

# FCC Part 15C Measurement and Test Report

For

**Shenzhen YiDianTong Ecommerce Co., Ltd.**

**3506, 5F, 3 Buliding Duoli Industrial Zone, Meilin Street, Futian District,**

**ShenZhen, GuanDong, China**

**FCC ID: 2AQ4CY-D002-214**

**FCC Rule(s):** FCC Part 15.249

**Product Description:** 2.4G SNES Wireless Controller

**Tested Model:** Y-D002-214

**Report No.:** WTX20X03009503W-1

**Sample Receipt Date:** Mar.12, 2020

**Tested Date:** Mar.12, 2020 to Mar.26, 2020

**Issued Date:** Mar.27, 2020

**Tested By:** Jack Huang / Engineer

*Jack Huang*

**Reviewed By:** Lion Cai / RF Manager

*Lion Cai*

**Approved & Authorized By:** Silin Chen / Manager

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Waltek Testing Group (Shenzhen) Co., Ltd.



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## Report version

Version No.	Date of issue	Description
Rev.00	Mar.27, 2020	Original
/	/	/

## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: Shenzhen YiDianTong Ecommerce Co., Ltd.  
Address of applicant: 3506, 5F, 3 Buliding Duoli Industrial Zone, Meilin Street,  
Futian District, ShenZhen, GuanDong, China

Manufacturer: Shenzhen YiDianTong Ecommerce Co., Ltd.  
Address of manufacturer: 3506, 5F, 3 Buliding Duoli Industrial Zone, Meilin Street,  
Futian District, ShenZhen, GuanDong, China

General Description of EUT	
Product Name:	2.4G SNES Wireless Controller
Trade Name:	/
Model No.:	Y-D002-214
Adding Model(s):	Y-D002-215, Y-D002-216
Rated Voltage:	Battery:DC3.7V
Battery Capacity	500mAh
Power Adapter Model:	/
Software Version:	1.6A
Hardware Version:	AZ-VS-SNES1129-A
<i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model Y-D002-214, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Frequency Range:	2402MHz-2470MHz
Max. Field Strength:	91.45dBuV/m
Modulation:	GFSK
Antenna Type:	PCB Antenna
Antenna Gain:	0dBi



➤ Center Frequency of Each of Channel:

Channel	Frequency (MHz)
01	2402
02	2408
03	2452
04	2420
05	2470
06	2438
07	2440

## 1.2 Test Standards

The tests were performed according to following standards:

**FCC Rules Part 15.249**: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

**ANSI C63.10-2013**: American National Standard for Testing Unlicensed Wireless Devices.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

## 1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

## 1.4 Test Facility

### Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

### FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

### Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.



### 1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low Channel	2402MHz
TM2	Middle Channel	2440MHz
TM3	High Channel	2470MHz

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	50~55 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Adapter	/	KA1517-0502000CNU	/
Notebook	Lenovo	E445	EB12648265
USB Cable	/	/	/

### 1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	± 0.42dB
Occupied Bandwidth	Conducted	± 1.5%
Conducted Spurious Emission	Conducted	± 2.17dB
Conducted Emissions	Conducted	9-150kHz ± 3.74dB
		0.15-30MHz ± 3.34dB
Transmitter Spurious Emissions	Radiated	30-200MHz ± 4.52dB
		0.2-1GHz ± 5.56dB
		1-6GHz ± 3.84dB
		6-18GHz ± 3.92dB



## 1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2019-04-30	2020-04-29
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2019-04-30	2020-04-29
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2019-04-30	2020-04-29
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2019-04-30	2020-04-29
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2019-04-30	2020-04-29
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
SEMT-1042	Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2019-05-05	2021-05-04
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2019-04-30	2020-04-29
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2019-04-30	2020-04-29
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2019-04-30	2020-04-29
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2019-04-30	2020-04-29
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2019-04-30	2020-04-29
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2019-04-30	2020-04-29
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2019-05-05	2021-05-04
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2019-04-30	2020-04-29
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2019-04-30	2020-04-29
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2019-04-30	2020-04-29
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2020-03-17	2021-03-16
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2020-03-17	2021-03-16
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2020-03-17	2021-03-16
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2020-03-17	2021-03-16
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2020-03-17	2021-03-16
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2020-03-17	2021-03-16





<b>Software List</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Version</b>
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

\*Remark: indicates software version used in the compliance certification testing



## 2. SUMMARY OF TEST RESULTS

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<b>FCC Rules</b>	<b>Description of Test Item</b>	<b>Result</b>
§15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.207(a)	Conducted Emission	Compliant
§15.209(a)(f)	Radiated Spurious Emissions	Compliant
§15.249(a)	Field Strength of Emissions	Compliant
§15.249(d)	Out of Band Emission	Compliant
§15.215(c)	Emission Bandwidth	Compliant



### **3. Antenna Requirements**

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#### **3.1 Standard Applicable**

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

#### **3.2 Test Result**

This product has a PCB antenna, fulfill the requirement of this section.

## 4. Radiated Emissions

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### 4.1 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of Harmonics (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(d) 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 §15.209, whichever is the lesser attenuation.

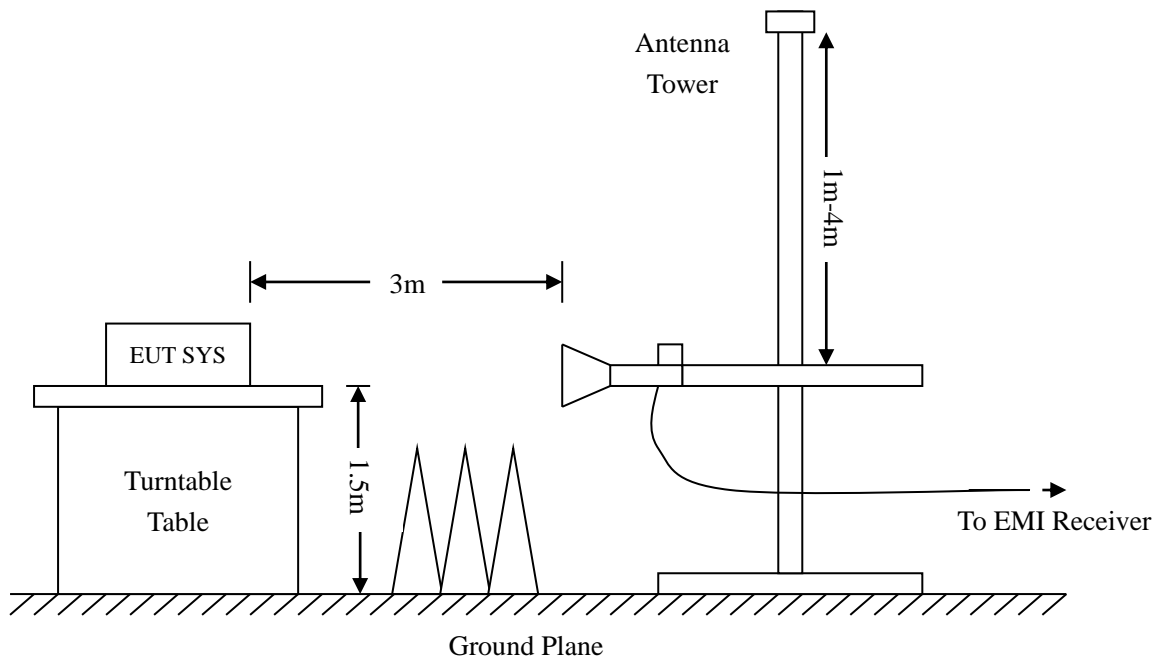
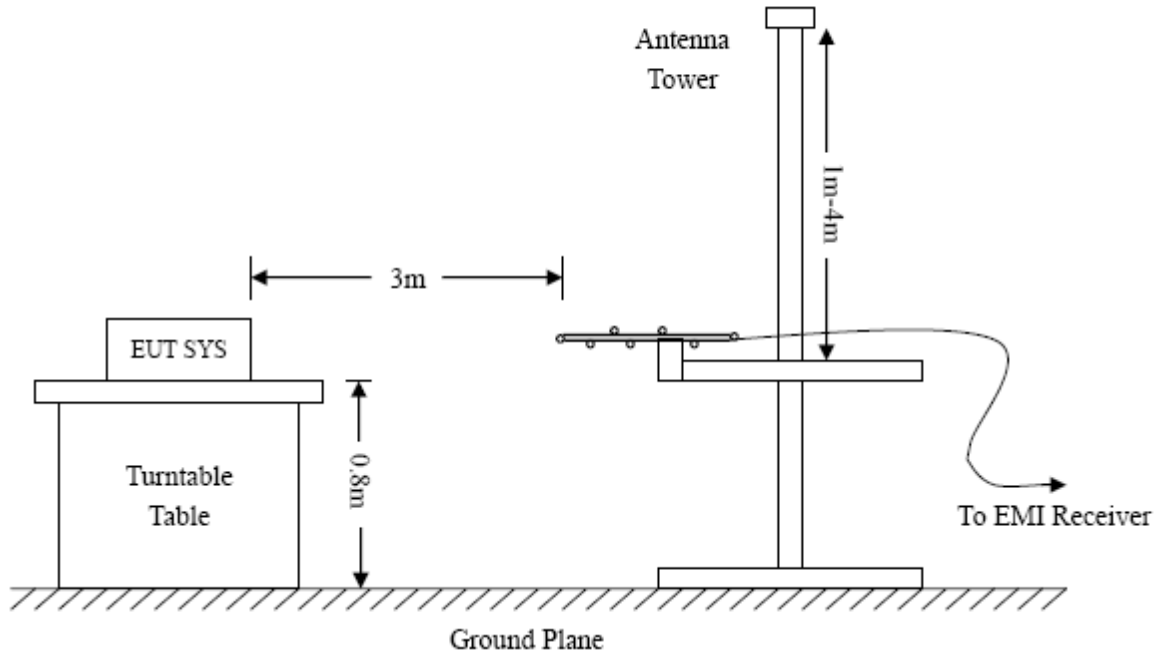
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

