



RED-RADIO

ETSI EN 300 220-1 V3.1.1 (2017-02)

ETSI EN 300 220-2 V3.2.1 (2018-06)

TEST REPORT

Client Name : ShenZhen EBELONG Technology Co., Ltd.

Address : 4th Floor, Building No.2, Hengmingzhu shajing Industrial Park,
Xiangxing Road, Bao'an District, ShenZhen GuangDong China.

Product Name : Wireless Controller

Test Model No. : ERC902

Report No. : CCTI-2022101904-1E

Issued Date : Nov. 17, 2022

Prepared By : Shenzhen CCTI Technology Co., Ltd.

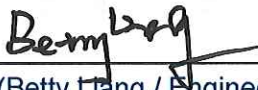
Address : 7th Floor, Block A, Building E, Yongwei Industrial Park, No. 118,
Yongfu Road, Qiaotou, Fuhai Street, Bao'an District, Shenzhen,
Guangdong, China

Contact Info : Tel : 0086-400-188-9662 E-mail : ccti@ccti-lab.com
Fax : 0086-755-2722 5865 W e b : www.ccti-lab.com

TEST REPORT VERIFICATION

Applicant : ShenZhen EBELONG Technology Co., Ltd.
Address : 4th Floor, Building No.2, Hengmingzhu shajing Industrial Park, Xiangxing Road, Bao'an District, ShenZhen GuangDong China.
Manufacturer : ShenZhen EBELONG Technology Co., Ltd.
Address : 4th Floor, Building No.2, Hengmingzhu shajing Industrial Park, Xiangxing Road, Bao'an District, ShenZhen GuangDong China.
Product Name : Wireless Controller
Model No. : ERC902
Series No. : ERC903, ERC904, ERC905, ERC906
Trade Mark : N/A
Rating(s) : Input: AC184-264V; 50/60Hz; 3A
Load: 500W
Test Date : Oct. 20, 2022 to Nov. 17, 2022
Test Standard(s) : ETSI EN 300 220-1 V3.1.1 (2017-02)
ETSI EN 300 220-2 V3.2.1 (2018-06)
Test Result : PASS

This device described above has been tested by CCTI, and the test results show that the equipment under test (EUT) is in compliance with the 2014/53/EU RED Directive Art.3.2 requirements. The results shown in this test report refer only to the sample(s) tested unless other wise stated and the sample(s) are retained for 30 days only. The document is issued by CCTI, may be altered or revised by CCTI, personal only, and shall be noted in the revision of the document. this document cannot be reproduced except in full with our prior written permission.

Producer By : 
(Betty Liang / Engineer)

Date : Nov. 17, 2022

Authorized Signer : 
(Corey Mao / Manager)

Date : Nov. 17, 2022



TABLE OF CONTENTS

1. TEST SUMMARY.....	4
1.1. TEST FACILITY.....	5
1.2. Measurement Uncertainty.....	5
2. General Information.....	6
2.1. General Description Of EUT.....	6
2.2. Description of Test Conditions.....	7
2.3. Description of Support Units.....	8
2.4. Test Instrument Used.....	9
3. Frequency error and frequency drift.....	10
3.1. Applied procedures / limit.....	10
4. Effective radiated power.....	13
4.1. Applied procedures / limit.....	13
4.2. Frequency stability under low voltage conditions.....	15
4.3. Applied procedures / limit.....	15
5. Spurious emissions – Transmitter (25- 1000MHz).....	17
5.1. Applied procedures / limit.....	17
6. Spurious emissions – Transmitter (Above 1000MHz).....	20
6.1. Applied procedures / limit.....	20
7. Duty cycle.....	23
7.1. Applied procedures / limit.....	23
Table 13: Duty cycle class.....	23
8. Transient power.....	24
8.1. Applied procedures / limit.....	24
9. Adjacent channel power.....	25
9.1. Applied procedures / limit.....	25
9.2. Test Procedures.....	25
9.3. Test Result.....	25
10. Modulation bandwidth.....	26
10.1. Applied procedures / limit.....	26
10.2. Measuring Instruments and Setting.....	26
10.3. Test Procedures.....	26
10.4. Test Result.....	27
11. Spurious emissions – Receiver (30-1000MHz).....	28
11.1. Applied procedures / limit.....	28
12. Spurious emissions – Receiver (above 1000MHz).....	29
12.1. Applied procedures / limit.....	29
13. Blocking or desensitization.....	30
13.1. Applied procedures / limit.....	30
13.2. Test Procedures.....	30
13.3. TEST RESULTS.....	30
APPENDIX I -- EUT PHOTOGRAPHS.....	31
APPENDIX II -- EUT TEST PHOTOGRAPHS.....	35

1. TEST SUMMARY

Compliance with ETSI EN 300 220-1 V3.1.1 (2017-02) & ETSI EN 300 220-2 V3.2.1 (2018-06)

Clause	Parameter	Remarks
Transmitter Parameters		
7.1	Frequency error and frequency drift	PASS
7.2	Average power	N/A
7.3	Effective radiated power	PASS
7.4	Spread spectrum modulation	PASS
7.5	Transient power	PASS
7.6	Adjacent channel power	N/A
7.7	Modulation bandwidth	PASS
7.8	spurious emissions	PASS
7.9	Frequency stability under low voltage conditions	PASS
7.10	Duty cycle	PASS
7.11	Time-out-timer	N/A
Receiver Parameters		
8.1	Receiver sensitivity	N/A
8.2	Receiver LBT threshold and transmitter max on-time	N/A
8.3	Adjacent channel selectivity	N/A
8.4	Blocking or desensitization	N/A
	Spurious response rejection	N/A
8.5	Receiver spurious radiation	N/A
N/A is an abbreviation for Not Applicable.		

1.1. TEST FACILITY

Shenzhen CCTI Technology Co., Ltd.

7th Floor, Block A, Building E, Yongwei Industrial Park, No. 118, Yongfu Road, Qiaotou, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China.

1.2. Measurement Uncertainty

Measurement Uncertainty for a Level of Confidence of 95 %, $U=2 \times U_c(y)$.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions, radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions, radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$

中鉴检测
CCTI TESTING

2. General Information

2.1. General Description Of EUT

EUT Name : Wireless Controller
Trademark : N/A
Model No. : ERC902
Series No. : ERC903, ERC904, ERC905, ERC906
Model Difference : The product is different for model number.
Operation Frequency : 433.92MHz
Channel number : 1 Channel
EIRP Power : -1.72dBm
Type of Modulation : FSK
Antenna type : Internal antenna
Antenna Gain: : 1dBi
Power Supply : Input: AC184-264V; 50/60Hz; 3A
Load: 500W

Remark:

- (1) S2 was selected as the test model and the datas have been recorded in this report.
(2) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

