

RED-EMC Test Report

For

Low Power Radio Solutions Ltd
easyRadio Transceiver

Model No.: ER400TRS-02

Prepared For : Low Power Radio Solutions Ltd
Address : Two Rivers Industrial Estate, Station Lane, Witney, OXON, OX28 4BH,
United Kingdom

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
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TEST REPORT

Applicant : Low Power Radio Solutions Ltd
Manufacturer : Low Power Radio Solutions Ltd
Product Name : easyRadio Transceiver
Model No. : ER400TRS-02
Trade Mark : N.A.
Rating(s) : Input: DC 3-6V

Test Standard(s) : ETSI EN 301 489-1 V2.2.0 (2017-03)
EN 55032: 2015
EN 55024: 2010+A1: 2015
ETSI EN 301 489-3 V2.2.1 (2017-03)

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 301 489-1, EN 301 489-3, EN 55032 and EN 55024 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test

Feb. 07~Mar. 08, 2018

Prepared By



Winkey Wang

(Tested Engineer / Winkey Wang)

Reviewer

May Lu

(Project Manager / May Lu)

Approved & Authorized Signer

Tom Chen

(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	Low Power Radio Solutions Ltd
Address	:	Two Rivers Industrial Estate, Station Lane, Witney, OXON, OX28 4BH, United Kingdom
Manufacturer	:	Low Power Radio Solutions Ltd
Address	:	Two Rivers Industrial Estate, Station Lane, Witney, OXON, OX28 4BH, United Kingdom

1.2. Description of Device (EUT)

Product Name	:	easyRadio Transceiver	
Model No.	:	ER400TRS-02	
Trade Mark	:	N.A.	
Test Power Supply	:	DC 5V from PC with AC 230V/50Hz	
Product Description	:	Operation Frequency:	433.270-434.340MHz
		Number of Channel:	10 Channels
		Modulation Type:	FSK
		Antenna Type:	N/A
		Antenna Gain(Peak):	N/A
<p>Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2) Client didn't provide any antenna.</p>			

1.3. Auxiliary Equipment Used During Test

Notebook	:	Manufacturer: LIFE BOOK Model: LH531 CE, FCC DOC
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1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	TX Mode

For Conducted Emission	
Final Test Mode	Description
Mode 1	TX Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	TX Mode

1.5. Test Equipment List

Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 17, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 17, 2017	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 17, 2017	1 Year
4.	Software Name EZ-EMC	Ferrari Tcchnology	ANB-03A	N/A	N/A	N/A

Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Nov. 17, 2017	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 20, 2017	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Nov. 17, 2017	1 Year
4.	Software Name EZ-EMC	Ferrari Tcchnology	ANB-03A	N/A	N/A	N/A

Electrostatic Discharge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	3Ctest	ESD-30T	ES0131505	Nov. 17, 2017	1 Year

R/S Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 20, 2017	1 year
2	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/36164	May 20, 2017	1 year
3	Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120 L3F	332	May 20, 2017	1 year
4	Power Amplifier (0.08-1G)	MILMEGA	80RF1000-175	1059345	May 20, 2017	1 year
5	Power Amplifier (1-2G)	MILMEGA	AS0102-55	1018770	May 20, 2017	1 year
6	Power Amplifier (2-6G)	MILMEGA	AS1860-50	1059346	May 20, 2017	1 year
7	Signal Generator	Agilent	N5181A	MY50145187	May 20, 2017	1 year
8	Field Strength Meter	HOLADAY	HI-6005	N/A	May 20, 2017	1 year
9	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	May 20, 2017	1 year
10	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	May 20, 2017	1 year

1.6. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal)
		Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

1.7. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

Test Location

All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102

2. Summary of Test Results

EMC Emission				
Test Items	Standard	Basic Standard	Limit	Results
Conducted Emission	ETSI EN 301 489-1 V2.2.0 Clause 8.3 & 8.4	EN 55032: 2015	Class A or B NOTE (2)	PASS
Radiated Emission	ETSI EN 301 489-1 V2.2.0 Clause 8.2	EN 55032: 2015	Class A or B NOTE (2)	PASS
Harmonic Current Emission	ETSI EN 301 489-1 V2.2.0 Clause 8.5	EN 61000-3-2:2014	Class A	N/A
Voltage Fluctuations & Flicker	ETSI EN 301 489-1 V2.2.0 Clause 8.6	EN 6000-3-3:2013	/	N/A
EMC Immunity				
Test Items	Standard	Basic Standard	Performance Criteria	Results
Electrostatic Discharge	ETSI EN 301 489-1 V2.2.0 Clause 9.3	EN 61000-4-2:2009	B	PASS
RF Electromagnetic Field	ETSI EN 301 489-1 V2.2.0 Clause 9.2	EN 61000-4-3:2006 +A1:2008+A2:2010	A	PASS
Fast transients, common mode	ETSI EN 301 489-1 V2.2.0 Clause 9.4	EN 61000-4-4:2012	B	N/A
Surges	ETSI EN 301 489-1 V2.2.0 Clause 9.8	EN 61000-4-5:2014	B	N/A
Radio frequency, common mode	ETSI EN 301 489-1 V2.2.0 Clause 9.5	EN 61000-4-6:2014	A	N/A
Volt. Interruptions Volt. Dips	ETSI EN 301 489-1 V2.2.0 Clause 9.7	EN 61000-4-11:2004	B / C / C NOTE (3)	N/A
NOTE:				
	(1) "N/A" denotes test is not applicable in this Test Report			
	(2) Alternatively, for equipment intended to be used exclusively in an industrial environment or a telecommunication centre, the class A limits may be used.			
	(3) Voltage dip: 100% reduction – Performance Criteria B			
	Voltage dip: 100% reduction – Performance Criteria B			
	Voltage dip: 70% reduction – Performance Criteria C			
	Voltage Interruption: 0% Interruption – Performance Criteria C			

3. Emission Test

3.1. Conducted Emission Test at Main Ports

3.1.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 V2.2.0 Clause 8.3 & 8.4
Basic Standard	EN 55032: 2015

Limits for conducted emissions

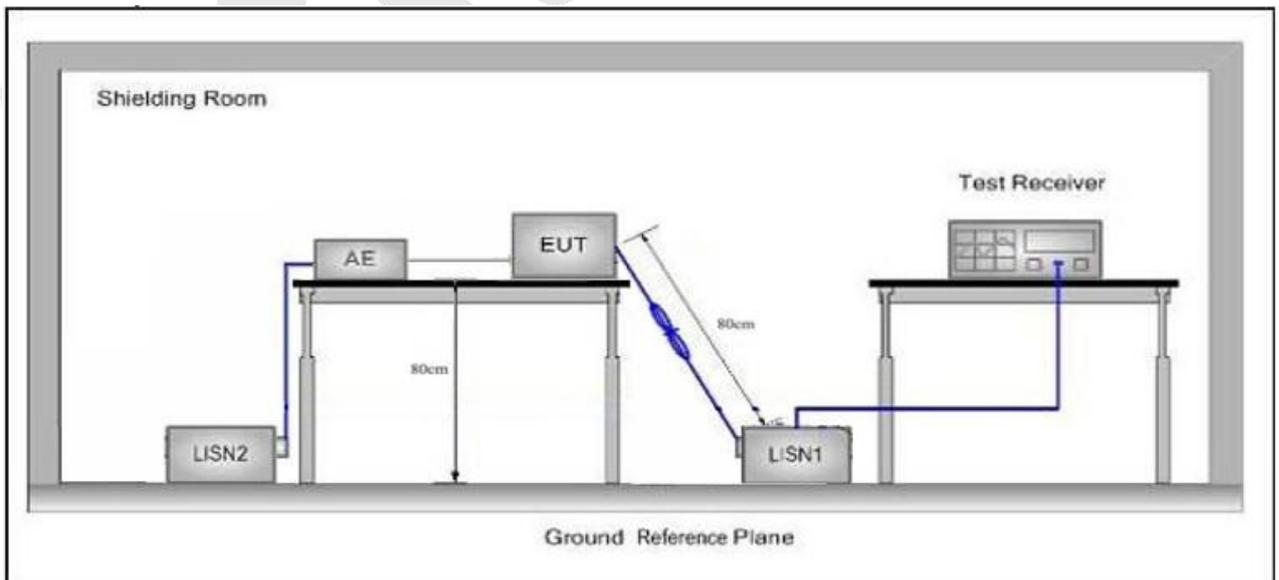
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50

Remark: *Decreasing linearly with logarithm of the frequency.

Limits for conducted emissions of equipment
intended to be used in telecommunication centres and industrial environment

Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	79	66
	500kHz~30MHz	73	60

3.1.2. Test Setup



3.1.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ETSI EN 301 489-1 V2.2.0 & EN55032: 2015 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

For the actual test configuration, please refer to the related Item EUT Test Photos.

