

Description

The DZXCANTE-008L080 digital servo drive is designed to drive brushed and brushless servomotors, stepper motors, and AC induction motors from a compact form factor ideal for embedded applications. This fully digital drive operates in torque, velocity, or position mode and employs Space Vector Modulation (SVM), which results in higher bus voltage utilization and reduced heat dissipation compared to traditional PWM. The drive can be configured for a variety of external command signals. Commands can also be configured using the drive's built-in Motion Engine, an internal motion controller used with distributed motion applications. In addition to motor control, this drive features dedicated and programmable digital and analog inputs and outputs to enhance interfacing with external controllers and devices.

The DZXCANTE-008L080 features a single RS232 interface used for drive configuration and setup. The CANopen interface can be used for online operation in networked applications. Drive commissioning is accomplished using DriveWare® 7, available for download at www.a-m-c.com. The DZX Hardware Installation Manual is available for download from www.a-m-c.com. All drive and motor parameters are stored in non-volatile memory.

The DZXCANTE-008L080 conforms to the following specifications and is designed to the Environmental Engineering Considerations as defined in MIL-STD-810F.

Extended Environment Performance

Ambient Temperature	-40°C to +75°C (-40°F to +167°F)
Storage Temperature	-50°C to +100°C (-58°F to +212°F)
Thermal Shock	-40°C to +75°C (-40°F to +167°F) in 2 min.
Relative Humidity	0 to 95% Non-Condensing
Vibration	30 Grms for 5 min. in 3 axes

Power Range

Peak Current	8 A (5.7 A _{RMS})
Continuous Current	4 A (4 A _{RMS})
Supply Voltage	10 - 80 VDC


CANopen
Features

- ▲ Follows the CAN in Automation (CiA) 301 Communications Profile and 402 Device Profile
- ▲ Four Quadrant Regenerative Operation
- ▲ Space Vector Modulation (SVM) Technology
- ▲ Fully Digital State-of-the-art Design
- ▲ Programmable Gain Settings
- ▲ Fully Configurable Current, Voltage, Velocity and Position Limits
- ▲ PIDF Velocity Loop
- ▲ PID + FF Position Loop
- ▲ 12-bit Analog to Digital Hardware
- ▲ On-the-Fly Mode and Gain Set Switching

MODES OF OPERATION

- Profile Modes
- Cyclic Synchronous Modes
- Current
- Velocity
- Position
- Interpolated Position Mode (PVT)

COMMAND SOURCE

- ±10 V Analog
- PWM and Direction
- Encoder Following
- Over the Network
- Sequencing
- Indexing
- Jogging

FEEDBACK SUPPORTED

- ±10 VDC Position
- Halls
- Incremental Encoder
- Auxiliary Incremental Encoder
- Tachometer (±10 VDC)

