



CMA Testing and Certification Laboratories

廠商會檢定中心

TEST REPORT

Report No. : AS0075937(9) Date : 22 Dec 2014

Application No. : LS040587(0)

Applicant : Smarhome Products Ltd
Rm B808-9, 8/F.,
Sea View Estate 2-8 Watson Road, North Point
Hong Kong

Sample Description : One(1) item of submitted sample stated to be :

Sample Description	Model number
433MHz Wireless Transmitter	WB035A / WB013BR / WB013SN / PB72WH / PB75BR and PB75SN

Radio Frequency : 433.92MHz Transmitter
Rating : 1 x 3V button cell
No. of submitted sample : Eight (8) piece (s)

Date Received : 24 Oct 2014, 02 Dec 2014, 11 Dec 2014.

Test Period : 27 Oct 2014 to 15 Dec 2014.

Test Requested : FCC Part 15 Certification.

Test Method : 47 CFR Part 15 (10-1-12 Edition)
ANSI C63.4 – 2009


Test Result : See attached sheet(s) from page 2 to 28.

Conclusion : The submitted sample was found to comply with requirement of FCC Part 15 Subpart C.

Remark : All six models are same in circuitry and components and construction, and therefore model WB035A was chosen to be representative of the test sample. The difference(s) between the tested model and the declared model(s) is/are Model no., Color and Outlook.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____


Mr. WONG Lap-pong, Andrew
Manager
Electrical Division

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FCC ID: LQP-WB035

CMA Industrial Development Foundation Limited

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Tested by:

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Reviewed by:

Mr. WONG Lap-pong, Andrew



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1 General Information

1.1 General Description

The equipment under test (EUT) is a transmitter for doorbell. It operates at 433.92MHz and the oscillation of radio control is generated by a crystal. The EUT is powered by 1 x 3V button cell. There is a button to trigger on the EUT to transmit the radio signal to receiver..

The antenna terminal is permanently attached in EUT and the radio output power is unable to adjust.

The brief circuit description is listed as follows:

- U2 and its associated circuit act as RF IC
- U1 and its associated circuit act as MCU
- Y1 and its associated circuit act as oscillator
- L2, L3, C7, C10 and its associated circuit act as RF filter
- Q1, Q2 and its associated circuit act as battery detect

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1.2 Location of the test site

FCC Registration Number: 552221

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2009. A Semi-Anechoic Chamber Testing Site is set up for investigation and located at:

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
Fo Tan, Shatin,
New Territories,
Hong Kong.

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2009. A shielded room is located at :

Ground Floor, Yan Hing Centre,
9 – 13 Wong Chuk Yeung Street,
Fo Tan, Shatin,
New Territories,
Hong Kong.

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1.3 List of measuring equipment

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date	Calibration Period
EMI Test Receiver	R&S	ESCI	100152	28 Aug 2015	1Year
Spectrum Analyzer	R&S	FSV40	100628	17 Dec 2014	1Year
Broadband Antenna	Schaffner	CBL6112B	2718	06 Jan 2015	1Year
Loop Antenna	EMCO	6502	00056620	28 Oct 2015	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	24 Nov 2015	1Year
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	24 Nov 2015	1Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	24 Nov 2015	1Year

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1.4 Measurement Uncertainty

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

Radiated emissions

Frequency	Uncertainty (U_{lab})
30MHz ~ 200MHz (Horizontal)	4.63dB
30MHz ~ 200MHz (Vertical)	4.65dB
200MHz ~1000MHz (Horizontal)	4.45dB
200MHz ~1000MHz (Vertical)	4.41dB

Conducted emissions

Frequency	Uncertainty (U_{lab})
150kHz ~ 30MHz	2.47dB

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2 Description of the radiated emission test

2.1 Test Procedure

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2009.

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 1m and 0.8m high above the ground. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1 m above the ground.

