STC Test Report

Date: 2016-08-22
No. : DM124572

Applicant:	Power Probe Tek, LLC 890 Mariner Street, Brea, CA 92821
Description of Sample(s):	Submitted sample(s) said to be Product: DUAL-ZONE DIGITAL THERMOMETER Brand Name: POWER PROBE Model Number: TEMPKIT FCC ID: 2AJARTEMPKIT
Date Sample(s) Received:	2016-07-26
Date Tested:	2016-08-09 to 2016-08-22
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.
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):	---

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

STC Test Report

CONTENT:

1.0 General Details

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

Submitted sample(s) said to be

Product:	DUAL-ZONE DIGITAL THERMOMETER
Manufacturer:	Dongguan Huayi Mastech Co., Ltd. Yuliangwei Industrial Area, Qingxi Town, Dongguan, China
Brand Name:	POWER PROBE
Model Number:	TEMPKIT
Rating:	3.0Vd.c. (AAA battery *2)

1.1.1 Description of EUT Operation

The Equipment Under Test (EUT) is a DUAL-ZONE DIGITAL THERMOMETER. The transmitter is a periodically operated transmitter. It is pulse transmitter. The RF signal was modulated by IC, the type of modulation used is ASK.

1.2 Date of Order

2016-07-26

1.3 Submitted Sample(s):

1 Sample

1.4 Test Duration

2016-08-09 to 2016-08-22

1.5 Country of Origin

China

1.6 Antenna Details

Antenna Type:	spring-loaded antenna
Antenna Gain:	3dBi

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.

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 15.231e	ANSI C63.10: 2013	N/A	☒	☐	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10: 2013	N/A	☒	☐	☐
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	☒	☐	☐

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

Test Requirement:	FCC 47CFR 15.231e
Test Method:	ANSI C63.10: 2013
Test Date:	2015-08-27
Mode of Operation:	Tx mode

Test Method:

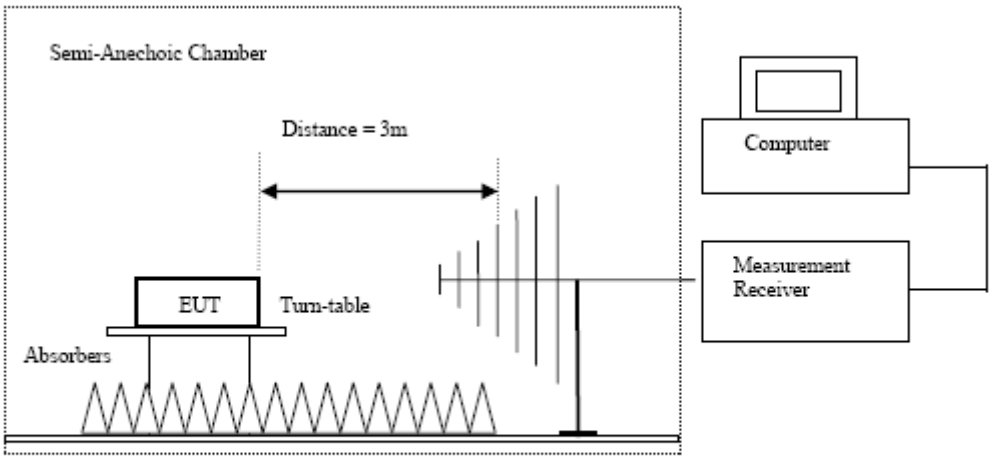
For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. 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.

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:	1MHz
	VBW:	1MHz
	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.
- 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 15.231e]:

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	1,000	100
70-130	500	50
130-174	500 to 1,500[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

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

Results of Tx mode(30MHz – 3GHz): 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
315.00	70.1	13.9	84.0	15848.9	24,166.7	Vertical

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
+ 630.00	36.2	23.8	60.0	1000.0	4,400.0	Vertical
945.00	33.8	25.5	59.3	922.6	4,400.0	Vertical
1260.00	27.1	29.4	56.5	668.3	4,400.0	Vertical
1575.00	31.8	32.2	64.0	1577.6	4,400.0	Vertical

Correction Factor=Cable loss Factor+Ant Factor-Amp Factor
Final Field Strengted = Measured Level+ Correction Factor

Results of Tx mode(30MHz – 3GHz): PASS

Field Strength of Fundamental Emissions Average 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
*	315.00	51.4	13.9	65.3	1840.8	2,416.7	Vertical

Field Strength of Spurious Emissions Average 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
+	630.00	17.5	23.8	41.3	116.1	440.0	Vertical
	945.00	15.1	25.5	40.6	107.2	440.0	Vertical
	1260.00	8.4	29.4	37.8	77.6	440.0	Vertical
	1575.00	13.1	32.2	45.3	184.1	440.0	Vertical

Correction Factor=Cable loss Factor+Ant Factor-Amp Factor
Final Field Strengted = Measured Level+ Correction Factor
Remarks:

*: Adjusted by Duty Cycle = -18.7dB

+: 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.

