CMA Testing and Certification Laboratories
廠商會檢定中心

TEST REPORT

Report No. : AV0031094 (6) Date : 09 Jun 2017

Application No. : LV016868(7)

Applicant : GMP EMS Limited
Room 2021-2023 Metro Centre Tower 1,
32 Lam Hing Street, Kowloon Bay,
Kowloon, Hong Kong

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

Sample Description	Model No.
Clapper Plus with remote control	E049F

Radio Frequency : 914.98MHz Transmitter;
Rating : 1 x 3V button cell
No. of submitted sample : Four (4) piece (s)
Sample registration No. : RV024279-002

Date Received : 06 Jun 2017

Test Period : 06 Jun 2017 to 08 Jun 2017.

Test Requested : FCC 47CFR Part 15 Certification.

Test Method : 47 CFR Part 15 (10-1-15 Edition)
ANSI C63.10 – 2013

Test Engineer : Mr. Yau Kwok Pun, Stanley

Test Result : See attached sheet(s) from page 2 to 18.

Conclusion : The submitted sample was found to comply with requirement of FCC 47CFR Part 15 Subpart C.

For and on behalf of
CMA Industrial Development Foundation Limited

Authorized Signature : _____ Page 1 of 18
Mr. WONG Lap-pong, Andrew
Manager
Electrical Division

FCC ID: 2AL9R-CLAPPERPLUS

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Room 1302, Yan Hing Centre, 9-13 Wong Chuk Yeung St., Fo Tan, Shatin, N.T., Hong Kong.
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1 General Information

1.1 General Description

The equipment under test (EUT) is a remote transmitter with operating frequency at 914.98MHz The oscillation of radio control is generated by a 26 MHz crystal. The remote contains two buttons (KEY II or KEY III) and when the buttons were pressed, it will transmit the RF signal to receiver and to control on/off function of the corresponding power socket (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, crystal, ANT	and its associated circuit act as RF module
-U1	and its associated circuit act as MCU
-S1, S2	and its associated circuit act as buttons

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1.2 Location of the test site

FCC Registration Number: 416666

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.10 – 2013. 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 C63.10 – 2013. 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	Rohde & Schwarz	ESCI	100152	16 Nov 2017	1Year
Spectrum Analyzer	Rohde & Schwarz	FSP30	100628	28 Mar 2018	1Year
Broadband Antenna	Schaffner	CBL6112B	2692	29 Mar 2018	2Years
Log Periodic Antenna	Teseq	UPA6109	43666	28 Jul 2018	2Years
Loop Antenna	EMCO	6502	00056620	25 Jan 2018	2Years
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-531	21 Dec 2017	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9718	9718-119	21 Dec 2017	2Years
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170442	02 Aug 2017	2Years
Broadband Pre-Amplifier	Schwarzbeck	BBV 9719	9719-010	02 Aug 2017	2Years
Coaxial Cable	Schaffner	RG 213/U	N/A	16 May 2018	1Year
Coaxial Cable	Suhner	RG 214/U	N/A	16 May 2018	1Year
Coaxial Cable	Suhner	Sucoflex_104	N/A	21 Dec 2017	1Year

Support Equipment (Supplied by CMA):

- N/A

Support Equipment (Supplied by Client):

- N/A

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1.3 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)	4.83 dB
30MHz ~ 200MHz (Vertical)	4.84 dB
200MHz ~1000MHz (Horizontal)	4.96 dB
200MHz ~1000MHz (Vertical)	6.00 dB
1GHz ~ 6GHz	4.38 dB
6GHz ~ 18GHz	4.47 dB
18GHz ~ 40GHz	4.60 dB

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1.4 Test Summary

TEST ITEM	FCC REFERANCE	RESULT
Radiated emission	15.231(b)	Comply
Assigned bandwidth (20dB bandwidth)	15.231(c)	Comply
Power line conducted emission	15.207	-
Transmission time after manual activation	15.231(a)	Comply

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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 C63.10 – 2013.

A non-conductive turntable with dimensions of 1.5m x 0.4m x 0.8m (L x W x H) placed above the reference ground plane. The equipment under test (EUT) was placed at 0.8m height for below 1GHz measurement and 1.5m height for above 1GHz measurement. The test distance is 3m between EUT and receiving antenna. A broadband antenna mounting on the mast received the signal strength. The turntable was rotated to maximize the emission level. The antenna was 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. Additional absorbing material will be placed between the EUT and receiving antenna for above 1GHz measurement.

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.

2.2 Test Result

Peak Detector data was measured unless otherwise stated.

The radiated emissions are measured from 9kHz to 10GHz (the tenth harmonics)

"#" means emissions appearing within the restricted bands shall follow the requirement of 47 CFR Part 15 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.

The EUT has been tested in Transmission mode.

