



EMC TEST REPORT

For

SHENZHEN NOBLE OPTO CO., LTD.

Product Name: High Power Traffic Light

Model No.: NBVB313HP

Prepared for : SHENZHEN NOBLE OPTO CO., LTD.
Address : Building 5F, Mingjinhai Industry Park, Shiyan Town, Bao'an District, Shenzhen, China, 518108

Prepared by : SHENZHEN POCE TECHNOLOGY CO., LTD.
Address : H Building, Hongfa Science and Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, China

Report No. : POCE18081717RRE
Date of Receiver : Aug. 17, 2018
Number of tested samples : 1
Serial number : Prototype
Date of Test : Aug. 17, 2018–Aug. 21, 2018
Date of Report : Aug. 21, 2018

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen POCE Technology Co., Ltd

TABLE OF CONTENT

Description

Test Report Description

Page

1. GENERAL INFORMATION	4
1.1. Description of Device (EUT).....	4
1.2. Test Standards	5
1.3. Test Methodology	5
1.4. Test Facility	5
2. MEASURING DEVICE AND TEST EQUIPMENT	6
2.1. For Power Line Conducted Emission	6
2.2. For Radiated Emission Measurement	6
2.3. For Harmonic Current / Flicker Measurement.....	6
2.4. For Electrostatic Discharge Immunity Test	6
2.5. For RF Strength Susceptibility Test	6
2.6. For Electrical Fast Transient /Burst Immunity Test.....	7
2.7. For Surge Immunity Test.....	7
2.8. For Injected Current Susceptibility Test.....	7
2.9. For Magnetic Field Immunity Test.....	7
2.10. For Voltage Dips and Interruptions Test.....	7
3. POWER LINE CONDUCTED EMISSION MEASUREMENT	8
3.1. Block Diagram of Test Setup	8
3.2. Measuring Standard	8
3.3. EUT Configuration on Measurement.....	8
3.4. Test Procedure	8
4. RADIATED EMISSION MEASUREMENT.....	11
4.1. Block Diagram of Test	11
4.2. Measuring Standard	11
4.3. EUT Configuration on Test.....	11
4.4. Test Procedure	12
5. MAGNETIC EMISSION DISTURBANCES.....	15
6. HARMONIC CURRENT EMISSION MEASUREMENT	19
6.1Block Diagram of Test Setup	19
6.2 Measuring Standard.....	19
6.3 Description of test Equipment.....	19
7. VOLTAGE FLUCTUATION AND FLICKER EASUREMENT	20
7.1Block Diagram of Test Setup	20
7.2Measuring Standard.....	20
8. ELECTROSTATIC DISCHARGE IMMUNITY TEST.....	21
8.1 Block Diagram of Test Setup	21
8.2 Test Standard	21
8.3 Severity Levels and Performance Criterion	21
8.4 Test Procedure	22
9. RF FIELD STRENGTH SUSCEPTIBILITY TEST	23
9.1Block Diagram of Test	24
9.2 Test Standard	24
9.3Severity Levels and Performance Criterion	25
9.4Test Procedure	25
10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST	27
10.1 Block Diagram of Test Setup	27
10.2 Test Standard	27

10.3 Severity Levels and Performance Criterion	27
10.4 Test Procedure	28
11. SURGE IMMUNITY TEST.....	30
11.1 Block Diagram of Test Setup.....	30
11.2 Test Standard	30
11.3 Severity Levels and Performance Criterion.....	30
11.4 Test Procedure	31
12. INJECTED CURRENTS SUSCEPTIBILITY TEST	33
12.1 Block Diagram of Test Setup	33
12.2 Test Standard	33
12.3 Severity Levels and Performance Criterion	33
12.4 Test Procedure	34
13. MAGNETIC FIELD SUSCEPTIBILITY TEST	36
13.1 Block Diagram of Test	36
13.2 Test Standard	36
13.3 Severity Levels and Performance Criterion	36
13.4 Test Procedure	36
14. VOLTAGE DIPS AND INTERRUPTIONS TEST	38
14.1 Block Diagram of Test Setup	38
14.2 Test Standard	38
14.3 Severity Levels and Performance Criterion	39
14.4 Test Procedure	39
15. PHOTOGRAPH	41
15.1 Photo of Radiated Emission Measurement	41
15.2 Photo of Conducted Emission Measurement	41
15. PHOTOGRAPHS OF EUT.....	42
16. MANUFACTURER/ APPROVAL HOLDER DECLARATION.....	46
Photos of EUT	

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : High Power Traffic Light

Trade Name : N/A

Model : NBVB313HP

Supplementary Model : NBAL313HP, NBPS312HP, NBVB312HP, NBAL213HP, NBPS212HP, NBVB213HP, NBVB212HP, NBAL113HP, NBVB113HP, NBVB112HP, NBVB200HP-R, NBVB200HP-A, NBVB200HP-G, NBVB300HP-R, NBVB300HP-A, NBVB300HP-G, NBVB100HP-R, NBVB100HP-A, NBVB100HP-G

Test Voltage : AC 230/50Hz

Rating : Input: AC 100-240V, 50-60 Hz

Applicant : SHENZHEN NOBLE OPTO CO., LTD.

Address : Building 5F, Mingjinhai Industry Park, Shiyan Town, Bao'an District, Shenzhen, China, 518108

Manufacturer : SHENZHEN NOBLE OPTO CO., LTD.

Address : Building 5F, Mingjinhai Industry Park, Shiyan Town, Bao'an District, Shenzhen, China, 518108

Test Standards : EN 55015:2013+A1:2015
EN 61547:2009
EN 61000-3-2:2014
EN 61000-3-3:2013

Test Result : PASS

Test Engineer

Reviewed By:



1.2. Test Standards

- √ Indicates that the test is applicable
 × Indicates that the test is not applicable

Standard	Test Items	Status
EN 55015:2013+A1:2015	Disturbance Voltage at The Mains Terminals (150KHz To 30MHz)	√
	Radiated Disturbances (30MHz To 300MHz)	√
	Magnetic Emission (9KHz To 30MHz)	√
EN 61000-3-2:2014	Harmonic Current	×
EN 61000-3-3:2013	Voltage Fluctuations	√
EN 61000-4-2:2009	Electrostatic discharge Immunity	√
EN 61000-4-3:2006+A2:2010	Radiated Susceptibility (80MHz to 1GHz)	√
EN 61000-4-4:2012	Electrostatic Fast Transient/Burst Immunity	√
EN 61000-4-5:2014	Surge Immunity	√
EN 61000-4-6:2014	Conducted Susceptibility (150KHz to 80MHz)	√
EN 61000-4-8:2010	Power Frequency Magnetic Field Immunity (50/60Hz)	√
EN 61000-4-11:2004	Voltage Dips Short Interruptions Immunity Tests	√

1.3. Test Methodology

All measurements contained in this report were conducted with CISPR 16-1, radio disturbance and immunity measuring apparatus, and CISPR16-2, Method of measurement of disturbances and immunity.

All measurement required was performed at laboratory of Shenzhen POCE Technology Co., Ltd., at H Building, Hongfa Science and Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, China

1.4. Test Facility

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

CNAS Registration Number. is L8229

The facility also complies with the radiated and AC line conducted test site criteria set forth in CISPR 16-1, CISPR16-2.

2. MEASURING DEVICE AND TEST EQUIPMENT

2.1. For Power Line Conducted Emission

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	Test Receiver	Rohde & Schwarz	ESPI TEST RECEIVER	ID:1164.6607K03-102109-MH	Dec. 28, 2017
2.	L.I.S.N	Rohde & Schwarz	ESH3-Z5.831.5518.52	9561-G071	Dec. 28, 2017
3.	50ΩCoaxial Switch	Anritsu	MP59B	M20531	N/A
4.	Pulse Limiter	SCHWARZ BECK	VTSD 9561-F Pulse limiter 10dB Ateennator	561-G071	Dec. 28, 2017
5.	Cable	SCHWARZ BECK	N/A	N/A	Dec. 28, 2017

2.2. For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	Test Receiver	Rohde & Schwarz	ESPI TEST RECEIVER	ID:1164.6607K03-102109-MH	Dec. 28, 2017
2.	Bilog Antenna	Sunol Sciences	Model JB6 Antenna	A090414	Dec. 28, 2017
3.	50ΩCoaxial Switch	Anritsu	MP59B	M20531	N/A
4.	control	Positioning Controller	Model MF-7802	MF780208362	Dec. 28, 2017
5.	Cable	SCHWARZ BECK	N/A	N/A	Dec. 28, 2017
6.	Cable	SCHWARZ BECK	N/A	N/A	Dec. 28, 2017

2.3. For Harmonic Current / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	Coupling decoupling network	SCHAFFNER	M016	20812	Dec. 28, 2017
2.	PC	N/A	P2L97	N/A	Dec. 28, 2017

2.4. For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	ESD Tester	Prima	ESD61002A	144305	Dec. 28, 2017

2.5. For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	Signal	HP	8648A	3625U00573	Dec. 28, 2017

	Generator				
2.	Amplifier	AR	500A100	17034	NCR
3.	Amplifier	AR	100W/1000M1	17028	NCR
4.	Isotropic Field Monitor	AR	FM2000	16829	NCR
5.	Isotropic Field Probe	AR	FP2000	16755	Dec. 28, 2017
6.	Biconic Antenna	EMCO	3108	9507-2534	NCR
7.	Log-periodic Antenna	AR	AT1080	16812	NCR
8.	PC	N/A	486DX2	N/A	N/A

