

Prüfbericht-Nr.: <i>Test report No.:</i>	50225675 001	Auftrags-Nr.: <i>Order No.:</i>	170104588	Seite 1 von 13 <i>Page 1 of 13</i>	
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	N/A	Auftragsdatum: <i>Order date.:</i>	03.02.2019		
Auftraggeber: <i>Client:</i>	Ring LLC 1523 26th St, Santa Monica, CA 90404, USA				
Prüfgegenstand: <i>Test item:</i>	Floodlight Battery				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	5B21S8				
Auftrags-Inhalt: <i>Order content:</i>	FCC testing				
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.209 RSS-247 Issue 2 February 2017 RSS-Gen Issue 5 November 2018				
Wareneingangsdatum: <i>Date of receipt:</i>	03.02.2019				
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000875847-001				
Prüfzeitraum: <i>Testing period:</i>	03.02.2019 - 13.02.2019				
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Guangdong) Ltd.			Please refer to photo documents	
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Guangdong) Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft von / tested by:	kontrolliert von / reviewed by:				
18.02.2019 Amy Wang / Project Manager		19.02.2019 Storm Shu / Technical Certifier			
Datum Date	Name/Stellung Name/Position	Unterschrift Signature	Datum Date	Name/Stellung Name/Position	
Sonstiges / Other:					
FCC ID: 2AEUPBHAFB002 IC :20271-BHAFB002 Note: The Radiated Spurious Emission of this product are evaluated in this report which was additional tests as test report 50226141 001.					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>			Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged:</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					
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Test Summary

5.1.1 RADIATED SPURIOUS EMISSION
RESULT: Pass

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1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of General 2.4GHz wireless

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Guangdong) Ltd.

No.102, 1F of Southwest and No.205, 2F No.767 Tianyuan Road, Tianhe District, Guangzhou 510663, Guangdong Province P.R. China

FCC Accreditation Designation No.: CN1207

Test site Industry Canada No.: 2932C-1

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

For the measurement Equipment list, refer to the appendix B.

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Item	Extended Uncertainty
Conducted Emission	± 2.68 dB
Radiated Emission (30-1000MHz)	Field strength (dB μ V/m)
Radiated Emission (above 1000MHz)	Field strength (dB μ V/m)
Radio Spectrum	± 4.51 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Guangdong) Ltd. file for certification follow-up purposes.

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Test Report No.

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2.7 Status of Facility Used for Testing

The TÜV Rheinland (Guangdong) Ltd. Test facility located at No.102, 1F of Southwest and No.205, 2F No.767 Tianyuan Road, Tianhe District, Guangzhou 510663, Guangdong Province P.R. China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT (equipment under test) 5B21S8 is a Floodlight Battery which support Bluetooth Wireless function operated at 2.4GHz.

Therefore, RE (1-18GHz) tests were performed on **5B21S8**.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	Floodlight Battery
Bluetooth Core Version	Bluetooth Low Energy 4.2
Type Designation	5B21S8
FCC ID	2AEUPBHAFB001
Operating Voltage	DC 6V (lithium battery)
Testing Voltage	DC 6V
Type of Modulation	GFSK
Channel Number	40 channels
Channel Separation	2MHz
Antenna Type	Integral Antenna (PCB Antenna)
Antenna number	1
Antenna Gain	0 dBi Max

Prüfbericht - Nr.: 50225675 001
*Test Report No.*Seite 8 von 13
Page 8 of 13**Table 3: RF Channel and Frequency of General 2.4GHz Bluetooth (LE mode)**

RF Channel	Frequency (MHz)						
0	2402.00	11	2424.00	22	2446.00	33	2468.00
1	2404.00	12	2426.00	23	2448.00	34	2470.00
2	2406.00	13	2428.00	24	2450.00	35	2472.00
3	2408.00	14	2430.00	25	2452.00	36	2474.00
4	2410.00	15	2432.00	26	2454.00	37	2476.00
5	2412.00	16	2434.00	27	2456.00	38	2478.00
6	2414.00	17	2436.00	28	2458.00	39	2480.00
7	2416.00	18	2438.00	29	2460.00		
8	2418.00	19	2440.00	30	2462.00		
9	2420.00	20	2442.00	31	2464.00		
10	2422.00	21	2444.00	32	2466.00		

