

Shenzhen Certification Technology Service Co., Ltd 2F, Building B, East Area of Nanchang Second Industrial Zone, Gushu 2nd Road, Bao'an District, Shenzhen518126, P.R. China.

TEST REPORT

FCC ID: 2ACYPRF-602C

Applicant : SHENZHEN YONGNUO PHOTOGRAPHIC EQUIPMENT CO.,

LTD

Address : B509 5/F, BUILDING 2, SAIGE SCIENCE AND TECHNOLOGY

PARK, NORTH OF HUAQIANG ROAD, FUTIAN, SHENZHEN,

CHINA.

Equipment under Test (EUT):

Name : Wireless Flash Trigger

Model : RF-602/N, RF-602/C

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

Report No. : CST-TCB140624035 **Date of Test** : August 02 - 08, 2014

Date of Issue : August 09, 2014

Test Result : PASS *

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.

FCC ID: 2ACYPRF-602C Page 1 of 33

^{*} In the configuration tested, the EUT complied with the standards specified above

TABLE OF CONTENT

Des	script	tion	Page
1 G	ener	al Information	3
	1.1	Description of Device (EUT)	3
	1.2	Description of Test Facility	3
2	EM	C Equipment List	4
3		Procedure	
4	Sum	nmary of Measurement	6
	4.1	Summary of test result	
	4.2	Test mode	6
5	POV	WER LINE CONDUCTED EMISSION	8
	5.1	Conducted Emission Limits(15.209&249)	8
	5.2	Test Setup	
	5.3	Test Procedure	9
	5.4	Test Results	9
6	Rad	iation Emission	
	6.1	Radiation Emission Limits(15.209&249 (a))	10
	6.2	Test Setup	11
	6.3	Test Procedure	12
	6.4	Test Equipment Setting For emission test	13
	6.5	Test Condition	13
	6.6	Test Result	_
7	Occ	upied bandwidth	17
	7.1	Test limit	17
	7.2	Method of measurement	17
	7.3	Test Setup	17
	7.4	Test Results	17
8	Ban	d Edge Check	19
	8.1	Test limit	19
	8.2	Test Procedure	19
	8.3	Test Setup	19
	8.4	Test Result	
9	Anto	enna Requirement	
	9.1	Standard Requirement	
	9.2	Antenna Connected Construction	24
	9.3	Result	
10	Pho	tographs of Test Setup	25
11	Pho	tographs of EUT	27

1 General Information

1.1 Description of Device (EUT)

Trade Name : YONGNUO

EUT : Wireless Flash Trigger Model No. : RF-602/N, RF-602/C

All model's the function, software and electric circuit are the

DIFF. : same, only with a product model named different, the test mode

is RF-602/C.

Type of Antenna : PCB Antenna, Max. Gain: 1.5dBi

Operation Frequency : 2410MHz

Channel number : 1

Modulation type : FSK

Power Supply : DC 3V Supply by battery

Applicant . SHENZHEN YONGNUO PHOTOGRAPHIC EQUIPMENT

CO., LTD

Address : B509 5/F, BUILDING 2, SAIGE SCIENCE AND

TECHNOLOGY PARK, NORTH OF HUAQIANG ROAD,

FUTIAN, SHENZHEN, CHINA.

Manufacturer : SHENZHEN YONGNUO PHOTOGRAPHIC EQUIPMENT

CO., LTD

Address : B509 5/F, BUILDING 2, SAIGE SCIENCE AND

TECHNOLOGY PARK, NORTH OF HUAQIANG ROAD,

FUTIAN, SHENZHEN, CHINA.

