

Description

The ZBE12A8 PWM servo drive is designed to drive brushless DC motors at a high switching frequency. The drive is fully protected against over-voltage, under-voltage, over-current, over-heating, and short-circuits at the output. A single digital output indicates operating status. This drive can interface with any controller that has analog $\pm 10V$ output and may be powered by a single unregulated and isolated DC power supply.

Power Range

Peak Current	12 A
Continuous Current	6 A
Supply Voltage	20 - 80 VDC

**Features**

- ▲ Four quadrant regenerative operation
- ▲ Compact size, high power density
- ▲ DIP switch selectable modes

MODES OF OPERATION

- Current
- Open Loop
- Encoder Velocity

COMMAND SOURCE

- $\pm 10 V$ Analog

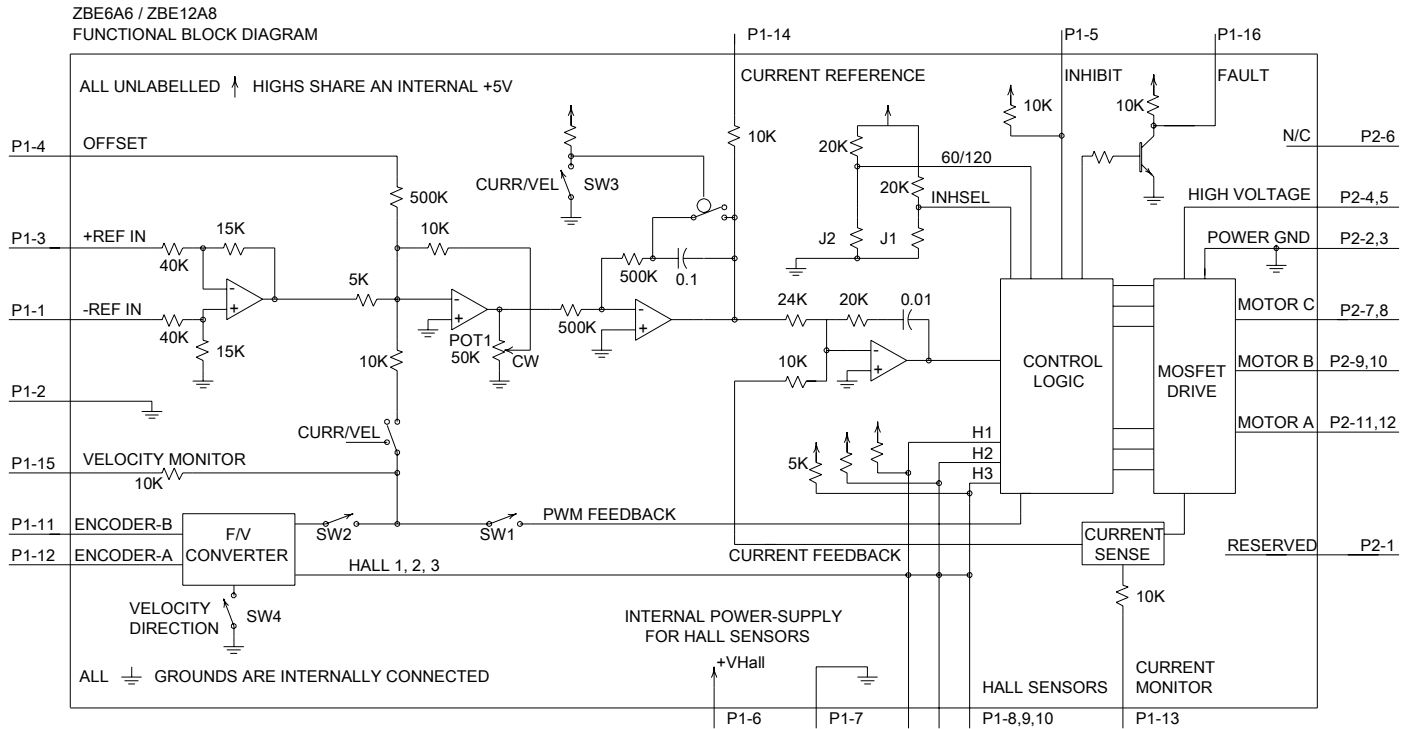
FEEDBACK SUPPORTED

- Halls
- Incremental Encoder

COMPLIANCES & AGENCY APPROVALS

- RoHS
- UL/cUL Pending
- CE Pending

BLOCK DIAGRAM



MODE SELECTION TABLE	SW1	SW2	SW3
CURRENT	OFF	ON	ON
OPEN-LOOP	ON	OFF	OFF
ENCODER VELOCITY	OFF	ON	OFF

NOTES:
 - RECOMMENDED SETTING FOR CURRENT MODE: POT 1 FULLY CCW.
 - AMPLIFIERS ARE SHIPPED IN CURRENT MODE WITH MAXIMUM CURRENT SETTINGS.

Approvals and Compliances

	US and Canadian safety compliance with UL 508c, the industrial standard for power conversion electronics. UL registered under file number E140173. Note that machine components compliant with UL are considered UL registered as opposed to UL listed as would be the case for commercial products.
