

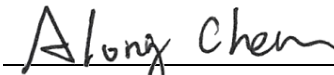
FCC Test Report

FCC ID : P27SZSMK03N
Equipment : ZigBee Smoke Alarm
Model No. : SZ-SMK03N
Multiple Listing : Refer to item 1.1.1 for more details
Brand Name : Sercomm
Applicant : Sercomm Corporation
Address : 8F, No. 3-1, YuanQu St., NanKang, Taipei 115,
Taiwan, R.O.C.
Standard : 47 CFR FCC Part 15.247
Received Date : Apr. 19, 2018
Tested Date : Apr. 25 ~ May 03, 2018

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



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Release Record

Report No.	Version	Description	Issued Date
FR840901	Rev. 01	Initial issue	Jun. 07, 2018

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	Note	N/A
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 2483.50MHz 52.87 (Margin -1.13dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 19.15	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

N/A means Not Applicable.

Note: The device consumes DC power, so the test is not required.

1 General Description

1.1 Information

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
Sercomm	SZ-SMK03N	ZigBee Smoke Alarm	Main tested model
	SZ-SMK03Nxxxxxxxx		the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, a to z, "blank" or "-", for marketing purpose
	SZ-SMK03xxxxxxxx		
† All models are electrically identical, different model names are for marketing purpose.			

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Mode	Ch. Frequency (MHz)	Channel Number	Data Rate
2400~2483.5	ZigBee	2405~2480	11-26 [16]	250kbps
Note 1: ZigBee uses DSSS-ASK modulation.				

1.1.3 Antenna Details

Ant. No.	Type	Connector	Gain (dBi)	Remarks
1	PIFA	UFL	2.84	---

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3Vdc from battery
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1.1.5 Accessories

Accessories		
No.	Equipment	Description
1	Lithium battery (For RF module)	Brand: GP Model: CR123A Power Rating: 3Vdc
2	Lithium battery (For main board)	Brand: FDK Model: CR17335E-R Power Rating: 3Vdc

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	Simplicity Studio, V4
Duty Cycle Of Test Signal (%)	100%
Duty Factor (dB)	0

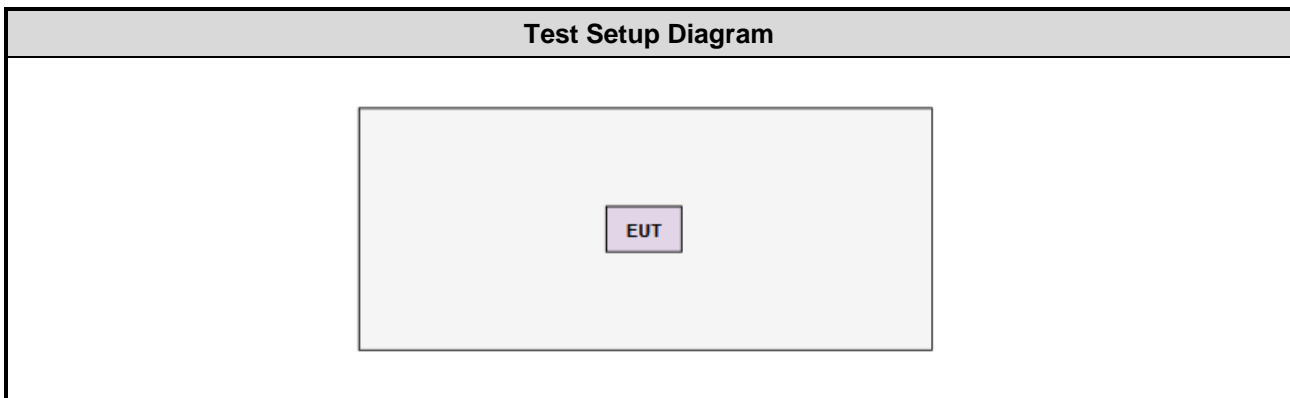
1.1.8 Power Setting

Modulation Mode	Test Frequency (MHz)	Power Set
ASK	2405	20
ASK	2440	20
ASK	2475	20
ASK	2480	13

1.2 Local Support Equipment List

Support Equipment List						
No.	Equipment	Brand	Model	S/N	FCC ID	Signal cable / Length (m)
1	Notebook	DELL	Latitude E6430	9ZFB4X1	DoC	---

1.3 Test Setup Chart



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

1.4 The Equipment List

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. 03, 2018	Jan. 02, 2019
Receiver	R&S	ESR3	101658	Nov. 20, 2017	Nov. 19, 2018
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 19, 2018	Apr. 18, 2019
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Jan. 18, 2018	Jan. 17, 2019
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 23, 2017	Nov. 22, 2018
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2017	Nov. 12, 2018
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 07, 2017	Dec. 06, 2018
Preamplifier	EMC	EMC02325	980187	Sep. 04, 2017	Sep. 03, 2018
Preamplifier	Agilent	83017A	MY53270014	Aug. 21, 2017	Aug. 20, 2018
Preamplifier	EMC	EMC184045B	980192	Aug. 22, 2017	Aug. 21, 2018
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Nov. 27, 2017	Nov. 26, 2018
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY32487/4	Nov. 27, 2017	Nov. 26, 2018
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Nov. 27, 2017	Nov. 26, 2018
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Nov. 27, 2017	Nov. 26, 2018
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Nov. 27, 2017	Nov. 26, 2018
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Nov. 27, 2017	Nov. 26, 2018
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. 16, 2018	Apr. 15, 2019
Power Meter	Anritsu	ML2495A	1241002	Oct. 16, 2017	Oct. 15, 2018
Power Sensor	Anritsu	MA2411B	1207366	Oct. 16, 2017	Oct. 15, 2018
DC POWER SOURCE	GW INSTRON	GPC-6030D	EM892433	Oct. 26, 2017	Oct. 25, 2018
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 DTS Meas Guidance v04

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$))

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.134 Hz
Conducted power	± 0.808 dB
Power density	± 0.463 dB
Conducted emission	± 2.670 dB
AC conducted emission	± 2.90 dB
Radiated emission ≤ 1 GHz	± 3.66 dB
Radiated emission > 1 GHz	± 5.37 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH03-WS	23°C / 63%	Akun Chung
RF Conducted	TH01-WS	22°C / 63%	Brad Wu

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- IC site registration No.: 10807C-1

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate
Radiated Emissions ≤1GHz	ASK	2405	250kbps
Radiated Emissions >1GHz Maximum Output Power 6dB bandwidth Power spectral density	ASK	2405 / 2440 / 2475 / 2480	250kbps

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

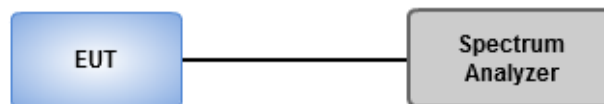
6dB Bandwidth

1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
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) = 30 kHz, Video bandwidth = 100 kHz.
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 Result of 6dB and Occupied Bandwidth

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
Zigbee_1TX	1.649M	2.243M	2M24G1D	1.612M	2.243M

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

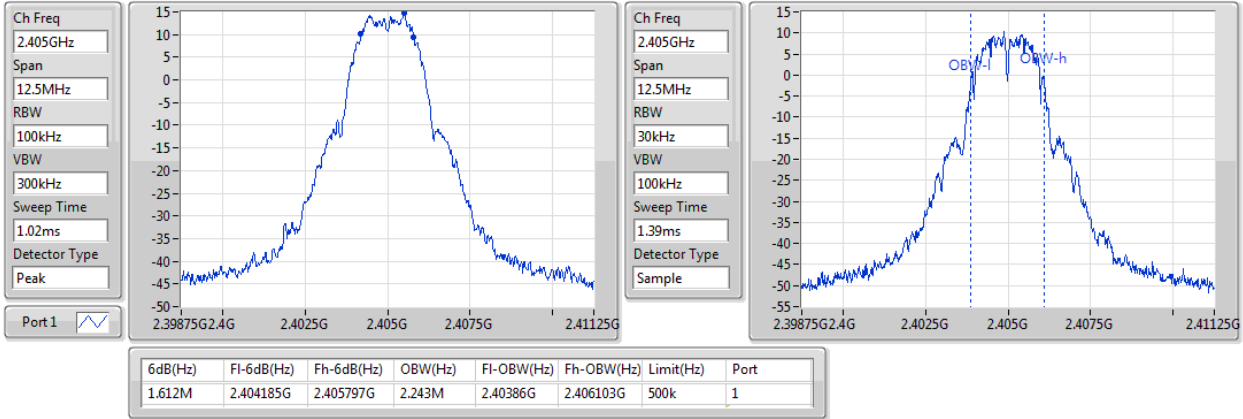
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
Zigbee_1TX	-	-	-	-
2405MHz	Pass	500k	1.612M	2.243M
2440MHz	Pass	500k	1.612M	2.243M
2475MHz	Pass	500k	1.649M	2.243M
2480MHz	Pass	500k	1.63M	2.243M