The device was rotated through three orthogonal axes to determine which attitude and configuration produce the highest emission during measurement.

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2.2 Test Result

Peak Detector data was measured unless otherwise stated.

“#” means emissions appearing within the restricted bands shall follow the requirement of section 15.205.

The frequencies from fundamental up to tenth harmonics were investigated, and emissions more 20dB below limit were not reported. Thus, those highest emissions were presented in next pages (section 2.3).

It was found that the EUT meet the FCC requirement.

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2.3 Radiated Emission Measurement Data

Radiated emission

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	23	°C
Relative humidity:	53	%

Detector: Peak RBW: 1MHz VBW: 3MHz Operation mode: Transmission

Testing frequency range: 9kHz to 25GHz

Frequency (MHz)	Polarity (H/V)	Reading at 3m (dBμV)	Antenna Factor and Cable Loss (dB/m)	Field Strength at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
433.918	V	72.5	17.9	90.4	100.8	- 10.4
867.868	V	17.8	23.4	41.2	80.8	- 39.6
#1301.803	H	60.9	- 9.3	51.6	74.0	- 22.4
1735.653	V	63.4	- 8.1	55.3	80.8	- 25.5
2169.659	V	60.2	- 6.3	53.9	80.8	- 26.9
2603.529	V	56.7	- 4.6	52.1	80.8	- 28.7
3037.466	V	42.7	- 2.9	39.8	80.8	- 41.0
3471.427	H	39.3	- 2.9	36.4	80.8	- 44.4
#3905.667	V	43.8	- 1.7	42.1	74.0	- 31.9
#4339.324	V	45.7	0.2	45.9	74.0	- 28.1

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2.3 Radiated Emission Measurement Data (Con't)

Radiated emission

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	23	° C
Relative humidity:	53	%

Frequency (MHz)	Polarity (H/V)	Peak Reading at 3m (dBµV/m)	Average Factor (dB)	Average Value at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
433.918	V	90.4	- 14.0	76.4	80.8	- 4.4
867.868	V	41.2	- 14.0	27.2	60.8	- 33.6
#1301.803	H	51.6	- 14.0	37.6	54.0	- 16.4
1735.653	V	55.3	- 14.0	41.3	60.8	- 19.5
2169.659	V	53.9	- 14.0	39.9	60.8	- 20.9
2603.529	V	52.1	- 14.0	38.1	60.8	- 22.7
3037.466	V	39.8	- 14.0	25.8	60.8	- 35.0
3471.427	H	36.4	- 14.0	22.4	60.8	- 38.4
#3905.667	V	42.1	- 14.0	28.1	54.0	- 25.9
#4339.324	V	45.9	- 14.0	31.9	54.0	- 22.1

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3 Description of the Line-conducted Test

3.1 Test Procedure

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2009. The EUT was setup as described in the procedures, and both lines were measured.

3.2 Test Result

No measurement is required as the EUT is a battery-operated product.

3.3 Graph and Table of Conducted Emission Measurement Data

Not Applicable

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4 Photograph

4.1 Photographs of the Test Setup for Radiated Emission and Conducted Emission

For electronic filing, the photos are saved with filename TSup1.jpg to TSup6.jpg.

4.2 Photographs of the External and Internal Configurations of the EUT

For electronic filing, the photos are saved with filename ExPho1.jpg to ExPho6.jpg and InPho1.jpg to InPho4.jpg.

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5 Supplementary document

The following document were submitted by applicant, and for electronic filing, the document are saved with the following filenames:

Document	Filename
ID Label/Location	LabelSmp.jpg
Block Diagram	BlkDia.pdf
Schematic Diagram	Schem.pdf
Users Manual	UserMan.pdf
Operational Description	OpDes.pdf

5.1 Bandwidth

The plot saved in TestRpt2.pdf shows the fundamental emission is confined in the specified band. It also shows that the 20dB bandwidth met the 15.231(c) requirement.

