Test Report:PSC-160A

160W Single Output with Battery Charger (UPS Function)

■ DESIGN VERIFY TEST

Output Function Test
Input Function Test
Protection Function Test
Control 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： 150 mVp-p (Max)	I/P： 230VAC O/P：FULL LOAD Ta：25℃	V1： 95 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1： 12 V ~15 V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	11.66 V ~ 15.57 V/ 230 VAC 11.67 V ~ 15.57 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1： -1 %~ +1 % (Max)	I/P： 100 VAC / 264 VAC O/P：FULL/ MIN LOAD Ta：25℃	V1： -0.31 %~ 0.274 %	P
4	LINE REGULATION	V1：-0.5 %~+0.5 % (Max)	I/P：100 VAC ~ 264 VAC O/P：FULL LOAD Ta：25℃	V1： 0 %~ 0 %	P
5	LOAD REGULATION	V1：-0.5 %~+0.5 % (Max)	I/P： 230 VAC O/P：FULL ~MIN LOAD Ta：25℃	V1： -0.31 %~ 0.267 %	P
6	SET UP TIME	230VAC： 2000 ms (Max) 115VAC： 2000 ms (Max)	I/P： 230 VAC/115VAC O/P：FULL LOAD Ta：25℃	230VAC/ 949.795 ms 115VAC/ 1354.656 ms	P
7	RISE TIME	230VAC： 30 ms (Max) 115VAC： 30 ms (Max)	I/P： 230 VAC/115VAC O/P：FULL LOAD Ta：25℃	230VAC/ 7.412 ms 115VAC/ 7.407 ms	P
8	HOLD UP TIME	230VAC： 40 ms (Max) 115VAC： 40 ms (Max)	I/P： 230 VAC/115VAC O/P：FULL LOAD Ta：25℃	230VAC/ 44.998 ms 115VAC/ 44.569 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	TEST： <5 %	P
10	DYNAMIC LOAD	V1： 1380 mVp-p	I/P： 230 VAC (1).O/P：FULL /Min LOAD 90%DUTY/ 1KHZ (2).O/P：FULL /Min LOAD 90%DUTY/ 3KHZ (3).O/P：FULL /Min LOAD 90%DUTY/ 5KHZ (4).O/P：FULL /Min LOAD 50%DUTY/ 120HZ Ta：25℃	(1) 656 mVp-p (2) 498 mVp-p (3) 516 mVp-p (4) 735 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P：TESTING O/P：FULL LOAD Ta：25℃ I/P： LOW-LINE-3V= 87 V HIGH-LINE+15%=300 V O/P：FULL/MIN LOAD ON： 30 Sec . OFF： 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	83.062 V~264V TEST：OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P： 90 VAC ~ 264 VAC O/P：FULL~MIN LOAD Ta：25℃	TEST： OK	P
3	POWER FACTOR	0.95 / 230 VAC(TYP) 0.98 / 115 VAC(TYP)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	PF= 0.979 / 230 VAC PF= 0.997 / 115 VAC	P
4	EFFICIENCY	88 % (TYP)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	88.88 %	P
5	INPUT CURRENT	230V/ 1.5 A (TYP) 115V/ 2.5 A (TYP)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I = 0.792 A/ 230 VAC I = 1.598 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 70 A (TYP) 115V/ 35 A (TYP) COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 41.500 A/ 230VAC I = 27.734 A/115VAC	P
7	LEAKAGE CURRENT	< 1 mA / 240VAC	I/P： 240 VAC O/P：Min LOAD Ta：25℃	L-FG： 0.309 mA N-FG： 0.309 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 % ~150 %	I/P： 230 VAC I/P： 115 VAC O/P：TESTING Ta：25℃	127.2 %/230VAC 127.1 %/115VAC Hiccup Mode	P
2	OVER VOLTAGE PROTECTION	CH1： 14.49 V ~ 18.63 V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	17.15 V/230VAC 17.12 V/ 115 VAC Shut down Re- power ON	P
3	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P： 264 VAC O/P：FULL LOAD Ta：25℃	NO DAMAGE Hiccup Mode	P

