H SERIES AC/DC

Power-One's H Series of AC/DC power supplies provides a full range of features and options for chassis mount applications or 19" rack systems. With a universal input from 85 to 255 VAC, the H series meets the most rigorous requirements of commercial, industrial, and datacom systems. LED indicators display the status of the converter and allow visual monitoring of the system.

Rated for use in convection applications, the H Series delivers high reliability power with a Mean Time Between Failure (MTBF) in excess of 300,000 hours. In addition to UL, CUL, and LGA regulatory compliance to IEC950/EN60950, the H series displays the CE Mark.

FEATURES

- Universal Input, 85-255VAC
- 4.2kV Isolation
- Individually Isolated Outputs
- Overtemperature, Overvoltage, and Overcurrent Protected
- CE marked to Low Voltage Directive
- Input Transient & ESD Compliance to EN61000-4-2/-3/-4/-5
- Greater than 300,000 Hours MTBF
- Optional ACFAIL and Undervoltage Detection
- Optional DIN Rail Mounting

SINGLE OUTPUT MODEL SELECTION CHART

MODEL	OUTPUT VOLTAGE	ADJUSTMENT RANGE	MAXIMUM OUTPUT CURRENT	LINE REGULATION	LOAD REGULATION	RIPPLE & NOISE mV (NOTE 1)	INITIAL SETTING ACCURACY
LH 1001-2R	5.1V	0.0V to 5.5V	11.0A	±1.0%	1.0%	200	5.00V to 5.20V
LH 1301-2R	12.0V	0.0V to 13.2V	6.0A	±0.9%	1.25%	200	11.76V to 12.24V
LH 1501-2R	15.0V	0.0V to 16.5V	4.5A	±0.7%	1.0%	200	14.70V to 15.30V
LH 1601-2R	24.0V	0.0V to 26.4V	3.0A	±0.7%	0.7%	200	23.52V to 24.48V
LH 1901-2R	48.0V	0. 0V to 52.8V	1.5A	±0.4%	0.4%	150	47.04 V to 48.96V

MULTIPLE OUTPUT MODEL SELECTION CHART

MODEL	OUTPUT VOLTAGE	ADJUSTMENT RANGE	OUTPUT CURRENT	LINE REGULATION	LOAD REGULATION	RIPPLE & NOISE %p-p (NOTE 1)	INITIAL SETTING ACCURACY
LH 2320-2 48 Watts	12V	Fixed	2.0A	±0.4%	0.4%	1.25%	11.76V to 12.24V
	12V	Fixed	2.0A	±0.7%	See Graph 1	1.25%	11.40V to 12.60V
LH 2540-2 51 Watts	15V	Fixed	1.7A	±1.0%	0.4%	1.0%	14.70V to 15.30V
	15V	Fixed	1.7A	±1.0%	See Graph 2	1.0%	14.25V to 15.75V
LH 3020-2 42 Watts	5.1V	Fixed	5.0A	±0.6%	0.5%	3.0%	5.00V to 5.20V
	12V	Fixed	0.7A	±1.25%	See Graph 3	1.25%	11.40V to 12.60V
	12V	Fixed	0.7A	±1.25%	See Graph 3	1.25%	11.40V to 12.60V
LH 3040-2 44 Watts	5V	Fixed	5.0A	±0.6%	0.5%	3.0%	5.00V to 5.20V
	15V	Fixed	0.6A	±1.0%	See Graph 4	1.0%	14.25V to 15.75V
	15V	Fixed	0.6A	±1.0%	See Graph 4	1.0%	14.25V to 15.75V

NOTE: 1) Maximum peak-to-peak noise, 20 MHz bandwidth.

Rev. 10/2000

H SERIES AC/DC

INPUT SPECIFICATIONS (NOTE 1)

PARAMETER	CONDITIONS/DESCRIPTION	MIN	NOM	MAX	UNITS
Input Voltage - AC	Continuous input range.	85		255	VAC
Input Frequency	AC Input.	47		63	Hz
Hold-up Time	At 85VAC.	5.0			mS
	At 110VAC.	10.7			
No Load Input Power	Single output models, nominal input.			2.5	
	Dual output models, nominal input.			9.0	W
	Triple output models, nominal input			9.0	
Input Current	230 VAC at full rated load.		0.44		ARMS
Input Protection	Non-user serviceable internal AC input line fuse, 250V, slow blow.		2.5		A
Inrush Surge Current	Internally limited by thermistor, one cycle, 25°C, 255VAC.			42	APK

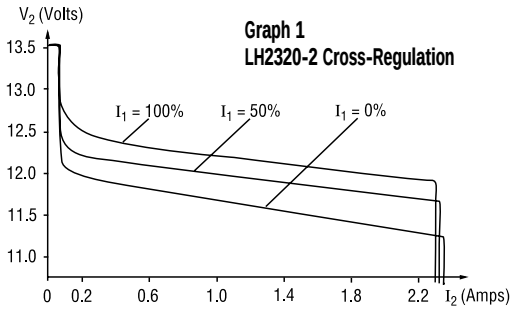
NOTE: 1) All parameters measured at Tc=25°C, pins 2 and 23 connected, nominal input voltage and full rated load unless otherwise noted.

