



STC Test Report

Date : 2008-07-23

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No. : HM162121

Applicant (ANE001):

Ansen Electronics Company
Room 73-78, 2/F., Sino Industrial Plaza, 9 Kai Cheung Road,
Kowloon Bay, Kowloon, Hong Kong.

Description of Samples:

Product: LOW COST REMOTE THERMO-
HYGRO SENSOR WITH DISPLAY
Brand Name: N/A
Model Number: W186-F
FCC ID: L5CW186TX-F

Date Samples Received:

2008-07-08

Date Tested:

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**

Ansen Electronics Company
Room 73-78, 2/F., Sino Industrial Plaza,
9 Kai Cheung Road, Kowloon Bay, Kowloon, Hong Kong.

HKSTC Code Number for Applicant

Manufacturer

Ansen Electronics Company
Chen Tung Industrial Zone, Ning Tau Administrative District,
Dongguan, Guangdong, China

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1.3 Equipment Under Test [EUT] Description of Sample

Product: LOW COST REMOTE THERMO-HYGRO SENSOR WITH DISPLAY
Manufacturer: Ansen Electronics Company
Brand Name: N/A
Model Number: W186-F
Rating: 3Vd.c. ("AA" size battery x 2)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is an Ansen Electronics Company, LOW COST REMOTE THERMO-HYGRO SENSOR WITH DISPLAY. This product is operated by 3V (AA) battery. -MCU will detect the temperature, humidity sensor and will display the temperature and humidity. At the same time, it will transmit the signal through the data pin. The RF circuit will modulate the signal (AM modulation) and output the modulated signal by the antenna.

1.4 Date of Order

2008-07-08

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

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 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Radiated Emissions, 30MHz to 1GHz | FCC 47CFR 15.209 | ANSI C63.4:2003 | N/A | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

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3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

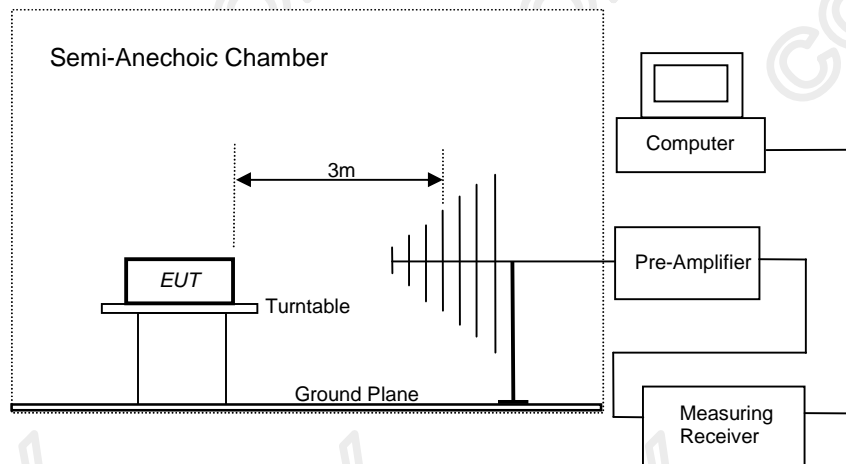
Test Requirement: FCC 47CFR 15.231e & 15.209
Test Method: ANSI C63.4:2003
Test Date: 2008-07-15
Mode of Operation: Tx Mode

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 HKSTC 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, mV/m at 3 meters $= 22.72727(F) - 2454.545$; for the band 260-470 MHz, mV/m at 3 meters $= 16.6667(F) - 2833.3333$. The maximum permissible unwanted emission level is 20dB below the maximum fundamental level.

Results of Tx Mode:

| 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 |
| 433.98 | 52.8 | 18.2 | 71.0 | 3548.1 | 43,996.8 | 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 |
| * 433.98 | 34.7 | 18.2 | 52.9 | 441.6 | 4,399.7 | Vertical |

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Results of Tx Mode:

| 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 |
| 867.96 | 15.5 | 25.2 | 40.7 | 108.4 | 4399.7 | Vertical |
| + 1301.94 | < 1.0 | 29.4 | < 30.4 | < 33.1 | 5,000.0 | Vertical |
| 1735.92 | < 1.0 | 32.2 | < 33.2 | < 45.7 | 4,399.7 | Vertical |
| 2169.90 | < 1.0 | 15.9 | < 16.9 | < 7.0 | 4,399.7 | Vertical |
| 2603.88 | < 1.0 | 17.4 | < 18.4 | < 8.3 | 4,399.7 | Vertical |
| 3037.86 | < 1.0 | 17.2 | < 18.2 | < 8.1 | 4,399.7 | Vertical |
| 3471.84 | < 1.0 | 18.8 | < 19.8 | < 9.8 | 4,399.7 | Vertical |
| + 3905.82 | < 1.0 | 19.7 | < 20.7 | < 10.8 | 5,000.0 | Vertical |
| + 4339.80 | < 1.0 | 20.6 | < 21.6 | < 12.0 | 5,000.0 | Vertical |

