



Low profile single board layout provides high reliability and metal baseplate improves thermal performance by $>10^{\circ}\text{C}$ over open frame designs.

The Bolero HV half brick is a High Power CoolConverter™ in the Galaxy family of high-efficiency DC/DC converters.

- Industry Standard Pinout and Footprint
- Typical Efficiency:
93% at 52V, 4A; 91% at 52V, 2A
- No Heat Sink Required (Baseplate Standard)
- Very Low Common-mode Noise for a Commercial DC/DC Converter
- Two-stage Input Filter
- Constant Switching Frequency, 330kHz
- Remote Sense
- Single Board SMT Construction
- Low Profile, 0.4"
- Optional Low Profile Heatsink for Improved Thermal Performance
- Header with M3 Metal Inserts for Mechanical Connection to PCB
- Two Year Warranty

CONTROL FUNCTIONS

- Optional Droop Current Sharing
- Microprocessor Controlled
- Primary-side Enable, Choice of Logic

PROTECTION FEATURES

- Over Temperature Protection
- Over Voltage Protection
- Over/Under Input Voltage Protection
- Over Current Protection

TYPICAL CHARACTERISTICS

- Output Setpoint Accuracy: $\pm 1\%$
- Load Regulation: $\pm 0.25\%$
- Line Regulation: $\pm 0.25\%$
- Regulation over Line, Load, and Temperature: $\pm 2\%$
- Low Output Ripple
- Industry Standard Output Trim



GENERAL SPECIFICATIONS

$V_{IN} = 48V_{DC}$, $T_A @ 25^{\circ}C$, 300 LFM airflow, $V_{OUT} = 52V$, $I_{OUT} = \text{Full Load unless otherwise noted}$. $C_{OUT} = 180\mu F$ Al-Elec
Available output power depends on ambient temperature and good thermal management. (See application graphs for limits.)

Input Characteristics				
Parameter	Min	Typ	Max	Units
Operating Input Voltage	36	48	75	V_{DC}
Input Current (Model Dependent)			7.0	A
Input Capacitance		4.0		μF
Input Hysteresis, Low Line		2		V_{DC}
Output Characteristics				
Regulation Over Line, Load & Temperature	98		102	$\%V_{NOM}$
Optional Droop, No Load to Full Load			2	V_{DC}
Voltage Ripple			30	mV _{RMS}
Voltage Ripple, 20MHz BW			200	mV _{P-P}
Current Range	0		4	A
Current Limit Inception	4.2		5.0	A
Short Circuit Current, Peak (see Note below)			6	A
Settling Time to $\pm 1\%$			300	μS
Turn-on Time to 98% V_{nom}			30	mS
Output Overshoot at Turn-on			1	$\%V_{OUT}$
Trim Range	50		105	$\%V_{OUT}$
Overvoltage Protection, Latching		115		$\%V_{OUT}^{**}$
Isolation				
Isolation Test Voltage, Input/Output (Basic)	2250			V_{DC}
Isolation Resistance	10			M Ω
Features				
Overtemperature Protection, Thermal Sensor, Latching*			120	$^{\circ}C$
Switching Frequency, Fixed		330		kHz

Notes: During short circuit, converter will shut down and attempt to restart once per second.

The average current during this condition will be very low and the device can be safely left in this condition continuously. For specific output voltage specifications, see the corresponding detailed data sheet.

*PCB less than 130 $^{\circ}C$.

**OVP set to limit maximum voltage in system to a safe level. This can be adjusted for higher voltages if needed.

General Specifications

Operating Temperature, Baseplate	-40 $^{\circ}C$ to +100 $^{\circ}C$
Storage Temperature	-55 $^{\circ}C$ to +125 $^{\circ}C$
Relative Humidity	10% to 95% RH, Non-condensing
Vibration	2 to 9Hz, 3mm disp., 9 to 200Hz 1g
Material Flammability	UL V-0
Weight	55 grams
MTBF	Telcordia (Bellcore) 1,600,000 hours

Approvals and Standards

UL and c-UL Recognized Component,
TUV, UL60950, CSA 22.2 No. 950,
IEC/EN60950** pending.

