2mV/V

3. Test Equipment and Ancillaries Used for Tests

Test Item	Radiated Emissions				
Test Site	Semi Anechoic Room(3M02-NK)				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
Bilog Antenna	Schwarzbeck	VULB9168	369	2024/02/19	2025/02/18
Active Loop Antenna	Schwarzbeck	FMZB 1513	414	2024/01/16	2025/01/15
Horn Antenna	EMCO	3115	31601	2023/10/18	2024/10/17
Horn Antenna	EMCO	3116	31974	2023/10/16	2024/10/15
EMI Receiver	ROHDE & SCHWARZ	ESCI	101423	2023/07/05	2024/07/04
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	102151	2023/08/15	2024/08/14
Preamplifier	Agilent	8449B	3008A01954	2024/03/01	2025/02/28
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2023/10/13	2024/10/12
Preamplifier	EM Electronics corp.	EM330	60659	2024/02/17	2025/02/16
Cable-6m(9k~300M)	NA	EMC5D-BM-BM-6	130606	2024/03/13	2025/03/12
Cable-3in1(30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1315	2024/02/23	2025/02/22
Cable-0.5m(1G-40G)	HUBER SUHNER	SUCOFLEX 104	805443/4	2024/03/05	2025/03/04
Cable-3m(1G-40G)	HUBER SUHNER	SUCOFLEX 104	805796/4	2024/03/05	2025/03/04
Cable-8m(1G-26.5G)	WOKEN	WCBA-WCA203SM	CCE1374	2024/03/05	2025/03/04
Cable-1m(1G-40G)	HUBER SUHNER	HUBER SUHNER / SF102	552450	2023/06/08	2024/06/07
Cable-3m(1G-40G)	HUBER SUHNER	HUBER SUHNER / SF102	552451	2023/06/08	2024/06/07
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA
Highpass Filter	WOKEN	WFIL-H1400-10000F	WR866WC2B1	2023/10/17	2024/10/16
Radio Comnunication Analyzer	Anritsu	MT8821C	6261830569	2024/02/17	2025/02/16

Test Item	RF Conducted				
Test Site	RFCON01-NK				
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date
CAX Signal Analyzer	KEYSIGHT	N9000B	MY57100339	2023/11/06	2024/11/05
Radio Comnunication Analyzer	Anritsu	MT8821C	6261830569	2024/02/17	2025/02/16
TEMP & HUMI CHAMBER	T-MACHINE	TMJ-9712	T-12-040111	2023/08/07	2024/08/06

4. RF Output Power Test

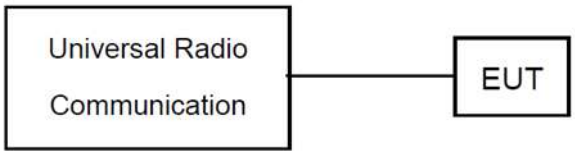
4.1 Test Limit

N/A

4.2 Test Procedures

1. The EUT was set up for the maximum power with simulator.
2. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.3 Test Setup



4.4 Test Result and Data

Band 26(Part 90s)

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Opration Channel/Frequency(MHz)	
					QPSK	16QAM
1.4	26697/814.7	0	1	0	21.54	20.32
		0	6	0	19.24	19.18
	26740/819	0	1	0	21.55	20.31
		0	6	0	19.28	19.11
	26783/823.3	0	1	5	21.52	20.39
		0	6	0	19.14	19.15

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Opration Channel/Frequency(MHz)	
					QPSK	16QAM
3	26705/815.5	0	1	0	21.47	20.32
		0	6	0	19.24	19.04
	26740/819	0	1	0	21.23	20.38
		0	6	0	19.27	19.07
	26775/822.5	0	1	5	21.22	20.31
		0	6	0	19.29	19.13

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Opration Channel/Frequency(MHz)	
					QPSK	16QAM
5	26715/816.5	0	1	0	21.42	21.61
		0	6	0	20.31	20.21
	26740/819	0	1	0	21.45	21.71
		0	6	0	20.17	20.35
	26765/821.5	0	1	5	21.43	21.77
		0	6	0	20.14	20.29

BW (MHz)	Opration Channel/ Frequency(MHz)	Index	RB size	RB offset	Conducted Power (dBm)	
					Opration Channel/Frequency(MHz)	
					QPSK	16QAM
10	26740/819	0	1	0	21.5	21.59
			5	0	21.45	21.33

5. Effective Radiated Power / Equivalent Isotropic Radiated Power Test

5.1. Test Limit

For FCC Part 90.635(b): ERP maximum power is 100 watts for mobile stations.

5.2. Test Procedures

For Conducted power measurement:

1. The EUT links up with simulator and is set to maximum output power level at low / middel / high channel.
2. Measure the output power of low / middle / high channel of the EUT.

For ERP measurement:

ERP can be calculated by below formula from ANSI C63.26.

1. EIRP = PT + GT - LC

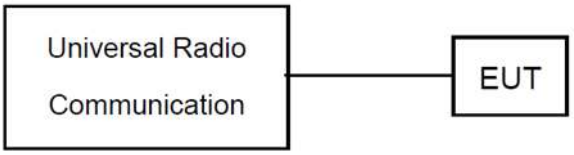
   PT= transmitter output power, in dBm.

   GT= gain of the transmitting antenna, in dBi (EIRP).

   LC= signal attenuation in the connecting cable between the transmitter and antenna, in dB.

3. ERP = EIRP – 2.15 dB.

5.3. Test Setup



5.4. Test Result and Data

LTE Cat M1 Band26 1.4M QPSK(Part 90s)

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	Cable Loss (dbm)	E.R.P. (dBm)	E.R.P. (W)	Limit (dBm)	Margin (dB)
26697	814.7	1	21.54	-0.89	0.67	17.83	0.06	50	-32.17
		Full	19.24	-0.89	0.67	15.53	0.04	50	-34.47
26740	819	1	21.55	-0.89	0.67	17.84	0.06	50	-32.16
		Full	19.28	-0.89	0.67	15.57	0.04	50	-34.43
26783	823.3	1	21.52	-0.89	0.67	17.81	0.06	50	-32.19
		Full	19.14	-0.89	0.67	15.43	0.03	50	-34.57

LTE CAT M1 Band26 1.4M 16QAM(Part 90s)

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	Cable Loss (dbm)	E.R.P. (dBm)	E.R.P. (W)	Limit (dBm)	Margin (dB)
26697	814.7	1	20.32	-0.89	0.67	16.61	0.05	50	-33.39
		Full	19.18	-0.89	0.67	15.47	0.04	50	-34.53
26740	819	1	20.31	-0.89	0.67	16.6	0.05	50	-33.4
		Full	19.11	-0.89	0.67	15.4	0.03	50	-34.6
26783	823.3	1	20.39	-0.89	0.67	16.68	0.05	50	-33.32
		Full	19.15	-0.89	0.67	15.44	0.03	50	-34.56

LTE CAT M1 Band26 3M QPSK(Part 90s)

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	Cable Loss (dbm)	E.R.P. (dBm)	E.R.P. (W)	Limit (dBm)	Margin (dB)
26705	815.5	1	21.47	-0.89	0.67	17.76	0.06	50	-32.24
		Full	19.24	-0.89	0.67	15.53	0.04	50	-34.47
26740	819	1	21.23	-0.89	0.67	17.52	0.06	50	-32.48
		Full	19.27	-0.89	0.67	15.56	0.04	50	-34.44
26775	822.5	1	21.22	-0.89	0.67	17.51	0.06	50	-32.49
		Full	19.29	-0.89	0.67	15.58	0.04	50	-34.42

LTE CAT M1 Band26 3M 16QAM(Part 90s)

