ISED Test Report

IC	:	**3147A-BL5340PA**
Equipment	:	**Bluetooth 5.2 BLE + 802.15.4 + NFC Module**
Model No.	:	**BL5340PA Series**
Brand Name	:	**Laird Connectivity**
Applicant	:	**Laird Connectivity LLC**
Address	:	**W66N220 Commerce Court, Cedarburg, WI 53012 United States Of America**
Manufacturer	:	**Laird Connectivity LLC**
Address	:	**W66N220 Commerce Court, Cedarburg, Wisconsin 53012, USA**
Standard	:	**RSS-247 Issue 2 February 2017**
Received Date	:	**Oct. 04, 2021**
Tested Date	:	**Nov. 14, 2022 ~ Jan. 30, 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
CR1O0405	Rev. 01	Initial issue	Mar. 24, 2023

Summary of Test Results

IC Rules	Test Items	Measured	Result
RSS-Gen Section 8.8	AC Power Line Conducted Emissions	[dBuV]: 2.396MHz 28.36 (Margin -17.64dB) - AV	Pass
RSS-247 Section 5.5 RSS-Gen Section 8.9	Unwanted Emissions	[dBuV/m at 3m]: 41.64MHz 31.99 (Margin -8.01dB) - PK	Pass
RSS-247 Section 5.4 (d)	Conducted Output Power	Power [dBm]: 21.10 Margin -8.9 dB	Pass
RSS-247 Section 5.2 (a)	6dB Bandwidth	Meet the requirement of limit Margin -0.969 MHz	Pass
RSS-247 Section 5.2 (b)	Power Spectral Density	Meet the requirement of limit Margin -8.05 dB	Pass
N/A	Antenna Requirement	Meet the requirement of limit	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

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	**Mode**	**Ch. Frequency (MHz)**	**Channel Number**	**Data Rate**
2400~2483.5	802.15.4	2405~2480	11-26 [16]	250kbps
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. Note 2: 802.15.4 uses DSSS-OQPSK modulation.				

1.1.2 Antenna Details

Ant. No.	Brand	Model	Type	Connector	2400-2500MHz	2400-2480MHz	Remarks
					Gain (dBi)		
1	Laird	NanoBlue	PCB Dipole	IPEX MHF4	2	---	External
2	Laird	FlexPIFA	PCB Dipole	IPEX MHF4	---	2	External
3	Mag.Layers	EDA-8709-2G4C1-B27-CY	Dipole	IPEX MHF4	2	---	External
4	Laird	mFlexPIFA	PIFA	IPEX MHF4	---	2	External
5	Laird	Laird NFC	spiral	---	---	---	Internal + External
6	Laird	BL5340 onboard printed PCB Trace antenna	Printed PCB	---	1.49	---	Internal
7	Laird	i-FlexPIFA	Inverted Ground Flexible Planar Inverted F Antenna (i-FlexPIFA)	---	---	3.1	External

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3Vdc from host		
Operational Voltage	☐ Vnom (3.30 Vdc)	☒ Vmax (3.60 Vdc)	☒ Vmin (3.00 Vdc)

1.1.4 Accessories

N/A

1.1.5 Test Sample Information

Serial Number of Test Sample	Radiated Emission: 940-00179_00008 AC Power Line Conducted Emission: 940-00179_00008 Antenna Port Conducted: 940-00179_00008 940-00164_00013

1.1.6 Channel List

Channel No.	Frequency (MHz)
11	2405
12	2410
13	2415
14	2420
15	2425
16	2430
17	2435
18	2440
19	2445
20	2450
21	2455
22	2460
23	2465
24	2470
25	2475
26	2480

1.1.7 Test Tool and Duty Cycle

Test Tool	Tera Term, Version: 4.74	
Duty Cycle and Duty Factor	**Duty Cycle Of Test Signal (%)**	**Duty Factor (dB)**
	100.00%	0

1.1.8 Power Index of Test Tool

External antenna

Modulation Mode	Test Frequency (MHz)	Power Index	
		Main chip (nRF5340)	FEM chip (nRF21540)
OQPSK	2405	pos0dBm	25(Gain=20)
OQPSK	2440	pos0dBm	25(Gain=20)
OQPSK	2475	neg8dBm	25(Gain=20)
OQPSK	2480	neg40dBm	25(Gain=20)

Internal antenna

Modulation Mode	Test Frequency (MHz)	Power Index	
		Main chip (nRF5340)	FEM chip (nRF21540)
OQPSK	2405	pos0dBm	25(Gain=20)
OQPSK	2440	pos0dBm	25(Gain=20)
OQPSK	2475	neg7dBm	25(Gain=20)
OQPSK	2480	neg40dBm	25(Gain=20)

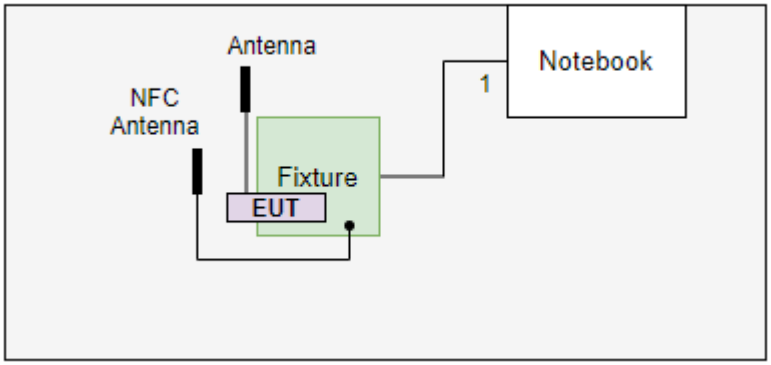
Note:
BL5340PA modules certified with FIXED default nRF21540 TX_Gain=POUTA_PROD=20dB±0.5dB (which is the TX_Gain value stored in the nRF21540 chip production by Nordic per chip to chip to hit the TX_Gain=POUTA_PROD=20dB±0.5dB). This particular certification sample had Nordic calibrated and stored TX_Gain value in decimal of 25." "BL5340PA consists of nRF5340 chip RF driving the nRF21540 Front end module (FEM) which is used in 20dB FIXED TX_Gain mode.

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
1	Notebook	DELL	Latitude E5470	DoC	---
2	50Ω terminator	---	---	---	---
3	Fixture	---	---	---	Provided by applicant.
4	USB Cable	ICC	micro to A	---	---

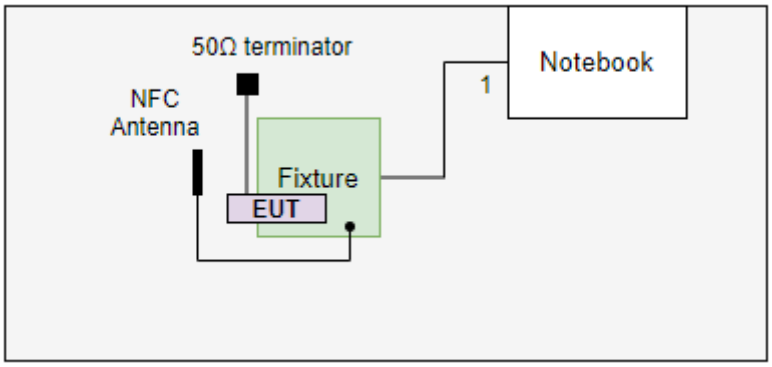
1.3 Test Setup Chart

Test Setup Diagram – conducted emission



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

Test Setup Diagram – radiated emission



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

1.4 Test Equipment List and Calibration Data

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Jan. 30, 2023				
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	Schwarzbeck 8127	8127666	Feb. 15, 2022	Feb. 14, 2023
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 17, 2022	Oct. 16, 2023
50 ohm terminal (Support Unit)	NA	50	01	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. 15, 2022 ~ Nov. 16, 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. 14, 2022 ~ Jan. 03, 2023				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101910	Apr. 08, 2022	Apr. 07, 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

RSS-247 Issue 2 February 2017
RSS-Gen Issue 5 February 2021 Amendment 2
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**
Bandwidth	±34.130 Hz
Conducted power	±0.808 dB
Power density	±0.583 dB
Conducted emission	±2.715 dB
AC conducted emission	±2.92 dB
Unwanted Emission ≤ 1GHz	±3.96 dB
Unwanted Emission > 1GHz	±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 33381, 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

Test item	Mode	Test Frequency (MHz)	Data Rate	Conducted / Radiated measurement	Test Configuration
AC Power Line Conducted Emissions	OQPSK	2405	250kbps	Conducted	1 Note2, 2 Note2
Unwanted Emissions ≤ 1GHz (Conducted)	OQPSK	2405	250kbps	Conducted	1 Note2, 2 Note2
Unwanted Emissions > 1GHz (Conducted)	OQPSK	2405 / 2440 / 2475 / 2480	250kbps	Conducted	1 Note2, 2 Note2
Unwanted Emissions ≤ 1GHz (Radiated)	OQPSK	2405	250kbps	Radiated	1 Note3
Unwanted Emissions > 1GHz (Radiated)	OQPSK	2405 / 2440 / 2475 / 2480 2475	250kbps 250kbps	Radiated	1 Note2,3 2 Note2,3
Conducted Output Power 6dB bandwidth Power spectral density	OQPSK	2405 / 2440 / 2475 / 2480 2475	250kbps 250kbps	Conducted	1 Note2 2 Note2

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** result was found as the worst case and was shown in this report.
2. Test configurations are listed as below:
   1) Configuration 1: Power index of Internal antenna+ Laird NFC
   2) Configuration 2: Power index of External antenna (Model: i-FlexPIFA) + Laird NFC
3. The 50Ω terminators are connected to antenna port of EUT for radiated emission measurement.
4. VREQCNTRL turned off
5. nRF5340 chipset DCDC convertor Mode A : VREGRADIO DCDC on / VRERGMAIN DCDC on / VREGH DCDC on

   nRF5340 chipset DCDC convertor Mode B : VREGRADIO DCDC off / VRERGMAIN DCDC off / VREGH DCDC off

   Mode A is the worst case

3 Transmitter Test Results

3.1 6dB and Occupied Bandwidth

3.1.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

3.1.2 Test Procedures

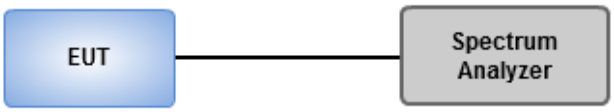
6dB Bandwidth

1. Set resolution bandwidth (RBW) = 1% to 5% of the anticipated emission, Video bandwidth = 3x the RBW.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

Occupied Bandwidth

1. Set resolution bandwidth (RBW) = 1% ~ 5 % of OBW, Video bandwidth = 3 x RBW
2. Detector = Sample, Trace mode = max hold.
3 Sweep = auto couple, Allow the trace to stabilize.
4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

3.1.3 Test Setup



3.1.4 Test Results

Ambient Condition	24-25°C / 61-65%	**Tested By**	Roger Lu

Refer to Appendix A.

3.2 Conducted Output Power

3.2.1 Limit of Conducted Output Power

Conducted power shall not exceed 1Watt.

Antenna gain <= 6dBi, no any corresponding reduction is in output power limit.

3.2.2 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.

3.2.3 Test Setup

3.2.4 Test Results

Ambient Condition	24-25°C / 61-65%	**Tested By**	Roger Lu

Refer to Appendix B.

3.3 Power Spectral Density

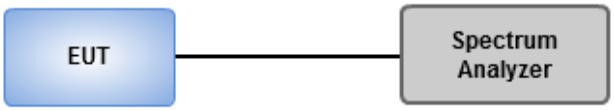
3.3.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

3.3.2 Test Procedures

1. Set the RBW = 3 kHz, VBW = 10 kHz.
2. Detector = Peak, Sweep time = auto couple.
3. Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

3.3.3 Test Setup



3.3.4 Test Results

Ambient Condition	24-25°C / 61-65%	**Tested By**	Roger Lu

Refer to Appendix C.

3.4 Unwanted Emissions in Restricted Frequency Bands

3.4.1 Limit of Unwanted Emissions in 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.

3.4.2 Test Procedures

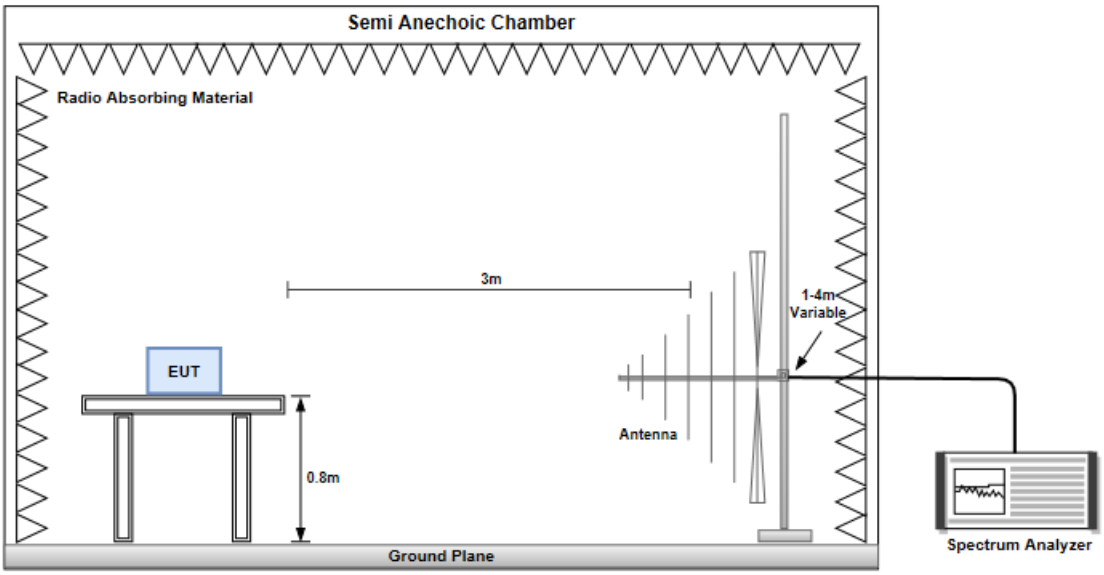
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

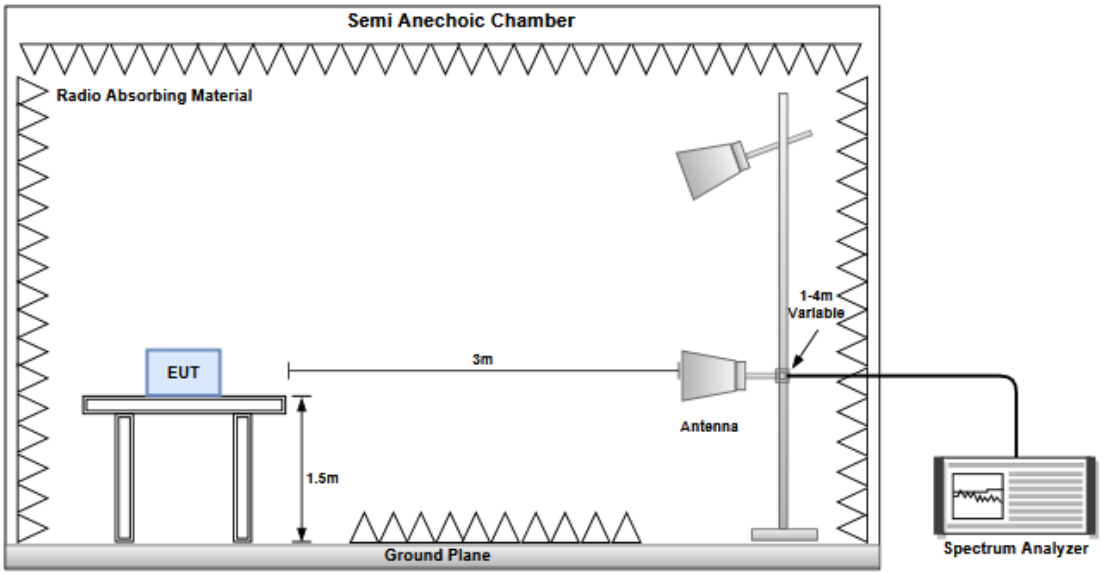
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.4.3 Test Setup

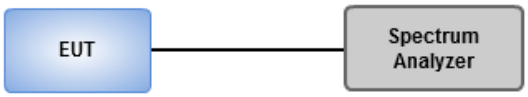
Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



Transmitter Conducted Unwanted Emissions (30MHz~40GHz)



3.4.4 Test Results

Refer to Appendix D.

3.5 Emissions in non-restricted Frequency Bands

3.5.1 Emissions in non-restricted frequency bands limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

3.5.2 Test Procedures

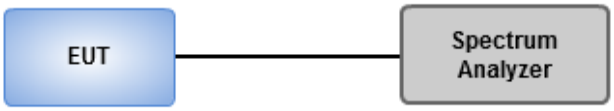
Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

Emission level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

3.5.3 Test Setup



3.5.4 Test Results

Ambient Condition	24-25°C / 61-65%	**Tested By**	Roger Lu

Refer to Appendix E.

3.6 AC Power Line Conducted Emissions

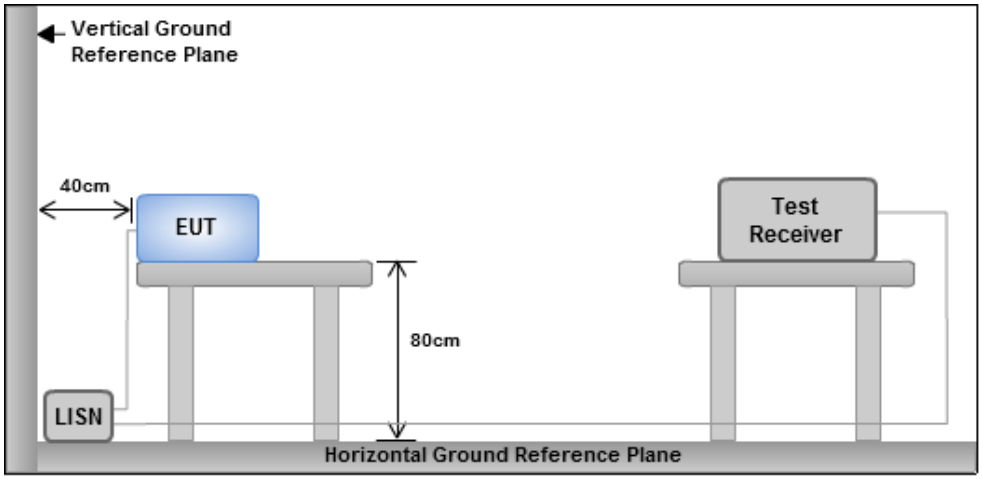
3.6.1 Limit of AC Power Line Conducted Emissions

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.		

3.6.2 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

3.6.3 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

3.6.4 Test Results

Refer to Appendix F.

