Description

The DZRALTE-012L080 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 DZRALTE-012L080 features a RS-232 interface for drive configuration and setup as well as a RS-485 interface for drive networking. Drive commissioning is accomplished using DriveWare® 7, available for download at www.a-m-c.com.

All drive and motor parameters are stored in non-volatile memory.

Power Range

Peak Current	12 A (8.5 A_{RMS})
Continuous Current	6 A (6 A_{RMS})
Supply Voltage	20 - 80 VDC

Features

- 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
- Current
- Hall Velocity
- Position
- Velocity

COMMAND SOURCE
- PWM and Direction
- Encoder Following
- Over the Network
- ±10 V Analog
- 5V Step and Direction
- Sequencing
- Indexing
- Jogging

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

INPUTS/OUTPUTS
- 2 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

BLOCK DIAGRAM

PDI-1,2,3 (CAP-A)
GND
+5V
5k

PDO-1,2,3
GND
+5V
5k

PAI-1 + (REF+)
PAI-1 – (REF–)
6.7k
6.7k
2k

PDI-4,5 + (PWM+ / AUX ENC A,B + / STEP+ / DIR+ / CAP-B,C +)
PDI-4,5 – (PWM– / AUX ENC A,B – / STEP– / DIR– / CAP-B,C –)

RS485 BAUD, RS485 ADDR 0,1
500k

SELECT
RS232 TX / RS485 TX–
RS232 RX / RS485 RX–
RS485 TX+
RS485 RX+
GND

I/O Interface

RS232/485 Interface

Drive Logic

Motor Feedback

+5V
5k
HALL A,B,C
GND

MOT ENC A,B,I +
MOT ENC A,B,I –

Power Stage
MOTOR A
MOTOR B
MOTOR C
HIGH VOLTAGE
GND

Logic Power
LOGIC POWER

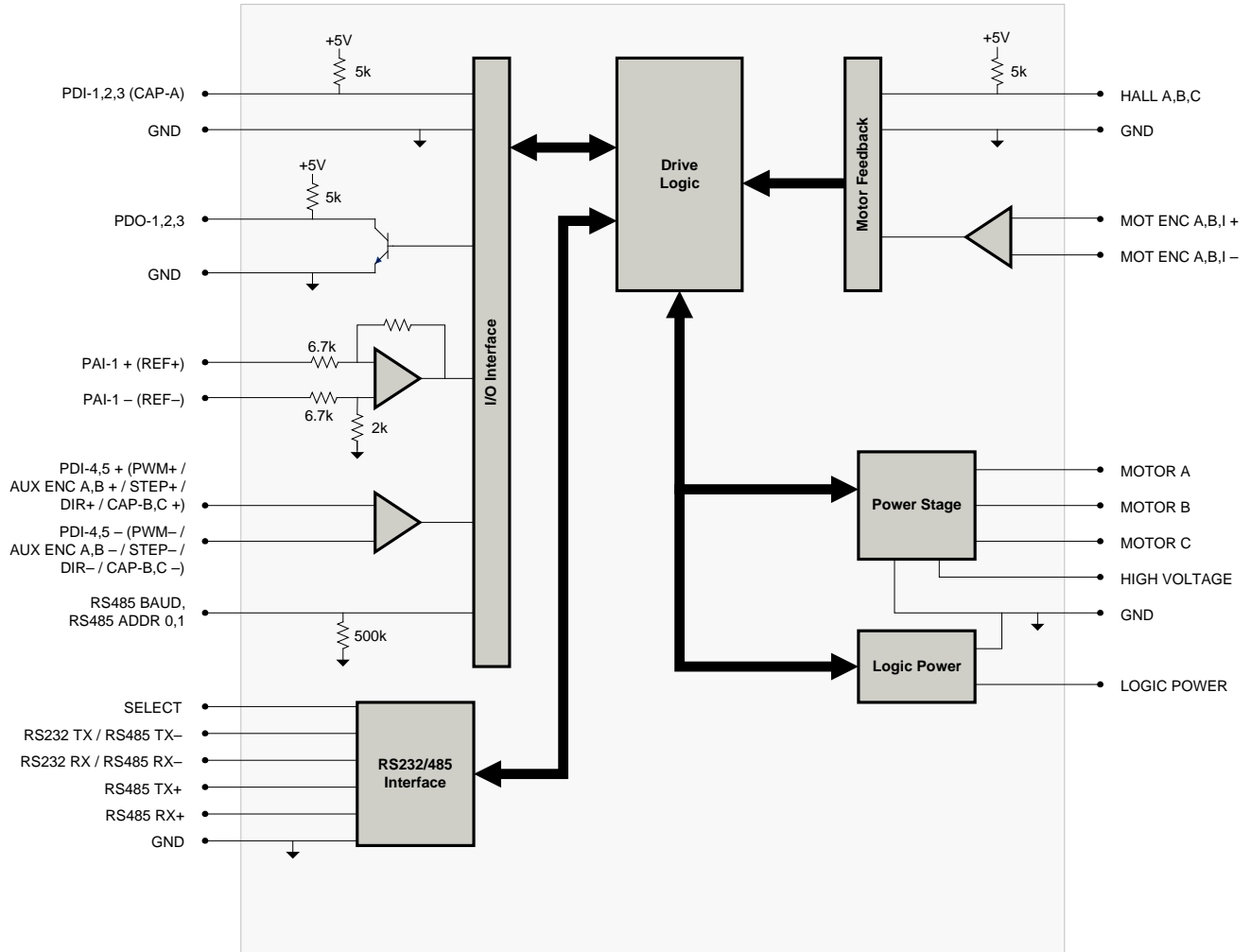| Information on Approvals and Compliances	
cRUus	US and Canadian safety compliance with UL 508c, the industrial standard for power conversion electronics. UL registered under file number E140173. Note that machine components compliant with UL are considered UL registered as opposed to UL listed as would be the case for commercial products.
CE	Compliant with European CE for both the Class A EMC Directive 2004/108/EC on Electromagnetic Compatibility (specifically EN 61000-6-4:2007 and EN 61000-6-2:2005) and LVD requirements of directive 2006/95/EC (specifically EN 60204-1:2006), a low voltage directive to protect users from electrical shock.
RoHS COMPLIANCE	RoHS (Reduction of Hazardous Substances) is intended to prevent hazardous substances such as lead from being manufactured in electrical and electronic equipment.

