TIP700

Digital Output 24V DC
Version 1.0 Revision B

User Manual

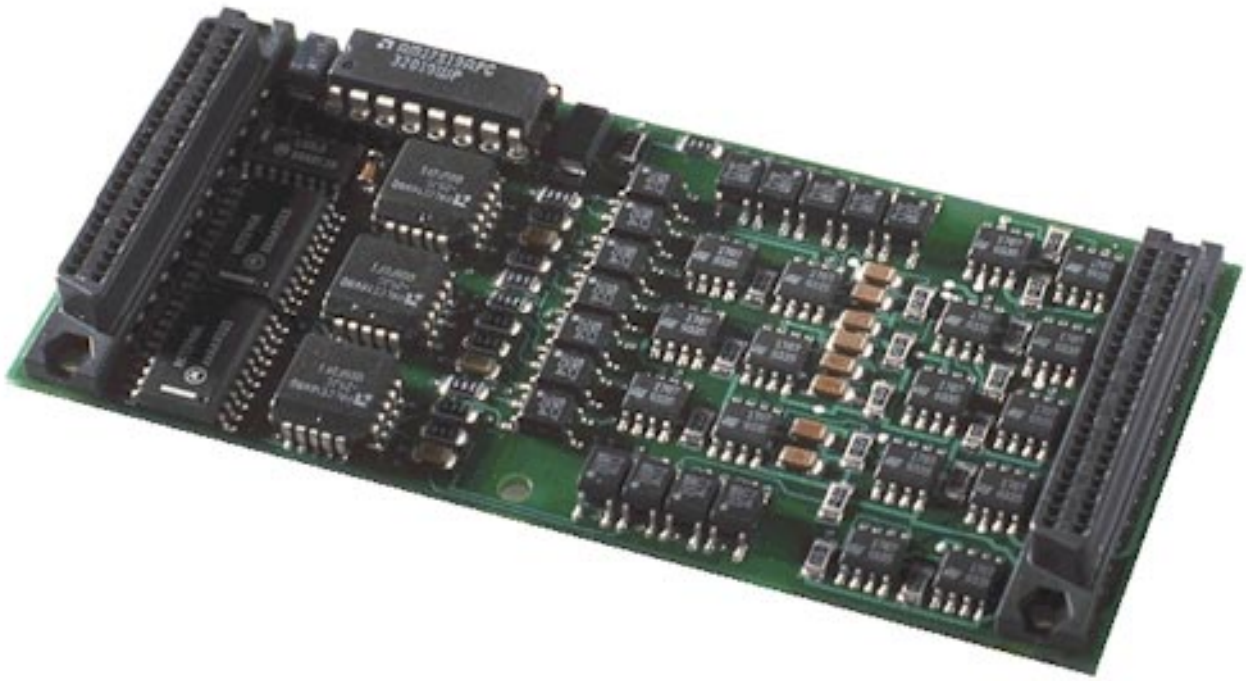
Issue 1.2

12 May 1997

D75700801

TEWS DATEN*TECHNIK* GmbH
Am Bahnhof 7
D-25469 Halstenbek
Germany
Tel +49 (0)4101 4058-0
Fax +49 (0)4101 4058-19

TEWS DATENTECHNIK



TIP700-10
16 isolated digital outputs 24V DC

TIP700-20
8 isolated digital outputs 24V DC

This manual covers both products

Issue	Desscription	Date
1.0	First issue	30 June 1994
1.1	Technical Spec.	03 April 1996
1.2	Schematics	12 May 1997

TEWS DATENTECHNIK

1. Product Description

The TIP700 is an IndustryPack® compatible module with digital outputs interfacing directly to 24 volt DC control voltage. There are two versions available: The TIP700-10 implements 16 outputs, the TIP700-20 implements 8 outputs.

The 16 (8) digital outputs are also galvanically isolated by opto-coupler. They are isolated against each other in pairs of two. Each pair can be individually configured as high or low side switch. The output drivers are capable of driving 0.5 A continuous per channel. They resist short-circuits and are protected against thermal overload.

The implemented hardware watchdog can be activated for automatic deactivation of the outputs in case of a software failure.