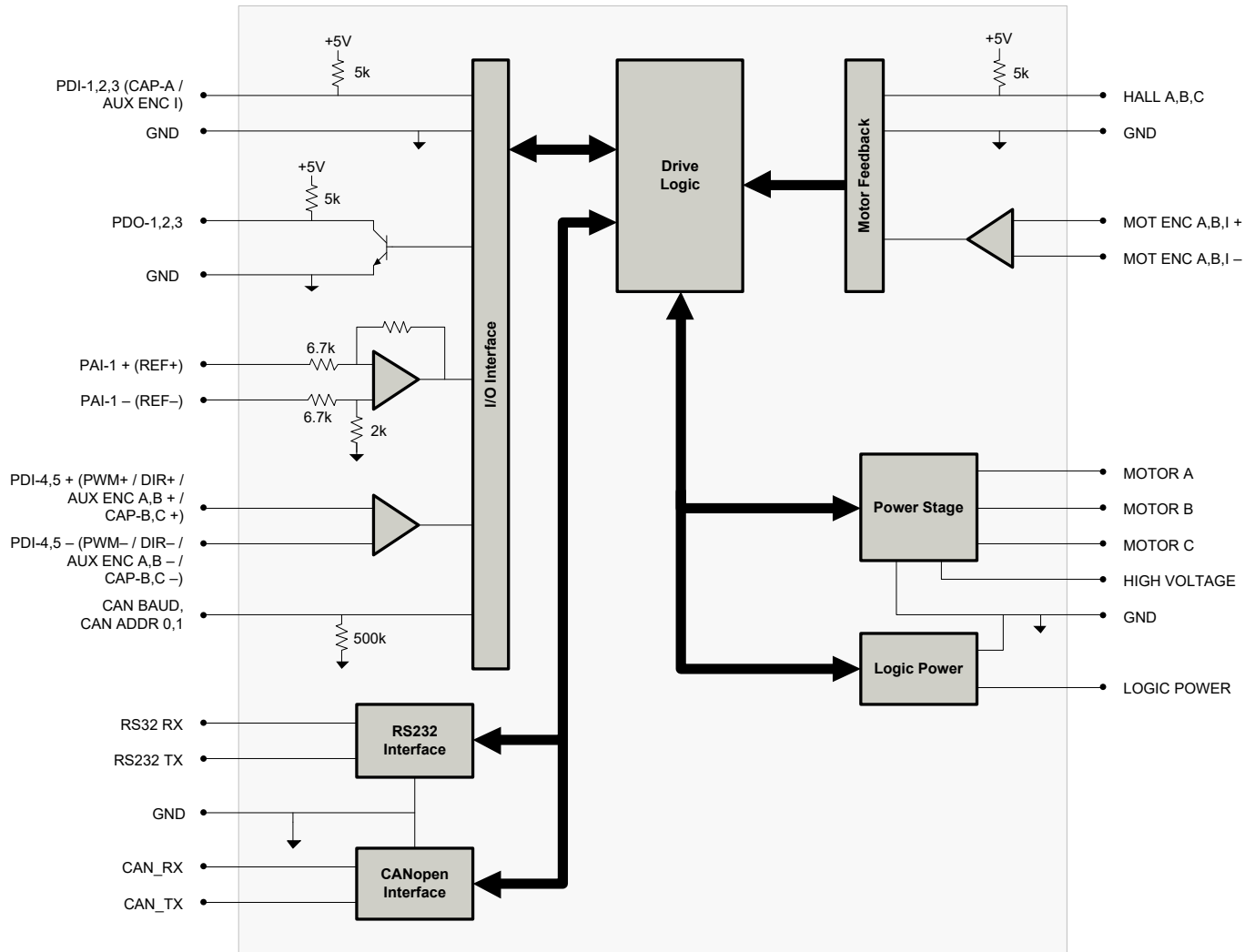
INPUTS/OUTPUTS

- 3 High Speed Captures
- 1 Programmable Analog Input (12-bit Resolution)
- 2 Programmable Digital Inputs (Differential)
- 3 Programmable Digital Inputs (Single-Ended)
- 3 Programmable Digital Outputs (Single-Ended)




AGENCY APPROVALS & COMPLIANCE CONSIDERATIONS

- RoHS
- MIL-STD-810F (as stated)
- MIL-STD-1275D (optional)
- MIL-STD-461E (optional)
- MIL-STD-704F (optional)
- MIL-HDBK-217 (optional)
- UL / cUL
- CE Class A (LVD)
- CE Class A (EMC)

BLOCK DIAGRAM



Information on Approvals and Compliances

MIL-STD-810F	Environmental Engineering Considerations and Laboratory Tests – (as stated)
MIL-STD-1275D	Characteristics of 28 Volt DC Electrical Systems in Military Vehicles – (optional)
MIL-STD-461E	Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment – (optional)
MIL-STD-704F	Aircraft Electric Power Characteristics – (optional)
MIL-HDBK-217	Reliability Prediction of Electronic Equipment (MTBF) – (optional)
	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 EMC Directive 2014/30/EU on Electromagnetic Compatibility (specifically EN 61000-6-4:2007/A1:2011 for Emissions, Class A and EN 61000-6-2:2005 for Immunity, Performance Criteria A). LVD requirements of Directive 2014/35/EU (specifically, EN 60204-1:2006/A1:2009, a Low Voltage Directive to protect users from electrical shock).
	The RoHS Directive restricts the use of certain substances including lead, mercury, cadmium, hexavalent chromium and halogenated flame retardants PBB and PBDE in electronic equipment.

