All specifications are subject to change without notice.
Typical for 25 °C unless otherwise specified.
Specifications in *italic* text are guaranteed by design.

Analog output

Table 1. Analog output specifications

Parameter	Condition	Specification
Resolution		12 bits, 1 in 4,096
Output range		*0 V to 5.0 V*
Number of channels		2
Write time		12 µs, typ
Power on and reset voltage	Initializes to 000h code	0 V, ±10 mV
Output drive	Each D/A OUT	5 mA, sourcing
Slew rate		0.8 V/µs typ
Differential nonlinearity		±0.25 LSB max
Zero-scale error (Note 1)	000h code	+2 mV typ +10 mV max
Full-scale error	FFFh code	-0.1 % of FSR typ ±1 % of FSR max
Offset error		±1 mV typ ±10 mV max
Gain error		±1.5 % of FSR max

Note 1: Zero-scale error may result in a "dead-band" digital input code region. In this case, changes in requested output voltage may not produce a corresponding change in the output voltage when the voltage is less than 10 mV. The offset error is tested and specified at 10 mV.

Note 2: Error tested at no load.

Digital input/output

Table 2. Digital I/O specifications

Parameter	Conditions	Specification
Digital input type		CMOS
Number of I/O		8
Configuration		Each bit may be configured as input (power on default) or output
Pull-up configuration		Each bit has a programmable 100 kΩ pull resistor (50 to 150 kΩ range) that may be programmed as pull-up (power on default), pull-down, or disabled. The pull-up/down resistors are disabled on outputs when in open-drain mode.
DIO supply voltage (VIO)		5 V or 3.3 V, jumper selectable with jumper W3 (factory default is 5 V.)
Port read time		400 µs, typ
Port write time		550 µs, typ
Interrupt functionality		Each bit may be configured to generate an interrupt on change when in input mode.
Input low voltage threshold		0.3 x VIO V max
Input high voltage threshold		0.7 x VIO V min
Input voltage limits	Both 3.3 V and 5 V modes	6.5 V absolute max (Note 3) –0.5 V absolute min

Parameter	Conditions	Specification
Input voltage recommended range	5 V mode	5.5 V max 0 V min
	3.3 V mode	3.8 V max (Note 3) 0 V min
Output type		CMOS, entire port may be configured as push-pull or open-drain
High level output current		10 mA max (Note 4)
Low level output current		25 mA max
Output high voltage	VIO = 3.3 V	2.5 V min (IOH = –10 mA)
	VIO = 5 V	4.0 V min (IOH = –10 mA)
Output low voltage	VIO = 3.3 V	0.25 V max (IOL = 10 mA)
	VIO = 5 V	0.2 V max (IOL = 10 mA)

Note 3: When VIO is 3.3V the input will tolerate voltages up to 6.5V, but the voltage must be current-limited or it will change the VIO voltage due to current flowing into the MCC 152. An external current limiting resistor of 700 Ω or larger is recommended on each input that is higher than 3.3V when the W3 jumper is in the 3.3V position.

Memory

Table 3. Memory specifications

Parameter	Specification
Non-volatile memory	4 KB (ID and serial storage, no user-modifiable memory)

Power

Table 4. Power specifications

Parameter	Conditions	Specification
Supply current, 5 V supply	Typical, 5V DIO selection	15 mA
	Maximum, 5V DIO selection	35 mA (Note 5, Note 6)
	Typical, 3.3V DIO selection	10 mA
	Maximum, 3.3V DIO selection	12 mA (Note 5)
Supply current, 3.3 V supply (Note 4)	Typical, 5V DIO selection	0.01 mA
	Maximum, 5V DIO selection	6 mA
	Typical, 3.3V DIO selection	3.5 mA
	Maximum, 3.3V DIO selection	11 mA (Note 5)

Note 4: The power consumed by all DAQ HATs must be within the capacity of the Raspberry Pi power supply. Extra care must be taken with sourcing 3.3V loads since they are supplied by the regulator on the Raspberry Pi; MCC recommends using the 5V DIO selection when sourcing large load currents such as LEDs.

Note 5: This specification does not include user loading on analog outputs.

Note 6: This specification does not include user loading on digital outputs or the VIO terminal.

Interface specifications

Table 5. Interface specifications

Parameter	Specification
Raspberry Pi GPIO pins used	GPIO 8, GPIO 10, GPIO 11 (SPI interface) GPIO 2, GPIO 3 (I2C interface) ID_SD, ID_SC (ID EEPROM) GPIO 12, GPIO 13, GPIO 26, (Board address) GPIO 21 (Interrupt)
Data interface type	SPI slave device, CE0 chip select (Analog output) I2C slave device (Digital I/O)

Parameter	Specification
SPI mode	1
SPI clock rate	50 MHz, max
I2C address	0x20 to 0x27, depending on board address jumper setting
I2C clock rate	400 kHz, max

Environmental

Table 6. Environmental specifications

Parameter	Specification
Operating temperature range	0 °C to 55 °C
Storage temperature range	–40 °C to 85 °C
Humidity	0% to 90% non-condensing

Mechanical

Table 7. Mechanical specifications

Parameter	Specification
Dimensions (L × W × H)	65 × 56.5 × 12 mm (2.56 × 2.22 × 0.47 in.) max

Screw terminal connector

Table 8. Screw terminal connector specifications

Parameter	Specification
Connector type	Screw terminal
Wire gauge range	16 AWG to 30 AWG

Table 9. Screw terminal pinout

Connector J2		
Pin	**Signal name**	**Pin description**
1	AO0	Analog output 0
2	AGND	Analog ground
3	AO1	Analog output 1
4	AGND	Analog ground
5	VIO	Digital supply voltage output (5V or 3.3V, depending on W3)
6	DGND	Digital ground
Connector J3		
Pin	**Signal name**	**Pin description**
7	DIO0	Digital I/O 0
8	DIO1	Digital I/O 1
9	DIO2	Digital I/O 2
10	DIO3	Digital I/O 3
11	DGND	Digital ground
12	DIO4	Digital I/O 4
13	DIO5	Digital I/O 5
14	DIO6	Digital I/O 6
15	DIO7	Digital I/O 7
16	DGND	Digital ground