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

Analog input

Table 1. General analog input specifications

Parameter	Conditions	Specification
Number of channels		2
ADC resolution		24-bit
A/D converter type		Delta sigma
Sampling mode		Simultaneous
Master timebase (f_M)	Frequency	26.2144 MHz
	Accuracy	±50 ppm max
Master timebase sources		■ Internal clock ■ Shared clock from another MCC 172
Data rates (f_S)		(f_M / 512) / n, n = 1, 2, …, 256 51.2 kS/s max 200 S/s min
Input coupling		AC
AC cutoff frequency		-3 dB: 0.78 Hz -0.1 dB: 5.2 Hz max
Input voltage range		±5 V
Common-mode voltage range	CHx to AGND	±2 V max
Overvoltage protection	CHx+ to CHx-	±35 V
	CHx- to ground	±3 V
IEPE compliance voltage		23 V max
IEPE excitation current		4.0 mA min 4.1 mA typ
Input delay	1 kHz to 23 kHz input frequency	4.5 µs + 39 / f_S
Channel-to-channel matching	Phase (200 Hz to 23 kHz)	(f_{in} * 0.022°) max
	Gain (20 Hz to 23 kHz)	0.19 dB typ
Passband	Frequency	0.453 * f_S
	Flatness (20 Hz to 23 kHz)	52 mdB (pk-to-pk typ)
Phase nonlinearity	f_S = 51.2 kS/s 200 Hz to 23 kHz input frequency	±0.36° max
Stopband	Frequency	0.547 * f_S
	Rejection	99 dB min
Alias-free bandwidth		0.453 * f_S
Alias rejection		100 dB @ 51.2 kS/s
Oversample rate		128 * f_S
Crosstalk	1 kHz	-122 dB
SFDR	f_{in} = 1 kHz, -60 dBFS	120 dB
Dynamic range	f_{in} = 1kHz, -1 dBFS	100 dB
Input impedance	Differential	202 kΩ
	CHx- (shield) to ground	50 Ω
Throughput	Single board	102.4 kS/s max (51.2 kS/s × 2 channels)
	Multiple boards	Up to 307.2 kS/s aggregate (Note 1)

Note 1: Dependent on the load on the Raspberry Pi processor and the SPI interface.

Note 2: For best results, connect the signal source and the Raspberry Pi to a common ground. If a floating source is required, connect the MCC 172 to earth ground via the DGND screw terminal to minimize common mode noise.

Accuracy

Analog input AC voltage measurement accuracy

Table 2. AC accuracy components and specifications. All values are (±) and apply to calibrated readings

Gain error, max	Offset error, max	Gain temperature coefficient, max	Offset temperature coefficient, max
0.43%	5.10 mV	88 ppm/°C	184 µV/°C

Noise performance

Table 3. Noise performance specifications

Idle Channel	51.2 kS/s
Noise	33 µVrms
Noise density	207 nV/√Hz

Total harmonic distortion (THD)

Table 4. Total harmonic distortion specifications

Input Amplitude	1 kHz	8 kHz
-1 dBFS	-93 dB	-91 dB
-10.96 dBFS	-87 dB	-87 dB

External digital trigger

Table 5. External digital trigger specifications

Parameter	Specification
Trigger source	TRIG input
Trigger mode	Software configurable for rising or falling edge, or high or low level
Trigger latency	1 µs + 1 sample period (1/fs) max
Trigger pulse width	100 ns min
Input type	Schmitt trigger, 100 K pull-down to ground
Input high voltage threshold	1.48 V min
Input low voltage threshold	1.2 V max
Input hysteresis	0.51 V min
Input voltage limits	6.5 V absolute max –0.5 V absolute min 0 V recommended min

Memory

Table 6. Memory specifications

Parameter	Specification
Data FIFO	48 K (49,152) analog input samples
Non-volatile memory	4 KB (ID and calibration storage, no user-modifiable memory)

Power

Table 7. Power specifications

Parameter	Conditions	Specification
Supply current, 5V supply	Typical	100 mA
	Maximum	140 mA

Interface specifications

Table 8. Interface specifications

Parameter	Specification
Raspberry Pi™ GPIO pins used	GPIO 8, 9, 10, 11 (SPI interface) ID_SD, ID_SC (ID EEPROM) GPIO 12, 13, 26, (Board address) GPIO 5, 6, 19, 16, 20 (clock / trigger sharing, reset, IRQ)
Data interface type	SPI slave device, CE0 chip select
SPI mode	1
SPI clock rate	18 MHz, max

Environmental

Table 9. 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 10. Mechanical specifications

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

Signal connectors

Table 11. Analog input signal connector specifications

Parameter	Specification
Connector types	10-32 coaxial / screw terminal (in parallel, only one source may be connected to a channel at a time)
Coaxial input signals	CH0: channel 0 input CH1: channel 1 input
Screw terminal wire gauge range	16 AWG to 30 AWG

Table 12. Analog input screw terminal pinout

Connector J2		
Pin	**Signal name**	**Pin description**
1	CH0+	Channel 0 positive input
2	CH0-	Channel 0 negative input
3	CH1+	Channel 1 positive input
4	CH1-	Channel 1 negative input

Table 13. Trigger input screw terminal pinout

Connector J5		
Pin	**Signal name**	**Pin description**
1	TRIG	Digital trigger input
2	GND	Digital ground