TEST REPORT

Applicant Name & Address	:	MAXWISE Production Enterprise Ltd. Room 1501, 15/F., AT Tower, 180 Electric Road, North Point, Hong Kong
Manufacturing Site	:	Maxwise Production Enterprise Limited. No.1 Henghai Road, Henghai Garden, South District, Zhongshan, Guangdong, China
Sample Description		
Product	:	Wii Remote Controller
FCC ID	:	Q2V-WIIRMCM001
Model No.	:	DIGWIIRCB, DGWRBD, WIIRM, WIIMT
Electrical Rating	:	DC 3V (2×AA Battery)
Frequency	:	2.4GHz Transceiver
Date Received	:	08 November 2009
Date Test Conducted	:	08 November 2009 – 25 January 2010
Test standards	:	**FCC Part 15: 2008**
Test Result	:	Pass
Conclusion	:	The submitted samples complied with the above rules/standards.
Remark	:	None.

**********End of Page**********

Prepared and Checked By:

Ryan Liang
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Intertek Guangzhou

Approved By:

Signature
Carrie Chen
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Intertek Guangzhou
28 January 2010 Date

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Tel / Fax: 86-20-8213 9688/86-20-3205 7538

CONTENT

1. General Description

1.1 Product Description

The Equipment Under Test (EUT) is a Bluetooth Wii Remote Controller model: DIGWIIRCB, DGWRBD, WIIRM, WIIMT. It is powered by an internal 3.0V 2×AA Battery. The main function of EUT is working as a controller when playing a game with SONY WII host.

Antenna Type: PCB antenna

Model(s) DGWRBD, WIIRM, and WIIMT are the same as model DIGWIIRCB in hardware aspect. The difference in model number serves as marketing strategy.

For electronic filing, the brief circuit description is saved with filename: Description.pdf.

1.2 Related Submittal (s) / Grants

This is an application for certification of a transceiver.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003). Radiated emission measurement was performed in semi-anechoic chamber room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

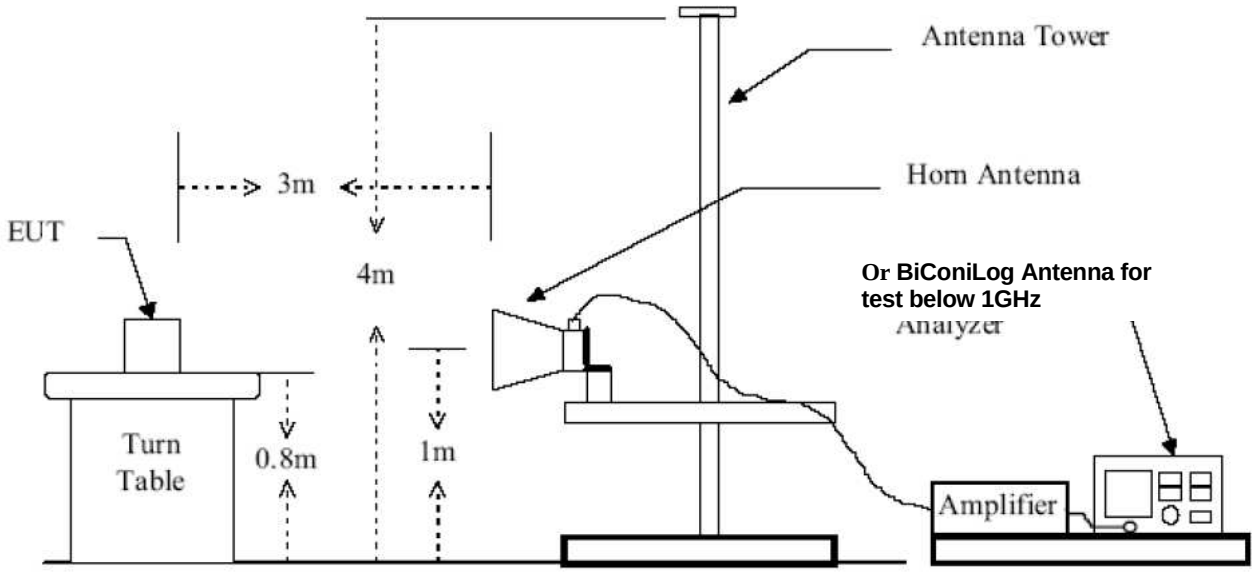
1.4 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data is **Interterk Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, Block D, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC.

Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	25-Nov-09	25-May-11
SZ185-01	EMI Receiver	R&S	ESCI	100547	18-May-09	18-May-10
SZ061-08	Horn Antenna	ETS	3115	00092346	17-Jul-08	17-Jan-10
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	19-Mar-09	19-Mar-10
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	18-Mar-09	18-Mar-10
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	31-Oct-09	31-Oct-10
SZ062-02	RF Cable	RADIALL	RG 213U	--	26-Oct-09	26-Apr-10
SZ062-06	RF Cable	RADIALL	0.04-26.5GHz	--	17-Aug-09	17-Aug-10

Test setup figure



Test setup figure

1.5 Measurement Uncertainty

Uncertainty: 4.8 dB in the frequency range of 30MHz-26.5GHz at a level of confidence of 95%.
When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2. System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2003).

The EUT was powered with 2 × AA Battery (new) in the testing.

All packets DH1, DH3 & DH5 mode in all modulation type GFSK, π/4 –DQPSK and 8-DPSK were tested, and only the worst data was reported in this report.

For maximizing emissions, the unit was placed in the center of the turntable, and the turntable was rotated through 360°, the antenna hei ght was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Chapter 3

2.2 EUT Exercising Software

The EUT exercise program (ActivePerl-5.8.4.810-MSWin32-x86, BlueTool_v0.9.1.0 and FT232 vcp 2151 provided by client) used during radiated testing was designed to exercise the various system components in a manner similar to a typical use.

Before test, the channel and power controlling software provided by the applicant was used to configure the operating channel as well as the output power level.

2.3 Special Accessories

No special accessories used.

2.4 Equipment Modification

The EUT has been modified to pass the above standard FCC Part15. The details please refer to Modification Report.

2.5 Support Equipment List and Description

This product was tested in a standalone configuration.
There are no special accessories necessary for compliance of the product.

3. Summary of Test Results

FCC Rules	Description of Test	Result
15.203	Antenna Requirement	Pass
15.207	Disturbance Voltage at the Mains Terminals	N/A
15.109 & 15.249	Radiated Emission	Pass
15.249	Band Edges Measurement	Pass

Remark: 1. The symbol “N/A” in above table means Not Applicable.
2. When determining the test results, measurement uncertainty of tests has been considered.

3.1 Antenna Requirement

The EUT Antenna Type: PCB antenna

3.2 Conducted Emission

The EUT is battery operating device, the conducted emission is unnecessary.