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

FCCID: 2ACYPRF-602C Page 3 of 33

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	1 Year
Spectrum analyzer	Agilent	E4407B	MY49510055	Oct. 30, 13	1Year
Receiver	R&S	ESCI	101165	Oct. 30, 13	1 Year
Receiver	R&S	ESCI	101202	Oct. 30, 13	1Year
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	Mar.11, 14	1Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	Mar.11, 14	1 Year
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170 D(1432)	Mar.11, 14	1Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	Mar.12, 14	1Year
Cable	Resenberger	SUCOFLEX 104	MY6562/4	Oct. 30, 13	1Year
Cable	Resenberger	SUCOFLEX 104	309972/4	Oct. 30, 13	1Year
Cable	Resenberger	SUCOFLEX 104	329112/4	Oct. 30, 13	1Year
Pre-amplifier	SCHWARZBECK	BBV9743	9743-019	Oct. 30, 13	1 Year
Pre-amplifier	Quietek	AP-180C	CHM-0602012	Oct. 30, 13	1Year

FCCID: 2ACYPRF-602C Page 4 of 33

Report No.: CST-TCB140624035

3 Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The test procedure used was ANSI Standard C63.4-2003 using a 50 u 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.

FCCID: 2ACYPRF-602C Page 5 of 33

4 Summary of Measurement

4.1 Summary of test result

Test Item	Test Requirement	Stanadard 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 by 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	2410					

Channel list					
CH1	2410MHz	/	/		

4.3 Block Diagram

EUT

FCCID: 2ACYPRF-602C Page 6 of 33

Report No.: CST-TCB140624035

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	2.13 dB	Polarize: V
chamber (below 30MHz)	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m	3.04dB	Polarize: V
chamber (30MHz to 1GHz)	3.02dB	Polarize: H
Uncertainty for Radiation Emission test in 3m	3.84dB	Polarize: H
chamber (1GHz to 25GHz)	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%	

FCCID: 2ACYPRF-602C Page 7 of 33

5 POWER LINE CONDUCTED EMISSION

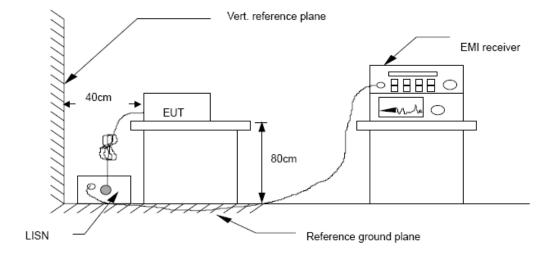
5.1 Conducted Emission Limits(15.209&249)

Frequency	Limits dB(μV)			
MHz	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



FCCID: 2ACYPRF-602C Page 8 of 33

Report No.: CST-TCB140624035

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.

.

FCCID: 2ACYPRF-602C Page 9 of 33

6 Radiation Emission

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

Frequency	Field Strength						
(MHz)	Limits at 3 metres (watts,e.i.r.p.)						
	uV/m	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		93.97(AV)	3				
Carrier frequency		113.97(PK)	3				

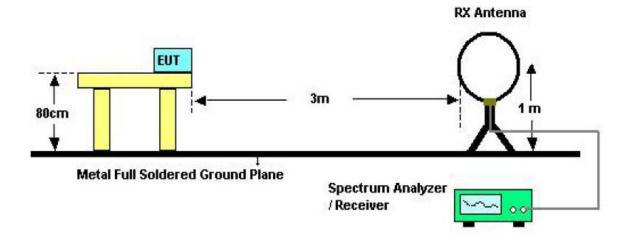
NOTE:

