The Embedded I/O Company

TEWS TECHNOLOGIES

TPMC460

16 Channel Serial Interface RS232/RS422

Version 1.0

User Manual

Issue 1.0.6

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TPMC460-10R

16 channel RS232 asynchronous serial interface, front panel and back I/O

TPMC460-11R

16 channel RS422 asynchronous serial interface, front panel and back I/O

TPMC460-12R

8 channel RS232, 8 channel RS422 asynchronous serial interface, front panel and back I/O

TPMC460-13R

12 channel RS232, 4 channel RS422 asynchronous serial interface, front panel and back I/O

TPMC460-14R

4 channel RS232, 12 channel RS422 asynchronous serial interface, front panel and back I/O

Style Conventions

Hexadecimal characters are specified with prefix 0x, i.e. 0x029E (that means hexadecimal value 029E).

For signals on hardware products, an ‚Active Low' is represented by the signal name with # following, i.e. IP_RESET#.

Access terms are described as:

W	Write Only
R	Read Only
R/W	Read/Write
R/C	Read/Clear
R/S	Read/Set

Issue	Description	Date
1.0	First Issue	November 2004
1.1	Configuration EEPROM data & Pinout clarification	October 2005
1.2	Channel numbering clarification	August 2006
1.3	New address TEWS LLC	September 2006
1.4	Changed RS422 Transceiver	October 2006
1.0.5	Corrected Back-I/O Pinouts New notation for HW Engineering Documentation Releases	April 2009
1.0.6	General Revision	August 2014

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1 Product Description

The TPMC460 is a standard single-width 32 bit PMC module and offers 16 channels of high performance serial interface.

Five different standard modules are available: The TPMC460-10R provides 16 RS232 interfaces. The TPMC460-11R provides 16 RS422 interfaces. The TPMC460-12R provides 8 RS232 and 8 RS422 interfaces. The TPMC460-13R provides 12 RS232 and 4 RS422 interfaces. The TPMC460-14R provides 4 RS232 and 12 RS422 interfaces. Other configurations are available as factory option on a per channel basis.

All modules offer front panel I/O with a HD68 connector and P14 I/O. Each RS232 channel supports RxD, TxD, RTS and CTS. Each RS422 supports RxD+/- and TxD+/-.

A transparent 32 bit / 66 MHz PCI-to-PCI Bridge provides access to the two Exar XR17D158 octal PCI-UARTs. The PCI-to-PCI Bridge allows 32 bit accesses on the local PCI bus and permits the high data throughput necessary for the high performance serial interfaces.

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

Interrupts are supported. For fast interrupt source detection each octal UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers up to ±15KV according to IEC 1000-4-2.

The TPMC460 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

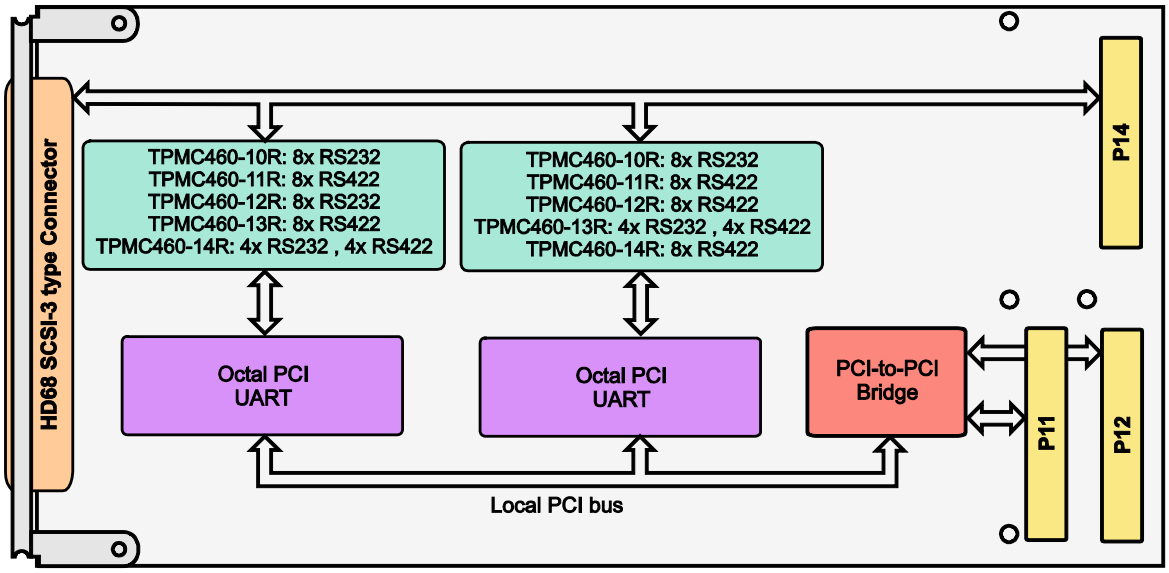

Figure 1-1 : Block Diagram

2 Technical Specification

PMC Interface	
Mechanical Interface	PCI Mezzanine Card (PMC) Interface Single Size
Electrical Interface	PCI Rev. 2.2 compliant 33 MHz / 66 MHz, 32 bit PCI 3.3V and 5V PCI Signaling Voltage
On Board Devices	
PCI-to-PCI Bridge	PCI2050B (Texas Instruments)
Octal UART	XR17D158 (Exar)
Transceiver	RS232: MAX3225E (or equivalent) RS422: MAX3077E (or equivalent)
I/O Interface	
Interface Type	Asynchronous serial interface
Number of Channels	16 (2x 8 channels)
Physical Interface	TPMC460-10R: 16 RS232 TPMC460-11R: 16 RS422 TPMC460-12R: 8 RS232, 8 RS422 TPMC460-13R: 12 RS232, 4 RS422 TPMC460-14R: 4 RS232, 12 RS422
Serial Channel I/O Signals	RS232: TxD, RxD, RTS, CTS, GND RS422: TxD+/-, RxD+/-, GND
Termination	RS422: 120Ω between RxD+ and RxD- of each channel
Programmable Baud Rates	RS232: up to 921.6 kbps RS422: up to 5.5296 Mbps
ESD Protection	RS232: ±15kV—Human Body Model ±8kV—IEC 1000-4-2, Contact Discharge ±15kV—IEC 1000-4-2, Air-Gap Discharge RS422: ±15kV—Human Body Model
I/O Connector	HD68 SCSI-3 type connector (e.g. AMP# 787082) PMC P14 I/O (64 pin Mezzanine Connector)
Physical Data	
Power Requirements	TPMC460-10R: 80 mA typical @ +3.3V DC (no load) 70 mA typical @ +5V DC TPMC460-11R: 120 mA typical @ +3.3V DC (no load) 70 mA typical @ +5V DC TPMC460-12R: 100 mA typical @ +3.3V DC (no load) 70 mA typical @ +5V DC TPMC460-13R: 90 mA typical @ +3.3V DC (no load) 70 mA typical @ +5V DC TPMC460-14R: 110 mA typical @ +3.3V DC (no load) 70 mA typical @ +5V DC

Temperature Range	Operating Storage	-40°C to +85°C -55°C to +125°C
MTBF	TPMC460-10R: 580 000 h TPMC460-11R: 430 000 h TPMC460-12R: 480 000 h TPMC460-13R: 530 000 h TPMC460-14R: 460 000 h MTBF values shown are based on calculation according to MIL-HDBK-217F and MIL-HDBK-217F Notice 2; Environment: $G_{B\ 20°C}$. The MTBF calculation is based on component FIT rates provided by the component suppliers. If FIT rates are not available, MIL-HDBK-217F and MIL-HDBK-217F Notice 2 formulas are used for FIT rate calculation.	
Humidity	5 – 95 % non-condensing	
Weight	74 g	

Table 2-1 : Technical Specification

3 PMC/PCI Interface

The TPMC460 uses two Exar XR17D158 octal PCI-UARTs to provide and control the 16 serial channels. A transparent 32 bit / 66 MHz PCI-to-PCI Bridge provides access to the two octal PCI-UARTs. The PCI-to-PCI Bridge allows 32 bit accesses on the local PCI bus and permits the high data throughput necessary for the high performance serial interfaces.

