Test Report

Date : 2017-07-04
No. : DM126645

Applicant	:	Delight Power Products Ltd. Unit 10-11, 7/F, Wah Lai Industrial Centre, 10-14 Kwei Tei Street, Fo Tan, N.T., Hong Kong
Supplier / Manufacturer	:	Delight Power Products Ltd. Unit 10-11, 7/F, Wah Lai Industrial Centre, 10-14 Kwei Tei Street, Fo Tan, N.T., Hong Kong
Description of Sample(s)	:	Submitted sample(s) said to be Product: Wireless Bridge Wifi to RF Converter Brand Name: DeLight Model No.: WB14 FCC ID: 2AM83WB14
Date Samples Received	:	2017-02-22
Date Tested	:	2017-02-28 to 2017-07-03
Investigation Requested	:	Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 and ANSI C63.10:2013 for FCC Certification.
Conclusions	:	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.
Remarks	:	---

LONG Yun Jian, Along
Authorized Signatory
ElectroMagnetic Compatibility Department
For and on behalf of
STC (Dongguan) Company Limited

Test Report

CONTENT:

1.0 General Details

1.1 Test Laboratory

STC (Dongguan) Company Limited
EMC Laboratory
68 Fumin Nan Road, Dalang, Dongguan, Guangdong, China
Telephone: (86 769) 81119888
Fax: (86 769) 81116222

1.2 Equipment Under Test [EUT]

Description of Sample(s)

Product:	Wireless Bridge Wifi to RF Converter
Manufacturer:	Delight Power Products Ltd. Unit 10-11, 7/F, Wah Lai Industrial Centre, 10-14 Kwei Tei Street, Fo Tan, N.T., Hong Kong
Brand Name:	DeLight
Model Number:	WB14
Rating:	5.0Vd.c. (Powered by USB port) / 3.7Vd.c Li-ion polymer rechargeable battery

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Wireless Bridge Wifi to RF Converter. The EUT is operating at 433.3MHz. Test was conducted under Tx mode.

1.3 Date of Order

2017-02-22

1.4 Submitted Sample(s):

1 Sample

1.5 Test Duration

2017-02-28 to 2017-07-03

1.6 Country of Origin

China

2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 and ANSI C63.10: 2013 for FCC Certification.
This is a manually operated transmitter, Press the button to start sending signals.

2.2 Test Standards and Results Summary Tables

EMISSION
Results Summary

Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Failed	N/A
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231(a)	ANSI C63.10: 2013	N/A	☒	☐	☐
20dB Bandwidth of Fundamental Emission	FCC 47CFR 15.231(c)	ANSI C63.10: 2013	N/A	☒	☐	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10: 2013	N/A	☒	☐	☐
AC Mains Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10: 2013	N/A	☒	☐	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

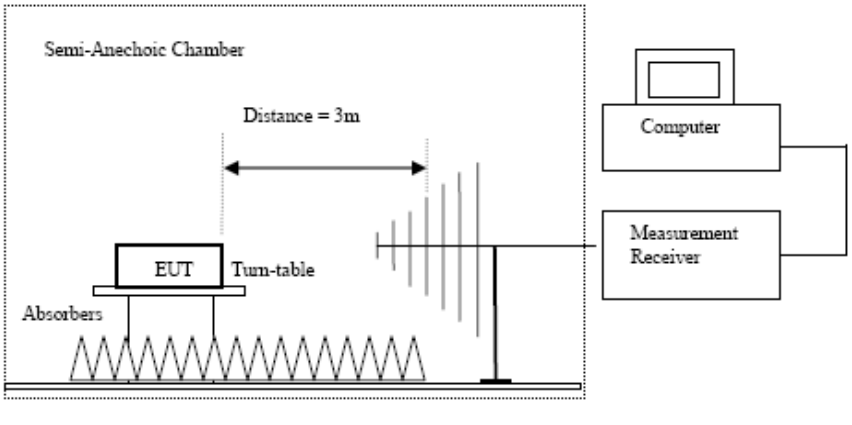
Test Requirement:	FCC 47CFR 15.231(a)
Test Method:	ANSI C63.10:2013
Test Date:	2017-02-28
Mode of Operation:	Tx mode

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. 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. The emissions worst-case are shown in Test Results of the following pages.

* Semi-anechoic chamber located on the STC (Dongguan) Company Ltd. 68 Fumin Nan Road, Dalang, Dongguan, Guangdong, PRC with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 629686.

Test Setup:



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used, 9kHz to 30MHz loop antennas are used.

