

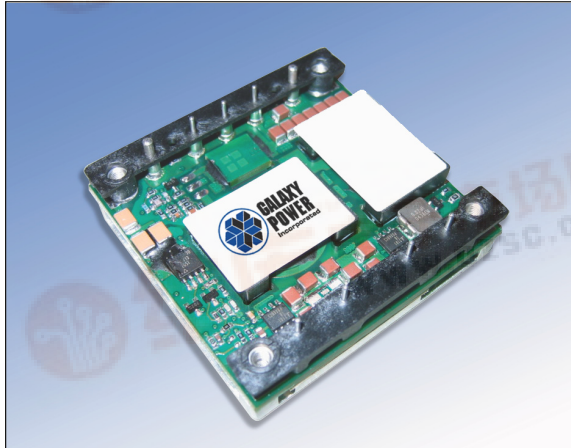


**GALAXY
POWER**
Incorporated

BOLERO HP

48V Input, 53VDC, 8A Output

Half-brick



Single board construction with power components and planar magnetics thermally connected to an insulated baseplate give the highest power density for a converter in this class. Open frame design is compatible with water wash process.

Meets IEEE 802.3af Std for 2250V Isolation for Power over Ethernet Applications.

GHBW53V08 Features:

**48V Input
53VDC, 8A Output**

High Efficiency:

**93.5% at 53V, 8A
94.0% at 53V, 4A**

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

- Industry Standard Pinout and Footprint
- Highest Efficiency in the Industry
- Low Thermal Impedance Baseplate Standard
- Two-stage Input Filter
- Constant Switching Frequency, 270kHz
- Remote Sense
- Optional Heatsinks
- Header with M3 Metal Inserts for Mechanical Connection to PCB
- Two Year Warranty

CONTROL FUNCTIONS

- Microprocessor Controlled
- Primary-side Enable, Choice of Logic

STANDARD PROTECTION FEATURES*

- Over Temperature Protection, Auto-restart
- Over Voltage Protection, Latching
- Over Current Protection, Latching
- Over/Under Input Voltage Lockout

TYPICAL CHARACTERISTICS

- Output Setpoint Accuracy: $\pm 1\%$
- Load Regulation: $\pm 0.2\%$
- Line Regulation: $\pm 0.2\%$
- Regulation over Line, Load, and Temperature: $\pm 2\%$
- Low Output Ripple
- Industry Standard Output Trim

*Consult factory for other options.

ISO 9001 CERTIFIED ORGANISATION



Certified to ISO 9001:2000



GENERAL SPECIFICATIONS

$V_{IN} = 48V_{DC}$, $T_A @ 25^\circ C$, 300 LFM airflow, $V_{OUT} = 53V$, $I_{OUT} = \text{Full Load unless otherwise noted}$. $C_{OUT} = 180\mu F \text{ Al-Elec}$
 Available output power depends on ambient temperature and good thermal management. (See application graphs for limits.)

Input Characteristics				
Parameter	Min	Typ	Max	Units
Operating Voltage Range	38	42	55	V
Input Current, No Load @48Vin	0.05		0.11	A
Input Current, Full Load @48Vin	9.35		9.55	A
Input Current, Maximum Low Line			13	A
Input Capacitance		8		μF
Input Hysteresis, Low Line		2		VDC
Output Characteristics				
Regulation Over Line, Load & Temperature			2	%VNOM
Voltage Ripple			50	VRMS
Voltage Ripple, 500kHz BW, 1 μF ext cap		120	150	mVP-P
Voltage Ripple, 500kHz – 1MHz, 1 μF ext cap			50	mVP-P
Voltage Ripple, > 1MHz, 1 μF ext cap			30	mVP-P
Current Range	0		8	A
Current Limit Inception, Latching	9		11	A
Output Transient Response, 25% to 75% load change, 1A/ μsec			3	%
Settling Time to $\pm 1\%$			400	μS
Turn-on Time to 98% Vnom			50	mS
Output Overshoot at Turn-on			0	%VOUT
Trim Range	42		56	V
Overvoltage Protection, Latching	57	58.5	60	VDC
Isolation ¹				
Isolation Test Voltage, Input/Output (Basic)	2250			VDC
Isolation Resistance	10			M Ω
Features				
Overtemperature Protection, Thermal Sensor, Auto-restart ²	98		105	$^\circ C$
Input, Output Ripple Frequency, Fixed		270		kHz

Notes:

1. Isolation: Output to Case = 2000VDC; Input to Case = 1000VDC; Input to Output = 2250VDC

2. PCB less than 130 $^\circ C$

GENERAL SPECIFICATIONS

Operating Temperature	-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	TBD	
MTBF	BELLCORE TR-332	1,600,000 hours

APPROVALS AND STANDARDS

UL and c-UL Recognized Component, TUV, UL1950, 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.

