香 港 標 準 及 檢 定 中 心
Hong Kong Standards and Testing Centre

Date : 2004-10-21
No. : HM152670

TEST REPORT

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

Description of Samples:

Model name:	Wireless Rain Gauge
Model no.:	W064
Brand name:	Ansen
FCC ID:	L5CW064

Date Samples Received: 2004-10-04

Date Tested: 2004-10-13

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: ----

KC Lee, EMC
DAR Approved Signatory

香港新界大埔工業村大宏街 10 號
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

CONTENT:

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 **ANE001**

Manufacturer

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

1.3 Equipment Under Test [EUT]

Description of Sample

Product:	Wireless Rain Gauge
Manufacturer:	Ansen Electronics Company
Brand Name:	Ansen
Model Number:	W064
Input Voltage:	3Vd.c (“AA” size battery x 2)

1.3.1 Description of EUT Operation

The Equipment Under Test (EUT) is an Ansen Electronics Company, Wireless Rain Gauge. The transmitter is an automatic transmitter. The EUT is to transmit RF signal while temperature measurement is changed. The EUT is for data transmission, Modulation by Data Code. Tape is pulses modulation.

1.4 Date of Order

2004-10-04

1.5 Submitted Sample(s):

3 Samples per model

1.6 Test Duration

2004-10-13

1.7 Country of Origin

China

1.8 Additional Information of EUT

	Submitted	Not Available
User Manual	☒	☐
Part List	☒	☐
Circuit Diagram	☒	☐
Printed Circuit Board [PCB] Layout	☒	☐
Block diagram	☒	☐
FCC ID Label	☒	☐

2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 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 15.231e	ANSI C63.4:2003	N/A	☒	☐	☐
Radiated Emissions, 30MHz to 1GHz	FCC 47CFR 15.109	ANSI C63.4:2003	Class B	☒	☐	☐
Conducted Emissions on AC, 0.15MHz to 30MHz	FCC 47CFR 15.107	ANSI C63.4:2003	Class B	☐	☐	☒

Note: N/A - Not Applicable

3.0 Test Results

3.1 Emission

3.1.1 Radiated Emissions

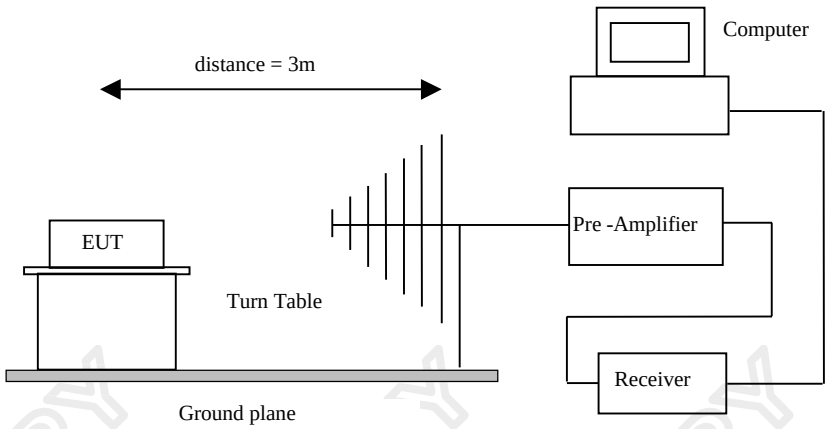
Test Requirement:	FCC 47CFR 15.231e
Test Method:	ANSI C63.4:2003
Test Date:	2004-10-13
Mode of Operation:	Tx mode

Test Method:

The sample was placed 0.8m above the ground plane on the OATS *. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigate all operating modes, rotated about all 3 axis (X, Y & Z) to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarization. The emissions worst-case are shown in Test Results of the following pages.