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

Zigbee_1TX

EBW

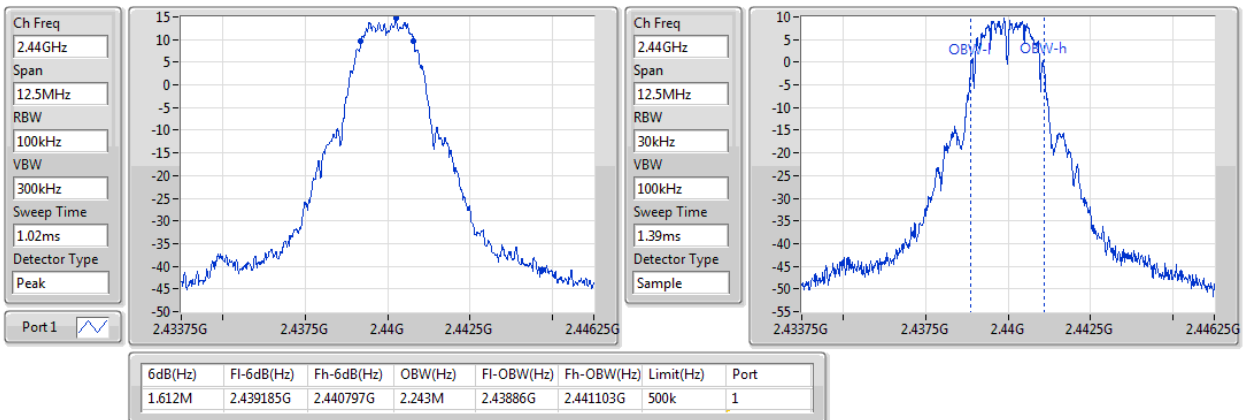
2405MHz

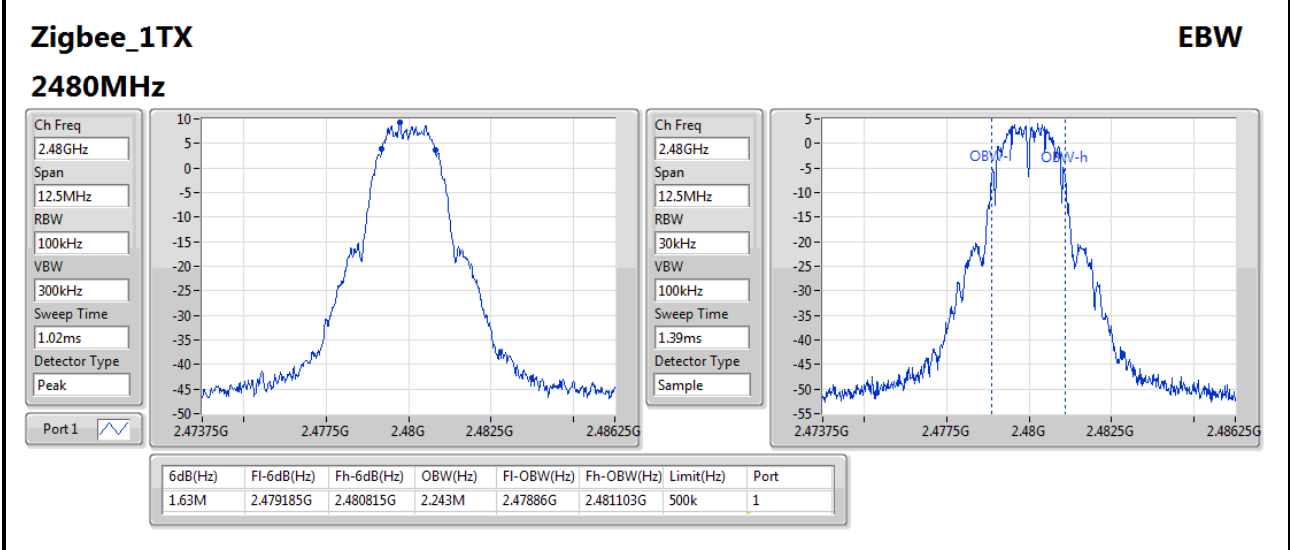
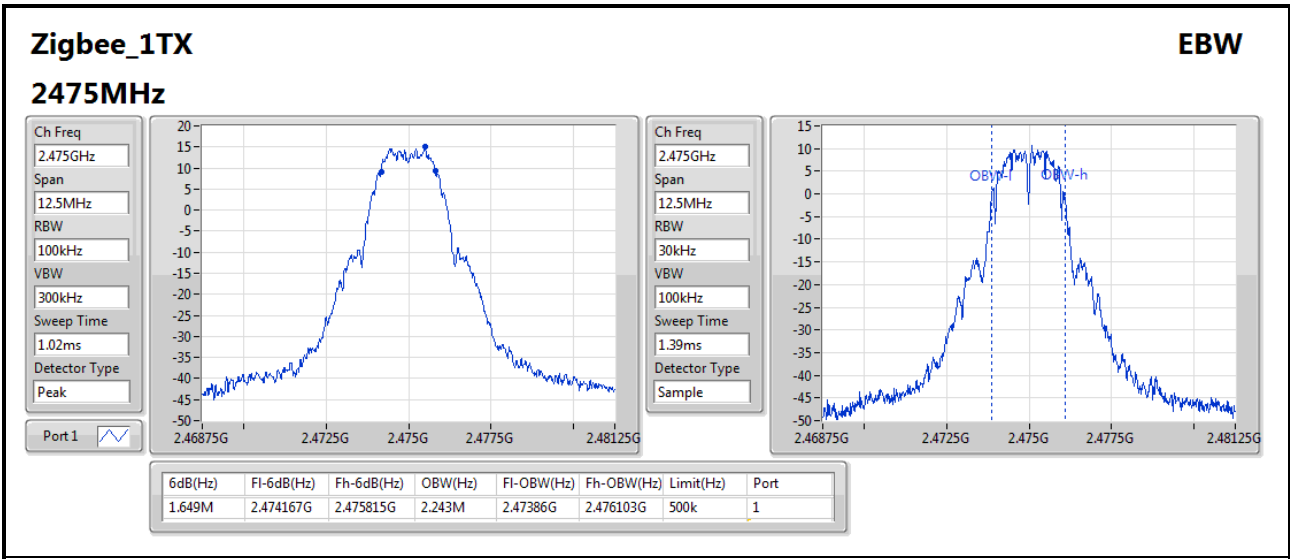


Zigbee_1TX

EBW

2440MHz





3.2 RF Output Power

3.2.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

- Antenna gain \leq 6dBi, no any corresponding reduction is in output power limit.
- Antenna gain $>$ 6dBi
 - Non Fixed, point to point operations.
The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB
 - Fixed, point to point operations
Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations ,no any corresponding reduction is in transmitter peak output power