### 4.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



Frequency :9kHz-30MHz  
 RBW=10KHz,  
 VBW =30KHz  
 Sweep time= Auto  
 Trace = max hold  
 Detector function = peak

Frequency :30MHz-1GHz  
 RBW=120KHz,  
 VBW=300KHz  
 Sweep time= Auto  
 Trace = max hold  
 Detector function = peak, QP

Frequency :Above 1GHz  
 RBW=1MHz,  
 VBW=3MHz(Peak), 10Hz(AV)  
 Sweep time= Auto  
 Trace = max hold  
 Detector function = peak, AV



### 4.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of  $-6\text{dB}\mu\text{V}$  means the emission is  $6\text{dB}\mu\text{V}$  below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15C Limit}$$

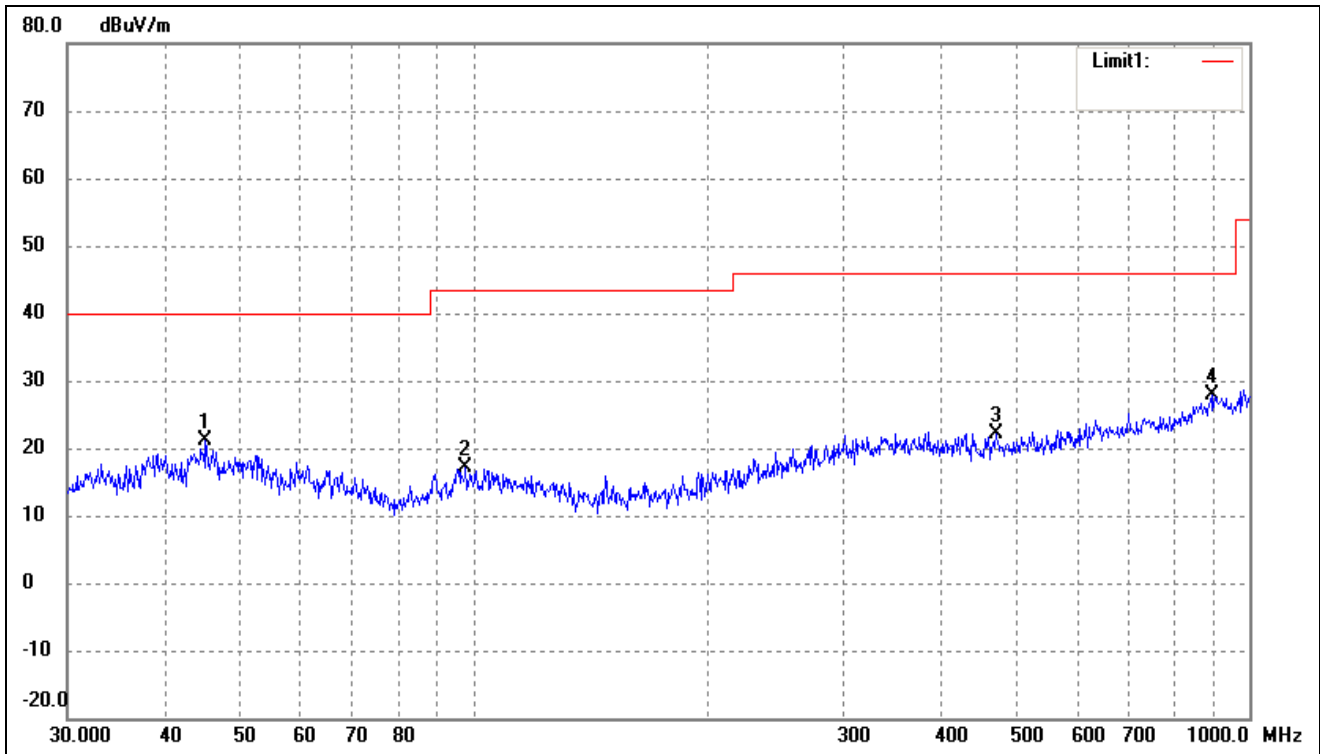
### 4.4 Summary of Test Results/Plots

*Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*



➤ Spurious Emissions Below 1GHz

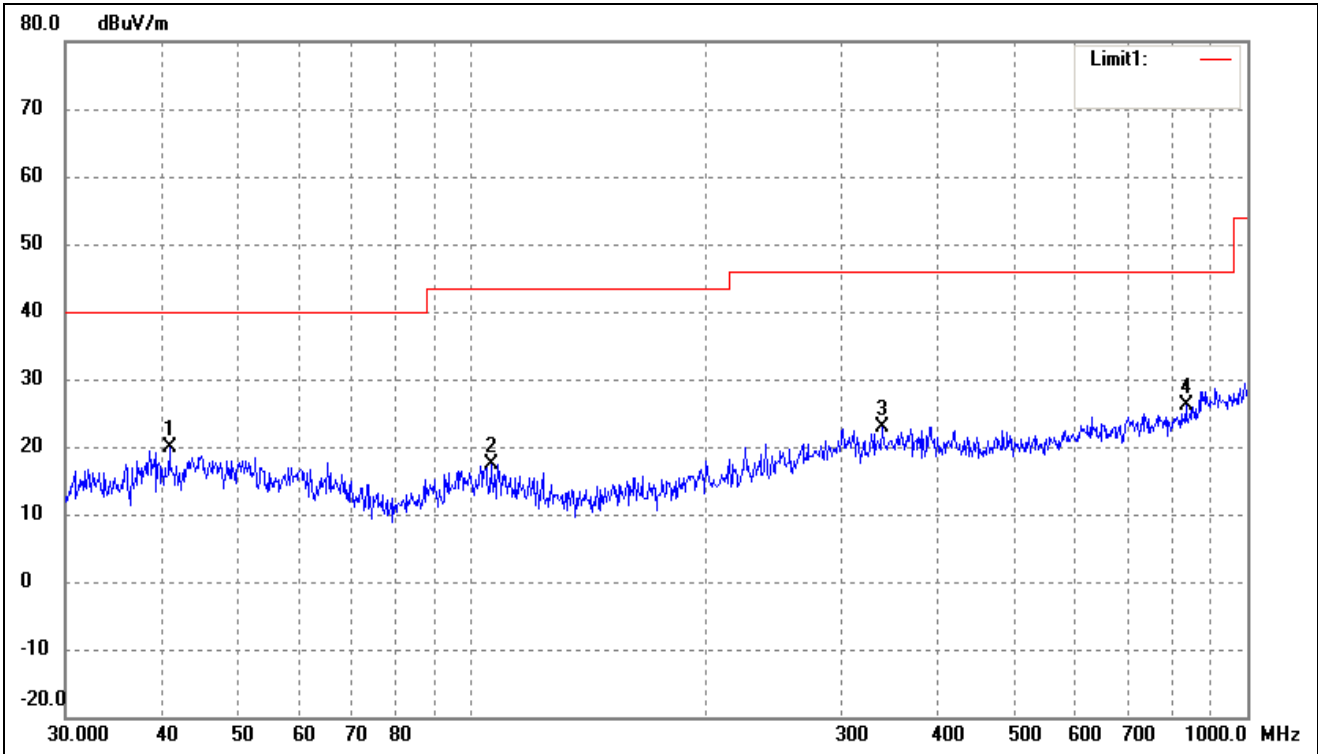
Test Channel	Low	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	45.2166	35.07	-13.92	21.15	40.00	-18.85	130	100	peak
2	97.7983	32.46	-15.36	17.10	43.50	-26.40	280	100	peak
3	472.1760	30.33	-8.10	22.23	46.00	-23.77	82	100	peak
4	893.8567	29.32	-1.48	27.84	46.00	-18.16	321	100	peak



