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: Jul. 02, 2024	Date: Jul. 02, 2024

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
77535RRF.003	Original release	Mar. 21, 24
PSU-QSU2404090210RF04	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
PSU-QSU2404090210RF04	Updated antenna gains and EIRP. Verify RSE the data is better than the original, so the data is not replaced.	Jul. 02, 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(d)(4)	Equivalent isotropically Radiated Power (Band 4) (Band 66)	Compliance	A
§2.1055 §27.54	Frequency Stability	See Note	-
§2.1049	Occupied Bandwidth	See Note	-
§2.1051 §27.53(h)	Conducted Band Edge Measurements (Band 4) (Band 66)	See Note	-
§2.1051 §27.53(h)	Conducted Spurious Emissions (Band 4) (Band 66)	See Note	-
§2.1053 §27.53(h)	Radiated Spurious Emissions (Band 4) (Band 66)	Compliance	A
§27.50(d)(5)	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

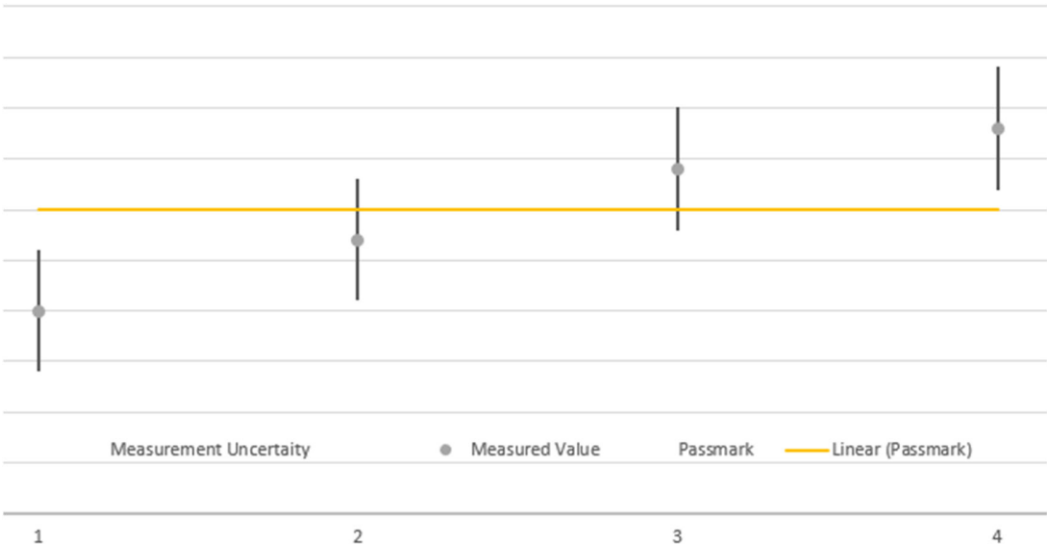
The FCC Site Registration No. is 434559; The Designation No. is CN1325.

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 4 Channel Bandwidth: 1.4MHz**	1710.7MHz ~ 1754.3MHz
	LTE Band 4 Channel Bandwidth: 3MHz	1711.5MHz ~ 1753.5MHz
	LTE Band 4 Channel Bandwidth: 5MHz	1712.5MHz ~ 1752.5MHz
	LTE Band 4 Channel Bandwidth: 10MHz	1715MHz ~ 1750MHz
	LTE Band 4 Channel Bandwidth: 15MHz	1717.5MHz ~ 1747.5 MHz
	LTE Band 4 Channel Bandwidth: 20MHz	1720MHz ~ 1745MHz
	LTE Band 66 Channel Bandwidth: 1.4MHz	1710.7MHz ~ 1779.3MHz
	LTE Band 66 Channel Bandwidth: 3MHz	1711.5MHz ~ 1778.5MHz
	LTE Band 66 Channel Bandwidth: 5MHz	1712.5MHz ~ 1777.5MHz
	LTE Band 66 Channel Bandwidth: 10MHz	1715MHz ~ 1775MHz
	LTE Band 66 Channel Bandwidth: 15MHz	1717.5MHz ~ 1772.5MHz
	LTE Band 66 Channel Bandwidth: 20MHz	1720MHz ~ 1770MHz
FREQUENCY RANGE NB-IOT	**LTE Band 4 (Sub-carrier Spacing: 3.75/15KHz)**	1710.1MHz ~ 1754.9MHz
	LTE Band 66 (Sub-carrier Spacing: 3.75/15KHz)	1710.1MHz ~ 1779.9MHz
MAX. EIRP POWER CAT-M1	**LTE Band 4 Channel Bandwidth: 1.4MHz**	355.63mW
	LTE Band 4 Channel Bandwidth: 3MHz	349.14mW
	LTE Band 4 Channel Bandwidth: 5MHz	353.18mW

	LTE Band 4 Channel Bandwidth: 10MHz	351.56mW
	LTE Band 4 Channel Bandwidth: 15MHz	346.74mW
	LTE Band 4 Channel Bandwidth: 20MHz	356.45mW
	LTE Band 66 Channel Bandwidth: 1.4MHz	348.34mW
	LTE Band 66 Channel Bandwidth: 3MHz	348.34mW
	LTE Band 66 Channel Bandwidth: 5MHz	347.54mW
	LTE Band 66 Channel Bandwidth: 10MHz	347.54mW
	LTE Band 66 Channel Bandwidth: 15MHz	349.14mW
	LTE Band 66 Channel Bandwidth: 20MHz	351.56mW
MAX. EIRP POWER NB-IOT	**LTE Band 4 (Sub-carrier Spacing: 3.75KHz)**	372.39mW
	LTE Band 4 (Sub-carrier Spacing: 15KHz)	376.7mW
	LTE Band 66 (Sub-carrier Spacing: 3.75KHz)	378.44mW
	LTE Band 66 (Sub-carrier Spacing: 15KHz)	373.25mW
EMISSION DESIGNATOR CAT-M1	**LTE Band 66 Channel Bandwidth: 1.4MHz**	QPSK: 1M08G7D
		16QAM: 947KD7D
EMISSION DESIGNATOR NB-IOT	**LTE Band 66 (Sub-carrier Spacing: 15KHz)**	QPSK: 126KG7D
		16QAM: 188KG7D
ANTENNA TYPE*	FR4 Embedded LTE Antenna with 6.0dBi for LTE 4/LTE 66	
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.

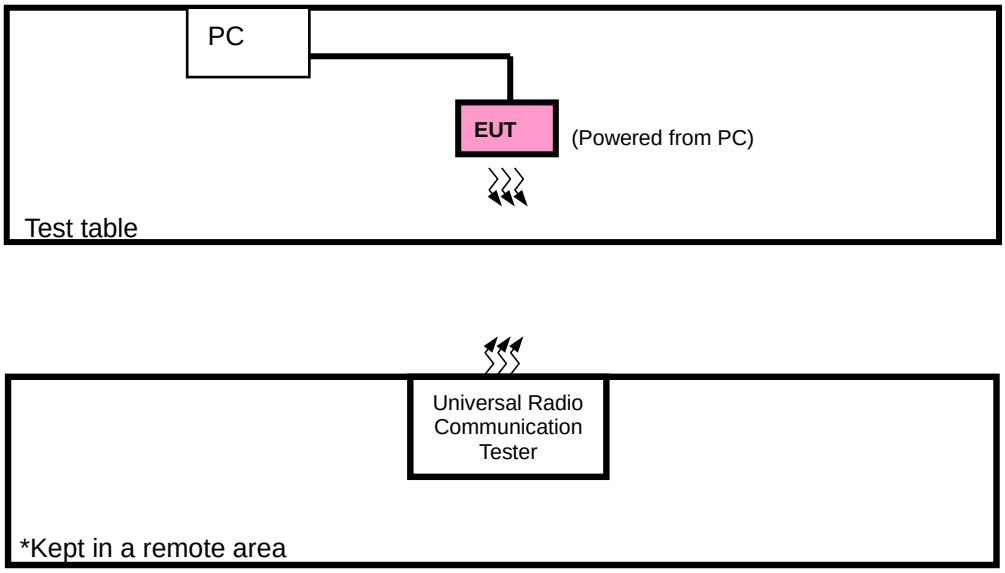
3. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

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 test report.

2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION



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**

LTE BAND 4 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
CAT-M1	EIRP	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
NB-IOT	EIRP	19952 to 20398	19952, 20525, 20398	3.75KHz	BPSK,QPSK	1 RB / 0 RB Offset
		19952 to 20398	19952, 20525, 20398	15KHz	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 4 are covered by LTE Band 66, Because it is a subset of LTE Band 66 with the same output power and supported bandwidths, So the conducted test data and RSE test data please refer to LTE Band 66.

CAT-M1 LTE BAND 66 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	EIRP	131979 to 132665	131979,132322,132665	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
		131987 to 132657	131987,132322,132657	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
		131997 to 132647	131997,132322,132647	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		132022 to 132622	132022,132322,132622	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
		132047 to 132597	132047,132322,132597	15MHz	QPSK,16QAM	1 RB / 0 RB Offset
		132072 to 132572	132072,132322,132572	20MHz	QPSK,16QAM	1 RB / 0 RB Offset
A	RADIATED EMISSION	131979 to 132665	132322	1.4MHz	QPSK	1 RB / 0 RB Offset
		131987 to 132657	132322	3MHz	QPSK	1 RB / 0 RB Offset
		131997 to 132647	132322	5MHz	QPSK	1 RB / 0 RB Offset
		132022 to 132622	132322	10MHz	QPSK	1 RB / 0 RB Offset
		132047 to 132597	132322	15MHz	QPSK	1 RB / 0 RB Offset
		132072 to 132572	132072,132322,132572	20MHz	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 66 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	MODE
A	ERP	131974 to 132670	131974, 132322, 132670	BPSK,QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	131974 to 132670	131974, 132322, 132670	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	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

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.

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 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);

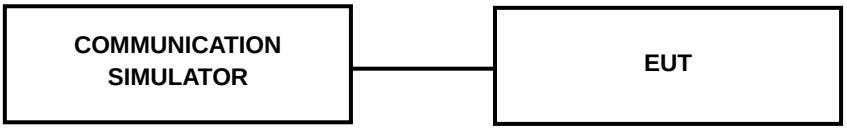
L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

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 4

Band/BW	Modulation	RB Size	RB Offset	Low CH 19957	Mid CH 20175	High CH 20393
				Frequency 1710.7 MHz	Frequency 1732.5 MHz	Frequency 1754.3 MHz
4/ 1.4	QPSK	1	0	19.21	19.16	19.17
		1	5	19.19	19.31	19.06
		3	0	19.35	19.02	19.29
		3	3	19.30	19.29	19.13
		6	0	19.35	19.23	19.16
	16QAM	1	0	19.35	19.36	19.51
		1	5	19.36	19.30	19.35
		3	0	19.16	19.32	19.16
		3	3	19.32	19.24	19.25
		6	0	19.24	19.30	19.37

Band/BW	Modulation	RB Size	RB Offset	Low CH 19965	Mid CH 20175	High CH 20385
				Frequency 1711.5 MHz	Frequency 1732.5 MHz	Frequency 1753.5 MHz
4/ 3	QPSK	1	0	19.27	19.17	19.29
		1	5	19.15	19.22	19.13
		3	0	19.27	19.15	19.32
		3	3	19.30	19.20	19.20
		6	0	19.33	19.12	19.15
	16QAM	1	0	19.43	19.36	19.40
		1	5	19.34	19.27	19.42
		3	0	19.11	19.24	19.18
		3	3	19.23	19.25	19.25
		6	0	19.13	19.39	19.34

Band/BW	Modulation	RB Size	RB Offset	Low CH 19975 Frequency 1712.5 MHz	Mid CH 20175 Frequency 1732.5 MHz	High CH 20375 Frequency 1752.5 MHz
4/ 5	QPSK	1	0	19.21	19.13	19.20
		1	5	19.24	19.30	19.16
		3	0	19.34	19.03	19.34
		3	3	19.26	19.22	19.17
		6	0	19.34	19.13	19.21
	16QAM	1	0	19.40	19.30	19.48
		1	5	19.34	19.27	19.33
		3	0	19.04	19.20	19.21
		3	3	19.28	19.37	19.27
		6	0	19.23	19.39	19.34

Band/BW	Modulation	RB Size	RB Offset	Low CH 20000 Frequency 1715 MHz	Mid CH 20175 Frequency 1732.5 MHz	High CH 20350 Frequency 1750 MHz
4/ 10	QPSK	1	0	19.31	19.12	19.23
		1	5	19.19	19.27	19.10
		3	0	19.37	19.10	19.38
		3	3	19.26	19.18	19.17
		6	0	19.38	19.24	19.14
	16QAM	1	0	19.46	19.37	19.38
		1	5	19.44	19.37	19.41
		3	0	19.10	19.23	19.26
		3	3	19.21	19.24	19.26
		6	0	19.17	19.39	19.30

Band/BW	Modulation	RB Size	RB Offset	Low CH 20025	Mid CH 20175	High CH 20325
				Frequency 1717.5 MHz	Frequency 1732.5 MHz	Frequency 1747.5 MHz
4/ 15	QPSK	1	0	19.32	19.17	19.23
		1	5	19.23	19.21	19.19
		3	0	19.28	19.07	19.37
		3	3	19.34	19.28	19.21
		6	0	19.39	19.12	19.21
	16QAM	1	0	19.34	19.36	19.37
		1	5	19.40	19.38	19.34
		3	0	19.06	19.24	19.15
		3	3	19.25	19.32	19.17
		6	0	19.20	19.38	19.24