SPECIFICATIONS

Power Specifications		
Description	Units	Value
DC Supply Voltage Range	VDC	10 - 80
DC Bus Over Voltage Limit	VDC	88
DC Bus Under Voltage Limit	VDC	8
Logic Supply Voltage	VDC	5 (+/- 5%)
Maximum Peak Output Current ¹	A (Arms)	8 (5.7)
Maximum Continuous Output Current ²	A (Arms)	4 (4)
Maximum Continuous Output Power	W	304
Maximum Power Dissipation at Continuous Current	W	16
Internal Bus Capacitance ³	µF	20
Minimum Load Inductance (Line-To-Line) ⁴	µH	250 (at 80 V supply); 150 (at 48 V supply); 75 (at 24 V supply)
Switching Frequency	kHz	20
Maximum Output PWM Duty Cycle	%	92
Control Specifications		
Description	Units	Value
Communication Interfaces	-	CANopen (RS-232 for configuration)
Command Sources	-	±10 V Analog, Encoder Following, Over the Network, PWM and Direction, Sequencing, Indexing, Jogging
Feedback Supported	-	±10 VDC Position, Auxiliary Incremental Encoder, Halls, Incremental Encoder, Tachometer (±10 VDC)
Commutation Methods	-	Sinusoidal, Trapezoidal
Modes of Operation	-	Profile Modes, Cyclic Synchronous Modes, Current, Velocity, Position, Interpolated Position Mode (PVT)
Motors Supported ⁵	-	Three Phase (Brushless Servo), Single Phase (Brushed Servo, Voice Coil, Inductive Load), Stepper (2- or 3-Phase Closed Loop), AC Induction (Closed Loop Vector)
Hardware Protection	-	40+ Configurable Functions, Over Current, Over Temperature (Drive & Motor), Over Voltage, Short Circuit (Phase-Phase & Phase-Ground), Under Voltage
Programmable Digital Inputs/Outputs (PDIs/PDOs)	-	5/3
Programmable Analog Inputs/Outputs (PAIs/PAOs)	-	1/0
Primary I/O Logic Level	-	5V TTL
Current Loop Sample Time	µs	50
Velocity Loop Sample Time	µs	100
Position Loop Sample Time	µs	100
Maximum Encoder Frequency	MHz	20 (5 pre-quadrature)
Mechanical Specifications		
Description	Units	Value
Agency Approvals	-	RoHS, MIL-STD-810F (as stated), MIL-STD-1275D (optional), MIL-STD-461E (optional), MIL-STD-704F (optional), MIL-HDBK-217 (optional), UL, cUL, CE Class A (LVD), CE Class A (EMC)
Size (H x W x D)	mm (in)	63.5 x 50.8 x 24.4 (2.5 x 2 x 1.0)
Weight	g (oz)	105 (3.7)
Baseplate Operating Temperature Range ⁶	°C (°F)	-40 - 85 (-40 - 185)
Ambient Temperature Range	°C (°F)	-40 - 75 (-40 - 167)
Storage Temperature Range	°C (°F)	-50 - 100 (-58 - 212)
Thermal Shock	°C (°F)	-40 - 75 (-40 - 167) in 2 minutes
Vibration	Grms	30 for 5 minutes in 3 axes
Relative Humidity	-	0 - 95% Non-Condensing
Cooling System	-	Natural Convection
Form Factor	-	PCB Mounted
P1 Connector	-	30-pin, 2.54 mm spaced, dual-row header
P2 Connector	-	24-pin, 2.54 mm spaced, dual-row header

Notes

1. Capable of supplying drive rated peak current for 2 seconds with 10 second foldback to continuous value. Longer times are possible with lower current limits.
2. Continuous A_{rms} value attainable when RMS Charge-Based Limiting is used.
3. It is recommended to connect a 100µF / 100V electrolytic capacitor between High Voltage and Power Ground.
4. Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
5. Maximum motor speed for stepper motors is 600 RPM. Consult the hardware installation manual for 2-phase stepper wiring configuration.
6. Additional cooling and/or heatsink may be required to achieve rated performance.