3.1.4. Test Data

PASS

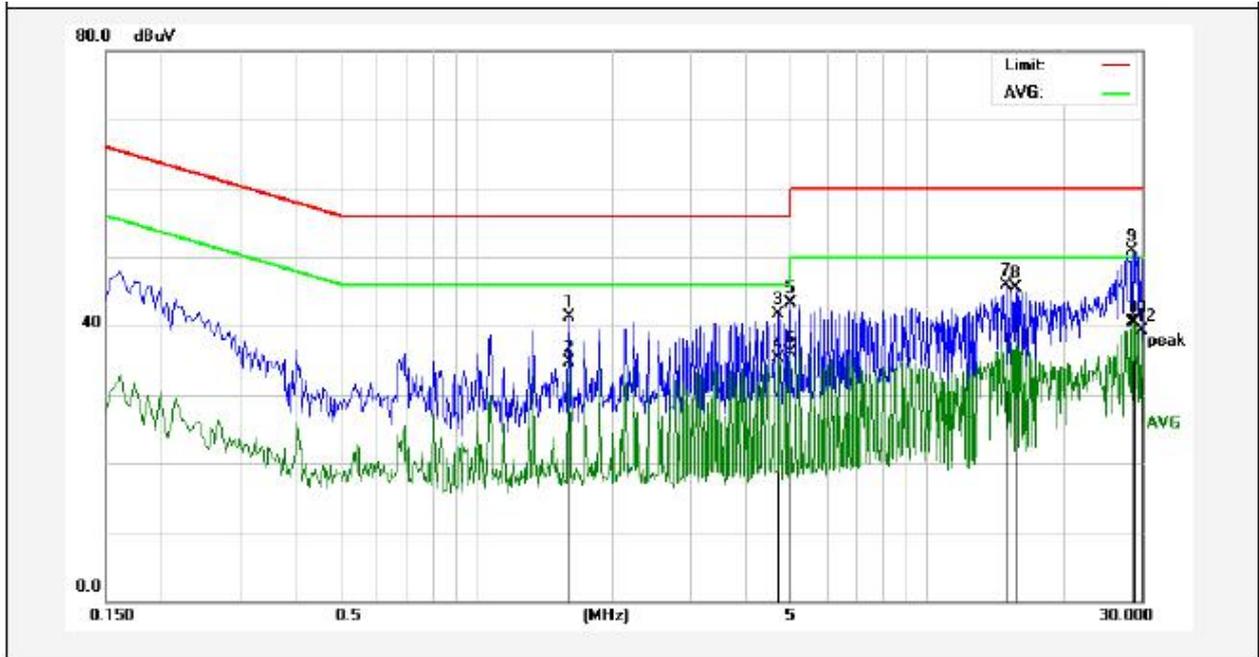
The EUT should be compliance to the limit of Class B

Only the worst case data was showed in the report, please to see the following pages

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Conducted Emission Test Data

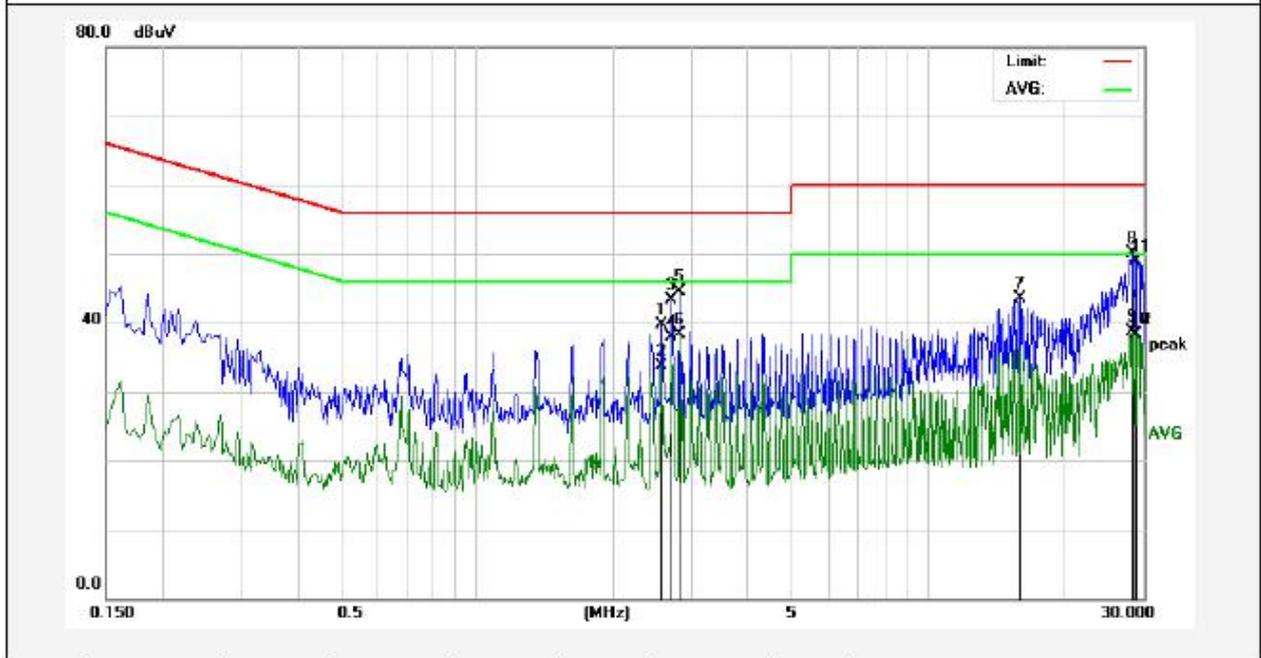
Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: DC 5V from PC with AC 230V/50Hz
 Comment: Live Line
 Tem.:25.4°C Hum.:54%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	1.6060	21.21	20.13	41.34	56.00	-14.66	QP	
2	1.6060	14.57	20.13	34.70	46.00	-11.30	AVG	
3	4.6859	21.58	20.20	41.78	56.00	-14.22	QP	
4	4.6859	15.13	20.20	35.33	46.00	-10.67	AVG	
5	4.9539	23.03	20.21	43.24	56.00	-12.76	QP	
6	4.9539	15.81	20.21	36.02	46.00	-9.98	AVG	
7	14.9739	25.58	20.26	45.84	60.00	-14.16	QP	
8	15.7819	25.17	20.27	45.44	60.00	-14.56	QP	
9	28.5180	30.69	20.27	50.96	60.00	-9.04	QP	
10	28.5180	20.16	20.27	40.43	50.00	-9.57	AVG	
11	28.7860	20.26	20.27	40.53	50.00	-9.47	AVG	
12	29.8540	19.00	20.27	39.27	50.00	-10.73	AVG	

Conducted Emission Test Data

Test Site: 1# Shielded Room
 Operating Condition: Mode 1
 Test Specification: DC 5V from PC with AC 230V/50Hz
 Comment: Neutral Line
 Tem.:25.4°C Hum.:54%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	2.5620	19.63	20.15	39.78	56.00	-16.22	QP	
2	2.5620	13.52	20.15	33.67	46.00	-12.33	AVG	
3	2.6980	23.11	20.15	43.26	56.00	-12.74	QP	
4	2.6980	17.80	20.15	37.95	46.00	-8.05	AVG	
5	2.8060	24.34	20.16	44.50	56.00	-11.50	QP	
6	2.8100	18.11	20.16	38.27	46.00	-7.73	AVG	
7	16.0380	23.22	20.28	43.50	60.00	-16.50	QP	
8	28.4020	29.75	20.27	50.02	60.00	-9.98	QP	
9	28.4020	18.36	20.27	38.63	50.00	-11.37	AVG	
10	28.6700	18.10	20.27	38.37	50.00	-11.63	AVG	
11	28.9420	28.71	20.27	48.98	60.00	-11.02	QP	
12	28.9420	17.99	20.27	38.26	50.00	-11.74	AVG	

3.2. Radiated Emission Test

3.2.1. Test Standard and Limit

Test Standard	ETSI EN 301 489-1 V2.2.0 Clause 8.2
Basic Standard	EN 55032: 2015

Radiated Emission Test Limit (Below 1000MHz)

Frequency (MHz)	Limit (dB μ V/m)	
	Quasi-peak Level	
	Class B	Class A
30MHz~230MHz	40	50
230MHz~1000MHz	47	57

Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.

Radiated Emission Test Limit (Above 1000MHz)

Frequency (MHz)	Limit (dB μ V/m)			
	Class B		Class A	
	Peak	Average	Peak	Average
1000 MHz -3000 MHz	70	50	76	56
3000 MHz -6000 MHz	74	54	80	60

Remark: 1. The lower limit applies at the transition frequency. 2. The test distance is 3m.