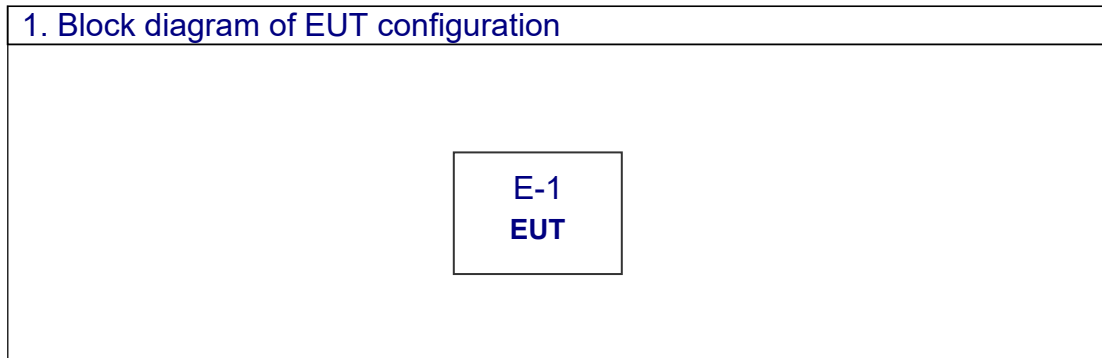
Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

Channel List	
Channel	Frequency(MHz)
01	433.92

2.2. Description of Test Conditions

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



2.2.1. Support Equipment

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C - 35°C	0°C ~ 55°C Note: (1)
Relative Humidity	20% - 75%	N/A
Supply Voltage	AC230V	DC2.97V~DC3.63V Note: (2)

Notes:

(1) For tests at extreme temperatures, measurements shall be made in accordance with the procedures specified in clause 5.3.4.3, at the upper and lower temperatures of the range as follow: temperature: -20°C to +55°C;

Where the manufacture's stated operating range does not include the range of -20°C to +55°C, the equipment shall be tested over the following temperature ranges:

- a) 0°C to +35°C for equipment intended for indoor use only, or intended for use in areas where the temperature is controlled within this range;
- b) over the extremes of the operating temperature range(s) of the stated combination(s) or host equipment(s) in case of plug-in radio devices.

(2) For the Leclanché or lithium type battery: 0.85 times the nominal voltage of the battery; for the mercury or nickel-cadmium type of battery: 0.9 times the nominal voltage of the battery. In both cases, the upper extreme test voltage shall be 1.15 times the nominal voltage of the battery.

(3) The measurements are performed at the highest, middle, lowest available channels.

2.3. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Wireless Controller	N/A	ERC902	ERC903, ERC904, ERC905, ERC906	N/A

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- The support equipment was authorized by Declaration of Confirmation.
- For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.4. Test Instrument Used

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Until
1	Spectrum Analyzer	R&S	FSP_40	100129	Mar. 08, 2023
2	EMI Test Receiver	R&S	ESIB26	100234	Mar. 08, 2023
3	Pre-Amplifier	TDK Sonoma	PA-02-4	None	Mar. 08, 2023
4	Pre-Amplifier	TDK Sonoma	310	242803	Mar. 08, 2023
5	(RE) Antenna	TDK	HLP-3003C	130173	Mar. 08, 2023
6	(RE) Antenna	TDK	HLP-3003C	130174	Mar. 08, 2023
7	(RE) Antenna	TDK	PBA-2030	30500	Mar. 08, 2023
8	(RE) Antenna	TDK	PLP-3003	61001	Mar. 08, 2023
9	(RE&RS Antenna	TDK	HRN-0118	130186	Mar. 08, 2023
10	System Contraller	Generaic NI	None	None	Mar. 08, 2023
11	Shifter	Anritsu	MP59B	6200487248	Mar. 08, 2023
12	Signal	Agilent	8648C	3847M00920	Mar. 08, 2023
13	Amplifier	Amplifier Research	150W1000 M 3	None	Mar. 08, 2023
14	Camera Wireless Controller	Nakaga wadenki	Nakaga wadenki	None	Mar. 08, 2023
15	Wireless Controller	Shoshin	CAT-200	None	Mar. 08, 2023
16	CVCF1	NF	ES6000W-LF	422554	Mar. 08, 2023
17	CVCF2	NF	ES2000S	424588/424598	Mar. 08, 2023

3. Frequency error and frequency drift

3.1. Applied procedures / limit.

The frequency error and drift shall not exceed the values given in table 1 or 2 under normal and extreme conditions.

Table 1: Frequency error for systems with channel specifications of less than or equal to 25 kHz

Channelization	Frequency error limit (KHz)				
	47MHz	47MHz to 137MHz	137MHz to 300MHz	300MHz to 500MHz	500MHz to 1000MHz
Channelization systems	±10	±10	±10	±12	±12.5
Note: For equipment having a channel spacing of 12,5 kHz or less, the frequency error limit shall not exceed 50 % of the channel spacing. 50 % of the channel spacing					

Table 2: Frequency error for all other systems.

Operating frequency	Frequency error limit (ppm)
≤1000MHz	±100
NOTE: The frequency error measured shall not exceed the designated frequency band.	

3.1.1. Measuring Instruments and Setting

The following table is the setting of Spectrum Analyzer.

Spectrum Analyzer	Setting
Attenuation	10~20dB
Span Frequency	500kHz
RB	10 kHz
VB	30 kHz
Detector	Peak
Trace	Peak 50 sweeps

3.1.2. Test Procedures

- (a) Connected the antenna port to the Spectrum Analyzer via a Attenuator,
 - (b) Set center frequency of spectrum analyzer = operating carrier frequency.
- set the Spectrum Analyzer as below:

Resolution BW: 10 kHz

Video BW: 30 kHz

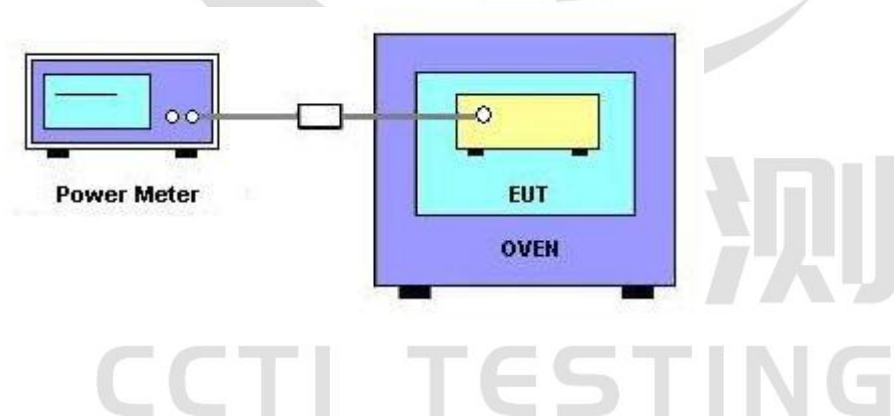
Span: 500 kHz

- (c) When the trace completed, find the peak value of the power envelope and record the frequency.

The above procedure shall be performed at normal and extreme test conditions.

The measurement shall be repeated at the lowest, the middle, and the highest channel of the stated frequency range. These measurements shall also be performed at normal and extreme test conditions.

