The Embedded I/O Company

TEWS TECHNOLOGIES

TIP710

16 Digital Outputs, 6V to 48V DC, High Side Switch

Version 1.0

User Manual

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TIP710-10

16 Digital Outputs, 6V to 48V DC

High Side Switch

Issue	Description	Date
1.0	Initial Issue	February 2002

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1 Product Description

The TIP710 is an IndustryPack® compatible module providing 16 digital outputs configured as high side switch with galvanic isolation via optocouplers.

The TIP710 directly controls up to 16 lines of all kinds of resistive, capacitive and inductive loads.

The outputs are capable of driving 1A continuous per channel at an external supply voltage of 6V to 48V.

All outputs resist short-circuits and are protected against thermal overload.

After power-on or reset all channels are in the off state. A hardware watchdog clears all outputs in case of trigger failure.

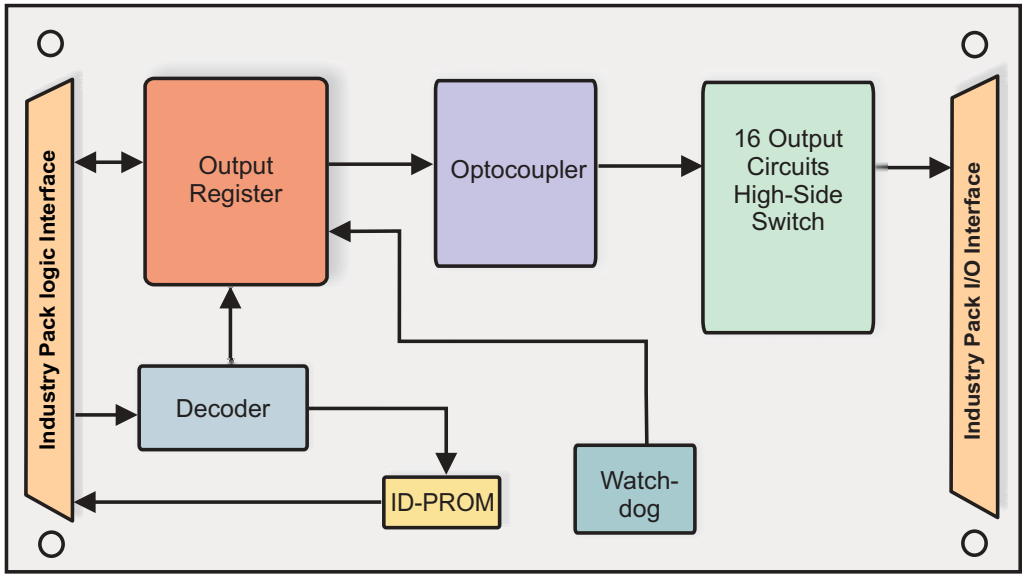

Figure 1-1 : TIP710 Block Diagram

2 Technical Specification

IP Interface		
IP Interface	Single Size IndustryPack® Logic Interface	
Module Specific Data		
Number of Outputs	16 digital Outputs	
Output Isolation	Optocouplers for galvanic isolation to logical interface, all channels share the same power supply and ground	
External Output Voltage	24V DC typical, 6V DC minimum, 48V DC maximum	
Output Current	1A maximum	
Short Circuit Current	4.5A typical	
Output Turn On/Off Time	Turn-on time: 85µs typical RL = 47Ω, Vbb = 25V DC	Turn-off time.: 150µs typical RL = 47Ω, Vbb = 25V DC
Output Protection	Overload, short circuit, GND and Vbb open wire protection, thermal shutdown	
Watchdog	Maximum Trigger distance = 100ms	
Wait States	No wait states	
Interface Connector	50-conductor flat cable	
Power Requirements	170mA typical @ +5V DC	
Temperature Range	Operating Storage	-40 °C to +85 °C -50°C to +125 °C
MTBF	279120h	
Humidity	5 – 95 % non-condensing	

Figure 2-1 : TIP710 Technical Specification

3 ID-PROM Content

ID-PROM CONTENT		
Address	**Function**	**Content**
01h	ASCII ‘I’	49h
03h	ASCII ‘P’	50h
05h	ASCII ‘A’	41h
07h	ASCII ‘C’	43h
09h	Manufacturer ID	B3h
0Bh	Model Number	33h
0Ch	Revision	10h
0Fh	RESERVED	00h
11h	Driver-ID Low-Byte	00h
13h	Driver-ID High-Byte	00h
15h	Number of bytes used	0Ch
17h	CRC	7Fh

Figure 3-1 : TIP710-10 V1.0 ID-PROM Contents

4 Address Map

4.1 IP Bus Address Map

The TIP710 is accessed in the I/O space though the following set of two direct accessible register.

Register Name	Register Symbol	Size	Address
Output Data Register	OUTDAT	16-bit	00h
Watchdog Control Register	WDGCSR	16-bit	02h

Figure 4-1 : TIP710 I/O Space Register

4.1.1 Output Data Register

The Data Output Register is a word wide read/write register. The status of the digital output channels can be set or reset directly by writing to the Output Data Register. Bit 0 represents OUTPUT 1 and bit 15 represents OUTPUT 16.

