Certificate #6613.01

FCC TEST REPORT

(PART 90)

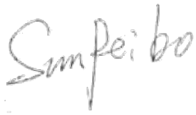
Applicant:	Telit Communications S.p.A.
Address:	Via Stazione di Prosecco 5/b – 34010 Sgonico, Trieste – Italy

Manufacturer or Supplier	Telit Communications S.p.A.
Address	Via Stazione di Prosecco 5/b – 34010 Sgonico, Trieste – Italy
Product	ME310M1-W2 / ME310M1-W1
Brand Name	Telit Cinterion
Model Name	ME310M1-W2 / ME310M1-W1
FCC ID	RI7ME310M1WX
Date of tests	Feb. 18, 2024 ~ Apr. 26, 2024

The tests have been carried out according to the requirements of the following standard:

☒ **FCC Part 90, Subpart R, S** ☒ **ANSI/TIA/EIA-603- D**
☒ **FCC Part 2** ☒ **ANSI/TIA/EIA-603-E** ☒ **ANSI C63.26-2015**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Hanwen Xu Engineer / Mobile Department	Approved by Peibo Sun Manager / Mobile Department
 Date: Apr. 26, 2024	 Date: Apr. 26, 2024

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-240204W001RF05	Original release	Apr. 26, 2024

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 90 & Part 2			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**TEST LAB***
§2.1046 §90.635(b)	Conducted Output Power	PASS	A
§90.541(d)	Effective Radiated Power	PASS	A
§2.1055 §90.213 §90.539	Frequency Stability	PASS	A
§2.1049 §90.209	Occupied Bandwidth	PASS	A
§2.1051 §90.543(e)(f) §90.691(a)	Emission Masks	PASS	A
§2.1051 §90.543(e)(f) §90.691(a)	Conducted Spurious Emissions	PASS	A
§2.1053 §90.691	Radiated Spurious Emissions	PASS	A

Note:
The differences between LTE NB-IoT/Cat-M1 modules ME310M1-W1 (FCC ID:RI7ME310M1WX) HW 0.0 and ME310M1-W2 (FCC ID: RI7ME310M1W2) HW0.0 are as shown in the following list. Testing has been run on parent product ME310M1-W2 and the worst cases of power and RSE have been verified also on ME310M1-W1 variant. Only the worst-case data (ME310M1-W2) have been reported.

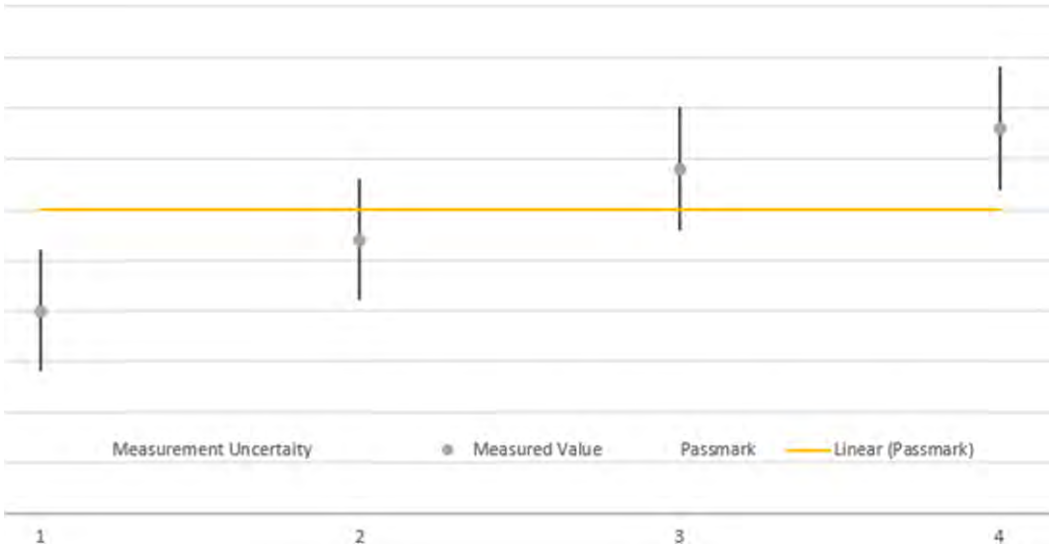
Model	ME310M1-W1 HW0.0	ME310M1-W2 HW0.0
The PSRAM section (U403/R402/R402/C402)	NOT-mounted	Mounted
The FLASH dimensions and capacity (U401)	(Small dimensions) 8MB	(Big dimensions) 16MB

1.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	UNCERTAINTY
Maximum Peak Output Power	±2.06dB
Frequency Stability	±76.97Hz
Radiated emissions (9KHz~30MHz)	±2.68dB
Radiated emissions (30MHz~1GHz)	±4.98dB
Radiated emissions (1GHz ~6GHz)	±4.70dB
Radiated emissions (6GHz ~18GHz)	±4.60dB
Radiated emissions (18GHz ~40GHz)	±4.12dB
Conducted emissions	±4.01dB
Occupied Channel Bandwidth	±43.58KHz
Band Edge Measurements	±4.70dB
Peak to average ratio	±0.76dB

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



The verdicts in this test report are given according the above diagram:

Case	Measured Value	Uncertainty Range	Verdict
1	below pass mark	below pass mark	Passed
2	below pass mark	within pass mark	Passed
3	above pass mark	within pass mark	Failed
4	above pass mark	above pass mark	Failed

That means, the laboratory applies, as decision rule (see ISO/IEC 17025:2017), the so-called shared risk principle.

1.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Pre-Amplifier	R&S	SCU18F1	100815	Aug.30,22	Aug.29,24
Pre-Amplifier	R&S	SCU08F1	101028	Sep.16,22	Sep.15,24
Vector Signal Generator	R&S	SMBV100B	102176	Feb.15,24	Feb.14,26
Signal Generator	R&S	SMB100A	182185	Feb.15,24	Feb.14,26
3m Fully-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-01Chamber	Nov.25,22	Nov.24,25
3m Semi-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ-EMC-02Chamber	Nov.25,22	Nov.24,25
EMI TEST Receiver	R&S	ESR26	101734	Feb.25,22	Feb.24,24
EMI TEST Receiver	R&S	ESR26	101734	Feb.24,24	Feb.23,26
EMI TEST Receiver	R&S	ESW44	101973	Feb.25,22	Feb.24,24
EMI TEST Receiver	R&S	ESW44	101973	Feb.24,24	Feb.23,26
Bilog Antenna	SCHWARZBECK	VULB 9163	1264	Feb.28,22	Feb.27,24
Bilog Antenna	SCHWARZBECK	VULB 9163	1264	Feb.27,24	Feb.26,26
Horn Antenna	ETS-LINDGREN	3117	227836	Aug.22,22	Aug.21,24
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Feb.23,22	Feb.22,24
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Feb.22,24	Feb.21,26
Horn Antenna	Steatite Q-par Antennas	QMS 00208	23485	Aug.22,22	Aug.21,24
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.23,22	Feb.22,24
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.22,24	Feb.21,26
WIDEBANDRADIO COMMUNICATION TESTER	R&S	CMW500	169399	Jun.27,22	Jun.26,24
Test Software	EMC32	EMC32	N/A	N/A	N/A
Test Software	ELEKTRA	ELEKTRA4.32	N/A	N/A	N/A
Open Switch and Control Unit	R&S	OSP220	101964	Oct.01,22	Sep.30,24
DC Source	HYELEC	HY3010B	551016	Aug.31,22	Aug.30,24
Hygrothermograph	DELI	20210528	SZ014	Sep.06,22	Sep.05,24
PC	LENOVO	E14	HRSW0024	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-7.00M	N/A	N/A	N/A
TMC-AMI18843A(CABLE)	R&S	HF290-NMNM-4.00M	N/A	N/A	N/A
CABLE	R&S	W13.02	N/A	Apr.28,23	Apr.27,24
CABLE	R&S	W12.14	N/A	Apr.28,23	Apr.27,24
CABLE	R&S	J12J103539-00-1	SEP-03-20-069	Apr.28,23	Apr.27,24
CABLE	R&S	J12J103539-00-1	SEP-03-20-070	Apr.28,23	Apr.27,24
Temperature Chamber	votsch	VT4002	58566078100050	May.31,22	May.30,24

NOTE: 1. The calibration interval of the above test instruments is 12 /24/ 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.

3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 525120; The Designation No. is CN1171.

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	ME310M1-W2 / ME310M1-W1	
BRAND NAME	Telit Cinterion	
MODEL NAME	ME310M1-W2 / ME310M1-W1	
NOMINAL VOLTAGE	EUT 3.8Vdc	
MODULATION TECHNOLOGY	**CAT-M / NB-IOT :LTE**	BPSK, QPSK, 16QAM
FREQUENCY RANGE CAM-T	**LTE Band 14 Channel Bandwidth: 5MHz**	790.5MHz ~ 795.5MHz
	LTE Band 14 Channel Bandwidth: 10MHz	793MHz
	LTE Band 26 (Channel Bandwidth: 1.4MHz)	814.7MHz ~ 823.3MHz
	LTE Band 26 (Channel Bandwidth: 3MHz)	815.5MHz ~ 822.5MHz
	LTE Band 26 (Channel Bandwidth: 5MHz)	816.5MHz ~ 821.5MHz
	LTE Band 26 (Channel Bandwidth: 10MHz)	819MHz
FREQUENCY RANGE NB-IOT	**LTE Band 14 (Sub-carrier Speacing: 3.75/15KHz)**	788.1MHz ~ 797.9MHz
	LTE Band 26 (Sub-carrier Speacing: 3.75/15KHz)	814.2MHz ~ 823.8MHz
EMISSION DESIGNATOR CAM-T	**LTE Band 14 Channel Bandwidth: 5MHz**	QPSK: 1M08G7D
		16QAM: 1M08W7D
	LTE Band 14 Channel Bandwidth: 10MHz	QPSK: 1M07G7D
		16QAM: 1M07W7D
	LTE Band 26 (Channel Bandwidth: 1.4MHz)	QPSK: 1M08G7D
		16QAM: 1M08W7D
	LTE Band 26 (Channel Bandwidth: 3MHz)	QPSK: 1M08G7D
		16QAM: 1M08W7D
	LTE Band 26 (Channel Bandwidth: 5MHz)	QPSK: 1M08G7D
		16QAM: 1M07W7D
	LTE Band 26 (Channel Bandwidth: 10MHz)	QPSK: 1M08G7D
		16QAM: 1M07W7D
EMISSION DESIGNATOR NB-IOT	**LTE Band 14 (Sub-carrier Speacing: 3.75KHz)**	BPSK: 44K33G7D
		QPSK: 48K87W7D
	LTE Band 14 (Sub-carrier Speacing: 15KHz)	BPSK: 122K2G7D
		QPSK: 189K5W7D

	LTE Band 26 (Sub-carrier Speacing: 3.75KHz)	BPSK: 44K66G7D
		QPSK: 49K15W7D
	LTE Band 26 (Sub-carrier Speacing: 15KHz)	BPSK: 120K0G7D
		QPSK: 121K6W7D
MAX. EIRP POWER CAM-T	**LTE Band 14 Channel Bandwidth: 5MHz**	299.92mW
	LTE Band 14 Channel Bandwidth: 10MHz	300.61mW
	LTE Band 26 (Channel Bandwidth: 1.4MHz)	323.59mW
	LTE Band 26 (Channel Bandwidth: 3MHz)	316.23mW
	LTE Band 26 (Channel Bandwidth: 5MHz)	319.89mW
	LTE Band 26 (Channel Bandwidth: 10MHz)	324.34mW
MAX. EIRP POWER NB-IOT	**LTE Band 14 (Sub-carrier Speacing: 3.75KHz)**	298.54mW
	LTE Band 14 (Sub-carrier Speacing: 15KHz)	302mW
	LTE Band 26 (Sub-carrier Speacing: 3.75KHz)	306.2mW
	LTE Band 26 (Sub-carrier Speacing: 15KHz)	310.46mW
ANTENNA TYPE	1/4 1 Antenna	
ANTENNA GAIN	2.14 dBi for LTE Band 14/ LTE Band 26	
HW VERSION	0.0	
SW VERSION	ME310M1-W2: M0U.100001/ME310M1-W1: M0U.000001	
I/O PORTS	Refer to user's manual	
DATA CABLE	N/A	
EXTREME TEMPERATURE	-40-85 ℃	
EXTREME VOLTAGE	2.5V - 4.5V	

NOTE:

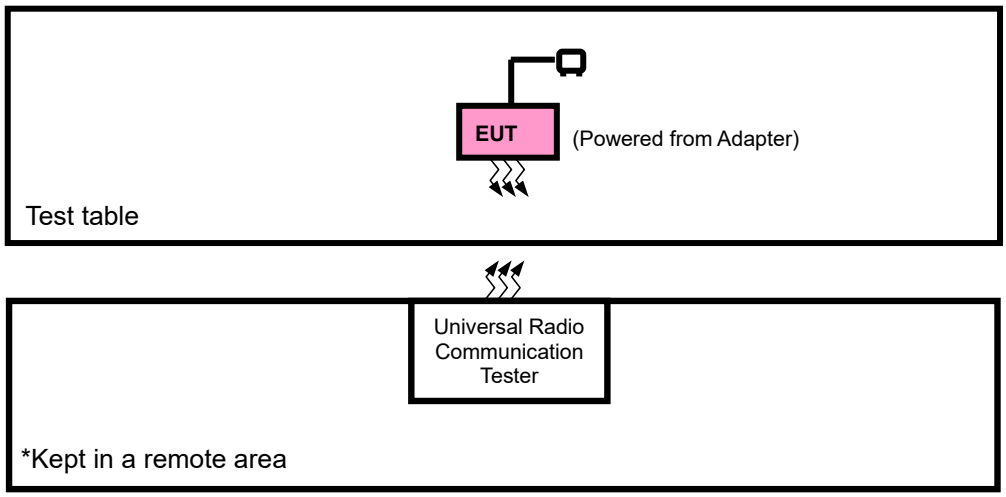
1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

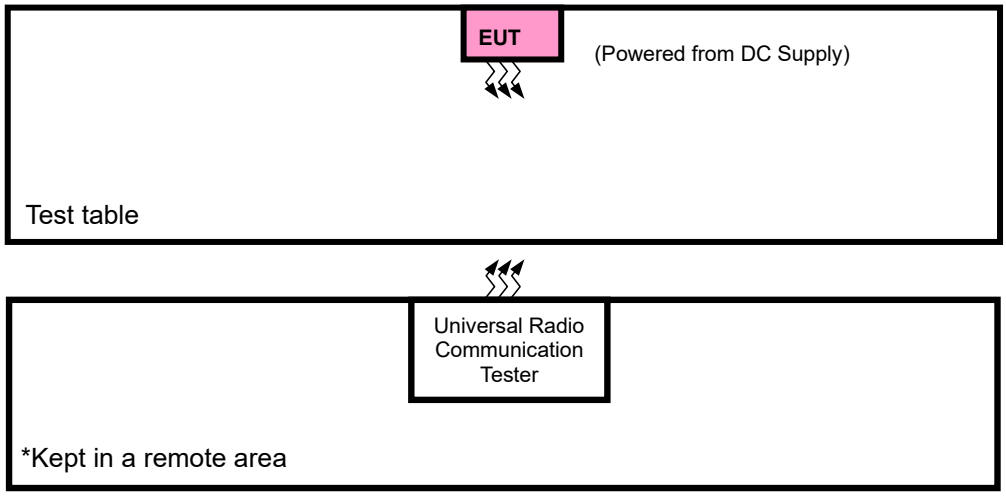
MODULATION MODE	TX FUNCTION
LTE	1TX/1RX

3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
4. Antenna gain and EUT conducted cable loss are provided by the customer, and the laboratory will record the results based on these items that involve these two parameters.

2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION TEST





2.3 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Laptop	Lenovo	ThinkPad E14	HRSW00024	N/A
2	DC Source	HYELEC	HY3010B	551016	N/A
3	Adapter	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable, 1.0m;
2	USB Line: Unshielded, Detachable, 1.0m;

2.4 DESCRIPTION OF TEST MODES

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

EUT CONFIGURE MODE	DESCRIPTION
A	EUT + Adapter + USB Cable with LTE link
B	EUT + DC Source with LTE link

CAT-M LTE BAND 14 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	23305 to 23355	23305, 23330, 23355	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23330	23330	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	23330	23330	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	23305 to 23355	23305, 23330, 23355	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
		23330	23330	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	23330	23330	10MHz	QPSK,16QAM	1 RB / 0 RB Offset 50 RB / 0 RB Offset
A	BAND EDGE	23305 to 23355	23305	5MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			23355	5MHz	QPSK,16QAM, 64QAM	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		23300	23330	10MHz	QPSK,16QAM, 64QAM	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
						1 RB / 49 RB Offset
						/
A	CONDUCTED EMISSION	23305 to 23355	23305, 23330, 23355	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23330	23330	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	23305 to 23355	23330	5MHz	QPSK	1 RB / 0 RB Offset
		23330	23330	10MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

NB-IOT LTE BAND 14 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	MODE
A	ERP	23282 to 23378	23282, 23330, 23378	BPSK,QPSK	1 RB / 0 RB Offset
		23330	23330	BPSK,QPSK	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	23330	23330	BPSK,QPSK	50 RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	23282 to 23378	23282, 23330, 23378	BPSK,QPSK	25 RB / 0 RB Offset
		23330	23330	BPSK,QPSK	50 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	23330	23330	BPSK,QPSK	1 RB / 0 RB Offset 50 RB / 0 RB Offset
A	BAND EDGE	23282 to 23378	23282	BPSK,QPSK	1 RB / 0 RB Offset
					25 RB / 0 RB Offset
			23378	BPSK,QPSK	1 RB / 24 RB Offset
					25 RB / 0 RB Offset
		23300	23330	BPSK,QPSK	1 RB / 0 RB Offset
					50 RB / 0 RB Offset
					1 RB / 49 RB Offset
					/
A	CONDUCTED EMISSION	23282 to 23378	23282, 23330, 23378	BPSK,QPSK	1 RB / 0 RB Offset
		23330	23330	BPSK,QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	23282 to 23378	23330	QPSK	1 RB / 0 RB Offset
		23330	23330	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

CAM-T LTE BAND 26 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	26697 to 26783	26697, 26740, 26783	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
		26705 to 26775	26705, 26740, 26775	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
		26715 to 26765	26715, 26740, 26765	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		26740	26740	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	26740	26740	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	26697 to 26783	26697, 26740, 26783	1.4MHz	QPSK,16QAM	6 RB / 0 RB Offset
		26705 to 26775	26705, 26740, 26775	3MHz	QPSK,16QAM	15 RB / 0 RB Offset
		26715 to 26765	26715, 26740, 26765	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
		26740	26740	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	26740	26740	10MHz	QPSK,16QAM	1 RB / 0 RB Offset 50 RB / 0 RB Offset
A	BAND EDGE	26697 to 26783	26697	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
						6 RB / 0 RB Offset
			26783	1.4MHz	QPSK,16QAM	1 RB / 5 RB Offset
						6 RB / 0 RB Offset
		26705 to 26775	26705	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
						15 RB / 0 RB Offset
			26775	3MHz	QPSK,16QAM	1 RB / 14 RB Offset
						15 RB / 0 RB Offset
		26715 to 26765	26715	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			26765	5MHz	QPSK,16QAM	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		26740	26740	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
			26740	10MHz	QPSK,16QAM	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
A	CONDUCTED EMISSION	26697 to 26783	26697, 26740, 26783	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
		26705 to 26775	26705, 26740, 26775	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
		26715 to 26765	26715, 26740, 26765	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		26740	26740	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	26697 to 26783	26740	1.4MHz	QPSK	1 RB / 0 RB Offset
		26705 to 26775	26740	3MHz	QPSK	1 RB / 0 RB Offset
		26715 to 26765	26740	5MHz	QPSK	1 RB / 0 RB Offset
		26740	26740	10MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

NB-IOT LTE BAND 26 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	MODE
A	ERP	26692 to 26788	26697, 26740, 26783	BPSK,QPSK	1 RB / 0 RB Offset
B	FREQUENCY STABILITY	26740	26740	BPSK,QPSK	50 RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	26692 to 26788	26697, 26740, 26783	BPSK,QPSK	6 RB / 0 RB Offset
		26740	26740	BPSK,QPSK	50 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	26740	26740	BPSK,QPSK	1 RB / 0 RB Offset 50 RB / 0 RB Offset
A	BAND EDGE	26692 to 26788	26692	BPSK,QPSK	1 RB / 0 RB Offset
					6 RB / 0 RB Offset
			26788	BPSK,QPSK	1 RB / 5 RB Offset
					6 RB / 0 RB Offset
		26740	26740	BPSK,QPSK	1 RB / 0 RB Offset
					50 RB / 0 RB Offset
			26740	BPSK,QPSK	1 RB / 49 RB Offset
					50 RB / 0 RB Offset
A	CONDUCTED EMISSION	26692 to 26788	26697, 26740, 26783	BPSK,QPSK	1 RB / 0 RB Offset
		26740	26740	BPSK,QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	26692 to 26788	26740	QPSK	1 RB / 0 RB Offset
		26740	26740	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
EIRP(ERP)	24deg. C, 60%RH	DC 4.5V By Adapter	Hanwen Xu
FREQUENCY STABILITY	24deg. C, 61%RH	DC 2.5V/ 3.8V/ 4.5V By Battery	James Fu
OCCUPIED BANDWIDTH	24deg. C, 61%RH	DC 4.5V By Adapter	James Fu
BAND EDGE	24deg. C, 61%RH	DC 4.5V By Adapter	James Fu
CONDUCTED EMISSION	24deg. C, 61%RH	DC 4.5V By Adapter	James Fu
RADIATED EMISSION	23deg. C, 70%RH	DC 4.5V By Adapter	Hanwen Xu

2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC 47 CFR Part 2

FCC 47 CFR Part 90

ANSI/TIA/EIA-603-D

ANSI/TIA/EIA-603-E

ANSI C63.26-2015

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

3 TEST TYPES AND RESULTS

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

47 CFR 90.542(a)(6)
Control stations and mobile stations transmitting in the 758–768 MHz band and the 788–798 MHz band are limited to 30 watts ERP.
47 CFR 90.542(a)(7)
Portable stations (hand-held devices) transmitting in the 758–768 MHz band and the 788–798 MHz band are limited to 3 watts ERP.
Per FCC Part 90.635(a)(b)

The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

3.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

Per KDB 971168 D01 Power Meas License Digital Systems v03r01 or subclause 5.2.5.5 of ANSI C63.26-2015, the relevant equation for determing the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

ERP or EIRP = $P_{Meas} + G_T – L_C$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively

(expressed in the same units as P_{Meas}, typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

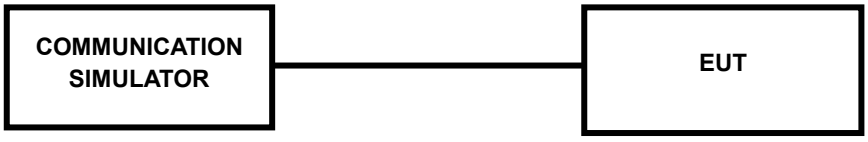
L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB

CONDUCTED POWER MEASUREMENT:

a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

3.1.3 TEST SETUP

CONDUCTED POWER MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

LTE Band 14

Band/BW	Modulation	RB Size	RB Offset	Low CH 23305	Mid CH 23330	High CH 23355
				Frequency 790.5 MHz	Frequency 793 MHz	Frequency 795.5 MHz
14/ 5	QPSK	1	0	22.39	22.47	22.47
		1	5	22.39	22.40	22.46
		3	0	22.45	22.50	22.45
		3	3	22.63	22.62	22.63
		6	0	22.26	22.32	22.21
	16QAM	1	0	22.25	22.34	22.33
		1	5	22.33	22.33	22.43
		3	0	22.41	22.47	22.35
		3	3	22.49	22.49	22.53
		6	0	22.14	22.15	22.16

Band/BW	Modulation	RB Size	RB Offset	/	Mid CH 23330	/
				/	Frequency 793 MHz	/
14/ 10	QPSK	1	0	/	22.52	/
		1	5	/	22.54	/
		3	0	/	22.59	/
		3	3	/	22.64	/
		6	0	/	22.35	/
	16QAM	1	0	/	22.45	/
		1	5	/	22.42	/
		3	0	/	22.58	/
		3	3	/	22.50	/
		6	0	/	22.28	/

LTE Band 26

Band/BW	Modulation	RB Size	RB Offset	Low CHG 26697	Mid CH 26740	High CH 26783
				Frequency 814.7 MHz	Frequency 819 MHz	Frequency 823.3 MHz
26/ 1.4	QPSK	1	0	22.58	22.76	22.64
		1	5	22.63	22.61	22.60
		3	0	22.69	22.79	22.84
		3	3	22.63	22.74	22.78
		6	0	22.84	22.96	22.83
	16QAM	1	0	22.48	22.63	22.62
		1	5	22.45	22.49	22.54
		3	0	22.61	22.74	22.73
		3	3	22.54	22.58	22.75
		6	0	22.60	22.72	22.76

Band/BW	Modulation	RB Size	RB Offset	Low CHG 26705	Mid CH 26740	High CH 26775
				Frequency 815.5 MHz	Frequency 819 MHz	Frequency 822.5 MHz
26/ 3	QPSK	1	0	22.48	22.75	22.68
		1	5	22.57	22.54	22.66
		3	0	22.70	22.84	22.74
		3	3	22.64	22.70	22.86
		6	0	22.83	22.86	22.82
	16QAM	1	0	22.55	22.56	22.64
		1	5	22.52	22.56	22.50
		3	0	22.63	22.72	22.74
		3	3	22.57	22.60	22.76
		6	0	22.68	22.75	22.76

Band/BW	Modulation	RB Size	RB Offset	Low CHG 26715	Mid CH 26740	High CH 26765
				Frequency 816.5 MHz	Frequency 819 MHz	Frequency 821.5 MHz
26/ 5	QPSK	1	0	22.52	22.73	22.77
		1	5	22.58	22.51	22.58
		3	0	22.73	22.76	22.85
		3	3	22.58	22.74	22.82
		6	0	22.77	22.91	22.80
	16QAM	1	0	22.44	22.54	22.53
		1	5	22.50	22.47	22.46
		3	0	22.61	22.63	22.79
		3	3	22.49	22.61	22.85
		6	0	22.65	22.76	22.72

Band/BW	Modulation	RB Size	RB Offset	/	Mid CH 26740	/
				/	Frequency 819 MHz	/
26/ 10	QPSK	1	0	/	22.78	/
		1	5	/	22.66	/
		3	0	/	22.87	/
		3	3	/	22.85	/
		6	0	/	22.97	/
	16QAM	1	0	/	22.67	/
		1	5	/	22.61	/
		3	0	/	22.75	/
		3	3	/	22.73	/
		6	0	/	22.86	/

NB-IOT

LTE Band 14						
Sub-carrier Speacing (KHz)	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		23281	23330	23379
		Frequence (MHz)		788.1	793	797.9
3.75	BPSK	1	0	22.56	22.57	22.58
		1	47	22.55	22.59	22.61
	QPSK	1	0	22.56	22.55	22.58
		1	47	22.55	22.53	22.61
15	BPSK	1	0	22.61	**22.66**	22.60
		1	11	22.59	22.56	22.61
	QPSK	1	0	22.61	22.55	22.58
		1	11	22.62	22.60	22.63
		12	0	21.42	21.54	21.45

LTE Band 26_Part90S						
Sub-carrier Speacing (KHz)	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		26692	26740	26788
		Frequence (MHz)		814.2	819	823.8
3.75	BPSK	1	0	22.57	22.72	22.71
		1	47	22.62	22.70	22.69
	QPSK	1	0	22.55	22.69	22.67
		1	47	22.59	22.68	22.66
15	BPSK	1	0	22.57	**22.78**	22.72
		1	11	22.48	22.69	22.61
	QPSK	1	0	22.57	22.74	22.65
		1	11	22.58	22.73	22.75
		12	0	21.47	21.56	21.43

ERP

LTE BAND 14

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23305	790.5	22.63	2.14	24.77	299.92	3
23330	793	22.62	2.14	24.76	299.23	3
23355	795.5	22.63	2.14	24.77	299.92	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23305	790.5	22.49	2.14	24.63	290.4	3
23330	793	22.49	2.14	24.63	290.4	3
23355	795.5	22.53	2.14	24.67	293.09	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
-	-	-	-	-	-	-
23330	793	22.64	2.14	24.78	300.61	3
-	-	-	-	-	-	-

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
-	-	-	-	-	-	-
23330	793	22.58	2.14	24.72	296.48	3
-	-	-	-	-	-	-

REMARKS: ERP Output Power (dBm) = ERP (dBm) -2.15(dB).