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

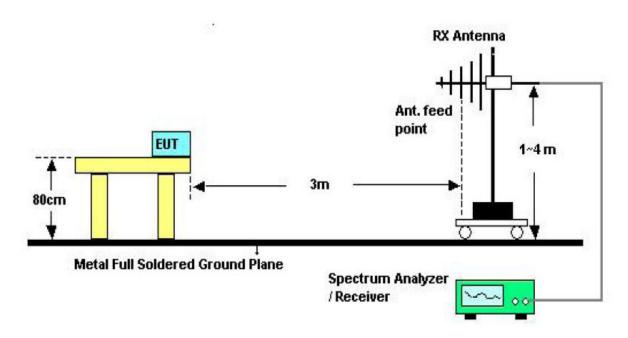
FCCID: 2ACYPRF-602C Page 10 of 33

6.2 Test Setup

See the next page

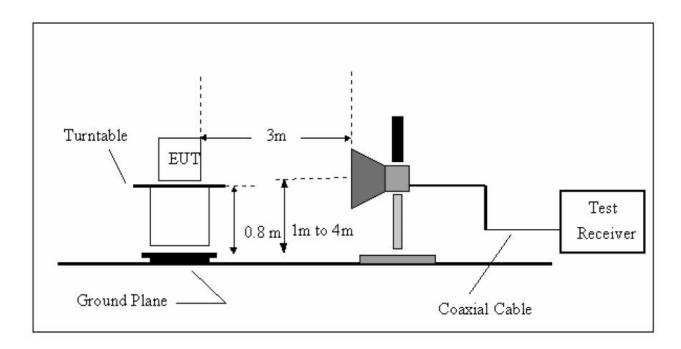


Below 30MHz Test Setup



Above 30MHz Test Setup

FCCID: 2ACYPRF-602C Page 11 of 33



Above 1GHz Test Setup

6.3 Test Procedure

- a) The measureing 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
- b) The Test antenna shall vary between 1m and 4m,Both Horizontal and Vertical antenna are set of make measurement.
- c) 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 Qusia Peak Detector mode remeasured
- d) If Peak value 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.
- e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.
- f) For the actual test configuration, please see the test setup photo.

Report No.: CST-TCB140624035

6.4 Test Equipment Setting For emission test.

9KHz~150KHz	RBW 200Hz	VBW1KHz
150KHz~30MHz	RBW 9KHz	VBW 30KHz
30MHZ~1GHz	RBW 120KHz	VBW 300KHz
Above 1GHz	RBW 1MHz	VBW 3MHz

6.5 Test Condition

Continual Transmitting in maximum power.

6.6 Test Result

PASS.

We have scanned the 10th harmonic from 9KHz to the EUT.

Note: The Radiated emissions is showed the maximum power data of TX test mode and showed worst orthogonal axes with Y orthogonal axes.

Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value hasno need to be reported.

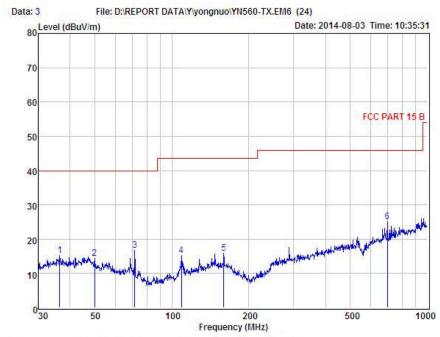
FCCID: 2ACYPRF-602C Page 13 of 33

Below 1GHz test data:



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 Tel: 4006786199 FAX: +86-755-26736857

