

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION

Product Name : A remote controller
Trade Name : AC RYAN
Model Name : ACR-VE91200
FCC ID : Y8J-ACR-VE91200-1
Serial Number : N/A
Technical Data : DC 3V
Report Number : EESZD10170006-8
Date : Nov. 15, 2011
Regulations : See below

Standards	Results
<input checked="" type="checkbox"/> 47 CFR FCC Part 15 Subpart C 15.249	PASS

Prepared for
AC RYAN ASIA PACIFIC PTE LTD
60 KAKI BUKIT PLACE #01-12 EUNOS TECHPARK SINGAPORE 415979

Prepared by
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Check No.: 30000416

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CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION
Building C, Hongwei Industrial Zone, Baoan 70 District, Shenzhen

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(Note: N/A means not applicable)

1. GENERAL INFORMATION

Applicant: AC RYAN ASIA PACIFIC PTE LTD
60 KAKI BUKIT PLACE #01-12 EUNOS TECPARK SINGAPORE
415979

Manufacturer: AC RYAN ASIA PACIFIC PTE LTD
60 KAKI BUKIT PLACE #01-12 EUNOS TECPARK SINGAPORE
415979

Sample Description: A remote controller

Model Name: ACR-VE91200

Trade Name: AC RYAN

FCC ID: Y8J-ACR-VE91200-1

Report Number: EESZD10170006-8

Date of Test: Oct. 17, 2011 to Nov. 15, 2011

The above equipment was tested by CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION for compliance with the requirements set forth in FCC Rules and the measurement procedure according to ANSI C63.4-2009.

The test results of this report relate only to the tested sample identified in this report.

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Approved by ; 
Jimmy Li
Manager



Date : Nov. 15, 2011

2. TEST SUMMARY

The complete list of measurements is given below:

Clause	Test Item	Rule	Result
7	20dB Bandwidth	FCC 15.215(c)	PASS
8	Radiated Emission	FCC 15.209 FCC 15.249(a) (d)	PASS
9	Out of Band Emission	FCC 15.249 (d)	PASS
--	Antenna Requirements *	FCC 15.203	PASS

*: According to 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. The EUT has a built in antenna which is a short wire solder on the PCB, this is permanently attached antenna and meets the requirements of this section.

3. MEASUREMENT UNCERTAINTY

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement items	Uncertainty
Radiated Emissions / Band edge Emission	4.6 dB
Conducted disturbance	2.6 dB

4. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model Number	Serial Number	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/09/2012
Spectrum Analyzer	Agilent	E4440A	MY46185649	03/29/2012
Biconilog Antenna	ETS-LINGREN	3142C	00044562	07/06/2012
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Horn Antenna	ETS-LINGREN	3117	00057407	07/06/2012
Microwave Preamplifier	Agilent	8449B	3008A02425	07/06/2012

6. PRODUCT INFORMATION

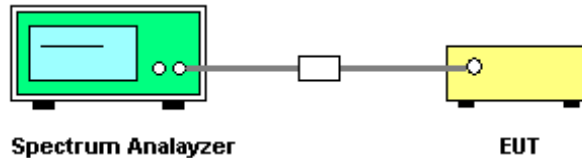
Items	Description
Rating	DC 3V
Intentional Transceiver	Intentional Transmitter
Modulation	GFSK
Frequency Range	2.403975GHz~2.476975GHz
Channel Number	64
Type	PCB Antenna
Gain	1.7dBi

7. 20DB BANDWIDTH MEASUREMENT

7.1 LIMITS

None

7.2 BLOCK DIAGRAM OF TEST SETUP



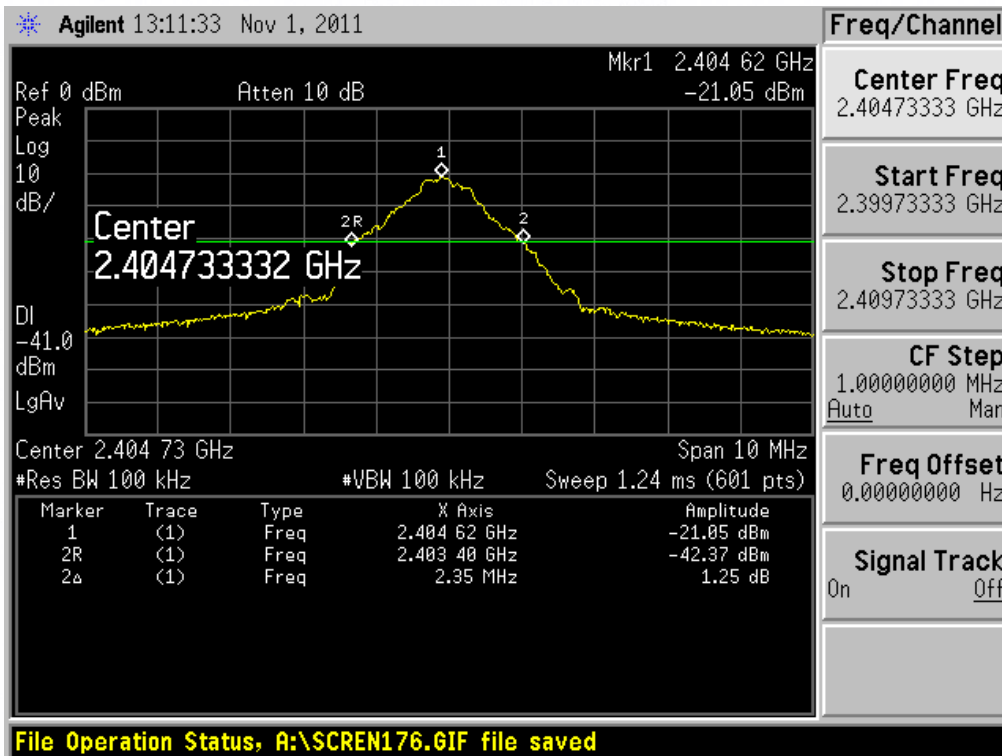
7.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level.
4. The 20dB bandwidth was determined from where the channel output spectrum intersected the display line.

