iML8683 – 120V_{AC} 13W Down Light EVM

– Application Notes –

Table of Content

 深圳市鑫宝宏电子有限公司 手机：13670037219 QQ:1561451328

1. IC Description

The iML8683 is a Three Terminal Current Controller (TTCC) for regulating the current flowing through an LED string.

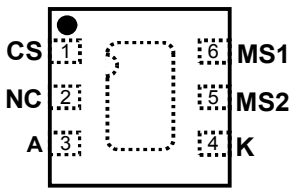
The application of the iML8683 is configured in parallel with an LED string. The iML8683 can work as voltage controlled current source, current regulator, or cut-off. It is suitable for the applications adopting periodical AC voltage source.

The PCB layout is also very flexible to meet various shape requirements. It is especially suitable for replacing incandescent light bulb and linear type fluorescent lamp.

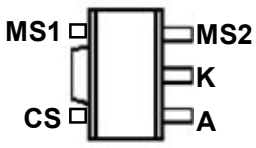
2. Features

- **System**
  - ✓ All solid state components
  - ✓ No electrolytic capacitor needed
  - ✓ Compact size
  - ✓ High Power Factor and Low Total Harmonic Distortion Performance
  - ✓ High efficiency
  - ✓ Flexible PCB layout style
  - ✓ Wide range of LED forward voltage selection
- **Chip**
  - ✓ 88V input sustaining voltage.
  - ✓ 3V dropout voltage for up to 150mA regulating current.
  - ✓ Chip-on-board process available.
- **Applications**
  - ✓ AC LED lighting engine.
  - ✓ LED light bulb.
  - ✓ LED light tube.

3. Package and Pin Diagrams



DFN 2mm×2mm



SOT-89-5L

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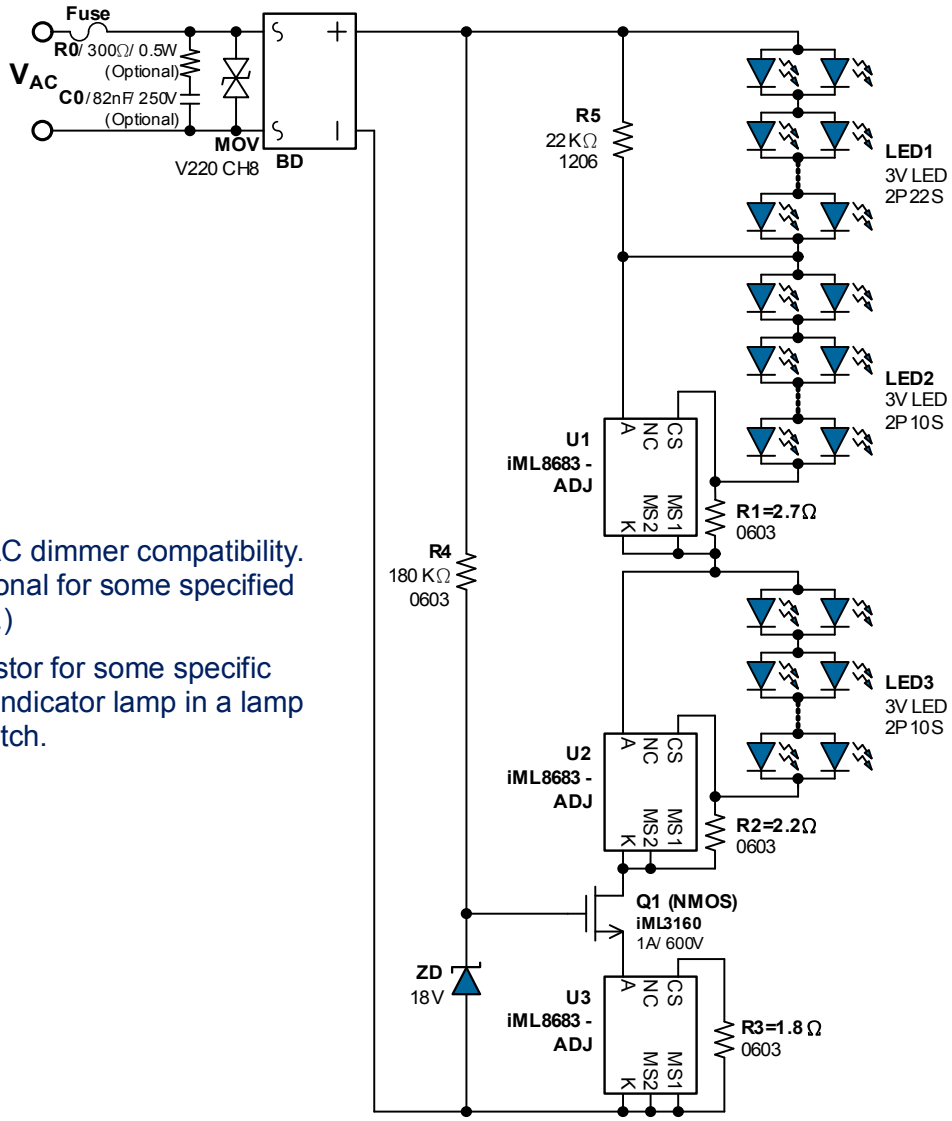
4. Application Circuit

