Description

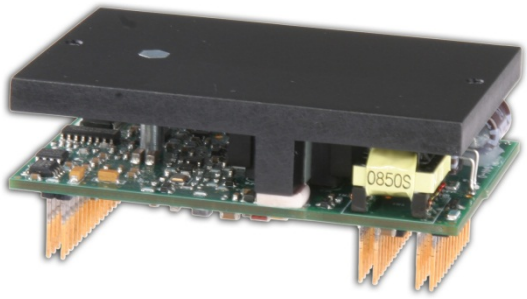
The DZCANTE-025L200 digital servo drive is designed to drive brushed and brushless servomotors from a compact form factor ideal for embedded applications. This fully digital drive operates in torque, velocity, or position mode and employs Space Vector Modulation (SVM), which results in higher bus voltage 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 DZCANTE-025L200 features a single RS232 interface used for drive configuration and setup. Drive commissioning is accomplished using DriveWare® 7, available for download at www.a-m-c.com. The CANopen interface can be used for online operation in networked applications.

The DZ Hardware Installation Manual is available for download from www.a-m-c.com. All drive and motor parameters are stored in non-volatile memory.

Power Range

Peak Current	25 A (17.7 A_{RMS})
Continuous Current	12.5 A (12.5 A_{RMS})
Supply Voltage	40 - 175 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
- Compact Size, High Power Density
- 12-bit Analog to Digital Hardware
- On-the-Fly Mode Switching
- On-the-Fly Gain Set Switching

MODES OF OPERATION
- Profile Current
- Profile Velocity
- Profile Position
- Interpolated Position Mode (PVT)

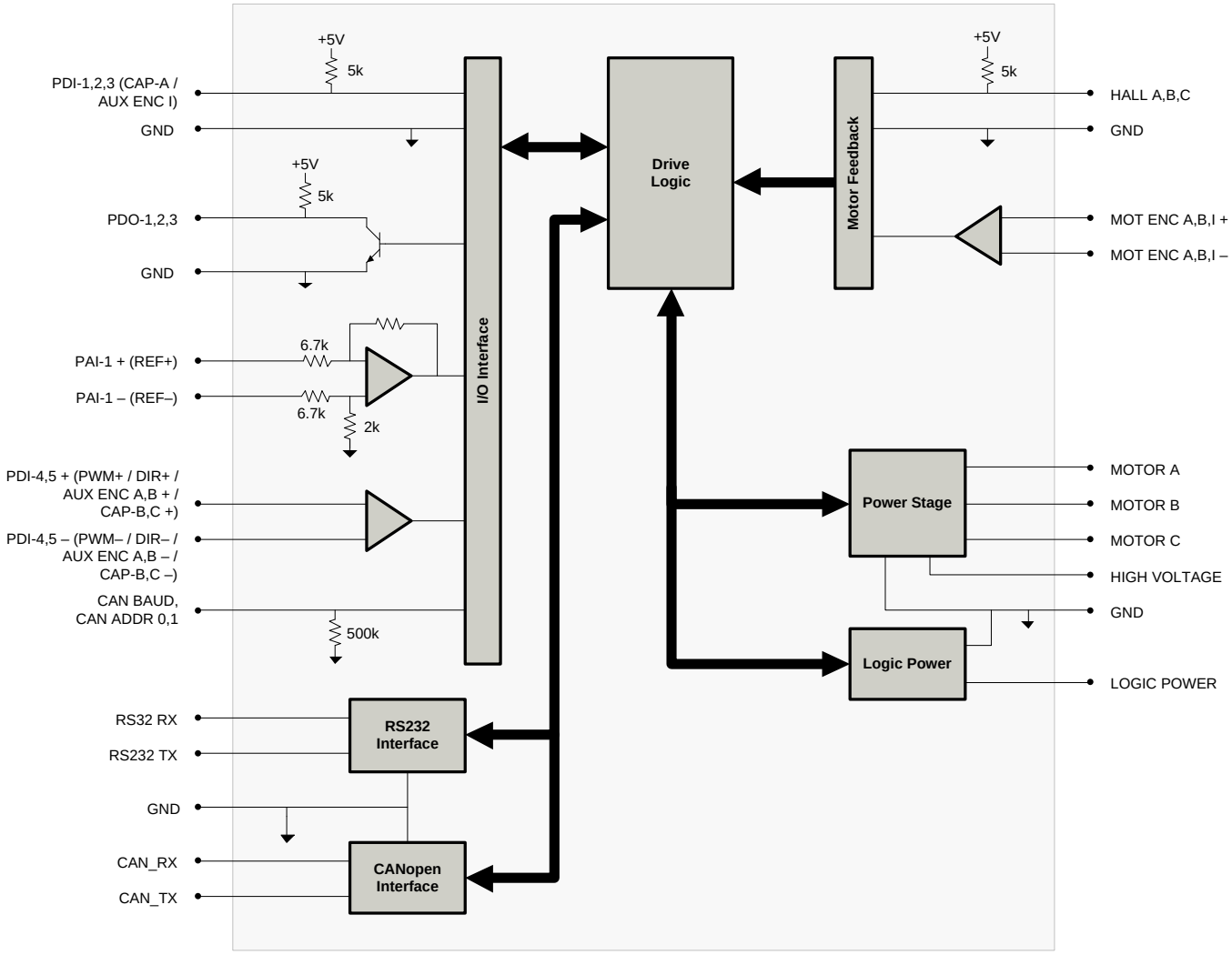
COMMAND SOURCE
- ±10 V Analog
- PWM and Direction
- Encoder Following
- Over the Network
- Sequencing
- Indexing
- Jogging

