

TEST REPORT

of

FCC Part 15 Subpart C

☒ New Application; ☐ Class I PC; ☐ Class II PC

Product : Wireless Keyboard

Model: SCORPIUS-U9WL, TESORO-G1W

Model Difference: N/A

Brand: ione

FCC ID: F2QSCORPIUSU9WL

FCC Rule Part: §15.249

Applicant: Ione International Co., Ltd.

Address: 8F-2, No. 75, Sec 1, Hsin Tai Wu Road, Hsi Chih District, New Taipei City, Taiwan, R.O.C.

Test Performed by:

International Standards Laboratory

<Lung-Tan LAB>

*Site Registration No.

BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3;

*Address:

No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.

Lung-Tan Hsiang, Tao Yuan County 325, Taiwan

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Report No.: **ISL-11LR017FC**

Issue Date : **2011/04/14**

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.

This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory.

VERIFICATION OF COMPLIANCE

Applicant: Ione International Co., Ltd.
Product Description: Wireless Keyboard
Brand Name: ione
FCC ID: F2QSCORPIUSU9WL
Model No.: SCORPIUS-U9WL, TESORO-G1W
Model Difference: N/A
Date of test: 2011/03/25 ~ 2011/04/14
Date of EUT Received: 2011/03/25

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:



Date:

Apr. 14, 2011

Dion Chang / Engineer

Prepared By:



Date:

Apr. 14, 2011

Eva Kao / Asst. Supervisor

Approved By:



Date:

Apr. 14, 2011

Vincent Su / RF Manager

Version

Version No.	Date	Description
00	Apr. 14, 2011	Initial creation of document

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1 GENERAL INFORMATION

1.1 Product Description

Product Name:	Wireless Keyboard
Brand Name:	ione
Model Name:	SCORPIUS-U9WL, TESORO-G1W
Model Difference:	N/A
Hardware Version	N/A
Software Version	N/A
Operation Frequency:	2402~2479MHz
Channel number:	78 channels, 1MHz step
Modulation Type:	GFSK
Power Supply	3V dc form 2*AA battery
Antenna Designation:	Printed Antenna

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **F2QSCORPIUSU9WL** filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory** <Lung-Tan LAB> No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd., Lung-Tan Hsiang, Tao Yuan County 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-3.

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

2 System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the engineering operating mode. the Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2003.

2.4 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Conduction 03 -1 Cable	WOKEN	CFD 300-NL	Conduction 03 -1	06/21/2010	06/21/2011
EMI Receiver 12	ROHDE & SCHWARZ	ESCI	100804	06/25/2010	06/25/2011
ISNT2-02	FCC	FCC-TLISN-T2-02	20413	05/15/2010	05/15/2011
ISNT4-02	FCC	FCC-TLISN-T4-02	20575	05/15/2010	05/15/2011
ISNT8-02	FCC	FCC-TLISN-T8-02	20476	05/15/2010	05/15/2011
LISN 07	FCC Inc.	FCC-LISN-50-100-4-02	07040	06/02/2010	06/02/2011
LISN 08	FCC	FCC-LISN50-25-2-01	07039	06/25/2010	06/25/2011

Chamber 14(966)					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer 21	Agilent	N9010A	MY49060537	07/13/2010	07/13/2011
Spectrum Analyzer 19	R&S	FSP40	100116	10/18/2010	10/18/2011
Spectrum Analyzer 20	Agilent	E4443A	MY48250315	05/11/2010	05/11/2011
Loop Antenna	A.H.SYSTEM	SAS-564	294	02/28/2011	02/27/2012
Bilog Antenna	Schaffner	CBL 6111D	22612	03/30/2011	03/29/2012
Horn antenna(06)	EMCO	3117	0006665	09/27/2010	09/26/2012
Horn antenna(05)	Com-power	AH-640	100A	01/11/2011	01/10/2013
Horn antenna(04)	Com-power	AH-826	081001	03/30/2011	03/29/2012
Preamplifier	HP	8447F	N/A	01/03/2011	02/28/2012
Preamplifier 15	Agilent	8449B	3008A2471	01/06/2011	01/06/2012
Preamplifier 13	MITEQ	JS4-2600400	1329256	06/10/2010	06/10/2011
Cable	Huber Suhner	Sucoflex 106	N/A	02/09/2011	02/08/2012
Cable	Pacific	8D-FB	N/A	10/18/2010	10/17/2011

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter 03	Agilent	E4418B	GB41299009	06/05/2010	06/04/2011
Power Sensor RF 01	Agilent	8481H	MY41091048	06/05/2010	06/04/2011
Spectrum Analyzer 19	R&S	FSP40	100116	10/18/2010	10/18/2011
Spectrum Analyzer 20	Agilent	E4443A	MY48250315	05/11/2010	05/11/2011
Temperature Chamber	KSON	THS-B4H100	2287	03/03/2011	03/03/2012
DC Power supply	ABM	51850	N/A	N/A	N/A

Note: Calibration is traceable to NIST or national or international standards.

2.5 Limitation

(1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 - 56	56 - 46
0.5 – 5	56	46
5 - 30	60	50

(2) Radiated Emission 15.249(a)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following.

Frequency (MHz)	Field strength of Fundamental	Field strength of Harmonics	Distance (m)
902 - 928	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
2400 – 2483.5	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
5725 – 5875	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3
24.0 – 24.25 GHz	250 mV/m (107.95dBuV/m)	2500 uV/m (67.95dBuV/m)	3

(3) Radiated Emission 15.249 (d)

Emission 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 Section 15.209 as below, whichever is the lesser attenuation.

Frequency (MHz)	Field strength $\mu\text{V/m}$	Distance (m)	Field strength at 3m dB $\mu\text{V/m}$
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

(4) Radiated Emission 15.249(e)

For frequencies above 1000MHz, the above field strength limits are based on average limits. The peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

- Remark:
1. Emission level in dB $\mu\text{V/m}$ = 20 log ($\mu\text{V/m}$)
 2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
 3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of § 15.205
 4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of § 15.205, then the general radiated emission limits in § 15.209 apply.

2.6 Configuration of Tested System

Fig. 2-1 Configuration of Radiated Emission Test

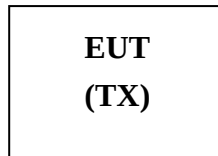


Fig. 2-2 Configuration of AC Power Line Test

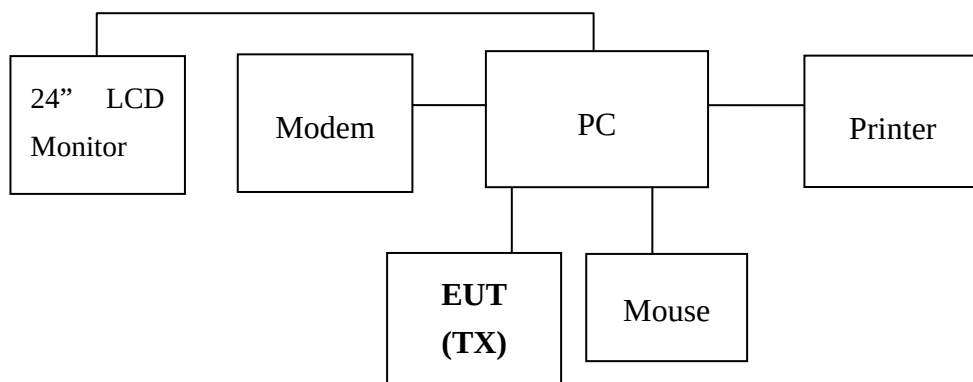


Table 2-1 Equipment Used in Tested System

No	Unit	Brand	Model	Serial No.	Power Cord	FCC ID
1	Personal Computer	Lenovo	MT-M9439-AD5	L3AEB0B	Non-shielded	FCC DOC
2	24" LCD Monitor	DELL	2408FPW	N/A	Non-shielded	FCC DOC
3	DELL PS/2 Keyboard	DELL	SK-8110	N/A	N/A	FCC DOC
4	Modem	Aceex	DM1414	0301000557	No-nshielded	FCC DOC
5	Printer	HP	C930	3872H155	Non-shielded	FCC DOC