2.6. For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	Burst Tester	HTEC	HEFT 51	144303	Dec. 28, 2017
2.	Coupling CLamp	HTEC	IP-4A	147147	Dec. 28, 2017

2.7. For Surge Immunity Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	Surge Tester	HTEC	HCWG	144302	Dec. 28, 2017

2.8. For Injected Current Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	Simulator	EMTEST	CWS500C	0900-12	Dec. 28, 2017
2.	CDN	EMTEST	CDN-M2	5100100100	Dec. 28, 2017
3.	CDN	EMTEST	CDN-M3	0900-11	Dec. 28, 2017
4.	Injection CLamp	EMTEST	F-2031-23MM	368	Dec. 28, 2017
5.	Attenuator	EMTEST	ATT6	0010222A	Dec. 28, 2017

2.9. For Magnetic Field Immunity Test

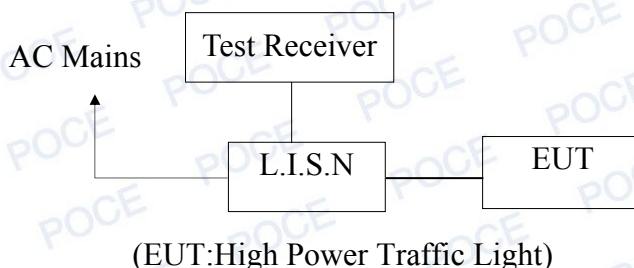
Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	Magnetic Field Tester	HTEC	HPFM T	144301	Dec. 28, 2017

2.10. For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Factory Number	Last Cal.
1.	Dips Tester	HTEC	HPFS	144304	Dec. 28, 2017

3. POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1. Block Diagram of Test Setup



3.2. Measuring Standard

EN 55015:2013+A1:2015

Power Line Conducted Emission Limits

Frequency (MHz)	Limit (dBμV)	
	Quasi-Peak Level	Average Level
0.009 ~ 0.05	110	-
0.05 ~ 0.15	90.0~80.0*	-
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

3.3. EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN 55015 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 55015 regulations during conducted emission measurement.

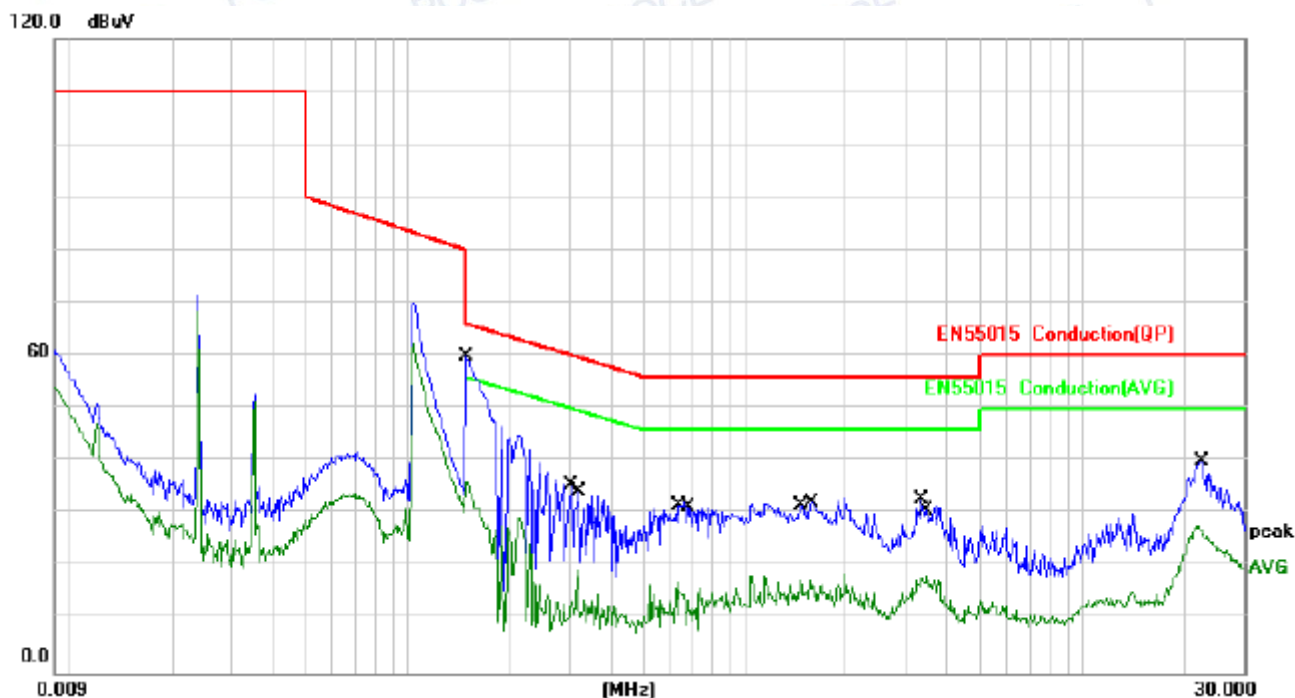
The bandwidth of the field strength meter (R&S Test Receiver ESCS30) is set at 9KHz in 150KHz~30MHz and 200Hz in 9KHz~150KHz.

The frequency range from 9kHz to 30MHz is investigated.

Conduction Uncertainty: $U_c = \pm 2.72 \text{ dB}$

Conducted Emission

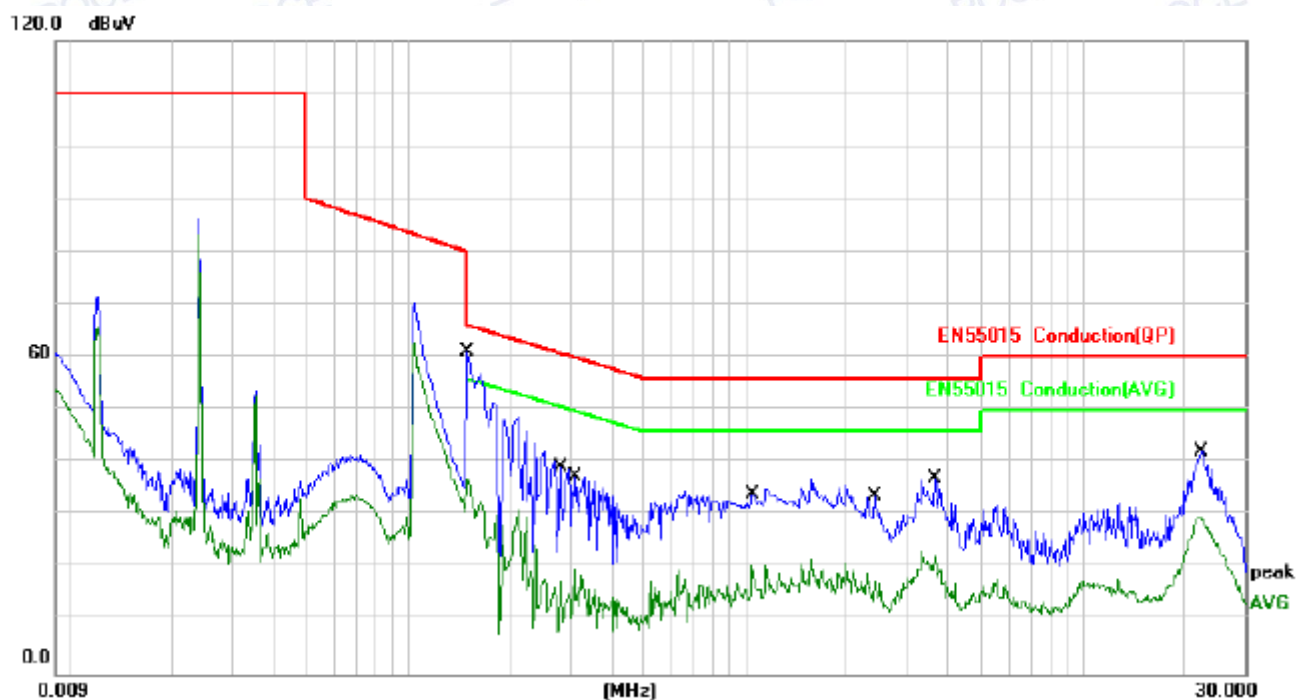
EUT	: High Power Traffic Light	Temperature:	20°C
M/N	: NBVB313HP	Humidity	: 50%
Test Voltage	: AC 230V/50Hz	Test Mode	: On
Test Engineer	: Bill	Phase	: N-Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1500	60.05	-0.13	59.92	65.99	-6.07	QP	
2		0.1500	36.27	-0.13	36.14	55.99	-19.85	AVG	
3		0.3060	35.52	-0.01	35.51	60.08	-24.57	QP	
4		0.3180	19.48	-0.01	19.47	49.76	-30.29	AVG	
5		0.6300	17.42	-0.05	17.37	46.00	-28.63	AVG	
6		0.6820	31.49	-0.06	31.43	56.00	-24.57	QP	
7		1.4660	17.73	-0.19	17.54	46.00	-28.46	AVG	
8		1.5900	32.56	-0.20	32.36	56.00	-23.64	QP	
9		3.3260	33.10	-0.19	32.91	56.00	-23.09	QP	
10		3.4460	18.73	-0.19	18.54	46.00	-27.46	AVG	
11		22.1259	28.28	-0.40	27.88	50.00	-22.12	AVG	
12		22.4260	40.49	-0.40	40.09	60.00	-19.91	QP	

