

FCC 15.249
2.4 GHz Report

for

Chungear Industrial Co., Ltd.

106 Kanho Road, Taichung, Taiwan

Product Name : Ceiling Fan Remote Controller
Model Name : (1)MR101F-3A (2)MR101F-3B
FCC ID : KUJCE10326

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APPENDIX A TEST PHOTOGRAPHS

TEST REPORT CERTIFICATION

Applicant : Chungear Industrial Co., Ltd.
Manufacturer #1 : Chungear Industrial Co., Ltd.
Manufacturer #2 : Satellite Electronic (Zhongshan) Ltd.
Manufacturer #3 : Zhongshan Amity Electronic Ltd.
Product Name : Ceiling Fan Remote Controller
Model No. : (1)MR101F-3A (2)MR101F-3B
Serial No. : N/A
Brand : None
Power Supply : AC 120V/60Hz

Rules of Compliance and Measurement Standards:

FCC CFR 47 Part 15 Subpart C/Oct. 2014

ANSI C63.4-2003

ANSI C63.10-2009

AUDIX Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report. **AUDIX Technology Corp.** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Test: 2015. 05. 22 ~ 28

Date of Report: 2015. 06. 02

Producer: Sabrina Wang
(Sabrina Wang/Administrator)

Signatory: Ben Cheng
(Ben Cheng/Manager)

1. REPORT HISTORY

Revision	Date	Revision Summary	Report Number
0	2015. 06. 02	Original Report.	EM-F150296

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	PASS
15.205/15.209/ 15.249(a)	Radiated Band Edge and Radiated Spurious Emission Fundamental Frequency	PASS
----	Occupied Bandwidth 99% Power	Reference only
15.203	Antenna Requirement	PASS

3. GENERAL INFORMATION

3.1. Description of EUT

Product	Ceiling Fan Remote Controller												
Model Number	(1)MR101F-3A (2)MR101F-3B The differences of above models list in following: <table border="1"><thead><tr><th>Item \ Model</th><th>MR101F-3A</th><th>MR101F-3B</th></tr></thead><tbody><tr><td>Number of Light</td><td>1</td><td>2</td></tr><tr><td>Used Transmitter</td><td>TR191A</td><td>TR192A</td></tr><tr><td>Appearance</td><td colspan="2">Different</td></tr></tbody></table> The M/N MR101F-3B was tested in this report.	Item \ Model	MR101F-3A	MR101F-3B	Number of Light	1	2	Used Transmitter	TR191A	TR192A	Appearance	Different	
Item \ Model	MR101F-3A	MR101F-3B											
Number of Light	1	2											
Used Transmitter	TR191A	TR192A											
Appearance	Different												
Serial Number	N/A												
Brand Name	None												
Applicant	Chungear Industrial Co., Ltd. 106 Kanho Road, Taichung, Taiwan												
Manufacture#1	Chungear Industrial Co., Ltd. 106 Kanho Road, Taichung, Taiwan												
Manufacture#2	Satellite Electronic (Zhongshan)., Ltd. No.15, Torch Hi-Tech Industrial Development Zone, Zhong Shan City Guangdong Province China												
Manufacture#3	Zhongshan Amity Electronic Ltd. No. 16 Torch Hi-Tech Industrial Development Zone, Zhong Shan City Guangdong Province China												
RF Features	Bluetooth Low Energy (BLE)												
Transmit Type	1T1R												
Power Wire	Non-Shielded, Undetachable, 0.11m*2												
Date of Receipt of Sample	2015. 05. 13												

3.2. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (Mbps)
BLE	2402-2480	40	GFSK	1

Channel List			
BLE			
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

3.3. Antenna Information

Antenna Part Number	Manufacture	Antenna Type	Frequency	Max Gain (dBi)
---	---	PCB Antenna	2.4GHz	4.33

3.4. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
BLE	0.98	N/A	N/A

Note: When duty cycle is less than 98% (0.98) that duty cycle factor $10\log(1/x)$ is needed to add in conducted test items measured in average detector.

AC Conduction	
Test Case	Normal operation

	Item	Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge ^{Note1}	BLE	1Mbps	00/39
	Radiated Spurious Emission ^{Note1}	BLE	1Mbps	00/19/39
	Fundamental Frequency	BLE	1Mbps	00/19/39
	Occupied Bandwidth 99% Power	BLE	1Mbps	00/39

Note 1:

Mobile Device

Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow:

- Lie
- Side
- Stand

3.5. Tested Supporting System List

3.5.1. Support Peripheral Unit

No.	Product	Manufacturer	Model No.	Serial No.	FCC ID
1	Ceiling Fan Remote Controller (Transmitter)	Chungear Industrial Co., Ltd.	TR192A	N/A	KUJCE10302

3.5.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	N/A
2.	AC Power Cord: Unshielded, Detachable, 1.8m

3.6. Setup Configuration

3.6.1. EUT Configuration for Power Line and Radiated Emission



3.7. Operating Condition of EUT

The transmitter (TR192A) is used for enabling EUT RF function under continues transmitting and choosing channel.

3.8. Description of Test Facility

Test Firm Name	:	AUDIX Technology Corporation EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
Test Location & Facility	:	No. 7 Shielded Room No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Semi-Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724

3.9. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	± 3.5dB
Radiation Test (Distance: 3m)	30MHz~300MHz	± 3.64dB
	300MHz~1000MHz	± 4.70dB
	Above 1GHz	± 2.94dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
Occupied Bandwidth 99% Power	± 1kHz

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	101276	2015. 04. 04	1 Year
2.	A.M.N.	R&S	ESH2-Z5	100366	2015. 03. 11	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-881-13	2015. 01. 14	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	101495	2015. 01. 17	1 Year

4.2. Radiated Emission Measurement

4.2.1. Frequency Range 30MHz~1000MHz (Semi-Anechoic Chamber)

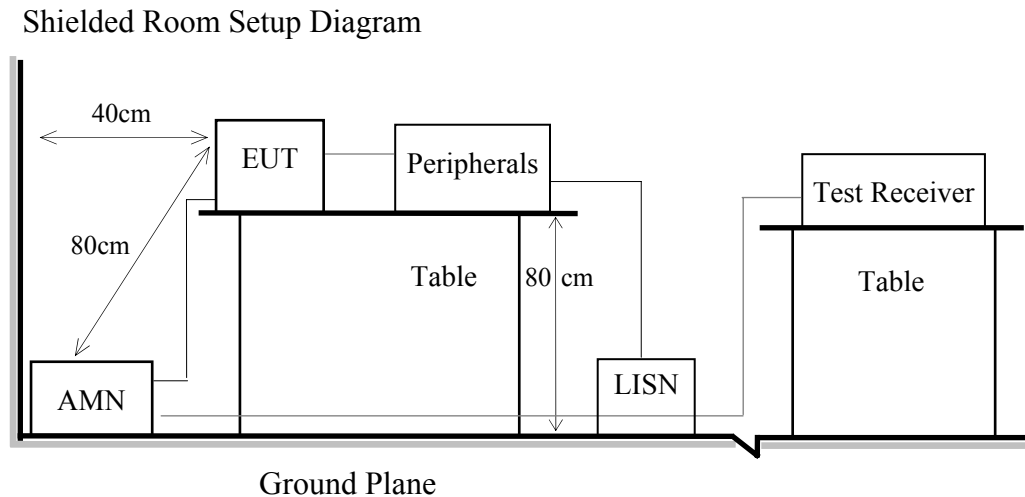
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2014. 09. 15	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2014. 06. 24	1 Year
3.	Amplifier	HP	8447D	2944A06305	2015. 02. 12	1 Year
4.	Bilog Antenna	TESEQ	CBL6112D	33821	2014. 08. 02	1 Year

