

iML8683 – 220V_{AC} 14W Down Light EVM

– Application Notes –

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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

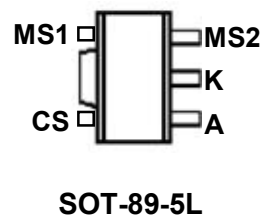
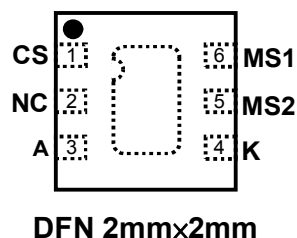
■ Chip

- ✓ 88V input sustaining voltage.
- ✓ 3V dropout voltage for up to 150mA regulating current.
- ✓ Chip-on-board process available.

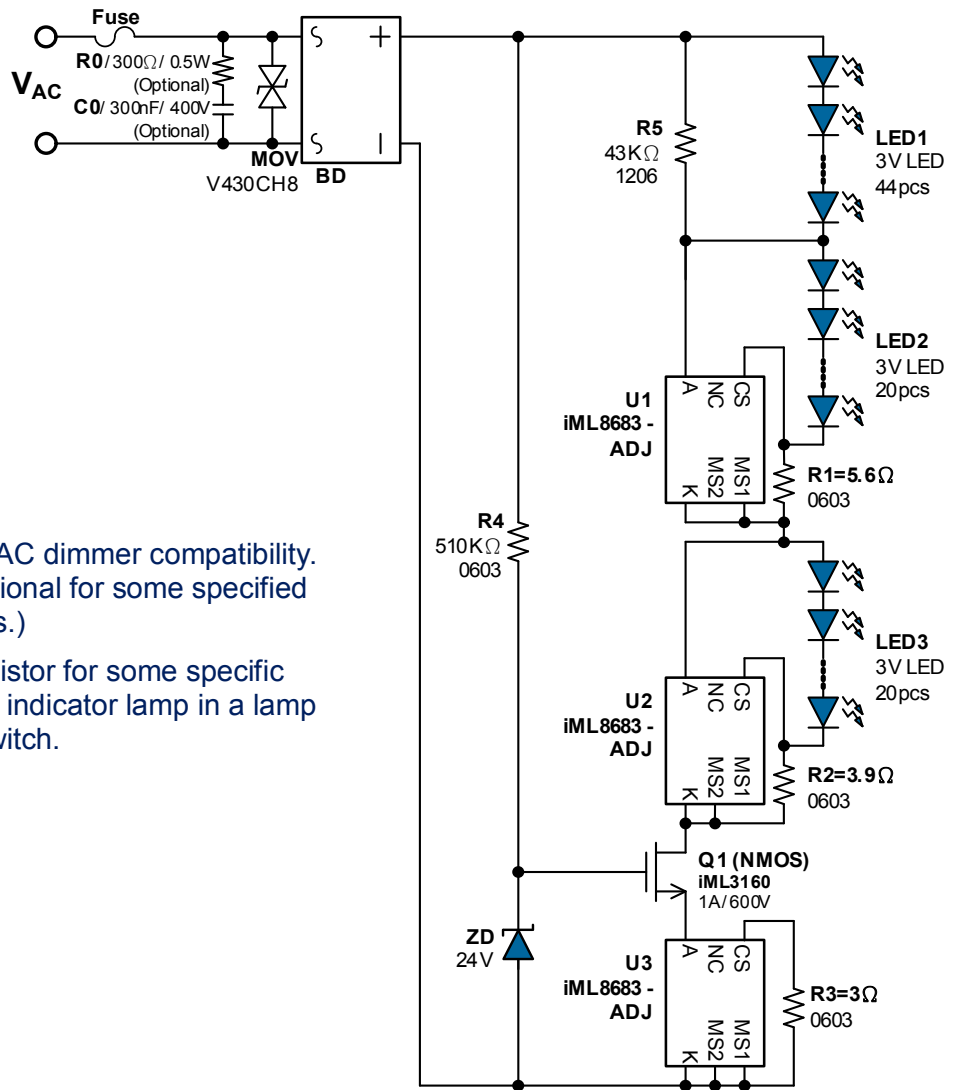
■ Applications

- ✓ AC LED lighting engine.
- ✓ LED light bulb.
- ✓ LED light tube.

