

APPLICATION CERTIFICATION FCC Part 15C

On Behalf of
TZUMI Electronics, LLC

AURA LED LIGHT
Model No.: 6788, 7276, 7289

FCC ID: 2AON76788

Prepared for : TZUMI Electronics, LLC
Address : 16 EAST 34TH STREET 16TH FLOOR, NEW YORK,
United States

Prepared by : Shenzhen Accurate Technology Co., Ltd.
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Report No. : ATE20200084
Date of Test : February 18-20, 2020
Date of Report : February 21, 2020

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Test Report Certification

Applicant : TZUMI Electronics, LLC
 Manufacturer : Shenzhen Kinlan Technology Company Limited
 EUT Description : AURA LED LIGHT
 Model No. : 6788, 7676, 7289
 Trade Mark : tzumi

Measurement Procedure Used:

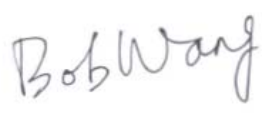
FCC Rules and Regulations Part 15 Subpart C Section 15.247 ANSI C63.10: 2013

The EUT was tested according to DTS test procedure of August 24, 2018 KDB558074 D01 DTS Meas Guidance v05 for compliance to FCC 47CFR 15.247 requirements

The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test : February 18-20, 2020
 Date of Report : February 21, 2020

Test Engineer : 
 (Bob Wang, Engineer)

Prepared by : 
 (Bob Wang, Engineer)

Approved & Authorized Signer : 
 (Sean Liu, Manager)



1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Model Number : 6788, 7276, 7289
 (Note: These samples are same except their appearance is different. So we prepare 6788 for test only.)

Bluetooth version : V4.0

Frequency Range : 2402MHz-2480MHz

Number of Channels : 40

Antenna Gain(Max) : 0dBi

Antenna type : PCB Antenna

Modulation mode : GFSK

Power supply : DC 5V(Power by USB port)

Trade Mark : tzumi

Applicant : TZUMI Electronics, LLC

Address : 16 EAST 34TH STREET 16TH FLOOR, NEW YORK, United States

Manufacturer : Shenzhen Kinlan Technology Company Limited

Address : West of 3F, Building A4, Yinlong Industrial Park, No.292 Shenshan Road, Longgang Street, Longgang District, Shenzhen, Guangdong, China

1.2. Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

1.3.Special Accessory and Auxiliary Equipment

AC/DC Power Adapter (provided by laboratory)	:	Model:TEKA006-0501000UKU
		Input: 100-240V~50/60Hz 0.3A
		Output: DC 5V/1A

1.4.Description of Test Facility

EMC Lab : Recognition of accreditation by Federal Communications Commission (FCC)
The Designation Number is CN1189
The Registration Number is 708358

Listed by Innovation, Science and Economic Development Canada (ISED)
The Registration Number is 5077A-2

Accredited by China National Accreditation Service for Conformity Assessment (CNAS)
The Registration Number is CNAS L3193

Accredited by American Association for Laboratory Accreditation (A2LA)
The Certificate Number is 4297.01

Name of Firm : Shenzhen Accurate Technology Co., Ltd.
Site Location : 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.5.Measurement Uncertainty

Radiated emission expanded uncertainty (9kHz-30MHz)	: U=2.66dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	: U=4.28dB, k=2
Radiated emission expanded uncertainty (1G-18GHz)	: U=4.98dB, k=2
Radiated emission expanded uncertainty (18G-26.5GHz)	: U=5.06dB, k=2
Conduction Emission Expanded Uncertainty (Mains ports, 9kHz-30MHz)	: U=2.72dB, k=2
Conduction Emission Expanded Uncertainty (Telecommunication ports, 150kHz-30MHz)	: U=2.94dB, k=2
Power disturbance Expanded Uncertainty	: U=2.92dB, k=2
Harmonic current expanded uncertainty	: U=0.512%, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 04, 2020	One Year
Spectrum Analyzer	Rohde&Schwarz	FSV-40	101495	Jan. 04, 2020	One Year
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 04, 2020	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 04, 2020	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 04, 2020	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 04, 2020	One Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 04, 2020	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 04, 2020	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-12m	No.11	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-0.5m	No.12	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-2m	No.13	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-0.5m	No.15	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	SUHNER	N-2m	No.16	Jan. 04, 2020	One Year
RF Coaxial Cable (Radiated Emission)	RESENBERGER	N-6m	No.17	Jan. 04, 2020	One Year
Radiated Emission Measurement Software: EZ_EMV V1.1.4.2					

3. OPERATION OF EUT DURING TESTING

3.1.Operating Mode

The mode is used: **Transmitting mode**

Low Channel: 2402MHz

Middle Channel: 2440MHz

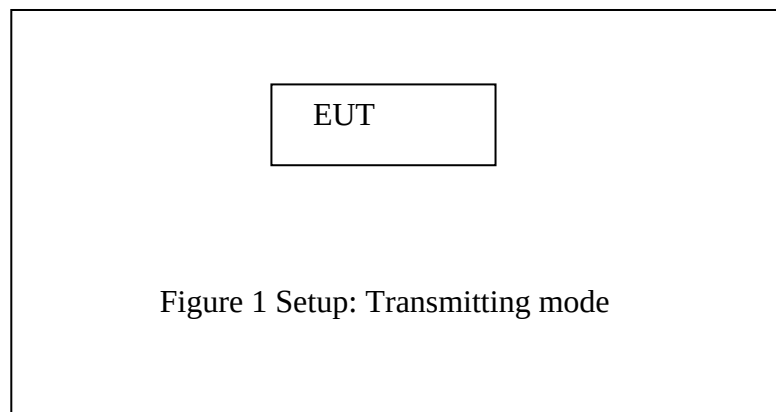
High Channel: 2480MHz

Note: The equipment under test (EUT) was tested under new battery.

The Bluetooth has been tested under continuous transmission mode.

Its duty cycle setting is greater than 98%.

3.2.Configuration and peripherals



4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.247(a)(2)	6dB Bandwidth Test	Compliant
Section 15.247(b)(3)	Maximum Peak Output Power Test	Compliant
Section 15.247(e)	Power Spectral Density Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.247(d) Section 15.209	Radiated Spurious Emission Test	Compliant
Section 15.207	AC Power Line Conducted Emission Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 6DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



5.2. The Requirement For Section 15.247(a)(2)

Section 15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.3. EUT Configuration on Test

The equipment is installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

5.5. Test Procedure

5.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

5.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

5.5.3. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

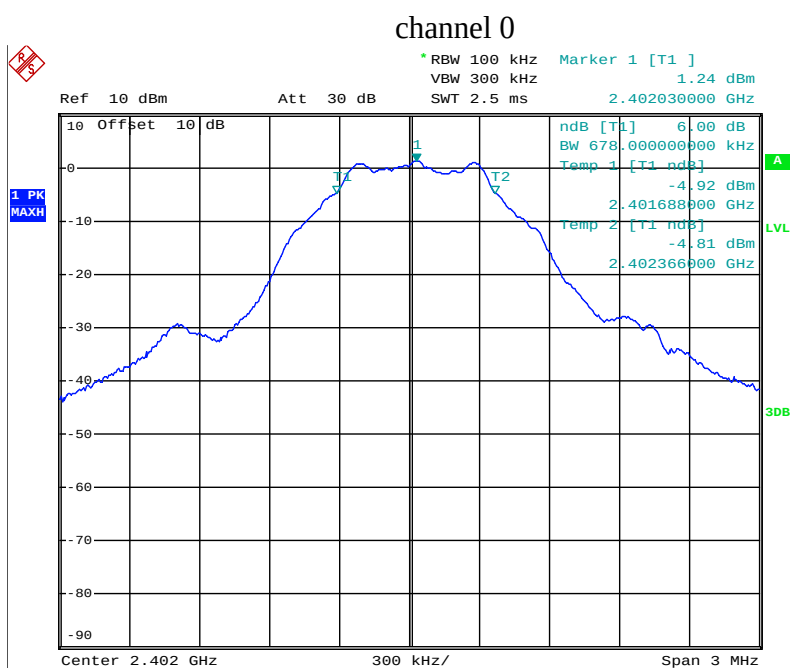
5.6.Test Result

Test Lab: Shielding room

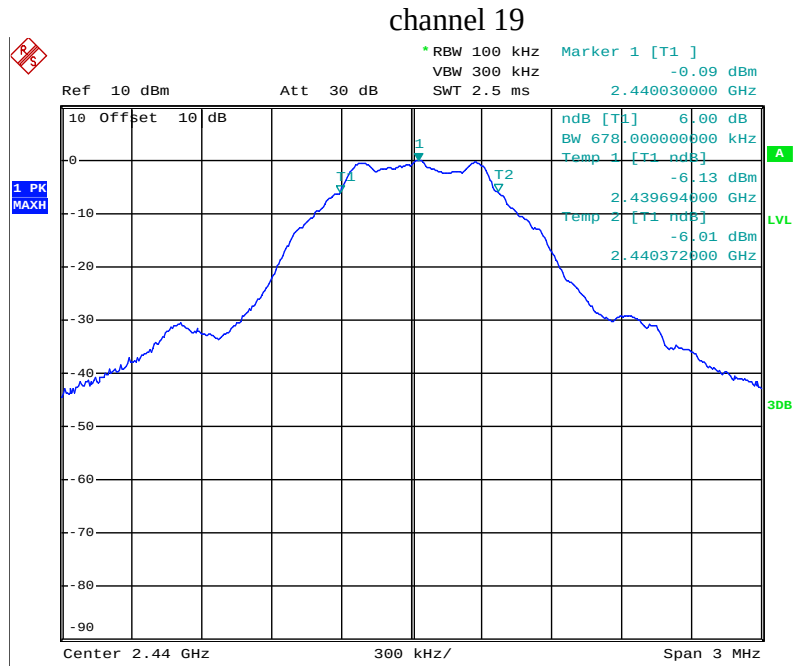
Test Engineer: Bob

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit(MHz)	Result
0	2402	0.678	0.5	Pass
19	2440	0.678	0.5	Pass
39	2480	0.678	0.5	Pass

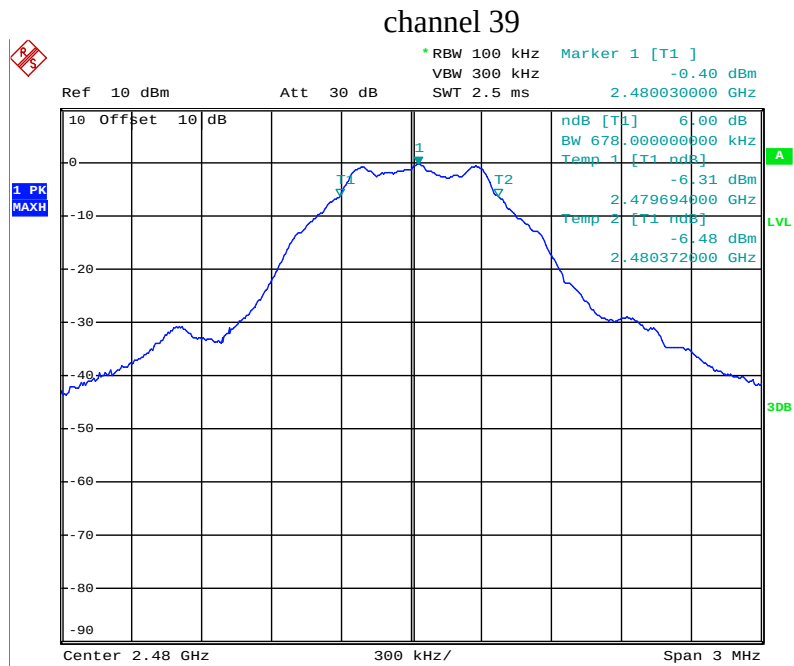
The spectrum analyzer plots are attached as below.



