

AX10455

**8 Channel Relay Actuator
PC/104 Module**

Operating Guide

Disclaimers

The information in this manual has been carefully checked and is believed to be accurate. AXIOMTEK Co., Ltd. assumes no responsibility for any infringements of patents or other rights of third parties which may result from its use.

AXIOMTEK assumes no responsibility for any inaccuracies that may be contained in this document. AXIOMTEK makes no commitment to update or to keep current the information contained in this manual.

AXIOMTEK reserves the right to make improvements to this document and/or product at any time and without notice.

No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of AXIOMTEK Co., Ltd.

Copyright© 1995 by AXIOMTEK Co., Ltd.

All rights reserved.

December 1994, 1st Edition

Printed in Taiwan

Trademarks Acknowledgments

AXIOMTEK is a trademark of AXIOMTEK Co., Ltd.

IBM is a registered trademark of International Business Machines Corporation.

MS-DOS, Microsoft C and QuickBasic are trademarks of Microsoft Corporation.

TURBO C is a trademark of Borland Inc.

BASIC is a trademark of Dartmouth College.

Intel is a trademark of Intel Corporation.

Other brand names and trademarks are the properties and registered brands of their respective owners.

ESD Precautions

Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This helps to discharge any static electricity on your body.
- Wear a wrist grounding strap, available from most electronic component stores, when handling boards and components.

Unpacking

The AX10455 is packed in an anti-static bag. The board has components that are easily damaged by static electricity. Do not remove the anti-static wrapping until proper precautions have been taken. Safety instructions in front of this User's Manual describe anti-static precautions and procedures.

Inventory and Inspection

After unpacking the board, place it on a raised surface and carefully inspect the board for any damage that might have occurred during shipment. Ground the board and exercise extreme care to prevent damage to the board from static electricity.

Integrated circuits will sometimes come out of their sockets during shipment. Examine all integrated circuits, particularly the BIOS, processor and keyboard controller chip to ensure that they are firmly seated.

The AX10455 8 Channel Relay Actuator PC/104 Module package includes the following:

- AX10455/AX10455-16 Board
- Screw 3mm (x4)
- Bronze stick 6mm (x4)
- AS59099 DAC Driver CD

Make sure that all of the items listed above are present.

What To Do If There Is A Problem

If there are damaged or missing parts, contact your supplier and/or dealer immediately. Do not attempt to apply power to the board if there is damage to any of its components.

Table of Contents

General Description	1
Features	1
Specifications	2
Module Configuration and Installation	3
Location Diagram	3
DIP Switch Setting	4
Connector Pin Assignments	6
Module Installation	7
Register Description	8
Programming	9
Example	9
Function Description	10
Relay Output	10
Block Diagram	11
Appendix A PC I/O Port Mapping	12
Appendix B PC/104 Mechanical Specifications	13
PC/104 General Description	13
Module Dimensions	13

General Description

The AX10455 relay actuator PC/104 module is designed for control applications. It contains 8 channels electromechanical single-pole double throw relays which can be set or reset directly by I/O write instructions. Each relay is rated at 1.5A at 125VAC. The normal open, normal close and command contacts of each relay are brought out through a 50-pin mating connectors. A LED, adjacent to each relay, lights up when the relay is activated. The relay is activated when a logic high is written to the controlling bit.

Features

- 8 single-pole, double-throw relays
- 125VAC/1.5A maximum contact rating
- Isolation upto 1000 Vrms
- NC, NO and COM contacts output
- LED indicators to show activated relays

Specifications

Relay Output

- **Number of Channels:** 8
- **Type:** Electromechanical DIP Relay, Normal Open
- **Form:** DPDT(wired as SPDT)
- **Contact Rating:**
 - ⊙ Maximum Switching Power: 30W/60VA
 - ⊙ Maximum Switching Voltage: 125VDC/125VAC
 - ⊙ Maximum Switching Current: 1.5ADC/1.5AAC
- **Contact Resistance:** 100mΩ maximum
- **Indication Mode:** Logic "1" = LED Light on and relay set
Logic "0" = LED Light off and relay reset
- **Life Expectancy:** 10x10⁶ operations (rated)
- **Operate/Release:** 8/8ms
- **Break down Voltage:**
 - ⊙ Coil to contact : 1500Vrms
 - ⊙ Across contact: 1000Vrms

Power Requirements

- +5VDC: 200mA typ.
- +12VDC: 100mA typ.