3.3 Radiated Emission

Data is included worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.3.1 Radiated Emission Limits

According to FCC 15.109, except for Class A digital device, the field strength of radiated emission from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Class B Radiated Emission Limits:

Frequency (MHz)	Field Strength (dBμV/m)
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

According to FCC 15.249, operating within the bands 2400-2483.5 MHz, the field strength of emissions from intentional radiators operated within this frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
2400 - 2483.5	50	500

3.3.2 Test Setup

Reference 1.4

3.3.3 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB

AV = -10 dB

FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 dBµV/m

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

3.3.4 Radiated Emission Test Data

Date of test: 22 January, 2010
Worst case operating mode: EUT on Transmitting

Table 1

Radiated Emissions
Pursuant to FCC 15.109: Emissions Requirement

Polarization	Frequency (MHz)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin
H	168.000	35.9	43.5	-7.6
H	216.000	37.9	43.5	-5.6
H	263.000	38.6	46.0	-7.4
H	288.005	39.4	46.0	-6.6
H	312.005	39.6	46.0	-6.4
H	324.005	38.5	46.0	-7.5
H	360.002	40.4	46.0	-5.6
H	408.002	40.2	46.0	-5.8
H	432.000	39.4	46.0	-6.6
H	551.990	43.0	46.0	-3.0
H	600.000	43.2	46.0	-2.8
H	647.995	44.2	46.0	-1.8
H	672.100	44.5	46.0	-1.5
H	695.990	43.6	46.0	-2.4
H	720.100	42.1	46.0	-3.9
H	743.990	42.6	46.0	-3.4
H	768.005	43.0	46.0	-3.0
H	815.990	42.4	46.0	-3.6

Date of test: 22 January, 2010
Worst case operating mode: EUT on Transmitting

Table 2-1

Radiated Emissions
Pursuant to FCC 15.249: Emissions Requirement

(2402MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2402.000	98.2	36.7	28.5	90.0	114.0	-24.0
Vertical	2402.008	90.6	36.7	28.5	82.4	114.0	-31.6
Horizontal	4804.028	51.0	36.1	33.1	48.0	74.0	-26.0
Horizontal	7206.036	55.6	36.2	37.8	57.2	74.0	-16.8
Vertical	9608.036	46.5	36.3	38.6	48.8	74.0	-25.2
Vertical	12010.041	51.6	35.6	39.5	55.5	74.0	-18.5

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2402.000	98.2	36.7	28.5	30.1	59.9	94.0	-34.1
Vertical	2402.008	90.6	36.7	28.5	30.1	52.3	94.0	-41.7
Horizontal	4804.028	51.0	36.1	33.1	30.1	17.9	54.0	-36.1
Horizontal	7206.036	55.6	36.2	37.8	30.1	27.1	54.0	-26.9
Vertical	9608.036	46.5	36.3	38.6	30.1	18.7	54.0	-35.3
Vertical	12010.041	51.6	35.6	39.5	30.1	25.4	54.0	-28.6

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

Date of test: 22 January, 2010
Worst case operating mode: EUT on Transmitting

Table 2-2

Radiated Emissions
Pursuant to FCC 15.249: Emissions Requirement

(2441MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2441.012	97.2	36.7	28.5	89.0	114.0	-25.0
Vertical	2441.013	91.8	36.7	28.5	83.6	114.0	-30.4
Horizontal	4882.015	54.5	36.1	33.3	51.7	74.0	-22.3
Horizontal	7332.037	50.0	36.3	37.9	51.6	74.0	-22.4
Vertical	9746.052	44.9	36.3	38.7	47.3	74.0	-26.7
Vertical	12205.066	48.3	35.6	39.5	52.2	74.0	-21.8

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2441.012	97.2	36.7	28.5	30.1	58.9	94.0	-35.1
Vertical	2441.013	91.8	36.7	28.5	30.1	53.5	94.0	-40.5
Horizontal	4882.015	54.5	36.1	33.1	30.1	21.4	54.0	-32.6
Horizontal	7332.037	50.0	36.3	37.8	30.1	21.4	54.0	-32.6
Vertical	9746.052	44.9	36.3	38.6	30.1	17.1	54.0	-36.9
Vertical	12205.066	48.3	35.6	39.5	30.1	22.1	54.0	-31.9

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

Date of test: 22 January, 2010
Worst case operating mode: EUT on Transmitting

Table 2-3

Radiated Emissions
Pursuant to FCC 15.249: Emissions Requirement

(2480MHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2480.015	96.5	36.7	28.5	88.3	114.0	-25.7
Vertical	2480.011	92.9	36.7	28.5	84.7	114.0	-29.3
Horizontal	4960.028	55.2	36.1	33.1	52.2	74.0	-21.8
Horizontal	7440.034	56.9	36.3	37.9	58.5	74.0	-15.5
Horizontal	9920.060	45.7	36.3	38.7	48.1	74.0	-25.9
Vertical	12400.056	49.5	35.6	39.5	53.4	74.0	-20.6

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	2480.015	96.5	36.7	28.5	30.1	58.2	94.0	-35.8
Vertical	2480.011	92.9	36.7	28.5	30.1	54.6	94.0	-39.4
Horizontal	4960.028	55.2	36.1	33.1	30.1	22.1	54.0	-31.9
Horizontal	7440.034	56.9	36.3	37.9	30.1	28.4	54.0	-25.6
Horizontal	9920.060	45.7	36.3	38.6	30.1	17.9	54.0	-36.1
Vertical	12400.056	49.5	35.6	39.5	30.1	23.3	54.0	-30.7

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

3.3.5 Test Result

The data on the above test result table lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

According 15.209, the worst case radiated emission at 672.1 MHz

Judgement: Passed by 1.5 dB

According 15.249, the worst case radiated emission at 7440.034 MHz
Judgement: Passed by 15.5 dB

3.4 Band Edges Measurement

3.4.1 Limited of the band edges measurement

Sec15.249:
(d) 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 Section 15.209, whichever is the lesser attenuation.

