Report No.: DDT-R16Q0223-2E1

Issued Date: Mar. 15, 2016

FCC AND IC CERTIFICATION TEST REPORT
FOR

Applicant	:	Elec-Tech International Co., Ltd.
Address	:	No.1 Jinfeng Road, Tangjiawan Town, Xiangzhou District, Zhuhai City, Guangdong Province, P.R. China 519085
Equipment under Test	:	LED ceiling light
FCC Model No.	:	546821XX(“XX”=00-99, which respectively represents different LED source colour temperature)
IC Model No.	:	54682141; 54682142; 54682143
Trade Mark	:	ETI; Commercial Electric
FCC ID	:	XZH-5468212016
IC	:	20122-5468212016
Manufacturer	:	Elec-Tech International Co., Ltd.
Address	:	The same as applicant
Factory 1	:	Wuhu 3E Lighting Co., Ltd.
Address	:	11 Wei er ci RD Eastern Wuhu Economic & Technological Development Area, Wuhu City, Anhui Province 241000 China
Factory 2	:	Elec-Tech International Co., Ltd.
Address	:	18-1 Keji 6th Road Gangwan Ave Tangjiawan Town Xiangzhou District Zhuhai City Guangdong Province, P.R. China 519085
Factory 3	:	Guangdong NVCETi Lighting Co., Ltd.
Address	:	Factory#2-2,No. 1, South Zhongzhu Science & Technology Road, Innovation Coast, High Tech District, Zhuhai City, Guangdong Province, P.R.China 519085

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

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REPORT

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TEST REPORT DECLARE

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Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C: 2015, RSS-210 Issue 8 Dec. 2010

Test procedure used:

ANSI C63.10:2013, ANSI C63.4:2014, RSS-Gen Issue 4, Nov. 2014.

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC&IC standards.

Report No:	DDT-R16Q0223-2E1		
Date of Test:	Jan. 30, 2016 ~ Feb. 28, 2016	**Date of Report**:	Mar. 15, 2016

Prepared By: ***Approved By:***

Damon Hiu/Engineer ***Kevin Feng/EMC Manager***

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

1. Summary of test results

Description of Test Item	Standard	Results
20dB Bandwidth	FCC Part 15: 15.215 RSS-210 Issue 8 ANSI C63.10:2013 ANSI C63.4:2014	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.249(d) RSS-210 Issue 8 ANSI C63.10:2013 ANSI C63.4:2014	PASS
Band Edge Compliance	FCC Part 15: 15.249(d) RSS-210 Issue 8 RSS-Gen Issue 4 ANSI C63.10:2013 ANSI C63.4:2014	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207 RSS-Gen Issue 4 ANSI C63.10:2013 ANSI C63.4:2014	PASS
Note: N/A is an abbreviation for Not Applicable.		

2. General test information

2.1. Description of EUT

EUT* Name	:	LED ceiling light
FCC Model Number	:	546821XX (“XX”=00-99, which respectively represents different LED colour temperature)
IC Model Number	:	54682141; 54682142; 54682143
EUT function description	:	Please reference user manual of this device
Power supply	:	AC 120V/60Hz, 25W
Operation frequency	:	2402MHz -2480MHz
Modulation	:	GFSK
Data rate	:	1Mbps
Antenna Type	:	Integrated PCB antenna, maximum PK gain: 0dBi
Date of Receipt	:	Jan. 30, 2016
Sample Type	:	Series production

Note 1: EUT is the ab. of equipment under test.
Note 2: the models 54682141, 54682142 and 54682143 are identical except the colour temperature, therefore the model 54682141 was tested and recorded in this report.

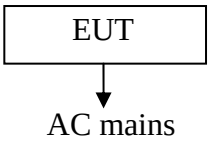
2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number or Type	Serial No.	Other
/	/	/	/	/

2.3. Assistant equipment used for test

Description of Assistant equipment	Manufacturer	Model number or Type	EMC Compliance	SN
/	/	/	/	/

2.4. Block diagram of EUT configuration for test



Test software: uEnergy Tools 2.5.0
The test software was used to control EUT work in Continuous TX mode, and select test channel, wireless mode as blow table.

Tested mode, channel, information		
Mode	Channel	Frequency (MHz)
GFSK	CH0	2402
	CH19	2440
	CH39	2480
Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.		

2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa

2.6. Deviations of test standard

No Deviation

2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808 Tel: +86-0769-22891499 http://www.dgddt.com

FCC Registration Number: 270092

2.8. Measurement uncertainty

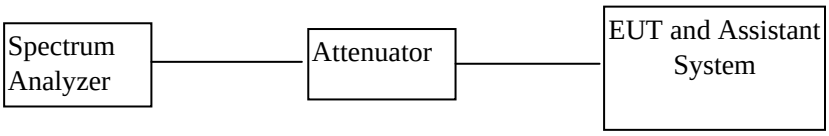
Test Item	Uncertainty
Uncertainty for Conduction emission test	±2.44dB (150KHz-30MHz)
	±2.94dB (9KHz-150KHz)
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	±3.14 dB (Antenna Polarize: V)
	±3.16 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz to 18GHz)(include Fundamental emission)	±4.14dB(1-6GHz)
	±4.46dB (6GHz-18Gz)
Bandwidth	±1.1%
Stop Transmitting Time Test	±0.6%
Uncertainty for frequency error	6.7 x 10-8 (Antenna couple method)
	5.5 x 10-8 (Conducted method)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

3. Equipment used during test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
RF Connected Test					
Spectrum analyzer	R&S	FSU26	1166.1660.26	2015/10/24	1Year
Vertor Signal Generator	R&S	SMBV100A	1407.6004K02	2015/10/24	1Year
RF Signal Generator	R&S	SMR20	1104.0002.20	2015/10/24	1Year
Power Sensor	Agilent	U2021XA	MY55150010	2015/04/18	1Year
Power Sensor	Agilent	U2021XA	MY55150011	2015/04/19	1Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	2015/10/24	1Year
Attenuator	Mini-Circuits	BW-S10W2	101109	2015/10/24	1Year
RF Cable	Micable	C10-01-01-1	100309	2015-08-18	1Year
Test Software	JS Tonscend	JS1120-2	Ver.2.5	N/A	N/A
USB Data acquisition	Agilent	U2531A	TW55043503	N/A	N/A
Auto control Unit	JS Tonscend	JS0806-2	158060010	N/A	N/A
Radiated Emission Test					
EMI Test Receiver	R&S	ESU8	100316	2015/10/24	1Year
Spectrum analyzer	R&S	FSU26	1166.1660.26	2015/10/24	1Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2015/05/30	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	2015/10/24	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	2015/10/24	1 Year
Pre-amplifier	A.H.	PAM-0118	360	2015/08/18	1 Year
RF Cable	HUBSER	CP-X2	W11.03	2015/10/24	1Year
RF Cable	HUBSER	CP-X1	W12.02	2015/10/24	1 Year
MI Cable	HUBSER	C10-01-01-1M	1091629	2015/10/24	1 Year
Test software	Audix	E3	V 6.11111b	/	/
Power Line Conducted Emissions Test					
Test Receiver	R&S	ESU8	100316	2015/10/24	1 Year
LISN 1	R&S	ENV216	101109	2015/10/24	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	2015/10/24	1 Year
CE Cable 1	HUBSER	ESU8/RF2	W10.01	2015/10/24	1 Year
Test software	Audix	E3	V 6.11111b	/	/

