



## Test Report

Product Name	Smart Keypad
Model No.	KPD800
P/N	TSA04-0
FCC ID	FU5TSA04

Applicant	EVERSPRING INDUSTRY CO., LTD
Address	3F, No.50, Sec.1, Zhonghua Rd., Tucheng Dist., New Taipei City 23666,Taiwan

Date of Receipt	Apr. 17, 2012
Issued Date	Apr. 20, 2012
Report No.	124371R-RFUSP44V01
Report Version	V1.0



The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of Quietek Corporation.

This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

# Test Report Certification

Issued Date: Apr. 20, 2012

Report No.: 124371R-RFUSP44V01



Product Name	Smart Keypad
Applicant	EVERSPRING INDUSTRY CO., LTD
Address	3F, No.50, Sec.1, Zhonghua Rd., Tucheng Dist., New Taipei City 23666,Taiwan
Manufacturer	Dong-Guan Li Yuan Electronics Co.,Ltd
Model No.	KPD800
P/N	TSA04-0
EUT Rated Voltage	DC 3V(Power by battery)
EUT Test Voltage	DC 3V(Power by battery)
Trade Name	IRIS
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2010 ANSI C63.4: 2003
Test Result	Complied

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Documented By :



( Adm. Specialist / Joanne Lin )

Tested By :



( Assistant Engineer / Alan Chen )

Approved By :



( Manager / Vincent Lin )

## TABLE OF CONTENTS

Description	Page
<b>1. GENERAL INFORMATION .....</b>	<b>4</b>
1.1. EUT Description.....	4
1.2. Operational Description .....	6
1.3. Tested System Details.....	7
1.4. Configuration of Test System .....	7
1.5. EUT Exercise Software .....	7
1.6. Test Facility .....	8
<b>2. Radiated Emission .....</b>	<b>9</b>
2.1. Test Equipment.....	9
2.2. Test Setup .....	10
2.3. Limits .....	11
2.4. Test Procedure .....	11
2.5. Uncertainty .....	12
2.6. Test Result of Radiated Emission.....	13
<b>3. Band Edge .....</b>	<b>26</b>
3.1. Test Equipment.....	26
3.2. Test Setup .....	26
3.3. Limits .....	27
3.4. Test Procedure .....	27
3.5. Uncertainty .....	27
3.6. Test Result of Band Edge .....	28
<b>4. EMI Reduction Method During Compliance Testing .....</b>	<b>32</b>
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Smart Keypad
Trade Name	IRIS
Model No.	KPD800
FCC ID	FU5TSA04
P/N	TSA04-0
Frequency Range	2405~2475MHz
Channel Control	Auto
Channel Separation	5MHz
Antenna Type	Chip Antenna
Channel Number	15
Type of Modulation	DSSS

#### Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	muRata	LDA313G3313F-243	0.8dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203

#### Frequency of Each Channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2405 MHz	Channel 02:	2410 MHz	Channel 03:	2415 MHz	Channel 04:	2420 MHz
Channel 05:	2425 MHz	Channel 06:	2430 MHz	Channel 07:	2435 MHz	Channel 08:	2440 MHz
Channel 09:	2445 MHz	Channel 10:	2450 MHz	Channel 11:	2455 MHz	Channel 12:	2460 MHz
Channel 13:	2465 MHz	Channel 14:	2470 MHz	Channel 15:	2475 MHz		

## Note:

1. The EUT is a Smart Keypad with a built-in 2.4GHz Zigbee transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
4. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249 for spread spectrum devices.

Test Mode	Mode 1: Transmit
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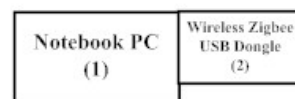
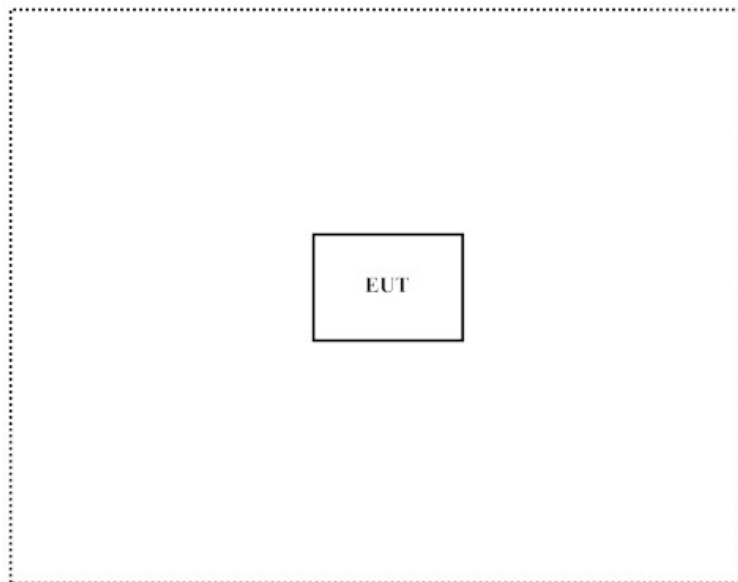
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
(1)	Notebook PC	DELL	PPT	N/A	Non-Shielded, 0.8m
(2)	Wireless Zigbee USB Dongle	EVERSPRING	KPD800	N/A	N/A

Signal Cable Type	Signal cable Description
N/A	

### 1.4. Configuration of Test System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) The EUT and the notebook will show the transmitting and receiving characteristics when the communication is success.
- (3) Execute “HyperTerminal.exe” on the Notebook.
- (4) Configure the test mode and the test channel.
- (5) Start the continuous Transmit.
- (6) Verify that the EUT works properly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site : <http://www.quietek.com/tw/ctg/cts/accreditations.htm>

The address and introduction of Quietek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

Site Description: File on  
 Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
 Columbia, MD 21046  
 Registration Number: 92195

Accreditation on NVLAP  
 NVLAP Lab Code: 200533-0

Site Name: Quietek Corporation  
 Site Address: No.5-22, Ruishukeng, Linkou Dist.,  
 New Taipei City 24451,  
 Taiwan, R.O.C.  
 TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789  
 E-Mail : [service@quietek.com](mailto:service@quietek.com)

FCC Accreditation Number: TW1014

## 2. Radiated Emission

### 2.1. Test Equipment

The following test equipment are used during the radiated emission test:

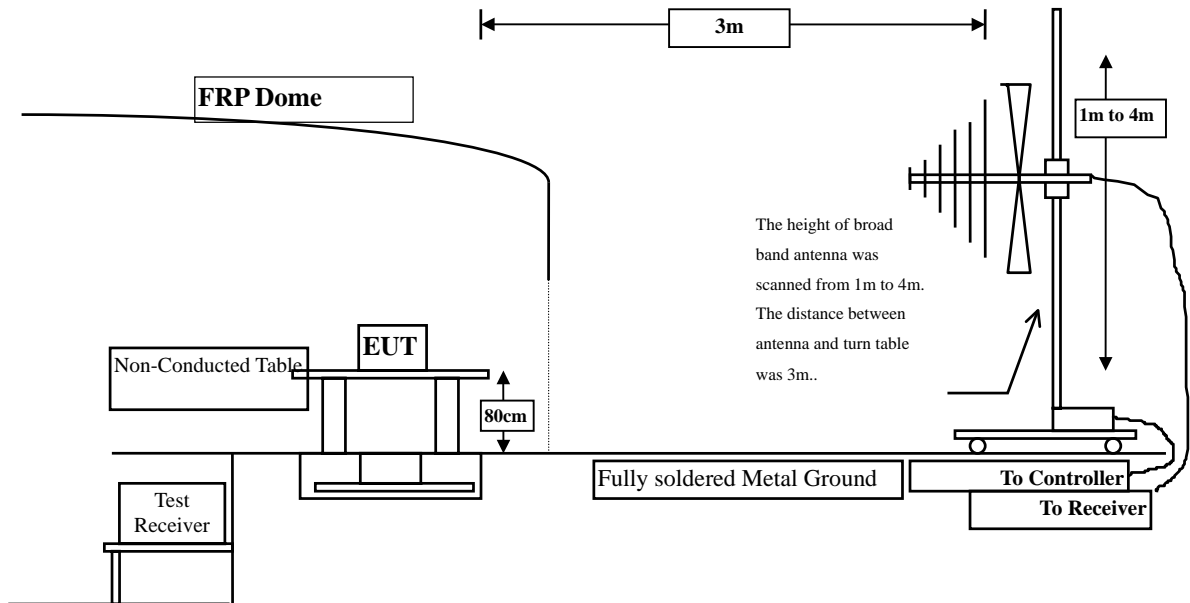
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2012
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2012
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
  2. The test instruments marked with "X" are used to measure the final test results.

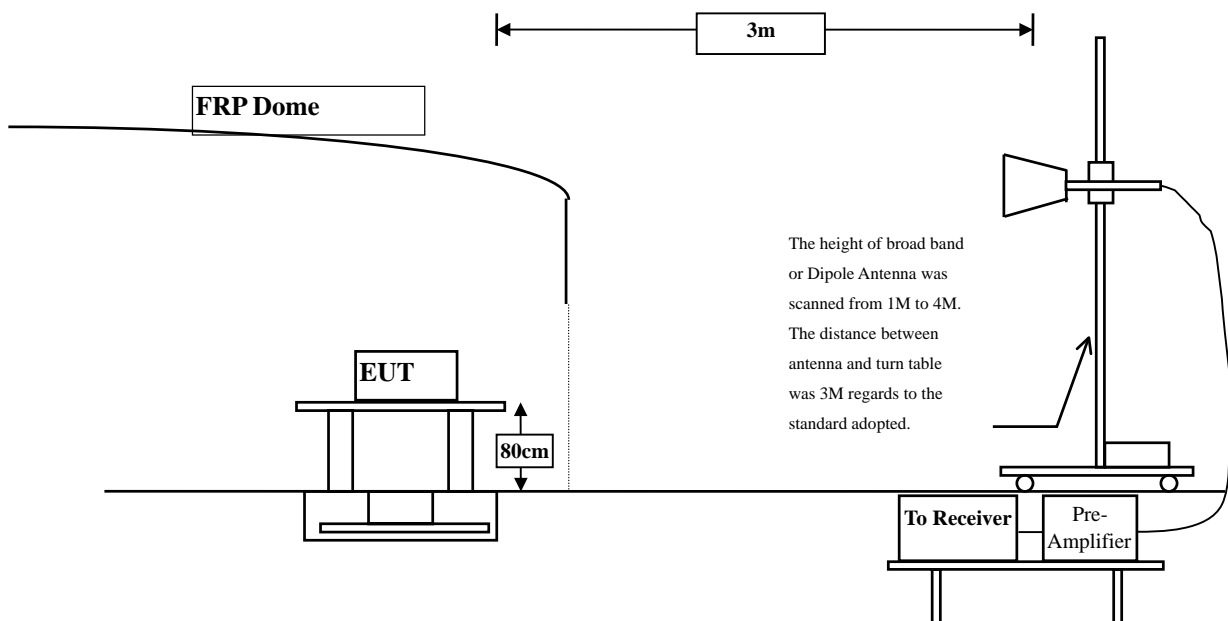


## 2.2. Test Setup

### Radiated Emission Below 1GHz



### Radiated Emission Above 1GHz



## 2.3. Limits

### ➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m @3m)	(dBuV/m @3m)	(uV/m @3m)	(dBuV/m @3m)
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

- Remarks :
1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
  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.

### ➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

## 2.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested compliance to FCC 47CFR 15.249 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 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 is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2003 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The measurement frequency range from 30MHz - 10th Harmonic of fundamental was investigated.

