



Test Report: ADD-155A

155W 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) V2 : 100 mVp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 85 mVp-p (Max) V2 : 42 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 12V ~ 14.5 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	11.46 V ~ 16.32 V / 230 VAC 11.47 V ~ 16.33 V / 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : -2 %~ +2 % (Max) V2 : -3 %~ +3 % (Max)	I/P : 100VAC / 264 VAC O/P : FULL/ MIN LOAD Ta : 25°C	V1 : -0.043 %~ 0.18 % V2 : -0.51 % 1.4 %	P
4	LINE REGULATION	V1 : -1 %~ +1 % (Max) V2 : -0.5 %~ +0.5 % (Max)	I/P : 88VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0 % V2 : 0 % 0.122 %	P
5	LOAD REGULATION	V1 : -1 %~ +1 % (Max) V2 : -2 %~ +2 % (Max)	I/P : 230 VAC O/P : FULL ~MIN LOAD Ta : 25°C	V1 : -0.043 %~ 0.043 % V2 : -0.51 % 1.26 %	P
6	CROSS REGULATION	V1 : -1 %~ +1 % (Max) V2 : -2 %~ +2 % (Max)	I/P : 230 VAC O/P : Testing O/P 60%LOAD Other O/P 40%LOAD Change Ta : 25°C	V1 : 0.043 %~ 0.043 % V2 : 0 % 0 %	P
7	SET UP TIME	230VAC : 1000 ms (Max) 115VAC : 2000 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 465.045 ms 115VAC/ 1463.727 ms	P
8	RISE TIME	230VAC : 90 ms (Max) 115VAC : 90 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 7.879 ms 115VAC/ 8.696 ms	P
9	HOLD UP TIME	230VAC : 24 ms (TYP) 115VAC : 20 ms (TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 34.153 ms 115VAC/ 34.501 ms	P
10	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
11	DYNAMIC LOAD	V1 : 1380 mVp-p V2 : 1000 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°C	(1) V1: 556 / V2: 398 mVp-p (2) V1: 512 / V2: 356 mVp-p (3) V1: 378 / V2: 354 mVp-p (4) V1: 695 / V2: 365 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	88VAC~264 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-3V= 85 V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	54.781 V~264V TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 100VAC ~ 264 VAC O/P : FULL ~MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.92 / 230 VAC(TYP) 0.92 / 115 VAC(TYP)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	PF= 0.971 / 230 VAC PF= 0.982 / 115 VAC	P
4	EFFICIENCY	78 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	81.5 %	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°C	I = 0.84 A/ 230 VAC I = 1.72 A/ 115 VAC	P
6	INRUSH CURRENT	230V/ 45 A (TYP) 115V/ 20 A (TYP) COLD START	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	I = 43.57 A/ 230 VAC I = 17.66 A/ 115 VAC	P
7	LEAKAGE CURRENT	< 1 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.52 mA N-FG : 0.52 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %~ 135 %	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	114.9 %/ 230 VAC 114.5 %/ 115 VAC ■ Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 15.87V~18.63V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	17.67 V/ 230 VAC 17.66 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°C	NO DAMAGE ■ Constant Current Limiting	P

CONTROL FUNCTION TEST

1	BATTERY LOW	Battery low voltage: 10V ±0.8	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	Battery low : 10.1 V	P
2	REST FUNCTION	Battery voltage:12V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	OK	P

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 : 900V 7 A	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 Ta : 25°C	(1) 816/1.76 V/A (2) 760/2.22 V/A (3) 812/1.76 V/A (4) 836/2.5 V/A	P
2	Diode Peak Voltage	D40 Rated : 200 V 20 A	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 65.8 V (2) 60.5 V (3) 64.5 V	P
3	Clamp Diode Peak Voltage	D1 Rated : 1000 V 1 A	I/P : High-Line +3V = 267 V O/P : (1) Dynamic Load 90%Duty/1KHz (2)Full load continue Ta : 25°C	(1) 745 V (2) 816 V	P
4	Input Capacitor Voltage	C5 Rated : 150 u / 400V/85°C SURGE Voltage:450V	I/P : High-Line +3V = 267 V O/P : (1)Full Load Turn on /Off	(1) 386 V (2) 424 V	P

			(2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(3) 404 V	
5	Control IC Voltage Test	U1 Rated : 30 V	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°C	(1) 17.4 V (2) 18.2 V (3) 18.0 V	P
6	Power Transistor (D to S) or (C to E) Peak Voltage	Q1 Rated : 600 V	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°C	(1) 404 V (2) 396 V (3) 404 V (4) 424 V	P

