

FCC C2PC Test Report

FCC ID : RF41539C
Equipment : Handheld Terminal
Model No. : DX-A400
Brand Name : KEYENCE
Applicant : KEYENCE CORPORATION
Address : 1-3-14 HIGASHI-NAKAJIMA,
HIGASHI-YODOGAWA-KU, OSAKA, JAPAN
Standard : 47 CFR FCC Part 15.247
Received Date : Jul. 06, 2023
Tested Date : Jul. 15 ~ Jul. 18, 2023

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

Approved by:



Along Chen / Assistant Manager



Gary Chang / Manager

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Release Record

Report No.	Version	Description	Issued Date
FR162103-02AC	Rev. 01	Initial issue	Aug. 10, 2023

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.630MHz 37.25 (Margin -18.75dB) - QP	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 212.36MHz 27.71 (Margin -15.79dB) - PK	Pass

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

This is a Class II Permissive Change report (C2PC).

This report is issued as a supplementary report to original ICC report no. FR162103AC. The difference is changing components of LPDDR & eMMC.

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N _{TX})	Data Rate / MCS
2400-2483.5	b	2412-2462	1-11 [11]	1	1-11 Mbps
2400-2483.5	g	2412-2462	1-11 [11]	1	6-54 Mbps
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	1	MCS 0-7
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	1	MCS 0-7

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.
 Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
 Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

1.1.2 Antenna Details

Ant. No.	Model	Type	Gain (dBi)	Connector
1	Venus 4	PIFA	-0.23	No

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.8Vdc
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1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	Battery	Brand: KEYENCE Model: DX-BQ3 Rating: 3.8Vdc (11.51Wh) 3030mAh

1.1.5 Channel List

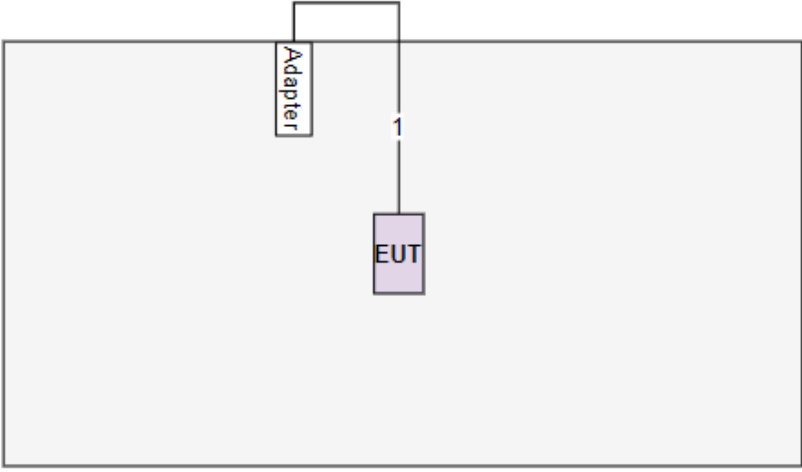
Frequency band (MHz)		2400~2483.5	
802.11 b / g / n HT20		802.11n HT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	3	2422
2	2417	4	2427
3	2422	5	2432
4	2427	6	2437
5	2432	7	2442
6	2437	8	2447
7	2442	9	2452
8	2447	---	---
9	2452	---	---
10	2457	---	---
11	2462	---	---

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Adapter	PHIHONG	PSA10F-050Q	---	Provided by applicant. Input: 100-240V~ 50/60Hz, 0.35A Output: 5.0V=2.0A, 10.0W

Note: Adapter is used for charging only.

1.3 Test Setup Chart

Test Setup Diagram	
	
No.	Signal cable / Length (m)
1	USB, 1m shielded. (Provided by applicant.)

