



# Test Report: IDLV-45-24

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45W PWM Output LED Driver

## ■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Component Stress Test

## ■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

## ■ RELIABILITY TEST

Environment Test



■ DESIGN VERIFY TEST

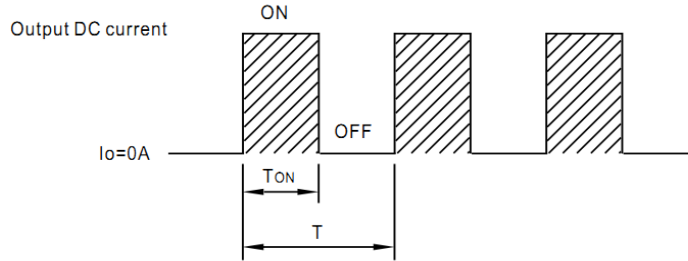
**OUTPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM FREQUENCY	1KHz (±20%)	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	850Hz
2	VOLTAGE TOLERANCE	±10%	I/P: 90 VAC / 295 VAC O/P: 70%/FULL/ NO LOAD Ta: 25°C	-1.8%-1.8%
3	OVER/UNDERSHOOT TEST	<±10 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<±10%
4	SET UP TIME(Max)	500ms/230VAC 1200ms/115VAC	I/P: 230 VAC I/P: 115 VAC O/P: FULL /80%LOAD Ta: 25°C	360ms/230VAC 804ms/115VAC
<div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>INPUT=230VAC/50HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p> <p>Δ: 25.0 V @: 25.0 V Δ: 360ms @: 70.0ms</p> <p>Ch1 250 V Ch2 5.00 V M 100ms A Ch2 14.2 V</p> <p>49.60%</p> </div> <div style="width: 45%;"> <p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</p> <p>Δ: 6.00 A @: 10.0mA Δ: 804ms @: 24.0ms</p> <p>Ch1 100 V Ch2 500mA M 200ms A Ch2 1.26 A</p> <p>50.40%</p> </div> </div>				
5	AUXILIARY DC OUTPUT (For A-Type only)	Nominal 12V (deviation 11.4-12.6) @50mA	I/P: 230 VAC O/P: FULL LOAD	11.91V

6 DIMMING TEST

※ Dimming principle for PWM style output

Dimming is achieved by varying the duty cycle of the output current.

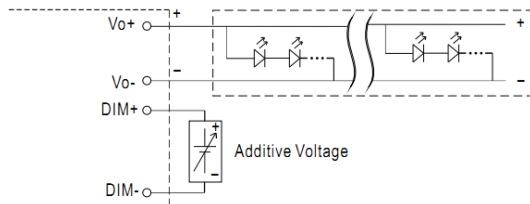


$$\text{Duty cycle(\%)} = \frac{T_{ON}}{T} \times 100\%$$

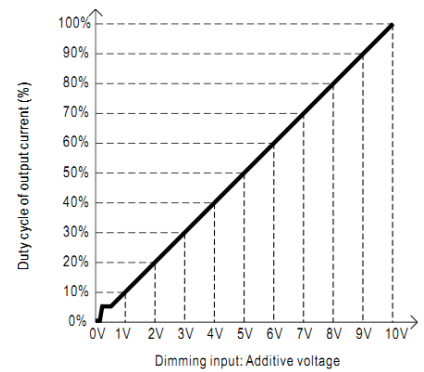
Output PWM frequency : 1KHz(±20%)

※ 2 in 1 dimming function

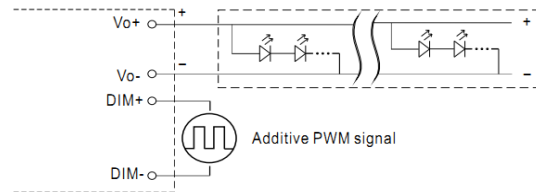
◎ Applying additive 0 ~ 10VDC



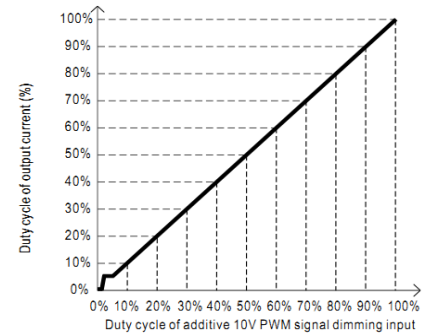
"DO NOT connect "DIM- to Vo-"



◎ Applying additive 10V PWM signal (frequency range 300~3000Hz):



"DO NOT connect "DIM- to Vo-"



Note : 1. Min. duty cycle of output current is about 8% and the output current is not defined when 0% < Iout < 8%.

2. The duty cycle of output current could drop down to 0% when dimming input is about 0Vdc or 10V PWM signal with 0% duty cycle.