Radiated Emission Test Limit for FM Receivers

Frequency (MHz)	Limit (dB μ V/m)	
	Quasi-peak Level	
	Fundamental	Harmonics
30MHz~230MHz	60	52
230MHz~300MHz	60	52
300MHz~1000MHz	60	56

Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.

Frequency Range of Radiated Measurement

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 6 GHz, whichever is lower

3.2.2. Test Setup

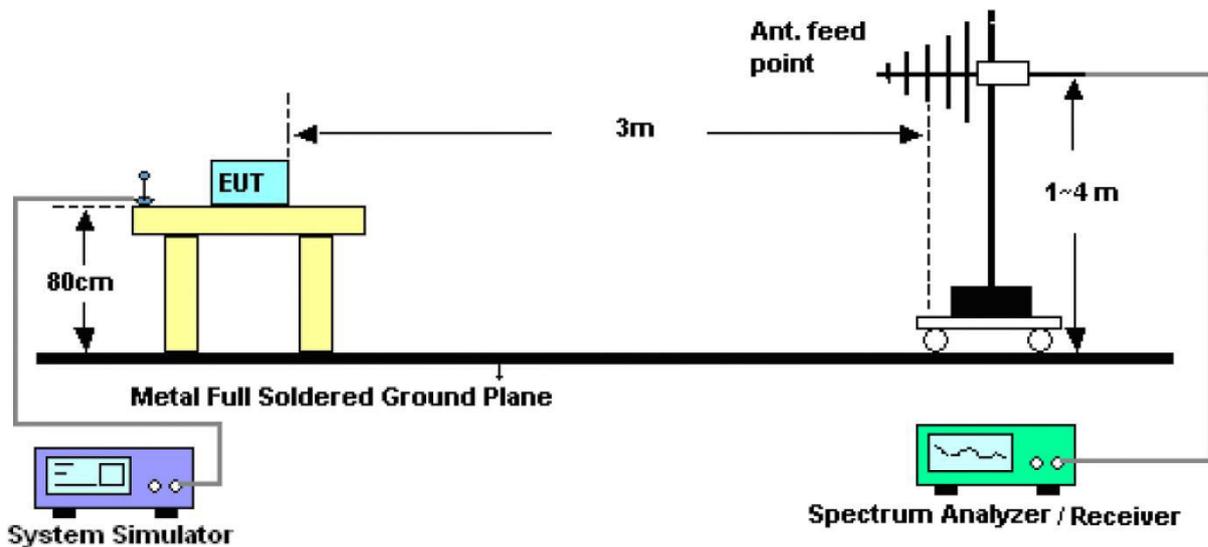


Figure 1. 30MHz to 1GHz

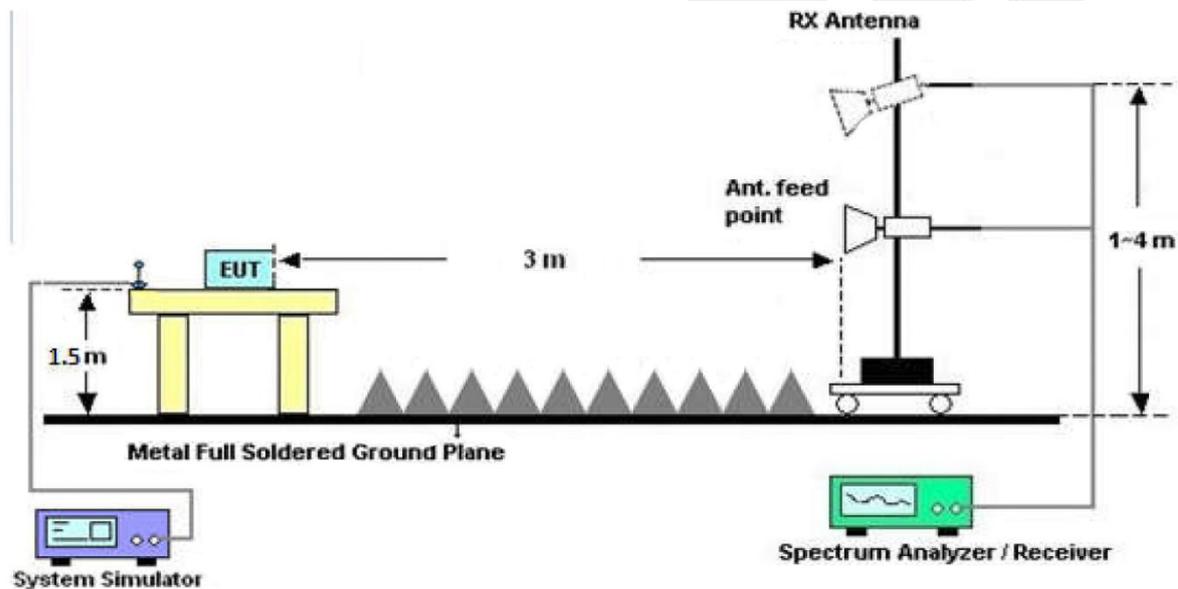


Figure 2. Above 1 GHz

3.2.3. Test Procedure

- 1) The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- 2) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- 3) The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4) The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- 5) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold

mode when the test frequency is below 1GHz.

The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.

6) For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak/Average detection at frequency above 1GHz.

3.2.4. Test Data

PASS

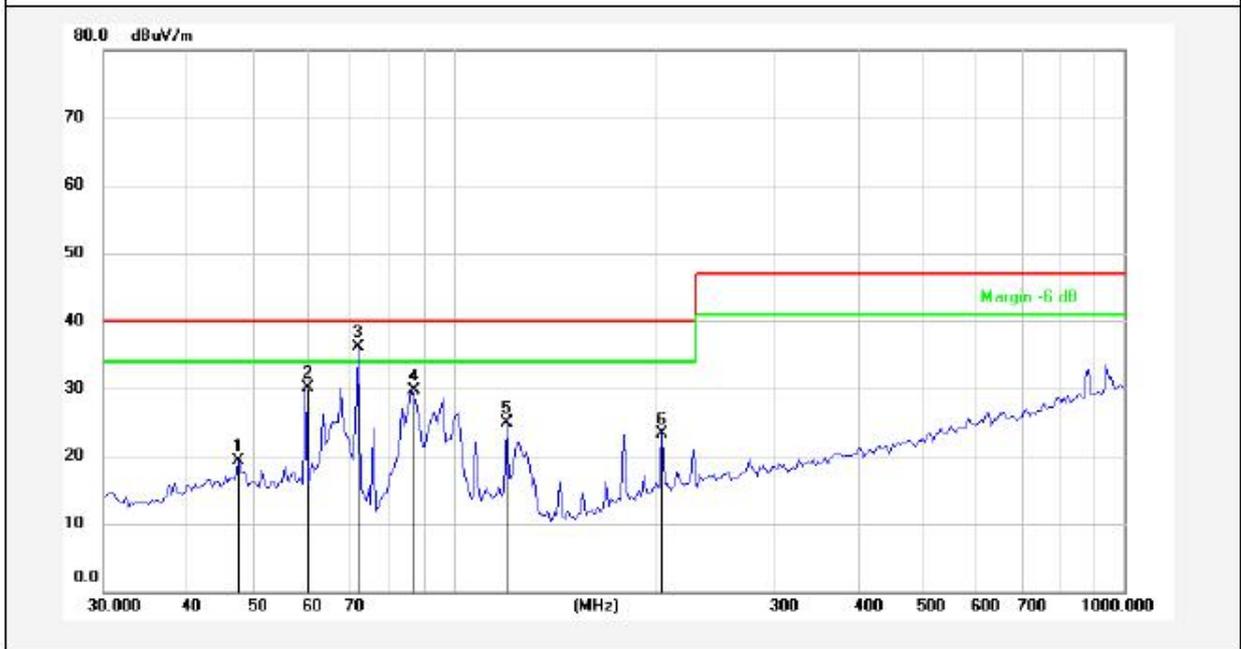
The EUT should be compliance to the limit of Class B

Only the worst case data was showed in the report, please to see the following pages

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Test Results (30~1000MHz)

