Test Report： IDLV-65-24

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

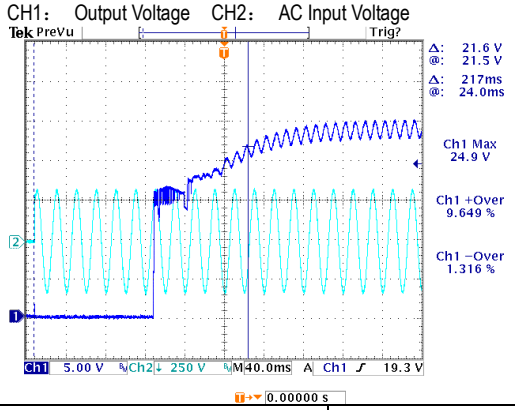
Safety Test
E.M.C. Test

■ RELIABILITY TEST

Environment Test

■ DESIGN VERIFY TEST

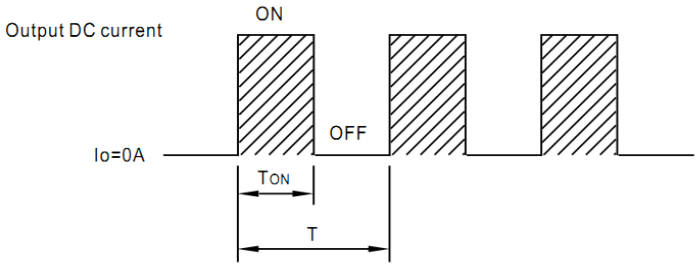
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	PWM FREQUENCY	1KHz（±20%）	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	877Hz
2	VOLTAGE TOLERANCE	±10%	I/P：180 VAC / 295 VAC O/P：FULL/ NO LOAD Ta：25℃	-0.750% ~ 0.050%
3	OVER/UNDERSHOOT TEST	<±10%	I/P： 230VAC O/P：FULL LOAD Ta：25℃	<±10%
4	SET UP TIME(Max)	500ms/230VAC	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	217ms/230VAC
	INPUT=230VAC/50HZ @ FULL LOAD CH1： Output Voltage CH2： AC Input Voltage 			
5	AUXILIARY DC OUTPUT (For A-Type only)	Nominal 12V（deviation 11.4~12.6） @50mA	I/P: 230 VAC O/P: FULL LOAD	11.96V

6 DIMMING TEST

※ **Dimming principle for PWM style output**

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

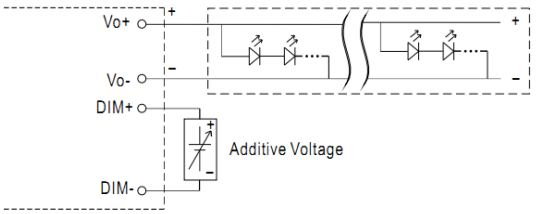


$$\text{Duty cycle}(\%) = \frac{T_{ON}}{T} \times 100\%$$

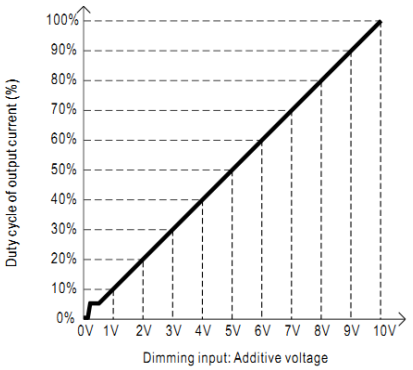
Output PWM frequency : 1KHz(±20%)

※ **2 in 1 dimming function**

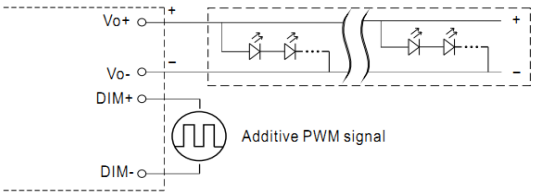
◎ Applying additive 0 ~ 10VDC



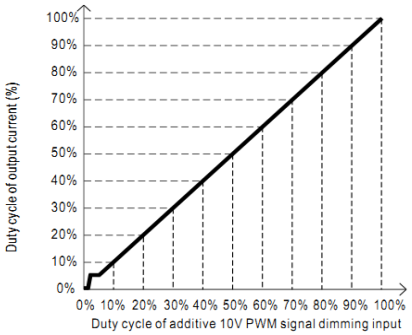
"DO NOT connect "DIM- to Vo-"



