

**FCC 15.249
2.4GHz Report**

for

ACCO Brands, Inc.

**1500 Fashion Island Blvd., 3rd Floor, San Mateo,
CA 94404, USA**

**Product Name : Wireless Dongle
Model Name : M01438-D
Brand : Kensington
FCC ID : GV3M01438-D**

**Prepared by: : AUDIX Technology Corporation,
EMC Department**



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

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TEST REPORT CERTIFICATION

Applicant : ACCO Brands, Inc.
Manufacturer : ACCO Brands, Inc.
EUT Description
(1) Product : Wireless Dongle
(2) Model : M01438-D
(3) Brand : Kensington
(4) Power Rating : DC 5V

Applicable Standards:

47CFRFCC Part 15 Subpart C
ANSI C63.10:2013

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 Report: 2019. 04. 12

Reviewed by:

Annie Yu (Annie Yu/Administrator)

Approved by:

Ben Cheng (Ben Cheng/Manager)

1. REVISION RECORD OF TEST REPORT

Edition No	Issued Data	Revision Summary	Report Number
0	2019. 04. 12	Original Report	EM-F190130

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
15.215	Emission Bandwidth	PASS
15.203	Antenna Requirement	PASS

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	ACCO Brands, Inc. 1500 Fashion Island Blvd., 3rd Floor, San Mateo, CA 94404, USA
Manufacturer	ACCO Brands, Inc. 1500 Fashion Island Blvd., 3rd Floor, San Mateo, CA 94404, USA
Product	Wireless Dongle
Model	M01438-D
Brand	Kensington

3.2. Description of EUT

Test Model	M01438-D
Serial Number	N/A
Power Rating	DC 5V
RF Features	2.4GHz
Transmit Type	1T1R
Sample Status	Production
Date of Receipt	2019. 03. 29
Date of Test	2019. 04. 08 ~ 11
Interface Ports of EUT	● USB x 1
Accessories Supplied	None

3.3. Antenna Information

No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	---	---	PCB Antenna	2408-2474	3.2631

3.4. EUT Specifications Assessed in Current Report

Mode	Fundamental Range (MHz)	Channel Number	Modulation	Data Rate
2.4GHz	2408-2474	34	FSK	1Mbps

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

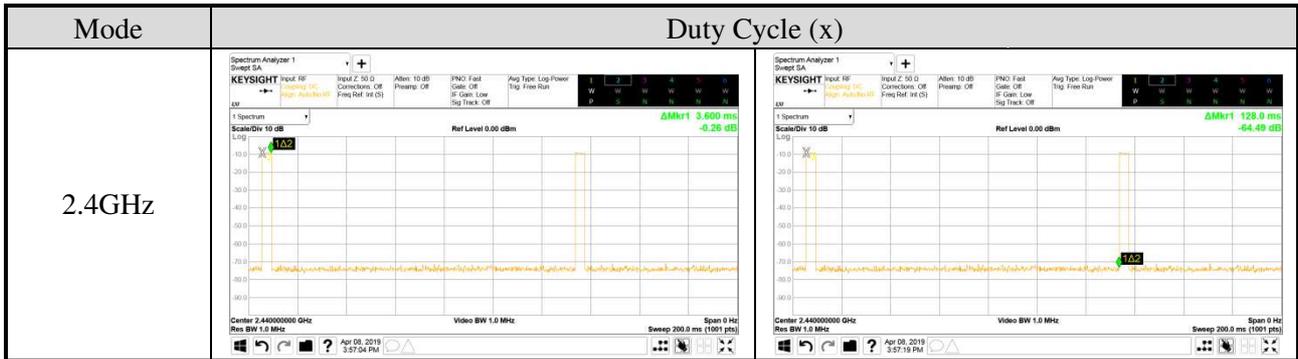
3.5. Description of Key Components

None

3.6. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
2.4GHz	0.028	3.6	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	Test Channel
Radiated Test Case	Radiated Band Edge ^{Note1}	2.4GHz	1/34
	Radiated Spurious Emission (30MHz-1GHz) ^{Note1}	2.4GHz	34
	Radiated Spurious Emission (Above 1GHz) ^{Note1}	2.4GHz	1/17/34
	Fundamental Frequency	2.4GHz	1/17/34
	Occupied Bandwidth 99% Power	2.4GHz	1/17/34

Note 1: Mobile Device

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

3.7. Tested Supporting System List

3.7.1. Support Peripheral Unit

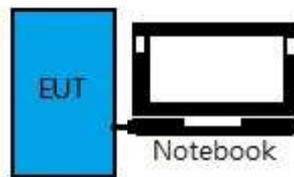
No.	Product	Brand	Model No.	Serial No.	Approval
1.	Notebook PC	acer	N16Q2	N/A	Contains FCC ID: PPD-QCNFA435 Contains IC: 4104A-QCNFA435
2.	Notebook PC	HP	P7Q52PA	N/A	Contains FCC ID: PD98260NG

3.7.2. Cable Lists

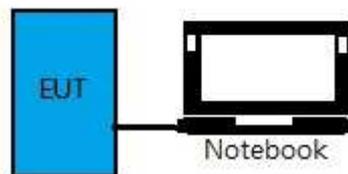
No.	Cable Description Of The Above Support Units
1.	Adapter: Chicony, M/N A11-065N1A DC Cord : Shielded, Undetachable, 1.8m, Bonded a ferrite core AC Power Cord : Unshielded, Detachable, 1.0
2.	USB Cable : Unshielded, Detachable, 1.0m Adapter: HP, M/N HSTNN-CA40 DC Cord : Shielded, Undetachable, 1.8m, Bonded a ferrite core AC Power Cord : Unshielded, Detachable, 1.8

3.8. Setup Configuration

3.8.1. EUT Configuration for Power Line & Radiated Emission



3.8.2. EUT Configuration for RF Conducted Test Items



3.9. Operating Condition of EUT

Test program “RF Test & EMI Mode V1.0.0.3” is used for enabling EUT RF function under continues transmitting and choosing channel.

3.10. Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 (1) No. 8 Shielding Room (2) Semi-Anechoic Chamber (IC Test Site Registration No.:5183B-1)

3.11. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.50dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	±5.82dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
Occupied Bandwidth 99% Power	±1kHz

4. MEASUREMENT EQUIPMENTLIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESR	101774	2019. 01. 23	1 Year
2.	A.M.N.	R&S	ENV4200	100169	2018. 11. 14	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2018. 12. 19	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2019. 01. 12	1 Year
5.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.8 S/R	2018. 04. 20	1 Year
6.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2018. 09. 12	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2018. 06. 20	1 Year
3.	Amplifier	HP	8447D	2944A06305	2019. 01. 30	1 Year
4.	Amplifier	HP	8449B	3008A00529	2019. 01. 23	1 Year
5.	Bilog Antenna	CHASE	CBL6112D	33821	2019. 01. 19	1 Year
6.	Loop Antenna	R&S	HFH2-Z2	891847/27	2017. 12. 18	2 Years
7.	Double-Ridged Waveguide Horn	EMCO	3115	9609-4927	2018. 06. 22	1 Year
8.	Horn Antenna	COM-POWER	AH-840	101092	2018. 05. 07	1 Year
9.	2.4GHz Notch Filter	K&L	7NSL10-2441.5E130.5-00	1	2018. 07. 24	1 Year
10.	3GHz Notch Filter	Microwave Circuits	H3G018G1	484796	2018. 08. 22	1 Year
11.	Digital Thermo-Hygro Meter	IMax	HTC-1	No.1 3m A/C	2018. 04. 20	1 Year
12.	Test Software	Audix	e3	V6.120619c	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2018. 04. 26	1 Year
2.	Digital Thermo-Hygro Meter	Shenzhen Datronn Electronics	KT-905	RF	2018. 04. 19	1 Year

