FCC C2PC Test Report

FCC ID	:	**KQL-RM024**
Equipment	:	**2.4GHz FHSS Wireless Module**
Model No.	:	**RM024**
Brand Name	:	**Laird**
Applicant	:	**Laird Connectivity**
Address	:	**W66N220 Commerce Court, Cedarburg, Wisconsin 53012, USA**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Mar. 04, 2020**
Tested Date	:	**Mar. 05 ~ Mar. 10, 2020**

We, International Certification Corp., 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 may be duplicated completely for legal use with the approval of the applicant. 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**

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR822301-03	Rev. 01	Initial issue	Apr. 23, 2020

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.192MHz 51.42 (Margin -12.51dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 838.98MHz 42.22 (Margin -3.78dB) - 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).
The modification is adding a new antenna

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	**Modulation**	**Ch. Freq. (MHz)**	**Channel Number**	**Data Rate**
2400-2483.5	FHSS	2400.7-2470.9	1-79 [79]	280 kbps

1.1.2 Antenna Details

Ant. No.	Model	**Type**	**Gain (dBi)**	**Connector**
1	Laird/001-0014	FlexPIFA	2	U.FL

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3Vdc from host

1.1.4 Accessories

N/A

1.1.5 Channel List

Frequency band (MHz)		2400~2483.5			
Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2400.700	28	2425.000	55	2449.300
2	2401.600	29	2425.900	56	2450.200
3	2402.500	30	2426.800	57	2451.100
4	2403.400	31	2427.700	58	2452.000
5	2404.300	32	2428.600	59	2452.900
6	2405.200	33	2429.500	60	2453.800
7	2406.100	34	2430.400	61	2454.700
8	2407.000	35	2431.300	62	2455.600
9	2407.900	36	2432.200	63	2456.500
10	2408.800	37	2433.100	64	2457.400
11	2409.700	38	2434.000	65	2458.300
12	2410.600	39	2434.900	66	2459.200
13	2411.500	40	2435.800	67	2460.100
14	2412.400	41	2436.700	68	2461.000
15	2413.300	42	2437.600	69	2461.900
16	2414.200	43	2438.500	70	2462.800
17	2415.100	44	2439.400	71	2463.700
18	2416.000	45	2440.300	72	2464.600
19	2416.900	46	2441.200	73	2465.500
20	2417.800	47	2442.100	74	2466.400
21	2418.700	48	2443.000	75	2467.300
22	2419.600	49	2443.900	76	2468.200
23	2420.500	50	2444.800	77	2469.100
24	2421.400	51	2445.700	78	2470.000
25	2422.300	52	2446.600	79	2470.900
26	2423.200	53	2447.500	---	---
27	2424.100	54	2448.400	---	---

1.1.6 Test Tool and Duty Cycle

Test Tool	Laird Technologies Config, V6.01	
Duty Cycle and Duty Factor	Duty Cycle (%)	Duty Factor (dB)
	18.06	14.86

1.1.7 Duty Cycle of Normal Operation

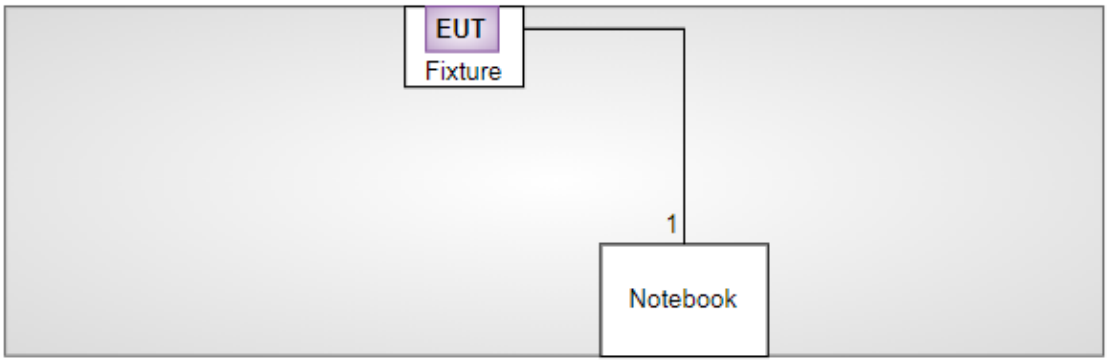
Duty Cycle and Duty Factor	Duty Cycle (%)	Duty Factor (dB)
	9.4783	20.47

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude E6430	DoC	---
2	Fixture	---	---	---	Provided by applicant.

1.3 Test Setup Chart

Test Setup Diagram



No.	Signal cable / Length (m)
1	USB, 1.74m shielded.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101658	Dec. 12, 2019	Dec. 11, 2020
LISN	R&S	ENV216	100003	Sep. 23, 2019	Sep. 22, 2020
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 22, 2019	Oct. 21, 2020
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 chamber 3 / (03CH03-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101499	Jan. 09, 2020	Jan. 08, 2021
Receiver	R&S	ESR3	101657	Feb. 14, 2020	Feb. 13, 2021
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 17, 2019	Apr. 16, 2020
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 27, 2019	Dec. 26, 2020
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2019	Nov. 14, 2020
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2019	Nov. 12, 2020
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 07, 2019	Oct. 06, 2020
Preamplifier	EMC	EMC02325	980187	Aug. 14, 2019	Aug. 13, 2020
Preamplifier	Agilent	83017A	MY53270014	Aug. 07, 2019	Aug. 06, 2020
Preamplifier	EMC	EMC184045B	980192	Aug. 01, 2019	Jul. 31, 2020
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/**4**	Sep. 27, 2019	Sep. 26, 2020
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Sep. 27, 2019	Sep. 26, 2020
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Sep. 27, 2019	Sep. 26, 2020
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Sep. 27, 2019	Sep. 26, 2020
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Sep. 27, 2019	Sep. 26, 2020
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Sep. 27, 2019	Sep. 26, 2020
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)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Apr. 17, 2019	Apr. 16, 2020
Power Meter	Anritsu	ML2495A	1241002	Oct. 23, 2019	Oct. 22, 2020
Power Sensor	Anritsu	MA2411B	1207366	Oct. 23, 2019	Oct. 22, 2020
Signal Generator	R&S	SMB100A	175727	Dec. 27, 2019	Dec. 26, 2020
DC POWER SOURCE	GW INSTEK	GPC-6030D	GES855395	Oct. 29, 2019	Oct. 28, 2020
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247
ANSI C63.10-2013
FCC KDB 558074 D01 15.247 Meas Guidance v05r02

