

The Embedded I/O Company



TIP812-10

SERCOS Interface

Version 1.0

User Manual

Issue 1.0.5

August 2014

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TIP812-10

Sercos Interface

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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

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Issue	Description	Date
1.0	First Issue	January 1998
1.1	General Revision	June 2003
1.2	SERCON816 SERCOS Controller	October 2004
1.3	New address TEWS LLC	September 2006
1.0.4	New Notation for User Manual and Engineering Documentation	December 2008
1.0.5	General Revision	August 2014

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1 Product Description

The TIP812-10 provides a complete SERCOS Bus-Interface using the SERCON816 SERCOS Controller in SERCON410B compatible mode.

The TIP812-10 supports RS485 and optical fiber ring as physical interfaces. The RS485 transceivers are located on the TIP812-10 module while the optical transceivers are located on the optional 6U TIP812-TM-10 Transition Module. The TIP812-TM-10 Transition Module also provides a DB9 connector and an on board termination option for the RS485 interface. The TIP812-TM-10 Transition Module is required for the optical fiber interface.

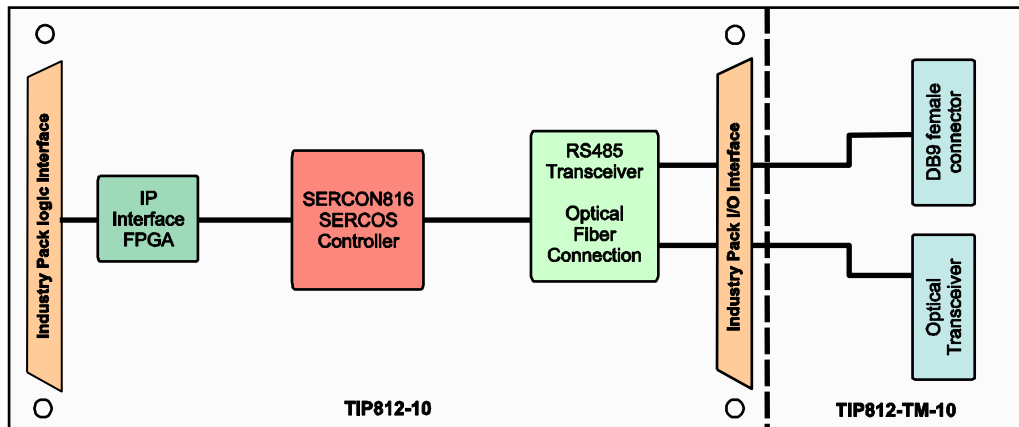


Figure 1-1 : Block Diagram

2 Technical Specification

IP Interface	
Interface	Single Size IndustryPack® Logic Interface compliant to ANSI/VITA 4-1995
ID ROM Data	Format I
I/O Space	Used (0 wait states)
Memory Space	Used (0 wait states)
Interrupts	Int1 & Int2 used
DMA	Not supported
Clock Rate	8 MHz
Module Type	Type I
On Board Devices	
SERCOS Controller	TIP812-10 : SERCON816 (SERCON410B compatible mode)
RS485 Transceiver	TIP812-10 : ADM485-AR
Optical Transceiver	TIP812-TM-10 : HFBR-1604, HFBR-2602
I/O Interface	
Physical Interface	TIP812-10: RS485, signals for optical fiber TIP812-TM-10: RS485, optical fiber
Interface Connector	TIP812-10 : 50-conductor flat cable e.g. for TIP812-TM-10 TIP812-TM-10 : DB9 (RS485 Interface), HFBR-1604/2602 (Optical Interface)
Physical Data	
Power Requirements	TIP812-10: 65mA typical @ +5V DC TIP812-TM-10: 16mA typical @ +5V DC
Temperature Range	Operating -40 °C to +85 °C Storage -45°C to +125°C
MTBF	TIP812-10: 706000 h TIP812-TM-10: 990000 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	TIP812-10: 50 g TIP812-TM-10: 180 g

Figure 2-1 : Technical Specification

3 Functional Description

The TIP812-10 implements a SERCOS communication interface by using the SERCON816 SERCOS controller in SERCON410B compatible mode. The SERCOS interface is a digital interface for communication between systems which have to exchange information cyclically at short, fixed intervals (65µsec to 65msec). It is appropriate for the synchronous operation of distributed control or test equipment (e.g. connection between drives and numeric control).

