Certificate #6613.01

VARIANT FCC TEST REPORT

(PART 27)

Applicant:	NORDIC SEMICONDUCTOR ASA
Address:	Otto Nielsens Vei 12, 7052 Trondheim, Norway

Manufacturer or Supplier:	NORDIC SEMICONDUCTOR ASA
Address:	Otto Nielsens Vei 12, 7052 Trondheim, Norway
Product:	Cellular IoT module
Brand Name:	nRF91
Model Name:	nRF9151
FCC ID	2ANPO00NRF9151
Date of tests	Apr. 12, 2024 ~ Jun. 14, 2024

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

☒ **FCC Part 27** ☒ **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: Jun. 14, 2024	Date: Jun. 14, 2024

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
77535RRF.003	Original release	Mar. 21, 24
PSU-QSU2404090210RF03	Based on the original report (Report No.: 77535RRF.003, Model Name: nRF9151, FCC ID: 2ANPO00nRF9151). The firm wares are all the same, just different SW name and change Power class from PC3 to PC5. The new sample verify RSE worse case and conducted power. So this report only replaces the conducted power and RSE data. other test data refer to the original report.	Jun. 14, 2024

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 27 & PART 2			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**TEST LAB***
§2.1046	Conducted Output Power	Compliance	A
§27.50(c)(10) §27.50(b)(10) §27.1507(a)&(b)	Effective Radiated Power (Band 12) (Band 13) (Band 17) (Band 85) (Band 8)	Compliance	A
§27.50(d)(4) §27.50(h)(2)	Equivalent Isotropically Radiated Power	Compliance	A
§2.1055 §27.54	Frequency Stability	See Note	-
§2.1049	Occupied Bandwidth	See Note	-
§2.1051 §27.53(c)(2) §27.53(g) §27.53(h) §27.53(m)(4)	Conducted Band Edge Measurements (Band 12) (Band 13) (Band 17) (Band 85) (Band 8)	See Note	-
§2.1051 §27.53(g) §27.53(c)(2) §27.53(f) §27.53(h) §27.53(m)(4) §27.1509(a)	Conducted Spurious Emissions (Band 12) (Band 13) (Band 17) (Band 85) (Band 8)	See Note	-
§2.1053 §27.53(c)(2) §27.53(f) §27.53(g) §27.53(h) §27.53(m)(4) §27.1509(a)	Radiated Spurious Emissions (Band 12) (Band 13) (Band 17) (Band 85) (Band 8)	Compliance	A
§27.50	Peak to average ratio*	See Note	-

* Refer to KDB 971168 D01 Power Meas License Digital Systems v03r01.

Note: Refer to the original source report (Report No.: 77535RRF.003, Model Name: nRF9151, FCC ID: 2ANPO00nRF9151).

***Test Lab Information Reference**

Lab A:

Huarui 7Layers High Technology (Suzhou) Co., Ltd.

Lab Address:

Tower N, Innovation Center, 88 Zhuyi Road, High-tech District, Suzhou City, Anhui Province

Accredited Test Lab Cert 6613.01

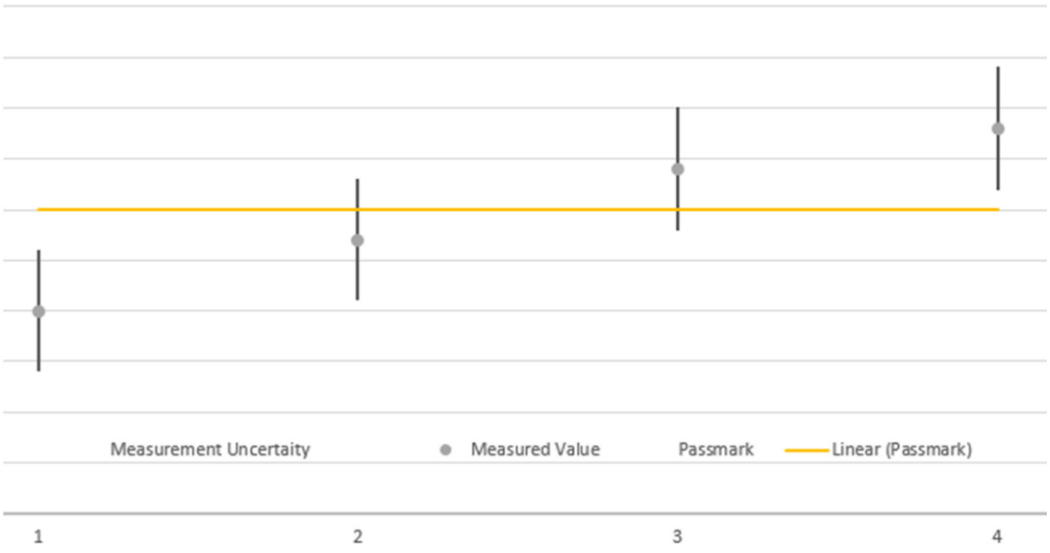
The FCC Site Registration No. is 434559; The Designation No. is CN1325.

1.1 MEASREMENT 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
Frequency Stability	±76.97Hz
Radiated emissions (9KHz~30MHz)	±2.68dB
Radiated emissions & Radiated Power (30MHz~1GHz)	±4.98dB
Radiated emissions & Radiated Power (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
Conducted Output power	±2.06dB
Band Edge Measurements	±4.70dB

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	Mar.29,24	Mar.28,26
Signal Generator	R&S	SMB100A	182185	Mar.29,24	Mar.28,26
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	Mar.28,24	Mar.27,26
EMI TEST Receiver	R&S	ESW44	101973	Mar.28,24	Mar.27,26
Bilog Antenna	SCHWARZBECK	VULB 9163	1264	Dec.26,23	Dec.25,25
Horn Antenna	ETS-LINDGREN	3117	227836	Aug.22,22	Aug.21,24
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.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
6DB attenuator	Tonscend Technology Co., Ltd	N/A	23062787	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.27,24	Apr.26,25
CABLE	R&S	W12.14	N/A	Apr.27,24	Apr.26,25
CABLE	R&S	J12J103539-00-1	SEP-03-20-069	Apr.27,24	Apr.26,25
CABLE	R&S	J12J103539-00-1	SEP-03-20-070	Apr.27,24	Apr.26,25
Temperature Chamber	votsch	VT4002	58566078100050	May.31,22	May.30,24
Temperature Chamber	votsch	VT4002	58566078100050	May.30,24	May.29,26

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 434559; The Designation No. is CN1325.

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT*	Cellular IoT module	
BRAND NAME*	nRF91	
MODEL NAME*	nRF9151	
NOMINAL VOLTAGE*	EUT 3.7Vdc	
MODULATION TECHNOLOGY	**CAT-M1 / NB-IOT :LTE**	BPSK, QPSK, 16QAM
FREQUENCY RANGE CAT-M1	**LTE Band 12 Channel Bandwidth: 1.4MHz**	699.7MHz ~ 715.3MHz
	LTE Band 12 Channel Bandwidth: 3MHz	700.5MHz ~ 714.5MHz
	LTE Band 12 Channel Bandwidth: 5MHz	701.5MHz ~ 713.5MHz
	LTE Band 12 Channel Bandwidth: 10MHz	704MHz ~ 711MHz
	LTE Band 13 Channel Bandwidth: 5MHz	779.5MHz ~ 784.5MHz
	LTE Band 13 Channel Bandwidth: 10MHz	782MHz
	LTE Band 85 Channel Bandwidth: 5MHz	700.5MHz ~ 713.5MHz
	LTE Band 85 Channel Bandwidth: 10MHz	703MHz ~ 711MHz
	LTE Band 8 Channel Bandwidth: 1.4MHz	880.7MHz ~ 914.3MHz
	LTE Band 8 Channel Bandwidth: 3MHz	881.5MHz ~ 913.5MHz
	LTE Band 8 Channel Bandwidth: 5MHz	882.5MHz ~ 912.5MHz
	LTE Band 8 Channel Bandwidth: 10MHz	885MHz ~ 910MHz
FREQUENCY RANGE NB-IOT	**LTE Band 12 (Sub-carrier Spacing: 3.75/15KHz)**	699.1MHz ~ 715.9MHz
	LTE Band 13 (Sub-carrier Spacing: 3.75/15KHz)	771.1MHz ~ 786.9MHz
	LTE Band 17 (Sub-carrier Spacing: 3.75/15KHz)	704.1MHz ~ 715.9MHz
	LTE Band 85 (Sub-carrier Spacing: 3.75/15KHz)	698.1MHz ~ 715.9MHz

	LTE Band 8 (Sub-carrier Spacing: 3.75/15KHz)	880.1MHz ~ 914.9MHz
MAX. ERP/EIRP POWER CAT-M1	**LTE Band 12 Channel Bandwidth: 1.4MHz**	174.18mW
	LTE Band 12 Channel Bandwidth: 3MHz	174.18mW
	LTE Band 12 Channel Bandwidth: 5MHz	171.79mW
	LTE Band 12 Channel Bandwidth: 10MHz	174.58mW
	LTE Band 13 Channel Bandwidth: 5MHz	164.44mW
	LTE Band 13 Channel Bandwidth: 10MHz	168.27mW
	LTE Band 85 Channel Bandwidth: 5MHz	169.43mW
	LTE Band 85 Channel Bandwidth: 10MHz	171.4mW
	LTE Band 8 Channel Bandwidth: 1.4MHz	171.79mW
	LTE Band 8 Channel Bandwidth: 3MHz	171mW
	LTE Band 8 Channel Bandwidth: 5MHz	172.58 mW
	LTE Band 8 Channel Bandwidth: 10MHz	173.78 mW
MAX. ERP/EIRP POWER NB-IOT	**LTE Band 12 (Sub-carrier Spacing: 3.75KHz)**	174.98mW
	LTE Band 12 (Sub-carrier Spacing: 15KHz)	172.58mW
	LTE Band 13 (Sub-carrier Spacing: 3.75KHz)	181.13 mW
	LTE Band 13 (Sub-carrier Spacing: 15KHz)	180.72mW
	LTE Band 17 (Sub-carrier Spacing: 3.75KHz)	175.79 mW
	LTE Band 17 (Sub-carrier Spacing: 15KHz)	178.24mW
	LTE Band 85 (Sub-carrier Spacing: 3.75KHz)	178.24mW
	LTE Band 85 (Sub-carrier Spacing: 15KHz)	181.13mW

	LTE Band 8 (Sub-carrier Spacing: 3.75KHz)	181.97mW
	LTE Band 8(Sub-carrier Spacing: 15KHz)	185.35mW
EMISSION DESIGNATOR CAT-M1	**LTE Band 13 Channel Bandwidth: 5MHz**	QPSK: 1M10G7D
		16QAM: 942KW7D
	LTE Band 85&12 Channel Bandwidth: 5MHz	QPSK: 1M10G7D
		16QAM: 973KW7D
	LTE Band 8 Channel Bandwidth: 1.4MHz	QPSK: 1M10G7D
		16QAM: 970KW7D
EMISSION DESIGNATOR NB-IOT	**LTE Band 13 (Sub-carrier Spacing: 3.75KHz)**	QPSK: 55KG7D
	LTE Band 13 (Sub-carrier Spacing: 15KHz)	QPSK: 189KG7D
	LTE Band 85&12&17 (Sub-carrier Spacing: 15KHz)	BPSK: 125KG7D
		QPSK: 189KG7D
	LTE Band 8 (Sub-carrier Spacing: 15KHz)	BPSK: 140KG7D
		QPSK: 189KG7D
ANTENNA TYPE*	RF4 Embedded LTE Antenna with 2.7dBi for LTE12/ LTE13/ LTE 17/ LTE85/LTE8	
HW VERSION*	nRF9151 LACA AA	
SW VERSION*	mfw_nRF91x1_2.0.1	
I/O PORTS*	Refer to user's manual	
CABLE SUPPLIED*	N/A	
EXTREME TEMPERATURE*	-40-85 ℃	
EXTREME VOLTAGE*	3.0V - 5.5V	

NOTE:

1. ***Since the above data and/or information is provided by the client relevant results or conclusions of this report are only made for these data and/or information , Test Lab is not responsible for the authenticity, integrity and results of the data and information and/or the validity of the conclusion.

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

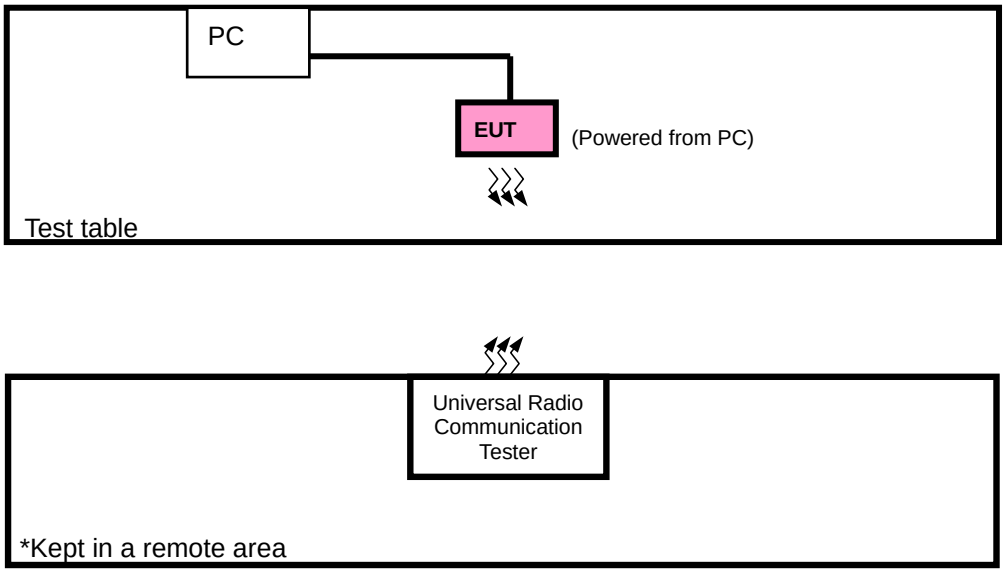
MODULATION MODE	TX FUNCTION

LTE	1TX/1RX

4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in the test report.

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	USB Cable	RF Murata cable for Cellular IoT	MXHS83QE3000	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

2.4 TEST ITEM AND TEST CONFIGURATION

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

EUT CONFIGURE MODE	DESCRIPTION
A	**EUT + USB Cable with LTE link**

CAT-M1 LTE BAND 12 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095 ,23155	5MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095 ,23130	10MHz	QPSK, 16QAM, 64QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	23017 to 23173	23095	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23095	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23095	5MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23060,23095,23130	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 12 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	MODE
A	ERP	23011 to 23179	23011,23095,23179	BPSK,QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	23011 to 23179	23011,23095,23179	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.

CAT-M1 LTE BAND 13 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	23205 to 23255	23205, 20175, 23255	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		23230	23230	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	23205 to 23255	23205,23230, 23255	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230	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 13 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	MODE
A	ERP	23181 to 23279	23181, 23230, 23279	BPSK,QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	23181 to 23279	23181, 23230, 23279	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 17 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	MODE
A	ERP	23731 to 23849	23731, 23790, 23849	BPSK,QPSK	1 RB / 0 RB Offset

Note: 1.This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

2. LTE Band 17 are covered by LTE Band 12, Because it is a subset of LTE Band 12 with the same output power and supported bandwidths, So the conducted test data and RSE test data please refer to LTE Band 12

CAT-M1 LTE BAND 85 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	134027 to 134157	134027, 134092, 134157	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		134052 to 134132	134052, 134092, 134132	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	134027 to 134157	134027, 134092, 134157	5MHz	QPSK	1 RB / 0 RB Offset
		134052 to 134132	134092	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 85 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	MODE
A	ERP	134003 to 132181	134003, 134092, 134181	BPSK,QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	134003 to 132181	134003, 134092, 134181	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.

CAT-M1 LTE BAND 8 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	21457 to 21648	21457,21625,217793	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		21465 to21785	21465 ,21625,21785	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		21475 to 21775	21475 ,21625, 21775	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		21500 to 21750	21500 ,21625, 21750	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	21457 to 21648	21457,21625,217793	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		21465 to21785	21465 ,21625,21785	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		21475 to 21775	21475 ,21625, 21775	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		21500 to 21750	21500 ,21625, 21750	10MHz	QPSK, 16QAM	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 8 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	MODE
A	ERP	21451 to 21799	21451,21625,21799	BPSK,QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	21451 to 21799	21451,21625,21799	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
ERP&EIRP	23deg. C, 70%RH	DC 3.7V By PC	Hanwen Xu
RADIATED EMISSION	23deg. C, 70%RH	DC 3.7V By PC	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 27

KDB 971168 D01 Power Meas License Digital Systems v03r01

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

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1-watt EIRP.

