Test Report：PWM-40-24

40W PWM Output LED Power Supply

■ 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	VERDICT
1	PWM FREQUENCY	1.47KHz	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	1.483KHz	PASS
2	OUTPUT VOLTAGE TOLERANCE	V1: -3.0%~ +3.0% (Max)	I/P: 90 VAC / 305VAC O/P:FULL/ NO LOAD Ta:25℃	V1: -0.095% ~ 0.058%	PASS
3	SET UP TIME	230VAC : 500 ms (Max) 115VAC : 500 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:95% LOAD Ta:25℃	230VAC/ 316 ms 115VAC/ 359 ms	PASS
4	RISE TIME	230VAC : 80 ms (Max) 115VAC : 80 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:95% LOAD Ta:25℃	230VAC/ 0.17 ms 115VAC/ 0.17 ms	PASS
5	HOLD UP TIME	230VAC : 16 ms (Typ) 115VAC : 16 ms (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25℃	230VAC/ 21 ms 115VAC/ 21 ms	PASS
6	OVER/UNDERSHOOT TEST	＜ ±5%	I/P: 230 VAC O/P:FULL LOAD Ta:25℃	TEST: ＜5 %	PASS

7 DIMMER TEST

SPEC:

*The duty of the PWM style output can be adjusted through output cable by connecting a 0~10Vdc or 10V PWM signal or resistance between DIM+ and DIM－.

* Reference resistance value for output current adjustment (Typical)

Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
Output duty	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

*0 ~ 10V dimming function for output current adjustment (Typical)

Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
Output duty	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

*10V PWM signal for output current adjustment (Typical)：Frequency range：100Hz~3KHz

Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Output duty	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

TEST RESULT: I/P： 230 VAC ;Ta：25℃

PASS

1	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K
	Output Current	0.180A	0.339A	0.505A	0.678A	0.849A	1.013A	1.177A	1.339A	1.507A	1.680A
	%	10.78%	20.30%	30.24%	40.60%	50.84%	60.66%	70.48%	80.18%	90.24%	100.60%
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V
	Output Current	0.174A	0.326A	0.483A	0.650A	0.818A	0.997A	1.162A	1.335A	1.515A	1.678A
	%	10.42%	19.52%	28.92%	38.92%	48.98%	59.70%	69.58%	79.94%	90.72%	100.48%
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	Output Current	0.158A	0.316A	0.481A	0.648A	0.825A	0.996A	1.171A	1.345A	1.531A	1.677A
	%	9.46%	18.92%	28.80%	38.80%	49.40%	59.64%	70.12%	80.54%	91.68%	100.42%

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~305 VAC	I/P：TESTING O/P：FULL LOAD Ta：25℃	87 V~305 V	PASS
			I/P： (1)LOW-LINE-3V=87 V HIGH-LINE+10V=315 V O/P：FULL/NO LOAD ON：30 Sec OFF：30 Sec 10MIN (2)230VAC ON：0.5 Sec OFF：0.5 Sec 20MIN (3)230VAC ON：3Sec OFF：3Sec 12HOURS (POWER ON/OFF NO DAMAGE)	TEST： (1) OK (2) OK (3) OK	
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P： 90 VAC ~ 305 VAC O/P：FULL ~NO LOAD Ta：25℃	TEST： OK	PASS
3	POWER FACTOR	115V/ 0.97 (TYP) 230V/ 0.95 (TYP) 277V/ 0.92 (TYP)	I/P： 115 VAC I/P： 230 VAC I/P： 277 VAC O/P：FULL LOAD Ta：25℃	PF= 0.996 / 115 VAC PF= 0.977 / 230 VAC PF= 0.944 / 277 VAC	PASS
4	EFFICIENCY	89% (TYP)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	89.35%	PASS
5	INPUT CURRENT	115V/ 0.6 A (TYP) 230V/ 0.3 A (TYP) 277V/ 0.25 A (TYP)	I/P： 115 VAC I/P： 230 VAC I/P： 277 VAC O/P：FULL LOAD Ta：25℃	I = 0.397 A/ 115 VAC I = 0.200 A/ 230 VAC I = 0.174 A/ 277 VAC	PASS
6	INRUSH CURRENT	230V/ 50 A (TYP) Twidth =270 us measured at 50% Ipeak COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 45.4 A Twidth = 200 us	PASS
7	LEAKAGE CURRENT	< 0.25 mA / 277 VAC	I/P： 305 VAC O/P：NO LOAD Ta：25℃	L-CASE： 0.003 mA N-CASE： 0.003 mA	PASS
8	NO LOAD CONSUMPTION	< 0.5 W	I/P：230VAC O/P：NO LOAD Ta：25℃	0.44 W	PASS
9	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 60% or higher at 230V/115VAC Total harmonic distortion will be lower than 20% when output loading is 75% or higher at 277VAC	I/P： 115 VAC I/P： 230 VAC O/P：60% LOAD I/P： 277 VAC O/P：75%LOAD Ta：25℃	THD： 6.40% /115VAC THD： 15.09% /230VAC THD： 14.78% /277VAC	PASS

