

## SPECIFICATION

For

## SWITCHING POWER SUPPLY

### M/N: MPI-U405(-C)

#### Revision History

Version	Revise Date	Change Items
Rev. 01	Oct. 1. 2010	Established.
Rev. 02	Oct. 20. 2010	Updating safety approval status.
Rev. 03	Nov. 4. 2010	Updating spec of fixed screws.
Rev. 04	Nov. 5. 2010	1. Adding performance curves of 70°C with convection cooled. 2. Updating operating temperature range.
Rev. 05	Mar. 28. 2011	Defining the fan output current is 0.5A max.
Rev. 06	Feb. 17. 2012	Updated the "Over Temperature Protection" function.
Rev. 07	Arp. 26. 2012	Updated the safety approvals status.
Rev. 08	Jun. 13. 2012	Updated derating curves.
Rev. 09	Mar. 27. 2017	Changed Operating Altitude form 2K to 3.5K.
Rev. 10	Jan. 25. 2018	1. Changed Form. 2. Added EN 55032.



### FEATURES

- ✓ 400W single output power supply.
- ✓ Active PFC meets Class D.
- ✓ Conducted EMI meets CISPR/FCC Class B.
- ✓ High Efficiency up to 95%.
- ✓ Adjustable output range.
- ✓ Design to meet IEC 60950-1, EN 60950-1, and UL 60950-1.
- ✓ Utilizes a thermally efficient U channel chassis design.



### Models & Ratings

Model Number	Rated Output Power	Output Voltage <sup>(Note 1)</sup>	Min. Current
MPI-U405	400 W	+22~+26 V / 24 V	0 A

Total Output Power: Total maximum power is rated 400W with convection cooled at 50 degree C<sup>(Note 2)</sup>, with minimum 23.3CFM forced air cooling at 70°C environment temperature.

Note:

1. Output power can be adjusted by variable resistor with nominal 24V which would be adjusted at factory.
2. If input voltage is lower than 230VAC, the output power should be considered. Please see the detail info at performance curves.
3. Model no. coding:

**MPI-U405 - X**  
1

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<b>X=</b>	<b>Mechanical</b>
<b>blank</b>	<b>Open frame</b>
<b>C</b>	<b>Optional cover kit</b>

### Summary

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Range	90	115 / 230	264	VAC	Continuous input range.
Input Frequency	47	50 / 60	63	Hz	AC input.
Efficiency		94	95	%	AC 230V input, 24V <sub>OUT</sub> , load 14.6A.
Operation Temperature	-25		+70	°C	Performance curves are below.
Weight		884.8		g	
Dimensions	198.0 (L) x 97.0 (W) mm, Tolerance +/- 0.4mm, with (H) 41.0 mm, Tolerance +0/-0.5 mm.				
EMC	EN 55022 / EN 55032, EN 61204-3, EN 61000-3-2: 2000 & EN 61000-3-3: 2001, IEC 61000-4-2: 2001, IEC 61000-4-3: 2002, IEC 61000-4-4: 2004, IEC 61000-4-5: 2001, IEC 61000-4-6: 2004, IEC 61000-4-8: 2001, IEC 61000-4-11: 2004				
Safety Approvals	IEC 60950-1, 2nd edition, EN 60950-1, 2nd edition, UL 60950-1, 2nd Edition, CSA C22.2 No. 60950-1-07, 2nd Edition				

### Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage	90	115 / 230	264	VAC	Continuous input range.
Input Frequency	47	50 / 60	63	Hz	AC input.
Inrush Current			60	A	
Input Protection	Non-user serviceable internally located AC input line fuse. Fuse : 6.3A / 250VAC * 1pcs				

Note:

1. Nominal input 230VAC input and rated load would be referred to all testing conditions if no specific condition indicated.

### Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage		+22~+26 / 24		VDC	
Initial Set Accuracy		1		%	Voltage setting is at nominal AC input voltage 60% rated load and 25°C.
Minimum Load		0		A	
Hold Up Time		20		mS	AC 230V input , 24V <sub>OUT</sub>
Total Regulation		±2.0		%	Total regulation is measured a setting output voltage. Input voltage is from 90-264VAC and output from 0-400W.
Ripple & Noise		±1		%	Measured at rated load by a 20MHz bandwidth limited oscilloscope and the each output is connected with a 10µF Electrolytic Capacitor and a 0.1µF Ceramic Capacitor.
Overvoltage Protection	For some reason the power supply fails to control itself, the build-in over voltage protection circuit will shut down the outputs to prevent damaging external circuits.				
Over Temperature Protection	When the power supply operating over the temperature or over load limit, the power supply will be shut down automatically to protect itself.				
Short Circuit Protection	Fully protected against output overload and short circuit. Automatic recovery upon of overload condition.				
Remote Voltage sense	Compensates for wire voltage drop.				

Note:

1. Nominal input 230VAC input and rated load would be referred to all testing conditions if no specific condition indicated.

### General

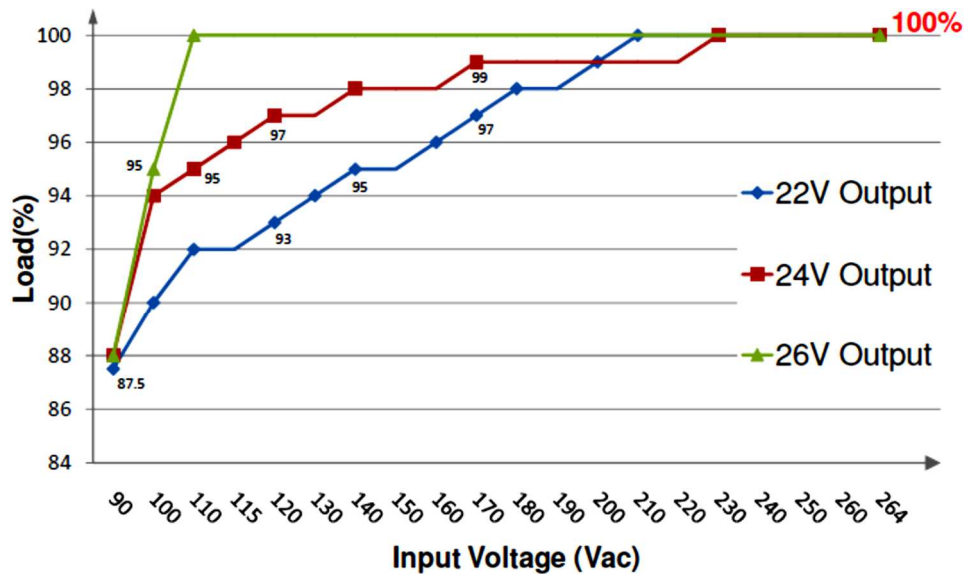
Characteristic		Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency			94	95	%	AC 230V input, 24V <sub>OUT</sub> , load 14.6A.
Isolation	IP to OP	3000			VAC	
	IP to Ground	1500			VAC	
Switching Frequency			65		KHZ	

### Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Low temperature start up	-40			°C	Performance curves are below.
Operating Temperature	-25		+70	°C	Performance curves are below.
Storage Temperature	-20		+85	°C	
Relative Humidity	5		95	%RH	Non-condensing.
Cooling	23.3			CFM	Forced-cooled @ 400W / 70°C
Operating / Non- Operating Altitude		3500 / 4000		m	

### Derating curve

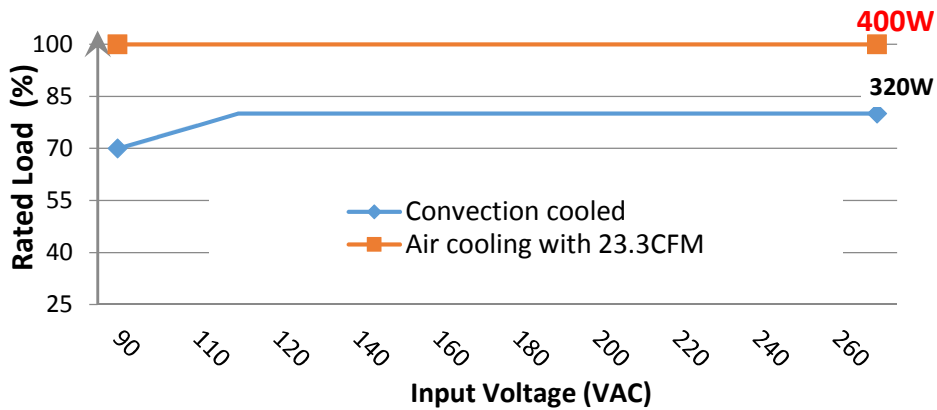
Without cover provided:



MPI-U405 with Convection Cooled @ ambient 50 degree C

(If the ambient above 50 degree C, please see note 2.)

