

FCC Test Report

FCC ID : 2ASKHAQG01
Equipment : Arrow-VI
Model No. : 4-6340-17
(Please refer to section 1.1.1 for more details)
Brand Name : PHILLIPS CONNECT TECHNOLOGIES
Applicant : PHILLIPS CONNECT TECHNOLOGIES LLC
Address : 12012 Burke Street, SANTA FE SPRINGS,
California, 90670-2676, United States
Standard : 47 CFR FCC Part 15.247
Received Date : Jan. 06, 2021
Tested Date : Jan. 13 ~ Jan. 18, 2021

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
FR110604AE	Rev. 01	Initial issue	Feb. 03, 2021

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	Note	N/A
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 4804.00MHz 44.90 (Margin -9.10dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Power [dBm]: 4.77	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
<p>N/A means Not Applicable. Note: The EUT consumes DC power from battery, so the test is not required.</p>			

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 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
PHILLIPS CONNECT TECHNOLOGIES	4-6340-17	Arrow-VI	LTE Cellular GPS Tracker
	4-6340-10		
	4-6341-17		
	4-6341-10		
† All models are electrically identical, different model names are for marking purpose.			

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Bluetooth Mode	Ch. Freq. (MHz)	Channel Number	Data Rate
2400-2483.5	V5.1 LE	2402-2480	0-39 [40]	1 Mbps
2400-2483.5	V5.1 LE	2402-2480	0-39 [40]	2 Mbps
Note: Bluetooth LE (Low energy) uses GFSK modulation.				

1.1.3 Antenna Details

Ant. No.	Type	Connector	Gain (dBi)	Remarks
1	Chip	No	3.6	---

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from battery
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1.1.5 Accessories

N/A

1.1.6 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
37	2402	9	2422	18	2442	28	2462
0	2404	10	2424	19	2444	29	2464
1	2406	38	2426	20	2446	30	2466
2	2408	11	2428	21	2448	31	2468
3	2410	12	2430	22	2450	32	2470
4	2412	13	2432	23	2452	33	2472
5	2414	14	2434	24	2454	34	2474
6	2416	15	2436	25	2456	35	2476
7	2418	16	2438	26	2458	36	2478
8	2420	17	2440	27	2460	39	2480

1.1.7 Test Tool and Duty Cycle

Test Tool	Tera Term, V4.80	
Modulation Mode	Duty Cycle Of Test Signal (%)	Duty Factor (dB)
GFSK-1Mbps	100.00%	0.00
GFSK-2Mbps	100.00%	0.00

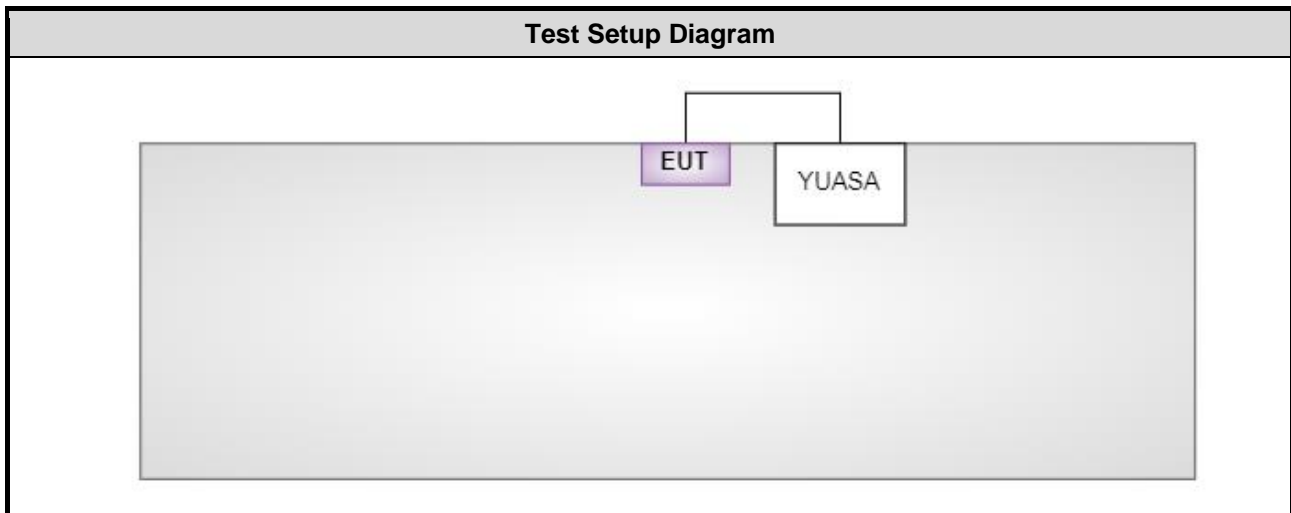
1.1.8 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)		
	2402	2440	2480
GFSK/1Mbps	4	4	4
GFSK/2Mbps	4	4	4

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude E5470	DoC	---
2	DC Battery	YUASA	38B19R(S)-MF	---	---

1.3 Test Setup Chart



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

1.4 Test Equipment List and Calibration Data

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Jan. 13, 2021				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2020	Dec. 03, 2021
Receiver	R&S	ESR3	101657	Feb. 14, 2020	Feb. 13, 2021
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 10, 2020	Jul. 09, 2021
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 11, 2020	Dec. 10, 2021
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 06, 2020	Nov. 05, 2021
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 17, 2020	Nov. 16, 2021
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 06, 2020	Oct. 05, 2021
Preamplifier	EMC	EMC02325	980225	Jul. 03, 2020	Jul. 02, 2021
Preamplifier	Agilent	83017A	MY39501308	Sep. 26, 2020	Sep. 25, 2021
Preamplifier	EMC	EMC184045B	980192	Jul. 21, 2020	Jul. 20, 2021
RF Cable	EMC	EMC104-SM-SM-80 00	181106	Oct. 06, 2020	Oct. 05, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 06, 2020	Oct. 05, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 06, 2020	Oct. 05, 2021
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 06, 2020	Oct. 05, 2021
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 06, 2020	Oct. 05, 2021
LF cable 11M	EMC	EMCCFD400-NW-N W-11000	200801	Oct. 06, 2020	Oct. 05, 2021
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	Jan. 18, 2021				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Apr. 30, 2020	Apr. 29, 2021
Power Meter	Anritsu	ML2495A	1241002	Nov. 04, 2020	Nov. 03, 2021
Power Sensor	Anritsu	MA2411B	1207366	Nov. 04, 2020	Nov. 03, 2021
DC POWER SOURCE	GW INSTRON	GPC-6030D	GES855395	Nov. 09, 2020	Nov. 08, 2021
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA

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

1.5 Test Standards

47 CFR FCC Part 15.247

ANSI C63.10-2013

1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

1.7 Deviation from Test Standard and Measurement Procedure

None

1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$)).

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.130 Hz
Conducted power	± 0.808 dB
Power density	± 0.583 dB
Conducted emission	± 2.715 dB
Radiated emission ≤ 1 GHz	± 3.41 dB
Radiated emission > 1 GHz	± 4.59 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corp.
Test Site	03CH01-WS, TH01-WS
Address of Test Site	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

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

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate	Test Configuration
AC Power Line Conducted Emissions Radiated Emissions \leq 1GHz	BT LE	2480	1Mbps	---
Maximum Output Power 6dB bandwidth Power spectral density	BT LE	2402, 2440, 2480	1Mbps 2Mbps	---
Radiated Emissions > 1GHz	BT LE	2402, 2440, 2480	1Mbps	---

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

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

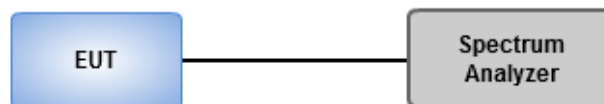
6dB Bandwidth

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) = 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 Result of 6dB and Occupied Bandwidth

Ambient Condition	24°C / 66%	Tested By	Aska Huang
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Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-LE(1Mbps)	735.507k	1.067M	1M07F1D	706.522k	1.053M
BT-LE(2Mbps)	1.391M	2.106M	2M11F1D	1.239M	2.091M

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

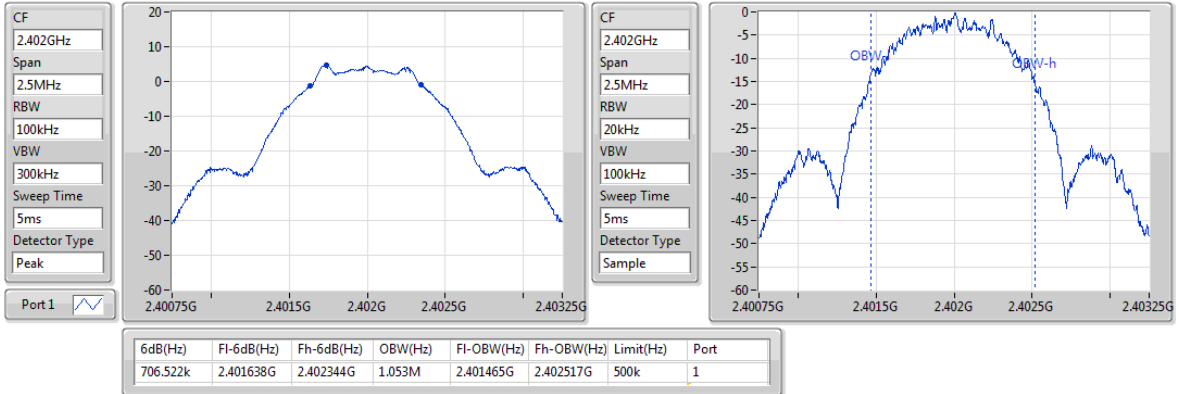
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	706.522k	1.053M
2440MHz	Pass	500k	710.145k	1.06M
2480MHz	Pass	500k	735.507k	1.067M
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	500k	1.391M	2.091M
2440MHz	Pass	500k	1.239M	2.098M
2480MHz	Pass	500k	1.312M	2.106M

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

BT-LE(1Mbps)

