



Test Report

Date : 2017-10-06

No. : HM170882

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Applicant: Lexiwave Technology (Hong Kong) Limited
801A, IC Development Center, Hong Kong Science Park, Shatin
Hong Kong

Manufacturer: Wenzhou MTLC Electric Appliances Co., Ltd
Tiancheng Industrial Zone, Yueqing, Zhejiang, China

Description of Sample(s): Product: Appliance Control
Brand Name: N/A
Model Number: ZZH-ZW15RM
FCC ID: ZZH-ZW15RM

Date Sample(s) Received: 2017-08-14

Date Tested: 2017-09-01 to 2017-09-18

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2016 and ANSI C63.10:2013 for FCC Certification.

Conclusion(s): The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.

Remark(s): --



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-ZW15RM
Rating: 120Va.c

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 Technical Details

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 / Severity	Test Result	
				Pass	Fail
Field Strength of Fundamental & Harmonics Emissions	FCC 47CFR 15.231	ANSI C63.10:2013	N/A	☒	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	☒	☐
AC power-line conducted emissions	FCC 47CFR 15.207	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)) Energy usage measurement mode (15.231, (a) (3)) Tx mode with Lamp load

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 HK0001.

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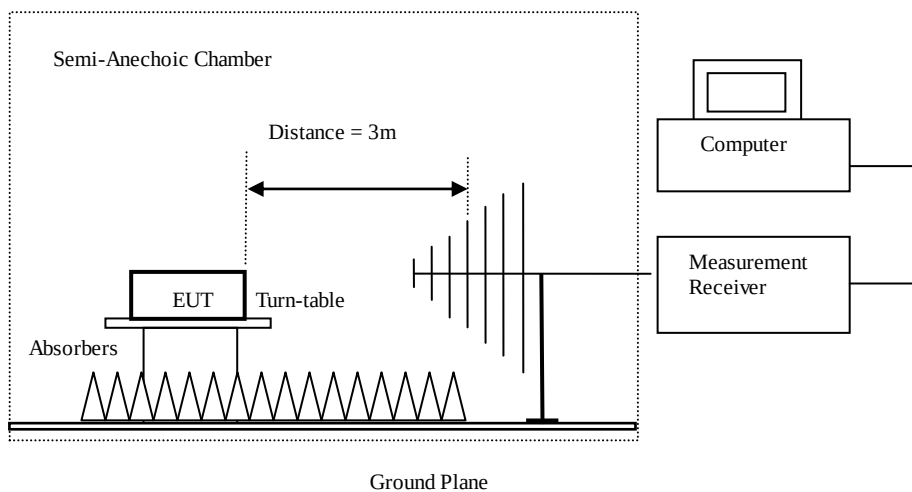
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Spectrum Analyzer Setting:

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

Test Setup:



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 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

¹ Linear interpolations

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Result of Tx Test Mode: Pass