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:	25	° C
Relative humidity:	60	%

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)	Detector Type
914.980	H	60.1	28.0	88.1	101.9	-13.8	Peak
914.980	V	48.5	28.0	76.5	101.9	-25.4	Peak
1829.973	H	50.0	-7.4	42.6	81.9	-39.3	Peak
#2744.932	H	46.0	-4.2	41.8	74.0	-32.2	Peak
#3659.908	H	44.5	-1.8	42.7	74.0	-31.3	Peak
#4574.900	H	36.6	1.4	38.0	74.0	-36.0	Peak
5489.800	H	36.4	3.8	40.2	81.9	-41.7	Peak
6404.860	H	36.8	5.0	41.8	81.9	-40.1	Peak
#7319.840	H	34.6	10.8	45.4	74.0	-28.6	Peak
#8234.820	H	32.8	13.1	45.9	74.0	-28.1	Peak
#9149.800	H	33.2	12.8	46.0	74.0	-28.0	Peak

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2.3 Radiated Emission Measurement Data

Radiated emission

Environmental conditions:

Parameter	Recorded value	
Ambient temperature:	25	° C
Relative humidity:	60	%

Frequency (MHz)	Polarity (H/V)	Peak Reading at 3m (dBµVm)	Average Factor (dB)	Average Value at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
914.980	H	88.1	-7.3	80.8	81.9	-1.1
914.980	V	76.5	-7.3	69.2	81.9	-12.7
1829.973	H	42.6	-7.3	35.3	61.9	-26.6
#2744.932	H	41.8	-7.3	34.5	54.0	-19.5
#3659.908	H	42.7	-7.3	35.4	54.0	-18.6
#4574.900	H	38.0	-7.3	30.7	54.0	-23.3
5489.800	H	40.2	-7.3	32.9	61.9	-29.0
6404.860	H	41.8	-7.3	34.5	61.9	-27.4
#7319.840	H	45.4	-7.3	38.1	54.0	-15.9
#8234.820	H	45.9	-7.3	38.6	54.0	-15.4
#9149.800	H	46.0	-7.3	38.7	54.0	-15.3

Remark: According to FCC Part15 C clause 15.231 (b), the EUT shall demonstrate the compliance with the limits on the field strength of emissions based on the average value of the measured emissions. The equation with a sample calculation as follow: Average value = Peak value + 20 Log_{10} (Duty cycle), where the Duty cycle is calculated from following section 4.2.

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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 C63.10 – 2013. 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

N/A

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4 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	2AL9R-CLAPPERPLUS_Label Smpl & Loc.pdf
Block Diagram	2AL9R-CLAPPERPLUS_BlkDia.pdf
Schematic Diagram	2AL9R-CLAPPERPLUS_Schem.pdf
PCB Layout	2AL9R-CLAPPERPLUS_PCB.pdf
User Manual	2AL9R-CLAPPERPLUS_Manual.pdf
Operational Description	2AL9R-CLAPPERPLUS_OpDes.pdf
Test Setup	2AL9R-CLAPPERPLUS_TSup.pdf
Internal photos	2AL9R-CLAPPERPLUS_InPho.pdf

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4.1 Bandwidth

Appendices A1 is shown the fundamental emission is confined in the specified band. The 20dB bandwidth is 491.7 kHz. The bandwidth requirement is 0.5% of 914.98 MHz = 4.575 MHz. It also shows that the EUT met the FCC Part 15.231(c) bandwidth requirement.

4.2 Duty cycle

The worst case duty cycle is used for the average factor calculation.

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

Time duration of one cycle = 100 ms

Effective period of one cycle = 740 us x 58
= 0.04292s or 42.92 ms

Duty Cycle = (42.92 ÷ 100) ms
= 0.4292

Therefore, the average correction factor is found by $20 \log_{10} 0.4292 = -7.3$ dB

4.3 Transmission time

Duration of each transmission =4.05 s

The duration of the transmission is less than 5s after the transmission is activated by remote controller. An Appendices A3 is shown the EUT to comply with FCC part 15, section 15.231(a)(1).

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5 Appendices

A1. Bandwidth Plot
A2. Average Factor
A3. Transmission time
A4. Photos of External Configuration

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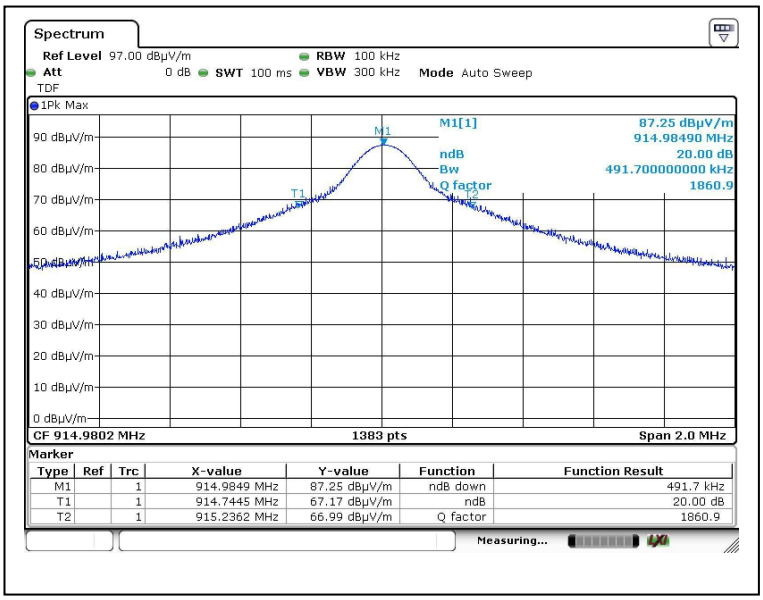
A1. Bandwidth Plot



