ESP AC-DC Series, Modular Power Supply Data Sheet

Features

- 1 to 12 isolated outputs with full user configurability
- 1.45V to 28V standard output voltages
- Isolated bias supply voltage of 5V @ 50mA
- Class B conducted emissions
- 400, 600 and 1000 Watts of output power
- Series and parallel capability
- Zero-load operation
- EN61000-3-2 compliant
- Universal input
- Fully-floating outputs
- Individual control signals on each module
- Modular construction
- Industry-standard footprint
- 2-year warranty

Applications

- Industrial equipment
- Test and measurement
- Telecommunications
- Peripherals
- Audio/broadcast
- Automation
- Linear and rotary motion

Description

ESP provides an instant, no-compromise power solution for any power requirements where a unique set of voltage and current requirements is needed. Power-One, Inc. has coupled a 2-transistor forward converter front end with planar magnetic main transformer technology and modular magnetic amplifier output stages to provide a fast turn-around, production line built power solution that can be matched to meet your exact requirements for volts and amps. Configured units may be shipped within 48 hours to your specific set point requirements complete with CE and UL approval and fully compliant to EN61000-3-2.

Designed as a cost-effective solution for single-piece or volume production runs, the ESP Series provides up to 1000 watts of output power in a rugged, extruded aluminium package. Power connections are made using quality screw terminal connections, and primary and secondary controls enable power channels to be individually margined, enabled, paralleled or stacked to provide literally millions of power solutions to match your needs.

Single-Output Module Selection

Module	No. of Slots	Nominal Voltage	Range	Imax
Module 1	1	5V	3 to 5.6V	30A
Module 2	1	12V	5 to 13V	20A
Module 3	1	18V	8 to 20V	15A
Module 4	1	24V	12 to 28V	12A
Module 70	2	5V	1.45 to 5.6V	80A

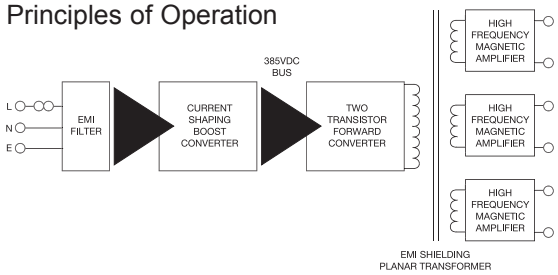
Dual-Output Module Selection

Module	No. of Slots	Nominal Voltage	Range	Imax
Module 5	1	24V 24V	10 to 28V 10 to 28V	3A 3A
Module 6	1	5V 24V	3 to 5.6V 10 to 28V	10A 3A

CE (LVD)

c UL us

Principles of Operation



Specification All specifications are typical at nominal input, full load at 25°C unless otherwise stated.

Output Specifications

Maximum power	Input module B (for 4 slot only) Input module C (for 4 & 6 slot) Input module D (for 6 slot only)	400W 600W 1000W(1)
Output adjustment	(Note 2)	Multi-turn potentiometer
Line regulation		±0.1%
Load regulation	50% load change	±0.2%
Cross regulation		±0.2% typ.
Transient response	(Note 3)	<10%, <0.5ms
Temperature coefficient		±0.02%/°C
Ripple and noise	(Note 4)	1.0% or 100mV pk-pk
Overvoltage protection		Standard on all outputs
Overcurrent protection	(Note 5)	Individual current limit
Thermal protection		Standard
Mains failure signal	Option 03, 05, 06 or 07	5ms warning
Output isolation	(Note 6)	Each single and dual output fully floating
Margin	See application note for individual module margin capabilities	
Minimum load	(Note 7)	Zero
Turn-on delay	90VAC, full load	900ms max
Remote sense	Single output modules only	0.5V drop

Input Specifications

Input voltage range	Universal input	88 to 264VAC 125 to 370VDC
Input frequency range	(Note 8)	47Hz to 63Hz
Inrush current	230VAC @ 25°C	85A max.
Harmonic distortion	(Power factor)	EN61000-3-2

EMC Characteristics

Emissions: Conducted	EN55022, FCC	Level B
Immunity: Electrostatic discharge	EN61000-4-2	Level 4
Radiated RFI	EN61000-4-3	Level 3
Fast transients - burst	EN61000-4-4	Level 3
Input line surges	EN61000-4-5	Class 3
Conducted RFI	EN61000-4-6	Level 3
Voltage dips	EN61000-4-11	Compliant

