



The Test Report issued under the responsibility of :
Greatwall International Approval Co., Limited
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Report No. : E86.12.328.002

This Test Report is Prepared for

Shenzhen Excel Digital Technology Co., LTD

1907,Overseas Chinese High-Tech Venture Park,Nanshan,Shenzhen,P.R.China

Product Name: Multi-Function Remote

Model No.: AF101RX,AF101GRX,AF106RX

Brand Name: N/A

Applicable standards: FCC Part 15 Subpart C, Paragraph 15.249

Test result: The FCC testing has been performed on the submitted samples and found in compliance with ANSI C63.4&FCC Part 15 Subpart C, Paragraph 15.249.

Prepared by :

Shirley Xu Assistant

Reviewer :

Mary Huang/Supervisor

Approved & Authorized Signer :

Mike Wang/ Manager

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Test Report Conclusion

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1. General Information

1.1 Details of Applicant

Name: Shenzhen Excel Digital Technology Co.,LTD
Address: 1907,Overseas Chinese High-Tech Venture Park,Nanshan,Shenzhen,P.R.China

1. 2 Application Details

Date of Receipt of Application: Nov 26, 2012
Date of Receipt of Test Item: Nov 26, 2012
Date of Test: Nov 26, 2012~ Dec 12, 2012

1.3 General Description of EUT

Product Name:	Multi-Function Remote
Model No.:	AF101RX,AF101GRX,AF106RX
Brand Name:	N/A
Operation Frequency:	2402~2480MHz
Modulation Technology:	GFSK
Antenna Type:	PCB Antenna with Gain 0dBi
Power supply:	Input: DC5V, 0.1A
Remark:	Only the basic model No. AF101RX was tested. The other models are identical in the same PCB layout, interior structure and electrical circuits with the basic model. The only difference is the model name for commercial purpose.
FCC ID:	QZVCZ-DG-AF100

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Test Equipments					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2012-04-26	2013-04-25
EMI Test Receiver	ROHDE&SCHWARZ	ESH3	860905/006	2012-04-26	2013-04-25
Spectrum Analyzer	HP	ESA-L1500A	US37451154	2012-04-26	2013-04-25
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100294	2012-04-26	2013-04-25
Ultra Broadband ANT	Schwarebeck	VULB9163	9163/340	2012-04-26	2013-04-25
ESDV Test Receiver	ROHDE&SCHWARZ	ESDV	100008	2012-04-26	2013-04-25
Spectrum Analyzer	HP	8595E	3441A00893	2012-04-26	2013-04-25
Impuls-Begrenzer	ROHDE&SCHWARZ	ESH3-Z2	100281	2012-04-26	2013-04-25
ESPI Test Receiver	ROHDE&SCHWARZ	ESI26	838786/013	2012-04-26	2013-04-25
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170265	2012-04-26	2013-04-25
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-631	2012-04-26	2013-04-25

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3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications:			
Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.249(a) & 15.249(b) Limit	Field Strength of Fundamental	PASS	Complies
FCC Part 15, Paragraph 15.209	Radiated Emission Test	PASS	Complies
FCC Part 15 Subpart C Paragraph 15.249(d) Limit	Band Edge Test	PASS	Complies

3.2 Test Standards

FCC Part 15 Subpart C, Paragraph 15.249

4.0 Test Lab Details

Name: SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD

Address: 5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao,FuTian District, Shenzhen,CHINA.

FCC Registration Number: 899988

Note: All tests were done at SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD

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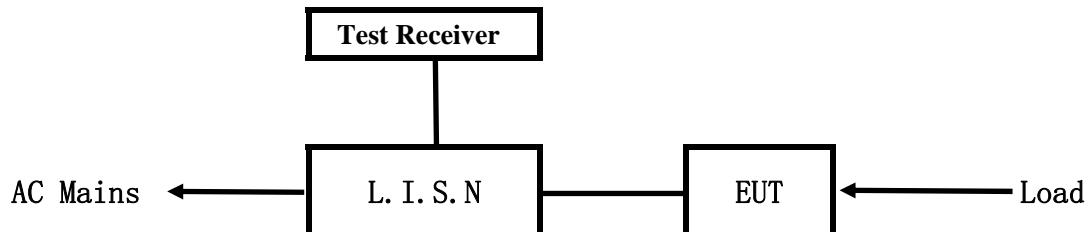
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5. Power Line Conducted Emission Test

5.1 Schematics of the test



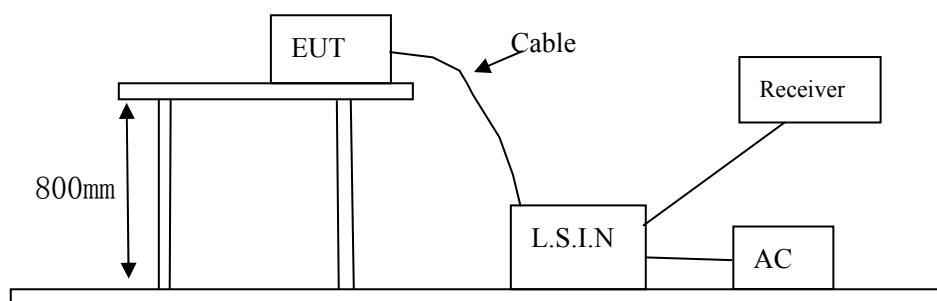
EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2003. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2003.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2003. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

One channels are provided to the EUT

A. EUT

Device	Manufacturer	Model	FCC ID
Multi-Function Remote	Shenzhen Excel Digital Technology Co.,LTD	AF101RX,AF101GRX, AF106RX	QZVCZ-DG- AF100

B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

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C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
PC	IBM	R400	DOC	--
Mouse	L.SEletron	M-F105	DOC	
Earphone	--	--	--	--

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2003

- A Setup the EUT and simulators as shown on follow
- B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency(MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The tighter limit shall apply at the transition frequencies

5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

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A: Conducted Emission on Live Terminal (150kHz to 30MHz)

