## M2M I/O Modules

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To view all of Advantech’s M2M I/O Modules, please visit [www.advantech.com/products](http://www.advantech.com/products).
M2M I/O Modules Overview

Introduction
The Internet of Things (IoT) is a new design paradigm, rapidly gaining wide global attention from academia, industry, and government. The fundamental concept is to emphasize ubiquitous computing among global networked machines and physical objects, denoted as things, such as sensors, actuators, machine-to-machine (M2M) devices, wireless sensor network (WSN) devices etc..

Machine To Machine (M2M) Technology
Machine To Machine (M2M) technology is now sufficiently mature that large numbers of companies are confident enough in its potential to launch their own projects that include innovation in services and products. The use of M2M technology is particularly well-suited to interaction with a large number of remote, and possibly mobile, devices, usually acting as the interface with an end-user.

Wireless Sensor Networks
The IoT is composed of four layers, an application layer, service layer, network layer and device layer. The application layer is the real application system, the service layer is now defined as cloud computing and the network layer is the wired/wireless network infrastructure. The device layer connects everything to the internet and is the key infrastructure of the IoT. One of the most important technologies is the Wireless Sensor Network, which is the wireless I/O and sensor solution/interface to collect and transmit analog/digital signals to the internet. The WSN is composed of two major parts: the wireless technology is based on IEEE 802.15.4 with many protocols, such as ZigBee, 6LoWPAN, WirelessHART. With different types of I/Os and sensors, signals can be measured in every situation. For instance, bridges can be measured through strain gauges, and buildings can be measured for energy usage. WSN is the next generation of wireless data acquisition solution.
IEEE 802.15.4

IEEE 802.15.4 is defined and maintain by the IEEE organization. The standard intends to offer fundamental lower network layers of low-rate wireless personal area networks (WPANs) which focuses on low-data rate, low-power consumption ubiquitous wireless communication between devices. IEEE 802.15.4 conforming devices may use one of three possible unlicensed frequency bands for operation:
- 868.0-868.6 MHz: Europe, allows one communication channel.
- 902-928 MHz: North America, up to ten channels, extended to thirty.
- 2400-2483.5 MHz: worldwide use, up to sixteen channels.
IEEE 802.15.4 defines the Wireless Medium Access Control (MAC) and Physical Layer (PHY) for WPANs only, upper layer stacks can be implemented by users for variety of applications. One example of the known protocols is ZigBee.

Network Topologies

Wireless Sensor Networks (WSN) can be built using a few or a lot of “nodes”. Each node can be connected to one or several sensors; the network topology is composed of three typical components, PAN Coordinator/Gateway, Router and End Device (or called End Node), which can be built to Star, Tree and Mesh network topologies.

Three components of a wireless sensor network

- PAN Coordinator/Gateway
  A coordinator is the data collection center and also exists as a gateway to transfer and translate wireless data to other interfaces.

- Router
  A router enhances the wireless signal and a wireless router is used to select the optimal path for wireless communication between the coordinator and the end nodes.

- End Node/Device
  An end node is a wireless remote I/O for data acquisition. Data is acquired from sensors or devices which are then transmitted through it. The end node communicates with the coordinator directly or via a router to a coordinator.

Three Network Topologies

- Star Topology
  It’s the simplest way to construct a network with a gateway and end nodes. The benefit of the topology is that it operates as a low-latency communication network. But has the limitation of low wireless signal coverage.

- Tree Topology
  Using a tree topology, the network can be extended through routers making it flexible enough to locate the end nodes in specified locations. Latency is increased with the number of routers hopping.

- Mesh Topology
  When routers connect to each other in a mesh topology they have the following benefits.
  1. Wide network coverage.
  2. Robust routing mechanism with self-healing.
  3. Multi-hopping mechanism.
  But also the following limitations:
  1. More power consumption than the other topologies.
  2. Routing path and hop counts affect the latency and performance.

