



Shenzhen Certification Technology Service Co., Ltd
2F, Building B, East Area of Nanchang Second Industrial Zone,
Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China.

TEST REPORT

FCC ID: 2ACC6GR-309

Applicant : U-Fairy G.R. IOT Tech CO., Ltd
Address : Baihuali Industry District, Changping Town Dongguan City,
Guangdong Province

Equipment under Test (EUT):

Name : Door/window Detector
Model : GR-309

Standards : FCC PART 15, SUBPART C : 2013 (Section 15.249)

Report No. : CST-TCB140418015

Date of Test : April 25, 2014 to May 14, 2014

Date of Issue : May 16, 2014

Test Result :	PASS *
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* In the configuration tested, the EUT complied with the standards specified above

Authorized Signature

(Mark Zhu)
General Manager

The manufacture should ensure that all the products in series production are in conformity with the product sample detailed in this report.

If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of Shenzhen Certification Technology Service Co., Ltd. Or test done by Shenzhen Certification Technology Service Co., Ltd. Approvals in connection with, distribution or use of the product described in this report must be approved by Shenzhen Certification Technology Service Co., Ltd. Approvals in writing.

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1 General Information

1.1 Description of Device (EUT)

Trade Name	: N/A
EUT	: Door/window Detector
Model No.	: GR-309
Type of Antenna	: Integral Antenna, Max. Gain: 1dBi
Operation Frequency	: 908.42MHz
Channel number	: 1
Modulation type	: FSK
Power Supply	: DC 3V Supply by AAA battery
Applicant	: U-Fairy G.R. IOT Tech CO., Ltd
Address	: Baihuali Industry District, Changping Town Dongguan City, Guangdong Province
Manufacturer	: U-Fairy G.R. IOT Tech CO., Ltd
Address	: Baihuali Industry District, Changping Town Dongguan City, Guangdong Province

1.2 Description of Test Facility

Shenzhen Certification Technology Service Co., Ltd.
2F, Building B, East Area of Nanchang Second Industrial Zone,
Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China
FCC Registered No.:197647

2 EMC Equipment List

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	Nov.16, 13	1Year
Spectrum analyzer	Agilent	E4407B	MY46185649	Oct. 30, 13	1Year
Receiver	R&S	ESCI	100492	Oct. 30, 13	1Year
Receiver	R&S	ESCI	101202	Oct. 30, 13	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	VULB9168-438	Mar.11, 14	1Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	Mar.11, 14	1Year
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170 D(1432)	Mar.11, 14	1Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	Mar.11, 14	1Year
Cable	Resenberger	N/A	No.1	Oct. 30, 13	1Year
Cable	SCHWARZBECK	N/A	No.2	Oct. 30, 13	1Year
Cable	SCHWARZBECK	N/A	No.3	Oct. 30, 13	1Year
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	Oct. 30, 13	1Year
Pre-amplifier	R&S	AFS33-180026 50-30-8P-44	SEL0080	Oct. 30, 13	1Year

3 Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The test procedure used was ANSI Standard C63.4-2003 using a 50 μ H LISN. Both Lines were observed. The bandwidth of the receiver was 10kHz with an appropriate sweep speed. The ambient temperature of the EUT was 25°C with a humidity of 58%.

RADIATION INTERFERENCE: The test procedure used was ANSI Standard C63.4-2003 using a ANRITSU spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a micro volt at the output of the antenna. The resolution bandwidth was 100kHz and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3MHz above 1 GHz. The ambient temperature of the EUT was 25°C with a humidity of 58%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer and cable loss. The antenna correction factors and cable loss are stated in terms of dB. The gain of the Pre-selector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF + CABLE = FS

33.20 dBuV + 10.36 dB + 0.9 dB = 44.46 dBuV/m @ 3m

ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSI Standard C63.4-2003 10.1.7 with the EUT 40 cm from the vertical ground wall.

