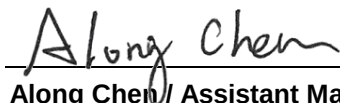


FCC Test Report

FCC ID : Q9DARBTUSBZB1
Equipment : ZigBee USB Adapter
Model No. : ARBTUSBZB1
Brand Name : aruba a Hewlett Packard Enterprise Company
Applicant : Hewlett Packard Enterprise company
Address : 3333 Scott Blvd Santa Clara, CA 94089 United States
Standard : 47 CFR FCC Part 15.247
Received Date : Aug. 15, 2019
Tested Date : Aug. 22 ~ Aug. 27, 2019

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:



Along Chen / Assistant Manager

Approved by:



Gary Chang / Manager



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Release Record

Report No.	Version	Description	Issued Date
FR981501	Rev. 01	Initial issue	Nov. 01, 2019

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.654MHz 33.47 (Margin -12.53dB) - AV	Pass
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]: 8.43	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

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	ZigBee	2405~2480	11-26 [16]	250kbps
Note 1: ZigBee uses DSSS-OQPSK modulation.				

1.1.2 Antenna Details

Ant. No.	Type	Connector	Gain (dBi)	Remarks
1	Printed	No	1.5	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc from host
-------------------	----------------

1.1.4 Accessories

N/A

1.1.5 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

1.1.6 Test Tool and Duty Cycle

Test Tool	Tera Term, V4.74	
Duty Cycle and Duty Factor	Duty Cycle (%)	Duty Factor (dB)
	100.00	0.00

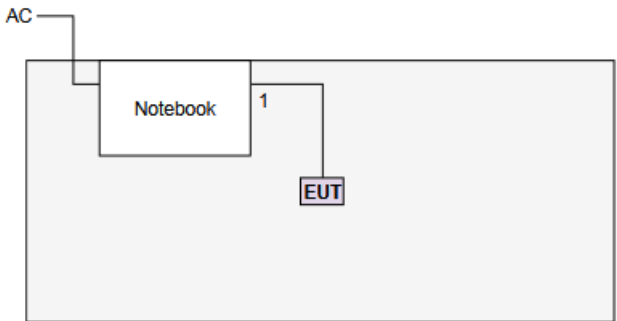
1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
OQPSK	2405	8
OQPSK	2440	8
OQPSK	2475	8
OQPSK	2480	5

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	S/N	Remarks
1	Notebook	DELL	NBXPS13-9360 -R1708S	---	Provided by applicant.

1.3 Test Setup Chart

Test Setup Diagram	
 The diagram shows a large rectangular area representing the test setup. Inside this area, there is a box labeled 'Notebook'. A line labeled 'AC' enters the top left of the setup area and connects to the 'Notebook' box. Another line labeled '1' connects the 'Notebook' box to a small box labeled 'EUT' (Equipment Under Test) located below and to the right of the 'Notebook' box.	
No.	Signal cable / Length (m)
1	USB, 1m shielded.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Jan. 08, 2019	Jan. 07, 2020
LISN	R&S	ENV216	101579	Mar. 08, 2019	Mar. 07, 2020
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 23, 2018	Oct. 22, 2019
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 27, 2018	Dec. 26, 2019
Receiver	R&S	ESR3	101658	Dec. 11, 2018	Dec. 10, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 12, 2019	Jul. 11, 2020
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 18, 2018	Dec. 17, 2019
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2018	Nov. 14, 2019
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 09, 2018	Nov. 08, 2019
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 08, 2018	Oct. 07, 2019
Preamplifier	EMC	EMC02325	980225	Jul. 09, 2019	Jul. 08, 2020
Preamplifier	Agilent	83017A	MY39501308	Oct. 04, 2018	Oct. 03, 2019
Preamplifier	EMC	EMC184045B	980192	Aug. 01, 2019	Jul. 31, 2020
RF Cable	EMC	EMC104-SM-SM-8000	181106	Oct. 08, 2018	Oct. 07, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 08, 2018	Oct. 07, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 08, 2018	Oct. 07, 2019
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160502	Oct. 08, 2018	Oct. 07, 2019
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 08, 2018	Oct. 07, 2019
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Oct. 08, 2018	Oct. 07, 2019
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Apr. 17, 2019	Apr. 16, 2020
Power Meter	Anritsu	ML2495A	1241002	Oct. 09, 2018	Oct. 08, 2019
Power Sensor	Anritsu	MA2411B	1207366	Oct. 09, 2018	Oct. 08, 2019
DC POWER SOURCE	GW INSTEK	GPC-6030D	EM892433	Oct. 25, 2018	Oct. 24, 2019
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

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

47 CFR FCC Part 15.247

ANSI C63.10-2013

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 Measurement Uncertainty

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	± 34.130 Hz
Conducted power	± 0.808 dB
Power density	± 0.583 dB
Conducted emission	± 2.715 dB
AC conducted emission	± 2.92 dB
Radiated emission ≤ 1 GHz	± 3.41 dB
Radiated emission > 1 GHz	± 4.59 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	23°C / 60%	Alex Tsai
Radiated Emissions	03CH01-WS	25°C / 63%	Akun Chung
RF Conducted	TH01-WS	23°C / 65%	Roger Lu

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

2.2 The Worst Test Modes and Channel Details

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

NOTE:

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

3 Transmitter Test Results

3.1 Conducted Emissions

3.1.1 Limit of Conducted Emissions

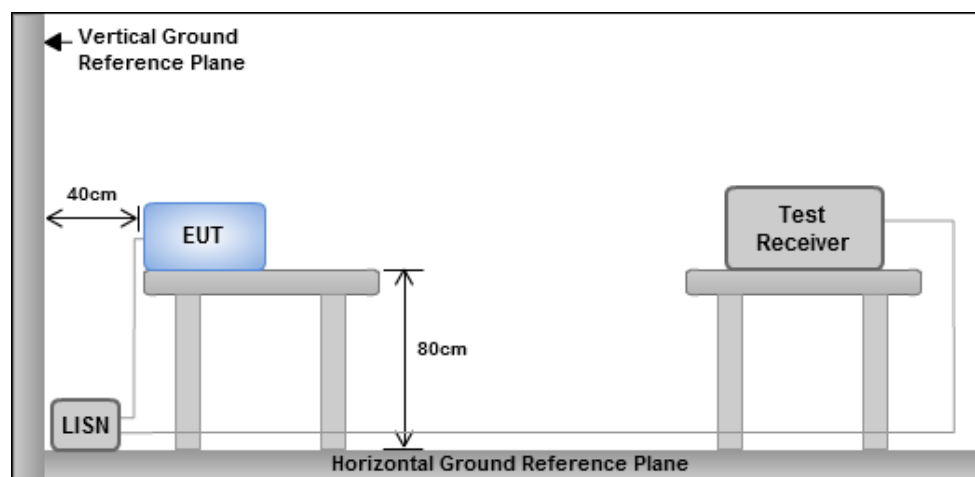
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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

