Description

The DZCANTS-020L080 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 DZCANTS-020L080 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	20 A (14.1 A_{RMS})
Continuous Current	12 A (12 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
- Compact Size, High Power Density
- 12-bit Analog to Digital Hardware
- On-the-Fly Mode Switching
- On-the-Fly Gain Set Switching
- Dedicated Safe Torque Off (STO) Inputs

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

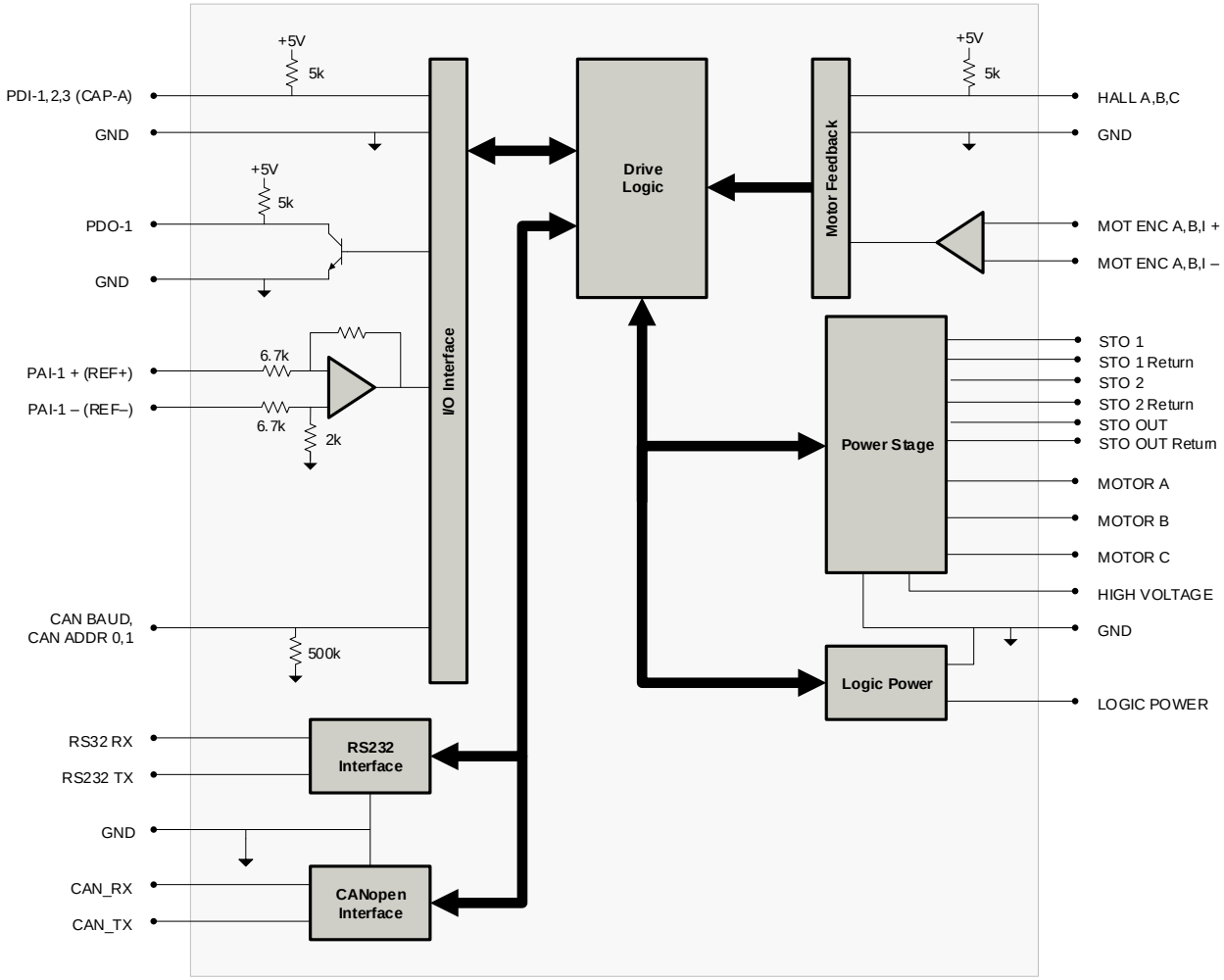
COMMAND SOURCE
- ±10 V Analog
- Over the Network
- Sequencing
- Indexing
- Jogging

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

INPUTS/OUTPUTS
- 1 High Speed Capture
- 1 Programmable Analog Input (12-bit Resolution)
- 3 Programmable Digital Inputs (Single-Ended)
- 1 Programmable Digital Outputs (Single-Ended)