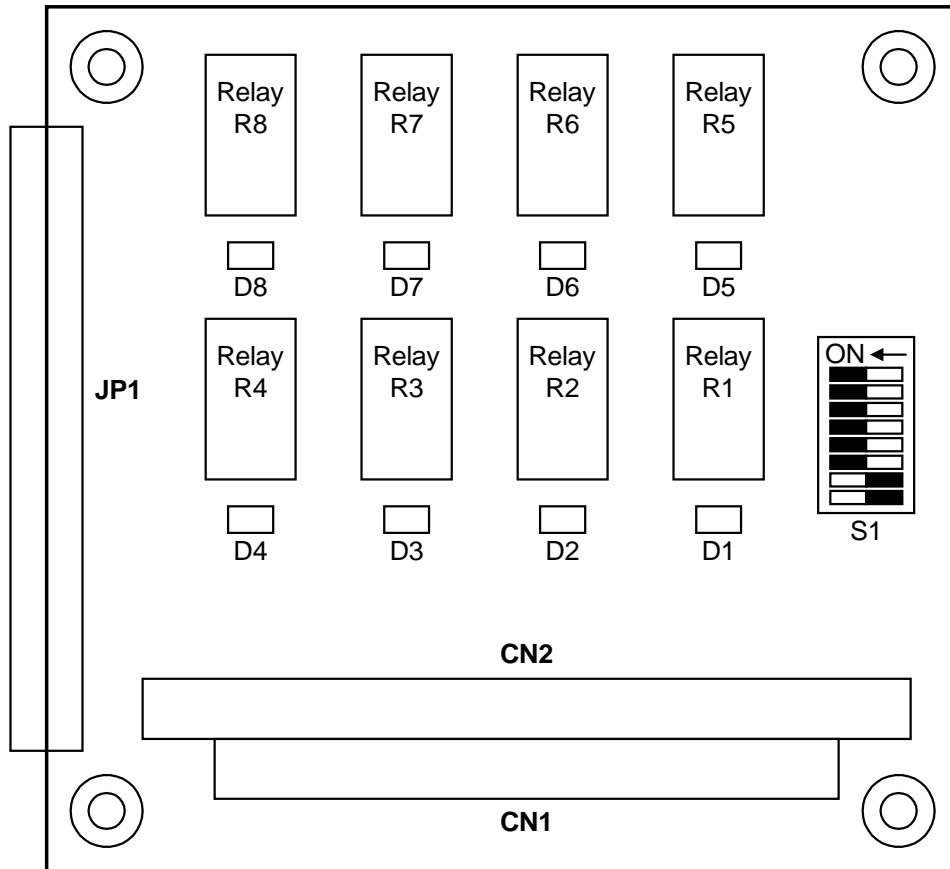
Physical/Environmental

- **Dimension:** 95mm X 90mm
- **Weight:** 230g
- **Operating Temperature Range:** 0°C to 50°C
- **Storage Temperature Range:** -20°C to 70°C
- **Relative Humidity:** 0 to 90%, non-condensing

Module Configuration and Installation

Location Diagram

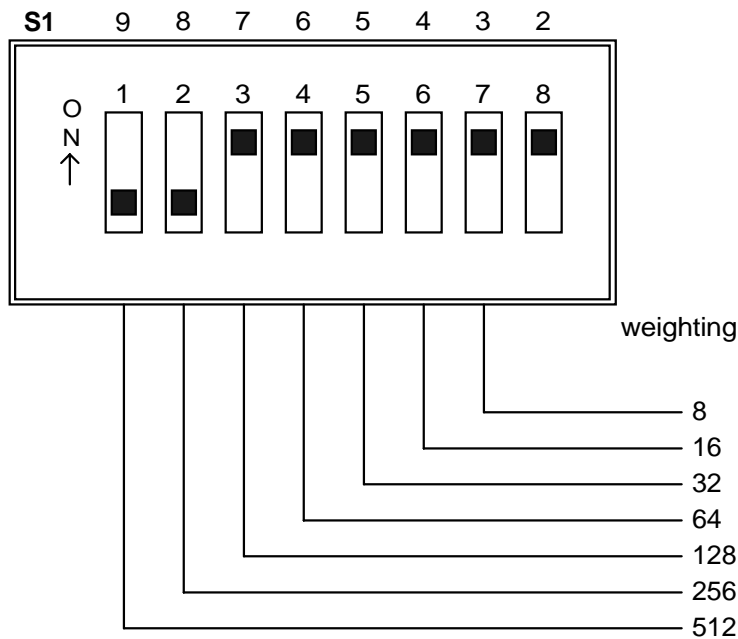
Refer to the following location diagram for help locating components needed during configuration and installation of the AX10455 module.



