

# FCC Test Report

**Application No.:** HKES131000254201

**Applicant:** TONZEX INDUSTRIAL (HK) LTD

**Address:** Room 2212, 22/F., Block B, New Trade Plaza  
No. 6, On Ping Street, Shek Mun, Shatin, N.T.  
Hong Kong

**Product Information:**

Product Description: Bluetooth Speaker with LED Light

Model: TS3222B

Product Class : Low Power Communication Device – Transmitter (2.4 GHz)

FCC ID: 2AA8OTS3222B

**Requirement:** CFR 47 FCC PART 15 SUBPART C, 2012  
- Intentional Radiators (Section 15.249)

**Date of Receipt:** 2013-10-08

**Date of Test:** 2013-10-18

**Date of Issue:** 2013-10-21

<b>Test Result :</b>	<b>PASS*</b>
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\* In the configuration tested, the EUT complied with the requirements for the relevant clauses of Federal Communications Commission Rules as specified above.

Authorized Signature:



**LOKE Sai Kit, Wilson**  
**Senior Manager**

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS IECC Limited or testing done by SGS IECC Limited in connection with, distribution or use of the product described in this report must be approved by SGS IECC Limited in writing.

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## 2 Test Summary

Test	Test Requirement	Test Method	Result
Conducted Emission (150KHz to 30MHz)	FCC PART 15, SUBPART C: 2012	ANSI C63.4:2003	N/A <sup>1)</sup>
Radiated Emission (9kHz to 1GHz)	FCC PART 15, SUBPART C: 2012	ANSI C63.4:2003	PASS
Radiated Emission above 1 GHz	FCC PART 15, SUBPART C: 2012	ANSI C63.4:2003	PASS
Band edge / 20 dB Bandwidth	FCC PART 15, SUBPART C: 2012	ANSI C63.4:2003 Marker-Delta measurement	PASS

**Remark :**

1) Please refer to section 6.1 of this report for explanation

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### 3 Contents

	Page
<b>1 COVER PAGE .....</b>	<b>1</b>
<b>2 TEST SUMMARY .....</b>	<b>2</b>
<b>3 CONTENTS .....</b>	<b>3</b>
<b>4 GENERAL INFORMATION.....</b>	<b>4</b>
4.1 GENERAL DESCRIPTION OF EUT .....	4
4.2 DETAILS OF EUT .....	4
4.3 CONDITIONS OF EUT .....	4
4.4 DESCRIPTION OF SUPPORT UNITS.....	4
4.5 STANDARDS APPLICABLE FOR TESTING.....	4
4.6 TEST LOCATION.....	4
4.7 TEST FACILITY .....	5
4.8 DEVIATION FROM STANDARDS.....	6
4.9 ABNORMALITIES FROM STANDARD CONDITIONS.....	6
4.10 DECLARATION OF FAMILY GROUPING .....	6
4.11 ABBREVIATIONS .....	6
<b>5 EQUIPMENTS USED DURING TEST .....</b>	<b>7</b>
<b>6 TEST RESULTS.....</b>	<b>8</b>
6.1 CONDUCTED EMISSIONS MAINS TERMINALS, 150kHz TO 30MHz .....	8
6.2 RADIATED EMISSIONS, 9kHz TO 1GHz .....	8
6.2.1 <i>EUT Operation</i> .....	9
6.2.2 <i>Test Setup and Procedure</i> .....	10
6.2.3 <i>Measurement Data</i> .....	11
6.3 RADIATED EMISSIONS ABOVE 1 GHz.....	13
6.3.1 <i>EUT Operation</i> .....	13
6.3.2 <i>Test Setup and Procedure</i> .....	14
6.3.3 <i>Measurement Data</i> .....	15
6.4 BAND EDGE / 20 dB BANDWIDTH .....	17
<b>7 PHOTOGRAPHS.....</b>	<b>19</b>
7.1 RADIATED EMISSION TEST SETUP.....	19
7.2 EUT CONSTRUCTIONAL DETAILS.....	20

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## 4 General Information

### 4.1 General Description of EUT

EUT Name:	Bluetooth Speaker with LED Light
Model:	TS3222B
Serial No.:	--

### 4.2 Details of EUT

Power Supply:	DC 3.7V (Rechargeable battery x 1)
Power Cord:	--
Operating Frequency	2402-2480MHz
Antenna Type:	Integral antenna (13mm×4mm)
Bluetooth Version	3.0+EDR
Modulation Type:	GFSK, π/4-DQPSK and 8DPSK

### 4.3 Conditions of EUT

The received sample was under good condition.