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 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 ≤ 1GHz	±3.96 dB
Radiated emission > 1GHz	±4.51 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	23°C / 63%	Alex Tsai
Radiated Emissions	03CH03-WS	20-21°C / 63-65%	Roger Lu
RF Conducted	TH01-WS	20°C / 65%	Roger Lu

- MRA Number: APEC TEL
- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISED#: 10807A
- CAB identifier: TW2732

2.2 Testing Facility

Test Laboratory	International Certification Corp.
Test Site	CO01-WS, TH01-WS
Address of Test Site	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.
Test Site	03CH03-WS
Address of Test Site	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

2.3 The Worst Test Modes and Channel Details

Test item	Modulation	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	FHSS	2400.7	280 kbps	---
Radiated Emissions ≤1GHz	FHSS	2400.7	280 kbps	---
Radiated Emissions >1GHz	FHSS	2400.7 / 2435.8 / 2470.9	280 kbps	---

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

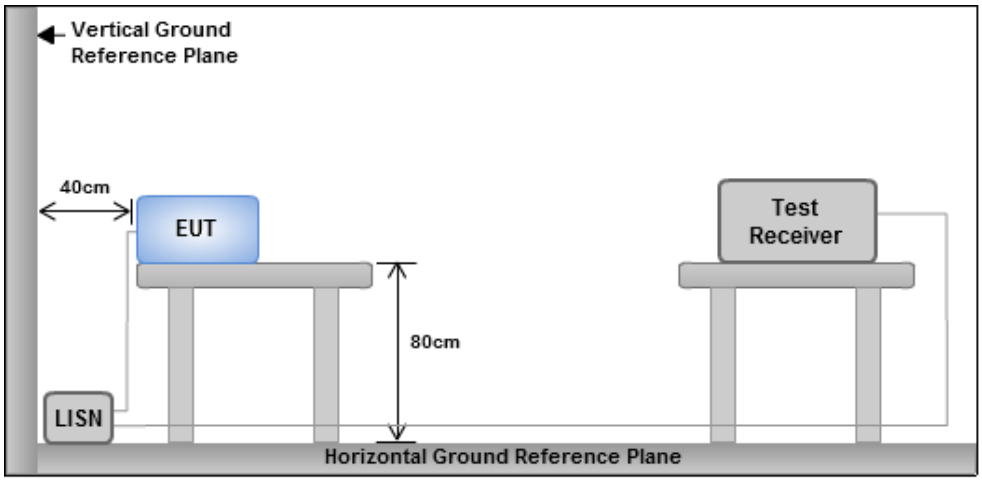
3.1.1 Limit of Conducted Emissions

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.

