

# **FCC Test Report**

Report No.: AGC00210200727FE02

FCC ID : 2AVUH-TTCL02X

**APPLICATION PURPOSE** : Original Equipment

**PRODUCT DESIGNATION**: LED Stand Light Remote control

**BRAND NAME** : TAOTRONICS

**MODEL NAME** : TT-CL026,TT-CL027

APPLICANT Shenzhen NearbyExpress Technology Development

Company Limited

**DATE OF ISSUE** : Aug. 05, 2020

**STANDARD(S)** : FCC Part 15.247

**REPORT VERSION**: V1.0

## Attestation of Global Compliance (Shenzhen) Co., Ltd



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## REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Aug. 05, 2020	Valid	Initial Release

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## 1. VERIFICATION OF COMPLIANCE

Applicant	Shenzhen NearbyExpress Technology Development Company Limited		
Address	Room 701, 702, 703, 705, 706, 708, 709, Building E, Galaxy World Phase II, Minle Community, Minzhi Street, Longhua District, Shenzhen, Guangdong, China 518000		
Manufacturer	Shenzhen NearbyExpress Technology Development Company Limited		
Address	Room 701, 702, 703, 705, 706, 708, 709, Building E, Galaxy World Phase Minle Community, Minzhi Street, Longhua District, Shenzhen, Guangdong, China 518000		
Factory	Shenzhen Derui chuang technology Co.,Ltd		
Address	A6 East, Colt Low Carbon Industrial Park Building, Da lang Street, Longhua New District, Shenzhen China		
Product Designation	LED Stand Light Remote control		
Brand Name	TAOTRONICS		
Test Model	TT-CL026		
Series Model	TT-CL027		
Difference Description	All the same except for the model name.		
Date of test	Jul. 16, 2020 to Aug. 05, 2020		
Deviation	No any deviation from the test method		
Condition of Test Sample	Normal		
Test Result	Pass		
Report Template	AGCRT-US-BLE/RF		

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC part 15.247.

Prepared By	Sky dong	
	Sky Dong (Project Engineer)	Aug. 05, 2020
Reviewed By	Max Zhang	
CC CC	Max Zhang (Reviewer)	Aug. 05, 2020
Approved By	Formerles	
	Forrest Lei (Authorized Officer)	Aug. 05, 2020

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## 2.GENERAL INFORMATION

## 2.1PRODUCT DESCRIPTION

The EUT is designed as a "LED Stand Light Remote control". It is designed by way of utilizing the GFSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	-2.768dBm(Max)
Bluetooth Version	V 4.0
Modulation	BR □GFSK, EDR □π /4-DQPSK, □8DPSK BLE ☑GFSK 1Mbps □GFSK 2Mbps
Number of channels	40 Channel
Antenna Designation	Integral Antenna(Comply with requirements of the FCC part 15.203)
Antenna Gain	0.5dBi
Hardware Version	V1.0
Software Version	V1.0
Power Supply	DC 3V by battery

## 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency	
100	0	2402MHZ	
⊗	GG C	2404MHZ	
2400~2483.5MHZ	· F : 10	-G : F	
	38	2478 MHZ	
	39	2480 MHZ	

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## 2.3 RELATED SUBMITTAL(S)/GRANT(S)

This submittal(s) (test report) is intended for **FCC ID: 2AVUH-TTCL02X** filing to comply with the FCC Part 15.247 requirements.

#### 2.4TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

#### 2.5 SPECIAL ACCESSORIES

Refer to section 2.2.

#### 2.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

#### 2.7. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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#### 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, Uc = ±0.8 dB
- Uncertainty of RF power density, conducted, Uc = ±2.6 dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7 dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %

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## 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION		
1	Low channel TX		
2	Middle channel TX		
3	High channel TX		

#### Note:

- 1. Only the result of the worst case was recorded in the report, if no other cases.
- 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
- 3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.
- 4. The test software is the wtcdb.exe which can set the EUT into the individual test modes.

