



Features

- Universal AC input / Full range
- Built in active PFC circuit compliance to EN61000-3-2
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Free air convection for 400W and 500W with 23.5CFM forced air
- High power density 6.2w/in³
- AC input active surge current limiting
- U-bracket low profile:41mm
- Current sharing(1+1) for 24V and 48V models (Optional)
- Built-in remote ON-OFF control
- Built-in remote sense function
- Built in DC OK active signal
- 3 years warranty

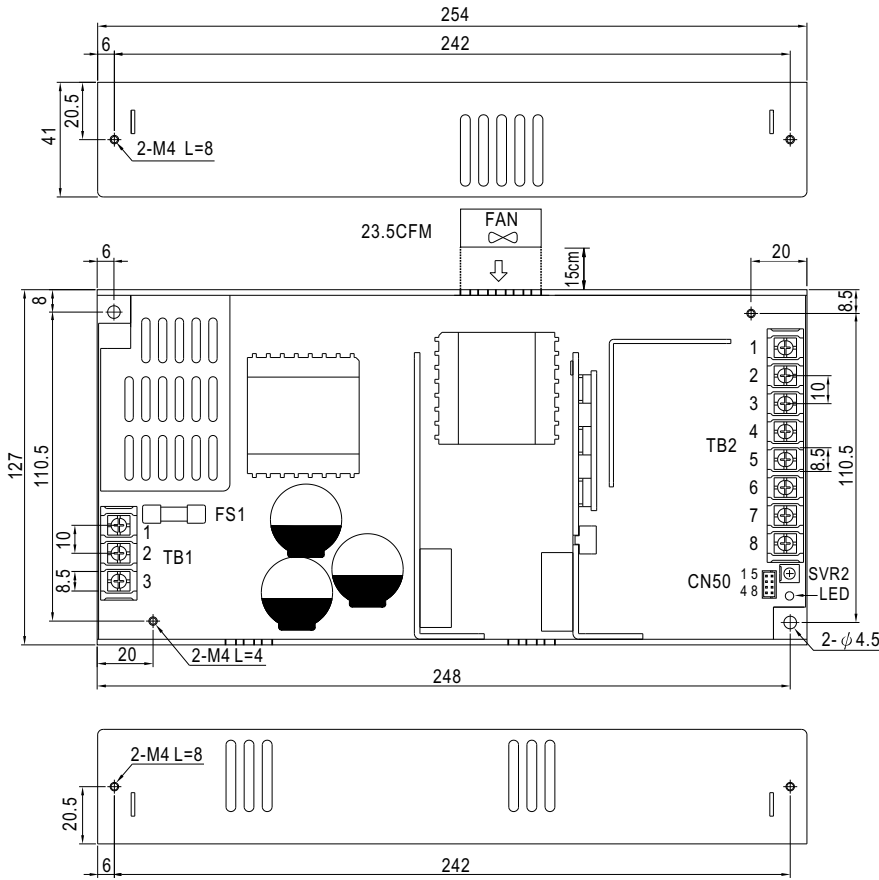


SPECIFICATION

MODEL	USP-500-5	USP-500-12	USP-500-15	USP-500-24	USP-500-48	
OUTPUT	DC VOLTAGE	5V	12V	15V	24V	48V
	RATED CURRENT	80A	42A	33.5A	21A	10.5A
	CURRENT RANGE (convection)	0 ~ 60A	0 ~ 33A	0 ~ 27A	0 ~ 17A	0 ~ 8.5A
	CURRENT RANGE (23.5CFM FAN)	0 ~ 80A	0 ~ 42A	0 ~ 33.5A	0 ~ 21A	0 ~ 10.5A
	RATED POWER (convection)	300W	396W	405W	408W	408W
	RATED POWER (23.5CFM FAN)	400W	504W	502.5W	504W	504W
	RIPPLE & NOISE (max.) Note.2	80mVp-p	100mVp-p	100mVp-p	150mVp-p	150mVp-p
	VOLTAGE ADJ. RANGE	4.5 ~ 5.5V	10.8 ~ 13.2V	13.5 ~ 16.5V	21.6 ~ 27V	43.2 ~ 52.8V
	VOLTAGE TOLERANCE Note.3	±2.0%	±2.0%	±2.0%	±2.0%	±2.0%
	LINE REGULATION	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%
	LOAD REGULATION	±2.0%	±1.0%	±1.0%	±1.0%	±1.0%
	SETUP, RISE TIME	1500ms, 80ms/230VAC 3100ms, 80ms/115VAC at full load				
HOLD UP TIME (Typ.)	20ms/230VAC 20ms/115VAC at full load					
INPUT	VOLTAGE RANGE Note.5	90 ~ 264VAC 127 ~ 370VDC				
	FREQUENCY RANGE	47 ~ 63Hz				
	POWER FACTOR (Typ.)	0.95/230VAC 0.98/115VAC at full load				
	EFFICIENCY (Typ.)	85%	90%	90%	89%	90%
	AC CURRENT (Typ.)	6A/115VAC	2.6A/230VAC			
	INRUSH CURRENT (Typ.)	30A/115VAC	50A/230VAC			
	LEAKAGE CURRENT	<2mA / 240VAC				
PROTECTION	OVERLOAD	105 ~ 130% rated output power Protection type : Constant current limiting, unit will shut down after 3 sec. ,re-power on to recover				
