



Test Report: CEN-60-48

60W Single Output LED Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Other Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

■ RELIABILITY TEST

DESIGN VERIFY TEST

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	RIPPLE & NOISE	V1: 4.6 Vp-p (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	V1: 2.13Vp-p (Max)
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 43 V ~ 53 V	I/P: 230 VAC I/P:115VAC O/P:MIN LOAD Ta:25°C	42.09V~ 54.53V /230VAC 42.09V~ 54.51V/115VAC
3	CURRENT ADJ RANGE	1A ~ 1.3 A	I/P: 230 VAC O/P: CV=Vo-2V Ta:25°C	0.777A~ 1.505 A
4	CONSTANT CURRENT REGION	36 V ~ 48V	I/P: 230 VAC O/P:CV MODE Ta:25°C	O/P=36V: 1.353A O/P=47 V: 1.257A
5	OUTPUT VOLTAGE TOLERANCE	V1: 10% ~ -10 % (Max)	I/P: 100 VAC /295VAC O/P:FULL/ 0 % LOAD Ta:25°C	V1: 1.38%~ -1.38%
6	LINE REGULATION	V1: 3 % ~ -3 % (Max)	I/P:100 VAC ~295 VAC O/P:FULL LOAD Ta:25°C	V1: 0.15%~ -0.15%
7	LOAD REGULATION	V1: 5 % ~ -5 % (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.9%~ -0.9%
8	SET UP TIME	230VAC/500 ms (Max) 115VAC/ 1200 ms (Max)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 367ms 115 VAC/ 906ms
9	OVER/UNDERSHOOT TEST	< ±10%	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	TEST:<10 %

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	INPUT VOLTAGE RANGE	90VAC~295 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	41V~264V
			I/P: (1)LOW-LINE-3V=87 V (2)HIGH-LINE=305 V O/P:FULL/MIN LOAD ON: 30 Sec . OFF: 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	TEST: OK
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE	I/P: 100 VAC ~295AC O/P:FULL~MIN LOAD Ta:25°C	OK
3	POWER FACTOR	0.95/ 230 VAC FULL LOAD 0.97/ 115 VAC FULL LOAD 0.9/ 277 VAC FULL LOAD	I/P: 230 VAC I/P: 115 VAC I/P: 277 VAC O/P:FULL LOAD Ta:25°C	PF=0.958 /230V/100%LOAD PF=0.991 /115V/100%LOAD PF=0.91 /277V/100%LOAD
4	EFFICIENCY	91% (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	91.91 %
5	INPUT CURRENT	230 V/ 0.4 A (Typ) 115 V/ 0.8 A (Typ)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 0.3A/ 230VAC I = 0.59A/ 115VAC
6	INRUSH CURRENT	230 V/ 45 A (Typ) COLD START	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	I = 36A/ 230VAC

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	OVER LOAD PROTECTION	95 %~110 %	I/P: 230 VAC I/P: 115 VAC O/P:TESTING Ta:25°C	105%/ 230VAC 104%/115VAC Constant current limiting,
2	OVER VOLTAGE PROTECTION	V1: 54V~ 60V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	57.18V/ 230VAC 57.95V/ 115VAC Shut down Re- power ON
3	OVER TEMPERATURE PROTECTION	NO DAMAGE	I/P: 230 VAC O/P:FULL LOAD	O.T.P. Active Shut down o/p voltage · re-power on to recover
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P: 295VAC O/P: FULL LOAD Ta:25°C	NO DAMAGE Hiccup Mode

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated 13A/600V	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)514V (2)504V (3)510V
2	Diode Peak Voltage	D100 Rated 20A/300V	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)238V (2)178V (3)235V
3	Clamp Diode Peak Voltage	D2 Rated 3A/800V	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)494V (2)450V (3)492V
4	Control IC Voltage Test	U 1 Rated 10.5V~21V	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)14.725V (2)14.681V (3)14.687V

