
FCC Test Report

Report No.: AGC04916150702FE03

FCC ID : XUR-VELRC1

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : 2.4G Wireless Remote Control

BRAND NAME : VERTIX

MODEL NAME : VEL-RC-01, VEL-RC-02, CHV-RC-01, CAV-RC-01,
VTX-RC-01, VTX-RC-02, AQU-RC-01, AQU-RC-02

CLIENT : Xtreme DSP Global Pte Ltd

DATE OF ISSUE : Aug.03, 2015

STANDARD(S) : FCC Part 15 Rules

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug.03, 2015	Valid	Original Report

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1. VERIFICATION OF CONFORMITY

Applicant	Xtreme DSP Global Pte Ltd
Address	21 Bukit Batok Crescent, #11-71 WCEGA Tower, Singapore 658065
Manufacturer	Xtreme DSP Global Pte Ltd
Address	21 Bukit Batok Crescent, #11-71 WCEGA Tower, Singapore 658065
Product Designation	2.4G Wireless Remote Control
Brand Name	VERTIX
Test Model	VEL-RC-01
Series Model	VEL-RC-02, CHV-RC-01, CAV-RC-01, VTX-RC-01, VTX-RC-02, AQU-RC-01, AQU-RC-02
Difference description	All the same except for the model name.
Date of test	July 28, 2015 to July 28, 2015
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF (2013-03-01)

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2009) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.249.

Tested By

Matt Zhang

Matt Zhang(Zhang Liang)

Aug.03, 2015

Reviewed By

Bart Xie

Bart Xie(Xie Xiaobin)

Aug.03, 2015

Approved By

Solger Zhang

Solger Zhang(Zhang Hongyi)
Authorized Officer

Aug.03, 2015

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is “2.4G Wireless Remote Control ” designed as a “RF Product”. It is designed by way of utilizing the FSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2449.5MHz
RF Output Power	1dBm(Max)
Modulation	FSK
Number of channels	1
Hardware Version	VERTIX_K1A3
Software Version	N/A
Antenna Designation	Permanent Antenna
Antenna Gain	0 dBi
Power Supply	DC3V by battery

3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Transmitting mode
2	Idle mode

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configuration:



5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.215(c)	20 dB Bandwidth	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.209 §15.249(a)	Radiated Emission	Compliant
§15.249(d)	Out of Band Emission	Compliant
§15.207(a)	Conducted Emission	N/A

6. TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D,Baoding Technology Park,Guangming Road2,Dongcheng District, Dongguan, Guangdong, China,
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009.

ALL TEST EQUIPMENT LIST**FOR RADIATED EMISSION TEST (BELOW 1GHZ)**

Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 4, 2015	July 3, 2016
RF Cable	SCHWARZBECK	AK9515E	96221	July 4, 2015	July 3, 2016
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2015	June 5, 2016
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 6, 2015	June 5, 2016
Spectrum analyzer	Agilent	E4407B	MY46185649	June 6, 2015	June 5, 2016

FOR RADIATED EMISSION TEST (1GHZ ABOVE)

Radiated Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	July 11, 2015	July 10, 2016
Spectrum Analyzer	Agilent	E4411B	MY4511453	July 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 7, 2015	July 6, 2016
RF Cable	SCHWARZBECK	AK9515H	96220	July 8, 2015	July 7, 2016
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2015	June 5, 2016
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 6, 2015	June 5, 2016

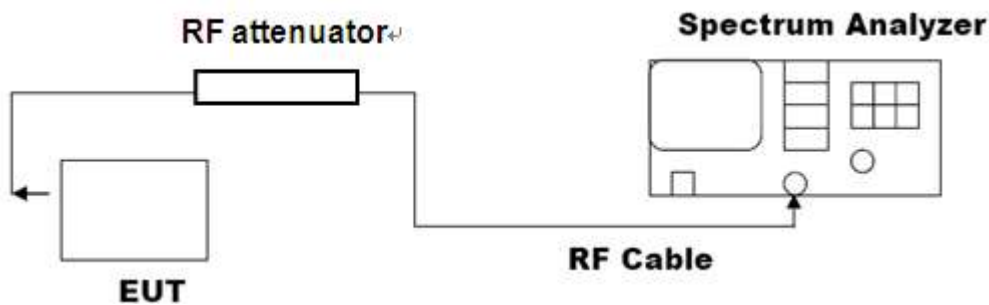
Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016
Artificial Mains Network	Narda	L2-16B	000WX31025	July 8, 2015	July 7, 2016
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 8, 2015	July 7, 2016
RF Cable	SCHWARZBECK	AK9515E	96222	July 4, 2015	July 3, 2016
Shielded Room	CHENGYU	843	PTS-002	June 6,2015	June 5,2016

7. 20DB BANDWIDTH

7.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. RBW=100kHz, VBW $\geq$ RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