COMPLIANCES & AGENCY APPROVALS
- TÜV Rheinland® (STO)
- RoHS
- UL/cUL Pending
- CE Pending

BLOCK DIAGRAM



Information on Approvals and Compliances	
RoHS Compliant	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.
TÜVRheinland CERTIFIED Functional Safety Type Approved	Functional Safety STO is TÜV Rheinland® certified and meets requirements of the following standards: • EN ISO 13849-1 Category 4 / PL e • EN IEC 61800-5-2 STO (SIL 3) • EN62061 SIL CL3 IEC 61508 SIL 3

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%)
STO Signal Level	VDC	24
Maximum Peak Output Current[1]	A (Arms)	20 (14.1)
Maximum Continuous Output Current[2]	A (Arms)	12 (12)
Maximum Continuous Output Power	W	912
Maximum Power Dissipation at Continuous Current	W	48
Internal Bus Capacitance	µF	94
Minimum Load Inductance (Line-To-Line)[3]	µH	250 (at 80 V supply); 150 (at 48 V supply); 75 (at 24 V supply); 40 (at 12 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[4]	-	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)	-	3/1
Programmable Analog Inputs/Outputs (PAIs/PAOs)	-	1/0
STO Inputs/Outputs	-	2/1
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	-	TÜV Rheinland® (STO), RoHS, UL/cUL Pending, CE Pending
Size (H x W x D)	mm (in)	63.5 x 57.0 x 22.9 (2.50 x 2.25 x 0.9)
Weight	g (oz)	105 (3.7)
Heatsink (Base) Temperature Range[5]	°C (°F)	0 - 75 (32 - 167)
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

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. Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
4. Maximum motor speed for stepper motors is 600 RPM. Consult the hardware installation manual for 2-phase stepper wiring configuration.
5. 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+)	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	STO OUTPUT	Safe Torque Off Output	O
9	STO OUT RETURN	Safe Torque Off Output Return	STORETO
10	PDI-1	Programmable Digital Input	I
11	PDI-2	Programmable Digital Input	I
12	PDI-3 (CAP-A)	Programmable Digital Input or High Speed Capture	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	STO-1	Safe Torque Off – Input 1	I
18	STO-1 RETURN	Safe Torque Off 1 Return	STORET1
19	STO-2	Safe Torque Off – Input 2	I
20	STO-2 RETURN	Safe Torque Off 2 Return	STORET2
21	GND	Ground	GND
22	HALL A	Single-ended Commutation Sensor Input	I
23	HALL B		I
24	HALL C		I
25	MOT ENC I+	Differential Encoder Index Input (see MC1XDZC02-HP1 datasheet for recommended signal conditioning)	I
26	MOT ENC I-		I
27	MOT ENC A+	Differential Encoder A Channel Input (see MC1XDZC02-HP1 datasheet for recommended signal conditioning)	I
28	MOT ENC A-		I
29	MOT ENC B+	Differential Encoder B Channel Input (see MC1XDZC02-HP1 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	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.	I
5a	5b	HIGH VOLTAGE		I
6a	6b	RESERVED	Reserved	-
7a	7b	MOTOR C	Motor Phase Outputs. Current output distributed equally across 4 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

SAFE TORQUE OFF (STO) INPUTS (P1-8,9 and P1-17 to P1-20)

The Safe Torque Off (STO) Inputs are dedicated +24VDC sinking single-ended inputs.

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

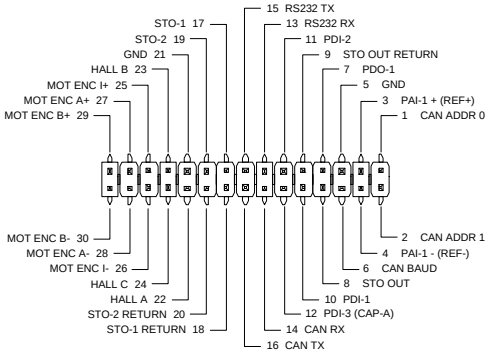
CAN BAUD (P1-6)

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.