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	Cable Loss (dbm)	E.R.P. (dBm)	E.R.P. (W)	Limit (dBm)	Margin (dB)
26705	815.5	1	20.32	-0.89	0.67	16.61	0.05	50	-33.39
		Full	19.04	-0.89	0.67	15.33	0.03	50	-34.67
26740	819	1	20.38	-0.89	0.67	16.67	0.05	50	-33.33
		Full	19.07	-0.89	0.67	15.36	0.03	50	-34.64
26775	822.5	1	20.31	-0.89	0.67	16.6	0.05	50	-33.4
		Full	19.13	-0.89	0.67	15.42	0.03	50	-34.58

LTE CAT M1 Band26 5M QPSK(Part 90s)

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	Cable Loss (dbm)	E.R.P. (dBm)	E.R.P. (W)	Limit (dBm)	Margin (dB)
26715	816.5	1	21.42	-0.89	0.67	17.71	0.06	50	-32.29
		Full	20.31	-0.89	0.67	16.6	0.05	50	-33.4
26740	819	1	21.45	-0.89	0.67	17.74	0.06	50	-32.26
		Full	20.17	-0.89	0.67	16.46	0.04	50	-33.54
26765	821.5	1	21.43	-0.89	0.67	17.72	0.06	50	-32.28
		Full	20.14	-0.89	0.67	16.43	0.04	50	-33.57

LTE CAT M1 Band26 5M 16QAM(Part 90s)

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	Cable Loss (dbm)	E.R.P. (dBm)	E.R.P. (W)	Limit (dBm)	Margin (dB)
26715	816.5	1	21.61	-0.89	0.67	17.9	0.06	50	-32.1
		Full	20.21	-0.89	0.67	16.5	0.04	50	-33.5
26740	819	1	21.71	-0.89	0.67	18	0.06	50	-32
		Full	20.35	-0.89	0.67	16.64	0.05	50	-33.36
26765	821.5	1	21.77	-0.89	0.67	18.06	0.06	50	-31.94
		Full	20.29	-0.89	0.67	16.58	0.05	50	-33.42

LTE CAT M1 Band26 10M QPSK(Part 90s)

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	Cable Loss (dbm)	E.R.P. (dBm)	E.R.P. (W)	Limit (dBm)	Margin (dB)
26740	819	1	21.5	-0.89	0.67	17.79	0.06	50	-32.21
		Full	21.45	-0.89	0.67	17.74	0.06	50	-32.26

CAT M1 Band26 10M 16QAM(Part 90s)

Channel	Frequency (MHz)	RB size	Conducted Power (dBm)	Gain (dBi)	Cable Loss (dbm)	E.R.P. (dBm)	E.R.P. (W)	Limit (dBm)	Margin (dB)
26740	819	1	21.59	-0.89	0.67	17.88	0.06	50	-32.12
		Full	21.33	-0.89	0.67	17.62	0.06	50	-32.38

6. Emission Bandwidth & Occupied Bandwidth Test

6.1. Test Limit

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

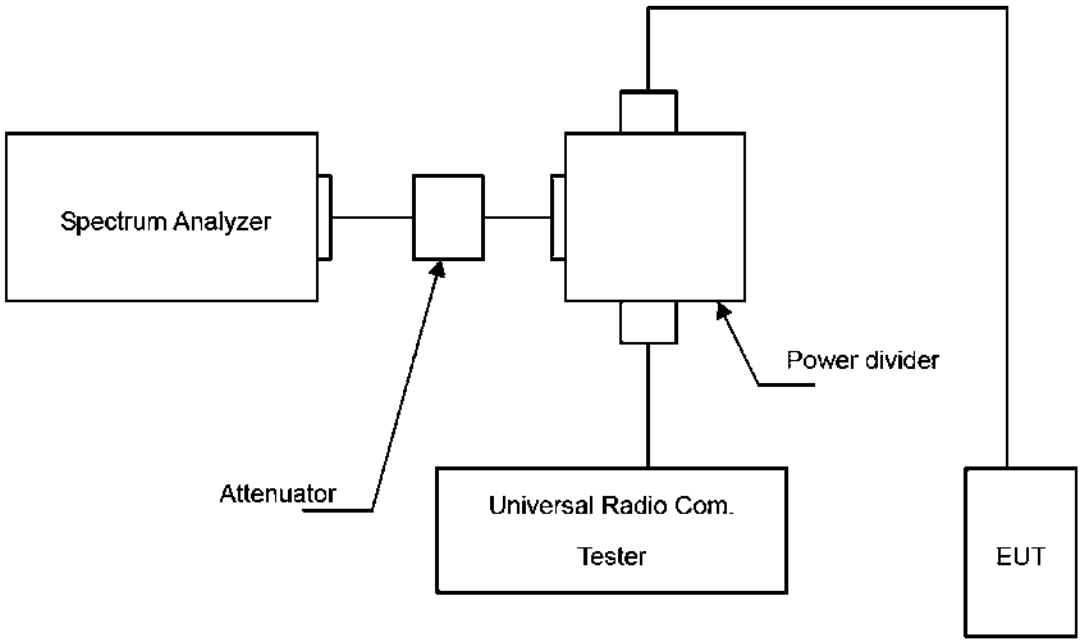
6.2. Test Procedures

a. The EUT makes a phone call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels. (low, middle and high operational frequency range.)

b. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

c. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

6.3. Test Setup



6.4. Test Result and Data

Moduration type	RB	Bandwidth (MHz)	Channel No.	Frequency (MHz)	-26dBc Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
QPSK	100%	1.4	26740	819	1.3650	1.1204
		3	26740	819	1.4120	1.1291
		5	26740	819	1.2330	0.9485
		10	26740	819	1.4020	1.1281
16QAM	100%	1.4	26740	819	1.1620	0.9541
		3	26740	819	1.1920	0.9609
		5	26740	819	1.1850	0.9616
		10	26740	819	1.1890	0.9719

