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# tM-AD4P2C2

4-channel Analog Input, 2-channel Digital Input and 2-channel Digital Output Module

## Features

- Multifunction (4 AI, 2 DI and 2 DO)
- 2 Voltage Input Channels and 2 Current Input Channels
- Digital Input Channels can be used as 16-bit Counters
- Digital Output Channels can be used as Voltage Input Limit Alarms
- 4 kV ESD and EFT Protection
- 120 V$_{DC}$ Overvoltage Protection
- Adjustable Sampling Rate
- Dual Watchdog
- 2500 V$_{DC}$ Intra-module Isolation
- Configurable Power-on Value Settings
- Configurable Safe Value Settings
- Wide Operating Temperature Range: -25 ~ +75°C

CE  FC  RoHS

## Introduction

The tM-AD4P2C2 is a multifunction module that includes 4 analog input channels, 2 digital input channels and 2 digital output channels. The module provides a programmable analog input range that includes 2 voltage input channels (±1 V, ±2.5 V, ±5 V, and ±10 V) and 2 current input channels (±20 mA, 0 ~ 20 mA and 4 ~ 20 mA). The analog inputs provide a high overvoltage protection of 120 V$_{DC}$ and an adjustable sampling rate. The module supports sink-type digital output with short circuit protection and the digital outputs can be used as voltage input limit alarms. The digital inputs are source-type and all digital input channels can be used as 16-bit counters. There are options for configuring power-on and safe digital output values. 4 kV ESD protection and 2500 V$_{DC}$ intra-module isolation are also provided. The tM-AD4P2C2 supports the DCON, Modbus RTU and Modbus ASCII protocols, which can be configured via software.

## Applications

- Industrial Automation
- Building Automation
- Food and Beverage Systems
- Industrial Machinery
- Control Systems
- Semiconductor Fabrication

## System Specifications

| Communication | |
|---|---|
| Interface | RS-485 |
| Format | (N, 8, 1), (N, 8, 2), (O, 8, 1), (E, 8, 1) |
| Baud Rate | 1200 ~ 115200 bps |
| Protocol | DCON, Modbus RTU, Modbus ASCII |
| Dual Watchdog | Yes, Module(2.3 seconds), Communication (Programmable) |
| **LED Indicators/Display** | |
| System LED Indicator | Yes, 1 LED as Power/Communication Indicator |
| **Isolation** | |
| Intra-module Isolation, Field-to-Logic | 2500 V$_{DC}$ |
| **EMS Protection** | |
| ESD (IEC 61000-4-2) | ±4 kV Contact for each Terminal |
| | ±8 kV Air for Random Point |
| EFT (IEC 61000-4-4) | ±4 kV for Power Line |
| **Power** | |
| Reverse Polarity Protection | Yes |
| InputVoltageRange | 10 ~ 30 V$_{DC}$ |
| Consumption | 1 W Max. |
| **Mechanical** | |
| Dimensions (W x L x H) | 52 mm x 98 mm x 27 mm |
| Installation | DIN-Rail Mounting |
| **Environment** | |
| Operating Temperature | -25 ~ +75°C |
| Storage Temperature | -30 ~ +75°C |
| Humidity | 10 ~ 95% RH, Non-condensing |