	Compliant with European CE for both the Class A EMC Directive 89/336/EEC on Electromagnetic Compatibility (specifically EN 61000-6-4:2001, EN 61000-6-2:2001, EN 61000-3-2:2000, and EN 61000-3-3:1995/A1:2001) and LVD requirements of directive 73/23/EEC (specifically EN 60204-1), a low voltage directive to protect users from electrical shock.
	RoHS (Reduction of Hazardous Substances) is intended to prevent hazardous substances such as lead from being manufactured in electrical and electronic equipment.

SPECIFICATIONS

Power Stage Specifications		
Description	Units	Value
DC Supply Voltage	VDC	20 - 80
Over Voltage Limit	VDC	86
Peak Output Current ¹	A	12
Maximum Continuous Output Current	A	6
Maximum Power Dissipation at Continuous Current	W	24
Minimum Load Inductance (Line-To-Line) ²	μH	100
Switching Frequency	kHz	32
Control Specifications		
Description	Units	Value
Command Sources	-	±10 V Analog
Feedback Supported	-	Halls, Incremental Encoder
Commutation Methods	-	External, Trapezoidal
Modes of Operation	-	Current, Encoder Velocity, Open Loop
Hardware Protection	-	Over Current, Over Temperature, Over Voltage, Short Circuit (Phase-Phase & Phase-Ground)
Current Loop Sample Time	μs	31.3
Mechanical Specifications		
Description	Units	Value
Size (H x W x L)	mm (in)	27.7 x 50.8 x 68.6 (1.1 x 2 x 2.7)
Heatsink (Base) Temperature Range ³	°C (°F)	0 - 65 (32 - 149)
P1 Connector	-	16-pin, 2.54 mm spaced header
P2 Connector	-	12-pin, 2.54 mm spaced header

Notes

1. Maximum duration of peak current is ~2 seconds.
2. Low inductance motors, such as 'pancake' and 'basket-wound', require external inductors. The Minimum Load Inductance provided assumes the highest allowed bus voltage. Lower inductances are acceptable for lower bus voltages.
3. Additional cooling and/or heatsink may be required to achieve rated performance.