4. 20dB Bandwidth and 99% Bandwidth

4.1. Block diagram of test setup



4.2. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.3. Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

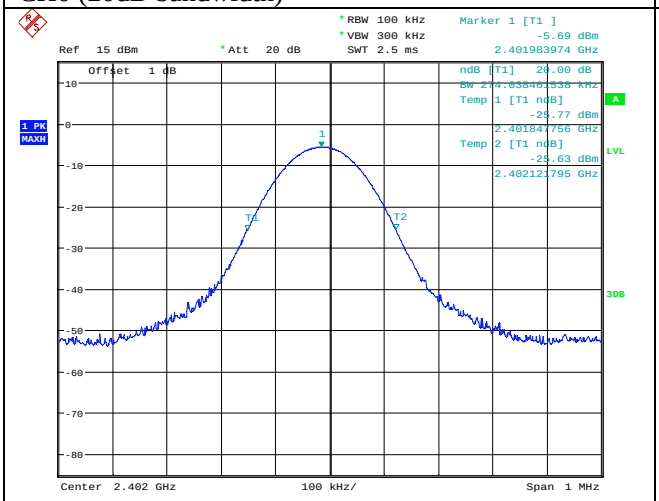
(2) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 300 kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.4. Test Result

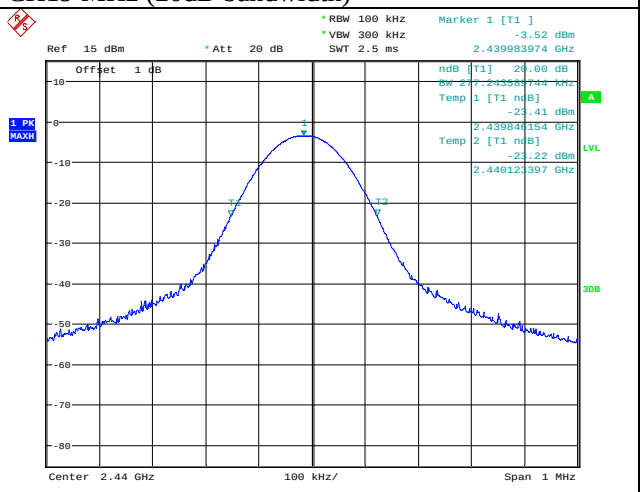
Mode	Freq. (MHz)	20dB bandwidth Result (MHz)	99% bandwidth Result (MHz)	Limit (MHz)	Margin (MHz)	Conclusion
TX mode GFSK	2402	0.274	0.236	/	/	PASS
	2440	0.277	0.236	/	/	PASS
	2480	0.277	0.237	/	/	PASS

4.5. Original test data

CH0 (20dB bandwidth)

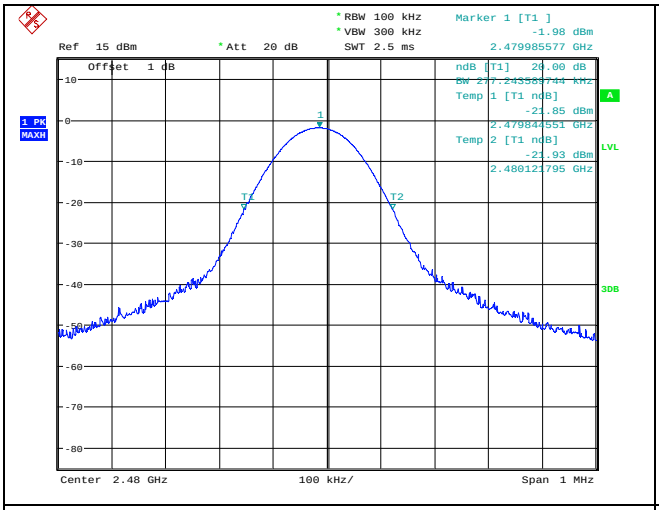


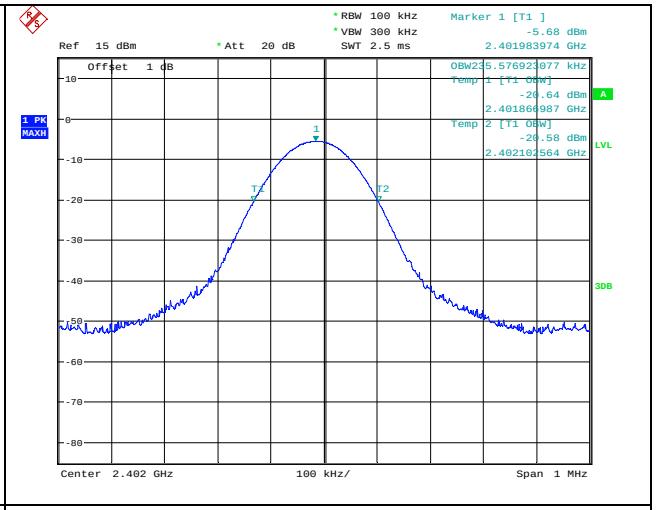
CH19 MHz (20dB bandwidth)



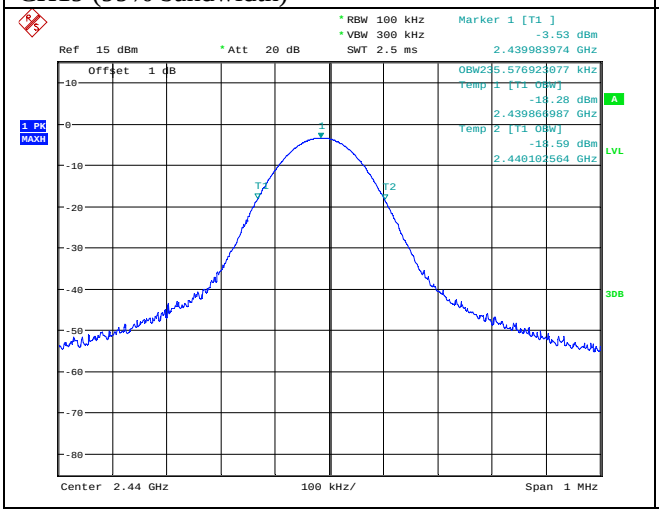
CH39MHz (20dB bandwidth)

CH0 MHz (99% bandwidth)

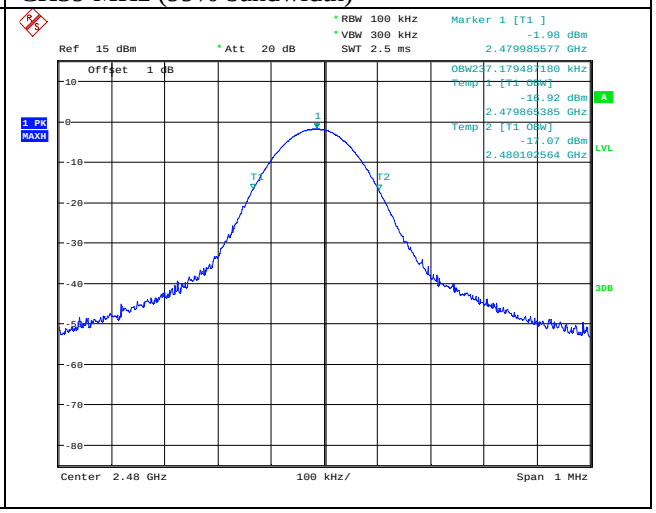




CH19 (99% bandwidth)



