

FCC Radio Test Report

FCC ID: 2ATDI-CC

Report No. : BTL-FCCP-3-2306G086
Equipment : 4G LTE Router
Model Name : CC, C1500, C1600, CC Pro, CC SE, CC 5G, TT, TT Pro, TT SE, TT 5G, KK, KK Pro, KK SE, KK 5G, CC Disney, PowFi
Brand Name : NRadio
Applicant : NRadio Technologies Co., Ltd.
Address : Room 408,Ziyun Building,No.211,Xin'an 2nd Rd.,Bao'an District,Shenzhen,P.R.C.

Radio Function : Transmit Simultaneously

FCC Rule Part(s) : FCC CFR Title 47, Part 15, Subpart C (15.247)
FCC CFR Title 47, Part 22
FCC CFR Title 47, Part 24
FCC CFR Title 47, Part 27
FCC CFR Title 47, Part 90

Date of Receipt : 2023/6/13
Date of Test : 2023/7/13 ~ 2023/8/10
Issued Date : 2023/8/14

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

Prepared by : 
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Approved by : 
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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REVISION HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-3-2306G086	R00	Original Report.	2023/8/14	Valid

1 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards.

Standard(s) Section	Description	Test Result	Judgement	Remark
15.205 15.209 15.247(d) 2.1053 22.917(a) 24.238(a) 27.53(c)(2) 27.53(f) 27.53(g) 27.53(h) 90.543 (e)(3) 90.543 (f)	Radiated Emissions	APPENDIX A	Pass	-----

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report.
- (2) The report format version is TP.1.1.1.

1.1 REFERENCE TEST GUIDANCE

ANSI C63.10-2013
ANSI C63.26-2015
ANSI/TIA-603-E-2016
FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

1.2 TEST FACILITY

The test locations stated below are under the TAF Accreditation Number 0659.
The test location(s) used to collect the test data in this report are:
No. 72, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
(FCC DN: TW0659)

☒ C06 ☒ CB21 ☐ CB22

1.3 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, providing a level of confidence of approximately **95 %**.
The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{CISPR} requirement.

A. Radiated emissions test :

Test Site	Measurement Frequency Range	U,(dB)
CB21	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
	1 GHz ~ 6 GHz	5.21
	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

NOTE:

Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

1.4 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Test Voltage	Tested by
Radiated emissions	Refer to data	AC 120V	Mark Wang

2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	4G LTE Router		
Model Name	CC, C1500, C1600, CC Pro, CC SE, CC 5G, TT, TT Pro, TT SE, TT 5G, KK, KK Pro, KK SE, KK 5G, CC Disney, PowFi		
Brand Name	NRadio		
Model Difference	The difference between them is that the models are different for different customers and different sales areas, and their circuit schematic, safety structures, key components, etc. are exactly the same, and the differences do not affect the safety and electromagnetic compatibility of the product.		
Power Source	DC voltage supplied from USB port.		
Power Rating	I/P: 5V---2A		
Products Covered	1 * USB Cable		
HW Version (Product)	WT6289		
SW Version (Product)	1.9.2		
Operation Frequency	2412 MHz ~ 2462 MHz		
Operation Frequency	Band	UL Frequency (MHz)	DL Frequency (MHz)
	WCDMA II	1850 ~ 1910	1930 ~ 1990
	WCDMA IV	1710 ~ 1755	2110 ~ 2155
	WCDMA V	824 ~ 849	869 ~ 894
	LTE 2	1850 ~ 1910	1930 ~ 1990
	LTE 4	1710 ~ 1755	2110 ~ 2155
	LTE 5	824 ~ 849	869 ~ 894
	LTE 12	699 ~ 716	729 ~ 746
	LTE 13	777 ~ 787	746 ~ 756
	LTE 14	788 ~ 798	758 ~ 768
	LTE 66	1710 ~ 1780	2110 ~ 2200
	LTE 71	663 ~ 698	617 ~ 652
Test Model	CC		
Sample Status	Engineering Sample		
EUT Modification(s)	N/A		

NOTE:



(1) The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

(2) Channel List:
WLAN 2.4 GHz:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	06	2437	11	2462
02	2417	07	2442		
03	2422	08	2447		
04	2427	09	2452		
05	2432	10	2457		

(3) Table for Filed Antenna:

For WIFI:

Ant.	Brand	Model Name	Type	Connector	Frequency Range (MHz)	Gain (dBi)
1		CC-300	Shrapnel	N/A	2400-2500	3.54
2		CC-300	Shrapnel	N/A	2400-2500	3.54

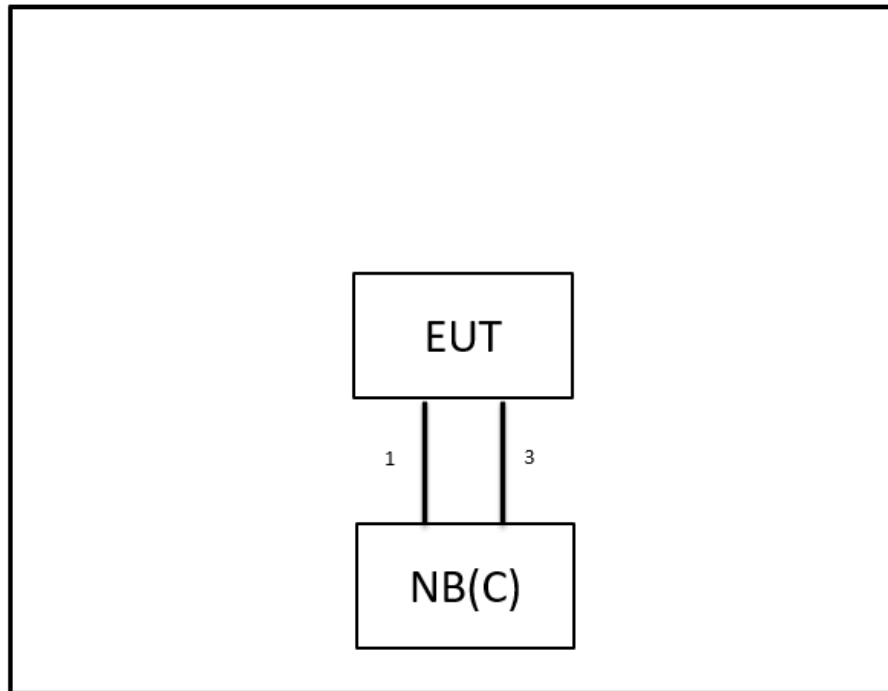
For WWAN:

Antenna	Brand	Model Name	Type	Connector	Gain (dBi)	Note
-	N/A	N/A	N/A	N/A	0.5	WCDMA Band II LTE Band 2
					0.3	WCDMA Band IV LTE Band 4
					-1.2	WCDMA Band V LTE Band 5
					-2.8	LTE Band 12
					-1.7	LTE Band 13
					-2.1	LTE Band 14
					0.7	LTE Band 66
					0.5	LTE Band 71

- (4) The above Antenna information are derived from the antenna data sheet provided by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.2 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Equipment letters and Cable numbers refer to item numbers described in the tables of clause 2.3.



2.3 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
C	NB	HP	TPN-C125	N/A	Furnished by test lab.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
1	No	No	1m	Type C to USB	Supplied by test requester
3	No	No	1m	RJ-45 Cable	Furnished by test lab.

3 RADIATED EMISSIONS TEST

3.1 LIMIT

For WIFI:

In case the emission fall within the restricted band specified on 15.205, then the 15.209 limit in the table below has to be followed.