Test frequencies are lowest channel: 2402 MHz, middle channel: 2440 MHz and highest channel: 2480 MHz for General 2.4GHz

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, General 2.4GHz wireless transmitting mode
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel
- B. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- FCC/IC Label and Location Info
- Operation Description
- Photo Document
- Schematics
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model 5B21S8 in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Notebook	Lenovo	ThinkPad X260	PC0DZSKR	N/A

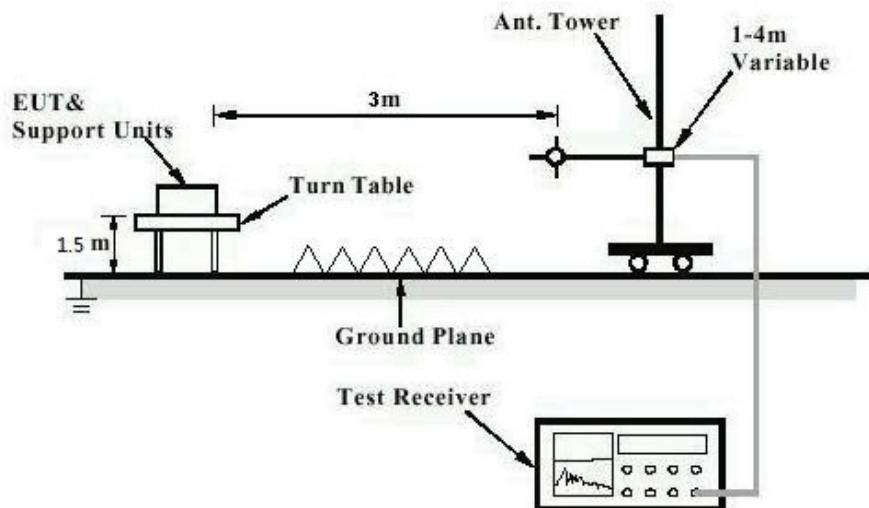
4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Above 1GHz)



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Radiated Spurious Emission

RESULT: Pass

Test Specification

Test standard	:	FCC Part 15.247 (d) & FCC Part 15.205 RSS-247 Clause 3.3
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Issue 5

Kind of test site

:

FAR

Test Setup

Date of testing	:	Refer to test result
Input voltage	:	DC 6V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	22 °C
Relative humidity	:	50 %
Atmospheric pressure	:	101 kPa

Remark:

Testing was carried out within frequency range 18GHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

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Appendix A: Photographs of the Test Set-Up

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Appendix B: Test Results of General 2.4GHz

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18GHz - 25GHz.....	3

Appendix B.1: Measurement Equipment List

Measurement Equipment List

 TÜVRheinland®
Precisely Right.

Testing Start Date	03.02.2019
Testing end date	12.02.2019
Project Manager	Amy Wang
Cost Center	41
Test Report Number	50225675 001
Order Item Number	0170104588B00010
Customer	TUV Rheinland / CCIC (Ningbo)
Product Name	Floodlight battery
Comment	

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Old ID	Equip.	Description	Model	Manufacturer	Inte. (mon)	Due Date DD.MM.YYYY
1.805	1813829	FSP30 Spectrum Analyzer	FSP30	Rohde & Schwarz	12	22.08.2019
1.808	1813833	Horn Antenna	3160-09	EMCO	60	29.07.2019
1.819A	1813846	Band Reject Filter	BRM50702	Micro-Tronics	24	04.07.2020
1.808A	1813834	Pre-Amplifier	A33-18002650-30-8P-4	MITEQ	24	20.07.2019
1.666	1813697	SAC	N/A	Albatross Project	36	27.11.2021
1.913	1814012	Shielding Room	9x4x3.4	Changzhou Yuanping	60	06.12.2020