FEEDBACK SUPPORTED
- ±10 VDC Position
- Halls
- Incremental Encoder
- Auxiliary Incremental Encoder

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)

COMPLIANCES & AGENCY APPROVALS
- UL
- cUL
- CE Class A (LVD)
- CE Class A (EMC)
- RoHS II

BLOCK DIAGRAM



Information on Approvals and Compliances	
cULus	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.
CE	Compliant with European EMC Directive 2004/108/EC on Electromagnetic Compatibility (specifically EN 61000-6-4:2007 for Emissions, Class A and EN 61000-6-2:2005 for Immunity, Performance Criteria A). LVD requirements of Directive 2006/95/EC (specifically, EN 60204-1:2004, a Low Voltage Directive to protect users from electrical shock).
RoHS II Compliant	The RoHS II Directive 2011/65/EU 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	40 - 175
DC Bus Over Voltage Limit	VDC	193
DC Bus Under Voltage Limit	VDC	36
Logic Supply Voltage	VDC	5 (+/- 5%)
Maximum Peak Output Current[1]	A (Arms)	25 (17.7)
Maximum Continuous Output Current[2]	A (Arms)	12.5 (12.5)
Maximum Continuous Output Power	W	2078
Maximum Power Dissipation at Continuous Current	W	109
Internal Bus Capacitance[3]	µF	20
Minimum Load Inductance (Line-To-Line)[4]	µH	500 (at 170 V supply); 225 (at 72 V supply); 150 (at 48 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
Commutation Methods	-	Sinusoidal, Trapezoidal
Modes of Operation	-	Profile Current, Profile Velocity, Profile Position, Interpolated Position Mode (PVT)
Motors Supported	-	Closed Loop Vector, Single Phase (Brushed, Voice Coil, Inductive Load), Three Phase (Brushless)
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	-	CE Class A (EMC), CE Class A (LVD), cUL, RoHS II, UL
Size (H x W x D)	mm (in)	76.2 x 50.8 x 22.9 (3.0 x 2.0 x 0.9)
Weight	g (oz)	123.9 (4.4)
Minimum Heatsink (Base) Temperature Range[5]	°C (°F)	0 - 60 (32 - 140)
Storage Temperature Range	°C (°F)	-40 - 85 (-40 - 185)
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
P3 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. Requires a 100 µF / 200 V electrolytic capacitor near the P2 Power Connector between High Voltage and Power Ground pins.
4. Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
5. Thermal shutdown when PCB temperature reaches 75°C. The base plate temperature at this point may be between 60°C and 75°C depending on rate of base plate cooling (additional heat sinking), ambient temperature, and output current.