APPLICATION NOTES

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

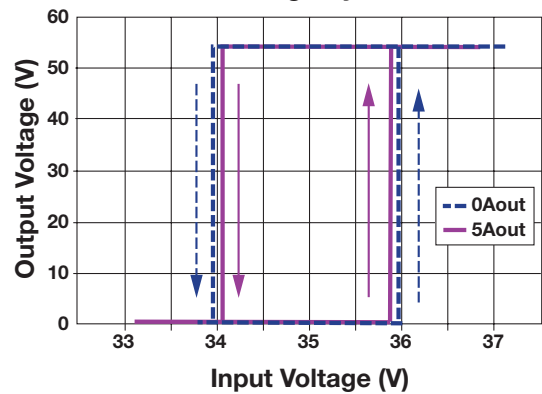
Valid Input Voltage Range:

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.

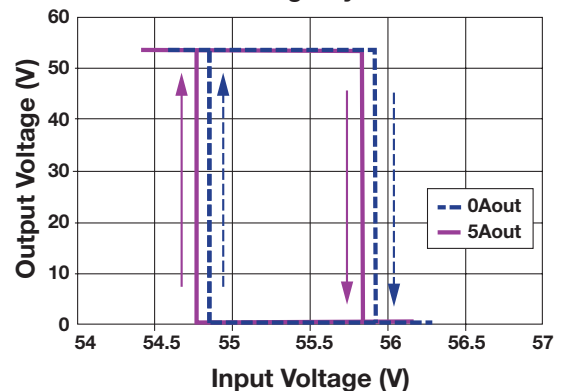
ON/OFF Logic Option:

The ON/OFF control logic can be either Negative (standard) or Positive to enable the converter. For Negative logic, bring the ON/OFF pin to less than 1.0V with respect to the -INPUT pin to enable the converter. The pull-down must be able to sink 100 μ A. For Positive logic, bring the ON/OFF pin to greater than 4.0V with respect to the -INPUT pin and be limited to less than 10V. To request the Positive logic version, add the suffix (P) to the standard part number. The ON/OFF pin has a built-in pull up resistor of approximately 100k Ω to +5V.

Undervoltage Hysteresis



Overvoltage Hysteresis



APPLICATION NOTES

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 on the ON/OFF pin or power to the converter. This advanced 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 baseplate temperature is monitored with a PTC thermal sensor. If the maximum rated temperature is exceeded, the converter behaves as described in the specifications (latch or auto-restart). If the converter is the latching type, it is re-enabled by either cycling the power or enable ON/OFF. If the converter is the non-latching type, it will restart when the temperature decreases below the trip point and no less than 2 seconds, whichever occurs later.

Control Options:

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

- 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.

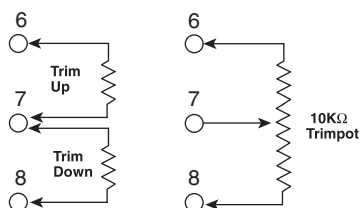
The standard behavior was chosen based on system design experience but we understand that customers often have their own requirements.

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 1V.

External Output Trimming

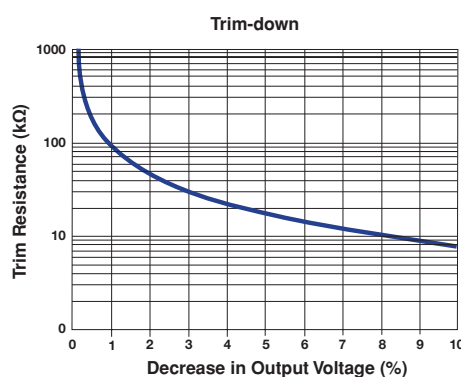


Safety:

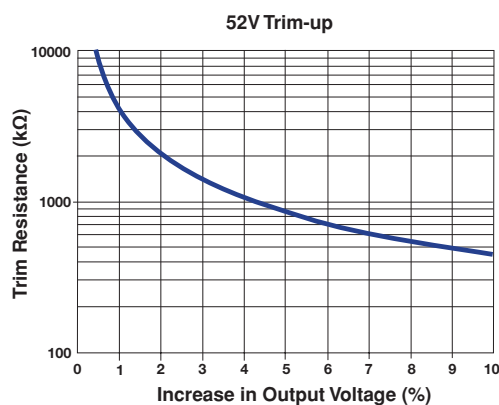
An external input fuse must always be used to meet these safety requirements.

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.