EUT Operating Environment

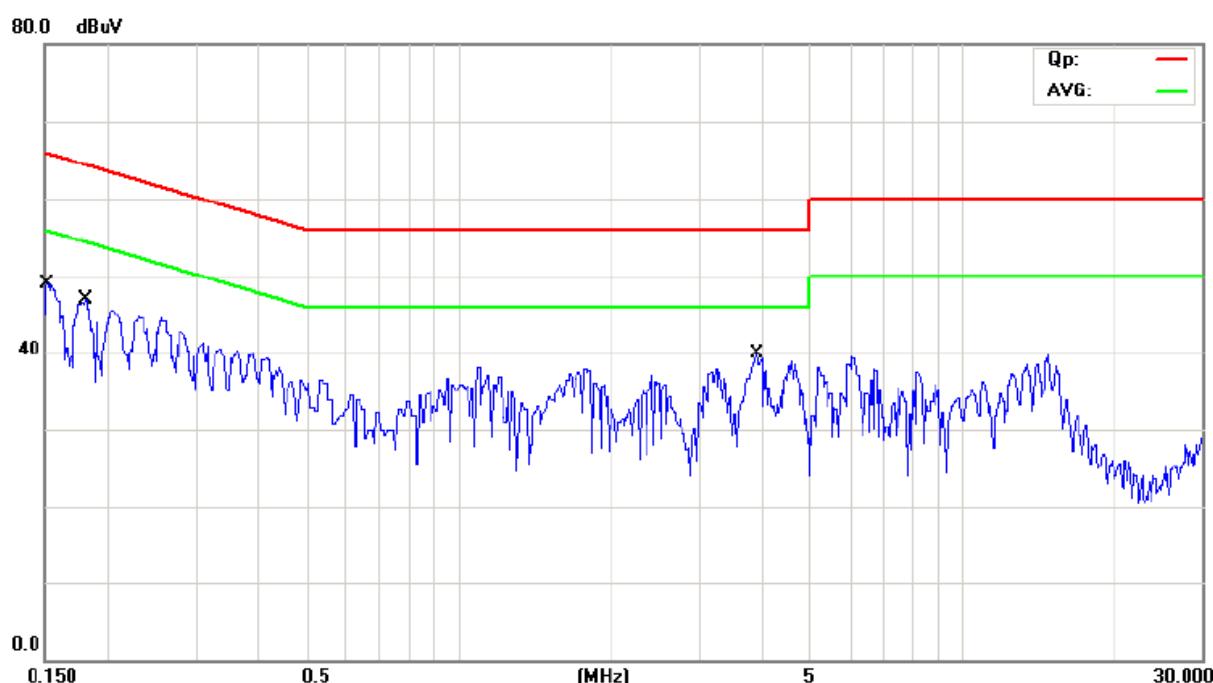
Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

EUT set Condition: Keep Transmitting

Equipment Level: Class B

Results: Pass

Please refer to following diagram for individual



Frequency (MHz)	Line	Reading(dB μ V)		Limit(dB μ V)	
		Quasi-peak	Average	Quasi-peak	Average
0.151	Live	48.87	36.49	65.91	55.91
0.180	Live	46.83	35.36	64.46	54.46
3.897	Live	39.85	26.85	56.00	46.00

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B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

EUT Operating Environment

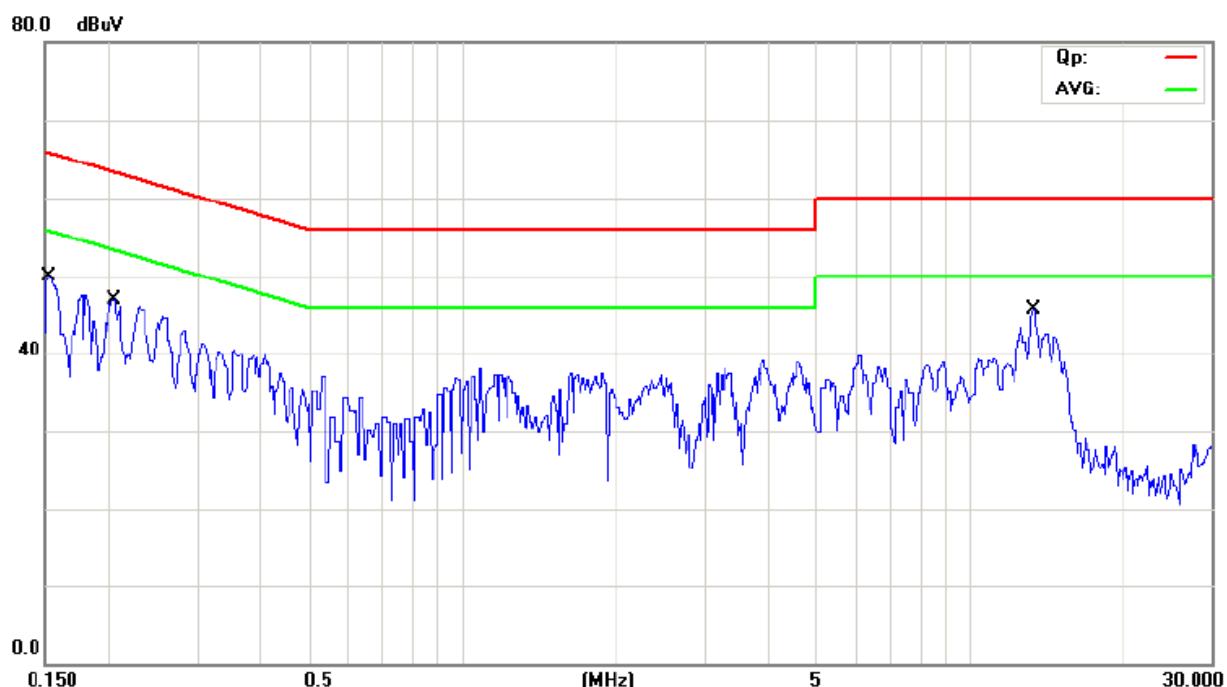
Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

EUT set Condition: Keep Transmitting

Equipment Level: Class B

Results: Pass

Please refer to following diagram for individual



Frequency (MHz)	Line	Reading(dB μ V)		Limit(dB μ V)	
		Quasi-peak	Average	Quasi-peak	Average
0.152	Neutral	49.88	38.52	65.86	55.86
0.205	Neutral	46.99	34.18	63.40	53.40
13.375	Neutral	45.70	31.51	60.00	50.00