EBW-DTS

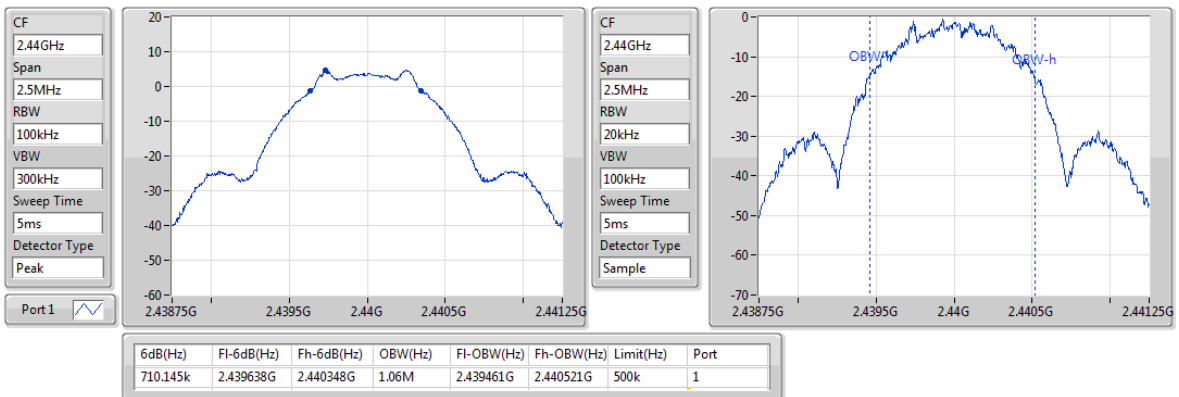
2402MHz



BT-LE(1Mbps)

EBW-DTS

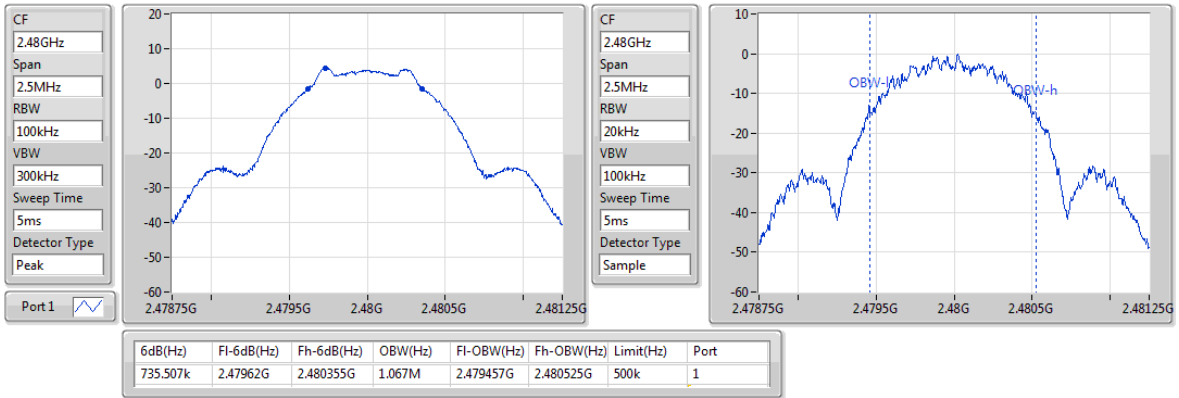
2440MHz



BT-LE(1Mbps)

EBW-DTS

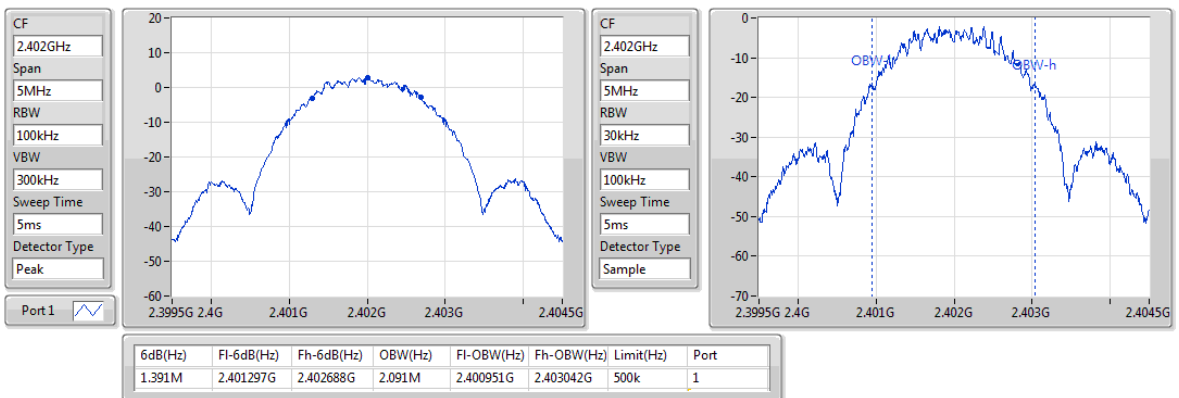
2480MHz



BT-LE(2Mbps)

EBW-DTS

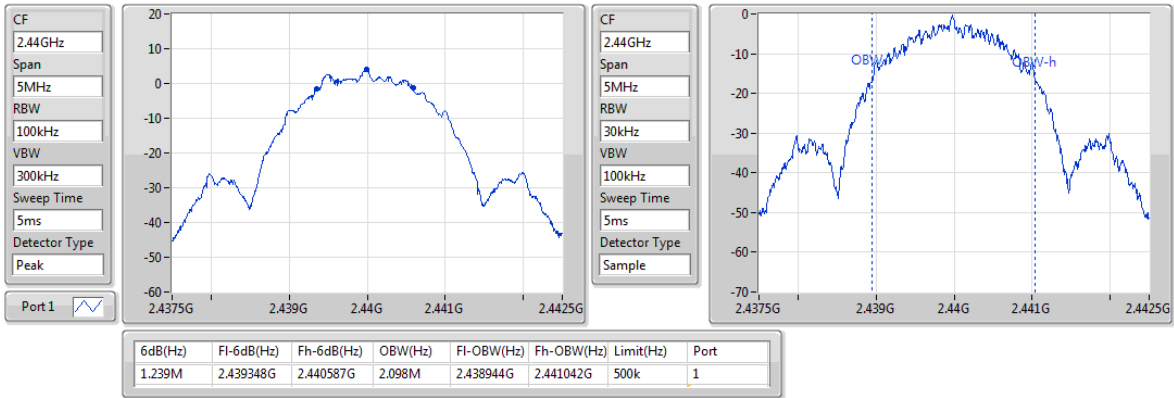
2402MHz



BT-LE(2Mbps)

EBW-DTS

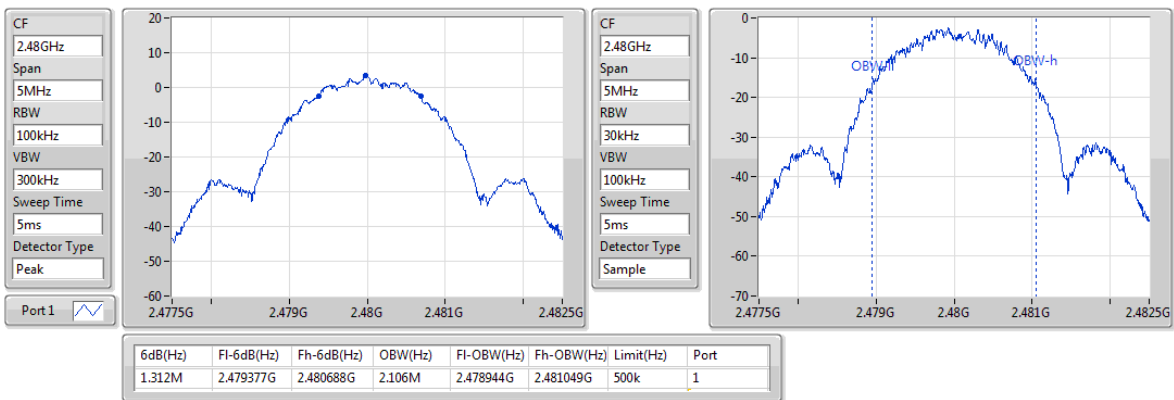
2440MHz



BT-LE(2Mbps)

EBW-DTS

2480MHz



3.2 RF Output Power

3.2.1 Limit of RF Output Power

Conducted power shall not exceed 1 Watt.

Antenna gain $\leq 6\text{dBi}$, 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 Result of Maximum Output Power

Ambient Condition	24°C / 66%	Tested By	Aska Huang
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Summary of Peak Conducted Output Power

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	4.77	0.00300
BT-LE(2Mbps)	4.76	0.00299

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.60	4.75	30.00
2440MHz	Pass	3.60	4.76	30.00
2480MHz	Pass	3.60	4.77	30.00
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	3.60	4.74	30.00
2440MHz	Pass	3.60	4.75	30.00
2480MHz	Pass	3.60	4.76	30.00

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

Summary of Conducted (Average) Output Power

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	4.63	0.00290
BT-LE(2Mbps)	4.61	0.00289

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.60	4.60	-
2440MHz	Pass	3.60	4.62	-
2480MHz	Pass	3.60	4.63	-
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	3.60	4.59	-
2440MHz	Pass	3.60	4.60	-
2480MHz	Pass	3.60	4.61	-

Note: Average power is for reference only.