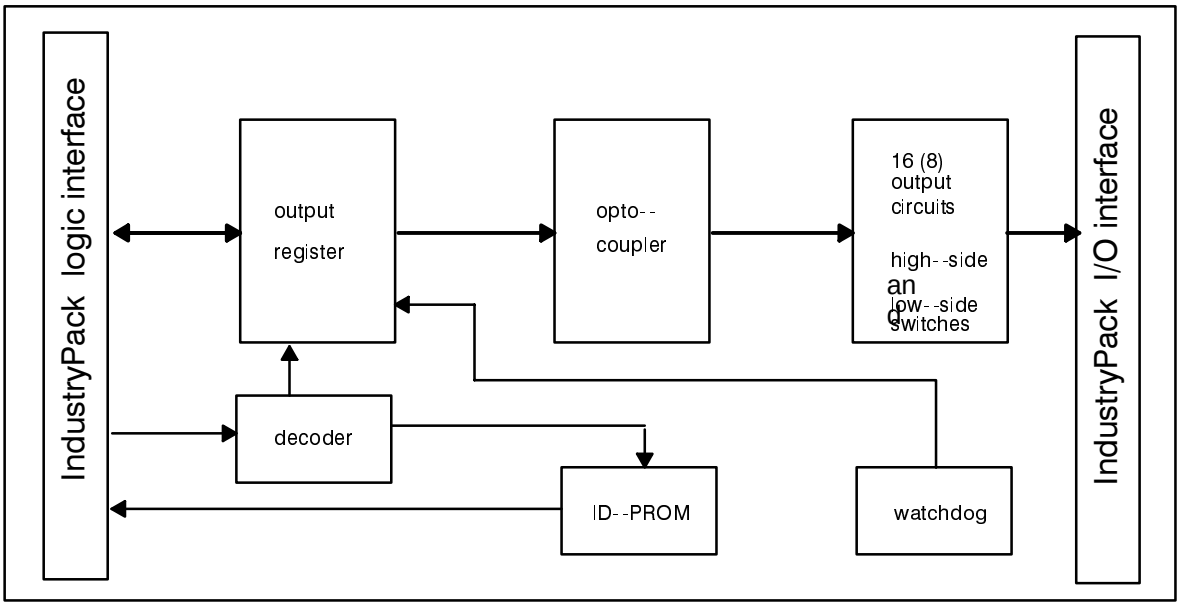


Figure 1: TIP700 Block Diagram

2. Technical Specification

Logic Interface	IndustryPack® Logic Interface
Size	single wide IP
I/O Interface	50-conductor flat cable
Number of Outputs	16 (TIP700-10) 8 (TIP700-20)
Output Isolation	All channels, each two channels share the same power supply and ground
External Output Voltage	24V DC typical 6V DC minimum 48V DC maximum
Output Current	0.5A (0.4A for voltages over 32V)
Short Circuit Current	0.8A typical (2A maximum)
Output Voltage Drop	1.1V typical at 0.5A
Output Protection	Overload, short circuit, GND and Vs open wire protection, thermal shutdown
Output Watch Dog	can be enables under software control, 120msec time out
Wait States	no wait states
Power Requirements	175mA @ 5V for all Modules
Temperature Range	Operating 0°C to 70°C Storage -45°C to 125°C
Humidity	5 - 95% non-condensing

3. ID Prom Contents

ADDRESS	FUNCTION	
$ 01	ASCII 'I'	$ 49
$ 03	ASCII 'P'	$ 50
$ 05	ASCII 'A'	$ 41
$ 07	ASCII 'C'	$ 43
$ 09	Manufacturer ID	$ B3
$ 0B	Model Number	$ 05 for TIP700-10 $ 06 for TIP700-20
$ 0D	Revision	$ 10
$ 0F	RESERVED	$ 00
$ 11	Driver-ID low-byte	$ 00
$ 13	Driver-ID high-byte	$ 00
$ 15	number of bytes used	$ 0C
$ 17	C R C	$ D7 for TIP700-10 $ 55 for TIP700-20

Figure 2: ID PROM contents

4. VMEbus Addressing

The TIP700 is accessed in the I/O space through the following set of two direct accessible registers:

ADDRESS	NAME	FUNCTION	SIZE
$ 00	OUTDAT	Data Bits D00 - D15	word
$ 02	WDGCSR	Watch Dog Control Register	word

Figure 3: TIP700 Register Map

5. Functional Description

5.1. Digital Outputs

5.1.1. Optical Isolation

The TIP700 has 16 (TIP700-10) or 8 (TIP700-20) digital outputs. The standard signal level for these outputs is 24V DC. All output channels are isolated by optical coupler and are also isolated against each other in groups of two outputs.

5.1.2. Output Polarity

Each output can be individually configured as a high or a low side switch depending on the external wiring of the output signal lines.

5.1.3. Overload Protection

The output drivers are implemented by smart drivers TDExxx. The maximum continuous output current is 0.5 A. The output circuits are protected against overload, short circuit and over temperature. In case of such a failure the corresponding output will be disabled until the error condition is removed. The output then returns automatically to normal operation.