According to the specific rule Part 27.50(c)(10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698–746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

Part 27.50(b)(10)：Portable stations (hand-held devices) transmitting in the 746–757 MHz, 776–788 MHz, and 805–806 MHz bands are limited to 3 watts ERP.

FCC §27.1507 (a) & (d):
(a) Maximum ERP. The power limits specified in this section are applicable to operations in areas more than
110 km (68.4 miles) from the U.S./Mexico border and 140 km (87 miles) from the U.S./Canada border.
(3) Mobile, control and auxiliary test stations. Mobile, control and auxiliary test stations must not
exceed 10 watts ERP.
(4) Portable stations. Portable stations must not exceed 3 watts ERP.
(d) PAR limit. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

3.1.2 TEST PROCEDURES

EIRP 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 determine 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 isotopically 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);

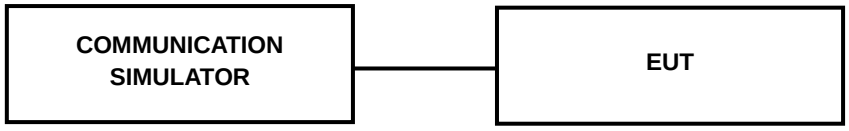
L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

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)

CAT-M1

LTE Band 12

Band/BW	Modulation	RB Size	RB Offset	Low CH 23017	Mid CH 23095	High CH 23173
				Frequency 699.7 MHz	Frequency 707.5 MHz	Frequency 715.3 MHz
12/ 1.4	QPSK	1	0	19.25	19.27	19.20
		1	5	19.39	19.37	19.41
		3	0	19.41	19.35	19.41
		3	3	19.33	19.33	19.41
		6	0	19.11	19.14	19.03
	16QAM	1	0	19.58	19.62	19.51
		1	5	19.58	19.71	19.66
		3	0	19.32	19.42	19.56
		3	3	19.43	19.43	19.47
		6	0	19.41	19.48	19.44

Band/BW	Modulation	RB Size	RB Offset	Low CH 23025 Frequency 700.5 MHz	Mid CH 23095 Frequency 707.5 MHz	High CH 23165 Frequency 714.5 MHz
12/ 3	QPSK	1	0	19.32	19.29	19.18
		1	5	19.36	19.34	19.40
		3	0	19.39	19.31	19.33
		3	3	19.42	19.23	19.40
		6	0	19.18	19.06	19.11
	16QAM	1	0	19.66	19.64	19.59
		1	5	19.55	19.71	19.53
		3	0	19.32	19.49	19.59
		3	3	19.53	19.46	19.45
		6	0	19.37	19.34	19.46

Band/BW	Modulation	RB Size	RB Offset	Low CH 23035 Frequency 701.5 MHz	Mid CH 23095 Frequency 707.5 MHz	High CH 23155 Frequency 713.5 MHz
12/ 5	QPSK	1	0	19.35	19.35	19.22
		1	5	19.35	19.24	19.28
		3	0	19.46	19.43	19.41
		3	3	19.33	19.25	19.40
		6	0	19.10	19.02	19.13
	16QAM	1	0	19.65	19.57	19.65
		1	5	19.58	19.61	19.61
		3	0	19.31	19.40	19.58
		3	3	19.48	19.50	19.52
		6	0	19.39	19.46	19.39

Band/BW	Modulation	RB Size	RB Offset	Low CH 23060	Mid CH 23095	High CH 23130
				Frequency 704 MHz	Frequency 707.5 MHz	Frequency 711 MHz
12/ 10	QPSK	1	0	19.37	19.37	19.30
		1	5	19.41	19.39	19.42
		3	0	19.54	19.45	19.43
		3	3	19.43	19.37	19.49
		6	0	19.19	19.17	19.16
	16QAM	1	0	19.67	19.69	19.66
		1	5	19.64	19.72	19.67
		3	0	19.46	19.50	19.64
		3	3	19.58	19.52	19.54
		6	0	19.42	19.49	19.53

LTE Band 13

Band/BW	Modulation	RB Size	RB Offset	Low CH 23205	Mid CH 23230	High CH 23255
				Frequency 779.5 MHz	Frequency 782.0 MHz	Frequency 784.5 MHz
13/ 5	QPSK	1	0	19.27	19.25	19.03
		1	5	19.13	19.19	18.96
		3	0	19.45	19.29	19.15
		3	3	19.41	19.22	19.24
		6	0	19.14	19.03	19.00
	16QAM	1	0	19.46	19.43	19.30
		1	5	19.44	19.45	19.32
		3	0	19.20	19.13	19.00
		3	3	19.22	19.12	19.07
		6	0	19.34	19.32	19.06

Band/BW	Modulation	RB Size	RB Offset	/	Mid CH 23230	/
				/	Frequency 782.0 MHz	/
13/ 10	QPSK	1	0	/	19.42	/
		1	5	/	19.27	/
		3	0	/	19.51	/
		3	3	/	19.45	/
		6	0	/	19.18	/
	16QAM	1	0	/	19.56	/
		1	5	/	19.51	/
		3	0	/	19.32	/
		3	3	/	19.28	/
		6	0	/	19.43	/

LTE Band 85

Band/BW	Modulation	RB Size	RB Offset	Low CH 134027	Mid CH 134092	High CH 134157
				Frequency 700.5 MHz	Frequency 707 MHz	Frequency 713.5 MHz
85/ 5	QPSK	1	0	19.28	19.26	19.32
		1	5	19.39	19.41	19.34
		3	0	19.41	19.51	19.39
		3	3	19.46	19.41	19.47
		6	0	19.14	19.19	19.08
	16QAM	1	0	19.42	19.56	19.59
		1	5	19.44	19.50	19.47
		3	0	19.22	19.26	19.19
		3	3	19.30	19.20	19.30
		6	0	19.34	19.28	19.34

Band/BW	Modulation	RB Size	RB Offset	Low CH 134052 Frequency 703 MHz	Mid CH 134092 Frequency 707 MHz	High CH 134132 Frequency 711 MHz
85/ 10	QPSK	1	0	19.42	19.32	19.37
		1	5	19.44	19.47	19.45
		3	0	19.45	19.54	19.46
		3	3	19.52	19.55	19.53
		6	0	19.16	19.24	19.18
	16QAM	1	0	19.47	19.58	19.64
		1	5	19.57	19.56	19.54
		3	0	19.28	19.32	19.26
		3	3	19.34	19.35	19.33
		6	0	19.37	19.36	19.35

LTE Band 8

Band/BW	Modulation	RB Size	RB Offset	Low CH 21457 Frequency 880.7 MHz	Mid CH 21625 Frequency 897.5MHz	High CH 21793 Frequency 914.3MHz
8/ 1.4	QPSK	1	0	19.27	19.37	19.32
		1	5	19.22	19.25	19.35
		3	0	19.11	19.16	19.19
		3	3	19.41	19.60	19.50
		6	0	19.65	19.55	19.62
	16QAM	1	0	19.36	19.38	19.43
		1	5	19.31	19.23	19.20
		3	0	19.17	19.18	19.20
		3	3	19.25	19.03	19.12
		6	0	19.51	19.45	19.39

Band/BW	Modulation	RB Size	RB Offset	Low CH 21465 Frequency 881.5 MHz	Mid CH 21625 Frequency 897.5MHz	High CH 21785 Frequency 913.5MHz
8/ 3	QPSK	1	0	19.38	19.37	19.26
		1	5	19.24	19.26	19.28
		3	0	19.10	19.17	19.14
		3	3	19.44	19.61	19.50
		6	0	19.54	19.45	19.63
	16QAM	1	0	19.35	19.33	19.40
		1	5	19.24	19.33	19.26
		3	0	19.06	19.24	19.21
		3	3	19.26	19.03	19.11
		6	0	19.50	19.43	19.45

Band/BW	Modulation	RB Size	RB Offset	Low CH 21475 Frequency 882.5 MHz	Mid CH 21625 Frequency 897.5MHz	High CH 21775 Frequency 912.5MHz
8/ 5	QPSK	1	0	19.34	19.35	19.33
		1	5	19.19	19.21	19.23
		3	0	19.17	19.17	19.22
		3	3	19.48	19.50	19.47
		6	0	19.67	19.49	19.59
	16QAM	1	0	19.28	19.41	19.35
		1	5	19.36	19.25	19.28
		3	0	19.15	19.13	19.17
		3	3	19.15	19.09	19.18
		6	0	19.49	19.39	19.42

Band/BW	Modulation	RB Size	RB Offset	Low CH 21500 Frequency 885 MHz	Mid CH 21625 Frequency 897.5MHz	High CH 21750 Frequency 910MHz
8/ 10	QPSK	1	0	19.41	19.38	19.39
		1	5	19.30	19.32	19.36
		3	0	19.22	19.27	19.29
		3	3	19.56	19.63	19.62
		6	0	19.69	19.57	19.70
	16QAM	1	0	19.42	19.44	19.46
		1	5	19.39	19.34	19.32
		3	0	19.19	19.28	19.27
		3	3	19.27	19.17	19.21
		6	0	19.55	19.52	19.51

NB-IOT

LTE Band 12						
Sub-carrier Spacing (KHz)	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		23011	23095	23179
		Frequence (MHz)		699.1	707.5	715.9
3.75	BPSK	1	0	19.73	19.71	19.70
		1	47	19.66	19.65	19.59
	QPSK	1	0	**19.75**	19.73	19.68
		1	47	19.68	19.66	19.61
12	BPSK	1	0	19.67	19.65	19.63
		1	11	19.65	19.63	19.61
	QPSK	1	0	19.62	19.64	19.60
		1	11	19.66	19.63	19.62
		12	0	17.65	17.67	17.52

LTE Band 13						
Sub-carrier Spacing (KHz)	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		23181	23230	23279
		Frequence (MHz)		777.1	782	786.9
3.75	BPSK	1	0	19.87	19.79	19.83
		1	47	19.84	19.69	19.76
	QPSK	1	0	**19.88**	19.80	19.82
		1	47	19.83	19.71	19.75
12	BPSK	1	0	19.84	19.86	19.87
		1	11	19.83	19.84	19.85
	QPSK	1	0	19.85	19.83	19.73
		1	11	19.82	19.84	19.74
		12	0	17.73	17.65	17.66

LTE Band 17						
Sub-carrier Spacing (KHz)	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		23731	23790	23849
		Frequence (MHz)		704.1	710	715.9
3.75	BPSK	1	0	19.73	19.74	19.66
		1	47	19.72	19.67	19.60
	QPSK	1	0	19.74	19.75	19.67
		1	47	19.67	19.67	19.62
12	BPSK	1	0	19.62	19.62	19.74
		1	11	19.60	19.70	19.73
	QPSK	1	0	19.70	19.78	19.76
		1	11	19.71	**19.81**	19.73
		12	0	17.68	17.67	17.56

LTE Band 85						
Sub-carrier Spacing (KHz)	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		134003	134092	134181
		Frequence (MHz)		698.1	707	715.9
3.75	BPSK	1	0	19.68	19.81	19.71
		1	47	19.62	19.75	19.63
	QPSK	1	0	19.79	19.72	19.69
		1	47	19.74	19.70	19.64
12	BPSK	1	0	19.76	**19.88**	19.57
		1	11	19.73	19.87	19.53
	QPSK	1	0	19.74	19.85	19.55
		1	11	19.75	19.87	19.53
		12	0	17.68	17.68	17.57

LTE Band 8						
Sub-carrier Spacing (KHz)	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		21451	21625	21799
		Frequence (MHz)		880.1	897.5	914.9
3.75	BPSK	1	0	19.72	19.71	19.90
		1	47	19.62	19.66	19.83
	QPSK	1	0	19.73	19.75	19.89
		1	47	19.65	19.78	19.82
15	BPSK	1	0	19.58	19.84	19.97
		1	11	19.56	19.83	19.96
	QPSK	1	0	19.53	19.84	**19.98**
		1	11	19.54	19.82	19.97
		12	0	17.59	17.54	17.65

ERP /EIRP

CAT-M1
LTE BAND 12
CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23017	699.7	19.41	2.7	22.11	162.55	3
23095	707.5	19.37	2.7	22.07	161.06	3
23173	715.3	19.41	2.7	22.11	162.55	3

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23017	699.7	19.58	2.7	22.28	169.04	3
23095	707.5	19.71	2.7	22.41	174.18	3
23173	715.3	19.66	2.7	22.36	172.19	3

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23025	700.5	19.66	2.7	22.36	172.19	3
23095	707.5	19.71	2.7	22.41	174.18	3
23165	714.5	19.59	2.7	22.29	169.43	3

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23025	700.5	19.41	2.7	22.11	162.55	3
23095	707.5	19.37	2.7	22.07	161.06	3
23165	714.5	19.41	2.7	22.11	162.55	3

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23035	701.5	19.46	2.7	22.16	164.44	3
23095	707.5	19.43	2.7	22.13	163.31	3
23155	713.5	19.41	2.7	22.11	162.55	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23035	701.5	19.65	2.7	22.35	171.79	3
23095	707.5	19.61	2.7	22.31	170.22	3
23155	713.5	19.65	2.7	22.35	171.79	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23060	704	19.54	2.7	22.24	167.49	3
23095	707.5	19.45	2.7	22.15	164.06	3
23130	711	19.49	2.7	22.19	165.58	3

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23060	704	19.67	2.7	22.37	172.58	3
23095	707.5	19.72	2.7	22.42	174.58	3
23130	711	19.67	2.7	22.37	172.58	3

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

LTE BAND 13

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23205	779.5	19.45	2.7	22.15	164.06	3
23230	782	19.29	2.7	21.99	158.12	3
23255	784.5	19.24	2.7	21.94	156.31	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23205	779.5	19.46	2.7	22.16	164.44	3
23230	782	19.45	2.7	22.15	164.06	3
23255	784.5	19.32	2.7	22.02	159.22	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23230	782	19.51	2.7	22.21	166.34	3

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23230	782	19.56	2.7	22.26	168.27	3

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

LTE BAND 85

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
134027	700.5	19.46	2.7	22.16	164.44	3
134092	707	19.51	2.7	22.21	166.34	3
134157	713.5	19.47	2.7	22.17	164.82	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
134027	700.5	19.44	2.7	22.14	163.68	3
134092	707	19.56	2.7	22.26	168.27	3
134157	713.5	19.59	2.7	22.29	169.43	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
134052	703	19.52	2.7	22.22	166.72	3
134092	707	19.55	2.7	22.25	167.88	3
134132	711	19.53	2.7	22.23	167.11	3

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
134052	703	19.57	2.7	22.27	168.66	3
134092	707	19.58	2.7	22.28	169.04	3
134132	711	19.64	2.7	22.34	171.4	3

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

LTE BAND 8

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21457	880.7	19.65	2.7	22.35	171.79	3
21625	897.5	19.6	2.7	22.3	169.82	3
21793	914.3	19.62	2.7	22.32	170.61	3

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21457	880.7	19.51	2.7	22.21	166.34	3
21625	897.5	19.45	2.7	22.15	164.06	3
21793	914.3	19.43	2.7	22.13	163.31	3

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21465	881.5	19.54	2.7	22.24	167.49	3
21625	897.5	19.61	2.7	22.31	170.22	3
21785	913.5	19.63	2.7	22.33	171	3

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21465	881.5	19.5	2.7	22.2	165.96	3
21625	897.5	19.43	2.7	22.13	163.31	3
21785	913.5	19.45	2.7	22.15	164.06	3

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21475	882.5	19.67	2.7	22.37	172.58	3
21625	897.5	19.5	2.7	22.2	165.96	3
21775	912.5	19.59	2.7	22.29	169.43	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21475	882.5	19.49	2.7	22.19	165.58	3
21625	897.5	19.41	2.7	22.11	162.55	3
21775	912.5	19.42	2.7	22.12	162.93	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21500	885	19.69	2.7	22.39	173.38	3
21625	897.5	19.63	2.7	22.33	171	3
21750	910	19.7	2.7	22.4	173.78	3

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21500	885	19.55	2.7	22.25	167.88	3
21625	897.5	19.52	2.7	22.22	166.72	3
21750	910	19.51	2.7	22.21	166.34	3

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

NB-IOT

LTE B12 3.75KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23011	699.1	19.73	2.7	22.43	174.98	3
23095	707.5	19.71	2.7	22.41	174.18	3
23179	715.9	19.7	2.7	22.4	173.78	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23011	699.1	19.75	2.7	22.45	175.79	3
23095	707.5	19.73	2.7	22.43	174.98	3
23179	715.9	19.68	2.7	22.38	172.98	3