EMC Characteristics:
Designed to meet emission and immunity
requirements per EN55022, CISPR22,
Class B and CISPR24.

** An external fuse shall be used to comply with the requirements.

CoolConverter™ Family

Galaxy's **COOLCONVERTERS™** feature:

- Single-stage power conversion architecture, control, and magnetic design allow unprecedented power density and efficiency in an isolated power supply.
- An advanced microcontroller reduces parts count while adding features, performance, and flexibility in the design.

PROTECTION AND CONTROL

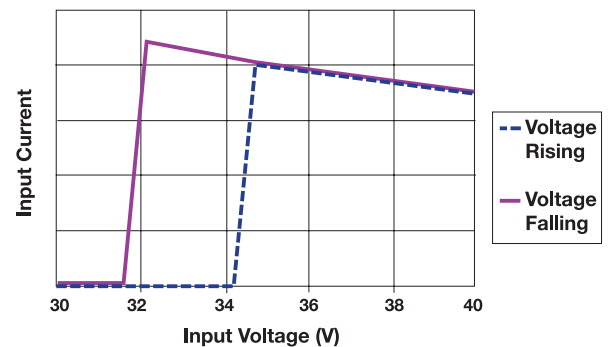
Valid Input Voltage Range:

The converter measures the input voltage and will not allow operation outside of the input voltage specification. As shown by the graphs, hysteresis is added to both the high and low voltage to prevent the converter from turning on and off repeatedly when the voltage is held near either voltage extreme. At low line this assures the maximum input current is not exceeded; at high line this assures the semiconductor devices in the converter are not damaged by excessive voltage stress.

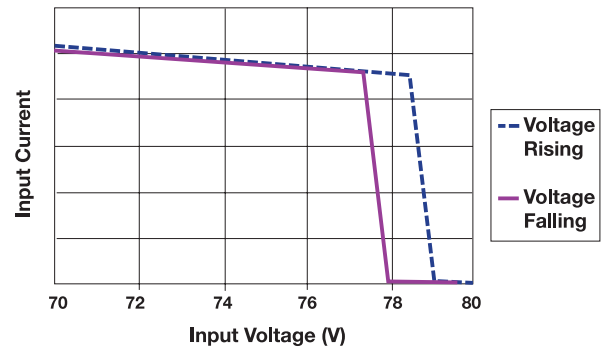
ON/OFF Logic Option:

The ON/OFF control logic can be either Negative (standard) or Positive to enable the converter. For Negative logic, the ON/OFF pin is brought below 1.0V with respect to the –INPUT pin to enable the converter. For Positive logic, the ON/OFF pin is brought to greater than 4.0V with respect to the Enable. To request the Positive logic version, add the suffix (P) to the standard part number. The Input pin has a built-in pull-up resistor of approximately 100k Ω to +5.0V.

Undervoltage Lockout



Overvoltage Lockout



Output Over Voltage Protection:

The output voltage is constantly monitored by the microprocessor. If the output voltage exceeds the over-voltage specification, the microprocessor will latch the converter off. To turn the converter on requires either cycling the ON/OFF pin or power to the converter. This feature prevents the converter from damaging the load if there is a converter failure or application error. If non-latching is required, consult factory.

Thermal Shutdown:

The printed circuit board temperature is measured using a semiconductor sensor. If the maximum rated temperature is exceeded, the converter is latched off. To re-enable the converter requires cycling the ON/OFF pin or power to the converter. If non-latching shutdown is required, consult factory.

Control Options:

As the behavior of the circuit is determined by firmware in the microcontroller, specific customer requirements such as:

- non-latching thermal protection
- custom valid input voltage range
- controlled delay from initiating an ON/OFF signal for power sequencing can be accomplished with no change to hardware.

The standard behavior was chosen based on system design experience but we understand that customers often have their own requirements.

Please consult Galaxy Power for your special needs.

Remote Sense:

The output voltage is regulated at the point where the sense pins connect to the power output pins. Total sense compensation should not exceed 0.4V or 2% of Vout, whichever is greater.