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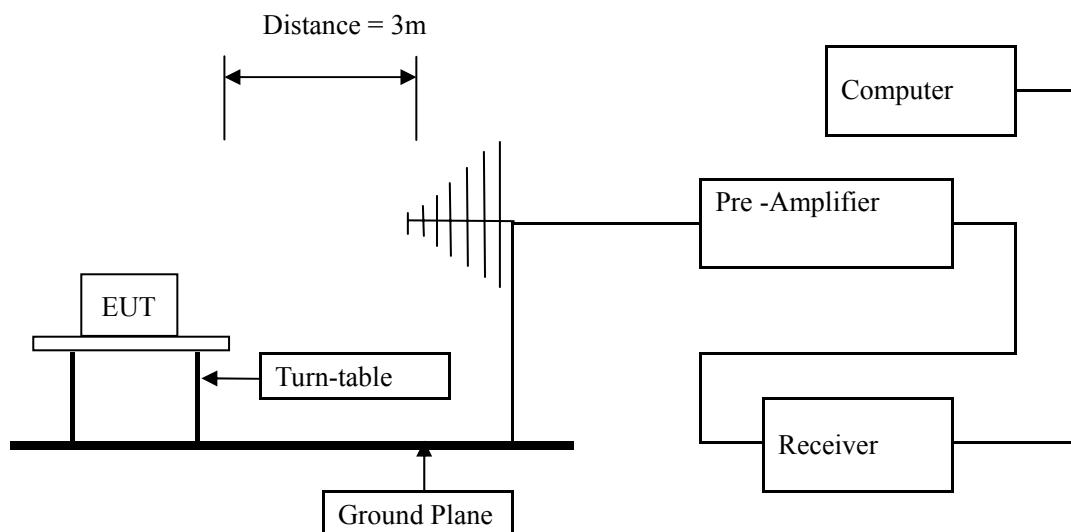


6 Radiated Emission Test

6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.4 –2003. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2003.
- (3) The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings except for Fundamental radiated emissions are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . For Fundamental radiated emissions, the RBW is 3MHz. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) The antenna polarization : Vertical polarization and Horizontal polarization.

Block diagram of Test setup



6.2 Configuration of The EUT

Same as section 5.3 of this report

6.3 EUT Operating Condition

Same as section 5.4 of this report.

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6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

A FCC Part 15 Subpart C Paragraph 15.249(a) Limit

Fundamental Frequency (MHz)	Field Strength of Fundamental (3m)		Field Strength of Harmonics (3m)	
	mV/m	dBuV/m	uV/m	dBuV/m
2400-2483.5	50	94 (Average)	114 (Peak)	500

Note:

1. RF Field Strength (dBuV) = $20 \log \text{RF Voltage (uV)}$
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

B. Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

1. RF Voltage (dBuV) = $20 \log \text{RF Voltage (uV)}$
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
4. All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz. As to 1G-25G, the final emission level got using PK and AV detector.

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6.5 Test result

A Fundamental & Harmonics Radiated Emission Data

Product:	Multi-Function Remote	Test Mode:	Low Channel- keep transmitting
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	5.0VDC	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2402	86.13 (PK)	H	114/94	-7.87
2402	83.76 (PK)	V	114/94	-10.24
4804	--	H/V	74/54	--
7206	--	H/V	74/54	--
9608	--	H/V	74/54	--
12010	--	H/V	74/54	--
14412	--	H/V	74/54	--
16814	--	H/V	74/54	--
19216	--	H/V	74/54	--
21618	--	H/V	74/54	--
24020	--	H/V	74/54	--

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Product:	Multi-Function Remote	Test Mode:	Middle Channel- keep transmitting
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	5.0VDC	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2441	81.33 (PK)	H	114/94	-12.67
2441	83.56 (PK)	V	114/94	-10.44
4882	--	H	74/54	--
7323	--	V	74/54	--
9764	--	H/V	74/54	--
12205	--	H/V	74/54	--
14646	--	H/V	74/54	--
17087	--	H/V	74/54	--
19528	--	H/V	74/54	--
21969	--	H/V	74/54	--
24410	--	H/V	74/54	--

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Product:	Multi-Function Remote	Test Mode:	High Channel- keep transmitting
Test Item:	Fundamental Radiated Emission Data	Temperature:	25°C
Test Voltage:	5.0VDC	Humidity:	56%
Test Result:	Pass		

Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
2480	81.62 (PK)	V	114/94	-12.38
2480	84.69 (PK)	H	114/94	-9.31
4960	--	H/V	74/54	--
7440	--	H/V	74/54	--
9920	--	H/V	74/54	--
12400	--	H/V	74/54	--
14880	--	H/V	74/54	--
17360	--	H/V	74/54	--
19840	--	H/V	74/54	--
22320	--	H/V	74/54	--
24800	--	H/V	74/54	--

Note: (1) PK= Peak, AV= Average

(2) Emission Level = Reading Level + Antenna Factor + Cable Loss.

(3) Margin=Emission-Limits

(4) According to section 15.35(b), the peak limit is 20dB higher than the average limit

(5) The measured PK value less than the AV limit.