3. Package and Pin Diagrams



4. Application Circuit

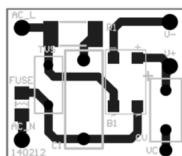
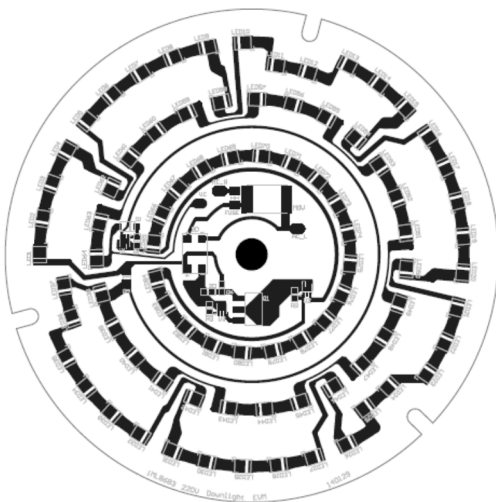


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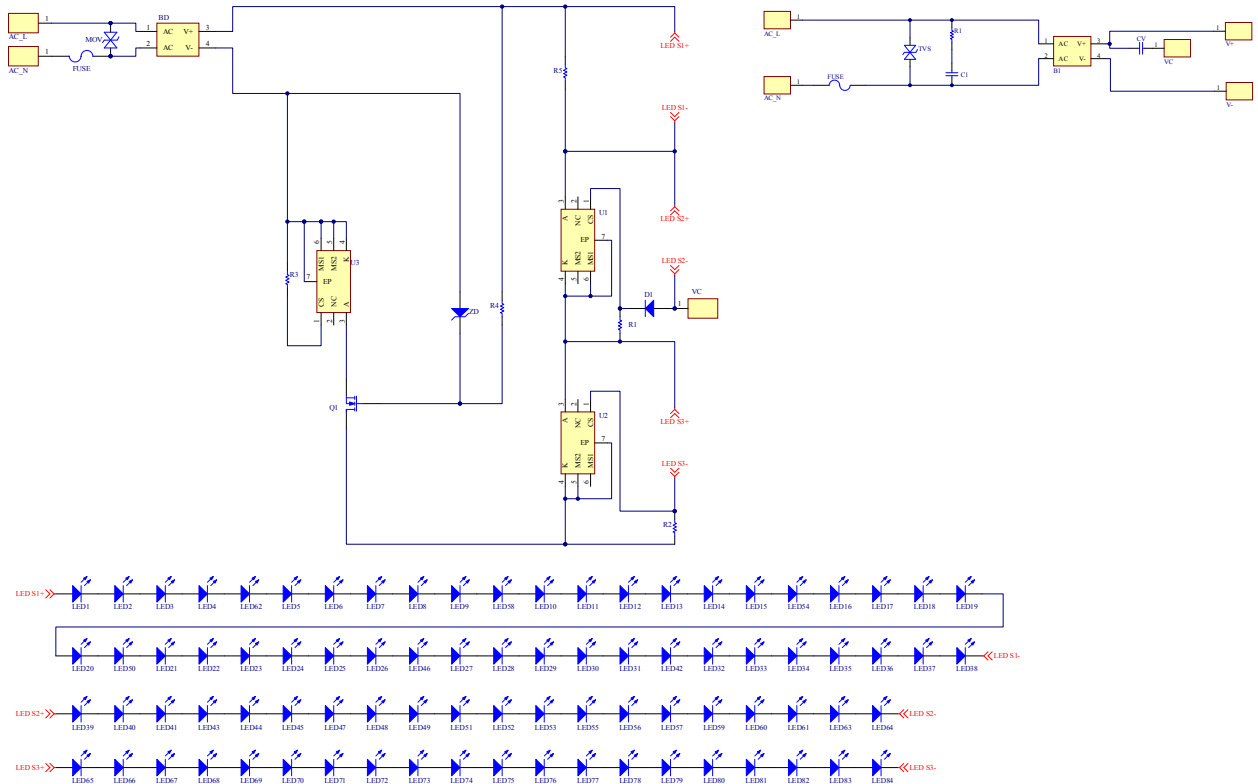
R0/C0: For TRIAC dimmer compatibility. (It is optional for some specified dimmers.)