4 Summary of Measurement

4.1 Summary of test result

Test Item	Test Requirement	Standard Paragraph	Result
Spurious Emission	FCC PART 15: 2013	Section 15.249&15.209	Compliance
Conduction Emission	FCC PART 15: 2013	Section 15.207	Not applicable
Occupied bandwidth	FCC PART 15: 2013	Section 15.249	Compliance
Band edge Requirement	FCC PART 15: 2013	Section 15.249	Compliance
Antenna Requirement	FCC PART 15: 2013	Section 15.203	Compliance

Note: EUT can be powered with inside battery, according to exploratory test, when powered by battery have worse emissions, and also can make sure EUT have enough power for wireless work, so all the final test were performed with new battery.

4.2 Test mode

Tested mode, channel information		
Mode	Channel	Frequency (MHz)
FSK	CH1	908.42

4.3 Block Diagram



4.4 Assistant equipment used for test

Description : N/A
Manufacturer : N/A
Model No. : N/A

4.5 Test Conditions

Temperature range	21-25°C
Humidity range	40-75%
Pressure range	86-106kPa

4.6 Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.50dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.04dB	Polarize: V
	3.02dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.84dB	Polarize: H
	3.56dB	Polarize: V
Uncertainty for radio frequency	1×10^{-9}	
Uncertainty for temperature	0.2°C	
Uncertainty for humidity	3%	
Uncertainty for DC and low frequency voltages	0.06%	

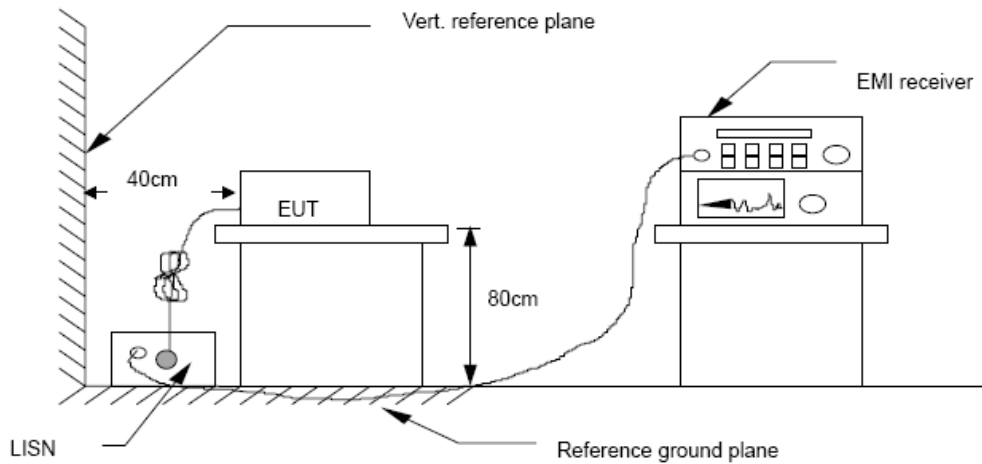
5 POWER LINE CONDUCTED EMISSION

5.1 Conducted Emission Limits(15.209&249)

Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

- Notes: 1. *Decreasing linearly with logarithm of frequency.
 2. The lower limit shall apply at the transition frequencies.
 3. The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

5.2 Test Setup



5.3 Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and 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 lines 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 ANSI C63.4-2003 on Conducted Emission Measurement. The bandwidth of test receiver (R & S ESCS30) is set at 9 kHz.

5.4 Test Results

EUT Supply by DC battery, so the test is not applicable.

