



Test Report: ODLV-65-60

65W 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

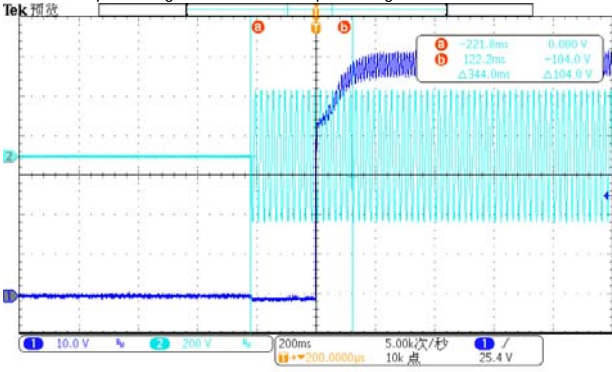
E.M.C. Test

■ 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	903Hz
2	VOLTAGE TOLERANCE	±10%	I/P: 180 VAC / 295 VAC O/P: FULL/ NO LOAD Ta: 25°C	-0.667% ~ 0.36%
3	OVER/UNDERSHOOT TEST	<±10 %	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	<±10%
4	SET UP TIME(Max)	500ms/230VAC	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	344ms/230VAC
<p>INPUT=230VAC/50HZ @ FULL LOAD CH1: Output Voltage CH2: AC Input Voltage</p> 				
5	AUXILIARY DC OUTPUT (For A-Type only)	Nominal 12V (deviation 11.4~12.6) @50mA	I/P: 230 VAC O/P: FULL LOAD	11.86V

6 DIMMING TEST

※ **Dimming principle for PWM style output**
 Dimming is achieved by varying the duty cycle of the output current.

Output DC current

$I_o=0A$

ON

OFF

T_{ON}

T

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

Output PWM frequency : 1KHz(±20%)

※ **2 in 1 dimming function**

◎ Applying additive 0 ~ 10VDC

Vo+ +

Vo- -

DIM+ +

DIM- -

Additive Voltage

"DO NOT connect "DIM- to Vo-"

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

Vo+ +

Vo- -

DIM+ +

DIM- -

Additive PWM signal

"DO NOT connect "DIM- to Vo-"

Duty cycle of output current (%)

Dimming input: Additive voltage

Duty cycle of output current (%)

Duty cycle of additive 10V PWM signal dimming input

Note : 1. Min. duty cycle of output current is about 8% and the output current is not defined when $0\% < I_{out} < 8\%$.
 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	0.11A	0.22A	0.33A	0.45A	0.56A	0.68A	0.79A	0.91A	1.02A	1.14A	1.15A
	Duty cycle of output current	0%	10.0%	20.0%	30.0%	40.9%	50.9%	61.8%	71.8%	82.7%	92.7%	103.6%	104.5%
2	Dimming Duty cycle	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	0.10A	0.22A	0.33A	0.44A	0.55A	0.66A	0.78A	0.89A	1.00A	1.12A	1.13A
	Duty cycle of output current	0%	9.1%	20.0%	30.0%	40.0%	50.0%	60.0%	68.6%	70.9%	90.9%	101.8%	102.7%

TEST RESULT: OK

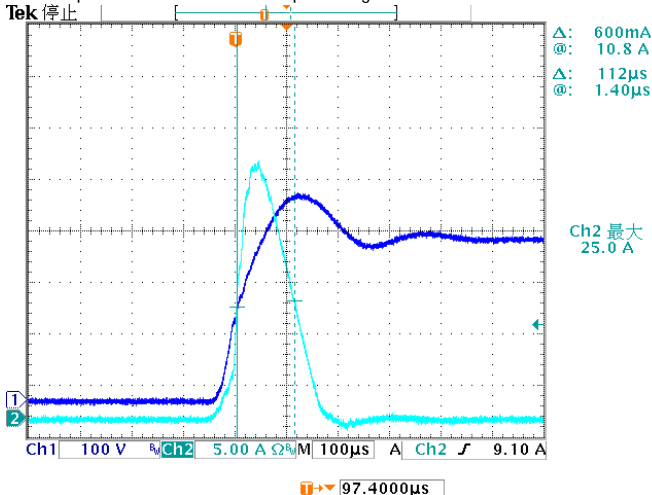


INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	180VAC~295VAC	I/P: TESTING O/P: FULL LOAD Ta: 25°C	177V~305V
			I/P: (1)LOW-LINE-3V=177 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: 180 VAC ~295 VAC O/P: FULL~NO LOAD Ta: 25°C	TEST: OK
3	AC CURRENT	0.4A/230VAC 0.3A/277VAC	I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C	I = 0.315A/ 230VAC I = 0.270A/ 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: 0.0028 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	0.417 W for Blank-Type 0.485 W for A-Type
6	INRUSH CURRENT(Typ)	COLD START 30A/230VAC Twidth =270 us measured at 50% Ipeak	I/P: 230 VAC O/P: FULL LOAD Ta: 25°C	I= 25A/ 230VAC Twidth = 112us