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

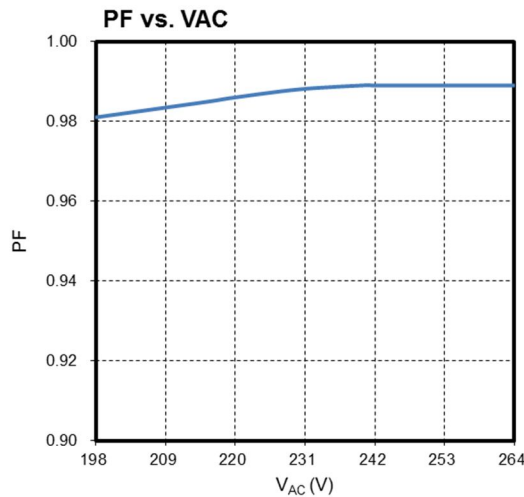
Component	Description	Package
Main Board		
Fuse	NC (0Ω)	1206
BD	Bridge Diode, MDB10S, 1000V, 1A	
MOV	V430CH8	8*5mm
U1, U2, U3	iML8683NL-ADJ	DFN-2x2-6L
LED1 ~ LED84	HongLi, 3V LED (CCT=5700K)	2835
R1	Resistor, 5.6Ω	0603
R2	Resistor, 3.9Ω	0603
R3	Resistor, 3Ω	0603
R4	Resistor, 510KΩ	0603
R5	Resistor, 43KΩ	1206
D1	80V/0.5A Schottky Diode, MBR 0580-TP	SOD-123
ZD	Zener Diode, 24V	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	300nF/400V	Mylar Capacitor
BD	NC	
CV	NC	E. Cap

8. Performance Data and Typical Characteristic

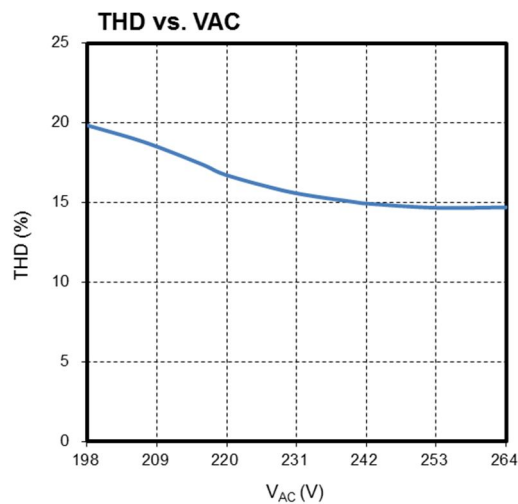
8.1 Test Result

V _{AC} (V)	I _{IN} (mA)	PF	THD (%)	P _{IN} (W)	I _{IN} Line Reg.
198	54.28	0.981	19.84	10.610	-12.89%
207	59.04	0.983	18.79	12.071	-5.27%
216	61.17	0.985	17.41	13.022	-1.84%
220	62.32	0.986	16.71	13.590	0.00%
230	64.27	0.988	15.65	14.680	3.12%
240	65.69	0.989	15.03	15.594	5.40%
242	66.01	0.989	14.93	15.810	5.92%
253	67.44	0.989	14.66	16.896	8.22%
264	68.82	0.989	14.69	18.055	10.43%