### 4.4 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Notebook	HP	Omnibook xt6200	OE116
BT test board	Applicant Supply	N/A	N/A
Test software			APPOTech RF control kit V2.2 software

All field strength measures in this test report were done by the aid of test software which places the device in continuous transmission with 100% duty cycle under different package type and the test software above allowed to set the frequency fixed and hopping stopped.

When testing, the software about Transmit Power grade is 7 as worse case.

### 4.5 Standards Applicable for Testing

CFR 47, FCC Part 15, Oct 2012  
ANSI C63.4:2003

### 4.6 Test Location

All tests were performed at:

SGS IECC Limited (Member of the SGS Group (SGS SA))

Units 303-305, 3/F., 31 Lok Yip Road, On Lok Tsuen, Fanling, N.T., Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

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#### 4.7 Test Facility

Measurement facility located at Fanling (Hong Kong), placed on file with the FCC Pursuant to Section 2.948 of the FCC Rules (FCC Registration No. : 97774).

The test facility is recognized, certified, or accredited by the following organizations:

FCC – CAB Registration No.: 446297

Measurement facility located at Fanling (Hong Kong), accredited as a Conformity Assessment Body (CAB) and was designated by FCC to perform compliance testing on equipment subject to Declaration Of Conformity (DOC) and Certification under Part 15 and 18 of the Commission's Rules.

#### 4.8 Deviation from Standards

None.

#### 4.9 Abnormalities from Standard Conditions

None.

#### 4.10 Declaration of Family Grouping

None.

#### 4.11 Abbreviations

N/A: Not Applicable

EUT: Equipment Under Test

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## 5 Equipments Used during Test

Radiated Emission				
Equipment	Manufacturer	Model / Serial No.	Cal. Date	Cal. Due Date
3m Semi-Anechoic Chamber (pre-test)	--	--	--	--
3m / 10m Open Aera Test Site	--	--	2012-02-24	2015-02-23
Test Receiver	Rohde & Schwarz	ESCS 30 / 100388	2012-11-19	2013-11-18
Spectrum Analyzer	Rohde & Schwarz	FSP 30 / 101474	2012-08-16	2014-08-07
Loop antenna	Rohde & Schwarz	HFH2-Z2	2012-10-11	2014-10-10
Antenna 30-1000MHz	Schaffner	CBL6111C / 2791	2012-10-11	2014-10-10
Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D / 9120D-1070	2012-11-13	2014-11-12
Horn Antenna 15-26.5GHz	Schwarzbeck	BBHA9170 / 9170-492	2012-11-12	2014-11-11
Preamplifier 10MHz – 6GHz	Schwarzbeck	BBV9743 / 9743-052	2012-11-13	2014-11-12
Preamplifier 1-18GHz	Schwarzbeck	BBV9718 / 9718-223	2012-11-13	2014-11-12
Preamplifier 18- 26.5GHz	Schwarzbeck	BBV9719 / 9719-019	2012-11-13	2014-11-12
Coaxial Cable	--	E167	2013-06-28	2014-06-27
RF Cable	HUBER+SUHNER	E207	2012-11-14	2013-11-13
Antenna Mast System	Schwarzbeck	AM9104 / -	--	--
Turntable with Controller	Drehtisch	DT312 / -	--	--

General Use Equipment				
Equipment	Manufacturer	Model / Serial No.	Cal. Date	Cal. Due Date
Digital Multimeter	Fluke	189 / 83640020	2013-04-10	2014-04-09
Temperature / Humidity meter	-	E159	2013/11/05	2014-11-04

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## 6 Test Results

### 6.1 Conducted Emissions Mains Terminals, 150kHz to 30MHz

Test Requirement: FCC Part15 C Section 15.207

Test Method: ANSI C63.4:2003

Test Date: Not Applicable

**Remark:**

The product is battery operated and this test is not applicable.

