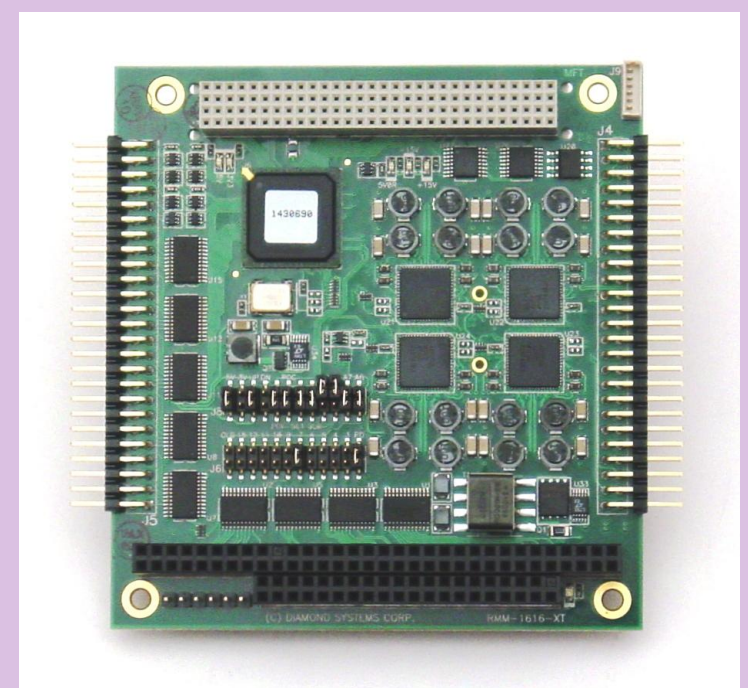


RUBY-MM-1616



Analog Output & Digital I/O PC/104 Module



- ◆ 4, 8 or 16 16-bit analog outputs
- ◆ 16-bit D/A resolution
- ◆ Unipolar and bipolar operation
- ◆ Simultaneous updating of all outputs
- ◆ 5V, 0-10V, and $\pm 5V$, and $\pm 10V$ voltage output ranges
- ◆ 0-20mA, 4-20mA and 0-24mA current output ranges
- ◆ Independent output range for each channel
- ◆ D/A digital calibration
- ◆ Waveform generator up to 16 channels
- ◆ 48 digital I/O lines, bit and byte-wide
- ◆ External trigger capability
- ◆ 2 32-bit programmable counter/timers
- ◆ 4 24-bit pulse width modulators
- ◆ Fully calibrated for highest accuracy
- ◆ Extremely rugged -40°C to $+85^{\circ}\text{C}$ operating temperature
- ◆ PC/104 form factor: 3.55" x 3.775" (90mm x 96mm)

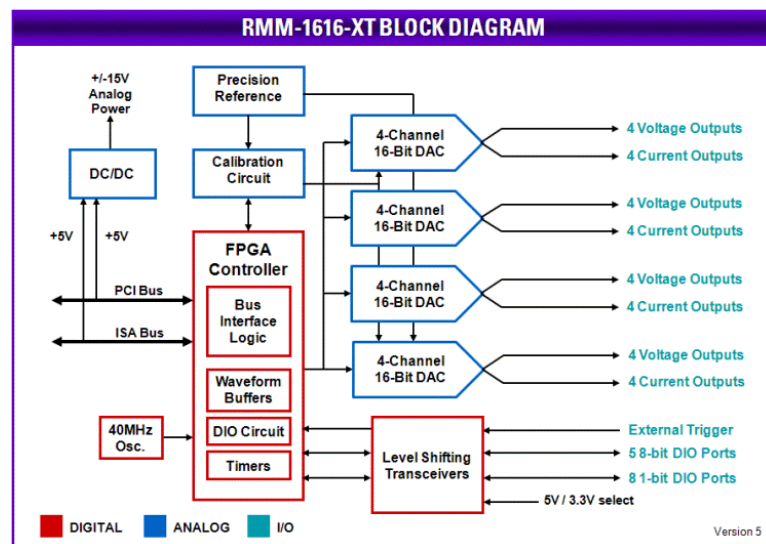
High Performance Analog I/O Functionality

The Ruby-MM-1616 PC/104 module provides 4, 8 or 16 channels of 16-bit resolution analog voltage or current output. The output range can be individually selected for 0-5V, 0-10V, $\pm 5V$, $\pm 10V$, 0-20mA, 4-20mA, or 0-24mA. All outputs are updated simultaneously, either with a software command or in response to an external signal.

The module also includes 48 lines of digital I/O, 40 lines of byte-wide and 8 lines of bit-wide. Other features include +5V only operation, individual DC/DC converters with filtered outputs for each DAC to supply $\pm 15V$ for operation, and a six layer circuit board to bury and shield the analog signals.