*: OATS [Open Area Test Site] located at HKSTC with a metal ground plane on 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 formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, μV/m at meters=22.72727(F)-2454.545; for the band 260-470 MHz, μV/m at 3 meters =16.6667(F)-2833.3333. The maximum permissible unwanted emission level is 20dB below the maximum fundamental level.

Results:

Field Strength of Fundamental Emissions Peak Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	Antenna Polarity
433.90	57.8	18.8	76.6	6760.8	43,983.5	Vertical

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	Antenna Polarity
867.8	< 1.0	28.9	< 29.9	31.3	4398.3	Vertical
+ 1301.70	< 1.0	29.4	< 30.4	< 33.1	5,000.0	Vertical
1735.60	< 1.0	32.2	< 33.2	< 45.7	4,398.3	Vertical
2169.50	< 1.0	15.9	< 16.9	< 7.0	4,398.3	Vertical
2603.40	< 1.0	17.4	< 18.4	< 8.3	4,398.3	Vertical
3037.30	< 1.0	17.2	< 18.2	< 8.1	4,398.3	Vertical
3471.20	< 1.0	18.8	< 19.8	< 9.8	4,398.3	Vertical
+ 3905.10	< 1.0	19.7	< 20.7	< 10.8	5,000.0	Vertical
+ 4339.00	< 1.0	20.6	< 21.6	< 12.0	5,000.0	Vertical

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Results:

Field Strength of Fundamental Emissions Average Value						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit ** @3m μV/m	Antenna Polarity
* 433.90	42.3	18.8	61.1	1135.0	4,398.3	Vertical

Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V/m	Correction Factor dB μ V/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit @3m μ V/m	Antenna Polarity
867.8	< 1.0	28.9	< 29.9	< 31.2608	439.8	Vertical
+ 1301.70	< 1.0	29.4	< 30.4	< 33.1	500.0	Vertical
1735.60	< 1.0	32.2	< 33.2	< 45.7	439.8	Vertical
2169.50	< 1.0	15.9	< 16.9	< 7.0	439.8	Vertical
2603.40	< 1.0	17.4	< 18.4	< 8.3	439.8	Vertical
3037.30	< 1.0	17.2	< 18.2	< 8.1	439.8	Vertical
3471.20	< 1.0	18.8	< 19.8	< 9.8	439.8	Vertical
+ 3905.10	< 1.0	19.7	< 20.7	< 10.8	500.0	Vertical
+ 4339.00	< 1.0	20.6	< 21.6	< 12.0	500.0	Vertical

Remarks:

*: Adjusted by Duty Cycle = -15.5dB

**: According to FCC C47CFR 15.231e,
FCC Limit for Average Measurement = 16.6667(433.9MHz)-2833.3333=4,398.3μV/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.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty = 30MHz to 1GHz ±4.1dB

Limited for Radiated Emissions [FCC 47 CFR 15.109 Class B]:

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:

Radiated Emissions Quasi-Peak						
Frequency MHz	Measured Level @3m dBμV/m	Correction Factor dBμV/m	Field Strength dBμV/m	Field Strength μV/m	Limit @3m μV/m	Antenna Polarity
NO EMISSION DETECTED WITHIN 20dB OF THE FCC LIMITS						

Remarks:

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty = 30MHz to 1GHz ±4.1dB

3.1.1 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.107
Test Method:	ANSI C63.4:2003
Test Date:	N/A
Mode of Operation:	N/A

Results: N/A

The EUT is operated by a single source of internal battery power [located in the battery compartment], therefore power line conducted emission was deemed unnecessary.