LIMITS OF RADIATED EMISSIONS MEASUREMENT (9 kHz to 1000 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSIONS MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	Radiated Emissions (dBuV/m)		Measurement Distance (meters)
	Peak	Average	
Above 1000	74	54	3

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBuV/m)
5150-5250	-27	68.3
5250-5350	-27	68.3
5470-5725	-27	68.3
5725-5850	-27 (NOTE 2)	68.3
	10 (NOTE 2)	105.3
	15.6 (NOTE 2)	110.9
	27 (NOTE 2)	122.3

NOTE:

- (1) The limit for radiated test was performed according to FCC Part 15, Subpart C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)

Margin Level = Measurement Value - Limit Value

Calculation example:

Reading Level		Correct Factor		Measurement Value
19.11	+	2.11	=	21.22

Measurement Value		Limit Value		Margin Level
21.22	-	54	=	-32.78

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average

Spectrum Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector
Start ~ Stop Frequency	90KHz~110KHz for QP detector
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

For LTE:

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 equal to -13dBm.

NOTE:

(1) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)

Margin Level = Measurement Value - Limit Value

Calculation example:

Reading Level		Correct Factor		Measurement Value
-50.43	+	-2.11	=	-52.54

Measurement Value		Limit Value		Margin Level
-52.54	-	-13	=	-39.54

3.2 TEST PROCEDURE

For WIFI:

- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- For the actual test configuration, please refer to the related Item – EUT TEST PHOTO.

For LTE:

The testing follows FCC KDB 971168 v03r01 Section 6.2.

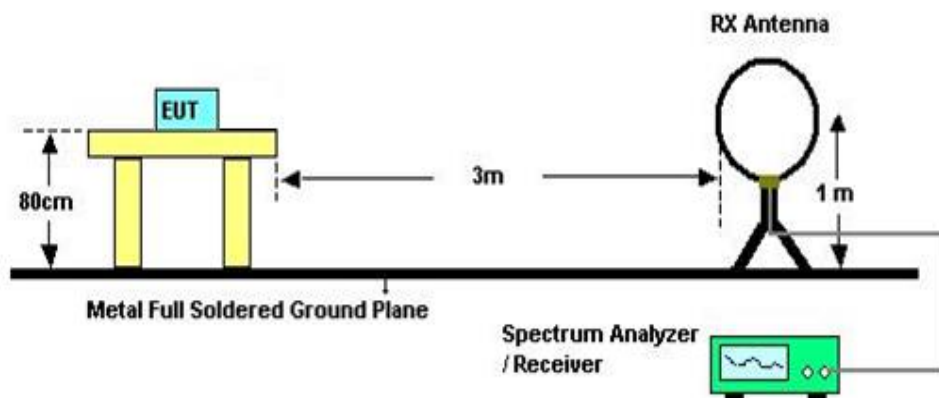
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- 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
- $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- ERP can be calculated form EIRP by subtracting the gain of dipole, $ERP = EIPR - 2.15\text{dBi}.$
- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

3.3 DEVIATION FROM TEST STANDARD

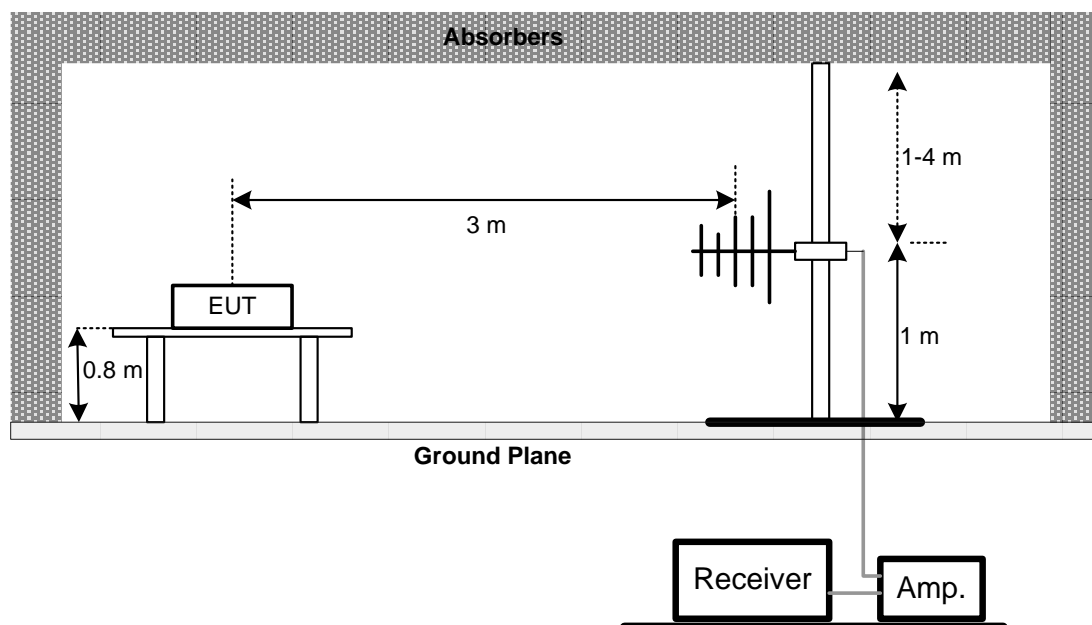
No deviation.