3.1.2. Test Setup Layout



3.1.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

3.1.5. TEST RESULTS

EUT:	Wireless Controller	Model Name :	S2
Temperature:	26°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage :	AC230V
Test Mode :	TX Mode		

Temperature °C	Power supplied V _{AC} to EUT	MCF(MHz)	Frequency drift (kHz) Limit
25	3	433.92	100kHz
Reference Frequency: 433.92 MHz Limit< 100 kHz			
Temperature °C	Power supplied V _{AC} to EUT	MCF(MHz)	Frequency Error (kHz)
-20	2.7	433.742	17
	3.3	433.684	22
25	2.7	433.435	48
	3.3	433.463	43
55	2.7	433.422	45
	3.3	433.434	46

4. Effective radiated power

4.1. Applied procedures / limit

The effective radiated power shall not exceed the values 10mW

4.1.1. Measuring Instruments and Setting

The following table is the setting of the power meter

Spectrum Analyzer	Setting
Attenuation	Auto
Start Frequency	25 MHz
Stop Frequency	1000 MHz
Detector	Positive Peak
Sweep Time	Auto
RB / VB	100 kHz / 100 kHz

4.1.2. Test Procedures

EUT was placed on a 1.5m outdoor wooden table. The search antenna is placed at 3m distances from the EUT and search antenna height is from 1-4m. With the transmitter operating at continuously mode, the turntable was slowly rotated to locate the direction of maximum emission.

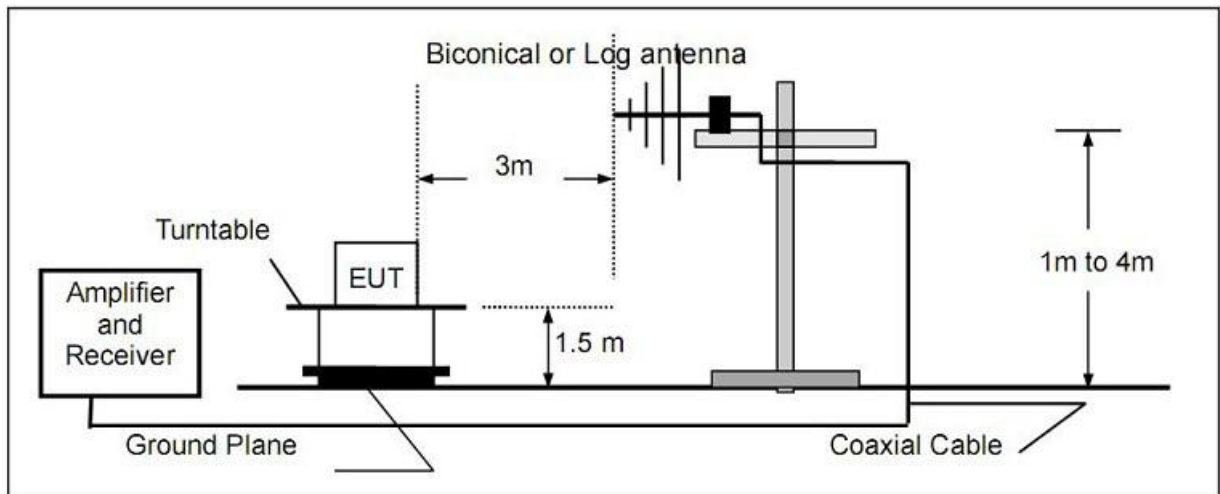
Once maximum direction is determined, the search antenna was raised and lowered in Both vertical and horizontal polarizations.

The EUT was removed from the turntable and replaced with a linearly polarized antenna

connected to a calibrated RF signal generator. The RF generator was set to a measured emission frequency and the search antenna was raised and lowered to produced a maximum received reading.

The generator output was increased to match the radiated emission reading measured

4.1.3. Test Setup Layout



4.1.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.1.5. TEST RESULTS

EUT:	Wireless Controller	Model Name :	ERC902
Temperature:	26°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage :	AC230V
Test Mode :	TX Mode		

Test mode	Frequency (MHz)	ERP Level (dBm)	Limit (dBm)	Result
Tranmitting with modulation	433.92	-1.72	0.00	Pass
Tranmitting with unmodulation	433.92	NA	0.00	Pass

Remark:
N/A: Not applicable

4.2. Frequency stability under low voltage conditions

4.3. Applied procedures / limit

This test is for battery operated equipment only.

The equipment shall either:

- (a) remain on channel, for channelized equipment within the limits stated in clause 5.1.1 , or with in the assigned operating frequency band, for non-channelized equipment, whilst the radiated or conducted power is greater than the spurious emission limits; or
- (b) the equipment cease to function below the providers declared operating voltage.

4.3.1. Measuring Instruments and Setting

The following table is the setting of Spectrum Analyzer

Spectrum Analyzer	Setting
Attenuation	10~20dB
Span Frequency	500kHz
RB	10 kHz
VB	30 kHz
Detector	Peak
Trace	Peak 50 sweeps

4.3.2. Test Procedures

- (a) Connected the antenna port to the Spectrum Analyzer via a Attenuator,

- (b) Set center frequency of spectrum analyzer = operating carrier frequency.

set the Spectrum Analyzer as below:

Resolution BW: 10 kHz

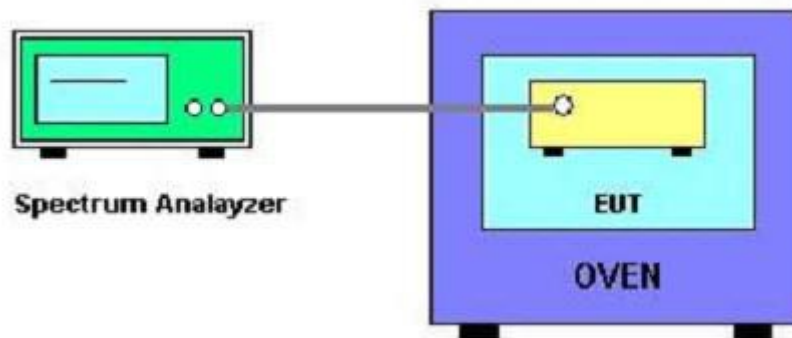
Video BW: 30 kHz

Span: 500 kHz

- (c) When the trace completed, find the peak value of the power envelope and record the frequency. The above procedure shall be performed at normal and extreme test conditions. The measurement shall be repeated at the lowest, the middle, and the highest channel of the stated frequency range.

These measurements shall also be performed at normal and extreme test conditions

4.3.3. Test Setup Layout



4.3.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.5. TEST RESULTS

EUT:	Wireless Controller	Model Name :	ERC902
Temperature:	26°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage :	AC230V
Test Mode :	TX Mode		

DC power Supplied (V)	Conducted Power	Limits
3V	-109.44	a) Remain on channel, for channelized equipment within the limits stated in clause 7.1.3, or within the assigned operating frequency band, for non-channelized equipment, whilst the radiated or conducted power is greater than the spurious emission limits; or b) The equipment cease to function below the providers declared operating voltage.
2.7V	-30.84	
< 2.7V	No function	

5. Spurious emissions – Transmitter (25- 1000MHz)

5.1. Applied procedures / limit

State	47MHz to 74MHz 87.5MHz to 118MHz 174MHz to 230MHz 470MHz to 862MHz	Other frequencies ≤1000MHz	Frequencies > 1000MHz
Operating	4 nW (-54 dBm)	250 nW (-36 dBm)	1 uW (-30 dBm)
Standby	2 nW (57 dBm)	2 nW (-57 dBm)	20 nW (-47dBm)

5.1.1. Measuring Instruments and Setting

The following table is the setting of the Spectrum Analyzer.