3.1.2 Test Procedures

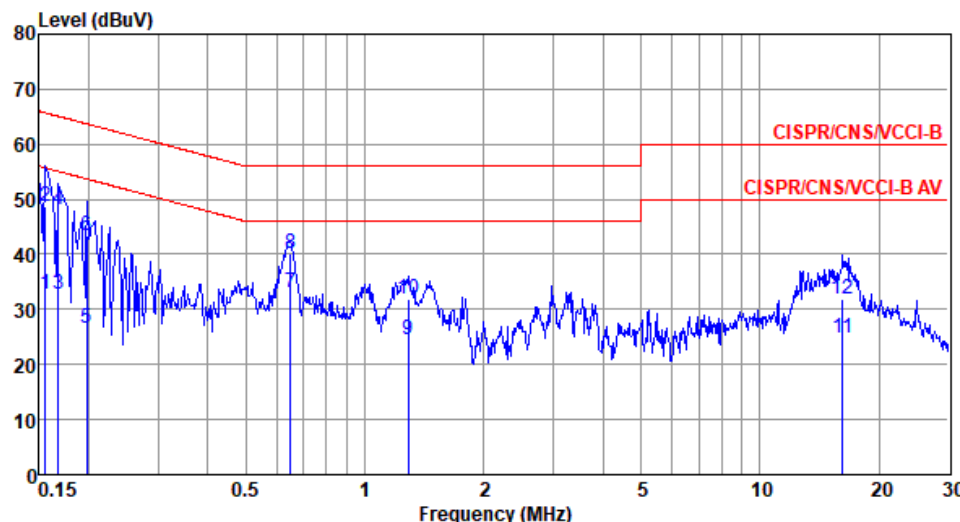
1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels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

