STC Test Report

Date : 2015-12-23
No. : HM170051

Applicant: Heng Yu Electronic Manufacturing Co., Ltd.
Room 1503-5, Nan Fung Commercial Centre, 19 Lam Lok Street, Kowloon Bay, Hong Kong.

Manufacturer: Zhuhai Heng Yu New Technology Company Limited.
Heng Ke Campus, Jin Hai Avenue, San Zao, Zhuhai, Guang Dong, P.R.C.: 8109040

Description of Sample(s):

Product:	Wireless Keyboard
Brand Name:	Heng Yu
Model Number:	K104R-RF
FCC ID:	XENK104RRF01

Date Sample(s) Received: 2015-11-05

Date Tested: 2015-11-20 to 2015-12-11

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 and ANSI C63.10:2013 for FCC Certification.

Conclusion(s): The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remark(s): ---

CHEUNG Chi, Kenneth
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

CONTENT:

1.0 General Details

1.1 Equipment Under Test [EUT]
Description of Sample(s)

Product:	Wireless Keyboard
Manufacturer:	Zhuhai Heng Yu New Technology Company Limited. Heng Ke Campus, Jin Hai Avenue, San Zao, Zhuhai, Guang Dong, P.R.C.: 8109040
Brand Name:	Heng Yu
Model Number:	K104R-RF
Rating:	6Vd.c. (“AAA” size battery x 4) / 5Vd.c. (from PC USB port) – For non RF function

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is a Wireless Keyboard of Heng Yu Electronic Manufacturing Co., Ltd., it is a Keyboard, modulation by IC; and type is GFSK Modulation.

1.3 Date of Order

2015-11-05

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2015-11-20 to 2015-12-11

1.6 Country of Origin

China

2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2014 Regulations and ANSI C63.10:2013 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION
Results Summary

Test Condition	Test Requirement	Test Method	Class / Severity	Test Result	
				Pass	Fail
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.249	ANSI C63.10:2013	N/A	☒	☐
20 dB Bandwidth	FCC 47CFR 15.215(c)	ANSI C63.10:2013	N/A	☒	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	☒	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Field Strength of Fundamental & Harmonics Emissions

Test Requirement:	FCC 47CFR 15.249
Test Method:	ANSI C63.10:2013
Test Date:	2015-11-20
Mode of Operation:	Tx mode

Test Method:

The sample was placed 0.8m above the ground plane on a standard radiated emission test site. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. In the frequency range of 9kHz to 30MHz, The center of the loop antenna shall be 1 meter above the ground and rotated loop axis for maximum reading. The emissions worst-case are shown in Test Results of the following pages.

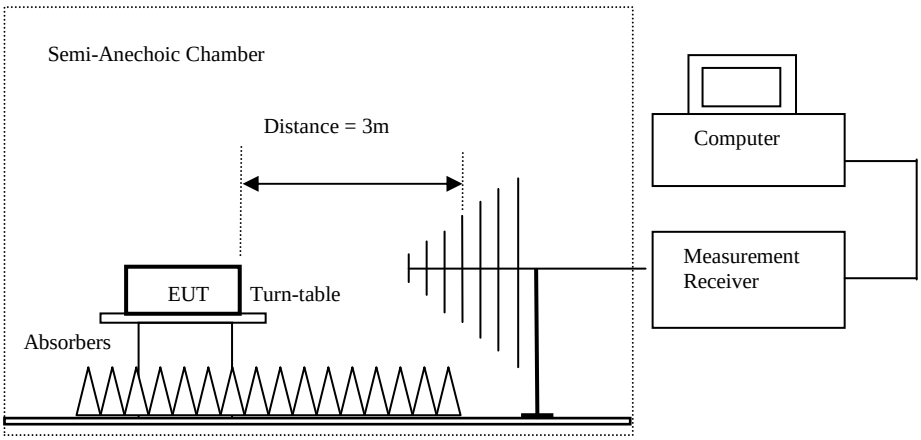
Remark: 3 orthogonal axis apply to hand-held device only.

*: Semi-anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)	RBW:	10kHz
	VBW:	30kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
30MHz – 1GHz (QP)	RBW:	120kHz
	VBW:	120kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
Above 1GHz (Pk & Av)	RBW:	3MHz
	VBW:	3MHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold

Test Setup:



Ground Plane

Absorbers placed on top of the ground plane are for measurements above 1000MHz only.

Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.249]:

Fundamental frequency [MHz]	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

Results of Tx mode (Lowest Frequency Channel-2404MHz) (Above 1GHz): Pass

	Field Strength of Fundamental and Harmonics Emissions						
	Peak Value						
	Frequency	Measured Level @3m	Correction Factor	Field Strength	Field Strength	Limit @3m	E-Field Polarity
	MHz	dBµV/m	dBµV/m	dBµV/m	µV/m	µV/m	
	2404.0	59.7	33.8	93.5	47,315.1	500,000	Horizontal
*	4808.0	13.7	42.8	56.5	668.3	5,000	Horizontal
	7212.0	14.0	49.2	63.2	1,445.4	5,000	Horizontal
	9616.0					5,000	Horizontal
*	12020.0					5,000	Horizontal
	14424.0					5,000	Horizontal
	16828.0	Emissions detected are more than				5,000	Horizontal
*	19232.0	20 dB below the FCC Limits				5,000	Horizontal
	21636.0					5,000	Horizontal
	24040.0					5,000	Horizontal

	Field Strength of Fundamental and Harmonics Emissions						
	Average Value						
	Frequency	Measured Level @3m	Correction Factor	Field Strength	Field Strength	Limit @3m	E-Field Polarity
	MHz	dBµV/m	dBµV/m	dBµV/m	µV/m	µV/m	
	2404.0	22.4	33.8	56.2	645.7	50,000	Horizontal
*	4808.0	1.2	42.8	44.0	158.5	500	Horizontal
	7212.0	1.8	49.2	51.0	354.8	500	Horizontal
	9616.0					500	Horizontal
*	12020.0					500	Horizontal
	14424.0					500	Horizontal
	16828.0	Emissions detected are more than				500	Horizontal
*	19232.0	20 dB below the FCC Limits				500	Horizontal
	21636.0					500	Horizontal
	24040.0					500	Horizontal

Results of Tx mode (Middle Frequency Channel-2442MHz) (Above 1GHz): Pass

Field Strength of Fundamental and Harmonics Emissions Peak Value							
	Frequency	Measured Level @3m	Correction Factor	Field Strength	Field Strength	Limit @3m	E-Field Polarity
	MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m	
	2442.0	58.9	33.7	92.6	42,658.0	500,000	Horizontal
*	4884.0	14.8	42.8	57.6	758.6	5,000	Horizontal
*	7326.0	16.2	49.1	65.3	1,840.8	5,000	Horizontal
	9768.0					5,000	Horizontal
*	12210.0					5,000	Horizontal
	14652.0					5,000	Horizontal
	17094.0	Emissions detected are more than				5,000	Horizontal
*	19536.0	20 dB below the FCC Limits				5,000	Horizontal
	21978.0					5,000	Horizontal
	24420.0					5,000	Horizontal

Field Strength of Fundamental and Harmonics Emissions Average Value							
	Frequency	Measured Level @3m	Correction Factor	Field Strength	Field Strength	Limit @3m	E-Field Polarity
	MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m	
	2442.0	20.7	33.7	54.4	524.8	50,000	Horizontal
*	4884.0	2.4	42.8	45.2	182.0	500	Horizontal
*	7326.0	2.7	49.1	51.8	389.0	500	Horizontal
	9768.0					500	Horizontal
*	12210.0					500	Horizontal
	14652.0					500	Horizontal
	17094.0	Emissions detected are more than				500	Horizontal
*	19536.0	20 dB below the FCC Limits				500	Horizontal
	21978.0					500	Horizontal
	24420.0					500	Horizontal

Results of Tx mode (Highest Frequency Channel-2480MHz) (Above 1GHz): Pass

	Field Strength of Fundamental and Harmonics Emissions						
	Peak Value						
	Frequency	Measured Level @3m	Correction Factor	Field Strength	Field Strength	Limit @3m	E-Field Polarity
	MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m	
	2480.0	58.3	33.7	92.0	39,810.7	500,000	Horizontal
*	4960.0	15.1	42.9	58.0	794.3	5,000	Horizontal
*	7440.0	12.5	49.0	61.5	1,188.5	5,000	Horizontal
	9920.0					5,000	Horizontal
*	12400.0					5,000	Horizontal
	14880.0					5,000	Horizontal
	17360.0	Emissions detected are more than				5,000	Horizontal
*	19840.0	20 dB below the FCC Limits				5,000	Horizontal
	22320.0					5,000	Horizontal
	24800.0					5,000	Horizontal

	Field Strength of Fundamental and Harmonics Emissions						
	Average Value						
	Frequency	Measured Level @3m	Correction Factor	Field Strength	Field Strength	Limit @3m	E-Field Polarity
	MHz	dBμV/m	dBμV/m	dBμV/m	μV/m	μV/m	
	2480.0	19.3	33.7	53.0	446.7	50,000	Horizontal
*	4960.0	2.8	42.9	45.7	192.8	500	Horizontal
*	7440.0	1.8	49.0	50.8	346.7	500	Horizontal
	9920.0					500	Horizontal
*	12400.0					500	Horizontal
	14880.0					500	Horizontal
	17360.0	Emissions detected are more than				500	Horizontal
*	19840.0	20 dB below the FCC Limits				500	Horizontal
	22320.0					500	Horizontal
	24800.0					500	Horizontal

Remarks:

* Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission falling within the restricted bands of FCC Rules Part 15 Section 15.205 the limits of FCC Rules Part 15 Section 15.209 were applied.