4.2.2. Above 1000MHz (Fully Anechoic Chamber)

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2014. 09. 15	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2014. 06. 24	1 Year
3.	Amplifier	Agilent	8449B	3008A02676	2015. 02. 11	1 Year
4.	2.4GHz Notch Filter	K&L	7NSL10-244 1.5E130.5-0 0	1	2014. 06. 12	1 Year
5.	3G High Pass Filter	Microwave Circuits	H3G018G1	484796	2014. 06. 12	1 Year
6.	Horn Antenna	EMCO	3115	9609-4927	2014. 06. 17	1 Year
7.	Horn Antenna	EMCO	3116	2653	2014. 10. 10	1 Year

5. CONDUCTED EMISSION MEASUREMENT

5.1. Block Diagram of Test Setup



5.2. Power Line Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

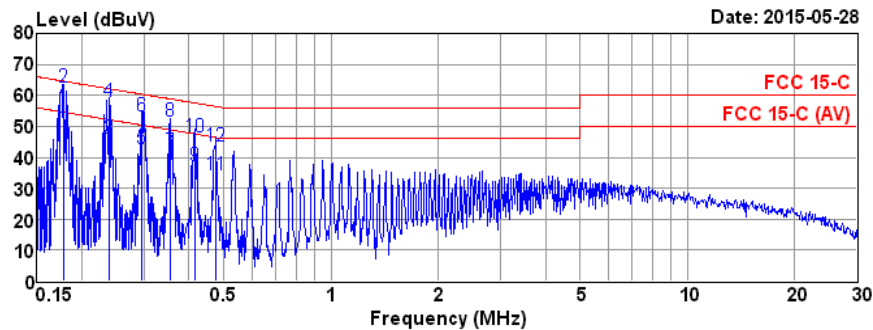
5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.4. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Conducted Emission Measurement Results

PASSED.

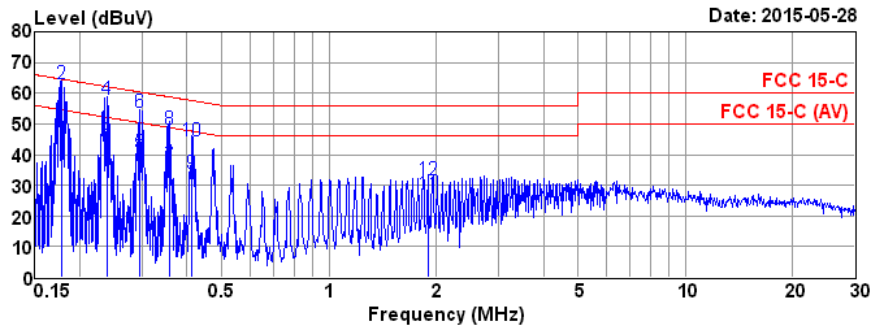
Test Date	2015/05/28	Temp./Hum.	24°C/58%
Test Voltage	AC 120V, 60Hz		



Site no. : No.7 Shielded Room Data no. : 2
 Condition : ESH2-Z5 366 Phase : NEUTRAL
 Limit : FCC 15-C
 Env. / Ins. : 24°C / 58% ESCI (1276) Engineer : Ken
 EUT : MR101F-3B
 Power Rating : 120Vac/60Hz
 Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.179	0.12	0.03	9.85	39.41	49.41	54.55	5.14	Average
2	0.179	0.12	0.03	9.85	52.66	62.66	64.55	1.89	QP
3	0.238	0.12	0.03	9.85	36.32	46.32	52.17	5.85	Average
4	0.238	0.12	0.03	9.85	48.12	58.12	62.17	4.05	QP
5	0.294	0.13	0.03	9.86	32.77	42.79	50.41	7.62	Average
6	0.294	0.13	0.03	9.86	43.34	53.36	60.41	7.05	QP
7	0.356	0.13	0.03	9.85	31.79	41.80	48.83	7.03	Average
8	0.356	0.13	0.03	9.85	41.44	51.45	58.83	7.38	QP
9	0.417	0.13	0.03	9.85	27.21	37.22	47.51	10.29	Average
10	0.417	0.13	0.03	9.85	36.44	46.45	57.51	11.06	QP
11	0.476	0.14	0.03	9.86	24.41	34.44	46.41	11.97	Average
12	0.476	0.14	0.03	9.86	33.42	43.45	56.41	12.96	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.



Site no. : No.7 Shielded Room Data no. : 1
 Condition : ESH2-Z5 366 Phase : LINE
 Limit : FCC 15-C
 Env. / Ins. : 24*C / 58% ESCI (1276) Engineer : Ken
 EUT : MR101F-3B
 Power Rating : 120Vac/60Hz
 Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.179	0.11	0.03	9.85	38.69	48.68	54.55	5.87	Average
2	0.179	0.11	0.03	9.85	53.02	63.01	64.55	1.54	QP
3	0.238	0.11	0.03	9.85	34.36	44.35	52.17	7.82	Average
4	0.238	0.11	0.03	9.85	47.99	57.98	62.17	4.19	QP
5	0.296	0.12	0.03	9.86	30.80	40.81	50.37	9.56	Average
6	0.296	0.12	0.03	9.86	43.74	53.75	60.37	6.62	QP
7	0.358	0.12	0.03	9.85	26.36	36.36	48.78	12.42	Average
8	0.358	0.12	0.03	9.85	38.46	48.46	58.78	10.32	QP
9	0.413	0.12	0.03	9.85	23.80	33.80	47.59	13.79	Average
10	0.413	0.12	0.03	9.85	34.57	44.57	57.59	13.02	QP
11	1.898	0.18	0.06	9.86	17.01	27.11	46.00	18.89	Average
12	1.898	0.18	0.06	9.86	21.87	31.97	56.00	24.03	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.

