



STC Test Report

Date : 2008-07-17

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No. : HM161832

Applicant (EWI002):

Ewig Industries Macao Commercial Offshore Limited.
Rua de Pequim Macau Finance Centre 10E, Macau

Description of Samples:

Model Name: 433MHz Thermo Hygro Sensor
Brand Name: Enhanced Living
Model Number: THX201
FCC ID: N9ZTHX201

Date Samples Received:

2008-06-10, 2008-06-26, 2008-07-10

Date Tested:

2008-06-18 to 2008-07-15

Investigation Requested:

FCC Part 15 Subpart C

Conclusions:

The submitted product was deemed to have 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:

Dr. LEE Kam Chuen,
ElectroMagnetic Compatibility Department
For and on behalf of
The Hong Kong Standards and Testing Centre Ltd.

The Hong Kong Standards and Testing Centre Ltd.

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1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate
New Territories, Hong Kong

Telephone: 852 2666 1888
Fax: 852 2664 4353

1.2 Applicant Details **Applicant**

Ewig Industries Macao Commercial Offshore Limited.
Rua de Pequim Macau Finance Centre 10E, Macau

Manufacturer

Q & S Manufacturing Co., Ltd
Yin Shan District, Fu Gang Village,
Xiang Mang West Road, Qing Xi Town, Dong Guan, China

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1.3 Equipment Under Test [EUT] Description of Sample

Product: 433MHz Thermo Hygro Sensor
Manufacturer: Q & S Manufacturing Co., Ltd
Brand Name: Enhanced Living
Model Number: THX201
Rating: 3Vd.c ("AAA" size battery x 2)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a EWIG INDUSTRIES MACAO COMMERCIAL OFFSHORE LTD, 433MHz Thermo Hygro Sensor. The EUT transmit periodically after switch on. The operation period of each transmission is 446ms, and the silent period between each transmission is 60.601s. The EUT to transmit while switch on. Modulation by IC; and type is pulse modulation.

1.4 Date of Order

2008-06-10, 2008-06-26, 2008-07-10

1.5 Submitted Sample(s):

4 Samples

1.6 Test Duration

2008-06-18 to 2008-07-15

1.7 Country of Origin

China

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2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2007 and ANSI C63.4:2003 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
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231e	ANSI C63.4:2003	N/A	☒	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.209	ANSI C63.4:2003	N/A	☒	☐

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

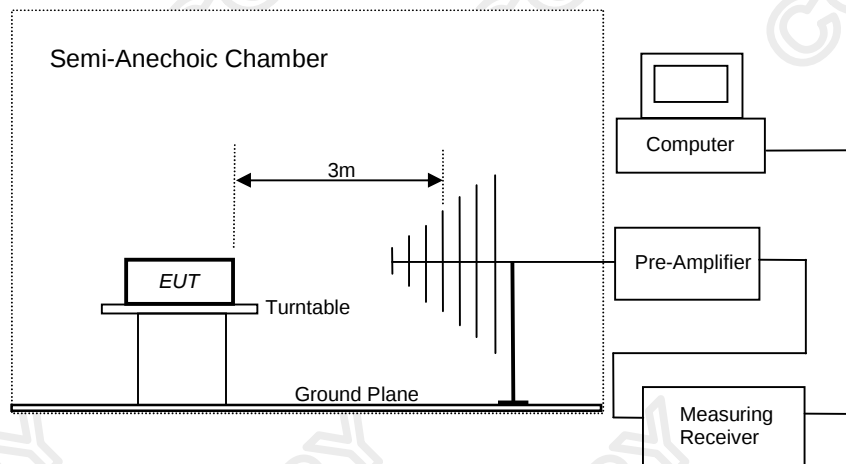
Test Requirement: FCC 47CFR 15.231e
Test Method: ANSI C63.4:2003
Test Date: 2008-07-14
Mode of Operation: Tx On mode

Test Method:

The sample was placed 0.8m 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 G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

Test Setup:



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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 *	50 to 150 *
174-260	1,500	150
260-470	1,500 to 5,000 *	150 to 500 *
Above 470	5,000	500

Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, $\mu\text{V/m}$ at 3 meters = $22.72727(F) - 2454.545$; for the band 260-470 MHz, $\mu\text{V/m}$ at 3 meters = $16.6667(F) - 2833.3333$. The maximum permissible unwanted emission level is 20dB below the maximum fundamental level.