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: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

═END═

External antenna

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
802.15.4	1.55M	2.363M	2M36D1D	1.55M	2.363M

Max-N dB = Maximum 6dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth\

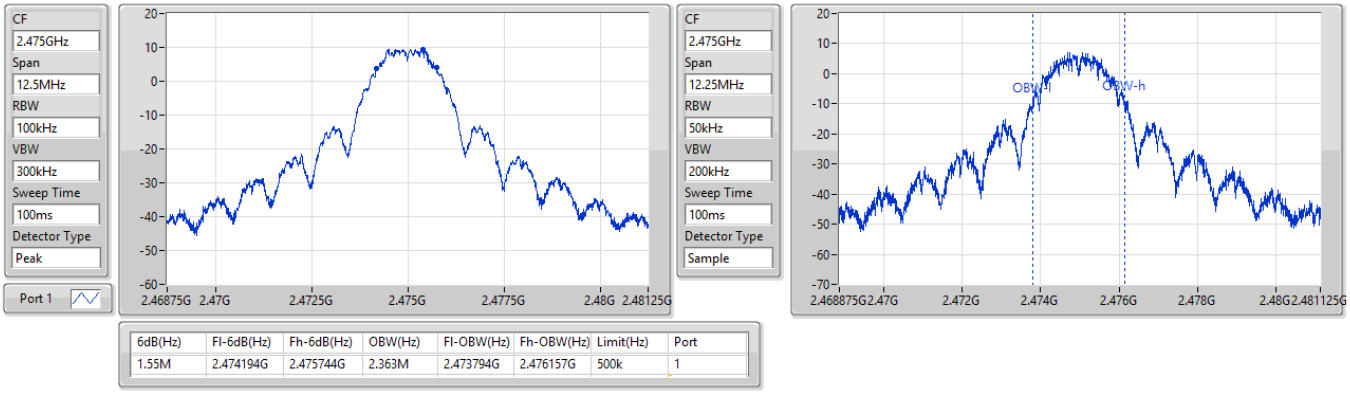
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
802.15.4	-	-	-	-
2475MHz	Pass	500k	1.55M	2.363M

Port X-N dB = Port X 6dB down bandwidth;
Port X-OBW = Port X 99% occupied bandwidth

2.4-2.4835GHz_802.15.4 **EBW**

2475MHz



Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.15.4	13.44	0.02208

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
802.15.4	-	-	-	-	-
2475MHz	Pass	3.10	13.44	13.44	30.00

DG = Directional Gain; Port X = Port X output power
Note : Conducted average output power is for reference

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
802.15.4	-7.91

RBW = 3kHz;

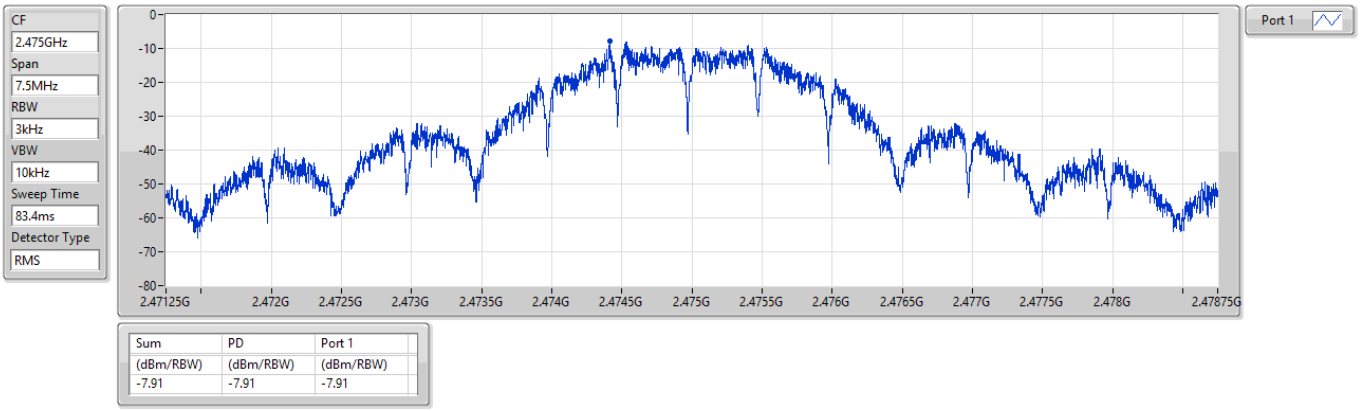
Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
802.15.4	-	-	-	-	-
2475MHz	Pass	3.10	-7.91	-7.91	8.00

DG = Directional Gain; RBW = 3kHz;
PD = Power density; Port X = Port X Power Density;

2.4-2.4835GHz_802.15.4 **PSD**

2475MHz



Transmitter Conducted Unwanted Emissions (30MHz ~ 1GHz)

Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	GRF (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2.4-2.4835GHz	-	-	-	-	-	-	-	-		-	-	-
802.15.4	Pass	30M	1G	PK	38M	3.10	-79.06	-79.06	4.7	-71.26	-55.20	-16.06

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

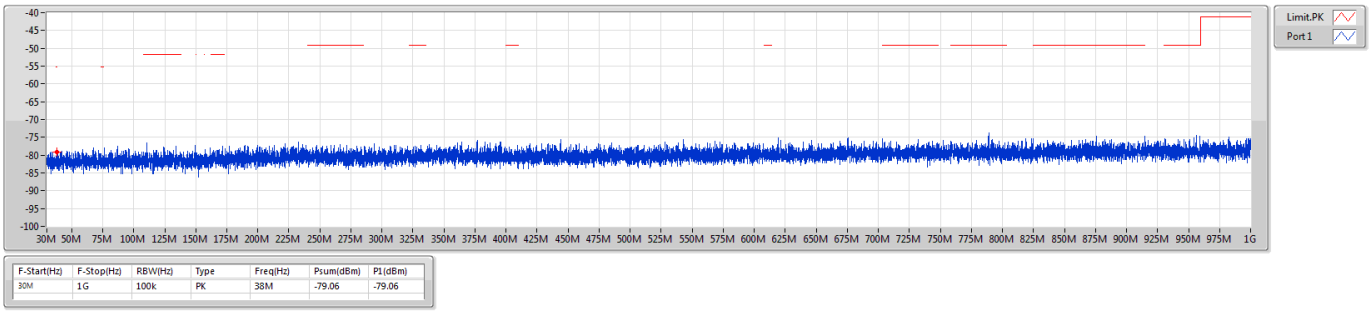
Result

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	GRF (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
802.15.4	-	-	-	-	-	-	-	-		-	-	-
2405MHz	Pass	30M	1G	PK	38M	3.10	-79.06	-79.06	4.7	-71.26	-55.20	-16.06

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

2.4-2.4835GHz_802.15.4 **CSE Other [PK]**

2405MHz



Transmitter Conducted Unwanted Emissions (1GHz ~ 3.1GHz)

Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.15.4	Pass	2.4835G	2.5G	AV	2.4835G	3.10	-47.57	-47.57	-44.47	-41.20	-3.27

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

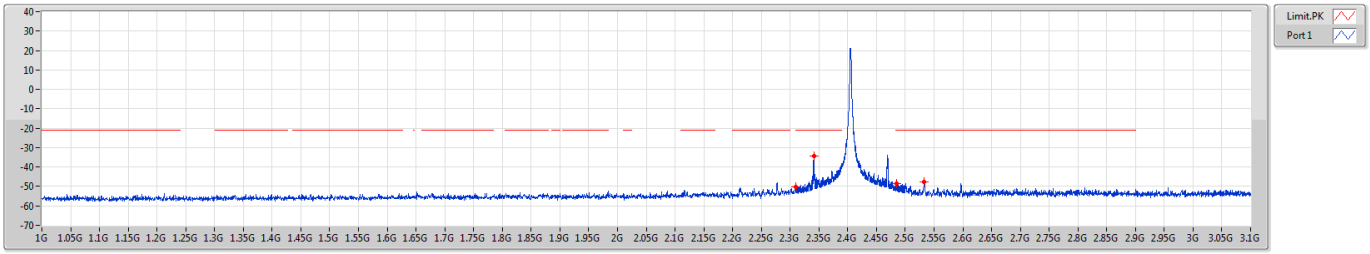
Result

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
802.15.4	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	1G	2.31G	AV	2.31G	3.10	-59.16	-59.16	-56.06	-41.20	-14.86
2405MHz	Pass	2.31G	2.39G	AV	2.38924G	3.10	-49.35	-49.35	-46.25	-41.20	-5.05
2405MHz	Pass	2.4835G	2.5G	AV	2.48462G	3.10	-60.13	-60.13	-57.03	-41.20	-15.83
2405MHz	Pass	2.5G	3.1G	AV	2.5327G	3.10	-54.17	-54.17	-51.07	-41.20	-9.87
2405MHz	Pass	1G	2.31G	PK	2.31G	3.10	-50.03	-50.03	-46.93	-21.20	-25.73
2405MHz	Pass	2.31G	2.39G	PK	2.3412G	3.10	-34.55	-34.55	-31.45	-21.20	-10.25
2405MHz	Pass	2.4835G	2.5G	PK	2.48553G	3.10	-48.72	-48.72	-45.62	-21.20	-24.42
2405MHz	Pass	2.5G	3.1G	PK	2.5333G	3.10	-47.80	-47.80	-44.70	-21.20	-23.50
2440MHz	Pass	1G	2.31G	AV	2.31G	3.10	-62.62	-62.62	-59.52	-41.20	-18.32
2440MHz	Pass	2.31G	2.39G	AV	2.31196G	3.10	-54.79	-54.79	-51.69	-41.20	-10.49
2440MHz	Pass	2.4835G	2.5G	AV	2.48791G	3.10	-55.44	-55.44	-52.34	-41.20	-11.14
2440MHz	Pass	2.5G	3.1G	AV	2.5039G	3.10	-55.50	-55.50	-52.40	-41.20	-11.20
2440MHz	Pass	1G	2.31G	PK	2.31G	3.10	-53.59	-53.59	-50.49	-21.20	-29.29
2440MHz	Pass	2.31G	2.39G	PK	2.37624G	3.10	-32.64	-32.64	-29.54	-21.20	-8.34
2440MHz	Pass	2.4835G	2.5G	PK	2.4878G	3.10	-44.49	-44.49	-41.39	-21.20	-20.19
2440MHz	Pass	2.5G	3.1G	PK	2.5045G	3.10	-35.41	-35.41	-32.31	-21.20	-11.11
2475MHz	Pass	1G	2.31G	AV	2.31G	3.10	-63.48	-63.48	-60.38	-41.20	-19.18
2475MHz	Pass	2.31G	2.39G	AV	2.3468G	3.10	-57.44	-57.44	-54.34	-41.20	-13.14
2475MHz	Pass	2.4835G	2.5G	AV	2.4835G	3.10	-47.57	-47.57	-44.47	-41.20	-3.27
2475MHz	Pass	2.5G	3.1G	AV	2.5069G	3.10	-57.60	-57.60	-54.50	-41.20	-13.30
2475MHz	Pass	1G	2.31G	PK	2.31G	3.10	-54.19	-54.19	-51.09	-21.20	-29.89
2475MHz	Pass	2.31G	2.39G	PK	2.34748G	3.10	-49.26	-49.26	-46.16	-21.20	-24.96
2475MHz	Pass	2.4835G	2.5G	PK	2.48352G	3.10	-35.29	-35.29	-32.19	-21.20	-10.99
2475MHz	Pass	2.5G	3.1G	PK	2.5393G	3.10	-43.30	-43.30	-40.20	-21.20	-19.00
2480MHz	Pass	1G	2.31G	AV	2.31G	3.10	-64.40	-64.40	-61.30	-41.20	-20.10
2480MHz	Pass	2.31G	2.39G	AV	2.34588G	3.10	-63.82	-63.82	-60.72	-41.20	-19.52
2480MHz	Pass	2.4835G	2.5G	AV	2.4835G	3.10	-58.71	-58.71	-55.61	-41.20	-14.41
2480MHz	Pass	2.5G	3.1G	AV	2.5987G	3.10	-63.55	-63.55	-60.45	-41.20	-19.25
2480MHz	Pass	1G	2.31G	PK	2.31G	3.10	-56.33	-56.33	-53.23	-21.20	-32.03
2480MHz	Pass	2.31G	2.39G	PK	2.33272G	3.10	-52.20	-52.20	-49.10	-21.20	-27.90
2480MHz	Pass	2.4835G	2.5G	PK	2.48352G	3.10	-47.82	-47.82	-44.72	-21.20	-23.52
2480MHz	Pass	2.5G	3.1G	PK	2.5603G	3.10	-52.10	-52.10	-49.00	-21.20	-27.80

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

2.4-2.4835GHz_802.15.4 **CSE Bandedge [PK]**

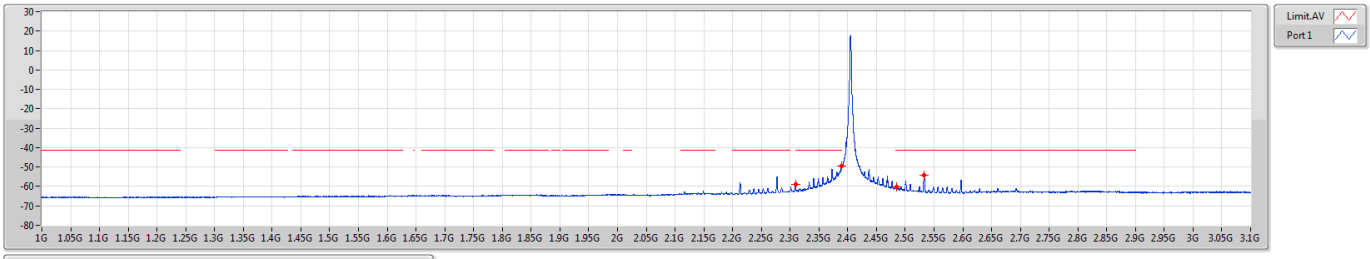
2405MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	PK	2.31G	-50.03	-50.03
2.31G	2.39G	1M	PK	2.3412G	-34.55	-34.55
2.4835G	2.5G	1M	PK	2.48553G	-48.72	-48.72
2.5G	3.1G	1M	PK	2.5333G	-47.80	-47.80

2.4-2.4835GHz_802.15.4 **CSE Bandedge [AV]**

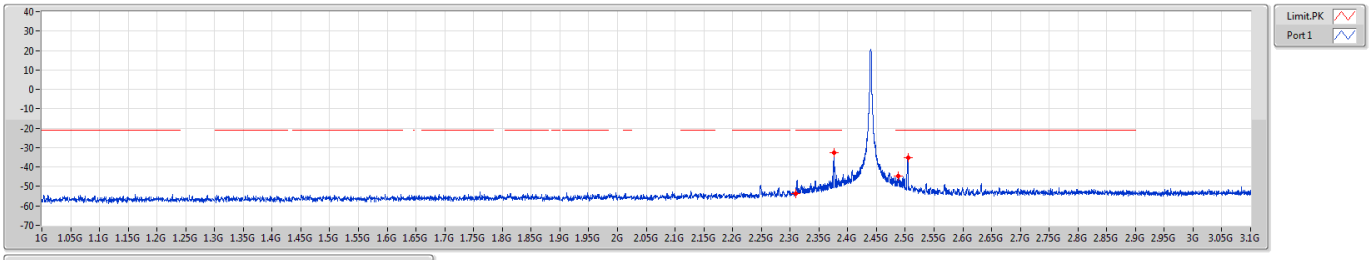
2405MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	AV	2.31G	-59.16	-59.16
2.31G	2.39G	1M	AV	2.38924G	-49.35	-49.35
2.4835G	2.5G	1M	AV	2.48462G	-60.13	-60.13
2.5G	3.1G	1M	AV	2.5327G	-54.17	-54.17

2.4-2.4835GHz_802.15.4 **CSE Bandedge [PK]**

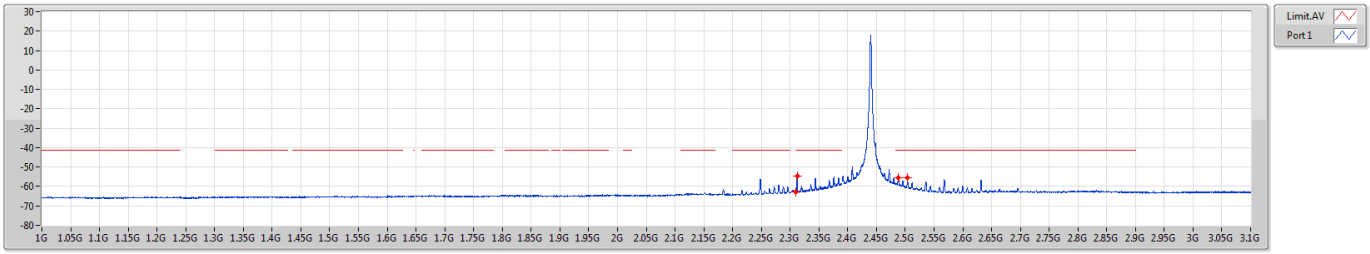
2440MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	PK	2.31G	-53.59	-53.59
2.31G	2.39G	1M	PK	2.37624G	-32.64	-32.64
2.4835G	2.5G	1M	PK	2.4878G	-44.49	-44.49
2.5G	3.1G	1M	PK	2.5045G	-35.41	-35.41

2.4-2.4835GHz_802.15.4 **CSE Bandedge [AV]**

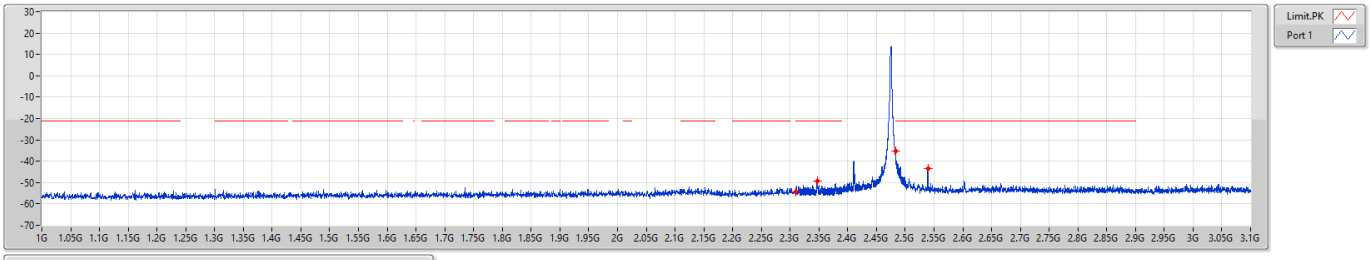
2440MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	AV	2.31G	-62.62	-62.62
2.31G	2.39G	1M	AV	2.31196G	-54.79	-54.79
2.4835G	2.5G	1M	AV	2.48791G	-55.44	-55.44
2.5G	3.1G	1M	AV	2.5039G	-55.50	-55.50

2.4-2.4835GHz_802.15.4 **CSE Bandedge [PK]**

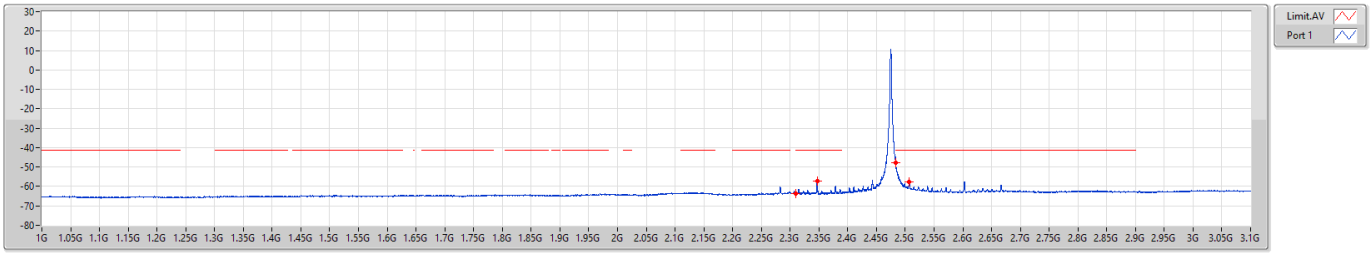
2475MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	PK	2.31G	-54.19	-54.19
2.31G	2.39G	1M	PK	2.34748G	-49.26	-49.26
2.4835G	2.5G	1M	PK	2.48352G	-35.29	-35.29
2.5G	3.1G	1M	PK	2.5393G	-43.30	-43.30

2.4-2.4835GHz_802.15.4 **CSE Bandedge [AV]**

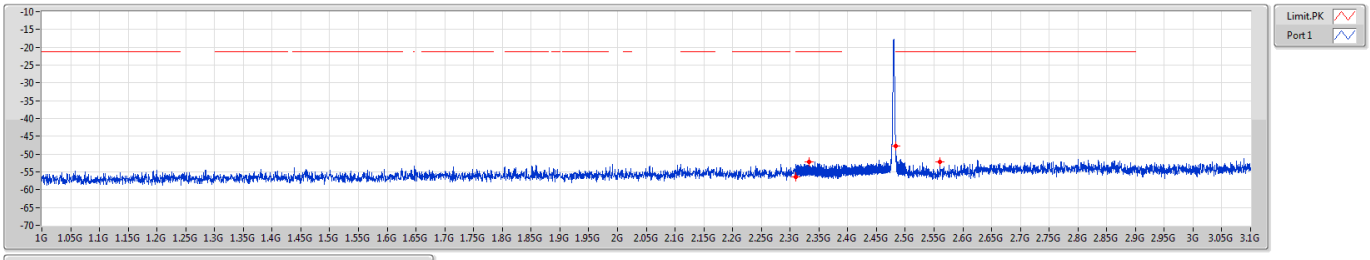
2475MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	AV	2.31G	-63.48	-63.48
2.31G	2.39G	1M	AV	2.3468G	-57.44	-57.44
2.4835G	2.5G	1M	AV	2.4835G	-47.57	-47.57
2.5G	3.1G	1M	AV	2.5069G	-57.60	-57.60

2.4-2.4835GHz_802.15.4 **CSE Bandedge [PK]**

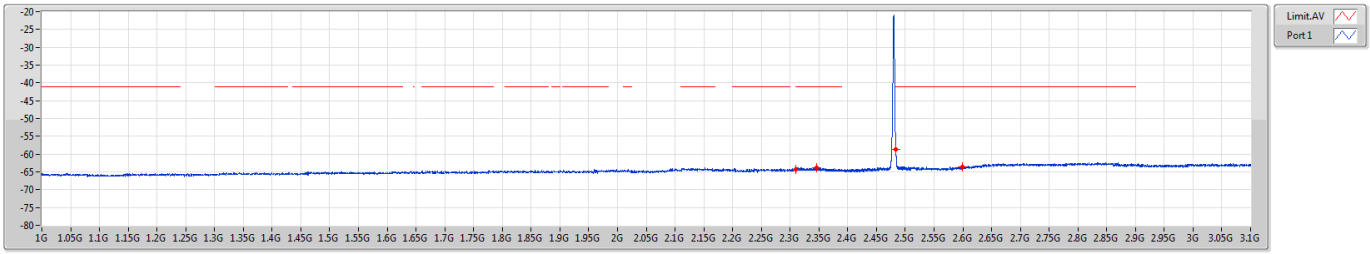
2480MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	PK	2.31G	-56.33	-56.33
2.31G	2.39G	1M	PK	2.33272G	-52.20	-52.20
2.4835G	2.5G	1M	PK	2.48352G	-47.82	-47.82
2.5G	3.1G	1M	PK	2.5603G	-52.10	-52.10