LTE B12 15KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23011	699.1	19.67	2.7	22.37	172.58	3
23095	707.5	19.65	2.7	22.35	171.79	3
23179	715.9	19.63	2.7	22.33	171	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23011	699.1	19.66	2.7	22.36	172.19	3
23095	707.5	19.64	2.7	22.34	171.4	3
23179	715.9	19.62	2.7	22.32	170.61	3

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

NB-IOT

LTE B13 3.75KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23181	777.1	19.87	2.7	22.57	180.72	3
23230	782	19.79	2.7	22.49	177.42	3
23279	786.9	19.83	2.7	22.53	179.06	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23181	777.1	19.88	2.7	22.58	181.13	3
23230	782	19.8	2.7	22.5	177.83	3
23279	786.9	19.82	2.7	22.52	178.65	3

LTE B13 15KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23181	777.1	19.84	2.7	22.54	179.47	3
23230	782	19.86	2.7	22.56	180.3	3
23279	786.9	19.87	2.7	22.57	180.72	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23181	777.1	19.85	2.7	22.55	179.89	3
23230	782	19.84	2.7	22.54	179.47	3
23279	786.9	19.74	2.7	22.44	175.39	3

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

NB-IOT

LTE B17 3.75KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23731	704.1	19.73	2.7	22.43	174.98	3
23790	710	19.74	2.7	22.44	175.39	3
23849	715.9	19.66	2.7	22.36	172.19	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23731	704.1	19.74	2.7	22.44	175.39	3
23790	710	19.75	2.7	22.45	175.79	3
23849	715.9	19.67	2.7	22.37	172.58	3

LTE B17 15KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23731	704.1	19.62	2.7	22.32	170.61	3
23790	710	19.7	2.7	22.4	173.78	3
23849	715.9	19.74	2.7	22.44	175.39	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23731	704.1	19.71	2.7	22.41	174.18	3
23790	710	19.81	2.7	22.51	178.24	3
23849	715.9	19.76	2.7	22.46	176.2	3

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

NB-IOT

LTE B85 3.75KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
134003	698.1	19.68	2.7	22.38	172.98	3
134092	707	19.81	2.7	22.51	178.24	3
134181	715.9	19.71	2.7	22.41	174.18	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
134003	698.1	19.79	2.7	22.49	177.42	3
134092	707	19.72	2.7	22.42	174.58	3
134181	715.9	19.69	2.7	22.39	173.38	3

LTE B85 15KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
134003	698.1	19.76	2.7	22.46	176.2	3
134092	707	19.88	2.7	22.58	181.13	3
134181	715.9	19.57	2.7	22.27	168.66	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
134003	698.1	19.75	2.7	22.45	175.79	3
134092	707	19.87	2.7	22.57	180.72	3
134181	715.9	19.55	2.7	22.25	167.88	3

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

NB-IOT

LTE B8A 3.75KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21451	880.1	19.72	2.7	22.42	174.58	3
21625	897.5	19.71	2.7	22.41	174.18	3
21799	914.9	19.9	2.7	22.6	181.97	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21451	880.1	19.73	2.7	22.43	174.98	3
21625	897.5	19.78	2.7	22.48	177.01	3
21799	914.9	19.89	2.7	22.59	181.55	3

LTE B8A 15KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21451	880.1	19.58	2.7	22.28	169.04	3
21625	897.5	19.84	2.7	22.54	179.47	3
21799	914.9	19.97	2.7	22.67	184.93	3

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
21451	880.1	19.54	2.7	22.24	167.49	3
21625	897.5	19.84	2.7	22.54	179.47	3
21799	914.9	19.98	2.7	22.68	185.35	3

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

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

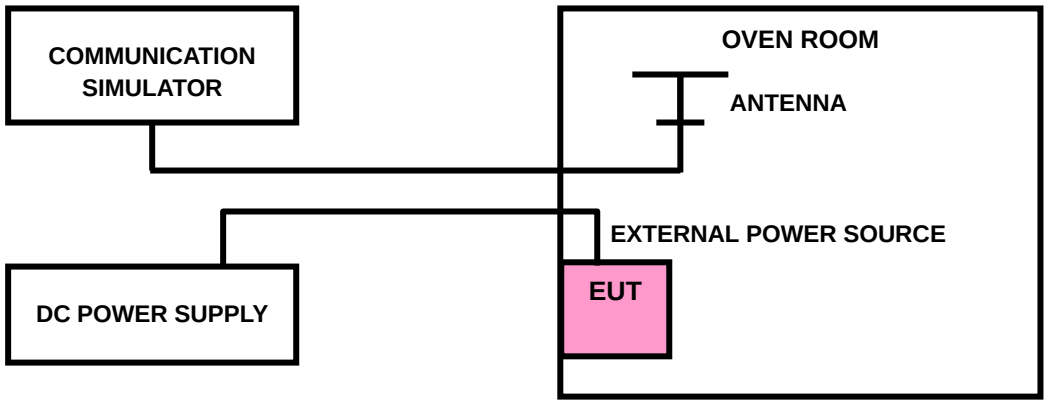
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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

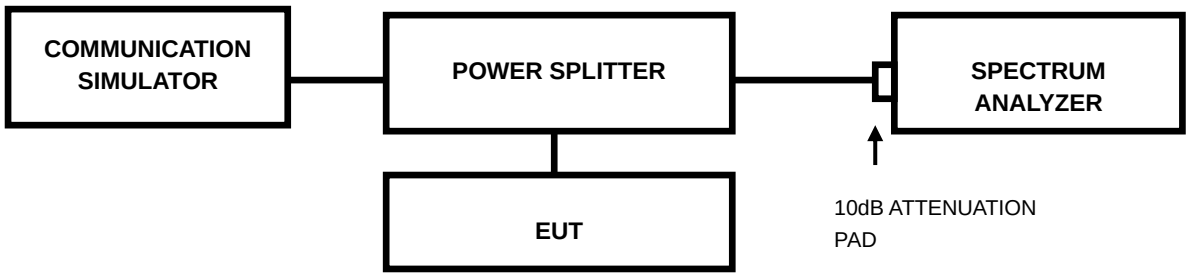
Refer to the original source report (Report No.: 77535RRF.003, Model Name: nRF9151, FCC ID: 2ANPO00nRF9151).

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

Refer to the original source report (Report No.: 77535RRF.003, Model Name: nRF9151, FCC ID: 2ANPO00nRF9151).

3.4 BAND EDGE MEASUREMENT

3.4.1 LIMITS OF BAND EDGE MEASUREMENT

According to FCC 27.53(g) specified that For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

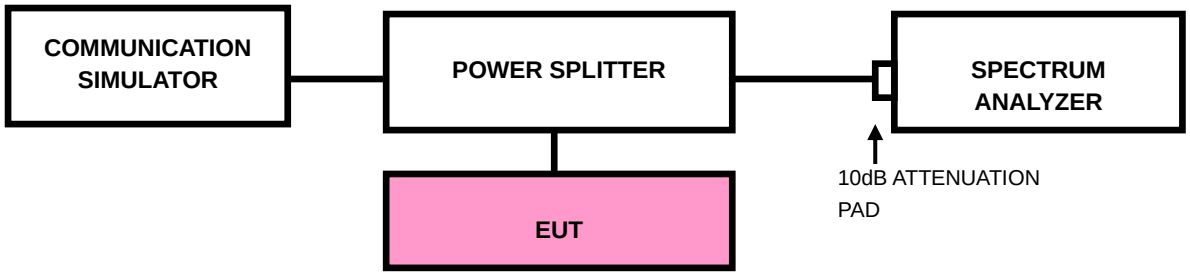
According to FCC 27.53(h) specified that For operations in the 1710-1755 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

According to FCC 27.53(m)(4) specified that For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. For mobile digital stations, in the 1-megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed.

47 CFR 27.53(c)(2)：On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

47 CFR 27.53(f)：For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions 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.

3.4.2 TEST SETUP



3.4.3 TEST PROCEDURES

a) All measurements were done at low and high operational frequency range

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

c) Tune the analyzer to the nominal center frequency of the emission bandwidth

(EBW)

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

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

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

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

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

i) Use auto-coupled sweep time.

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

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

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

3.4.4 TEST RESULTS

Refer to the original source report (Report No.: 77535RRF.003, Model Name: nRF9151, FCC ID: 2ANPO00nRF9151).

3.5 CONDUCTED SPURIOUS EMISSIONS

3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

According to FCC 27.53(g) specified that For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

According to FCC 27.53(h) specified that For operations in the 1710-1755 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

According to FCC 27.53(m)(4) specified that For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. For mobile digital stations, in the 1-megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed.

47 CFR 27.53(c)(2)：On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

47 CFR 27.53(f)：For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotopically 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.

FCC §27.1509 (a):

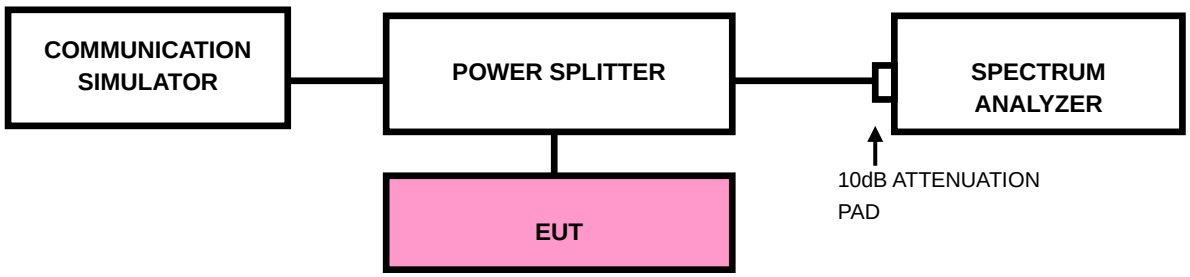
The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts: (a) For 900 MHz broadband operations in 897.5–900.5 MHz band by at least 43 + 10 log (P) dB.

3.5.2 TEST PROCEDURE

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high 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.

Refer to the original source report (Report No.: 77535RRF.003, Model Name: nRF9151, FCC ID: 2ANPO00nRF9151).

3.6 RADIATED EMISSION MEASUREMENT

3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to FCC 27.53(g) specified that For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

According to FCC 27.53(h) specified that For operations in the 1710-1755 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

According to FCC 27.53(m)(4) specified that For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. For mobile digital stations, in the 1-megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed.

47 CFR 27.53(c)(2)：On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

47 CFR 27.53(f)：For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions 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.

FCC §27.1509 (a):

The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) in watts by at least the following amounts: (a) For 900 MHz broadband operations in 897.5–900.5 MHz band by at least 43 + 10 log (P) dB.

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.

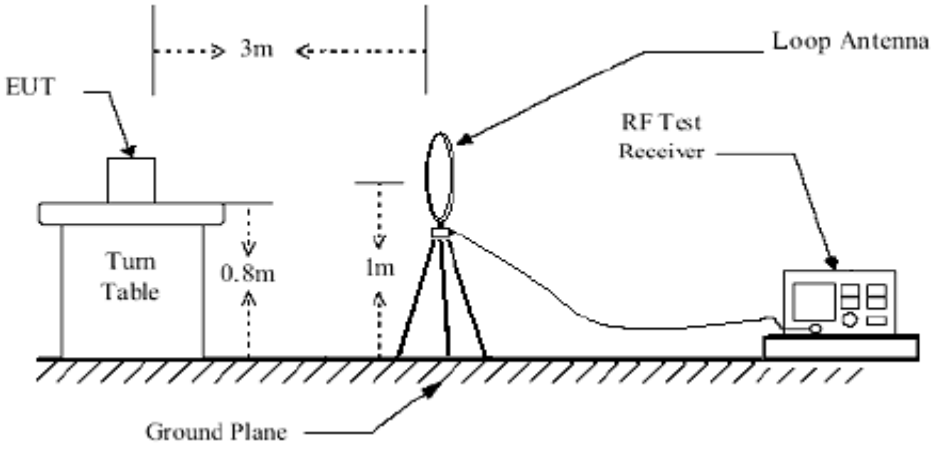
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.6.3 DEVIATION FROM TEST STANDARD

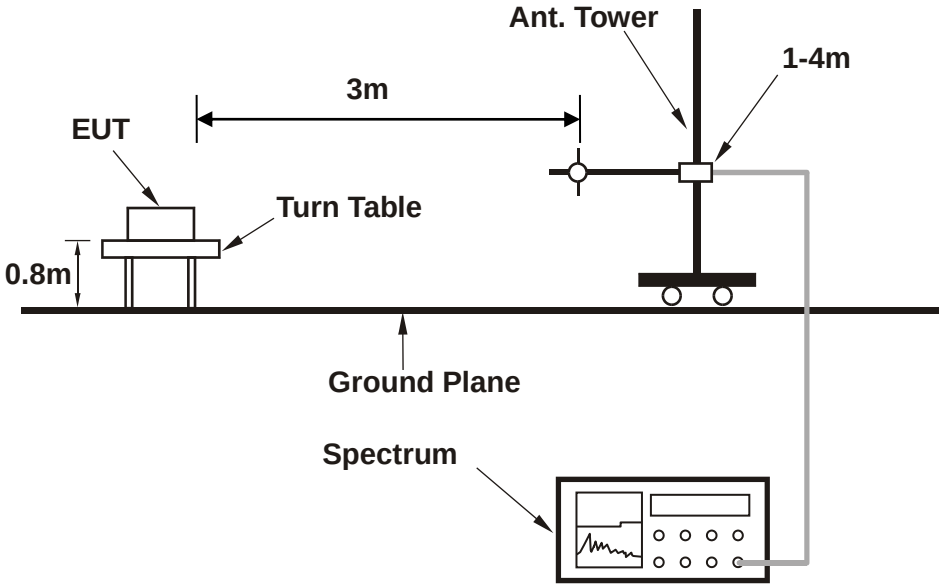
No deviation

3.6.4 TEST SETUP

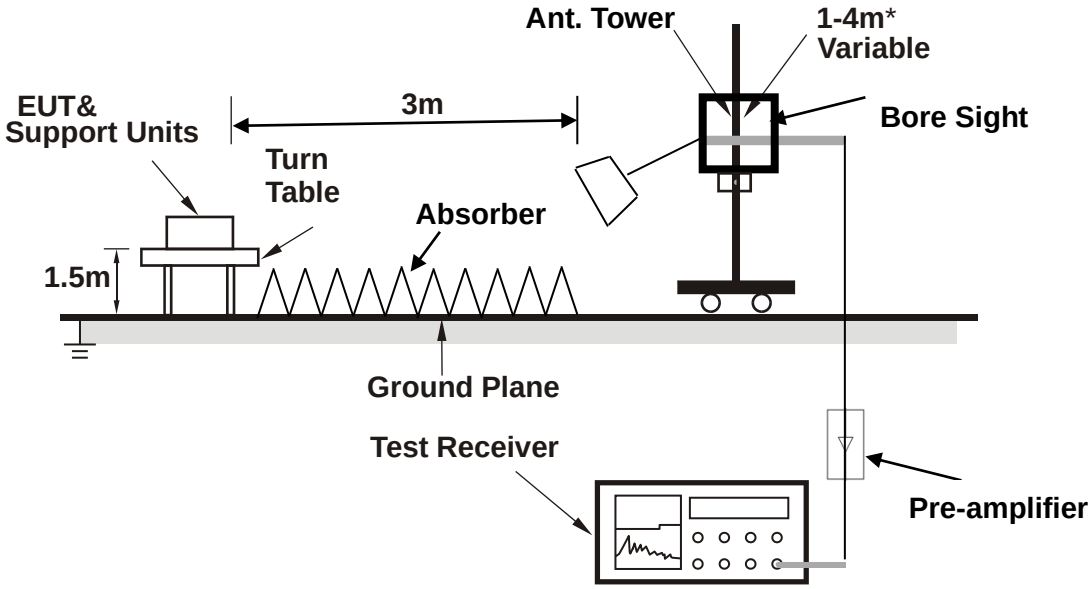
< Frequency Range below 30MHz >



< Frequency Range 30MHz~1GHz >



<Frequency Range above 1GHz>



Note: Above 1G is a directional antenna depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

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.