PIN FUNCTIONS

P1 - Signal Connector			
Pin	Name	Description / Notes	I/O
1	CAN ADDR 0	CAN Bus Address Selector	I
2	CAN ADDR 1		I
3	PAI-1 + (REF+)		I
4	PAI-1 - (REF-)		I
5	GND	Ground	GND
6	CAN BAUD	CAN bus bit rate selector.	I
7	PDO-1	Programmable Digital Output	O
8	PDO-2	Programmable Digital Output	O
9	PDO-3	Programmable Digital Output	O
10	PDI-1	Programmable Digital Input	I
11	PDI-2	Programmable Digital Input	I
12	PDI-3 (CAP-A / AUX ENC I)	Programmable Digital Input or High Speed Capture or Auxiliary Encoder Index	I
13	RS232 RX	Receive Line (RS-232)	I
14	CAN RX	CAN Receive Line (Requires External Transceiver)	I
15	RS232 TX	Transmit Line (RS-232)	O
16	CAN TX	CAN Transmit Line (Requires External Transceiver)	O
17	PDI-4 + (PWM+ / AUX ENC A+ / CAP-B+)	Programmable Digital Input or PWM or Auxiliary Encoder or High Speed Capture (For Single-Ended Signals see DZ HW Installation Manual)	I
18	PDI-4 - (PWM- / AUX ENC A- / CAP-B-)		I
19	PDI-5 + (DIR+ / AUX ENC B+ / CAP-C+)	Programmable Digital Input or Direction or Auxiliary Encoder or High Speed Capture (For Single-Ended Signals see DZ HW Installation Manual)	I
20	PDI-5 - (DIR- / AUX ENC B- / CAP-C-)		I
21	GND	Ground	GND
22	HALL A	Single-ended Commutation Sensor Input (For Differential Inputs See MC1XDZ02 Datasheet For Recommended Signal Conditioning)	I
23	HALL B		I
24	HALL C		I
25	MOT ENC I+	Differential Encoder Index Input (See MC1XDZ02 Datasheet For Recommended Signal Conditioning)	I
26	MOT ENC I-		I
27	MOT ENC A+	Differential Encoder A Channel Input (See MC1XDZ02 Datasheet For Recommended Signal Conditioning)	I
28	MOT ENC A-		I
29	MOT ENC B+	Differential Encoder B Channel Input (See MC1XDZ02 Datasheet For Recommended Signal Conditioning)	I
30	MOT ENC B-		I

P2 - Power Connector			
Pin	Name	Description / Notes	I/O
1a	LOGIC PWR	Logic Supply Input. Turn on the external logic supply first before turning on the main power supply.	I
1b	RESERVED	Reserved	-
2a	2b	GND	GND
3a	3b	GND	GND
4a	4b	HIGH VOLTAGE	I
5a	5b	HIGH VOLTAGE	I
6a	6b	RESERVED	-
7a	7b	MOTOR C	O
8a	8b	MOTOR C	O
9a	9b	MOTOR B	O
10a	10b	MOTOR B	O
11a	11b	MOTOR A	O
12a	12b	MOTOR A	O

Pin Details

CAN ADDR 0 (P1-1)

This pin, CAN ADDR 0, as well as CAN ADDR 1, are used for CAN bus addressing. To set the CAN node address of a drive, use the formula

$$CANAddress = \frac{7 * Addr0}{3} + 8 * \frac{7 * Addr1}{3},$$

where *CANAddress* is the desired node address and *Addr0* and *Addr1* represent the voltage that should be applied to pins CAN ADDR 0 and CAN ADDR 1, respectively. The values for *Addr0* and *Addr1* are always integer multiples of 3/7 V within the range 0-3 V. Examples of the voltages required to set certain node addresses are given in the table below. Note that setting a CAN address of 0 will utilize the address stored in non-volatile memory.