### 6.2 Radiated Emissions, 9kHz to1GHz

Test Requirement: FCC Part15 Subpart C Section 15.209 and 15.249(d)

Test Method: ANSI C63.4:2003

Test Date: 2013-10-18

Measurement Distance: 3m

Detector: For PK value:

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

For AV value:

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW = 10 Hz

Sweep = auto

Detector function = peak

Trace = max hold

Limit :

Frequency range MHz	Quasi-peak limits dB ( $\mu$ V/m)
0.009 – 0.490	-72.4 – 20logF(MHz)
0.490 – 1.705	-12.4 – 20logF(MHz)
1.705 – 30.0	-10.5
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960	54

Note: 1) At transitional frequencies the lower limit applies.  
2) F is the frequency of the spurious emission measured in MHz.  
3) Limit from 0.009 – 30 MHz is converted from measuring distance 300m or 30m to 3m with the formula provided in FCC Part 15, section 15.31(f)(2)  
4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

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### 6.2.1 EUT Operation

Operating Environment:

Temperature: 21 °C      Humidity: 55%

EUT Operation: Pre-test with Peak detector with the following mode(s):

- 1: Transmission with GFSK
- 2: Transmission with  $\Pi/4$ -DQPSK;
- 3: Transmission with 8DPSK;

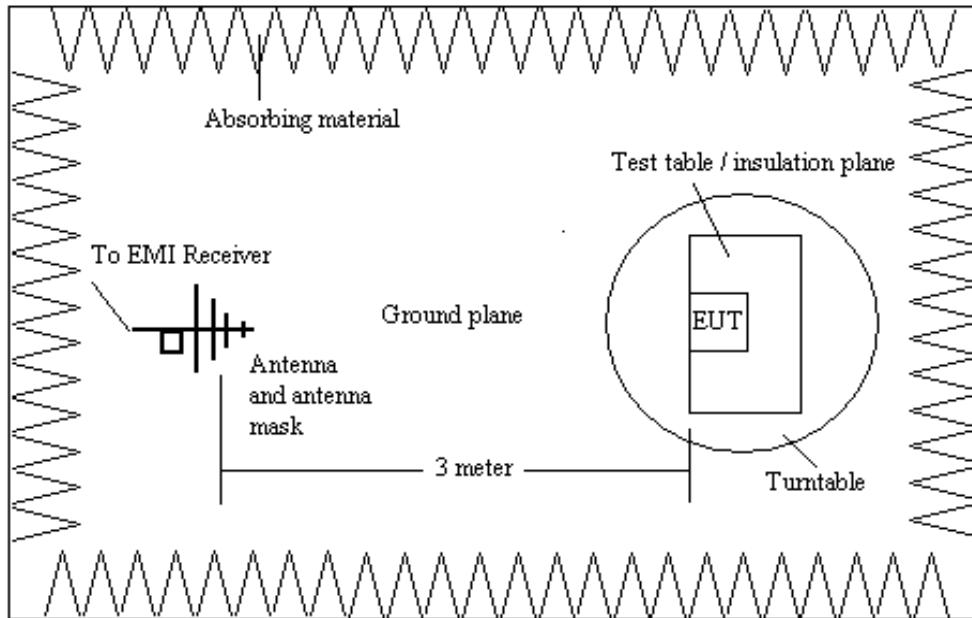
Final test with Quasi-Peak and Average detector with the following mode(s):

- 1: Transmission with GFSK and in continuous transmission with 100% duty cycle mode

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### 6.2.2 Test Setup and Procedure



1. The pre-test of the radiated emissions test was conducted in a semi-anechoic chamber and the final measurement was conducted in the open area test site.
2. The EUT was operated with new batteries. The EUT was placed upon a non-metallic table 0.8m above the ground reference plane.
3. Loop antennat and Bilog antenna was used for the frequency range from the lowest generated frequency to 30MHz and 30MHz to 1GHz respectively
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT with located frequencies.
5. The actual frequencies of maximum emission were confirmed in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters for Bilog antenna (Loop antenna is still maintain in 1m hight) in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

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### 6.2.3 Measurement Data

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. The EUT was measured by Bilog antenna with 2 orthogonal polarities and frequencies of peak emissions from the EUT were detected within 6dB of the limit line. Final measurement was conducted in the open area test site with data as follows:

#### Test results on operation with control for transmission mode:

##### (1) Operation Frequency : 2402.0 MHz

Frequency (MHz)	Antenna Polarization	Correction Factor (dB/m)	Receiver QP Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)
31.500	V	18.8	3.7	22.5	40.0	-17.5
76.750	V	9.1	4.7	13.8	40.0	-26.2
139.000	H	11.8	4.6	16.4	43.5	-27.1
277.875	H	13.6	4.8	18.4	46.0	-27.6
427.438	V	17.6	9.2	26.8	46.0	-19.2
499.800	V	18.2	17.9	36.1	46.0	-9.9