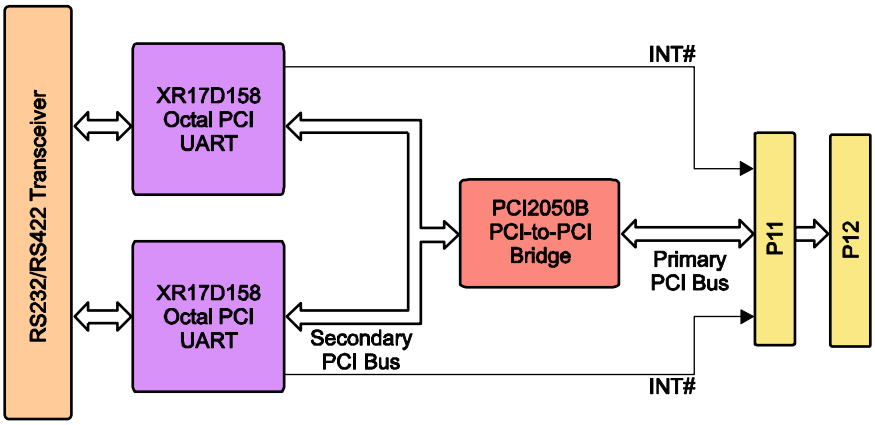

Figure 3-1 : PMC/PCI Interface

The following chart gives information about how the serial channels are assigned to the octal UARTs:

Octal PCI UART	Internal UART	Serial Channel
Octal PCI UART 1	UART Channel 0	0
	UART Channel 1	1
	UART Channel 2	2
	UART Channel 3	3
	UART Channel 4	4
	UART Channel 5	5
	UART Channel 6	6
	UART Channel 7	7
Octal PCI UART 2	UART Channel 0	8
	UART Channel 1	9
	UART Channel 2	10
	UART Channel 3	11
	UART Channel 4	12
	UART Channel 5	13
	UART Channel 6	14
	UART Channel 7	15

Table 3-1 : Serial channel mapping

3.1 Secondary PCI Bus Overview

The following chart gives information about the device numbers of the octal PCI UARTs and how their interrupts are wired to the Primary PCI Bus:

	Secondary PCI Bus Device Number	Primary PCI Bus Interrupt Line
Octal UART1	4 (AD20 used as IDSEL)	INTA#
Octal UART2	5 (AD21 used as IDSEL)	INTB#

Table 3-2 : Secondary PCI Bus Overview

3.2 PCI2050B PCI-to-PCI Bridge General Info

Vendor ID: 0x104C (Texas Instruments)

Device ID: 0xAC28 (PCI2050b)

The general purpose I/O interface is not used. GPIO pins are pulled up.

Only secondary clock outputs 0-1 and 9 are used to clock secondary devices. The host software may disable clock outputs 2-8 through the secondary clock control register located at PCI offset 0x68 to save power.

For detailed description of the PCI2050B PCI-to-PCI Bridge refer to the PCI2050B data sheet, which is available on the Texas Instruments website (www.ti.com).

4 XR17D158 Octal PCI-UART

4.1 PCI Configuration Space Registers (PCR)

PCI CFG Register Address	Write '0' to all unused (Reserved) bits								PCI writeable	Initial Values (Hex Values)
	31	24	23	16	15	8	7	0		
0x00	Device ID				Vendor ID				N	01CC 1498
0x04	Status				Command				Y	0080 0000
0x08	Class Code						Revision ID		N	070002 ??
0x0C	BIST		Header Type		PCI Latency Timer		Cache Line Size		N	00 00 00 00
0x10	Memory Base Address Register (BAR)								Y	FFFFF000
0x14	I/O Base Address Register (Unimplemented)								N	00000000
0x18	Base Address Register 0 (Unimplemented)								N	00000000
0x1C	Base Address Register 1 (Unimplemented)								N	00000000
0x20	Base Address Register 2 (Unimplemented)								N	00000000
0x24	Base Address Register 3 (Unimplemented)								N	00000000
0x28	Reserved								N	00000000
0x2C	Subsystem ID				Subsystem Vendor ID				N	s.b. 1498
0x30	Expansion ROM Base Address (Unimplemented)								N	00000000
0x34	Reserved								N	00000000
0x38	Reserved								N	00000000
0x3C	Max_Lat		Min_Gnt		Interrupt Pin		Interrupt Line		Y[7:0]	00 00 01 00

Table 4-1 : XR17D158 PCI Header

Device-ID:	0x01CC	TPMC460
Vendor-ID:	0x1498	TEWS TECHNOLOGIES
Revision ID:		XR17D158 silicon revision
Subsystem-ID:	0x000A	-10R
	0x000B	-11R
	0x000C	-12R
	0x000D	-13R
	0x000E	-14R
Subsystem Vendor-ID:	0x1498	TEWS TECHNOLOGIES

4.2 Device Configuration Space

PCI Base Address: XR17D158 PCI Base Address 0 (Offset 0x10 in PCI Configuration Space).

The Device Configuration Space is accessible directly from the PCI bus and is mapped into 4K of the PCI bus memory address space. It contains the Device Configuration Registers and the UART Configuration Registers.

Device Configuration Space Content	PCI Address	Size (Bit)
UART 0 Configuration Registers	PCI Base Address 0 + (0x0000 to 0x007F)	32
Device Configuration Registers	PCI Base Address 0 + (0x0080 to 0x009F)	32
UART 0 Configuration Registers	PCI Base Address 0 + (0x0100 to 0x01FF)	32
UART 1 Configuration Registers	PCI Base Address 0 + (0x0200 to 0x03FF)	32
UART 2 Configuration Registers	PCI Base Address 0 + (0x0400 to 0x05FF)	32
UART 3 Configuration Registers	PCI Base Address 0 + (0x0600 to 0x07FF)	32
UART 4 Configuration Registers	PCI Base Address 0 + (0x0800 to 0x09FF)	32
UART 5 Configuration Registers	PCI Base Address 0 + (0x0A00 to 0x0BFF)	32
UART 6 Configuration Registers	PCI Base Address 0 + (0x0C00 to 0x0DFF)	32
UART 7 Configuration Registers	PCI Base Address 0 + (0x0E00 to 0x0FFF)	32

Table 4-2 : Device Configuration Space

All registers can be accessed in 8, 16 or 32 bit width with exception to one special case: When reading the receive data together with its LSR register content, the host must read them in 16 or 32 bits format in order to maintain integrity of the data byte with its associated error flags.