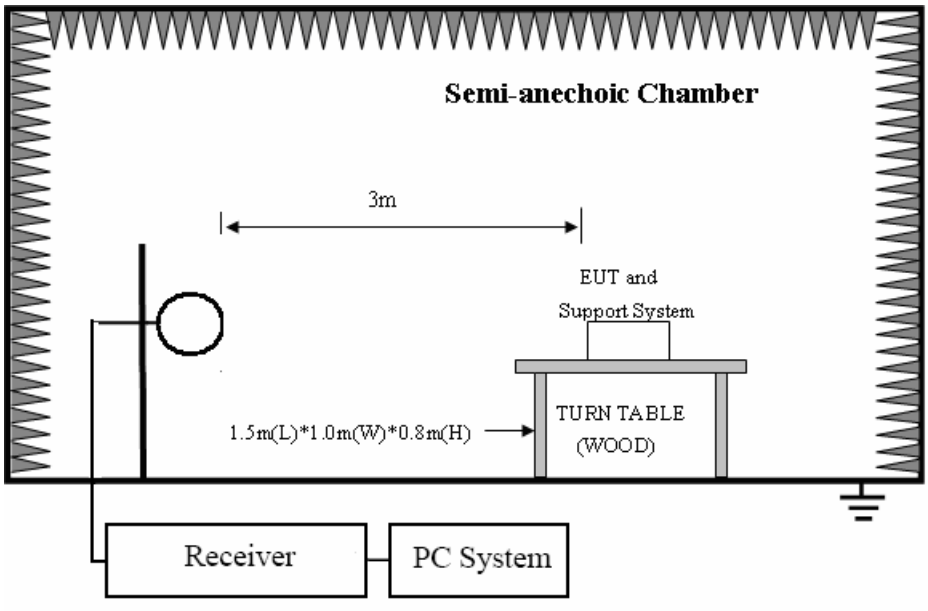
CH39 MHz (99% bandwidth)



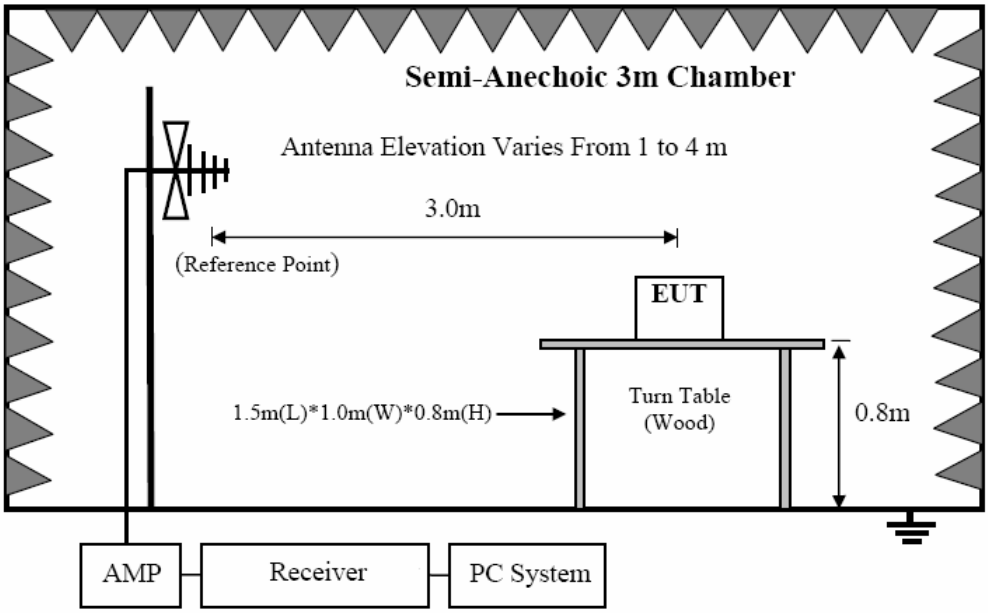
5. Radiated emission

5.1. Block diagram of test setup

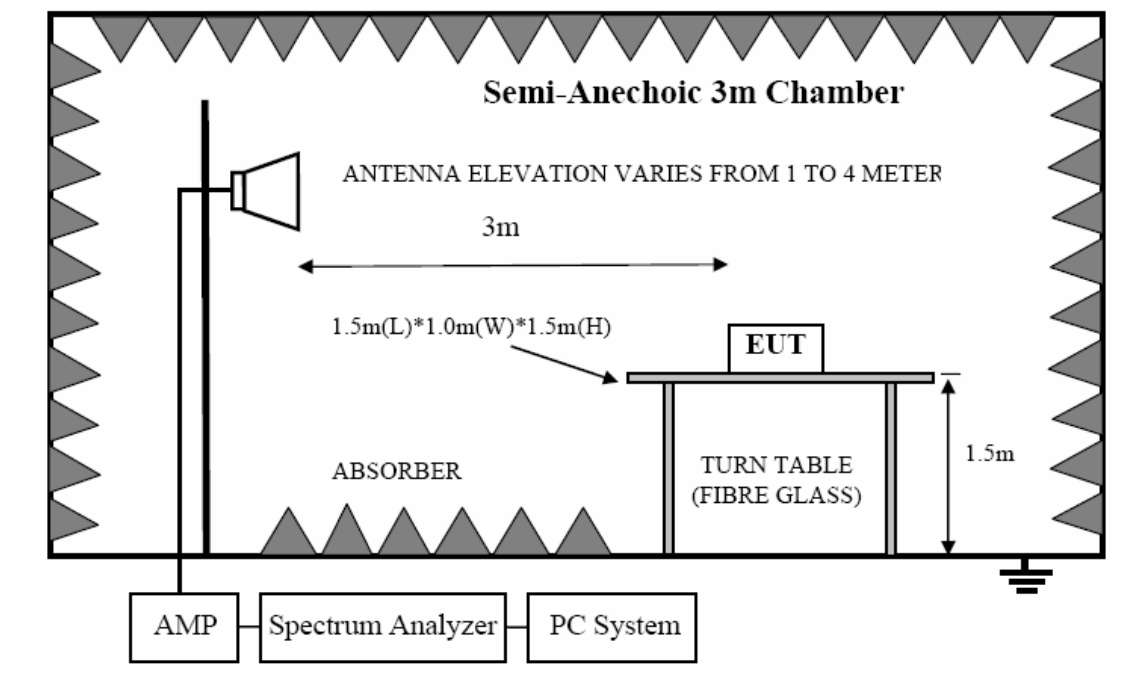
In 3m Anechoic Chamber Test Setup Diagram for 9KHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

5.2. Limit

1. FCC 15.205 Restricted frequency band

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])

2. FCC 15.209 Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(KHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(KHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5

216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Note: (1)The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz and above 1000MHz.Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer then that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$Limit_{3m}(dBuV/m)= Limit_{30m}(dBuV/m) + 40Log(30m/3m)$$

3. Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

5.3. Test Procedure

(1) EUT height should be 0.8m for below 1GHz at a semi - anechoic chamber while EUT height should be 1.5m for above 1GHz at full chamber or semi - anechoic chamber ground with absorbers.