Test Mode: Band 5 QPSK 1.4MHz
CH26740

Test Mode: Band 5 QPSK 10MHz
CH26740

Test Mode: Band 5 QPSK 3MHz
CH26740

Test Mode: Band 5 QPSK 5MHz
CH26740

Test Mode: Band 5 16QAM 1.4MHz
CH26740

Test Mode: Band 5 16QAM 10MHz
CH26740

Test Mode: Band 5 16QAM 3MHz
CH26740

Test Mode: Band 5 16QAM 5MHz
CH26740

7. Peak to Average Ratio Test

7.1. Test Limit

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

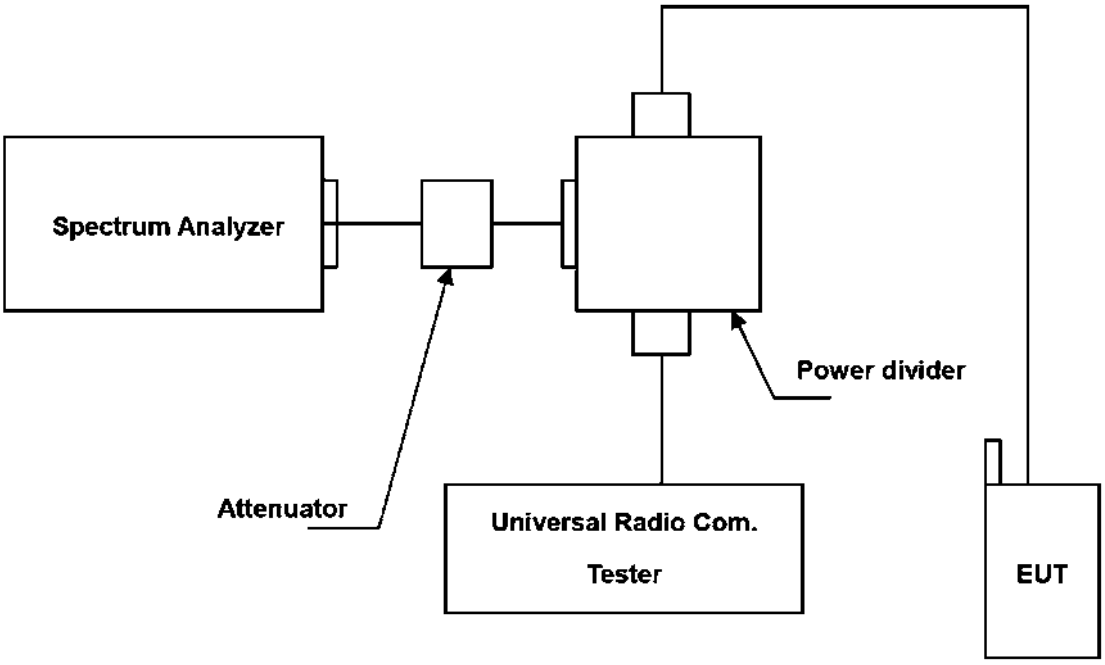
7.2. Test Procedures

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%

7.3. Test Setup

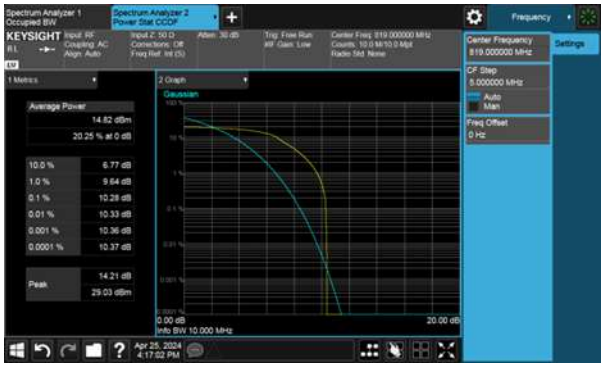


7.4. Test Result and Data

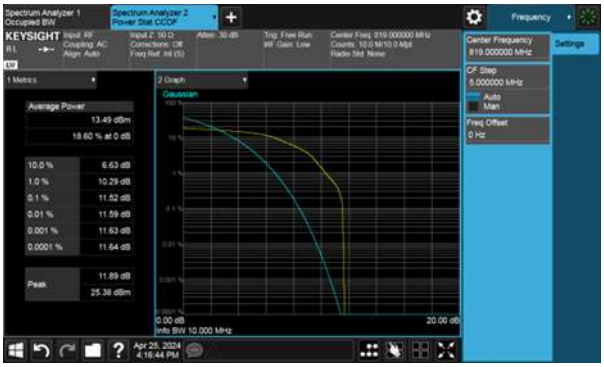
Band	Mode	Bandwidth (MHz)	RB size	Channel	Frequency (MHz)	PAR (dB)	Limit	Result
Cat M1 Band 26 (Part 90s)	QPSK	1.4	1RB	26740	819	10.28	13	Pass
	16QAM			26740	819	11.52	13	Pass
	QPSK	3		26740	819	8.88	13	Pass
	16QAM			26740	819	10.26	13	Pass
	QPSK	5		26740	819	8.83	13	Pass
	16QAM			26740	819	9.3	13	Pass
	QPSK	10		26740	819	9.76	13	Pass
	16QAM			26740	819	8.76	13	Pass

Part 90s

Test Mode: Band 5 QPSK 1.4MHz
CH26740



Test Mode: Band 5 16QAM 5MHz
CH26740



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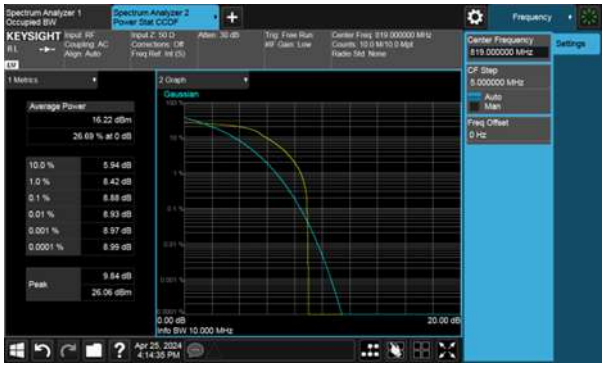
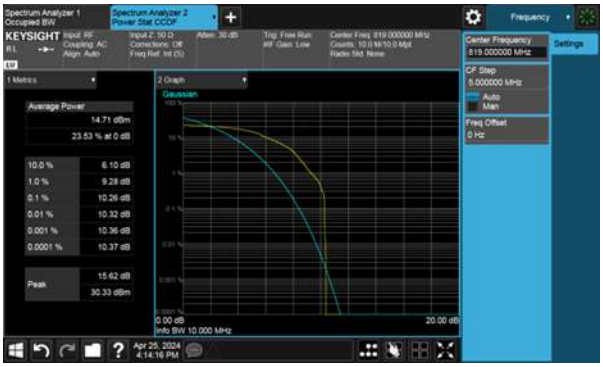
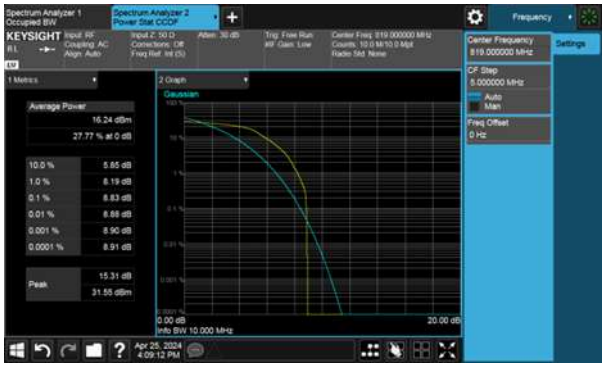
CH26740



