FCC PART 15.249 EMI MEASUREMENT AND TEST REPORT

For

Ezkey Corp.

4F-2,No.799,Zhongzheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan, R.O.C.

FCC ID:2ACAMTAB-88

April 23, 2014

This Report Concerns: **Equipment Type:** Original Report Bluetooth Keyboard Lisa Chan Test Engineer: Lisa Chen Report No.: BSL14045142Y-1ER-3 April 16, 2014/ Receive EUT Date/Test Date: April 16 - April 23, 2014 Reviewed By: Sky Zhang **BSL Testing Co.,LTD.** NO. 24, ZH Park, Nantou, Shenzhen, 518000 China Prepared By: Tel: 86-755-26508703 Fax: 86-755-26508703

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1. GENERAL INFORMATION

1.1. Report information

- 1.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that BSL approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that BSL in any way guarantees the later performance of the product/equipment.
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- 1.1.3.Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through BSL, unless the applicant has authorized BSL in writing to do so.

Test Facility -

The test site used to collect the radiated data is located on the address of

BSL Testing Co.,LTD.

(FCC Registered Test Site Number: 191509) on

NO. 24, ZH Park, Nantou, Shenzhen, 518000 China

The Test Site is constructed and calibrated to meet the FCC requirements.

1.2. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	Uncertainty
1	Conducted Emission Test	+/-1.25dB
2	RF Power, Conducted	+/-0.20dB
3	Spurious emissions, conducted	+/-0.33dB
4	All emissions, radiated (<1G)	+/-3.47dB
5	All emissions, radiated (>1G)	+/-3.82dB
6	Temperature	+/-0.5°CdB
7	Humidity	+/-2%

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2. PRODUCT DESCRIPTION

2.1. EUT Description

Description : Bluetooth Keyboard

Applicant : Ezkey Corp.

4F-2,No.799,Zhongzheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan, R.O.C.

Manufacturer : Eytech Corp

No.3 GuiHua Rd, WenZaiKeng Industrial Zone TangXiaYong Willage SonGang

Town BaoAn Distriet ShenZhen City

Model Number : TAB-88, C301

Modulation type : GFSK Antenna gain : 0dBi

Frequency : 2402-2480MHz Number of Channels : 79 Channels

BT version : 2.1

Power Supply : Transmitting:DC 3.7V By battery (fully charged battery is used

during the measurement)

		Channe	el List		
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

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2.2. Block Diagram of EUT Configuration

Radiated emissions test

EUT

Figure 1 EUT Setup

2.3. Support Equipment List

Name	Model No	S/N	Manufacturer	Used (Y/N)

2.4. Test Conditions

Items		Required (IEC 68-1)	Actual	
Temperature (°	C)	15-35	20-25	
Humidity (%R)	H)	25-75	50-63	
Barometric	pressure	860-1060	950-1000	
(mbar)	_			

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3. TEST RESULTS SUMMARY

FCC 15 Subpart C, Paragraph 15.249:2013

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission	Compliant
Section 15.249(a)	The fundamental field strength and the harmonics	Compliant
Section 15.209 Section 15.249(d)	Radiated Emission	Compliant
Section 15.249(d)	Band Edge	Compliant
Section 15.203	Antenna Requirement	Compliant
Section 15.249	20dB Bandwidth	Compliant

Remark: "N/A" means "Not applicable".

Statement: All testing was performed using the test procedures found in ANSI C63.4-2003.

Modifications

No modification was made.