The plot saved in TestRpt2.pdf shows the fundamental emission is confined in the specified band. The 20dB bandwidth is 379.16kHz. The bandwidth requirement is 0.25% of 315 MHz = 1.0848 MHz .

5.2 Duty cycle

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 100ms

There are 2 pulses cycle in 100ms

Duration of pulse 1 = 1.9565ms

Duration of pulse 2 = 652.2µs

Duration of pulse 3 = 347.8µs

Number of pulse 1 in one pulse cycle = 1

Number of pulse 2 in one pulse cycle = 8

Number of pulse 3 in one pulse cycle = 8

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Total number of pulse 1 = 1 x 2 = 2
 Total number of pulse 2 = 8 x 2 = 16
 Total number of pulse 3 = 8 x 2 = 16

Effective period of the cycle = 1.9565ms x 2 + 652.2μs x 16 +
 347.8μs x 16
 = 19.913ms

Duty Cycle = 24.3601 / 100
 = 0.19913

Therefore, the average factor is found by $20 \log_{10} 0.19913 = -14.0\text{dB}$

5.3 Transmission time

Duration of each transmission = 3.78046s

The duration of the transmission after manual switching is 3.78046s and it is less than 5s after being released. The plot is saved in TestRpt3.pdf. It shows to comply FCC part 15, section 15.231(a)(1).

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6 Appendices

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A3.	Photos of Internal Configurations	2	pages
A4.	ID Label/Location	1	page
A5.	Bandwidth Plot	1	page
A6.	Average Factor	2	pages
A7.	Transmission time	1	page

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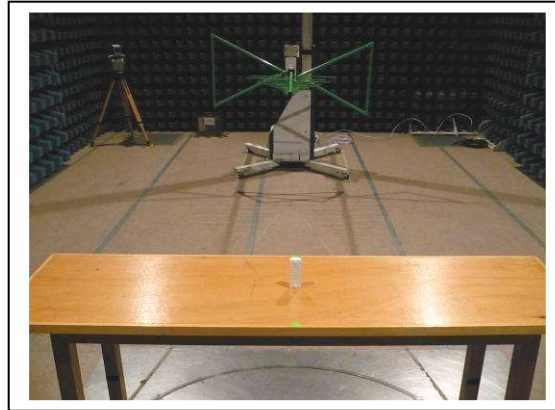
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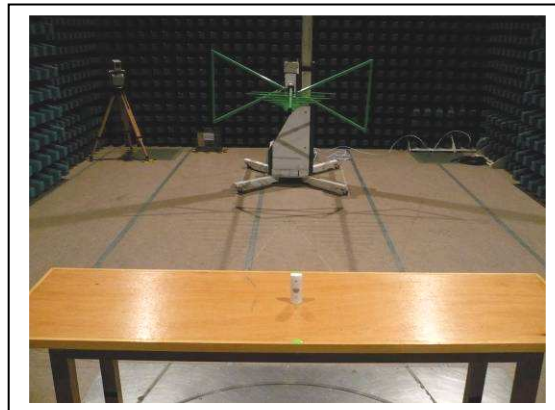
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A1. Photos of the set-up of Radiated Emissions



(Front view, 30MHz – 1GHz)



(Back view, 30MHz – 1GHz)

