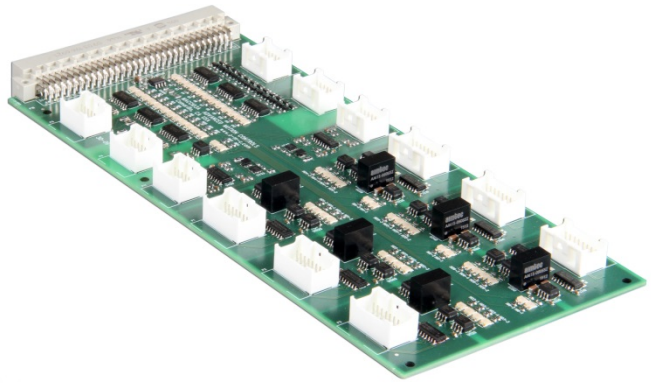
Description

The Motion Automation Control Card (MACC) family are general purpose motion/automation controllers with embedded Click&Move® programming capability.

Most applications for the MACC platform require digital and/or analog input/output hardware elements. *ADVANCED* Motion Controls® offers a wide range of input/output modules to fulfill any application requirement. These modules are partial or fully customizable to fit the application specifications and budget.

The MACCIO3 module features the necessary digital I/O's to support up to six position mode servo or stepper drives with Step/Dir command input. A cost-effective and high performance motion control system can be built using the hardware resources of the MACC on-board FPGA and the software resources of the Click&Move® software development environment.

The MACCIO3 can fit other data acquisition applications as well.



Click&Move®

Automation Solution

FEATURES

- 12 optocoupled digital inputs
- 2 high speed differential optocoupled digital inputs
- 12 optocoupled digital outputs
- 12 high-speed RS422 differential digital inputs (2 per axis – galvanic isolation population option)
- 24 high-speed RS422 differential digital outputs (4 per axis – galvanic isolation population option)
- 4 independent encoder inputs supporting encoders or handwheels
- Fits standard DIN rail plastic case