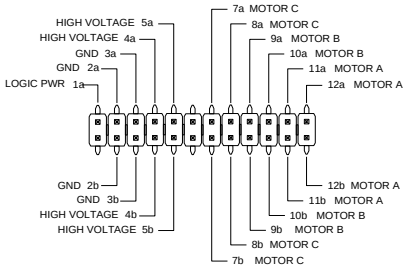
CAN BAUD Value (V)	CAN BAUD Tolerance (V)	CAN Bus Bit Rate (bits/s)
0	±0.388	Bit rate stored in non-volatile memory
1	±0.388	500k
2	±0.388	250k
3	±0.388	125k

MECHANICAL INFORMATION

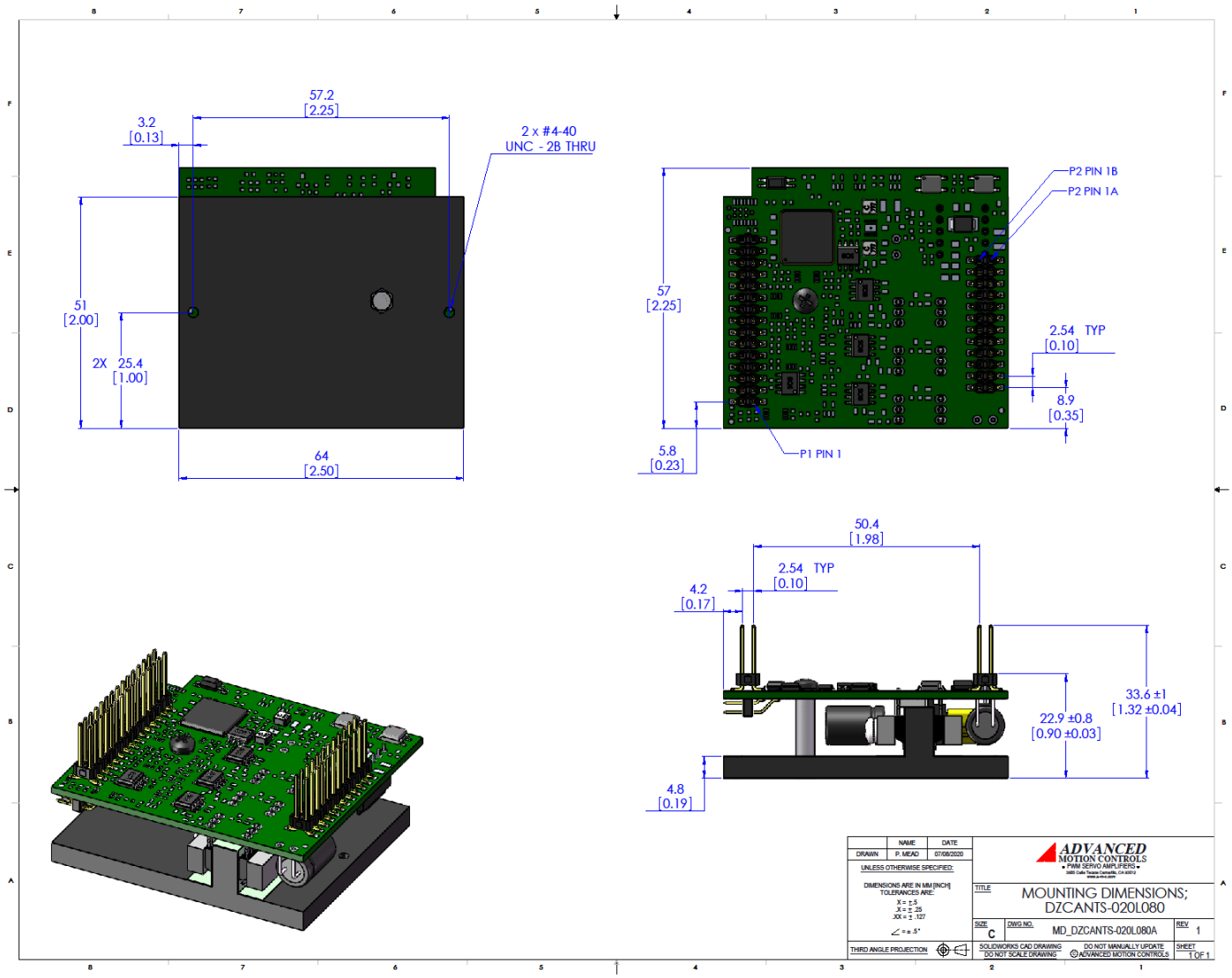
P1 - Signal Connector		
Connector Information		30-pin, 2.54 mm spaced, dual-row header
Mating Connector	Details	Samtec: SSM-115-L-DV (SMT); BCS-115-L-D-PE (Pass-through)
	Included with Drive	No



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



MOUNTING DIMENSIONS



PART NUMBERING INFORMATION

D Z C A N T S - 0 2 0 L 0 8 0 -

Drive Series	
DZ	DigiFlex Z (PCB Mount)

Communication	
C	CANopen

Command Inputs	
AN	Analog (±10V) No Step & Direction

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

Functional Safety	
S	Safe Torque Off (STO)

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	

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

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

Customer Special
Code indicating customer-specific design

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 MC1XDZC03-SHP

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.