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

Frequency Range of Fundamental [MHz]	Field Strength of Fundamental Emission [Average] [μV/m]	Field Strength of Spurious Emission [Average] [μV/m]
40.66-40.70	2,250	225
70-130	1,250	125
130-174	1,250 to 3,750 *	125 to 375 *
174-260	3,750	375
260-470	3,750 to 12,500 *	375 to 1,250 *
Above 470	12,500	1,250

[1]Linear interpolations.
The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Results of Tx mode(1GHz – 18GHz): PASS

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
433.30	54.5	18.6	73.1	4518.6	109,708.5	Vertical
433.30	64.7	18.8	83.5	14962.4	109,708.5	Horizontal

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV	Correction Factor dB/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	E-Field Polarity
866.60	19.2	25.8	45.0	177.8	10,970.8	Vertical
866.60	21.8	25.7	47.5	237.1	10,970.8	Horizontal
1299.90	9.1	31.6	40.7	108.4	10,970.8	Vertical
1299.90	12.2	31.5	43.7	153.1	10,970.8	Horizontal
1733.20	12.6	34.3	46.9	221.3	10,970.8	Vertical
1733.20	16.7	34.1	50.8	346.7	10,970.8	Horizontal
2599.80	14.6	37.2	51.8	389.0	10,970.8	Vertical
2599.80	14.8	36.9	51.7	384.6	10,970.8	Horizontal

Results of Tx mode(1GHz – 18GHz): PASS

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Field Strength@Peak dBμV	Duty Cycle Factor dB	Field Strength@Average dBμV/m	Field Strength@Average μV/m	Limit @3m μV/m	E-Field Polarity
433.30	73.1	-5.4	67.7	2426.6	10,970.8	Vertical
433.30	83.5	-5.4	78.1	8035.3	10,970.8	Horizontal

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Field Strength @Peak dBμV	Duty Cycle Factor dB/m	Field Strength@Average dBμV/m	Field Strength@Average μV/m	Limit @3m μV/m	E-Field Polarity
866.60	45.0	-5.4	39.6	95.5	1,097.1	Vertical
866.60	47.5	-5.4	42.1	127.4	1,097.1	Horizontal
1299.90	40.7	-5.4	35.3	58.2	1,097.1	Vertical
1299.90	43.7	-5.4	38.3	82.2	1,097.1	Horizontal
1733.20	46.9	-5.4	41.5	118.9	1,097.1	Vertical
1733.20	50.8	-5.4	45.4	186.2	1,097.1	Horizontal
2599.80	51.8	-5.4	46.4	208.9	1,097.1	Vertical
2599.80	51.7	-5.4	46.3	206.5	1,097.1	Horizontal

Remarks:

FCC Limit for Fundamental Average Measurement = 41.6667(433.3)-7083.333=10970.848μV/m

+: 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 were not adjusted for averaging and the limits of FCC Rules Part 15 Section 15.209 were applied.

*: Adjusted by Duty Cycle = -5.4dB
Duty Cycle Correction =-5.4dB
Correction Factor= Cable loss Factor+ Ant Factor-Amp Factor
Average Value Final Field Strengted = Peak Value Final Field Strengted +Duty Cycle

Correction Factor includes Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty (30MHz – 1GHz): 4.6dB
(1GHz – 18GHz): 4.4dB
Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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

Frequency Range	Quasi-Peak Limits
[MHz]	[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
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 mode (9kHz - 30MHz): PASS

Emissions detected are more than 20 dB below the limit line(s).

Results of Tx mode (30MHz – 1GHz): PASS

Radiated Emissions Quasi-Peak					
Emission Frequency MHz	E-Field Polarity	Level @3m dBμV/m	Limit @3m dBμV/m	Level @3m μV/m	Limit @3m μV/m
30.6	Vertical	37.3	40.0	73.3	100
37.4	Vertical	36.0	40.0	63.1	100
60.3	Vertical	35.2	40.0	57.5	100
98.5	Vertical	34.0	43.5	50.1	150
250.0	Vertical	34.2	46.0	51.3	200
375.0	Vertical	41.5	46.0	118.9	200
500	Vertical	38.6	46.0	85.1	200
720.7	Vertical	40.4	46.0	104.7	200
750.1	Vertical	41.0	46.0	112.2	200
101.9	Horizontal	30.1	43.5	32.0	150
143.3	Horizontal	32.8	43.5	43.7	150
250	Horizontal	37.6	46.0	75.9	200
375	Horizontal	44.6	46.0	169.8	200
500	Horizontal	40.5	46.0	105.9	200
750	Horizontal	43.9	46.0	156.7	200

Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty: 9kHz - 30MHz): 3.3dB
(30MHz – 1GHz): 4.6dB
(1GHz – 18GHz): 4.4dB
Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