5.1.4. Output Watchdog

The TIP700 IP has a output watchdog which can be enabled under software control. When the watch dog is active a mono stabile flip-flop is retriggered with each write to the output data register OUTDAT. If there is no write access within approximately 120msec, the watch dog resets all outputs.

Note

The watchdog is disabled after power up or a reset.

6. Programming

6.1. Accessing the Output Data Register OUTDAT

The status of the outputs can be manipulated directly by writing to the Output Data Register OUTDAT. Each bit of this data register is controlling one output line.

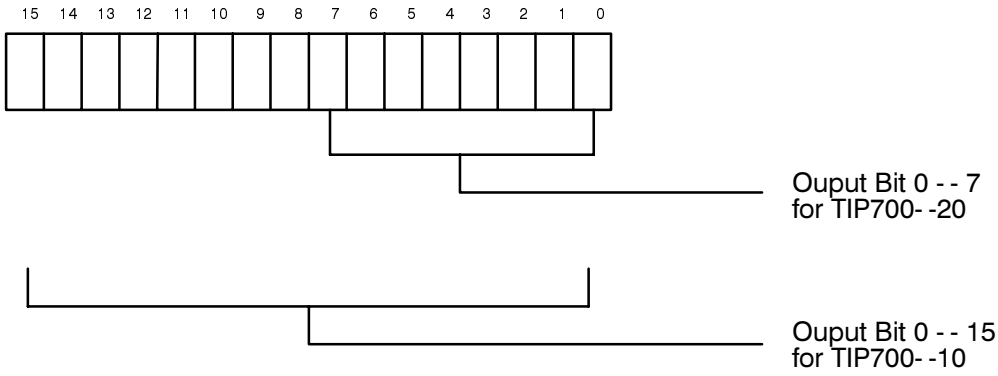


Figure 4: Output Data Register OUTDAT

At the TIP700-20 with only 8 outputs only bit 0 to bit 7 are used.

The Output Data Register OUTDAT is implemented as a read/write register. Bit manipulating instructions can be used to modify the status of single outputs.

Note

After a system reset all outputs are inactive.

6.2. Initialization of the Watch Dog Function

The output watch dog is controlled by the Watch Dog Control Register WDGCSR. Bit 0 of this register is a write only bit. When it is set to '1' the watch dog is enabled.

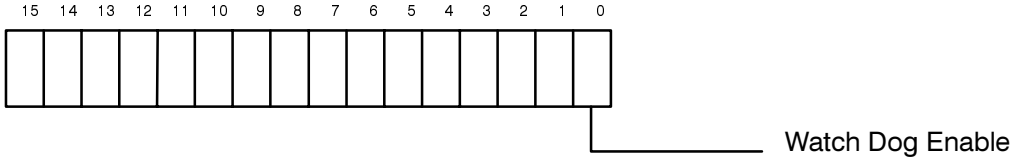


Figure 5: Watch Dog Control Register WDGCSR

Note

The watchdog is disabled after power up or a reset.

7. Installation

The outputs are optically isolated from the logic circuit in pairs of two. Output channels 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10, 11 and 12, 13 and 14 , 15 and 16 share the same output potential but are completely isolated against the other output pairs.

Each output can be individually be configured as a high side or a low side switch by corresponding wiring.

