Test Report

Date : 2017-06-16
No. : HM170711

Applicant: Skyrocket H.K. Limited
Room 1205, 12/F, Harbour Crystal Centre, 100 Granville Road, Tsimshatsui East, Kowloon, Hong Kong

Manufacturer: Skyrocket H.K. Limited
Room 1205, 12/F, Harbour Crystal Centre, 100 Granville Road, Tsimshatsui East, Kowloon, Hong Kong

Description of Sample(s):

Product:	VRSE
Brand Name:	Skyrocket
Model Number:	01764
Additional Model:	01765
FCC ID:	O5301764TX

Date Sample(s) Received: 2017-04-12

Date Tested: 2017-04-25 to 2017-04-29

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47 CFR [Codes of Federal Regulations] Part 15: 2015 and ANSI C63.4: 2014 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): The tested model supports Bluetooth (BLE) single mode only
This report is a supplement to Test Report, number HM170711 issued on 2017-06-15. The original page(s) of the same test report is hereby superseded.

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

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Test Report

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1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate

Telephone: (852) 26661888
Fax: (852) 26644353

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

Product:	VRSE
Manufacturer:	Skyrocket H.K. Limited Room 1205, 12/F, Harbour Crystal Centre, 100 Granville Road, Tsimshatsui East, Kowloon, Hong Kong
Brand Name:	Skyrocket
Model Number:	01764
Rating:	Input: 3.0Vd.c, “AAA” x 2

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is VRSE, which is a BLE single mode gaming device. The R.F. signal was modulated by IC; the type of modulation used was GFSK.

1.3 Date of Order

2017-04-12

1.4 Submitted Sample(s):

4 Samples

1.5 Test Duration

2017-04-25 to 2017-05-02

1.6 Country of Origin

China

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1.7 Antenna Details

Antenna Type (Bluetooth):	Circuit board printed meander line antenna
Antenna Gain (Bluetooth):	0dBi

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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. ANSI C63.10:2013 and ANSI C63.4: 2014 for FCC Certification.

2.2 Test Standards and Results Summary Tables

EMISSION (BLUETOOTH)
Results Summary

Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Fail	N/A
Maximum Peak Conducted Output Power	FCC 47CFR 15.247(b)(1)	ANSI C63.10:2013	N/A	☒	☐	☐
Radiated Spurious Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	☒	☐	☐
Power Spectral Density	FCC 47CFR 15.247(a)(1)	ANSI C63.10:2013	N/A	☒	☐	☐
6dB Bandwidth	FCC 47CFR 15.247(a)(1)	ANSI C63.10:2013	N/A	☒	☐	☐
Band-edge measurement (Radiated)	FCC 47CFR 15.247(d)	ANSI C63.10:2013	N/A	☒	☐	☐
Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10:2013	N/A	☐	☐	☒
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	☒	☐	☐
RF Exposure	FCC 47CFR 15.247(i)	N/A	N/A	☒	☐	☐

Note: N/A – Not Applicable

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2.3 Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate in the table below is the worst case rate with respect to the specific test item.
Investigation has been done on all the possible configurations for searching the worst cases.
The following table is a list of the test modes shown in this test report.

Bluetooth

Test Items	Mode
Maximum Peak Conducted Output Power	GFSK
Power Spectral Density	GFSK
Radiated Spurious Emissions	GFSK
Band-edge compliance of Radiated Emission	GFSK

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3.0 Test Results

3.1 Emission

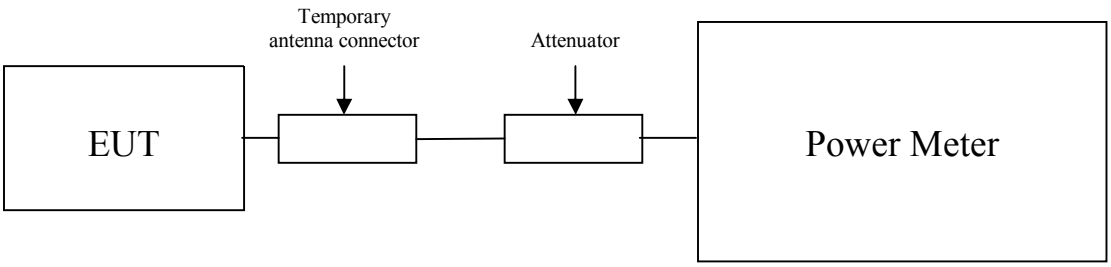
3.1.1 Maximum Peak Conducted Output Power

Test Requirement:	FCC 47CFR 15.247(b)(2)
Test Method:	ANSI C63.10:2013
Test Date:	2017-04-25
Mode of Operation:	Tx mode

Test Method:

The RF output of the EUT was connected to the Power Meter. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in dBm.

Test Setup:



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Limits for Maximum Peak Conducted Output Power [FCC 47CFR 15.247]:

2400–2483.5 MHz band: The maximum peak output power shall not exceeded the following limits: For frequency hopping systems employing at least 75 hopping channels: 1 Watt For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 Watts For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt

Results of Bluetooth mode (Fundamental Power): Pass

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2402	0.000579

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2440	0.000409

Transmitter Frequency (MHz)	Maximum conducted output power (Watt)
2480	0.000583

	:	30MHz to 1GHz	1.7dB
Calculated measurement uncertainty		1GHz to 18GHz	1.7dB

Remark:
1. All test data for each data rate were verified, but only the worst case was reported.
2. The EUT is programmed to transmit signals continuously for all testing.