3.3 Power Spectral Density

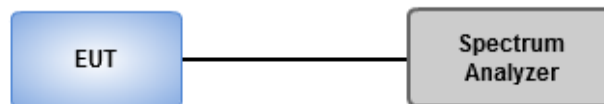
3.3.1 Limit of Power Spectral Density

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

3.3.2 Test Procedures

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 Result of Power Spectral Density

Ambient Condition	24°C / 66%	Tested By	Aska Huang
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Summary

Mode	PD (dBm/3kHz)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-7.69
BT-LE(2Mbps)	-11.70

RBW = 3kHz;

Result

Mode	Result	Gain (dBi)	PD (dBm/3kHz)	PD Limit (dBm/3kHz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.60	-8.29	8.00
2440MHz	Pass	3.60	-8.48	8.00
2480MHz	Pass	3.60	-7.69	8.00
BT-LE(2Mbps)	-	-	-	-
2402MHz	Pass	3.60	-11.70	8.00
2440MHz	Pass	3.60	-12.04	8.00
2480MHz	Pass	3.60	-12.21	8.00

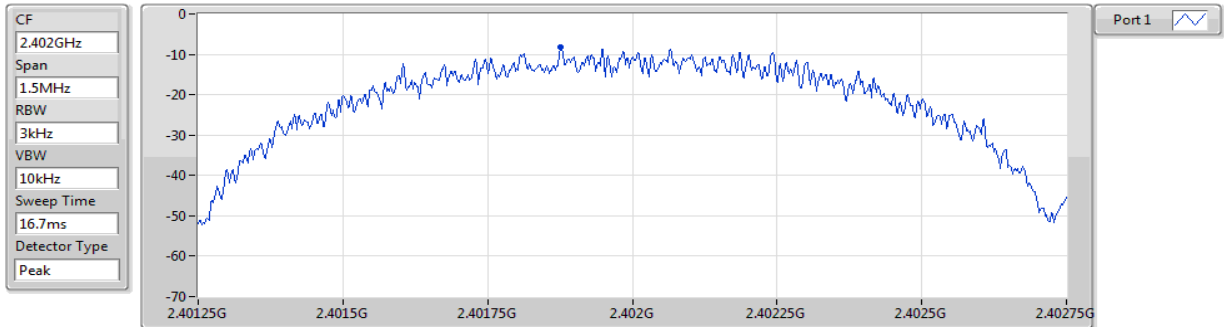
DG = Directional Gain

PD = Maximum power density; Port X = Port X Power Density;

BT-LE(1Mbps)

PSD

2402MHz

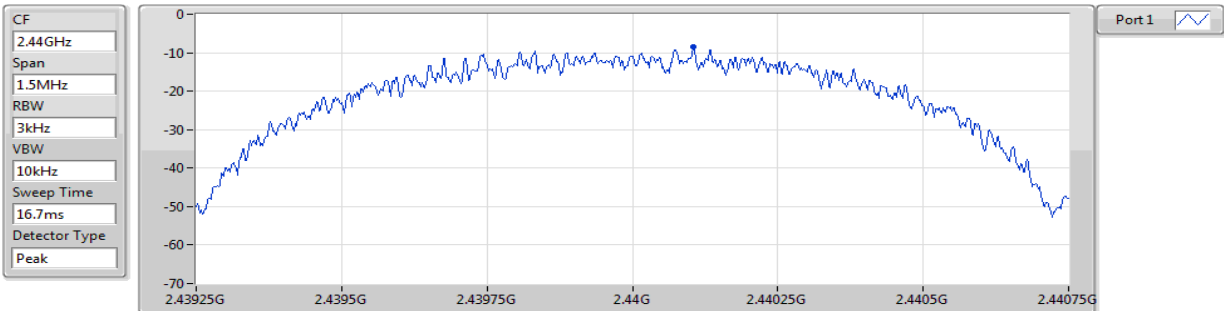


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.29	-8.29	-8.29

BT-LE(1Mbps)

PSD

2440MHz

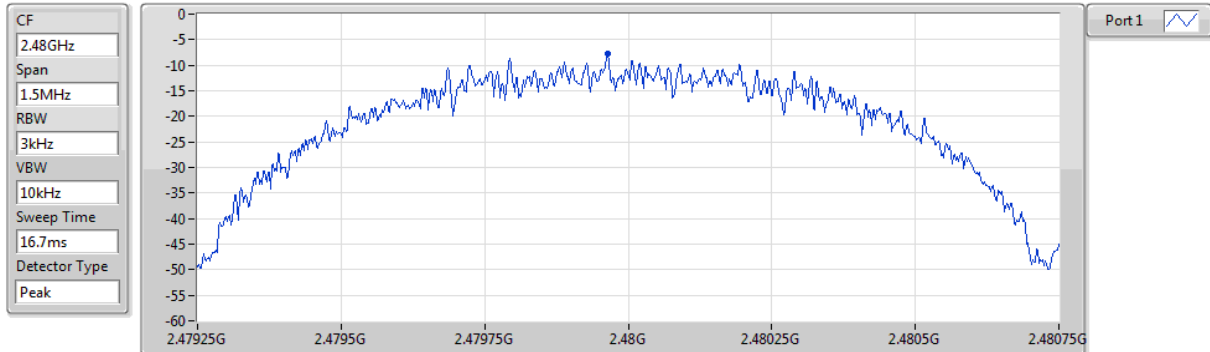


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.48	-8.48	-8.48

BT-LE(1Mbps)

PSD

2480MHz

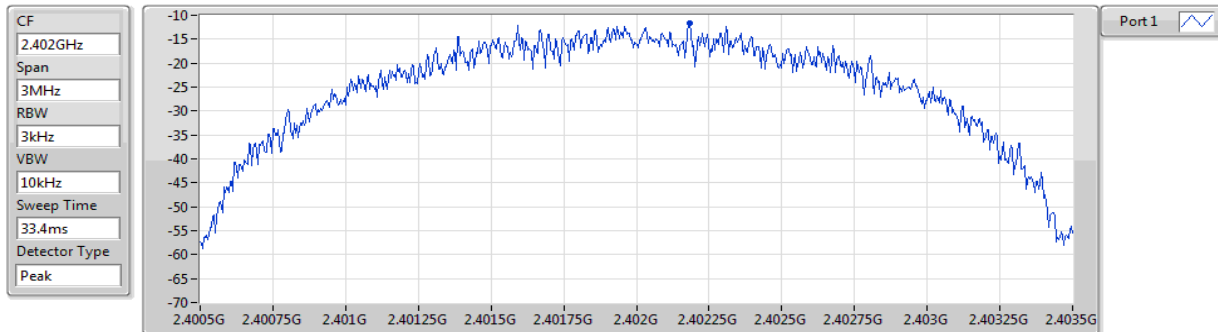


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-7.69	-7.69	-7.69

BT-LE(2Mbps)

PSD

2402MHz

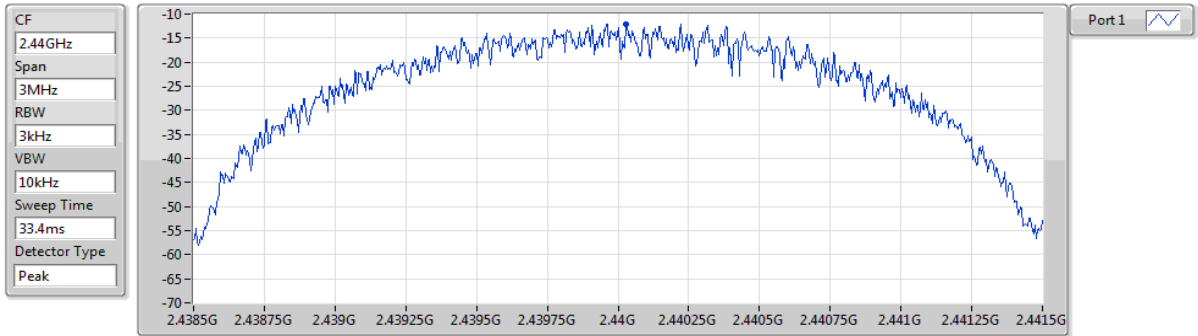


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-11.70	-11.70	-11.70

BT-LE(2Mbps)

PSD

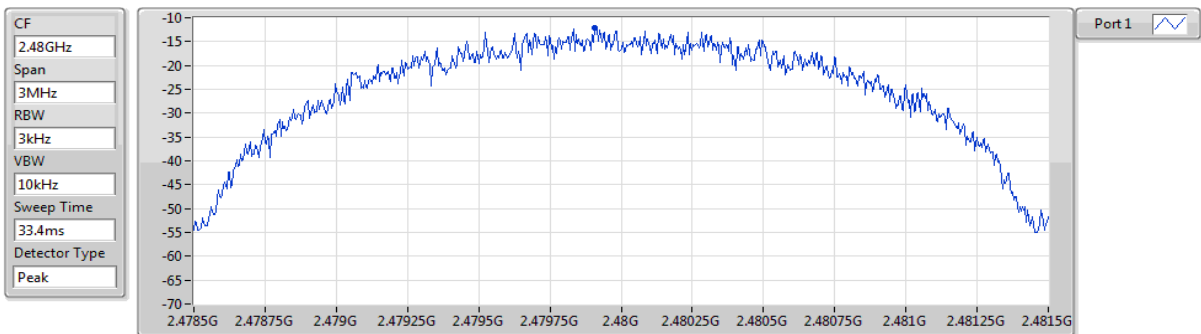
2440MHz



BT-LE(2Mbps)

PSD

2480MHz



3.4 Emissions in Restricted Frequency Bands

3.4.1 Limit of 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:
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.