3.2.2 Test Procedures

- Maximum Peak Conducted Output Power
 - Spectrum analyzer**
 1. Set RBW = 1MHz, VBW = 3MHz, Detector = Peak.
 2. Sweep time = auto, Trace mode = max hold, Allow trace to fully stabilize.
 3. Use the spectrum analyzer channel power measurement function with the band limits set equal to the DTS bandwidth edges.
 - Power meter**
 1. A broadband Peak 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.
- Maximum Conducted Output Power (For reference only)
 - Power meter**
 1. A broadband Average 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 Result of Maximum Output Power

Summary of Peak conducted Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee_1TX	19.15	0.08222

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
Zigbee_1TX	-	-	-	-	-	-	-
2405MHz	Pass	2.84	19.15	19.15	30.00	21.99	36.00
2440MHz	Pass	2.84	18.95	18.95	30.00	21.79	36.00
2475MHz	Pass	2.84	18.81	18.81	30.00	21.65	36.00
2480MHz	Pass	2.84	12.92	12.92	30.00	15.76	36.00

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

Summary of Conducted (Average) Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee_1TX	19.08	0.08091

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
Zigbee_1TX	-	-	-	-	-	-	-
2405MHz	Pass	2.84	19.08	19.08		21.92	
2440MHz	Pass	2.84	18.91	18.91		21.75	
2475MHz	Pass	2.84	18.76	18.76		21.60	
2480MHz	Pass	2.84	12.7	12.70		15.54	

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

Note : Conducted average output power is for reference only

3.3 Power Spectral Density

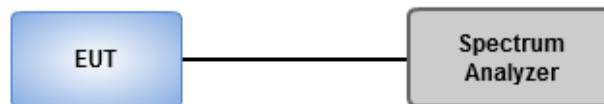
3.3.1 Limit of Power Spectral Density

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

3.3.2 Test Procedures

- Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.
 1. Set the RBW = 3kHz, VBW = 10kHz.
 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.
- Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.
 1. Set the RBW = 100kHz, VBW = 300 kHz.
 2. Detector = RMS, Sweep time = auto couple.
 3. Set the sweep time to: $\geq 10 \times (\text{number of measurement points in sweep}) \times (\text{maximum data rate per stream})$.
 4. Perform the measurement over a single sweep.
 5. Use the peak marker function to determine the maximum amplitude level.

3.3.3 Test Setup



3.3.4 Test Result of Power Spectral Density

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
Zigbee_1TX	3.51

RBW=3kHz.

Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
Zigbee_1TX	-	-	-	-	-
2405MHz	Pass	2.84	3.51	3.51	8.00
2440MHz	Pass	2.84	3.33	3.33	8.00
2475MHz	Pass	2.84	3.39	3.39	8.00
2480MHz	Pass	2.84	-2.84	-2.84	8.00

DG = Directional Gain; RBW=3kHz;

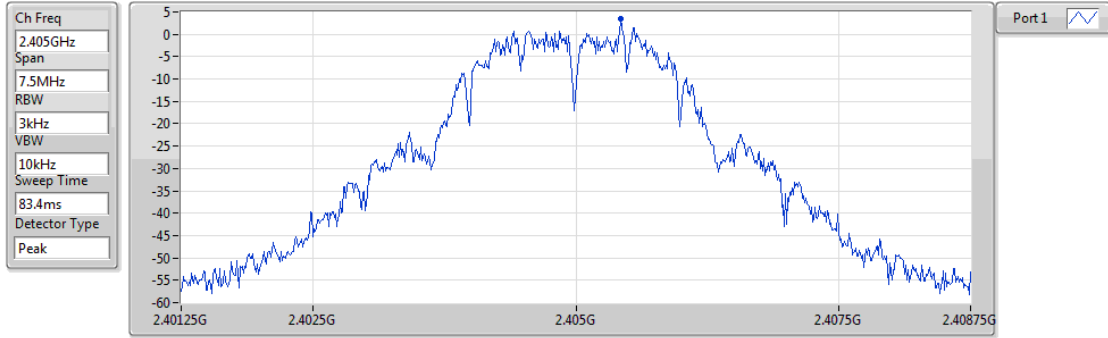
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