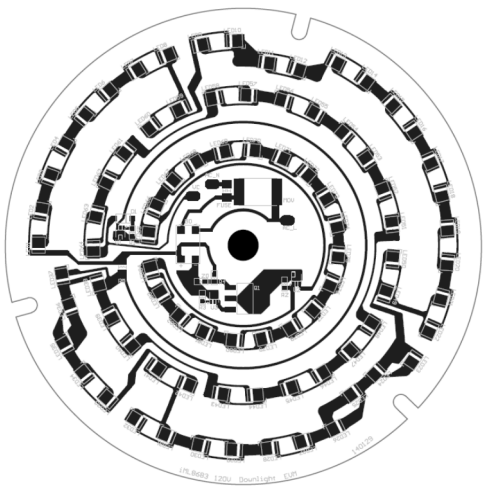


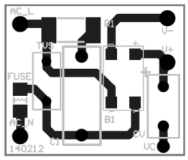
Remark:

R0/C0: For TRIAC dimmer compatibility. (It is optional for some specified dimmers.)

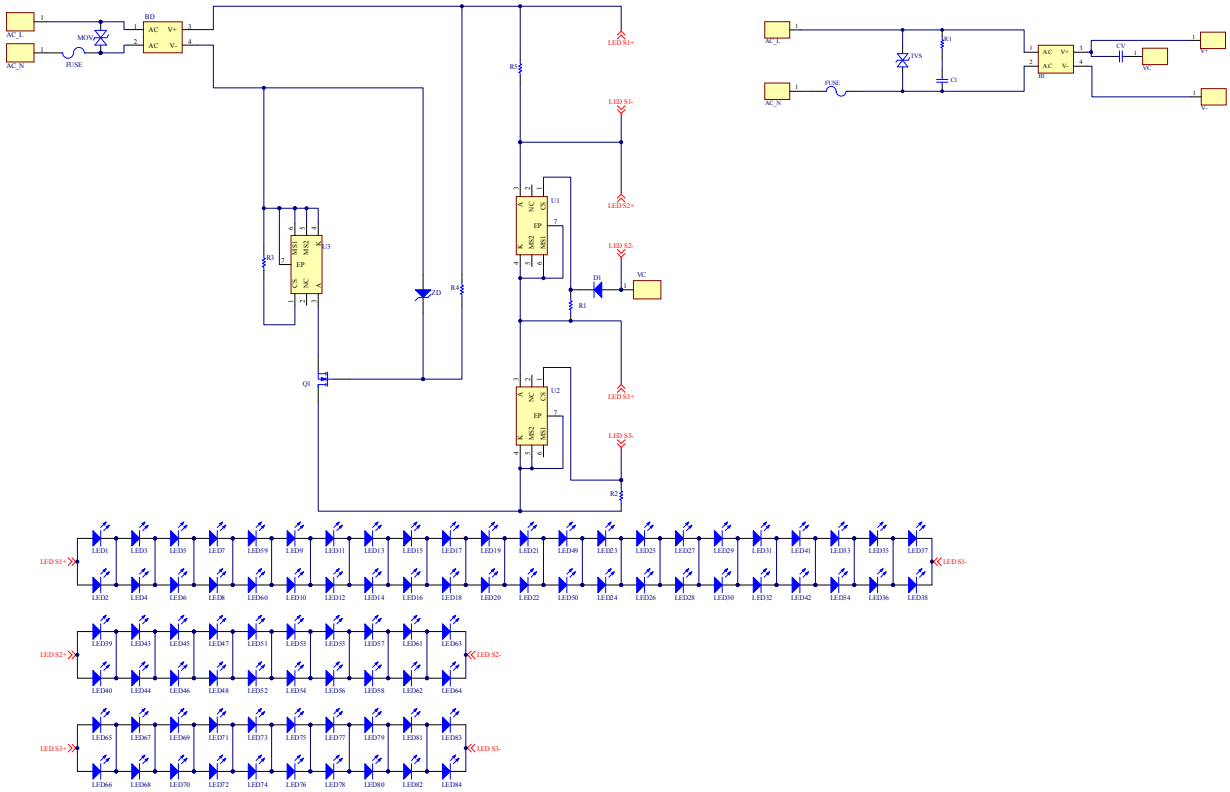
R5: Bleeder resistor for some specific dimmers or indicator lamp in a lamp ON/OFF switch.