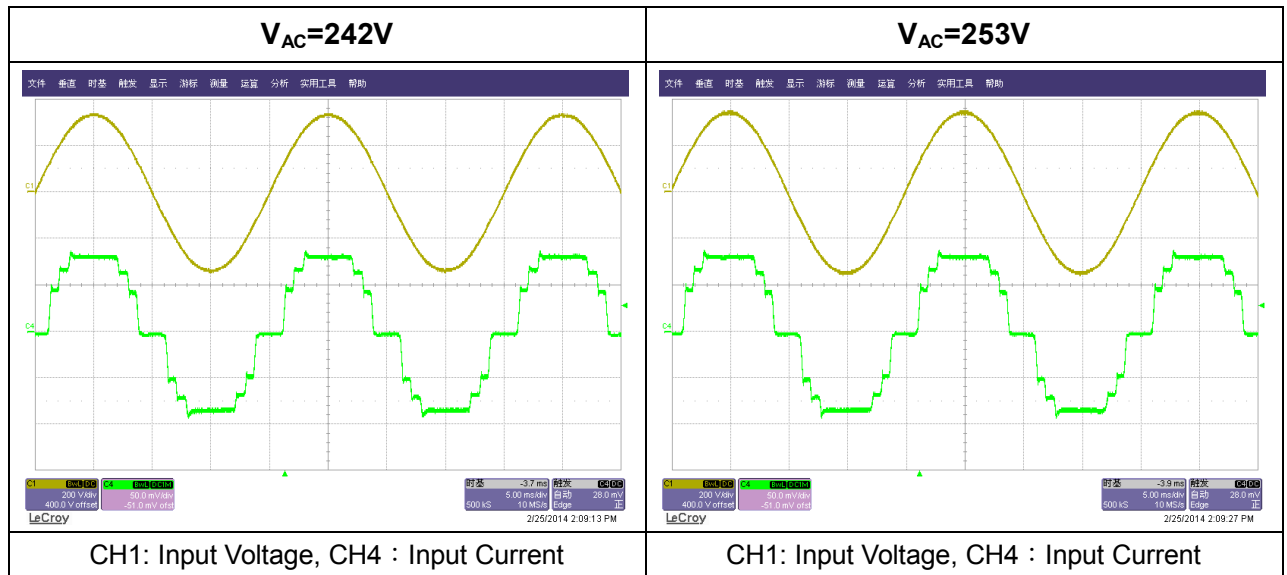
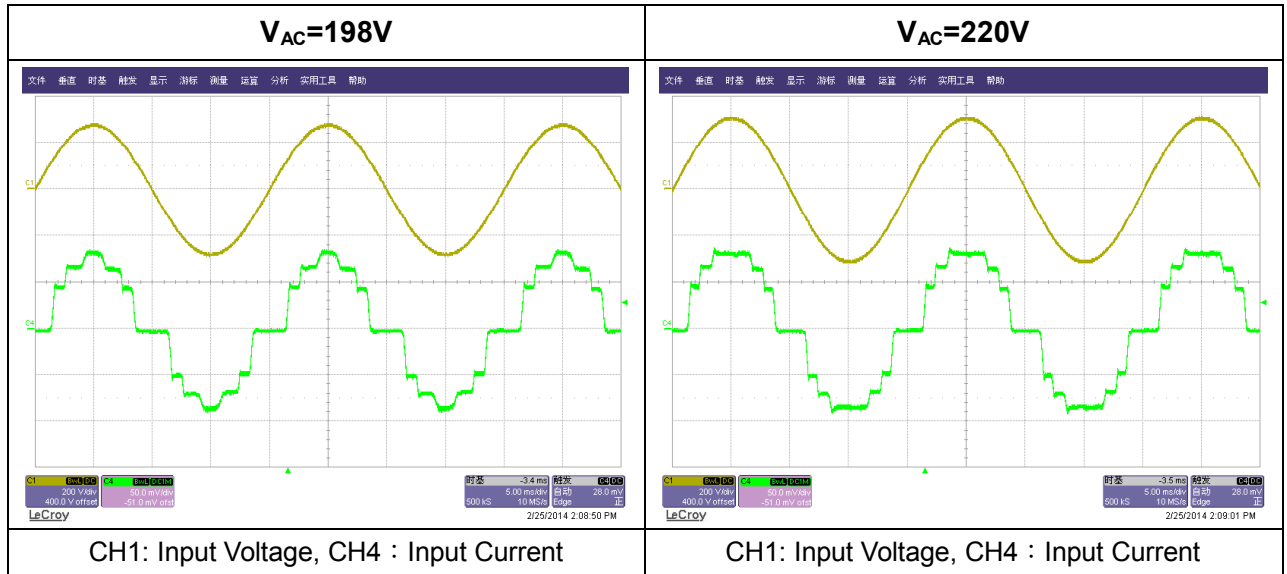
8.2 Power Factor vs. V_{AC}