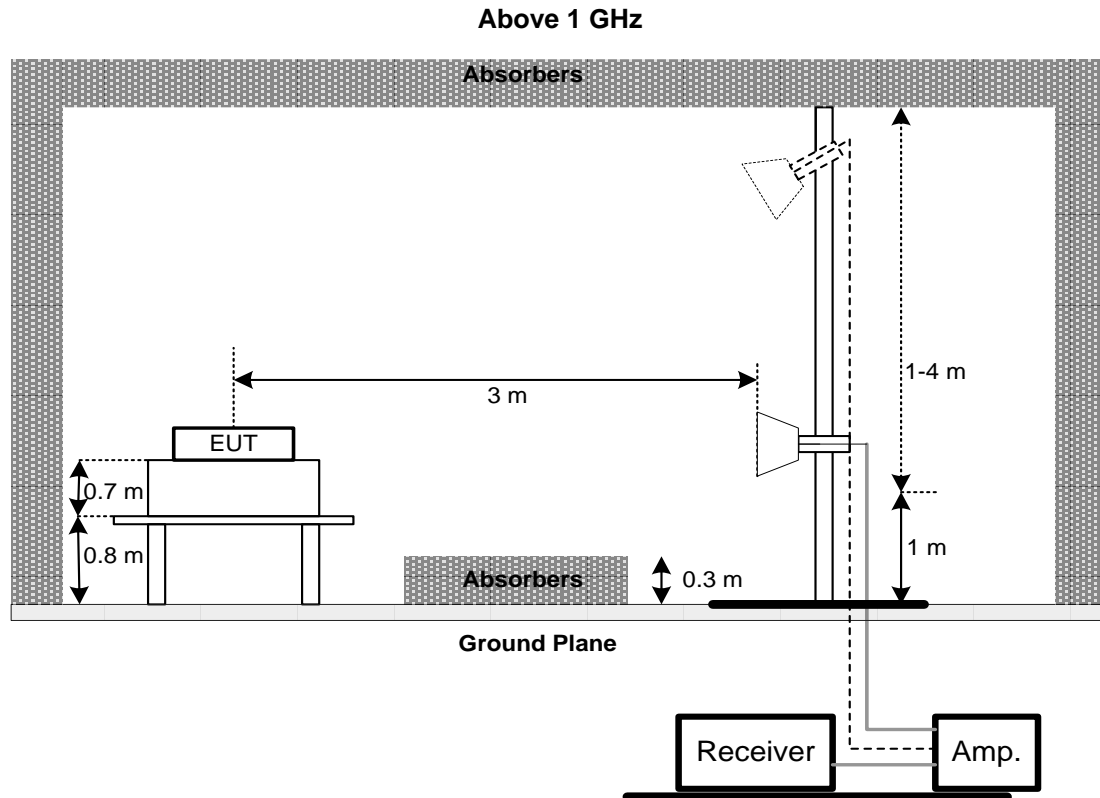
3.4 TEST SETUP

9 kHz to 30 MHz



30 MHz to 1 GHz





3.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

3.6 TEST RESULT

Please refer to the APPENDIX A.

