FCC TEST REPORT

Product	:	Laser trigger
Trade mark	:	N/A
Model/Type reference	:	LV5
FCC ID	:	VAAWFTLV5
Report Number	:	EESZE07270003-1
Date	:	Nov. 05, 2012
Regulations	:	See below

Test Standards	Results
☒ 47 CFR FCC Part 15 Subpart C 15.249: 2011	PASS

Prepared for

Harvest One Limited
9D On Shing Industrial Building, 2-16 Wo Liu Hang Road, Fo Tan, N.T., Hong Kong

Prepared by

Centre Testing International
Hongwei Industrial Zone, Bao'an 70 District,
Shenzhen, Guangdong, China
TEL: +86-755-3368 3668
FAX: +86-755-3368 3385

Tested by: Reviewed by: Louisa Li

Approved by: Jimmy Li
Lab manager

Date: Nov. 05, 2012

Check No.: 47220686

TABLE OF CONTENTS

(Note: N/A means not applicable)

1. GENERAL INFORMATION

Applicant: Harvest One Limited
9D On Shing Industrial Building, 2-16 Wo Liu Hang Road, Fo Tan, N.T.,Hong Kong

FCC ID: VAAWFTLV5

Product: Laser trigger

Trade mark: N/A

Model/Type reference: LV5

Serial Number: N/A

Report Number: EESZE07270003-1

Sample Received Date: Oct. 29, 2012

Sample tested Date: Oct. 29, 2012 to Nov. 05, 2012

The above equipment was tested by Centre Testing International for compliance with the requirements set forth in the FCC Rules and Regulations Part 15 and the measurement procedure according to ANSI C63.4:2009.

2. TEST SUMMARY

The complete list of measurements is given below:

No.	Test Item	Rule	Result
1	20dB Bandwidth	FCC 15.215(c)	**PASS**
2	Radiated Emission	FCC 15.209	**PASS**
3	Out of Band Emission	FCC 15.249 (d)	**PASS**
4	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	4.5 dB

4. TEST EQUIPMENT LIST

Equipment	Manufacturer	Model Number	Serial Number	Due Date
3M Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	3510	07/09/2013
Spectrum Analyzer	Agilent	E4440A	MY46185649	03/07/2013
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	401	07/06/2013
Multi device Controller	ETS-LINGREN	2090	00057230	N/A
Horn Antenna	ETS-LINGREN	3117	00057407	07/06/2013
Microwave Preamplifier	Agilent	8449B	3008A02425	03/29/2013
Loop Antenna	ETS-LINDGERN	6502	71730	07/06/2013

5. SUPPORT EQUIPMENT LIST

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
----	----	----	----	----	----	----
----	----	----	----	----	----	----
----	----	----	----	----	----	----

6. PRODUCT INFORMATION

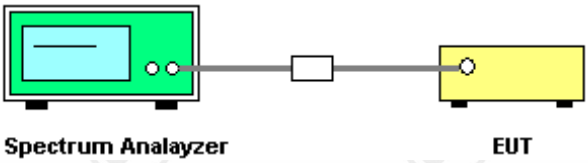
Items	Description
Rating	DC 3V
Intentional Transceiver	Intentional Transmitter
Modulation	MSK
Frequency Range	2.445796783～2.480988190GHz
Channel Number	16
Frequency	2.445796783GHz, 2.445796783GHz, 2.445796783GHz, 2.445796783GHz, 2.445796783GHz, 2.448996002GHz, 2.452195221GHz, 2.455394440GHz, 2.458593658GHz, 2.461792877GHz, 2.464992096GHz, 2.468191315GHz, 2.471390533GHz, 2.474589752GHz, 2.477788971GHz, 2.480988190GHz
Type	PCB Antenna
Connector	fixed on board

