



FCC TEST REPORT (PART 96)

Applicant:	Thundercomm Technology Co., Ltd.				
Address:	No. 107, Middle Datagu Road, Xiantao Street, Yubei District, Chongqing, China, 401122				
Manufacturer or Supplier:	Thundercomm Technology Co., Ltd	d.			
Address:	No. 107, Middle Datagu Road, Xia	ntao Street, Yubei District, Chongqing, China, 401122			
Product:	Edge AI Station				
Brand Name:	Thundercomm				
Model Name:	EB5S				
FCC ID:	2AOHHEB5S				
Date of tests:	Sep. 09, 2023 ~ Oct. 31, 2023				
The tests have been carried out according to the requirements of the following standard:					
□ 47 CFR FCC P					
	15				
CONCLUSION: The submitted sample was found to COMPLY with the test requirement					
Prepared by Simon Wang Approved by Luke Lu Engineer / Mobile Department Manager / Mobile Department					
	Simon wang luke lu				
Date: Oct. 31, 2023 Date: Oct. 31, 2023					
This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at					

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RELEASE CONTROL RECORD

ISSUE NO. DESCRIPTION		DATE ISSUED	
W7L-P23070010RF08	Original release	Oct. 31, 2023	



1 SUMMARY OF TEST RESULTS

47 CFR FCC PART 96				
FCC CLAUSE	TEST ITEM	RESULT		
2.1046 96.41(b)	Maximum Peak Output Power and Maximum EIRP	Compliance		
2.1051 96.41(e)	Conducted Band Edge	See Note 2		
2.1049	Occupied Bandwidth	See Note 2		
2.1055	Frequency Stability	See Note 2		
2.1051 96.41(e)	Conducted Spurious Emissions	See Note 2		
2.1053 96.41(e)	Radiated Spurious Emissions	Compliance See Note 3		
96.41(g)	Peak-to-Average Power Ratio	See Note 2		

Note:1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

- 2. Refer to Module report FYCR220600021102, FCC ID: XMR2022RM520NGL.
- 3. For NSA band, the EUT had been tested with all combinations, the report only shows the worst case RSE mode data.



1.1 MEASUREMENT UNCERTAINTY

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

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

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

1.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer			Last Cal.	Next Cal.
Pre-Amplifier	R&S	SCU18F1	100815	_	Aug.29,24
Pre-Amplifier	R&S	SCU08F1	101028	Sep.16,22	Sep.15,24
Vector Signal Generator	R&S	SMBV100B	102176	Feb.16,22	Feb.15,24
Signal Generator	R&S	SMB100A	182185	Feb.16,22	Feb.15,24
3m Fully-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ- EMC-01Ch amber	Nov.25,22	Nov.24,25
3m Semi-anechoic Chamber	TDK	9m*6m*6m	HRSW-SZ- EMC-02Ch amber	Nov.25,22	Nov.24,25
EMI TEST Receiver	R&S	ESR26	101734	Feb.25,22	Feb.24,24
EMI TEST Receiver	R&S	ESW44	101973	Feb.25,22	Feb.24,24
Bilog Antenna	SCHWARZBE CK	VULB 9163	1264	Feb.28,22	Feb.27,24
Horn Antenna	ETS-LINDGRE N	3117	227836	Aug.22,22	Aug.21,24
Horn Antenna (18GHz-40GHz)	Steatite Q-par Antennas	QMS 00880	23486	Feb.23,22	Feb.22,24
Horn Antenna	Steatite Q-par Antennas	QMS 00208	23485	Aug.22,22	Aug.21,24
Loop Antenna	SCHWARZ	HFH2-Z2/Z2E	100976	Feb.23,22	Feb.22,24
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(CA BLE)	R&S	HF290-NMNM-7 .00M	N/A	N/A	N/A
TMC-AMI18843A(CA BLE)	R&S	HF290-NMNM-4 .00M	N/A	N/A	N/A
CABLE	R&S	W13.02	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W13.02	N/A	Oct.27,23	Apr.26,24
CABLE	R&S	W12.14	N/A	Apr.28,23	Oct.27,23
CABLE	R&S	W12.14	N/A	Oct.27,23	Apr.26,24
CABLE	R&S	J12J103539-00- 1	SEP-03-20- 069	Apr.28,23	Oct.27,23



CABLE	R&S	J12J103539-00- 1	SEP-03-20- 069	Oct.27,23	Apr.26,24
CABLE	R&S	J12J103539-00- 1			
CABLE	R&S	J12J103539-00- 1	SEP-03-20- 070	Oct.27,23	Apr.26,24
Temperature Chamber	votsch	VT4002	585660781 00050	May.31,22	May.30,24

- NOTE: 1. The calibration interval of the above test instruments is 6 months or 24months or 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	Edge AI Station			
BRAND NAME	Thundercomm			
MODEL NAME	EB5S			
NOMINAL VOLTAGE	19Vdc(adapter)			
MODULATION TECHNOLOGY	5G NR	DFT-s-OFDM (Pi/2BPSK, QPSK,16QAM,64QAM,256Q AM); CP-OFDM(QPSK,16QAM,64 QAM,256QAM);		
		2A_n48A		
SUPPORT ENDC	NR Band n48	5A_n48A		
COMBINE	INK Ballu 1140	13A_n48A		
		66A_n48A		
FREQUENCY RANGE	NR Band n48	3555 MHz ~ 3694.98MHz		
	NR Band n48 Channel Bandwidth: 10MHz	QPSK: 8M75G7D 16QAM: 8M80W7D 64QAM: 8M71W7D 256QAM: 8M71W7D		
EMISSION DESIGNATOR	NR Band n48 Channel Bandwidth: 20MHz	QPSK: 18M4G7D 16QAM: 18M5W7D 64QAM: 18M4W7D 256QAM: 18M4W7D		
	NR Band n48 Channel Bandwidth: 40MHz	QPSK: 38M2G7D 16QAM: 38M3W7D 64QAM: 38M2W7D 256QAM: 38M1W7D		
	NR Band n48 Channel Bandwidth: 10MHz	133.05mW		
MAX. EIRP POWER	NR Band n48 Channel Bandwidth: 20MHz	136.78mW		
	NR Band n48 Channel Bandwidth: 40MHz	141.26mW		
ANTENNA GAIN	Fixed External Antenna with -1.84 dBi gain for NR Band n48			
HW VERSION	Turbox EB5S-IO-BOARD V03			