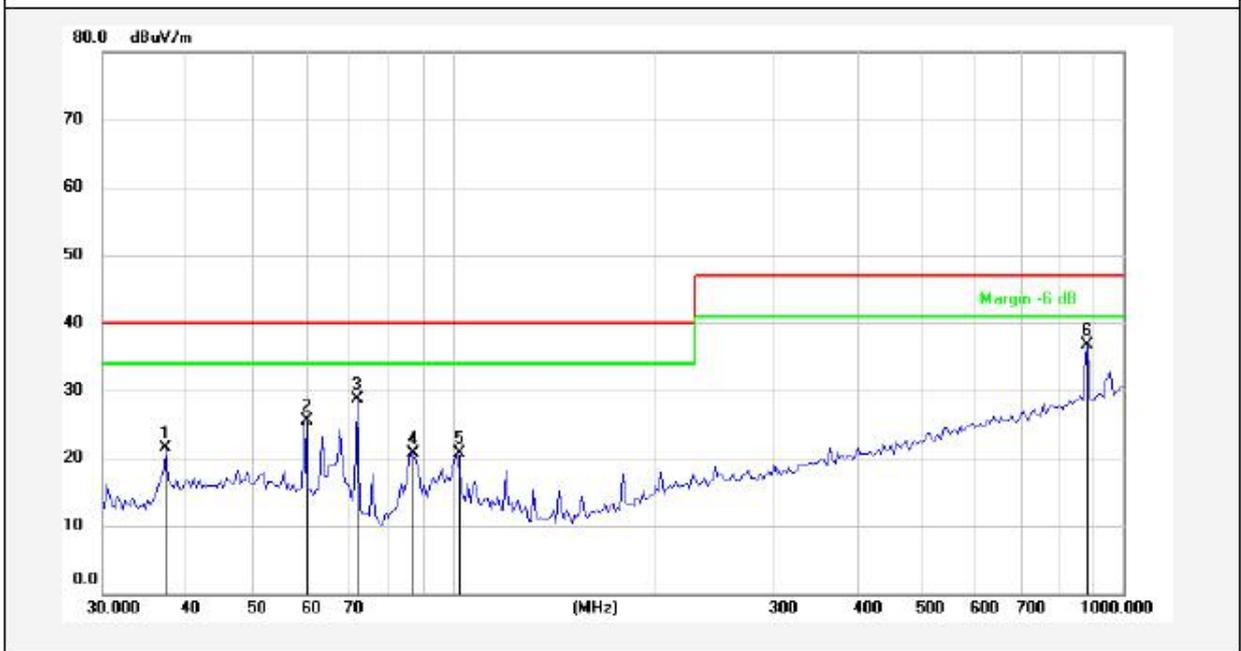
Job No.: ATSZAWW180207001 Temp.(°C)/Hum.(%RH): 23.2°C/53.4%RH
 Standard: EN301489_Class B_3m Power Source: DC 5V from PC with AC 230V/50Hz
 Test Mode: Mode 1 Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor ()	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	47.7422	34.16	-14.92	19.24	40.00	-20.76	peak			
2	59.9639	46.40	-16.31	30.09	40.00	-9.91	peak			
3	72.0843	55.26	-19.10	36.16	40.00	-3.84	QP	300	0	
4	86.6547	48.71	-19.07	29.64	40.00	-10.36	peak			
5	119.8556	43.13	-18.29	24.84	40.00	-15.16	peak			
6	204.5961	39.43	-16.06	23.37	40.00	-16.63	peak			

Test Results (30~1000MHz)

Job No.: ATSZAWW180207001 Temp.(°C)/Hum.(%RH): 23.2°C/53.4%RH
 Standard: EN301489_Class B_3m Power Source: DC 5V from PC with AC 230V/50Hz
 Test Mode: Mode 1 Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor ()	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	37.3509	38.17	-16.72	21.45	40.00	-18.55	peak			
2	59.9639	41.83	-16.31	25.52	40.00	-14.48	peak			
3	72.0841	47.79	-19.10	28.69	40.00	-11.31	peak			
4	86.6547	39.81	-19.07	20.74	40.00	-19.26	peak			
5	101.4663	37.40	-16.78	20.62	40.00	-19.38	peak			
6	884.5028	40.33	-3.57	36.76	47.00	-10.24	peak			



Test Results (1GHz~6GHz)

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Detector
1445.52	49.45	-3.05	46.40	70.00	-23.60	H	PEAK
2064.79	52.03	-2.73	49.30	70.00	-20.70	H	PEAK
2171.03	47.98	-4.36	43.62	70.00	-26.38	H	PEAK
4187.74	47.36	-5.33	42.03	74.00	-31.97	H	PEAK
4382.83	48.25	-5.41	42.84	74.00	-31.16	H	PEAK
4876.65	53.26	-5.39	47.87	74.00	-26.13	H	PEAK
1445.52	39.01	-3.05	35.96	50.00	-14.04	H	AVG
2064.79	42.11	-2.73	39.38	50.00	-10.62	H	AVG
2171.03	38.80	-4.36	34.44	50.00	-15.56	H	AVG
4187.74	42.38	-5.33	37.05	54.00	-16.95	H	AVG
4382.83	40.03	-5.41	34.62	54.00	-19.38	H	AVG
4876.65	39.38	-5.39	33.99	54.00	-20.01	H	AVG
1564.82	55.76	-2.92	52.83	70.00	-17.17	V	PEAK
2078.39	52.22	-2.61	49.61	70.00	-20.39	V	PEAK
2279.93	49.11	-3.96	45.15	70.00	-24.85	V	PEAK
4121.01	45.98	-5.33	40.65	74.00	-33.35	V	PEAK
4468.55	46.83	-5.44	41.39	74.00	-32.61	V	PEAK
4928.40	46.31	-6.16	40.15	74.00	-33.85	V	PEAK
1564.82	41.76	-2.92	38.83	50.00	-11.17	V	AVG
2078.39	38.66	-2.61	36.04	50.00	-13.96	V	AVG
2279.93	39.27	-3.96	35.31	50.00	-14.69	V	AVG
4121.01	42.21	-5.33	36.88	54.00	-17.12	V	AVG
4468.55	37.96	-5.44	32.52	54.00	-21.48	V	AVG
4928.40	37.47	-6.16	31.31	54.00	-22.69	V	AVG

Remark:

1. Level =Receiver Read level + Antenna Factor

4. Immunity Test

General Performance Criteria

◆ Performance criteria for continuous phenomena applied to transmitters and receivers (CT/CR)

During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

◆ Performance criteria for transient phenomena applied to transmitters and receivers (TT/TR)

After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.

During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.

If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

◆ Performance criteria for equipment which does not provide a continuous communication link

For radio equipment which does not provide a continuous communication link, the performance criteria described in CT/CR and TT/TR are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests.

The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in CT/CR and TT/TR.

◆ Performance criteria for ancillary equipment tested on a stand alone basis

If ancillary equipment is intended to be tested on a stand alone basis, the performance criteria described in CT/CR and TT/TR are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests.

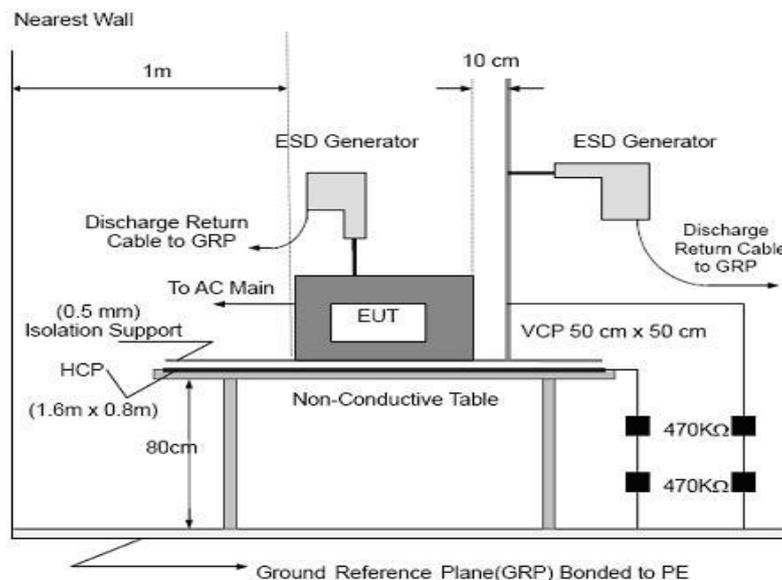
The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in CT/CR and TT/TR.

4.1. Electrostatic Discharge Test

4.1.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 V2.2.0 Clause 9.3
Basic Standard	EN 61000-4-2:2009
Discharge Impedance:	330 ohm / 150 pF
Performance Criterion:	CT/CR
Discharge Voltage:	Air Discharge: 2kV/4kV/8kV
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

4.1.2. Test Setup



Note:

TABLE-TOP EQUIPMENT:

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940kohm total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT:

The equipment under test was installed in a representative system as described in section 7 of IEC/EN 61000-4-2,

and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

4.1.3. Test Procedure

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

1) Contact discharge was applied to conductive surfaces and coupling planes of the EUT.

During the test, it was performed with single discharges. For the single discharge time between successive single discharges was at least 1 second.

Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

2) Air discharges at insulation surfaces of the EUT.

It was at least ten single discharges with positive and negative at the same selected point.