3.1.3 Test Setup

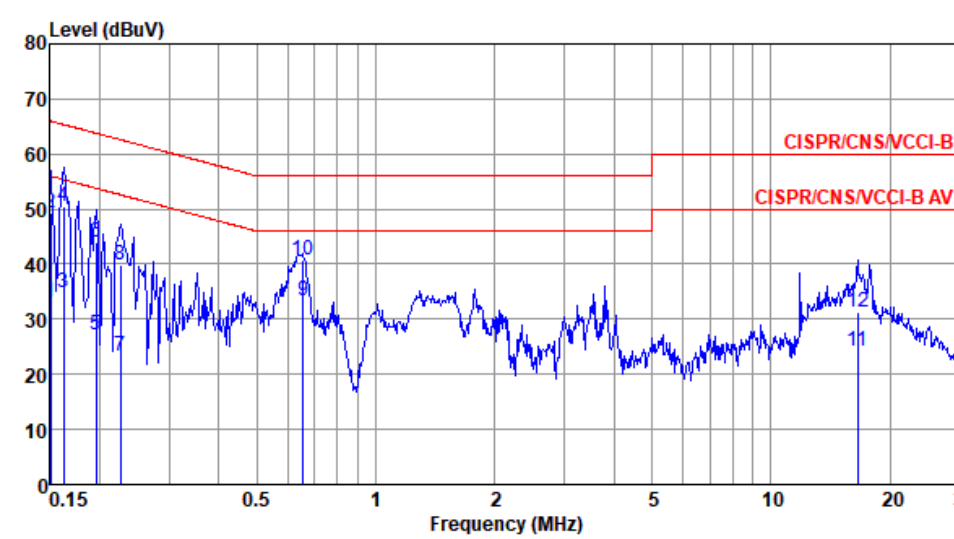


- Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

Modulation	OQPSK	Test Freq. (MHz)	2475																																																																																																																					
Power Phase	Line																																																																																																																							
Level (dBUV)  <table><tr><th></th><th>Freq MHz</th><th>Level dBuA</th><th>Limit Line dBuA</th><th>Over Limit dB</th><th>Read Level dBuA</th><th>LISN factor dB</th><th>cable loss dB</th><th>Remark</th></tr><tr><td>1</td><td>0.156</td><td>32.74</td><td>55.69</td><td>-22.95</td><td>23.16</td><td>9.53</td><td>0.05</td><td>Average</td></tr><tr><td>2</td><td>0.156</td><td>48.69</td><td>65.69</td><td>-17.00</td><td>39.11</td><td>9.53</td><td>0.05</td><td>QP</td></tr><tr><td>3</td><td>0.168</td><td>32.71</td><td>55.08</td><td>-22.37</td><td>23.12</td><td>9.53</td><td>0.06</td><td>Average</td></tr><tr><td>4</td><td>0.168</td><td>48.27</td><td>65.08</td><td>-16.81</td><td>38.68</td><td>9.53</td><td>0.06</td><td>QP</td></tr><tr><td>5</td><td>0.198</td><td>26.57</td><td>53.71</td><td>-27.14</td><td>16.96</td><td>9.54</td><td>0.07</td><td>Average</td></tr><tr><td>6</td><td>0.198</td><td>43.47</td><td>63.71</td><td>-20.24</td><td>33.86</td><td>9.54</td><td>0.07</td><td>QP</td></tr><tr><td>7*</td><td>0.647</td><td>33.20</td><td>46.00</td><td>-12.80</td><td>23.52</td><td>9.59</td><td>0.09</td><td>Average</td></tr><tr><td>8</td><td>0.647</td><td>40.26</td><td>56.00</td><td>-15.74</td><td>30.58</td><td>9.59</td><td>0.09</td><td>QP</td></tr><tr><td>9</td><td>1.289</td><td>24.55</td><td>46.00</td><td>-21.45</td><td>14.83</td><td>9.60</td><td>0.12</td><td>Average</td></tr><tr><td>10</td><td>1.289</td><td>31.89</td><td>56.00</td><td>-24.11</td><td>22.17</td><td>9.60</td><td>0.12</td><td>QP</td></tr><tr><td>11</td><td>16.226</td><td>24.72</td><td>50.00</td><td>-25.28</td><td>14.49</td><td>9.66</td><td>0.57</td><td>Average</td></tr><tr><td>12</td><td>16.226</td><td>32.02</td><td>60.00</td><td>-27.98</td><td>21.79</td><td>9.66</td><td>0.57</td><td>QP</td></tr></table>					Freq MHz	Level dBuA	Limit Line dBuA	Over Limit dB	Read Level dBuA	LISN factor dB	cable loss dB	Remark	1	0.156	32.74	55.69	-22.95	23.16	9.53	0.05	Average	2	0.156	48.69	65.69	-17.00	39.11	9.53	0.05	QP	3	0.168	32.71	55.08	-22.37	23.12	9.53	0.06	Average	4	0.168	48.27	65.08	-16.81	38.68	9.53	0.06	QP	5	0.198	26.57	53.71	-27.14	16.96	9.54	0.07	Average	6	0.198	43.47	63.71	-20.24	33.86	9.54	0.07	QP	7*	0.647	33.20	46.00	-12.80	23.52	9.59	0.09	Average	8	0.647	40.26	56.00	-15.74	30.58	9.59	0.09	QP	9	1.289	24.55	46.00	-21.45	14.83	9.60	0.12	Average	10	1.289	31.89	56.00	-24.11	22.17	9.60	0.12	QP	11	16.226	24.72	50.00	-25.28	14.49	9.66	0.57	Average	12	16.226	32.02	60.00	-27.98	21.79	9.66	0.57	QP
	Freq MHz	Level dBuA	Limit Line dBuA	Over Limit dB	Read Level dBuA	LISN factor dB	cable loss dB	Remark																																																																																																																
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Note 1: Level (dBUV) = Read Level (dBUV) + LISN Factor (dB) + Cable Loss (dB). Note 2: Over Limit (dB) = Level (dBUV) – Limit Line (dBUV).																																																																																																																								

Modulation	OQPSK	Test Freq. (MHz)	2475
Power Phase	Neutral		



	Freq MHz	Level dBuA	Limit Line dBuA	Over Limit dB	Read Level dBuA	LISN factor dB	cable loss dB	Remark
1	0.150	32.93	56.00	-23.07	23.31	9.57	0.05	Average
2	0.150	49.17	66.00	-16.83	39.55	9.57	0.05	QP
3	0.162	34.74	55.34	-20.60	25.11	9.57	0.06	Average
4	0.162	50.50	65.34	-14.84	40.87	9.57	0.06	QP
5	0.195	27.12	53.80	-26.68	17.47	9.58	0.07	Average
6	0.195	44.04	63.80	-19.76	34.39	9.58	0.07	QP
7	0.226	23.24	52.61	-29.37	13.58	9.59	0.07	Average
8	0.226	39.96	62.61	-22.65	30.30	9.59	0.07	QP
9*	0.654	33.47	46.00	-12.53	23.75	9.63	0.09	Average
10	0.654	40.61	56.00	-15.39	30.89	9.63	0.09	QP
11	16.573	24.30	50.00	-25.70	13.95	9.78	0.57	Average
12	16.573	31.42	60.00	-28.58	21.07	9.78	0.57	QP

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

2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

3.2 6dB and Occupied Bandwidth

3.2.1 Limit of 6dB Bandwidth

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

3.2.2 Test Procedures

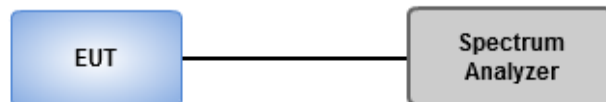
6dB Bandwidth

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) = 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.

3.2.3 Test Setup



3.2.4 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	1.522M	2.261M	2M26G1D	1.359M	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;

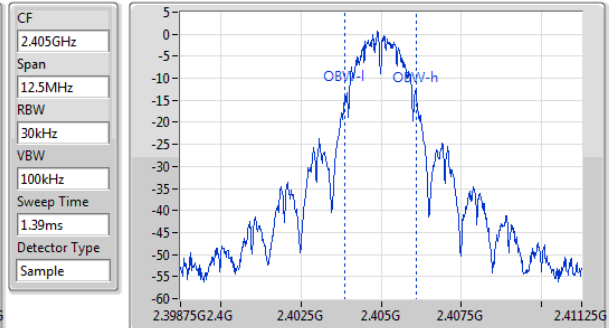
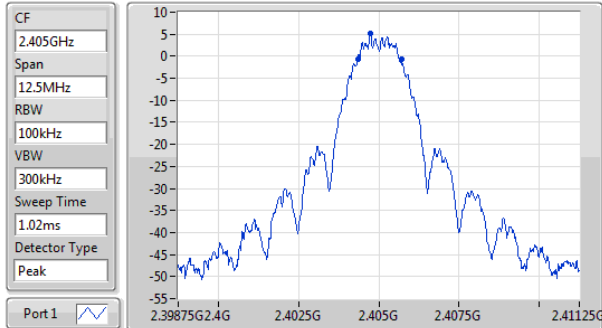
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
Zigbee	-	-	-	-
2405MHz	Pass	500k	1.359M	2.243M
2440MHz	Pass	500k	1.486M	2.261M
2475MHz	Pass	500k	1.522M	2.261M
2480MHz	Pass	500k	1.467M	2.261M

