

Specifications

PMD-1208LS



**MEASUREMENT
COMPUTING™**

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Specifications

Typical for 25 °C unless otherwise specified.

Analog input section

| Parameter | Conditions | Specification |
|---|------------------------------|---|
| A/D converter type | | Successive Approximation type |
| Input voltage range for linear operation, Single Ended Mode | CHx to GND | ±10V max |
| Input common-mode voltage range for linear operation, Differential Mode | CHx to GND | -10V min, +20V max |
| Absolute maximum input voltage | CHx to GND | ±40V max |
| Input current (Note 1) | V _{in} = +10V | 70µA typ |
| | V _{in} = 0V | -12µA typ |
| | V _{in} = -10V | -94µA typ |
| Number of channels | | 8 single ended / 4 differential, software selectable |
| Input ranges, Single Ended Mode | | ±10V, G=2 |
| Input ranges, Differential Mode | | ±20V, G=1 ±10V, G=2 ±5V, G=4 ±4V, G=5 ±2.5V, G=8 ±2.0V, G=10 ±1.25V, G=16 ±1.0V, G=20 Software selectable |
| Throughput | Software paced | 50 S/s |
| | Continuous scan | 1.2 kS/s |
| | Burst scan to 4K sample FIFO | 8 kS/s |
| Channel Gain Queue | Up to 8 elements | Software configurable channel, range, and gain. |
| Resolution (Note 2) | Differential | 12 bits, no missing codes |
| | Single ended | 11 bits |
| CAL Accuracy | CAL = 2.5V | ±0.05% typ, ±0.25% max |
| Integral Linearity Error | | ±1 LSB typ |
| Differential Linearity Error | | ±0.5 LSB typ |
| Repeatability | | ±1 LSB typ |
| CAL current | Source | 5mA max |
| | Sink | 20µA min, 200nA typ |
| Trigger Source | Software selectable | External Digital: TRIG_IN |

Note 1: Input current is a function of applied voltage on the analog input channels. For a given input voltage, V_{in} , the input leakage is approximately equal to $(8.181 \cdot V_{in} - 12) \mu A$

Note 2: The AD7870 converter only returns 11-bits (0-2047 codes) in single-ended mode.

Table 1. Accuracy, Differential Mode

| Range | Accuracy (LSB) |
|-------------|----------------|
| $\pm 20V$ | 5.1 |
| $\pm 10V$ | 6.1 |
| $\pm 5V$ | 8.1 |
| $\pm 4V$ | 9.1 |
| $\pm 2.5V$ | 12.1 |
| $\pm 2V$ | 14.1 |
| $\pm 1.25V$ | 20.1 |
| $\pm 1V$ | 24.1 |

Table 2. Accuracy, Single-Ended Mode

| Range | Accuracy (LSB) |
|-----------|----------------|
| $\pm 10V$ | 4.0 |

Table 3. Accuracy Components, Differential Mode - All values are (\pm)

| Range | % of Reading | Gain Error at FS (mV) | Offset (mV) | Accuracy at FS (mV) |
|-------------|--------------|-----------------------|-------------|---------------------|
| $\pm 20V$ | 0.2 | 40 | 9.766 | 49.766 |
| $\pm 10V$ | 0.2 | 20 | 9.766 | 29.766 |
| $\pm 5V$ | 0.2 | 10 | 9.766 | 19.766 |
| $\pm 4V$ | 0.2 | 8 | 9.766 | 17.766 |
| $\pm 2.5V$ | 0.2 | 5 | 9.766 | 14.766 |
| $\pm 2V$ | 0.2 | 4 | 9.766 | 13.766 |
| $\pm 1.25V$ | 0.2 | 2.5 | 9.766 | 12.266 |
| $\pm 1V$ | 0.2 | 2 | 9.766 | 11.766 |

Table 4. Accuracy Components, Single-Ended Mode - All values are (\pm)

| Range | % of Reading | Gain Error at FS (mV) | Offset (mV) | Accuracy at FS (mV) |
|-----------|--------------|-----------------------|-------------|---------------------|
| $\pm 10V$ | 0.2 | 20 | 19.531 | 39.531 |

Analog output section

| Parameter | Conditions | Specification |
|----------------------------|----------------|---|
| D/A converter type | | PWM |
| Resolution | | 10-bits, 1 in 1024 |
| Maximum output range | | 0 -5 Volts |
| Number of channels | | 2 voltage output |
| Throughput | Software paced | 100 S/s single channel mode 50 S/s dual channel mode |
| Power on and reset voltage | | Initializes to 000h code |
| Maximum voltage (Note 3) | No Load | Vs |
| | 1mA Load | 0.99*Vs |
| | 5mA Load | 0.98*Vs |
| Output drive | Each D/A OUT | 30mA |
| Slew rate | | 0.14V/mS typ |

Note 3: Vs is the USB bus +5V power. The maximum analog output voltage is equal to Vs at no-load. V is system dependent and may be less than 5 volts.

Digital input/output

| | |
|------------------------------------|--|
| Digital type | 82C55 |
| Number of I/O | 16 (Port A0 through A7, Port B0 through B7) |
| Configuration | 2 banks of 8 |
| Pull up/pull-down configuration | All pins pulled up to Vs via 47K resistors (default). Positions available for pull down to ground. Hardware selectable via zero ohm resistors as a factory option. |
| Input high voltage | 2.0V min, 5.5V absolute max |
| Input low voltage | 0.8V max, -0.5V absolute min |
| Output high voltage (IOH = -2.5mA) | 3.0V min |
| Output low voltage (IOL = 2.5mA) | 0.4V max |

External trigger

| Parameter | Conditions | Specification |
|-------------------------|---------------------|---|
| Trigger Source (Note 4) | External Digital | TRIG_IN |
| Trigger mode | Software selectable | Level Sensitive: user configurable for TTL level high or low input. |
| Trigger latency | Burst | 25µs min, 50µs max |
| Trigger pulse width | Burst | 40µs min |
| Input high voltage | | 3.0V min, 15.0V absolute max |
| Input low voltage | | 0.8V max |
| Input leakage current | | ±1.0µA |

Note 4: TRIG_IN is protected with a 1.5KOhm series resistor.