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
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).

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

Radiated Emissions Quasi-Peak						
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
+ 30.40	11.3	19.2	30.5	33.5	100.0	Horizontal
95.80	17.1	10.1	27.2	22.9	150.0	Horizontal
612.10	17.5	22.1	39.6	95.5	200.0	Vertical

Correction Factor=Cable loss Factor+Ant Factor-Amp Factor
Final Field Strengted = Measured Level+ Correction Factor

Remarks:
Calculated measurement uncertainty (9kHz - 30MHz): 3.3dB
(30MHz – 1GHz): 4.6dB
(1GHz - 26GHz): 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 Antenna Requirement

Test Requirements: § 15.203

Test Specification:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Results:

This is spring-loaded antenna. There is no external antenna, the antenna gain = 3dBi. User is unable to remove or changed the Antenna.

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231e
Test Method:	ANSI C63.10: 2013
Test Date:	2016-08-09
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:

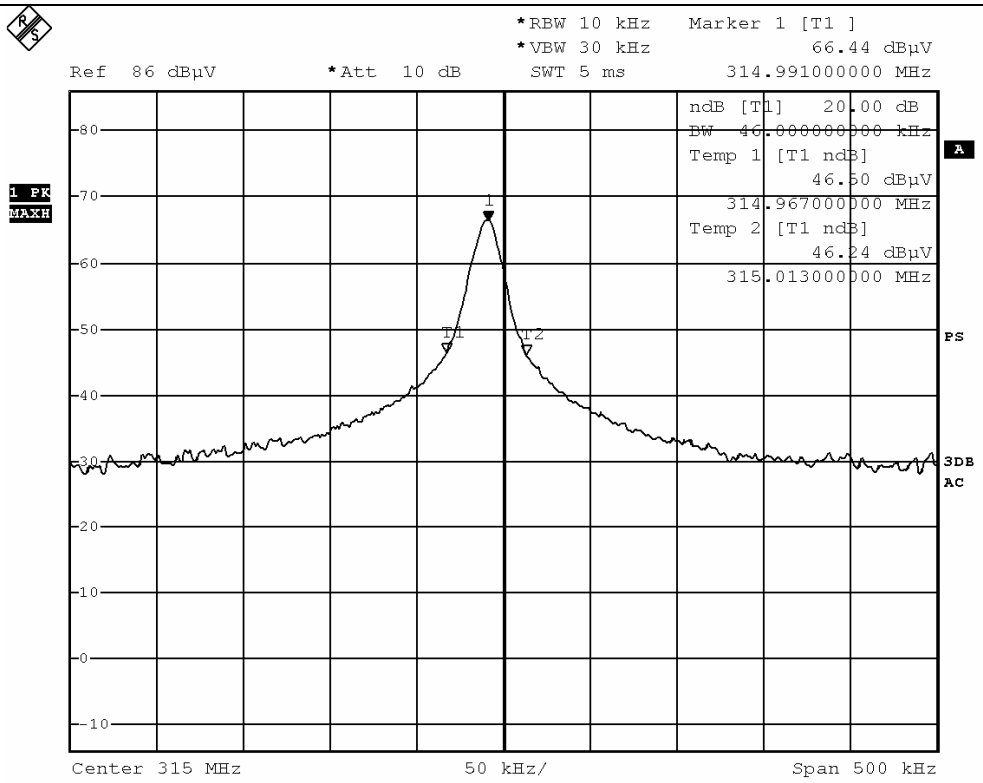
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [kHz]
315	46.0	787.5