Conducted Emission

EUT	: High Power Traffic Light	Temperature:	20°C
M/N	: NBVB313HP	Humidity	: 50%
Test Voltage	: AC 230V/50Hz	Test Mode	: On
Test Engineer	: Bill	Phase	: L-Line

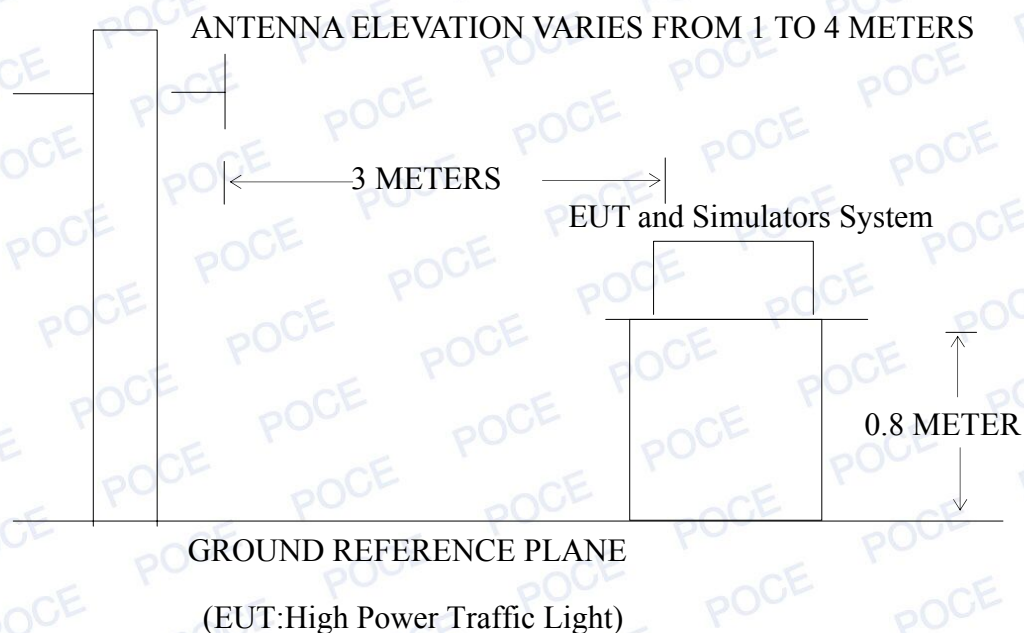


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1	*	0.1500	61.09	-0.13	60.96	65.99	-5.03	QP	
2		0.1502	36.90	-0.13	36.77	55.98	-19.21	AVG	
3		0.2819	39.12	-0.01	39.11	60.76	-21.65	QP	
4		0.3100	19.98	-0.01	19.97	49.97	-30.00	AVG	
5		1.0420	20.66	-0.13	20.53	46.00	-25.47	AVG	
6		1.0500	34.28	-0.13	34.15	56.00	-21.85	QP	
7		2.3940	33.94	-0.24	33.70	56.00	-22.30	QP	
8		2.3940	17.92	-0.24	17.68	46.00	-28.32	AVG	
9		3.6300	37.14	-0.19	36.95	56.00	-19.05	QP	
10		3.6300	22.46	-0.19	22.27	46.00	-23.73	AVG	
11		22.2060	30.21	-0.40	29.81	50.00	-20.19	AVG	
12		22.2500	42.52	-0.40	42.12	60.00	-17.88	QP	

4. RADIATED EMISSION MEASUREMENT

4.1. Block Diagram of Test

4.1.1. Block diagram of test setup (In chamber)



4.2. Measuring Standard

EN 55015:2013+A1:2015

Radiated Emission Limits

Including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
30 ~ 230	3	40
230 ~ 300	3	47

Note: (1) The smaller limit shall apply at the combination point between two frequency bands.

(2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

4.3. EUT Configuration on Test

The EN 55015 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.4. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna (calibrated by Dipole Antenna) is used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

The bandwidth of the Receiver (ESCS30) is set at 120kHz.
The frequency range from 30MHz to 300MHz is investigated.

Radiation Uncertainty: $U_r = \pm 3.84 \text{ dB}$

Radiated Emission Test Data

EUT	:	High Power Traffic Light	Temperature:	20°C
M/N	:	NBVB313HP	Humidity	: 50%
Test Voltage	:	AC 230V/50Hz	Test Mode	: On
Test Engineer	:	Bill	Polarization	: Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		31.7045	30.70	-4.95	25.75	40.00	-14.25	QP		
2		47.6564	39.29	-16.65	22.64	40.00	-17.36	QP		
3	*	116.9826	46.00	-12.85	33.15	40.00	-6.85	QP		
4		127.3859	40.45	-12.56	27.89	40.00	-12.11	QP		
5		141.2932	41.09	-13.13	27.96	40.00	-12.04	QP		
6		159.2652	43.92	-13.02	30.90	40.00	-9.10	QP		

Radiated Emission Test Data

EUT	:	High Power Traffic Light	Temperature:	20℃
M/N	:	NBVB313HP	Humidity	: 50%
Test Voltage	:	AC 230V/50Hz	Test Mode	: On
Test Engineer	:	Bill	Polarization	: Vertical



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		30.1385	27.18	-5.02	22.16	40.00	-17.84	QP		
2		51.7751	41.34	-18.75	22.59	40.00	-17.41	QP		
3		90.5986	39.02	-17.20	21.82	40.00	-18.18	QP		
4	*	116.7135	41.86	-12.78	29.08	40.00	-10.92	QP		
5		127.9739	36.70	-12.38	24.32	40.00	-15.68	QP		
6		160.0005	38.92	-12.90	26.02	40.00	-13.98	QP		

5. MAGNETIC EMISSION DISTURBANCES

5.1 Measurement Uncertainty

The quasi-peak limits of the magnetic component of the radiated disturbance field strength in the frequency range 9 kHz to 30 MHz, measured as a current in 2 m, 3 m or 4 m loop antennas around the Lighting equipment, are given in table 3.

The limits for the 2 m loop diameter apply to equipment not exceeding a length of 1,6 m, those for the 3 m loop diameter for equipment having a length in between 1,6 m and 2,6 m and those for the 4 m loop diameter for equipment having a length in between 2,6 m and 3,6 m.

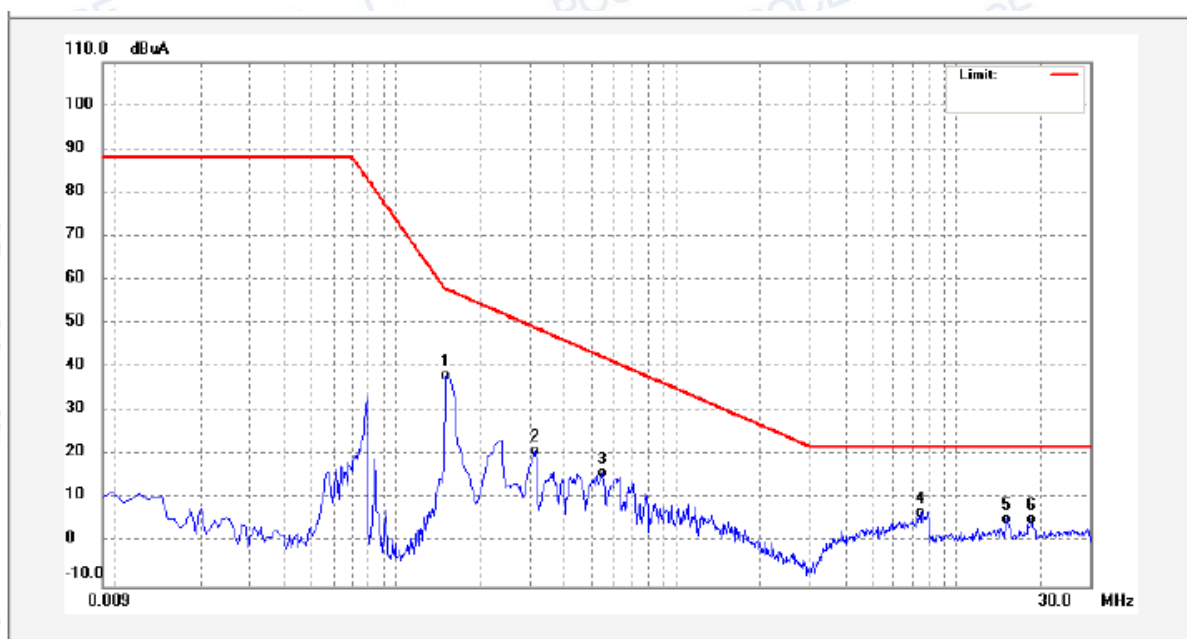
5.2 Limit of Magnetic Emission Disturbances

Table 3a – Radiated disturbance limits in the frequency range 9 kHz to 30 MHz

Frequency range MHz	Limits for loop diameter dB(μA) ^a		
	2 m	3 m	4 m
9 kHz to 70 kHz	88	81	75
70 kHz to 150 kHz	88 to 58 ^b	81 to 51 ^b	75 to 45 ^b
150 kHz to 3,0 MHz	58 to 22 ^b	51 to 15 ^b	45 to 9 ^b
3,0 MHz to 30 MHz	22	15 to 16 ^c	9 to 12 ^c
^a At the transition frequency, the lower limit applies.			
^b Decreasing linearly with the logarithm of the frequency. For electrodeless lamps and luminaires, the limit in the frequency range of 2,2 MHz to 3,0 MHz is 58 dB(μA) for 2 m, 51 dB(μA) for 3 m and 45 dB(μA) for 4 m loop diameter.			
^c Increasing linearly with the logarithm of the frequency.			
NOTE In Japan, the limits for frequencies 9 kHz to 150 kHz do not apply.			

