

FCC Test Report

Part 15 subpart C

Client Information:

Applicant: Modern Co., Ltd.

Applicant add.: 171 KangYi Road, Qingxi Town, Dongguan, Guangdong, China

Product Information:

EUT Name: Fireplace remote control transmitter

Model No.: TR1003, TR1001, TR1002-T, TR1002-TH, TR1003-P, TR1003-B,
TR1003-PB, TR1004, TR1005, TR1006

Brand Name: Durablowl

FCC ID: 2AKOB-TR1003

Standards: FCC PART 15 Subpart C: 2016 section 15.231

Test procedure used: ANSI C63.10-2013

Prepared By:

ATS Electronic Technology Co., Ltd.

Add. : 3/F, Building A, No. 1 Hedong Three Road, Jinxia Community, Changan Town,
DongGuan City, GuangDong, P.R.China

Date of Receipt: Dec. 02, 2016

Date of Test: Dec. 16, 2016

Date of Issue: Dec. 19, 2016

Test Result: Pass

This device described above has been tested by ATT Product Service Co., Ltd., and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

*This test report must not be used by the client to claim product endorsement by any agency of the U.S. government.

Reviewed by: Vera Wang

Approved by: Simon Zeng

1 Contents

	Page
COVER PAGE	
1 CONTENTS	2
2 TEST SUMMARY	3
2.1 COMPLIANCE WITH FCC PART 15 SUBPART C	3
2.2 MEASUREMENT UNCERTAINTY	4
2.3 TEST LOCATION	4
3 GENERAL INFORMATION	5
3.1 GENERAL DESCRIPTION OF EUT	5
3.2 DESCRIPTION OF TEST CONDITIONS	6
3.3 TEST PERIPHERAL LIST	7
3.4 EUT PERIPHERAL LIST	7
4 EQUIPMENTS LIST FOR ALL TEST ITEMS	8
5 ANTENNA REQUIREMENT	9
6 PROVISION FOR MOMENTARY OPERATION	10
6.1 MEASUREMENT PROCEDURE	10
6.2 TEST SETUP	10
6.3 TEST RESULT	11
7 DUTY CYCLE CORRECTION FACTOR	12
7.1 MEASUREMENT PROCEDURE	12
7.2 TEST SETUP	12
7.3 TEST RESULT	13
8 RADIATED EMISSION	15
8.1 MEASUREMENT PROCEDURE	15
8.2 TEST SETUP	17
8.3 TEST RESULT	18
9 BANDWIDTH	23
9.1 MEASUREMENT PROCEDURE	23
9.2 TEST SETUP	23
9.3 TEST RESULT	24
10 PHOTOGRAPHS	25
10.1 RADIATED SPURIOUS EMISSION TEST SETUP	25
11 EUT PHOTOS	26

2 Test Summary

2.1 Compliance with FCC Part 15 subpart C

Test	Test Requirement	Standard Paragraph	Result
Antenna Requirement	FCC Part 15 C:2016	Section 15.203	PASS
Manually	FCC Part 15 C:2016	Section 15.231(a)(1)	PASS
automatically	FCC Part 15 C:2016	Section 15.231(a)(2)	N/A
periodic	FCC Part 15 C:2016	Section 15.231(a)(3)	N/A
emergency(alarm)	FCC Part 15 C:2016	Section 15.231(a)(4)	N/A
security	FCC Part 15 C:2016	Section 15.231(a)(5)	N/A
Average Factor	FCC Part 15 C:2016	Section 15.231(b)	PASS
Field Strength of Fundamental and Spurious Emission	FCC Part 15 C:2016	Section 15.231(b) & 15.209	PASS
Bandwidth	FCC Part 15 C:2016	Section 15.231(c)	PASS
Frequency Tolerance	FCC Part 15 C:2016	Section 15.231(d)	N/A
Field Strength(periodic trasmitter)	FCC Part 15 C:2016	Section 15.231(e)	N/A
Conducted Emission	FCC Part 15 C:2016	Section 15.207	N/A

2.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, The following measurements uncertainty Levels have estimated based on ANSI C63.10:2013, the maximum value of the uncertainty as below

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.44dB
Uncertainty for Radiation Emission test (150KHz-30MHz)	3.21dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	3.14 dB (Polarize: V)
	3.16 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz to 25GHz)	2.08dB(Polarize: V)
	2.56dB (Polarize: H)
Uncertainty for radio frequency	1×10^{-9}
Uncertainty for conducted RF Power	0.65dB

2.3 Test Location

All tests were performed at:

ATT Product Service Co., Ltd.

No. 3, ChangLianShan Industrial Park, ChangAn Town, DongGuan City, GuangDong, China.

The FCC Registration: 923232

3 General Information

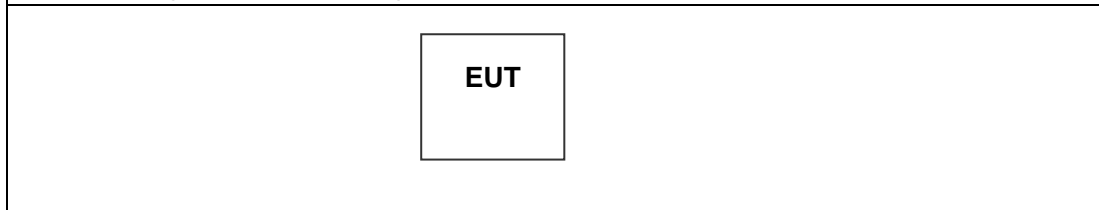
3.1 General Description of EUT

Manufacturer:	Modern Co., Ltd.
Manufacturer Address:	171 KangYi Road, Qingxi Town, Dongguan, Guangdong, China
EUT Name:	Fireplace remote control transmitter
Model No:	TR1003
Derivative model No.:	TR1001, TR1002-T, TR1002-TH, TR1003-P, TR1003-B, TR1003-PB, TR1004, TR1005, TR1006
Brand Name:	Durablow
Operation frequency:	315 MHz
NUMBER OF CHANNEL:	1
Modulation Technology:	ASK
H/W No.:	V 1.0
S/W No.:	V 1.1
Antenna Type:	Integral Antenna
Antenna Gain:	Maximum 0 dBi
Power Supply:	3Vdc by battery
Power Cord:	N/A
Note:	
1	All the model are the same except model name and appearance color.
2	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.2 Description of Test conditions

- (1) EUT was tested in normal configuration (Please See following Block diagram)

1. Block diagram of EUT configuration(TX Mode)



- (2) new battery is used during all test.
- (3) The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

3.3 Test Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	/	/	/	/	/	/	/

3.4 EUT Peripheral List

No.	Equipment	Manufacturer	EMC Compliance	Model No.	Serial No.	Power cord	signal cable
1	/	/	/	/	/	/	/