CONTROL FUNCTION TEST

1	AC OK	Relay contack output ON :AC OK; OFF:AC Fail 30V/1A	I/P: 230 VAC O/P:FULL LOAD	0K	P
2	BATTERY LOW	Battery low voltage：<11V CUT OFF 9.5~10.5V	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	Battery low： 10.9 V CUT OFF： 10.1 V	P

COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated：650V 13.8A	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2) Output Short (3)Full load continue (4) Dynamic Load 90%Duty/1KHz (5) Dynamic Load 50%Duty/120Hz Ta：25℃	(1) 636 V (2) 508 V (3) 620 V (4) 620 V (5) 624 V	P
2	Diode Peak Voltage	Q101 Rated：75V 80A	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2)Output Short (3)Full load continue (4)NO LOAD TURN ON (5) Dynamic Load 90%Duty/1KHz (6) Dynamic Load 50%Duty/120Hz Ta：25℃	(1) 63.5 V (2) 88.5 V (3) 62.5 V (4) 64.5 V (5) 65,.5 V (6) 67.5 V	P
3	Input Capacitor Voltage	C 5 Rated：120u /400V/105℃	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta：25℃	(1) 398 V (2) 387 V (3) 400 V	P
4	Control IC Voltage Test	U 1 Rated： 28V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta：25℃	(1) 17.1 V (2) 11.9 V (3) 12.9 V	P
5	CLAMP DIODE Peak Voltage	D2 Rated：800 V 3A	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2)Dynamic Load 90%Duty /3KHz Ta：25℃	(1) 536 V (2) 545 V	P
6	Power Transistor **(D to S) or (C to E) Peak Voltage**	Q2 Rated：600V 20A	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2) Output Short (3)Full load continue (4)NO LOAD TURN ON Ta：25℃	(1) 424 V (2) 396 V (3) 400 V (4) 432 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 KVAC/min I/P-FG : 2.0KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 3.6 KVAC/min I/P-FG : 2.4 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25℃	I/P-O/P : 1.096 mA I/P-FG : 2.603 mA O/P-FG : 0.168 mA NO DAMAGE	P
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℃/70%RH	I/P-O/P : 9999 MΩ I/P-FG : 9999 MΩ O/P-FG : 9999 MΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 Mω	40 A / 2min Ta : 25℃ / 70%RH	5 mΩ	P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS B	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25℃	PASS	P
2	CONDUCTION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25℃	PASS Test by certified Lab	P
3	RADIATION	EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL LOAD Ta : 25℃	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℃	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℃	CRITERIA A	P
6	SURGE	IEC61000-4-5 LIGHT INDUSTRY L-N : 1KV L,N-PE : 2KV	I/P : 230 VAC/50HZ O/P : FULL LOAD Ta : 25℃	CRITERIA A	P
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： PSC-160A PSC-160A-C
1. ROOM AMBIENT BURN-IN：1 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 25℃
2. HIGH AMBIENT BURN-IN： 1HRS
I/P： 230VAC O/P： FULL LOAD Ta= 40 ℃
PSC-160A
<table>
<tr><th>NO</th><th>Position</th><th>ROOM AMBIENT
Ta=14.0℃</th><th>HIGH AMBIENT
Ta=40.4℃</th></tr>
<tr><td>1</td><td>LF2</td><td>51.7℃</td><td>74.3℃</td></tr>
<tr><td>2</td><td>LF1</td><td>32.3℃</td><td>55.7℃</td></tr>
<tr><td>3</td><td>BD1</td><td>57.5℃</td><td>82.1℃</td></tr>
<tr><td>4</td><td>C5</td><td>48.6℃</td><td>72.4℃</td></tr>
<tr><td>5</td><td>D1</td><td>58.2℃</td><td>82.5℃</td></tr>
<tr><td>6</td><td>Q2</td><td>61.3℃</td><td>87.0℃</td></tr>
<tr><td>7</td><td>Q1</td><td>66.5℃</td><td>92.3℃</td></tr>
<tr><td>8</td><td>D2</td><td>50.5℃</td><td>84.5℃</td></tr>
<tr><td>9</td><td>L1</td><td>50.9℃</td><td>74.7℃</td></tr>
<tr><td>10</td><td>L2</td><td>57.3℃</td><td>80.5℃</td></tr>
<tr><td>11</td><td>T1coil</td><td>78.2℃</td><td>106.1℃</td></tr>
<tr><td>12</td><td>T1core</td><td>76.8℃</td><td>101.6℃</td></tr>
<tr><td>13</td><td>Q101</td><td>56.4℃</td><td>85.7℃</td></tr>
<tr><td>14</td><td>Q102</td><td>63.8℃</td><td>91.0℃</td></tr>
<tr><td>15</td><td>C8</td><td>62.1℃</td><td>88.1℃</td></tr>
<tr><td>16</td><td>C101</td><td>68.1℃</td><td>93.6℃</td></tr>
<tr><td>17</td><td>C112</td><td>56.3℃</td><td>81.2℃</td></tr>
<tr><td>18</td><td>RY1</td><td>46.8℃</td><td>72.0℃</td></tr>
<tr><td>19</td><td>RY2</td><td>38.9℃</td><td>64.1℃</td></tr>
<tr><td>20</td><td>D4</td><td>47.0℃</td><td>71.2℃</td></tr>
<tr><td>21</td><td>U1</td><td>54.9℃</td><td>80.2℃</td></tr>
<tr><td>22</td><td>U2</td><td>57.8℃</td><td>82.0℃</td></tr>
<tr><td>23</td><td>U101</td><td>58.7℃</td><td>90.8℃</td></tr>
<tr><td>24</td><td>C201</td><td>53.4℃</td><td>82.1℃</td></tr>
</table>
PSC-160A-C</td><td>P</td></tr>
</table>