Appendix B.2: Harmonics Radiated Emission

18GHz - 25GHz

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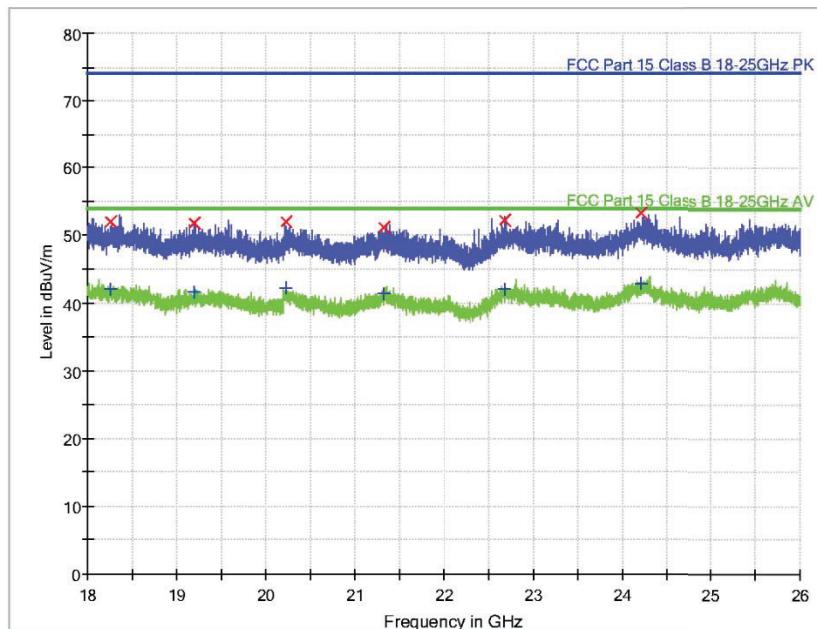
EMC Test Record (Emission)

Common Information

Manufacturer: Ring LLC
Test Item: Floodlight Battery
Identification: 5B21S8
Test Standard: CFR Title 47 Part 15C
Test Detail: Transmitter spurious
Operation Mode: HIGH:2480 MHz
Climate Condition: 22 °C; 50 %RH; 101 kPa
Test Voltage/Freq.: DC 6 V
Receive No.: /
Report No.: /
Result: Pass
Comment: Test distance is 3m;Horizontal

Subrange 1
Frequency range: 18GHz-26GHz
Receiver: TUV FSP30
Transducer: TUV SAC Horn 3160-09

EMCTT_EREF011-A02-08_18GHz-25GHz_With PreAMP EXT



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Jacky Chen
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Limit and Margin PK

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Comment
18255.000000	52.0	1000.0	1000.000	H	8.0	22.0	74.0	
19201.000000	51.9	1000.0	1000.000	H	7.9	22.1	74.0	
20231.000000	51.9	1000.0	1000.000	H	7.7	22.1	74.0	
21328.000000	51.1	1000.0	1000.000	H	7.2	22.9	74.0	
22683.000000	52.1	1000.0	1000.000	H	7.4	21.9	74.0	
24216.000000	53.2	1000.0	1000.000	H	7.7	20.8	74.0	

Limit and Margin AV

Frequency (MHz)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBuV/m)	Comment
18255.000000	42.1	1000.0	1000.000	H	8.0	11.9	54.0	
19201.000000	41.6	1000.0	1000.000	H	7.9	12.4	54.0	
20231.000000	42.2	1000.0	1000.000	H	7.7	11.9	54.0	
21328.000000	41.4	1000.0	1000.000	H	7.2	12.6	54.0	
22683.000000	41.9	1000.0	1000.000	H	7.4	12.1	54.0	
24216.000000	42.8	1000.0	1000.000	H	7.7	11.2	54.0	

