EN 55015:2013
EN 61547:2009
EN 61000-3-2: 2006+A1:2009+A2:2009
EN 61000-3-3: 2013
MEASUREMENT AND TEST REPORT

For

NEWSTAR LED CO., LIMITED

7/F, Block A,YuShan Industrial Park,Songbai Road,ShiYan Town,
Bao'An,ShenZhen,China,518108

Model:	**NS-CON-IR44B-3CH-LV, NS-ZJFJ-3CH-LV, NS-XDIMMER-1CH-LV, NS-RFDIMMER-1CH-LV, NS-TM06,NS-TM08, NS-CONSYN-RFXB(T)-3CH, NS-CON-IR24B-3CH-LV, NS-CONAudio-RF8B(T)-3CH-LV, NS-CON-RF20B(H)-3CH-LV, NS-CON-RF20B(C)-3CH-LV, NS-CON-RF20B(SJ)-3CH-LV, NS-CON-TRF8B(H)-3CH-LV, NS-CON-TRF8B(T)-3CH-LV, NS-WF100, NS-USB-DMX**

September 02,2014

This Report Concerns:	**Equipment Type:**
☒ Original Report	**LED Controller**

Test By:	Angell /
Report Number:	**CTE14IR-189E**
Test Date:	August 26 ~ September 02 , 2014
Reviewed By:	Jason Chen /
Prepared By:	**Coffee-T Electronics Technology Co Ltd** 4th Floor,Bldg A3,Digital Tech Park,7th GaoXin South Blvd,Tech Park,NanShan,ShenZhen,China Tel:+86-755-86622903 Fax:+86-755-86622819

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	**NEWSTAR LED CO., LIMITED**
Address of applicant:	7/F, Block A,YuShan Industrial Park,Songbai Road,ShiYan Town, Bao'An,ShenZhen,China,518108
Manufacturer:	**NEWSTAR LED CO., LIMITED**
Address of Manufacturer:	7/F, Block A,YuShan Industrial Park,Songbai Road,ShiYan Town, Bao'An,ShenZhen,China,518108

General Description of E.U.T

EUT Description:	**LED Controller**
Model No:	NS-CON-IR44B-3CH-LV, NS-ZJFJ-3CH-LV, NS-XDIMMER-1CH-LV, NS-RFDIMMER-1CH-LV, NS-TM06,NS-TM08, NS-CONSYN-RFXB(T)-3CH, NS-CON-IR24B-3CH-LV, NS-CONAudio-RF8B(T)-3CH-LV, NS-CON-RF20B(H)-3CH-LV, NS-CON-RF20B(C)-3CH-LV, NS-CON-RF20B(SJ)-3CH-LV, NS-CON-TRF8B(H)-3CH-LV, NS-CON-TRF8B(T)-3CH-LV, NS-WF100, NS-USB-DMX
Note:	All models share same circuit diagrame, just with different appearance. All test performance on: **NS-CON-IR44B-3CH-LV**
Trademark:	

** The test data gathered are from the production sample provided by the manufacturer. Supplementary Models share same circuit and with different appearance.*

1.2 Test Standards

The following Declaration of Conformity report of EUT is prepared in accordance with

EN 55015: 2013

EN 61547: 2009

EN 61000-3-2: 2006+A1:2009+A2:2009

EN 61000-3-3: 2013

The objective of the manufacturer is to demonstrate compliance with the described standards above.

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1.3 Test Summary

For the EUT described above. The standards used were EN 55015 for Emissions & EN 61547 for Immunity.

Table 1 : Tests Carried Out Under EN 55015:2013

Standard	Test Items	Status
EN 55015:2013	Disturbance Voltage at The Mains Terminals (0.009~30MHz)	X
	Magnetic Field Emission (0.009~30MHz)	√
	Radiated Disturbances (30MHz To 300MHz)	√

√ Indicates that the test is applicable

× Indicates that the test is not applicable

Table 2 : Tests Carried Out Under EN 61000-3-2: 2006 +A1:2009+A2:2009/ EN 61000-3-3: 2013

Standard	Test Items	Status
EN 61000-3-2: 2006+A1:2009+A2:2009	Harmonic Current Test	√
EN 61000-3-3: 2013	Voltage Fluctuations and Flicker Test	√

√ Indicates that the test is applicable

× Indicates that the test is not applicable

Table 3 : Tests Carried Out Under EN 61547: 2009

Standard	Test Items	Status
EN61000-4-2:2008	Electrostatic discharge Immunity	√
EN61000-4-3:2010	Radiated Susceptibility (80MHz to 1GHz)	√
EN61000-4-4:2011	Electrical Fast Transient/Burst Immunity	X
EN61000-4-5:2005	Surge Immunity	X
EN61000-4-6:2008	Conducted Susceptibility (150kHz to 80MHz)	√
EN61000-4-8:2009	Power Frequency Magnetic Field Immunity (50/60Hz)	×
EN61000-4-11:2004	Voltage Dips, Short Interruptions Immunity	√

√ Indicates that the test is applicable

× Indicates that the test is not applicable

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1.4 Test Methodology

All measurements contained in this report were conducted with CISPR 16-1: 2002, radio disturbance and immunity measuring apparatus, and CISPR16-2: 2002, Method of measurement of disturbances and immunity.
All measurement required was performed at COFFEE-T ELECTRONICS TECHNOLOGY CO.,LTD at 4th Floor,Bldg A3,Digital Tech Park,7th GaoXin South Blvd,Tech Park,NanShan,ShenZhen,China

1.5 Test Facility

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

FCC – Registration No.: 752058
COFFEE-T ELECTRONICS TECHNOLOGY CO.,LTD, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752058, March, 2008.

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1.6 Test Equipment List and Details

Test equipments list of Shenzhen COFFEE-T ELECTRONICS TECHNOLOGY CO.,LTD.

No.	Instrument no.	Equipment	Manufacturer	Model No.	S/N	Calculator date	Calculator due date
1	CTE-EMC001	EMI Test Receiver	R&S	ESCI	100687	2014-4-14	2015-4-13
2	CTE-EMC002	EMI Test Receiver	R&S	ESPI	100097	2014-4-14	2015-4-13
3	CTE-EMC003	Amplifier	HP	8447D	1937A02492	2014-4-14	2015-4-13
4	CTE-EMC004	Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	07101	2014-4-14	2015-4-13
5	CTE-EMC005	Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	07102	2014-4-14	2015-4-13
6	CTE-EMC006	Power Clamp	SCHWARZBECK	MDS-21	3812	2014-4-14	2015-4-13
7	CTE-EMC007	Positioning Controller	C&C	CC-C-1F	MF7802113	**N/A**	**N/A**
8	CTE-EMC008	`Electrostatic Discharge Simulator	TESEQ	NSG437	125	2014-4-14	2015-4-13
9	CTE-EMC009	Fast Transient Burst Generator	SCHAFFNER	MODULA6150	34572	2014-4-14	2015-4-13
10	CTE-EMC010	Fast Transient Noise Simulator	Noiseken	FNS-105AX	31485	2014-4-14	2015-4-13
11	CTE-EMC011	Color TV Pattern Genenator	PHILIPS	PM5418	TM209947	**N/A**	**N/A**
12	CTE-EMC012	Power Frequency Magnetic Field Generator	EVERFINE	EMS61000-8K	608002	2014-4-14	2015-4-13
13	CTE-EMC013	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
14	CTE-EMC014	Capacitive Coupling Clamp	TESEQ	CDN8014	25096	2014-4-14	2015-4-13
15	CTE-EMC015	High Field Biconical Antenna	ELECTRO-METRICS	EM-6913	166	2013-10-20	2014-10-19
16	CTE-EMC016	Log Periodic Antenna	ELECTRO-METRICS	EM-6950	811	2013-10-20	2014-10-19
17	CTE-EMC017	Remote Active Vertical Antenna	ELECTRO-METRICS	EM-6892	304	2013-10-20	2014-10-19
18	CTE-EMC018	TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	9163-324	2014-4-14	2015-4-13
19	CTE-EMC019	Horn Antenna	SCHWARZBECK	BBHA9120A	B08000991-0001	2014-4-14	2015-4-13