##### (2) Operation Frequency : 2441.0 MHz

Frequency (MHz)	Antenna Polarization	Correction Factor (dB/m)	Receiver QP Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)
30.500	H	19.2	3.8	23.0	40.0	-17.0
87.125	V	9.4	6.3	15.7	40.0	-24.3
137.438	V	11.7	4.4	16.1	43.5	-27.4
270.438	V	13.3	4.8	18.1	46.0	-27.9
430.875	H	17.7	4.6	22.3	46.0	-23.7
499.188	V	18.2	17.2	35.4	46.0	-10.6

**(3) Operation Frequency : 2480.0 MHz**

Frequency (MHz)	Antenna Polarization	Correction Factor (dB/m)	Receiver QP Reading (dB $\mu$ V)	Emission Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Over Limit (dB)
30.625	V	19.1	4.1	23.2	40.0	-16.8
84.563	V	9.3	8.4	17.7	40.0	-22.3
373.438	H	15.4	9.9	25.3	46.0	-20.7
425.500	V	17.6	9.2	26.8	46.0	-19.2
493.125	V	18.1	15.2	33.3	46.0	-12.7
651.000	H	20.2	4.3	24.5	46.0	-21.5

**Note:**

- 1) All readings are Quasi-Peak values.
- 2) Correction Factor = Antenna Factor + Cable Loss.
- 3) The above results were the worst case results with the EUT positioned in all 3 axis during the test. The EUT was positioned vertically and horizontally on the table for vertical and horizontal measurement respectively.
- 4) Other emissions more than 20dB below the limit are not shown on the above table and only worst six emissions below 1GHz are listed.
- 5) There is not any other emission which falls in restricted bands which set out in Section 15.205 Restricted bands can be detected and reported.

### 6.3 Radiated Emissions above 1 GHz

Test Requirement: FCC Part15 Subpart C Section 15.209 & 15.249(a) & (d)  
Test Method: ANSI C63.4:2003  
Test Date: 2013-10-18  
Frequency Range: 1GHz – 26GHz  
Measurement Distance: 3m  
Detector:  
For PK value:  
RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz  
VBW  $\geq$  RBW  
Sweep = auto  
Detector function = peak  
Trace = max hold  
For AV value:  
RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz  
VBW = 10 Hz  
Sweep = auto  
Detector function = peak  
Trace = max hold

Limit :

Fundamental Frequency :

Frequency range MHz	Limits (Peak) dB ( $\mu$ V/m)	Limits (Average) dB ( $\mu$ V/m)
2400 to 2483.5	114	94

Spurious Emission :

Frequency range MHz	Limits (Peak) dB ( $\mu$ V/m)	Limits (Average) dB ( $\mu$ V/m)
Over 1000	74	54

#### 6.3.1 EUT Operation

Operating Environment:

Temperature: 21 °C      Humidity: 55 %

EUT Operation: Pre-test with Peak detector with the following mode(s):  
1: Transmission with GFSK  
2: Transmimssion with II/4-DQPSK;  
3: Transmission with 8DPSK;

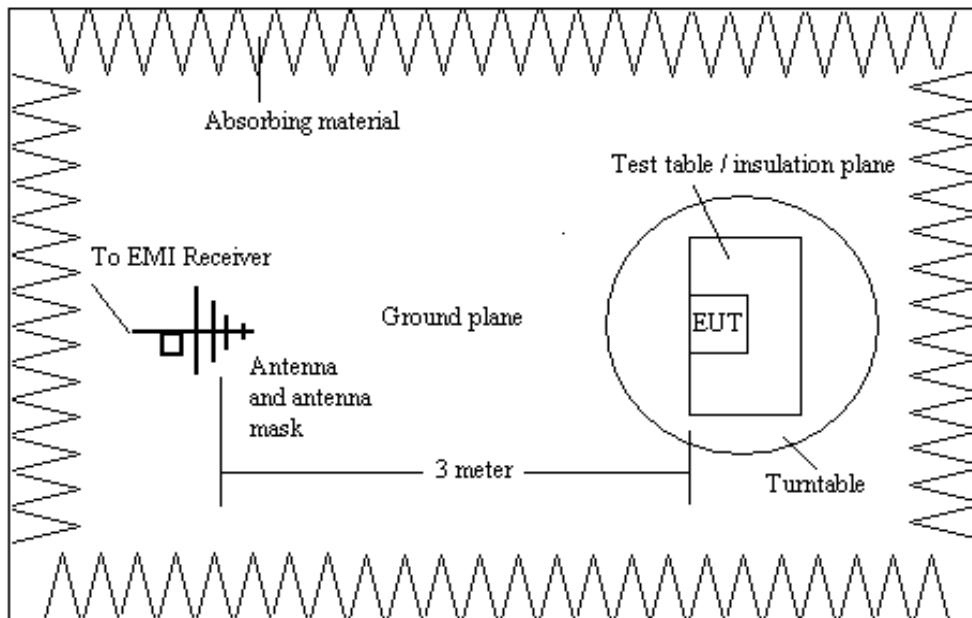
Final test with Quasi-Peak detector with the following mode(s):

