

# TEST REPORT

**Applicant:** SHENZHEN YONGNUO PHOTOGRAPHIC EQUIPMENT CO., LTD

**Address of Applicant:** Building A, Shenfubao modern optics factory Kengzi Street, Pingshan District, Shenzhen, China

**Manufacturer:** SHENZHEN YONGNUO PHOTOGRAPHIC EQUIPMENT CO., LTD

**Address of Manufacturer:** Building A, Shenfubao modern optics factory Kengzi Street, Pingshan District, Shenzhen, China

**Factory:** SHENZHEN YONGNUO PHOTOGRAPHIC EQUIPMENT CO., LTD. PINGSHAN OPTICAL FACTORY

**Address of Factory:** 2F Building A, Shenfubao Modern Optical Factory Area, No.14 Jinxiu Middle Road, Kengzi Street, Pingshan District, Shenzhen, China.

### Equipment Under Test (EUT)

**Product Name:** TTL SPEEDLITE

**Model No.:** YN650EX-RF

**Trade Mark:** 

**FCC ID:** 2ACYPYN650RF

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.249

**Date of sample receipt:** April 06, 2022

**Date of Test:** April 06-08, 2022

**Date of report issued:** April 08, 2022

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



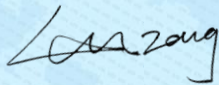
**Robinson Luo**  
**Laboratory Manager**

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 2 Version

Version No.	Date	Description
00	April 08, 2022	Original

Prepared By:

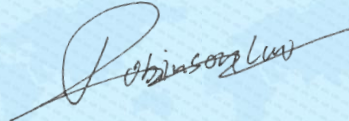


Date:

April 08, 2022

Project Engineer

Check By:



Date:

April 08, 2022

Reviewer

## 3 Contents

	Page
1 COVER PAGE.....	1
2 VERSION .....	2
3 CONTENTS .....	3
4 TEST SUMMARY .....	4
4.1 MEASUREMENT UNCERTAINTY .....	4
5 GENERAL INFORMATION .....	5
5.1 GENERAL DESCRIPTION OF EUT .....	5
5.2 TEST MODE .....	7
5.3 DESCRIPTION OF SUPPORT UNITS .....	7
5.4 DEVIATION FROM STANDARDS.....	7
5.5 ABNORMALITIES FROM STANDARD CONDITIONS .....	7
5.6 TEST FACILITY.....	7
5.7 TEST LOCATION .....	7
5.8 ADDITIONAL INSTRUCTIONS.....	7
6 TEST INSTRUMENTS LIST .....	8
7 TEST RESULTS AND MEASUREMENT DATA.....	10
7.1 ANTENNA REQUIREMENT .....	10
7.2 RADIATED EMISSION METHOD .....	11
7.2.1 <i>Field Strength of The Fundamental Signal</i> .....	13
7.2.2 <i>Spurious emissions</i> .....	14
7.2.3 <i>Bandedge emissions</i> .....	19
7.3 20dB OCCUPY BANDWIDTH .....	20
8 TEST SETUP PHOTO .....	22
9 EUT CONSTRUCTIONAL DETAILS .....	22

## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	N/A
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a) (d)/15.209	Pass
Band edge	15.249 (d)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

*Remarks:*

1. Test according to ANSI C63.10: 2013.
2. Pass: The EUT complies with the essential requirements in the standard.

### 4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz-30MHz	3.1dB	(1)
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

## 5 General Information

### 5.1 General Description of EUT

Product Name:	TTL SPEEDLITE
Model No.:	YN650EX-RF
Serial No.:	6947110911397
Test sample(s) ID:	GTSL202204000022-1
Sample(s) Status	Engineered sample
Operation Frequency:	2402.5MHz~2456.5MHz
Channel numbers:	16
Channel separation:	3MHz
Modulation type:	FSK
Antenna Type:	PCB Antenna
Antenna gain:	3.7dBi(Declared by applicant)
Power supply:	Input: DC 6V(4*1.5V Size “AA” Battery)

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402.5 MHz	5	2414.5 MHz	9	2429.5 MHz	13	2444.5 MHz
2	2405.5 MHz	6	2417.5 MHz	10	2432.5 MHz	14	2450.5 MHz
3	2408.5 MHz	7	2420.5 MHz	11	2438.5 MHz	15	2453.5 MHz
4	2411.5 MHz	8	2426.5 MHz	12	2441.5 MHz	16	2456.5 MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402.5MHz
The middle channel	2426.5MHz
The Highest channel	2456.5MHz

## 5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data. New battery is used during all test.	

### Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	90.26	91.76	89.35

## 5.3 Description of Support Units

None.