A SERCOS interface communication system consists of one master and several slaves. These units are connected by an optical fiber ring. This ring starts and ends at the master. The slaves regenerate and repeat their received data or send their own telegrams. By this method the telegrams sent by the master are received by all slaves while the master receives data telegrams from the slaves. The optical fiber assures a reliable high speed data transmission with excellent noise immunity.

The TIP812-10 contains all the hardware related functions of the SERCOS interface and considerably reduces the hardware costs and the computing time requirements of the host CPU. It is the direct link between the electric optical receiver and transmitter and the host CPU that executes the control algorithms. The TIP812-10 can be used for both, SERCOS interface masters and slaves.

The TIP812-10 implements a serial interface for direct connection to the optical transmitter and receiver located on the TIP812-TM-10 Transition Module.

The serial interface operates at data rates up to 4 Mbaud. A dual ported RAM (1024 * 16 bit) is used for control and communication data exchange between the TIP812-10 and the host CPU. The organization of the memory is flexible.

The telegram processing of cyclic data is automatically controlled by the TIP812-10. The transmission of service channel information over several communication cycles is executed automatically.

4 ID PROM Contents

Offset	Function	Value
0x01	ASCII 'I'	0x49
0x03	ASCII 'P'	0x50
0x05	ASCII 'A'	0x41
0x07	ASCII 'C'	0x43
0x09	Manufacturer ID	0xB3
0x0B	Model Number	0x15
0x0D	Revision	0x10
0x0F	Reserved	0x00
0x11	Driver-ID Low - Byte	0x00
0x13	Driver-ID High - Byte	0x00
0x15	Number of bytes used	0x0D
0x17	CRC	0xDD
0x19	Version	0x0A

Figure 4-1 : ID PROM Contents

5 IP Addressing

The TIP812-10 is accessed through a set of direct accessible registers.

The SERCON816 registers and other additional registers are accessible in the IP I/O address space.

The lower 1024 * 16 bit of the SERCON816 dual ported RAM area is accessible in the IP MEM address space (SERCON410B compatible mode).

5.1 SERCON816 Registers

Offset	Name	Function	Size (bit)
0x00	VERSION	Please see SERCON816 Reference Manual	16
0x02	REG01	Please see SERCON816 Reference Manual	16
0x04	REG02	Please see SERCON816 Reference Manual	16
0x06	REG03	Please see SERCON816 Reference Manual	16
0x08	REG04	Please see SERCON816 Reference Manual	16
0x0A	REG05	Please see SERCON816 Reference Manual	16
0x0C	REG06	Please see SERCON816 Reference Manual	16
0x0E	REG07	Please see SERCON816 Reference Manual	16
0x10	REG08	Please see SERCON816 Reference Manual	16
0x12	REG09	Please see SERCON816 Reference Manual	16
0x14	REG0A	Please see SERCON816 Reference Manual	16
0x16	REG0B	Please see SERCON816 Reference Manual	16
0x18	REG0C	Please see SERCON816 Reference Manual	16
0x1A	REG0D	Please see SERCON816 Reference Manual	16
0x1C	REG0E	Please see SERCON816 Reference Manual	16
0x1E	TSCYC0	Please see SERCON816 Reference Manual	16
0x20	TSCYC1	Please see SERCON816 Reference Manual	16
0x22	TCYCDL	Please see SERCON816 Reference Manual	16
0x24	TCNTLT	Please see SERCON816 Reference Manual	16
0x26	TCNTST	Please see SERCON816 Reference Manual	16
0x28	TCYCSTART	Please see SERCON816 Reference Manual	16
0x2A	JTSCYC1	Please see SERCON816 Reference Manual	16
0x2C	JTSCYC2	Please see SERCON816 Reference Manual	16
0x2E	PROGERR	Please see SERCON816 Reference Manual	16
0x30	JTRDEL1	Please see SERCON816 Reference Manual	16
0x32	JTRDEL2	Please see SERCON816 Reference Manual	16
0x34	TINT0	Please see SERCON816 Reference Manual	16
0x36	TINT1	Please see SERCON816 Reference Manual	16
0x38	TINT2	Please see SERCON816 Reference Manual	16
0x3A	TINT3	Please see SERCON816 Reference Manual	16
0x3C	TDIVCLK	Please see SERCON816 Reference Manual	16