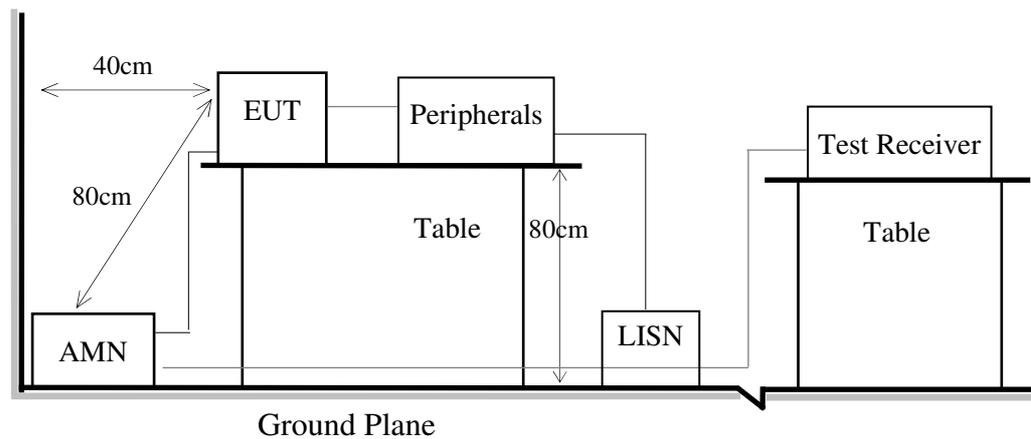
5. CONDUCTED EMISSION MEASUREMENT

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.8

5.1.2. Shielded Room Setup Diagram



5.2. 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

Remark1.: 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 63.10. 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. To Check frequency range from 150kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Test Results

Please refer to Appendix A.

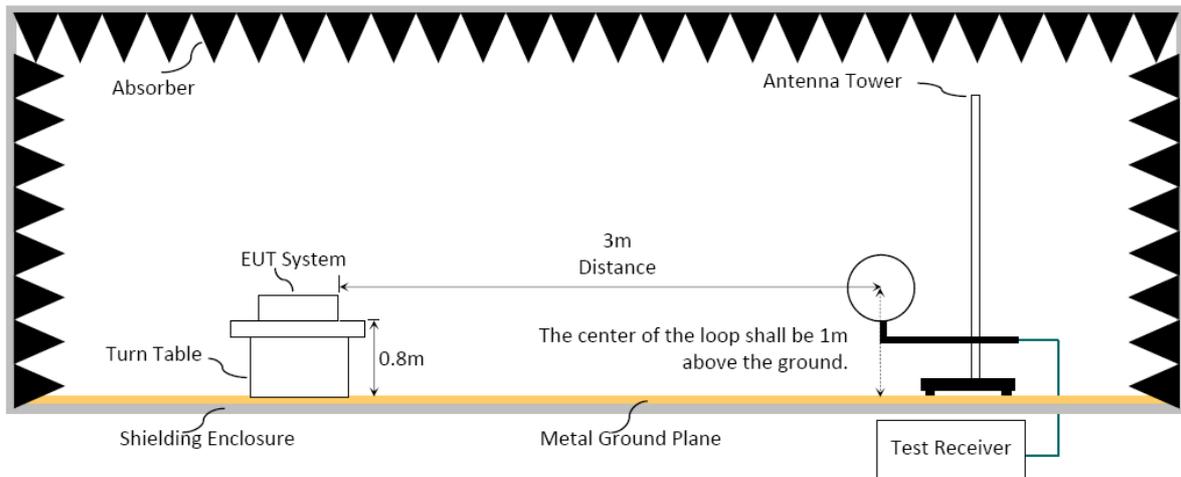
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