## I/O Specifications

| Analog Input | | Voltage | Current |
|---|---|---|---|
| Channels | | 2 Single-ended | 2 Single-ended |
| Type | | ±1 V, ±2.5 V, ±5 V, ±10 V | ±20 mA, 0 ~ 20 mA, 4 ~ 20 mA |
| Resolution | Normal Mode | 14-bit | |
| | Fast Mode | 12-bit | |
| Sampling Rate | Normal Mode | 10 Hz total | |
| | Fast Mode | 200 Hz total | |
| Accuracy | Normal Mode | ±0.1 % | |
| | Fast Mode | ±0.5 % | |
| Zero Drift | | ±20 µV/°C | |
| Span Drift | | ±25 ppm/°C | |
| Input Impedance | | 10 MΩ | 136 Ω |
| Overvoltage Protection | | 120 V$_{DC}$ | - |
| Overcurrent Protection | | - | Yes, 50 mA @ 110 V$_{DC}$ |
| **Digital Input** | | | |
| Channels | | 2 | |
| Type | | Wet Contact (Source) | |
| On Voltage Level | | +3.5 ~ 50 V$_{DC}$ | |
| Off Voltage Level | | +1 V$_{DC}$ Max. | |
| Input Impedance | | 10 KΩ, 0.5 W | |
| Counters | Channels | 2 | |
| | Max. Count | 65535 (16-bit) | |
| | Max. Input Frequency | 50 Hz | |
| | Min. Plus Width | 10 ms | |
| Overvoltage Protection | | 70 V$_{DC}$ | |
| **Digital Output** | | | |
| Channels | | 2 | |
| Type | | Isolated Open Collector (Sink) | |
| Max. Load Current | | 700 mA/Channel | |
| Load Voltage | | +3.5 ~ 50 V$_{DC}$ | |
| Overvoltage Protection | | 60 V$_{DC}$ | |
| Overload Protection | | 1.4 A (with short circuit protection) | |
| Short Circuit Protection | | Yes | |
| Power-on Value | | Yes, Programmable | |
| Safe Value | | Yes, Programmable | |

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## Wire Connections

| Voltage Input for Vin0 and Vin1 | Current Input for Vin0 and Vin1 |
|---|---|
| mV/V, Vinx, DO.GND/AGND | mA, 125 Ω, Vinx, DO.GND/AGND — Requires Optional External 125 Ω Resistor |

**Current Input for Iin2 and Iin3**

mA, Iinx, DO.GND/AGND
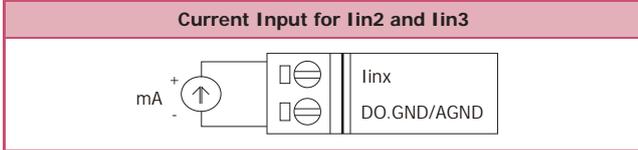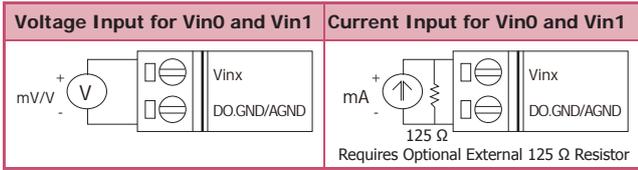
| Digital Input/ Counter | ON State Readback as 1 | OFF State Readback as 0 |
|---|---|---|
| | +3.5 ~ +50 V$_{DC}$ | OPEN or <1 V$_{DC}$ |
| Source | DIx 10K, DO.PWR/DI.COM, To other channels | DIx 10K, DO.PWR/DI.COM, To other channels |

| Output Type | ON State Readback as 1 | OFF State Readback as 0 |
|---|---|---|
| | Relay ON | Relay OFF |
| Drive Relay | DO.PWR/DI.COM, DOx, DO.GND/AGND | DO.PWR/DI.COM, DOx, DO.GND/AGND |
| Resistance Load | DO.PWR/DI.COM, DOx, DO.GND/AGND | DO.PWR/DI.COM, DOx, DO.GND/AGND |