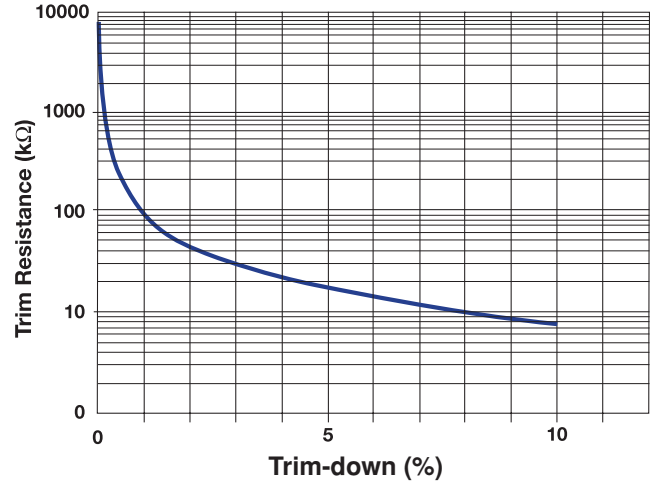
Safety:

An external input fuse must always be used to meet safety requirements.

Trim:

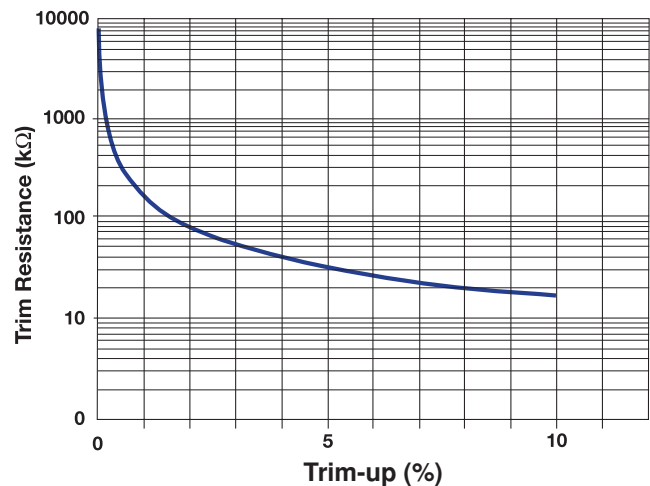
To trim the output voltage higher, connect the required trim resistor from the Trim pin to the +Sense pin. To trim the output voltage lower, connect the required trim resistor from the Trim pin to the –Sense pin. See diagram below.

Trim-down



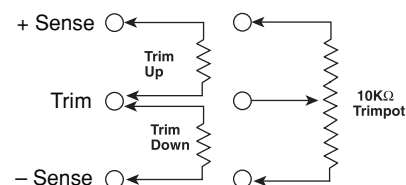
$$R_{\text{TRIM-DOWN}} = \left\{ \frac{100}{\Delta\%} - 2 \right\} \text{ k}\Omega$$

Trim-up (for 3.3V)



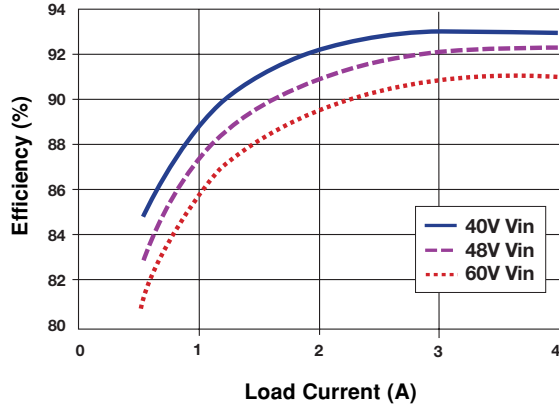
$$R_{\text{TRIM-UP}} = \left\{ \frac{V_o (100 + \Delta\%)}{1.225 \Delta\%} - \frac{(100 + 2\Delta\%)}{\Delta\%} \right\} \text{ k}\Omega$$