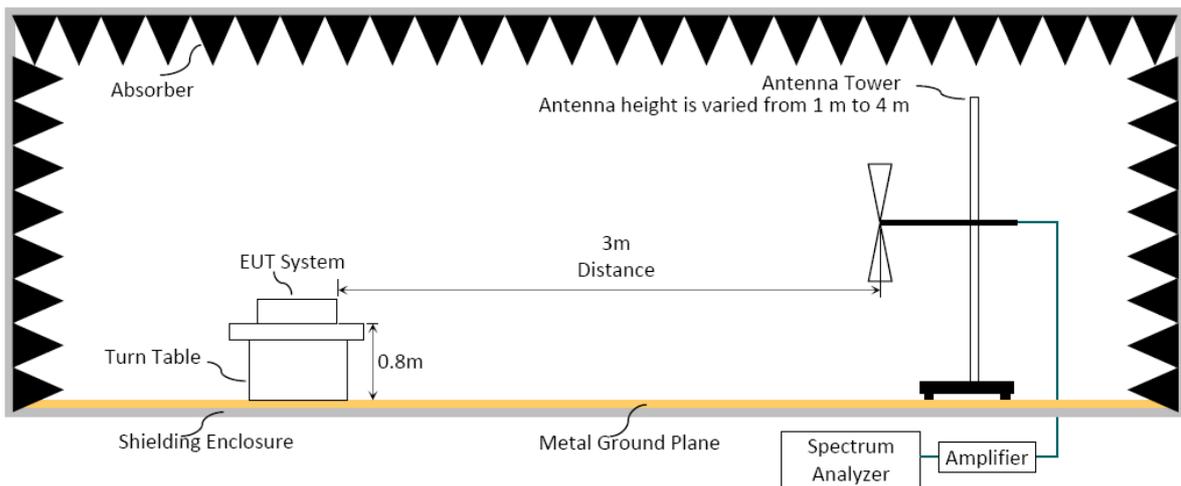
6.1.1. Block Diagram of EUT

Indicated as section 3.8

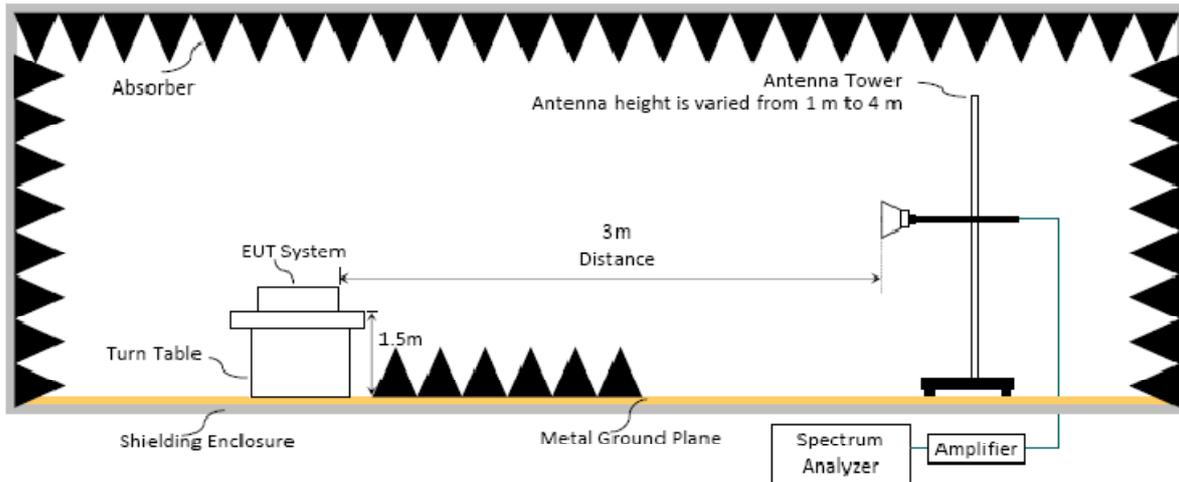
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

6.2.1. General Limit

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in FCC Section 15.205, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance(m)	Limits	
		dBμV/m	μV/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dBμV/m (Peak) 54.0 dBμV/m (Average)	

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

- (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 C63.10: 6.6.4.3, 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	dB μ V/m	μ V/m	dB μ V/m
902-928MHz	50	94(Quasi-Peak)	500	74 (Peak)
				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: mV/m=1000 μ V/m; dB μ V/m = 20 log (μ V/m)

6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turntable which has 80cm height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
 Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 25GHz:

The EUT setup on the turntable which has 80 cm (for 30-1000MHz) and 1.5m (for above 1GHz) 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 C63.10-2013regulation.

Frequency below 1GHz:

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

- (1)RBW = 120KHz
- (2)VBW \geq 3 x 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 final measurement.

Frequency above 1GHz to 10th harmonic (up to 25 GHz):**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 detector for final measurement.

Average Detector:**■ Option 1:**

- (1) RBW = 1MHz
- (2) VBW $\geq 1/ T$.

Modulation Type	T (ms)	1/ T (kHz)	VBW Setting (kHz)
2.4GHz	---	---	0.27

N/A: 1/ T is not implemented when duty cycle presented in section 3.7 is $\geq 98\%$.

- (1) Detector = Peak.
- (2) Sweep time = auto.
- (3) Trace mode = max hold.
- (4) 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 3.7

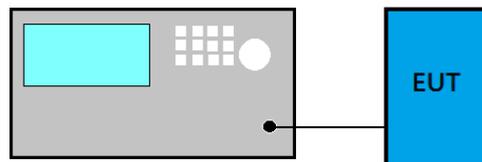
□ ERP = Peak Emission Level - 95.2dB - 2.14dB

6.5. Test Results

Please refer to Appendix A.

7. EMISSION BANDWIDTH MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. Test Procedure

- (1) Set RBW close to 1-5 % of 20dB BW.
- (2) Set $VBW \geq RBW$.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -20dB to record the final bandwidth.

7.3. Test Results

Please refer to Appendix A

8. DEVIATION TO TEST SPECIFICATIONS

【NONE】



Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

APPENDIX A

Tel: +886 2 26099301
Fax: +886 2 26099303

APPDNDIX A

TEST DATA AND PLOTS

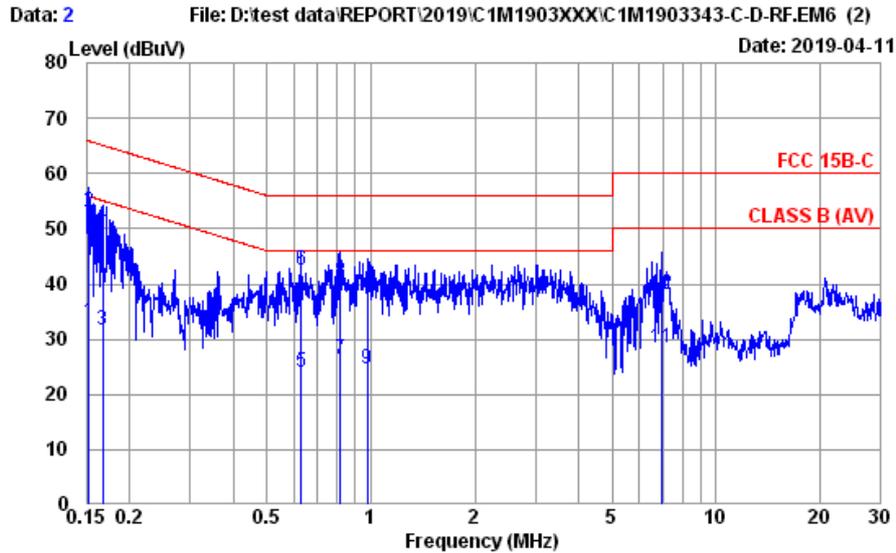
(Model: M01438-D)

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A.3.1 Emission Bandwidth.....	13
A.3.2 Measurement Plots	13

A.1 CONDUCTED EMISSION

Test Date	2019/04/11	Temp./Hum.	22°C/57%
Test Voltage	DC 5V (USB Via Notebook PC)		