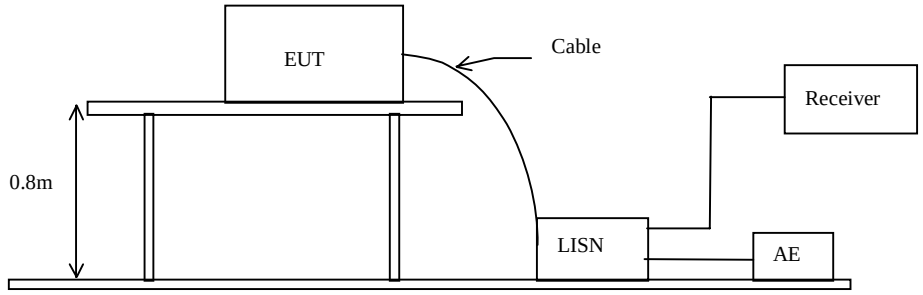
3.1.2 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.10:2013
Test Date:	2017-07-03
Mode of Operation:	TX mode
Test Voltage:	120Va.c., 60Hz

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:

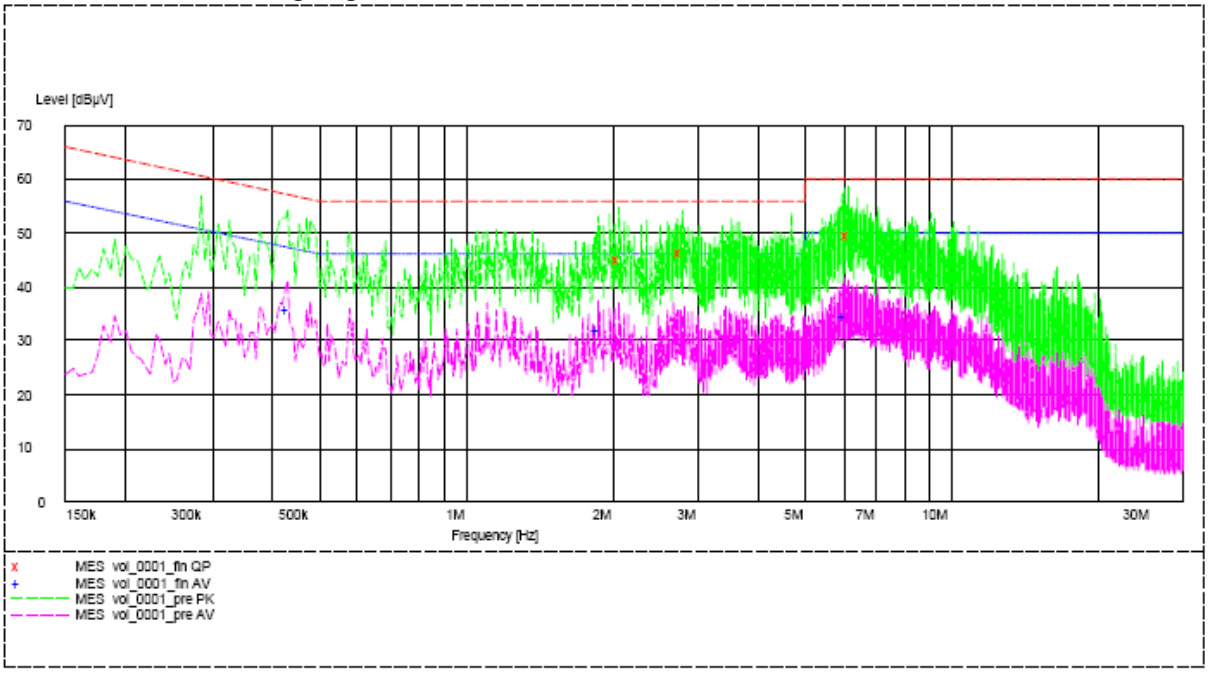


Limit for Conducted Emissions (FCC 47 CFR 15.207):

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.

Result of TX mode (L): PASS
Please refer to the following diagram for individual results.