7. 20DB BANDWIDTH MEASUREMENT

7.1 LIMITS

None

7.2 BLOCK DIAGRAM OF TEST SETUP



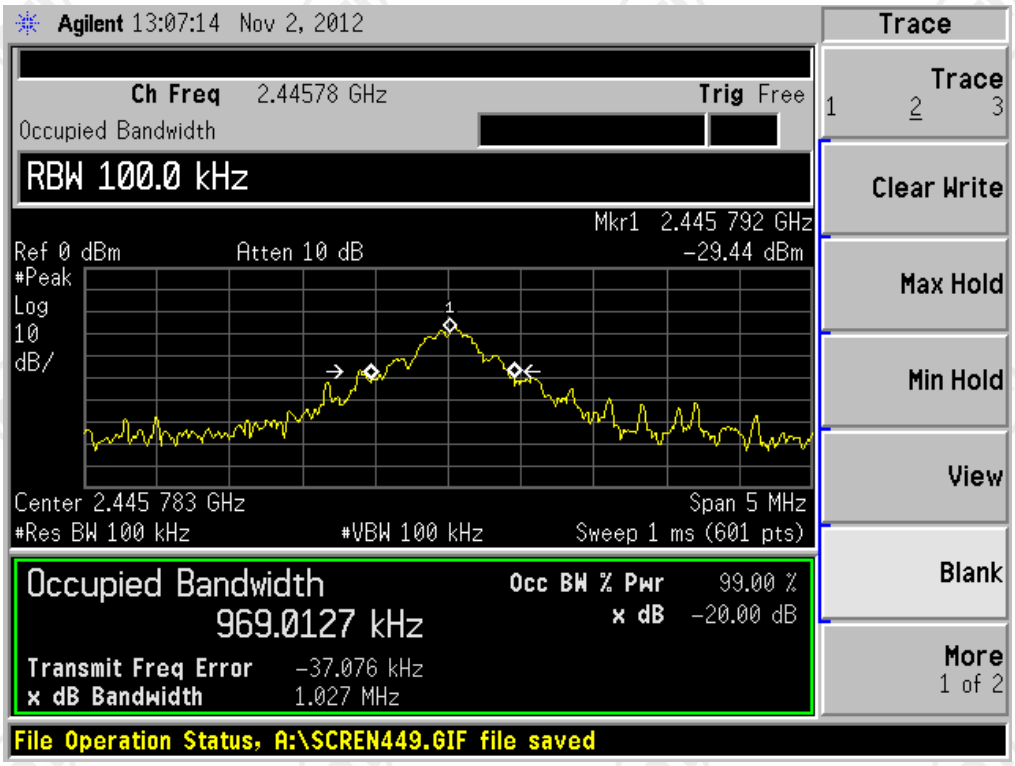
7.3 TEST PROCEDURE

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 and 20dB BW function in spectrum analyzer were taken.

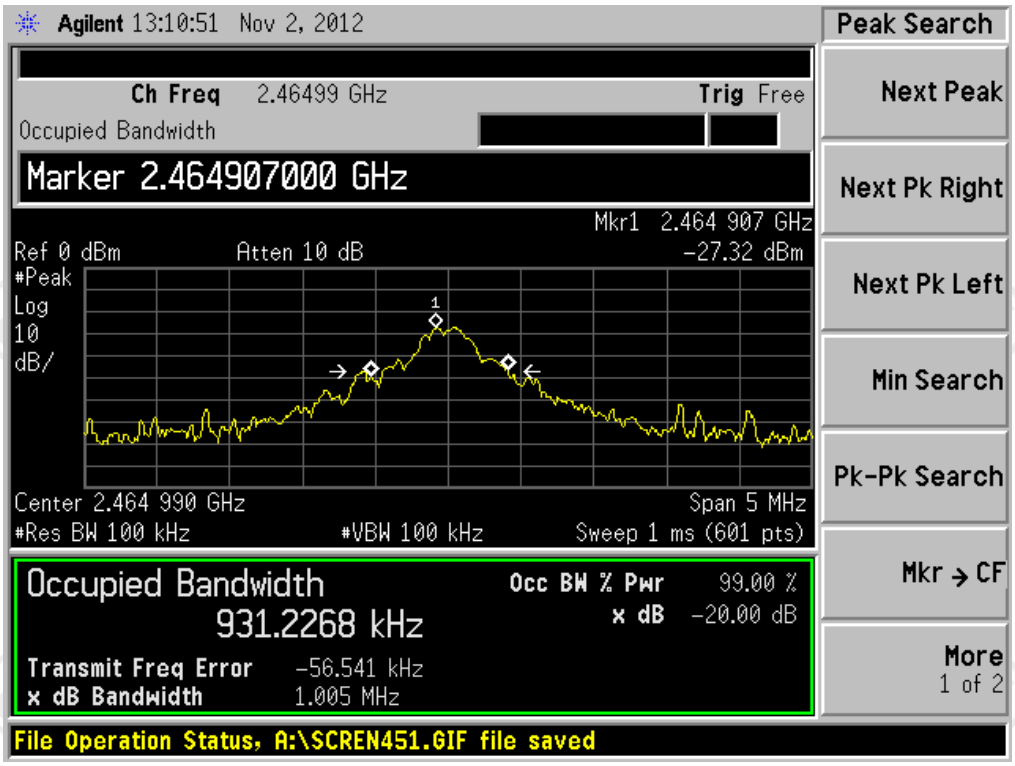
7.4 TEST RESULT

20dB Bandwidth:

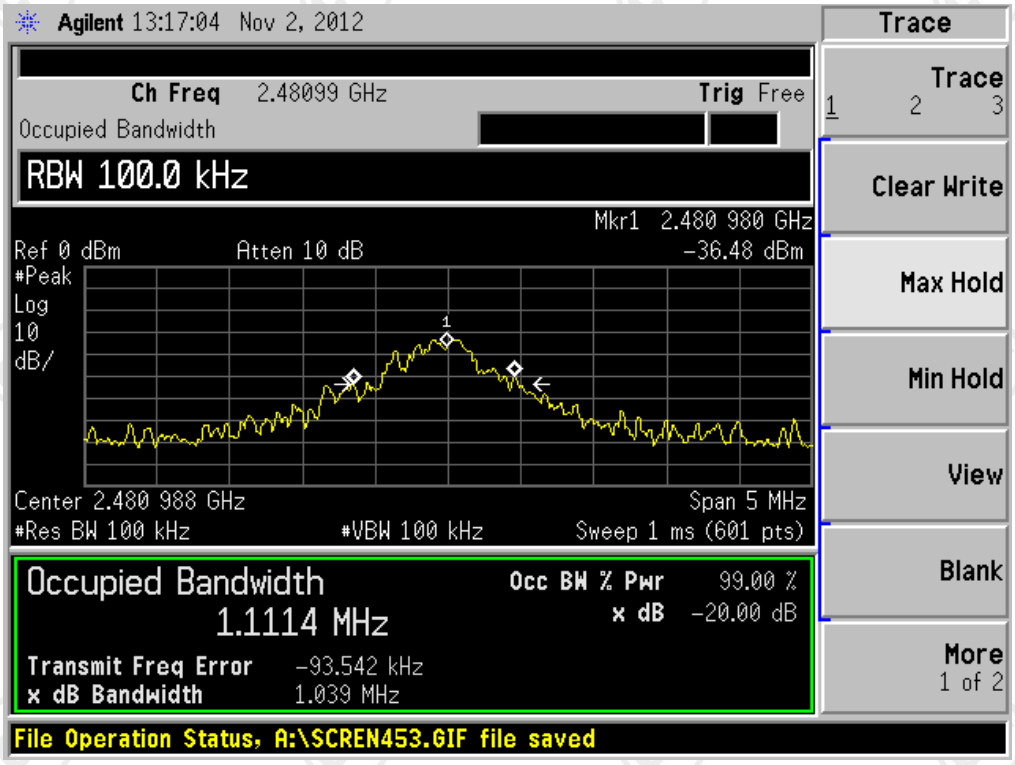
Channel	Frequency (GHz)	20 dB BW (MHz)	Result (MHz)
Low	2.445796783	1.027	1.039
Middle	2.464992096	1.005	
High	2.480988190	1.039	