■ AFETY & 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°C	I/P-O/P : 2.22 mA I/P-FG : 2.26 mA O/P-FG : 2.98 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°C /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°C / 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°C	PASS	P
2	CONDUCTION	■EN55022 CLASS B	I/P : 230 VAC (50HZ) O/P : FULL/50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	■EN55022 CLASS B	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 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°C	CRITERIA A	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 : ADD-155A 1. ROOM AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 16.1°C 2. HIGH AMBIENT BURN-IN : 1 HRS I/P : 230VAC O/P : FULL LOAD Ta= 49.2°C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>ROOM AMBIENT Ta= 16.1 °C</th> <th>HIGH AMBIENT Ta= 49.2°C</th> </tr> </thead> <tbody> <tr><td>1</td><td>U1</td><td>61.7°C</td><td>91.9°C</td></tr> <tr><td>2</td><td>U100</td><td>56.7°C</td><td>86.9°C</td></tr> <tr><td>3</td><td>LF1</td><td>37.9°C</td><td>70.2°C</td></tr> <tr><td>4</td><td>BD1</td><td>62.7°C</td><td>94.2°C</td></tr> <tr><td>5</td><td>L1</td><td>73.6°C</td><td>106.8°C</td></tr> <tr><td>6</td><td>D2</td><td>63.7°C</td><td>95.1°C</td></tr> <tr><td>7</td><td>D3</td><td>57.3°C</td><td>88.2°C</td></tr> <tr><td>8</td><td>C5</td><td>49.2°C</td><td>81.4°C</td></tr> <tr><td>9</td><td>Q1</td><td>45.0°C</td><td>76.1°C</td></tr> <tr><td>10</td><td>Q2</td><td>52.1°C</td><td>82.8°C</td></tr> <tr><td>11</td><td>T1coil</td><td>72.6°C</td><td>103.6°C</td></tr> <tr><td>12</td><td>U200</td><td>72.2°C</td><td>102.7°C</td></tr> <tr><td>13</td><td>D40</td><td>78.7°C</td><td>108.6°C</td></tr> <tr><td>14</td><td>L100</td><td>70.2°C</td><td>102.5°C</td></tr> <tr><td>15</td><td>Q300</td><td>49.5°C</td><td>80.0°C</td></tr> <tr><td>16</td><td>D201</td><td>54.6°C</td><td>85.4°C</td></tr> <tr><td>17</td><td>L201</td><td>53.1°C</td><td>85.8°C</td></tr> <tr><td>18</td><td>C201</td><td>35.0°C</td><td>67.1°C</td></tr> <tr><td>19</td><td>C102</td><td>58.9°C</td><td>91.5°C</td></tr> <tr><td>20</td><td>J106</td><td>53.8°C</td><td>87.1°C</td></tr> </tbody> </table>	NO	Position	ROOM AMBIENT Ta= 16.1 °C	HIGH AMBIENT Ta= 49.2°C	1	U1	61.7°C	91.9°C	2	U100	56.7°C	86.9°C	3	LF1	37.9°C	70.2°C	4	BD1	62.7°C	94.2°C	5	L1	73.6°C	106.8°C	6	D2	63.7°C	95.1°C	7	D3	57.3°C	88.2°C	8	C5	49.2°C	81.4°C	9	Q1	45.0°C	76.1°C	10	Q2	52.1°C	82.8°C	11	T1coil	72.6°C	103.6°C	12	U200	72.2°C	102.7°C	13	D40	78.7°C	108.6°C	14	L100	70.2°C	102.5°C	15	Q300	49.5°C	80.0°C	16	D201	54.6°C	85.4°C	17	L201	53.1°C	85.8°C	18	C201	35.0°C	67.1°C	19	C102	58.9°C	91.5°C	20	J106	53.8°C	87.1°C		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : 120% LOAD Ta : 25°C	TEST : OK	P																																																																																				
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 264VAC/100VAC O/P : 100 % LOAD Ta= -10°C	TEST : OK	P																																																																																				
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL50°C NO DAMAGE	I/P : 272 VAC O/P : FULL LOAD Ta=50°C HUMIDITY= 95 %R.H	TEST : OK	P																																																																																				



155W Single Output With Battery Charger (UPS Function)

ADD-155 series

5	TEMPERATURE COEFFICIENT	$\pm 0.03\%/^{\circ}\text{C}$ (0~50 $^{\circ}\text{C}$)	I/P : 230 VAC O/P : FULL LOAD	$\pm 0.01\%/^{\circ}\text{C}$ (0~50 $^{\circ}\text{C}$)	P
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45 $^{\circ}\text{C}$ ~ +90 $^{\circ}\text{C}$ 2. Temperature change rate : 25 $^{\circ}\text{C}$ / 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 : -10 $^{\circ}\text{C}$ ~ +60 $^{\circ}\text{C}$ 2. Temperature change rate : 25 $^{\circ}\text{C}$ / 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	P
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 : 60min in each axis (X.Y.Z) (6) Ta : 25 $^{\circ}\text{C}$		TEST : OK	P
9	CAPACITOR LIFE CYCLE	SUPPOSE C102 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta=25 $^{\circ}\text{C}$ LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta=50 $^{\circ}\text{C}$ LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta=50 $^{\circ}\text{C}$ LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta=50 $^{\circ}\text{C}$ LIFE TIME		(1) 122310HRS (2) 22364HRS (3) 40924HRS (4) 67372HRS	P
10	MTBF	MIL-HDBK-217F NOTICE S2 PARTS COUNT TOTAL FAILURE RATE : 202.3K HRS			P
11	DMTBF/Accelerated Life Test	Demonstration Mean Time Between Failure (Expected Life): Above 50,000 hours @ TA 50 $^{\circ}\text{C}$			P

2007/3/20 A50-S014

SAMPLE	TEST RESULT	TESTER	APPROVAL
PRODUCT SAMPLE	PASS	SHENYM	WANGDZ