## 2.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

## 2.6. Test Result of Radiated Emission

Product : Smart Keypad  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmit-X

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
2405.000	31.593	39.890	71.483	-42.517	114.000
2440.000	31.852	40.820	72.672	-41.328	114.000
2475.000	32.118	43.270	75.388	-38.612	114.000
<b>Average Detector:</b>					
2405.000	31.593	36.460	68.053	-25.947	94.000
2440.000	31.852	37.720	69.572	-24.428	94.000
2475.000	32.118	40.190	72.308	-21.692	94.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Smart Keypad  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmit-X

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Vertical</b>					
<b>Peak Detector:</b>					
2405.000	30.926	46.470	77.396	-36.604	114.000
2440.000	31.139	47.790	78.929	-35.071	114.000
2475.000	31.378	49.640	81.018	-32.982	114.000
<b>Average Detector:</b>					
2405.000	30.926	43.660	74.586	-19.414	94.000
2440.000	31.139	45.110	76.249	-17.751	94.000
2475.000	31.378	47.180	78.558	-15.442	94.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Smart Keypad  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmit-Y

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
2405.000	31.593	44.288	75.881	-38.119	114.000
2440.000	31.852	47.140	78.992	-35.008	114.000
2475.000	32.118	50.382	82.500	-31.500	114.000
<b>Average Detector:</b>					
2405.000	31.593	42.736	74.329	-19.671	94.000
2440.000	31.852	44.320	76.172	-17.828	94.000
2475.000	32.118	48.776	80.894	-13.106	94.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Smart Keypad  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmit-Y

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Vertical</b>					
<b>Peak Detector:</b>					
2405.000	30.926	46.202	77.128	-36.872	114.000
2440.000	31.139	46.300	77.439	-36.561	114.000
2475.000	31.378	49.305	80.683	-33.317	114.000
<b>Average Detector:</b>					
2405.000	30.926	44.728	75.654	-18.346	94.000
2440.000	31.139	43.470	74.609	-19.391	94.000
2475.000	31.378	47.757	79.135	-14.865	94.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Smart Keypad  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmit-Z

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
2405.000	31.593	43.590	75.183	-38.817	114.000
2440.000	31.852	41.980	73.832	-40.168	114.000
2475.000	32.118	44.210	76.328	-37.672	114.000
<b>Average Detector:</b>					
2405.000	31.593	40.700	72.293	-21.707	94.000
2440.000	31.852	38.890	70.742	-23.258	94.000
2475.000	32.118	41.460	73.578	-20.422	94.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.



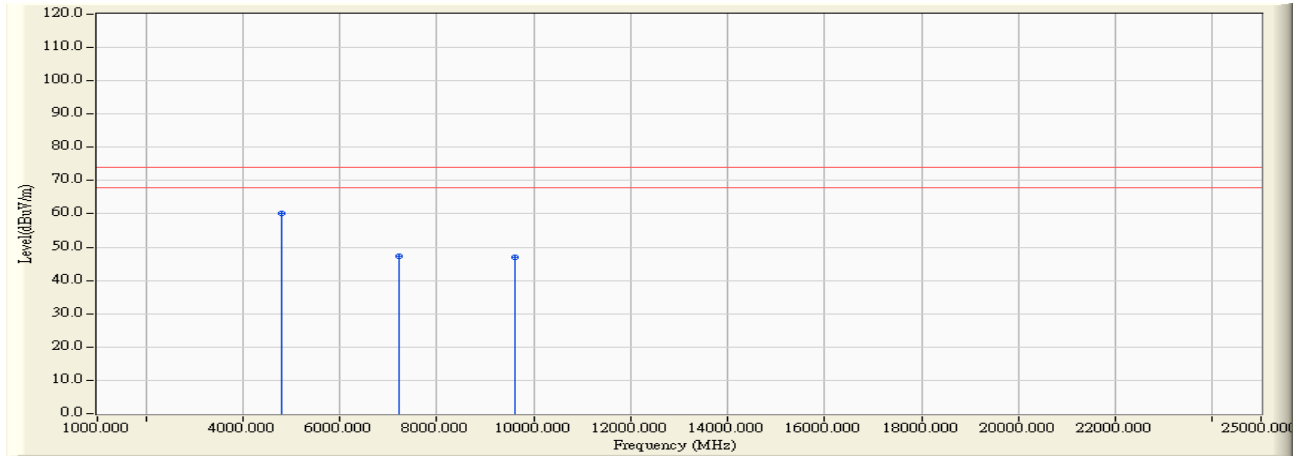
Product : Smart Keypad  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmit-Z

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Vertical</b>					
<b>Peak Detector:</b>					
2405.000	30.926	40.970	71.896	-42.104	114.000
2440.000	31.139	42.000	73.139	-40.861	114.000
2475.000	31.378	44.960	76.338	-37.662	114.000
<b>Average Detector:</b>					
2405.000	30.926	37.610	68.536	-25.464	94.000
2440.000	31.139	38.880	70.019	-23.981	94.000
2475.000	31.378	42.010	73.388	-20.612	94.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Smart Keypad  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2405MHz)

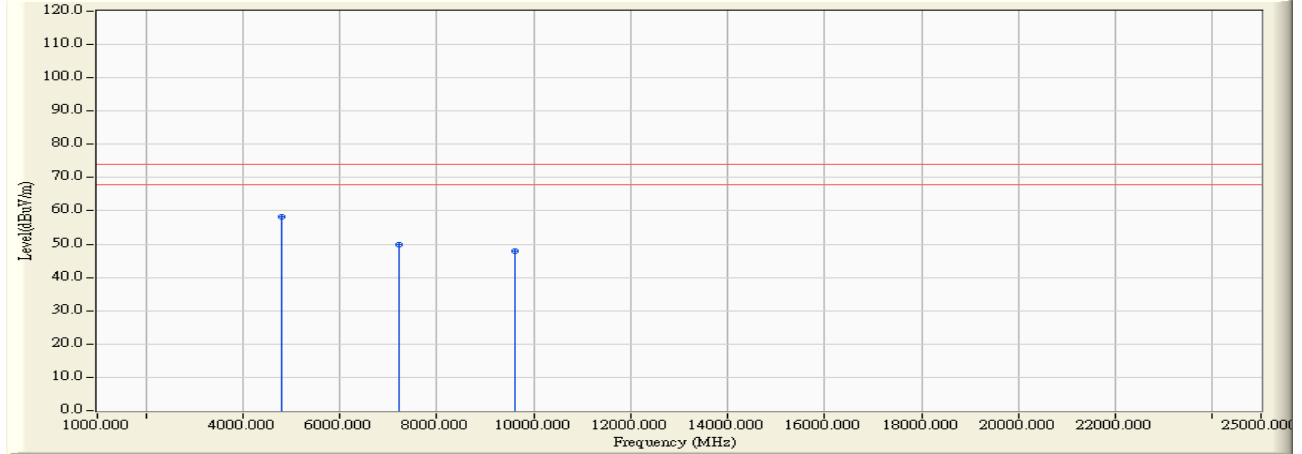


Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4810.000	0.532	59.700	60.232	-13.768	74.000
7215.000	7.411	39.910	47.321	-26.679	74.000
9620.000	8.282	38.740	47.022	-26.978	74.000
<b>Average Detector:</b>					
4810.000	0.532	51.090	51.622	-2.378	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Keypad  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2405MHz)