Note: All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

Grounding: Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

3 Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	Compliant
§15.249(a)(d)(e)	Radiated Emission	Compliant
§15.215 (c)	20dB band width Measurement	Compliant

4 Description of test modes

The EUT has been tested under operating condition.

The EUT is staying in continuous transmitting mode

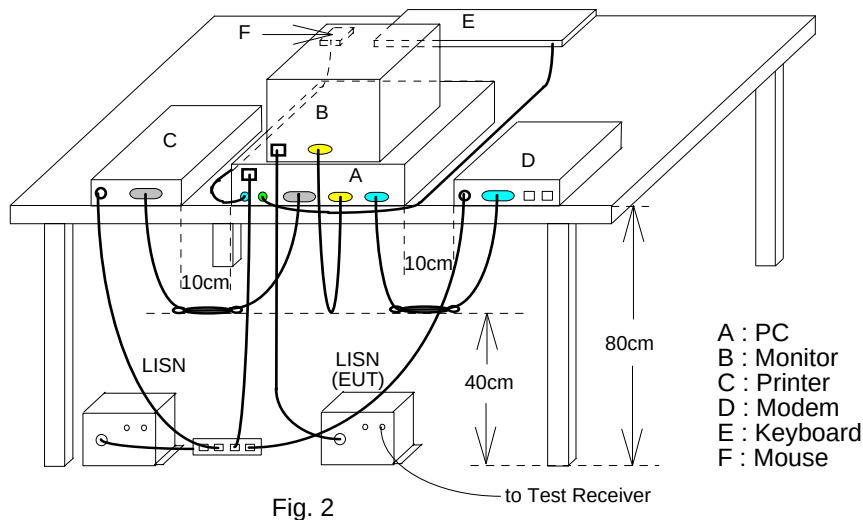
Channel low (2402MHz)、mid (2440MHz) and high (2479MHz) with highest data rate are chosen for full testing.

5 Conducted Emissions Test

5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.2 Test SET-UP (Block Diagram of Configuration)



5.3 Measurement Equipment Used:

Refer to section 2.4 in this report

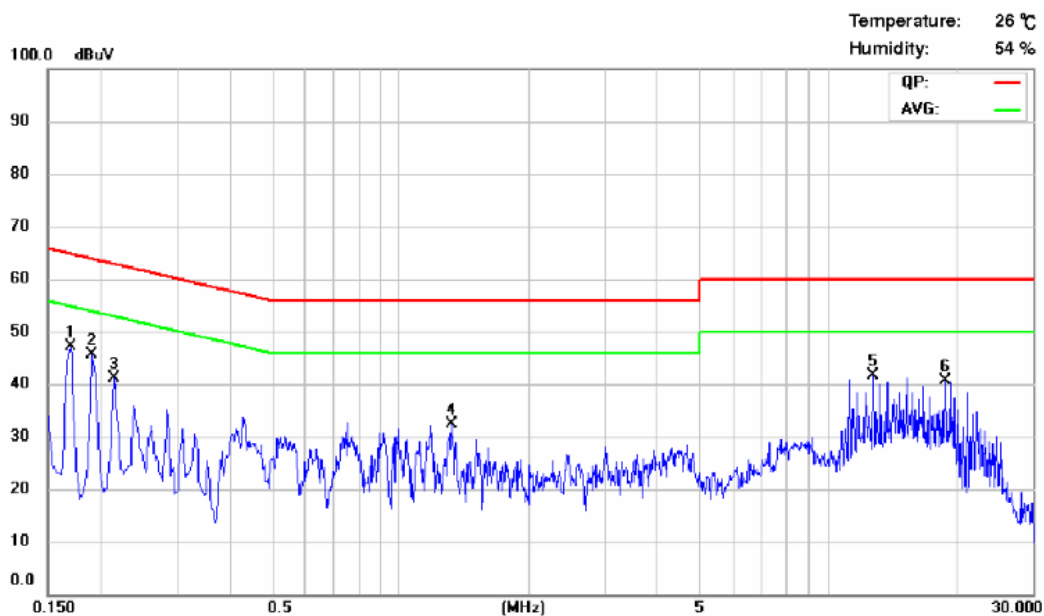
5.4 Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode	Test Date:	04/09/2011
		Test By:	Dino