OUTPUT SPECIFICATIONS (NOTE 1)

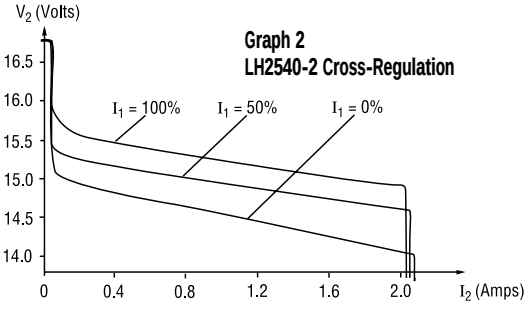
PARAMETER	CONDITIONS/DESCRIPTION		MIN	NOM	MAX	UNITS
Efficiency	Full rated load, 230VAC. Varies with distribution of loads among outputs.		74		83	%
Minimum loads	Minimum load required for regulation.		0			Amps
Ripple and Noise	Full load, 20 MHz bandwidth.			See Model Selection Charts		
Output Power		5V single output model			56.1	
		12V single output model			72.0	
		15V single output model			67.5	Watts
		24V single output model			72.0	
		48V single output model			72.0	
		Dual and triple output models		See Model Selection Chart		
Overshoot / Undershoot	Output voltage overshoot/undershoot at turn-on.				0	V
Transient Response	Recovery time, to within 1% of initial set point due to a 50-100% load change, 4% max. deviation. (Main output only on multi-output units).				120	µS
Turn-on Rise Time	Time required for output voltage to rise from 10% to 90%, 100% load.	5V single output model		5	25	
		12V single output model		10	40	
		15V single output model		15	50	
		24V single output model		20	70	mS
		48V single output model		85	230	
		Dual output models		25	80	
		Triple output models		75	210	

NOTE: 1) All parameters measured at Tc=25°C, pins 2 and 23 connected, nominal input voltage and full rated load unless otherwise noted.