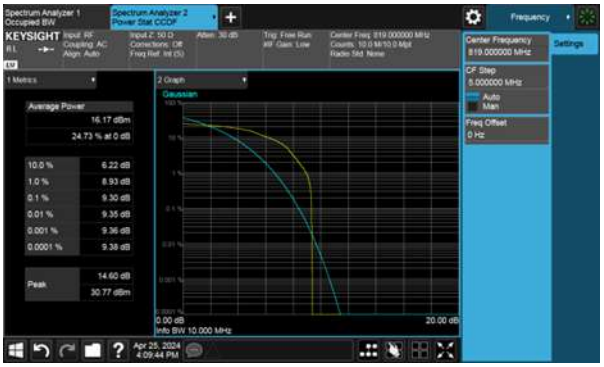
Test Mode: Band 5 16QAM 3MHz
CH26740



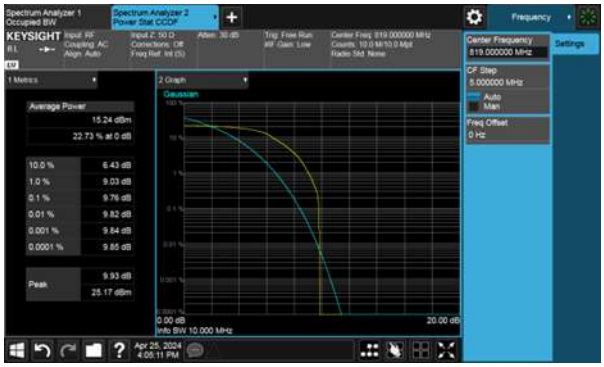
Test Mode: Band 5 QPSK 3MHz
CH26740



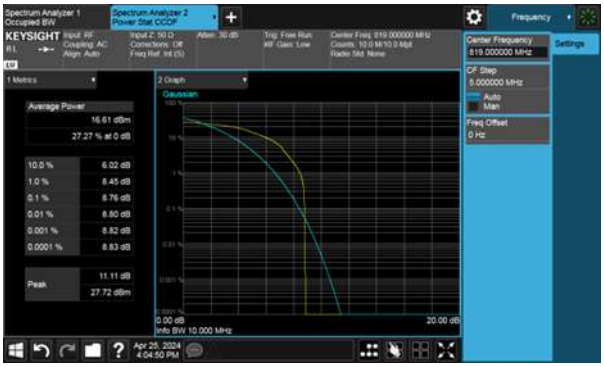
Test Mode: Band 5 16QAM 3MHz
CH26740



Test Mode: Band 5 QPSK 10MHz
CH26740



Test Mode: Band 5 16QAM 10MHz
CH26740



8. Band Edge

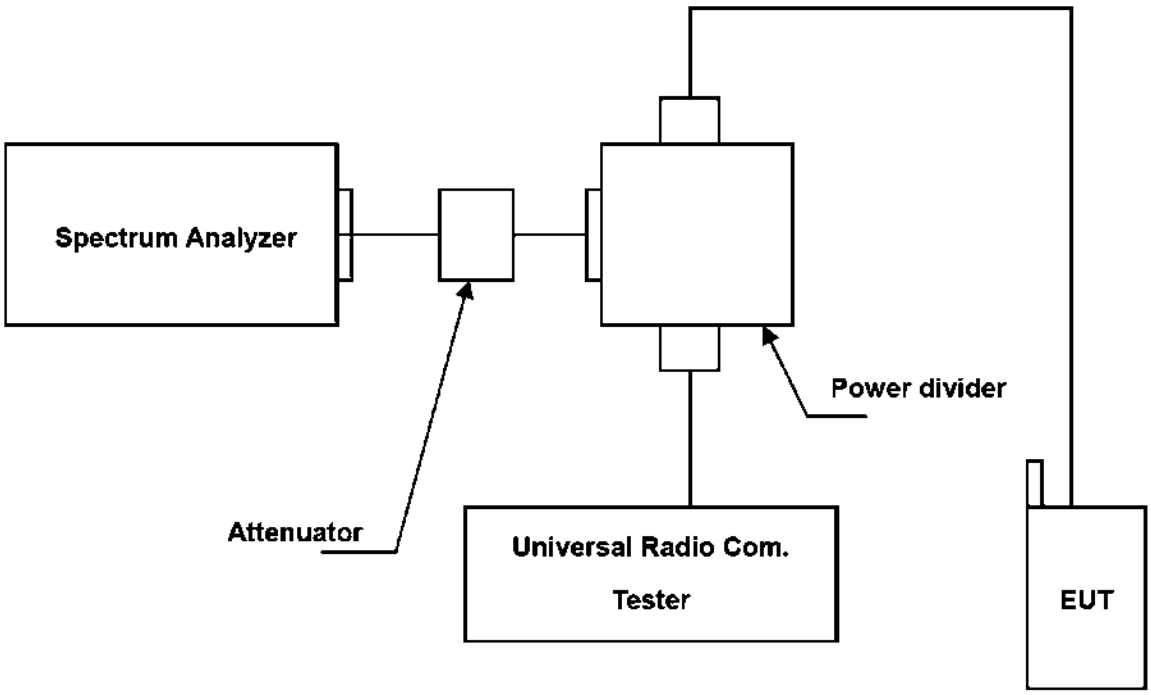
8.1. Test Limit

§22.917(a), §24.238(a)
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB.

8.2. Test Procedures

a. The EUT was set up for the maximum peak power with WWAN link data modulation.
The power was measured with Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.)
b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss in the transmitted path track.
c. The center frequency of spectrum is the band edge frequency and span is 10 MHz. RB of the resolution bandwidth of at least one percent of the emission bandwidth.
d. Record the max trace plot into the test report.

8.3. Test Setup



8.4. Test Result and Data

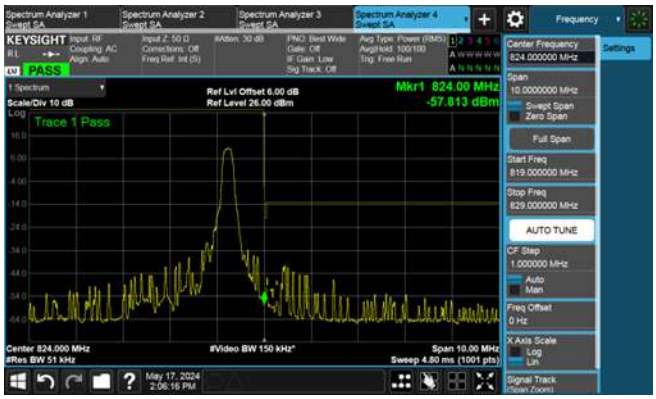
Part90S

Test Mode: QPSK Band 26 1.4M CH26697-1@0

Test Mode: QPSK Band 26 10M CH26740-1@0

Test Mode: QPSK Band 26 1.4M CH26783-1@MAX

Test Mode: QPSK Band 26 10M CH26740-1@MAX



9. Conducted Spurious Emission Test

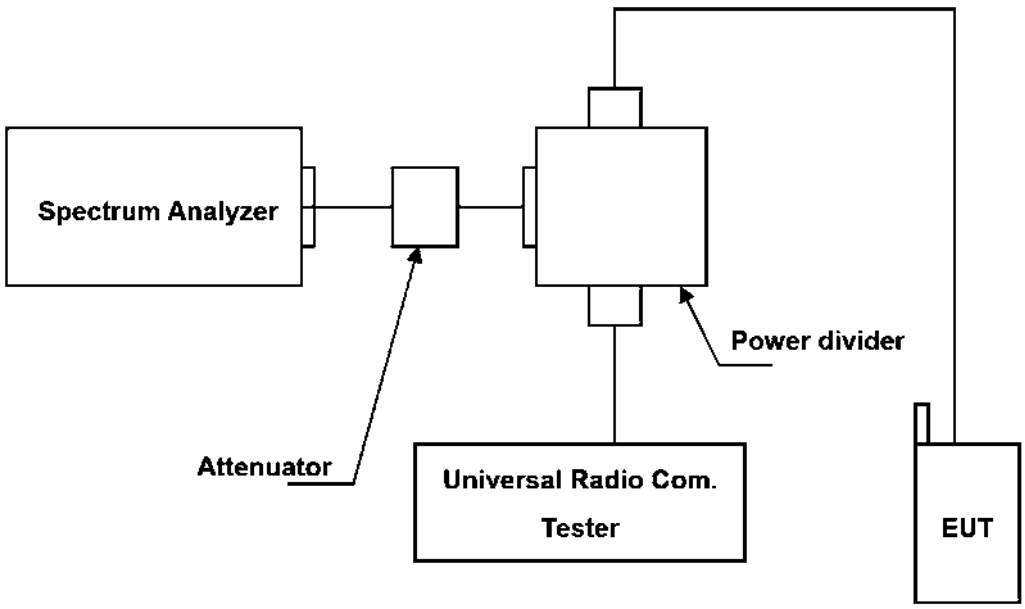
9.1. Test Limit

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission equal to -13dBm

9.2. Test Procedures

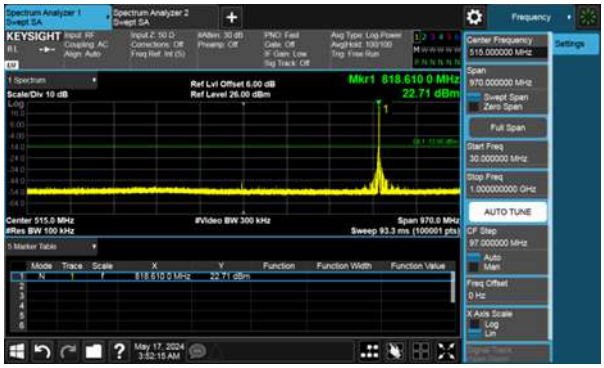
a. The EUT was set up for the maximum peak power with WWAN link data modulation. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range.)
b. The conducted spurious emission used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
c. When the spectrum scanned from 10MHz to 2.5GHz (Band 7and Band 41: scanned from 10MHz to 4GHz), it shall be connected to the band reject filter attenuated the carried frequency. The spectrum set RB=1MHz, VB=1MHz.
d. When the spectrum scanned from 2.5GHz to 10th harmonic (Band 7 and Band 41: scanned from 4GHz to 10th harmonic), it shall be connected to the high pass filter attenuated the carried frequency. The spectrum set RB=1MHz, VB=1MHz.