	OVER VOLTAGE	5.7 ~ 7V	13.5 ~ 16V	17 ~ 21V	27.8 ~ 32.4V	53 ~ 64.8V
	OVER TEMPERATURE	85°C±5°C (TSW1 : detect on heatsink of o/p diode)				
		95°C±5°C (5V), 100°C (12V, 15V, 24V, 48V) (TSW2 : detect on heatsink of power transistor) Protection type : Shut down o/p voltage with auto-recovery				
FUNCTION	REMOTE ON/OFF CONTROL	RC+/RC-: 0~0.8V power on ; 4~10V power off				
	DC-OK SIGNAL	PSU turn on : 3.3V ~ 5.6V ; PSU turn off: 0 ~ 1V				
ENVIRONMENT	WORKING TEMP.	-20 ~ +70°C (Refer to output load derating curve)				
	WORKING HUMIDITY	20 ~ 90% RH non-condensing				
	STORAGE TEMP., HUMIDITY	-40 ~ +85°C, 10 ~ 95% RH				
	TEMP. COEFFICIENT	±0.03%/°C (0 ~ 50°C)				
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes				
SAFETY & EMC (Note 4)	SAFETY STANDARDS	UL60950-1, TUV EN60950-1 approved				
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:1.5KVAC O/P-FG:0.5KVAC				
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms/500VDC 25°C 70%RH				
	EMI CONDUCTION & RADIATION	Compliance to EN55022 (CISPR22) Class B				
	HARMONIC CURRENT	Compliance to EN61000-3-2,-3				
OTHERS	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11, ENV50204, EN55024, EN61000-6-2, heavy industry level, criteria A				
	MTBF	129.8K hrs min. MIL-HDBK-217F (25°C)				
	DIMENSION	254*127*41mm (L*W*H)				
	PACKING	1.6Kg; 6pcs/10.6Kg/0.67CUFT				
NOTE	<p>1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C of ambient temperature.</p> <p>2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor.</p> <p>3. Tolerance : includes set up tolerance, line regulation and load regulation.</p> <p>4. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives.</p> <p>5. Derating may be needed under low input voltages. Please check the derating curve for more details.</p>					