Channel low



Channel middle



Channel high

8. RADIATED EMISSIONS MEASUREMENT

8.1 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

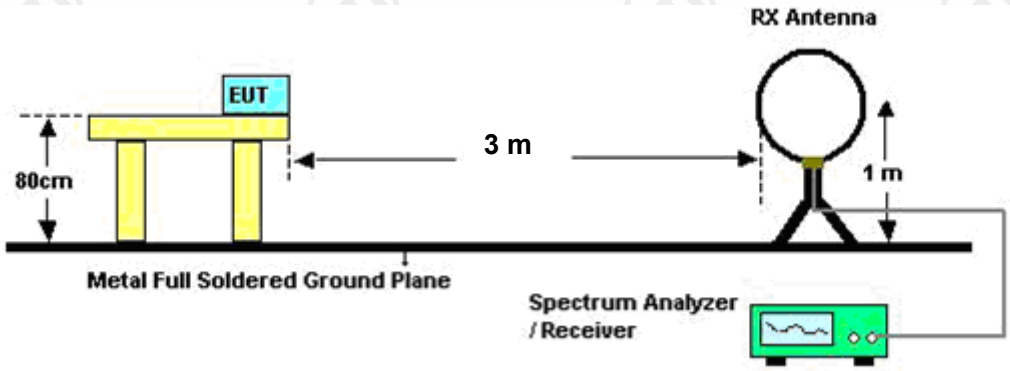
(2) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209 as the following , whichever is the lesser attenuation.

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

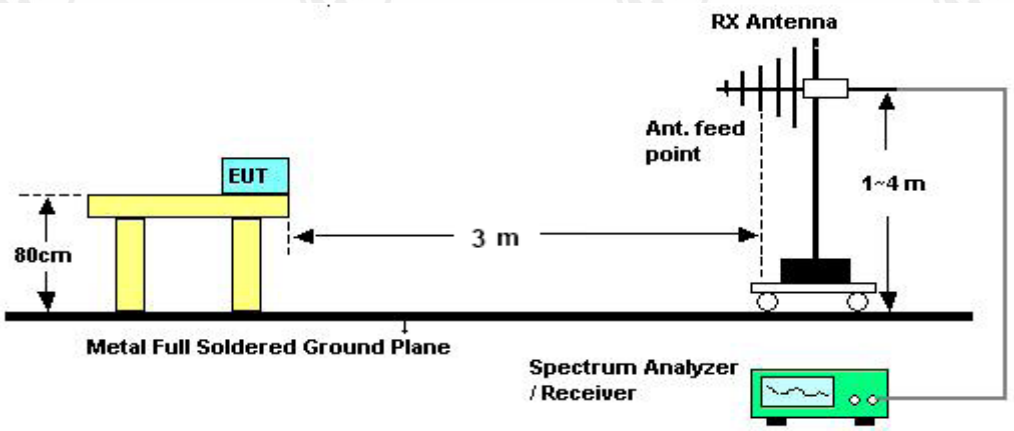
Note: the tighter limit applies at the band edges.

8.2 BLOCK DIAGRAM OF TEST SETUP

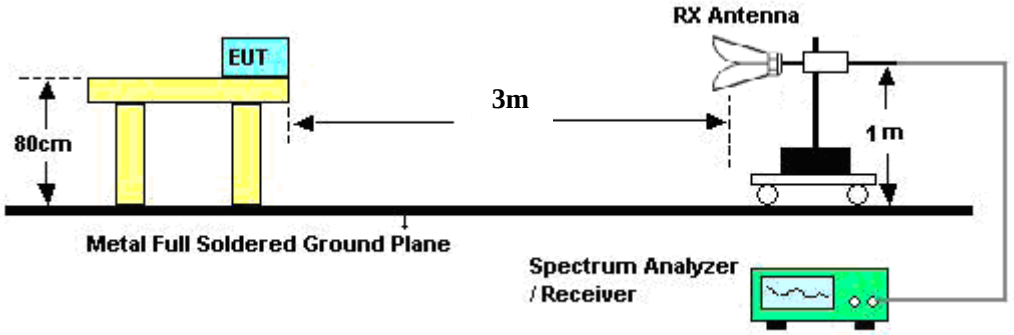
For radiated emissions from 9kHz to 30MHz



For radiated emissions from 30 - 1000MHz



For radiated emissions from 1GHz to 25GHz



8.3 TEST PROCEDURE

Below 30MHz

a. 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.

b. 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.

c. The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

30MHz ~ 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 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.