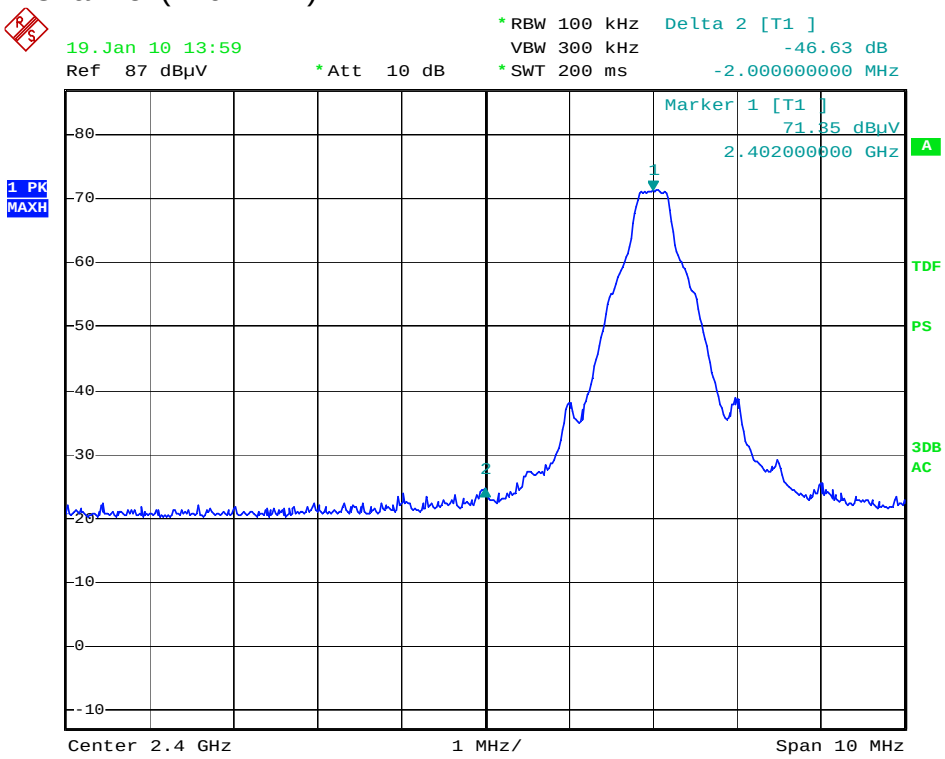
(e) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

3.4.2 Test Setup

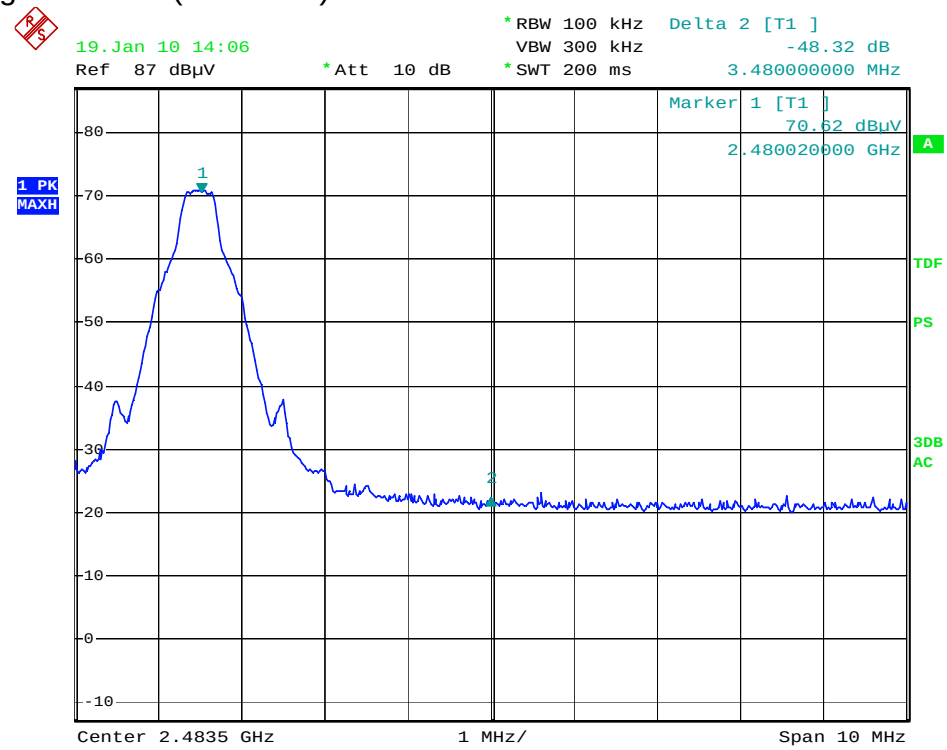
Reference 1.4

3.4.3 Test Plot

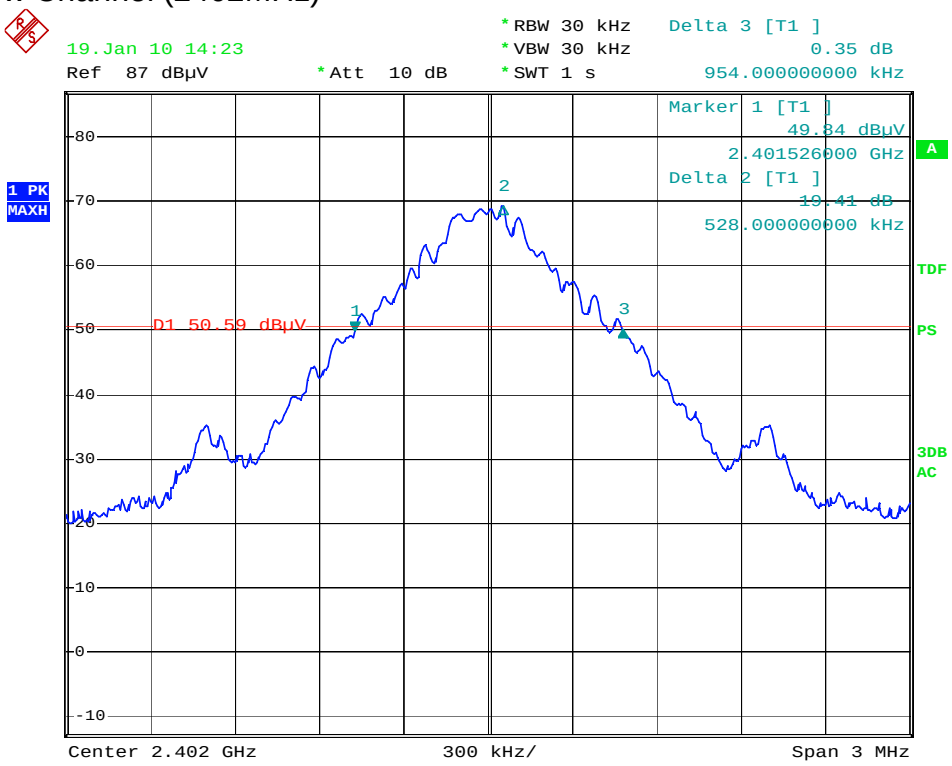
Frequency Bands
Operating mode: Transmitting
Low Channel (2402MHz)