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Jul. 18, 2023				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101658	Feb. 17, 2023	Feb. 16, 2024
LISN	R&S	ENV216	101579	May 09, 2023	May 08, 2024
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127667	Jan .03, 2023	Jan .02, 2024
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 17, 2022	Oct. 16, 2023
50 ohm terminal (Support Unit)	NA	50	01	Jun. 14, 2023	Jun. 13, 2024
Measurement Software	AUDIX	e3	6.120210k	NA	NA

Note: Calibration Interval of instruments listed above is one year.

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Jul. 15, 2023				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Mar. 03, 2023	Mar. 02, 2024
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 01, 2022	Oct. 31, 2023
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 03, 2022	Aug. 02, 2023
Preamplifier	EMC	EMC02325	980225	Jun. 28, 2023	Jun. 27, 2024
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 04, 2022	Oct. 03, 2023
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 04, 2022	Oct. 03, 2023
LF cable 11M	EMC	EMCCFD400-NW-N W-11000	200801	Oct. 04, 2022	Oct. 03, 2023
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 04, 2022	Oct. 03, 2023
Measurement Software	AUDIX	e3	6.120210g	NA	NA

Note: Calibration Interval of instruments listed above is one year.

1.5 Test Standards

47 CFR FCC Part 15.247

ANSI C63.10-2013

1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

1.7 Deviation from Test Standard and Measurement Procedure

None

1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$)).

Measurement Uncertainty	
Parameters	Uncertainty
AC conducted emission	± 2.92 dB
Radiated emission ≤ 1 GHz	± 3.41 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, 03CH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	11g	2437	6 Mbps	---
Radiated Emissions ≤1GHz	11g	2437	6 Mbps	---

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **X-plane** results were found as the worst case and were shown in this report.

3 Transmitter Test Results

3.1 Conducted Emissions

3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

3.1.2 Test Procedures

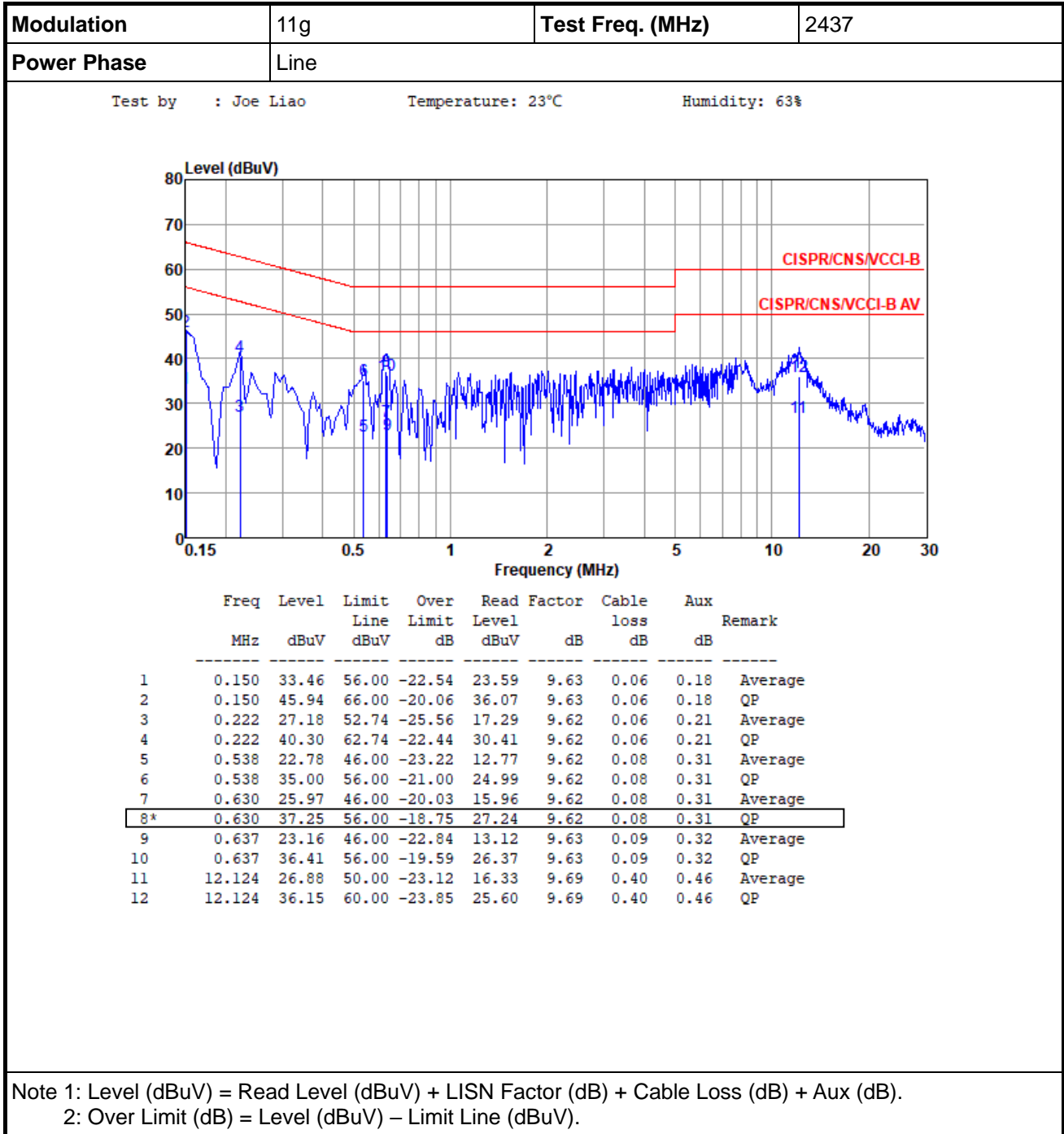
1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

