TS-SER2 – 2 Serial / 1 Parallel PC/104 Card

Introduction

The TS-SER2 is an 8-bit PC/104 expansion card with two serial ports and one parallel port. Each of these subsystems is discussed below.

Serial Ports

The two serial ports are labeled COMA and COMB. RS-232C drivers are standard, but RS-422 (a.k.a. full-duplex RS-485) / RS-485 drivers can be added optionally.

With either set of drivers, all serial signals are routed to both 10-pin headers and RJ45 connectors. See tables 1 and 2 for pin-outs. The RJ45 pinout for RS-232 is per the industry standard EIA/TIA 561 specification. The RJ45 socket pins are numbered from left to right (1 through 8) when looking into the socket.

The serial ports use 16C550 UARTs, which provide 16 byte send and receive FIFOs, reducing the CPU overhead of high-speed serial communications.

For half-duplex RS-485 you must enable and disable the transmitters when sending data. This is done using the RTS line of the serial port. Asserting RTS turns on the transmitter, and deasserting RTS turns it back off. Note that RTS still controls the transmit enable when using full-duplex RS-485, so make sure to assert RTS. If you require automatic transmit enable, please contact Technologic Systems.

The serial baud clock is generated from either the PC/104 BCLK (8.33 MHz) or OSC (14.318 MHz) signals, selected by JP13. If you are using the TS-SER2 with a Technologic Systems EPC board, you should use the BCLK selection (JP13 installed). If you are using another manufacturer's processor board and you do not know the PC/104 BCLK rate, you should use the OSC selection. Because a programmable logic device generates the baud clock, non-standard clock rates can be handled if necessary in your design. Please contact Technologic Systems for further details.

Port COM A can use interrupts 3, 5, and 7. COM B can use interrupts 4, 6, and 9. To select the desired interrupts, simply install jumpers on the associated pins in the IRQ jumper block.

Pin	COMA / B (header and DB9)	
	RS-232	RS-485
1	-	TX+
2	RX data	
3	TX data	
4	Logic High (DTR) *	RX+
5	GND	GND
6	-	RX-
7	RTS	
8	CTS	
9	-	TX-
10	-	

Table 1 - Serial Port Header Pinout
* Resistor pull-up to 5V on ten pin header

5	4	3	2	1
10	9	8	7	6

Figure 1 - Serial Port Header Pin Location
Pin 1 is away from the PC/104 connector

PLEASE NOTE: Not all serial adapter cables are alike! We are aware of at least two 'standard' pin outs for these cables. If you did not purchase your serial adapter cables from us, this may be an issue if the serial ports are not working correctly (or at all)

Pin	COMA / B (RJ45)		
	RS-232	FD RS-485	HD RS-485
1	-	TX+	RX/TX+
2	-	TX-	RX/TX-
3	-	-	-
4	GND	GND	GND
5	RXD	-	-
6	TXD	-	-
7	CTS	RX-	-
8	RTS	RX+	-

Table 2 – RJ45 Pinout for RS-232,
Full Duplex RS-485, and Half Duplex RS-485

JP#	Function	Port
JP1	Select FD RS-485 (RS-422 - 2 wire pairs)	COM A
JP2	Select HD RS-485 (1 wire pair)	COM A
JP3	Add termination resistor to TX pair	COM A
JP4	Add termination resistor to RX pair	COM A
JP5	Connect CTS to RJ45 connector	COM A
JP6	Connect RTS to RJ45 connector	COM A
JP7	Select RS-422 (2 wire pairs)	COM B
JP8	Select RS-485 (1 wire pair)	COM B
JP9	Add termination resistor to TX pair	COM B
JP10	Add termination resistor to RX pair	COM B
JP11	Connect CTS to RJ45 connector	COM B
JP12	Connect RTS to RJ45 connector	COM B
JP13	Select PC/104 Bus Clock as baud clock source (PC/104 OSC used if not installed)	A & B

Table 3 – JP Jumper Functions

JP14	JP15	JP18 *	COMA	COMB
Yes	Yes	Yes	2E8h	3E8h
Yes	No	Yes	2F8h	3F8h
No	Yes	Yes	260h	268h
No	No	Yes	Disabled	Disabled
Yes	Yes	No	250h	258h
Yes	No	No	220h	228h
No	Yes	No	210h	218h
No	No	No	Disabled	Disabled

Table 4 – Serial Port I/O Address Selection
* **NOTE: JP18 is shared with the parallel port**

Because the I/O address decode is handled by a programmable logic device, completely different addresses can be used if necessary in your design. Please contact Technologic Systems for further details.

Table 5 lists the de-facto 'standard' I/O addresses and interrupts for PC compatible computers. Note that this setup shares IRQ 4 between COM1 and COM3, and IRQ 3 between COM3 and COM4. You **cannot** use interrupt driven serial communications simultaneously on both ports using the same interrupt. **Because of this, the factory default settings are IRQ 5, address 2E8h for COMA (COM4) and IRQ 6, address 3E8h for COMB (COM3).**

Port #	I/O Address	'Standard' IRQ	Factory Default IRQ
COM1	3F8h	4	4
COM2	2F8h	3	3
COM3	3E8h	4	6
COM4	2E8h	3	5

Table 6 – 'Standard' Serial Port I/O Addresses and Interrupts

Parallel Port

The parallel port is a standard PS/2 mode bi-directional port. It can be assigned to 5 different I/O locations and two interrupts, or disabled completely. For further information on programming the bi-directional modes, take a look at books that cover standard PC compatible hardware.

JP16	JP17	JP18 *	LPT Address
Yes	Yes	Yes	278h
Yes	No	Yes	378h
No	Yes	Yes	3BCh
No	No	Yes	disabled
Yes	Yes	No	278h
Yes	No	No	27Ch
No	Yes	No	37Ch
No	No	No	disabled

Table 7 – Parallel Port I/O Address Selection
* **NOTE: JP18 is shared with the serial ports**

Because the I/O address decode is handled by a programmable logic device, completely different addresses can be used if necessary in your design. Please contact Technologic Systems for further details.

The parallel port can use interrupts 7 and 9. To select the desired interrupt, simply install a jumper on the associated pins in the IRQ jumper block.