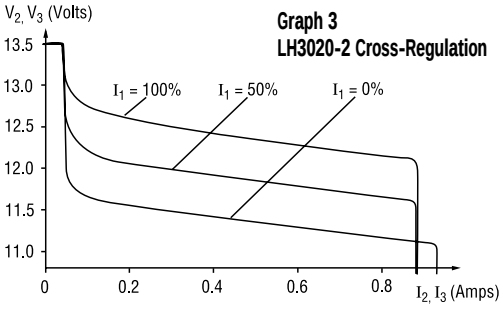
Graph 1
LH2320-2 Cross-Regulation



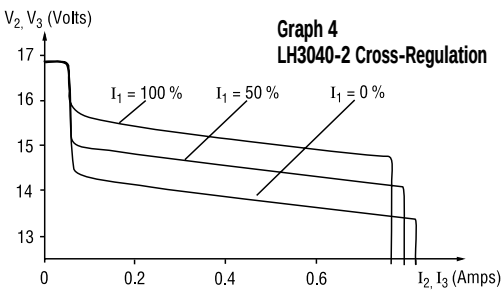
Graph 2
LH2540-2 Cross-Regulation



Graph 3
LH3020-2 Cross-Regulation



Graph 4
LH3040-2 Cross-Regulation



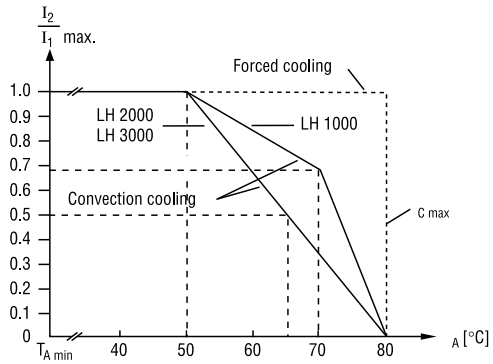
H SERIES AC/DC

INTERFACE SIGNALS AND INTERNAL PROTECTION

PARAMETER	CONDITIONS/DESCRIPTION		MIN	NOM	MAX	UNITS
Overvoltage Protection		5V single output model		7.5		
		V1, 12V single and dual output models		21		
		V2, V3, 12V dual and triple output models		24		
		V1, 15V single and dual output models		25		V
		V2, V3, 15V dual and triple output models		31		
		24V single output model		41		
		48V single output model		85		
Overload Protection		5V single output model	11.44			
		12V single output model	6.24			
		V1, V2, 12V dual output model	2.08			
		V2, V3, 12V triple output model	0.73			
		15V single output model	4.68			Amps
		V1, V2, 12V dual output model	1.77			
		V2, V3, 15V dual and triple output models	0.62			
		24V single output model	3.12			
		48V single output model	1.56			
Overtemperature Protection	Case temperature which activates protective shutdown and Inhibit LED. Automatic restart below this temperature.		95	105		°C
Inhibit Control Voltage	Voltage to enable outputs (or connect pins 2 and 23 together)		-50		0.8	V
	Voltage to disable outputs (or leave open)		2.4		50.0	
Inhibit Control Current	Outputs enabled.		-60	-100	-220	µA
Inhibit LED	Red LED illuminated when output is inhibited.					
Power OK LED	Green LED illuminated when output is within regulation limits.					
Output Adjust Range	Percentage of output, single output models only.		0		110	%
Output Adjust Limits	Voltage limits of +Voltage Adjust input.		0		8	V

SAFETY, REGULATORY, AND EMI SPECIFICATIONS

PARAMETER	CONDITIONS/DESCRIPTION		MIN	NOM	MAX	UNITS
Agency Approvals	UL1950. CSA 22.2 NO. 234/950. EN60950 (LGA).			Approved		
Dielectric Withstand Voltage	Input to output. Output to output.		4200 300			VDC
Electromagnetic Interference	EN55011 / CISPR 11 and EN55022 / CISPR 22 Conducted. EN55011 / CISPR 11 and EN55022 / CISPR 22 Radiated.		A B			Class
ESD Susceptibility	Per EN61000-4-2, level 2.		4			kV
Radiated Susceptibility	Per EN61000-4-3, level 3. Per EN61000-4-3, level X		10 20			V/M
EFT/Burst	Per EN61000-4-4, level 1.		±0.5			kV
Input Transient Protection	Per EN61000-4-5 class 1.	Line to Ground Line to Line	0.5 0.5			kV
Insulation Resistance	Input to output.		300			M
Leakage Current	Per EN60950, 264VAC.				1.4	mA



Output current derating versus temperature

For the Most Up-To-Date Information

www.power-one.com

24 Hours/Day—7 Days/Week

H SERIES AC/DC

ENVIRONMENTAL SPECIFICATIONS

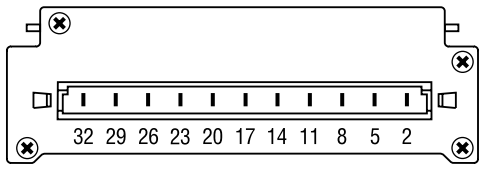
PARAMETER	CONDITIONS/DESCRIPTION		MIN	NOM	MAX	UNITS
Altitude	Operating.			10k		ASL Ft.
	Non-Operating.			40k		ASL Ft.
Temperature- Operating	Operating ambient temperature.		-10		50	°C
	Operating case temperature.		-10		80	
Temperature- Storage			-25		100	°C
Temperature Coefficient	0°C to 70°C (after 15 minute warm-up).	5V single and triple output model		±1.0		mV/°C
		12V single and dual output models		±2.4		
		15V single and dual output models		±3.0		
		24V single output model		±4.8		
		48V single output model		±9.6		
Relative Humidity	Non-Condensing.		5		93	%RH
Shock	Per EN60068-2-27, MIL-STD-810D section 516.3.				15	G
Vibration	Per EN60068-2-6, MIL-STD-810D section 514.3.				2	GRMS
MTBF	Calculated, MIL-HDBK-217F, 40°C, ground benign, single output models.			384,000		Hours
	Calculated, MIL-HDBK-217F, 40°C, ground benign, dual output models.			306,000		
	Calculated, MIL-HDBK-217F, 40°C, ground benign, triple output models			270,000		
Unit Weight				27.1/770		oz/gm