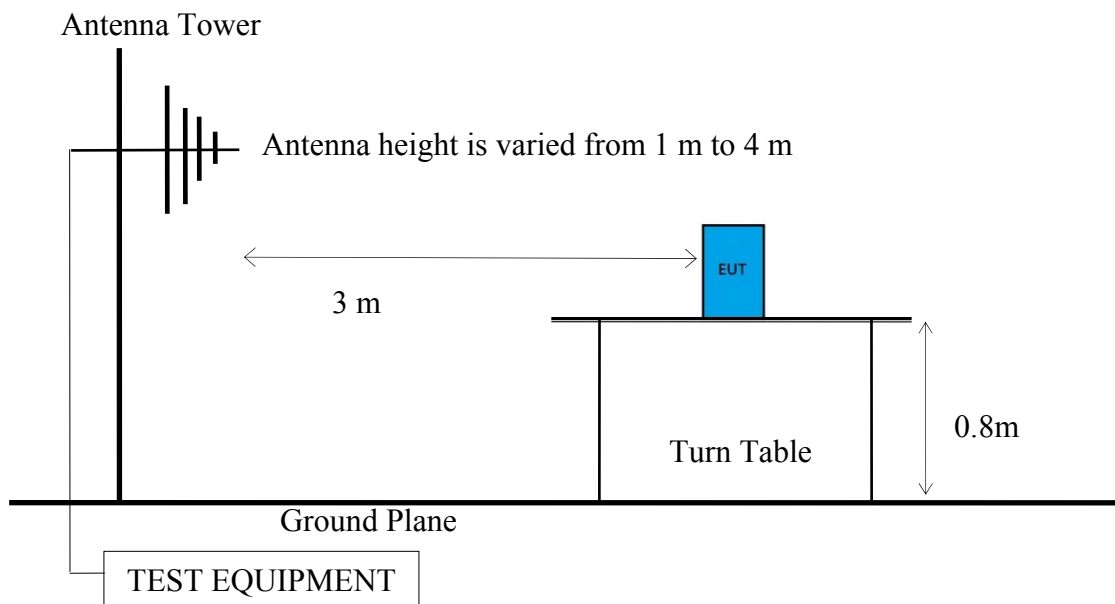
6. RADIATED EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup

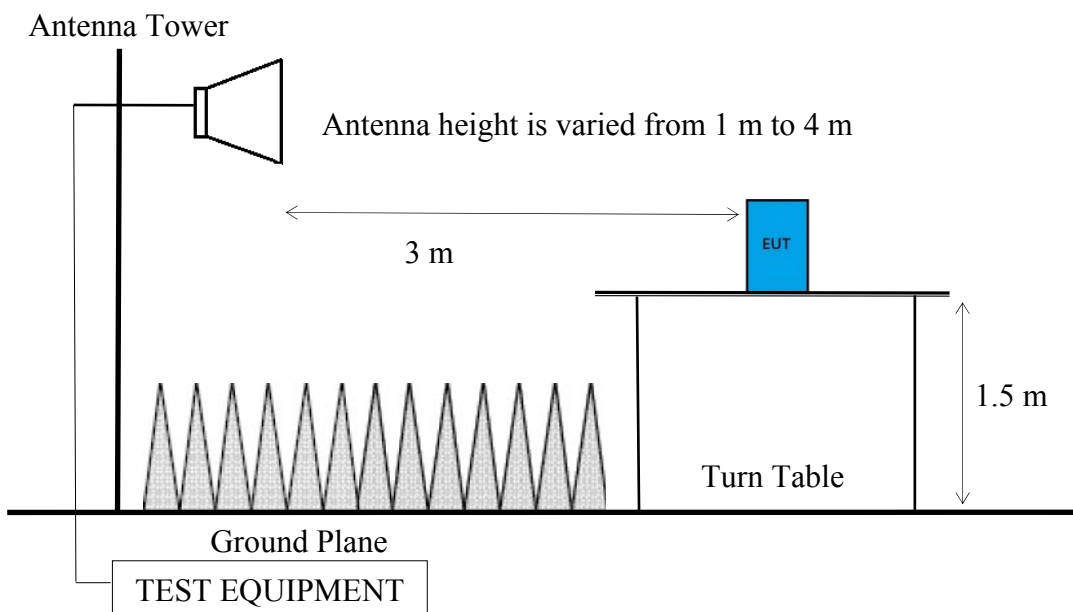
6.1.1. Block Diagram of EUT

Indicated as section 3.6

6.1.2. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000 MHz



6.1.3. Fully Anechoic Chamber (3m) Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

6.2.1. General Limit

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with section 6.2.2. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Frequency (MHz)	Distance (m)	Field Strengths Limits	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

Remark : (1) $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI 63.4: 8.3.1.2, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.2.2. Limite for Fundamental & Harmonics Frequency

Fundamental Frequency	Field strength of fundamental		Field strength of harmonics	
	mV/m	$\text{dB}\mu\text{V/m}$	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
902-928MHz	50	114 (Peak)	500	74 (Peak)
		94 (Average)		54 (Average)
2400-2483.5MHz	50	114 (Peak)	500	74 (Peak)
		94 (Average)		54 (Average)
5725-5875MHz	50	114 (Peak)	500	74 (Peak)
		94 (Average)		54 (Average)
24.0-24.25GHz	250	128 (Peak)	2500	88 (Peak)
		108 (Average)		68 (Average)

Remark: $\text{mV/m} = 1000\mu\text{V/m}$; $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

6.3. Test Procedure

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4-2003 regulation.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

Frequency above 1GHz to 10th harmonic:

Peak Detector:

- (1) RBW = 1MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average for finally measurement.

Average Measurement:

Option 1:

- (1) RBW = 1 MHz
- (2) VBW = 1/T or 10Hz when duty cycle >98%.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

Option 2:

Average Emission Level= Peak Emission Level+ D.C.C.F.

6.4. Measurement Result Explanation

- Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading
- Average Emission Level = Antenna Factor + Cable Loss + Meter Reading
- Average Emission Level = Peak Emission Level + DCCF
Duty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.4

6.5. Test Results

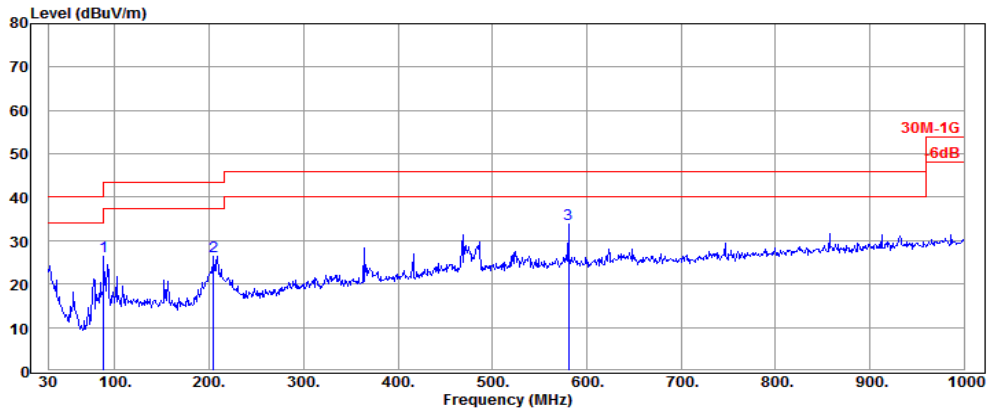
PASSED.