SW VERSION	R.5S.LA.2.20231030
I/O PORTS	Refer to user's manual
DATA CABLE	N/A
EXTREME TEMPERATURE	-20-60 °C
EXTREME VOLTAGE	12V - 24V

NOTE:

- 1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual
- 2. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

MODULATION MODE	TX FUNCTION	
NR	2TX/2RX	

3. For UL_MIMO Mode, according to the KDB 662911 D01, Basic methodology with N_{ANT} transmit antennas, each with the same directional gain G_{ANT} dBi, being driven by N_{ANT} transmitter outputs of equal power. Directional gain is to be computed as follows:

Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi (For any transmit signals that are *correlated* with each other).

So the Gain of N48 can be calculated as below:

NR Band	G _{ANT} (All antennas with the same Gain)	Directional gain
48	-1.84dBi	1.17dBi

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

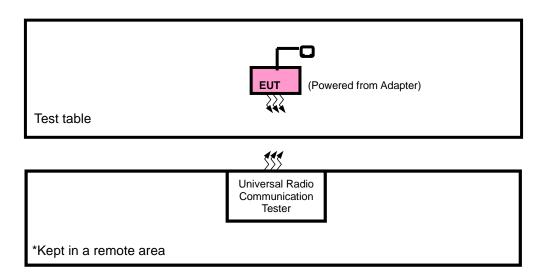
List of Accessory:

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
AC Adapter	Huntkey	Shenzhen Huntkey Electric Co. Ltd.	HKA09019047-6U	I/P: 100-240Vac, 1.5A, O/P: 19Vdc, 3.15A



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	N/A	N/A	N/A	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
Α	EUT + Adapter + USB Cable with 5G NR link



5G NR n48 MODE (SA_n48, DC_2A_n48A, DC_5A_n48A, DC_13A_n48A, DC_66A_n48A)

EUT CONFIGU RE MODE	TEST ITEM	AVAILABLE CP-OFDM CHANNEL	AVAILABLE DFT-S-OFDM CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE(DFT-S- OFDM) (INCLUDE CP-OFDM)
		637000 to 646332	637000 to 646332	Low, Middle, High	10MHz	Pi/2BPSK, QPSK, 16QAM, 64QAM, 256QAM	1RB/ 0RB Offset
А	A EIRP	637334 to 646000	637334 to 646000	Low, Middle, High	20MHz	Pi/2BPSK, QPSK, 16QAM, 64QAM, 256QAM	1RB/ 0RB Offset
		638000 to 645332	638000 to 645332	Low, Middle, High	40MHz	Pi/2BPSK, QPSK, 16QAM, 64QAM, 256QAM	1RB/ 0RB Offset
		637000 to 646332	637000 to 646332	Low, Middle, High	10MHz	QPSK	1RB/ 0RB Offset
Δ	RADIATED EMISSION	637334 to 646000	637334 to 646000	Middle	20MHz	QPSK	1RB/ 0RB Offset
		638000 to 645332	638000 to 645332	Middle	40MHz	QPSK	1RB/ 0RB Offset

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

2. The test data presented in the report from worst SA_n48



TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP&EIRP	23deg. C, 70%RH	DC 19V By Adapter	Jace Hu
RADIATED EMISSION	23deg. C, 70%RH	DC 19V By Adapter	Jace Hu



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 96

KDB 971168 D02 Power Meas License Digital Systems v02r02

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



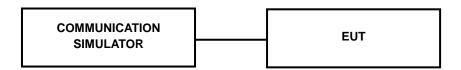
3 TEST TYPES AND RESULTS

3.1 MAXIMUM EIRP MEASUREMENT

3.1.1 LIMITS OF MAXIMUM EIRP MEASUREMENT

Device	Maximum EIRP (dBm/10 MHz)		
End User Device	23		
Category A CBSD	30		
Category B CBSD	47		

3.1.2 TEST SETUP



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



3.1.3 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 = PMeas + GT - LC

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);

Lc = 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.

3.1.4 DEVIATION FROM TEST STANDARD

No deviation.



3.1.5 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

5G SA

EIRP

SISO

N48

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637000	3555	21.8	-1.84	19.96	99.08	23
641666	3624.99	21.86	-1.84	20.02	100.46	23
646332	3694.98	21.92	-1.84	20.08	101.86	23

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637000	3555	21.8	-1.84	19.96	99.08	23
641666	3624.99	21.87	-1.84	20.03	100.69	23
646332	3694.98	21.75	-1.84	19.91	97.95	23

CHANNEL BANDWIDTH: 10MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637000	3555	20.33	-1.84	18.49	70.63	23
641666	3624.99	20.42	-1.84	18.58	72.11	23
646332	3694.98	20.32	-1.84	18.48	70.47	23

CHANNEL BANDWIDTH: 10MHz 256QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637000	3555	18.34	-1.84	16.5	44.67	23
641666	3624.99	18.41	-1.84	16.57	45.39	23
646332	3694.98	18.41	-1.84	16.57	45.39	23



CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _τ -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637334	3560.01	22.1	-1.84	20.26	106.17	23
641666	3624.99	22.05	-1.84	20.21	104.95	23
646000	3690	21.93	-1.84	20.09	102.09	23

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637334	3560.01	22.23	-1.84	20.39	109.4	23
641666	3624.99	22.11	-1.84	20.27	106.41	23
646000	3690	21.94	-1.84	20.1	102.33	23

CHANNEL BANDWIDTH: 20MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637334	3560.01	20.63	-1.84	18.79	75.68	23
641666	3624.99	20.56	-1.84	18.72	74.47	23
646000	3690	20.46	-1.84	18.62	72.78	23

CHANNEL BANDWIDTH: 20MHz 256QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _τ -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637334	3560.01	18.63	-1.84	16.79	47.75	23
641666	3624.99	18.59	-1.84	16.75	47.32	23
646000	3690	18.43	-1.84	16.59	45.6	23