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

Zigbee

2405MHz

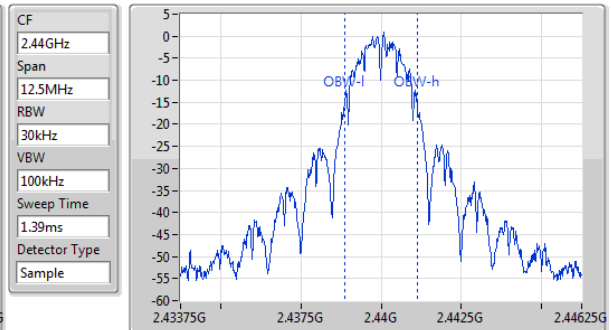
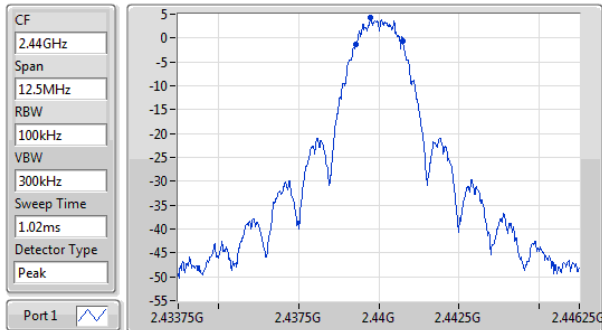


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.359M	2.404348G	2.405707G	2.243M	2.40386G	2.406103G	500k	1

EBW

Zigbee

2440MHz



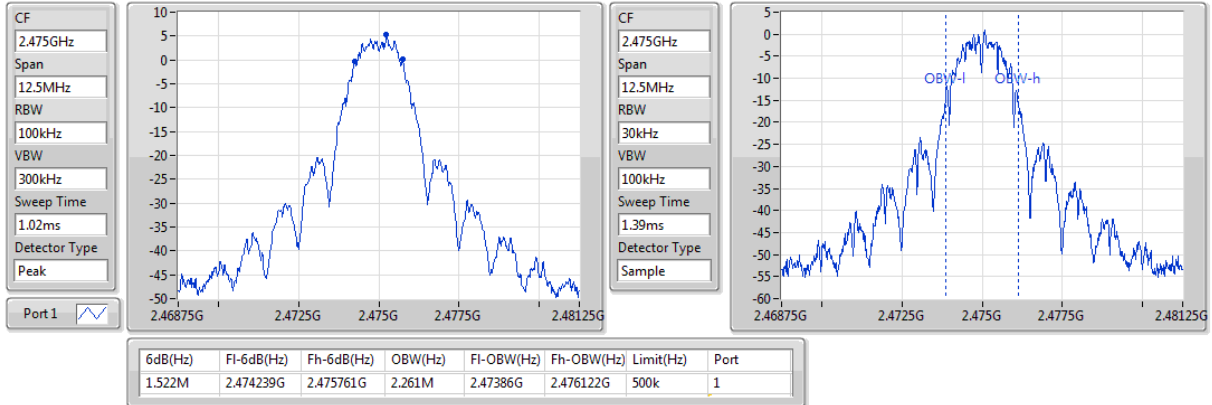
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.486M	2.439275G	2.440761G	2.261M	2.43886G	2.441122G	500k	1

EBW

Zigbee

EBW

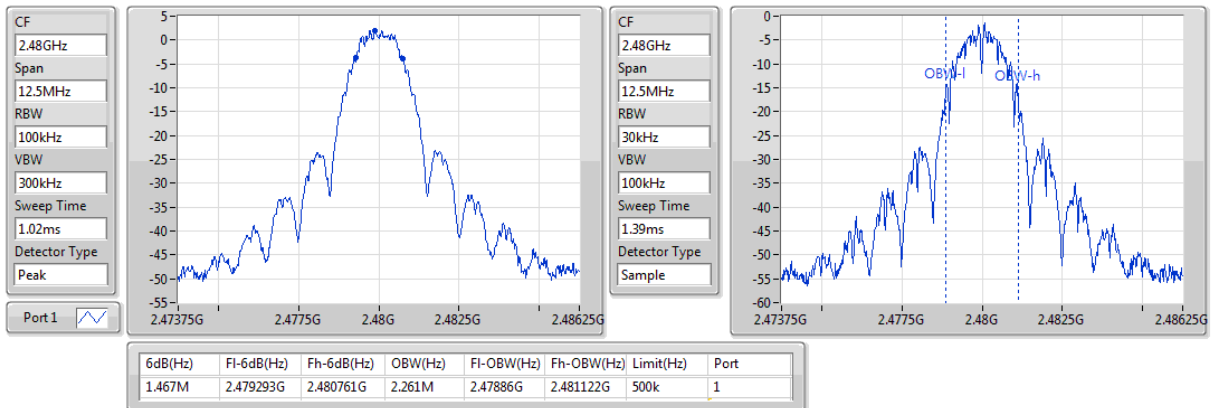
2475MHz



Zigbee

EBW

2480MHz



3.3 RF Output Power

3.3.1 Limit of RF Output Power

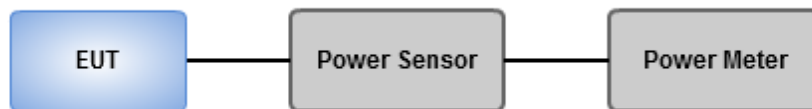
Conducted power shall not exceed 1Watt.

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

3.3.2 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.

3.3.3 Test Setup



3.3.4 Test Result of Maximum Output Power

Summary of Peak power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee	8.43	0.00697

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	1.50	8.24	8.24	30.00
2440MHz	Pass	1.50	8.36	8.36	30.00
2475MHz	Pass	1.50	8.43	8.43	30.00
2480MHz	Pass	1.50	5.97	5.97	30.00

DG = Directional Gain;

Summary of Average power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee	8.35	0.00684

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	1.50	8.15	8.15	-
2440MHz	Pass	1.50	8.27	8.27	-
2475MHz	Pass	1.50	8.35	8.35	-
2480MHz	Pass	1.50	5.87	5.87	-

DG = Directional Gain;

Note : Conducted average output power is for reference only

3.4 Power Spectral Density

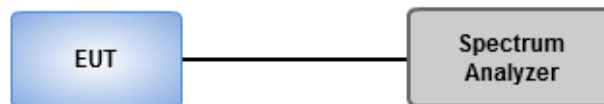
3.4.1 Limit of Power Spectral Density

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

3.4.2 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.