Mechanical Specification

Case No. 963A-D Unit:mm



AC Input Terminal Pin No. Assignment

Pin No.	Assignment
1	AC/L
2	AC/N
3	FG \perp

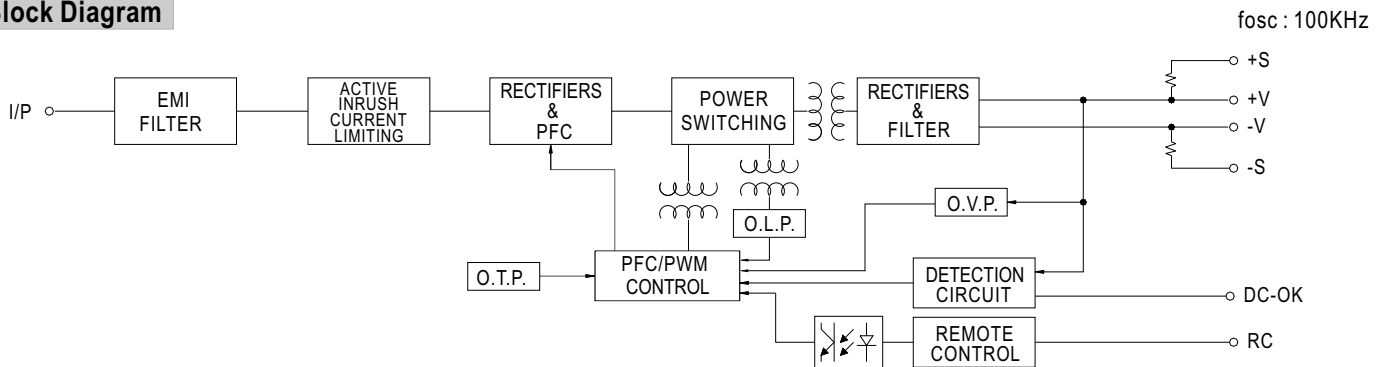
DC Output Terminal Pin No. Assignment

Pin No.	Assignment
1-4	DC OUTPUT -V
5-8	DC OUTPUT +V

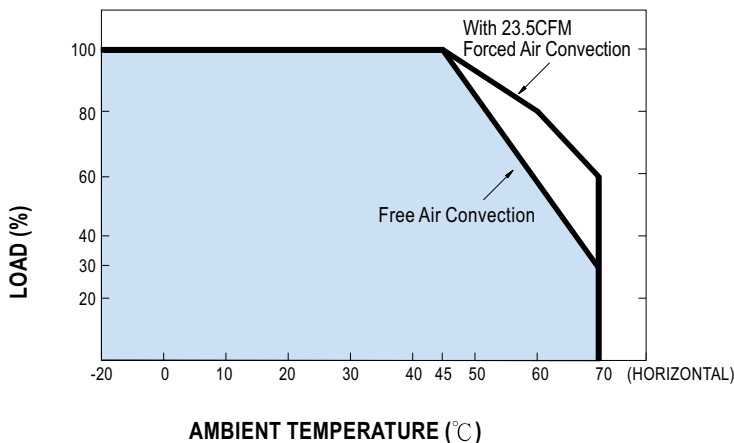
Connector pin number assignment (CN50) : JST B8B-PHDSS or equivalent

Pin No.	Assignment	Mating Housing	Terminal
1	+S	JST PHD-08VS or equivalent	JST SPHD-002T-P0.5 or equivalent
2	GND		
3	RC-		
4	CS(Optional)		
5	-S		
6	DC-OK		
7	RC+		
8	-S		