With cover provided:



**Performance curves of MPI-U405-C (24V output @ 50°C)**

(If the ambient above 50 degree C, please see note 3.)

- Note:
1. Can be start-up at -40°C.
  2. When the input voltage is 115~264Vac, the output power is 280W max.; If the input voltage is 90~114Vac, the output power is 200W max. at ambient from 51 to 70 degree C.
  3. In condition of the unit with optional cover (model no. suffix -C), the max. output is 200W at convection cooled, max. 350W with 23.3CFM forced air cooling at ambient from 51 to 70 degree C.

### EMC: Emissions

Phenomenon	Standard	Class	Notes & Conditions
Conducted	EN 55022 / EN 55032 EN 61204-3	B	
Radiated	EN 55022 / EN 55032 EN 61204-3	B	
Harmonic Current	EN 61000-3-2: 2000	D	
Voltage Flicker	EN 61000-3-3: 2001	D	

### EMC: Immunity

Phenomenon	Standard	Criteria	Notes & Conditions
ESD	IEC 61000-4-2: 2001	A	8KV air discharge, 6KV contact discharge
Radiated	IEC 61000-4-3: 2002	A	10V/m
EFT	IEC 61000-4-4: 2004	A	2KV Line & PE
Surges	IEC 61000-4-5: 2001	A	1KV line to line, 2KV line to PE
Conducted	IEC 61000-4-6: 2004	A	10V/m
Power Magnetic	IEC 61000-4-8: 2001	A	3A/m
Dips and Interruptions	IEC 61000-4-11: 2004	A A A B	DIP: >95%, 0.5 cycle DIP: >30%, 25 cycles <sup>(Note 2)</sup> DIP: >60%, 5 cycles <sup>(Note 2)</sup> INT: >95%, 250 cycles

Note:

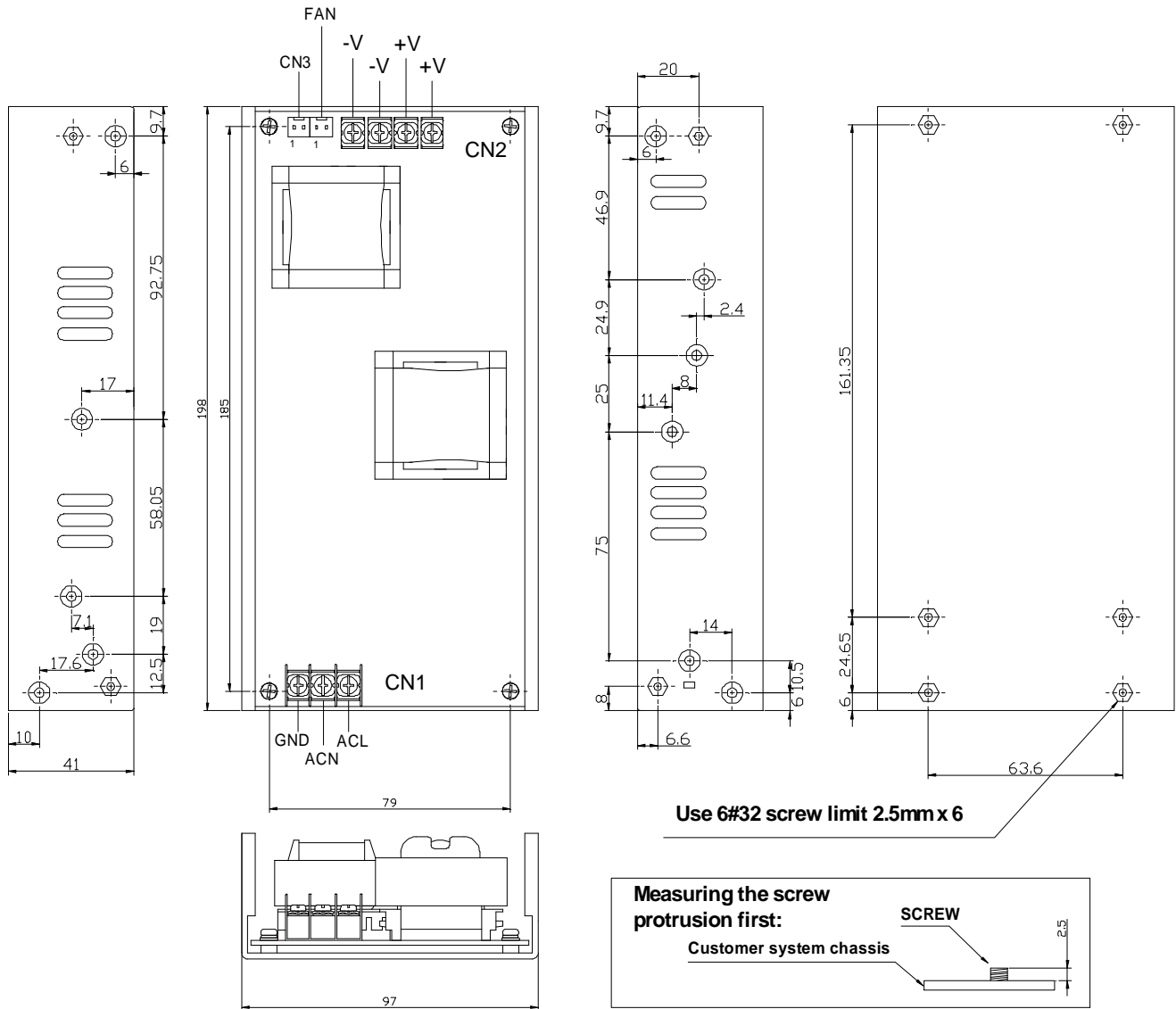
- Above specification is applied with output equal or below 400W. For higher output power, please re-confirm with us.
- The test result of input 230Vac / 115Vac is criteria A / B.