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4. TEST EQUIPMENT USED

EQUIPMENT/FACIL ITIES	MANUFACTURE R	MODEL	SERIAL NO.	DATE OF CAL.	CAL. INTERV AL
3m Semi-Anechoic Chamber	Chengyu Electron	9 (L)*6 (W)* 6 (H)	BSL086	Aug. 23 2013	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCI3	BSL001	Sep. 28 2013	1 Year
BiConiLog Antenna	Rohde & Schwarz	HL562	BSL009	Sep. 28 2013	1 Year
Double -ridged waveguide horn	Rohde & Schwarz	9120D	BSL008	Aug. 27 2013	1 Year
Horn Antenna	ETS-LINDGREN	3160	BSL072	Dec. 28 2013	1 Year
Cable	Rohde & Schwarz	N/A	BSL045	Aug. 27 2013	1 Year
Cable	Rohde & Schwarz	N/A	BSL046	Aug. 27 2013	1 Year
Cable	Rohde & Schwarz	N/A	BSL047	Aug. 27 2013	1 Year
Amplifier(100kHz-40G Hz)	R&S	SMR40	BSL007	Sep. 28 2013	1 Year
Band filter	Amindeon	82346	BSL049	Aug. 27 2013	1 Year
Active Loop Antenna	EMTES	EM15	BSL011	Sep. 28 2013	1 Year
Coaxial Switch	YUANFANG	TA218B	BSL004	Aug. 27 2013	1 Year
Spectrum analyzer	Rohde & Schwarz	FSP40	BSL049	Sep. 28 2013	1 Year
Shielding Room	zhongyu Electron	7.0(L)x3.0(W)x3.0(H)	BSL085	Sep. 28 2013	1 Year
EMI Test Receiver	R&S	ESPI	BSL002	Sep. 28 2013	1 Year
10dB Pulse Limita	R&S	N/A	BSL003	Sep. 28 2013	1 Year
Coaxial Switch	YUANFANG	TA218B	BSL004	Aug. 27 2013	1 Year
LISN	Rohde & Schwarz	ESH3-Y5	BSL005	Sep. 28 2013	1 Year
Coaxial Cable	YUANFANG	N/A	BSL048	Aug. 27 2013	1 Year
EMI TEST SOFTWARE	AUDIX	Е3	N/A	N/A	N/A

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5. ANTENNA REQUIREMENT

5.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

5.2. Antenna Connected Construction

According to § 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The antenna used in this product is PCB antenna. The antenna is permanently attached. Refer to the product photo.

5.3. Result

Compliance

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6. CONDUCTED POWER LINE TEST

6.1. Test Equipment

Please refer to section 4 this report.

6.2. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uh coupling inpedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uh coupling inpedance with 50ohm termination.

Both sides of A.C. Line are check for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ASIN C63.4:2003 on conducted measurement. Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

6.3. Test Setup



For the actual test configuration, Please refer to the related items-Photos of testing

6.4. Conducted Power line Emission Limits

FCC Part 15 Paragraph 15.207 (dBuV)					
Frequency Range (MHZ)	Class A QP/AV	Class B QP/AV			
0.15-0.5	79/66	65-56/56-46			
0.5-5.0	73/60	56-46			
5.0-3.0	73/60	60-50			

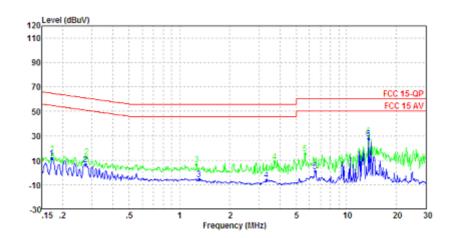
Note: In the above table, the tighter limit applies at the band edges.

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6.5. Conducted Power Line Test Result

PASS

Link Mode

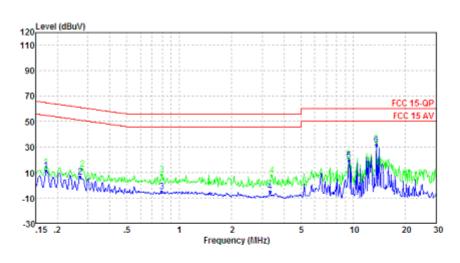


Condition: : RBW:9.000KHz VBW:30.000KHz

	Freq	Level	Limit	Limit	Renark	Pol/Phase
	MHz	dBu∀	dBu∀	₫₿		
1 2 3 4 5	0. 17 0. 27 1. 31 3. 33 6. 49 13. 55		50, 98 46, 00 46, 00 50, 00	-44.45 -51.54 -51.96 -48.92	Average Average Average Average Average Average	LINE LINE LINE LINE LINE LINE