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3.1.2 Radiated Spurious Emissions

Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.4:2014
Test Date:	2017-04-25
Mode of Operation:	Tx mode (Bluetooth)

Test Method:

The sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. 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, 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. The emissions worst-case are shown in Test Results of the following pages.
The frequency range from 9kHz to the 10th harmonic of the fundamental transmitter was observed.

* 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.

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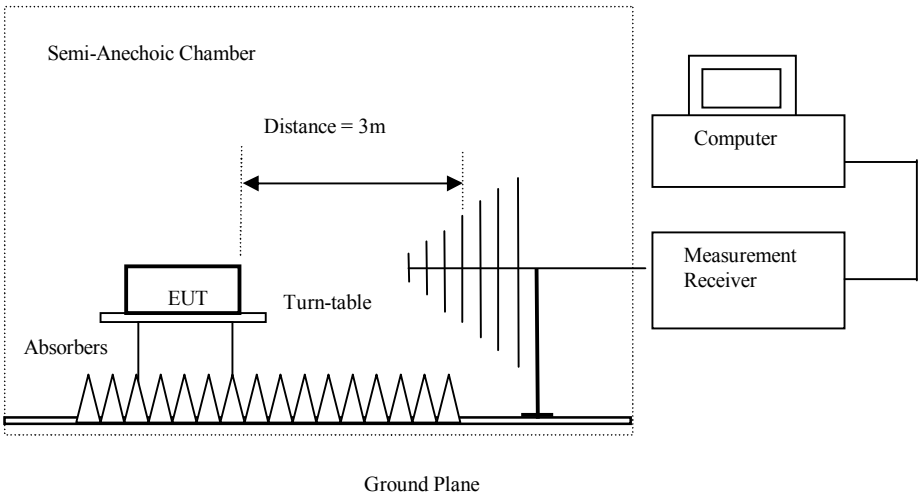
Spectrum Analyzer Setting:

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:	1MHz
	VBW:	3MHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

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

Frequency Range	Quasi-Peak Limits
[MHz]	[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.

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Result of Tx mode (Bluetooth: 2402.0 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (Bluetooth: 2402.0 MHz) (GFSK mode) (30MHz – 1GHz): Pass

Field Strength of Spurious Emissions Quasi-Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (Bluetooth: 2402.0 MHz) (GFSK mode) (Above 1GHz): Pass

Peak Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4804.0	7.1	42.4	49.5	74.0	24.5	Horizontal
7206.0	4.2	46.2	50.4	74.0	23.6	Horizontal
9608.0	3.1	48.8	51.9	74.0	22.1	Horizontal
12010.0	2.4	52.4	54.8	74.0	19.2	Horizontal

Result of Tx mode (Bluetooth: 2402.0 MHz) (GFSK mode) (Above 1GHz): Pass

Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4804.0	-7.3	42.4	35.1	54.0	18.9	Horizontal
7206.0	-9.1	46.2	37.1	54.0	16.9	Horizontal
9608.0	-10.5	48.8	38.3	54.0	15.7	Horizontal
12010.0	-13.3	52.4	39.1	54.0	14.9	Horizontal

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Result of Tx mode (Bluetooth: 2426.0 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (Bluetooth: 2426.0 MHz) (GFSK mode) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions Quasi-Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (Bluetooth: 2426.0 MHz) (GFSK mode) (Above 1GHz): Pass

Peak Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4852.0	6.9	42.5	49.4	74.0	24.6	Horizontal
7278.0	4.9	46.3	51.2	74.0	22.8	Horizontal
9704.0	3.0	48.9	51.9	74.0	22.1	Horizontal
12130.0	1.9	52.5	54.4	74.0	19.6	Horizontal

Result of Tx mode (Bluetooth: 2426.0 MHz) (GFSK mode) (Above 1GHz): Pass

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4852.0	-7.4	42.5	35.1	54.0	18.9	Horizontal
7278.0	-9.1	46.3	37.2	54.0	16.8	Horizontal
9704.0	-10.9	48.9	38.0	54.0	16.0	Horizontal
12130.0	-12.6	52.5	39.9	54.0	14.1	Horizontal

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Result of Tx mode (Bluetooth: 2480.0 MHz) (GFSK mode) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Results of Tx mode (Bluetooth: 2480.0 MHz) (GFSK mode) (30MHz – 1000MHz): PASS

Field Strength of Spurious Emissions Quasi-Peak Value						
Frequency MHz	Measured Level dBuV	Correction Factor dB/m	Field Strength dBuV/m	Field Strength uV/m	Limit uV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (Bluetooth: 2480.0 MHz) (GFSK mode) (Above 1GHz): Pass

Peak Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4960.0	6.1	42.7	48.8	74.0	25.2	Horizontal
7440.0	4.9	46.5	51.4	74.0	22.6	Horizontal
9920.0	2.3	49.7	52.0	74.0	22.0	Horizontal
12400.0	1.4	52.7	54.1	74.0	19.9	Horizontal

Result of Tx mode (Bluetooth: 2480.0 MHz) (GFSK mode) (Above 1GHz): Pass

Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4960.0	-6.9	42.7	35.8	54.0	18.2	Horizontal
7440.0	-8.9	46.5	37.6	54.0	16.4	Horizontal
9920.0	-10.4	49.7	39.3	54.0	14.7	Horizontal
12400.0	-13.4	52.7	39.3	54.0	14.7	Horizontal

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Remarks:

* Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty: (9kHz - 30MHz): 3.3dB
(30MHz - 1GHz): 4.6dB
(1GHz - 26GHz): 4.4dB

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

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3.1.3 Power Spectral Density

Test Requirement: FCC 47CFR 15.247(e)
Test Method: ANSI C63.10:2013
Test Date: 2016-12-01
Mode of Operation: On mode

Test Method:

The RF output of the EUT was connected to the spectrum analyzer. Set the fundamental frequency as the center frequency of the spectral analyzer. Use RBW=3kHz , VBW= 10KHz , Set the span to 1.5 times the DTS channel bandwidth. Detector = peak, Sweep time = auto couple , Trace mode = max hold. Measure the Power Spectral Density (PSD) and record the results in dBm.

