DORADO HV DC/DC CONVERTER
48V Input – 34VDC – 3A Output

bel POWER PRODUCTS

GLDW34V03

GLDW34V03 – 1/4 Brick Dorado HV

- Industry standard pinout and footprint
- High efficiency: 87% at 34V, 3A; 89% at 34V, 1.5A
- Droop feature allows current sharing
- Very low common-mode noise for a commercial DC/DC converter
- Two-stage input filter
- Constant switching frequency
- Remote sense
- Single board design
- Optional low profile heat sink for improved thermal performance
- Header with M3 metal inserts for mechanical connection to PCB



Control Functions

- Compatible with fan turn-on requirements
- Designed to be stable with high capacitance load
- Uses innovative control and power topology for lower parts count
- Microprocessor controlled
- Primary-side enable, choice of logic

Protection Features

- Over temperature protection
- Over voltage protection
- Over current protection
- Over/Under input voltage protection

Typical Characteristics

- Output setpoint accuracy: ± 0.2%
- Load regulation: – 0.77V/A untrimmed
- Line regulation: ± 0.2%
- Low output ripple
- Output trim

ISO 9001 CERTIFIED ORGANISATION

Certified to ISO 9001:2000

Ordering Information

Standard Model Number	Input Voltage	Output Voltage	Max Current
GLDW34V03*	48V	34V	3A

* **Options:**

P = Positive Logic Version; High = On

E = 0.18" Pins (± .01")
M = 0.145" Pins (± .01")

S = 0.12" Pins (± .01")
R = Heat Sink-Ready

Example Part Number:
(All options)

GLDW34V03 PSR 00X 123

Part Number
Options:
- Positive Logic Version
- Optional Pin Lengths
  - **E** = 0.18"
  - **M** = 0.145"
  - **S** = 0.12"
- Heat Sink-Ready
- Heat Sink
  - 001 = 0.25"
  - 002 = 0.50"
  - 003 = 1.00"
  - 004 = 0.13"
- Latched
  - OVP and OTP latch immediately
  - OCP latches after 3 seconds

Dorado HV Heat Sink Part Numbers

Part Number	Height	Typical Thermal Performance: Natural Convection Power Dissipation†	Typical Thermal Performance: 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 heat sink to ambient ‡ @ 300'/min.

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Input Specifications

Parameter	Min	Typical	Max	Units
Operating Input Voltage	36	48	75	V_{DC}
Input Current			4	A
Input Capacitance		2		µF
Maximum Turn-on Voltage			35.5	V
Minimum Turn-on Voltage	30.0			V
Input Hysteresis, Low Line		2		V_{DC}

V_{IN} = 48V_{DC}, T_A@25˚ C, 300 LFM Airflow, V_{OUT} = 34V_{DC}, I_{OUT} = 68µF electrolytic capacitor across output pins. Available output power depends on ambient temperature and good thermal management. (See application graphs for limits.)

Output Specifications

Parameter	Min	Typical	Max	Units
Output Voltage/Trim Range[1]	16.5		35.5	V_{DC}
Remote Sense Compensation			1	V
Regulation Over Line, Load & Temperature	97		103	$\%V_{NOM}$
Voltage Ripple			30	mV_{RMS}
Current Range – Trimmed to 26V	0		3.6	A
Current Range – Untrimmed	0		3	A
Current Limit Inception[2]	110	130		$\%I_{OUT}$
Turn-on Time to 98% Vnom			400	mS
Output Overshoot at Turn-on			1	$\%V_{OUT}$
Over Voltage Protection		115		$\%V_{OUT}$

1. Trimming is realized by connecting an external resistor between “trim” pin and “–sense” pin. See graph and formula on page 4.
2. Current limit inception is output voltage dependent. See Current Limit Graph on page 5.