DIP Switch Setting

AX10455 occupies four consecutive I/O port spaces. The first address or base address is set via a DIP switch labeled S1. If more than one modules are to be installed to one PC, each module must be given its own distinct base address. No more than one module may use the same base address. When you are selecting the base address, it would be better if you check with **Appendix A** to avoid conflicting with other installed devices. Valid addresses are from 200 Hex to 3F8 Hex. Following figure is the default setting where the base address is set to 300 Hex.

Base Address Switch Setting



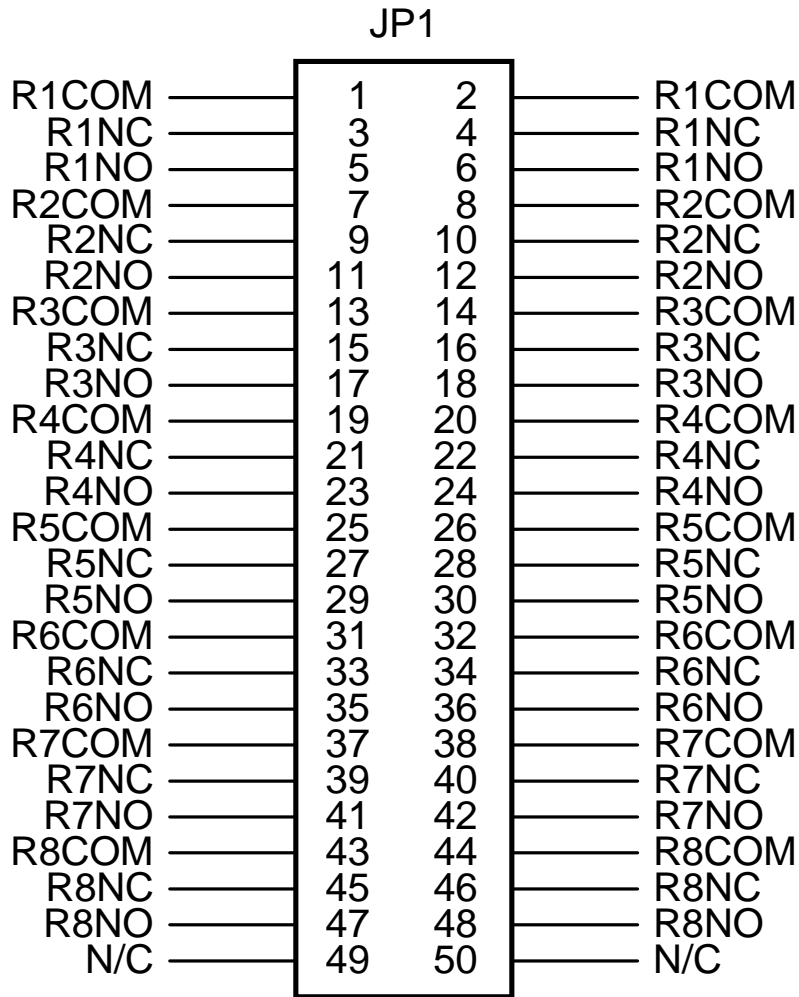
$$\begin{aligned} \text{Base Address} &= 512 + 256 = 768 \text{ (Decimal)} \\ &= 300 \text{ (Hex)} \end{aligned}$$

I/O Port Range (Hexadecimal)	DIP Switch Position							
	1	2	3	4	5	6	7	8
	A9	A8	A7	A6	A5	A4	A3	A2
200 – 203	1	0	0	0	0	0	0	0
204 – 207	1	0	0	0	0	0	0	1
208 – 20B	1	0	0	0	0	0	1	0
20C – 20F	1	0	0	0	0	0	1	1
.
220 - 223	1	0	0	0	1	0	0	0
.
.
*300 – 303	1	1	0	0	0	0	0	0
.
.
3F8 - 3FB	1	1	1	1	1	1	1	0
3FC – 3FF	1	1	1	1	1	1	1	1

NOTE 0 = ON, 1 = OFF,
 (*) : Factory default setting

Connector Pin Assignments

All output of AX10455 are brought out through an 50-pin connectors labeled JP1. The following figure and descriptions give the necessary data for wiring.