3) For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.4. Test Data

Job No.: ATSZAWW180207001 Temp.(°C)/Hum.(%RH): 23.2°C/53.4%RH
 Standard: EN61000-4-2 Power Source: DC 5V from PC with AC 230V/50Hz
 Test Mode: Mode 1

Item	Contact Discharge to conducted surfaces and to coupling planes		Air Discharge at insulating surfaces
	Direct Contact Discharge	Indirect Contact Discharge	
Test Voltage	Reaction of EUT / Result	Reaction of EUT / Result	Reaction of EUT / Result
+2kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
-2kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
+4kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
-4kV	n.r.r. PASS	n.r.r. PASS	n.r.r. PASS
+6kV	-	-	n.r.r. PASS
-6kV	-	-	n.r.r. PASS
+8kV	-	-	n.r.r. PASS
-8kV	-	-	n.r.r. PASS

Remarks: n.r.r. = no reaction recognized

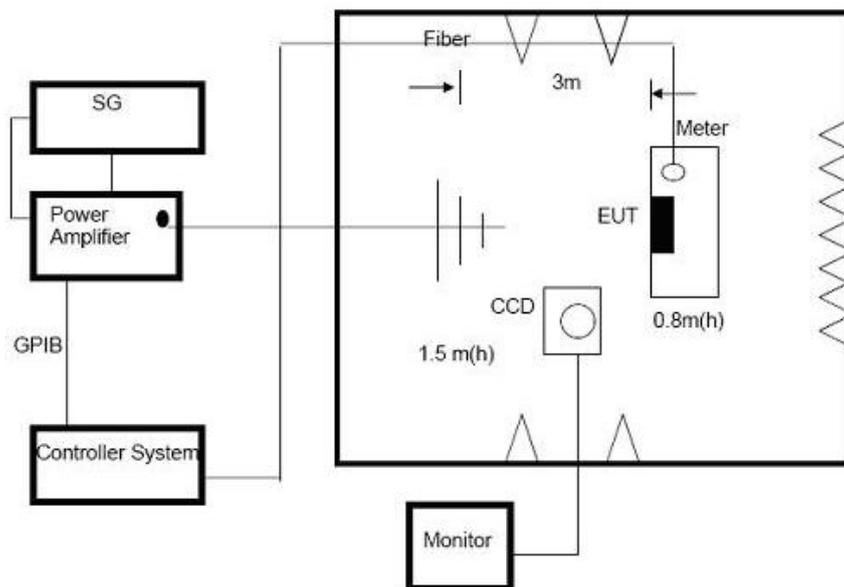
Performance Criteria A observed and No any function degraded during the tests.

4.2. Radiated, RF Electromagnetic Fields Test

4.2.1. Test Standard and Specification

Test Standard	ETSI EN 301 489-1 V2.2.0 Clause 9.2
Basic Standard	EN 61000-4-3: 2006+A1:2008+A2:2010
Required Performance	A
Frequency Range	80MHz to 6GHz
Field Strength	3 V/m
Modulation	1kHz Sine Wave, 80%, AM Modulation
Frequency Step	1 % of preceding frequency value
Polarity of Antenna	Horizontal and Vertical
Test Distance	3 m
Antenna Height	1.5 m
Dwell Time	at least 3 seconds

4.2.2. Test Setup



4.2.3. Test Procedure

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber. The testing distance from antenna to the EUT was 3 meters.

- 1) The field strength level was 3V/m
- 2) The frequency range is swept from 80 MHz to 6000 MHz with the signal 80%amplitude modulated with a 1kHz sine wave.
- 3) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0.5s.

4) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.2.4. Test Data

Job No.: ATSZAWW180207001 Temp.(°C)/Hum.(%RH): 23.2°C/53.4%RH
 Standard: EN61000-4-3 Power Source: DC 5V from PC with AC 230V/50Hz
 Test Mode: Mode 1

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observation	Perform. Criteria	Results
80~6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	CT,CR	A	PASS
			Rear			
			Left			
			Right			

Anbotek

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Conducted Emission Test



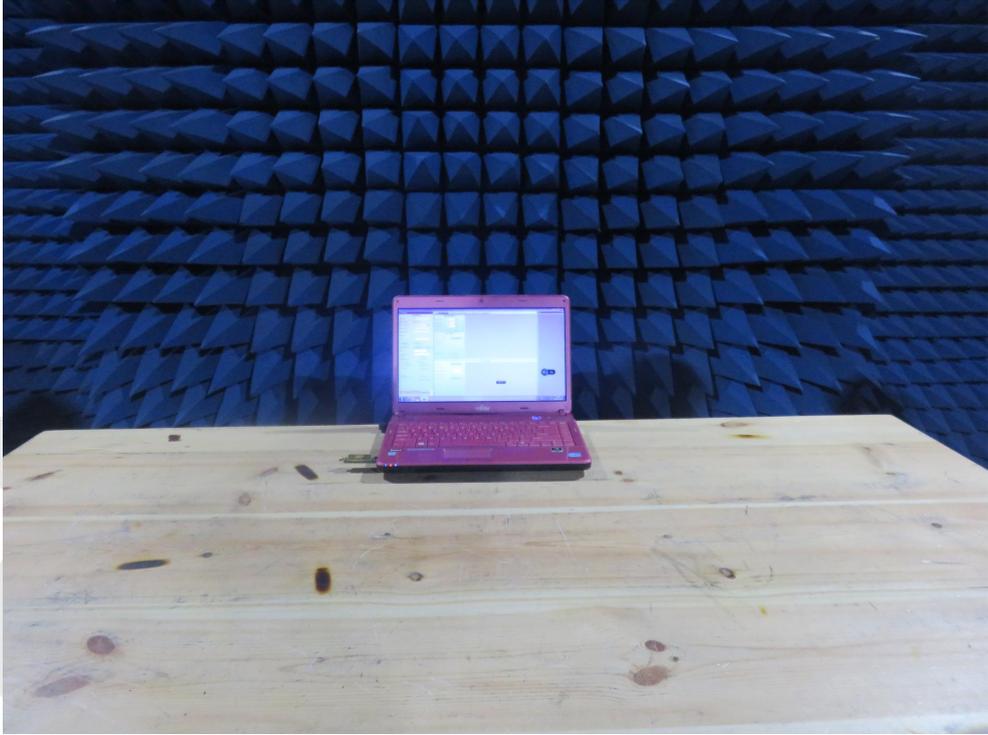
Photo of Radiation Emission Test



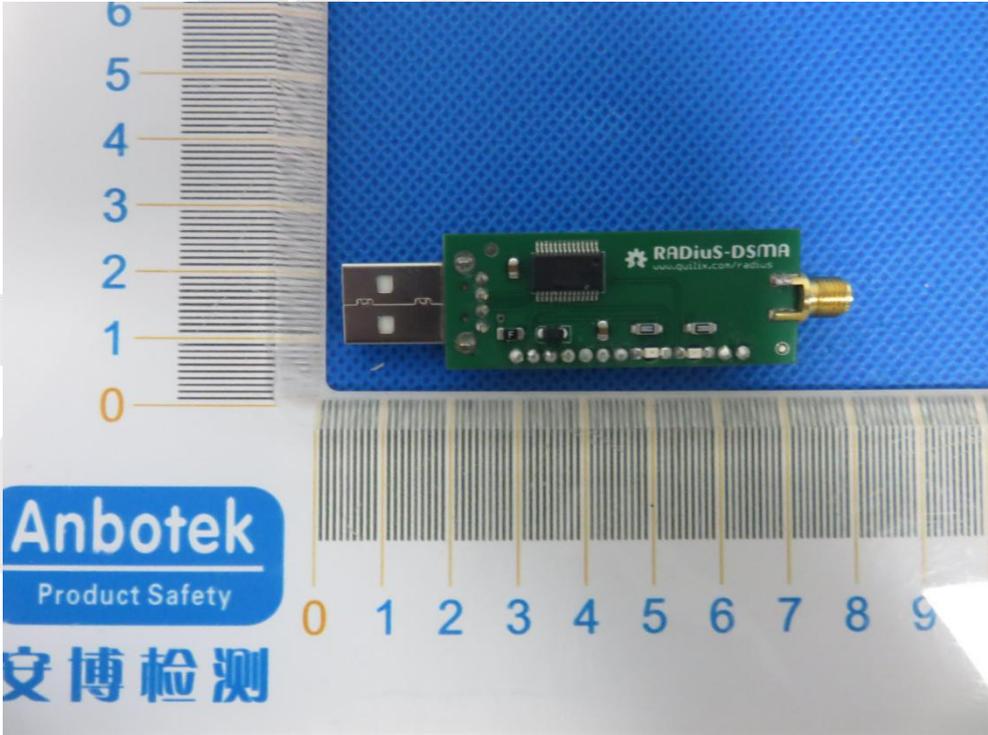
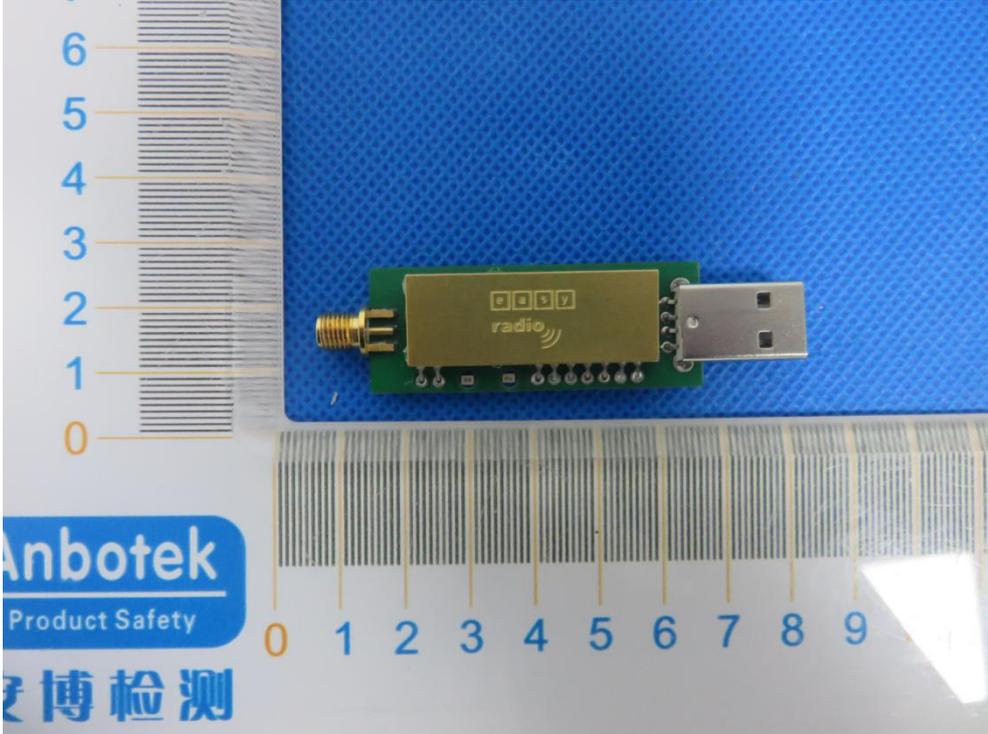
Photo of Electrostatic Discharge Test

