STC Test Report

Date : 2010-10-05
No. : HM165640

Applicant (CKT001): CKICOM TECHNOLOGY LTD.
Unit 220, 2/F, Enterprise Place, No. 5 Science Park, West Avenue, Hong Kong Science Park, Shatin, N.T., Hong Kong.

Manufacturer: CKICOM TECHNOLOGY LTD.
Unit 220, 2/F, Enterprise Place, No. 5 Science Park, West Avenue, Hong Kong Science Park, Shatin, N.T., Hong Kong.

Description of Sample(s): Submitted sample(s) said to be

Product:	CAREase II
Brand Name:	CAREase
Model Number:	T210
FCC ID:	YQKCEIIPT210

Date Sample(s) Received: 2010-08-17, 2010-09-10

Date Tested: 2010-08-27 to 2010-09-17

Investigation Requested: Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2009 and ANSI C63.4:2003 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): ---

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

STC Test Report

CONTENT:

The Hong Kong Standards and Testing Centre Ltd.
10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong
Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org

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

CKICOM TECHNOLOGY LTD.
Unit 220, 2/F, Enterprise Place, No. 5 Science Park, West Avenue, Hong Kong Science Park, Shatin, N.T., Hong Kong.

Manufacturer

CKICOM TECHNOLOGY LTD.
Unit 220, 2/F, Enterprise Place, No. 5 Science Park, West Avenue, Hong Kong Science Park, Shatin, N.T., Hong Kong.

1.3 Equipment Under Test [EUT]
Description of Sample

Submitted sample(s) said to be

Product:	CAREase II
Manufacturer:	CKICOM TECHNOLOGY LTD.
Brand Name:	CAREase
Model Number:	T210
Rating:	3Vd.c. ("CR2032" button cell x 1)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is a CKICOM TECHNOLOGY LTD., CAREase II. The EUT consist both periodic and manual operated transmitter function. By pressing the button [§15.231(a) – manually activated transmitter] the EUT will be paired with the wetness alarm receiver. This transmission always stops 3 seconds after activating. When the EUT achieves wet detection, the transmitter will periodically (every 52 sec) send a signal (535ms long) to the receiver unit [§15.231(e) – periodic operation]. The transmission signal modulation by IC; and the type is amplitude modulation.

1.4 Date of Order

2010-08-17, 2010-09-10

1.5 Submitted Sample(s):

2 Sample(s)

1.6 Test Duration

2010-08-27 to 2010-09-17

1.7 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 2009 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	N/A
Field Strength of Fundamental Emissions & Spurious Emissions	FCC 47CFR 15.231a	ANSI C63.4:2003	N/A	☒	☐	☐
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

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions (30 – 1000MHz)

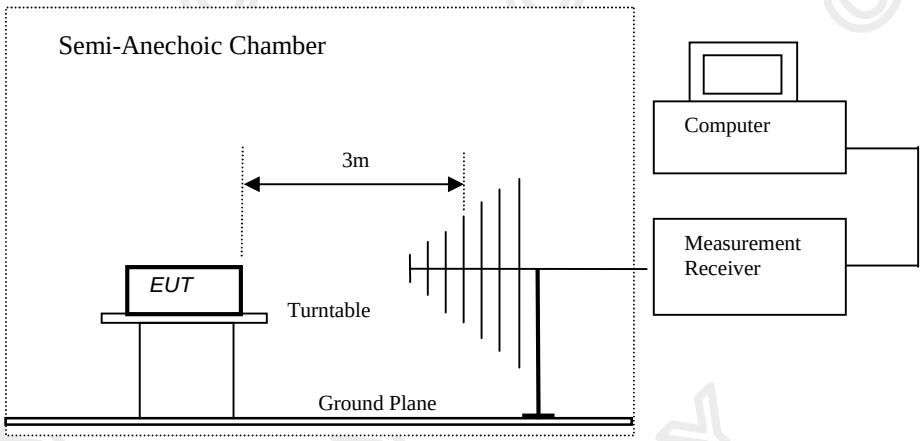
Test Requirement:	FCC 47CFR 15.231a
Test Method:	ANSI C63.4:2003
Test Date:	2010-09-17
Mode of Operation:	Tx on mode (press on the button)

Test Method:

The sample was placed 0.8m above the ground plane of OATS*. 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.

*: OATS [Open Area Test Site] located at the roof of Hong Kong Standards & Testing Centre with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 568301.

Test Setup:



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

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μV/m at 3 meters=56.81818(F)-6136.3636; for the band 260-470 MHz, μV/m at 3 meters =41.6667(F)-7083.3333. The maximum permissible unwanted emission level is 20dB below the maximum permitted fundamental level.

Results of Tx on mode (press on the button): 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
	315.0	62.8	16.0	78.8	8,709.6	60,416.8	Horizontal
	630.0	27.2	23.1	50.3	327.3	6,041.7	Horizontal
	945.0	29.2	26.7	55.9	623.7	5,000.0	Horizontal
	1260.0	32.3	27.8	60.1	1,011.6	6,041.7	Horizontal
+	1575.0	32.1	32.0	64.1	1,603.2	5,000.0	Horizontal
	1890.0	20.1	33.5	53.6	478.6	6,041.7	Horizontal
+	2205.0	< 1.0	5.8	< 6.8	< 2.2	5,000.0	Horizontal
	2520.0	< 1.0	3.3	< 4.3	< 1.6	6,041.7	Horizontal
+	2835.0	< 1.0	5.4	< 6.4	< 2.1	5,000.0	Horizontal
	3150.00	< 1.0	6.0	< 7.0	< 2.2	6,041.7	Horizontal

Remarks:

FCC Limit for Fundamental Average Measurement = 41.6667(315)-7083.3333=6,041.68μV/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 = -10.73dB
Duty Cycle Correction =-20dB, if the calculation duty cycle correction >-20dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

Results of Tx on mode (press on the button): 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
	315.0	52.1	16.0	68.1	2,541.0	6,041.7	Horizontal
	630.0	16.5	23.1	39.6	95.5	604.2	Horizontal
	945.0	18.5	26.7	45.2	182.0	500.0	Horizontal
	1260.0	21.6	27.8	49.4	295.1	604.2	Horizontal
+	1575.0	21.4	32.0	53.4	467.7	500.0	Horizontal
	1890.0	9.4	33.5	42.9	139.6	604.2	Horizontal
+	2205.0	< 1.0	5.8	< 6.8	< 2.2	500.0	Horizontal
	2520.0	< 1.0	3.3	< 4.3	< 1.6	604.2	Horizontal
+	2835.0	< 1.0	5.4	< 6.4	< 2.1	500.0	Horizontal
	3150.00	< 1.0	6.0	< 7.0	< 2.2	604.2	Horizontal

Remarks:

FCC Limit for Fundamental Average Measurement = 41.6667(315)-7083.3333=6,041.68μV/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 = -10.73dB
Duty Cycle Correction =-20dB, if the calculation duty cycle correction >-20dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