8.3 THD vs. V_{AC}

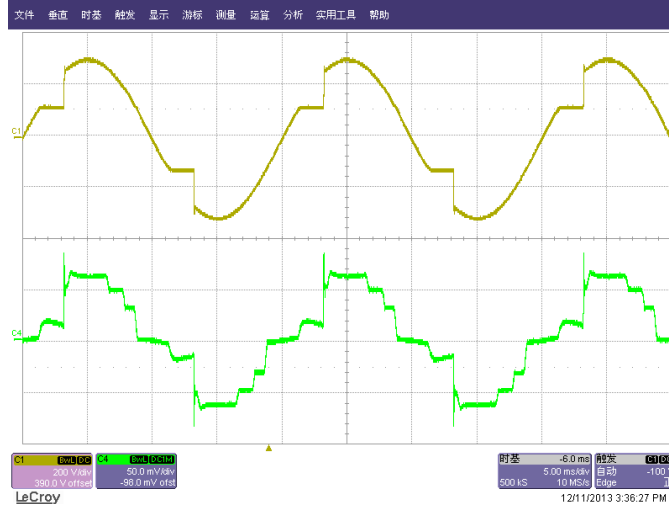


8.4 Input Voltage and Input Current

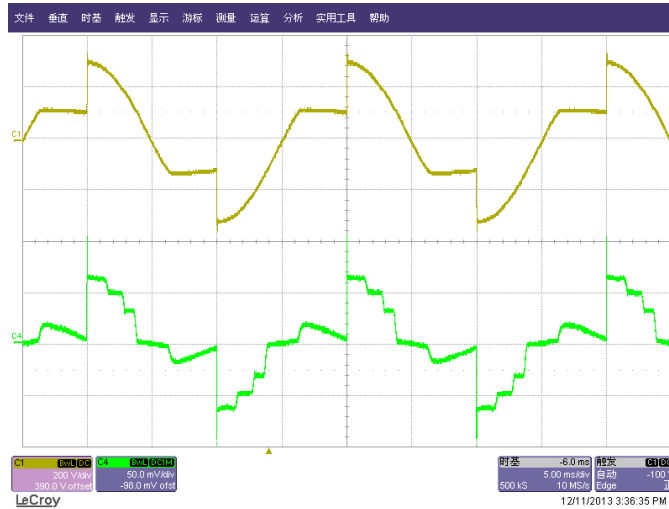


8.5 TRIAC Dimming Waveforms

8.5.1 Leading Phase TRIAC Dimming



CH1: Input Voltage, CH4 : Input Current



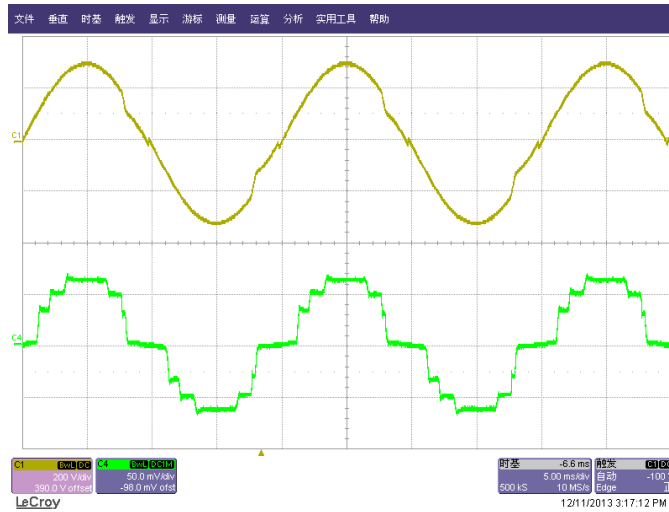
CH1: Input Voltage, CH4 : Input Current



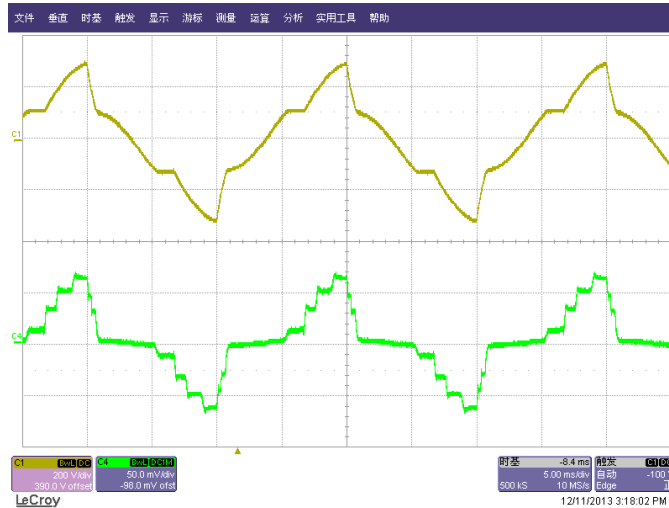
CH1: Input Voltage, CH4 : Input Current

<< Note : TRIAC Dimmer (Busch-Jaeger 2247U) >>

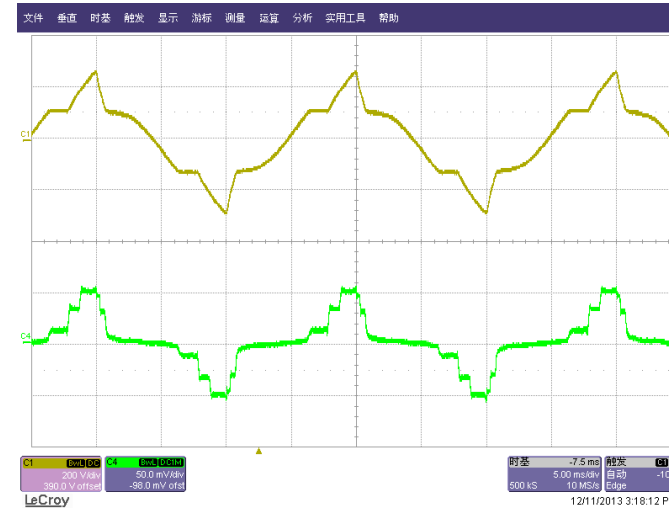
8.5.2 Trailing Phase TRIAC Dimming



CH1: Input Voltage, CH4 : Input Current