Test results of each port are measured value with duty factor

Zigbee_1TX

PSD

2405MHz

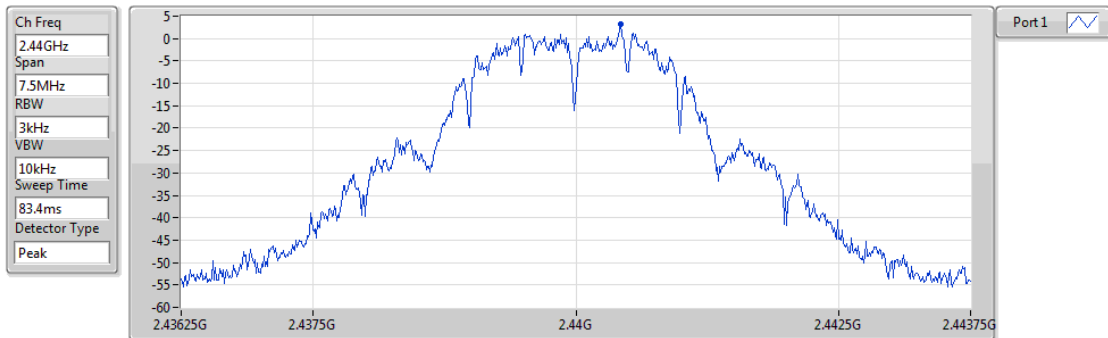


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
3.51	3.51	3.51

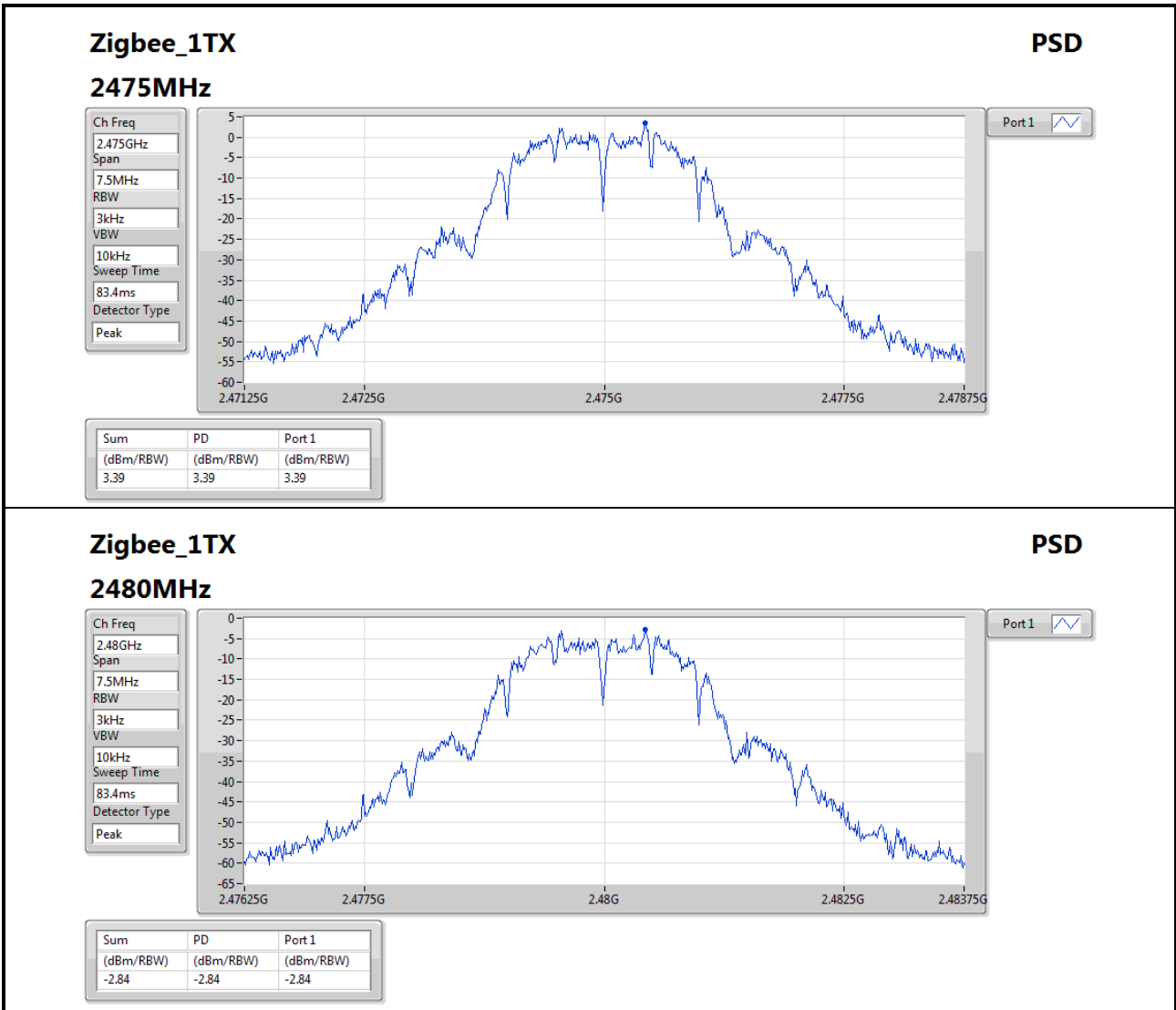
Zigbee_1TX

PSD

2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
3.33	3.33	3.33



3.4 Unwanted Emissions into Restricted Frequency Bands

3.4.1 Limit of Unwanted Emissions into Restricted Frequency Bands

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

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

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

3.4.2 Test Procedures

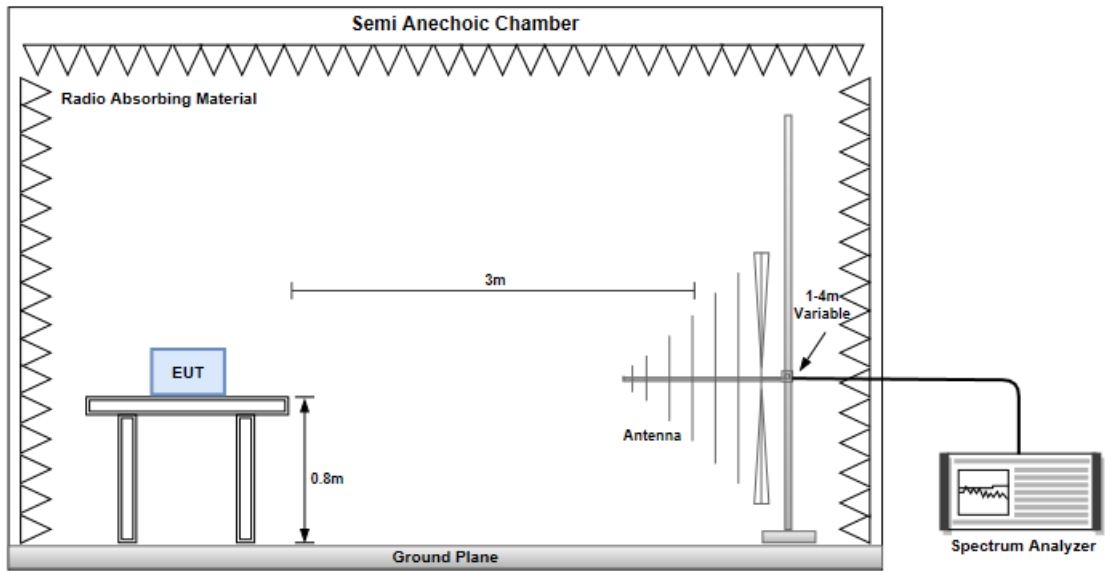
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

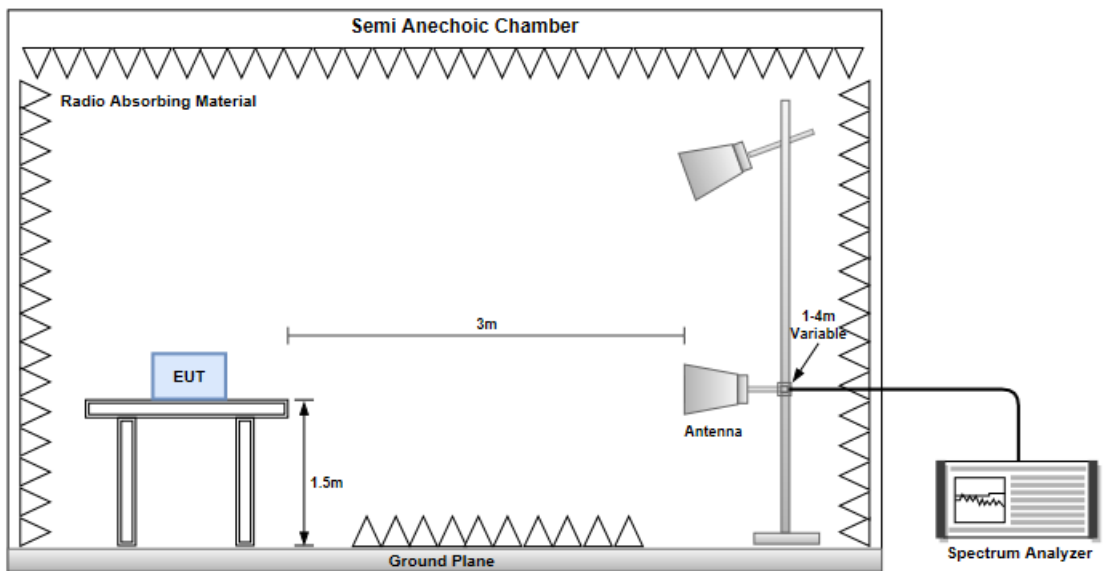
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.4.3 Test Setup