LTE BAND 26

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26697	814.7	22.84	2.14	24.98	314.77	100
26740	819	22.96	2.14	25.1	323.59	100
26783	823.3	22.84	2.14	24.98	314.77	100

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26697	814.7	22.61	2.14	24.75	298.54	100
26740	819	22.74	2.14	24.88	307.61	100
26783	823.3	22.76	2.14	24.9	309.03	100

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26705	815.5	22.83	2.14	24.97	314.05	100
26740	819	22.86	2.14	25	316.23	100
26775	822.5	22.86	2.14	25	316.23	100

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26705	815.5	22.68	2.14	24.82	303.39	100
26740	819	22.75	2.14	24.89	308.32	100
26775	822.5	22.76	2.14	24.9	309.03	100

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26715	816.5	22.77	2.14	24.91	309.74	100
26740	819	22.91	2.14	25.05	319.89	100
26765	821.5	22.85	2.14	24.99	315.5	100

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26715	816.5	22.65	2.14	24.79	301.3	100
26740	819	22.76	2.14	24.9	309.03	100
26765	821.5	22.85	2.14	24.99	315.5	100

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
-	-	-	-	-	-	-
26740	819	22.97	2.14	25.11	324.34	100
-	-	-	-	-	-	-

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
-	-	-	-	-	-	-
26740	819	22.86	2.14	25	316.23	100
-	-	-	-	-	-	-

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

NB-IOT

LTE B14 3.75KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23281	788.1	22.56	2.14	24.7	295.12	3
23330	793	22.59	2.14	24.73	297.17	3
23379	797.9	22.61	2.14	24.75	298.54	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23281	788.1	22.56	2.14	24.7	295.12	3
23330	793	22.55	2.14	24.69	294.44	3
23379	797.9	22.61	2.14	24.75	298.54	3

LTE B14 15KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23281	788.1	22.61	2.14	24.75	298.54	3
23330	793	22.66	2.14	24.8	302	3
23379	797.9	22.61	2.14	24.75	298.54	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23281	788.1	22.62	2.14	24.76	299.23	3
23330	793	22.6	2.14	24.74	297.85	3
23379	797.9	22.63	2.14	24.77	299.92	3

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

NB-IOT

LTE B26 3.75KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26692	814.2	22.62	2.14	24.76	299.23	100
26740	819	22.72	2.14	24.86	306.2	100
26788	823.8	22.71	2.14	24.85	305.49	100

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26692	814.2	22.59	2.14	24.73	297.17	100
26740	819	22.69	2.14	24.83	304.09	100
26788	823.8	22.67	2.14	24.81	302.69	100

LTE B26 15KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26692	814.2	22.57	2.14	24.71	295.8	100
26740	819	22.78	2.14	24.92	310.46	100
26788	823.8	22.72	2.14	24.86	306.2	100

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
26692	814.2	22.58	2.14	24.72	296.48	100
26740	819	22.74	2.14	24.88	307.61	100
26788	823.8	22.75	2.14	24.89	308.32	100

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked

3.2.2 TEST PROCEDURE

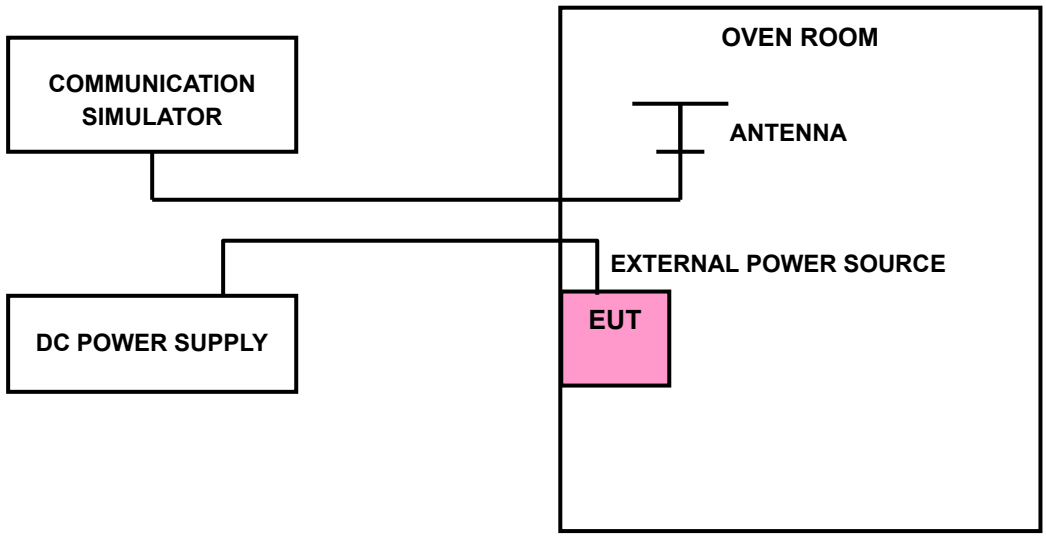
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

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

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

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

3.2.3 TEST SETUP



3.2.4 TEST RESULTS

Please Refer to Appendix Of this test report.

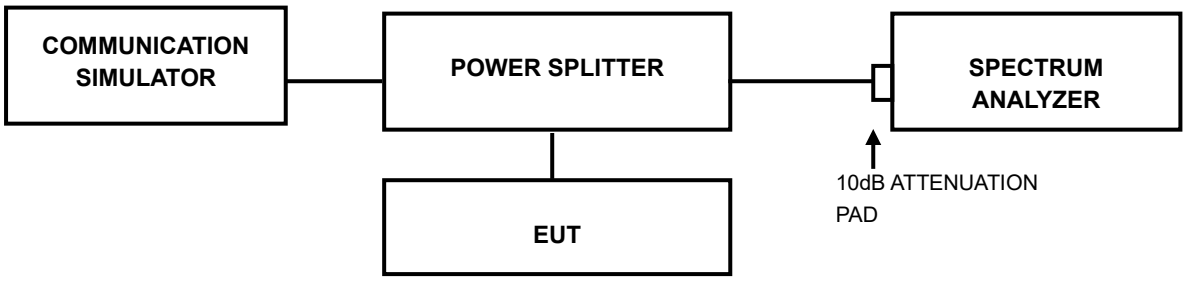
Note: VL = Low voltage(2.5V); VN/NV = Normal voltage(3.8V); VH = High voltage(4.5V);
NT = Normal temperature (25℃)

3.3 OCCUPIED BANDWIDTH MEASUREMENT

3.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

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.

3.3.2 TEST SETUP



3.3.3 TEST PROCEDURES

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

b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

3.3.4 TEST RESULTS

Please Refer to Appendix Of this test report.

3.4 EMISSION MASK MEASUREMENT

3.4.1 LIMITS OF EMISSION MASK MEASUREMENT

LTE Band14:
According to FCC part 90.543(e) shall be tested the emission mask.
(e) For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

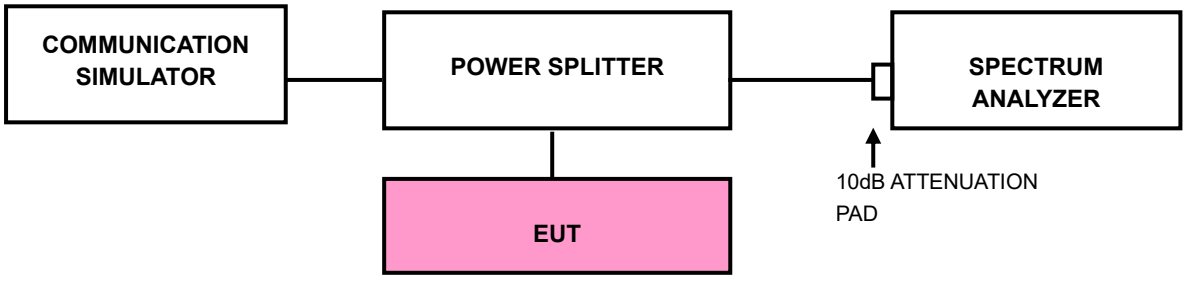
(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

LTE Band26:

According to FCC part 90.691 shall be tested the emission mask. For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

3.4.2 TEST SETUP



3.4.3 TEST PROCEDURES

a) Connect the transmitter to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.

b) Tune the analyzer to the nominal center frequency of the emission bandwidth (EBW).

c) Set the resolution bandwidth (RBW) ≧ 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.

d) Beyond the 1MHz band from the band edge, RBW=1MHz was used.

e) Set the video bandwidth (VBW) to ≧3 x RBW.

f) Select the average power (RMS) display detector.

g) Set the number of measurement points to ≧ 1001.

h) Use auto-coupled sweep time.

i) Perform the measurement over an interval of time when the transmission is continuous and at its maximum power level.

j) The RF fundamental frequency should be excluded against the limit line in the operating frequency band and use RBW is 10KHz or 100KHz.

k) Record the max trace plot into the test report.

3.4.4 TEST RESULTS

Please Refer to Appendix Of this test report.

3.5 CONDUCTED SPURIOUS EMISSIONS

3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

(1)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

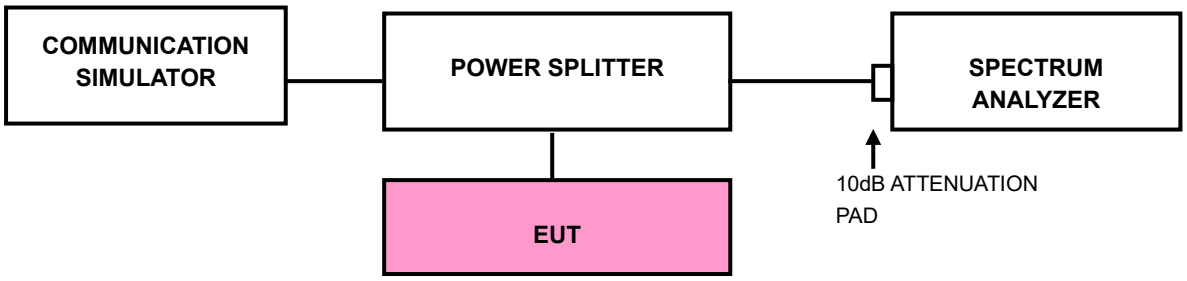
(2) For operations in the 763–775 MHz and 793–805 MHz bands, all emissions including harmonics in the band 1559– 1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

3.5.2 TEST PROCEDURE

a. The EUT makes a phone call to the communication simulator. All measurements were done at middle operational frequency range.

b. Measuring frequency range is from 9kHz up to a frequency including its 10th harmonic. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

3.5.3 TEST SETUP



3.5.4 TEST RESULTS

NOTE ：The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

Please Refer to Appendix Of this test report.

3.6 RADIATED EMISSION MEASUREMENT

3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

(1)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

(2) For operations in the 763–775 MHz and 793–805 MHz bands, all emissions including harmonics in the band 1559– 1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

3.6.2 TEST PROCEDURES

a. Substitution method is used for E.I.R.P 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 rotated 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.

b. The substitution horn antenna 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

c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.

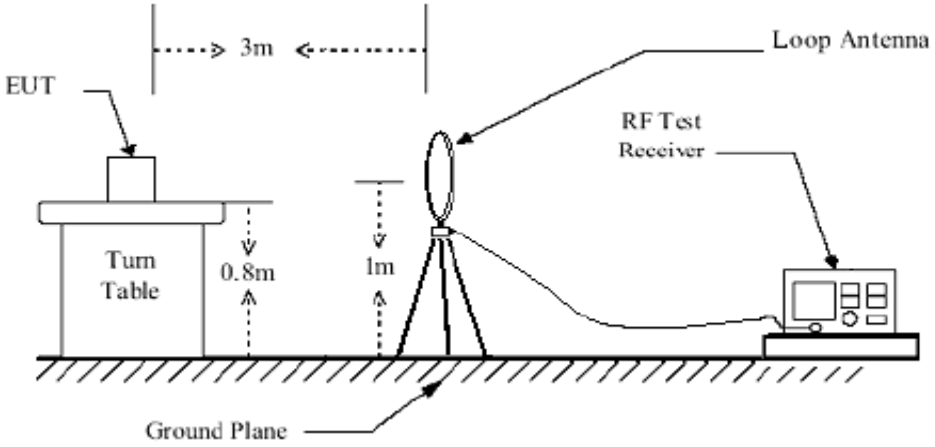
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.6.3 DEVIATION FROM TEST STANDARD

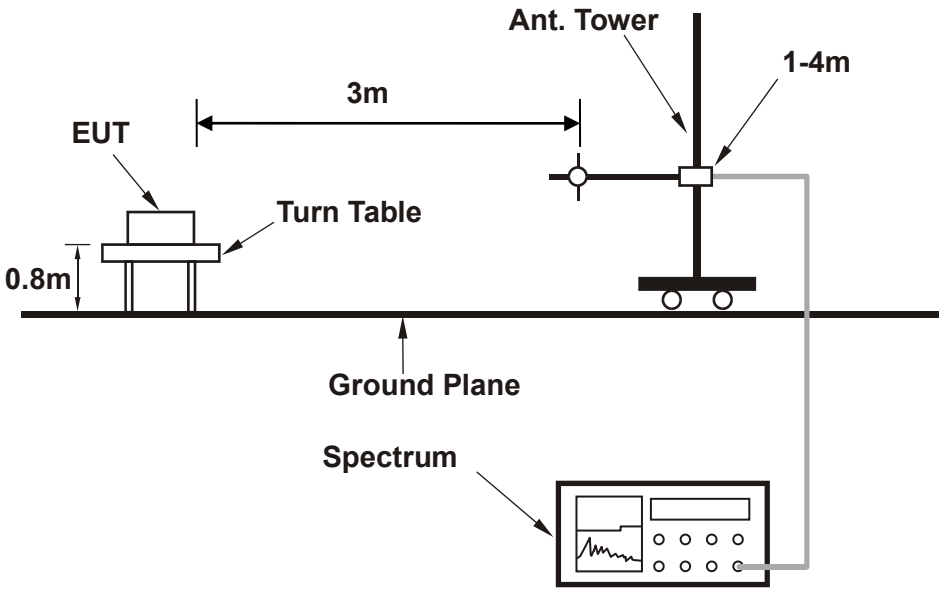
No deviation

3.6.4 TEST SETUP

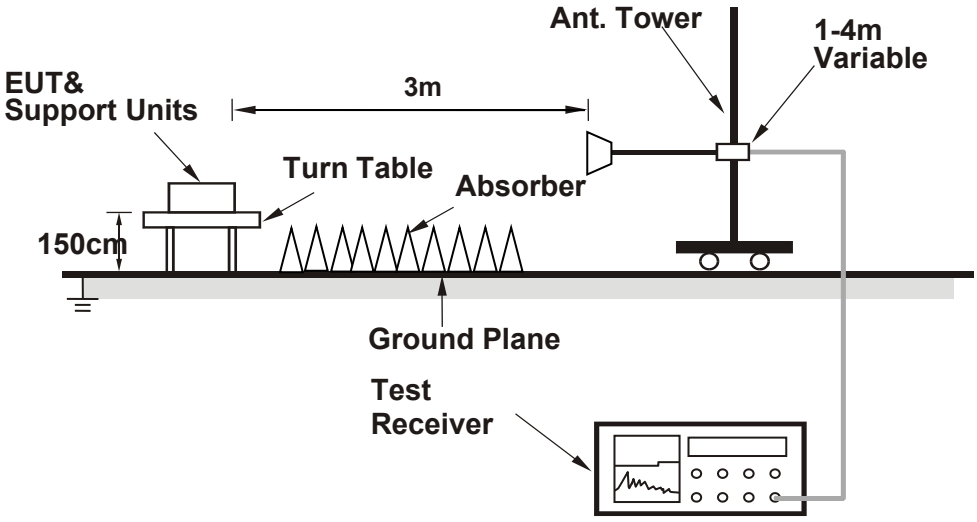
<Below 30MHz>



< Frequency Range 30MHz~1GHz >



< Frequency Range above 1GHz >



For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.6.5 TEST RESULTS

NOTE ：The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

BELOW 1GHz WORST-CASE DATA

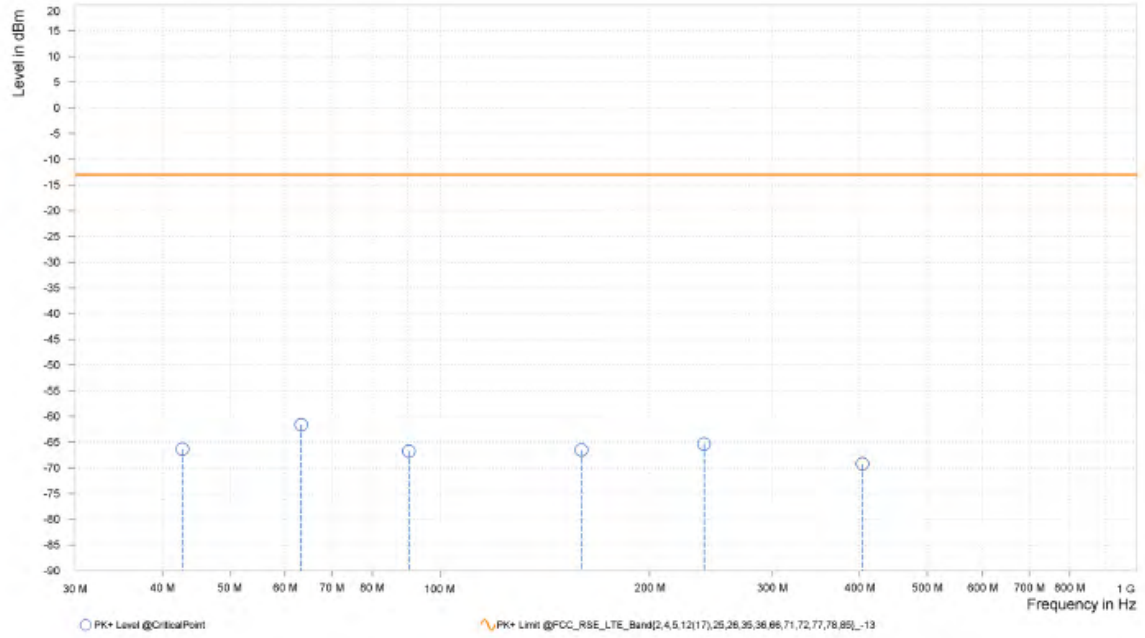
30 MHz – 1GHz data:

CAM-T LTE Band 26:

CHANNEL BANDWIDTH: 10MHz / QPSK

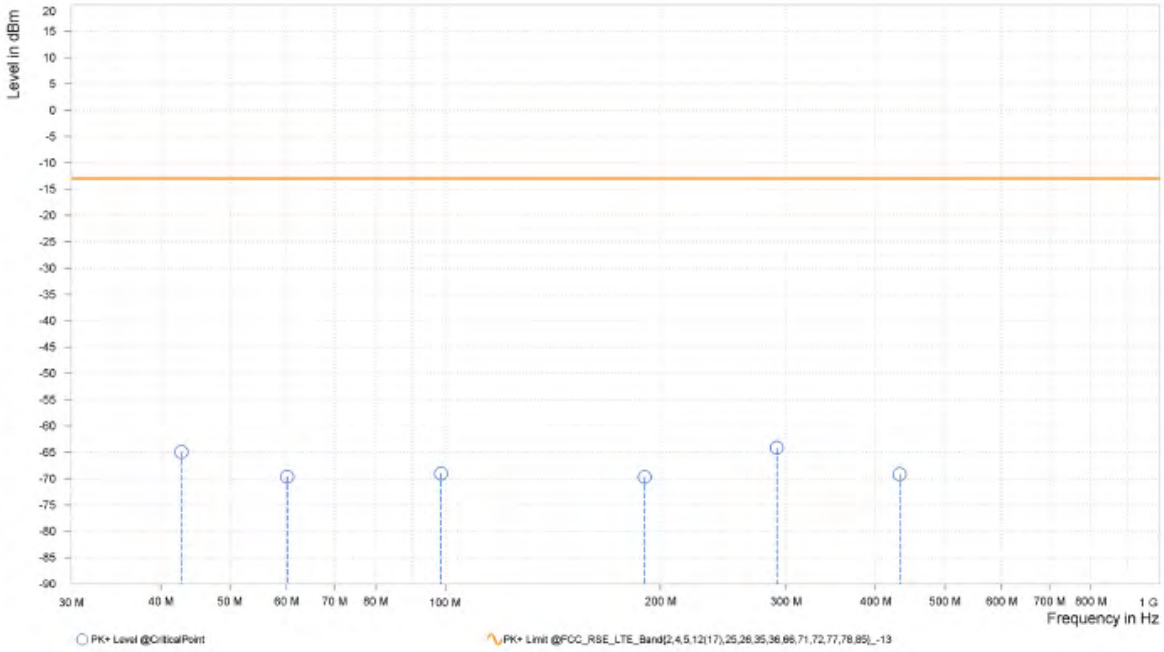
MODE	TX channel 26740	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	42.750	-66.37	-13.00	53.37	2.84	H	233.8	1.00
1	63.300	-61.60	-13.00	48.60	1.87	H	359	2.00
1	90.300	-66.75	-13.00	53.75	-1.40	H	354.9	2.00
1	159.650	-66.53	-13.00	53.53	-4.54	H	134.6	1.00
1	239.300	-65.36	-13.00	52.36	2.54	H	359.1	1.00
1	403.500	-69.22	-13.00	56.22	7.30	H	5	1.00



MODE	TX channel 26740	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	42.750	-64.92	-13.00	51.92	4.51	V	354.2	2.00
1	60.100	-69.61	-13.00	56.61	4.44	V	2.1	2.00
1	98.700	-69.02	-13.00	56.02	4.79	V	2.1	2.00
1	190.150	-69.73	-13.00	56.73	0.00	V	235.1	1.00
1	290.900	-64.16	-13.00	51.16	4.72	V	175.3	2.00
1	432.350	-69.12	-13.00	56.12	8.05	V	5.2	1.00



ABOVE 1GHz

Note: For higher frequency, the emission is too low to be detected.