Remarks:

*: Adjusted by Duty Cycle = -18.1dB

**: According to FCC C47CFR 15.231e,
FCC Limit for Average Measurement = $16.6667(433.98\text{MHz}) - 2833.3333 = 4,399.7\mu\text{V/m}$

+: 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]:

| Frequency Range [MHz] | Quasi-Peak Limits [$\mu\text{V/m}$] |
|--------------------------|--|
| 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.

Results of On Mode:

| Radiated Emissions Quasi-Peak | | | | | |
|---|---------------------|--|--|-------------------------------------|---------------------------------|
| Emission Frequency MHz | E-Field Polarity | Level @3m $\text{dB}\mu\text{V/m}$ | Limit @3m $\text{dB}\mu\text{V/m}$ | Level @3m @3m $\mu\text{V/m}$ | Limit @3m $\mu\text{V/m}$ |
| Emissions detected are more than 20 dB below the FCC Limits | | | | | |

Remarks:

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty = 30MHz to 1GHz 5.2dB

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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: | 2008-07-15 |
| 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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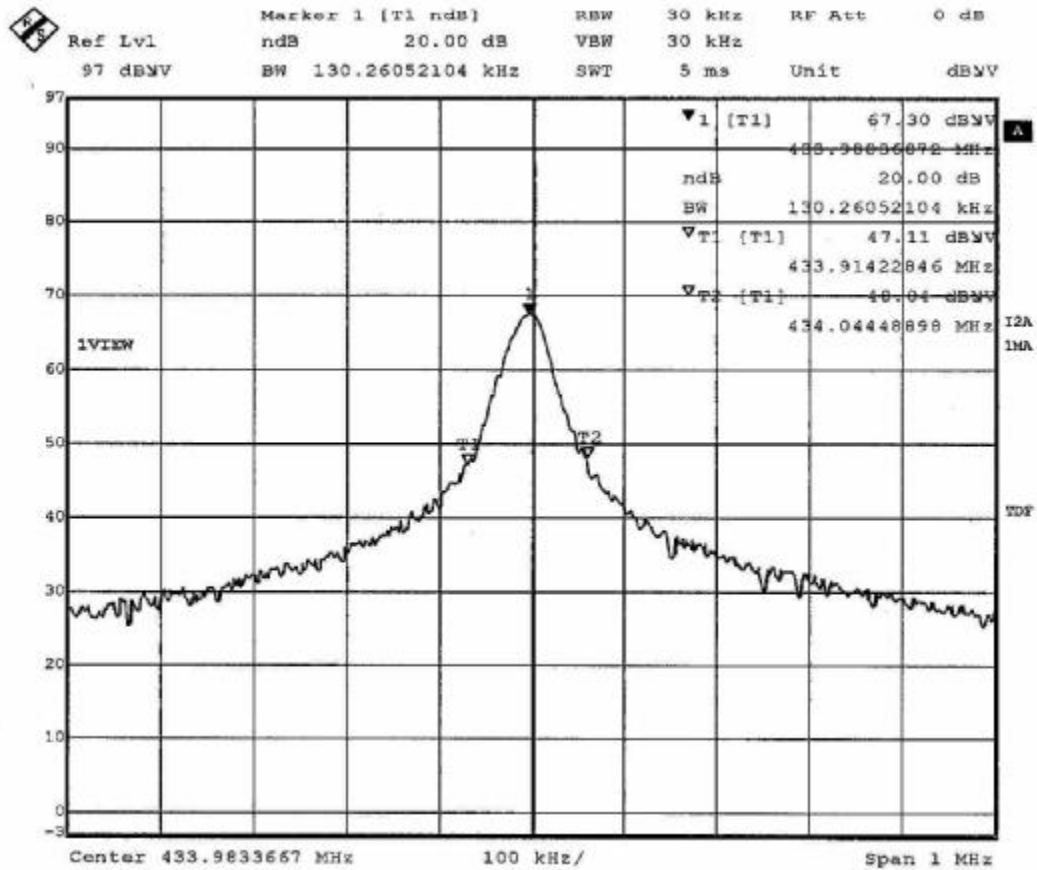
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Limits for 20dB Bandwidth of Fundamental Emission:

| Frequency Range [MHz] | 20dB Bandwidth [KHz] | FCC Limits * [KHz] |
|--------------------------|-------------------------|-----------------------|
| 433.98 | 130.3 | 1084.95 |