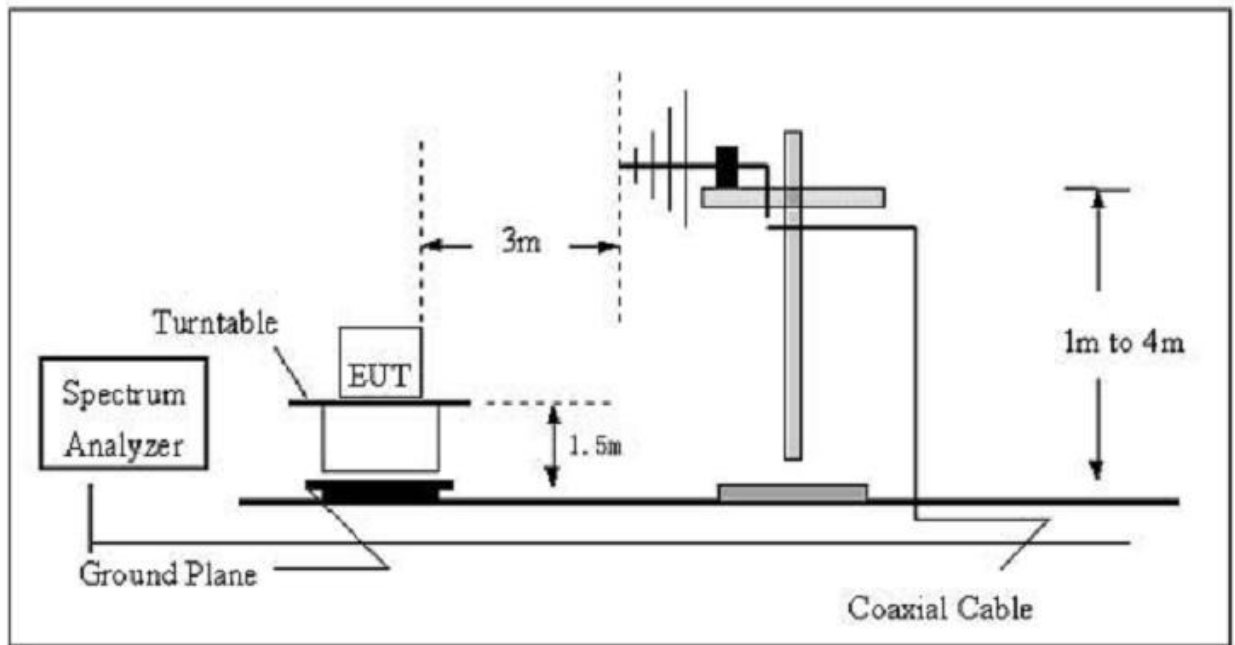
Spectrum Analyzer	Setting
Attenuation	Auto
Start Frequency	25 MHz
Stop Frequency	1000 MHz
Detector	Positive Peak
Sweep Time	Auto
RB / VB	100 kHz / 100 kHz

5.1.2. Test Procedures

- The EUT was placed on the top of the turntable in open test site area.
- The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- This measurement shall be repeated with the transmitter in standby mode where applicable.
- For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable.
- The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded suspected value is indicated as Read Level (Raw).
- Replace the EUT by standard antenna and feed the RF port by signal generator.
- Adjust the frequency of the signal generator to the suspected emission and slightly rotate The turntable to locate the position with maximum reading.
- Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
- The level of the spurious emission is the power level of (8) plus the gain of the standard Antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.
- If the level calculated in (9) is higher than limit by more than 6dB, then lower the RBW of the spectrum analyzer to 30KHz. If the level of this emission does not change by more than 2dB, then it is taken as narrowband emission, otherwise, wideband emission.
- The measurement shall be repeated at the lowest and the highest channel of the stated frequency range

5.1.3. Test Setup Layout

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



5.1.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.1.5. Results of Standby Mode Spurious Emissions

For the initial investigation on standby mode and receiving mode, no significant differences in spurious emissions were observed between these 2 modes. So test data for standby mode was omitted in this section

5.1.6. TEST RESULTS (25MHz ~ 1000MHz)

EUT:	Wireless Controller	Model Name :	ERC902
Temperature:	26°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage :	AC230V
Test Mode :	TX Mode		

Polar (H/V)	Frequency	Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	
V	55.87	-51.52	0.23	-51.34	-36.00	-15.33	peak
V	864.64	-77.61	21.651	-54.35	-36.00	-18.31	peak
H	161.61	-78.12	23.52	-54.53	-36.00	-198.53	peak
H	868.53	-78.63	25.65	-52.95	-36.00	-16.5	peak

Remark:

1. Measurements above show only up to 4 maximum emissions noted, or would be lesser, with "N/A" remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
2. Absolute Level= ReadingLevel+ Factor, Margin= Limit- Absolute Level

6. Spurious emissions – Transmitter (Above 1000MHZ).

6.1. Applied procedures / limit.

State	47MHz to 74MHz 87.5MHz to 118MHz 174MHz to 230MHz 470MHz to 862MHz	Other frequencies ≤1000MHz	Frequencies > 1000MHz
Operating	4 nW (-54 dBm)	250 nW (-36 dBm)	1 uW (-30 dBm)
Standby	2 nW (57 dBm)	2 nW (-57 dBm)	20 nW (-47dBm)

6.1.1. Measuring Instruments and Setting

The following table is the setting of the Spectrum Analyzer.

Spectrum Analyzer	Setting
Attenuation	Auto
Start Frequency	25 MHz
Stop Frequency	1000 MHz
Detector	Positive Peak
Sweep Time	Auto
RB / VB	100 kHz / 100 kHz