5. PCB Layout and Photograph





6. Schematic of PCB



7. Bill of Materials

Component	Description	Package
Main Board		
Fuse	NC (0Ω)	1206
BD	Bridge Diode, MDB10S, 1000V, 1A	
MOV	V220CH8	8*5mm
U1, U2, U3	iML8683NL-ADJ	DFN-2x2 6L
LED1 ~ LED84	HongLi, 3V LED (CCT=5700K)	2835
R1	Resistor, 2.7Ω	0603
R2	Resistor, 2.2Ω	0603
R3	Resistor, 1.8Ω	0603
R4	Resistor, 180KΩ	0603
R5	Resistor, 22KΩ	1206
D1	80V/0.5A Schottky Diode, MBR 0580-TP	SOD-123
ZD	Zener Diode, 18V	SOD-523
Q1	HV NMOS, iML3160, 600V/1A, $V_{GS,MAX}$=30V	SOT-223
Front End Board		
Fuse	NC (0Ω)	1206
MOV	NC	Φ 7mm
R1	Resistor, 300Ω	0.5W
C1	82nF/250V	Mylar Capacitor
BD	NC	
CV	NC	E. Cap

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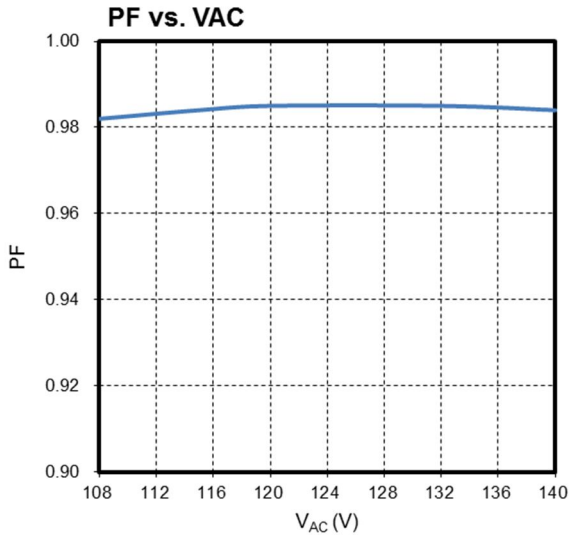
8. Performance Data and Typical Characteristic

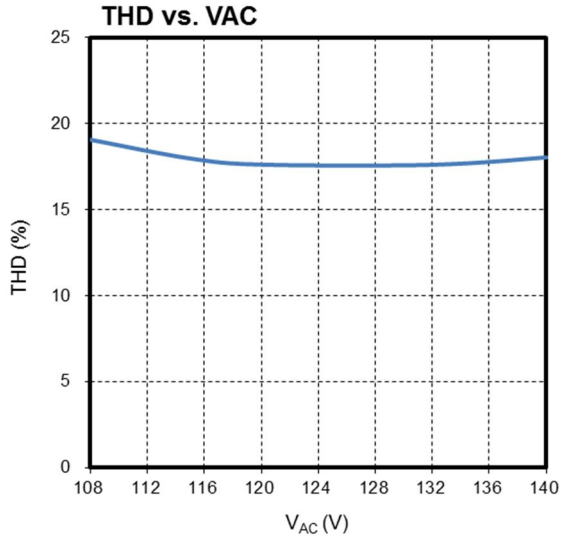
8.1 Test Result

V_{AC} (V)	I_{IN} (mA)	PF	THD (%)	P_{IN} (W)	I_{IN} Line Reg.
108	104.20	0.982	19.07	11.124	-5.19%
115	107.80	0.984	17.98	12.270	-1.91%
120	109.90	0.985	17.62	13.062	0.00%
132	113.50	0.985	17.61	14.714	3.28%
140	115.60	0.984	18.04	15.896	5.19%