Test Channel	Low	Polarity:	Vertical
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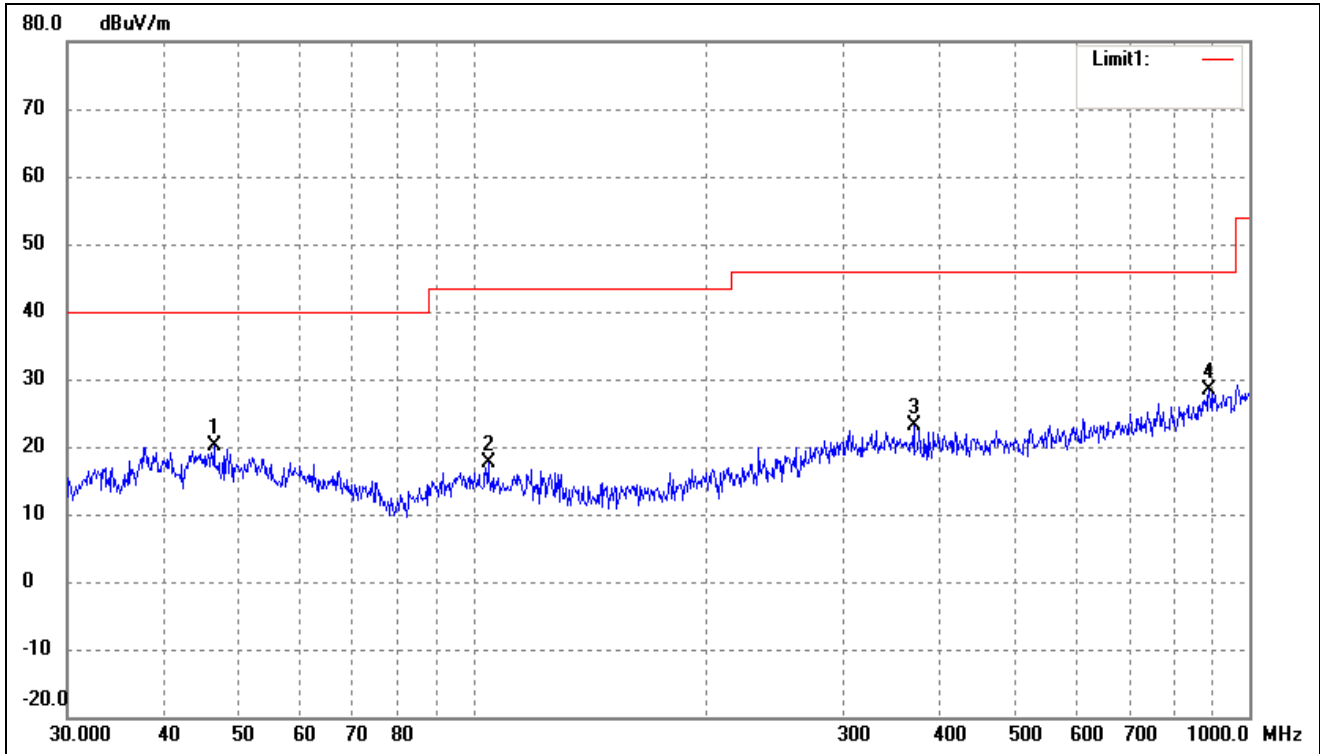


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	40.8446	34.02	-14.13	19.89	40.00	-20.11	226	100	peak
2	106.0126	32.18	-14.83	17.35	43.50	-26.15	100	100	peak
3	338.4001	30.87	-8.00	22.87	46.00	-23.13	313	100	peak
4	833.3171	29.10	-2.92	26.18	46.00	-19.82	106	100	peak





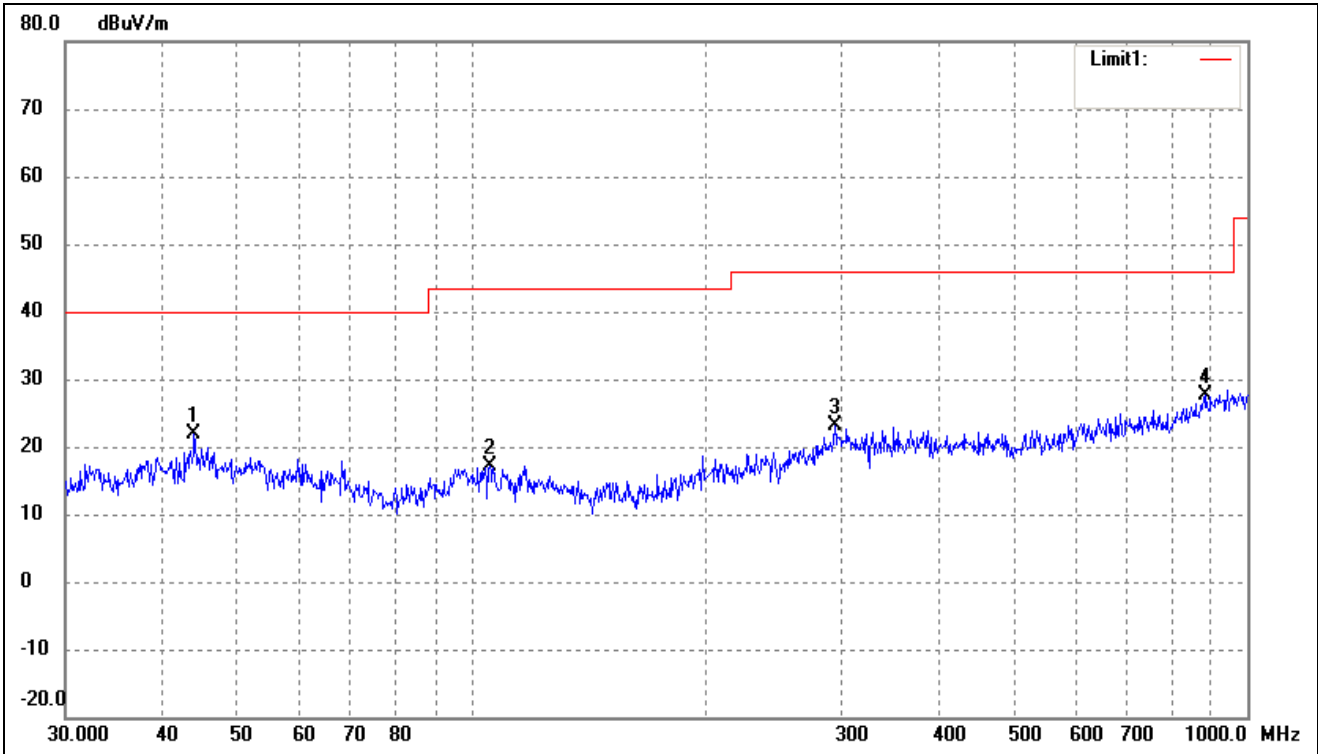
Test Channel	Middle	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	46.3402	34.02	-13.86	20.16	40.00	-19.84	315	100	peak
2	104.5361	32.40	-14.86	17.54	43.50	-25.96	99	100	peak
3	369.4047	31.03	-7.88	23.15	46.00	-22.85	58	100	peak
4	887.6099	30.19	-1.76	28.43	46.00	-17.57	146	100	peak