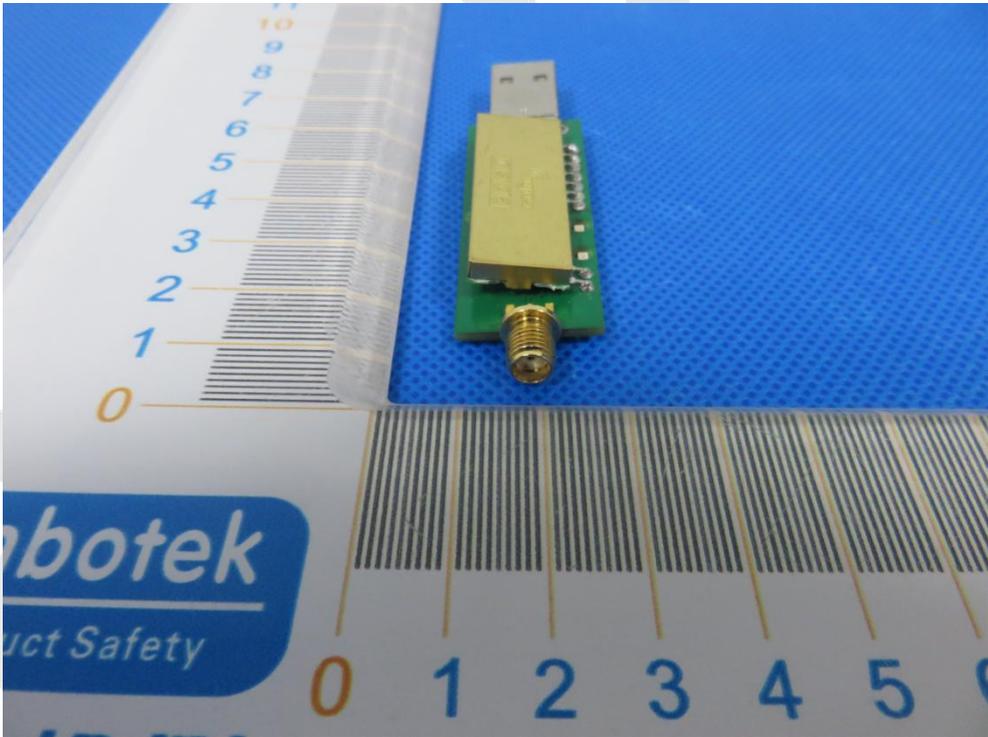
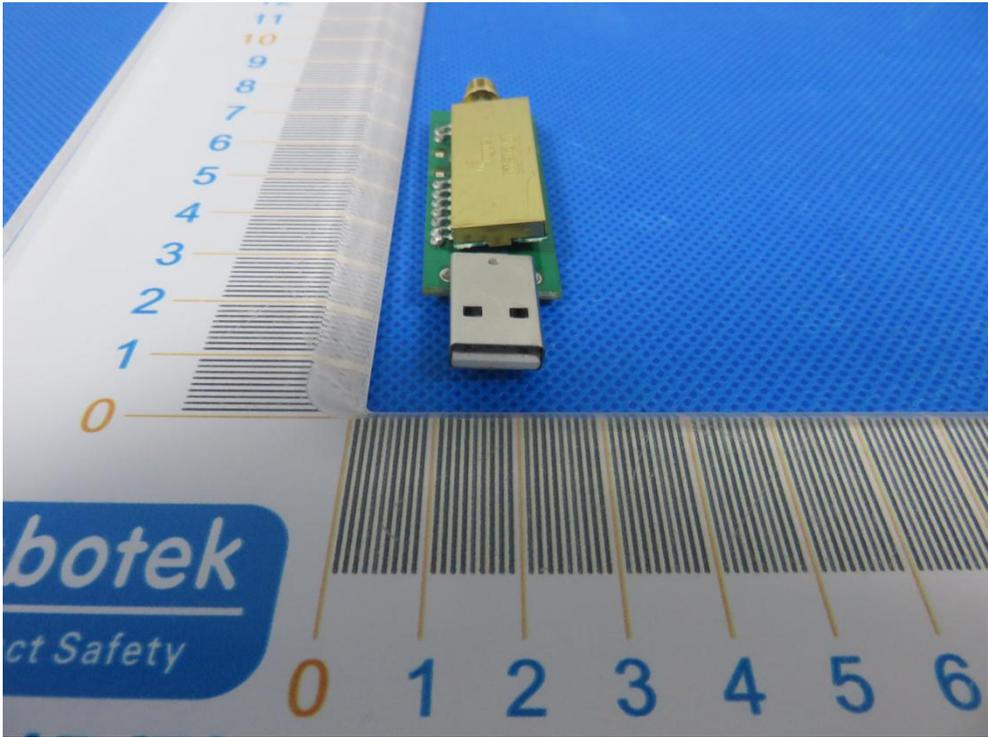