8.2 Power Factor vs. V_{AC}



8.3 THD vs. V_{AC}



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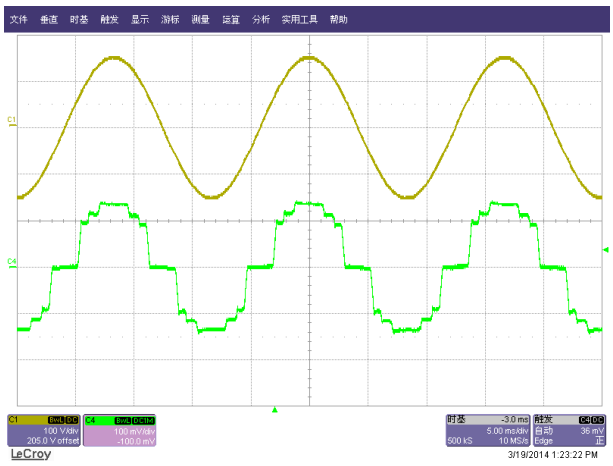
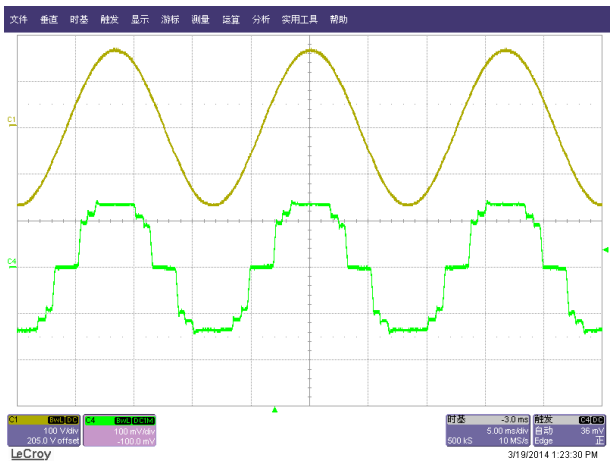
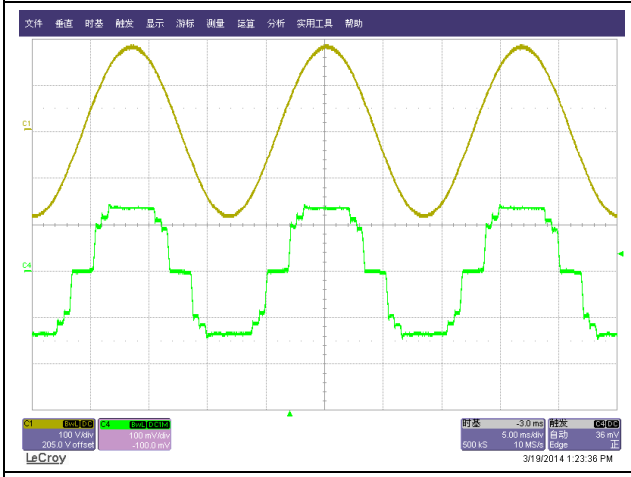
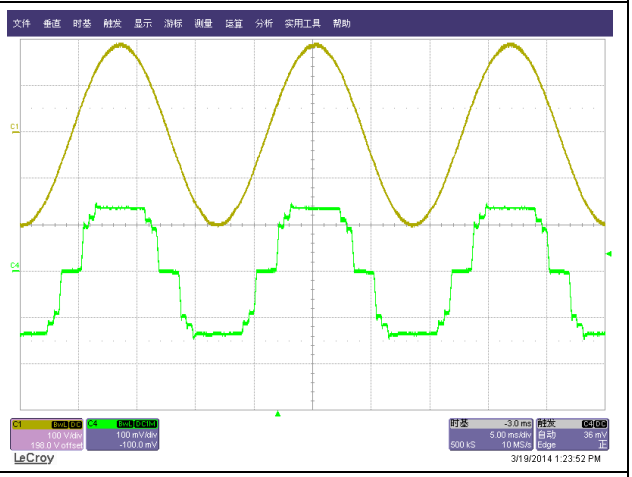
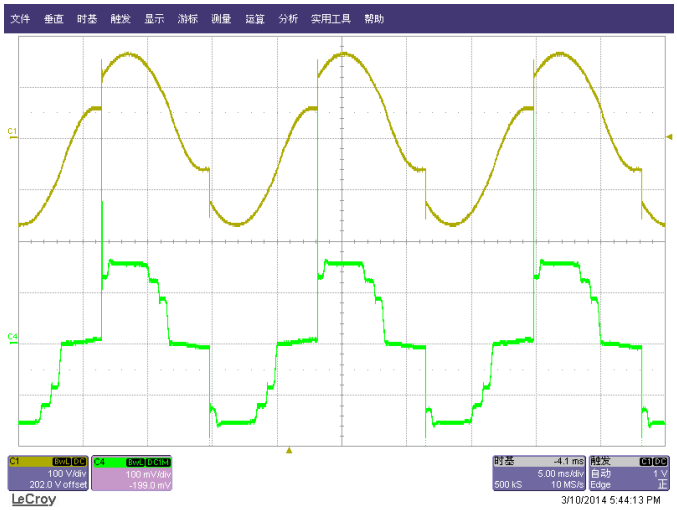
8.4 Input Voltage and Input Current