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:	2004-10-13
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:

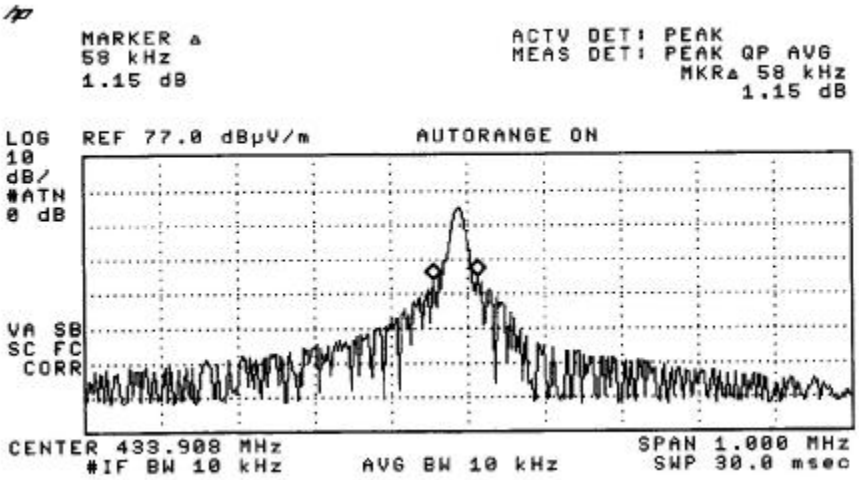
As Test Setup of clause 3.1.1 in this test report.

Limits for 20 dB Bandwidth of Fundamental Emission:

Frequency Range [MHz]	20dB Bandwidth [KHz]	FCC Limits * [KHz]
433.9	58	1085

*: FCC Limit for Bandwidth measurement = (0.25%)(Center Frequency)
=(0.0025)(433.9)
=1085KHz

20dB Bandwidth of Fundamental Emission



Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM007	SPECTRUM ANALYZER	HEWLETT PACKARD	HP85660B	3144A21192	15/06/04
EM008	SPECTRUM ANALYZER DISPLAY	HEWLETT PACKARD	HP85662A	3144A20514	15/06/04
EM009	QUASI PEAK ADAPTOR	HEWLETT PACKARD	HP85650A	3303A01702	15/06/04
EM010	RF PRESELECTOR	HEWLETT PACKARD	HP85685A	3221A01410	15/06/04
EM011	ATTENNUATOR/SWITCH	HEWLETT PACKARD	HP11713A	2508A10595	15/06/04
EM012	PRE-AMPLIFIER	HEWLETT PACKARD	HP8449B	3008A00262	15/06/04
EM013	CONTROLLER (COMPUTER), COLOR MONITOR, KEYBOARD & MOUSE FLOPPY DRIVE	HEWLETT PACKARD HEWLETT PACKARD HEWLETT PACKARD	HP9000 HP A1097C HP9133L	6226A60314 3151J39517 2623A02468	15/06/04
EM020	HORN ANTENNA	EMCO	3115	4032	30/07/03
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	30/07/03
EM072	SIGNAL GENERATOR	HEWLETT PACKARD	8640B	1948A11892	N/A
EM083	HKSTC OPEN AREA TEST SITE	HKSTC	N/A	N/A	08/02/03
EM131	PORTABLE SPECTRUM ANALYSER	HEWLETT PACKARD	8595EM	3710A00155	13/01/04
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	04/10/04
EM219	BICONILOG ANTENNA	EMCO	3142C	00029071	28/10/03
EM195	ANTENNA POSITIONING MAST	EMCO	2075	2368	N/A
EM196	MULTI-DEVICE CONTROLLER	EMCO	2090	1662	N/A

Conducted Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL
EM078	VARIAC	SHANGHAI VOLTAGE	TDGC-3/0.5	N/A	CM
EM081	SMALL SCREENED ROOM	MIKO INST HK	N/A	N/A	17/10/03
EM119	LISN	R & S	ESH3-Z5	0831.5518.52	01/10/02
EM127	ISOLATION TRANSFORMER 220 TO 300	WING SUN	N/A	N/A	CM
EM142	PULES LIMITER	R & S	ESH3Z2	357.8810.52	07/07/03
EM181	EMI TEST RECEIVER	R & S	ESIB7	100072	06/01/04
EM154	SHIELDING ROOM	SIEMENA MATSUSHITA COMPONENTS	N/A	803-740-057-99A	17/10/03
EM197	LISN	EMCO	4825/2	1193	08/04/03

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

Appendix B

Duty Cycle Correction During 100msec

Each function key sends a different series of characters, but each packet period (72msec) never exceeds a series of 23 long (525µsec) or short (450µsec) pulses. Assuming any combination of short and long pulses may be obtained due to encoding the worse case transmit duty cycle would be considered 23x525µsec per 72msec=16.7% duty cycle. Figure A through C show the characteristics of the pulse train for one of these functions.