SAFETY & EMC TEST

SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	WITHSTAND VOLTAGE	IEC60950-1 I/P-O/P: 3.75KVAC/min I/P-FG:2KVAC/min<4.5mA O/P-FG:1.5KVAC/min	I/P-O/P: 4 KVAC/min I/P-FG: 2.4KVAC/min O/P-FG: 1.8KVAC/min Ta:25°C	I/P-O/P:4.64mA I/P-FG: 3.44mA O/P-FG: 4mA NO DAMAGE
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ I/P-FG: 500VDC>100MΩ O/P-FG:500VDC>100MΩ	I/P-O/P: 500 VDC I/P-FG: 500 VDC O/P-FG: 500 VDC Ta:25°C	I/P-O/P:14.7 GΩ I/P-FG: 13.8G Ω O/P-FG: 30G Ω NO DAMAGE
3	GROUNDING CONTINUITY	IEC60950-1 FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40A / 2min Ta:25°C	9 mΩ
4	LEAKAGE CURRENT	IEC60950-1 < 0.75 mA / 240VAC	I/P: 264 VAC O/P:Min LOAD Ta:25°C	L-FG:0.34 mA N-FG:0.34mA

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT
1	HARMONIC	EN61000-3-2 CLASS A CLASS C	I/P: 230VAC/50HZ LOAD:LED/ELECTRONIC LOAD O/P:100% LOAD Ta:25°C	PASS
2	CONDUCTION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL/50% LOAD Ta:25°C	PASS Test by certified Lab
3	RADIATION	EN55015 CLASS B	I/P: 230 VAC (50HZ) O/P:FULL LOAD Ta:25°C	PASS Test by certified Lab
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
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N :2KV L,N-PE:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT																																												
1	TEMPERATURE RISE TEST	MODEL : CEN-60-24 1. ROOM AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 25 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P : 230VAC O/P : FULL LOAD Ta= 61.7 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 25 °C</th> <th>HIGH AMBIENT Ta= 50.4 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>L1</td><td>55.2°C</td><td>75.7°C</td></tr> <tr><td>2</td><td>BD1</td><td>43.0°C</td><td>64.3°C</td></tr> <tr><td>3</td><td>Q1</td><td>49.7°C</td><td>70.9°C</td></tr> <tr><td>4</td><td>D100</td><td>52.5°C</td><td>73.0°C</td></tr> <tr><td>5</td><td>C105</td><td>50.6°C</td><td>70.8°C</td></tr> <tr><td>6</td><td>T1</td><td>53.3°C</td><td>73.2°C</td></tr> <tr><td>7</td><td>RTH1</td><td>50.3°C</td><td>71.3°C</td></tr> <tr><td>8</td><td>C5</td><td>49.3°C</td><td>70.2°C</td></tr> <tr><td>9</td><td>C47</td><td>55.4°C</td><td>75.6°C</td></tr> <tr><td>10</td><td>D2</td><td>74.5°C</td><td>97.8°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 25 °C	HIGH AMBIENT Ta= 50.4 °C	1	L1	55.2°C	75.7°C	2	BD1	43.0°C	64.3°C	3	Q1	49.7°C	70.9°C	4	D100	52.5°C	73.0°C	5	C105	50.6°C	70.8°C	6	T1	53.3°C	73.2°C	7	RTH1	50.3°C	71.3°C	8	C5	49.3°C	70.2°C	9	C47	55.4°C	75.6°C	10	D2	74.5°C	97.8°C	
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9	C47	55.4°C	75.6°C																																													
10	D2	74.5°C	97.8°C																																													
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 100 % LOAD Ta : 25°C	TEST : OK																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 295VAC/100VAC O/P : 100 % LOAD Ta= -35 °C	TEST : OK																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 50 °C NO DAMAGE	I/P : 295 VAC O/P : FULL LOAD Ta= 50 °C HUMIDITY= 95 %R.H	TEST : OK																																												
5	TEMPERATURE COEFFICIENT	± 0.03 %(0~50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.011 %(0~50°C)																																												
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°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																																												
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°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																																												



60W Single Output LED Power Supply

CEN-60 series

8	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°C	TEST : OK
9	CAPACITOR LIFE CYCLE	CEN-60-24: 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= 50.4 °C LIFE TIME	(1) 530904 HRS (2) 134530 HRS
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 523.4K HRS	
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure(Expected Life) : 30,000 hours @ Tcase 65°C; 50,000 hours @ Tcase 55°C	

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2010/1/21	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2010/3/1	PRODUCT SAMPLE W1002B53	PASS	SANFORD SU	VINCENT TSENG

2003/12/12 A50-F023