CAN ADDR 0 Value (V)	CAN ADDR 1 Value (V)	CAN ADDR Tolerance (V)	CAN Address (Node #)
0	0	±0.1	Address stored in non-volatile memory
3/7 (0.43)	0	±0.1	1
6/7 (0.86)	0	±0.1	2
9/7 (1.3)	0	±0.1	3
...	...	±0.1	...
18/7 (2.57)	21/7 (3.0)	±0.1	62
21/7 (3.0)	21/7 (3.0)	±0.1	63

CAN BAUD (P1-6)

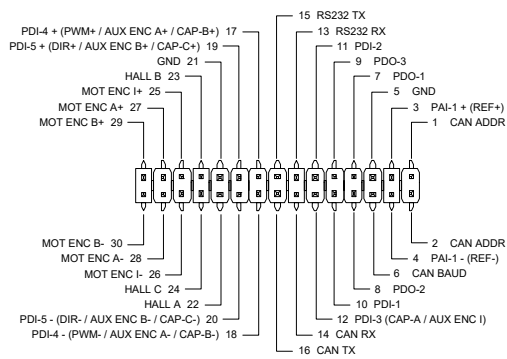
The CAN bit rate is set by applying the appropriate voltage to the CAN BAUD pin as given in the table below. Note that higher bit rates are possible when using the value stored in NVM.

CAN BAUD Value (V)	CAN BAUD Tolerance (V)	CAN Bus Bit Rate (bits/s)
0	±0.388	Bit rate stored in non-volatile memory
1	±0.388	500k
2	±0.388	250k
3	±0.388	125k

MECHANICAL INFORMATION

P1 - Signal Connector

Connector Information	30-pin, 2.54 mm spaced, dual-row header
Mating Connector	Details: Samtec: SSM-115-L-DV (SMT); BCS-115-L-D-PE (Pass-through)
	Included with Drive: No

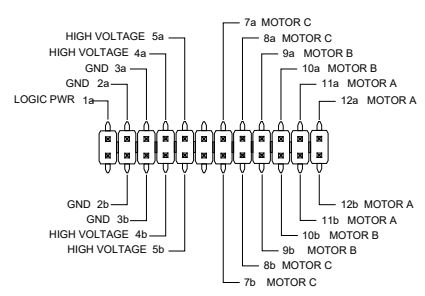


The diagram shows the pinout for the 30-pin P1 signal connector. It is a dual-row header with pins numbered 1 to 30. The connections are as follows:

- Pin 1: CAN ADDR 0
- Pin 2: CAN ADDR 1
- Pin 3: PAI-1 + (REF+)
- Pin 4: PAI-1 - (REF-)
- Pin 5: GND
- Pin 6: CAN BAUD
- Pin 7: PDO-1
- Pin 8: PDO-2
- Pin 9: PDO-3
- Pin 10: PDI-1
- Pin 11: PDI-2
- Pin 12: PDI-3 (CAP-A / AUX ENC I)
- Pin 13: RS232 RX
- Pin 14: CAN RX
- Pin 15: RS232 TX
- Pin 16: CAN TX
- Pin 17: PDI-4 + (PWM+ / AUX ENC A+ / CAP-B+)
- Pin 18: PDI-4 - (PWM- / AUX ENC A- / CAP-B-)
- Pin 19: PDI-5 + (DIR+ / AUX ENC B+ / CAP-C+)
- Pin 20: PDI-5 - (DIR- / AUX ENC B- / CAP-C-)
- Pin 21: GND
- Pin 22: HALL A
- Pin 23: HALL B
- Pin 24: HALL C
- Pin 25: MOT ENC I+
- Pin 26: MOT ENC I-
- Pin 27: MOT ENC A+
- Pin 28: MOT ENC A-
- Pin 29: MOT ENC B+
- Pin 30: MOT ENC B-