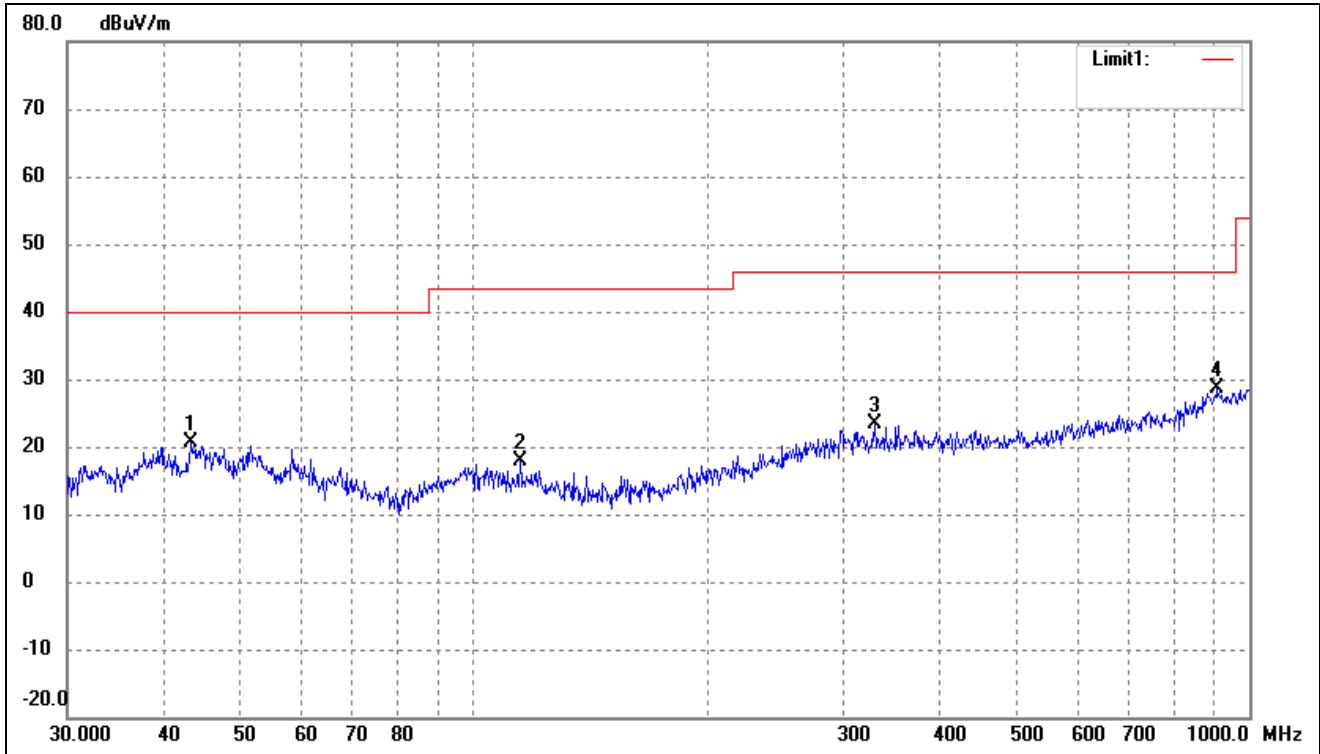
Test Channel	Middle	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	43.9658	35.89	-13.98	21.91	40.00	-18.09	136	100	peak
2	105.6415	31.88	-14.84	17.04	43.50	-26.46	102	100	peak
3	294.1137	31.55	-8.34	23.21	46.00	-22.79	93	100	peak
4	884.5029	29.52	-1.90	27.62	46.00	-18.38	176	100	peak



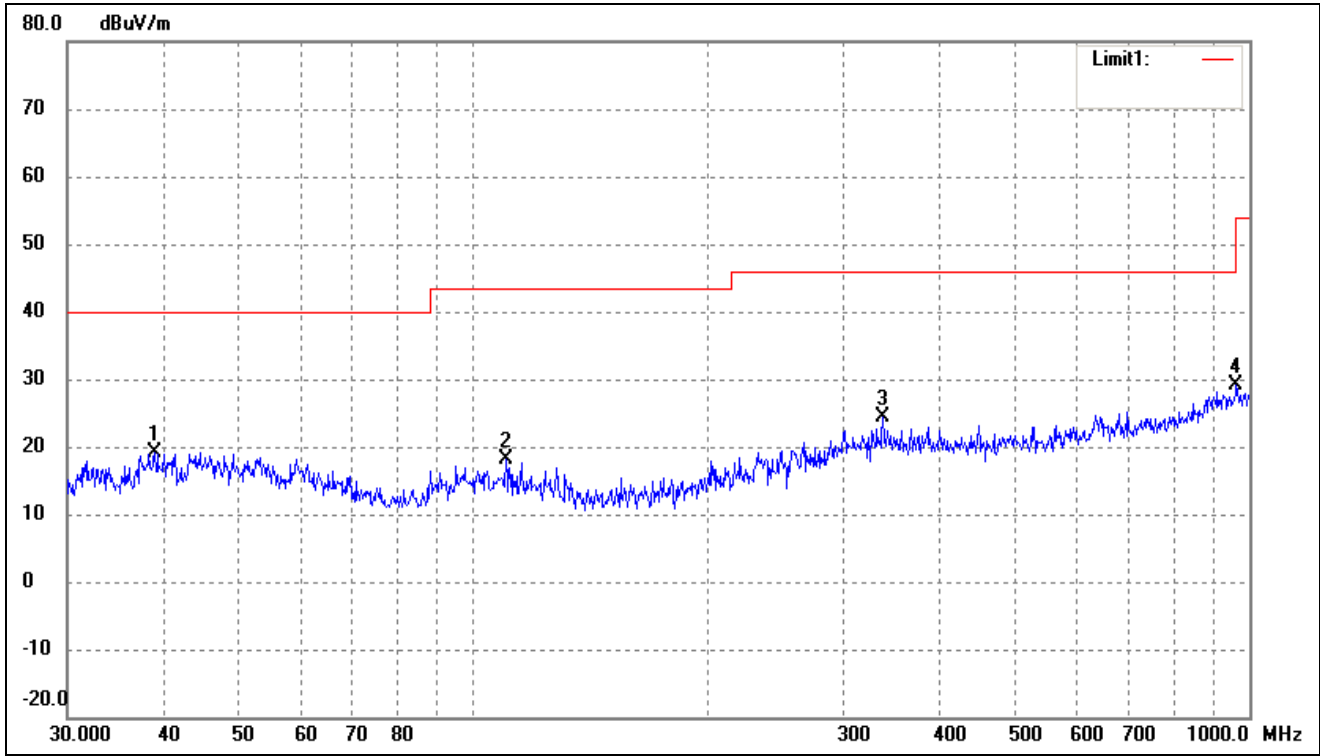
Test Channel	High	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	43.3534	34.54	-14.01	20.53	40.00	-19.47	352	100	peak
2	114.9168	33.04	-15.19	17.85	43.50	-25.65	92	100	peak
3	329.0389	31.61	-8.34	23.27	46.00	-22.73	128	100	peak
4	909.6666	29.62	-1.04	28.58	46.00	-17.42	115	100	peak



Test Channel	High	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	38.8879	33.76	-14.59	19.17	40.00	-20.83	315	100	peak
2	110.1816	32.92	-14.79	18.13	43.50	-25.37	99	100	peak
3	337.2155	32.38	-8.04	24.34	46.00	-21.66	58	100	peak
4	962.1623	30.14	-1.06	29.08	54.00	-24.92	146	100	peak



*Spurious Emissions Above 1GHz*

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2402MHz							
2402	100.31	-9.48	90.83	114	-23.17	H	PK
2402	100.15	-9.47	90.68	94	-3.32	H	AV
4804	66.18	-4.42	61.76	74	-12.24	H	PK
4804	45.28	-4.42	40.86	54	-13.14	H	AV
7206	57.38	-2.13	55.25	74	-18.75	H	PK
7206	44.73	-2.13	42.60	54	-11.40	H	AV
2402	99.43	-9.48	89.95	114	-24.05	V	PK
2402	99.06	-9.48	89.58	94	-4.42	V	AV
4804	63.26	-4.42	58.84	74	-15.16	V	PK
4804	43.58	-4.42	39.16	54	-14.84	V	AV
7206	49.00	-2.13	46.87	74	-27.13	V	PK
7206	42.09	-2.13	39.96	54	-14.04	V	AV
Middle Channel-2440MHz							
2440	99.89	-9.47	90.42	114	-23.58	H	PK
2440	99.46	-9.47	89.99	94	-4.01	H	AV
4880	63.36	-4.42	58.94	74	-15.06	H	PK
4880	45.02	-4.42	40.60	54	-13.40	H	AV
7320	53.93	-2.13	51.80	74	-22.20	H	PK
7320	44.02	-2.13	41.89	54	-12.11	H	AV
2440	98.79	-9.47	89.32	114	-24.68	V	PK
2440	98.12	-9.47	88.65	94	-5.35	V	AV
4880	62.54	-4.42	58.12	74	-15.88	V	PK
4880	42.18	-4.42	37.76	54	-16.24	V	AV
7320	46.68	-2.13	44.55	74	-29.45	V	PK
7320	41.44	-2.13	39.31	54	-14.69	V	AV



Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
High Channel-2470MHz							
2470	100.79	-9.34	91.45	114	-22.55	H	PK
2470	100.61	-9.34	91.27	94	-2.73	H	AV
4940	64.67	-4.42	60.25	74	-13.75	H	PK
4940	44.44	-4.42	40.02	54	-13.98	H	AV
7410	51.29	-2.13	49.16	74	-24.84	H	PK
7410	43.93	-2.13	41.80	54	-12.20	H	AV
2470	99.70	-9.34	90.36	114	-23.64	V	PK
2470	99.09	-9.34	89.75	94	-4.25	V	AV
4940	62.38	-4.42	57.96	74	-16.04	V	PK
4940	40.72	-4.42	36.30	54	-17.70	V	AV
7410	44.40	-2.13	42.27	74	-31.73	V	PK
7410	42.50	-2.13	40.37	54	-13.63	V	AV

*Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5<sup>th</sup> Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*

*The measurements greater than 20dB below the limit from 9kHz to 30MHz..*



## 5. Out of Band Emissions

### 5.1 Standard Applicable

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 §15.209, whichever is the lesser attenuation.