4.2.1 UART Register Sets

The Device Configuration Space provides a register set for each of the 8 internal UARTs.

UART Register Set	Register Set Offset
Serial Channel 0	0x0000
Serial Channel 1	0x0200
Serial Channel 2	0x0400
Serial Channel 3	0x0600
Serial Channel 4	0x0800
Serial Channel 5	0x0A00
Serial Channel 6	0x0C00
Serial Channel 7	0x0E00

Table 4-3 : UART Register Set Offset

Each UART Register Set contains the 16C550 Compatible 5G Register Set. It also provides a way to directly access the FIFO from the PCI bus.

Offset Address	Description	Access	Data Width
0x000 – 0x00F	UART Channel Configuration Registers First 8 registers are 16550 compatible	R/W	8, 16, 32
0x010 – 0x07F	Reserved	-	-
0x080 – 0x093	Channel 0: Device Configuration Registers All other channels: Reserved	R/W	8, 16, 32
0x094 – 0x0FF	Reserved	-	-
0x100	Read FIFO – 64 bytes of RX FIFO data	R	8, 16, 32
	Write FIFO – 64 bytes of TX FIFO data	W	8, 16, 32
0x140 – 0x17F	Reserved	-	-
0x180 – 0x1FF	Read FIFO with errors – 64 bytes of RX FIFO data + LSR	R	16, 32

Table 4-4 : UART Register Set

Embedded in the UART 0 Register set are the Device Configuration Registers.

4.2.2 Device Configuration Registers

The Device Configuration Registers control general operating conditions and monitor the status of various functions. This includes a 16 bit general purpose counter, multipurpose input/outputs (not supported by the TPMC460), sleep mode, soft-reset, and device identification and revision. They are embedded inside the UART 0 Register Set.

Address	Register	Description	Access	Reset Value
0x080	INT0 [7:0]	Channel Interrupt Indicator	R	0x00
0x081	INT1 [15:8]	Interrupt Source Details	R	0x00
0x082	INT2 [23:16]		R	0x00
0x083	INT3 [31:24]		R	0x00
0x084	TIMERCNTL	Timer Control Register	R/W	0x00
0x085	TIMER	Reserved	-	0x00
0x086	TIMERLSB	Programmable Timer Value	R/W	0x00
0x087	TIMERMSB		R/W	0x00
0x088	8XMODE	Sampling Rate Select	R/W	0x00
0x089	REGA	Reserved	-	0x00
0x08A	RESET	UART Reset	W	0x00
0x08B	SLEEP	UART Sleep Mode Enable	R/W	0x00
0x08C	DREV	Device Revision	R	0x01
0x08D	DVID	Device Identification	R	0x28
0x08E	REGB	Simultaneous UART Write & EEPROM Interface	W	0x00
0x08F	MPIOINT	MPIO Interrupt Mask	R/W	0x00
0x090	MPIOLVL	MPIO Level Control	R/W	0x00
0x091	MPIO3T	MPIO Output Pin Tri-state Control	R/W	0x00
0x092	MPIOINV	MPIO Input Polarity Select	R/W	0x00
0x093	MPIOSEL	MPIO Input/Output Select	R/W	0xFF

Table 4-5 : Device Configuration Registers

For a detailed description of the Device Configuration Registers please refer to the XR17D158 data sheet which is available on the Exar website (www.exar.com).

4.2.3 UART Configuration Registers

Each UART channel has its own set of internal UART configuration registers for its own operation control and status reporting. The following table provides the register offsets within a register set, access types and access control:

Register Offset	Comment	Register	Access	Reset Value
16550 Compatible				
0x00	LCR[7] = 0	RHR – Receive Holding Register THR – Transmit Holding Register	R W	0xXX
	LCR[7] = 1	DLL – Baud Rate Generator Divisor Latch Low	R/W	0xXX
0x01	LCR[7] = 0	IER – Interrupt Enable Register	R/W	0x00
	LCR[7] = 1	DLM – Baud Rate Generator Divisor Latch High	R/W	0xXX
0x02		ISR – Interrupt Status Register FCR – FIFO Control Register	R W	0x01 0x00
0x03		LCR – Line Control Register	R/W	0x00
0x04		MCR – Modem Control Register	R/W	0x00
0x05		LSR – Line Status Register Reserved	R W	0x60
0x06		MSR – Modem Status Register – Auto RS485 Delay (not supported by the TPMC460)	R W	0xX0
0x07	User Data	SPR – Scratch Pad Register	R/W	0xFF
Enhanced Registers				
0x08		FCTR – Feature Control Register	R/W	0x00
0x09		EFR – Enhanced Function Register	R/W	0x00
0x0A		TXCNT – Transmit FIFO Level Counter TXTRG – Transmit FIFO Trigger Level	R W	0x00
0x0B		RXCNT – Receiver FIFO Level Counter RXTRG – Receiver FIFO Trigger Level	R W	0x00
0x0C		Xchar – Xon, Xoff Received Flags Xoff-1 – Xoff Character 1	R W	0x00
0x0D		Reserved Xoff-2 – Xoff Character 2	R W	0x00
0x0E		Reserved Xon-1 – Xon Character 1	R W	0x00
0x0F		Reserved Xon-2 – Xon Character 2	R W	0x00

Table 4-6 : UART Channel Configuration Registers

The address for a UART Configuration Register x in a UART Register Set for channel y is:

PCI Base Address 0 (PCI Base Address for the UART Register Space)

+ UART Register Set Offset for *channel y*

+ Register Offset for *register x*

Addressing example:

The address for the LCR register of UART channel 5 is:

PCI Base Address	(PCI Base Address for the Device Configuration Space)
+ 0x0A00	(Offset of the UART register set for serial channel 5)
+ 0x0003	(Offset of the LCR register within a UART register set)

For a detailed description of the serial channel registers please refer to the XR17D158 data sheet which is available on the Exar website (www.exar.com).

4.3 Configuration EEPROM

After power-on or PCI reset, the XR17D158 loads initial configuration register data from a configuration EEPROM. Each XR17D158 has its own configuration EEPROM.

The configuration EEPROM contains the following configuration data:

- Vendor ID
- Vendor Device ID
- SubSystem Vendor ID
- SubSystem Device ID

See the XR17D158 Manual for more information.

Address	Configuration Register	Configuration Register Offset	Value
0x00	Vendor ID	0x02	0x1498
0x01	Vendor Device ID	0x00	0x01CC
0x02	Subsystem Vendor ID	0x2E	0x1498
0x03	Subsystem Device ID	0x2C	s.b.

Table 4-7 : Configuration EEPROM TPMC460-xxR

Subsystem ID Value (Offset 0x0C): TPMC460-10R 0x000A

TPMC460-11R 0x000B

TPMC460-12R 0x000C

TPMC460-13R 0x000D

TPMC460-14R 0x000E

The words following the configuration data contain:

- The module version and revision
- The UART clock frequency in Hz
- The physical interface attached to the serial channels
- The maximal baud rate of the transceivers in bps
- The supported control signals of the serial channels

For the physical interfaces and the control signals applies: Bit 7 represents UART channel 7 and bit 0 represents UART channel 0. The appropriate bit is set to ‘1’ for each UART channel attached to the physical interface represented by the word. Bit 15 to bit 8 are always ‘0’.