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+)	Differential Programmable Analog Input or Reference Signal Input (12-bit Resolution)	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 MC1XZD02 Datasheet For Recommended Signal Conditioning)	I
23	HALL B		I
24	HALL C		I
25	MOT ENC I+	Differential Encoder Index Input (See MC1XZD02 Datasheet For Recommended Signal Conditioning)	I
26	MOT ENC I-		I
27	MOT ENC A+	Differential Encoder A Channel Input (See MC1XZD02 Datasheet For Recommended Signal Conditioning)	I
28	MOT ENC A-		I
29	MOT ENC B+	Differential Encoder B Channel Input (See MC1XZD02 Datasheet For Recommended Signal Conditioning)	I
30	MOT ENC B-		I

P2 and P3 - Power Connector				
Pin		Name	Description / Notes	I/O
1a		LOGIC PWR	Logic Supply Input	I
	1b	RESERVED	Reserved	-
2a	2b	GND	Ground.	GND
3a	3b	GND		GND
4a	4b	HIGH VOLTAGE	DC Power Input. 3A Continuous Current Rating Per Pin. Requires a 100 µF / 200 V electrolytic capacitor near P2 between High Voltage and Power Ground.	I
5a	5b	HIGH VOLTAGE		I
6a	6b	RESERVED	Reserved	-
7a	7b	MOTOR C	Motor Phase Outputs. Current output distributed equally across both P2 and P3 connectors – 8 pins per motor phase, 3A continuous current carrying capacity per pin.	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. Voltages that result in an address above 63 are reserved and should not be used. Addresses above 63 can be set using DriveWare® or network commands.

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

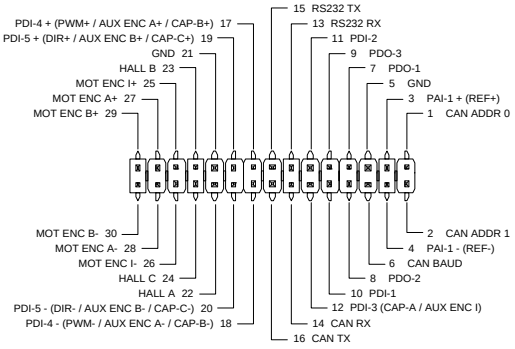
CAN BAUD (P1-6)

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.

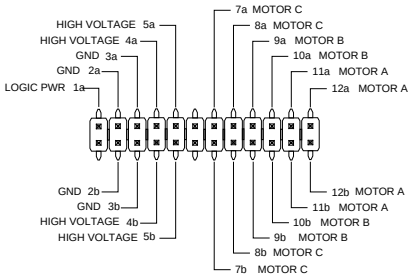
CAN BAUD Value (V)	CAN BAUD Tolerance (V)	CAN Bus Bit Rate (bits/s)
0	±0.388	Bit rate stored in non-volatile memory
1	±0.388	500k
2	±0.388	250k
3	±0.388	125k

MECHANICAL INFORMATION

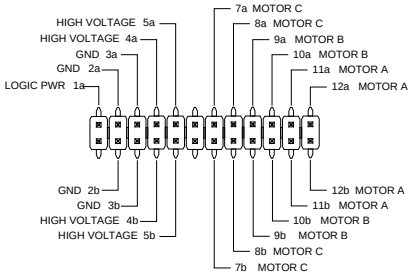
P1 - Signal Connector		
Connector Information		30-pin, 2.54 mm spaced, dual-row header
Mating Connector	Details	Samtec: SSM-115-L-DV
	Included with Drive	No