(2) Test antenna was located 1m/3m from the EUT on an adjustable mast, and the antenna used as below table:

Test frequency range	Test antenna used	Test distance
9KHz-30MHz	Active Loop antenna	3 m
30MHz-1GHz	Trilog Broadband Antenna	3 m
1GHz-18GHz	Double Ridged Horn Antenna(1GHz-18GHz)	3 m
18GHz-40GHz	Horn Antenna(18GHz-40GHz)	1 m

According ANSI C63.10:2013 clause 6.4.4.2 and 6,5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9KHz to 25GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it’s fixed 1m above

ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Change power supply range from 85% to 115% of the rated supply voltage

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 18GHz to 25GHz, so below final test was performed with frequency range from 9KHz to 18GHz.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(5) The emissions from 9KHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz, for emissions from 9KHz-90KHz,110KHz-490KHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9KHz to 1GHz, QP or average values were measured with EMI receiver with below RBW

Frequency band	RBW
9KHz-150KHz	200Hz
150KHz-30MHz	9KHz
30MHz-1GHz	120KHz

(7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RMS detector RBW 1MHz VBW 3MHz for Average measure(according ANSI C63.10:2013 clause 4.2.3.2.3 procedure for average measure).

(8) For fundamental frequency test, according to section 4.5 test result of this report, the EUT's BW (max) =0.277MHz, so set spectrum analyzer's RBW=1MHz, VBW=3MHz. peak detector for PK, RMS detector for AV, Read the Level in spectrum analyzer and record.

(9) X, Y, Z three axial are tested and the report only the worst case.

5.4. Test result

PASS. (See below detailed test result)

All the emissions except fundamental emission from 9 KHz to 25GHz were comply with FCC PART 15.209 limits limit.

Note1: According exploratory test no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so the final test was performed with frequency range from 30MHz to 18GHz and recorded in below.

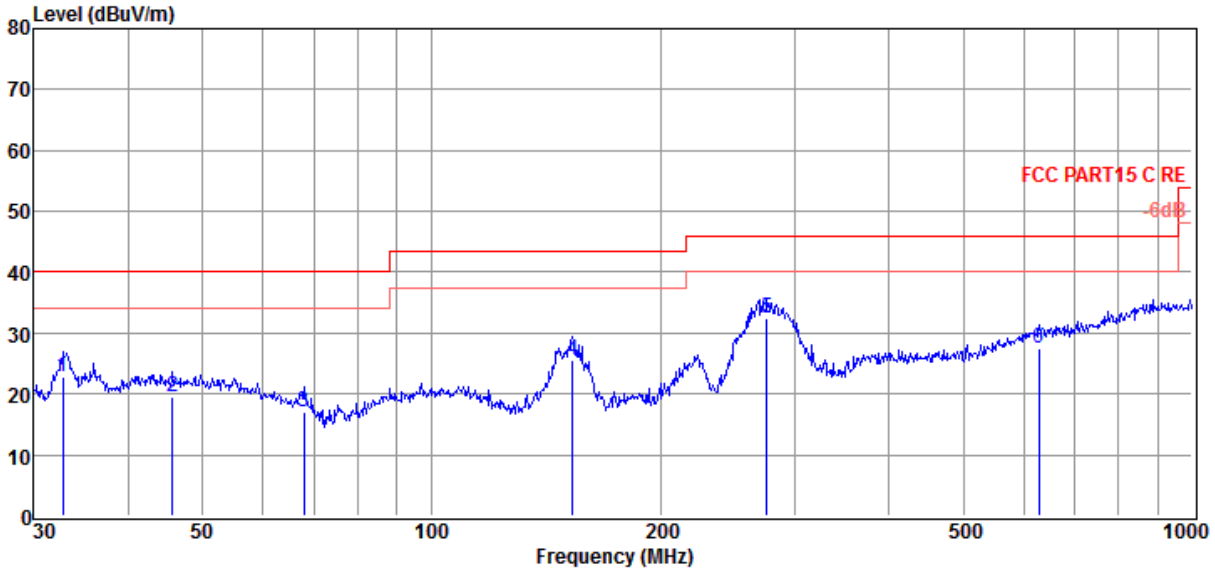
Note2: For emissions below 1GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1GHz, the final test was only performed with EUT working in GFSK, Tx 2440MHz mode.

Note3: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2016 Report Data\16Q0223-2\RE.EM6	
Test Date	: 2016-01-30	**Tested By**	: Jerry
EUT	: LED ceiling light	**Model Number**	: 54682141
Power Supply	: AC 120V/60Hz	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2015 VULB9163/3m/HORIZONTAL
Memo	:		

Data: 29



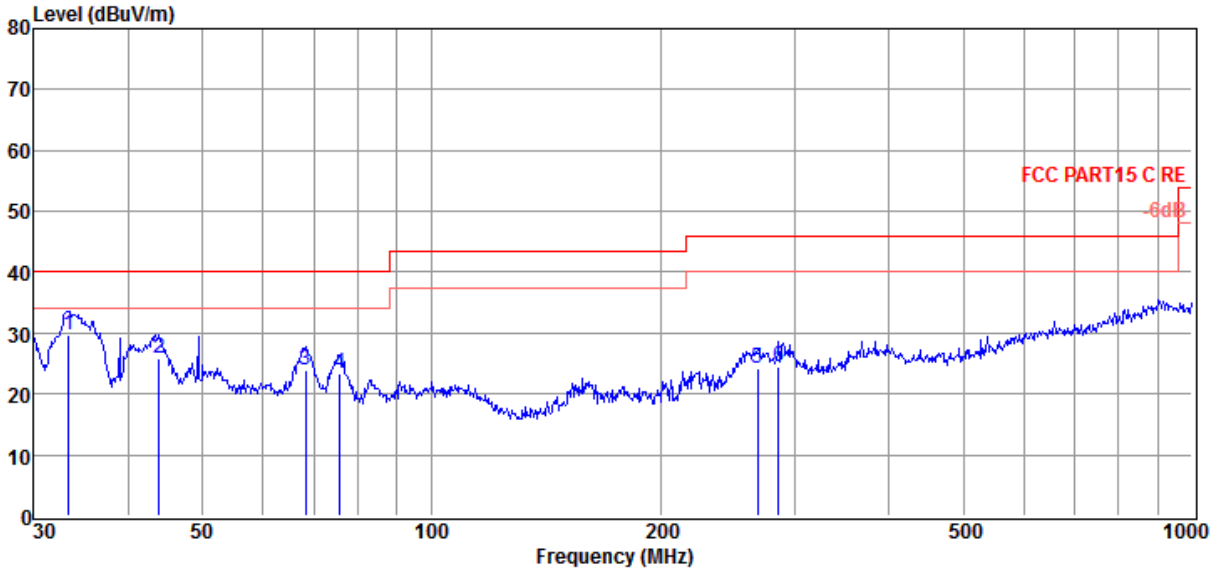
Item (Mark)	Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	32.75	7.63	11.48	3.71	22.82	40.00	-17.18	QP	HORIZONTAL
2	45.70	3.54	12.23	3.85	19.62	40.00	-20.38	QP	HORIZONTAL
3	67.91	4.72	8.32	4.04	17.08	40.00	-22.92	QP	HORIZONTAL
4	153.20	13.23	7.69	4.62	25.54	43.50	-17.96	QP	HORIZONTAL
5	276.12	14.64	12.52	5.26	32.42	46.00	-13.58	QP	HORIZONTAL
6	629.48	1.36	19.40	6.60	27.36	46.00	-18.64	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2016 Report Data\16Q0223-2\RE.EM6	
Test Date	: 2016-01-30	**Tested By**	: Jerry
EUT	: LED ceiling light	**Model Number**	: 54682141
Power Supply	: AC 120V/60Hz	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2015 VULB9163/3m/VERTICAL
Memo	:		