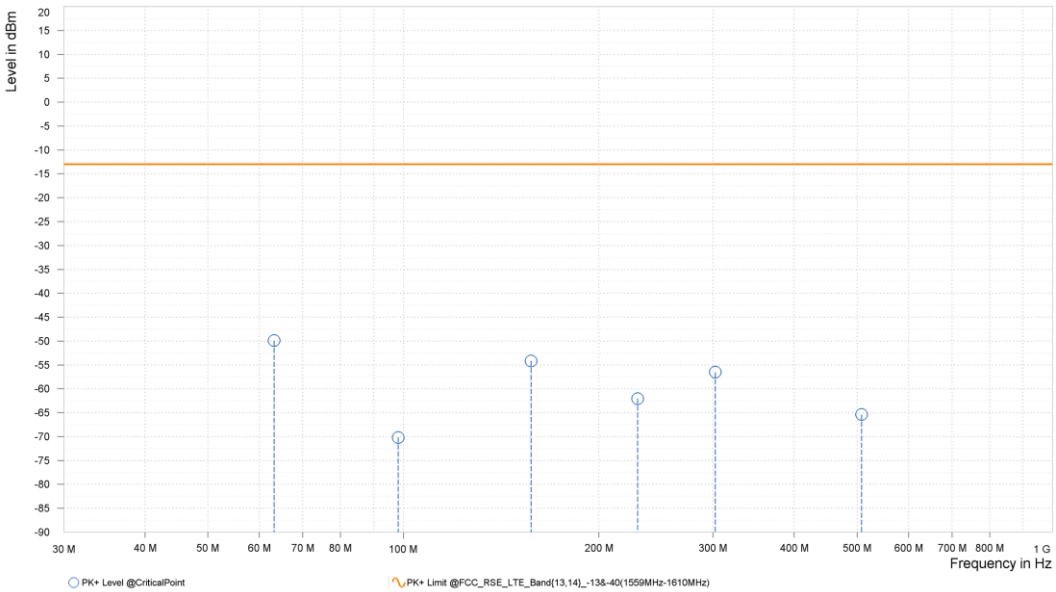
BELOW 1GHz WORST-CASE DATA

30 MHz – 1GHz data:

CAT-M1 LTE Band 13
CHANNEL BANDWIDTH: 5MHz / QPSK

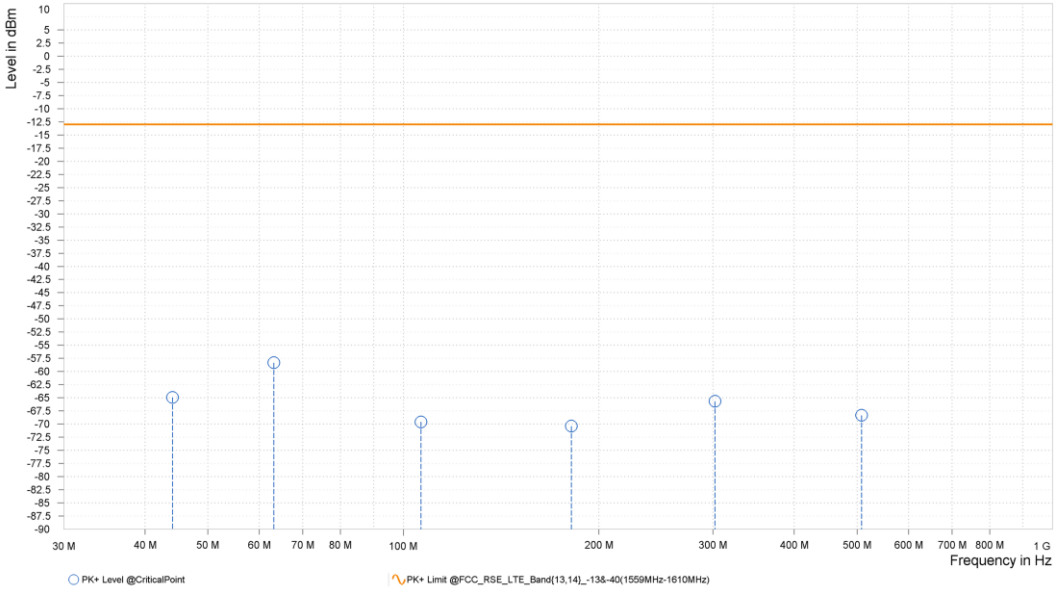
MODE	TX channel 23255	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	63.250	-49.92	-13.00	36.92	1.87	H	194.3	2.00
1	98.200	-70.18	-13.00	57.18	-0.19	H	354.9	2.00
1	157.300	-54.16	-13.00	41.16	-4.90	H	62.8	2.00
1	229.550	-62.04	-13.00	49.04	2.15	H	5.2	1.00
1	302.300	-56.51	-13.00	43.51	5.45	H	5.2	1.00
2	507.796	-65.38	-13.00	52.38	7.47	H	359	1.00



MODE	TX channel 23255	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 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	44.100	-64.93	-13.00	51.93	5.33	V	98.8	2.00
1	63.200	-58.32	-13.00	45.32	0.11	V	98.8	2.00
1	106.500	-69.58	-13.00	56.58	3.55	V	354.2	2.00
1	181.450	-70.38	-13.00	57.38	-0.37	V	357.6	1.00
1	302.150	-65.66	-13.00	52.66	5.10	V	206.2	2.00
2	508.163	-68.33	-13.00	55.33	6.89	V	209.9	1.00



ABOVE 1GHz

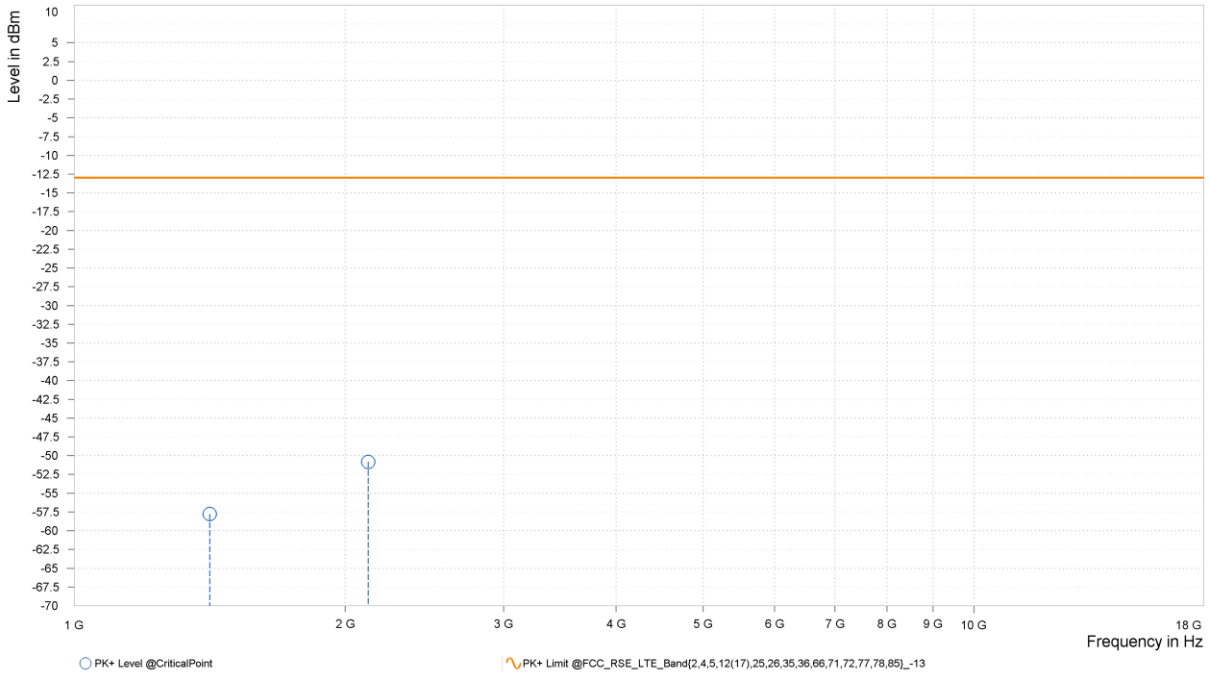
Note: For higher frequency, the emission is too low to be detected.

CAT-M1 LTE BAND 12

CHANNEL BANDWIDTH: 1.4MHz / QPSK

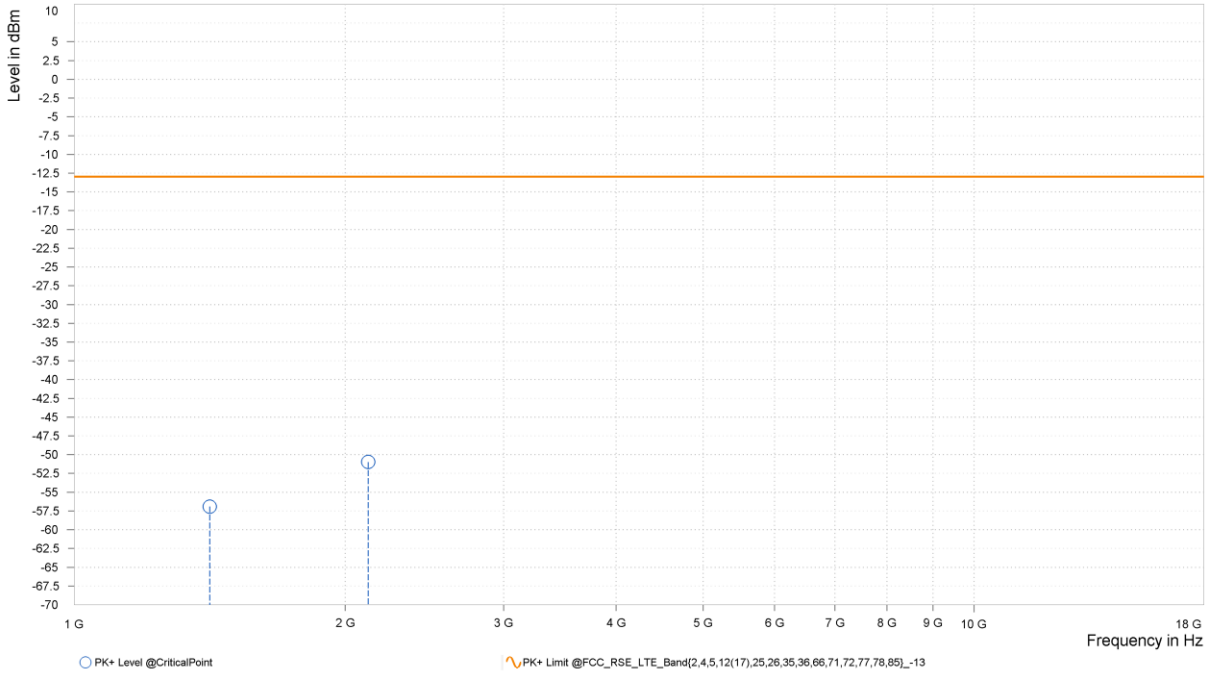
MODE	TX channel 23095	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,413.740	-57.78	-13.00	44.78	2.91	H	224.2	1.00
1	2,120.610	-50.82	-13.00	37.82	10.89	H	224.2	1.00



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

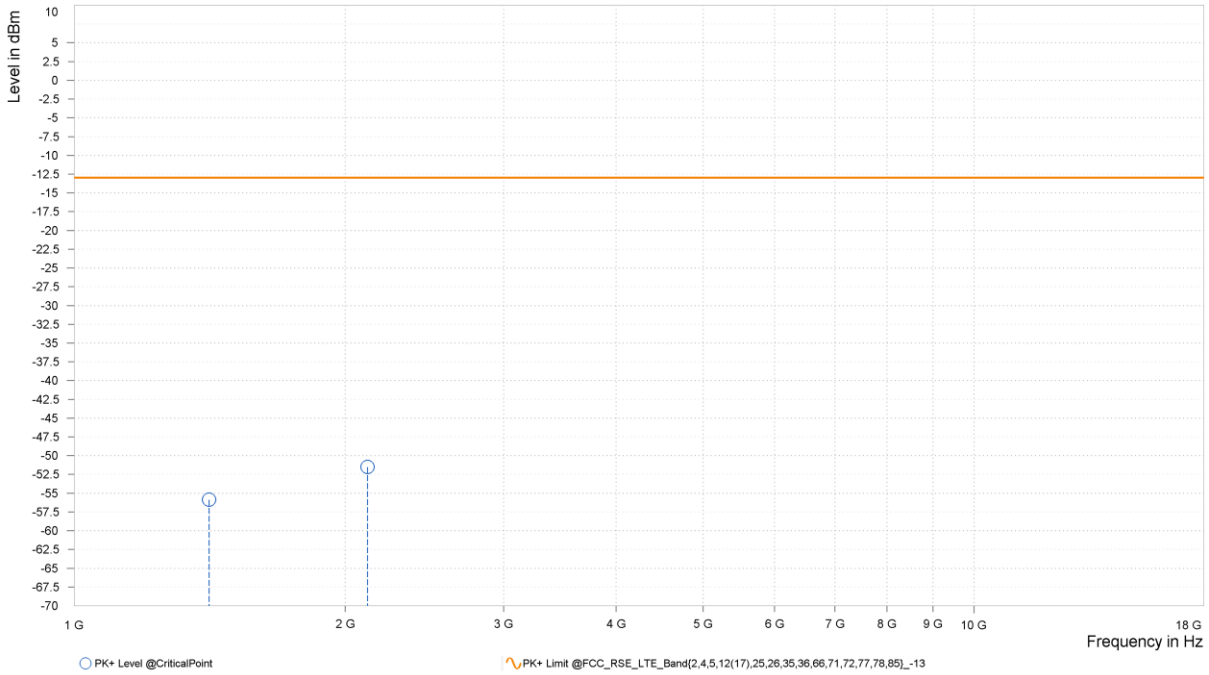
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,413.740	-56.92	-13.00	43.92	2.81	V	2.5	2.00
1	2,120.610	-50.99	-13.00	37.99	10.53	V	1	1.00



CHANNEL BANDWIDTH: 3MHz / QPSK

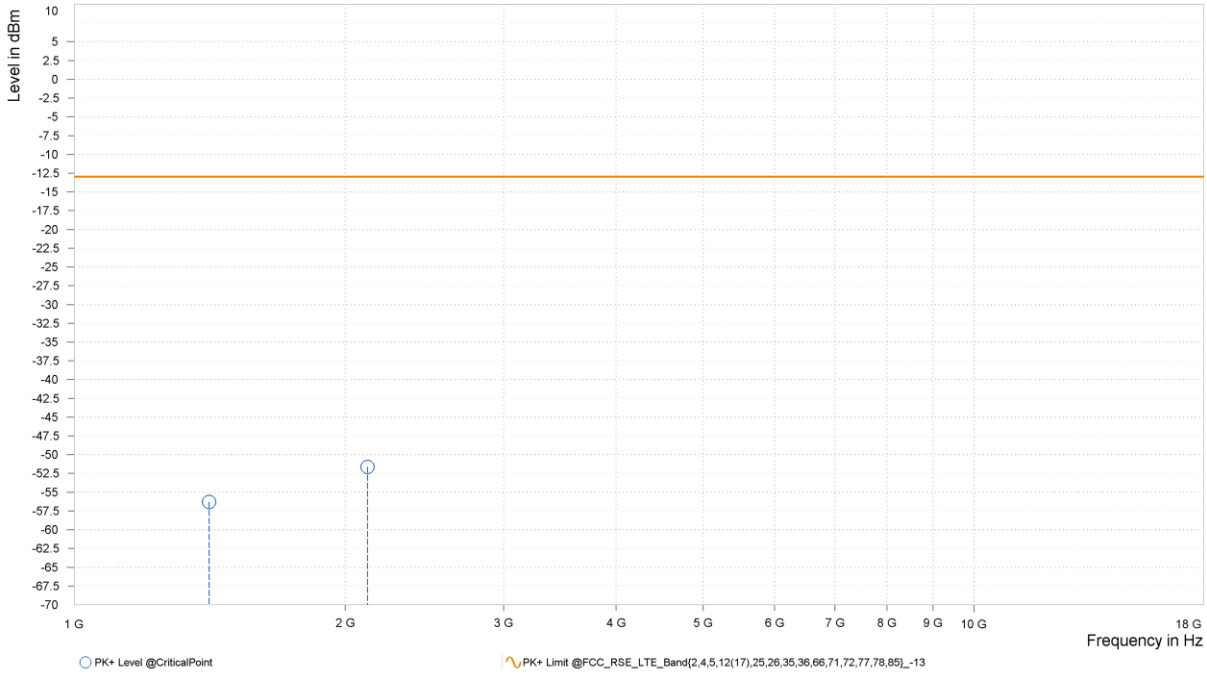
MODE	TX channel 23095	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,412.300	-55.86	-13.00	42.86	3.05	H	221.8	1.00
1	2,118.450	-51.51	-13.00	38.51	10.80	H	2.3	2.00