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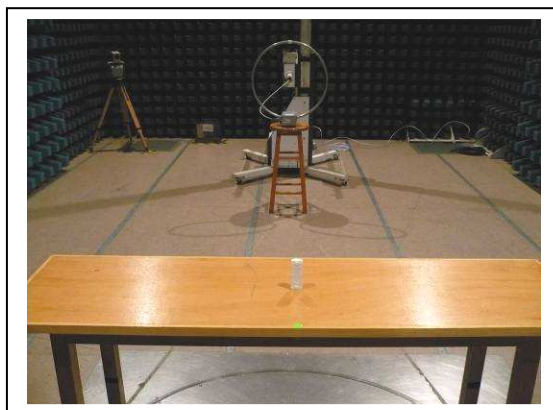
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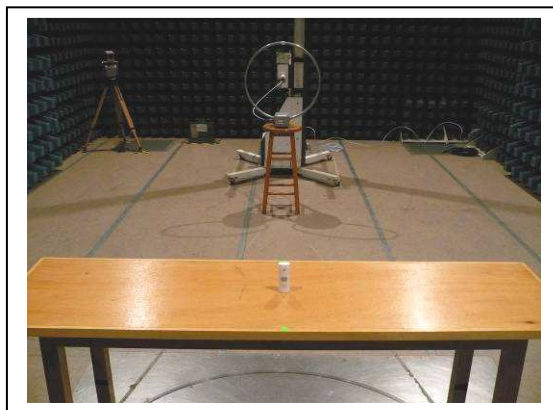
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A1. Photos of the set-up of Radiated Emissions



(Front view, 9kHz – 30MHz)



(Back view, 9kHz – 30MHz)

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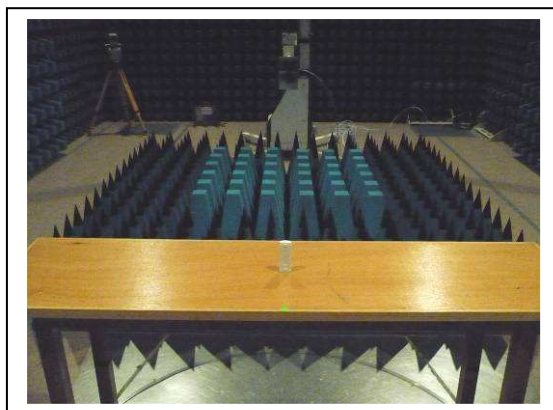
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A1. Photos of the set-up of Radiated Emissions



(Front view, 1GHz – 4.5GHz)



(Back view, 1GHz – 4.5GHz)

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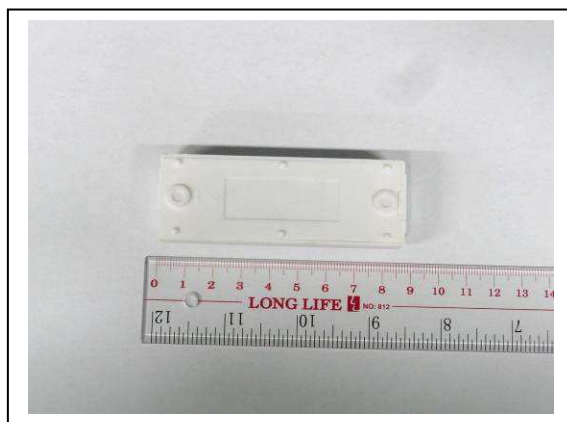
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A2. Photos of External Configurations



External Configuration 1
(WB035A and PB72WH)



External Configuration 2
(WB035A and PB72WH)

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A2. Photos of External Configurations



External Configuration 3
(WB013BR and PB75BR)



External Configuration 4
(WB013BR and PB75BR)

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A2. Photos of External Configurations



External Configuration 5
(WB013SN and PB75SN)



External Configuration 6
(WB013SN and PB75SN)

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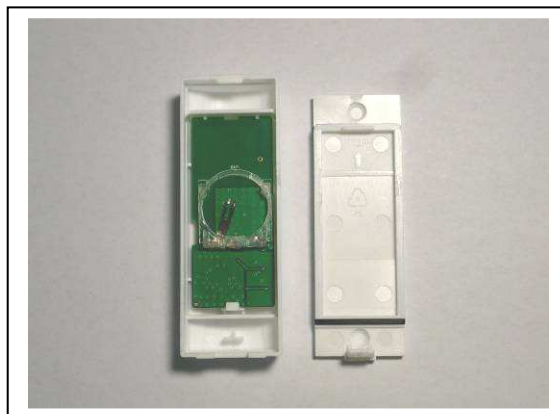
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A3. Photos of Internal Configurations