JP1 connector pin description:

Signal Name	Description
R1COM – R8COM	The common contact pins of relays 1 through 8.
R1NC – R8NC	The normally close contacts of relays 1 through 8.
R1NO – R8NO	The normally open contacts of relays 1 through 8.
N/C	No connect.

Module Installation

The AX10455 PC/104 module is shipped with protective electrostatic cover. When unpacking, touching the module electro-statically shielded packaging with the metal frame of your computer to discharge the accumulated static electricity prior to touching the module.

Following description summarizes the procedures for installing the AX10455:

WARNING *Turn off the PC and all accessories connected to the PC whenever installing or moving any peripheral board including the AX10455 module.*

Installation Procedures:

1. Turn off the system power.
2. Unplug all power cords.
3. Remove the case cover if necessary.
4. Remove the top module if it is a non-stackthrough module.
5. Put the AX10455 module in line with the top present module as described in **Appendix B**.
6. Install four spacers if necessary.
7. Connect cable if necessary.
8. Crush between the modules until inside distance is SPACER's height (0.6"). Restore all the screws.
9. Repeat step 6 until all modules are set into position.
10. Connect cable to AX10455 if necessary
11. Replace the case cover and connect all the necessary cables.
12. Turn on the system power.

Register Description

The AX10455 occupies 4 consecutive addresses in I/O address space, but only one address is used. During installation, properly set S1 switch to select the correct base address.

The following table shows the register configuration:

- Base address +0

Bit No.	7	6	5	4	3	2	1	0
Bit Name	R8	R7	R6	R5	R4	R3	R2	R1

Only base address +0 is used for 8-bit wide relay output register. This register is a read/write register for controlling relays. The controlling bit R1 through R8 is corresponding to the onboard relay 1 through relay 8. To activate a relay, set the corresponding controlling bit to "1". To turn off a relay, set the corresponding controlling bit to "0".

The data written to the register can be read back as a data for comparison and confirmation purpose. Base address +1, +2, +3 are all reserved.

Programming

Programming the AX10455 is very simple. It can be easily accomplished using direct I/O instructions of whatever application languages. In this section an example in BASIC is given.

Example

The example shows how to control the eight relays on module.

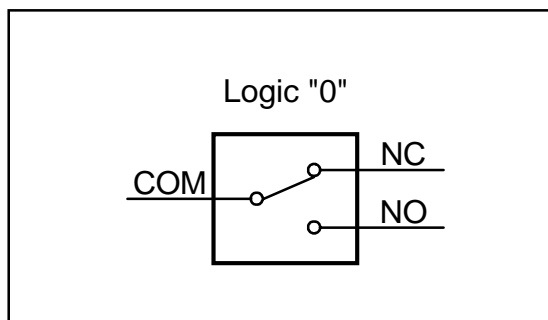
Assume the base address is 300 Hex.

```
BASE = &H300
out BASE, 0           ' All relays are off
out BASE, 1           ' Only relay 1 is actuated
out BASE, &H80        ' Only relay 8 is actuated
out BASE, &H55        ' Relay 1, 3, 5, 7 are actuated
inp (BASE)           ' Read back relay status: 55Hex
```