V_{AC}=108V	V_{AC}=120V
	
CH1: Input Voltage, CH4：Input Current	CH1: Input Voltage, CH4：Input Current

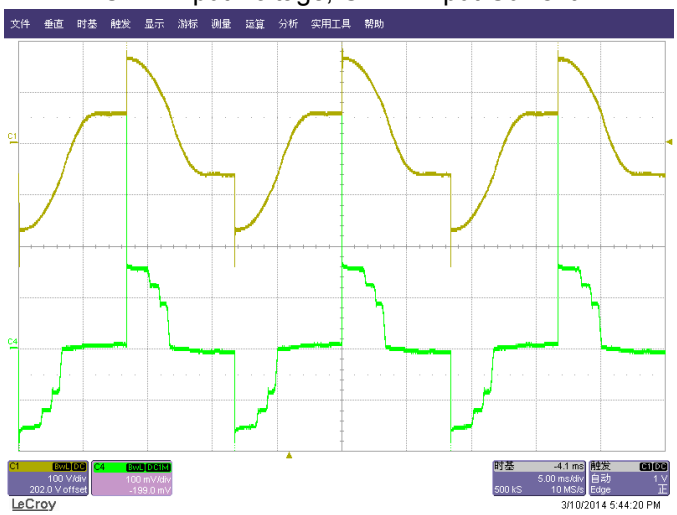
V_{AC}=132V	V_{AC}=140V
	
CH1: Input Voltage, CH4：Input Current	CH1: Input Voltage, CH4：Input Current

8.5 TRIAC Dimming Waveforms

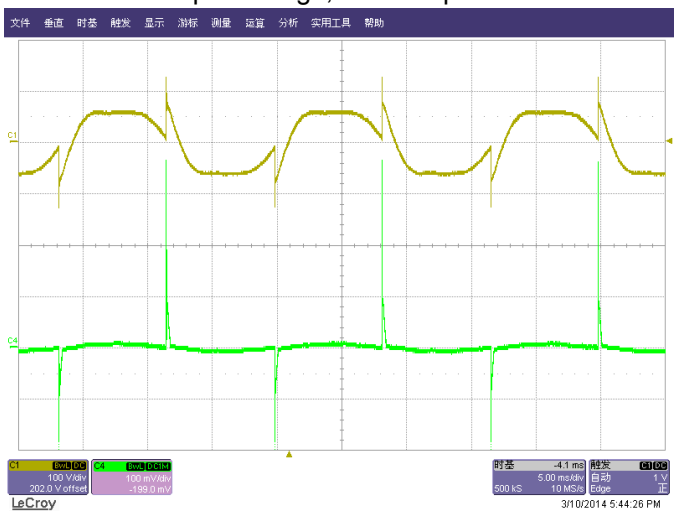
8.5.1 Leading Phase TRIAC Dimming



CH1: Input Voltage, CH4：Input Current



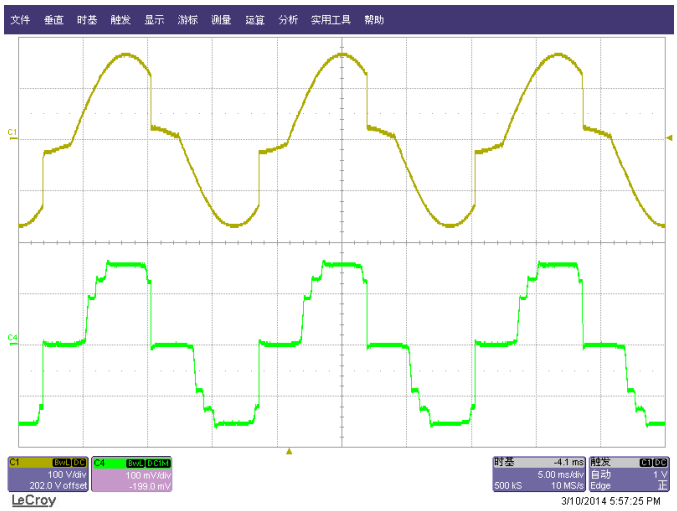
CH1: Input Voltage, CH4：Input Current



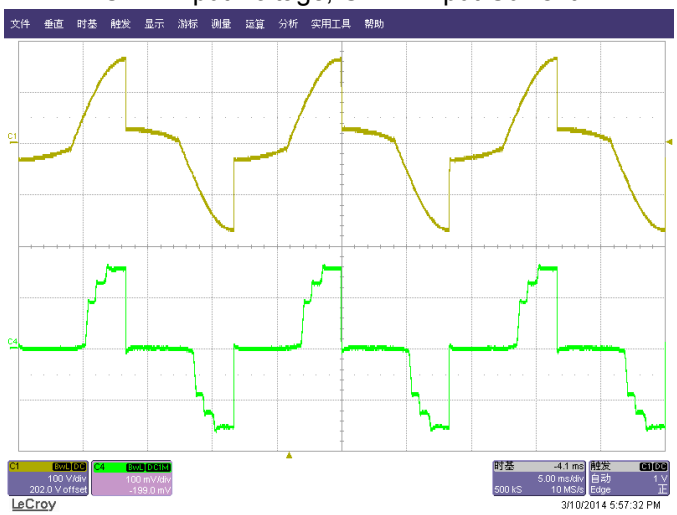
CH1: Input Voltage, CH4：Input Current

<< Note：TRIAC Dimmer (Leviton-Illumatech-IP106-1LZ) >>

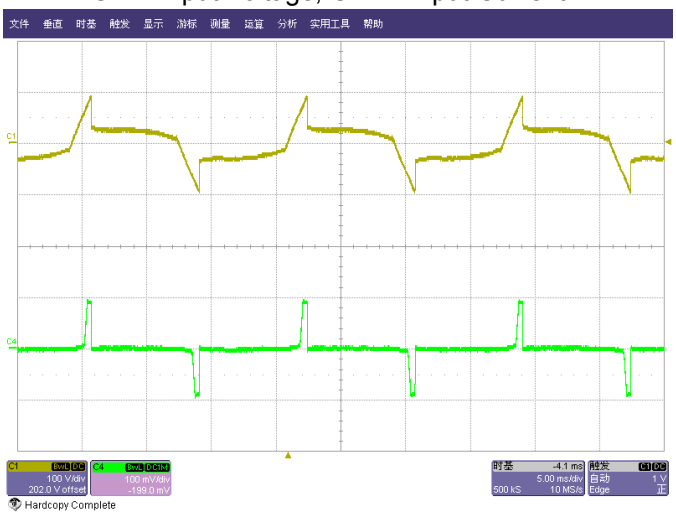
8.5.2 Trailing Phase TRIAC Dimming



CH1: Input Voltage, CH4：Input Current



CH1: Input Voltage, CH4：Input Current



CH1: Input Voltage, CH4：Input Current

<< Note：TRIAC Dimmer (LUTRON- DIVA- DVELV-300P) >>

8.5.3 Compatible Dimmers

Brands	Series	Model	Voltage	Power	Type
Leviton	Illumatech	IP106-1LZ	120V	600W	Leading
Leviton	Decora	6633-PL	120V	600W	Leading
Leviton	Decora	6615-P	120V	300W	Trailing
LUTRON	DIVA	DVCL-153P	120V	600W	Leading
LUTRON	DIVA	DV-600P-IV	120V	600W	Leading
LUTRON	DIVA	DVELV-300P	120V	300W	Trailing
LUTRON	Ariadni	AY-600P-IV	120V	600W	Leading
LUTRON	Nova	N-600-AL	120V	600W	Leading
LUTRON	Skylark	CT-600P	120V	600W	Leading
LUTRON	Skylark	CTCL-153P	120V	600W	Leading

9. Surge Performance

In order to pass 1KV surge test (IEC61000-4-5), a MOV is required. Without MOV, the light engine can pass 750V surge. Here are the test results.