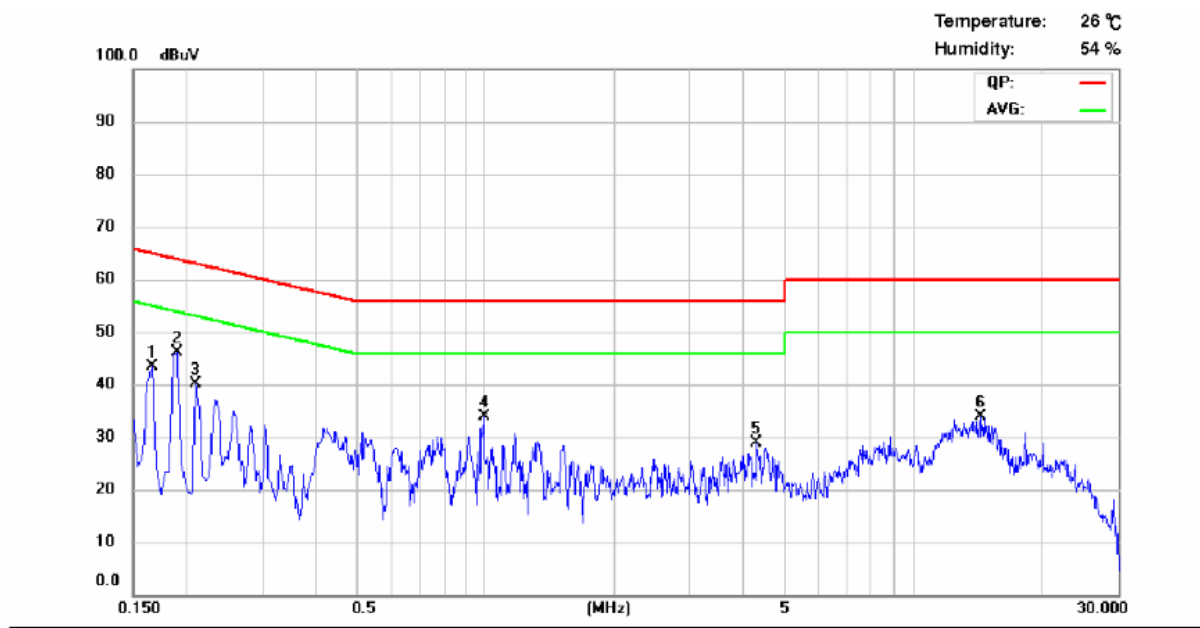


Site: Conduction 03

Phase: L1

Limit: CISPR22 Class B Conduction

No.	Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
1	0.1700	0.08	0.04	40.24	64.9	-24.7	29.75	54.9	-25.2	
2	0.1900	0.07	0.04	38.65	64.0	-25.3	33.23	54.0	-20.8	
3	0.2140	0.07	0.04	36.88	63.0	-26.1	26.43	53.0	-26.6	
4	1.3220	0.06	0.07	25.25	56.0	-30.7	20.24	46.0	-25.7	
5	12.7380	0.15	0.23	30.62	60.0	-29.3	23.50	50.0	-26.5	
6	18.7300	0.19	0.25	31.65	60.0	-28.3	24.56	50.0	-25.4	



Site: Conduction 03

Phase: **N**

Limit: CISPR22 Class B Conduction

No.	Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
1	0.1660	0.11	0.04	30.40	65.1	-34.7	25.27	55.1	-29.8	
2	0.1900	0.1	0.04	37.26	64.0	-26.7	26.40	54.0	-27.6	
3	0.2100	0.1	0.04	32.35	63.2	-30.8	33.98	53.2	-19.2	
4	0.9940	0.07	0.06	27.11	56.0	-28.8	23.25	46.0	-22.7	
5	4.3100	0.09	0.14	20.35	56.0	-35.6	18.35	46.0	-27.6	
6	14.3180	0.23	0.24	21.58	60.0	-38.4	13.68	50.0	-36.3	

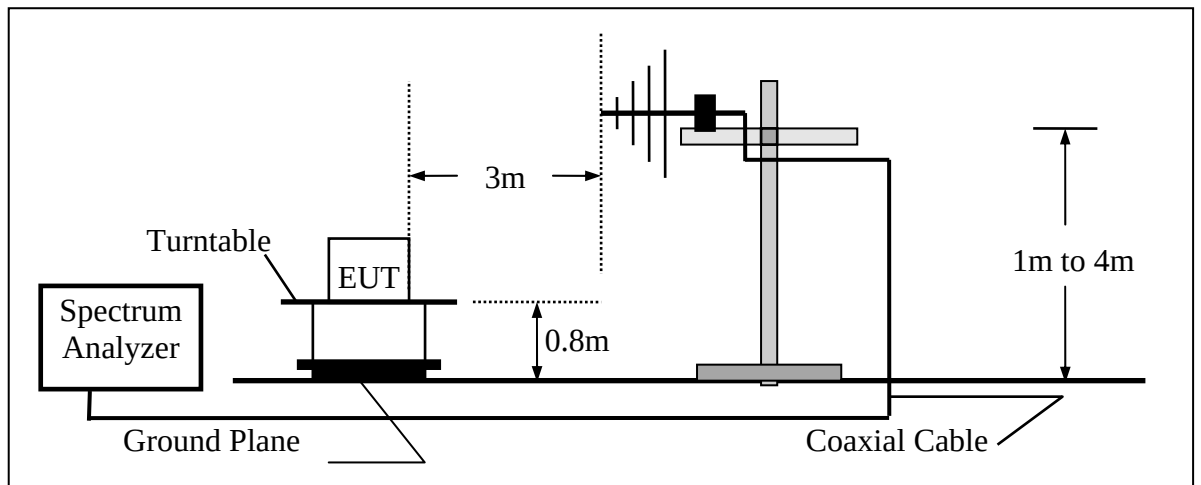
6 Radiated Emission Test

6.1 Measurement Procedure

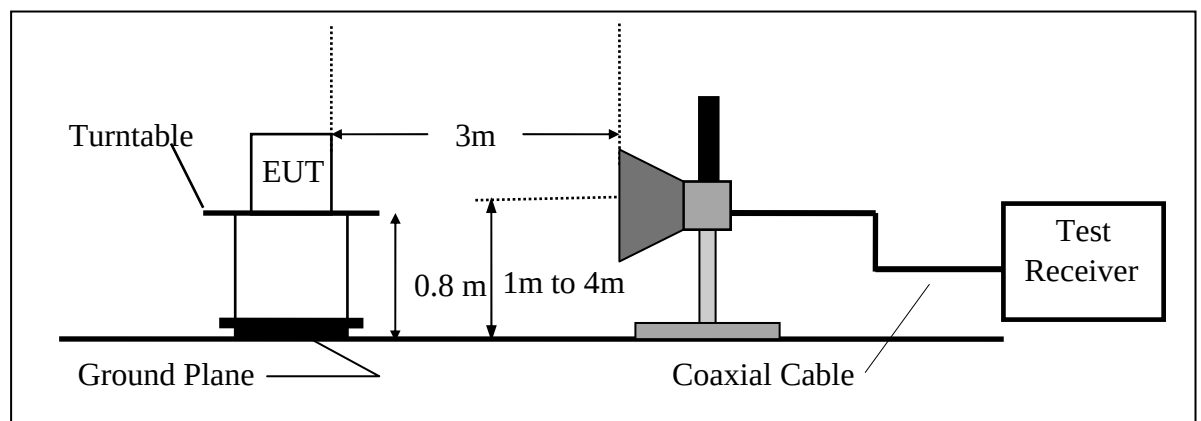
1. The EUT was placed on a turntable that is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

6.2 Test SET-UP (Block Diagram of Configuration)

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



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



6.3 Measurement Equipment Used:

Refer to section 2.4 in this report

6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

$$AV \text{ Factor} = 20\log ((2.04\text{ms} * 11)/100\text{ms})) = -12.94\text{dB}$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

6.5 Measurement Result

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	:TX CH Low
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Fundamental Frequency :2402 MHz

Test Date : Apr. 13, 2011

Test By :Dino

Pol. :Vertical

Temp./Hum. :21 °C/ 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	205.5700	53.45	10.41	0.9	34.54	30.22	43.50	-13.28	205	313	peak
2	475.2300	45.55	17.4	1.3	33.73	30.52	46.00	-15.48	353	7	peak
3	656.6200	45.34	19.34	1.51	33.36	32.83	46.00	-13.17	100	246	peak
4	746.8300	37.17	20.07	1.6	33.07	25.77	46.00	-20.23	100	231	peak
5	826.3700	47.06	20.92	1.75	32.94	36.79	46.00	-9.21	100	335	peak
6	940.8300	38.52	21.91	1.88	32.66	29.65	46.00	-16.35	100	119	peak