Test Date	2015/05/28	Temp./Hum.	24°C/58%
Test Voltage	AC 120V, 60Hz		

6.5.1. Emissions within Restricted Frequency Bands

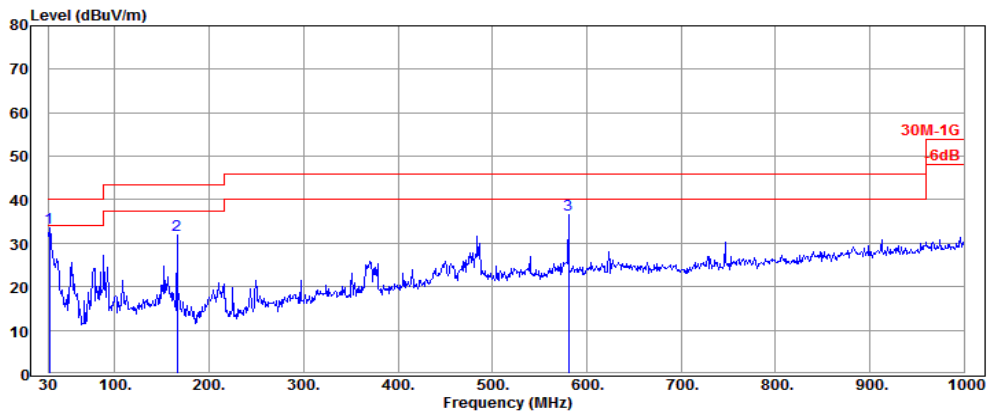
6.5.1.1. Frequency Below 1 GHz

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

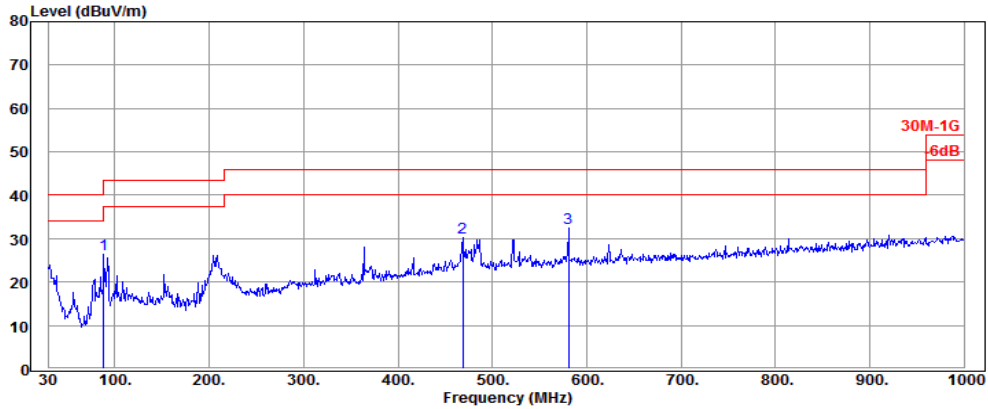
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
88.20	8.81	3.12	14.33	26.26	43.50	17.24	Peak
204.60	9.61	4.02	12.81	26.44	43.50	17.06	Peak
580.96	18.08	6.49	9.27	33.84	46.00	12.16	Peak



Antenna at Vertical Polarization

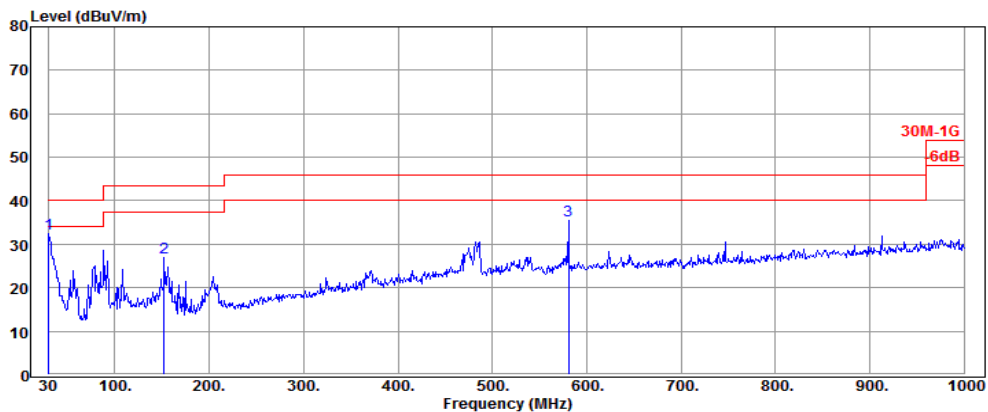
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.97	18.07	2.34	13.09	33.50	40.00	6.50	Peak
165.80	9.65	3.73	18.54	31.92	43.50	11.58	Peak
580.96	18.08	6.49	12.00	36.57	46.00	9.43	Peak

Mode	BLE	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

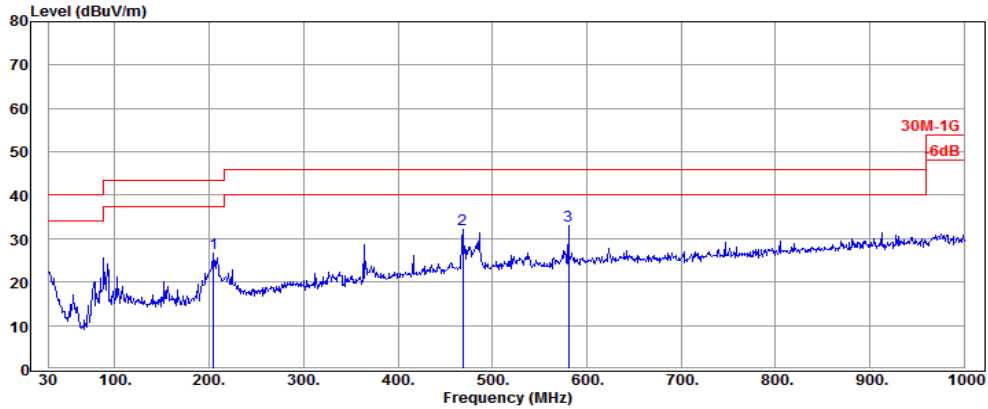
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
88.20	8.81	3.12	14.46	26.39	43.50	17.11	Peak
468.44	16.55	6.22	7.55	30.32	46.00	15.68	Peak
580.96	18.08	6.49	7.88	32.45	46.00	13.55	Peak