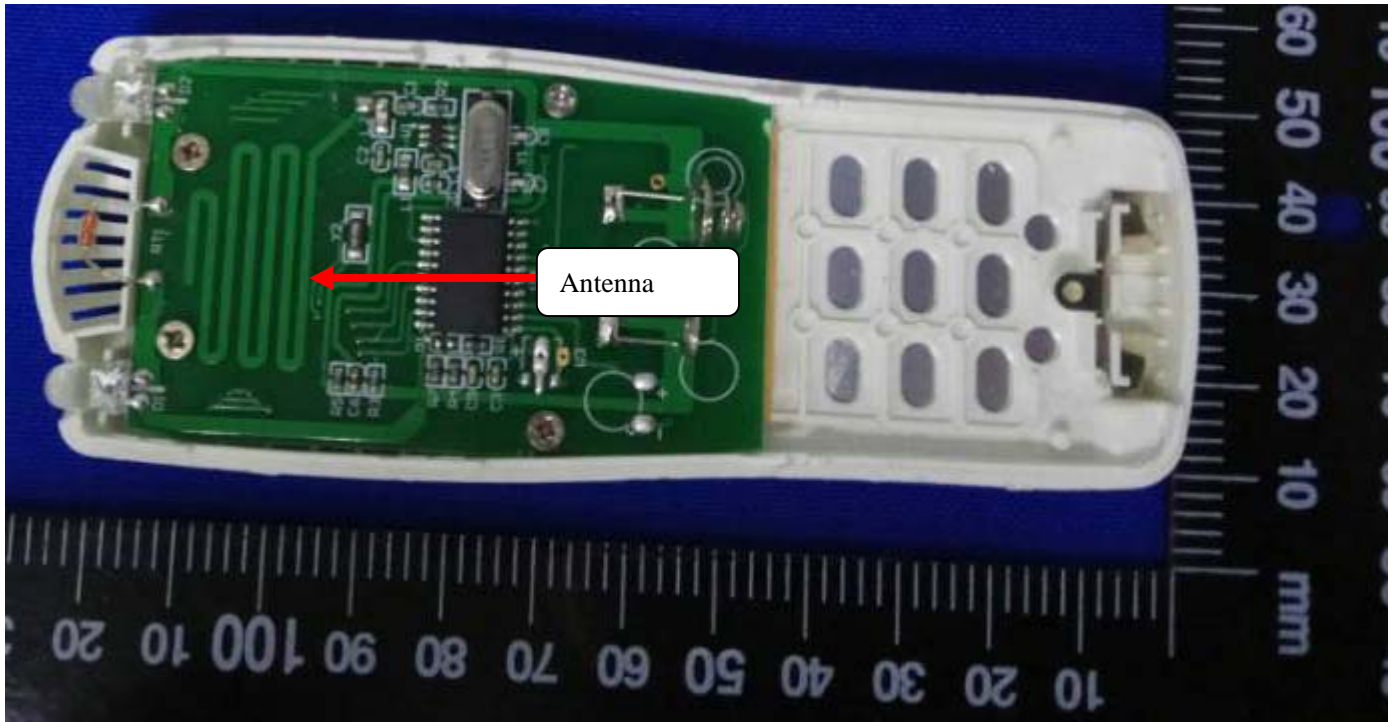
4 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2016.06.29	2017.06.28
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2016.06.29	2017.06.28
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2016.06.29	2017.06.28
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2016.06.29	2017.06.28
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2016.06.29	2017.06.28
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2016.06.29	2017.06.28
7	SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170367	2016.06.29	2017.06.28
8	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.29	2017.06.28
9	EMI Test Receiver	R&S	ESCI	100124	2016.06.29	2017.06.28
10	Loop Antenna	ARA	PLA-1030/B	1029	2016.06.29	2017.06.28
11	EMI Test Receiver	Rohde & Schwarz	ESIB26	100394	2016.06.29	2017.06.28

5 Antenna Requirement

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The EUT has fixed antenna, which accordance to the above sections, is considered sufficient to comply with the provisions of these sections. Please see EUT photo for details.



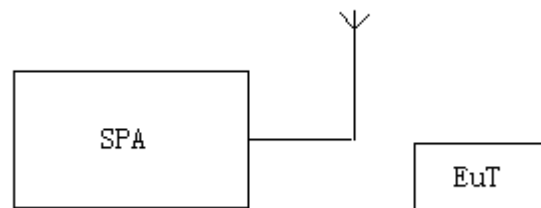
The requirements of section 15.203 are **FULFILLED**.

6 PROVISION FOR MOMENTARY OPERATION

6.1 MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
Centre frequency = Operation Frequency
RBW=100KHz
VBW=300KHz
Span: 0Hz
Sweep time: 5S
2. Set the EUT to transmit by manually operated. Use the “View” function of SPA to find the transmission time of being released.
3. Record the data and Reported.