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6 Radiation Emission

6.1 Radiation Emission Limits(15.209&249 (a))

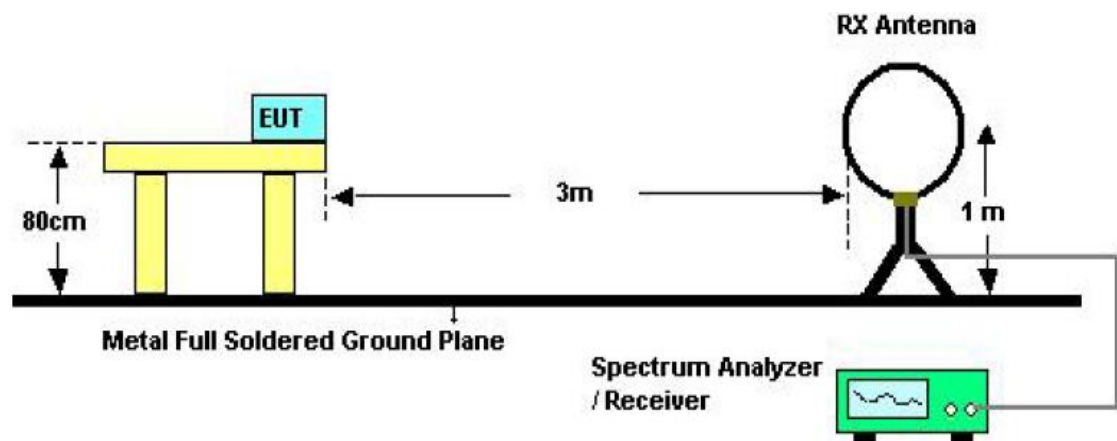
Frequency (MHz)	Field Strength Limits at 3 metres (watts,e.i.r.p.)		
	uV/m	Limit dB uV/m	Measurement distance(m)
0.009-0.490	2400/F(kHz)	XX	300
0.490-1.705	24000/F(kHz)	XX	30
1.705-30	30	29.5	30
30~88	100(3nW)	40	3
88~216	150(6.8nW)	43.5	3
216~960	200(12nW)	46	3
Above960	500(75nW)	54	3
Carrier Frequency(below 1GHz)	---	94.00(QP)	3
Carrier Frequency(above 1GHz)	---	94.00(AV)	3
		114.00(PK)	3

NOTE:

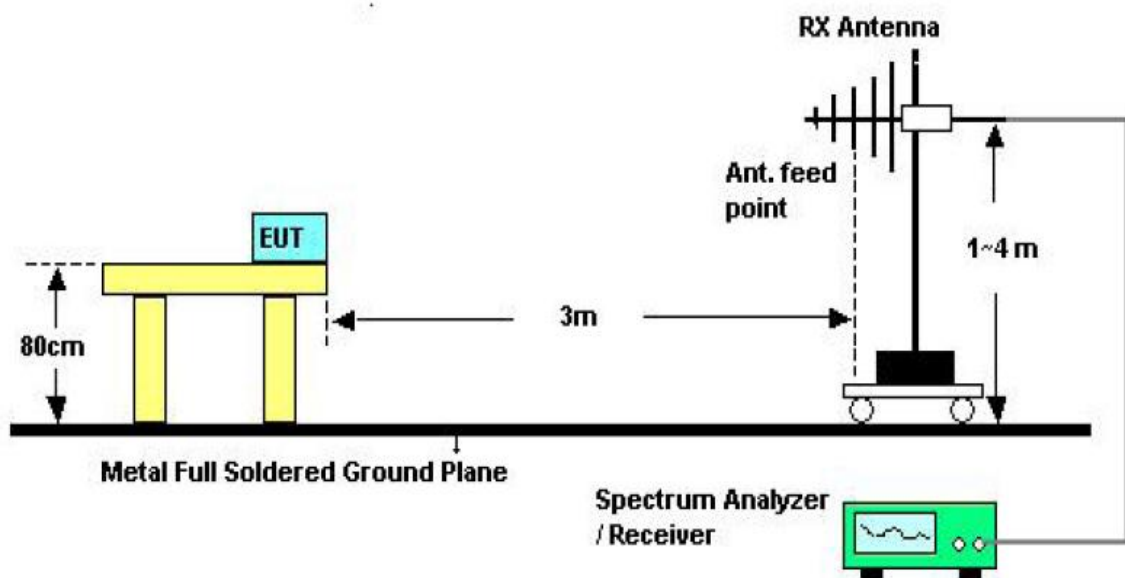
- a) The tighter limit applies at the band edges.
- b) Emission Level(dB uV/m)=20log Emission Level(Uv/m)