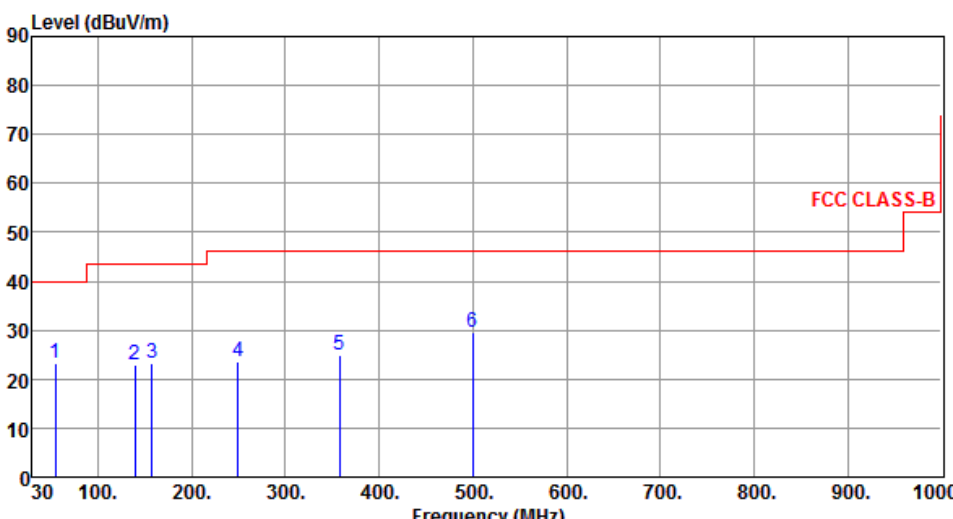
Radiated Emissions below 1 GHz



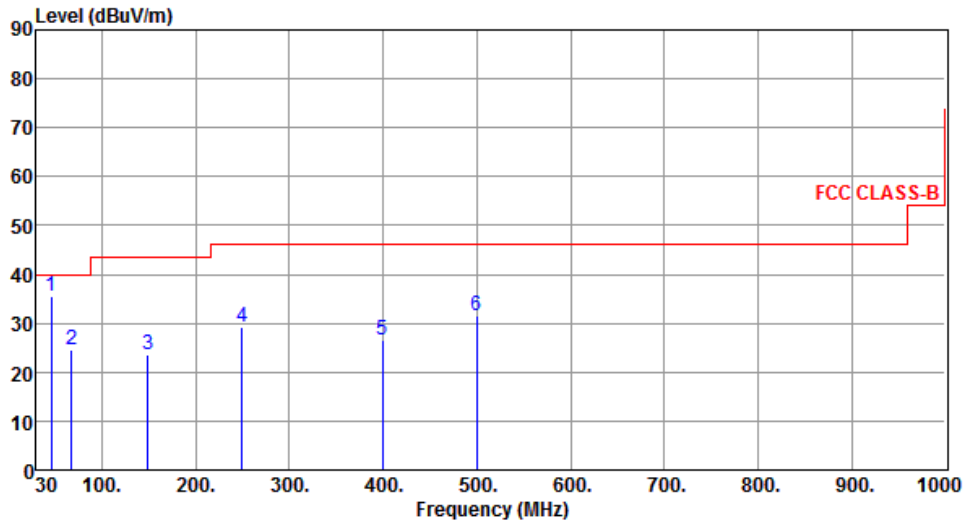
Radiated Emissions above 1 GHz



3.4.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	ASK	Test Freq. (MHz)	2405						
Polarization	Horizontal								
 <p>The graph plots Level (dBuV/m) on the y-axis (0 to 90) against Frequency (MHz) on the x-axis (30 to 1000). A red step function represents the FCC CLASS-B limit, which is 40 dBuV/m from 30 to 100 MHz, 45 dBuV/m from 100 to 200 MHz, and 50 dBuV/m from 200 to 1000 MHz. Six blue vertical lines represent emission peaks at 54.25, 139.61, 158.04, 249.22, 357.86, and 499.48 MHz. The peak at 499.48 MHz is the highest, reaching approximately 30 dBuV/m.</p>									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	54.25	23.12	40.00	-16.88	31.43	-8.31	Peak	---	---
2	139.61	22.96	43.50	-20.54	31.54	-8.58	Peak	---	---
3	158.04	23.21	43.50	-20.29	31.30	-8.09	Peak	---	---
4	249.22	23.67	46.00	-22.33	32.86	-9.19	Peak	---	---
5	357.86	24.93	46.00	-21.07	31.12	-6.19	Peak	---	---
6	499.48	29.39	46.00	-16.61	32.39	-3.00	Peak	---	---
<p>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.</p>									

Modulation	ASK	Test Freq. (MHz)	2405
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	45.52	35.57	40.00	-4.43	43.76	-8.19	Peak	---	---
2	67.83	24.50	40.00	-15.50	34.67	-10.17	Peak	---	---
3	149.31	23.67	43.50	-19.83	31.81	-8.14	Peak	---	---
4	249.22	29.30	46.00	-16.70	38.49	-9.19	Peak	---	---
5	399.57	26.68	46.00	-19.32	31.76	-5.08	Peak	---	---
6	499.48	31.66	46.00	-14.34	34.66	-3.00	Peak	---	---

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

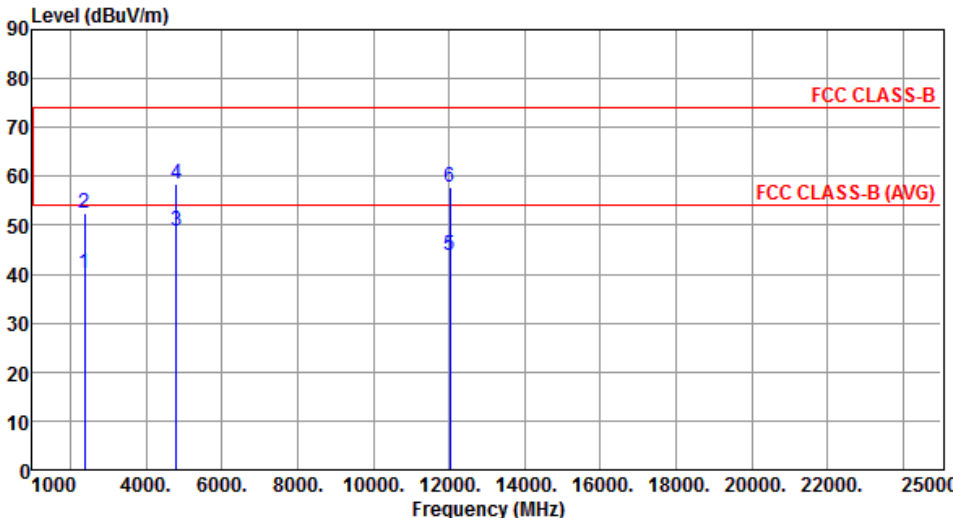
*Factor includes antenna factor , cable loss and amplifier gain

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.

3.4.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation	ASK	Test Freq. (MHz)	2405
Polarization	Horizontal		

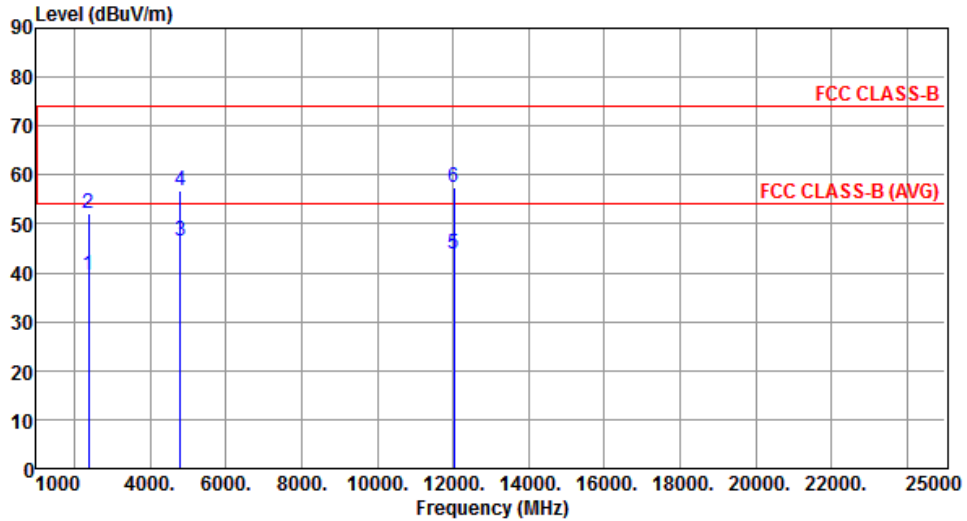


The graph plots Level (dBuV/m) on the y-axis (0 to 90) against Frequency (MHz) on the x-axis (1000 to 25000). Two horizontal red lines represent FCC CLASS-B (at ~74 dBuV/m) and FCC CLASS-B (AVG) (at ~54 dBuV/m). Six vertical blue lines indicate measurement points labeled 1 through 6. Points 1, 2, 3, 4, and 5 are at 2390 MHz, and point 6 is at 12025 MHz. The emission levels at these points are 40.10, 52.48, 48.73, 58.54, 43.78, and 57.62 dBuV/m respectively.