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	108% ~ 120 %	I/P： 100 VAC I/P： 230 VAC I/P： 305 VAC O/P：TESTING Ta：25℃	112.6 %/ 100 VAC 112.7 %/ 230 VAC 112.7 %/ 305 VAC Hiccup Mode , recovers automatically after fault condition is removed	PASS
2	OVER VOLTAGE PROTECTION	CH1： 28 V ~ 34 V	I/P： 90 VAC I/P： 230 VAC I/P： 305 VAC O/P：NO LOAD Ta：25℃	28.97 V/ 90 VAC 28.92 V/ 230 VAC 28.90 V/ 305 VAC Shut down o/p voltage，re-power on to recover	PASS
3	OVER TEMPERATURE PROTECTION	SPEC： O.T.P. NO DAMAGE	I/P： 230 VAC O/P：FULL LOAD	O.T.P. Active Shut down o/p voltage，re-power on to recover	PASS
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P： 305 VAC O/P：FULL LOAD Ta：25℃	NO DAMAGE Hiccup mode , recovers automatically after fault condition is removed	PASS

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated 800 V 9 A	I/P：High-Line +3V = 308 V O/P： (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta：25℃	(1) 656 V (2) 636 V (3) 632 V	PASS
2	Diode Peak Voltage	D100 Rated 150 V 30 A Q105 60 V 79 A	I/P：High-Line +3V = 308 V O/P： (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta：25℃	D100 (1) 104 V (2) 102 V (3) 101 V Q105 (1) 25.7 V (2) 24.3 V (3) 0 V	PASS
3	Input Capacitor Voltage	C5 Rated 33uF / 450 V	I/P：High-Line +3V = 308 V O/P： (1) FULL LOAD Turn on /Off (2) NO LOAD Turn on /Off (3) FULL LOAD / NO LOAD Change Ta：25℃	(1) 440 V (2) 446 V (3) 442 V	PASS
4	Control IC Voltage Test	U1 Rated 28V	I/P：High-Line +3V = 308 V O/P： (1) FULL LOAD Turn on /Off (2) NO LOAD Turn on /Off (3) FULL LOAD / NO LOAD Change Ta：25℃	(1) 17.2 V (2) 17.2 V (3) 17.1 V	PASS
5	PFC Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 600 V 10 A	I/P：High-Line +3V = 308 V O/P： (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta：25℃	(1) 460 V (2) 477 V (3) 458 V	PASS

SAFETY & E.M.C. TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P： 3.75 KVAC/min	I/P-O/P： 4.2 KVAC/min Ta：25℃	I/P-O/P： 2.639 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P：500VDC>100MΩ	I/P-O/P： 500 VDC Ta：25℃/70%RH	I/P-O/P： >9999 MΩ NO DAMAGE	PASS