Comparison of Topologies

<table>
<thead>
<tr>
<th>Topology</th>
<th>Star</th>
<th>Tree</th>
<th>Mesh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Installation Fee</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Network Coverage</td>
<td>Small</td>
<td>Large</td>
<td>Large</td>
</tr>
<tr>
<td>Network Capability</td>
<td>Small</td>
<td>Large</td>
<td>Large</td>
</tr>
<tr>
<td>Reliability</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>
Low Power Consumption Design

The ADAM-2000 series is designed for applications that require long-time operation without maintenance. Therefore power consumption is taken into consideration during its design. The ADAM-2000 series not only follows the IEEE-802.15.4 standard for low-power consumption wireless communication, but also optimizes the peripheral hardware and firmware design to achieve μA-level power consumption. This allows ADAM-2000 input/output and sensor modules to be powered by 2 AA Alkaline batteries.

Features

Advantech’s ADAM-2000 Series are wireless I/O devices designed for industrial systems and applications.

Global Deployable ISM 2.4GHz IEEE 802.15.4 Standard

The standard has the following benefits.

- With the global deployable ISM 2.4 GHz RF band, the ADAM-2000 series can be installed worldwide.
- Compared to a wired solution, wireless technology makes the network easily extensible and can be installed in almost any location, especially in distributed construction applications.
- Enhances transmission power and high-gain antennas can expand network coverage.
- Enlarges highly effective network structure to reduce development costs and maintainable complexity in harsh applications.
- Provides self-forming and self-healing ability to cope with communication failures or node failures conditions.
- Low data rates and low duty cycles make it possible to act as standalone devices with batteries for a long term operation without maintenance.

Industrial Communication and I/O Interfaces

The popular industrial communication protocol Modbus makes the ADAM-2000 series easy to integrate with industrial systems and is also compliant with ADAM-4000 and ADAM-6000 wired solutions. Multiple I/O interface selection provides users plentiful sensor options.

Low Power Consumption Design

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Overview

Advantech and Industrial SCADA Software Support

The ADAM-2000 series can be configured through the Adam/Apax .NET Utility. Only a few steps are required, and wireless networks can be built up quickly. Due to the Modbus protocol design, the ADAM-2000 series can support any third-party SCADA software and HMI, including Advantech SCADA software, WebAccess.

Ensured Data Design

The ADAM-2000 family has an acking mechanism feature to ensure data communicating processes can be successfully transferred between the coordinator and end device before device entering sleep mode.

Over The Air (OTA) Firmware Update

The ADAM-2000 modules with strengthened firmware maintenance technique, which integrates a stable backup buffer and secure mechanism allowing wireless module firmware updates during operation.

Event Triggering

ADAM-2000 digital input modules are empowered with an Event Triggering function. When receiving DI status change, ADAM-2000 digital input modules will wake up immediately from sleep mode and send I/O data to a coordinator. This avoids the missing of events during operation.

Site Survey Monitoring

The ADAM-2000 modules provide an useful site survey tool in Adam/Apax. Net utility to help users to achieve network setup and major remote maintenance tasks to avoid try and error network processes. The topology monitoring of an ADAM-2000 network adopts an easy place and drag action allowing users to choose the working field image for monitoring backgrounds, and lists the relations among ADAM-2000 modules then illustrated in a single page. Through site survey monitoring, users can comprehensively know each device location, current status, and information in customized background.
## M2M I/O Modules Selection Guide