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

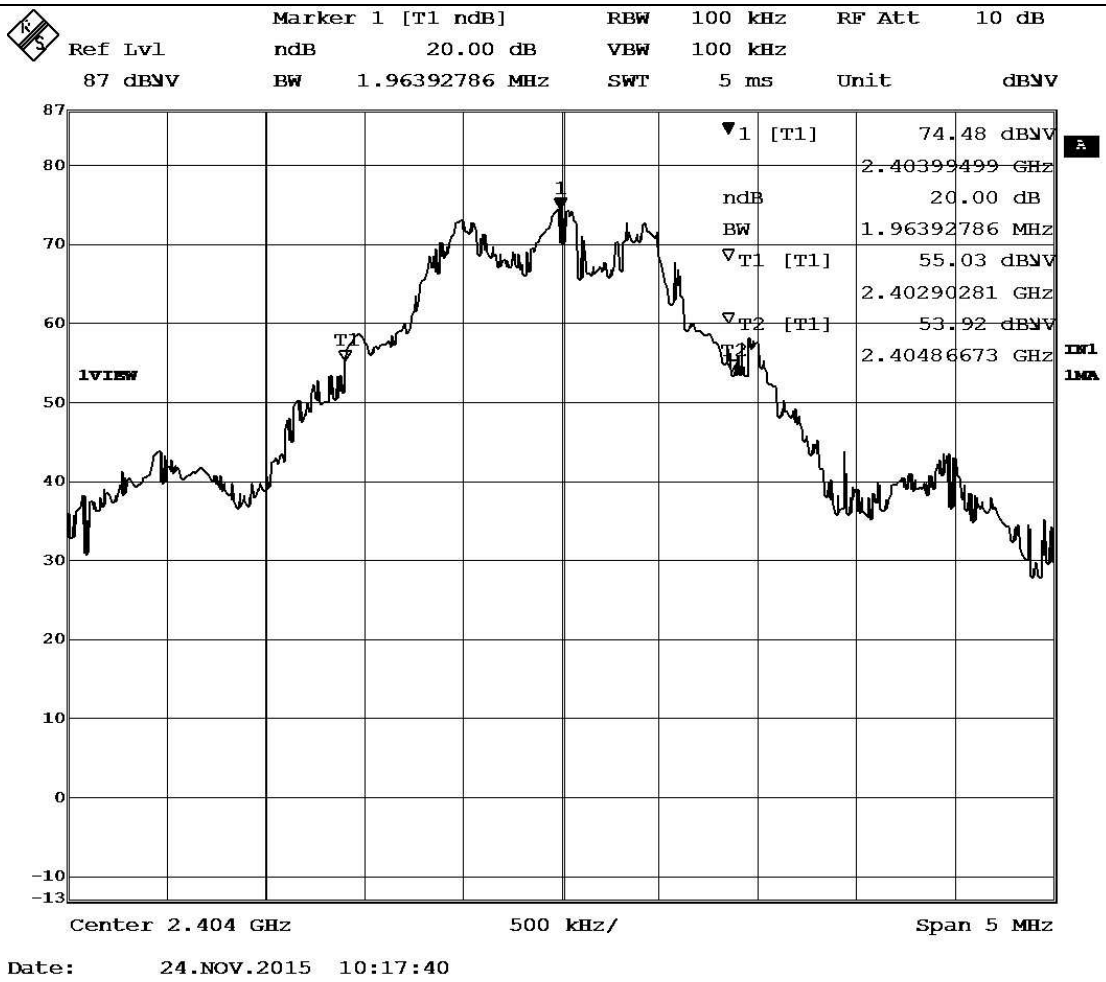
Calculated measurement uncertainty (9kHz - 30MHz): 2.4dB
(30MHz – 1GHz): 4.9dB
(1GHz - 6GHz): 4.02dB
(6GHz – 18GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [MHz]
2404	1.96