Field Strength of Fundamental and Harmonics Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
908.4	55.3	24.3	79.6	9,549.9	125,000	Vertical
1816.8	12.3	24.6	36.9	70.0	12,500	Vertical
* 2752.2	10.1	29.3	39.4	93.3	5,000	Vertical
* 3633.6	Emissions detected are more than 20 dB below the FCC Limits				5,000	Vertical
* 4542.0					5,000	Vertical
* 5450.4					5,000	Vertical
6358.8					5,000	Vertical
* 7267.2					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 MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
908.4	N/A	N/A	68.4	2,630.3	12,500	Vertical
1816.8	N/A	N/A	25.7	19.3	1,250	Vertical
* 2752.2	N/A	N/A	23.2	14.5	500	Vertical
* 3633.6	Emissions detected are more than 20 dB below the FCC Limits				500	Vertical
* 4542.0					500	Vertical
* 5450.4					500	Vertical
6358.8					500	Vertical
* 7267.2					500	Vertical
* 8175.6					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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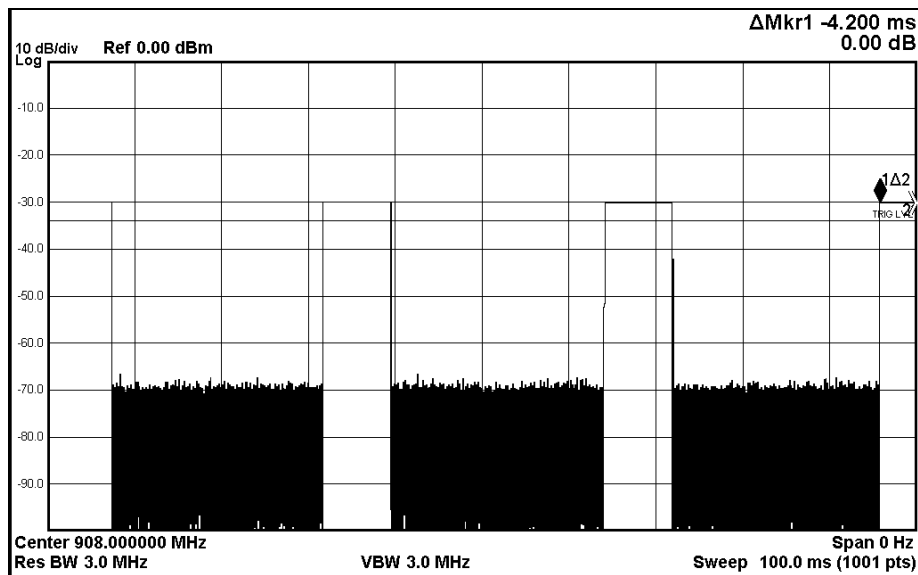
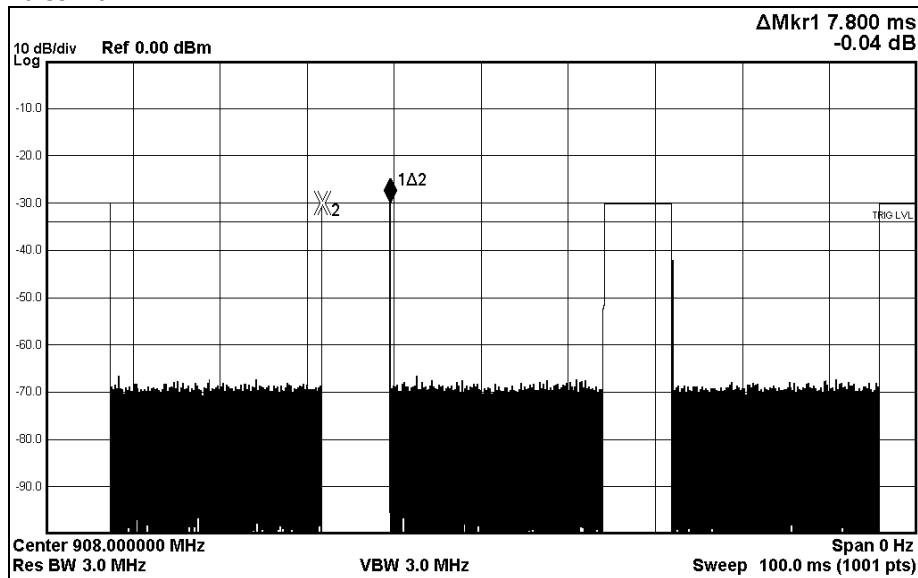
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Pulse Train