Sold & Serviced By:

ELECTROMATE

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www.electromate.com
sales@electromate.com

SPECIFICATIONS

Power Specifications		
Description	Units	Value
DC Supply Voltage Range	VDC	20 - 80
DC Bus Over Voltage Limit	VDC	88
DC Bus Under Voltage Limit	VDC	17
Logic Supply Voltage	VDC	5 (+/- 5%)
Maximum Peak Output Current[1]	A (Arms)	12 (8.5)
Maximum Continuous Output Current[2]	A (Arms)	6 (6)
Maximum Continuous Output Power	W	456
Maximum Power Dissipation at Continuous Current	W	24
Internal Bus Capacitance	μF	33
Minimum Load Inductance (Line-To-Line)[3]	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	%	85
Control Specifications		
Description	Units	Value
Communication Interfaces	-	RS-485/232
Command Sources	-	±10 V Analog, 5V Step and Direction, 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	-	Current, Hall Velocity, Position, Velocity
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, UL
Size (H x W x D)	mm (in)	63.5 x 50.8 x 18.4 (2.5 x 2 x 0.7)
Weight	g (oz)	99.8 (3.5)
Heatsink (Base) Temperature Range[4]	°C (°F)	0 - 65 (32 - 149)
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	-	12-pin, 2.54 mm spaced 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. Additional cooling and/or heatsink may be required to achieve rated performance.

PIN FUNCTIONS

		P1 - Signal Connector	
Pin	Name	Description / Notes	I/O
1	RS485 ADDR 0	RS-485 Network Address Selector	I
2	RS485 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	RS485 BAUD	RS-485 Baud 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)	Programmable Digital Input or High Speed Capture	I
13	RS232 RX / RS485 RX-	Receive Line (RS-232 or RS-485)	I
14	RS485 RX+	Receive Line (RS-485)	I
15	RS232 TX / RS485 TX-	Transmit Line (RS-232 or RS-485)	O
16	RS485 TX+	Transmit Line (RS-485)	O
17	PDI-4 + (PWM+ / STEP+ / AUX ENC A+ / CAP-B+)	Programmable Digital Input or PWM or Step+ or Auxiliary Encoder or High Speed Capture (For Single-Ended Signals see DZ HW Installation Manual)	I
18	PDI-4 - (PWM- / STEP- / 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 MC1XDZ01 Datasheet For Recommended Signal Conditioning)	I
23	HALL B		I
24	HALL C		I
25	MOT ENC I+	Differential Encoder Index Input (See MC1XDZ01 Datasheet For Recommended Signal Conditioning)	I
26	MOT ENC I-		I
27	MOT ENC A+	Differential Encoder A Channel Input (See MC1XDZ01 Datasheet For Recommended Signal Conditioning)	I
28	MOT ENC A-		I
29	MOT ENC B+	Differential Encoder B Channel Input (See MC1XDZ01 Datasheet For Recommended Signal Conditioning)	I
30	MOT ENC B-		I