## Pin Assignments
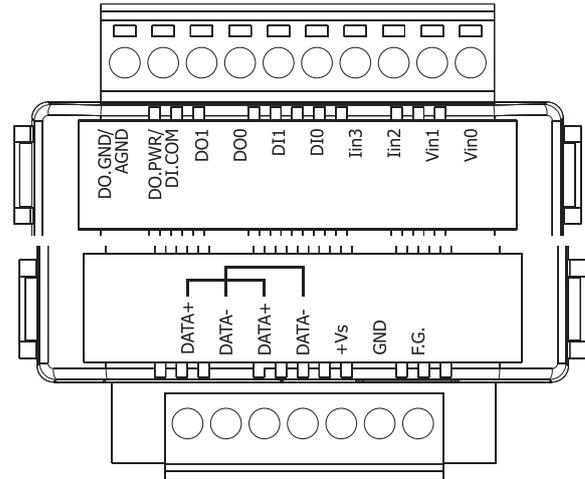


## Block Diagram



## Dimensions (Units: mm)



Left Side View | Front View | Right Side View | Rear View | Bottom View | Top View
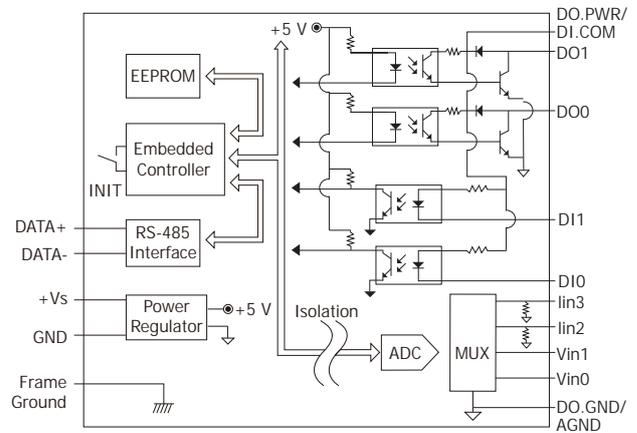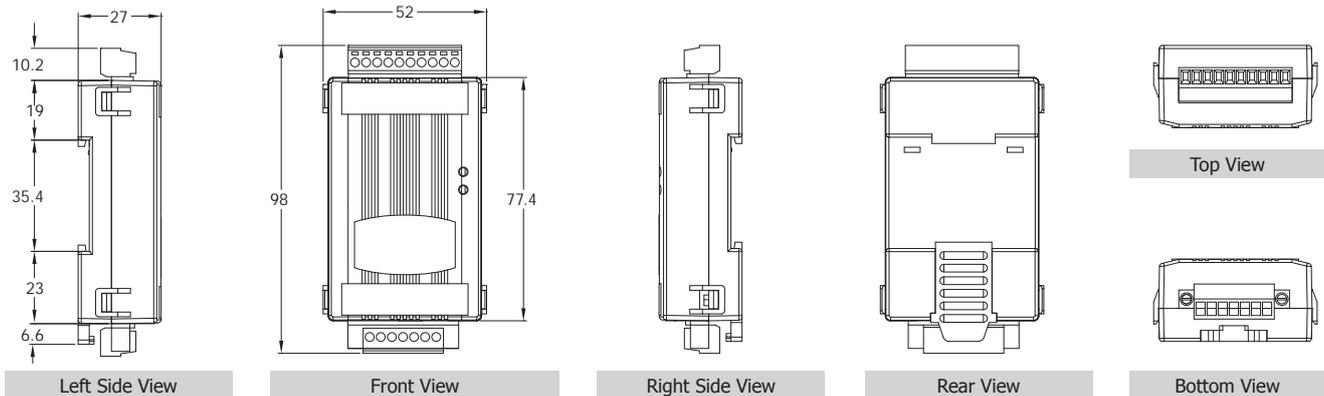
## Ordering Information

| tM-AD4P2C2 CR | 4-Channel Isolated Analog Input and 2-channel Isolated Digital Input and 2-channel Isolated Digital Output Module(RoHS) |
|---|---|

## Related Products

| tM-7561 CR | Isolated USB to RS-485 Converter (RoHS) |
|---|---|
| tM-7520U CR | Isolated RS-232 to RS-485 Converter (RoHS) |

| tM-7510U CR | Isolated RS-485 Repeater (RoHS) |
|---|---|
| MDR-20-24 CR | 24W Single Output Industrial DIN-Rail Power Supply (RoHS) |

Tiny RS-485 Remote I/O Modules — 2/3 — tM-AD4P2C2