Result:

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	Antenna Polarity
433.72	57.9	18.4	76.3	6531.3	43,953.5	Vertical

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	Antenna Polarity
* 433.80	51.5	18.4	69.9	3126.1	4,396.7	Vertical

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Results:

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	Antenna Polarity
867.60	27.6	26	53.6	478.6	4395.3	Vertical
+ 1301.16	< 1.0	29.4	< 30.4	< 33.1	5,000.0	Vertical
1734.88	< 1.0	32.2	< 33.2	< 45.7	4,395.3	Vertical
2168.60	< 1.0	15.9	< 16.9	< 7.0	4,395.3	Vertical
2602.32	< 1.0	17.4	< 18.4	< 8.3	4,395.3	Vertical
3036.04	< 1.0	17.2	< 18.2	< 8.1	4,395.3	Vertical
3469.76	< 1.0	18.8	< 19.8	< 9.8	4,395.3	Vertical
+ 3903.48	< 1.0	19.7	< 20.7	< 10.8	5,000.0	Vertical
+ 4337.20	< 1.0	20.6	< 21.6	< 12.0	5,000.0	Vertical

Remarks:

*: Adjusted by Duty Cycle = -6.4dB

***: According to FCC C47CFR 15.231e,
FCC Limit for Average Measurement = $16.6667(433.72\text{MHz}) - 2833.3333 = 4395.34\mu\text{V/m}$

+: Denotes restricted band of operation.

Measurements were made using a peak detector. For emissions falling within the restricted bands of FCC Rules Part 15 Section 15.205, the limits of FCC Rules Part 15 Section 15.209 were applied.

No further spurious emissions found between lowest internal frequency and 30MHz

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty = 30MHz to 1GHz 5.2dB

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Limited for Radiated Emissions [FCC 47 CFR 15.209]:

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.

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	Antenna Polarity
1301.10	26.7	26.5	53.2	457.1	4395.3	Vertical

Calculated measurement uncertainty	=	30MHz to 1GHz	5.2dB
	=	1GHz to 18GHz	5.1dB



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3.2 20dB Bandwidth of Fundamental Emission

Test Requirement: FCC 47 CFR 15.231e
Test Method: ANSI C63.4:2003 (Section 13.1.7)
Test Date: 2008-07-14
Mode of Operation: On 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.

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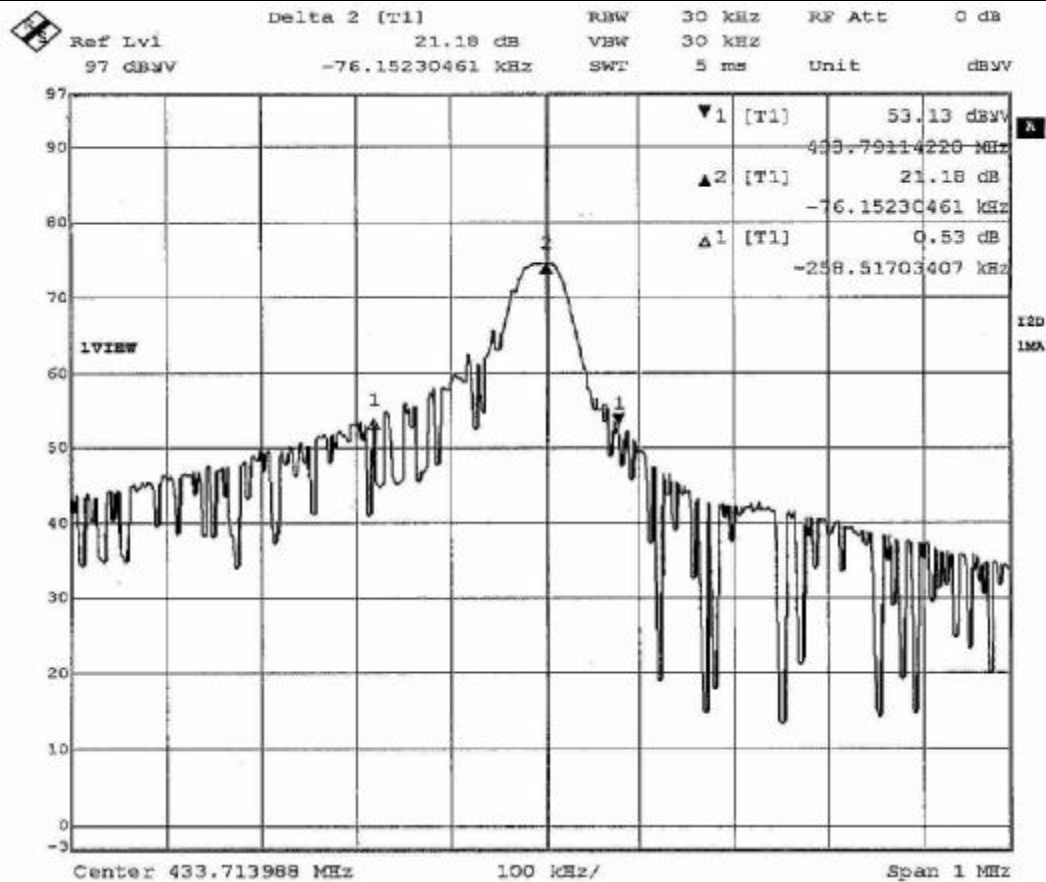
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Limits for 20dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [KHz]	FCC Limits * [KHz]
433.71	258.5	1084.3