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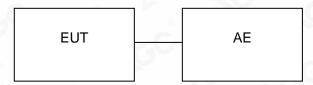


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## 5. SYSTEM TEST CONFIGURATION

#### **5.1 CONFIGURATION OF TESTED SYSTEM**

Radiated Emission Configure:



## **5.2 EQUIPMENT USED IN TESTED SYSTEM**

Item	Equipment	Equipment Model No. ID or Specifica		ion Remark	
1	LED Stand Light Remote control	Remote TT-CL026 2AVUH-TTCL02X		EUT	
2	Control Box	N/A	USB-TTL	AE	

#### 5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247 (b)(3)	Peak Output Power	Compliant
15.247 (a)(2)	6 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.247 (e)	Maximum Conducted Output Power Density	Compliant
15.209	Radiated Emission	Compliant
15.207	Conducted Emission	N/A

Note: 1. The conducted limits are not required for devices which only employ battery power for operation.

2. For battery operated equipment, the equipment tests are performed using a new battery.

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## 6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd		
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China		
Designation Number	CN1259		
FCC Test Firm Registration Number	975832		
A2LA Cert. No.	5054.02		
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA		

## **TEST EQUIPMENT OF RADIATED EMISSION TEST**

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2022
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020
2.4GHz Fliter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Aug. 26, 2019	Aug. 25, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 09, 2019	Sep. 08, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 15, 2019	Oct. 16, 2020
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021
Test software	FARA	EZ-EMC (Ver RA-03A)	N/A	N/A	N/A

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#### 7. PEAK OUTPUT POWER

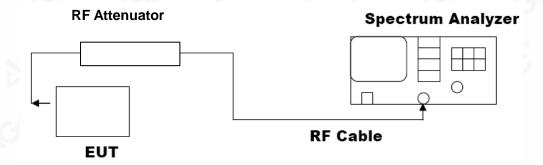
#### 7.1. MEASUREMENT PROCEDURE

For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. RBW ≥ DTS bandwidth
- 3. VBW≥3\*RBW.
- 4. SPAN≥VBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

# 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) PEAK POWER TEST SETUP



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#### 7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT							
	FOR GFSK MOUDULATION						
Frequency (GHz)  Peak Power Applicable Limits (dBm)  Pass or Fail							
2.402	-5.847	30	Pass				
2.440	-4.270	30	Pass				
2.480	-2.768	30	Pass				

CH<sub>0</sub>



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#### **CH19**



#### CH39



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#### 8. 6 DB BANDWIDTH

## **8.1. MEASUREMENT PROCEDURE**

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW ≥ 3×RBW.
- 4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

## 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

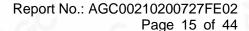
#### **8.3. LIMITS AND MEASUREMENT RESULTS**

	LIMITS AND MEASUR	REMENT RESULT	
Applicable Limite		Applicable Limits	
Applicable Limits	Test Data	Criteria	
CO C	Low Channel	751.0	PASS
>500KHZ	Middle Channel	776.7	PASS
	High Channel	801.2	PASS

## TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



## TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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## 9. CONDUCTED SPURIOUS EMISSION

#### 9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to ANSI C63.10 for compliance to FCC PART 15.247 requirements.

## 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 7.2.

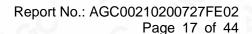
#### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

#### 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT					
A contract to 1 to 20	Measurement Result				
Applicable Limits	Test Data	Criteria			
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the reference level	PASS PASS			

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#### **TEST RESULT FOR ENTIRE FREQUENCY RANGE**

GFSK MODULATION IN LOW CHANNEL



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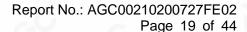