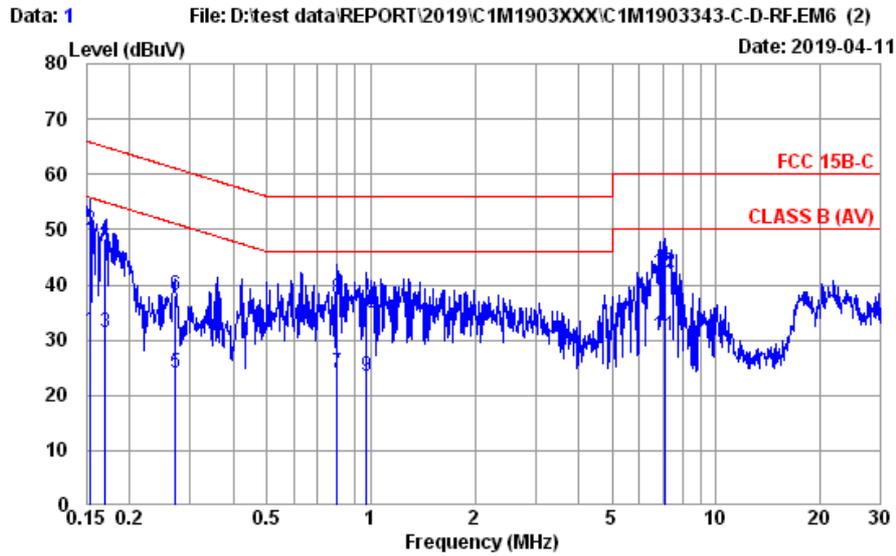


Site no. : No.8 Shielded Room Data no. : 2
 Condition : ENV4200 100169 LISN Phase : NEUTRAL
 Limit : FCC 15B-C
 Env. / Ins. : 22°C / 57% ESR3 (1774) Engineer : Xar Zhuo
 EUT : M01438-D
 Power Rating : DC 5V (Via USB)
 Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.152	10.70	0.03	9.86	12.38	32.97	55.87	22.90	Average
2	0.152	10.70	0.03	9.86	32.58	53.17	65.87	12.70	QP
3	0.168	10.67	0.03	9.86	11.04	31.60	55.08	23.48	Average
4	0.168	10.67	0.03	9.86	30.14	50.70	65.08	14.38	QP
5	0.627	10.48	0.05	9.86	3.78	24.17	46.00	21.83	Average
6	0.627	10.48	0.05	9.86	22.11	42.50	56.00	13.50	QP
7	0.817	10.47	0.06	9.86	5.93	26.32	46.00	19.68	Average
8	0.817	10.47	0.06	9.86	19.98	40.37	56.00	15.63	QP
9	0.979	10.47	0.06	9.86	4.17	24.56	46.00	21.44	Average
10	0.979	10.47	0.06	9.86	17.28	37.67	56.00	18.33	QP
11	6.951	11.07	0.16	9.88	7.17	28.28	50.00	21.72	Average
12	6.951	11.07	0.16	9.88	17.13	38.24	60.00	21.76	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
 2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.

Test Date	2019/04/11	Temp./Hum.	22°C/57%
Test Voltage	DC 5V (USB Via Notebook PC)		



Site no. : No.8 Shielded Room Data no. : 1
 Condition : ENV4200 100169 LISN Phase : LINE
 Limit : FCC 15B-C
 Env. / Ins. : 22°C / 57% ESR3 (1774) Engineer : Xar Zhuo
 EUT : M01438-D
 Power Rating : DC 5V (Via USB)
 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	0.154	10.61	0.03	9.86	11.21	31.71	55.78	24.07	Average
2	0.154	10.61	0.03	9.86	29.28	49.78	65.78	16.00	QP
3	0.170	10.58	0.03	9.86	11.01	31.48	54.94	23.46	Average
4	0.170	10.58	0.03	9.86	28.02	48.49	64.94	16.45	QP
5	0.272	10.50	0.03	9.86	3.53	23.92	51.07	27.15	Average
6	0.272	10.50	0.03	9.86	17.70	38.09	61.07	22.98	QP
7	0.800	10.43	0.06	9.86	3.78	24.13	46.00	21.87	Average
8	0.800	10.43	0.06	9.86	17.24	37.59	56.00	18.41	QP
9	0.974	10.42	0.06	9.86	3.08	23.42	46.00	22.58	Average
10	0.974	10.42	0.06	9.86	14.55	34.89	56.00	21.11	QP
11	7.100	10.93	0.16	9.88	9.92	30.89	50.00	19.11	Average
12	7.100	10.93	0.16	9.88	21.23	42.20	60.00	17.80	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
 2. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

A.2 RADIATED EMISSION

Test Date	2019/04/11	Temp./Hum.	23°C/49%
Test Voltage	DC 5V (USB Via Notebook PC)		

A.2.1 Emissions Applied to General Requirement

A.2.1.1 Frequency 9kHz~30MHz

The emissions (9kHz~30MHz) not reported for there is no emission be found.

A.2.1.2 Frequency Below 1GHz

Mode	2.4GHz	Frequency	TX 2474MHz
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Antenna at Horizontal Polarization

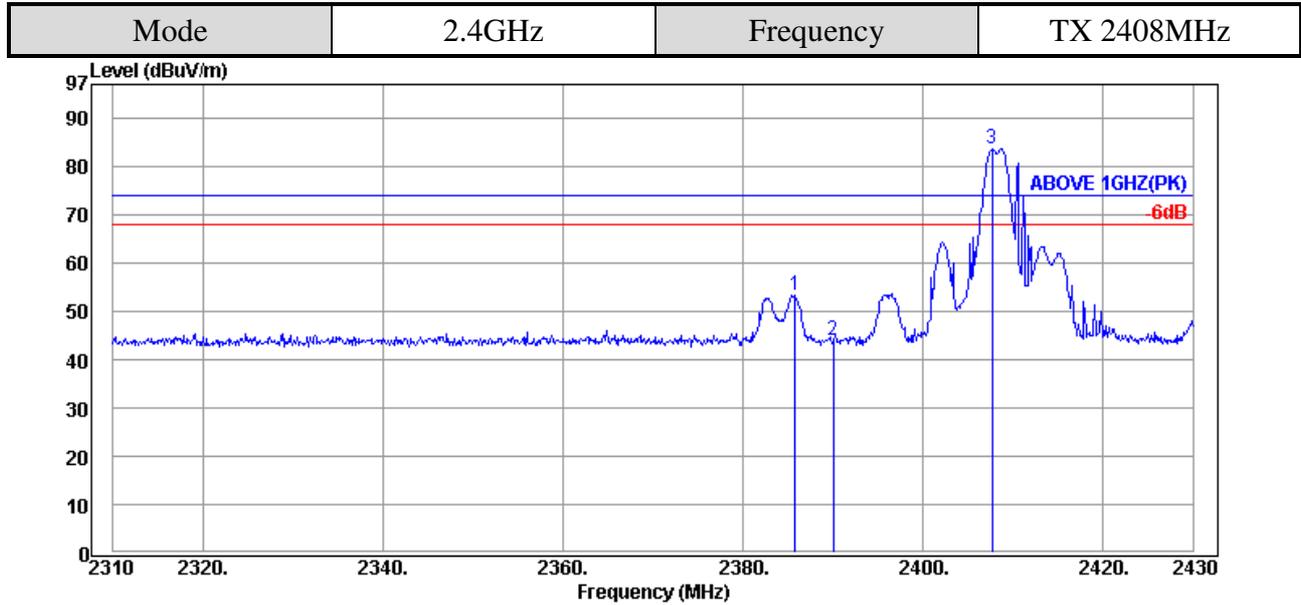
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
118.27	18.55	2.51	3.17	24.23	43.50	19.27	Peak
150.28	16.98	2.90	4.06	23.94	43.50	19.56	Peak
199.75	16.27	3.42	3.85	23.54	43.50	19.96	Peak
227.88	17.74	3.72	2.54	24.00	46.00	22.00	Peak
333.61	20.69	4.96	4.10	29.75	46.00	16.25	Peak
399.57	22.37	5.86	1.55	29.78	46.00	16.22	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
116.33	18.43	2.49	4.08	25.00	43.50	18.50	Peak
144.46	17.32	2.83	3.66	23.81	43.50	19.69	Peak
199.75	16.27	3.42	9.13	28.82	43.50	14.68	Peak
215.27	17.11	3.59	4.05	24.75	43.50	18.75	Peak
325.85	20.46	4.84	2.30	27.60	46.00	18.40	Peak
421.88	22.71	6.08	2.14	30.93	46.00	15.07	Peak