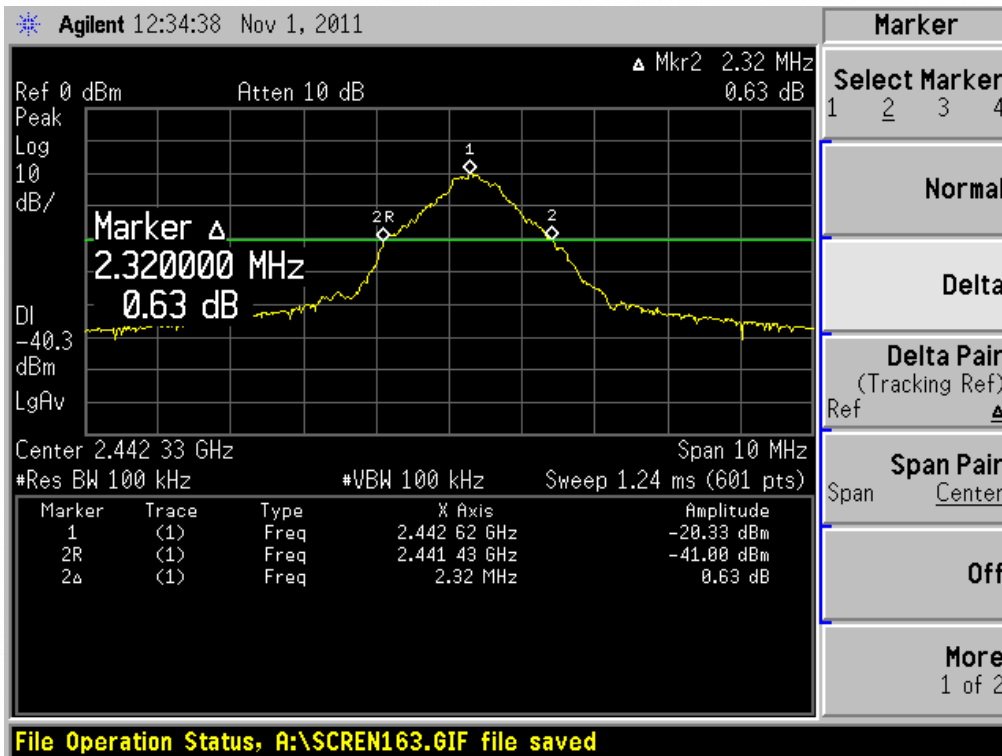
7.4 TEST RESULT

Worst case-- Modulation Type: GFSK

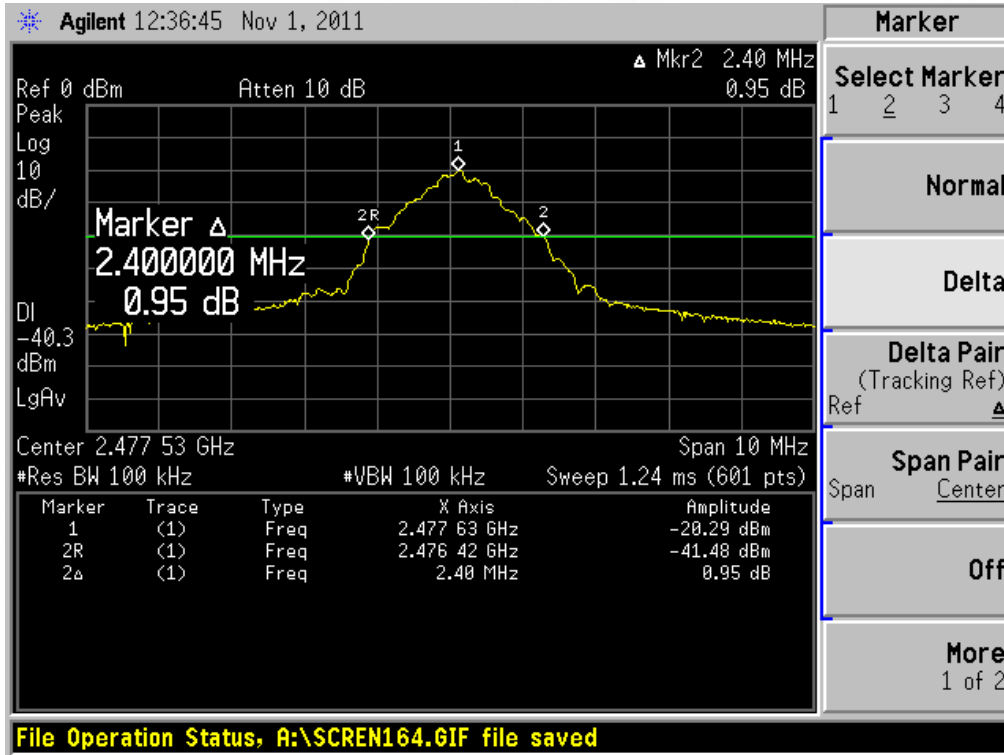
Channel	Frequency (GHz)	20 dB BW (MHz)	Result
Low	2.403975	2.35	2.40MHz
Middle	2.441950	2.32	
High	2.476975	2.40	



Low Channel



Middle Channel



High Channel

9. RADIATED EMISSIONS MEASUREMENT

9.1 LIMITS

(1) The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/ meter)	Field strength of harmonics (microvolts/ meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