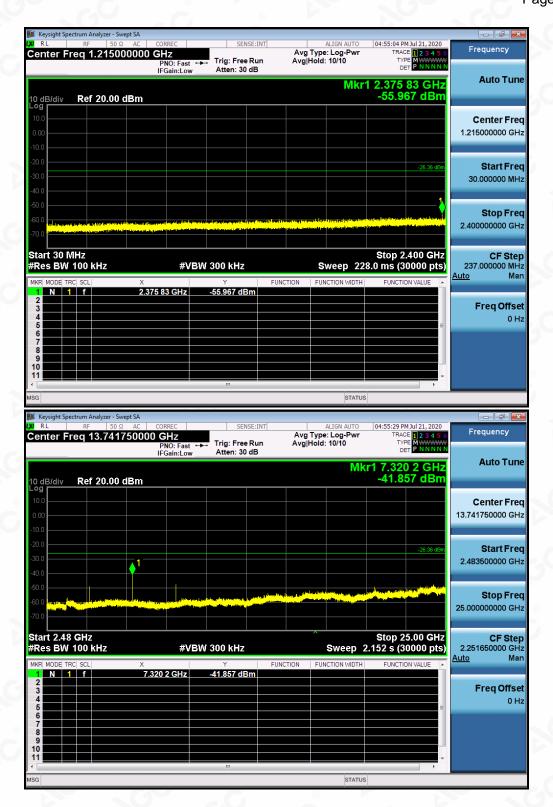
## GFSK MODULATION IN MIDDLE CHANNEL



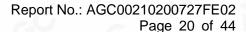
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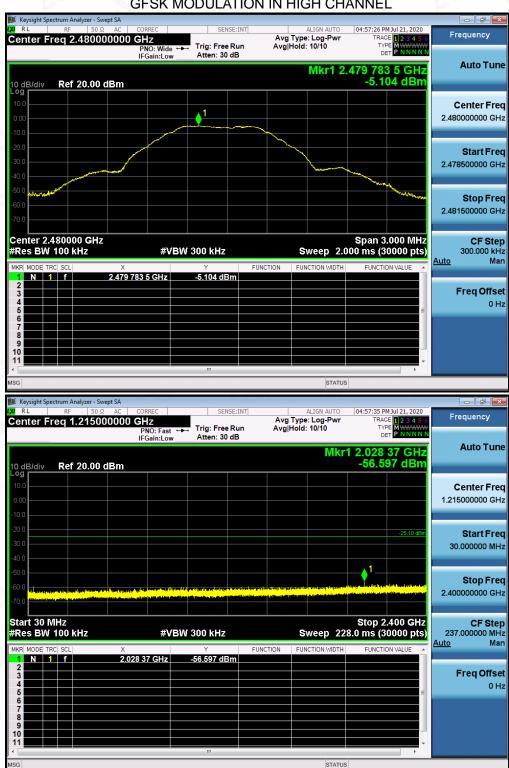


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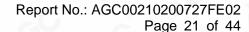




## GFSK MODULATION IN HIGH CHANNEL



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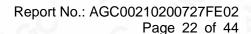






Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit.

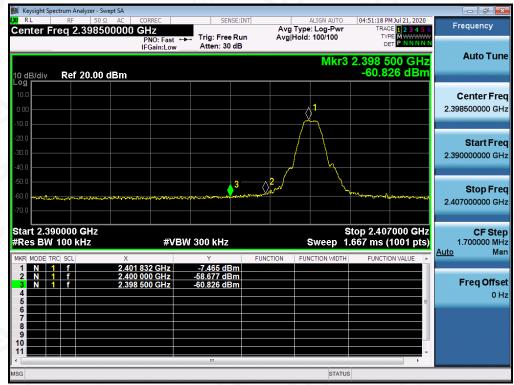
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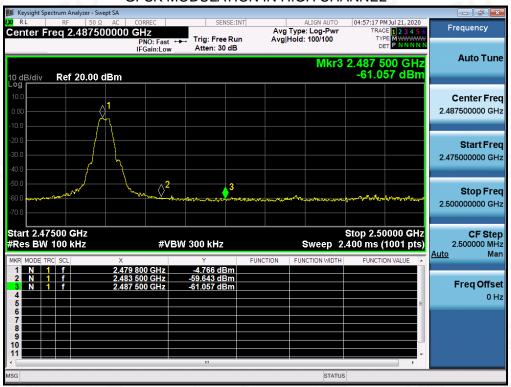