CH1: Input Voltage, CH4 : Input Current



CH1: Input Voltage, CH4 : Input Current

<< Note : TRIAC Dimmer (Busch-Jaeger 6513U) >>

8.5.3 Compatible Dimmers

Brands	Model	Voltage	Power	Type
Busch-Jaeger	2250U	220V	600W	Leading
Busch-Jaeger	2247U	220V	500W	Leading
Busch-Jaeger	6513U	220V	420W	Trailing
GIRA	0300-00	220V	400W	Leading
GIRA	0307-00/I02	220V	400W	Trailing
NAM	ASW 3701	220V	700W	Leading
NAM	ASW 3000	220V	1000W	Leading
SIEMENS	DELTA Vista	220V	500W	Leading
TCL	Legrand	220V	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 220V/14W 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 _b	Repetition	Number of Tests/ Total	Performance criteria
#1	220VAC-line to line	+500V 90°	1.2/50 μs	30s	5/5	A
		-500V 270°	1.2/50 μs	30s	5/5	A
#2	220VAC-line to line	+750V 90°	1.2/50 μs	30s	5/5	A
		-750V 270°	1.2/50 μs	30s	5/5	A
#3 V430CH8	220VAC-line to line	+1000V 90°	1.2/50 μs	30s	5/5	A
		-1000V 270°	1.2/50 μs	30s	5/5	A

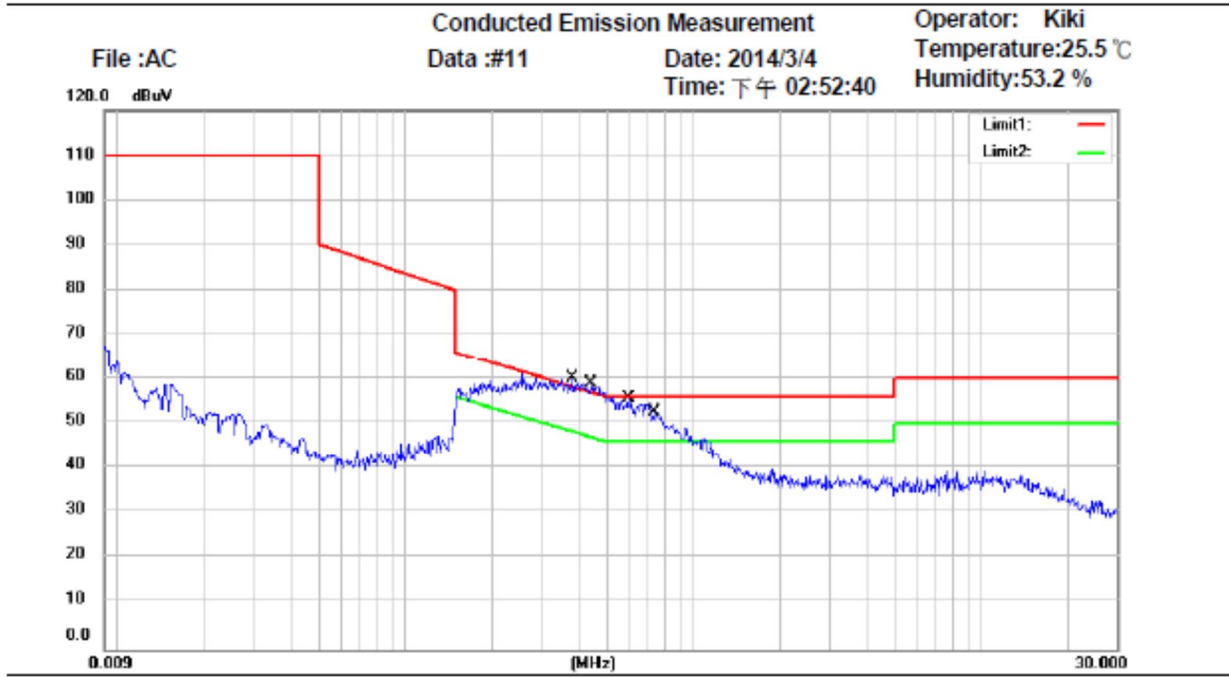
Performance criteria:

- 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

10. EMI Performance



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



Site : Chamber_03

Condition : EN55015 Conduction(QP)

Phase: L1

EUT :

Power : 220 V.a.c.