Remarks:

Duty Cycle Correction = 20Log(0.167) =-15.5dB

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

Figure A [Pulse Train]

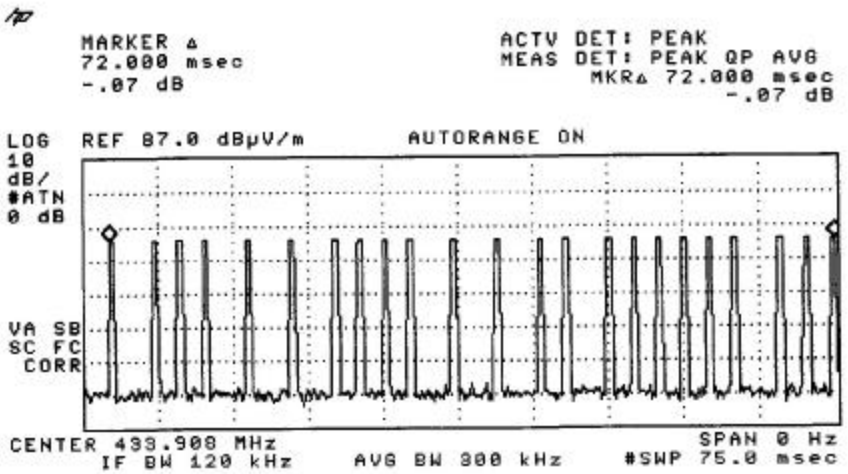


Figure B [Long Pulse]

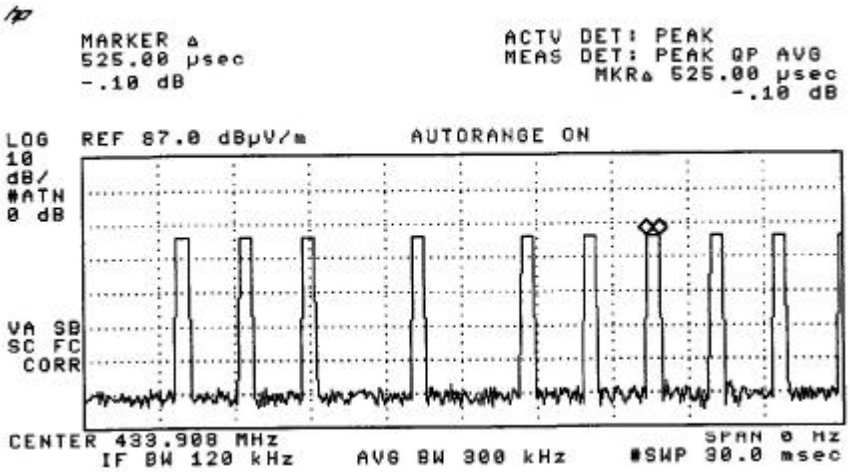
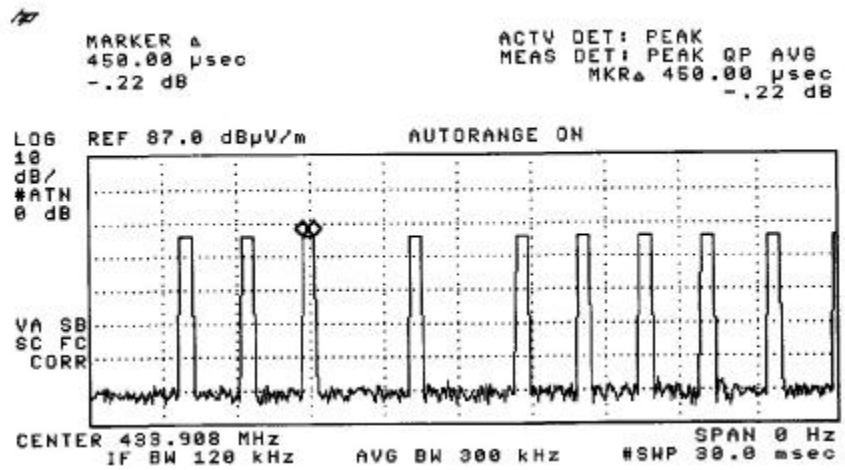