2.4-2.4835GHz_802.15.4 **CSE Bandedge [AV]**

2480MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	AV	2.31G	-64.40	-64.40
2.31G	2.39G	1M	AV	2.34588G	-63.82	-63.82
2.4835G	2.5G	1M	AV	2.4835G	-58.71	-58.71
2.5G	3.1G	1M	AV	2.5987G	-63.55	-63.55

Transmitter Conducted Unwanted Emissions (3.1GHz ~ 25GHz)

Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.15.4	Pass	4G	5G	AV	4.881G	3.10	-52.52	-52.52	-49.42	-41.20	-8.22

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

Result

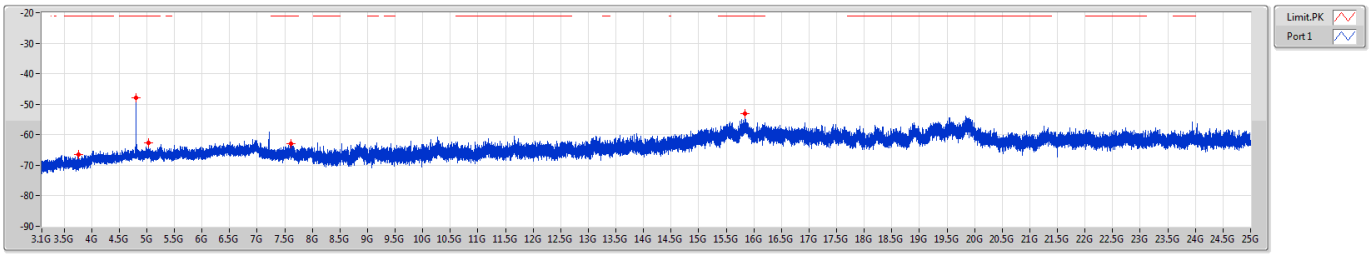
Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
802.15.4	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	3.1G	4G	AV	3.98695G	3.10	-75.85	-75.85	-72.75	-41.20	-31.55
2405MHz	Pass	4G	5G	AV	4.811G	3.10	-53.41	-53.41	-50.31	-41.20	-9.11
2405MHz	Pass	5G	7G	AV	5.0305G	3.10	-73.74	-73.74	-70.64	-41.20	-29.44
2405MHz	Pass	7G	8G	AV	7.631G	3.10	-73.37	-73.37	-70.27	-41.20	-29.07
2405MHz	Pass	8G	25G	AV	19.88194G	3.10	-63.63	-63.63	-60.53	-41.20	-19.33
2405MHz	Pass	3.1G	4G	PK	3.76825G	3.10	-66.59	-66.59	-63.49	-21.20	-42.29
2405MHz	Pass	4G	5G	PK	4.8115G	3.10	-47.98	-47.98	-44.88	-21.20	-23.68
2405MHz	Pass	5G	7G	PK	5.027G	3.10	-62.79	-62.79	-59.69	-21.20	-38.49
2405MHz	Pass	7G	8G	PK	7.609G	3.10	-62.96	-62.96	-59.86	-21.20	-38.66
2405MHz	Pass	8G	25G	PK	15.83966G	3.10	-52.97	-52.97	-49.87	-21.20	-28.67
2440MHz	Pass	3.1G	4G	AV	3.97615G	3.10	-75.95	-75.95	-72.85	-41.20	-31.65
2440MHz	Pass	4G	5G	AV	4.881G	3.10	-52.52	-52.52	-49.42	-41.20	-8.22
2440MHz	Pass	5G	7G	AV	5.237G	3.10	-73.65	-73.65	-70.55	-41.20	-29.35
2440MHz	Pass	7G	8G	AV	7.3185G	3.10	-66.61	-66.61	-63.51	-41.20	-22.31
2440MHz	Pass	8G	25G	AV	19.85803G	3.10	-63.47	-63.47	-60.37	-41.20	-19.17
2440MHz	Pass	3.1G	4G	PK	3.9271G	3.10	-65.90	-65.90	-62.80	-21.20	-41.60
2440MHz	Pass	4G	5G	PK	4.8795G	3.10	-46.73	-46.73	-43.63	-21.20	-22.43
2440MHz	Pass	5G	7G	PK	5.423G	3.10	-63.21	-63.21	-60.11	-21.20	-38.91
2440MHz	Pass	7G	8G	PK	7.3185G	3.10	-60.40	-60.40	-57.30	-21.20	-36.10
2440MHz	Pass	8G	25G	PK	19.84688G	3.10	-53.48	-53.48	-50.38	-21.20	-29.18
2475MHz	Pass	3.1G	4G	AV	3.98425G	3.10	-75.53	-75.53	-72.43	-41.20	-31.23
2475MHz	Pass	4G	5G	AV	4.949G	3.10	-60.14	-60.14	-57.04	-41.20	-15.84
2475MHz	Pass	5G	7G	AV	5.207G	3.10	-74.09	-74.09	-70.99	-41.20	-29.79
2475MHz	Pass	7G	8G	AV	7.4905G	3.10	-71.03	-71.03	-67.93	-41.20	-26.73
2475MHz	Pass	8G	25G	AV	19.1435G	3.10	-63.60	-63.60	-60.50	-41.20	-19.30
2475MHz	Pass	3.1G	4G	PK	3.8389G	3.10	-65.49	-65.49	-62.39	-21.20	-41.19
2475MHz	Pass	4G	5G	PK	4.9515G	3.10	-53.92	-53.92	-50.82	-21.20	-29.62
2475MHz	Pass	5G	7G	PK	5.3875G	3.10	-63.27	-63.27	-60.17	-21.20	-38.97
2475MHz	Pass	7G	8G	PK	7.4735G	3.10	-61.42	-61.42	-58.32	-21.20	-37.12
2475MHz	Pass	8G	25G	PK	18.86991G	3.10	-53.82	-53.82	-50.72	-21.20	-29.52
2480MHz	Pass	3.1G	4G	AV	3.982G	3.10	-75.89	-75.89	-72.79	-41.20	-31.59
2480MHz	Pass	4G	5G	AV	4.959G	3.10	-74.75	-74.75	-71.65	-41.20	-30.45
2480MHz	Pass	4G	5G	AV	4.9855G	3.10	-74.44	-74.44	-71.34	-41.20	-30.14
2480MHz	Pass	5G	7G	AV	5.2385G	3.10	-73.87	-73.87	-70.77	-41.20	-29.57
2480MHz	Pass	7G	8G	AV	7.602G	3.10	-73.39	-73.39	-70.29	-41.20	-29.09
2480MHz	Pass	8G	25G	AV	19.88353G	3.10	-63.49	-63.49	-60.39	-41.20	-19.19
2480MHz	Pass	3.1G	4G	PK	3.99415G	3.10	-65.37	-65.37	-62.27	-21.20	-41.07
2480MHz	Pass	4G	5G	PK	4.756G	3.10	-63.69	-63.69	-60.59	-21.20	-39.39
2480MHz	Pass	4G	5G	PK	4.959G	3.10	-64.82	-64.82	-61.72	-21.20	-40.52
2480MHz	Pass	5G	7G	PK	5.2185G	3.10	-64.01	-64.01	-60.91	-21.20	-39.71
2480MHz	Pass	7G	8G	PK	7.591G	3.10	-62.95	-62.95	-59.85	-21.20	-38.65

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2480MHz	Pass	8G	25G	PK	19.61259G	3.10	-54.29	-54.29	-51.19	-21.20	-29.99

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

2.4-2.4835GHz_802.15.4 **CSE [PK]**

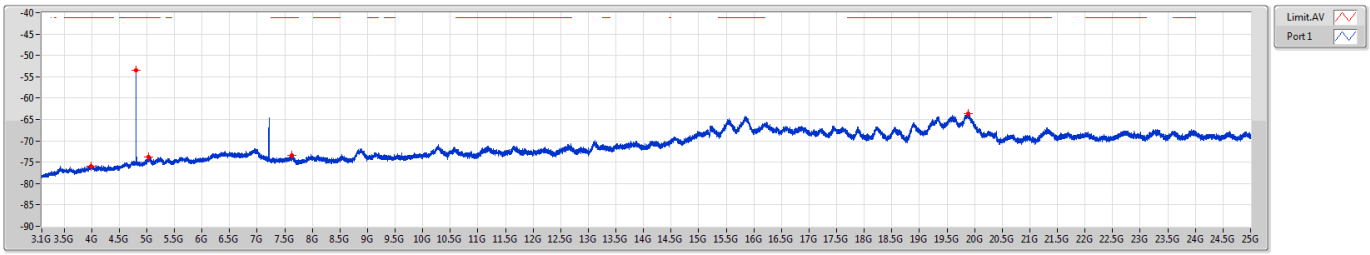
2405MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	PK	3.76825G	-66.59	-66.59
4G	5G	1M	PK	4.8115G	-47.98	-47.98
5G	7G	1M	PK	5.027G	-62.79	-62.79
7G	8G	1M	PK	7.609G	-62.96	-62.96
8G	25G	1M	PK	15.83966G	-52.97	-52.97

2.4-2.4835GHz_802.15.4 **CSE [AV]**

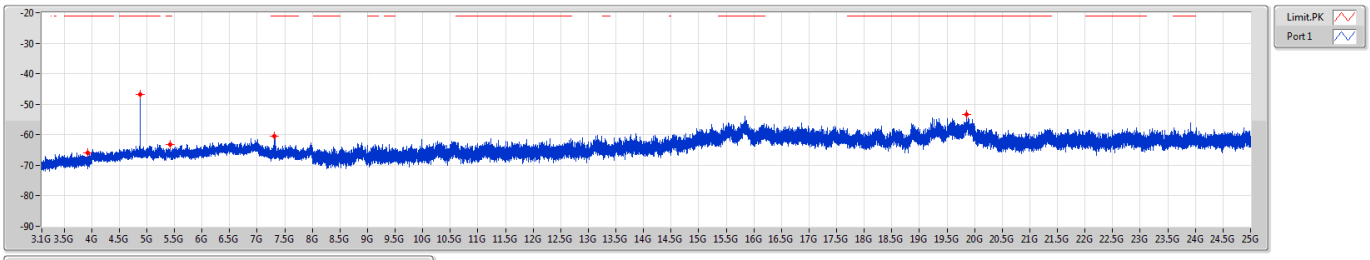
2405MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	AV	3.98695G	-75.85	-75.85
4G	5G	1M	AV	4.811G	-53.41	-53.41
5G	7G	1M	AV	5.0305G	-73.74	-73.74
7G	8G	1M	AV	7.631G	-73.37	-73.37
8G	25G	1M	AV	19.88194G	-63.63	-63.63

2.4-2.4835GHz_802.15.4 **CSE [PK]**

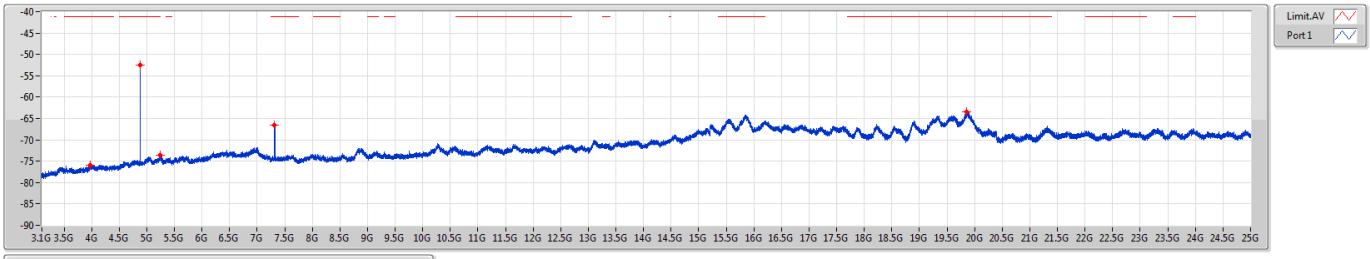
2440MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	PK	3.9271G	-65.90	-65.90
4G	5G	1M	PK	4.8795G	-46.73	-46.73
5G	7G	1M	PK	5.423G	-63.21	-63.21
7G	8G	1M	PK	7.3185G	-60.40	-60.40
8G	25G	1M	PK	19.84688G	-53.48	-53.48

2.4-2.4835GHz_802.15.4 **CSE [AV]**

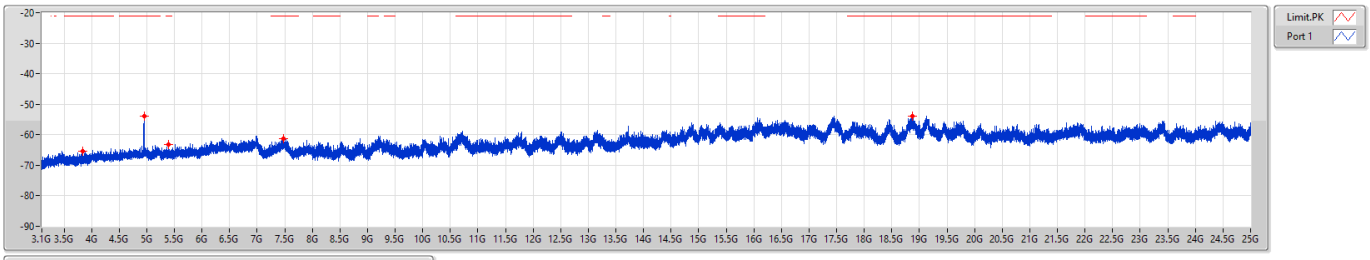
2440MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	AV	3.97615G	-75.95	-75.95
4G	5G	1M	AV	4.881G	-52.52	-52.52
5G	7G	1M	AV	5.237G	-73.65	-73.65
7G	8G	1M	AV	7.3185G	-66.61	-66.61
8G	25G	1M	AV	19.85803G	-63.47	-63.47

2.4-2.4835GHz_802.15.4 **CSE [PK]**

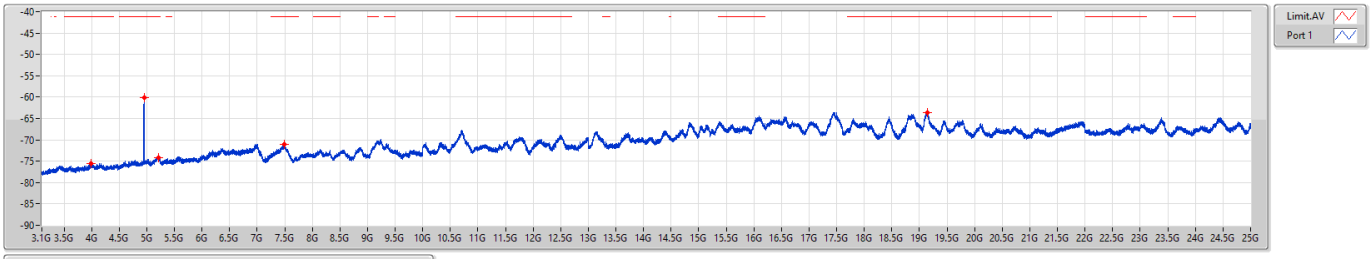
2475MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	PK	3.8389G	-65.49	-65.49
4G	5G	1M	PK	4.9515G	-53.92	-53.92
5G	7G	1M	PK	5.3875G	-63.27	-63.27
7G	8G	1M	PK	7.4735G	-61.42	-61.42
8G	25G	1M	PK	18.86991G	-53.82	-53.82

2.4-2.4835GHz_802.15.4 **CSE [AV]**

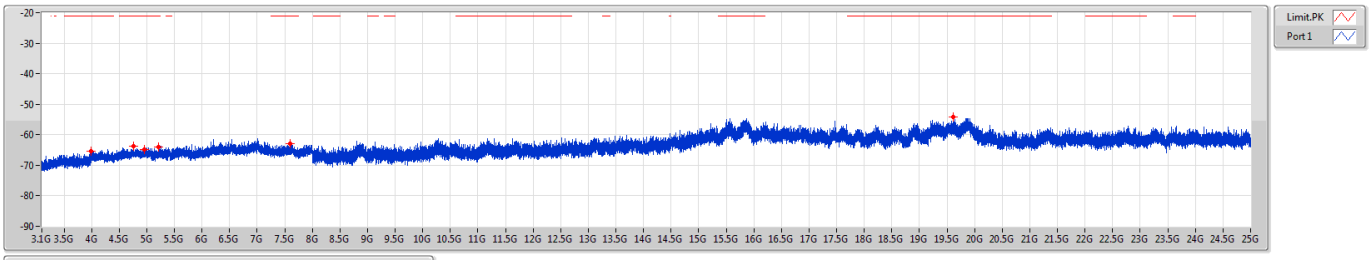
2475MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	AV	3.98425G	-75.53	-75.53
4G	5G	1M	AV	4.949G	-60.14	-60.14
5G	7G	1M	AV	5.207G	-74.09	-74.09
7G	8G	1M	AV	7.4905G	-71.03	-71.03
8G	25G	1M	AV	19.1435G	-63.60	-63.60

2.4-2.4835GHz_802.15.4 **CSE [PK]**

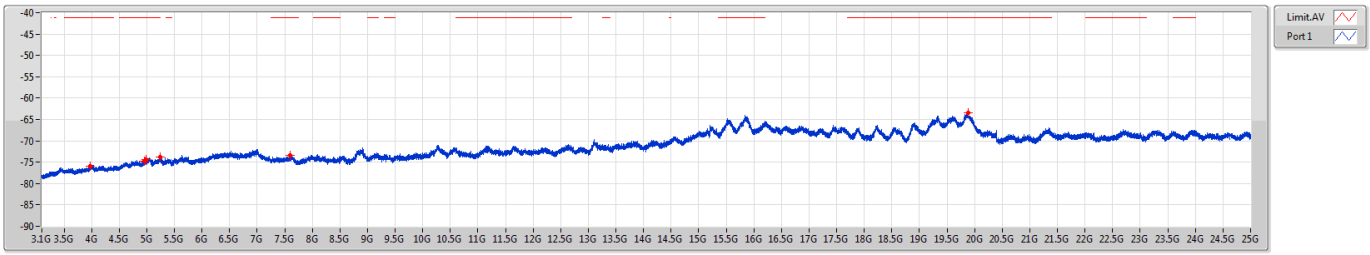
2480MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	PK	3.99415G	-65.37	-65.37
4G	5G	1M	PK	4.756G	-63.69	-63.69
4G	5G	1M	PK	4.959G	-64.82	-64.82
5G	7G	1M	PK	5.2185G	-64.01	-64.01
7G	8G	1M	PK	7.591G	-62.95	-62.95
8G	25G	1M	PK	19.61259G	-54.29	-54.29

2.4-2.4835GHz_802.15.4 **CSE [AV]**

2480MHz



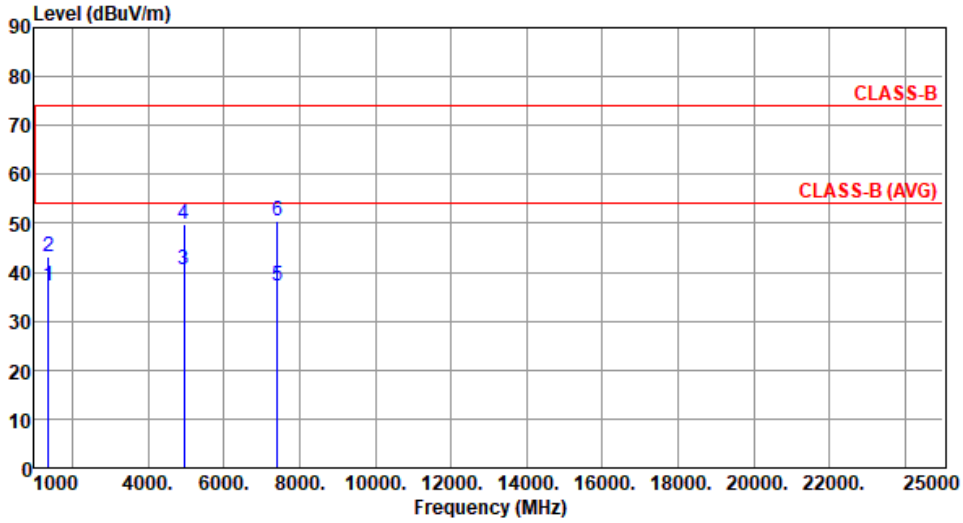
F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	AV	3.982G	-75.89	-75.89
4G	5G	1M	AV	4.959G	-74.75	-74.75
4G	5G	1M	AV	4.9855G	-74.44	-74.44
5G	7G	1M	AV	5.2385G	-73.87	-73.87
7G	8G	1M	AV	7.602G	-73.39	-73.39
8G	25G	1M	AV	19.88353G	-63.49	-63.49