OPTIONS

DESCRIPTION	OPTION	NOTES
Undervoltage Monitor	-D1 thru -D8	Input and/or V1 output monitoring circuitry. The input and/or output undervoltage monitoring circuit operates independently of the built-in input undervoltage lock-out circuit. A logic "low" (JFET output) or "high" signal (NPN output) is generated at pin 5 as soon as one of the monitored voltages drops below the preselected threshold level. Consult factory for specific types. Not compatible with -V options.
ACFAIL Signal (VME)	-V2	This option defines an undervoltage monitoring circuit for the input voltage. Equivalent to -D option and generates an ACFAIL signal (V signal) which conforms to the VME standard. Not compatible with -D option.
	-V3	This option defines an undervoltage monitoring circuit for the input and main output voltage. Equivalent to –D option and generates an ACFAIL signal (V signal) which conforms to the VME standard. Not compatible with -D option.
Front Panel for 19” Rack		Order HZZ00802 front panel for 19" rack mounting on Schroff systems.
Chassis Mounting Plate		Order HZZ01215 for chassis mounting plates. Designed for mounting the 19" cassette to a chassis/wall where only frontal access is given.
DIN Rail Bracket		Order HZZ01210 universal mounting bracket for DIN-rail or chassis mounting.
Mating Connectors		Order as follows for mating H11 connectors: HZZ00101: Faston, straight, 0.250” x 0.030” (6.3 x 0.8 mm) HZZ00102: Screw terminals, 90°, #13 AWG (2.5 mm²) max HZZ00103 Solder pin 0.200” (5.2 mm), Ø 0.063” (1.6 mm)

Pin	Single Output	Dual Output	Triple Output
2	Inhibit Control	Inhibit Control	Inhibit Control
5	-D or -V Option	-D or -V Option	-D or -V Option
8	+V1		+V3
11	-V1		-V3
14	+Voltage Adjust	+V2	+V2
17	-Voltage Adjust	-V2	-V2
20	+V1	+V1	+V1
23	-V1	-V1	-V1
26	GND (note1)	GND (note1)	GND (note1)
29	Neutral	Neutral	Neutral
32	Line	Line	Line

Note 1: Leading pin (pregrounded)



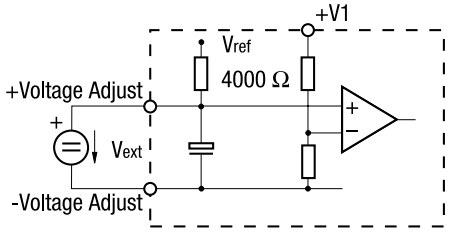
H SERIES AC/DC

OUTPUT VOLTAGE ADJUSTMENT

As a standard feature, single output modules offer an adjustable output voltage, identified by the letter "R" in the part number. The output voltage V1 can either be adjusted with an external voltage (Vext) or with an external resistor (R1 or R2) to the new value, $V1_A$. The adjustment range of $V1_A$ is approximately 0% to 110% of the nominal output voltage, V1. For output voltages above the nominal output value, the minimum input voltage must be increased proportionally to the increase in output. For example, to increase the output of an H Series power supply to 110% of initial value, the minimum input voltage must be increased by an additional 10%.

Method 1:

Adjust output voltage $V1_A$ from 0% to 110% of V1 using Vext between +VOLTAGE ADJUST (pin 14) and -VOLTAGE ADJUST (pin 17). NOTE: Values of Vext must be between 0.0V and 8.0V.

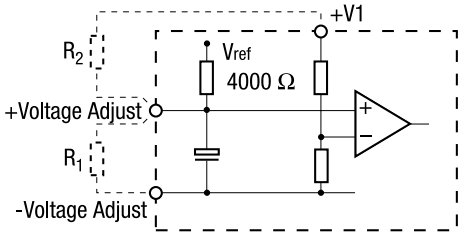


Voltage Adjustment with external voltage Vext

$$V1_A = \frac{Vext \times V1}{2.5V} \quad \text{where Vext} = \frac{2.5V \times V1_A}{V1}$$

Method 2:

Adjust output voltage $V1_A$ from 0% to 100% of V1 using resistor R1 between +VOLTAGE ADJUST (pin 14) and -VOLTAGE ADJUST (pin 17).



Voltage Adjustment with external resistor R1 or R2

$$V1_A = \frac{V1 \times R1}{R1 + 4000} \quad \text{where Vext} = \frac{4000 \times V1_A}{V1 - V1_A}$$

Method 3:

Adjust output voltage $V1_A$ from 100% to 110% of V1 using resistor R2 between +VOLTAGE ADJUST (pin 14) and output V1 (pin 20).

$$R2 = \frac{4000 \times V1_A \times (V1 - 2.5V)}{2.5V \times (V1_A - V1)} \quad \text{and } V1_A = \frac{V1 \times 2.5V \times R2}{2.5V \times (R2 + 4000) - (V1 \times 4000)}$$

NOTES: To prevent damage, R2 should never be less than 47k . R inputs of n units with paralleled outputs may be paralleled, but if one single external resistor is to be used, its value should be R1/n, or R2/n respectively.

NUCLEAR AND MEDICAL APPLICATIONS Power-One products are not authorized for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems without the express written consent of the President of Power-One, Inc.

TECHNICAL REVISIONS The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

H SERIES AC/DC

OVERALL SIZE: 6.61" x 4.38" x 1.52" (168.5Mmm x 111.2mm x 38.7mm) WEIGHT: 27.1 OZ. (770gm)