Condi t		W:9.00	OKHz V	BW:30.	000KHz	
	Freq	Level	Line	Limit	Renark	Pol/Phase
_	MHz	dBu∀	dBuV	₫B		
1 2 3 4 5	0. 17 0. 28 1. 27 3. 72 5. 65 13. 55	15, 33 12, 74 6, 70 8, 64 15, 27 29, 89	60, 90 56, 00 56, 00 60, 00	-49, 44 -48, 16 -49, 30 -47, 36 -44, 73 -30, 11	QP QP QP QP	LINE LINE LINE LINE LINE LINE

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Condi	: RB	W:9.00 Level	Linit	Over	000KHz Renark	Pol/Phase
	MHz	dBuV	dBuV	₫B		
1 2 3 4 5	0. 17 0. 27 0. 80 3. 33 9. 45 13. 55	11.56 6.65 -5.34 -5.31 19.11 31.56	51.12 46.00 46.00 50.00	-44.47 -51.34 -51.31 -30.89	Average Average Average Average Average Average	NEUTRAL NEUTRAL NEUTRAL NEUTRAL NEUTRAL NEUTRAL

Condition: : RBW:9.000KHz VBW:30.000KHz Limit Over							
	Freq	Level		Limit	Renark	Pol/Phase	
-	MHz	dBu∀	₫₿u₹	ab			
1 2 3 4 5	0. 17 0. 28 0. 80 3. 40 9. 45 13. 55	14.35 12.42 8.22 7.76 20.26 32.64	60.90 56.00 56.00 60.00	-50, 51 -48, 48 -47, 78 -48, 24 -39, 74 -27, 36	QP QP QP QP	NEUTRAL NEUTRAL NEUTRAL NEUTRAL NEUTRAL NEUTRAL	

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7. RADIATED EMISSION TEST

7.1. Test Equipment

Please refer to section 4 this report.

7.2. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level.

Calibrated Loop antenna is used as receiving antenna for frequencies below 30MHz, Calibrated Bilog antenna is used as receiving antenna for frequencies between 30 MHz and 1 GHz, Calibrated Horn antenna is used as receiving antenna for frequencies above 1000MHz. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.

The bandwidth of test receiver is set at 9kHz in below 30MHz. and set at 120kHz in 30-1000MHz, and 1MHz in above 1000MHz.

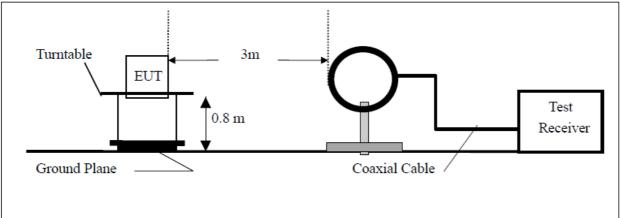
The frequency range from 9kHz to 25GHz is checked.

The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Peak detector and Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

Through three orthogonal axes to determine which attitude and equipment arrangement produces the highest emission relative to the limit. And X direction is worst mode