The following two tables give information about the EEPROM content of both UARTs.

Address	Configuration Register	TPMC460-10R	TPMC460-11R	TPMC460-12R	TPMC460-13R	TPMC460-14R
0x04	Module Version	0x0100	0x0100	0x0100	0x0100	0x0100
0x05	Module Revision	0x0000	0x0000	0x0000	0x0000	0x0000
0x06	EEPROM Revision	0x0002	0x0002	0x0002	0x0002	0x0002
0x07	Oscillator Frequency (high)	0x02A3	0x02A3	0x02A3	0x02A3	0x02A3
0x08	Oscillator Frequency (low)	0x0000	0x0000	0x0000	0x0000	0x0000
0x09-0x0F	Reserved	-	-	-	-	-
0x10	RS232 Channels	0x00FF	0x0000	0x00FF	0x00FF	0x000F
0x11	RS422 Channels	0x0000	0x00FF	0x0000	0x0000	0x00F0
0x12	TTL Channels	0x0000	0x0000	0x0000	0x0000	0x0000
0x13	RS485 Full Duplex Ch.	0x0000	0x0000	0x0000	0x0000	0x0000
0x14	RS485 Half Duplex Ch.	0x0000	0x0000	0x0000	0x0000	0x0000
0x15-0x1E	Reserved	-	-	-	-	-
0x1F	Programmable Interfaces	0x0000	0x0000	0x0000	0x0000	0x0000
0x20	Max Data Rate RS232 (high)	0x000F	0x000F	0x000F	0x000F	0x000F
0x21	Max Data Rate RS232 (low)	0x4240	0x4240	0x4240	0x4240	0x4240
0x22	Max Data Rate RS422 (high)	0x0098	0x0098	0x0098	0x0098	0x0098
0x23	Max Data Rate RS422 (low)	0x9680	0x9680	0x9680	0x9680	0x9680
0x24	Max Data Rate TTL (high)	0x0098	0x0098	0x0098	0x0098	0x0098
0x25	Max Data Rate TTL (low)	0x9680	0x9680	0x9680	0x9680	0x9680
0x26	Max Data Rate RS485 Full Duplex (high)	0x0000	0x0000	0x0000	0x0000	0x0000
0x27	Max Data Rate RS485 Full Duplex (low)	0x0000	0x0000	0x0000	0x0000	0x0000
0x28	Max Data Rate RS485 Half Duplex (high)	0x0000	0x0000	0x0000	0x0000	0x0000
0x29	Max Data Rate RS485 Half Duplex (low)	0x0000	0x0000	0x0000	0x0000	0x0000
0x2A-0x2F	Reserved	-	-	-	-	-
0x30	RxD & TxD	0x00FF	0x00FF	0x00FF	0x00FF	0x00FF
0x31	RTS & CTS	0x00FF	0x0000	0x00FF	0x00FF	0x000F
0x32	Full modem	0x0000	0x0000	0x0000	0x0000	0x0000
0x33-0x37	Reserved	-	-	-	-	-
0x38	Enhanced RTS & CTS (Front or Back I/O only)	0x0000	0x0000	0x0000	0x0000	0x0000
0x39	Enhanced Full modem (Front or Back I/O only)	0x0000	0x0000	0x0000	0x0000	0x0000
0x3A	Channels with enhanced RTS & CTS Support for RS232 only	0x0000	0x0000	0x0000	0x0000	0x0000
0x3B-0x3F	Reserved	-	-	-	-	-

Table 4-8 : Physical Configuration EEPROM Data of UART 1

Address	Configuration Register	TPMC460-10	TPMC460-11	TPMC460-12	TPMC460-13	TPMC460-14
0x04	Module Version	0x0100	0x0100	0x0100	0x0100	0x0100
0x05	Module Revision	0x0000	0x0000	0x0000	0x0000	0x0000
0x06	EEPROM Revision	0x0002	0x0002	0x0002	0x0002	0x0002
0x07	Oscillator Frequency (high)	0x02A3	0x02A3	0x02A3	0x02A3	0x02A3
0x08	Oscillator Frequency (low)	0x0000	0x0000	0x0000	0x0000	0x0000
0x09-0x0F	Reserved	-	-	-	-	-
0x10	RS232 Channels	0x00FF	0x0000	0x0000	0x000F	0x0000
0x11	RS422 Channels	0x0000	0x00FF	0x00FF	0x00F0	0x00FF
0x12	TTL Channels	0x0000	0x0000	0x0000	0x0000	0x0000
0x13	RS485 Full Duplex Ch.	0x0000	0x0000	0x0000	0x0000	0x0000
0x14	RS485 Half Duplex Ch.	0x0000	0x0000	0x0000	0x0000	0x0000
0x15-0x1E	Reserved	-	-	-	-	-
0x1F	Programmable Interfaces	0x0000	0x0000	0x0000	0x0000	0x0000
0x20	Max Data Rate RS232 (high)	0x000F	0x000F	0x000F	0x000F	0x000F
0x21	Max Data Rate RS232 (low)	0x4240	0x4240	0x4240	0x4240	0x4240
0x22	Max Data Rate RS422 (high)	0x0098	0x0098	0x0098	0x0098	0x0098
0x23	Max Data Rate RS422 (low)	0x9680	0x9680	0x9680	0x9680	0x9680
0x24	Max Data Rate TTL (high)	0x0098	0x0098	0x0098	0x0098	0x0098
0x25	Max Data Rate TTL (low)	0x9680	0x9680	0x9680	0x9680	0x9680
0x26	Max Data Rate RS485 Full Duplex (high)	0x0000	0x0000	0x0000	0x0000	0x0000
0x27	Max Data Rate RS485 Full Duplex (low)	0x0000	0x0000	0x0000	0x0000	0x0000
0x28	Max Data Rate RS485 Half Duplex (high)	0x0000	0x0000	0x0000	0x0000	0x0000
0x29	Max Data Rate RS485 Half Duplex (low)	0x0000	0x0000	0x0000	0x0000	0x0000
0x2A-0x3F	Reserved	-	-	-	-	-
0x30	RxD & TxD	0x00FF	0x00FF	0x00FF	0x00FF	0x00FF
0x31	RTS & CTS	0x00FF	0x0000	0x0000	0x000F	0x0000
0x32	Full modem	0x0000	0x0000	0x0000	0x0000	0x0000
0x33-0x37	Reserved	-	-	-	-	-
0x38	Enhanced RTS & CTS (Front or Back I/O only)	0x0000	0x0000	0x0000	0x0000	0x0000
0x39	Enhanced Full modem (Front or Back I/O only)	0x0000	0x0000	0x0000	0x0000	0x0000
0x3A	Channels with enhanced RTS & CTS Support for RS232 only	0x0000	0x0000	0x0000	0x0000	0x0000
0x3B-0x3F	Reserved	-	-	-	-	-

Table 4-9 : Physical Configuration EEPROM Data of UART 2

Words not used are reserved for future used and filled with “0x0000”.