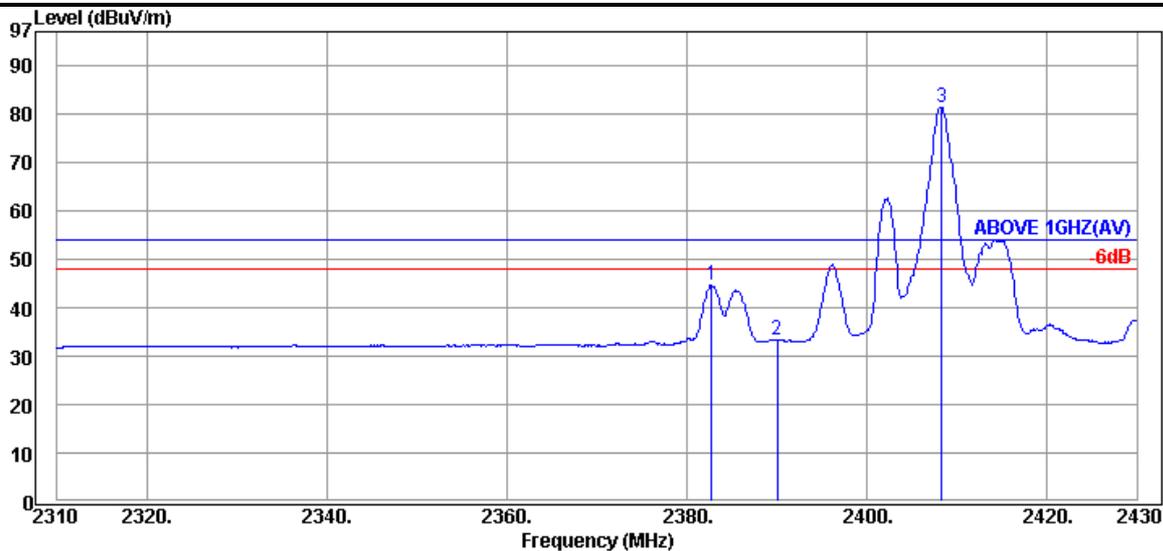
A.2.1.3 Frequency Above 1 GHz to 10th harmonics

Band Edge:



Antenna at Horizontal Polarization

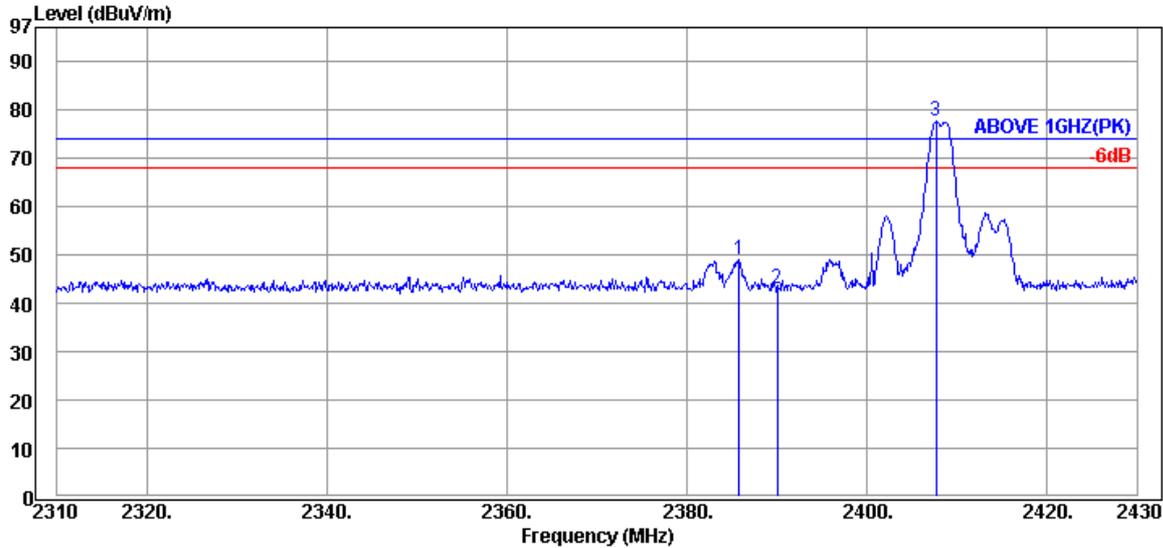
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2385.84	28.28	6.02	18.98	53.28	74.00	20.72	Peak
2390.04	28.28	6.03	9.65	43.96	74.00	30.04	Peak
2407.68	28.30	6.05	49.27	83.62	---	---	Peak



Antenna at Horizontal Polarization

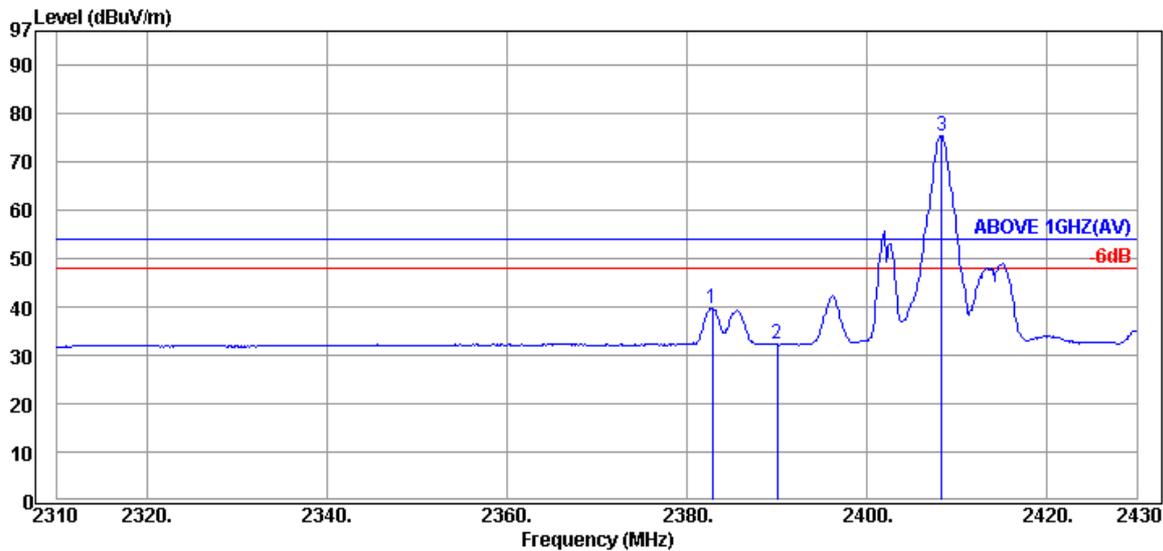
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2382.72	28.27	6.02	10.23	44.52	54.00	9.48	Average
2390.04	28.28	6.03	-1.07	33.24	54.00	20.76	Average
2408.28	28.30	6.05	47.12	81.47	---	---	Average

Mode	2.4GHz	Frequency	TX 2408MHz
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Antenna at Vertical Polarization