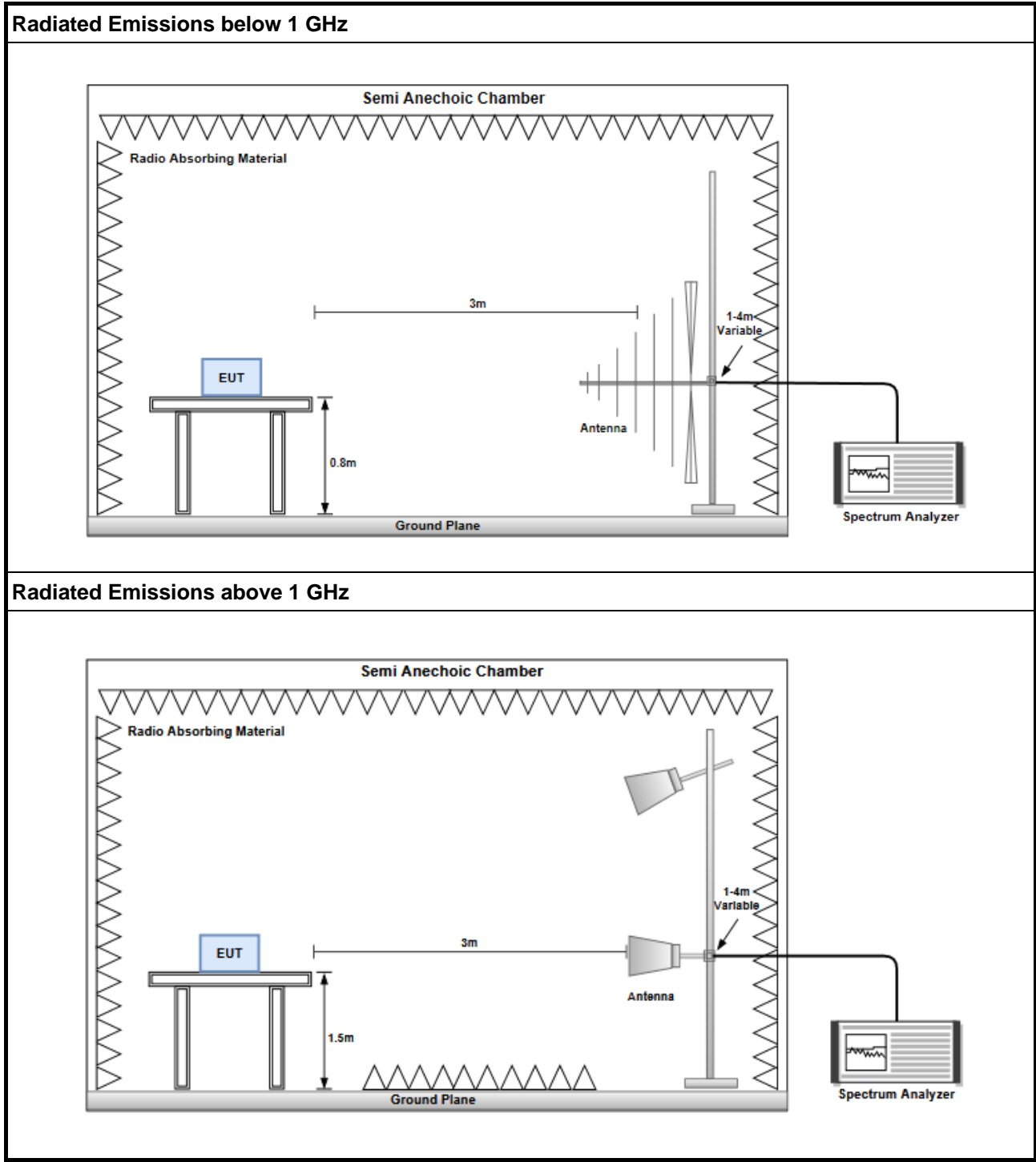
3.4.2 Test Procedures

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.

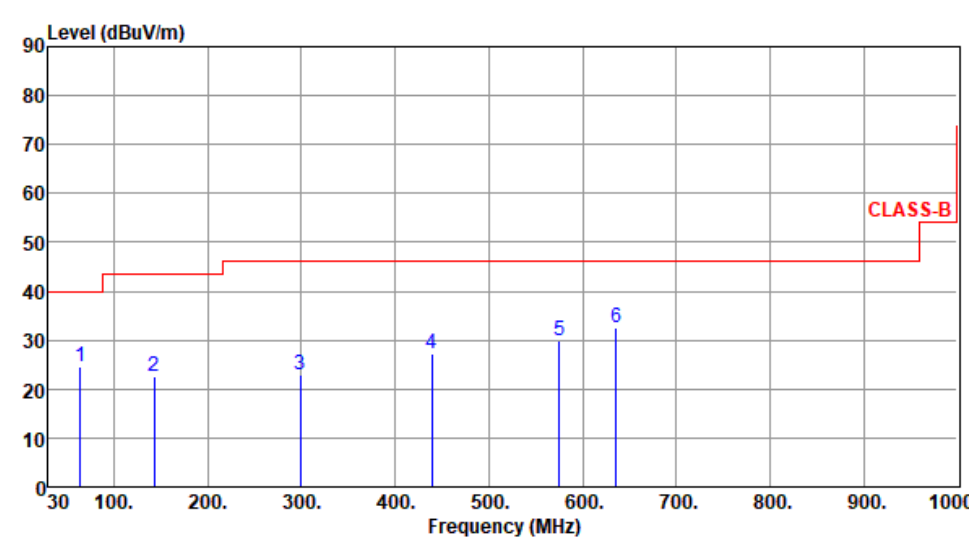
Note:

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

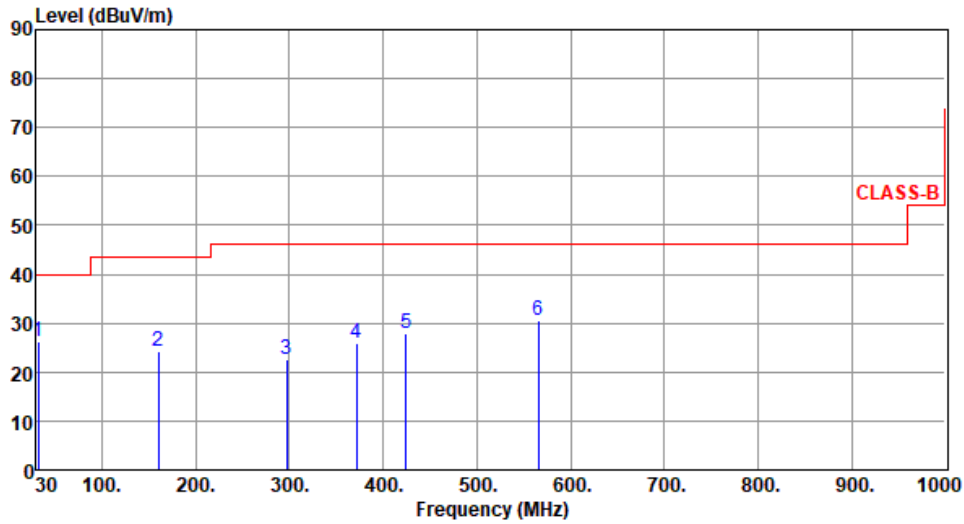


3.4.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	BT-LE (1Mbps)	Test Freq. (MHz)	2480						
Polarization	Horizontal								
Test By : Roger Lu Temperature(°C):21 Humidity(%):65									
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	63.95	24.63	40.00	-15.37	34.17	-9.54	Peak	---	---
2	142.52	22.64	43.50	-20.86	31.64	-9.00	Peak	---	---
3	298.69	22.94	46.00	-23.06	31.16	-8.22	Peak	---	---
4	439.34	27.28	46.00	-18.72	31.86	-4.58	Peak	---	---
5	575.14	29.73	46.00	-16.27	31.45	-1.72	Peak	---	---
6	636.25	32.48	46.00	-13.52	32.82	-0.34	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	BT-LE (1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	31.94	26.18	40.00	-13.82	35.67	-9.49	Peak	---	---
2	159.98	24.20	43.50	-19.30	33.03	-8.83	Peak	---	---
3	296.75	22.68	46.00	-23.32	30.94	-8.26	Peak	---	---
4	371.44	25.92	46.00	-20.08	32.14	-6.22	Peak	---	---
5	424.79	27.87	46.00	-18.13	32.90	-5.03	Peak	---	---
6	565.44	30.69	46.00	-15.31	32.70	-2.01	Peak	---	---

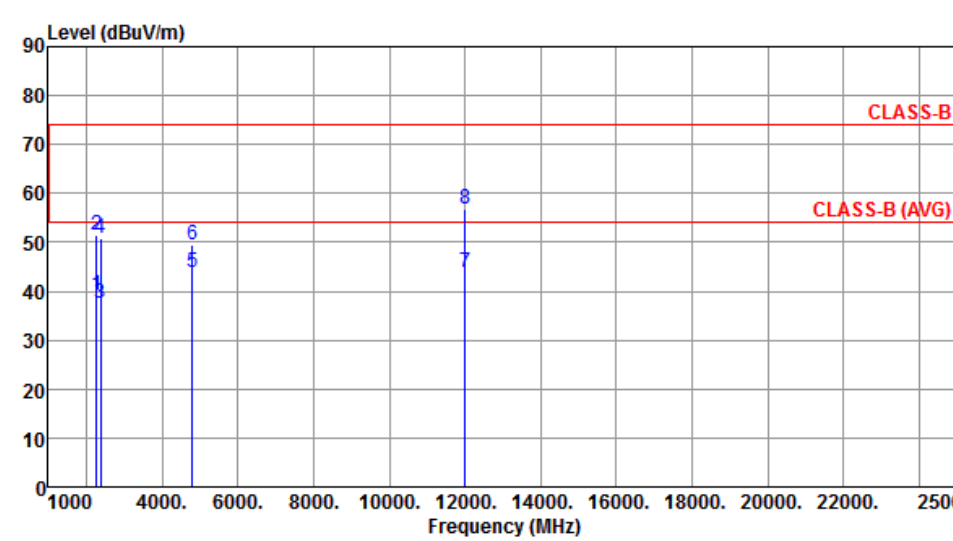
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*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.

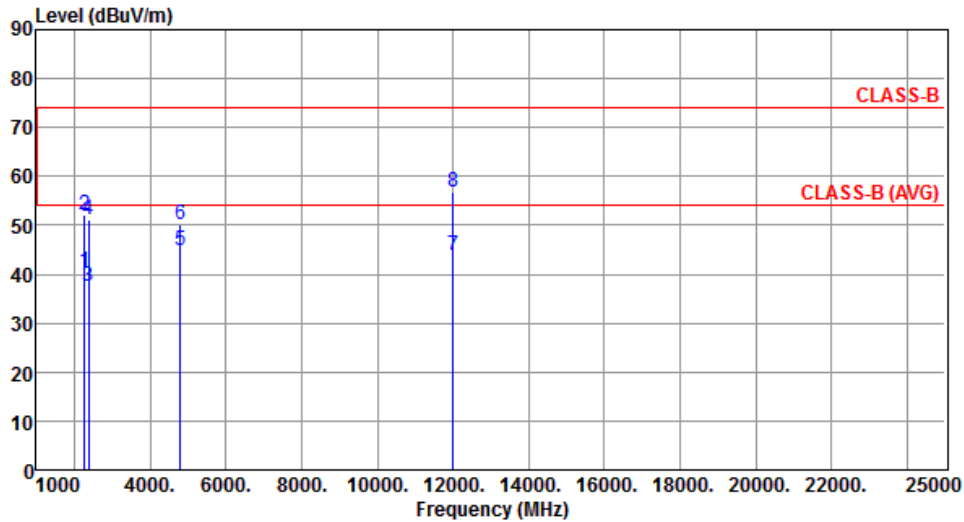
3.4.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation	BT-LE (1Mbps)	Test Freq. (MHz)	2402						
Polarization	Horizontal								
Test By : Roger Lu Temperature(°C):21 Humidity(%):65									
									