*: FCC Limit for Bandwidth measurement
= (0.25%)(Center Frequency)
= (0.0025)(433.72)
= 1084.3KHz

20dB Bandwidth of Fundamental Emission



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Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	--	2006/05/02	2009/05/02
EM219	BICONILOG ANTENNA	EMCO	3142C	00029071	2006/08/23	2008/08/23
EM229	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB40	100248	2007/07/20	2008/08/20
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2006/07/26	2008/07/26

Remarks:-

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

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Appendix B

Duty Cycle Correction During 100msec

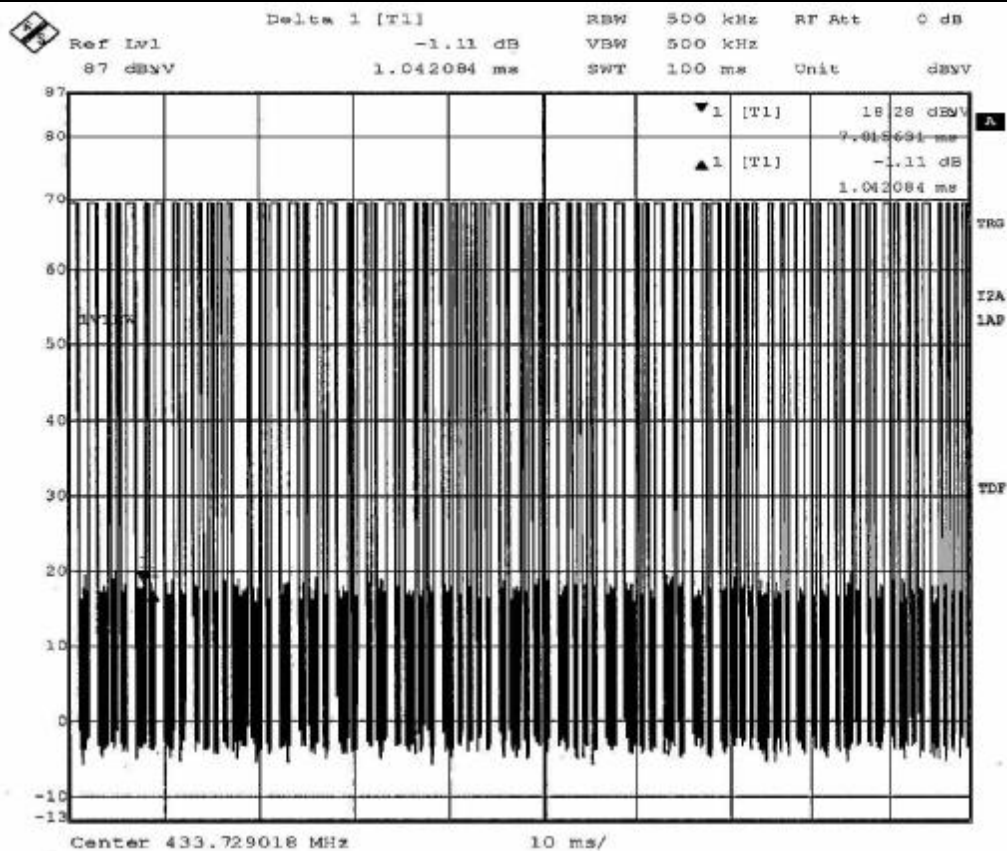
The data packet is a combination of different pulses, but each packet period (100msec) with never exceeds a series of 23 long (1.04msec) and 49 short (0.48msec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worse case transmit duty cycle would be considered $23 \times 1.04 \text{ msec} + 49 \times 0.48 \text{ msec}$ per $100 \text{ msec} = 47.4\%$ duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction = $20\text{Log}(0.474) = -6.4\text{dB}$