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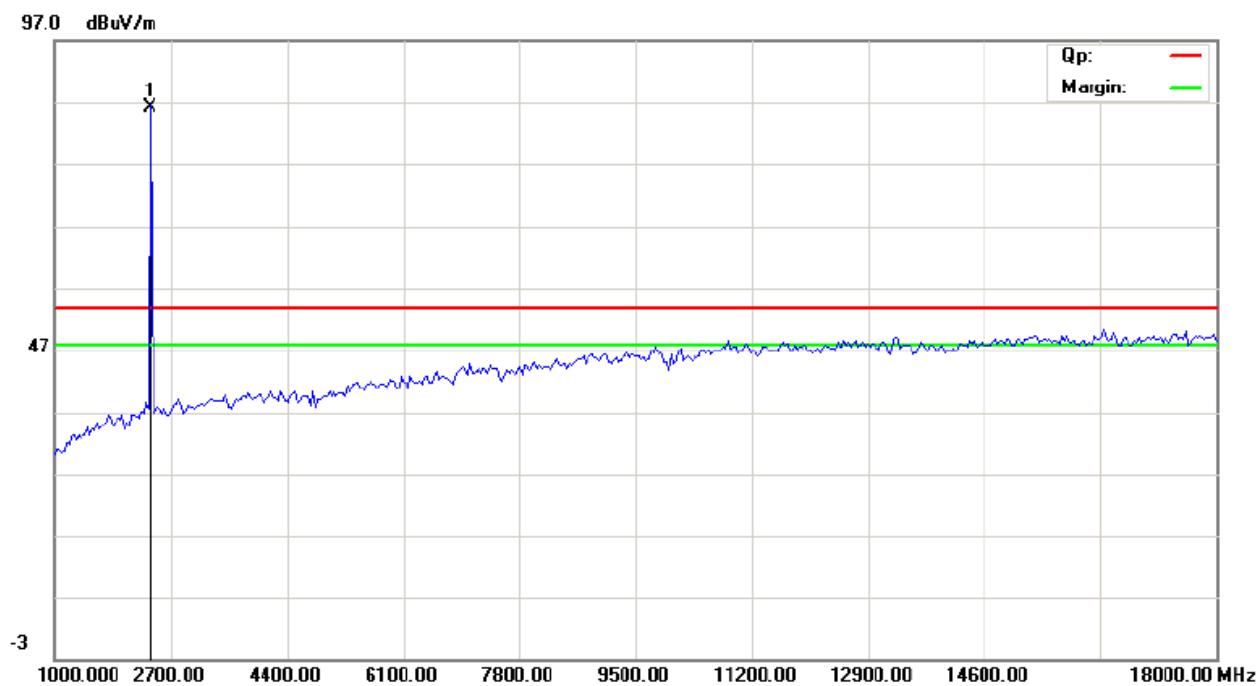
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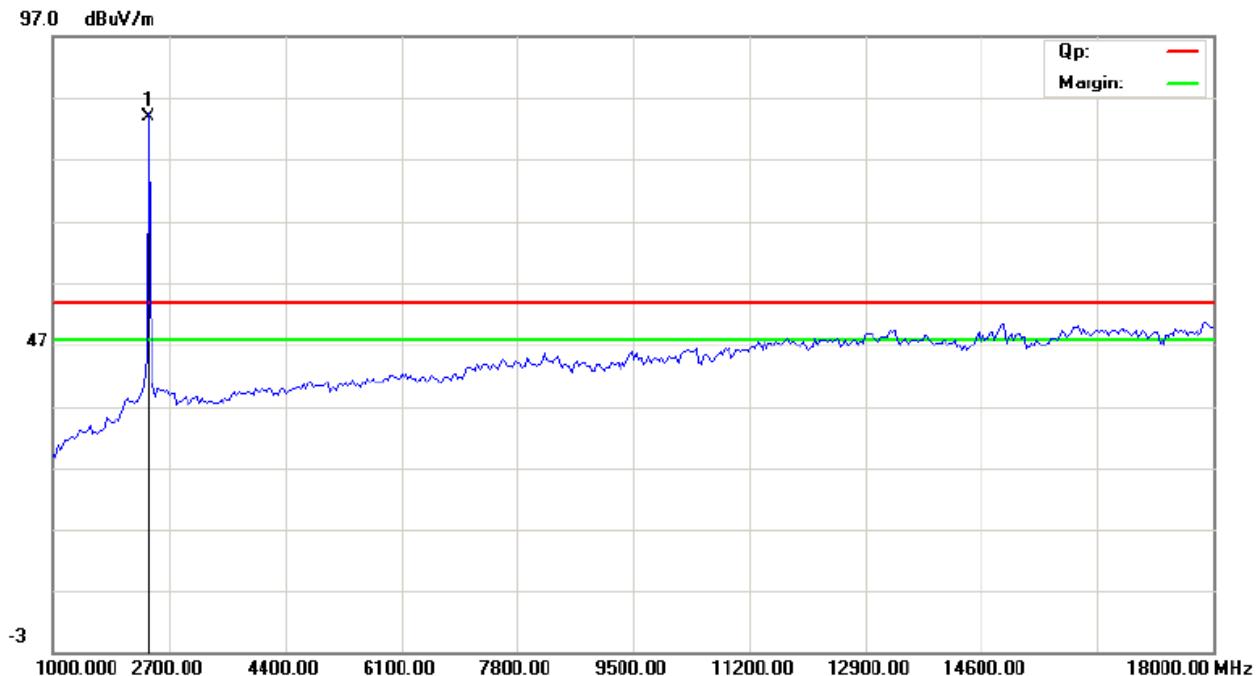


Please refer to the following test plots for details:

Low Channel: Horizontal



Low Channel : Vertical



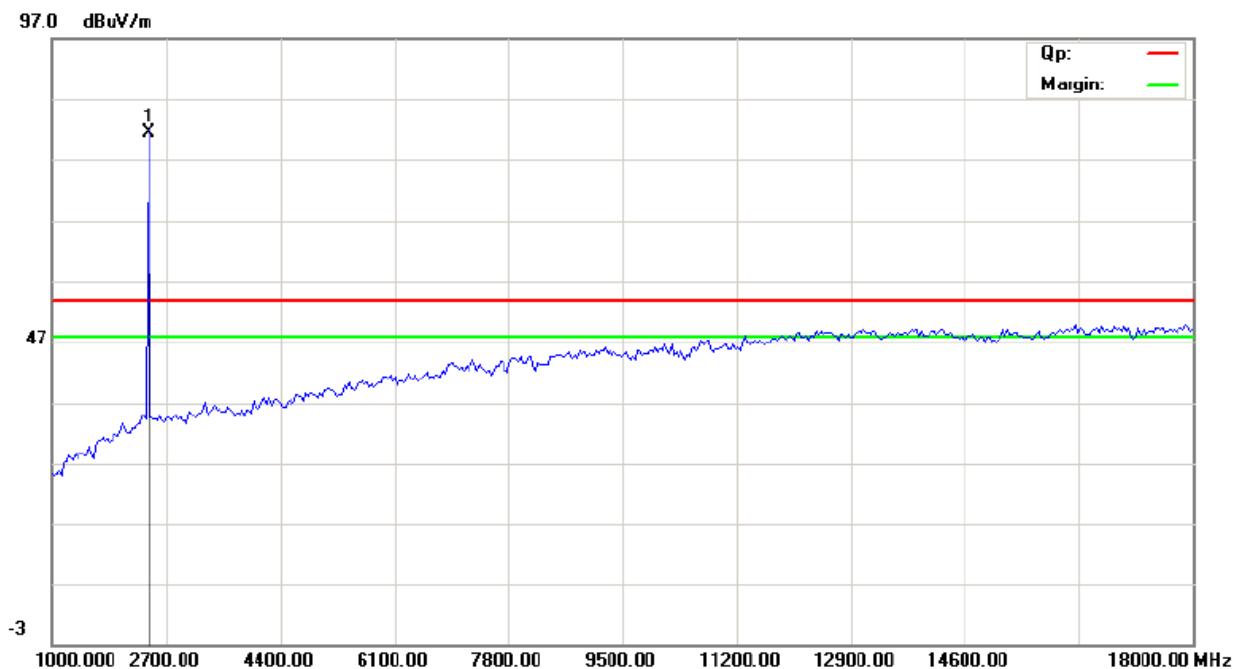
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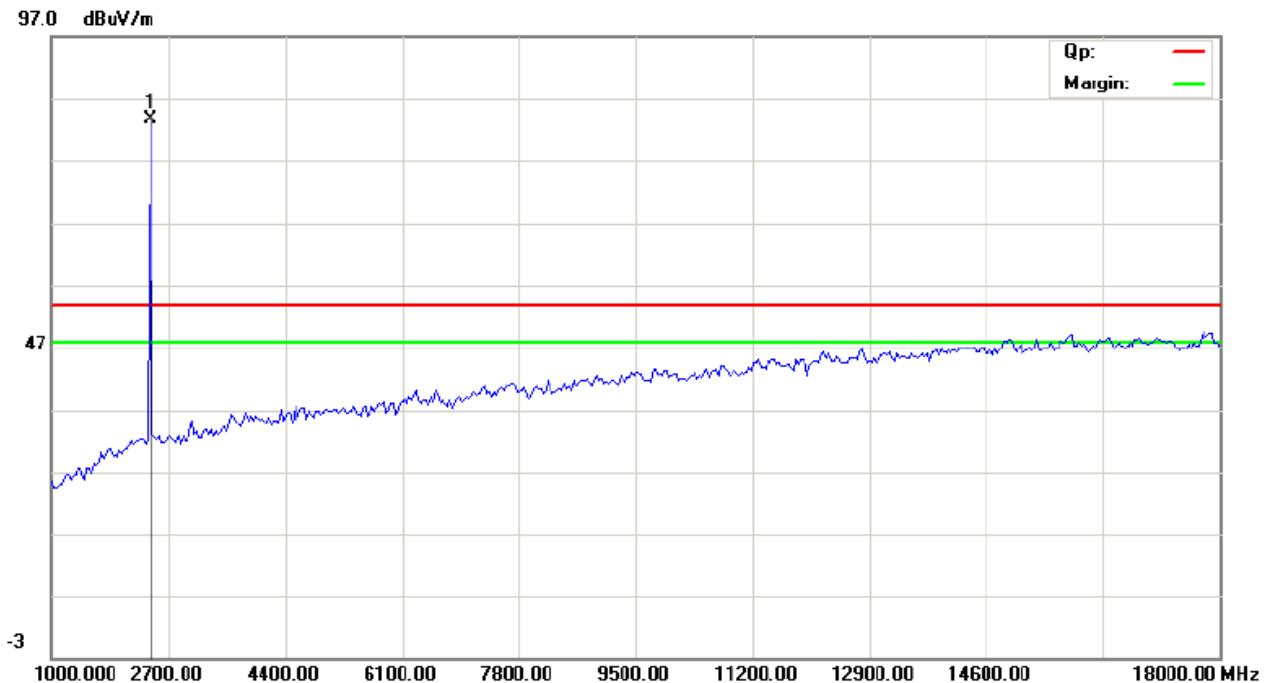
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Middle Channel : Horizontal