Worldwide Testing Services(Taiwan) Co., Ltd.

Surge

Applicant: **Integrated Memory Logic, Inc.**

Standard : EN 61000 - 4 – 5

Device : **iML8683 120V/13W LED Downlight Module**

Date : 2014.03.04

Temperature	:	22.4 °C
Pressure	:	990 hPa
Rel. humidity	:	49.4 %

Model	Test mode	Voltage Angle	Waveform T_r / T_h	Repetition	Number of Tests/ Total	Performance criteria
#1	120VAC-line to line	+500V 90°	1.2/50 µs	30s	5/5	A
		-500V 270°	1.2/50 µs	30s	5/5	A
#2	120VAC-line to line	+750V 90°	1.2/50 µs	30s	5/5	A
		-750V 270°	1.2/50 µs	30s	5/5	A
#3 V220CH8	120VAC-line to line	+1000V 90°	1.2/50 µs	30s	5/5	A
		-1000V 270°	1.2/50 µs	30s	5/5	A

Performance criteria:

A : No loss of performance or function

B : Temporary loss of function or performance which is self recoverable

C : Temporary loss of function or perform. which req. operate. intervention or system reset

D : Loss of function which is not recoverable

ETS DR. GENZ TAIWAN PS CO., LTD.
6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU, TAIPEI 114, TAIWAN, R.O.C.

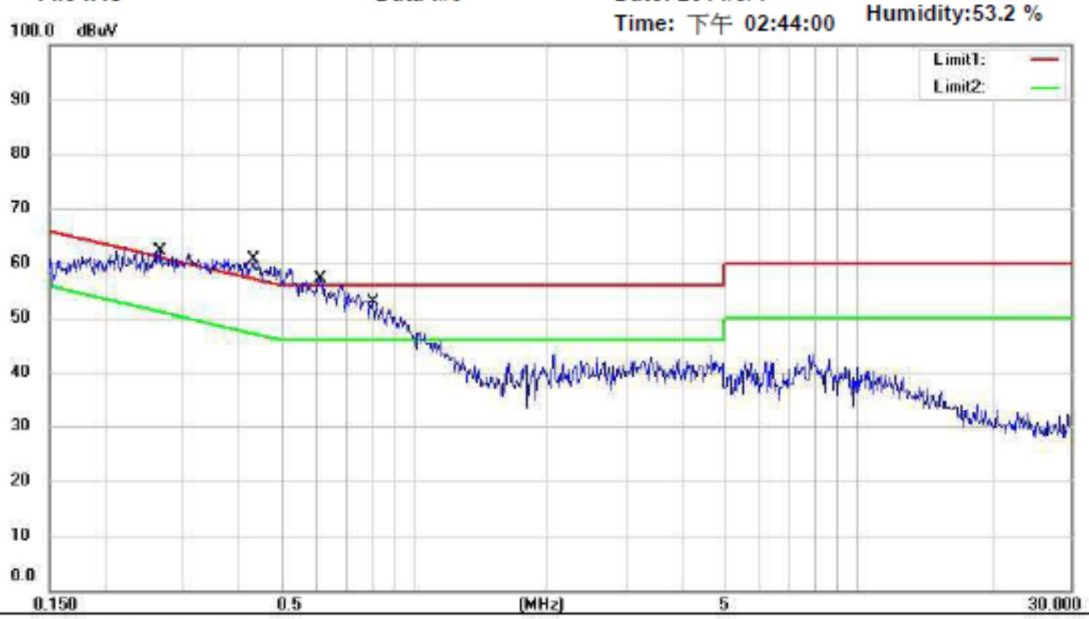
10. EMI Performance

Address:6F.,No.58,Ln 188,Ruey Kuang Rd,Neihu,Taipei
Tel:+886-2-6606-8877
Fax:+886-2-6606-8875

Conducted Emission Measurement

Operator: Kiki
Temperature:25.5 ℃
Humidity:53.2 %

File :AC
Data :#9
Date: 2014/3/4
Time: 下午 02:44:00



Site : Chamber_03
Condition : FCC Part 15 Class B Conduction (QP)
Phase: L1
EUT :
Power : 120 Va.c.
M/N: iML8683 120V 13W
Test Mode :
Note : Downlight Module