Website: http://www.cessz.com Email: Service@cessz.com



Condition : FCC PART 15 B POL: HORIZONTAL 3m

EUT : Wireless Flash Trigger Model No : RF-602/C

Test Mode : TX 2410MHz : DC 3V from battery Power

Test Engineer : Store

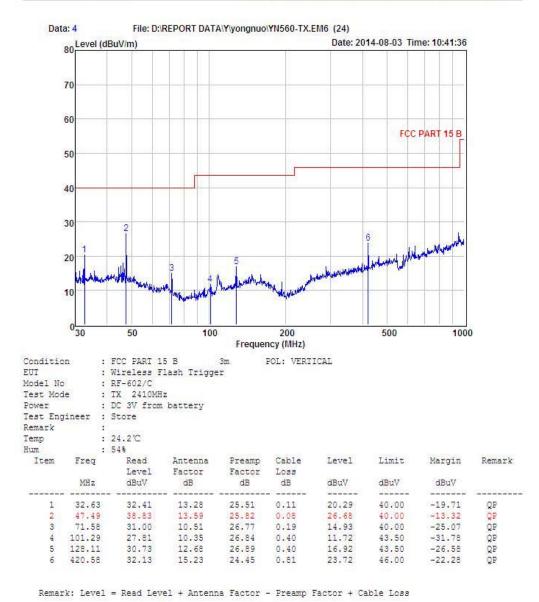
Remark

: 24.2°C Temp Hum : 54%

Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	36.38	27.35	13.39	25.66	0.10	15.18	40.00	-24.82	QP
2	49.88	26.59	13.54	25.82	0.10	14.41	40.00	-25.59	QP
3	71.58	32.72	10.51	26.77	0.19	16.65	40.00	-23.35	QP
4	109.03	30.65	11.13	26.86	0.41	15.33	43.50	-28.17	QP
5	159.78	28.18	14.14	26.91	0.44	15.85	43.50	-27.65	QP
6	696.86	30.00	19.62	25.75	1.19	25.06	46.00	-20.94	QP



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 Tel: 4006786199 FAX: +86-755-26736857 Website: http://www.cessz.com/Email: Service@cessz.com/



-2-

Notes: --Means other frequency and mode comply with standard requirements and at least have 20dB margin.

Report No.: CST-TCB140624035

Radiated Emissions Result of Inside band (2410MHz)

EUT	Wireless Flash Trigger	Model Name	RF-602/C
Temperature	25°C	Relative Humidity	56%
Pressure	960hPa	Test voltage	DC 3V supply by battery
Test Mode	TX	Antenna polarization	Horizontal/Vertical

	Channel (2410MHz)									
Fre.	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	
2410	Н	80.17 (PK)	27.62	3.92	34.97	-3.43	76.74	113.97	-37.23	
2410	Н	72.58 (AV)	27.62	3.92	34.97	-3.43	69.15	93.97	-24.82	
	Н									
2410	V	88.15 (PK)	27.62	3.92	34.97	-3.43	84.72	113.97	-29.25	
2410	V	79.37(AV)	27.62	3.92	34.97	-3.43	75.94	93.97	-18.03	
	V								-	

Freq. (MHz)	Ant. Pol H/V	Peak Reading	AV Reading	Ant. / CL CF	Actual Fs		Peak Limit	AV Limit	Margin (dB)	
(1 VIII IZ)	11/ 4	(dBuV)	(dBuV)	(dB)	Peak (dBuV/m)	AV (dBuV/m)	(dBuV/m)		, ,	Remark
1489.53	Н	48.09		-10.27	37.82		74.00	54.00	-16.18	Peak
1942.13	Н	46.29		-8.86	37.43		74.00	54.00	-16.57	Peak
2654.72	Н	45.55		-6.94	38.61		74.00	54.00	-15.39	Peak
4820.00	Н	41.90		0.64	42.54		74.00	54.00	-11.46	Peak
N/A										
1218.43	V	48.59		-11.52	37.07		74.00	54.00	-16.93	Peak
1821.56	V	45.95		-9.16	36.79		74.00	54.00	-17.21	Peak
2794.23	V	43.80		-6.38	37.42		74.00	54.00	-16.58	Peak
4820.00	V	42.42		0.64	43.06		74.00	54.00	-10.94	Peak
N/A										

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:

a. Peak setting 30MHz-1GHz, RBW=120KHz, VBW=300KHz.

Above 1G: RBW=1MHz, VBW=3MHz

b. AV setting 30MHz-1GHz, RBW=1MHz, VBW=10Hz. Above 1G: RBW=1MHz, VBW=10Hz

FCCID: 2ACYPRF-602C Page 16 of 33

7 Occupied bandwidth

7.1 Test limit

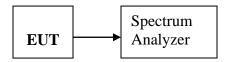
Please refer section 15.249

7.2 Method of measurement

a)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.

b)The test receiver RBW set 30KHz,VBW set 30KHz,Sweep time set auto.