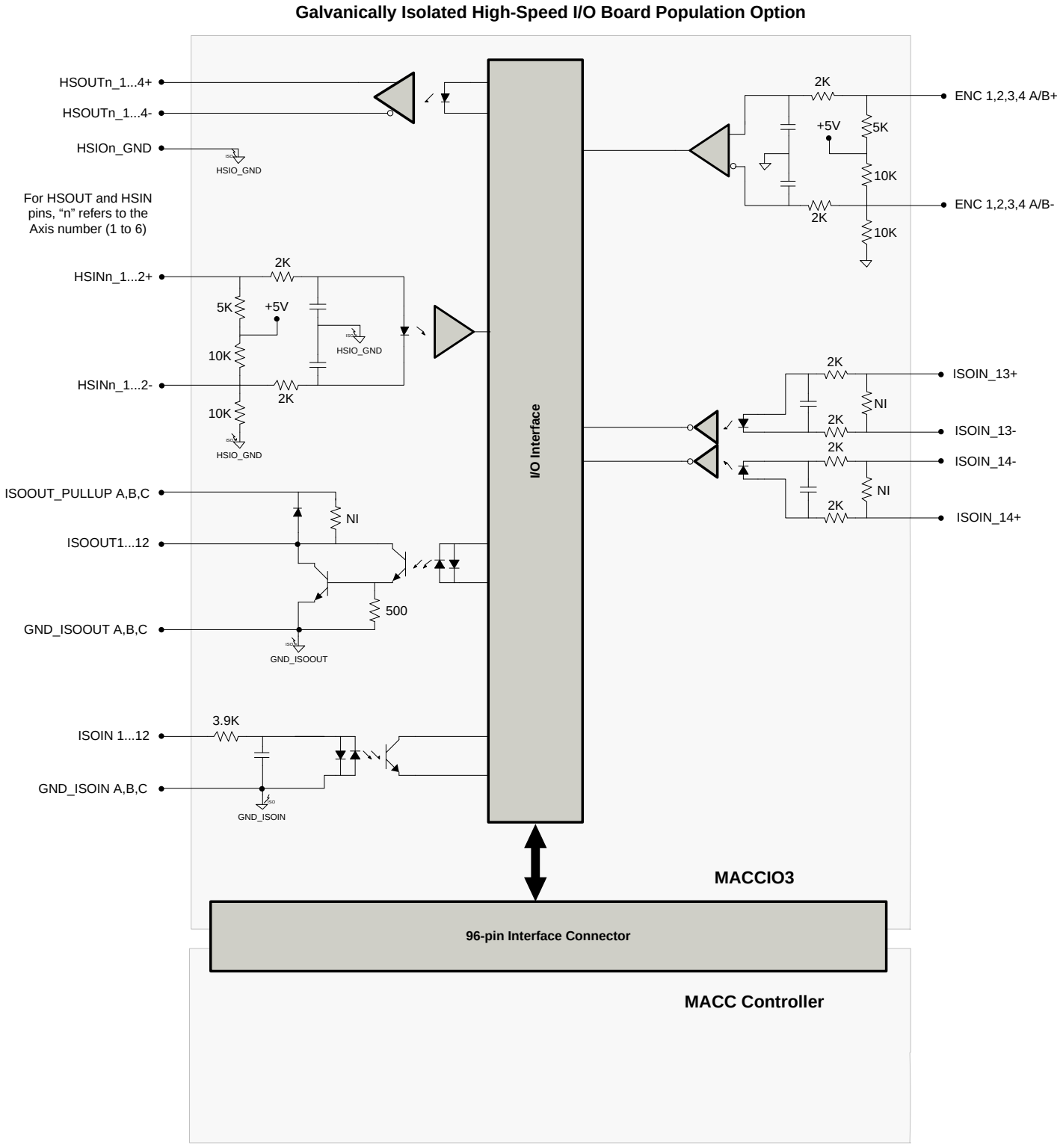
CUSTOMIZATION OPTIONS

- Remove galvanic isolation of high-speed digital I/O

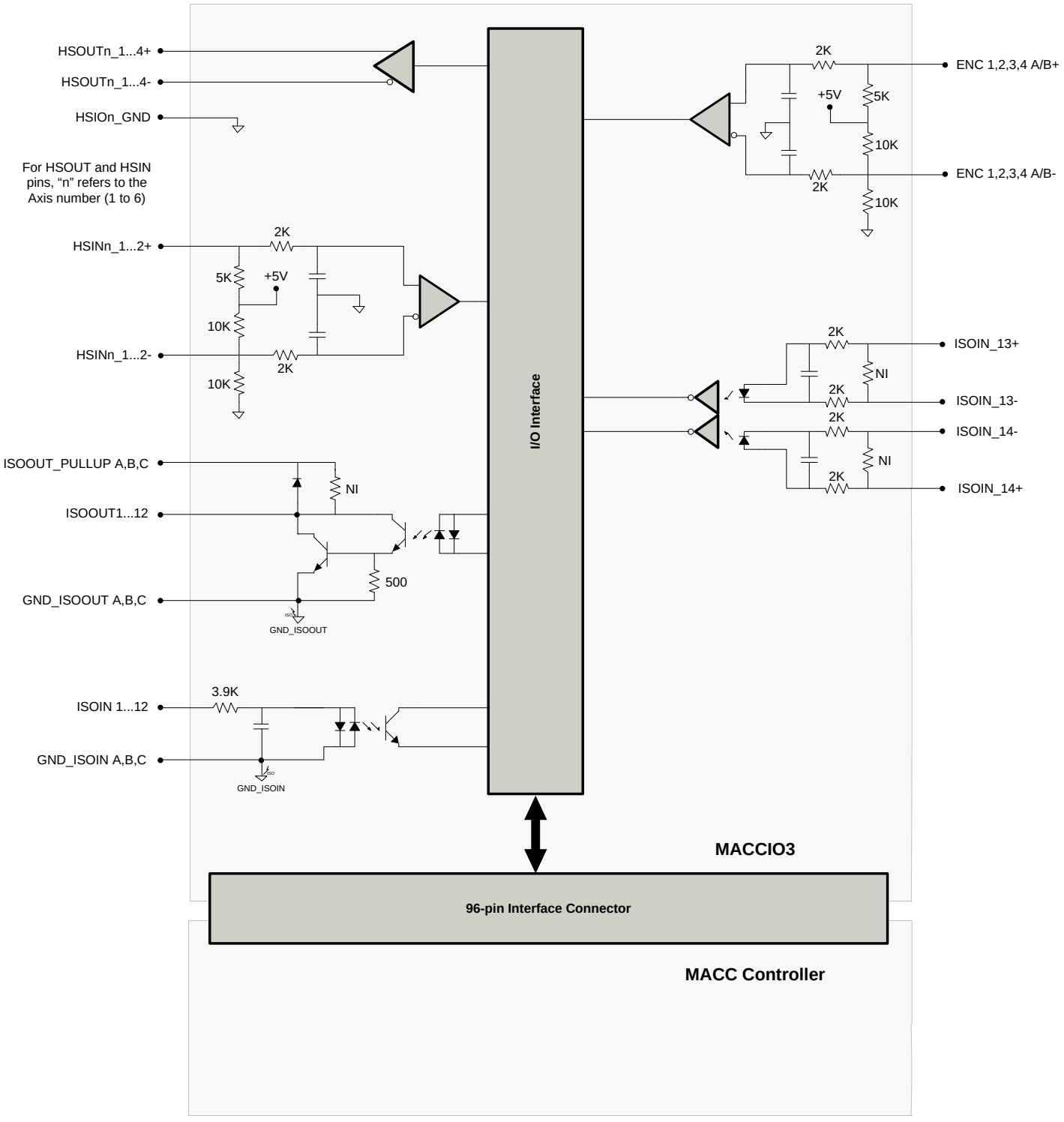
COMPATIBLE CONTROL CARDS

- MACC02
- MACC11

BLOCK DIAGRAM



Non-Galvanically Isolated High-Speed I/O Board Population Option

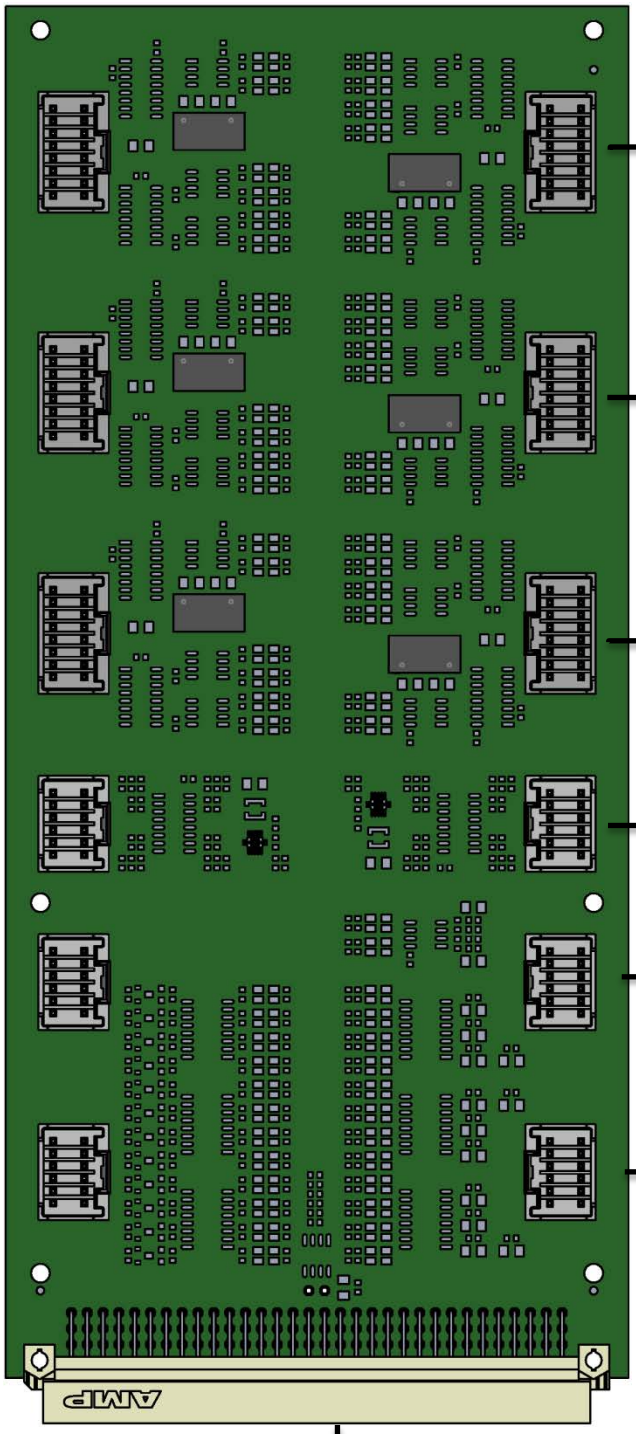


SPECIFICATIONS

Power Specifications		
Description	Units	Value
DC Supply Voltage	VDC	Directly from the MACC, no external power supply required
I/O Specifications		
Description	Units	Value
Isolated Digital Outputs		
Maximum Turn On Delay	µs	10
Typical Turn Off Delay	µs	130 (@ 240 ohm pull-up to 24V)
Typical Saturation Voltage	V	1 (@ 100 mA load)
Maximum Continuous Output Current	mA	100
Maximum Peak Output Current	mA	250 (@ 50% duty cycle)
Maximum Output Voltage	V	30
Isolated Digital Inputs		
Maximum Turn On Delay	µs	4 (@ 24 V input)
Maximum Turn Off Delay	µs	60
Minimum Input Voltage	V	18
Maximum Input Voltage	V	30
Isolated Differential High-Speed Outputs (RS422)		
Typical Turn On/Off Delay	ns	70
Isolated Differential High-Speed Inputs (RS422)		
Typical Turn On/Off Delay	ns	250
ISOIN_13 and ISOIN_14 Isolated Differential Inputs		
Typical Turn On Delay	ns	100
Typical Turn Off Delay	ns	250
Analog Inputs		
Maximum Input Voltage	V	±12
Mechanical Specifications		
Description	Units	Value
Agency Approvals	-	UL Pending, cUL Pending, CE Pending, RoHS II
Size (H x W x D)	mm (in)	219.96 x 99.95 x 11.04 (8.66 x 3.94 x 0.43)
Weight	g (oz)	127.6 (4.5)
Operating Temperature Range	°C (°F)	0 - 75 (32 - 167)
Storage Temperature Range	°C (°F)	-40 - 85 (-40 - 185)
HIGH SPEED I/O Connectors	-	16-pin, 2.00 mm spaced dual-row vertical or right-angled headers
I/O Connectors	-	12-pin, 2.00 mm spaced dual-row vertical or right-angled headers
MACC INTERFACE I/O Connector	-	96-pin, 2.54 mm spaced plug connector