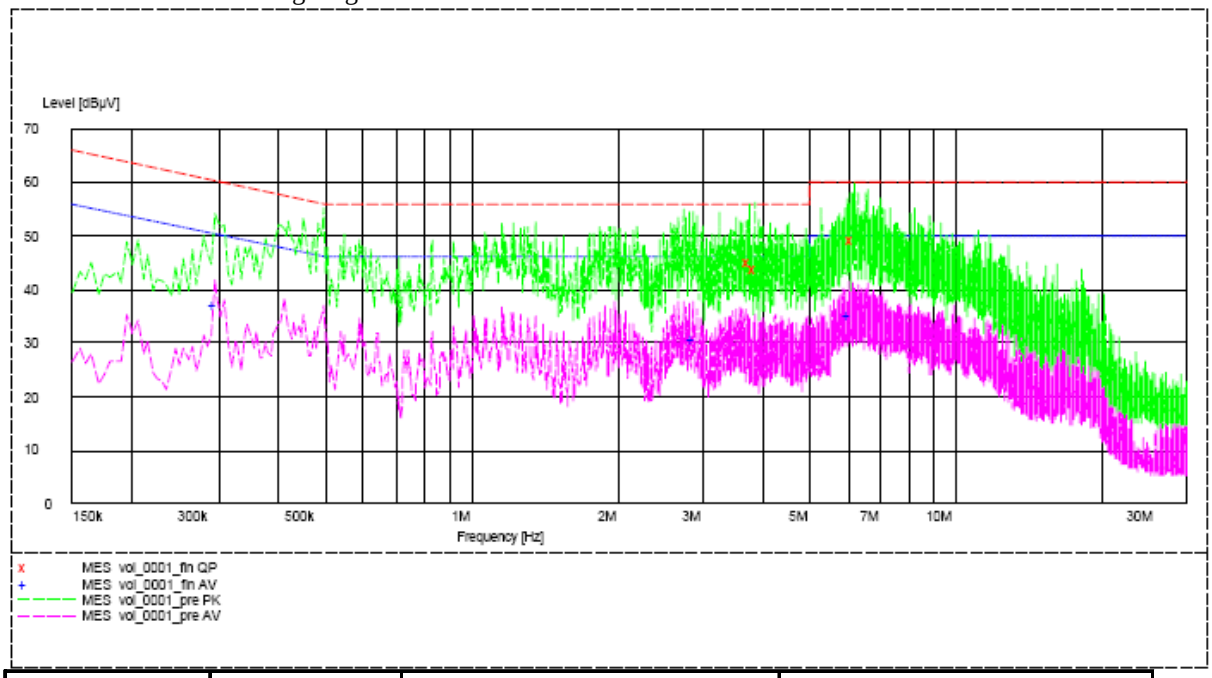
Conductor Live or Neutral	Frequency MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Average Level dBµV	Average Limit dBµV
Live	2.070	45.0	56.0	-*-	-*-
Live	2.785	46.4	56.0	-*-	-*-
Live	6.130	49.4	60.0	-*-	-*-
Live	0.430	-*-	-*-	35.9	47.0
Live	1.875	-*-	-*-	32.2	46.0
Live	6.000	-*-	-*-	34.4	50.0

Limit for Conducted Emissions (FCC 47 CFR 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.

Result of TX mode (N): PASS
Please refer to the following diagram for individual results.



Conductor Live or Neutral	Frequency MHz	Quasi-peak Level dBµV	Quasi-peak Limit dBµV	Average Level dBµV	Average Limit dBµV
Neutral	3.760	45.2	56.0	-*-	-*-
Neutral	3.855	44.1	56.0	-*-	-*-
Neutral	6.160	49.1	60.0	-*-	-*-
Neutral	0.295	-*-	-*-	37.1	50.0
Neutral	2.865	-*-	-*-	30.8	46.0
Neutral	6.025	-*-	-*-	35.1	50.0

Remarks:
Calculated measurement uncertainty (0.15MHz – 30MHz): 3.2dB
-*- Emission(s) that is far below the corresponding limit line.

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231(c)
Test Method:	ANSI C63.10:2013
Test Date:	2017-03-01
Mode of Operation:	Tx mode

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Test Setup:

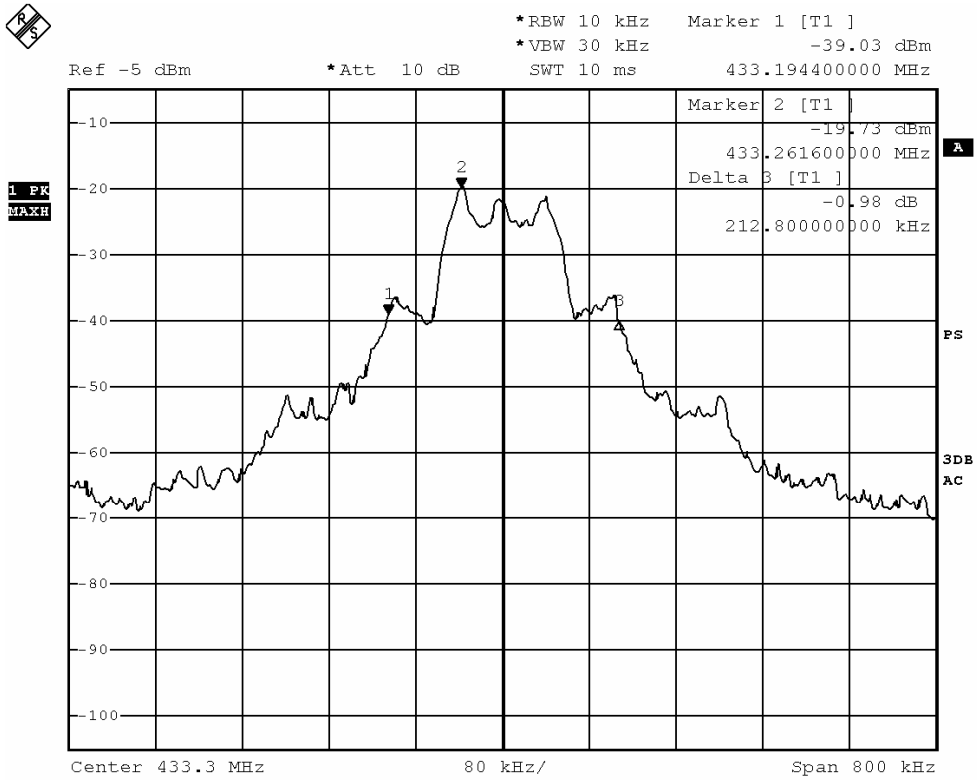
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [MHz]
433.3	212.8	1.08325

