

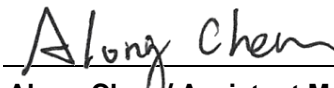
FCC C2PC Test Report

FCC ID : SQG-LWBPLUS
Equipment : 802.11n 2.4GHz + BT5.2 M.2 Module
Model No. : Sterling LWB+
Brand Name : Laird Connectivity
Applicant : Laird Connectivity LLC
Address : W66N220 Commerce Court, Cedarburg, WI
53012 United States Of America
Standard : 47 CFR FCC Part 15.247
Received Date : Nov. 02, 2022
Tested Date : Nov. 16 ~ Nov. 21, 2022

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

Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Local Support Equipment List	8
1.3	Test Setup Chart	8
1.4	The Equipment List	9
1.5	Test Standards	10
1.6	Reference Guidance	10
1.7	Deviation from Test Standard and Measurement Procedure.....	10
1.8	Measurement Uncertainty	10
2	TEST CONFIGURATION.....	11
2.1	Testing Facility	11
2.2	The Worst Test Modes and Channel Details	11
3	TRANSMITTER TEST RESULTS	12
3.1	Conducted Output Power	12
3.2	Unwanted Emissions into Restricted Frequency Bands	13
3.3	AC Power Line Conducted Emissions	15
4	TEST LABORATORY INFORMATION	16
Appendix A. Conducted Output Power		
Appendix B. Unwanted Emissions into Restricted Frequency Bands		
Appendix C. AC Power Line Conducted Emissions		

Release Record

Report No.	Version	Description	Issued Date
FR1O0407-02AC	Rev. 01	Initial issue	Dec. 06, 2022

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emission	[dBuV]: 0.343MHz 33.43 (Margin -15.70dB) - AV	Pass
15.247(d) 15.209	Unwanted Emissions	[dBuV/m at 3m]: 7311.00MHz 50.78 (Margin -3.22dB) - AV	Pass
15.247(b)(3)	Conducted Output Power	Max Power [dBm]: 26.12	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 report no. FR1O0407AC. The differences compared to the original design is listed as follows:

- The LWB+ SIP module (Part Number 453-00083) is mounted onto the M.2 Card for new variant (Part Number 453-00141).
- Removing Chip antenna.

1.1.1 Product Details

Brand name	Model Name	Product Name	Part Number	Description
Laird Connectivity	Sterling LWB+	802.11n 2.4GHz + BT5.2 M.2 Module	453-00141	M.2 Module

1.1.2 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

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.

1.1.3 Antenna Details

Ant. No.	Manufacturer	Laird Part Number	Model	Type	Connector	Gain (dBi)
1	Laird	001-0001	2.4GHz Dipole Antenna	Dipole	RP-SMA	2
2	Laird	001-0022	FlexPIFA	PIFA	IPEX MHF4L	2
3	Laird	001-0023	FlexnNotch	PCB Dipole	IPEX MHF4L	2
4	Laird	EFA2400A3S-10MH4	mFlexPIFA	PIFA	IPEX MHF4L	2
5	Laird	001-0012	Waterproof Dipole Antenna	Dipole	RP-SMA	2
6	Laird	TRAB24003P	Phantom 800MHz - 5.8GHz	Monopole	N-female	3

Note: Antenna 6 with highest gain was chosen for final test.

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3 Vdc from host
--------------------------	-------------------

1.1.5 Accessories

N/A

1.1.6 Channel List

Channel	Frequency(MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

1.1.7 Test Tool and Duty Cycle

Test Tool	Tera Term, Version: V4.74		
Duty Cycle and Duty Factor	Mode	Duty Cycle (%)	Duty Factor (dB)
	11b	95.19%	0.21
	11g	71.29%	1.47
	HT20	70.42%	1.52

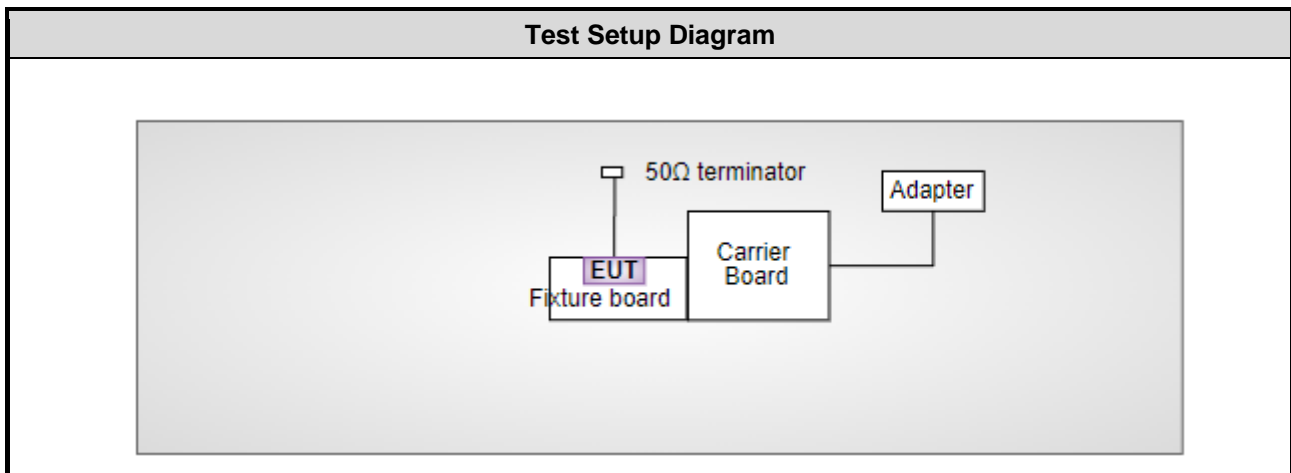
1.1.8 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
11b	2412	18
11b	2437	19
11b	2462	19
11g	2412	14
11g	2437	21
11g	2462	14
HT20	2412	13
HT20	2437	21
HT20	2462	13

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude 3400	DoC	---
2	Fixture board	---	---	---	Provided by applicant.
3	Carrier Board	Laird Connectivity	SU60-SOMC	---	Provided by applicant.
4	Adapter	I.T.E	MU24AY12020 0-A1	---	Provided by applicant.

1.3 Test Setup Chart



Note: The support notebook and USB cable were disconnected from EUT and removed from test table when EUT is set to transmit continuously.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Nov. 21, 2022				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101658	Feb. 16, 2022	Feb. 15, 2023
LISN	R&S	ENV216	101579	Apr. 21, 2022	Apr. 20, 2023
LISN (Support Unit)	SCHWARZBECK	NSLK 8127	8127667	Jan .07, 2022	Jan .06, 2023
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 17, 2022	Oct. 16, 2023
50 ohm terminal (Support Unit)	NA	50	04	May 10, 2022	May 09, 2023
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 chamber3 / (03CH03-WS)				
Tested Date	Nov. 17, 2022				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Mar. 15, 2022	Mar. 14, 2023
Spectrum Analyzer	R&S	FSV40	101499	Mar. 08, 2022	Mar. 07, 2023
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 01, 2022	Oct. 31, 2023
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Jun. 28, 2022	Jun. 27, 2023
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 20, 2021	Dec. 19, 2022
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170508	Jan. 11, 2022	Jan. 10, 2023
Preamplifier	EMC	EMC02325	980187	Jul. 16, 2022	Jul. 15, 2023
Preamplifier	EMC	EMC184045SE	980897	Aug. 01, 2022	Jul. 31, 2023
Preamplifier	EMC	EMC184045SE	980903	Jul. 16, 2022	Jul. 15, 2023
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 04, 2022	Oct. 03, 2023
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Sep. 23, 2022	Sep. 22, 2023
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Sep. 23, 2022	Sep. 22, 2023
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Sep. 23, 2022	Sep. 22, 2023
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Sep. 23, 2022	Sep. 22, 2023
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Sep. 23, 2022	Sep. 22, 2023
Measurement Software	AUDIX	e3	6.120210g	NA	NA

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

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Nov. 16, 2022				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101910	Apr. 18, 2022	Apr. 17, 2023
Power Meter	Anritsu	ML2495A	1241001	Jan. 14, 2022	Jan. 13, 2023
Power Sensor	Anritsu	MA2411B	1911228	Jan. 14, 2022	Jan. 13, 2023
Measurement Software	Sporton	SENSE-15247_DTS	V5.10.8.7.3	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
Conducted power	± 0.808 dB
AC conducted emission	± 2.92 dB
Unwanted Emission ≤ 1 GHz	± 3.96 dB
Unwanted Emission > 1 GHz	± 4.51 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, TH01-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.)
Test Site	03CH03-WS
Address of Test Site	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 333, Taiwan (R.O.C.)