CHANNEL BANDWIDTH: 40MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
638000	3570	22.12	-1.84	20.28	106.66	23
641666	3624.99	22.12	-1.84	20.28	106.66	23
645332	3679.98	22.03	-1.84	20.19	104.47	23

CHANNEL BANDWIDTH: 40MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
638000	3570	22.05	-1.84	20.21	104.95	23
641666	3624.99	22.01	-1.84	20.17	103.99	23
645332	3679.98	22.03	-1.84	20.19	104.47	23

CHANNEL BANDWIDTH: 40MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
638000	3570	20.65	-1.84	18.81	76.03	23
641666	3624.99	20.55	-1.84	18.71	74.3	23
645332	3679.98	20.42	-1.84	18.58	72.11	23

CHANNEL BANDWIDTH: 40MHz 256QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _τ -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
638000	3570	18.65	-1.84	16.81	47.97	23
641666	3624.99	18.63	-1.84	16.79	47.75	23
645332	3679.98	18.42	-1.84	16.58	45.5	23



MIMO N48

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637000	3555	19.79	1.17	20.96	124.75	23
641666	3624.99	20.07	1.17	21.24	133.05	23
646332	3694.98	19.81	1.17	20.98	125.32	23

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637000	3555	19.3	1.17	20.47	111.44	23
641666	3624.99	19.53	1.17	20.70	117.5	23
646332	3694.98	19.26	1.17	20.43	110.42	23

CHANNEL BANDWIDTH: 10MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637000	3555	17.77	1.17	18.94	78.35	23
641666	3624.99	17.85	1.17	19.02	79.8	23
646332	3694.98	18.13	1.17	19.30	85.12	23

CHANNEL BANDWIDTH: 10MHz 256QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637000	3555	15.19	1.17	16.36	43.25	23
641666	3624.99	15.37	1.17	16.54	45.08	23
646332	3694.98	14.95	1.17	16.12	40.93	23



CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637334	3560.01	20.08	1.17	21.25	133.36	23
641666	3624.99	20.19	1.17	21.36	136.78	23
646000	3690	19.86	1.17	21.03	126.77	23

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637334	3560.01	19.5	1.17	20.67	116.69	23
641666	3624.99	19.76	1.17	20.93	123.89	23
646000	3690	19.43	1.17	20.60	114.82	23

CHANNEL BANDWIDTH: 20MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637334	3560.01	18.32	1.17	19.49	88.93	23
641666	3624.99	18.08	1.17	19.25	84.15	23
646000	3690	17.77	1.17	18.94	78.35	23

CHANNEL BANDWIDTH: 20MHz 256QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
637334	3560.01	15.4	1.17	16.57	45.4	23
641666	3624.99	15.5	1.17	16.67	46.45	23
646000	3690	15.2	1.17	16.37	43.35	23



CHANNEL BANDWIDTH: 40MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
638000	3570	20.33	1.17	21.50	141.26	23
641666	3624.99	20.17	1.17	21.34	136.15	23
645332	3679.98	20.17	1.17	21.34	136.15	23

CHANNEL BANDWIDTH: 40MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
638000	3570	19.84	1.17	21.01	126.19	23
641666	3624.99	19.72	1.17	20.89	122.75	23
645332	3679.98	19.53	1.17	20.70	117.5	23

CHANNEL BANDWIDTH: 40MHz 64QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
638000	3570	18.03	1.17	19.20	83.18	23
641666	3624.99	17.99	1.17	19.16	82.42	23
645332	3679.98	17.82	1.17	18.99	79.26	23

CHANNEL BANDWIDTH: 40MHz 256QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _τ -L _C (dB)	EIRP (dBm)	EIRP (mW)	Limit (dBm/10MHz)
638000	3570	15.68	1.17	16.85	48.42	23
641666	3624.99	15.51	1.17	16.68	46.56	23
645332	3679.98	15.32	1.17	16.49	44.57	23



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

3.2.2 TEST PROCEDURES

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) 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 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.

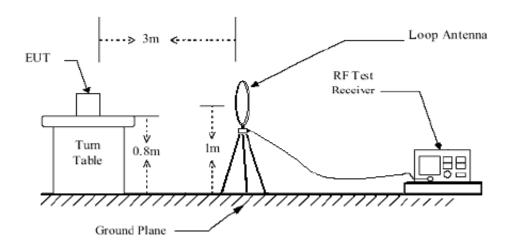
3.2.3 DEVIATION FROM TEST STANDARD

No deviation.

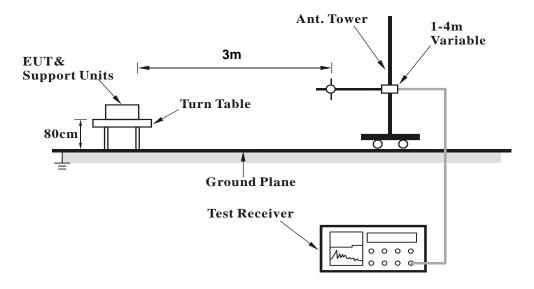


3.2.4 TEST SET UP

< Frequency Range below 30MHz >

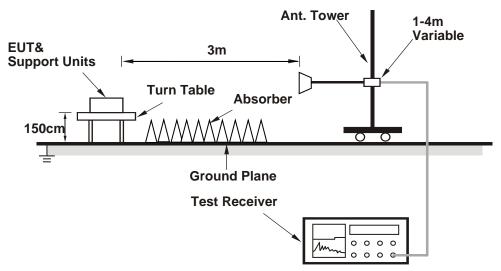


<Frequency Range below 1GHz>



<Frequency Range above 1GHz>





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



3.2.5 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.