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
= (0.0025)(433.3)
= 1.08325MHz

20dB Bandwidth of Fundamental Emission



Appendix A

List of Measurement Equipment

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EMD004	LISN	ROHDE & SCHWARZ	ESH3-Z5	100102	2017-04-14	2018-04-14
EMD022	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100314	2017-04-15	2018-04-15
EMD035	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100441	2017-04-14	2018-04-14
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB 26	100388	2017-04-15	2018-04-15
EMD041	TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ENV216	100261	2017-04-14	2018-04-14
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2016.12.30	2018.12.30
EMD062	Double-Ridged Waveguide (1GHz – 18GHz)	ETS.LINDGREN	3117	00075933	2014.11.15	2017.11.15
EMD084	MULTI-DVICE CONTROLLER	ETS.LINDGREN	2090	00060107	N/A	N/A
EMD088	Video Contol Unit	ETS.LINDGREN	Y21953A	2601073	N/A	N/A
EMD093	Monitor	ViewSonic	VA9036	Q8X064201876	N/A	N/A
EMD102	Intelligent Frequency	Ainuo lnstrument Co., Ltd	AN97005SS	79707454	N/A	N/A
EMD103	Intelligent Frequency	Ainuo lnstrument Co., Ltd	AN97005SS	79707455	N/A	N/A
EMD105	FACT-3 EMC Chamber	ETS.LINDGREN	FACT-3	3803	N/A	N/A
EMD106	Shielding Room #1	ETS.LINDGREN	RFD-100	3802	N/A	N/A
EMD111	Power meter	ROHDE & SCHWARZ	NRVD	102051	2017-04-14	2018-4-14
	100V Insertion Unit	ROHDE & SCHWARZ	URV5-Z4	100464	2017-04-14	2018-4-14
EMD113	Pre-Amplifier	ROHDE & SCHWARZ	N/A	1129588	2017-04-14	2018-4-14
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2016.05.23	2019.05.23
EMD131	Standard Gain Horn Antenna (18GHz – 26.5GHz)	Chengdu AINFO lnc.	JXTXLB-42-15-C-KF	J2021100721001	2015.06.27	2018.06.27
RE01	RF cable	N/A	N/A	N/A	2016-9-28	2018-9-27
RE02	RF cable	N/A	N/A	N/A	2016-9-28	2018-9-27

Remarks:-

N/A Not Applicable or Not Available

Appendix B

Duty Cycle Correction During 100msec

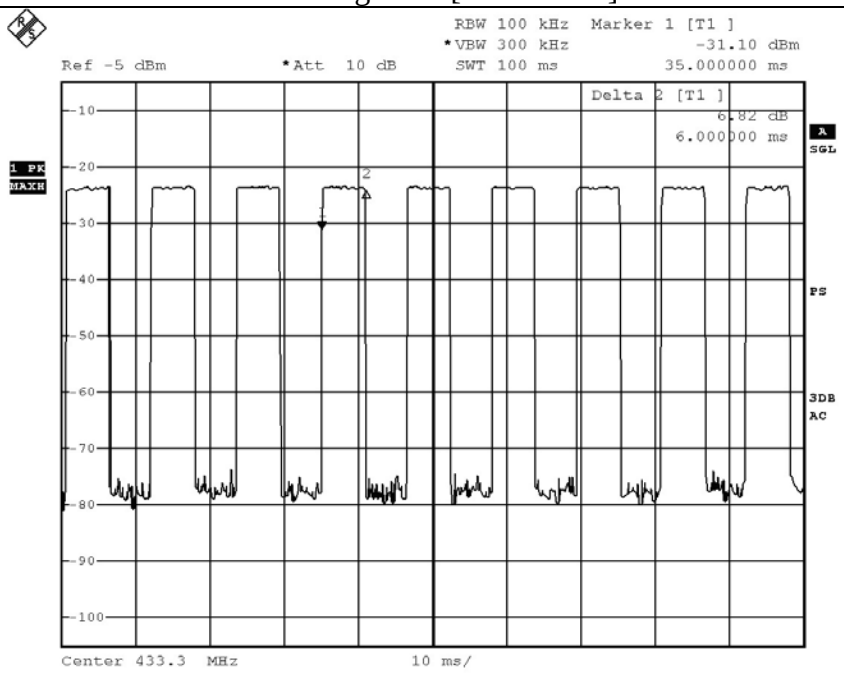
Each packet period (100msec) only one (54msec) pulse. So duty cycle would be considered (54) msec per 100msec = 54% duty cycle. Figure A shows the characteristics of the pulse train for one of these functions.