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2274.00	39.03	54.00	-14.97	41.59	-2.56	Average	100	163
2	2274.00	51.32	74.00	-22.68	53.88	-2.56	Peak	100	163
3	2390.00	37.49	54.00	-16.51	40.28	-2.79	Average	100	163
4	2390.00	50.96	74.00	-23.04	53.75	-2.79	Peak	100	163
5	4804.00	43.75	54.00	-10.25	40.25	3.50	Average	100	289
6	4804.00	49.39	74.00	-24.61	45.89	3.50	Peak	100	289
7	12010.00	43.75	54.00	-10.25	29.48	14.27	Average	100	30
8	12010.00	56.64	74.00	-17.36	42.37	14.27	Peak	100	30

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

Modulation	BT-LE (1Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2274.00	40.56	54.00	-13.44	43.12	-2.56	Average	179	189
2	2274.00	52.13	74.00	-21.87	54.69	-2.56	Peak	179	189
3	2390.00	37.66	54.00	-16.34	40.45	-2.79	Average	179	185
4	2390.00	51.16	74.00	-22.84	53.95	-2.79	Peak	179	185
5	4804.00	44.90	54.00	-9.10	41.40	3.50	Average	157	185
6	4804.00	50.29	74.00	-23.71	46.79	3.50	Peak	157	185
7	12010.00	43.78	54.00	-10.22	29.51	14.27	Average	100	50
8	12010.00	56.85	74.00	-17.15	42.58	14.27	Peak	100	50

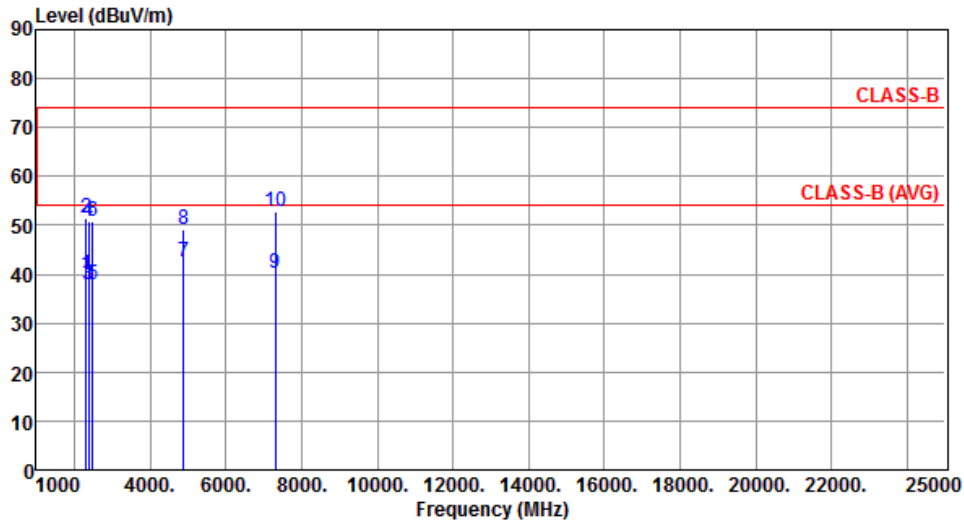
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

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

Modulation	BT-LE (1Mbps)	Test Freq. (MHz)	2440
Polarization	Horizontal		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2312.00	39.82	54.00	-14.18	42.48	-2.66	Average	100	167
2	2312.00	51.36	74.00	-22.64	54.02	-2.66	Peak	100	167
3	2390.00	38.00	54.00	-16.00	40.79	-2.79	Average	100	167
4	2390.00	50.89	74.00	-23.11	53.68	-2.79	Peak	100	167
5	2483.50	37.90	54.00	-16.10	40.64	-2.74	Average	100	167
6	2483.50	50.85	74.00	-23.15	53.59	-2.74	Peak	100	167
7	4880.00	42.48	54.00	-11.52	39.01	3.47	Average	100	288
8	4880.00	49.04	74.00	-24.96	45.57	3.47	Peak	100	288
9	7320.00	40.14	54.00	-13.86	31.12	9.02	Average	123	204
10	7320.00	52.78	74.00	-21.22	43.76	9.02	Peak	123	204

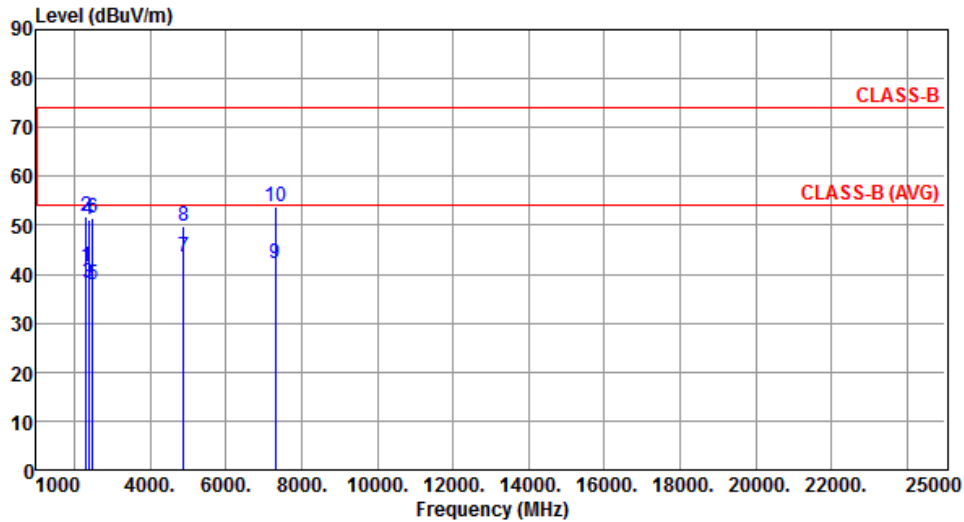
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	BT-LE (1Mbps)	Test Freq. (MHz)	2440
Polarization	Vertical		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2312.00	41.36	54.00	-12.64	44.02	-2.66	Average	193	182
2	2312.00	51.82	74.00	-22.18	54.48	-2.66	Peak	193	182
3	2390.00	38.07	54.00	-15.93	40.86	-2.79	Average	193	188
4	2390.00	51.26	74.00	-22.74	54.05	-2.79	Peak	193	188
5	2483.50	38.01	54.00	-15.99	40.75	-2.74	Average	193	188
6	2483.50	51.55	74.00	-22.45	54.29	-2.74	Peak	193	188
7	4880.00	43.44	54.00	-10.56	39.97	3.47	Average	133	186
8	4880.00	49.89	74.00	-24.11	46.42	3.47	Peak	133	186
9	7320.00	42.03	54.00	-11.97	33.01	9.02	Average	189	170
10	7320.00	53.73	74.00	-20.27	44.71	9.02	Peak	189	170

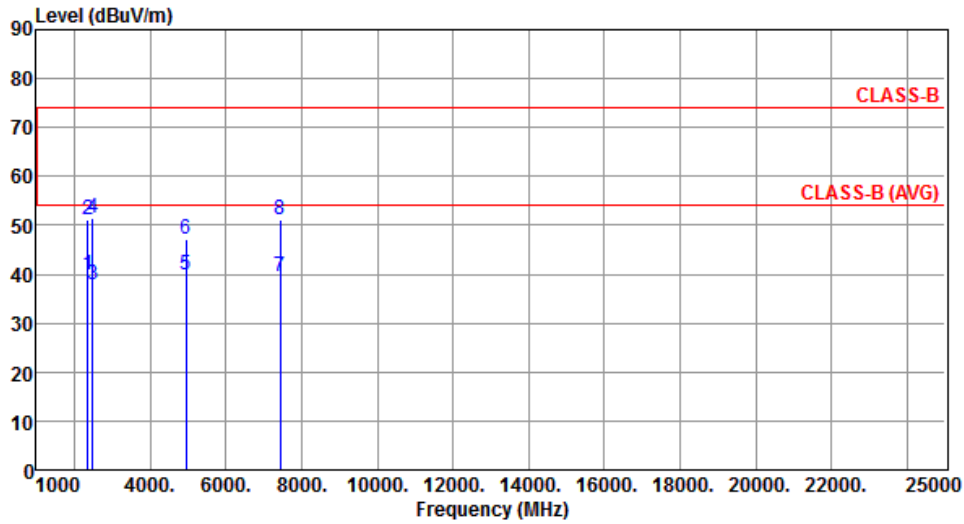
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	BT-LE (1Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2352.00	39.80	54.00	-14.20	42.55	-2.75	Average	100	165
2	2352.00	51.10	74.00	-22.90	53.85	-2.75	Peak	100	165
3	2483.50	37.84	54.00	-16.16	40.58	-2.74	Average	100	165
4	2483.50	51.31	74.00	-22.69	54.05	-2.74	Peak	100	165
5	4960.00	39.79	54.00	-14.21	36.11	3.68	Average	100	284
6	4960.00	47.26	74.00	-26.74	43.58	3.68	Peak	100	284
7	7440.00	39.63	54.00	-14.37	30.65	8.98	Average	100	205
8	7440.00	51.16	74.00	-22.84	42.18	8.98	Peak	100	205

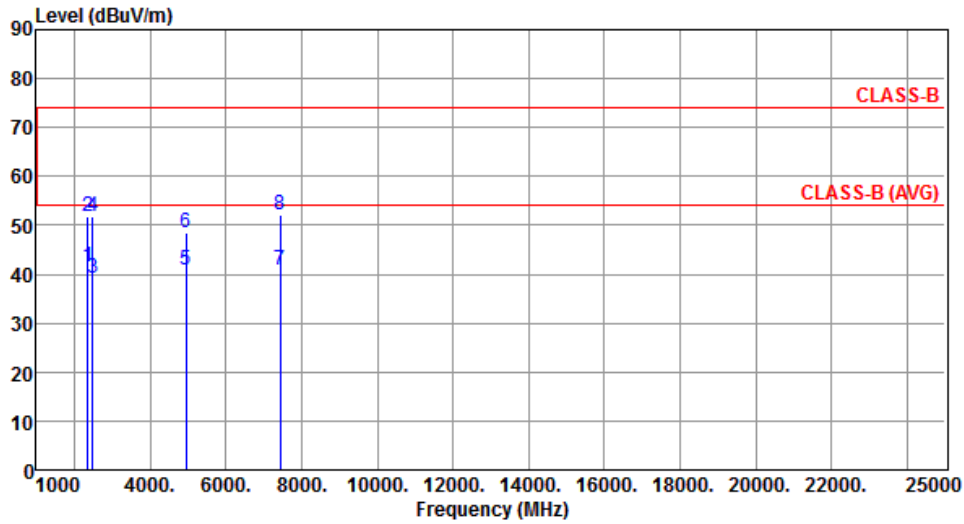
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	BT-LE (1Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2352.00	41.43	54.00	-12.57	44.18	-2.75	Average	188	181
2	2352.00	51.91	74.00	-22.09	54.66	-2.75	Peak	188	181
3	2483.50	39.14	54.00	-14.86	41.88	-2.74	Average	185	203
4	2483.50	51.84	74.00	-22.16	54.58	-2.74	Peak	185	203
5	4960.00	40.93	54.00	-13.07	37.25	3.68	Average	133	183
6	4960.00	48.51	74.00	-25.49	44.83	3.68	Peak	133	183
7	7440.00	40.73	54.00	-13.27	31.75	8.98	Average	176	169
8	7440.00	52.13	74.00	-21.87	43.15	8.98	Peak	176	169