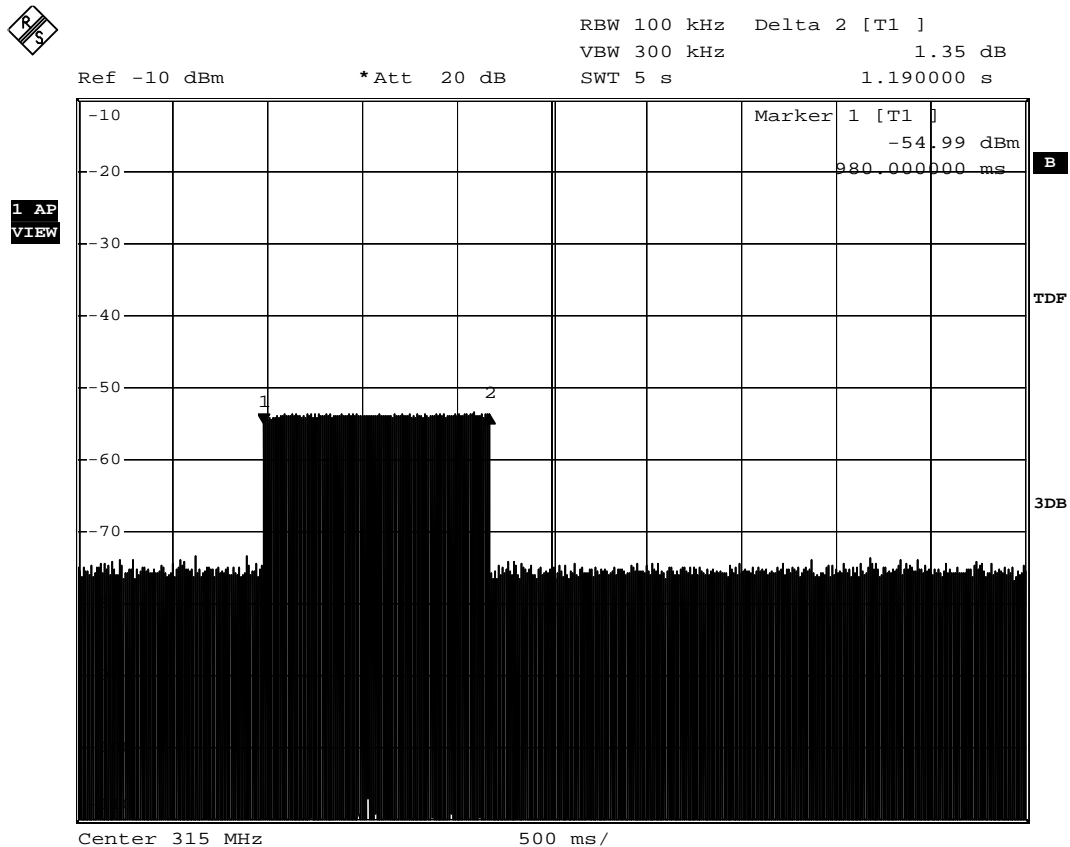
6.2 TEST SETUP



6.3 TEST RESULT

Test Mode: EUT @ 315MHz for RF Transmitter

The time of stopping transmission after switch releasing (s)	Limit (s)
1.19	5.00



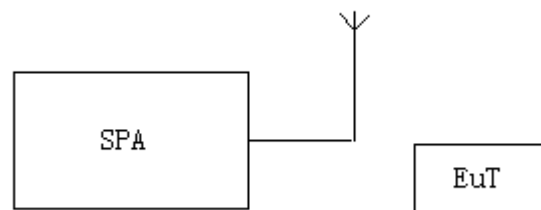
RESULT: PASS

7 DUTY CYCLE CORRECTION FACTOR

7.1 MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
Centre frequency = Operation Frequency
RBW=100KHz; VBW=300KHz
Span: 0Hz
Sweep time: more than two pulse trains or more than each type of pulse occupancy time
2. Set the EUT to transmit by manually operated. Use the "Delta mark" function of SPA to find the period time between two pulse trains and each type of pulse occupancy time.
3. Record the plots and Reported.

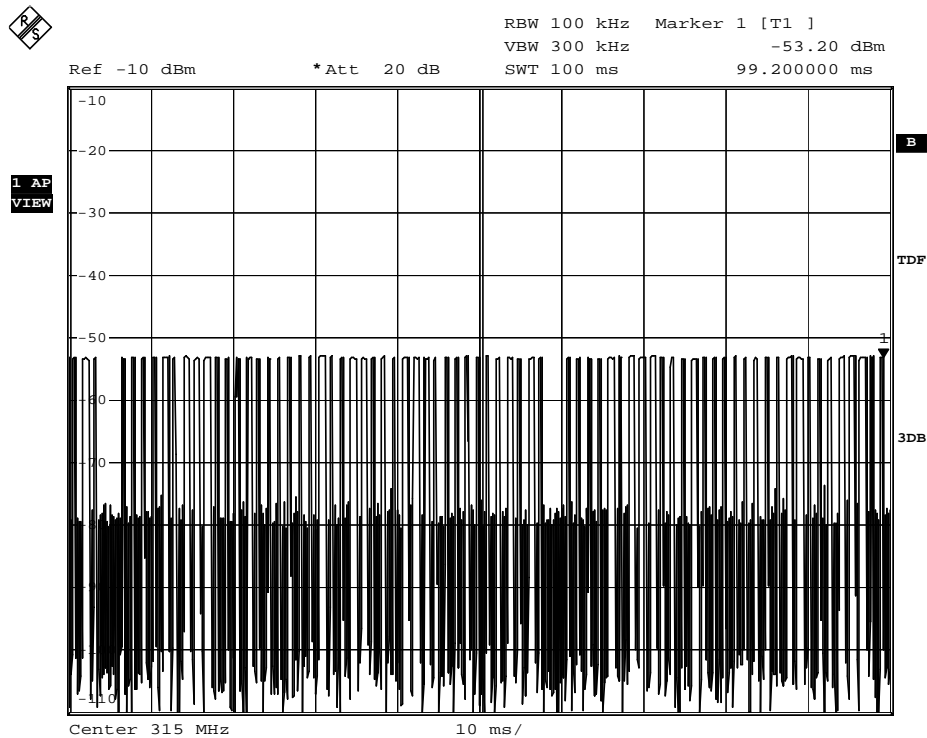
7.2 TEST SETUP

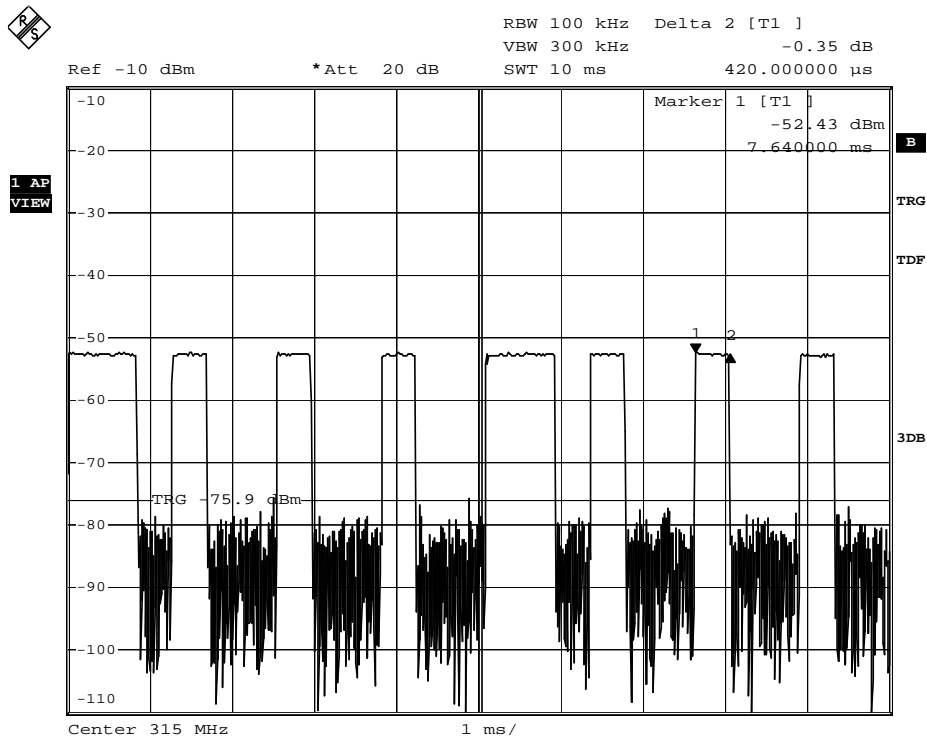
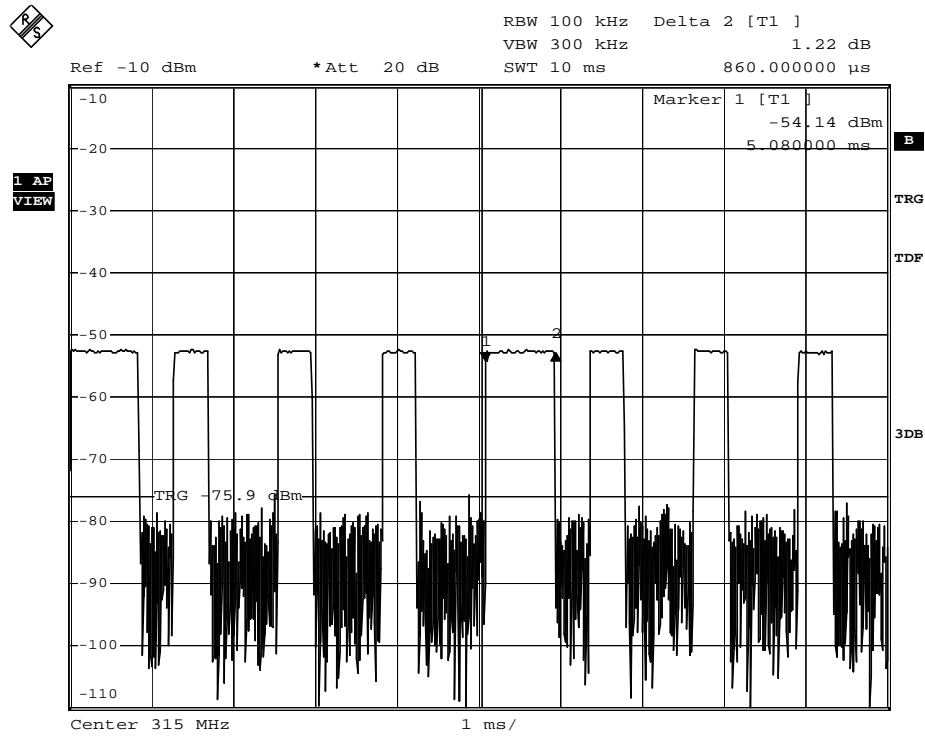