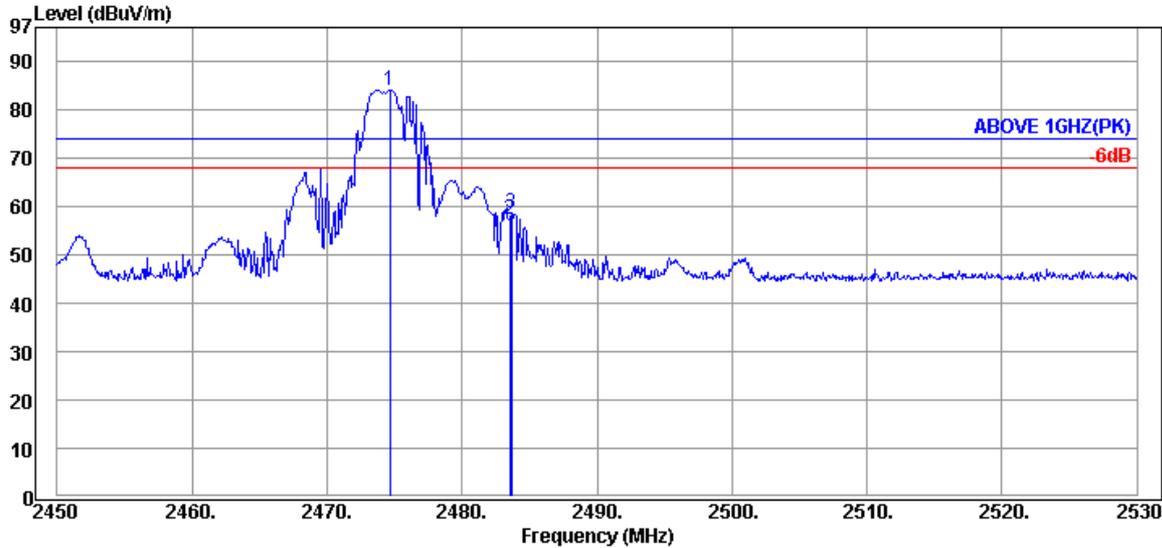
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2385.84	28.28	6.02	14.84	49.14	74.00	24.86	Peak
2390.04	28.28	6.03	8.83	43.14	74.00	30.86	Peak
2407.68	28.30	6.05	43.17	77.52	---	---	Peak



Antenna at Vertical Polarization

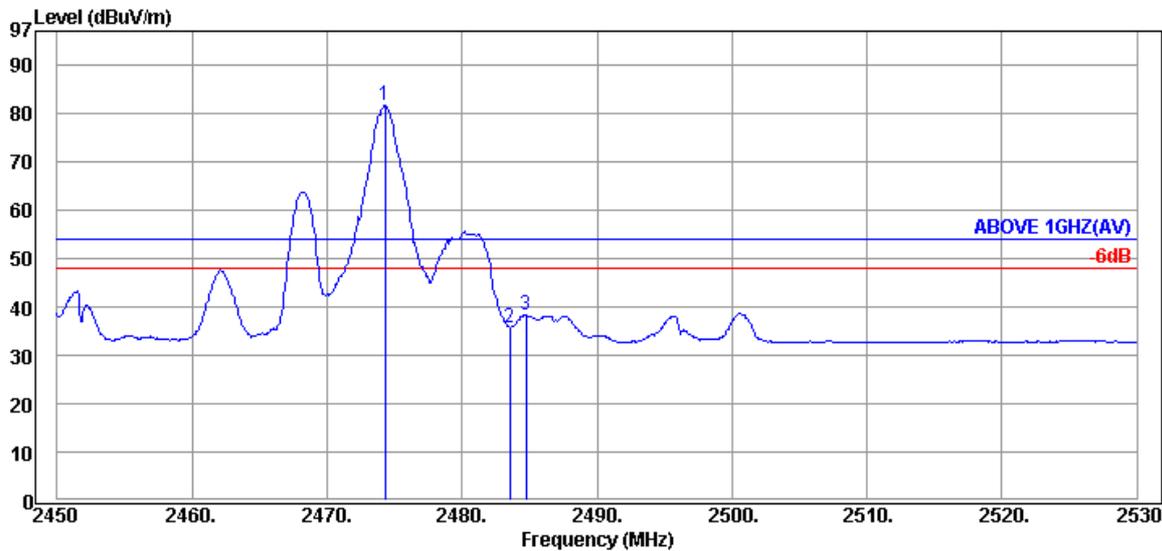
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2382.84	28.27	6.02	5.50	39.79	54.00	14.21	Average
2390.04	28.28	6.03	-2.02	32.29	54.00	21.71	Average
2408.28	28.30	6.05	41.07	75.42	---	---	Average

Mode	2.4GHz	Frequency	TX 2474MHz
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Antenna at Horizontal Polarization

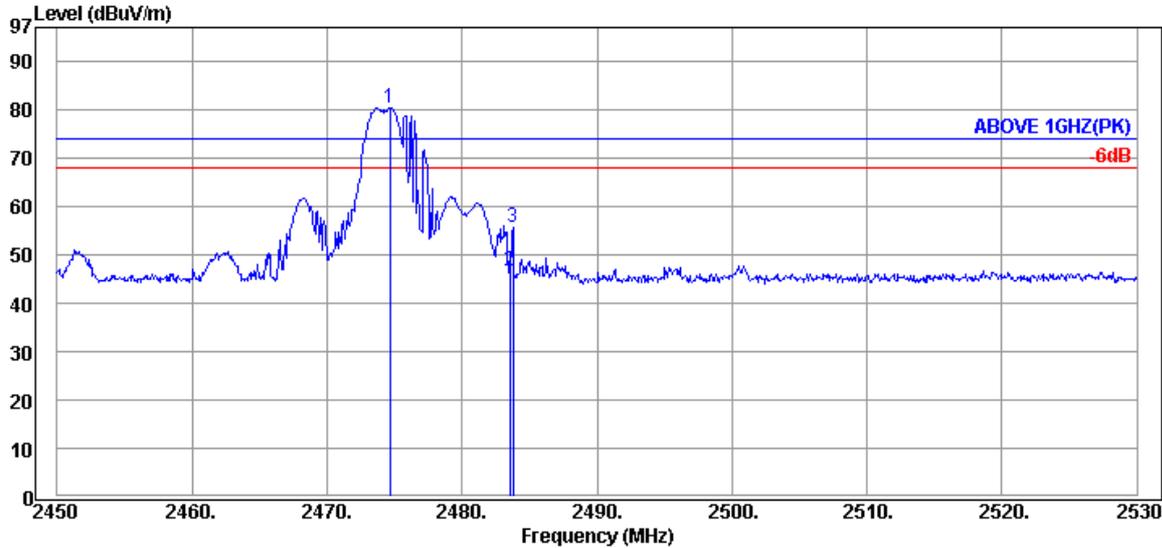
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2474.64	28.37	6.12	49.53	84.02	---	---	Peak
2483.52	28.38	6.13	22.71	57.22	74.00	16.78	Peak
2483.68	28.38	6.13	24.18	58.69	74.00	15.31	Peak