Band/BW	Modulation	RB Size	RB Offset	Low CH 20050	Mid CH 20175	High CH 20300
				Frequency 1720 MHz	Frequency 1732.5 MHz	Frequency 1745 MHz
4/ 20	QPSK	1	0	19.34	19.27	19.31
		1	5	19.28	19.32	19.20
		3	0	19.40	19.17	19.41
		3	3	19.41	19.30	19.28
		6	0	19.42	19.26	19.29
	16QAM	1	0	19.49	19.43	19.52
		1	5	19.47	19.42	19.46
		3	0	19.19	19.33	19.27
		3	3	19.33	19.39	19.28
		6	0	19.27	19.40	19.39

LTE Band 66

Band/BW	Modulation	RB Size	RB Offset	Low CH 131979 Frequency 1710.7MHz	Mid CH 132322 Frequency 1745MHz	High CH 132665 Frequency 1779.3MHz
66/ 1.4	QPSK	1	0	19.30	19.30	19.21
		1	5	19.32	19.22	19.27
		3	0	19.39	19.24	19.20
		3	3	19.32	19.28	19.28
		6	0	19.42	19.20	19.30
	16QAM	1	0	19.36	19.23	19.36
		1	5	19.41	19.37	19.35
		3	0	19.22	19.17	19.19
		3	3	19.14	19.21	19.34
		6	0	19.14	19.30	19.39

Band/BW	Modulation	RB Size	RB Offset	Low CH 131987 Frequency 1711.5MHz	Mid CH 132322 Frequency 1745MHz	High CH 132657 Frequency 1778.5MHz
66/ 3	QPSK	1	0	19.35	19.31	19.19
		1	5	19.23	19.24	19.32
		3	0	19.30	19.34	19.23
		3	3	19.32	19.30	19.27
		6	0	19.35	19.23	19.26
	16QAM	1	0	19.25	19.34	19.29
		1	5	19.42	19.41	19.32
		3	0	19.15	19.06	19.20
		3	3	19.25	19.10	19.28
		6	0	19.23	19.21	19.34

Band/BW	Modulation	RB Size	RB Offset	Low CH 131997 Frequency 1712.5MHz	Mid CH 132322 Frequency 1745MHz	High CH 132647 Frequency 1777.5MHz
66/ 5	QPSK	1	0	19.37	19.32	19.26
		1	5	19.31	19.21	19.33
		3	0	19.26	19.26	19.28
		3	3	19.37	19.36	19.20
		6	0	19.37	19.21	19.19
	16QAM	1	0	19.39	19.32	19.35
		1	5	19.41	19.40	19.33
		3	0	19.19	19.15	19.15
		3	3	19.21	19.18	19.27
		6	0	19.24	19.23	19.39

Band/BW	Modulation	RB Size	RB Offset	Low CH 132022 Frequency 1715MHz	Mid CH 132322 Frequency 1745MHz	High CH 132622 Frequency 1775MHz
66/ 10	QPSK	1	0	19.24	19.26	19.29
		1	5	19.23	19.18	19.32
		3	0	19.28	19.37	19.23
		3	3	19.35	19.37	19.15
		6	0	19.41	19.25	19.26
	16QAM	1	0	19.36	19.28	19.33
		1	5	19.41	19.38	19.27
		3	0	19.25	19.08	19.19
		3	3	19.20	19.08	19.24
		6	0	19.17	19.19	19.35

Band/BW	Modulation	RB Size	RB Offset	Low CH 132047	Mid CH 132322	High CH 132597
				Frequency 1717.5 MHz	Frequency 1745MHz	Frequency 1772.5 MHz
66/ 15	QPSK	1	0	19.27	19.21	19.26
		1	5	19.21	19.24	19.22
		3	0	19.32	19.27	19.24
		3	3	19.34	19.32	19.28
		6	0	19.43	19.24	19.19
	16QAM	1	0	19.26	19.27	19.41
		1	5	19.34	19.33	19.32
		3	0	19.17	19.15	19.13
		3	3	19.14	19.17	19.36
		6	0	19.24	19.28	19.32

Band/BW	Modulation	RB Size	RB Offset	Low CH 132072	Mid CH 132322	High CH 132572
				Frequency 1720MHz	Frequency 1745MHz	Frequency 1770MHz
66/ 20	QPSK	1	0	19.38	19.33	19.31
		1	5	19.35	19.31	19.36
		3	0	19.40	19.38	19.33
		3	3	19.39	19.42	19.29
		6	0	19.46	19.35	19.34
	16QAM	1	0	19.40	19.36	19.43
		1	5	19.45	19.42	19.41
		3	0	19.26	19.20	19.26
		3	3	19.27	19.23	19.39
		6	0	19.25	19.34	19.42

NB-IOT

LTE Band 4						
Sub-carrier Spacing (KHz)	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		19951	20175	20399
		Frequence (MHz)		1710.1	1732.5	1754.9
3.75	BPSK	1	0	19.69	19.70	19.54
		1	47	19.64	19.64	19.46
	QPSK	1	0	19.71	19.69	19.55
		1	47	19.65	19.66	19.47
12	BPSK	1	0	19.74	19.65	19.55
		1	11	19.73	19.64	19.52
	QPSK	1	0	**19.76**	19.64	19.63
		1	11	19.73	19.63	19.62
		12	0	17.61	17.56	17.48

LTE Band 66						
Sub-carrier Spacing (KHz)	Modulation	RB Size	RB Offset	Low	Mid	High
		Channel		131973	132322	132671
		Frequence (MHz)		1710.1	1745	1779.9
3.75	BPSK	1	0	19.67	19.60	19.66
		1	47	19.58	19.55	**19.78**
	QPSK	1	0	19.63	19.65	19.66
		1	47	19.71	19.59	19.60
12	BPSK	1	0	19.66	19.50	19.65
		1	11	19.65	19.47	19.63
	QPSK	1	0	19.72	19.48	19.64
		1	11	19.65	19.46	19.62
		12	0	17.53	17.46	17.42

EIRP
LTE BAND 4
CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19957	1710.7	19.35	6	25.35	342.77	1
20175	1732.5	19.31	6	25.31	339.63	1
20393	1754.3	19.29	6	25.29	338.06	1

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19957	1710.7	19.36	6	25.36	343.56	1
20175	1732.5	19.36	6	25.36	343.56	1
20393	1754.3	19.51	6	25.51	355.63	1

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19965	1711.5	19.33	6	25.33	341.19	1
20175	1732.5	19.22	6	25.22	332.66	1
20385	1753.5	19.32	6	25.32	340.41	1

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19965	1711.5	19.43	6	25.43	349.14	1
20175	1732.5	19.39	6	25.39	345.94	1
20385	1753.5	19.42	6	25.42	348.34	1

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19975	1712.5	19.34	6	25.34	341.98	1
20175	1732.5	19.3	6	25.3	338.84	1
20375	1752.5	19.34	6	25.34	341.98	1

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19975	1712.5	19.4	6	25.4	346.74	1
20175	1732.5	19.39	6	25.39	345.94	1
20375	1752.5	19.48	6	25.48	353.18	1

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20000	1715	19.38	6	25.38	345.14	1
20175	1732.5	19.27	6	25.27	336.51	1
20350	1750	19.38	6	25.38	345.14	1

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20000	1715	19.46	6	25.46	351.56	1
20175	1732.5	19.39	6	25.39	345.94	1
20350	1750	19.41	6	25.41	347.54	1

CHANNEL BANDWIDTH: 15MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20025	1717.5	19.39	6	25.39	345.94	1
20175	1732.5	19.28	6	25.28	337.29	1
20325	1747.5	19.37	6	25.37	344.35	1

CHANNEL BANDWIDTH: 15MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20025	1717.5	19.4	6	25.4	346.74	1
20175	1732.5	19.38	6	25.38	345.14	1
20325	1747.5	19.37	6	25.37	344.35	1

CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20050	1720	19.42	6	25.42	348.34	1
20175	1732.5	19.32	6	25.32	340.41	1
20300	1745	19.41	6	25.41	347.54	1

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20050	1720	19.49	6	25.49	354	1
20175	1732.5	19.43	6	25.43	349.14	1
20300	1745	19.52	6	25.52	356.45	1

LTE BAND 66

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131979	1710.7	19.42	6	25.42	348.34	1
132322	1745	19.3	6	25.3	338.84	1
132665	1779.3	19.3	6	25.3	338.84	1

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131979	1710.7	19.41	6	25.41	347.54	1
132322	1745	19.37	6	25.37	344.35	1
132665	1779.3	19.39	6	25.39	345.94	1

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131987	1711.5	19.35	6	25.35	342.77	1
132322	1745	19.34	6	25.34	341.98	1
132657	1778.5	19.32	6	25.32	340.41	1

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131987	1711.5	19.42	6	25.42	348.34	1
132322	1745	19.41	6	25.41	347.54	1
132657	1778.5	19.34	6	25.34	341.98	1

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131997	1712.5	19.37	6	25.37	344.35	1
132322	1745	19.36	6	25.36	343.56	1
132647	1777.5	19.33	6	25.33	341.19	1

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
131997	1712.5	19.41	6	25.41	347.54	1
132322	1745	19.4	6	25.4	346.74	1
132647	1777.5	19.39	6	25.39	345.94	1

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132022	1715	19.41	6	25.41	347.54	1
132322	1745	19.37	6	25.37	344.35	1
132622	1775	19.32	6	25.32	340.41	1

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132022	1715	19.41	6	25.41	347.54	1
132322	1745	19.38	6	25.38	345.14	1
132622	1775	19.35	6	25.35	342.77	1

CHANNEL BANDWIDTH: 15MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132047	1717.5	19.43	6	25.43	349.14	1
132322	1745	19.32	6	25.32	340.41	1
132597	1772.5	19.28	6	25.28	337.29	1

CHANNEL BANDWIDTH: 15MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132047	1717.5	19.34	6	25.34	341.98	1
132322	1745	19.33	6	25.33	341.19	1
132597	1772.5	19.41	6	25.41	347.54	1

CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132072	1720	19.46	6	25.46	351.56	1
132322	1745	19.42	6	25.42	348.34	1
132572	1770	19.36	6	25.36	343.56	1

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
132072	1720	19.45	6	25.45	350.75	1
132322	1745	19.42	6	25.42	348.34	1
132572	1770	19.43	6	25.43	349.14	1

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

NB-IOT

LTE B4 3.75KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
19951	1710.1	19.69	6	25.69	370.68	1
20175	1732.5	19.7	6	25.7	371.54	1
20399	1754.9	19.54	6	25.54	358.1	1

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
19951	1710.1	19.71	6	25.71	372.39	1
20175	1732.5	19.69	6	25.69	370.68	1
20399	1754.9	19.55	6	25.55	358.92	1

LTE B4 15KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
19951	1710.1	19.74	6	25.74	374.97	1
20175	1732.5	19.65	6	25.65	367.28	1
20399	1754.9	19.55	6	25.55	358.92	1

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
19951	1710.1	19.76	6	25.76	376.7	1
20175	1732.5	19.64	6	25.64	366.44	1
20399	1754.9	19.63	6	25.63	365.59	1

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

NB-IOT

LTE B66 3.75KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
131973	1710.1	19.67	6	25.67	368.98	1
132322	1745	19.6	6	25.6	363.08	1
132671	1779.9	19.78	6	25.78	378.44	1

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
131973	1710.1	19.71	6	25.71	372.39	1
132322	1745	19.65	6	25.65	367.28	1
132671	1779.9	19.66	6	25.66	368.13	1

LTE B66 15KHz

CHANNEL BANDWIDTH: BPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
131973	1710.1	19.66	6	25.66	368.13	1
132322	1745	19.5	6	25.5	354.81	1
132671	1779.9	19.65	6	25.65	367.28	1

CHANNEL BANDWIDTH: QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G_T-L_C (dB)	ERP (dBm)	ERP (mW)	Limit (W)
131973	1710.1	19.72	6	25.72	373.25	1
132322	1745	19.48	6	25.48	353.18	1
132671	1779.9	19.64	6	25.64	366.44	1

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

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

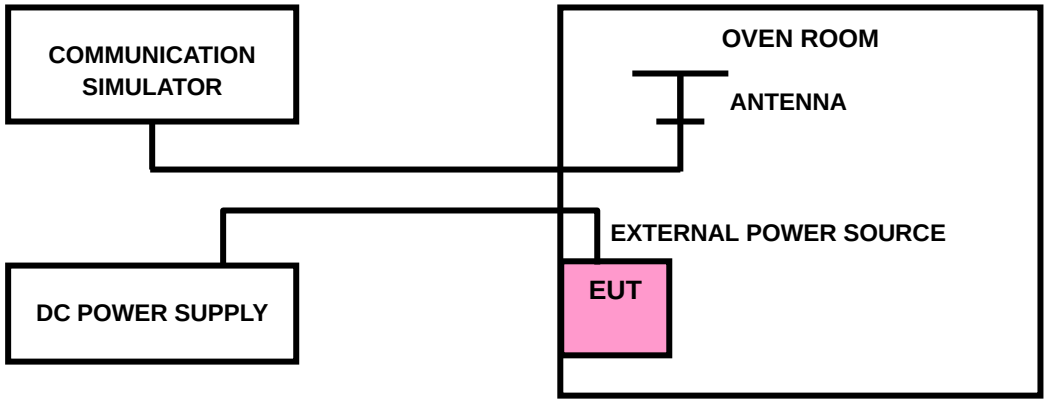
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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

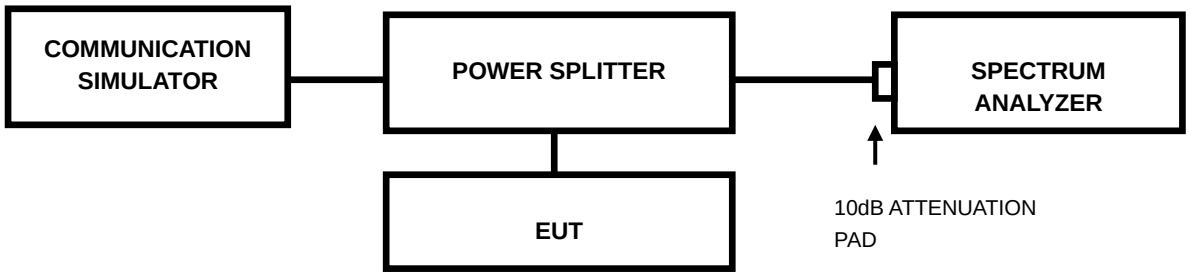
Refer to the original source report (Report No.: 77535RRF.003, Model Name: nRF9151, FCC ID: 2ANPO00nRF9151).