External antenna

Unwanted Emissions (Above 1GHz)

Modulation	OQPSK	**Test Freq. (MHz)**	2475
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

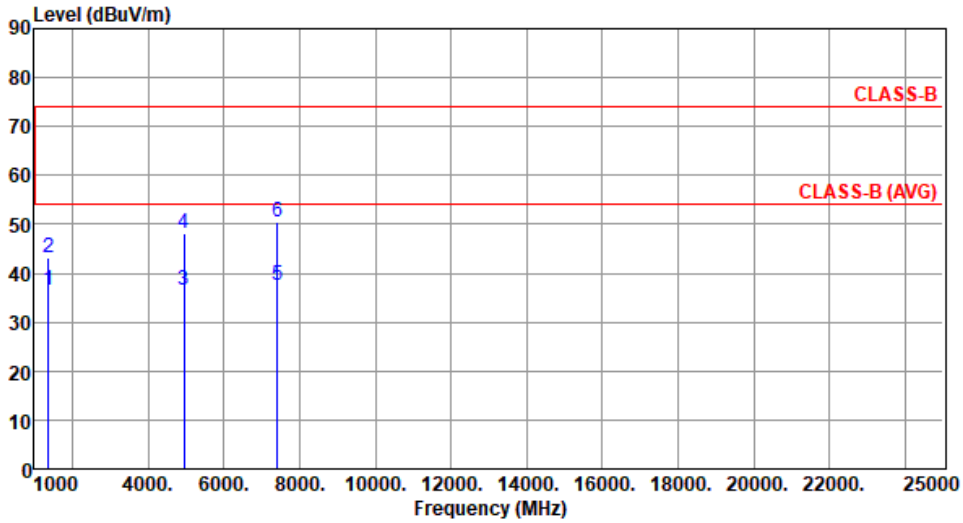


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	37.18	54.00	-16.82	43.19	-6.01	Average	126	315
2	1375.00	43.25	74.00	-30.75	49.26	-6.01	Peak	126	315
3	4950.00	40.58	54.00	-13.42	40.65	-0.07	Average	197	46
4	4950.00	49.96	74.00	-24.04	50.03	-0.07	Peak	197	46
5	7425.00	37.15	54.00	-16.85	31.51	5.64	Average	100	184
6	7425.00	50.49	74.00	-23.51	44.85	5.64	Peak	100	184

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	OQPSK	**Test Freq. (MHz)**	2475
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

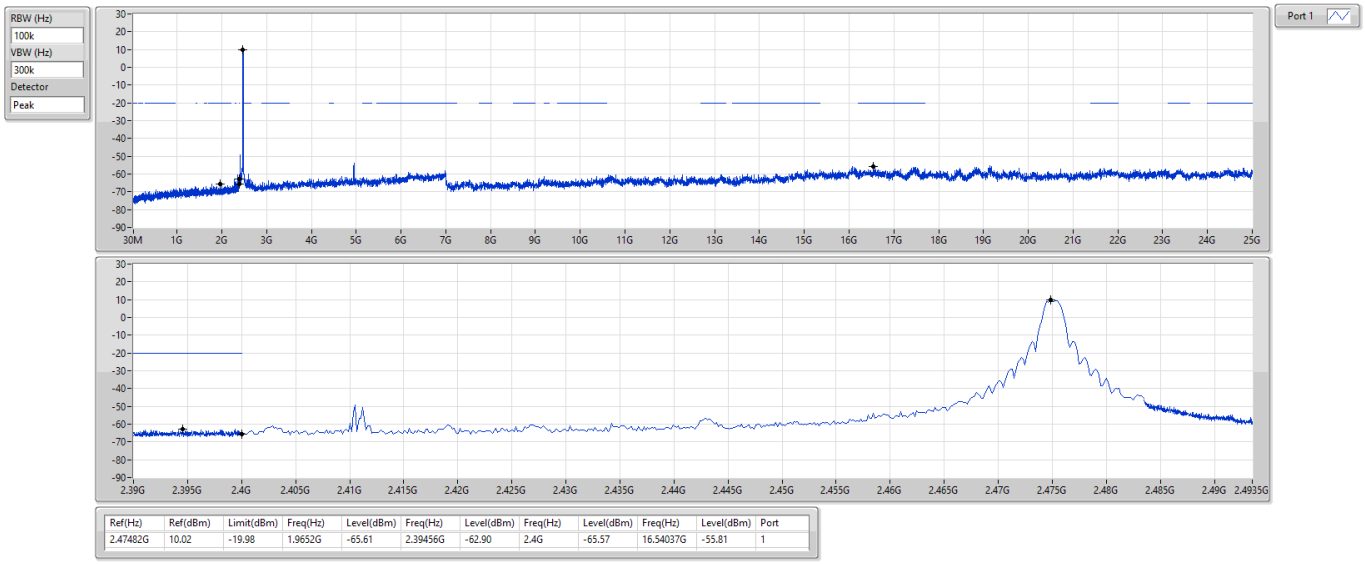


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	36.69	54.00	-17.31	42.70	-6.01	Average	106	213
2	1375.00	43.12	74.00	-30.88	49.13	-6.01	Peak	106	213
3	4950.00	36.57	54.00	-17.43	36.64	-0.07	Average	190	76
4	4950.00	48.15	74.00	-25.85	48.22	-0.07	Peak	190	76
5	7425.00	37.45	54.00	-16.55	31.81	5.64	Average	100	88
6	7425.00	50.37	74.00	-23.63	44.73	5.64	Peak	100	88

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).

2.4-2.4835GHz_802.15.4 **CSENdB**

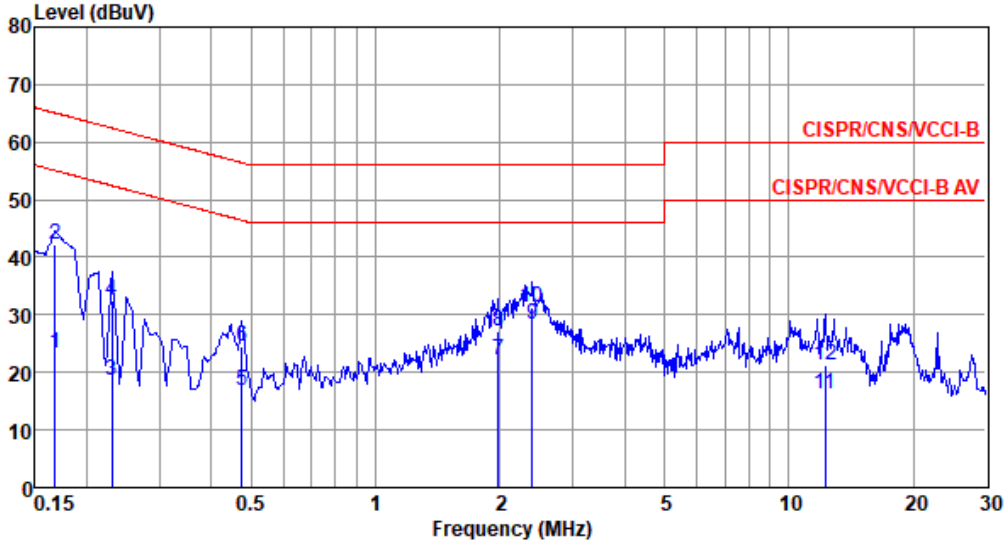
2475MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47482G	10.02	-19.98	1.9652G	-65.61	2.39456G	-62.90	2.4G	-65.57	16.54037G	-55.81	1

Modulation	OQPSK	**Test Freq. (MHz)**	2405
Power Phase	Line		

Test by : Joe Liao Temperature: 22°C Humidity: 66%

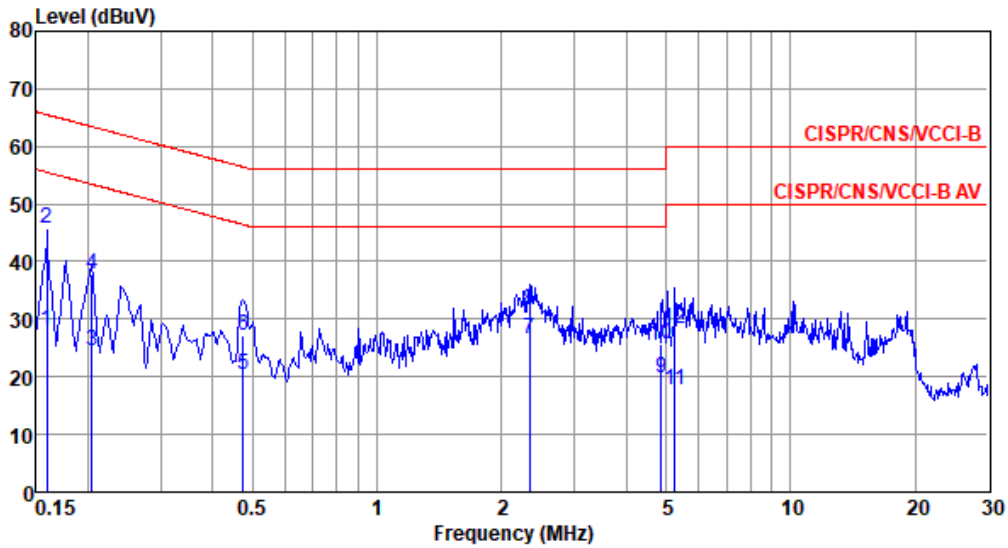


	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.168	23.38	55.08	-31.70	13.64	9.68	0.06	0.00	Average
2	0.168	42.24	65.08	-22.84	32.50	9.68	0.06	0.00	QP
3	0.230	18.74	52.44	-33.70	9.00	9.68	0.06	0.00	Average
4	0.230	32.37	62.44	-30.07	22.63	9.68	0.06	0.00	QP
5	0.474	16.72	46.45	-29.73	6.98	9.67	0.07	0.00	Average
6	0.474	24.36	56.45	-32.09	14.62	9.67	0.07	0.00	QP
7	1.980	22.22	46.00	-23.78	12.40	9.69	0.13	0.00	Average
8	1.980	27.10	56.00	-28.90	17.28	9.69	0.13	0.00	QP
9*	2.396	28.36	46.00	-17.64	18.53	9.69	0.14	0.00	Average
10	2.396	31.19	56.00	-24.81	21.36	9.69	0.14	0.00	QP
11	12.253	16.33	50.00	-33.67	6.19	9.74	0.40	0.00	Average
12	12.253	21.12	60.00	-38.88	10.98	9.74	0.40	0.00	QP

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

Modulation	OQPSK	**Test Freq. (MHz)**	2405
Power Phase	Neutral		

Test by : Joe Liao Temperature: 22°C Humidity: 66%



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.159	28.05	55.52	-27.47	18.38	9.61	0.06	0.00	Average
2	0.159	45.74	65.52	-19.78	36.07	9.61	0.06	0.00	QP
3	0.204	24.39	53.45	-29.06	14.72	9.61	0.06	0.00	Average
4	0.204	37.84	63.45	-25.61	28.17	9.61	0.06	0.00	QP
5	0.474	20.26	46.45	-26.19	10.58	9.61	0.07	0.00	Average
6	0.474	27.28	56.45	-29.17	17.60	9.61	0.07	0.00	QP
7*	2.334	26.59	46.00	-19.41	16.83	9.62	0.14	0.00	Average
8	2.334	31.64	56.00	-24.36	21.88	9.62	0.14	0.00	QP
9	4.874	19.81	46.00	-26.19	9.94	9.65	0.22	0.00	Average
10	4.874	25.56	56.00	-30.44	15.69	9.65	0.22	0.00	QP
11	5.249	17.72	50.00	-32.28	7.84	9.65	0.23	0.00	Average
12	5.249	28.47	60.00	-31.53	18.59	9.65	0.23	0.00	QP

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

Internal antenna

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
802.15.4	1.581M	2.602M	2M60D1D	1.469M	2.339M

Max-N dB = Maximum 6dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth

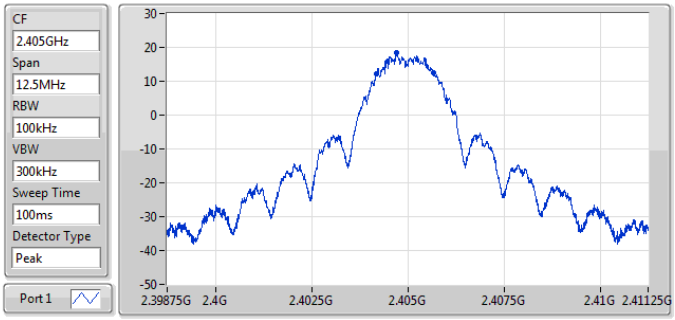
Result

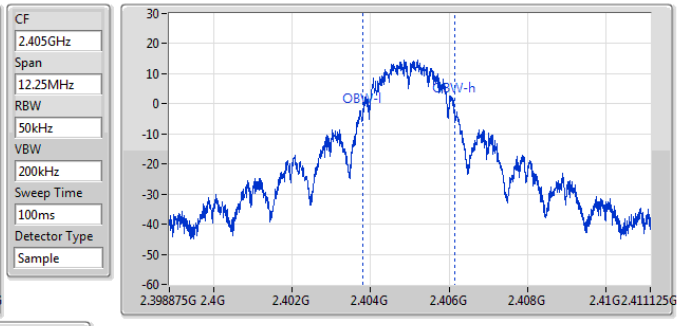
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
802.15.4	-	-	-	-
2405MHz	Pass	500k	1.469M	2.339M
2440MHz	Pass	500k	1.531M	2.357M
2475MHz	Pass	500k	1.581M	2.357M
2480MHz	Pass	500k	1.538M	2.602M

Port X-N dB = Port X 6dB down bandwidth;
Port X-OBW = Port X 99% occupied bandwidth

2.4-2.4835GHz_802.15.4 **EBW**

2405MHz

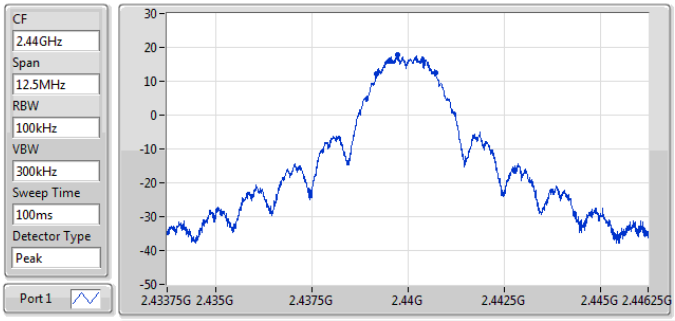


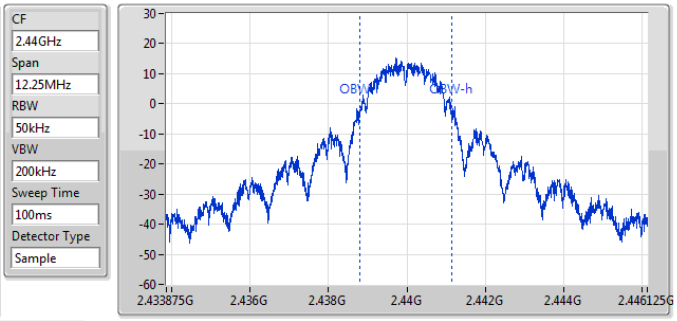


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.469M	2.404194G	2.405663G	2.339M	2.403794G	2.406133G	500k	1

2.4-2.4835GHz_802.15.4 **EBW**

2440MHz

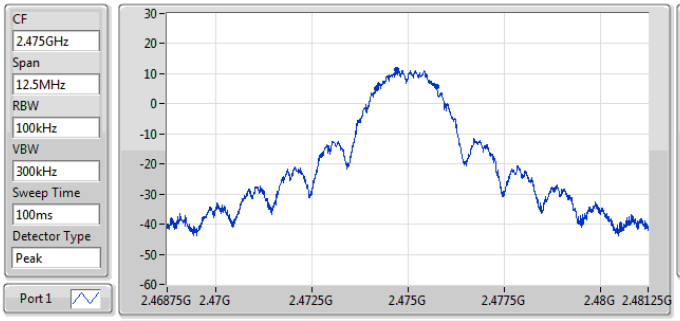




6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.531M	2.4392G	2.440731G	2.357M	2.438794G	2.441151G	500k	1

2.4-2.4835GHz_802.15.4 **EBW**

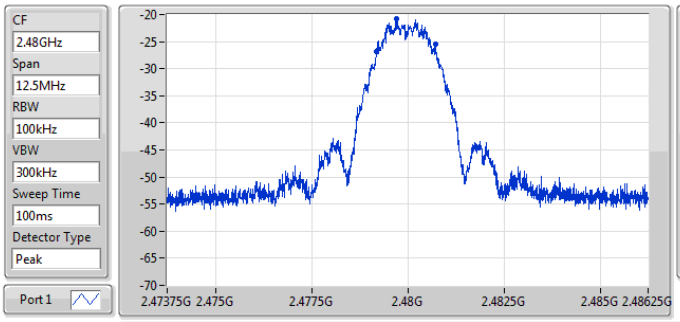
2475MHz

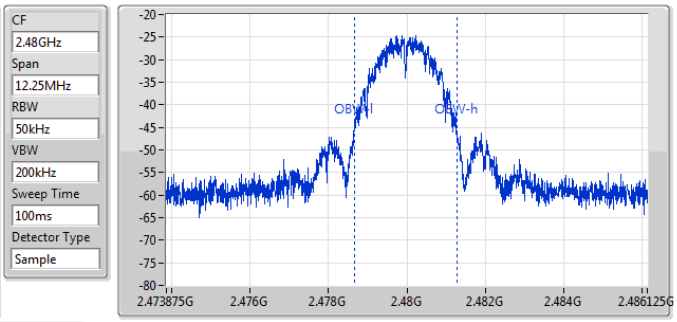


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.581M	2.474181G	2.475763G	2.357M	2.473782G	2.476139G	500k	1

2.4-2.4835GHz_802.15.4 **EBW**

2480MHz





6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.538M	2.479188G	2.480725G	2.602M	2.478672G	2.481273G	500k	1

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.15.4	21.10	0.12882

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
802.15.4	-	-	-	-	-
2405MHz	Pass	1.49	21.1	21.10	30.00
2440MHz	Pass	1.49	20.98	20.98	30.00
2475MHz	Pass	1.49	15.02	15.02	30.00
2480MHz	Pass	1.49	-18.41	-18.41	30.00

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

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
802.15.4	-0.05

RBW = 3kHz;

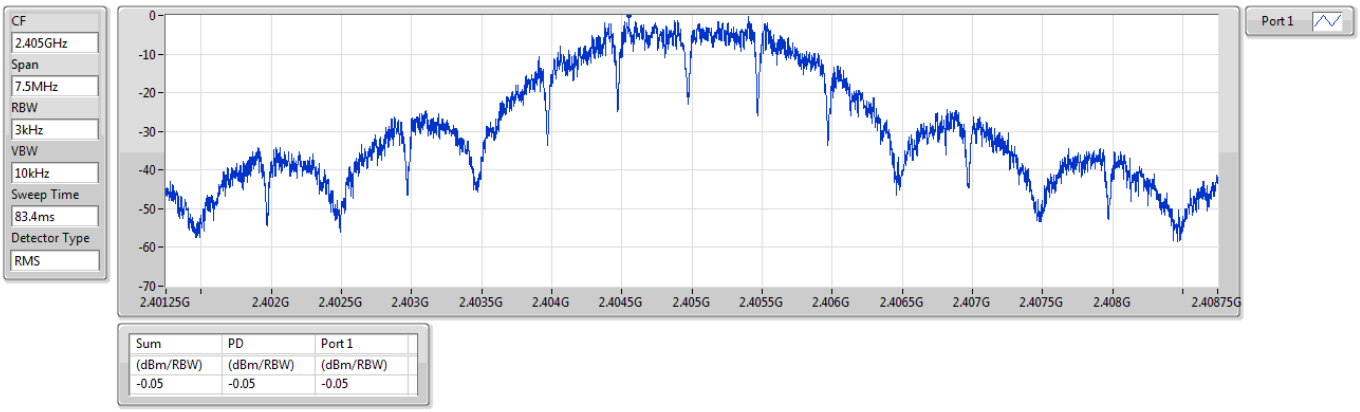
Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
802.15.4	-	-	-	-	-
2405MHz	Pass	1.49	-0.05	-0.05	8.00
2440MHz	Pass	1.49	-1.34	-1.34	8.00
2475MHz	Pass	1.49	-5.54	-5.54	8.00
2480MHz	Pass	1.49	-38.12	-38.12	8.00