Antenna at Horizontal Polarization

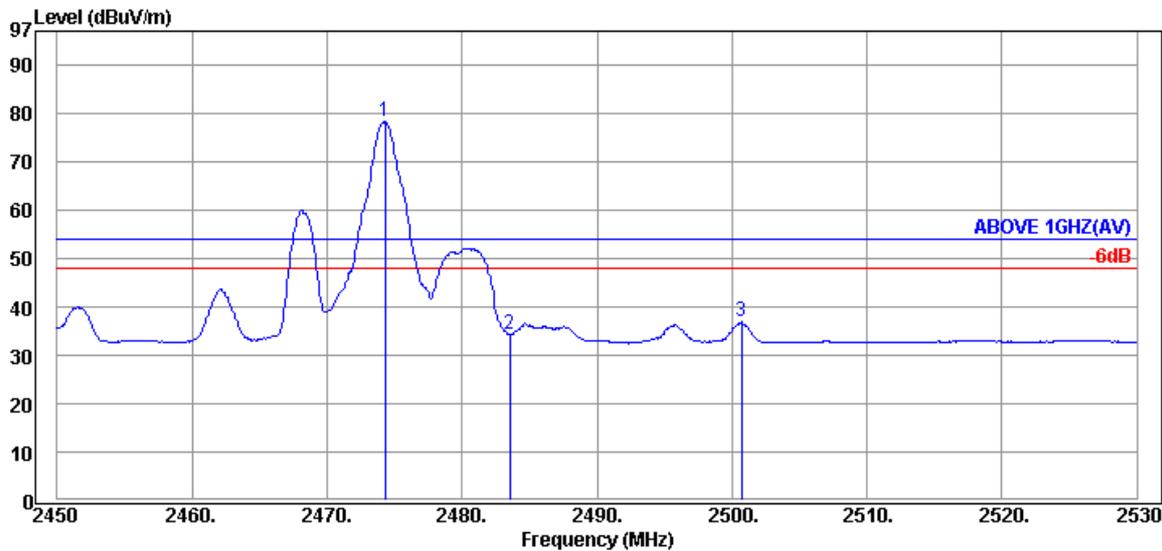
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2474.32	28.37	6.12	47.12	81.61	---	---	Average
2483.52	28.38	6.13	1.26	35.77	54.00	18.23	Average
2484.72	28.38	6.13	3.83	38.34	54.00	15.66	Average

Mode	2.4GHz	Frequency	TX 2474MHz
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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
2474.64	28.37	6.12	45.97	80.46	---	---	Peak
2483.52	28.38	6.13	12.06	46.57	74.00	27.43	Peak
2483.76	28.38	6.13	21.02	55.53	74.00	18.47	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
2474.32	28.37	6.12	43.72	78.21	---	---	Average
2483.52	28.38	6.13	-0.13	34.38	54.00	19.62	Average
2500.72	28.40	6.15	2.29	36.84	54.00	17.16	Average

A.2.1.3 Frequency Above 1GHz

Mode	2.4GHz	Frequency	TX 2408MHz
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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
4818.00	32.85	8.45	4.44	45.74	54.00	8.26	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
4818.00	32.85	8.45	5.84	47.14	54.00	6.86	Peak

Mode	2.4GHz	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
4880.00	32.96	8.52	4.62	46.10	54.00	7.90	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
4880.00	32.96	8.52	4.96	46.44	54.00	7.56	Peak

Mode	2.4GHz	Frequency	TX 2474MHz
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Antenna at Horizontal Polarization

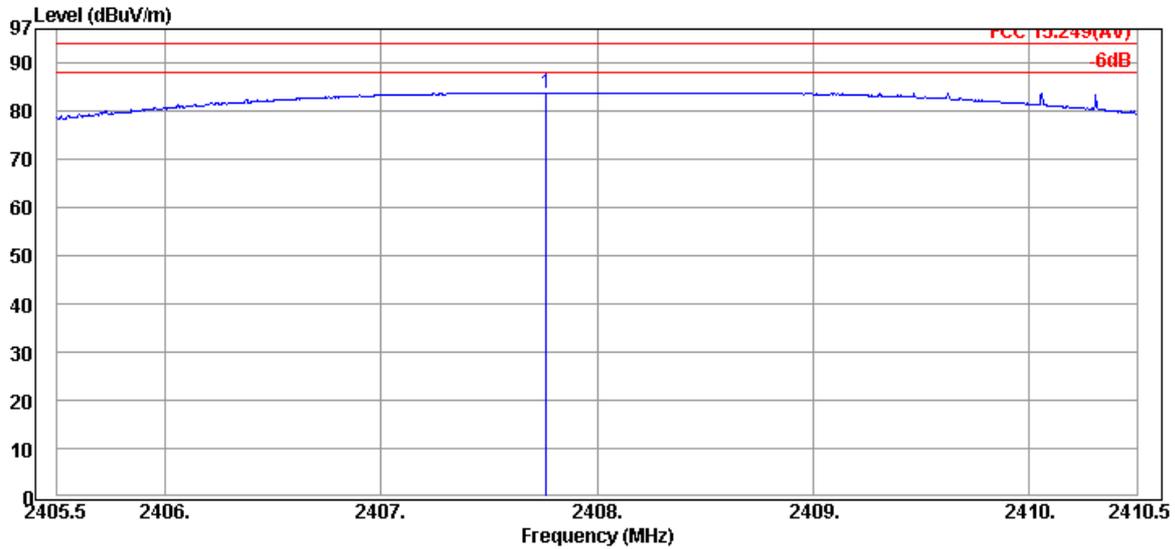
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4950.00	33.09	8.59	5.18	46.86	54.00	7.14	Peak

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
4950.00	33.09	8.59	5.49	47.17	54.00	6.83	Peak

A.2.2 Fundamental Frequency

Mode	2.4GHz	Frequency	TX 2408MHz
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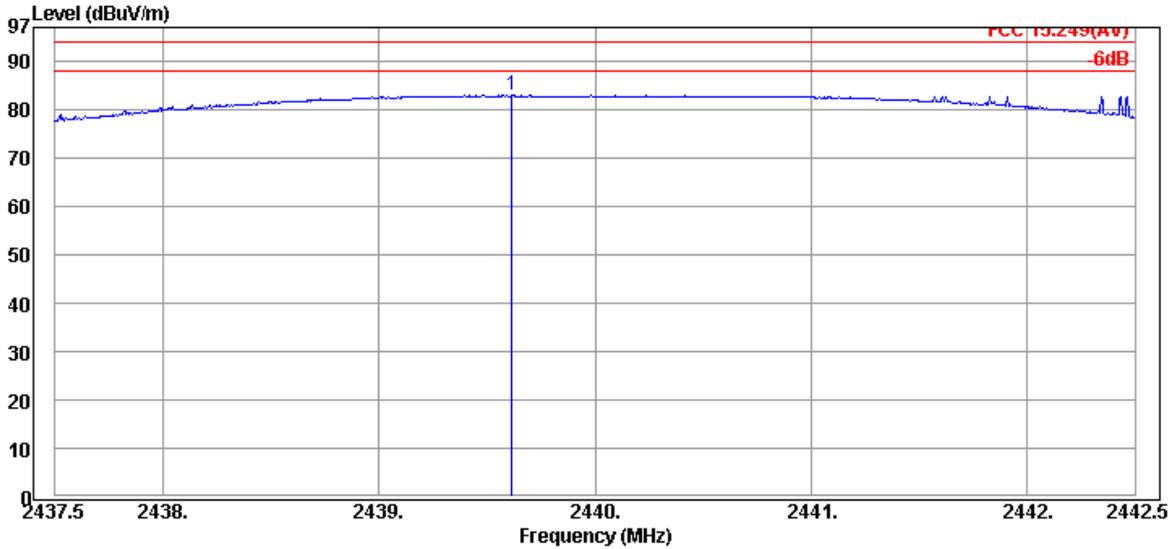


