



SERIAL PORTS EMERALD-MM-OPTO

OPTO-ISOLATED SERIAL PORTS + DIGITAL I/O



- ◆ 2 or 4 serial ports based on 16C2850 UART (1 or 2 UART chips)
- ◆ Opto-isolation for protection against spikes and ground differences
- ◆ RS-232, RS-422, and RS-485 protocols
- ◆ Auto-flow RS-485 control for compatibility and ease of use
- ◆ 460.8kbps max baud rate
- ◆ Line termination for reliable communications
- ◆ 128-byte FIFOs for reduced processor overhead
- ◆ 24 digital I/O lines using 82C55
- ◆ +5V only power supply
- ◆ Operating temperature -40 to +85°C

ORDERING GUIDE

- EMM-OPT2-XT** 2 opto-isolated RS-232/422/485 ports, 24 digital I/O
- EMM-OPT4-XT** 4 opto-isolated RS-232/422/485 ports, 24 digital I/O

For cables and accessories, see pages 46-47.

DIGITAL I/O HEADER

C7	1	2	C6
C5	3	4	C4
C3	5	6	C2
C1	7	8	C0
B7	9	10	B6
B5	11	12	B4
B3	13	14	B2
B1	15	16	B0
A7	17	18	A6
A5	19	20	A4
A3	21	22	A2
A1	23	24	A0
+5V	25	26	GND

The digital I/O is provided on a 26-pin pin header with the following pinout. Mating cable is C-26-18.

2 SERIAL PORTS + DIGITAL I/O

1 Emerald-MM-Opto provides 2 or 4 optically isolated serial ports with RS-232, RS-422, and RS-485 protocols, as well as 24 digital I/O lines, all on a single board. The optical isolation of 1000V DC or AC protects your embedded system from ground differentials or noise spikes on the serial ports that could damage non-isolated boards. Each port is isolated from the other ports as well as the system. An optional 3MΩ/ 220pF isolation bridge between port ground and system ground is available. Extended temperature capability (-40 to +85°C) enables the board to operate reliably in vehicles such as trains and buses.

In addition to ruggedness, Emerald-MM-Opto offers flexibility with the following advanced features:

- ◆ Independent protocol and IRQ configuration for each serial port.
- ◆ Eight different I/O address combinations with jumper selection
- ◆ 16C2850 UART chips with 128-byte FIFOs support high-speed data rates at up to 460kbps without overloading the system processor
- ◆ Auto-flow control enables easy RS-485 operation by automatically enabling and disabling the transmitter during data transmission, preventing bus conflicts and ensuring compatibility with standard serial port software.
- ◆ Multiple line termination options to support RS-422 or RS-485 networks, including 1KΩ pull-up / pull-down resistors and 150Ω end termination resistors.

The 24 digital I/O lines are based on an 82C55 chip and feature programmable direction in 4- and 8-bit groups. All I/O lines contain user-configurable 10KΩ pull-up resistors. This 2-in-1 combination of serial ports and digital I/O provides more functionality in less space.

Serial Port Connectors

Each serial port has its own 10-pin header. Mating cable C-DB9M-1 may be used for each port (qty 2 or 4 per board) to provide a standard male DB9 connector. In RS-232 mode, the pinout conforms to the PC standard for a 9-pin DTE (Data Terminal Equipment) serial port.

SPECIFICATIONS

SERIAL PORTS	
No. of serial ports	EMM-OPT2-XT: 2; EMM-OPT4-XT: 4
Protocol	RS-232, RS-422, RS-485; Jumper selected
Maximum baud rate	230.4kbps RS-232; 460.8kbps RS-422/RS485
Communications parameters	5, 6, 7, or 8 data bits; Even, odd, or no parity
Short circuit protection	All outputs protected against continuous short circuit
Isolation voltage	1000VDC or AC
Isolation coupling option	3MW in parallel with 220pF (consult factory for more details)
RS-232 MODE	
Input impedance	3KΩ min
Input voltage swing	±30V max
Output voltage swing	±5V min, ±7V typical
RS-422, RS-485 MODES	
Differential input threshold	-0.2V min, +0.2V max
Input impedance	12KΩ min
Input current	+1.0mA max (VIN = 12V) 0.8mA max (VIN = -7V)
Differential output voltage	2.0V min (RL = 50W)
High/low states differential output voltage symmetry	0.2V max
DIGITAL I/O	
No. of I/O lines	24, using 82C55 chip
Direction	Ports A and B: Individually programmable for all input or all output Port C: Programmable in 4-bit groups for input or output
Input voltage	Low 0.5V min, 0.8V max High 2.0V min, 5.5V max
Output voltage	Low 0.0V min, 0.4V max High 3.0V min, Vcc - 0.4V max
Output current	±2.5mA max, each line
Pull-up resistors	10KΩ all lines, selectable with jumper
GENERAL	
Dimensions	3.55" x 3.775" (PC/104 standard)
Power supply	+5VDC ±10%
Current consumption	300mA / 1.5W typical, all outputs unloaded
Operating temp.	-40 to +85°C
Weight	3.0 oz / 85g

INPUT/OUTPUT HEADERS (2 OR 4 PER BOARD)

RS-232 Configuration

NC	1	2	NC
RXD	3	4	RTS
TXD	5	6	CTS
NC	7	8	NC
ISO GND	9	10	NC

RS-422 Configuration

RXD+	1	2	CTS-
RXD-	3	4	RTS+
TXD+	5	6	CTS+
TXD-	7	8	RTS-
ISO GND	9	10	NC

RS-485 Configuration

RXD+/RXD+	1	2	NC
TXD-/RXD-	3	4	NC
TXD+/RXD+	5	6	NC
TXD-/RXD-	7	8	NC
ISO GND	9	10	NC

In RS-485 mode, only one pair of signal wires is used, plus ground reference. Either pins 1 and 3 or pins 5 and 7 may be used.