DG = Directional Gain; RBW = 3kHz;
PD = Power density; Port X = Port X Power Density;

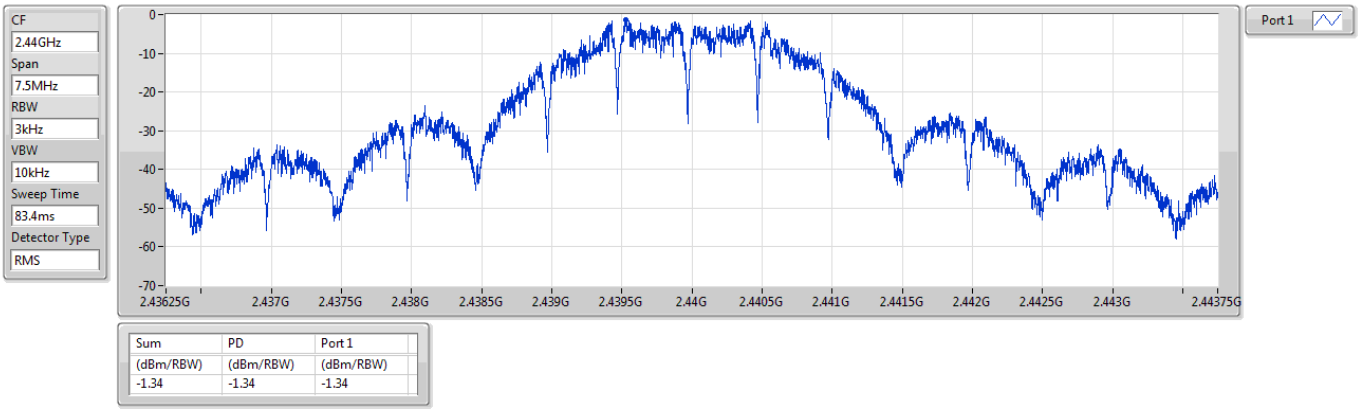
2.4-2.4835GHz_802.15.4 **PSD**

2405MHz



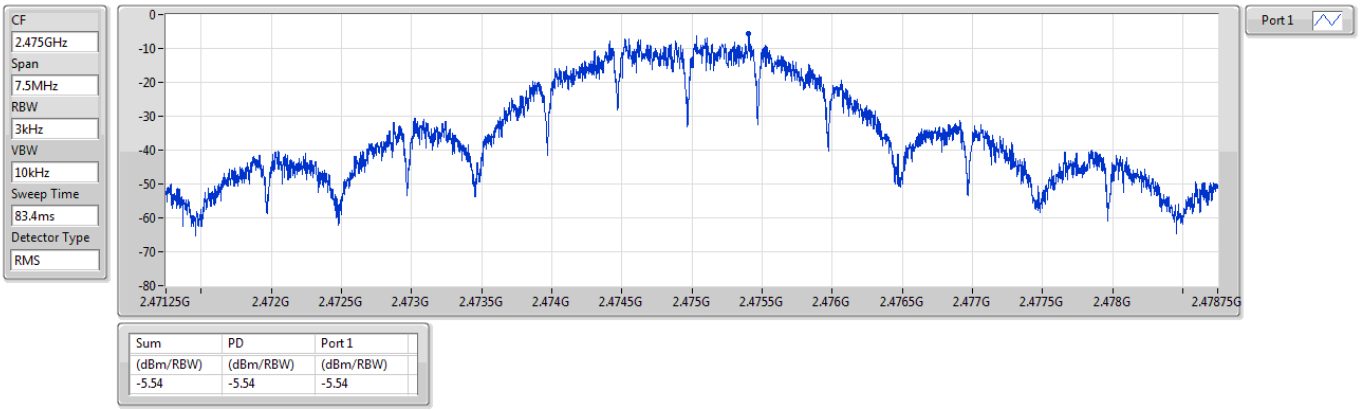
2.4-2.4835GHz_802.15.4 **PSD**

2440MHz



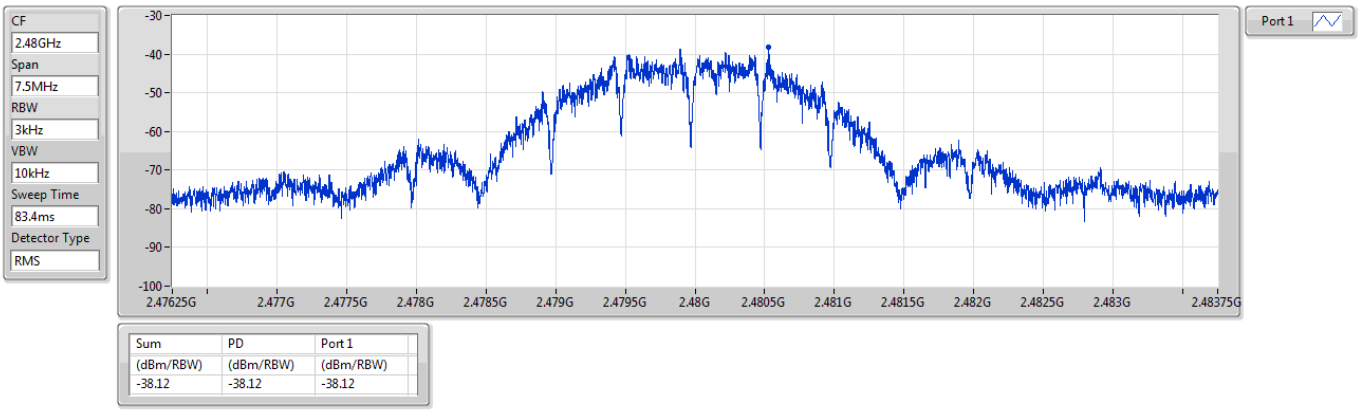
2.4-2.4835GHz_802.15.4 **PSD**

2475MHz



2.4-2.4835GHz_802.15.4 **PSD**

2480MHz



Transmitter Conducted Unwanted Emissions (30MHz ~ 1GHz)

Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	GRF (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2.4-2.4835GHz	-	-	-	-	-	-	-	-		-	-	-
802.15.4	Pass	30M	1G	PK	38M	2.00	-79.06	-79.06	4.7	-72.36	-55.20	-17.16

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

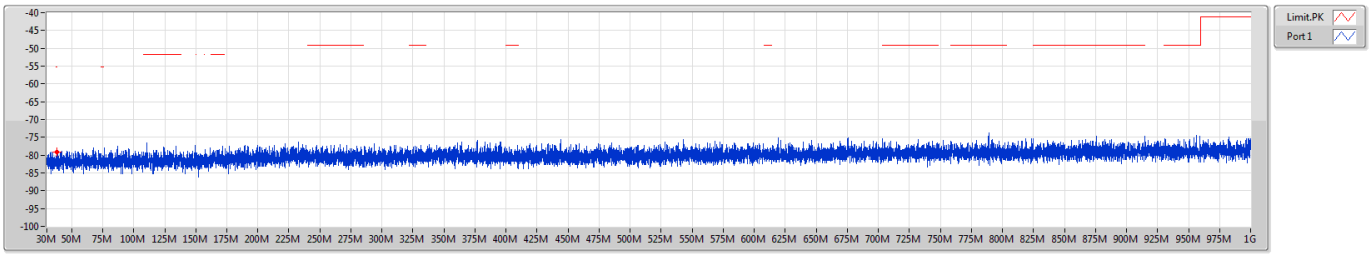
Result

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	GRF (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
802.15.4	-	-	-	-	-	-	-	-		-	-	-
2405MHz	Pass	30M	1G	PK	38M	2.00	-79.06	-79.06	4.7	-72.36	-55.20	-17.16

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

2.4-2.4835GHz_802.15.4 **CSE Other [PK]**

2405MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
30M	1G	100k	PK	38M	-79.06	-79.06

Transmitter Conducted Unwanted Emissions (1GHz ~ 3.1GHz)

Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.15.4	Pass	2.4835G	2.5G	AV	2.4835G	2.00	-46.57	-46.57	-44.57	-41.20	-3.37

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

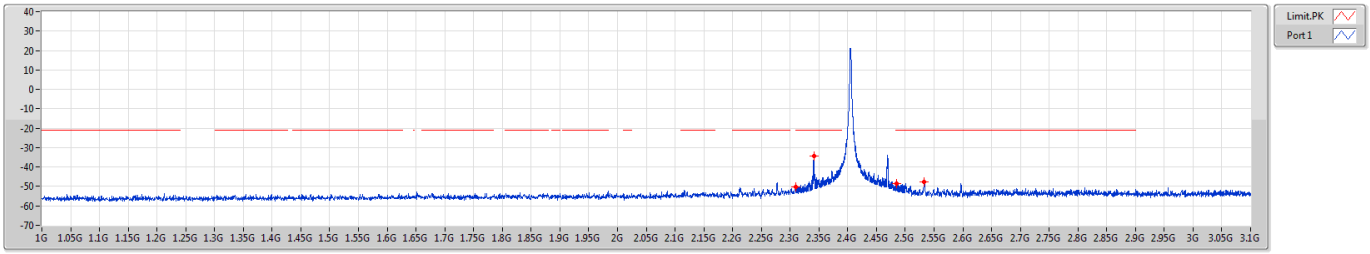
Result

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
802.15.4	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	1G	2.31G	AV	2.31G	2.00	-59.16	-59.16	-57.16	-41.20	-15.96
2405MHz	Pass	2.31G	2.39G	AV	2.38924G	2.00	-49.35	-49.35	-47.35	-41.20	-6.15
2405MHz	Pass	2.4835G	2.5G	AV	2.48462G	2.00	-60.13	-60.13	-58.13	-41.20	-16.93
2405MHz	Pass	2.5G	3.1G	AV	2.5327G	2.00	-54.17	-54.17	-52.17	-41.20	-10.97
2405MHz	Pass	1G	2.31G	PK	2.31G	2.00	-50.03	-50.03	-48.03	-21.20	-26.83
2405MHz	Pass	2.31G	2.39G	PK	2.3412G	2.00	-34.55	-34.55	-32.55	-21.20	-11.35
2405MHz	Pass	2.4835G	2.5G	PK	2.48553G	2.00	-48.72	-48.72	-46.72	-21.20	-25.52
2405MHz	Pass	2.5G	3.1G	PK	2.5333G	2.00	-47.80	-47.80	-45.80	-21.20	-24.60
2440MHz	Pass	1G	2.31G	AV	2.31G	2.00	-62.62	-62.62	-60.62	-41.20	-19.42
2440MHz	Pass	2.31G	2.39G	AV	2.31196G	2.00	-54.79	-54.79	-52.79	-41.20	-11.59
2440MHz	Pass	2.4835G	2.5G	AV	2.48791G	2.00	-55.44	-55.44	-53.44	-41.20	-12.24
2440MHz	Pass	2.5G	3.1G	AV	2.5039G	2.00	-55.50	-55.50	-53.50	-41.20	-12.30
2440MHz	Pass	1G	2.31G	PK	2.31G	2.00	-53.59	-53.59	-51.59	-21.20	-30.39
2440MHz	Pass	2.31G	2.39G	PK	2.37624G	2.00	-32.64	-32.64	-30.64	-21.20	-9.44
2440MHz	Pass	2.4835G	2.5G	PK	2.4878G	2.00	-44.49	-44.49	-42.49	-21.20	-21.29
2440MHz	Pass	2.5G	3.1G	PK	2.5045G	2.00	-35.41	-35.41	-33.41	-21.20	-12.21
2475MHz	Pass	1G	2.31G	AV	2.31G	2.00	-64.16	-64.16	-62.16	-41.20	-20.96
2475MHz	Pass	2.31G	2.39G	AV	2.34696G	2.00	-57.69	-57.69	-55.69	-41.20	-14.49
2475MHz	Pass	2.4835G	2.5G	AV	2.4835G	2.00	-46.57	-46.57	-44.57	-41.20	-3.37
2475MHz	Pass	2.5G	3.1G	AV	2.5069G	2.00	-57.43	-57.43	-55.43	-41.20	-14.23
2475MHz	Pass	1G	2.31G	PK	2.31G	2.00	-55.50	-55.50	-53.50	-21.20	-32.30
2475MHz	Pass	2.31G	2.39G	PK	2.34712G	2.00	-49.84	-49.84	-47.84	-21.20	-26.64
2475MHz	Pass	2.4835G	2.5G	PK	2.48352G	2.00	-34.31	-34.31	-32.31	-21.20	-11.11
2475MHz	Pass	2.5G	3.1G	PK	2.5072G	2.00	-48.81	-48.81	-46.81	-21.20	-25.61
2480MHz	Pass	1G	2.31G	AV	2.31G	2.00	-64.40	-64.40	-62.40	-41.20	-21.20
2480MHz	Pass	2.31G	2.39G	AV	2.34588G	2.00	-63.82	-63.82	-61.82	-41.20	-20.62
2480MHz	Pass	2.4835G	2.5G	AV	2.4835G	2.00	-58.71	-58.71	-56.71	-41.20	-15.51
2480MHz	Pass	2.5G	3.1G	AV	2.5987G	2.00	-63.55	-63.55	-61.55	-41.20	-20.35
2480MHz	Pass	1G	2.31G	PK	2.31G	2.00	-56.33	-56.33	-54.33	-21.20	-33.13
2480MHz	Pass	2.31G	2.39G	PK	2.33272G	2.00	-52.20	-52.20	-50.20	-21.20	-29.00
2480MHz	Pass	2.4835G	2.5G	PK	2.48352G	2.00	-47.82	-47.82	-45.82	-21.20	-24.62
2480MHz	Pass	2.5G	3.1G	PK	2.5603G	2.00	-52.10	-52.10	-50.10	-21.20	-28.90

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

2.4-2.4835GHz_802.15.4 **CSE Bandedge [PK]**

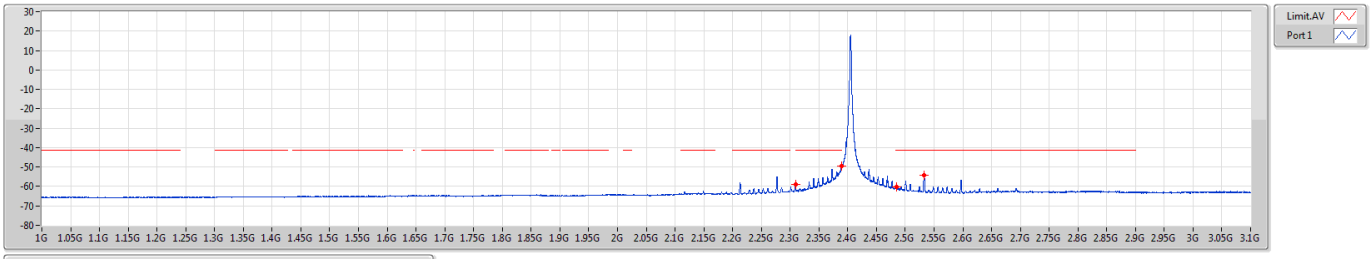
2405MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	PK	2.31G	-50.03	-50.03
2.31G	2.39G	1M	PK	2.3412G	-34.55	-34.55
2.4835G	2.5G	1M	PK	2.48553G	-48.72	-48.72
2.5G	3.1G	1M	PK	2.5333G	-47.80	-47.80

2.4-2.4835GHz_802.15.4 **CSE Bandedge [AV]**

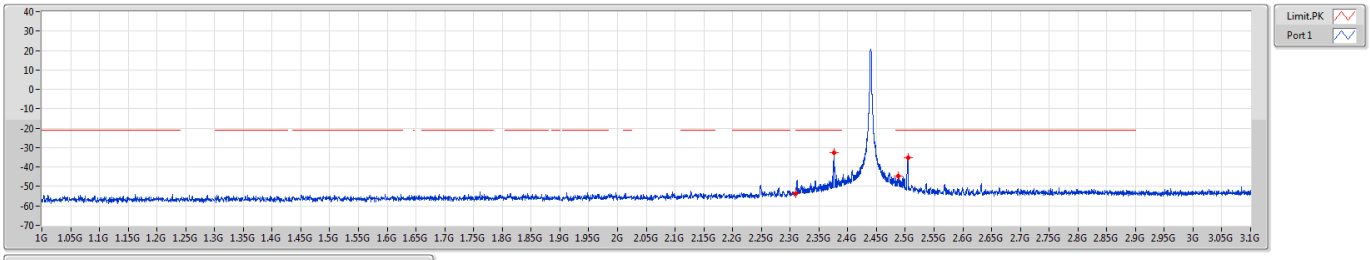
2405MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	AV	2.31G	-59.16	-59.16
2.31G	2.39G	1M	AV	2.38924G	-49.35	-49.35
2.4835G	2.5G	1M	AV	2.48462G	-60.13	-60.13
2.5G	3.1G	1M	AV	2.5327G	-54.17	-54.17

2.4-2.4835GHz_802.15.4 **CSE Bandedge [PK]**

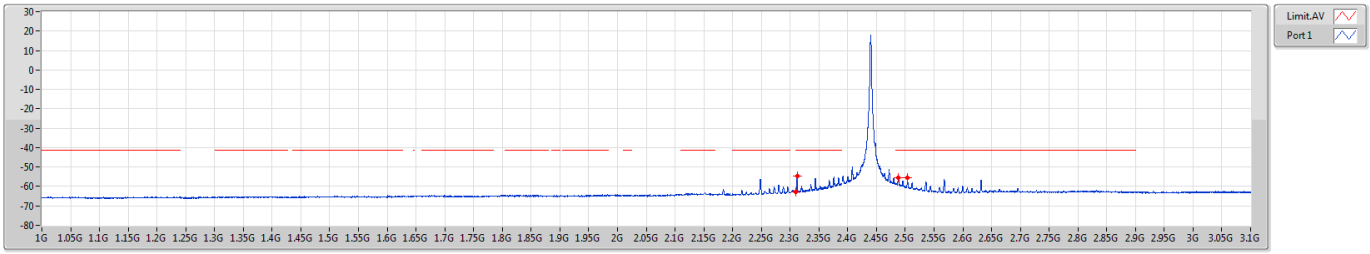
2440MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	PK	2.31G	-53.59	-53.59
2.31G	2.39G	1M	PK	2.37624G	-32.64	-32.64
2.4835G	2.5G	1M	PK	2.4878G	-44.49	-44.49
2.5G	3.1G	1M	PK	2.5045G	-35.41	-35.41

2.4-2.4835GHz_802.15.4 **CSE Bandedge [AV]**

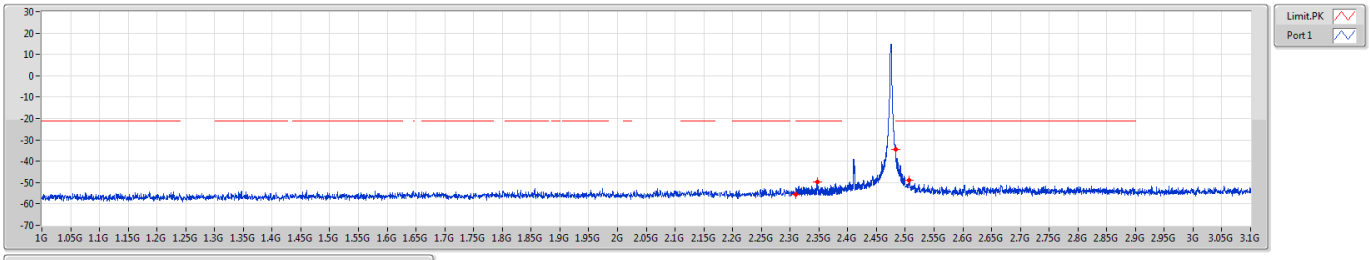
2440MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	AV	2.31G	-62.62	-62.62
2.31G	2.39G	1M	AV	2.31196G	-54.79	-54.79
2.4835G	2.5G	1M	AV	2.48791G	-55.44	-55.44
2.5G	3.1G	1M	AV	2.5039G	-55.50	-55.50

