FCC Test Report

FCC ID	:	**P27SBTC1**
Equipment	:	**SmartBrief Transmitter**
Model No.	:	**SBT-C1**
Brand Name	:	**Near**
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	:	**Aug. 27, 2019**
Tested Date	:	**Aug. 29 ~ Sep. 06, 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: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR982701	Rev. 01	Initial issue	Sep. 27, 2019

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 53.14 (Margin -0.86dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 17.30	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.			

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	4.1	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3Vdc from battery

1.1.4 Accessories

Accessories		
No.	**Equipment**	**Description**
1	Lithium battery	Brand: Murata Model: CR2477 Power Rating: 3Vdc

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, Version: V4.94	
Duty Cycle and Duty Factor	Duty Cycle (%)	Duty Factor (dB)
	100	0

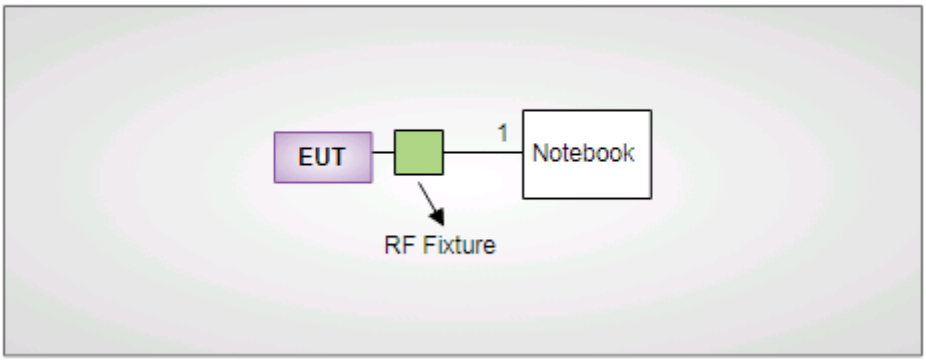
1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
OQPSK	2405	17
OQPSK	2440	17
OQPSK	2475	17
OQPSK	2480	9

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
1	Notebook	DELL	Latitude E6440	DoC	---
2	RF Fixture	---	---	---	Provided by applicant.

1.3 Test Setup Chart

Test Setup Diagram	
	
No.	**Signal cable / Length (m)**
1	Micro USB, 1.8m shielded without core.

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. 07, 2019	Jan. 06, 2020
Receiver	R&S	ESR3	101658	Dec. 11, 2018	Dec. 10, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 17, 2019	Apr. 16, 2020
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Jan. 07, 2019	Jan. 06, 2020
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	980187	Aug. 14, 2019	Aug. 13, 2020
Preamplifier	Agilent	83017A	MY53270014	Aug. 07, 2019	Aug. 06, 2020
Preamplifier	EMC	EMC184045B	980192	Aug. 01, 2019	Jul. 31, 2020
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Oct. 01, 2018	Sep. 30, 2019
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Oct. 01, 2018	Sep. 30, 2019
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Oct. 01, 2018	Sep. 30, 2019
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Oct. 01, 2018	Sep. 30, 2019
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Oct. 01, 2018	Sep. 30, 2019
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Oct. 01, 2018	Sep. 30, 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 ≤ 1GHz	±3.96 dB
Radiated emission > 1GHz	±4.51 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH03-WS	25°C / 66%	Roger Lu
RF Conducted	TH01-WS	23°C / 65%	Aska Huang

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

2.2 The Worst Test Modes and Channel Details

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

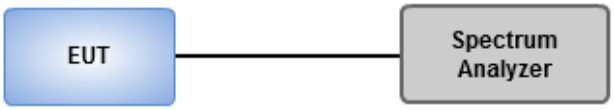
6dB Bandwidth

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) = 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

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
Zigbee	1.83M	2.261M	2M26G1D	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;

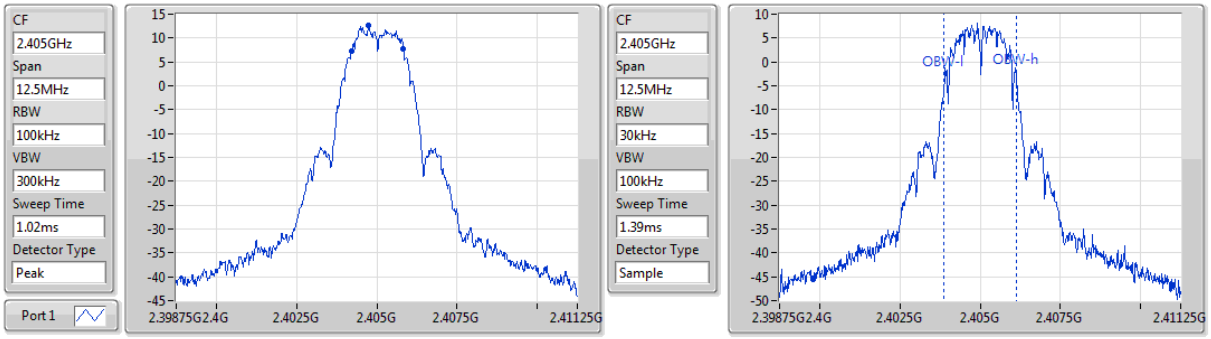
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
Zigbee	-	-	-	-
2405MHz	Pass	500k	1.63M	2.261M
2440MHz	Pass	500k	1.612M	2.261M
2475MHz	Pass	500k	1.83M	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 **EBW**

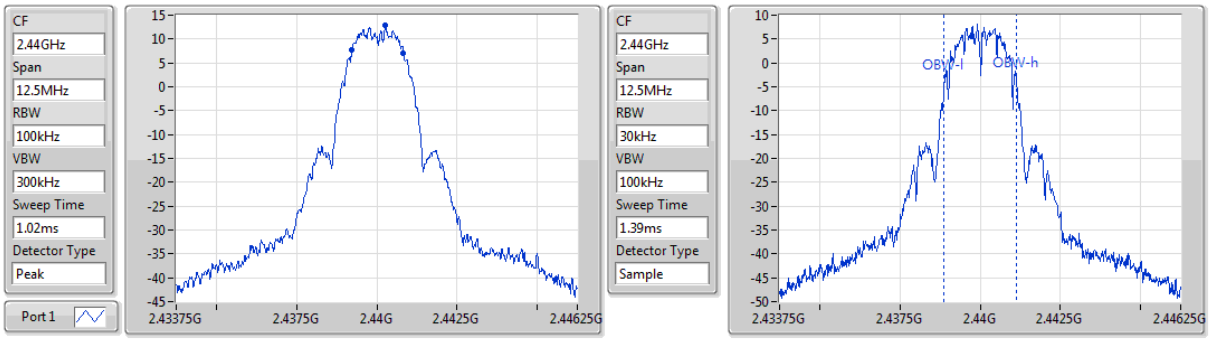
2405MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.63M	2.404203G	2.405833G	2.261M	2.403878G	2.40614G	500k	1