		P2 - Power Connector	
Pin	Name	Description / Notes	I/O
1	LOGIC PWR	Logic Supply Input	I
2	GND	Ground	GND
3	GND	Ground	GND
4	HIGH VOLTAGE	DC Power Input	I
5	HIGH VOLTAGE	DC Power Input	I
6	RESERVED	Reserved	-
7	MOTOR C		O
8	MOTOR C		O
9	MOTOR B	Motor Phase Outputs. Current output distributed equally across 2 pins per motor phase, 3A continuous current carrying capacity per pin.	O
10	MOTOR B		O
11	MOTOR A		O
12	MOTOR A		O

Pin Details

RS485 ADDR 0 (P1-1)

This pin, RS485 ADDR 0, as well as RS485 ADDR 1, are used for RS-485 network addressing. To set the address of a drive, use the formula

$$RS485Address = \frac{7*Addr0}{3} + 8*\frac{7*Addr1}{3},$$

where *RS485Address* is the desired node address and *Addr0* and *Addr1* represent the voltage that should be applied to pins RS485 ADDR 0 and RS485 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 drive address of 0 will utilize the address stored in non-volatile memory.

RS485 ADDR 0 Value (V)	RS485 ADDR 1 Value (V)	RS485 ADDR Tolerance (V)	RS485 Address (Address #)
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

RS485 BAUD (P1-6)

The RS-485 baud rate is set by applying the appropriate voltage to the RS485 BAUD pin as given in the table below.

RS485 BAUD Value (V)	RS485 BAUD Tolerance (V)	RS485 Baud Rate (bits/s)
0	±0.388	Bit rate stored in non-volatile memory
1	±0.388	9.6k
2	±0.388	38.4k
3	±0.388	115.2k

HARDWARE SETTINGS

Jumper Settings

Jumper	Description	Configuration		
	Header Jumper	Not Installed	Pins 1-2	Pins 2-3
J1	Reserved.	-	-	N/A
J2	Reserved.	-	-	N/A
J3	RS-485 selection. Install this jumper (2mm) to select RS-485 communication. This jumper is located on a 6-pin header between the PCB and heatsink. It consists of the two pins closest to the corner of the PCB.	RS-232	RS-485	N/A

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

Pin assignments (P1):
- 17 PDI-4 + (PWM+ / STEP+ / AUX ENC A+ / CAP-B+)
- 19 PDI-5 + (DIR+ / AUX ENC B+ / CAP-C+)
- 21 GND
- 23 HALL B
- 25 MOT ENC I+
- 27 MOT ENC A+
- 29 MOT ENC B+
- 15 RS232 TX / RS485 TX-
- 13 RS232 RX / RS485 RX-
- 11 PDI-2
- 9 PDO-3
- 7 PDO-1
- 5 GND
- 3 PAI-1 + (REF+)
- 1 RS485 ADDR 0
- 30 MOT ENC B-
- 28 MOT ENC A-
- 26 MOT ENC I-
- 24 HALL C
- 22 HALL A
- 20 PDI-5 - (DIR- / AUX ENC B- / CAP-C-)
- 18 PDI-4 - (PWM- / STEP- / AUX ENC A- / CAP-B-)
- 16 RS485 TX+
- 14 RS485 RX+
- 12 PDI-3 (CAP-A)
- 10 PDI-1
- 8 PDO-2
- 6 RS485 BAUD
- 4 PAI-1 - (REF-)
- 2 RS485 ADDR 1

P2 - Power Connector		
Connector Information		12-pin, 2.54 mm spaced header
Mating Connector	Details	Samtec: BCS-112-L-S-PE
	Included with Drive	No

Pin assignments (P2):
- 11 MOTOR A
- 9 MOTOR B
- 7 MOTOR C
- 5 HIGH VOLTAGE
- 3 GND
- 1 LOGIC PWR
- 2 GND
- 4 HIGH VOLTAGE
- 8 MOTOR C
- 10 MOTOR B
- 12 MOTOR A

MOUNTING DIMENSIONS

Mounting dimensions drawing with the following callouts:

- 2.50 [63.50]
- 2.00 [50.80]
- 1.00 [25.40]
- 0.13 [3.18]
- 2.25 [57.15]
- 2X 4-40 UNC-2B THRU
- P1 - PIN1
- P2 - PIN1
- 0.10 TYP [2.54]
- 0.55 [13.97]
- 0.37 [9.45]
- 0.10 TYP [2.54]
- 0.15 [3.81]
- 2.08 [52.94]
- 0.10 [2.54]
- 0.42 [10.67]
- 1.15 [29.11]
- 0.31 [7.85]