5G SA BELOW 1GHz WORST-CASE DATA

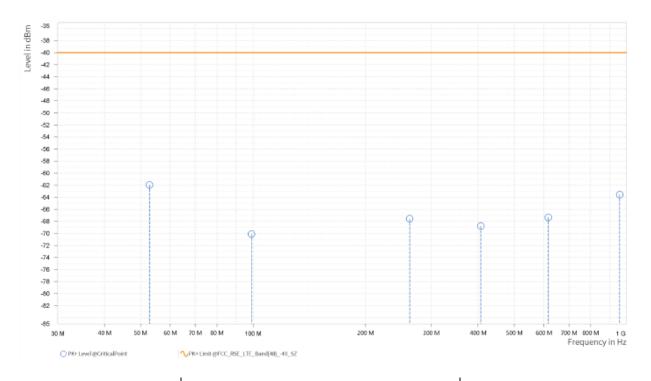
30 MHz - 1GHz data:

N48

CHANNEL BANDWIDTH: 10MHz / QPSK

MODE	TX channel 641666	FREQUENCY RANGE	Below 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ			
TESTED BY	Jace Hu	ace Hu				
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						

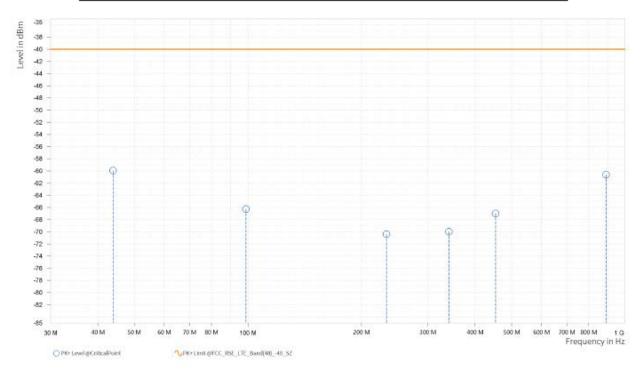
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	52.800	-61.94	-40.00	21.94	4.20	Η	300.1	2
1	99.000	-70.10	-40.00	30.10	0.43	Н	273.8	1
1	262.300	-67.57	-40.00	27.57	3.02	Н	300.1	1
1	406.850	-68.77	-40.00	28.77	6.96	Н	300.1	2
2	616.421	-67.34	-40.00	27.34	8.88	Н	90	1
2	957.329	-63.56	-40.00	23.56	15.09	Н	202.1	2





MODE	TX channel 641666	FREQUENCY RANGE	Below 1000MHz					
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ					
TESTED BY	Jace Hu							
ANTE	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	43.900	-59.95	-40.00	19.95	5.27	٧	94.2	1
1	98.850	-66.27	-40.00	26.27	4.16	٧	300.1	1
1	233.000	-70.40	-40.00	30.40	3.01	٧	300.1	2
1	341.100	-69.98	-40.00	29.98	5.95	٧	300.1	1
2	453.392	-66.98	-40.00	26.98	7.01	٧	90	2
2	889.496	-60.62	-40.00	20.62	12.16	٧	90	2





ABOVE 1GHz

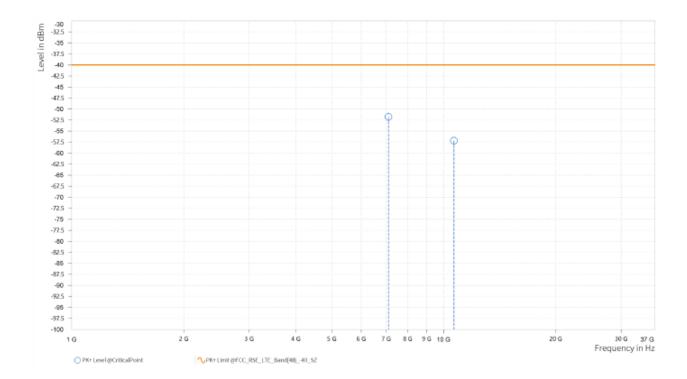
N48

CHANNEL BANDWIDTH: 10MHz/QPSK

CH637000:

MODE	TX channel 637000	FREQUENCY RANGE	Above 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz			
TESTED BY	Jace Hu					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						

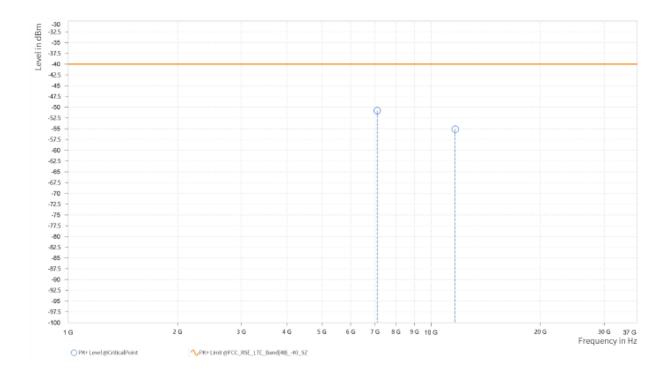
Rg	Frequency [MHz]	PK+ Level [dBm]		PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,100.500	-51.79	-40.00	11.79	27.37	Η	0.9	2
6	10,650.000	-57.20	-40.00	17.20	16.94	Н	1	1





MODE	TX channel 637000	FREQUENCY RANGE	Above 1000MHz					
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz					
TESTED BY	Jace Hu							
ANTEN	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							

Rg	Frequency [MHz]	Level	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,101.000	-50.81	-40.00	10.81	27.35	٧	359	1
6	11,650.500	-55.10	-40.00	15.10	18.57	V	1	2

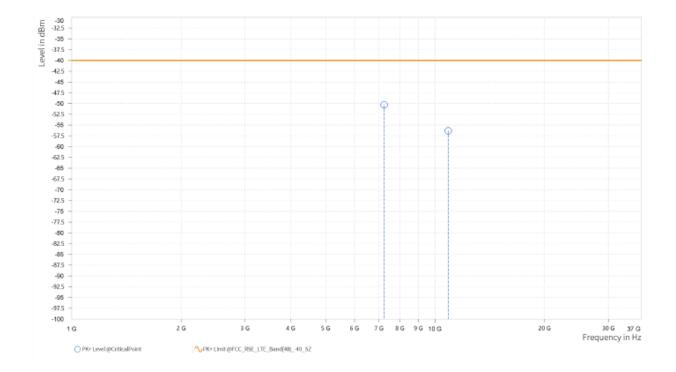




CH641666:

MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz			
TESTED BY	Jace Hu					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						

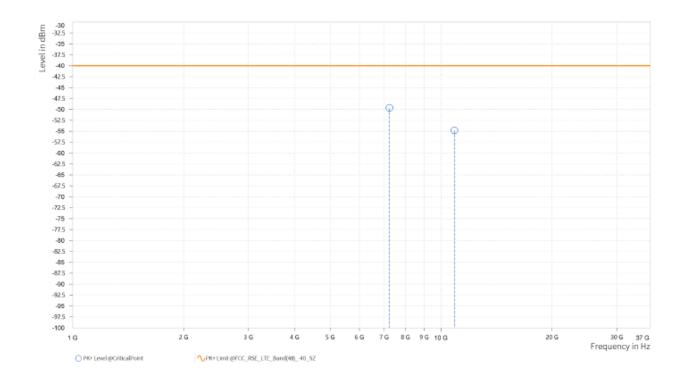
Rg		PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,240.500	-50.31	-40.00	10.31	27.37	Ξ	148.9	2
6	10,861.500	-56.31	-40.00	16.31	16.38	Н	350.1	1





MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz			
TESTED BY	Jace Hu					
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						

Rg	Frequency [MHz]	Level	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth	Antenna Height [m]
5	7,241.182	-49.63	-40.00	9.63	27.34	٧	1	1
6	10,863.182	-54.80	-40.00	14.80	16.50	V	359	2

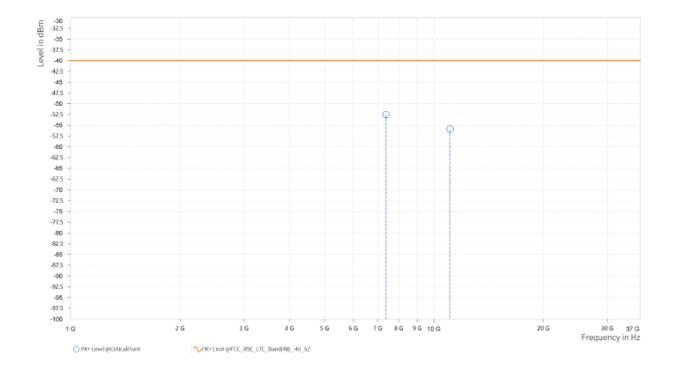




CH646332:

MODE	TX channel 646332	FREQUENCY RANGE	Above 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz			
TESTED BY	Jace Hu					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						

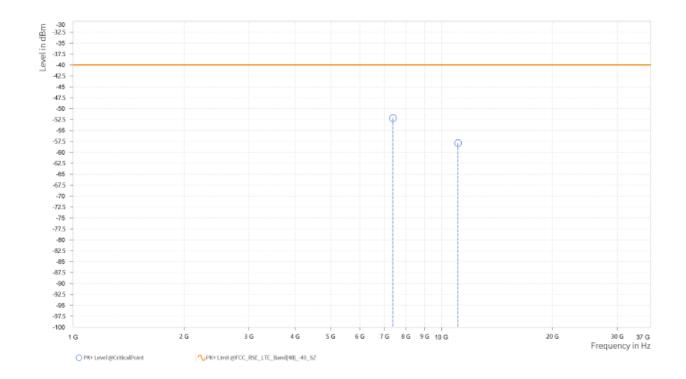
Rg	Frequency [MHz]		PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,380.000	-52.54	-40.00	12.54	26.57	Н	214.7	1
6	11,070.000	-55.90	-40.00	15.90	17.13	Н	91.5	2





MODE	TX channel 646332	FREQUENCY RANGE	Above 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz			
TESTED BY	Jace Hu					
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						

Rg	Frequency [MHz]	PK+ Level [dBm]		PK+ Margin [dB]	Correction [dB]	Polarization	Azımuth	Antenna Height [m]
5	7,380.000	-52.18	-40.00	12.18	26.61	٧	359.1	1
6	11,070.500	-57.88	-40.00	17.88	17.32	V	359.1	1

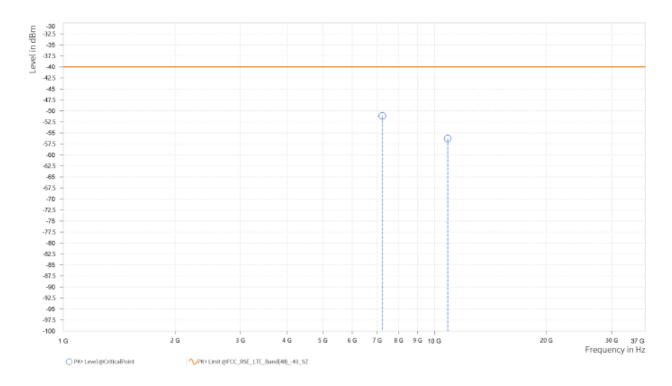




CHANNEL BANDWIDTH: 20MHz/QPSK

MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz			
TESTED BY	Jace Hu					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						

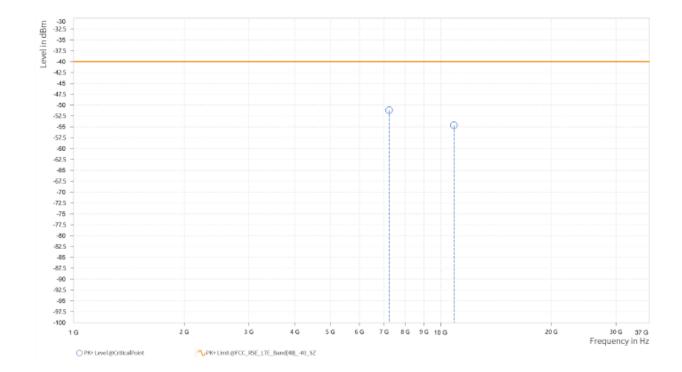
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,233.000	-51.12	-40.00	11.12	27.44	Н	4.2	2
6	10,847.500	-56.30	-40.00	16.30	16.45	Н	358.7	1





MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz		
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	23deg. C, 70%RH			
TESTED BY	Jace Hu				
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M					