7.3 Test Setup

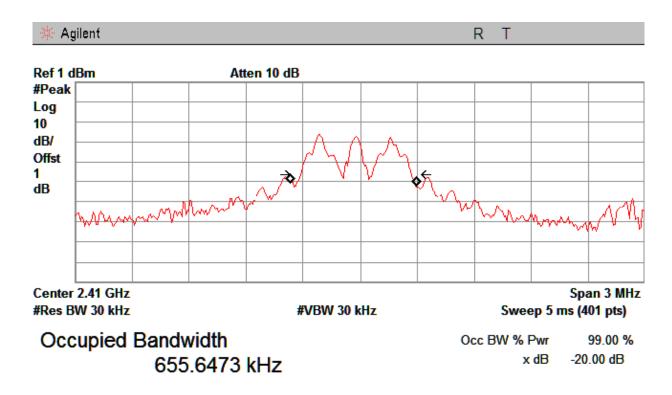


7.4 Test Results

Mode	Freq (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Conclusion	
FSK	2410	0.581	0.656	/	PASS	

Note: Detailed information please see the following page.

FCCID: 2ACYPRF-602C Page 17 of 33



Transmit Freq Error -37.792 kHz x dB Bandwidth 580.599 kHz

FCCID: 2ACYPRF-602C Page 18 of 33

8 Band Edge Check

8.1 Test limit

Please refer section 15.249 and section 15.205.

249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in section 15.209, whichever is the lesser attenuation.

249(e) As show in section 15.35(b), for frequencies above 1000MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak filed strength shall not exceed 2500 millivolts/meter at 3meters along the antenna azimuth.

8.2 Test Procedure

- 8.2.1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 8.2.2. Set spectrum analyzer please see the following test plot.
- 8.2.3. Set the spectrum analyzer as RBW, VBW=1000 KHz,
- 8.2.4. Max hold, view and count how many channel in the band.

8.3 Test Setup

Please see the section 6.2, above 1GHz Test Setup.

8.4 Test Result

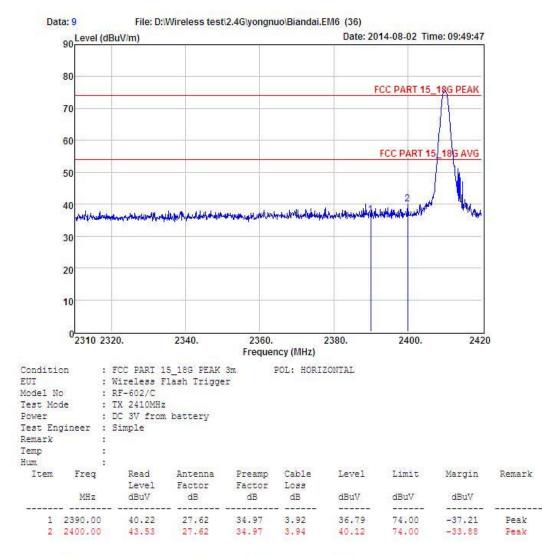
Pass.

Detailed information please see the following page.