5 Configuration Hints

The following chart shows the UART interface mapping of the different variants of the TPMC460.

Serial Channel	TPMC460-10R		TPMC460-11R		TPMC460-12R		TPMC460-13R		TPMC460-14R	
	RS232	RS422	RS232	RS422	RS232	RS422	RS232	RS422	RS232	RS422
0	X			X	X		X		X	
1	X			X	X		X		X	
2	X			X	X		X		X	
3	X			X	X		X		X	
4	X			X	X		X			X
5	X			X	X		X			X
6	X			X	X		X			X
7	X			X	X		X			X
8	X			X		X	X			X
9	X			X		X	X			X
10	X			X		X	X			X
11	X			X		X	X			X
12	X			X		X		X		X
13	X			X		X		X		X
14	X			X		X		X		X
15	X			X		X		X		X

Table 5-1 : UART interface mapping

Other configurations are available as factory build option on a per channel base.

RS422 channels provide on board 120Ω termination resistors. Do not apply additional external termination resistors here.

6 Programming Hints

6.1 UART Baud Rate Programming

Each of the 16 UART channels of the TPMC460 provides a programmable Baud Rate Generator. The clock of the XR17D158 UART can be divided by any divisor from 1 to 2^{16} – 1. The divisor can be programmed by the UART channel DLM (Divisor MSB) and DLL (Divisor LSB) registers. After a reset bit 7 of the UART channels MCR register defaults to '0' and the divisor value is 0xFFFF.

The basic formula of baud rate programming is:

$$\text{Baud Rate} = \frac{44.2368MHz}{16 \cdot Divisor \cdot (1 + 3 \cdot MCR[7])}$$

Examples for standard baud rates are given in following chart:

Baud Rate MCR[7] = 0	Baud Rate MCR[7] = 1	Divisor	DLM Value	DLL Value
400	100	0x1B00	0x1B	0x00
600	150	0x1200	0x12	0x00
1200	300	0x0900	0x09	0x00
2400	600	0x0480	0x04	0x80
4800	1200	0x0240	0x02	0x40
9600	2400	0x0120	0x01	0x20
19.2k	4800	0x0090	0x00	0x90
38.4k	9600	0x0048	0x00	0x48
57.6k	14.4k	0x0030	0x00	0x30
115.2k	28.8k	0x0018	0x00	0x18
230.4k	57.6k	0x000C	0x00	0x0C
460.8k	115.2k	0x0006	0x00	0x06
921.6k	230.4k	0x0003	0x00	0x03
1.3824M	345.6k	0x0002	0x00	0x02
2.7648M	691.2k	0x0001	0x00	0x01

Table 6-1 : UART Baud Rate Programming

To calculate a divisor value for a given baud rate, use following formula:

$$\text{Divisor} = \frac{44.2368MHz}{16 \cdot Baud\ Rate \cdot (1 + 3 \cdot MCR[7])}$$

The sampling rate for a UART channel can be set to 8x (normal operation is 16x) in the 8XMODE register. Transmit and receive data rates will double by selecting 8x sample rate.

The maximum achievable baud rate is 5.5296 Mbps (Divisor = 0x0001 & 8x sampling rate).

These steps should be used to modify the DLM, DLL registers of an UART channel:

1. Write 0x80 to the LCR register of the UART channel (enable access to the DLM, DLL registers).

2. Program the DLM, DLL registers of the UART channel.

3. Write normal operation byte value to the LCR register of the UART channel.

These steps should be used to modify MCR register bit 7 of an UART channel (set baud rate generator prescaler):

1. Set UART channel EFR register bit 4 to '1' (enable modification of MCR register bits 5-7).

2. Modify UART channel MCR register bit 7.

3. Set UART channel EFR register bit 4 to '0' (latch modified MCR register setting).

Note that the maximum baud rate for RS232 channel is 921.6 kps. Thus the minimum divisor value for RS232 channels is 0x0003 with MCR[7] = 0.

7 Pin Assignment – I/O Connector

Connect channel I/O either to front I/O or P14 back I/O at a time. Do not connect an I/O channel to both front I/O connector and P14 back I/O connector at the same time.

RS422 channels provide on board 120Ω termination resistors. Do not apply additional external termination resistors here.

Please note that on the TPMC460 the P14 back I/O connector is always populated and connected to on board logic. Do not use these modules on carrier boards where P14/J14 is reserved for other system signals but PMC I/O. In this case ask support for special board options with front I/O only.

7.1 Front Panel I/O Connector

The TPMC460 front panel I/O connector is a HD68 SCSI-3 type female connector (e.g. AMP# 787082).

7.1.1 TPMC460-10R

Pin	Signal	Signal Level
1	TxD[00]	RS232
2	RTS#[00]	RS232
3	TxD[01]	RS232
4	RTS#[01]	RS232
5	TxD[02]	RS232
6	RTS#[02]	RS232
7	TxD[03]	RS232
8	RTS#[03]	RS232
9	GND	
10	TxD[04]	RS232
11	RTS#[04]	RS232
12	TxD[05]	RS232
13	RTS#[05]	RS232
14	TxD[06]	RS232
15	RTS#[06]	RS232
16	TxD[07]	RS232
17	RTS#[07]	RS232
18	TxD[08]	RS232
19	RTS#[08]	RS232
20	TxD[09]	RS232
21	RTS#[09]	RS232
22	TxD[10]	RS232
23	RTS#[10]	RS232
24	TxD[11]	RS232
25	RTS#[11]	RS232
26	GND	
27	TxD[12]	RS232
28	RTS#[12]	RS232
29	TxD[13]	RS232
30	RTS#[13]	RS232
31	TxD[14]	RS232
32	RTS#[14]	RS232
33	TxD[15]	RS232
34	RTS#[15]	RS232

Pin	Signal	Signal Level
35	RxD[00]	RS232
36	CTS#[00]	RS232
37	RxD[01]	RS232
38	CTS#[01]	RS232
39	RxD[02]	RS232
40	CTS#[02]	RS232
41	RxD[03]	RS232
42	CTS#[03]	RS232
43	GND	
44	RxD[04]	RS232
45	CTS#[04]	RS232
46	RxD[05]	RS232
47	CTS#[05]	RS232
48	RxD[06]	RS232
49	CTS#[06]	RS232
50	RxD[07]	RS232
51	CTS#[07]	RS232
52	RxD[08]	RS232
53	CTS#[08]	RS232
54	RxD[09]	RS232
55	CTS#[09]	RS232
56	RxD[10]	RS232
57	CTS#[10]	RS232
58	RxD[11]	RS232
59	CTS#[11]	RS232
60	GND	
61	RxD[12]	RS232
62	CTS#[12]	RS232
63	RxD[13]	RS232
64	CTS#[13]	RS232
65	RxD[14]	RS232
66	CTS#[14]	RS232
67	RxD[15]	RS232
68	CTS#[15]	RS232