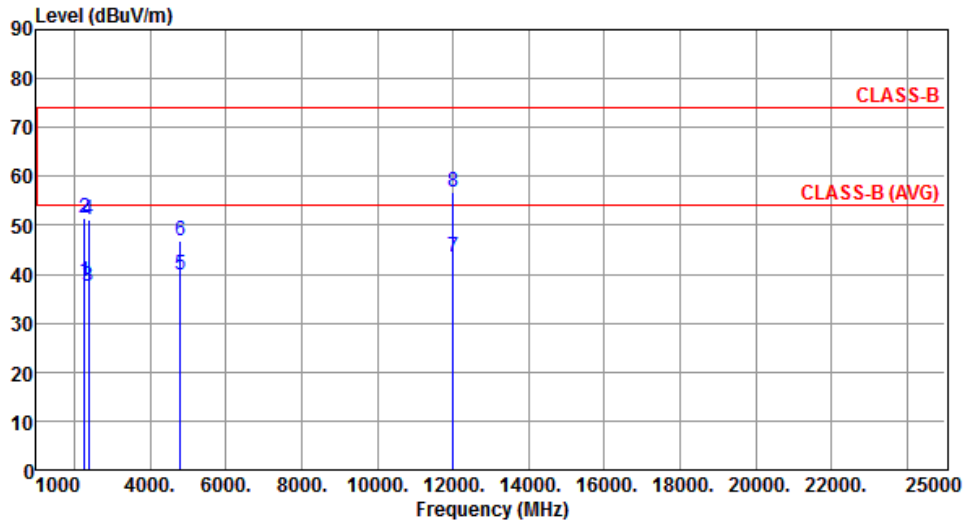
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	BT-LE (2Mbps)	Test Freq. (MHz)	2402
Polarization	Horizontal		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2274.00	38.59	54.00	-15.41	41.15	-2.56	Average	100	168
2	2274.00	51.33	74.00	-22.67	53.89	-2.56	Peak	100	168
3	2390.00	37.66	54.00	-16.34	40.45	-2.79	Average	100	168
4	2390.00	51.08	74.00	-22.92	53.87	-2.79	Peak	100	168
5	4804.00	39.75	54.00	-14.25	36.25	3.50	Average	100	288
6	4804.00	46.77	74.00	-27.23	43.27	3.50	Peak	100	288
7	12010.00	43.42	54.00	-10.58	29.15	14.27	Average	100	20
8	12010.00	56.65	74.00	-17.35	42.38	14.27	Peak	100	20

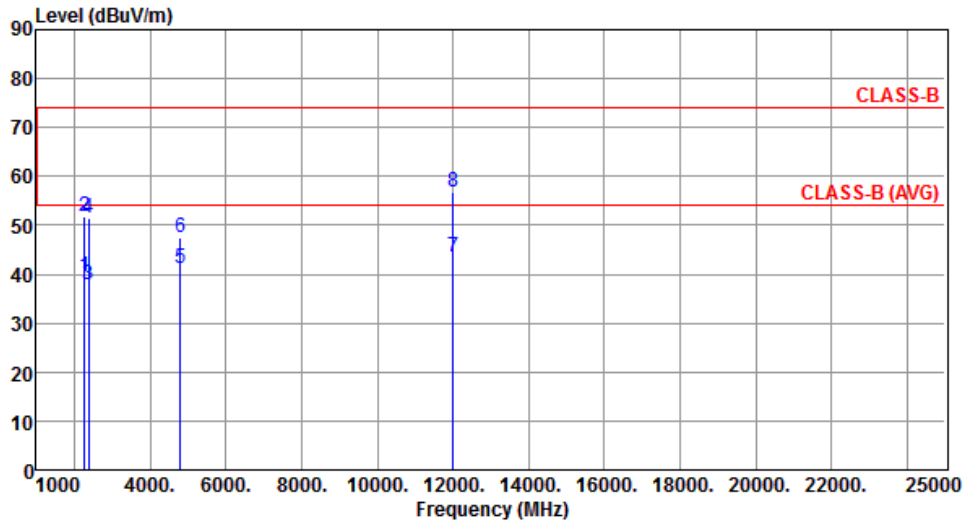
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	BT-LE (2Mbps)	Test Freq. (MHz)	2402
Polarization	Vertical		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2274.00	39.55	54.00	-14.45	42.11	-2.56	Average	182	184
2	2274.00	51.72	74.00	-22.28	54.28	-2.56	Peak	182	184
3	2390.00	37.90	54.00	-16.10	40.69	-2.79	Average	182	191
4	2390.00	51.36	74.00	-22.64	54.15	-2.79	Peak	182	191
5	4804.00	41.06	54.00	-12.94	37.56	3.50	Average	153	181
6	4804.00	47.65	74.00	-26.35	44.15	3.50	Peak	153	181
7	12010.00	43.53	54.00	-10.47	29.26	14.27	Average	100	40
8	12010.00	56.73	74.00	-17.27	42.46	14.27	Peak	100	40

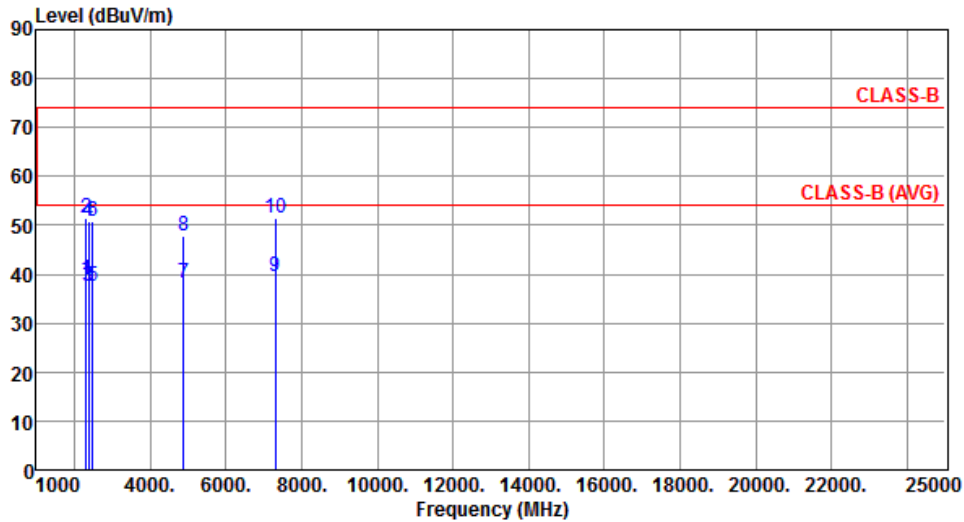
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	BT-LE (2Mbps)	Test Freq. (MHz)	2440
Polarization	Horizontal		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2312.00	38.99	54.00	-15.01	41.65	-2.66	Average	100	163
2	2312.00	51.32	74.00	-22.68	53.98	-2.66	Peak	100	163
3	2390.00	37.55	54.00	-16.45	40.34	-2.79	Average	100	163
4	2390.00	50.89	74.00	-23.11	53.68	-2.79	Peak	100	163
5	2483.50	37.51	54.00	-16.49	40.25	-2.74	Average	100	163
6	2483.50	50.80	74.00	-23.20	53.54	-2.74	Peak	100	163
7	4880.00	38.08	54.00	-15.92	34.61	3.47	Average	100	289
8	4880.00	47.68	74.00	-26.32	44.21	3.47	Peak	100	289
9	7320.00	39.48	54.00	-14.52	30.46	9.02	Average	100	202
10	7320.00	51.39	74.00	-22.61	42.37	9.02	Peak	100	202

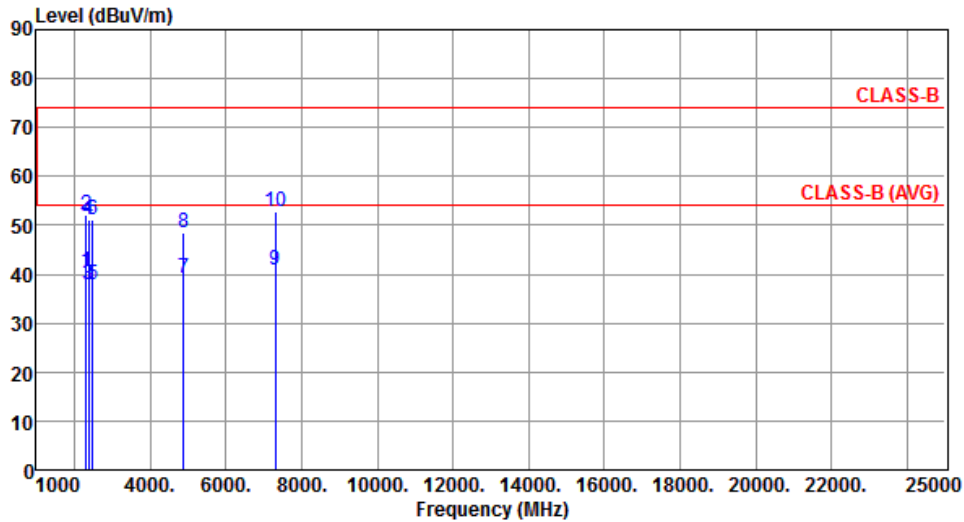
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	BT-LE (2Mbps)	Test Freq. (MHz)	2440
Polarization	Vertical		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2312.00	40.62	54.00	-13.38	43.28	-2.66	Average	181	182
2	2312.00	52.02	74.00	-21.98	54.68	-2.66	Peak	181	182
3	2390.00	37.79	54.00	-16.21	40.58	-2.79	Average	198	180
4	2390.00	51.07	74.00	-22.93	53.86	-2.79	Peak	198	180
5	2483.50	37.90	54.00	-16.10	40.64	-2.74	Average	198	180
6	2483.50	51.03	74.00	-22.97	53.77	-2.74	Peak	198	180
7	4880.00	39.31	54.00	-14.69	35.84	3.47	Average	135	189
8	4880.00	48.48	74.00	-25.52	45.01	3.47	Peak	135	189
9	7320.00	40.79	54.00	-13.21	31.77	9.02	Average	179	174
10	7320.00	52.85	74.00	-21.15	43.83	9.02	Peak	179	174