Middle Channel : Vertical



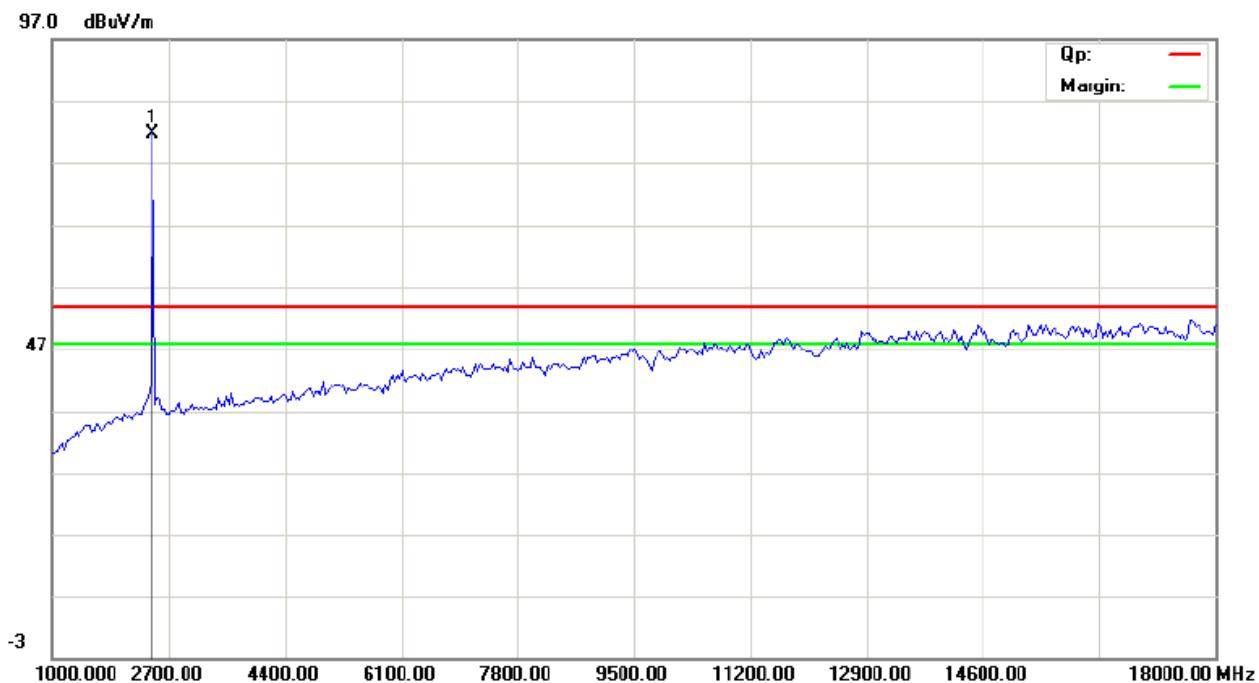
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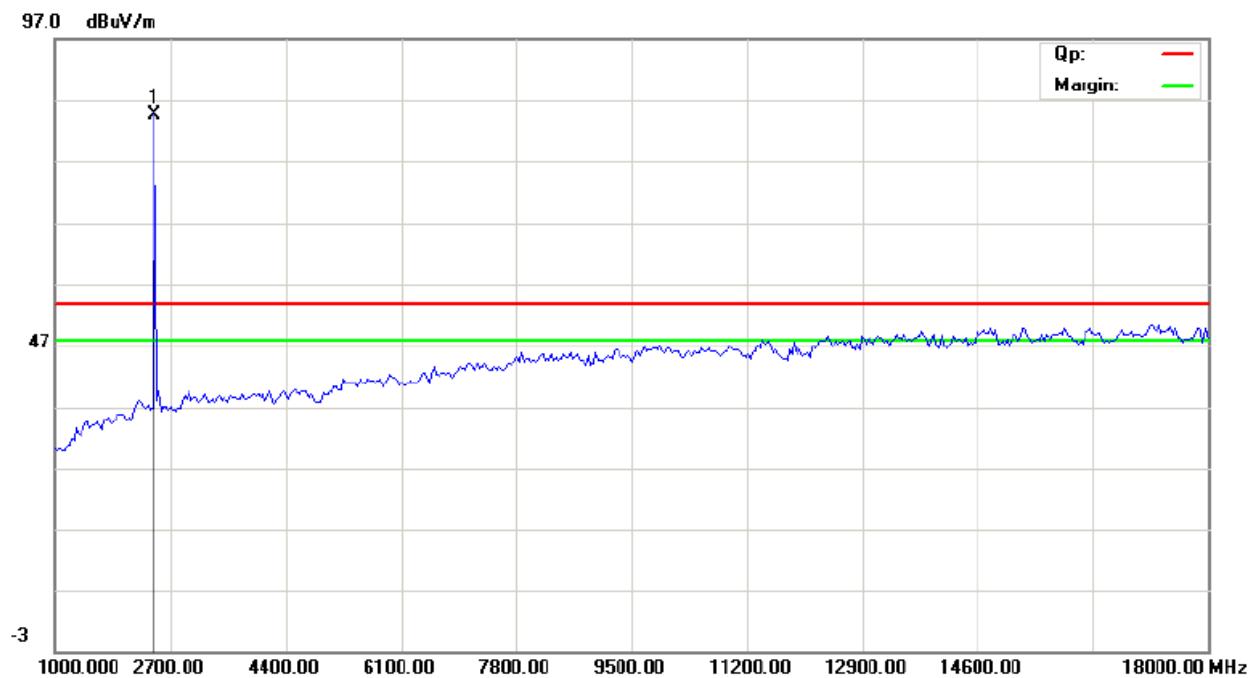
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High Channel : Horizontal



High Channel : Vertical



Note: for the radiated emissions from 18-25GHz, it was the floor noise.

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B. General Radiated Emission Data

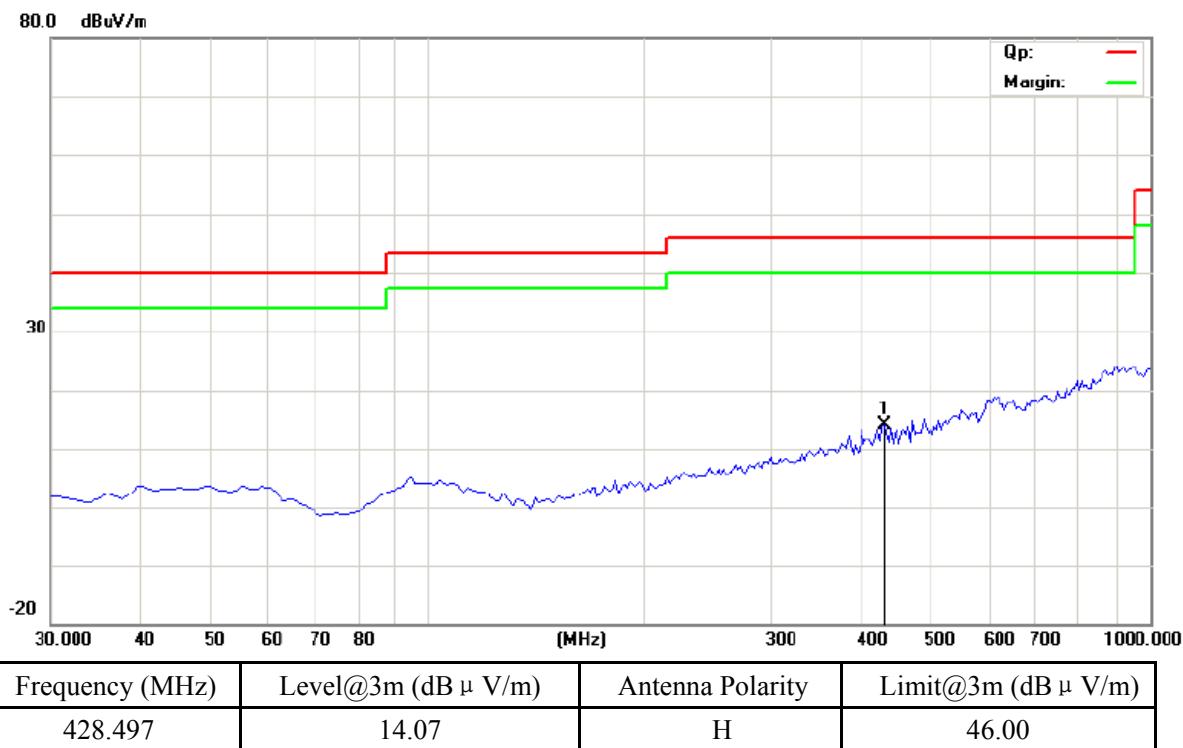
Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: **Keep Transmitting**