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.2662	44.68	QP	9.66	54.34	61.24	-6.90	
	0.2662	31.99	AVG	9.66	41.65	51.24	-9.59	
*	0.4325	43.02	QP	9.67	52.69	57.20	-4.51	
	0.4325	30.05	AVG	9.67	39.72	47.20	-7.48	
	0.6126	40.13	QP	9.68	49.81	56.00	-6.19	
	0.6126	27.03	AVG	9.68	36.71	46.00	-9.29	
	0.8083	36.09	QP	9.69	45.78	56.00	-10.22	
	0.8083	23.08	AVG	9.69	32.77	46.00	-13.23	

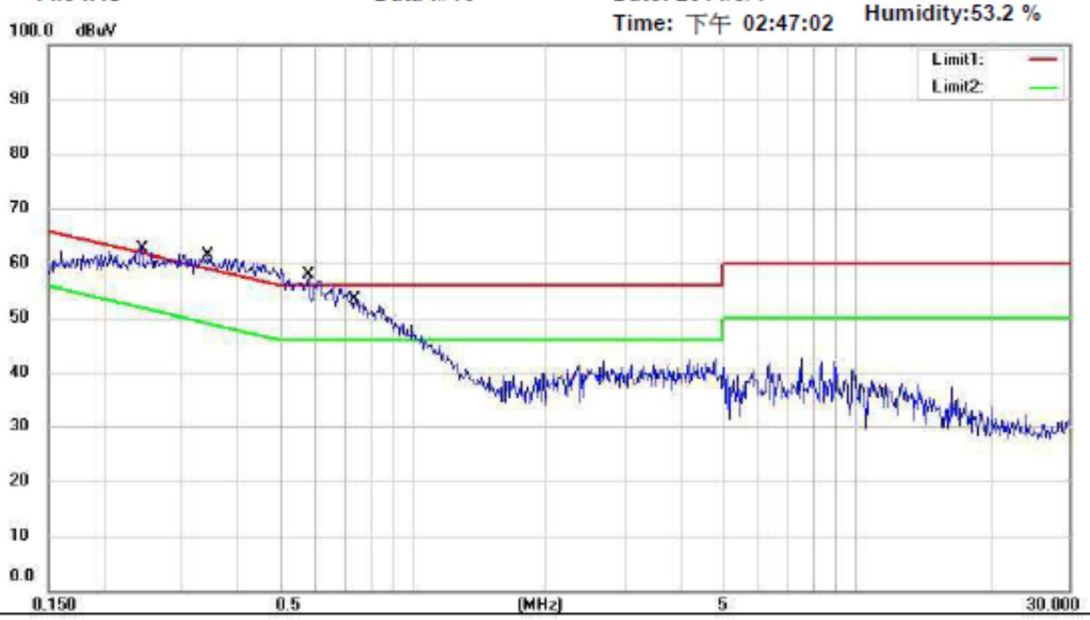
*:Maximum data x:Over limit !:over margin

Address:6F.,No.58,Ln 188,Ruey Kuang Rd,Neihu,Taipei
Tel:+886-2-6606-8877
Fax:+886-2-6606-8875

Conducted Emission Measurement

Operator: Kiki
Temperature:25.5 ℃
Humidity:53.2 %

File :AC
Data :#10
Date: 2014/3/4
Time: 下午 02:47:02



Site : Chamber_03
Condition : FCC Part 15 Class B Conduction (QP)
Phase: N
EUT :
Power : 120 Va.c.
M/N: iML8683 120V 13W
Test Mode :
Note : Downlight Module

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.2435	44.64	QP	9.67	54.31	61.98	-7.67	
	0.2435	31.87	AVG	9.67	41.54	51.98	-10.44	
*	0.3456	44.23	QP	9.68	53.91	59.07	-5.16	
	0.3456	31.18	AVG	9.68	40.86	49.07	-8.21	
	0.5791	40.86	QP	9.68	50.54	56.00	-5.46	
	0.5791	27.59	AVG	9.68	37.27	46.00	-8.73	
	0.7362	37.69	QP	9.69	47.38	56.00	-8.62	
	0.7362	24.54	AVG	9.69	34.23	46.00	-11.77	

*:Maximum data x:Over limit !:over margin