1: Transmission with GFSK and in continuous transmission with 100% duty cycle mode

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### 6.3.2 Test Setup and Procedure



1. The pre-test of the radiated emissions test was conducted in a semi-anechoic chamber and the final measurement was conducted in the open area test site.
2. The EUT was operated with new batteries. The EUT was placed upon a non-metallic table 0.8m above the ground reference plane.
3. Horn antenna was used for the frequency over 1GHz
4. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT with located frequencies.
5. The actual frequencies of maximum emission were confirmed in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.

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### 6.3.3 Measurement Data

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. The EUT was measured with 2 orthogonal polarities and frequencies of average emissions from the EUT were measured as follows:

#### Test results on operation with control for transmission mode:

##### (1) Fundamental Frequency

Frequency (MHz)	Antenna Polarization	Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Remark
		Peak	Average	Peak	Average	
2402.0	H	90.61	89.80	114	94	Pass
2402.0	V	92.21	91.50	114	94	Pass
2441.0	H	90.37	89.53	114	94	Pass
2441.0	V	90.11	89.35	114	94	Pass
2480.0	H	86.81	85.39	114	94	Pass
2480.0	V	85.20	83.86	114	94	Pass

##### (2) Spurious Emission

###### Operation Frequency : 2402.0 MHz

Frequency (MHz)	Antenna Polarization	Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Remark
		Peak	Average	Peak	Average	
4804.0	H	49.4	41.5	74	54	Pass
7206.0	H	46.0	33.8	74	54	Pass
9608.0	H	44.8	29.9	74	54	Pass
12010.0	H	46.5	32.7	74	54	Pass
14442.0	H	56.2	43.0	74	54	Pass
16814.0	H	55.0	42.0	74	54	Pass

**Operation Frequency : 2441.0 MHz**

Frequency (MHz)	Antenna Polarization	Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Remark
		Peak	Average	Peak	Average	
4882.0	H	48.7	40.0	74	54	Pass
7323.0	H	46.5	34.0	74	54	Pass
9764.0	H	48.6	30.0	74	54	Pass
12205.0	H	50.6	36.0	74	54	Pass
14648.0	H	59.8	46.0	74	54	Pass
17082.0	H	59.0	46.0	74	54	Pass

**Operation Frequency : 2480.0 MHz**

Frequency (MHz)	Antenna Polarization	Emission Level (dB $\mu$ V/m)		Limit (dB $\mu$ V/m)		Remark
		Peak	Average	Peak	Average	
4960.0	H	49.0	40.0	74	54	Pass
7440.0	H	45.0	33.0	74	54	Pass
9920.0	H	48.0	31.0	74	54	Pass
12400.0	H	50.0	36.0	74	54	Pass
14880.0	H	59.0	45.0	74	54	Pass
17360.0	H	59.0	46.0	74	54	Pass