M/N: iML8683 220V 14W LED

Test Mode :

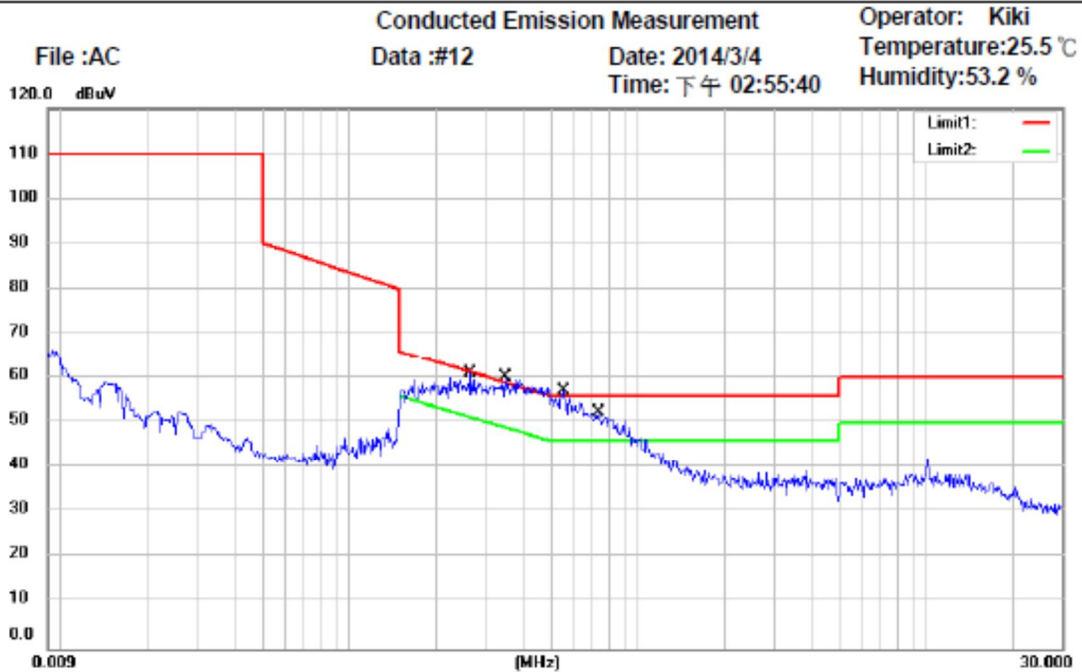
Note : Downlight Module

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.3791	41.87	QP	9.67	51.54	58.30	-6.76	
	0.3791	28.01	AVG	9.67	37.68	48.30	-10.62	
*	0.4447	41.38	QP	9.67	51.05	56.97	-5.92	
	0.4447	27.33	AVG	9.67	37.00	46.97	-9.97	
	0.6030	39.06	QP	9.68	48.74	56.00	-7.26	
	0.6030	24.80	AVG	9.68	34.48	46.00	-11.52	
	0.7352	36.54	QP	9.68	46.22	56.00	-9.78	
	0.7352	22.43	AVG	9.68	32.11	46.00	-13.89	

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



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Tel:+886-2-6606-8877
Fax:+886-2-6606-8875



Site : Chamber_03

Condition : EN55015 Conduction(QP)

Phase: N

EUT :

Power : 220 V.a.c.

M/N: iML8683 220V 14W LED

Test Mode :

Note : Downlight Module

Mk.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Comment
	0.2648	42.44	QP	9.67	52.11	61.28	-9.17	
	0.2648	28.82	AVG	9.67	38.49	51.28	-12.79	
	0.3484	42.05	QP	9.68	51.73	59.00	-7.27	
	0.3484	28.24	AVG	9.68	37.92	49.00	-11.08	
*	0.5590	39.73	QP	9.68	49.41	56.00	-6.59	
	0.5590	25.51	AVG	9.68	35.19	46.00	-10.81	
	0.7371	36.20	QP	9.69	45.89	56.00	-10.11	
	0.7371	22.30	AVG	9.69	31.99	46.00	-14.01	

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