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
= (0.0025)(315)
= 787.5kHz

20dB Bandwidth of Fundamental Emission



BMP

Date: 9.AUG.2016 12:08:35

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	2016.03.29	2017.03.29
EMD022	EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100314	2016.03.29	2017.03.29
EMD035	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100441	2016.03.29	2017.03.29
EMD036	EMI Test Receiver	ROHDE & SCHWARZ	ESIB 26	100388	2016.03.29	2017.03.29
EMD041	TWO-LINE V-NETWORK	ROHDE & SCHWARZ	ENV216	100261	2016.03.29	2017.03.29
EMD061	Biconilog Antenna	ETS.LINDGREN	3142C	00060439	2014.11.29	2016.11.29
EMD062	Double-Ridged Waveguide (1GHz – 18GHz)	ETS.LINDGREN	3117	00075933	2014.11.15	2016.11.15
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
	100V Insertion Unit	ROHDE & SCHWARZ	URV5-Z4	100464	2016.03.29	2017.03.29
EMD113	Pre-Amplifier	ROHDE & SCHWARZ	N/A	1129588	2016.03.29	2017.03.29
EMD124	Loop Antenna	ETS-Lindgren	6502	00104905	2016.05.23	2017.05.23
EMD131	Standard Gain Horn Antenna (18GHz – 26.5GHz)	Chengdu AINFO lnc.	JXTXLB-42-15-C-KF	J2021100721001	2015.06.27	2017.06.27

Remarks:-

N/A Not Applicable or Not Available

Appendix B

Duty Cycle Correction During 68.8msec

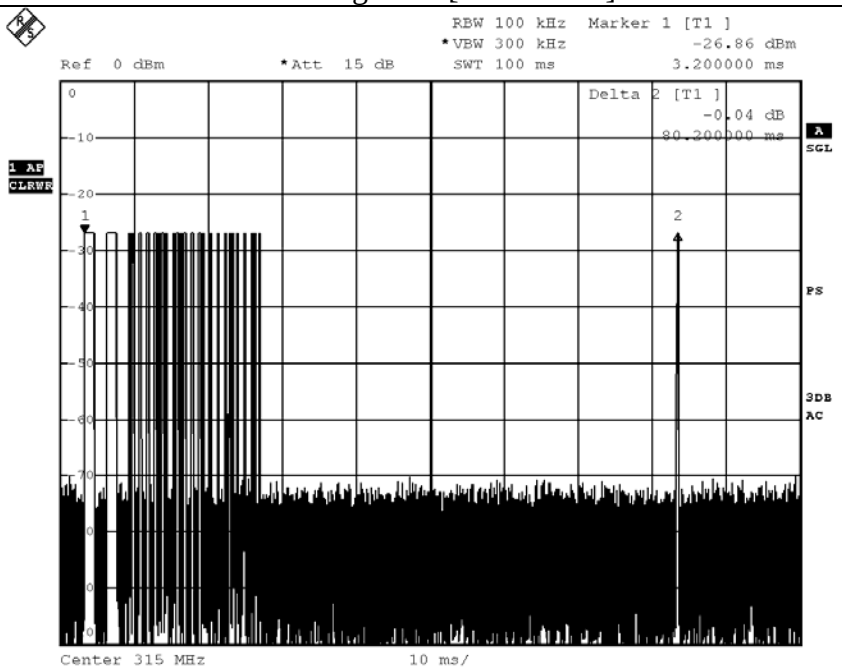
Each packet period (80.2msec) never exceeds a series of 2 (1.52msec) long and 26 (0.24msec) short pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered (1.52 x 2+0.24 x 26) msec per 80.2msec = 11.6% duty cycle. Figure A through E shows the characteristics of the pulses train for one of these functions.

Remarks:

Duty cycle = 20Log [(1.52*2)+ (0.24*26)/80.2]= -18.7dB

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

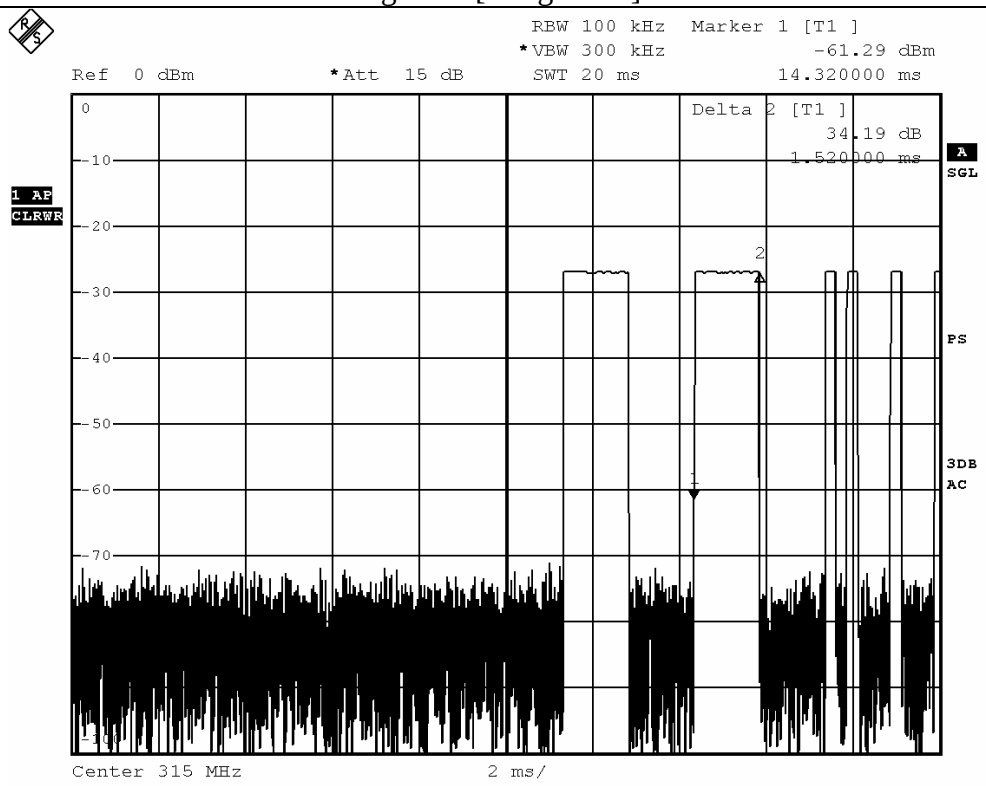
Figure A [Pulse Train]



BMP

Date: 19.AUG.2016 14:52:13

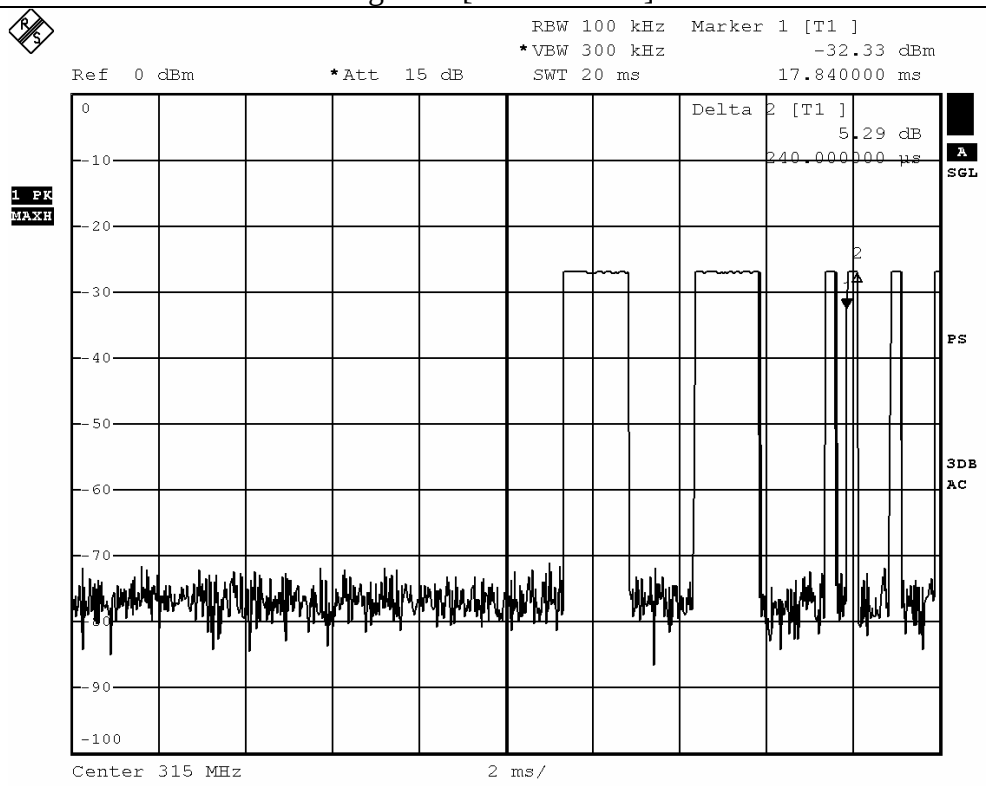
Figure B [Long Pulse]