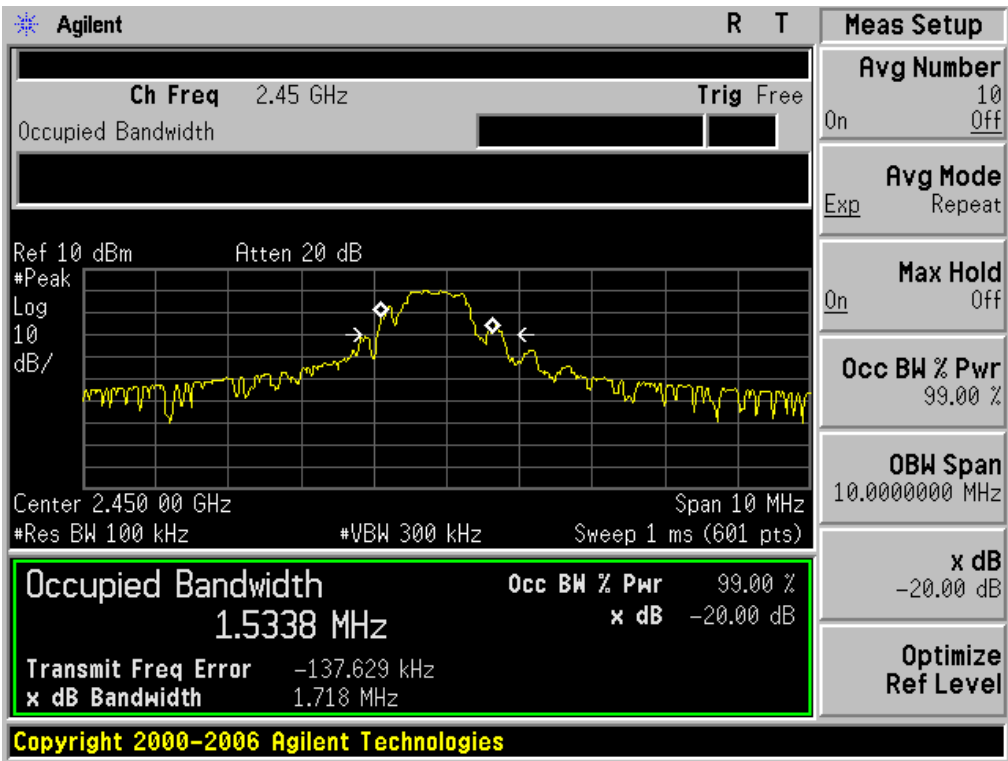


7.3. LIMITS AND MEASUREMENT RESULTS

Mode	Channel Frequency(MHz)	20dB Bandwidth(MHz)
Transmitting	2449.5	1.718

According to FCC 15.215(c), must be designed to ensure that the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated .

TEST PLOT OF BANDWIDTH



8. RADIATED EMISSION

8.1. MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

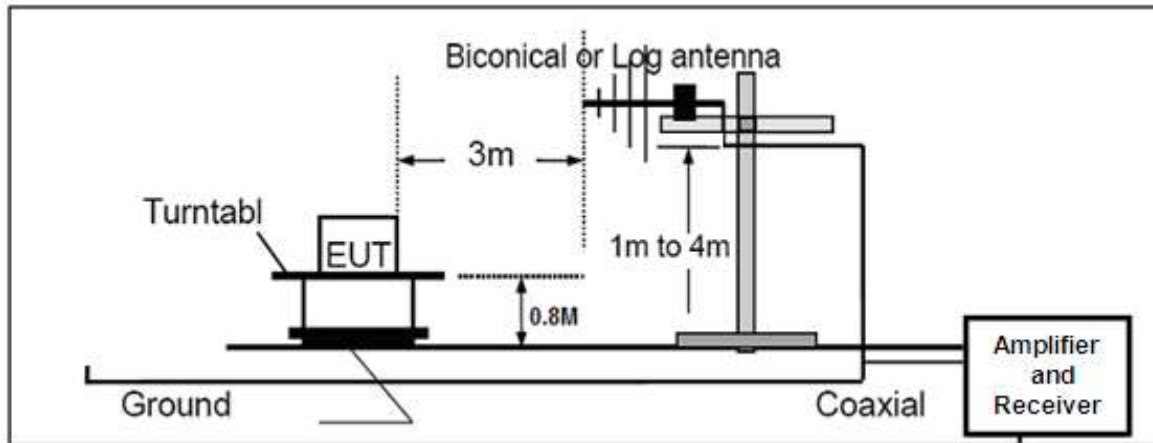
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

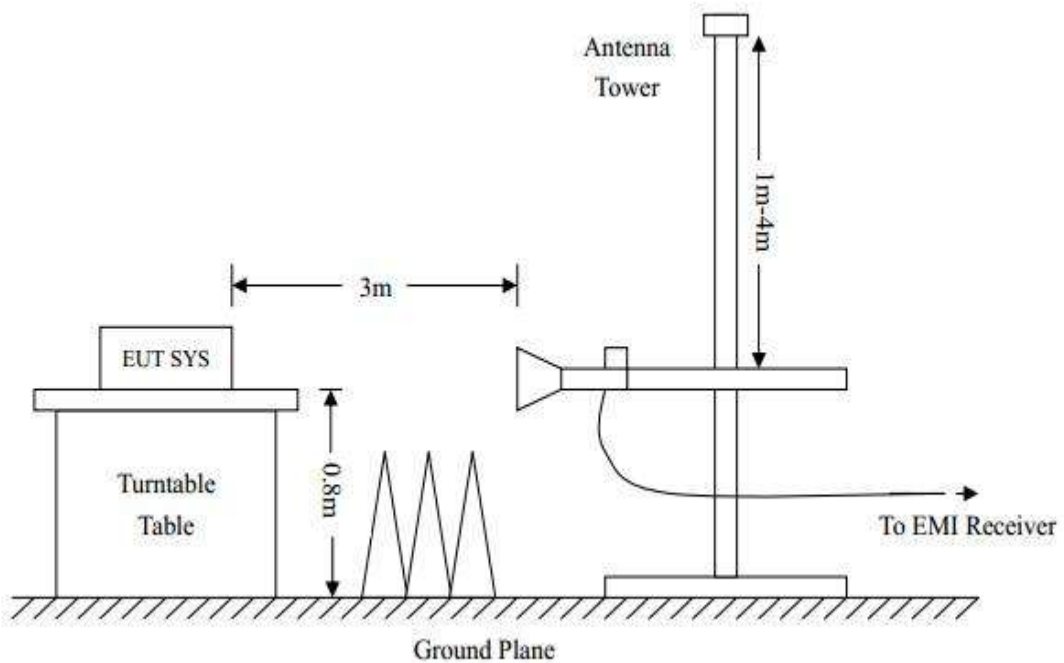
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