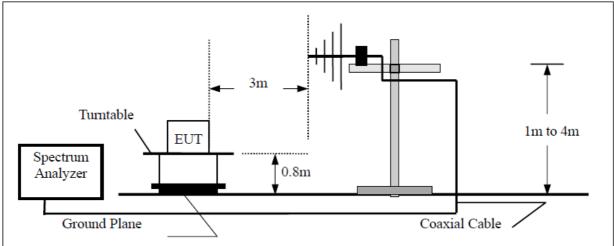
7.3. Radiated Test Setup

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz

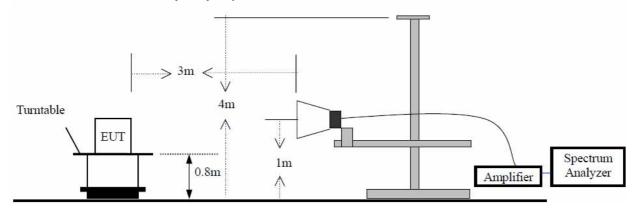


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(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



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7.4. 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. Fundamental and Harmonics Radiated Emissions 15.249(a) Limit

Fundamental Frequency	Field as trength of Fundamental(3m)			Field as trength of Harmonics(3m)		
(MHZ)	mV/m	dBuV/m	dBuV/m		dBuV/m	
902-928	50	94(AV)	114(Peak)	500	54(AV)	74(Peak)
2400-2483.5	50	94(AV)	114(Peak)	500	54(AV)	74(Peak)

Note: (1) RF Voltage (dBuV)=20 log 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 os based on measurement instrumentation employing an average detector. Measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

B. Spurious Radiated Emissions.

		Limit							
Frequency (MHz)	Field Strength of Quasi-peak Value (microvolts/m)	Field Strength of Quasi-peak Value (dBµV/m)	Measurement distance (m)	The final measurement in band 9-90kHz,					
0.009 - 0.490	2400/F(kHz)	/	300	110-490kHz and above 1000MHz is					
0.490 - 1.705	24000/F(kHz)	/	30	performed with					
1.705-30	30	29.5	30	Average detector. Except those					
30 - 88	100	40	3	frequency bands mention above, the					
88 - 216	150	43.5	3	final measurement for frequencies					
216 - 960	200	46	3	below 1000MHz is					
Above 960	500	54	3	performed with Quasi Peak detector.					

Note: (1) RF Voltage (dBuV)=20 log Voltage(uV)

- (2) In the Above Table, the tighter limit applies at the band edges.
- (3) Distagnce refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

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7.5. Radiated Emission Test Result

Pass

A. Fundamental Radiated Emissions Data

CH Low

Freq. (MHz)	Read Level (dBuV) AV/PK	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission (dBuV/m) AV/PK	HORIZ/ VERT	Limits (dBuV/m) AV/PK	Margin (dB)
2402	64.61/86.66	27.47	5.42	30.17	67.33/89.38	VERT	94/114	-26.67/-24.62
2402	70.97/87.56	27.47	5.42	30.17	73.69/90.28	HORIZ	94/114	-20.31/-23.72

CH Middle

Freq. (MHz)	Read Level (dBuV) AV/PK	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission (dBuV/m) AV/PK	HORIZ/ VERT	Limits (dBuV/m) AV/PK	Margin (dB)
2441	65.87/87.04	27.40	5.40	30.15	68.52/89.69	VERT	94/114	-25.48/-24.31
2441	72.04/88.28	27.40	5.40	30.15	74.69/90.93	HORIZ	94/114	-19.31/-23.07

CH High

Freq. (MHz)	Read Level (dBuV) AV/PK	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission (dBuV/m) AV/PK	HORIZ/ VERT	Limits (dBuV/m) AV/PK	Margin (dB)
2480	66.25/87.65	27.50	5.46	29.98	69.23/90.63	VERT	94/114	-24.77/-23.37
2480	73.51/89.56	27.50	5.46	29.98	76.49/92.54	HORIZ	94/114	-17.51/-21.46

Remark:

 $Final\ Emission = Receiver\ Read\ level + Antenna\ Factor + Cable\ Loss - Preamplifier\ Factor$

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B. General Radiated Emissions Data

For below 9kHz-30MHz Spurious

Freq. (MHz)	Emission(dBuV/m) PK / AV	Limits(dBuV/m) PK / AV	Margin (dB)
-	-	-	-
-	-	-	-