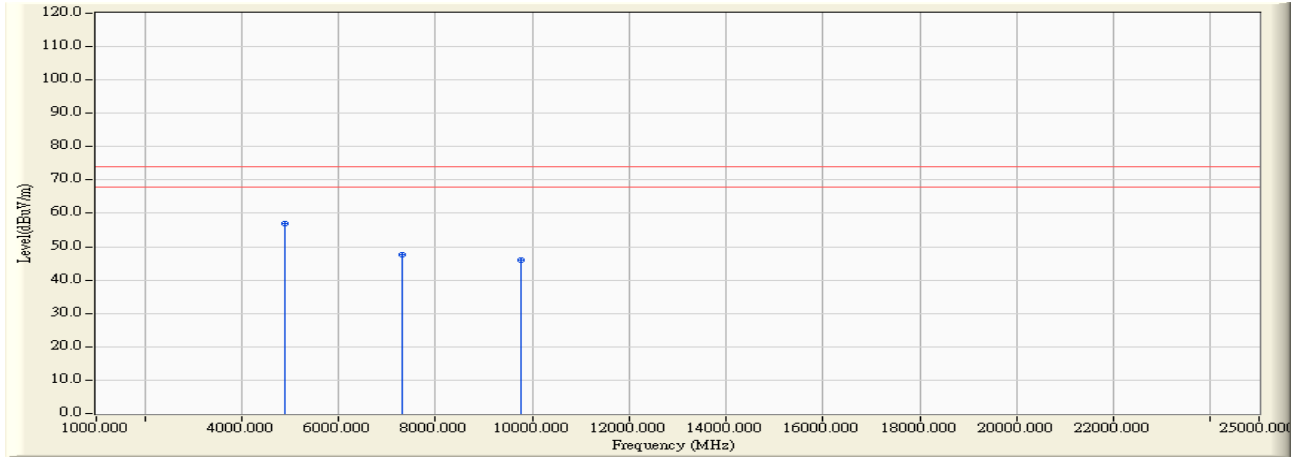


Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Vertical</b>					
<b>Peak Detector:</b>					
4810.000	0.927	57.230	58.157	-15.843	74.000
7215.000	7.895	41.810	49.705	-24.295	74.000
9620.000	8.760	39.150	47.910	-26.090	74.000
<b>Average Detector:</b>					
4810.000	0.927	48.710	49.637	-4.363	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Keypad  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2440 MHz)

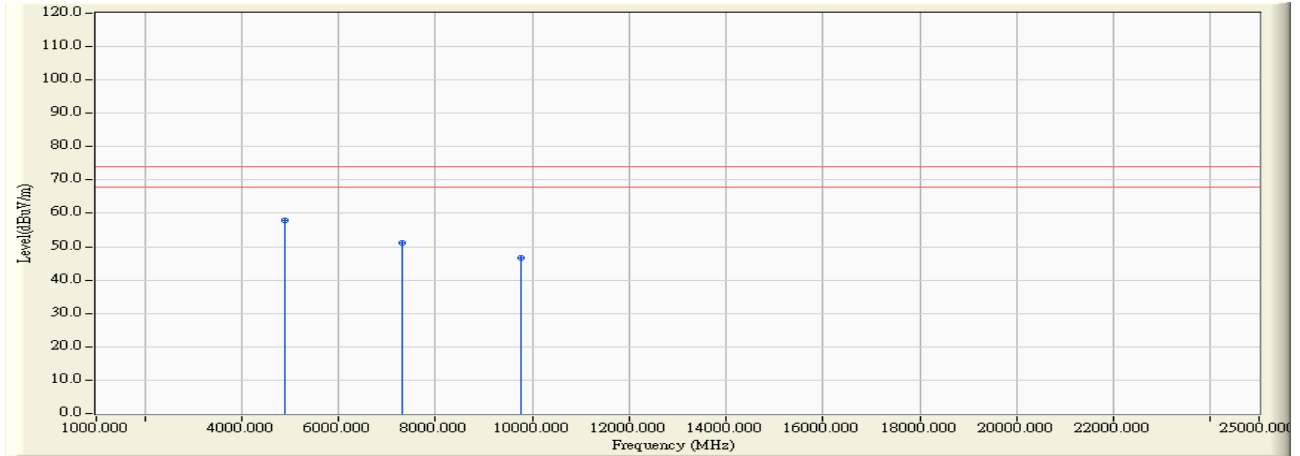


Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4880.000	0.038	57.060	57.098	-16.902	74.000
7320.000	7.699	39.970	47.669	-26.331	74.000
9760.000	7.665	38.240	45.905	-28.095	74.000
<b>Average Detector:</b>					
4880.000	0.038	48.680	48.718	-5.282	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Keypad  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2440 MHz)

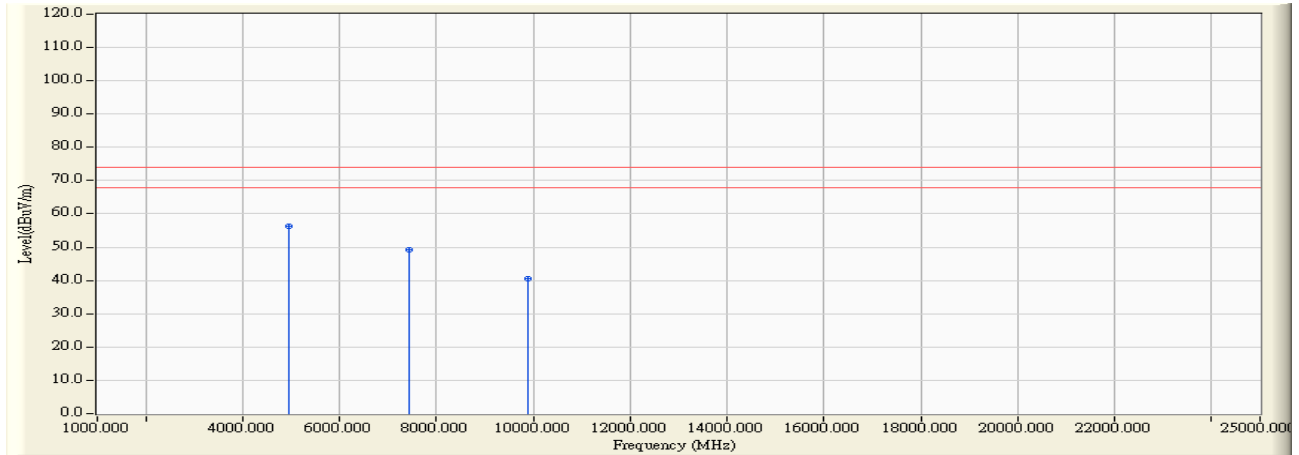


Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Vertical</b>					
<b>Peak Detector:</b>					
4880.000	0.499	57.530	58.029	-15.971	74.000
7320.000	8.303	42.740	51.043	-22.957	74.000
9760.000	8.299	38.260	46.560	-27.440	74.000
<b>Average Detector:</b>					
4880.000	0.499	49.120	49.619	-4.381	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Keypad  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2475 MHz)