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



"DO NOT connect "DIM- to Vo-"



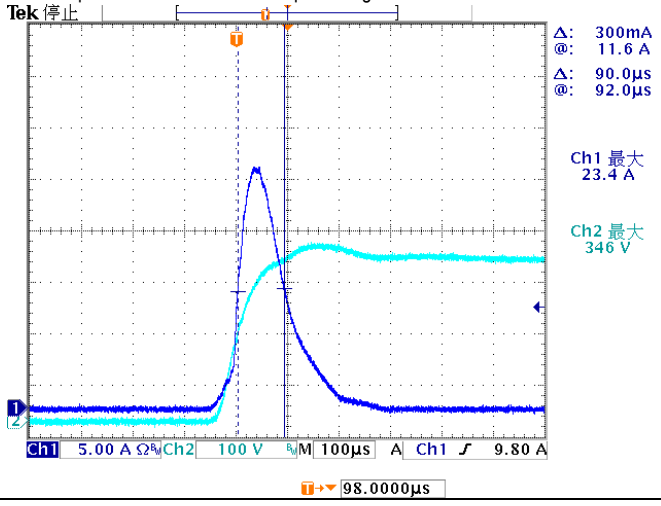
Note : 1. Min. duty cycle of output current is about 8% and the output current is not defined when 0%< Iout<8%.
2. The duty cycle of output current could drop down to 0% when dimming input is about 0Vdc or 10V PWM signal with 0% duty cycle.

I/P： 230 VAC
O/P：DIMMING TEST
Ta：25℃

1	Dimming voltage	0V	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	OPEN
	Output Current	0	0.21A	0.45A	0.69A	0.94A	1.18A	1.43A	1.68A	1.92A	2.18A	2.42A	2.46A
	Duty cycle of output current	0%	8.8%	18.6%	28.8%	39.2%	49.2%	59.6%	70.0%	80.0%	90.8%	100.8%	102.5%
2	Dimming Duty cycle	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	OPEN
	Output Current	0	0.20A	0.44A	0.68A	0.92A	1.16A	1.40A	1.64A	1.89A	2.13A	2.38A	2.44A
	Duty cycle of output current	0%	8.3%	18.3%	28.3%	38.3%	48.3%	58.3%	68.3%	78.8%	88.8%	99.2%	101.7%

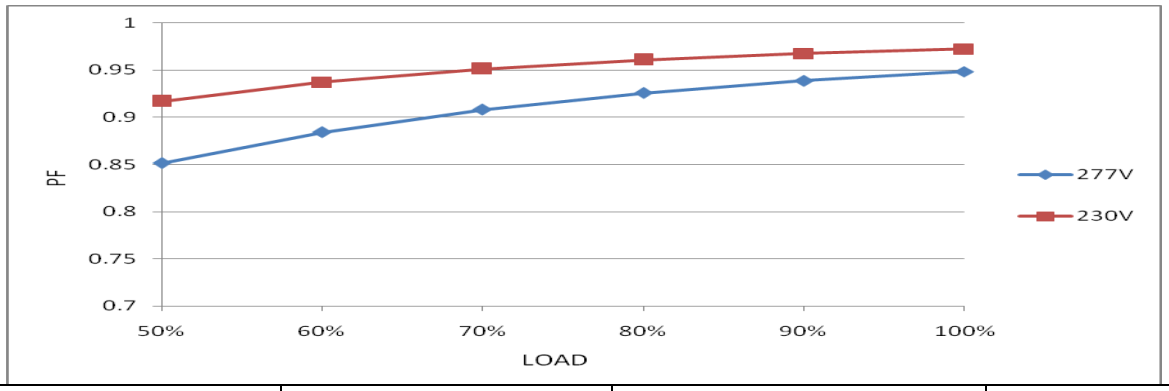
TEST RESULT：OK

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℃	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℃	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℃	I = 0.290A/ 230VAC I = 0.248A/ 277VAC
4	LEAKAGE CURRENT	< 0.75mA / 277VAC	I/P： 277 VAC O/P：NO LOAD Ta：25℃	L-FG： 0.0028 mA N-FG： 0.0029 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℃	0.448 W for Blank-Type 0.441 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℃	I= 23.4A/ 230VAC Twidth = 90us
	INPUT=230VAC/50HZ @ FULL LOAD CH2：Input current CH1：AC Input Voltage 			