External Output Trimming

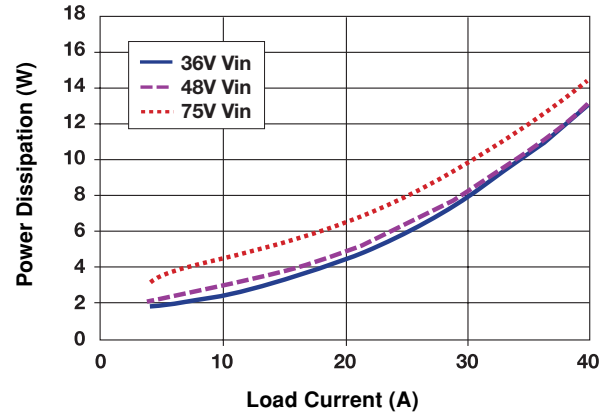


GPBW52V04R OPERATION

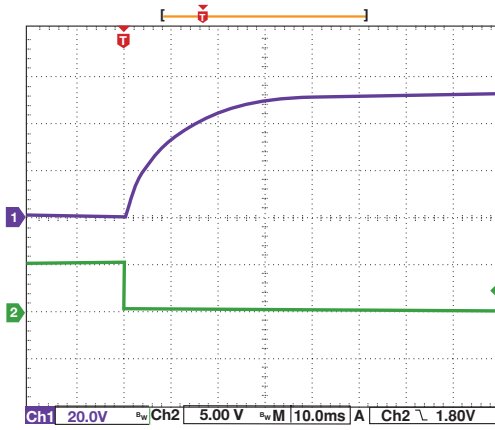
Efficiency



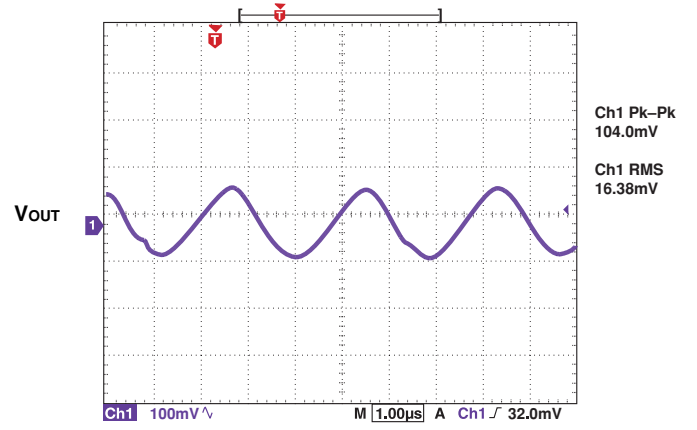
Power Dissipation



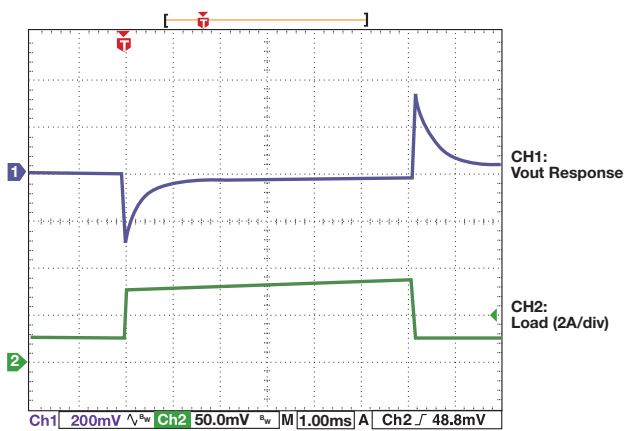
Start-up Waveform



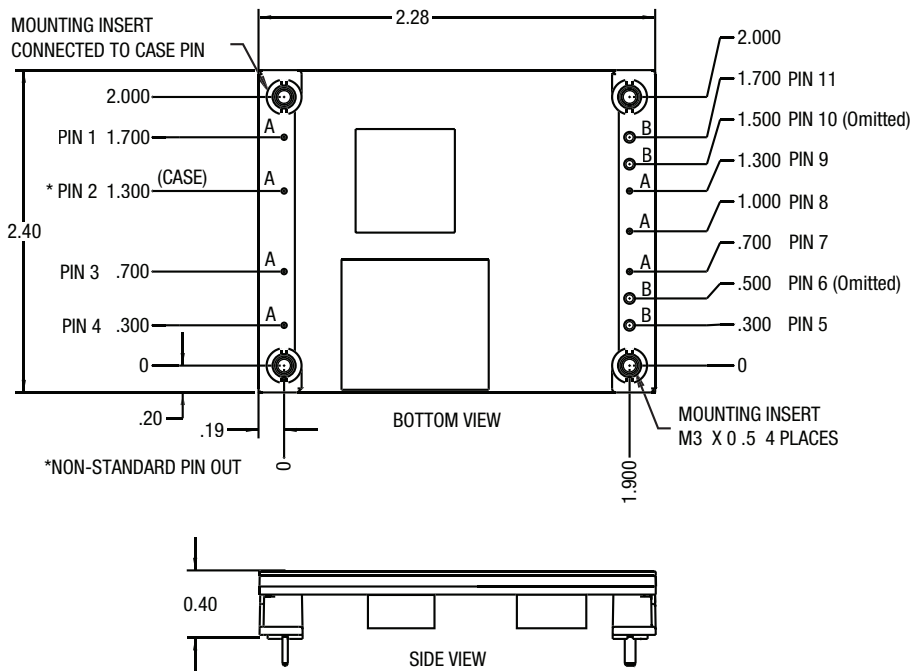
Voltage Ripple



Transient Reponse



PACKAGE DETAIL



Pin No.	Function	Pin Dia. (in.)
1	– Input	0.040
2*	Case Ground Pin	0.040
3	On/Off	0.040
4	+ Input	0.040
5	+ Output	0.080
6	N/C	(No Pin)
7	+ Sense	0.040
8	Trim	0.040
9	– Sense	0.040
10	N/C	(No Pin)
11	– Output	0.080

Notes:

1. "A" = 0.040 dia. pins
2. "B" = 0.080 dia. pins
3. Optional pins marked*
4. Mechanical tolerances
x.xxx in. = ± 0.005 in.
x.xx in. = ± 0.01 in.
5. Pin material: brass with tin/lead plating over nickel
6. Workmanship: Meets or exceeds IPC-A-610B Class II

ORDERING INFORMATION