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	:TX CH Low	Test Date	:Apr. 13, 2011
Fundamental Frequency	:2402 MHz	Test By	:Dino
Pol.	:Horizontal	Temp./Hum.	:21 °C / 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	248.2500	56.11	12.66	1	34.43	35.34	46.00	-10.66	100	303	peak
2	342.3400	46.05	14.99	1.08	34.05	28.07	46.00	-17.93	197	8	peak
3	664.3800	45.20	19.39	1.53	33.32	32.80	46.00	-13.20	227	18	peak
4	722.5800	42.90	19.83	1.6	33.11	31.22	46.00	-14.78	100	215	peak
5	826.3700	53.18	20.92	1.75	32.94	42.91	46.00	-3.09	100	131	peak
6	907.8500	39.99	21.58	1.82	32.84	30.55	46.00	-15.45	285	290	peak

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	:TX CH Mid	Test Date	:Apr. 13, 2011
Fundamental Frequency	:2440 MHz	Test By	:Dino
Pol.	:Vertical	Temp./Hum.	:21 °C / 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	75.5900	62.36	7.15	0.6	34.55	35.56	40.00	-4.44	172	131	peak
2	106.6300	50.64	12.06	0.67	34.38	28.99	43.50	-14.51	399	324	peak
3	205.5700	52.55	10.41	0.9	34.54	29.32	43.50	-14.18	273	262	peak
4	474.2600	44.17	17.39	1.3	33.73	29.13	46.00	-16.87	134	5	peak
5	664.3800	43.38	19.39	1.53	33.32	30.98	46.00	-15.02	272	300	peak
6	826.3700	49.46	20.92	1.75	32.94	39.19	46.00	-6.81	352	250	peak

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	:TX CH Mid	Test Date	:Apr. 13, 2011
Fundamental Frequency	:2440 MHz	Test By	:Dino
Pol.	:Horizontal	Temp./Hum.	:21 °C / 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	205.5700	50.59	10.41	0.9	34.54	27.36	43.50	-16.14	318	291	peak
2	227.8800	57.94	10.97	0.9	34.48	35.33	46.00	-10.67	350	189	peak
3	248.2500	56.11	12.66	1	34.43	35.34	46.00	-10.66	258	355	peak
4	664.3800	45.20	19.39	1.53	33.32	32.80	46.00	-13.20	237	20	peak
5	722.5800	42.90	19.83	1.6	33.11	31.22	46.00	-14.78	156	24	peak
6	826.3700	54.18	20.92	1.75	32.94	43.91	46.00	-2.09	301	119	peak

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	:TX CH High	Test Date	:Apr. 13, 2011
Fundamental Frequency	:2479 MHz	Test By	:Dino
Pol.	:Vertical	Temp./Hum.	:21 °C/ 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	205.5700	55.15	10.41	0.9	34.54	31.92	43.50	-11.58	100	261	peak
2	353.0100	41.60	15.28	1.11	33.99	24.00	46.00	-22.00	100	260	peak
3	475.2300	44.55	17.4	1.3	33.73	29.52	46.00	-16.48	360	250	peak
4	657.5900	45.42	19.35	1.52	33.35	32.94	46.00	-13.06	100	175	peak
5	826.3700	46.36	20.92	1.75	32.94	36.09	46.00	-9.91	306	93	peak
6	962.1700	36.32	22.05	1.92	32.54	27.75	54.00	-26.25	100	327	peak

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	:TX CH High	Test Date	:Apr. 13, 2011
Fundamental Frequency	:2479 MHz	Test By	:Dino
Pol.	:Horizontal	Temp./Hum.	:21 °C/ 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	227.8800	58.54	10.97	0.9	34.48	35.93	46.00	-10.07	349	213	peak
2	339.4300	48.51	14.9	1.08	34.07	30.42	46.00	-15.58	378	260	peak
3	474.2600	41.98	17.39	1.3	33.73	26.94	46.00	-19.06	100	75	peak
4	664.3800	46.50	19.39	1.53	33.32	34.10	46.00	-11.90	100	27	peak
5	826.3700	53.97	20.92	1.75	32.94	43.70	46.00	-2.30	293	299	peak
6	904.9400	40.39	21.55	1.81	32.85	30.90	46.00	-15.10	354	265	peak

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak / QP detector mode.
- 4 Measurement result within this frequency range shown “ – ” in the table above means the reading of emissions are attenuated more than 20Db below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz, VBW=300KHz.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode :TX CH Low Test Date :Apr. 13, 2011
Fundamental Frequency :2402 MHz Test By :Dino
Pol. :Vertical Temp./Hum. :21 °C/ 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	2402.000	43.19	32.82	2.34	0	78.35	114.00	-35.65	147	139	peak

1	1601.380	58.43	29.31	1.94	46.32	43.36	54.00	-10.64	100	87	AVG
2	1601.400	71.37	29.31	1.94	46.32	56.30	74.00	-17.70	103	87	peak
3	4804.000	65.45	34.64	3.42	47.32	56.19	74.00	-17.81	152	163	peak
4	4804.000	52.51	34.64	3.42	47.32	43.25	54.00	-10.75	152	163	AVG
5	7206.000	63.65	36.08	4.18	46.34	57.57	74.00	-16.43	161	96	peak
6	7206.000	50.71	36.08	4.18	46.34	44.63	54.00	-9.37	168	266	AVG
7	9608.000	48.17	37.11	4.92	43.56	46.64	74.00	-27.36	171	172	peak
8	12010.000	47.55	39.3	5.6	43.31	49.14	74.00	-24.86	221	126	peak

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode :TX CH Low Test Date :Apr. 13, 2011
 Fundamental Frequency :2402 MHz Test By :Dino
 Pol. :Horizontal Temp./Hum. :21 °C / 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	2402.000	38.79	32.82	2.34	0	73.95	114.00	-40.05	272	290	peak

1	1601.380	66.47	29.31	1.94	46.32	51.40	74.00	-22.60	100	27	peak
2	4804.000	66.01	34.64	3.42	47.32	56.75	74.00	-17.25	100	291	peak
3	4804.000	53.07	34.64	3.42	47.32	43.81	54.00	-10.19	100	291	AVG
4	7206.000	69.62	36.08	4.18	46.34	63.54	74.00	-10.46	100	289	peak
5	7206.000	56.68	36.08	4.18	46.34	50.60	54.00	-3.40	100	289	AVG
6	9608.000	48.63	37.11	4.92	43.56	47.10	74.00	-26.90	360	227	peak
7	12010.000	47.26	39.3	5.6	43.31	48.85	74.00	-25.15	346	187	peak

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode :TX CH Mid Test Date :Apr. 13, 2011
Fundamental Frequency :2440 MHz Test By :Dino
Pol. :Vertical Temp./Hum. :21 °C/ 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	2402.000	43.19	32.82	2.34	0	78.35	114.00	-35.65	147	139	peak

1	1625.000	66.60	29.48	1.95	46.32	51.71	74.00	-22.29	290	163	peak
2	4880.000	66.93	34.62	3.45	47.35	57.65	74.00	-16.35	136	154	peak
3	4880.000	53.99	34.62	3.45	47.35	44.71	54.00	-9.29	136	154	AVG
4	7320.000	65.68	36.01	4.23	46.24	59.68	74.00	-14.32	117	178	peak
5	7320.000	52.74	36.01	4.23	46.24	46.74	54.00	-7.26	117	178	AVG
6	9760.000	47.44	37.26	4.95	43.5	46.15	74.00	-27.85	100	357	peak
7	12200.000	48.11	39.34	5.64	43.5	49.59	74.00	-24.41	155	82	peak