P2 - Power Connector

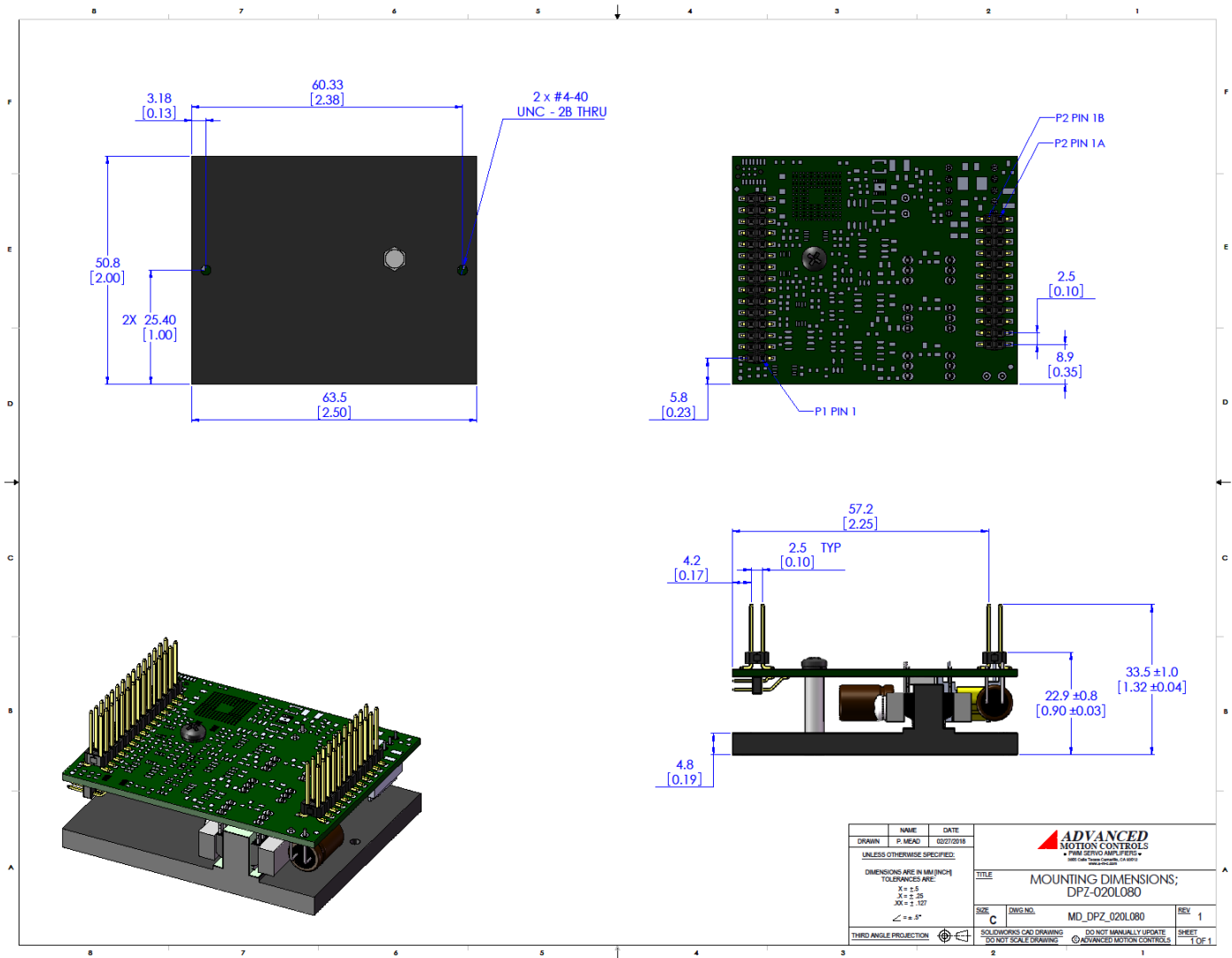
Connector Information	24-pin, 2.54 mm spaced, dual-row header
Mating Connector	Details: Samtec: SSM-112-L-DV (SMT); BCS-112-L-D-PE (Pass-through)
	Included with Drive: No