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

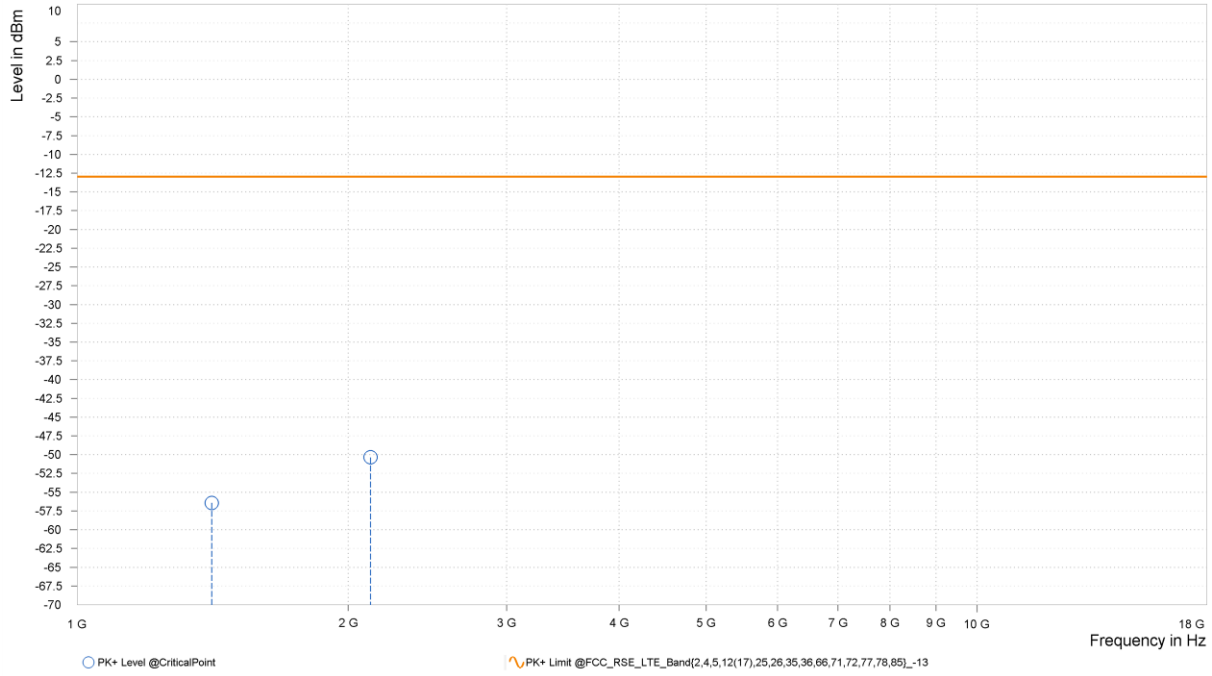
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,412.300	-56.30	-13.00	43.30	2.96	V	323.4	2.00
1	2,118.450	-51.62	-13.00	38.62	10.47	V	0.9	2.00



CHANNEL BANDWIDTH: 5MHz / QPSK

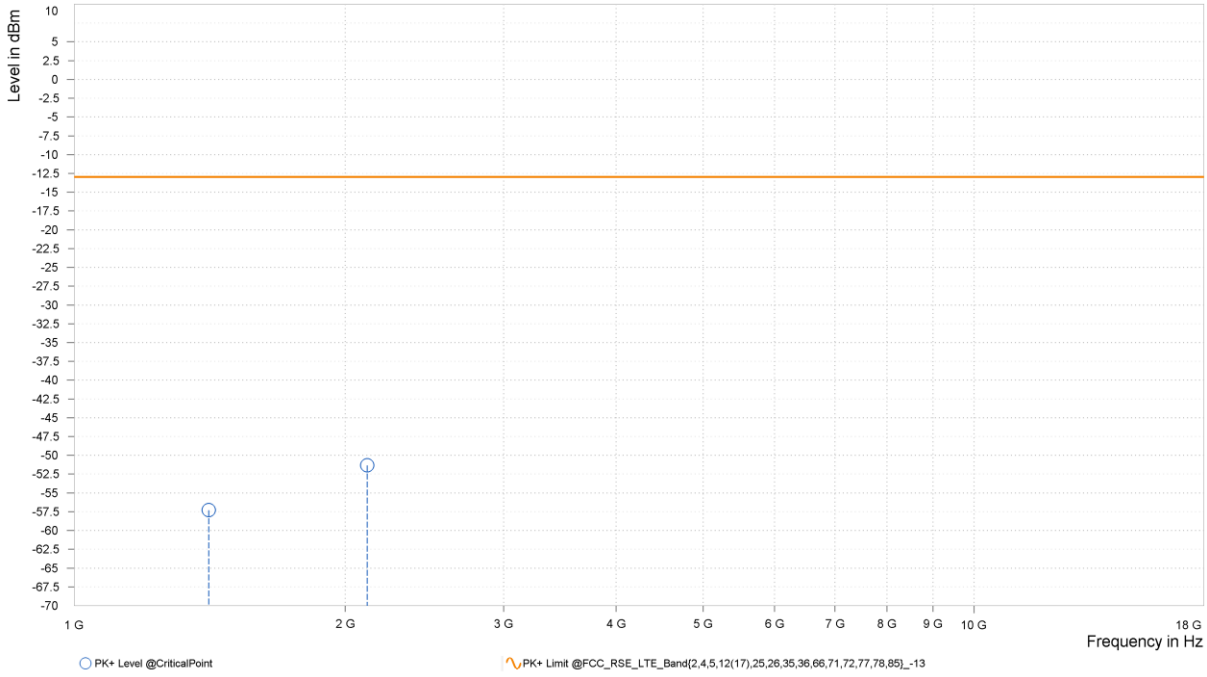
MODE	TX channel 23095	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,410.500	-56.42	-13.00	43.42	3.34	H	359	2.00
1	2,117.000	-50.36	-13.00	37.36	10.74	H	359	2.00



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 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	1,410.500	-57.30	-13.00	44.30	3.26	V	5.8	1.00
1	2,115.750	-51.34	-13.00	38.34	10.38	V	354.9	2.00

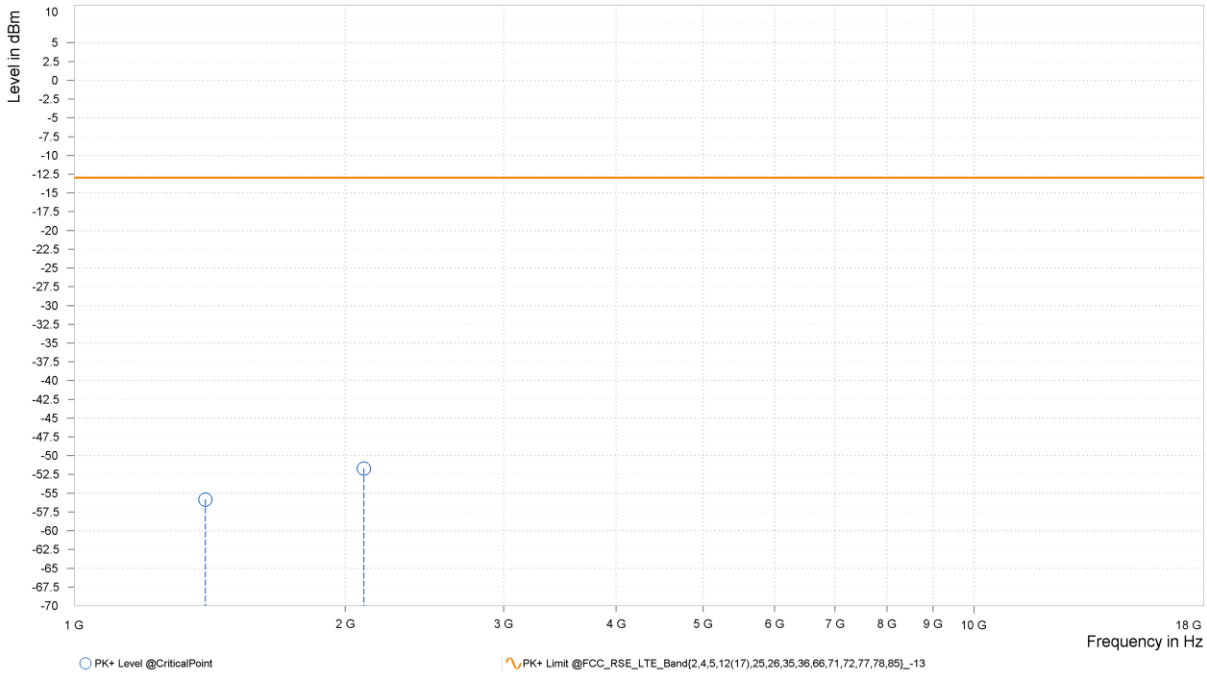


CHANNEL BANDWIDTH: 10MHz / QPSK

CH 23060

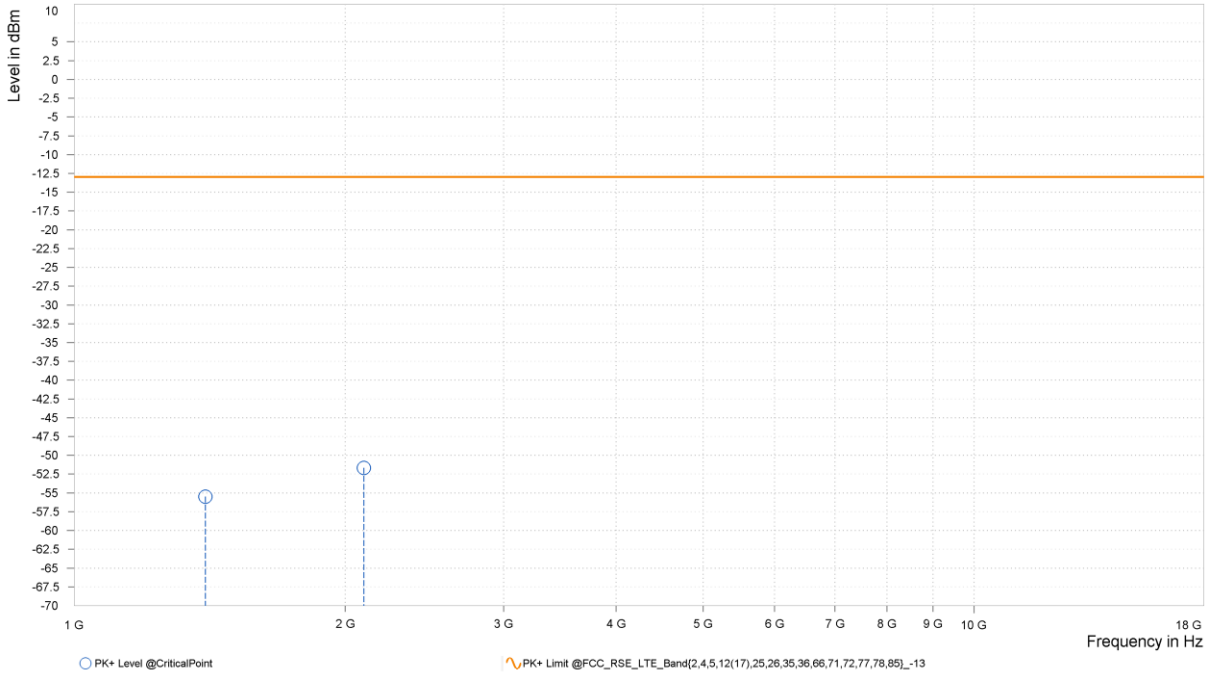
MODE	TX channel 23060	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,399.000	-55.84	-13.00	42.84	4.97	H	1	1.00
1	2,098.500	-51.71	-13.00	38.71	9.95	H	227.9	1.00



MODE	TX channel 23060	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

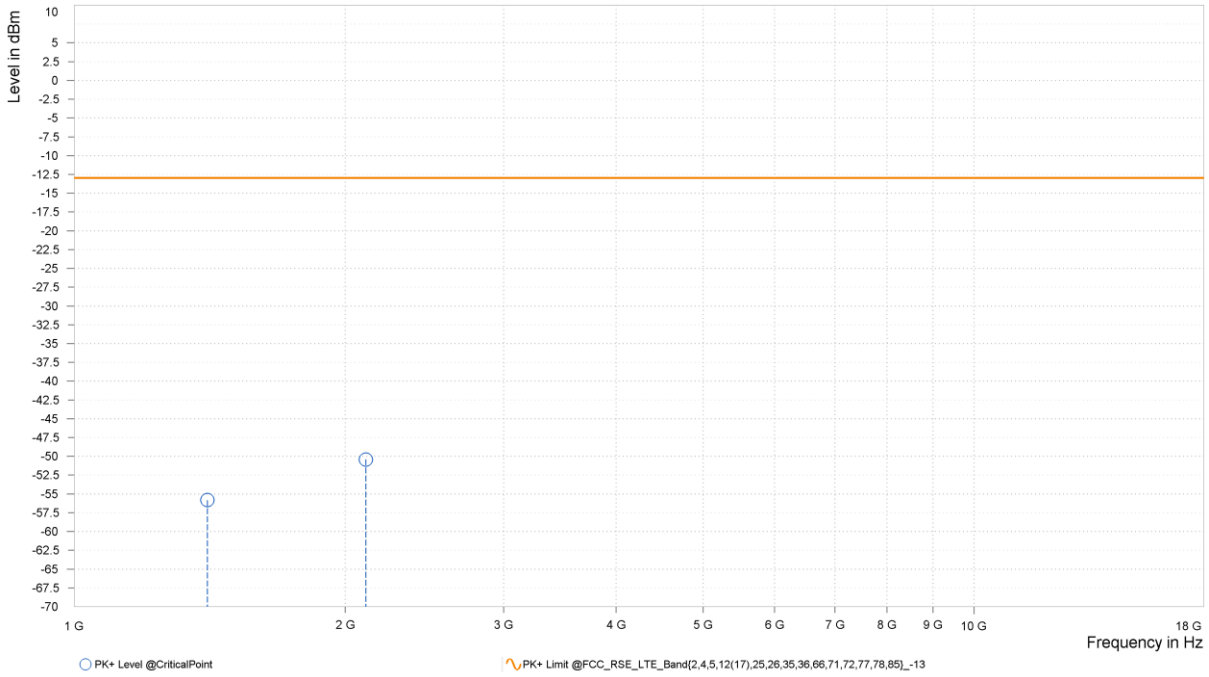
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,399.000	-55.48	-13.00	42.48	4.96	V	359.1	1.00
1	2,098.500	-51.66	-13.00	38.66	9.85	V	355.6	2.00



CH 23095

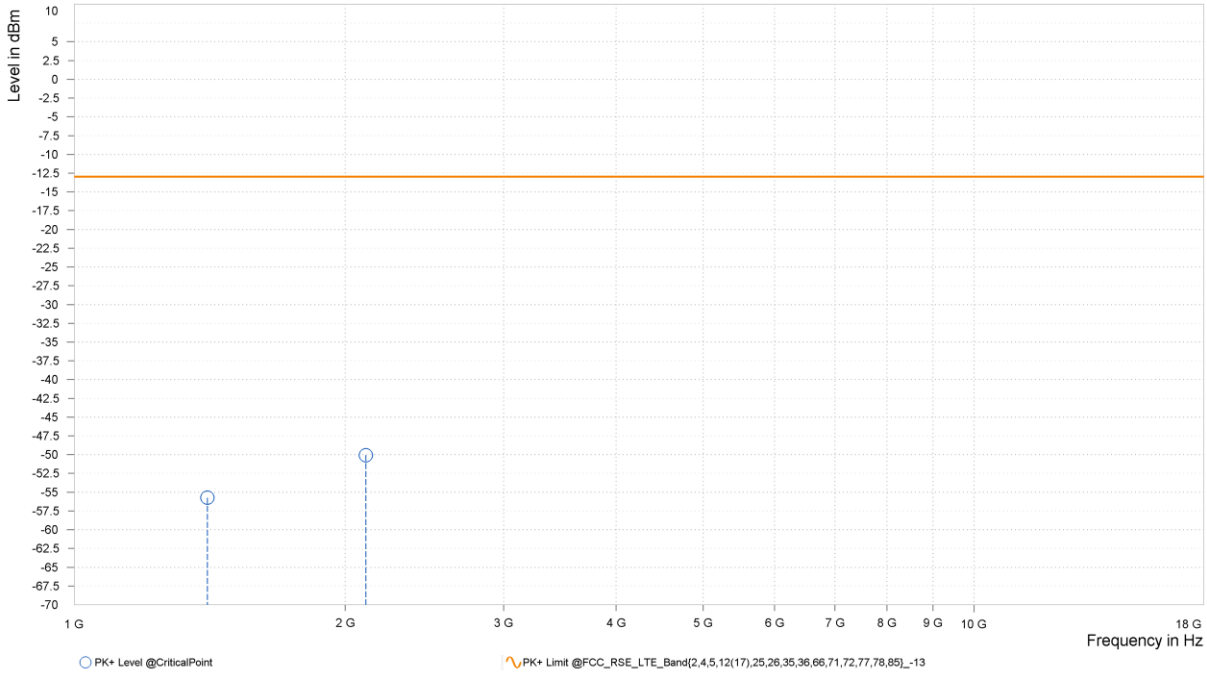
MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,406.000	-55.83	-13.00	42.83	3.97	H	359	2.00
1	2,108.500	-50.43	-13.00	37.43	10.38	H	5.1	1.00



