



# Test Report:PSC-160B

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160W Single 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 : 240 mVp-p (Max )	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 75 mVp-p (Max )	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 24 V ~29 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	22.99 V ~ 29.92 V/ 230 VAC 22.98 V ~ 29.93 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : -1 %~ +1 % (Max)	I/P : 100 VAC / 264 VAC O/P : FULL/ MN LOAD Ta : 25°C	V1 : -0.09 %~ 0.112 %	P
4	LINE REGULATION	V1 : -0.5 %~ +0.5 % (Max)	I/P : 100 VAC ~ 264 VAC O/P : FULL LOAD Ta : 25°C	V1 : 0 %~ 0 %	P
5	LOAD REGULATION	V1 : -0.5 %~ +0.5 % (Max)	I/P : 230 VAC O/P : FULL ~MN LOAD Ta : 25°C	V1 : -0.112 %~ 0.112 %	P
6	SET UP TIME	230VAC : 2000 ms (Max) 115VAC : 2000 ms (Max)	I/P : 230 VAC/115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 1031.439 ms 115VAC/ 1424.525 ms	P
7	RISE TIME	230VAC : 30 ms (Max) 115VAC : 30 ms (Max)	I/P : 230 VAC/115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 17.619 ms 115VAC/ 17.858 ms	P
8	HOLD UPTIME	230VAC : 40 ms (Max) 115VAC : 40 ms (Max)	I/P : 230 VAC/115VAC O/P : FULL LOAD Ta : 25°C	230VAC/ 48.143 ms 115VAC/ 47.671 ms	P
9	OVER/UNDERSHOOT TEST	< ±5%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : <5 %	P
10	DYNAMIC LOAD	V1 : 2760 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) 356 mVp-p (2) 288 mVp-p (3) 255 mVp-p (4) 415 mVp-p	P

**INPUT FUNCTION TEST**

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90VAC~264 VAC	I/P : TESTNG O/P : FULL LOAD Ta : 25°C <hr/> 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 )	72.050 V~264V  TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 90 VAC ~ 264 VAC O/P : FULL~MN LOAD Ta : 25°C	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°C	PF= 0.979 / 230 VAC PF= 0.997 / 115 VAC	P
4	EFFICIENCY	90 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	91.1 %	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 = 0.775 A/ 230 VAC I = 1.568 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°C	I = 41.140 A/ 230VAC I = 23.765 A/115VAC	P
7	LEAKAGE CURRENT	< 1 mA / 240VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.756 mA N-FG : 0.756 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°C	132.2 %/230VAC 132.4 %/115VAC HiccupMode	P
2	OVER VOLTAGE PROTECTION	CH1 : 28.98 V ~ 37.26 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	30.92 V/230VAC 30.91 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 HiccupMode	P

**CONTROL FUNCTION TEST**

1	AC OK	Relay contact output ON :AC OK; OFF:AC Fail 30V/1A	I/P: 230 VAC O/P:FULL LOAD	OK	P
2	BATTERY LOW	Battery low voltage: <22V CUT OFF 19~21V	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	Battery low : 21.4 V CUT OFF : 19.8 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 15.5A	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°C	(1) 588 V (2) 464 V (3) 584 V (4) 588 V (5) 588 V	P
2	Diode Peak Voltage	Q102 Rated : 150V 50A	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°C	(1) 135 V (2) 139 V (3) 118 V (4) 123 V (5) 127 V (6) 126 V	P
3	Input Capacitor Voltage	C 5 Rated : 120u /400V/105°C	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) 397 V (2) 389 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°C	(1) 17.5 V (2) 15.9 V (3) 17.9 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°C	(1) 524 V (2) 544 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°C	(1) 436 V (2) 416 V (3) 416 V (4) 436 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°C	I/P-O/P : 2.968 mA I/P-FG : 3.006 mA O/P-FG : 1.945 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 CONTNUITY	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.FT	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 LN-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				



				NO	Position	ROOM AMBIENT Ta=15.1°C	HIGH AMBIENT Ta=40.7°C		
				1	D4	50.6°C	73.6°C		
				2	U1	57.3°C	80.2°C		
				3	U2	54.2°C	73.2°C		
				4	U220	53.6°C	73.6°C		
				5	LF2	51.6°C	76.1°C		
				6	BD1	53.7°C	76.9°C		
				7	L1	55.1°C	78.0°C		
				8	C5	48.9°C	71.7°C		
				9	D1	51.5°C	74.6°C		
				10	Q2	56.0°C	79.7°C		
				11	Q1	69.6°C	94.2°C		
				12	D2	82.8°C	106.3°C		
				13	L2	62.4°C	86.2°C		
				14	T1	93.0°C	111.6°C		
				15	Q101	82.4°C	106.0°C		
				16	Q102	75.2°C	101.1°C		
				17	C101	81.4°C	98.4°C		
				18	C201	53.3°C	80.2°C		
				19	C8	64.9°C	87.7°C		
				20	C112	55.3°C	81.6°C		
				21	RY1	59.9°C	87.6°C		
				22	RY2	48.8°C	73.8°C		
				23	RY3	42.6°C	67.2°C		
				24	C55	50.9°C	77.1°C		
				25	C42	42.2°C	67.9°C		
				26	R5	85.9°C	108.2°C		
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)		I/P : 230 VAC O/P : 130 % 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= -20 °C		TEST : OK		P	
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL 45°C NO DAMAGE		I/P : 272 VAC O/P : FULL LOAD Ta= 45 °C HUMIDITY= 95%R.H		TEST : OK		P	
5	TEMPERATURE COEFFICIENT	± 0.03 %/°C (0~45°C)		I/P : 230 VAC O/P : FULL LOAD		± 0.003 %/°C (0~45°C)		P	
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -20°C~ +85°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		P	



7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -20°C ~ +70°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	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°C	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 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 45 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 45°C LIFE TIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 45 °C LIFETIME PSC-160A-C SUPPOSE C101 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= 40 °C LIFE TIME (3) I/P : 230VAC O/P : 75% LOAD Ta= 40 °C LIFETIME (4) I/P : 230VAC O/P : 50% LOAD Ta= 40 °C LIFETIME	(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 °C		P

SAMPLE	TESTER	APPROVAL
PRODUCT SAMPLE	FRANK	WANGDZ

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