## 5.4 Deviation from Standards

None.

## 5.5 Abnormalities from Standard Conditions

None.

## 5.6 Test Facility

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

- **FCC—Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files.

- **IC —Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

## 5.7 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123- 128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

## 5.8 Additional Instructions

Test Software	Special test command provided by manufacturer
Power level setup	Default

## 6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 24 2021	June. 23 2022
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 24 2021	June. 23 2022
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 24 2021	June. 23 2022
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 24 2021	June. 23 2022
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 24 2021	June. 23 2022
9	Coaxial Cable	GTS	N/A	GTS211	June. 24 2021	June. 23 2022
10	Coaxial cable	GTS	N/A	GTS210	June. 24 2021	June. 23 2022
11	Coaxial Cable	GTS	N/A	GTS212	June. 24 2021	June. 23 2022
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 24 2021	June. 23 2022
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 24 2021	June. 23 2022
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 24 2021	June. 23 2022
15	Band filter	Amindeon	82346	GTS219	June. 24 2021	June. 23 2022
16	Power Meter	Anritsu	ML2495A	GTS540	June. 24 2021	June. 23 2022
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 24 2021	June. 23 2022
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 24 2021	June. 23 2022
19	Splitter	Agilent	11636B	GTS237	June. 24 2021	June. 23 2022
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 24 2021	June. 23 2022
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 17 2021	Oct. 16 2022
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 17 2021	Oct. 16 2022
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 17 2021	Oct. 16 2022
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 24 2021	June. 23 2022



RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 24 2021	June. 23 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 24 2021	June. 23 2022
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 24 2021	June. 23 2022
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 24 2021	June. 23 2022
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 24 2021	June. 23 2022
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 24 2021	June. 23 2022
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 24 2021	June. 23 2022
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 24 2021	June. 23 2022

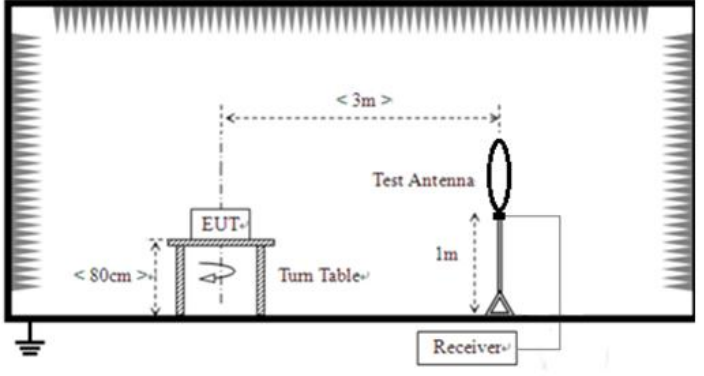
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 24 2021	June. 23 2022
2	Barometer	ChangChun	DYM3	GTS255	June. 24 2021	June. 23 2022