Table 7-1 : TPMC460-10R Pin Assignment Front Panel I/O Connector

7.1.2 TPMC460-11R

Pin	Signal	Signal Level	Pin	Signal	Signal Level
1	TxD+[00]	RS422	35	TxD-[00]	RS422
2	RxD+[00]	RS422	36	RxD-[00]	RS422
3	TxD+[01]	RS422	37	TxD-[01]	RS422
4	RxD+[01]	RS422	38	RxD-[01]	RS422
5	TxD+[02]	RS422	39	TxD-[02]	RS422
6	RxD+[02]	RS422	40	RxD-[02]	RS422
7	TxD+[03]	RS422	41	TxD-[03]	RS422
8	RxD+[03]	RS422	42	RxD-[03]	RS422
9	GND		43	GND	
10	TxD+[04]	RS422	44	TxD-[04]	RS422
11	RxD+[04]	RS422	45	RxD-[04]	RS422
12	TxD+[05]	RS422	46	TxD-[05]	RS422
13	RxD+[05]	RS422	47	RxD-[05]	RS422
14	TxD+[06]	RS422	48	TxD-[06]	RS422
15	RxD+[06]	RS422	49	RxD-[06]	RS422
16	TxD+[07]	RS422	50	TxD-[07]	RS422
17	RxD+[07]	RS422	51	RxD-[07]	RS422
18	TxD+[08]	RS422	52	TxD-[08]	RS422
19	RxD+[08]	RS422	53	RxD-[08]	RS422
20	TxD+[09]	RS422	54	TxD-[09]	RS422
21	RxD+[09]	RS422	55	RxD-[09]	RS422
22	TxD+[10]	RS422	56	TxD-[10]	RS422
23	RxD+[10]	RS422	57	RxD-[10]	RS422
24	TxD+[11]	RS422	58	TxD-[11]	RS422
25	RxD+[11]	RS422	59	RxD-[11]	RS422
26	GND		60	GND	
27	TxD+[12]	RS422	61	TxD-[12]	RS422
28	RxD+[12]	RS422	62	RxD-[12]	RS422
29	TxD+[13]	RS422	63	TxD-[13]	RS422
30	RxD+[13]	RS422	64	RxD-[13]	RS422
31	TxD+[14]	RS422	65	TxD-[14]	RS422
32	RxD+[14]	RS422	66	RxD-[14]	RS422
33	TxD+[15]	RS422	67	TxD-[15]	RS422
34	RxD+[15]	RS422	68	RxD-[15]	RS422

Table 7-2 : TPMC460-11R Pin Assignment Front Panel I/O Connector

7.1.3 TPMC460-12R

Pin	Signal	Signal Level
1	TxD[00]	RS232
2	RTS#[00]	RS232
3	TxD[01]	RS232
4	RTS#[01]	RS232
5	TxD[02]	RS232
6	RTS#[02]	RS232
7	TxD[03]	RS232
8	RTS#[03]	RS232
9	GND	
10	TxD[04]	RS232
11	RTS#[04]	RS232
12	TxD[05]	RS232
13	RTS#[05]	RS232
14	TxD[06]	RS232
15	RTS#[06]	RS232
16	TxD[07]	RS232
17	RTS#[07]	RS232
18	TxD+[08]	RS422
19	RxD+[08]	RS422
20	TxD+[09]	RS422
21	RxD+[09]	RS422
22	TxD+[10]	RS422
23	RxD+[10]	RS422
24	TxD+[11]	RS422
25	RxD+[11]	RS422
26	GND	
27	TxD+[12]	RS422
28	RxD+[12]	RS422
29	TxD+[13]	RS422
30	RxD+[13]	RS422
31	TxD+[14]	RS422
32	RxD+[14]	RS422
33	TxD+[15]	RS422
34	RxD+[15]	RS422

Pin	Signal	Signal Level
35	RxD[00]	RS232
36	CTS#[00]	RS232
37	RxD[01]	RS232
38	CTS#[01]	RS232
39	RxD[02]	RS232
40	CTS#[02]	RS232
41	RxD[03]	RS232
42	CTS#[03]	RS232
43	GND	
44	RxD[04]	RS232
45	CTS#[04]	RS232
46	RxD[05]	RS232
47	CTS#[05]	RS232
48	RxD[06]	RS232
49	CTS#[06]	RS232
50	RxD[07]	RS232
51	CTS#[07]	RS232
52	TxD-[08]	RS422
53	RxD-[08]	RS422
54	TxD-[09]	RS422
55	RxD-[09]	RS422
56	TxD-[10]	RS422
57	RxD-[10]	RS422
58	TxD-[11]	RS422
59	RxD-[11]	RS422
60	GND	
61	TxD-[12]	RS422
62	RxD-[12]	RS422
63	TxD-[13]	RS422
64	RxD-[13]	RS422
65	TxD-[14]	RS422
66	RxD-[14]	RS422
67	TxD-[15]	RS422
68	RxD-[15]	RS422

Table 7-3 : TPMC460-12R Pin Assignment Front Panel I/O Connector

7.1.4 TPMC460-13R

Pin	Signal	Signal Level	Pin	Signal	Signal Level
1	TxD[00]	RS232	35	RxD[00]	RS232
2	RTS#[00]	RS232	36	CTS#[00]	RS232
3	TxD[01]	RS232	37	RxD[01]	RS232
4	RTS#[01]	RS232	38	CTS#[01]	RS232
5	TxD[02]	RS232	39	RxD[02]	RS232
6	RTS#[02]	RS232	40	CTS#[02]	RS232
7	TxD[03]	RS232	41	RxD[03]	RS232
8	RTS#[03]	RS232	42	CTS#[03]	RS232
9	GND		43	GND	
10	TxD[04]	RS232	44	RxD[04]	RS232
11	RTS#[04]	RS232	45	CTS#[04]	RS232
12	TxD[05]	RS232	46	RxD[05]	RS232
13	RTS#[05]	RS232	47	CTS#[05]	RS232
14	TxD[06]	RS232	48	RxD[06]	RS232
15	RTS#[06]	RS232	49	CTS#[06]	RS232
16	TxD[07]	RS232	50	RxD[07]	RS232
17	RTS#[07]	RS232	51	CTS#[07]	RS232
18	TxD[08]	RS232	52	RxD[08]	RS232
19	RTS#[08]	RS232	53	CTS#[08]	RS232
20	TxD[09]	RS232	54	RxD[09]	RS232
21	RTS#[09]	RS232	55	CTS#[09]	RS232
22	TxD[10]	RS232	56	RxD[10]	RS232
23	RTS#[10]	RS232	57	CTS#[10]	RS232
24	TxD[11]	RS232	58	RxD[11]	RS232
25	RTS#[11]	RS232	59	CTS#[11]	RS232
26	GND		60	GND	
27	TxD+[12]	RS422	61	TxD-[12]	RS422
28	RxD+[12]	RS422	62	RxD-[12]	RS422
29	TxD+[13]	RS422	63	TxD-[13]	RS422
30	RxD+[13]	RS422	64	RxD-[13]	RS422
31	TxD+[14]	RS422	65	TxD-[14]	RS422
32	RxD+[14]	RS422	66	RxD-[14]	RS422
33	TxD+[15]	RS422	67	TxD-[15]	RS422
34	RxD+[15]	RS422	68	RxD-[15]	RS422