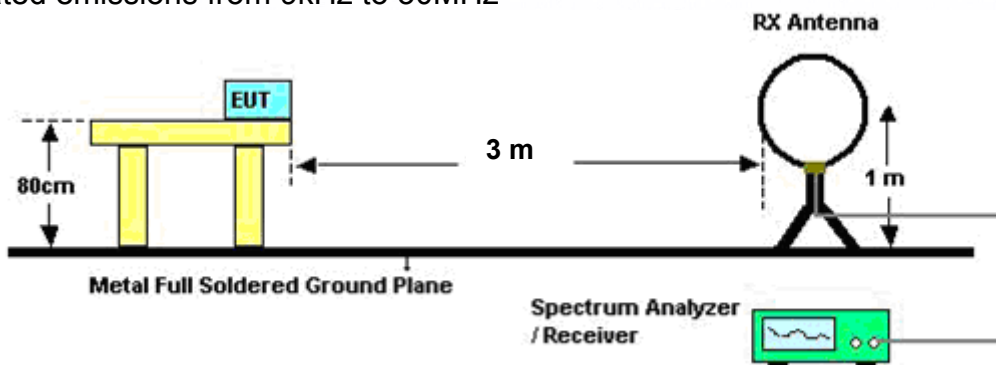
(2) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209 as the following , whichever is the lesser attenuation.

Frequency (MHz)	Field strength (mV/m)	Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

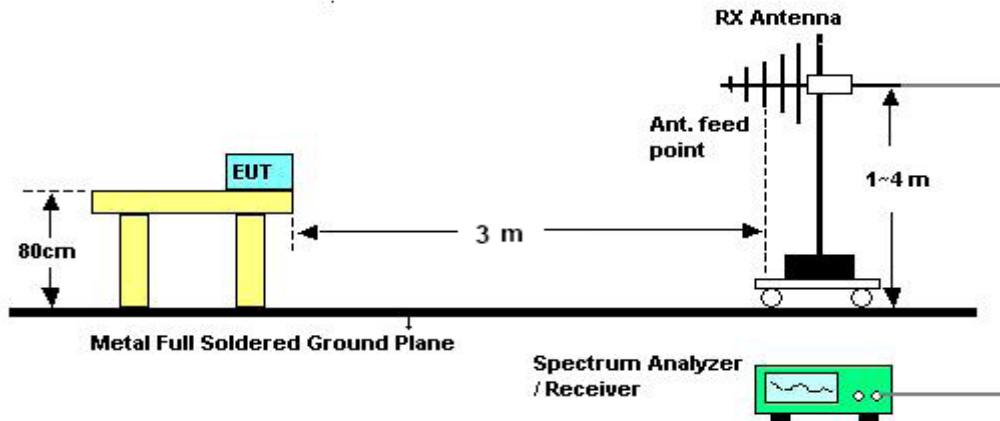
Note: the tighter limit applies at the band edges.

9.2 BLOCK DIAGRAM OF TEST SETUP

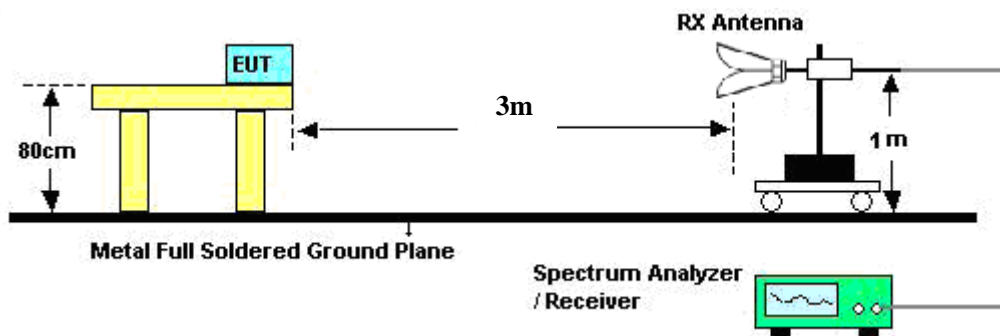
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30 - 1000MHz



For radiated emissions from 1GHz to 25GHz



9.3 TEST PROCEDURE

Below 30MHz

- The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 1 meter away from the antenna (loop antenna). The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- For each suspected emission, the EUT was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

30MHz ~ 1GHz:

- The EUT was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where EUT radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Above 1GHz:

a. The EUT was placed on the non-conductive turntable 0.8 m above the ground at a chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where EUT radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