FCCID: 2ACYPRF-602C Page 19 of 33

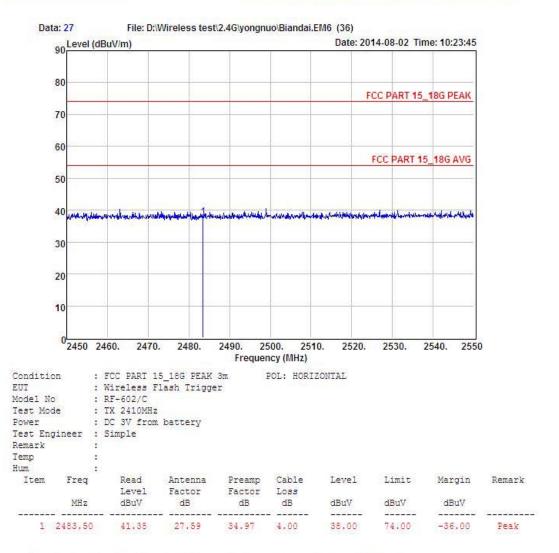


Shenzhen Certification Technology Service Co., Ltd.
2F, Building B, East Area of Nanchang Second Industrial Zone,
Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China
Tel: 4006786199 FAX: +86-755-26736857
Website: http://www.cessz.com/Email: Service@cessz.com/



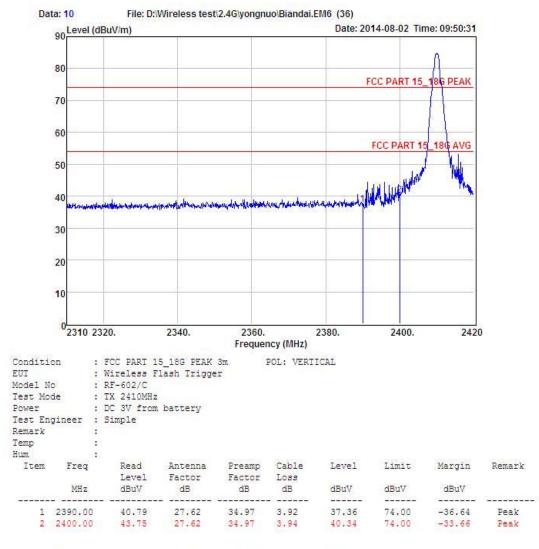


Shenzhen Certification Technology Service Co., Ltd. 2F, Building B, East Area of Nanchang Second Industrial Zone, Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China Tel: 4006786199 FAX: +86-755-26736857 Website: http://www.cessz.com/Email: Service@cessz.com/



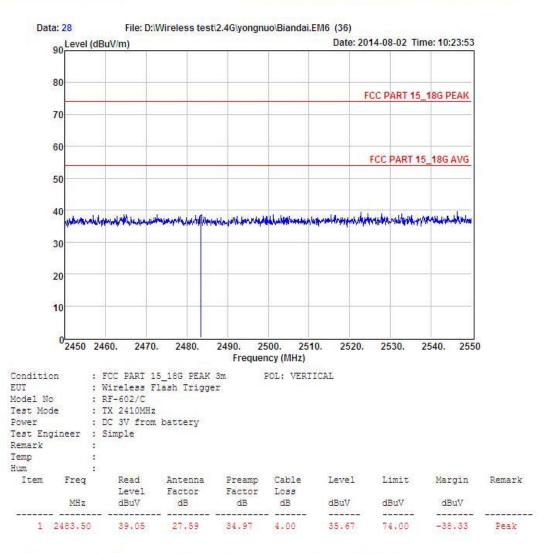


Shenzhen Certification Technology Service Co., Ltd.
2F, Building B, East Area of Nanchang Second Industrial Zone,
Gushu 2nd Road, Bao'an District, Shenzhen 518126, P.R. China
Tel: 4006786199 FAX: +86-755-26736857
Website: http://www.cessz.com/Email: Service@cessz.com/





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 Tel: 4006786199 FAX: +86-755-26736857 Website: http://www.cessz.com/Email: Service@cessz.com/



9 Antenna Requirement

9.1 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.

9.2 Antenna Connected Construction

The directional gains of antenna used for transmitting is 1.5dBi, and the antenna is PCB Antenna. Please see EUT photo for details.