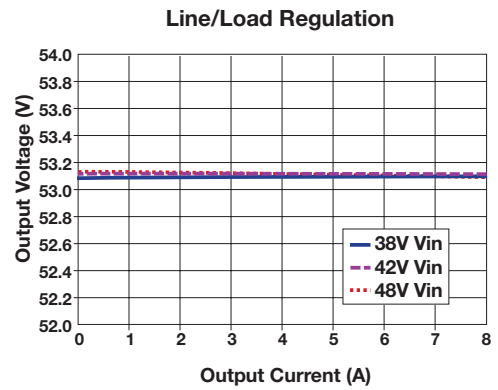
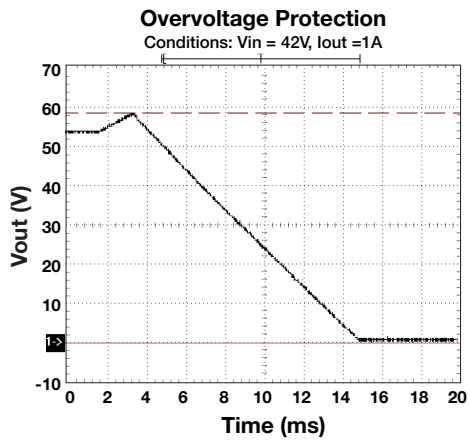
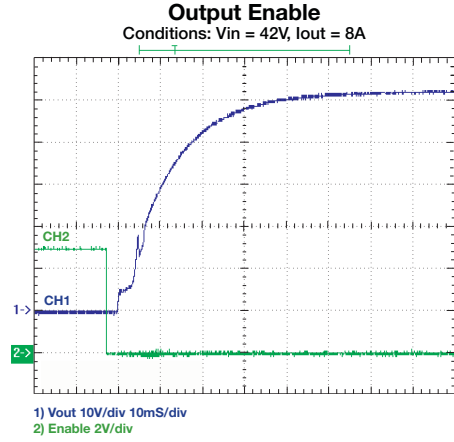
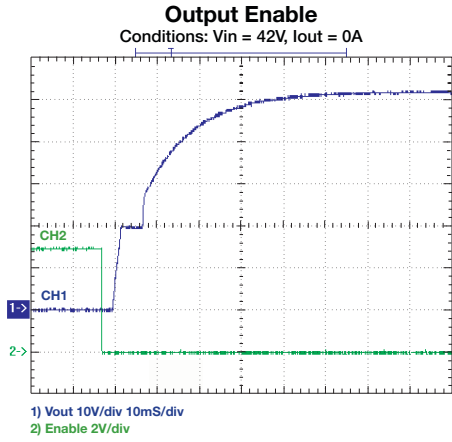
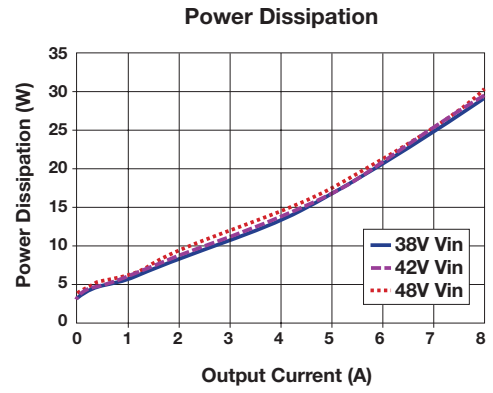
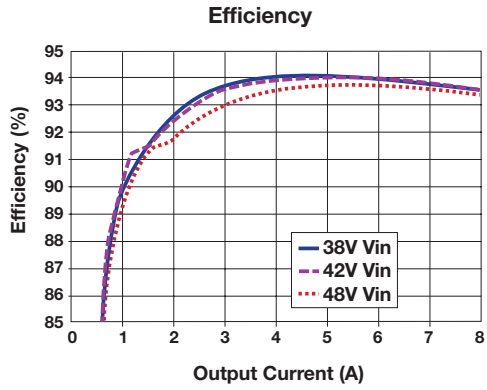


$$R_{\text{TRIM-DOWN}} = \left\{ \frac{100}{\Delta\%} - 2 \right\} \text{ k}\Omega$$



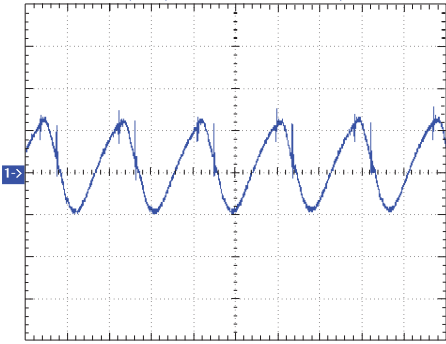
$$R_{\text{TRIM-UP}} = \left\{ \frac{V_o (100 + \Delta\%)}{1.225\Delta\%} - \frac{(100 + 2\Delta\%)}{\Delta\%} \right\} \text{ k}\Omega$$