8.2. TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz

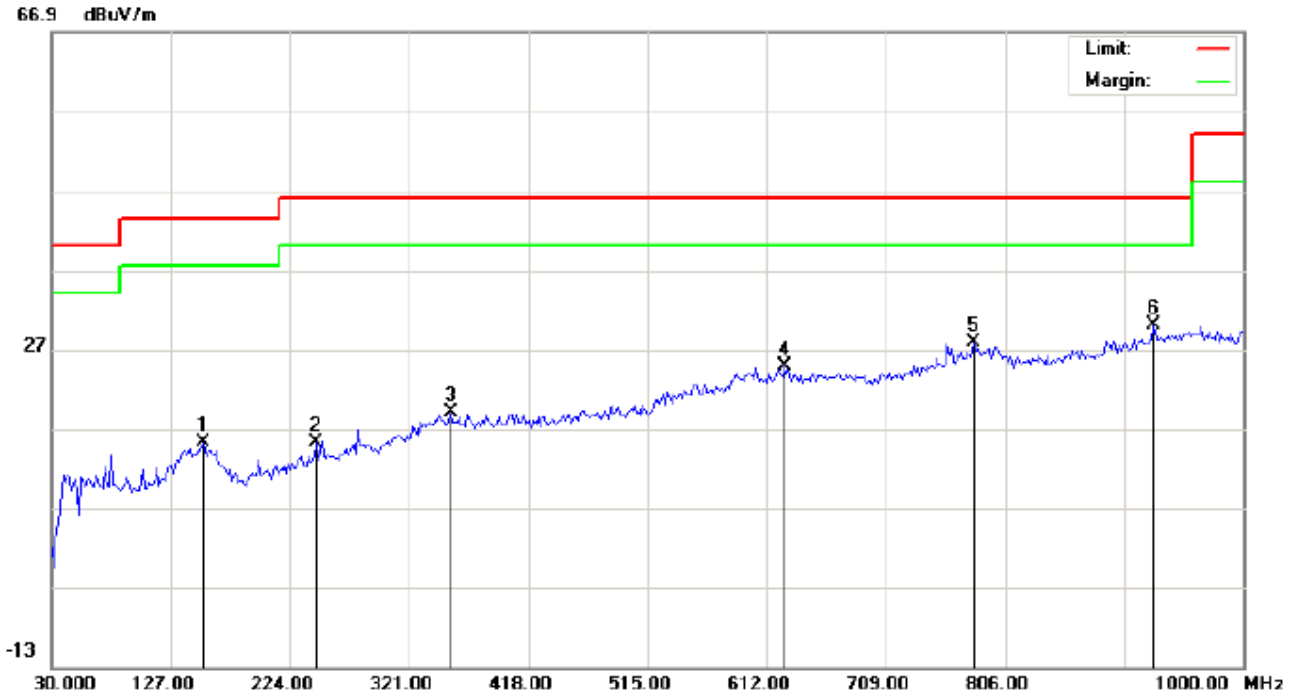


8.3. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW 1GHZ-Horizontal



Site: site #1

Limit: FCC Class B 3M Radiation

EUT: 2.4G Wireless Remote Control

M/N: VEL-RC-01

Mode: Transmitting

Note:

Polarization: **Horizontal**

Power:

Distance: 3m

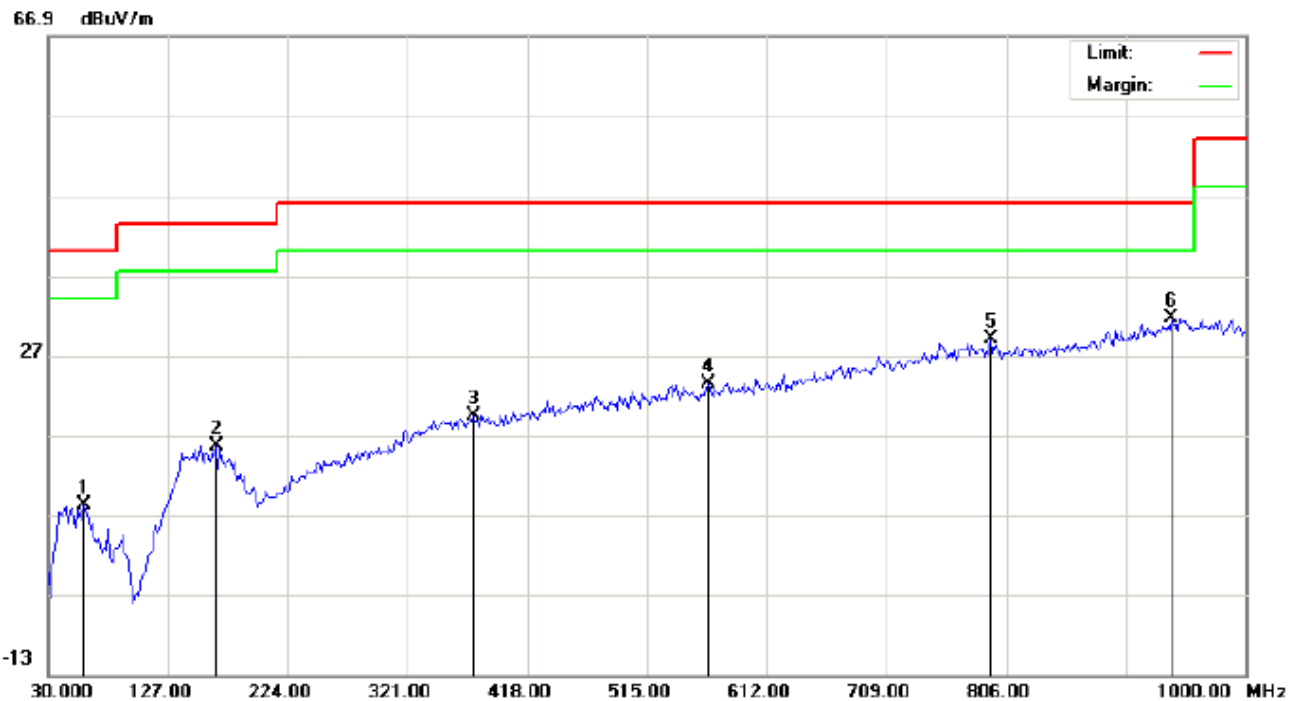
Temperature: 23.2

Humidity: 56.4 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		152.8667	-0.11	15.28	15.17	43.50	-28.33	peak			
2		245.0167	1.52	13.71	15.23	46.00	-30.77	peak			
3		354.9500	0.20	18.77	18.97	46.00	-27.03	peak			
4		626.5500	0.97	23.79	24.76	46.00	-21.24	peak			
5		780.1333	0.71	27.05	27.76	46.00	-18.24	peak			
6	*	927.2500	0.69	29.37	30.06	46.00	-15.94	peak			

RESULT: PASS

RADIATED EMISSION BELOW 1GHZ-Vertical



Site: site #1

Limit: FCC Class B 3M Radiation

EUT: 2.4G Wireless Remote Control

M/N: VEL-RC-01

Mode: Transmitting

Note:

Polarization: **Vertical**

Power:

Distance: 3m

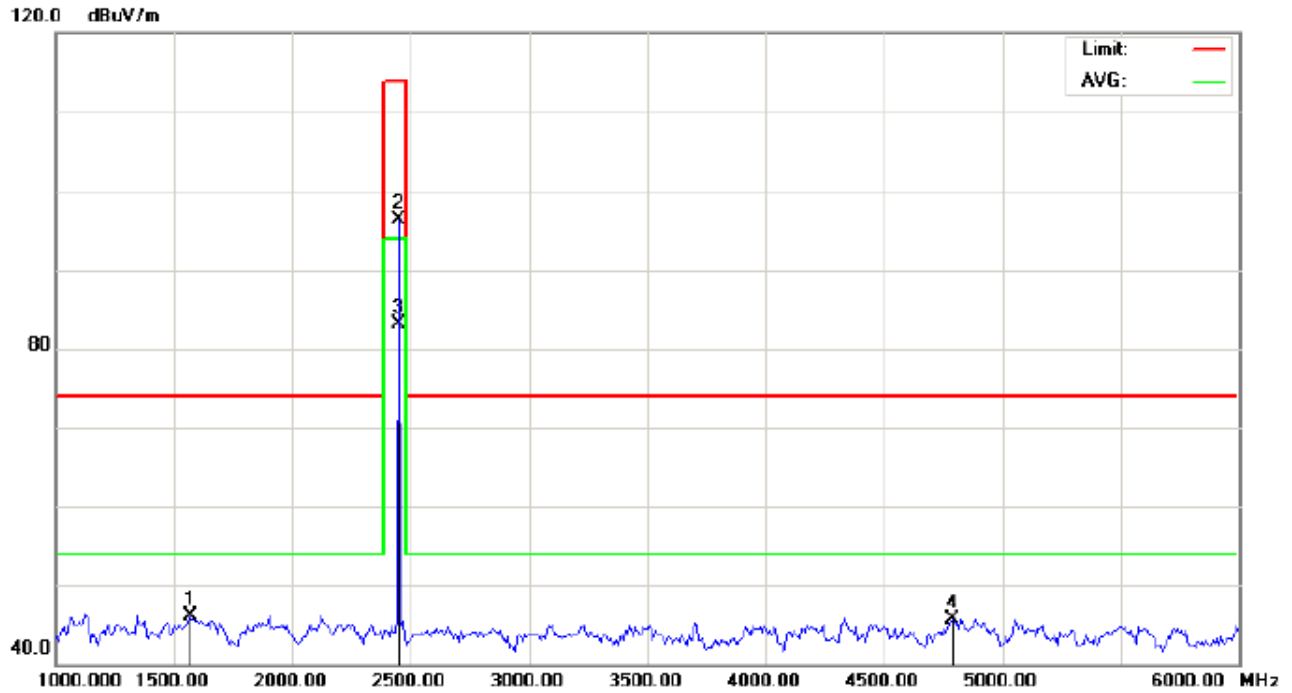
Temperature: 23.2

Humidity: 56.4 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		59.1000	0.09	8.16	8.25	40.00	-31.75	peak			
2		165.8000	0.74	14.96	15.70	43.50	-27.80	peak			
3		374.3500	0.58	18.90	19.48	46.00	-26.52	peak			
4		565.1167	0.86	22.56	23.42	46.00	-22.58	peak			
5		793.0667	1.79	27.22	29.01	46.00	-16.99	peak			
6	*	940.1833	1.92	29.73	31.65	46.00	-14.35	peak			

RESULT: PASS**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics) -Horizontal

Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: 2.4G Wireless Remote Control

Distance: 3m

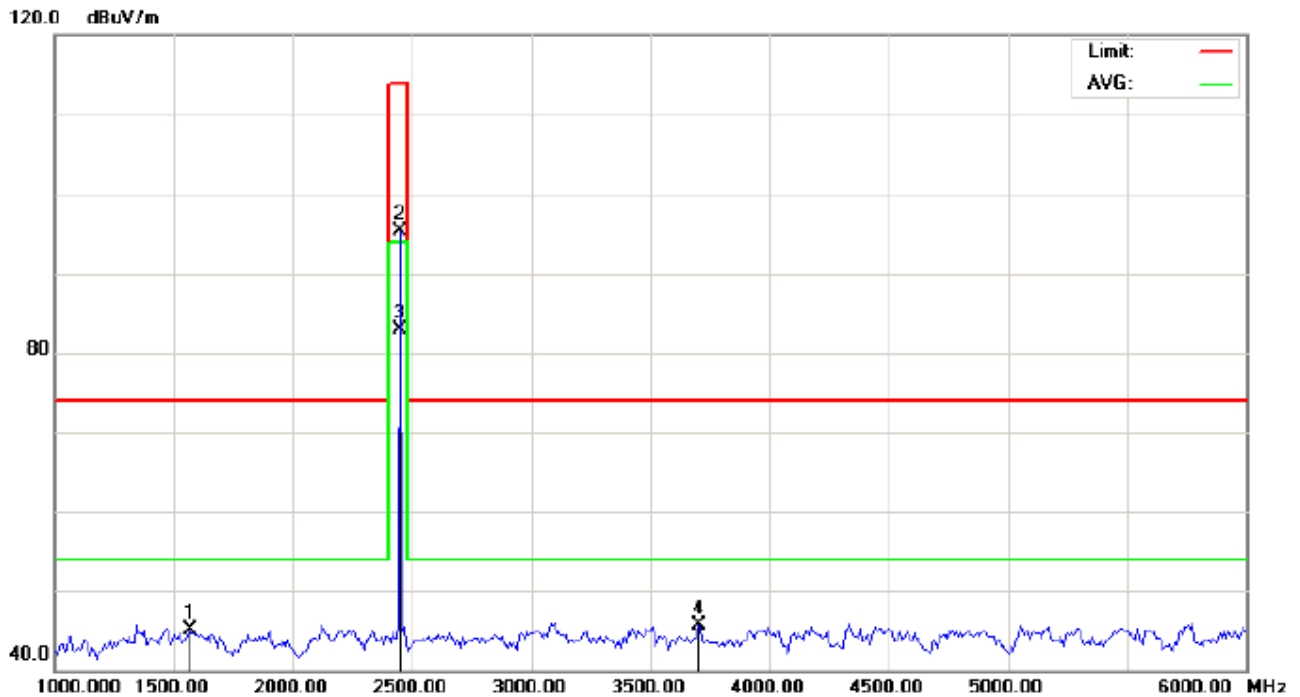
M/N: VEL-RC-01

Mode: Transmitting

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1566.667	60.80	-14.68	46.12	74.00	-27.88	peak			
2		2450.000	105.86	-9.62	96.24	114.00	-17.76	peak			
3	*	2450.000	92.78	-9.62	83.16	94.00	-10.84	AVG	150	307	
4		4791.667	48.15	-2.35	45.80	74.00	-28.20	peak			

RESULT: PASS

RADIATED EMISSION ABOVE 1GHZ (1-10th Harmonics) -Vertical

Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)-

Power:

Humidity: 60 %

EUT: 2.4G Wireless Remote Control

Distance: 3m

M/N: VEL-RC-01

Mode: Transmitting

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1566.667	59.80	-14.68	45.12	74.00	-28.88	peak			
2		2450.000	104.86	-9.62	95.24	114.00	-18.76	peak			
3	*	2450.000	92.51	-9.62	82.89	94.00	-11.11	AVG	150	319	
4		3700.000	52.44	-6.66	45.78	74.00	-28.22	peak			

RESULT: PASS**Note:** 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

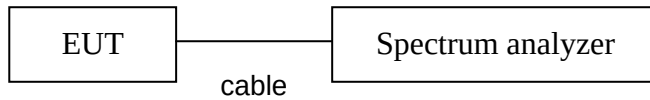
The "Factor" value can be calculated automatically by software of measurement system.