### Wireless Network

<table>
<thead>
<tr>
<th>Model</th>
<th>ADAM-2510Z</th>
<th>ADAM-2520Z</th>
<th>ADAM-2031Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE Standard</td>
<td>IEEE 802.15.4</td>
<td>IEEE 802.15.4</td>
<td></td>
</tr>
<tr>
<td>Modulation Type</td>
<td>DSSS (OQPSK)</td>
<td>DSSS (OQPSK)</td>
<td></td>
</tr>
<tr>
<td>Frequency Band</td>
<td>ISM 2.4 GHz (2.4 GHz ~ 2.4835 GHz)</td>
<td>ISM 2.4 GHz (2.4 GHz ~ 2.4835 GHz)</td>
<td></td>
</tr>
<tr>
<td>Channels</td>
<td>11 - 26</td>
<td>11 - 26</td>
<td>3 ± 1 dBm</td>
</tr>
<tr>
<td>Topology</td>
<td>Star / Tree / Mesh</td>
<td>Star / Tree / Mesh</td>
<td></td>
</tr>
<tr>
<td>Transmit Power</td>
<td>19 ± 1 dBm</td>
<td>19 ± 1 dBm</td>
<td>3 ± 1 dBm</td>
</tr>
<tr>
<td>Receiver Sensitivity</td>
<td>-97 dBm</td>
<td>-97 dBm</td>
<td></td>
</tr>
<tr>
<td>Outdoor Range</td>
<td>1000 m (with 2 dBi Antenna)</td>
<td>110 m</td>
<td>1000 m</td>
</tr>
<tr>
<td>RF Data Rate</td>
<td>250 Kbps</td>
<td>250 Kbps</td>
<td></td>
</tr>
</tbody>
</table>

### Network

| Interface | RS-485/USB |
| Communication Protocol | Modbus RTU |

### Analog Input

| Resolution | - |
| Channels | - |
| Sampling Rate | - |
| Voltage Input | - |
| Current Input | - |

### Thermocouple Type

| J, K, T, E, R, S, B |
| Sensor Input |

| Temperature | -20°C ~ 70°C (-4°F ~ 157.9°F) |
| Humidity | 0 ~ 100% RH |
| CO2 | 350 ~ 10,000 ppm of CO2 |

### Digital Input and Digital Output

| Input Channels | - |
| Output Channels | - |

### Power Requirement

| External Power | -20°C ~ 70°C (-4°F ~ 157.9°F) |
| Battery Power | 0°C ~ 50°C (32°F ~ 122°F) |

### Power Consumption

| Power Supply | 0.8 W @ 24 Vdc |
| USB | 0.5 W @ 5 Vdc |
| Battery AA * 2 | 0.3 W @ 3 Vdc |

### Storage Temperature

| -40°C ~ 85°C (-40°F ~ 184°F) |

### Operation Humidity

| 20~95% RH |

### Storage Humidity

| 0~95% RH |

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**Note:** For detailed specifications, please refer to the manufacturer’s documentation.
# M2M I/O Modules Selection Guide

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<tr>
<td><strong>IEEE 802.15.4</strong></td>
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<tr>
<td><strong>DSSS (OQPSK)</strong></td>
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<tr>
<td><strong>ISM 2.4 GHz (2.4 GHz ~ 2.4835 GHz)</strong></td>
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</tr>
<tr>
<td><strong>Channels</strong></td>
<td>11 - 26</td>
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<tr>
<td><strong>Star / Tree / Mesh</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Transmit Power</strong></td>
<td>19 ± 1 dBm</td>
<td>3 ± 1 dBm</td>
<td>3 ± 1 dBm</td>
<td>19 ± 1 dBm</td>
<td>3 ± 1 dBm</td>
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<tr>
<td><strong>1000m</strong></td>
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<tr>
<td><strong>250 Kbps</strong></td>
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<tr>
<td><strong>End Device</strong></td>
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<tr>
<td><strong>-16-bit</strong></td>
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<tr>
<td><strong>-6 Non-Isolation (Differential)</strong></td>
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<tr>
<td><strong>-12 samples/second (total)</strong></td>
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<tr>
<td><strong>±150mV, ±500mV</strong></td>
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<tr>
<td><strong>±1V, ±5V, ±10V</strong></td>
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<tr>
<td><strong>±20mA, 0<del>20mA, 4</del>20 mA</strong></td>
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<tr>
<td><strong>-10°C ~ 50°C (14°F ~ 122°F)</strong></td>
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<tr>
<td><strong>0~100%RH</strong></td>
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<tr>
<td><strong>350 ~ 10,000ppm of CO2</strong></td>
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<tr>
<td><strong>External PWR/Error/Status</strong></td>
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<tr>
<td><strong>Power Input:</strong></td>
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<tr>
<td><strong>Unregulated 10 ~ 30 VDC</strong></td>
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<tr>
<td><strong>Battery Input:</strong></td>
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<tr>
<td><strong>2 x AA Alkaline 3 VDC</strong></td>
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<tr>
<td><strong>-10°C ~ 50°C (14°F ~ 122°F)</strong></td>
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<tr>
<td><strong>-20°C ~ 70°C (-4°F ~ 157.9°F)</strong></td>
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<tr>
<td><strong>0°C ~ 50°C (32°F ~ 122°F)</strong></td>
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<tr>
<td><strong>0.3 W @ 24 Vdc</strong></td>
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<tr>
<td><strong>-420 uW @ 3 Vdc (1 minute Tx Interval)</strong></td>
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<tr>
<td><strong>240 uW @ 3 Vdc (2 minute Tx Interval)</strong></td>
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<tr>
<td><strong>150 uW @ 3 Vdc (5 minute Tx Interval)</strong></td>
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<tr>
<td><strong>-380 uW @ 3 Vdc (1 minute Tx Interval)</strong></td>
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<tr>
<td><strong>220 uW @ 3 Vdc (2 minute Tx Interval)</strong></td>
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<tr>
<td><strong>130 uW @ 3 Vdc (5 minute Tx Interval)</strong></td>
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<tr>
<td><strong>-40°C ~ 85°C (-40°F ~ 184°F)</strong></td>
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<tr>
<td><strong>20~95% RH</strong></td>
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<tr>
<td><strong>0~95% RH</strong></td>
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</tbody>
</table>