Date: 20.FEB.2020 14:26:22



Date: 20.FEB.2020 14:27:14



Date: 20.FEB.2020 14:27:50

6. MAXIMUM PEAK OUTPUT POWER TEST

6.1. Block Diagram of Test Setup



6.2. The Requirement For Section 15.247(b)(3)

Section 15.247(b)(3): For systems using digital modulation in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands: 1 Watt.

6.3. EUT Configuration on Test

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 3 MHz and VBW to 10MHz.

6.5.3. Measurement the maximum peak output power.

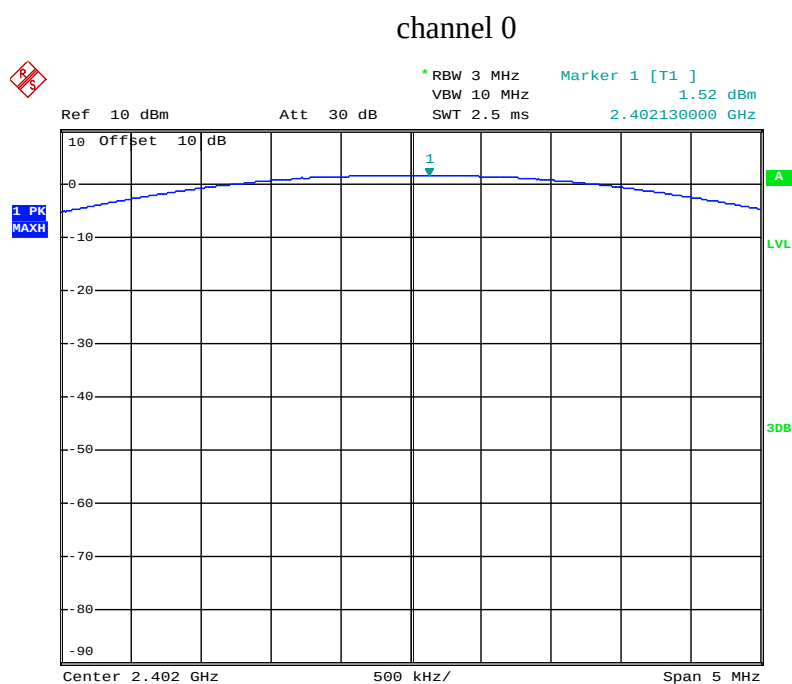
6.6. Test Result

Test Lab: Shielding room

Test Engineer: Bob

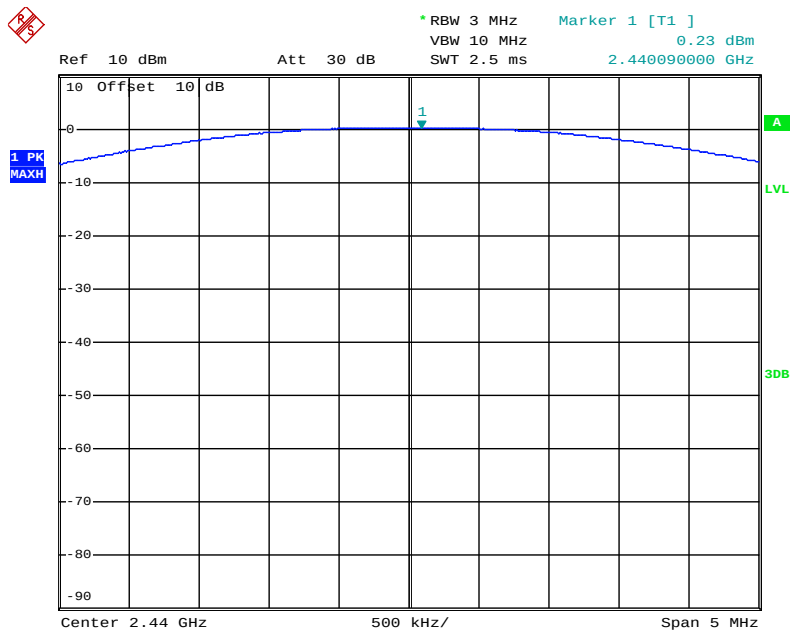
Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Result
0	2402	1.52	30	Pass
19	2440	0.23	30	Pass
39	2480	-0.16	30	Pass

The spectrum analyzer plots are attached as below.



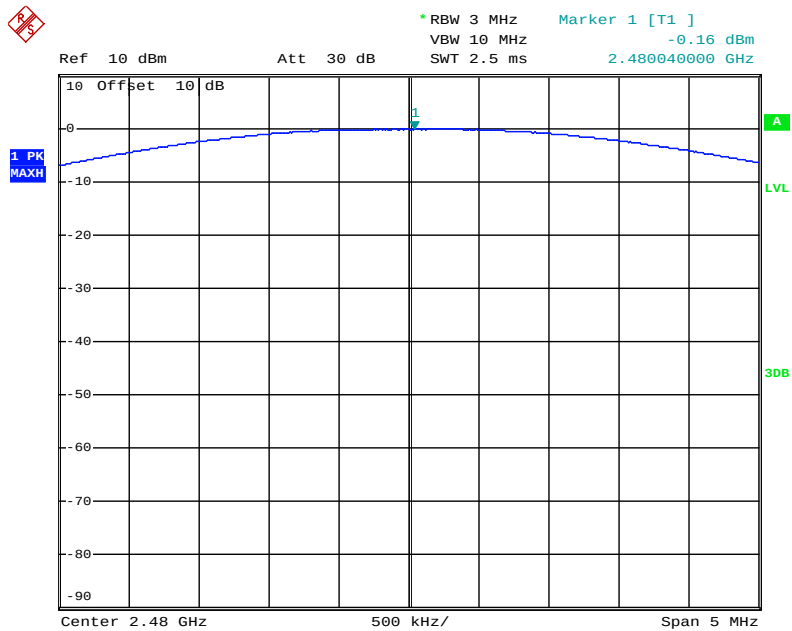
Date: 20.FEB.2020 14:33:38

channel 19



Date: 20.FEB.2020 14:33:14

channel 39



Date: 20.FEB.2020 14:32:48

7. POWER SPECTRAL DENSITY TEST

7.1. Block Diagram of Test Setup



7.2. The Requirement For Section 15.247(e)

Section 15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

7.3. EUT Configuration on Test

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

7.5. Test Procedure

7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

7.5.2. Measurement Procedure PKPSD:

7.5.3. This procedure must be used if maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit, and is optional if the maximum (average) conducted output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \times \text{RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3kHz) and repeat.

7.5.4. Measurement the maximum power spectral density.

7.6. Test Result

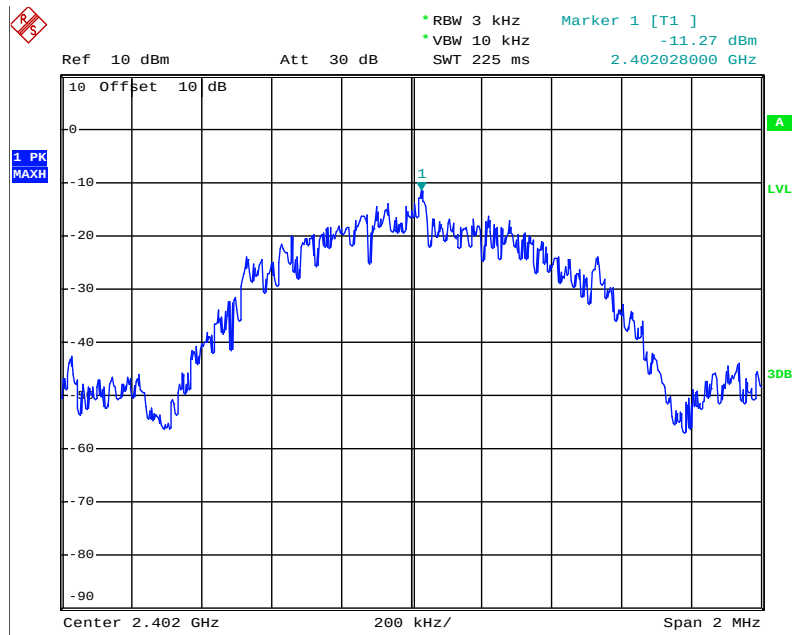
Test Lab: Shielding room

Test Engineer: Bob

Channel	Frequency (MHz)	PSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
0	2402	-11.27	8	Pass
19	2440	-12.59	8	Pass
39	2480	-13.00	8	Pass

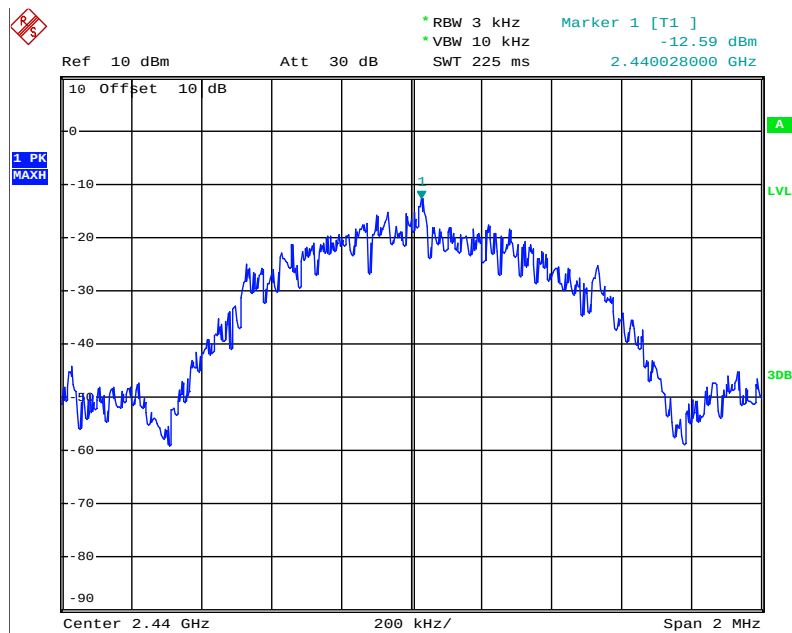
The spectrum analyzer plots are attached as below.

channel 0



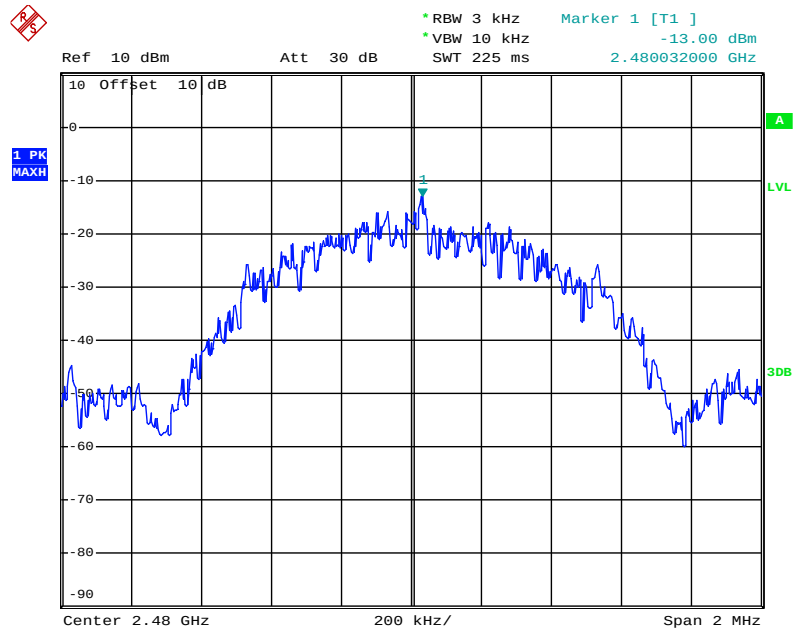
Date: 20.FEB.2020 14:34:30

channel 19



Date: 20.FEB.2020 14:35:07

channel 39



Date: 20.FEB.2020 14:36:04

8. BAND EDGE COMPLIANCE TEST

8.1. Block Diagram of Test Setup



8.2. The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

8.3. EUT Configuration on Test

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

8.5. Test Procedure

Conducted Band Edge:

8.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

8.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

Radiate Band Edge:

8.5.3. The EUT is placed on a turntable, which is 0.1m above the ground plane and worked at highest radiated power.

8.5.4. The turntable was rotated for 360 degrees to determine the position of maximum emission level.

8.5.5. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

8.5.6. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

8.5.7. RBW=1MHz, VBW=1MHz

8.5.8. The band edges was measured and recorded.

Note: All modes of operation were investigated and the worst case emissions are reported.