3.1.3 Test Setup



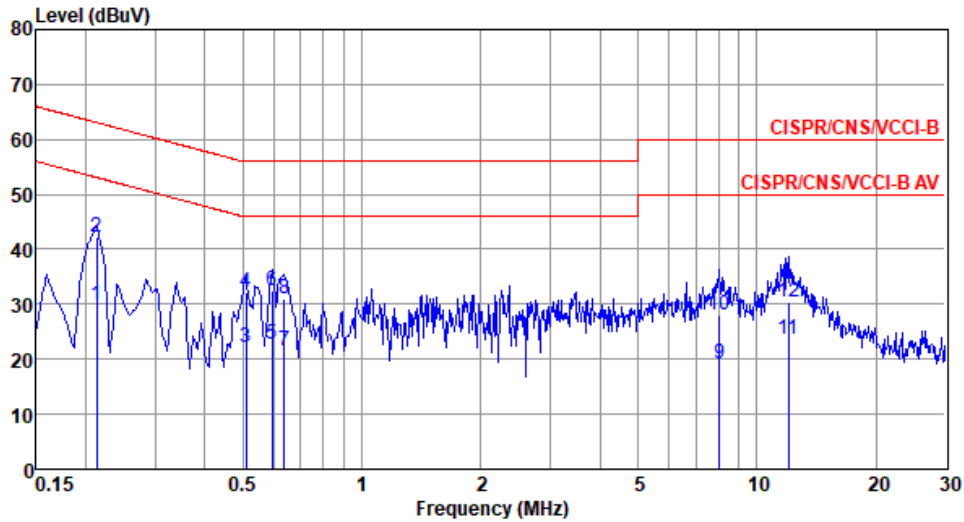
- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions



Modulation	11g	Test Freq. (MHz)	2437
Power Phase	Neutral		

Test by : Joe Liao Temperature: 23°C Humidity: 63%



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.213	29.94	53.10	-23.16	20.05	9.63	0.06	0.20	Average
2*	0.213	42.09	63.10	-21.01	32.20	9.63	0.06	0.20	QP
3	0.510	22.07	46.00	-23.93	12.07	9.62	0.07	0.31	Average
4	0.510	32.19	56.00	-23.81	22.19	9.62	0.07	0.31	QP
5	0.592	22.80	46.00	-23.20	12.79	9.62	0.08	0.31	Average
6	0.592	32.43	56.00	-23.57	22.42	9.62	0.08	0.31	QP
7	0.637	21.42	46.00	-24.58	11.38	9.63	0.09	0.32	Average
8	0.637	31.03	56.00	-24.97	20.99	9.63	0.09	0.32	QP
9	8.020	19.25	50.00	-30.75	8.79	9.70	0.32	0.44	Average
10	8.020	28.18	60.00	-31.82	17.72	9.70	0.32	0.44	QP
11	11.996	23.66	50.00	-26.34	13.07	9.73	0.40	0.46	Average
12	11.996	30.34	60.00	-29.66	19.75	9.73	0.40	0.46	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).
 Note 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

3.2 Unwanted Emissions into Restricted Frequency Bands

3.2.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Quasi-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