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Isolation Specifications

Parameter	Min	Typical	Max	Units
Isolation Test Voltage, Input/Baseplate/Output (Basic)	2000			V_{DC}
Isolation Resistance	10			MΩ

Features

Parameter	Min	Typical	Max	Units
Over Temperature Protection, Thermal Sensor[3]			117	° C
Switching Frequency, Fixed		333		kHz

3. PCB less than 130° C.

General Specifications

Operating Temperature	-40° C to + 100° C
Storge Temperature	-55° C + 125° C
Relative Humidity	10% to 95% RH, Non-condensing
Vibration	2 to 9 Hz, 3mm disp., 9 to 200 Hz, 1g
Material Flammability	UL V-0
Weight	35 grams
MTBF Telcordia (Bellcore)	1.6 million hours

Approvals and Standards

UL and c-UL Recognized Component, TUV, UL60950, CSA 22.2 No. 950, IEC/EN 60950**

EMC Characteristics:

Designed to meet emission and immunity requirements per EN55022, CISPR 22, Class B, and CISPR 24.

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

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Application Notes

CoolConverter™

Bel Power's Proprietary CoolConverter™

- Patented 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.
- Low common-mode noise as a result of lower capacitance in the transformer compared to planar magnetics and metal baseplate designs.
- Higher reliability than planar transformer designs that can suffer from via fatigue from thermal cycling, and metal baseplate designs with board to board interconnects that are subject to mechanical stress on electrical connections.

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.

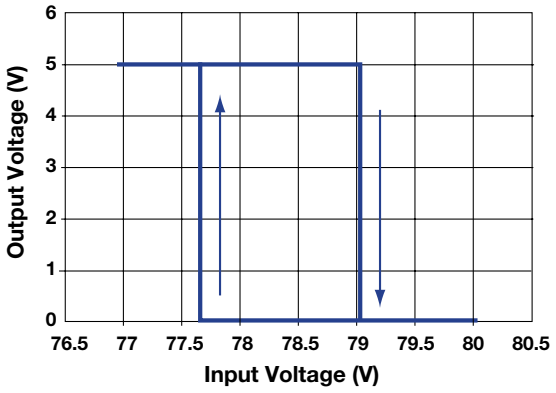
ON/OFF Logic Option

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 to below 1.0V with respect to the –INPUT pin to enable the converter. The pull-down must be able to sink 100µA. For Positive logic, the ON/OFF pin is brought 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 100kΩ to +5V.

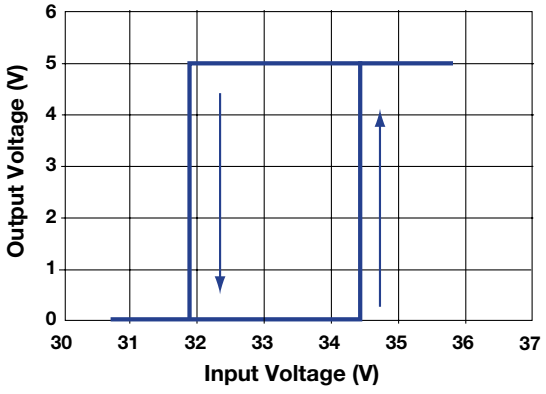
Output Over Voltage Protection

The output voltage is monitored by a redundant secondary-side circuit. If the ouput voltage exceeds the over voltage specification, the microprocessor will restart every 2 seconds and limit voltage with a separate reference circuit. This advanced feature prevents the converter from damaging the load if there is a converter failure or application error. Latching is available as an option.

Over Voltage Hysteresis



Under Voltage Hysteresis



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CoolConverter™

Protection and Control

Over Current Protection
If over current lasts more than 2 seconds the converter will shut down and try to restart every 10 seconds until the fault is removed. Latching is available as an option.

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.

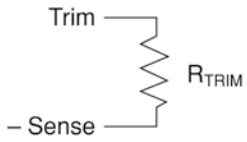
Remote Sense
The output voltage is regulated at the point where the sense pins connect to the power output pins. Total sense compensation should not exceed 0.4V or 2% of Vout, whichever is greater.

Sharing
Two modules can passively share a common load of 2 - 6A at 60/40% maximum imbalance with diode ORing when their output voltages are controlled with a common control on the trim pins, from 17V to 32V output range.