Radiated Emissions (30 – 1000MHz)

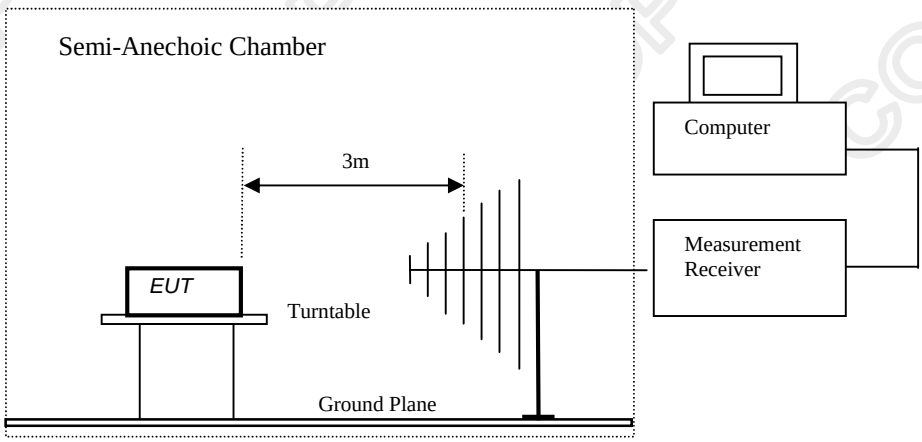
Test Requirement:	FCC 47CFR 15.231e
Test Method:	ANSI C63.4:2003
Test Date:	2010-09-17
Mode of Operation:	Tx on mode (achieves wet detection)

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:



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 formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μV/m at 3 meters = 22.72727(F) - 2454.545; for the band 260-470 MHz, μV/m at 3 meters = 16.6667(F) - 2833.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Results of Tx on mode (achieves wet detection): 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
	315.0	55.7	16.0	71.7	3,845.9	24,166.8	Horizontal
	630.0	29.0	23.1	52.1	402.7	2,416.7	Horizontal
	945.0	22.1	26.7	48.8	275.4	2,416.7	Horizontal
	1260.0	27.5	27.8	55.3	582.1	2,416.7	Horizontal
+	1575.0	23.2	29.6	52.8	436.5	5,000.0	Horizontal
	1890.0	19.5	31.2	50.7	342.8	2,416.7	Horizontal
+	2205.0	< 1.0	5.8	< 6.8	< 2.2	5,000.0	Horizontal
	2520.0	< 1.0	34.9	< 35.9	< 62.4	2,416.7	Horizontal
+	2835.0	< 1.0	26.5	< 27.5	< 23.7	5,000.0	Horizontal
	3150.00	< 1.0	26.5	< 27.5	< 23.7	2,416.7	Horizontal

Remarks:

FCC Limit for Fundamental Average Measurement = 16.6667(315)-2833.3333=2,416.68μV/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 = -11.85dB
Duty Cycle Correction =-20dB, if the calculation duty cycle correction >-20dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

Results of Tx on mode (achieves wet detection): 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
315.0	43.9	16.0	59.9	988.6	2,416.7	Horizontal
630.0	17.1	23.1	40.2	102.3	241.7	Horizontal
945.0	10.2	26.7	36.9	70.0	241.7	Horizontal
1260.0	15.6	27.8	43.4	147.9	241.7	Horizontal
+ 1575.0	11.3	29.6	40.9	110.9	500.0	Horizontal
1890.0	7.6	31.2	38.8	87.1	241.7	Horizontal
+ 2205.0	< 1.0	5.8	< 6.8	< 2.2	500.0	Horizontal
2520.0	< 1.0	34.9	< 35.9	< 62.4	241.7	Horizontal
+ 2835.0	< 1.0	26.5	< 27.5	< 23.7	500.0	Horizontal
3150.00	< 1.0	26.5	< 27.5	< 23.7	241.7	Horizontal

Remarks:

FCC Limit for Fundamental Average Measurement = 16.6667(315)-2833.3333=2,416.68μV/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 = -11.85dB
Duty Cycle Correction =-20dB, if the calculation duty cycle correction >-20dB

Correction Factor includes Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

Limits for Radiated Emissions [FCC 47 CFR 15.209]:

Frequency Range [MHz]	Quasi-Peak Limits [μV/m]
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.

Results of Tx on mode: PASS

Field Strength of Fundamental Emissions Quasi-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
Emissions detected are more than 20 dB below the FCC Limits						

Remarks:
No additional spurious emissions found between lowest internal used/generated frequency and 30MHz

Correction Factor includes Antenna Factor and Cable Attenuation.
Calculated measurement uncertainty : 30MHz to 1GHz 5.1dB

3.2 20dB Bandwidth of Fundamental Emission

Test Requirement:	FCC 47 CFR 15.231a
Test Method:	ANSI C63.4:2003 (Section 13.1.7)
Test Date:	2010-09-17
Mode of Operation:	Tx on mode (press on the button)

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:

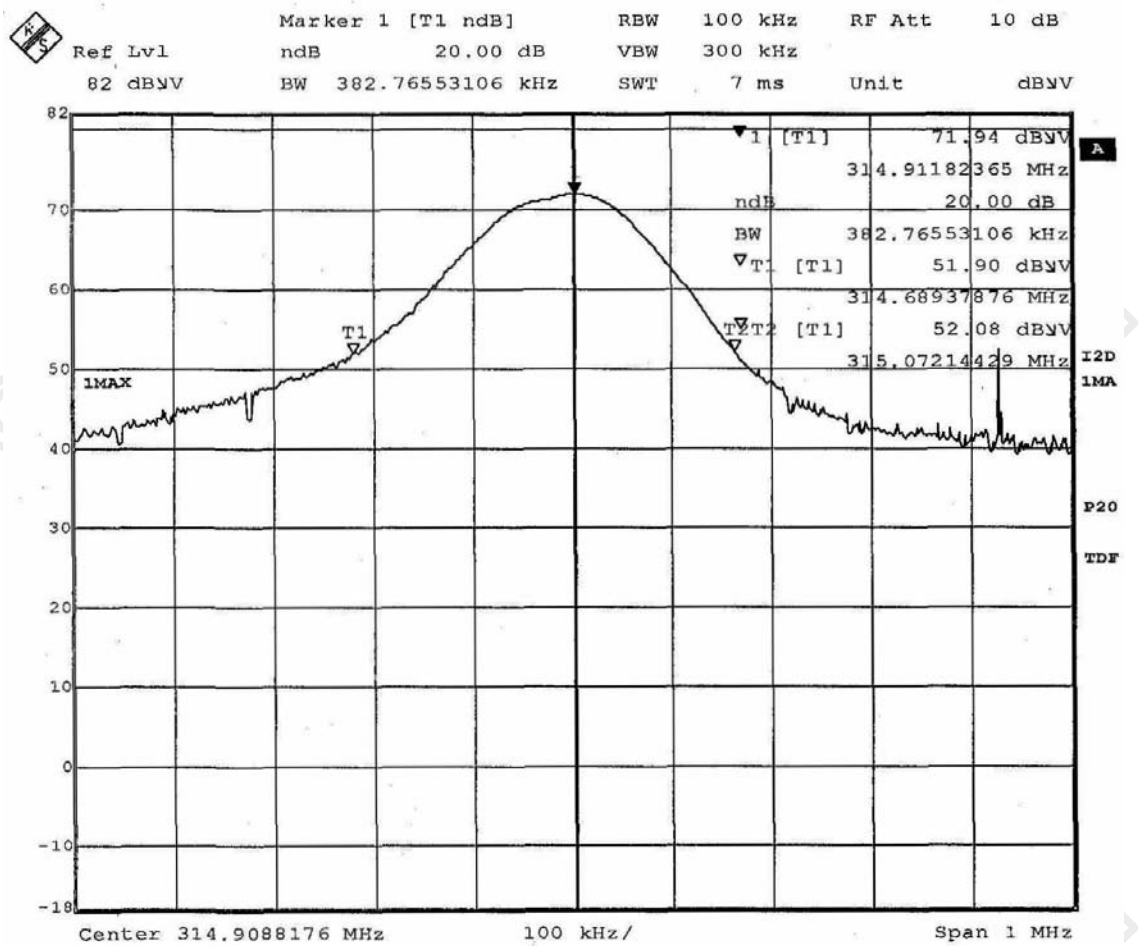
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [kHz]
315	382.766	787.5