Mode: Low Channel

Results: Pass

Please refer to following diagram for individual



Note: Low Channel was the worse case

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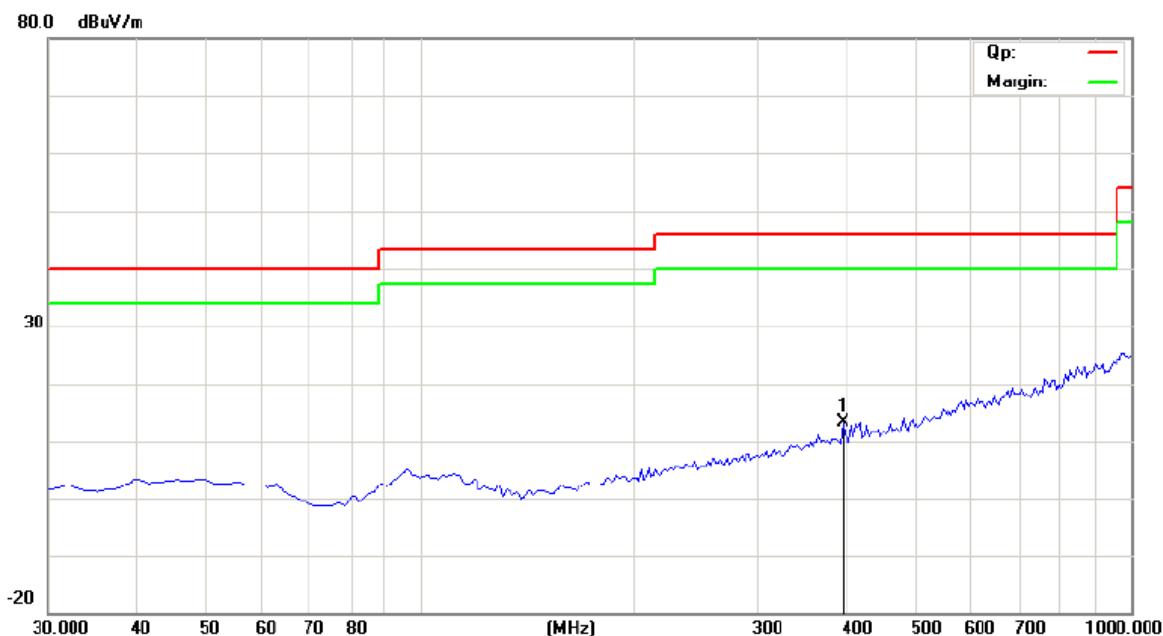
Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: **Keep Transmitting**

Mode: Low Channel

Results: Pass

Please refer to following diagram for individual



Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
393.507	13.41	V	46.00

Note: Low Channel was the worse case

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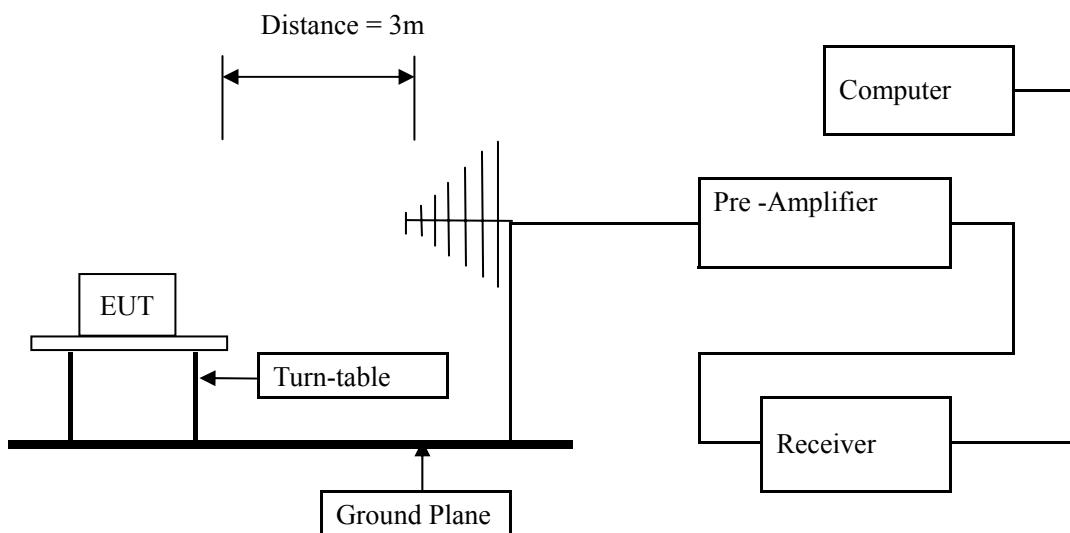


7. Band Edge

7.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.4 –2003. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988
- (2) Set Spectrum as RBW=VBW=1MHz and Peak detector used
- (3) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (4) The antenna polarization: Vertical polarization and Horizontal polarization.

7.2 Radiated Test Setup



For the actual test configuration , please refer to the related items – Photos of Testing

7.3 Configuration of The EUT

Same as section 5.3 of this report

7.4 EUT Operating Condition

Same as section 5.4 of this report.

7.5 Band Edge Limit

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.

Remark: low, mid and high channel all have been tested; only worse case is reported.