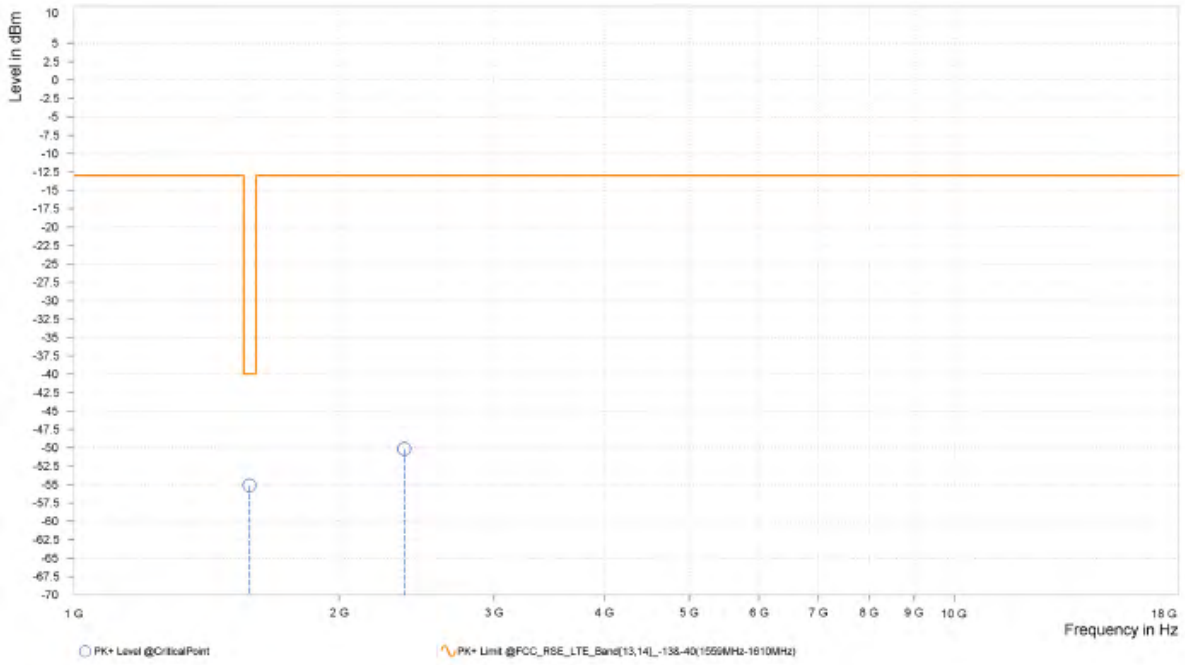
LTE B14

CHANNEL BANDWIDTH: 5MHz / QPSK

CH23330

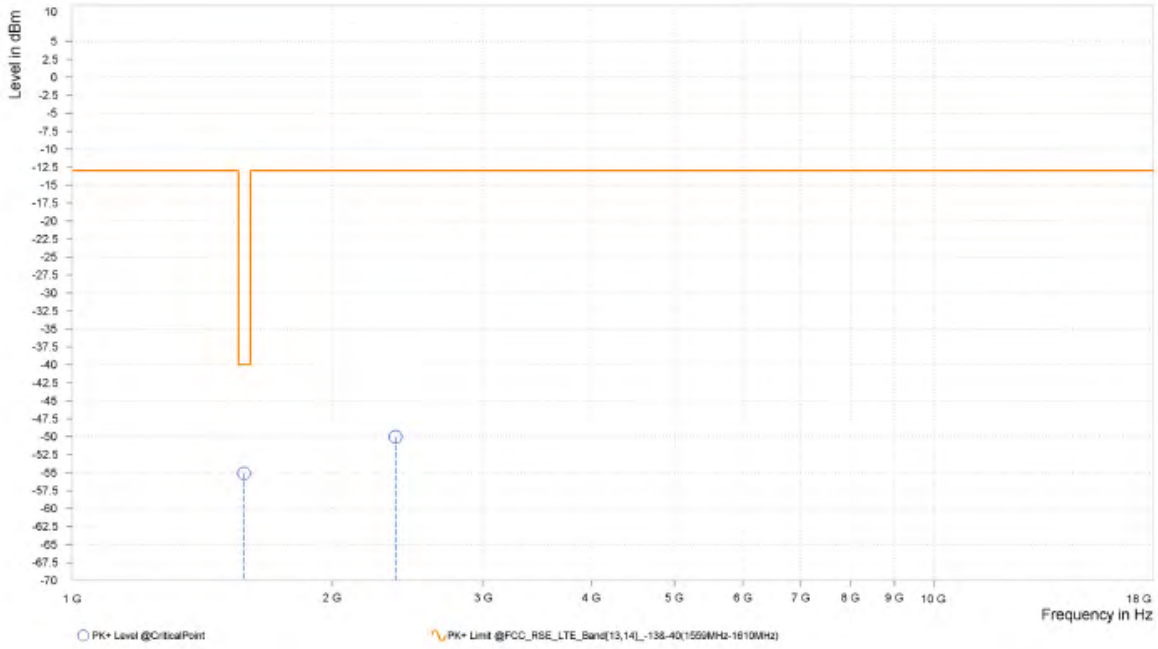
MODE	TX channel 23330	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,581.500	-55.10	-40.00	15.10	5.28	H	134.6	2.00
1	2,372.500	-50.17	-13.00	37.17	12.87	H	5.1	1.00



MODE	TX channel 23330	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,581.500	-55.09	-40.00	15.09	5.13	V	357.6	1.00
1	2,372.250	-50.04	-13.00	37.04	12.59	V	355	2.00

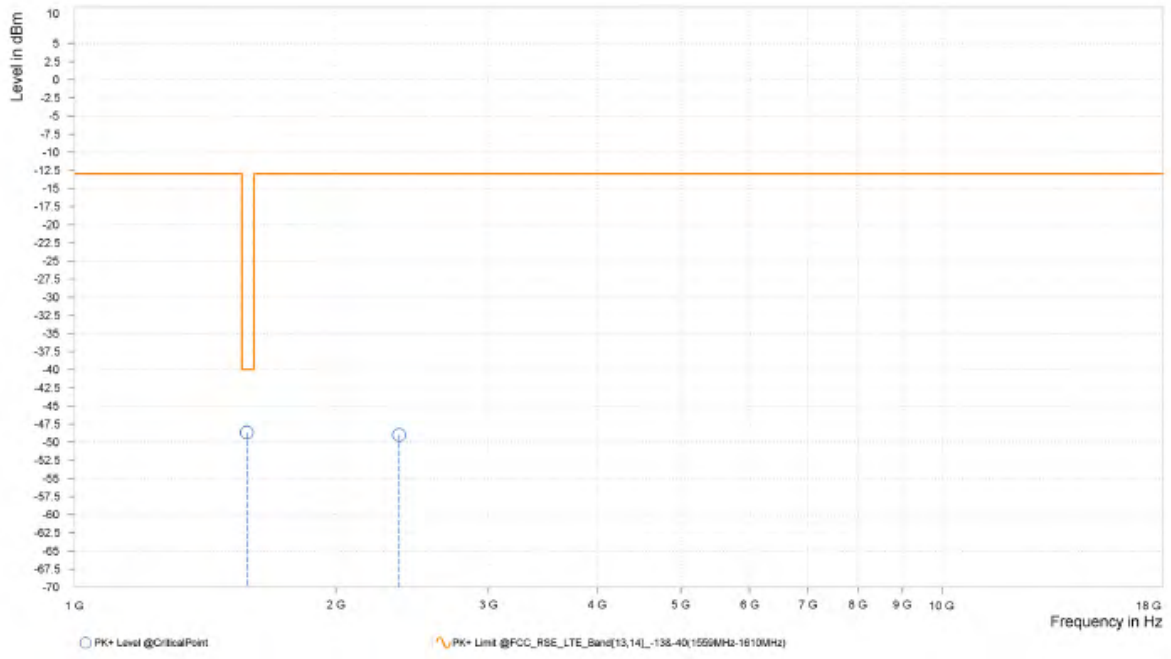


CHANNEL BANDWIDTH: 10MHz / QPSK

CH23330

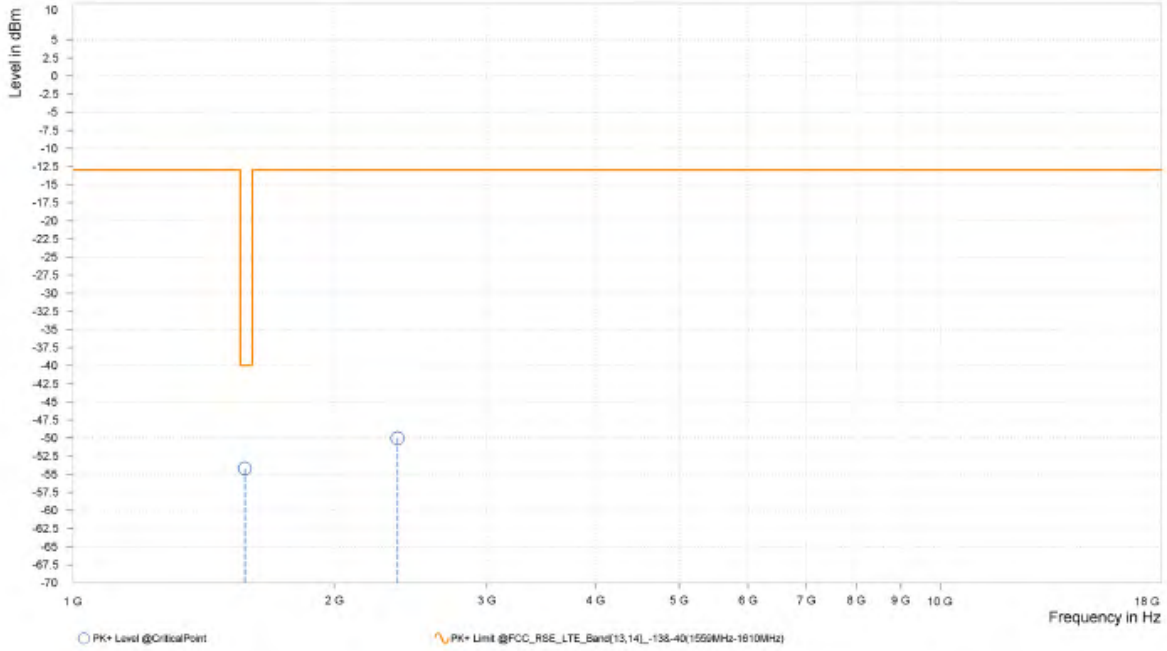
MODE	TX channel 23330	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,578.500	-48.66	-40.00	8.66	5.29	H	5	1.00
1	2,365.500	-49.00	-13.00	36.00	12.93	H	354.9	2.00



MODE	TX channel 23330	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,577.000	-54.23	-40.00	14.23	5.11	V	2.2	2.00
1	2,365.500	-50.03	-13.00	37.03	12.62	V	8.2	1.00

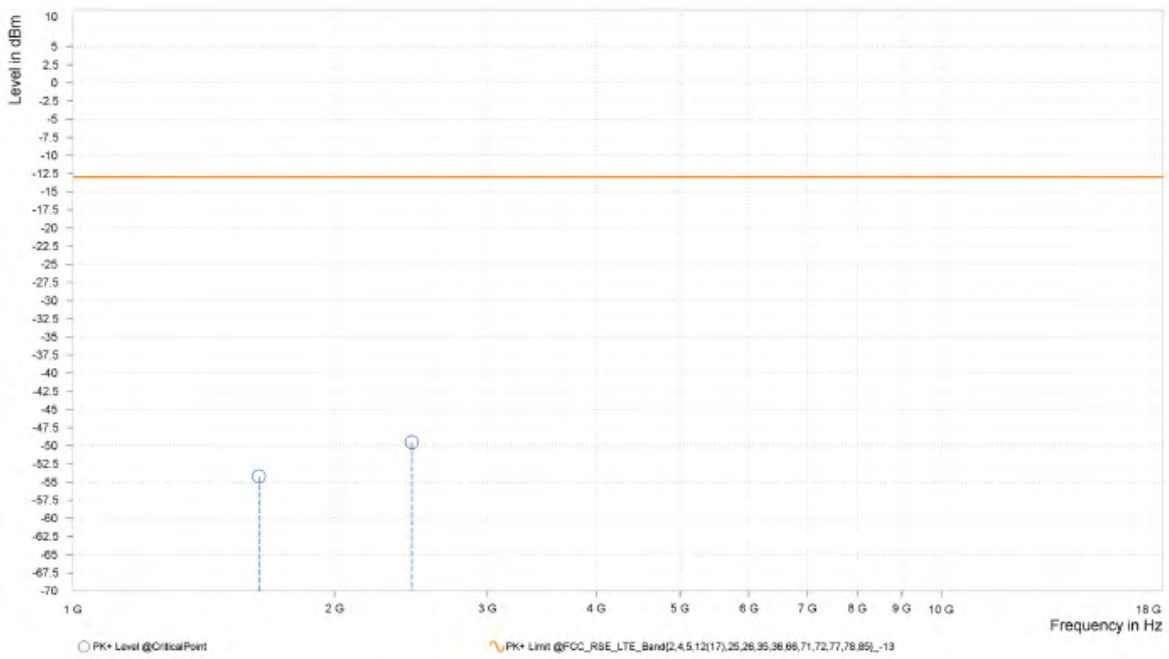


LTE BAND 26

CHANNEL BANDWIDTH: 1.4MHz / QPSK

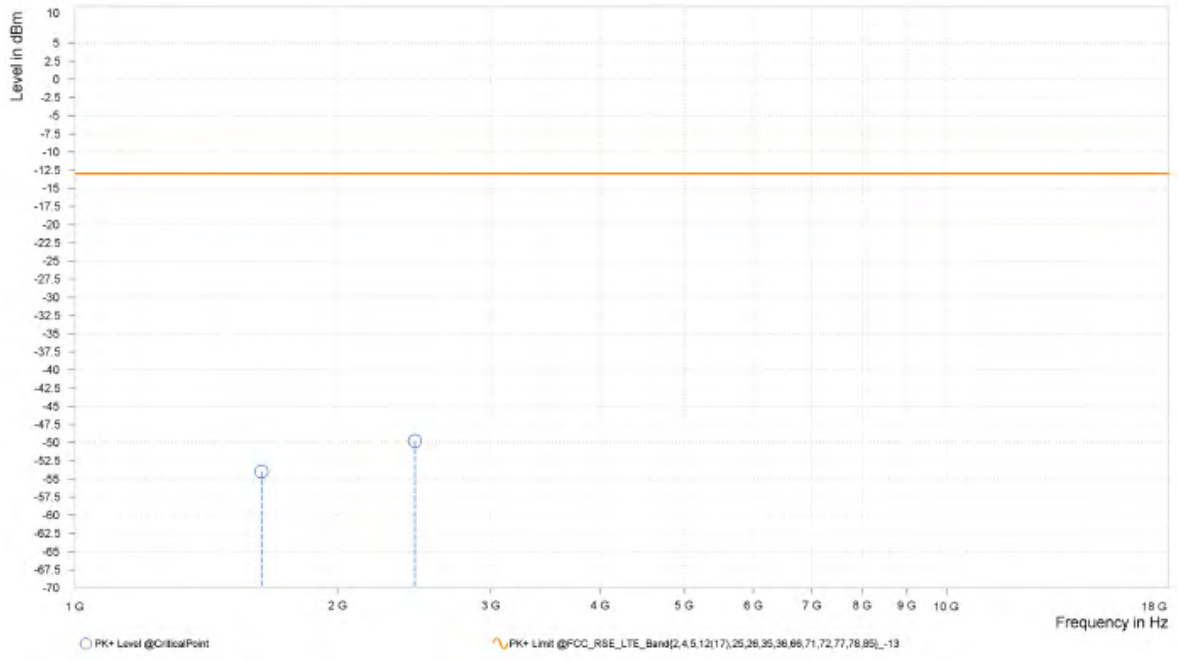
MODE	TX channel 26697	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,636.740	-54.22	-13.00	41.22	6.39	H	357.5	1.00
1	2,455.110	-49.50	-13.00	36.50	12.51	H	1	1.00



MODE	TX channel 26697	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,636.740	-54.01	-13.00	41.01	6.01	V	1	1.00
1	2,455.110	-49.79	-13.00	36.79	12.28	V	2.1	2.00

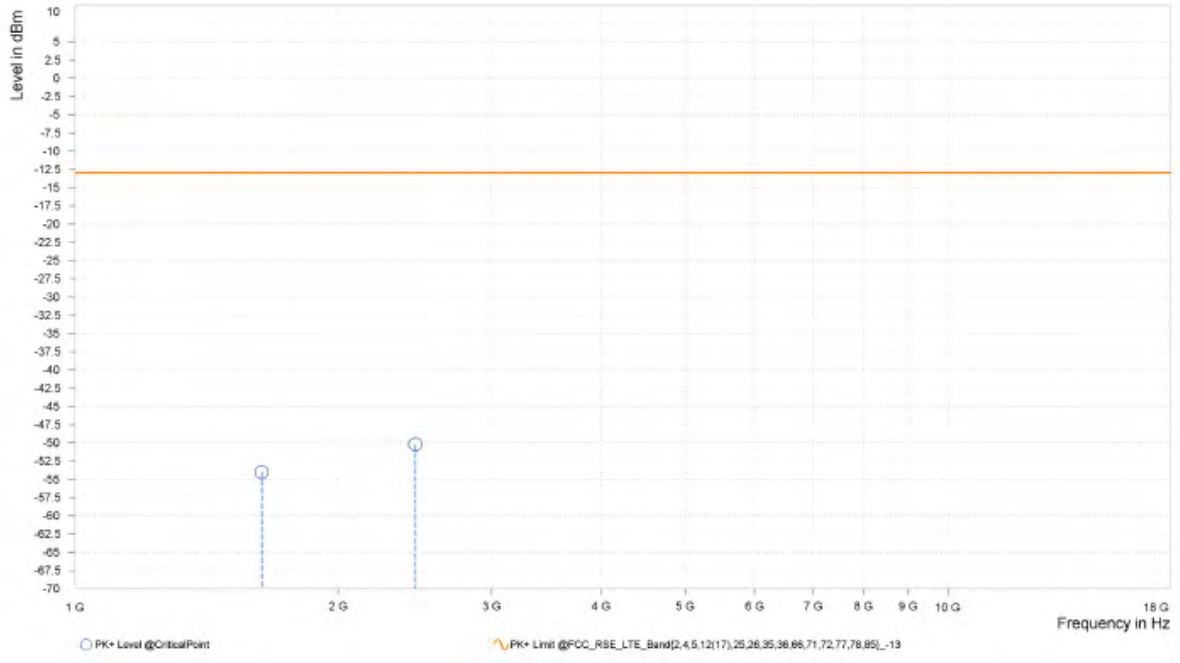


CHANNEL BANDWIDTH: 3MHz / QPSK

CH26740

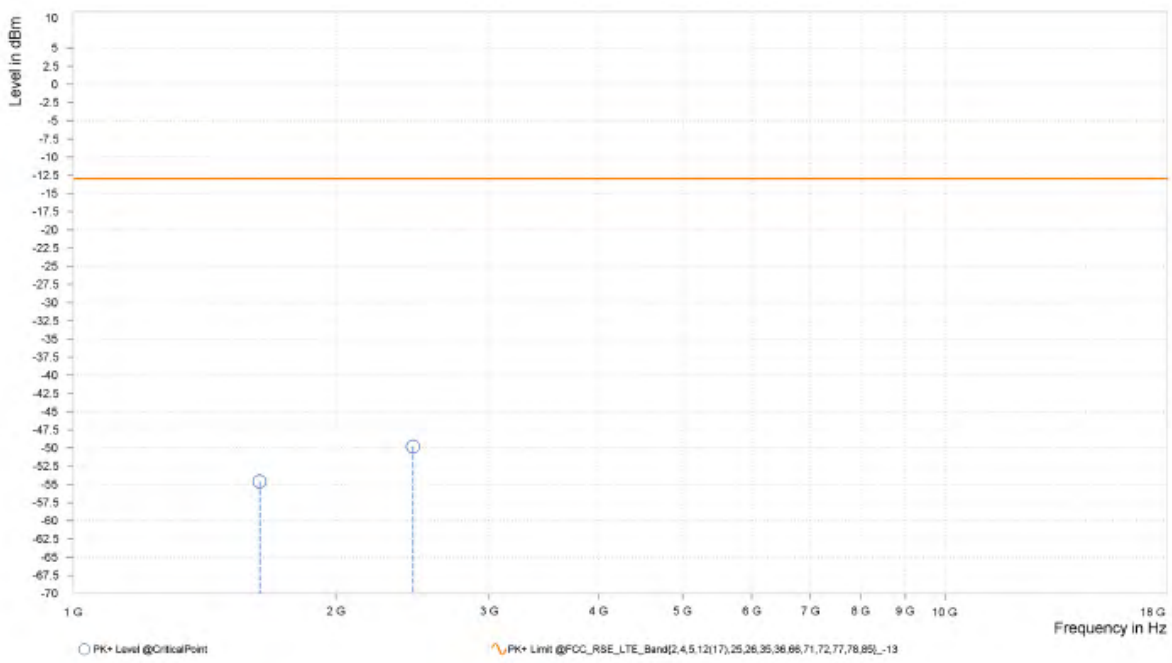
MODE	TX channel 26740	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,635.000	-54.03	-13.00	41.03	6.32	H	359	2.00
1	2,452.950	-50.23	-13.00	37.23	12.52	H	355.4	2.00



MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

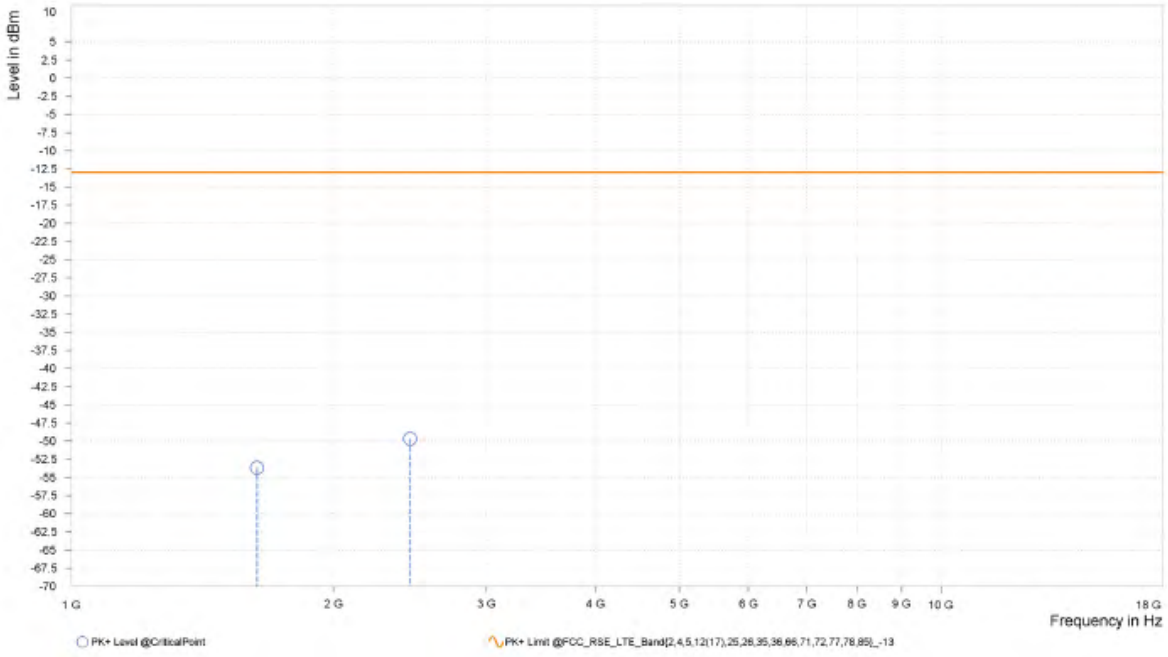
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,635.300	-54.60	-13.00	41.60	5.97	V	134.5	2.00
1	2,452.950	-49.80	-13.00	36.80	12.30	V	1	1.00



CHANNEL BANDWIDTH: 5MHz / QPSK

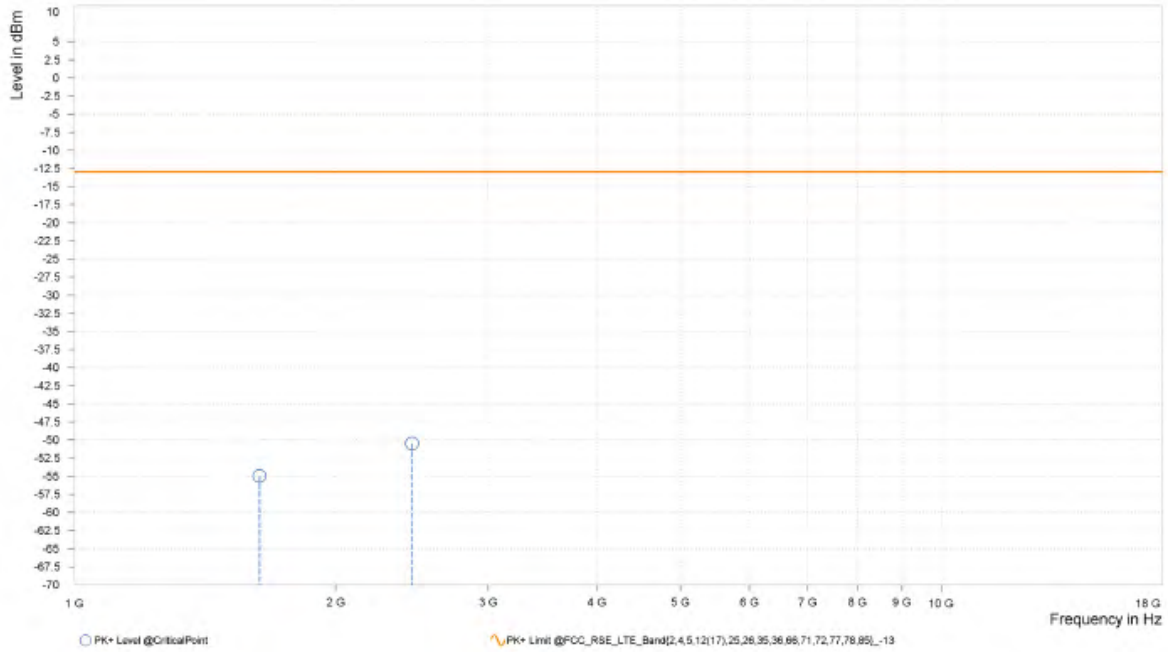
MODE	TX channel 26740	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,633.500	-53.66	-13.00	40.66	6.25	H	132.1	2.00
1	2,450.250	-49.68	-13.00	36.68	12.54	H	226.7	1.00



MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

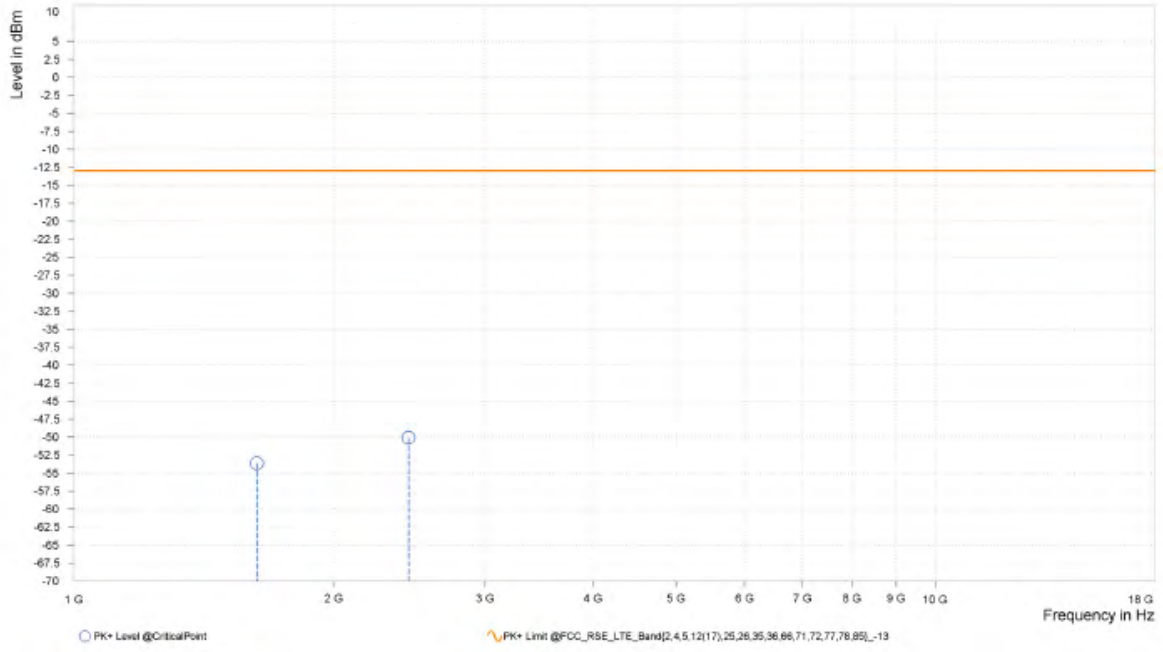
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,633.500	-54.96	-13.00	41.96	5.90	V	359	1.00
1	2,450.250	-50.46	-13.00	37.46	12.33	V	354.9	2.00



CHANNEL BANDWIDTH: 10MHz / QPSK

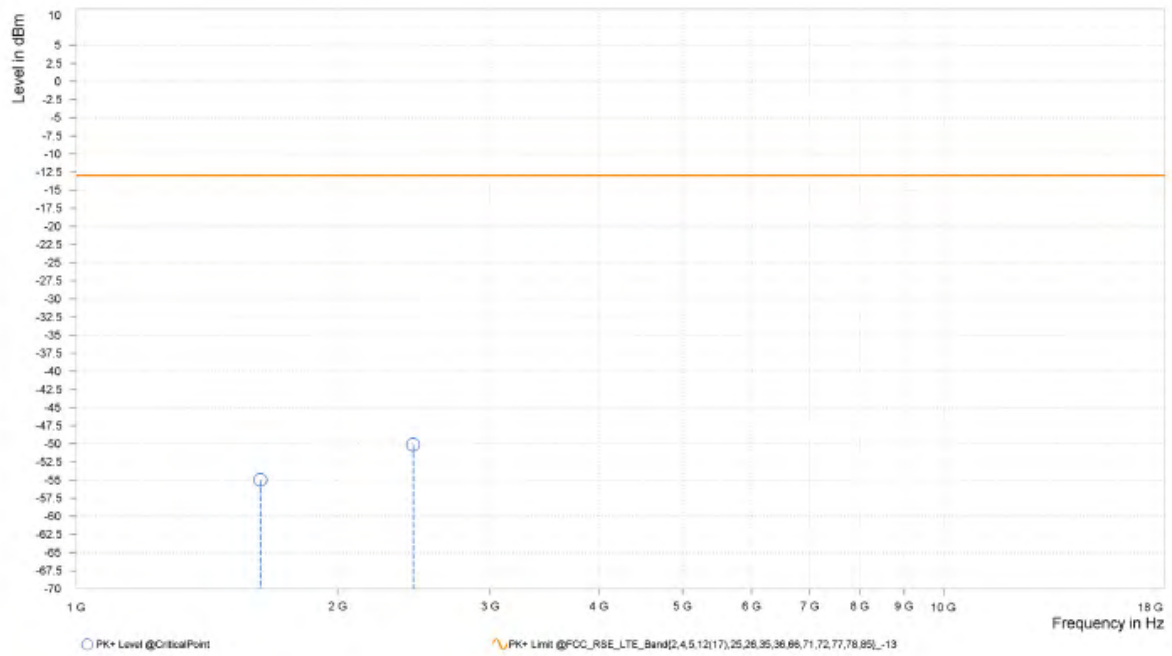
MODE	TX channel 26740	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,629.000	-53.65	-13.00	40.65	6.09	H	354.9	2.00
1	2,443.500	-50.09	-13.00	37.09	12.57	H	1	1.00



MODE	TX channel 26740	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,629.000	-54.98	-13.00	41.98	5.80	V	357.8	1.00
1	2,443.500	-50.14	-13.00	37.14	12.40	V	229.2	1.00



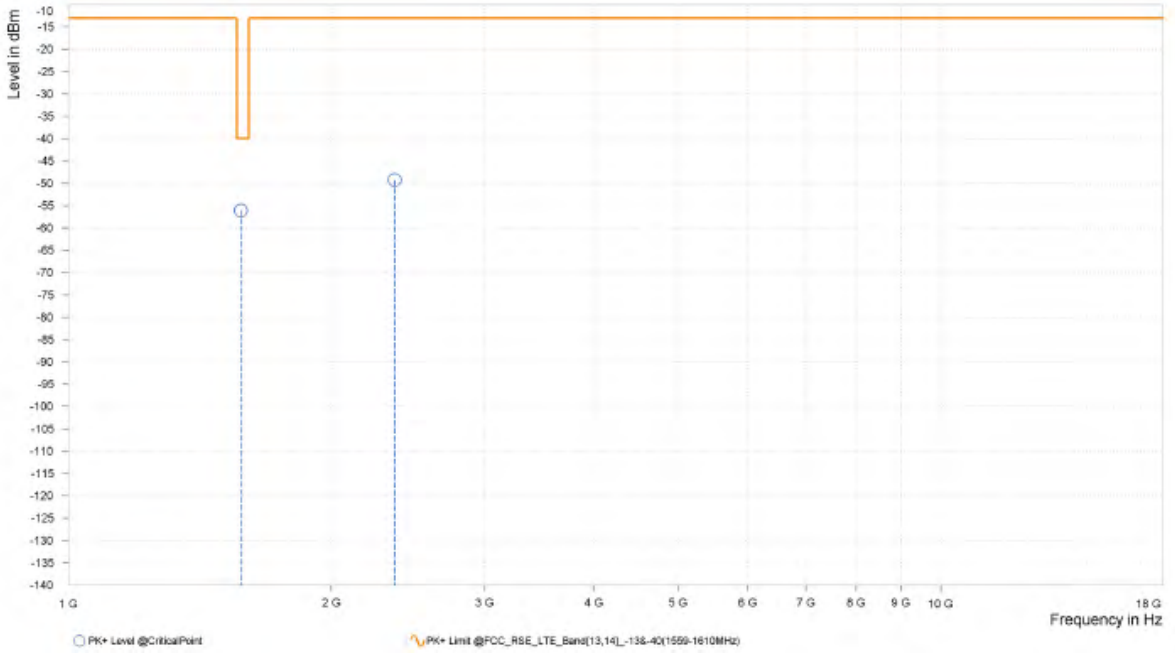
NB-IOT LTE Band 14:

CHANNEL BANDWIDTH: QPSK

CH 23282

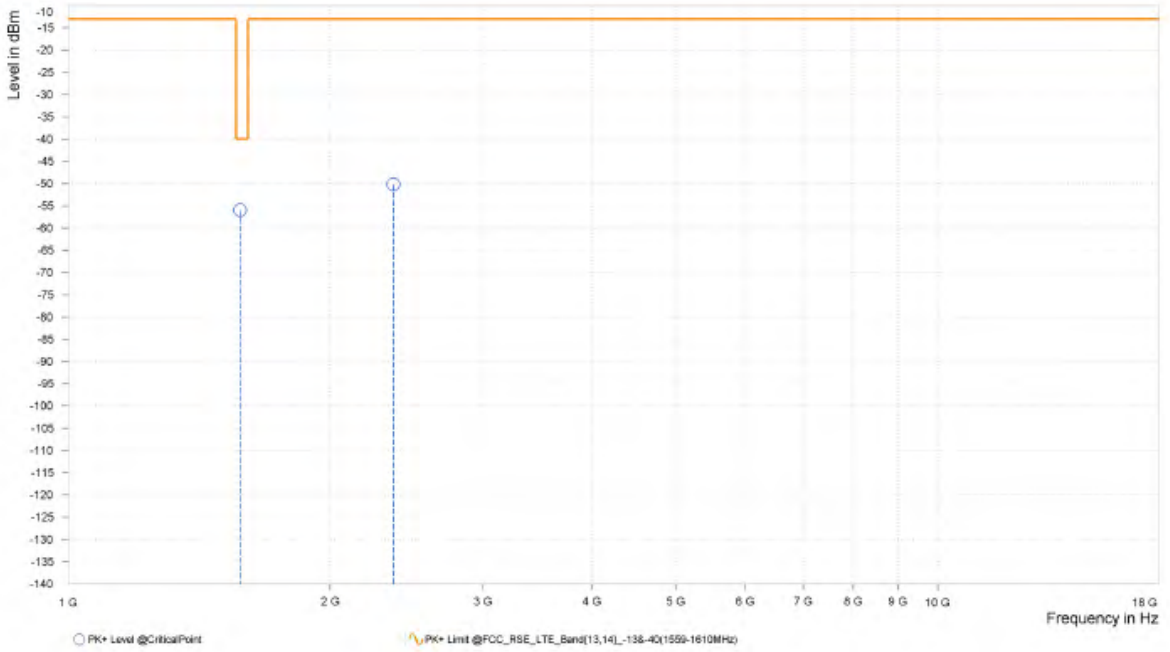
MODE	TX channel 23282	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,576.200	-56.10	-40.00	16.10	12.31	H	0.9	2.00
3	2,364.300	-49.25	-13.00	36.25	19.63	H	356.1	1.00



MODE	TX channel 23282	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

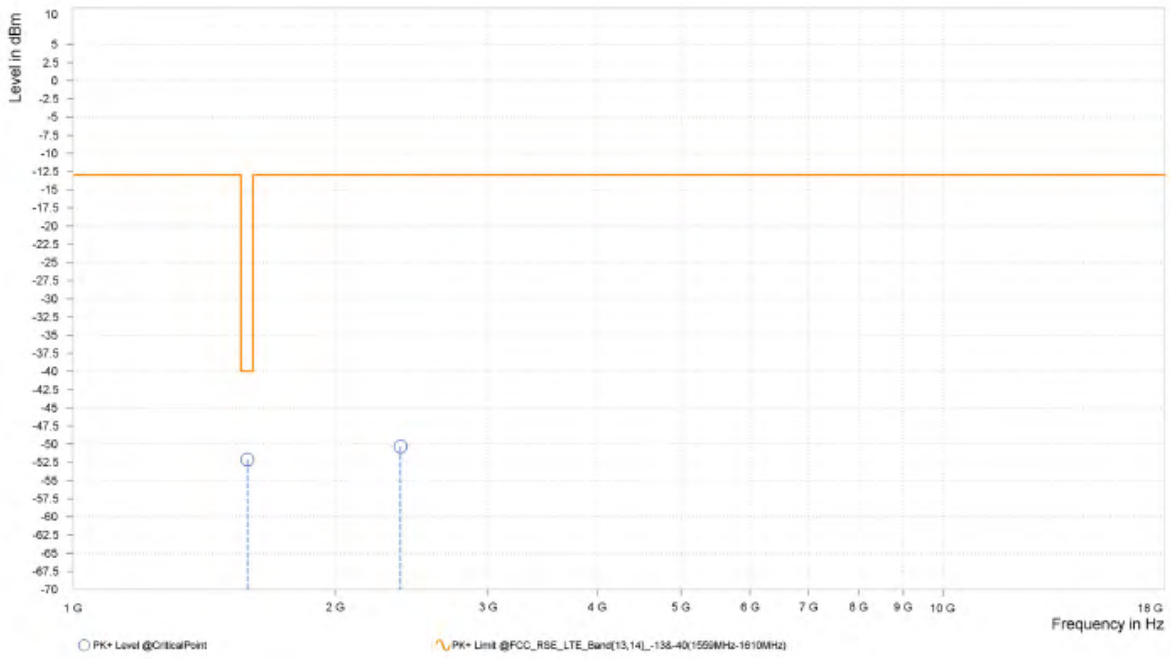
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,576.200	-55.99	-40.00	15.99	13.52	V	352.2	1.00
3	2,364.300	-50.21	-13.00	37.21	19.29	V	102.1	1.00



CH 23330

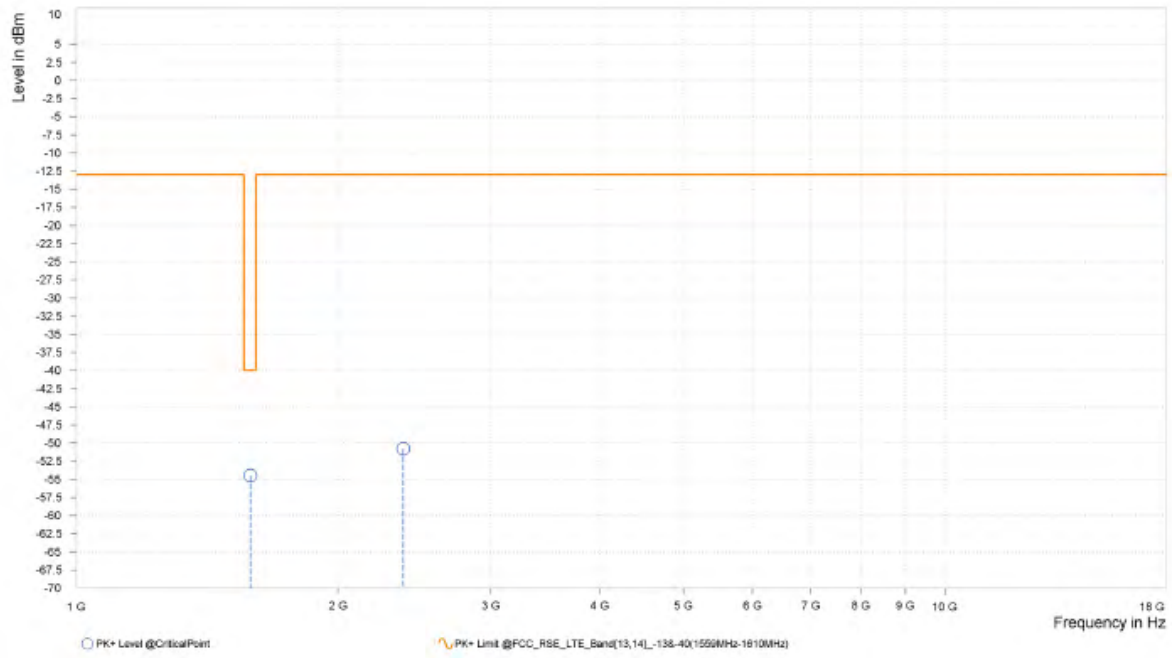
MODE	TX channel 23330	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,585.500	-52.10	-40.00	12.10	5.26	H	5	1.00
1	2,379.000	-50.34	-13.00	37.34	12.85	H	359.1	1.00



MODE	TX channel 23330	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

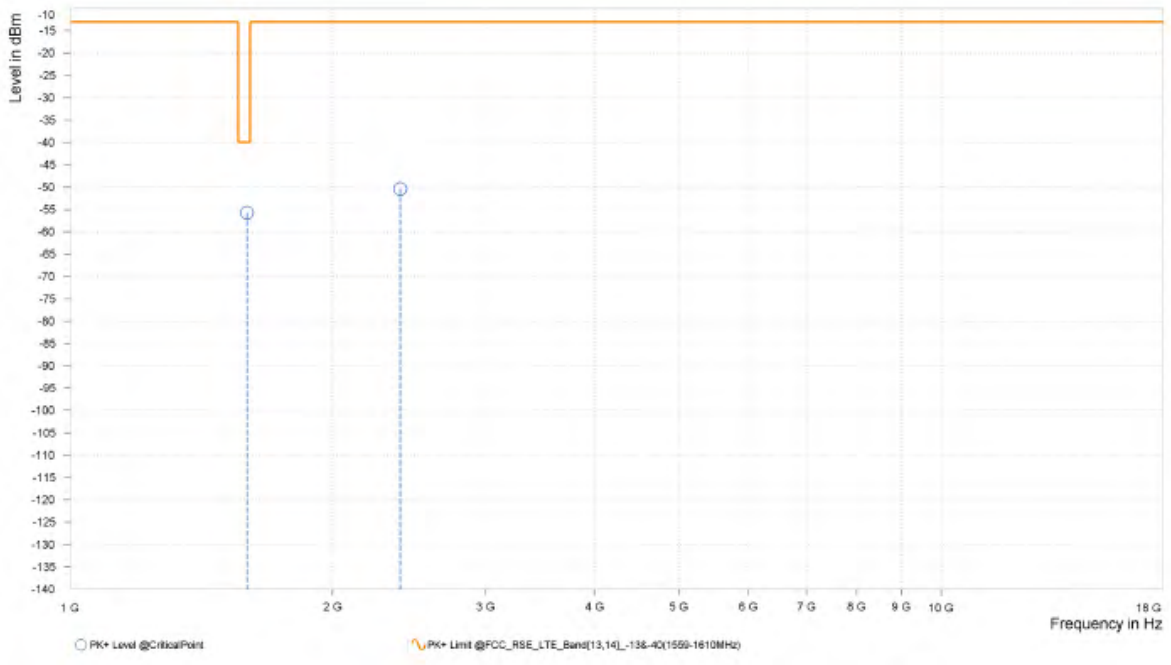
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,586.000	-54.49	-40.00	14.49	5.15	V	357.4	1.00
1	2,379.000	-50.80	-13.00	37.80	12.59	V	359	2.00



CH 26788

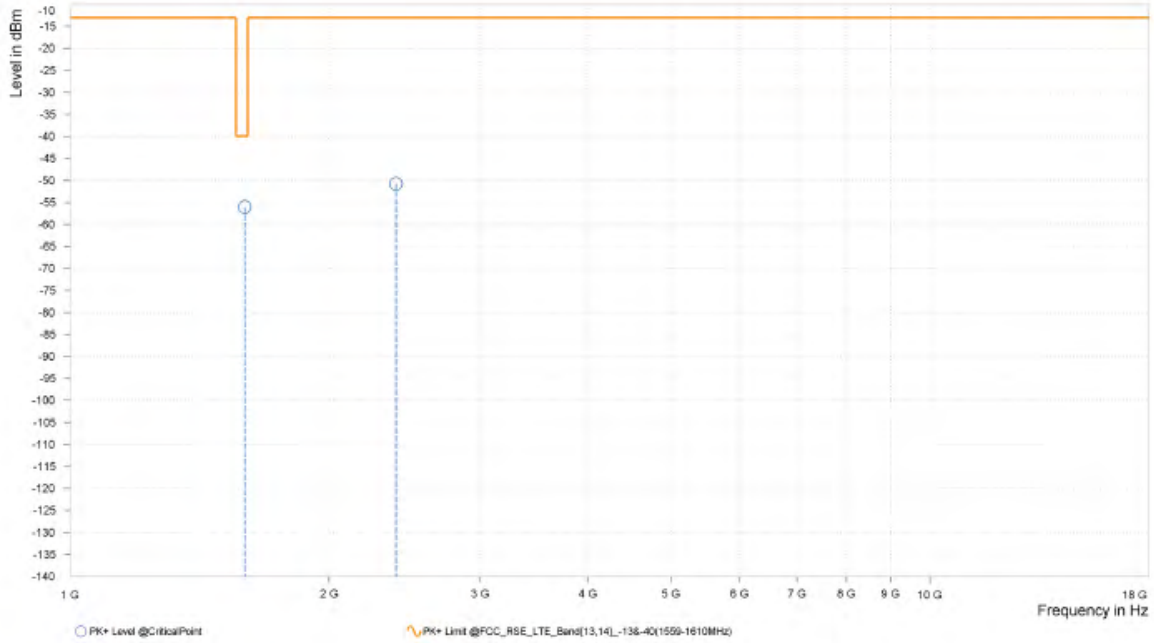
MODE	TX channel 23378	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,595.800	-55.73	-40.00	15.73	12.73	H	353.8	1.00
3	2,393.700	-50.37	-13.00	37.37	19.53	H	1	1.00



MODE	TX channel 23378	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,595.800	-56.03	-40.00	16.03	13.68	V	359	2.00
3	2,393.700	-50.75	-13.00	37.75	19.06	V	64.2	2.00

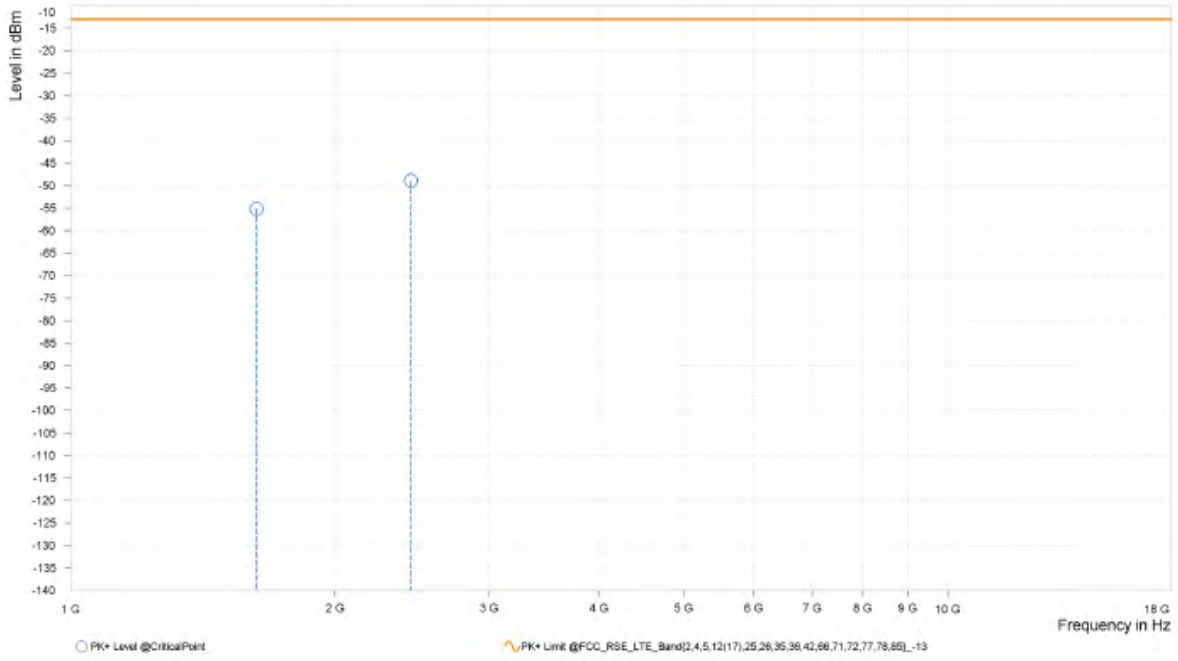


NB-IOT LTE Band 26:

CHANNEL BANDWIDTH: QPSK

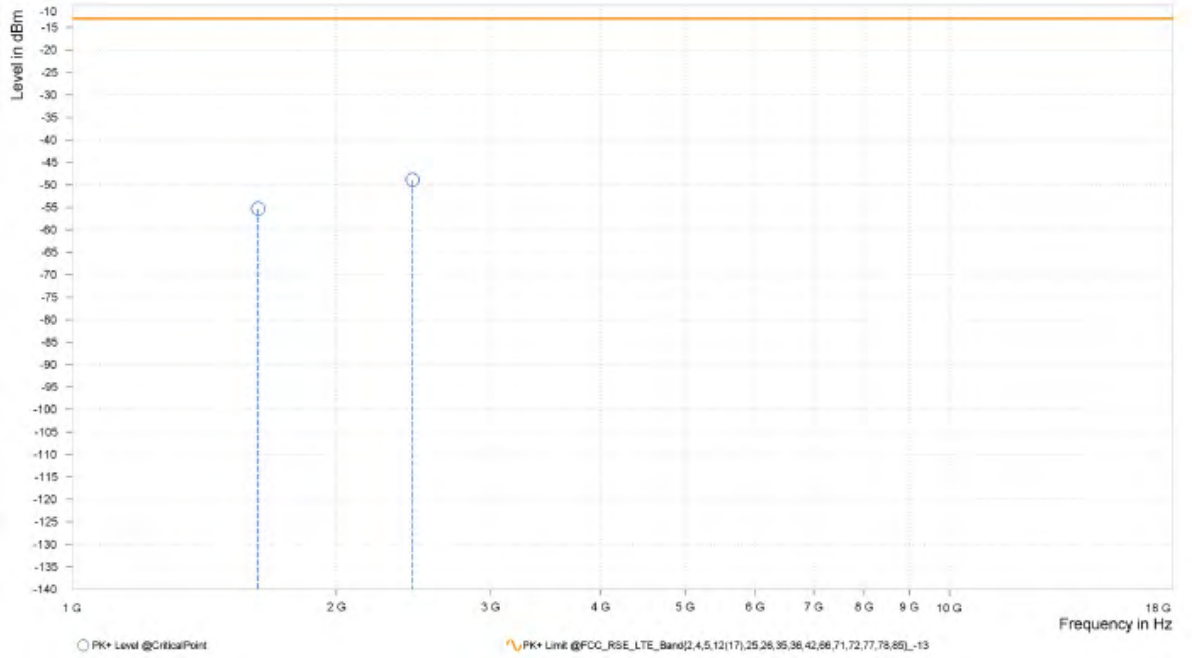
MODE	TX channel 26692	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,628.200	-55.15	-13.00	42.15	13.46	H	79.7	2.00
3	2,442.300	-48.86	-13.00	35.86	19.66	H	103.4	1.00