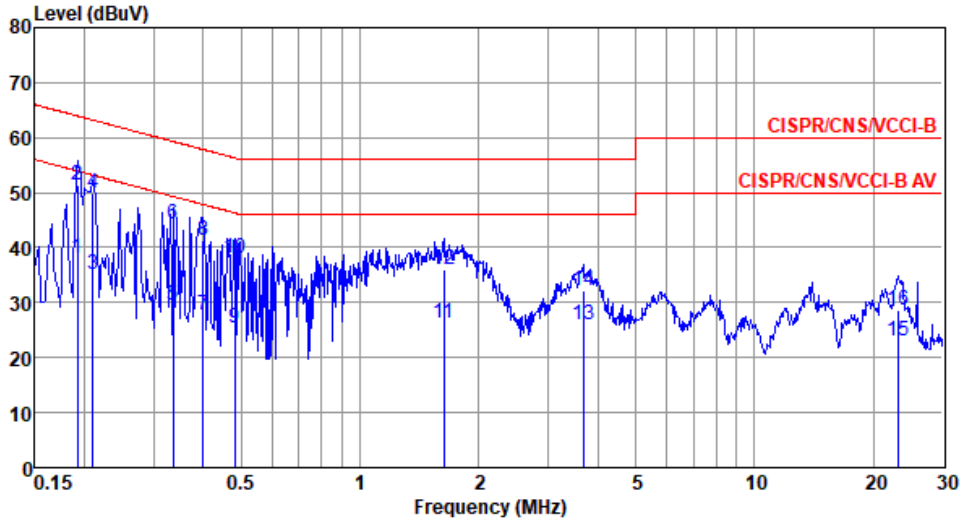
3.1.3 Test Setup



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

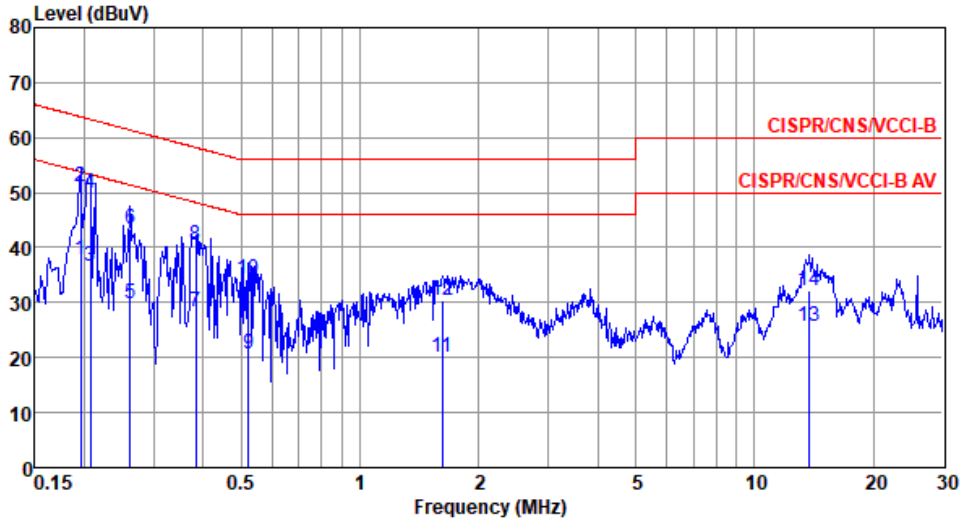
Modulation	FHSS	Test Freq. (MHz)	2400.7
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.192	38.08	53.93	-15.85	28.42	9.60	0.06	Average
2*	0.192	51.42	63.93	-12.51	41.76	9.60	0.06	QP
3	0.211	35.08	53.18	-18.10	25.42	9.60	0.06	Average
4	0.211	49.80	63.18	-13.38	40.14	9.60	0.06	QP
5	0.336	29.46	49.31	-19.85	19.79	9.60	0.07	Average
6	0.336	44.18	59.31	-15.13	34.51	9.60	0.07	QP
7	0.400	27.86	47.86	-20.00	18.18	9.60	0.08	Average
8	0.400	41.37	57.86	-16.49	31.69	9.60	0.08	QP
9	0.481	25.46	46.32	-20.86	15.77	9.60	0.09	Average
10	0.481	38.13	56.32	-18.19	28.44	9.60	0.09	QP
11	1.628	26.14	46.00	-19.86	16.36	9.62	0.16	Average
12	1.628	36.03	56.00	-19.97	26.25	9.62	0.16	QP
13	3.681	25.90	46.00	-20.10	15.99	9.63	0.28	Average
14	3.681	32.03	56.00	-23.97	22.12	9.63	0.28	QP
15	23.140	23.10	50.00	-26.90	12.67	9.74	0.69	Average
16	23.140	28.62	60.00	-31.38	18.19	9.74	0.69	QP

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

Modulation	FHSS	Test Freq. (MHz)	2400.7
Power Phase	Neutral		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.195	37.88	53.80	-15.92	28.24	9.58	0.06	Average
2*	0.195	51.01	63.80	-12.79	41.37	9.58	0.06	QP
3	0.207	36.51	53.32	-16.81	26.87	9.58	0.06	Average
4	0.207	50.01	63.32	-13.31	40.37	9.58	0.06	QP
5	0.262	29.89	51.38	-21.49	20.24	9.58	0.07	Average
6	0.262	43.52	61.38	-17.86	33.87	9.58	0.07	QP
7	0.383	28.34	48.21	-19.87	18.69	9.57	0.08	Average
8	0.383	40.48	58.21	-17.73	30.83	9.57	0.08	QP
9	0.521	20.74	46.00	-25.26	11.08	9.57	0.09	Average
10	0.521	34.13	56.00	-21.87	24.47	9.57	0.09	QP
11	1.619	20.20	46.00	-25.80	10.45	9.59	0.16	Average
12	1.619	30.36	56.00	-25.64	20.61	9.59	0.16	QP
13	13.768	25.58	50.00	-24.42	15.25	9.78	0.55	Average
14	13.768	32.28	60.00	-27.72	21.95	9.78	0.55	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
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:
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.

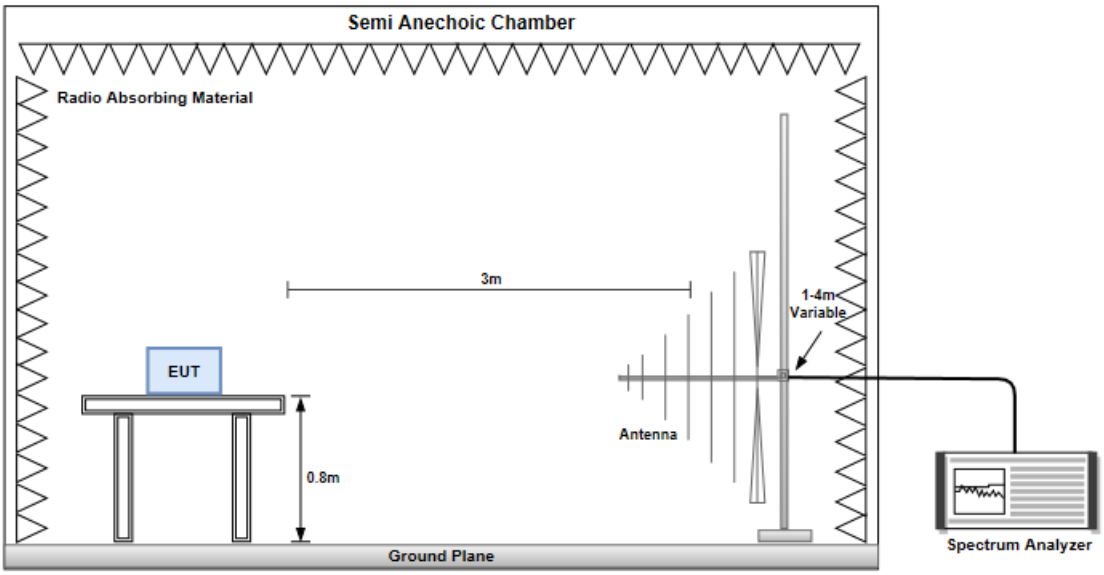
   Radiated emission Average value for field strength of harmonics
   The average value is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

3. $$20\log(\text{Duty cycle}) = 20\log\frac{9.4783*1\text{ ms}}{100\text{ ms}} = -20.47\text{dB}$$