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

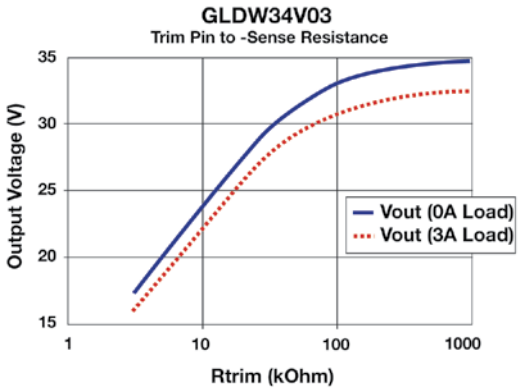
External Output Trimming

Resistor



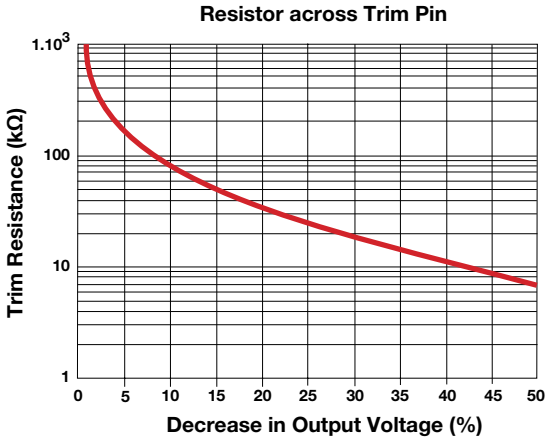
Trim-up

$$R_{TRIM\text{-}UP} = \left\{ \frac{6.2V_{OUT}\,(V)}{14.02\,(2.5 - 0.055\,I_{OUT}\,(A) - V_{OUT}\,(V)} \right\} - 3\ k\Omega$$



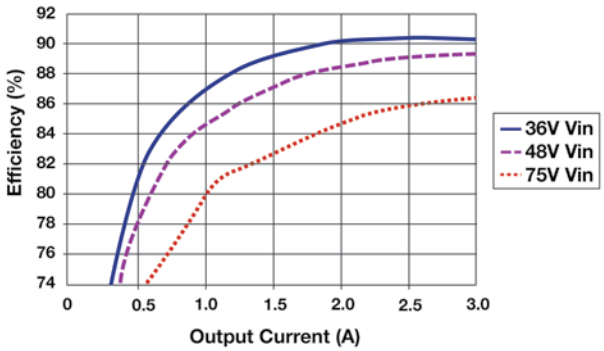
Trim-down

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

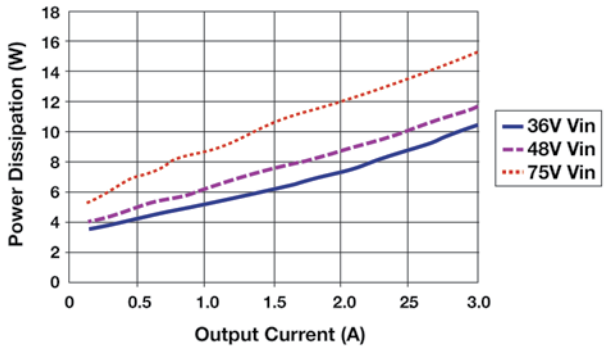


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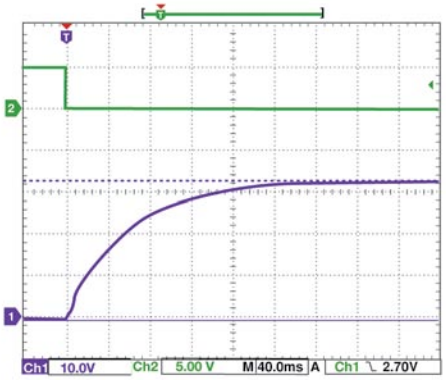
Efficiency Data