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7.6 Test Result

Horizontal

Product:	Multi-Function Remote		Test Mode:	Low Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC5.0V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2400MHz	PK (dB μ V/m)	44.38	Limit	74(dB μ V/m)
	AV(dB μ V/m)	33.23		54(dB μ V/m)
2390MHz	PK (dB μ V/m)	39.12	Limit	74(dB μ V/m)
	AV(dB μ V/m)	--		54(dB μ V/m)

Vertical

Product:	Multi-Function Remote		Test Mode:	Low Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC5.0V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2400MHz	PK (dB μ V/m)	45.72	Limit	74(dB μ V/m)
	AV(dB μ V/m)	33.89		54(dB μ V/m)
2390MHz	PK (dB μ V/m)	40.25	Limit	74(dB μ V/m)
	AV(dB μ V/m)	--		54(dB μ V/m)

Horizontal

Product:	Multi-Function Remote		Test Mode:	High Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC5.0V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.5MHz	PK (dB μ V/m)	40.83	Limit	74(dB μ V/m)
	AV(dB μ V/m)	--		54(dB μ V/m)

Vertical

Product:	Multi-Function Remote		Test Mode:	High Channel- keep transmitting
Mode	Keeping Transmitting		Test Voltage	DC5.0V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
2483.5MHz	PK (dB μ V/m)	41.24	Limit	74(dB μ V/m)

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8.0 Antenna Requirement

Applicable Standard

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.

This product has integral permanent antenna, fulfill the requirement of this section.

PCB antenna with Gain 0dBi was used.

Test Result: Pass

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9.0 20dB Bandwidth Measurement

Product:	Multi-Function Remote	Test Mode:	Low Channel- keep transmitting
Mode	Keeping Transmitting	Test Voltage	DC5.0V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	906kHz	--	--



Date: 12.DEC.2012 19:19:29

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9.1 20dB Bandwidth Measurement

Product:	Multi-Function Remote	Test Mode:	Middle Channel- keep transmitting
Mode	Keeping Transmitting	Test Voltage	DC5.0V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	1.338MHz	--	--
<p>Date: 12.DEC.2012 19:15:08</p>			

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9.2 20dB Bandwidth Measurement

Product:	Multi-Function Remote	Test Mode:	High Channel- keep transmitting
Mode	Keeping Transmitting	Test Voltage	DC5.0V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK
20dB Bandwidth	1.176MHz	--	--



Date: 12.DEC.2012 19:17:37

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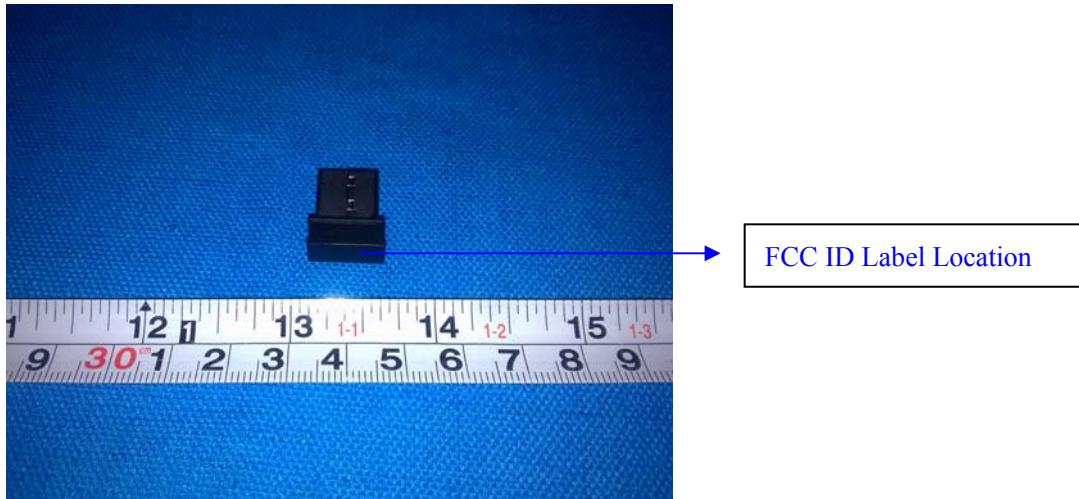
10.0 FCC ID Label

FCC ID: QZVCZ-DG-AF100

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



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11.0 Photo of testing

11.1 Conducted test View--



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11.2 Radiated emission test view



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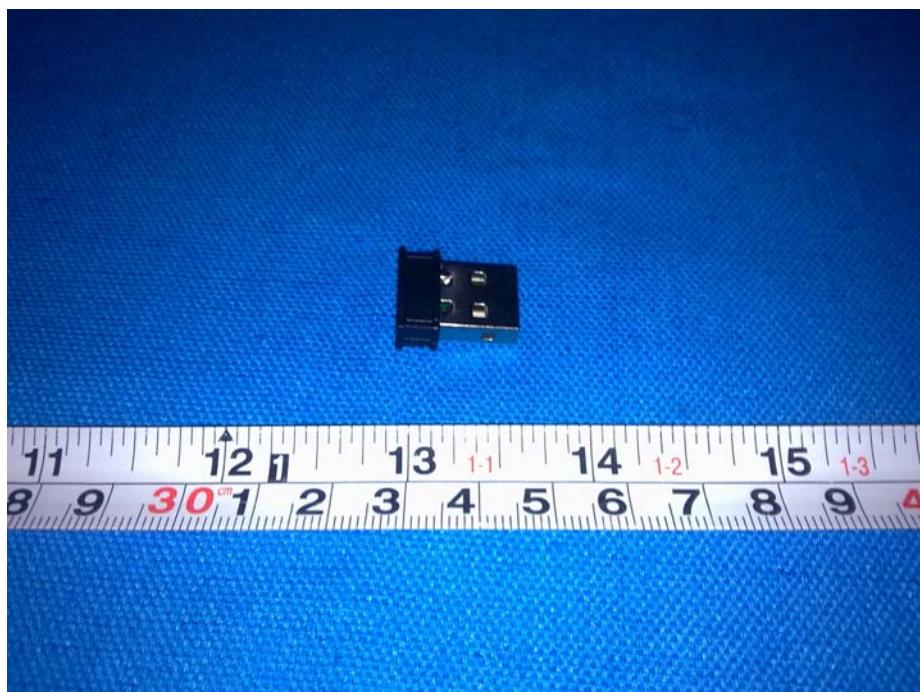
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11.3 Photographs - EUT

Outside View—



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Interior View—



End of the report

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