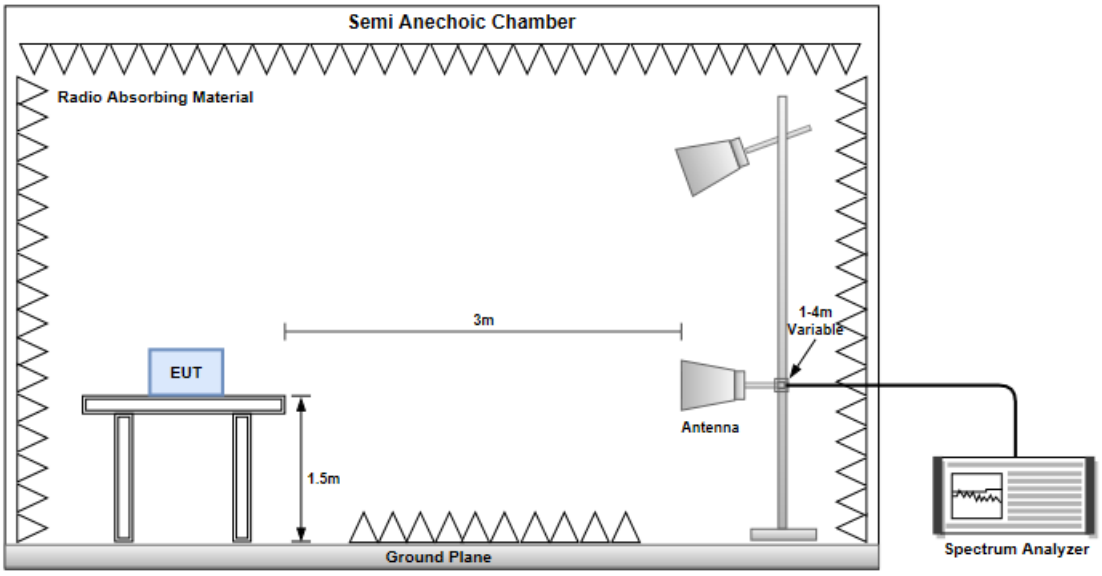
   Please see page 25 ~ 26 for plotted duty

3.2.3 Test Setup

Radiated Emissions below 1 GHz

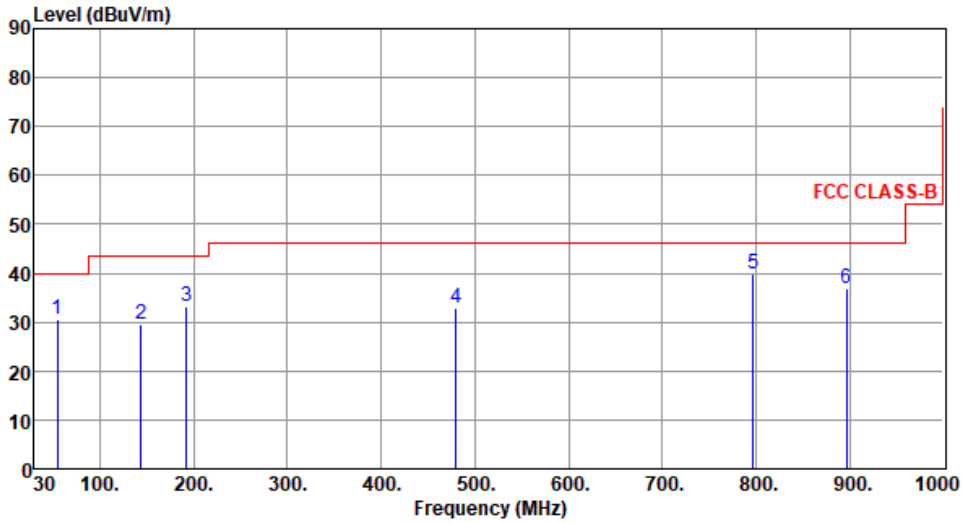


Radiated Emissions above 1 GHz



3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

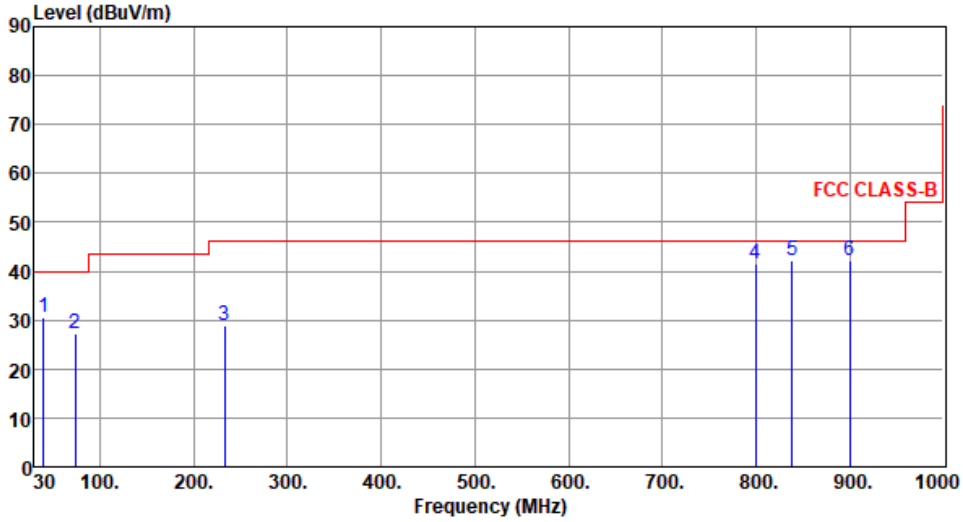
Modulation	FHSS	**Test Freq. (MHz)**	2400.7
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	54.25	30.66	40.00	-9.34	39.44	-8.78	Peak	---	---
2	143.49	29.71	43.50	-13.79	38.62	-8.91	Peak	---	---
3	191.99	33.13	43.50	-10.37	44.62	-11.49	Peak	---	---
4	480.08	32.94	46.00	-13.06	36.37	-3.43	Peak	---	---
5	797.27	39.71	46.00	-6.29	36.86	2.85	Peak	---	---
6	896.21	36.80	46.00	-9.20	32.50	4.30	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*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	FHSS	Test Freq. (MHz)	2400.7
Polarization	Vertical		