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	40.10	54.00	-13.90	41.31	-1.21	Average	258	271
2	2390.00	52.48	74.00	-21.52	53.69	-1.21	Peak	258	271
3	4810.00	48.73	54.00	-5.27	43.10	5.63	Average	228	212
4	4810.00	58.54	74.00	-15.46	52.91	5.63	Peak	228	212
5	12025.00	43.78	54.00	-10.22	28.06	15.72	Average	100	195
6	12025.00	57.62	74.00	-16.38	41.90	15.72	Peak	100	195

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	ASK	Test Freq. (MHz)	2405
Polarization	Vertical		



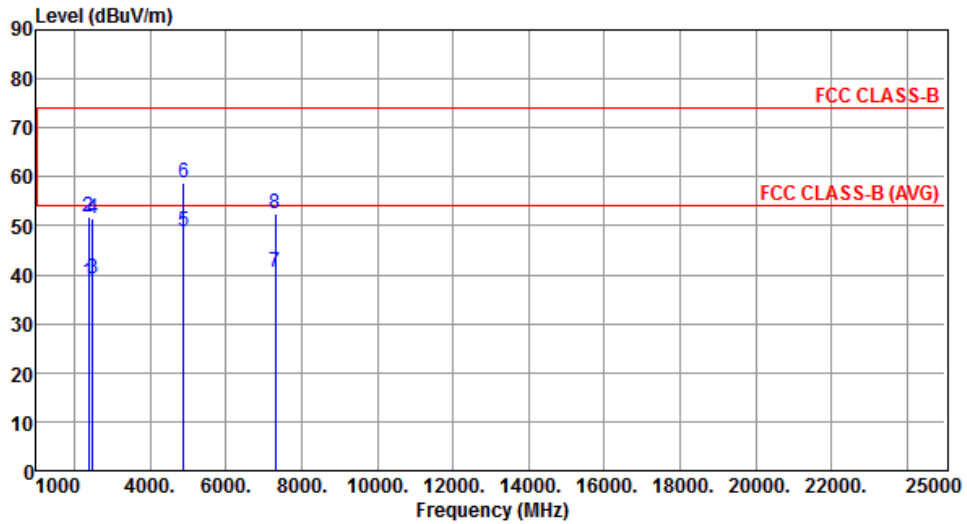
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	39.39	54.00	-14.61	40.60	-1.21	Average	359	240
2	2390.00	52.22	74.00	-21.78	53.43	-1.21	Peak	359	240
3	4810.00	46.46	54.00	-7.54	40.83	5.63	Average	130	80
4	4810.00	56.80	74.00	-17.20	51.17	5.63	Peak	130	80
5	12025.00	43.82	54.00	-10.18	28.10	15.72	Average	100	160
6	12025.00	57.50	74.00	-16.50	41.78	15.72	Peak	100	160

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	ASK	Test Freq. (MHz)	2440
Polarization	Horizontal		



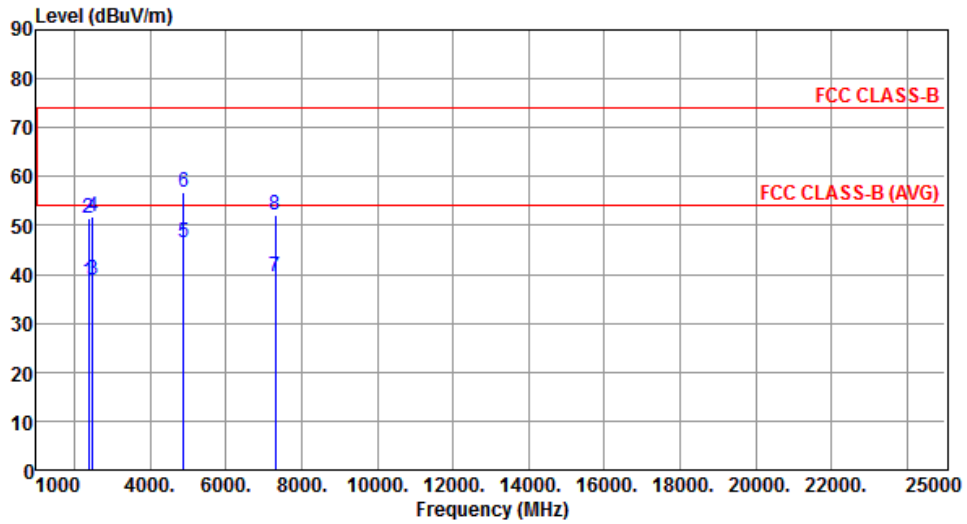
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.51	54.00	-15.49	39.72	-1.21	Average	250	270
2	2390.00	51.65	74.00	-22.35	52.86	-1.21	Peak	250	270
3	2483.50	39.04	54.00	-14.96	39.90	-0.86	Average	250	270
4	2483.50	51.53	74.00	-22.47	52.39	-0.86	Peak	250	270
5	4880.00	48.88	54.00	-5.12	43.06	5.82	Average	233	211
6	4880.00	58.70	74.00	-15.30	52.88	5.82	Peak	233	211
7	7320.00	40.40	54.00	-13.60	29.41	10.99	Average	171	188
8	7320.00	52.54	74.00	-21.46	41.55	10.99	Peak	171	188

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	ASK	Test Freq. (MHz)	2440
Polarization	Vertical		



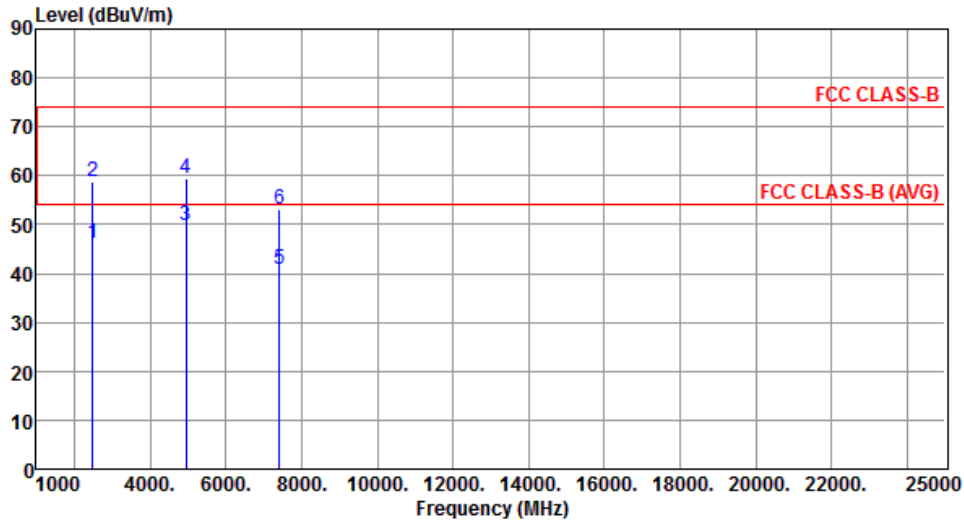
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.49	54.00	-15.51	39.70	-1.21	Average	325	210
2	2390.00	51.49	74.00	-22.51	52.70	-1.21	Peak	325	210
3	2483.50	38.78	54.00	-15.22	39.64	-0.86	Average	325	210
4	2483.50	51.95	74.00	-22.05	52.81	-0.86	Peak	325	210
5	4880.00	46.61	54.00	-7.39	40.79	5.82	Average	129	81
6	4880.00	56.87	74.00	-17.13	51.05	5.82	Peak	129	81
7	7320.00	39.52	54.00	-14.48	28.53	10.99	Average	100	150
8	7320.00	52.16	74.00	-21.84	41.17	10.99	Peak	100	150

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	ASK	Test Freq. (MHz)	2475
Polarization	Horizontal		



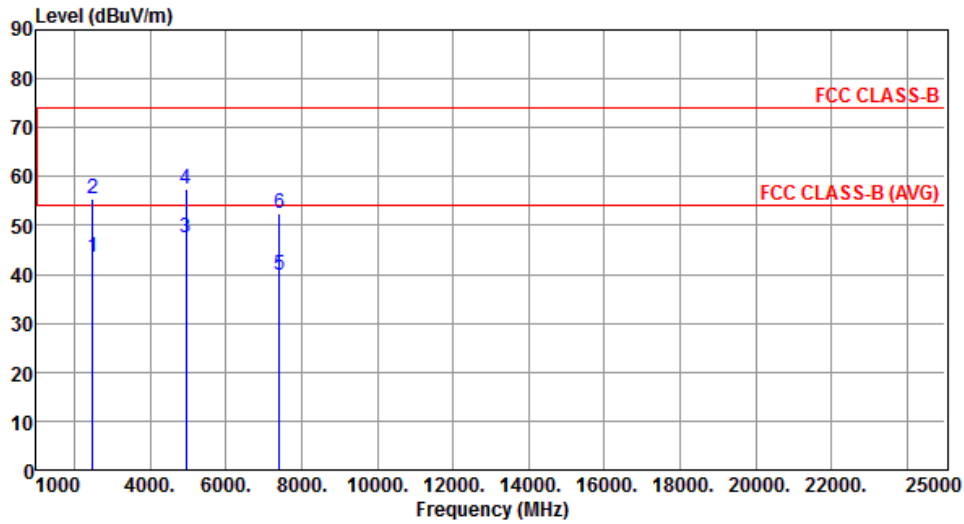
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	46.20	54.00	-7.80	47.06	-0.86	Average	273	271
2	2483.50	58.93	74.00	-15.07	59.79	-0.86	Peak	273	271
3	4950.00	49.75	54.00	-4.25	43.72	6.03	Average	235	209
4	4950.00	59.50	74.00	-14.50	53.47	6.03	Peak	235	209
5	7425.00	40.83	54.00	-13.17	29.47	11.36	Average	100	186
6	7425.00	53.04	74.00	-20.96	41.68	11.36	Peak	100	186