8.6. Test Result

Conducted Band Edge Result

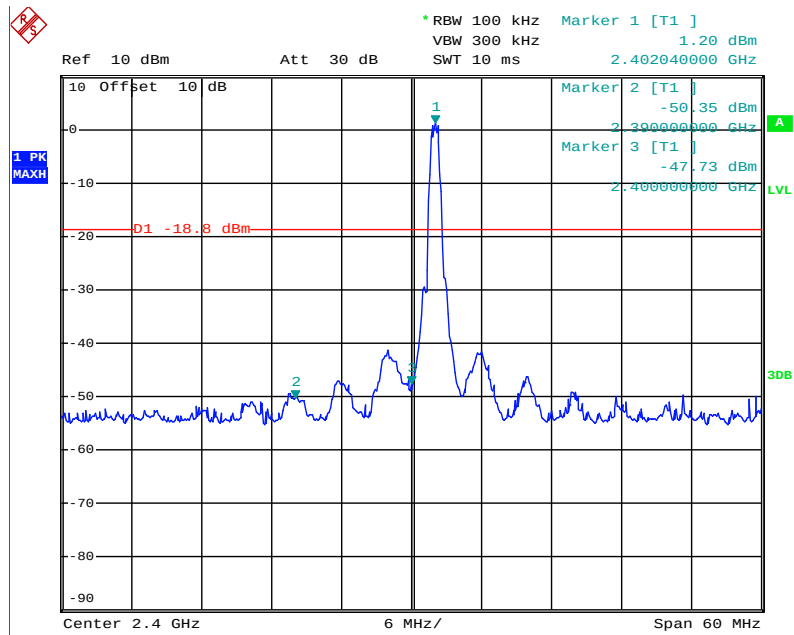
Test Lab: Shielding room

Test Engineer: Bob

Channel	Frequency	Delta peak to band emission	Limit(dBc)	Result
0	2.402GHz	46.53	> 20	Pass
39	2.480GHz	42.68	> 20	Pass

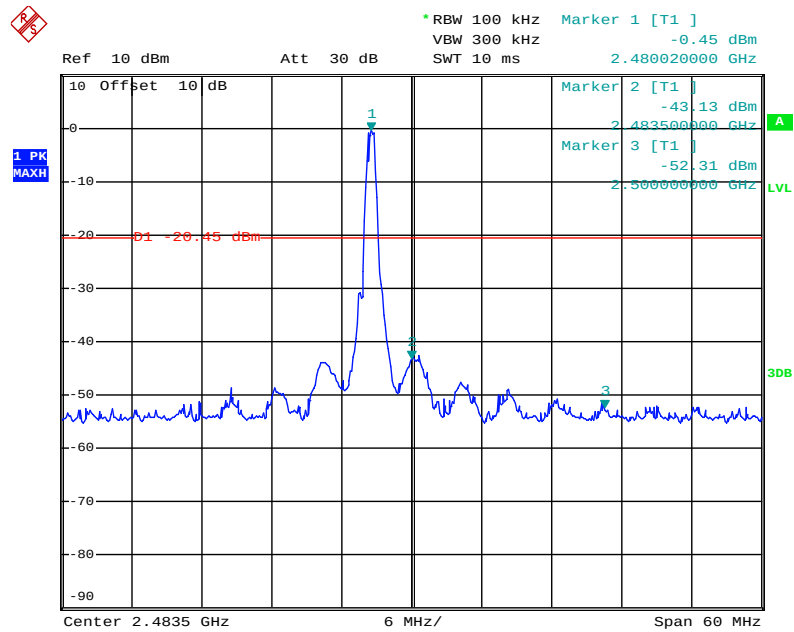
The spectrum analyzer plots are attached as below.

channel 0



Date: 20.FEB.2020 14:30:53

channel 39



Date: 20.FEB.2020 14:31:49

Radiated Band Edge Result

Test Lab: 3m Anechoic chamber
Test Engineer: Bob



ACCURATE TECHNOLOGY CO., LTD.

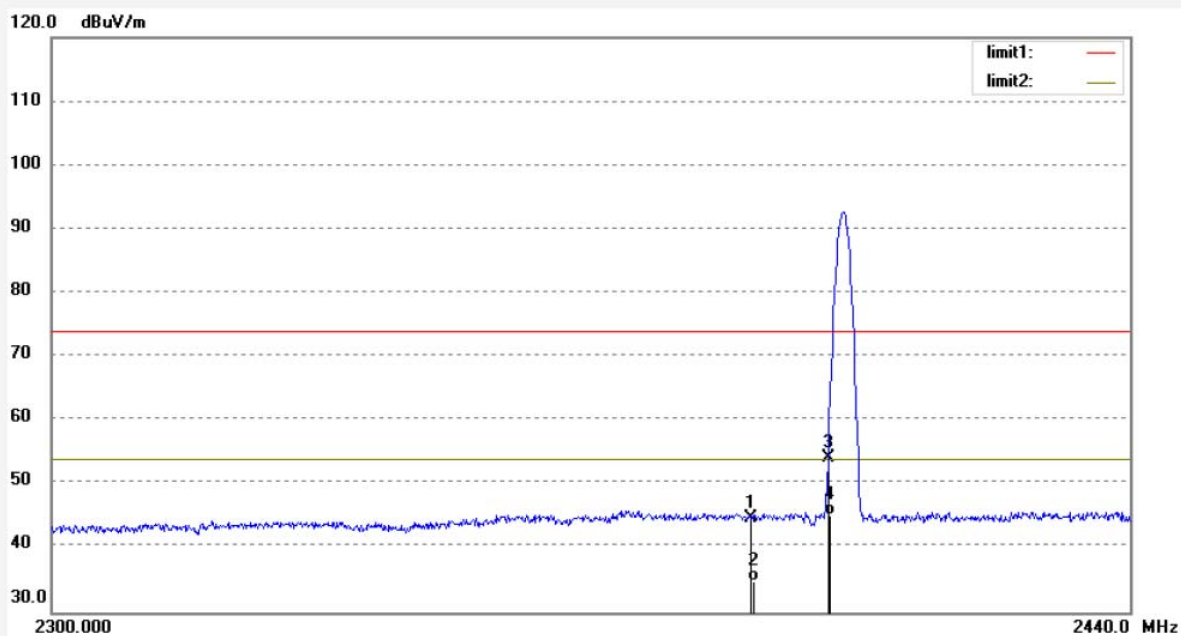
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: 2020 #58
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 23 C / 48 %
EUT: AURA LED LIGHT
Mode: TX2402MHz
Model: 6788
Manufacturer: Kinlan

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 20/02/19/
Time: 10/40/15
Engineer Signature: Bob
Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	43.93	0.79	44.72	74.00	-29.28	peak	150	185	
2	2390.000	34.12	0.79	34.91	54.00	-19.09	AVG	150	136	
3	2400.000	53.40	0.88	54.28	74.00	-19.72	peak	150	58	
4	2400.000	44.21	0.88	45.09	54.00	-8.91	AVG	150	213	

Job No.: 2020 #57

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2402MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Horizontal

Power Source: AC 120V/60Hz

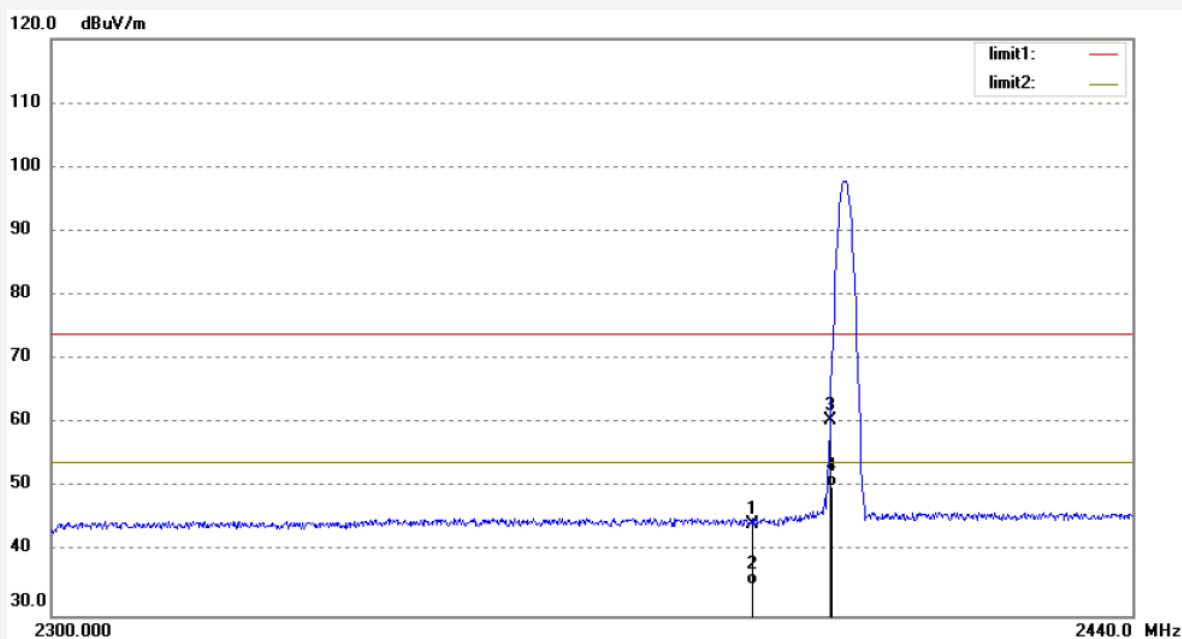
Date: 20/02/19/

Time: 10/37/35

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	43.55	0.79	44.34	74.00	-29.66	peak	200	198	
2	2390.000	34.12	0.79	34.91	54.00	-19.09	AVG	200	69	
3	2400.000	59.53	0.88	60.41	74.00	-13.59	peak	200	211	
4	2400.000	49.35	0.88	50.23	54.00	-3.77	AVG	200	301	

Job No.: 2020 #56

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2480MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Horizontal

Power Source: AC 120V/60Hz

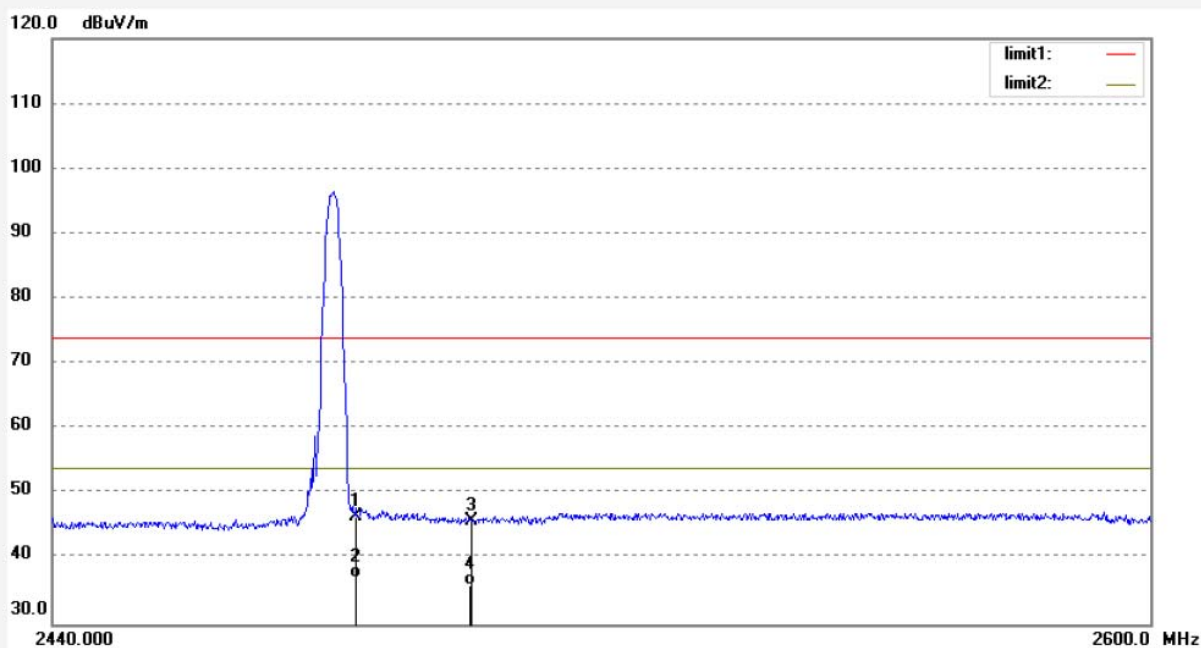
Date: 20/02/19/

Time: 10/33/43

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	45.42	1.10	46.52	74.00	-27.48	peak	200	16	
2	2483.500	35.95	1.10	37.05	54.00	-16.95	AVG	200	321	
3	2500.000	44.75	1.10	45.85	74.00	-28.15	peak	200	82	
4	2500.000	34.95	1.10	36.05	54.00	-17.95	AVG	200	219	