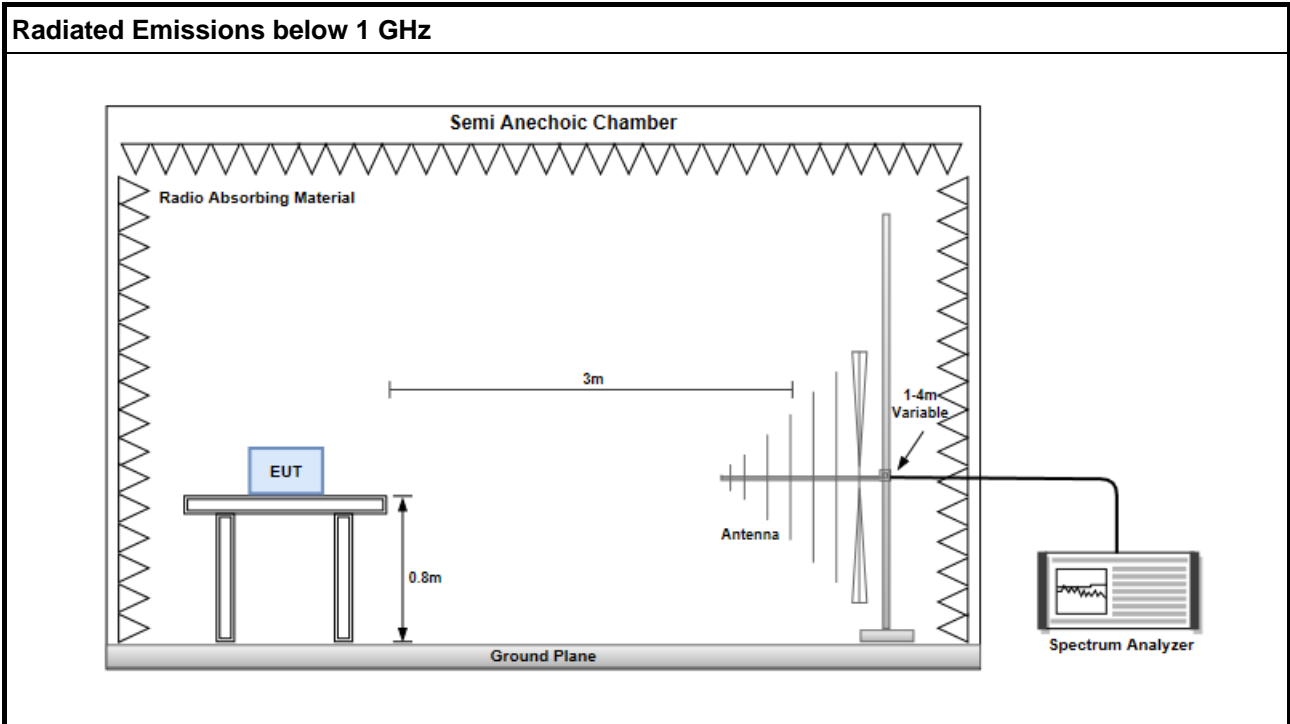
3.2.2 Test Procedures

1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

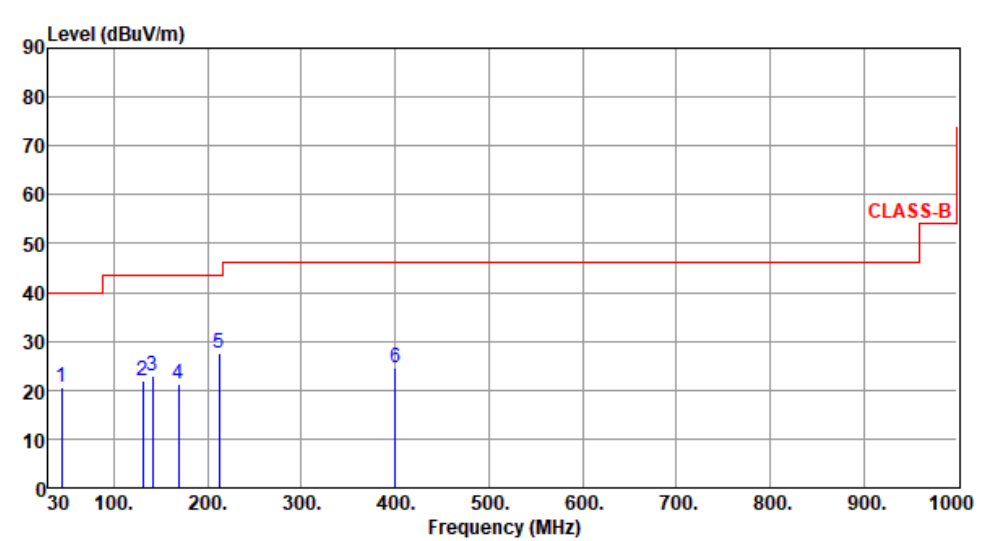
Note:

1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.