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	:TX CH Mid	Test Date	:Apr. 13, 2011
Fundamental Frequency	:2440 MHz	Test By	:Dino
Pol.	:Horizontal	Temp./Hum.	:21 °C / 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	2440.000	41.53	32.89	2.36	0	76.78	114.00	-37.22	194	325	peak

1	1625.000	62.91	29.48	1.95	46.32	48.02	74.00	-25.98	167	346	peak
2	4880.000	70.92	34.62	3.45	47.35	61.64	74.00	-12.36	115	316	peak
3	4880.000	57.98	34.62	3.45	47.35	48.70	54.00	-5.30	115	316	AVG
4	7320.000	70.30	36.01	4.23	46.24	64.30	74.00	-9.70	106	288	peak
5	7320.000	57.36	36.01	4.23	46.24	51.36	54.00	-2.64	106	288	AVG
6	9760.000	48.76	37.26	4.95	43.5	47.47	74.00	-26.53	283	0	peak
7	12200.000	47.97	39.34	5.64	43.5	49.45	74.00	-24.55	274	43	peak

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode :TX CH High Test Date :Apr. 13, 2011
Fundamental Frequency :2479 MHz Test By :Dino
Pol. :Vertical Temp./Hum. :21 °C/ 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	2479.000	42.14	32.96	2.39	0	77.49	114.00	-36.51	214	192	peak

1	1652.550	66.95	29.67	1.96	46.33	52.25	74.00	-21.75	100	360	peak
2	4958.000	66.71	34.61	3.48	47.38	57.42	74.00	-16.58	131	159	peak
3	4958.000	53.77	34.61	3.48	47.38	44.48	54.00	-9.52	131	159	AVG
4	7437.000	61.09	35.94	4.27	46.15	55.15	74.00	-18.85	129	184	peak
5	7437.000	48.15	35.94	4.27	46.15	42.21	54.00	-11.79	129	184	AVG
6	9916.000	46.53	37.42	4.98	43.43	45.50	74.00	-28.50	317	249	peak
7	12395.000	47.04	39.38	5.68	43.7	48.40	74.00	-25.60	367	116	peak

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	:TX CH High	Test Date	:Apr. 13, 2011
Fundamental Frequency	:2479 MHz	Test By	:Dino
Pol.	:Horizontal	Temp./Hum.	:21 °C / 68%

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	2479.000	36.51	32.96	2.39	0	71.86	114.00	-42.14	100	185	peak

1	1652.520	61.19	29.67	1.96	46.33	46.49	74.00	-27.51	168	0	peak
2	4958.000	72.04	34.61	3.48	47.38	62.75	74.00	-11.25	100	310	peak
3	4958.000	59.10	34.61	3.48	47.38	49.81	54.00	-4.19	100	310	AVG
4	7437.000	65.24	35.94	4.27	46.15	59.30	74.00	-14.70	112	312	peak
5	7437.000	52.30	35.94	4.27	46.15	46.36	54.00	-7.64	100	312	AVG
6	9916.000	46.61	37.42	4.98	43.43	45.58	74.00	-28.42	122	34	peak
7	12395.000	47.37	39.38	5.68	43.7	48.73	74.00	-25.27	100	269	peak

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result

Operation Mode :Band Edge Test Date :Apr. 13, 2011
Temp./Hum. :21 °C / 68% Test By :Dino

CH Low Vertical

Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
2390.000	11.09	32.8	2.33	0	46.22	54.00	-7.78	231	271	peak

CH Low Horizontal

Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
2390.000	11.70	32.8	2.33	0	46.83	54.00	-7.17	390	52	peak

CH High Vertical

Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
2483.500	10.92	32.97	2.39	0	46.28	54.00	-7.72	230	25	peak

CH High Horizontal

Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
2483.500	11.31	32.97	2.39	0	46.67	54.00	-7.33	389	37	peak

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 “F” denotes fundamental frequency; “H” denotes harmonics frequency. “S” denotes spurious frequency.
- 4 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 6 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

7 20 dB Band Width Measurement

7.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT normal operating mode.
3. Set SPA Center Frequency = fundamental frequency, RBW = 100kHz, VBW = 300kHz, Span = 20MHz.
4. Set SPA Max hold. Mark peak, -20dB.

7.2 Test SET-UP (Block Diagram of Configuration)

Same as 4.2 Radiated Emission Measurement.

7.3 Measurement Equipment Used:

Same as 4.2 Radiated Emission Measurement.