**TEST RESULT FOR BAND EDGE** 

## GFSK MODULATION IN LOW CHANNEL



#### GFSK MODULATION IN HIGH CHANNEL



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## 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

#### 10.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set SPA Trace 1 Max hold, then View.

Note: The method of PKPSD in the KDB 558074 item 10.2 was used in this testing.

## 10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 7.2.

#### 10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

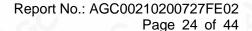
## **10.4 LIMITS AND MEASUREMENT RESULT**

Channel No.	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result	
Low Channel	-14.800	8	Pass	
Middle Channel	-13.427	8	Pass	
High Channel	-12.101	8	Pass	





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TEST PLOT OF SPECTRAL DENSITY FOR MIDDLE CHANNEL



## TEST PLOT OF SPECTRAL DENSITY FOR HIGH CHANNEL



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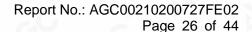
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#### 11. RADIATED EMISSION

#### 11.1. MEASUREMENT PROCEDURE

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

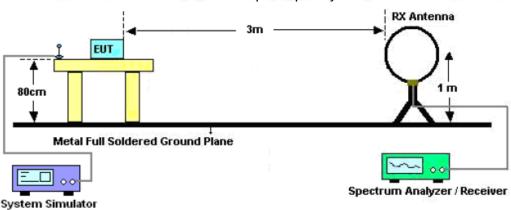
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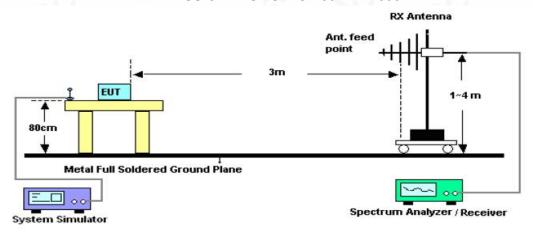


## 11.2. TEST SETUP

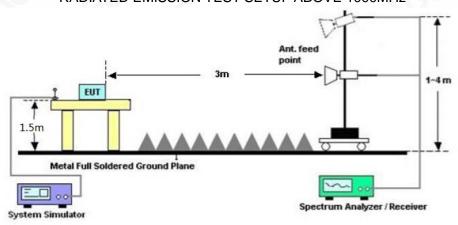
## Radiated Emission Test-Setup Frequency Below 30MHz



#### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



#### RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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## 11.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)		
0.009~0.490	2400/F(KHz)	300		
0.490~1.705	24000/F(KHz)	30		
1.705~30.0	30	30		
30~88	100	3		
88~216	150	3		
216~960	200	3		
Above 960	500	3		

Note: All modes were tested For restricted band radiated emission,

the test records reported below are the worst result compared to other modes.