Table 7-4 : TPMC460-13R Pin Assignment Front Panel I/O Connector

7.1.5 TPMC460-14R

Pin	Signal	Signal Level
1	TxD[00]	RS232
2	RTS#[00]	RS232
3	TxD[01]	RS232
4	RTS#[01]	RS232
5	TxD[02]	RS232
6	RTS#[02]	RS232
7	TxD[03]	RS232
8	RTS#[03]	RS232
9	GND	
10	TxD+[04]	RS422
11	RxD+[04]	RS422
12	TxD+[05]	RS422
13	RxD+[05]	RS422
14	TxD+[06]	RS422
15	RxD+[06]	RS422
16	TxD+[07]	RS422
17	RxD+[07]	RS422
18	TxD+[08]	RS422
19	RxD+[08]	RS422
20	TxD+[09]	RS422
21	RxD+[09]	RS422
22	TxD+[10]	RS422
23	RxD+[10]	RS422
24	TxD+[11]	RS422
25	RxD+[11]	RS422
26	GND	
27	TxD+[12]	RS422
28	RxD+[12]	RS422
29	TxD+[13]	RS422
30	RxD+[13]	RS422
31	TxD+[14]	RS422
32	RxD+[14]	RS422
33	TxD+[15]	RS422
34	RxD+[15]	RS422

Pin	Signal	Signal Level
35	RxD[00]	RS232
36	CTS#[00]	RS232
37	RxD[01]	RS232
38	CTS#[01]	RS232
39	RxD[02]	RS232
40	CTS#[02]	RS232
41	RxD[03]	RS232
42	CTS#[03]	RS232
43	GND	
44	TxD-[04]	RS422
45	RxD-[04]	RS422
46	TxD-[05]	RS422
47	RxD-[05]	RS422
48	TxD-[06]	RS422
49	RxD-[06]	RS422
50	TxD-[07]	RS422
51	RxD-[07]	RS422
52	TxD-[08]	RS422
53	RxD-[08]	RS422
54	TxD-[09]	RS422
55	RxD-[09]	RS422
56	TxD-[10]	RS422
57	RxD-[10]	RS422
58	TxD-[11]	RS422
59	RxD-[11]	RS422
60	GND	
61	TxD-[12]	RS422
62	RxD-[12]	RS422
63	TxD-[13]	RS422
64	RxD-[13]	RS422
65	TxD-[14]	RS422
66	RxD-[14]	RS422
67	TxD-[15]	RS422
68	RxD-[15]	RS422

Table 7-5 : TPMC460-14R Pin Assignment Front Panel I/O Connector

7.2 Back I/O PMC Connector (P14)

7.2.1 TPMC460-10R

Pin	Signal	Signal Level
1	TxD[00]	RS232
2	RxD[00]	RS232
3	RTS#[00]	RS232
4	CTS#[00]	RS232
5	TxD[01]	RS232
6	RxD[01]	RS232
7	RTS#[01]	RS232
8	CTS#[01]	RS232
9	TxD[02]	RS232
10	RxD[02]	RS232
11	RTS#[02]	RS232
12	CTS#[02]	RS232
13	TxD[03]	RS232
14	RxD[03]	RS232
15	RTS#[03]	RS232
16	CTS#[03]	RS232
17	TxD[04]	RS232
18	RxD[04]	RS232
19	RTS#[04]	RS232
20	CTS#[04]	RS232
21	TxD[05]	RS232
22	RxD[05]	RS232
23	RTS#[05]	RS232
24	CTS#[05]	RS232
25	TxD[06]	RS232
26	RxD[06]	RS232
27	RTS#[06]	RS232
28	CTS#[06]	RS232
29	TxD[07]	RS232
30	RxD[07]	RS232
31	RTS#[07]	RS232
32	CTS#[07]	RS232

Pin	Signal	Signal Level
33	TxD[08]	RS232
34	RxD[08]	RS232
35	RTS#[08]	RS232
36	CTS#[08]	RS232
37	TxD[09]	RS232
38	RxD[09]	RS232
39	RTS#[09]	RS232
40	CTS#[09]	RS232
41	TxD[10]	RS232
42	RxD[10]	RS232
43	RTS#[10]	RS232
44	CTS#[10]	RS232
45	TxD[11]	RS232
46	RxD[11]	RS232
47	RTS#[11]	RS232
48	CTS#[11]	RS232
49	TxD[12]	RS232
50	RxD[12]	RS232
51	RTS#[12]	RS232
52	CTS#[12]	RS232
53	TxD[13]	RS232
54	RxD[13]	RS232
55	RTS#[13]	RS232
56	CTS#[13]	RS232
57	TxD[14]	RS232
58	RxD[14]	RS232
59	RTS#[14]	RS232
60	CTS#[14]	RS232
61	TxD[15]	RS232
62	RxD[15]	RS232
63	RTS#[15]	RS232
64	CTS#[15]	RS232

Table 7-6 : TPMC460-10R Pin Assignment Back I/O PMC Connector (P14)

7.2.2 TPMC460-11R

Pin	Signal	Signal Level
1	TxD+[00]	RS422
2	TxD-[00]	RS422
3	RxD+[00]	RS422
4	RxD-[00]	RS422
5	TxD+[01]	RS422
6	TxD-[01]	RS422
7	RxD+[01]	RS422
8	RxD-[01]	RS422
9	TxD+[02]	RS422
10	TxD-[02]	RS422
11	RxD+[02]	RS422
12	RxD-[02]	RS422
13	TxD+[03]	RS422
14	TxD-[03]	RS422
15	RxD+[03]	RS422
16	RxD-[03]	RS422
17	TxD+[04]	RS422
18	TxD-[04]	RS422
19	RxD+[04]	RS422
20	RxD-[04]	RS422
21	TxD+[05]	RS422
22	TxD-[05]	RS422
23	RxD+[05]	RS422
24	RxD-[05]	RS422
25	TxD+[06]	RS422
26	TxD-[06]	RS422
27	RxD+[06]	RS422
28	RxD-[06]	RS422
29	TxD+[07]	RS422
30	TxD-[07]	RS422
31	RxD+[07]	RS422
32	RxD-[07]	RS422

Pin	Signal	Signal Level
33	TxD+[08]	RS422
34	TxD-[08]	RS422
35	RxD+[08]	RS422
36	RxD-[08]	RS422
37	TxD+[09]	RS422
38	TxD-[09]	RS422
39	RxD+[09]	RS422
40	RxD-[09]	RS422
41	TxD+[10]	RS422
42	TxD-[10]	RS422
43	RxD+[10]	RS422
44	RxD-[10]	RS422
45	TxD+[11]	RS422
46	TxD-[11]	RS422
47	RxD+[11]	RS422
48	RxD-[11]	RS422
49	TxD+[12]	RS422
50	TxD-[12]	RS422
51	RxD+[12]	RS422
52	RxD-[12]	RS422
53	TxD+[13]	RS422
54	TxD-[13]	RS422
55	RxD+[13]	RS422
56	RxD-[13]	RS422
57	TxD+[14]	RS422
58	TxD-[14]	RS422
59	RxD+[14]	RS422
60	RxD-[14]	RS422
61	TxD+[15]	RS422
62	TxD-[15]	RS422
63	RxD+[15]	RS422
64	RxD-[15]	RS422

Table 7-7 : TPMC460-11R Pin Assignment Back I/O PMC Connector (P14)