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20	CTE-EMC020	Teo Line Single Phase Module	SCHWARZBECK	NSLK8128	D-69250	2014-4-14	2015-4-13
21	CTE-EMC021	10dB attenuator	SCHWARZBECK	MTAIMP-136	R65.90.0001 #06	2014-4-14	2015-4-13
22	CTE-EMC022	Electric bridge	Zentech	100 LCR METER	803024	N/A	N/A
23	CTE-EMC023	RF Current Probe	FCC	F-33-4	80	2014-4-14	2015-4-13
24	CTE-EMC024	SIGNAL GENERATOR	HP	8647A	3349A02296	2014-4-14	2015-4-13
25	CTE-EMC025	MICROWAVE AMPLIFIER	HP	8349B	2627A00994	2014-4-14	2015-4-13
26	CTE-EMC026	Triple-Loop Antenna	EVERFINE	LLA-2	607004	2014-4-14	2015-4-13
27	CTE-EMC027	CDN	FRANKONIA	M2+M3	A3027019	2013-10-20	2014-10-19
28	CTE-EMC028	6dB Attenuator	FRANKONIA	75-A-FFN-06	1001698	2013-10-20	2014-10-19
29	CTE-EMC029	EMV-Mess-Systeme GMBH	FRANKONIA	FLL-75	1020A1109	2013-10-20	2014-10-19
30	CTE-EMC030	EM Injection Clamp	FCC	F-203I-13mm	091536	2013-10-20	2014-10-19
31	CTE-EMC031	9KHz-2.4GHz Signal generator	MARCONI INSTRUMENTS	2024	112260/042	2013-10-20	2014-10-19

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2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software offered by manufacture, can let the EUT being normal operation.

2.3 Special Accessories

As shown in section 2.5, interface cable used for compliance testing is shielded as normally supplied by **NEWSTAR LED CO., LIMITED** and its respective support equipment manufacturers.

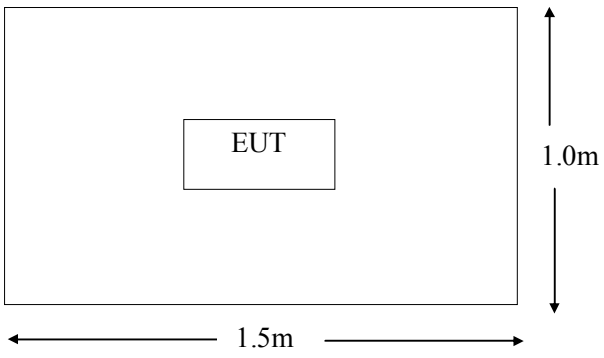
2.4 Equipment Modifications

The EUT tested was not modified by CTE.

2.5 Configuration of Test System

EUT

2.6 Test Setup Diagram



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3 - DISTURBANCE VOLTAGE AT THE MAINS TERMINALS

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is 3.4 dB.

3.2 Limit of Disturbance Voltage At The Mains Terminals

Frequency Range (MHz)	Limits (dBuV)*	
	Quasi-Peak	Average
0.009~0.050**	110	—
0.050~0.150**	90~80***	—
0.150～0.500	66～56***	56～46***
0.500~2.51	56	46
2.51~3.0	73	63
3.0~5.0	56	46
5.0～30.0	60	50

Remark: * At the transition frequency, the lower limit applies.
** The limit values in the frequency range 9kHz to 150 kHz are considered to be "provisional limit", which may be modified after some years of experience.
*** The limit decreases linearly with the logarithm of the frequency in the ranges 50kHz to 150 kHz and 150kHz to 0.5MHz

3.3 EUT Setup

The setup of EUT is according with CISPR 16-1: 2002, CISPR16-2: 2002 measurement procedure. The specification used was the EN 55015 limits.

The EUT was placed center and the back edge of the test table.

The AV cables were draped along the test table and bundled to 30-40cm in the middle.

The spacing between the peripherals was 10 cm.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

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3.4 Instruments Setup

The receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range……9KHz to 30 MHz Detector……..Peak & Quasi-Peak
IF Band Width……...200Hz / 9KHz
Frequency Range……9KHz to 150KHz / 150KHz to 30MHz

3.5 Test Procedure

During the conducted emission test, the EUT power cord was connected to the auxiliary outlet of the first Artificial Mains.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dBμV of specification limits). Quasi-peak readings are distinguished with a "**QP**". Average readings are distinguished with a "**AV**".

3.6 Summary of Test Results

According to the data in section 3.6, the EUT complied with the EN 55015 Conducted margin, with the *worst* margin reading of:

3.7 Disturbance Voltage Test Data

Temperature (℃)	22~25
Humidity (%RH)	50~60
Barometric Pressure (mbar)	950~1000
EUT	LED Controller
M/N	NS-CON-IR44B-3CH-LV
Operating Mode	ON

Test data see following pages

Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

3.8 Test Result

Pass

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4- Magnetic Field Emission Test

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

4.2 Limit of Magnetic Field Emission

Frequency (MHz)	Limit For Loop Diameter of 2m (dBμA))
9K~70K	88
70K~150K	88 ~58
150K~2.2M	58~26
2.2M~3.0M	58
3.0M~30M	22

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

4.3 EUT Setup

The Magnetic Field Emission tests were performed with a triple-loop antenna, using the setup accordance with the CISPR 16-1: 2002, CISPR16-2: 2002. The specification used was EN 55015 limits for Magnetic Field Emission.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

4.4 Test Receiver Setup

According to EN 55015 rules, the frequency was investigated from 9KHz to 150KHz / 150KHz to 30MHz. During the Magnetic Field emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Frequency Range……9KHz to 30 MHz
Detector……..Peak & Quasi-Peak
IF Band Width……...200Hz / 9KHz
Frequency Range……9KHz to 150KHz / 150KHz to 30MHz

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4.5 Test Procedure

EUT is placed in the center of triple-loop antenna (Diameter is 2m). Turn on the EUT, then the induced current in the loop antenna can be detected by a current probe and measured by the

receiver. Three field directions shall be measured in sequence. Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak and Average readings were only performed when an emission was found to be marginal (within -10 dBμV of specification limits). Quasi-peak readings are distinguished with a "**QP**". Average readings are distinguished with a "**AV**".