6.2 Test Setup

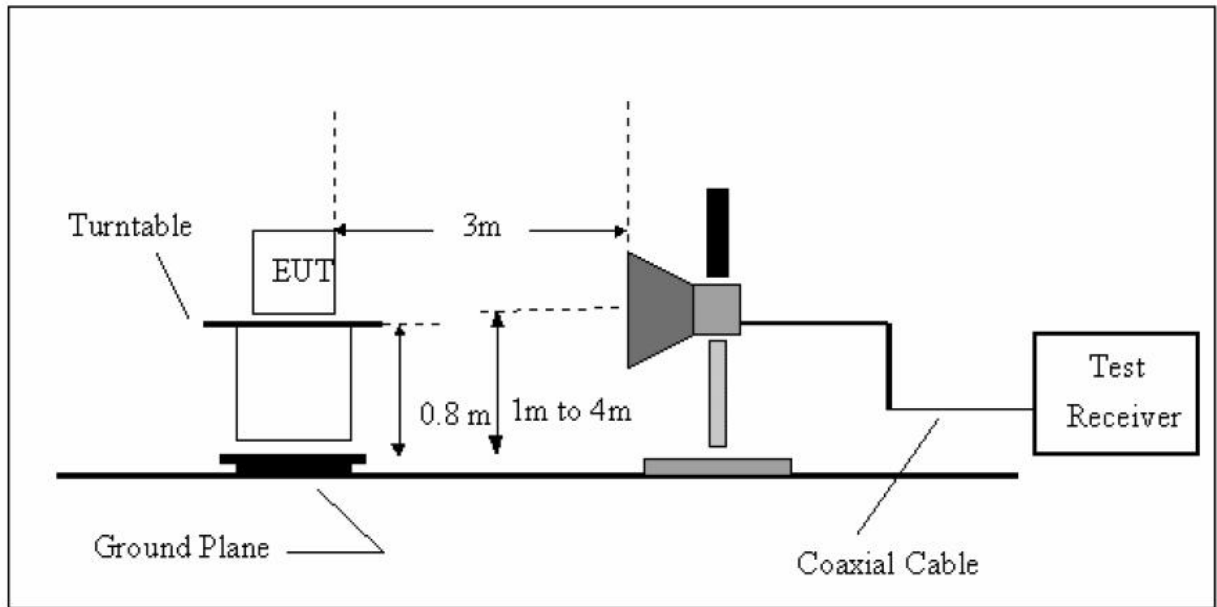
See the next page



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

6.3 Test Procedure

- The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground, the table was rotated 360 degrees to determine the position of the highest radiation
- The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- The initial step in collecting conducted 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 remeasured
- If Peak value is comply with QP limit below 1GHz. The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.
- For the actual test configuration, please see the test setup photo.

6.4 Test Equipment Setting for emission test.

9 kHz~150 kHz	RBW 200Hz	VBW1 kHz
150 kHz~30MHz	RBW 9 kHz	VBW 30 kHz
30MHz~1GHz	RBW 120 kHz	VBW 300 kHz
Above 1GHz	RBW 1MHz	VBW 3MHz

6.5 Test Condition

Make the EUT at Continual Transmitting in maximum power. We also estimated location of the XYZ 3 axis, the X axis is the worst mode. So only show the test data of the worst case in this report.

6.6 Test Result

PASS.

We have scanned the 10th harmonic from 9 kHz to the EUT.
Detailed information please see the following page.

From 9 kHz to 30MHz: Conclusion: **PASS**

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Radiated Emissions Result

EUT	Door/window Detector	Model Name	GR-309
Temperature	25°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 3V supply by battery
Test Mode	TX mode	Antenna polarization	Horizontal/Vertical

Channel (908.42MHz)									
Fre. MHz	Plority H/V	Reading dBuV	Antenna Factor dB	Cable Loss dB	Amplifier Gain dB	Correct Factor dB	Measure Result dBuV/m	Limit dBuV/m	Margin dB
908.42	H	94.35(QP)	21.77	1.49	27.64	-4.38	89.97	94	4.03
902.00	H	38.64(PK)	21.69	1.46	25.65	-2.50	36.14	46	9.86
928.00	H	37.38(PK)	22.00	1.28	25.63	-2.35	35.03	46	10.97
272.28	H	47.61(QP)	12.15	0.66	24.14	-10.33	36.28	46	9.72
908.42	V	96.63(QP)	21.77	1.49	27.64	-4.38	92.25	94	1.75
902.00	V	39.46(PK)	21.69	1.46	25.65	-2.50	36.96	46	9.04
928.00	V	38.59(PK)	22.00	1.28	25.63	-2.35	36.24	46	9.76
272.28	V	49.67(QP)	12.15	0.66	24.14	-10.33	39.34	46	6.66

