



Test Report : PWM-90-48

90W 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°C	1.479KHz	PASS
2	OUTPUT VOLTAGE TOLERANCE	V1 : -1%~ 1% (Max)	I/P : 90 VAC / 305 VAC O/P : FULL/ NO LOAD Ta : 25°C	V1 : -0.18 %~ 0.06 %	PASS
3	SET UP TIME	230VAC : 500 ms (Max) 115VAC : 500 ms(Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 405 ms 115VAC/ 447 ms	PASS
4	RISE TIME	230VAC : 80 ms (Max) 115VAC : 80 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 0.172 ms 115VAC/ 0.172 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°C	230VAC/ 24.8 ms 277VAC/ 21.6 ms	PASS
6	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 5 %	PASS

7	DIMMER TEST	<p>SPEC:</p> <p>* 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 - .</p> <p>* Reference resistance value for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Resistance value</th> <td>10K</td><td>20K</td><td>30K</td><td>40K</td><td>50K</td><td>60K</td><td>70K</td><td>80K</td><td>90K</td><td>100K</td> </tr> <tr> <th>Output duty</th> <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> </tr> </table> <p>*0 ~ 10V dimming function for output current adjustment (Typical)</p> <table border="1"> <tr> <th>Dimming value</th> <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> </tr> <tr> <th>Output duty</th> <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> </tr> </table> <p>*10V PWM signal for output current adjustment (Typical): Frequency range: 100Hz~3KHz</p> <table border="1"> <tr> <th>Duty value</th> <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> </tr> <tr> <th>Output duty</th> <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> </tr> </table>										Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K	Output duty	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V	Output duty	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	Output duty	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
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		TEST RESULT: I/P : 230 VAC ; Ta : 25°C																																																																											
		1	Resistance value	10K	20K	30K	40K	50K	60K	70K	80K	90K	100K																																																																
			Output Current	0.197A	0.384A	0.568A	0.768A	0.954A	1.141A	1.320A	1.513A	1.697A	1.877A																																																																
%	10.48%		20.43%	30.21%	40.85%	50.74%	60.69%	70.21%	80.48%	90.27%	99.84%																																																																		
2	Dimming value	1V	2V	3V	4V	5V	6V	7V	8V	9V	10V																																																																		
	Output Current	0.198A	0.373A	0.553A	0.742A	0.933A	1.125A	1.321A	1.518A	1.717A	1.878A																																																																		
	%	10.53%	19.84%	29.41%	39.47%	49.63%	59.84%	70.27%	80.74%	91.33%	99.89%																																																																		
3	Duty value	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%																																																																		
	Output Current	0.192A	0.365A	0.546A	0.736A	0.928A	1.129A	1.316A	1.511A	1.719A	1.875A																																																																		
	%	10.21%	19.41%	29.04%	39.15%	49.36%	60.05%	70.00%	80.37%	91.44%	99.73%																																																																		
										PASS																																																																			

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°C	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°C	TEST : OK	PASS
3	POWER FACTOR	115V/ 0.98 (TYP) 230V/ 0.96 (TYP) 277V/ 0.94 (TYP)	I/P : 115 VAC I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.997 / 115 VAC PF= 0.974 / 230 VAC PF= 0.950 / 277 VAC	PASS
4	EFFICIENCY	90.5% (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	91.12%	PASS
5	INPUT CURRENT	115V/ 0.95 A (TYP) 230V/ 0.5 A (TYP) 277V/ 0.4 A (TYP)	I/P : 115 VAC I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	I = 0.869 A/ 115 VAC I = 0.439 A/ 230 VAC I = 0.374 A/ 277 VAC	PASS
6	INRUSH CURRENT	230V/ 60 A (TYP) Twidth =550 us measured at 50% Ipeak COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 51.0 A Twidth = 388 us	PASS
7	LEAKAGE CURRENT	< 0.25 mA/ 277 VAC	I/P : 305 VAC O/P : NO LOAD Ta : 25°C	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°C	< 0.395 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°C	THD : 5.37% /115VAC THD : 15.69% /230VAC THD : 15.55% /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°C	114.32 %/ 100 VAC 114.30 %/ 230 VAC 114.31 %/ 305 VAC Hiccup mode , recovers automatically after fault condition is removed	PASS
2	OVER VOLTAGE PROTECTION	CH1 : 54 V ~ 60 V	I/P : 90 VAC I/P : 230 VAC I/P : 305 VAC O/P : NO LOAD Ta : 25°C	57.38 V/ 90 VAC 56.36 V/ 230 VAC 56.38 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°C	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 9A	I/P : High-Line +3V = 308 V O/P : (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta : 25°C	(1) 728 V (2) 704 V (3) 712 V	PASS
2	Diode Peak Voltage	Q101 Rated 170V 20A Q105 Rated 60V 79A	I/P : High-Line +3V = 308 V O/P : (1) FULL LOAD Turn on (2) Output Short (3) FULL LOAD continue Ta : 25°C	Q101 (1) 154 V (2) 155 V (3) 154 V Q105 (1) 48.0 V (2) 49.8 V (3) 0 V	PASS
3	Input Capacitor Voltage	C5 Rated: 82uF / 450 V	I/P : High-Line +3V = 308 V O/P: (1) FULL LOAD input on/off (2) NO LOAD Turn on /Off (3) FULL LOAD / NO LOAD Change Ta : 25°C	(1) 440 V (2) 440 V (3) 446 V	PASS
4	Control IC Voltage Test	U1 Rated 28 V	I/P : High-Line +3V = 298 V O/P : (1) FULL LOAD Turn on /Off (2) NO LOAD Turn on /Off (3) FULL LOAD / NO LOAD Change Ta : 25°C	(1) 17.4 V (2) 17.4 V (3) 17.4 V	PASS
5	P.F.C 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°C	(1) 476 V (2) 460 V (3) 460 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°C	I/P-O/P : 2.684 mA NO DAMAGE	PASS
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ	I/P-O/P : 500 VDC Ta : 25°C/70%RH	I/P-O/P : >9999 MΩ NO DAMAGE	PASS