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

20dB Bandwidth of Fundamental Emission



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:	2010-09-17
Mode of Operation:	Tx on mode (achieves wet detection)

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:

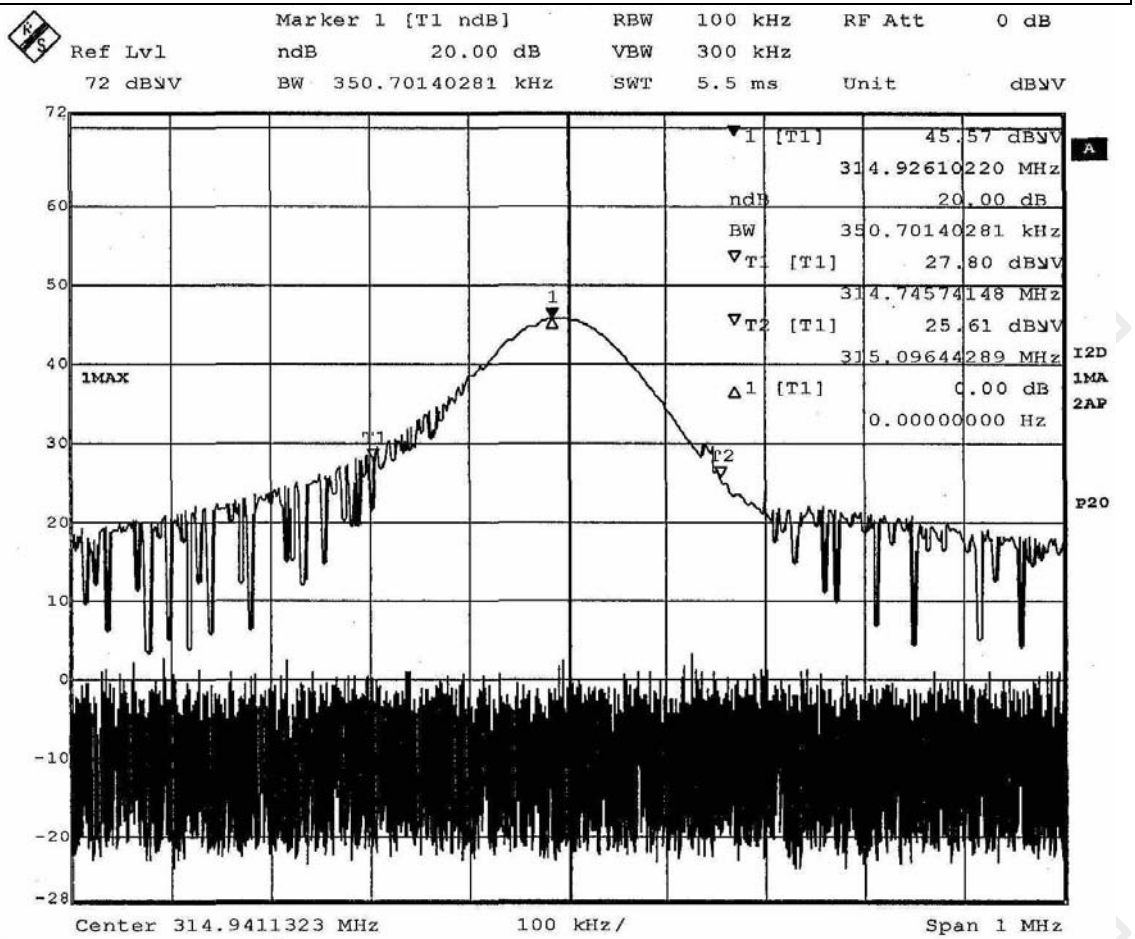
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [kHz]	FCC Limits * [kHz]
315	350.701	787.5

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

20dB Bandwidth of Fundamental Emission



Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM020	HORN ANTENNA	EMCO	3115	4032	2009/09/02	2011/09/02
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-Linggren	FACT-3	--	2008/12/01	2011/12/01
EM194	BICONILOG ANTENNA	EMCO	3142B	1795	2008/09/08	2010/09/08
EM229	EMI Test Receiver	R&S	ESIB40	100248	2009/09/27	2010/09/27
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2009/07/26	2011/07/26

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

Appendix B

Duty Cycle Correction During 100msec [FCC 47CFR 15.231(a)]

The transmitter periodically sends a different series of characters, but each packet period (100msec) never exceeds a series of 3 long (1.002msec) and 52 short (501.002μsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered (3x1.002msec)+(52x0.501002msec) per 100msec=29.06% duty cycle. Figure A through E shows the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = 20log (0.2906)=-10.73dB
Duty Cycle Correction =-20dB, if the calculation duty cycle correction >-20dB

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

Figure A [Pulses Train]