NOTE:

- (1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

4 LIST OF MEASURING EQUIPMENTS

Radiated Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Preamplifier	EMCI	EMC330N	980850	2022/9/19	2023/9/18
2	Preamplifier	EMCI	EMC118A45SE	980819	2023/3/7	2024/3/6
3	Pre-Amplifier	EMCI	EMC184045SE	980907	2022/9/28	2023/9/27
4	Preamplifier	EMCI	EMC001340	980579	2022/9/30	2023/9/29
5	Test Cable	EMCI	EMC104-SM-1000	180809	2023/7/10	2024/7/9
6	Test Cable	EMCI	EMC104-SM-SM-3000	220322	2023/3/14	2024/3/13
7	Test Cable	EMCI	EMC104-SM-SM-7000	220324	2023/3/14	2024/3/13
8	EXA Signal Analyzer	keysight	N9020B	MY57120120	2023/2/24	2024/2/23
9	Loop Ant	Electro-Metrics	EMCI-LPA600	291	2022/9/19	2023/9/18
10	Horn Antenna	RFSPIN	DRH18-E	211202A18EN	2023/5/12	2024/5/11
11	Horn Ant	Schwarzbeck	BBHA 9170D	1136	2023/5/12	2024/5/11
12	Log-bicon Antenna	Schwarzbeck	VULB9168	1369	2023/5/9	2024/5/8
13	6dB Attenuator	EMCI	EMCI-N-6-06	AT-06001	2023/5/9	2024/5/8
14	Test Cable	EMCI	EMC101G-KM-KM-3000	220329	2023/3/14	2024/3/13
15	Test Cable	EMCI	EMC102-KM-KM-1000	220327	2023/3/14	2024/3/13
16	WIRELESS COMMUNICATION TEST SET	Agilent	E5515C	GB47390193	2023/7/4	2024/7/3
17	Radio Communication Test Station	ANRITSU	MT8821C	6262044728	2022/11/25	2023/11/24
18	Measurement Software	EZ	EZ EMC (Version NB-03A1-01)	N/A	N/A	N/A

Remark: "N/A" denotes no model name, no serial no. or no calibration specified.
All calibration period of equipment list is one year.

5 EUT TEST PHOTO

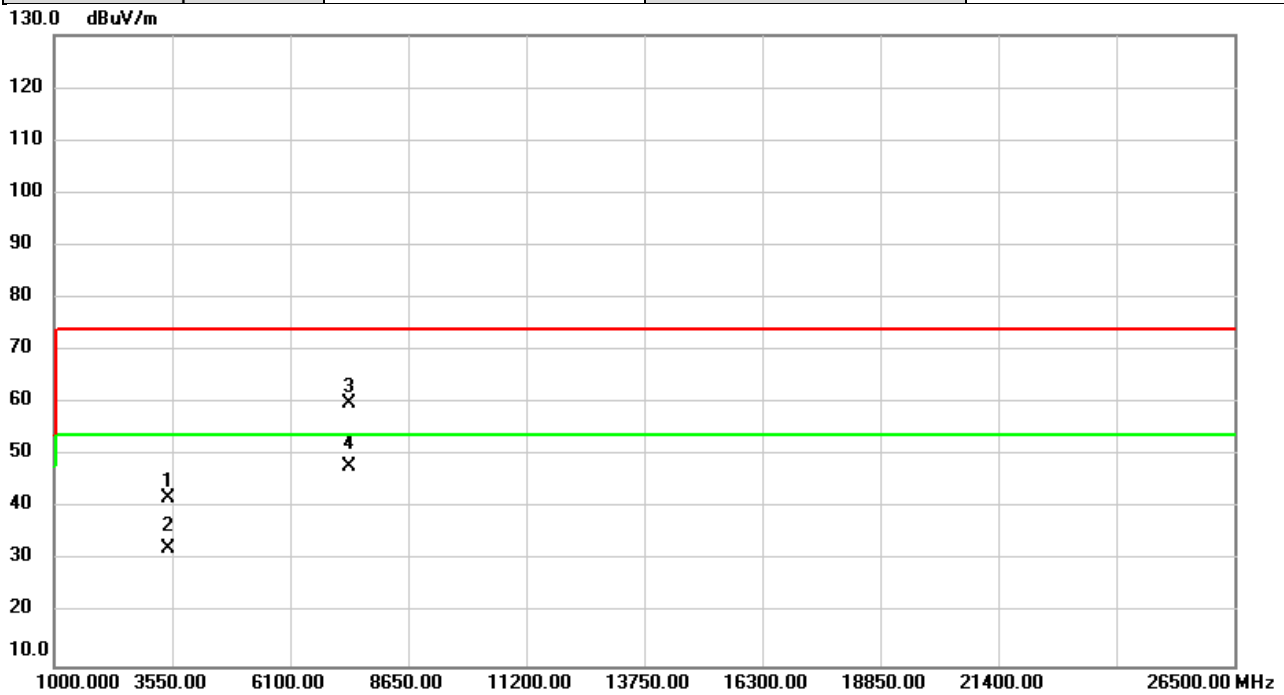
Please refer to document Appendix No.: TP-2306G086-FCCP-1 (APPENDIX-TEST PHOTOS).