2.4-2.4835GHz_802.15.4 **CSE Bandedge [PK]**

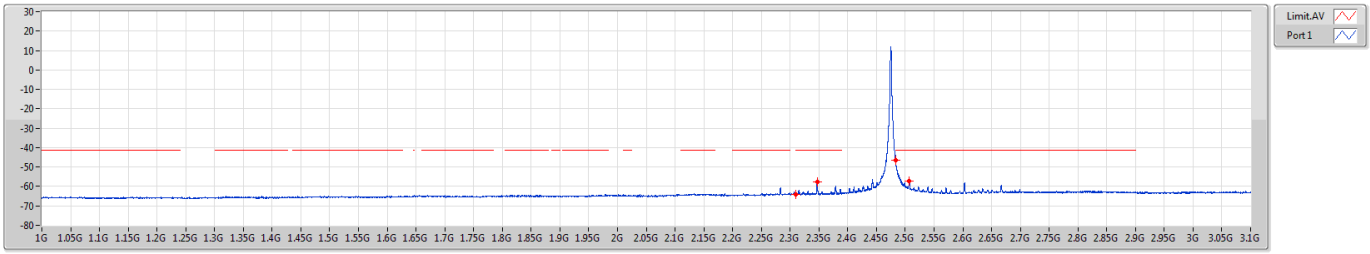
2475MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	PK	2.31G	-55.50	-55.50
2.31G	2.39G	1M	PK	2.34712G	-49.84	-49.84
2.4835G	2.5G	1M	PK	2.48352G	-34.31	-34.31
2.5G	3.1G	1M	PK	2.5072G	-48.81	-48.81

2.4-2.4835GHz_802.15.4 **CSE Bandedge [AV]**

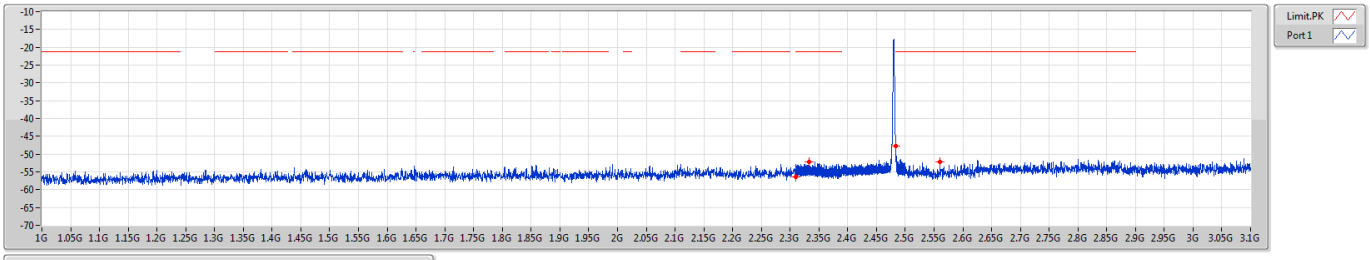
2475MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	AV	2.31G	-64.16	-64.16
2.31G	2.39G	1M	AV	2.34696G	-57.69	-57.69
2.4835G	2.5G	1M	AV	2.4835G	-46.57	-46.57
2.5G	3.1G	1M	AV	2.5069G	-57.43	-57.43

2.4-2.4835GHz_802.15.4 **CSE Bandedge [PK]**

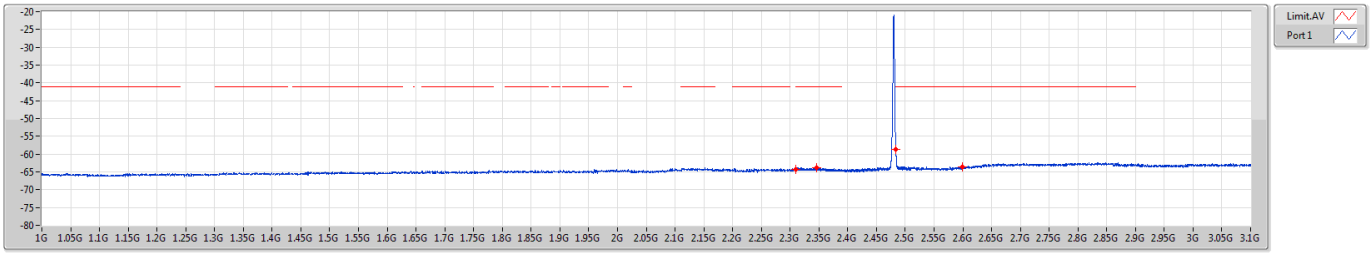
2480MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	PK	2.31G	-56.33	-56.33
2.31G	2.39G	1M	PK	2.33272G	-52.20	-52.20
2.4835G	2.5G	1M	PK	2.48352G	-47.82	-47.82
2.5G	3.1G	1M	PK	2.5603G	-52.10	-52.10

2.4-2.4835GHz_802.15.4 **CSE Bandedge [AV]**

2480MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	2.31G	1M	AV	2.31G	-64.40	-64.40
2.31G	2.39G	1M	AV	2.34588G	-63.82	-63.82
2.4835G	2.5G	1M	AV	2.4835G	-58.71	-58.71
2.5G	3.1G	1M	AV	2.5987G	-63.55	-63.55

Transmitter Conducted Unwanted Emissions (3.1GHz ~ 25GHz)

Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.15.4	Pass	4G	5G	AV	4.881G	2.00	-52.52	-52.52	-50.52	-41.20	-9.32

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

Result

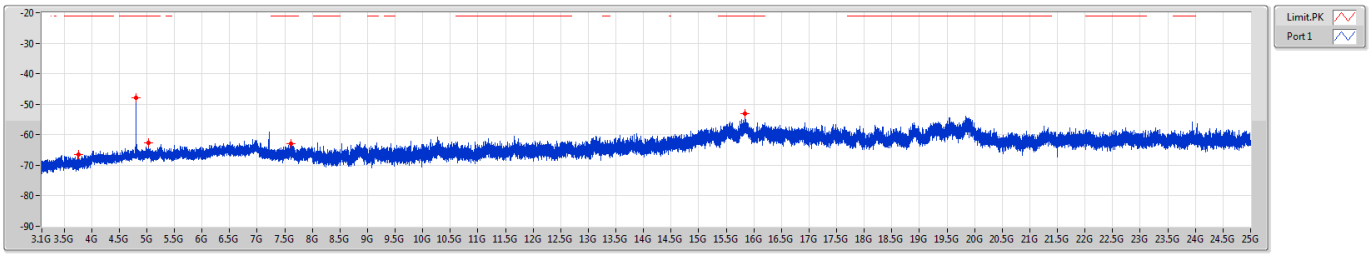
Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
802.15.4	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	3.1G	4G	AV	3.98695G	2.00	-75.85	-75.85	-73.85	-41.20	-32.65
2405MHz	Pass	4G	5G	AV	4.811G	2.00	-53.41	-53.41	-51.41	-41.20	-10.21
2405MHz	Pass	5G	7G	AV	5.0305G	2.00	-73.74	-73.74	-71.74	-41.20	-30.54
2405MHz	Pass	7G	8G	AV	7.631G	2.00	-73.37	-73.37	-71.37	-41.20	-30.17
2405MHz	Pass	8G	25G	AV	19.88194G	2.00	-63.63	-63.63	-61.63	-41.20	-20.43
2405MHz	Pass	3.1G	4G	PK	3.76825G	2.00	-66.59	-66.59	-64.59	-21.20	-43.39
2405MHz	Pass	4G	5G	PK	4.8115G	2.00	-47.98	-47.98	-45.98	-21.20	-24.78
2405MHz	Pass	5G	7G	PK	5.027G	2.00	-62.79	-62.79	-60.79	-21.20	-39.59
2405MHz	Pass	7G	8G	PK	7.609G	2.00	-62.96	-62.96	-60.96	-21.20	-39.76
2405MHz	Pass	8G	25G	PK	15.83966G	2.00	-52.97	-52.97	-50.97	-21.20	-29.77
2440MHz	Pass	3.1G	4G	AV	3.97615G	2.00	-75.95	-75.95	-73.95	-41.20	-32.75
2440MHz	Pass	4G	5G	AV	4.881G	2.00	-52.52	-52.52	-50.52	-41.20	-9.32
2440MHz	Pass	5G	7G	AV	5.237G	2.00	-73.65	-73.65	-71.65	-41.20	-30.45
2440MHz	Pass	7G	8G	AV	7.3185G	2.00	-66.61	-66.61	-64.61	-41.20	-23.41
2440MHz	Pass	8G	25G	AV	19.85803G	2.00	-63.47	-63.47	-61.47	-41.20	-20.27
2440MHz	Pass	3.1G	4G	PK	3.9271G	2.00	-65.90	-65.90	-63.90	-21.20	-42.70
2440MHz	Pass	4G	5G	PK	4.8795G	2.00	-46.73	-46.73	-44.73	-21.20	-23.53
2440MHz	Pass	5G	7G	PK	5.423G	2.00	-63.21	-63.21	-61.21	-21.20	-40.01
2440MHz	Pass	7G	8G	PK	7.3185G	2.00	-60.40	-60.40	-58.40	-21.20	-37.20
2440MHz	Pass	8G	25G	PK	19.84688G	2.00	-53.48	-53.48	-51.48	-21.20	-30.28
2475MHz	Pass	3.1G	4G	AV	3.9748G	2.00	-75.96	-75.96	-73.96	-41.20	-32.76
2475MHz	Pass	4G	5G	AV	4.951G	2.00	-59.09	-59.09	-57.09	-41.20	-15.89
2475MHz	Pass	5G	7G	AV	5.2295G	2.00	-73.93	-73.93	-71.93	-41.20	-30.73
2475MHz	Pass	7G	8G	AV	7.6265G	2.00	-73.37	-73.37	-71.37	-41.20	-30.17
2475MHz	Pass	8G	25G	AV	19.86334G	2.00	-63.54	-63.54	-61.54	-41.20	-20.34
2475MHz	Pass	3.1G	4G	PK	3.99595G	2.00	-64.78	-64.78	-62.78	-21.20	-41.58
2475MHz	Pass	4G	5G	PK	4.9515G	2.00	-52.64	-52.64	-50.64	-21.20	-29.44
2475MHz	Pass	5G	7G	PK	5.2455G	2.00	-62.96	-62.96	-60.96	-21.20	-39.76
2475MHz	Pass	7G	8G	PK	7.629G	2.00	-61.79	-61.79	-59.79	-21.20	-38.59
2475MHz	Pass	8G	25G	PK	19.83147G	2.00	-53.85	-53.85	-51.85	-21.20	-30.65
2480MHz	Pass	3.1G	4G	AV	3.982G	2.00	-75.89	-75.89	-73.89	-41.20	-32.69
2480MHz	Pass	4G	5G	AV	4.959G	2.00	-74.75	-74.75	-72.75	-41.20	-31.55
2480MHz	Pass	4G	5G	AV	4.9855G	2.00	-74.44	-74.44	-72.44	-41.20	-31.24
2480MHz	Pass	5G	7G	AV	5.2385G	2.00	-73.87	-73.87	-71.87	-41.20	-30.67
2480MHz	Pass	7G	8G	AV	7.602G	2.00	-73.39	-73.39	-71.39	-41.20	-30.19
2480MHz	Pass	8G	25G	AV	19.88353G	2.00	-63.49	-63.49	-61.49	-41.20	-20.29
2480MHz	Pass	3.1G	4G	PK	3.99415G	2.00	-65.37	-65.37	-63.37	-21.20	-42.17
2480MHz	Pass	4G	5G	PK	4.756G	2.00	-63.69	-63.69	-61.69	-21.20	-40.49
2480MHz	Pass	4G	5G	PK	4.959G	2.00	-64.82	-64.82	-62.82	-21.20	-41.62
2480MHz	Pass	5G	7G	PK	5.2185G	2.00	-64.01	-64.01	-62.01	-21.20	-40.81
2480MHz	Pass	7G	8G	PK	7.591G	2.00	-62.95	-62.95	-60.95	-21.20	-39.75

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	P1 (dBm)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
2480MHz	Pass	8G	25G	PK	19.61259G	2.00	-54.29	-54.29	-52.29	-21.20	-31.09

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

2.4-2.4835GHz_802.15.4 **CSE [PK]**

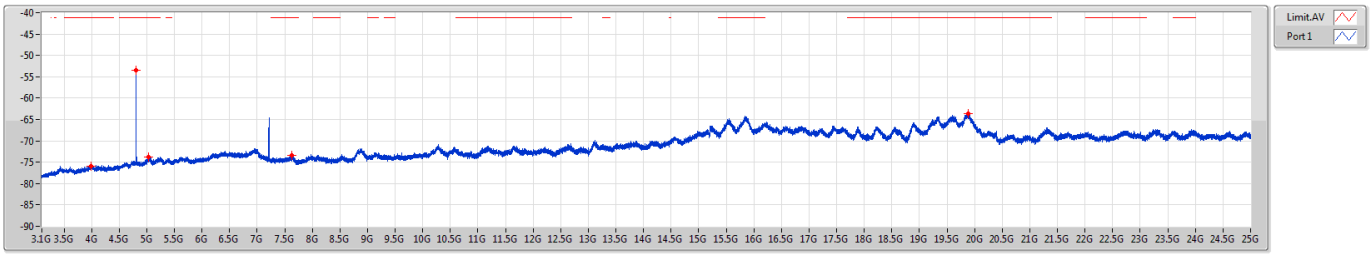
2405MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	PK	3.76825G	-66.59	-66.59
4G	5G	1M	PK	4.8115G	-47.98	-47.98
5G	7G	1M	PK	5.027G	-62.79	-62.79
7G	8G	1M	PK	7.609G	-62.96	-62.96
8G	25G	1M	PK	15.83966G	-52.97	-52.97

2.4-2.4835GHz_802.15.4 **CSE [AV]**

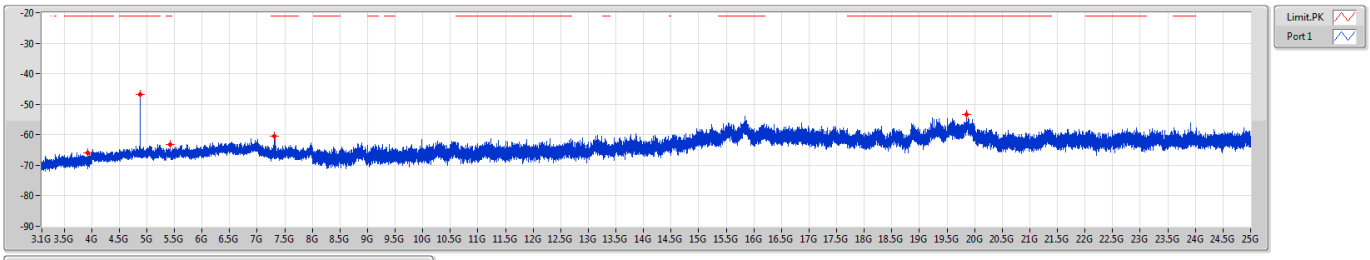
2405MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	AV	3.98695G	-75.85	-75.85
4G	5G	1M	AV	4.811G	-53.41	-53.41
5G	7G	1M	AV	5.0305G	-73.74	-73.74
7G	8G	1M	AV	7.631G	-73.37	-73.37
8G	25G	1M	AV	19.88194G	-63.63	-63.63

2.4-2.4835GHz_802.15.4 **CSE [PK]**

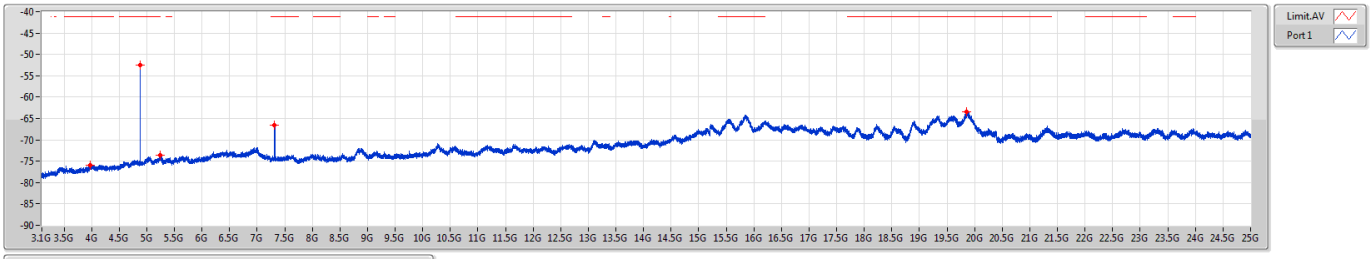
2440MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	PK	3.9271G	-65.90	-65.90
4G	5G	1M	PK	4.8795G	-46.73	-46.73
5G	7G	1M	PK	5.423G	-63.21	-63.21
7G	8G	1M	PK	7.3185G	-60.40	-60.40
8G	25G	1M	PK	19.84688G	-53.48	-53.48

2.4-2.4835GHz_802.15.4 **CSE [AV]**

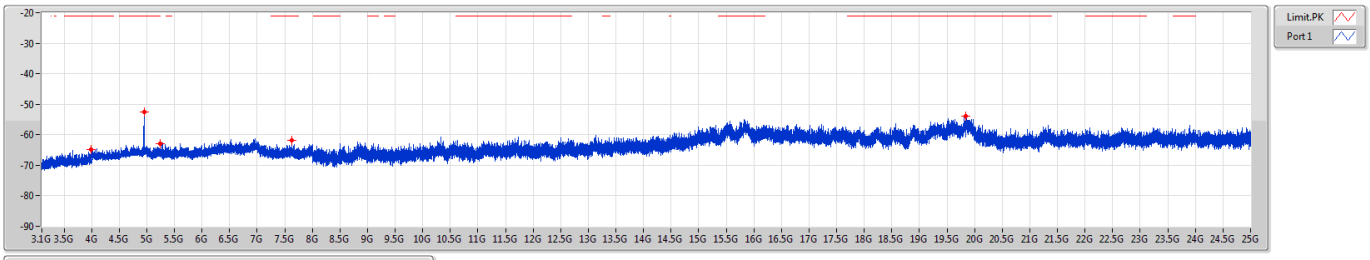
2440MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	AV	3.97615G	-75.95	-75.95
4G	5G	1M	AV	4.881G	-52.52	-52.52
5G	7G	1M	AV	5.237G	-73.65	-73.65
7G	8G	1M	AV	7.3185G	-66.61	-66.61
8G	25G	1M	AV	19.85803G	-63.47	-63.47

2.4-2.4835GHz_802.15.4 **CSE [PK]**

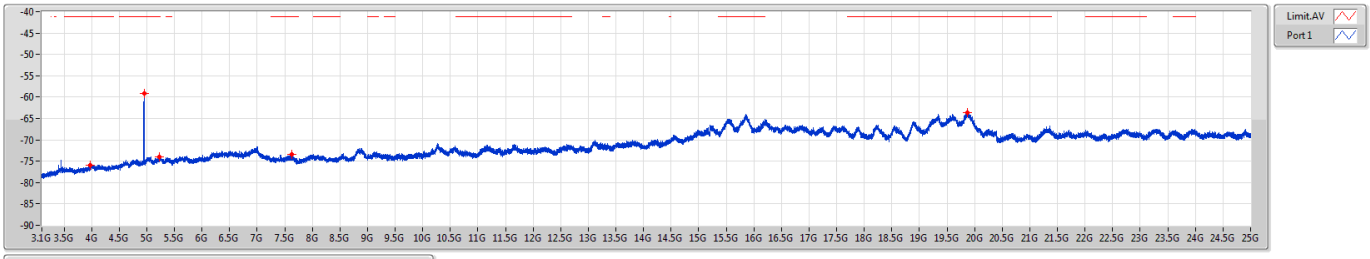
2475MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	PK	3.99595G	-64.78	-64.78
4G	5G	1M	PK	4.9515G	-52.64	-52.64
5G	7G	1M	PK	5.2455G	-62.96	-62.96
7G	8G	1M	PK	7.629G	-61.79	-61.79
8G	25G	1M	PK	19.83147G	-53.85	-53.85

2.4-2.4835GHz_802.15.4 **CSE [AV]**

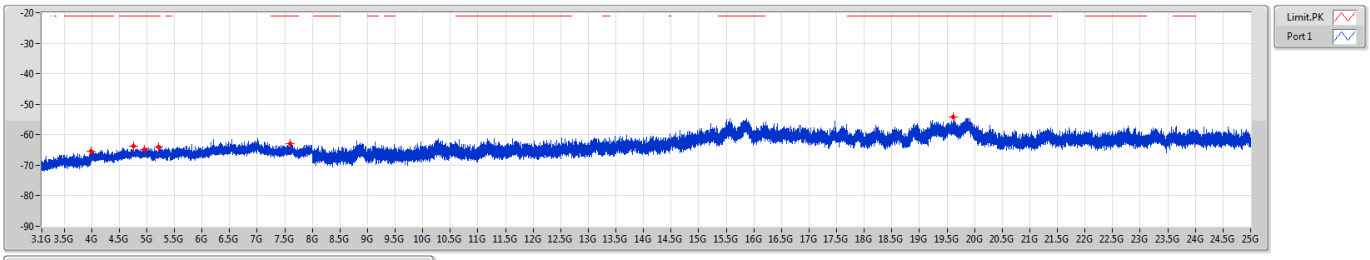
2475MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	AV	3.9748G	-75.96	-75.96
4G	5G	1M	AV	4.951G	-59.09	-59.09
5G	7G	1M	AV	5.2295G	-73.93	-73.93
7G	8G	1M	AV	7.6265G	-73.37	-73.37
8G	25G	1M	AV	19.86334G	-63.54	-63.54