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	ASK	Test Freq. (MHz)	2475
Polarization	Vertical		



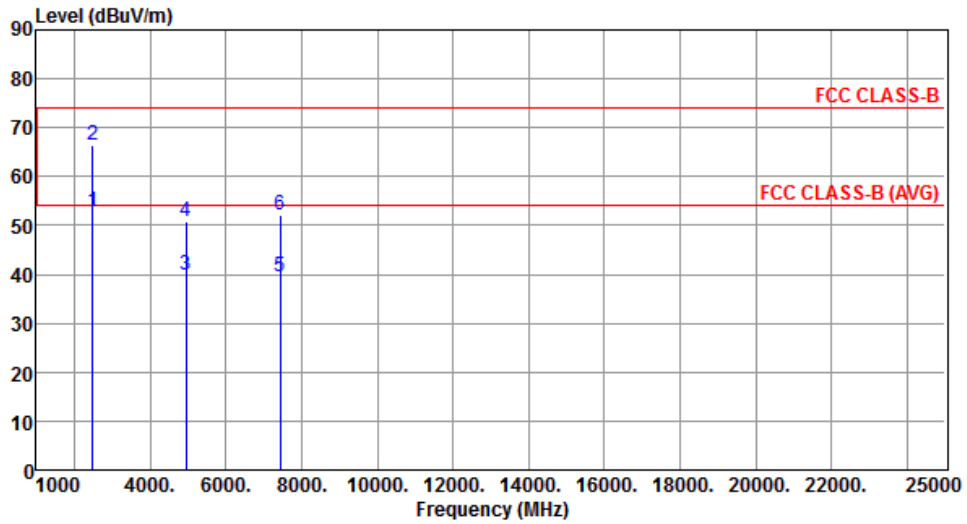
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	43.44	54.00	-10.56	44.30	-0.86	Average	339	236
2	2483.50	55.49	74.00	-18.51	56.35	-0.86	Peak	339	236
3	4950.00	47.34	54.00	-6.66	41.31	6.03	Average	132	79
4	4950.00	57.58	74.00	-16.42	51.55	6.03	Peak	132	79
5	7425.00	39.97	54.00	-14.03	28.61	11.36	Average	100	153
6	7425.00	52.58	74.00	-21.42	41.22	11.36	Peak	100	153

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	ASK	Test Freq. (MHz)	2480
Polarization	Horizontal		



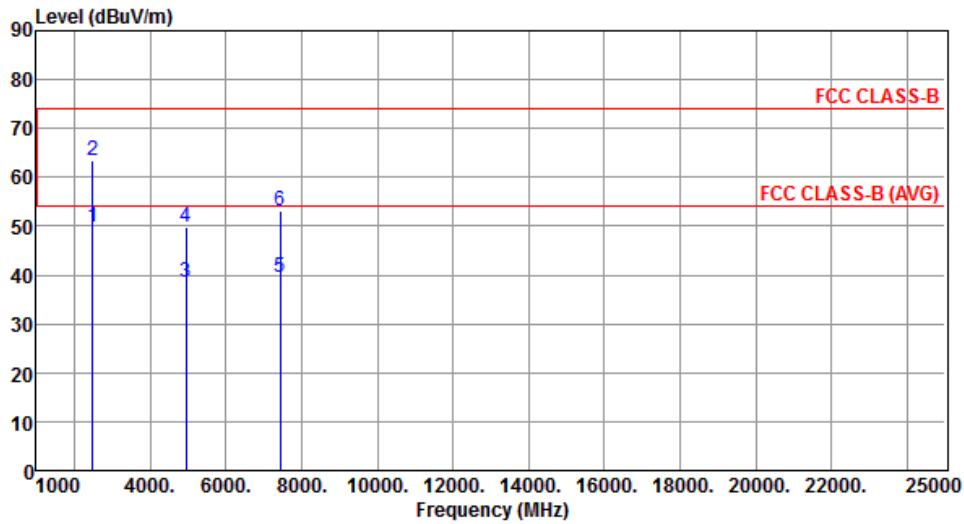
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	52.87	54.00	-1.13	53.73	-0.86	Average	269	265
2	2483.50	66.27	74.00	-7.73	67.13	-0.86	Peak	269	265
3	4960.00	39.76	54.00	-14.24	33.70	6.06	Average	233	210
4	4960.00	50.76	74.00	-23.24	44.70	6.06	Peak	233	210
5	7440.00	39.60	54.00	-14.40	28.23	11.37	Average	100	190
6	7440.00	52.11	74.00	-21.89	40.74	11.37	Peak	100	190

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	ASK	Test Freq. (MHz)	2480
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	2483.50	49.84	54.00	-4.16	50.70	-0.86	Average	334	237
2	2483.50	63.58	74.00	-10.42	64.44	-0.86	Peak	334	237
3	4960.00	38.60	54.00	-15.40	32.54	6.06	Average	126	78
4	4960.00	49.66	74.00	-24.34	43.60	6.06	Peak	126	78
5	7440.00	39.60	54.00	-14.40	28.23	11.37	Average	100	155
6	7440.00	53.00	74.00	-21.00	41.63	11.37	Peak	100	155

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).