NO	Position	ROOM AMBIENT Ta=15.1℃	HIGH AMBIENT Ta=40.7℃
1	D4	50.6℃	73.6℃
2	U1	57.3℃	80.2℃
3	U2	54.2℃	73.2℃
4	U220	53.6℃	73.6℃
5	LF2	51.6℃	76.1℃
6	BD1	53.7℃	76.9℃
7	L1	55.1℃	78.0℃
8	C5	48.9℃	71.7℃
9	D1	51.5℃	74.6℃
10	Q2	56.0℃	79.7℃
11	Q1	69.6℃	94.2℃
12	D2	82.8℃	106.3℃
13	L2	62.4℃	86.2℃
14	T1	93.0℃	111.6℃
15	Q101	82.4℃	106.0℃
16	Q102	75.2℃	101.1℃
17	C101	81.4℃	98.4℃
18	C201	53.3℃	80.2℃
19	C8	64.9℃	87.7℃
20	C112	55.3℃	81.6℃
21	RY1	59.9℃	87.6℃
22	RY2	48.8℃	73.8℃
23	RY3	42.6℃	67.2℃
24	C55	50.9℃	77.1℃
25	C42	42.2℃	67.9℃
26	R5	85.9℃	108.2℃

2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 130 % LOAD Ta : 25℃	TEST : OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -20 ℃	TEST : OK	P
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45℃ NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta= 45 ℃ HUMIDITY= 95 %R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	± 0.03 %/℃ (0~45℃)	I/P : 230 VAC O/P : FULL LOAD	± 0.003 %/℃ (0~45℃)	P
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -20℃~ +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

7	THERMAL SHOCK TEST	1. Thermal shock Temperature： -20℃~ +70℃ 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
8	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	P
9	CAPACITOR LIFE CYCLE	PSC-160A SUPPOSE C101 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= 45 ℃ LIFE TIME (3) I/P： 230VAC O/P：75% LOAD Ta= 45℃ LIFE TIME (4) I/P： 230VAC O/P：50% LOAD Ta= 45 ℃ LIFE TIME PSC-160A-C SUPPOSE C101 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) 54842HRS (2) 14576HRS (3) 39902HRS (4) 84905HRS (1) 23504HRS (2) 13209HRS (3) 26875HRS (4) 71422HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE： 257 KHRS		P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50℃		P

SAMPLE	TESTER	APPROVAL
PRODUCT SAMPLE	FRANK	WANGDZ

2007/3/20 A50-S014