Rg	Frequency [MHz]	Level	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azımuth	Antenna Height [m]
5	7,232.424	-51.14	-40.00	11.14	27.41	٧	80.8	2
6	10,848.182	-54.63	-40.00	14.63	16.58	V	5.8	2

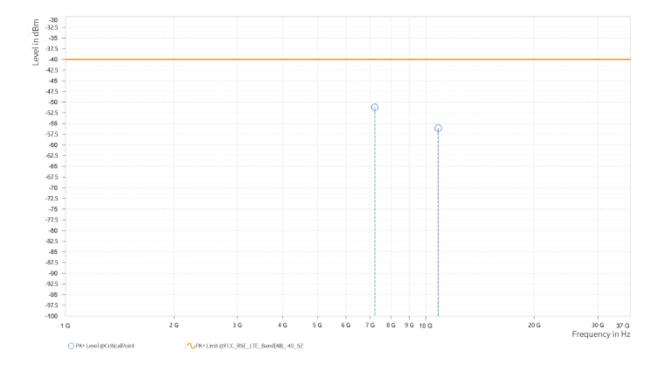




CHANNEL BANDWIDTH: 40MHz / QPSK

MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz		
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz		
TESTED BY	Jace Hu				
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M					

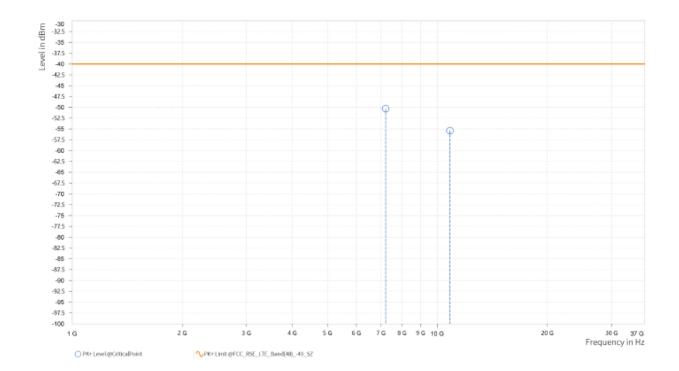
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,215.000	-51.20	-40.00	11.20	27.58	Ξ	1	1
6	10,821.000	-56.09	-40.00	16.09	16.59	Н	285.2	1





MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz				
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz				
TESTED BY	Jace Hu						
ANTEN	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						

Rg	Frequency [MHz]	Level	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azımuth	Antenna Height [m]
5	7,215.939	-50.30	-40.00	10.30	27.54	٧	359	2
6	10,823.182	-55.37	-40.00	15.37	16.72	V	359	2





UL_MIMO:

5G SA

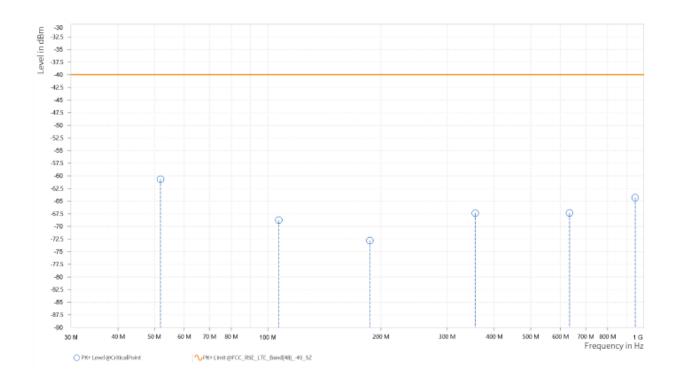
30 MHz - 1GHz data:

N48

CHANNEL BANDWIDTH: 10MHz/QPSK

MODE	TX channel 641666	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTEN	NA POLARITY & TEST DIS	TANCE: HORIZONTAL A	Г 3 М

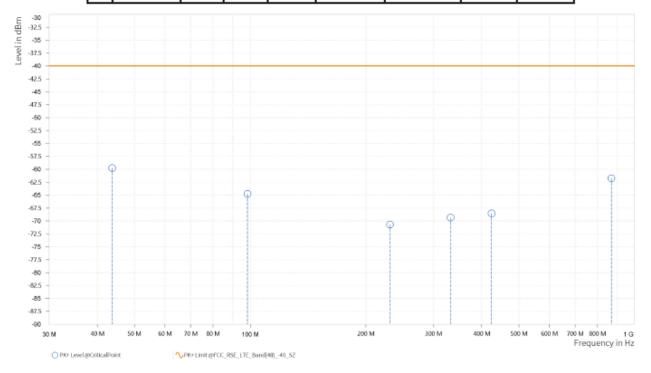
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	51.900	-60.66	-40.00	20.66	4.93	Н	34.2	2
1	107.000	-68.76	-40.00	28.76	-0.27	Н	1	2
1	186.900	-72.80	-40.00	32.80	-1.59	Н	5.2	1
1	356.000	-67.37	-40.00	27.37	6.40	Н	1	2
2	634.067	-67.35	-40.00	27.35	8.73	Н	1	1
2	947.796	-64.31	-40.00	24.31	14.44	Н	108.3	2





MODE	TX channel 641666	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60HZ
TESTED BY	Jace Hu		
ANTE	NNA POLARITY & TEST D	ISTANCE: 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	43.750	-59.77	-40.00	19.77	5.41	٧	354.8	2
1	98.400	-64.76	-40.00	24.76	3.97	٧	178.8	2
1	230.900	-70.69	-40.00	30.69	2.85	٧	1	1
1	331.850	-69.35	-40.00	29.35	5.19	٧	25.8	2
1	424.150	-68.54	-40.00	28.54	7.60	٧	1	1
2	869.650	-61.76	-40.00	21.76	13.28	٧	359	2