Tested by:
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Reviewed by:
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Jacky Chen
Reviewed by:
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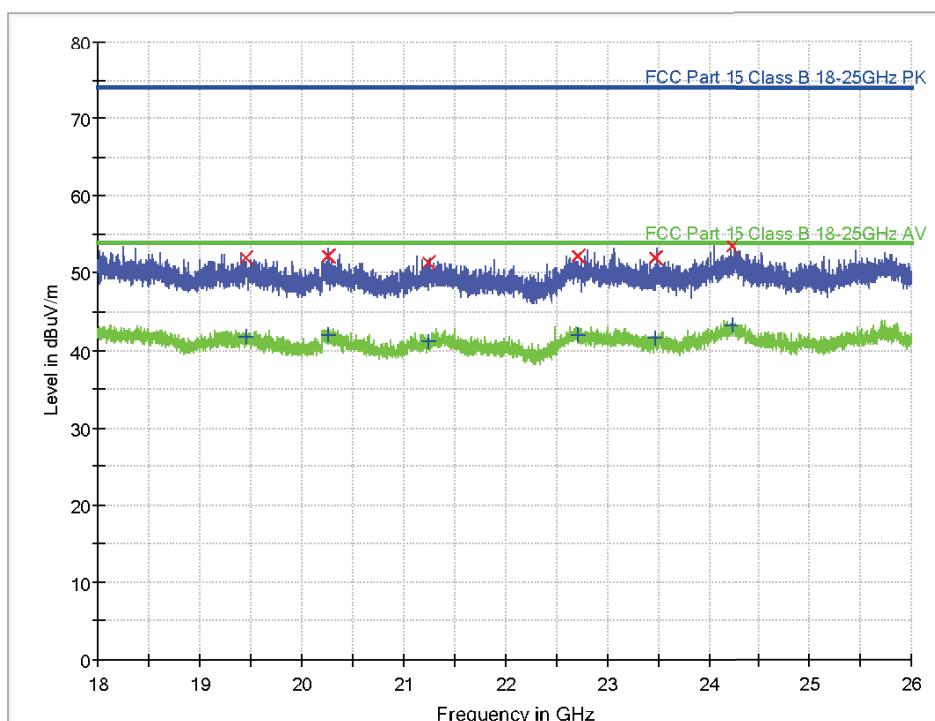
EMC Test Record (Emission)

Common Information

Manufacturer: Ring LLC
Test Item: Floodlight Battery
Identification: 5B21S8
Test Standard: CFR Title 47 Part 15C
Test Detail: Transmitter spurious
Operation Mode: HIGH:2480 MHz
Climate Condition: 22 °C; 50 %RH; 101 kPa
Test Voltage/Freq.: DC 6 V
Receive No.: /
Report No.: /
Result: Pass
Comment: Test distance is 3m;Vertical

Subrange 1
Frequency range: 18GHz-26GHz
Receiver: TUV FSP30
Transducer: TUV SAC Horn 3160-09

EMCTT_EREF011-A02-08_18GHz-25GHz_With PreAMP EXT



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Limit and Margin PK

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Comment
19446.000000	51.9	1000.0	1000.000	V	7.9	22.1	74.0	
20254.000000	52.2	1000.0	1000.000	V	7.6	21.8	74.0	
21234.000000	51.4	1000.0	1000.000	V	7.2	22.6	74.0	
22704.000000	52.2	1000.0	1000.000	V	7.4	21.8	74.0	
23474.000000	52.0	1000.0	1000.000	V	7.3	22.0	74.0	
24223.000000	53.4	1000.0	1000.000	V	7.7	20.6	74.0	

Limit and Margin AV

Frequency (MHz)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBuV/m)	Comment
19446.000000	41.9	1000.0	1000.000	V	7.9	12.1	54.0	
20254.000000	41.9	1000.0	1000.000	V	7.6	12.1	54.0	
21234.000000	41.2	1000.0	1000.000	V	7.2	12.8	54.0	
22704.000000	42.0	1000.0	1000.000	V	7.4	12.0	54.0	
23474.000000	41.5	1000.0	1000.000	V	7.3	12.5	54.0	
24223.000000	43.2	1000.0	1000.000	V	7.7	10.8	54.0	