9.3. Test Setup



9.4. Test Result and Data

Test Mode: QPSK 1RB 1.4M CH26740-1



Test Mode: QPSK 1RB 1.4M CH26740-2

10. Radiation Emission Test

10.1. Test Limit

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB.

10.2. Test Procedure

a. The EUT was set up for the maximum power with wwan link data modulation. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range).

b. E.I.R.P power measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be otated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution antenna (Note:1 & 2) is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G.

d. E.I.R.P. = Output power level of S.G - TX cable loss + Antenna gain of substitution horn

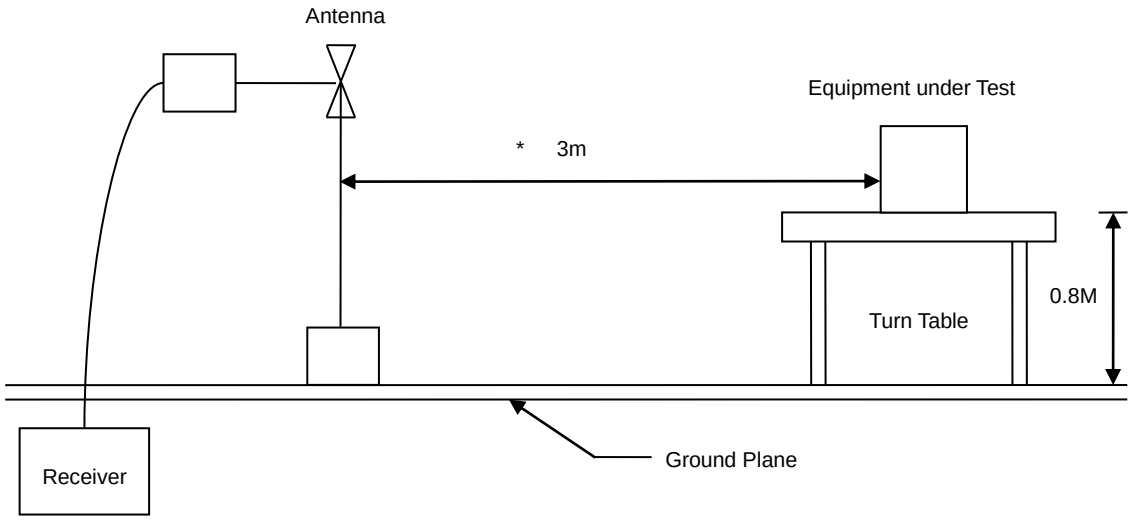
e. E.R.P. = E.I.R.P.- 2.15 dB

Note: 1. Below 1GHz substituted method test: sleeve dipole antenna to Bi-Log Antenna.

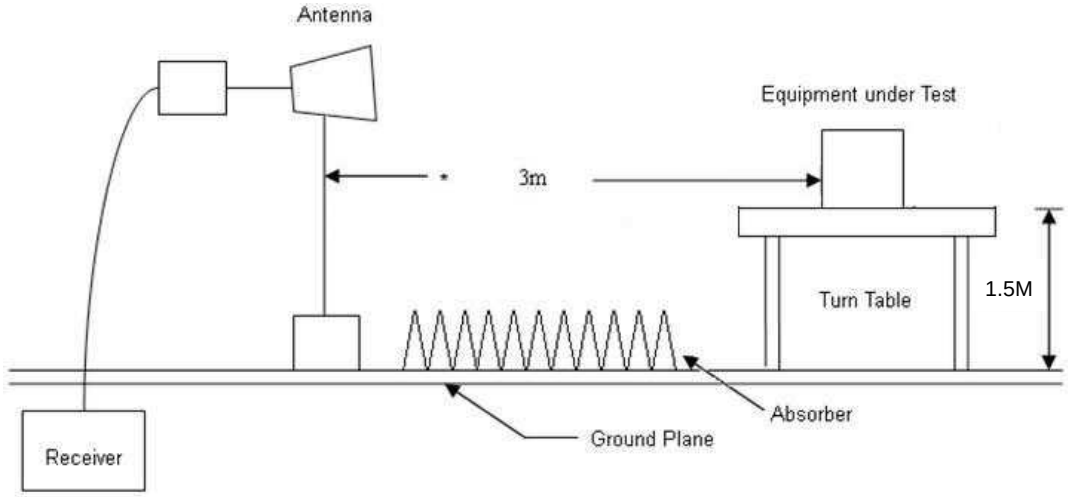
2. Above 1GHz substituted method test: horn antenna to horn antenna.