Job No.: 2020 #55

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2480MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Vertical

Power Source: AC 120V/60Hz

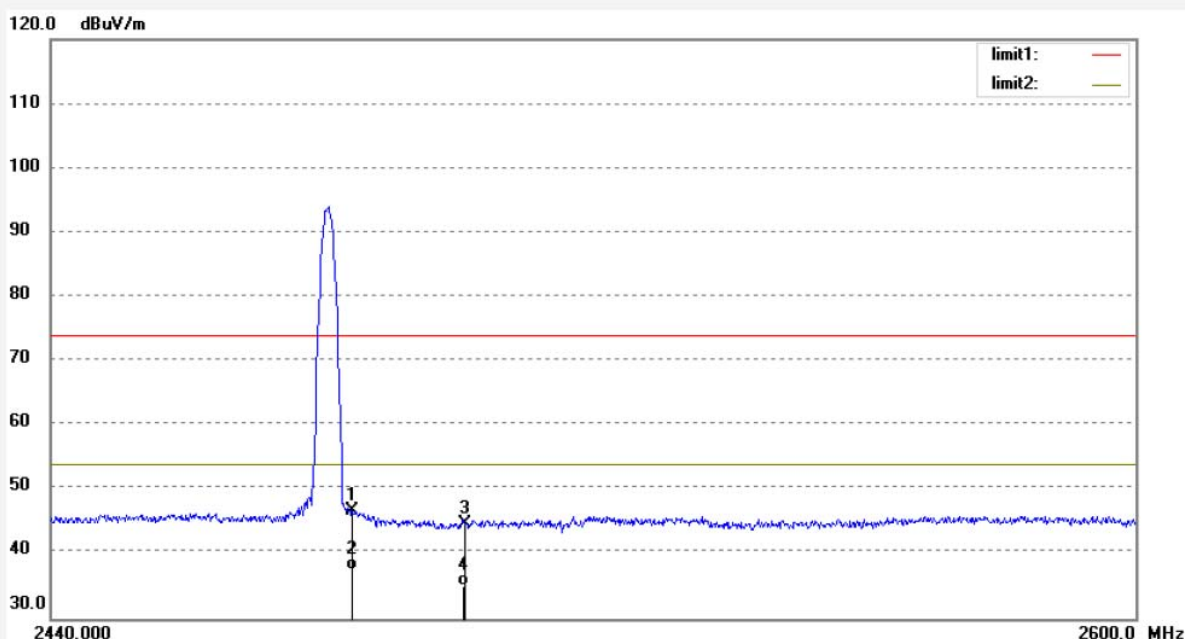
Date: 20/02/19/

Time: 10/30/54

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	45.77	1.10	46.87	74.00	-27.13	peak	150	187	
2	2483.500	36.46	1.10	37.56	54.00	-16.44	AVG	150	92	
3	2500.000	43.61	1.10	44.71	74.00	-29.29	peak	150	112	
4	2500.000	33.99	1.10	35.09	54.00	-18.91	AVG	150	301	

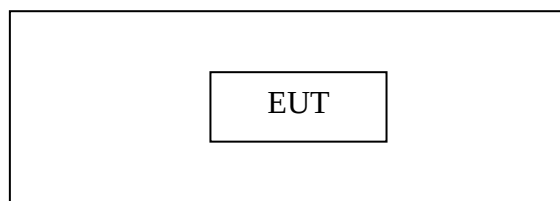
Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:
Result = Reading + Corrected Factor

9. RADIATED SPURIOUS EMISSION TEST

9.1. Block Diagram of Test Setup

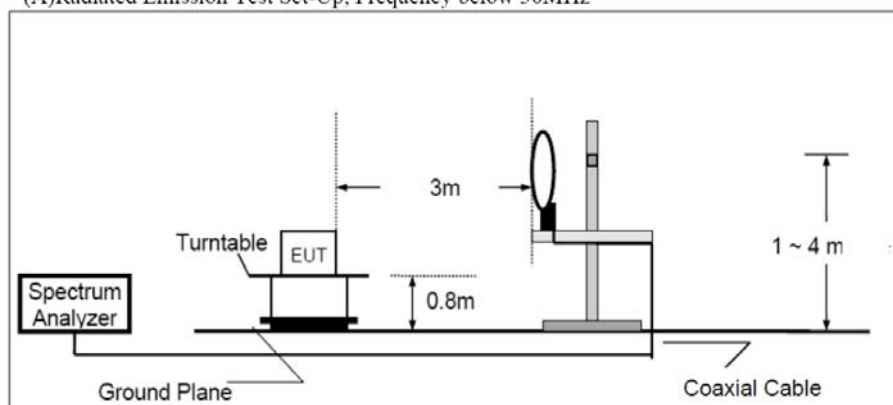
9.1.1. Block diagram of connection between the EUT and peripherals



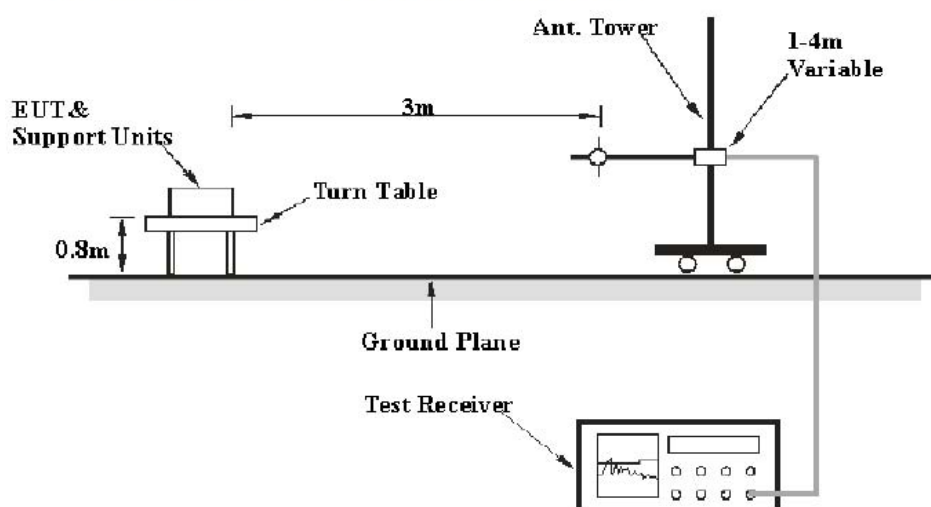
Setup: Transmitting mode

9.1.2. Semi-Anechoic Chamber Test Setup Diagram

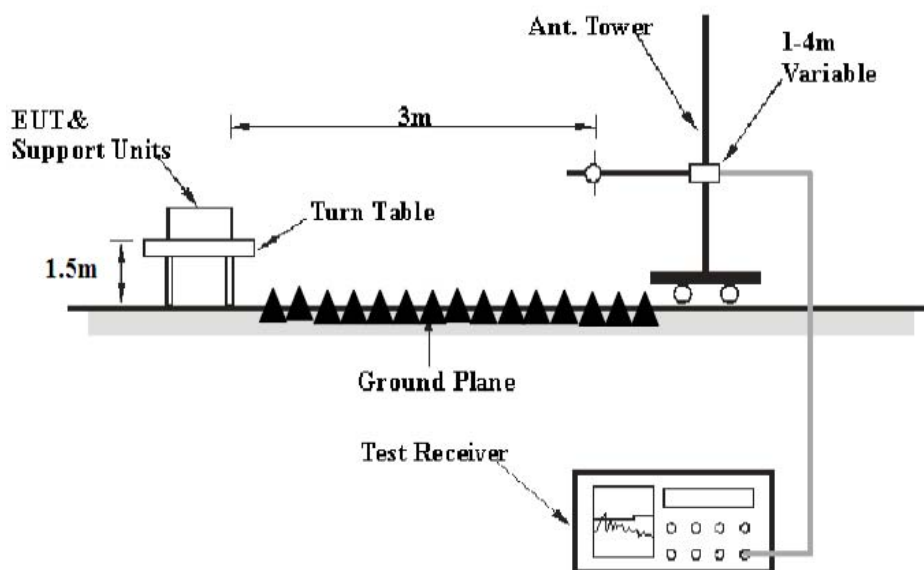
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 30MHz-1GHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



9.2.The Limit For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

9.3. Restricted bands of operation

9.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

9.4.Configuration of EUT on Test

The equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.5. Operating Condition of EUT

9.5.1. Setup the EUT and simulator as shown as Section 9.1.

9.5.2. Turn on the power of all equipment.

9.5.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2440MHz, and 2480MHz TX frequency to transmit.

9.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground (Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground (Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the worst case position data was reported.

The bandwidth of test receiver is set at 9 kHz in below 30MHz. and set at 120 kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector. The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading.

9.7.Data Sample

Frequency (MHz)	Reading (dB μ v)	Factor (dB/m)	Result (dB μ v/m)	Limit (dB μ v/m)	Margin (dB)	Remark
X.XX	43.85	-22.22	21.63	43.5	-21.87	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB μ v) = Uncorrected Analyzer/Receiver reading

Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain

Result(dB μ v/m) = Reading(dB μ v) + Factor(dB/m)

Limit (dB μ v/m) = Limit stated in standard

Margin (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dB μ V/m)–Limit(dB μ V/m)

Result(dB μ V/m)= Reading(dB μ V)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

9.8.Test Result

Pass.

Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz and 18 to 26.5GHz.

The spectrum analyzer plots are attached as below.

Note: All modes of operation were investigated and the worst case emissions are reported.