MODE	TX channel 26692	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

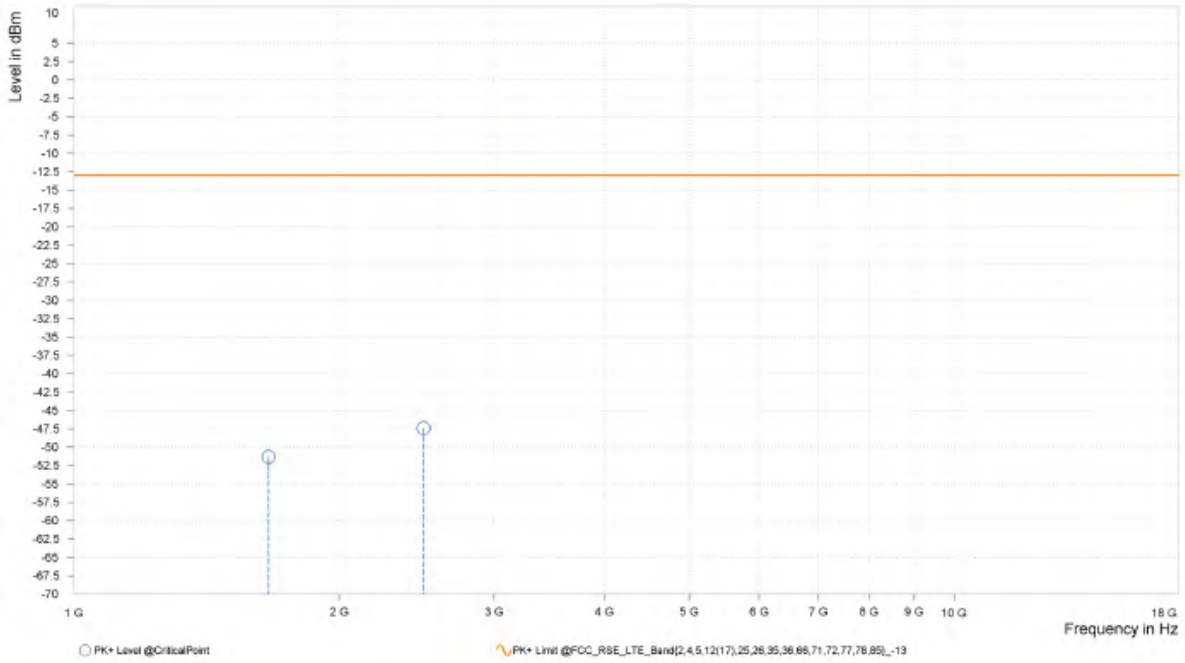
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,628.200	-55.34	-13.00	42.34	13.68	V	358.4	1.00
3	2,442.300	-48.90	-13.00	35.90	19.45	V	359	1.00



CH 26740

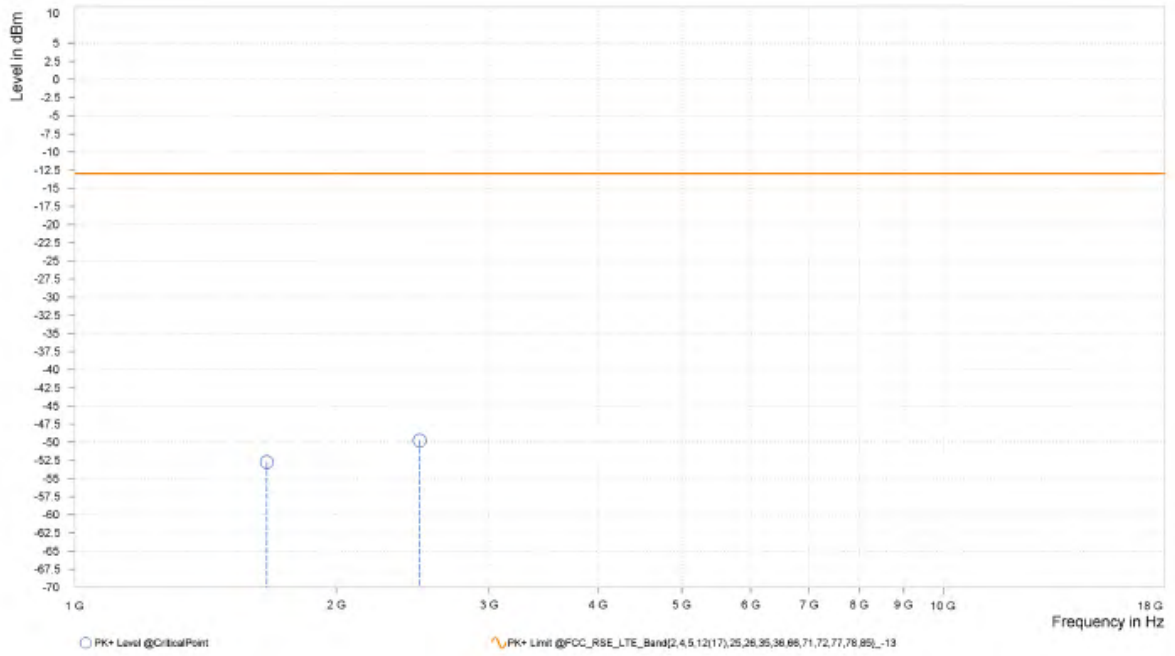
MODE	TX channel 26740	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,663.500	-51.31	-13.00	38.31	7.53	H	4.6	1.00
1	2,494.000	-47.40	-13.00	34.40	12.31	H	224.4	1.00



MODE	TX channel 26740	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

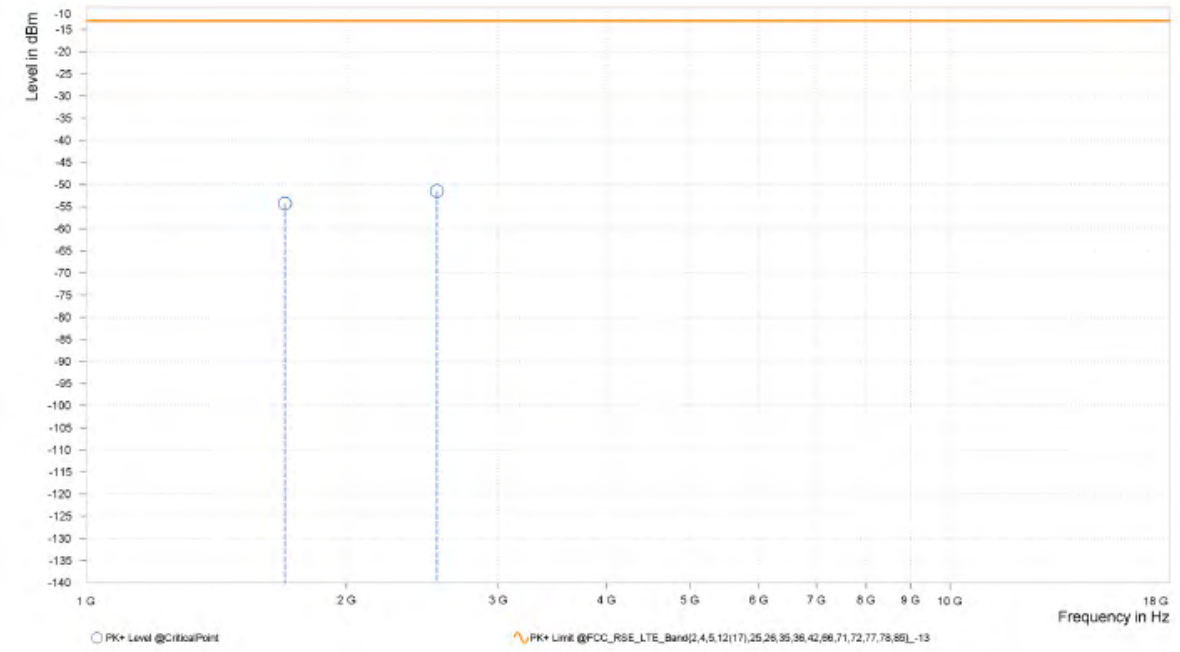
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,663.000	-52.76	-13.00	39.76	7.16	V	354.8	2.00
1	2,494.500	-49.75	-13.00	36.75	11.92	V	3	2.00



CH 26788

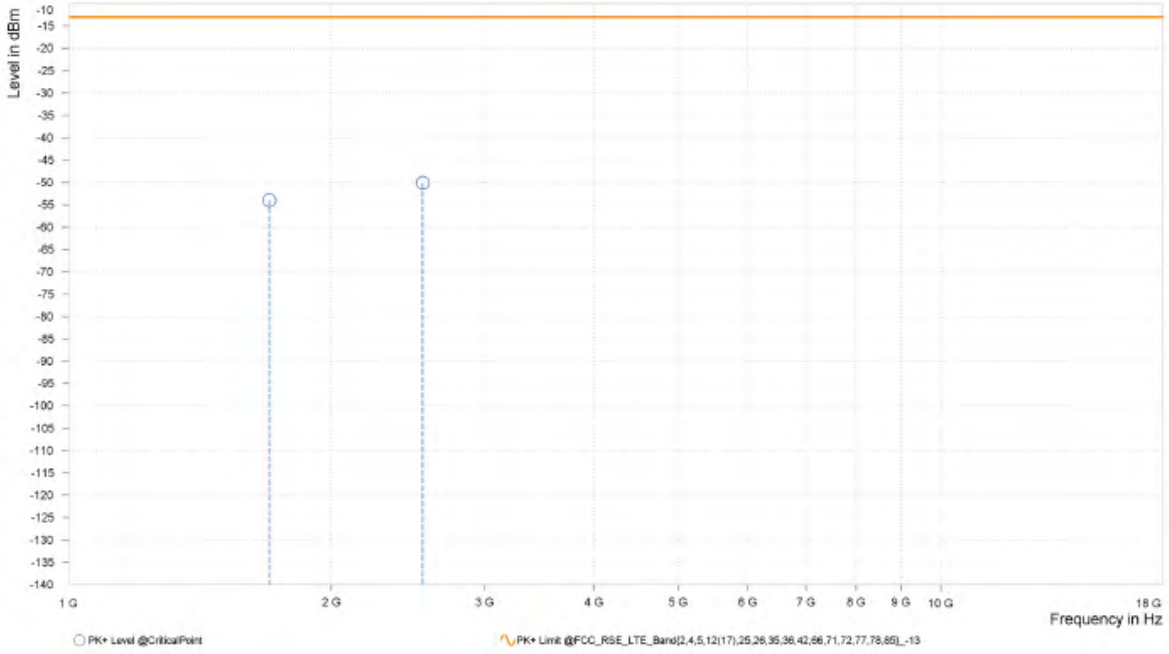
MODE	TX channel 26788	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,697.800	-54.27	-13.00	41.27	15.11	H	359	2.00
3	2,546.700	-51.51	-13.00	38.51	19.40	H	1	1.00



MODE	TX channel 26788	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	1,697.800	-53.98	-13.00	40.98	14.35	V	51.8	1.00
3	2,546.700	-50.12	-13.00	37.12	20.02	V	359	2.00

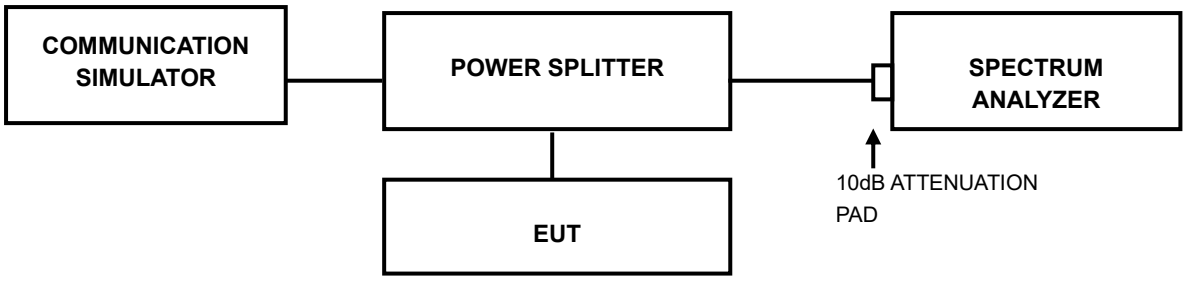


3.7 PEAK TO AVERAGE RATIO

3.7.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT

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

3.7.2 TEST SETUP



3.7.3 TEST PROCEDURES

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

3.7.4 TEST RESULTS

Please Refer to Appendix Of this test report.

4 INFORMATION ON THE TESTING LABORATORIES

We, Huarui 7layers High Technology (Suzhou) Co., Ltd. ,were founded in 2020 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Suzhou EMC/RF Lab:
Tel: +86 (0557) 368 1008

5 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

6 APPENDIX

CAT-M: LTE BAND14

PEAK-TO-AVERAGE RATIO(CCDF)

Test Result

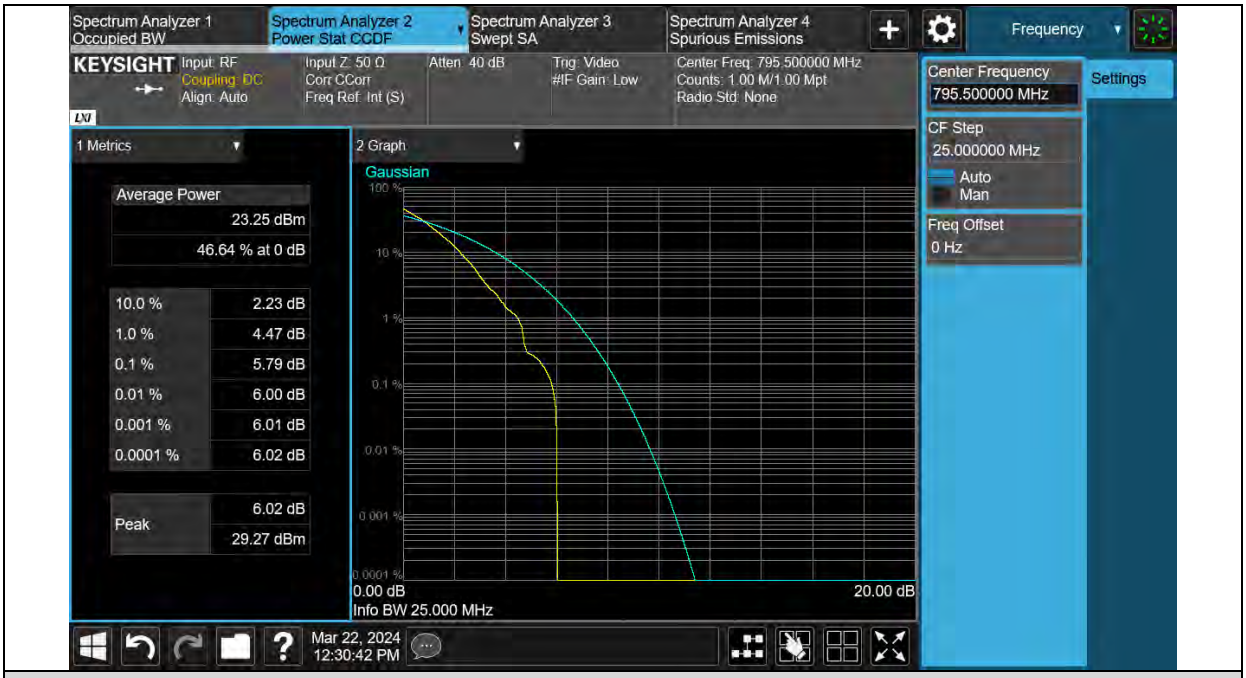
Band	Bandwidth	Modulation	Channel	Result(dB)	Limit(dB)	Verdict
Band14	5MHz	QPSK	23305	5.89	13	PASS
Band14	5MHz	QPSK	23330	5.82	13	PASS
Band14	5MHz	QPSK	23355	5.79	13	PASS
Band14	5MHz	16QAM	23305	7.39	13	PASS
Band14	5MHz	16QAM	23330	6.54	13	PASS
Band14	5MHz	16QAM	23330	6.26	13	PASS
Band14	10MHz	QPSK	23330	5.99	13	PASS
Band14	10MHz	16QAM	23330	7.45	13	PASS

Test Graphs

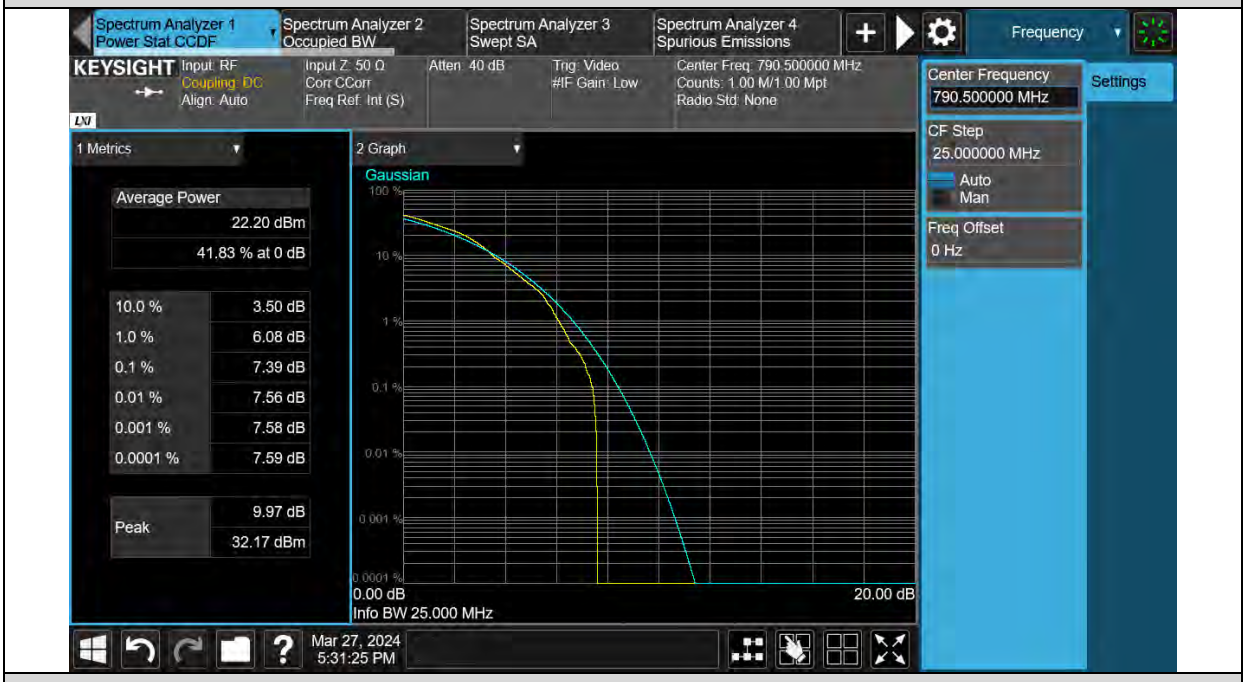
Band14-5MHz-QPSK-23305

Band14-5MHz-QPSK-23330

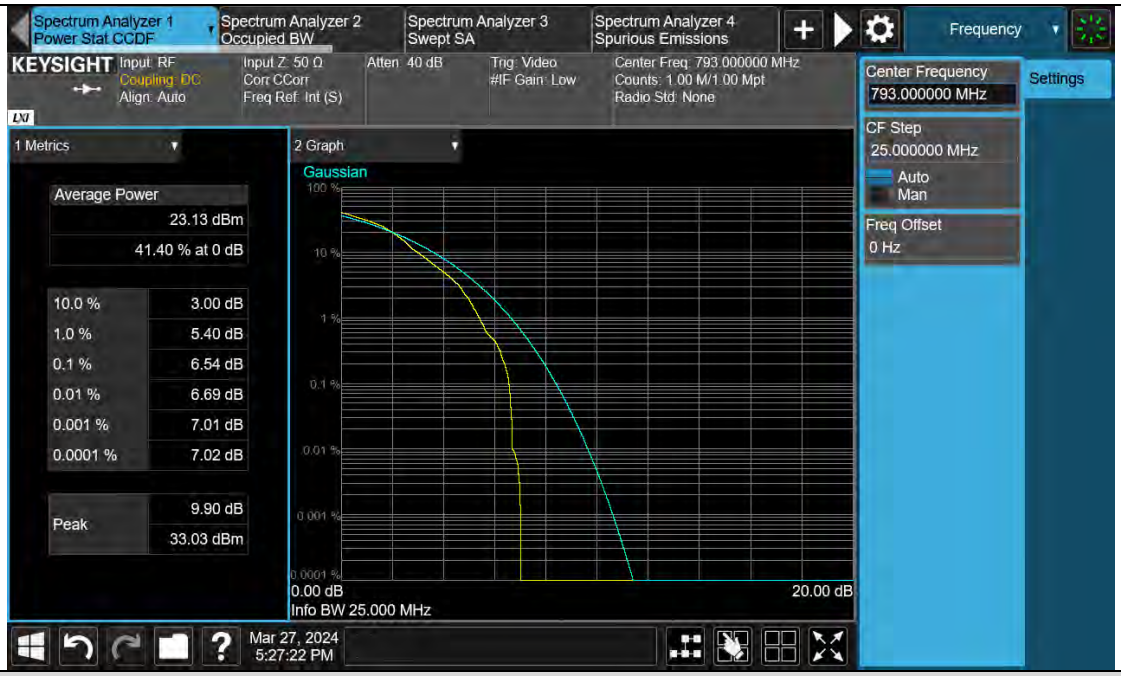
Band14-5MHz-QPSK-23355



Band14-5MHz-16QAM-23305



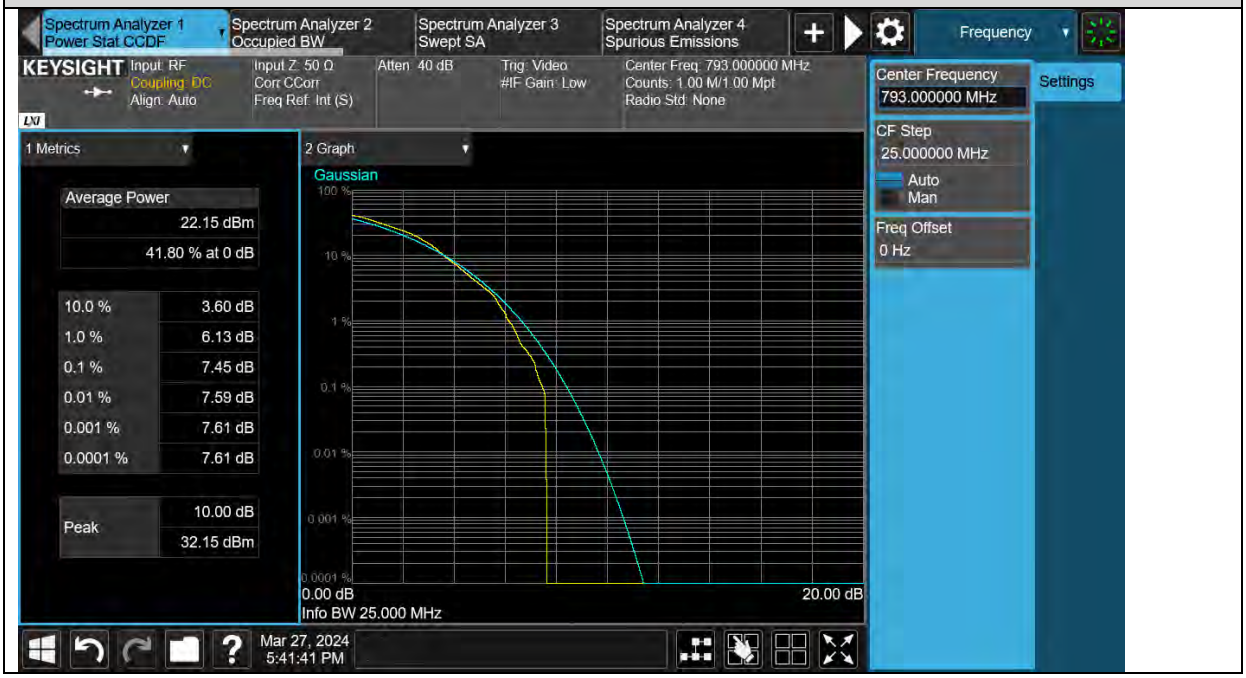
Band14-5MHz-16QAM-23330



Band14-5MHz-16QAM-23355

Band14-10MHz-QPSK-23330

Band14-10MHz-16QAM-23330



26DB BANDWIDTH AND OCCUPIED BANDWIDTH

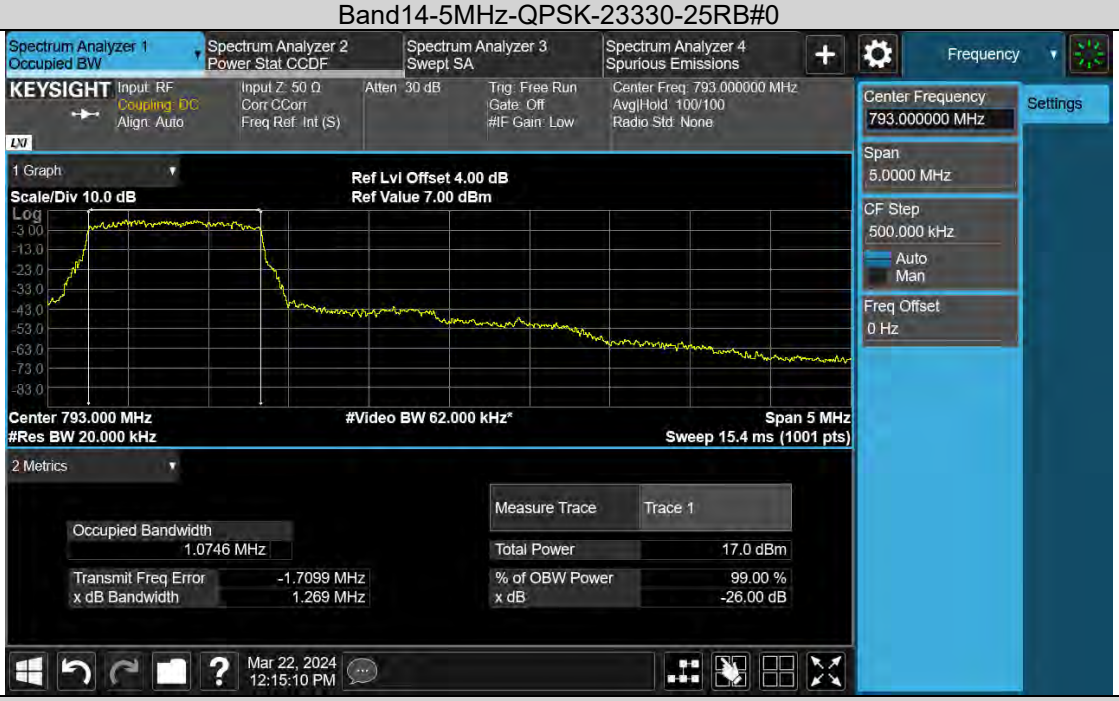
Test Result

Band	Bandwidth	Modulation	Channel	RB Configuration	Occupied Bandwidth (MHz)	26dB Bandwidth (MHz)	Verdict
Band14	5MHz	QPSK	23305	6RB#0	1.0751	1.248	PASS
Band14	5MHz	QPSK	23330	6RB#0	1.0746	1.269	PASS
Band14	5MHz	QPSK	23355	6RB#0	1.0708	1.234	PASS
Band14	5MHz	16QAM	23305	6RB#0	1.0775	1.308	PASS
Band14	5MHz	16QAM	23330	6RB#0	1.0745	1.268	PASS
Band14	5MHz	16QAM	23355	6RB#0	1.0743	1.269	PASS
Band14	10MHz	QPSK	23330	6RB#0	1.0695	1.252	PASS
Band14	10MHz	16QAM	23330	6RB#0	1.0725	1.287	PASS