Offset	Name	Function	Size (bit)
0x3E	DTDIVCLK	Please see SERCON816 Reference Manual	16
0x40	REG20	Please see SERCON816 Reference Manual	16
0x42	THTPT	Please see SERCON816 Reference Manual	16
0x44	THT	Please see SERCON816 Reference Manual	16
0x46	THWTP	Please see SERCON816 Reference Manual	16
0x48	THW	Please see SERCON816 Reference Manual	16
0x4A	REG25	Please see SERCON816 Reference Manual	16
0x4C	THR	Please see SERCON816 Reference Manual	16
0x4E	FIFO	Please see SERCON816 Reference Manual	16

Figure 5-1 : SERCON816 Registers

5.2 Interrupt Vector Register

Offset	Description	Size (bit)	Access
0x61	Interrupt Vector	8	R/W

Figure 5-2 : Interrupt Vector Register

The Interrupt Vector Register is used for reading the IP modules interrupt vector during an interrupt acknowledge cycle.

In case of write-access, data bit 0 is ignored.

In case of read-access (interrupt acknowledge cycle) data bit 0 indicates if the interrupt acknowledge is for IntReq0# (bit 0 = Low) or IntReq1# (bit 0 = High) (if indicated by the carrier board on IP address line A1).

SERCON816 INT0 pin is mapped to IP INTReq0#, SERCON816 INT1 pin is mapped to IP INTReq1#.

5.3 Master Sync Clock Enable Register

Offset	Description	Size (bit)	Access
0x71	Master Synchronization Clock Enable	8	R/W

Figure 5-3 : Master Sync Clock Enable Register

This register is for the RS485 interface only.

Data bit 0 of the Master Sync Clock Enable Register controls the transmission of the SERCON master synchronization clock (SERCON816 CON_CLK signal).

If data bit 0 is Low, the transmission of the SERCON816 CON_CLK signal is disabled. If data bit 0 is High, the transmission is enabled.

In case of write-access, data bits 7:1 are ignored.

In case of read-access, data bits 7:1 are undefined.

6 Jumper Configuration

6.1 TIP812-10 IP Module

Jumper Configuration	Description
Jumper J1 (SERCOS Interface Selection)	
1-3, 2-4 Installed	RS485 interface
3-5, 4-6 Installed	Optical Fiber Ring interface