### 5.2 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

### 5.3 Summary of Test Results/Plots

Test mode	Frequency	Limit	Result
	MHz	dBuV / dBc	
Lowest	2310.00	<54 dBuV	Pass
	2390.00	<54 dBuV	Pass
	2400.00	<54 dBuV	Pass
Highest	2483.50	<54 dBuV	Pass
	2500.00	<54 dBuV	Pass

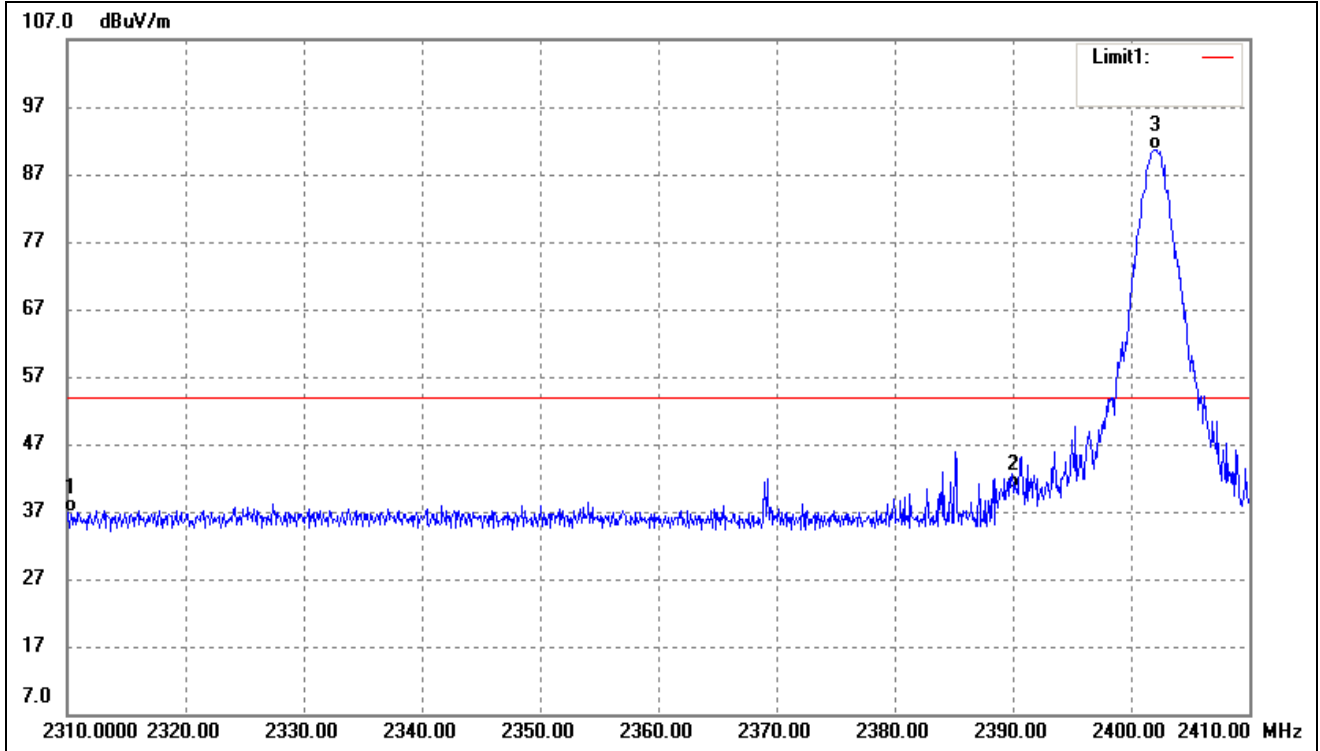
The edge emissions are below the FCC 15.209 Limits or complies with the 15.249 requirements.

Please refer to the test plots as below.



➤ Restricted Band

Test Channel	Low	Polarity:	Vertical(worst case)
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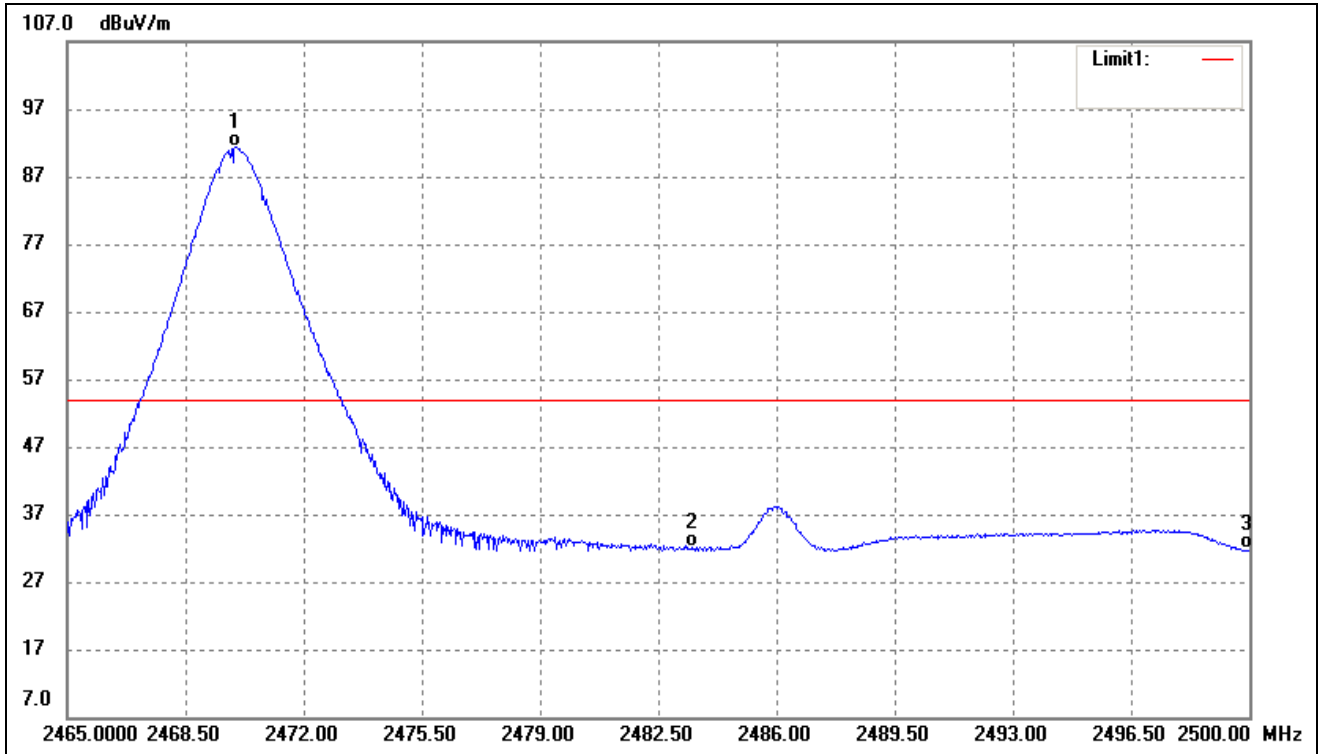


No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	46.44	-9.66	36.78	54.00	-17.22	Ave Detector
	2310.000	53.29	-9.66	43.63	74.00	-30.37	Peak Detector
2	2390.000	49.79	-9.50	40.29	54.00	-13.71	Ave Detector
	2390.000	67.25	-9.50	57.75	74.00	-16.25	Peak Detector
3	2402.100	100.15	-9.47	90.68	/	/	Ave Detector
	2401.700	100.31	-9.48	90.83	/	/	Peak Detector