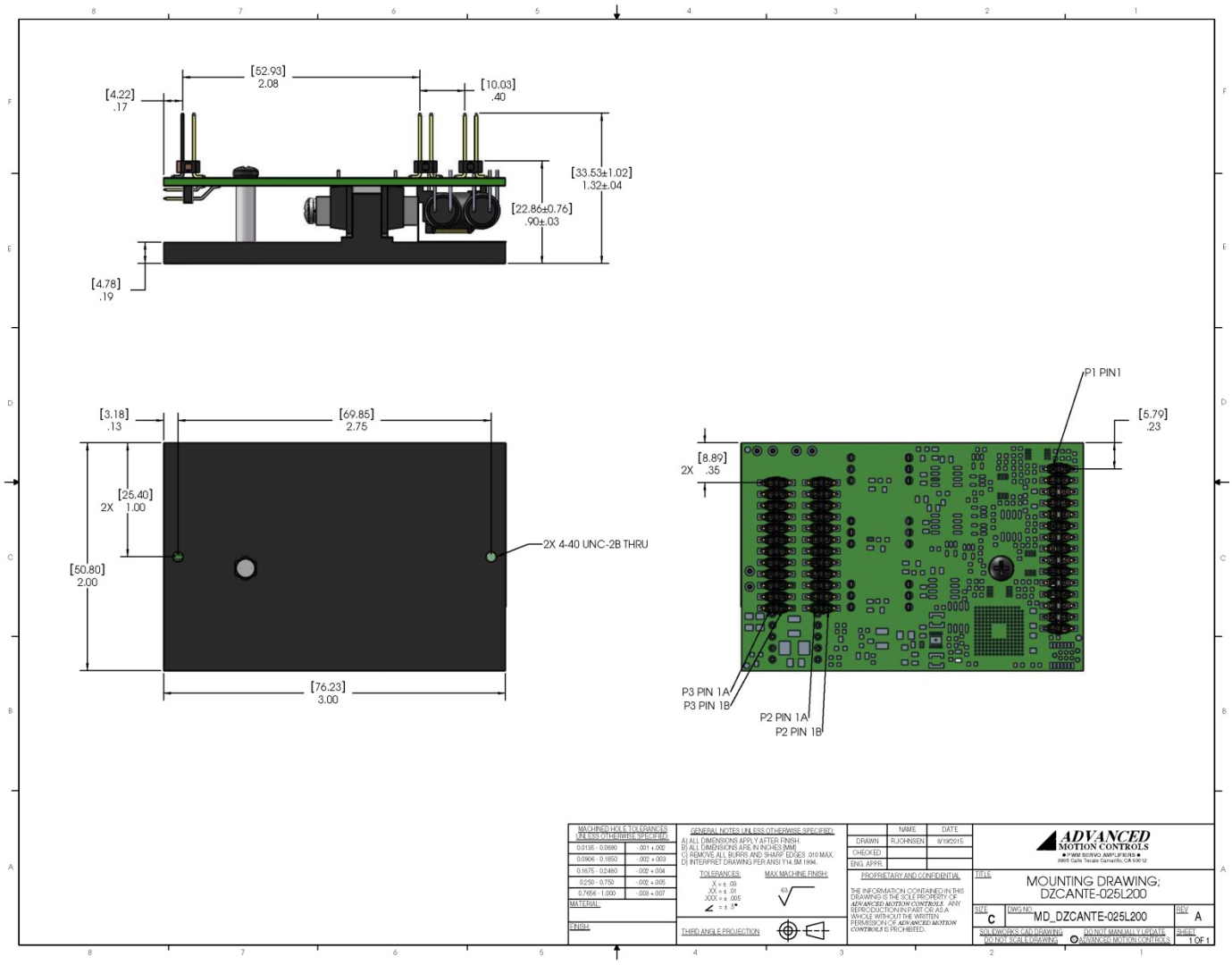
P2 - Power Connector		
Connector Information		24-pin, 2.54 mm spaced, dual-row header
Mating Connector	Details	Samtec: BCS-112-L-D-PE
	Included with Drive	No



P3 - Power Connector		
Connector Information		24-pin, 2.54 mm spaced, dual-row header
Mating Connector	Details	Samtec: BCS-112-L-D-PE
	Included with Drive	No



MOUNTING DIMENSIONS



PART NUMBERING INFORMATION

Example: D Z C A N T E - 0 2 5 L 2 0 0

Drive Series	
DZ	DigiFlex Z (PCB Mount)

Communication	
C	CANopen
E	EtherCAT
S	EtherCAT Sub-node
P	POWERLINK / Modbus TCP / Ethernet
R	RS485 / Modbus RTU

Command Inputs	
AN	Analog (±10V) No Step & Direction
AL	Analog (±10V) Low Voltage Step & Direction (5V)

Digital I/O	
T	TTL (5V) Non-Isolated

Motor Feedback	
E	Incremental Encoder and/or Halls
U	Universal (Halls, Inc. Enc., Abs. Enc, 1Vp-p Sin/Cos Enc.)

Max DC Bus Voltage (V_{DC})	
080	80
200	175

Power and Logic Supply	
B	DC Input Both Logic Supply Options (Internal or User)
L	DC Input Logic Supply Required

Peak Current ($A_{0\ to\ Peak}$)		
012	12 A	80V Drives
020	20 A	
040	40 A	
060	60 A	
010	10 A	175V Drives
020	20 A	
025	25 A	

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

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

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.

Power Supplies

Shunt Regulators

Mounting Card MC1XDZC02

Drive(s)

Filter Cards

To Motor

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