General Specifications

Hold-up time	(Note 9)	20ms typ after loss of AC power
Efficiency		82% typ.
Isolation voltage	Input/output Input/chassis	3000VAC 1500VAC
Switching frequency		200kHz
Approvals and standards	(Note 11)	IEC60950, UL1950 CSA22.2 No. 950
Leakage current	ESP4B, ESP4C, 1.25mA, 250VAC, 60Hz ESP6C, ESP6D, 1.75mA, 250VAC, 60Hz	
Weight	ESP4B, ESP4C ESP6C, ESP6D	2.5kg 3.5kg
Size		See mechanical specifications
MTBF	See application note	400,000 hours

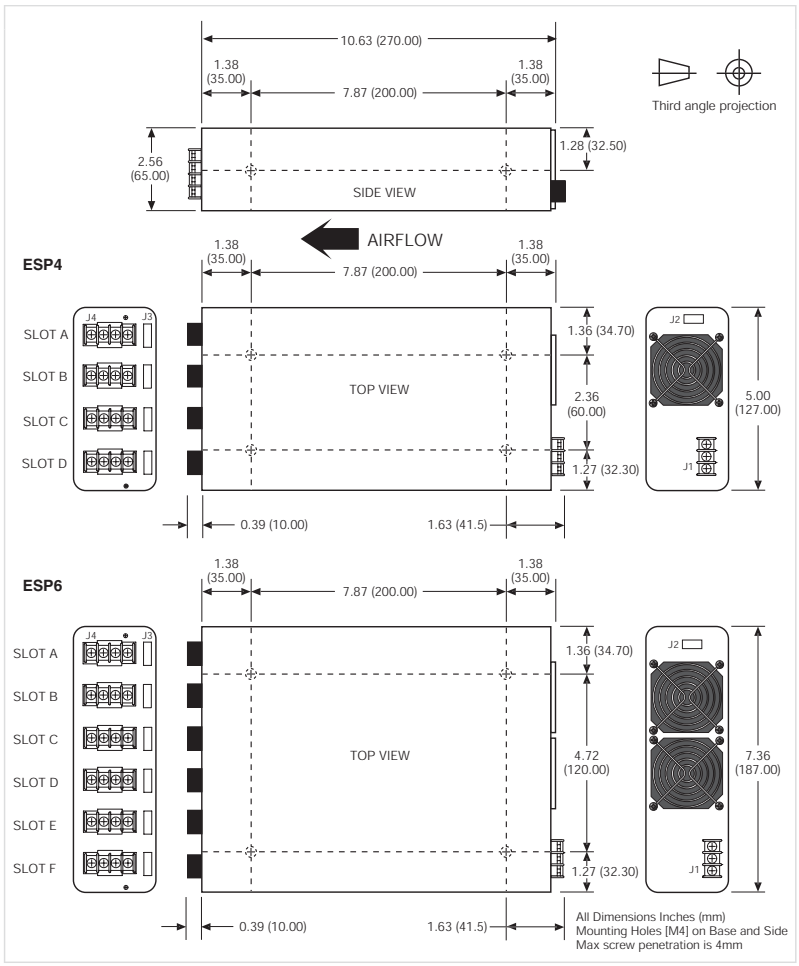
Environmental Specifications

Operating temperature (See derating curve)	See application note	-20°C to +50°C Derate 2.5% per °C up to +70°C
Storage temperature		-40°C to +85°C
Relative humidity	Non-condensing	5% to 95% RH
Shock		3000 bumps, 10G (16ms) half sine
Vibration		10-200Hz, 1.5G

NOTES

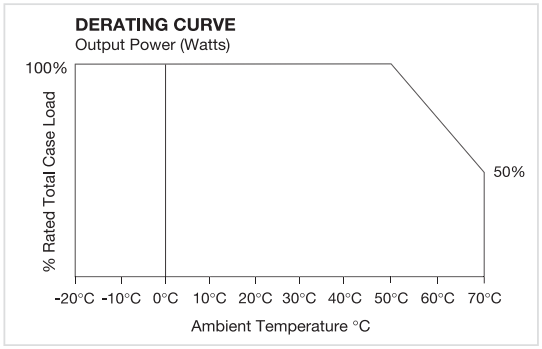
1 1000W peak power for 10ms at low line. 800W average power for input voltage less than 180VAC.
2 Outputs are user adjustable or factory set to your requested voltage.
3 25% to 75% load change.
4 Whichever is greater. 20MHz bandwidth. (See application note for specification below 0°C).
5 Straight line on all outputs. On Module 70 current limit adjustable from 50% to 110%. Optional foldback on Module 70 or contact factory for details see application note.
6 100V isolation between each output and 500V to chassis.
7 All outputs except Module 70, which has 5.0% minimum load for full specification.
8 Contact factory for 400Hz operation.
9 For nominal output voltages and full load.
10 The specifications contained in this data sheet are believed to be correct at time of publication. Specifications are subject to change without notice.
11 This product is not intended for use as a standalone unit and must be installed by authorized personnel in order to maintain approvals.