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISED#: 10807C
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

- The tests reported herein were performed according to the original worst case conditions in original report no. FR1O0407AC.

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
AC Power Line Conducted Emission	11g	2437	6 Mbps	---
Unwanted Emissions ≤ 1GHz	11g	2437	6 Mbps	---
Unwanted Emissions >1GHz	11b	2412 / 2437 / 2462	1 Mbps	---
Conducted Output Power	11g	2412 / 2437 / 2462	6 Mbps	
	HT20	2412 / 2437 / 2462	MCS 0	
NOTE:				
1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The Z-plane results were found as the worst case and were shown in this report.				

3 Transmitter Test Results

3.1 Conducted Output Power

3.1.1 Limit of Conducted Output Power

Conducted power shall not exceed 1Watt.

Antenna gain \leq 6dBi, no any corresponding reduction is in output power limit.

Antenna gain $>$ 6dBi

Non Fixed, point to point operations.

The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB

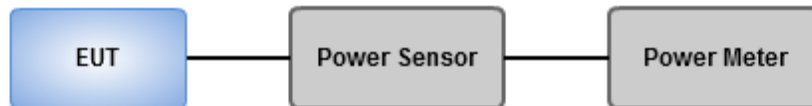
Fixed, point to point operations

Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

3.1.2 Test Procedures

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

3.1.3 Test Setup



3.1.4 Test Results

Ambient Condition	24°C / 66%	Tested By	Roger Lu
--------------------------	------------	------------------	----------

Refer to Appendix A.

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:
 Qusai-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

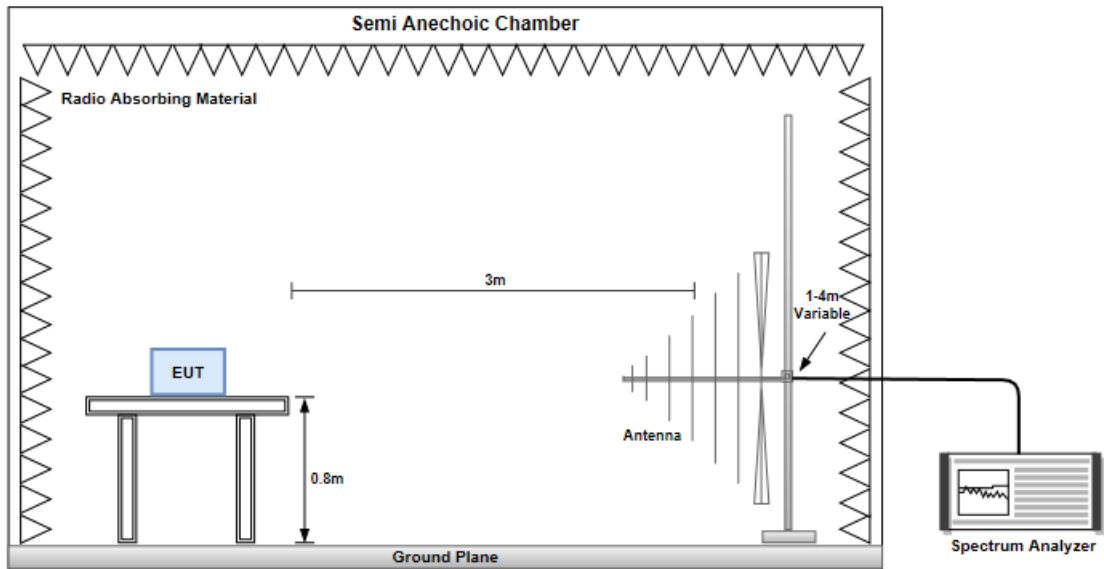
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission 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. For emission measurements above 1 GHz, the table height is 1.5 m
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:

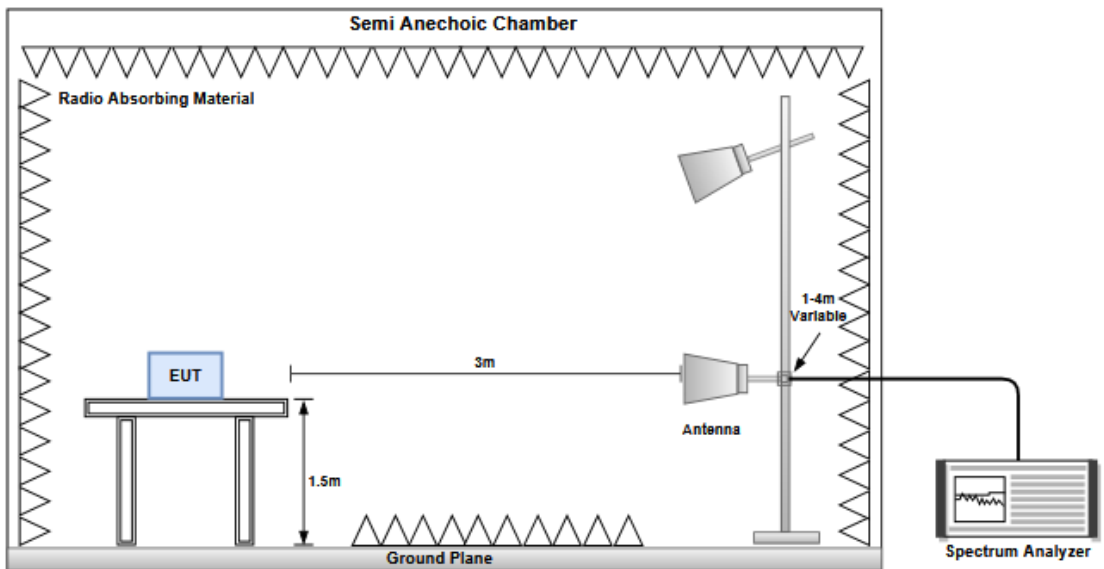
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.2.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.2.4 Test Results

Refer to Appendix B.

3.3 AC Power Line Conducted Emissions

3.3.1 Limit of AC Power Line Conducted Emissions

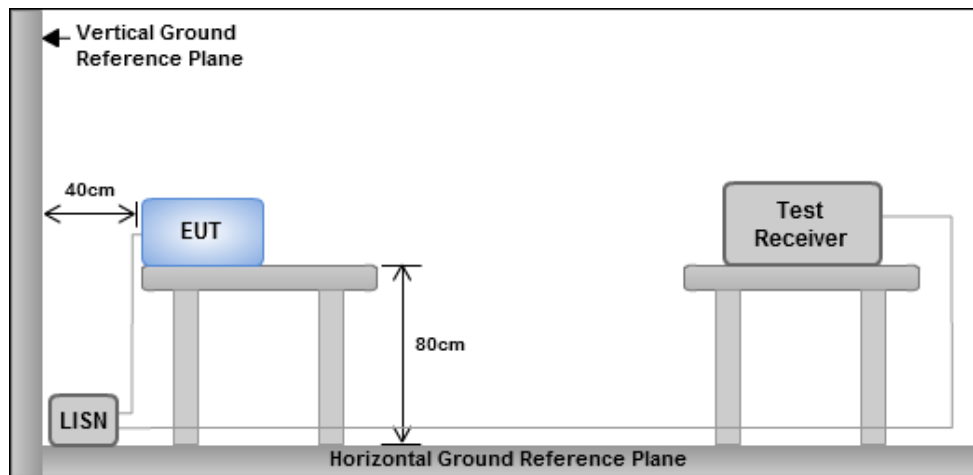
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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

3.3.2 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.

3.3.3 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

3.3.4 Test Results

Refer to Appendix C.