Tested by: *Chris Liang* Reviewed by: *Jacky Chen*
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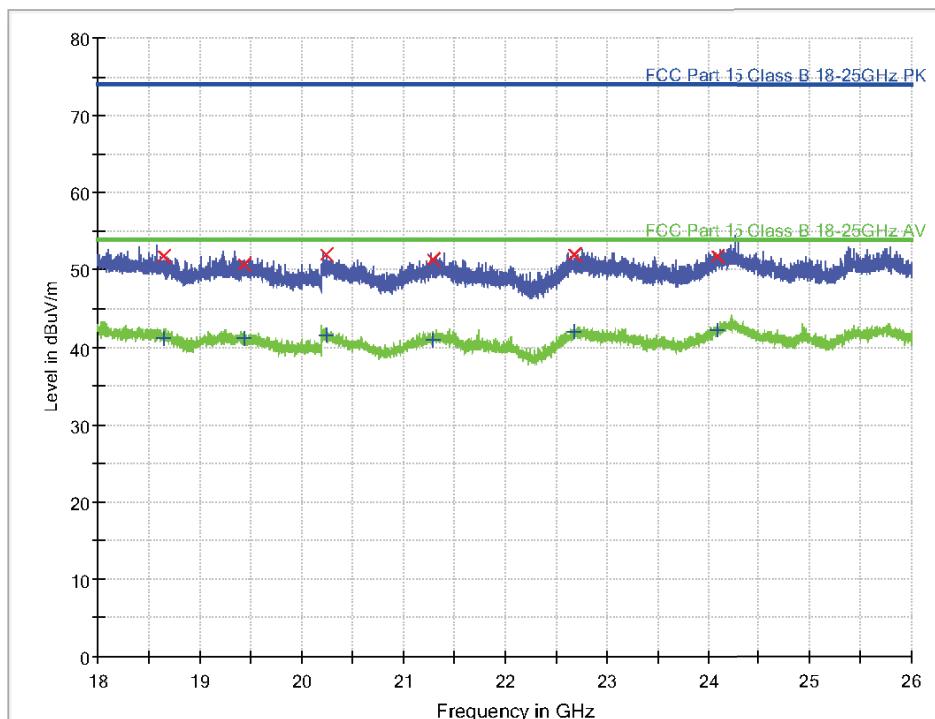
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Common Information

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Test Item: Floodlight Battery
Identification: 5B21S8
Test Standard: CFR Title 47 Part 15C
Test Detail: Transmitter spurious
Operation Mode: LOW:2402 MHz
Climate Condition: 22 °C; 50 %RH; 101 kPa
Test Voltage/Freq.: DC 6 V
Receive No.:
Report No.: /
Result: Pass
Comment: Test distance is 3m;Horizontal

Subrange 1
Frequency range: 18GHz-26GHz
Receiver: TUV FSP30
Transducer: TUV SAC Horn 3160-09

EMCTT_EREF011-A02-08_18GHz-25GHz_With PreAMP EXT



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Limit and Margin PK

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Comment
18648.000000	51.8	1000.0	1000.000	H	8.1	22.2	74.0	
19432.000000	50.8	1000.0	1000.000	H	7.9	23.2	74.0	
20245.000000	51.9	1000.0	1000.000	H	7.6	22.1	74.0	
21292.000000	51.3	1000.0	1000.000	H	7.2	22.7	74.0	
22682.000000	52.0	1000.0	1000.000	H	7.4	22.0	74.0	
24078.000000	51.9	1000.0	1000.000	H	7.8	22.2	74.0	

Limit and Margin AV

Frequency (MHz)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBuV/m)	Comment
18648.000000	41.1	1000.0	1000.000	H	8.1	12.9	54.0	
19432.000000	41.1	1000.0	1000.000	H	7.9	12.9	54.0	
20245.000000	41.6	1000.0	1000.000	H	7.6	12.4	54.0	
21292.000000	41.0	1000.0	1000.000	H	7.2	13.0	54.0	
22682.000000	41.9	1000.0	1000.000	H	7.4	12.1	54.0	
24078.000000	42.2	1000.0	1000.000	H	7.8	11.8	54.0	