6 EUT PHOTOS

Please refer to document Appendix No.: EP-2306G086-1 (APPENDIX-EUT PHOTOS).

APPENDIX A RADIATED EMISSIONS

Test Mode	IEEE 802.11b & WCDMA Band 4	Test Date	2023/8/10
Test Frequency	2462MHz & 1732.6 MHz	Polarization	Vertical
Temp	25°C	Hum.	51%



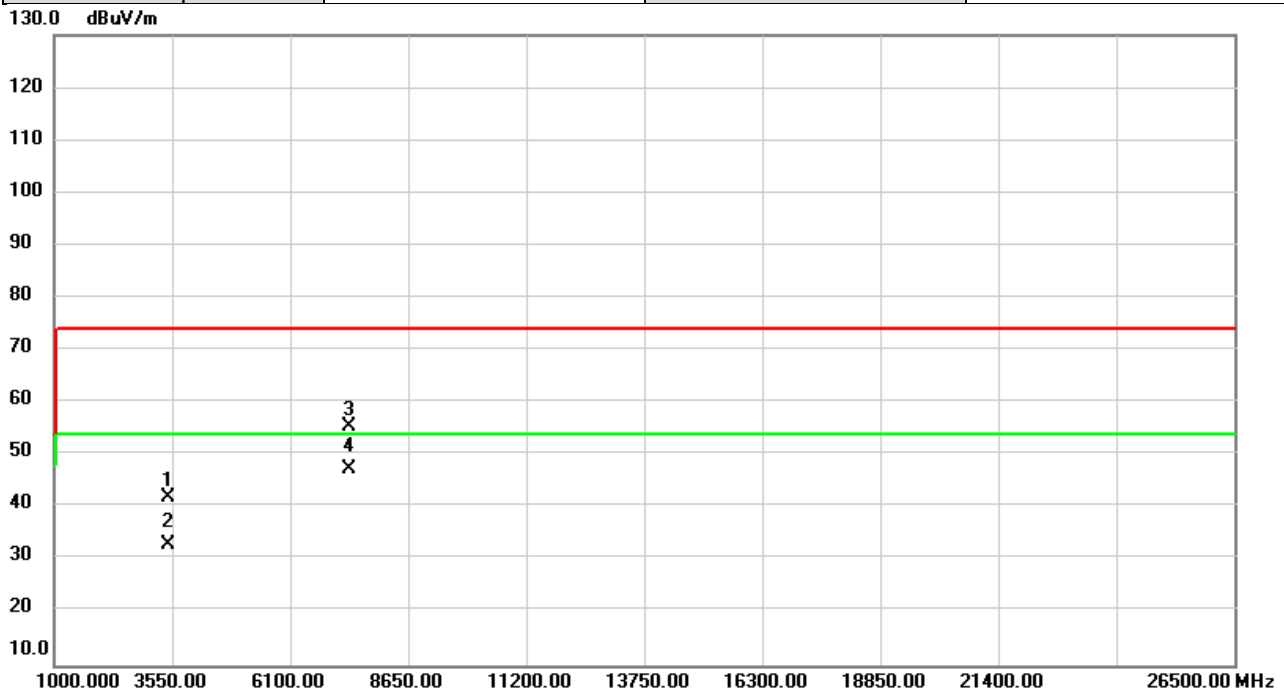
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		3465.000	44.40	-2.54	41.86	74.00	-32.14	peak	
2		3465.000	34.96	-2.54	32.42	54.00	-21.58	AVG	
3		7386.000	53.92	5.90	59.82	74.00	-14.18	peak	
4	*	7386.000	42.18	5.90	48.08	54.00	-5.92	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