#### 11.4. TEST RESULT

## **RADIATED EMISSION BELOW 30MHZ**

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

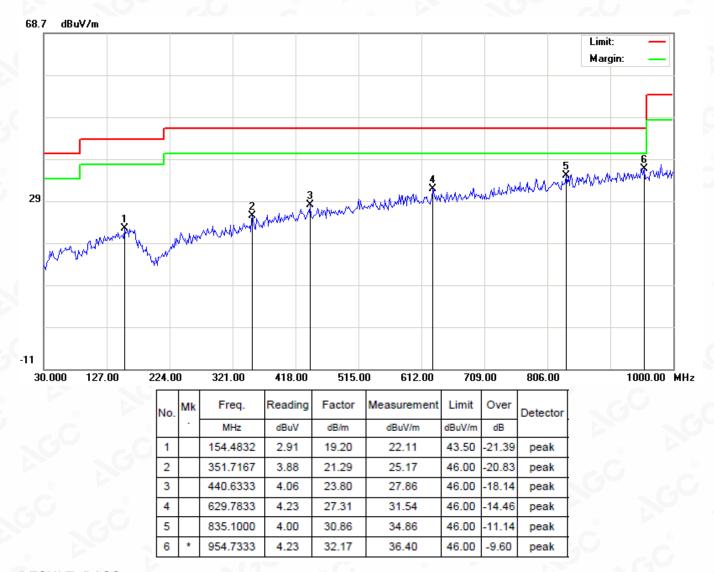
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## **RADIATED EMISSION BELOW 1GHZ**

EUT	LED Stand Light Remote control	Model Name	TT-CL026
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal



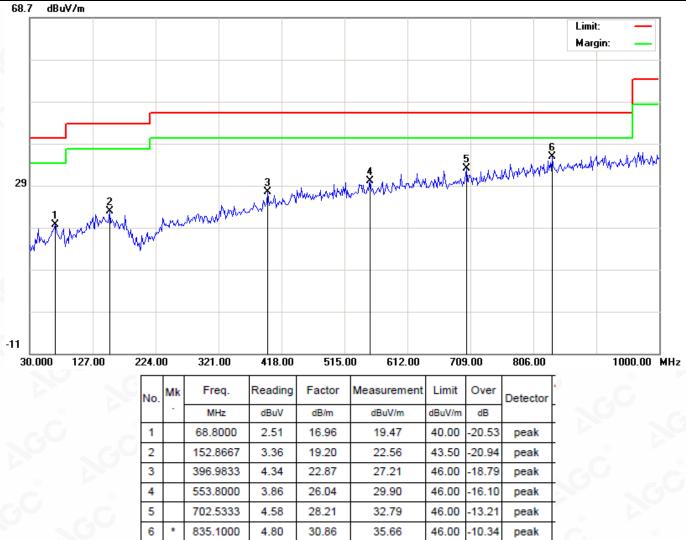
**RESULT: PASS** 

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EUT	LED Stand Light Remote control	Model Name	TT-CL026
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical



## RESULT: PASS Note:

- 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
- 2. All test modes had been tested. The mode 1 is the worst case and recorded in the report.

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## **RADIATED EMISSION ABOVE 1GHZ**

EUT	LED Stand Light Remote control	Model Name	TT-CL026
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4804.000	45.98	0.08	46.06	74	-27.94	peak
4804.000	36.17	0.08	36.25	54	-17.75	AVG
7206.000	41.23	2.21	43.44	74	-30.56	peak
7206.000	32.56	2.21	34.77	54	-19.23	AVG
		8			-6	8
Remark:			(8)			C
actor - Anto	anna Factor + Ca	able Loce	Dre amplifier			

Factor = Antenn	a Factor +	Cable Loss	s – Pre-amplifier.

EUT	LED Stand Light Remote control	Model Name	TT-CL026
Temperature	25° C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

				Margin	Valua Typa
(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
47.19	0.08	47.27	74	-26.73	peak
38.26	0.08	38.34	54 🌑	-15.66	AVG
42.57	2.21	44.78	74	-29.22	peak
33.34	2.21	35.55	54	-18.45	AVG
	66				
				(8)	
	47.19 38.26 42.57 33.34	47.19     0.08       38.26     0.08       42.57     2.21       33.34     2.21	47.19     0.08     47.27       38.26     0.08     38.34       42.57     2.21     44.78	47.19     0.08     47.27     74       38.26     0.08     38.34     54       42.57     2.21     44.78     74       33.34     2.21     35.55     54	47.19     0.08     47.27     74     -26.73       38.26     0.08     38.34     54     -15.66       42.57     2.21     44.78     74     -29.22       33.34     2.21     35.55     54     -18.45

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