

## HR/GR SERIES

Power-One's HR/GR Series of encapsulated AC/DC power supplies provides compact power to a wide range commercial and industrial applications. With a universal input from 85 to 265 VAC, compact case and high reliability, the HR/GR-family is an excellent choice for a PCB mountable AC-DC converter in space-critical applications. Selected models provide output voltage trimming through an external trim pin.

Rated for use in convection applications, the HR/GR Series delivers high reliability power with a Mean Time Between Failure (MTBF) in excess of 5 million hours. The HR/GR series is in compliance with the latest national and international regulatory compliance and displays the CE Mark.

### FEATURES

- Universal Input, 85-265VAC
- Single and Dual Outputs
- -10 to +50°C Ambient Operation
- 4.2kV Isolation
- Overcurrent Protected
- Input Transient & ESD Compliance to EN61000-4-2/-4/-5
- Greater than 5,000,000 Hours MTBF
- CE marked to Low Voltage Directive
- Class II Equipment (Double Insulation)



### SINGLE OUTPUT MODEL SELECTION CHART

MODEL	OUTPUT WATTAGE	OUTPUT VOLTAGE	ADJUSTMENT RANGE	MAXIMUM OUTPUT CURRENT	LINE REGULATION	LOAD REGULATION	RIPPLE & NOISE mV (NOTE 1)	INITIAL SETTING ACCURACY
<b>LHR 1101-2</b>	10	3.3V	3.0V to 3.6V	3.0A	±1.0%	±2.0%	90	3.24V to 3.36V
<b>LHR 1001-2</b>	10	5V	4.5V to 5.5V	2.0A	±1.0%	±2.0%	150	4.90V to 5.10V
<b>LHR 1301-2</b>	10	12V	10.8V to 13.2V	0.84A	±1.0%	±2.0%	150	11.76V to 12.24V
<b>LHR 1501-2</b>	10	15V	13.5V to 16.5V	0.67A	±1.0%	±2.0%	150	14.70V to 15.30V
<b>LHR 1601-2</b>	10	24V	21.6 to 26.4V	0.42A	±1.0%	±2.0%	150	23.52V to 24.48V
<b>LGR 1101-2</b>	23	3.3V	3.0V to 3.6V	7.0A	±1.0%	±2.0%	90	3.24V to 3.36V
<b>LGR 1001-2</b>	25	5V	4.5V to 5.5V	5.0A	±1.0%	±2.0%	150	4.90V to 5.10V
<b>LGR 1301-2</b>	25	12V	10.8V to 13.2V	2.1A	±1.0%	±2.0%	240	11.76V to 12.24V
<b>LGR 1501-2</b>	25	15V	13.5V to 16.5V	1.7A	±1.0%	±2.0%	300	14.70V to 15.30V
<b>LGR 1601-2</b>	25	24V	21.6 to 26.4V	1.0A	±1.0%	±2.0%	300	23.52V to 24.48V

### MULTIPLE OUTPUT MODEL SELECTION CHART

MODEL	OUTPUT WATTAGE	OUTPUT VOLTAGE	ADJUSTMENT RANGE	OUTPUT CURRENT	LINE REGULATION	LOAD REGULATION	RIPPLE & NOISE mV (NOTE 1)	INITIAL SETTING ACCURACY
<b>LHR 2320-2</b>	10	+12V	Fixed	0.42A	±1.0%	±2.0%	240	11.76V to 12.24V
		-12V	Fixed	0.42A	±1.0%	±2.0%	240	-11.76V to -12.24V
<b>LHR 2540-2</b>	10	+15V	Fixed	.335A	±1.0%	±2.0%	300	14.70V to 15.30V
		-15V	Fixed	.335A	±1.0%	±2.0%	300	-14.70V to -15.30V
<b>LGR 2020-2</b>	25	+5V	Fixed	2.5A	±1.0%	±2.0%	150	4.90V to 5.10V
		+12V	Fixed	1.0A	±1.0%	±2.0%	240	11.76V to 12.24V
<b>LGR 2320-2</b>	25	+12V	Fixed	1.0A	±1.0%	±2.0%	240	11.76V to 12.24V
		-12V	Fixed	1.0A	±1.0%	±2.0%	240	-11.76V to -12.24V
<b>LGR 2540-2</b>	25	+15V	Fixed	0.8A	±1.0%	±2.0%	300	14.70V to 15.30V
		-15V	Fixed	0.8A	±1.0%	±2.0%	300	-14.70V to -15.30V