Rugged Design

The Ruby-MM-1616 family was designed with harsh applications in mind. Extended temperature capability of -40°C to $+85^{\circ}\text{C}$ enables the board to operate in environments with extreme temperature swings, such as vehicles or outdoor installations. In addition, the board may be custom-configured with 0-ohm resistors in place of jumpers for increased ruggedness in high-vibration environments.



Ruby-MM-1616: Analog Output & DIO Module



Specifications

Number of analog outputs	4, 8 or 16
Resolution	16-bits
Output ranges	5V, 0-10V, and $\pm 5V$, and $\pm 10V$ 0-20mA, 4-20mA, 0-24mA
Settling time	$\pm 2LSB$ maximum
Linearity error	$\pm 2LSB$ maximum
Differential nonlinearity	$\pm 2LSB$ maximum
Monotonicity	15bits minimum
Maximum output current	$\pm 5mA$ / $2K\Omega$ minimum load
Reset	All DACs reset to 0V
Calibration	Digital with internal scale and offset registers per channel
Waveform generator	Up to 16 channels
Number of digital I/O lines	40 byte-wide, 8 bit-wide, programmable direction TTL/CMOS compatible
Input voltage	Logic 0: -0.5V min, 0.8V max Logic 1: 2.0V min, 5.5V max
Output voltage	Logic 0: 0.0V min, 0.4V max Logic 1: 3.0V min, 4.6V max
Output current	$\pm 2.5mA$ maximum per line
Counter/timers	2 32-bit; 40MHz clock
PWMs	4 24-bit
Input power	+5VDC $\pm 5\%$
Host interface	PC/104 ISA bus or PC/104-Plus (ISA + PCI) bus
Operating temperature	-40°C to +85°C (-40°F to +185°F)
Operating humidity	5% to 95% non-condensing
Shock	MIL-STD-202G compatible
Vibration	MIL-STD-202G compatible
MTBF	100,00 hours
Form factor	PC/104 compliant 3.55" x 3.775" (90mm x 96mm)
Weight	3.0oz (85g)
RoHS	Compliant

Software Support

All Ruby-MM-1616 models ship with Diamond's free Universal Driver software for C language programming under Windows 7, Windows Embedded 7, Windows XP, Linux and DOS. All major functions of the board are supported by the driver and example programs are also included.

Key Features

The Ruby-MM-1616 PC/104 module provides 4, 8 or 16 channels of 16-bit resolution analog voltage or current output. The output range can be individually selected for 0-5V, 0-10V, $\pm 5V$, $\pm 10V$, 0-20mA, 4-20mA, or 0-24mA. All outputs are updated simultaneously, either with a software command or in response to an external signal.

The module also includes 48 lines of digital I/O, 40 lines of byte-wide and 8 lines of bit-wide. Other features include +5V only operation, individual DC/DC converters with filtered outputs for each DAC to supply $\pm 15V$ for operation, and a six layer circuit board to bury and shield the analog signals.

For any output range, the resolution is equal to the maximum possible range of output voltages divided by the maximum number of possible steps. A 16-bit converter has very high resolution because the maximum number of steps is $216 = 65536$ (the actual output codes range from 0 to 65535, which is the full range of possible 16-bit binary numbers). Thus the resolution is equal to $1/65536$ times the full-scale range. This is the smallest possible change in the output. It corresponds to a change of 1 in the output code, and there it is often referred to as the value of 1 least significant bit, or 1 LSB.

Ruby-MM-1616 models are available with either PC/104 or PC/104-Plus I/O expansion buses. Appropriate mating cables are also available for your convenience. Cable number C-50-18 is a 50-conductor 18" ribbon cable. One is used for each of the data acquisition and digital I/O connectors.

Ordering Information

RMM-1616AP-XT	16 Channel 16-bit Analog Output PC/104-Plus Module with 48 Digital I/O, extended temp
RMM-816AP-XT	8 Channel 16-bit Analog Output PC/104-Plus Module with 48 Digital I/O, extended temp
RMM-416AP-XT	4 Channel 16-bit Analog Output PC/104-Plus Module with 48 Digital I/O, extended temp {Minimum Order Quantity applies}
RMM-1616A-XT	16 Channel 16-bit Analog Output PC/104 Module with 48 Digital I/O, extended temp
RMM-816A-XT	8 Channel 16-bit Analog Output PC/104 Module with 48 Digital I/O, extended temp
RMM-416A-XT	4 Channel 16-bit Analog Output PC/104 Module with 48 Digital I/O, extended temp {Minimum Order Quantity applies}
C-50-18	50-conductor 18" ribbon cable