PIN FUNCTIONS

P1 - Signal Connector			
Pin	Name	Description / Notes	I/O
1	+REF IN	Differential Reference Input (± 10 V Operating Range, ± 15 V Maximum Input)	I
2	SIGNAL GND	Signal Ground	SGND
3	-REF IN	Differential Reference Input (± 10 V Operating Range, ± 15 V Maximum Input)	I
4	OFFSET	Connection to external resistance for command offset adjustments.	-
5	$\overline{\text{INHIBIT IN}}$	TTL level (+5 V) inhibit/enable input. Leave open to enable drive. Pull to ground to inhibit drive. Inhibit turns off all power devices.	I
6	+V HALL OUT	Low Power Supply For Hall Sensors (+6 V @ 30 mA). Referenced to signal ground. Short circuit protected.	O
7	SIGNAL GND	Signal Ground	SGND
8	HALL 1	Single-ended Hall/Commutation Sensor Inputs (+5 V logic level)	I
9	HALL 2		I
10	HALL 3		I
11	ENCODER-B IN	Single-ended encoder channel B input. +5 V logic level.	I
12	ENCODER-A IN	Single-ended encoder channel A input. +5 V logic level.	I
13	CURRENT MONITOR	Current Monitor. Analog output signal proportional to the actual current output. Scaling is 3.92 A/V by default but may be set to half this value if the drive has a Current Scaling switch. Measure relative to signal ground.	O
14	CURRENT REFERENCE	Measures the command signal to the internal current-loop. This pin has a maximum output of $\pm TBA$ when the drive outputs maximum peak current.	O
15	VELOCITY MONITOR	When used in current or encoder velocity mode, voltage is proportional to the speed of the motor. In open-loop mode, voltage is proportional to the PWM duty cycle. Encoder F/V scaling: TBA	O
16	FAULT OUT	TTL level (+5 V) output becomes high when power devices are disabled due to at least one of the following conditions: inhibit, invalid Hall state, output short circuit, over voltage, over temperature, power-up reset.	O

P2 - Power Connector			
Pin	Name	Description / Notes	I/O
1	RESERVED	Reserved	-
2	PWR GND	Power Ground (Common With Signal Ground). 3A Continuous Current Rating Per Pin.	PGND
3	PWR GND	Power Ground (Common With Signal Ground). 3A Continuous Current Rating Per Pin.	PGND
4	HIGH VOLTAGE	DC Power Input. 3A Continuous Current Rating Per Pin.	I
5	HIGH VOLTAGE	DC Power Input. 3A Continuous Current Rating Per Pin.	I
6	RESERVED	Reserved	-
7	MOTOR C	Motor Phase C. 3A Continuous Current Rating Per Pin.	O
8	MOTOR C	Motor Phase C. 3A Continuous Current Rating Per Pin.	O
9	MOTOR B	Motor Phase B. 3A Continuous Current Rating Per Pin.	O
10	MOTOR B	Motor Phase B. 3A Continuous Current Rating Per Pin.	O
11	MOTOR A	Motor Phase A. 3A Continuous Current Rating Per Pin.	O
12	MOTOR A	Motor Phase A. 3A Continuous Current Rating Per Pin.	O

HARDWARE SETTINGS

Switch Functions

Switch	Description	Setting	
		On	Off
1	Open-loop mode selector. Activates internal PWM feedback.	Open-loop mode	Other modes
2	Activate velocity feedback or monitor. For encoder velocity mode, activates feedback. For current mode, activates velocity monitor.	Active	Inactive
3	Current mode selector.	Current mode	Other modes
4	Velocity feedback polarity.	Standard	Inverted

Potentiometer Functions

Potentiometer	Description	Turning CCW
1	Loop gain adjustment for voltage/velocity modes. Turn this pot fully ccw in current mode.	Increases gain