Magnetic Emission Test Data

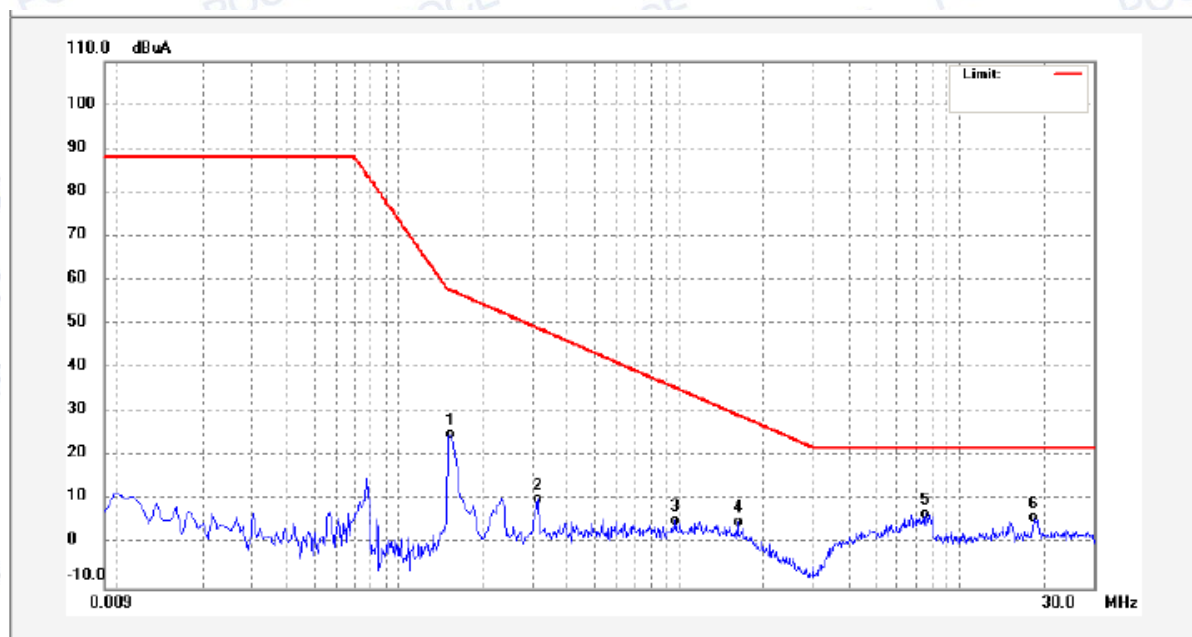
EUT	:	High Power Traffic Light	Temperature:	20℃
M/N	:	NBVB313HP	Humidity	: 50%
Test Voltage	:	AC 230V/50Hz	Test Mode	: On
Test Engineer	:	Bill	Comment	: Loop X



No.	Freq. (MHz)	Reading (dBuA)	Factor (dB)	Result (dBuA)	Limit dBuA	Margin (dB)	Detector	Remark
1	0.1505	24.86	13.33	38.19	57.95	-19.76	QP	
2	0.3146	2.15	19.02	21.17	49.09	-27.92	QP	
3	0.5466	-6.72	22.67	15.95	42.46	-26.51	QP	
4	7.4946	-19.00	26.00	7.00	22.00	-15.00	QP	
5	15.0586	-20.32	25.71	5.39	22.00	-16.61	QP	
6	18.5906	-20.35	25.72	5.37	22.00	-16.63	QP	

Magnetic Emission Test Data

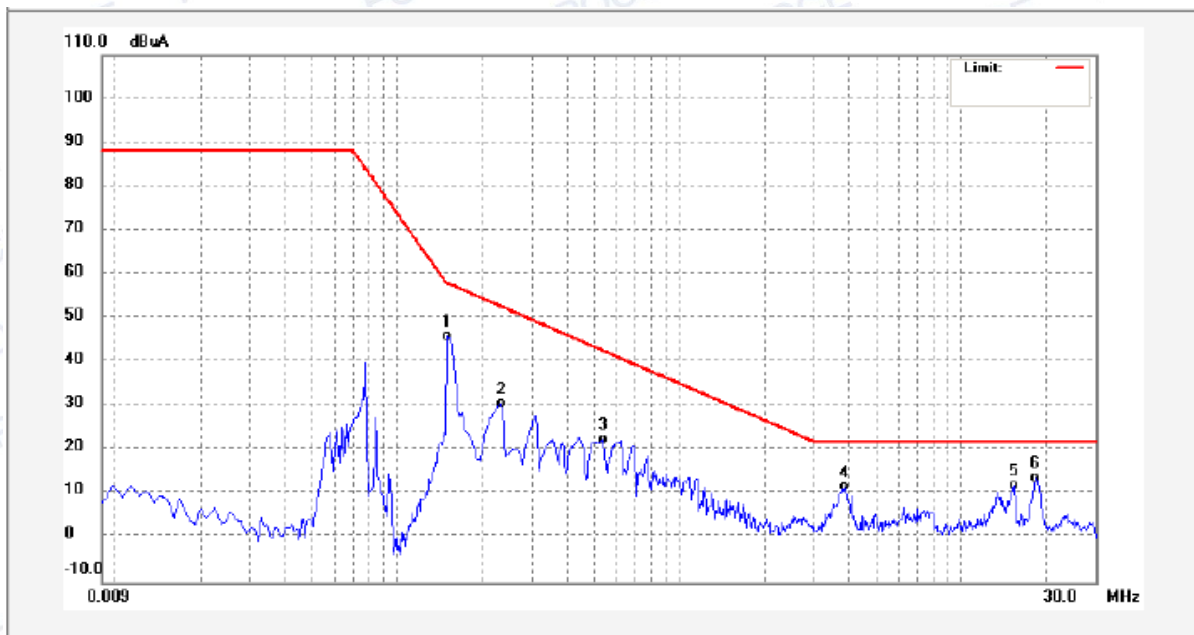
EUT	:	High Power Traffic Light	Temperature:	20°C
M/N	:	NBVB313HP	Humidity	: 50%
Test Voltage	:	AC 230V/50Hz	Test Mode	: On
Test Engineer	:	Bill	Comment	: Loop Y



No.	Freq. (MHz)	Reading (dBuA)	Factor (dB)	Result (dBuA)	Limit dBuA	Margin (dB)	Detector	Remark
1	0.1546	11.23	13.57	24.80	57.63	-32.83	QP	
2	0.3146	-8.91	19.02	10.11	49.09	-38.98	QP	
3	0.9706	-19.41	24.96	5.55	35.56	-30.01	QP	
4	1.6186	-20.40	25.50	5.10	29.41	-24.31	QP	
5	7.5586	-19.05	26.00	6.95	22.00	-15.05	QP	
6	18.2906	-19.53	25.72	6.19	22.00	-15.81	QP	

Magnetic Emission Test Data

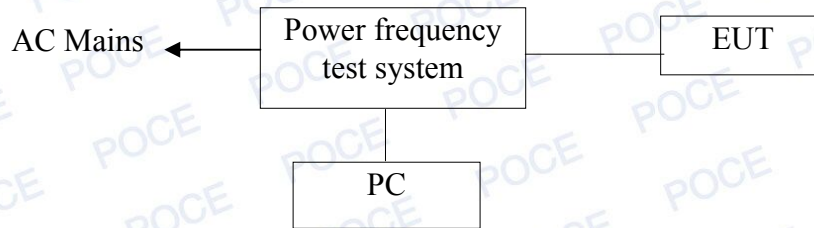
EUT	:	High Power Traffic Light	Temperature:	20℃
M/N	:	NBVB313HP	Humidity	: 50%
Test Voltage	:	AC 230V/50Hz	Test Mode	: On
Test Engineer	:	Bill	Comment	: Loop Z



No.	Freq. (MHz)	Reading (dBuA)	Factor (dB)	Result (dBuA)	Limit dBuA	Margin (dB)	Detector	Remark
1	0.1505	32.53	13.33	45.86	57.95	-12.09	QP	
2	0.2346	13.64	17.06	30.70	52.62	-21.92	QP	
3	0.5386	-0.17	22.58	22.41	42.63	-20.22	QP	
4	3.8546	-14.58	26.22	11.64	22.00	-10.36	QP	
5	15.4266	-13.53	25.71	12.18	22.00	-9.82	QP	
6	18.2906	-11.85	25.72	13.87	22.00	-8.13	QP	

6. HARMONIC CURRENT EMISSION MEASUREMENT

6.1 Block Diagram of Test Setup



(EUT:High Power Traffic Light)