Antenna at Vertical Polarization

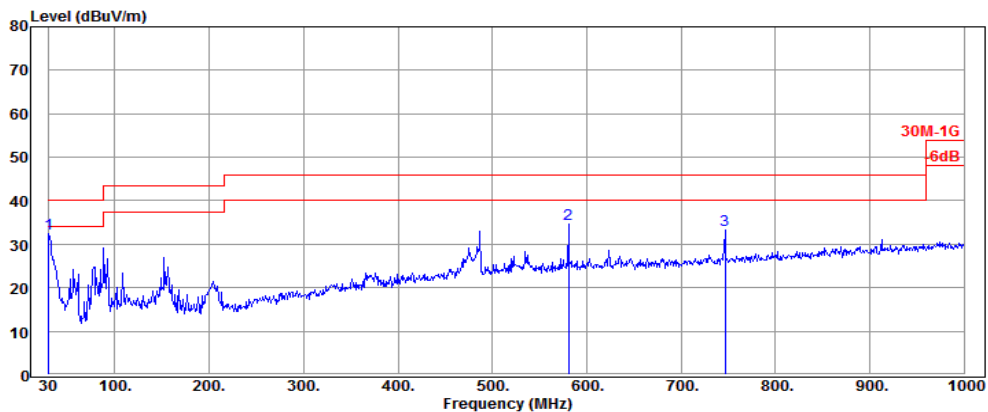
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.00	18.62	2.32	11.44	32.38	40.00	7.62	Peak
152.22	10.40	3.62	13.05	27.07	43.50	16.43	Peak
580.96	18.08	6.49	10.91	35.48	46.00	10.52	Peak

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
204.60	9.61	4.02	12.96	26.59	43.50	16.91	Peak
468.44	16.55	6.22	9.52	32.29	46.00	13.71	Peak
580.96	18.08	6.49	8.46	33.03	46.00	12.97	Peak



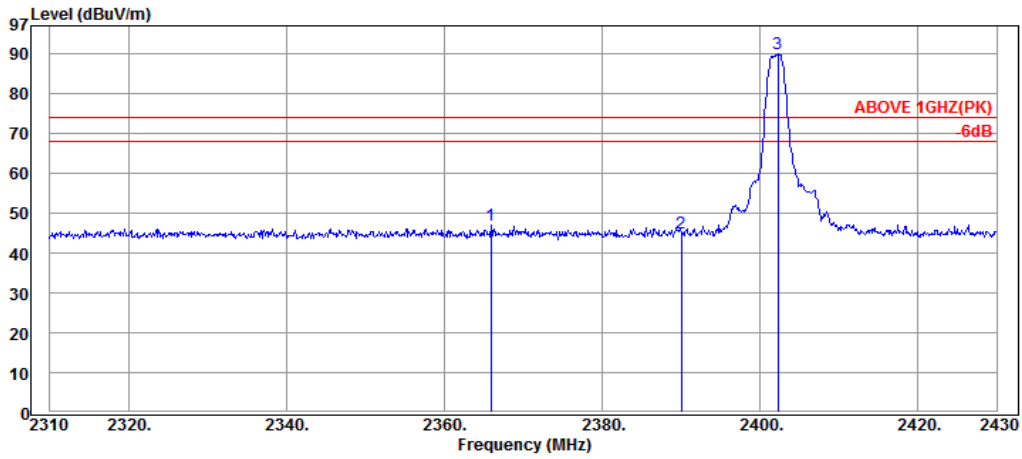
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
30.00	18.62	2.32	11.58	32.52	40.00	7.48	Peak
580.96	18.08	6.49	10.11	34.68	46.00	11.32	Peak
746.83	19.38	6.94	6.99	33.31	46.00	12.69	Peak

6.5.1.2. Frequency Above 1 GHz to 10th harmonics

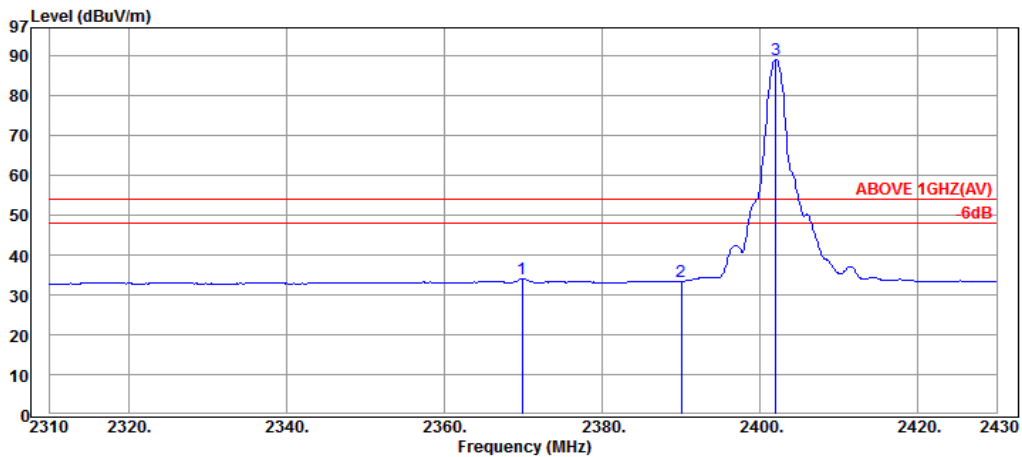
Band Edge:

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

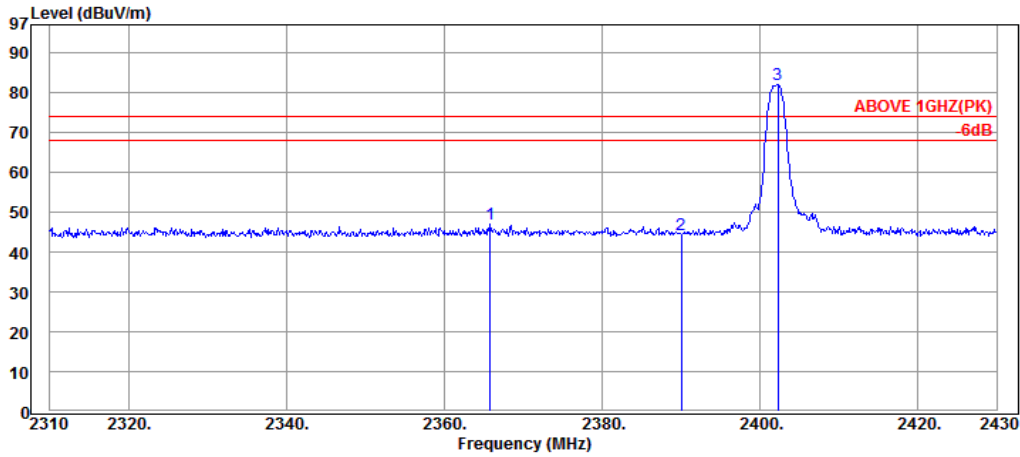
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2365.92	28.38	5.20	13.52	47.10	74.00	26.90	Peak
2390.04	28.40	5.24	11.30	44.94	74.00	29.06	Peak
2402.28	28.41	5.26	56.19	89.86	---	---	Peak