9.4 TEST RESULT

Note: Limit dB μ V/m @3m = Limit dB μ V/m @300m+ 80

Limit dB μ V/m @3m = Limit dB μ V/m @30m + 40

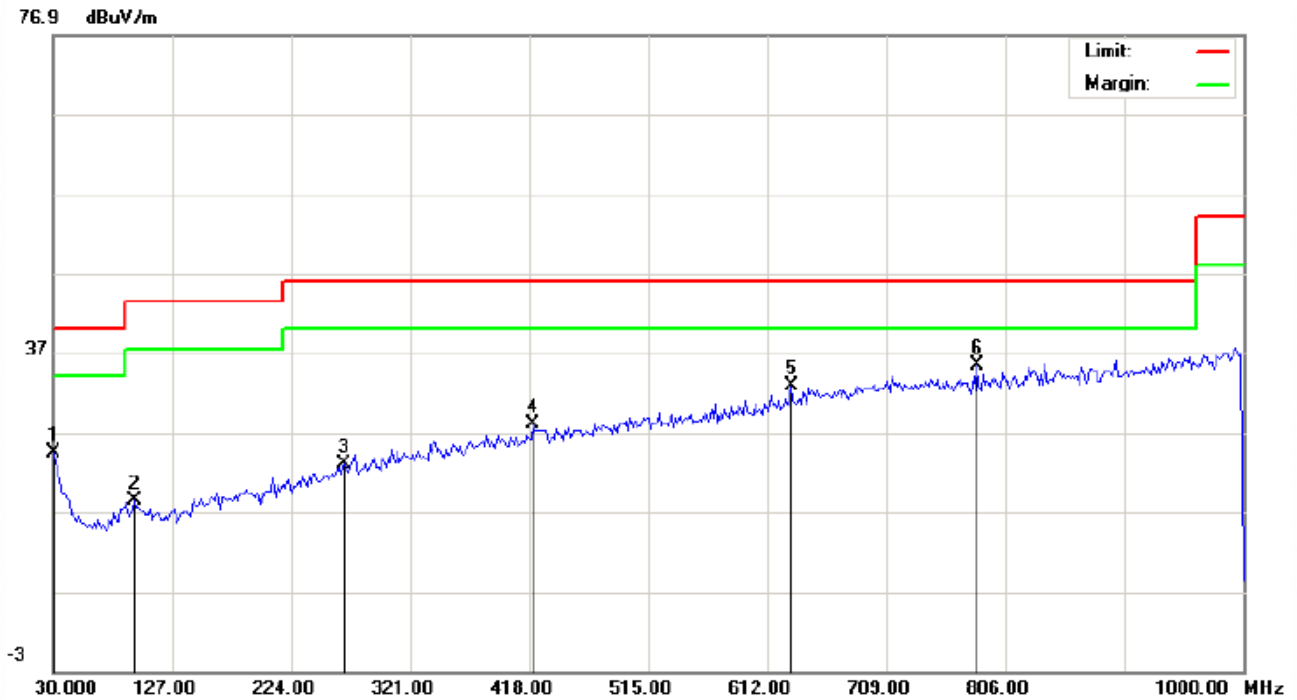
A. Below 30MHz:

The test data below 30MHz are very low, so they are not recorded.

B. 30MHz ~ 1GHz:

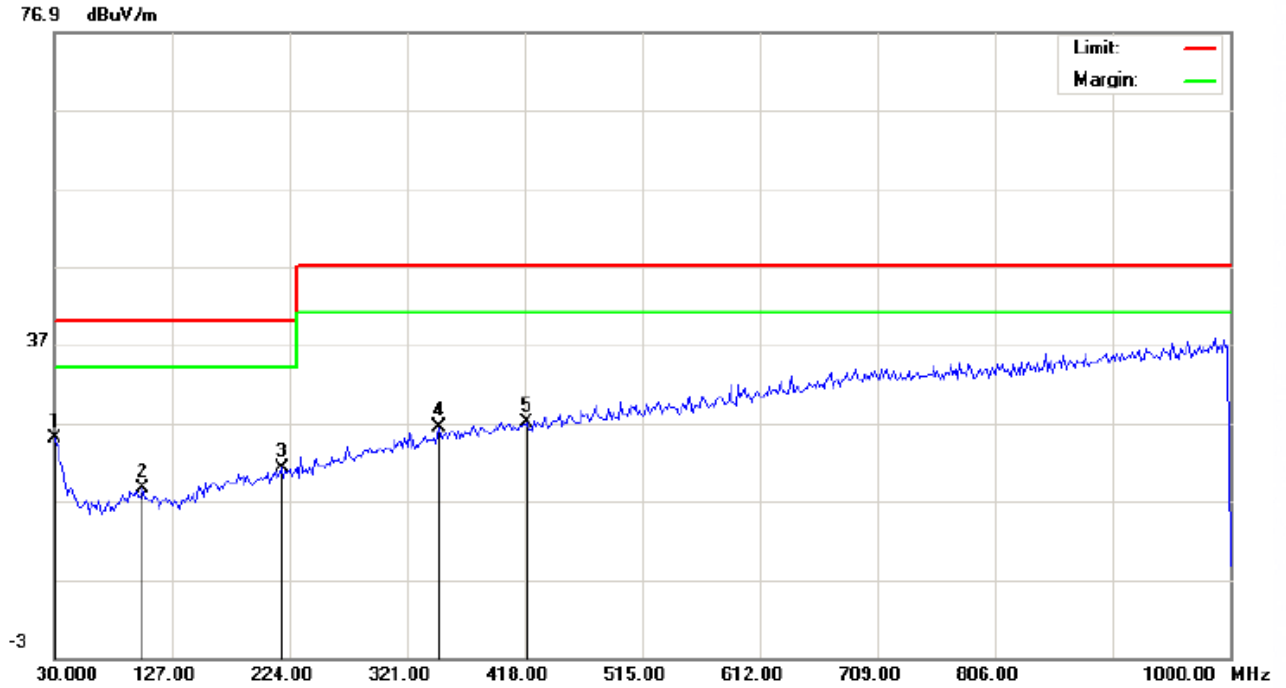
The test data of low channel, middle channel and high channel are almost same in frequency bands 30MHz to 1GHz, and the data of middle channel are chosen as representative in below:

H:



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	30.0000	6.68			17.63	24.31			40.00			-15.69		P
2	96.2833	8.21			10.26	18.47			43.50			-25.03		P
3	267.6500	8.41			14.54	22.95			46.00			-23.05		P
4	421.2333	9.31			18.72	28.03			46.00			-17.97		P
5	631.4000	9.79			22.99	32.78			46.00			-13.22		P
6	783.3667	10.34			25.04	35.38			46.00			-10.62		P

V:



No.	Freq. MHz	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		peak	QP	AVG	QP	AVG	QP	AVG		
1	30.0000	7.34			17.63	24.97			40.00			-15.03		P
2	102.7500	8.30			10.24	18.54			40.00			-21.46		P
3	217.5333	8.71			12.54	21.25			40.00			-18.75		P
4	346.8667	9.41			17.03	26.44			47.00			-20.56		P
5	419.6167	8.27			18.69	26.96			47.00			-20.04		P

C. Above 1GHz:

Test Results-(Measurement Distance: 3m)_Low Channel								
Frequency (MHz)	Measurement value			Limit			Antenna (H/V)	Result (P/F)
	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)		
*2403.975	83.63	---	---	114	---	94	H	P
4807.000	53.63	---	48.69	74	---	54	H	P
7206.000	52.16	---	45.02	74	---	54	H	P
9608.000	45.83	---	---	74	---	54	H	P
12010.000	31.25	---	---	74	---	54	H	P
14412.000	31.01	---	---	74	---	54	H	P
16814.000	30.02	---	---	74	---	54	H	P
17216.000	30.67	---	---	74	---	54	H	P

*2403.975	75.62	---	---	114	---	94	V	P
4807.000	50.20	---	---	74	---	54	V	P
7206.000	48.63	---	---	74	---	54	V	P
9608.000	36.58	---	---	74	---	54	V	P
12010.000	37.79	---	---	74	---	54	V	P
14412.000	41.99	---	---	74	---	54	V	P
16814.000	40.79	---	---	74	---	54	V	P

*: fundamental frequency

Test Results-(Measurement Distance: 3m)_Middle Channel								
Frequency (MHz)	Measurement value			Limit			Antenna (H/V)	Result (P/F)
	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)		
*2441.950	85.23	---	---	114	---	94	H	P
4880.000	54.02	---	50.01	74	---	54	H	P
7350.000	52.02	---	47.96	74	---	54	H	P
9800.000	29.79	---	---	74	---	54	H	P
12250.000	35.75	---	---	74	---	54	H	P
14700.000	36.06	---	---	74	---	54	H	P
17150.000	36.13	---	---	74	---	54	H	P

*2441.950	79.63	---	---	114	---	94	V	P
4880.000	52.08	---	48.69	74	---	54	V	P
7350.000	48.22	---	---	74	---	54	V	P
9800.000	33.86	---	---	74	---	54	V	P
12250.000	34.64	---	---	74	---	54	V	P
14700.000	36.56	---	---	74	---	54	V	P
17150.000	39.79	---	---	74	---	54	V	P

*: fundamental frequency

Test Results-(Measurement Distance: 3m)_High Channel								
Frequency (MHz)	Measurement value			Limit			Antenna (H/V)	Result (P/F)
	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)	PK (dB μ V/m)	QP (dB μ V/m)	AV (dB μ V/m)		
*2476.975	78.99	---	---	114	---	94	H	P
4940.000	55.23	---	50.96	74	---	54	H	P
7440.000	51.24	---	---	74	---	54	H	P
9920.000	38.65	---	---	74	---	54	H	P
12400.000	38.44	---	---	74	---	54	H	P
14880.000	39.79	---	---	74	---	54	H	P
17360.000	40.46	---	---	74	---	54	H	P

*2476.975	75.23	---	---	114	---	94	V	P
4940.000	53.65	---	48.52	74	---	54	V	P
7440.000	50.08	---	---	74	---	54	V	P
9920.000	38.63	---	---	74	---	54	V	P
12400.000	38.48	---	---	74	---	54	V	P
14880.000	38.74	---	---	74	---	54	V	P
17360.000	37.59	---	---	74	---	54	V	P

*: fundamental frequency

Remark:

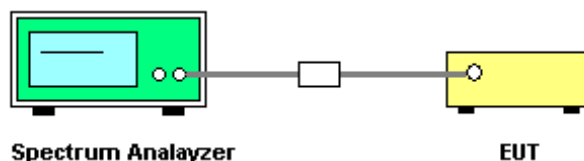
According to the emissions below 18GHz, the data curve is lower than the limit, and the data between 18GHz to 25GHz will be lower than the limit, so they are not recorded in the report.

10. BAND EDGE EMISSION MEASUREMENT

10.1 LIMITS

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

10.2 BLOCK DIAGRAM OF TEST SETUP



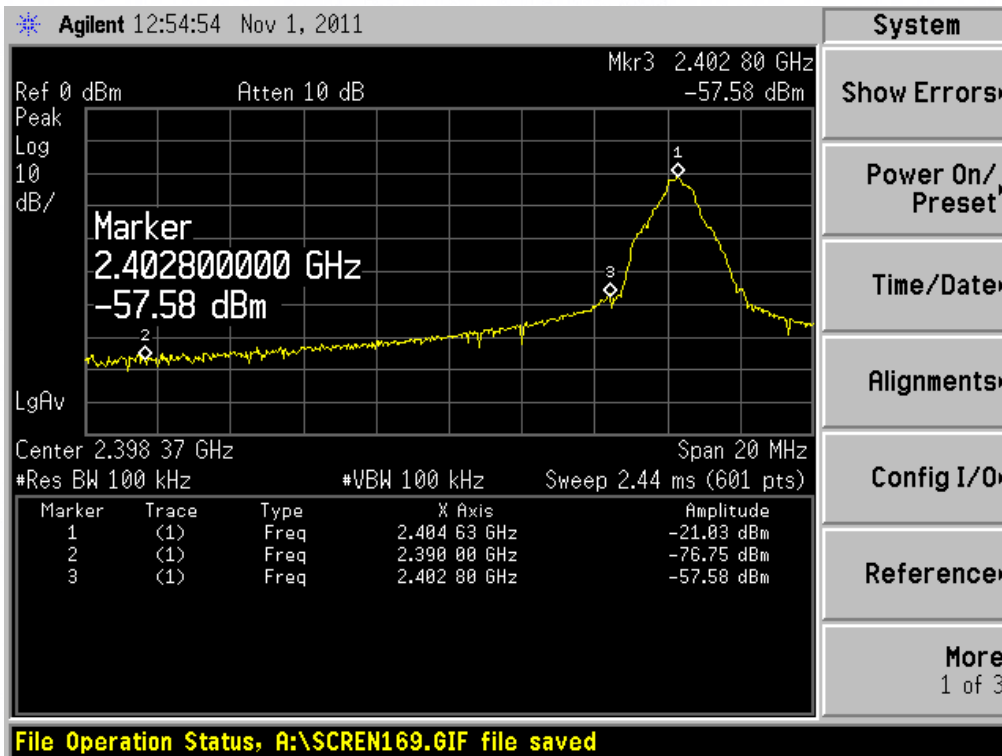
10.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. Record the emission drops at the band-edge relative to the highest fundamental emission level.
4. Use the marker-delta method to determine band-edge compliance as required.