3.4.3 Test Setup



3.4.4 Test Result of Power Spectral Density

Summary

Mode	PD (dBm/3kHz)
2.4-2.4835GHz	-
Zigbee	-5.99

Result

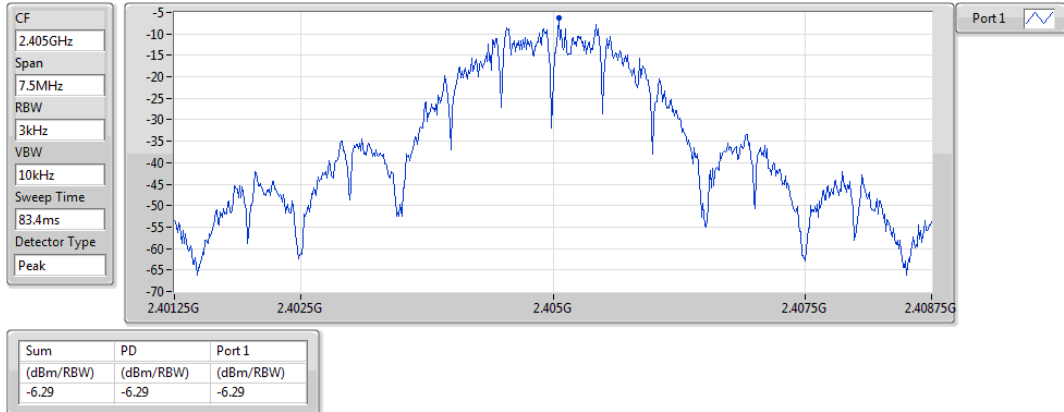
Mode	Result	DG (dBi)	PD (dBm/3kHz)	PD Limit (dBm/3kHz)
Zigbee	-	-	-	-
2405MHz	Pass	1.50	-6.29	8.00
2440MHz	Pass	1.50	-5.99	8.00
2475MHz	Pass	1.50	-7.79	8.00
2480MHz	Pass	1.50	-9.62	8.00

DG = Directional Gain;

Zigbee

PSD

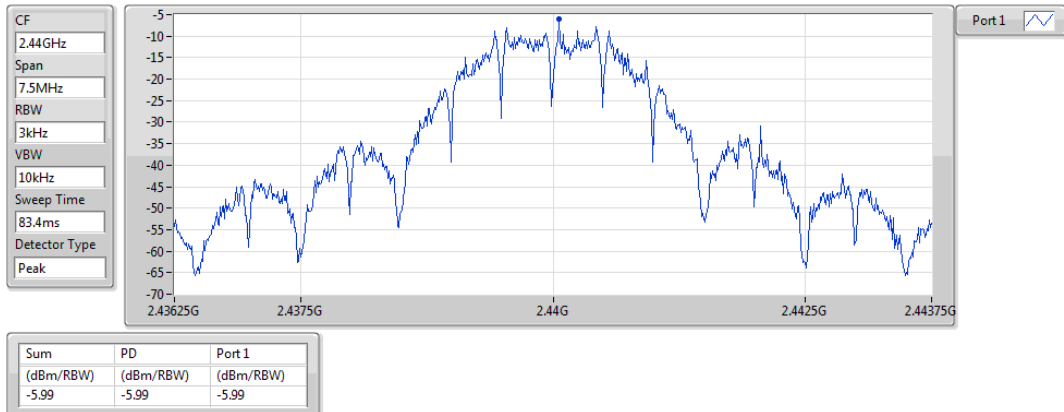
2405MHz



Zigbee

PSD

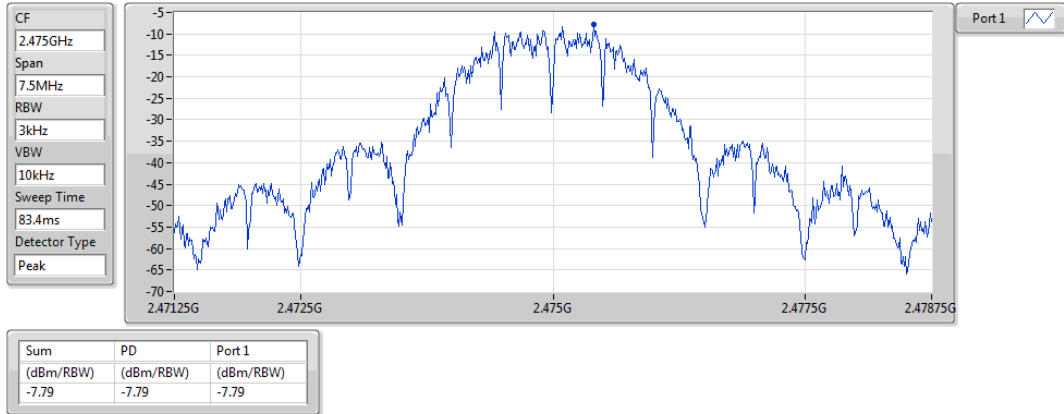
2440MHz



Zigbee

PSD

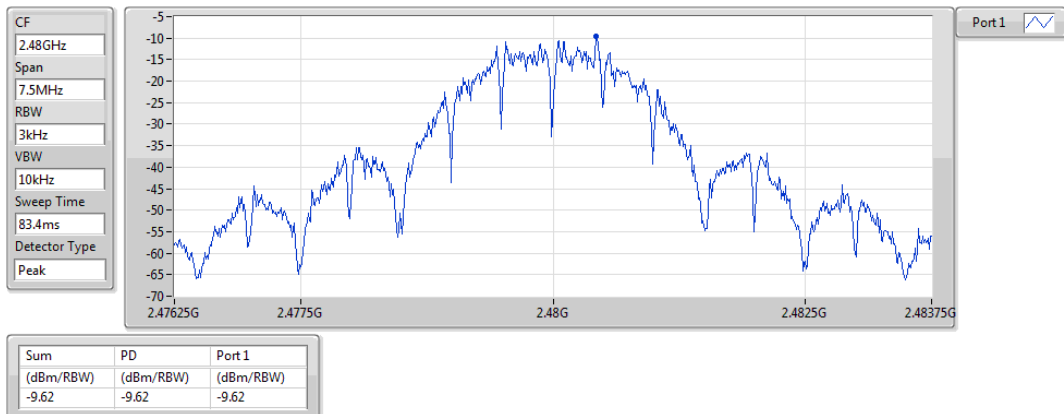
2475MHz



Zigbee

PSD

2480MHz



3.5 Unwanted Emissions into Restricted Frequency Bands

3.5.1 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.