BMP

Date: 19.AUG.2016 14:54:27

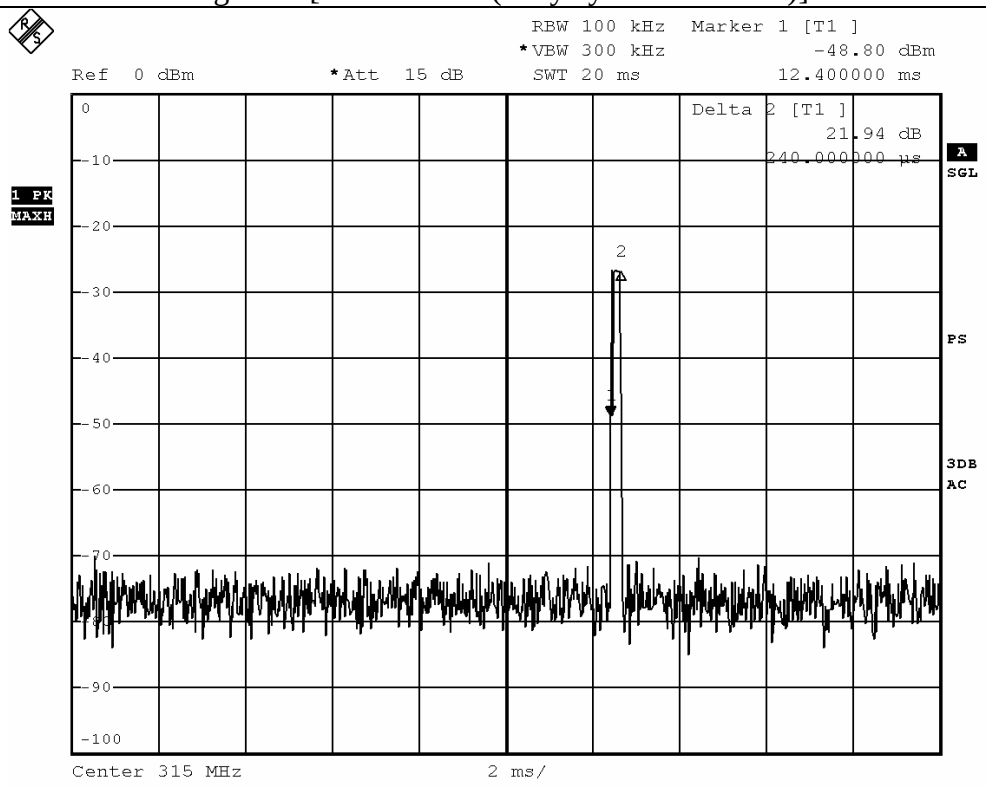
Figure C [Short Pulse 1]



BMP

Date: 19.AUG.2016 14:55:10

Figure D [Short Pulse 2(Duty cycle = -18.7dB)]