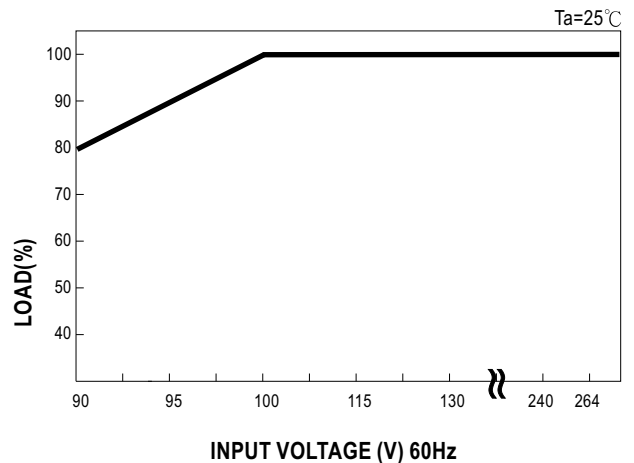
Block Diagram



Derating Curve



Static Characteristics



■ Function Description of CN50

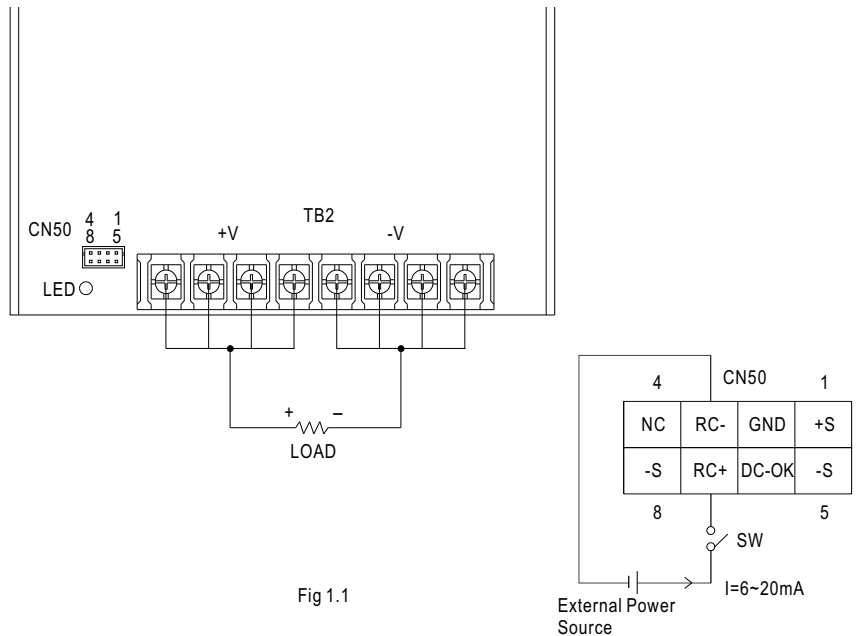
Pin No.	Function	Description
1	+S	Positive sensing. The +S signal should be connected to the positive terminal of the load. The +S and -S leads should be twisted in pair to minimize noise pick-up effect. The maximum line drop compensation is 0.5V.
2	GND	This pin connects to the negative terminal (-V). Return for DC_OK signal output.
3	RC-	Return for RC+ signal input.
4	CS (Optional)	Current sharing signal. When units are connected in parallel, the CS pins of the units should be connected to allow current balance between units.
5,8	-S	Negative sensing. The -S signal should be connected to the negative terminal of the load. The -S and +S leads should be twisted in pair to minimize noise pick-up effect. The maximum line drop compensation is 0.5V.
6	DC-OK	DC-OK signal is a TTL level signal, referenced to pin3(DC-OK GND). High when PSU turns on.
7	RC+	Turns the output on and off by electrical or dry contact between pin 7 (RC+) and pin 3 (RC-). 0~0.8V: Power ON, 4~10V: Power OFF.

■ Function Manual

1. Remote Control

The PSU can be turned ON/OFF by using the "Remote Control" function.

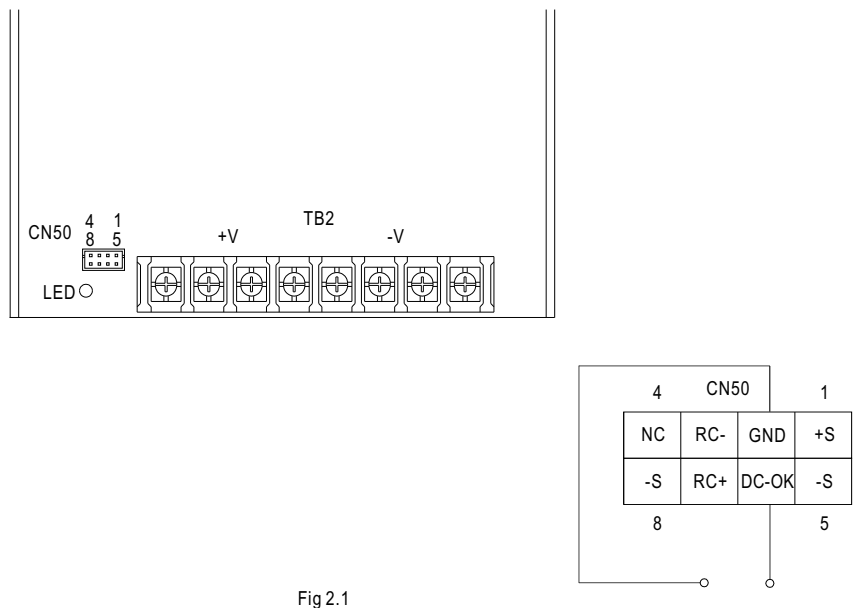
Between RC+(pin7) and RC-(pin3)	Output Status
SW OFF (0 ~ 0.8V)	ON
SW ON (4 ~ 10V)	OFF



2. DC-OK Signal

DC-OK signal is a TTL level signal. High when PSU turns on.