Mechanical Drawing

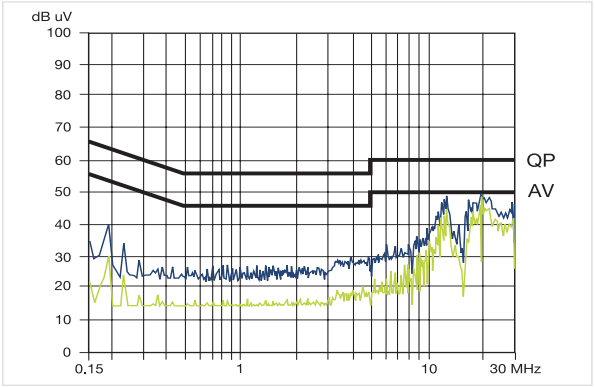


Connectors:
J1 Line Input Connector
J2 Options
See application note for Pinout
J3 Output Signals
See application note for Pinout
J4 Output Connector

Accessories:
- Parallel Link
- Series Link
- "U" Link
- Mating Connector for options + Module 1-6 signals
- Mating Connector for Module 70 signals



Typical Emissions to EN55022 Level B



Single-Output Module Selection

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Dual-Output Module Selection

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Output Signals

Output control signals are available on all output modules.
(see application note)

Modules 1 to 6
- Power good signal
- Output inhibit signal
- Remote adjust (margin)

Module 70 Additional Features
- Adjustable Current Limit
- Foldback or Straight Line Current Limiting
- Bias Voltage
- Selectable Output Inhibit or Enable

Dual output modules:
Output signals available on first [top] output only.

Production Configuration:
Units are shipped with nominal output voltages unless special configuration is specified. Power-One can configure to your exact requirements through use of appropriate series and parallel busbars, and voltage adjustment to specific set points.

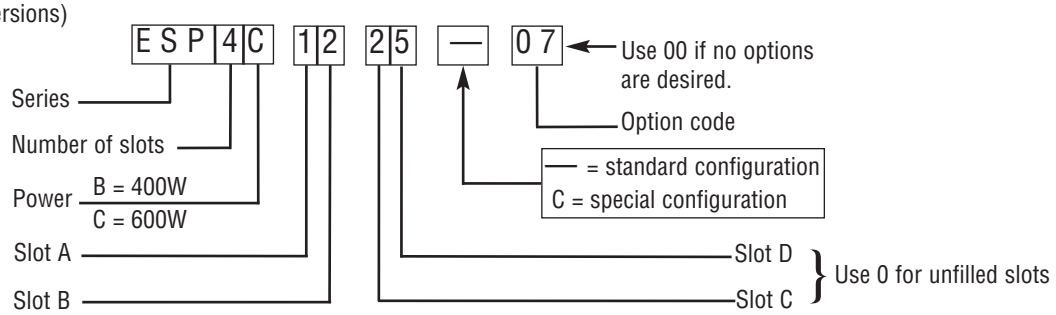
ESP Standard Options

06 Mains Power Fail + Global Enable + Bias Supply Voltage
07 Mains Power Fail + Global Inhibit + Bias Supply Voltage

How to Order ESP4

(Available in 400/600 Watt Versions)

Note: Calculate power requirements by summing output powers calculated at application output voltages.



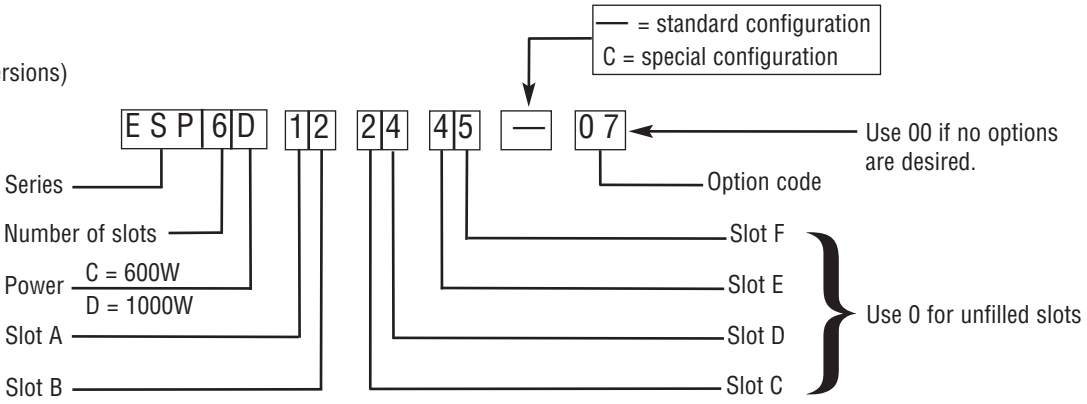
Specification of power supply detailed above:
- 4-slot series
- Maximum output power: 600W
- 5V @ 30A; 12V @ 20A; 24V @ 3A; 24V @ 3A
- Mains Power Fail signal + Logic Inhibit + Bias Supply Voltage