20dB Bandwidth of Fundamental Emission

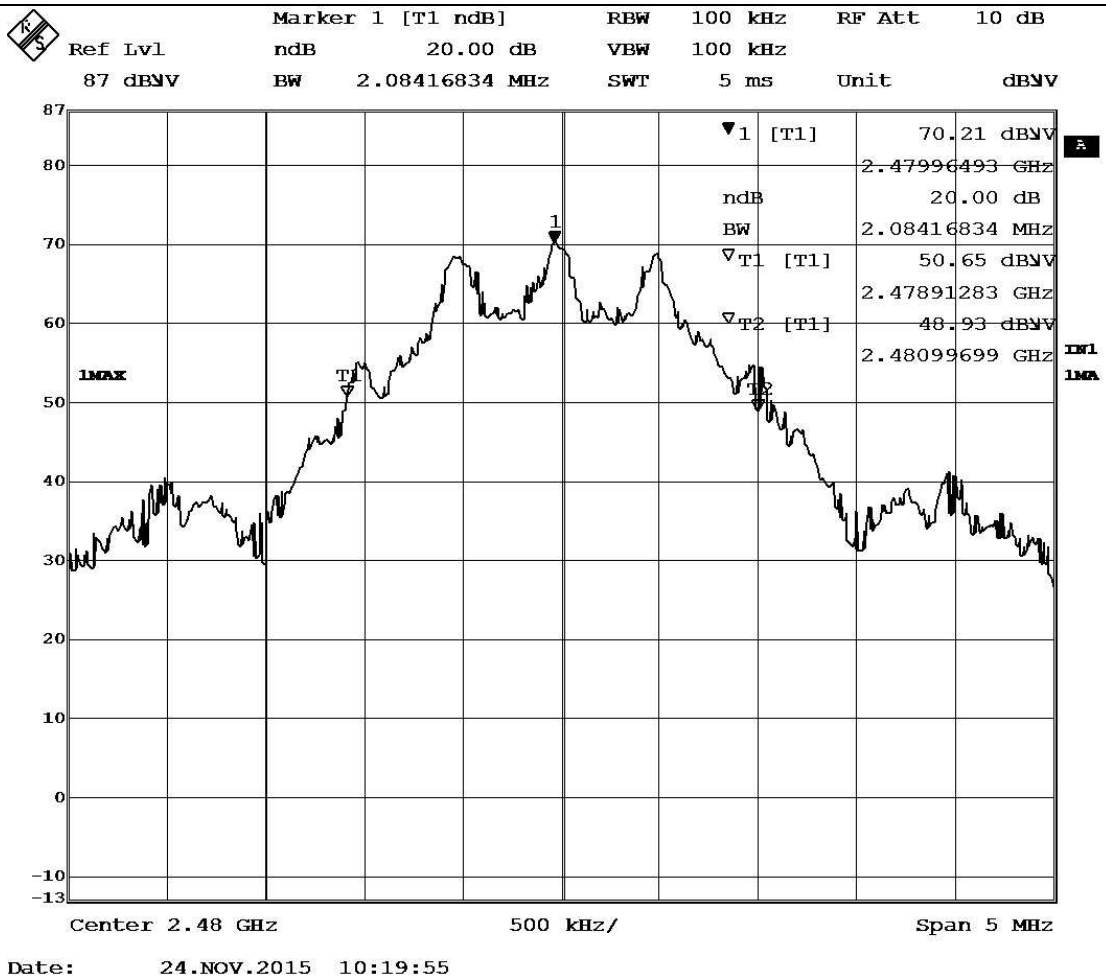


Frequency Range [MHz]	20dB Bandwidth [MHz]
2442	1.78

20dB Bandwidth of Fundamental Emission

Frequency Range [MHz]	20dB Bandwidth [MHz]
2480	2.08

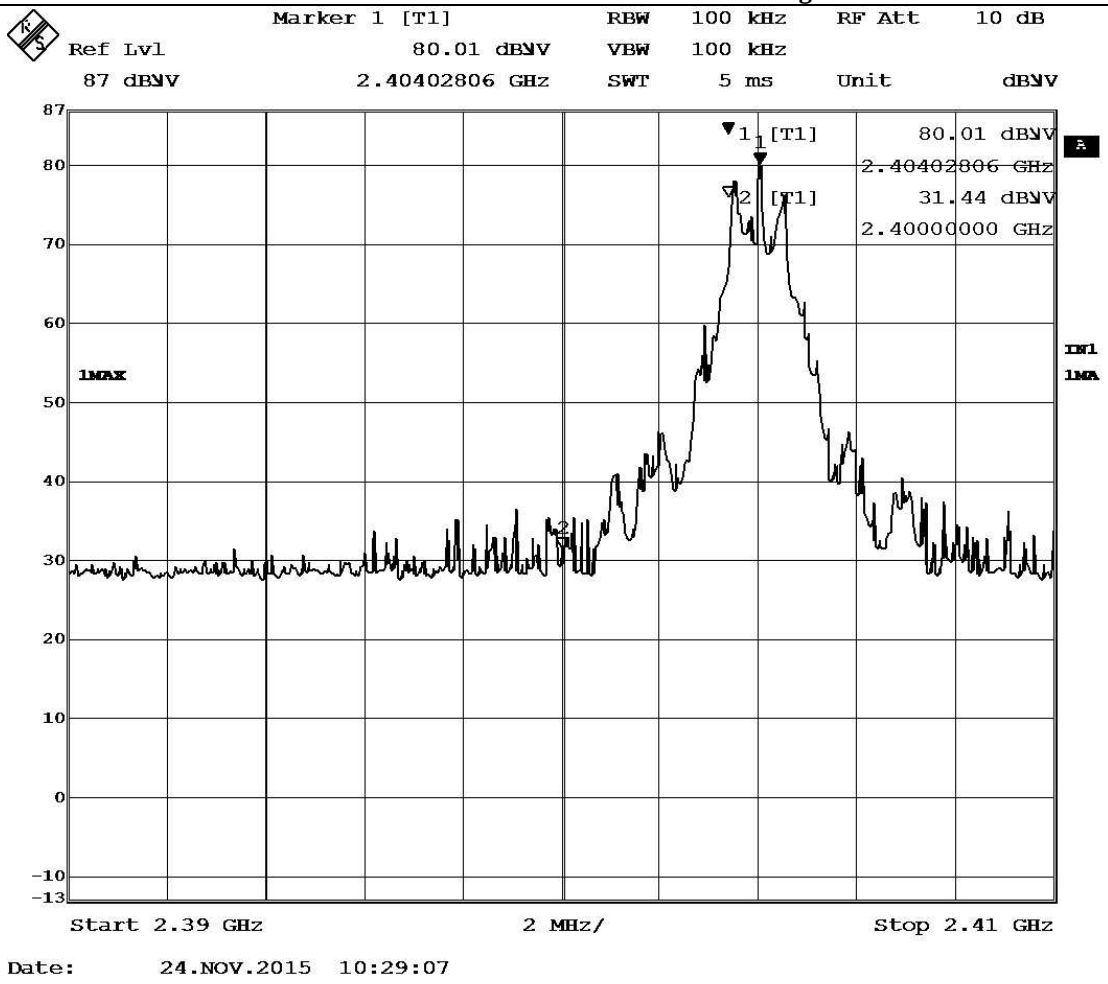
20dB Bandwidth of Fundamental Emission



Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Lowest Fundamental	80.01