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).

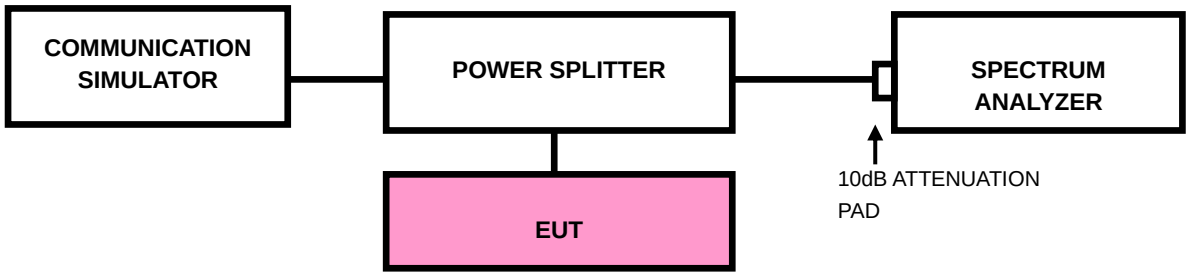
3.4 BAND EDGE MEASUREMENT

3.4.1 LIMITS OF BAND EDGE MEASUREMENT

47 CFR 27.50(d)(4)

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. Fixed stations operating in the 1710–1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

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

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

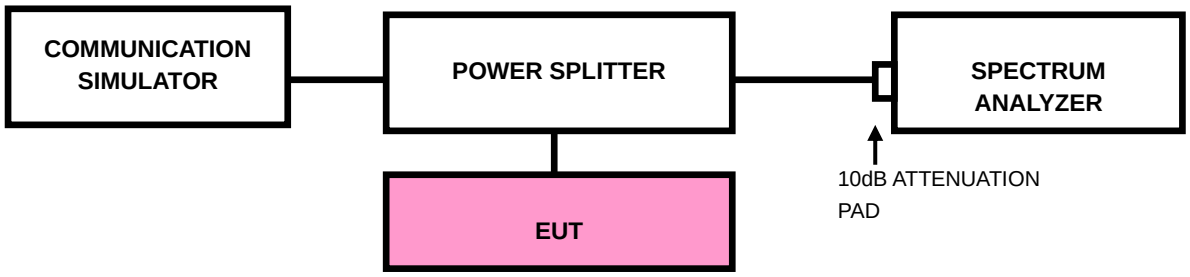
For LTE Band4/66
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit is equal to –13dBm.

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

For LTE Band4/66
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit is equal to –13dBm.

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.

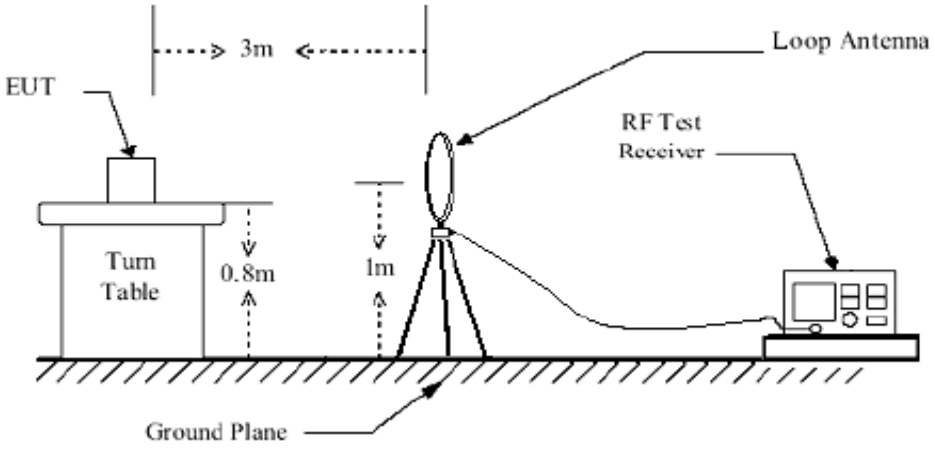
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.6.3 DEVIATION FROM TEST STANDARD

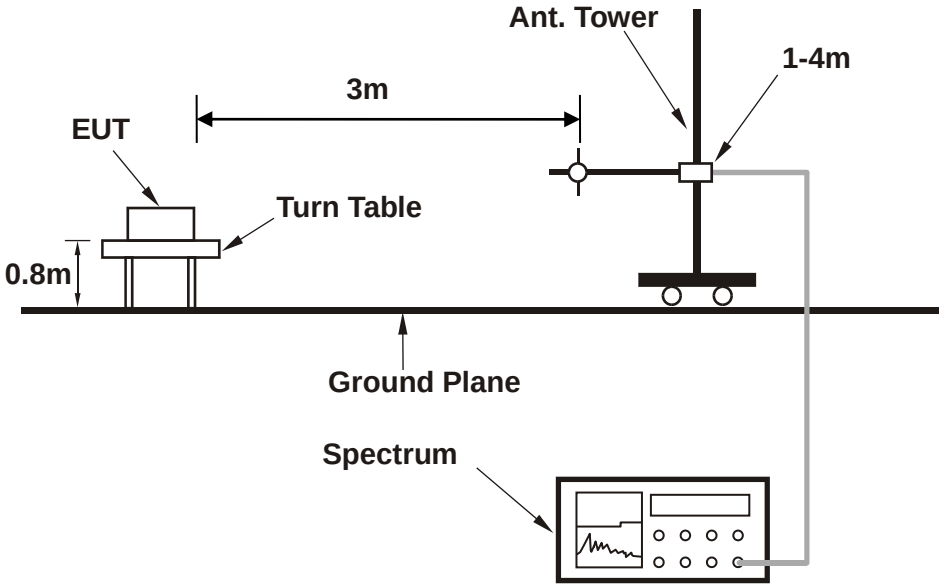
No deviation

3.6.4 TEST SETUP

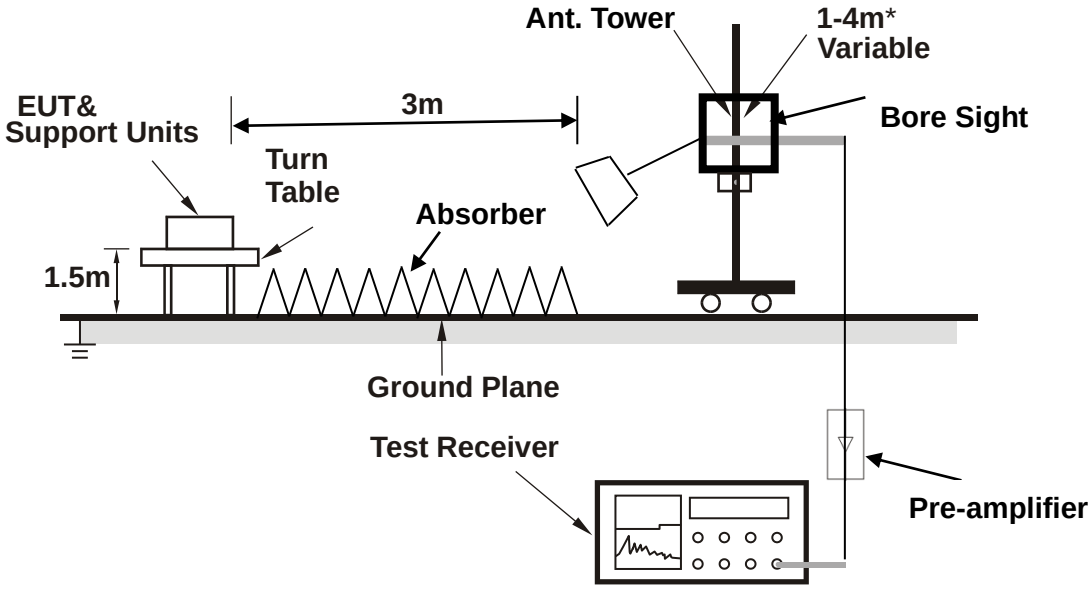
< Frequency Range below 30MHz >



< 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:

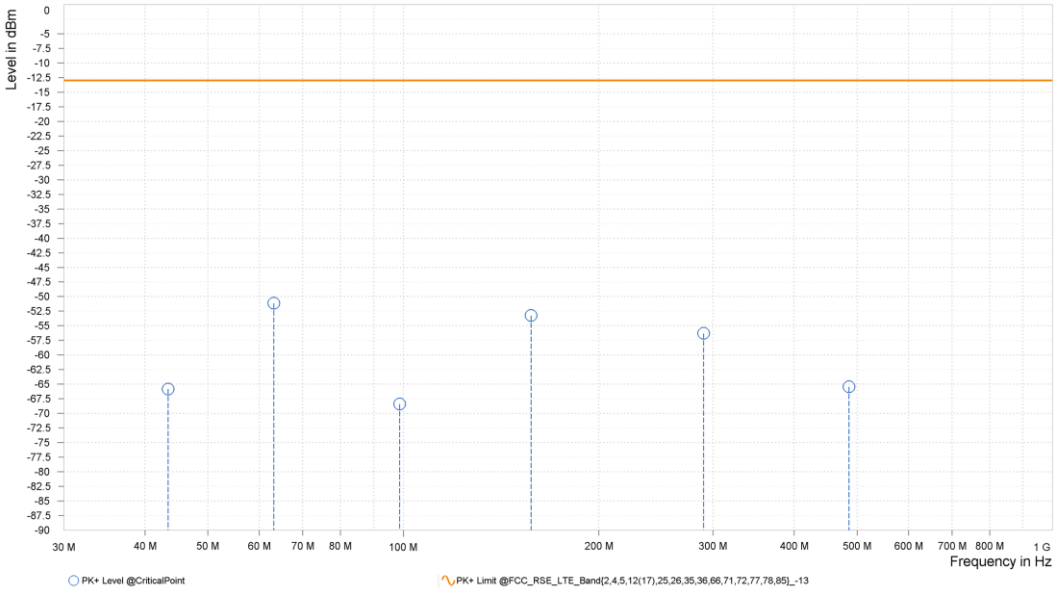
CAT-M1 LTE Band 66

CHANNEL BANDWIDTH: 20MHz / QPSK

CH132072

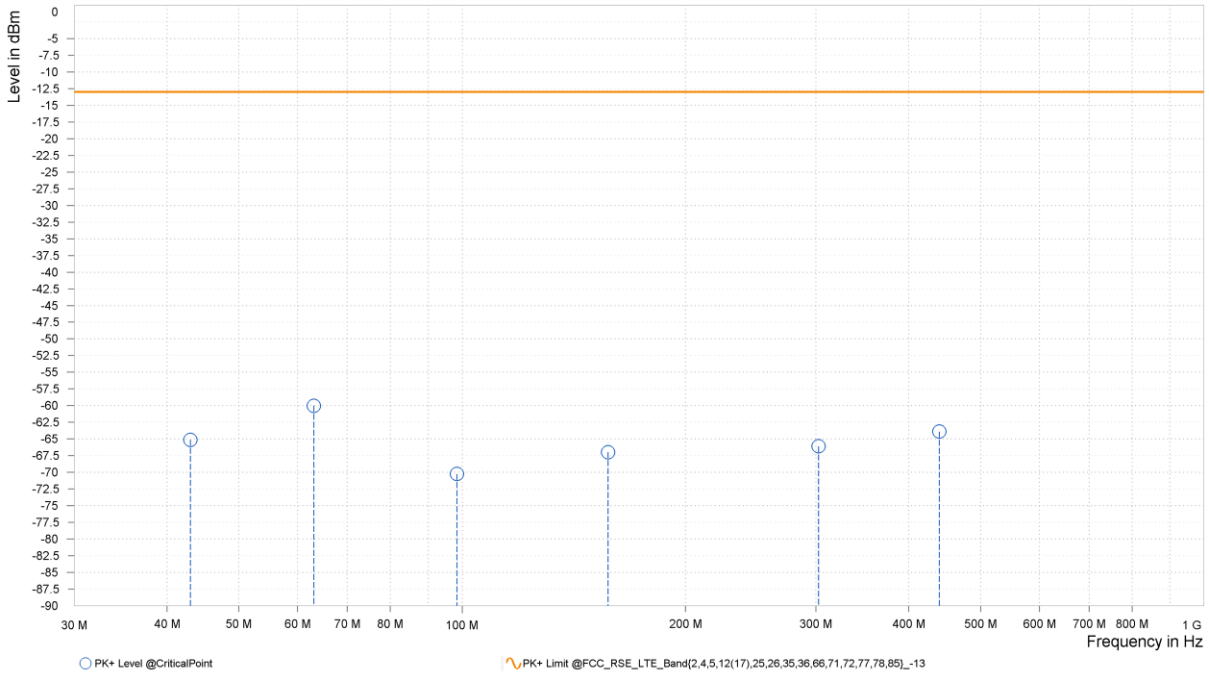
MODE	TX channel 132072	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	43.400	-65.82	-13.00	52.82	3.62	H	4.9	2.00
1	63.200	-51.13	-13.00	38.13	1.88	H	206.2	2.00
1	98.750	-68.40	-13.00	55.40	0.68	H	359	2.00
1	157.250	-53.24	-13.00	40.24	-4.91	H	1	2.00
1	290.100	-56.29	-13.00	43.29	5.83	H	5.8	1.00
2	485.933	-65.45	-13.00	52.45	6.71	H	1	2.00