8.4 TEST RESULT

Note: Limit dBμV/m @3m = Limit dBμV/m @300m+ 80
Limit dBμV/m @3m = Limit dBμV/m @30m + 40

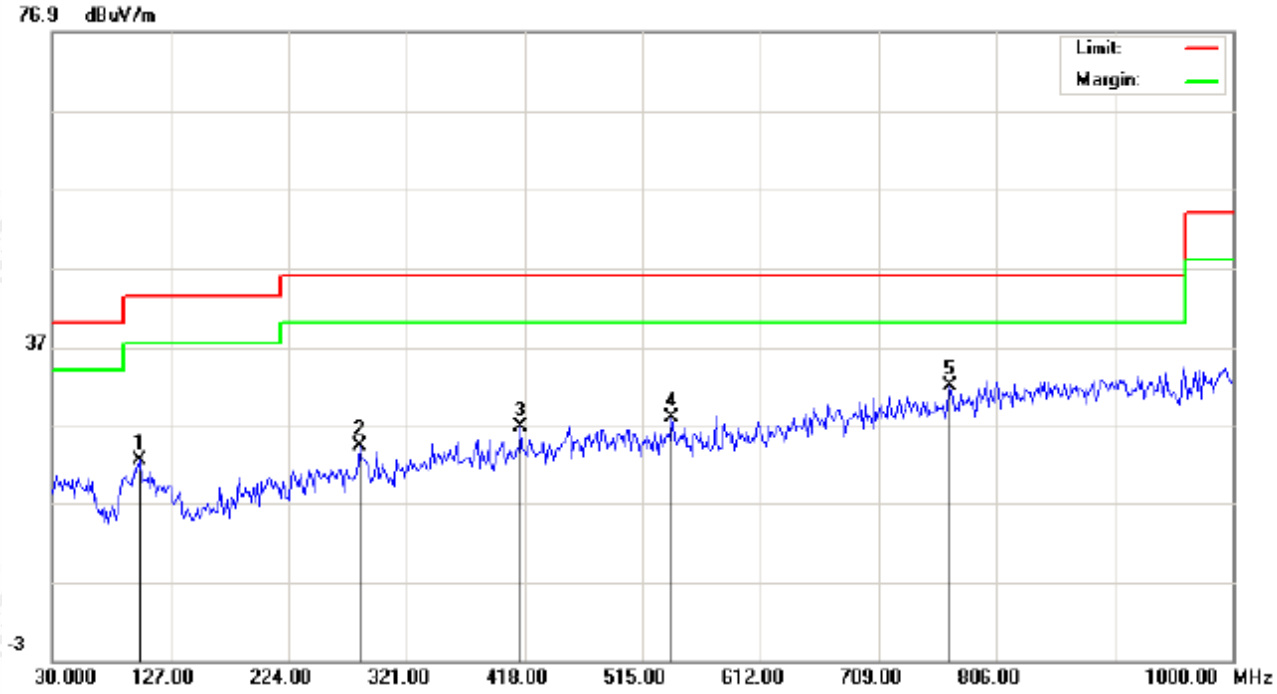
A. Below 30MHz:

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

B. 30MHz ～ 1GHz:

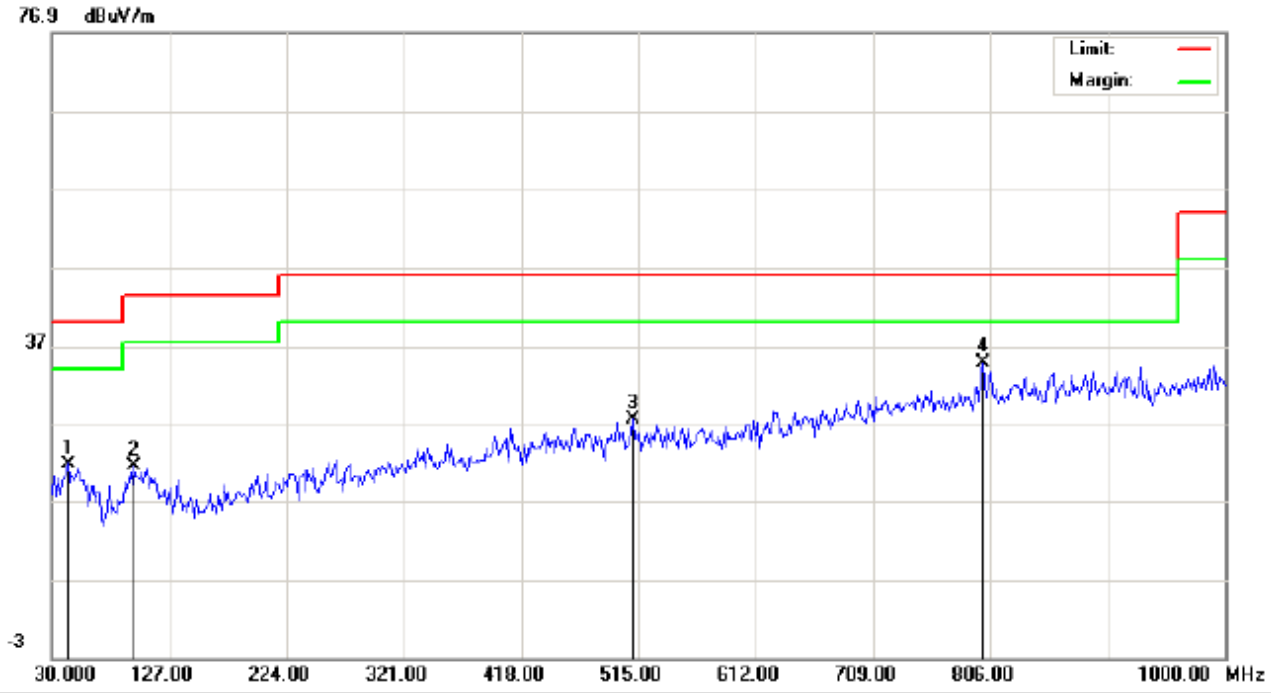
The test data of low channel, middle channel and high channel are almost same in frequency bands 30MHz to 1GHz, and the data of low channel are chosen as representative in below:

H:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	101.1333	6.77			15.85	22.62			43.50		-20.88		P	
2	282.2000	8.91			15.52	24.43			46.00		-21.57		P	
3	414.7667	8.20			18.53	26.73			46.00		-19.27		P	
4	539.2500	8.07			20.00	28.07			46.00		-17.93		P	
5	767.2000	7.54			24.40	31.94			46.00		-14.06		P	

V:



No.	Freq.	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV/m)			Limit (dBuV/m)		Margin (dB)			
	MHz	Peak	QP	AVG	dB	peak	QP	AVG	QP	AVG	QP	AVG	P/F	Comment
1	42.9333	6.89			15.01	21.90			40.00		-18.10		P	
2	97.9000	6.08			15.59	21.67			43.50		-21.83		P	
3	510.1500	7.76			19.88	27.64			46.00		-18.36		P	
4	799.5333	9.63			25.11	34.74			46.00		-11.26		P	

C. Above 1GHz:

Test Results-(Measurement Distance: 3m)_Channel low							
Frequency (GHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2.446*	92.12	---	---	114	94	H	P
4.892	45.23	---	---	74	54	H	P
7.337	46.10	---	---	74	54	H	P
9.783	42.12	---	---	74	54	H	P
12.229	43.12	---	---	74	54	H	P
2.446*	91.23	---	---	114	94	V	P
4.892	44.12	---	---	74	54	V	P
7.337	45.23	---	---	74	54	V	P
9.783	42.01	---	---	74	54	V	P

*: fundamental frequency

Test Results-(Measurement Distance: 3m)_Channel middle							
Frequency (GHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2.465*	90.23	---	---	114	94	H	P
4.930	41.23	---	---	74	54	H	P
7.395	46.69	---	---	74	54	H	P
9.860	40.20	---	---	74	54	H	P
12.325	45.10	---	---	74	54	H	P
2.465*	88.02	---	---	114	94	V	P
4.930	40.23	---	---	74	54	V	P
7.395	45.12	---	---	74	54	V	P
9.860	39.69	---	---	74	54	V	P

*: fundamental frequency

Test Results-(Measurement Distance: 3m)_Channel high							
Frequency (GHz)	Measurement value			Limit		Antenna	Result
	PK (dBμV/m)	AV factor (dB)	AV (dBμV/m)	PK (dBμV/m)	AV (dBμV/m)	(H/V)	(P/F)
2.481*	91.23	---	---	114	94	H	P
4.962	41.23	---	---	74	54	H	P
7.443	46.20	---	---	74	54	H	P
9.924	40.21	---	---	74	54	H	P
12.405	41.20	---	---	74	54	H	P
2.481*	90.22	---	---	114	94	V	P
4.962	40.23	---	---	74	54	V	P
7.443	45.12	---	---	74	54	V	P
9.924	39.32	---	---	74	54	V	P
12.405	40.02	---	---	74	54	V	P

*: fundamental frequency

Remark:

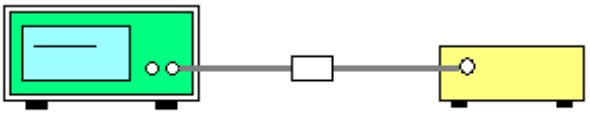
According to the emissions below 18GHz, the data curve is lower than the limit, and the data between 18GHz to 25GHz will be lower than the limit, so they are not recorded in the report.

9. BAND EDGE EMISSION MEASUREMENT

9.1 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 § FCC 15.209 & , whichever is the lesser attenuation.