Data: 30



Item (Mark)	Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	33.33	14.41	11.53	3.71	29.65	40.00	-10.35	QP	VERTICAL
2	43.81	9.57	12.41	3.83	25.81	40.00	-14.19	QP	VERTICAL
3	68.39	11.64	8.13	4.04	23.81	40.00	-16.19	QP	VERTICAL
4	75.71	12.79	6.60	4.11	23.50	40.00	-16.50	QP	VERTICAL
5	268.49	6.25	12.81	5.23	24.29	46.00	-21.71	QP	VERTICAL
6	285.98	6.13	13.02	5.31	24.46	46.00	-21.54	QP	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

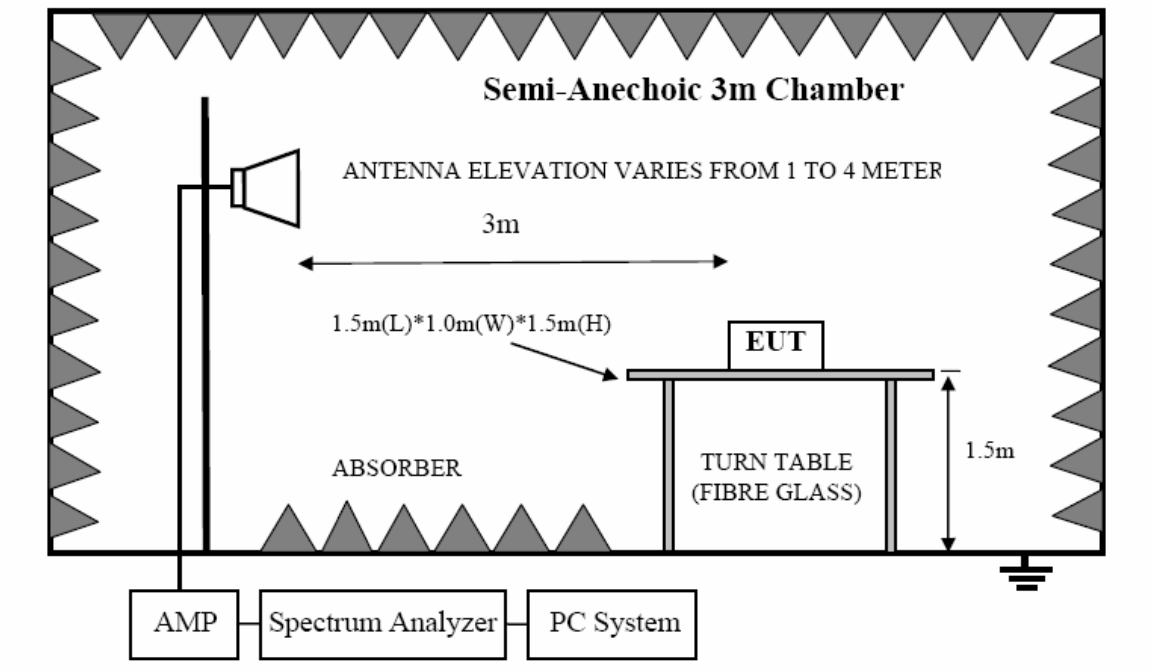
Radiated Emission test (above 1GHz)

Freq (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμ V/m)	Margin (dB)	Detector type	Polarization
Tx mode CH0									
2402.00	84.10	29.82	29.44	6.03	90.51	114.00	-23.49	Peak	HORIZONTAL
3417.64	38.58	31.87	29.75	7.22	47.92	74.00	-26.08	Peak	HORIZONTAL
4804.00	37.02	33.74	29.32	8.48	49.92	74.00	-24.08	Peak	HORIZONTAL
7438.44	35.95	36.55	30.70	10.80	52.60	74.00	-21.40	Peak	HORIZONTAL
2402.00	82.11	29.82	29.44	6.03	88.52	114.00	-25.48	Peak	VERTICAL
3961.37	38.03	33.29	29.06	7.59	49.85	74.00	-24.15	Peak	VERTICAL
4804.00	37.10	33.74	29.32	8.48	50.00	74.00	-24.00	Peak	VERTICAL
6607.02	36.63	35.89	30.03	10.05	52.54	74.00	-21.46	Peak	VERTICAL
7610.55	36.66	36.62	30.90	10.92	53.30	74.00	-20.70	Peak	VERTICAL
Tx mode CH19									
2440.00	81.34	29.97	29.57	6.08	87.82	114.00	-26.18	Peak	VERTICAL
3928.56	36.74	33.20	29.08	7.57	48.43	74.00	-25.57	Peak	VERTICAL
4880.00	36.80	33.72	29.33	8.56	49.75	74.00	-24.25	Peak	VERTICAL
6717.85	36.46	35.98	30.16	10.15	52.43	74.00	-21.57	Peak	VERTICAL
2440.00	83.46	29.97	29.57	6.08	89.94	114.00	-24.06	Peak	HORIZONTAL
3807.91	37.00	32.85	29.15	7.49	48.19	74.00	-25.81	Peak	HORIZONTAL
4880.00	38.38	33.72	29.33	8.56	51.33	74.00	-22.67	Peak	HORIZONTAL
7046.96	35.93	36.24	30.41	10.47	52.23	74.00	-21.77	Peak	HORIZONTAL
Tx mode CH39									
2480.00	83.45	30.12	29.69	6.13	90.01	114.00	-23.99	Peak	HORIZONTAL
3928.56	37.74	33.20	29.08	7.57	49.43	74.00	-24.57	Peak	HORIZONTAL
4960.00	37.63	33.71	29.34	8.63	50.63	74.00	-23.37	Peak	HORIZONTAL
7786.64	36.16	36.66	31.03	11.02	52.81	74.00	-21.19	Peak	HORIZONTAL
2480.00	79.83	30.12	29.69	6.13	86.39	114.00	-27.61	Peak	VERTICAL
3936.74	37.64	33.22	29.07	7.57	49.36	74.00	-24.64	Peak	VERTICAL
4960.00	37.01	33.71	29.34	8.63	50.01	74.00	-23.99	Peak	VERTICAL
6873.29	36.77	36.10	30.30	10.31	52.88	74.00	-21.12	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

6. Band Edge Compliance (radiated method)

6.1. Block diagram of test setup



6.2. Limit

All emissions outside operation frequency band 2400MHz to 2483.5MHz shall be comply with 15.209 limits.

6.3. Test Procedure

Same with clause 5.3 except change investigated frequency range from 2310MHz to 2415MHz and 2475MHz to 2500MHz.

Remark: All restriction band have been tested, and only the worse case is shown in report.