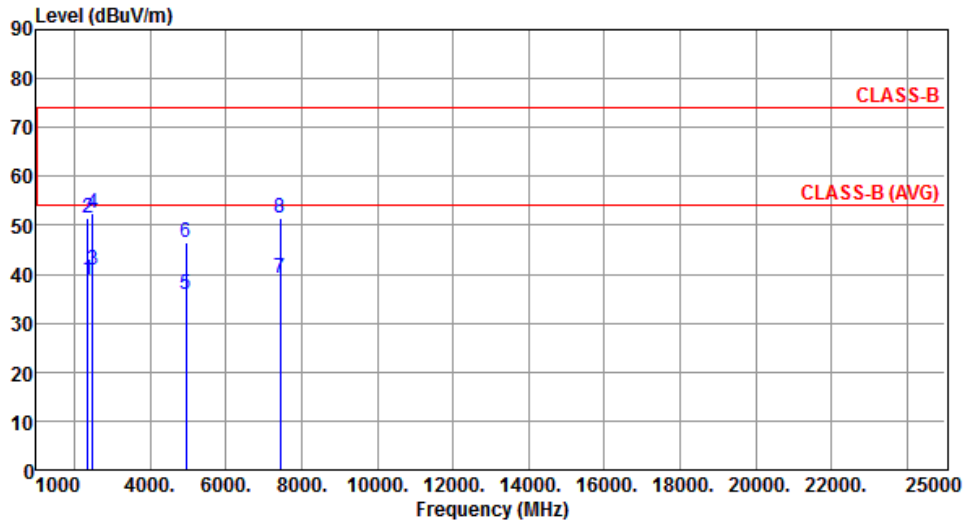
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	BT-LE (2Mbps)	Test Freq. (MHz)	2480
Polarization	Horizontal		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2352.00	38.82	54.00	-15.18	41.57	-2.75	Average	100	168
2	2352.00	51.39	74.00	-22.61	54.14	-2.75	Peak	100	168
3	2483.50	40.84	54.00	-13.16	43.58	-2.74	Average	100	168
4	2483.50	52.48	74.00	-21.52	55.22	-2.74	Peak	100	168
5	4960.00	35.93	54.00	-18.07	32.25	3.68	Average	100	285
6	4960.00	46.36	74.00	-27.64	42.68	3.68	Peak	100	285
7	7440.00	39.10	54.00	-14.90	30.12	8.98	Average	100	202
8	7440.00	51.46	74.00	-22.54	42.48	8.98	Peak	100	202

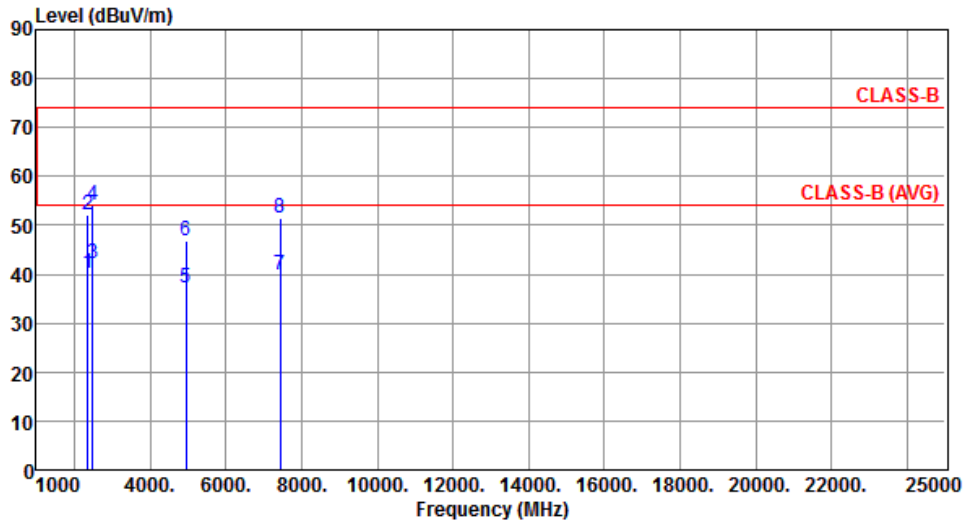
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	BT-LE (2Mbps)	Test Freq. (MHz)	2480
Polarization	Vertical		

Test By :Roger Lu Temperature(°C):21 Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2352.00	40.35	54.00	-13.65	43.10	-2.75	Average	191	186
2	2352.00	52.19	74.00	-21.81	54.94	-2.75	Peak	191	186
3	2483.50	42.02	54.00	-11.98	44.76	-2.74	Average	181	180
4	2483.50	53.98	74.00	-20.02	56.72	-2.74	Peak	181	180
5	4960.00	37.06	54.00	-16.94	33.38	3.68	Average	135	179
6	4960.00	46.83	74.00	-27.17	43.15	3.68	Peak	135	179
7	7440.00	39.84	54.00	-14.16	30.86	8.98	Average	175	165
8	7440.00	51.56	74.00	-22.44	42.58	8.98	Peak	175	165

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

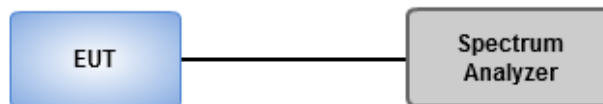
Reference level measurement

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

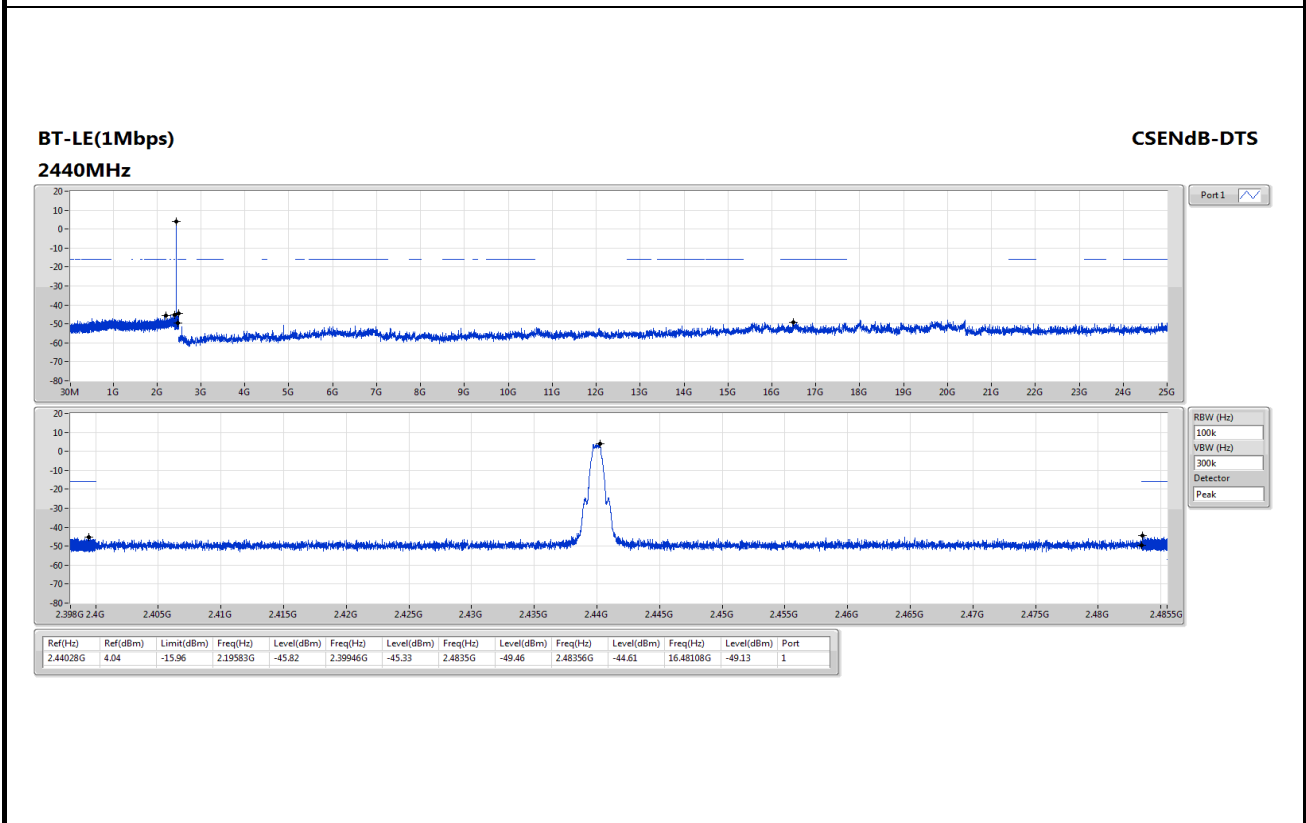
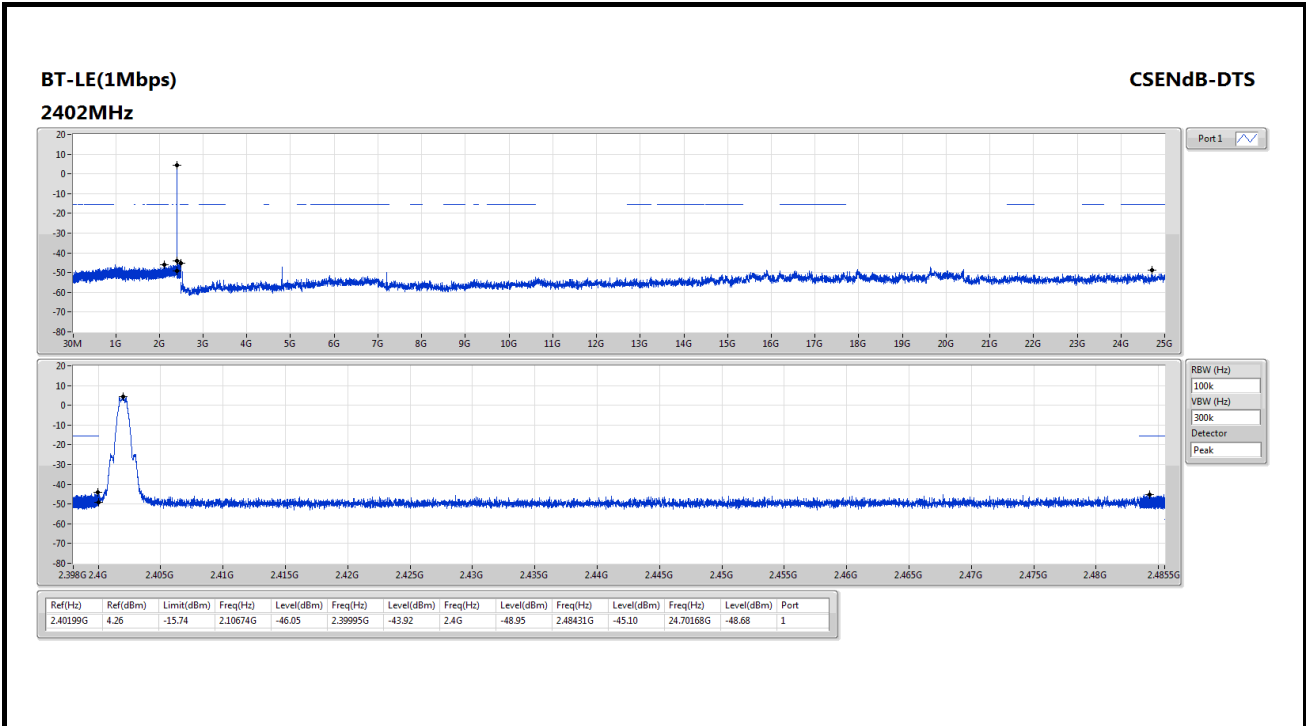
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