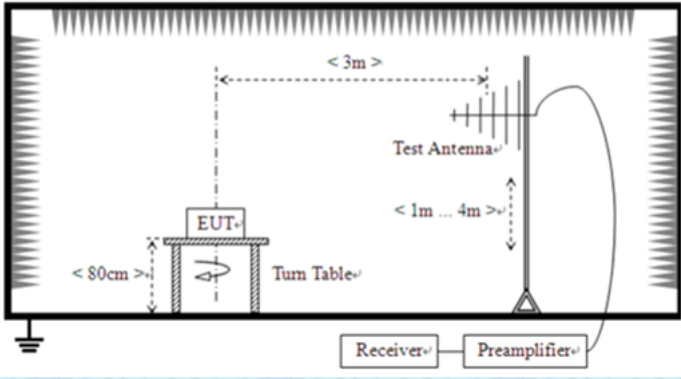
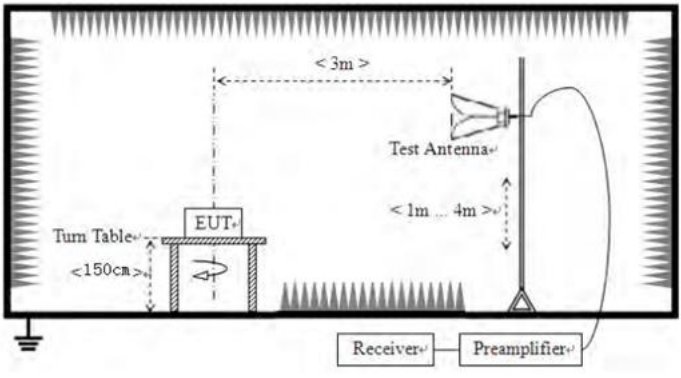
## 7 Test results and Measurement Data

### 7.1 Antenna requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203
<p><b>15.203 requirement:</b></p> <p>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, 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.</p> <p><b>15.247(c) (1)(i) requirement:</b></p> <p>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
<b>EUT Antenna:</b>	
<i>The antenna is PCB antenna, the best case gain of the are antennas 3.7dBi, reference to the appendix II for details</i>	

## 7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz-150kHz	Quasi-peak	200Hz	300Hz	Quasi-peak Value
	150kHz-30MHz	Quasi-peak	9kHz	10kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Peak		1MHz	10Hz	Average Value	
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark	
	2400MHz-2483.5MHz	94.00		Average Value	
		114.00		Peak Value	
Limit: (Spurious Emissions)	Frequency	Limit (uV/m)		Remark	
	0.009MHz-0.490MHz	2400/F(kHz) @300m		Quasi-peak Value	
	0.490MHz-1.705MHz	24000/F(kHz) @30m		Quasi-peak Value	
	1.705MHz-30.0MHz	30 @30m		Quasi-peak Value	
	30MHz-88MHz	100 @3m		Quasi-peak Value	
	88MHz-216MHz	150 @3m		Quasi-peak Value	
	216MHz-960MHz	200 @3m		Quasi-peak Value	
	960MHz-1GHz	500 @3m		Quasi-peak Value	
	Above 1GHz	500 @3m		Average Value	
5000 @3m		Peak Value			
Limit: (band edge)	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.				
Test setup:	<p>For radiated emissions from 9kHz to 30MHz</p>  <p>For radiated emissions from 30MHz to 1GHz</p>				

	 <p>For radiated emissions above 1GHz</p> 						
<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>						
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>						
<p>Test mode:</p>	<p>Refer to section 5.2 for details</p>						
<p>Test environment:</p>	<table border="1"> <tr> <td>Temp.:</td> <td>25 °C</td> <td>Humid.:</td> <td>52%</td> <td>Press.:</td> <td>1012mbar</td> </tr> </table>	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar		
<p>Test voltage:</p>	<p>DC 6V</p>						
<p>Test results:</p>	<p>Pass</p>						

**Measurement data:**

**7.2.1 Field Strength of The Fundamental Signal**

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2402.50	92.74	27.58	5.39	34.01	91.70	114.00	-22.30	Vertical
2402.50	86.87	27.58	5.39	34.01	85.83	114.00	-28.17	Horizontal
2426.50	92.81	27.48	5.43	33.96	91.76	114.00	-22.24	Vertical
2426.50	86.76	27.48	5.43	33.96	85.71	114.00	-28.29	Horizontal
2456.50	91.39	27.52	5.47	33.92	90.46	114.00	-23.54	Vertical
2456.50	85.50	27.52	5.47	33.92	84.57	114.00	-29.43	Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
2402.50	82.59	27.58	5.39	34.01	81.55	94.00	-12.45	Vertical
2402.50	77.36	27.58	5.39	34.01	76.32	94.00	-17.68	Horizontal
2426.50	83.03	27.48	5.43	33.96	81.98	94.00	-12.02	Vertical
2426.50	76.22	27.48	5.43	33.96	75.17	94.00	-18.83	Horizontal
2456.50	82.14	27.52	5.47	33.92	81.21	94.00	-12.79	Vertical
2456.50	76.51	27.52	5.47	33.92	75.58	94.00	-18.42	Horizontal