Power Dissipation

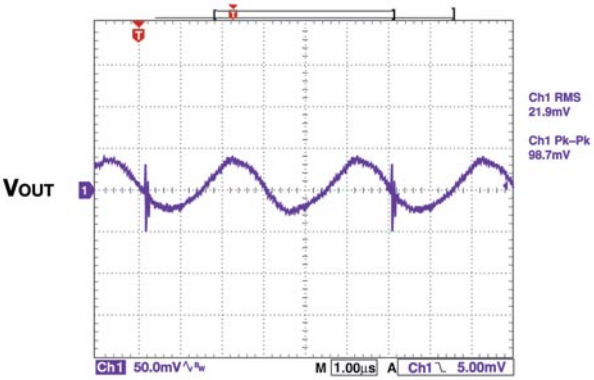


Start Up



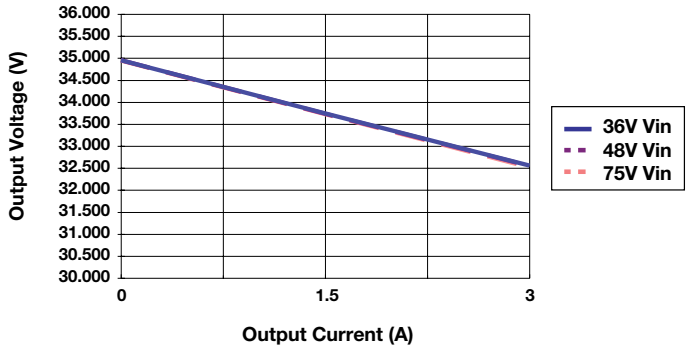
1. V_{OUT} 10V/div 40mS/div
2. Enable 5V/div

Voltage Ripple

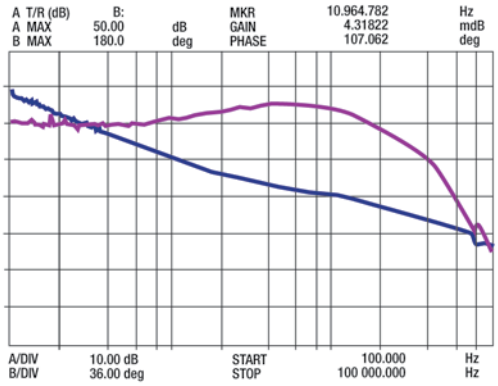


1. V_{OUT} 50mV/div 1µS/div

Line/Load Regulation

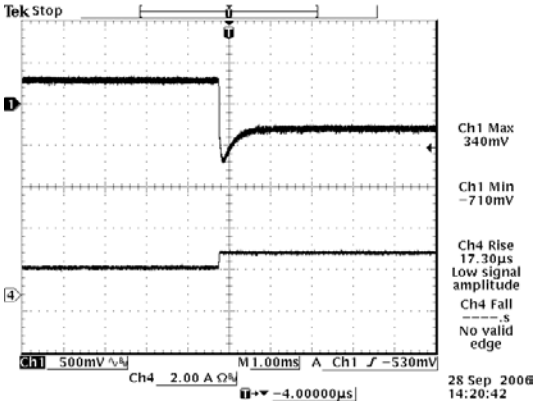


Bode Plot



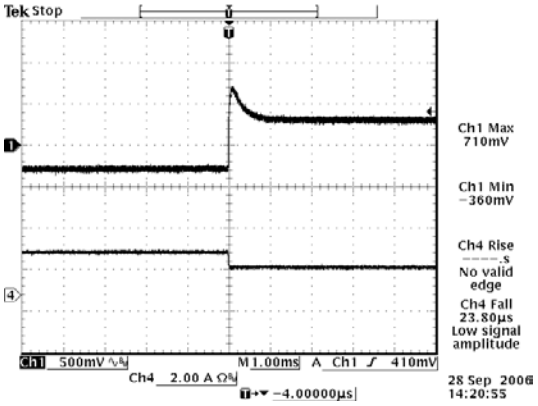
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Transient Response



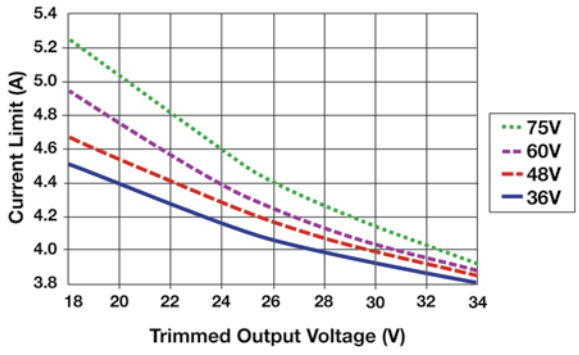
50% to 75% Load Transients
at V_{IN} = 48V@T_A = 25˚C