7.3 TEST RESULT

Test Mode: EUT @ 315MHz for RF Transmitter

Duty Cycle:	$(0.86\text{ms} \times 18 + 0.42\text{ms} \times 57) / 100\text{ms} = 0.3942$
Duty Cycle Correction Factor:	$20\lg(0.3942) = -8.09\text{dB}$





8 RADIATED EMISSION

8.1 MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

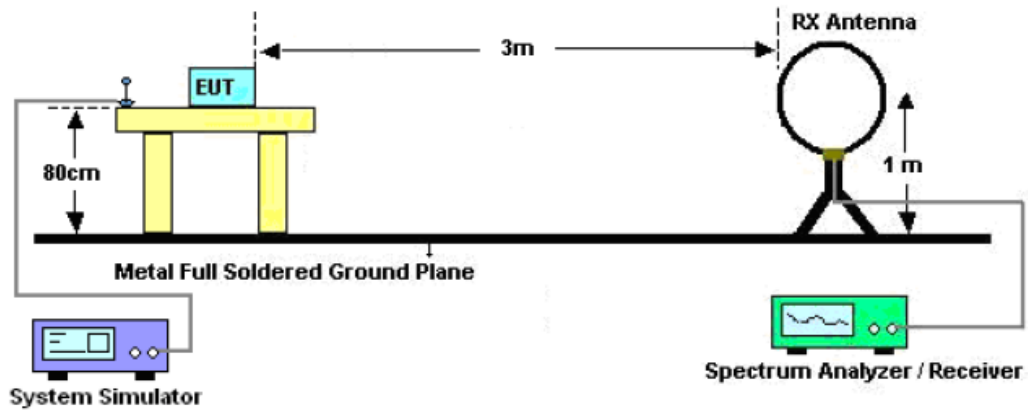
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/1MHz for Peak, 1MHz/10Hz for Average

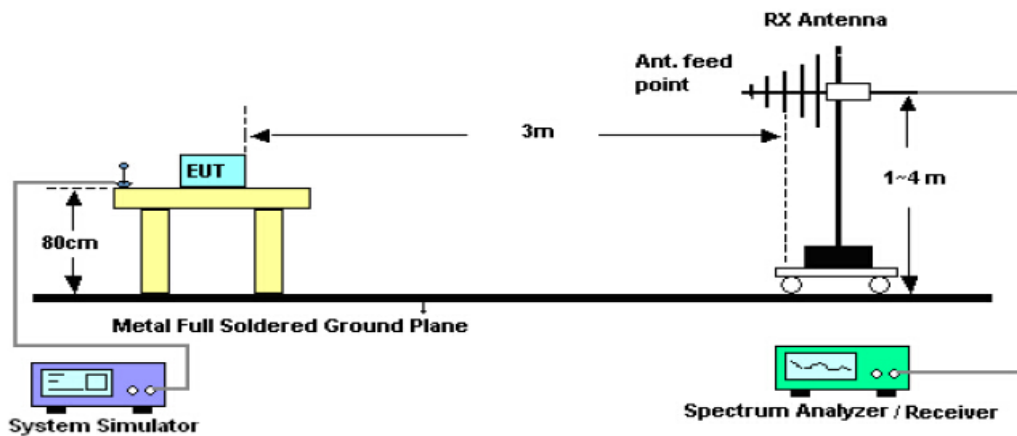
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RBW 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RBW 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RBW 120KHz for QP

8.2 TEST SETUP

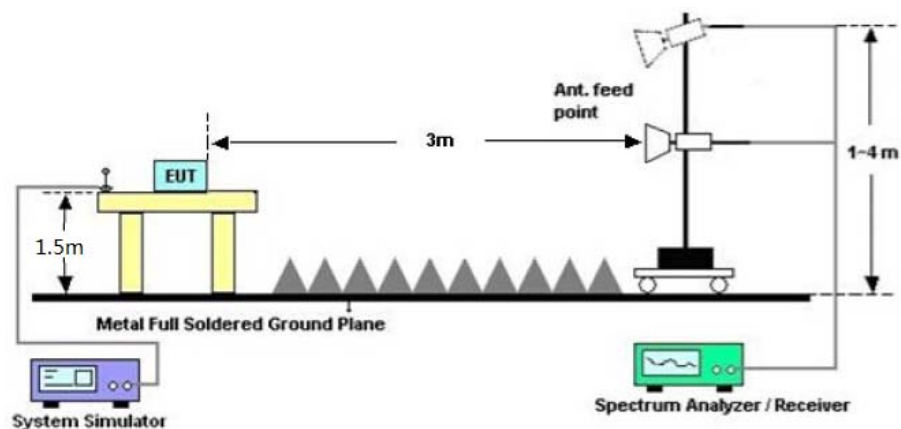
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