*: FCC Limit for Bandwidth measurement
= (0.25%)(Center Frequency)
= (0.0025)(433.98)
= 1084.95KHz

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

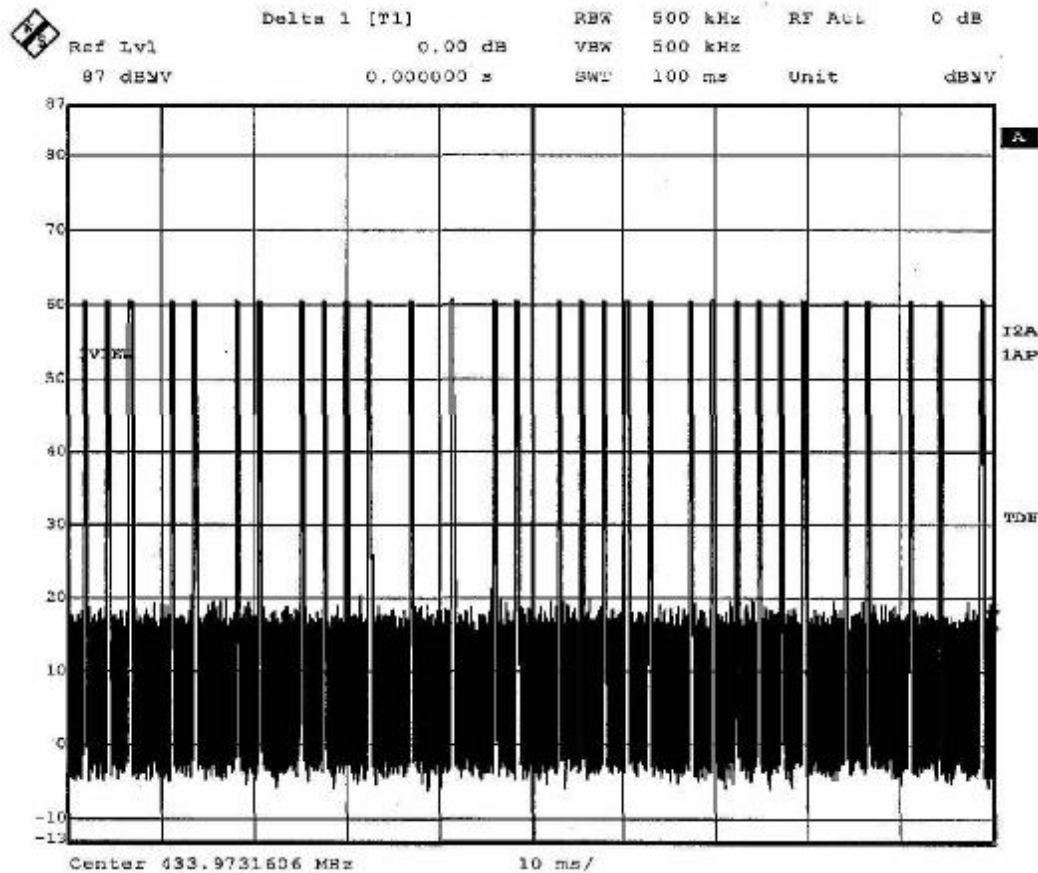
Each function key sends a different series of characters, but each packet period (100msec) never exceeds a series of 31 short (0.4msec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worse case transmit duty cycle would be considered $31 \times 0.4\text{msec}$ per 100msec = 12.4% duty cycle. Figure A through B show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction = $20\text{Log}(0.124) = -18.1\text{dB}$

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

Figure A [Pulse Train]