MODE	TX channel 132072	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	43.000	-65.12	-13.00	52.12	4.97	V	7.3	1.00
1	63.100	-60.03	-13.00	47.03	0.15	V	0.9	2.00
1	98.450	-70.26	-13.00	57.26	4.41	V	7.3	1.00
1	157.300	-66.97	-13.00	53.97	-2.39	V	267.3	2.00
1	302.250	-66.11	-13.00	53.11	5.09	V	359.1	1.00
1	439.950	-63.91	-13.00	50.91	6.97	V	359.1	1.00



ABOVE 1GHz

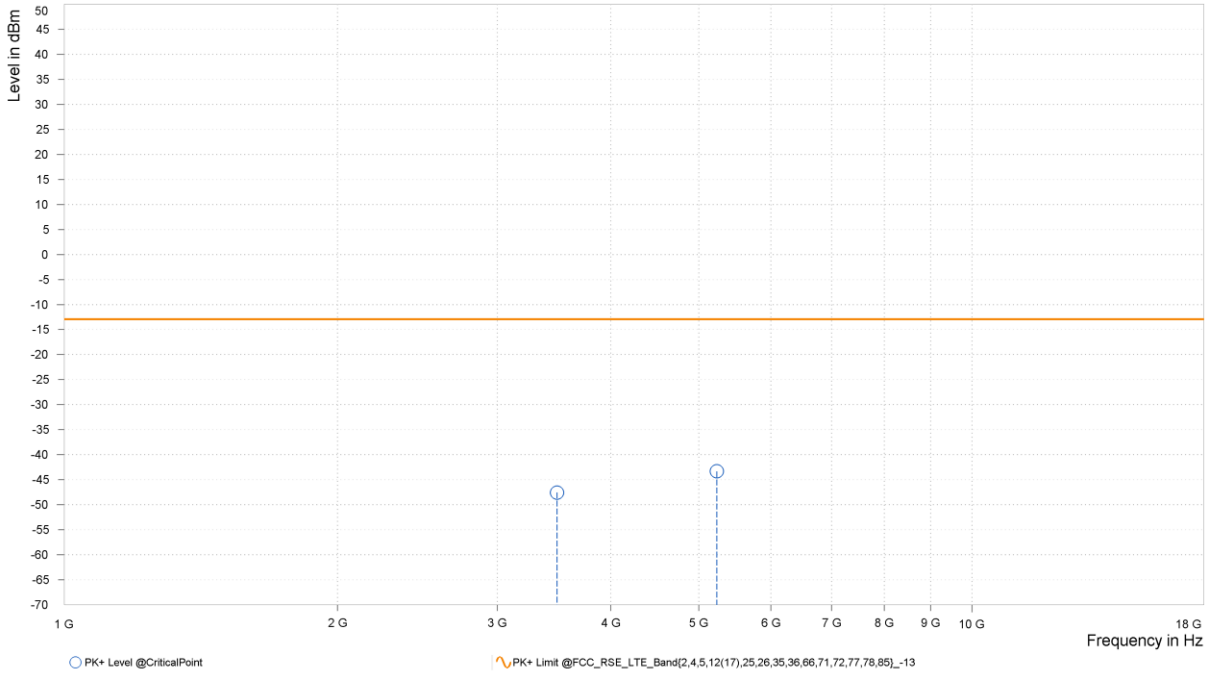
Note: For higher frequency, the emission is too low to be detected.

CAT-M1 LTE B66

CHANNEL BANDWIDTH: 1.4MHz / QPSK

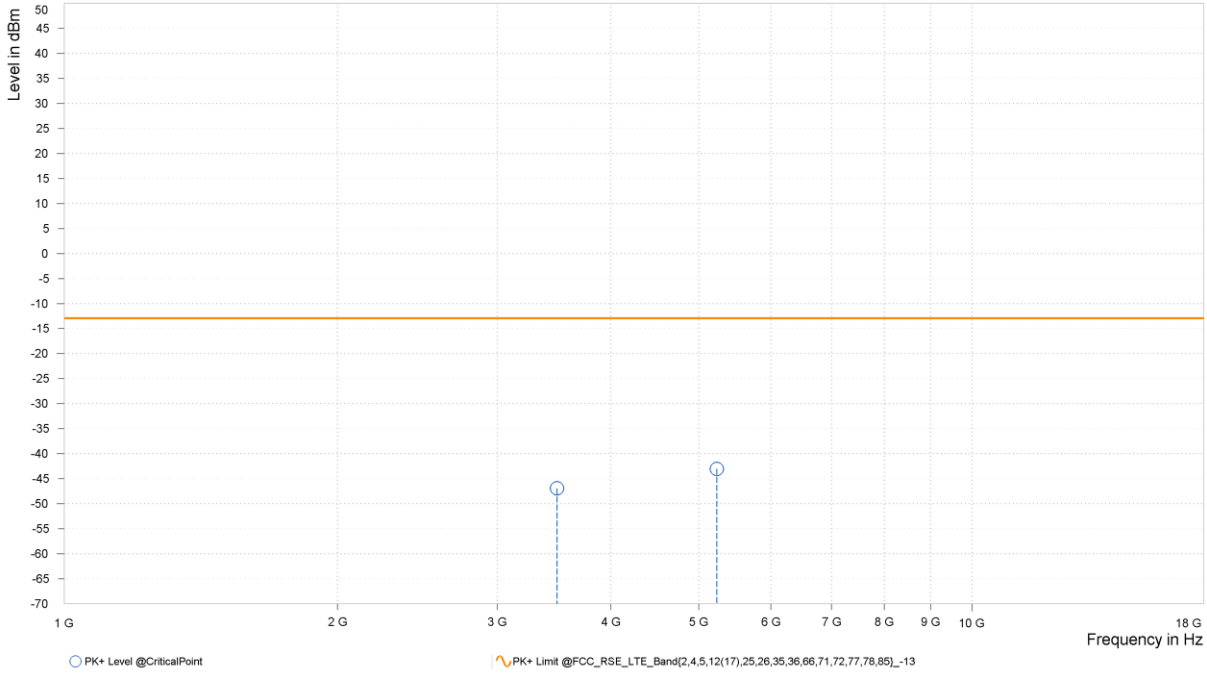
MODE	TX channel 132322	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,488.740	-47.58	-13.00	34.58	15.66	H	268.4	2.00
2	5,233.110	-43.34	-13.00	30.34	17.98	H	90.4	1.00



MODE	TX channel 132322	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			

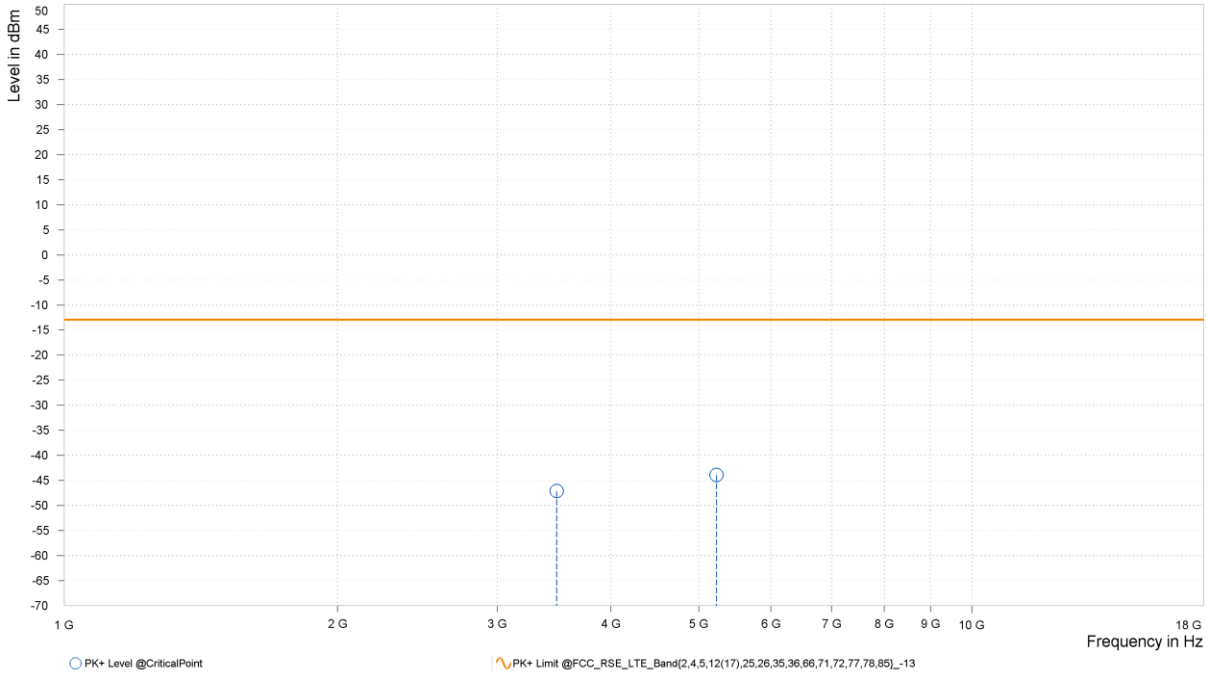
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,488.740	-46.93	-13.00	33.93	15.43	V	269.7	2.00
2	5,233.110	-43.03	-13.00	30.03	17.95	V	269.7	2.00



CHANNEL BANDWIDTH: 3MHz / QPSK

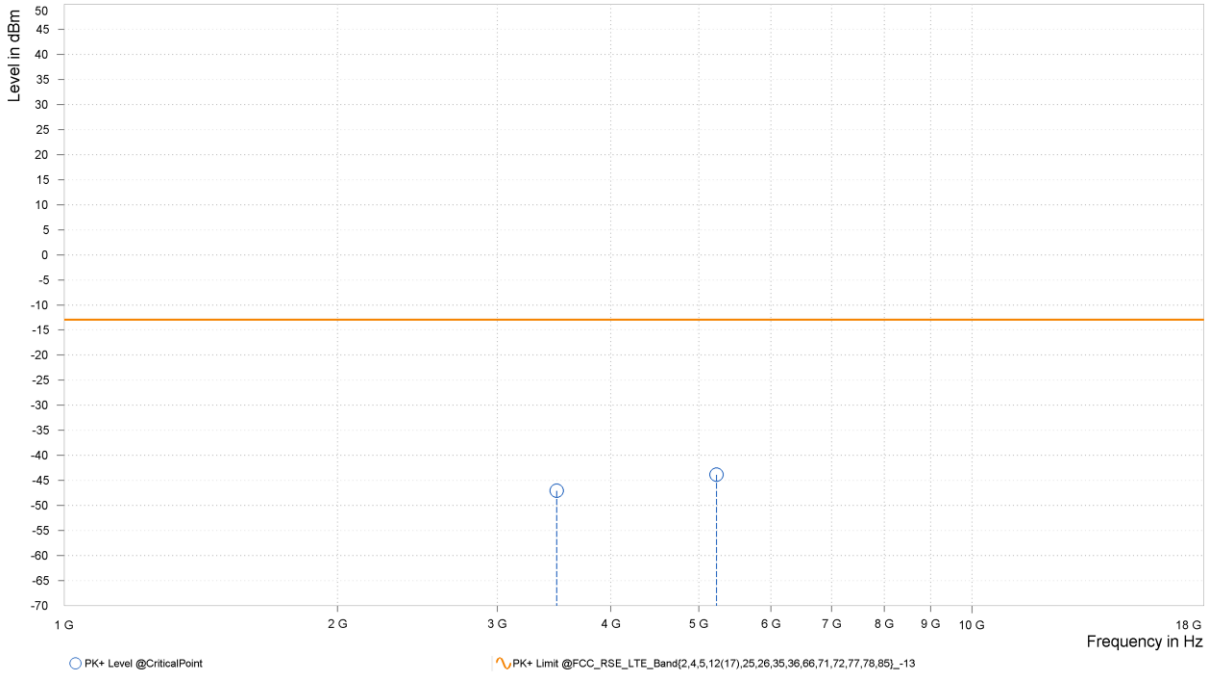
MODE	TX channel 132322	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,487.300	-47.15	-13.00	34.15	15.68	H	0.9	2.00
2	5,230.950	-43.92	-13.00	30.92	18.00	H	0.9	2.00