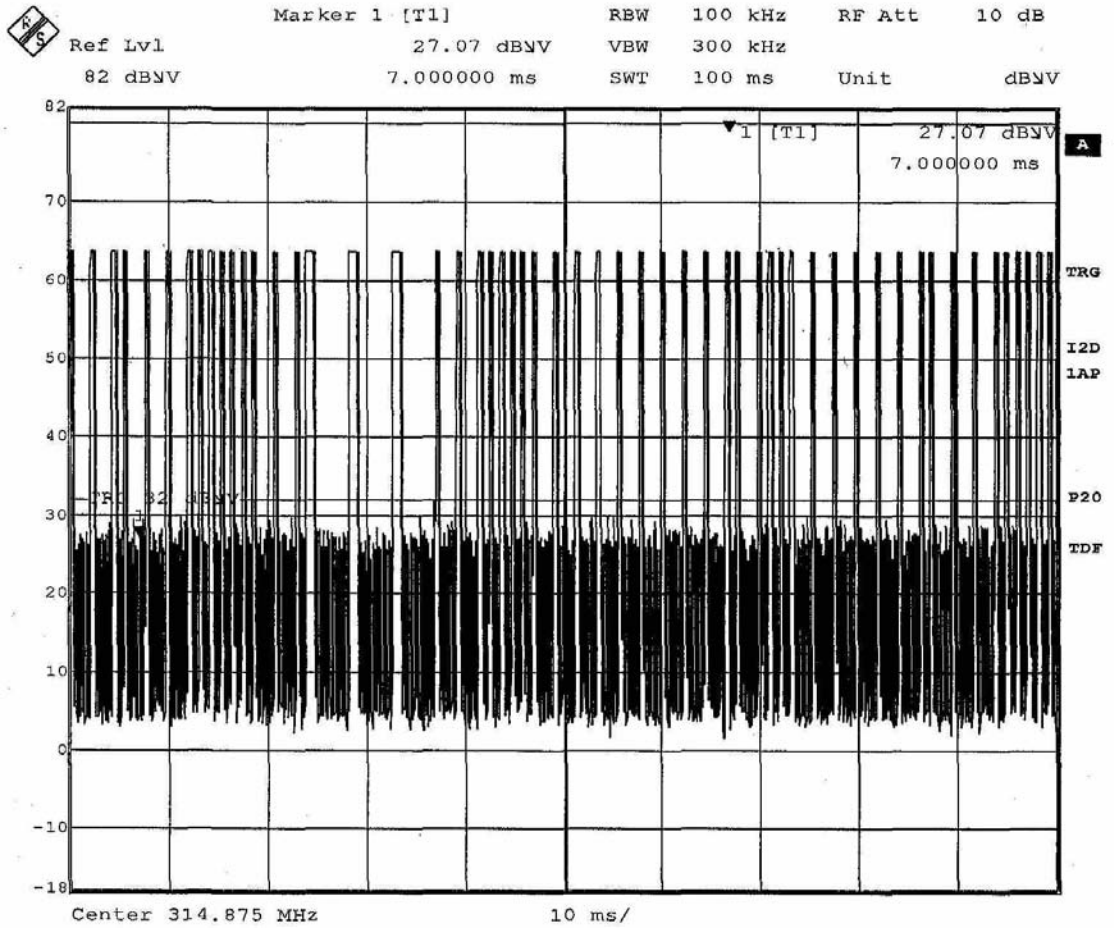


Figure B [Closer Look on the pulse train]

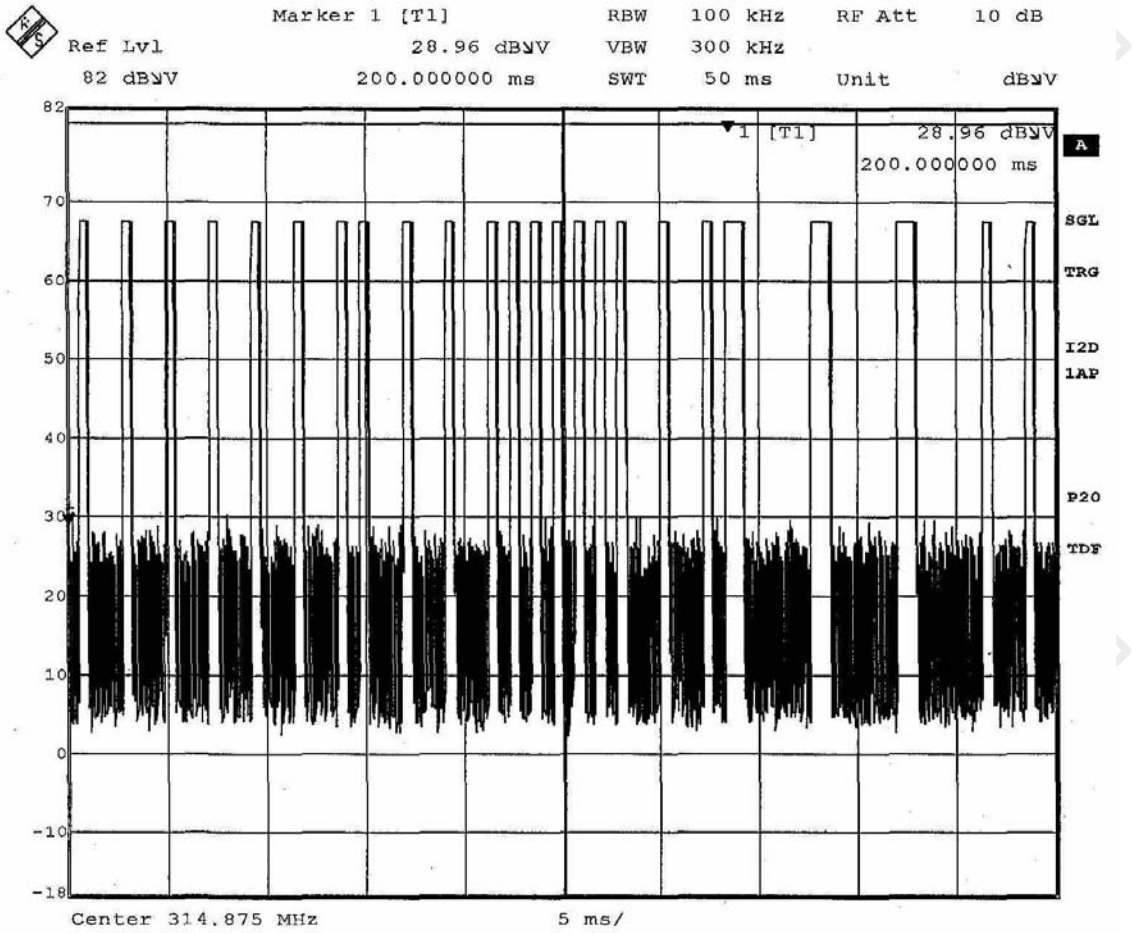


Figure C [Long pulse]