7.4 Measurement Results:

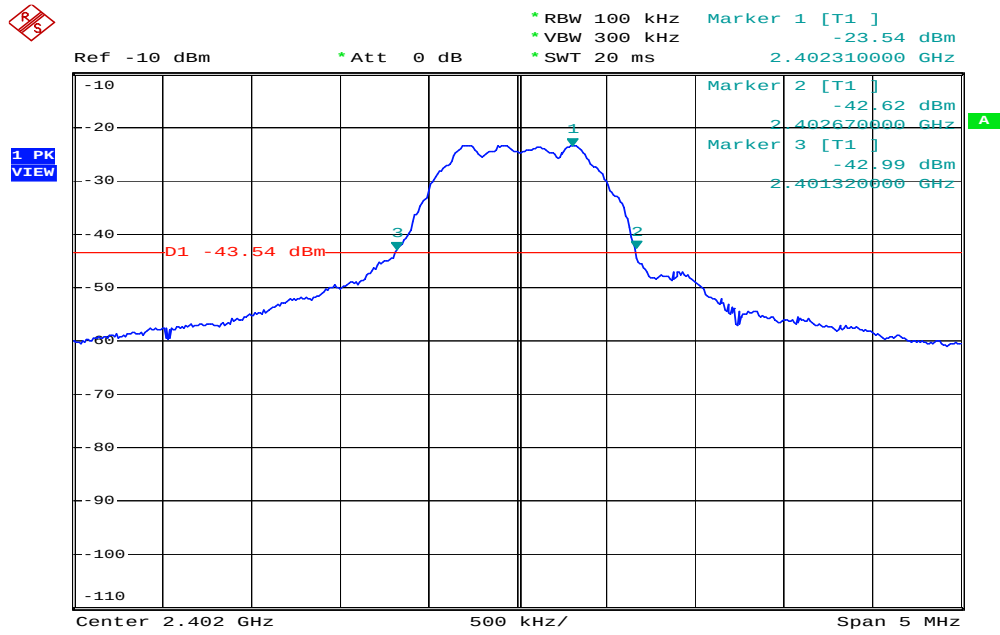
2402 Channel = 1.35MHz

2440 Channel = 1.73MHz

2479 Channel = 2.24MHz

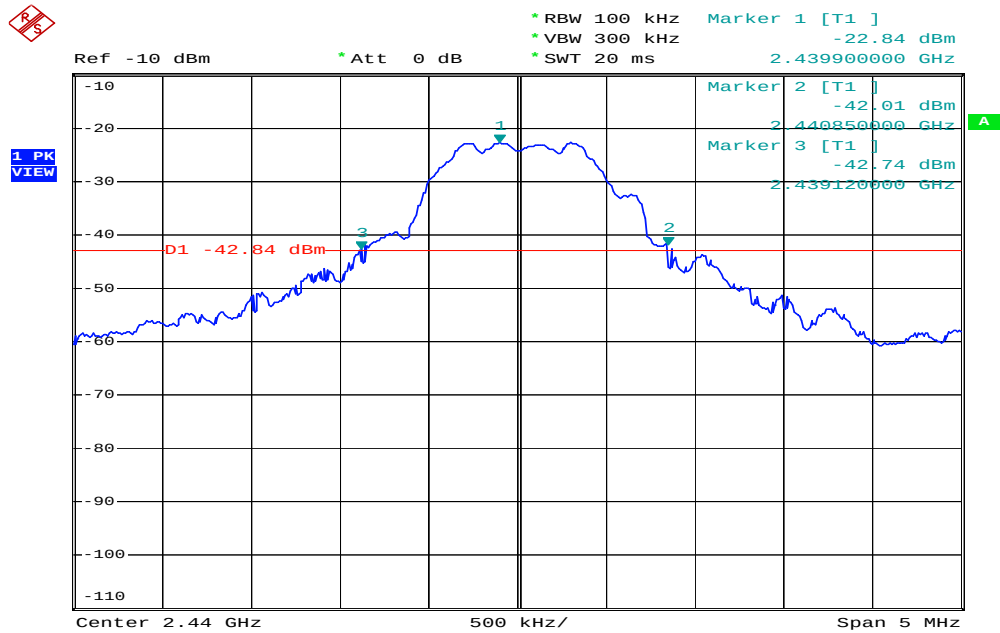
Refer to attached data chart.

20dB Bandwidth Test Data CH-Low



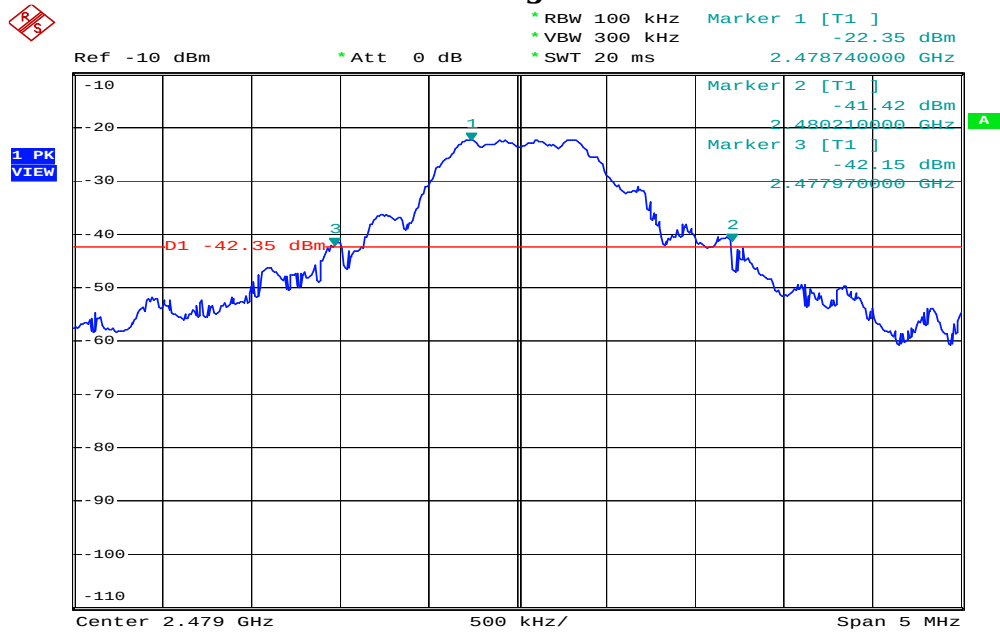
Date: 8.APR.2011 18:36:11

20dB Bandwidth Test Data CH-Mid



Date: 8.APR.2011 18:37:57

20dB Bandwidth Test Data CH-High

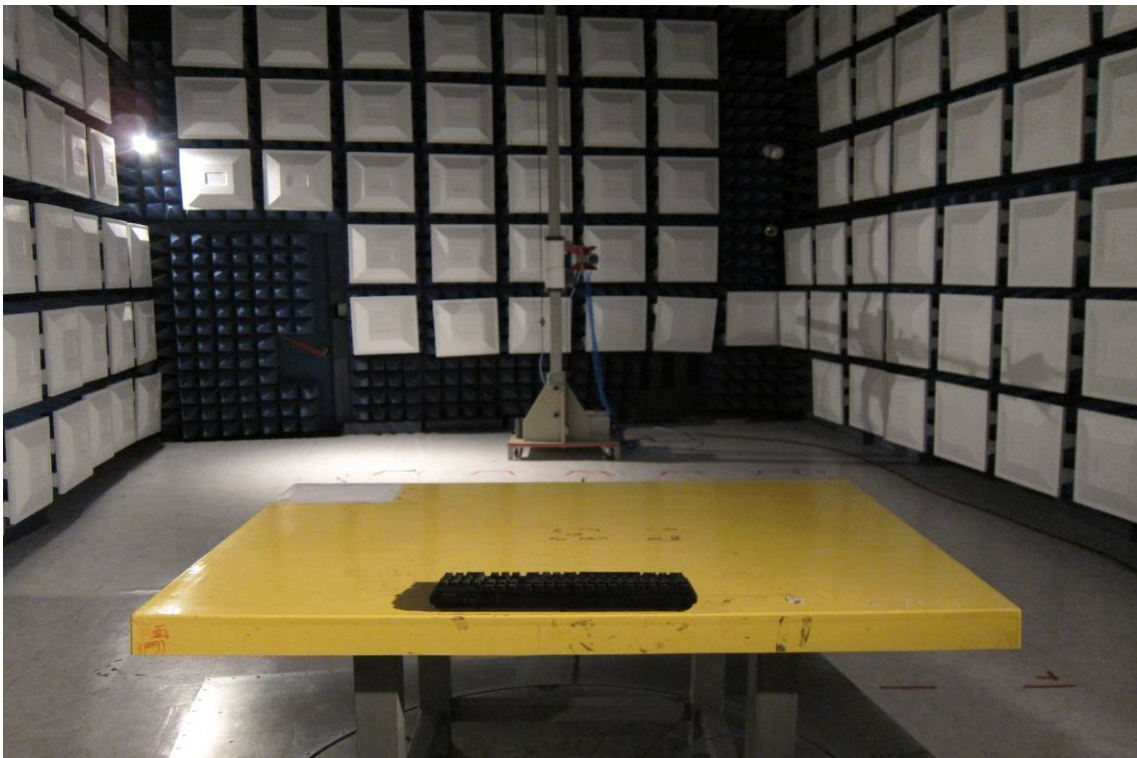
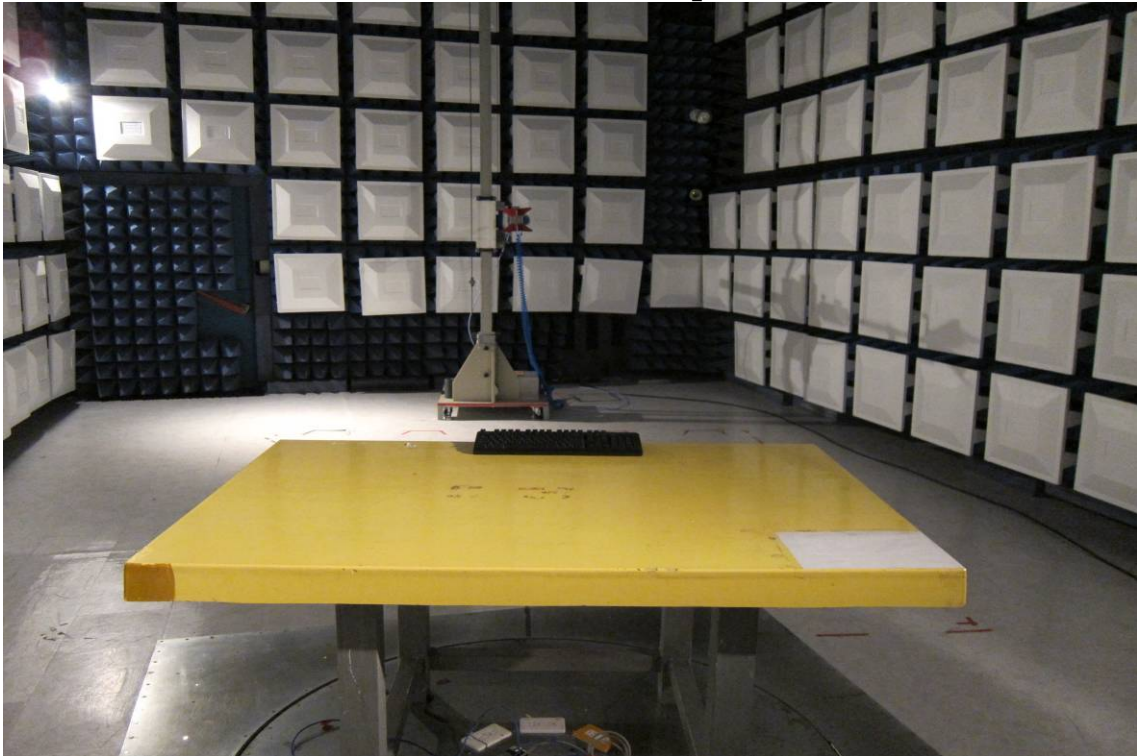