3.5.2 Test Procedures

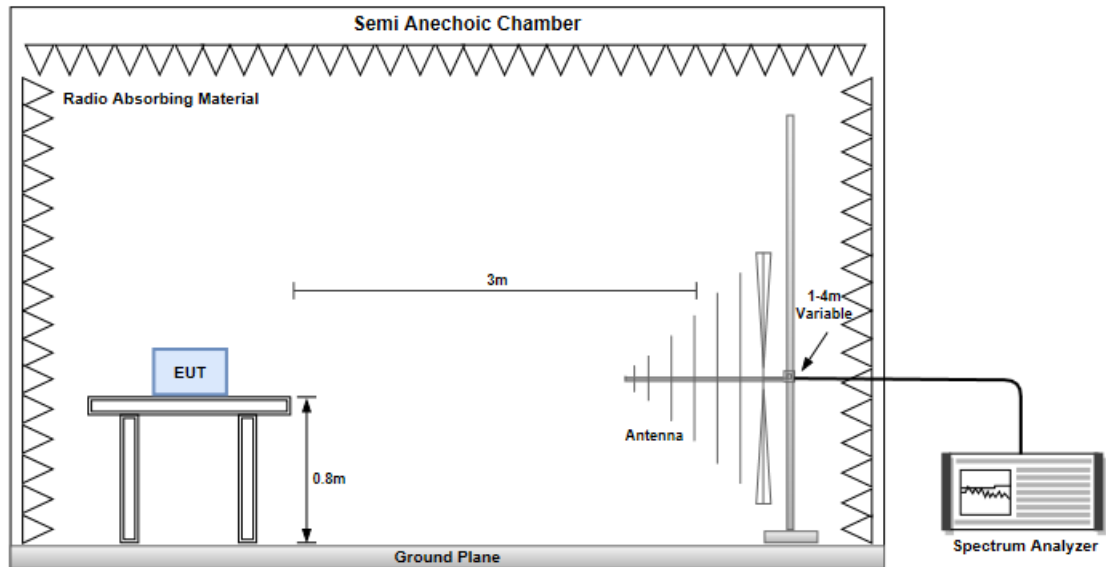
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

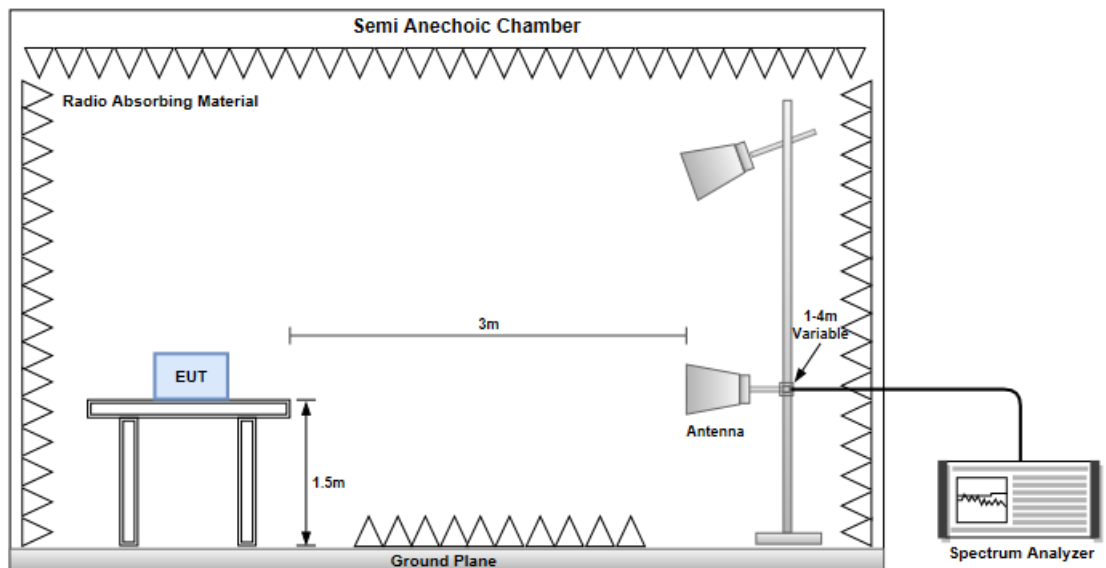
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz

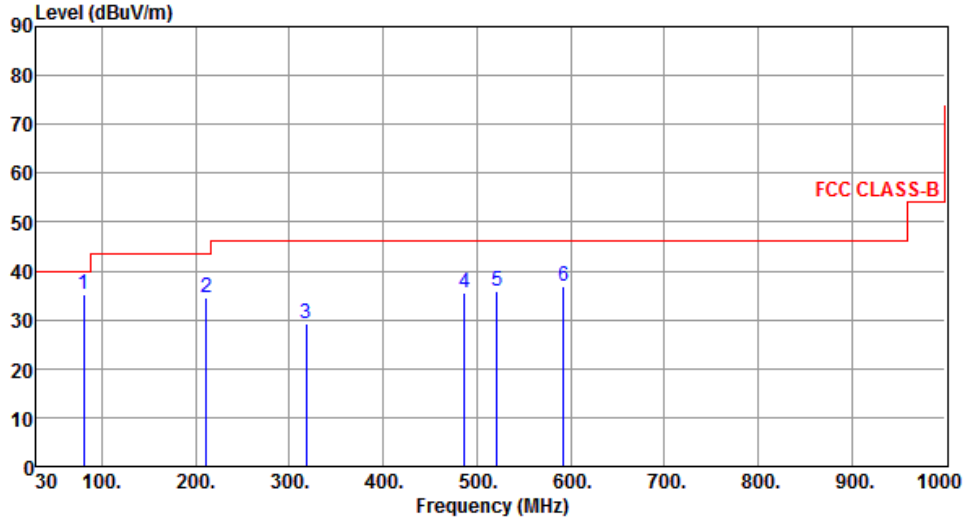


Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	OQPSK	Test Freq. (MHz)	2475
Polarization	Horizontal		



The graph displays the radiated unwanted emissions level in dBUV/m against frequency in MHz. The y-axis ranges from 0 to 90 dBUV/m, and the x-axis ranges from 30 to 1000 MHz. A red line 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 55 dBUV/m from 200 to 1000 MHz. Six measured peaks are indicated by blue vertical lines and numbered 1 through 6. The data for these peaks is provided in the table below.