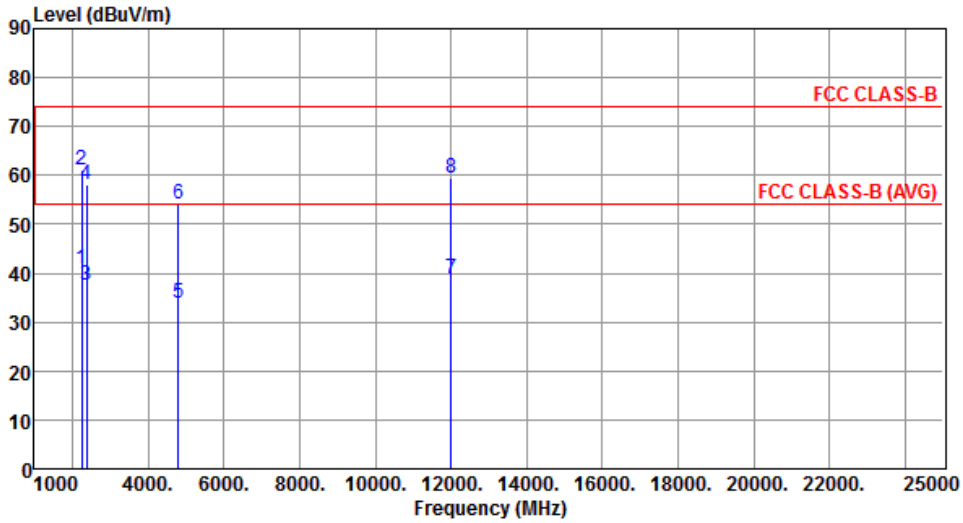


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	39.70	30.49	40.00	-9.51	39.78	-9.29	Peak	---	---
2	73.65	27.29	40.00	-12.71	39.03	-11.74	Peak	---	---
3	232.73	28.86	46.00	-17.14	39.95	-11.09	Peak	---	---
4	799.21	41.47	46.00	-4.53	38.61	2.86	Peak	---	---
5	838.98	42.22	46.00	-3.78	38.88	3.34	Peak	---	---
6	900.09	42.07	46.00	-3.93	37.75	4.32	Peak	---	---

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

3.2.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

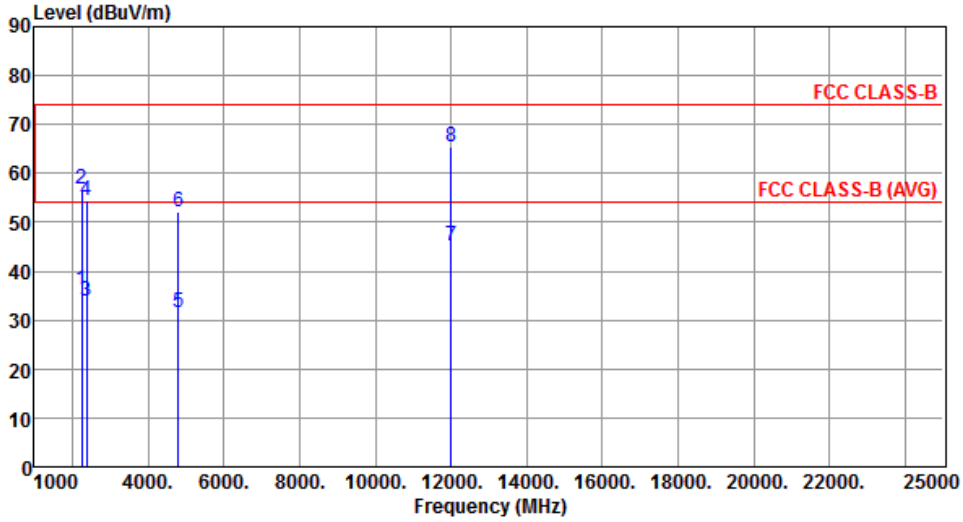
Modulation	FHSS	**Test Freq. (MHz)**	2400.7
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2245.00	40.74	54.00	-13.26	40.35	0.39	Average	100	11
2	2245.00	61.21	74.00	-12.79	60.82	0.39	Peak	100	11
3	2388.00	37.65	54.00	-16.35	37.40	0.25	Average	100	11
4	2388.00	58.12	74.00	-15.88	57.87	0.25	Peak	100	11
5	4801.40	33.78	54.00	-20.22	27.36	6.42	Average	228	328
6	4801.40	54.25	74.00	-19.75	47.83	6.42	Peak	228	328
7	12003.50	38.82	54.00	-15.18	22.78	16.04	Average	100	20
8	12003.50	59.29	74.00	-14.71	43.25	16.04	Peak	100	20

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

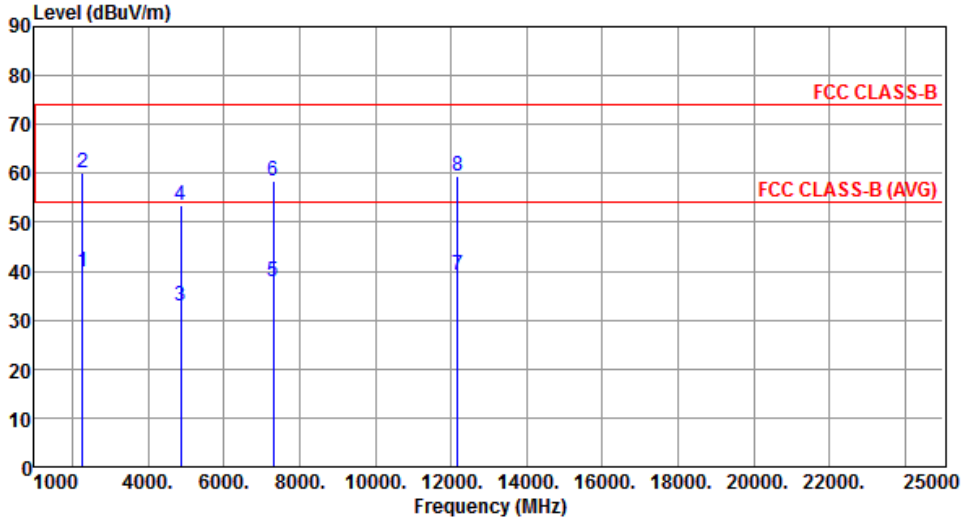
Modulation	FHSS	Test Freq. (MHz)	2400.7
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2245.00	36.17	54.00	-17.83	35.78	0.39	Average	332	256
2	2245.00	56.64	74.00	-17.36	56.25	0.39	Peak	332	256
3	2388.00	33.90	54.00	-20.10	33.65	0.25	Average	332	256
4	2388.00	54.37	74.00	-19.63	54.12	0.25	Peak	332	256
5	4801.40	31.62	54.00	-22.38	25.20	6.42	Average	245	2
6	4801.40	52.09	74.00	-21.91	45.67	6.42	Peak	245	2
7	12003.50	45.04	54.00	-8.96	29.00	16.04	Average	221	223
8	12003.50	65.51	74.00	-8.49	49.47	16.04	Peak	221	223