10.3. Test Setup

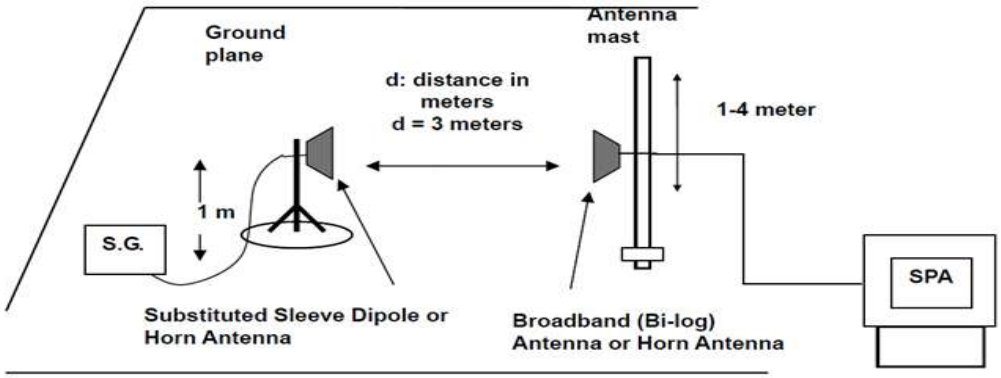
Below 1GHz test setup



Above 1GHz Test Setup

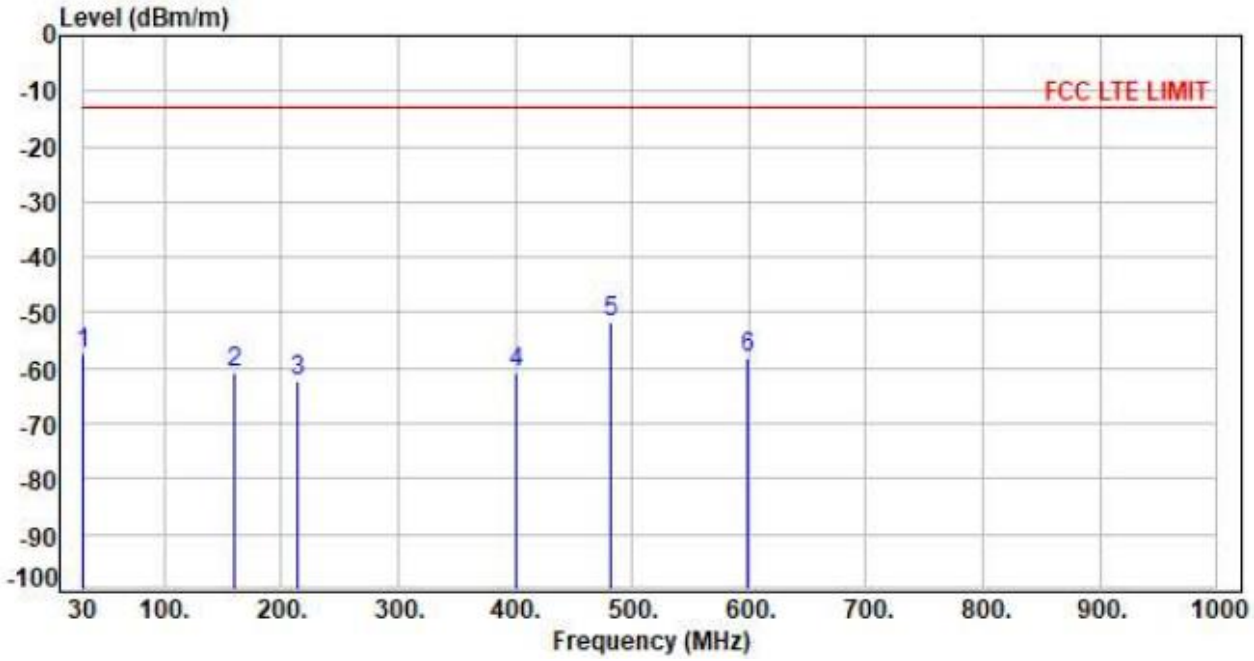


For Substituted Method Test Set-UP



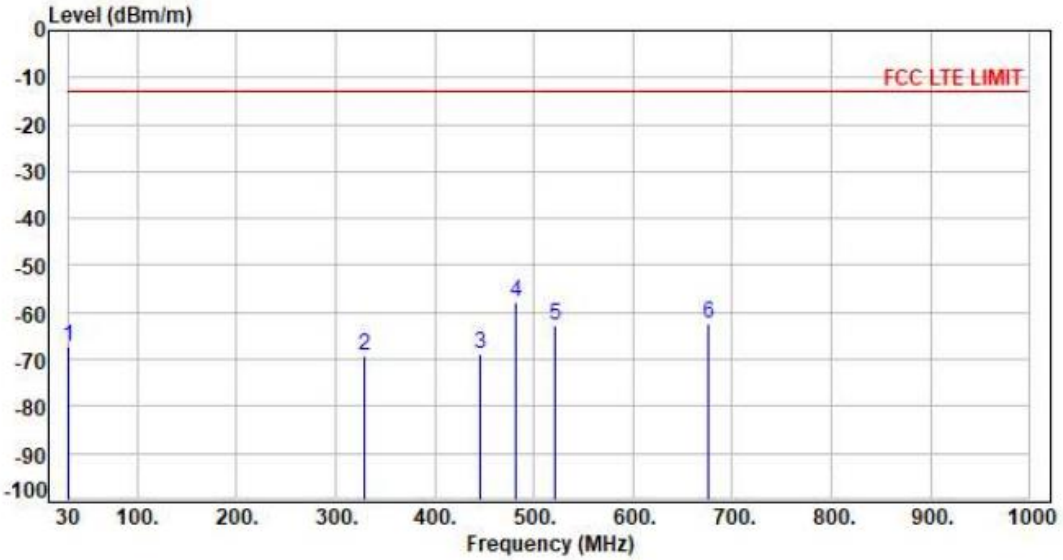
10.1. Test Result and Data (30MHz ~ 1GHz)

Test Mode	Cat M1, Band 26 5MHz, CH 26765	Pol/Phase	VERTICAL
Power	AC 120V/60Hz		



Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)
30	-59.14	V	-26.59	1.07	-27.45	-57.26	-13
159.98	-59.78	V	-51.12	1.74	-5.67	-60.68	-13
214.3	-61.38	V	-56.37	1.94	-1.95	-62.41	-13
400.54	-63.46	V	-56.81	2.64	0.75	-60.85	-13
482.02	-54.55	V	-47.45	2.61	0.62	-51.59	-13
598.42	-64.68	V	-54.52	2.89	1.55	-58.01	-13

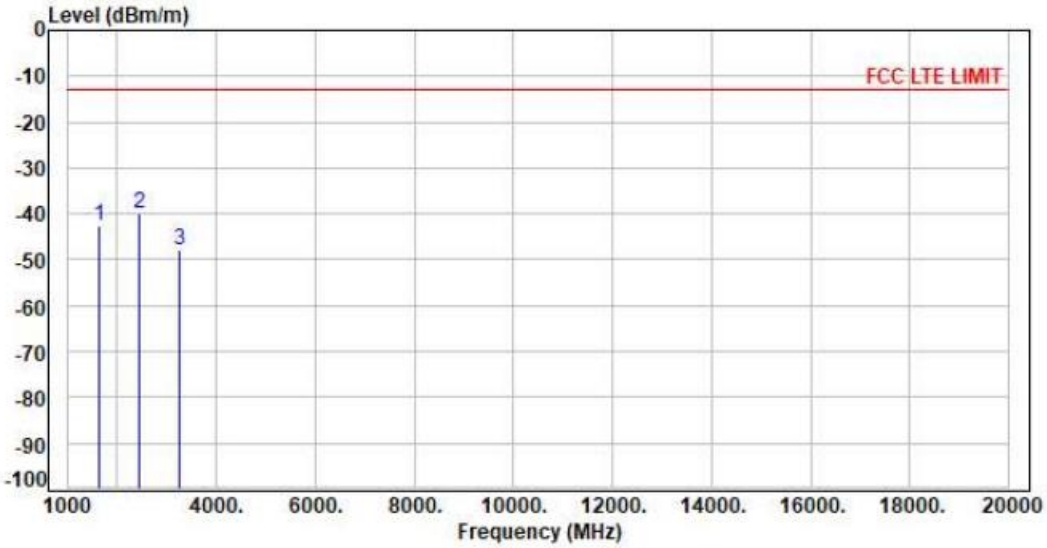
Test Mode	Cat M1, Band 26 5MHz, CH 26765	Pol/Phase	HORIZONTAL
Power	AC 120V/60Hz		



Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)
30.97	-75.37	H	-37.33	1.12	-26.53	-67.13	-13
328.76	-69.21	H	-65.4	2.28	0.61	-69.22	-13
445.16	-71.05	H	-64.68	2.52	0.68	-68.67	-13
482.02	-62.37	H	-53.81	2.61	0.62	-57.95	-13
520.82	-67.51	H	-58.53	2.7	0.79	-62.59	-13
676.02	-70.92	H	-58.18	3.11	1.07	-62.37	-13

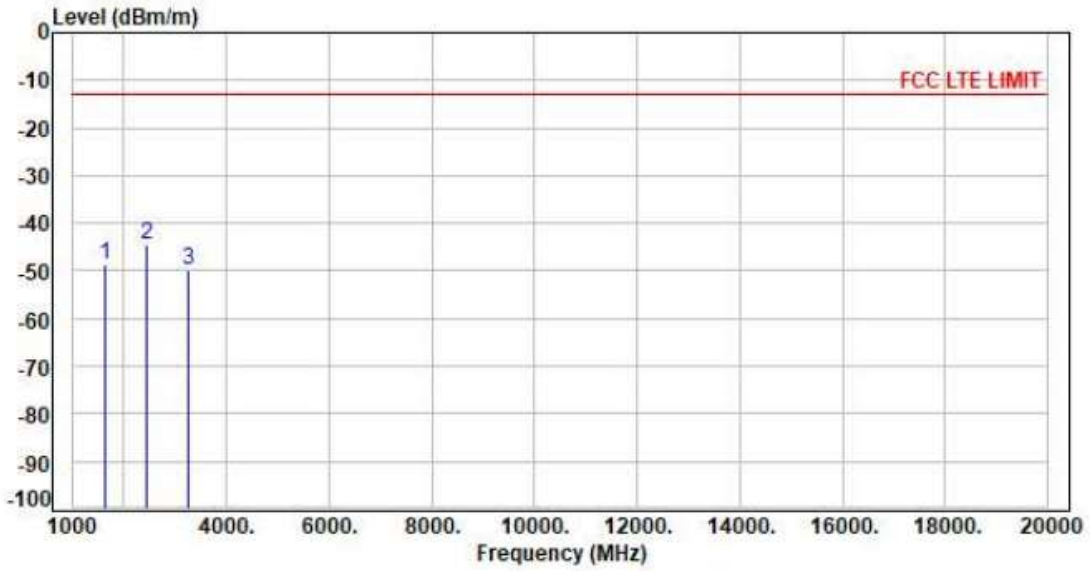
10.2. Test Result and Data (1GHz ~ 20GHz)