6.2 Measuring Standard

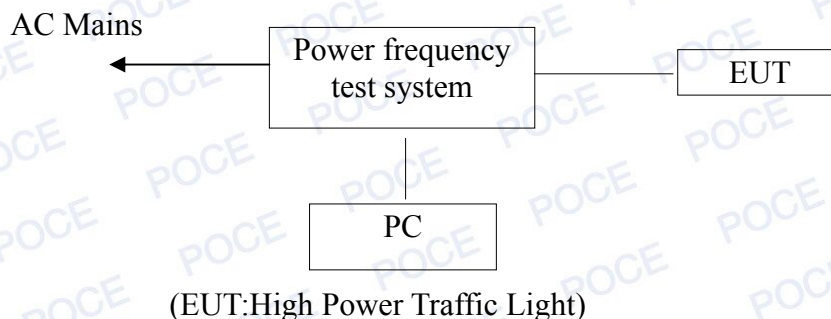
EN 61000-3-2: 2014

6.3 Description of test Equipment

N/A

7. VOLTAGE FLUCTUATION AND FLICKER EASUREMENT

7.1 Block Diagram of Test Setup



7.2 Measuring Standard

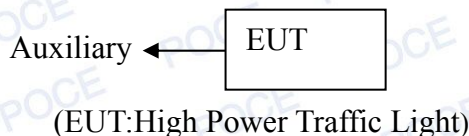
EN 61000-3-3:2013

	EUT values	Limit	Result
Pst	0.012	1.00	PASS
dc [%]	0.003	3.30	PASS
Dmax [%]	0.004	4.00	PASS
dt [s]	0.000	0.50	PASS

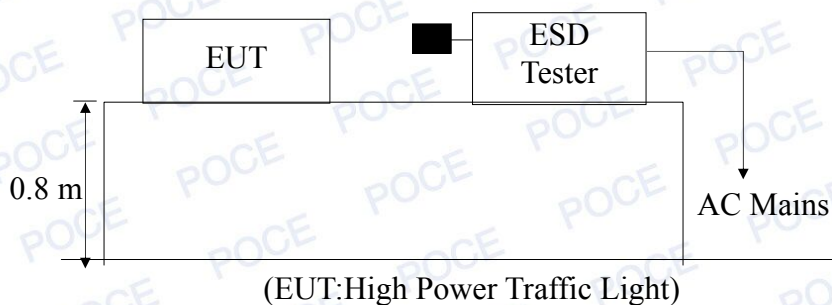
8. ELECTROSTATIC DISCHARGE IMMUNITY TEST

8.1 Block Diagram of Test Setup

8.1.1 Block Diagram of the EUT and the simulators



8.1.2 Block diagram of ESD test setup



8.2 Test Standard

EN 61547:2009 (EN 61000-4-2: 2009)

Severity Level: 3 / Air Discharge: $\pm 8\text{KV}$ Level: 2 / Contact Discharge: $\pm 4\text{KV}$

8.3 Severity Levels and Performance Criterion

8.3.1 Severity level

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	± 2	± 2
2.	± 4	± 4
3.	± 6	± 8
4.	± 8	± 15
X	Special	Special

8.3.2 Performance criterion: **B**

8.4 Test Procedure

8.4.1 Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

8.4.2 Contact Discharge:

All the procedure shall be same as Section 7.4.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

8.4.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

8.4.4 Indirect discharge for vertical coupling plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Electrostatic Discharger Test Results

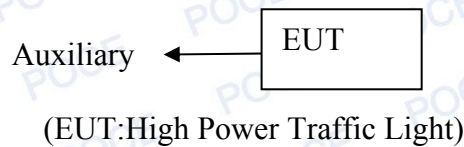
Standard	☐ IEC 61000-4-2 ☒ EN 61000-4-2		
Applicant	SHENZHEN NOBLE OPTO CO., LTD.		
EUT	High Power Traffic Light	Temperature	24℃
M/N	NBVB313HP	Humidity	53%
Criterion	B	Pressure	1021mbar
Test Mode	Normal	Test Date	2018-08-20
Test Engineer	Nick		

Air Discharge						
Test Points	Test Levels			Results		
	± 2KV	± 4KV	± 8KV	Passed	Fail	Performance Criterion
Front	☒	☒	☒	☒	☐	☐ A ☒ B
Back	☒	☒	☒	☒	☐	☐ A ☒ B
Left	☒	☒	☒	☒	☐	☐ A ☒ B
Right	☒	☒	☒	☒	☐	☐ A ☒ B
Top	☒	☒	☒	☒	☐	☐ A ☒ B
Bottom	☒	☒	☒	☒	☐	☐ A ☒ B
Contact Discharge						
Test Points	Test Levels		Results			
	± 2 kV	±4 kV	Passed	Fail	Performance Criterion	
Front	☒	☒	☒	☐	☐ A	☒ B
Back	☒	☒	☒	☐	☐ A	☒ B
Left	☒	☒	☒	☐	☐ A	☒ B
Right	☒	☒	☒	☐	☐ A	☒ B
Top	☒	☒	☒	☐	☐ A	☒ B
Bottom	☒	☒	☒	☐	☐ A	☒ B
Discharge To Horizontal Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion	
Front	☒	☒	☒	☐	☐ A	☒ B
Back	☒	☒	☒	☐	☐ A	☒ B
Left	☒	☒	☒	☐	☐ A	☒ B
Right	☒	☒	☒	☐	☐ A	☒ B
Discharge To Vertical Coupling Plane						
Side of EUT	Test Levels		Results			
	± 2 kV	± 4 kV	Passed	Fail	Performance Criterion	
Front	☒	☒	☒	☐	☐ A	☒ B
Back	☒	☒	☒	☐	☐ A	☒ B
Left	☒	☒	☒	☐	☐ A	☒ B
Right	☒	☒	☒	☐	☐ A	☒ B

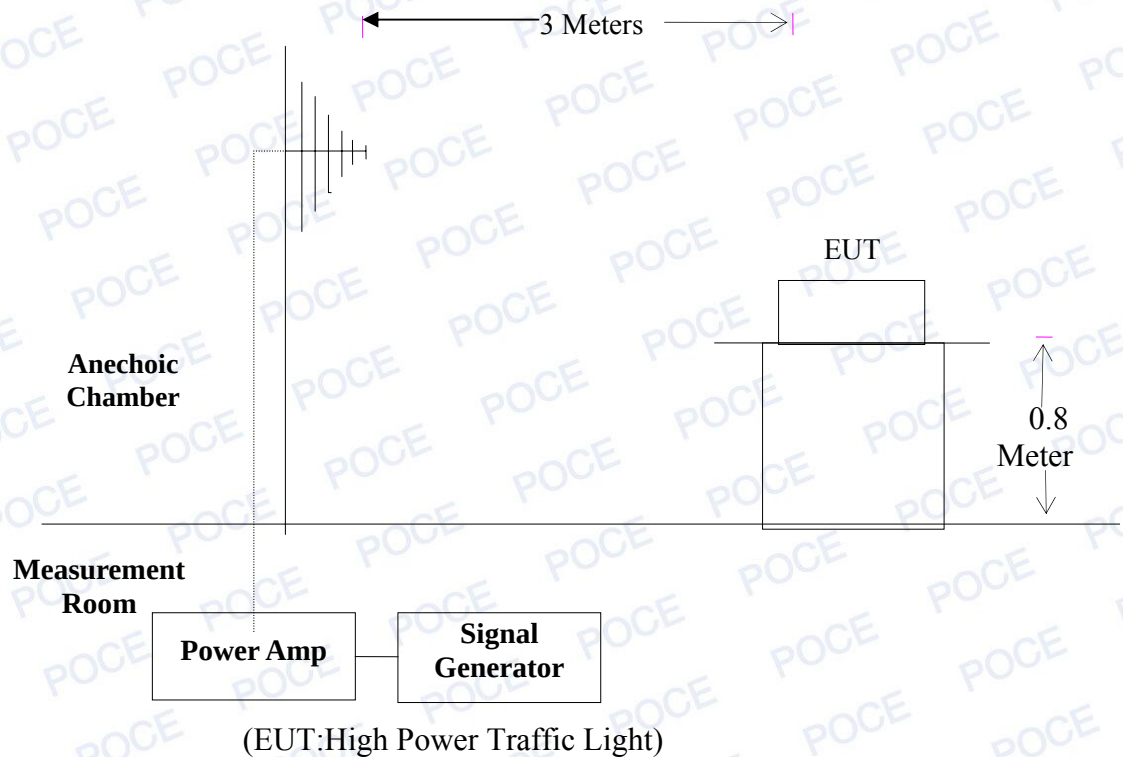
9. RF FIELD STRENGTH SUSCEPTIBILITY TEST

9.1 Block Diagram of Test

9.1.1 Block diagram of connection between the EUT and Load



9.1.2 Block diagram of RS test setup



9.2 Test Standard

EN 61547:2009(EN 61000-4-3: 2006+A2:2010 (Severity Level: 2, 3V / m))

9.3 Severity Levels and Performance Criterion

9.3.1 Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

9.3.2 Performance Criterion : A

9.4 Test Procedure

The EUT are placed on a table which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor its screen. All the scanning conditions are as following:

Condition of Test

Remark

1. Fielded Strength
2. Radiated Signal
3. Scanning Frequency
4. Sweep time of radiated
2. Dwell Time

3V/m (Severity Level 2)
Modulated
80-1000MHz
0.0015 Decade/s
1 Sec.