Test Setup:

As Test Setup of clause 3.1.3 in this test report.

Test Limit:
The maximum power spectral density (PSD) shall not exceeded 8dBm in any 3kHz band.

Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF=10log (3 kHz/100 kHz=-15.2dB)

Result of on mode: Pass

Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2402	-39.5	**8dBm**
2440	-42.1	**8dBm**
2480	-42.4	**8dBm**

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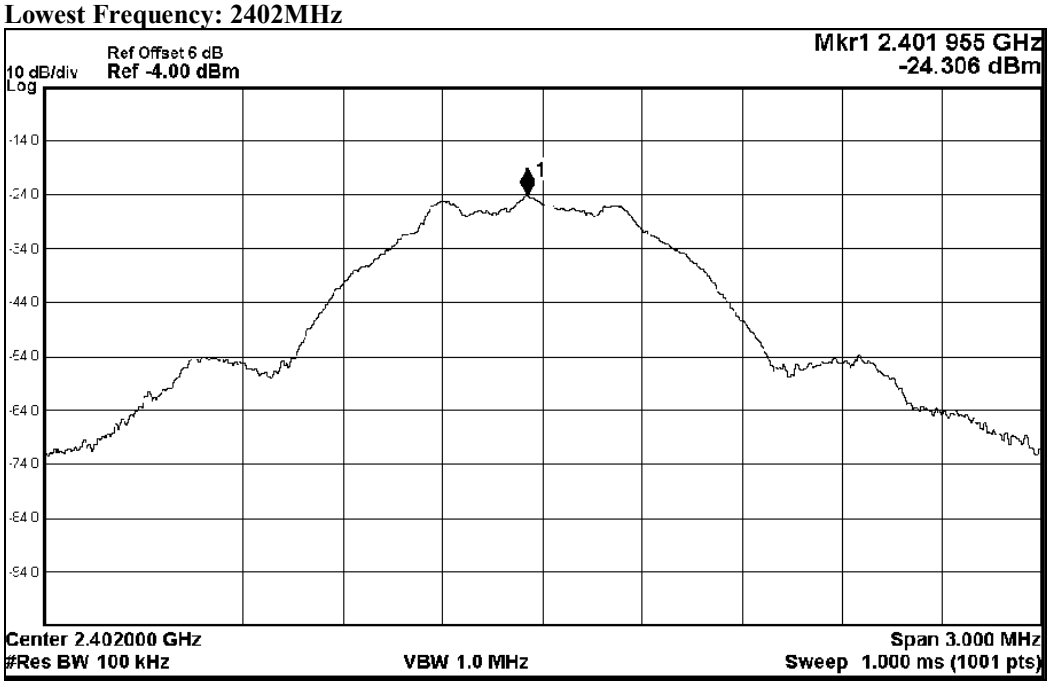
Lowest Frequency: 2402MHz



PSD at 100kHz = -24.3dBm/100kHz, PSD at 3kHz = -39.5dBm/3kHz

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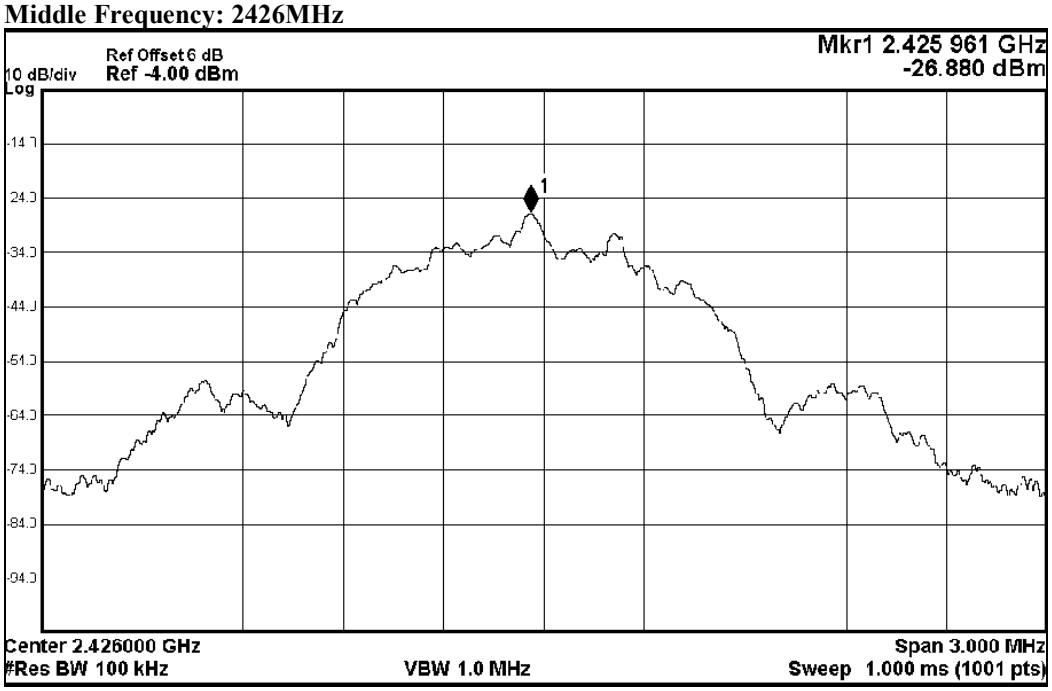
Middle Frequency: 2426MHz