Zigbee **EBW**

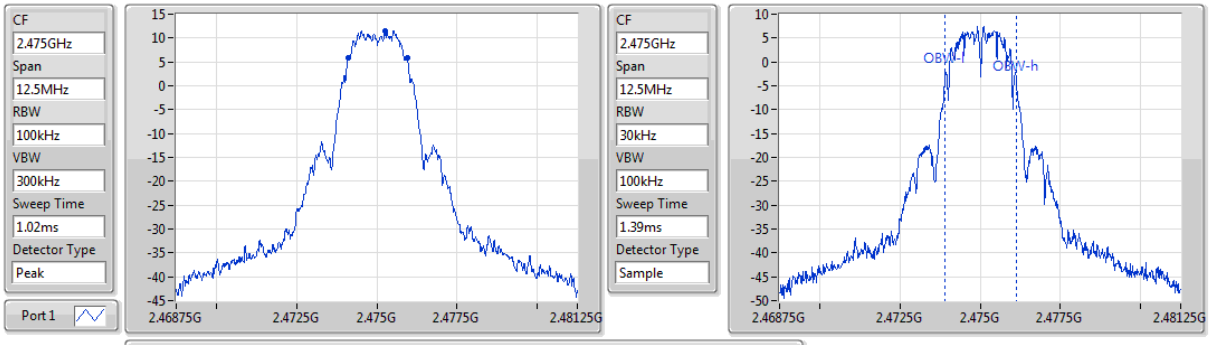
2440MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.612M	2.439221G	2.440833G	2.261M	2.438878G	2.44114G	500k	1

Zigbee **EBW**

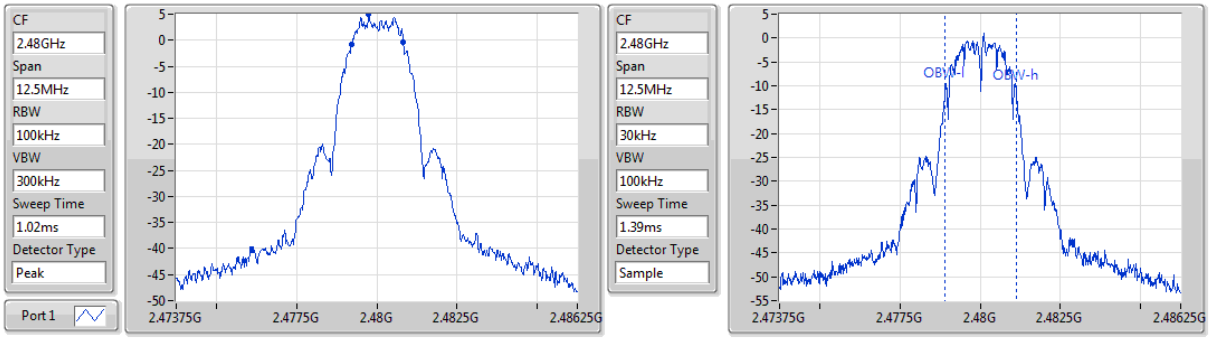
2475MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.83M	2.474112G	2.475942G	2.243M	2.473897G	2.47614G	500k	1

Zigbee **EBW**

2480MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.63M	2.479203G	2.480833G	2.243M	2.478897G	2.48114G	500k	1

3.2 RF Output Power

3.2.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

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

3.2.2 Test Procedures

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

3.2.3 Test Setup

3.2.4 Test Result of Maximum Output Power

Summary of Peak conducted Output Power

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee	17.30	0.05370

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	4.10	17.30	17.30	30.00
2440MHz	Pass	4.10	17.17	17.17	30.00
2475MHz	Pass	4.10	17.06	17.06	30.00
2480MHz	Pass	4.10	9.45	9.45	30.00

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

Summary of Conducted (Average) Output Power

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee	17.28	0.05346

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	4.10	17.28	17.28	-
2440MHz	Pass	4.10	17.16	17.16	-
2475MHz	Pass	4.10	17.04	17.04	-
2480MHz	Pass	4.10	9.40	9.40	-

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

Note : Conducted average output power is for reference only

3.3 Power Spectral Density

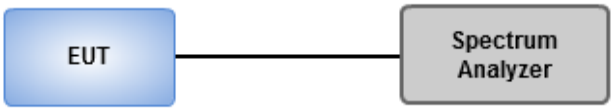
3.3.1 Limit of Power Spectral Density

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

3.3.2 Test Procedures

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

Summary

Mode	PD (dBm/3kHz)
2.4-2.4835GHz	-
Zigbee	0.73

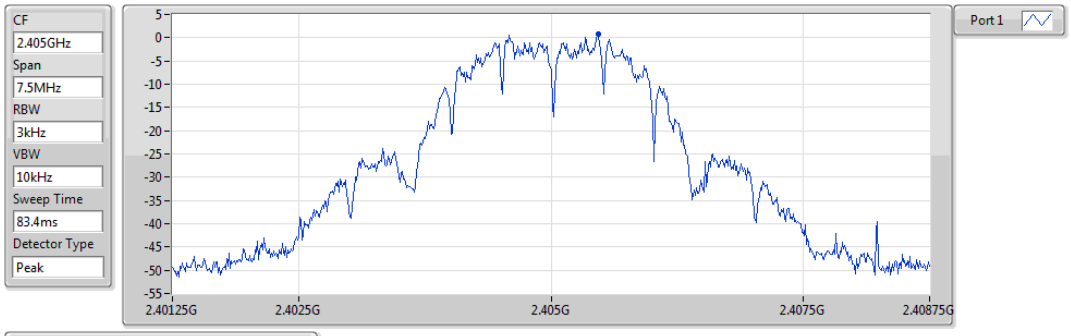
Result

Mode	Result	DG (dBi)	Port 1 (dBm/3kHz)	PD (dBm/3kHz)	PD Limit (dBm/3kHz)
Zigbee	-	-	-	-	-
2405MHz	Pass	4.10	0.73	0.73	8.00
2440MHz	Pass	4.10	0.34	0.34	8.00
2475MHz	Pass	4.10	0.38	0.38	8.00
2480MHz	Pass	4.10	-7.06	-7.06	8.00

