



Test Report: PCD-60-1050B

60W Single Output AC Dimmable 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	RIPPLE & NOISE	V1 : 3800 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 2800 mVp-p (Max)	P
2	OPERATING VOLTAGE RANGE	V1= 34V~57V	I/P : 230VAC O/P : CV MODE Ta : 25°C	O/P= 34V : 1.053 A O/P= 56V : 1.052 A	P
3	SET UP TIME	230VAC : 500 ms (Max)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 426 ms	P
4	OVER/UNDERSHOOT TEST	< 63V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 63 V	P
5	CURRENT ACCURACY	±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : ±0.14% %	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	180VAC~295 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE=3V=177 V HIGH-LINE=295 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	175 V~295V TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 180 VAC ~ 295 VAC O/P : FULL~MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.9 / 230 VAC(TYP) 0.9 / 277 VAC(TYP)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.977 / 100% PF= 0.931 / 100%	P
4	EFFICIENCY	86 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	88.97 %	P
5	INPUT CURRENT	230V/ 0.6 A (TYP) 277V/ 0.5 A (TYP)	I/P : 230 VAC I/P : 277 VAC O/P : FULL LOAD Ta : 25°C	I = 0.297 A/ 230 VAC I = 0.252 A/ 277 VAC	P
6	INRUSH CURRENT	230V/ 13 A (TYP) (twidth=50us measured at 50% Ipeak) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 7.671 A/ 230 VAC T = 34.4 us	P
7	LEAKAGE CURRENT	< 0.5 mA / 240 VAC	I/P : 240 VAC O/P : Min LOAD Ta : 25°C	L-CASE : 0.003 mA N-CASE : 0.003 mA	P
8	TOTAL HARMONIC DISTORTION	Total harmonic distortion will be lower than 20% when output loading is 60% or higher at 230VAC	I/P : 230VAC O/P : 60% LOAD Ta : 25°C	THD : 18.87 %	P
		Total harmonic distortion will be lower than 20% when output loading is 75% or higher at 277VAC	I/P : 277VAC O/P : 75% LOAD Ta : 25°C	THD : 18.54 %	

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : $105 \pm 5^{\circ}\text{C}$ 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	P
2	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 295 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup mode, recovers automatically after fault condition is removed.	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 2 Rated : STP10NK80ZFP: 800V/9A	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 670 V (2) 530 V (3) 616 V	P
2	Diode Peak Voltage	D100 Rated : FCF10A40: 400V/10A	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 320 V (2) 300 V (3) 315 V	P
3	Clamp Diode Peak Voltage	D 10 Rated : HER308: 1000V/3A	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 630 V (2) 506 V (3) 598 V	P
4	Control IC Voltage Test	U 1 Rated : NCP1608B: 10.2V~20V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 14.4 V (2) 12.1 V (3) 14.4 V	P