	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	80.44	35.26	40.00	-4.74	48.61	-13.35	Peak	---	---
2	211.39	34.45	43.50	-9.05	46.63	-12.18	Peak	---	---
3	318.09	29.20	46.00	-16.80	36.67	-7.47	Peak	---	---
4	486.87	35.57	46.00	-10.43	39.02	-3.45	Peak	---	---
5	521.79	35.74	46.00	-10.26	38.55	-2.81	Peak	---	---
6	592.60	36.99	46.00	-9.01	38.23	-1.24	Peak	---	---

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	OQPSK	Test Freq. (MHz)	2475
Polarization	Vertical		
Level (dBuV/m)			

3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

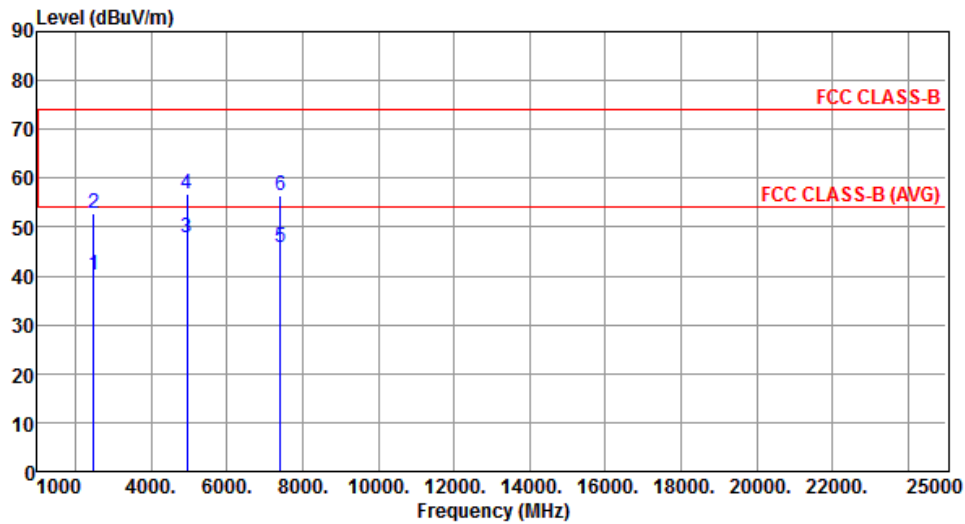
Modulation	OQPSK	Test Freq. (MHz)	2405
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	OQPSK	Test Freq. (MHz)	2405
Polarization	Vertical		
Level (dBuV/m) </			

Modulation	OQPSK	Test Freq. (MHz)	2440
Polarization	Horizontal		
Level (dBUV/m)			

Modulation	OQPSK	Test Freq. (MHz)	2440
Polarization	Vertical		
Level (dBUV/m)			

Modulation	OQPSK	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	40.29	54.00	-13.71	43.51	-3.22	Average	100	207
2	2483.50	52.77	74.00	-21.23	55.99	-3.22	Peak	100	207
3	4950.00	47.66	54.00	-6.34	43.86	3.80	Average	100	288
4	4950.00	56.66	74.00	-17.34	52.86	3.80	Peak	100	288
5	7425.00	45.80	54.00	-8.20	37.28	8.52	Average	385	201
6	7425.00	56.41	74.00	-17.59	47.89	8.52	Peak	385	201

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	OQPSK	Test Freq. (MHz)	2475
Polarization	Vertical		
Level (dBuV/m)			

Modulation	OQPSK	Test Freq. (MHz)	2480
Polarization	Horizontal		
Level (dBUV/m)			

Modulation	OQPSK	Test Freq. (MHz)	2480
Polarization	Vertical		
Level (dBuV/m)			

3.6 Emissions in Non-Restricted Frequency Bands

3.6.1 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.

