



# Test Report: ODLV-45-60

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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	817Hz
2	VOLTAGE TOLERANCE	± 10%	I/P: 90 VAC / 295 VAC O/P: 70%/FULL/ NO LOAD Ta: 25°C	-1.806% ~1.52%
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	350ms/230VAC 716ms/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> </div> <div style="width: 45%;"> <p>INPUT=115VAC/60HZ @ FULL LOAD</p> <p>CH1: Output Voltage CH2: AC Input Voltage</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	12.01V

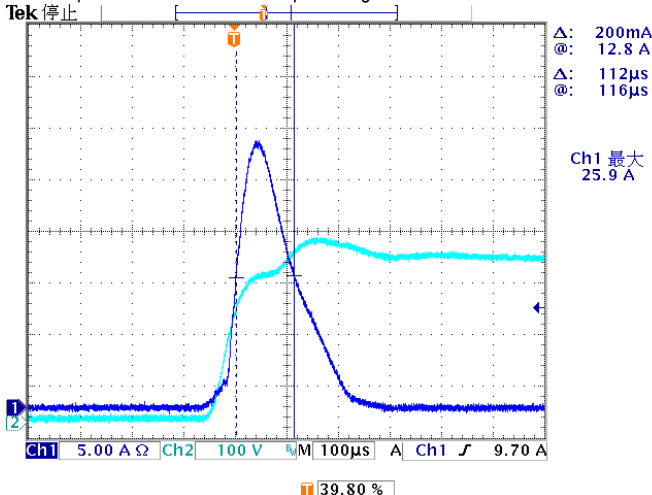
6	DIMMING TEST	<p>※ <b>Dimming principle for PWM style output</b> Dimming is achieved by varying the duty cycle of the output current.</p> <p style="text-align: right;">Duty cycle(%) = <math>\frac{T_{ON}}{T} \times 100\%</math></p> <p style="text-align: right;">Output PWM frequency : 1KHz(±20%)</p> <p>※ <b>2 in 1 dimming function</b></p> <p>◎ Applying additive 0 ~ 10VDC</p> <p style="text-align: right;">Duty cycle of output current (%)</p> <p style="text-align: center;">Dimming input: Additive voltage</p> <p>◎ Applying additive 10V PWM signal (frequency range 300~3000Hz):</p> <p style="text-align: right;">Duty cycle of output current (%)</p> <p style="text-align: center;">Duty cycle of additive 10V PWM signal dimming input</p> <p>Note : 1. Min. duty cycle of output current is about 8% and the output current is not defined when 0% &lt; I<sub>out</sub> &lt; 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.</p> <p>I/P: 230 VAC O/P: DIMMING TEST Ta: 25°C</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td rowspan="3" style="width: 20px;">1</td> <td style="width: 150px;">Dimming voltage</td> <td>0V</td><td>1V</td><td>2V</td><td>3V</td><td>4V</td><td>5V</td><td>6V</td><td>7V</td><td>8V</td><td>9V</td><td>10V</td><td>OPEN</td> </tr> <tr> <td>Output Current</td> <td>0</td><td>0.07A</td><td>0.14A</td><td>0.22A</td><td>0.29A</td><td>0.36A</td><td>0.44A</td><td>0.52A</td><td>0.59A</td><td>0.66A</td><td>0.73A</td><td>0.74A</td> </tr> <tr> <td>Duty cycle of output current</td> <td>0%</td><td>9.3%</td><td>18.7%</td><td>29.3%</td><td>38.7%</td><td>48.0%</td><td>58.7%</td><td>69.3%</td><td>78.7%</td><td>88.0%</td><td>97.3%</td><td>98.7%</td> </tr> <tr> <td rowspan="3" style="width: 20px;">2</td> <td style="width: 150px;">Dimming Duty cycle</td> <td>0%</td><td>10%</td><td>20%</td><td>30%</td><td>40%</td><td>50%</td><td>60%</td><td>70%</td><td>80%</td><td>90%</td><td>100%</td><td>OPEN</td> </tr> <tr> <td>Output Current</td> <td>0</td><td>0.07A</td><td>0.14A</td><td>0.22A</td><td>0.29A</td><td>0.37A</td><td>0.44A</td><td>0.52A</td><td>0.59A</td><td>0.67A</td><td>0.74A</td><td>0.74A</td> </tr> <tr> <td>Duty cycle of output current</td> <td>0%</td><td>9.3%</td><td>18.7%</td><td>29.3%</td><td>38.7%</td><td>49.3%</td><td>58.7%</td><td>69.3%</td><td>78.7%</td><td>89.3%</td><td>98.7%</td><td>98.7%</td> </tr> </table> <p>TEST RESULT: OK</p>	1	Dimming voltage	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN	Output Current	0	0.07A	0.14A	0.22A	0.29A	0.36A	0.44A	0.52A	0.59A	0.66A	0.73A	0.74A	Duty cycle of output current	0%	9.3%	18.7%	29.3%	38.7%	48.0%	58.7%	69.3%	78.7%	88.0%	97.3%	98.7%	2	Dimming Duty cycle	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN	Output Current	0	0.07A	0.14A	0.22A	0.29A	0.37A	0.44A	0.52A	0.59A	0.67A	0.74A	0.74A	Duty cycle of output current	0%	9.3%	18.7%	29.3%	38.7%	49.3%	58.7%	69.3%	78.7%	89.3%	98.7%	98.7%
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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 = 0.492A/ 115VAC I = 0.221A/ 230VAC I = 0.190A/ 277VAC
4	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P: 277 VAC O/P: NO LOAD Ta: 25°C	L-FG: 0.0029 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	0.445W for Blank-Type 0.543W 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=25.9A/ 230VAC Twidth = 112us

INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



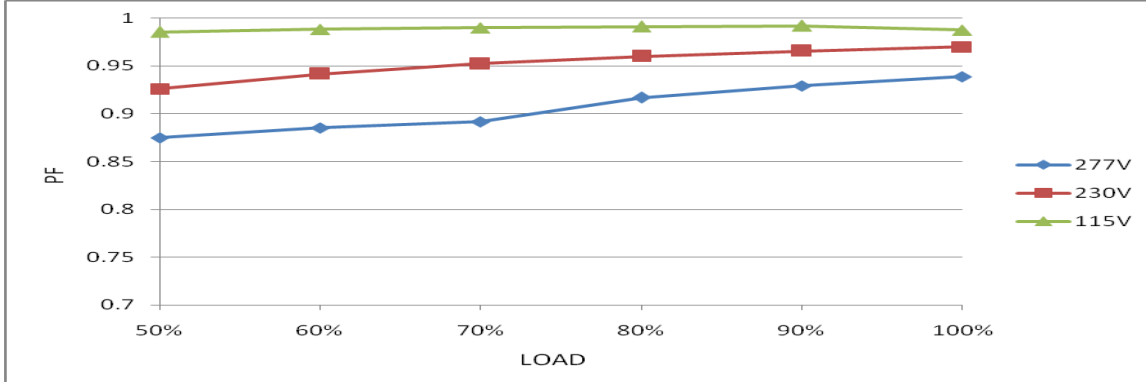


45W PWM Output LED Driver

ODLV-45 series

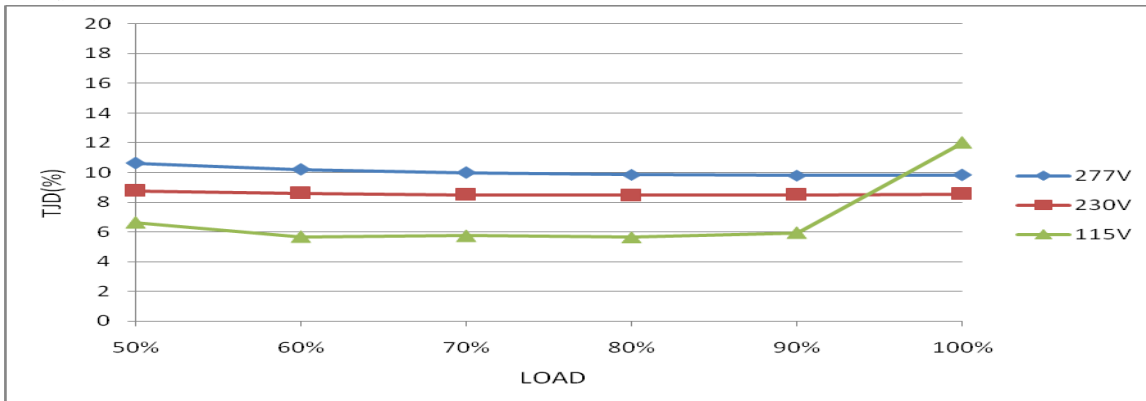
7	POWER FACTOR	0.95/ 115VAC 0.92/ 230VAC 0.9/ 277VAC	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: 80%/FULL LOAD Ta: 25°C	PF=0.991 /115VAC PF=0.970 /230VAC PF=0.939 /277VAC
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PF vs LOAD