Transient Response

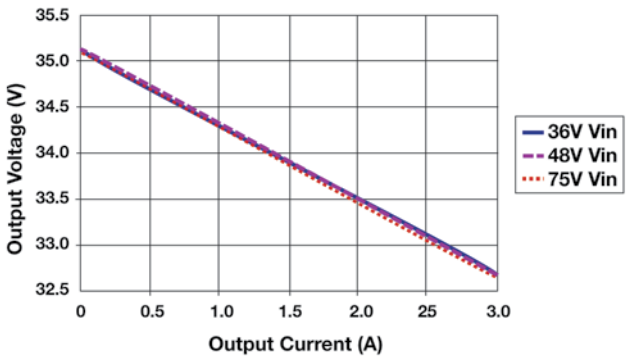


75% to 50% Load Transients
at V_{IN} = 48V@T_A = 25˚C

Current Limit vs. Line/Trim Voltage



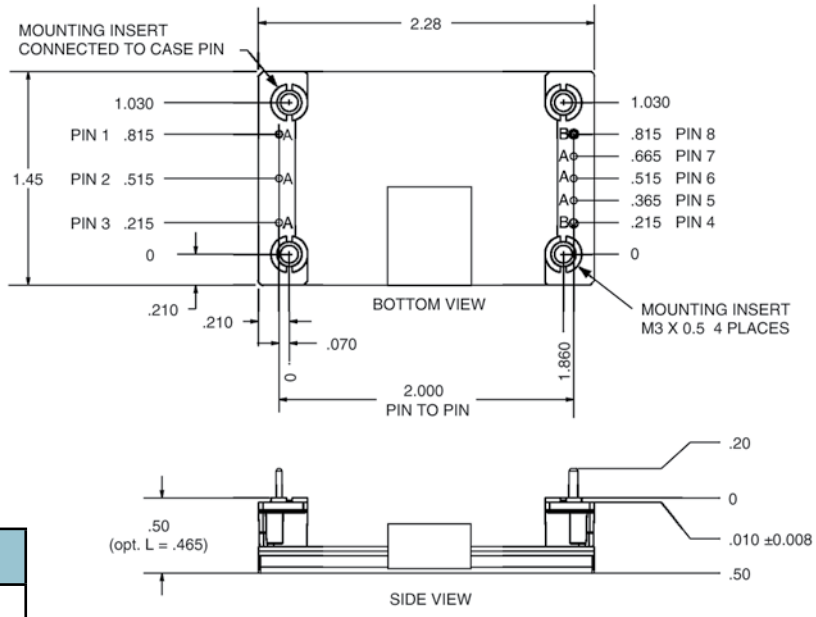
Setpoint vs. Line/Load



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Mechanical

GLDW34V03



Pin Configuration – Bottom View

Pin	Function	Pin Dia. (In.)
1	– Input	0.040
2	On/Off	0.040
3	+ Input	0.040
4	+ Output	0.060
5	+ Sense	0.040
6	Trim	0.040
7	– Sense	0.040*
8	– Output	0.060

* Connected to –Output internally.

Notes:
1. Mechanical tolerances
   x.xxx in. = ± 0.005 in.
   x.xx in = ± 0.01 in.
2. Pin material: Brass with tin/lead plating over nickel
3. Workmanship: Meets or exceeds IPC-A-610B Class II
4. "A" = 0.040" dia. pins
5. "B" = 0.060" dia. pins

RoHS Compliance
Complies with the European Directive 2002/95/EC, calling for the elimination of lead and other hazardous substances from electronic products. These parts are not however compatible with the higher temperatures associated with lead free solder processes and must be soldered using a reflow profile with a peak temperature of no more than 240˚C.

RoHS 2002/95/EC

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