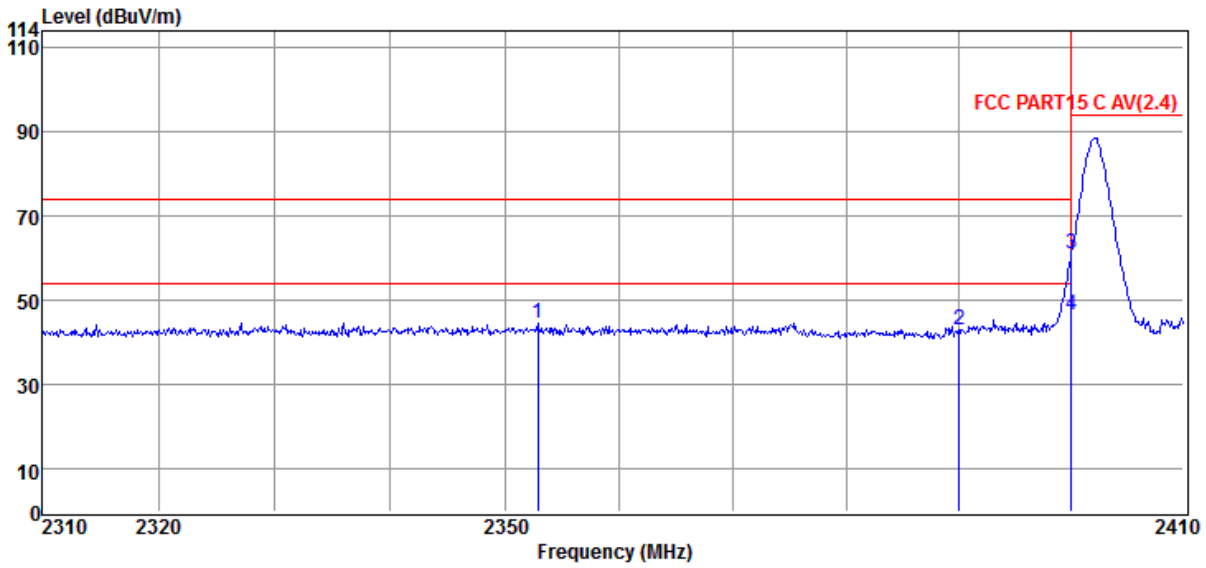
6.4. Test result

PASS. (See below detailed test result)

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2016 Report Data\16Q0223-2\RF.EM6	
Test Date	: 2016-03-08	**Tested By**	: Jerry
EUT	: LED ceiling light	**Model Number**	: 54682141
Power Supply	: AC 120V/60Hz	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2015 HF907/3m/VERTICAL
Memo	: CH0		

Data: 1



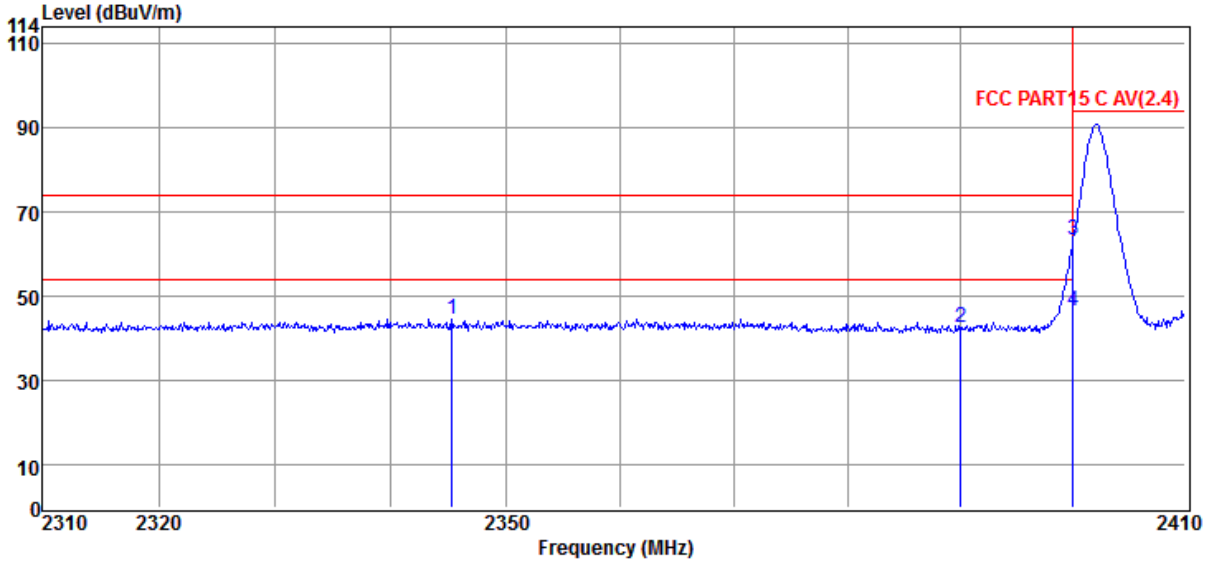
Item (Mark)	Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	2352.88	38.58	29.63	29.34	5.96	44.83	74.00	-29.17	Peak	VERTICAL
2	2390.00	36.88	29.78	29.41	6.01	43.26	74.00	-30.74	Peak	VERTICAL
3	2400.00	54.89	29.82	29.44	6.03	61.30	74.00	-12.70	Peak	VERTICAL
4	2400.00	40.14	29.82	29.44	6.03	46.55	54.00	-7.45	Average	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2016 Report Data\16Q0223-2\RF.EM6	
Test Date	: 2016-03-08	**Tested By**	: Jerry
EUT	: LED ceiling light	**Model Number**	: 54682141
Power Supply	: AC 120V/60Hz	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2015 HF907/3m/HORIZONTAL
Memo	: CH0		

Data: 2



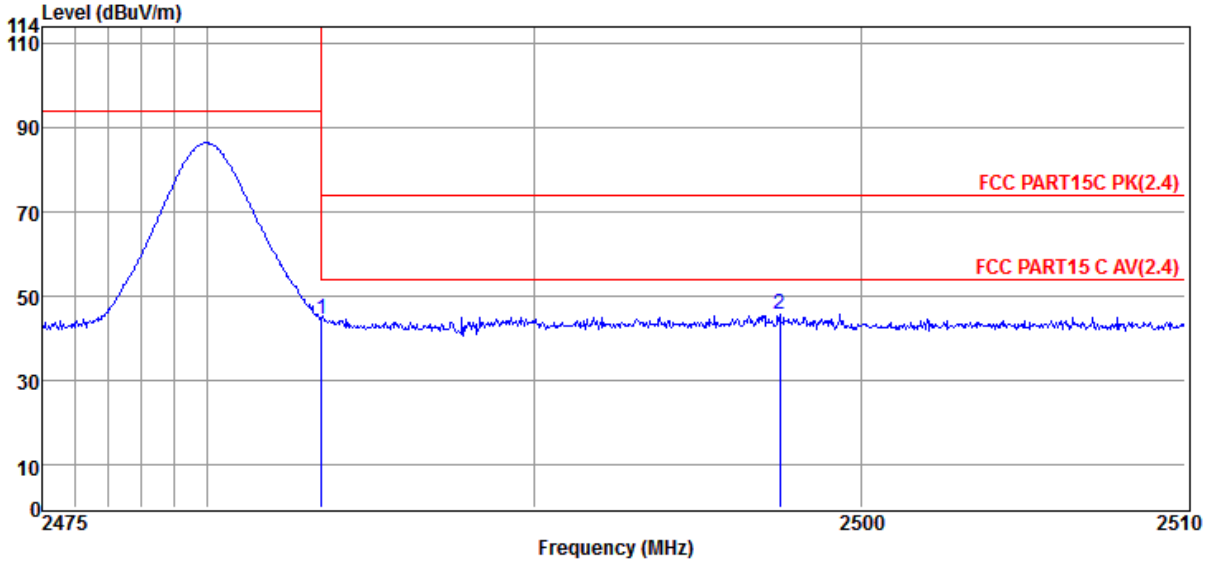
Item (Mark)	Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	2345.31	38.34	29.60	29.33	5.96	44.57	74.00	-29.43	Peak	HORIZONTAL
2	2390.00	36.24	29.78	29.41	6.01	42.62	74.00	-31.38	Peak	HORIZONTAL
3	2400.00	56.97	29.82	29.44	6.03	63.38	74.00	-10.62	Peak	HORIZONTAL
4	2400.00	41.15	29.82	29.44	6.03	47.56	54.00	-6.44	Average	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2016 Report Data\16Q0223-2\RF.EM6	
Test Date	: 2016-03-08	**Tested By**	: Jerry
EUT	: LED ceiling light	**Model Number**	: 54682141
Power Supply	: AC 120V/60Hz	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2015 HF907/3m/VERTICAL
Memo	: CH39		