Between DC-OK(pin6) and GND(pin2)	Output Status
3.3 ~ 5.6V	ON
0 ~ 1V	OFF



3. Remote Sense

The remote sensing compensates voltage drop on the load wiring up to 0.5V.

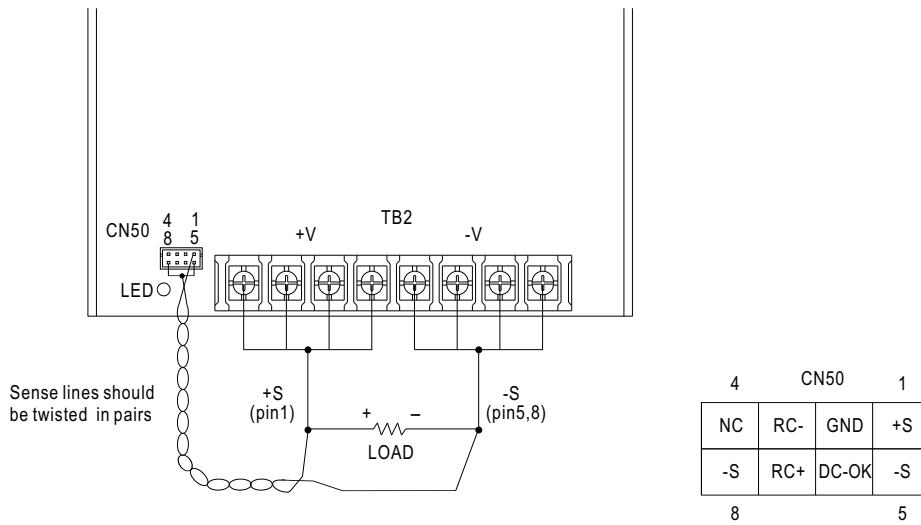


Fig 3.1

4. Current Sharing with Remote Sensing (Optional for 24V & 48V)

USP-500 has the built-in active current sharing function and can be connected in parallel to provide higher output power :

- (1) Parallel operation is available by connecting the units shown as below.
(+S,-S,CS and GND are connected mutually in parallel).
- (2) Difference of output voltages among parallel units should be less than 2%.
- (3) The total output current must not exceed the value determined by the following equation.
(output current at parallel operation)=(Rated current per unit)×(Number of unit)×0.9
- (4) In parallel operation 2 units is the maximum, please consult the manufacturer for applications of more connecting in parallel.
- (5) The power supplies should be paralleled using short and large diameter wiring and then connected to the load.