8.3 TEST RESULT

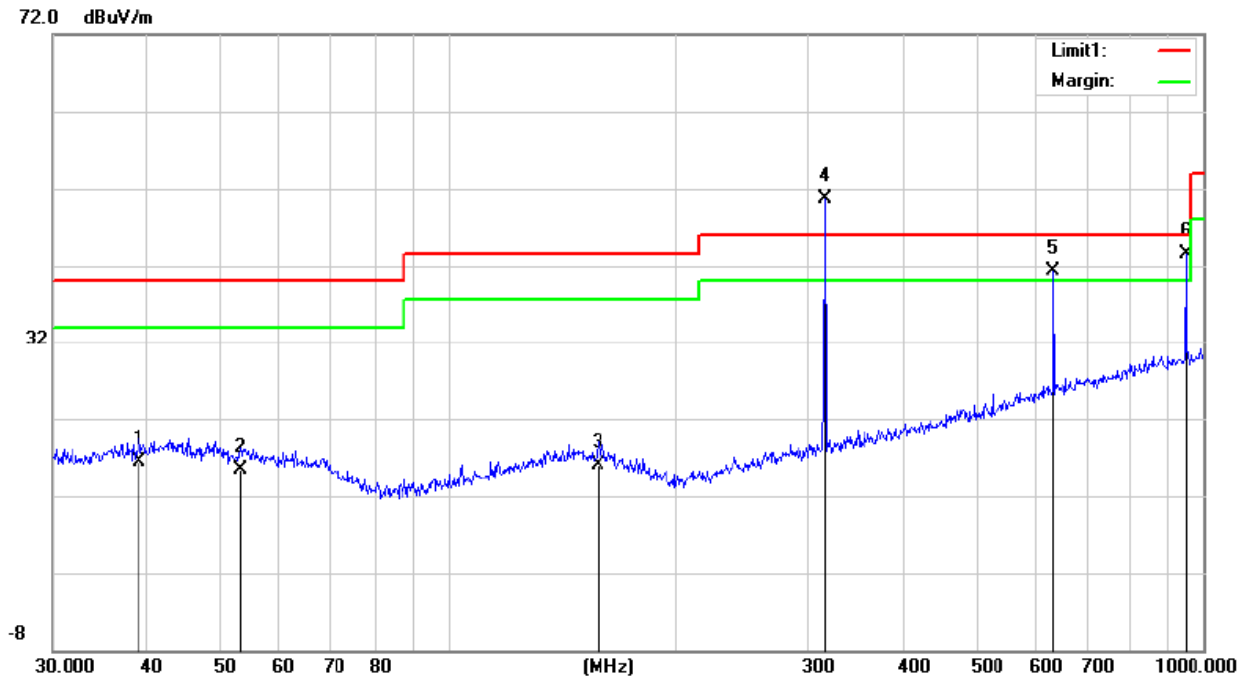
Test Mode: EUT @ 315MHz for RF Transmitter

RADIATED EMISSION BELOW 30MHz

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION BELOW

1GHZ-Horizontal



PK list

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB	Pass/Fail	Remark
315.081	H	37.42	13.27	50.69	95.60	-44.91	Pass	Fundamental
630.230	H	21.23	19.98	41.21	75.60	-54.39	Pass	Harmonic
945.480	H	19.64	23.77	43.41	75.60	-52.19	Pass	Harmonic

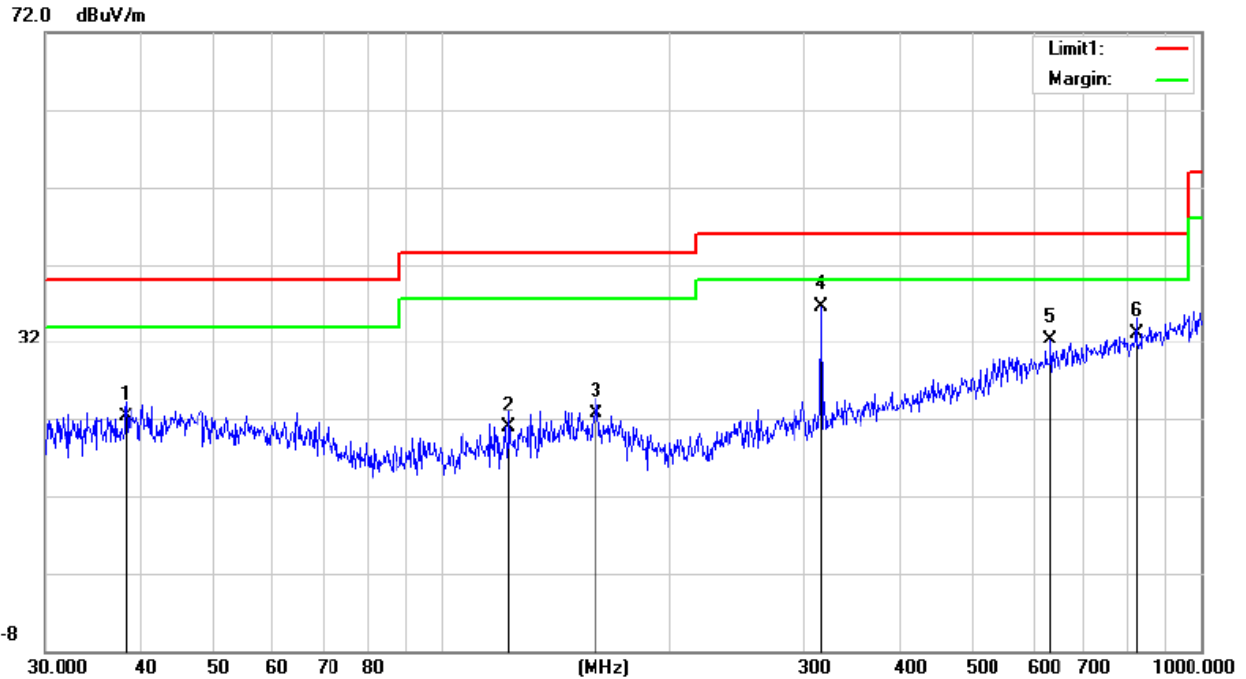
AV list

Frequency MHz	Polarization	PK Level dB(uV/m)	Duty Cycle Correction Factor: dB	AV Level dB(uV/m)	Limit dB(uV/m) AV	Margin dB	Pass/Fail	Remark
315.081	H	50.69	-8.09	42.6	75.60	-33.0	Pass	Fundamental
630.230	H	41.21	-8.09	33.12	55.60	-22.48	Pass	Harmonic
945.480	H	43.41	-8.09	35.32	55.60	-20.28	Pass	Harmonic