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

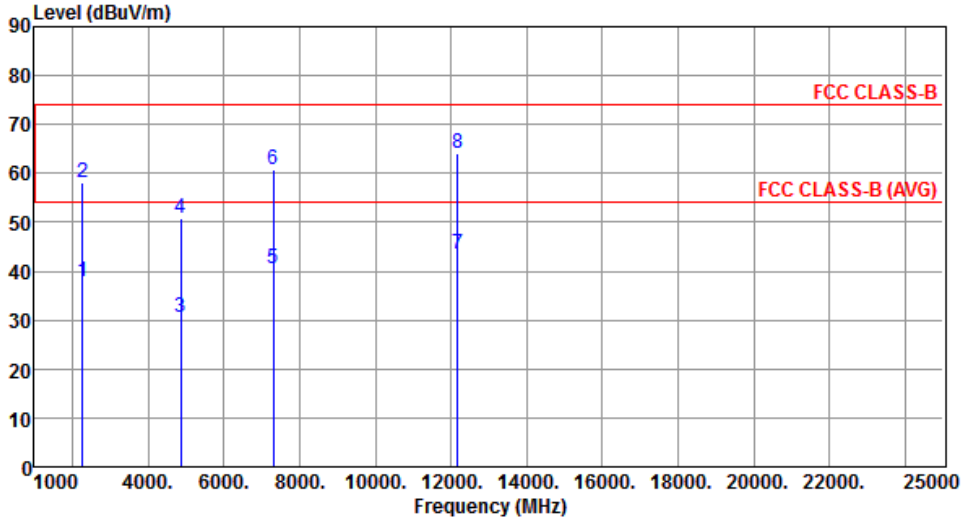
Modulation	FHSS	Test Freq. (MHz)	2435.8
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2280.00	39.73	54.00	-14.27	39.29	0.44	Average	101	1
2	2280.00	60.20	74.00	-13.80	59.76	0.44	Peak	101	1
3	4871.60	33.02	54.00	-20.98	26.53	6.49	Average	244	336
4	4871.60	53.49	74.00	-20.51	47.00	6.49	Peak	244	336
5	7307.40	37.84	54.00	-16.16	26.10	11.74	Average	209	330
6	7307.40	58.31	74.00	-15.69	46.57	11.74	Peak	209	330
7	12179.00	39.09	54.00	-14.91	22.76	16.33	Average	100	30
8	12179.00	59.56	74.00	-14.44	43.23	16.33	Peak	100	30

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

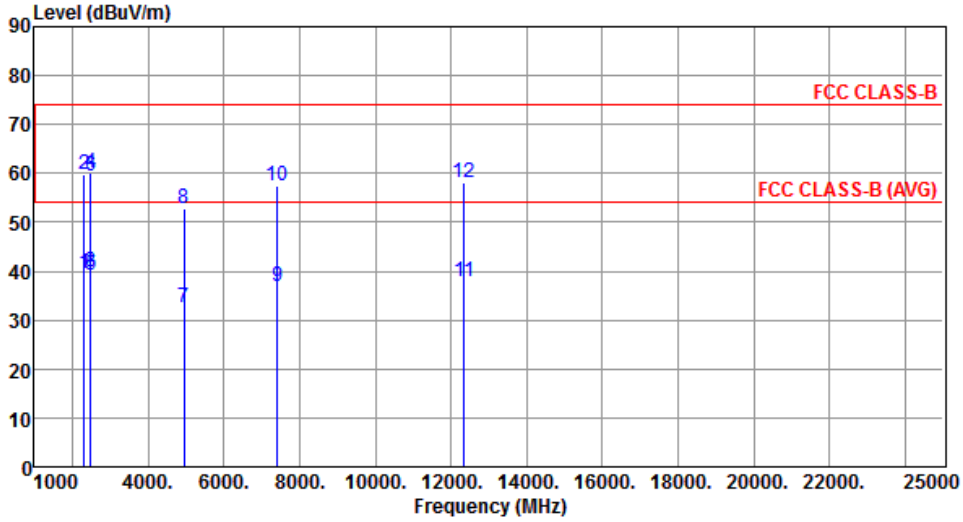
Modulation	FHSS	Test Freq. (MHz)	2435.8
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2280.00	37.76	54.00	-16.24	37.32	0.44	Average	333	258
2	2280.00	58.23	74.00	-15.77	57.79	0.44	Peak	333	258
3	4871.60	30.48	54.00	-23.52	23.99	6.49	Average	242	0
4	4871.60	50.95	74.00	-23.05	44.46	6.49	Peak	242	0
5	7307.40	40.36	54.00	-13.64	28.62	11.74	Average	304	344
6	7307.40	60.83	74.00	-13.17	49.09	11.74	Peak	304	344
7	12179.00	43.52	54.00	-10.48	27.19	16.33	Average	244	228
8	12179.00	63.99	74.00	-10.01	47.66	16.33	Peak	244	228