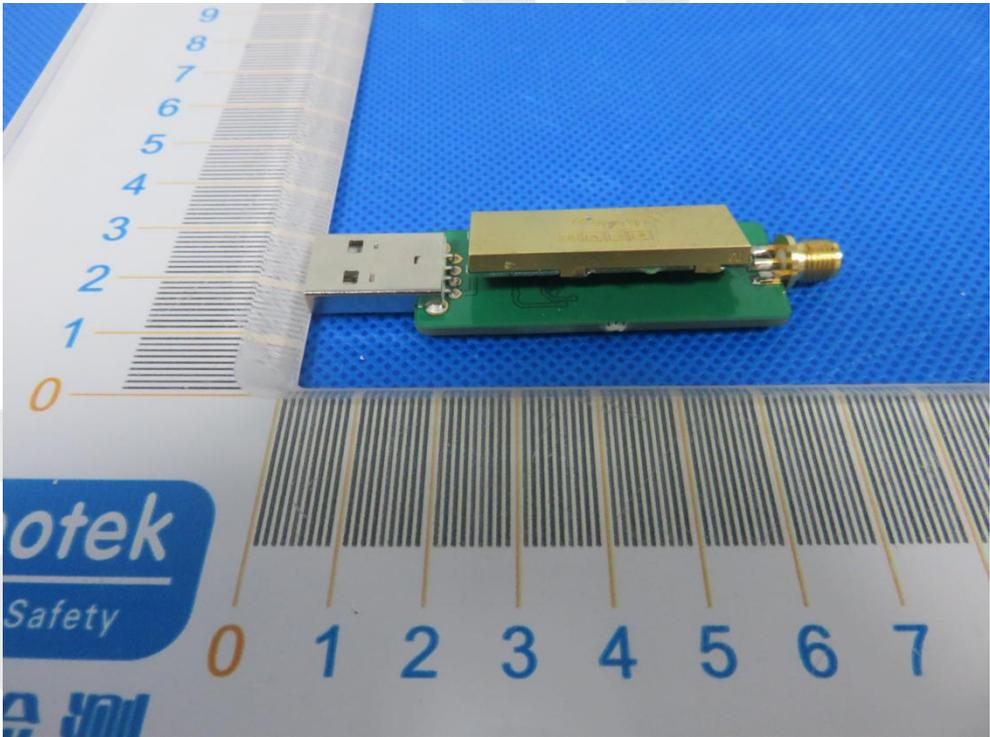
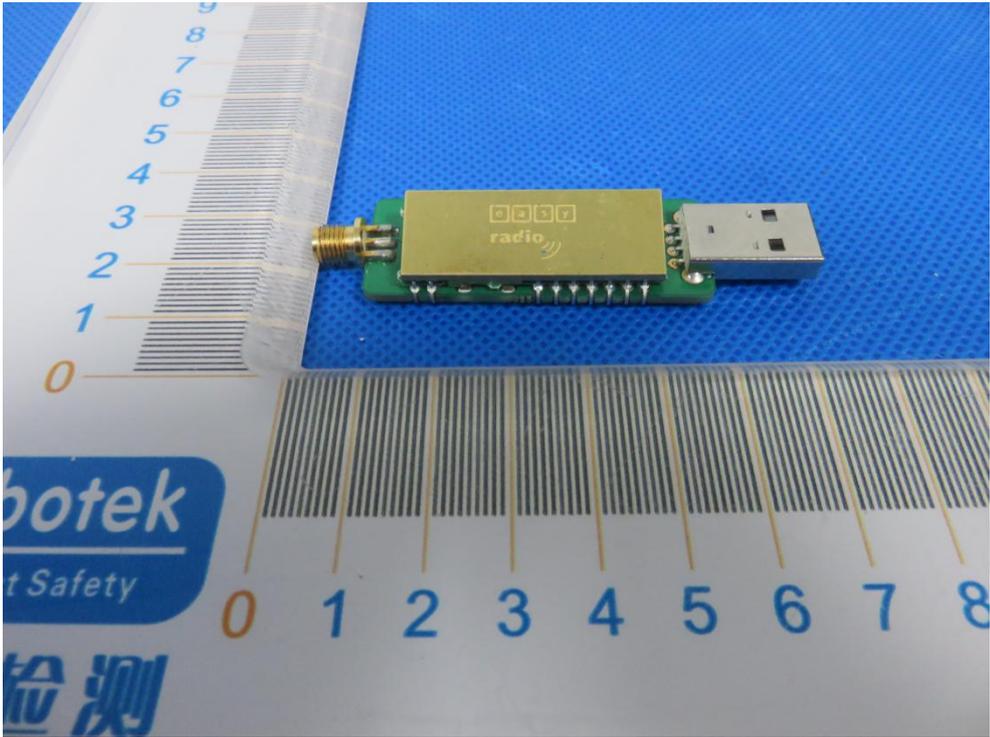
Photo of RF Field Strength Susceptibility Test



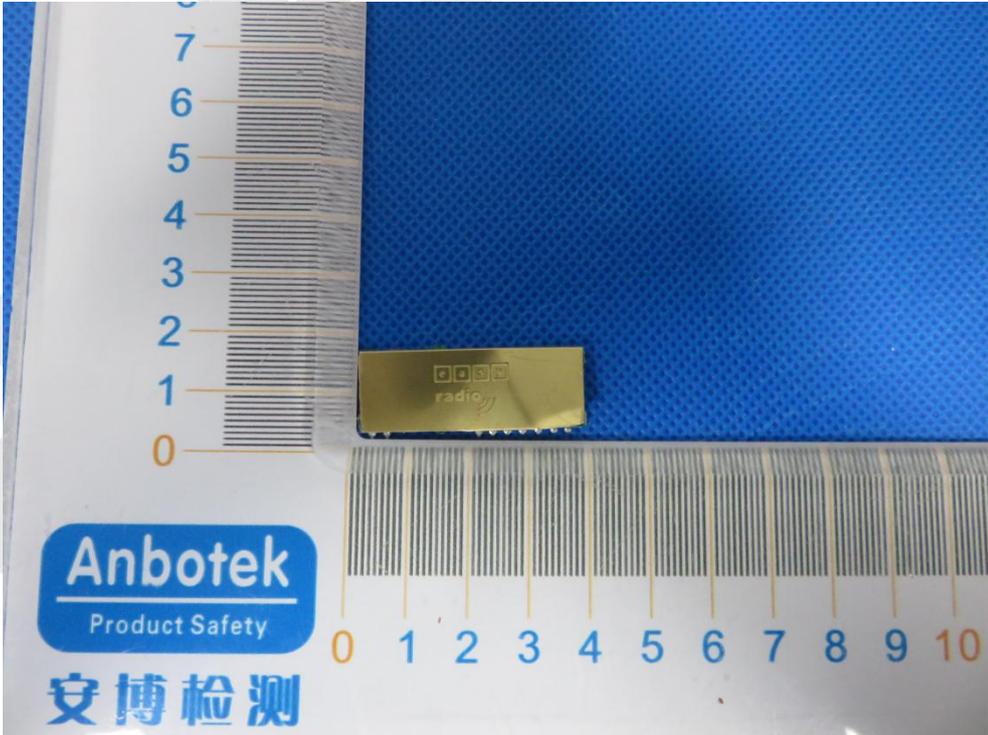
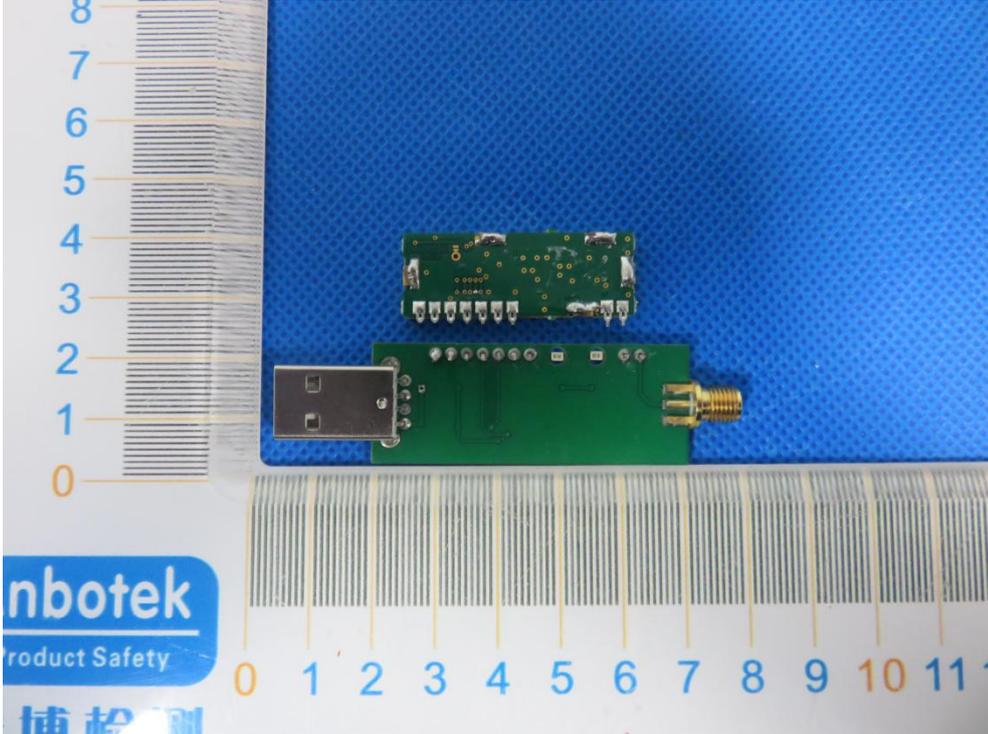
APPENDIX II -- EXTERNAL PHOTOGRAPH