Figure 6-1 : TIP812-10 Jumper Configuration

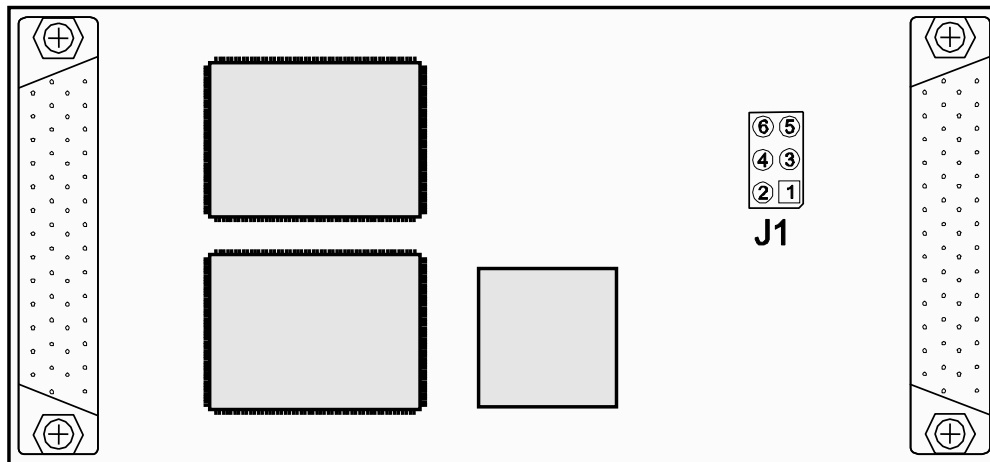


Figure 6-2 : TIP812-10 Jumper Location

6.2 TIP812-TM-10 Transition Module

All jumpers on the TIP812-TM-10 Transition Module are for the RS485 interface only.

There is no jumper configuration required for the optical interface.

Jumper Configuration	Description
Jumper J1 (DB9 Pin1 Connection)	
1-2 Installed	DB9 Pin1 = DB9 Pin 5 (RGND)
2-3 Installed	DB9 Pin1 = DB9 case
Jumper J2 (Sync Line Termination)	
1-2 Installed	RS485 Sync Signal Termination On
2-3 Installed	RS485 Sync Signal Termination Off
Jumper J3 (Data Line Termination)	
1-2 Installed	RS485 Data Signal Termination On
2-3 Installed	RS485 Data Signal Termination Off

Figure 6-3 : TIP812-TM-10 Jumper Configuration

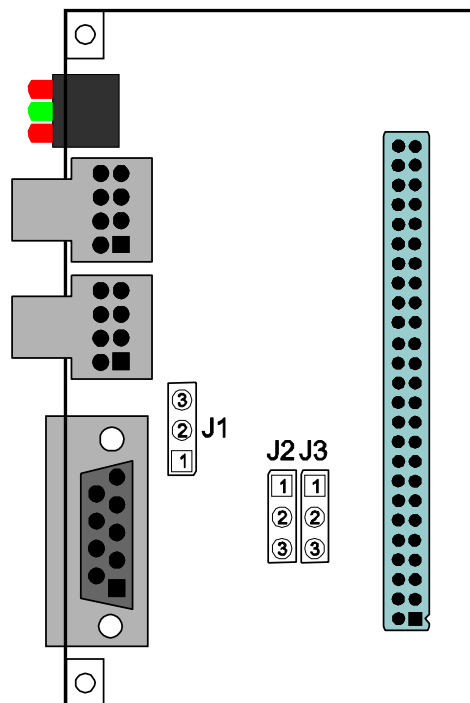


Figure 6-4 : TIP812-TM-10 Jumper Location

7 Pin Assignment – I/O Connector

7.1 50 pin I/O Connector of TIP812-10 IP Module

I/O Pin	Description
31	RS485 DATA Signal –
32	RS485 DATA Signal +
33	RS485 SYNC Signal –
34	RS485 SYNC Signal +
35	GND
36	GND
37	+5V
38	+5V
41	GND
42	Optical Fiber RxD
43	GND
44	Optical Fiber TxD
45	GND
47	ERROR# (LED)
48	TRANSMIT_ACTIVE# (LED)
49	RECEIVE_ACTIVE# (LED)

Figure 7-1 : 50 pin I/O Connector (IP)

7.2 TIP812-TM-10 Transition Module

7.2.1 50 pin I/O Connector (TM)

I/O Pin	Description
31	RS485 DATA Signal –
32	RS485 DATA Signal +
33	RS485 SYNC Signal –
34	RS485 SYNC Signal +
35	GND
36	GND
37	+5V
38	+5V
41	GND
42	Optical Fiber RxD
43	GND
44	Optical Fiber TxD
45	GND
47	ERROR# (LED)
48	TRANSMIT_ACTIVE# (LED)
49	RECEIVE_ACTIVE # (LED)

Figure 7-2 : 50 pin I/O Connector (TM)

7.2.2 DB9 Connector (female)

Pin	Description
1	SHLD_GND
3	RS485 DATA Signal –
4	RS485 SYNC Signal –
5	RGND
8	RS485 DATA Signal +
9	RS485 SYNC Signal +

Figure 7-3 : DB9 Connector (female)