3.2.3 Test Setup

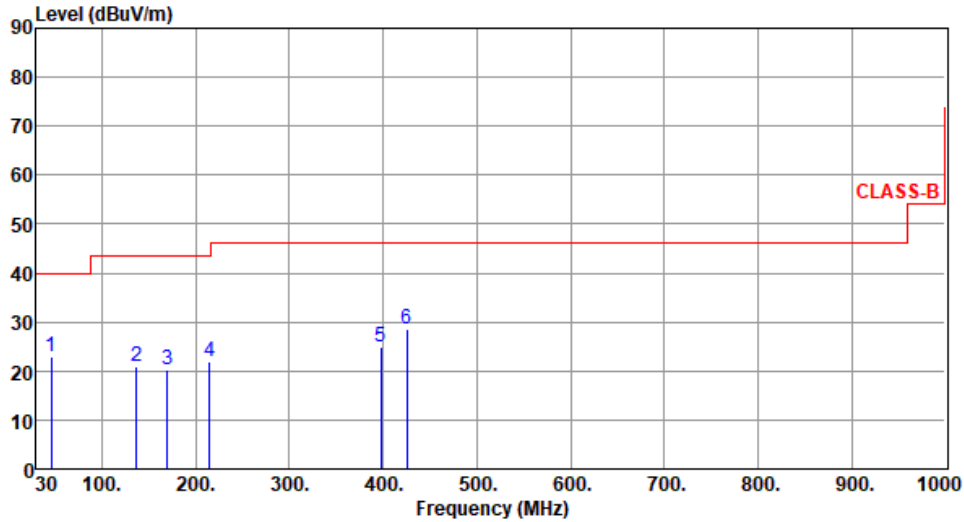


3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	11g	Test Freq. (MHz)	2437																																																																							
Polarization	Horizontal																																																																									
Test By : Sean Yu Temperature(°C): 26 Humidity(%): 61																																																																										
 <p>The graph plots Level (dBuV/m) on the y-axis (0 to 90) against Frequency (MHz) on the x-axis (30 to 1000). A red line represents the CLASS-B limit, which is constant at 40 dBuV/m until 100 MHz, then steps up to 45 dBuV/m at 200 MHz, and finally to 55 dBuV/m at 900 MHz. Six blue vertical lines indicate emission peaks at 44.55 MHz (1), 130.88 MHz (2), 141.55 MHz (3), 168.71 MHz (4), 212.36 MHz (5), and 400.54 MHz (6). Peak 5 is the highest, exceeding the 45 dBuV/m limit.</p>																																																																										
	<table border="1"> <thead> <tr> <th>Peak No.</th> <th>Freq. MHz</th> <th>Emission level dBuV/m</th> <th>Limit dBuV/m</th> <th>Margin dB</th> <th>SA reading dBuV</th> <th>Factor dB/m</th> <th>Remark</th> <th>ANT High cm</th> <th>Turn Table deg</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>44.55</td> <td>20.55</td> <td>40.00</td> <td>-19.45</td> <td>28.93</td> <td>-8.38</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>2</td> <td>130.88</td> <td>21.86</td> <td>43.50</td> <td>-21.64</td> <td>31.96</td> <td>-10.10</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>3</td> <td>141.55</td> <td>22.96</td> <td>43.50</td> <td>-20.54</td> <td>32.15</td> <td>-9.19</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>4</td> <td>168.71</td> <td>21.10</td> <td>43.50</td> <td>-22.40</td> <td>30.37</td> <td>-9.27</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>5</td> <td>212.36</td> <td>27.71</td> <td>43.50</td> <td>-15.79</td> <td>39.60</td> <td>-11.89</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>6</td> <td>400.54</td> <td>24.42</td> <td>46.00</td> <td>-21.58</td> <td>30.03</td> <td>-5.61</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> </tbody> </table>	Peak No.	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg	1	44.55	20.55	40.00	-19.45	28.93	-8.38	Peak	---	---	2	130.88	21.86	43.50	-21.64	31.96	-10.10	Peak	---	---	3	141.55	22.96	43.50	-20.54	32.15	-9.19	Peak	---	---	4	168.71	21.10	43.50	-22.40	30.37	-9.27	Peak	---	---	5	212.36	27.71	43.50	-15.79	39.60	-11.89	Peak	---	---	6	400.54	24.42	46.00	-21.58	30.03	-5.61	Peak	---	---			
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2	130.88	21.86	43.50	-21.64	31.96	-10.10	Peak	---	---																																																																	
3	141.55	22.96	43.50	-20.54	32.15	-9.19	Peak	---	---																																																																	
4	168.71	21.10	43.50	-22.40	30.37	-9.27	Peak	---	---																																																																	
5	212.36	27.71	43.50	-15.79	39.60	-11.89	Peak	---	---																																																																	
6	400.54	24.42	46.00	-21.58	30.03	-5.61	Peak	---	---																																																																	
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m). Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.																																																																										

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		

Test By :Sean Yu Temperature(°C):26 Humidity(%) :61



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	45.52	22.90	40.00	-17.10	31.05	-8.15	Peak	---	---
2	136.70	20.80	43.50	-22.70	30.54	-9.74	Peak	---	---
3	169.68	20.36	43.50	-23.14	29.76	-9.40	Peak	---	---
4	215.27	22.04	43.50	-21.46	33.92	-11.88	Peak	---	---
5	397.63	24.90	46.00	-21.10	30.53	-5.63	Peak	---	---
6	425.76	28.47	46.00	-17.53	33.31	-4.84	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)

*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou
District, New Taipei City, Taiwan
(R.O.C.)

Kwei Shan

Tel: 886-3-271-8666

No.3-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)
No.2-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666

Fax: 886-3-318-0345

Email: ICC_Service@icertifi.com.tw

==END==