4.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμA means the emission is 7dBμA below the maximum limit. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

4.7 Radiated Emissions Test Result

Temperature (℃)	22~24
Humidity (%RH)	50~60
Barometric Pressure (mbar)	950~1000
EUT	LED Controller
M/N	NS-CON-IR44B-3CH-LV
Operating Mode	ON

Test data see following pages

Remark: (1) When PK reading is less than relevant limit 20dB, the QP reading and AV reading will not be recorded.
(2) Where QP reading is less than relevant AV limit, the AV reading will not be measured

4.8 Test Result

Pass

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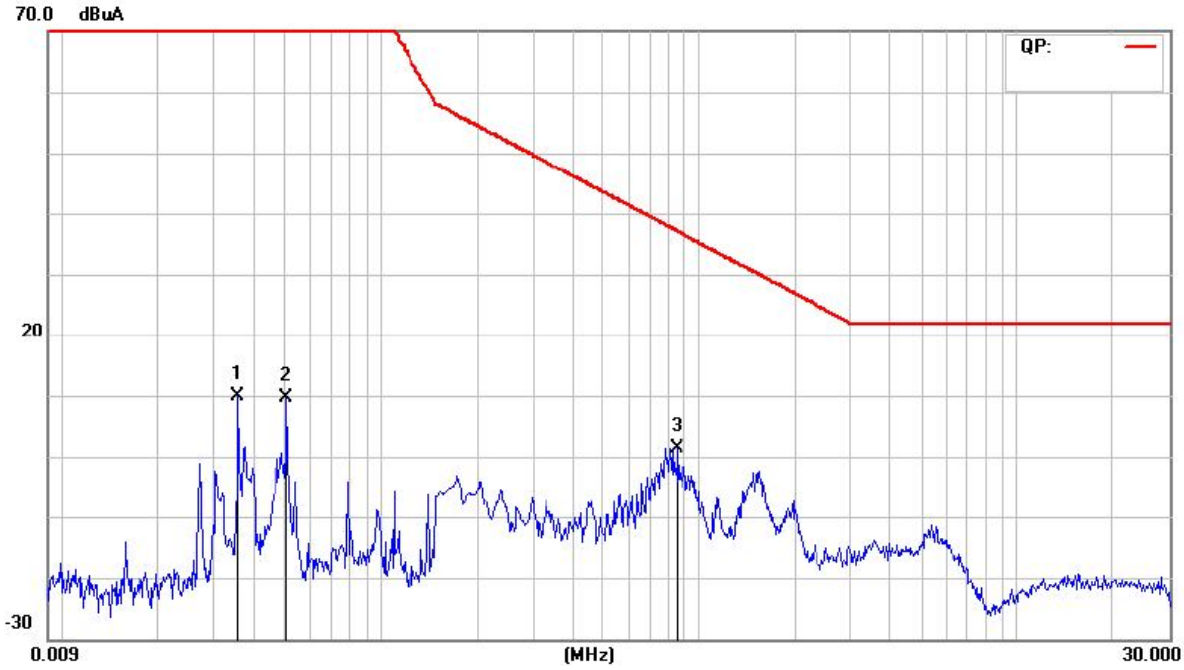
Magnetic Field Emission Test Data

EUT:	LED Controller	M/N: NS-CON-IR44B-3CH-LV
Operating Condition:	ON	
Test Site:	Shielded Room	
Operator:	Chen	
Test Specification:	DC 12V/50Hz	
Comment:	Polarization: X	Tem:24℃ Hum:60%
Start of Test:	08/27/14/ 10:40	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector	Comment
1		0.0355	-10.93	20.84	9.91	88.00	-78.09	peak	
2		0.0507	-11.21	20.77	9.56	88.00	-78.44	peak	
3	*	0.8540	-19.49	20.94	1.45	37.10	-35.65	peak	

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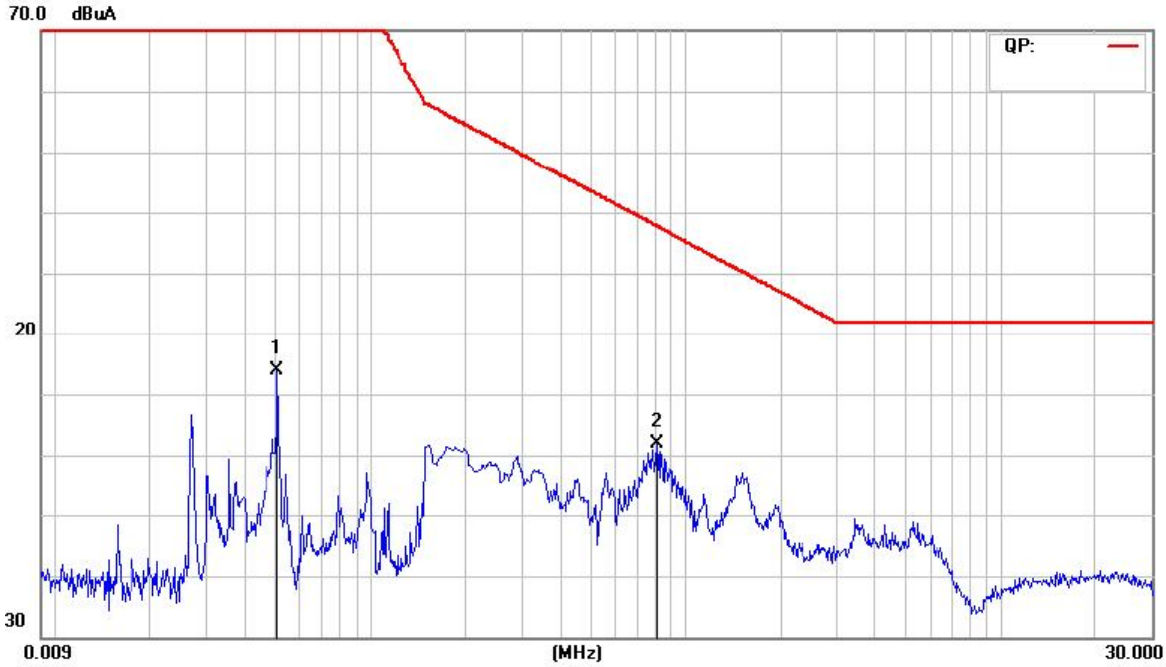
Magnetic Field Emission Test Data

EUT:	LED Controller	M/N: NS-CON-IR44B-3CH-LV
Operating Condition:	ON	
Test Site:	Shielded Room	
Operator:	Chen	
Test Specification:	DC 12V/50Hz	
Comment:	Polarization: Y	Tem:24℃ Hum:60%
Start of Test:	08/27/14/ 10:50	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector	Comment
1		0.0507	-3.75	17.69	13.94	88.00	-74.06	peak	
2	*	0.8059	-18.79	20.71	1.92	37.79	-35.87	peak	