Internal Configuration 1
(WB035A and PB72WH)



Internal Configuration 2
(WB013BR / WB013SN / PB75BR and PB75SN)

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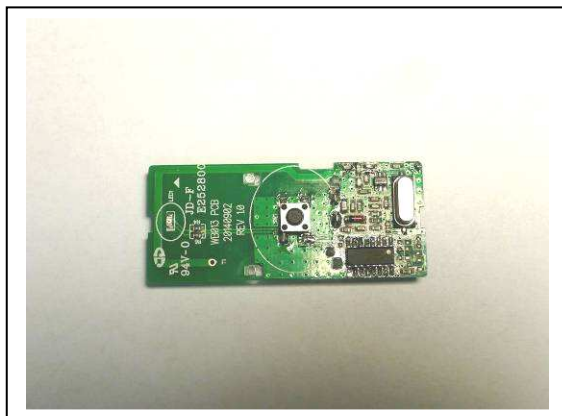
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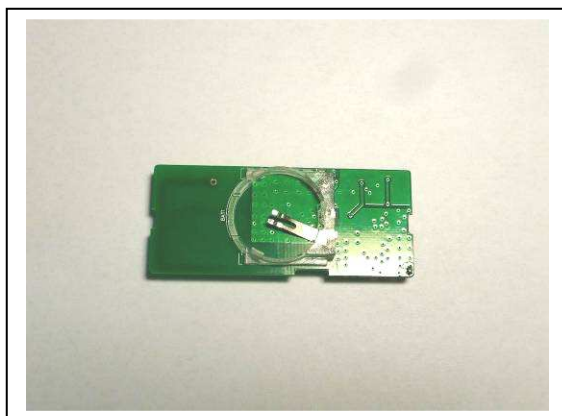
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A3. Photos of Internal Configurations



Internal Configuration 3
(All models)



Internal Configuration 4
(All models)

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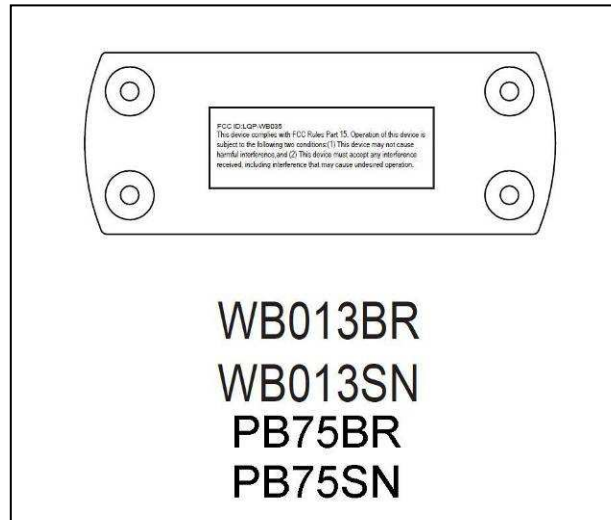
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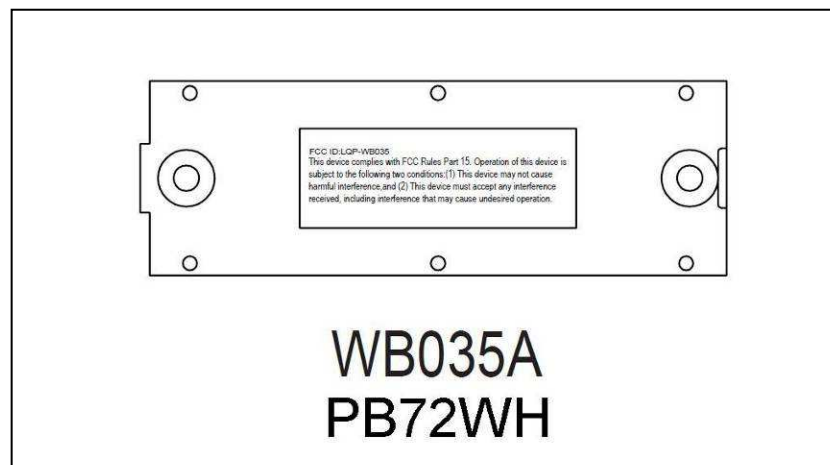
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A4. ID Label / Location