MODE	TX channel 132322	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			

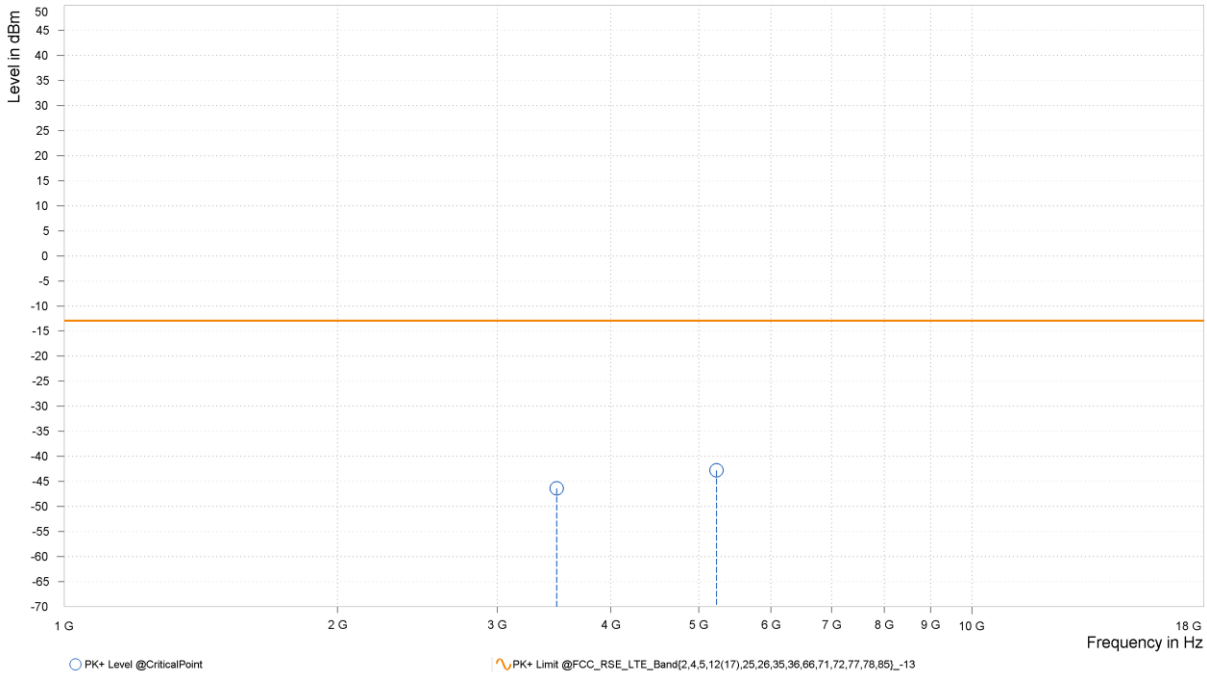
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,487.300	-47.09	-13.00	34.09	15.44	V	359	2.00
2	5,230.950	-43.87	-13.00	30.87	17.97	V	359	2.00



CHANNEL BANDWIDTH: 5MHz / QPSK

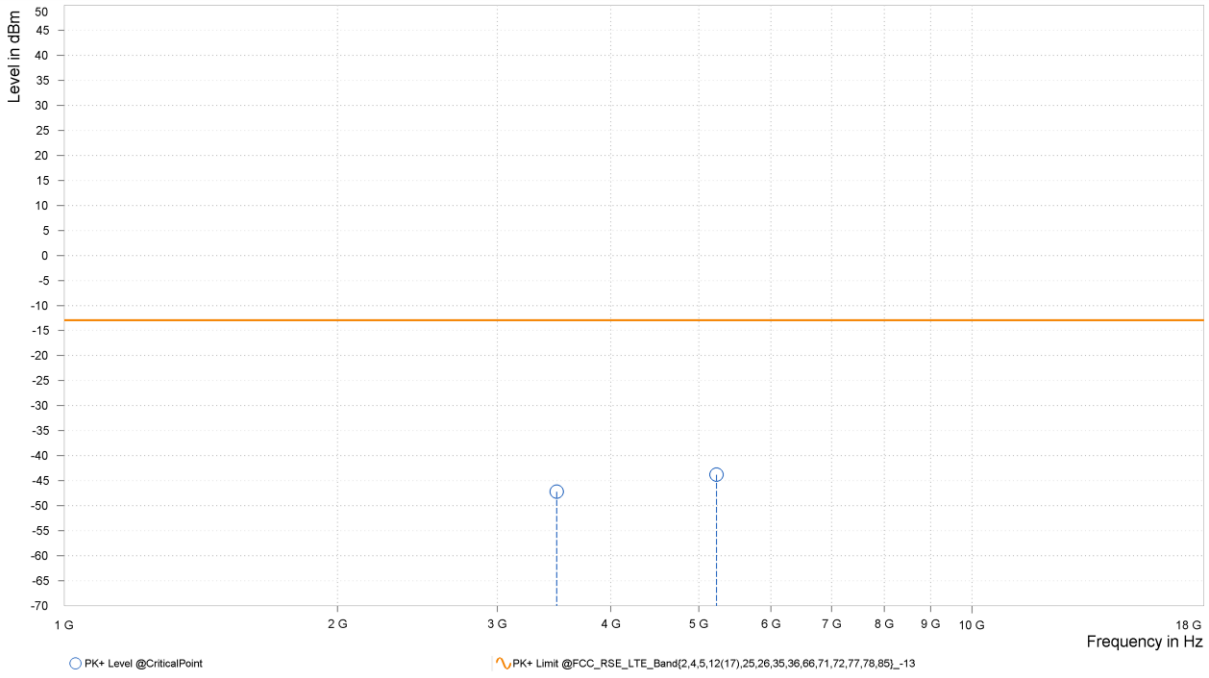
MODE	TX channel 132322	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,485.500	-46.41	-13.00	33.41	15.71	H	274.4	1.00
2	5,228.250	-42.80	-13.00	29.80	18.04	H	274.4	1.00



MODE	TX channel 132322	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			

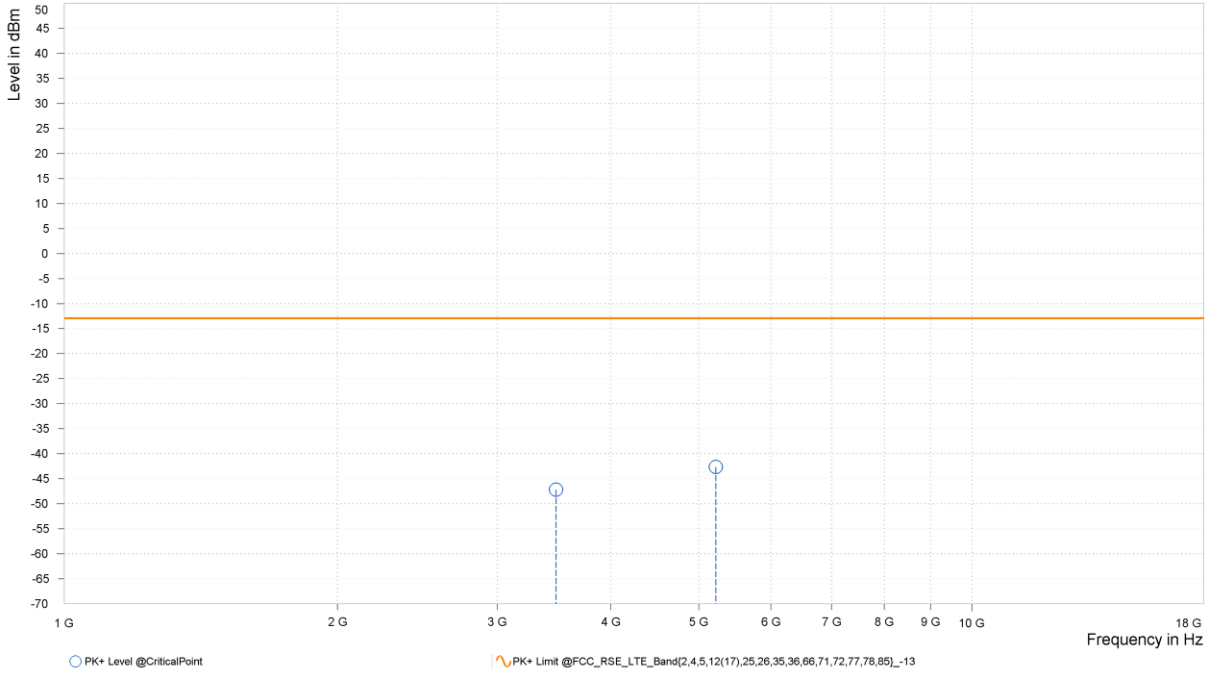
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,485.500	-47.21	-13.00	34.21	15.47	V	1	1.00
2	5,228.250	-43.81	-13.00	30.81	18.01	V	0.9	2.00



CHANNEL BANDWIDTH: 10MHz / QPSK

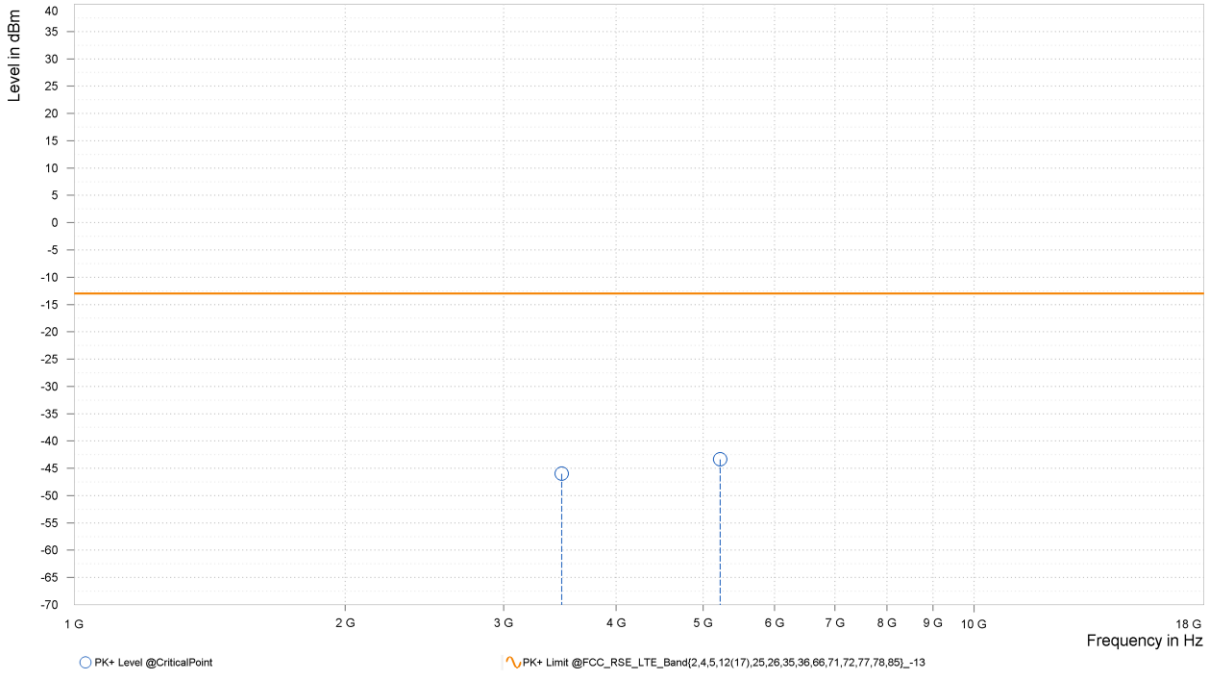
MODE	TX channel 132322	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,481.000	-47.20	-13.00	34.20	15.79	H	359	2.00
2	5,221.500	-42.67	-13.00	29.67	18.11	H	1	1.00



MODE	TX channel 132322	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			

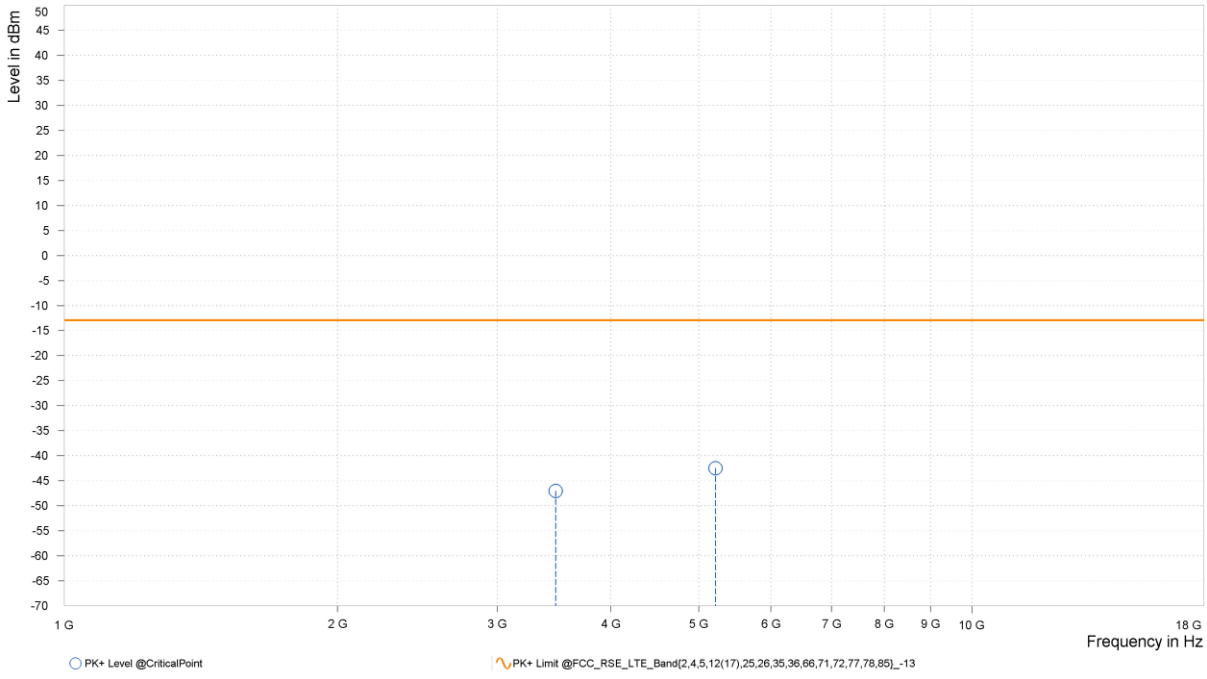
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,481.000	-45.98	-13.00	32.98	15.54	V	90.5	1.00
2	5,221.500	-43.36	-13.00	30.36	18.09	V	72.4	2.00



