Test Report: PB-230-48

230W Single Battery Charger

■ 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	BOOST CHARGE VOLTAGE	57.6V	I/P： 230 VAC I/P： 115 VAC O/P：90% LOAD Ta：25℃	57.29 V /230V 57.29 V /115V	P
21	DC VOLTAGE (Typ.)	54.4V	I/P： 230 VAC I/P： 115 VAC O/P：NO LOAD Ta：25℃	54.87 V /230V 54.64 V /115V	P
3	OUTPUTCURRENT	4 A	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	4.08 A /230V 4.08 A /115V	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℃	79 V~264V	P
			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)	TEST： OK	
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= 0.977 / 230 VAC PF= 0.996 / 115 VAC	P
4	EFFICIENCY	86.5 % (TYP)	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	86.84 %	P
5	INPUT CURRENT	230V/ 1.5 A (TYP) 115V/ 3 A (TYP)	I/P： 230 VAC I/P： 115 VAC O/P：FULL LOAD Ta：25℃	I = 1.18 A/ 230 VAC I = 2.41 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 50 A (TYP) COLD START	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	I = 31 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 3.5 mA / 240 VAC	I/P： 264 VAC O/P：Min LOAD Ta：25℃	L-FG： 1.1 mA N-FG： 0.4 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	90 %~ 110 %	I/P： 230 VAC I/P： 115 VAC O/P：TESTING Ta：25℃	103 %/ 230 VAC 103 %/ 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1： 59 V~ 64 V	I/P： 230 VAC I/P： 115 VAC O/P：MIN LOAD Ta：25℃	63.4 V/ 230 VAC 63.4 V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	Automatically derate charge current until zero	I/P: 230 VAC O/P: FULL LOAD	O.T.P. Active Automatically derate charge current until zero	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P： 264 VAC O/P：FULL LOAD Ta：25℃	NO DAMAGE Constant Current Limiting	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	FAN ON/OFF CONTROL	RTH3 > 50 ℃ FAN ON < 45 ℃ FAN OFF	I/P： 230 VAC O/P：FULL LOAD	>49.8 ℃ FAN ON <43.5 ℃ FAN OFF	P
2	REMOTE CONTROL	OPEN： POWER ON SHORT：POWER OFF	I/P： 230 VAC O/P：FULL LOAD Ta：25℃	OPEN： POWER ON SHORT： POWER OFF	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： STP7N95K3 7A/950V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2) Output Short (3)Fulll load continue Ta：25℃	(1) 780 V (2) 804 V (3) 752 V	P
2	Diode Peak Voltage	D101 Rated： STTH2003CT 20A/300V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2)Output Short (3)Fulll load continue Ta：25℃	(1) 196 V (2) 168 V (3) 142 V	P
3	Input Capacitor Voltage	C 5 Rated： 150u/400V 105℃ HU5 V peak=450V	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) 383.3 V (2) 383.8 V (3) 383.8 V	P
4	Control IC Voltage Test	U 1 Rated： FAN4800IN 13.26V~20V	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) 13.819 V (2) 13.808 V (3) 13.779 V	P
5	P.F.C Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated： IRFB20N50K 20A/500V	I/P：High-Line +3V = 267 V O/P： (1)Full Load Turn on (2) Output Short (3)Fulll load continue Ta：25℃	(1) 422 V (2) 398 V (3) 418 V	P