Figure C [Short Pulse]



Appendix C

Periodic Operation [FCC 47CFR 15.231e]

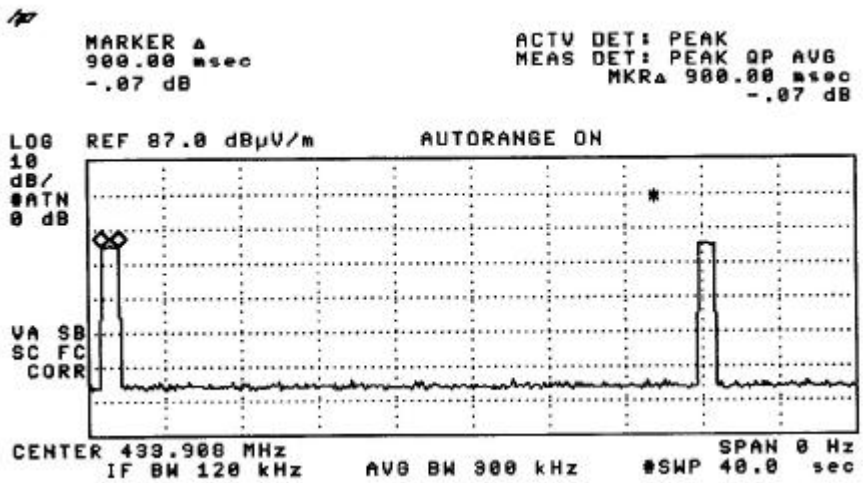
According to FCC 47CFR15.231e. The EUT shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case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

Results:

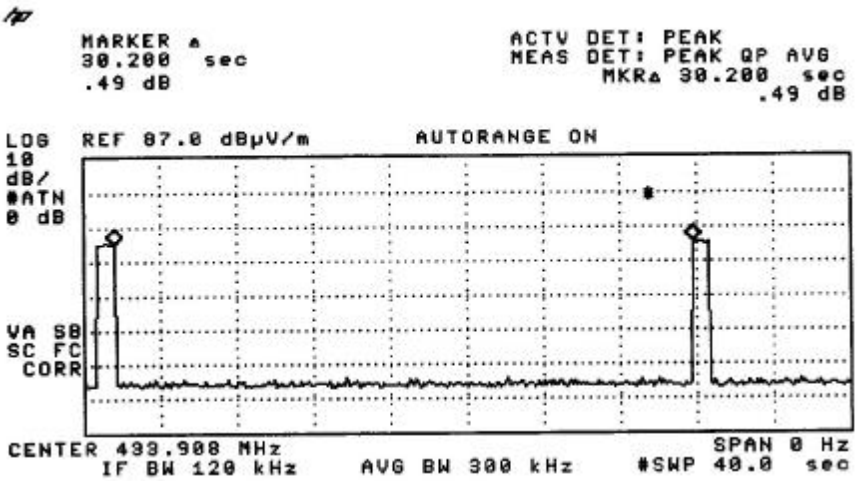
Since the EUT of each transmission is 900msec, so the silent period must not less than 27 seconds (900msec x 30).