I/P: 230 VAC

O/P: DIMMING TEST

Ta: 25°C

1	Dimming voltage	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0	0.18A	0.36A	0.54A	0.72A	0.91A	1.08A	1.27A	1.45A	1.63A	1.79A	1.82A
	Duty cycle of output current	0%	9.6%	19.1%	28.7%	38.3%	48.4%	57.4%	67.6%	77.1%	86.7%	95.2%	96.8%
2	Dimming Duty cycle	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	0.17A	0.36A	0.54A	0.73A	0.92A	1.10A	1.29A	1.47A	1.66A	1.845A	1.870A
	Duty cycle of output current	0%	9.0%	19.1%	28.7%	38.8%	48.9%	58.5%	68.6%	78.2%	88.3%	98.1%	99.5%

TEST RESULT: OK

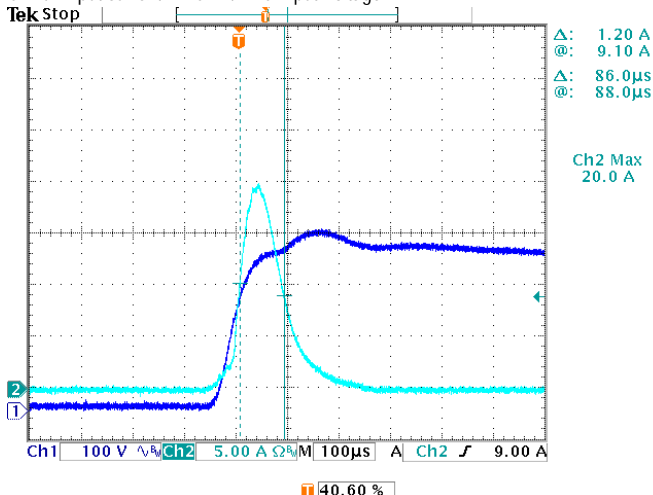


**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC-295VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	87V-305V
			I/P: (1)LOW-LINE-3V=87 V HIGH-LINE+10V=305 V O/P: FULL/NO LOAD ON: 30 Sec OFF: 30 Sec 10MIN (2)230VAC ON: 0.5 Sec OFF: 0.5 Sec 20MIN (POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 90 VAC ~295 VAC O/P: FULL~NO LOAD Ta: 25°C	TEST: OK
3	AC CURRENT	0.6A/115VAC 0.4A/230VAC 0.3A/277VAC	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: 80%/FULL LOAD Ta: 25°C	I = 0.448A/ 115VAC I = 0.216A/ 230VAC I = 0.181A/ 277VAC
4	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.0025 mA N-FG: 0.0025 mA
5	NO LOAD POWER CONSUMPTION	< 0.5W for Blank-Type < 1.2W for A-Type	I/P: 230VAC O/P: NO LOAD Ta: 25°C	0.279W for Blank-Type 0.844W for A-Type
6	INRUSH CURRENT(Typ)	COLD START 30A/230VAC Twidth =150 us measured at 50% Ipeak	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I=20.0A/ 230VAC Twidth = 86us

INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



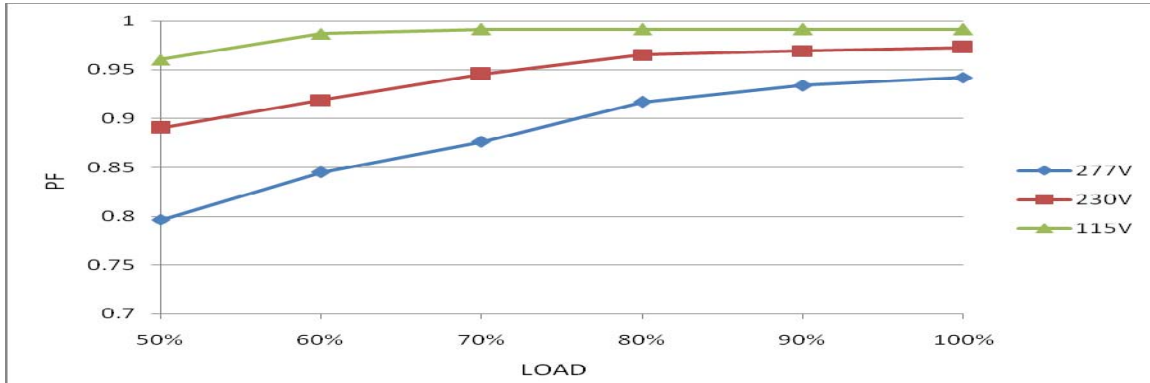


45W PWM Output LED Driver

IDLV-45 series

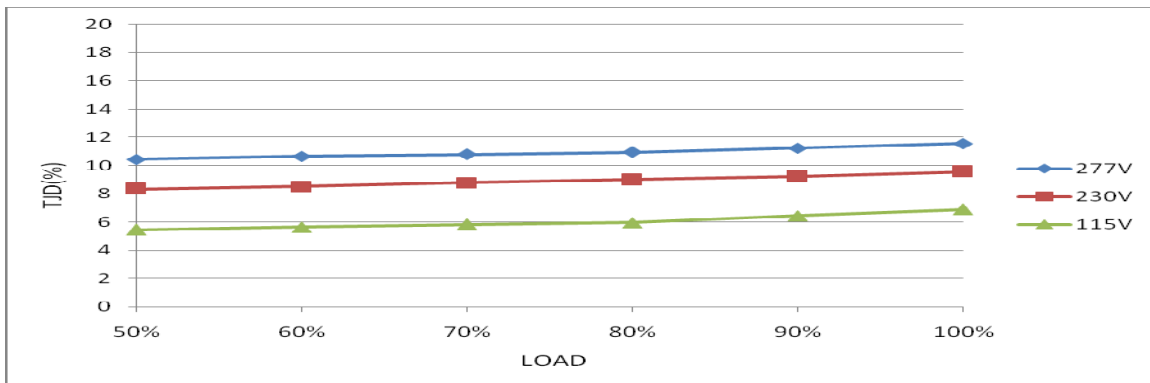
7	POWER FACTOR	0.95/ 115VAC 0.92/ 230VAC 0.9/ 277VAC	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: 80%/FULL LOAD Ta: 25°C	PF=0.991 /115VAC PF=0.972 /230VAC PF=0.942 /277VAC
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PF vs LOAD



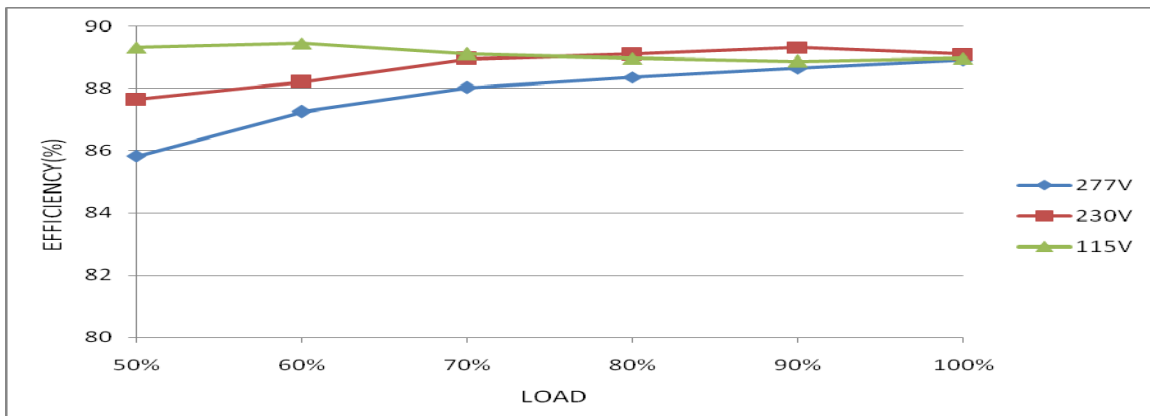
8	TOTAL HARMONIC DISTORTION	THD < 20% (@load ≥ 60%/115VAC, 230VAC; @load ≥ 75%/277VAC)	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: 60%/75% LOAD Ta: 25°C	THD=5.66% @60% load /115VAC THD=8.53% @60% load /230VAC THD=10.85% @75% load /277VAC
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THD vs LOAD



9	EFFICIENCY(Typ)	86%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	89.11%
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EFFICIENCY vs LOAD





## PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER CURRENT PROTECTION	105 %~ 115 %	I/P: 100VAC I/P: 230VAC I/P: 295VAC O/P: TESTING Ta: 25°C	111%/ 100VAC 111%/ 230VAC 111%/ 295VAC Hiccup mode, recovers automatically after fault condition is removed
2	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 90VAC I/P: 295VAC O/P: 70%/FULL LOAD Ta: 25°C	NO DAMAGE Shut down O/P voltage, re-power on to recovery

## COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 9 A/800V	I/P: High-Line +3V =298V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 716V (2) 654V (3) 660V
2	Diode Peak Voltage	D100 Rated 20A/200V	I/P: High-Line +3V =298V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 138V (2) 144V (3) 136V
3	Control IC Voltage Test	U1 Rated 35V	I/P: High-Line +3V =298V O/P: (1) Full Load input on/off (2) NO load input on /Off (3) Full Load /NO load Change Ta: 25°C	(1) 13.8V (2) 13.8V (3) 13.9V



## SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	I/P-O/P: 3.75KVAC/min	I/P-O/P: 4.2KVAC/min Ta: 25°C	I/P-O/P: 2.542mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P: 500VDC>100MΩ	I/P-O/P: 500VDC Ta: 25°C	I/P-O/P: >9999MΩ