INPUT=230VAC/50HZ @ FULL LOAD

CH2: Input current CH1: AC Input Voltage



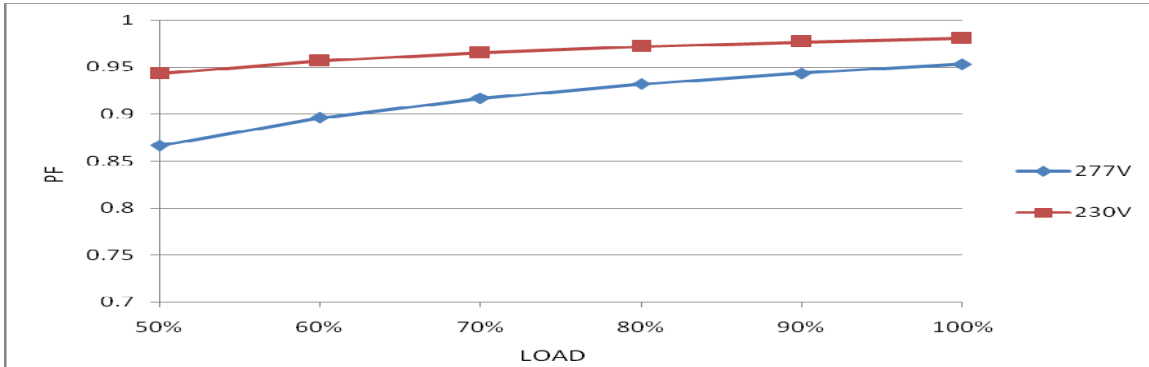


65W PWM Output LED Driver

ODLV-65 series

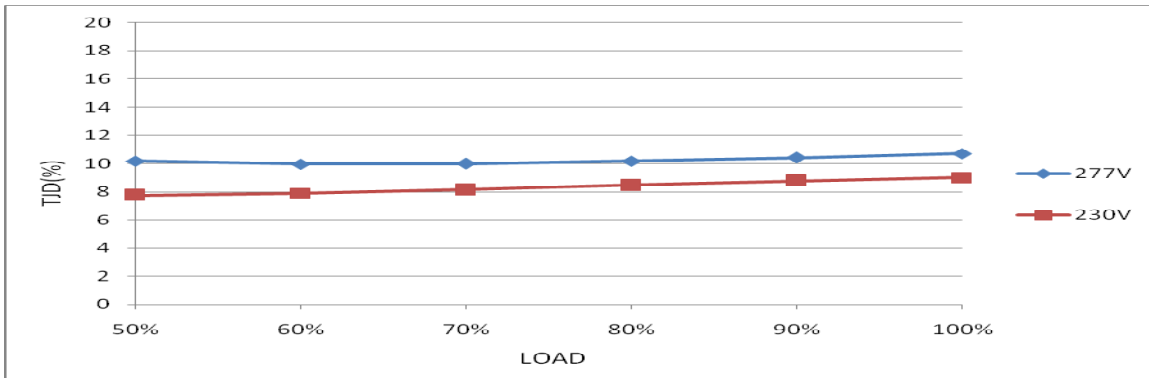
7	POWER FACTOR	0.95/ 230VAC 0.9/ 277VAC	I/P: 230 VAC I/P: 277 VAC O/P: FULL LOAD Ta: 25°C	PF=0.980 /230VAC PF=0.953 /277VAC
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PF vs LOAD



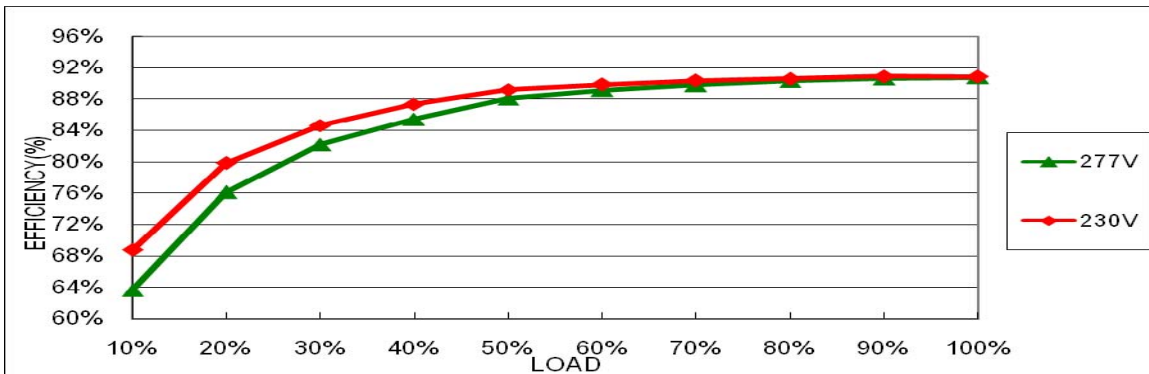
8	TOTAL HARMONIC DISTORTION	THD<20% (@load≥60%/230VAC; @load≥75%/277VAC)	I/P: 230 VAC I/P: 277 VAC O/P: 60%/75% LOAD Ta: 25°C	THD=7.89% @60% load /230VAC THD=11.17% @75% load /277VAC
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THD vs LOAD