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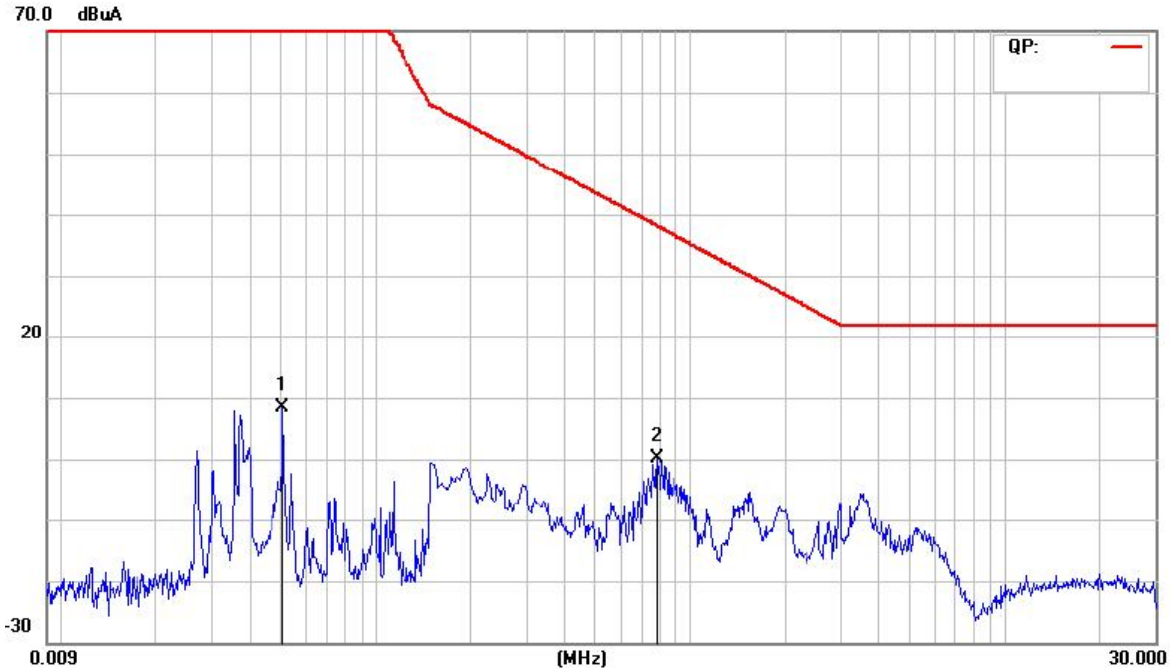
Magnetic Field Emission Test Data

EUT:	LED Controller	M/N: NS-CON-IR44B-3CH-LV
Operating Condition:	ON	
Test Site:	Shielded Room	
Operator:	Chen	
Test Specification:	DC 12V/50Hz	
Comment:	Polarization: Z	Tem:24℃ Hum:60%
Start of Test:	08/27/14/ 11:00	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuA	dB	dBuA	dBuA	dB	Detector	Comment
1		0.0507	-10.48	18.80	8.32	88.00	-79.68	peak	
2	*	0.7820	-20.64	20.70	0.06	38.15	-38.09	peak	

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5- RADIATED DISTURBANCES

5.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is 4.0 dB.

5.2 Limit of Radiated Disturbances

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dBμV/m)
30 ~ 230	3	40
230 ~ 300	3	47

Note: (1) The tighter limit shall apply at the edge between two frequency bands.
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

5.3 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the CISPR 16-1: 2002, CISPR16-2: 2002. The specification used was EN55015 limits.

The EUT was placed on the center of the test table.

Maximum emission emitted from EUT was determined by manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation and the levels in the final result of the test were recorded with the EUT running in the operating mode that maximum emission was emitted.

5.4 Test Receiver Setup

According to EN55015 rules, the frequency was investigated from 30 to 300 MHz. During the radiated emission test, the test receiver was set with the following configurations:

Test Receiver Setting:

Detector……...Peak & Quasi-Peak
IF Band Width……..…..120KHz
Frequency Range……..30MHz to 300MHz
Turntable Rotated……..……0 to 360 degrees

Antenna Position:

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Height……..…1m to 4m
Polarity……....Horizontal and Vertical

5.5 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -10 dBμV of specification limits), and are distinguished with a "QP" in the data table.

5.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The **"Margin"** column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dBμV means the emission is 7dBμV below the maximum limit for Class A. The equation for margin calculation is as follows:

Margin = Limit – Corr. Ampl.

5.7 Radiated Emissions Test Result

Temperature (℃)	22~25
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	LED Controller
M/N	NS-CON-IR44B-3CH-LV
Operating Mode	ON

Test data see following pages

5.8 Test Result

PASS

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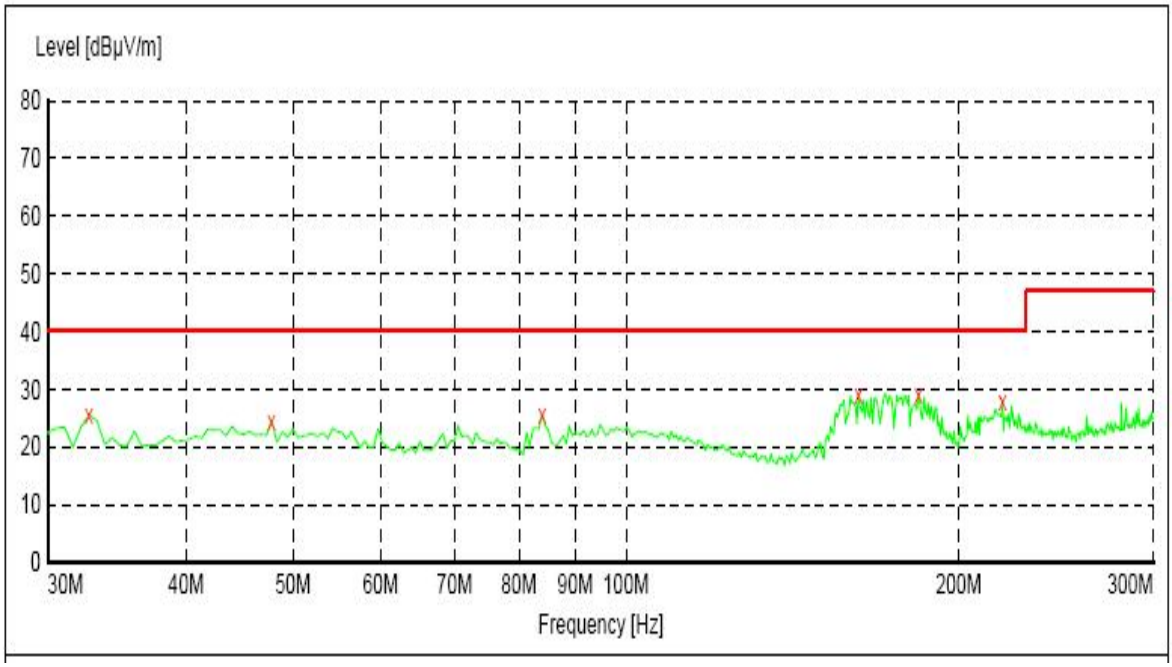
Radiated Emission Test Data

EUT:	LED Controller	M/N: NS-CON-IR44B-3CH-LV
Operating Condition:	ON	
Test Site:	3m CHAMBER	
Operator:	Jip	
Test Specification	DC 12V/50Hz	
Comment:	Polarization: Horizontal	Tem:25℃ Hum:50%
Start of Test:	08/27/14/ 15:30	



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
32.700000	25.50	14.4	40.0	14.5	---	100.0	0.00	HORIZONTAL
47.820000	24.40	15.8	40.0	15.6	---	100.0	0.00	HORIZONTAL
84.000000	25.40	14.0	40.0	14.6	---	100.0	0.00	HORIZONTAL
162.300000	29.20	12.8	40.0	10.8	---	100.0	0.00	HORIZONTAL
183.900000	29.20	14.3	40.0	10.8	---	100.0	0.00	HORIZONTAL
219.000000	27.90	15.3	40.0	12.1	---	100.0	0.00	HORIZONTAL