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 333, 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==



Conducted Output Power(Peak)

Appendix A.1

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_1TX	20.29	0.10691
802.11g_Nss1,(6Mbps)_1TX	26.12	0.40926
802.11n HT20_Nss1,(MCS0)_1TX	25.97	0.39537

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	3.00	19.26	19.26	30.00	22.26	36.00
2437MHz	Pass	3.00	20.29	20.29	30.00	23.29	36.00
2462MHz	Pass	3.00	20.19	20.19	30.00	23.19	36.00
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	3.00	22.96	22.96	30.00	25.96	36.00
2437MHz	Pass	3.00	26.12	26.12	30.00	29.12	36.00
2462MHz	Pass	3.00	22.81	22.81	30.00	25.81	36.00
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	3.00	21.95	21.95	30.00	24.95	36.00
2437MHz	Pass	3.00	25.97	25.97	30.00	28.97	36.00
2462MHz	Pass	3.00	21.75	21.75	30.00	24.75	36.00

DG = Directional Gain; Port X = Port X output power



Conducted Output Power(Average)

Appendix A.2

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_1TX	17.98	0.06281
802.11g_Nss1,(6Mbps)_1TX	20.14	0.10328
802.11n HT20_Nss1,(MCS0)_1TX	20.10	0.10233

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	3.00	16.94	16.94	-	19.94	-
2437MHz	Pass	3.00	17.98	17.98	-	20.98	-
2462MHz	Pass	3.00	17.86	17.86	-	20.86	-
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	3.00	13.62	13.62	-	16.62	-
2437MHz	Pass	3.00	20.14	20.14	-	23.14	-
2462MHz	Pass	3.00	13.65	13.65	-	16.65	-
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	3.00	12.65	12.65	-	15.65	-
2437MHz	Pass	3.00	20.1	20.10	-	23.10	-
2462MHz	Pass	3.00	12.48	12.48	-	15.48	-

DG = Directional Gain; Port X = Port X output power

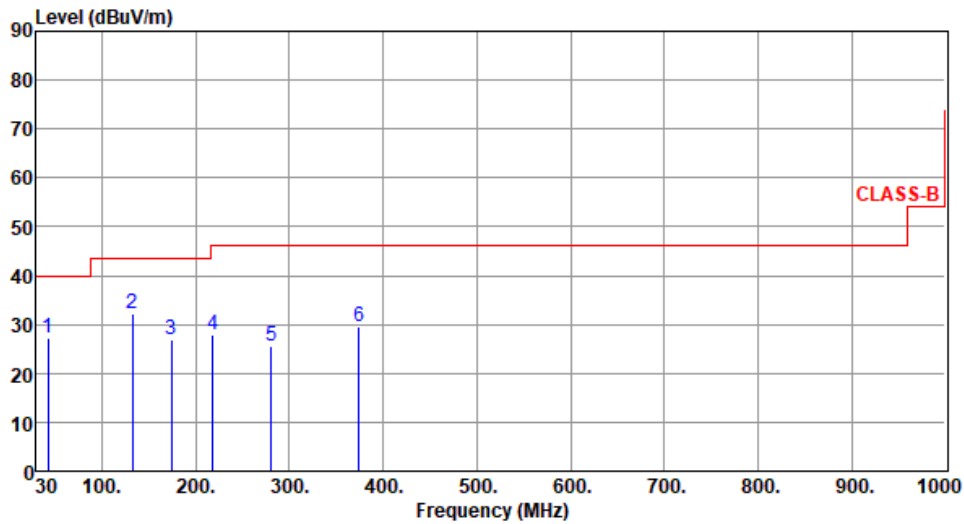
Note : Conducted average output power is for reference



Unwanted Emissions (Below 1GHz)

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

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	42.61	27.38	40.00	-12.62	36.23	-8.85	Peak	---	---
2	132.82	32.06	43.50	-11.44	41.99	-9.93	Peak	---	---
3	174.53	27.06	43.50	-16.44	36.42	-9.36	Peak	---	---
4	218.18	27.73	46.00	-18.27	39.47	-11.74	Peak	---	---
5	280.26	25.41	46.00	-20.59	33.86	-8.45	Peak	---	---
6	374.35	29.70	46.00	-16.30	35.54	-5.84	Peak	---	---

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

*Factor includes antenna factor , cable loss and amplifier gain

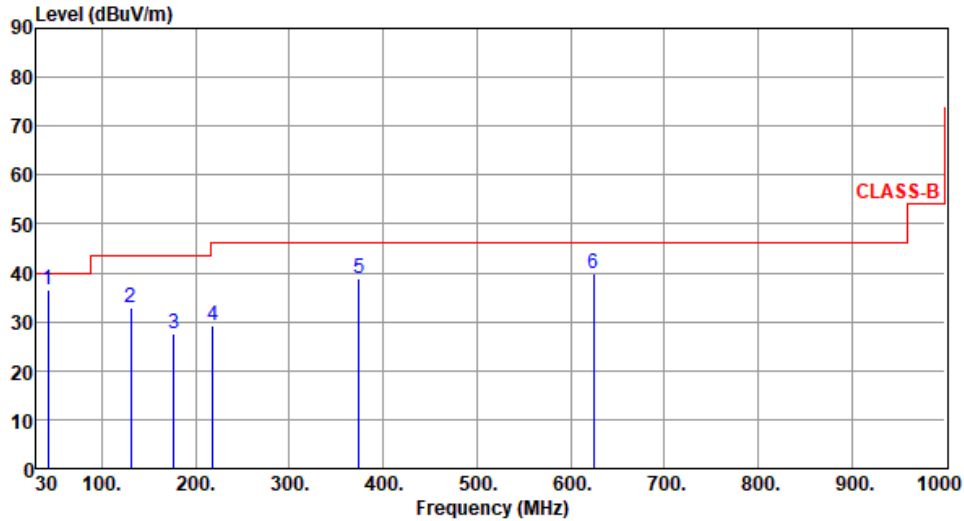
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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



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

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	42.61	36.44	40.00	-3.56	45.29	-8.85	Peak	---	---
2	130.88	33.03	43.50	-10.47	43.06	-10.03	Peak	---	---
3	176.47	27.57	43.50	-15.93	37.17	-9.60	Peak	---	---
4	218.18	29.13	46.00	-16.87	40.87	-11.74	Peak	---	---
5	374.35	38.84	46.00	-7.16	44.68	-5.84	Peak	---	---
6	624.61	39.90	46.00	-6.10	39.24	0.66	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.



Unwanted Emission (Above 1GHz) for 11b

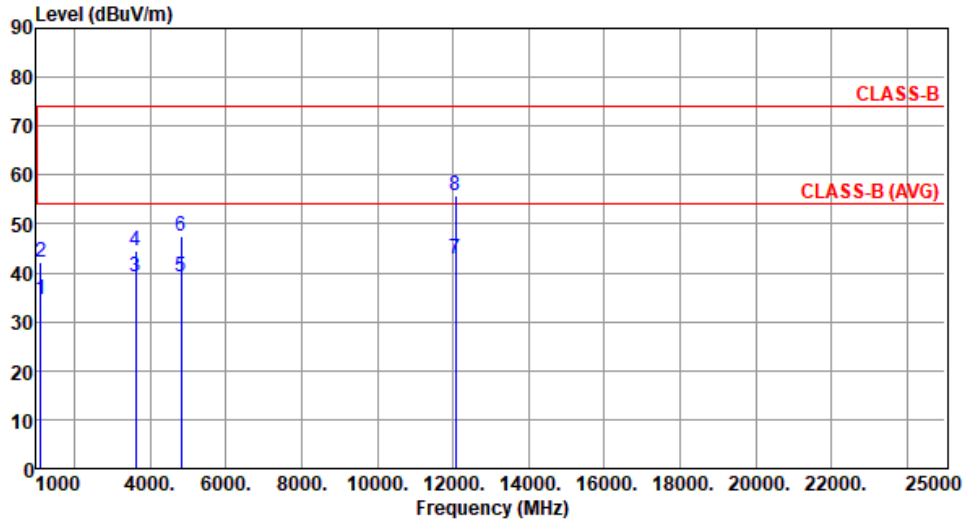
Modulation	11b	Test Freq. (MHz)	2412						
Polarization	Horizontal								
Test By :Akun Chung Temperature(°C):25 Humidity(%):66									
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1125.00	36.03	54.00	-17.97	42.59	-6.56	Average	175	353
2	1125.00	43.45	74.00	-30.55	50.01	-6.56	Peak	175	353
3	3618.00	34.88	54.00	-19.12	36.91	-2.03	Average	101	334
4	3618.00	43.15	74.00	-30.85	45.18	-2.03	Peak	101	334
5	4824.00	47.15	54.00	-6.85	47.48	-0.33	Average	184	300
6	4824.00	51.63	74.00	-22.37	51.96	-0.33	Peak	184	300
7	12060.00	43.53	54.00	-10.47	36.05	7.48	Average	100	295
8	12060.00	57.21	74.00	-16.79	49.73	7.48	Peak	100	295

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).



Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	1125.00	34.54	54.00	-19.46	41.10	-6.56	Average	188	17
2	1125.00	42.14	74.00	-31.86	48.70	-6.56	Peak	188	17
3	3618.00	39.14	54.00	-14.86	41.17	-2.03	Average	212	350
4	3618.00	44.65	74.00	-29.35	46.68	-2.03	Peak	212	350
5	4824.00	39.19	54.00	-14.81	39.52	-0.33	Average	112	32
6	4824.00	47.39	74.00	-26.61	47.72	-0.33	Peak	112	32
7	12060.00	42.92	54.00	-11.08	35.44	7.48	Average	100	50
8	12060.00	55.81	74.00	-18.19	48.33	7.48	Peak	100	50

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

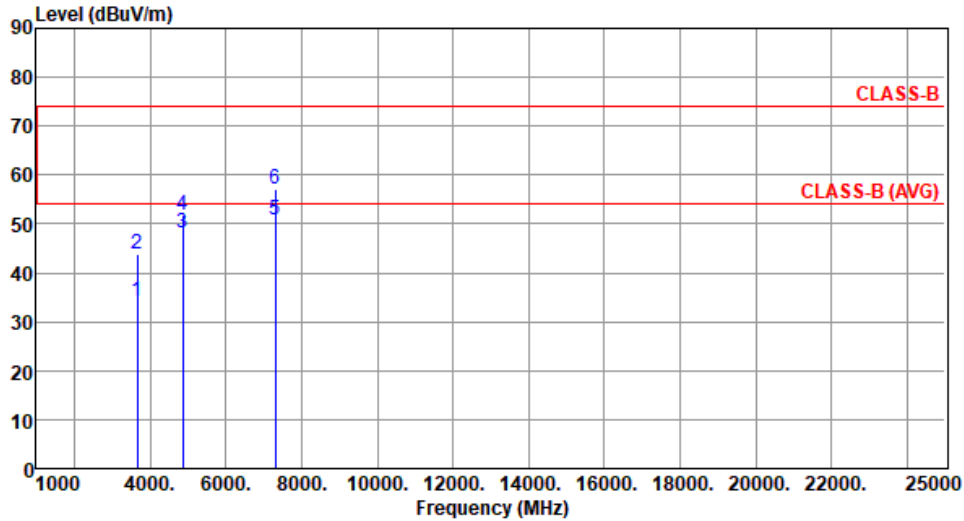
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3655.50	34.34	54.00	-19.66	36.33	-1.99	Average	100	325
2	3655.50	43.89	74.00	-30.11	45.88	-1.99	Peak	100	325
3	4874.00	48.00	54.00	-6.00	48.33	-0.33	Average	178	308
4	4874.00	51.92	74.00	-22.08	52.25	-0.33	Peak	178	308
5	7311.00	50.78	54.00	-3.22	44.96	5.82	Average	102	38
6	7311.00	57.18	74.00	-16.82	51.36	5.82	Peak	102	38

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

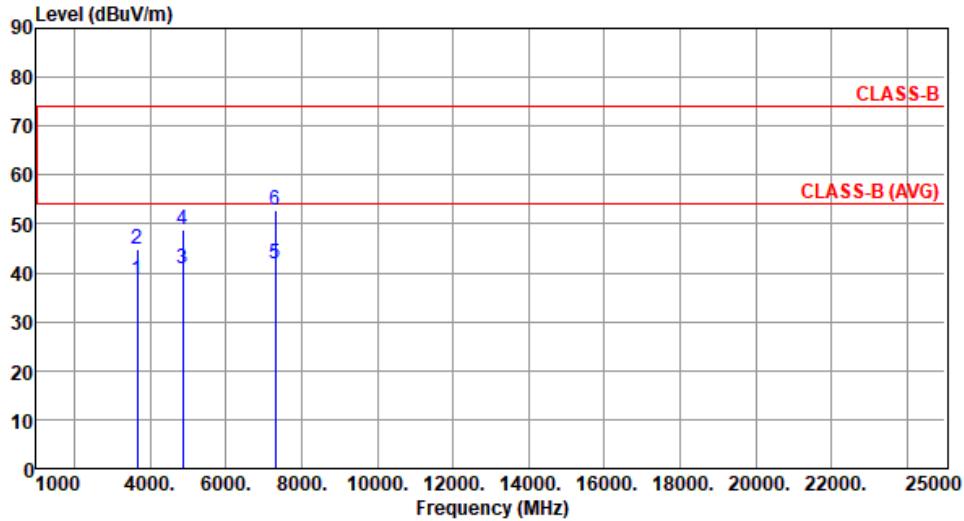
*Factor includes antenna factor , cable loss and amplifier gain

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



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

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3655.50	38.57	54.00	-15.43	40.56	-1.99	Average	212	354
2	3655.50	44.76	74.00	-29.24	46.75	-1.99	Peak	212	354
3	4874.00	40.82	54.00	-13.18	41.15	-0.33	Average	111	29
4	4874.00	48.92	74.00	-25.08	49.25	-0.33	Peak	111	29
5	7311.00	41.68	54.00	-12.32	35.86	5.82	Average	100	313
6	7311.00	52.66	74.00	-21.34	46.84	5.82	Peak	100	313

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

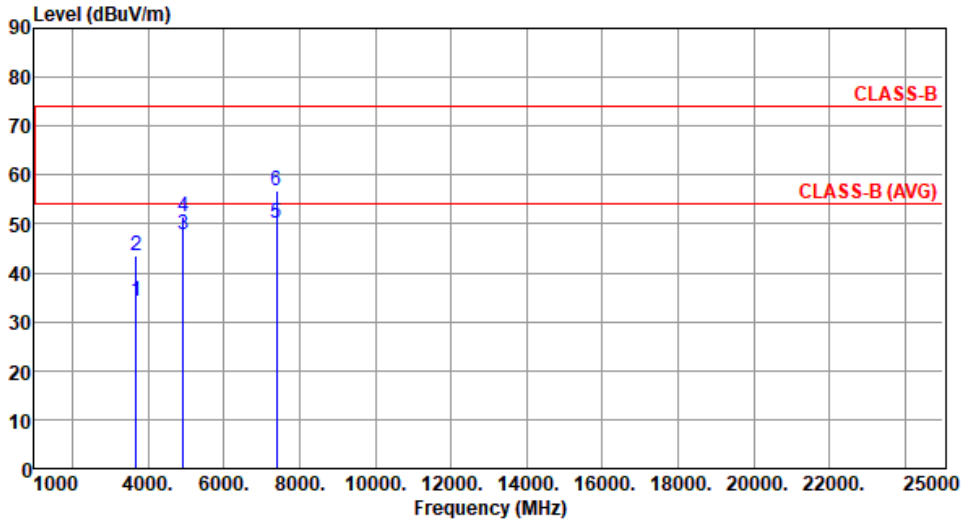
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	11b	Test Freq. (MHz)	2462
Polarization	Horizontal		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3693.00	34.13	54.00	-19.87	36.21	-2.08	Average	100	322
2	3693.00	43.46	74.00	-30.54	45.54	-2.08	Peak	100	322
3	4924.00	47.90	54.00	-6.10	48.13	-0.23	Average	191	322
4	4924.00	51.35	74.00	-22.65	51.58	-0.23	Peak	191	322
5	7386.00	49.99	54.00	-4.01	44.37	5.62	Average	110	39
6	7386.00	56.92	74.00	-17.08	51.30	5.62	Peak	110	39