20dB bandwidth

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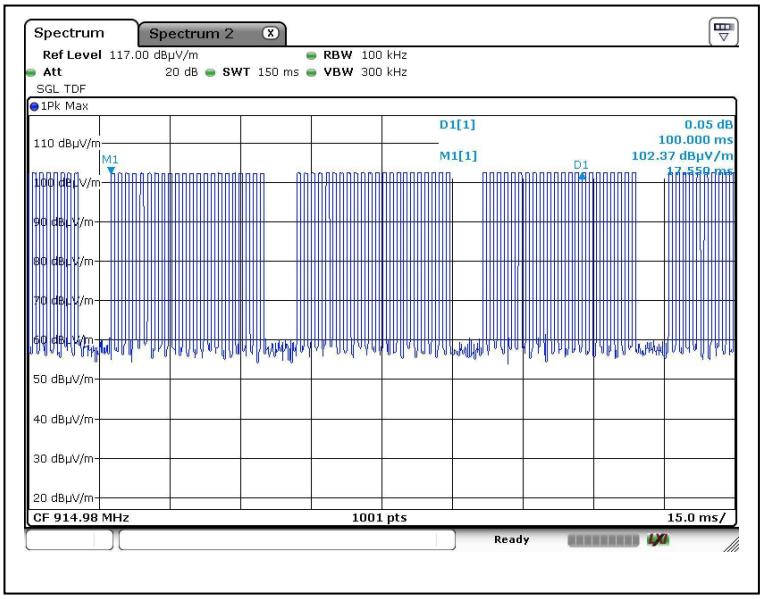
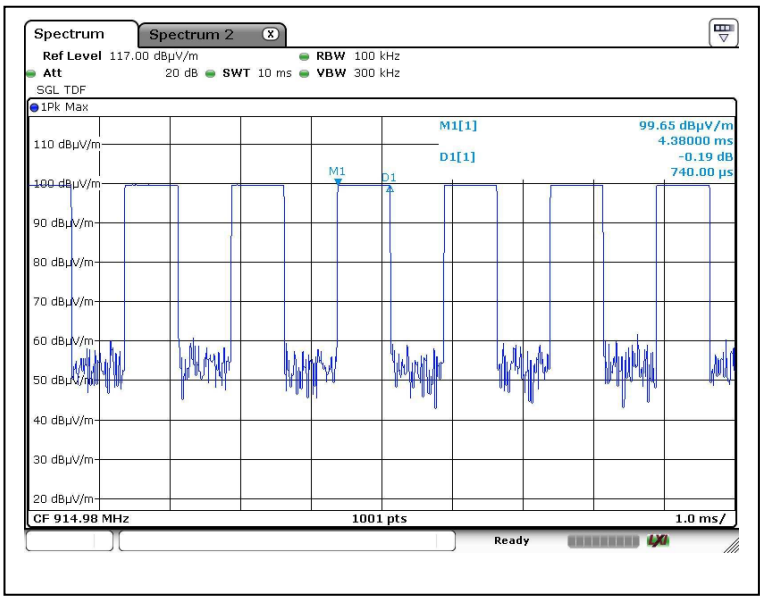
A2. Duty Cycle





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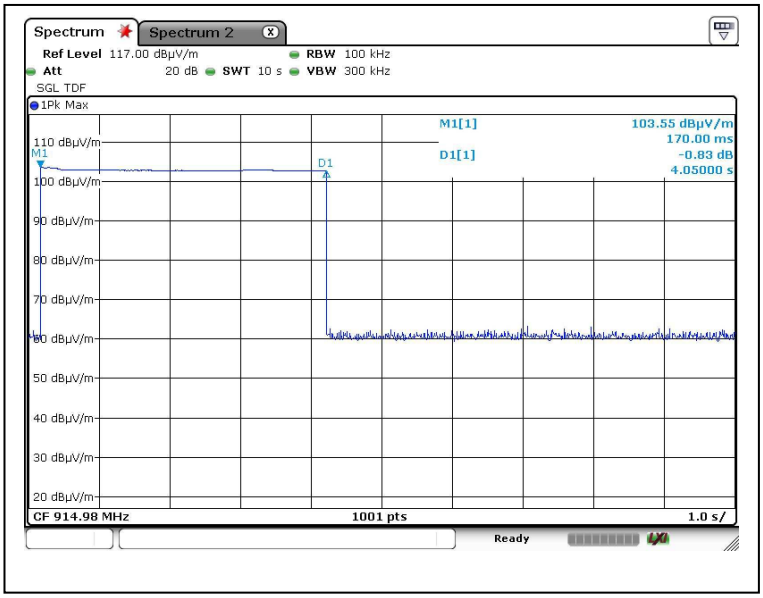
A3. Transmission time



FCC ID: 2AL9R-CLAPPERPLUS

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A4. Photos of External Configuration

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

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