CHANNEL BANDWIDTH: 15MHz / QPSK

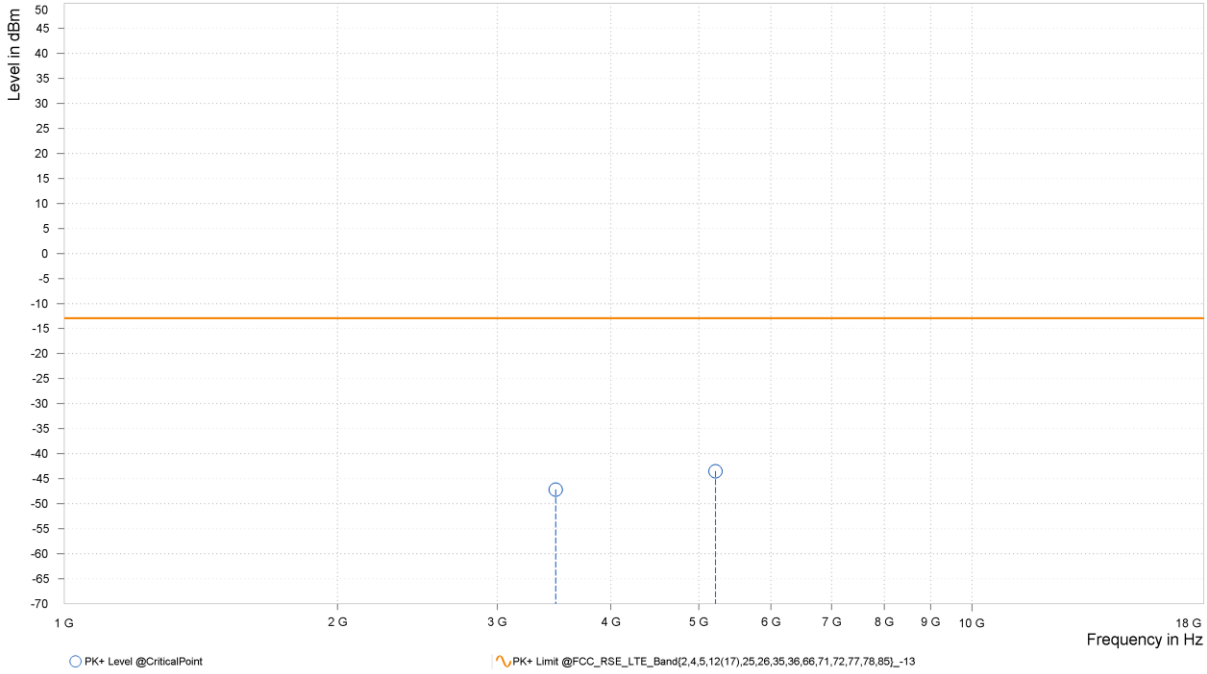
MODE	TX channel 132322	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,476.500	-47.05	-13.00	34.05	15.86	H	359	2.00
2	5,214.750	-42.49	-13.00	29.49	18.18	H	91.6	1.00



MODE	TX channel 132322	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]
2	3,476.500	-47.17	-13.00	34.17	15.61	V	89.2	1.00
2	5,214.750	-43.52	-13.00	30.52	18.17	V	1	2.00

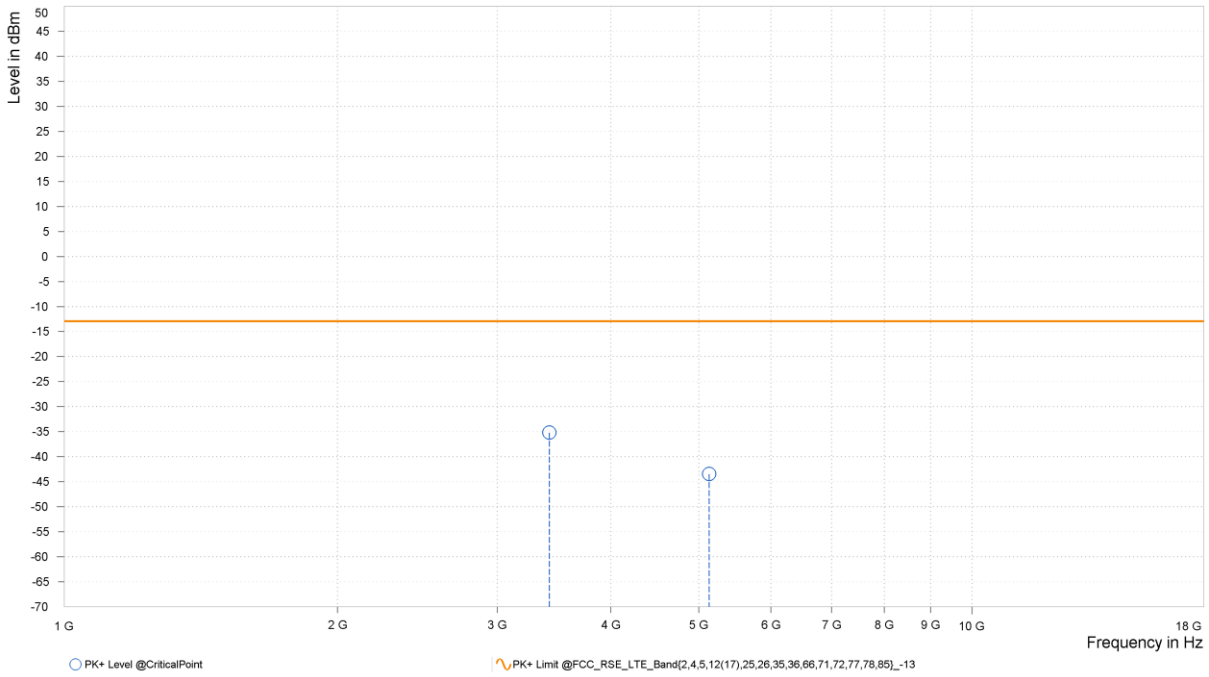


CHANNEL BANDWIDTH: 20MHz / QPSK

CH132072

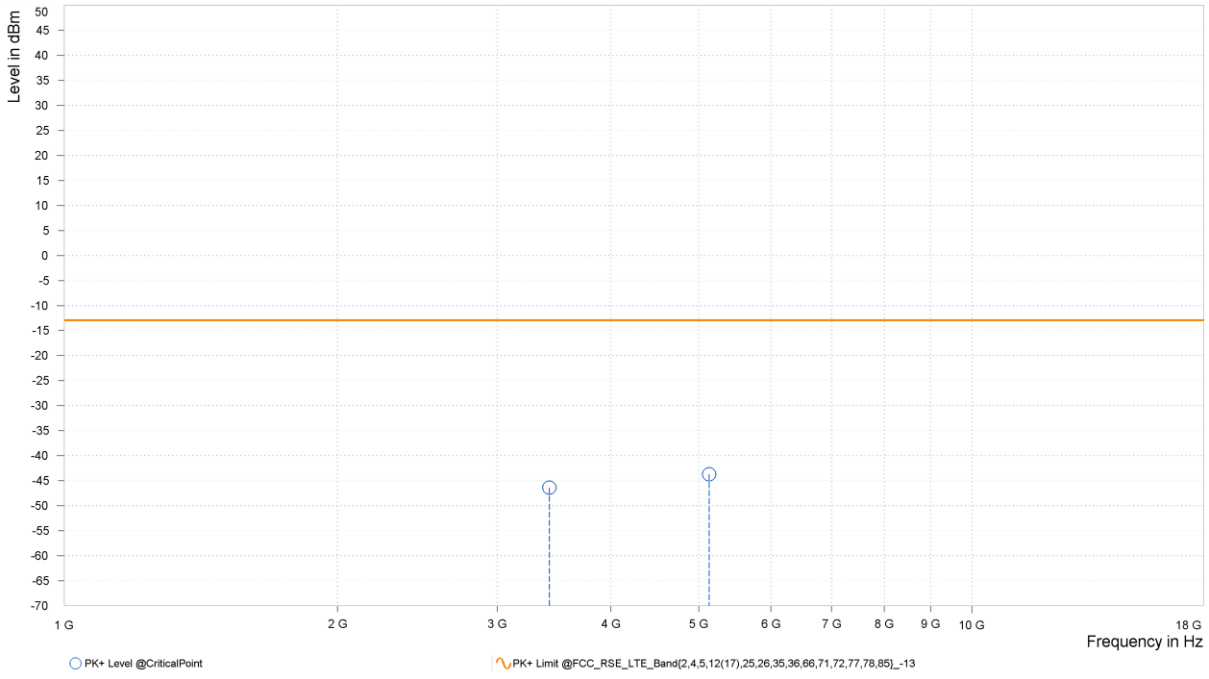
MODE	TX channel 132072	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,422.500	-35.20	-13.00	22.20	15.99	H	91.6	1.00
2	5,133.000	-43.47	-13.00	30.47	17.58	H	359.2	1.00



MODE	TX channel 132072	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			

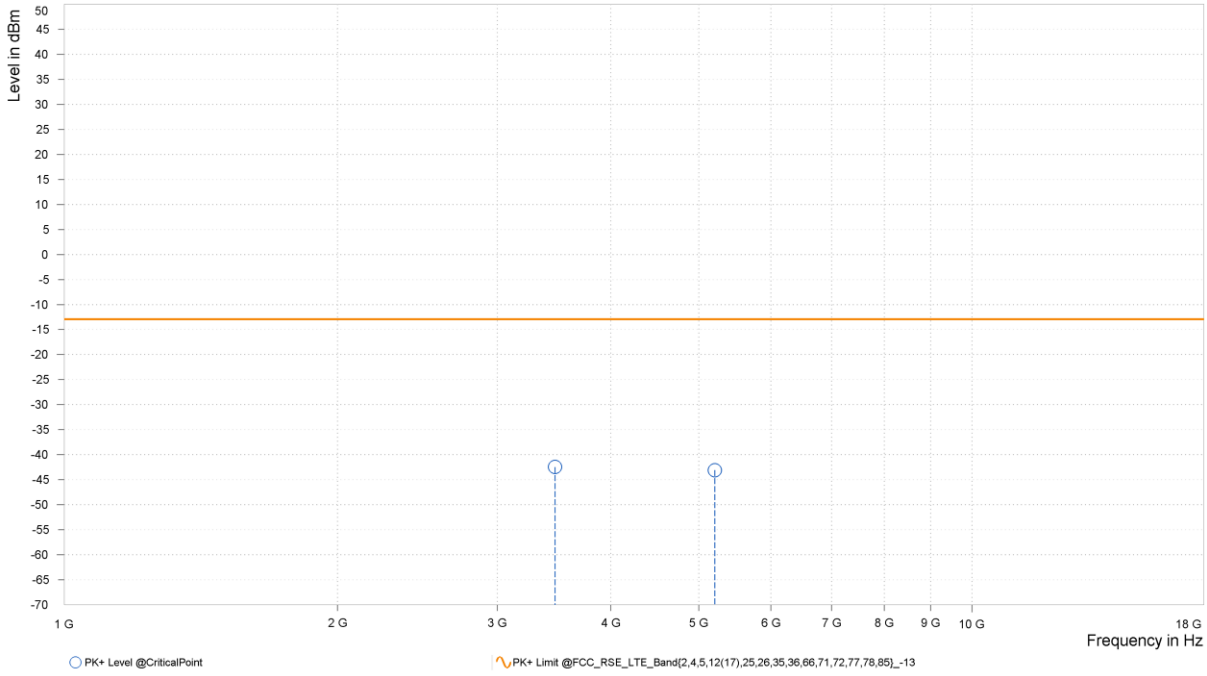
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,422.000	-46.39	-13.00	33.39	15.78	V	92.7	1.00
2	5,133.000	-43.72	-13.00	30.72	17.44	V	281.6	1.00