## E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230VAC/50HZ O/P: FULL /60% LOAD Ta: 25°C	PASS
2	CONDUCTION	EN55015	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
3	RADIATION	EN55015	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY Air: 8KV Contact: 4KV	I/P: 230 VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
6	SURGE	EN61000-4-5 LIGHT INDUSTRY L-N: 1KV	I/P: 230VAC/50HZ O/P: FULL LOAD Ta: 25°C	PASS
7	Test by certified Lab & Test Report Prepare			

■ **RELIABILITY TEST**

**ENVIRONMENT TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																																																
1	TEMPERATURE RISE TEST	MODEL: IDLV-45-36 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 27.9℃ 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 42.4℃																																																																		
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 27.9 °C</th> <th>HIGH AMBIENT Ta=42.4 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>L1</td><td>82.0℃</td><td>95.5℃</td></tr> <tr><td>2</td><td>BD1</td><td>78.1℃</td><td>91.3℃</td></tr> <tr><td>3</td><td>D1</td><td>88.8℃</td><td>102.6℃</td></tr> <tr><td>4</td><td>Q1</td><td>89.5℃</td><td>103.5℃</td></tr> <tr><td>5</td><td>U1</td><td>74.6℃</td><td>87.7℃</td></tr> <tr><td>6</td><td>T1</td><td>84.3℃</td><td>96.3℃</td></tr> <tr><td>7</td><td>C20</td><td>75.8℃</td><td>88.4℃</td></tr> <tr><td>8</td><td>D100</td><td>86.8℃</td><td>98.7℃</td></tr> <tr><td>9</td><td>C201</td><td>69.6℃</td><td>82.4℃</td></tr> <tr><td>10</td><td>Q100</td><td>60.0℃</td><td>73.4℃</td></tr> <tr><td>11</td><td>LF100</td><td>52.9℃</td><td>66.1℃</td></tr> <tr><td>12</td><td>C105</td><td>60.9℃</td><td>74.3℃</td></tr> <tr><td>13</td><td>C107</td><td>53.0℃</td><td>66.2℃</td></tr> <tr><td>14</td><td>R18</td><td>97.0℃</td><td>109.3℃</td></tr> <tr><td>15</td><td>TC</td><td>66.6℃</td><td>79.1℃</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 27.9 °C	HIGH AMBIENT Ta=42.4 °C	1	L1	82.0℃	95.5℃	2	BD1	78.1℃	91.3℃	3	D1	88.8℃	102.6℃	4	Q1	89.5℃	103.5℃	5	U1	74.6℃	87.7℃	6	T1	84.3℃	96.3℃	7	C20	75.8℃	88.4℃	8	D100	86.8℃	98.7℃	9	C201	69.6℃	82.4℃	10	Q100	60.0℃	73.4℃	11	LF100	52.9℃	66.1℃	12	C105	60.9℃	74.3℃	13	C107	53.0℃	66.2℃	14	R18	97.0℃	109.3℃	15	TC	66.6℃	79.1℃		
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 295VAC/200VAC O/P: FULL LOAD Ta= -25℃	TEST: OK																																																																
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 °C NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta=40 °C HUMIDITY= 95% R.H	TEST: OK																																																																
4	TEMPERATURE COEFFICIENT	±0.03%/°C (0~40℃)	I/P: 230 VAC O/P: FULL LOAD	±0.0025%/°C (0~40℃)																																																																
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature: -45℃ ~ +85℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle: 5 CYCLE 5. Input/Output condition: STATIC		TEST: OK																																																																
6	THERMAL SHOCK TEST	1. Thermal shock Temperature: -25℃ ~ +45℃ 2. Temperature change rate : 25℃ / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle: 10 CYCLE 5. Input/Output condition: 230VAC/Full Load AC ON/OFF TEST AC on 3 sec/AC off 1 sec TEST		TEST: OK																																																																





45W PWM Output LED Driver

**IDLV-45 series**

7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform: Sine Wave (2) Frequency: 10-500Hz (3) Sweep Time: 10min/sweep cycle (4) Acceleration: 2G (5) Test Time: 60min in each axis (X.Y.Z) (6) Ta: 25°C	TEST: OK
8	CAPACITOR LIFE CYCLE	IDLV-45-36: SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P: 230VAC O/P: FULL LOAD Ta= 25 °C LIFE TIME (2) I/P: 230VAC O/P: FULL LOAD Ta= 40 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 40 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 40 °C LIFE TIME	(1) 381013 HRS (2) 145427 HRS (3) 208270 HRS (4) 301975 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 386.59K hrs min MIL-HDBK-217F (25°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 85°C; 50,000 hours @ Tcase 75°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	CHENZH/ZHUOKB	SKY	LIUWY