Test Mode	Cat M1,Band 26 5MHz, CH 26715	Pol/Phase	VERTICAL
Power	AC 120V/60Hz		



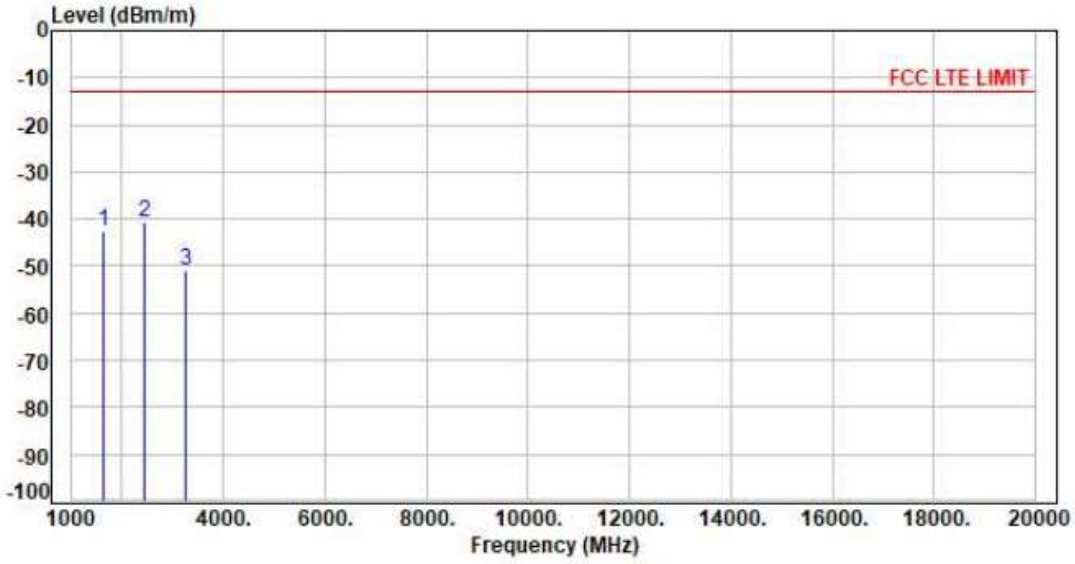
Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)
1628.6	-47.85	V	-44.6	4.48	8.8	-42.43	-13
2442.9	-49.33	V	-41.89	5.5	9.6	-39.94	-13
3257.2	-60.74	V	-49.15	6.55	9.91	-47.94	-13

Test Mode	Cat M1,Band 26 5MHz, CH 26715	Pol/Phase	HORIZONTAL
Power	AC 120V/60Hz		



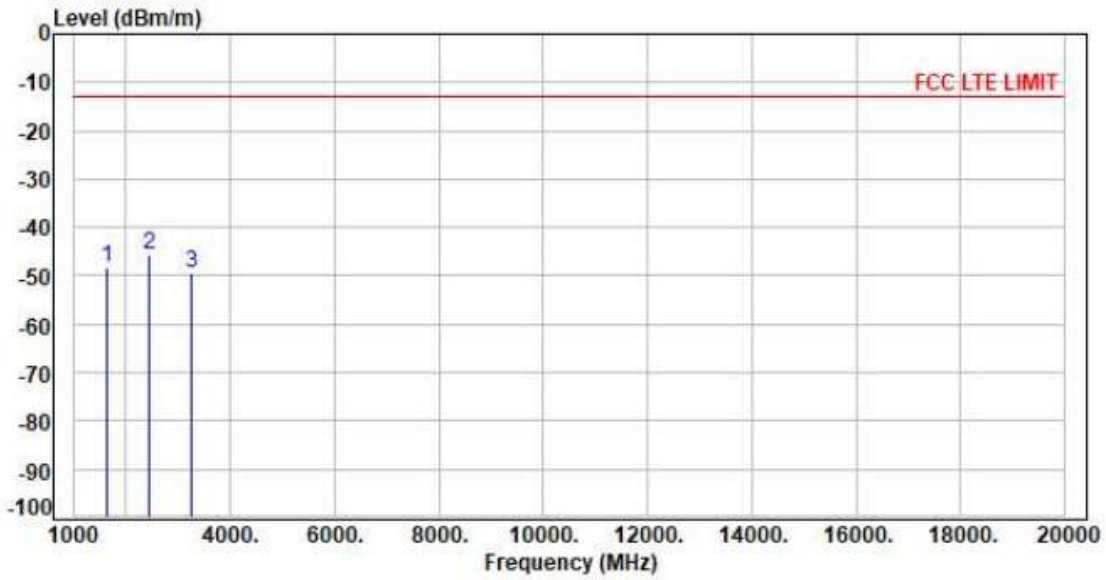
Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)
1628.6	-54.36	H	-50.71	4.48	8.8	-48.54	-13
2442.9	-54.02	H	-46.38	5.5	9.6	-44.43	-13
3257.2	-63.24	H	-50.84	6.55	9.91	-49.63	-13

Test Mode	Cat M1,Band 26 5MHz, CH 26740	Pol/Phase	VERTICAL
Power	AC 120V/60Hz		



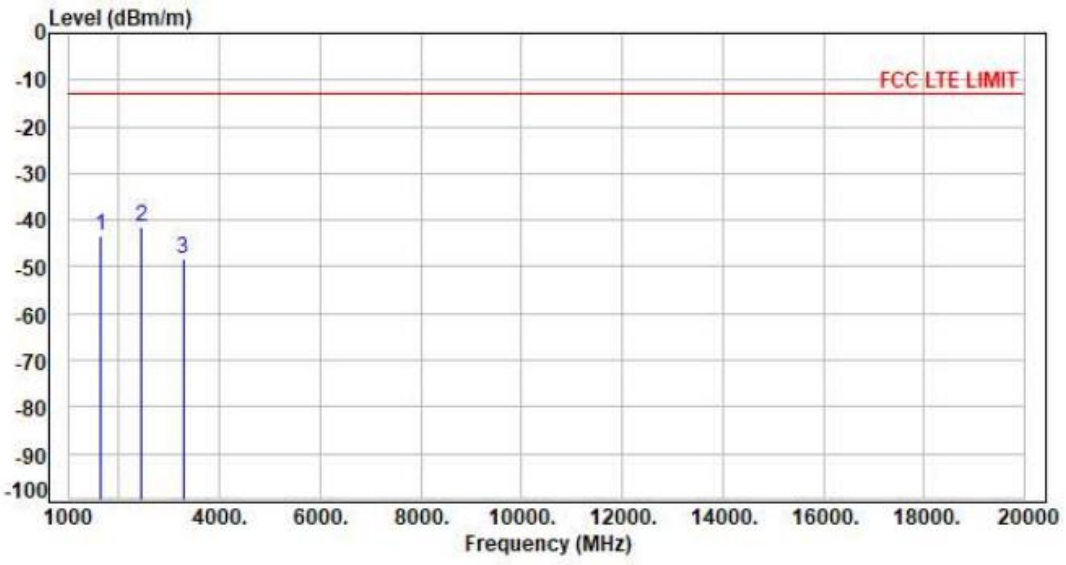
Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)
1633.6	-48.06	V	-44.76	4.49	8.8	-42.6	-13
2450.4	-50.06	V	-42.6	5.51	9.61	-40.65	-13
3267.2	-63.71	V	-52.09	6.56	9.91	-50.89	-13