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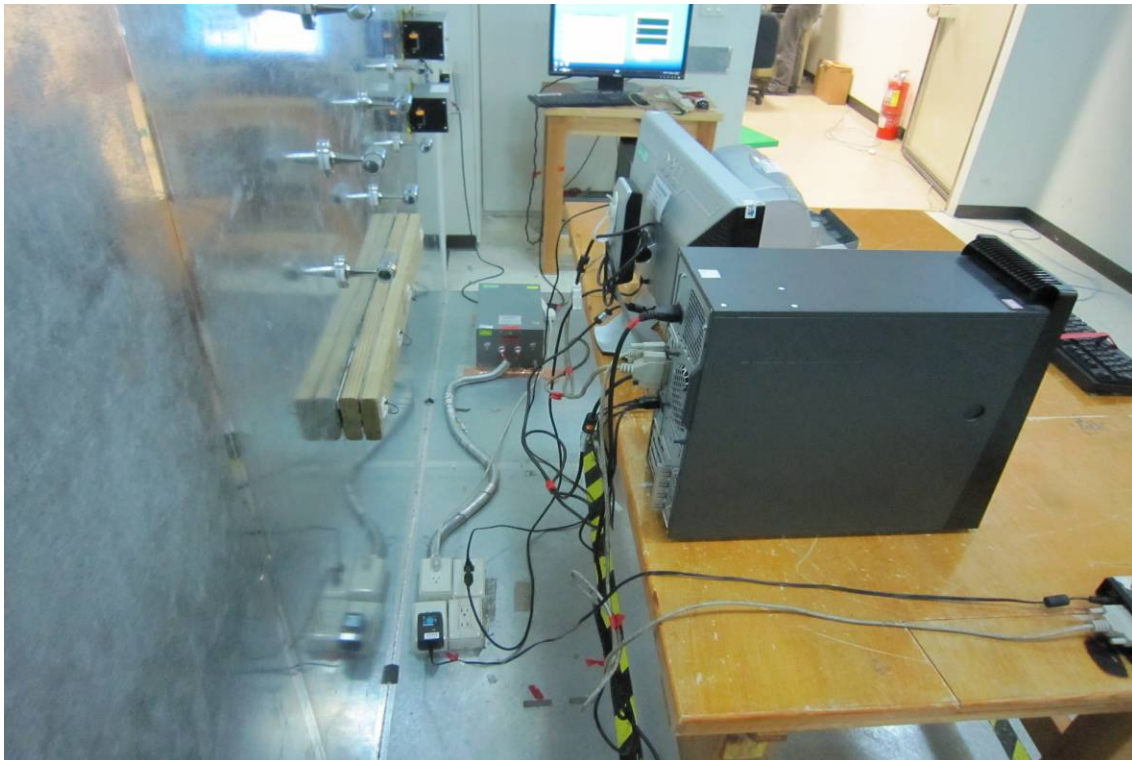
APPENDIX 1