Antenna at Horizontal Polarization

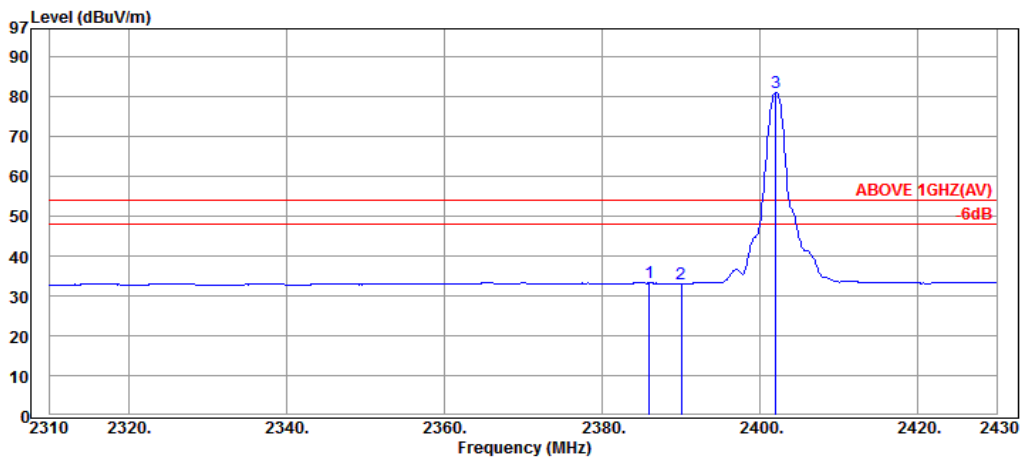
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2369.88	28.38	5.21	0.52	34.11	54.00	19.89	Average
2390.04	28.40	5.24	-0.15	33.49	54.00	20.51	Average
2402.04	28.41	5.26	55.36	89.03	---	---	Average

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Vertical Polarization

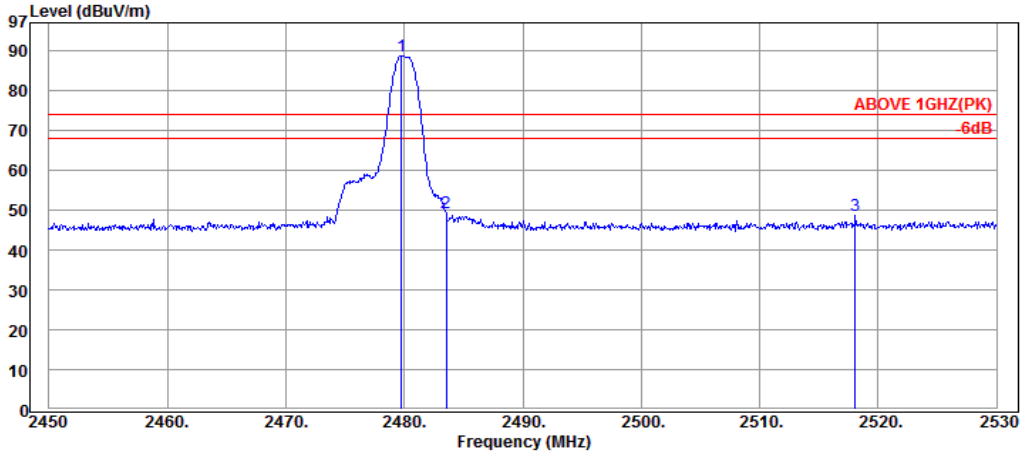
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2365.80	28.38	5.20	13.41	46.99	74.00	27.01	Peak
2390.04	28.40	5.24	10.79	44.43	74.00	29.57	Peak
2402.28	28.41	5.26	48.40	82.07	---	---	Peak



Antenna at Vertical Polarization

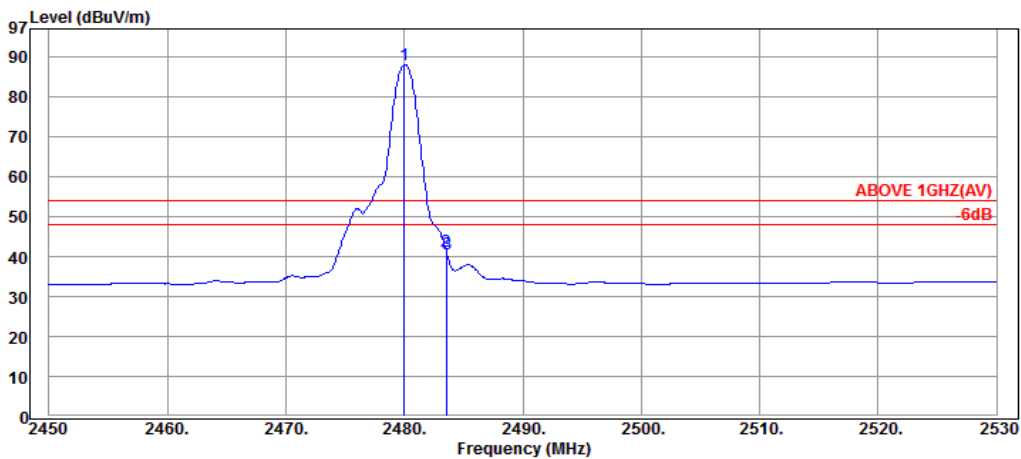
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2385.96	28.40	5.23	-0.39	33.24	54.00	20.76	Average
2390.04	28.40	5.24	-0.52	33.12	54.00	20.88	Average
2402.04	28.41	5.26	47.49	81.16	---	---	Average

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

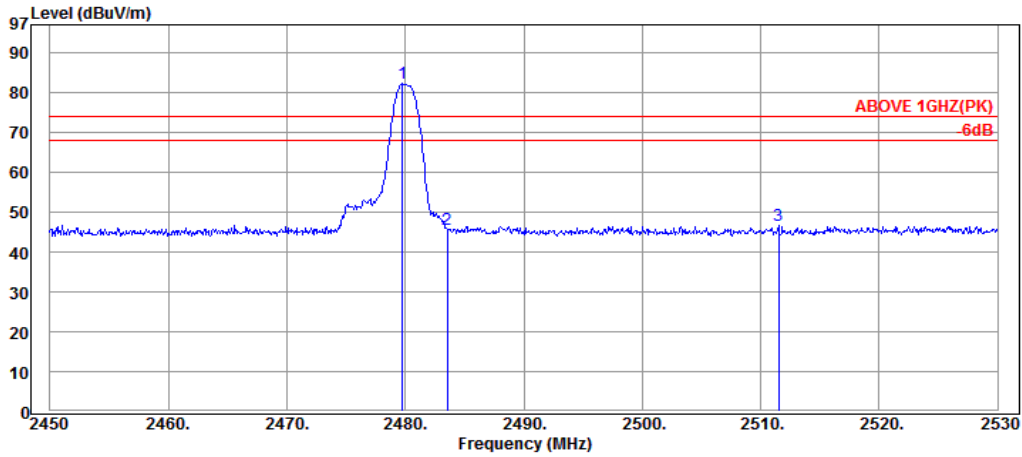
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.76	28.48	5.36	54.93	88.77	---	---	Peak
2483.52	28.49	5.37	15.42	49.28	74.00	24.72	Peak
2518.08	28.58	5.42	14.67	48.67	74.00	25.33	Peak