Function Description

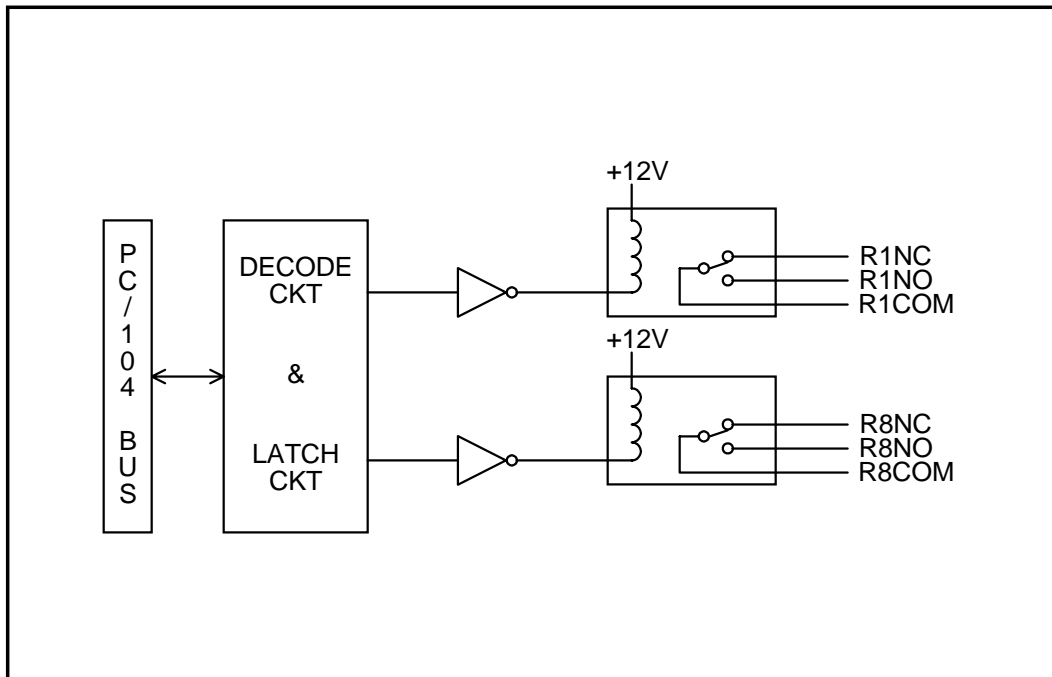
Relay Output

Each of the electromechanical relays has three contacts: COM (Common), NO (Normally Open) and NC (Normal Close). When a 0 is written to the associated controlling bit, the COM and NC posts make contact. When a 1 is written to the controlling bit, the COM and NO posts make contact. Refer to **Register Description** and **Programming** sections about how to control the relays.



Each relay of the AX10455 is equipped with an LED. The LEDs are labeled D1 through D8, for relay 1 through 0. The LED lights when relay.

Block Diagram



Appendix A PC I/O Port Mapping

I/O Port Address Range	Function
000 – 1FF	PC reserved
200 – 20F	Game controller (Joystick)
278 – 27F	Second parallel printer port (LPT2)
2E1	GPIB controller
2F8 – 2FF	Second serial port (COM2)
320 – 32F	Fixed disk (XT)
378 – 37F	Primary parallel printer port (LPT1)
380 – 38F	SDLC communication port
3B0 – 3BF	Monochrome adapter/printer
3C0 – 3CF	EGA, reserved
3D0 – 3DF	Color/graphics adapter
3F0 – 3F7	Floppy disk controller
3F8 – 3FF	Primary serial port (COM1)

Appendix B PC/104 Mechanical Specifications

PC/104 General Description

While the PC and PC/AT architectures have become extremely popular in both general purpose (desktop) and dedicated (non-desktop) applications, its use in embedded microcomputer applications has been limited due to the large size of standard PC and PC/AT motherboards and expansion cards. PC/104 module can be of two bus types, 8 bit and 16 bit, which correspond to the PC and PC/AT buses, respectively.

Besides bus option, there are stackthrough and non-stackthrough difference. The stackthrough version provides a self-stacking PC bus. It can be placed any where in a multi-module stack. The non-stackthrough version offers minimum thickness, by omitting bus stackthrough pins. It must be positioned at one end of a stack.

For convenience, the AX10410 is equipped with stackthrough version only.