MECHANICAL INFORMATION

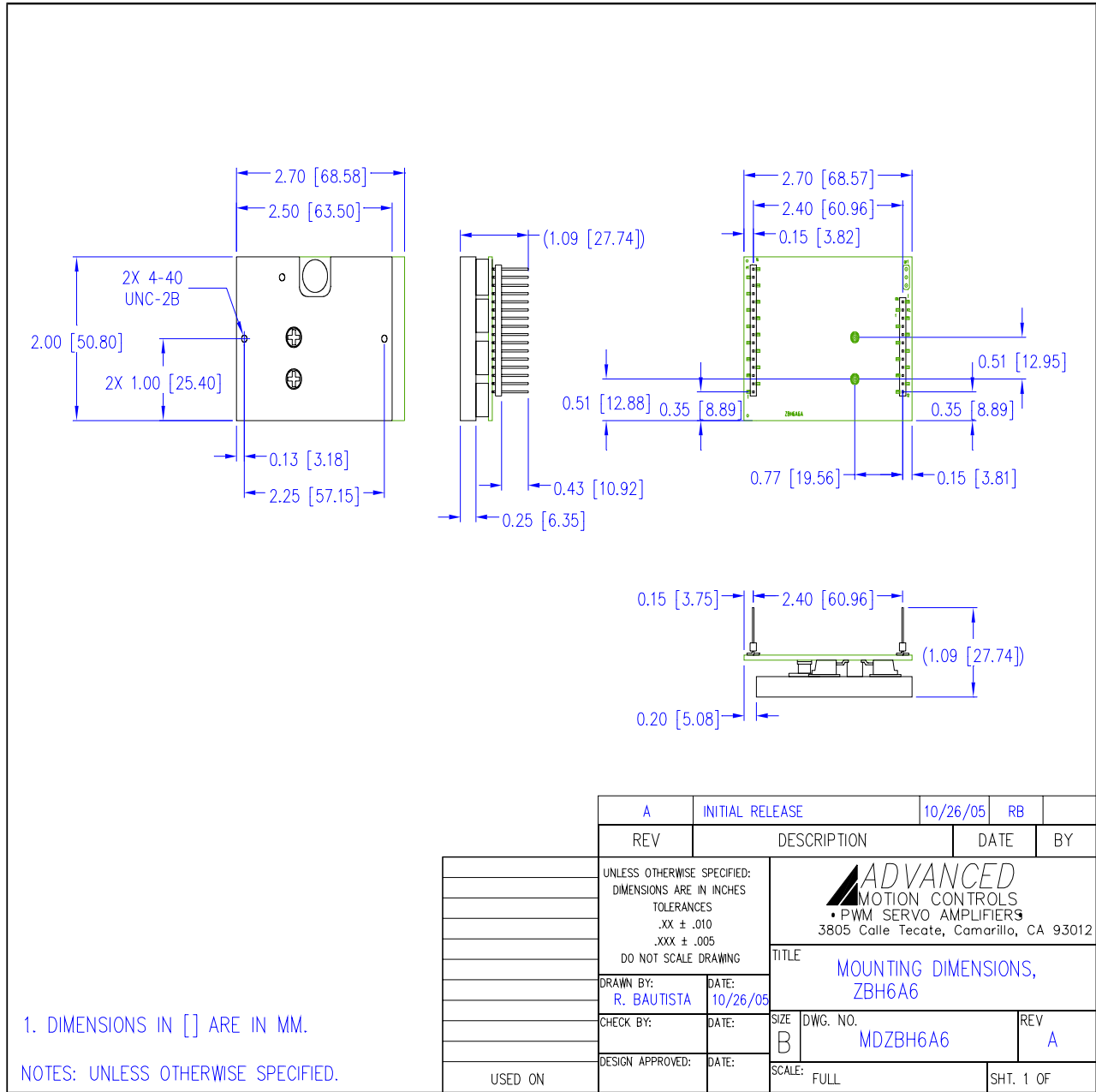
P1 - Signal Connector

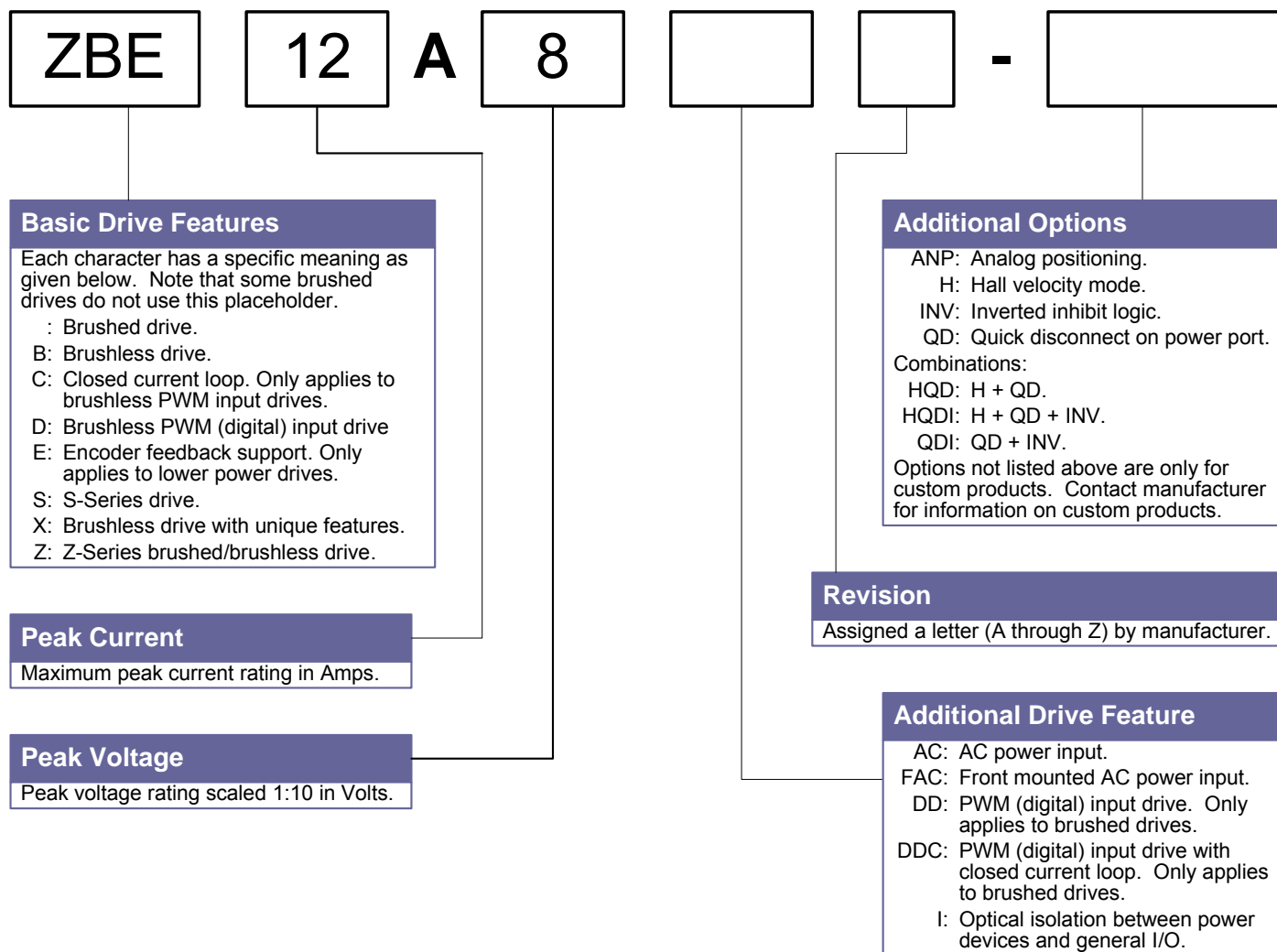
Connector Information	16-pin, 2.54 mm spaced header
Mating Connector	Samtec: BCS-116-L-S-PE

P2 - Power Connector

Connector Information	12-pin, 2.54 mm spaced header
Mating Connector	Samtec: BCS-112-L-S-PE

MOUNTING DIMENSIONS



PART NUMBERING INFORMATION


DigiFlex® Performance™ series of products are available in many configurations. All models listed on the website are readily available, standard product offerings. Other combinations or possibilities can be made available for OEMs with volume requests of 100 or more. Contact Applications Engineering for further information and details.

All specifications in this document are subject to change without written notice. Actual product may differ from pictures provided in this document.