

Date : 2017-10-06 No. : HM170880			Page 1 of 18
Applicant:		logy (Hong Kong) Limited oment Center, Hong Kong Sci	ence Park, Shatin
Manufacturer:		Electric Appliances Co., Ltd rial Zone, Yueqing, Zhejiang,	China
Description of Sample(s):	Product: Brand Name: Model Number: FCC ID:	Appliance Control N/A ZZH-BPC ZZH-BPC	
Date Sample(s) Received:	2017-08-14		
Date Tested:	2017-09-01 to 201	7-09-18	
Investigation Requested:	with FCC 47CFR	lagnetic Interference measures [Codes of Federal Regulation 3 for FCC Certification.	
Conclusion(s):	Federal Communi Regulations Part 1	oduct <u>COMPLIED</u> with the re ications Commission [FCC] F 15. The tests were performed cribed above and on Section 2	Rules and in accordance with
Remark(s):			HONG KONG SIRE

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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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1.0 General Details

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

Product:	Appliance Control
Manufacturer:	Wenzhou MTLC Electric Appliances Co., Ltd
	Tiancheng Industrial Zone, Yueqing, Zhejiang, China
Brand Name:	N/A
Model Number:	ZZH-BPC
Rating:	3.0Vd.c. ("AA"x2)

1.2 Description of EUT Operation

The Equipment Under Test (EUT) is an Appliance Control of Wenzhou MTLC Electric Appliances Co., Ltd, it consists of one 900MHz transmitter that is able to transmit RF signal in 908.4MHz while the EUT has been triggered, after that the EUT will transmit RF signal once in every hour.

1.3 Date of Order

2017-08-14

1.4 Submitted Sample(s):

2 Sample(s)

1.5 Test Duration

2017-09-01 to 2017-09-18

1.6 Country of Origin

China

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2.0 <u>Technical Details</u>

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2017 Regulations and ANSI C63.10:2013 for FCC Certification.

2.2 Test Standards and Results Summary Tables

	EMISSION Results Summary							
Test Condition Test Requirement Test Method Class / Test Result								
			Severity	Pass	Fail			
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.231	ANSI C63.10:2013	N/A	\boxtimes				
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A					

Note: N/A - Not Applicable

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- 3.0 Test Results
- 3.1 Emission

3.1.1 Field Strength of Fundamental & Harmonics Emissions

Test Requirement:	FCC 47CFR 15.231, (a) (1)
	FCC 47CFR 15.231, (a) (3)
Test Method:	ANSI C63.10:2013
Test Date:	2017-09-01
Mode of Operation:	Tx Test Mode (operating continuously for Radiated emission test)
	ON/OFF remote control / ON/OFF manual control (15.231, (a) (1)
	Wakeup notification command mode (15.231, (a) (3)

Test Method:

The sample was placed 0.8m above the ground plane on a standard radiated emission test site. 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, rotated about all 3 axis (X, Y & Z) and 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. In the frequency range of 9kHz to 30MHz, The center of the loop antenna shall be 1 meter above the ground and rotated loop axis for maximum reading. The emissions worst-case are shown in Test Results of the following pages.

Remark: 3 orthogonal axis apply to hand-held device only. Tx Test Mode is the worst case for radiated emission, since the EUT has been set to transmit RF signal continuously, and the peak level of the RF carrier output and modulation is no difference in listed modes.

*: 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 Designation Number <u>HK0001</u>.

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Spectrum Analyzer Setting:

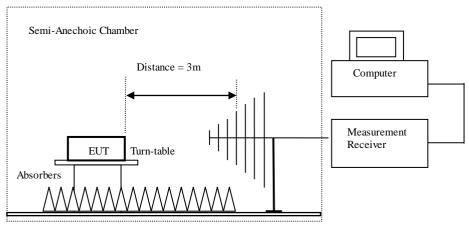
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No.