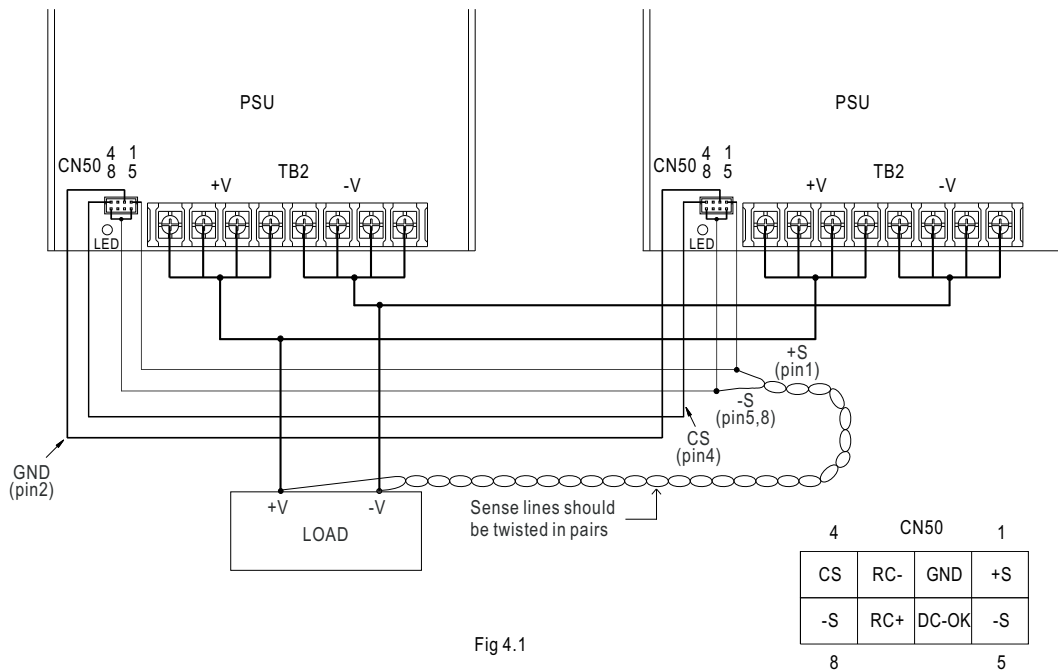


Fig 4.1

Note : 1. In parallel connection, maybe only one unit (master) operate if the total output load is less than 2% of rated load condition.
The other PSU (slave) may go into standby mode and its output LED and relay will not turn on.
2.2% min. of dummy load is required.

MODEL : USP-500-15

OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1: 100 mVp-p (Max)	I/P: 230VAC O/P:FULL LOAD Ta:25°C	V1: 16 mVp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1: 13.5V-16.5 V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	12.15 V- 17.04 V/ 230 VAC 12.15 V- 17.04 V/ 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1: 2 %- -2 % (Max)	I/P: 100 VAC / 264 VAC O/P:FULL/ MIN LOAD Ta:25°C	V1: 0.1 %- -0.1 %	P
4	LINE REGULATION	V1: 0.5 %- -0.5 % (Max)	I/P: 100 VAC ~ 264 VAC O/P:FULL LOAD Ta:25°C	V1: 0.04 %- -0.04 %	P
5	LOAD REGULATION	V1:1 %- -1 % (Max)	I/P: 230 VAC O/P:FULL ~MIN LOAD Ta:25°C	V1: 0.08 %- -0.08 %	P
6	SET UP TIME	230VAC: 1500 ms (Max) 115VAC 3100 ms (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 1062 ms 115VAC/ 2124 ms	P
7	RISE TIME	230VAC: 80 ms (Max) 115VAC 80 ms (Max)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 32 ms 115VAC/ 30 ms	P
8	HOLD UP TIME	230VAC: 20 ms (TYP) 115VAC 20 ms (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	230VAC/ 31.3 ms 115VAC/ 31.4 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: 1500 mVp-p	I/P: 230 VAC O/P:FULL /Min LOAD 90%DUTY/1KHZ Ta:25°C	671 mVp-p	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	100VAC-264 VAC	I/P:TESTING O/P:FULL LOAD Ta:25°C	77V-264V	P
			I/P: LOW-LINE-3V= 97 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°C	TEST: OK	P
3	POWER FACTOR	0.95 / 230 VAC(TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	PF= 0.977 / 230 VAC	P
		0.98 / 115 VAC(TYP)		PF= 0.996 / 115 VAC	
4	EFFICIENCY	90 % (TYP)	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	90.3 %	P
5	INPUT CURRENT	230V/ 2.6 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 2.49 A/ 230 VAC	P
		115V/ 6 A (TYP)		I = 4.99 A/ 115 VAC	
6	INRUSH CURRENT	230V/ 50 A (TYP)	I/P: 230 VAC I/P: 115 VAC O/P:FULL LOAD Ta:25°C	I = 45 A/ 230 VAC	P
		115V/ 30 A(TYP) COLD START		I = 23 A/ 115 VAC	
7	LEAKAGE CURRENT	< 2 mA / 240 VAC	I/P: 254 VAC O/P:Min LOAD Ta:25°C	L-FG: 1.3 mA N-FG: 1.3 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	105 %~ 130 %	I/P: 230 VAC I/P: 115 VAC O/P:TESTING Ta:25°C	115 %/ 230 VAC 115 %/ 115 VAC Constant Current Limiting unit will shut down o/p voltage after 3sec Re-power on to recover	P
2	OVER VOLTAGE PROTECTION	CH1: 17V~ 21V	I/P: 230 VAC I/P: 115 VAC O/P:MIN LOAD Ta:25°C	18.6 V/ 230 VAC 18.6 V/ 115 VAC Shunt down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC: TSW1 : 85 ± 5°C O.T.P TSW2 : 100 ± 5°C O.T.P NO DAMAGE	I/P: 264 VAC O/P:FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down	P
4	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 unit will shut down o/p voltage after 3sec Re-power on to recover	P