Bolero HV Part Numbers

Standard Model Number	Output Voltage	Max Current	Typical Efficiency	
			Half Load	Full Load
GPBW52V04R*	52V	4A	93%	91%

* Options:

P = Positive Logic Version; High = On

M = 0.145" Pins (± 0.01 ")

S = 0.12" Pins (± 0.01 ")

R = Heatsink Ready

G00X = Case Ground Pin + Heatsink

Heatsinks optional, consult factory.

Heatsink Part Numbers

Part Number	Height	Typical Thermal Performance	
		Natural Convection Power Dissipation†	Forced Convection Thermal Resistance**
001	0.25"	5W	5.8°C/W
002	0.50"	7W	3.2°C/W
003	1.00"	11W	2.0°C/W
004	0.13"	TBD	TBD

†@ 60°C rise heatsink to ambient

** @ 300'/min.

Ordering Information

Example Part No.:

GPBW52V04R

48V input

52V@ 4A output

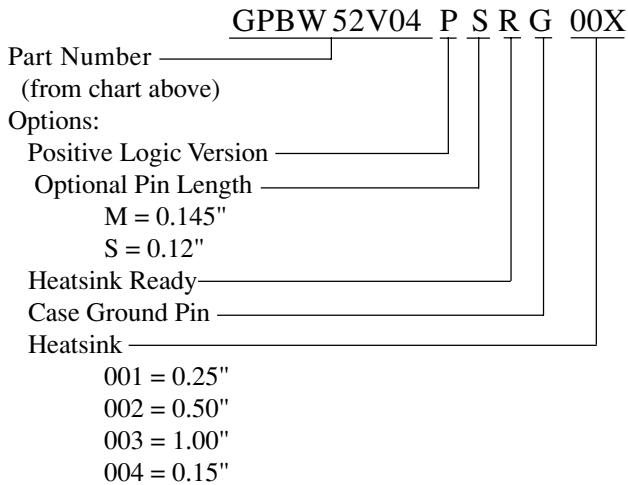
Negative Logic

0.20" Pin Length

Heatsink Ready Plate

Options Code:

(All options shown)



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