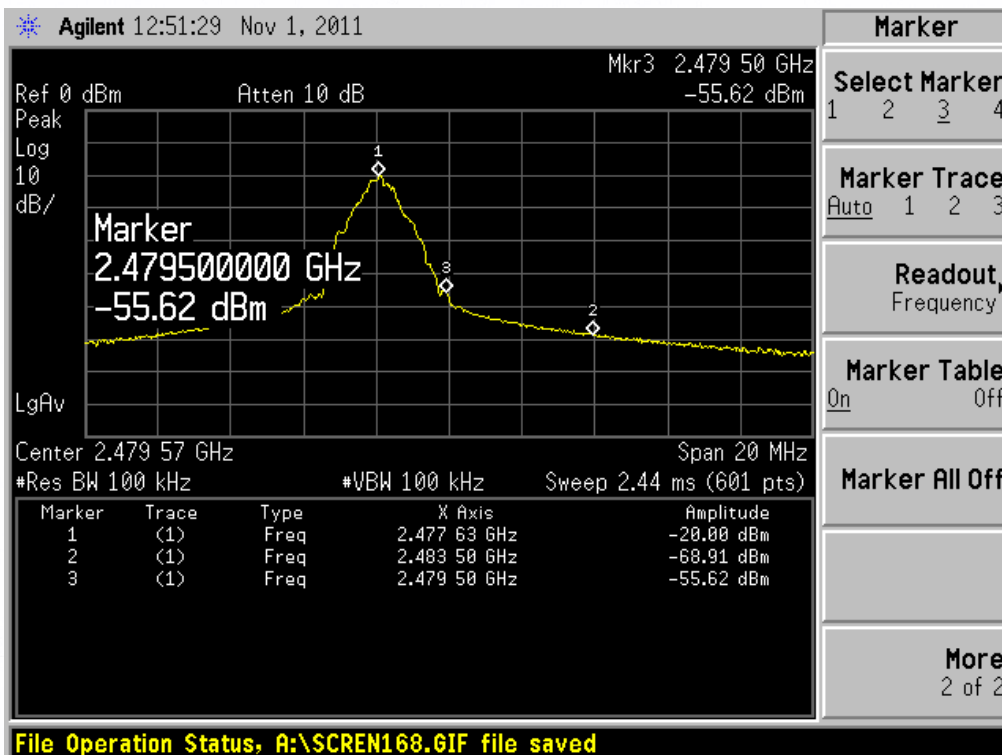
10.4 TEST RESULT

Worst case-- Modulation Type: GFSK

Channel Frequency (MHz)	Fundamental Emission (dB μ V/m)	Delta (dB)	Final Emission (dB μ V/m)	Limit (dB μ V/m)		Result (Pass / Fail)
	PK		PK	PK	AV	
Low	83.63	---	---	---	---	---
2402.8	---	36.55	47.08	74	54	Pass
2390.0	---	55.72	27.91	74	54	Pass
High	78.99	---	---	---	---	---
2479.5	---	35.62	43.37	74	54	Pass
2483.5	---	48.91	30.08	74	54	Pass



Low Channel



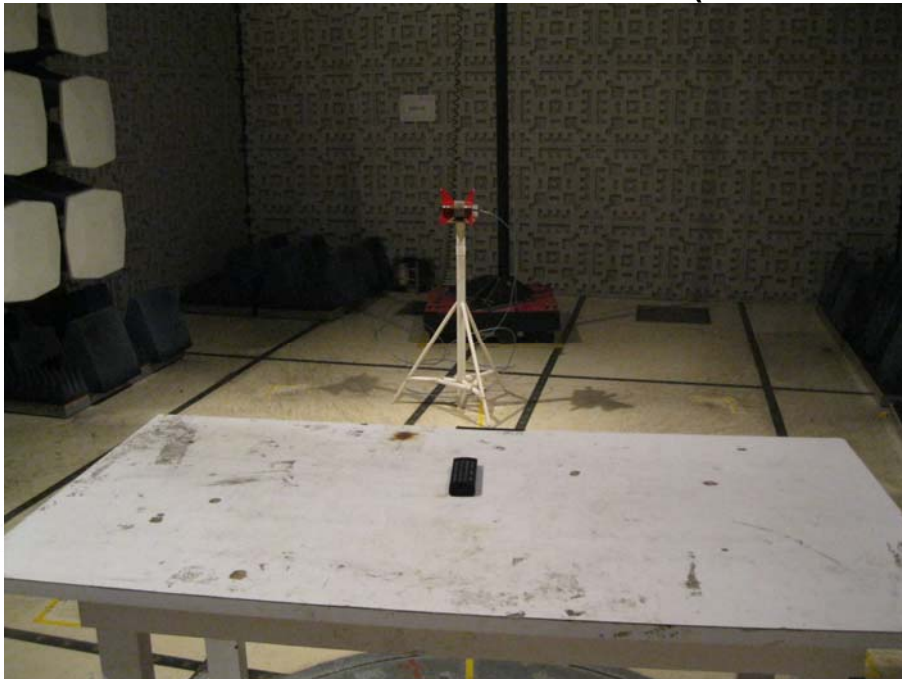
High Channel

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

TEST SETUP OF RADIATED EMISSION (30MHz~1GHz)