Test Graphs

Band14-5MHz-QPSK-23305-25RB#0

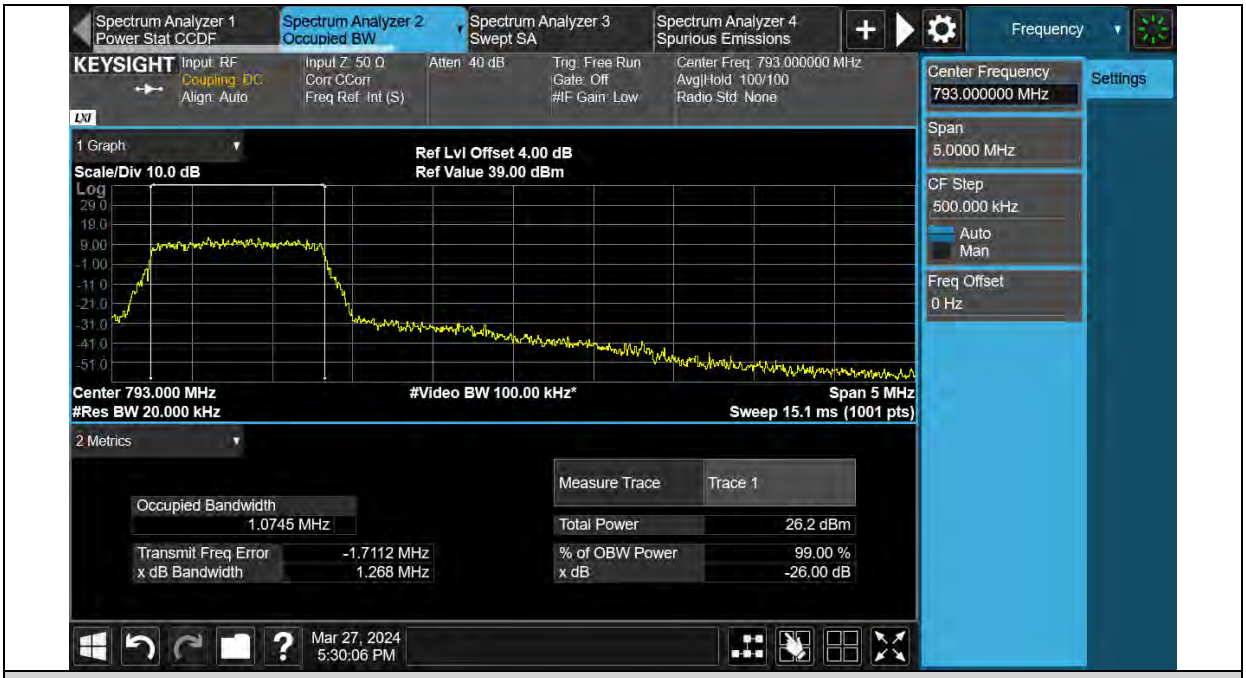
Band14-5MHz-QPSK-23330-25RB#0



Band14-5MHz-QPSK-23355-25RB#0

Band14-5MHz-16QAM-23305-25RB#0

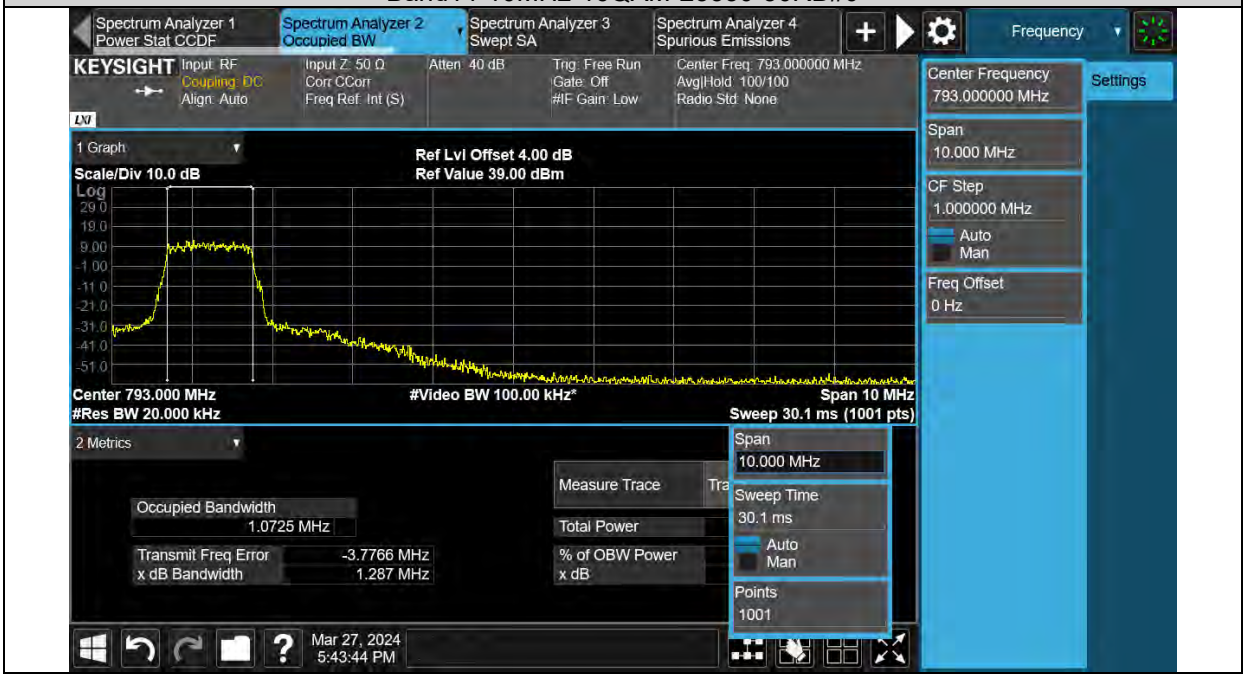
Band14-5MHz-16QAM-23330-25RB#0



Band14-5MHz-16QAM-23355-25RB#0

Band14-10MHz-QPSK-23330-50RB#0

Band14-10MHz-16QAM-23330-50RB#0



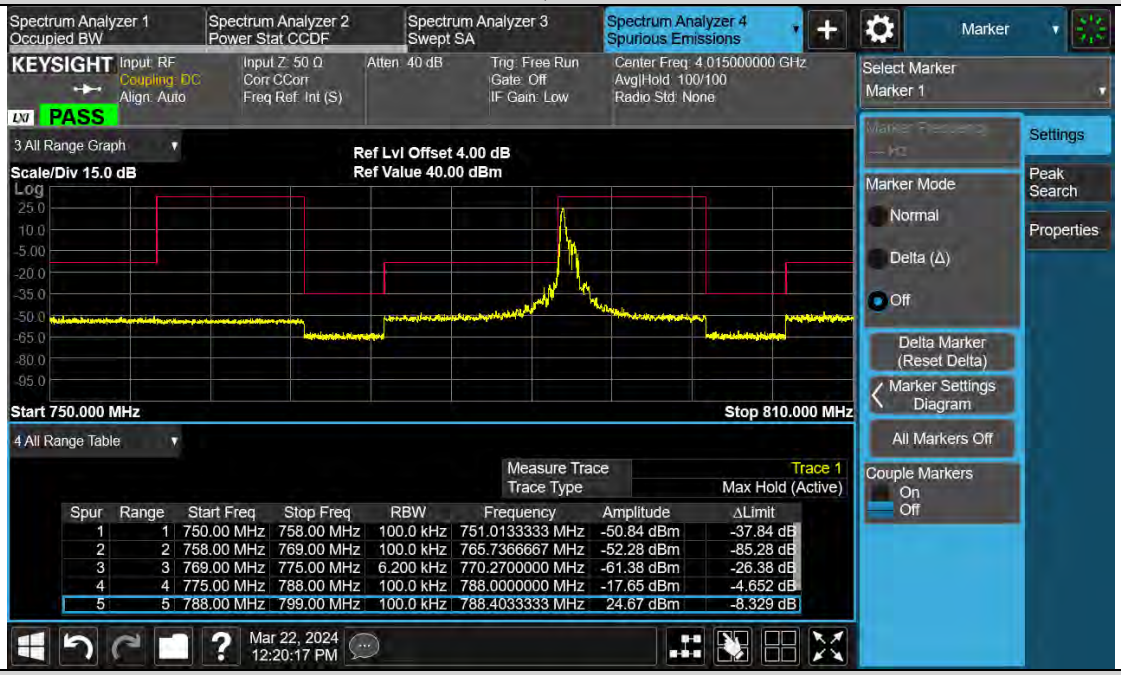
BAND EDGE

Test Result

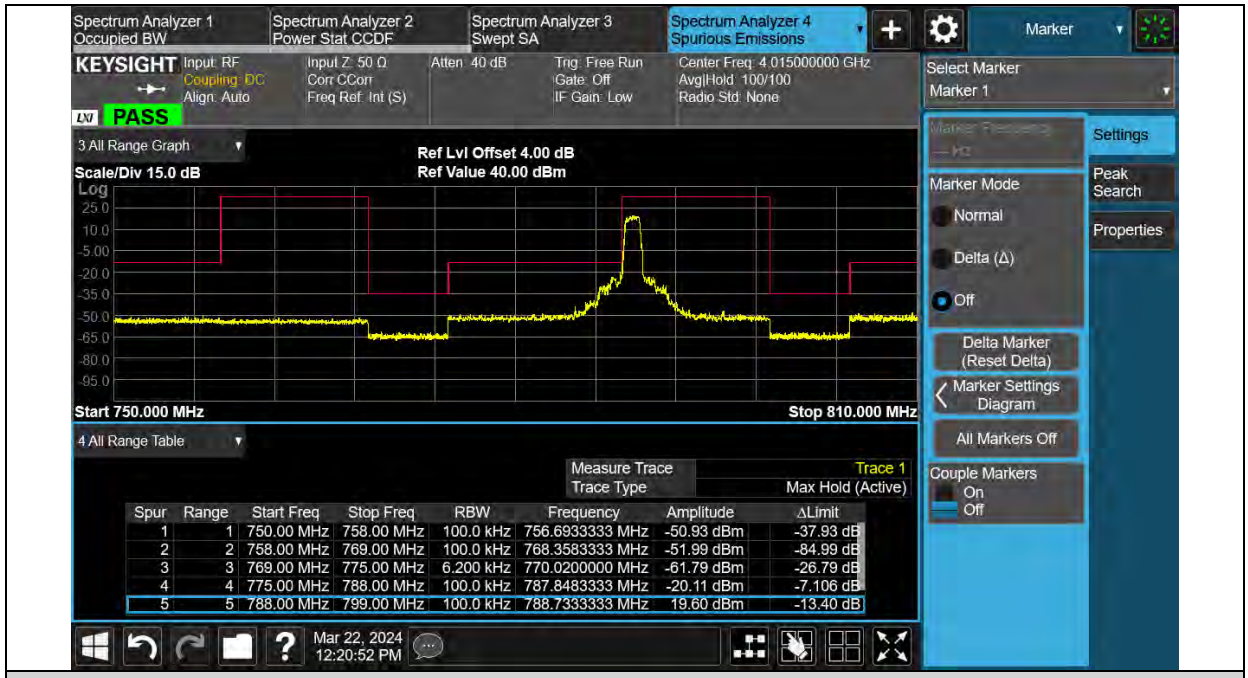
Band	Bandwidth	Modulation	Channel	RB Configuration	Result(dBm)	Verdict
Band14	5MHz	QPSK	23305	1RB#0	See Graph	PASS
Band14	5MHz	QPSK	23305	6RB#0	See Graph	PASS
Band14	5MHz	QPSK	23355	1RB#5	See Graph	PASS
Band14	5MHz	QPSK	23355	6RB#0	See Graph	PASS
Band14	5MHz	16QAM	23305	1RB#0	See Graph	PASS
Band14	5MHz	16QAM	23305	6RB#0	See Graph	PASS
Band14	5MHz	16QAM	23355	1RB#5	See Graph	PASS
Band14	5MHz	16QAM	23355	6RB#0	See Graph	PASS
Band13	10MHz	QPSK	23330	1RB#0	See Graph	PASS
Band13	10MHz	QPSK	23330	1RB#5	See Graph	PASS
Band13	10MHz	QPSK	23330	6RB#0	See Graph	PASS
Band13	10MHz	16QAM	23330	1RB#0	See Graph	PASS
Band13	10MHz	16QAM	23330	1RB#5	See Graph	PASS
Band13	10MHz	16QAM	23330	6RB#0	See Graph	PASS