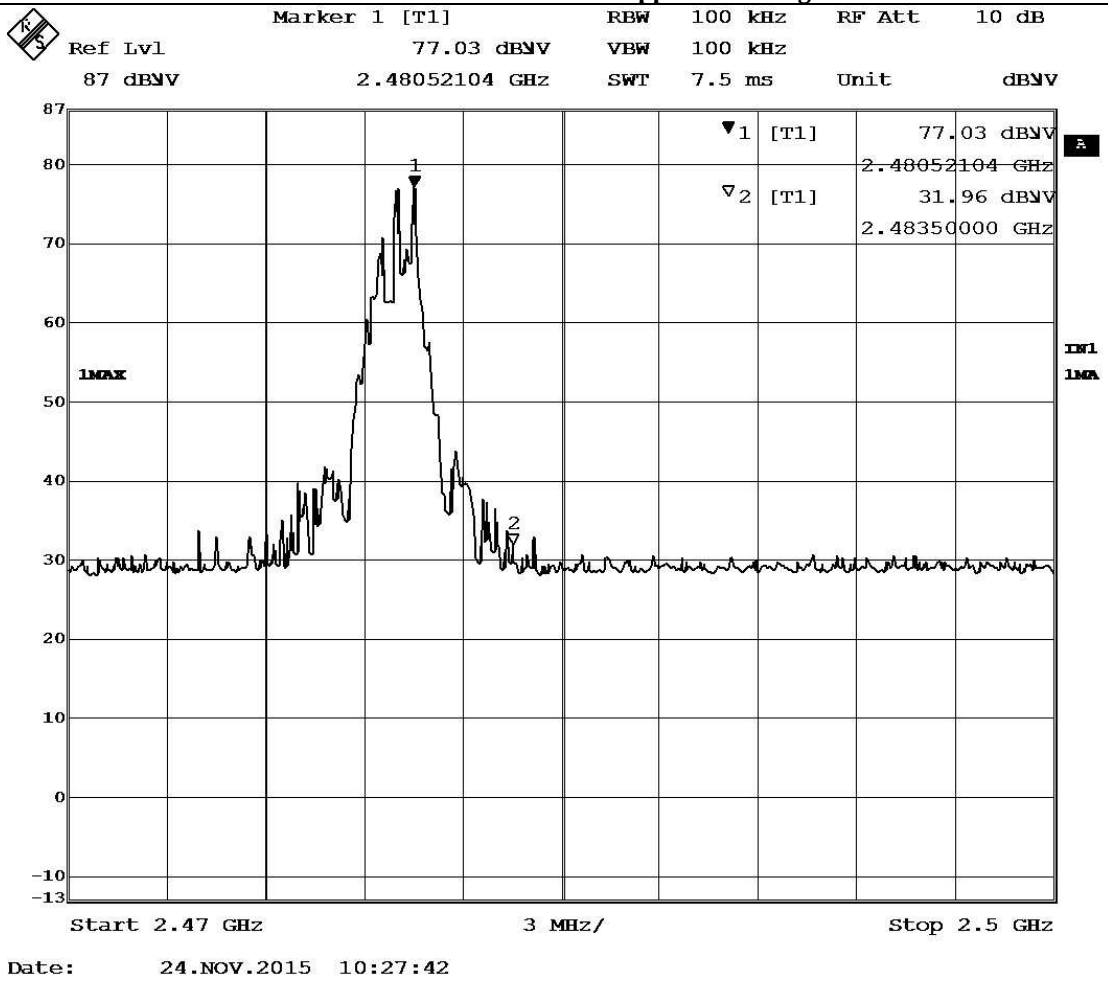
80.01dB Level Reduction at Lower Band Edge



Band Edge Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Highest Fundamental	77.03

77.03dB Level Reduction at Upper Band Edge



Band-edge Compliance of RF Radiated Emissions Measurement:

Limit：

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.