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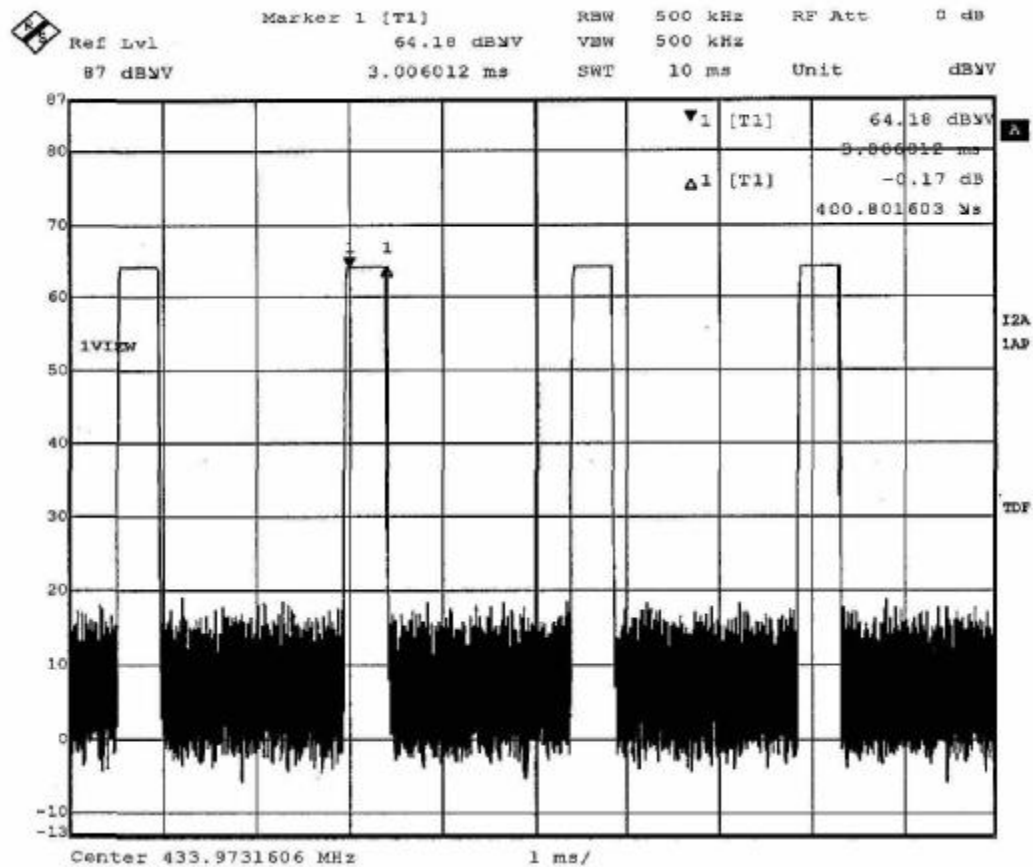
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Figure B [Pulse Period]



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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.

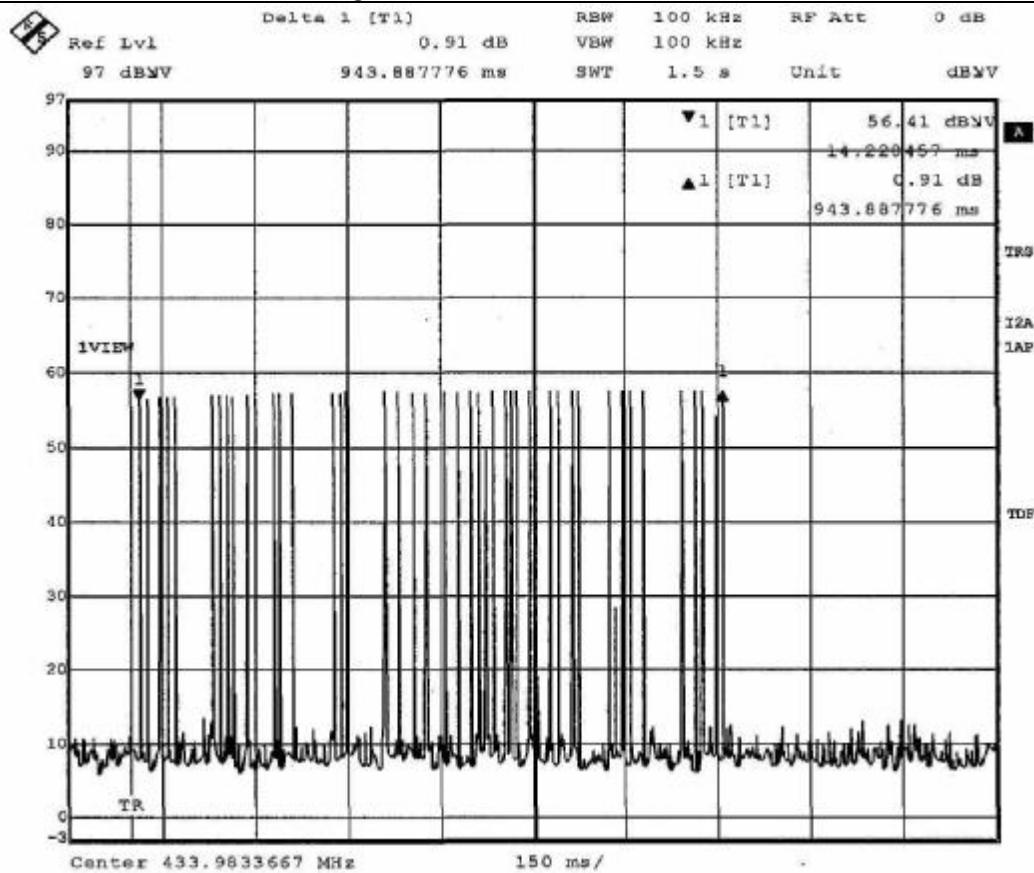
Results:

Transmission period = 0.944s < 1s

$30.06/0.944 = 31.84 > 30$

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

Figure D [Transmission period]



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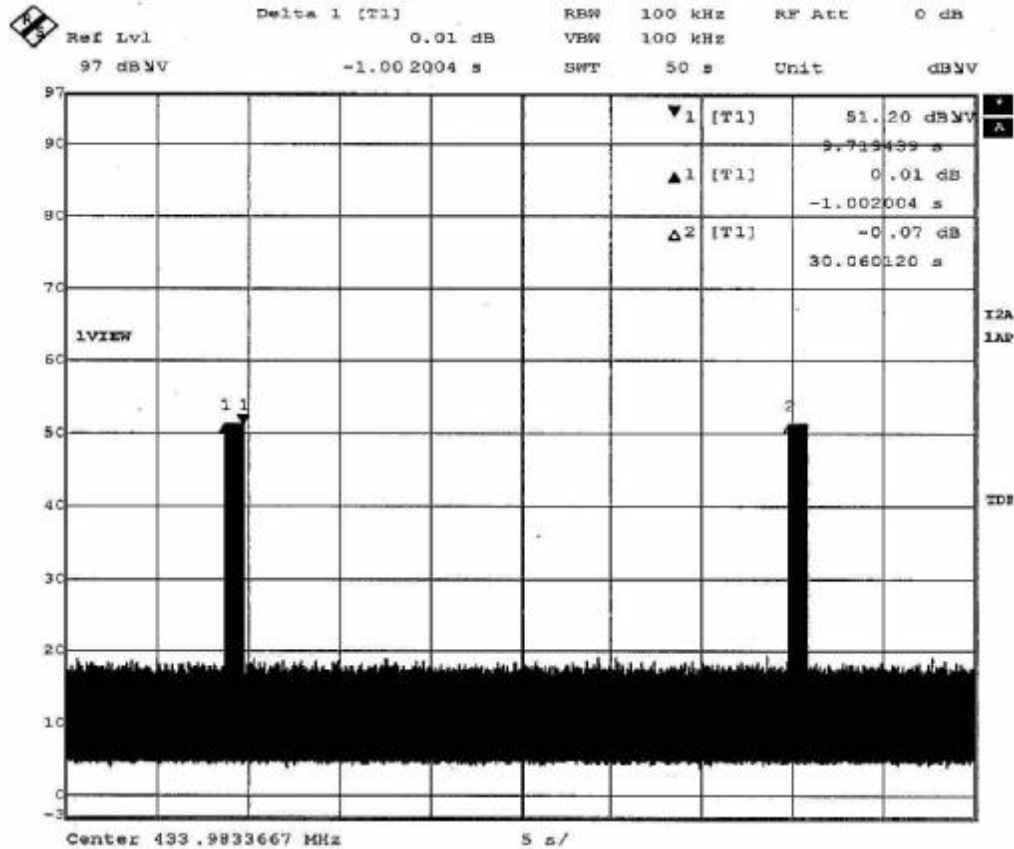
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Periodic operation [FCC 47CFR15.231e]

Figure E [Silent Period]



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Appendix D

Photographs of EUT

Front View of the product



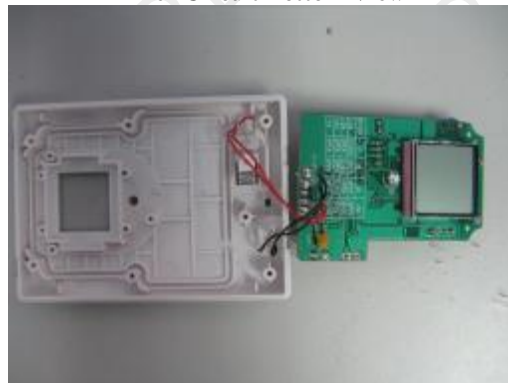
Rear View of the product



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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