PSD at 100kHz = -26.9dBm/100kHz, PSD at 3kHz = -42.1dBm/3kHz

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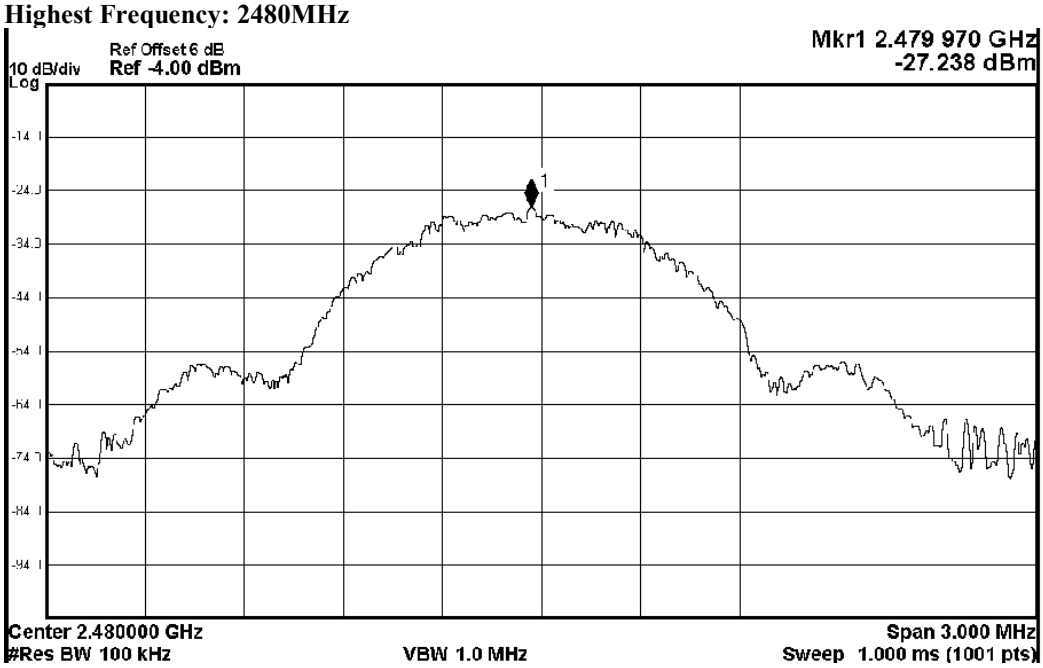
Highest Frequency: 2480MHz



PSD at 30kHz = -27.2dBm, PSD at 3kHz = -42.4dBm

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3.1.5 6dB Bandwidth Measurement

Test Requirement:	FCC 47CFR 15.247(a)(2)
Test Method:	ANSI C63.10-2013
Test Date:	2016-12-01
Mode of Operation:	Tx mode

Remark:
The result has been done on all the possible configurations for searching the worst cases.

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

As Test Setup of clause 3.1.3 in this test report.

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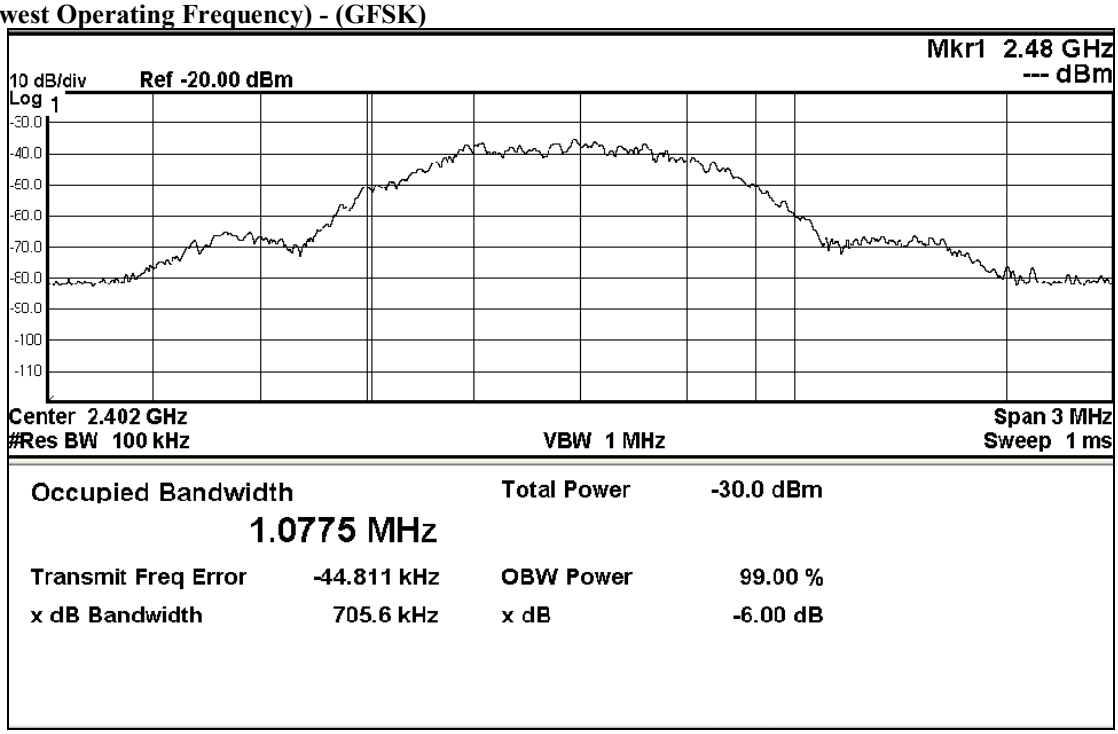
Fundamental Frequency [MHz]	6dB Bandwidth [kHz]	FCC Limits [kHz]
2402	705.6	>500kHz