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

Zigbee **PSD**

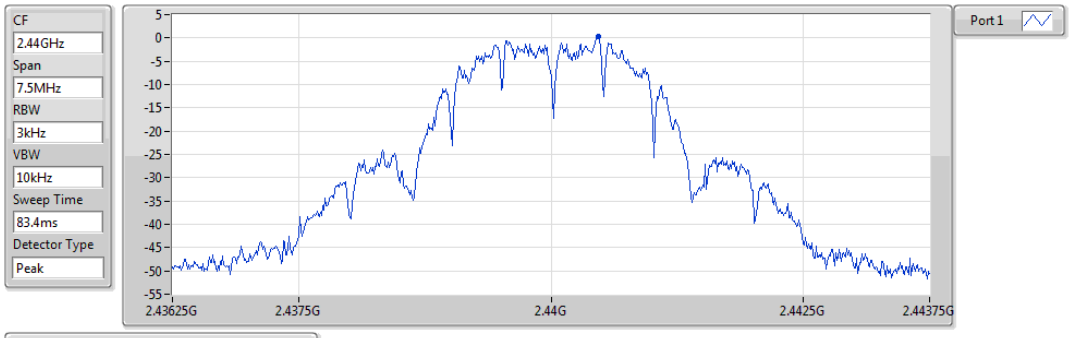
2405MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
0.73	0.73	0.73

Zigbee **PSD**

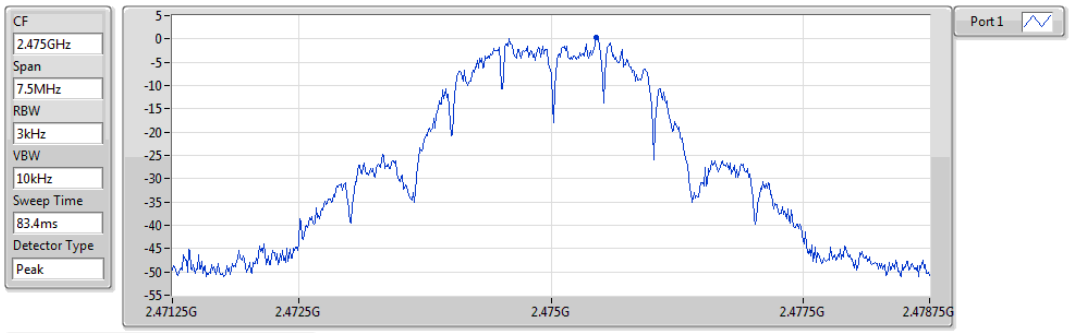
2440MHz



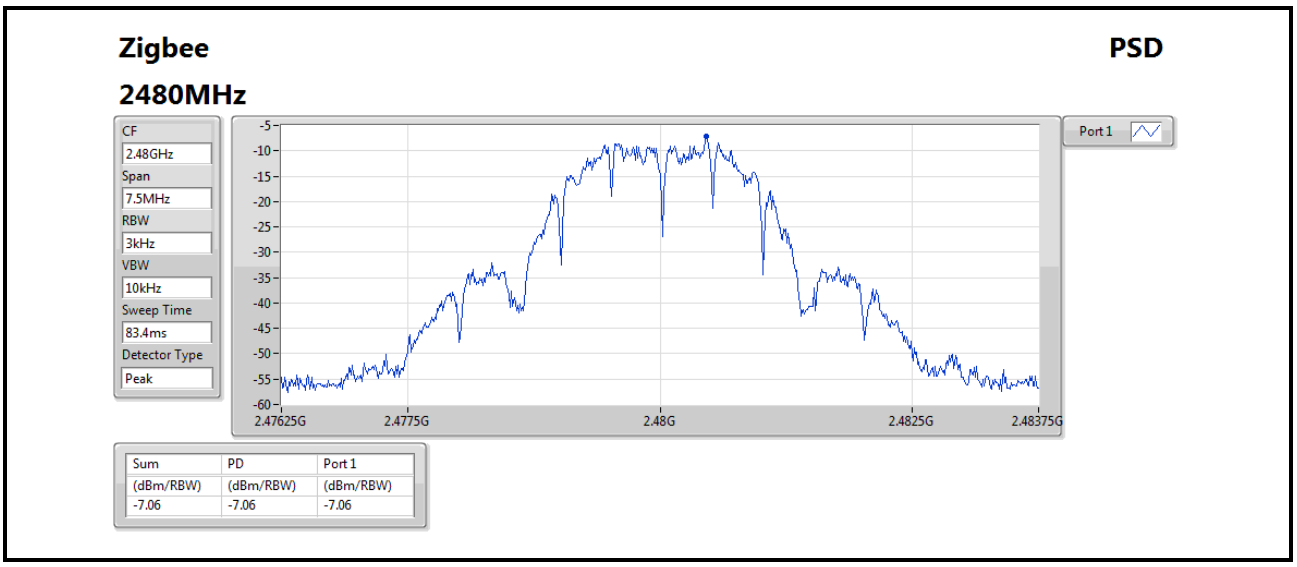
Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
0.34	0.34	0.34

Zigbee **PSD**

2475MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
0.38	0.38	0.38


Zigbee
PSD
2480MHz
CF
2.48GHz
Span
7.5MHz
RBW
3kHz
VBW
10kHz
Sweep Time
83.4ms
Detector Type
Peak
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
-55
-60
2.47625G
2.4775G
2.48G
2.4825G
2.48375G
Port 1
Sum
PD
Port 1
(dBm/RBW)
(dBm/RBW)
(dBm/RBW)
-7.06
-7.06
-7.06

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:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.4.2 Test Procedures

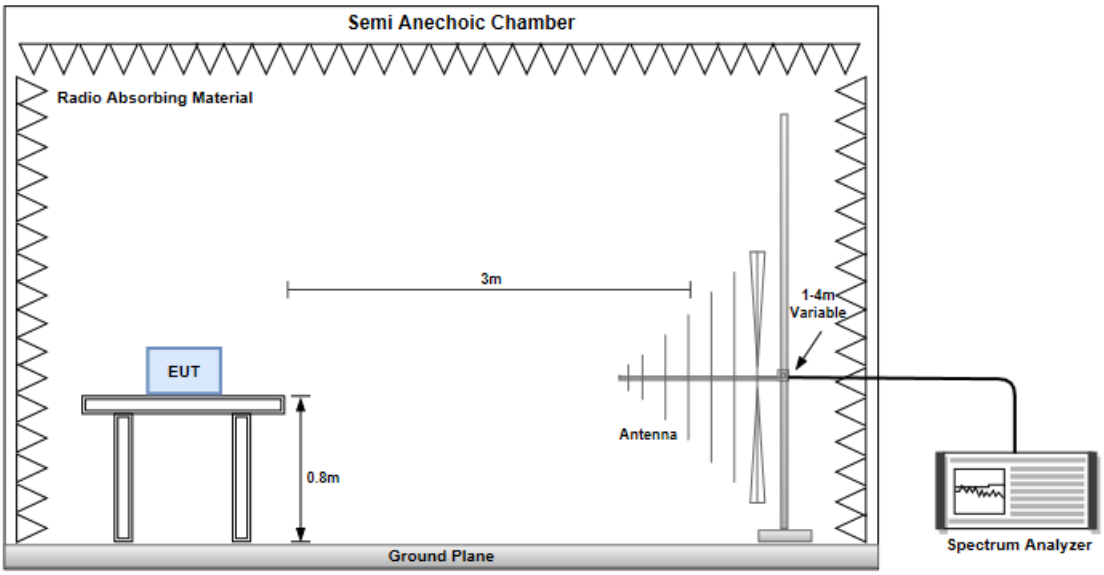
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