BMP

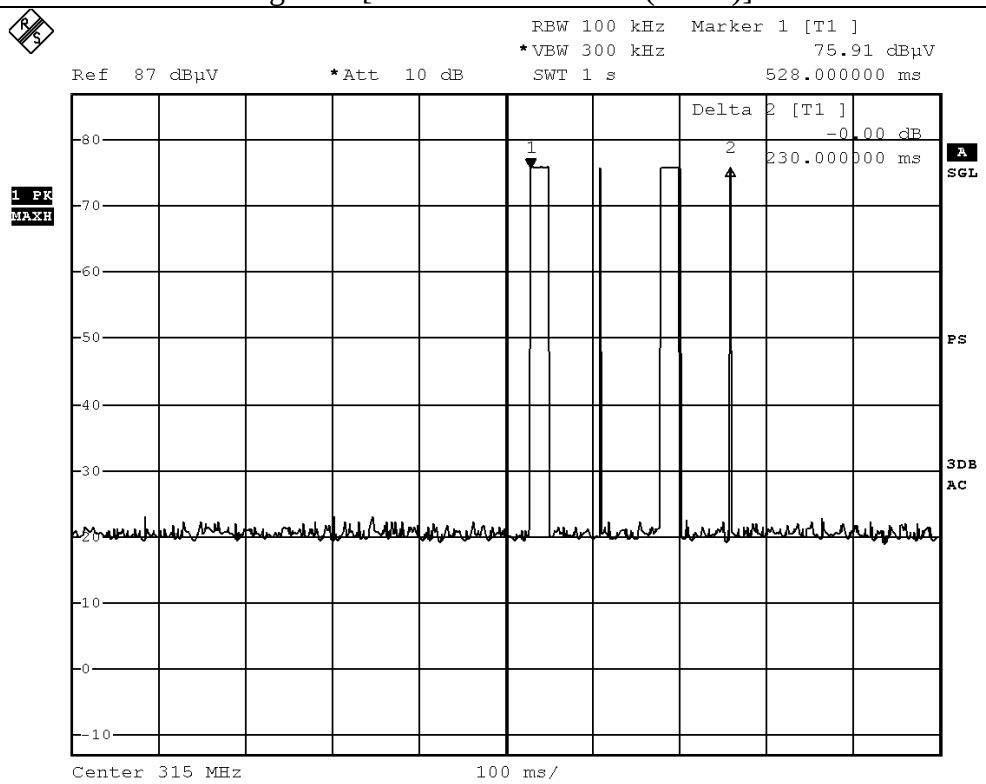
Date: 19.AUG.2016 14:56:13

Appendix C

Periodic Operation [FCC 47CFR 15.231(e)]

According to FCC 47CFR15.231 (e). A periodic transmitter shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

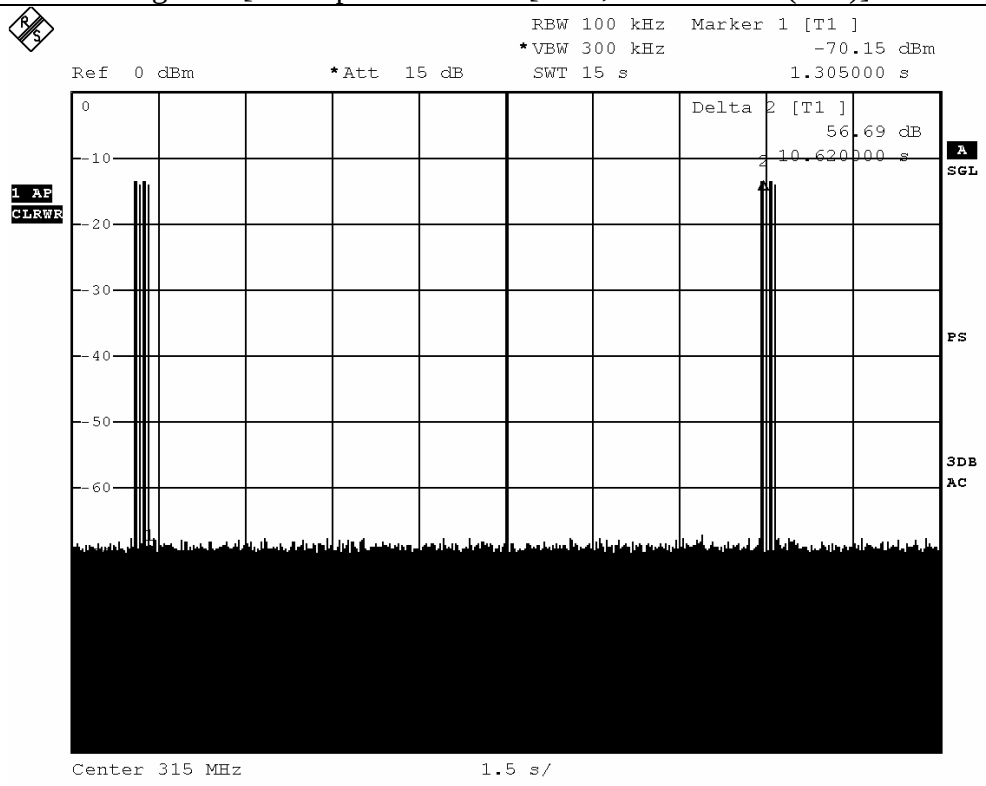
Figure E [Transmission Period (0.23 s)]



BMP

Date: 22.AUG.2016 10:56:50

Figure F [Silent period=10.62s [>10s, and>30*0.23(6.9s)]