3.54 pulse within 100ms

Duty cycle of TX = $((7.8 \times 3) + 4.2) / 100 = 0.276$

Duty cycle correction factor = $20 \log(0.276) = -11.2\text{dB}$

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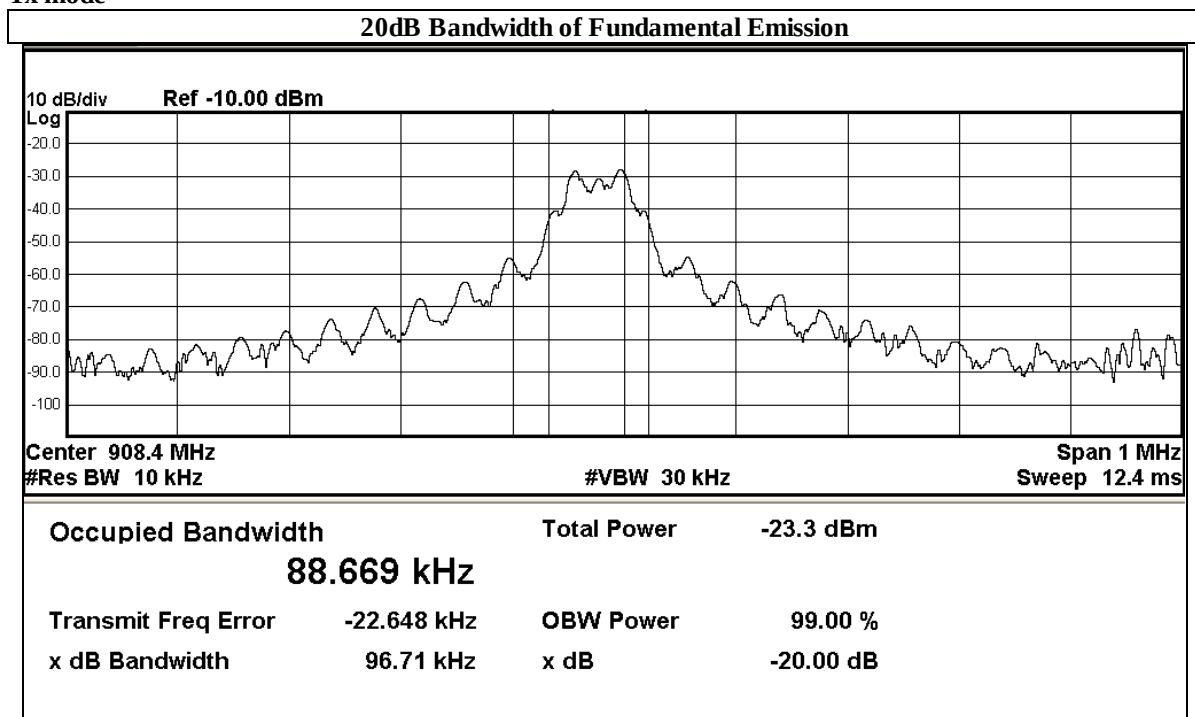
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Limits for 20dB Bandwidth of Fundamental Emission:

Frequency [MHz]	20dB Bandwidth [kHz]	Limit [kHz]
908.4	96.7	0.5%*908.4 MHz = 4542.0

Tx mode



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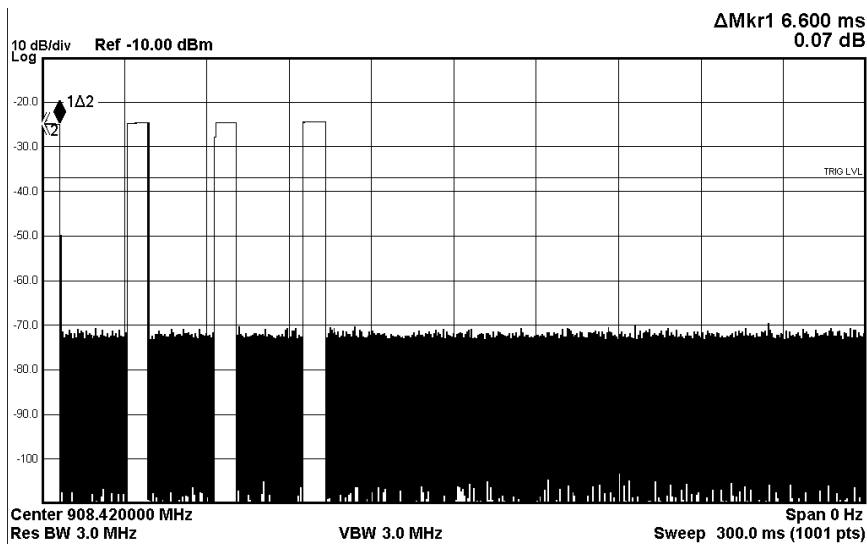
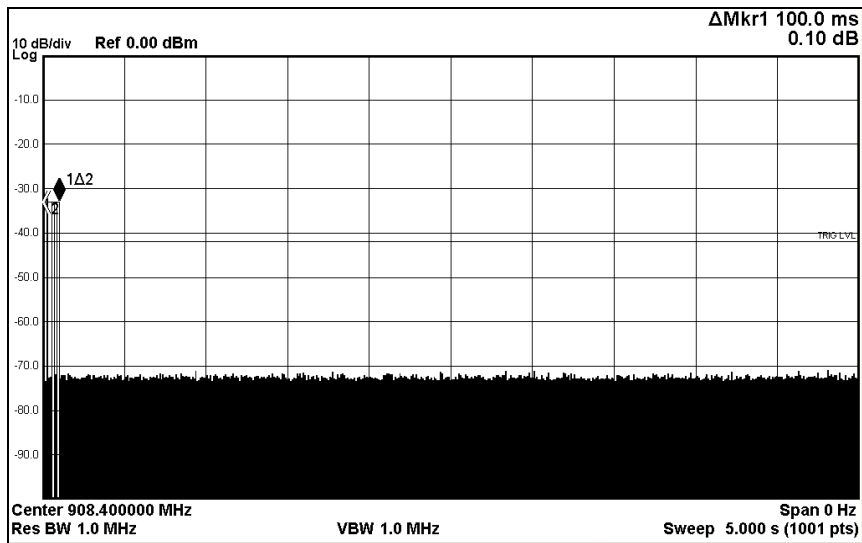
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Transmitter deactivation Measurement:

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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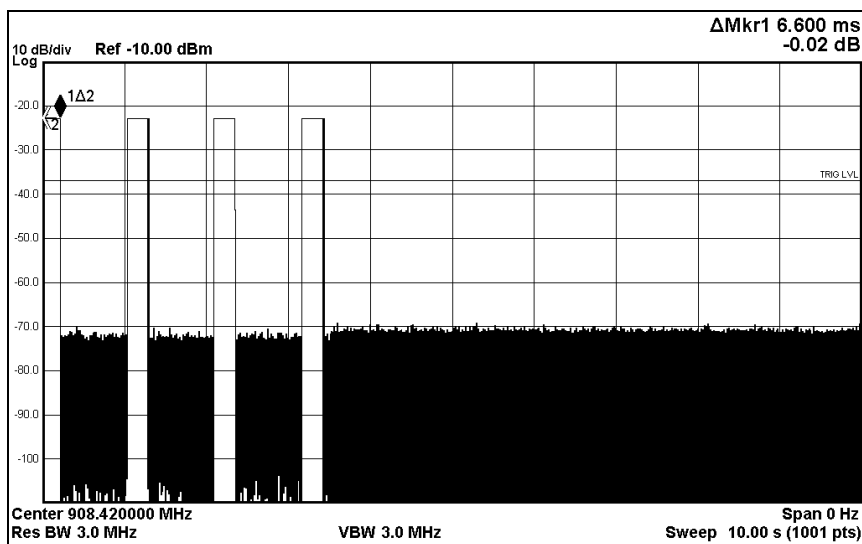
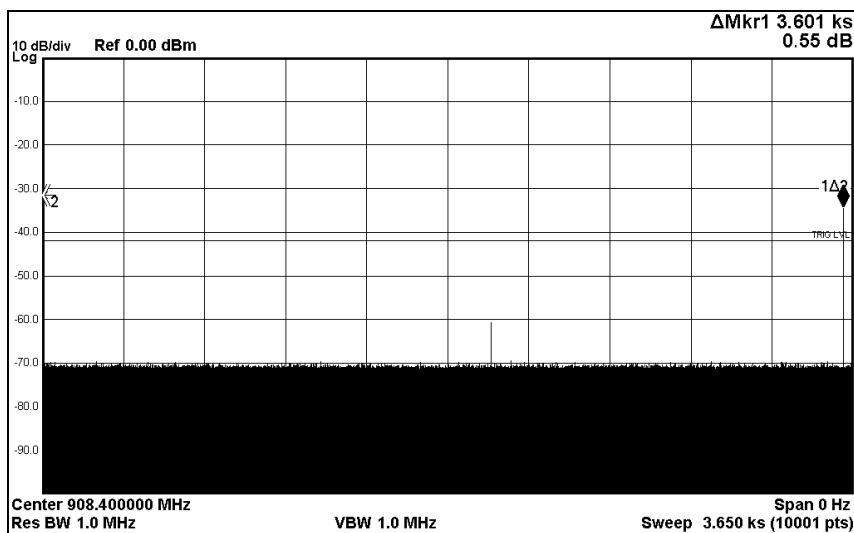
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Transmitter deactivation Measurement:

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 < 2s in 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
88-216	150
216-960	200
Above 960	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 mode with Lamp load, (9kHz – 30MHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

Result of Tx mode with Lamp load, (30MHz – 1GHz): PASS

Field Strength of Fundamental and Harmonics Emissions Quasi-Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
88.5	15.8	7.7	23.5	15.0	100	Vertical
124.3	22.6	7.1	29.7	30.5	150	Horizontal
179.0	19.7	10.4	30.1	32.0	150	Horizontal
183.6	18.8	10.1	28.9	27.9	200	Vertical
340.3	1.2	18.6	19.8	9.8	200	Horizontal
423.5	1.9	21.1	23.0	14.1	200	Horizontal

Result of Tx mode with Lamp load, (1GHz – 18GHz): PASS

Emissions detected are more than 20 dB below the FCC Limits

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3.1.2 Conducted Emissions (0.15MHz to 30MHz)

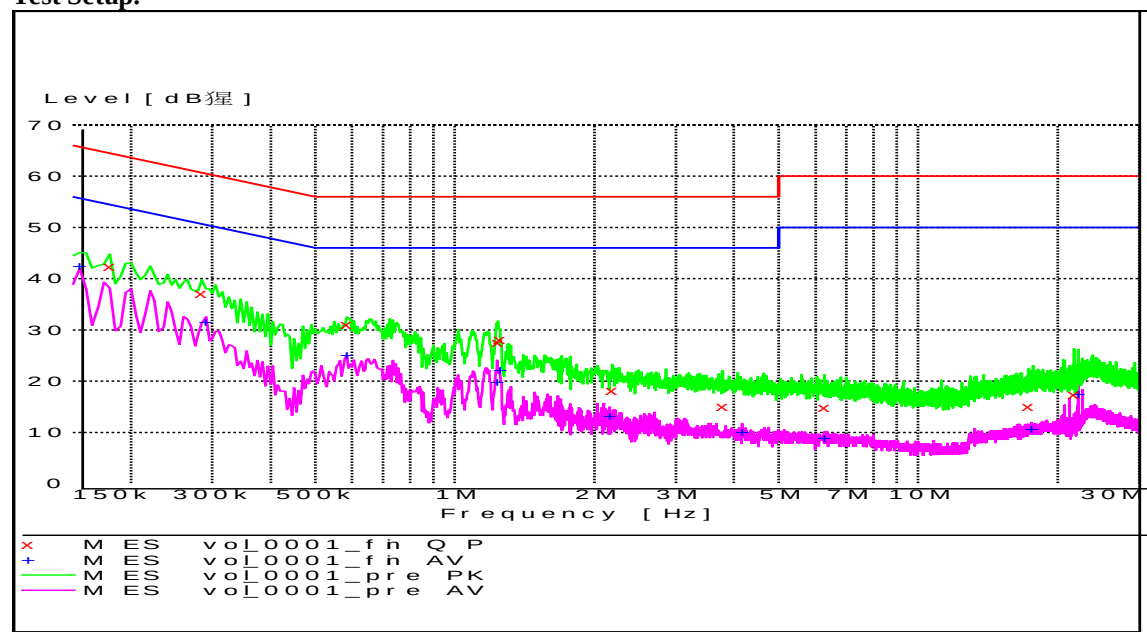
Test Requirement: FCC 47CFR 15.207
Test Method: ANSI C63.10:2013
Test Date: 2017-09-18

Mode of Operation: Tx mode with Lamp load

Test Method:

The test was performed in accordance with ANSI C63.10:2013, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Test Setup:



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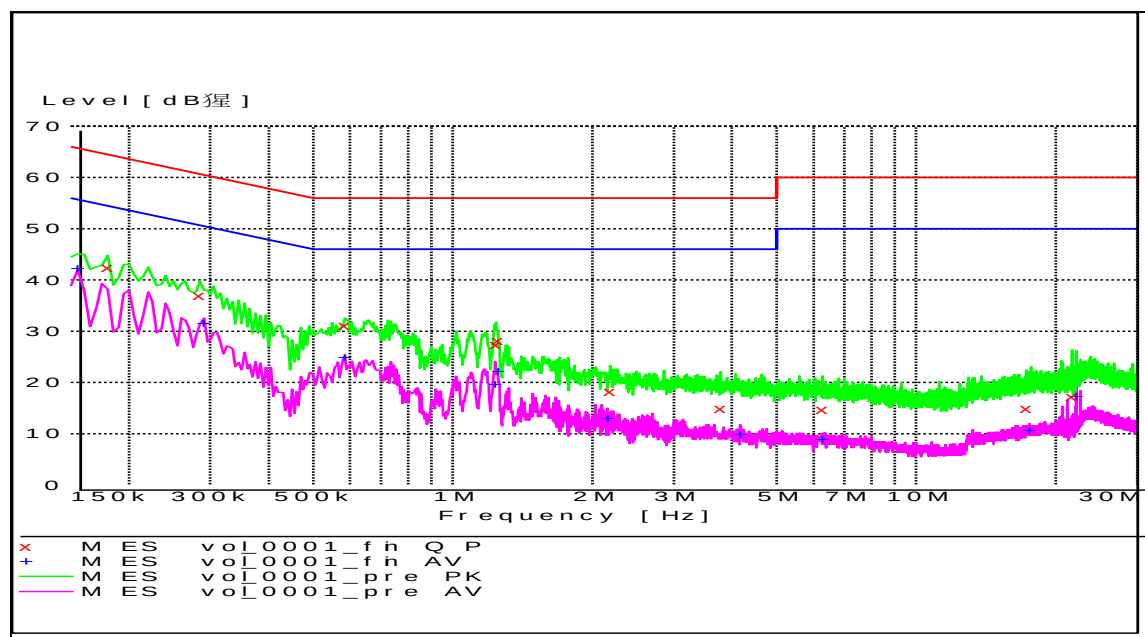
Limit for Conducted Emissions (FCC 47CFR 15.207):

Frequency Range [MHz]	Quasi-Peak Limits [dBμV]	Average [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of Tx mode with Lamp load – Live and Neutral: PASS



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MEASUREMENT RESULT: "vol_0001_fin QP"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.180000	42.40	9.9	65	22.0	L1	GND
0.285000	37.10	9.9	61	23.5	N	GND
0.585000	31.10	9.9	56	24.9	L1	GND
1.240000	27.50	9.9	56	28.5	N	GND
1.250000	28.10	9.9	56	27.9	N	GND
2.185000	18.20	10.2	56	37.8	L1	GND
3.785000	15.00	10.5	56	41.0	L1	GND
6.280000	14.80	10.6	60	45.2	N	GND
17.300000	15.00	10.7	60	45.0	N	GND
21.680000	17.30	10.8	60	42.7	N	GND

MEASUREMENT RESULT: "vol_0001_fin AV"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.155000	42.30	9.9	56	13.4	L1	GND
0.290000	31.50	9.9	51	19.0	N	GND
0.585000	25.00	9.9	46	21.0	N	GND
1.235000	19.70	9.9	46	26.3	N	GND
1.250000	22.20	9.9	46	23.8	N	GND
2.160000	13.00	10.1	46	33.0	L1	GND
4.175000	9.90	10.5	46	36.1	N	GND
6.290000	8.80	10.6	50	41.2	L1	GND
17.590000	10.70	10.7	50	39.3	L1	GND
22.155000	17.30	10.8	50	32.7	L1	GND

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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
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2018/04/24
EM355	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00094856	2018/03/03
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2018/06/01
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2018/04/27
EM302	PRECISION OMNIDIRECTIONAL DIPOLE (1 – 6GHZ)	SEIBERSDORF LABORATORIES	POD 16	161806/L	2018/05/11
EM303	PRECISION OMNIDIRECTIONAL DIPOLE (6 – 18GHZ)	SEIBERSDORF LABORATORIES	POD 618	6181908/L	2018/05/11

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	DUE CAL
EM232	LISN	SCHAFFNER	NNB41	04/100082	2018/03/03
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	2018/06/01
EM179	IMPULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	357-8810.52/54	2018/01/11
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057- 99A	2022/02/03

Remarks:

CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined

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Date : 2017-10-06

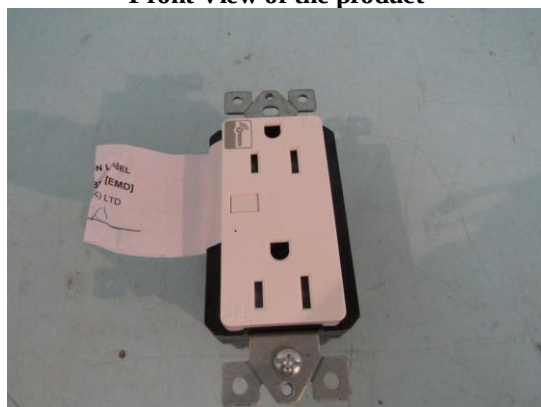
No. : HM170882

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Appendix B

Photographs of EUT

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 30MHz)



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



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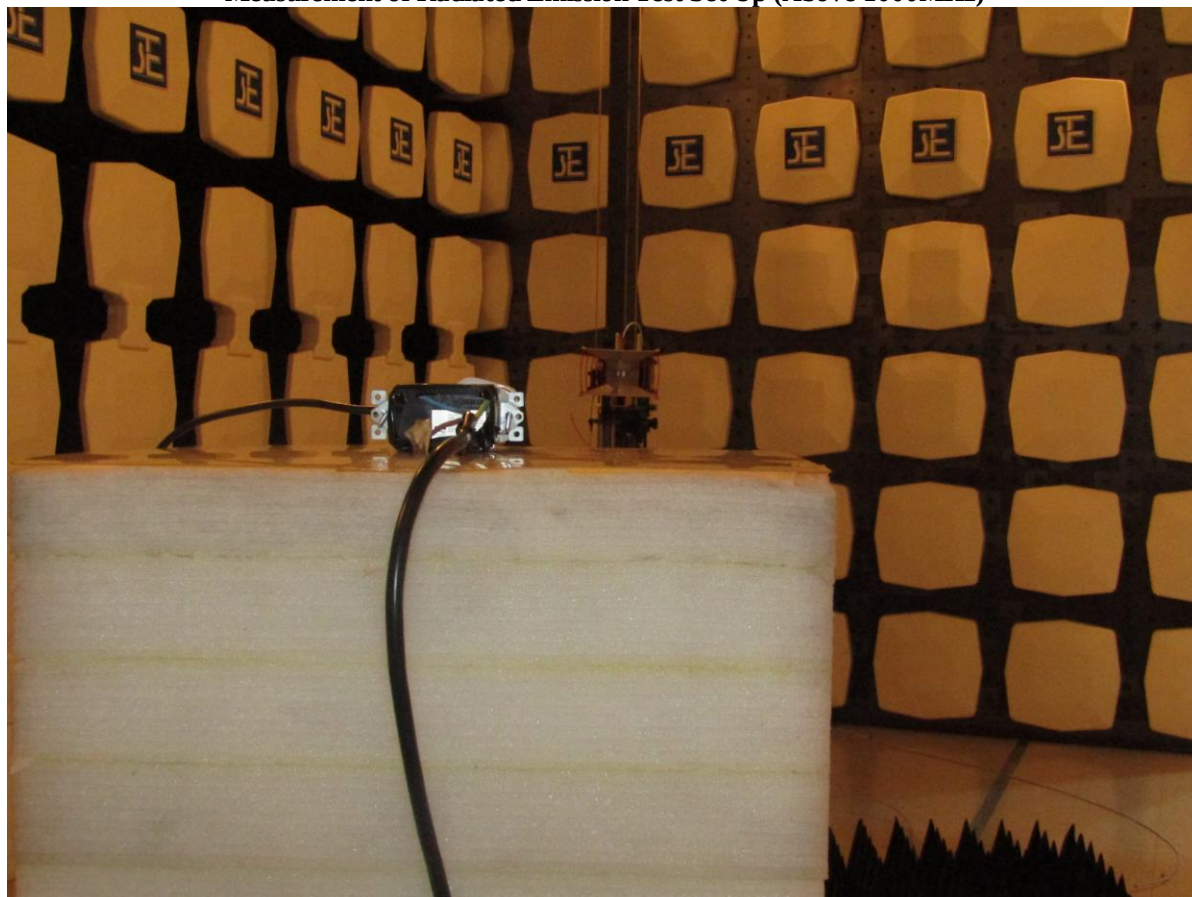
Date : 2017-10-06

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Photographs of EUT

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



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Measurement of Conducted Emission Test Set Up



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

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