Test Lab: 3m Anechoic chamber

Test Engineer: Bob

Below 1GHz



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Job No.: 2020 #27

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2402MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Horizontal

Power Source: AC 120V/60Hz

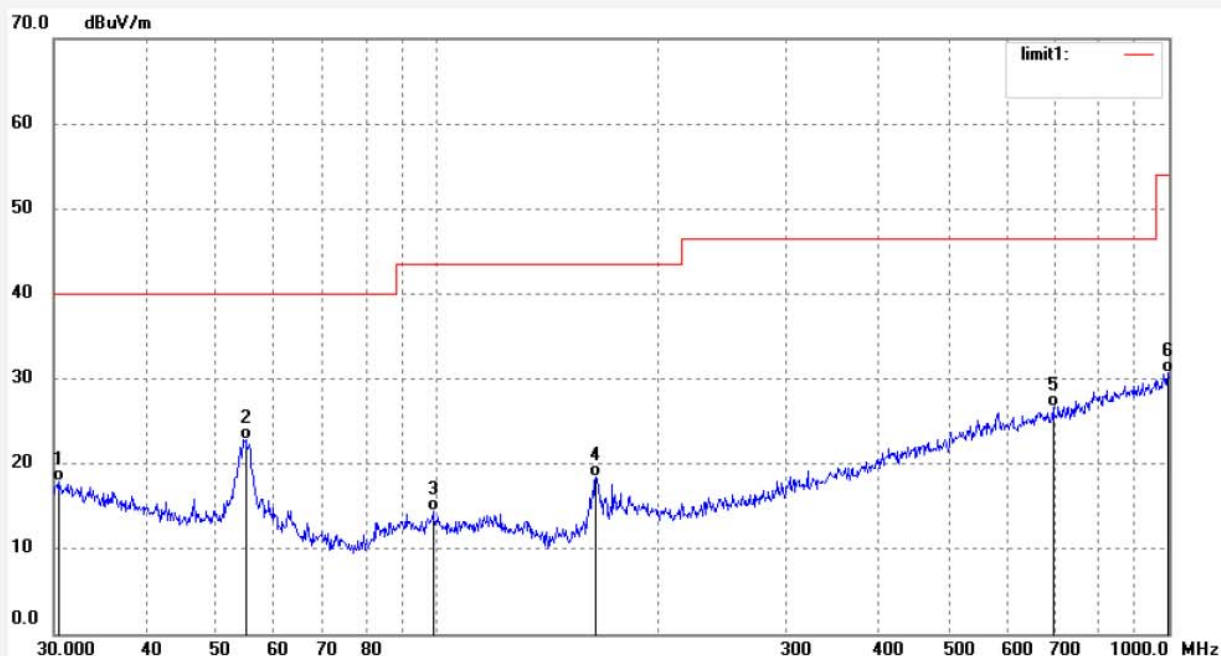
Date: 20/02/18/

Time: 11/06/13

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	30.4237	27.90	-10.04	17.86	40.00	-22.14	QP	200	44	
2	54.8348	36.86	-13.97	22.89	40.00	-17.11	QP	200	201	
3	98.8324	28.90	-14.51	14.39	43.50	-29.11	QP	200	311	
4	164.9073	33.97	-15.46	18.51	43.50	-24.99	QP	200	93	
5	694.4174	29.60	-2.88	26.72	46.50	-19.78	QP	200	159	
6	996.4995	28.90	1.78	30.68	54.00	-23.32	QP	200	104	



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Job No.: 2020 #28

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2402MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Vertical

Power Source: AC 120V/60Hz

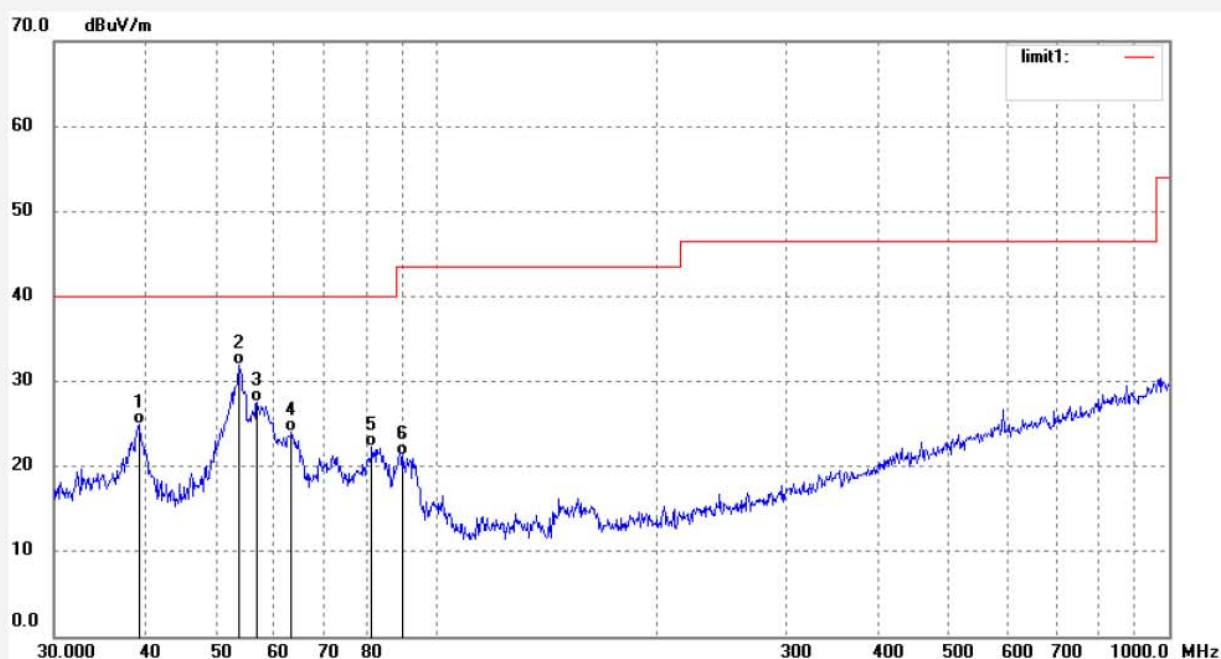
Date: 20/02/18/

Time: 11/08/02

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	39.1615	37.29	-12.36	24.93	40.00	-15.07	QP	100	106	
2	53.6931	45.77	-13.88	31.89	40.00	-8.11	QP	100	92	
3	56.7916	41.81	-14.32	27.49	40.00	-12.51	QP	100	111	
4	63.3132	40.11	-16.13	23.98	40.00	-16.02	QP	100	201	
5	81.4969	39.53	-17.18	22.35	40.00	-17.65	QP	100	82	
6	89.9047	37.41	-16.07	21.34	43.50	-22.16	QP	100	226	



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Job No.: 2020 #29

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2440MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Vertical

Power Source: AC 120V/60Hz

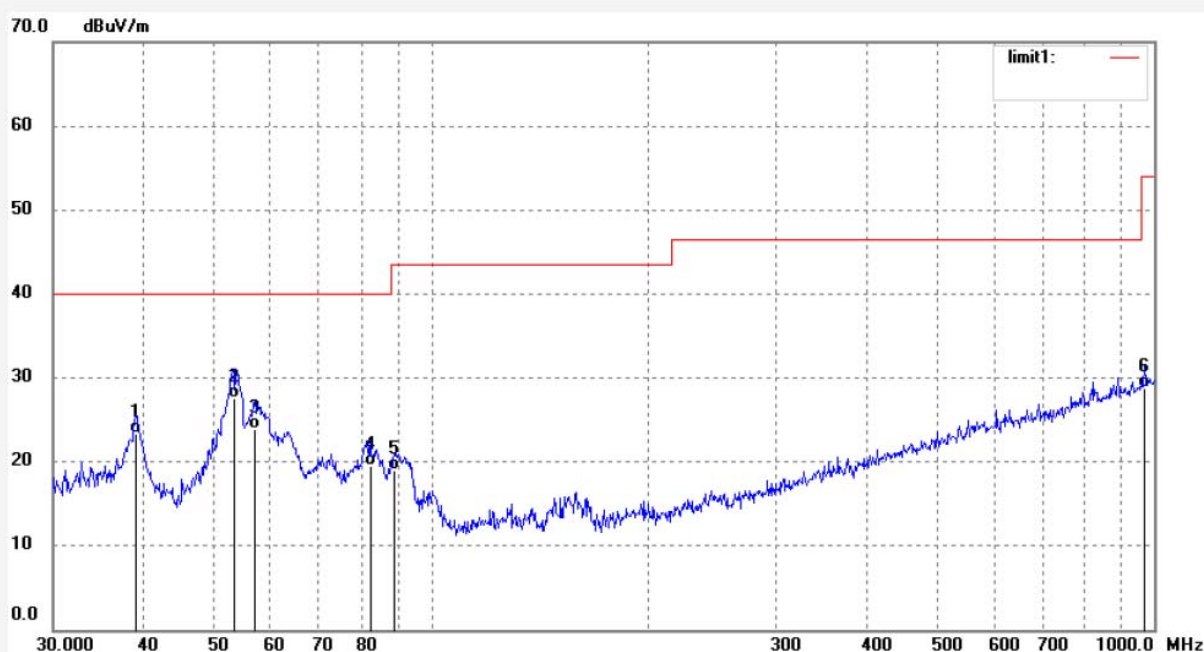
Date: 20/02/18/

Time: 11/09/15

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	39.0245	35.62	-12.33	23.29	40.00	-16.71	QP	100	103	
2	53.3179	41.38	-13.85	27.53	40.00	-12.47	QP	100	62	
3	56.9911	38.25	-14.36	23.89	40.00	-16.11	QP	100	115	
4	82.3588	36.54	-16.98	19.56	40.00	-20.44	QP	100	95	
5	88.9637	35.15	-16.14	19.01	43.50	-24.49	QP	100	146	
6	968.9338	27.35	1.43	28.78	54.00	-25.22	QP	100	163	



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Job No.: 2020 #30

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2440MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Horizontal

Power Source: AC 120V/60Hz

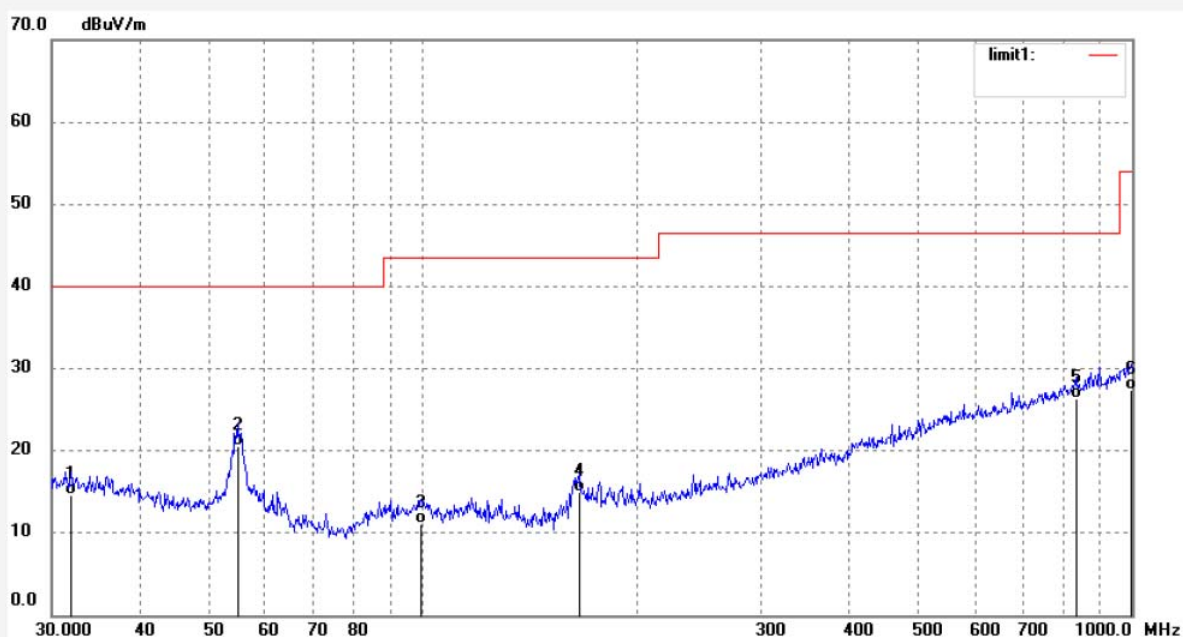
Date: 20/02/18/

Time: 11/10/50

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.9544	25.68	-11.12	14.56	40.00	-25.44	QP	200	103	
2	54.8348	34.46	-13.97	20.49	40.00	-19.51	QP	200	62	
3	99.5279	25.38	-14.28	11.10	43.50	-32.40	QP	200	118	
4	166.0680	30.21	-15.30	14.91	43.50	-28.59	QP	200	96	
5	833.3170	26.68	-0.41	26.27	46.50	-20.23	QP	200	114	
6	996.4995	25.62	1.78	27.40	54.00	-26.60	QP	200	152	

Job No.: 2020 #31

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2480MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Horizontal