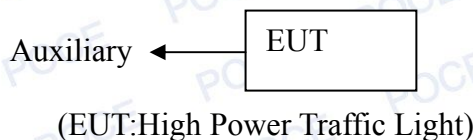
RF Field Strength Susceptibility Test Results

EUT	High Power Traffic Light			Temperature	: 22℃		
M/N	NBVB313HP			Humidity	: 50 %		
Test Voltage	AC 230V/50Hz			Test Mode	: On		
Field Strength	3 V/m			Test Date	: 2018-08-20		
Test Engineer:	Bill			Frequency Range:	80 MHz to1000 MHz		
Modulation:				☐ None	☐ Pulse	☒ AM 1KHz 80%	
Frequency Rang 1:		80~ 1000MHz		Frequency Rang 2:			
Steps	1	/	%	#	/	%	
	Horizontal	Vertical		Horizontal	Vertical		
Front	PASS	PASS					
Right	PASS	PASS					
Rear	PASS	PASS					
Left	PASS	PASS					
Test Equipment : 1. Signal Generator : 2031 (MARCONI) 2. Power Amplifier : 500A100 & 100W/1000M1 (A&R) 3. Power Antenna : 3108 (EMCO) & AT1080 (A&R) 4. Field Monitor : FM2000 (A&R)							
Note: Note: (The Criterion) A:Normal performance within the specification limits; B:Temporary degradation or less of function or performance which is self-recoverable; C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;							

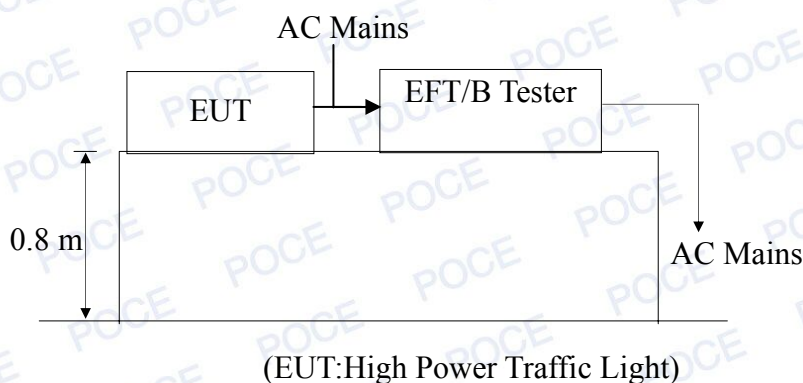
10. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

10.1 Block Diagram of Test Setup

10.1.1. Block Diagram of the EUT



10.1.2. EFT Test Setup



10.2 Test Standard

EN 61547:2009 (EN 61000-4-4:2012, Severity Level, Level 2: 1KV)

10.3 Severity Levels and Performance Criterion

10.3.1 Severity level

Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 KV	0.25 KV
2.	1 KV	0.5 KV
3.	2 KV	1 KV
4.	4 KV	2 KV
X	Special	Special

10.3.2 Performance criterion : B

10.4 Test Procedure

The EUT is put on the table which is 0.8 meter high above the ground. This reference ground plane shall project beyond the EUT by at least 0.1m on all sides and the minimum distance between EUT and all other conductive structure, except the ground plane beneath the EUT, shall be more than 0.5m.

10.4.1 For input and output AC power ports:

The EUT is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

10.4.2 For signal lines and control lines ports:

No I/O ports. It's unnecessary to test.

10.4.3 For DC output line ports:

It's unnecessary to test.

Electrical Fast Transient/Burst Test Results

EUT	: High Power Traffic Light	Temperature:	20℃
M/N	: NBVB313HP	Humidity :	50%
Test Voltage	: AC 230V/50Hz	Test Mode :	On
Test Engineer	: Bill	Test Date :	2018-08-20
Line: ☒ AC Mains ☐ Signal line ☐ DC line		Coupling : ☒ Direct ☐ Capacitive	
Test Time : 120s			
Line	Test Voltage	Result	
L	±2KV	Pass	
N	±2KV	Pass	
L、N	±2KV	Pass	
PE	±2KV	Pass	
L、PE	±2KV	Pass	
N、PE	±2KV	Pass	
L、PE、N	±2KV	Pass	
Test Equipment: Burst Tester Model : HEFT 51 Note: (The Criterion) A: Normal performance within the specification limits; B: Temporary degradation or loss of function or performance which is self-recoverable; C: Temporary degradation or loss of function or performance which requires operator intervention or system reset;			

11. SURGE IMMUNITY TEST

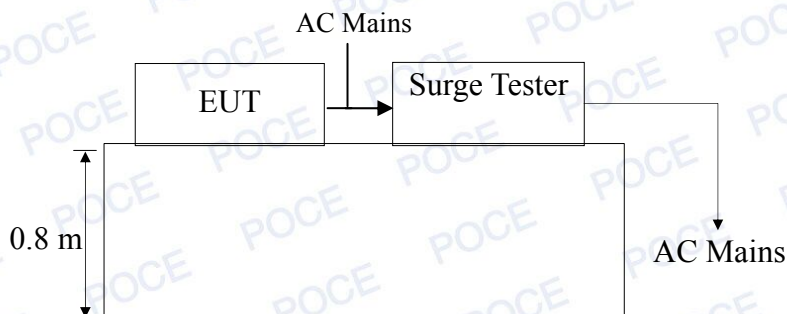
11.1 Block Diagram of Test Setup

11.1.1 Block Diagram of the EUT



(EUT:High Power Traffic Light)

11.1.2. Surge Test Setup



(EUT:High Power Traffic Light)

11.2 Test Standard

EN 61547:2009 (EN 61000-4-5: 2014)Severity Level: Line to Line: Level 2, 1.0KV

11.3 Severity Levels and Performance Criterion

11.3.1. Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

11.3.2 Performance criterion : C

11.4 Test Procedure

- 1) Set up the EUT and test generator as shown on Section 11.1.2.
- 2) For line to line coupling mode, provide a 1.0 KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.
- 3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
- 4) Different phase angles are done individually.
- 5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

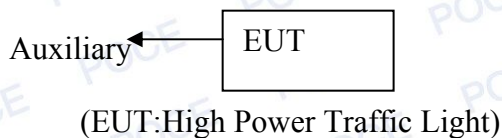
Surge Immunity Test Result

EUT	:	High Power Traffic Light			Temperature:	20℃
M/N	:	NBVB313HP			Humidity	: 50%
Test Voltage	:	AC 230V/50Hz			Test Mode	: On
Test Engineer	:	Bill			Test Date	: 2018-08-20
Location	Voltage (KV)	500V			1kV	
	Phase	+	-	+	-	
L、N	0°					
	90°	Pass				
	180°					
	270°		Pass			
L、PE	0°					
	90°			Pass		
	180°					
	270°				Pass	
N、PE	0°					
	90°			Pass		
	180°					
	270°				Pass	
Test Equipment :Surge Tester Model: HCWG						
Note: (The Criterion) A:Normal performance within the specification limits; B:Temporary degradation or less of function or performance which is self-recoverable; C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;						

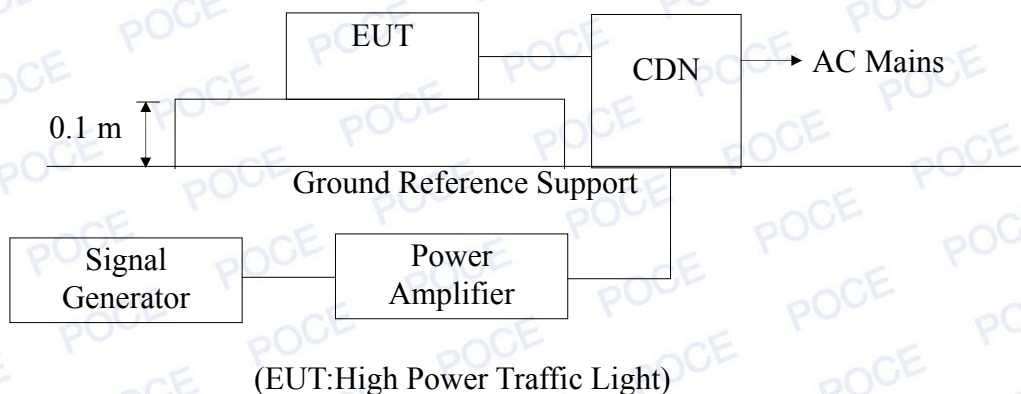
12. INJECTED CURRENTS SUSCEPTIBILITY TEST

12.1 Block Diagram of Test Setup

12.1.1 Block Diagram of the EUT



12.1.2 Block Diagram of Test Setup



12.2 Test Standard

EN 61547:2009 (EN 61000-4-6: 2014, Severity Level: Level 2, 3V (rms),
(0.15MHz ~ 80MHz)

12.3 Severity Levels and Performance Criterion

12.3.1 Severity level

Level	Field Strength V
1	1
2	3
3	10
X	Special

12.3.2 Performance criterion: A

12.4 Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 11.1.2.
- 2) Let the EUT work in test mode and measure it.
- 3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150KHz to 80MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
- 7) The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

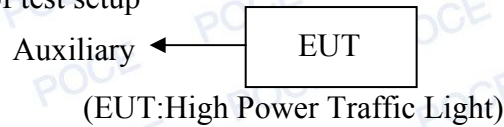
Injected Currents Susceptibility Test Results

EUT	:	High Power Traffic Light	Temperature:	20℃
M/N	:	NBVB313HP	Humidity	: 50%
Test Voltage	:	AC 230V/50Hz	Test Mode	: On
Test Engineer	:	Bill	Test Date	: 2018-08-20
Frequency Range (MHz)		Injected Position	Strength (Unmodulated)	Result
0.15~80		AC Mains	3V	Pass
Frequency Range (MHz)		Injected Position	Strength (Unmodulated)	Result
Test Equipment :Injected Currents Tester Model: CWS500C Injection CLamp Model: F-2031-23MM CDN Model: CDN-M2, CDN-M3 Note: (The Criterion) A:Normal performance within the specification limits; B:Temporary degradation or less of function or performance which is self-recoverable; C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;				