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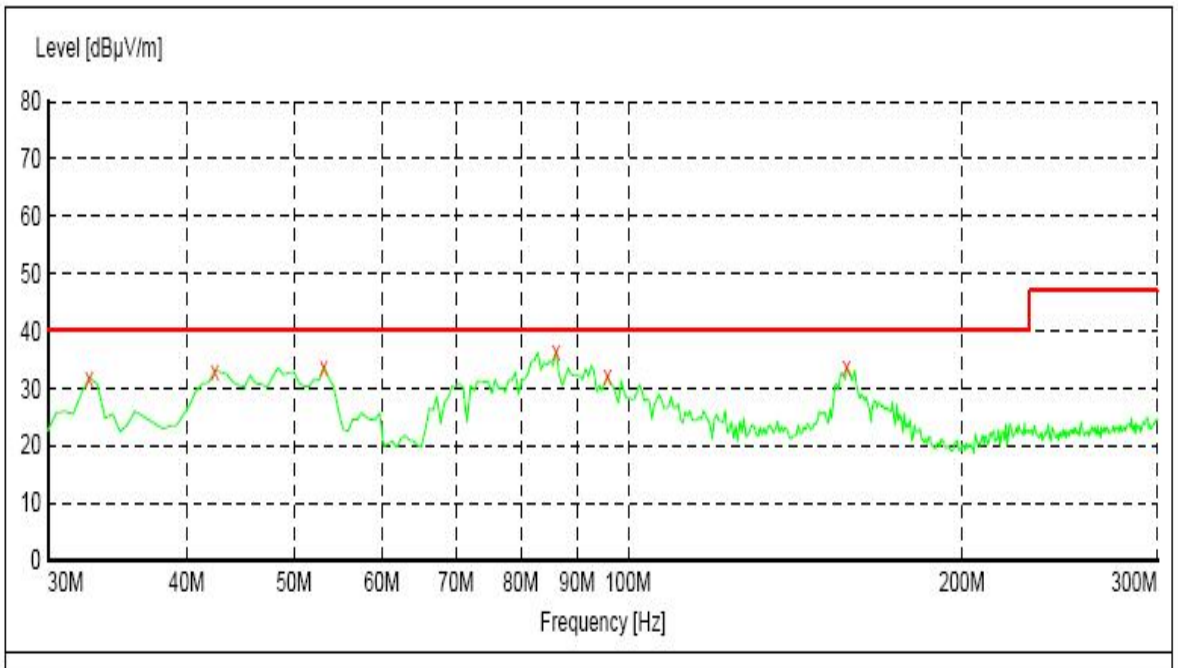
Radiated Emission Test Data

EUT:	LED Controller	M/N: NS-CON-IR44B-3CH-LV
Operating Condition:	ON	
Test Site:	3m CHAMBER	
Operator:	Jip	
Test Specification	DC 12V/50Hz	
Comment:	Polarization: Vertical	Tem:25℃ Hum:50%
Start of Test:	08/27/14/ 15:45	



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
32.700000	31.90	14.4	40.0	8.1	---	100.0	0.00	VERTICAL
42.420000	33.00	15.9	40.0	7.0	---	100.0	0.00	VERTICAL
53.220000	33.80	15.7	40.0	6.2	---	100.0	0.00	VERTICAL
86.160000	36.40	14.8	40.0	3.6	---	100.0	0.00	VERTICAL
95.880000	32.10	17.2	40.0	7.9	---	100.0	0.00	VERTICAL
157.440000	33.70	12.6	40.0	6.3	---	100.0	0.00	VERTICAL

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6 - HARMONIC CURRENT TEST (EN 61000-3-2)

6.1 Application of Harmonic Current Emission

Compliance to these standards ensures that tested equipment will not generate harmonic currents at levels that cause unacceptable degradation of the main environment. This directly contributes to meeting compatibility levels established in other EMC standards, which defines compatibility levels for low-frequency conducted disturbances in low-voltage supply systems.

6.2 Measurement Data

Note: For detailed test data, refer to the following pages:

Standard used:	EN/IEC 61000-3-2 - Equipment class D
Observation time:	150s
E. U. T.:	LED Controller
M/N	NS-CON-IR44B-3CH-LV
Operation Mode	ON

6.3 Test Results

E. U. T.:	LED Controller
Test Result	PASS

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Harmonic Number	Limit Current Amp	Average (filtered) Amp	% Limit	max. Value (Filtered) Amp	% Limit	Assessment
Fundamental:		0.017	-		-	
2:	-	0.000	-	0.000	-	-
3:	0.003	0.002	466.7	0.002	466.7	Pass
4:	-	0.000	-	0.000	-	-
5:	0.001	0.001	1100.0	0.001	1400.0	Pass
6:	-	0.000	-	0.000	-	-
7:	0.001	0.001	1100.0	0.001	1100.0	Pass
8:	-	0.000	-	0.000	-	-
9:	0.000	0.000	-	0.000	-	Pass
10:	-	0.000	-	0.000	-	-
11:	0.000	0.000	-	0.000	-	Pass
12:	-	0.000	-	0.000	-	-
13:	0.000	0.000	-	0.000	-	Pass
14:	-	0.000	-	0.000	-	-
15:	0.000	0.000	-	0.000	-	Pass
16:	-	0.000	-	0.000	-	-
17:	0.000	0.000	-	0.000	-	Pass
18:	-	0.000	-	0.000	-	-
19:	0.000	0.000	-	0.000	-	Pass
20:	-	0.000	-	0.000	-	-
21:	0.000	0.000	-	0.000	-	Pass
22:	-	0.000	-	0.000	-	-
23:	0.000	0.002	-	0.000	-	Pass
24:	-	0.000	-	0.000	-	-
25:	0.000	0.000	-	0.000	-	Pass
26:	-	0.000	-	0.000	-	-
27:	0.000	0.000	-	0.000	-	Pass
28:	-	0.000	-	0.000	-	-
29:	0.000	0.000	-	0.000	-	Pass
30:	-	0.000	-	0.000	-	-
31:	0.000	0.000	-	0.000	-	Pass
32:	-	0.000	-	0.000	-	-
33:	0.000	0.000	-	0.000	-	Pass
34:	-	0.000	-	0.000	-	-
35:	0.000	0.000	-	0.000	-	Pass
36:	-	0.000	-	0.000	-	-
37:	0.000	0.000	-	0.000	-	Pass
38:	-	0.000	-	0.000	-	-
39:	0.000	0.000	-	0.000	-	Pass
40:	-	0.000	-	0.000	-	-
21 - 39:	0.000	0.000	-	0.000	-	-

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7 - VOLTAGE FLUCTUATIONS AND FLICKER TEST (EN 61000-3-3)

7.1 Application of Voltage Fluctuations and Flicker Test

Compliance to these standards ensures that tested equipment will not generate flickers and voltage change at levels that cause unacceptable degradation of the main environment. This directly contributes to meeting compatibility levels established in other EMC standards, which defines compatibility levels for low-frequency conducted disturbances in low-voltage supply systems.