MODE	TX channel 23095	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

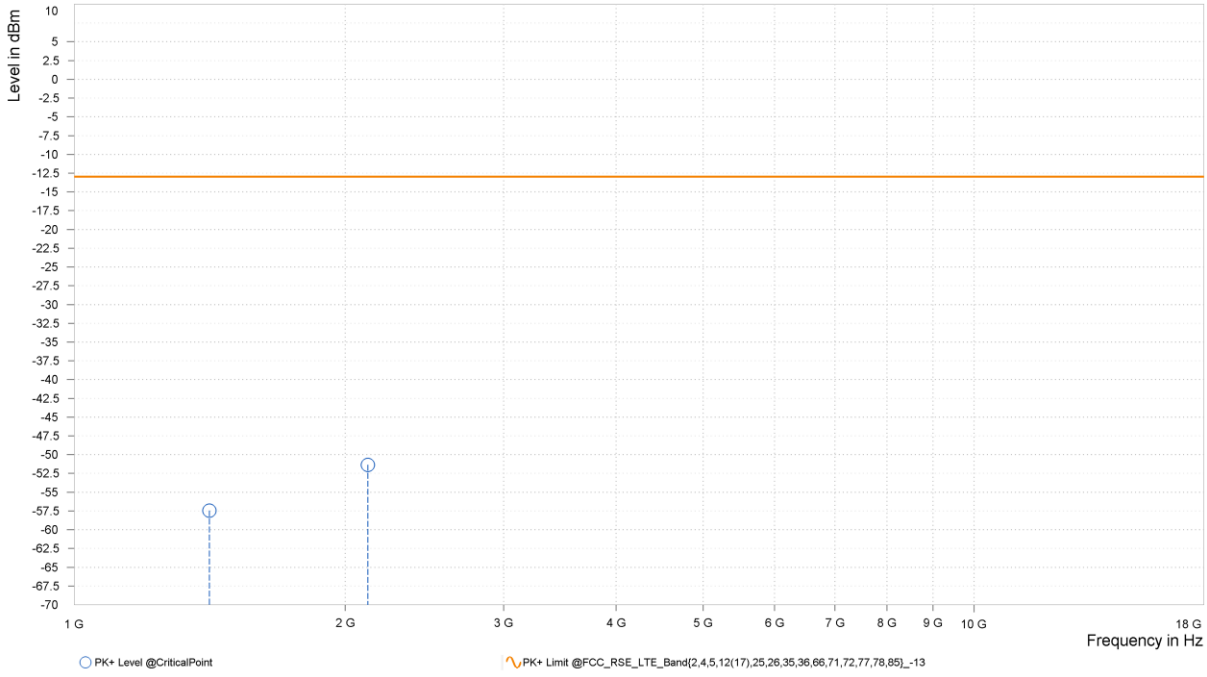
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,406.000	-55.73	-13.00	42.73	3.92	V	138.2	2.00
1	2,108.500	-50.07	-13.00	37.07	10.16	V	356.2	2.00



CH 23130

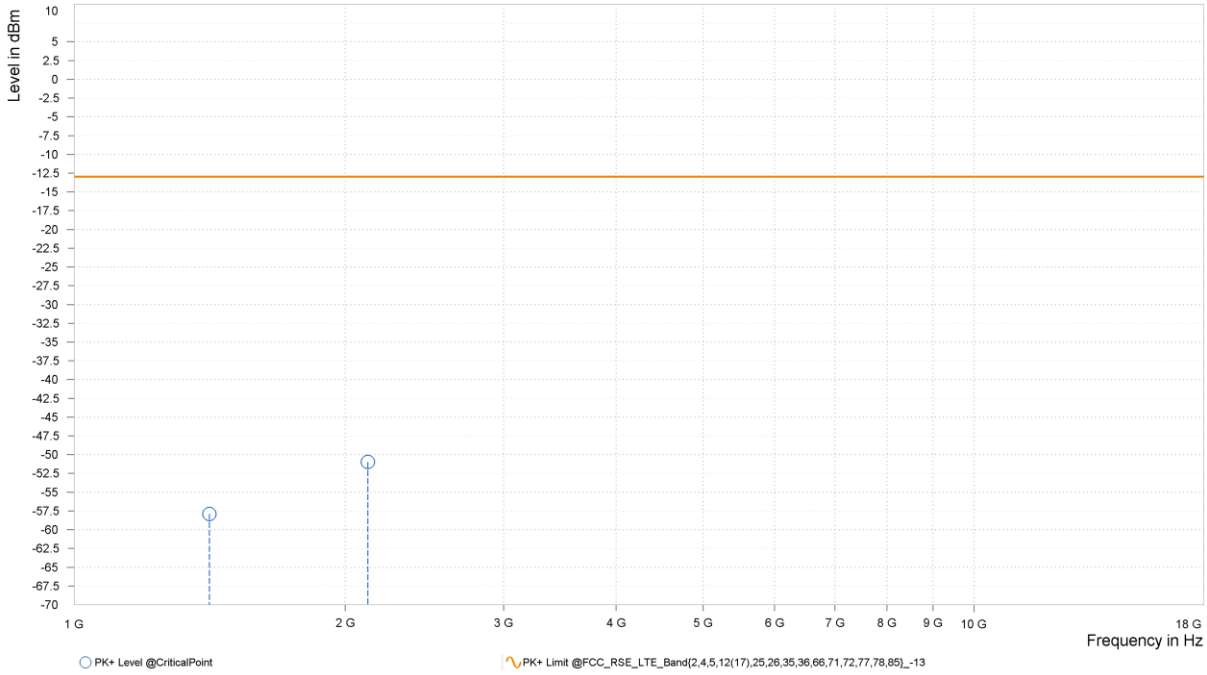
MODE	TX channel 23130	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,413.000	-57.46	-13.00	44.46	2.98	H	1	1.00
1	2,119.500	-51.37	-13.00	38.37	10.84	H	357.8	1.00



MODE	TX channel 23130	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 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	1,413.000	-57.89	-13.00	44.89	2.89	V	1	1.00
1	2,119.500	-50.98	-13.00	37.98	10.50	V	354.9	2.00



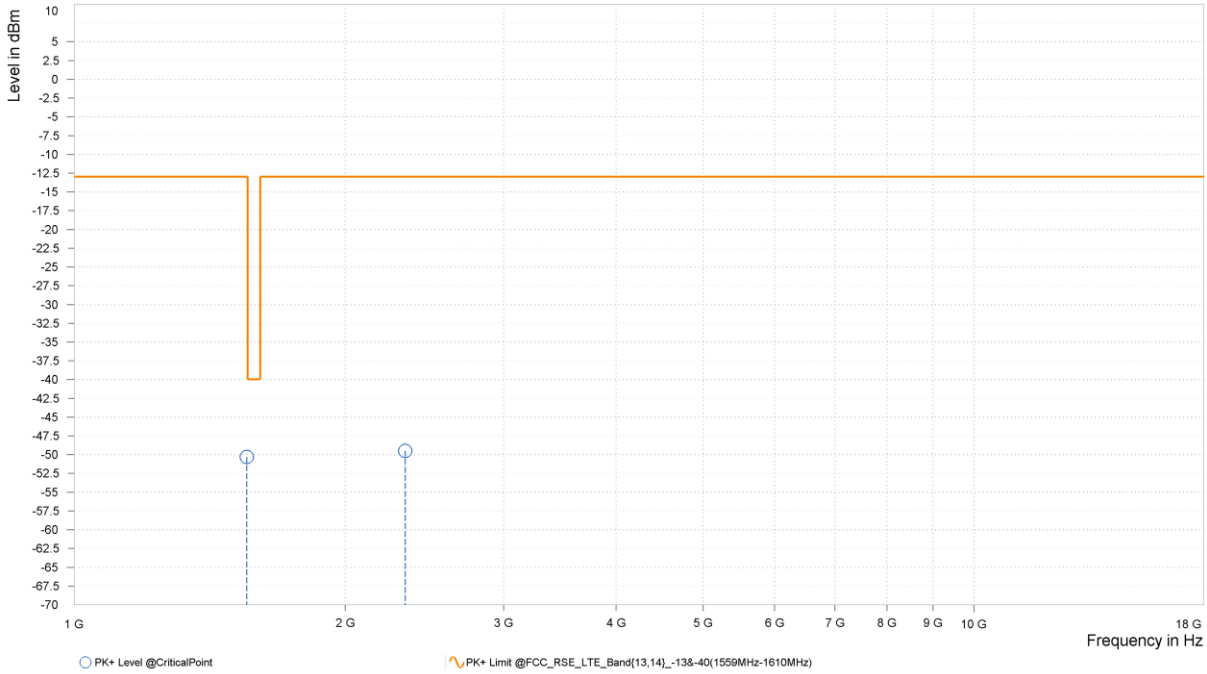
CAT-M1 LTE B13

CHANNEL BANDWIDTH: 5MHz / QPSK

CH23205

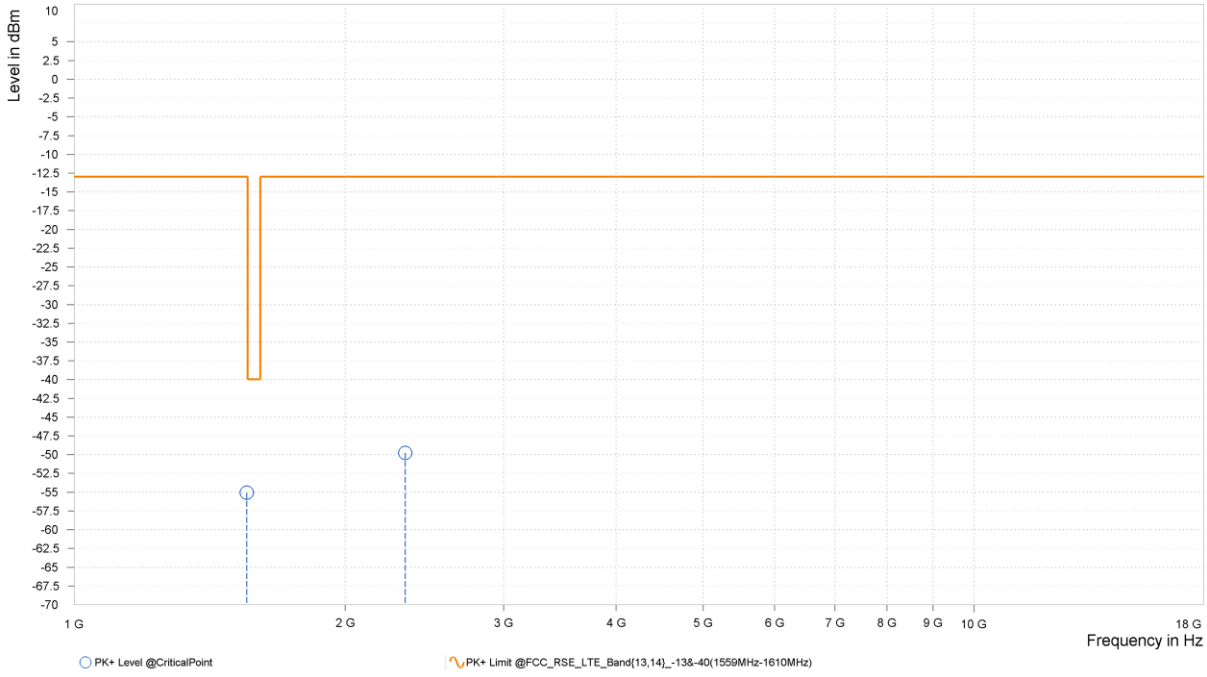
MODE	TX channel 23205	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,554.500	-50.32	-13.00	37.32	5.29	H	1	1.00
1	2,331.750	-49.49	-13.00	36.49	13.06	H	5.1	1.00



MODE	TX channel 23205	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			

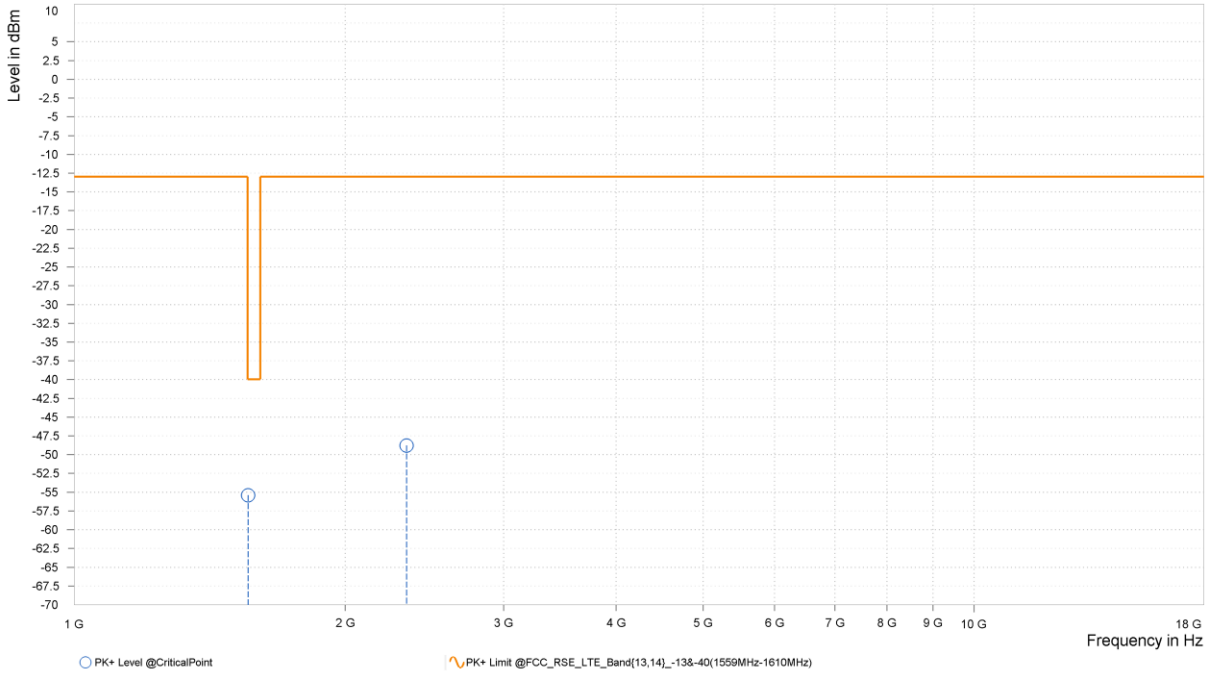
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,554.500	-55.08	-13.00	42.08	4.93	V	355.5	2.00
1	2,331.750	-49.76	-13.00	36.76	12.57	V	359	2.00



CH23230

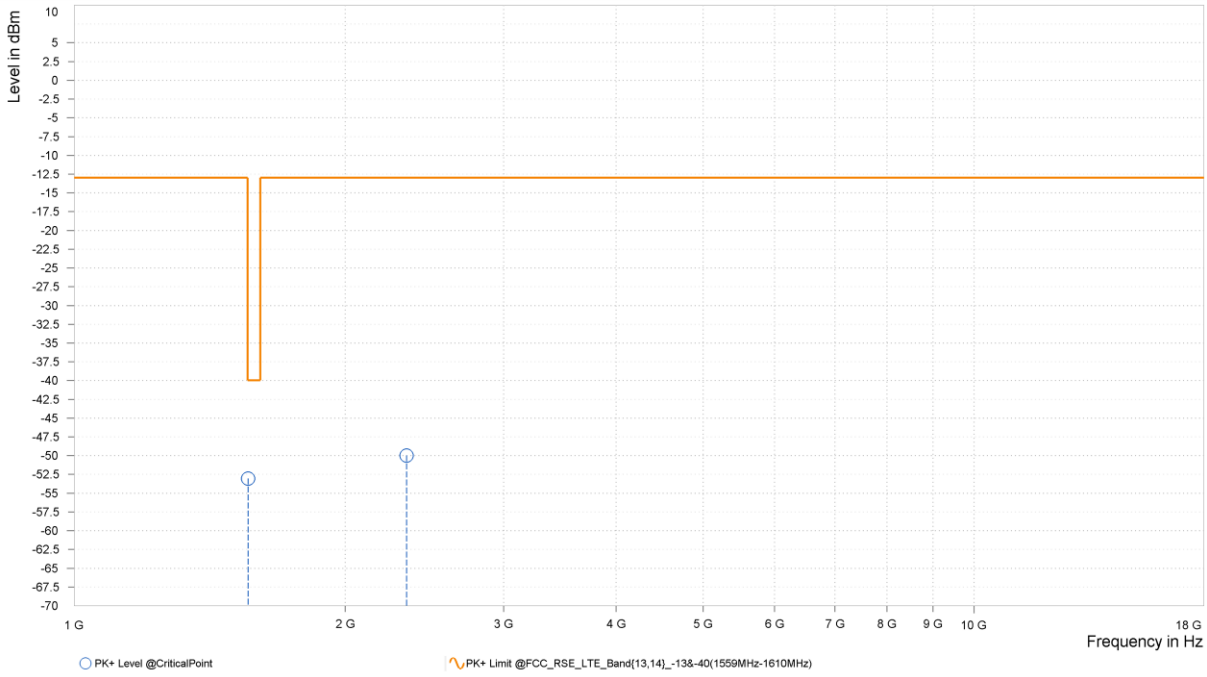
MODE	TX channel 23230	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,559.500	-55.40	-40.00	15.40	5.35	H	354.9	2.00
1	2,339.250	-48.78	-13.00	35.78	13.06	H	1	1.00