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

## HR/GR SERIES

### INPUT SPECIFICATIONS (NOTE 1)

PARAMETER	CONDITIONS/DESCRIPTION	MIN	NOM	MAX	UNITS
Input Voltage - AC	Continuous input range.	85		265	VAC
Input Voltage - DC	Continuous input range.	110		330	VDC
Input Frequency	AC Input.	47		400	Hz
Hold-up Time	Over full AC input voltage range at full rated load.	3			mS
Input Current	100 VAC at full rated load.		LHR Series LGR Series	0.3 0.6	ARMS
Fusing	Recommended 250V, slow blow fuse.		LHR Series LGR Series	T1.25A T2.0A	
Inrush Surge Current	Internally limited by thermistor, one cycle, 250C, 255VAC.		LHR Series LGR Series	25 30	APK
Operating Frequency	Switching frequency of main transformer.	80		120	kHz

**NOTE:** 1) Maximum peak to peak expressed as a percentage of output voltage, 20 MHz bandwidth.

### OUTPUT SPECIFICATIONS

PARAMETER	CONDITIONS/DESCRIPTION	MIN	NOM	MAX	UNITS
Efficiency	Full rated load, 110VAC.	LHR Series LGR Series	73 76	77 80	%
Minimum loads	Minimum load required for regulation.	Single output models Dual output models	0 20		%
Ripple and Noise	Full load, 20 MHz bandwidth.	See Model Selection Charts			
Output Power		See Model Selection Charts			
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 100 to 50% load change, 3% max. deviation.			500	mS

### INTERFACE SIGNALS AND INTERNAL PROTECTION

PARAMETER	CONDITIONS/DESCRIPTION	MIN	NOM	MAX	UNITS
Overload Protection	Foldback protected against output overload and short circuit. Automatic recovery upon removal of overload condition.				
Output Adjust Range	Percentage of output, single output models only.	90		110	%

### 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.	4200			VDC
Input to Output Capacitance		LHR Series LGR Series	2400 5000		pF
Electromagnetic Interference	EN55011 / CISPR 11 and EN55022 / CISPR 22 conducted.	B			Class
ESD Susceptibility	Per EN61000-4-2, level 4.	15			kV
EFT/Burst	Per EN61000-4-4, level 3.	±2.0			kV
Input Transient Protection	Per EN61000-4-5 class 3.	Line to Ground Line to Line	2.0 1.0		kV
Insulation Resistance	Input to output..	300			M
Leakage Current	Per EN60950, 230VAC, 50Hz.	LHR Series LGR Series		0.14 0.24	mA

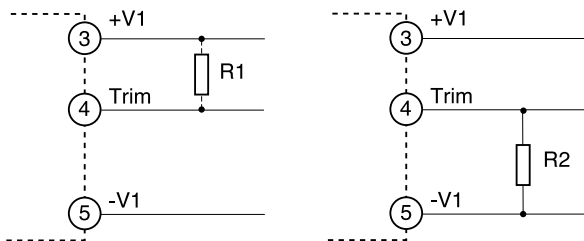
## HR/GR SERIES

### ENVIRONMENTAL SPECIFICATIONS

PARAMETER	CONDITIONS/DESCRIPTION	MIN	NOM	MAX	UNITS
Altitude	Operating.			10k	ASL Ft.
	Non-Operating.			40k	ASL Ft.
Operating Temperature	Operating ambient temperature.	-10		50	°C
	Operating case temperature.	-10		80	°C
Storage Temperature		-25		100	°C
Temperature Coefficient	0°C to 70°C (after 15 minute warm-up).		±0.05		%/°C
Relative Humidity	Non-Condensing.	5		95	%RH
Shock	Per EN60068-2-27, MIL-STD-810D section 516.3.			20	G
Vibration	Per EN60068-2-6, MIL-STD-810D section 514.3.			2	GRMS
MTBF	Calculated, MIL-HDBK-217F, 30°C, ground benign, LHR models.		7,180,000		Hours
	Calculated, MIL-HDBK-217F, 30°C, ground benign, LGR models.		5,660,000		Hours
Unit Weight			5.6/160		oz/gm