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS C	I/P：115VAC/230VAC/50HZ O/P：60%/FULL LOAD I/P：277VAC/50HZ O/P：75%/FULL LOAD Ta:25℃	OK	PASS
2	CONDUCTION	EN55015 CLASS B	I/P：230 VAC/50HZ O/P:FULL LOAD Ta:25℃	OK Test by certified Lab	PASS
3	RADIATION	EN55015 CLASS B	I/P：230 VAC/50HZ O/P:FULL LOAD Ta:25℃	OK Test by certified Lab	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℃	CRITERIA A	PASS
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT：1KV	I/P：230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	PASS
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV	I/P：230 VAC/50HZ O/P:FULL LOAD Ta:25℃	CRITERIA A	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><th>VERDICT</th></tr>
<tr><td>1</td><td>TEMPERATURE RISE TEST</td><td colspan="3">MODEL： PWM-40-36
1. ROOM AMBIENT BURN-IN：2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=23.3 ℃
2. HIGH AMBIENT BURN-IN： 2 HRS
I/P： 230VAC O/P： FULL LOAD Ta=51.3 ℃
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT
Ta= 23.3 ℃</th><th>HIGH AMBIENT
Ta= 51.3 ℃</th></tr>
<tr><td>1</td><td>C11</td><td>43.5℃</td><td>72.7℃</td></tr>
<tr><td>2</td><td>D6</td><td>43.7℃</td><td>73.0℃</td></tr>
<tr><td>3</td><td>Q1</td><td>45.9℃</td><td>75.0℃</td></tr>
<tr><td>4</td><td>Q2</td><td>47.5℃</td><td>76.6℃</td></tr>
<tr><td>5</td><td>C5</td><td>41.8℃</td><td>70.5℃</td></tr>
<tr><td>6</td><td>T1</td><td>47.5℃</td><td>75.9℃</td></tr>
<tr><td>7</td><td>C45</td><td>42.3℃</td><td>70.9℃</td></tr>
<tr><td>8</td><td>U1</td><td>42.9℃</td><td>72.0℃</td></tr>
<tr><td>9</td><td>C105</td><td>41.1℃</td><td>69.9℃</td></tr>
<tr><td>10</td><td>D100</td><td>41.7℃</td><td>70.5℃</td></tr>
<tr><td>11</td><td>Q105</td><td>39.4℃</td><td>68.1℃</td></tr>
<tr><td>12</td><td>U100</td><td>38.5℃</td><td>67.4℃</td></tr>
<tr><td>13</td><td>C112</td><td>36.1℃</td><td>65.0℃</td></tr>
<tr><td>14</td><td>RTH2</td><td>41.2℃</td><td>69.7℃</td></tr>
<tr><td>15</td><td>TC</td><td>39.3℃</td><td>67.9℃</td></tr>
</table></td><td>PASS</td></tr>
<tr><td>2</td><td>LOW TEMPERATURE
TURN ON TEST</td><td>TURN ON AFTER 2 HOUR</td><td>I/P：305VAC/100VAC
O/P：FULL LOAD
Ta= -45℃/-30℃</td><td>TEST：OK</td><td>PASS</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 50℃
NO DAMAGE</td><td>I/P：315 VAC
O/P：FULL LOAD
Ta= 50℃
HUMIDITY= 95% R.H</td><td>TEST：OK</td><td>PASS</td></tr>
<tr><td>4</td><td>TEMPERATURE COEFFICIENT</td><td>±0.03 %(0~50℃)</td><td>I/P： 230 VAC
O/P：FULL LOAD</td><td>±0.008 %(0~50℃)</td><td>PASS</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>OK</td><td>PASS</td></tr>
<tr><td>6</td><td>THERMAL SHOCK TEST</td><td colspan="2">1. Thermal shock Temperature： -45℃~ +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
turn on 58sec；turn off 2sec</td><td>OK</td><td>PASS</td></tr>
<tr><td>7</td><td>VIBRATION TEST</td><td colspan="2">1 Carton & 1 Set
(1) Waveform： Sine Wave
(2) Frequency：10~500Hz
(3) Sweep Time：12min/sweep cycle
(4) Acceleration：5G
(5) Test Time：90min in each axis (X.Y.Z)
(6) Ta：25℃</td><td>TEST：OK</td><td>PASS</td></tr>
</table>

8	CAPACITOR LIFE CYCLE	PWM-40-36：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=50 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta=50 ℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta=50 ℃ LIFE TIME	(1) 914605 HRS (2) 153006 HRS (3) 169694 HRS (4) 220860 HRS	PASS
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE：270.02 KHRS		PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) ： 50000 hours @ Tcase 70℃		PASS

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ Cary Chen	SKY	LIUWY

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