Title block:
TITLE: Mounting Dimensions; DZRALTE-012L080C
DRAWN P. MEAD 1/22/2009
SIZE C | DWG. NO. MD_DZRALTE-012L080C | REV A
SCALE: 2:1 | WEIGHT: | SHEET 1 OF 1
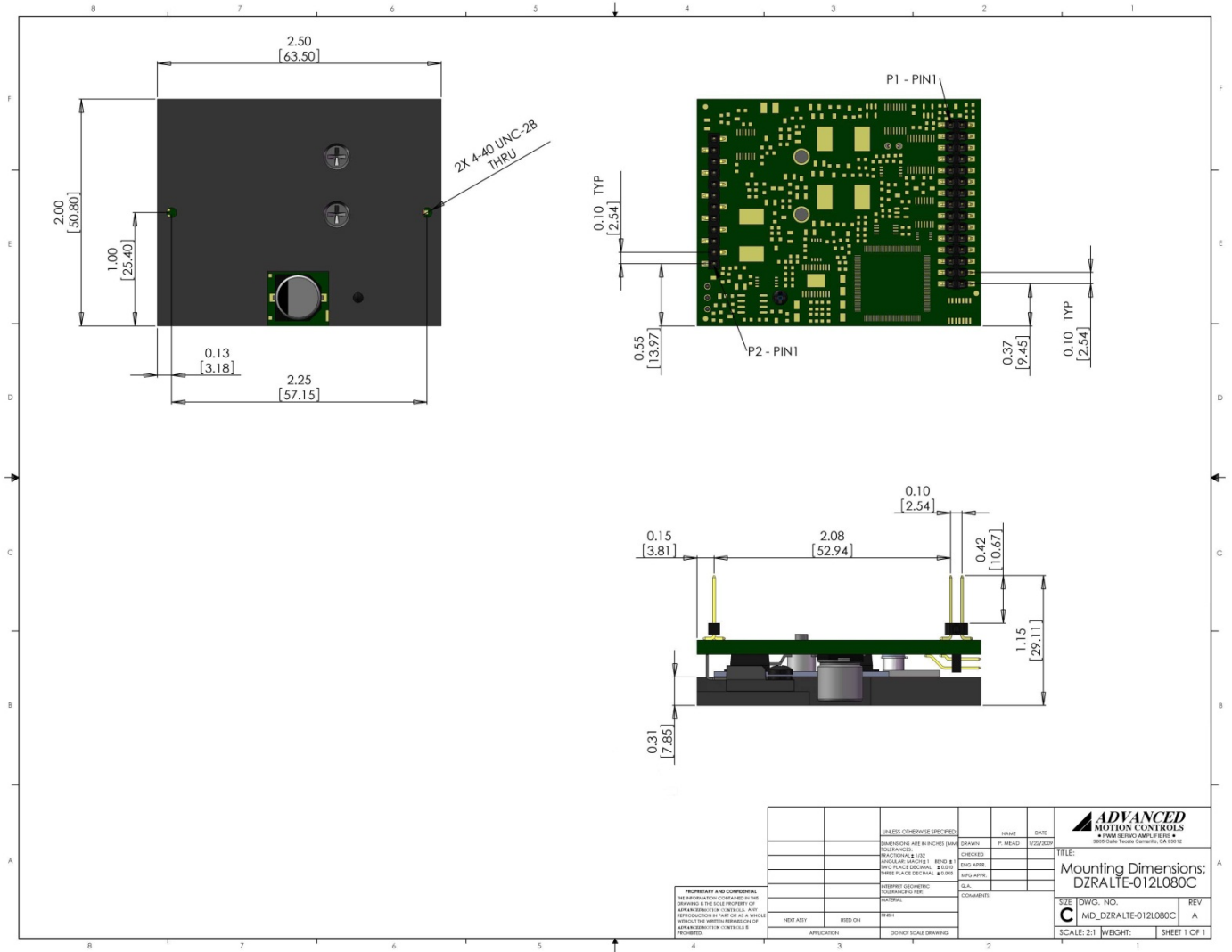
PART NUMBERING INFORMATION

Example: **D Z R A L T E - 0 1 2 L 0 8 0**

Drive Series	
DZ	**D**igiFlex **Z** (PCB Mount)

Communication	
R	**R**S232/RS485
C	**C**ANopen or RS232

Command Inputs	
AN	**A**nalog (±10V) **N**o Step & Direction
AL	**A**nalog (±10V) **L**ow Voltage Step & Direction (5V)

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

Motor Feedback	
E	Incremental **E**ncoder and/or Halls

Max DC Bus Voltage (V$_{DC}$)	
080	80 V
200	175 V

Power and Logic Supply	
L	DC Input **L**ogic Supply Required

Peak Current (A$_{0 \text{ to Peak}}$)		
012	12 A	
020	20 A	80V Drives
040	40 A	
060	60 A	
010	10 A	175V Drives
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.
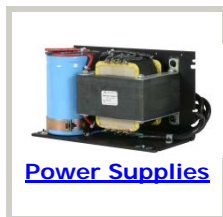
Examples of Customized Products

- ▲ 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.

Power Supplies — **Shunt Regulators** — **Mounting Card MC1XDZR02** — **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.