9.2 BLOCK DIAGRAM OF TEST SETUP

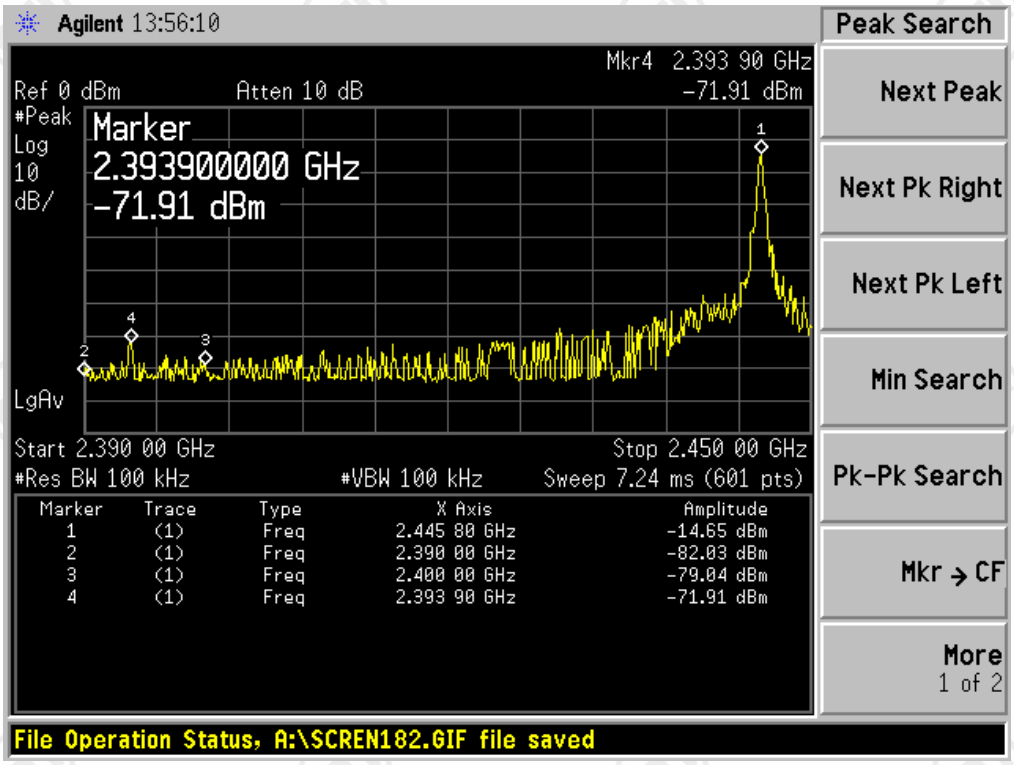


9.3 TEST PROCEDURE

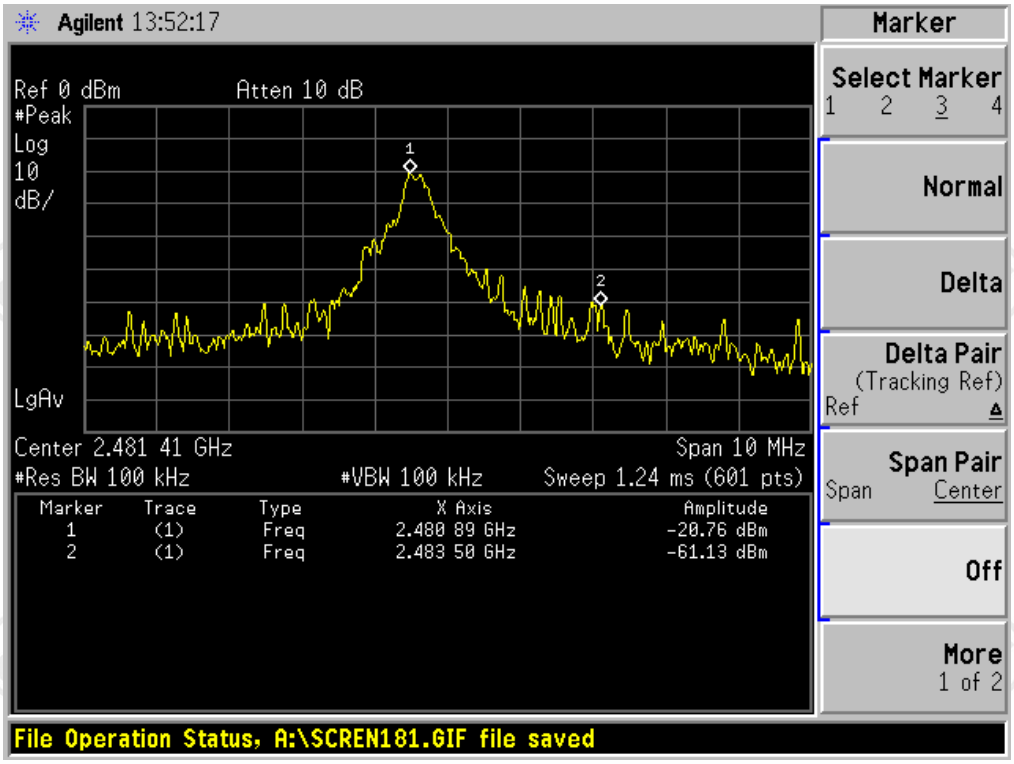
1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. Record the emission drops at the band-edge relative to the highest fundamental emission level.
4. Use the marker-delta method to determine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

9.4 TEST RESULT

Channel Frequency (GHz)	Fundamental Emission (dBμV/m)	Delta (dB)	Final Emission (dBμV/m)	Limit (dBμV/m)		Result (Pass / Fail)
	PK		PK	PK	AV	
2.446	92.12	---	---	---	---	---
2.400	---	64.39	27.73	74	54	Pass
2.481	91.23	---	---	---	---	---
2.4835	---	40.37	50.86	74	54	Pass