■ SAFETY & E.M.C. TEST

SAFETY TEST

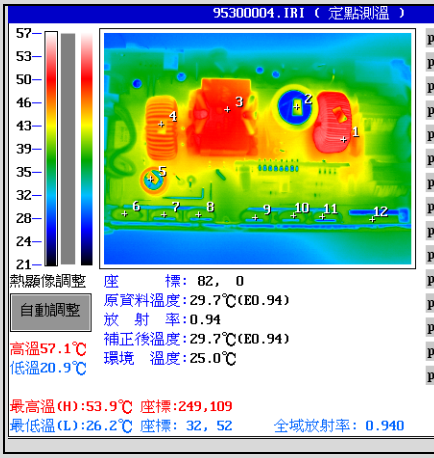
NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P: 3 KVAC/min I/P-FG: 1.5 KVAC/min O/P-FG: 0.5 KVAC/min	I/P-O/P: 3.6 KVAC/min I/P-FG: 1.8 KVAC/min O/P-FG: 0.6 KVAC/min Ta:25℃	I/P-O/P: 4.80 mA I/P-FG: 3.01 mA O/P-FG: 3.69 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P:500VDC>100MΩ 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℃	I/P-O/P: 14.5 GΩ I/P-FG: 12 GΩ O/P-FG: 17.4 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25℃	26mΩ	P
4	APPROVAL	TUV: Certificate NO ：S50180926 UL: File NO ：			P

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A CLASS D	I/P：220 /230/240VAC/50HZ O/P：100/75/50/25% 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：BAT 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: BAT LOAD Ta:25℃	CRITERIA A	P
5	E.F.T	EN61000-4-4 LIGHT INDUSTRY INPUT: 1KV	I/P: 230 VAC/50HZ O/P: BAT 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: BAT 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>THERMO TRACER TEST
Before potted
(ROOM AMBIENT)</td><td colspan="2">MODEL:PB-230-24 TEST CONDITION: 110 VAC FULL LOAD ROOM AMBIENT = 25 ℃
 