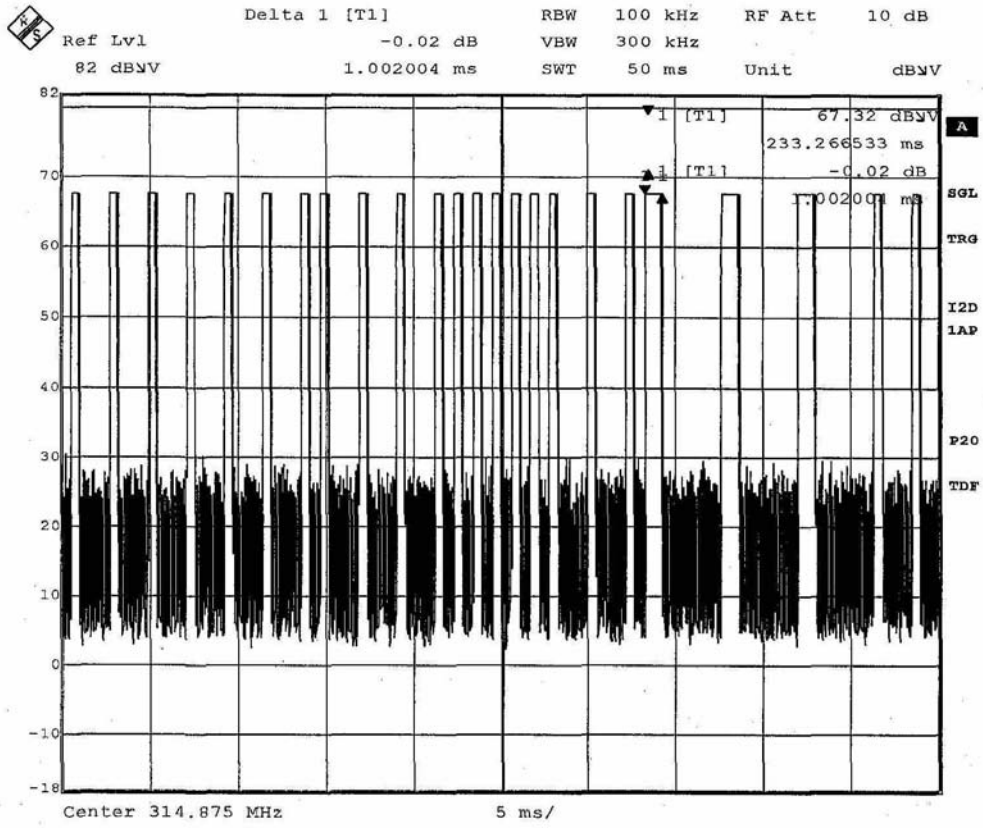


Figure D [Short pulse]

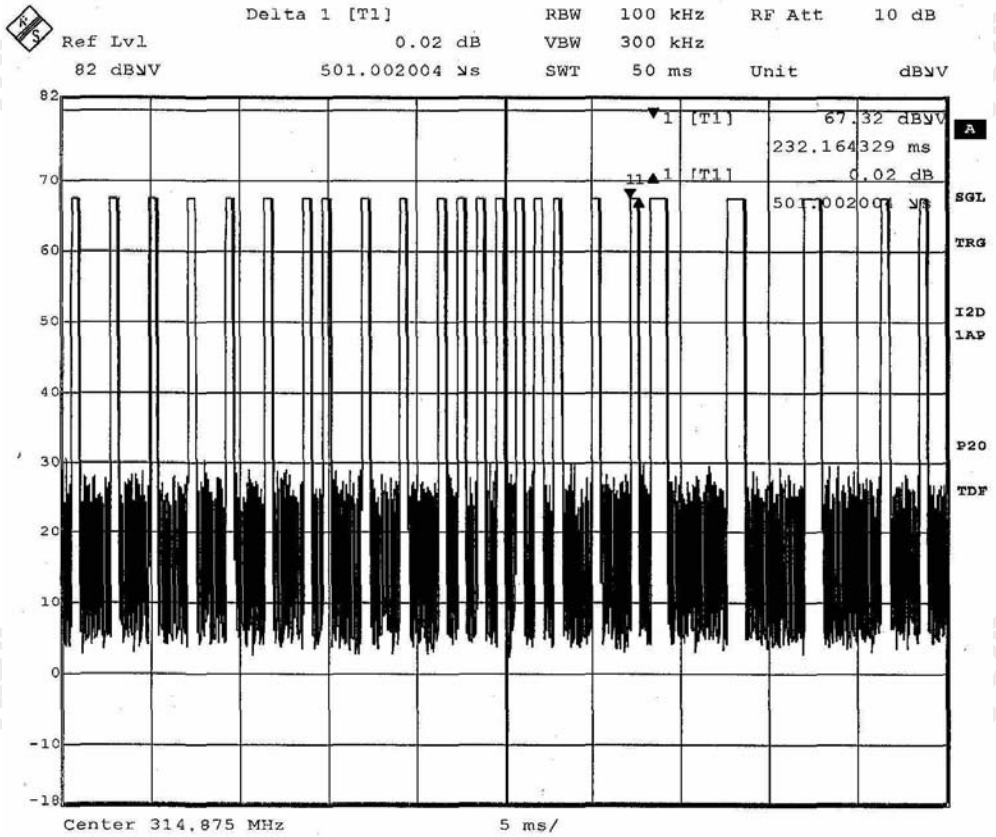
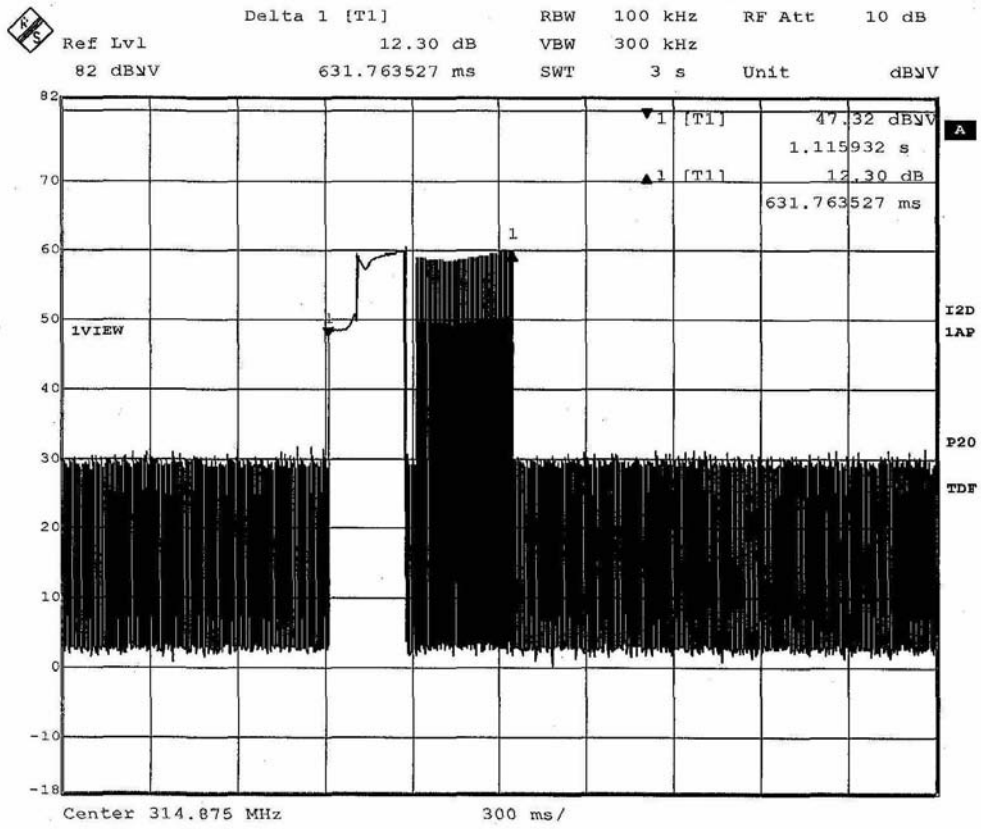


Figure E [Transmission cease time = 631.764ms <5s]



Appendix B

Duty Cycle Correction During 100msec [FCC 47CFR 15.231(e)]

The transmitter periodically sends a different series of characters, but each packet period (100msec) never exceeds a series of 5 long (1.002msec) and 41 short (501.002μsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worst case transmit duty cycle would be considered (5x1.002msec)+(41x0.501002μsec) per 100msec=25.55% duty cycle. Figure A through F show the characteristics of the pulses train for one of these functions.