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

Figure A [Pulse Train]



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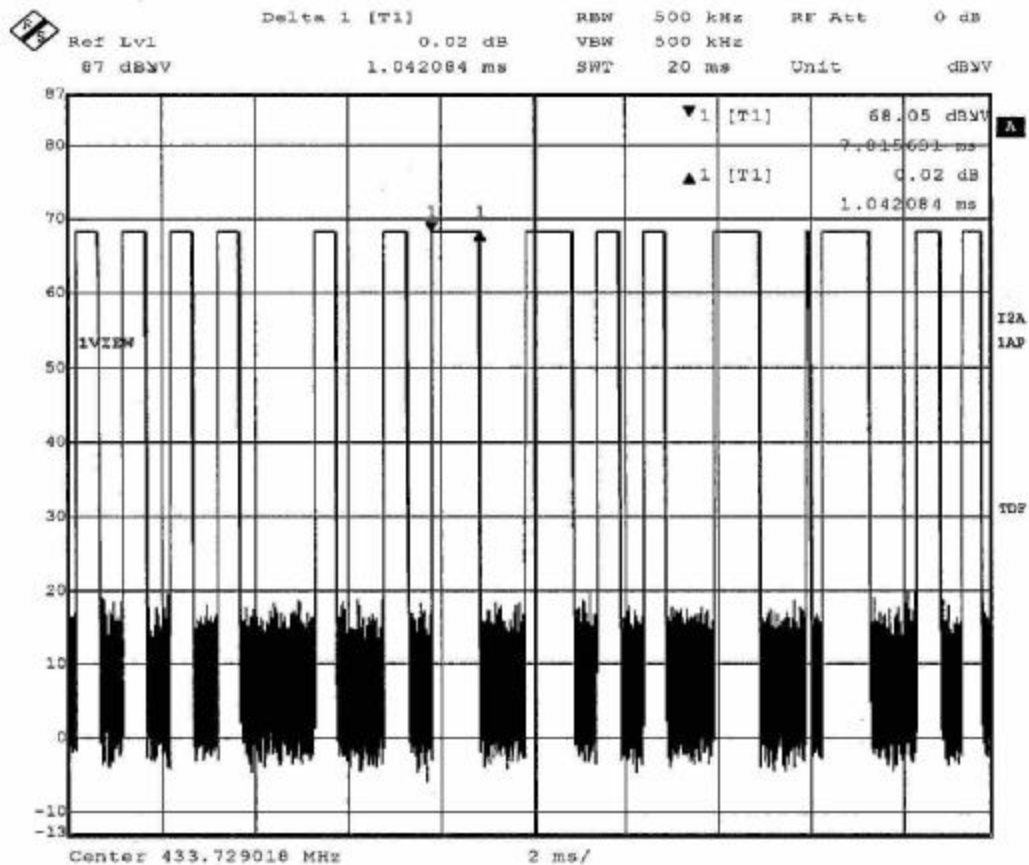
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Figure B [Long Pulse]