Test Channel	High	Polarity:	Vertical(worst case)
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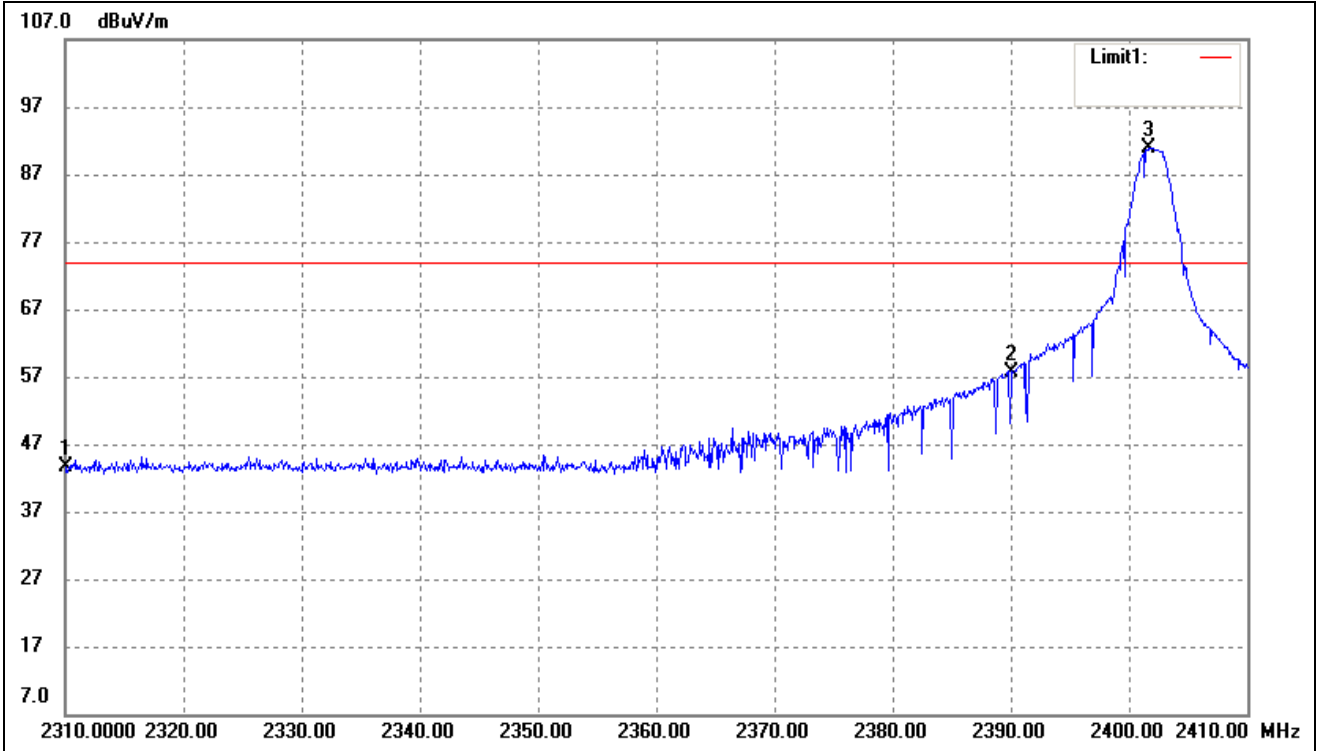
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2469.970	100.61	-9.34	91.27	/	/	Ave Detector
	2470.215	100.79	-9.34	91.45	/	/	Peak Detector
2	2483.500	41.46	-9.31	32.15	54.00	-21.85	Ave Detector
	2483.500	66.79	-9.31	57.48	74.00	-16.52	Peak Detector
3	2500.000	41.08	-9.28	31.80	54.00	-22.20	Ave Detector
	2500.000	57.65	-9.28	48.37	74.00	-25.63	Peak Detector



➤ Band edge

RBW:100kHz VBW:300kHz

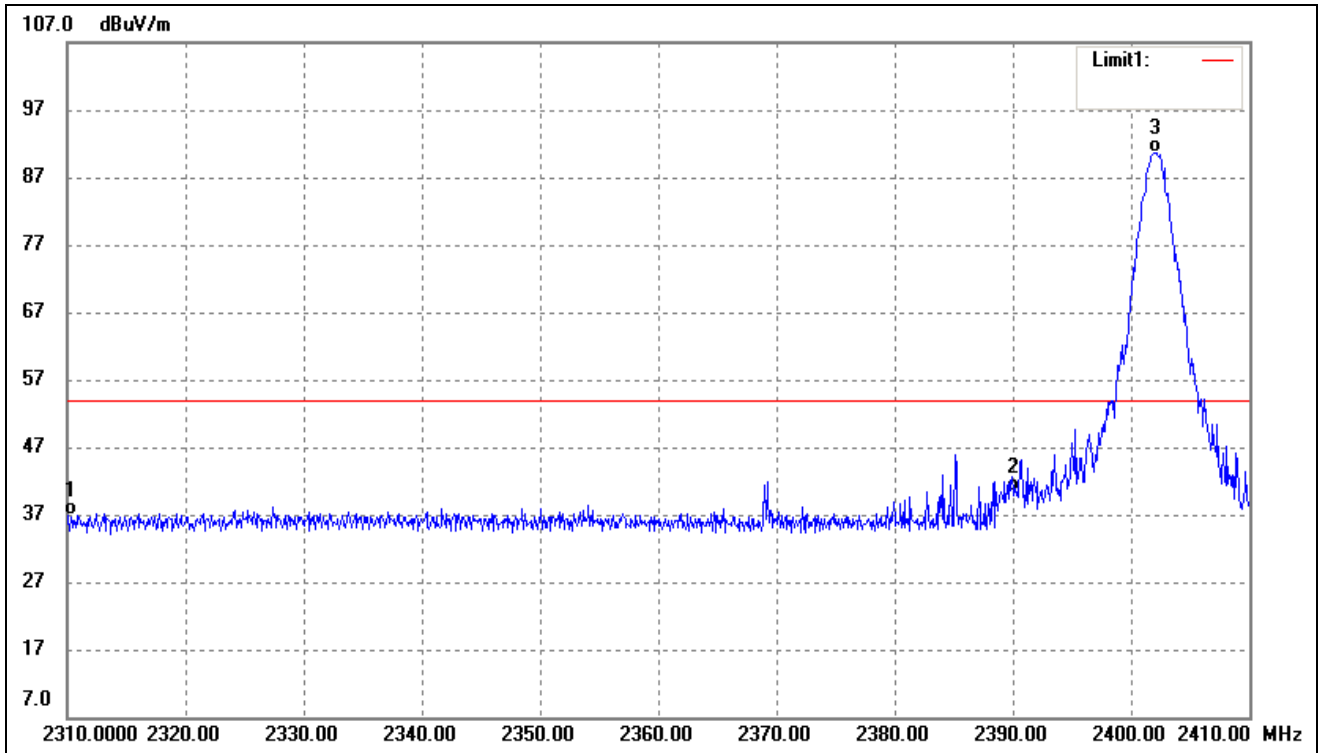
Test Channel	Low	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	53.29	-9.66	43.63	74.00	-30.37	Peak Detector
2	2390.000	67.25	-9.50	57.75	74.00	-16.25	Peak Detector
3	2401.700	100.31	-9.48	90.83	/	/	Peak Detector



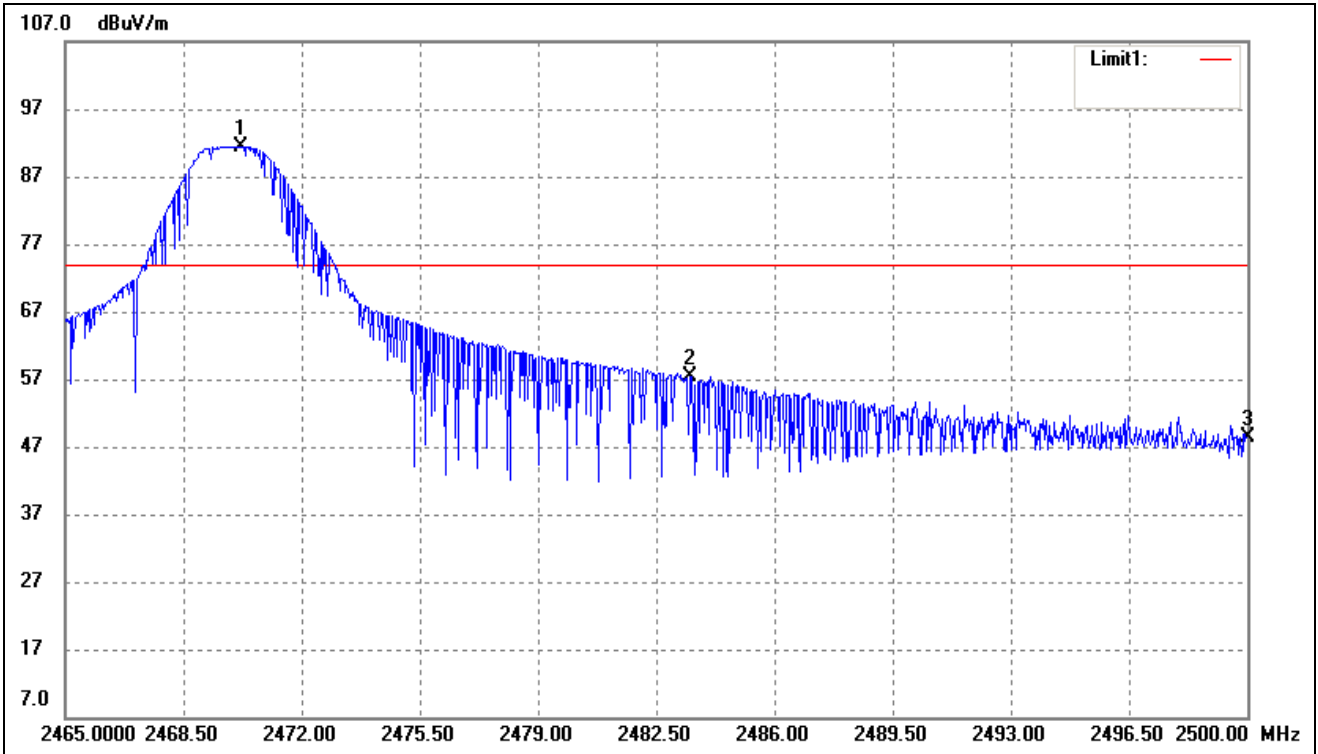
Test Channel	Low	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	46.44	-9.66	36.78	54.00	-17.22	Ave Detector
2	2390.000	49.79	-9.50	40.29	54.00	-13.71	Ave Detector
3	2402.100	100.15	-9.47	90.68	/	/	Ave Detector