Test Mode	Cat M1,Band 26 5MHz, CH 26740	Pol/Phase	HORIZONTAL
Power	AC 120V/60Hz		



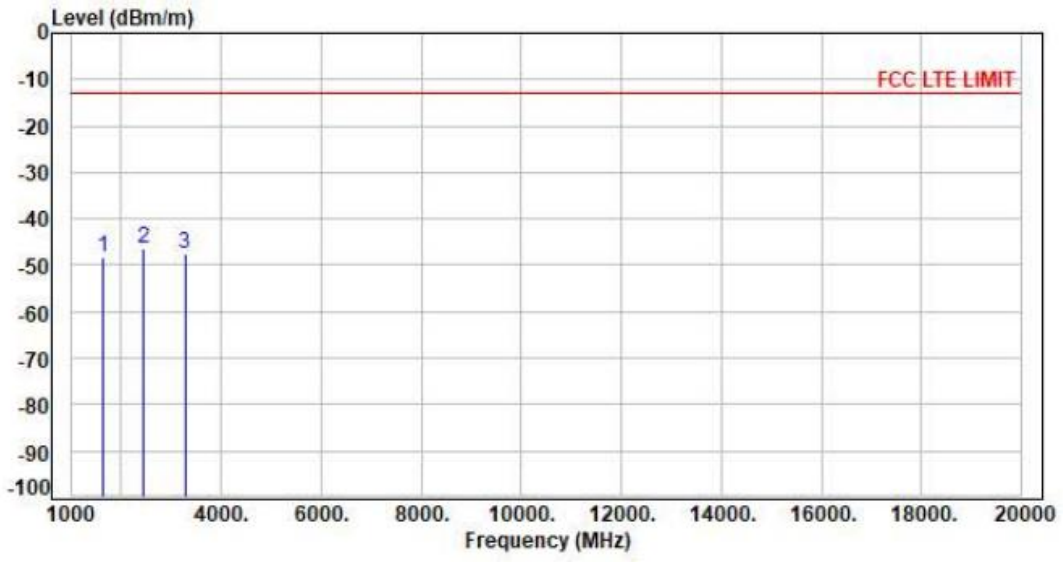
Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)
1633.6	-54.31	H	-50.62	4.49	8.8	-48.46	-13
2450.4	-55.12	H	-47.46	5.51	9.61	-45.51	-13
3267.2	-63.23	H	-50.78	6.56	9.91	-49.58	-13

Test Mode	Cat M1,Band 26 5MHz, CH 26765	Pol/Phase	VERTICAL
Power	AC 120V/60Hz		



Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)
1640.4	-49.03	V	-45.67	4.5	8.8	-43.52	-13
2460.6	-50.83	V	-43.35	5.52	9.63	-41.39	-13
3280.8	-61.16	V	-49.48	6.58	9.92	-48.29	-13

Test Mode	Cat M1,Band 26 5MHz, CH 26765	Pol/Phase	HORIZONTAL
Power	AC 120V/60Hz		



Frequency (MHz)	SA Reading (dBm)	Ant.Pol. (H/V)	SG Reading (dBm)	Cable Loss (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)
1640.4	-54.16	H	-50.4	4.5	8.8	-48.25	-13
2460.6	-55.93	H	-48.25	5.52	9.63	-46.29	-13
3280.8	-61.42	H	-48.89	6.58	9.92	-47.7	-13

11. Frequency Stability (Temperature & Voltage Variation) Test

11.1. Test Limit

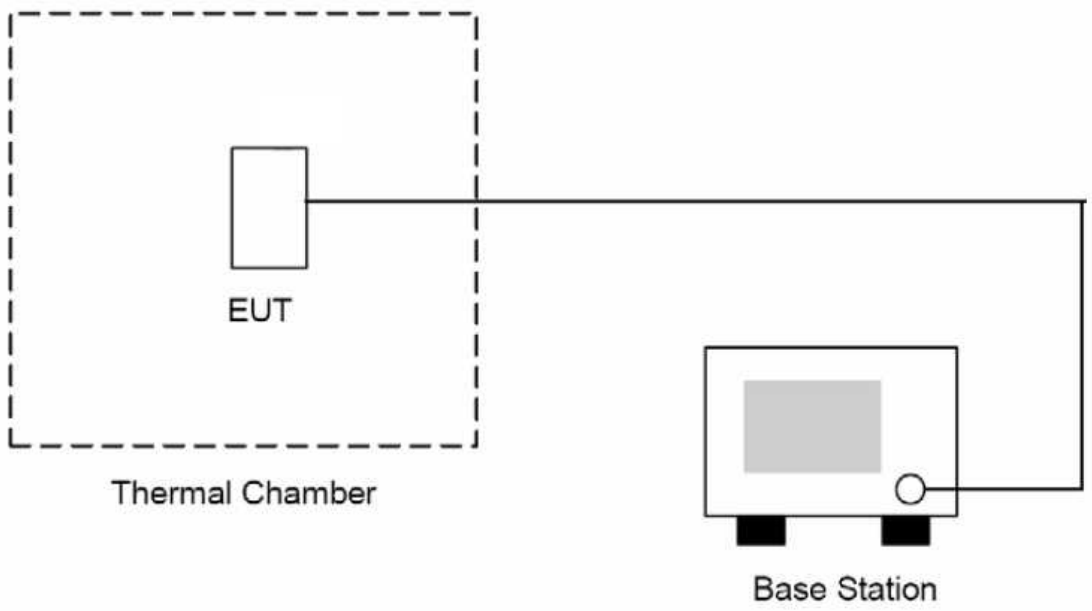
Mobile:
The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

Fixed or Base:
The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the ransmitter shall be maintained within ±0.00015% (±1.5ppm) of the center frequency.

11.2. Test Procedure

1. The EUT and test equipment were set up as shown on the following section.
2. With all power removed, the temperature was decreased to -30℃ and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was note within one minute.
3. With power OFF, the temperature was raised in 10℃ steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
4. The EUT was placed in a temperature chamber at 25 ±5℃ and connected as the following section.
5. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
6. The temperature tests were performed for the worst case.
7. Test data was recorded.

11.3. Test Setup



11.4. Test Result and Data

LTE CAT M1 Band 26 Part 90s QPSK 15M middle channel

Frequency Stability under Temperature				
Temperature Interval (℃)	Test Frequency (MHz)	Deviation (Hz)	Frequency error (ppm)	Limit (ppm)
75	819	3.12	0.004	2.5
60	819	2.71	0.003	2.5
50	819	2.6	0.003	2.5
40	819	-10.3	-0.013	2.5
30	819	0.2	0.000	2.5
20	819	4.4	0.005	2.5
10	819	5.3	0.006	2.5
0	819	2	0.002	2.5
-10	819	1.3	0.002	2.5
-20	819	9.8	0.012	2.5
-30	819	10.3	0.013	2.5

LTE CAT M1 Band 26 Part 90s QPSK 15M middle channel

Frequency Stability under Voltage at 20°C				
DC Voltage (V)	Test Frequency (MHz)	Deviation (Hz)	Frequency error (ppm)	Limit (ppm)
55.2	819	0.1	0.000	2.5
48	819	0.2	0.000	2.5
40.8	819	2.5	0.003	2.5