9. BAND EDGE EMISSION

9.1. MEASUREMENT PROCEDURE

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, then mark the higher-level emission for comparing with the FCC rules.

9.2. TEST SET-UP

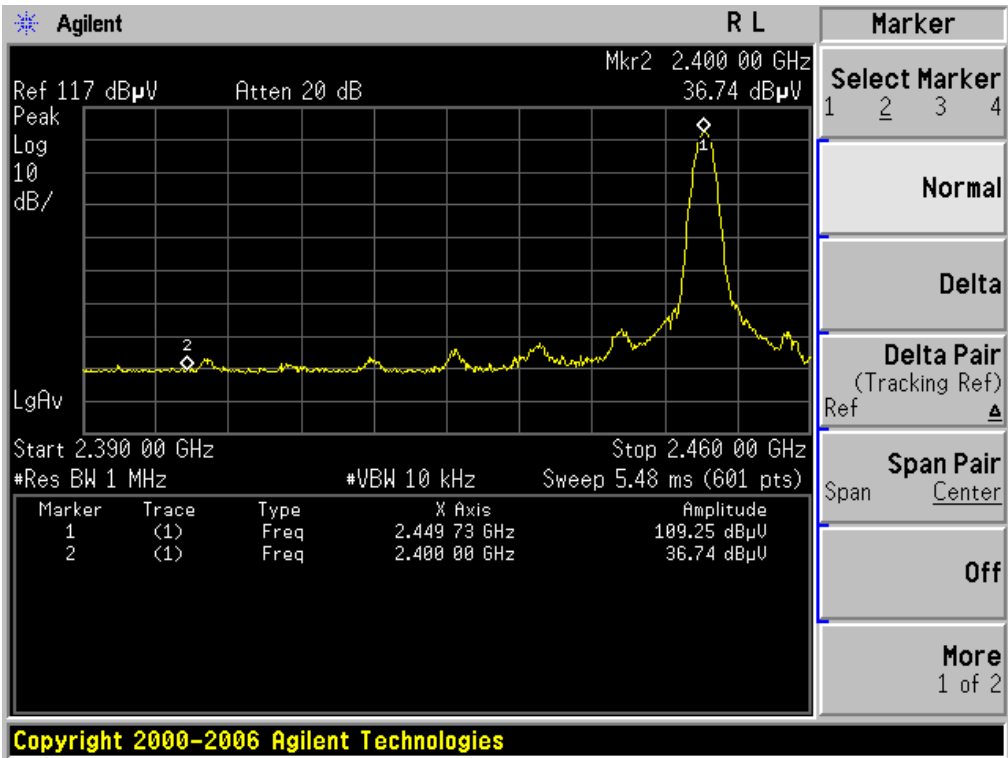


9.3 TEST RESULT

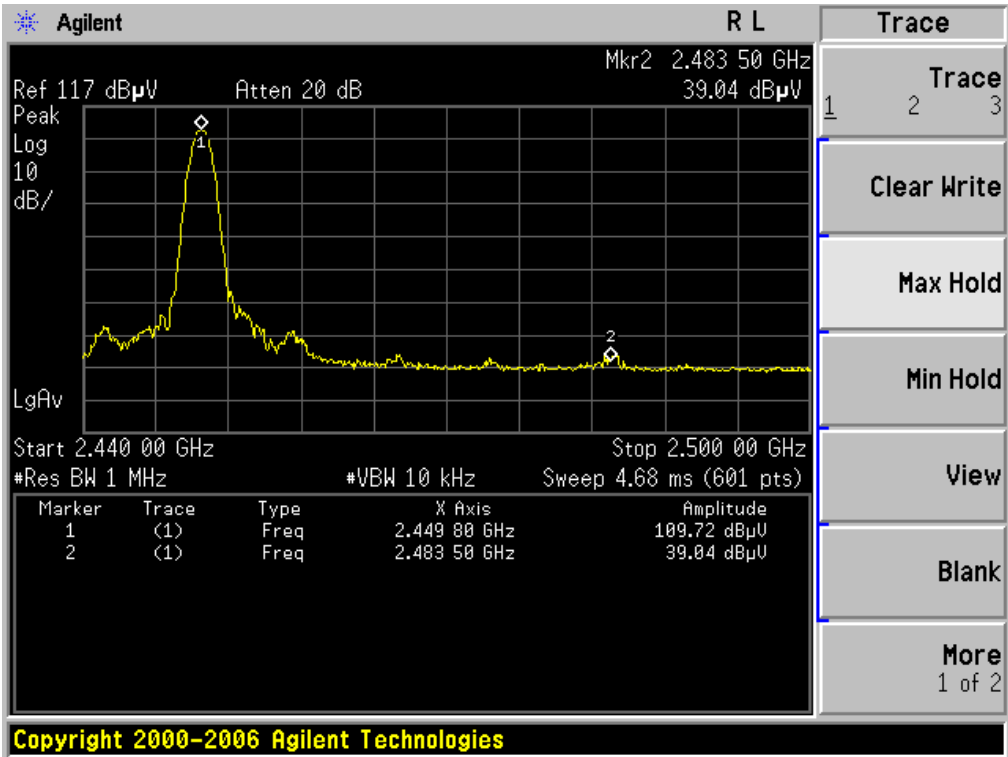
Frequency(MHz)	Limit(dBuv)	Result
Low Edge	<54	Pass
High Edge	<54	Pass

The edge emissions are shall be attenuated by at least 50 dB below the level of the fundamental.
Please refer to the test plots below.