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2407.77	28.30	6.05	49.44	83.79	94.00	10.21	Peak

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

Mode	2.4GHz	Frequency	TX 2440MHz
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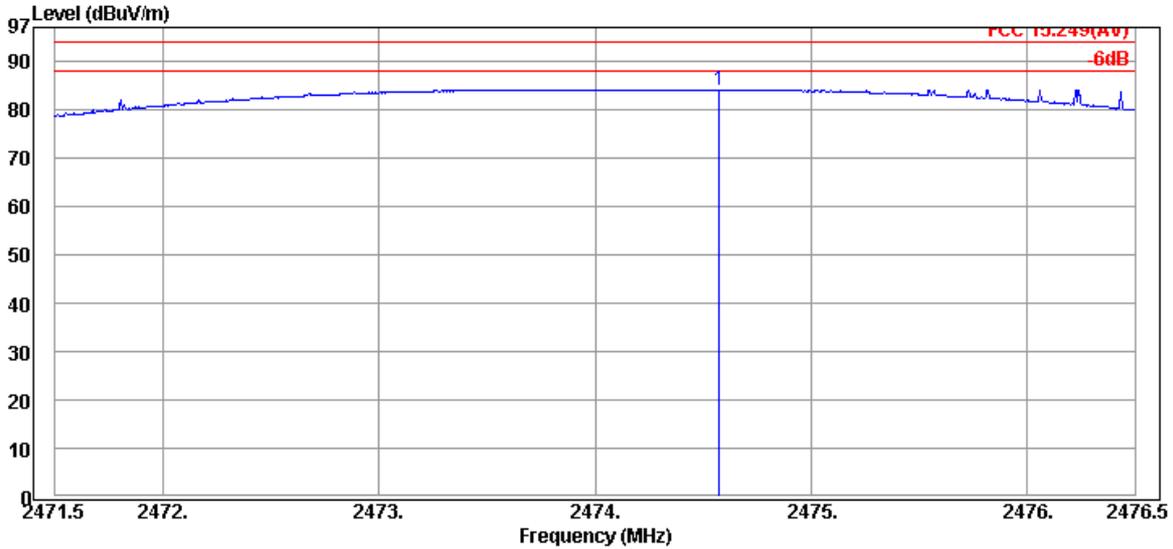


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2439.62	28.34	6.08	48.50	82.92	94.00	11.08	Peak

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

Mode	2.4GHz	Frequency	TX 2474MHz
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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
2474.58	28.37	6.12	49.65	84.14	94.00	9.86	Peak

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

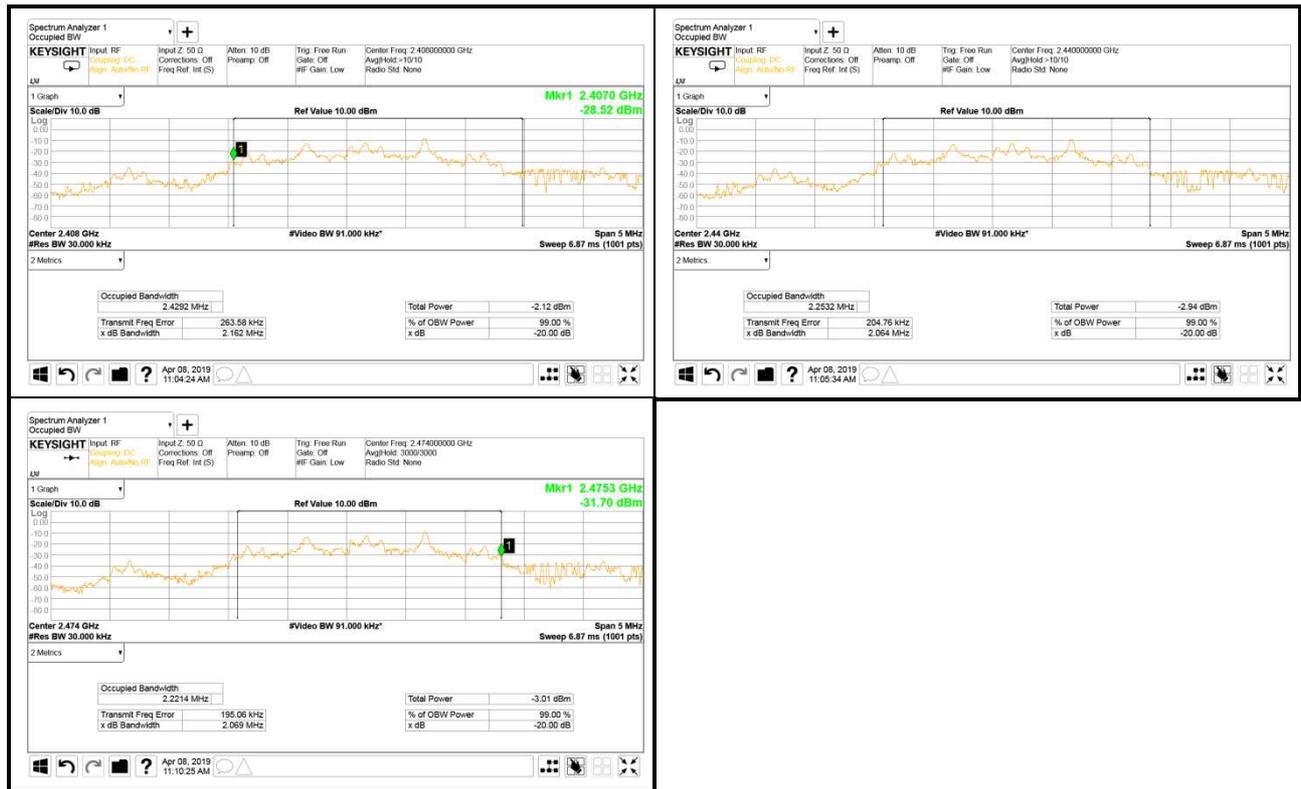
A.3 EMISSION BANDWIDTH MEASUREMENT

Test Date	2019/04/08	Temp./Hum.	24°C/54%
Test Voltage	DC 5V (USB Via Notebook PC)		

A.3.1 Emission Bandwidth

Mode	Centre Frequency (MHz)	20dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2.4GHz	2408	2.162	2.4292
	2440	2.064	2.2532
	2474	2.069	2.2214

A.3.2 Measurement Plots





Audix Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

APPENDIX B

Tel: +886 2 26099301
Fax: +886 2 26099303

APPDNDIX B

TEST PHOTOGRAPHS

(Model: M01438-D)