ID Label 1



ID Label 2

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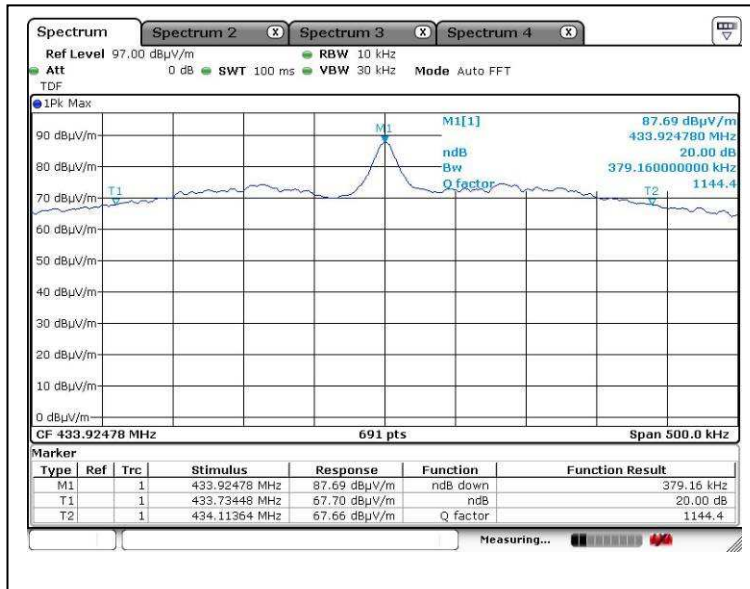
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A5. Bandwidth Plot



20dB bandwidth

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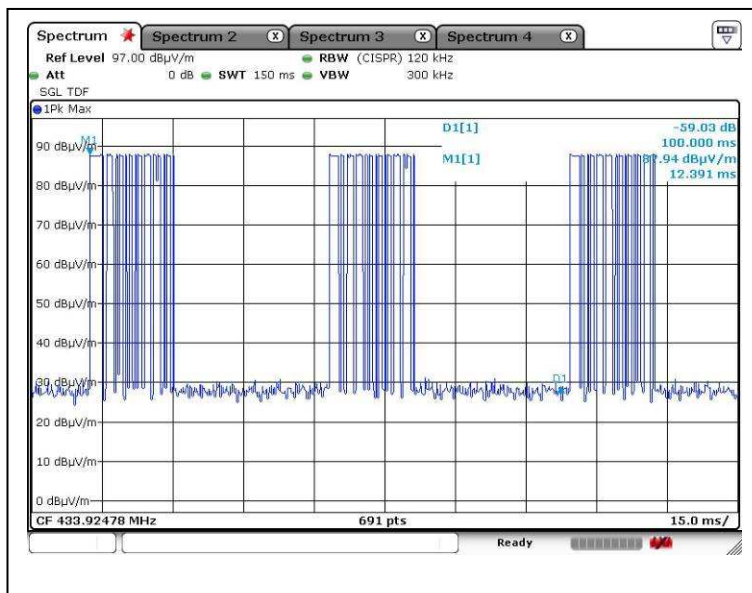
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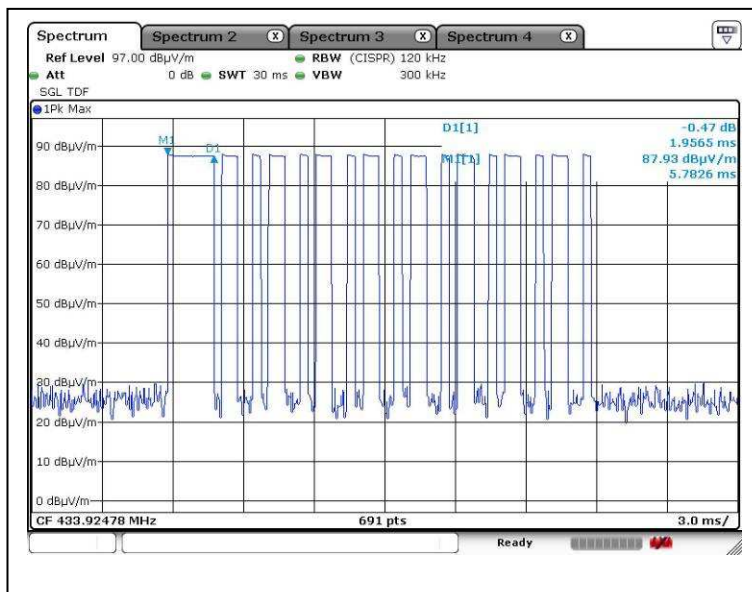
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A6. Duty Cycle