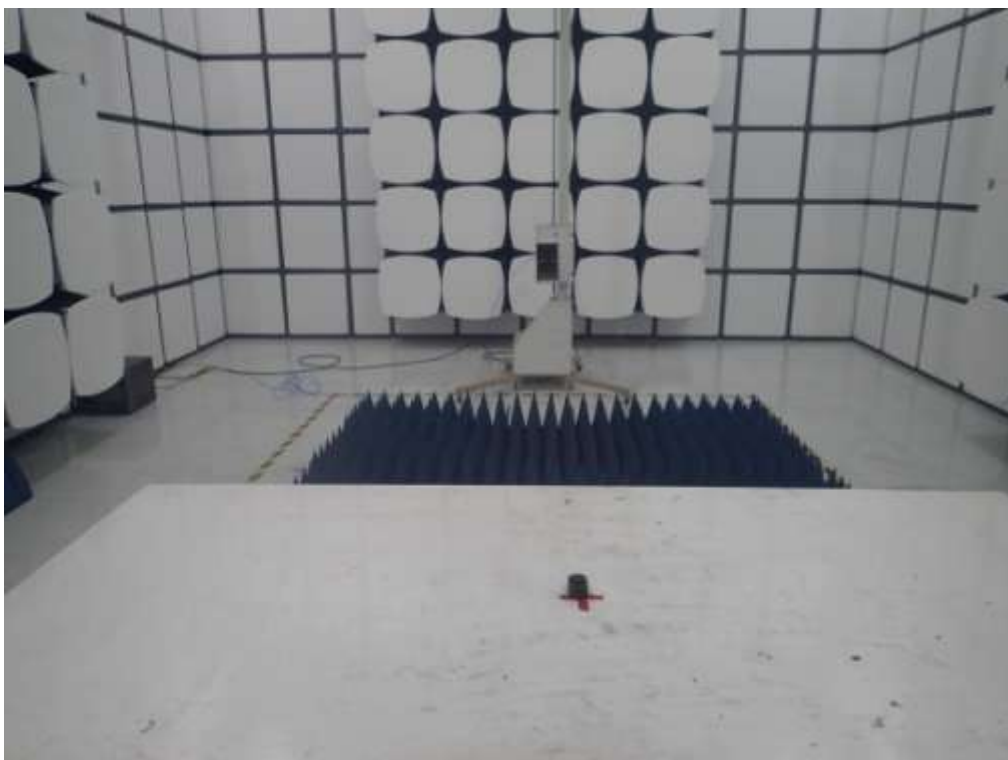
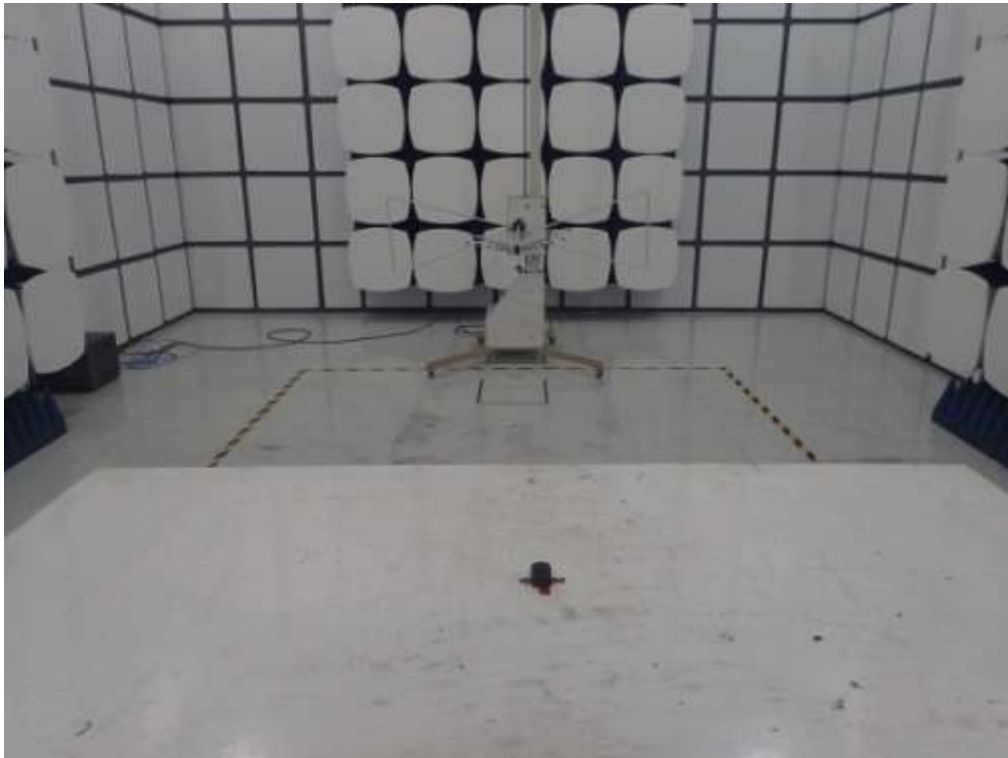
Low band edge-AV