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

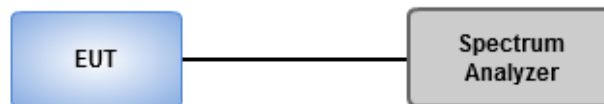
Reference level measurement

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



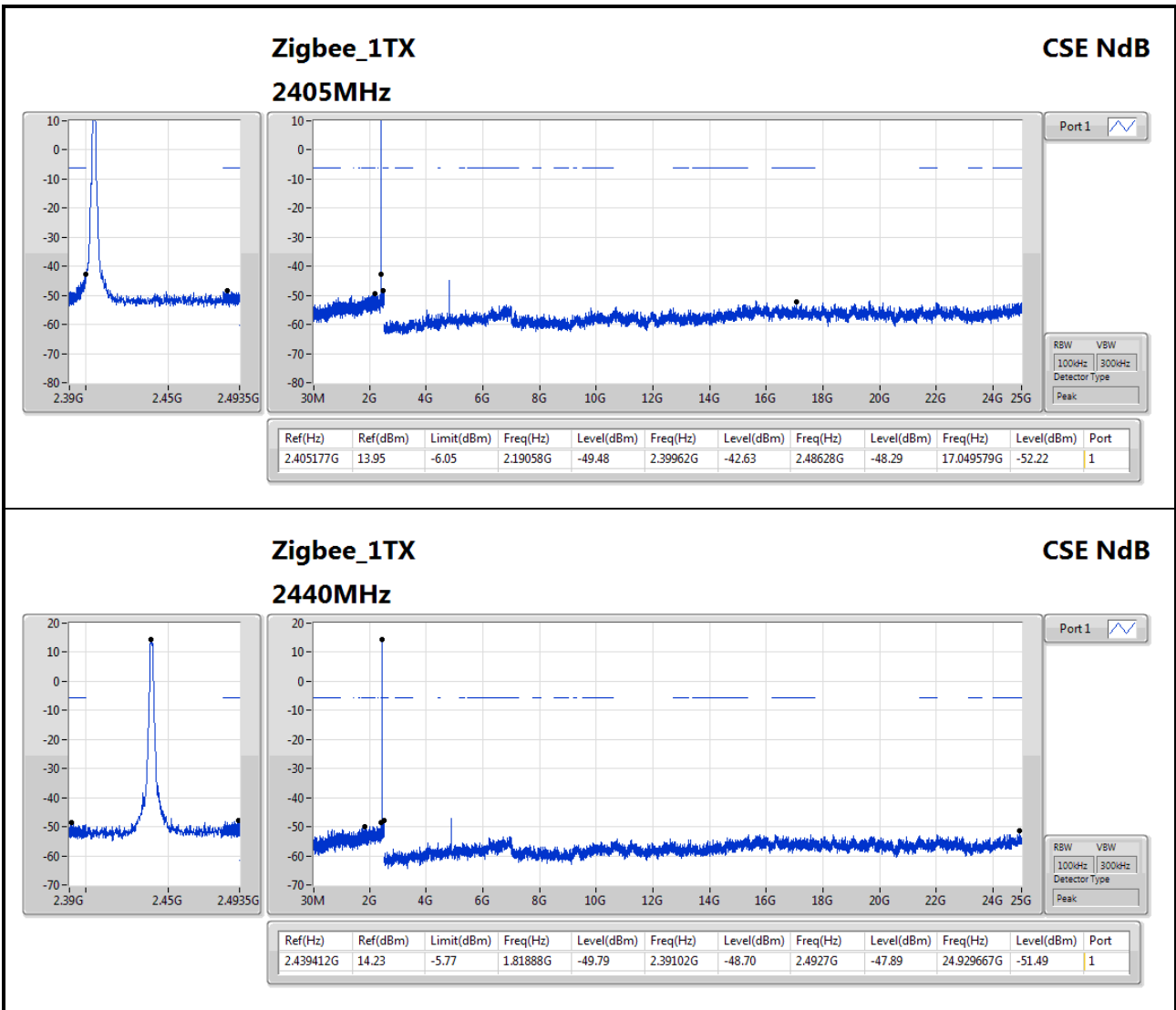
3.5.4 Unwanted Emissions into Non-Restricted Frequency Bands

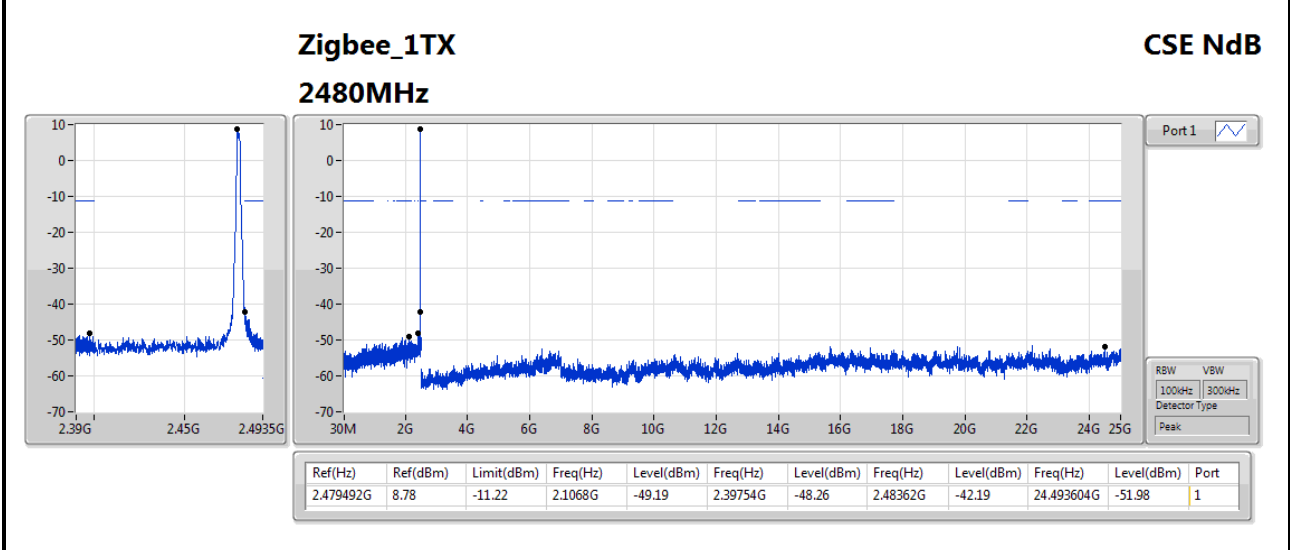
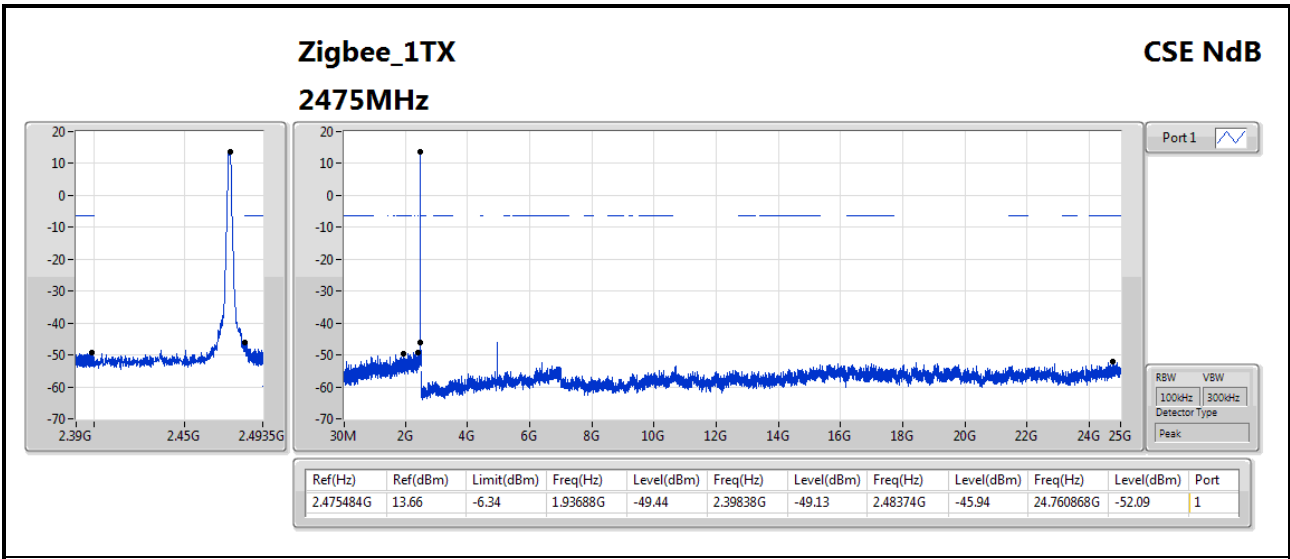
Summary

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
Zigbee_1TX	Pass	2.479492G	8.78	-11.22	2.1068G	-49.19	2.39754G	-48.26	2.48362G	-42.19	24.493604G	-51.98	1

Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
Zigbee_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	2.405177G	13.95	-6.05	2.19058G	-49.48	2.39962G	-42.63	2.48628G	-48.29	17.049579G	-52.22	1
2440MHz	Pass	2.439412G	14.23	-5.77	1.81888G	-49.79	2.39102G	-48.70	2.4927G	-47.89	24.929667G	-51.49	1
2475MHz	Pass	2.475484G	13.66	-6.34	1.93688G	-49.44	2.39838G	-49.13	2.48374G	-45.94	24.760868G	-52.09	1
2480MHz	Pass	2.479492G	8.78	-11.22	2.1068G	-49.19	2.39754G	-48.26	2.48362G	-42.19	24.493604G	-51.98	1





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>.

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Kou District, New Taipei City,
Taiwan, R.O.C.

Kwei Shan

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No. 3-1, Lane 6, Wen San 3rd St.,
Kwei Shan District, Tao Yuan City
333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

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.

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Email: ICC_Service@icertifi.com.tw

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