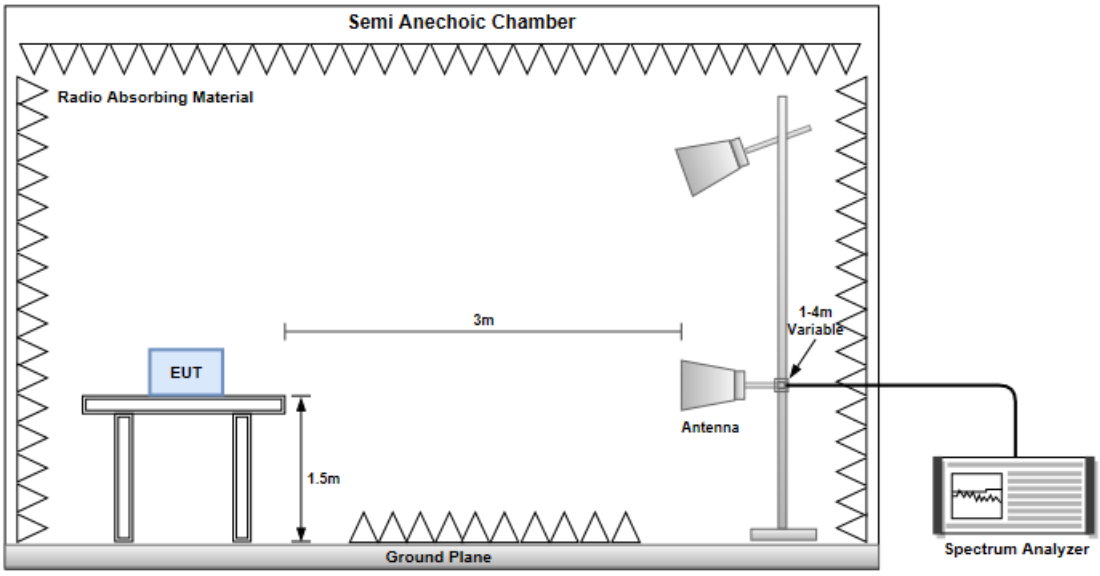
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.4.3 Test Setup

Radiated Emissions below 1 GHz

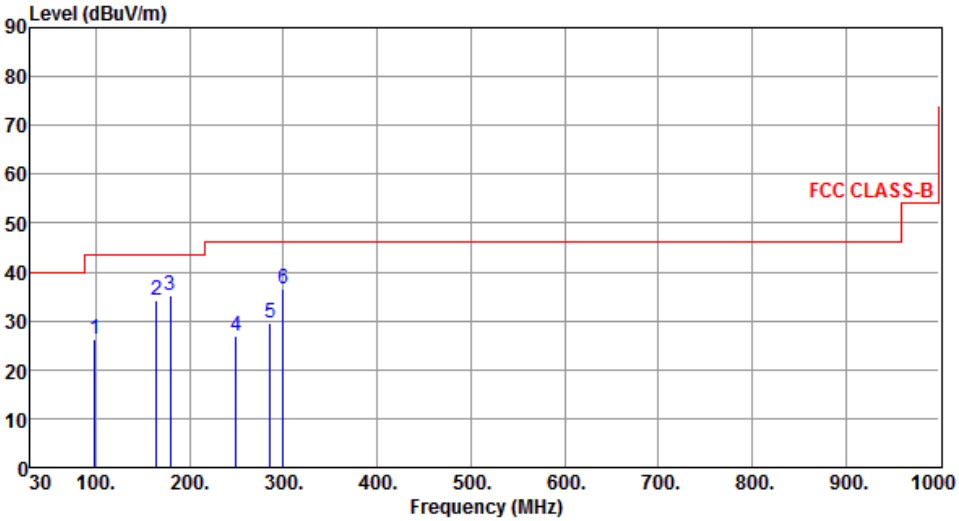


Radiated Emissions above 1 GHz



3.4.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

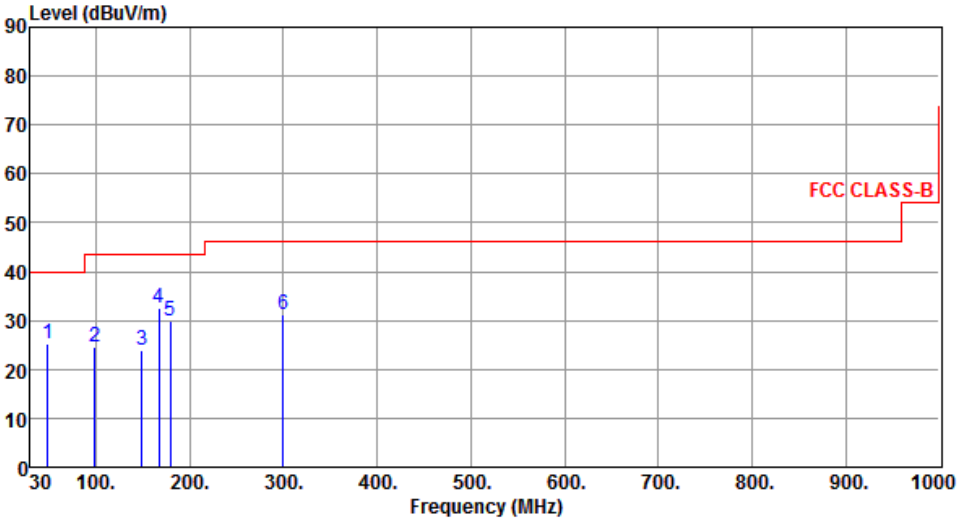
Modulation	OQPSK	Test Freq. (MHz)	2405
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	98.87	26.32	43.50	-17.18	40.20	-13.88	Peak	---	---
2	164.83	34.16	43.50	-9.34	43.07	-8.91	Peak	---	---
3	179.38	35.04	43.50	-8.46	45.21	-10.17	Peak	---	---
4	249.22	26.78	46.00	-19.22	36.76	-9.98	Peak	---	---
5	286.08	29.40	46.00	-16.60	38.06	-8.66	Peak	---	---
6	299.66	36.43	46.00	-9.57	44.76	-8.33	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)	2405
Polarization	Vertical		