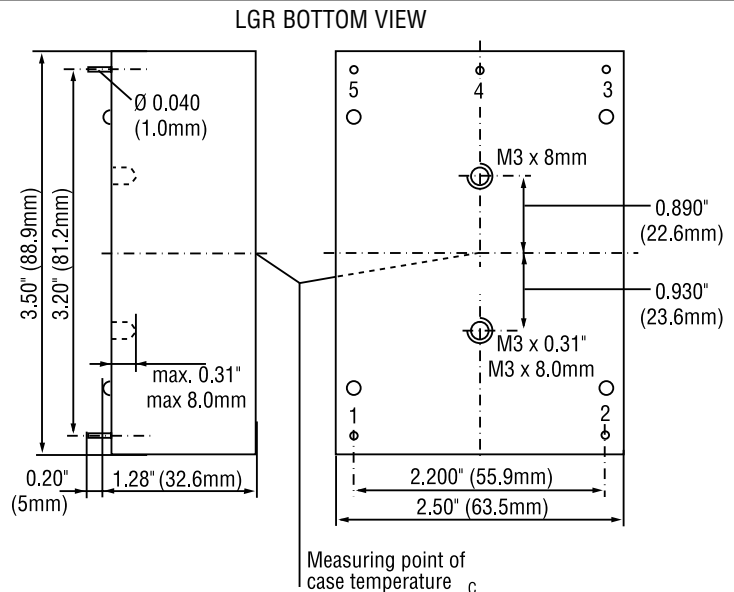
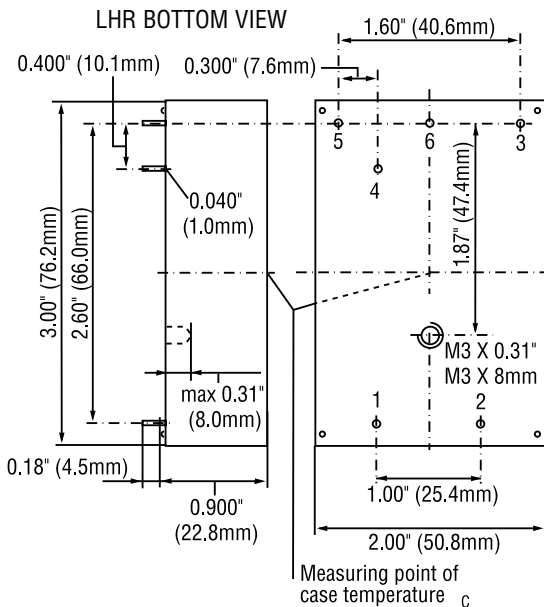
### OUTPUT VOLTAGE ADJUSTMENT

The output voltage may be adjusted within ±10% of V1 by means of an external potentiometer or fixed resistor (see table).



MODEL	R1 (K )		R2(K )	
	V1 + 5%	V1+ 10%	V1 – 5%	V1 –10%
LHR 1001-2	5.2	1.0	4.6	0.10
LHR 1301-2	8.2	0.39	49.0	18.9
LHR 1501-2	26.0	9.9	148	66.3
LHR 1601-2	10.0	820	140	61.0
LGR 1001-2	5.2	1.0	4.6	0.10
LGR 1301-2	8.2	0.49	48.3	18.9
LGR 1501-2	18.0	1.7	141	58.0
LGR 1601-2	10.0	820	140	61.0

### Output voltage adjustment for single output models



### HR/GR SERIES PIN OUT

PIN	LHR SINGLE OUTPUT	LHR DUAL OUTPUT	LGR SINGLE OUTPUT	LGR DUAL OUTPUT
1	LINE	LINE	LINE	LINE
2	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
3	+V1	+V1	+V1	+V1
4	VOLTAGE ADJUST	N/C	-V1	COMMON
5	-V1	-V2	VOLTAGE ADJUST	V2
6	N/C	COMMON	NO PIN	NO PIN

## HR/GR SERIES

### OPTIONS

Option Descriptions					
OPTION	DESCRIPTION	OPTION	DESCRIPTION	OPTION	DESCRIPTION
A	Test sockets	i	Inhibit input	V	ACFAIL signal (for 5.1 V output)
B	Cooling plate large	K	Alternative pinout	Y	Small soldering pins
B1	Cooling plate small	L	Input filter (Non-Isolated Models Only)	Z	Cell voltage selector switch
C	Thyristor-Crowbar	L	Surface mount package	-0	Ambient temperature range –40 to 60°C
D	"Save Data" signal	M	Surface mount package	-6	Hermetic semi-conductors
E	Inrush current limitation	P	Potentiometer	-7	ambient temperature range –25 to 71°C
F	Input fuse internally (not accessible)	R	External output voltage control	-8	Ambient temperature range –40 to 85°C
H	Increased electric strength test voltage	T	Current sharing	-9	Ambient temperature range –40 to 71°C

NOTE: Not all options are available for every product series

**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.

***For the Most Up-To-Date Information***

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