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1816.84	H	47.72	---	-6.37	41.35	---	74.00	54.00	12.65	Peak
2725.26	H	41.74	---	-2.82	38.92	---	74.00	54.00	15.08	Peak
3633.68	H	41.31	---	-1.10	40.21	---	74.00	54.00	13.79	Peak
1816.84	V	42.87	---	-6.37	40.05	---	74.00	54.00	13.95	Peak
2725.26	V	41.53	---	-2.82	40.43	---	74.00	54.00	13.57	Peak
3633.68	V	42.34	---	-1.10	41.24	---	74.00	54.00	12.76	Peak

Notes: 1 --Means other frequency and mode comply with standard requirements and at least have 20dB margin. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain
 Measurement Result=Reading + Correct Factor
 Margin=Measurement Result-Limit

2 –Spectrum setting:

- Peak setting 30MHz-1GHz, RBW=120 kHz, VBW=300 kHz.
- AV setting 30MHz-1GHz, RBW=1MHz, VBW=10Hz.

7 20dB bandwidth

7.1 Test limit

Please refer section 15.249

7.2 Method of measurement

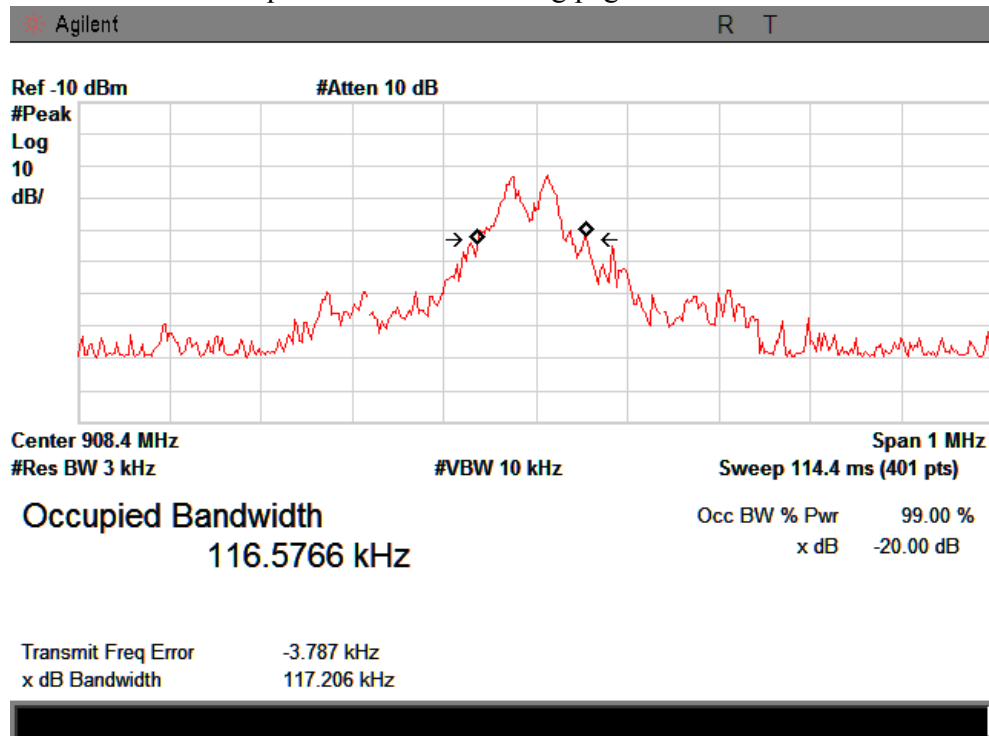
- The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.
- The test receiver RBW set RBW approximately to 1% of the 20 dB bandwidth, VBW set $\geq$ RBW, Sweep time set auto, detector function= Peak, trace=max hold

7.3 Test Setup



7.4 Test Results

Detailed information please see the following page.



8 Antenna Requirement

8.1 Standard Requirement

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 use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

8.2 Antenna Connected Construction

The directional gains of antenna used for transmitting is 1 dBi, and the antenna is an integral antenna and no consideration of replacement. Please see EUT photo for details.

8.3 Result

The EUT antenna is Integral Antenna. It complies with the standard requirement.