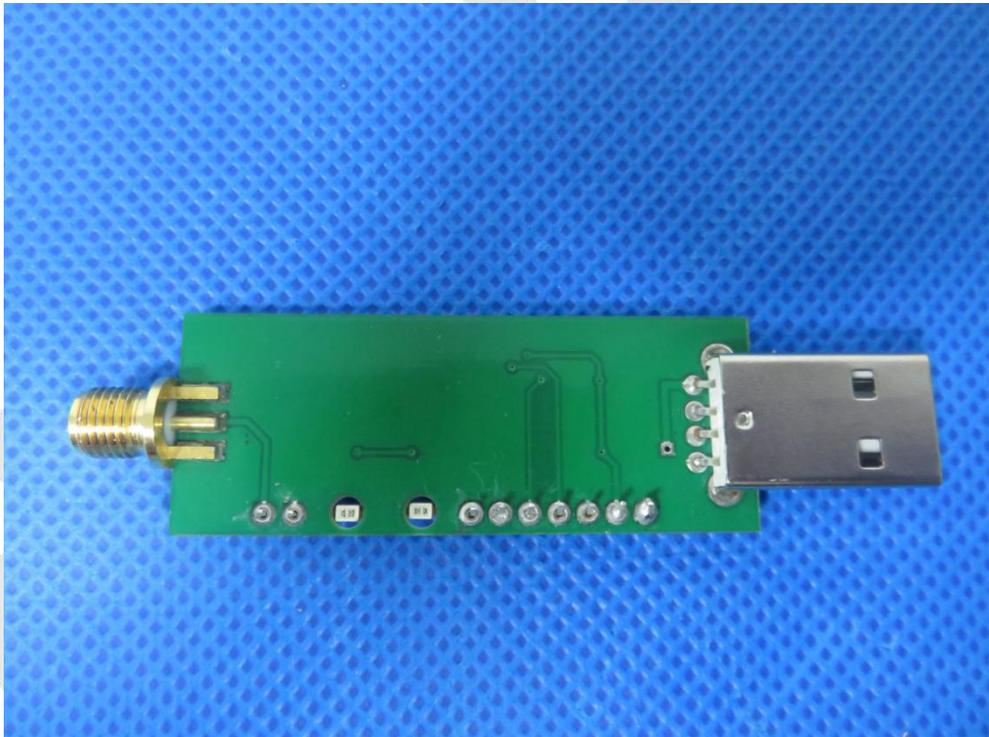
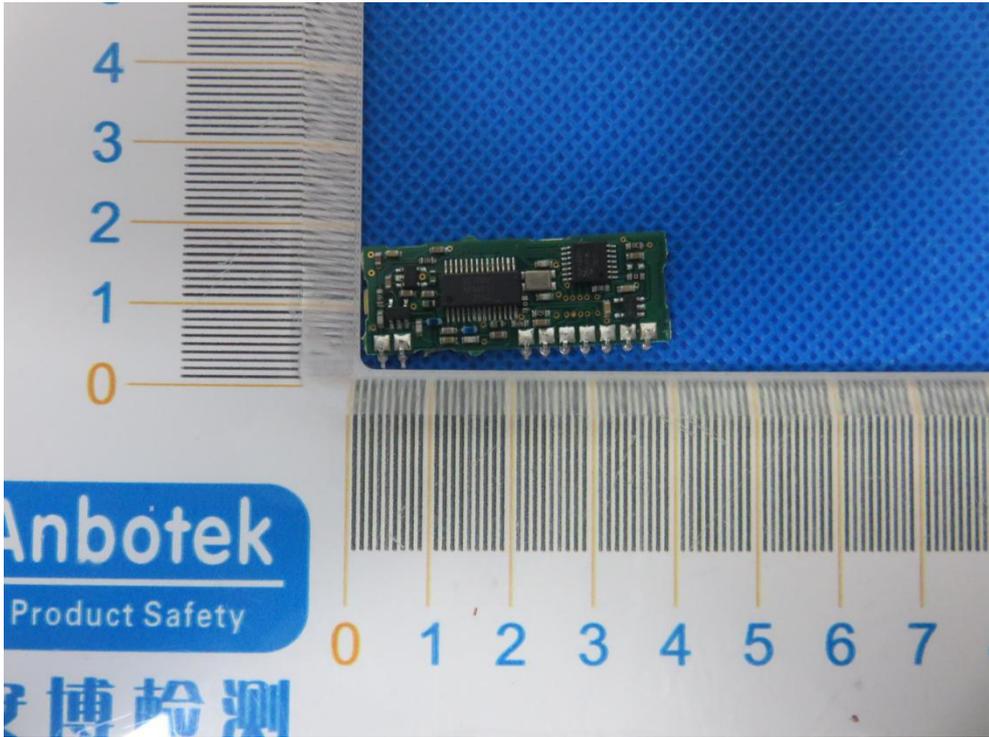


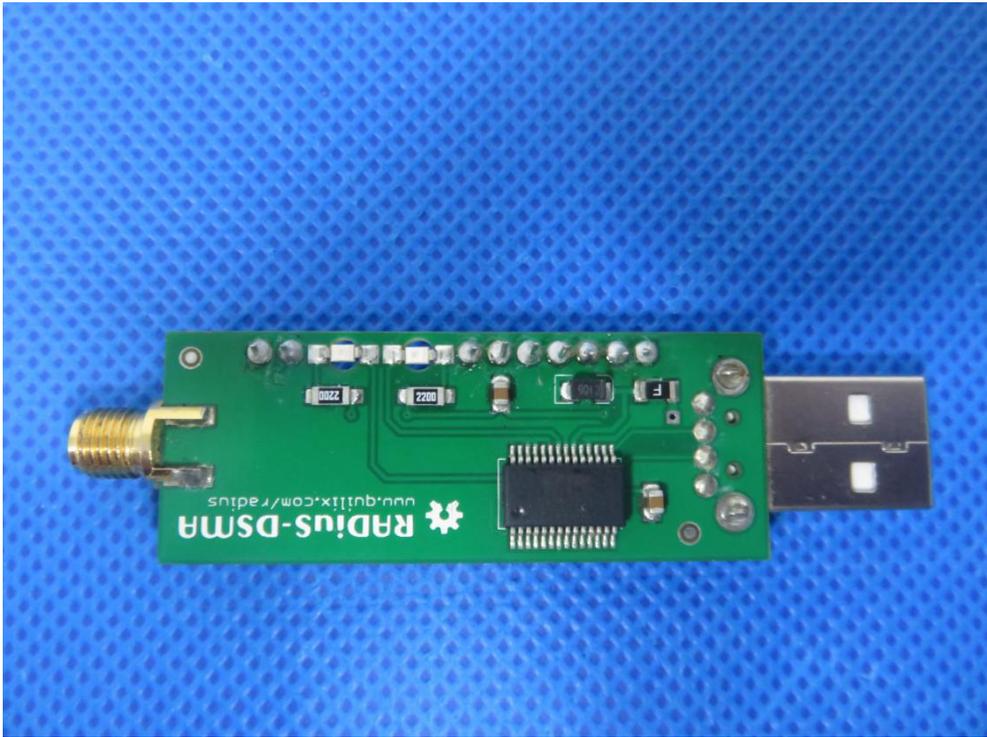


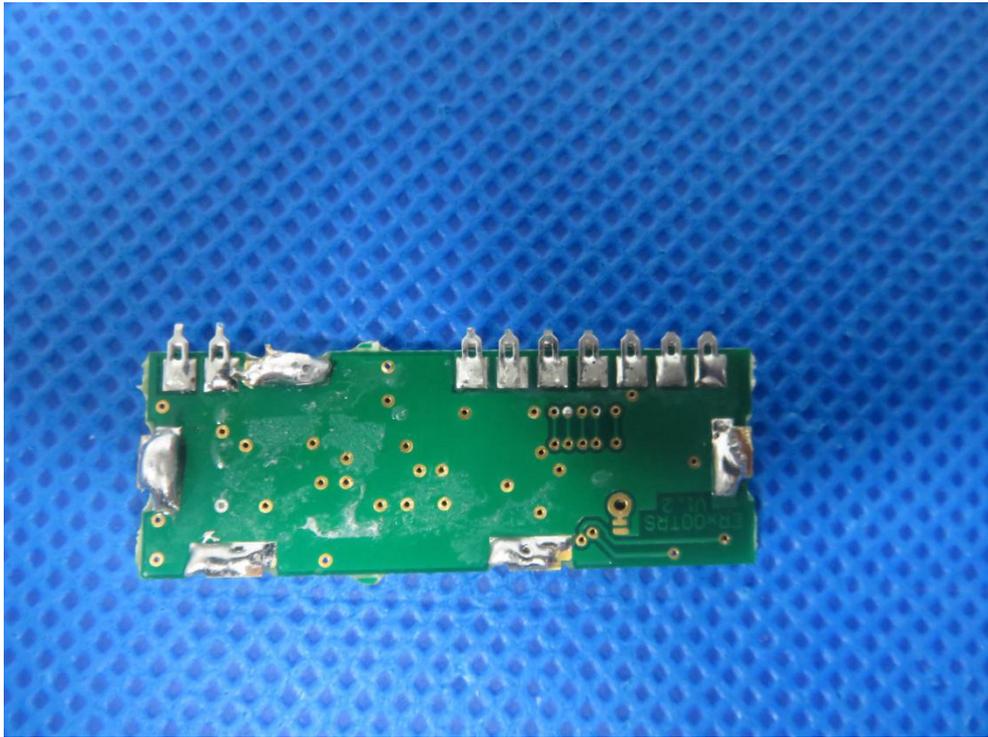


APPENDIX III -- INTERNAL PHOTOGRAPH









----- End of Report-----