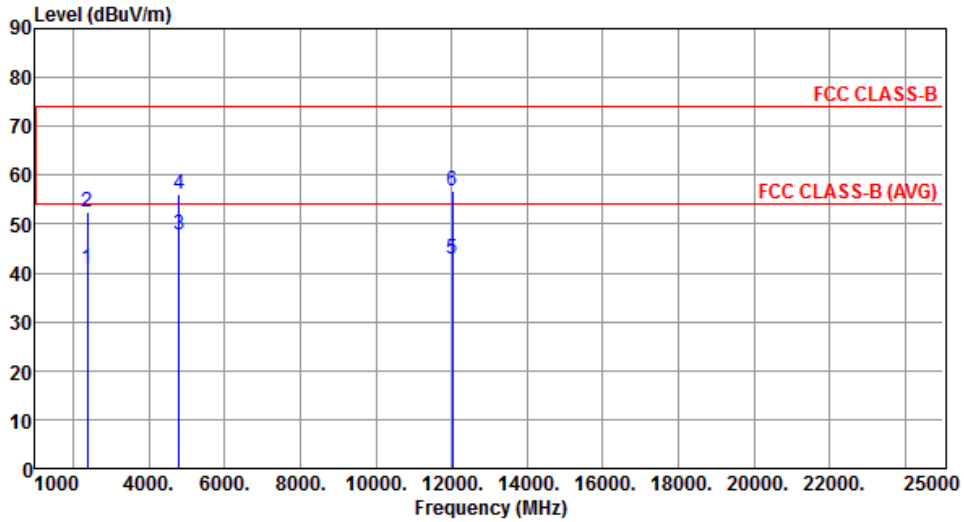


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	48.43	25.16	40.00	-14.84	33.81	-8.65	Peak	---	---
2	98.87	24.62	43.50	-18.88	38.50	-13.88	Peak	---	---
3	149.31	24.06	43.50	-19.44	32.85	-8.79	Peak	---	---
4	166.77	32.41	43.50	-11.09	41.41	-9.00	Peak	---	---
5	179.38	29.99	43.50	-13.51	40.16	-10.17	Peak	---	---
6	299.66	31.27	46.00	-14.73	39.60	-8.33	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)

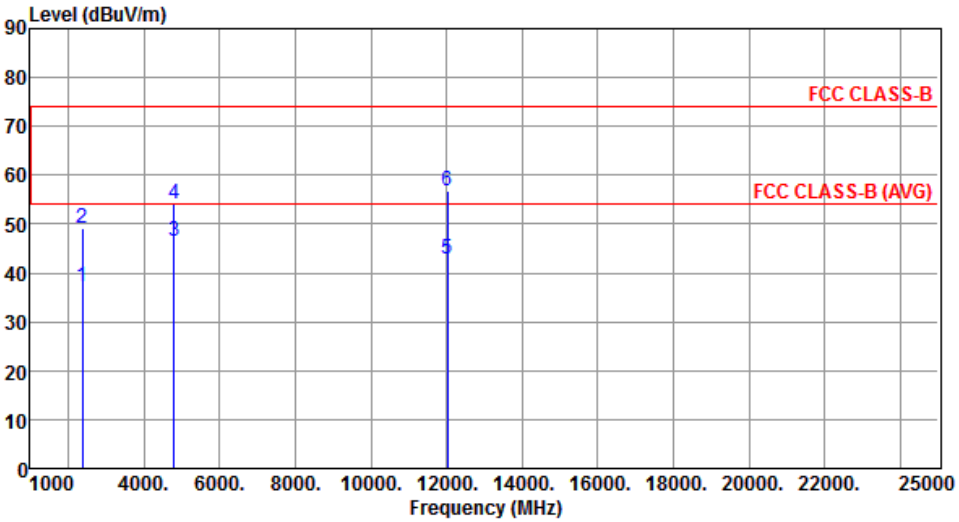
Modulation	OQPSK	Test Freq. (MHz)	2405
Polarization	Horizontal		



	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	40.95	54.00	-13.05	40.53	0.42	Average	100	217
2	2390.00	52.50	74.00	-21.50	52.08	0.42	Peak	100	217
3	4810.00	47.89	54.00	-6.11	41.55	6.34	Average	110	220
4	4810.00	56.24	74.00	-17.76	49.90	6.34	Peak	110	220
5	12025.00	42.92	54.00	-11.08	26.42	16.50	Average	100	30
6	12025.00	56.83	74.00	-17.17	40.33	16.50	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).

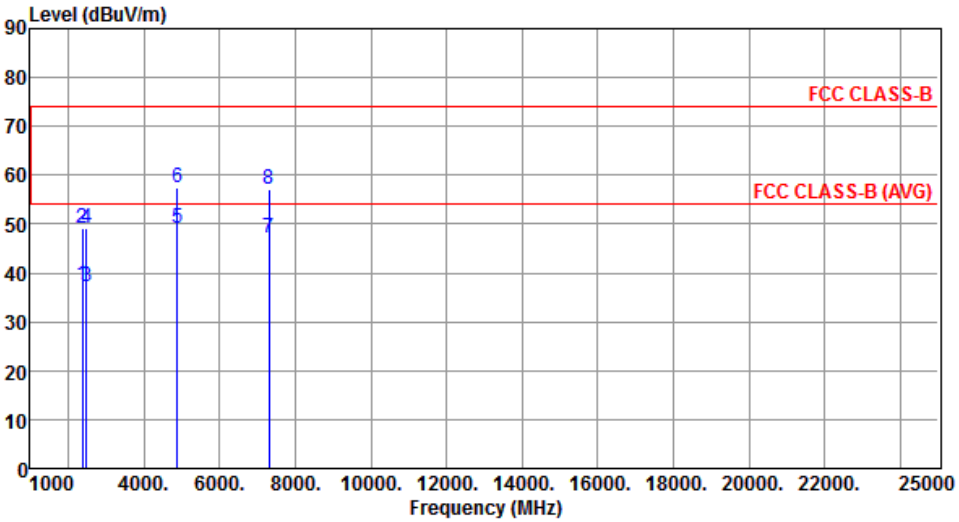
Modulation	OQPSK	Test Freq. (MHz)	2405
Polarization	Vertical		



	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	37.05	54.00	-16.95	40.12	-3.07	Average	375	182
2	2390.00	49.29	74.00	-24.71	52.36	-3.07	Peak	375	182
3	4810.00	46.39	54.00	-7.61	42.87	3.52	Average	100	205
4	4810.00	54.17	74.00	-19.83	50.65	3.52	Peak	100	205
5	12025.00	42.82	54.00	-11.18	29.55	13.27	Average	100	50
6	12025.00	56.71	74.00	-17.29	43.44	13.27	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).