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

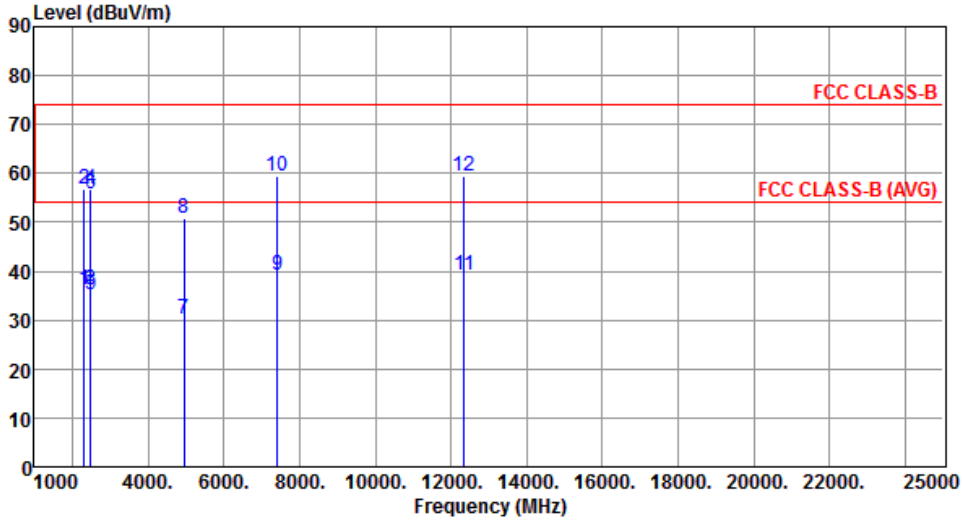
Modulation	FHSS	Test Freq. (MHz)	2470.9
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2315.00	39.46	54.00	-14.54	39.03	0.43	Average	103	355
2	2315.00	59.93	74.00	-14.07	59.50	0.43	Peak	103	355
3	2484.00	39.81	54.00	-14.19	39.56	0.25	Average	103	355
4	2484.00	60.28	74.00	-13.72	60.03	0.25	Peak	103	355
5	2497.00	39.10	54.00	-14.90	38.85	0.25	Average	103	355
6	2497.00	59.57	74.00	-14.43	59.32	0.25	Peak	103	355
7	4941.80	32.47	54.00	-21.53	25.87	6.60	Average	230	11
8	4941.80	52.94	74.00	-21.06	46.34	6.60	Peak	230	11
9	7412.70	36.98	54.00	-17.02	25.18	11.80	Average	205	325
10	7412.70	57.45	74.00	-16.55	45.65	11.80	Peak	205	325
11	12354.50	37.71	54.00	-16.29	21.78	15.93	Average	100	50
12	12354.50	58.18	74.00	-15.82	42.25	15.93	Peak	100	50

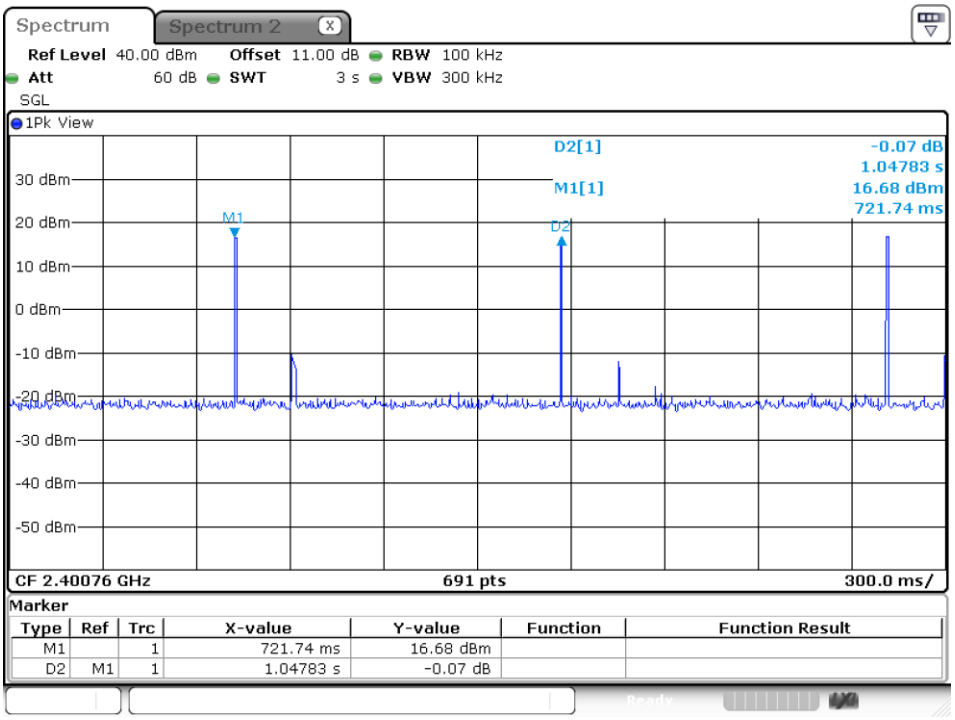
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