(Lowest Operating Frequency) - (GFSK)



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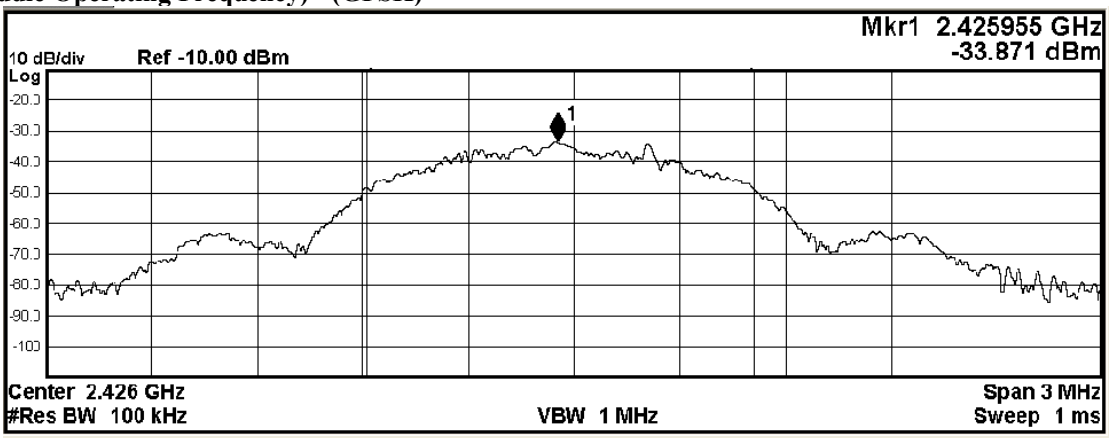
Fundamental Frequency [MHz]	6dB Bandwidth [kHz]	FCC Limits [kHz]
2426	655.3	>500kHz

(Middle Operating Frequency) - (GFSK)



Occupied Bandwidth	1.0919 MHz	Total Power	-28.4 dBm
Transmit Freq Error	-35.507 kHz	OBW Power	99.00 %
x dB Bandwidth	655.3 kHz	x dB	-6.00 dB

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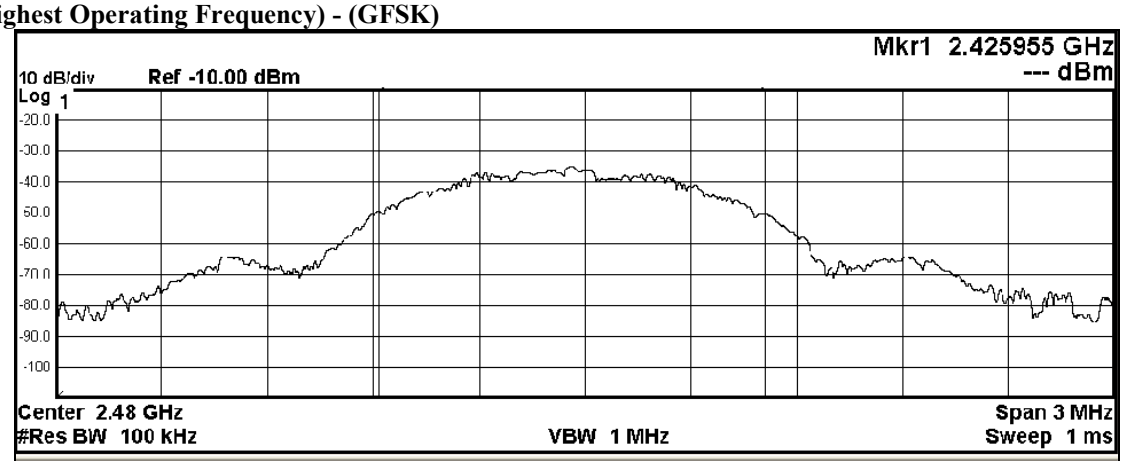
Fundamental Frequency [MHz]	6dB Bandwidth [kHz]	FCC Limits [kHz]
2480	652.3	>500kHz

(Highest Operating Frequency) - (GFSK)



Occupied Bandwidth	1.0929 MHz	Total Power	-29.5 dBm
Transmit Freq Error	-37.739 kHz	OBW Power	99.00 %
x dB Bandwidth	652.3 kHz	x dB	-6.00 dB

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3.1.6 Band-edge Compliance of RF Radiated Emissions Measurement:

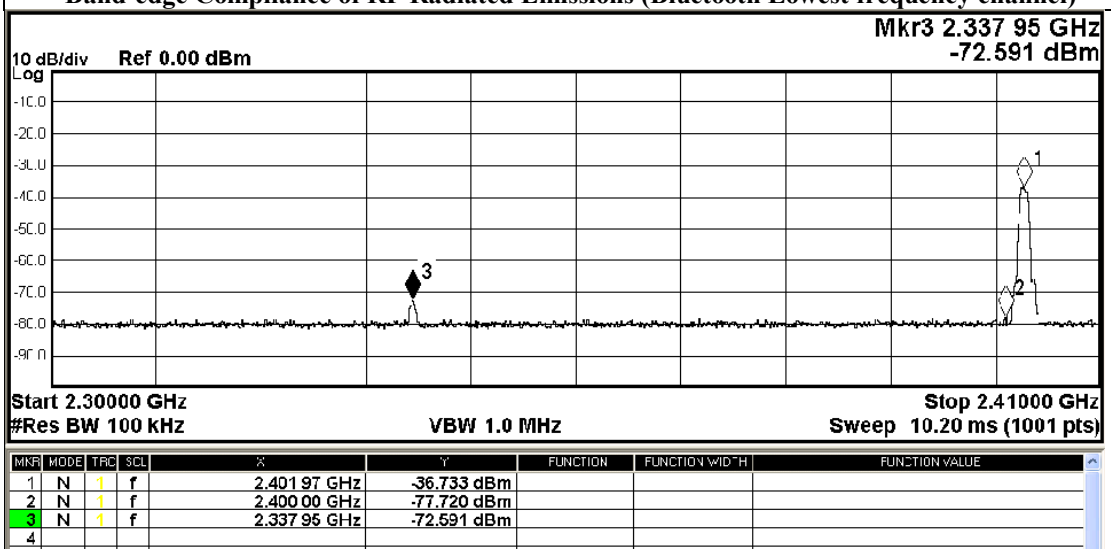
Limit：

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Band-edge Compliance of RF Radiated Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
2400 - Lowest Fundamental (2402)	41.1

Band-edge Compliance of RF Radiated Emissions (Bluetooth Lowest frequency channel)



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.401 97 GHz	-36.733 dBm			
2	N	1	f	2.400 00 GHz	-77.720 dBm			
3	N	1	f	2.337 95 GHz	-72.591 dBm			
4								

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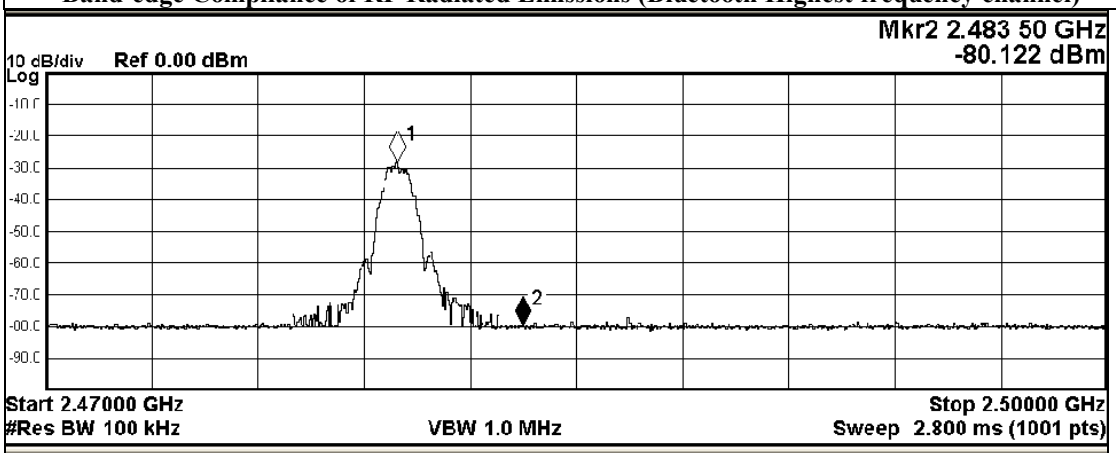
Band-edge Compliance of RF Radiated Emissions Measurement:

Frequency Range [MHz]	Radiated Emission Attenuated below the Fundamental [dB]
Highest Fundamental (2480) - 2483.5	52.1

Band-edge Compliance of RF Radiated Emissions (Bluetooth Highest frequency channel)



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.479 93 GHz	-28.143 dBm			
2	N	1	f	2.483 50 GHz	-80.122 dBm			
3								
4								

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3.1.11 Antenna Requirement

Test Requirements: § 15.203

Test Specification:

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 use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Results:

Bluetooth:
This is Circuit printed meander line antenna. There is no external antenna, the antenna gain = 0dBi. User is unable to remove or changed the Antenna.

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3.1.12 RF Exposure

Test Requirement:	FCC 47CFR 15.247(i)
Test Date:	2017-01-11
Mode of Operation:	Tx mode (Bluetooth)

Test Method:

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

Test Results:
The EUT complied with the requirement(s) of this section.
EUT meets the requirements of these sections as proven through MPE calculation
The MPE calculation for EUT @ 20cm

Bluetooth:
Based on the highest P = 0.398mW (2402MHz)

Pd = PG/ 4pi*R^2 = (0.398 x1)/12.566* $(20)^2$
= (0.25)/12.566x 400= 0.25 /5026.4
= 0.00005mW/cm^2

where:
*Pd = power density in mW/cm2
* G = Antenna numeric gain (0.63); Log G = g/10 (g = 0dBi).
* P = Conducted RF power to antenna (0.398mW).
* R = Minimum allowable distance.(20 cm)

**The power density Pd is less than 1 mW/cm^2 (listed MPE limit) in Bluetooth mode
**The SAR evaluation is not needed (this is a desk top device, R> 20 cm)
**The EUT(antenna) must be 0.2 meters away from the General Population.