ABOVE 1GHz

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

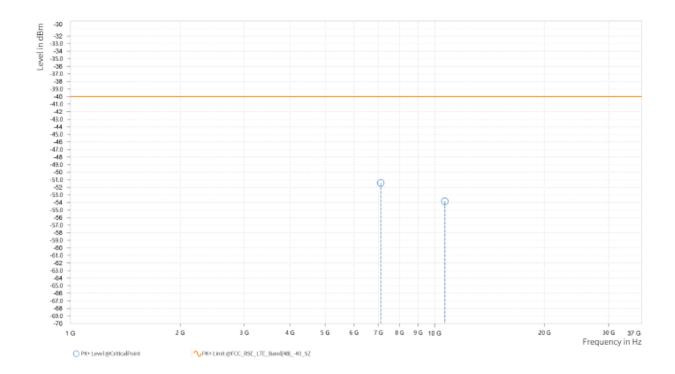
N48

CHANNEL BANDWIDTH: 10MHz/QPSK

CH637000:

MODE	TX channel 637000	FREQUENCY RANGE	Above 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz			
TESTED BY	Jace Hu					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						

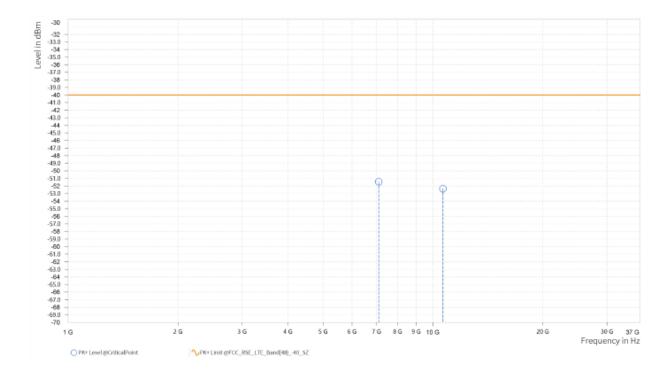
Rg	Frequency [MHz]	Level	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,101.000	-51.43	-40.00	11.43	27.38	Н	337.6	2
6	10,651.500	-53.84	-40.00	13.84	16.94	Н	359.1	2





MODE	TX channel 637000	FREQUENCY RANGE	Above 1000MHz				
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz				
TESTED BY	Jace Hu						
ANTEN	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						

Rg	Frequency [MHz]	PK+ Level [dBm]		PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,101.000	-51.46	-40.00	11.46	27.35	٧	1	1
6	10,651.500	-52.37	-40.00	12.37	17.15	V	349.4	2

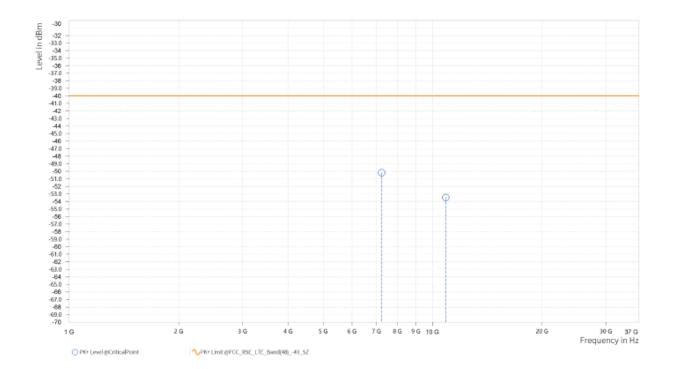




CH641666:

MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz				
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz				
TESTED BY	Jace Hu						
ANTENN	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						

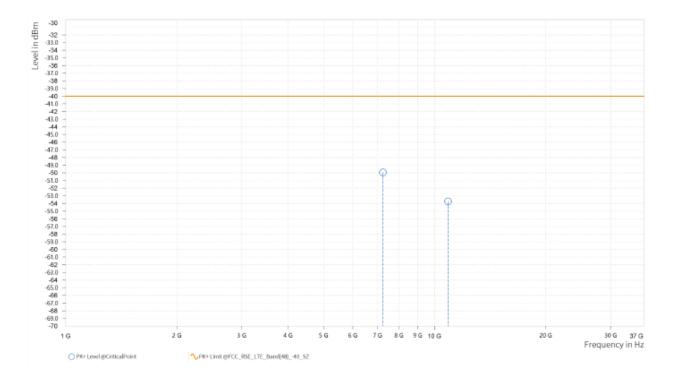
Rg	Frequency [MHz]	PK+ Level [dBm]		PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,241.000	-50.18	-40.00	10.18	27.37	Ξ	359	2
6	10,861.500	-53.49	-40.00	13.49	16.38	Н	359	2





MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz				
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz				
TESTED BY	Jace Hu						
ANTEN	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						

Rg	Frequency [MHz]		PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,241.000	-49.95	-40.00	9.95	27.35	>	336.5	1
6	10,861.500	-53.74	-40.00	13.74	16.51	٧	1	2

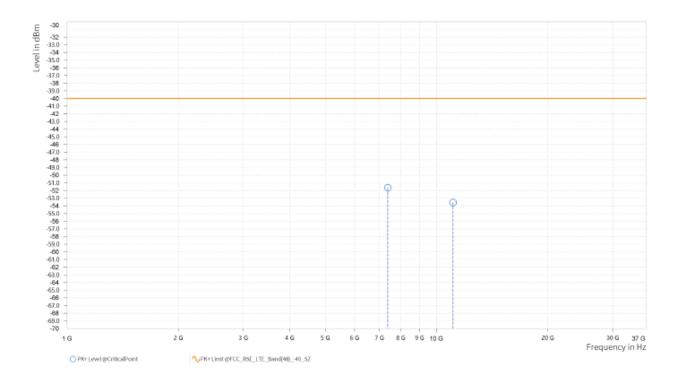




CH646332:

MODE	TX channel 646332	FREQUENCY RANGE	Above 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz			
TESTED BY	Jace Hu					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						