7.2 Measurement Data

Note: For detailed test data, refer to the following pages:

Standard used:	EN/IEC 61000-3-3 Flicker
Short time (Pst):	10 min
Observation time:	10 min (1 Flicker measurement)
Flicker meter:	DC 12V/50Hz
E. U. T.:	LED Controller
M/N	NS-CON-IR44B-3CH-LV
Operation Mode	ON

7.3 Test Results

E. U. T.:	LED Controller
Test Result	PASS

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Test Method: EN61000-3-3: 2008

Voltage Variations :		
Highest Level:	+1.52%	
Lowest Level:	+0.04%	
d(max):	1.48%	PASS
Highest d(t) of 500ms:	0.00%	PASS
Present d(t) over 3.33%:	0.00 Seconds	
Longest d(t) over 3.33%:	0.02 Seconds	
Highest Steady State:	+1.20%	
Lowest Steady State:	+1.20%	
Max d(c) Between Adjacent:	0.01%	PASS
Max d(c) Between Any:	0.01%	
Short Term Flicker Pst:	0.11	PASS

Flicker Results :

Pst Classifier Duration	Flicker	Plt Calculation Interval	Pst
0.1%	0.24		
0.7%	0.02		
1.0%	0.02		
1.5%	0.02		
2.2%	0.02		
3%	0.02		
4%	0.02		
6%	0.02		
8%	0.01		
10%	0.01		
13%	0.01		
17%	0.01		
30%	0.01		
50%	0.00		
80%	0.00		

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8 – IMMUNITY MEASUREMENT INSTRUMENTATION

8.1 Electrostatic Discharge Test System

An EM TEST DITOC0103Z ESD simulator is used for all testing. It is capable of applying Electrostatic discharges in both contact discharge modes to 4 kV and air discharge modes to 8 kV in both positive and negative polarities. This is in accordance with the IEC 61000-4-2 basic EMC publication.

8.2 Radiated Susceptibility Test System

An IFR 2032 signal generator and a Amplifier Research power amplifier are used to provide a signal at the appropriate power and frequency to a transmitting antenna to obtain the required electromagnetic field at the position of the EUT in accordance with the IEC 61000-4-3 basic EMC publication. The field was monitored by Amplifier Research field probe and Amplifier Research PM2002 power meter according the IEC 61000-4-3 standards.In order to judge the performance of the EUT, a set of monitor system is used.

8.3 Electrical Fast Transient/Burst Immunity Test System

An EM Test UCS 500-M6 Immunity test system is used for all testing. It is capable of applying fast transients to the AC line at any phase angle with respect to the AC line voltage wave form and to attached cables via a capacitive coupling clamp in accordance with the IEC 61000-4-4 basic EMC publication.

8.4 Surge Immunity Test System

An EM Test UCS 500-M6 Immunity test system is used for all testing. Both positive and negative polarities of voltage up to 2kV were applied to the AC input lines. The coupling network defined in the standard was used.

8.5 Conducted Susceptibility Test System

An IFR 2032A signal generator and a set of Amplifier Research test system are used for the testing. EUT was tested from 0.15 MHz to 80 MHz with 1kHz sine wave, 80% modulation with 3Vr.m.s. CDN coupling and de-coupling networks and EM clamp was tested. During the tests, injected was applied to power line by using CDNs-6.2.2 method, and I/O lines was injected by using EM clamp injection-6.2.3.method.

8.6 Power Frequency Magnetic Field Immunity Test System

An EM Test UCS 500-M6 Immunity test system is used for all testing. Test level as described in IEC 61000-4-8 titled “Table 1 – Test Levels for continuous field” was chosen. Single turn induction coil in 1m x 1m size was used to generate the magnetic field.

8.7 Voltage Dips, Short Interruptions Immunity Tests System

An EM Test UCS 500-M6 Immunity test system is used for all testing. Test level as described in IEC 61000-4-11, section 5, titled “Test Levels”.

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8.8 Equipment Test Table

IEC 61000-4-2: 1995 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.6 by 0.8-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by *0.5-millimeter* thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

IEC 61000-4-3 and IEC 61000-4-4 specify that a tabletop EUT be placed on a non-conducting table 80 centimeters above a ground reference plane and that floor-mounted equipment shall be placed on an insulating support approximately 10 centimeters above a ground plane. During the IEC 61000-4-3 tests, the EUT is positioned on a table in a shielded semi-anechoic test chamber to reduce reflections from the internal surfaces of the chamber. During the IEC 61000-4-4 tests, the EUT is positioned on a table over a ground reference plane in conformance with this requirement.

8.9 Instrument Calibration

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications.

Extensive engineering efforts have been made to ensure test data reliability through Quality Control and regular equipment calibration schedules. However, the application of radio frequency fields and voltages are not without an unavoidable level of uncertainty. These include inaccuracies in antenna factors, chamber imperfections and possible test generator output uncertainties.

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9- IMMUNITY TEST PROCEDURES

9.1 EUT and Cable Placement

The EUT and any peripherals are located at the center of the table for tabletop devices and in the center of the ground plane with the insulating support for floor-standing devices. The standards require that interconnecting cables to be connected to available ports of the unit and that the placement of the unit and the attached cables simulate a typical installation so far as to be practical.

9.2 Application of Electrostatic Discharge Immunity Test

The test is conducted in the following order according to the basic standard IEC 61000-4-2: Air Discharge, Direct Contact Discharge, Indirect Contact Horizontal Coupling Plane Discharge, and Indirect Contact Vertical Coupling Plane Discharge. The Electrostatic Discharge test levels are set and discharges for the different test modes are set appropriately. The Electrostatic Discharge is applied to the conductive surface of the computer in which the EUT is enclosed, and along all seams and control surfaces on the computer. When a discharge occurs and an error is caused, the type of error, discharge level and location is recorded.

9.3 Application of Radiated Susceptibility Test

The electromagnetic field is established at the front edge of the EUT. The frequency range is swept from 80 to 1000 MHz using a power level necessary to obtain a 3 volt/meter and 80% amplitude of a 1 kHz sine wave modulated field Strength is directed at the EUT. The test is performed with each of four sides of EUT facing the transmitting antenna. If an error is detected when the susceptible side of the EUT facing the transmitting antenna, the field is reduced until the error is not repeatable, the field is then manually increased until the error begins to occur. This threshold level, the frequency and the error created are noted before continuing. Both horizontal and vertical polarization of the antenna are set on test and measured individually

9.4 Application of Electrical Fast Transient/Burst Immunity Test

The EUT was arranged for Power Line Coupling and for I/O Line Coupling through a capacitive clamp, where applicable. (Note: The I/O coupling test using a capacitive clamp is performed on the I/O interface cables that are longer in length than 3 meters.) A metal ground plane 2.4 meter by 2.0 meter was placed between the floor and the table and is connected to the earth by a 2.0 meter ground rod. The ground rod is connected to the test facility's electrical earth.

9.5 Application of Surge Immunity Test

The EUT was setup as described in IEC 61000-4-5 and the test shall be performed according to the test plan.

9.6 Application of Conducted Susceptibility Test

The EUT was setup according to the IEC 61000-4-6 and the test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF input ports of the coupling devices are terminated by a 50 Ω load resistor. The frequency range is 150kHz to 80 MHz.

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9.7 Application of Power Frequency Magnetic Field Immunity Test

The EUT was setup according to the IEC 61000-4-8 and the test shall be done as the procedure described in the standard.