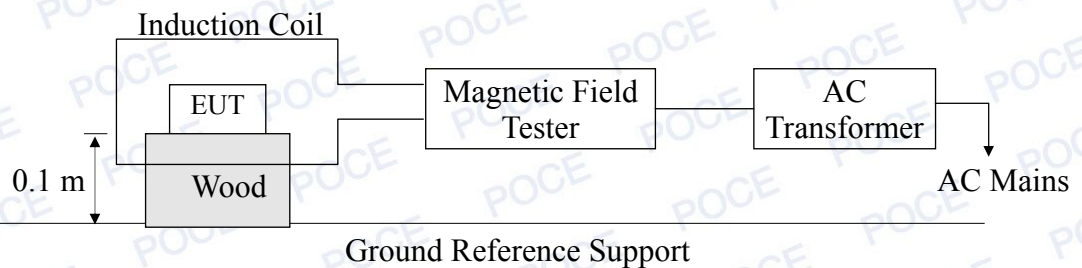
13. MAGNETIC FIELD SUSCEPTIBILITY TEST

13.1 Block Diagram of Test

13.1.1 Block diagram of test setup



13.1.2 Magnetic field test setup



13.2 Test Standard

EN 61547:2009 (EN 61000-4-8: 2010, Severity Level: Level 1, 1A / m)

13.3 Severity Levels and Performance Criterion

13.3.1 Severity Levels

Level	Field Strength A/m
1	1
2	3
3	10
4	30
5	100
X	Special

13.3.2 Performance Criterion : A

13.4 Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high) table, this small table is also placed on a larger table, 0.8 m above the ground. Both horizontal and vertical polarization of the induction coil are set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

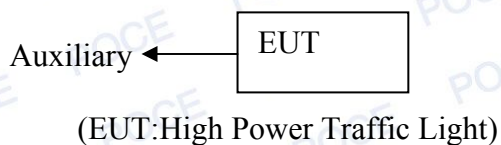
Magnetic Field Immunity Test Result

EUT	:	High Power Traffic Light	Temperature:	20℃
M/N	:	NBVB313HP	Humidity	: 50%
Test Voltage	:	AC 230V/50Hz	Test Mode	: On
Test Engineer	:	Bill	Test Date	: 2018-08-20
Test Level (A/M)		Testing Duration	Coil Orientation	Result
3		5 mins	X	Pass
3		5 mins	Y	Pass
3		5 mins	Z	Pass
Test Level (A/M)		Testing Duration	Coil Orientation	Result
Test Equipment :Magnetic Field Tester Model: HPFM T Note: (The Criterion) A:Normal performance within the specification limits; B:Temporary degradation or less of function or performance which is self-recoverable; C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;				

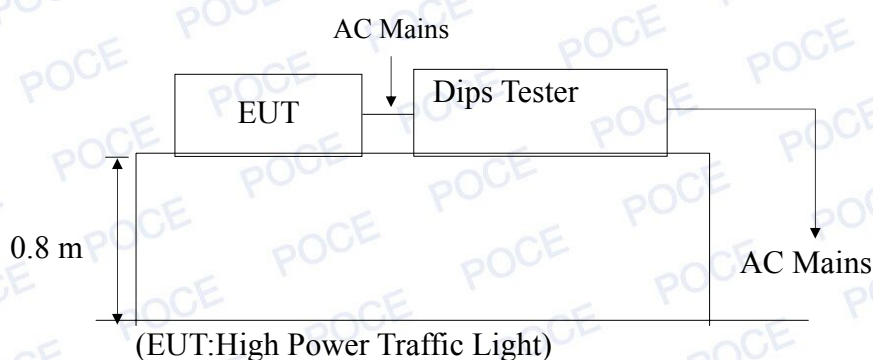
14. VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1 Block Diagram of Test Setup

14.1.1 Block Diagram of the EUT



14.1.2 Dips Test Setup



14.2 Test Standard

EN 61547:2009 (EN 61000-4-11: 2004)

14.3 Severity Levels and Performance Criterion

14.3.1 Severity level

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
70	30	10
0	100	0.5

14.3.2 Performance criterion : **C&B**

14.4 Test Procedure

- 1) Set up the EUT and test generator as shown on Section 13.1.2.
- 2) The interruptions is introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

Voltage Dips And Interruptions Test Results

EUT	:	High Power Traffic Light	Temperature:	20℃
M/N	:	NBVB313HP	Humidity :	50%
Test Voltage	:	AC 230V/50Hz	Test Mode :	On
Test Engineer	:	Bill	Test Date :	2018-08-20
Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in periods)	Criterion	Result
0	100	0.5P	B	Pass
70	30	10P	C	Pass
Test Level % U _T	Voltage Dips & Short Interruptions % U _T	Duration (in periods)	Criterion	Result

Test Equipment : Voltage Dips And Interruptions Tester Model: HPFS

Note: (The Criterion)
A:Normal performance within the specification limits;
B:Temporary degradation or less of function or performance which is self-recoverable;
C:Temporary degradation or loss of function or performance which requires operator intervention or system reset;