9	EFFICIENCY(Typ)	90%	I/P: 230VAC O/P: FULL LOAD Ta: 25°C	90.8%
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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: 200VAC I/P: 230VAC I/P: 295VAC O/P: TESTING Ta: 25°C	110.8%/ 200VAC 111.0%/ 230VAC 112.0%/ 295VAC Hiccup mode, recovers automatically after fault condition is removed
2	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 180VAC I/P: 295VAC O/P: 80%/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 9A/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) 697V (2) 693V (3) 689V
2	Diode Peak Voltage	D100 Rated 16A/400V	I/P: High-Line +3V =298V O/P: (1) Full Load Turn on (2) Output Short (3) Full load continue Ta: 25°C	(1) 345V (2) 346V (3) 343V
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) 15.2V (2) 14.4V (3) 15.2V



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: 1.888mA 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-65-60 1. ROOM AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 28.8°C 2. HIGH AMBIENT BURN-IN: 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 45.1°C																																																																		
		<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 28.8°C</th> <th>HIGH AMBIENT Ta=45.1°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>68.1°C</td><td>83.3°C</td></tr> <tr><td>2</td><td>C8</td><td>65.9°C</td><td>81.1°C</td></tr> <tr><td>3</td><td>C6</td><td>65.0°C</td><td>80.3°C</td></tr> <tr><td>4</td><td>D1</td><td>69.9°C</td><td>85.6°C</td></tr> <tr><td>5</td><td>Q1</td><td>69.3°C</td><td>84.4°C</td></tr> <tr><td>6</td><td>U1</td><td>66.3°C</td><td>82.2°C</td></tr> <tr><td>7</td><td>R17</td><td>67.9°C</td><td>83.5°C</td></tr> <tr><td>8</td><td>T1</td><td>69.9°C</td><td>85.8°C</td></tr> <tr><td>9</td><td>D100</td><td>64.1°C</td><td>79.7°C</td></tr> <tr><td>10</td><td>Q100</td><td>53.3°C</td><td>68.9°C</td></tr> <tr><td>11</td><td>U100</td><td>55.4°C</td><td>71.2°C</td></tr> <tr><td>12</td><td>RG1</td><td>65.1°C</td><td>80.7°C</td></tr> <tr><td>13</td><td>C105</td><td>54.1°C</td><td>69.3°C</td></tr> <tr><td>14</td><td>C107</td><td>49.3°C</td><td>64.7°C</td></tr> <tr><td>15</td><td>TC</td><td>60.0°C</td><td>74.9°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 28.8°C	HIGH AMBIENT Ta=45.1°C	1	BD1	68.1°C	83.3°C	2	C8	65.9°C	81.1°C	3	C6	65.0°C	80.3°C	4	D1	69.9°C	85.6°C	5	Q1	69.3°C	84.4°C	6	U1	66.3°C	82.2°C	7	R17	67.9°C	83.5°C	8	T1	69.9°C	85.8°C	9	D100	64.1°C	79.7°C	10	Q100	53.3°C	68.9°C	11	U100	55.4°C	71.2°C	12	RG1	65.1°C	80.7°C	13	C105	54.1°C	69.3°C	14	C107	49.3°C	64.7°C	15	TC	60.0°C	74.9°C		
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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°C	TEST: OK																																																																
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45 °C NO DAMAGE	I/P: 305VAC O/P: FULL LOAD Ta=45 °C HUMIDITY= 95% R.H	TEST: OK																																																																
4	TEMPERATURE COEFFICIENT	±0.03%/°C (0-45°C)	I/P: 230 VAC O/P: FULL LOAD	±0.01%/°C (0-45°C)																																																																
5	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature: -45°C ~ +85°C 2. Temperature change rate : 25°C / 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°C ~ +50°C 2. Temperature change rate : 25°C / 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																																																																



65W PWM Output LED Driver

ODLV-65 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-65-60: 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= 45 °C LIFE TIME (3) I/P: 230VAC O/P: 75% LOAD Ta= 45 °C LIFE TIME (4) I/P: 230VAC O/P: 50% LOAD Ta= 45 °C LIFE TIME	(1) 587376 HRS (2) 125136 HRS (3) 182062 HRS (4) 223163 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 398.7K hrs min MIL-HDBK-217F (25°C)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 80°C; 50,000 hours @ Tcase 70°C	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	CHENZH/ZHUOKB	SKY	LIUWY