Power Source: AC 120V/60Hz

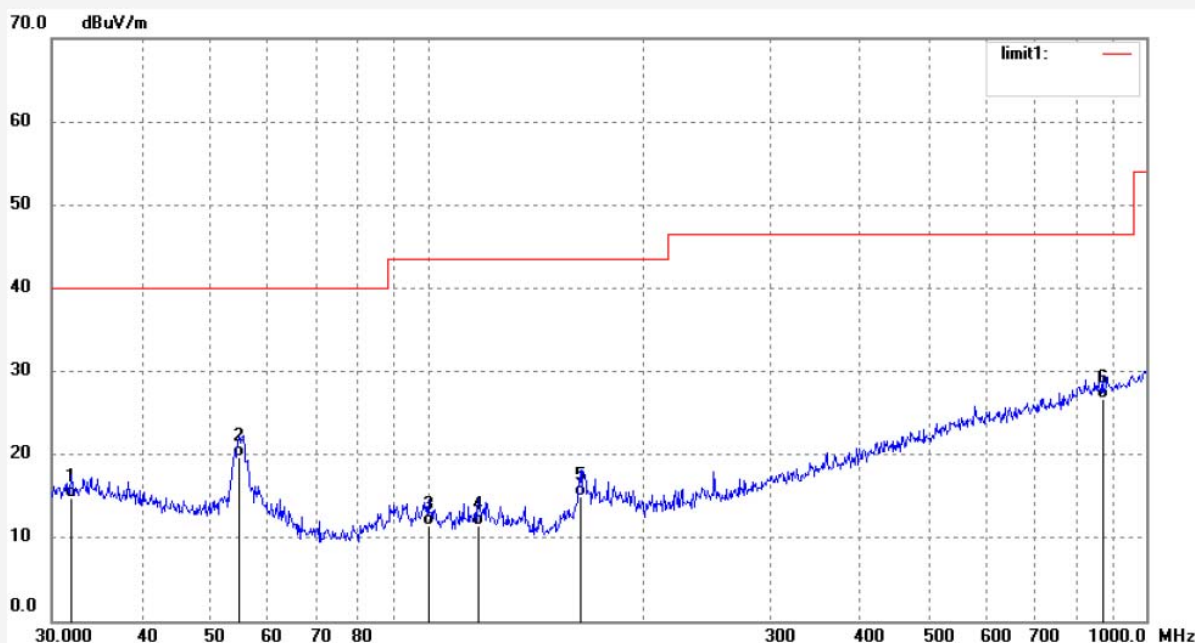
Date: 20/02/18/

Time: 11/12/02

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.9545	25.98	-11.12	14.86	40.00	-25.14	QP	200	106	
2	54.6428	33.62	-13.95	19.67	40.00	-20.33	QP	200	321	
3	100.2286	25.67	-14.16	11.51	43.50	-31.99	QP	200	201	
4	117.7724	25.68	-14.14	11.54	43.50	-31.96	QP	200	82	
5	163.1818	30.54	-15.49	15.05	43.50	-28.45	QP	200	215	
6	869.1301	26.64	0.03	26.67	46.50	-19.83	QP	200	63	



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Job No.: 2020 #32

Standard: FCC Class B 3M Radiated

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2480MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Vertical

Power Source: AC 120V/60Hz

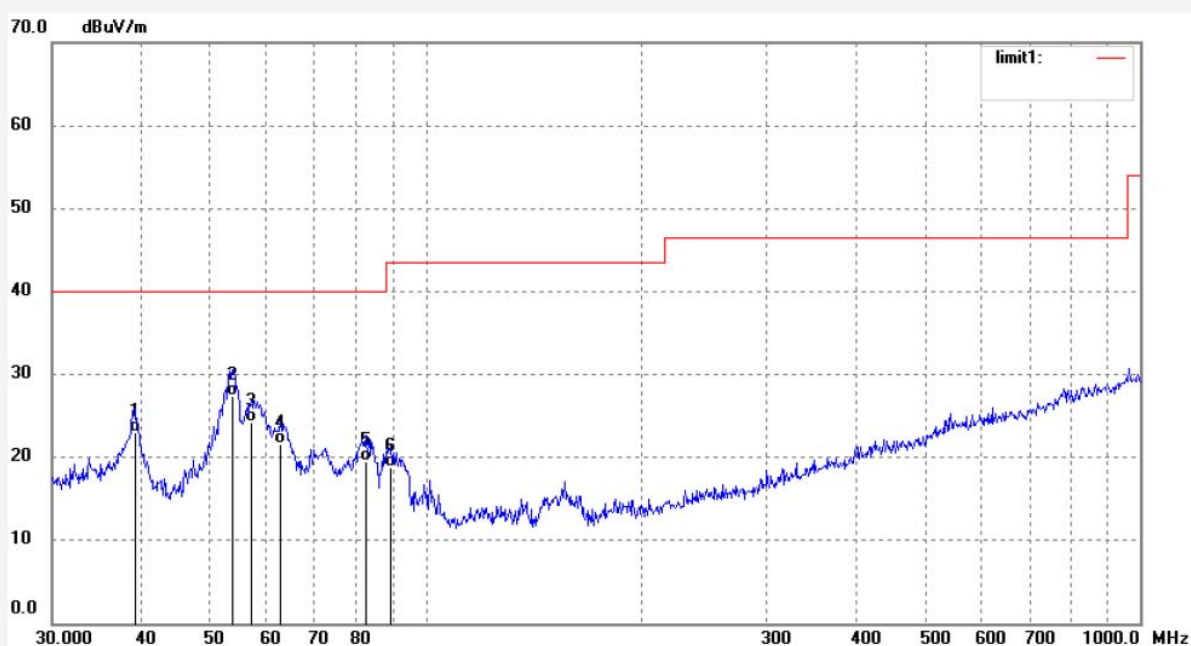
Date: 20/02/18/

Time: 11/13/25

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	39.1615	35.46	-12.36	23.10	40.00	-16.90	QP	100	64	
2	53.6931	41.35	-13.88	27.47	40.00	-12.53	QP	100	119	
3	56.9911	38.62	-14.36	24.26	40.00	-15.74	QP	100	104	
4	62.6507	37.55	-15.89	21.66	40.00	-18.34	QP	100	58	
5	82.3588	36.48	-16.98	19.50	40.00	-20.50	QP	100	321	
6	89.2762	34.98	-16.11	18.87	43.50	-24.63	QP	100	196	

Above 1GHz



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Job No.: 2020 #49

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2402MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Horizontal

Power Source: AC 120V/60Hz

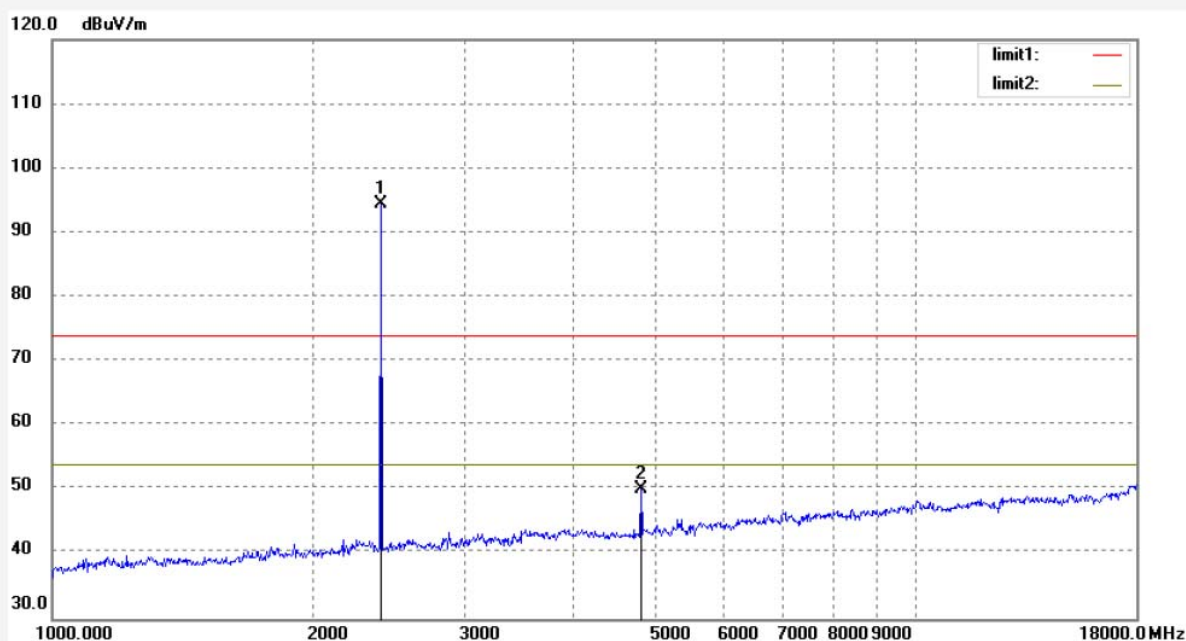
Date: 20/02/19/

Time: 10/12/12

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	93.67	0.88	94.55			peak	200	62	
2	4804.000	42.64	7.40	50.04	74.00	-23.96	peak	200	103	

Job No.: 2020 #50

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2402MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Vertical

Power Source: AC 120V/60Hz

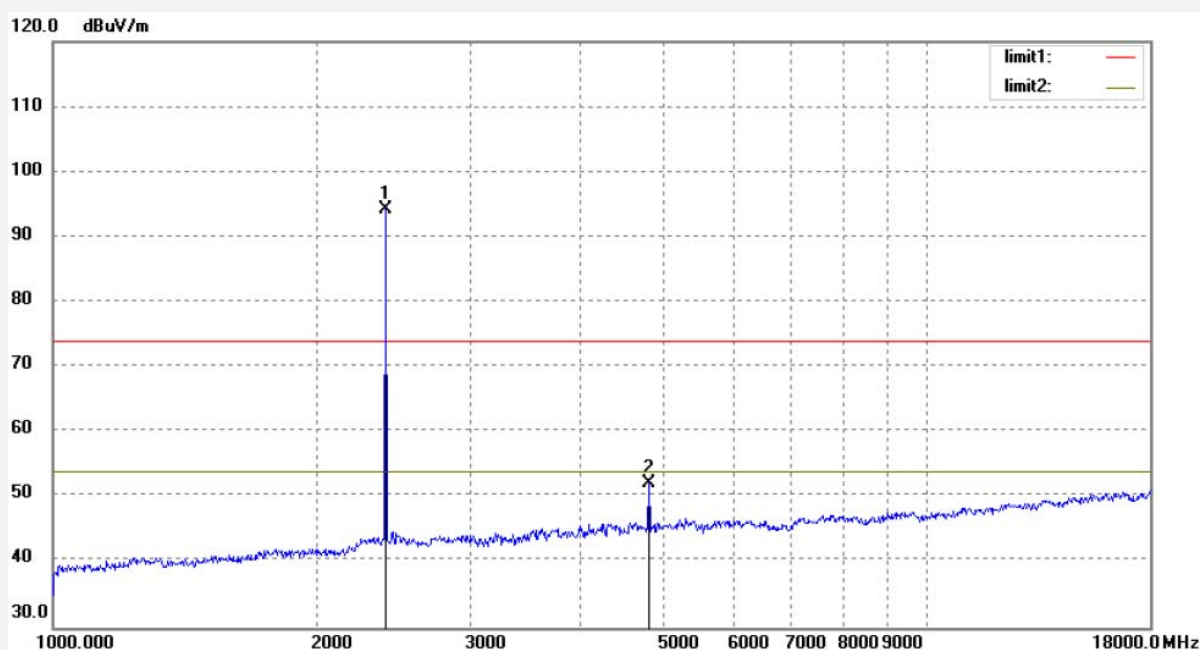
Date: 20/02/19/

Time: 10/15/47

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2402.000	93.38	0.88	94.26			peak	150	321	
2	4804.000	44.72	7.40	52.12	74.00	-21.88	peak	150	148	



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Job No.: 2020 #51

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2440MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Vertical