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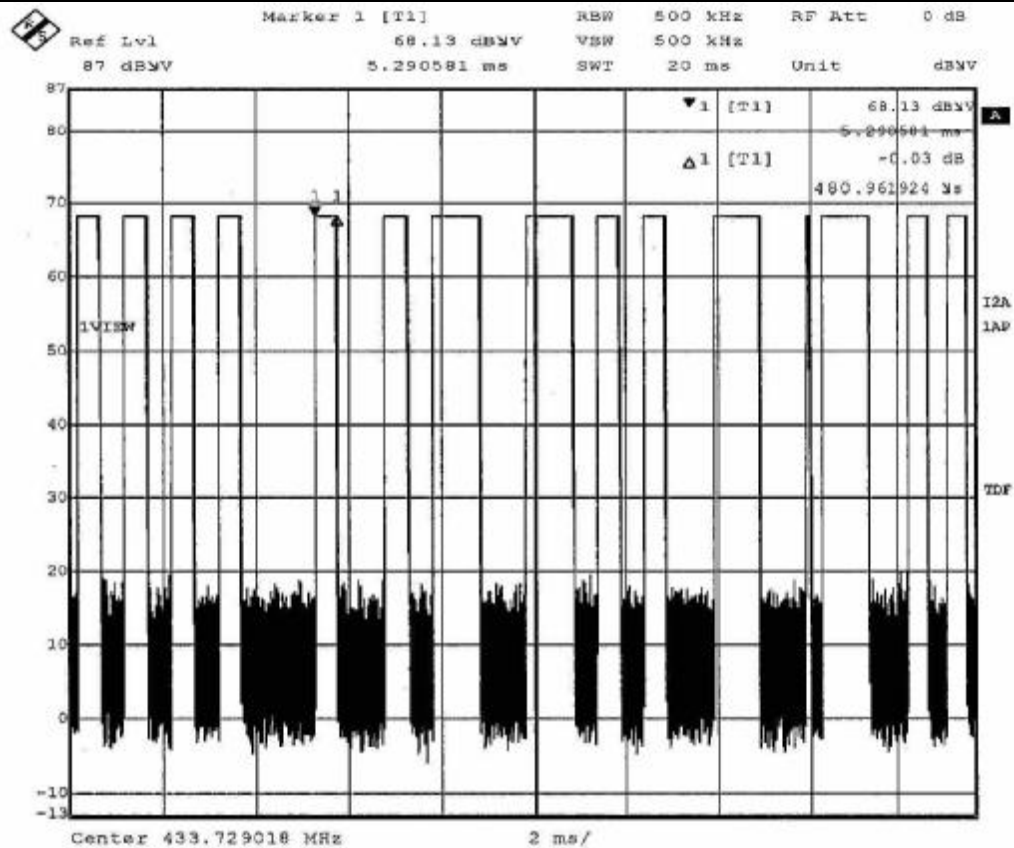
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Figure C [Short Pulse]



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Appendix C

Periodic Operation [FCC 47CFR 15.231e]

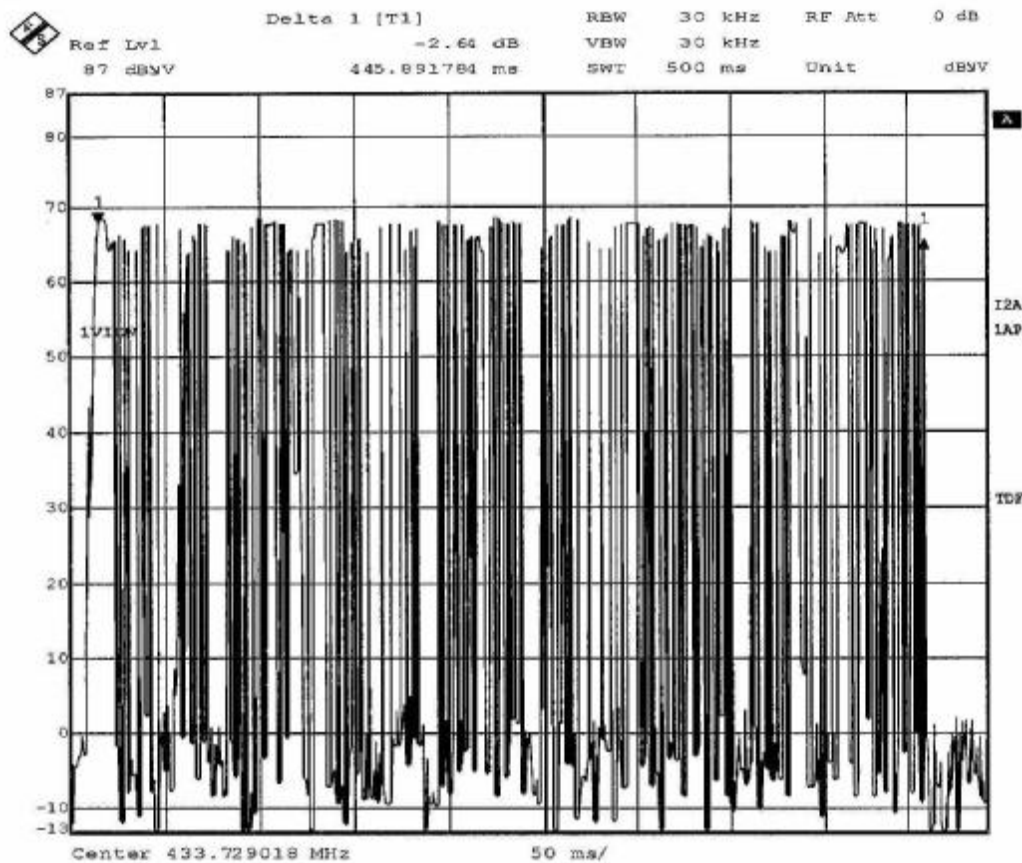
According to FCC 47CFR15.231e. The EUT shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case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