Duty Cycle 1



Duty Cycle 2

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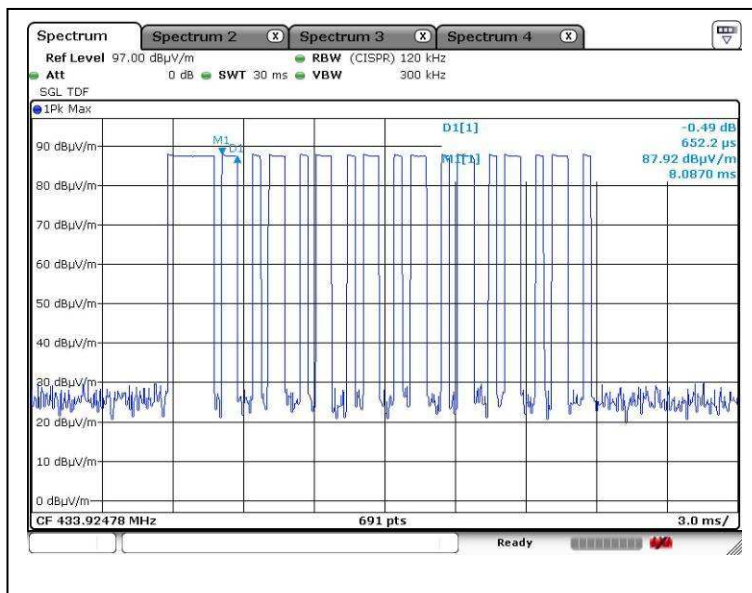
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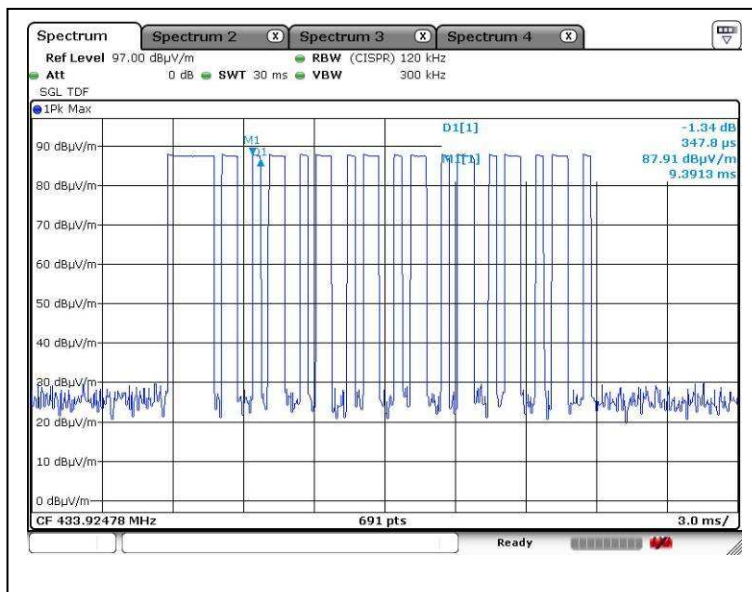
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A6. Duty Cycle