Remarks:

Duty cycle factor = 20Log [54/100]= -5.4dB

The following figures [Figure A to Figure D] showed the characteristics of the pulse train for one of these functions.

Figure A [Pulse Train]

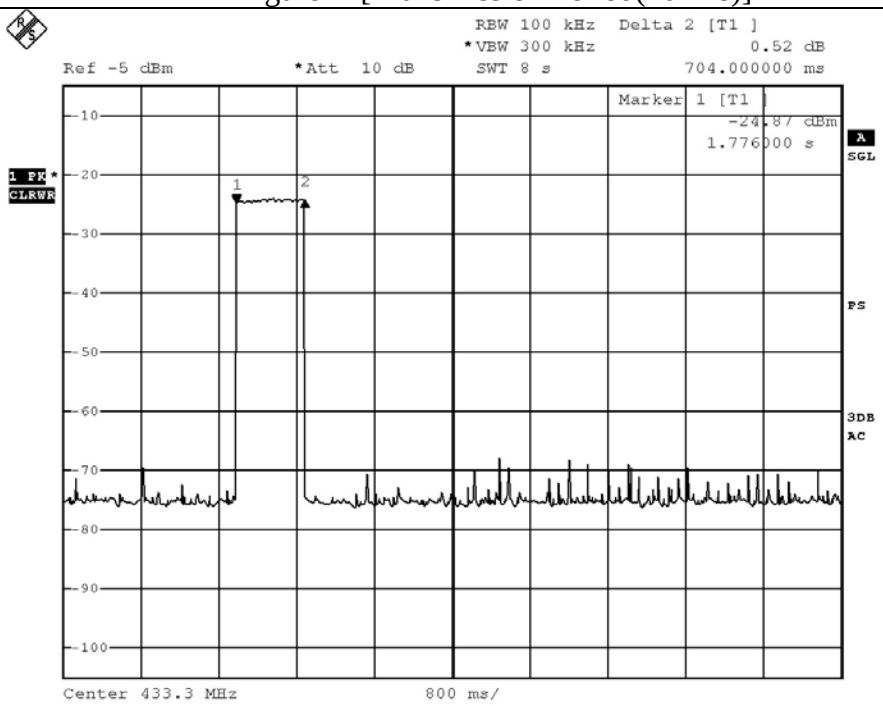


Appendix C

Manual Operated Transmitter Transmission Time [FCC 47CFR 15.231(a)]

According to FCC 47CFR15.231 (a). A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
The EUT ceases transmission almost immediately upon being released and appears to finish the current packet being transmitted. Therefore the longest period of time the transmitter should take to deactivate is a packet length.

Figure D [Transmission Period(704ms)]