PHOTOGRAPHS OF SETUP

Radiated Emission Setup Photos



Conducted Emission Setup Photos



APPENDIX 2

PHOTOGRAPHS OF EUT

Front View of EUT



Back View of EUT



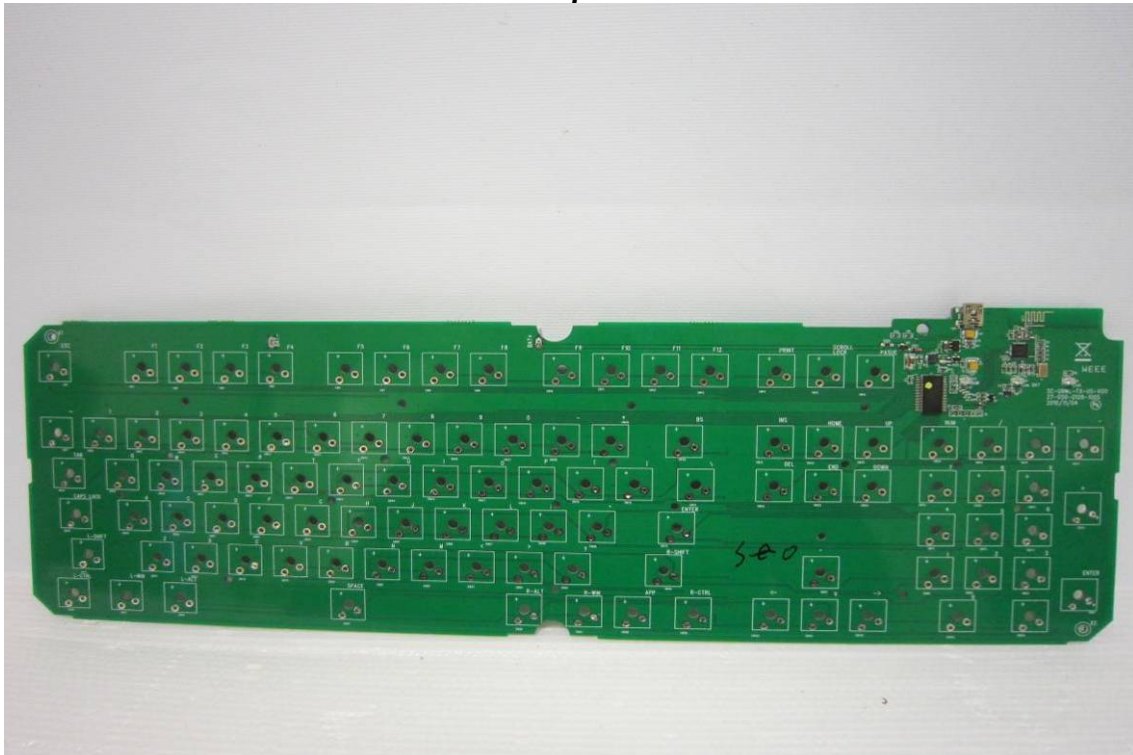
Site View of EUT



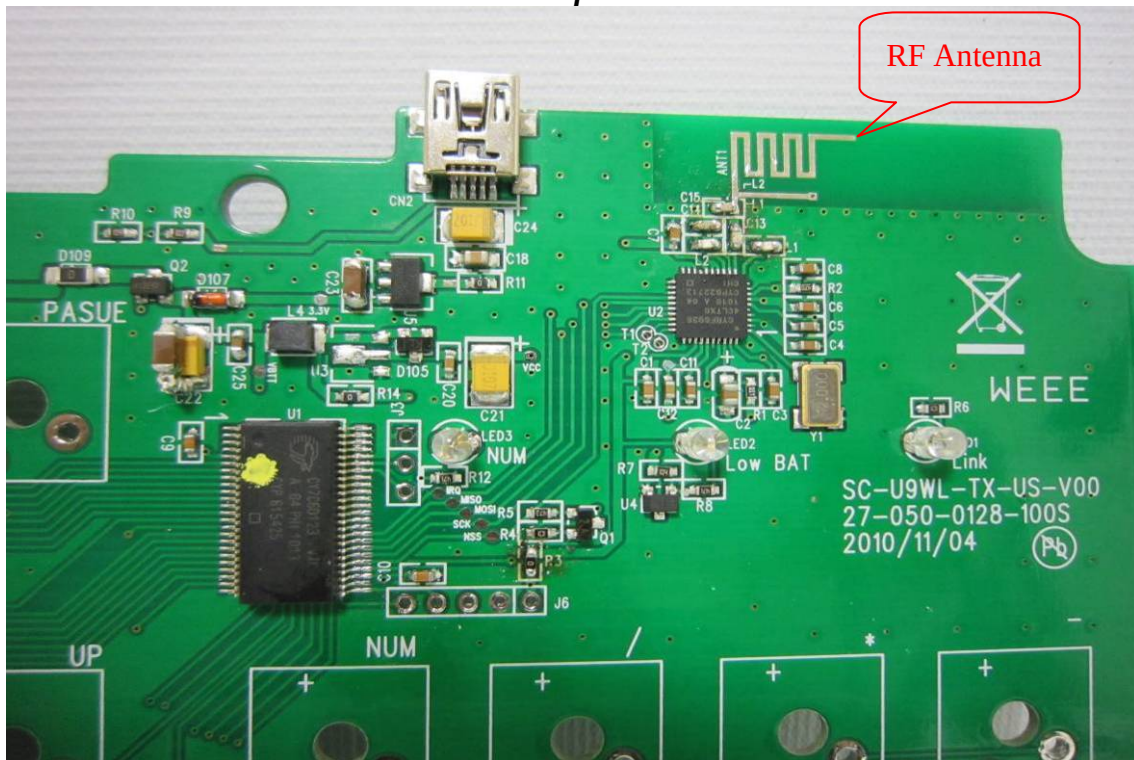
Open View of EUT



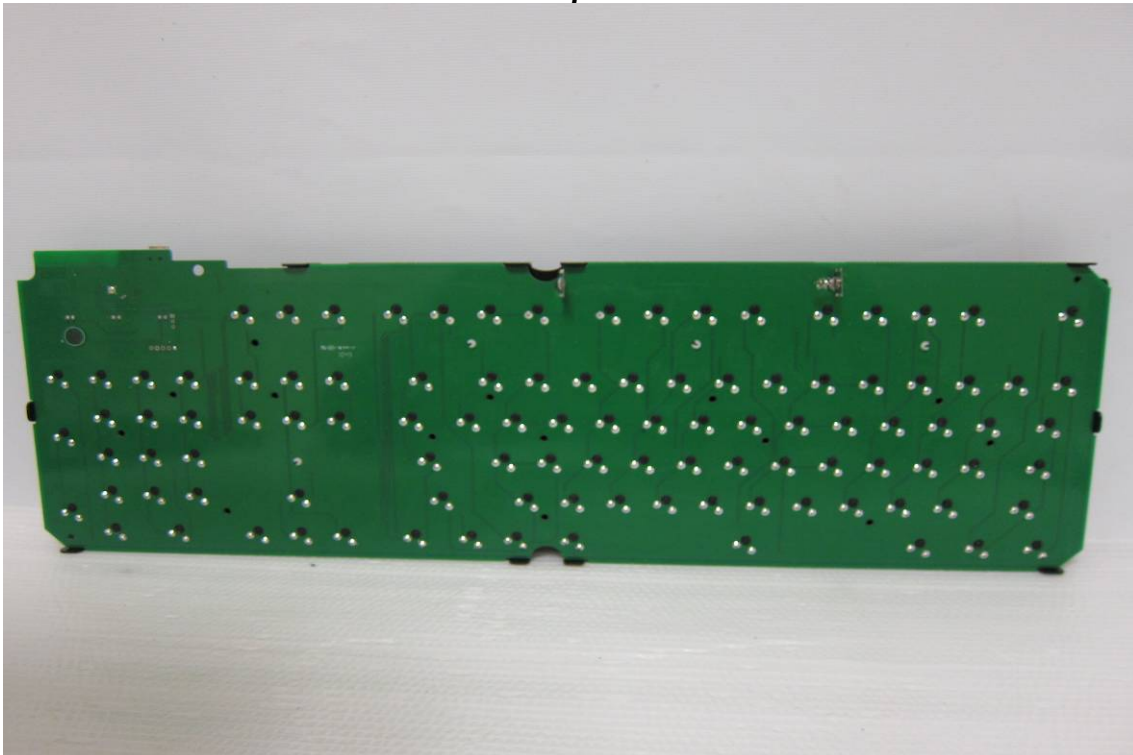
Internal of EUT – 1



Internal of EUT – 2



Internal of EUT – 2



~ End of Report ~