Power Source: AC 120V/60Hz

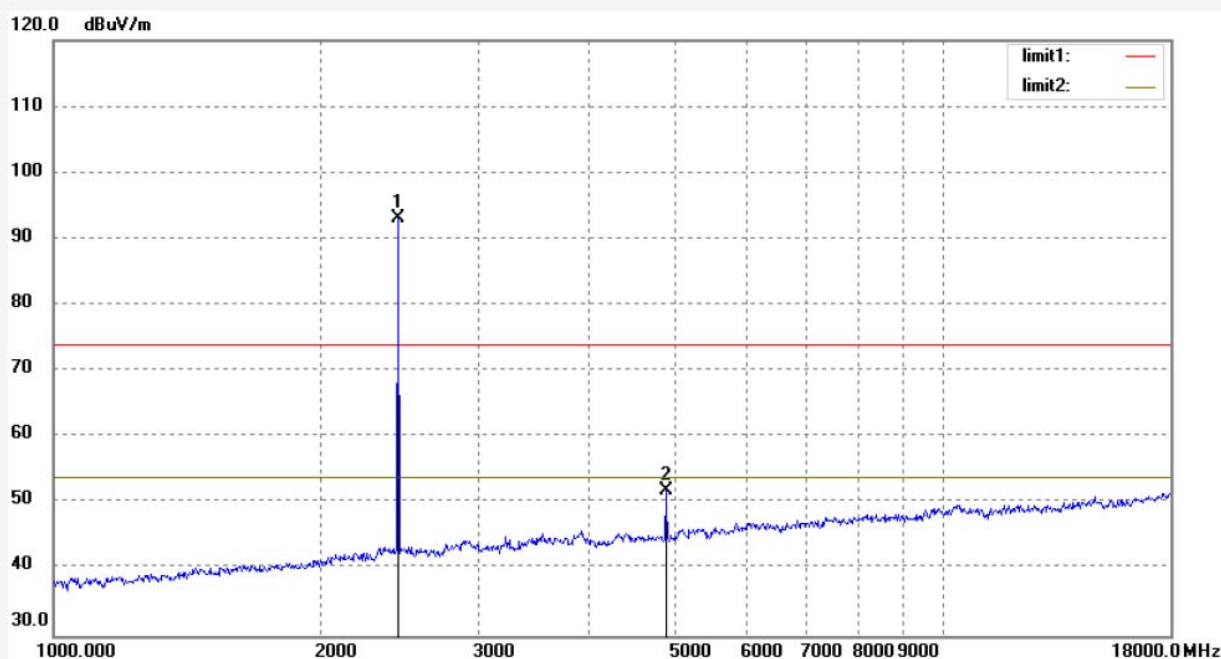
Date: 20/02/19/

Time: 10/19/35

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2440.000	92.19	1.03	93.22			peak	150	145	
2	4880.000	43.91	8.04	51.95	74.00	-22.05	peak	150	175	

Job No.: 2020 #52

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2440MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Horizontal

Power Source: AC 120V/60Hz

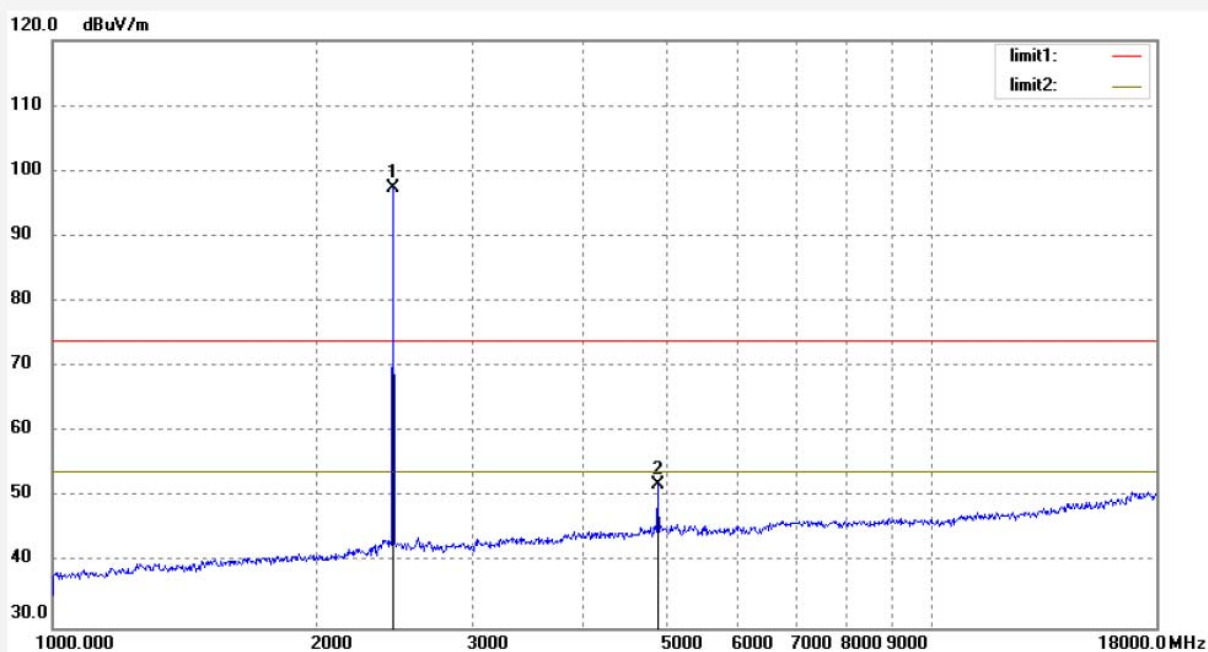
Date: 20/02/19/

Time: 10/21/12

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2440.000	96.26	1.03	97.29			peak	200	93	
2	4880.000	44.00	8.04	52.04	74.00	-21.96	peak	200	146	

Job No.: 2020 #53

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2480MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Horizontal

Power Source: AC 120V/60Hz

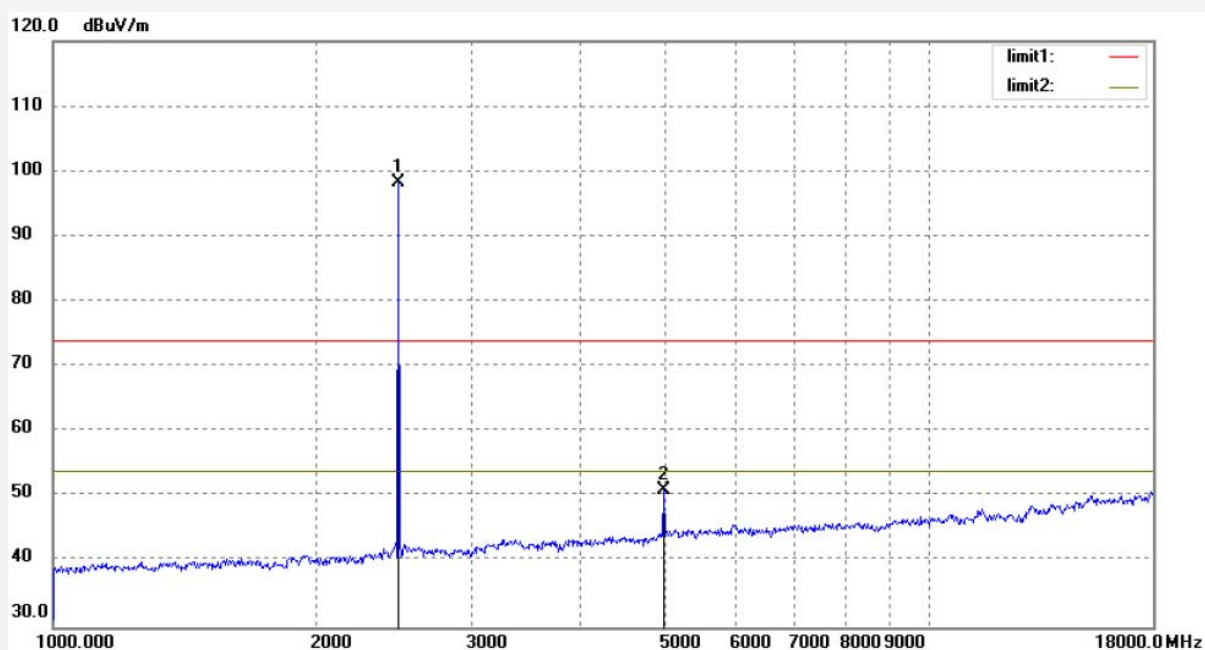
Date: 20/02/19/

Time: 10/25/15

Engineer Signature: Bob

Distance: 3m

Note: Report NO.:ATE20200084



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	97.25	1.09	98.34			peak	200	92	
2	4960.000	42.33	8.66	50.99	74.00	-23.01	peak	200	187	