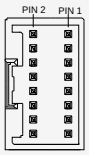
Information on Approvals and Compliances	
RoHS II Compliant	The RoHS II Directive 2011/65/EU restricts the use of certain substances including lead, mercury, cadmium, hexavalent chromium and halogenated flame retardants PBB and PBDE in electronic equipment.

CONNECTOR INFORMATION



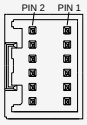
P1, P2, and P3 – Differential High Speed Digital RS422 I/O Connectors

- 16-pin, 2.00 mm spaced dual-row vertical header (Molex P/N 55917-1610)
- Mating Connector (Molex:P/N 51353-1600)



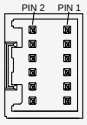
P11 – Encoder Input Connectors

- 12-pin, 2.00 mm spaced dual-row vertical header (Molex P/N 55917-1210)
- Mating Connector (Molex:P/N 51353-1200)



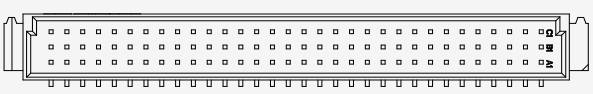
P5 and P6 – Digital Input Connectors

- 12-pin, 2.00 mm spaced dual-row vertical header (Molex P/N 55917-1210)
- Mating Connector (Molex:P/N 51353-1200)



P16 – MACC Interface I/O Connector

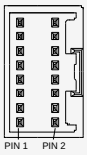
- 96-pin, 2.54 mm spaced plug connector
- I/O Module control card interface



CONNECTOR INFORMATION (CONT.)

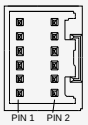
P4, P9, and P10 – Differential High Speed Digital RS422 I/O Connectors

- 16-pin, 2.00 mm spaced dual-row vertical header (Molex P/N 55917-1610)
- Mating Connector (Molex:P/N 51353-1600)



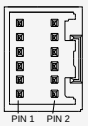
P12 – Encoder Input Connectors

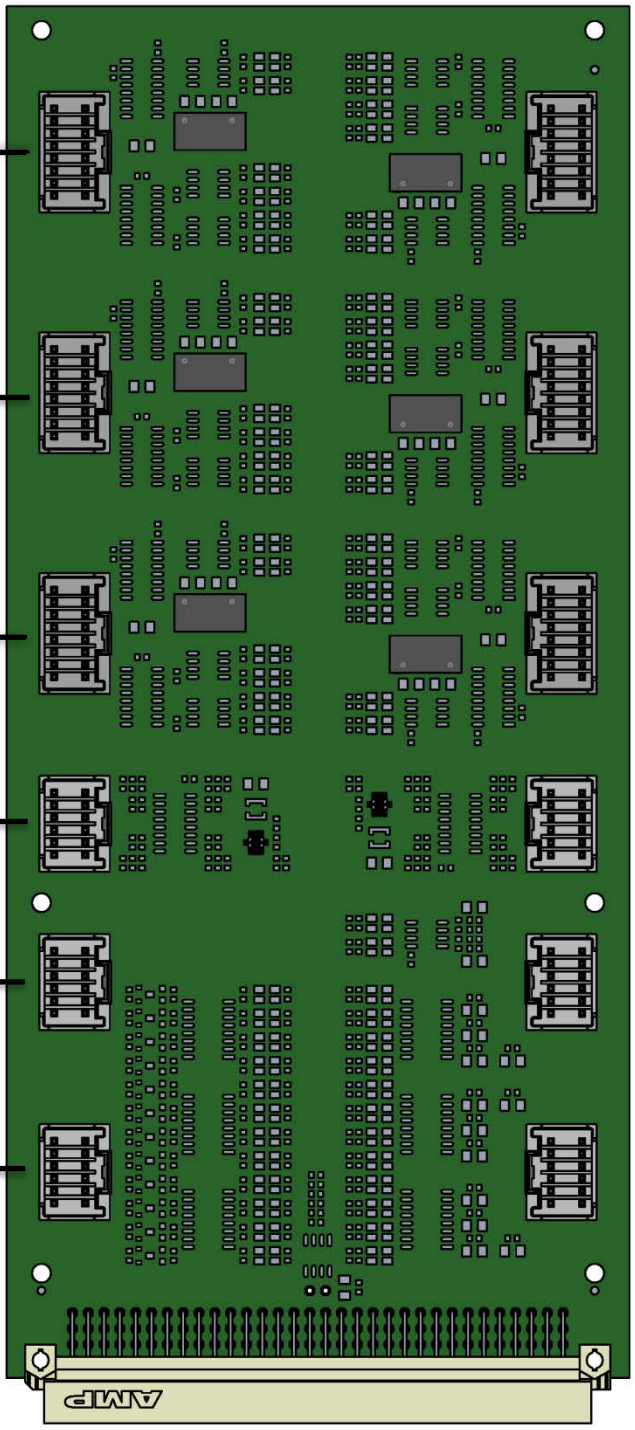
- 12-pin, 2.00 mm spaced dual-row vertical header (Molex P/N 55917-1210)
- Mating Connector (Molex:P/N 51353-1200)