Antenna at Horizontal Polarization

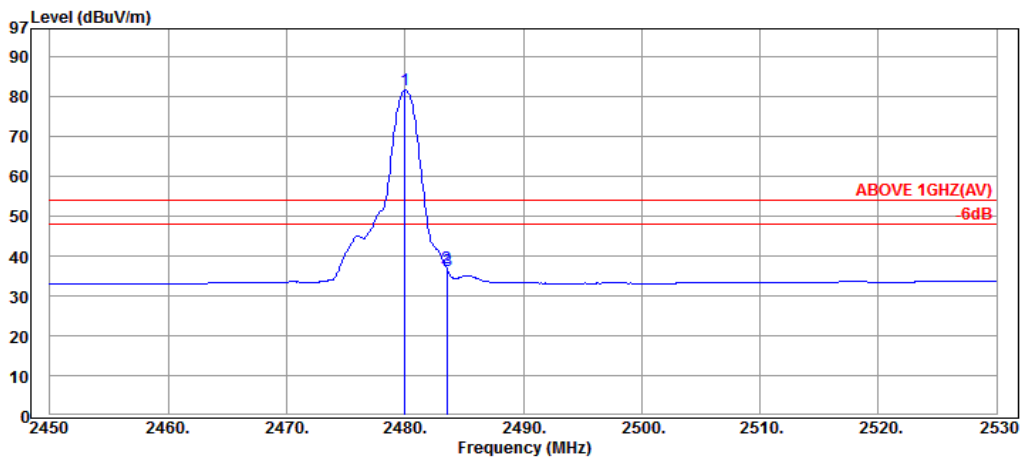
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	28.48	5.36	54.09	87.93	---	---	Average
2483.52	28.49	5.37	7.62	41.48	54.00	12.52	Average
2483.60	28.49	5.37	6.70	40.56	54.00	13.44	Average

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.76	28.48	5.36	48.34	82.18	---	---	Peak
2483.52	28.49	5.37	11.79	45.65	74.00	28.35	Peak
2511.52	28.55	5.41	12.55	46.51	74.00	27.49	Peak



Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2480.00	28.48	5.36	47.68	81.52	---	---	Average
2483.52	28.49	5.37	3.02	36.88	54.00	17.12	Average
2483.60	28.49	5.37	2.49	36.35	54.00	17.65	Average

6.5.2. Emissions outside the frequency band:

The emissions (up to 25GHz) not reported for there is no emission be found.

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4804.00	32.98	8.09	10.24	51.31	54.00	2.69	Average
4804.00	32.98	8.09	11.07	52.14	74.00	21.86	Peak
4861.00	33.10	8.15	8.56	49.81	54.00	4.19	Average
4861.00	33.10	8.15	12.06	53.31	74.00	20.69	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4804.00	32.98	8.09	11.43	52.50	54.00	1.50	Average
4804.00	32.98	8.09	12.59	53.66	74.00	20.34	Peak
4861.00	33.10	8.15	10.47	51.72	54.00	2.28	Average
4861.00	33.10	8.15	13.99	55.24	74.00	18.76	Peak

Mode	BLE	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
4861.00	33.10	8.15	6.59	47.84	54.00	6.16	Average
4861.00	33.10	8.15	10.00	51.25	74.00	22.75	Peak
4880.50	33.13	8.17	8.04	49.34	54.00	4.66	Average
4880.50	33.13	8.17	9.25	50.55	74.00	23.45	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
4859.50	33.10	8.15	9.26	50.51	54.00	3.49	Average
4859.50	33.10	8.15	12.82	54.07	74.00	19.93	Peak
4880.50	33.13	8.17	8.07	49.37	54.00	4.63	Average
4880.50	33.13	8.17	9.14	50.44	74.00	23.56	Peak

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

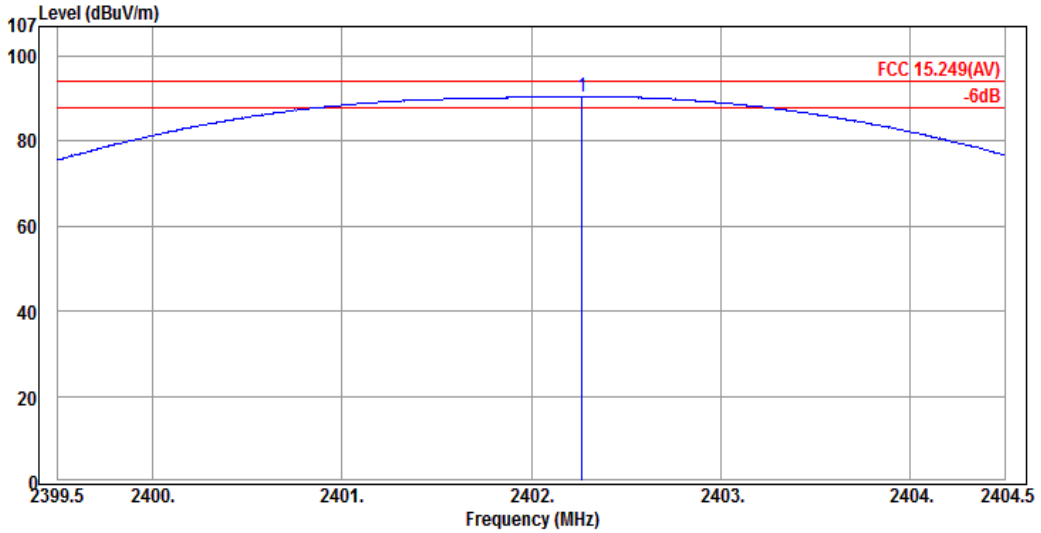
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
4861.00	33.10	8.15	8.71	49.96	54.00	4.04	Average
4861.00	33.10	8.15	12.20	53.45	74.00	20.55	Peak
4960.00	33.31	8.26	8.51	50.08	54.00	3.92	Average
4960.00	33.31	8.26	9.42	50.99	74.00	23.01	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
4859.50	33.10	8.15	9.27	50.52	54.00	3.48	Average
4859.50	33.10	8.15	12.81	54.06	74.00	19.94	Peak
4960.00	33.31	8.26	9.18	50.75	54.00	3.25	Average
4960.00	33.31	8.26	10.25	51.82	74.00	22.18	Peak