BMP

Date: 19.AUG.2016 14:49:41

Appendix D

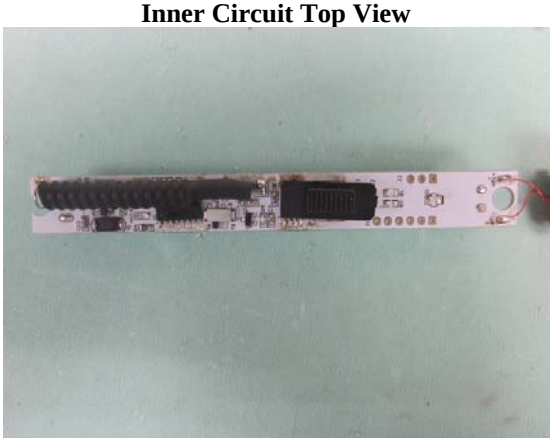
Photographs of EUT

Front View of the product

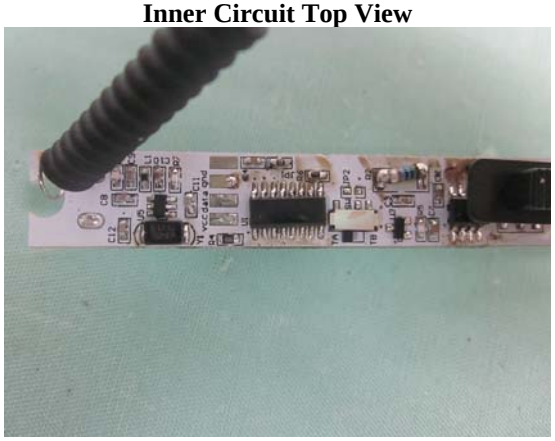
Rear View of the product

Inside View of the product

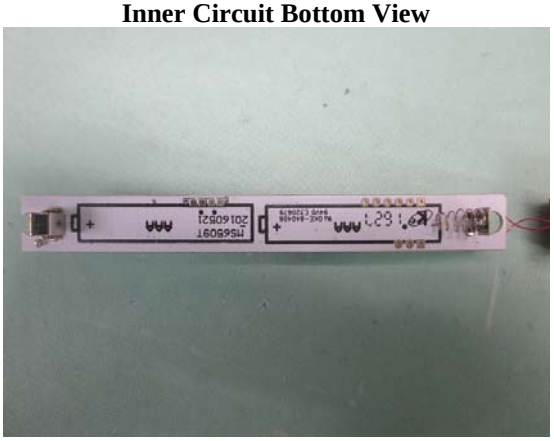
Inner Circuit Top View



Inner Circuit Top View

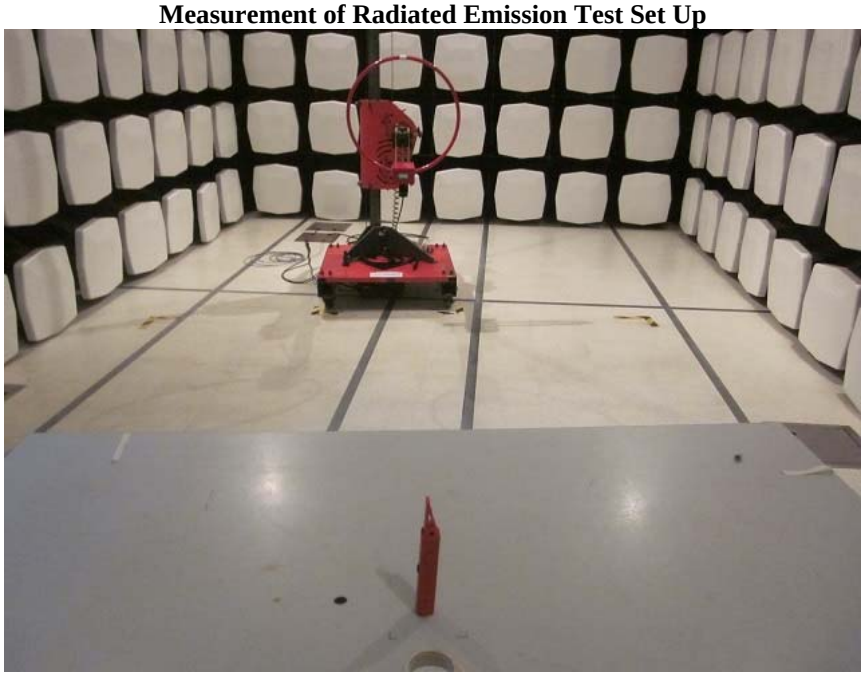