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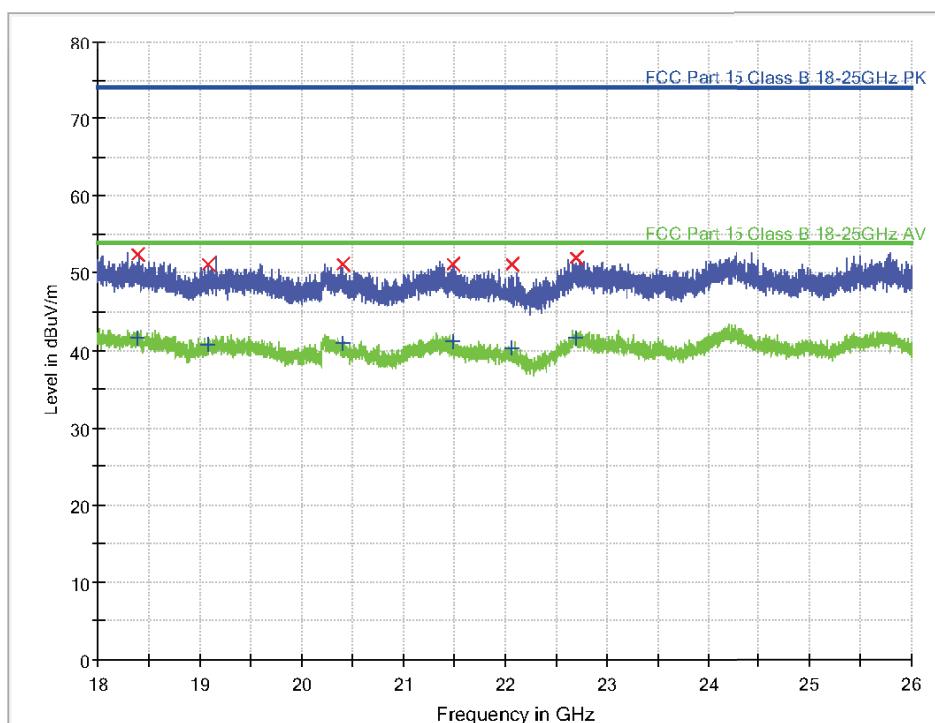
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Test Detail: Transmitter spurious
Operation Mode: LOW:2402 MHz
Climate Condition: 22 °C; 50 %RH; 101 kPa
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Receive No.:
Report No.: /
Result: Pass
Comment: Test distance is 3m;Vertical

Subrange 1
Frequency range: 18GHz-26GHz
Receiver: TUV FSP30
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EMCTT_EREF011-A02-08_18GHz-25GHz_With PreAMP EXT



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Limit and Margin PK

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Comment
18395.000000	52.4	1000.0	1000.000	V	8.1	21.7	74.0	
19083.000000	51.1	1000.0	1000.000	V	7.9	22.9	74.0	
20399.000000	51.1	1000.0	1000.000	V	7.5	22.9	74.0	
21484.000000	51.2	1000.0	1000.000	V	7.1	22.8	74.0	
22065.000000	51.1	1000.0	1000.000	V	6.5	22.9	74.0	
22699.000000	52.1	1000.0	1000.000	V	7.4	21.9	74.0	

Limit and Margin AV

Frequency (MHz)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBuV/m)	Comment
18395.000000	41.7	1000.0	1000.000	V	8.1	12.4	54.0	
19083.000000	40.8	1000.0	1000.000	V	7.9	13.2	54.0	
20399.000000	40.9	1000.0	1000.000	V	7.5	13.1	54.0	
21484.000000	41.2	1000.0	1000.000	V	7.1	12.8	54.0	
22065.000000	40.3	1000.0	1000.000	V	6.5	13.7	54.0	
22699.000000	41.6	1000.0	1000.000	V	7.4	12.4	54.0	