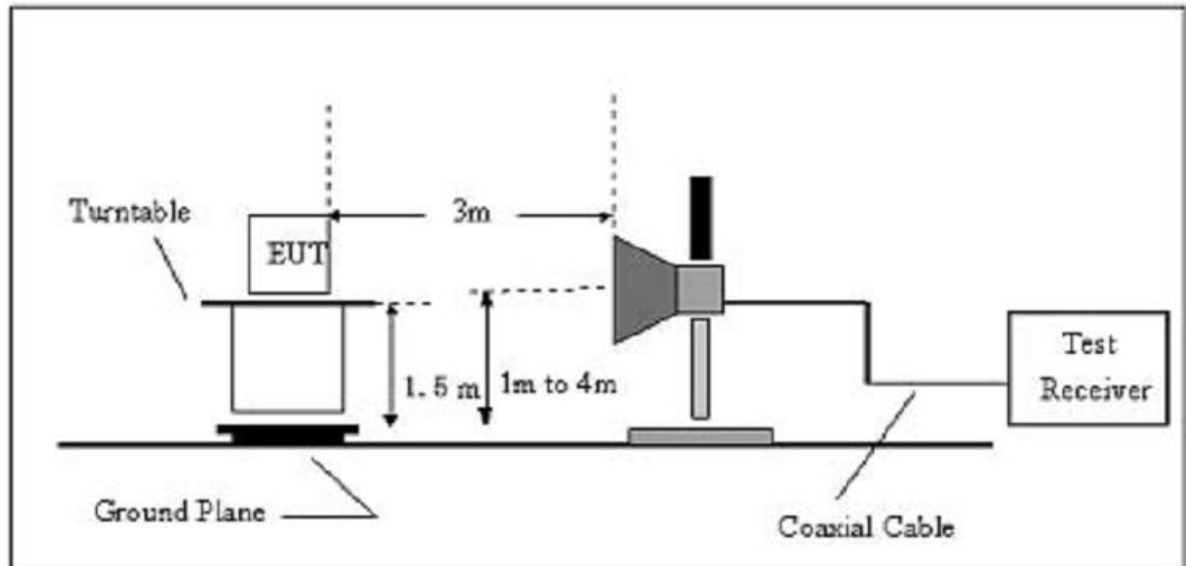
6.1.2. Test Procedures

- The EUT was placed on the top of the turntable in open test site area.
- The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- This measurement shall be repeated with the transmitter in standby mode where applicable.
- For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable.
- The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded. suspected value is indicated as Read Level (Raw).
- Replace the EUT by standard antenna and feed the RF port by signal generator.
- Adjust the frequency of the signal generator to the suspected emission and slightly rotate The turntable to locate the position with maximum reading.
- Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
- The level of the spurious emission is the power level of (8) plus the gain of the standard Antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.
- If the level calculated in (9) is higher than limit by more than 6dB, then lower the RBW of the spectrum analyzer to 30KHz. If the level of this emission does not change by more than 2dB, then it is taken as narrowband emission, otherwise, wideband emission.

k. The measurement shall be repeated at the lowest and the highest channel of the stated frequency range.

6.1.3. Test Setup Layout

(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



6.1.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

6.1.5. Results of Standby Mode Spurious Emissions

For the initial investigation on standby mode and receiving mode, no significant differences in spurious emissions were observed between these 2 modes. So test data for standby mode was omitted in this section

6.1.6. TEST RESULTS

EUT:	Wireless Controller	Model Name :	ERC902
Temperature:	26°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage :	AC230V
Test Mode :	TX Mode		

Polar (H/V)	Frequency	Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	
V	1256.36	-43.75	-4.52	-48.40	-30	-18.40	peak
H	1236.24	-44.63	-4.52	-79.19	-30	-19.21	peak
Remark: Absolute Level= Reading Level+ Factor, Margin= Limit- Absolute Level							

7. Duty cycle

7.1. Applied procedures / limit

In a period of 1 hour the duty cycle shall not exceed the class values given in table 13.

Table 13: Duty cycle class

Duty cycle class	Duty cycle ratio
1	$\leq 0.1\%$
2	$\leq 1.0\%$
3	$\leq 10\%$
4	Up to 100%

7.1.1. TEST RESULTS

For any period the duty cycle of this EUT is below 10%.

8. Transient power

8.1. Applied procedures / limit

At all frequencies where the emission levels measured in step 1 exceed the spurious domain limits (clause 7.8.3), the power level measured in step 1 shall not exceed the power level measured in Step 2 by more than 3 dB.

8.1.1. Test Procedures

Step 1

The transmitter shall be operated with powering on and off (e.g. by switching between active and standby state) at least 5 times within a maximum period of 60 seconds.

The recommended powering on- and off-time is at least 1 s respectively. If other on- and off-times are used, this shall be stated in the test report.

The measured power level shall be recorded for the measurement period covering at least 5 powering on and off events for the measurement receiver setting above and below the wanted channel.

If the resulting maximum power level in step 1 is above the spurious domain limit (clause 7.8.3), the second measurement step shall be performed

Step 2

In the second measurement, the procedure shall be repeated with the same settings of the Measuring receiver, whereas the transmitter shall be set on continuous transmission. If this is not possible, the measurements shall be carried out in a period shorter than the duration of the modulated transmitted burst.

The measured power level shall be recorded for the measurement period identical to the one in step1 for the measurement receiver setting above and below the wanted channel.

Measurement step 1 shall be repeated within the spectrum mask every 120 kHz from the Primarily adjusted point to both sides of the wanted frequencies, until either it is clearly ascertained that no power increases or limit exceeding appear, or until the frequency offset to the wanted frequency exceeds 2 MHz

8.1.1. Test Result

Channel Spacing	Step 1	Limit	Results
(times)	(dBm)	dB	(P/F)
1	-38.43	-36	PASS
2	-39.51	-36	PASS
3	-38.24	-36	PASS
4	-38.70	-36	PASS
5	-39.44	-36	PASS

9. Adjacent channel power

9.1. Applied procedures / limit.

These measurements are applicable to narrowband systems.

Adjacent channel power limits applicable to narrowband systems.

	Channel separation < 20 kHz	Channel separation ≥ 20 kHz
Normal test conditions	10 μ W	200 nW
Extreme test conditions	32 μ W	640 nW
NOTE: These limits also apply to spread spectrum equipment.		

9.2. Test Procedures

- The transmitter shall be operated at the carrier power determined under normal test conditions. The output of the transmitter shall be linked to the input of the "receiver" by a connecting device such that the impedance presented to the transmitter is 50 Ω and the level at the "receiver input" is appropriate.
- With the transmitter unmodulated, the tuning of the "receiver" shall be adjusted so that maximum response is obtained. This is the 0 dB response point. The "receiver" attenuator setting and the reading of the meter shall be recorded. If an unmodulated carrier cannot be obtained, then the measurement shall be made with the transmitter modulated with the normal test signal as appropriate, in which case this fact shall be recorded in test reports.
- The transmitter shall be modulated by a normal test signal as appropriate. The "receiver" variable attenuator shall be adjusted to obtain the same meter reading as in step b), or a known relation to it.
- The ratio of the adjacent channel power to the carrier power is the difference between the attenuator settings in steps b) and d), corrected for any differences in the reading of the meter.

9.3. Test Result

N/A

10. Modulation bandwidth

10.1. Applied procedures / limit

Emission Limits of the modulated signal			
Reference Bandwidth (RBW)	Limit	Lower envelope point minimum frequency	Upper envelope point maximum frequency
1 kHz	1 uW	fe, lower	fe, upper
1 kHz	250 nW	(fe, lower - 200 kHz)	(fe, upper + 200 kHz)
10 kHz	250 nW	(fe, lower - 400 kHz)	(fe, upper + 400 kHz)
100 kHz	250 nW	(fe, lower - 1 000 kHz)	(fe, upper + 1000kHz)

In table , fe, lower and fe, upper are the lower and upper edges of the band in which the equipment operates

10.2. Measuring Instruments and Setting

Spectrum Analyzer	Setting
Attenuation	Auto
Detector	Positive Peak
Sweep Time	Auto
RB	1 kHz, 10 kHz, 100 kHz
VB	3RB

10.3. Test Procedures

In clauses 7.2 or 7.3.

10.4. Test Result

EUT:	Wireless Controller	Model Name :	ERC902
Temperature:	26°C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage :	AC230V
Test Mode :	TX Mode		

fa(MHz)	fb(MHz)	Modulation bandwidth	Limit
433.26	433.23	17KHz	25KHz

Lower envelope point	Max Value	Limit	Reference Bandwidth	Result
minimum frequency	(dBm)		(RBW)	
(fe, lower - 200 kHz)	-35.40	-30dBm	1KHz	PASS
(fe, lower - 400 kHz)	-51.62	-36dBm	10KHz	PASS
(fe, lower - 1 000 kHz)	-52.53	-36dBm	100KHz	PASS
< (fe, lower - 1000 kHz)	-54.95	-36dBm	100KHz	PASS

中鉴检测
CCTI TESTING

11. Spurious emissions – Receiver (30-1000MHz)

11.1. Applied procedures / limit

Clause	Test Item	Frequency(MHz)	Limit
4.3.5	Spurious emissions	25-1000	-57dBm
	(radiated)	Above 1000	-47dBm

11.1.1. Measuring Instruments and Setting

The following table is the setting of the Spectrum Analyzer.