Note: For fundamental frequency , RBW>20dB BW, VBW>=RBW, PK detector for PK value, RMS detector for AV value

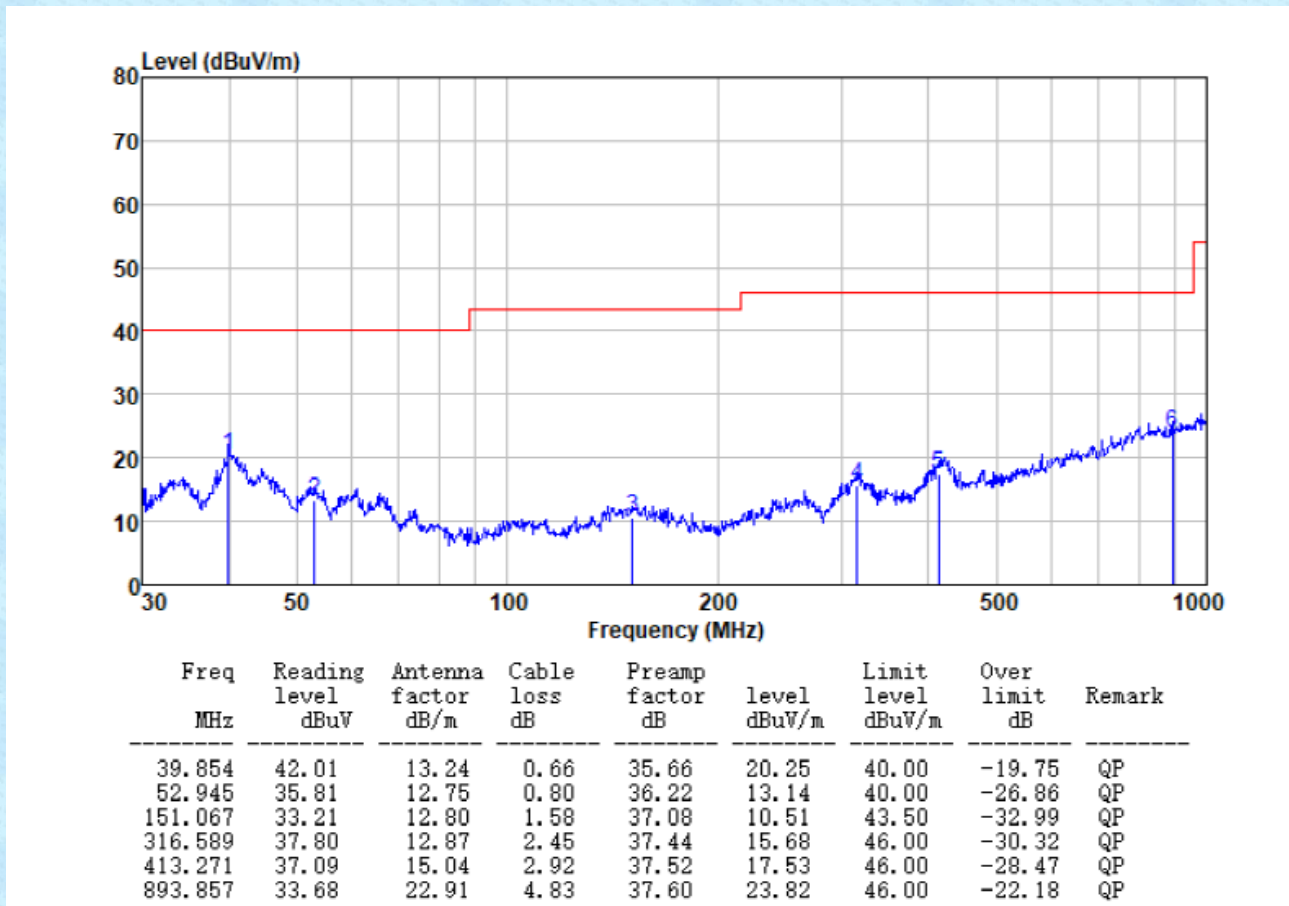
## 7.2.2 Spurious emissions

### ■ Below 30MHz

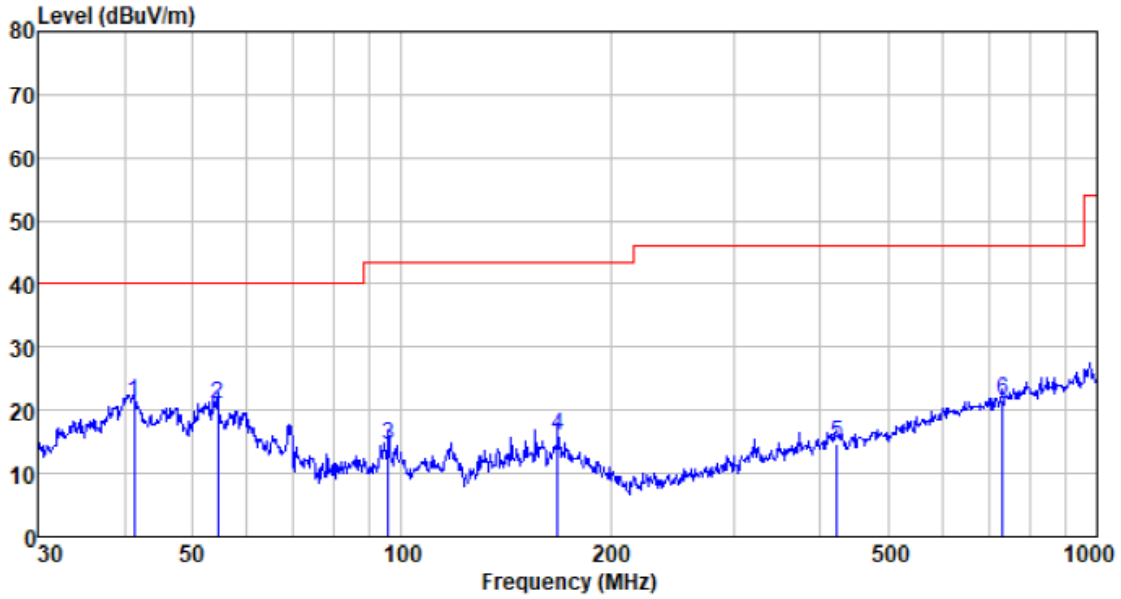
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

### ■ Below 1GHz

Horizontal:



**Vertical:**



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
41.277	43.08	13.18	0.68	35.74	21.20	40.00	-18.80	QP
54.452	43.67	12.60	0.81	36.25	20.83	40.00	-19.17	QP
95.762	41.25	8.83	1.16	36.69	14.55	43.50	-28.95	QP
167.824	38.93	12.52	1.67	37.18	15.94	43.50	-27.56	QP
422.058	34.09	15.26	2.96	37.52	14.79	46.00	-31.21	QP
731.920	33.76	21.13	4.20	37.63	21.46	46.00	-24.54	QP

■ Above 1GHz

Test channel:	Lowest channel
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4805.00	35.52	31.78	8.60	32.09	43.81	74.00	-30.19	Vertical
7207.50	30.64	36.15	11.65	32.00	46.44	74.00	-27.56	Vertical