Data: 9



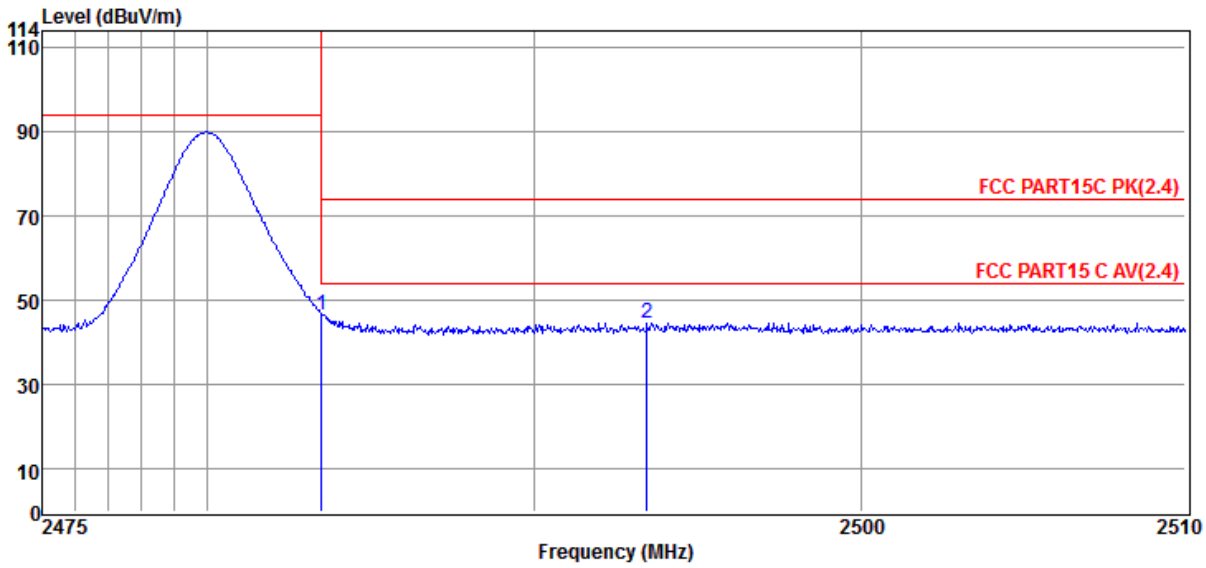
Item (Mark)	Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	38.03	30.14	29.71	6.15	44.61	74.00	-29.39	Peak	VERTICAL
2	2497.52	39.08	30.19	29.75	6.15	45.67	74.00	-28.33	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber	E:\2016 Report Data\16Q0223-2\RF.EM6	
Test Date	: 2016-03-08	**Tested By**	: Jerry
EUT	: LED ceiling light	**Model Number**	: 54682141
Power Supply	: AC 120V/60Hz	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2015 HF907/3m/HORIZONTAL
Memo	: CH39		

Data: 10

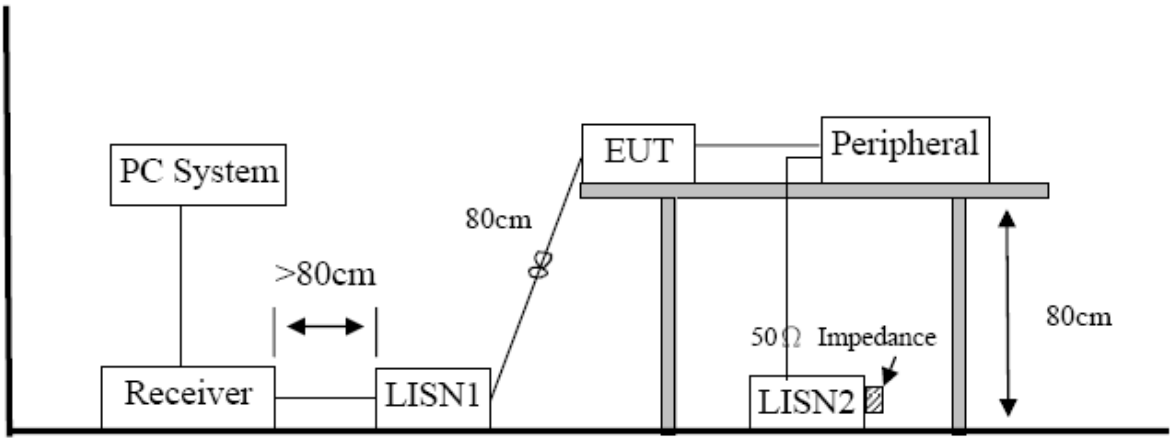


Item (Mark)	Freq (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	40.19	30.14	29.71	6.15	46.77	74.00	-27.23	Peak	HORIZONTAL
2	2493.45	38.15	30.18	29.73	6.15	44.75	74.00	-29.25	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.