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	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°C	OK	PASS
2	CONDUCTION	EN55015	I/P : 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	OK Test by certified Lab	PASS
3	RADIATION	EN55015	I/P : 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	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°C	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°C	CRITERIA A	PASS
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV	I/P : 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	PASS
7	Test by certified Lab & Test Report Prepare				

■ RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																																
1	TEMPERATURE RISE TEST	MODEL : PWM-90-36 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=46.0 °C <table border="1" data-bbox="469 584 1145 1086"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 30.3 °C</th> <th>HIGH AMBIENT Ta= 52.0 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>C5</td><td>64.0°C</td><td>78.4°C</td></tr> <tr><td>2</td><td>C105</td><td>65.9°C</td><td>79.4°C</td></tr> <tr><td>3</td><td>T1</td><td>70.9°C</td><td>85.0°C</td></tr> <tr><td>4</td><td>Q1</td><td>69.6°C</td><td>86.0°C</td></tr> <tr><td>5</td><td>Q2</td><td>70.8°C</td><td>87.0°C</td></tr> <tr><td>6</td><td>Q101</td><td>69.3°C</td><td>82.7°C</td></tr> <tr><td>7</td><td>D6</td><td>66.8°C</td><td>81.8°C</td></tr> <tr><td>8</td><td>C110</td><td>60.2°C</td><td>73.6°C</td></tr> <tr><td>9</td><td>C205</td><td>63.9°C</td><td>77.2°C</td></tr> <tr><td>10</td><td>C41</td><td>63.6°C</td><td>77.5°C</td></tr> <tr><td>11</td><td>ZNR2</td><td>64.9°C</td><td>80.4°C</td></tr> <tr><td>12</td><td>D5</td><td>63.1°C</td><td>78.4°C</td></tr> <tr><td>13</td><td>U1</td><td>64.5°C</td><td>79.2°C</td></tr> <tr><td>14</td><td>D10</td><td>77.5°C</td><td>93.0°C</td></tr> <tr><td>15</td><td>TC</td><td>60.3°C</td><td>75.0°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 30.3 °C	HIGH AMBIENT Ta= 52.0 °C	1	C5	64.0°C	78.4°C	2	C105	65.9°C	79.4°C	3	T1	70.9°C	85.0°C	4	Q1	69.6°C	86.0°C	5	Q2	70.8°C	87.0°C	6	Q101	69.3°C	82.7°C	7	D6	66.8°C	81.8°C	8	C110	60.2°C	73.6°C	9	C205	63.9°C	77.2°C	10	C41	63.6°C	77.5°C	11	ZNR2	64.9°C	80.4°C	12	D5	63.1°C	78.4°C	13	U1	64.5°C	79.2°C	14	D10	77.5°C	93.0°C	15	TC	60.3°C	75.0°C			PASS
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2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 305VAC/100VAC O/P : FULL LOAD Ta= -45°C/-30°C	TEST : OK	PASS																																																																
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 315 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95% R.H	TEST : OK	PASS																																																																
4	TEMPERATURE COEFFICIENT	±0.03 %(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	±0.002 %(0~50°C)	PASS																																																																
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		OK	PASS																																																																
6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -45°C~ +55°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 turn on 58sec ; turn off 2sec		OK	PASS																																																																

7	VIBRATION TEST	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°C	TEST : OK	PASS
8	CAPACITOR LIFE CYCLE	PWM-90-36 : 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=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) 162934 HRS (2) 37235 HRS (3) 65723 HRS (4) 72887 HRS	PASS
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 224.2KHRS		PASS
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 50000 hours @ Tcase 75°C		PASS

TEST RESULT	TESTER	REVIEW	APPROVAL
PASS	ZHANGZJ/ZHUOKB	SKY	LIUWY

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