Spectrum Analyzer	Setting
Attenuation	Auto
Detector	Positive Peak
Sweep Time	Auto
RB	1 kHz, 10 kHz, 100 kHz
VB	3RB

11.1.2. Test Procedures

- The EUT was placed on the top of the turntable in open test site area.
- The test shall be made in the receiving mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable.
- The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded suspected value is indicated as Read Level (Raw).
- Replace the EUT by standard antenna and feed the RF port by signal generator.
- Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
- Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
- The level of the spurious emission is the power level of (7) plus the gain of the standard antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.
- The measurement shall be repeated at the lowest and the highest channel of the stated frequency range.

11.1.3. Test Setup Layout

This test setup layout is the same as that shown in section 5.1.3

11.1.4. EUT Operation during Test

The EUT was programmed to be in continuously receiving mode.

11.1.5. TEST RESULTS (30MHz-1000MHz)

N/A

12. Spurious emissions – Receiver (above 1000MHz)

12.1. Applied procedures / limit

Clause	Test Item	Frequency(MHz)	Limit
4.3.5	Spurious emissions	25-1000	-57dBm
	(radiated)	Above 1000	-47dBm

12.1.1. Measuring Instruments and Setting

Please refer to section 9.1.1 in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Analyzer	Setting
Attenuation	Auto
Start Frequency	100MHz
Stop Frequency	12750MHz
Detector	Positive Peak
Sweep Time	Auto

12.1.2. Test Procedures

- The EUT was placed on the top of the turntable in open test site area.
- The test shall be made in the receiving mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable.
- The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded suspected value is indicated as Read Level (Raw).
- Replace the EUT by standard antenna and feed the RF port by signal generator.
- Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
- Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
- The level of the spurious emission is the power level of (7) plus the gain of the standard antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.
- The measurement shall be repeated at the lowest and the highest channel of the stated frequency range.

12.1.3. Test Setup Layout

This test setup layout is the same as that shown in section 6.1.3

12.1.4. EUT Operation during Test

The EUT was programmed to be in continuously receiving mode.

12.1.5. TEST RESULTS (Above 1000MHz)

N/A

13. Blocking or desensitization

13.1. Applied procedures / limit

The blocking level, for any frequency within the specified ranges, shall not be less than the values given in table ,except at frequencies on which spurious responses are found.

Receiver category	Frequency offset	Limit
1	± 2 MHz	≥ 84 dB -A (note 2)
2	± 2 MHz	≥ 35 dB -A (note 2)
3	± 2 MHz	≥ 24 dB -A (note 2)
1	± 10 MHz	≥ 84 dB -A (note 2)
2	± 10 MHz	≥ 60 dB -A (note 2)
3	± 10 MHz	≥ 44 dB -A (note 2)
NOTE 1: The limits apply also for the repeated tests in case of equipment using LBT or category 1 receivers, reduced by 13 dB or 40 dB, respectively, to account for the increased wanted signal level.		
NOTE 2: $A = 10 \log (BW_{\text{kHz}} / 16 \text{ kHz})$ BW is the receiver bandwidth (see clause 8.1.4).		

13.2. Test Procedures

This measurement shall be conducted under normal conditions.

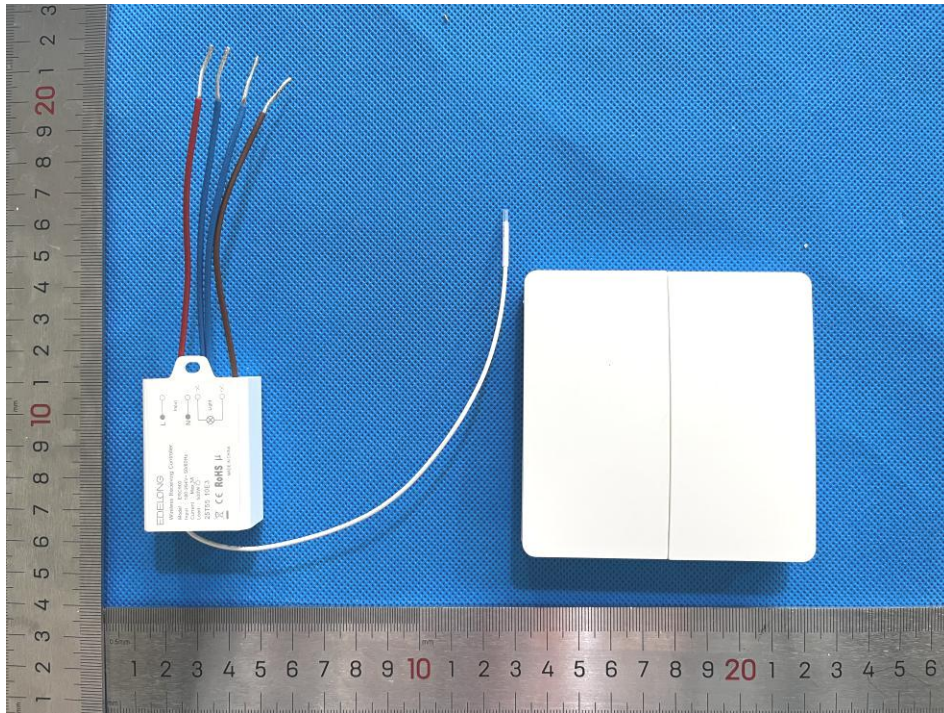
Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:

- a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna;or
- b) directly to the receiver permanent or temporary antenna connector Please refer to clause 8.2.2