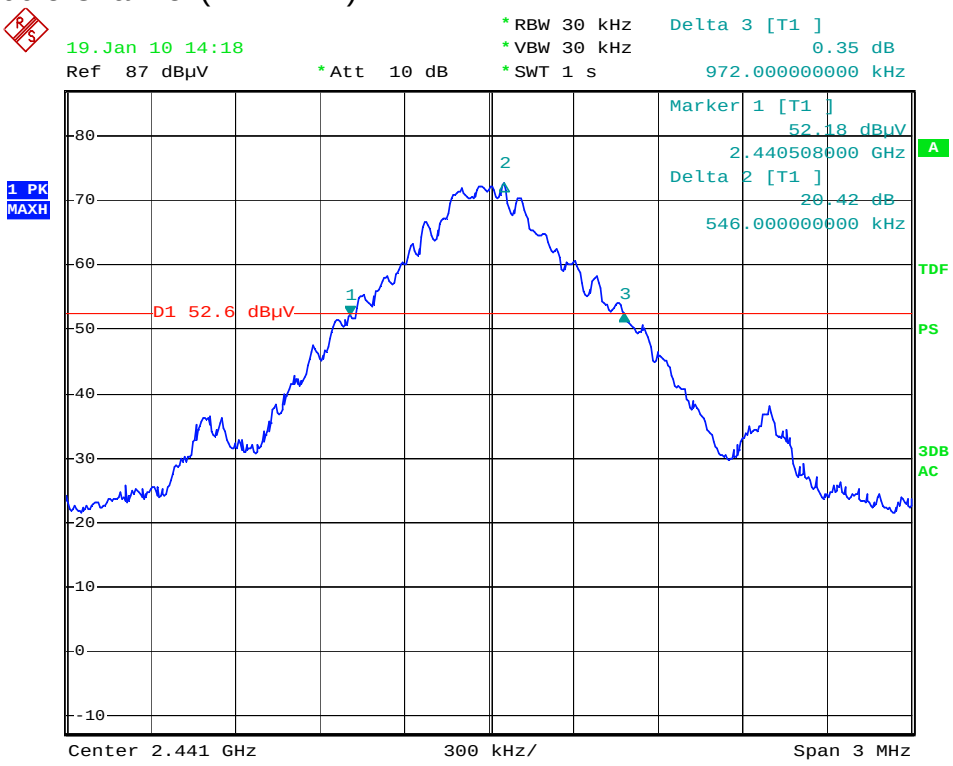
High Channel (2480MHz)



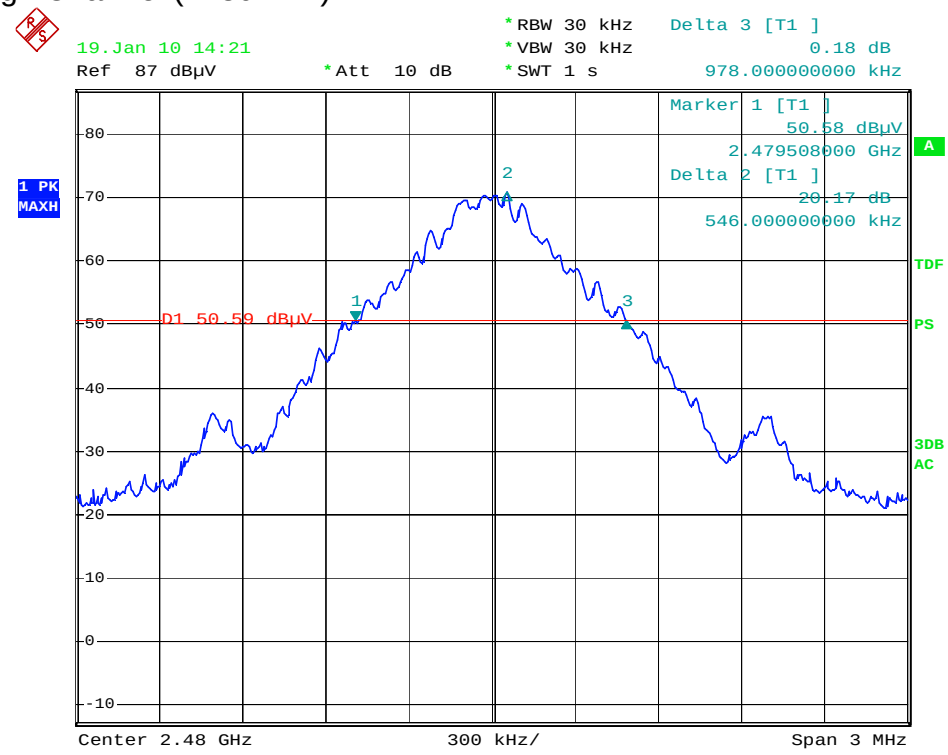
Modulation Bandwidth
Operating mode: Transmitting
Low Channel (2402MHz)



Middle Channel (2441MHz)



High Channel (2480MHz)



3.4.4 Test Result

From the plot, the field strength of any emissions outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfil the requirement of 15.249(d).

Peak Measurement

Bandedge compliance is determined by applying marker-delta method, i.e (Bandedge Plot).

(i) Lower channel 2402MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

= 90.0dBμv/m – 46.6dB
= 43.4dBμv/m

Average Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

= 59.9dBμv/m – 46.6dB
= 13.3dBμv/m

(ii) Upper channel 2480MHz:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

= 88.3dBμv/m – 48.3dB
= 40.0dBμv/m

Average Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

= 58.2dBμv/m – 48.3dB
= 9.9dBμv/m

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dBμv/m (Peak Limit) and 54dBμv/m (Average Limit).

3.4.5 Transmitter Duty Cycle Calculation FCC Rule 15.35(b, c)

Based on the Bluetooth Specification Version 2.0+ EDR, transmitter ON time is independent of packet type (DH1, DH3 and DH5) and packet length (single-slot and multi-slot). The maximum transmitter ON time for the Bluetooth is 625μs.

Each TX and RX time slot is 625μs in length. A TDD scheme is used where master and slave alternately transmit. For one period for a pseudo-random hopping through all 79 RF channels, for DH5:

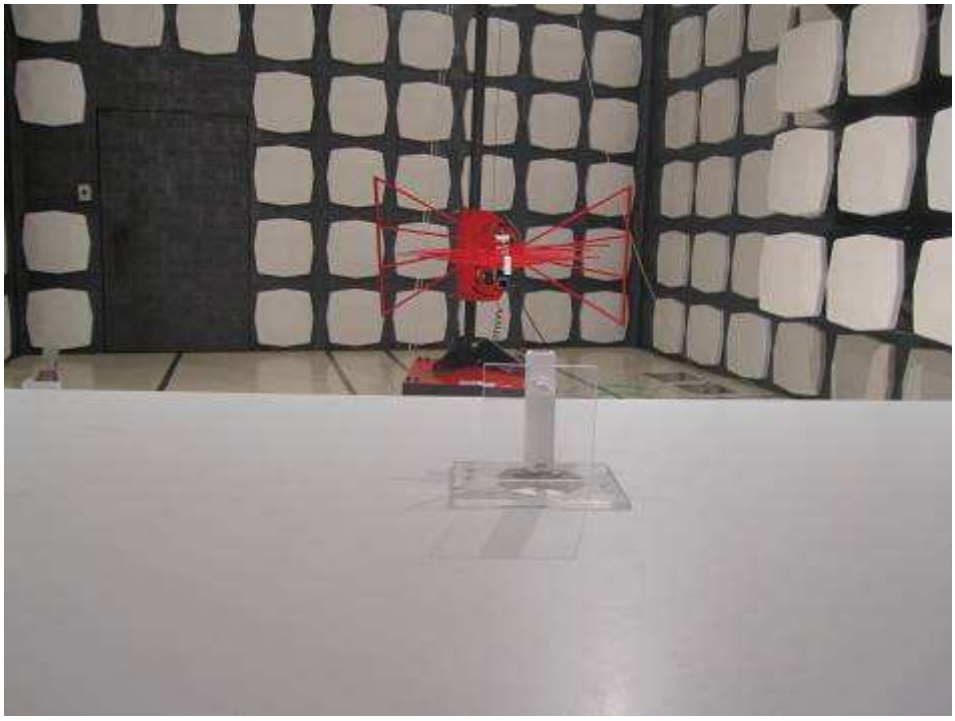
Time of 1 hopset (5 TX slots + 1 RX slot) = 0.625 ms x 6 = 3.75 ms

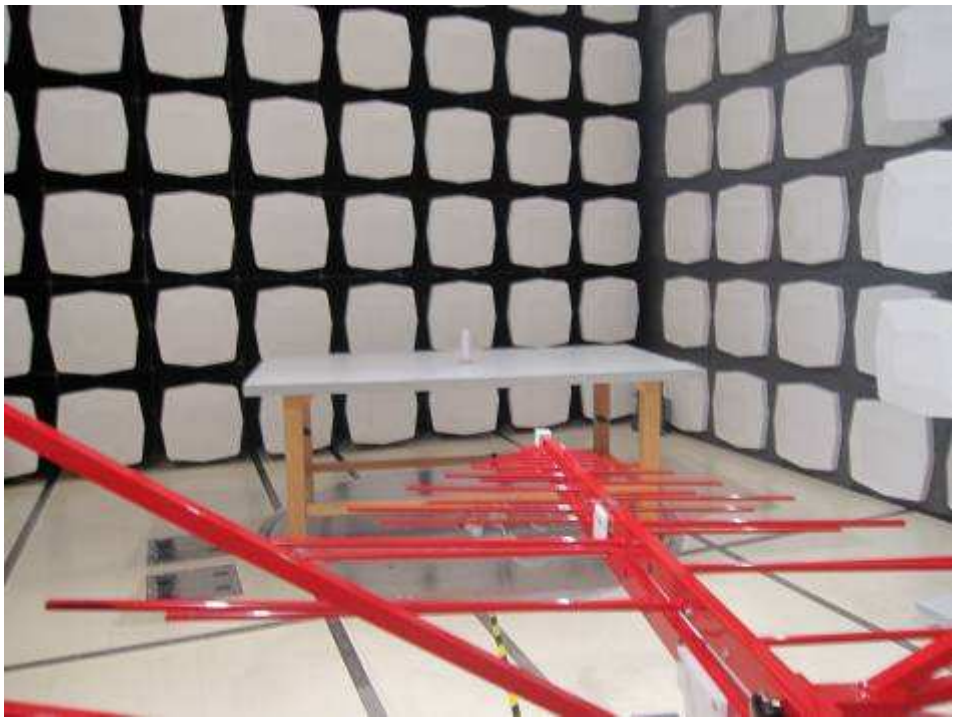
Time of 1 cycle =3.75 ms x 79 = 296.25 ms