**Note:**

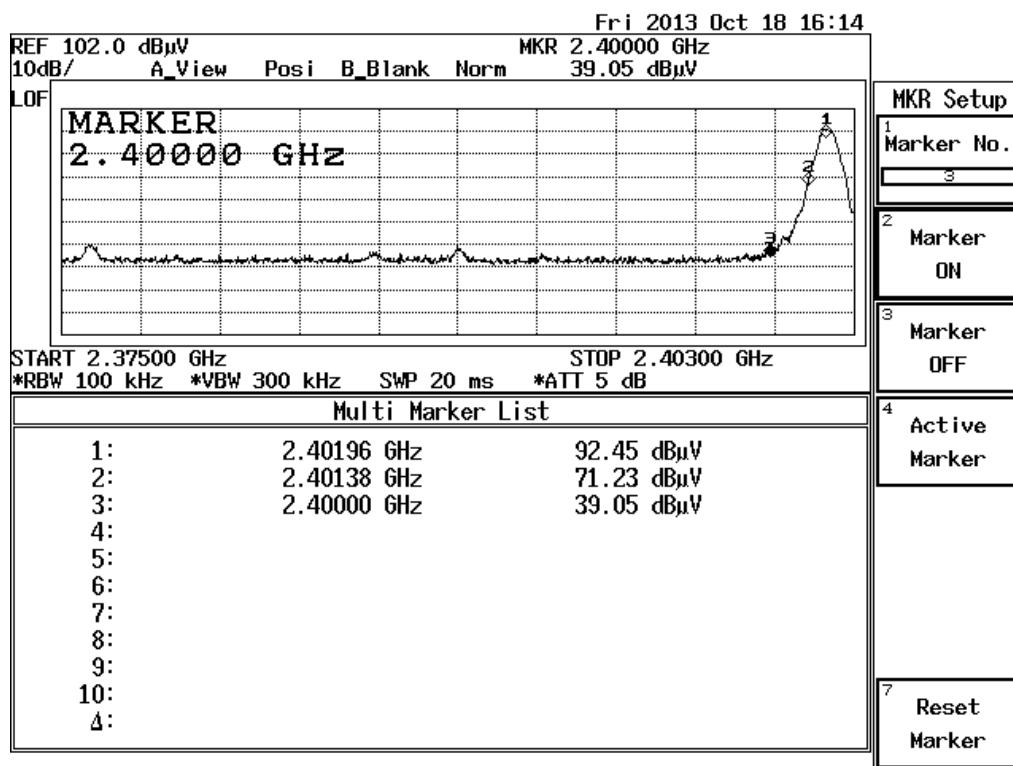
- 1) The above results were the worst case results with the EUT positioned in all 3 axis during the test. The EUT was positioned vertically and horizontally on the table for vertical and horizontal measurement respectively.
- 2) Other emissions more than 20dB below the limit are not shown on the above table and only worst six emissions below 1GHz are listed.
- 3) There is not any other emission which falls in restricted bands which set out in Section 15.205 Restricted bands can be detected and reported.

#### 6.4 Band Edge / 20 dB Bandwidth

Test Requirement: FCC Part15 Subpart C Section 15.215, 15.249(d)  
 Test Method: ANSI C63.4:2003 and Marker-Delta Method  
 Test Date: 2013-10-18  
 EUT Operation: 1: Transmission with GFSK  
                   2: Transmission with Π/4-DQPSK;  
                   3: Transmission with 8DPSK;  
 Result: Pass

#### Test Plot : (Worst case: Transmission with 8DPSK)

Operation frequency : 2402.0 MHz



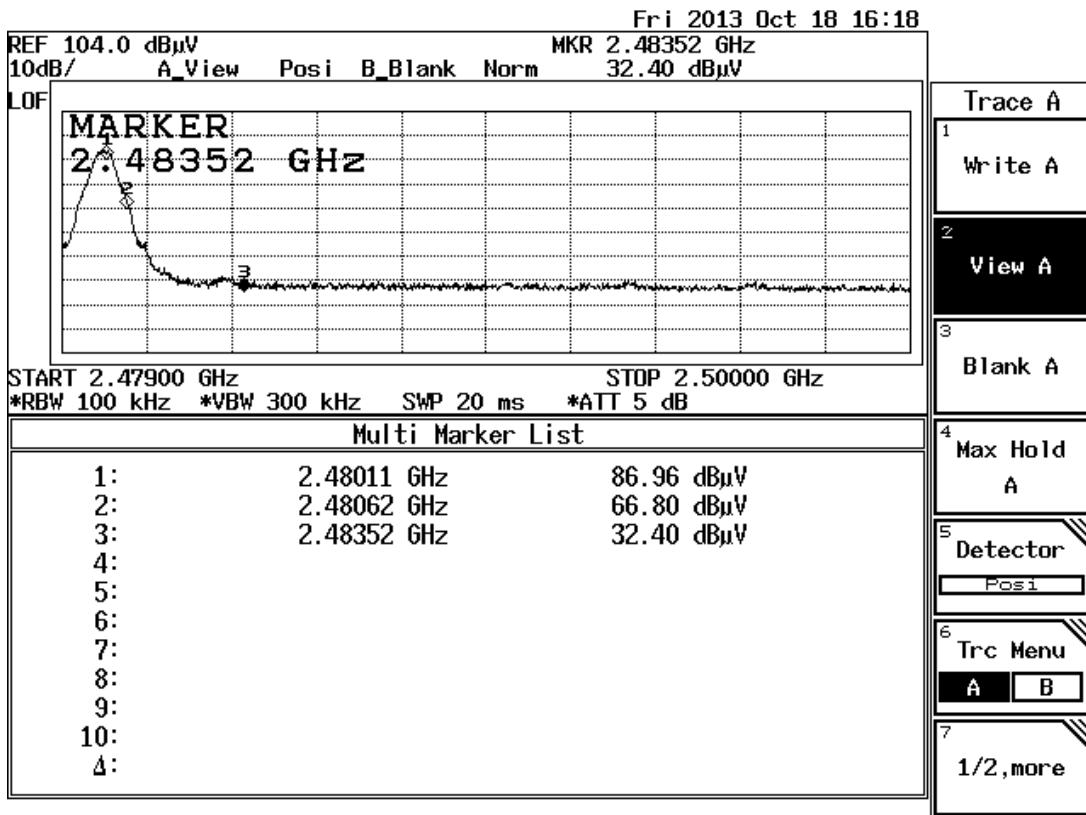
According to the page 13 of this report, the emission of the fundamental frequency 2402.0MHz is 92.21dB $\mu$ V/m and 91.5dB $\mu$ V/m for peak and average level respectively. Based on the delta method, the emission at the bandedge, 2400MHz, is more than 40dB below the fundamental and 20dB bandwidth falls in assigned band. It is deemed to comply with section 15.215. Besides, it is below the limit of 74dB $\mu$ V/m and 54dB $\mu$ V/m for peak and average level under 15.209. It is deemed to comply with section 15.249(d).