N	<u></u>	tο

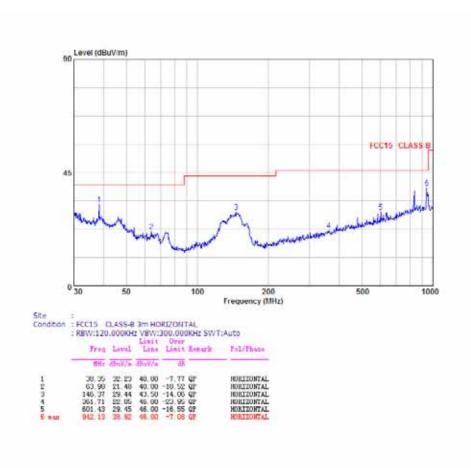
Emissions attenuated more than 20 dB below the permissible value are not reported.

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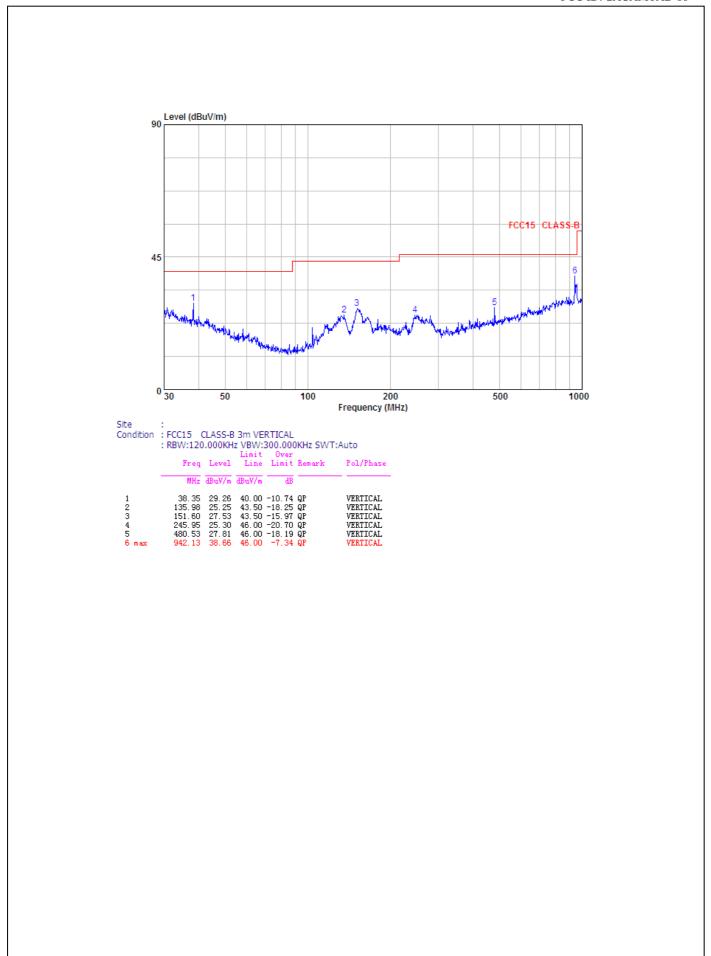
For 30M-1000MHz Spurious

Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

2402MHz Transmitting(Worst case mode)



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For 1000MHz-25000MHz Spurious

CH Low

Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)
4804	42.61/54.26		54.0/74.0	-11.39/-19.74
7206	46.23/60.35	VERT	54.0/74.0	-7.77/-13.65
9608	41.54/56.92		54.0/74.0	-12.46/-17.08
4804	42.16/55.89		54.0/74.0	-11.84/-18.11
7206	46.82/62.36	HORIZ	54.0/74.0	-7.18/-11.64
9608	42.36/56.63		54.0/74.0	-11.64/-17.37