Results:

Transmission period = 446ms < 1s
60.6/446ms = 135.9 > 30

The following figures [Figure D to Figure E] showed the duration of transmission period and silent period.

Figure D [Transmission period]



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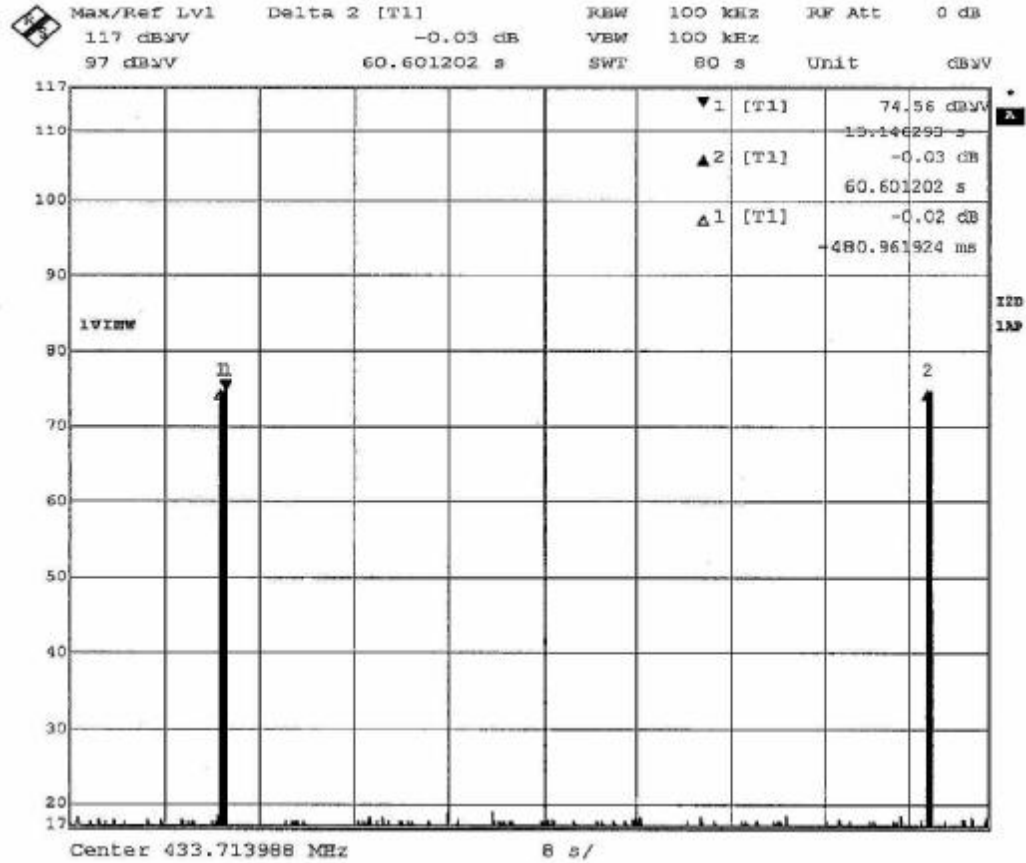
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Periodic operation [FCC 47CFR15.231e]

Figure E [Silent Period]



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Appendix D

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



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