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**Test Plot :**

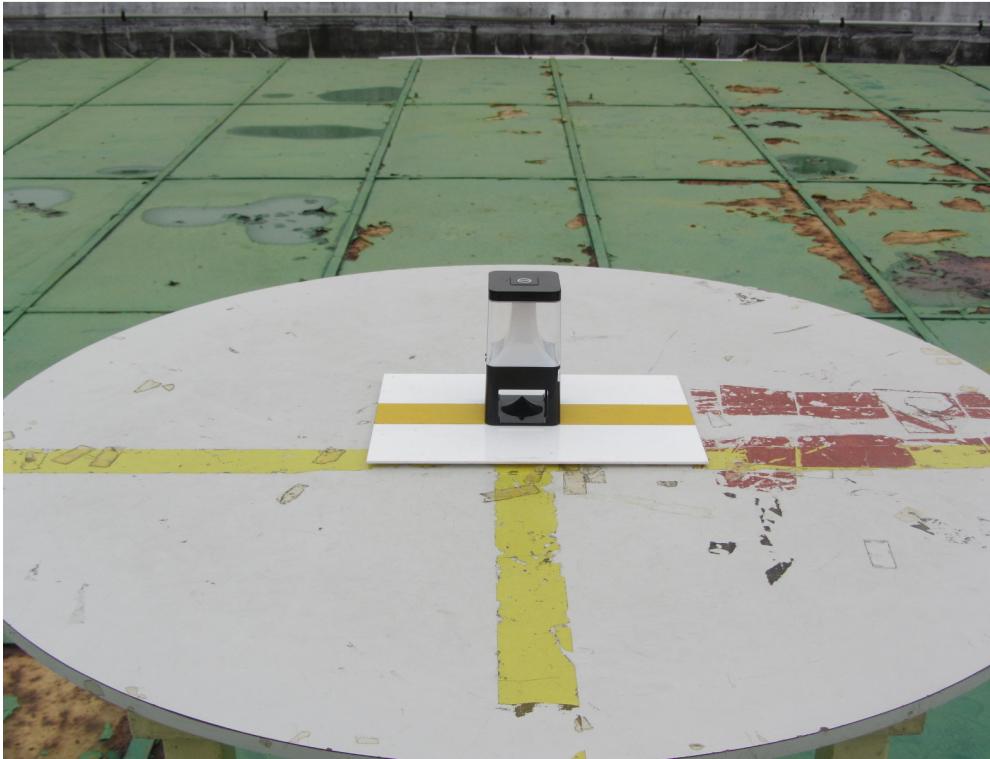
Operation frequency : 2480.0 MHz



According to the page 13 of this report, the emission of the fundamental frequency 2480.00MHz is 86.81dB $\mu$ V/m and 85.39dB $\mu$ V/m for peak and average level respectively. Based on the delta method, the emission at the bandedge, 2483.5MHz, is more than 40dB below the fundamental and 20dB bandwidth falls in the assigned band. It is deemed to comply with section 15.215. Besides, it is below the limit of 74dB $\mu$ V/m and 54dB $\mu$ V/m for peak and average level under 15.209. It is deemed to comply with section 15.249(d).