CH Middle

Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)
4882	41.29/54.46		54.0/74.0	-12.71/-19.54
7323	45.36/61.46	VERT	54.0/74.0	-8.64/-12.54
9764	42.36/55.59		54.0/74.0	-11.64/-18.41
4882	42.93/53.29		54.0/74.0	-11.07/-20.71
7323	46.06/63.50	HORIZ	54.0/74.0	-7.94/-10.5
9764	42.69/58.93		54.0/74.0	-11.31/-15.07

CH High

-11	5				
	Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)
	4960	43.62/54.89		54.0/74.0	-10.38/-19.11
	7440	47.03/62.16	VERT	54.0/74.0	-6.97/-11.84
	9920	41.39/57.90		54.0/74.0	-12.61/-16.1
	4960	42.36/55.49		54.0/74.0	-11.64/-18.51
	7440	47.09/63.29	HORIZ	54.0/74.0	-6.91/-10.71
	9920	43.58/59.32		54.0/74.0	-10.42/-14.68

Note:

- 1. The average measurement was not performed when the peak measured data under the limit of average detection.
- 2. Emissions attenuated more than 20 dB below the permissible value are not reported.

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8. BAND EDGE

8.1. Test Equipment

Please refer to Section 4 this report.

8.2. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement. The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz respectively.

8.3. Band Edge FCC 15.249(d) Limit

Emissions radiate	ed outside of the sp	ecified frequency b	oands, except for	r harmonics,	shall be attenuated	by at least 50 dB	below the level
of the fundamenta	al or to the general	radiated emission l	limits in Section	15.209, whi	chever is the lesser	attenuation.	

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8.4. Band Edge Test Result

Pass

ALL of the restriction bands were tested, and only the data of worst case was exhibited.

CH Low

Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)
2390	30.49/37.38		54.0/74.0	-23.51/-36.62
2400	29.96/36.52	VERT	54.0/74.0	-24.04/-37.48
2390	32.47/39.32		54.0/74.0	-21.53/-34.68
2400	31.09/38.46	HORIZ	54.0/74.0	-22.91/-35.54

CH High

· ₅					
Freq. (MHz)	Emission(dBuV/m) AV/PK	HORIZ/ VERT	Limits(dBuV/m) AV/PK	Margin (dB)	
2483.5	31.43/38.62		54.0/74.0	-22.57/-35.38	
2500.00	32.67/39.54	VERT	54.0/74.0	-21.33/-34.46	
2483.5	32.40/39.49		54.0/74.0	-21.60/-34.51	
2500.00	33.52/40.13	HORIZ	54.0/74.0	-20.48/-33.87	

Remark:

 $1.\ Factor = Antenna\ Factor + Cable\ Loss - Pre-amplifier.$

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9. 20-DB BANDWIDTH

9.1. Test Equipment

Please refer to Section 4 this report.

9.2. Test Procedure

- $1. \ Remove \ the \ antenna \ from \ the \ EUT \ and \ then \ connect \ a \ low \ loss \ RF \ cable \ from \ the \ antenna \ port \ to \ the \ spectrum \ analyzer.$
- 2. Set center frequency of spectrum analyzer = operating frequency.
- 3. The spectrum analyzer as RBW=30 KHz, VBW=100 KHz, Sweep=auto
- 4. Mark the peak frequency and -20 dB (upper and lower) frequency.