2.446GHz



2.481GHz

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

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

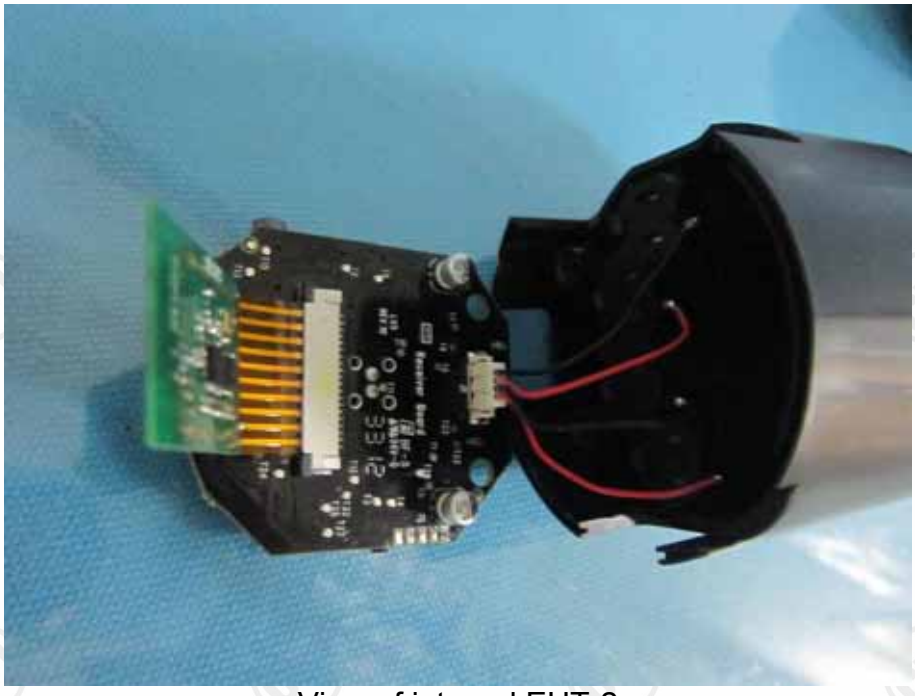
TEST SETUP OF RADIATED EMISSION (Above1GHz)