7. Power Line Conducted Emission

7.1. Block diagram of test setup



7.2. Power Line Conducted Emission Limits(Class B)

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

7.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 7.1 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded

for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

7.4. Test Result

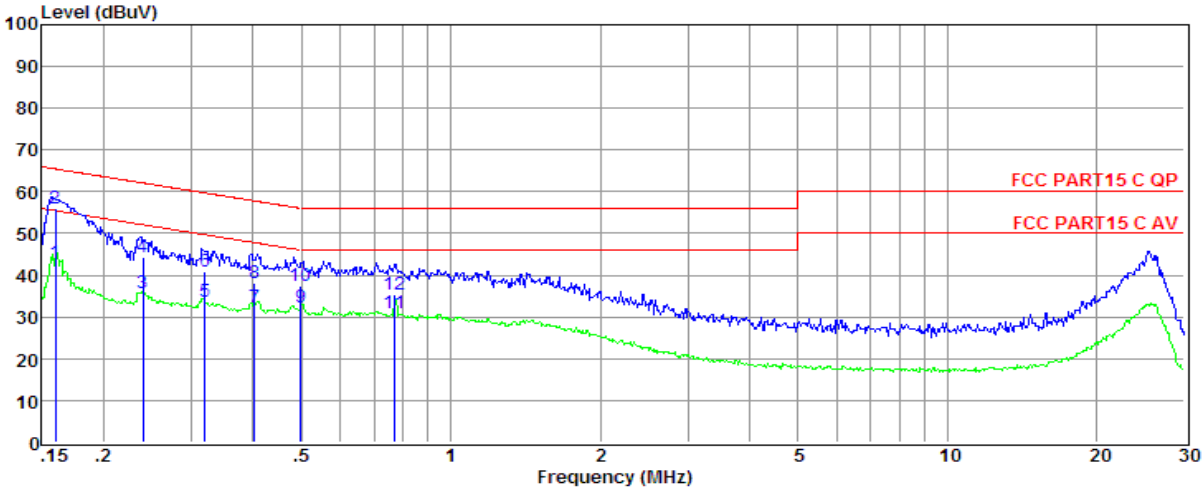
PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.
Note2: "-----" means Peak detection; "-----" mans Average detection

TR-4-E-010 Conducted Emission Test Result

Test Site	: DDT 1# Shield Room	E:\2016 report data\16Q0223-2\CE.EM6	
Test Date	: 2016-01-30	**Tested By**	: Jerry
EUT	: LED ceiling light	**Model Number**	: 54682141
Power Supply	: AC 120V/60Hz	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%, Press:100.1kPa	**LISN**	: 2015 ENV216/NEUTRAL
Memo	:		

Data: 50



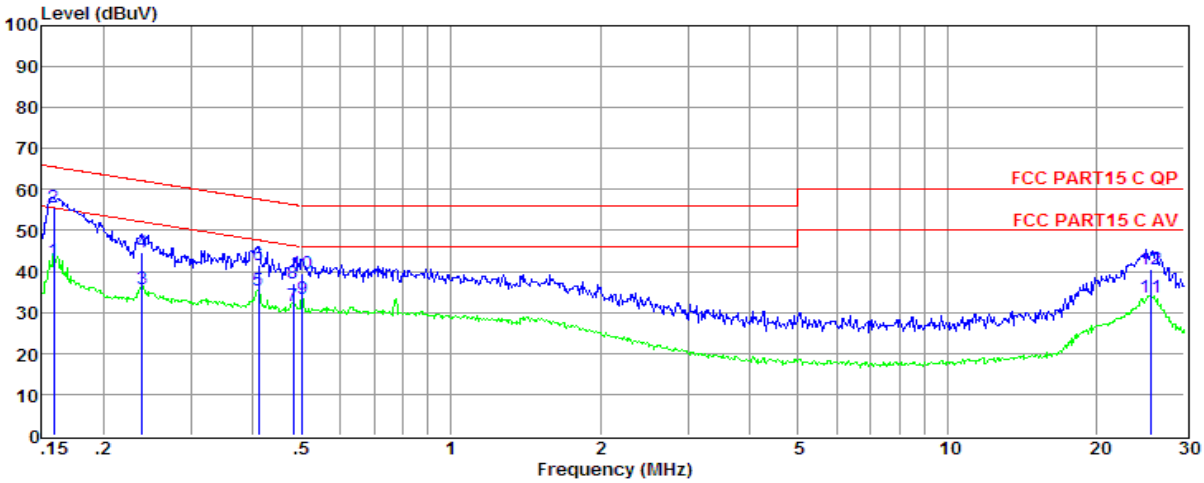
Item (Mark)	Freq (MHz)	Read Level (dBµV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBµV)	Limit Line (dBµV)	Over Limit (dB)	Detector	Phase
1	0.16	23.47	9.61	0.02	9.86	42.96	55.47	-12.51	Average	NEUTRAL
2	0.16	36.65	9.61	0.02	9.86	56.14	65.47	-9.33	QP	NEUTRAL
3	0.24	16.12	9.61	0.02	9.86	35.61	52.08	-16.47	Average	NEUTRAL
4	0.24	24.89	9.61	0.02	9.86	44.38	62.08	-17.70	QP	NEUTRAL
5	0.32	14.14	9.61	0.02	9.86	33.63	49.71	-16.08	Average	NEUTRAL
6	0.32	21.42	9.61	0.02	9.86	40.91	59.71	-18.80	QP	NEUTRAL
7	0.40	12.66	9.61	0.02	9.86	32.15	47.81	-15.66	Average	NEUTRAL
8	0.40	18.77	9.61	0.02	9.86	38.26	57.81	-19.55	QP	NEUTRAL
9	0.50	12.92	9.61	0.02	9.86	32.41	46.01	-13.60	Average	NEUTRAL
10	0.50	18.01	9.61	0.02	9.86	37.50	56.01	-18.51	QP	NEUTRAL
11	0.77	11.43	9.61	0.03	9.86	30.93	46.00	-15.07	Average	NEUTRAL
12	0.77	15.99	9.61	0.03	9.86	35.49	56.00	-20.51	QP	NEUTRAL

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

TR-4-E-010 Conducted Emission Test Result

Test Site	:	DDT 1# Shield Room	E:\2016 report data\16Q0223-2\CE.EM6		
Test Date	:	2016-01-30	**Tested By**	:	Jerry
EUT	:	LED ceiling light	**Model Number**	:	54682141
Power Supply	:	AC 120V/60Hz	**Test Mode**	:	TX mode
Condition	:	Temp:24.5'C,Humi:55%, Press:100.1kPa	**LISN**	:	2015 ENV216/LINE
Memo	:				

Data: 52



Item (Mark)	Freq (MHz)	Read Level (dBµV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBµV)	Limit Line (dBµV)	Over Limit (dB)	Detector	Phase
1	0.16	23.18	9.61	0.02	9.86	42.67	55.52	-12.85	Average	LINE
2	0.16	36.31	9.61	0.02	9.86	55.80	65.52	-9.72	QP	LINE
3	0.24	16.17	9.61	0.02	9.86	35.66	52.13	-16.47	Average	LINE
4	0.24	25.27	9.61	0.02	9.86	44.76	62.13	-17.37	QP	LINE
5	0.41	16.00	9.61	0.02	9.86	35.49	47.64	-12.15	Average	LINE
6	0.41	21.96	9.61	0.02	9.86	41.45	57.64	-16.19	QP	LINE
7	0.48	12.27	9.61	0.02	9.86	31.76	46.32	-14.56	Average	LINE
8	0.48	17.60	9.61	0.02	9.86	37.09	56.32	-19.23	QP	LINE
9	0.50	13.78	9.61	0.02	9.86	33.27	46.00	-12.73	Average	LINE
10	0.50	20.11	9.61	0.02	9.86	39.60	56.00	-16.40	QP	LINE
11	25.73	13.61	10.04	0.17	9.98	33.80	50.00	-16.20	Average	LINE
12	25.73	20.45	10.04	0.17	9.98	40.64	60.00	-19.36	QP	LINE

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

8. Antenna Requirements

8.1. Limit

For intentional device, according to FCC 47 CFR 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.

8.2. Result

The antennas used for this product are Integrated PCB antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 0dBi.

END OF REPORT