9.8 Application of Voltage Dips, Short Interruptions Immunity Tests

The EUT was setup according to the IEC 61000-4-11 and the test shall be done as the procedure described in the standard.

9.9 Deviations from the Standard

No deviations from EN 61547 were made when performing the tests described in this report.

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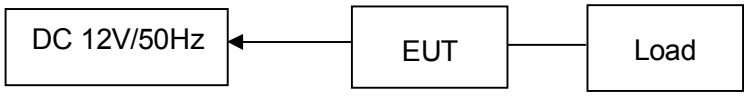
10 - Electrostatic Discharge immunity Test (IEC 61000-4-2)

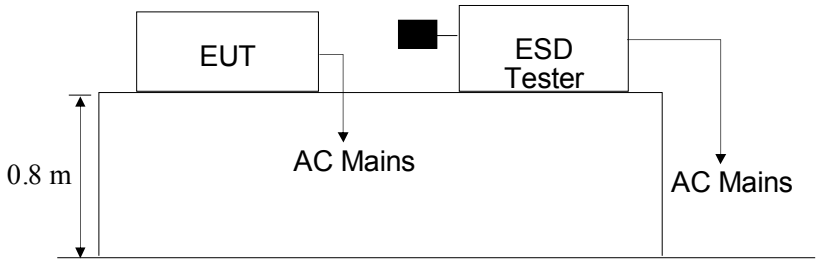
10.1 Block Diagram of Test Setup

10.1.1 Block diagram of connection between the EUT and Load



(EUT: LED Controller)

10.1.2 Block diagram of ESD test setup



(EUT: LED Controller)

10.2 Test Standard

EN 61547: 2009, (EN61000-4-2: 2008 Severity Level: 3 / Air Discharge: ±8KV Level: 2 / Contact Discharge: ±4KV)

10.3 Severity Levels and Performance Criterion

10.3.1 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

10.3.2 Performance criterion : B

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10.4 Operating Condition of EUT

10.4.1 Setup the EUT as shown on Section 10.1.

10.4.2 Turn on the power of all equipments.

10.4.3 Let the EUT work in measuring mode (ON) and measure it.

10.5 Test Procedure

10.5.1 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.

10.5.2 Contact Discharge:

All the procedure shall be same as Section 5.6.1. Except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

10.5.3 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.

10.5.4 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.

10.6 Test Results

PASS

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Temperature (℃)	22~23
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	LED Controller
M/N	NS-CON-IR44B-3CH-LV
Operating Mode	ON

Table 1: Electrostatic Discharge Immunity (Air Discharge)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Gap	A	A	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Metal	A	A	A	A	/	/	/	/	/	/
Bolts	A	A	A	A	/	/	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Front Side	A	A	A	A	/	/	/	/	/	/
Back Side	A	A	A	A	/	/	/	/	/	/
Left Side	A	A	A	A	/	/	/	/	/	/
Right Side	A	A	A	A	/	/	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

IEC 61000-4-2 Test Points	Test Levels									
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV	-15 kV	+15 kV
Front Side	A	A	A	A	/	/	/	/	/	/
Back Side	A	A	A	A	/	/	/	/	/	/
Left Side	A	A	A	A	/	/	/	/	/	/
Right Side	A	A	A	A	/	/	/	/	/	/

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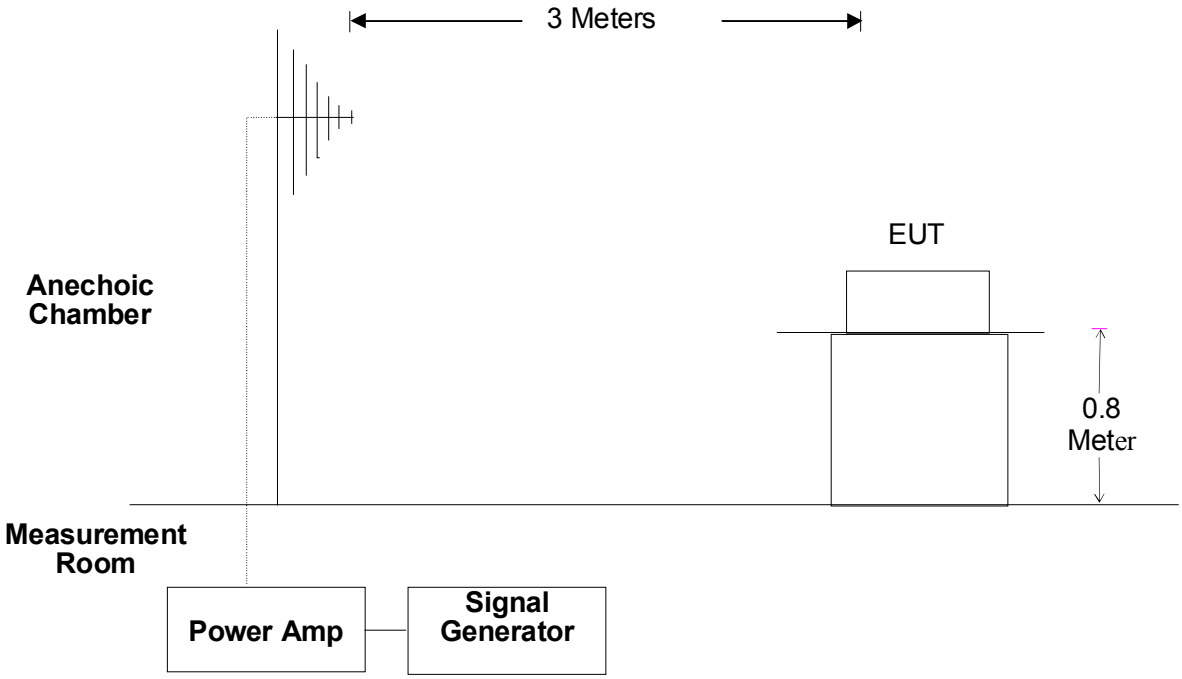
11 - RF Field Strength susceptibility TEST (IEC 61000-4-3)

11.1 Block Diagram of Test

11.1.1 Block diagram of connection between the EUT and Load

(EUT: LED Controller)

11.1.2 Block diagram of RS test setup



(EUT: LED Controller)

11.2 Test Standard

EN 61547: 2009, (EN61000-4-3: 2010, Severity Level: 2, 3V / m)

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11.3 Severity Levels and Performance Criterion

11.3.1 Severity Levels

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

11.3.2 Performance Criterion: A

11.4 Operating Condition of EUT

11.4.1 Setup the EUT as shown on Section 11.1.

11.4.2 Turn on the power of all equipments.

11.4.3 Let the EUT work in measuring mode (ON) and measure it..

11.5 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	3V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	80-1000MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	1 Sec.

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11.6 Test Results

PASS

Please refer to the following page.