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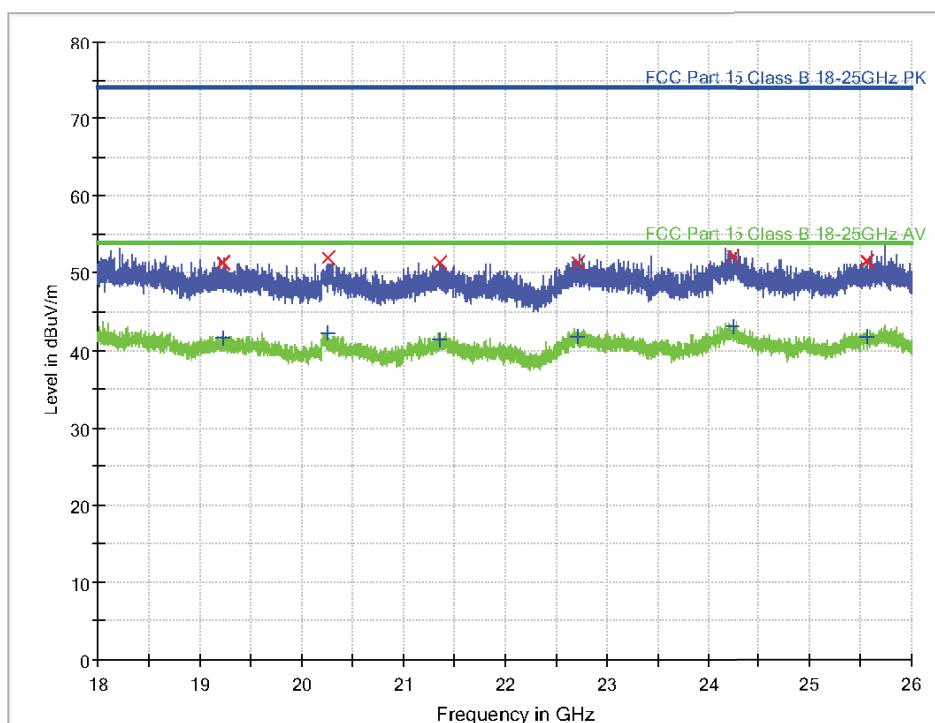
EMC Test Record (Emission)

Common Information

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Test Item: Floodlight Battery
Identification: 5B21S8
Test Standard: CFR Title 47 Part 15C
Test Detail: Transmitter spurious
Operation Mode: MIDDLE:2440 MHz
Climate Condition: 22 °C; 50 %RH; 101 kPa
Test Voltage/Freq.: DC 6 V
Receive No.:
Report No.: /
Result: Pass
Comment: Test distance is 3m;Horizontal

Subrange 1
Frequency range: 18GHz-26GHz
Receiver: TUV FSP30
Transducer: TUV SAC Horn 3160-09

EMCTT_EREF011-A02-08_18GHz-25GHz_With PreAMP EXT



Tested by:
20190212

Chris Liang

Reviewed by:
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Jacky Chen

TUV Rheinland (Guangdong) Ltd.

EMC Test Service Hotline: +86-20-28391188

Limit and Margin PK

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Comment
19225.000000	51.3	1000.0	1000.000	H	7.9	22.7	74.0	
20265.000000	51.9	1000.0	1000.000	H	7.6	22.1	74.0	
21357.000000	51.4	1000.0	1000.000	H	7.2	22.7	74.0	
22709.000000	51.4	1000.0	1000.000	H	7.4	22.7	74.0	
24241.000000	52.2	1000.0	1000.000	H	7.7	21.8	74.0	
25559.000000	51.6	1000.0	1000.000	H	7.0	22.4	74.0	

Limit and Margin AV

Frequency (MHz)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBuV/m)	Comment
19225.000000	41.5	1000.0	1000.000	H	7.9	12.5	54.0	
20265.000000	42.2	1000.0	1000.000	H	7.6	11.8	54.0	
21357.000000	41.3	1000.0	1000.000	H	7.2	12.7	54.0	
22709.000000	41.8	1000.0	1000.000	H	7.4	12.2	54.0	
24241.000000	43.1	1000.0	1000.000	H	7.7	10.9	54.0	
25559.000000	41.8	1000.0	1000.000	H	7.0	12.2	54.0	