Counter section

| | |
|----------------------------|---------------------|
| Counter type | Event counter |
| Number of Channels | 1 |
| Input source | CTR screw terminal |
| Resolution | 32 bits |
| Schmidt Trigger Hysteresis | 20mV to 100mV |
| Input Leakage Current | $\pm 1\mu\text{A}$ |
| Maximum input frequency | 1 MHz |
| High pulse width | 500ns min |
| Low pulse width | 500ns min |
| Input low voltage | 0V min, 1.0V max |
| Input high voltage | 4.0V min, 15.0V max |

Non-volatile memory

| | | | |
|----------------------|----------------------|---------------|-----------------------|
| Memory size | 8192 bytes | | |
| Memory configuration | Address Range | Access | Description |
| | 0x0000 – 0x17FF | Read/Write | A/D Data (4K samples) |
| | 0x1800 – 0x1EFF | Read/Write | User data area |
| | 0x1F00 – 0x1FEF | Read/Write | Calibration Data |
| | 0x1FF0 – 0x1FFF | Read/Write | System Data |

Power

| Parameter | Conditions | Specification |
|-------------------------------------|-------------------------------|----------------------|
| Supply Current (Note 5) | | 20mA |
| +5V USB power available (Note 6) | Connected to Self-Powered Hub | 4.5V min, 5.25V max |
| | Connected to Bus-Powered Hub | 4.1V min, 5.25V max |
| Output Current (Note 7) | Connected to Self-Powered Hub | 450mA min, 500mA max |
| | Connected to Bus-Powered Hub | 50mA min, 100mA max |

Note 5: This is the total current requirement for the PMD-1208LS, which includes up to 5mA for the status LED.

Note 6: Self-powered refers to USB hubs and hosts with a power supply. Bus-powered refers to USB hubs and hosts without their own power supply.

Note 7: This refers to the total amount of current that can be sourced from the USB +5V, analog outputs and digital outputs.

General

| Parameter | Conditions | Specification |
|----------------------------|--------------|-------------------|
| USB Controller Clock Error | 25 °C | ±30 ppm max |
| | 0 to 70 °C | ±50 ppm max |
| | -40 to 85 °C | ±100 ppm max |
| Device type | | USB 1.1 low-speed |
| Device compatibility | | USB 1.1, USB 2.0 |

Environmental

| | |
|-----------------------------|-------------------------|
| Operating Temperature Range | -40 to 85 °C |
| Storage Temperature Range | -40 to 85 °C |
| Humidity | 0 to 90% non-condensing |

Mechanical

| | |
|------------------------|-----------------------------|
| Dimensions | 79mm(L) x 82mm(W) x 25mm(H) |
| USB Cable Length | 3 Meters max |
| User Connection Length | 3 Meters max |

Main connector and pin out

| | |
|------------------|------------------|
| Connector type | Screw Terminal |
| Wire gauge range | 16 AWG to 30 AWG |

4-channel differential mode

| Pin | Signal Name | Pin | Signal Name |
|-----|-------------|-----|-------------|
| 1 | CH0 IN HI | 21 | Port A0 |
| 2 | CH0 IN LO | 22 | Port A1 |
| 3 | GND | 23 | Port A2 |
| 4 | CH1 IN HI | 24 | Port A3 |
| 5 | CH1 IN LO | 25 | Port A4 |
| 6 | GND | 26 | Port A5 |
| 7 | CH2 IN HI | 27 | Port A6 |
| 8 | CH2 IN LO | 28 | Port A7 |
| 9 | GND | 29 | GND |
| 10 | CH3 IN HI | 30 | PC+5V |
| 11 | CH3 IN LO | 31 | GND |
| 12 | GND | 32 | Port B0 |
| 13 | D/A OUT 0 | 33 | Port B1 |
| 14 | D/A OUT 1 | 34 | Port B2 |
| 15 | GND | 35 | Port B3 |
| 16 | CAL | 36 | Port B4 |
| 17 | GND | 37 | Port B5 |
| 18 | TRIG IN | 38 | Port B6 |
| 19 | GND | 39 | Port B7 |
| 20 | CTR | 40 | GND |

8-channel single-ended mode

| Pin | Signal Name | Pin | Signal Name |
|-----|-------------|-----|-------------|
| 1 | CH0 IN | 21 | Port A0 |
| 2 | CH1 IN | 22 | Port A1 |
| 3 | GND | 23 | Port A2 |
| 4 | CH2 IN | 24 | Port A3 |
| 5 | CH3 IN | 25 | Port A4 |
| 6 | GND | 26 | Port A5 |
| 7 | CH4 IN | 27 | Port A6 |
| 8 | CH5 IN | 28 | Port A7 |
| 9 | GND | 29 | GND |
| 10 | CH6 IN | 30 | PC+5V |
| 11 | CH7 IN | 31 | GND |
| 12 | GND | 32 | Port B0 |
| 13 | D/A OUT 0 | 33 | Port B1 |
| 14 | D/A OUT 1 | 34 | Port B2 |
| 15 | GND | 35 | Port B3 |
| 16 | CAL | 36 | Port B4 |
| 17 | GND | 37 | Port B5 |
| 18 | TRIG_IN | 38 | Port B6 |
| 19 | GND | 39 | Port B7 |
| 20 | CTR | 40 | GND |

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