9KHz – 30MHz (Pk & Av)	RBW: VBW: Sweep: Span: Trace:	10kHz 30kHz Auto Fully capture the emissions being measured Max. hold
30MHz – 1GHz (QP)	RBW: VBW: Sweep: Span: Trace:	120kHz 120kHz Auto Fully capture the emissions being measured Max. hold
Above 1GHz (Pk & Av)	RBW: VBW: Sweep: Span: Trace:	3MHz 3MHz Auto Fully capture the emissions being measured Max. hold

Test Setup:



Ground Plane

Absorbers placed on top of the ground plane are for measurements above 1000MHz only.

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Limits for Field Strength of Fundamental & Harmonics Emissions [FCC 47CFR 15.231]:

Fundamental frequency [MHz]	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	$1250 \text{ to } 3,750^{-1}$	125 to 375 1
174-260	3,750	375
260-470	3,750 to 12,500 ¹	375 to 1250 1
Above 470	12,500	1250

¹Linear interpolations

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Result of Tx Test Mode: Pass

	Field Strength of Fundamental and Harmonics Emissions								
	Peak Value								
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field			
	Level @3m	evel @3m Factor Strength Strength			Polarity				
MHz	dBµV/m	$dB\mu V/m$	dBµV/m	$\mu V/m$	$\mu V/m$				
908.4	59.3	24.3	83.6	15,135.6	125,000	Vertical			
1816.8	13.1	24.6	37.7	76.7	12,500	Vertical			
* 2752.2	10.8	29.3	40.1	101.2	5,000	Vertical			
* 3633.6		5,000	Vertical						
* 4542.0		5,000	Vertical						
* 5450.4	* 5450.4					Vertical			
6358.8	E	missions dete	cted are more	than	5,000	Vertical			
* 7267.2		20 dB below	the FCC Lim	its	5,000	Vertical			
* 8175.6					5,000	Vertical			
* 9084.0					5,000	Vertical			

	Field Strength of Fundamental and Harmonics Emissions						
Average Value (Calculated by duty cycle factor) Frequency Measured Correction Field Field Limit @3m E-							
requency	Level @3m	Factor	Strength	Strength	Linit @5iii	E-Field Polarity	
MHz	dBµV/m	dBµV/m	dBµV/m	μV/m	μV/m	Tolailty	
908.4	N/A	N/A	72.4	4,168.7	12,500	Vertical	
1816.8	N/A	N/A	26.5	21.1	1,250	Vertical	
* 2752.2	N/A	N/A	23.9	15.7	500	Vertical	
* 3633.6					500	Vertical	
* 4542.0		500	Vertical				
* 5450.4					500	Vertical	
6358.8	6358.8 Emissions detected are more than				500	Vertical	
* 7267.2	1	20 dB below	the FCC Lim	its	500	Vertical	
* 8175.6	1				500	Vertical	
* 9084.0					500	Vertical	

Note: Field Strength adjusted by Duty Cycle Correction Factor Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

- *: Denotes restricted band of operation.
 - Measurements were made using a peak detector. Any emission less than 1000 MHz 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.

Calculated measurement uncertainty	:	9kHz to 30MHz	3.7dB
		30MHz to 18GHz	5.0dB

Pulse Averaging Measurement

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Pulse Train ΔMkr1 7.800 ms -0.04 dB Ref 0.00 dBm 10 dB/div -10.0 -20.0 1Δ2 -30.0 0 RIGLVI -40.0 -50.0 -60.0 -70.0 -80.1 -90.1 Center 908.000000 MHz Res BW 3.0 MHz Span 0 Hz Sweep 100.0 ms (1001 pts) VBW 3.0 MHz ∆Mkr1 -4.200 ms 0.00 dB 10 dB/div Log — Ref 0.00 dBm -10. -20.0 ∮∆2 -30.0 40.0 -50.0 -60.0 -70.0 -80.0