6.5.3. Fundamental Frequency:

Mode	BLE	Frequency	TX 2402MHz
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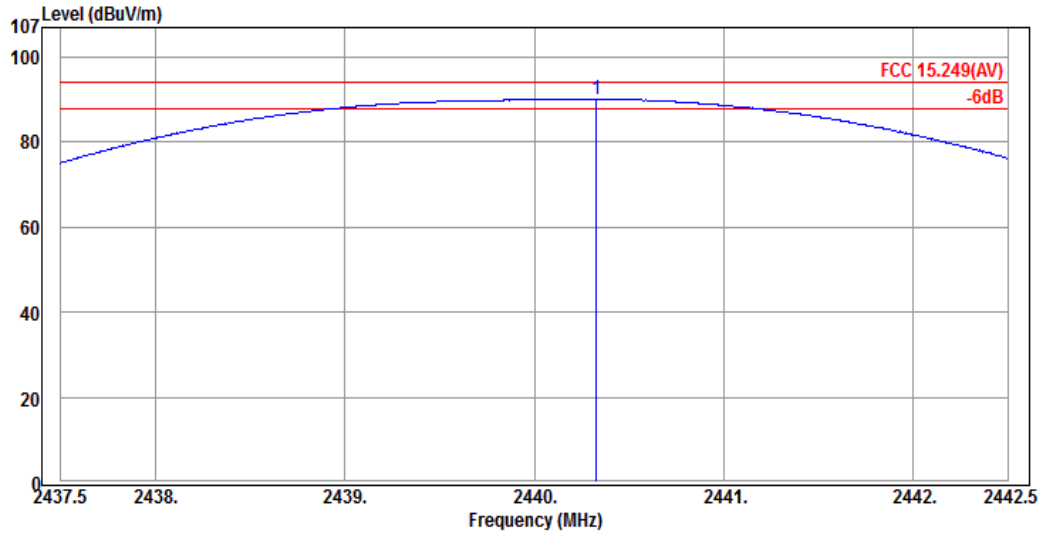


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2402.27	28.41	5.26	56.88	90.55	94.00	3.45	Peak

Remark: Horizontal is the strongest polarization and peak value has complied with limit, so vertical won't be listed in test report.

Mode	BLE	Frequency	TX 2440MHz
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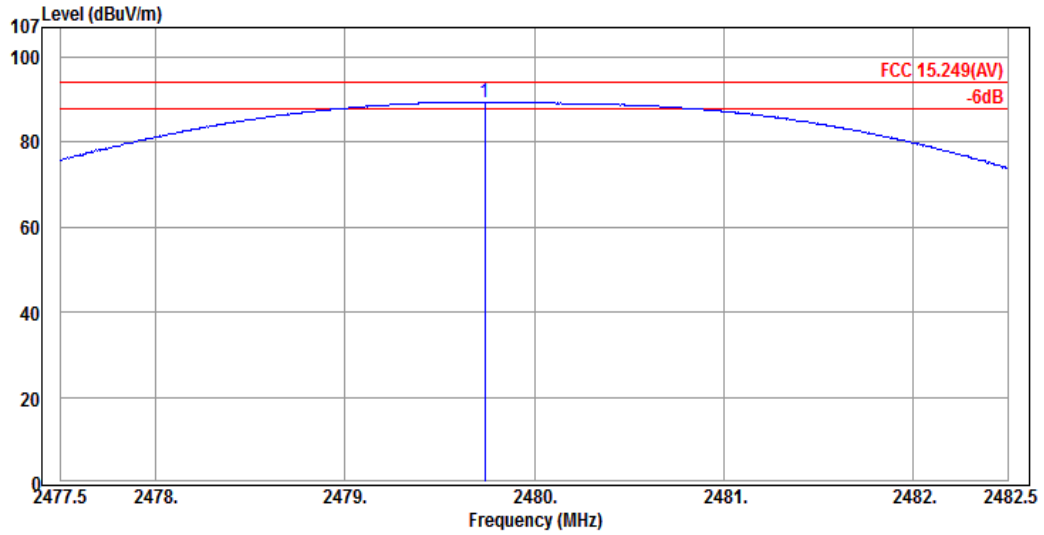


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2440.33	28.45	5.31	56.45	90.21	94.00	3.79	Peak

Remark: Horizontal is the strongest polarization and peak value has complied with limit, so vertical won't be listed in test report.

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2479.74	28.48	5.36	55.67	89.51	94.00	4.49	Peak

Remark: Horizontal is the strongest polarization and peak value has complied with limit, so vertical won't be listed in test report.

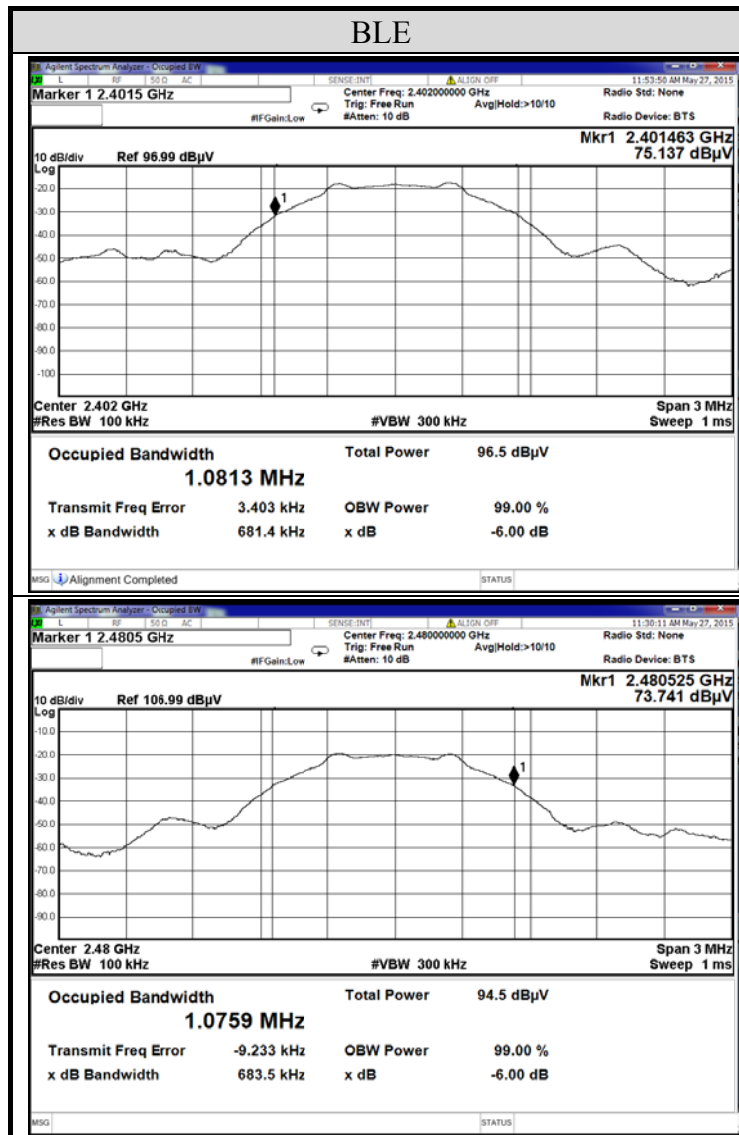
7. OCCUPIED BANDWIDTH 99% POWER MEASUREMENT

Test Date	2015/05/27	Temp./Hum.	25°C/57%
Cable Loss	---	Test Voltage	AC 120V, 60Hz

7.1.1. Occupied Bandwidth 99% Power Result

Modulation Type	Centre Frequency (MHz)	Occupied Bandwidth 99% Power (MHz)
BLE	2402	1.0813
	2480	1.0759

7.1.2. Measurement Plots



8. DEVIATION TO TEST SPECIFICATIONS

【NONE】