QP list

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) QP	Limit dB(uV/m) QP	Margin dB	Pass/Fail
39.02	H	3.13	13.36	16.49	40.00	23.51	Pass
53.13	H	2.75	12.66	15.41	40.00	24.59	Pass
158.11	H	3.49	12.66	16.15	40.00	27.35	Pass

RADIATED EMISSION BELOW 1GHZ-Vertical



PK list

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB	Pass/Fail	Remark
315.00	V	23.16	14.35	37.51	95.60	-58.09	Pass	Fundamental
630.00	V	12.38	20.56	32.94	75.60	-62.66	Pass	Harmonic

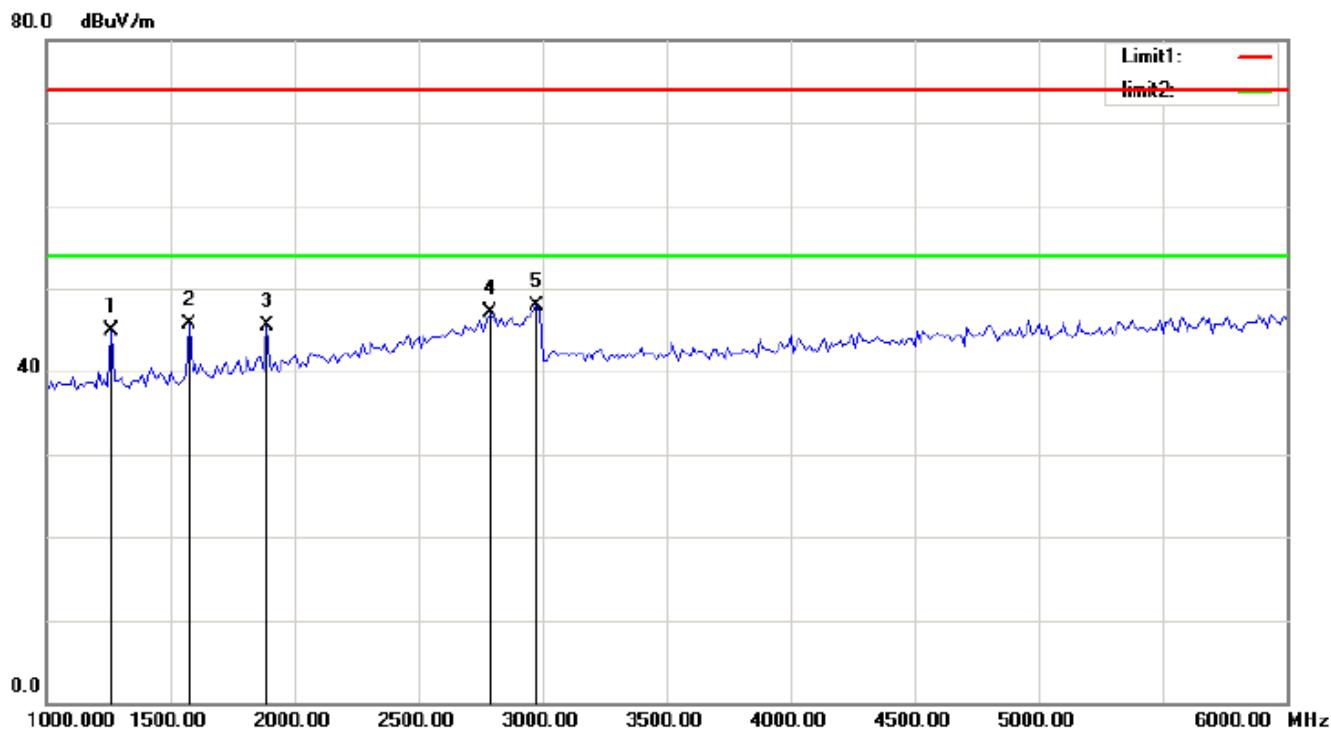
AV list

Frequency MHz	Polarization	PK Level dB(uV/m)	Duty Cycle Correction Factor: dB	AV Level dB(uV/m)	Limit dB(uV/m) AV	Margin dB	Pass/Fail	Remark
315.00	V	37.51	-8.09	29.42	75.60	-46.18	Pass	Fundamental
630.00	V	32.94	-8.09	24.85	55.60	-30.75	Pass	Harmonic

QP list

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) QP	Limit dB(uV/m) QP	Margin dB	Pass/Fail
38.346	V	8.94	13.27	22.21	40.00	-17.79	Pass
122.404	V	9.80	11.16	20.96	43.50	-22.54	Pass
159.784	V	10.06	12.7	22.76	43.50	-20.74	Pass
821.71	V	10.53	22.48	33.01	46.00	-12.99	Pass