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

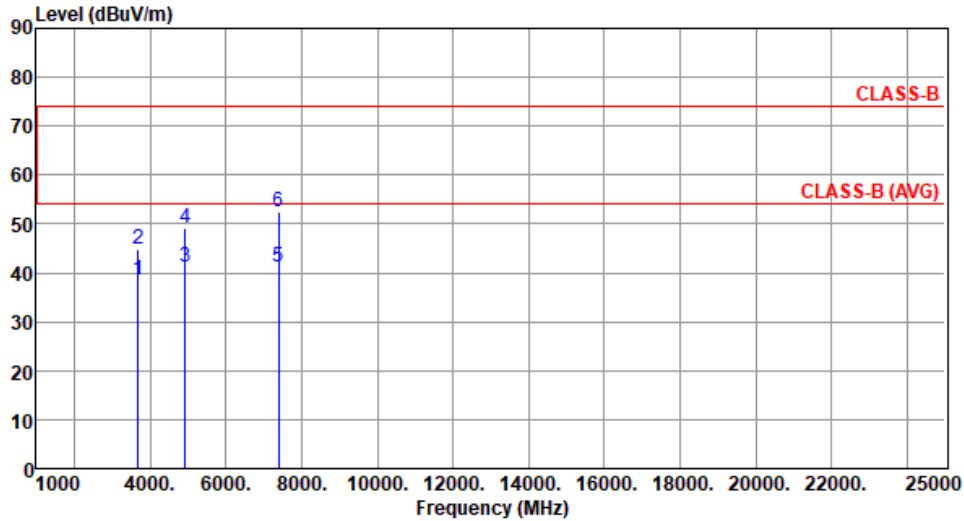
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	11b	Test Freq. (MHz)	2462
Polarization	Vertical		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3693.00	38.59	54.00	-15.41	40.67	-2.08	Average	182	352
2	3693.00	44.68	74.00	-29.32	46.76	-2.08	Peak	182	352
3	4924.00	41.10	54.00	-12.90	41.33	-0.23	Average	112	33
4	4924.00	48.99	74.00	-25.01	49.22	-0.23	Peak	112	33
5	7386.00	41.06	54.00	-12.94	35.44	5.62	Average	100	312
6	7386.00	52.37	74.00	-21.63	46.75	5.62	Peak	100	312

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

*Factor includes antenna factor , cable loss and amplifier gain

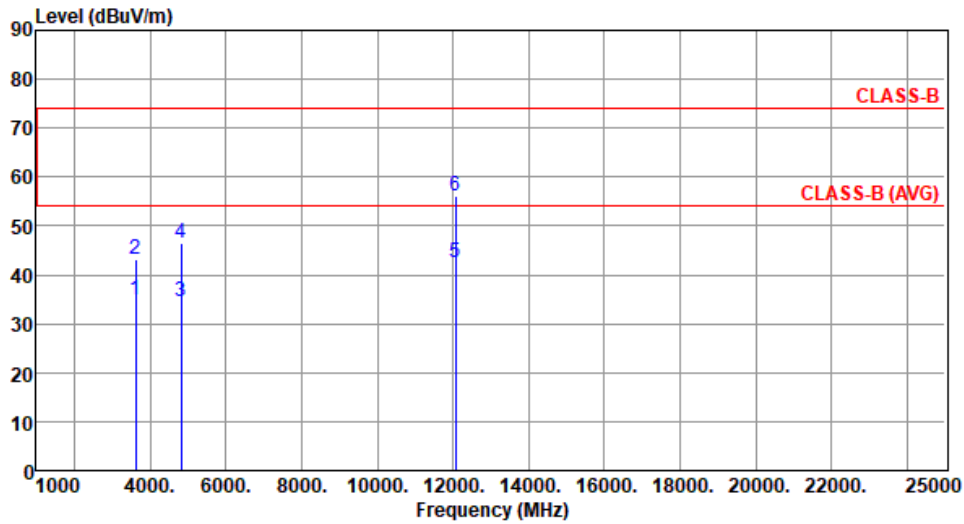
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).



Unwanted Emissions (Above 1GHz) for 11g

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3618.00	34.72	54.00	-19.28	36.75	-2.03	Average	102	335
2	3618.00	43.30	74.00	-30.70	45.33	-2.03	Peak	102	335
3	4824.00	34.53	54.00	-19.47	34.86	-0.33	Average	159	307
4	4824.00	46.53	74.00	-27.47	46.86	-0.33	Peak	156	307
5	12060.00	42.35	54.00	-11.65	34.87	7.48	Average	100	296
6	12060.00	56.14	74.00	-17.86	48.66	7.48	Peak	100	296

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

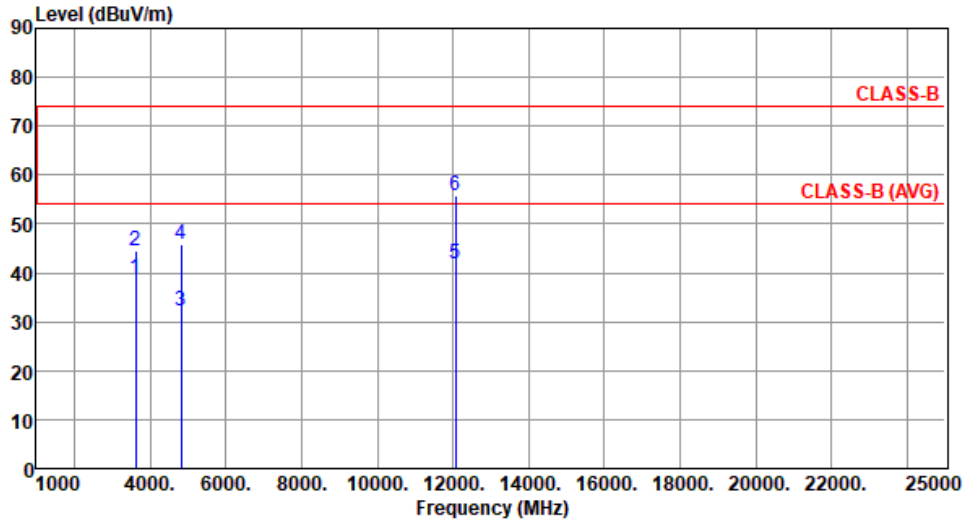
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3618.00	39.02	54.00	-14.98	41.05	-2.03	Average	215	347
2	3618.00	44.52	74.00	-29.48	46.55	-2.03	Peak	215	347
3	4824.00	32.10	54.00	-21.90	32.43	-0.33	Average	100	30
4	4824.00	45.88	74.00	-28.12	46.21	-0.33	Peak	100	30
5	12060.00	41.70	54.00	-12.30	34.22	7.48	Average	100	57
6	12060.00	55.74	74.00	-18.26	48.26	7.48	Peak	100	57

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

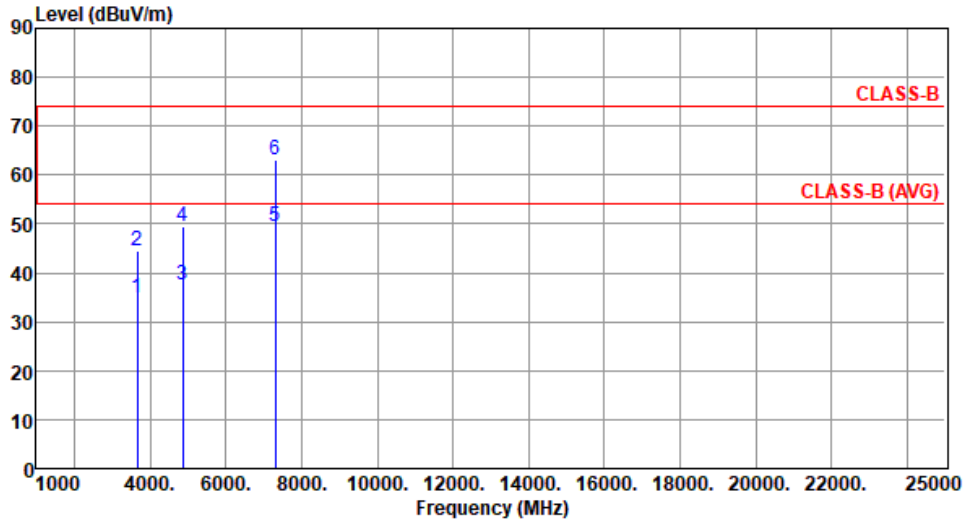
*Factor includes antenna factor , cable loss and amplifier gain

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



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

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3655.50	34.96	54.00	-19.04	36.95	-1.99	Average	100	322
2	3655.50	44.43	74.00	-29.57	46.42	-1.99	Peak	100	322
3	4874.00	37.52	54.00	-16.48	37.85	-0.33	Average	177	314
4	4874.00	49.63	74.00	-24.37	49.96	-0.33	Peak	177	314
5	7311.00	49.40	54.00	-4.60	43.58	5.82	Average	248	39
6	7311.00	63.00	74.00	-11.00	57.18	5.82	Peak	248	39