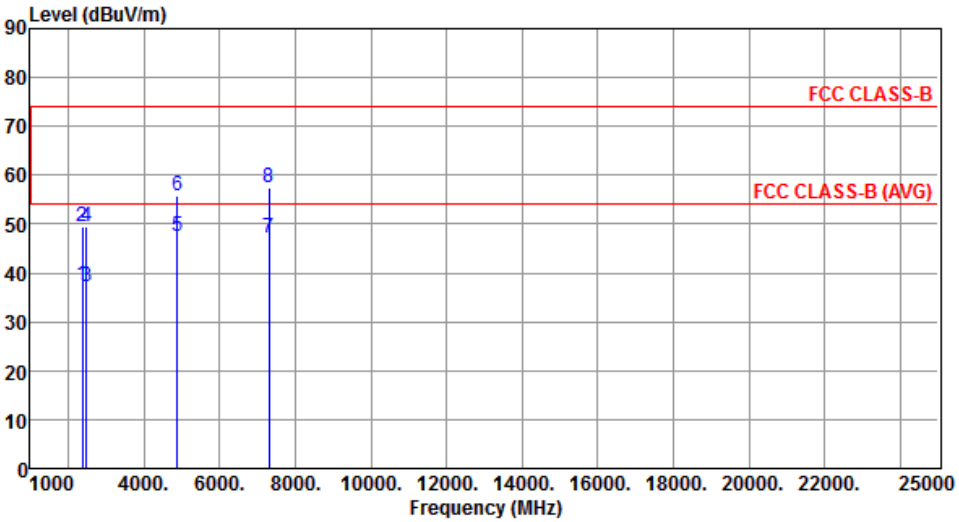
Modulation	OQPSK	Test Freq. (MHz)	2440
Polarization	Horizontal		



	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	37.49	54.00	-16.51	37.07	0.42	Average	100	218
2	2390.00	49.19	74.00	-24.81	48.77	0.42	Peak	100	218
3	2483.50	37.36	54.00	-16.64	37.10	0.26	Average	100	218
4	2483.50	49.09	74.00	-24.91	48.83	0.26	Peak	100	218
5	4880.00	49.05	54.00	-4.95	42.62	6.43	Average	100	219
6	4880.00	57.38	74.00	-16.62	50.95	6.43	Peak	100	219
7	7320.00	47.07	54.00	-6.93	35.28	11.79	Average	100	125
8	7320.00	57.19	74.00	-16.81	45.40	11.79	Peak	100	125

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).

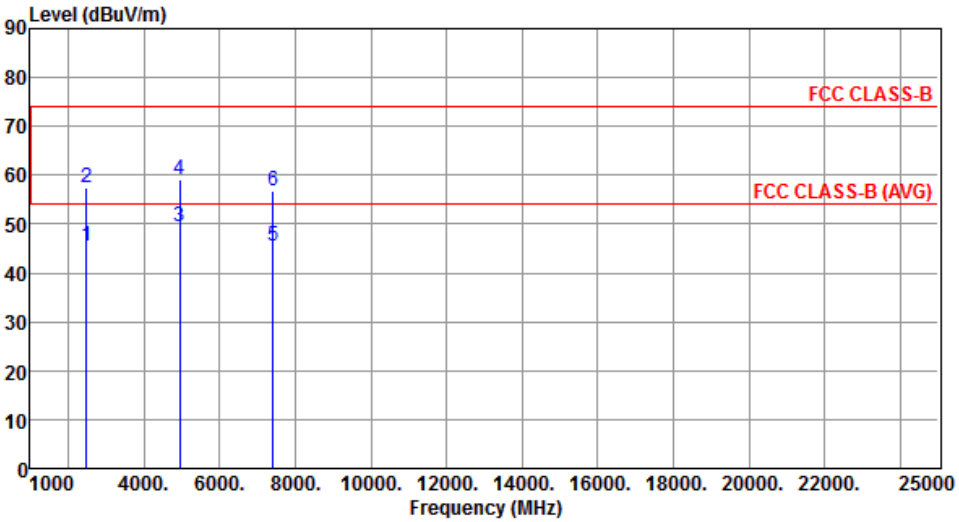
Modulation	OQPSK	Test Freq. (MHz)	2440
Polarization	Vertical		



	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	37.46	54.00	-16.54	37.04	0.42	Average	371	181
2	2390.00	49.41	74.00	-24.59	48.99	0.42	Peak	371	181
3	2483.50	37.25	54.00	-16.75	36.99	0.26	Average	371	181
4	2483.50	49.44	74.00	-24.56	49.18	0.26	Peak	371	181
5	4880.00	47.43	54.00	-6.57	41.00	6.43	Average	100	203
6	4880.00	55.75	74.00	-18.25	49.32	6.43	Peak	100	203
7	7320.00	47.27	54.00	-6.73	35.48	11.79	Average	100	72
8	7320.00	57.30	74.00	-16.70	45.51	11.79	Peak	100	72

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).

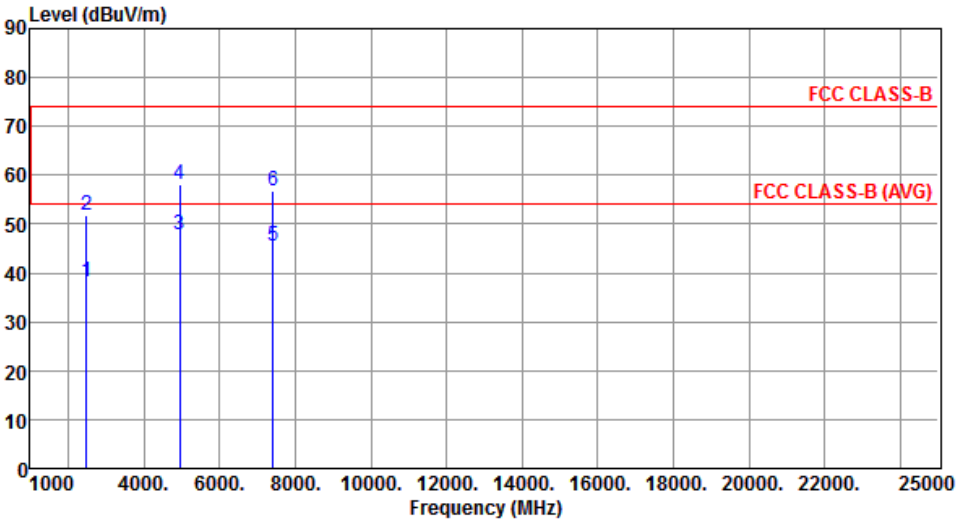
Modulation	OQPSK	**Test Freq. (MHz)**	2475
Polarization	Horizontal		



	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	45.59	54.00	-8.41	45.33	0.26	Average	100	219
2	2483.50	57.31	74.00	-16.69	57.05	0.26	Peak	100	219
3	4950.00	49.50	54.00	-4.50	42.84	6.66	Average	103	225
4	4950.00	59.02	74.00	-14.98	52.36	6.66	Peak	103	225
5	7425.00	45.66	54.00	-8.34	33.93	11.73	Average	100	128
6	7425.00	56.90	74.00	-17.10	45.17	11.73	Peak	100	128

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).