Duty Cycle 3



Duty Cycle 4

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Reviewed by:

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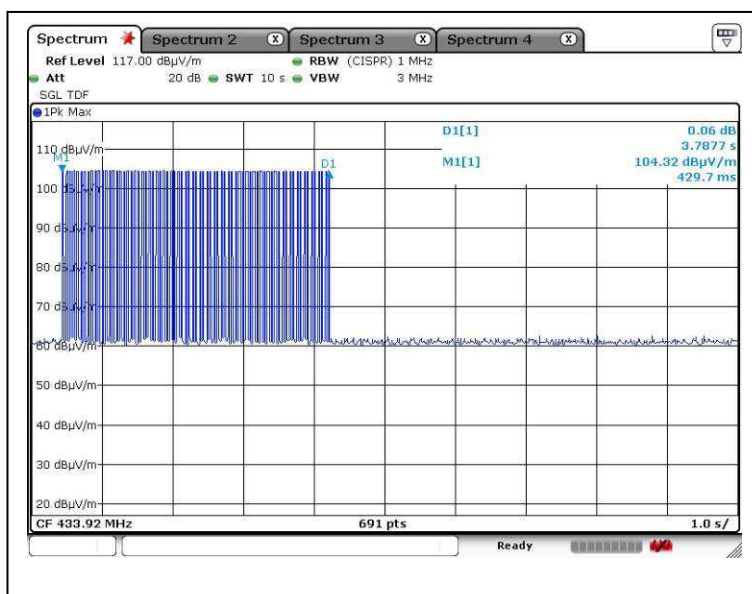
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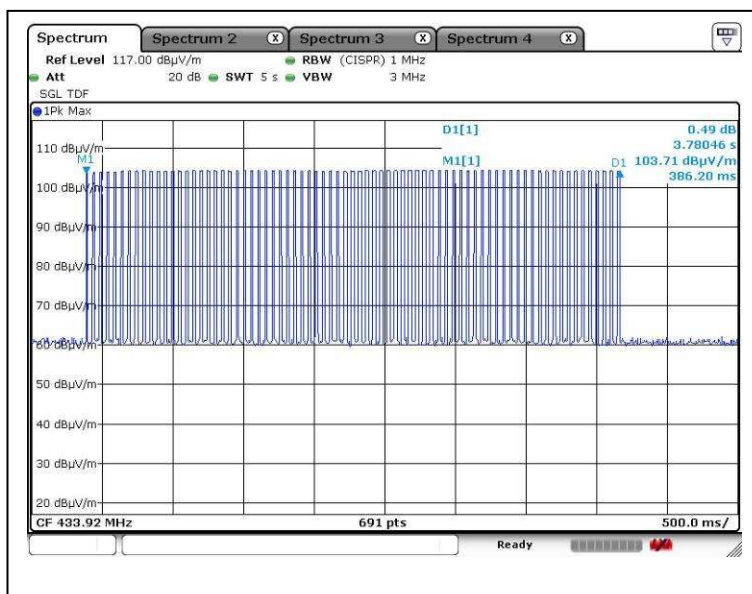
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A7. Transmission time



Transmission time 1



Transmission time 2

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

Tested by:

Mr. LEUNG Shu-kan, Ken

Reviewed by:

Mr. WONG Lap-pong, Andrew