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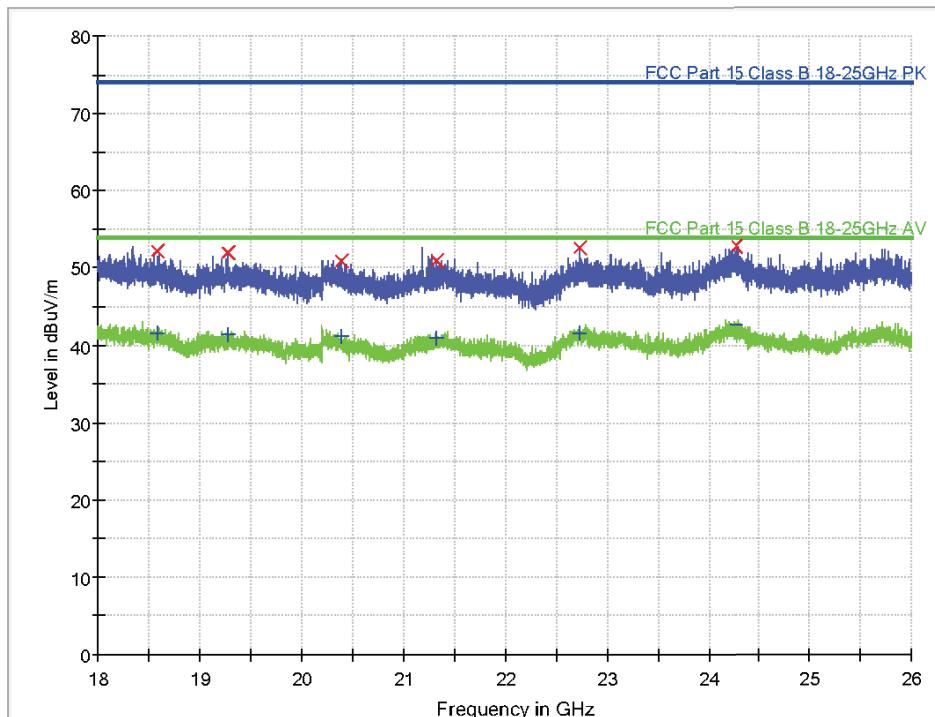
EMC Test Record (Emission)

Common Information

Manufacturer: Ring LLC
Test Item: Floodlight Battery
Identification: 5B21S8
Test Standard: CFR Title 47 Part 15C
Test Detail: Transmitter spurious
Operation Mode: MIDDLE:2440 MHz
Climate Condition: 22 °C; 50 %RH; 101 kPa
Test Voltage/Freq.: DC 6 V
Receive No.:
Report No.: /
Result: Pass
Comment: Test distance is 3m; Vertical

Subrange 1
Frequency range: 18GHz-26GHz
Receiver: TUV FSP30
Transducer: TUV SAC Horn 3160-09

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Limit and Margin PK

Frequency (MHz)	MaxPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBuV/m)	Comment
18582.000000	52.2	1000.0	1000.000	V	8.1	21.8	74.0	
19267.000000	52.0	1000.0	1000.000	V	7.9	22.0	74.0	
20386.000000	51.0	1000.0	1000.000	V	7.5	23.0	74.0	
21319.000000	51.0	1000.0	1000.000	V	7.2	23.1	74.0	
22732.000000	52.7	1000.0	1000.000	V	7.4	21.3	74.0	
24269.000000	52.9	1000.0	1000.000	V	7.7	21.1	74.0	

Limit and Margin AV

Frequency (MHz)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBuV/m)	Comment
18582.000000	41.5	1000.0	1000.000	V	8.1	12.5	54.0	
19267.000000	41.3	1000.0	1000.000	V	7.9	12.7	54.0	
20386.000000	41.2	1000.0	1000.000	V	7.5	12.8	54.0	
21319.000000	41.1	1000.0	1000.000	V	7.2	12.9	54.0	
22732.000000	41.5	1000.0	1000.000	V	7.4	12.5	54.0	
24269.000000	42.7	1000.0	1000.000	V	7.7	11.3	54.0	

Tested by: *Chris Liang* Reviewed by: *Jacky Chen*
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