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

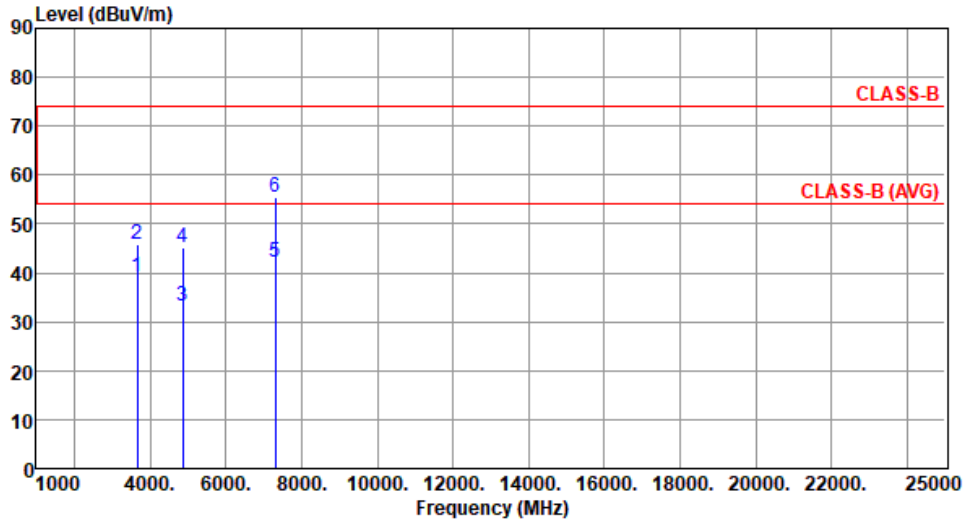
*Factor includes antenna factor , cable loss and amplifier gain

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



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

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3655.50	39.14	54.00	-14.86	41.13	-1.99	Average	197	355
2	3655.50	45.71	74.00	-28.29	47.70	-1.99	Peak	197	355
3	4874.00	33.33	54.00	-20.67	33.66	-0.33	Average	123	32
4	4874.00	45.05	74.00	-28.95	45.38	-0.33	Peak	123	32
5	7311.00	42.04	54.00	-11.96	36.22	5.82	Average	101	320
6	7311.00	55.36	74.00	-18.64	49.54	5.82	Peak	101	320

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

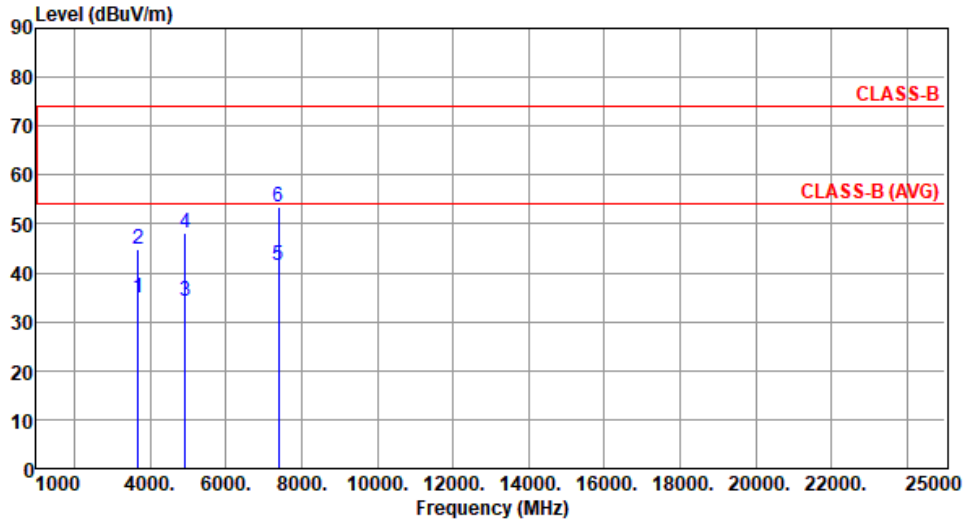
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3693.00	35.02	54.00	-18.98	37.10	-2.08	Average	100	326
2	3693.00	44.80	74.00	-29.20	46.88	-2.08	Peak	100	326
3	4924.00	34.33	54.00	-19.67	34.56	-0.23	Average	172	312
4	4924.00	48.29	74.00	-25.71	48.52	-0.23	Peak	172	312
5	7386.00	41.51	54.00	-12.49	35.89	5.62	Average	237	31
6	7386.00	53.50	74.00	-20.50	47.88	5.62	Peak	237	31

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

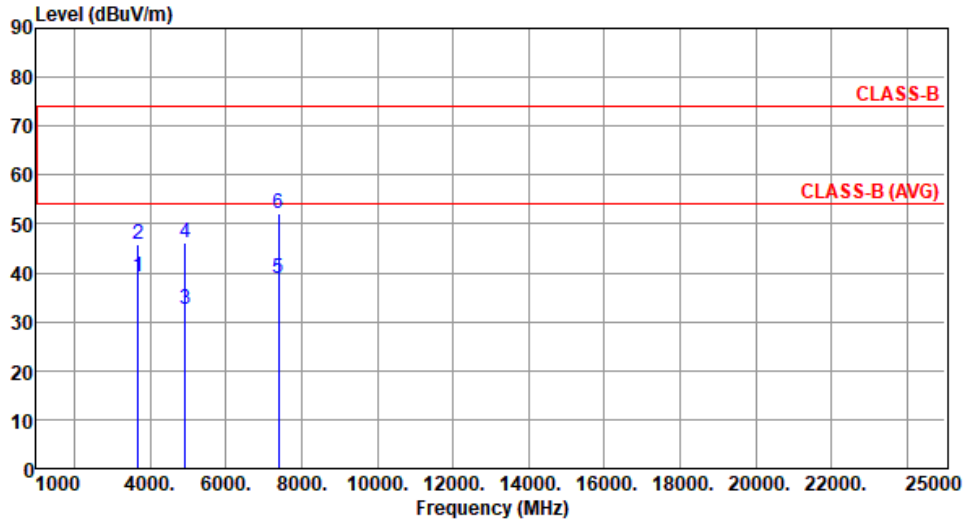
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	11g	Test Freq. (MHz)	2462
Polarization	Vertical		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3693.00	39.14	54.00	-14.86	41.22	-2.08	Average	200	342
2	3693.00	45.81	74.00	-28.19	47.89	-2.08	Peak	200	352
3	4924.00	32.50	54.00	-21.50	32.73	-0.23	Average	100	35
4	4924.00	46.02	74.00	-27.98	46.25	-0.23	Peak	100	35
5	7386.00	38.87	54.00	-15.13	33.25	5.62	Average	102	311
6	7386.00	52.14	74.00	-21.86	46.52	5.62	Peak	102	311

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).



Unwanted Emissions (Above 1GHz) for HT20

Modulation	HT20	Test Freq. (MHz)	2412						
Polarization	Horizontal								
Test By :Akun Chung Temperature(°C):25 Humidity(%):66									
	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	3618.00	34.59	54.00	-19.41	36.62	-2.03	Average	105	339
2	3618.00	43.42	74.00	-30.58	45.45	-2.03	Peak	105	339
3	4824.00	34.39	54.00	-19.61	34.72	-0.33	Average	163	303
4	4824.00	45.91	74.00	-28.09	46.24	-0.33	Peak	163	3033
5	12060.00	41.74	54.00	-12.26	34.26	7.48	Average	100	291
6	12060.00	55.78	74.00	-18.22	48.30	7.48	Peak	100	291