P7 and P8 – Digital Output Connectors

- 12-pin, 2.00 mm spaced dual-row vertical header (Molex P/N 55917-1210)
- Mating Connector (Molex:P/N 51353-1200)





PIN FUNCTIONS

P1 – Axis 1 Isolated Differential High-Speed Digital I/0 Connectors			
Pin	Name	Description / Notes	I/O
1	HSIO1_GND	Input common for HSIN1_x and HSOUT1_x	-
2	HSIO1_GND	Input common for HSIN1_x and HSOUT1_x	-
3	HSOUT1_4+	High speed isolated differential positive digital output	O
4	HSOUT1_2+	High speed isolated differential positive digital output	O
5	HSOUT1_4-	High speed isolated differential negative digital output	O
6	HSOUT1_2-	High speed isolated differential negative digital output	O
7	HSIO1_GND	Input common for HSIN1_x and HSOUT1_x	-
8	HSIO1_GND	Input common for HSIN1_x and HSOUT1_x	-
9	HSOUT1_3+	High speed isolated differential positive digital output	O
10	HSOUT1_1+	High speed isolated differential positive digital output	O
11	HSOUT1_3-	High speed isolated differential negative digital output	O
12	HSOUT1_1-	High speed isolated differential negative digital output	O
13	HSIN1_2+	High speed isolated differential positive digital input	I
14	HSIN1_1+	High speed isolated differential positive digital input	I
15	HSIN1_2-	High speed isolated differential negative digital input (leave open for single-ended use)	I
16	HSIN1_1-	High speed isolated differential negative digital input (leave open for single-ended use)	I

P2 – Axis 2 Isolated Differential High-Speed Digital I/0 Connectors			
Pin	Name	Description / Notes	I/O
1	HSIO2_GND	Input common for HSIN2_x and HSOUT2_x	-
2	HSIO2_GND	Input common for HSIN2_x and HSOUT2_x	-
3	HSOUT2_4+	High speed isolated differential positive digital output	O
4	HSOUT2_2+	High speed isolated differential positive digital output	O
5	HSOUT2_4-	High speed isolated differential negative digital output	O
6	HSOUT2_2-	High speed isolated differential negative digital output	O
7	HSIO2_GND	Input common for HSIN2_x and HSOUT2_x	-
8	HSIO2_GND	Input common for HSIN2_x and HSOUT2_x	-
9	HSOUT2_3+	High speed isolated differential positive digital output	O
10	HSOUT2_1+	High speed isolated differential positive digital output	O
11	HSOUT2_3-	High speed isolated differential negative digital output	O
12	HSOUT2_1-	High speed isolated differential negative digital output	O
13	HSIN2_2+	High speed isolated differential positive digital input	I
14	HSIN2_1+	High speed isolated differential positive digital input	I
15	HSIN2_2-	High speed isolated differential negative digital input (leave open for single-ended use)	I
16	HSIN2_1-	High speed isolated differential negative digital input (leave open for single-ended use)	I