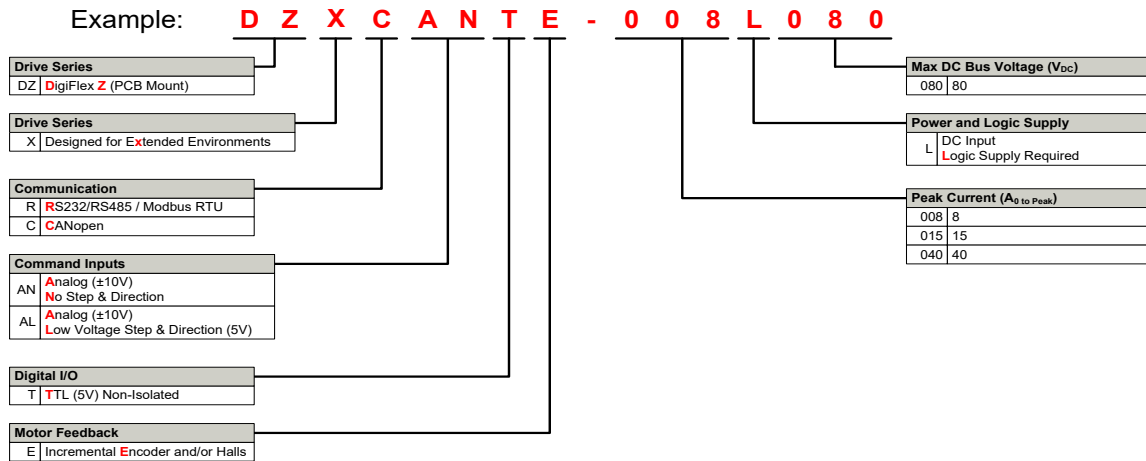
The diagram shows the pinout for the 24-pin P2 power connector. It is a dual-row header with pins numbered 1a to 12a and 12b to 7b. The connections are as follows:

- Pin 1a: LOGIC PWR
- Pin 2a: GND
- Pin 3a: GND
- Pin 4a: HIGH VOLTAGE
- Pin 5a: HIGH VOLTAGE
- Pin 6a: GND
- Pin 7a: MOTOR C
- Pin 8a: MOTOR C
- Pin 9a: MOTOR B
- Pin 10a: MOTOR B
- Pin 11a: MOTOR A
- Pin 12a: MOTOR A
- Pin 12b: MOTOR A
- Pin 11b: MOTOR A
- Pin 10b: MOTOR B
- Pin 9b: MOTOR B
- Pin 8b: MOTOR C
- Pin 7b: MOTOR C

MOUNTING DIMENSIONS



PART NUMBERING INFORMATION



DigiFlex® Performance™ series of products are available in many configurations. Note that not all possible part number combinations are offered as standard drives. All models listed in the selection tables of the website are readily available, standard product offerings.

ADVANCED Motion Controls also has the capability to promptly develop and deliver specified products for OEMs with volume requests. Our Applications and Engineering Departments will work closely with your design team through all stages of development in order to provide the best servo drive solution for your system. Equipped with on-site manufacturing for quick-turn customs capabilities, ADVANCED Motion Controls utilizes our years of engineering and manufacturing expertise to decrease your costs and time-to-market while increasing system quality and reliability.

Examples of Customized Products

- ▲ Optimized Footprint
- ▲ Private Label Software
- ▲ OEM Specified Connectors
- ▲ No Outer Case
- ▲ Increased Current Resolution
- ▲ Increased Temperature Range
- ▲ Custom Control Interface
- ▲ Integrated System I/O
- ▲ Tailored Project File
- ▲ Silkscreen Branding
- ▲ Optimized Base Plate
- ▲ Increased Current Limits
- ▲ Increased Voltage Range
- ▲ Conformal Coating
- ▲ Multi-Axis Configurations
- ▲ Reduced Profile Size and Weight

Feel free to contact Applications Engineering for further information and details.

Available Accessories

ADVANCED Motion Controls offers a variety of accessories designed to facilitate drive integration into a servo system. Visit www.a-m-c.com to see which accessories will assist with your application design and implementation.



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