Job No.: 2020 #54

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 23 C / 48 %

EUT: AURA LED LIGHT

Mode: TX2480MHz

Model: 6788

Manufacturer: Kinlan

Polarization: Vertical

Power Source: AC 120V/60Hz

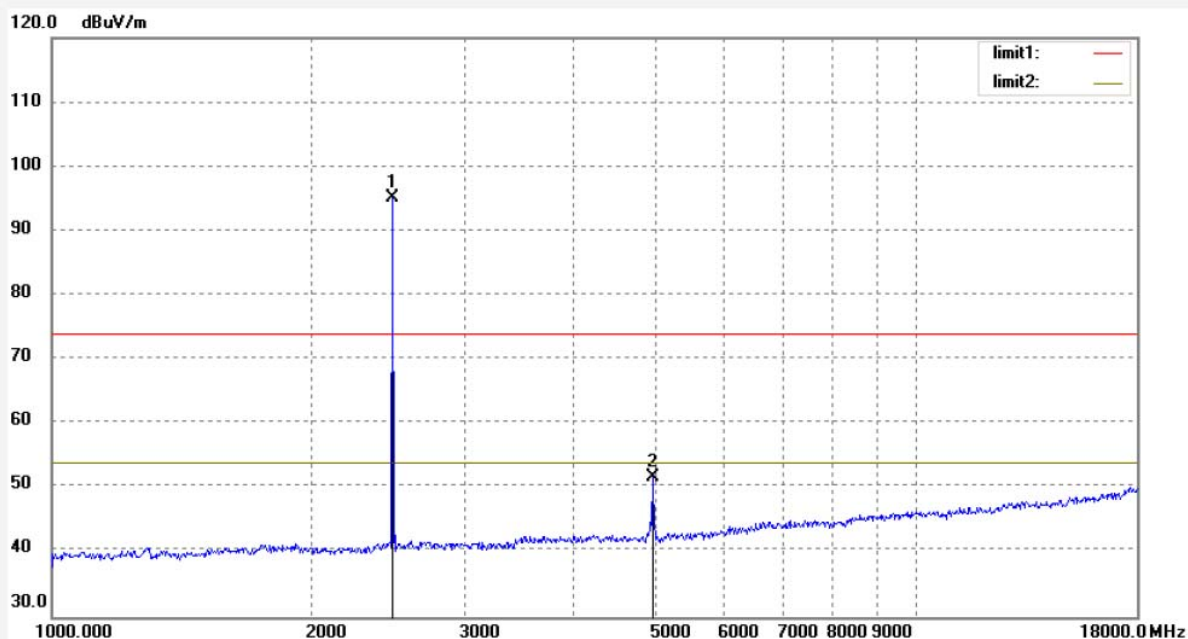
Date: 20/02/19/

Time: 10/28/32

Engineer Signature: Bob

Distance: 3m

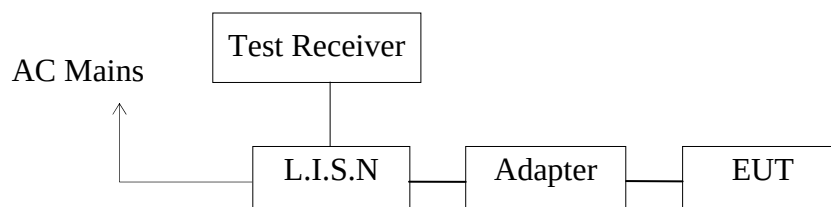
Note: Report NO.:ATE20200084



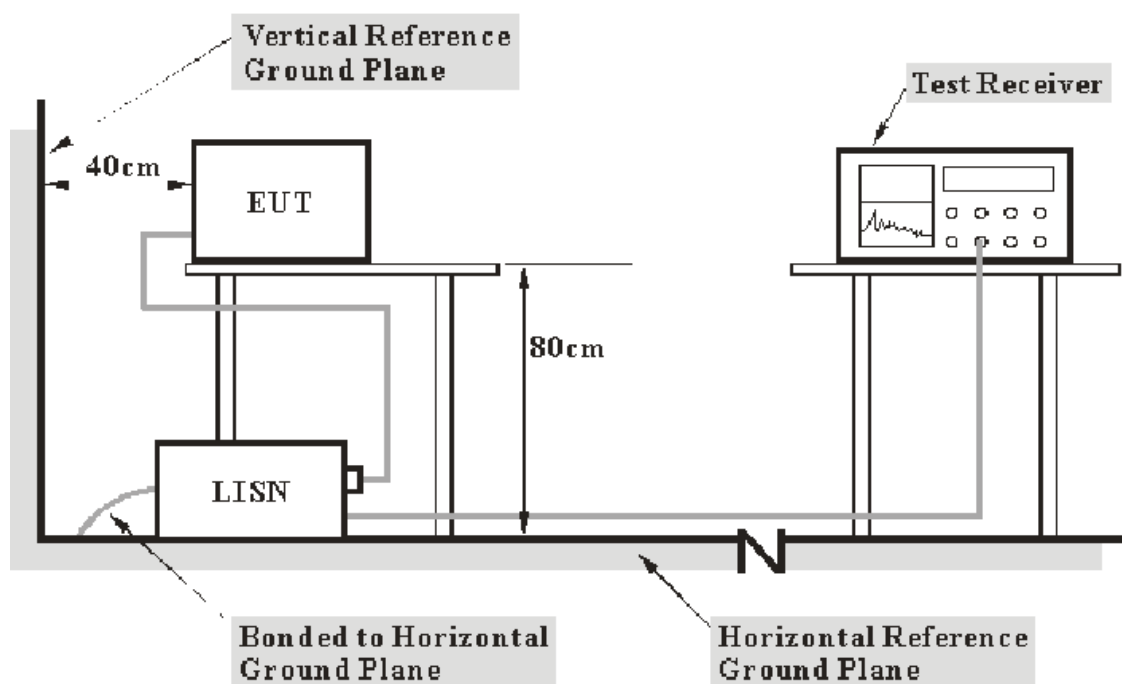
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	93.95	1.09	95.04			peak	150	96	
2	4960.000	43.12	8.58	51.70	74.00	-22.30	peak	150	178	

10. POWER LINE CONDUCTED EMISSION TEST

10.1. Block Diagram of Test Setup



10.2. Test System Setup



- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

10.3.Test Limits

Frequency (MHz)	Limit dB(μ V)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0
NOTE1: The lower limit shall apply at the transition frequencies. NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

10.4.Configuration of EUT on Test

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

10.5.Operating Condition of EUT

10.5.1.Setup the EUT and simulator as shown as Section 10.1.

10.5.2.Turn on the power of all equipment.

10.5.3.Let the EUT work in test mode and measure it.

10.6.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 C63.10: 2013 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

10.7.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.5	51.1	34.2	56.0	46.0	4.9	11.8	Pass

Frequency(MHz) = Emission frequency in MHz

Transducer value(dB) = Insertion loss of LISN + Cable Loss

Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value

Limit (dBμV) = Limit stated in standard

Calculation Formula:

Margin = Limit (dBμV) - Level (dBμV)

10.8.Result:

Pass

Note: Emissions attenuated more than 20 dB below the permissible value are not reported.

The spectral diagrams are attached as below.

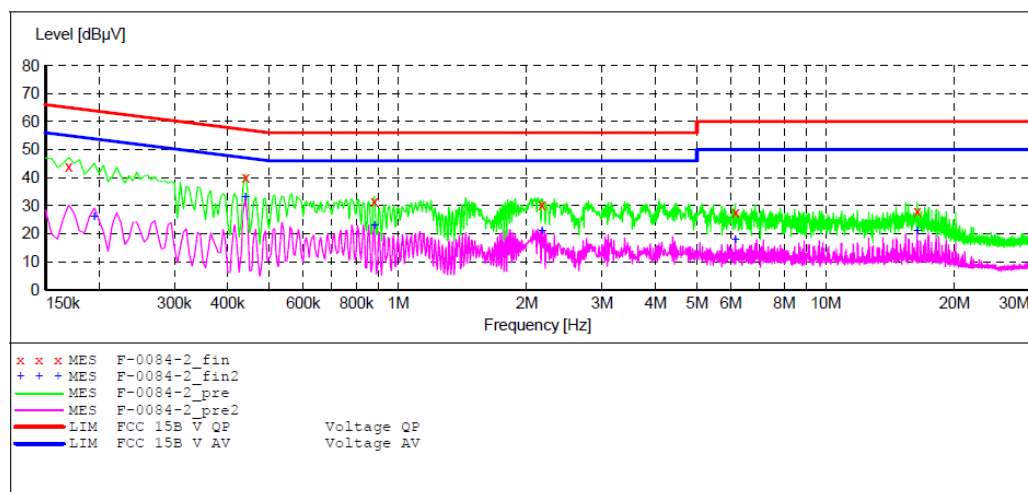
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 B

EUT: AURA LED LIGHT M/N:6788
 Manufacturer: Kinlan
 Operating Condition: ON
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: N 120V/60Hz
 Comment: Report NO.:ATE20200084
 Start of Test: 2/18/2020 / 10:09:39AM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 9.0 kHz 150.0 kHz 100.0 Hz QuasiPeak 1.0 s 200 Hz NSLK8126 2008
 Average
 150.0 kHz 30.0 MHz 5.0 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "F-0084-2_fin"

2/18/2020 10:13AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.170000	44.10	10.5	65	20.9	QP	N	GND
0.440000	39.90	10.7	57	17.2	QP	N	GND
0.880000	31.30	10.8	56	24.7	QP	N	GND
2.170000	30.10	11.0	56	25.9	QP	N	GND
6.150000	27.60	11.2	60	32.4	QP	N	GND
16.375000	27.90	11.4	60	32.1	QP	N	GND

MEASUREMENT RESULT: "F-0084-2_fin2"

2/18/2020 10:13AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.195000	26.00	10.5	54	27.8	AV	N	GND
0.440000	33.10	10.7	47	14.0	AV	N	GND
0.880000	22.70	10.8	46	23.3	AV	N	GND
2.170000	21.10	11.0	46	24.9	AV	N	GND
6.150000	17.60	11.2	50	32.4	AV	N	GND
16.375000	20.90	11.4	50	29.1	AV	N	GND

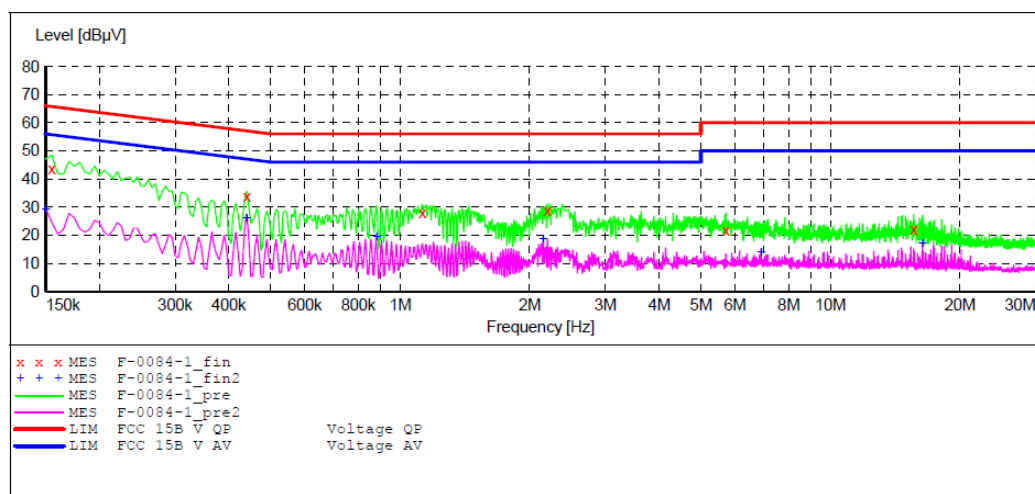
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15 B

EUT: AURA LED LIGHT M/N:6788
 Manufacturer: Kinlan
 Operating Condition: ON
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: L 120V/60Hz
 Comment: Report NO.:ATE20200084
 Start of Test: 2/18/2020 / 10:05:02AM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 9.0 kHz 150.0 kHz 100.0 Hz QuasiPeak 1.0 s 200 Hz NSLK8126 2008
 Average
 150.0 kHz 30.0 MHz 5.0 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "F-0084-1_fin"

2/18/2020 10:08AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.155000	43.50	10.5	66	22.2	QP	L1	GND
0.440000	33.80	10.7	57	23.3	QP	L1	GND
1.125000	27.80	10.9	56	28.2	QP	L1	GND
2.200000	28.70	11.0	56	27.3	QP	L1	GND
5.710000	21.60	11.2	60	38.4	QP	L1	GND
15.625000	22.10	11.4	60	37.9	QP	L1	GND

MEASUREMENT RESULT: "F-0084-1_fin2"

2/18/2020 10:08AM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.150000	29.10	10.5	56	26.9	AV	L1	GND
0.440000	26.10	10.7	47	21.0	AV	L1	GND
0.880000	19.30	10.8	46	26.7	AV	L1	GND
2.150000	18.60	11.0	46	27.4	AV	L1	GND
6.900000	13.90	11.2	50	36.1	AV	L1	GND
16.375000	17.10	11.4	50	32.9	AV	L1	GND

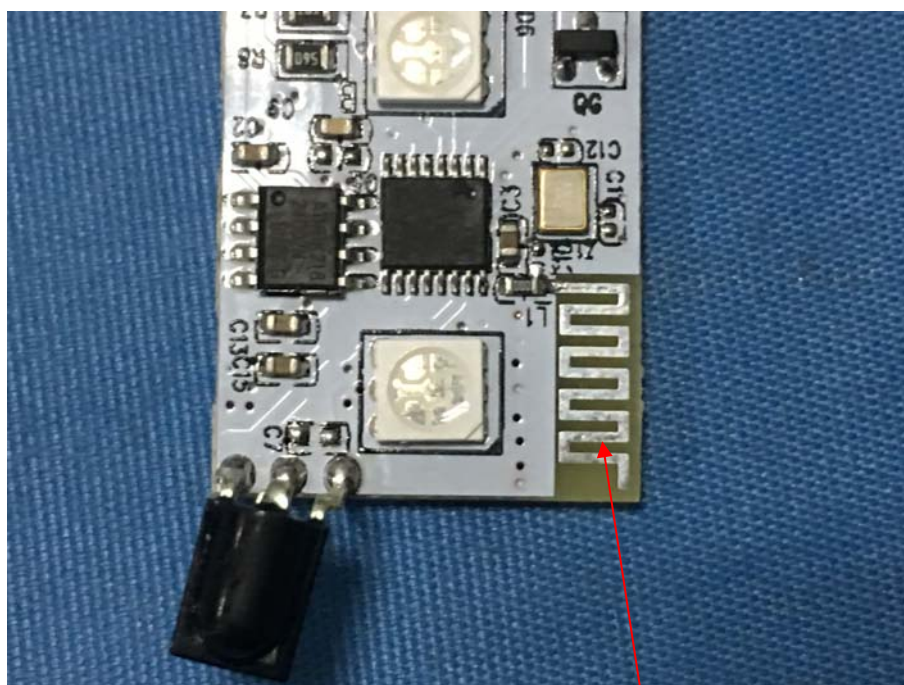
11.ANTENNA REQUIREMENT

11.1.The Requirement

According to Section 15.203, 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.

11.2.Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Max Antenna gain of EUT is 0dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna

***** End of Test Report *****