CH132322

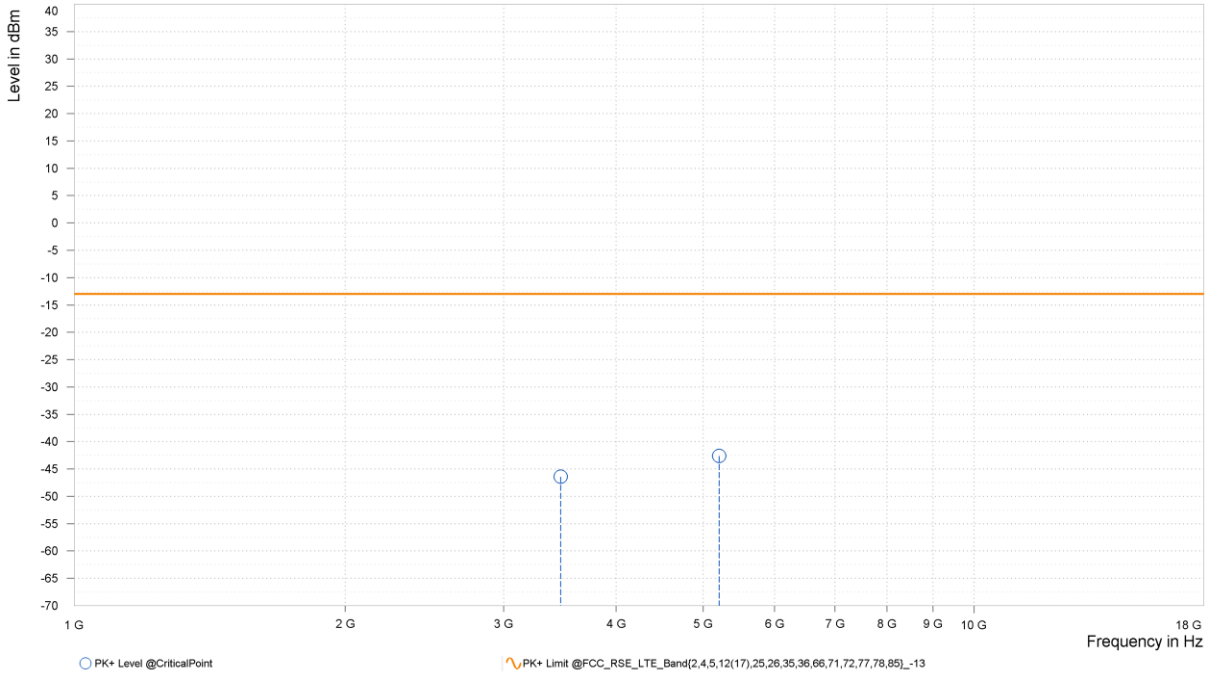
MODE	TX channel 132322	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,472.500	-42.46	-13.00	29.46	15.93	H	90.5	1.00
2	5,208.000	-43.11	-13.00	30.11	18.22	H	90.5	1.00



MODE	TX channel 132322	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			

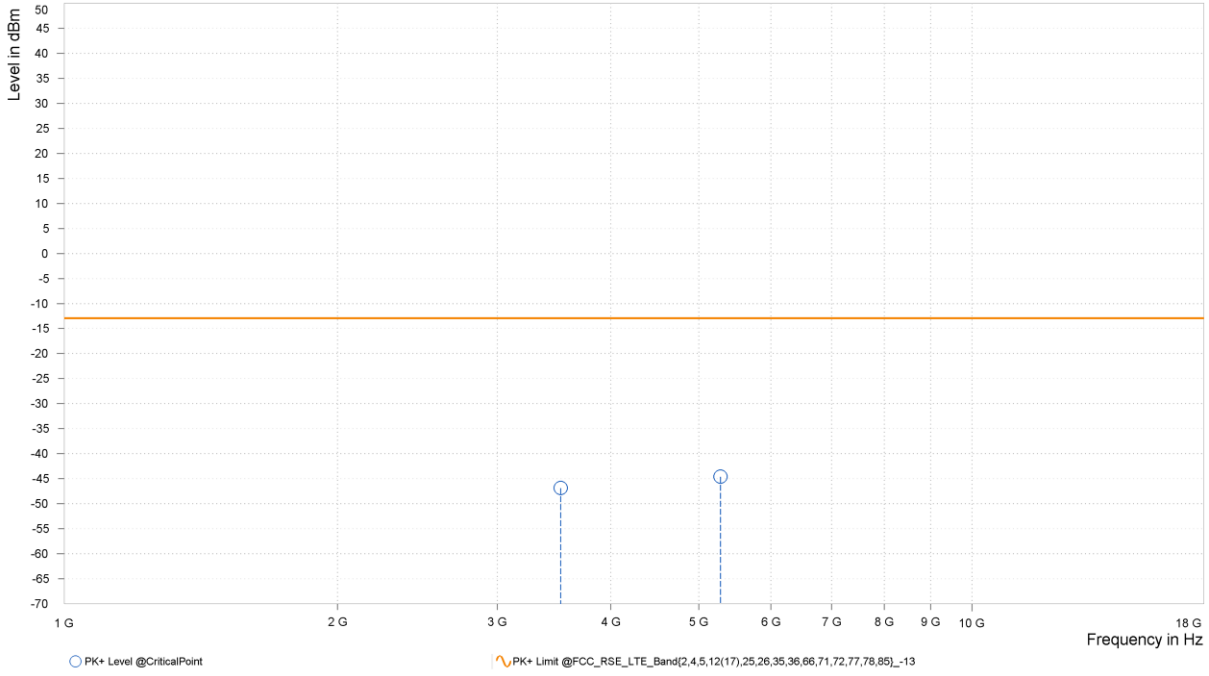
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,472.000	-46.42	-13.00	33.42	15.68	V	359	2.00
2	5,208.000	-42.63	-13.00	29.63	18.20	V	0.9	2.00



CH132572

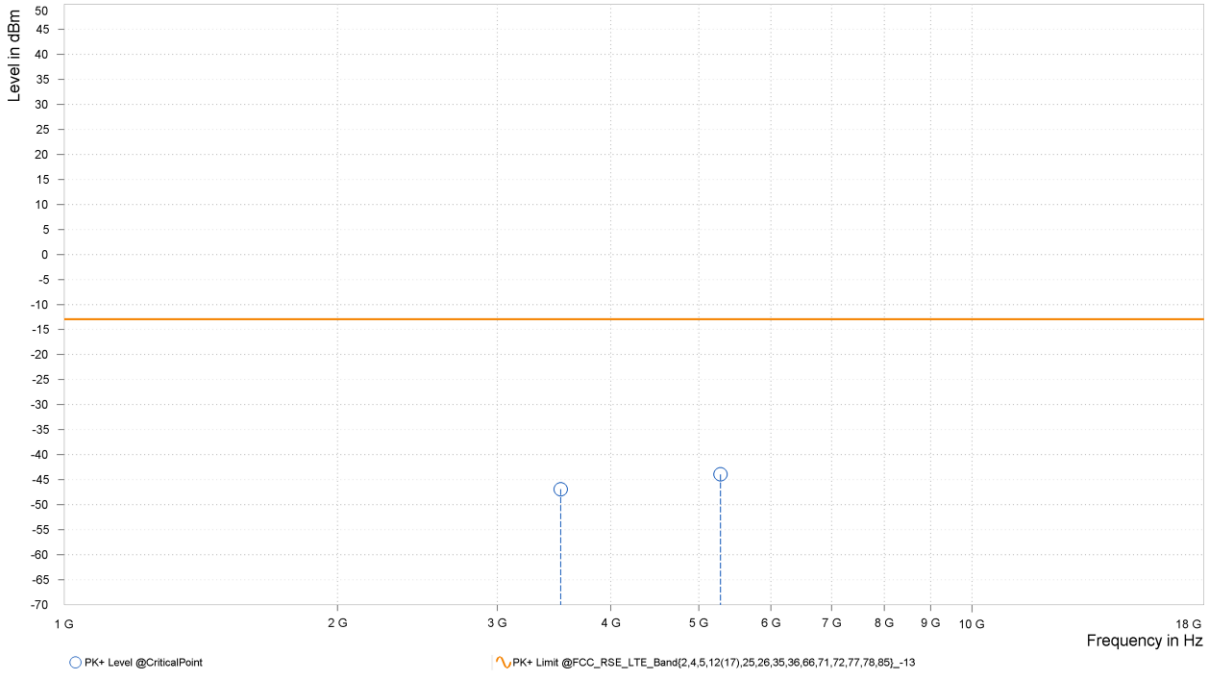
MODE	TX channel 132572	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,522.000	-46.88	-13.00	33.88	15.27	H	90.4	1.00
2	5,283.000	-44.60	-13.00	31.60	17.44	H	275.6	1.00



MODE	TX channel 132572	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			

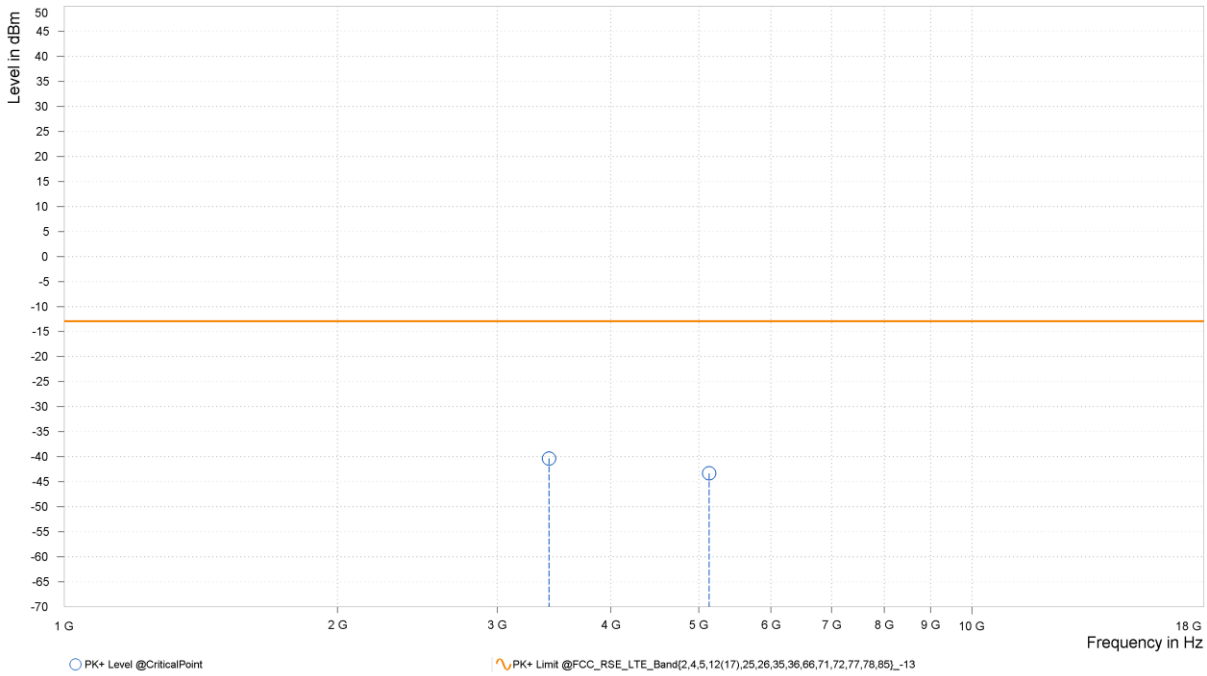
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,522.000	-46.89	-13.00	33.89	15.12	V	0.9	2.00
2	5,283.000	-43.95	-13.00	30.95	17.35	V	78.5	2.00



NB-IOT LTE Band 66
CHANNEL BANDWIDTH: QPSK
CH 131973

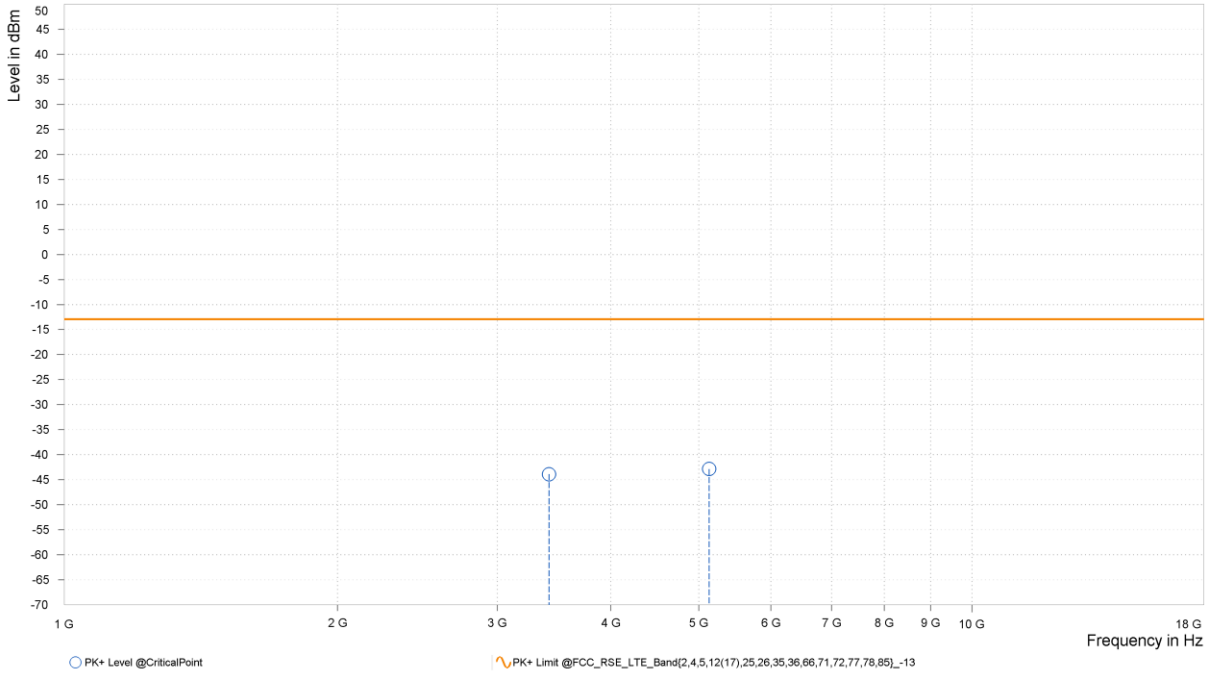
MODE	TX channel 131973	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,420.200	-40.35	-13.00	27.35	15.94	H	80.9	2.00
2	5,130.300	-43.34	-13.00	30.34	17.55	H	359.1	1.00