TEST SETUP OF RADIATED EMISSION (Above1GHz)



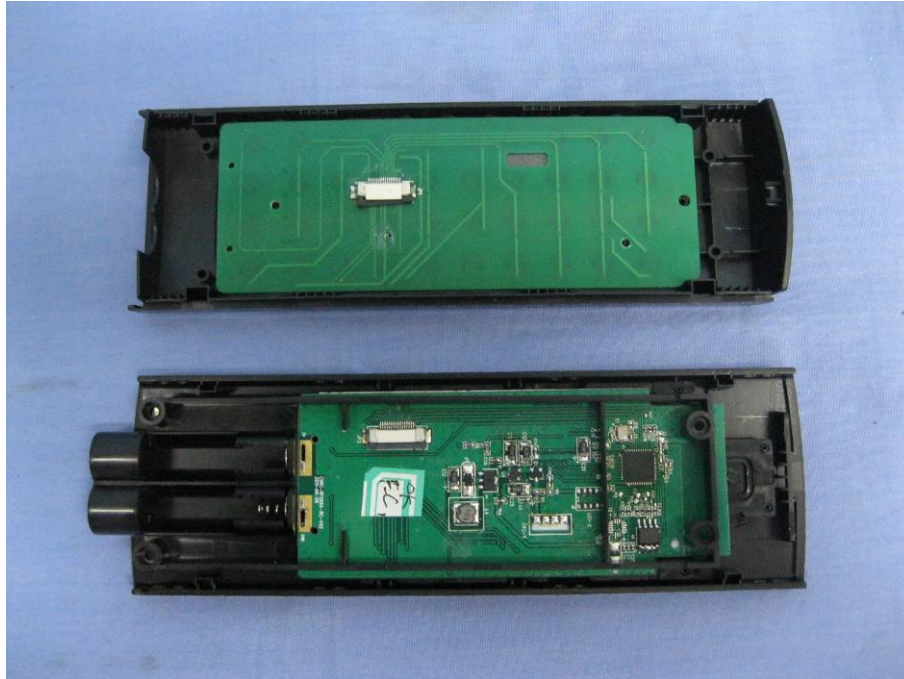
APPENDIX 2 PHOTOGRAPHS OF EUT



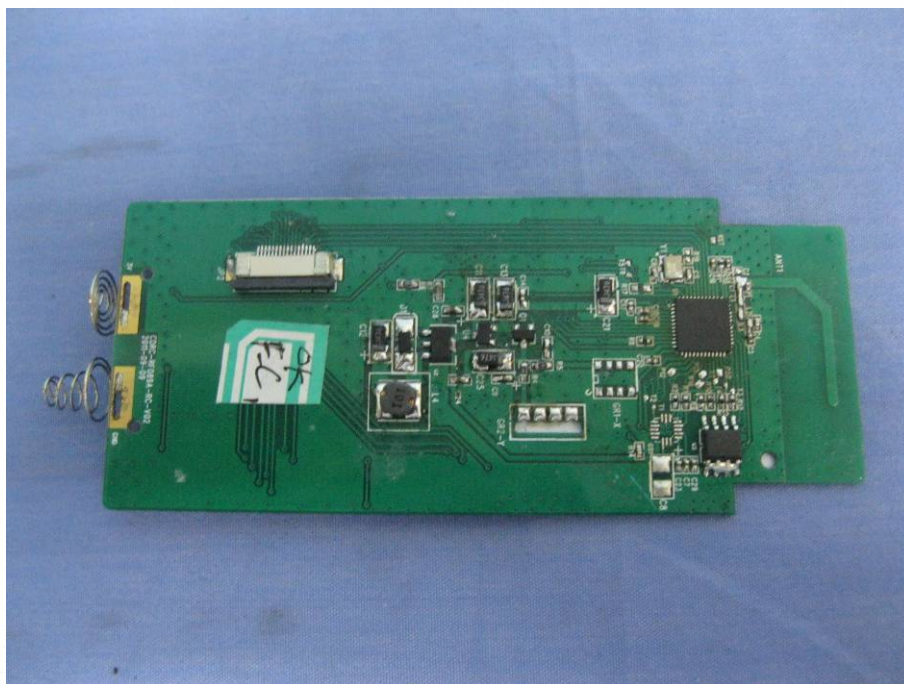
View of EUT-1



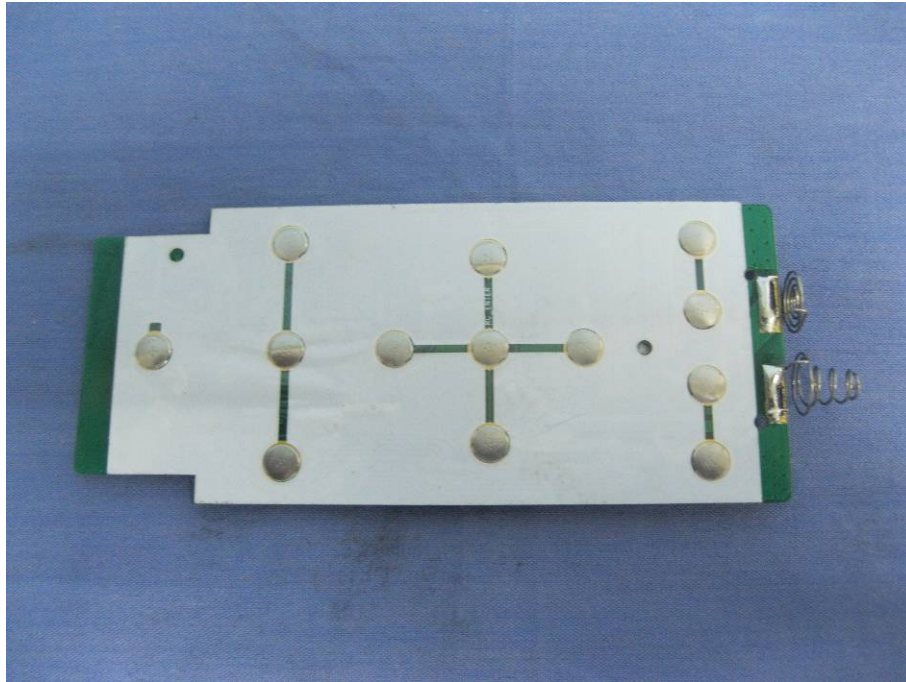