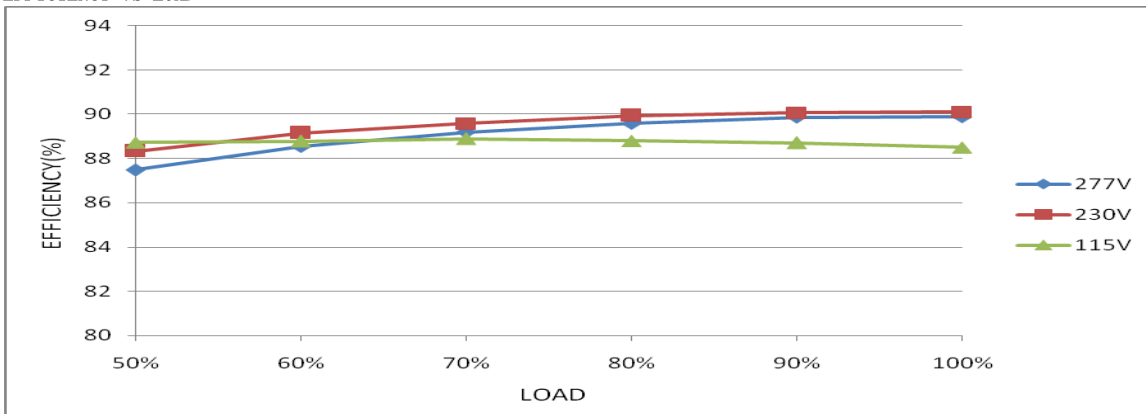
8	TOTAL HARMONIC DISTORTION	THD < 20% (@load ≥ 60%/115VAC, 230VAC; @load ≥ 75%/277VAC)	I/P: 115 VAC I/P: 230 VAC I/P: 277 VAC O/P: 60%/75% LOAD Ta: 25°C	THD=5.67% @60% load /115VAC THD=8.61% @60% load /230VAC THD=9.92% @75% load /277VAC
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THD vs LOAD



9	EFFICIENCY(Typ)	90%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	90.10%
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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	110%/ 100VAC 112%/ 230VAC 112%/ 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) <b>Peak Voltage</b>	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) 586V (2) 556V (3) 594V
2	<b>Diode Peak Voltage</b>	D101 Rated 5A/1000V	I/P: High-Line +3V =298V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 420V (2) 418V (3) 428V
3	<b>Control IC Voltage Test</b>	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) 14.0V (2) 14.0V (3) 14.1V



## 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: 1.874mA 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: ODLV-45-60 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 29.4℃ 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 54.2℃																																																																		
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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 50 ℃ NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta=50 ℃ HUMIDITY= 95% R.H	TEST: OK																																																																
4	TEMPERATURE COEFFICIENT	±0.03%/℃ (0~50℃)	I/P: 230 VAC O/P: FULL LOAD	±0.0067%/℃ (0~50℃)																																																																
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℃ ~ +55℃ 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

**ODLV-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	ODLV-45-60: 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= 50 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 50 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 50 °C LIFE TIME	(1) 590860 HRS (2) 159759 HRS (3) 186945 HRS (4) 188913 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 4229.8K hrs min. Telcordia SR-332 (Bellcore); 434.9K 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