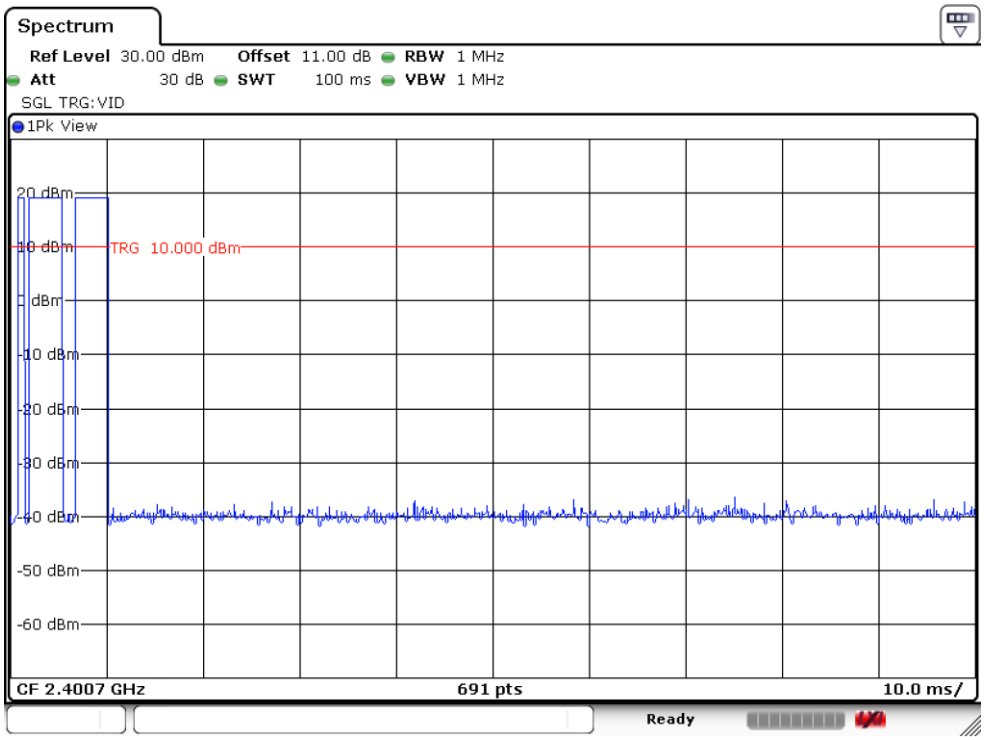
Modulation	FHSS	Test Freq. (MHz)	2470.9
Polarization	Vertical		

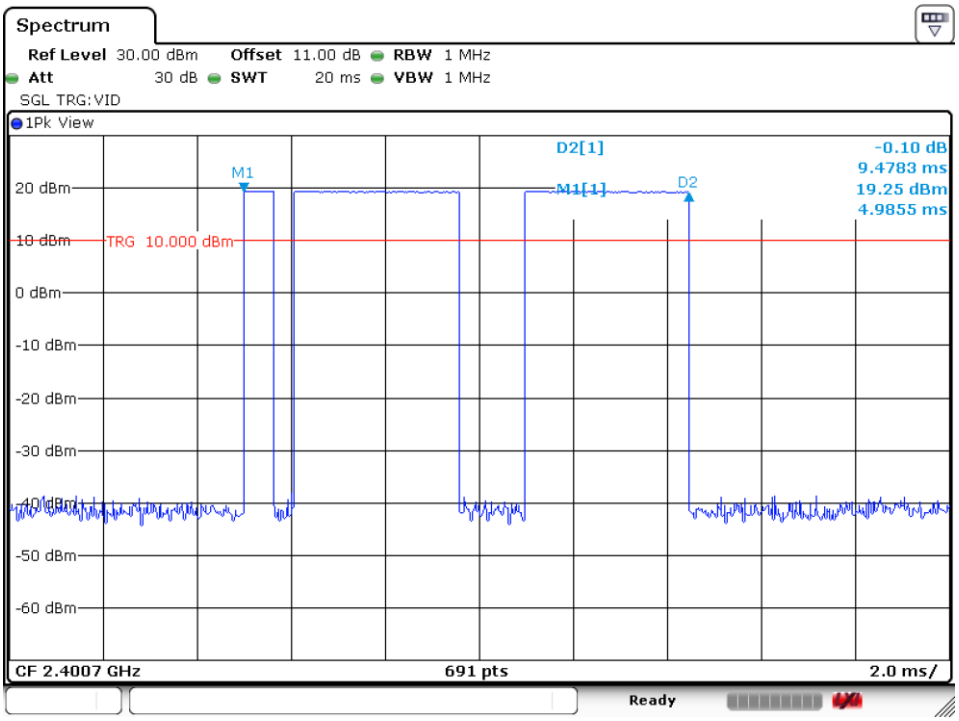


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2315.00	36.21	54.00	-17.79	35.78	0.43	Average	339	254
2	2315.00	56.68	74.00	-17.32	56.25	0.43	Peak	339	254
3	2484.00	36.18	54.00	-17.82	35.93	0.25	Average	339	254
4	2484.00	56.65	74.00	-17.35	56.40	0.25	Peak	339	254
5	2497.00	35.26	54.00	-18.74	35.01	0.25	Average	339	254
6	2497.00	55.73	74.00	-18.27	55.48	0.25	Peak	339	254
7	4941.80	30.38	54.00	-23.62	23.78	6.60	Average	241	3
8	4941.80	50.85	74.00	-23.15	44.25	6.60	Peak	241	3
9	7412.70	39.09	54.00	-14.91	27.29	11.80	Average	316	344
10	7412.70	59.56	74.00	-14.44	47.76	11.80	Peak	316	344
11	12354.50	39.06	54.00	-14.94	23.13	15.93	Average	229	233
12	12354.50	59.53	74.00	-14.47	43.60	15.93	Peak	229	233

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).


Spectrum
Spectrum 2
Ref Level 40.00 dBm Offset 11.00 dB RBW 100 kHz
Att 60 dB SWT 3 s VBW 300 kHz
SGL
1Pk View
D2[1] -0.07 dB
1.04783 s
M1[1] 16.68 dBm
721.74 ms
30 dBm
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
M1
D2
CF 2.40076 GHz 691 pts 300.0 ms/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 721.74 ms 16.68 dBm
D2 M1 1 1.04783 s -0.07 dB


Spectrum
Ref Level 30.00 dBm Offset 11.00 dB RBW 1 MHz
Att 30 dB SWT 100 ms VBW 1 MHz
SGL TRG:VID
1Pk View
20 dBm
10 dBm
TRG 10.000 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.4007 GHz 691 pts 10.0 ms/
Ready



$$20\log(\text{Duty cycle}) = 20\log\frac{9.4783*1\text{ms}}{100\text{ ms}} = -20.47\text{dB}$$

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 Corp (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	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, 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: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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