MODE	TX channel 131973	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			

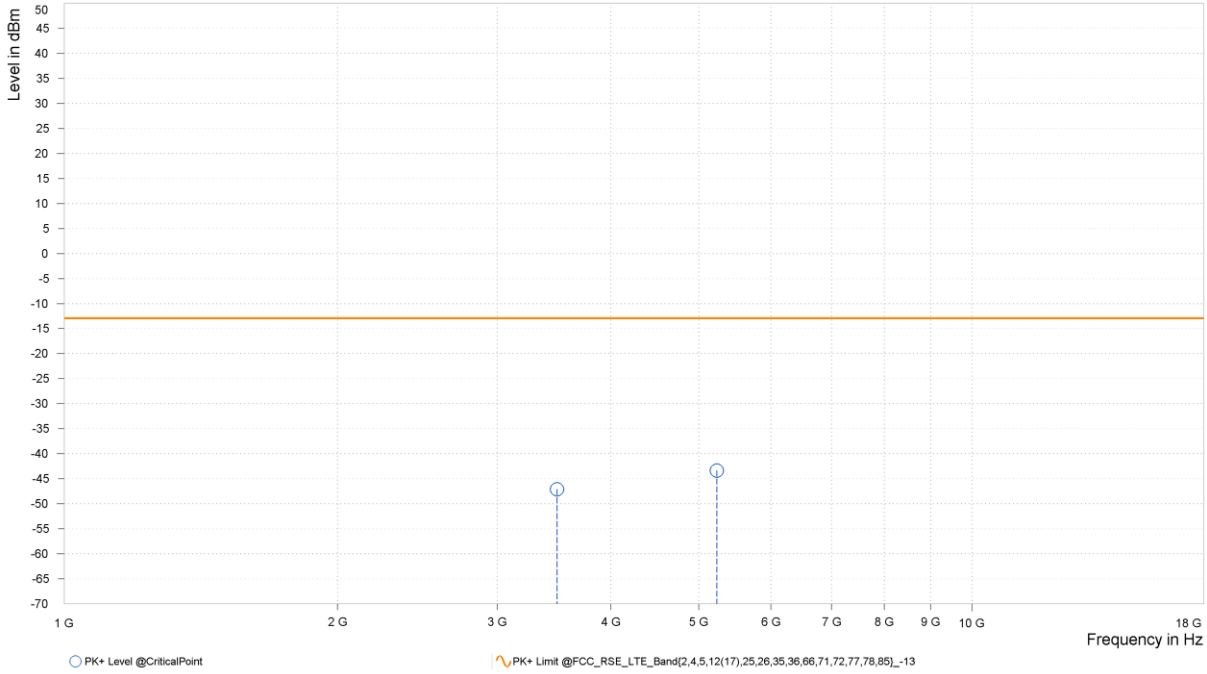
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,420.200	-43.89	-13.00	30.89	15.75	V	91.6	1.00
2	5,130.300	-42.86	-13.00	29.86	17.41	V	359	2.00



CH 132322

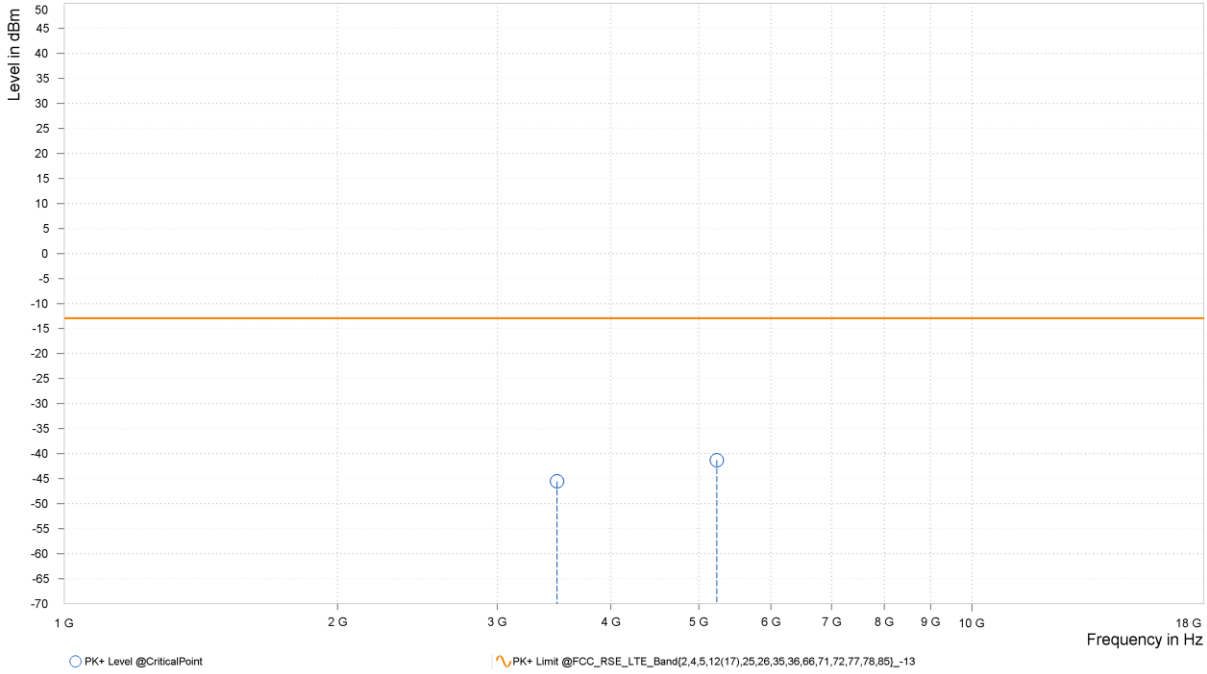
MODE	TX channel 132322	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,490.000	-47.12	-13.00	34.12	15.63	H	80.9	2.00
2	5,235.000	-43.38	-13.00	30.38	17.96	H	92.7	1.00



MODE	TX channel 132322	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			

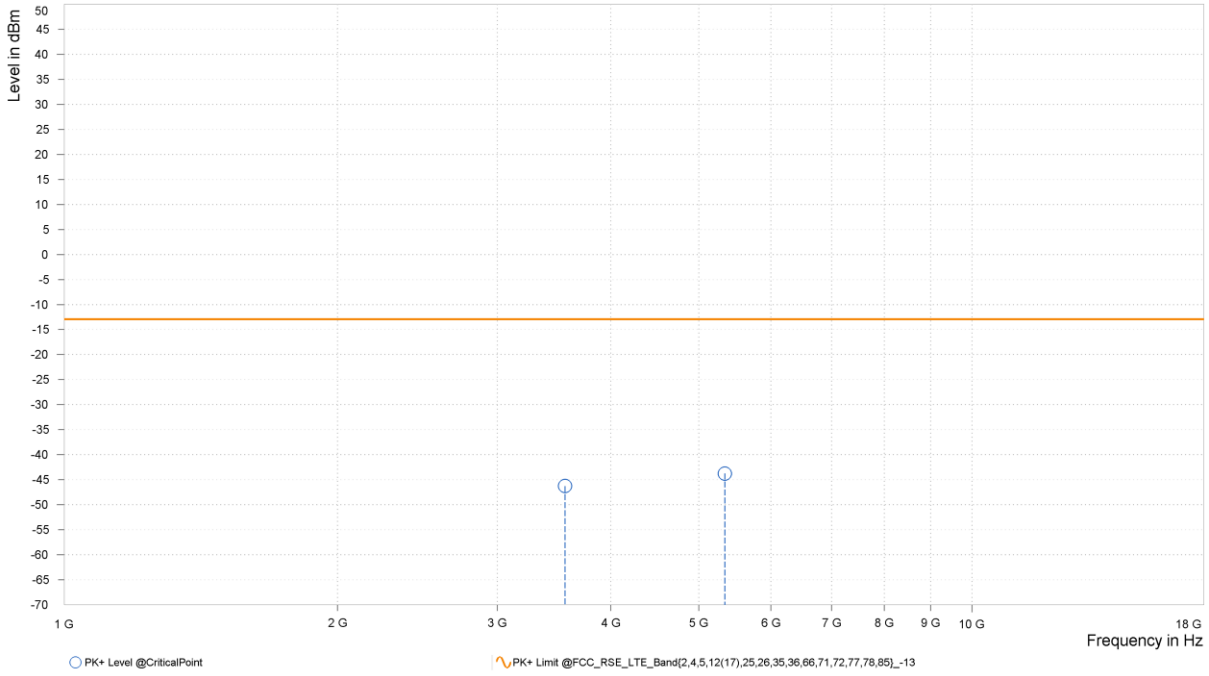
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,490.000	-45.55	-13.00	32.55	15.41	V	91.6	1.00
2	5,235.000	-41.30	-13.00	28.30	17.93	V	1	1.00



CH 132671

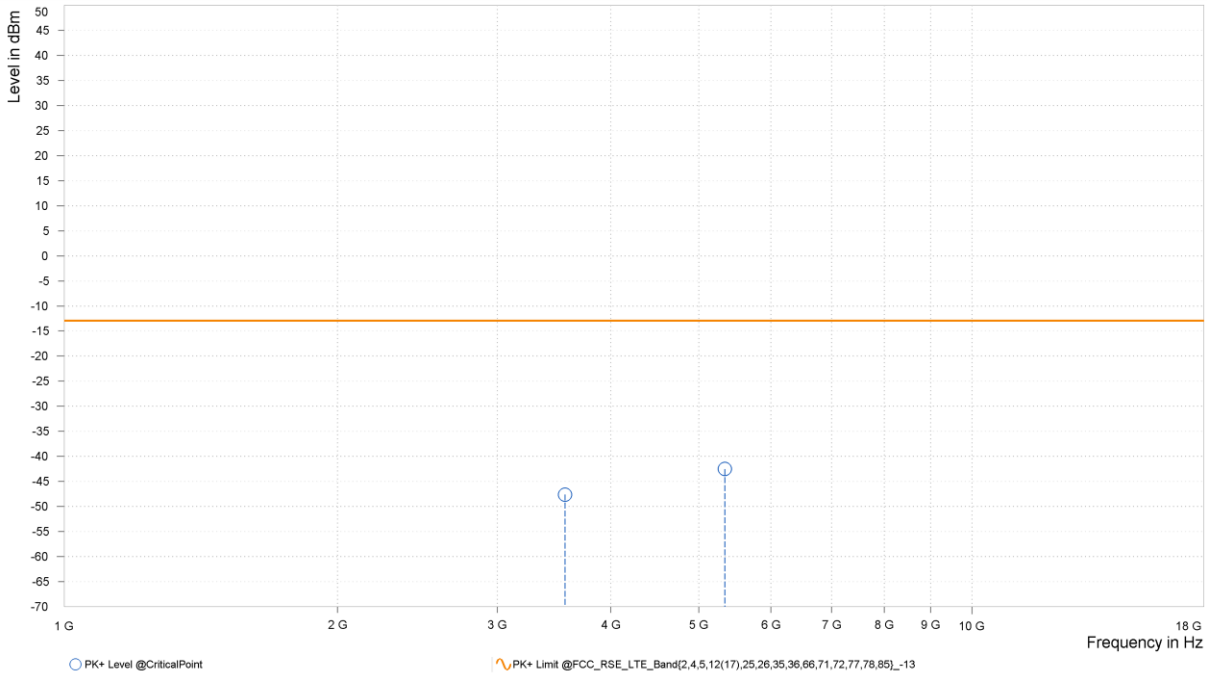
MODE	TX channel 132671	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	AC 120V 60HZ
TESTED BY	Hanwen Xu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
2	3,559.800	-46.26	-13.00	33.26	15.16	H	359	1.00
2	5,339.700	-43.78	-13.00	30.78	17.34	H	267.2	2.00



MODE	TX channel 132671	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	3,559.800	-47.65	-13.00	34.65	15.09	V	269.7	2.00
2	5,339.700	-42.55	-13.00	29.55	17.19	V	83.3	2.00

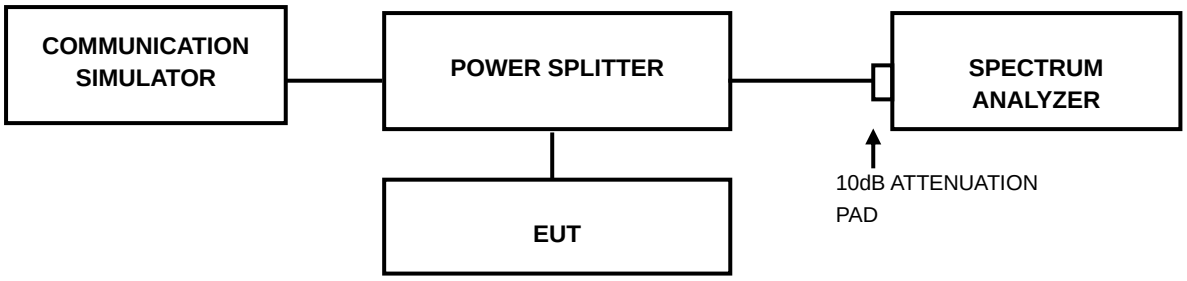


3.7 PEAK TO AVERAGE RATIO

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

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

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.

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.

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 any modifications are made to the EUT by the lab during the test.

--END--