P3 – Axis 3 Isolated Differential High-Speed Digital I/0 Connectors			
Pin	Name	Description / Notes	I/O
1	HSIO3_GND	Input common for HSIN3_x and HSOUT3_x	-
2	HSIO3_GND	Input common for HSIN3_x and HSOUT3_x	-
3	HSOUT3_4+	High speed isolated differential positive digital output	O
4	HSOUT3_2+	High speed isolated differential positive digital output	O
5	HSOUT3_4-	High speed isolated differential negative digital output	O
6	HSOUT3_2-	High speed isolated differential negative digital output	O
7	HSIO3_GND	Input common for HSIN3_x and HSOUT3_x	-
8	HSIO3_GND	Input common for HSIN3_x and HSOUT3_x	-
9	HSOUT3_3+	High speed isolated differential positive digital output	O
10	HSOUT3_1+	High speed isolated differential positive digital output	O
11	HSOUT3_3-	High speed isolated differential negative digital output	O
12	HSOUT3_1-	High speed isolated differential negative digital output	O
13	HSIN3_2+	High speed isolated differential positive digital input	I
14	HSIN3_1+	High speed isolated differential positive digital input	I
15	HSIN3_2-	High speed isolated differential negative digital input (leave open for single-ended use)	I
16	HSIN3_1-	High speed isolated differential negative digital input (leave open for single-ended use)	I

P4 – Axis 4 Isolated Differential High-Speed Digital I/0 Connectors			
Pin	Name	Description / Notes	I/O
1	HSIO4_GND	Input common for HSIN4_x and HSOUT4_x	-
2	HSIO4_GND	Input common for HSIN4_x and HSOUT4_x	-
3	HSOUT4_4+	High speed isolated differential positive digital output	O
4	HSOUT4_2+	High speed isolated differential positive digital output	O
5	HSOUT4_4-	High speed isolated differential negative digital output	O
6	HSOUT4_2-	High speed isolated differential negative digital output	O
7	HSIO4_GND	Input common for HSIN4_x and HSOUT4_x	-
8	HSIO4_GND	Input common for HSIN4_x and HSOUT4_x	-
9	HSOUT4_3+	High speed isolated differential positive digital output	O
10	HSOUT4_1+	High speed isolated differential positive digital output	O
11	HSOUT4_3-	High speed isolated differential negative digital output	O
12	HSOUT4_1-	High speed isolated differential negative digital output	O
13	HSIN4_2+	High speed isolated differential positive digital input	I
14	HSIN4_1+	High speed isolated differential positive digital input	I
15	HSIN4_2-	High speed isolated differential negative digital input (leave open for single-ended use)	I
16	HSIN4_1-	High speed isolated differential negative digital input (leave open for single-ended use)	I

P9 – Axis 5 Isolated Differential High-Speed Digital I/0 Connectors			
Pin	Name	Description / Notes	I/O
1	HSIO5_GND	Input common for HSIN5_x and HSOUT5_x	-
2	HSIO5_GND	Input common for HSIN5_x and HSOUT5_x	-
3	HSOUT5_4+	High speed isolated differential positive digital output	O
4	HSOUT5_2+	High speed isolated differential positive digital output	O
5	HSOUT5_4-	High speed isolated differential negative digital output	O
6	HSOUT5_2-	High speed isolated differential negative digital output	O
7	HSIO5_GND	Input common for HSIN5_x and HSOUT5_x	-
8	HSIO5_GND	Input common for HSIN5_x and HSOUT5_x	-
9	HSOUT5_3+	High speed isolated differential positive digital output	O
10	HSOUT5_1+	High speed isolated differential positive digital output	O
11	HSOUT5_3-	High speed isolated differential negative digital output	O
12	HSOUT5_1-	High speed isolated differential negative digital output	O
13	HSIN5_2+	High speed isolated differential positive digital input	I
14	HSIN5_1+	High speed isolated differential positive digital input	I
15	HSIN5_2-	High speed isolated differential negative digital input (leave open for single-ended use)	I
16	HSIN5_1-	High speed isolated differential negative digital input (leave open for single-ended use)	I

P10 – Axis 6 Isolated Differential High-Speed Digital I/0 Connectors			
Pin	Name	Description / Notes	I/O
1	HSIO6_GND	Input common for HSIN6_x and HSOUT6_x	-
2	HSIO6_GND	Input common for HSIN6_x and HSOUT6_x	-
3	HSOUT6_4+	High speed isolated differential positive digital output	O
4	HSOUT6_2+	High speed isolated differential positive digital output	O
5	HSOUT6_4-	High speed isolated differential negative digital output	O
6	HSOUT6_2-	High speed isolated differential negative digital output	O
7	HSIO6_GND	Input common for HSIN6_x and HSOUT6_x	-
8	HSIO6_GND	Input common for HSIN6_x and HSOUT6_x	-
9	HSOUT6_3+	High speed isolated differential positive digital output	O
10	HSOUT6_1+	High speed isolated differential positive digital output	O
11	HSOUT6_3-	High speed isolated differential negative digital output	O
12	HSOUT6_1-	High speed isolated differential negative digital output	O
13	HSIN6_2+	High speed isolated differential positive digital input	I
14	HSIN6_1+	High speed isolated differential positive digital input	I
15	HSIN6_2-	High speed isolated differential negative digital input (leave open for single-ended use)	I
16	HSIN6_1-	High speed isolated differential negative digital input (leave open for single-ended use)	I