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List of Measurement Equipment

LIST OF MEASUREMENT EQUIPMENT

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2017/04/24	2018/04/24
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A
EM354	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00142073	2016/02/29	2018/02/29
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2016/06/01	2017/06/01
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2016/04/27	2018/04/27
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2016/05/13	2018/05/13
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2016/05/13	2018/05/13
EM302	PRECISION OMNIDIRECTIONAL DIPOLE (1 – 6GHZ)	SEIBERSDORF LABORATORIES	POD 16	161806/L	2016/05/11	2018/05/11
EM303	PRECISION OMNIDIRECTIONAL DIPOLE (6 – 18GHZ)	SEIBERSDORF LABORATORIES	POD 618	6181908/L	2016/05/11	2018/05/11
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2016/03/16	2018/03/16

Remarks:-

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

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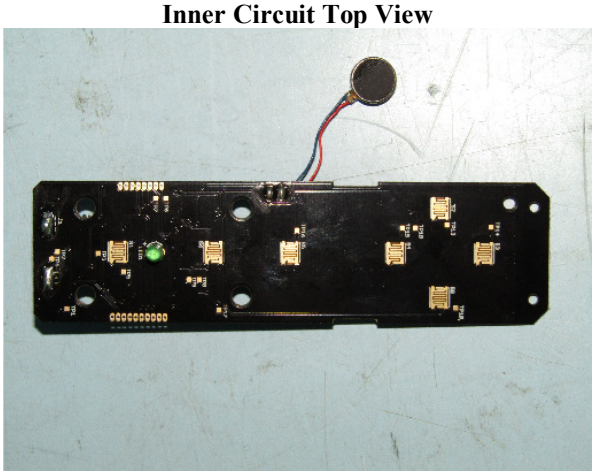
Appendix B

Photographs of EUT

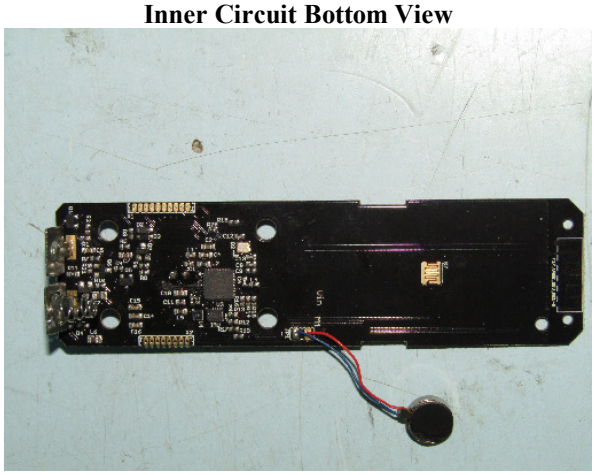
Front View of the product

Rear View of the product

Inner Circuit Top View



Inner Circuit Bottom View



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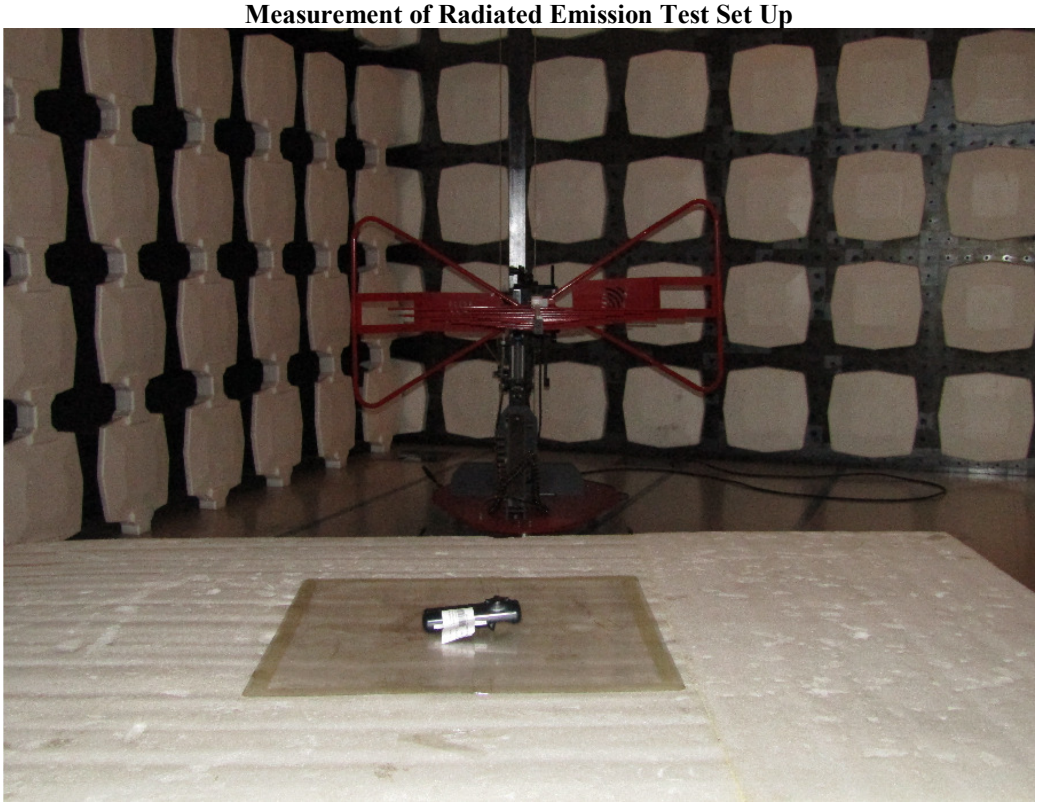
Photographs of EUT