<table>
<tr><th></th><th>Position</th><th>Temp</th><th>VERDICT</th></tr>
<tr><td>P1</td><td>L1</td><td>52.2</td><td>PASS</td></tr>
<tr><td>P2</td><td>C5</td><td>42.1</td><td>PASS</td></tr>
<tr><td>P3</td><td>T1</td><td>49.4</td><td>PASS</td></tr>
<tr><td>P4</td><td>L101</td><td>45.7</td><td>PASS</td></tr>
<tr><td>P5</td><td>C105</td><td>45.2</td><td>PASS</td></tr>
<tr><td>P6</td><td>D112</td><td>38.6</td><td>PASS</td></tr>
<tr><td>P7</td><td>D102</td><td>39.3</td><td>PASS</td></tr>
<tr><td>P8</td><td>D101</td><td>38.9</td><td>PASS</td></tr>
<tr><td>P9</td><td>Q2</td><td>38.3</td><td>PASS</td></tr>
<tr><td>P10</td><td>D2</td><td>37.9</td><td>PASS</td></tr>
<tr><td>P11</td><td>Q1</td><td>38.6</td><td>PASS</td></tr>
<tr><td>P12</td><td>BD1</td><td>37.7</td><td>PASS</td></tr>
<tr><td>P13</td><td></td><td></td><td></td></tr>
<tr><td>P14</td><td></td><td></td><td></td></tr>
<tr><td>P15</td><td></td><td></td><td></td></tr>
</table></td><td>P</td></tr>
<tr><td>2</td><td>TEMPERATURE RISE TEST</td><td colspan="2">MODEL：PB-230-12
1. ROOM AMBIENT BURN-IN：1 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 32 ℃
2. HIGH AMBIENT BURN-IN： 3 HRS
I/P： 230VAC O/P： FULL LOAD Ta= 54.9 ℃
<table>
<tr><th>NO</th><th>Position</th><th>P/N</th><th>ROOM AMBIENT
Ta= 32 ℃</th><th>HIGH AMBIENT
Ta= 54.9 ℃</th></tr>
<tr><td>1</td><td>C1</td><td>C/X2 824/275VAC 20%</td><td>35.3℃</td><td>58.4℃</td></tr>
<tr><td>2</td><td>LF1</td><td>LF103</td><td>36.6℃</td><td>58.7℃</td></tr>
<tr><td>3</td><td>C2</td><td>C/X2 474/275VAC 20%</td><td>36.0℃</td><td>59.6℃</td></tr>
<tr><td>4</td><td>BD1</td><td>6A/800V GLASS KBJ608G</td><td>40.7℃</td><td>63.7℃</td></tr>
<tr><td>5</td><td>L1</td><td>TR943</td><td>63.9℃</td><td>86.7℃</td></tr>
<tr><td>6</td><td>D5</td><td>3A/600V 1N5406</td><td>51.7℃</td><td>75.1℃</td></tr>
<tr><td>7</td><td>D2</td><td>STTH8S06D 8A/600V</td><td>48.8℃</td><td>71.5℃</td></tr>
<tr><td>8</td><td>Q1</td><td>IRFB20N50K 20A/500V</td><td>52.0℃</td><td>80.1℃</td></tr>
<tr><td>9</td><td>C5</td><td>150u/400V 105℃ 22*35 HU5</td><td>46.6℃</td><td>68.9℃</td></tr>
<tr><td>10</td><td>D3</td><td>BYV26EGP 1A/1KV</td><td>57.0℃</td><td>79.5℃</td></tr>
<tr><td>11</td><td>D112</td><td>STPS30L30CT 30A/30V</td><td>66.7℃</td><td>87.5℃</td></tr>
<tr><td>12</td><td>C40</td><td>10u/50V L5Kh 5*11 YXF</td><td>44.8℃</td><td>69.1℃</td></tr>
<tr><td>13</td><td>C68</td><td>47u/25V L5Kh 5*11 KY</td><td>40.3℃</td><td>64.3℃</td></tr>
<tr><td>14</td><td>Q2</td><td>STP7N95K3 7A/950V</td><td>61.8℃</td><td>85.5℃</td></tr>
<tr><td>15</td><td>U1</td><td>PWM FAN4800IN</td><td>43.6℃</td><td>66.9℃</td></tr>
<tr><td>16</td><td>C57</td><td>0.47u/50V L5Kh 5*11 KY</td><td>46.5℃</td><td>69.2℃</td></tr>
<tr><td>17</td><td>C53</td><td>47u/25V L5Kh 5*11 KY</td><td>37.9℃</td><td>61.8℃</td></tr>
<tr><td>18</td><td>T1</td><td>TF2024</td><td>61.1℃</td><td>82.7℃</td></tr>
<tr><td>19</td><td>C200</td><td>220u/50V UL7Kh 10*16 KY</td><td>47.4℃</td><td>69.8℃</td></tr>
<tr><td>20</td><td>C105</td><td>1000u/25V UL10Kh 10*23 ZLH</td><td>51.1℃</td><td>74.6℃</td></tr>
<tr><td>21</td><td>D101</td><td>FMEN-2308 30A/80V</td><td>60.1℃</td><td>80.8℃</td></tr>
<tr><td>22</td><td>C111</td><td>220u/25V UL7Kh 8*11.5 KY</td><td>48.3℃</td><td>70.8℃</td></tr>
<tr><td>23</td><td>RTH2</td><td>5KΩ TTC3A502F39HEY 1%</td><td>61.5℃</td><td>84.6℃</td></tr>
<tr><td>24</td><td>L110</td><td>CM5441Z161B-10</td><td>61.8℃</td><td>84.4℃</td></tr>
<tr><td>25</td><td>RTH3</td><td>5KΩ TTC3A502F39HEY 1%</td><td>51.1℃</td><td>75.1℃</td></tr>
</table></td><td>P</td></tr>
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3	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 40 ℃ NO DAMAGE	I/P： 272 VAC O/P：BAT+LOAD Ta= 40 ℃ HUMIDITY= 95 %R.H	TEST：OK	P
4	TEMPERATURE COEFFICIENT	± 0.03 %(0~50℃)	I/P： 230 VAC O/P：FULL LOAD	± 0.01 %(0~50℃)	P
5	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P： 264VAC/100VAC O/P： CV=13V Ta= -20 ℃	TEST：OK	P
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature： -45℃~ +90℃ 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： -25℃~ +45℃ 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	PB-230-12: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= 40 ℃ LIFE TIME		(1) 754769.6HRS (2) 255948HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE： 244.5K HRS			P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/11/27	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/12/17	PRODUCT SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2010/2/12	PRODUCT SAMPLE W1001D61	PASS	SANFORD SU	VINCENT TSENG

2009/08/04 A50-F023