15. PHOTOGRAPH

15.1 Photo of Radiated Emission Measurement



15.2 Photo of Conducted Emission Measurement



15. PHOTOGRAPHS OF EUT



Fig.1



Fig.2

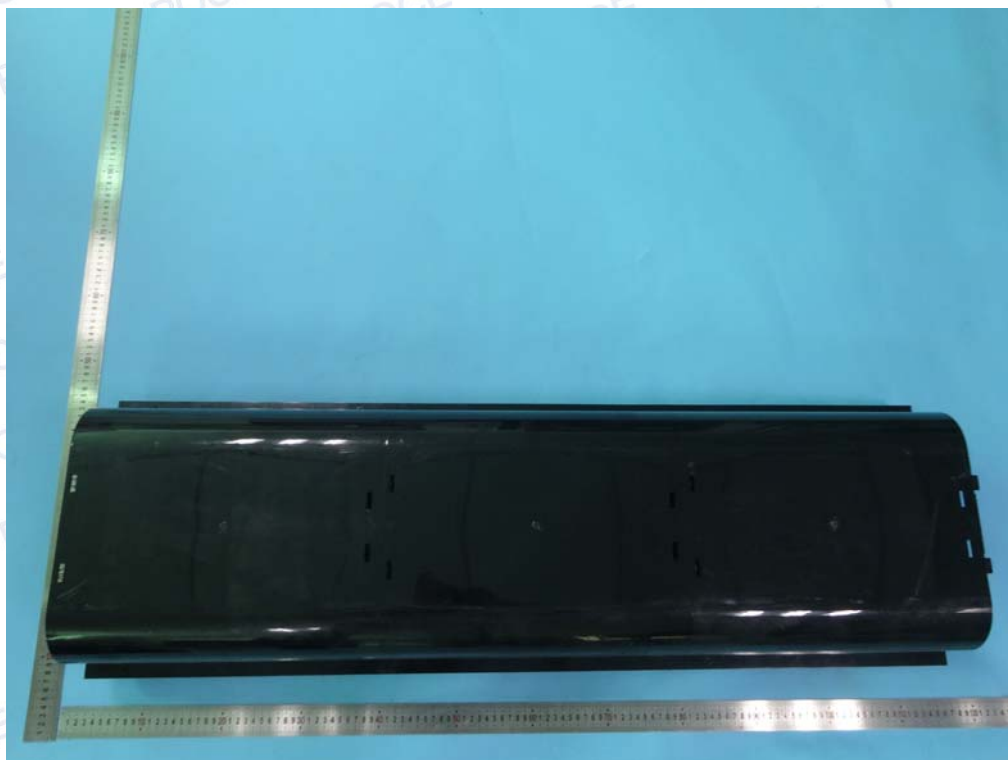


Fig.3

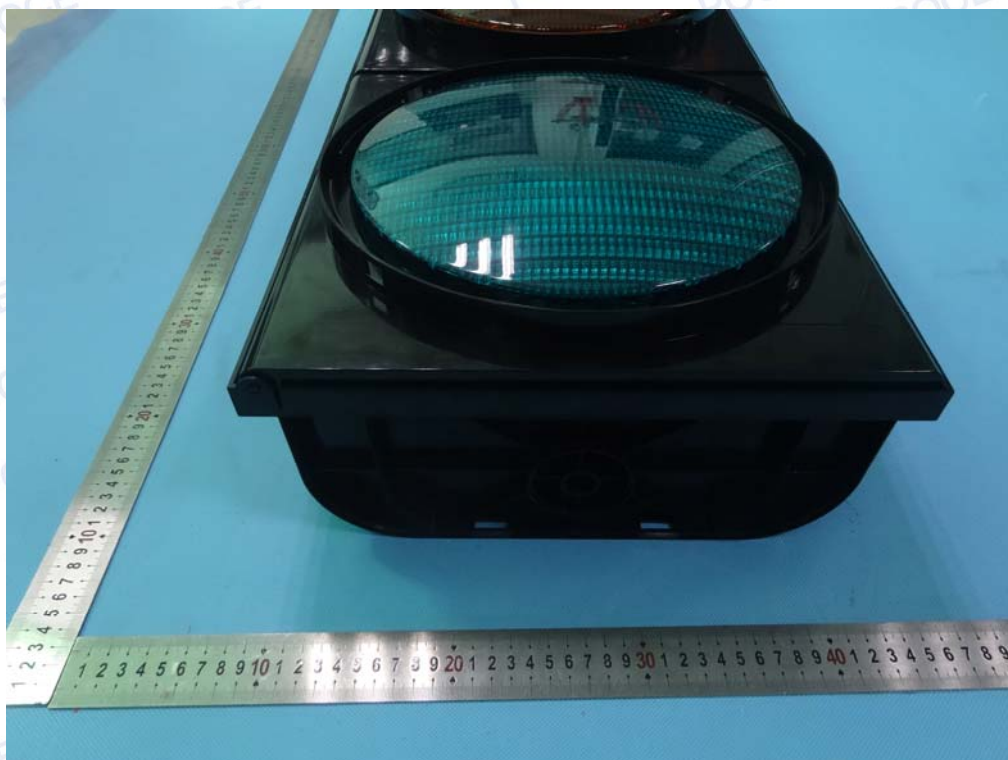


Fig.4

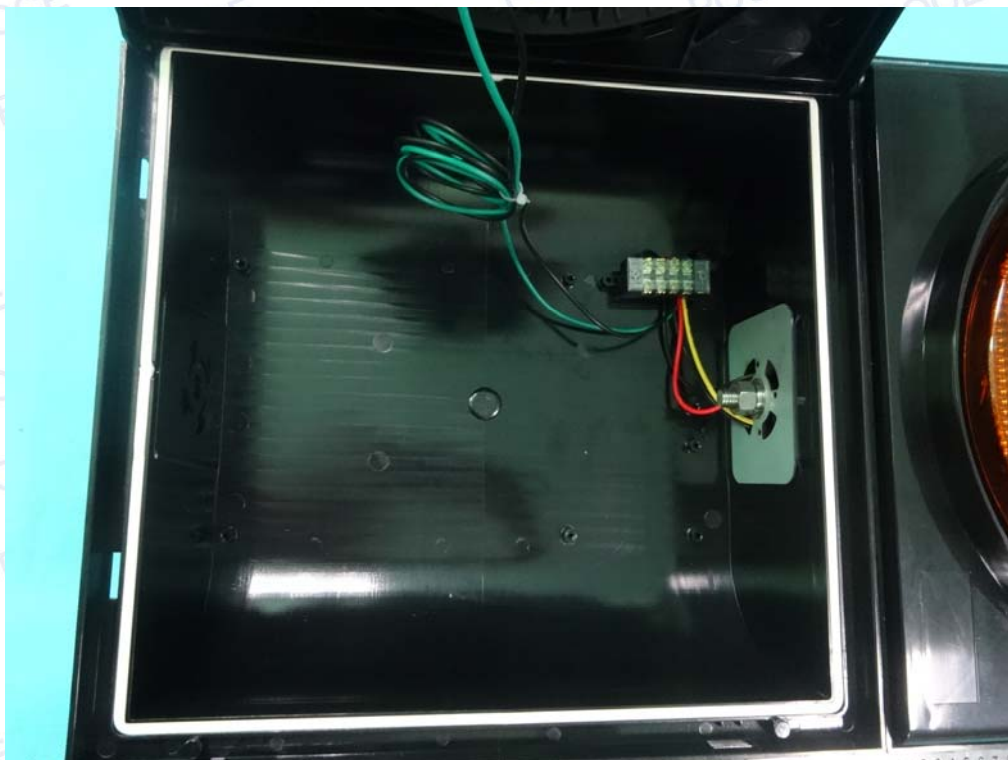


Fig.5

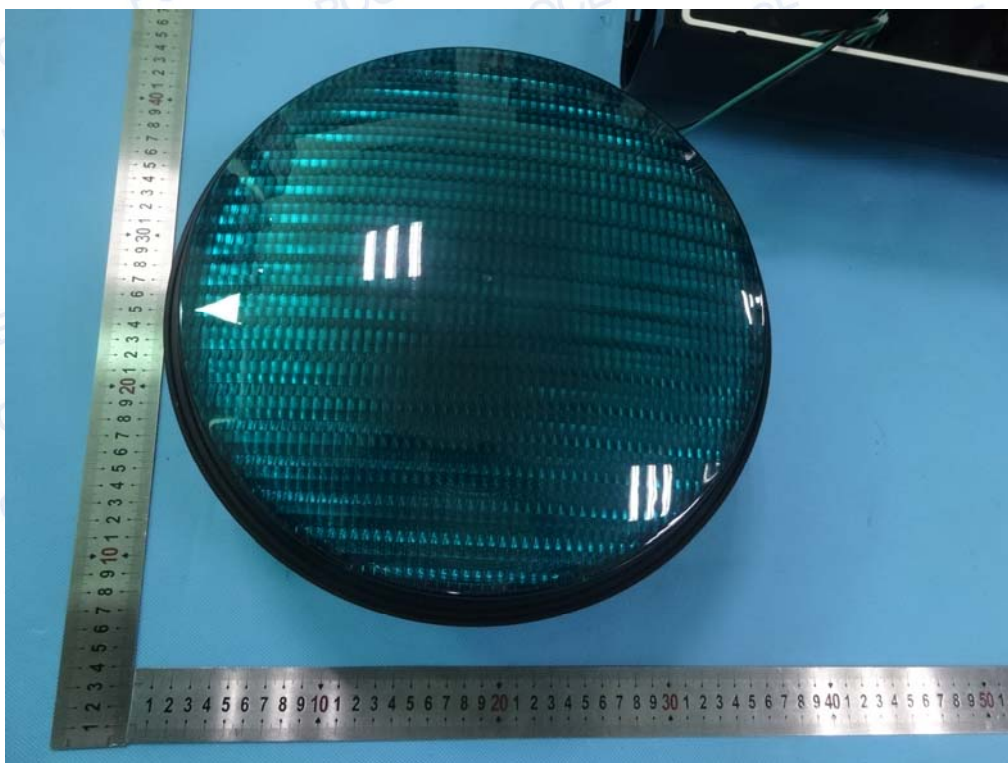


Fig.6



Fig.7

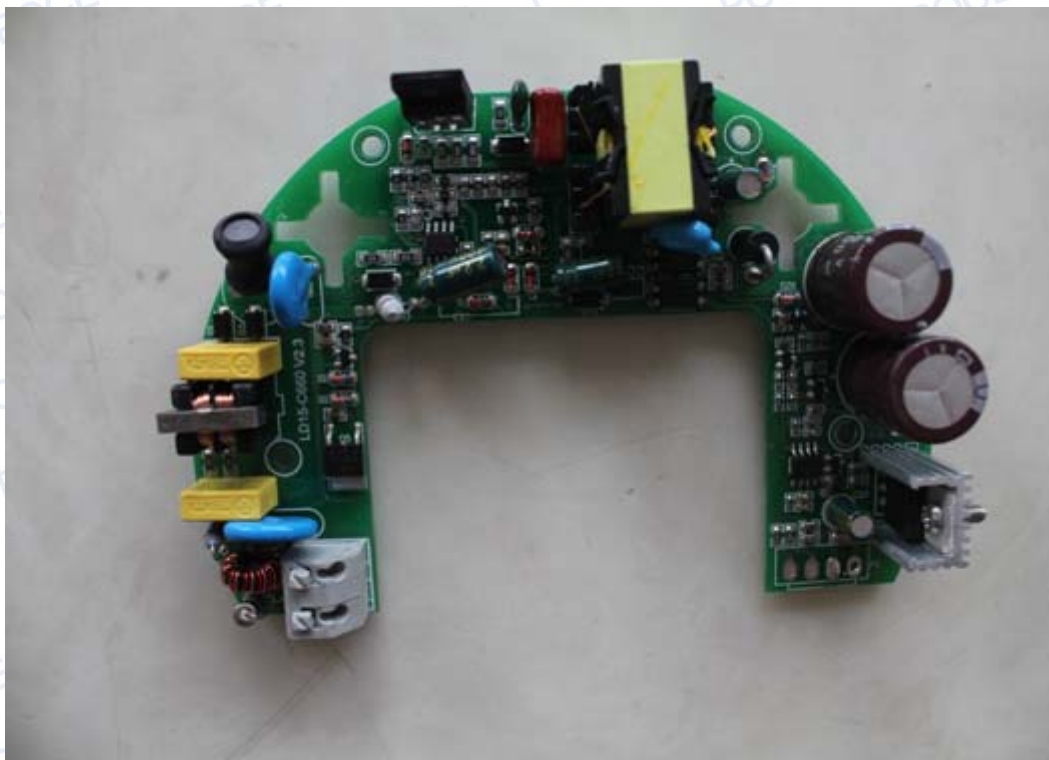


Fig.8

16. MANUFACTURER/ APPROVAL HOLDER DECLARATION

The following identical model(s):

NBVB313HP, NBAL313HP, NBPS312HP, NBVB312HP,
NBAL213HP, NBPS212HP, NBVB213HP, NBVB212HP,
NBAL113HP, NBVB113HP, NBVB112HP, NBVB200HP-R, NBVB200HP-A,
NBVB200HP-G, NBVB300HP-R, NBVB300HP-A, NBVB300HP-G, NBVB100HP-R,
NBVB100HP-A, NBVB100HP-G

Note: Model name only use for marking.

Belong to the tested device:

Product description	:	High Power Traffic Light
Model name	:	NBVB313HP

Remark: So no additional models tested.

*****THE END OF REPORT*****