Test Mode	IEEE 802.11b & WCDMA Band 4	Test Date	2023/8/10
Test Frequency	2462MHz & 1732.6 MHz	Polarization	Horizontal
Temp	25°C	Hum.	51%

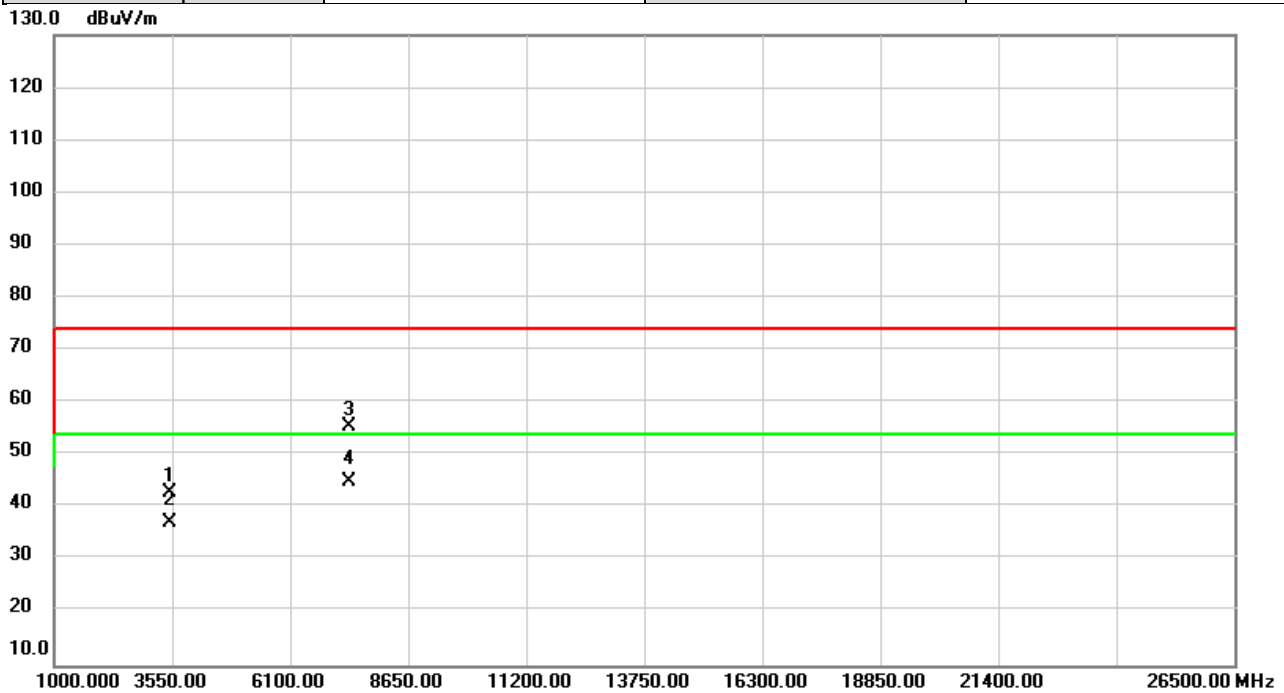


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		3465.000	44.48	-2.54	41.94	74.00	-32.06	peak	
2		3465.000	35.49	-2.54	32.95	54.00	-21.05	AVG	
3		7386.000	49.67	5.90	55.57	74.00	-18.43	peak	
4	*	7386.000	41.31	5.90	47.21	54.00	-6.79	AVG	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	IEEE 802.11b & LTE Band 66	Test Date	2023/8/10
Test Frequency	2462MHz & 1745.0MHz	Polarization	Vertical
Temp	25°C	Hum.	51%