 Span 0 Hz
 Span 0 Hz

 Res BW 3.0 MHz
 VBW 3.0 MHz
 Sweep 100.0 ms (1001 pts)

 3.54 pulse within 100ms
 5

Duty cycle of TX = $((7.8 \text{ x}^3) + 4.2)/100 = 0.276$ Duty cycle correction factor = $20 \log (0.276) = -11.2 \text{dB}$

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Limits for 20dB Bandwidth of Fundamental Emission:

Frequency	20dB Bandwidth	Limit
[MHz]	[kHz]	[kHz]
908.4	97.8	0.5% *908.4 MHz = 4542.0

Tx mode

dB/div Ref -10.00 dB	m							1	1
0		_							
0			\sim						
0		+	/	\mathbf{v}					
0		$\frac{1}{1}$			Mm				
0		/~			<u> </u>	۱ <u>۸</u>			
0 Commence					r	win	\sim_{W}	Mr www	m
nter 908.4 MHz es BW 10 kHz			#VB	w	30 kHz				Span 1 MH ep 12.4 n
Occupied Bandwidt	h	т	otal Po	ow	er	-22.8 dE	ßm		
9	0.068 kHz								
Transmit Freq Error	-22.654 kHz	С	BW P	ow	er	99.00	1%		
x dB Bandwidth	97.82 kHz		dB			-20.00	AD		

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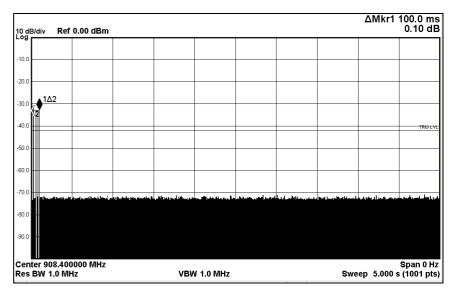


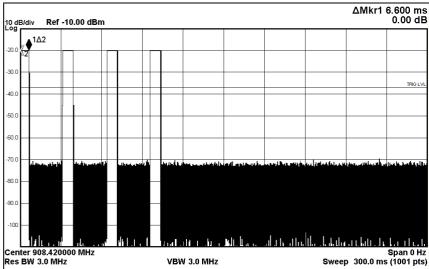
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Transmitter deactivation Measurement:

Devices operated under the 15.231(a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.





Transmission will cease within 5s

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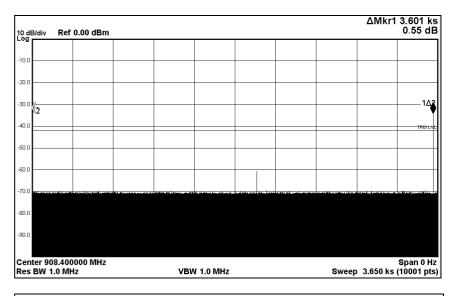


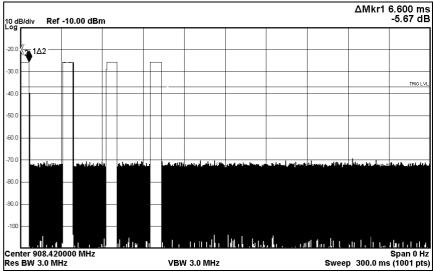
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Transmitter deactivation Measurement:

Devices operated under the 15.231(a)(3), periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.





Total Transmission time = $6.6 \times 4 = 26.4 \text{ms}$ Total transmit time < 2×10^{-1} hour observed period

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

Frequency Range [MHz]	Quasi-Peak Limits [µV/m]		
0.009-0.490	2400/F (kHz)		
0.490-1.705	24000/F (kHz)		
1.705-30	30		
30-88	100 150		
88-216			
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.