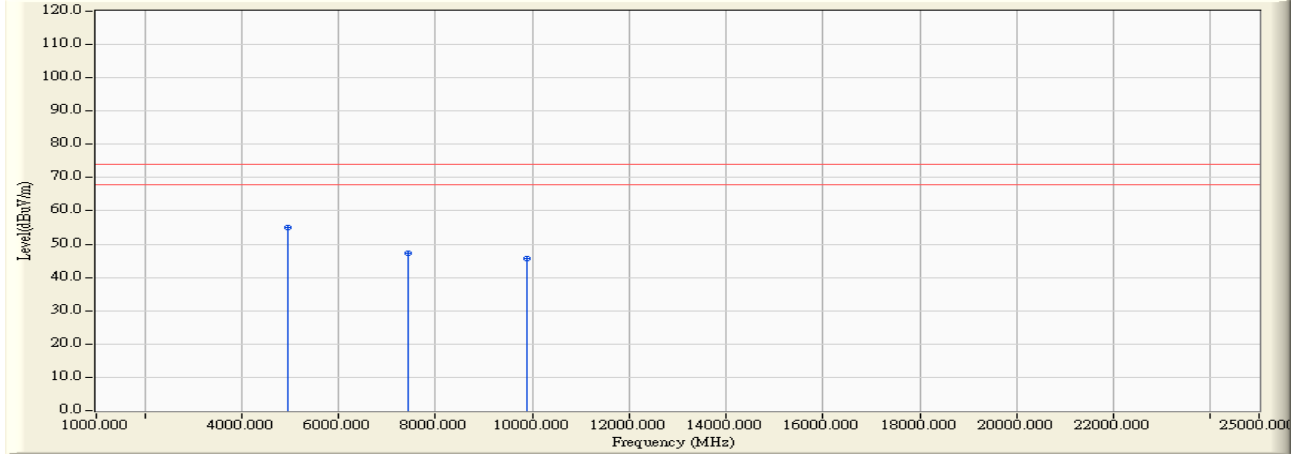


Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4950.000	0.483	55.850	56.333	-17.667	74.000
7425.000	8.496	40.820	49.316	-24.684	74.000
9900.000	8.163	32.400	40.562	-33.438	74.000
<b>Average Detector:</b>					
4950.000	0.483	47.670	48.153	-5.847	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Keypad  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2475MHz)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Vertical</b>					
<b>Peak Detector:</b>					
4950.000	0.642	54.260	54.902	-19.098	74.000
7425.000	5.401	41.840	47.242	-26.758	74.000
9900.000	6.965	38.830	45.795	-28.205	74.000
<b>Average Detector:</b>					
4950.000	0.642	45.970	46.612	-7.388	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Smart Keypad  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2440 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
148.340	-7.806	32.984	25.178	-18.322	43.500
295.780	-4.747	33.321	28.574	-17.426	46.000
460.680	4.030	32.590	36.620	-9.380	46.000
602.300	3.794	33.471	37.265	-8.735	46.000
792.420	6.391	33.648	40.039	-5.961	46.000
937.920	6.750	31.843	38.593	-7.407	46.000
<b>Vertical</b>					
55.220	-10.927	43.312	32.385	-7.615	40.000
179.380	-0.824	31.742	30.918	-12.582	43.500
381.140	0.816	32.697	33.513	-12.487	46.000
606.180	2.246	33.379	35.625	-10.375	46.000
804.060	3.371	32.349	35.720	-10.280	46.000
968.960	3.936	30.962	34.898	-19.102	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.



### 3. Band Edge

#### 3.1. Test Equipment

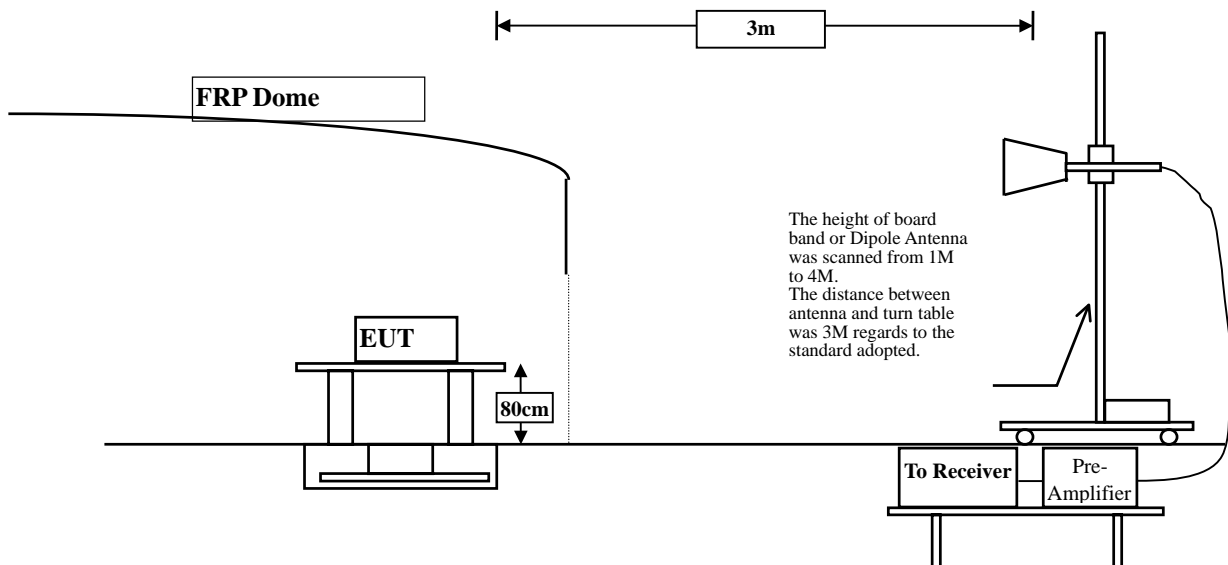
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	
☒ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2012
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2012
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

- Note:
1. All equipments are calibrated every one year.
  2. The test equipments marked by “X” are used to measure the final test results.