9.3 Result

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

FCCID: 2ACYPRF-602C Page 24 of 33

10 Photographs of Test Setup

Photographs-Radiated Emission Test Setup in Chamber

Below 1G



FCCID: 2ACYPRF-602C Page 25 of 33





FCCID: 2ACYPRF-602C Page 26 of 33

11 Photographs of EUT





FCCID: 2ACYPRF-602C Page 27 of 33





Page 28 of 33

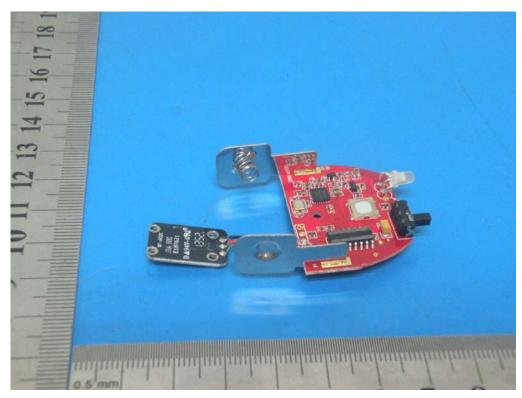


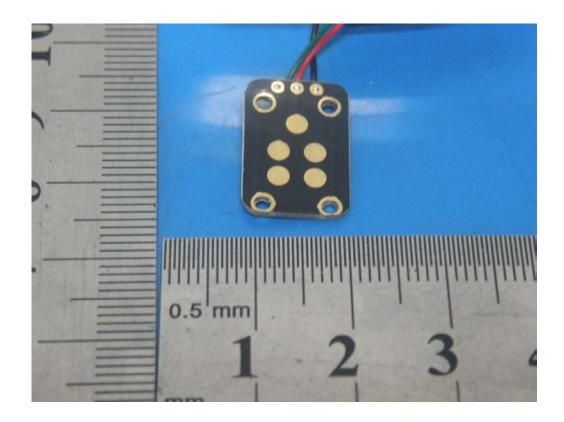


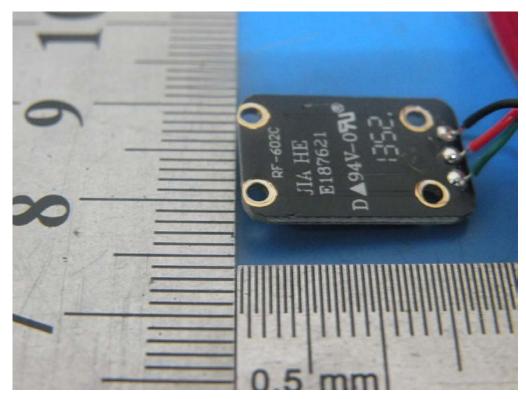


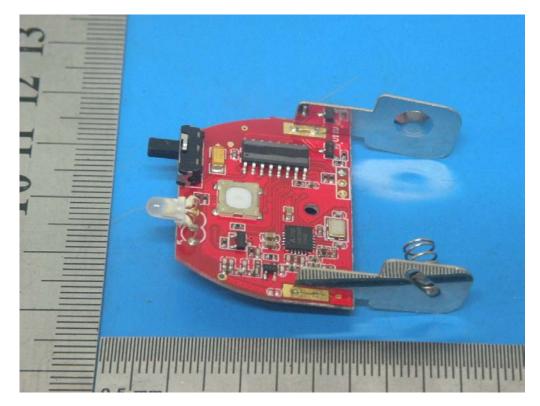


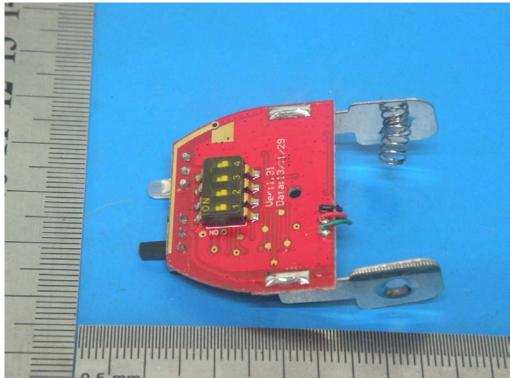












-----END OF THE REPORT----