Measurement of Radiated Emission Test Set Up



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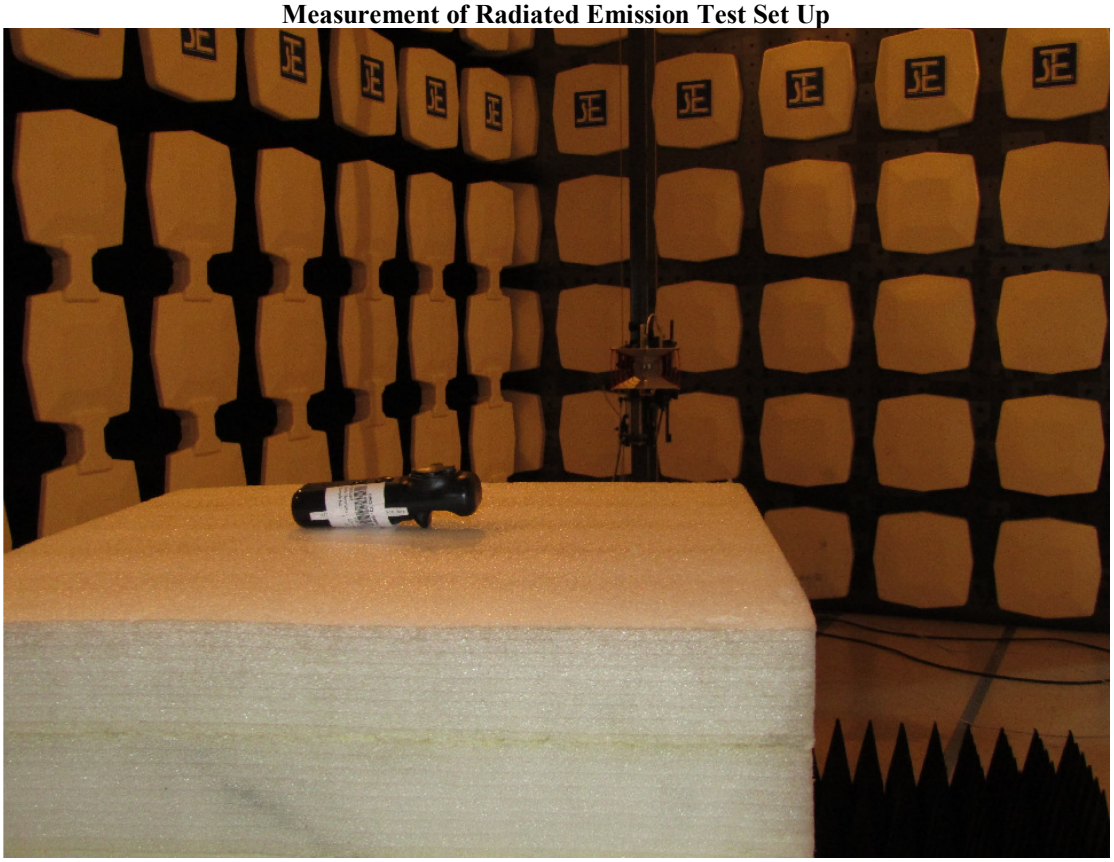
Measurement of Radiated Emission Test Set Up



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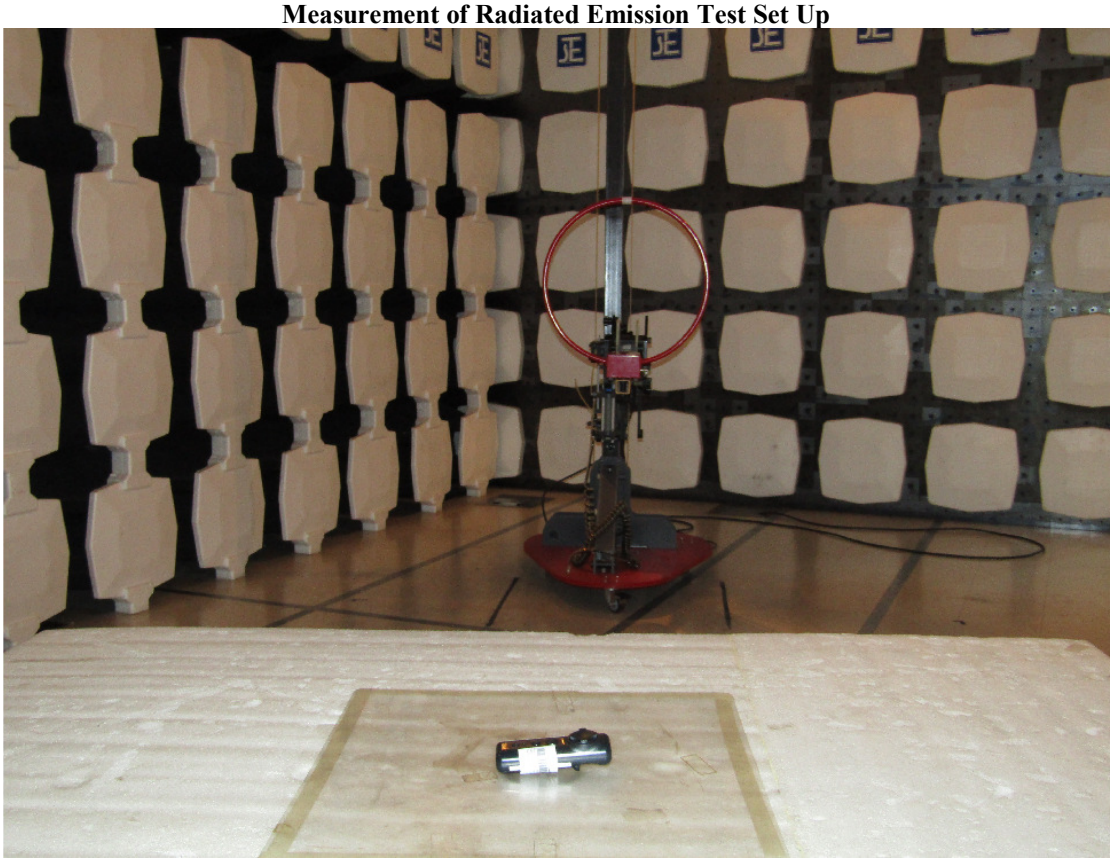
Photographs of EUT

Measurement of Radiated Emission Test Set Up



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

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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.