MODE	TX channel 23230	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			

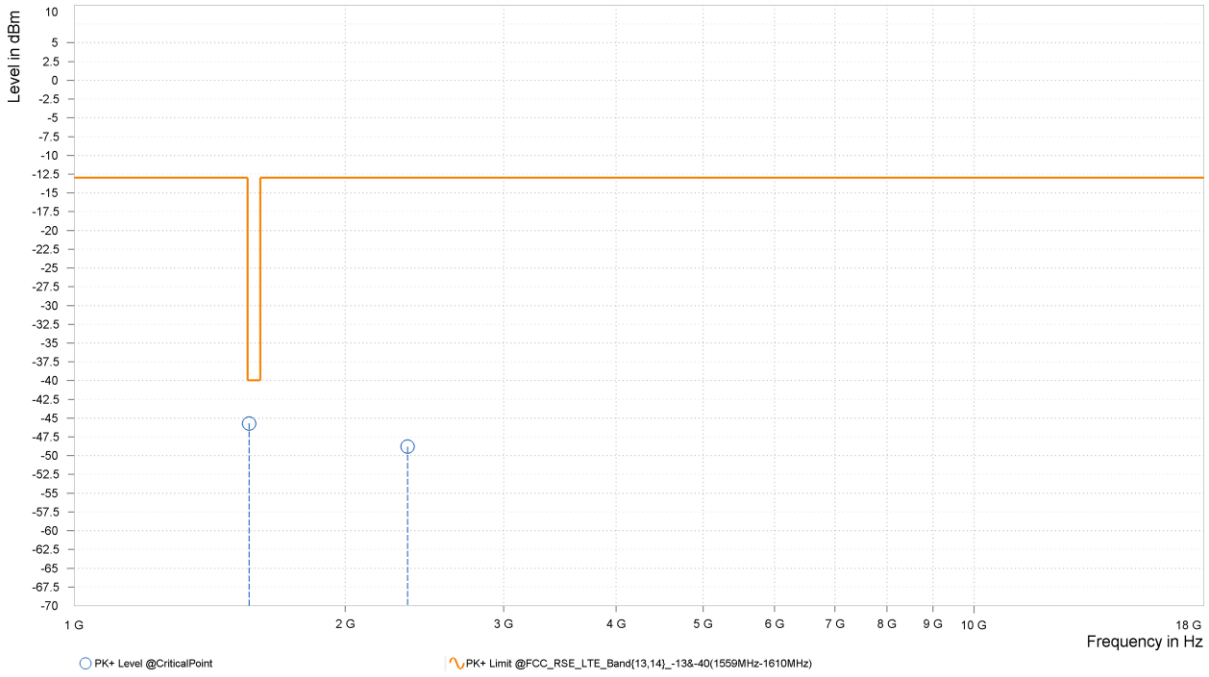
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,559.500	-53.05	-40.00	13.05	5.02	V	4.6	1.00
1	2,339.250	-49.97	-13.00	36.97	12.62	V	355.5	2.00



CH23255

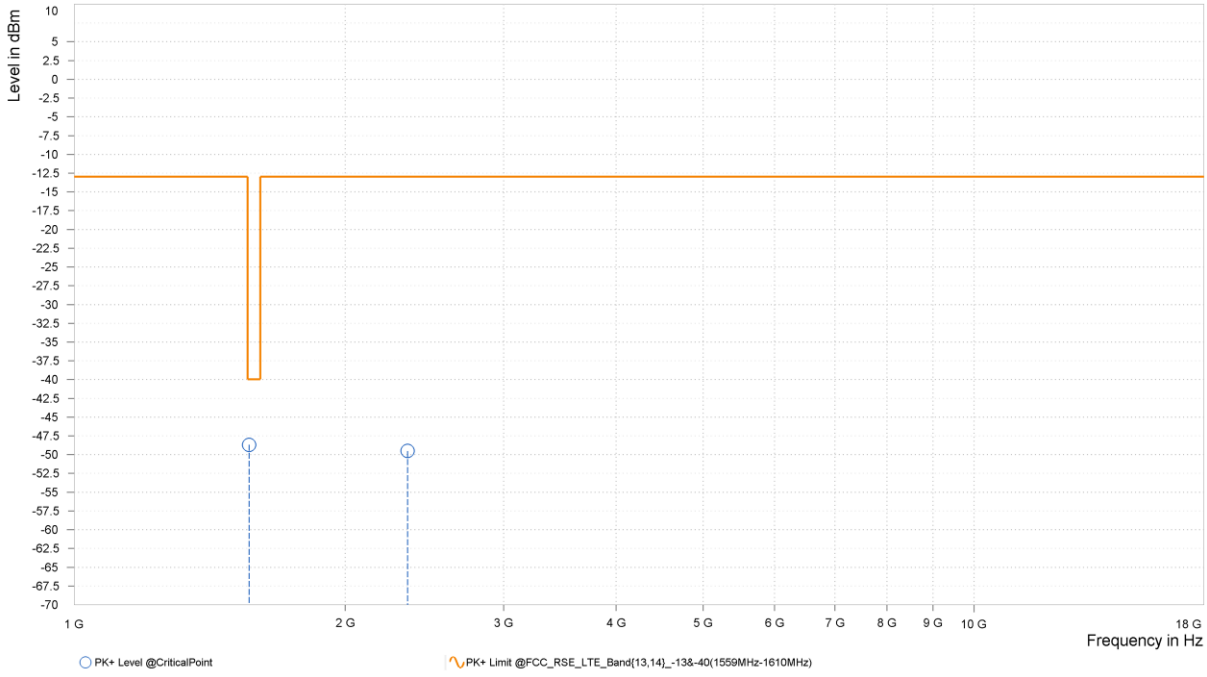
MODE	TX channel 23255	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,564.500	-45.70	-40.00	5.70	5.33	H	245.8	1.00
1	2,346.750	-48.81	-13.00	35.81	13.06	H	0.9	2.00



MODE	TX channel 23255	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			

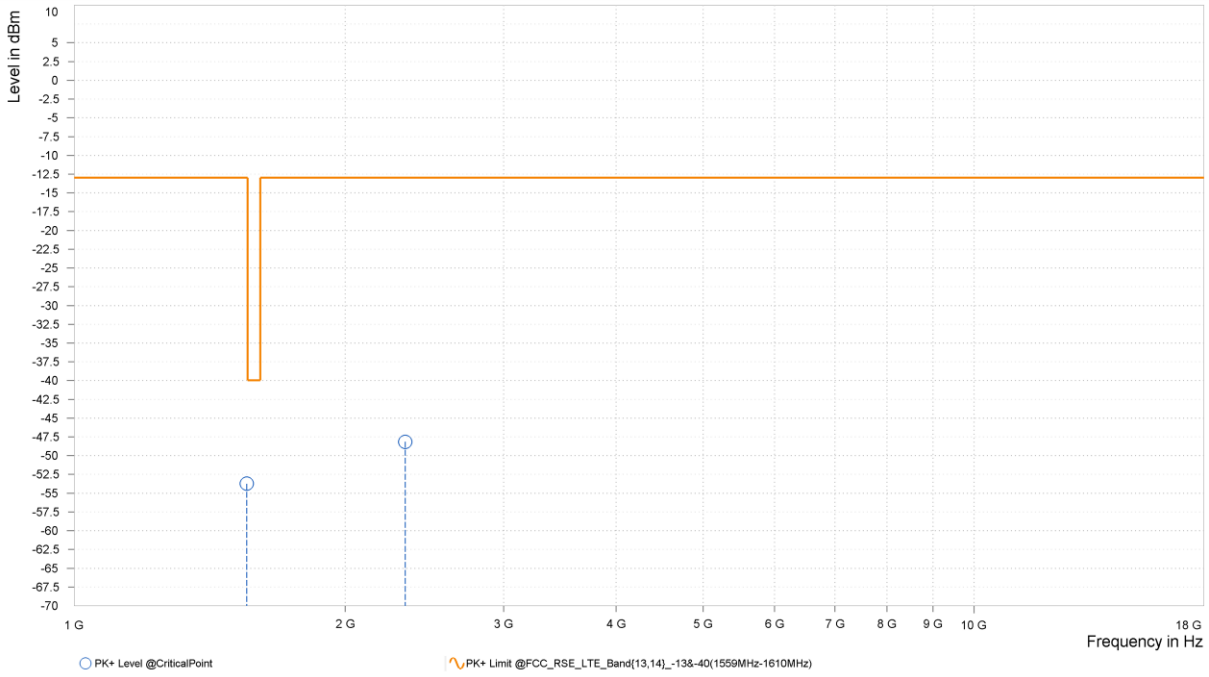
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,564.500	-48.70	-40.00	8.70	5.04	V	359.1	1.00
1	2,346.750	-49.51	-13.00	36.51	12.66	V	1	1.00



CHANNEL BANDWIDTH: 10MHz /QPSK

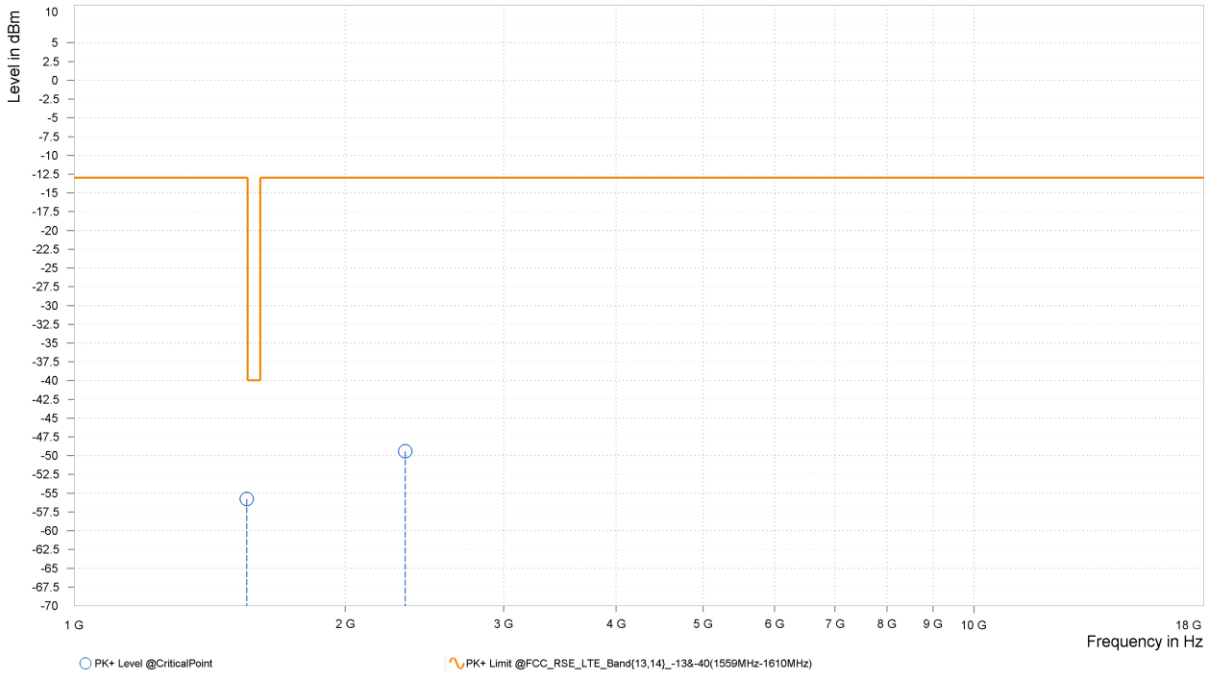
MODE	TX channel 23230	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V/60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,555.000	-53.73	-13.00	40.73	5.31	H	1	1.00
1	2,332.500	-48.16	-13.00	35.16	13.06	H	5.1	1.00



MODE	TX channel 23230	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			

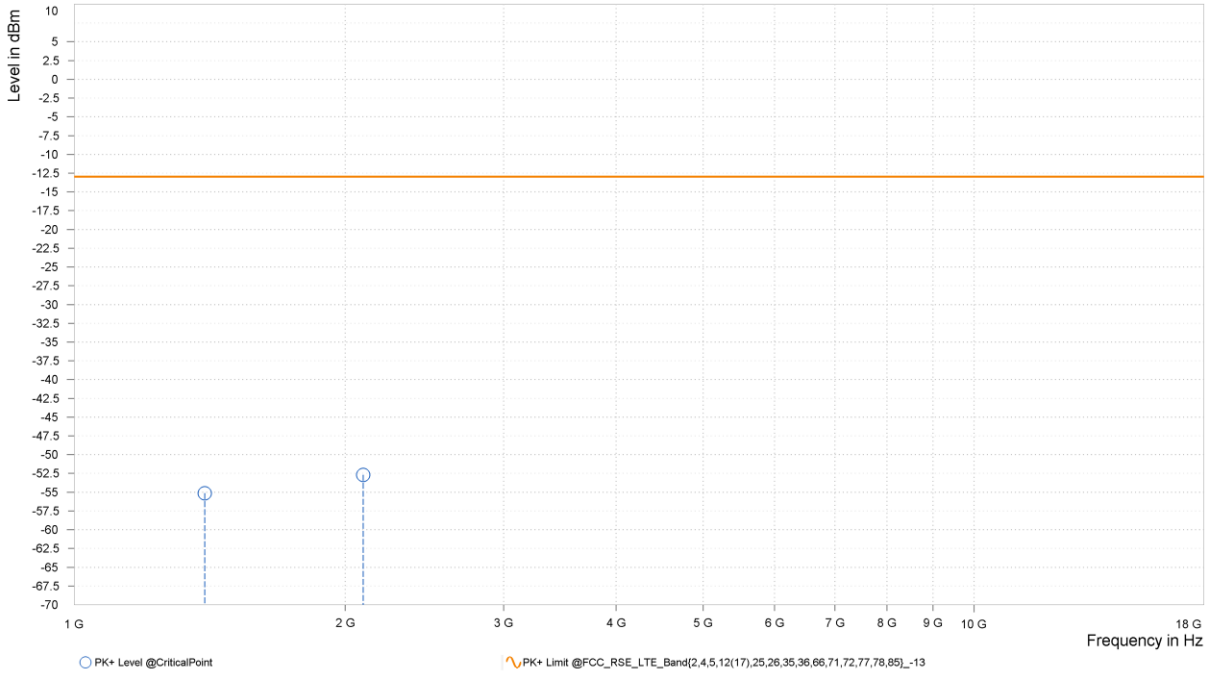
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,555.000	-55.79	-13.00	42.79	4.95	V	338.6	1.00
1	2,332.500	-49.41	-13.00	36.41	12.58	V	1	1.00