RADIATED EMISSION BOVE 1GHZ- Horizontal

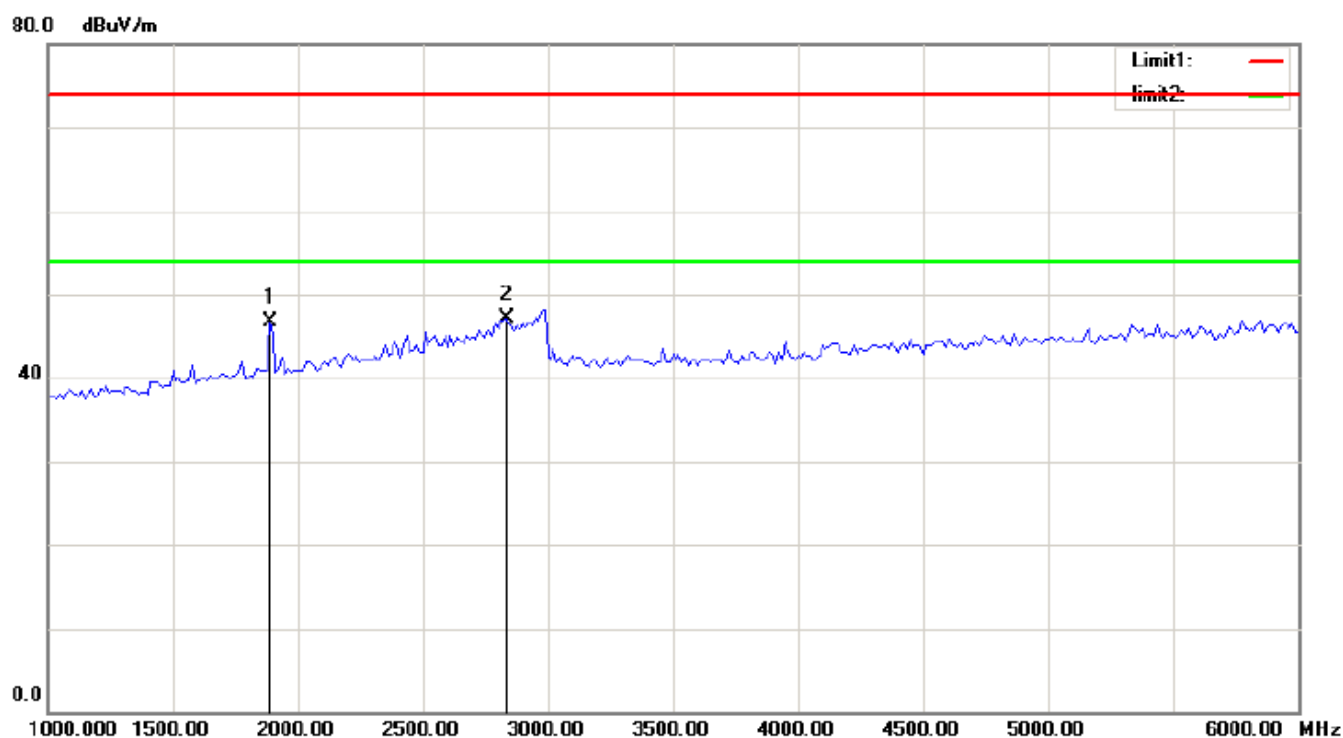


PK list

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB	Pass/Fail
1260.00	H	48.97	-3.99	44.98	74.00	-29.02	Pass
1575.00	H	49.62	-3.83	45.79	74.00	-28.21	Pass
1890.00	H	48.37	-2.94	45.43	74.00	-28.57	Pass
2787.00	H	46.13	0.92	47.05	74.00	-26.95	Pass
2975.00	H	46.28	1.64	47.92	74.00	-26.08	Pass

The average margin above 10dB. No recording in the test report.

RADIATED EMISSION BOVE 1GHZ- Vertical



PK list

Frequency MHz	Polarization	Reading dB(uV)	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) PK	Margin dB	Pass/Fail
1890.00	V	49.56	-2.94	46.62	74.00	-27.38	Pass
2837.50	V	45.98	1.11	47.09	74.00	-26.91	Pass

The average margin above 10dB. No recording in the test report.

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

2. AV Level = PK Level + Duty cycle correction factor.

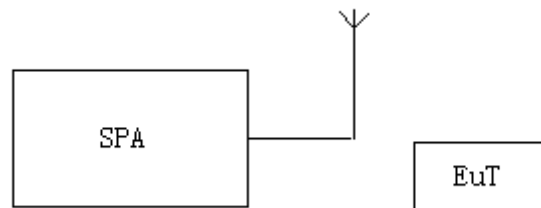
3. The "Factor" value can be calculated automatically by software of measurement system.

9 BANDWIDTH

9.1 MEASUREMENT PROCEDURE

1. Set the parameters of SPA as below:
Centre frequency = Operation Frequency
RBW=10KHz
VBW=30KHz
Span: 100kHz
Sweep time: Auto
2. Set the EUT to continue transmitting mode. Allow the trace to stabilize. Use the "N dB down" function of SPA to define the bandwidth.
3. Record the plots and Reported.