Average factor = 20 log (3.125 / 100) = -30.1 dB

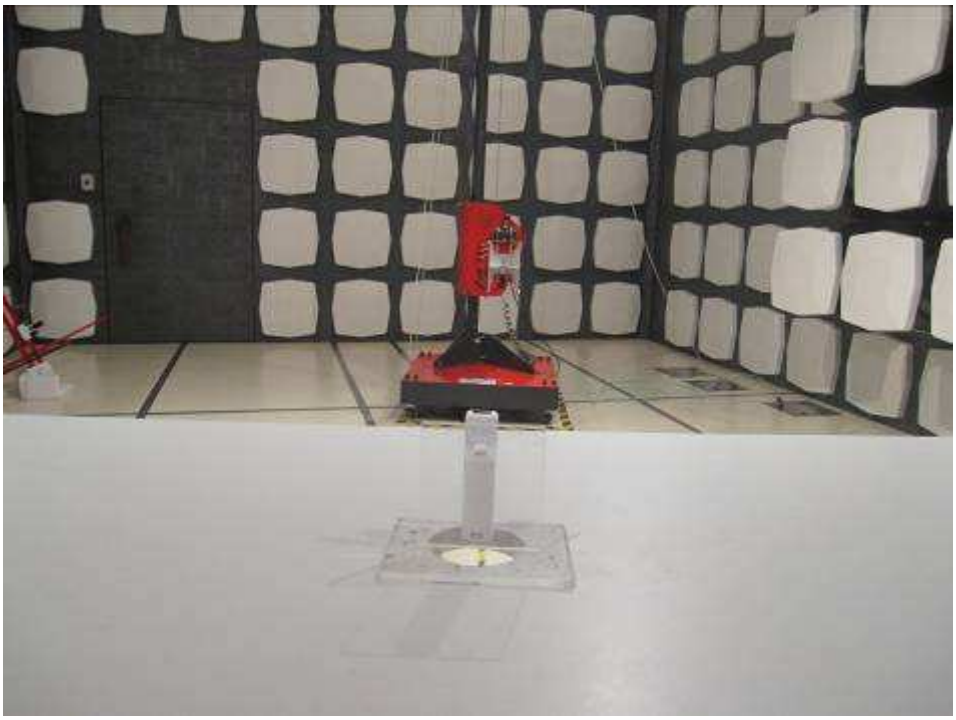
4. Appendix I – Photos of Test Setup

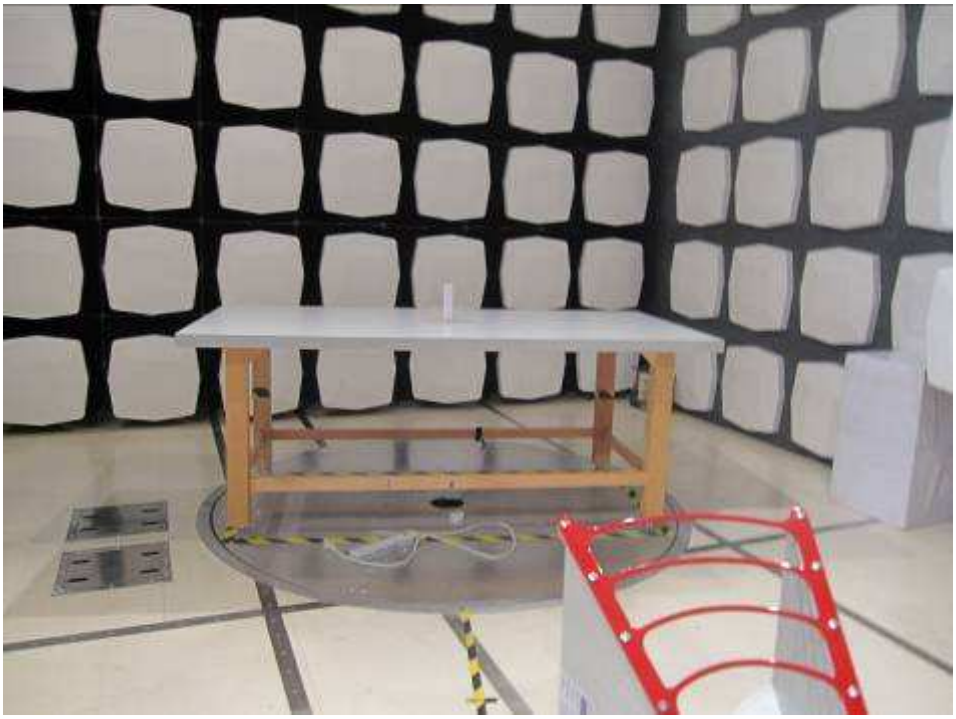
Radiated Emission





Radiated Emission



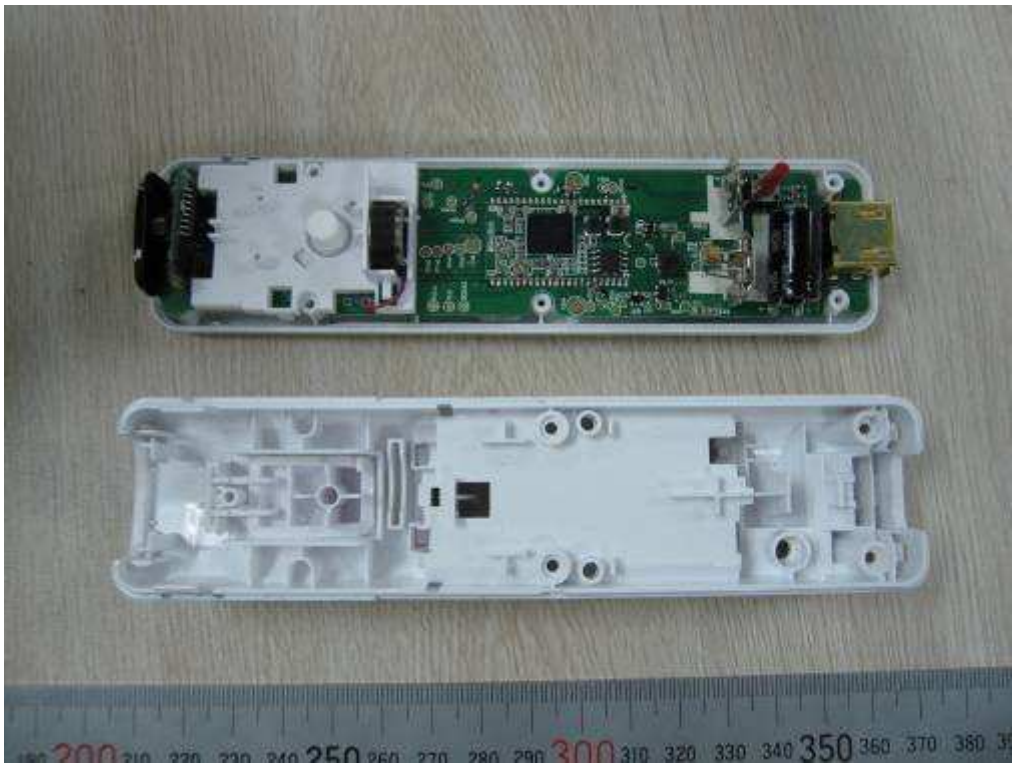


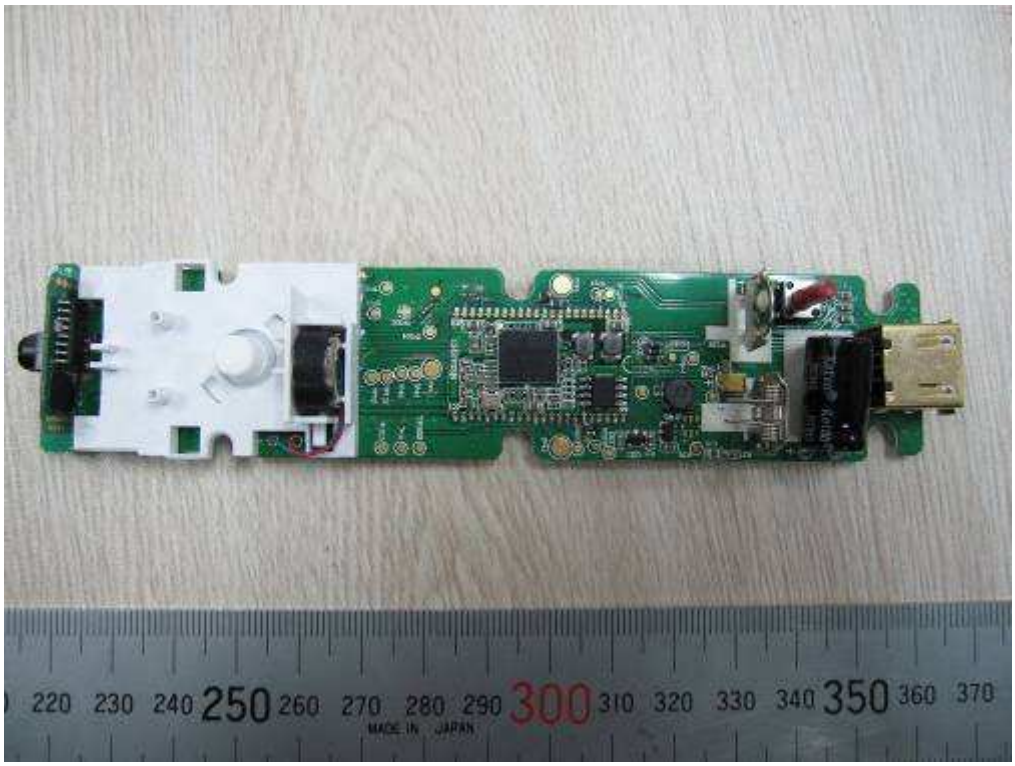
5. Appendix II – Photos of EUT

Over View

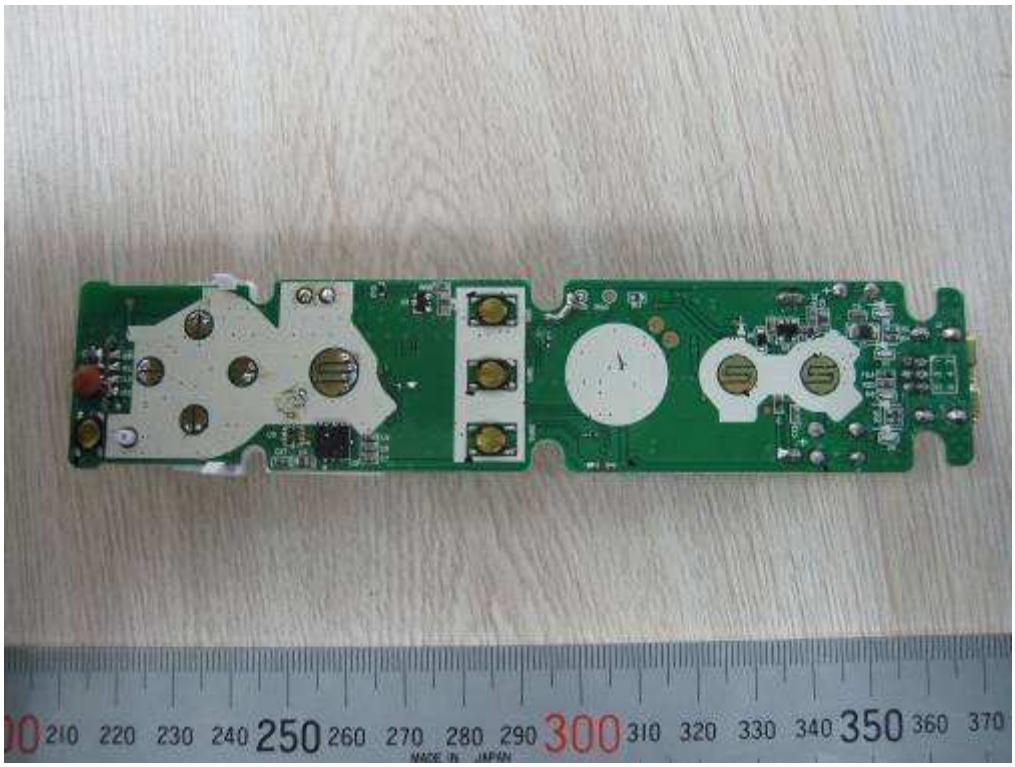
Internal View