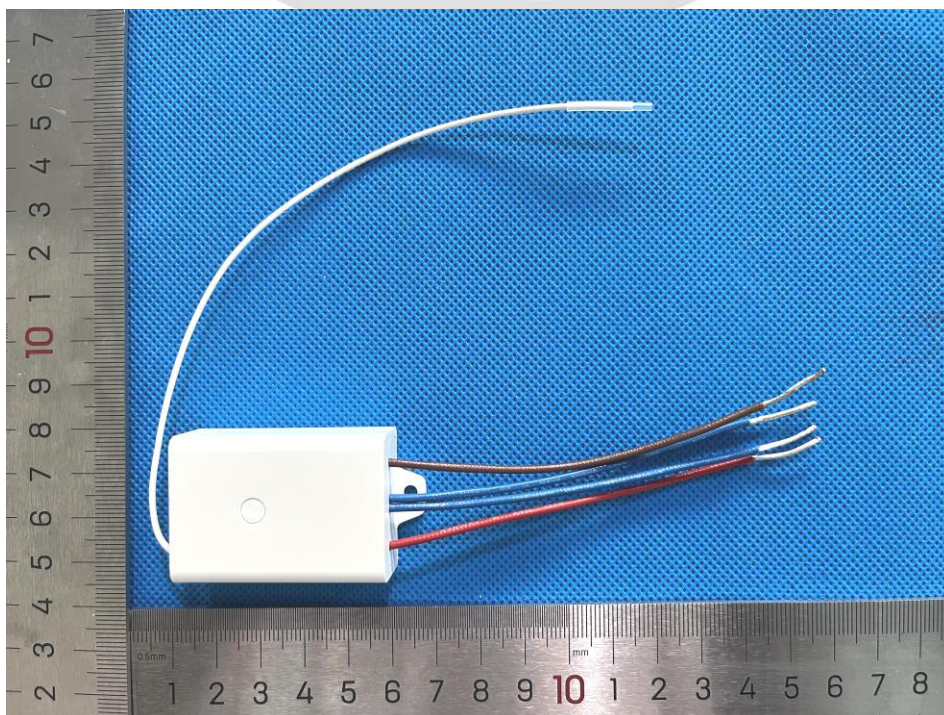
13.3. TEST RESULTS

N/A

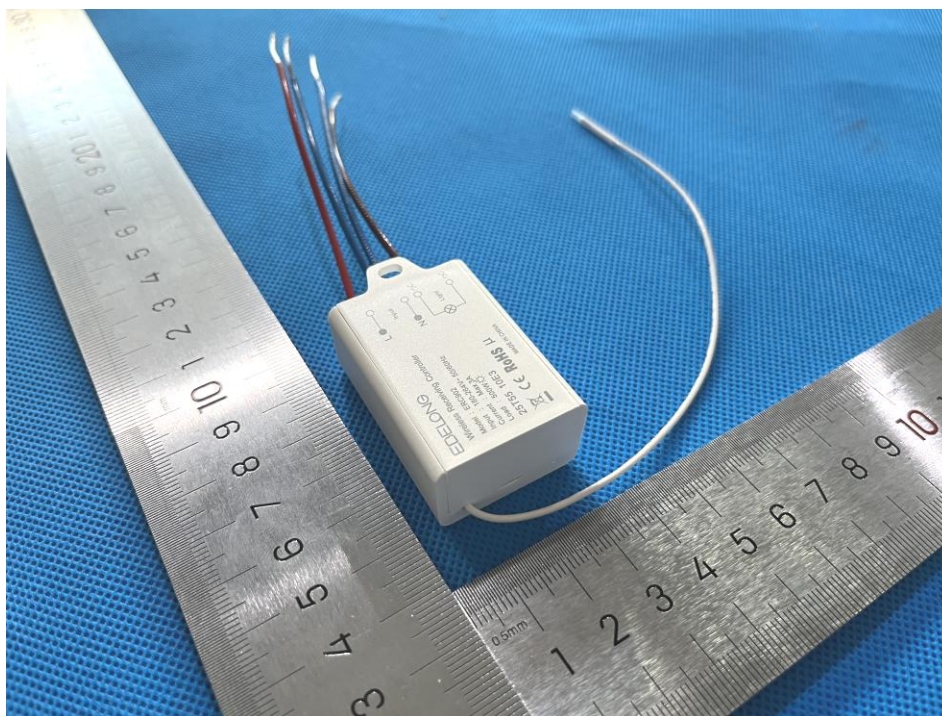
APPENDIX I -- EUT PHOTOGRAPHS



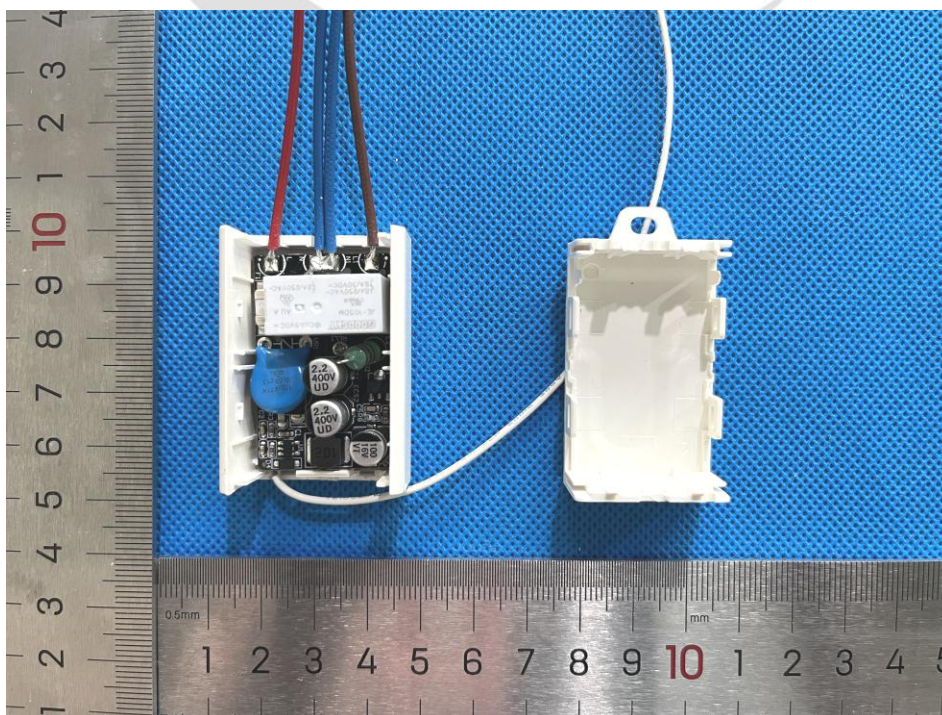
EUT Photo 1



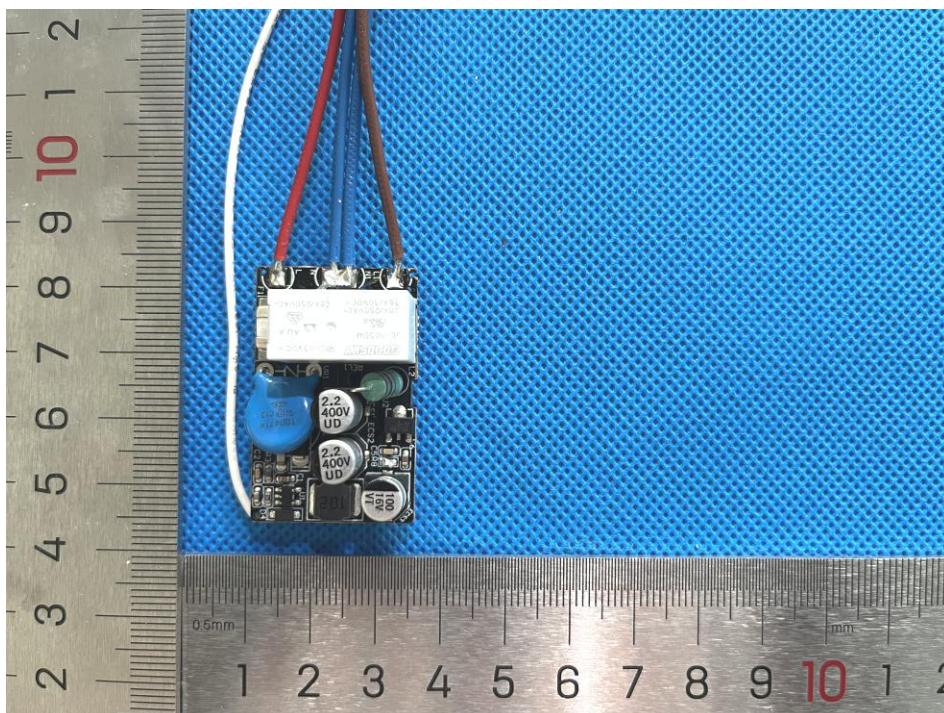
EUT Photo 2



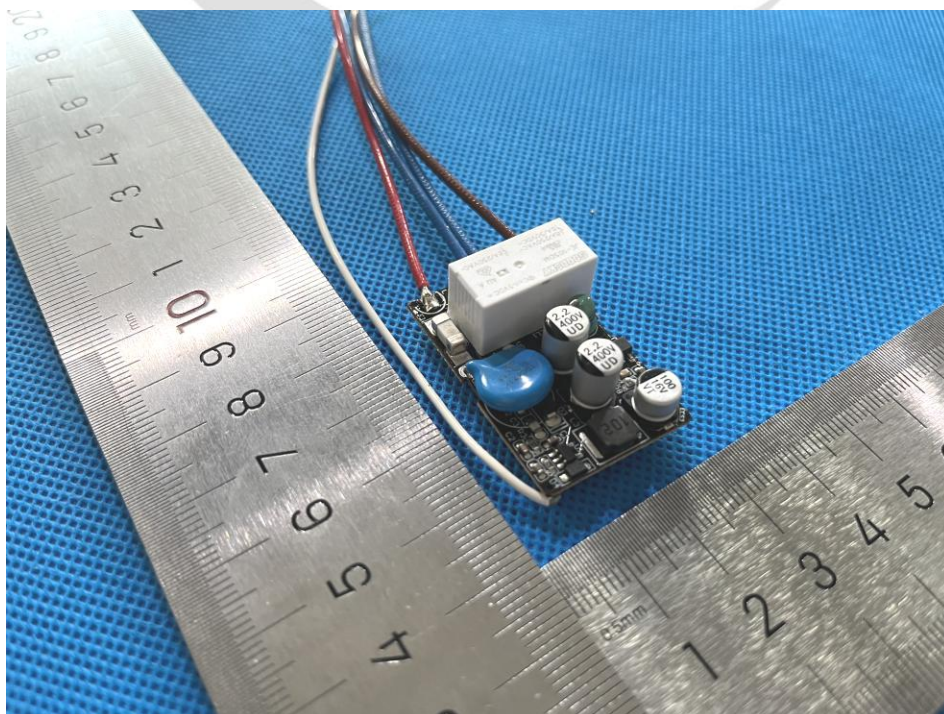