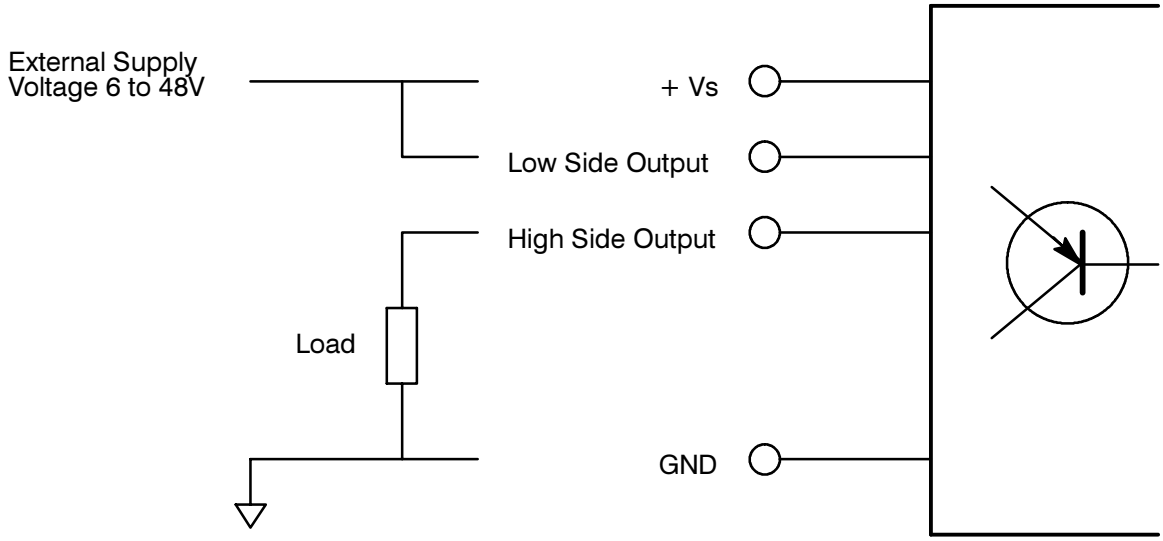


Figure 6: Output Wiring As High Side Switch

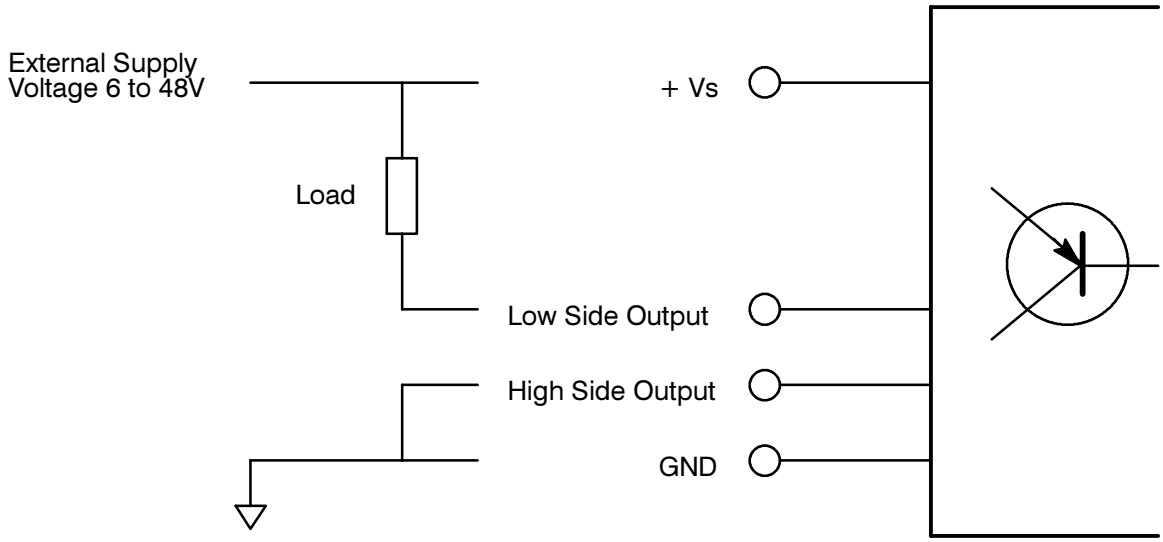


Figure 7: Output Wiring As Low Side Switch

8. IP I/O connector

8.1. Output Connections

Pin-Number	Function	Comment
01	GND Output 1-2	
02	GND Output 3-4	
03	GND Output 5-6	
04	GND Output 7-8	
05	Low Side Output 1	
06	High Side Output 1	
07	Low Side Output 2	
08	High Side Output 2	
09	Low Side Output 3	
10	High Side Output 3	
11	Low Side Output 4	
12	High Side Output 4	
13	Low Side Output 5	
14	High Side Output 5	
15	Low Side Output 6	
16	High Side Output 6	
15	Low Side Output 7	
18	High Side Output 7	
19	Low Side Output 8	
20	High Side Output 8	
21	+ Vs Output 1-2	
22	+ Vs Output 3-4	
23	+ Vs Output 5-6	
24	+ Vs Output 7-8	
25	nc	

Figure 8: TIP700 Output I/O connection output 1 to 8

Pin-Number	Function	Comment
26	GND Output 9-10	
27	GND Output 11-12	
28	GND Output 13-14	
29	GND Output 15-16	
30	Low Side Output 9	
31	High Side Output 9	
32	Low Side Output 10	
33	High Side Output 10	
34	Low Side Output 11	
35	High Side Output 11	
36	Low Side Output 12	
37	High Side Output 12	
38	Low Side Output 13	
39	High Side Output 13	
40	Low Side Output 14	
41	High Side Output 14	
42	Low Side Output 15	
43	High Side Output 15	
44	Low Side Output 16	
45	High Side Output 16	
46	+ Vs Output 9-10	
47	+ Vs Output 11-12	
48	+ Vs Output 13-14	
49	+ Vs Output 15-16	
50	nc	

Figure 9: Output I/O connection output 9 to 16 (TIP700-10 only)