2.4-2.4835GHz_802.15.4 **CSE [PK]**

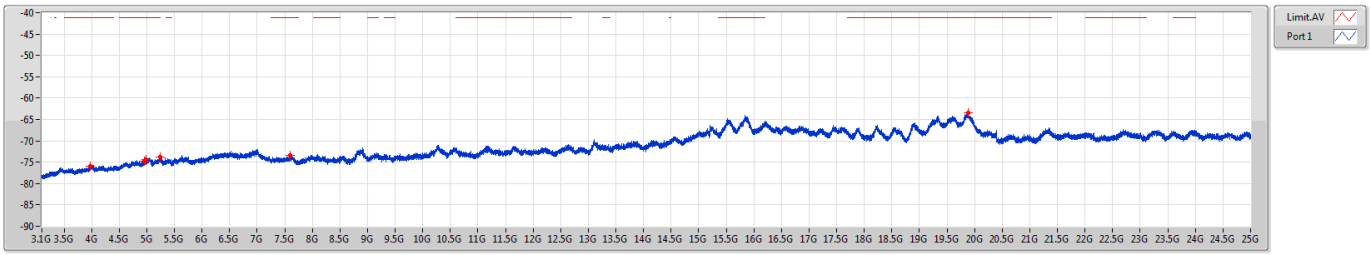
2480MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	PK	3.99415G	-65.37	-65.37
4G	5G	1M	PK	4.756G	-63.69	-63.69
4G	5G	1M	PK	4.959G	-64.82	-64.82
5G	7G	1M	PK	5.2185G	-64.01	-64.01
7G	8G	1M	PK	7.591G	-62.95	-62.95
8G	25G	1M	PK	19.61259G	-54.29	-54.29

2.4-2.4835GHz_802.15.4 **CSE [AV]**

2480MHz



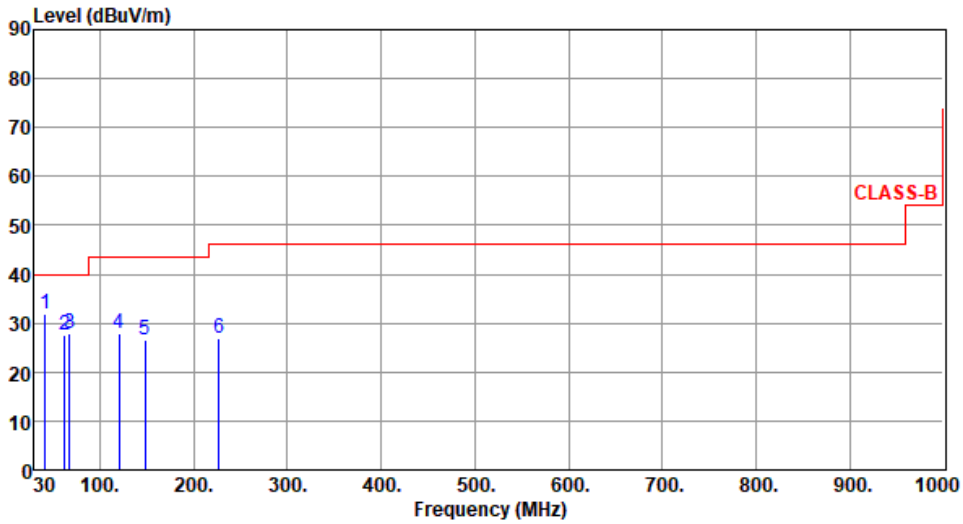
F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
3.1G	4G	1M	AV	3.982G	-75.89	-75.89
4G	5G	1M	AV	4.959G	-74.75	-74.75
4G	5G	1M	AV	4.9855G	-74.44	-74.44
5G	7G	1M	AV	5.2385G	-73.87	-73.87
7G	8G	1M	AV	7.602G	-73.39	-73.39
8G	25G	1M	AV	19.88353G	-63.49	-63.49

Internal antenna

Unwanted Emissions (Below 1GHz)

Modulation	OQPSK	**Test Freq. (MHz)**	2405
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):24 Humidity(%):63

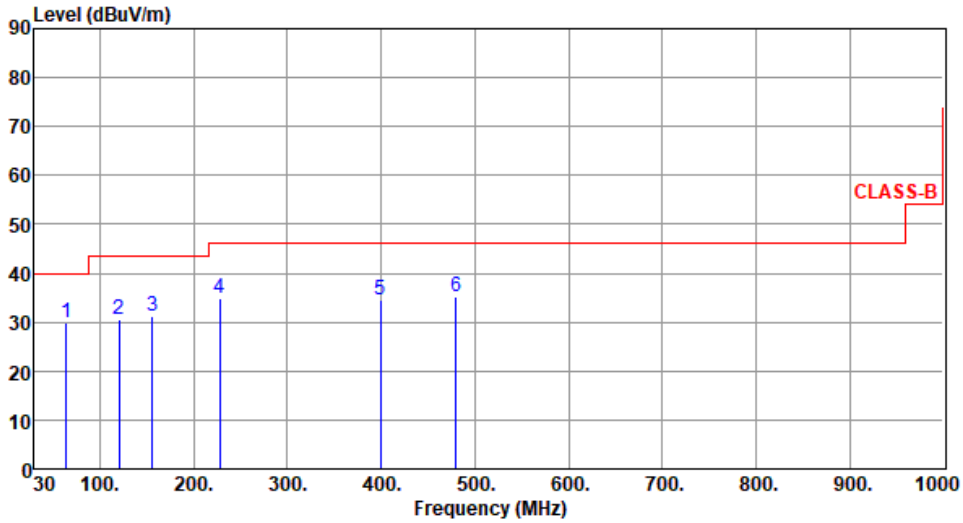


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	41.64	31.99	40.00	-8.01	41.08	-9.09	Peak	---	---
2	62.01	27.44	40.00	-12.56	37.16	-9.72	Peak	---	---
3	67.83	28.02	40.00	-11.98	38.54	-10.52	Peak	---	---
4	120.21	27.88	43.50	-15.62	39.03	-11.15	Peak	---	---
5	148.34	26.72	43.50	-16.78	35.34	-8.62	Peak	---	---
6	226.91	26.82	46.00	-19.18	38.49	-11.67	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	OQPSK	**Test Freq. (MHz)**	2405
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):24 Humidity(%):63



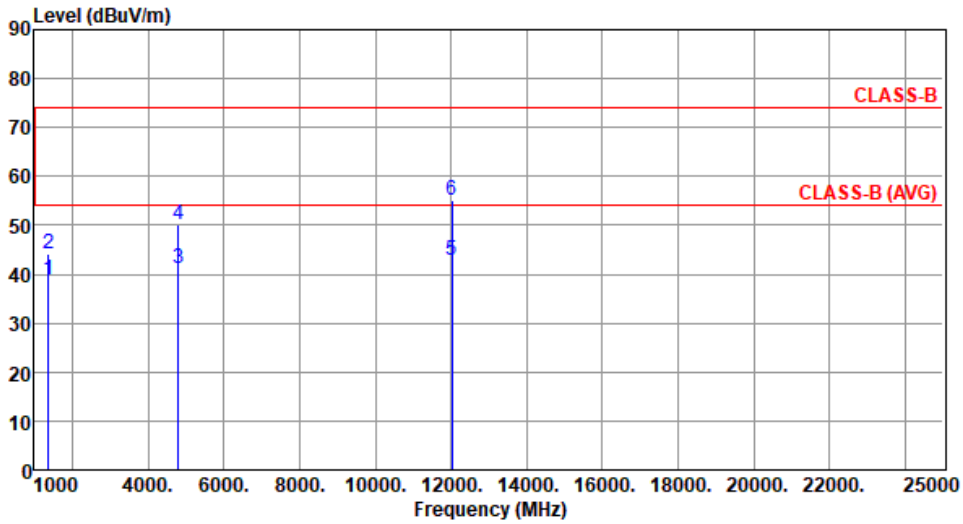
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	63.95	29.99	40.00	-10.01	39.82	-9.83	Peak	---	---
2	120.21	30.58	43.50	-12.92	41.73	-11.15	Peak	---	---
3	156.10	31.36	43.50	-12.14	39.79	-8.43	Peak	---	---
4	227.88	34.97	46.00	-11.03	46.51	-11.54	Peak	---	---
5	399.57	34.41	46.00	-11.59	39.36	-4.95	Peak	---	---
6	480.08	35.29	46.00	-10.71	38.19	-2.90	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 Emissions (Above 1GHz)

Modulation	OQPSK	**Test Freq. (MHz)**	2405
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

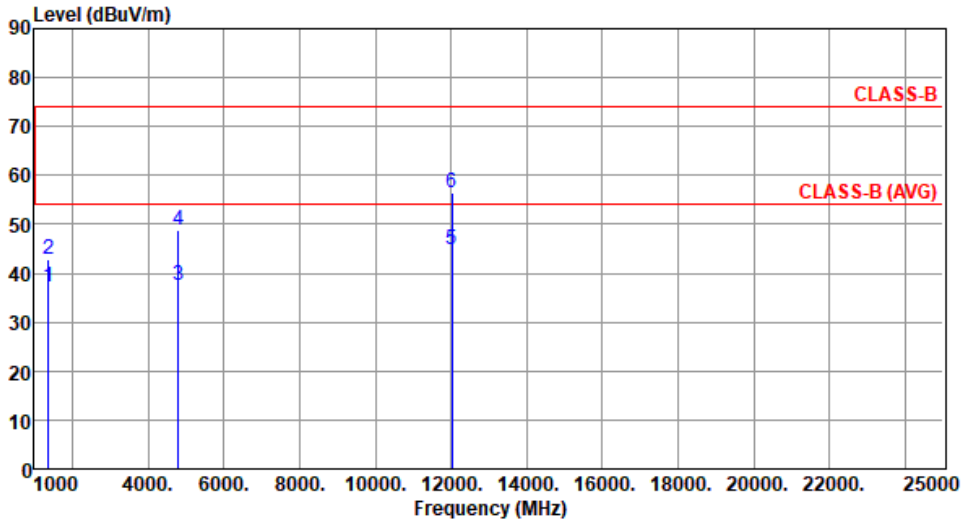


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	38.98	54.00	-15.02	44.99	-6.01	Average	116	327
2	1375.00	44.11	74.00	-29.89	50.12	-6.01	Peak	116	327
3	4810.00	41.11	54.00	-12.89	41.47	-0.36	Average	188	51
4	4810.00	50.31	74.00	-23.69	50.67	-0.36	Peak	188	51
5	12025.00	42.73	54.00	-11.27	35.38	7.35	Average	100	166
6	12025.00	55.01	74.00	-18.99	47.66	7.35	Peak	100	166

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	OQPSK	**Test Freq. (MHz)**	2405
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

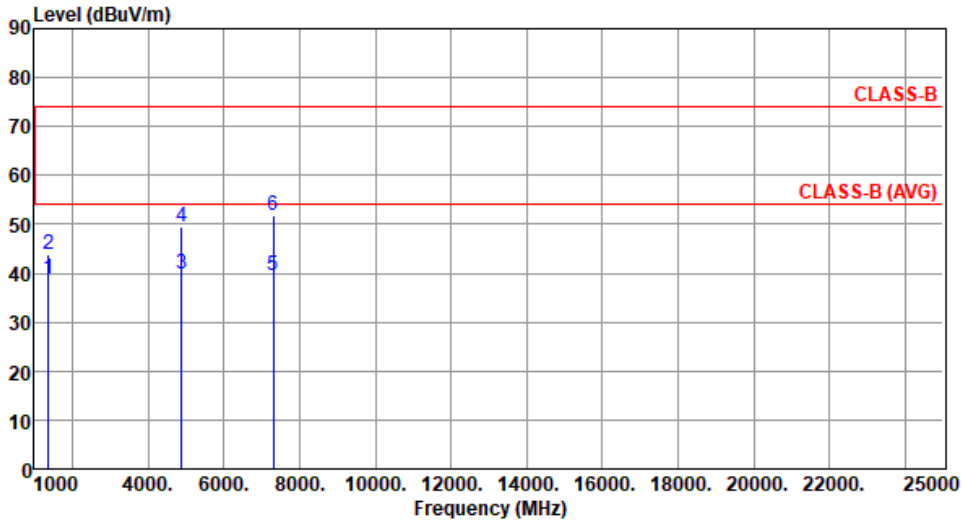


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	37.26	54.00	-16.74	43.27	-6.01	Average	118	204
2	1375.00	43.00	74.00	-31.00	49.01	-6.01	Peak	118	204
3	4810.00	37.49	54.00	-16.51	37.85	-0.36	Average	189	87
4	4810.00	48.68	74.00	-25.32	49.04	-0.36	Peak	189	87
5	12025.00	44.79	54.00	-9.21	37.44	7.35	Average	116	353
6	12025.00	56.61	74.00	-17.39	49.26	7.35	Peak	116	353

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	OQPSK	**Test Freq. (MHz)**	2440
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

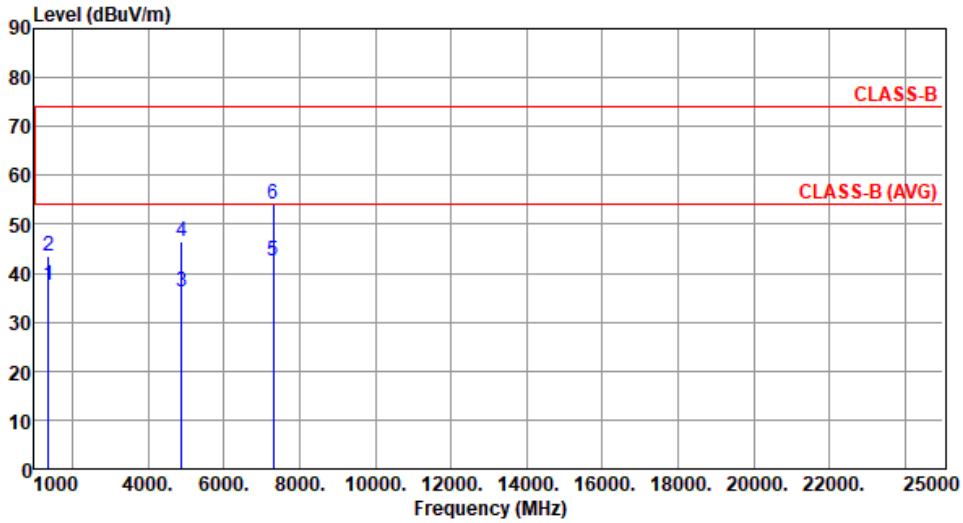


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	38.82	54.00	-15.18	44.83	-6.01	Average	118	324
2	1375.00	43.97	74.00	-30.03	49.98	-6.01	Peak	118	324
3	4880.00	40.00	54.00	-14.00	40.34	-0.34	Average	173	48
4	4880.00	49.61	74.00	-24.39	49.95	-0.34	Peak	173	48
5	7320.00	39.53	54.00	-14.47	33.76	5.77	Average	100	187
6	7320.00	51.96	74.00	-22.04	46.19	5.77	Peak	100	187

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	OQPSK	**Test Freq. (MHz)**	2440
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

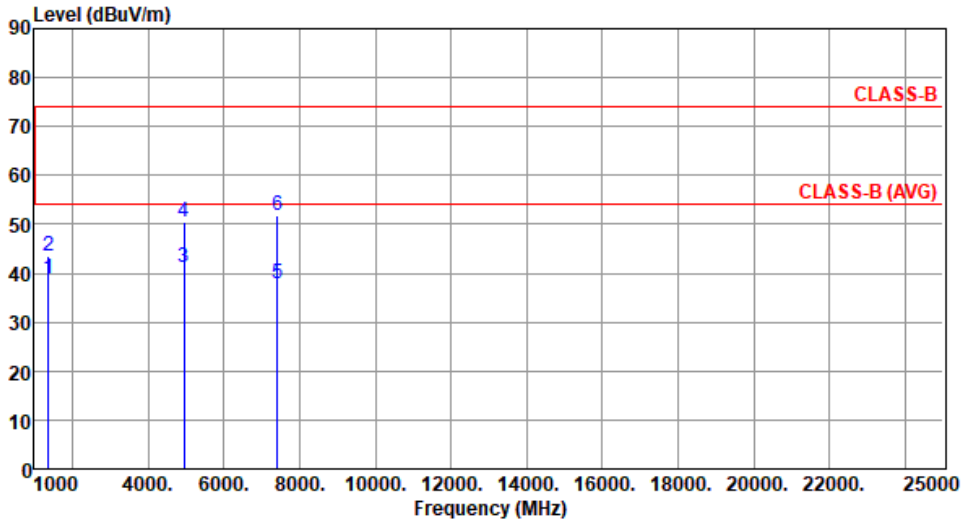


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	37.63	54.00	-16.37	43.64	-6.01	Average	119	201
2	1375.00	43.62	74.00	-30.38	49.63	-6.01	Peak	119	201
3	4880.00	36.31	54.00	-17.69	36.65	-0.34	Average	186	89
4	4880.00	46.52	74.00	-27.48	46.86	-0.34	Peak	186	89
5	7320.00	42.47	54.00	-11.53	36.70	5.77	Average	176	95
6	7320.00	54.14	74.00	-19.86	48.37	5.77	Peak	176	95

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	OQPSK	**Test Freq. (MHz)**	2475
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

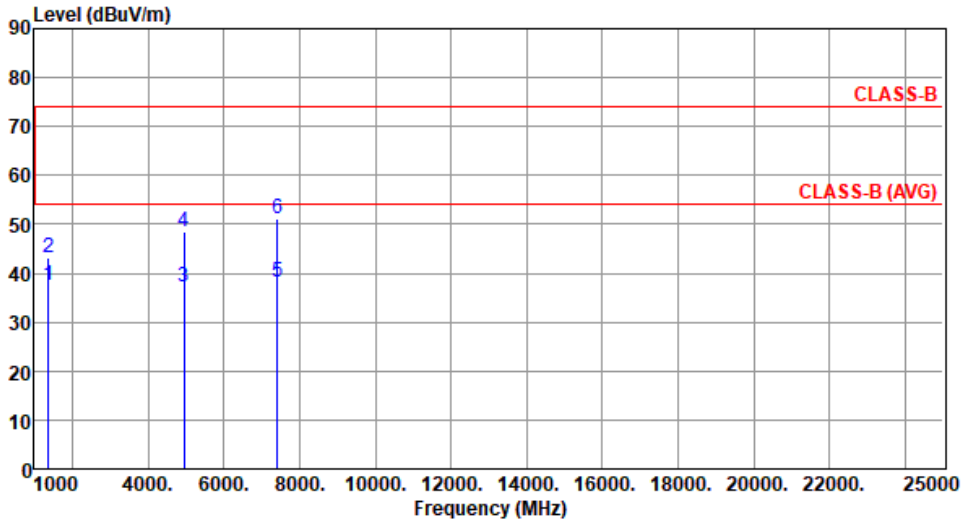


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	38.90	54.00	-15.10	44.91	-6.01	Average	118	321
2	1375.00	43.62	74.00	-30.38	49.63	-6.01	Peak	118	321
3	4950.00	41.18	54.00	-12.82	41.25	-0.07	Average	185	51
4	4950.00	50.48	74.00	-23.52	50.55	-0.07	Peak	185	51
5	7425.00	37.94	54.00	-16.06	32.30	5.64	Average	100	189
6	7425.00	51.87	74.00	-22.13	46.23	5.64	Peak	100	189

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	OQPSK	**Test Freq. (MHz)**	2475
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

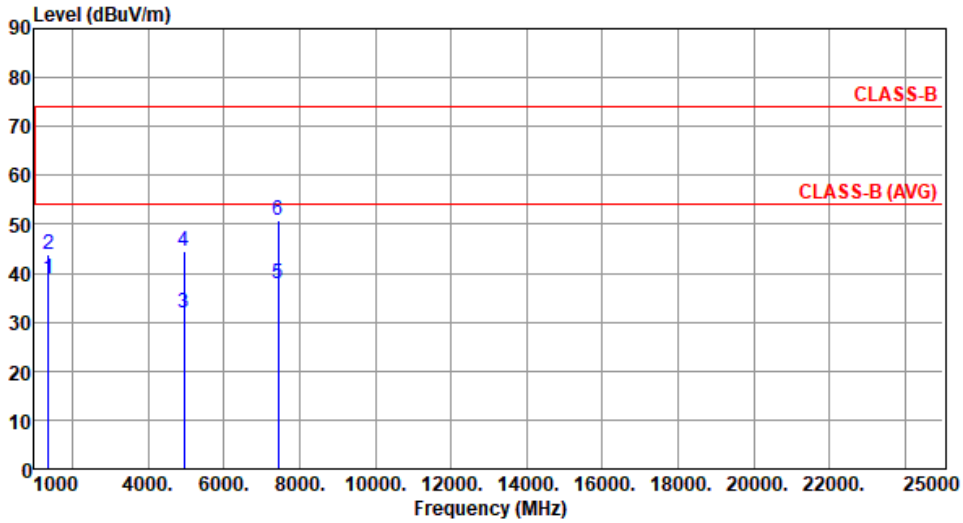


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	37.46	54.00	-16.54	43.47	-6.01	Average	118	196
2	1375.00	43.32	74.00	-30.68	49.33	-6.01	Peak	118	196
3	4950.00	37.26	54.00	-16.74	37.33	-0.07	Average	187	82
4	4950.00	48.48	74.00	-25.52	48.55	-0.07	Peak	187	82
5	7425.00	38.08	54.00	-15.92	32.44	5.64	Average	100	97
6	7425.00	51.03	74.00	-22.97	45.39	5.64	Peak	100	97