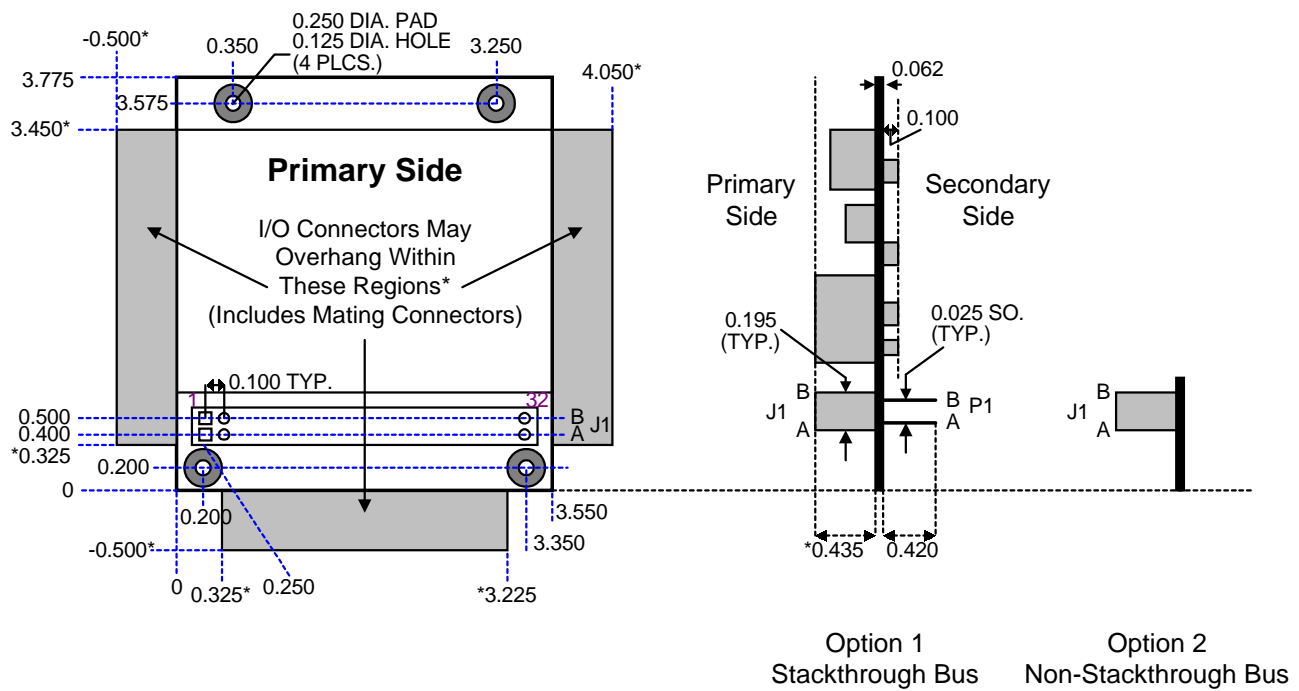
NOTE *For safety, you are suggested to cut bus stackthrough pins of the last module on condition; that you are sure you won't add/plug any module to the module stack in the future.*

The following sections provide the mechanical and electrical specifications for a compact version of the PC/AT bus, optimized for the unique requirements of embedded systems applications. The specification is herein referred to as "PC/104". Based on the 104 signal contacts on the two bus connectors (64 pins on CN1 plus 40 pins on CN2).

Module Dimensions

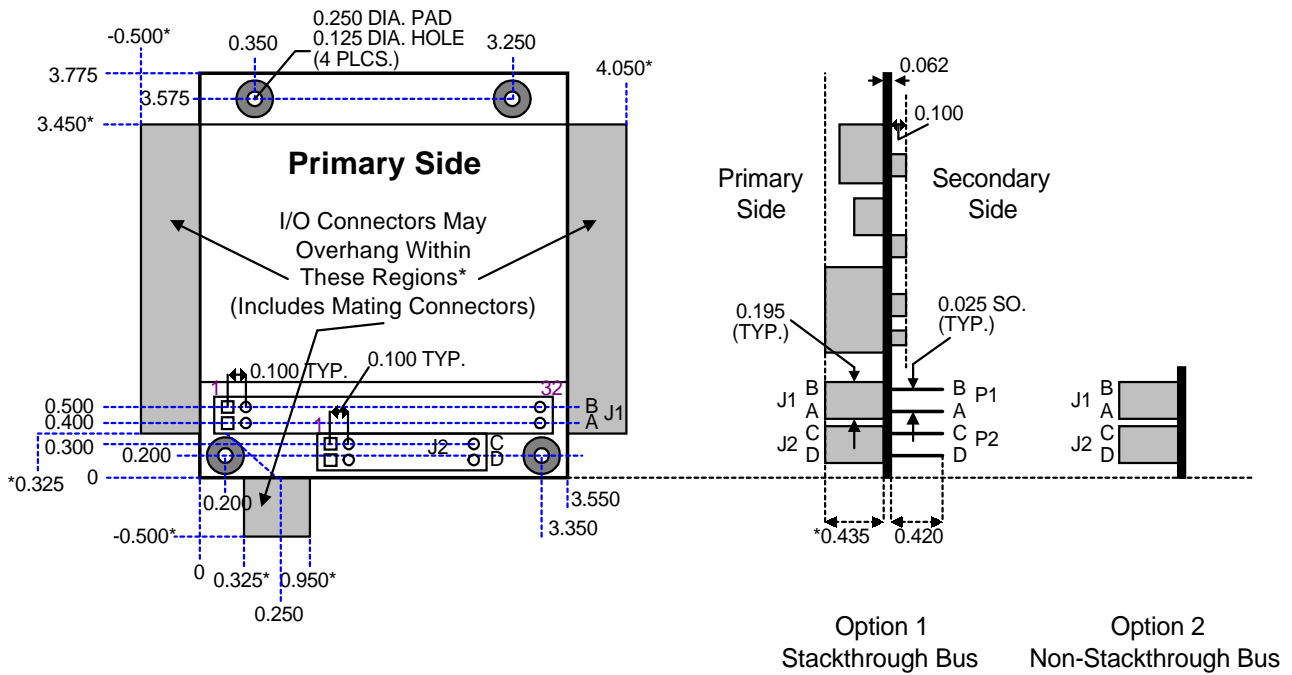
PC/104 modules can be of two bus types, 8-bit and 16-bit, which correspond to the PC and PC/AT buses, respectively.