9610.00	30.41	37.95	14.14	31.62	50.88	74.00	-23.12	Vertical
12012.50	*					74.00		Vertical
14415.00	*					74.00		Vertical
4805.00	39.44	31.78	8.60	32.09	47.73	74.00	-26.27	Horizontal
7207.50	32.24	36.15	11.65	32.00	48.04	74.00	-25.96	Horizontal
9610.00	29.67	37.95	14.14	31.62	50.14	74.00	-23.86	Horizontal
12012.50	*					74.00		Horizontal
14415.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4805.00	24.67	31.78	8.60	32.09	32.96	54.00	-21.04	Vertical
7207.50	19.53	36.15	11.65	32.00	35.33	54.00	-18.67	Vertical
9610.00	18.72	37.95	14.14	31.62	39.19	54.00	-14.81	Vertical
12012.50	*					54.00		Vertical
14415.00	*					54.00		Vertical
4805.00	28.70	31.78	8.60	32.09	36.99	54.00	-17.01	Horizontal
7207.50	21.59	36.15	11.65	32.00	37.39	54.00	-16.61	Horizontal
9610.00	18.30	37.95	14.14	31.62	38.77	54.00	-15.23	Horizontal
12012.50	*					54.00		Horizontal
14415.00	*					54.00		Horizontal