## 7 Photographs

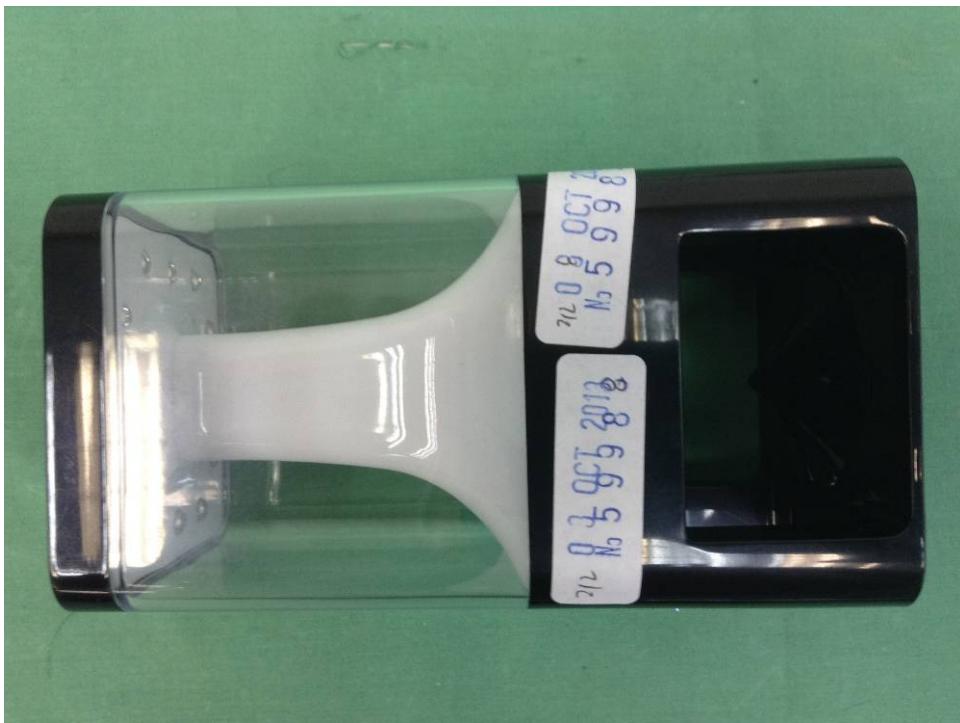
### 7.1 Radiatd Emission Test Setup



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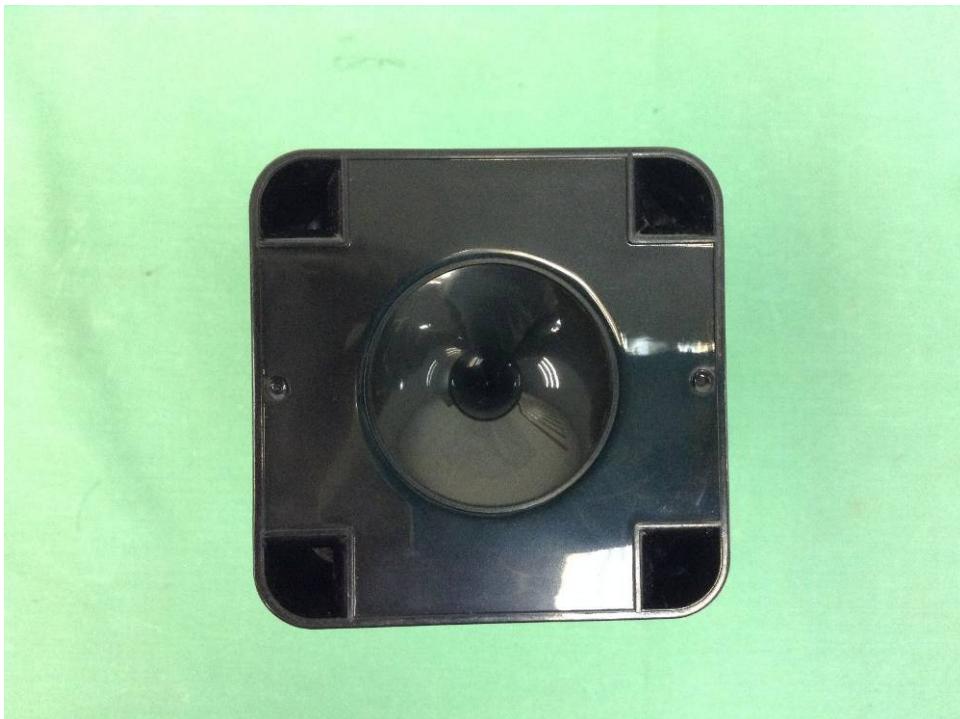
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## 7.2 EUT Constructional Details



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**--End of Report--**

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