APPENDIX 2 PHOTOGRAPHS OF EUT

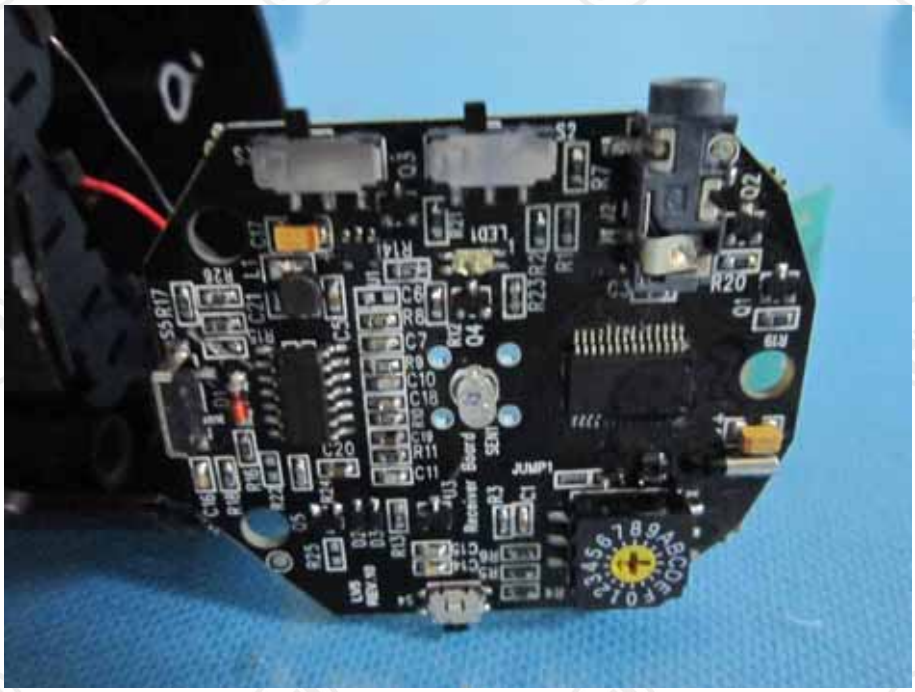
View of external EUT-1

View of external EUT-2

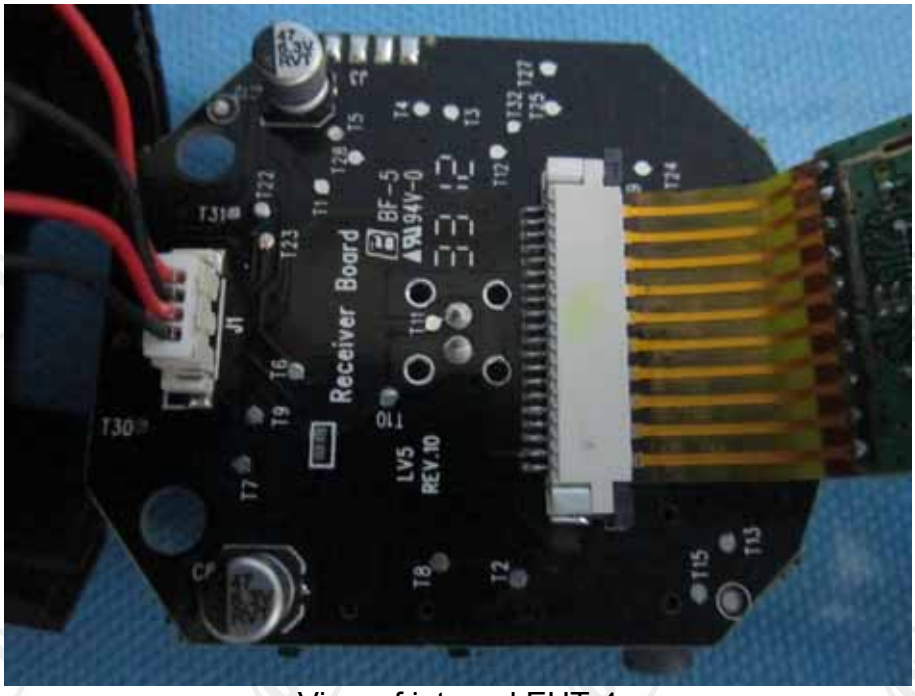
View of internal EUT-1



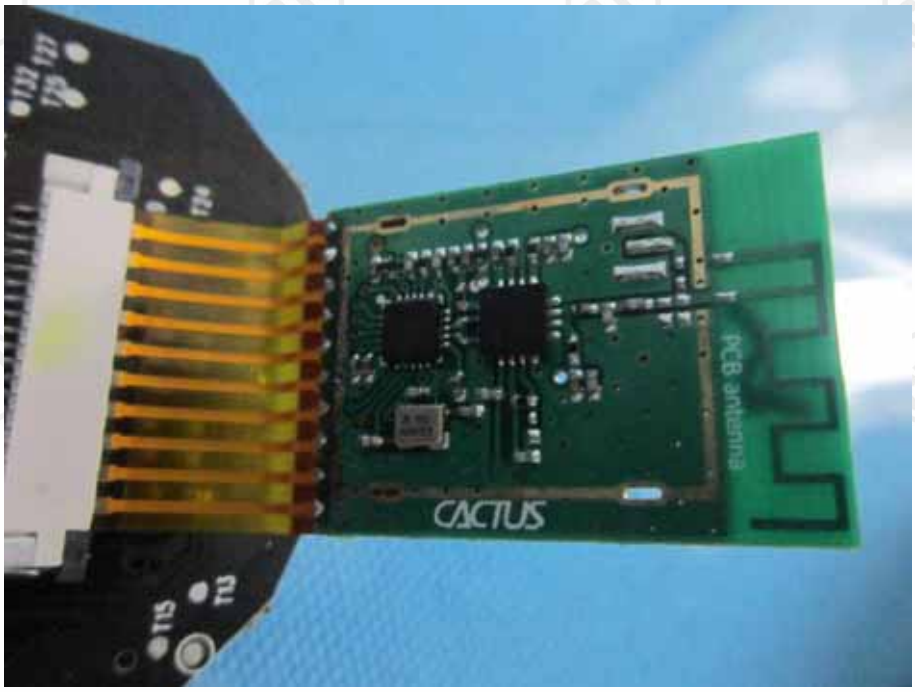
View of internal EUT-2



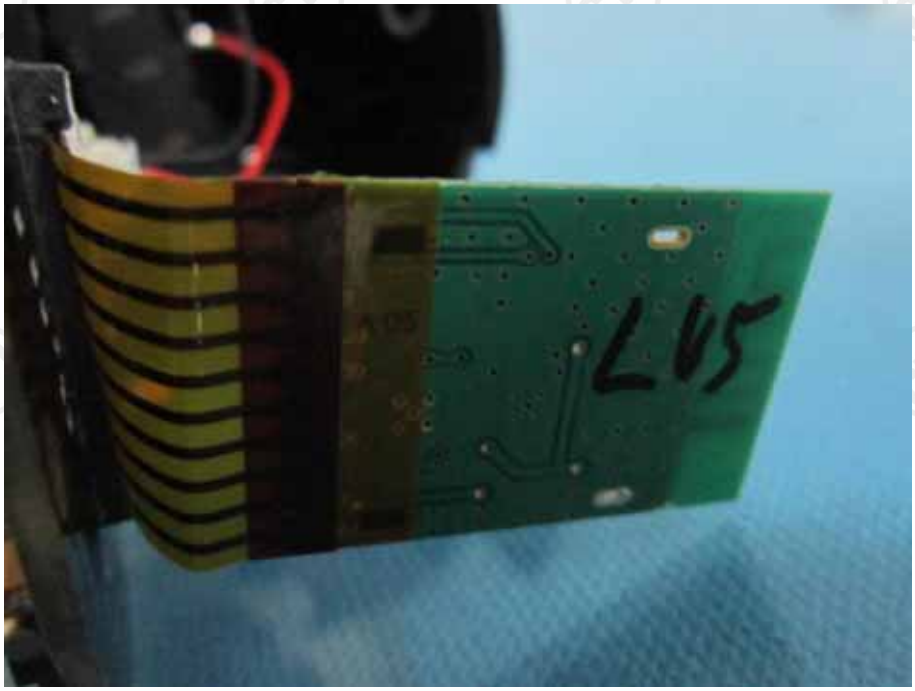
View of internal EUT-3



View of internal EUT-4



View of internal EUT-5



View of internal EUT-6

*** End of report ***

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.