Test channel:	Middle
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4853.00	35.94	31.85	8.67	32.12	44.34	74.00	-29.66	Vertical
7279.50	30.93	36.37	11.72	31.89	47.13	74.00	-26.87	Vertical
9706.00	30.66	38.35	14.25	31.62	51.64	74.00	-22.36	Vertical
12132.50	*					74.00		Vertical
14559.00	*					74.00		Vertical
4853.00	39.95	31.85	8.67	32.12	48.35	74.00	-25.65	Horizontal
7279.50	32.56	36.37	11.72	31.89	48.76	74.00	-25.24	Horizontal
9706.00	29.96	38.35	14.25	31.62	50.94	74.00	-23.06	Horizontal
12132.50	*					74.00		Horizontal
14559.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4853.00	25.02	31.85	8.67	32.12	33.42	54.00	-20.58	Vertical
7279.50	19.77	36.37	11.72	31.89	35.97	54.00	-18.03	Vertical
9706.00	18.93	38.35	14.25	31.62	39.91	54.00	-14.09	Vertical
12132.50	*					54.00		Vertical
14559.00	*					54.00		Vertical
4853.00	29.10	31.85	8.67	32.12	37.50	54.00	-16.50	Horizontal
7279.50	21.85	36.37	11.72	31.89	38.05	54.00	-15.95	Horizontal
9706.00	18.55	38.35	14.25	31.62	39.53	54.00	-14.47	Horizontal
12132.50	*					54.00		Horizontal
14559.00	*					54.00		Horizontal

Test channel:	Highest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4913.00	35.75	31.93	8.73	32.16	44.25	74.00	-29.75	Vertical
7369.50	30.80	36.59	11.79	31.78	47.40	74.00	-26.60	Vertical
9826.00	30.55	38.81	14.38	31.88	51.86	74.00	-22.14	Vertical
12282.50	*					74.00		Vertical
14739.00	*					74.00		Vertical
4913.00	39.72	31.93	8.73	32.16	48.22	74.00	-25.78	Horizontal
7369.50	32.42	36.59	11.79	31.78	49.02	74.00	-24.98	Horizontal
9826.00	29.83	38.81	14.38	31.88	51.14	74.00	-22.86	Horizontal
12282.50	*					74.00		Horizontal
14739.00	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4913.00	24.90	31.93	8.73	32.16	33.40	54.00	-20.60	Vertical
7369.50	19.69	36.59	11.79	31.78	36.29	54.00	-17.71	Vertical
9826.00	18.86	38.81	14.38	31.88	40.17	54.00	-13.83	Vertical
12282.50	*					54.00		Vertical
14739.00	*					54.00		Vertical
4913.00	28.96	31.93	8.73	32.16	37.46	54.00	-16.54	Horizontal
7369.50	21.76	36.59	11.79	31.78	38.36	54.00	-15.64	Horizontal
9826.00	18.47	38.81	14.38	31.88	39.78	54.00	-14.22	Horizontal
12282.50	*					54.00		Horizontal
14739.00	*					54.00		Horizontal

**Remarks:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. “\*”, means this data is the too weak instrument of signal is unable to test.

### 7.2.3 Bandedge emissions

All of the restriction bands were tested, and only the data of worst case was exhibited.