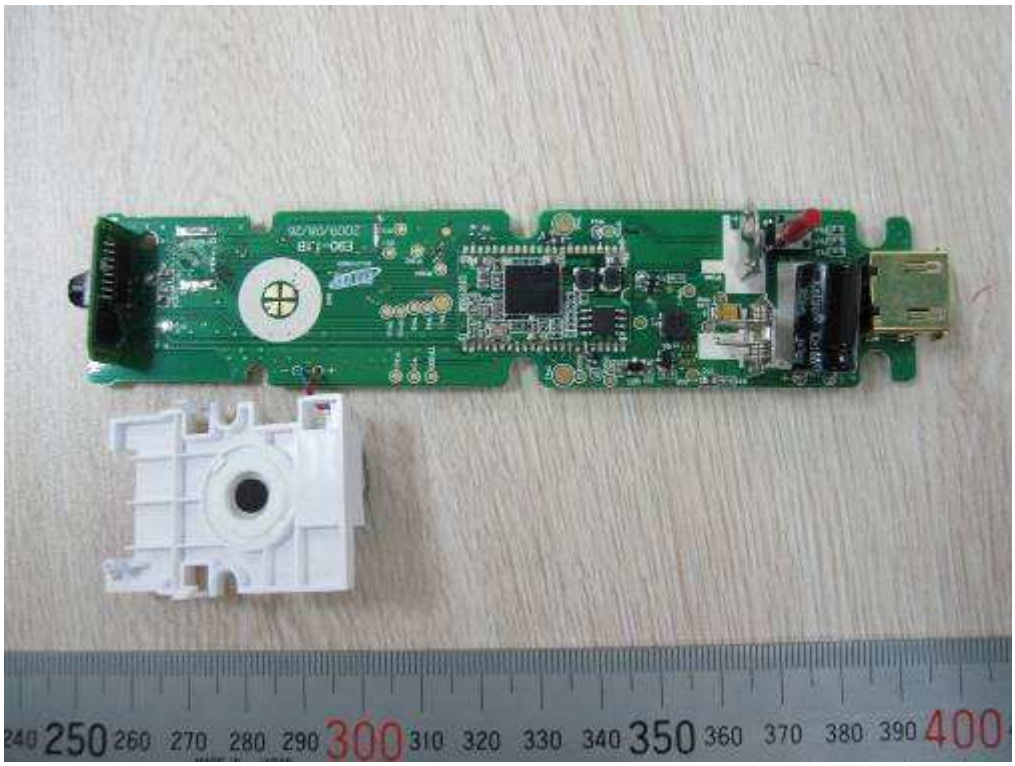
Internal View



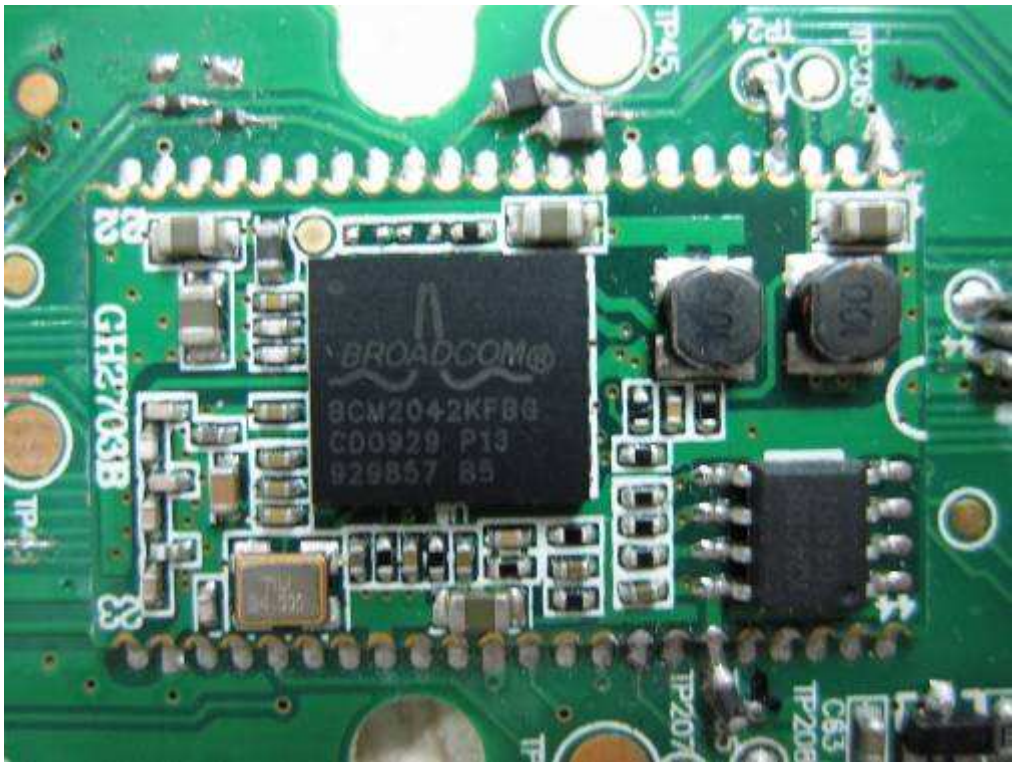


PCB View



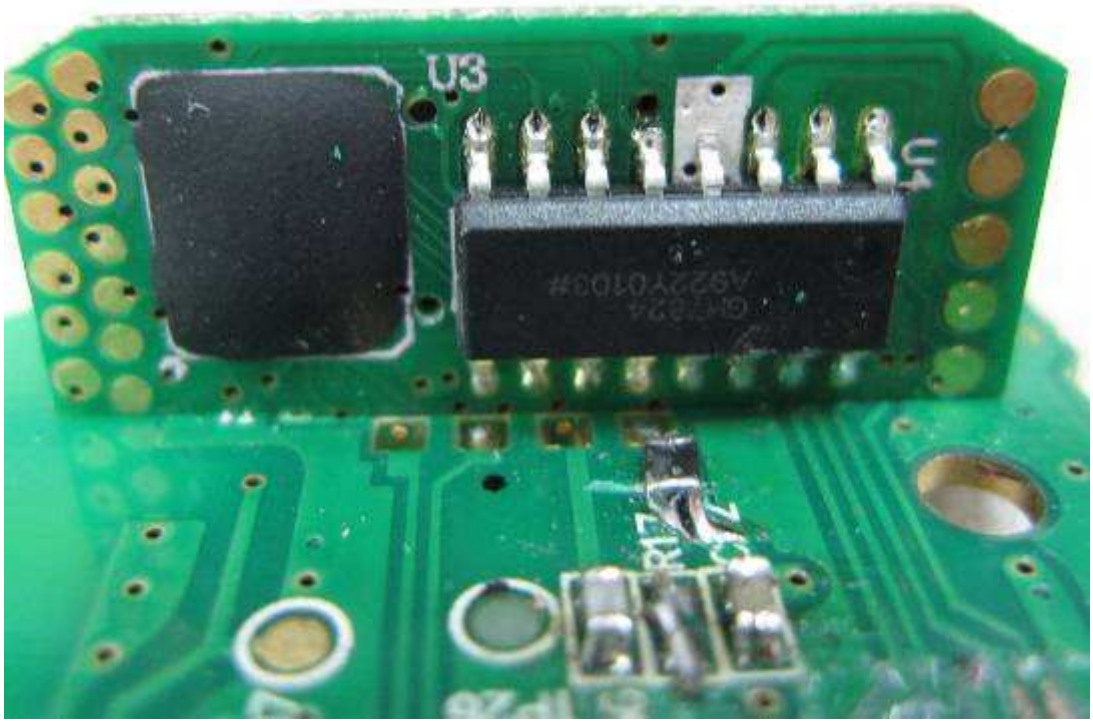


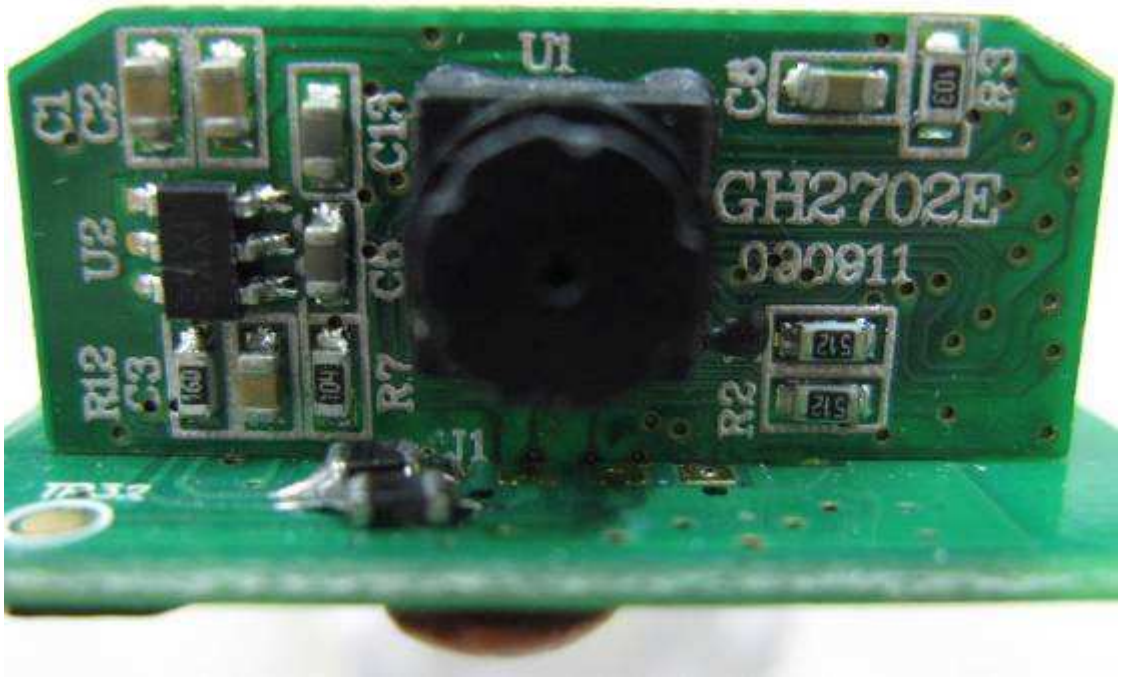
View of RF Module



View of Main Board IC

View of Antenna Module





6. Appendix III - Document List

Exhibit type	File Description	Filename
Test Report	Test Report	Report.pdf
Modification Report	Modification Report	Modification Report.pdf
Block Diagram	Block Diagram	Block.pdf
Schematics	Circuit Diagram	Circuit.pdf
Operation Description	Technical Description	Description.pdf
ID Label/Location	Label Artwork and Location	Label.pdf
User Manual	User Manual	Manual.pdf
Cover Letter	Confidentiality Letter	Request.pdf
Cover Letter	Letter of Agency	Agency.pdf

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