Test Graphs

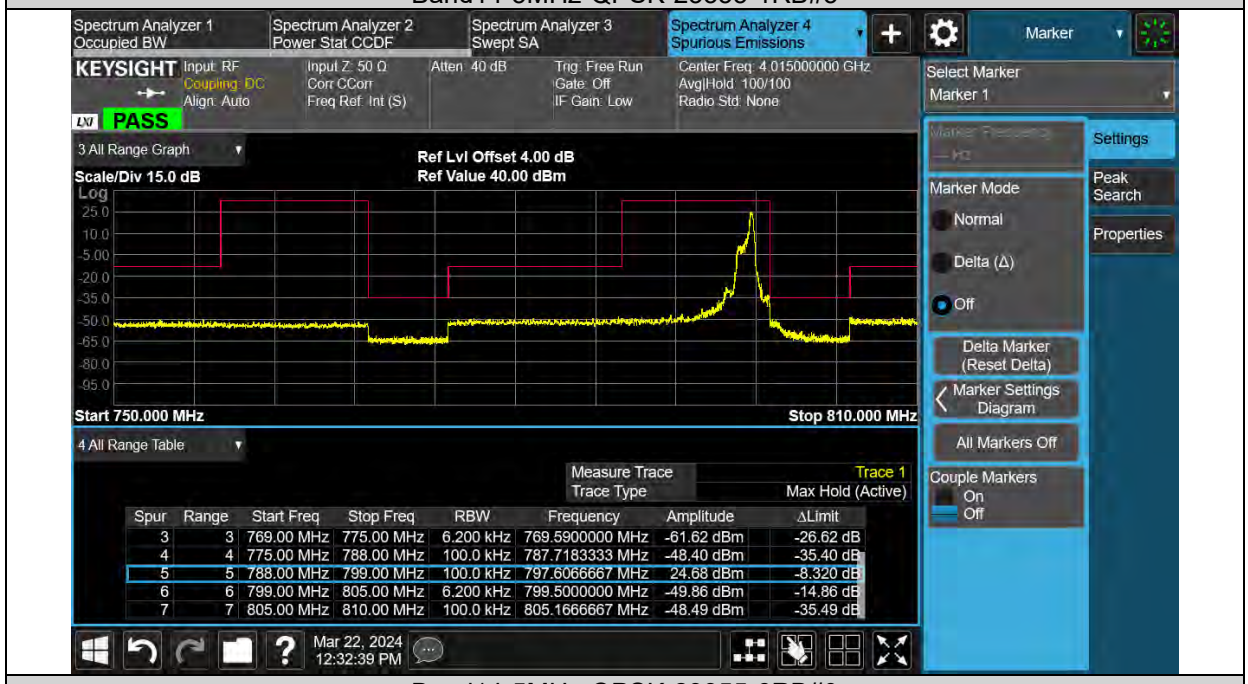
Band14-5MHz-QPSK-23305-1RB#0



Band14-5MHz-QPSK-23305-6RB#0

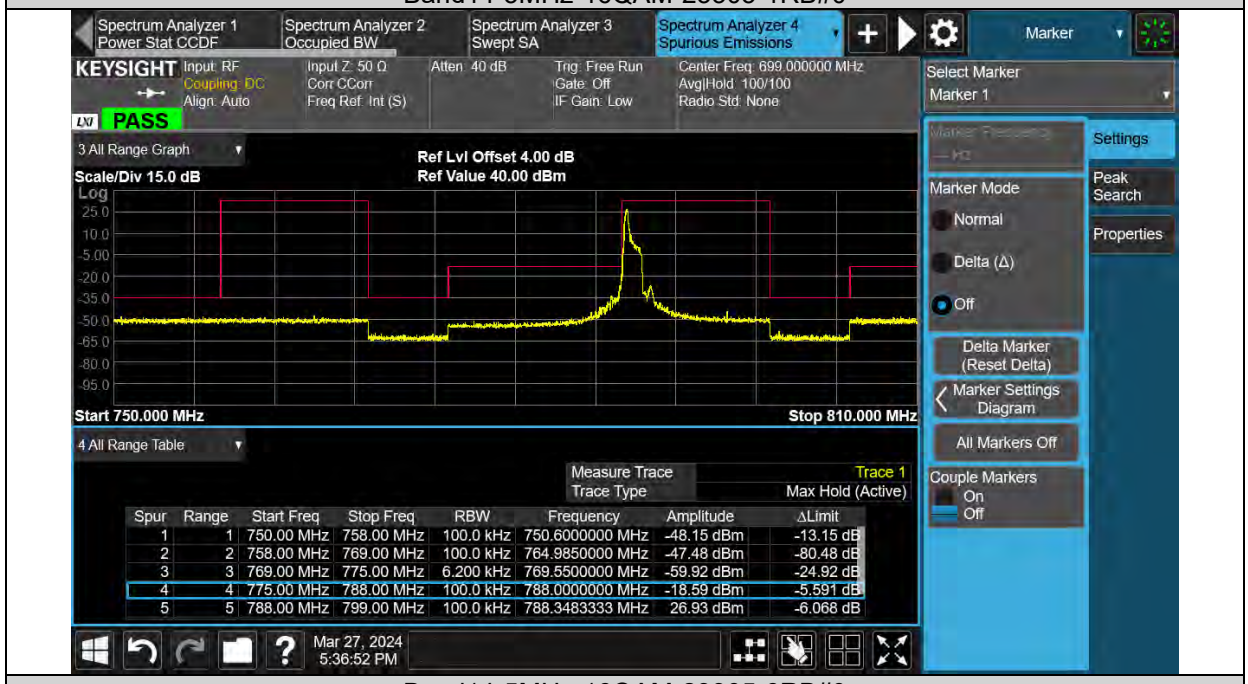


Band14-5MHz-QPSK-23355-1RB#5

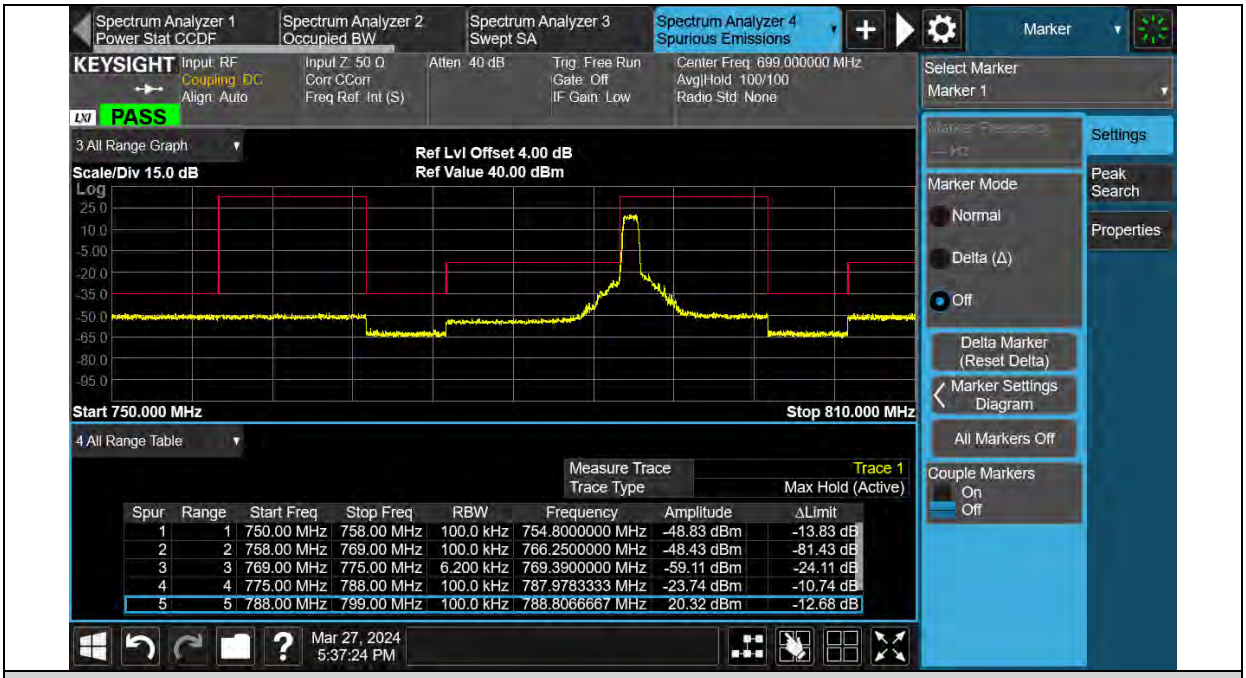


Band14-5MHz-QPSK-23355-6RB#0

Band14-5MHz-16QAM-23305-1RB#0

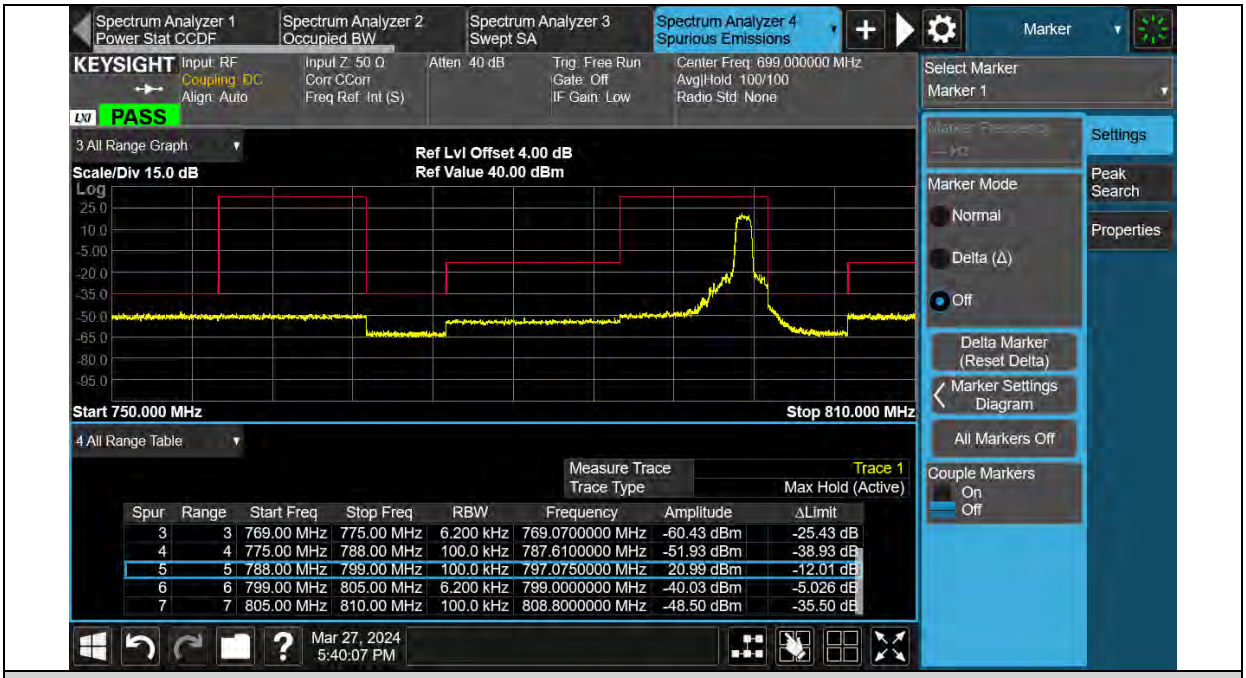


Band14-5MHz-16QAM-23305-6RB#0



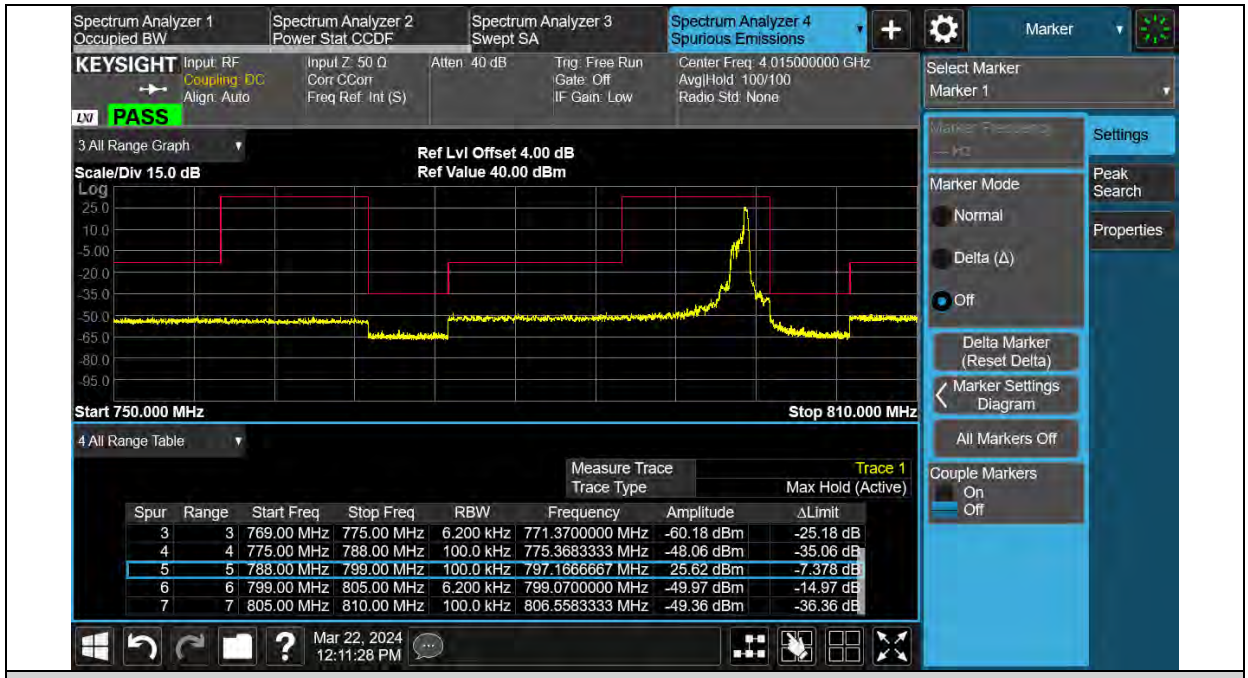
Band14-5MHz-16QAM-23355-1RB#5

Band14-5MHz-16QAM-23355-6RB#0



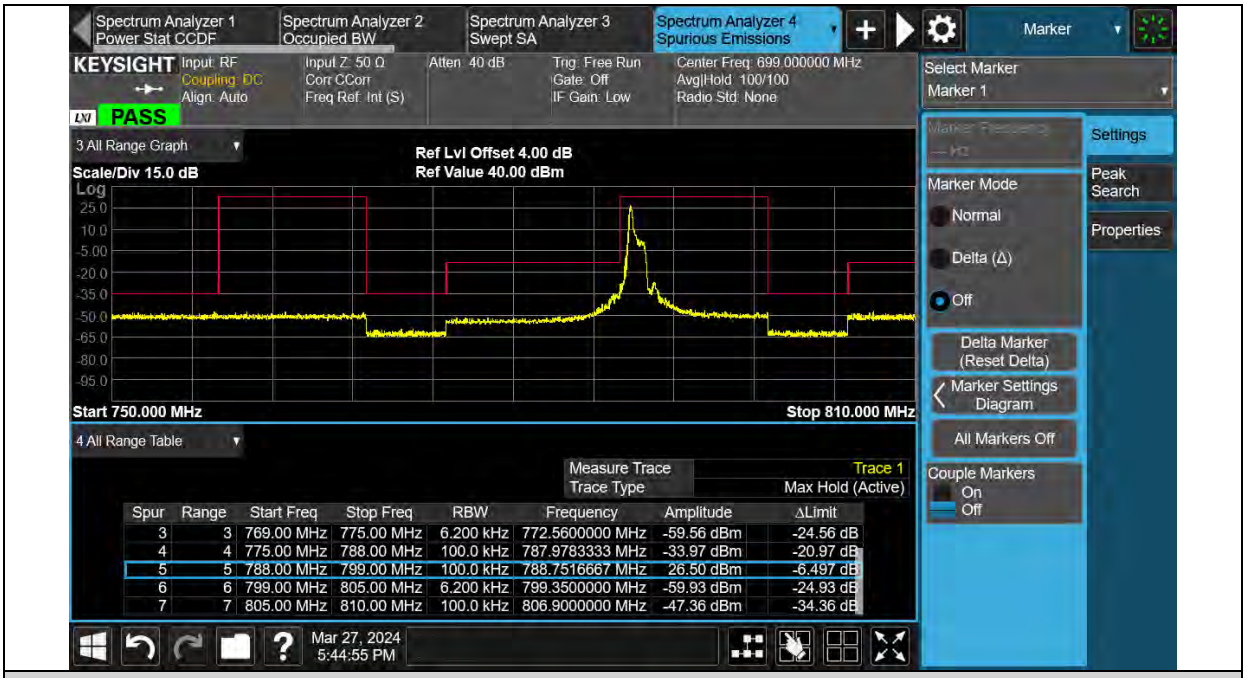
Band14-10MHz-QPSK-23330-1RB#0

Band14-10MHz-QPSK-23330-1RB#5



Band14-10MHz-QPSK-23330-6RB#0

Band14-10MHz-16QAM-23330-1RB#0



Band14-10MHz-16QAM-23330-1RB#5

Band14-10MHz-16QAM-23330-6RB#0


Spectrum Analyzer 1
Power Stat CCDF
Spectrum Analyzer 2
Occupied BW
Spectrum Analyzer 3
Swept SA
Spectrum Analyzer 4
Spurious Emissions
Marker
KEYSIGHT
Input: RF
Coupling: DC
Align: Auto
Input Z: 50 Ω
Corr CCorr
Freq Ref: Int (S)
Atten: 40 dB
Trig: Free Run
Gate: Off
IF Gain: Low
Center Freq: 699.000000 MHz
Avg|Hold: 100/100
Radio Std: None
Select Marker
Marker 1
PASS
3 All Range Graph
Ref Lvl Offset 4.00 dB
Scale/Div 15.0 dB
Ref Value 40.00 dBm
Log
25.0
10.0
-5.00
-20.0
-35.0
-50.0
-65.0
-80.0
-95.0
Start 750.000 MHz
Stop 810.000 MHz
Settings
Peak Search
Properties
Marker Mode
Normal
Delta (Δ)
Off
Delta Marker (Reset Delta)
Marker Settings Diagram
All Markers Off
Couple Markers
On
Off
4 All Range Table
Measure Trace
Trace 1
Trace Type
Max Hold (Active)
Spur Range Start Freq Stop Freq RBW Frequency Amplitude ΔLimit
3 3 769.00 MHz 775.00 MHz 6.200 kHz 770.3500000 MHz -60.47 dBm -25.47 dB
4 4 775.00 MHz 788.00 MHz 100.0 kHz 787.8050000 MHz -26.73 dBm -13.73 dB
5 5 788.00 MHz 799.00 MHz 100.0 kHz 789.6133333 MHz 19.93 dBm -13.07 dB
6 6 799.00 MHz 805.00 MHz 6.200 kHz 799.4000000 MHz -60.39 dBm -25.39 dB
7 7 805.00 MHz 810.00 MHz 100.0 kHz 806.7416667 MHz -48.79 dBm -35.79 dB
Mar 27, 2024
5:47:51 PM

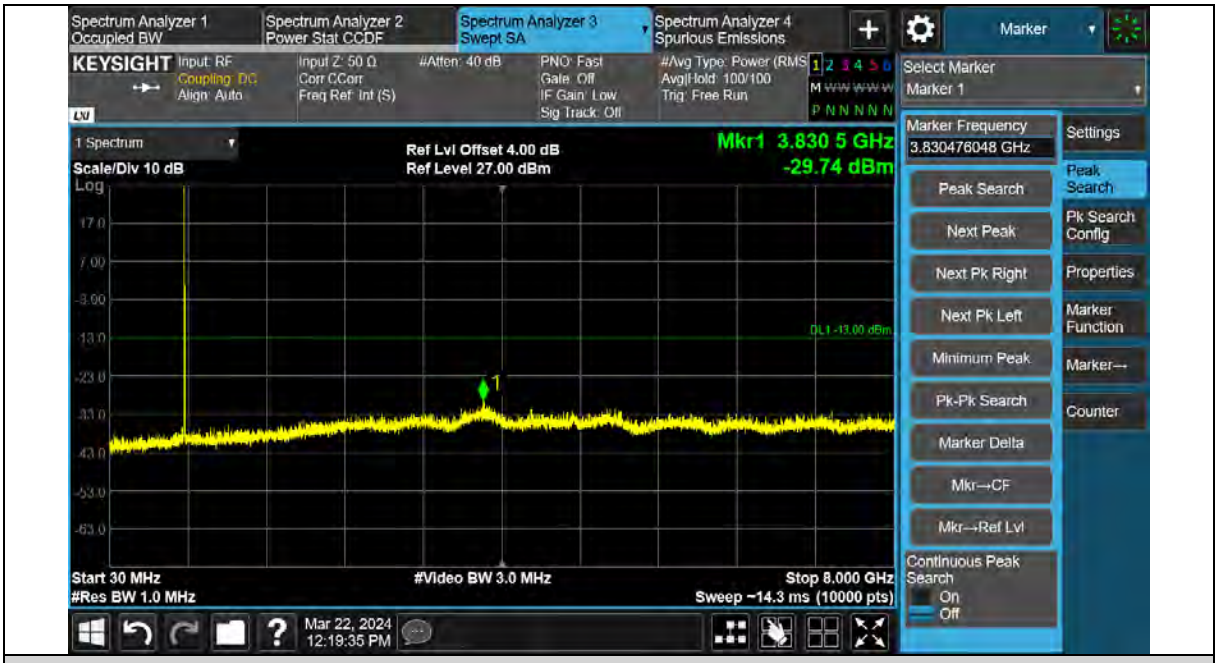
CONDUCTED SPURIOUS EMISSION

Test Result

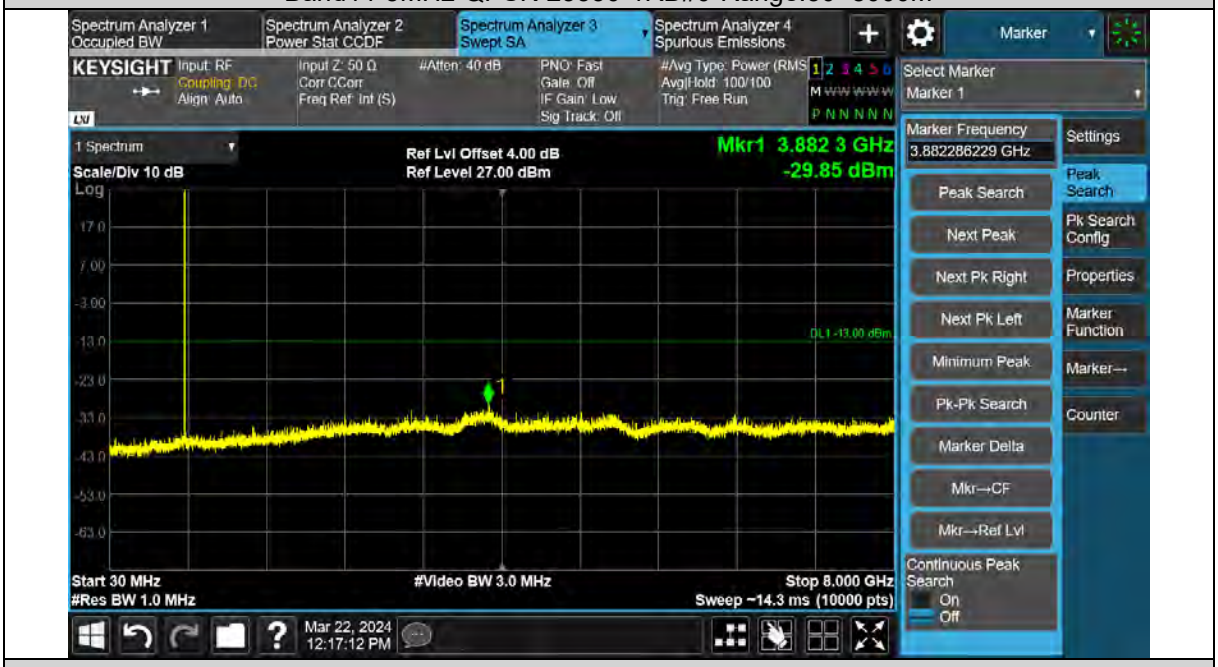
Band	Bandwidth	Modulation	Channel	RB Configuration	Frequency Range	Result (dBm)	Verdict
Band14	5MHz	QPSK	23305	1RB#0	Range:30~8000M	See Graph	PASS
Band14	5MHz	QPSK	23330	1RB#0	Range:30~8000M	See Graph	PASS
Band14	5MHz	QPSK	23355	1RB#0	Range:30~8000M	See Graph	PASS
Band14	5MHz	16QAM	23305	1RB#0	Range:30~8000M	See Graph	PASS
Band14	5MHz	16QAM	23330	1RB#0	Range:30~8000M	See Graph	PASS
Band14	5MHz	16QAM	23355	1RB#0	Range:30~8000M	See Graph	PASS
Band13	10MHz	QPSK	23330	1RB#0	Range:30~8000M	See Graph	PASS
Band13	10MHz	16QAM	23330	1RB#0	Range:30~8000M	See Graph	PASS

Test Graphs

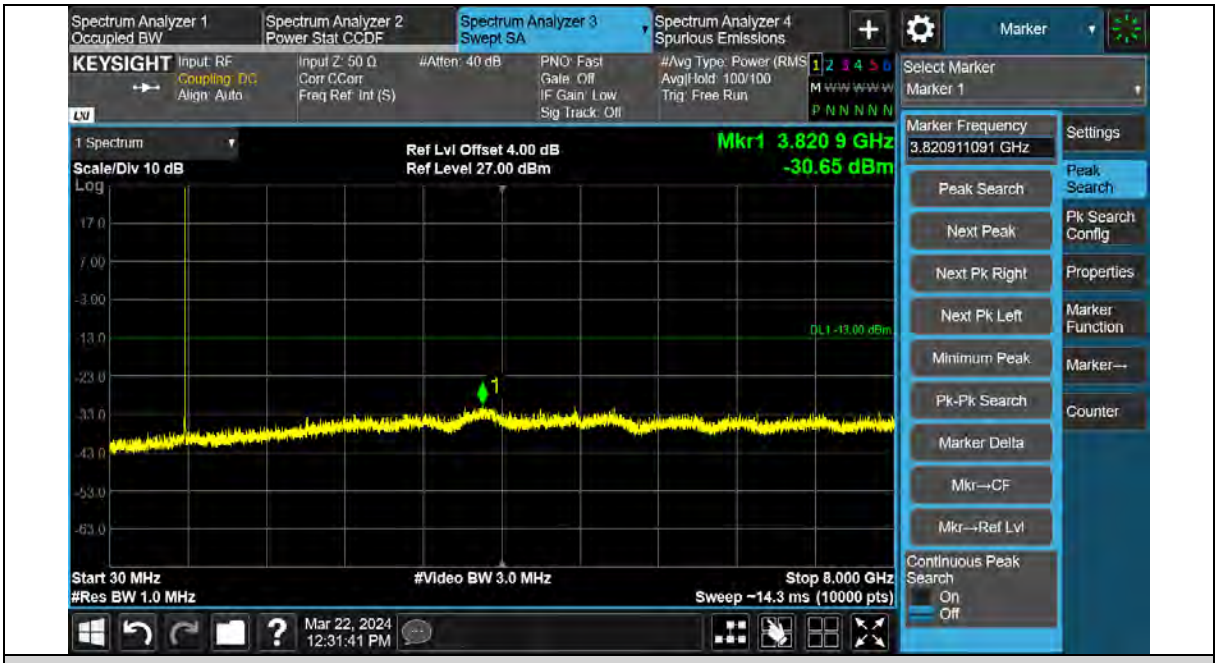
Band14-5MHz-QPSK-23305-1RB#0-Range:30~8000M



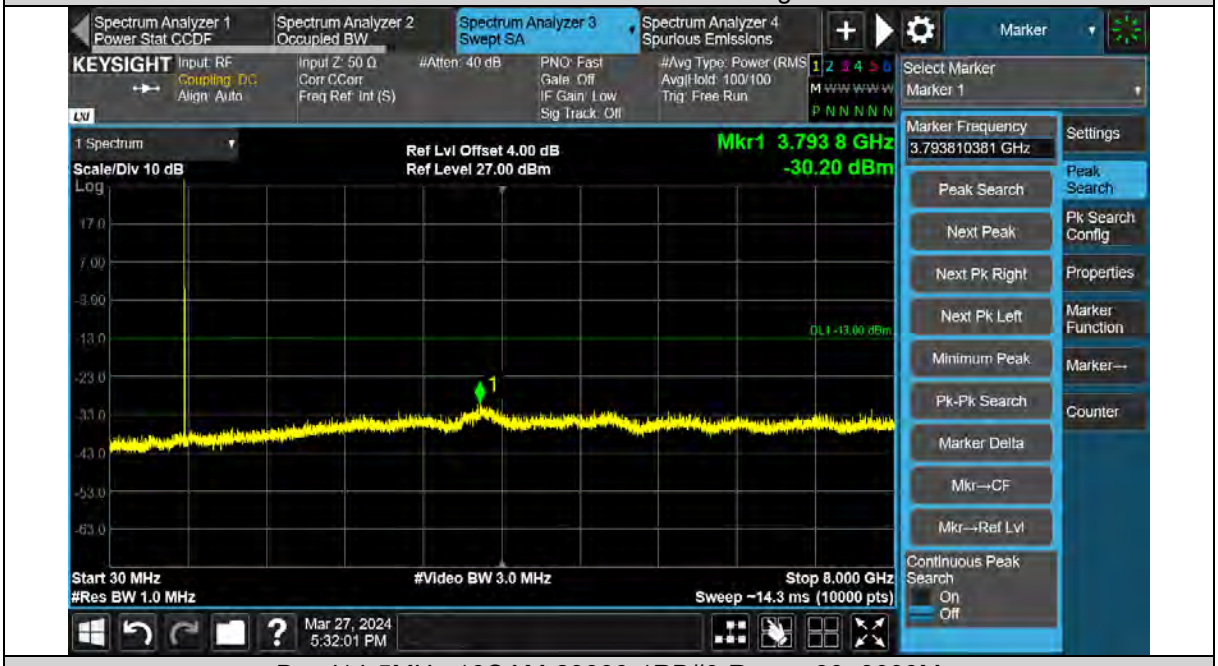
Band14-5MHz-QPSK-23330-1RB#0-Range:30~8000M



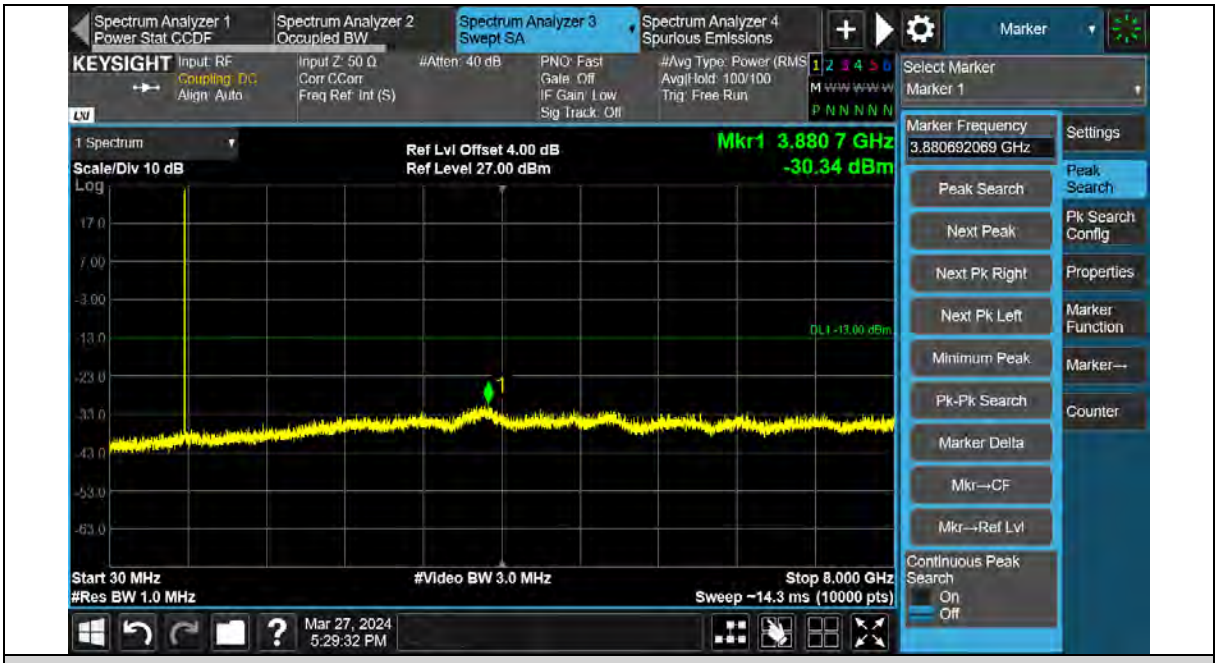
Band14-5MHz-QPSK-23355-1RB#0-Range:30~8000M



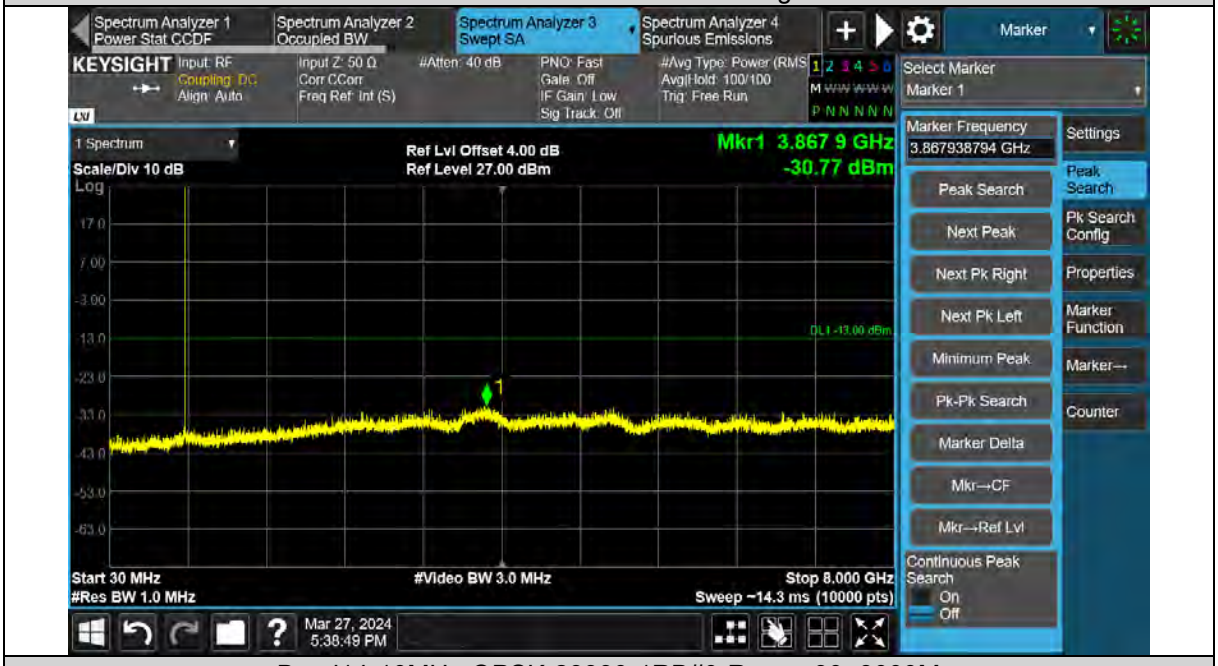
Band14-5MHz-16QAM-23305-1RB#0-Range:30~8000M



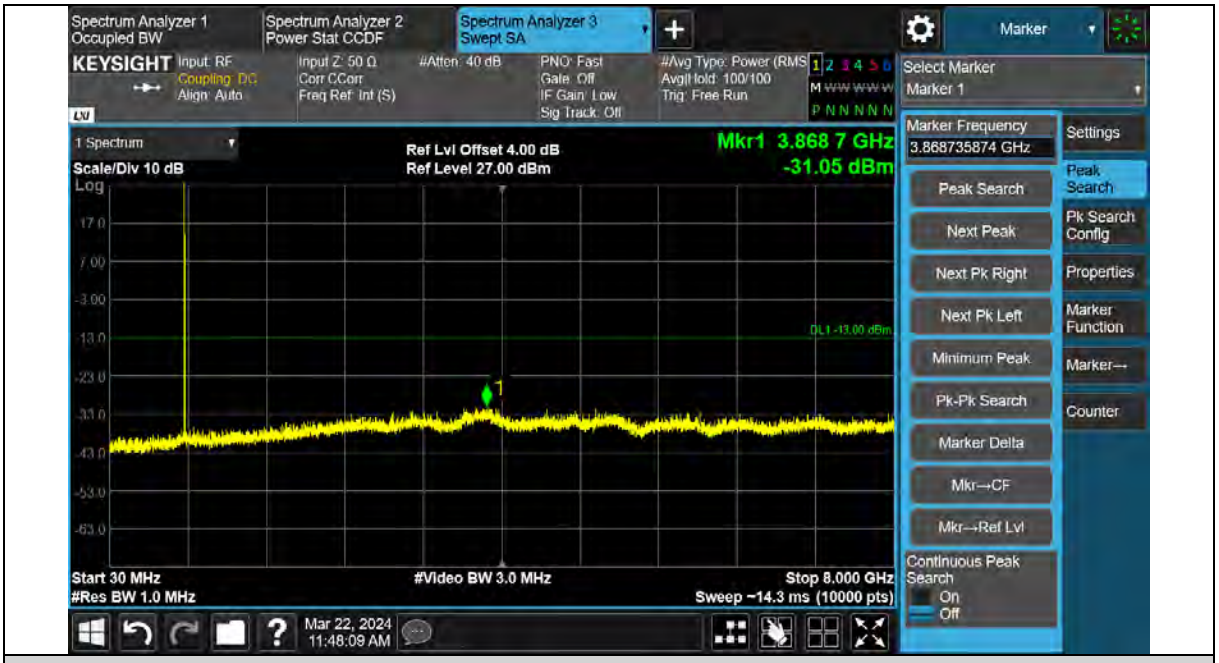
Band14-5MHz-16QAM-23330-1RB#0-Range:30~8000M