Temperature (℃)	22~23
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	LED Controller
M/N	NS-CON-IR44B-3CH-LV
Operating Mode	ON

Frequency Range (MHz)	Front (3 V/m)		Rear (3 V/m)		Left Side (3 V/m)		Right Side (3 V/m)	
80-1000	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
	A	A	A	A	A	A	A	A

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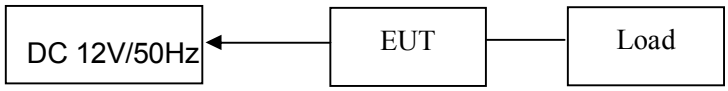
12 - Conducted Susceptibility Test (IEC 61000-4-6)

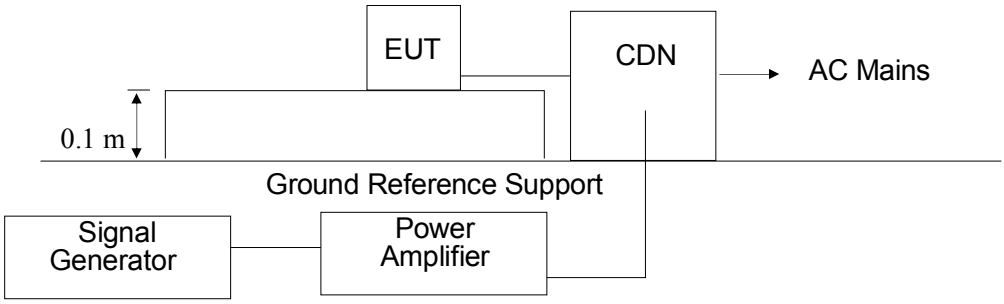
12.1 Block Diagram of Test Setup

12.1.1 Block Diagram of the EUT



(EUT: LED Controller)

12.1.2 Block Diagram of Test Setup



(EUT: LED Controller)

12.2 Test Standard

EN 61547: 2009 (EN61000-4-6: 2008, Severity Level 2: 3V (rms)).(0.15MHz ~ 80MHz)

12.3 Severity Levels and Performance Criterion

12.3.1 Severity level

Level	Field Strength V(rms)
1.	1
2.	3
3.	10
X	Special

12.3.2 Performance criterion: A

12.4 Operating Condition of EUT

12.4.1 Setup the EUT as shown in Section 14.1.

12.4.2 Turn on the power of all equipments.

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12.4.3 Let the EUT work in test mode (ON) and measure it.

12.5 Test Procedure

12.5.1 For AC Mains

It's unnecessary to test.

12.5.2 For signal lines and control lines ports:

It's unnecessary to test.

12.5.3 For DC Input line ports:

1) Set up the EUT, CDN and test generators as shown on Section 14.1.
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 network) 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*10-3decades/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.

Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

12.6 Test Results

PASS

Please refer to the following page.

Frequency Range (MHz): 0.15~80MHz
Modulation: Amplitude 80%, 1kHz sinewave
Severity Level: 3Vr.m.s.

Temperature (℃)	22~23
Humidity (%RH)	50~54
Barometric Pressure (mbar)	950~1000
EUT	LED Controller
M/N	NS-CON-IR44B-3CH-LV
Operating Mode	ON

Level	Voltage Level (e.m.f.) U_0	Pass	Fail
1	1	/	/
2	3	A	/
3	10	/	/
X	Special	/	/

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13 - TEST RESULTS

The following tests were performed on the **NEWSTAR LED CO., LIMITED.**'s product;
model: NSS-5050-60;the actual test results are contained within the Test Data section of this report.

13.1 IEC 61000-4-2 Electrostatic Discharge Immunity Test Configuration

The EUT was subjected to the electrostatic discharge tests required by EN 61547 and all lower levels specified in IEC 61000-4-2.

The EUT continued to perform as intended during and after the application of the ESD. Test setup photographs presented in Appendix C.

13.2 IEC 61000-4-3 Radiated Susceptibility Test Configuration

The EUT was subjected to a 3-volt/meter, 80% Amplitude, 1 kHz Sine wave field as required by EN 61547 and all lower levels specified in IEC 61000-4-3.

The EUT continued to perform as intended during and after the application of the electromagnetic field. Test setup photographs presented in Appendix C.

13.5 IEC 61000-4-6 Conducted Susceptibility Test Configuration

The EUT was subjected to the Conducted Susceptibility tests required by EN 61547 and all lower levels specified in IEC 61000-4-6.

The EUT continued to perform as intended during and after the application of the Conducted Susceptibility Test. Test setup photographs presented in Appendix C.

13.6 IEC 61000-4-11 Voltage Dips, Short Interruptions Immunity Tests Configuration

The EUT was subjected to the Voltage Dips/Interruptions tests required by EN 61547 and all lower levels specified in IEC 61000-4-11.

The EUT continued to perform as intended during and after the application of the Voltage Dips/Interruptions Test. Test setup photographs presented in Appendix C.

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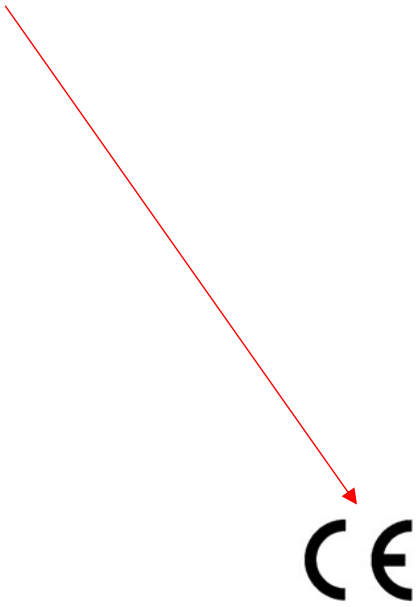
APPENDIX A - PRODUCT LABELING

CE Marking Label Specification

Specification: Text is Black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the EUT or silk-screened onto the EUT.

Proposed Label Location on EUT

EUT Rear View/Proposed CE Marking Location



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APPENDIX B - EUT PHOTOGRAPHS

EUT - View

EUT –View

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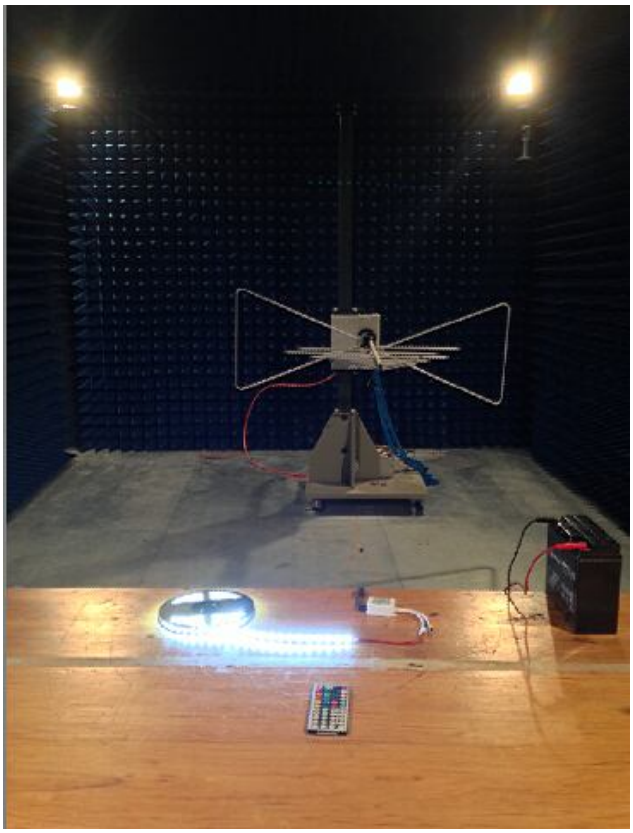
APPENDIX C - TEST SETUP PHOTOGRAPHS

Radiated Emission



Electrostatic Discharge Immunity Test (IEC 61000-4-2)

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