P5 – Isolated Digital Inputs Connector			
Pin	Name	Description / Notes	I/O
1	GND_ISOIN_B	Input common for ISOIN_5…ISOIN_8	-
2	GND_ISOIN_A	Input common for ISOIN_1…ISOIN_4	-
3	ISOIN_8	Isolated digital input	I
4	ISOIN_4	Isolated digital input	I
5	ISOIN_7	Isolated digital input	I
6	ISOIN_3	Isolated digital input	I
7	GND_ISOIN_B	Input common for ISOIN_5…ISOIN_8	-
8	GND_ISOIN_A	Input common for ISOIN_1…ISOIN_4	-
9	ISOIN_6	Isolated digital input	I
10	ISOIN_2	Isolated digital input	I
11	ISOIN_5	Isolated digital input	I
12	ISOIN_1	Isolated digital input	I

P6 – Isolated Digital Inputs Connector			
Pin	Name	Description / Notes	I/O
1	NC	No Connection	-
2	GND_ISOIN_C	Input common for ISOIN_9…ISOIN_12	-
3	ISOIN_14-	Isolated differential negative digital input	I
4	ISOIN_12	Isolated digital input	I
5	ISOIN_14+	Isolated differential positive digital input	I
6	ISOIN_11	Isolated digital input	I
7	NC	No Connection	-
8	GND_ISOIN_C	Input common for ISOIN_9…ISOIN_12	-
9	ISOIN_13-	Isolated differential negative digital input	I
10	ISOIN_10	Isolated digital input	I
11	ISOIN_13+	Isolated differential positive digital input	I
12	ISOIN_9	Isolated digital input	I

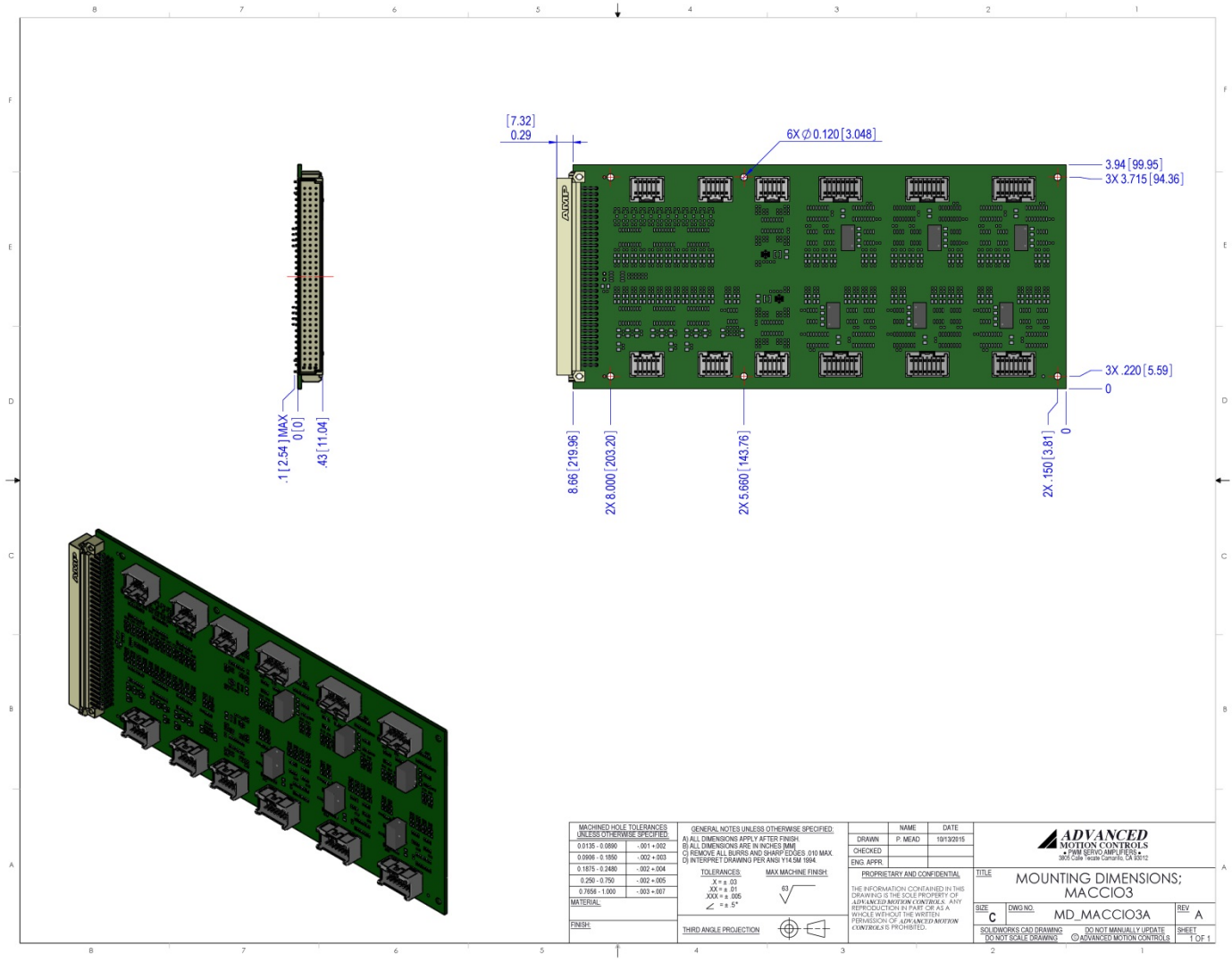
P7 – Isolated Digital Outputs Connector			
Pin	Name	Description / Notes	I/O
1	GND_ISOOUT_B	Output common for ISOOUT_5… ISOOUT_8	-
2	GND_ISOOUT_A	Output common for ISOOUT_1… ISOOUT_4	-
3	ISOOUT_8	Isolated digital output	O
4	ISOOUT_4	Isolated digital output	O
5	ISOOUT_7	Isolated digital output	O
6	ISOOUT_3	Isolated digital output	O
7	ISOOUT_B	Output pull-up for ISOOUT_5… ISOOUT_8	-
8	ISOOUT_A	Output pull-up for ISOOUT_1… ISOOUT_4	-
9	ISOOUT_6	Isolated digital output	O
10	ISOOUT_2	Isolated digital output	O
11	ISOOUT_5	Isolated digital output	O
12	ISOOUT_1	Isolated digital output	O