How to Order ESP6

(Available in 600/1000 Watt Versions)

Note: Calculate power requirements by summing output powers calculated at application output voltages.

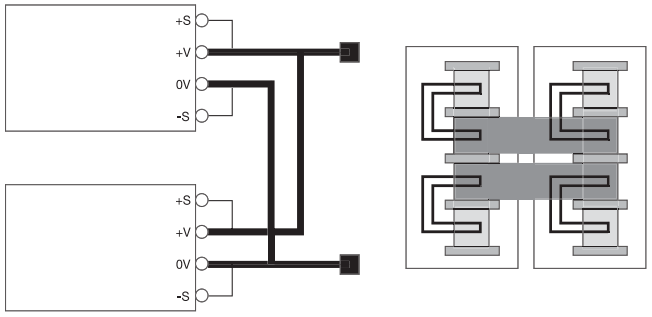
For ESP6D:
Limit total power from slots A-C and D-F to 550W each.



Specification of power supply detailed above:
- 6-slot series
- Maximum output power: 1000W
- 5V @ 30A; 12V @ 20A; 12V @ 20A; 24V @ 12A; 24V @ 12A; 24V @ 3A; 24V @ 3A
- Mains Power Fail signal + Logic Inhibit + Bias Supply Voltage

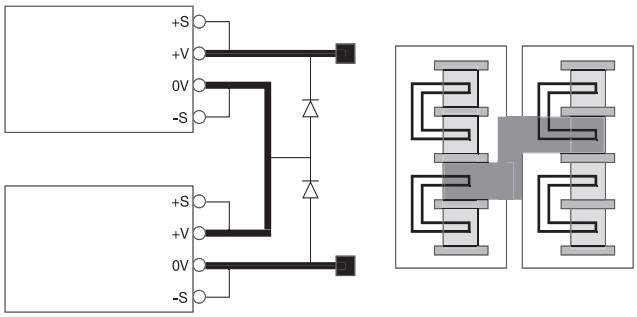
ESP Flexibility

Using Modules in Parallel



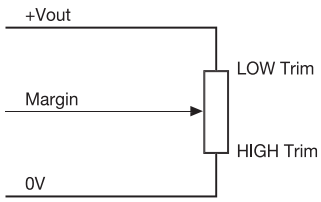
Notes:
Maximum current = (I_1 + I_2) x .9
Use two parallel links

Using Modules in Series

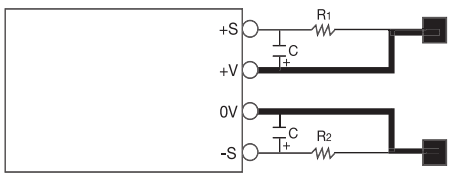


Notes:
Maximum voltage to chassis is 500V
Use series link
Reverse bias diodes may be required for certain applications, eg. large capacitive loads

Remote Adjustment



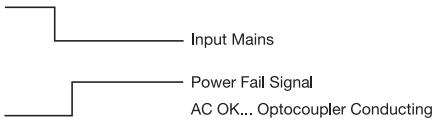
Remote Sensing



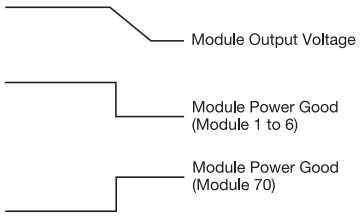
Notes:
Where the sensing point is remote from the output of the power supply, to avoid spurious noise pick-up it may be necessary to:

1 Use twisted pair sense wires.
2 Use R C as shown (R_1 = 100Ω) (R_2 = 10Ω) (C = 22μF).

Mains Power Fail Signal

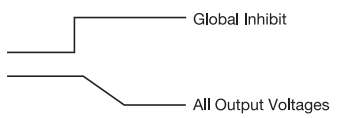


Output Power Good Signal



Notes:
See application note for full details.

Global Inhibit (Reverse Logic for Global Enable)



Module Inhibit