### Safety Approvals

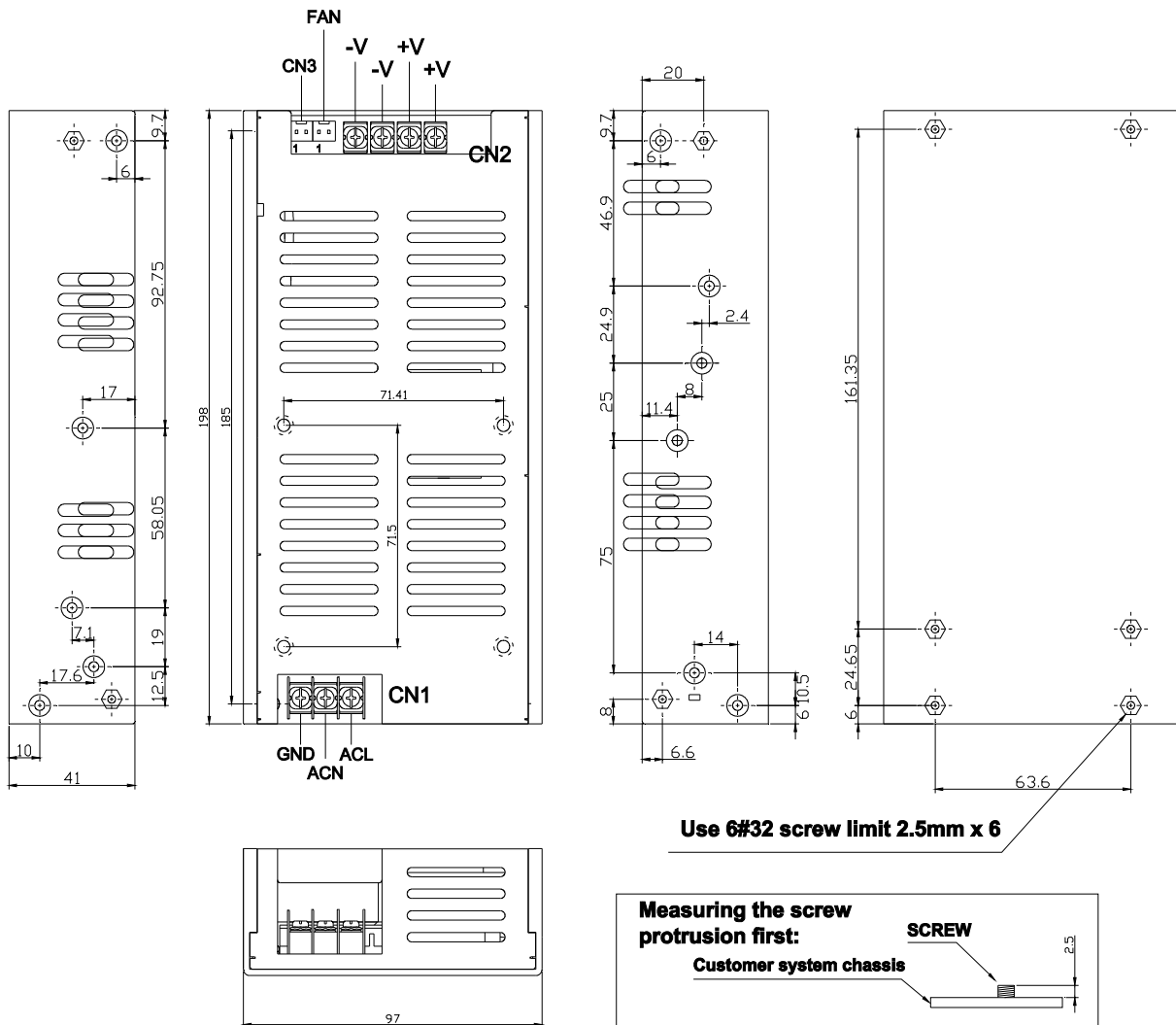
Safety Agency	Safety Standard	Notes & Conditions
TUV	EN 60950-1, 2nd edition	CE Declaration
CB	IEC 60950-1, 2nd edition	CB approved
UL/cUL	UL 60950-1, 2nd Edition CSA C22.2 No. 60950-1-07, 2nd Edition	UL approved cUL approved

### Mechanical Details

SIZE : 198.0 (L) x 97.0 (W), Tolerance +/- 0.4mm. 41.0 (H) mm, Tolerance +0/-0.5 mm.



With optional cover



Parameter	Conditions/Description
Dimension	198 (L) x 97 (W) mm, tolerance +/- 0.4mm, With (H) 41 mm, tolerance +0/-0.5 mm.
Connector	CN1 --- AC input: 3 Positions Terminal Blocks, European type by request. CN2 --- DC output: 4 Positions Terminal Blocks, European type by request. CN3 --- Output remote sense: 2 Positions FAN --- DC Fan output: 2 Positions
Pin Assignment	CN1 Pin 1. L 2. N 3. GND CN2 Pin 1. V+ 2. V+ 3. V- 4. V- CN3 Pin 1. Remote Sense + 2. Remote Sense - FAN <sup>(Note 1)</sup> Pin 1. V+ 2. V-

Note:

1. The voltage of fan is the same with the output voltage of power supply, and the output current is 0.5A max.

Option

Parameter	Conditions/Description	* Please contact us for the availability and pricing.
UPS charger module	Additional module available by request separately for UPS charger function.	
Multi outputs module	Additional module available by request separately for multi outputs.	



## Thermal Considerations

In order to ensure safe operation of the PSU in the end-use equipment, the temperature of the components listed in the table below must not be exceeded.

Temperature should be monitored using J type thermocouples placed on the hottest part of the component (out of any direct air flow). See Mechanical Details for component locations.

Temperature Measurements at max. amb.	
Component	Max Temperature
T1	110°C
Q1A	120°C
D5	120°C
C7, C7A, C7B	105°C
C21	105°C