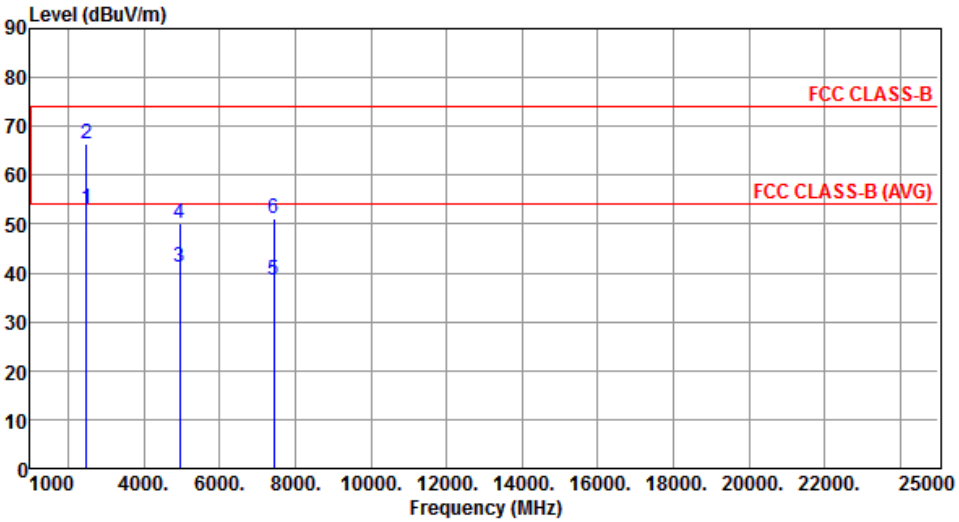
Modulation	OQPSK	**Test Freq. (MHz)**	2475
Polarization	Vertical		



	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	38.13	54.00	-15.87	37.87	0.26	Average	376	185
2	2483.50	51.94	74.00	-22.06	51.68	0.26	Peak	376	185
3	4950.00	47.96	54.00	-6.04	41.30	6.66	Average	100	204
4	4950.00	57.99	74.00	-16.01	51.33	6.66	Peak	100	204
5	7425.00	45.47	54.00	-8.53	33.74	11.73	Average	100	75
6	7425.00	56.67	74.00	-17.33	44.94	11.73	Peak	100	75

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).

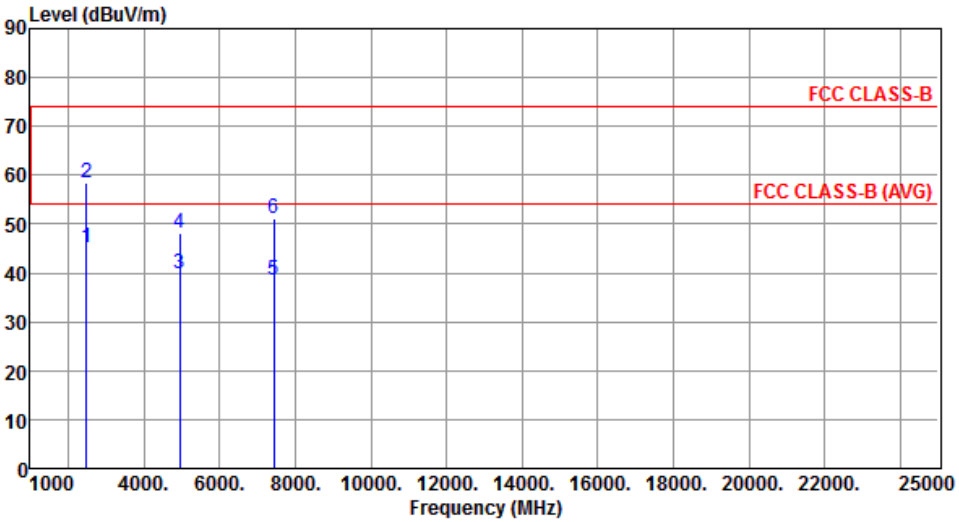
Modulation	OQPSK	Test Freq. (MHz)	2480
Polarization	Horizontal		



	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	53.14	54.00	-0.86	52.88	0.26	Average	100	221
2	2483.50	66.54	74.00	-7.46	66.28	0.26	Peak	100	221
3	4960.00	41.35	54.00	-12.65	34.64	6.71	Average	100	216
4	4960.00	50.11	74.00	-23.89	43.40	6.71	Peak	100	216
5	7440.00	38.67	54.00	-15.33	26.85	11.82	Average	100	126
6	7440.00	51.10	74.00	-22.90	39.28	11.82	Peak	100	126

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)**	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	45.27	54.00	-8.73	45.01	0.26	Average	377	182
2	2483.50	58.47	74.00	-15.53	58.21	0.26	Peak	377	182
3	4960.00	39.88	54.00	-14.12	33.17	6.71	Average	100	205
4	4960.00	48.04	74.00	-25.96	41.33	6.71	Peak	100	205
5	7440.00	38.40	54.00	-15.60	26.58	11.82	Average	100	75
6	7440.00	51.00	74.00	-23.00	39.18	11.82	Peak	100	75