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

Figure D [Each transmission]



Periodic operation [FCC 47CFR15.231e]
Figure E [Silent Period]



Appendix D

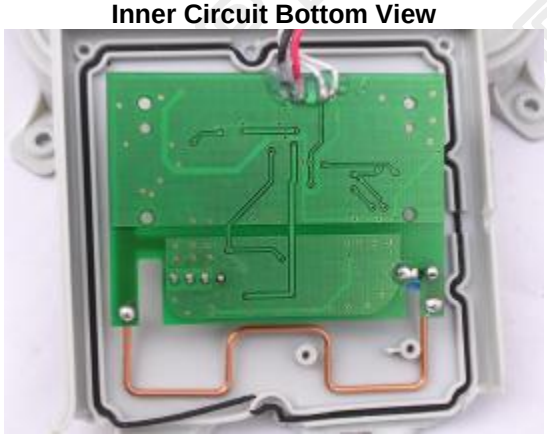
Photographs of EUT

Front View of the product

Rear View of the product

Inner Circuit Top View

Inner Circuit Bottom View



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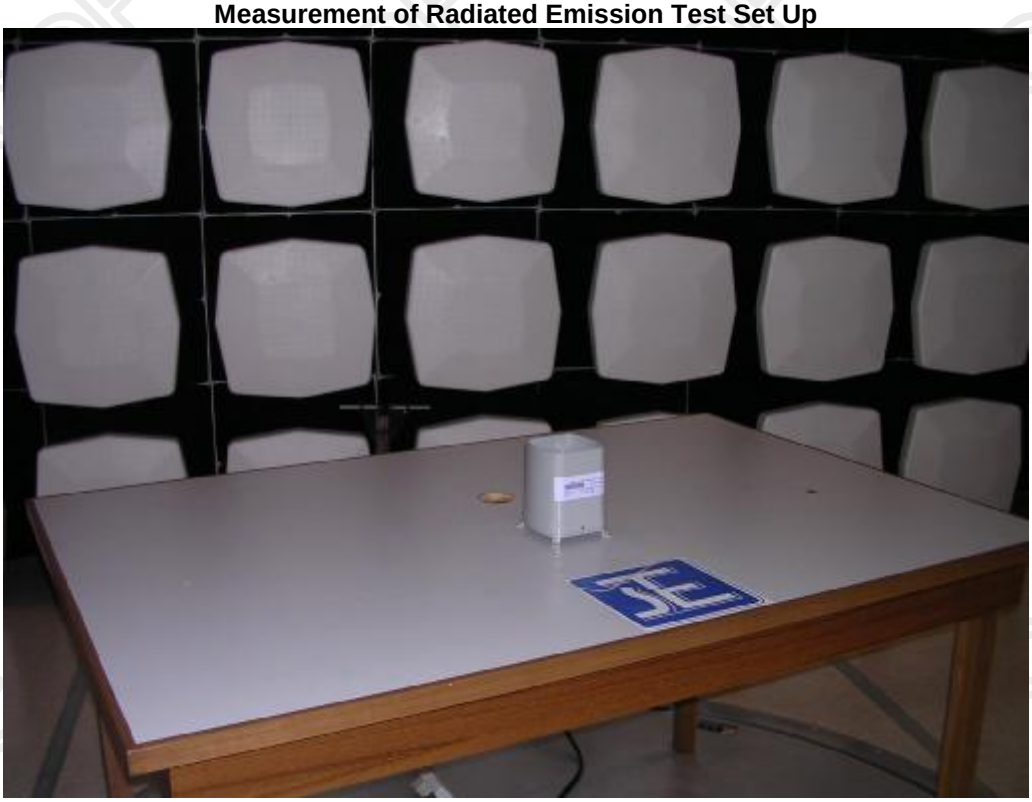
Photographs of EUT

Measurement of Radiated Emission Test Set Up



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