Inner Circuit Bottom View

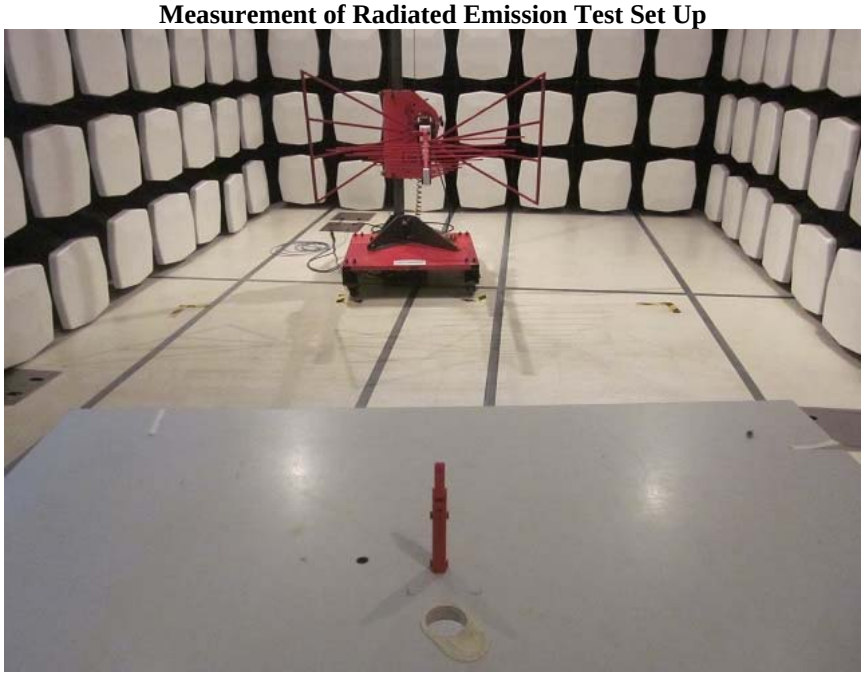


Photographs of EUT

Measurement of Radiated Emission Test Set Up

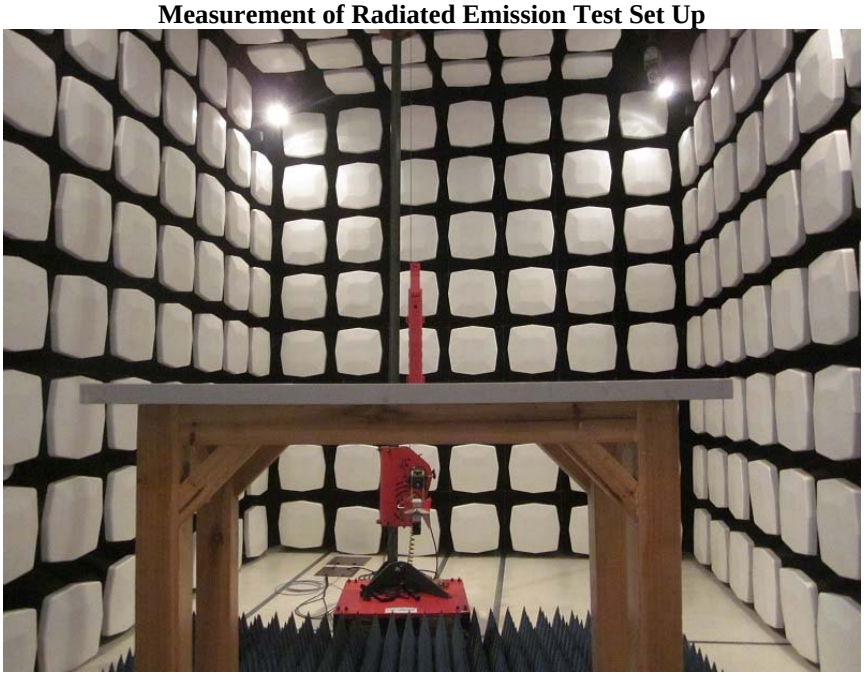


Measurement of Radiated Emission Test Set Up



Photographs of EUT

Measurement of Radiated Emission Test Set Up



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