3.6.2 Test Procedures

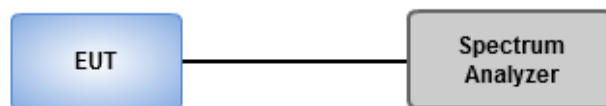
Reference level measurement

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

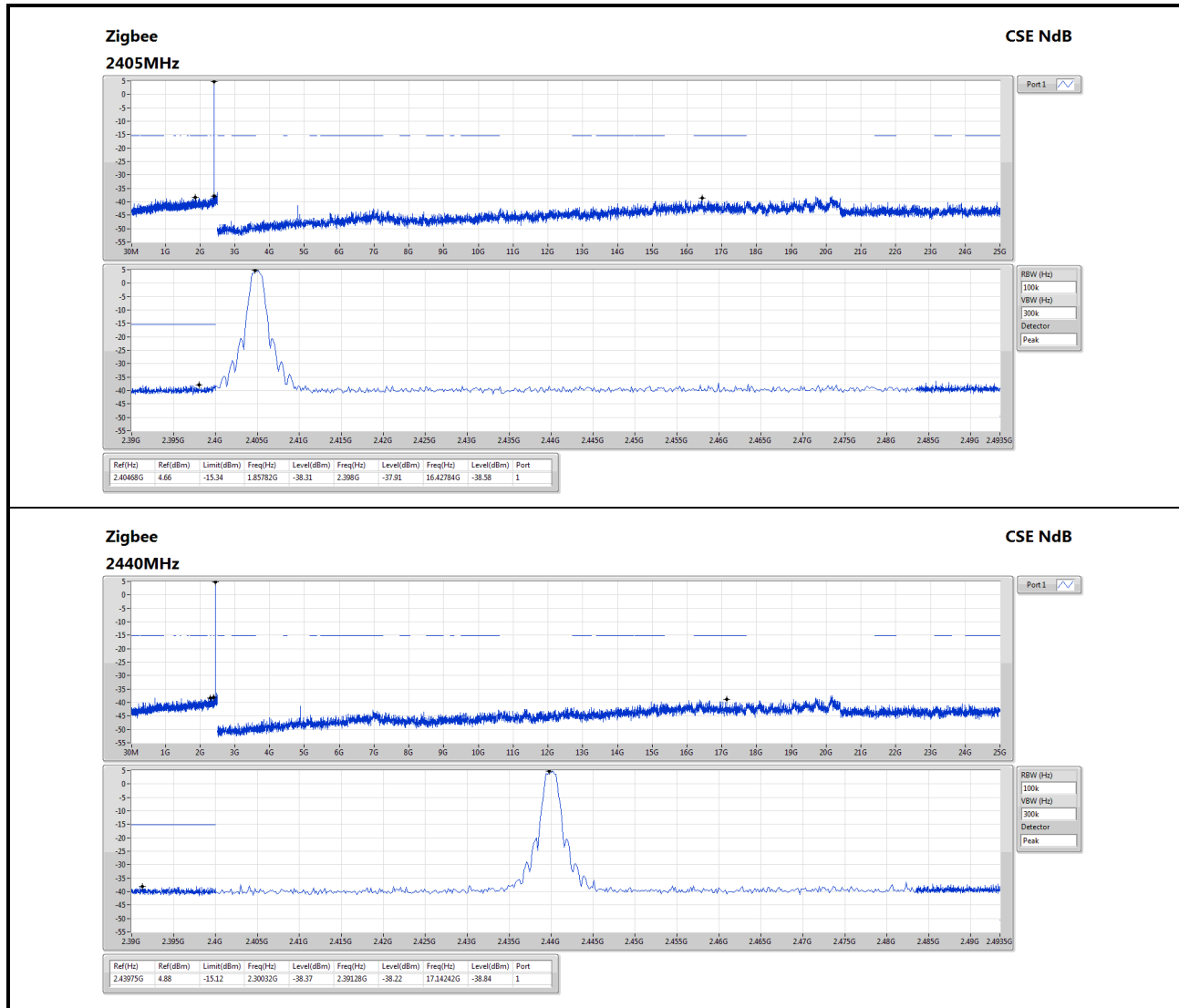
Emission level measurement

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

3.6.3 Test Setup

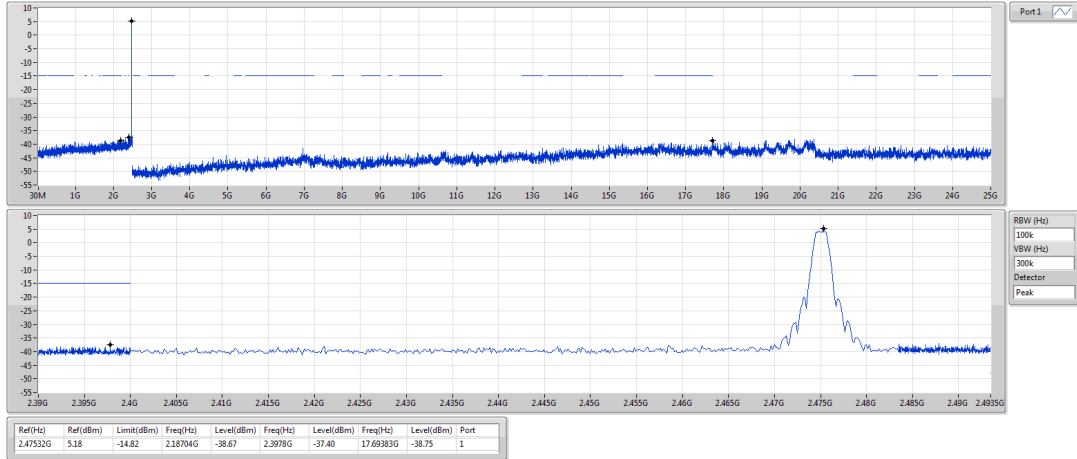


3.6.4 Unwanted Emissions into Non-Restricted Frequency Bands



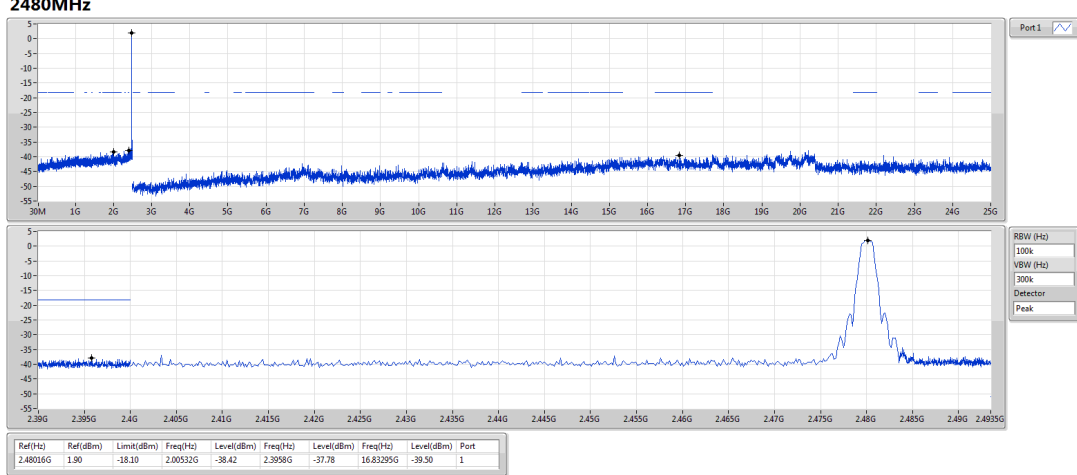
Zigbee
2475MHz

CSE NdB



Zigbee
2480MHz

CSE NdB



4 Test laboratory information

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

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

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

Linkou

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Taiwan, R.O.C.

Kwei Shan

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Kwei Shan District, Tao Yuan City
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Kwei Shan Site II

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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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