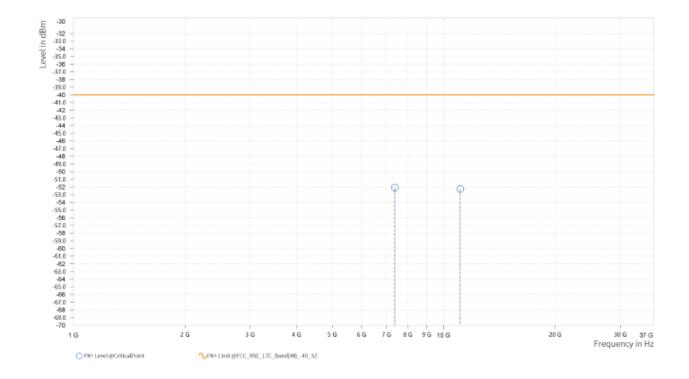
Rg	Frequency [MHz]	PK+ Level [dBm]		PK+ Margin [dB]	Correction [dB]	Polarization	Azımuth	Antenna Height [m]
5	7,381.000	-51.64	-40.00	11.64	26.57	Ξ	359.1	1
6	11,071.500	-53.57	-40.00	13.57	17.14	Η	359.1	2





MODE	TX channel 646332	FREQUENCY RANGE	Above 1000MHz			
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz			
TESTED BY	Jace Hu					
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						

Rg	Frequency [MHz]	PK+ Level [dBm]		PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,381.000	-52.08	-40.00	12.08	26.61	>	1	2
6	11,071.500	-52.27	-40.00	12.27	17.33	٧	1	2

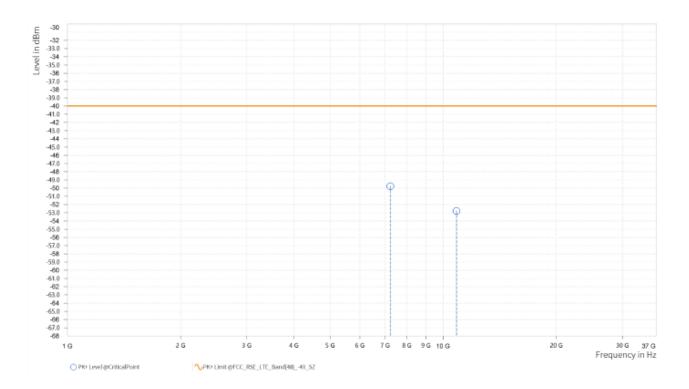




CHANNEL BANDWIDTH: 20MHz / QPSK

MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz				
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz				
TESTED BY	Jace Hu						
ANTENN	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						

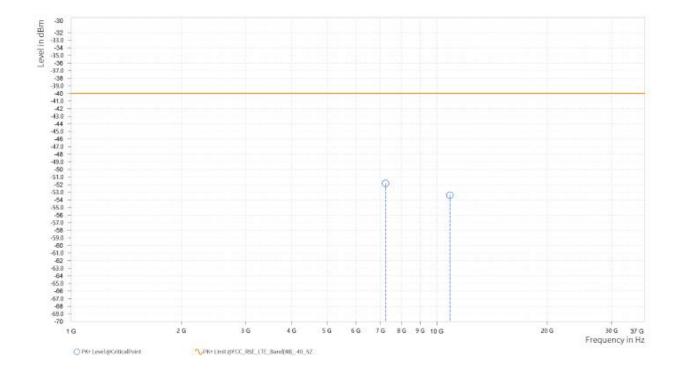
Rg	Frequency [MHz]		PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,232.000	-49.75	-40.00	9.75	27.44	Н	359.1	1
6	10,848.000	-52.77	-40.00	12.77	16.45	Н	359.1	2





MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz					
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz					
TESTED BY	Jace Hu							
ANTEN	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							

Rg	Frequency [MHz]	Level	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,232.000	-51.83	-40.00	11.83	27.42	٧	337.5	2
6	10,848.000	-53.39	-40.00	13.39	16.58	V	359	2

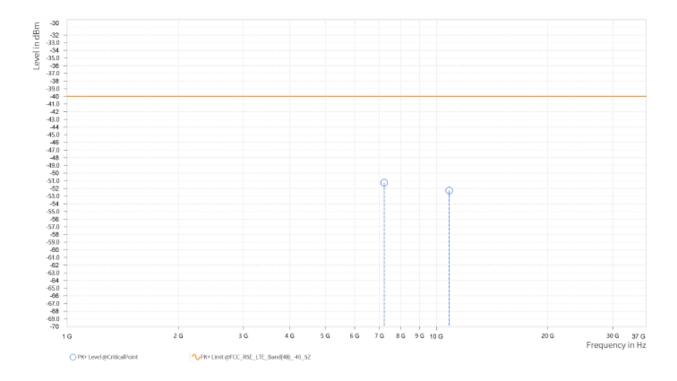




CHANNEL BANDWIDTH: 40MHz / QPSK

MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz
TESTED BY	Jace Hu		
ANTENN	A POLARITY & TEST DIST	ANCE: HORIZONTAL AT	3 M

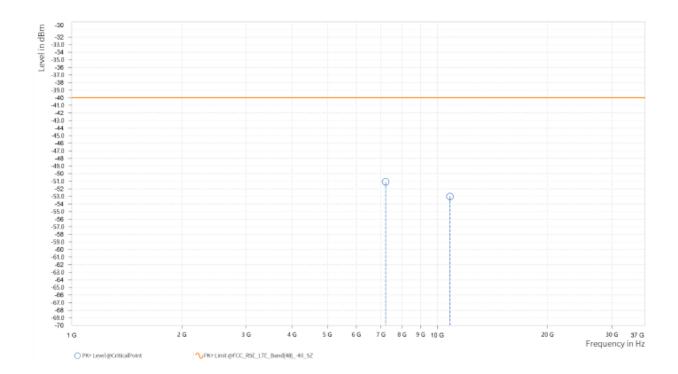
Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,214.000	-51.25	-40.00	11.25	27.59	Ξ	211.2	1
6	10,821.000	-52.28	-40.00	12.28	16.59	Н	266.2	2





MODE	TX channel 641666	FREQUENCY RANGE	Above 1000MHz					
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	AC 120V/60Hz					
TESTED BY	Jace Hu							
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								

Rg	Frequency [MHz]		PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
5	7,214.000	-51.08	-40.00	11.08	27.55	٧	1	2
6	10,821.000	-53.01	-40.00	13.01	16.74	V	359.1	2





4 INFORMATION ON THE TESTING LABORATORIES

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

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

Suzhou EMC/RF Lab:

Tel: +86 (0557) 368 1008



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

No any modifications are made to the EUT by the lab during the test.

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