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

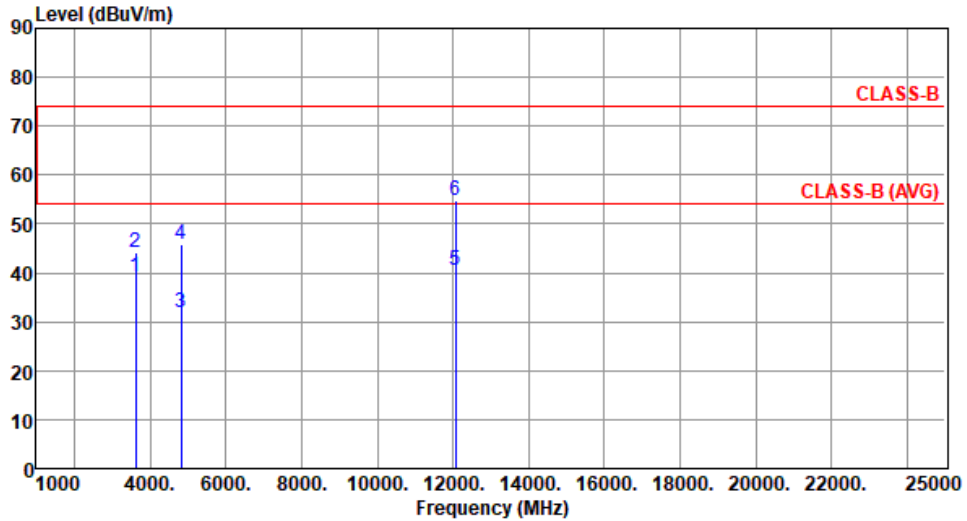
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Vertical		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3618.00	39.12	54.00	-14.88	41.15	-2.03	Average	222	339
2	3618.00	44.34	74.00	-29.66	46.37	-2.03	Peak	222	339
3	4824.00	31.98	54.00	-22.02	32.31	-0.33	Average	100	27
4	4824.00	45.77	74.00	-28.23	46.10	-0.33	Peak	100	27
5	12060.00	40.62	54.00	-13.38	33.14	7.48	Average	100	52
6	12060.00	54.69	74.00	-19.31	47.21	7.48	Peak	100	52

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

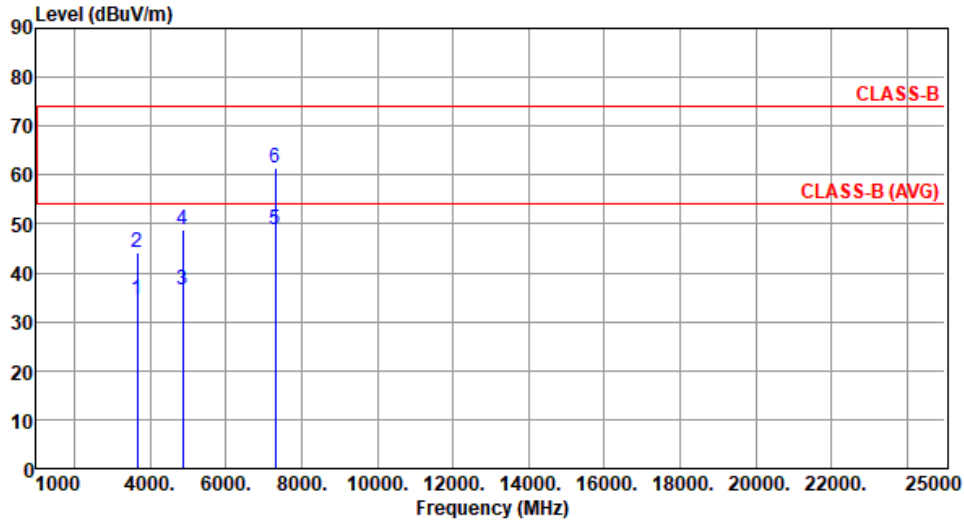
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3655.50	34.59	54.00	-19.41	36.58	-1.99	Average	100	318
2	3655.50	44.26	74.00	-29.74	46.25	-1.99	Peak	100	318
3	4874.00	36.45	54.00	-17.55	36.78	-0.33	Average	170	312
4	4874.00	48.89	74.00	-25.11	49.22	-0.33	Peak	170	312
5	7311.00	48.68	54.00	-5.32	42.86	5.82	Average	250	40
6	7311.00	61.56	74.00	-12.44	55.74	5.82	Peak	250	40

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

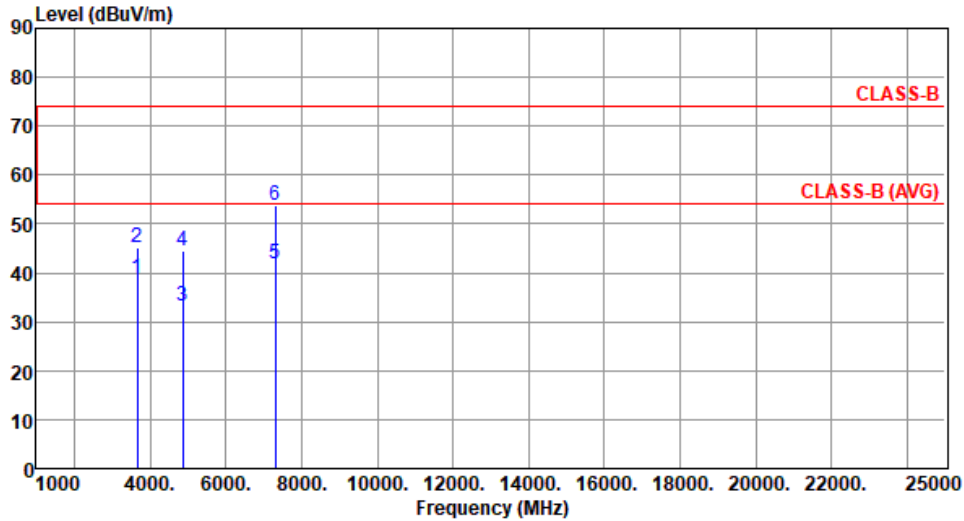
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3655.50	38.97	54.00	-15.03	40.96	-1.99	Average	195	353
2	3655.50	45.23	74.00	-28.77	47.22	-1.99	Peak	195	353
3	4874.00	33.15	54.00	-20.85	33.48	-0.33	Average	115	36
4	4874.00	44.62	74.00	-29.38	44.95	-0.33	Peak	115	36
5	7311.00	41.68	54.00	-12.32	35.86	5.82	Average	100	322
6	7311.00	53.83	74.00	-20.17	48.01	5.82	Peak	100	322

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

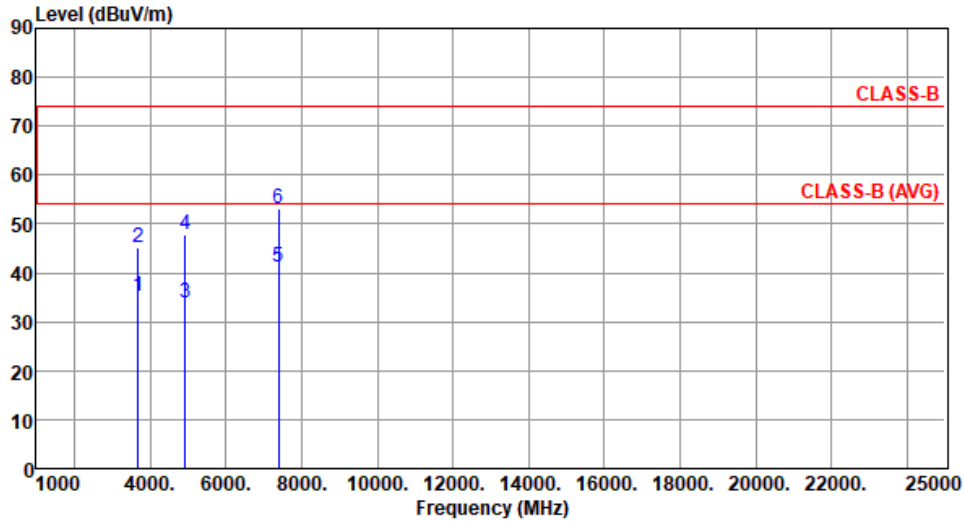
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3693.00	35.14	54.00	-18.86	37.22	-2.08	Average	100	328
2	3693.00	45.03	74.00	-28.97	47.11	-2.08	Peak	100	328
3	4924.00	33.92	54.00	-20.08	34.15	-0.23	Average	179	315
4	4924.00	47.79	74.00	-26.21	48.02	-0.23	Peak	179	315
5	7386.00	41.14	54.00	-12.86	35.52	5.62	Average	230	30
6	7386.00	53.19	74.00	-20.81	47.57	5.62	Peak	230	30