■ 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 KVAC/min Ta : 25°C	I/P-O/P : 1.181 mA NO DAMAGE	P
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	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS C	I/P: 230/240/277VAC /50HZ/60HZ O/P:100% LOAD Ta:25°C	PASS	P
2	CONDUCTION	EN55015	I/P:230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	P
3	RADIATION	EN55015	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab	P
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	P
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA B	P
6	SURGE	EN61000-4-5 LIGHT INDUSTRY L-N :1KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA B	P
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 : PCD-60-500B 1. ROOM AMBIENT BURN-IN : 2.5 HRS I/P : 230VAC O/P : 95% LOAD Ta=38.8 ℃ 2. HIGH AMBIENT BURN-IN : 3.5 HRS I/P : 230VAC O/P : 95% LOAD Ta=54.2 ℃ <table><thead><tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT Ta= 38.8 ℃</th><th>HIGH AMBIENT Ta= 54.2 ℃</th></tr></thead><tbody><tr><td>1</td><td>LF2</td><td>LF6013</td><td>77.9℃</td><td>88.0℃</td></tr><tr><td>2</td><td>R5</td><td>R/MO 2W 2.2KΩ</td><td>73.4℃</td><td>84.3℃</td></tr><tr><td>3</td><td>R15</td><td>R/MO 2W 120Ω</td><td>78.7℃</td><td>89.0℃</td></tr><tr><td>4</td><td>R16</td><td>R/C 1W 75KΩ</td><td>83.9℃</td><td>94.5℃</td></tr><tr><td>5</td><td>R17</td><td>R/MO 2W 10KΩ</td><td>88.7℃</td><td>98.9℃</td></tr><tr><td>6</td><td>R26</td><td>R/NW 2W 0.15Ω</td><td>87.0℃</td><td>97.3℃</td></tr><tr><td>7</td><td>C8</td><td>C/MPE 104/630V</td><td>83.1℃</td><td>93.3℃</td></tr><tr><td>8</td><td>C10</td><td>C/MPE 154/630V</td><td>83.3℃</td><td>93.3℃</td></tr><tr><td>9</td><td>BD1</td><td>UR4KB80</td><td>83.7℃</td><td>93.9℃</td></tr><tr><td>10</td><td>Q6</td><td>FMV08N50E</td><td>83.0℃</td><td>93.3℃</td></tr><tr><td>11</td><td>C11</td><td>C/MPE 224/630V</td><td>84.6℃</td><td>94.7℃</td></tr><tr><td>12</td><td>L1</td><td>TR6108</td><td>81.1℃</td><td>91.0℃</td></tr><tr><td>13</td><td>U1</td><td>NCP1608B</td><td>80.2℃</td><td>89.9℃</td></tr><tr><td>14</td><td>C40</td><td>C/E 47uF/63V</td><td>84.2℃</td><td>93.3℃</td></tr><tr><td>15</td><td>Q2</td><td>STP10NK80ZFP</td><td>88.9℃</td><td>100.0℃</td></tr><tr><td>16</td><td>D10</td><td>HER308</td><td>89.1℃</td><td>99.4℃</td></tr><tr><td>17</td><td>T1</td><td>TF6486</td><td>100.6℃</td><td>109.5℃</td></tr><tr><td>18</td><td>D100</td><td>HER1008G</td><td>89.3℃</td><td>98.9℃</td></tr><tr><td>19</td><td>C105</td><td>C/E 100uF/160V</td><td>83.5℃</td><td>93.3℃</td></tr></tbody></table>			NO	Position	P/N	ROOM AMBIENT Ta= 38.8 ℃	HIGH AMBIENT Ta= 54.2 ℃	1	LF2	LF6013	77.9℃	88.0℃	2	R5	R/MO 2W 2.2KΩ	73.4℃	84.3℃	3	R15	R/MO 2W 120Ω	78.7℃	89.0℃	4	R16	R/C 1W 75KΩ	83.9℃	94.5℃	5	R17	R/MO 2W 10KΩ	88.7℃	98.9℃	6	R26	R/NW 2W 0.15Ω	87.0℃	97.3℃	7	C8	C/MPE 104/630V	83.1℃	93.3℃	8	C10	C/MPE 154/630V	83.3℃	93.3℃	9	BD1	UR4KB80	83.7℃	93.9℃	10	Q6	FMV08N50E	83.0℃	93.3℃	11	C11	C/MPE 224/630V	84.6℃	94.7℃	12	L1	TR6108	81.1℃	91.0℃	13	U1	NCP1608B	80.2℃	89.9℃	14	C40	C/E 47uF/63V	84.2℃	93.3℃	15	Q2	STP10NK80ZFP	88.9℃	100.0℃	16	D10	HER308	89.1℃	99.4℃	17	T1	TF6486	100.6℃	109.5℃	18	D100	HER1008G	89.3℃	98.9℃	19	C105	C/E 100uF/160V	83.5℃	93.3℃	P
NO	Position	P/N	ROOM AMBIENT Ta= 38.8 ℃	HIGH AMBIENT Ta= 54.2 ℃																																																																																																					
1	LF2	LF6013	77.9℃	88.0℃																																																																																																					
2	R5	R/MO 2W 2.2KΩ	73.4℃	84.3℃																																																																																																					
3	R15	R/MO 2W 120Ω	78.7℃	89.0℃																																																																																																					
4	R16	R/C 1W 75KΩ	83.9℃	94.5℃																																																																																																					
5	R17	R/MO 2W 10KΩ	88.7℃	98.9℃																																																																																																					
6	R26	R/NW 2W 0.15Ω	87.0℃	97.3℃																																																																																																					
7	C8	C/MPE 104/630V	83.1℃	93.3℃																																																																																																					
8	C10	C/MPE 154/630V	83.3℃	93.3℃																																																																																																					
9	BD1	UR4KB80	83.7℃	93.9℃																																																																																																					
10	Q6	FMV08N50E	83.0℃	93.3℃																																																																																																					
11	C11	C/MPE 224/630V	84.6℃	94.7℃																																																																																																					
12	L1	TR6108	81.1℃	91.0℃																																																																																																					
13	U1	NCP1608B	80.2℃	89.9℃																																																																																																					
14	C40	C/E 47uF/63V	84.2℃	93.3℃																																																																																																					
15	Q2	STP10NK80ZFP	88.9℃	100.0℃																																																																																																					
16	D10	HER308	89.1℃	99.4℃																																																																																																					
17	T1	TF6486	100.6℃	109.5℃																																																																																																					
18	D100	HER1008G	89.3℃	98.9℃																																																																																																					
19	C105	C/E 100uF/160V	83.5℃	93.3℃																																																																																																					
2	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 180VAC/295VAC O/P : 95 % LOAD Ta= -30 ℃	TEST : OK	P																																																																																																				
3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 ℃ NO DAMAGE	I/P : 295 VAC O/P : 95% LOAD Ta= 50 ℃ HUMIDITY= 95 %R.H	TEST : OK	P																																																																																																				
4	TEMPERATURE COEFFICIENT	± 0.03 %(0~50℃)	I/P : 230 VAC O/P : 95% LOAD	± 0.0038 %(0~50℃)	P																																																																																																				
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		OK	P																																																																																																				

6	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35℃~ +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	OK	P
7	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10~500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 72min in each axis (X.Y.Z) (6) Ta : 25℃	TEST : OK	P
8	CAPACITOR LIFE CYCLE	PCD-60-500B: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	(1) 141718.5 HRS (2) 36932.7HRS (3) 54478.8HRS	P
9	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 358.030KHRS		P
10	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 75℃ ; 50,000 hours @ Tcase 65℃		P

TEST RESULT	TESTER	APPROVAL
PASS	ZOULF	HOWAY

2009/08/04 A50-G058