Appendix D

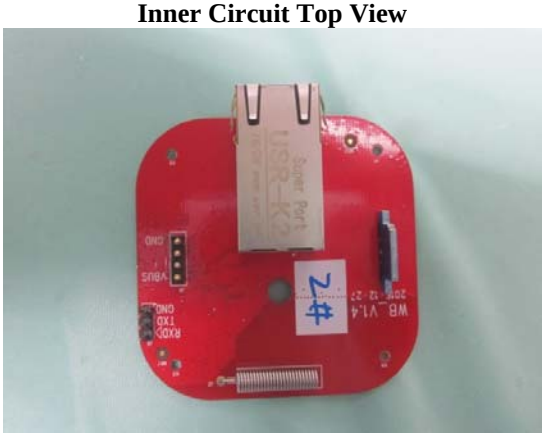
Photographs of EUT

Front View of the product

Rear View of the product

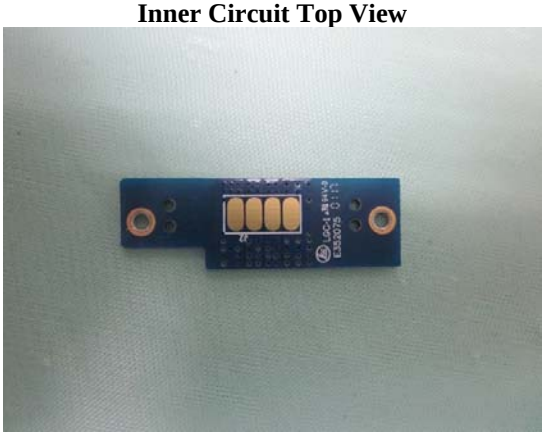
Inside View of the product

Inner Circuit Top View



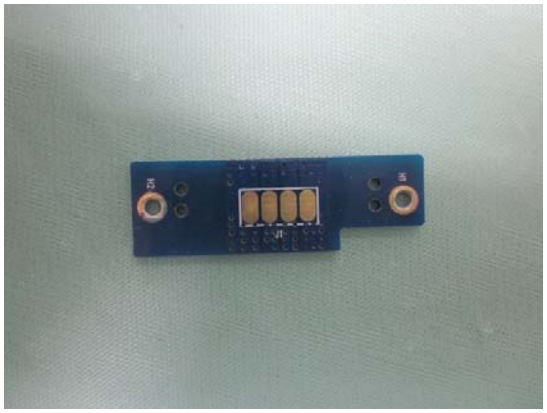
Inner Circuit Bottom View

Inner Circuit Top View



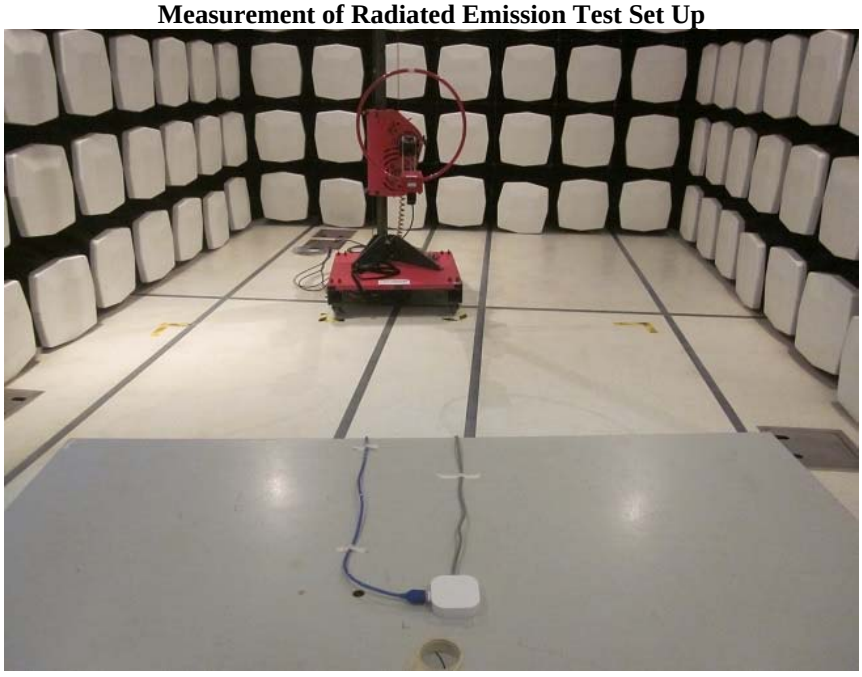
Photographs of EUT

Inner Circuit Bottom View

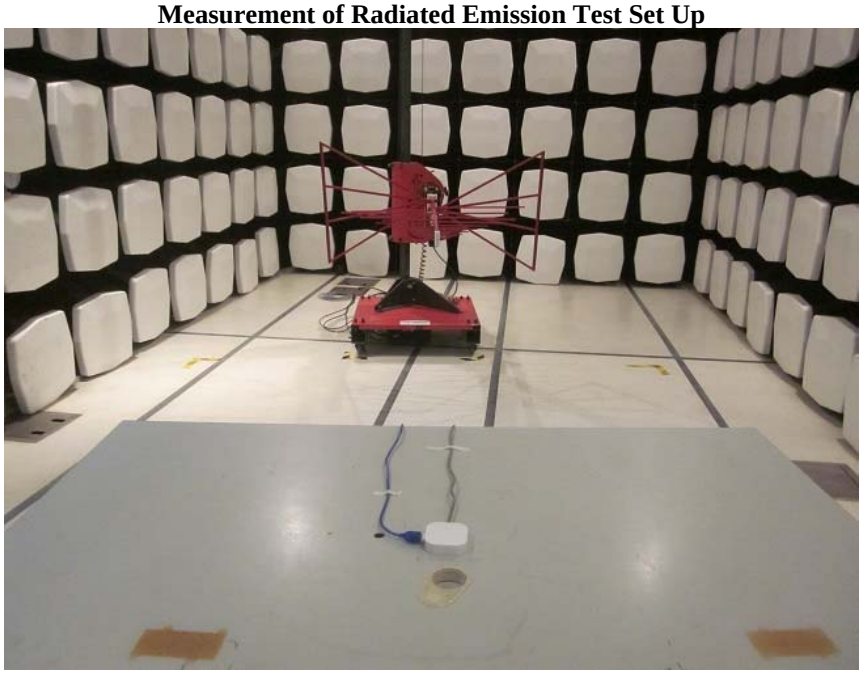


Photographs of EUT

Measurement of Radiated Emission Test Set Up

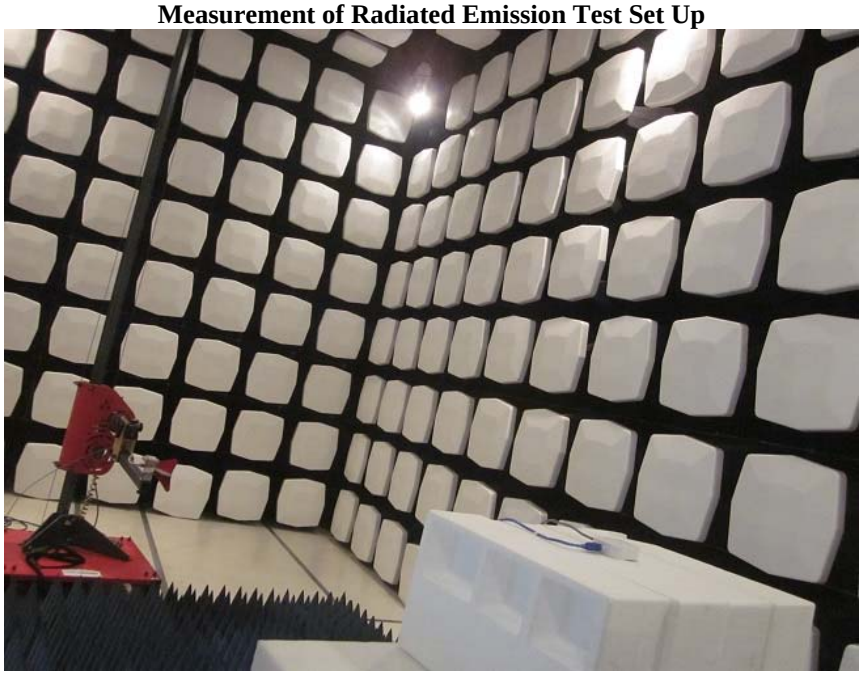


Measurement of Radiated Emission Test Set Up

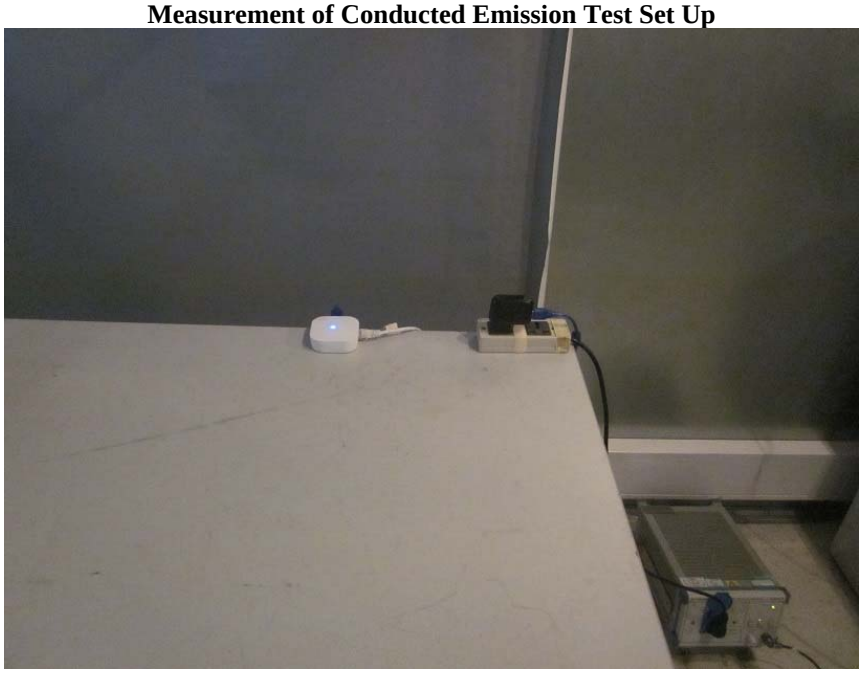


Photographs of EUT

Measurement of Radiated Emission Test Set Up



Measurement of Conducted Emission Test Set Up



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

Conditions of Issuance of Test Reports

1. All samples and goods are accepted by The STC (Dongguan) Company Limited (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The Company provides its services on the basis that such terms and conditions constitute express agreement between the Company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by the Company as a result of this application for testing service (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to his customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

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.

10. Issuance records of the Report are available on the internet at dgstc@dgstc.org. Further enquiry of validity or verification of the Reports should be addressed to the Company.