P8 – Isolated Digital Outputs Connector			
Pin	Name	Description / Notes	I/O
1	NC	No Connection	-
2	GND_ISOOUT_C	Output common for ISOOUT_9… ISOOUT_12	-
3	NC	No Connection	-
4	ISOOUT_12	Isolated digital output	O
5	NC	No Connection	-
6	ISOOUT_11	Isolated digital output	O
7	NC	No Connection	-
8	ISOOUT_C	Output pull-up for ISOOUT_9… ISOOUT_12	-
9	NC	No Connection	-
10	ISOOUT_10	Isolated digital output	O
11	NC	No Connection	-
12	ISOOUT_9	Isolated digital output	O

P11 – Encoder Connector			
Pin	Name	Description / Notes	I/O
1	GROUND	Ground	GND
2	GROUND	Ground	GND
3	ENC_B_2-	Differential encoder 2 B-channel negative input (leave open for single-ended encoders)	I
4	ENC_B_1-	Differential encoder 1 B-channel negative input (leave open for single-ended encoders)	I
5	ENC_B_2+	Differential encoder 2 B-channel positive input	I
6	ENC_B_1+	Differential encoder 1 B-channel positive input	I
7	+5V OUT	+5V encoder supply output. Maximum load on pins 7 and 8 together is 400mA.	O
8	+5V OUT	+5V encoder supply output. Maximum load on pins 7 and 8 together is 400mA.	O
9	ENC_A_2-	Differential encoder 2 A-channel negative input (leave open for single-ended encoders)	I
10	ENC_A_1-	Differential encoder 1 A-channel negative input (leave open for single-ended encoders)	I
11	ENC_A_2+	Differential encoder 2 A-channel positive input	I
12	ENC_A_1+	Differential encoder 1 A-channel positive input	I

P12 – Encoder Connector			
Pin	Name	Description / Notes	I/O
1	GROUND	Ground	GND
2	GROUND	Ground	GND
3	ENC_B_4-	Differential encoder 4 B-channel negative input (leave open for single-ended encoders)	I
4	ENC_B_3-	Differential encoder 3 B-channel negative input (leave open for single-ended encoders)	I
5	ENC_B_4+	Differential encoder 4 B-channel positive input	I
6	ENC_B_3+	Differential encoder 3 B-channel positive input	I
7	+5V OUT	+5V encoder supply output. Maximum load on pins 7 and 8 together is 400mA.	O
8	+5V OUT	+5V encoder supply output. Maximum load on pins 7 and 8 together is 400mA.	O
9	ENC_A_4-	Differential encoder 4 A-channel negative input (leave open for single-ended encoders)	I
10	ENC_A_3-	Differential encoder 3 A-channel negative input (leave open for single-ended encoders)	I
11	ENC_A_4+	Differential encoder 4 A-channel positive input	I
12	ENC_A_3+	Differential encoder 3 A-channel positive input	I

MOUNTING DIMENSIONS



CUSTOMIZATION INFORMATION

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