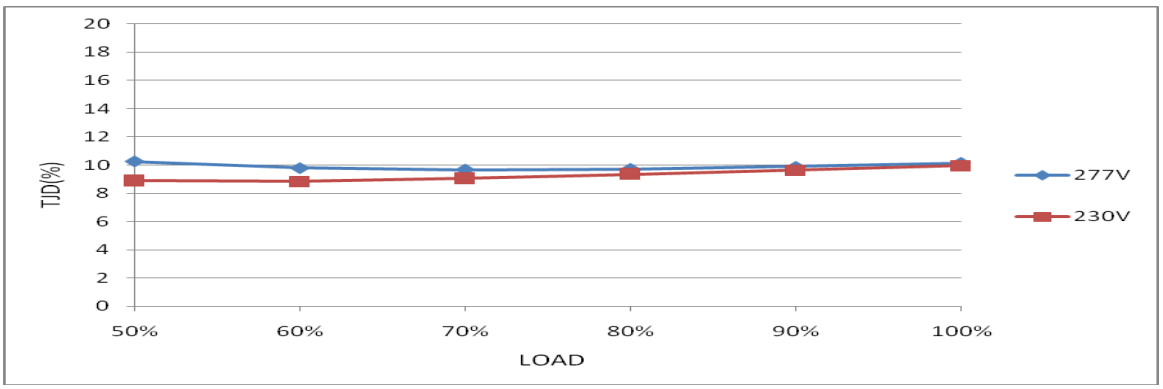
7	POWER FACTOR	0.95/ 230VAC 0.9/ 277VAC	I/P： 230 VAC I/P： 277 VAC O/P：FULL LOAD Ta：25℃	PF=0.972 /230VAC PF=0.949 /277VAC

PF vs LOAD



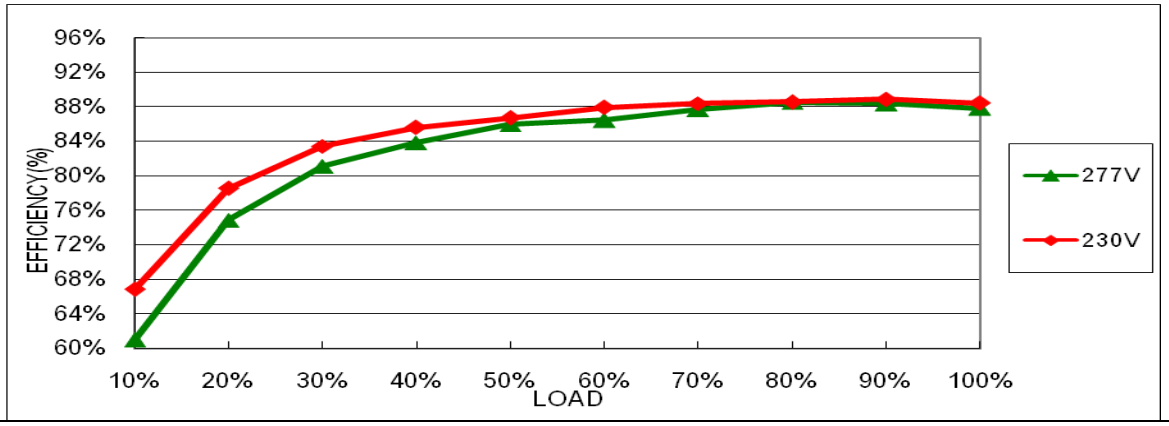
8	TOTAL HARMONIC DISTORTION	THD＜20% （@load≥60%/230VAC； @load≥75%/277VAC）	I/P：230 VAC I/P：277 VAC O/P：60% /75% LOAD Ta：25℃	THD=8.85% @60% load /230VAC THD=9.66% @75% load /277VAC

THD vs LOAD



9	EFFICIENCY(Typ)	87%	I/P： 230VAC O/P：FULL LOAD Ta：25℃	88.42%

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℃	113.7%/ 200VAC 114.1%/ 230VAC 114.5%/ 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℃	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℃	 (1) 628V (2) 640V (3) 626V
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℃	 (1) 129V (2) 135V (3) 129V
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℃	 (1) 15.0V (2) 14.5V (3) 15.0V