#### 3.2. Test Setup

##### RF Radiated Measurement:



### 3.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 3.4. 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.

### 3.5. Uncertainty

Conducted is  $\pm 1.27$  dB

Radiated is  $\pm 3.9$  dB

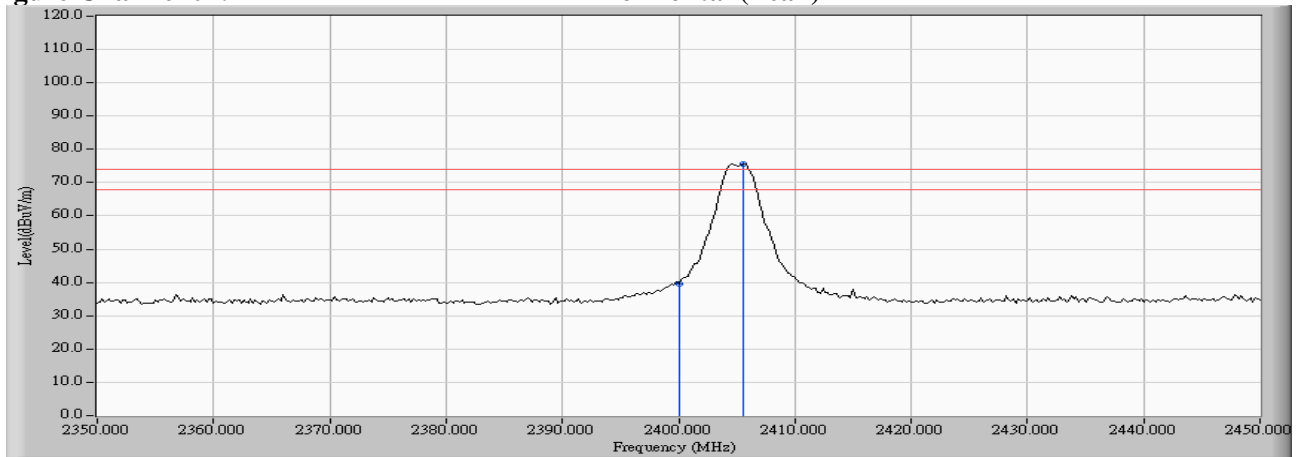
### 3.6. Test Result of Band Edge

Product : Smart Keypad  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit

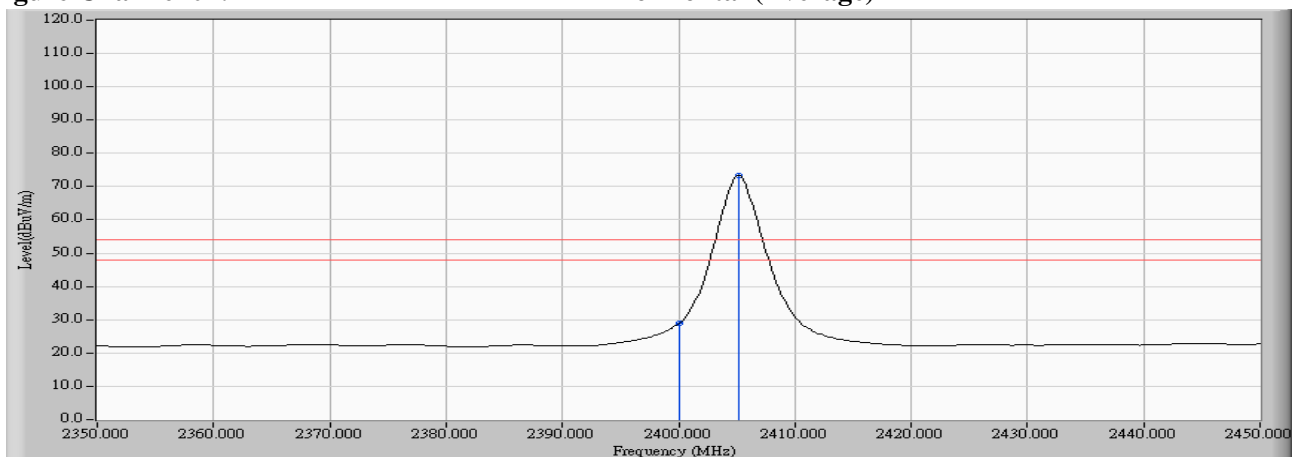
#### RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
01 (Peak)	2400.000	-1.084	40.790	39.707	-34.293	74.000	Pass
01 (Peak)	2405.600	-1.053	76.703	75.650	--	--	--
01 (Average)	2400.000	-1.084	29.996	28.913	-25.087	54.000	Pass
01 (Average)	2405.200	-1.055	74.350	73.295	--	--	--

**Figure Channel 01: Horizontal (Peak)**



**Figure Channel 01: Horizontal (Average)**



Note:

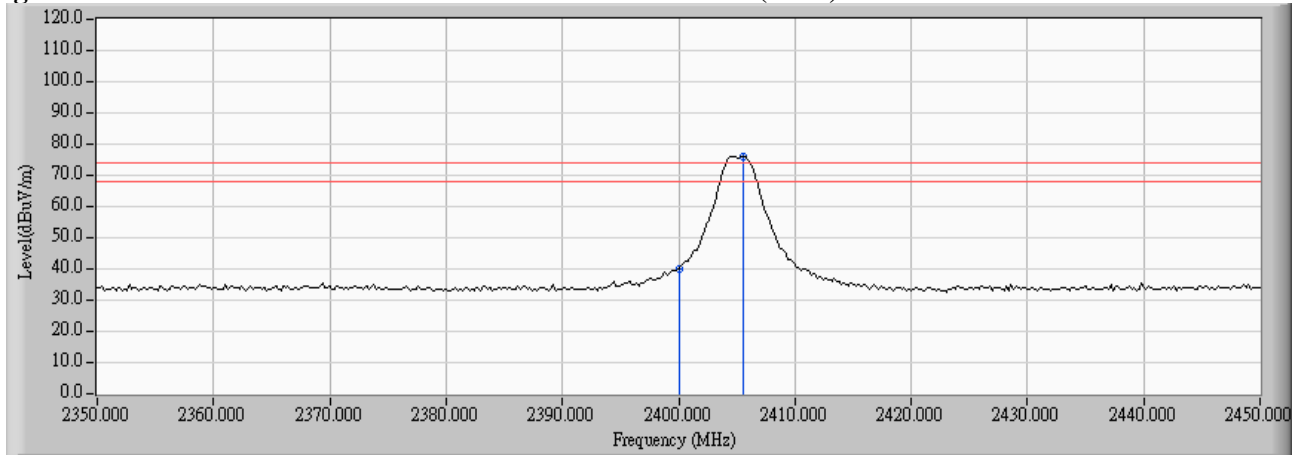
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Smart Keypad  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit