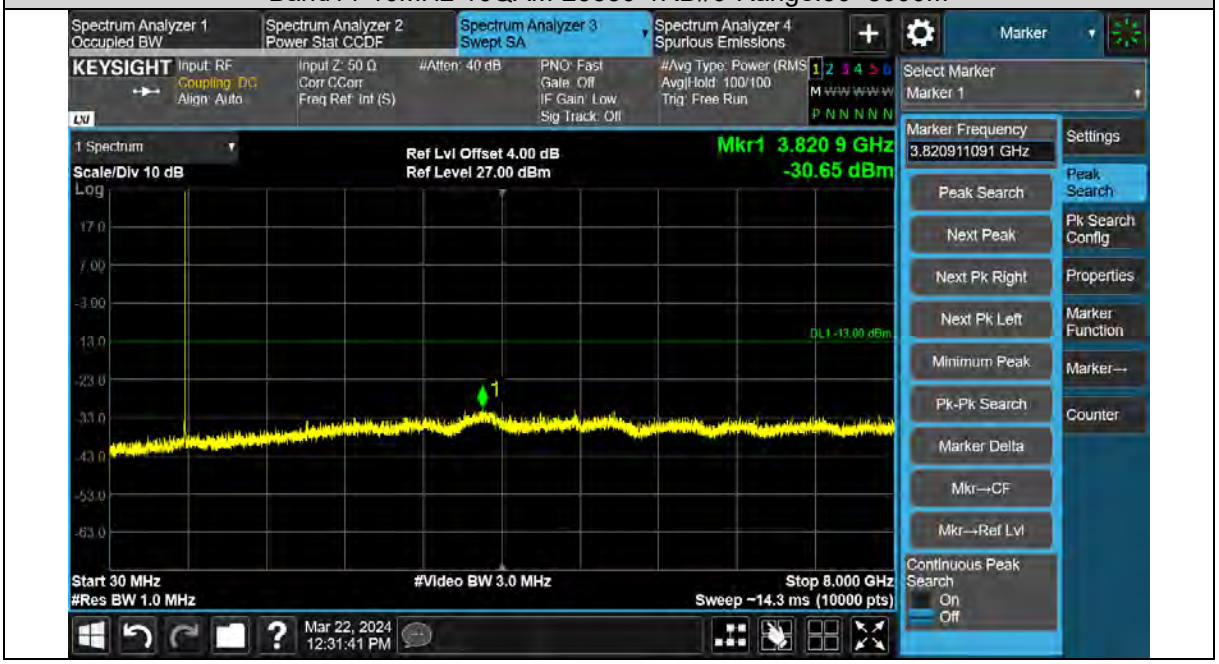
Band14-5MHz-16QAM-23355-1RB#0-Range:30~8000M



Band14-10MHz-QPSK-23330-1RB#0-Range:30~8000M



Band14-10MHz-16QAM-23330-1RB#0-Range:30~8000M



FREQUENCY STABILITY

Test Result

Voltage										
Band	Bandwidth	Modulation	Channel	RB Configure	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band14	10MHz	QPSK	23330	6RB#0	VL	NT	-22.2	-0.028389	±2.5	PASS
Band14	10MHz	QPSK	23330	6RB#0	VN	NT	-21.9	-0.028005	±2.5	PASS
Band14	10MHz	QPSK	23330	6RB#0	VH	NT	14.7	0.018798	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	VL	NT	27	0.034527	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	VN	NT	-11.9	-0.015217	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	VH	NT	-24.5	-0.031330	±2.5	PASS

Temperature										
Band	Bandwidth	Modulation	Channel	RB Configure	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band14	10MHz	QPSK	23330	6RB#0	NV	-30	2.5	0.003197	±2.5	PASS
Band14	10MHz	QPSK	23330	6RB#0	NV	-20	-18.8	-0.024041	±2.5	PASS
Band14	10MHz	QPSK	23330	6RB#0	NV	-10	-21.6	-0.027621	±2.5	PASS
Band14	10MHz	QPSK	23330	6RB#0	NV	0	-23.4	-0.029923	±2.5	PASS
Band14	10MHz	QPSK	23330	6RB#0	NV	10	-16.3	-0.020844	±2.5	PASS
Band14	10MHz	QPSK	23330	6RB#0	NV	20	-3.5	-0.004476	±2.5	PASS
Band14	10MHz	QPSK	23330	6RB#0	NV	30	-8.1	-0.010358	±2.5	PASS
Band14	10MHz	QPSK	23330	6RB#0	NV	40	-10.4	-0.013299	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	50	-15.1	-0.019309	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	-30	-13.7	-0.017519	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	-20	-17.6	-0.022506	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	-10	22.2	0.028389	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	0	6.7	0.008568	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	10	15.5	0.019821	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	20	23.6	0.030179	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	30	20.8	0.026598	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	40	-22.7	-0.029028	±2.5	PASS
Band14	10MHz	16QAM	23330	6RB#0	NV	50	5.3	0.006777	±2.5	PASS

NB-IOT: LTE BAND14

PEAK-TO-AVERAGE RATIO(CCDF)

Test Result

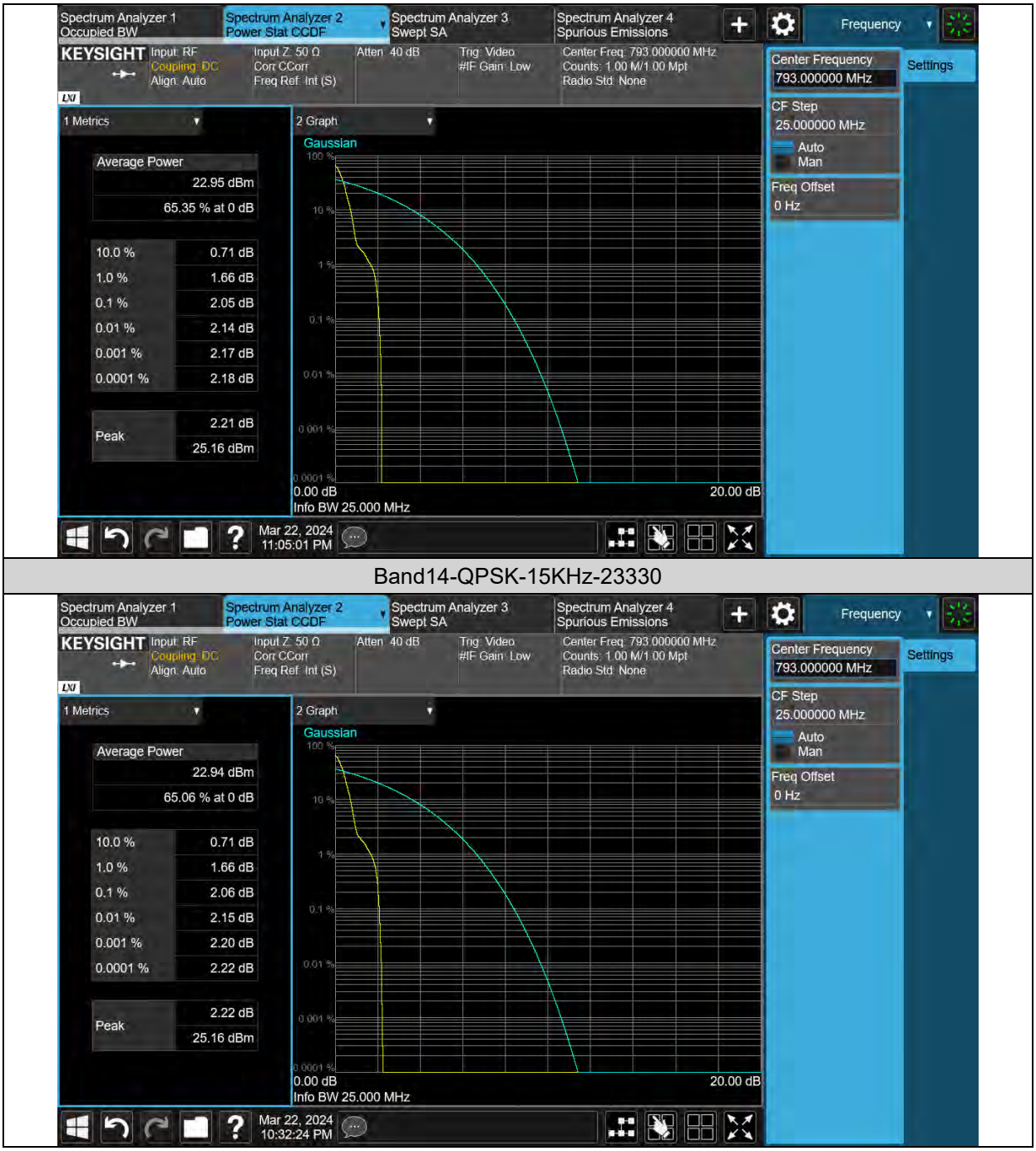
Band	Modulation	Sub-carrier spacing(KHz)	Channe	Result(dB)	Limit(dB)	Verdict
Band14	BPSK	3.75	23330	2.46	13	PASS
	QPSK	3.75	23330	2.43	13	PASS
	BPSK	15	23330	2.05	13	PASS
	QPSK	15	23330	2.06	13	PASS

Test Graphs

Band14-BPSK-3.75KHz-23330

Band14-QPSK-3.75KHz-23330

Band14-BPSK-15KHz-23330



Band14-QPSK-15KHz-23330

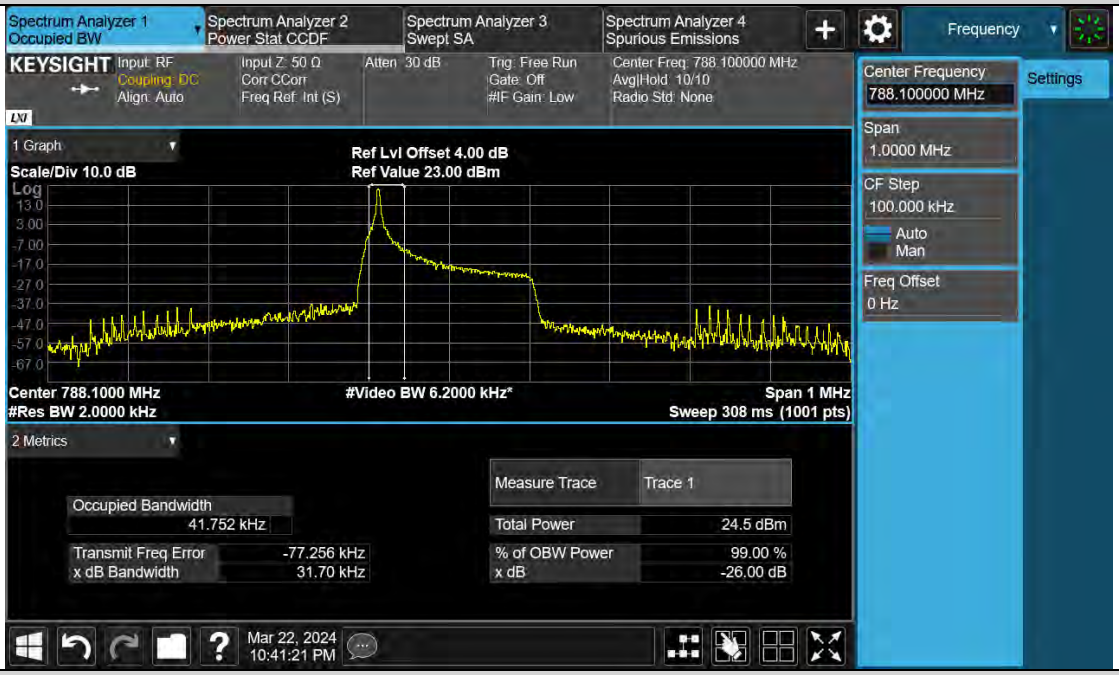
26DB BANDWIDTH AND OCCUPIED BANDWIDTH

Test Result

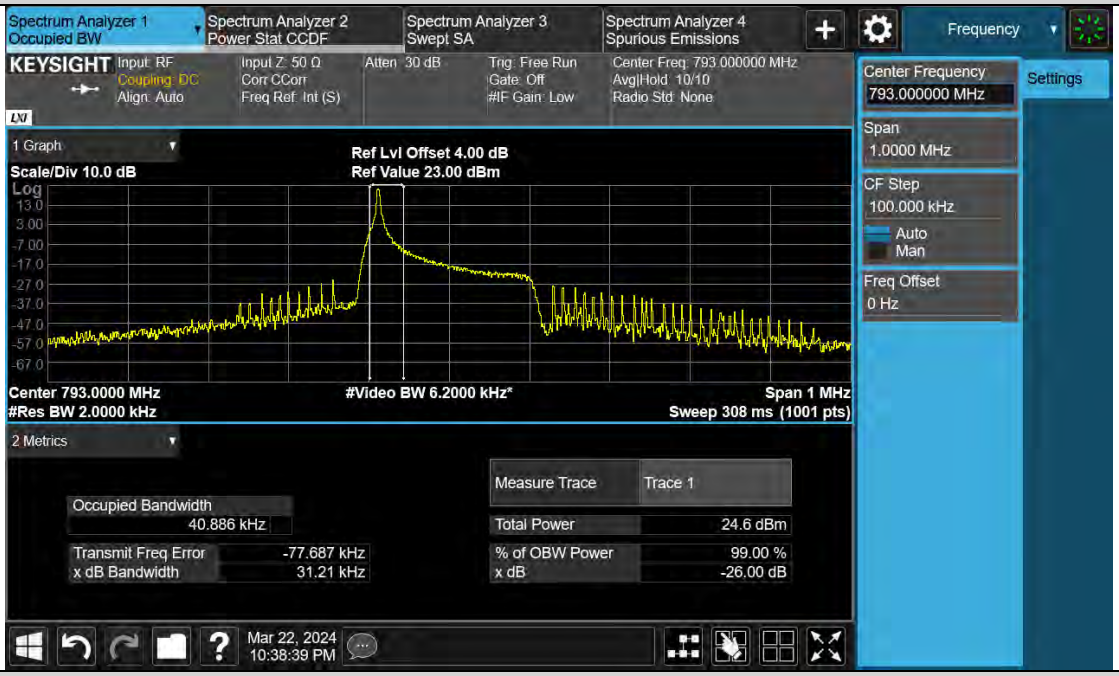
Band	Modulation	Sub-carrier spacing(KHz)	Channel	Ntones	Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)	Verdict
Band14	BPSK	3.75	23282	1RB#0	41.752	31.70	PASS
Band14	BPSK	3.75	23330	1RB#0	40.886	31.21	PASS
Band14	BPSK	3.75	23378	1RB#0	44.330	32.02	PASS
Band14	QPSK	3.75	23282	1RB#0	44.723	31.54	PASS
Band14	QPSK	3.75	23330	1RB#0	46.581	31.34	PASS
Band14	QPSK	3.75	23378	1RB#0	48.865	34.89	PASS
Band14	BPSK	15	23282	1RB#0	87.805	89.72	PASS
Band14	BPSK	15	23330	1RB#0	97.220	71.24	PASS
Band14	BPSK	15	23378	1RB#0	122.20	98.96	PASS
Band14	QPSK	15	23282	1RB#0	96.390	89.54	PASS
Band14	QPSK	15	23330	1RB#0	128.22	143.7	PASS
Band14	QPSK	15	23378	1RB#0	125.55	103.1	PASS
Band14	QPSK	15	23282	12RB#0	189.46	210.5	PASS
Band14	QPSK	15	23330	12RB#0	128.22	143.7	PASS
Band14	QPSK	15	23378	12RB#0	185.79	211.7	PASS

Test Graphs

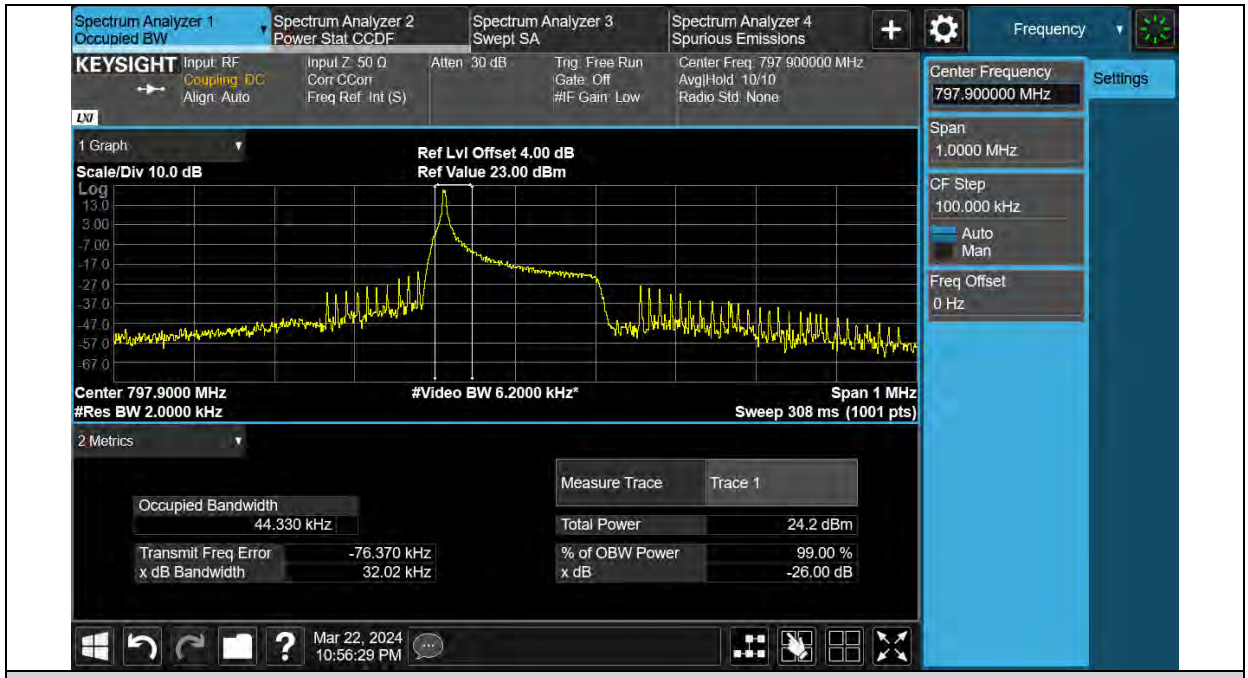
Band14-BPSK-3.75KHz-23282-1RB#0



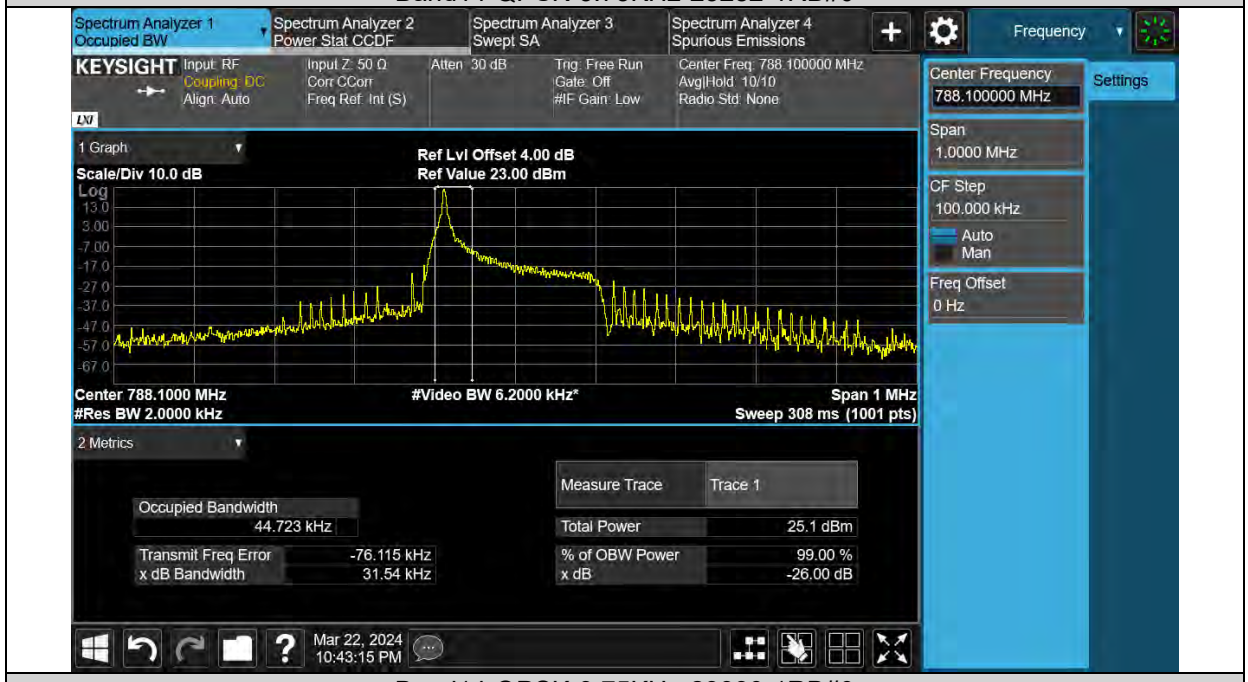
Band14-BPSK-3.75KHz-23330-1RB#0



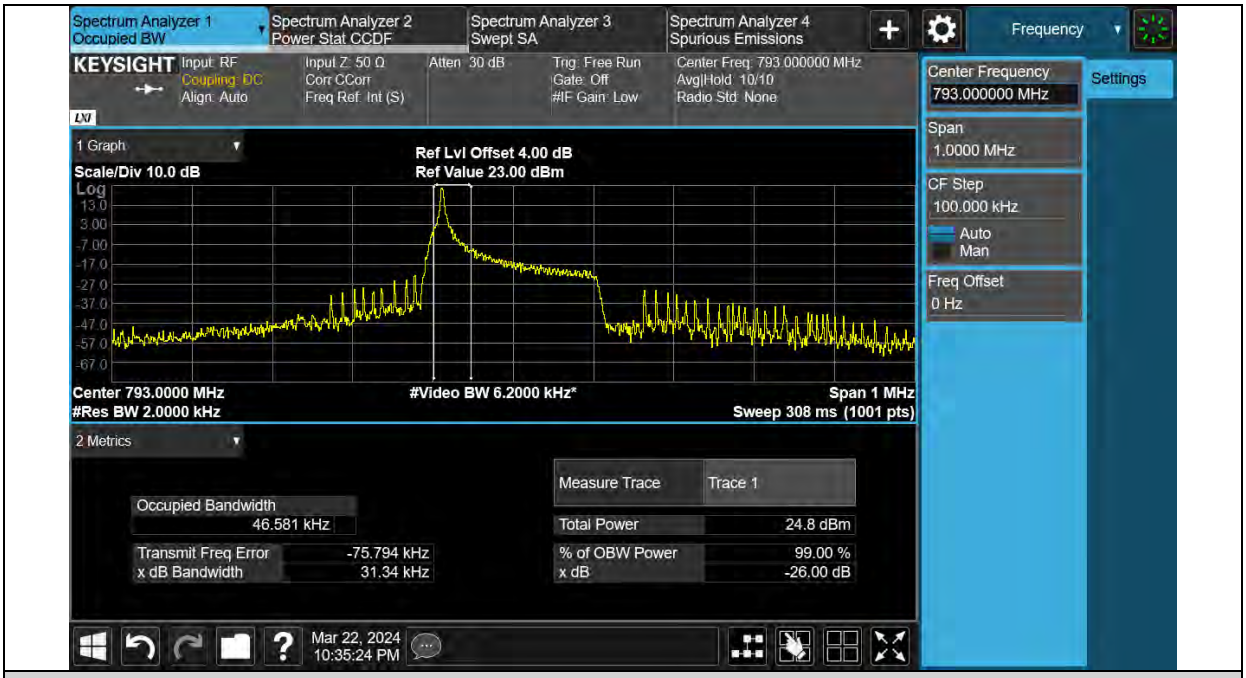
Band14-BPSK-3.75KHz-23378-1RB#0



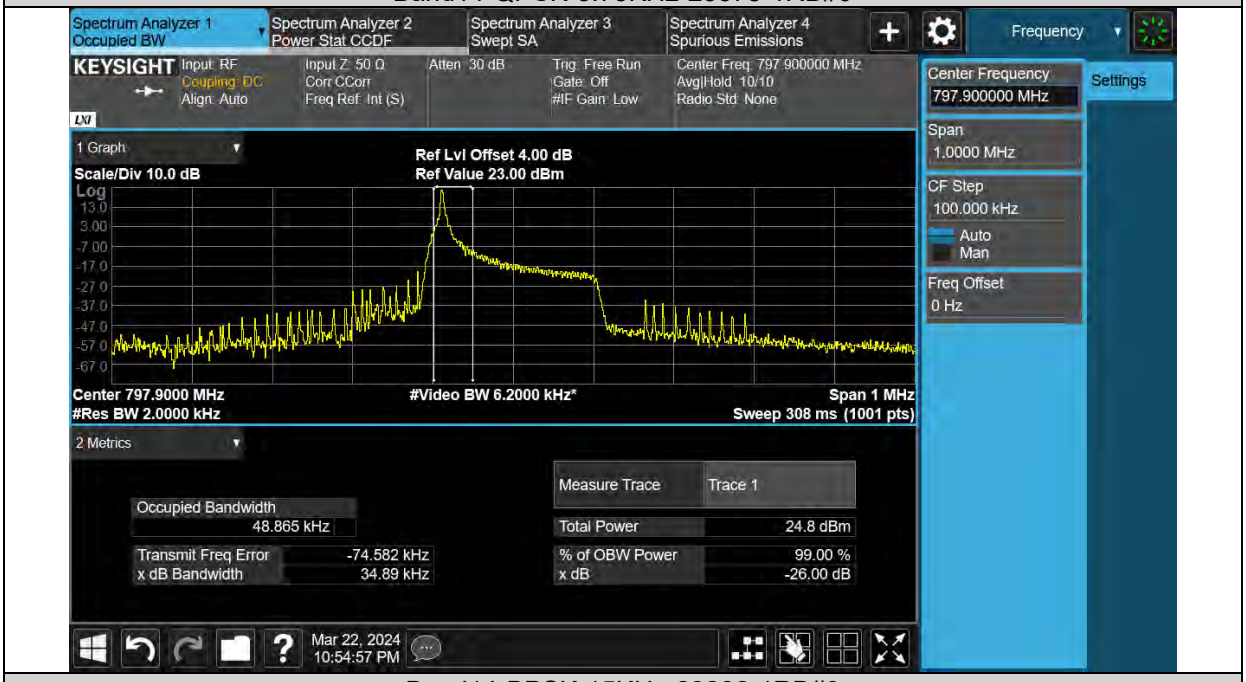
Band14-QPSK-3.75KHz-23282-1RB#0



Band14-QPSK-3.75KHz-23330-1RB#0



Band14-QPSK-3.75KHz-23378-1RB#0



Band14-BPSK-15KHz-23282-1RB#0