Remarks:

Duty Cycle Correction = 20log (0.2555)=-11.85dB

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

Figure A [Pulses Train]

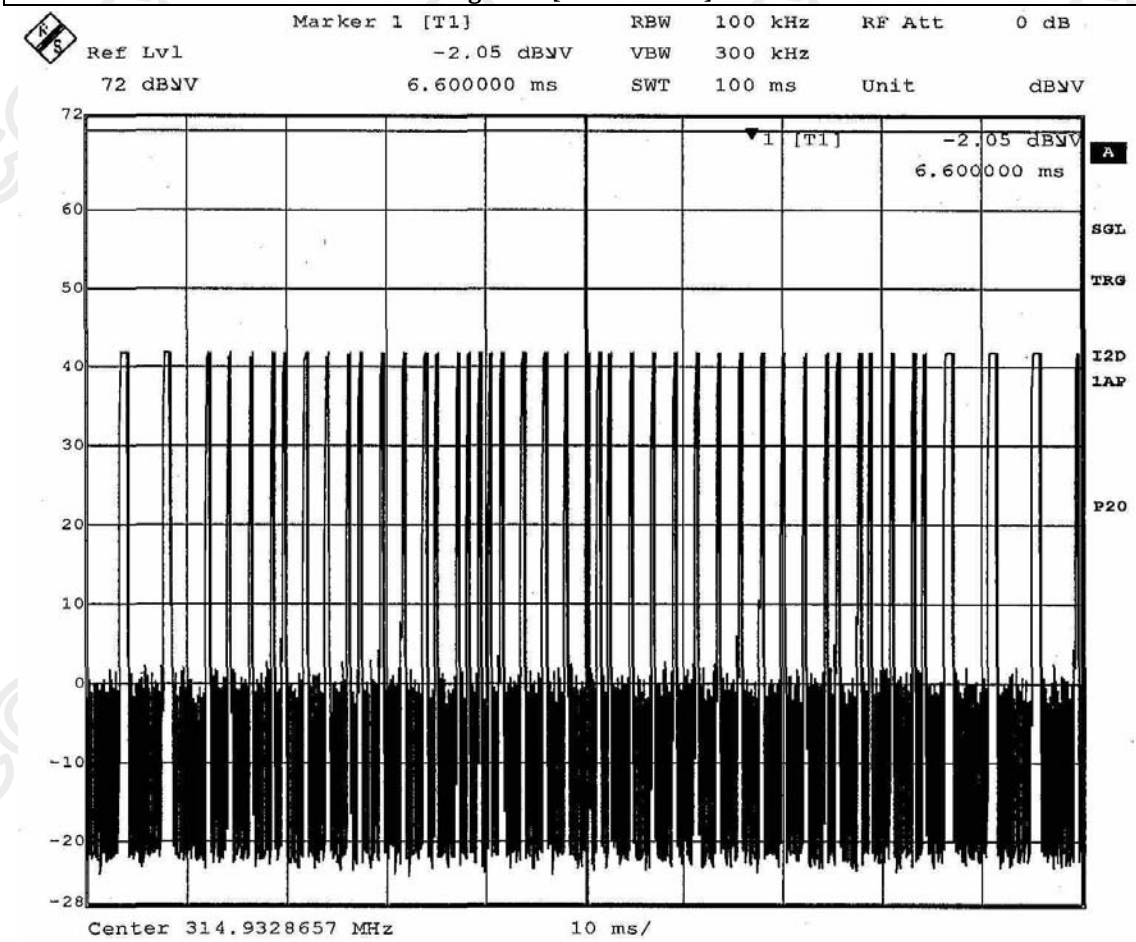


Figure B [Closer Look on each pulse train]

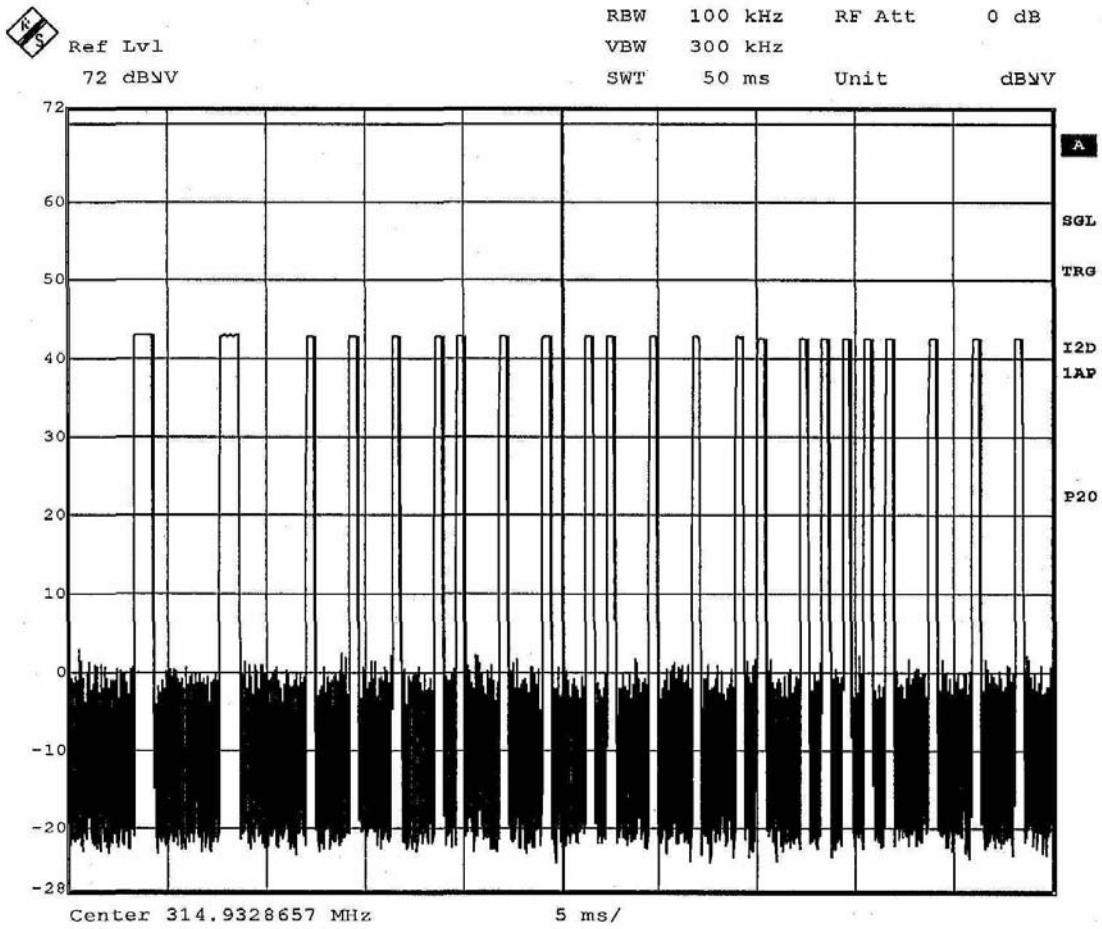


Figure C [Long pulse]