View of EUT-2



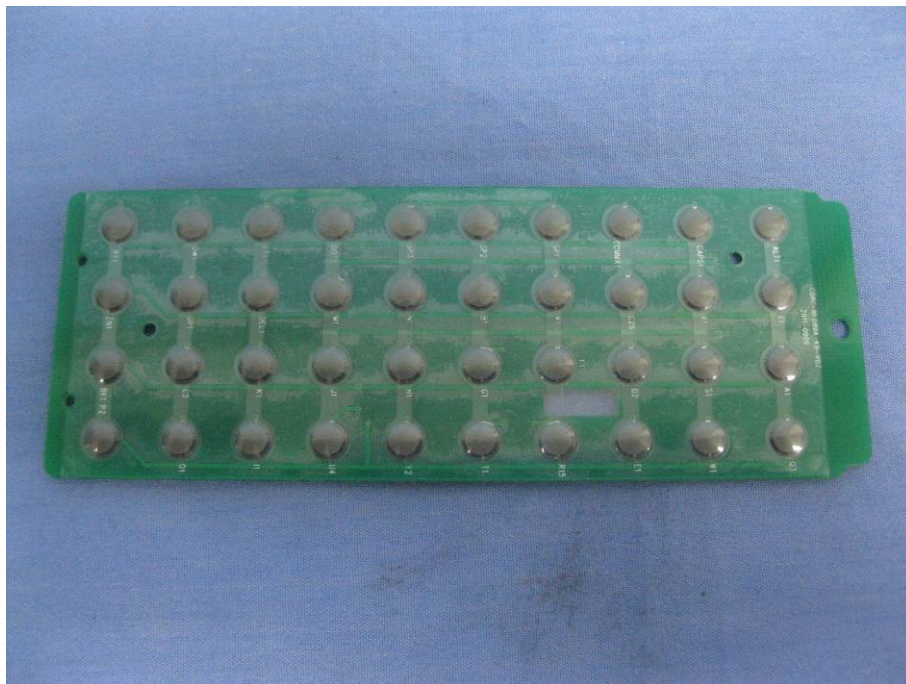
View of EUT-3



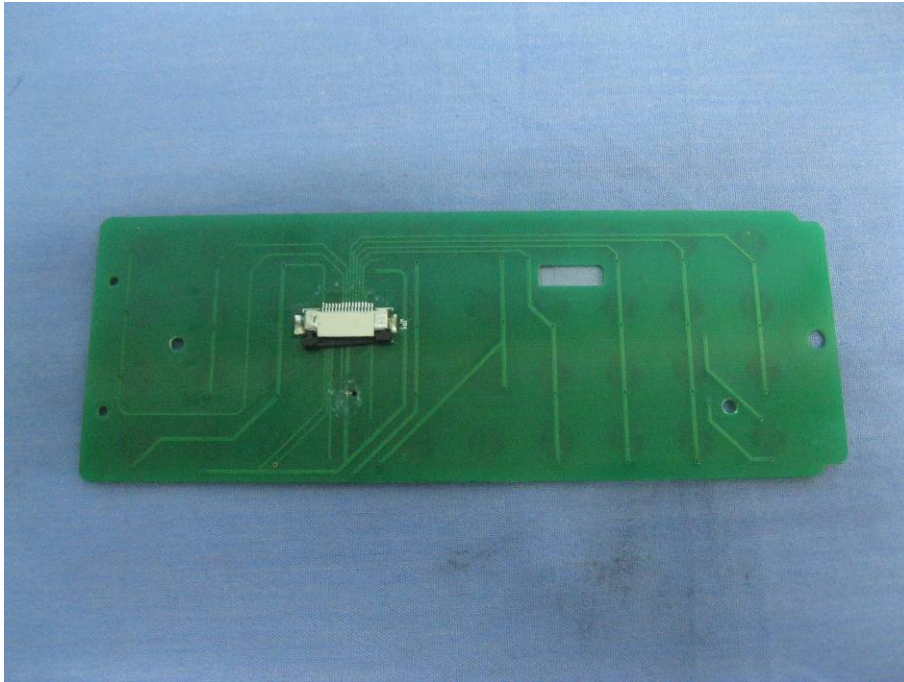
View of EUT-4



View of EUT-5



View of EUT-6



View of EUT-7

----End of the report----