Result：Band-edge Compliance of RF Radiated Emissions (Lowest)

Field Strength of Band-edge Compliance Peak Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dBμV	dB/m	dBμV/m	dBμV/m	dBμV/m	
2400.0	31.4	33.8	65.2	74.0	8.8	Horizontal
Field Strength of Band-edge Compliance Average Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dBμV	dB/m	dBμV/m	dBμV/m	dBμV/m	
2400.0	10.6	33.8	44.4	54.0	9.6	Horizontal

Result：Band-edge Compliance of RF Radiated Emissions (Highest)

Field Strength of Band-edge Compliance Peak Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dBμV	dB/m	dBμV/m	dBμV/m	dBμV/m	
2483.5	31.9	33.7	65.6	74.0	8.4	Horizontal
Field Strength of Band-edge Compliance Average Value						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dBμV	dB/m	dBμV/m	dBμV/m	dBμV/m	
2483.5	12.3	33.7	46.0	54.0	8.0	Horizontal

Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of Tx mode (Lowest Frequency Channel-2404MHz) (9kHz – 30MHz): PASS
Emissions detected are more than 20 dB below the FCC Limits

Result of Tx mode (Lowest Frequency Channel-2404MHz) (30MHz – 1GHz): PASS

Field Strength of Spurious Emissions						
Quasi-Peak						
Frequency	Measured Level @3m	Correction Factor	Field Strength	Limit @3m	Margin	E-Field Polarity
MHz	dBμV	dB/m	dBμV/m	dBμV/m	dBμV/m	
36.3	16.8	16.1	32.9	40.0	7.1	Horizontal
50.7	13.5	10.0	23.5	40.0	16.5	Horizontal
140.2	14.6	10.3	24.9	43.5	18.6	Horizontal
156.0	13.5	11.0	24.5	43.5	19.0	Horizontal
217.5	12.6	14.3	26.9	46.0	19.1	Horizontal
276.8	14.4	15.8	30.2	46.0	15.8	Horizontal

Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 4.9dB
1GHz to 6GHz 4.02dB
6GHz to 18GHz 4.03dB

Emissions in the lowest, middle and highest operating channel also the vertical and horizontal polarizations have been investigated, the worst-case test results are recorded in this report.

Appendix A

LIST OF MEASUREMENT EQUIPMENT

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2014/01/15	2016/01/25
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2015/04/20	2016/04/20
EM320	BICONILOG ANTENNA	ETS-LINDGREN	3142D	00094856	2014/08/06	2016/08/06
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2015/06/01	2016/06/01
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2014/01/15	2016/01/15
EM527	MICROWAVE FREQUENCY CABLE	SUHNER	SUCOFLEX 102	24514	2013/08/26	2016/08/26
EM528	MICROWAVE FREQUENCY CABLE	SUHNER	SUCOFLEX 102	24515	2013/08/26	2016/08/26
EM529	MICROWAVE FREQUENCY CABLE	SUHNER	SUCOFLEX 104	238296	2014/07/24	2016/07/24
EM530	MICROWAVE FREQUENCY CABLE	SUHNER	SUCOFLEX 102	24970	2013/08/26	2016/08/26

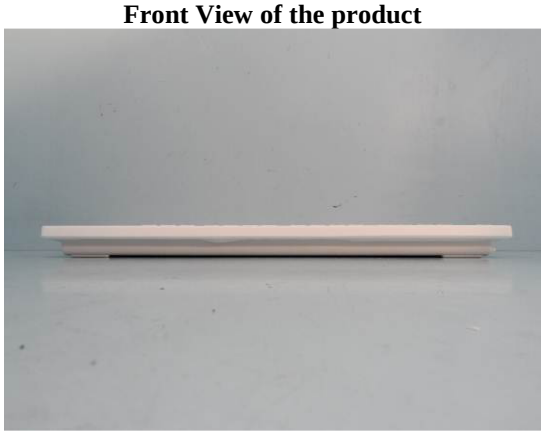
Remarks:

CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

Appendix B

Photographs of EUT

Front View of the product



Rear View of the product

Side View of the product

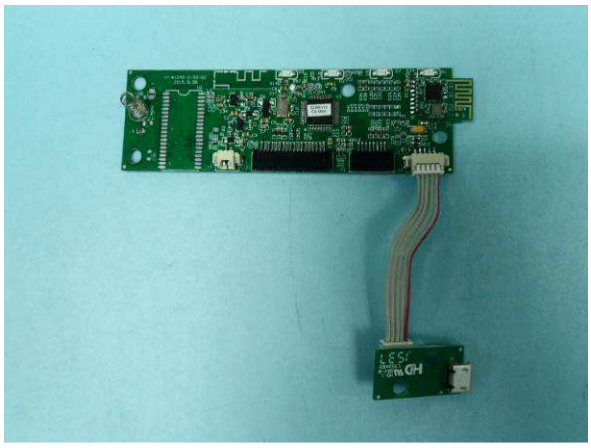
Side View of the product

Top View of the product

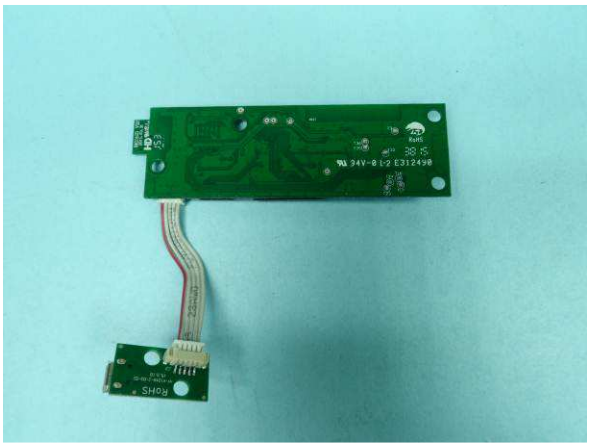
Bottom View of the product

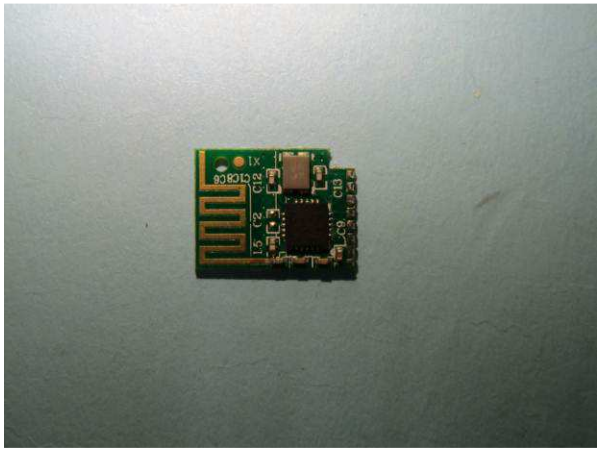
Photographs of EUT

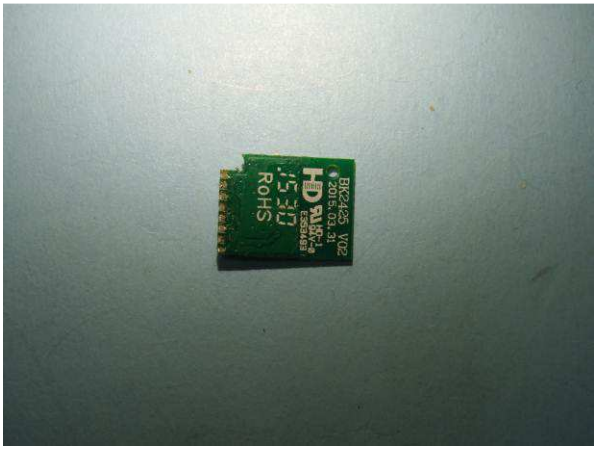
Front View of the Inner Circuit



Rear View of the Inner Circuit

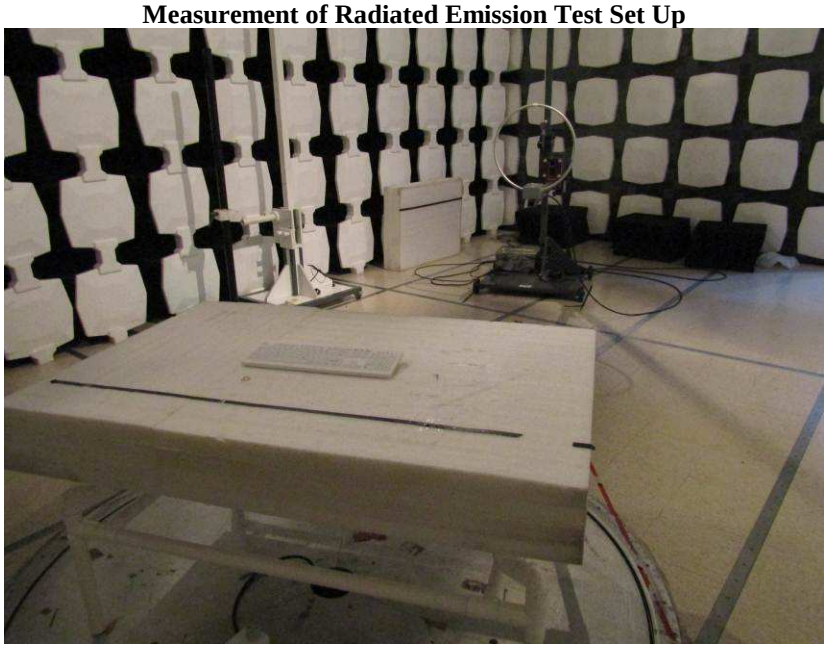




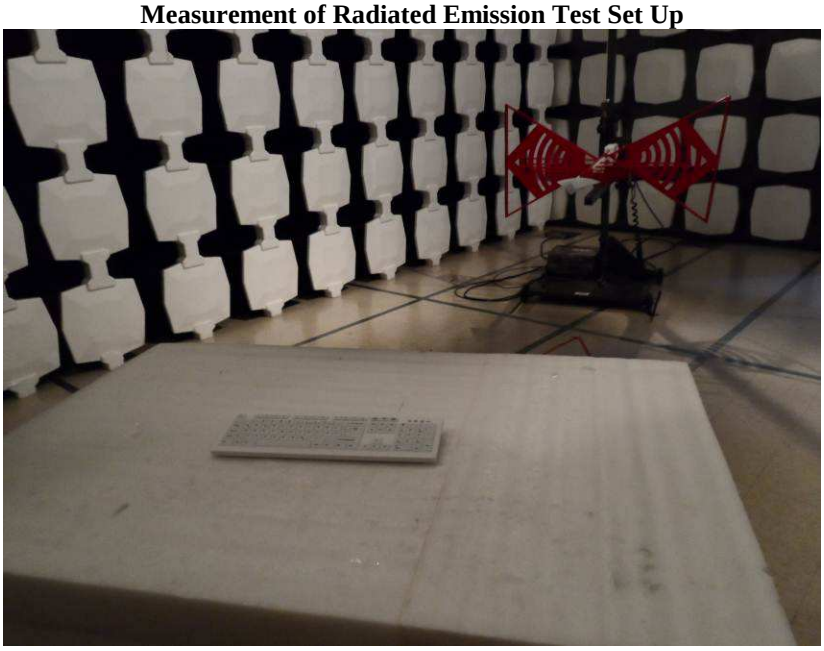


Photographs of EUT

Measurement of Radiated Emission Test Set Up

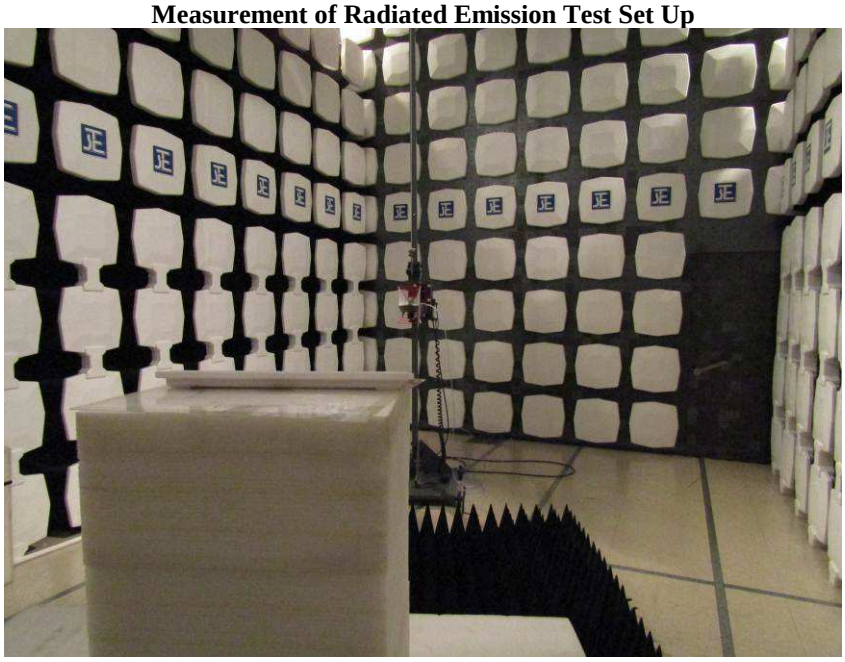


Measurement of Radiated Emission Test Set Up



Photographs of EUT

Measurement of Radiated Emission Test Set Up



******* End of Test Report *******

STC Test Report

Conditions of Issuance of Test Reports

1. All samples and goods are accepted by The Hong Kong Standards & Testing Centre Limited (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The Company provides its services on the basis that such terms and conditions constitute express agreement between the Company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by the Company as a result of this application for testing service (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to his customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The Report refers only to the sample tested and does not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.

5. In the event of the improper use the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Sample submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage howsoever arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. Subject to the variable length of retention time for test data and report stored hereinto as to otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of this test report for a period of three years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after the retention period. Under no circumstances shall we be liable for damages of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

10. Issuance records of the Report are available on the internet at www.stc-group.org. Further enquiry of validity or verification of the Reports should be addressed to the Company.