PC/104 8-Bit Module Dimensions



NOTE *Dimensions are in inches ± 0.05 .*

PC/104 16-Bit Module Dimensions



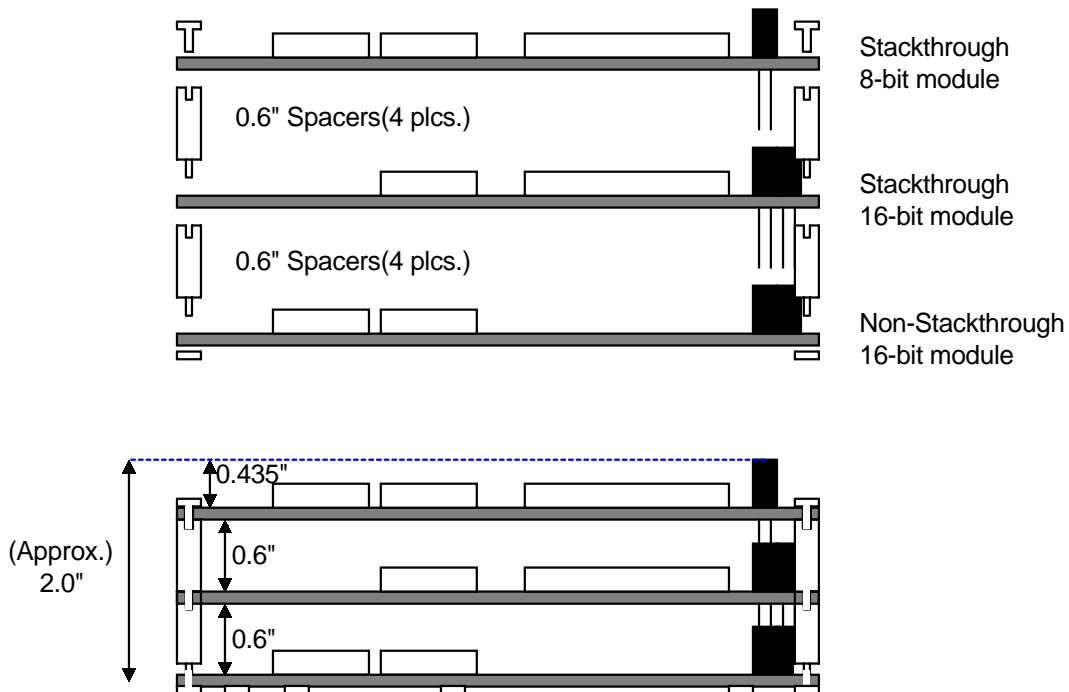
NOTE

Dimensions are in inches ± 0.05 .

I/O mating connectors may not extend outside these boundaries.

Typical Module Stack

Figure 1 illustrates a typical module stack of 8-bit modules, and shows the use of the “stack-through” and “non-stackthrough” CN1 bus connector options.



- Figure 1 Typical Module Stack -