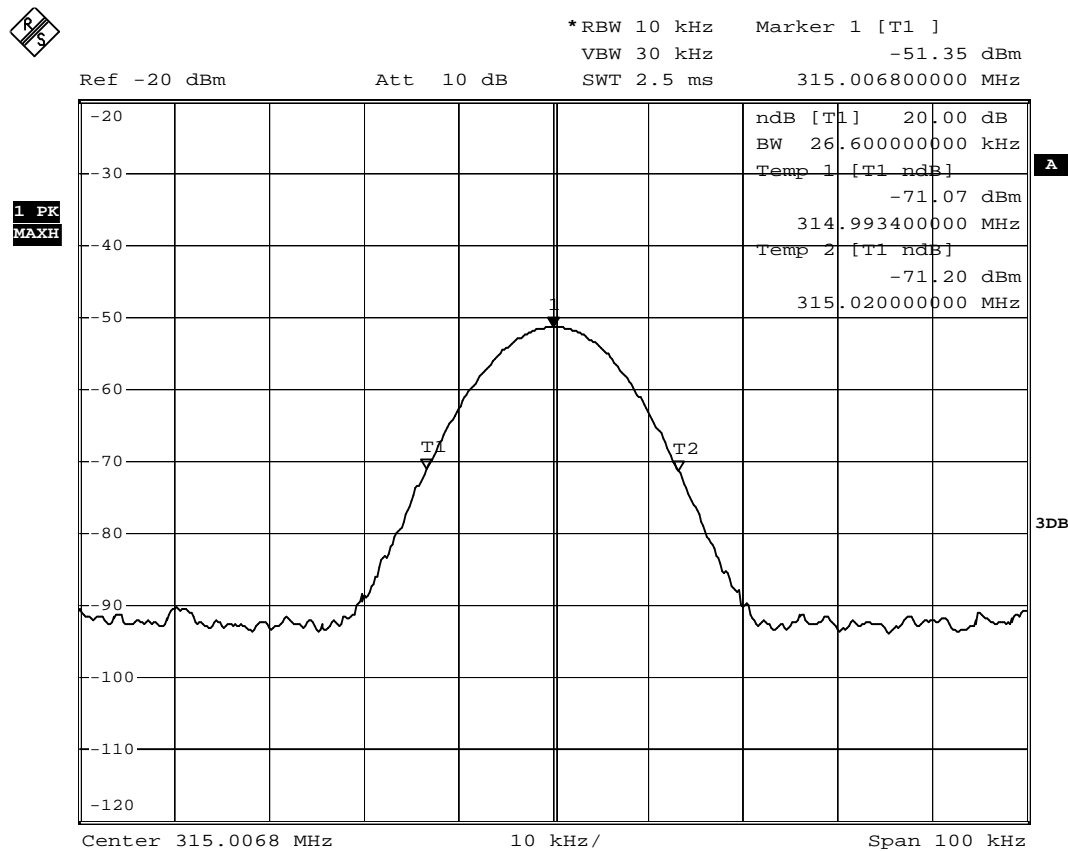
9.2 TEST SETUP



9.3 TEST RESULT

Test Mode: EUT @ 315MHz for RF Transmitter

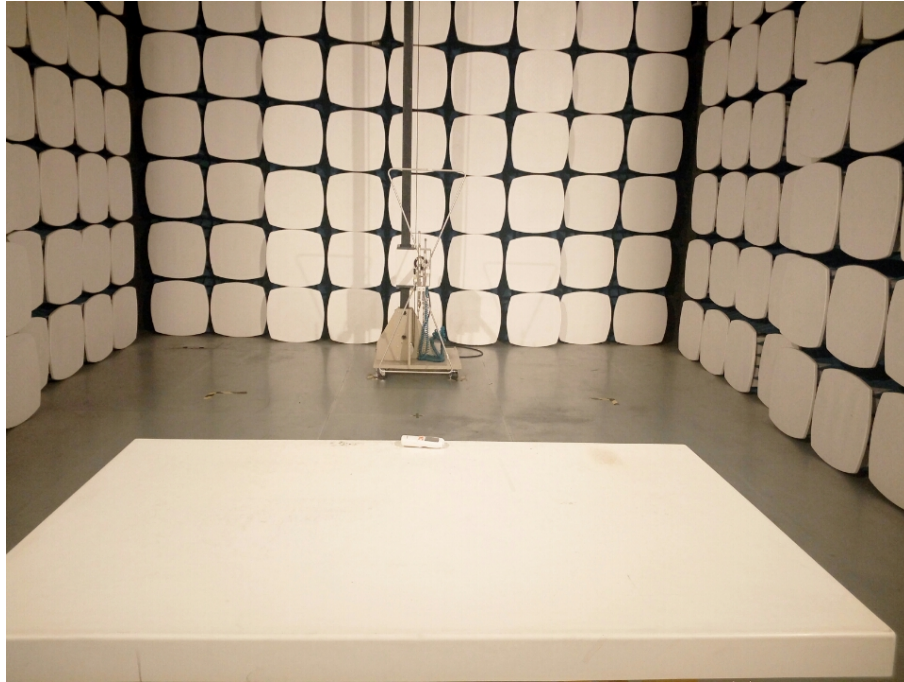
-20dB bandwidth	LIMIT	RESULT
26.6kHz	787.5KHz	Pass
Note: Limit= Operation Frequency ×0.25%		



10 Photographs

10.1 Radiated Spurious Emission Test Setup

Below 1GHz:

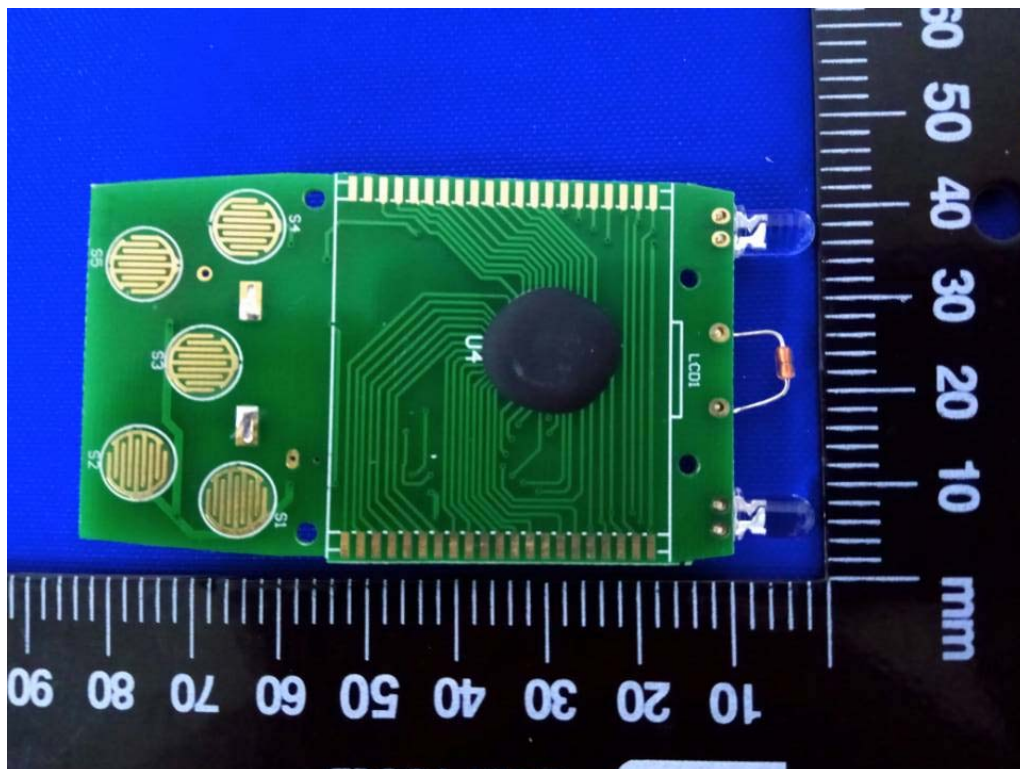
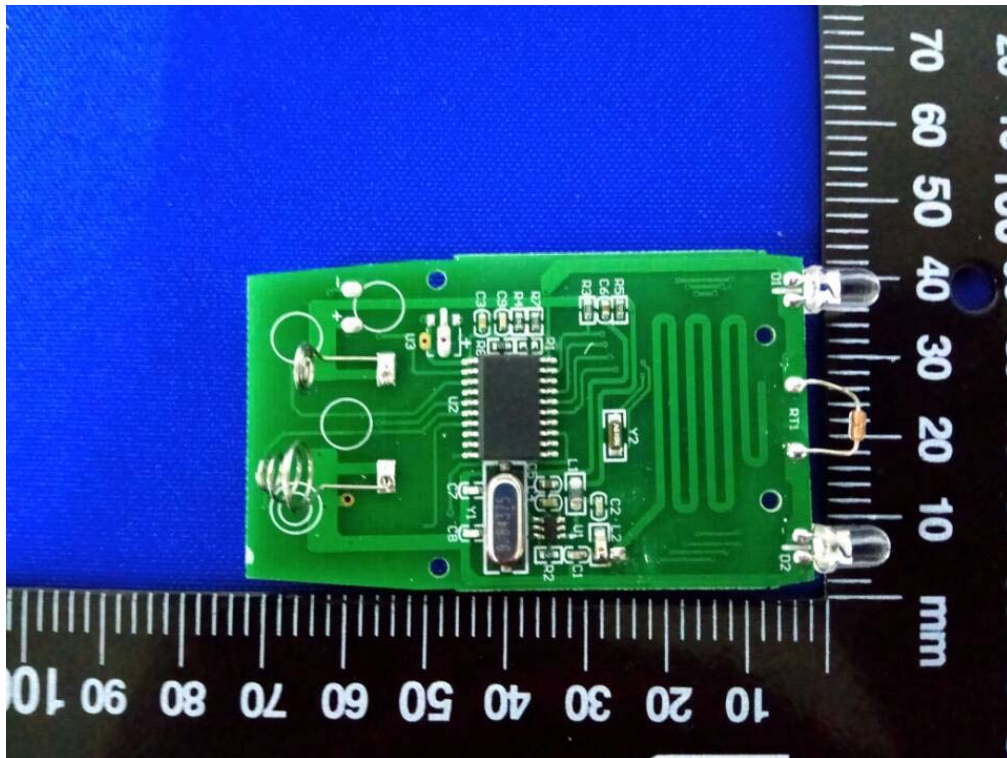


Above 1GHz:



11 EUT Photos





End of report **