3.5.3 Test Setup



3.5.4 Test Result of Emissions in non-restricted Frequency Bands

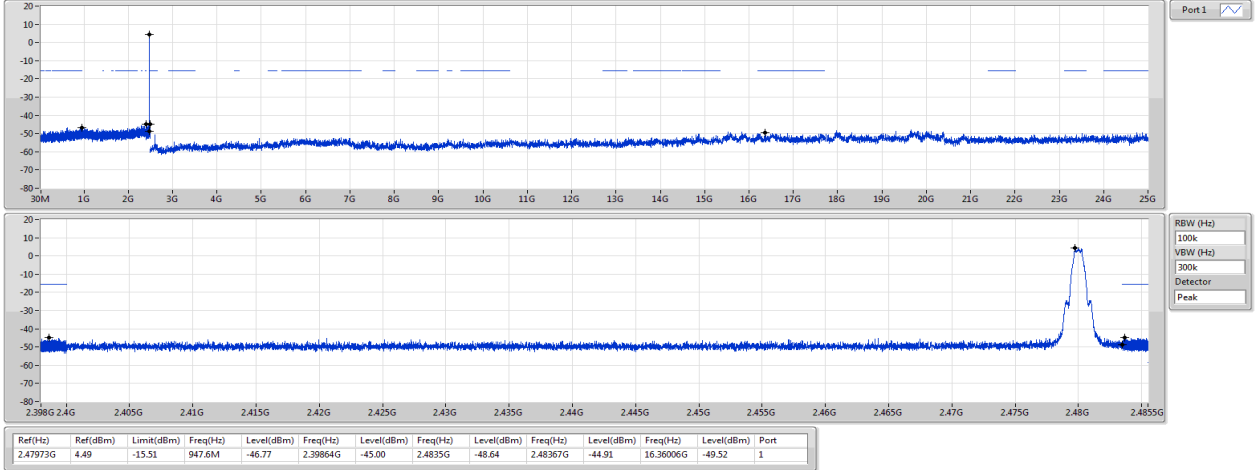
Ambient Condition	24°C / 66%	Tested By	Aska Huang
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BT-LE(1Mbps)

CSENdB-DTS

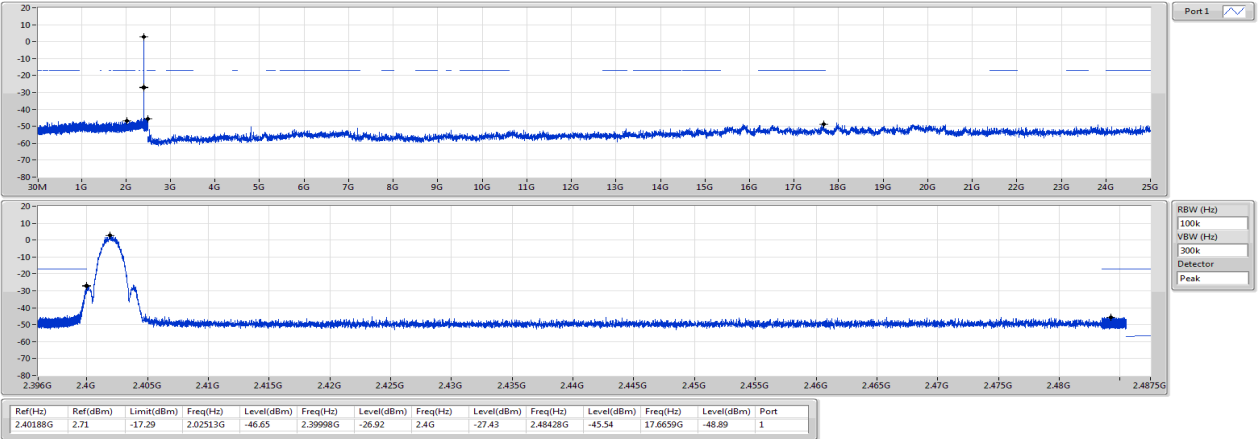
2480MHz



BT-LE(2Mbps)

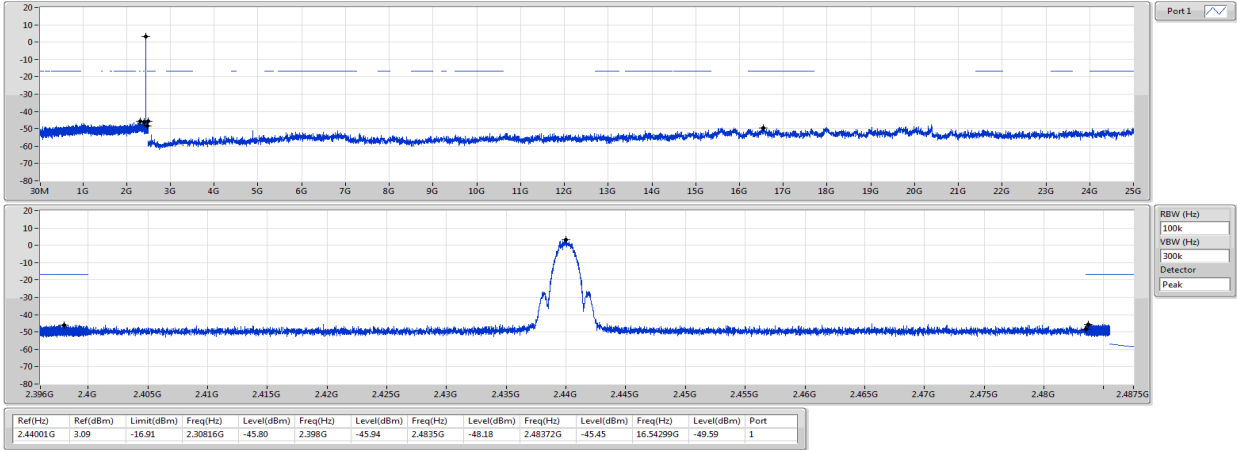
CSENdB-DTS

2402MHz



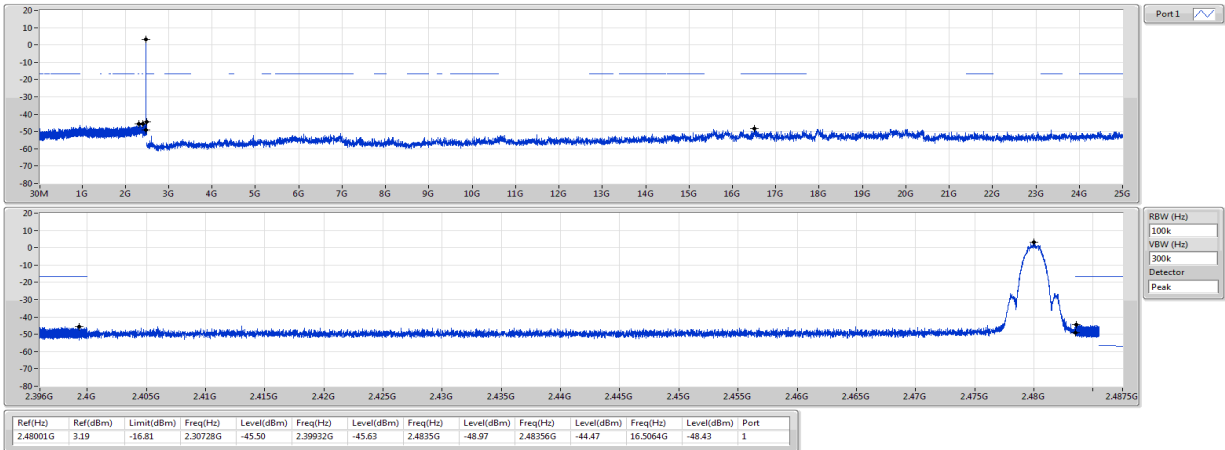
BT-LE(2Mbps)
2440MHz

CSEndB-DTS



BT-LE(2Mbps)
2480MHz

CSEndB-DTS



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

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 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.

Tel: 886-3-271-8666

Fax: 886-3-318-0155

Email: ICC_Service@icertifi.com.tw

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