Test channel:	Lowest channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	45.75	27.91	5.30	24.64	54.32	74.00	-19.68	Horizontal
2390.00	49.95	27.59	5.38	24.71	58.21	74.00	-15.79	Horizontal
2400.00	51.70	27.41	5.39	24.72	59.78	74.00	-14.22	Horizontal
2310.00	46.58	27.91	5.30	24.64	55.15	74.00	-18.85	Vertical
2390.00	51.30	27.59	5.38	24.71	59.56	74.00	-14.44	Vertical
2400.00	52.88	27.41	5.39	24.72	60.96	74.00	-13.04	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2310.00	35.65	27.91	5.30	24.64	44.22	54.00	-9.78	Horizontal
2390.00	37.06	27.59	5.38	24.71	45.32	54.00	-8.68	Horizontal
2400.00	38.43	27.41	5.39	24.72	46.51	54.00	-7.49	Horizontal
2310.00	35.80	27.91	5.30	24.64	44.37	54.00	-9.63	Vertical
2390.00	37.98	27.59	5.38	24.71	46.24	54.00	-7.76	Vertical
2400.00	39.01	27.41	5.39	24.72	47.09	54.00	-6.91	Vertical

Test channel:	Highest channel
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	48.20	27.53	5.47	24.80	56.40	74.00	-17.60	Horizontal
2500.00	46.82	27.55	5.49	24.86	55.00	74.00	-19.00	Horizontal
2483.50	49.52	27.53	5.47	24.80	57.72	74.00	-16.28	Vertical
2500.00	48.10	27.55	5.49	24.86	56.28	74.00	-17.72	Vertical

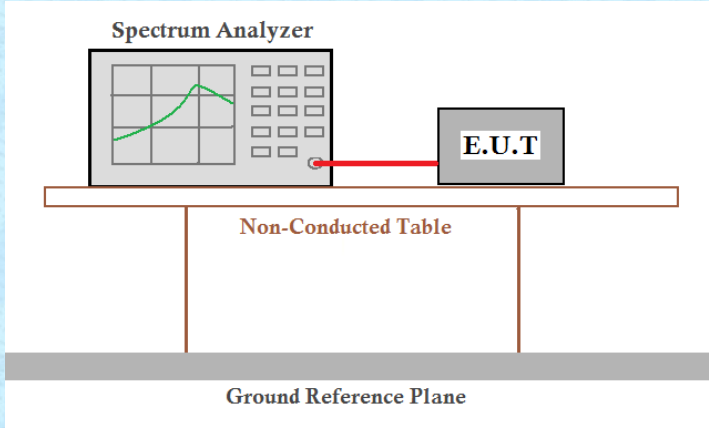
Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	36.52	27.53	5.47	24.80	44.72	54.00	-9.28	Horizontal
2500.00	36.11	27.55	5.49	24.86	44.29	54.00	-9.71	Horizontal
2483.50	36.42	27.53	5.47	24.80	44.62	54.00	-9.38	Vertical
2500.00	36.27	27.55	5.49	24.86	44.45	54.00	-9.55	Vertical

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor

### 7.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.249/15.215
Test Method:	ANSI C63.10:2013
Limit:	Operation Frequency range 2400MHz~2483.5MHz
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which sits on a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

#### Measurement Data

Test channel	20dB bandwidth(MHz)	Result
Lowest	1.042	Pass
Middle	1.045	Pass
Highest	1.043	Pass

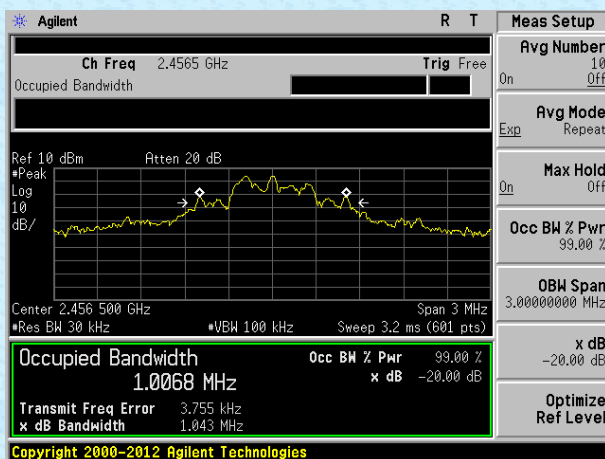
Test plot as follows:



Lowest channel



Middle channel



Highest channel

## 8 Test Setup Photo

Reference to the **appendix I** for details.

## 9 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----