Output Data Register – IP Base Address + 00h			
Bit Number	**Bit Symbol**	**Access**	**Description**
15 (MSB)	OUTPUT 16	r/w	To set an output channel active, write a '1' to the corresponding bit. For the inactive state write a '0' to the corresponding bit. 0 : inactive 1 : active
14	OUTPUT 15		
13	OUTPUT 14		
12	OUTPUT 13		
11	OUTPUT 12		
10	OUTPUT 11		
9	OUTPUT 10		
8	OUTPUT 9		
7	OUTPUT 8		
6	OUTPUT 7		
5	OUTPUT 6		
4	OUTPUT 5		
3	OUTPUT 4		
2	OUTPUT 3		
1	OUTPUT 2		
0 (LSB)	OUTPUT 1		

Figure 4-2 : Output Data Register

4.1.2 Watchdog Control Register

The output watchdog is controlled by the Watchdog Control Register WDGCSR. Bit 0 of this register is a write only bit. When it is set to the logic level ‘1’ the watchdog is enabled.

Watchdog Control Register – IP Base Address + 00h			
Bit Number	**Bit Symbol**	**Access**	**Description**
15 (MSB)	reserved		
14	reserved		
13	reserved		
12	reserved		
11	reserved		
10	reserved		
9	reserved		
8	reserved		
7	reserved		
6	reserved		
5	reserved		
4	reserved		
3	reserved		
2	reserved		
1	reserved		
0 (LSB)	WD enable	w	0 : disable watchdog 1 : enable watchdog

Figure 4-3 : Watchdog Control Register

The watchdog is disabled after power up or reset.

5 Functional Description

5.1 Digital Outputs

The TIP710 has 16 digital outputs. The standard signal level for these outputs is 24V DC.

A maximum voltage of 48V DC and a minimum voltage of 6V DC are possible. Only one external power supply is possible for all 16 digital Outputs.

5.1.1 Optical Isolation

All digital outputs are galvanic isolated by optocouplers to the computer system.

5.1.2 Overload Protection

The output drivers are implemented by Smart Power switches BSPxxx. The maximum continuous output current is 1A per channel. The output circuits are protected against short circuit, thermal overload and overvoltage. In case of such a failure the corresponding output will be disabled until the error condition is removed. Then the output returns automatically to normal operation.

Please check the maximum current of the used CPU board, IP carrier and the connection cable. Some standard cables (AWG28 50 pol.) are limited to 0.75 A per lead.

5.1.3 Output Watchdog

The TIP710 includes an output watchdog which can be enabled under software control. When the watchdog is active, a mono stabile flip-flop is retriggered with each write accesses to the Output Data Register. If there is no write access within approximately 120msec the watchdog sets all outputs in inactive state.

The watchdog is disabled after power up or reset.

6 I/O Pin Assignment

I/O PIN ASSIGNMENT		
I/O Pin Number	**Function**	**Signal Name**
1	Output Channel 1	OUT 1
2	external Power supply 6V – 48V	VBB
3	Output Channel 2	OUT 2
4	external Power supply 6V – 48V	VBB
5	Output Channel 3	OUT 3
6	external Power supply 6V – 48V	VBB
7	Output Channel 4	OUT 4
8	external Power supply 6V – 48V	VBB
9	Output Channel 5	OUT 5
10	external Power supply 6V – 48V	VBB
11	Output Channel 6	OUT 6
12	external Power supply 6V – 48V	VBB
13	Output Channel 7	OUT 7
14	external Power supply 6V – 48V	VBB
15	Output Channel 8	OUT 8
16	external Power supply 6V – 48V	VBB
17	Output Channel 9	OUT 9
18	external Power supply 6V – 48V	VBB
19	Output Channel 10	OUT 10
20	external Power supply 6V – 48V	VBB
21	Output Channel 11	OUT 11
22	external Power supply 6V – 48V	VBB
23	Output Channel 12	OUT 12
24	external Power supply 6V – 48V	VBB
25	Output Channel 13	OUT 13
26	external Power supply 6V – 48V	VBB
27	Output Channel 14	OUT 14
28	external Power supply 6V – 48V	VBB
29	Output Channel 15	OUT 15
30	external Power supply 6V – 48V	VBB
31	Output Channel 16	OUT 16
32	external Power supply 6V – 48V	VBB
33	n.c.	
34	n.c.	
35	n.c.	
36	n.c.	
37	n.c.	
38	n.c.	

I/O PIN ASSIGNMENT		
I/O Pin Number	**Function**	**Signal Name**
39	n.c.	
40	n.c.	
41	n.c.	
42	n.c.	
43	Power Supply Ground	GND
44	Power Supply Ground	GND
45	Power Supply Ground	GND
46	Power Supply Ground	GND
47	Power Supply Ground	GND
48	Power Supply Ground	GND
49	Power Supply Ground	GND
50	Power Supply Ground	GND

Figure 6-1 : I/O Pin Assignment