GHBW53V08 OPERATION



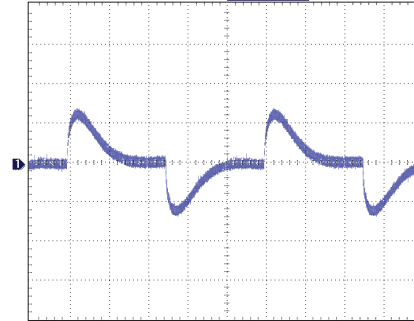
GHBW53V08 OPERATION

Voltage Ripple
Conditions: $V_{in} = 42V$, $I_{out} = 8A$



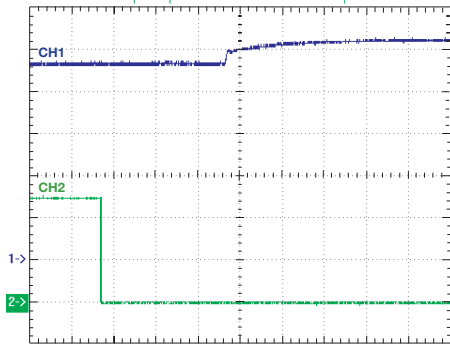
1) $V_{out} 50mV/div$ $2\mu S/div$
180 μF ext Cap, 20MHz BW

Transient Response
 $V_{in} = 42V$, Step load 2A-6A @1A/ μS



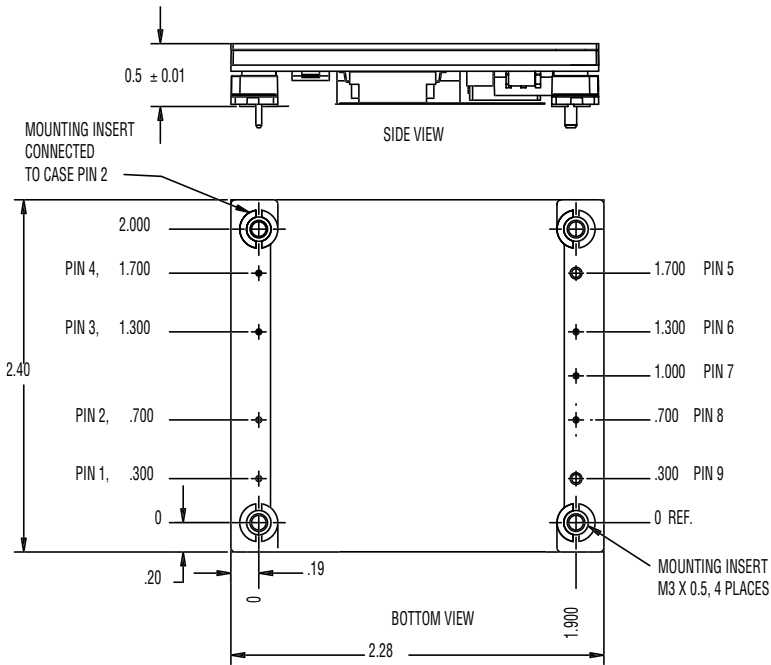
1) $V_{out} 500mV/div$ $400\mu S/div$

Back Bias



1) $V_{out} 10V/div$ $10mS/div$
2) Enable $2V/div$

PACKAGE DETAIL



Pin Configuration —

Bottom View

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

Notes:

- Mechanical tolerances
x.xxx in. = ± 0.005 in.
x.xx in. = ± 0.01 in.
- Pin material: brass with tin/lead plating over nickel
- Workmanship: Meets or exceeds IPC-A-610B Class II
- Min. screw length for heatsink attachment
 = 4.5mm + heatsink flange + locking hardware.

ORDERING INFORMATION

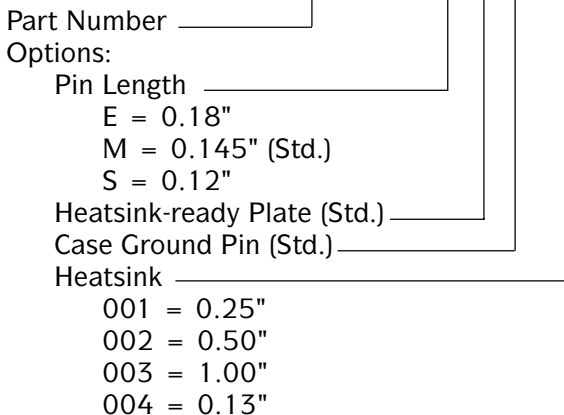
Part Number	Input Voltage	Output Voltage	Max Current
GHBW53V08*	48V	53V	8A

* Options:

- E = 0.18" Pins (± .01")
- M = 0.145" Pins (± .01")(Std.)
- S = 0.12" Pins (± .01")

Example Part Number:

GHBW53V08 M R G -00X



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