High band edge-AV



APPENDIX A: PHOTOGRAPHS OF TEST SETUP
FCC RADIATED EMISSION TEST SETUP



APPENDIX B: PHOTOGRAPHS OF EUT

ALL VIEW OF EUT



TOP VIEW OF EUT



BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



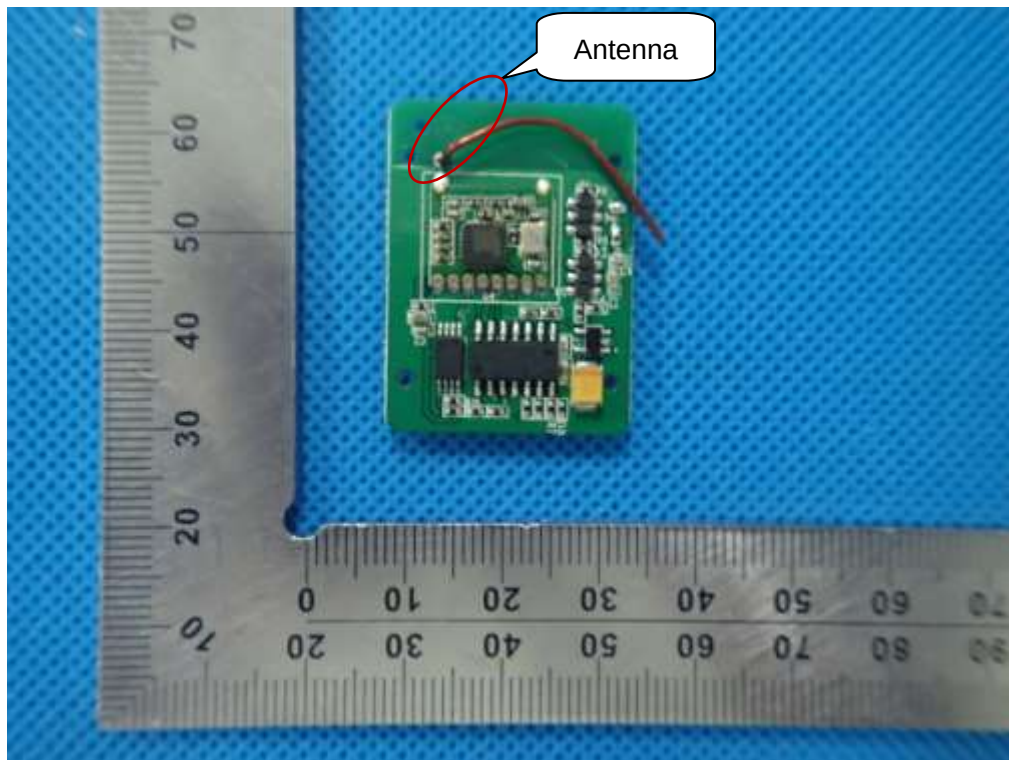
RIGHT VIEW OF EUT



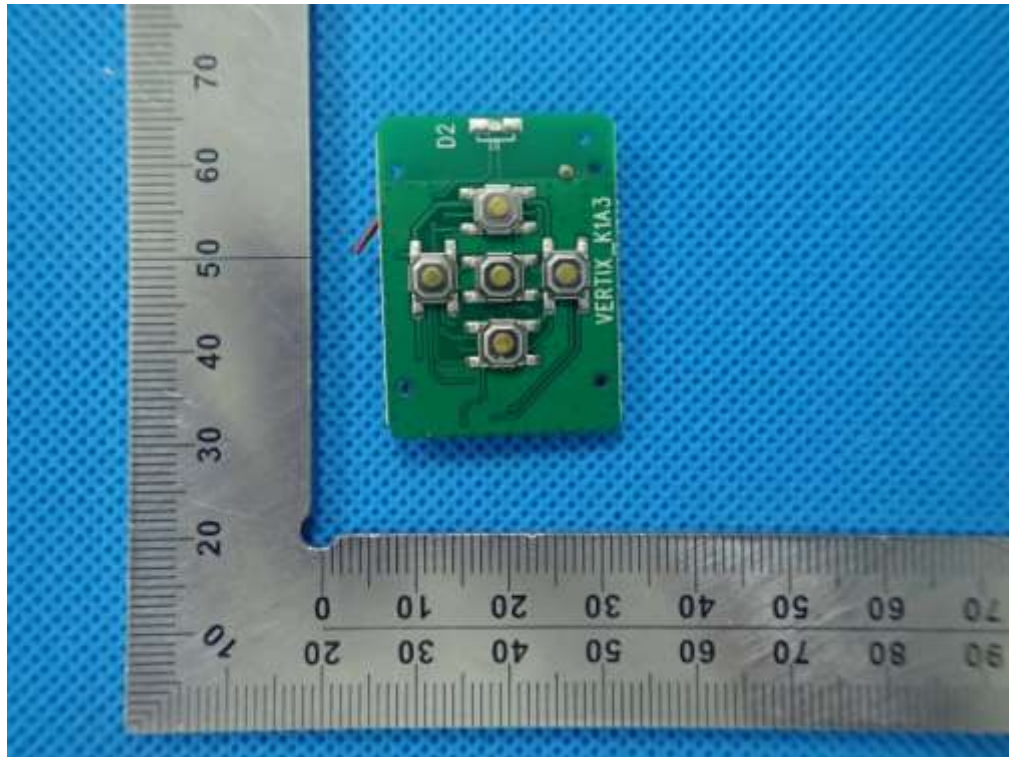
OPEN VIEW OF EUT-1



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----