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

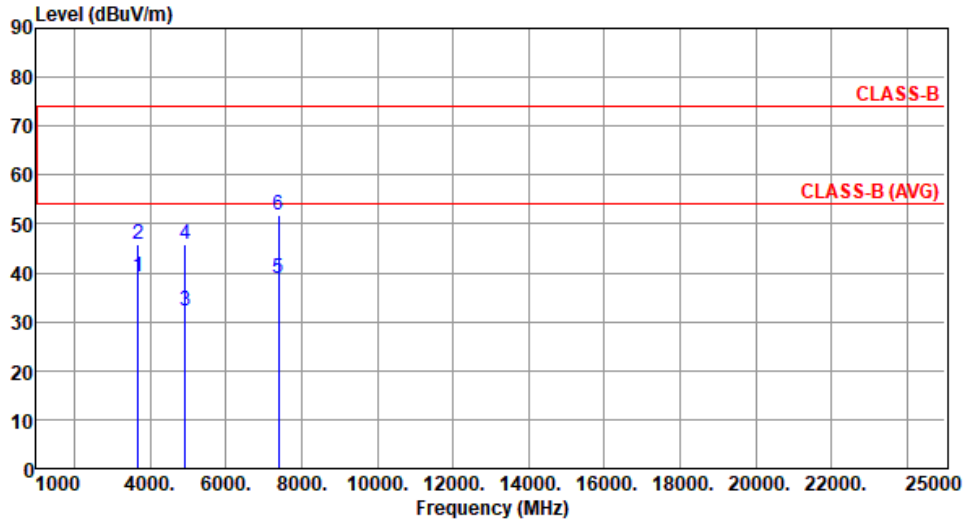
*Factor includes antenna factor , cable loss and amplifier gain

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



Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Vertical		

Test By :Akun Chung Temperature(°C):25 Humidity(%):66



	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	3693.00	39.27	54.00	-14.73	41.35	-2.08	Average	195	338
2	3693.00	45.87	74.00	-28.13	47.95	-2.08	Peak	195	338
3	4924.00	32.32	54.00	-21.68	32.55	-0.23	Average	100	39
4	4924.00	45.88	74.00	-28.12	46.11	-0.23	Peak	100	39
5	7386.00	38.73	54.00	-15.27	33.11	5.62	Average	100	312
6	7386.00	51.87	74.00	-22.13	46.25	5.62	Peak	100	312

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

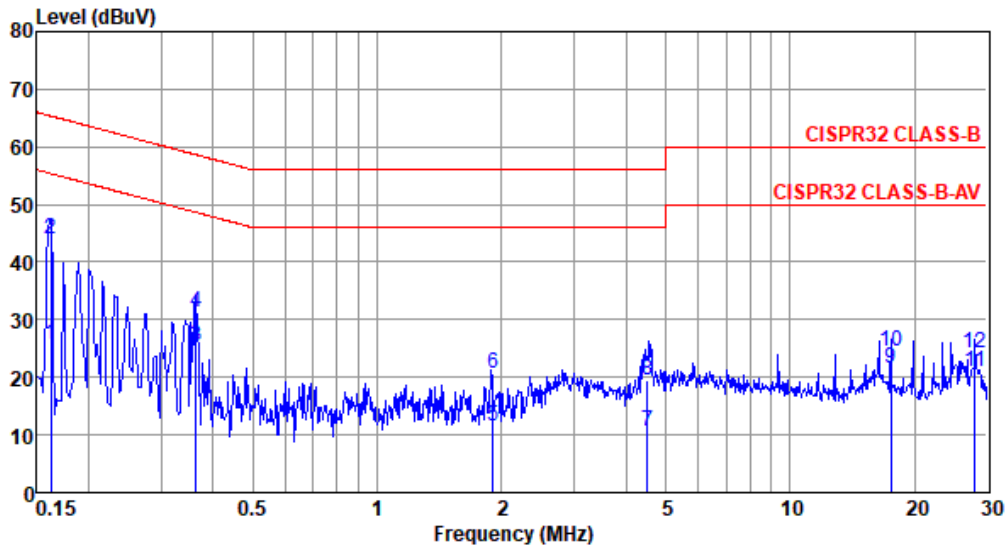
*Factor includes antenna factor , cable loss and amplifier gain

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



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

Test by : Joe Liao Temperature: 22°C Humidity: 63%



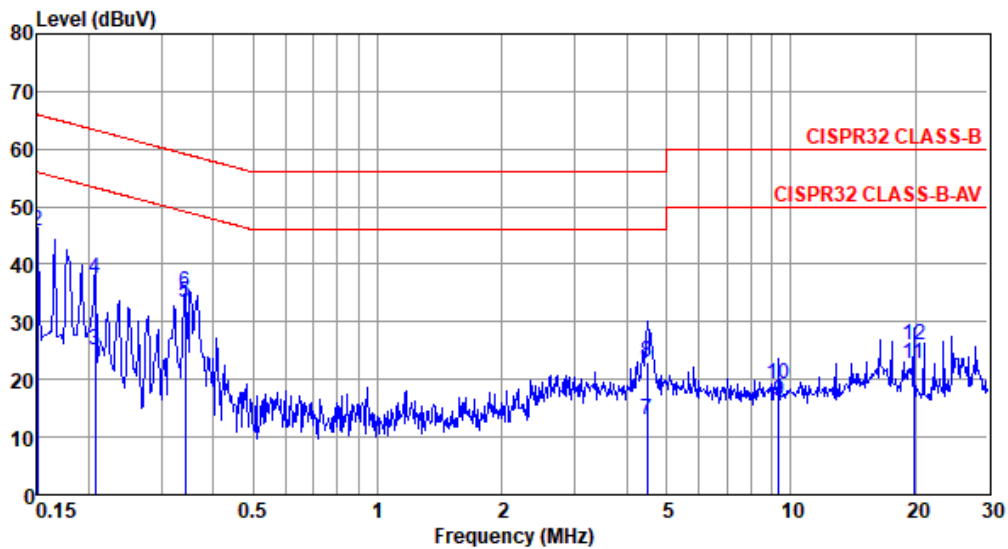
	Freq MHz	Level dBUV	Limit Line dBUV	Over Limit dB	Read Level dBUV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.162	25.73	55.34	-29.61	15.81	9.68	0.06	0.18	Average
2*	0.162	44.07	65.34	-21.27	34.15	9.68	0.06	0.18	QP
3	0.363	25.35	48.65	-23.30	15.34	9.67	0.06	0.28	Average
4	0.363	31.17	58.65	-27.48	21.16	9.67	0.06	0.28	QP
5	1.910	11.63	46.00	-34.37	1.45	9.69	0.13	0.36	Average
6	1.910	20.65	56.00	-35.35	10.47	9.69	0.13	0.36	QP
7	4.515	10.54	46.00	-35.46	0.21	9.71	0.20	0.42	Average
8	4.515	19.48	56.00	-36.52	9.15	9.71	0.20	0.42	QP
9	17.539	21.41	50.00	-28.59	10.69	9.73	0.48	0.51	Average
10	17.539	24.62	60.00	-35.38	13.90	9.73	0.48	0.51	QP
11	28.063	20.96	50.00	-29.04	9.94	9.68	0.59	0.75	Average
12	28.063	24.25	60.00	-35.75	13.23	9.68	0.59	0.75	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).



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

Test by : Joe Liao Temperature: 22°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	0.150	29.31	56.00	-26.69	19.46	9.61	0.06	0.18	Average
2	0.150	45.76	66.00	-20.24	35.91	9.61	0.06	0.18	QP
3	0.207	25.03	53.32	-28.29	15.16	9.61	0.06	0.20	Average
4	0.207	37.49	63.32	-25.83	27.62	9.61	0.06	0.20	QP
5*	0.343	33.43	49.13	-15.70	23.48	9.61	0.06	0.28	Average
6	0.343	35.08	59.13	-24.05	25.13	9.61	0.06	0.28	QP
7	4.496	13.07	46.00	-32.93	2.80	9.65	0.20	0.42	Average
8	4.496	23.06	56.00	-32.94	12.79	9.65	0.20	0.42	QP
9	9.352	16.31	50.00	-33.69	5.83	9.69	0.35	0.44	Average
10	9.352	19.19	60.00	-40.81	8.71	9.69	0.35	0.44	QP
11	19.879	22.77	50.00	-27.23	11.95	9.79	0.51	0.52	Average
12	19.879	25.85	60.00	-34.15	15.03	9.79	0.51	0.52	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).