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

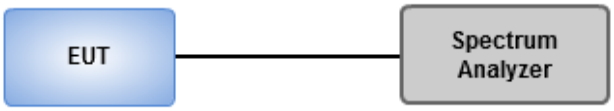
Reference level measurement

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

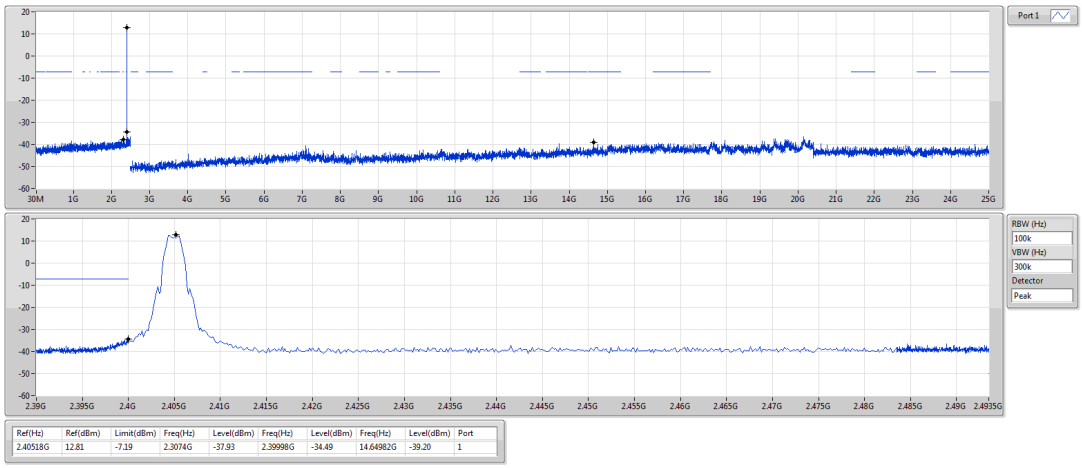
3.5.3 Test Setup



3.5.4 Unwanted Emissions into Non-Restricted Frequency Bands

Zigbee **CSE NdB**

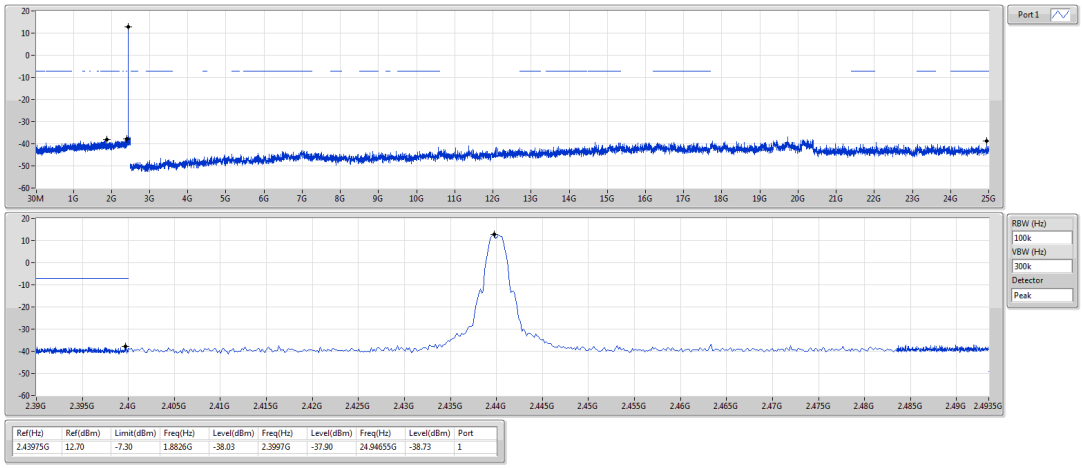
2405MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.40518G	12.81	-7.19	2.3074G	-37.93	2.39998G	-34.49	14.64982G	-39.20	1

Zigbee **CSE NdB**

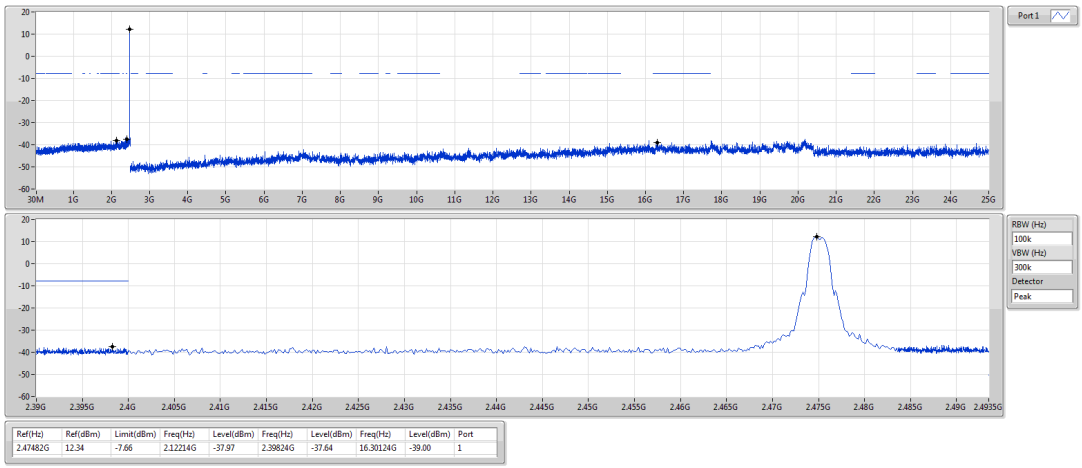
2440MHz



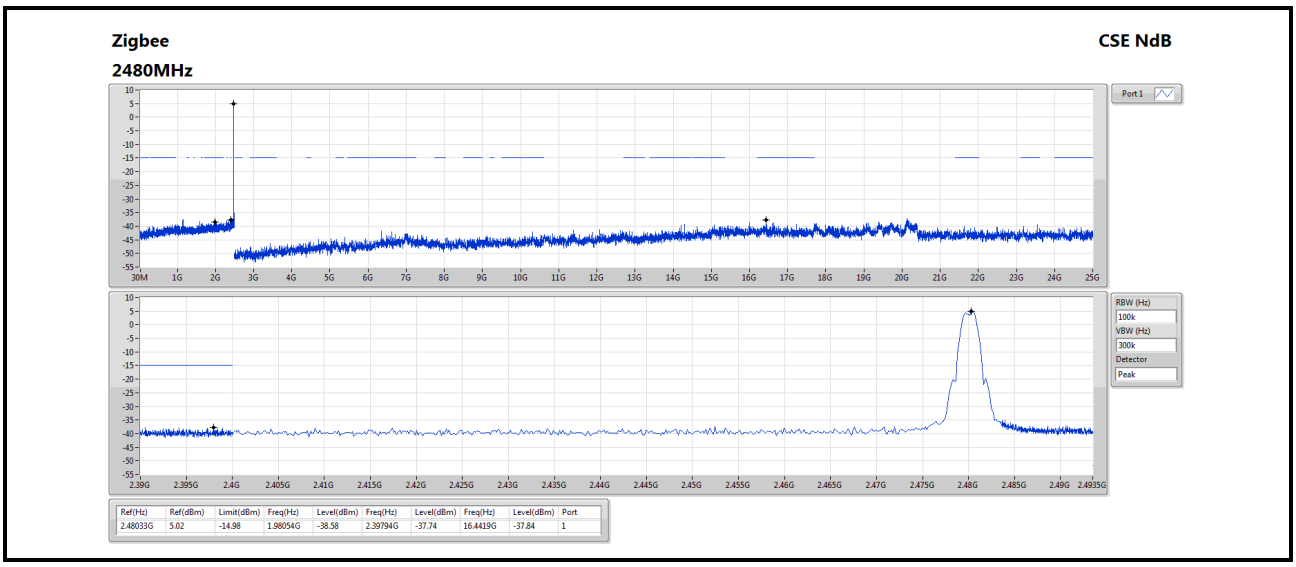
Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.43975G	12.70	-7.30	1.8826G	-38.03	2.3997G	-37.90	24.94655G	-38.73	1

Zigbee **CSE NdB**

2475MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.47482G	12.34	-7.66	2.12214G	-37.97	2.39824G	-37.64	16.30124G	-39.00	1


Zigbee
CSE NdB
2480MHz
Port 1
RBW (Hz)
100k
VBW (Hz)
300k
Detector
Peak
Ref(Hz) Ref(dBm) Limit(dBm) Freq(Hz) Level(dBm) Freq(Hz) Level(dBm) Freq(Hz) Level(dBm) Port
2.48033G 5.02 -14.98 1.98054G -38.58 2.39794G -37.74 16.4419G -37.84 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.

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

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

==END==