EUT Photo 3



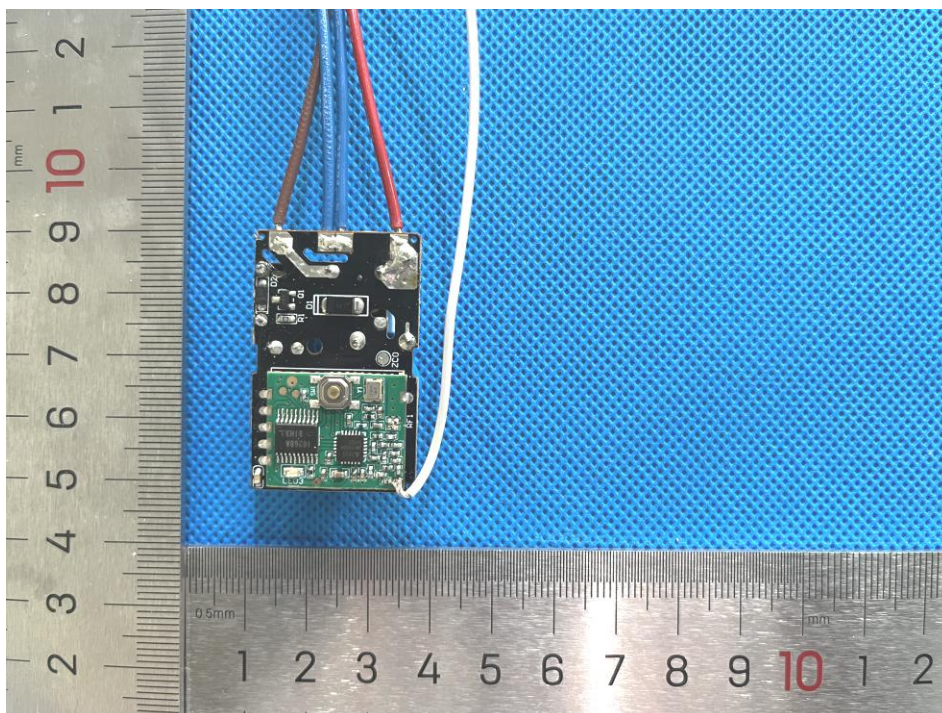
EUT Photo 4



EUT Photo 5



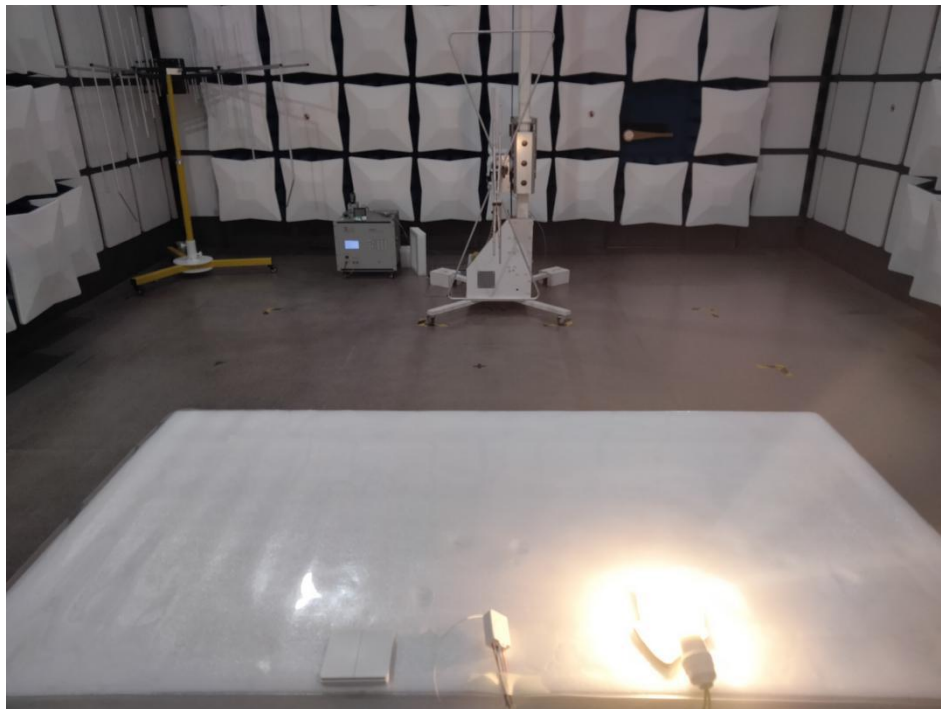
EUT Photo 6



EUT Photo 7

中鉴检测
CCTI TESTING

APPENDIX II -- EUT TEST PHOTOGRAPHS



EUT Test Photo

***** END OF REPORT *****

中鉴检测
CCTI TESTING