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℃	I/P-O/P：1.636mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P：500VDC>100MΩ	I/P-O/P： 500VDC Ta：25℃	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℃	PASS
2	CONDUCTION	EN55015	I/P：230 VAC/50HZ O/P：FULL LOAD Ta：25℃	PASS
3	RADIATION	EN55015	I/P：230 VAC/50HZ O/P：FULL LOAD Ta：25℃	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℃	PASS
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT：1KV	I/P： 230VAC/50HZ O/P：FULL LOAD Ta：25℃	PASS
6	SURGE	EN61000-4-5 LIGHT INDUSTRY L-N：1KV	I/P： 230VAC/50HZ O/P：FULL LOAD Ta：25℃	PASS
7	Test by certified Lab ＆ Test Report Prepare			

■ RELIABILITY TEST

ENVIRONMENT TEST

<table>
<tr><th>NO</th><th>TEST ITEM</th><th>SPECIFICATION</th><th>TEST CONDITION</th><th>RESULT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： IDLV-65-24
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 27.6℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 40.5℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT Ta= 27.6℃</th><th>HIGH AMBIENT Ta=40.5℃</th></tr>
<tr><td>1</td><td>BD1</td><td>86.3℃</td><td>97.1℃</td></tr>
<tr><td>2</td><td>C8</td><td>80.4℃</td><td>91.4℃</td></tr>
<tr><td>3</td><td>C6</td><td>79.2℃</td><td>90.3℃</td></tr>
<tr><td>4</td><td>D1</td><td>98.3℃</td><td>109.8℃</td></tr>
<tr><td>5</td><td>Q1</td><td>87.9℃</td><td>99.3℃</td></tr>
<tr><td>6</td><td>U1</td><td>78.6℃</td><td>89.7℃</td></tr>
<tr><td>7</td><td>R17</td><td>84.1℃</td><td>95.4℃</td></tr>
<tr><td>8</td><td>T1</td><td>89.5℃</td><td>100.3℃</td></tr>
<tr><td>9</td><td>D100</td><td>97.8℃</td><td>108.4℃</td></tr>
<tr><td>10</td><td>Q100</td><td>69.9℃</td><td>81.3℃</td></tr>
<tr><td>11</td><td>U100</td><td>72.9℃</td><td>83.9℃</td></tr>
<tr><td>12</td><td>RG1</td><td>83.7℃</td><td>94.5℃</td></tr>
<tr><td>13</td><td>C105</td><td>71.3℃</td><td>82.6℃</td></tr>
<tr><td>14</td><td>C107</td><td>58.6℃</td><td>70.3℃</td></tr>
<tr><td>15</td><td>TC</td><td>68.9℃</td><td>81.3℃</td></tr>
</table></td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P： 295VAC/200VAC
O/P：FULL LOAD
Ta= -25℃</td><td>TEST：OK</td></tr>
<tr><td>3</td><td>HIGH HUMIDITY
HIGH TEMPERATURE
HIGH VOLTAGE
TURN ON TEST</td><td>AFTER 12 HOURS
IN CHAMBER ON
CONTROL 40 ℃
NO DAMAGE</td><td>I/P： 305VAC
O/P：FULL LOAD
Ta=40 ℃
HUMIDITY= 95% R.H</td><td>TEST：OK</td></tr>
<tr><td>4</td><td>TEMPERATURE
COEFFICIENT</td><td>±0.03%/℃(0~40℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>±0.003%/℃(0~40℃)</td></tr>
<tr><td>5</td><td>STORAGE TEMPERATURE TEST</td><td colspan="2">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</td><td>TEST：OK</td></tr>
<tr><td>6</td><td>THERMAL SHOCK TEST</td><td colspan="2">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</td><td>TEST：OK</td></tr>
</table>

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℃	TEST：OK
8	CAPACITOR LIFE CYCLE	IDLV-65-24：SUPPOSE C105 IS THE MOST CRITICAL COMPONENT (1) I/P： 230VAC O/P：FULL LOAD Ta= 25 ℃ LIFE TIME (2) I/P： 230VAC O/P：FULL LOAD Ta= 40 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 40 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 40 ℃ LIFE TIME	(1) 177034 HRS (2) 69927 HRS (3) 134495 HRS (4) 221241 HRS
9	MTBF	Conducted by Parts Stress Analysis Prediction 4136.2K hrs min. Telcordia SR-332 (Bellcore) ; 398.8K hrs min. MIL-HDBK-217F (25℃)	
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) ： 30,000 hours @ Tcase 80℃； 50,000 hours @ Tcase 70℃	

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	CHENZH/ZHUOKB	SKY	LIUWY