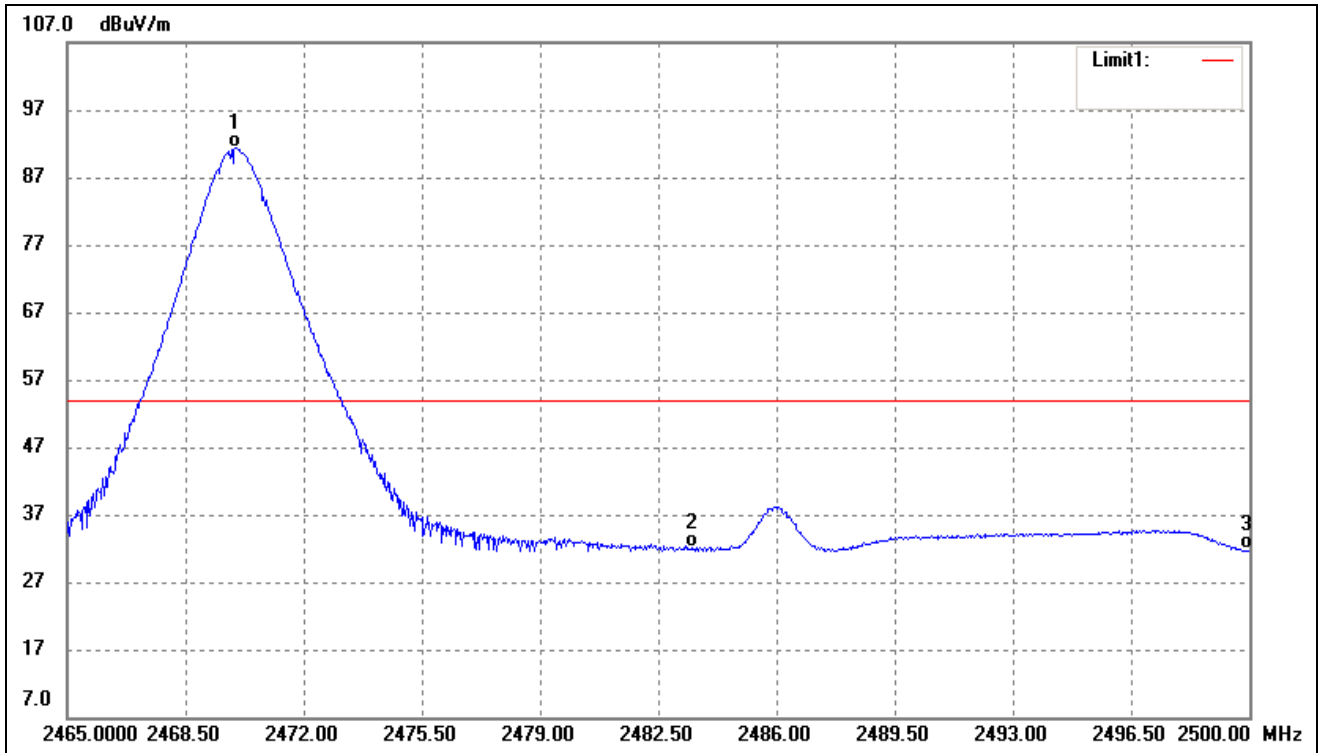
Test Channel	High	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2470.215	100.79	-9.34	91.45	/	/	Peak Detector
2	2483.500	66.79	-9.31	57.48	74.00	-16.52	Peak Detector
3	2500.000	57.65	-9.28	48.37	74.00	-25.63	Peak Detector



Test Channel	High	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2469.970	100.61	-9.34	91.27	/	/	Ave Detector
2	2483.500	41.46	-9.31	32.15	54.00	-21.85	Ave Detector
3	2500.000	41.08	-9.28	31.80	54.00	-22.20	Ave Detector

## 6. Emission Bandwidth

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### 6.1 Standard Applicable

According to 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

### 6.2 Test Procedure

According to the ANSI 63.10-2013, the emission bandwidth test method as follows.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Set span = 1MHz, centered on a transmitting channel

RBW  $\geq$  1% 20dB Bandwidth, VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down and 99% bandwidth of the emission.

### 6.3 Summary of Test Results/Plots

Test Channel	20dB Bandwidth(kHz)
Low Channel	1047
Middle Channel	1170
High Channel	1574

*Please refer to the following test plots*



<p>Low Channel</p>	<p>Agilent R T</p> <p>Ch Freq 2.402 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Points 1001</p> <p>Ref 15 dBm Atten 25 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offset</p> <p>1</p> <p>dB</p> <p>Center 2.402 GHz Span 3 MHz</p> <p>#Res BW 30 kHz #VBW 100 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 1.0058 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -20.00 dB</p> <p>Transmit Freq Error -5.705 kHz</p> <p>x dB Bandwidth 1.047 MHz</p> <p>Sweep</p> <p>Sweep Time 10.00 ms</p> <p>Auto Mar</p> <p>Single Sweep Cont</p> <p>Auto Sweep Coupling SA</p> <p>SR</p> <p>Points 1001</p> <p>Segmented</p>
<p>Middle Channel</p>	<p>Agilent R T</p> <p>Ch Freq 2.44 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 2.440000000 GHz</p> <p>Ref 15 dBm Atten 25 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offset</p> <p>1</p> <p>dB</p> <p>Center 2.44 GHz Span 3 MHz</p> <p>#Res BW 30 kHz #VBW 100 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 1.1613 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -20.00 dB</p> <p>Transmit Freq Error 1.830 kHz</p> <p>x dB Bandwidth 1.170 MHz</p> <p>Trace/View</p> <p>Trace 1 2 3</p> <p>Clear Write</p> <p>Max Hold</p> <p>Min Hold</p> <p>View</p> <p>Blank</p> <p>More 1 of 2</p>
<p>High Channel</p>	<p>Agilent R T</p> <p>Ch Freq 2.47 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 2.47 GHz</p> <p>Ref 15 dBm Atten 25 dB</p> <p>#Peak</p> <p>Log</p> <p>10</p> <p>dB/</p> <p>Offset</p> <p>1</p> <p>dB</p> <p>Center 2.47 GHz Span 3 MHz</p> <p>#Res BW 30 kHz #VBW 100 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 1.6019 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -20.00 dB</p> <p>Transmit Freq Error -54.590 kHz</p> <p>x dB Bandwidth 1.574 MHz</p> <p>Trace/View</p> <p>Trace 1 2 3</p> <p>Clear Write</p> <p>Max Hold</p> <p>Min Hold</p> <p>View</p> <p>Blank</p> <p>More 1 of 2</p>