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	OQPSK	**Test Freq. (MHz)**	2480
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

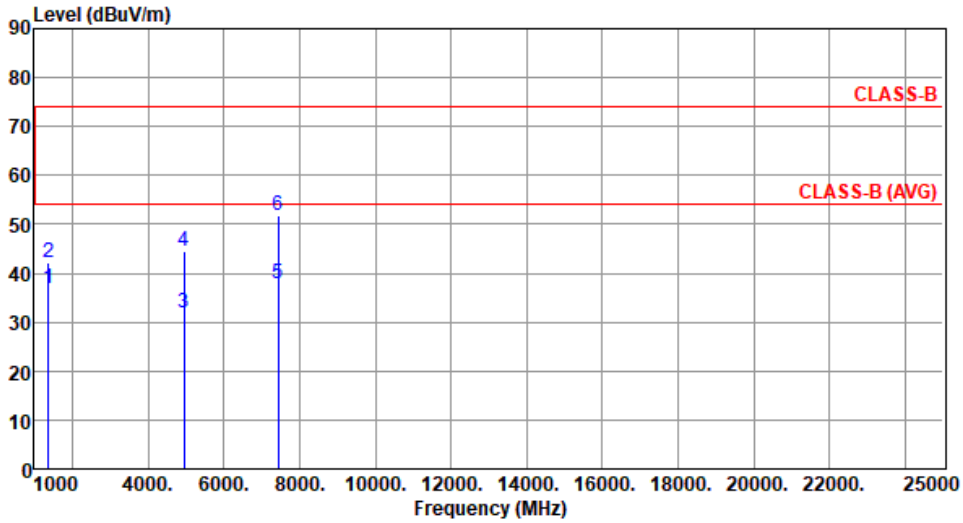


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	38.75	54.00	-15.25	44.76	-6.01	Average	118	328
2	1375.00	43.91	74.00	-30.09	49.92	-6.01	Peak	118	328
3	4960.00	32.03	54.00	-21.97	32.05	-0.02	Average	100	128
4	4960.00	44.49	74.00	-29.51	44.51	-0.02	Peak	100	128
5	7440.00	37.85	54.00	-16.15	32.19	5.66	Average	100	218
6	7440.00	50.94	74.00	-23.06	45.28	5.66	Peak	100	218

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	OQPSK	**Test Freq. (MHz)**	2480
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):25 Humidity(%):61

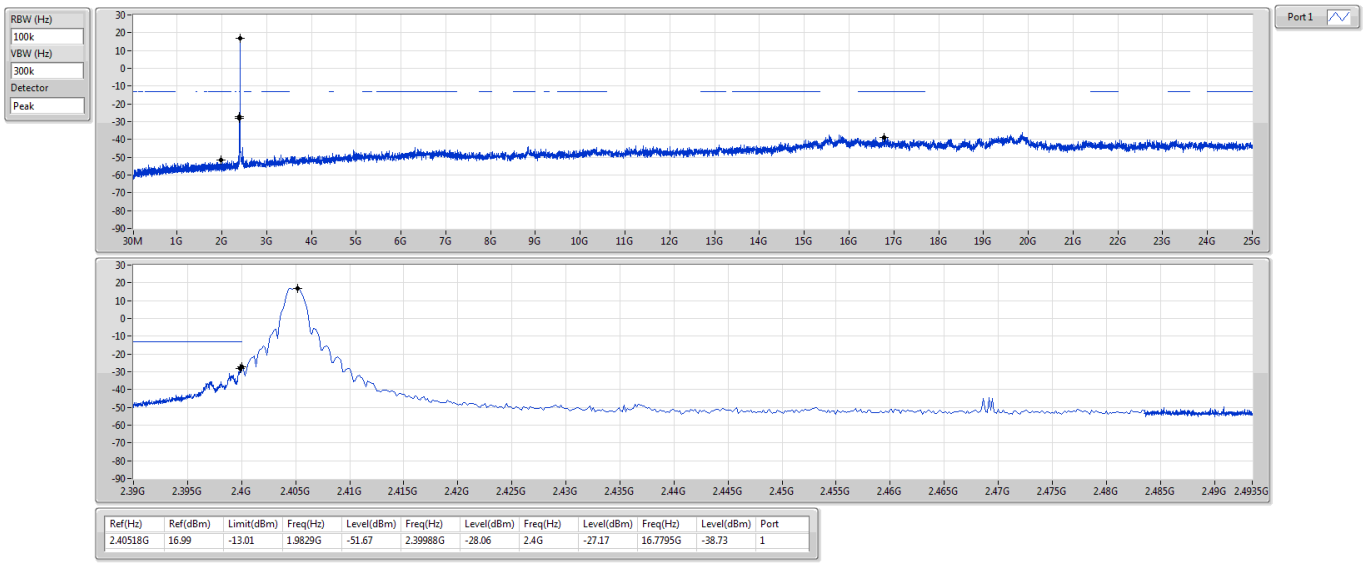


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	1375.00	37.03	54.00	-16.97	43.04	-6.01	Average	117	211
2	1375.00	42.20	74.00	-31.80	48.21	-6.01	Peak	117	211
3	4960.00	31.99	54.00	-22.01	32.01	-0.02	Average	100	54
4	4960.00	44.56	74.00	-29.44	44.58	-0.02	Peak	100	54
5	7440.00	37.91	54.00	-16.09	32.25	5.66	Average	100	183
6	7440.00	51.87	74.00	-22.13	46.21	5.66	Peak	100	183

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).

2.4-2.4835GHz_802.15.4 **CSENdB**

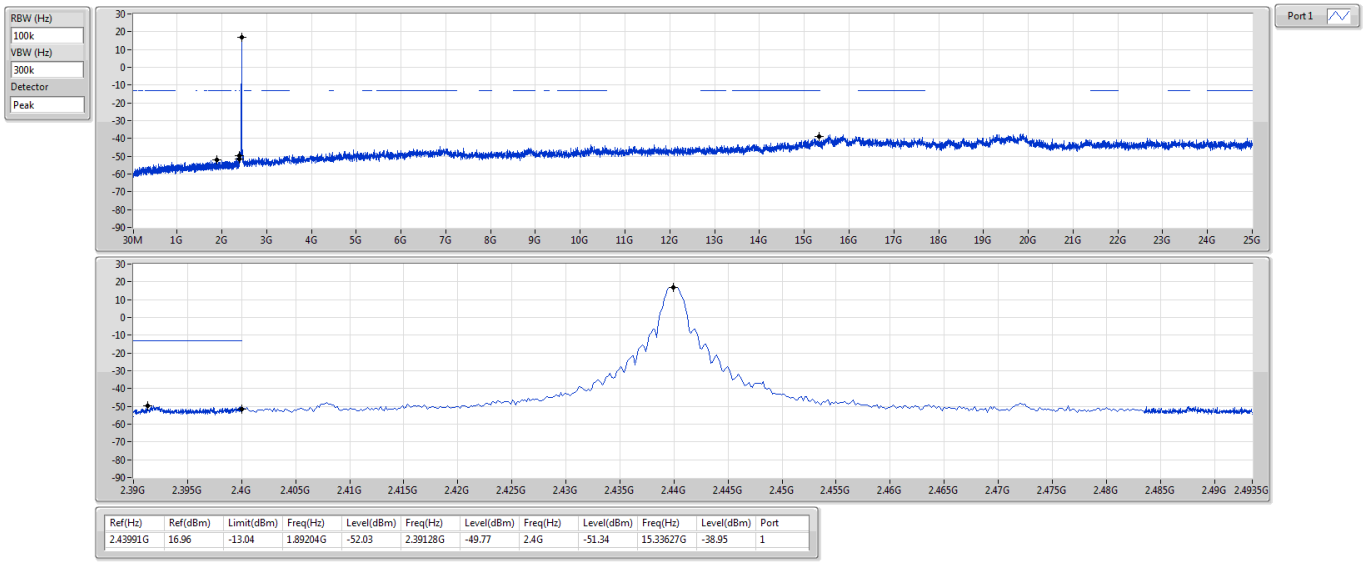
2405MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40518G	16.99	-13.01	1.9829G	-51.67	2.39988G	-28.06	2.4G	-27.17	16.7795G	-38.73	1

2.4-2.4835GHz_802.15.4 **CSENdB**

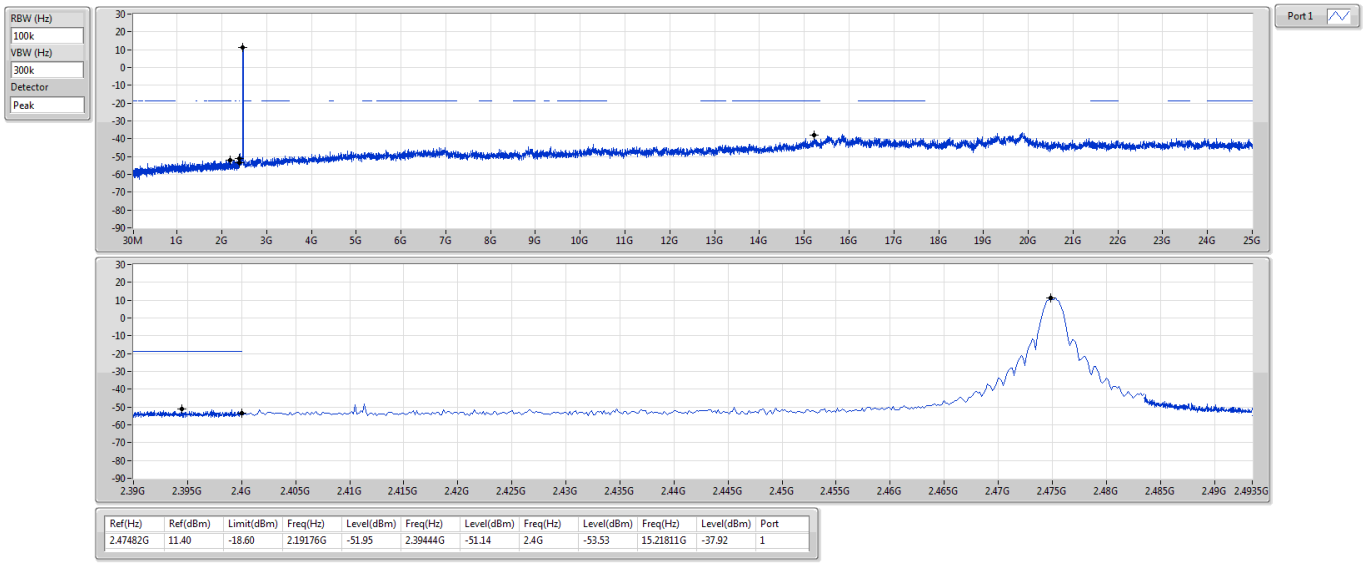
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.43991G	16.96	-13.04	1.89204G	-52.03	2.39128G	-49.77	2.4G	-51.34	15.33627G	-38.95	1

2.4-2.4835GHz_802.15.4 **CSENdB**

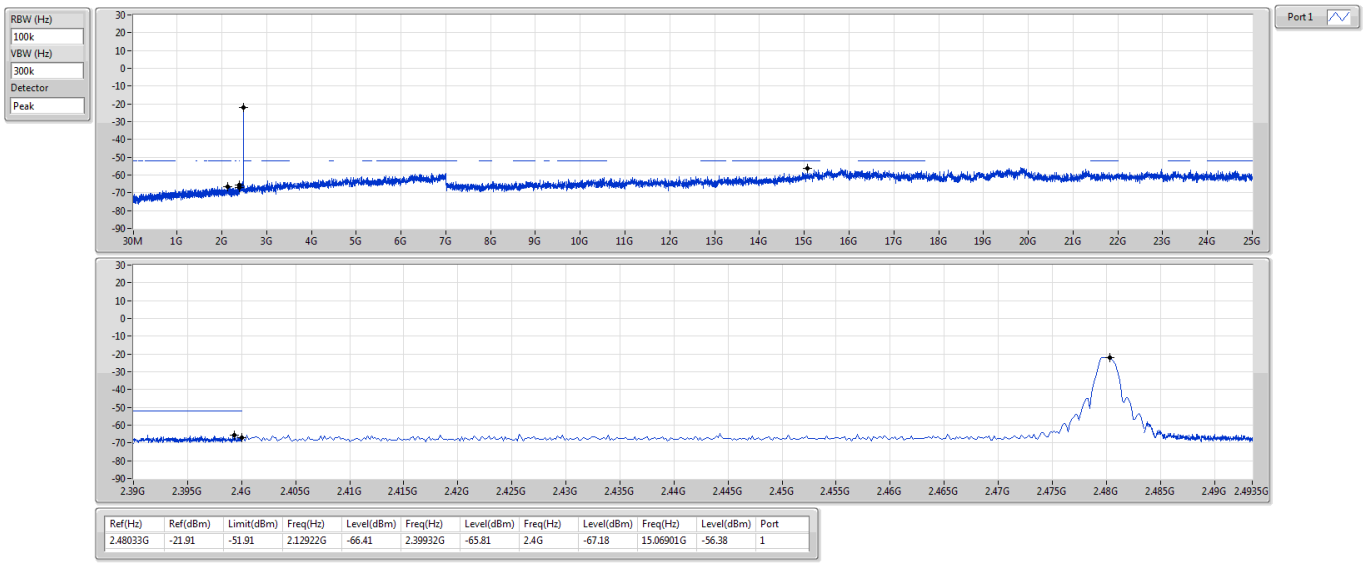
2475MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47482G	11.40	-18.60	2.19176G	-51.95	2.39444G	-51.14	2.4G	-53.53	15.21811G	-37.92	1

2.4-2.4835GHz_802.15.4 **CSENdB**

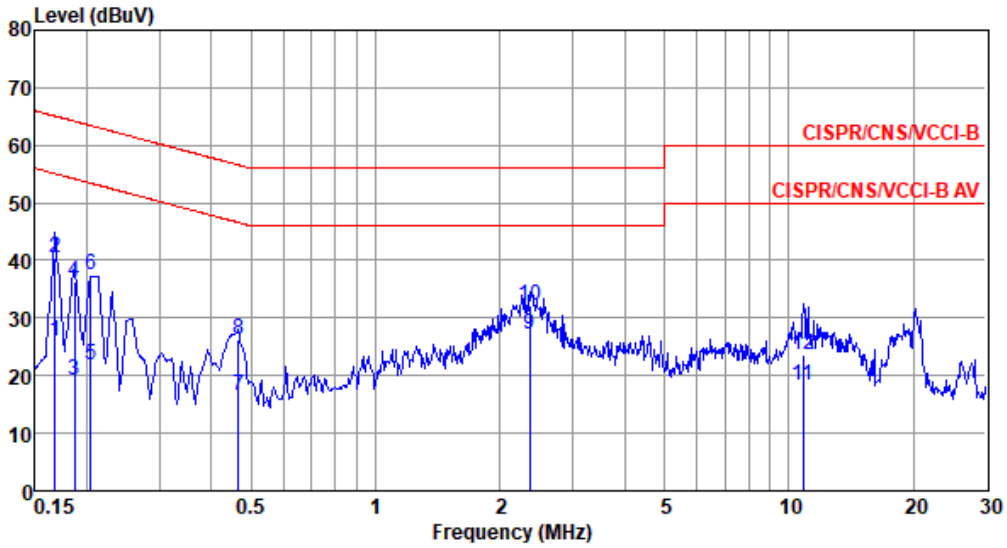
2480MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.48033G	-21.91	-51.91	2.12922G	-66.41	2.39932G	-65.81	2.4G	-67.18	15.06901G	-56.38	1

Modulation	OQPSK	**Test Freq. (MHz)**	2405
Power Phase	Line		

Test by : Joe Liao Temperature: 22°C Humidity: 66%

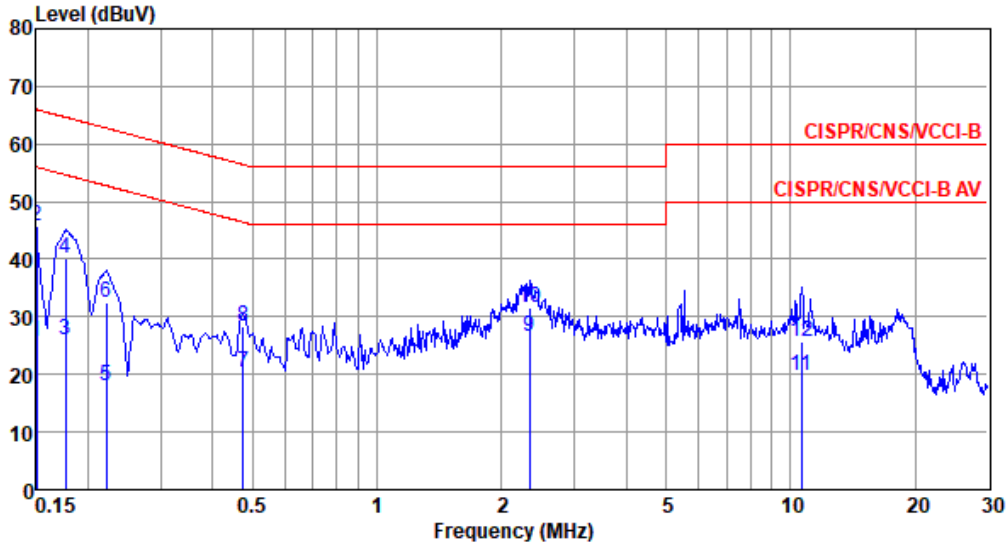


	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.168	25.86	55.08	-29.22	16.12	9.68	0.06	0.00	Average
2	0.168	40.40	65.08	-24.68	30.66	9.68	0.06	0.00	QP
3	0.186	19.21	54.20	-34.99	9.47	9.68	0.06	0.00	Average
4	0.186	36.38	64.20	-27.82	26.64	9.68	0.06	0.00	QP
5	0.204	21.98	53.45	-31.47	12.24	9.68	0.06	0.00	Average
6	0.204	37.53	63.45	-25.92	27.79	9.68	0.06	0.00	QP
7	0.466	16.49	46.58	-30.09	6.75	9.67	0.07	0.00	Average
8	0.466	26.26	56.58	-30.32	16.52	9.67	0.07	0.00	QP
9*	2.358	27.05	46.00	-18.95	17.22	9.69	0.14	0.00	Average
10	2.358	32.31	56.00	-23.69	22.48	9.69	0.14	0.00	QP
11	10.847	18.28	50.00	-31.72	8.16	9.74	0.38	0.00	Average
12	10.847	23.52	60.00	-36.48	13.40	9.74	0.38	0.00	QP

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

Modulation	OQPSK	**Test Freq. (MHz)**	2405
Power Phase	Neutral		

Test by : Joe Liao Temperature: 22°C Humidity: 66%



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.150	25.80	56.00	-30.20	16.13	9.61	0.06	0.00	Average
2	0.150	45.73	66.00	-20.27	36.06	9.61	0.06	0.00	QP
3	0.177	25.90	54.64	-28.74	16.23	9.61	0.06	0.00	Average
4	0.177	40.05	64.64	-24.59	30.38	9.61	0.06	0.00	QP
5	0.222	17.98	52.74	-34.76	8.31	9.61	0.06	0.00	Average
6	0.222	32.37	62.74	-30.37	22.70	9.61	0.06	0.00	QP
7	0.474	20.42	46.45	-26.03	10.74	9.61	0.07	0.00	Average
8	0.474	28.26	56.45	-28.19	18.58	9.61	0.07	0.00	QP
9*	2.334	26.48	46.00	-19.52	16.72	9.62	0.14	0.00	Average
10	2.334	31.66	56.00	-24.34	21.90	9.62	0.14	0.00	QP
11	10.620	19.74	50.00	-30.26	9.67	9.70	0.37	0.00	Average
12	10.620	25.55	60.00	-34.45	15.48	9.70	0.37	0.00	QP

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