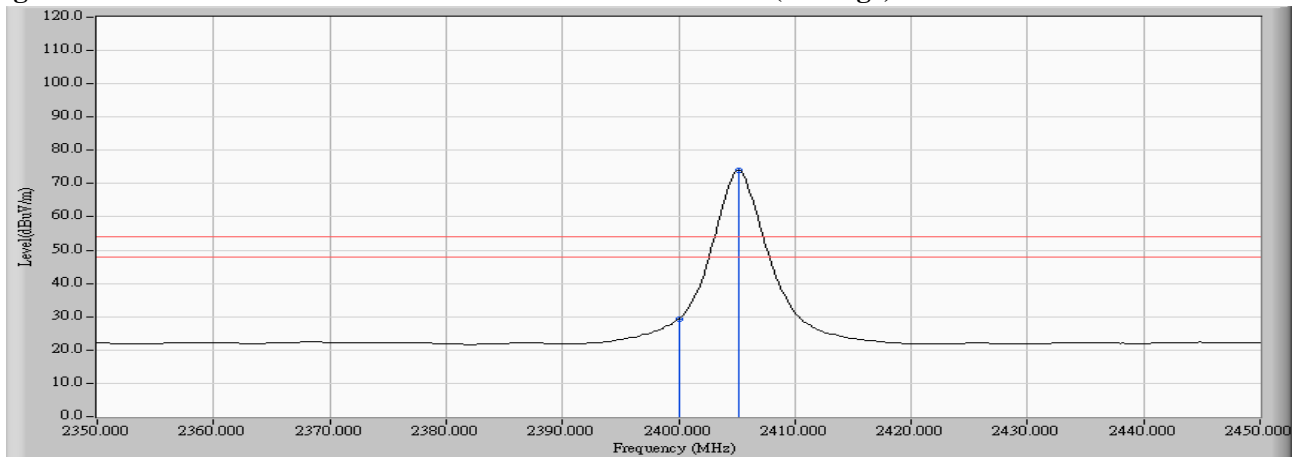
**RF Radiated Measurement (VERTICAL):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
01 (Peak)	2400.000	-1.733	41.964	40.232	-33.768	74.000	Pass
01 (Peak)	2405.600	-1.722	77.925	76.204	--	--	--
01 (Average)	2400.000	-1.733	31.124	29.392	-24.608	54.000	Pass
01 (Average)	2405.200	-1.723	75.666	73.944	--	--	--

**Figure Channel 01: VERTICAL (Peak)**



**Figure Channel 01: VERTICAL (Average)**



**Note:**

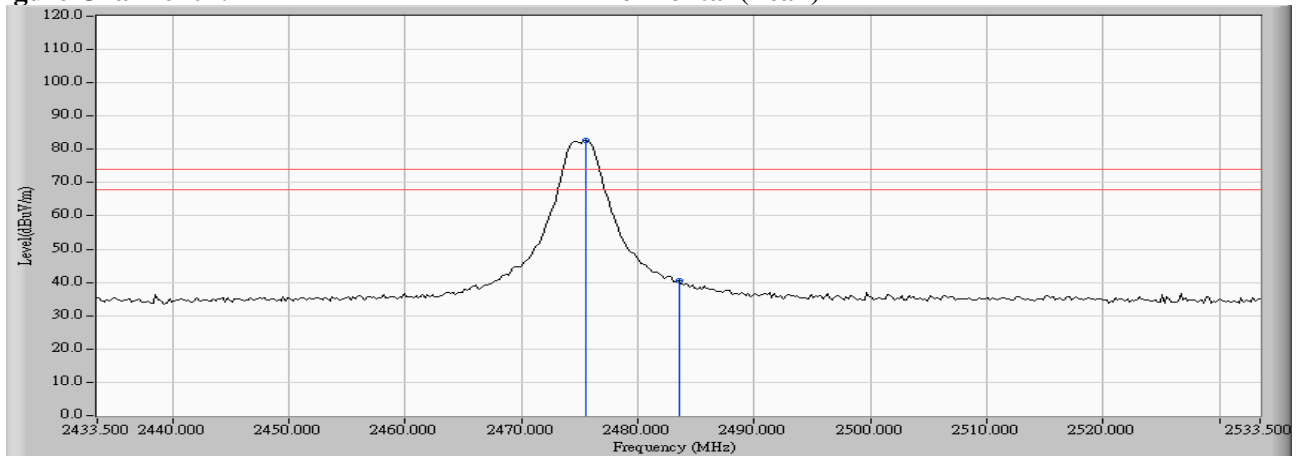
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Smart Keypad  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit

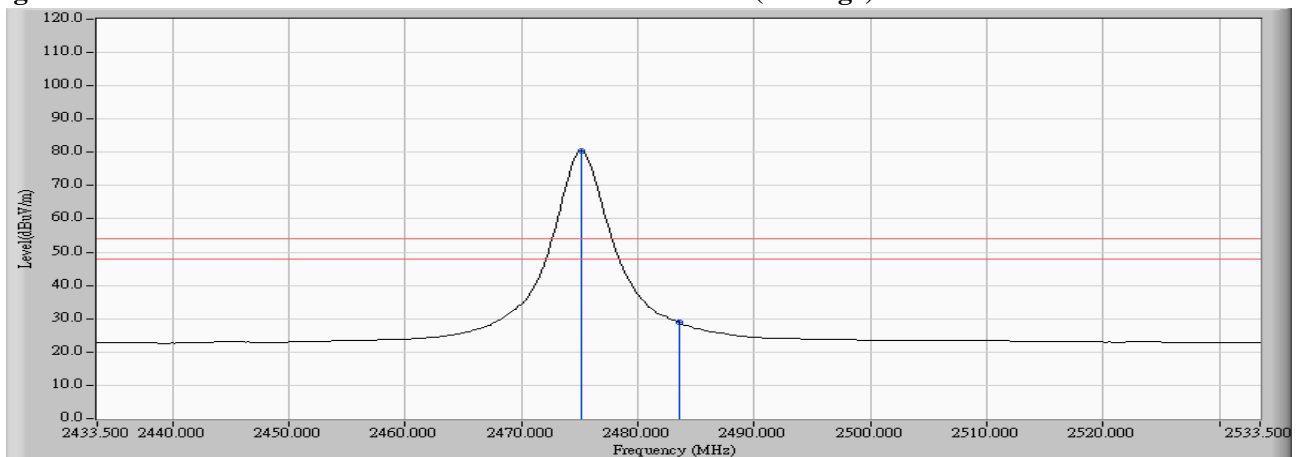
**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
01 (Peak)	2475.500	-0.610	83.144	82.535	--	--	--
01 (Peak)	2483.500	-0.558	40.976	40.418	-33.582	74.000	Pass
01 (Average)	2475.100	-0.611	80.972	80.360	--	--	--
01 (Average)	2483.500	-0.558	29.374	28.816	-25.184	54.000	Pass

**Figure Channel 01: Horizontal (Peak)**



**Figure Channel 01: Horizontal (Average)**



**Note:**

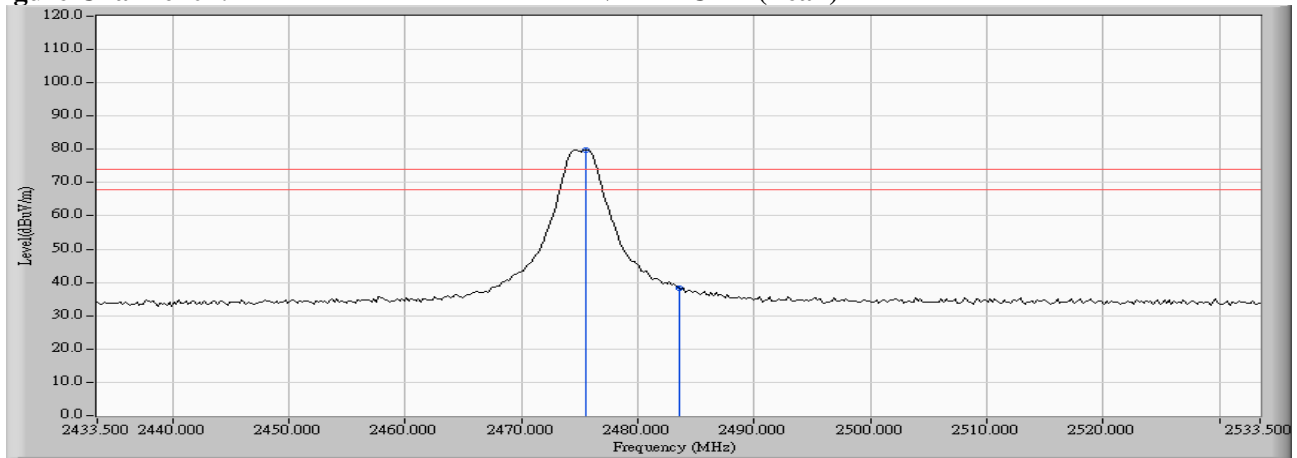
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Smart Keypad  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit

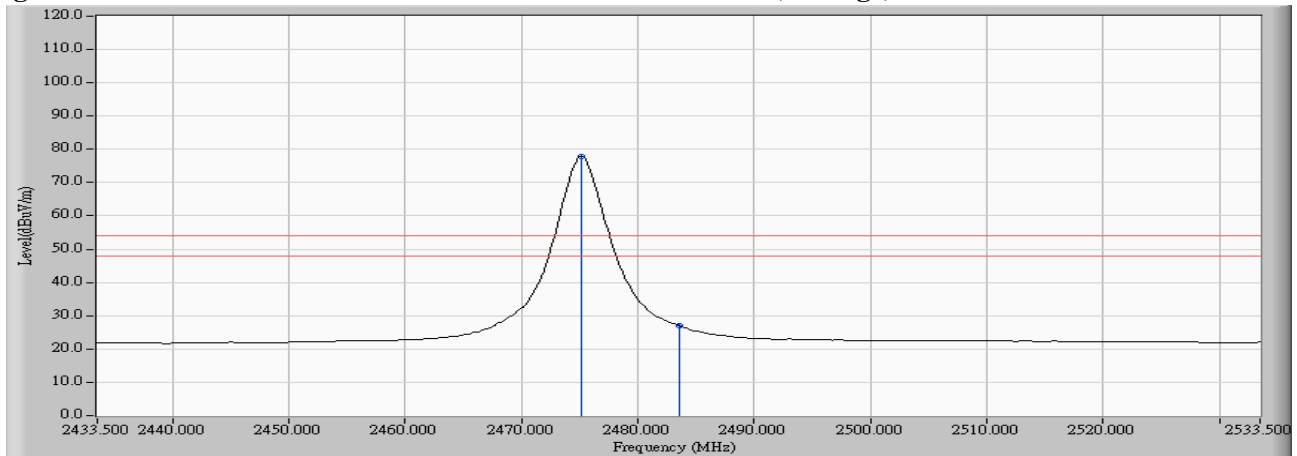
**RF Radiated Measurement (VERTICAL):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Result
01 (Peak)	2475.500	-1.350	81.290	79.941	--	--	--
01 (Peak)	2483.500	-1.305	39.550	38.245	-35.755	74.000	Pass
01 (Average)	2475.100	-1.351	79.212	77.860	--	--	--
01 (Average)	2483.500	-1.305	28.223	26.918	-27.082	54.000	Pass

**Figure Channel 01: VERTICAL (Peak)**



**Figure Channel 01: VERTICAL (Average)**



**Note:**

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “ \* ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

#### **4. EMI Reduction Method During Compliance Testing**

No modification was made during testing.