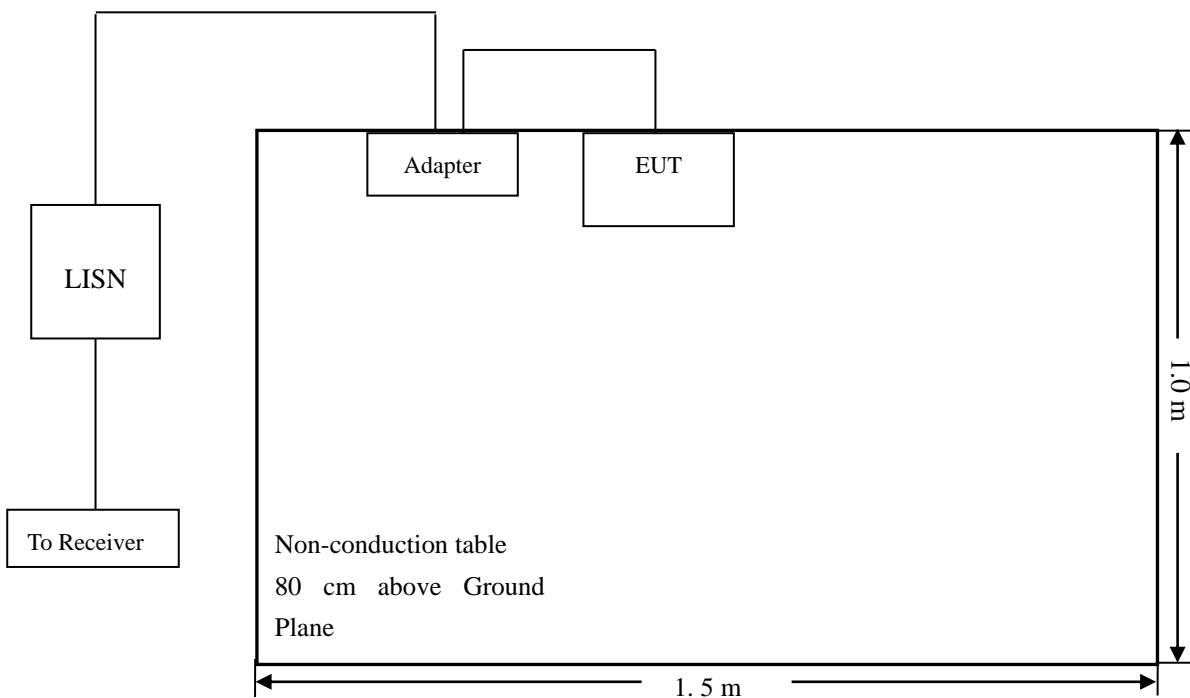
## 7. Conducted Emissions

### 7.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

### 7.2 Basic Test Setup Block Diagram



### 7.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

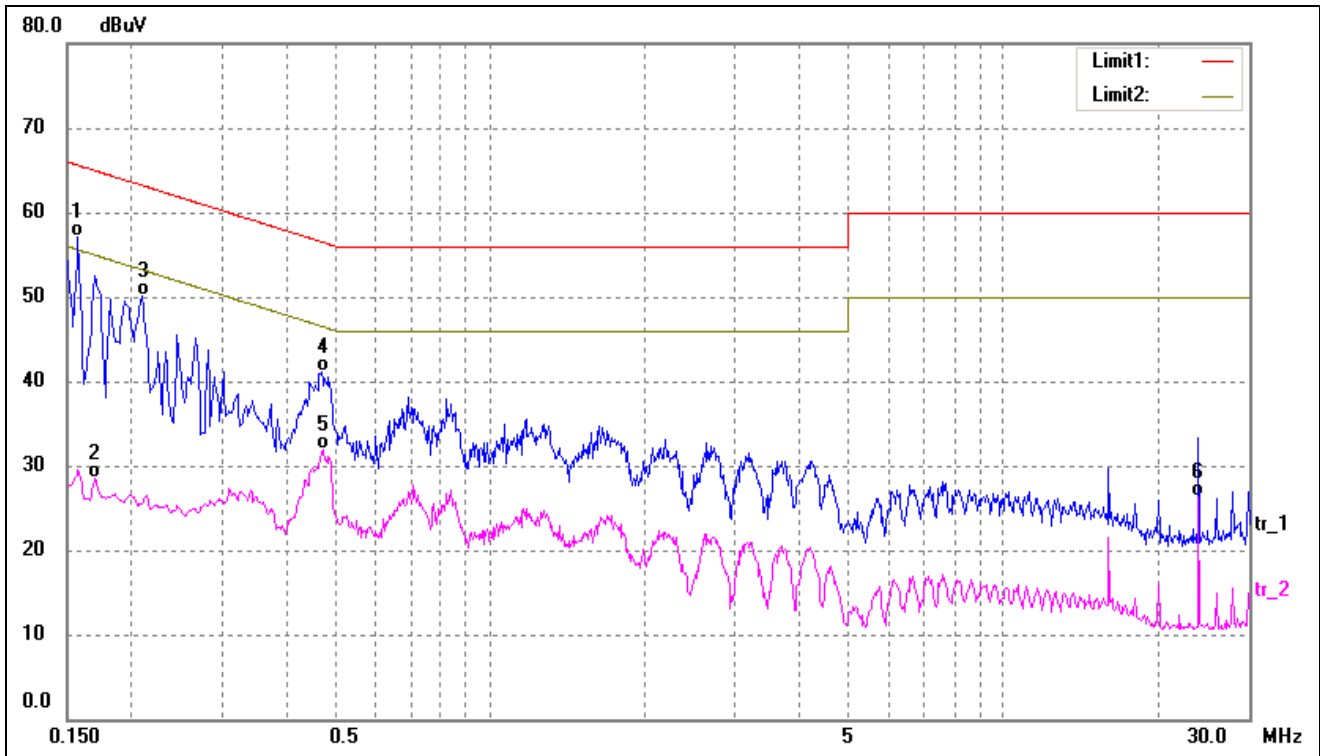
- Start Frequency ..... 150 kHz
- Stop Frequency ..... 30 MHz
- Sweep Speed ..... Auto
- IF Bandwidth..... 10 kHz
- Quasi-Peak Adapter Bandwidth ..... 9 kHz
- Quasi-Peak Adapter Mode ..... Normal

### 7.4 Summary of Test Results/Plots





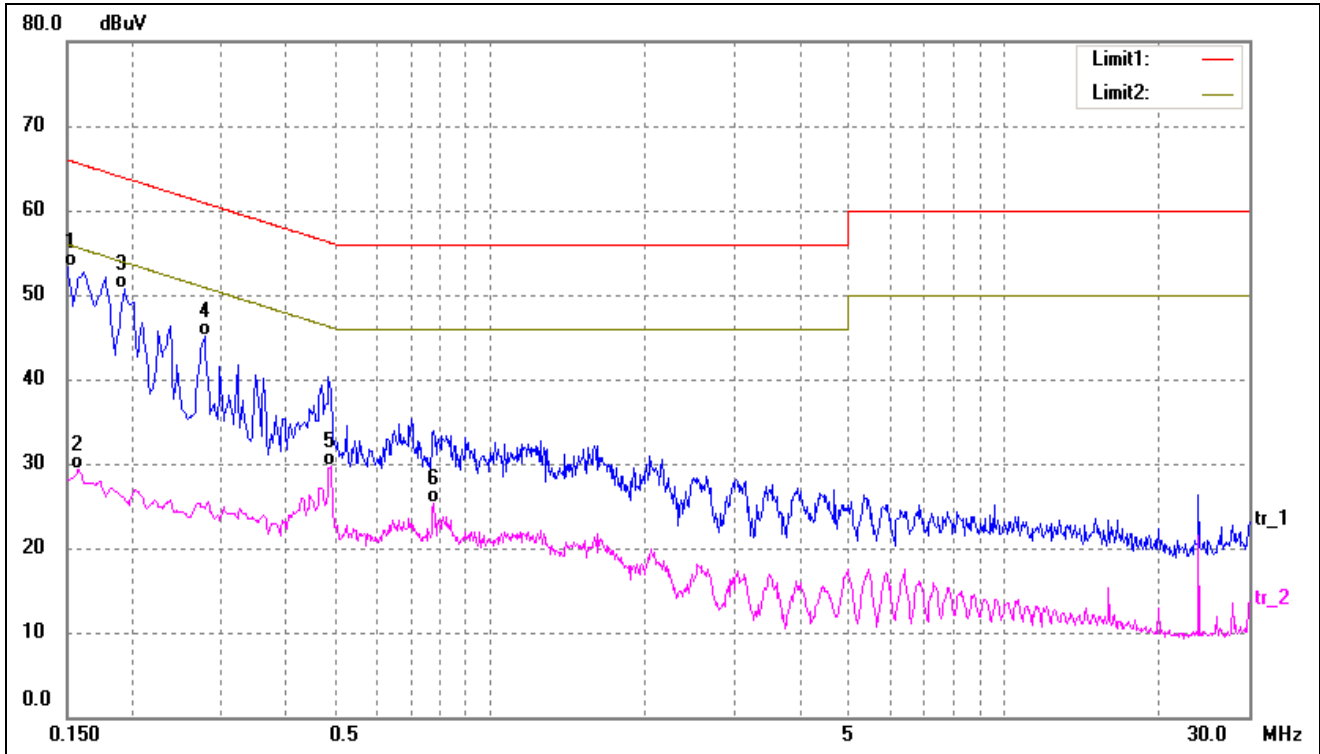
Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1580	47.07	9.95	57.02	65.57	-8.55	QP
2	0.1700	18.50	9.95	28.45	54.96	-26.51	AVG
3	0.2100	40.18	9.98	50.16	63.21	-13.05	QP
4	0.4700	31.08	10.02	41.10	56.51	-15.41	QP
5	0.4740	21.85	10.02	31.87	46.44	-14.57	AVG
6	23.9980	15.51	10.88	26.39	50.00	-23.61	AVG



Test Mode	Communication	AC120V 60Hz	Polarity:	Line
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1*	0.1500	43.39	9.96	53.35	66.00	-12.65	QP
2	0.1580	19.41	9.95	29.36	55.57	-26.21	AVG
3	0.1940	40.77	9.97	50.74	63.86	-13.12	QP
4	0.2780	35.00	10.01	45.01	60.88	-15.87	QP
5	0.4900	19.66	10.02	29.68	46.17	-16.49	AVG
6	0.7780	15.17	10.15	25.32	46.00	-20.68	AVG

\*\*\*\*\* END OF REPORT \*\*\*\*\*