Result of Tx Test Mode, (9kHz - 30MHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

Result of Tx Test Mode, (30MHz – IGHz): PASS								
Field Strength of Fundamental and Harmonics Emissions								
Quasi-Peak Value								
Frequency	Measured	Correction	Field	Field	Limit @3m	E-Field		
	Level @3m	Factor	Strength	Strength		Polarity		
MHz	dBµV/m	dBµV/m	dBµV/m	$\mu V/m$	$\mu V/m$			
63.1	0.3	9.2	9.5	3.0	100	Vertical		
101.7	0.1	10.3	10.4	3.3	150	Vertical		
210.4	0.2	14.0	14.2	5.1	150	Horizontal		
246.5	0.7	15.7	16.4	6.6	200	Horizontal		
337.9	0.5	18.6	19.1	9.0	200	Horizontal		
421.3	0.5	21.1	21.6	12.0	200	Horizontal		

Result of Tx Test Mode, (30MHz - 1GHz): PASS

Result of Tx Test Mode, (1GHz – 18GHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

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Appendix A

LIST OF MEASUREMENT EQUIPMENT

	Radiated Emission							
EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	DUE CAL			
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A			
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A			
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3		2018/04/21			
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A			
EM354	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00142073	2018/02/29			
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2018/06/15			
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2018/04/27			
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	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

Front View of the product



Rear View of the product



Inner Circuit Top View





Inner Circuit Bottom View

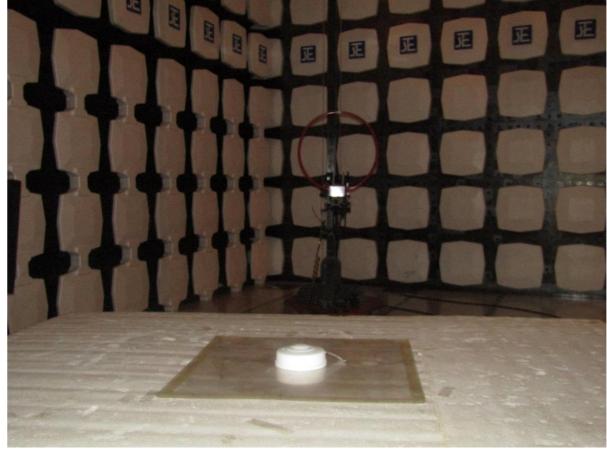




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Photographs of EUT

Measurement of Radiated Emission Test Set Up (9kHz to 30HMz)





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Photographs of EUT



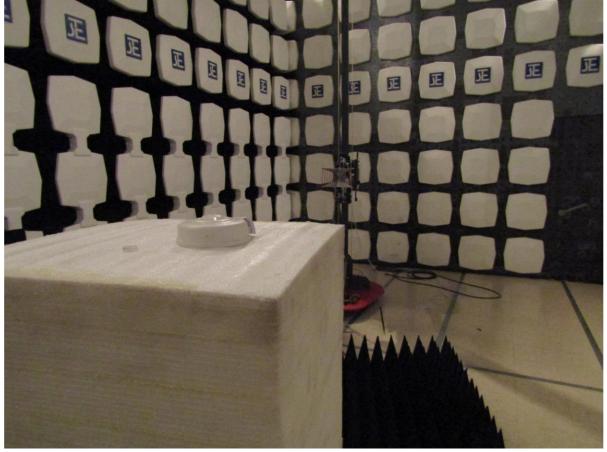
Measurement of Radiated Emission Test Set Up (30MHz to 1000MHz)



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Photographs of EUT

Measurement of Radiated Emission Test Set Up (Above 1000MHz)



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

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- 3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
- 4. The Report refers only to the sample tested and does not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.
- 5. In the event of the improper use the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
- 6. Sample submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
- 7. The Company will not be liable for or accept responsibility for any loss or damage howsoever arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
- 8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
- 9. Subject to the variable length of retention time for test data and report stored hereinto as to otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of this test report for a period of three years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after the retention period. Under no circumstances shall we be liable for damages of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.
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