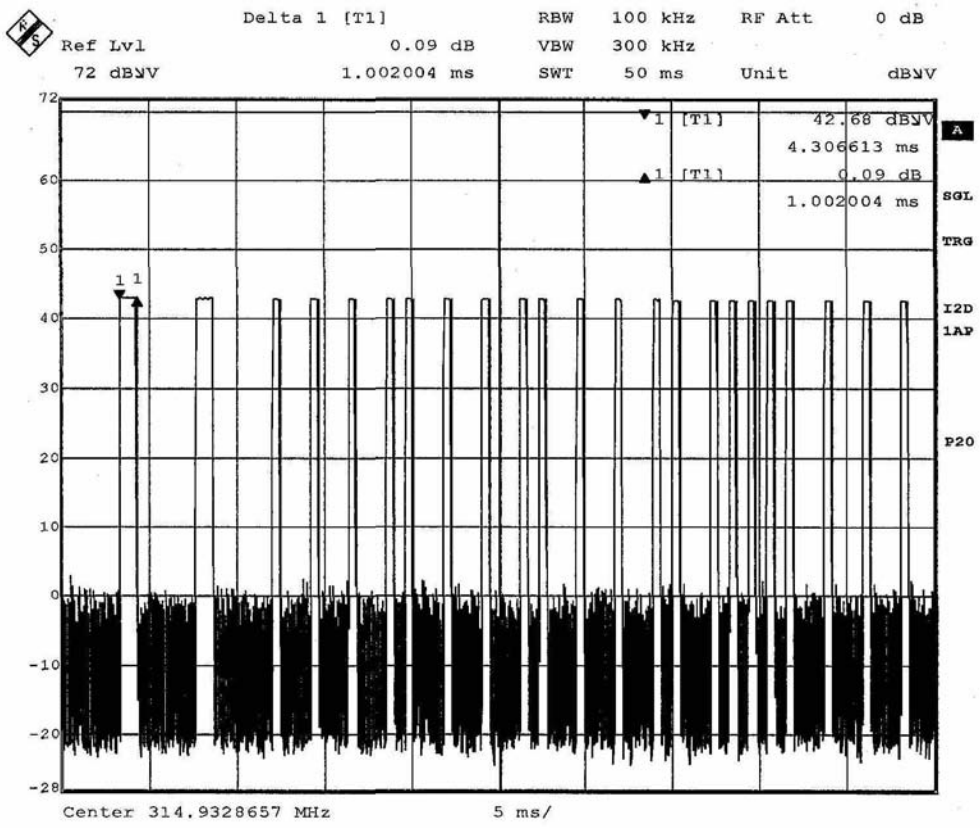


Figure D [Short pulse]

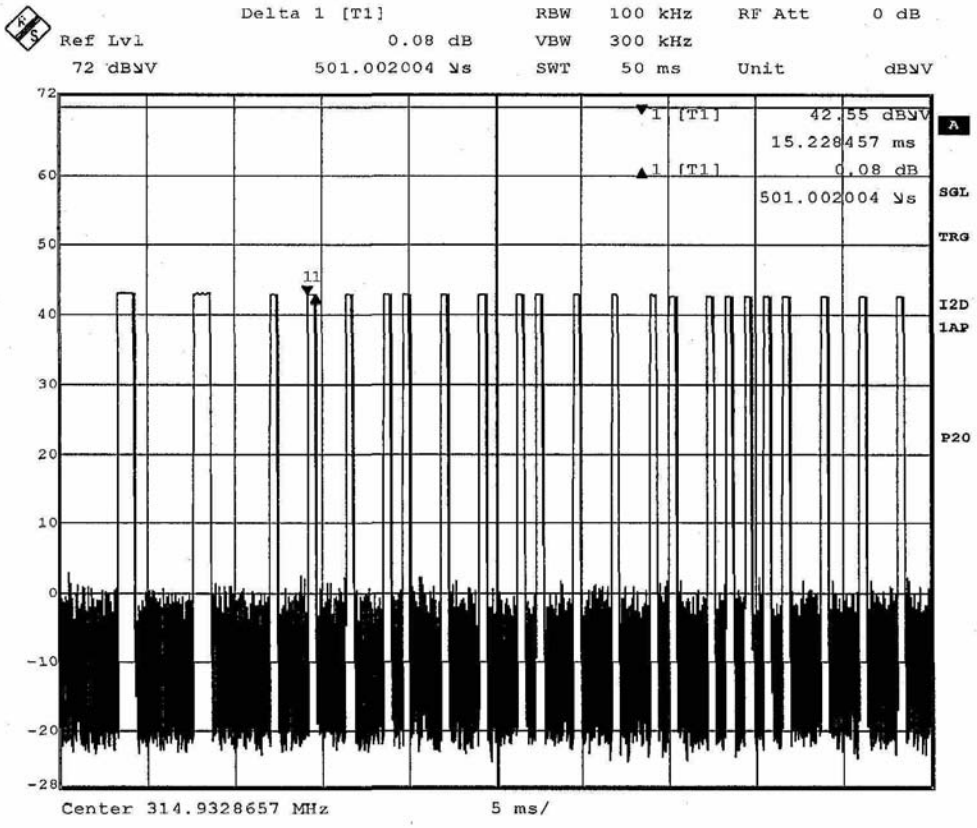


Figure E [Each Transmission period]