7.2.3 TPMC460-12R

Pin	Signal	Signal Level
1	TxD[00]	RS232
2	RxD[00]	RS232
3	RTS#[00]	RS232
4	CTS#[00]	RS232
5	TxD[01]	RS232
6	RxD[01]	RS232
7	RTS#[01]	RS232
8	CTS#[01]	RS232
9	TxD[02]	RS232
10	RxD[02]	RS232
11	RTS#[02]	RS232
12	CTS#[02]	RS232
13	TxD[03]	RS232
14	RxD[03]	RS232
15	RTS#[03]	RS232
16	CTS#[03]	RS232
17	TxD[04]	RS232
18	RxD[04]	RS232
19	RTS#[04]	RS232
20	CTS#[04]	RS232
21	TxD[05]	RS232
22	RxD[05]	RS232
23	RTS#[05]	RS232
24	CTS#[05]	RS232
25	TxD[06]	RS232
26	RxD[06]	RS232
27	RTS#[06]	RS232
28	CTS#[06]	RS232
29	TxD[07]	RS232
30	RxD[07]	RS232
31	RTS#[07]	RS232
32	CTS#[07]	RS232

Pin	Signal	Signal Level
33	TxD+[08]	RS422
34	TxD-[08]	RS422
35	RxD+[08]	RS422
36	RxD-[08]	RS422
37	TxD+[09]	RS422
38	TxD-[09]	RS422
39	RxD+[09]	RS422
40	RxD-[09]	RS422
41	TxD+[10]	RS422
42	TxD-[10]	RS422
43	RxD+[10]	RS422
44	RxD-[10]	RS422
45	TxD+[11]	RS422
46	TxD-[11]	RS422
47	RxD+[11]	RS422
48	RxD-[11]	RS422
49	TxD+[12]	RS422
50	TxD-[12]	RS422
51	RxD+[12]	RS422
52	RxD-[12]	RS422
53	TxD+[13]	RS422
54	TxD-[13]	RS422
55	RxD+[13]	RS422
56	RxD-[13]	RS422
57	TxD+[14]	RS422
58	TxD-[14]	RS422
59	RxD+[14]	RS422
60	RxD-[14]	RS422
61	TxD+[15]	RS422
62	TxD-[15]	RS422
63	RxD+[15]	RS422
64	RxD-[15]	RS422

Table 7-8 : TPMC460-12R Pin Assignment Back I/O PMC Connector (P14)

7.2.4 TPMC460-13R

Pin	Signal	Signal Level
1	TxD[00]	RS232
2	RxD[00]	RS232
3	RTS#[00]	RS232
4	CTS#[00]	RS232
5	TxD[01]	RS232
6	RxD[01]	RS232
7	RTS#[01]	RS232
8	CTS#[01]	RS232
9	TxD[02]	RS232
10	RxD[02]	RS232
11	RTS#[02]	RS232
12	CTS#[02]	RS232
13	TxD[03]	RS232
14	RxD[03]	RS232
15	RTS#[03]	RS232
16	CTS#[03]	RS232
17	TxD[04]	RS232
18	RxD[04]	RS232
19	RTS#[04]	RS232
20	CTS#[04]	RS232
21	TxD[05]	RS232
22	RxD[05]	RS232
23	RTS#[05]	RS232
24	CTS#[05]	RS232
25	TxD[06]	RS232
26	RxD[06]	RS232
27	RTS#[06]	RS232
28	CTS#[06]	RS232
29	TxD[07]	RS232
30	RxD[07]	RS232
31	RTS#[07]	RS232
32	CTS#[07]	RS232

Pin	Signal	Signal Level
33	TxD[08]	RS232
34	RxD[08]	RS232
35	RTS#[08]	RS232
36	CTS#[08]	RS232
37	TxD[09]	RS232
38	RxD[09]	RS232
39	RTS#[09]	RS232
40	CTS#[09]	RS232
41	TxD[10]	RS232
42	RxD[10]	RS232
43	RTS#[10]	RS232
44	CTS#[10]	RS232
45	TxD[11]	RS232
46	RxD[11]	RS232
47	RTS#[11]	RS232
48	CTS#[11]	RS232
49	TxD+[12]	RS422
50	TxD-[12]	RS422
51	RxD+[12]	RS422
52	RxD-[12]	RS422
53	TxD+[13]	RS422
54	TxD-[13]	RS422
55	RxD+[13]	RS422
56	RxD-[13]	RS422
57	TxD+[14]	RS422
58	TxD-[14]	RS422
59	RxD+[14]	RS422
60	RxD-[14]	RS422
61	TxD+[15]	RS422
62	TxD-[15]	RS422
63	RxD+[15]	RS422
64	RxD-[15]	RS422

Table 7-9 : TPMC460-13R Pin Assignment Back I/O PMC Connector (P14)

7.2.5 TPMC460-14R

Pin	Signal	Signal Level
1	TxD[00]	RS232
2	RxD[00]	RS232
3	RTS#[00]	RS232
4	CTS#[00]	RS232
5	TxD[01]	RS232
6	RxD[01]	RS232
7	RTS#[01]	RS232
8	CTS#[01]	RS232
9	TxD[02]	RS232
10	RxD[02]	RS232
11	RTS#[02]	RS232
12	CTS#[02]	RS232
13	TxD[03]	RS232
14	RxD[03]	RS232
15	RTS#[03]	RS232
16	CTS#[03]	RS232
17	TxD+[04]	RS422
18	TxD-[04]	RS422
19	RxD+[04]	RS422
20	RxD-[04]	RS422
21	TxD+[05]	RS422
22	TxD-[05]	RS422
23	RxD+[05]	RS422
24	RxD-[05]	RS422
25	TxD+[06]	RS422
26	TxD-[06]	RS422
27	RxD+[06]	RS422
28	RxD-[06]	RS422
29	TxD+[07]	RS422
30	TxD-[07]	RS422
31	RxD+[07]	RS422
32	RxD-[07]	RS422

Pin	Signal	Signal Level
33	TxD+[08]	RS422
34	TxD-[08]	RS422
35	RxD+[08]	RS422
36	RxD-[08]	RS422
37	TxD+[09]	RS422
38	TxD-[09]	RS422
39	RxD+[09]	RS422
40	RxD-[09]	RS422
41	TxD+[10]	RS422
42	TxD-[10]	RS422
43	RxD+[10]	RS422
44	RxD-[10]	RS422
45	TxD+[11]	RS422
46	TxD-[11]	RS422
47	RxD+[11]	RS422
48	RxD-[11]	RS422
49	TxD+[12]	RS422
50	TxD-[12]	RS422
51	RxD+[12]	RS422
52	RxD-[12]	RS422
53	TxD+[13]	RS422
54	TxD-[13]	RS422
55	RxD+[13]	RS422
56	RxD-[13]	RS422
57	TxD+[14]	RS422
58	TxD-[14]	RS422
59	RxD+[14]	RS422
60	RxD-[14]	RS422
61	TxD+[15]	RS422
62	TxD-[15]	RS422
63	RxD+[15]	RS422
64	RxD-[15]	RS422

Table 7-10: TPMC460-14R Pin Assignment Back I/O PMC Connector (P14)