CAT-M1 LTE Band 85
CHANNEL BANDWIDTH: 5MHz / QPSK
CH134027

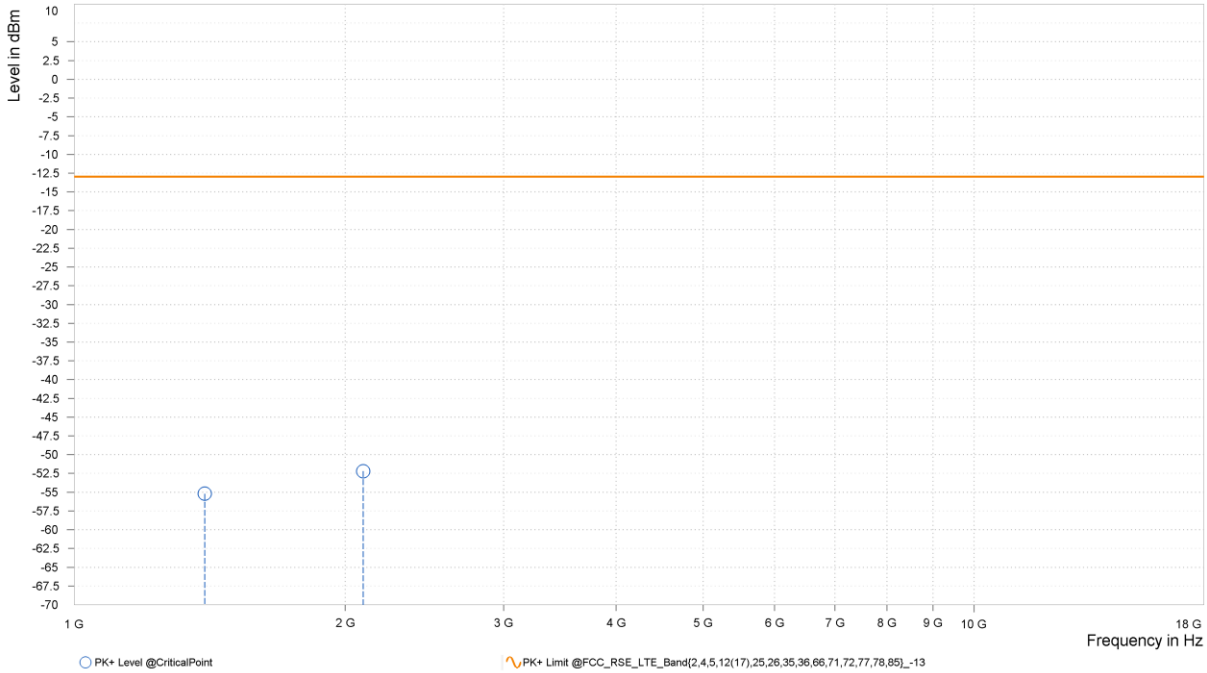
MODE	TX channel 134027	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,396.500	-55.13	-13.00	42.13	5.32	H	1	1.00
1	2,094.750	-52.69	-13.00	39.69	9.78	H	2.2	2.00



MODE	TX channel 134027	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

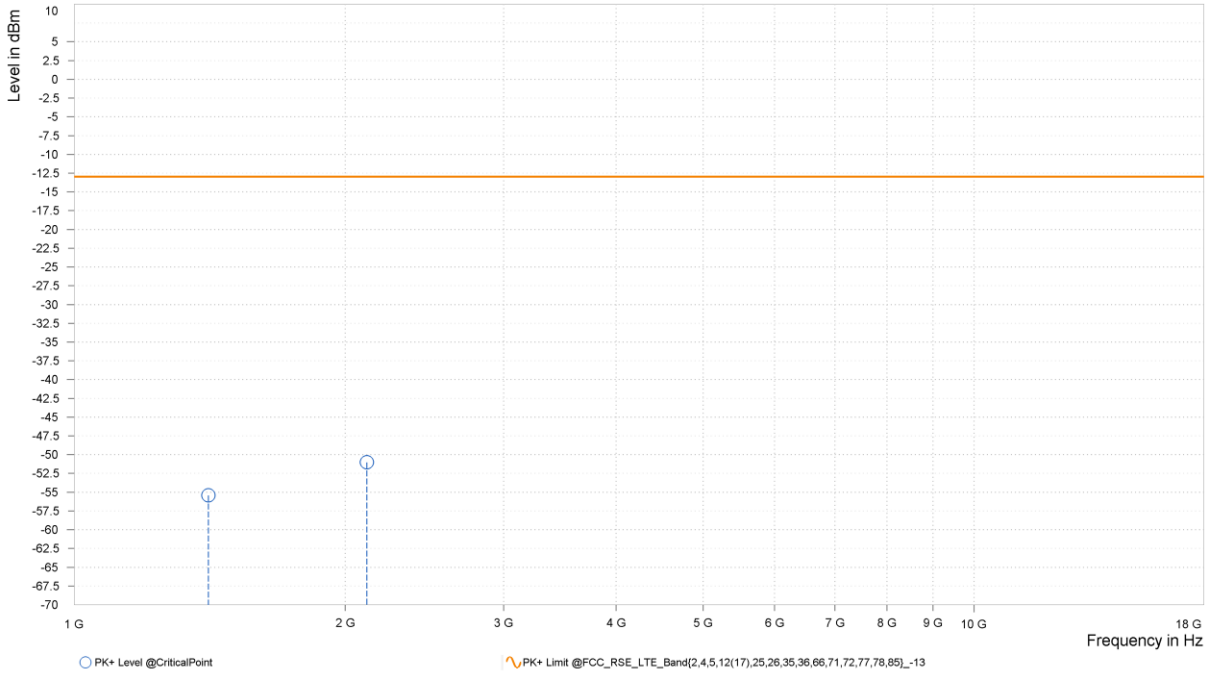
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,396.500	-55.20	-13.00	42.20	5.33	V	353.5	2.00
1	2,094.750	-52.21	-13.00	39.21	9.72	V	353.5	2.00



CH134092

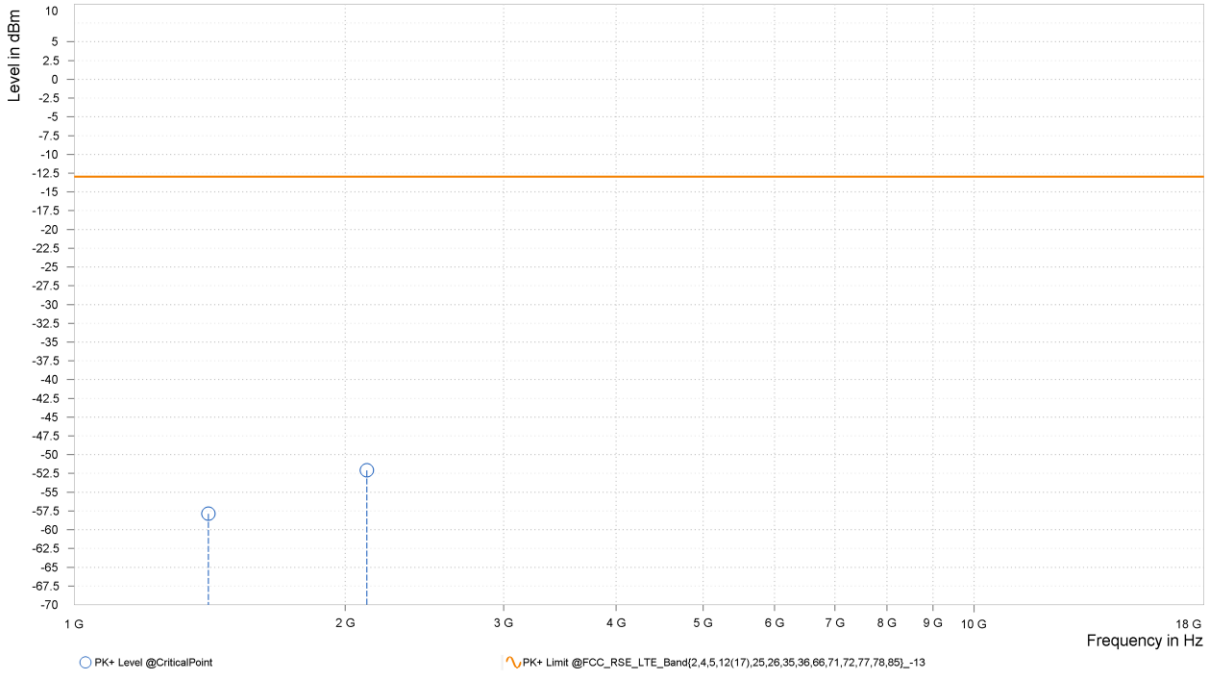
MODE	TX channel 134092	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,409.500	-55.42	-13.00	42.42	3.48	H	1	1.00
1	2,114.250	-51.01	-13.00	38.01	10.61	H	1	2.00



MODE	TX channel 134092	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

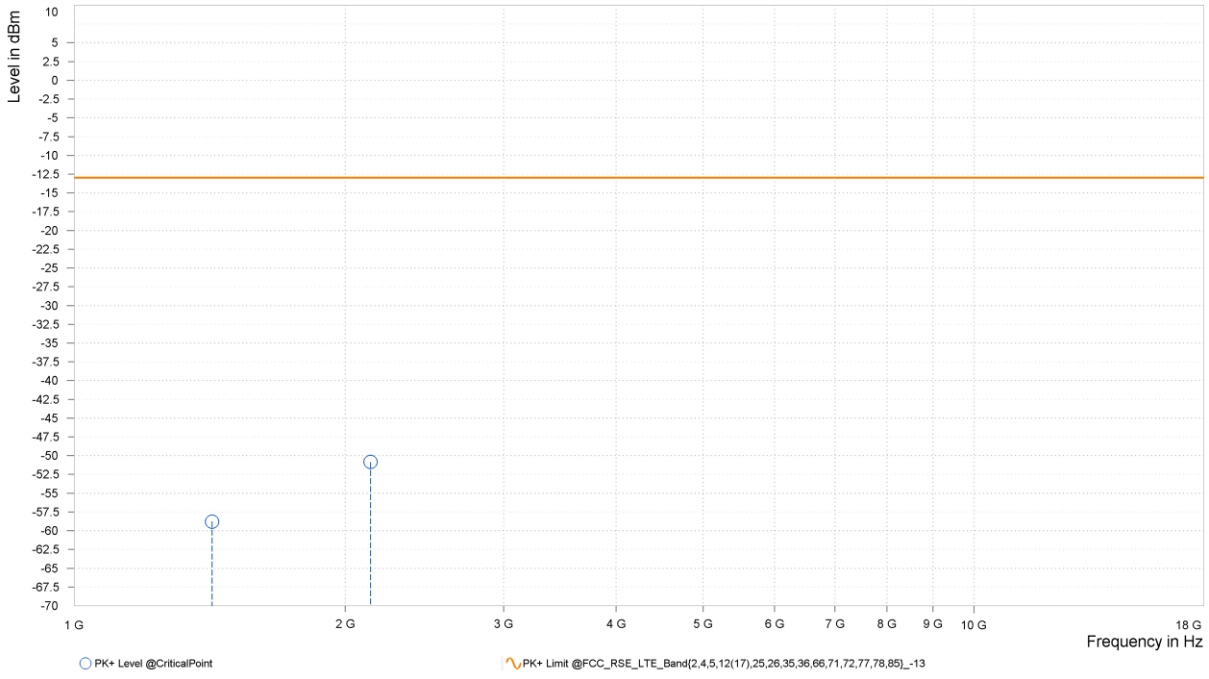
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,409.500	-57.86	-13.00	44.86	3.40	V	1	1.00
1	2,114.250	-52.09	-13.00	39.09	10.33	V	2.2	2.00



CH134157

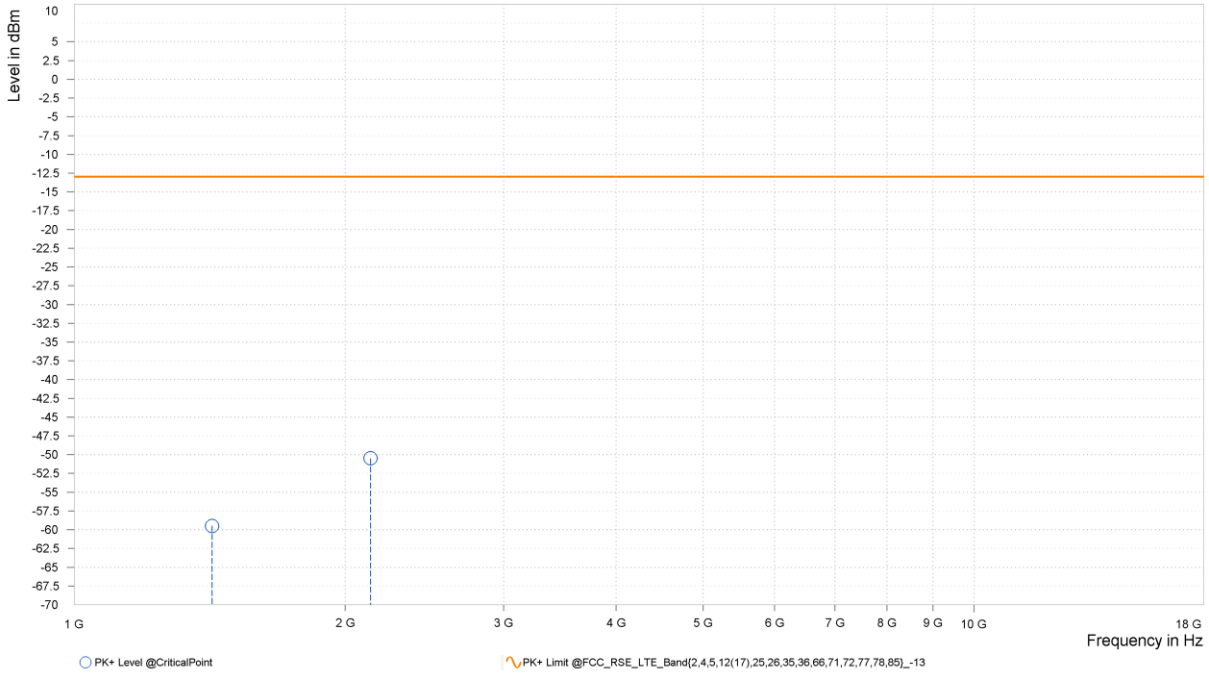
MODE	TX channel 134157	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,422.500	-58.79	-13.00	45.79	1.65	H	128.6	2.00
1	2,133.750	-50.85	-13.00	37.85	11.44	H	354.9	2.00



MODE	TX channel 134157	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

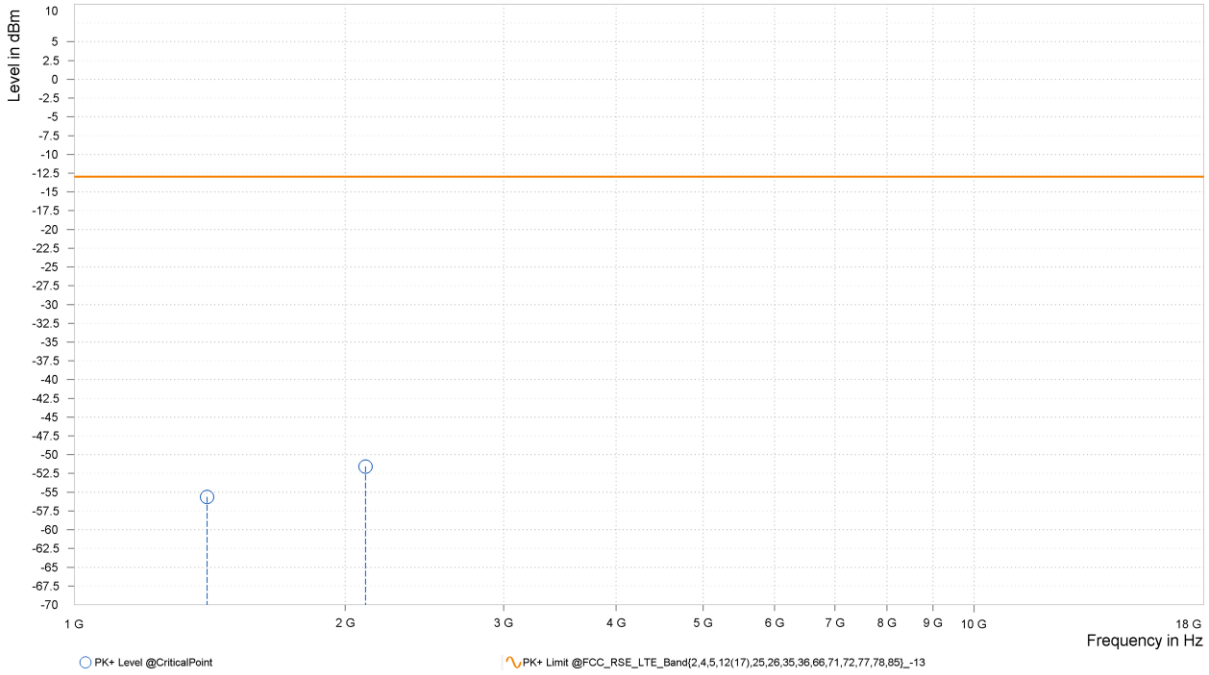
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	1,422.500	-59.50	-13.00	46.50	1.49	V	359	2.00
1	2,133.750	-50.48	-13.00	37.48	10.93	V	0.9	2.00



CHANNEL BANDWIDTH: 10MHz / QPSK

MODE	TX channel 134092	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	120Vac 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	1,405.000	-55.62	-13.00	42.62	4.11	H	229.1	1.00
1	2,107.500	-51.58	-13.00	38.58	10.33	H	131	2.00



MODE	TX channel 134092	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	120Vac 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	1,405.000	-55.31	-13.00	42.31	4.07	V	359.1	1.00
1	2,107.500	-51.04	-13.00	38.04	10.13	V	286.4	1.00