CONTROL FUNCTION TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	REMOTE CONTROL	RC+/RC-: 0~0.8V POWER ON RC+/RC-: 4~10V POWER OFF	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	RC+/RC-: 0~1.3V POWER ON RC+/RC-: 1.4V~10V POWER OFF	P
2	REMOTE SENSE	>0.25V	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	> 0.25 V	P
3	DC-OK SIGNAL	PSU turn on :3.3V~5.6V PSU turn off :0V~1V	I/P: 230 VAC O/P:FULL LOAD Ta:25°C	PSU turn on : 5.21V PSU turn off : 0V	P

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	TEMPERATURE RISE TEST	MODEL : USP-500-24 WITH FAN 1. ROOM AMBIENT BURN-IN : 1 HRS I/P: 230VAC O/P: FULL LOAD Ta= 35.5 °C 2. HIGH AMBIENT BURN-IN : 2 HRS I/P: 230VAC O/P: FULL LOAD Ta= 55.1 °C			P
2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P: 230 VAC O/P: 114 % LOAD Ta:25°C	TEST : OK	P
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P: 230 VAC 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 50°C NO DAMAGE	I/P: 272 VAC O/P:FULL LOAD Ta= 50°C HUMIDITY= 95 %R.H	TEST : OK	P
5	TEMPERATURE COEFFICIENT	± 0.03 %(0-50°C)	I/P: 230 VAC O/P:FULL LOAD	± 0 %(0-50°C)	P
6	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:1 hour in each axis (X.Y.Z) (6) Ta:25°C		TEST : OK	P

SAFETY TEST

NO	TEST ITEM	SPECICATION	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: 10.07 mA I/P-FG: 8.25 mA O/P-FG: 8.59 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	I/P-O/P: 3 GΩ I/P-FG: 1.8 GΩ O/P-FG: 12 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta:25°C	10 mΩ	P
4	APPROVAL	TUV: Certificate NO : R 50112380 UL: File NO : E183223			P

E.M.C TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS A	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 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 INDUSTRY INPUT: 2KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N :2KV L,N-PE:4KV	I/P: 230 VAC/50HZ O/P:FULL LOAD Ta:25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

M.T.B.F & LIFE CYCLE CALCULATION

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	CAPACITOR LIFE CYCLE	USP-500-24 WITH FAN : SUPPOSE I/P: 230VAC O/P:FULL LOAD Ta= 25°C I/P: 230VAC O/P:FULL LOAD Ta= 50°C	C105 IS THE MOST CRITICAL COMPONENT LIFE TIME= 432640 HRS LIFE TIME= 148835 HRS		P
2	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE: 129.8K HRS			P



COMPONENT STRESS TEST

NO	TEST ITEM	SPECICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q3 Rated SPW20N60C3 20.7A/650V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25°C	(1) 432 V (2) 426 V (3) 466 V	P
2	Diode Peak Voltage	Q100 Rated FDP3632 80A/100V Q108 FDP047AN08A0 80A/75V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25°C	(1) 84 V (2) 84 V (3) 81 V (1) 56.2 V (2) 56.2 V (3) 57.6 V	P
3	Input Capacitor Voltage	C5 Rated 150u/450V 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) 396 V (2) 394 V (3) 396 V	P
4	Control IC Voltage Test	U1 Rated CM6800GIP : 18V	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) 13.1 V (2) 13.3 V (3) 13.1 V	P
5	PFC Power Transistor (D to S) or (C to E) Peak Voltage	Q2 Rated SPW20N60C3 20.7A/650V	I/P:High-Line +3V = 267 V O/P: (1)Full Load Turn on (2) Full Load (3)Output Short Ta:25°C	(1) 458 V (2) 448 V (3) 460 V	P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2007/6/14	RD SAMPLE	PASS	VINCENT TSENG	MAX LIN
2007/8/10	PRODUCT SAMPLE W0707A39	PASS	VINCENT TSENG	MAX LIN
2007/11/16	PRODUCT SAMPLE W0710C59	PASS	VINCENT TSENG	MAX LIN

2003/12/12 A50-F023