



## Preliminary Information

# PI-1

## Parallel I/O Module

### Description:

Industry-standard *TRAM*® transputer evaluation modules provide an efficient and elegant development system solution for the designer of transputer-based systems. The *Paramax* line of transputer evaluation and peripheral modules add functionality to such a system.

The *Paramax* PI-1 parallel I/O module provides access from any *TRAM* development system to 24 channels of parallel input or output. It is a double-sized *TRAM* module and is compatible with the entire line of INMOS *TRAM* motherboards and modules. It is well-suited to applications where external signals or devices must be polled and driven from a transputer program.

Each I/O channel on the PI-1 is programmable in function (input or output) and can be toggled from software at rates up to 840 KHz. The PI-1 features 48 mA drive and built-in pull-up resistors, making simple connections to front-panel switches and LED outputs easy.

The PI-1's most important feature is its compatibility with industry standard solid-state relay I/O modules and motherboards. These 4000V-isolated I/O modules and motherboards allow easy 50-conductor ribbon cable connection at up to 10-feet via the PI-1. Each channel can control isolated power I/O from 24 to 280VAC (or DC) at up to 3.5A, from such manufacturers as Gordos and OPTO22. The versatility and inherent isolation of these power modules makes them ideal for use with the PI-1 in control applications. Multiplexer systems, such as Gordos' PAM2 and PAM3 are also compatible with the PI-1 and can provide thousands of power I/O channels from a single PI-1.

The PI-1 provides **LockStop**™ synchronization. This unique feature allows the system designer to eliminate I/O-based deadlock and lockstep delays.

A watchdog timer is also provided for system protection. It sets all outputs to the false condition when communications failures are detected.

### Features:

- 24-channels of parallel I/O via transputer link
- Single-byte commands allow four-bit accesses (read or write) at high speed (up to 840 KHz)
- Cable drive level: 48mA per channel
- Electrical and connector compatibility with Gordos and OPTO-22 type power I/O modules, with 4000V isolation (input and output) and control voltages up to 280 V AC or DC
- *Paramax TMS* and INMOS *TRAM* standard (double-module size) outline
- 10 or 20Mbit/second transputer link speed selected with jumpers for maximum configurability
- Easy input/output programmability of each channel line and corresponding power I/O
- LockStop feature allows requests for input to be handshaked with commands or to operate in full parallel mode
- Built-in pull-ups allow easy connection to front-panel switches in console applications
- Watchdog timer sets output devices to a false or shutdown condition during failures
- 4000V-isolation assures protection of valuable development system equipment in high-power applications without custom designs
- Applications include robotics, machine control, power-supply control, front-panel interfacing, geophysical and seismic equipment

### Ordering Information:

<b>Part Number</b>	<b>PI-1</b>
<b>Price</b>	<b>\$495</b>

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## Specifications:

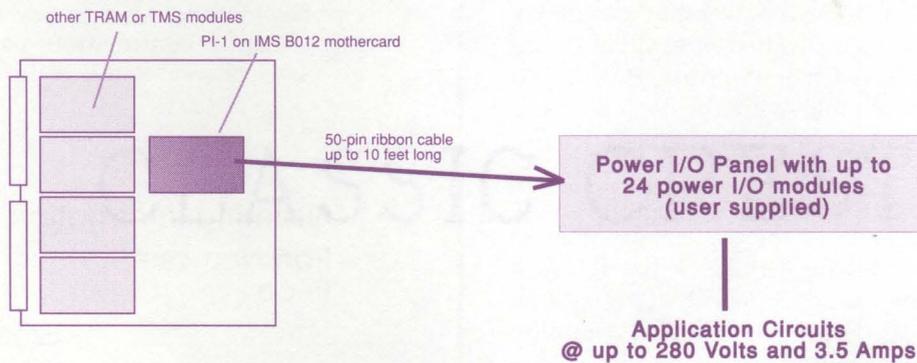
- Double-module TRAM size: 3.5 x 2.150" , INMOS TRAM compatible size
- INMOS TRAM electrical compatibility
- 24-channels programmable input and/or output with 48mA drive/channel and built-in pull-up resistors
- Command and output data structure:
 

Bit 7 - Read/NotWrite	Bit 3 - Data bit 3 (output only)
Bit 6 - Nibble A2	Bit 2 - Data bit 2 (output only)
Bit 5 - Nibble A1	Bit 1 - Data bit 1 (output only)
Bit 4 - Nibble A0	Bit 0 - Data bit 0 (output only)
- Input data structure:
 

Bit 7 - always 0	Bit 3 - Data bit 3 (input only)
Bit 6 - Nibble A2	Bit 2 - Data bit 2 (input only)
Bit 5 - Nibble A1	Bit 1 - Data bit 1 (input only)
Bit 4 - Nibble A0	Bit 0 - Data bit 0 (input only)
- Command data rate: Full speed link rate – 840KBytes/second (parallel mode)
- Selectable synchronization (**LockStop**) linkage from commands to input data
- Temperature range: 0 to 50 degrees Centigrade
- Voltage: 5V ± 10%
- Power: 350 mA @ 5.5V maximum

Nibble 5 Bit D3	Nibble 5 Bit D2	Nibble 5 Bit D1	Nibble 5 Bit D0	Nibble 4 Bit D3	Nibble 4 Bit D2	Nibble 4 Bit D1	Nibble 4 Bit D0	Nibble 3 Bit D3	Nibble 3 Bit D2	Nibble 3 Bit D1	Nibble 3 Bit D0
I/O bit 23	I/O bit 22	I/O bit 21	I/O bit 20	I/O bit 19	I/O bit 18	I/O bit 17	I/O bit 16	I/O bit 15	I/O bit 14	I/O bit 13	I/O bit 12
Nibble 2 Bit D3	Nibble 2 Bit D2	Nibble 2 Bit D1	Nibble 2 Bit D0	Nibble 1 Bit D3	Nibble 1 Bit D2	Nibble 1 Bit D1	Nibble 1 Bit D0	Nibble 0 Bit D3	Nibble 0 Bit D2	Nibble 0 Bit D1	Nibble 0 Bit D0
I/O bit 11	I/O bit 10	I/O bit 09	I/O bit 08	I/O bit 07	I/O bit 06	I/O bit 05	I/O bit 04	I/O bit 03	I/O bit 02	I/O bit 01	I/O bit 00

## PI-1 Command Data Pattern Translation



## PI-1 Example System Block Diagram