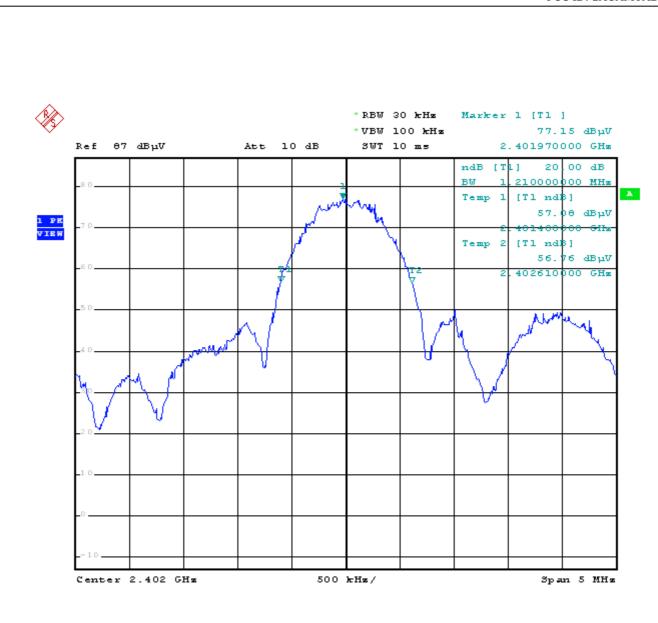
9.3. Limit

Please refer section 15.249

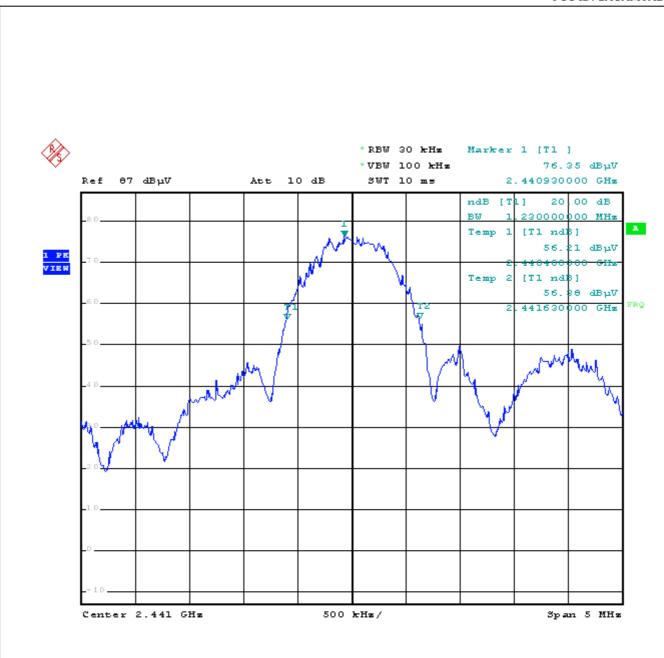
9.4. Test Result /Plots

Limit	Channel Frequency (MHz)	20dB Bandwidth (MHz)
/	2402	1.21
/	2441	1.23
/	2480	1.20

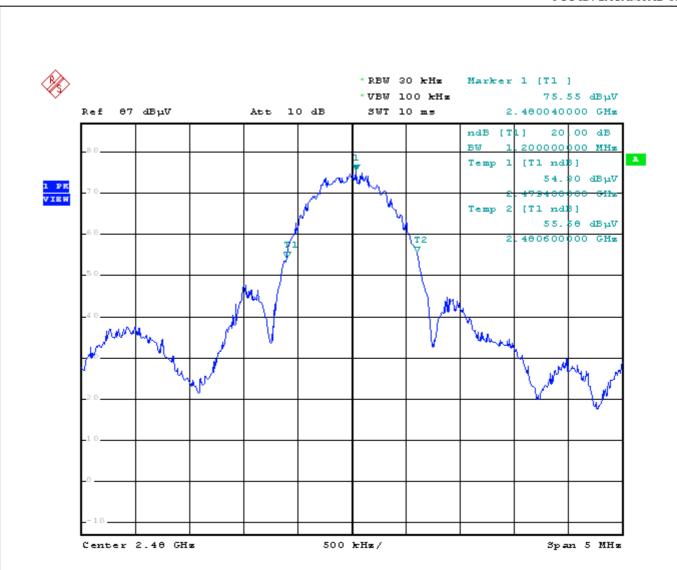
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End Of The Report

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