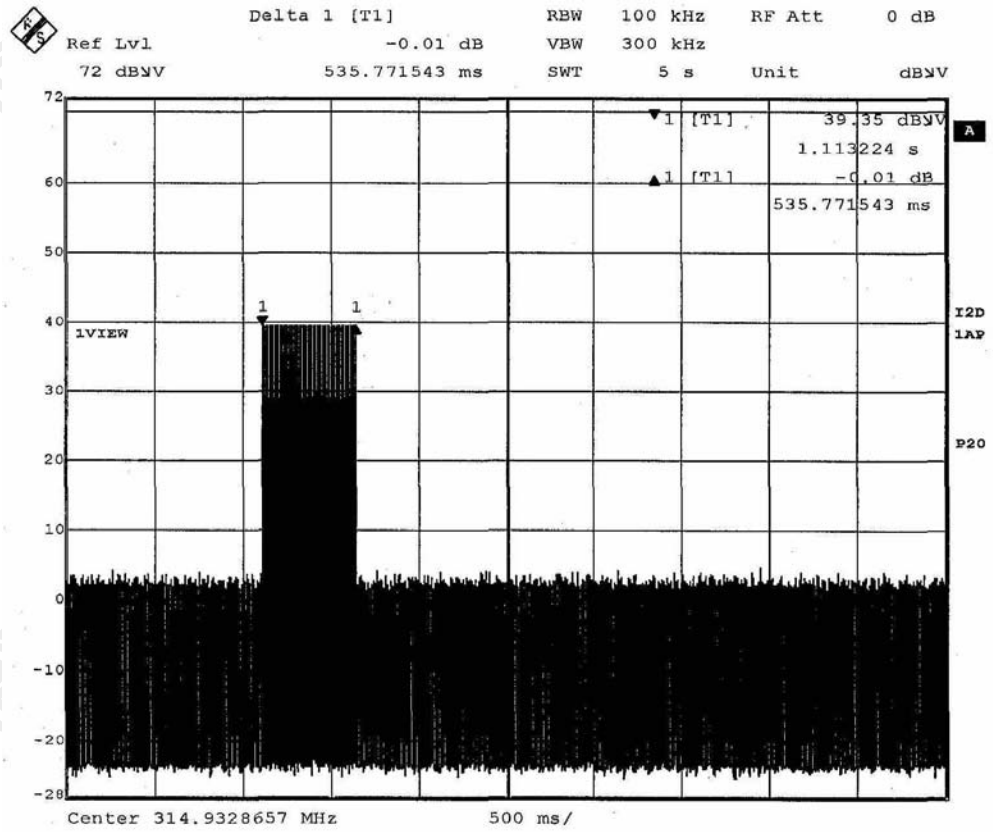
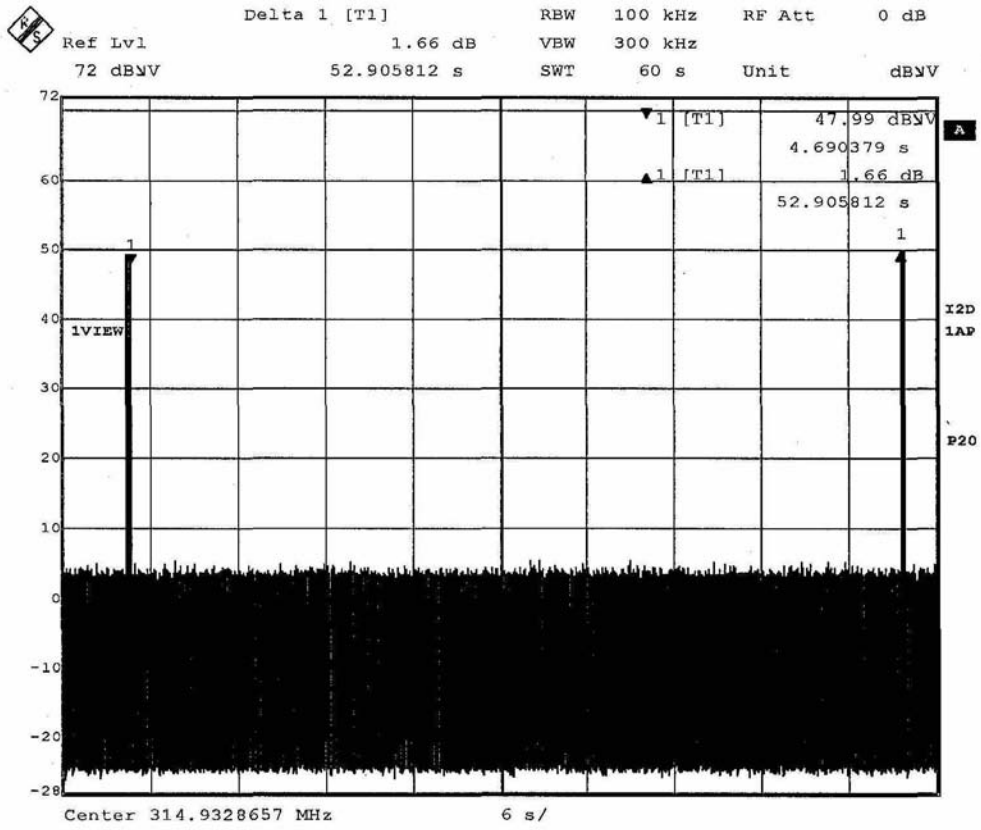


Figure F [Silent period]



Appendix C

Periodic Operation [FCC 47CFR 15.231(a)]

When pressing the button, the EUT will be paired with the Wetness Alarm Receiver. They are three transmissions shown on plot. The transmission stop with 3 seconds after activation and fulfils hereby the requirement 15.231(a) the transmitter within not more than 5 seconds of being released.

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.

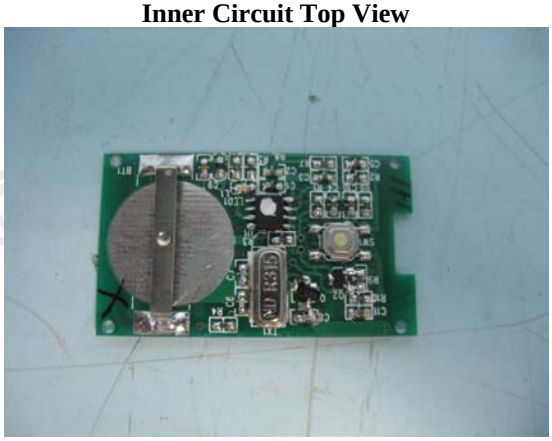
Appendix D

Photographs of EUT

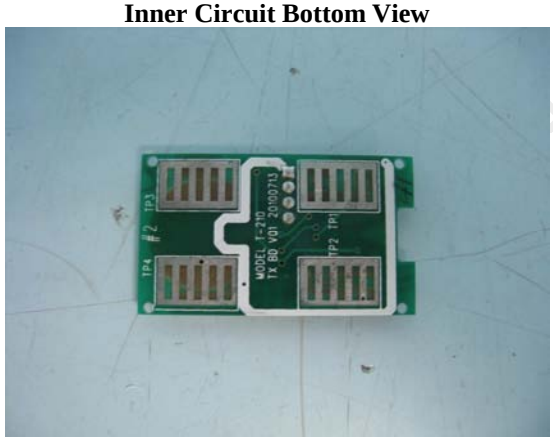
Front View of the product

Rear View of the product

Inner Circuit Top View



Inner Circuit Bottom View



Photographs of EUT

Measurement of Radiated Emission Test Set Up

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