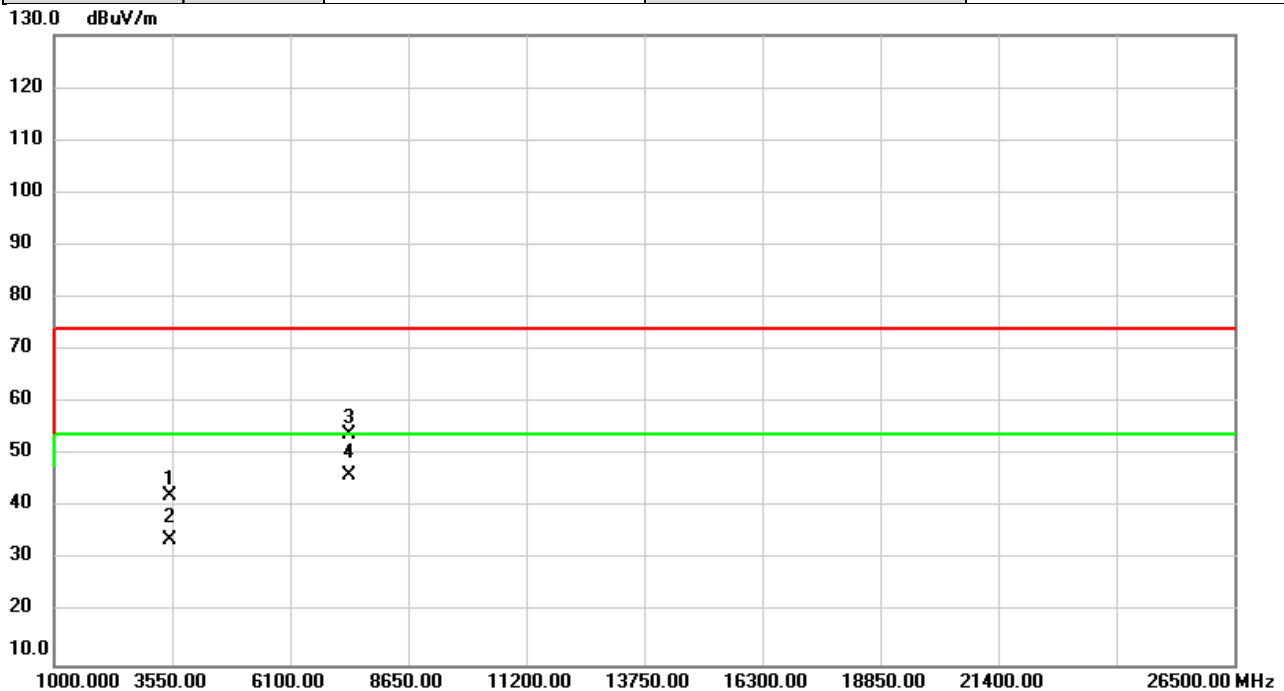


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		3490.000	45.31	-2.48	42.83	74.00	-31.17	peak	
2		3490.000	39.59	-2.48	37.11	54.00	-16.89	AVG	
3		7386.000	49.65	5.90	55.55	74.00	-18.45	peak	
4	*	7386.000	39.12	5.90	45.02	54.00	-8.98	AVG	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	IEEE 802.11b & LTE Band 66	Test Date	2023/8/10
Test Frequency	2462MHz & 1745.0MHz	Polarization	Horizontal
Temp	25°C	Hum.	51%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		3490.000	44.84	-2.48	42.36	74.00	-31.64	peak	
2		3490.000	36.39	-2.48	33.91	54.00	-20.09	AVG	
3		7386.000	47.96	5.90	53.86	74.00	-20.14	peak	
4	*	7386.000	40.38	5.90	46.28	54.00	-7.72	AVG	

REMARKS:

(1) Measurement Value = Reading Level + Correct Factor.

(2) Margin Level = Measurement Value - Limit Value.

End of Test Report