**Model Numbers:**

- ADAM-2632Z
- ADAM-2017Z
- ADAM-2018Z
- ADAM-2051Z
- ADAM-2051PZ
ADAM-2510Z

Wireless Router Node

Features
- Easy maintenance and field installation
- Low duty wireless communication
- Smart and simple indicator design
- Extends network range and coverage
- Outdoor range up to 1000 m
- Supports battery input with 2 x AA Alkaline batteries

Specifications

Wireless Communication
- IEEE Standard: IEEE 802.15.4
- Modulation Type: DSSS (OQPSK)
- Frequency Band: ISM 2.4 GHz (2.4 GHz – 2.4835 GHz)
- Channels: 11 - 26
- RF Data Rate: 250 Kbps
- Transmit Power: Typ. 19 ± 1 dBm
- Receiver Sensitivity: -97 dBm
- Topology: Star / Tree / Mesh
- Outdoor Range: 1000 m (with 2 dBi Antenna)
- Function: Router

General
- Connectors: 1 x plug-in terminal block (#14 – 22 AWG)
- Power Input: Unregulated 10 – 30 VDC
- Battery Input: 2 x AA Alkaline
- Power Consumption: 0.8 W @ 24 VDC
- 0.3 W @ 3 VDC (Battery AA x 2)

Common Specifications

Environment
- Operating Temperature
  - External Power: -20°C – 70°C (-4°F – 157.9°F)
  - Battery Power: 0°C – 50°C (32°F – 122°F)
- Storage Temperature
  - -40°C– 85°C (-40°F – 184°F)
- Operating Humidity
  - 20-95% RH
- Storage Humidity
  - 0-95% RH

Ordering Information
- ADAM-2510Z  Wireless Router Node

NEW

Easy maintenance and field installation
Low duty wireless communication
Smart and simple indicator design
Extends network range and coverage
Outdoor range up to 1000 m
Supports battery input with 2 x AA Alkaline batteries

COMPLIANT
2002/95/EC

14-8

SHOP ONLINE at www.airlinehyd.com 800-999-7378
ADAM-2520Z
Wireless Modbus RTU Gateway

Features
- 2.4 GHz IEEE 802.15.4 compliant RF
- Provides RS-422/485 and USB interfaces
- Multiple power input design
- Outdoor range up to 1000 m
- Supports battery input with 2 x AA Alkaline batteries

Specifications

Wireless Communication
- IEEE Standard: IEEE 802.15.4
- Modulation Type: DSSS (OQPSK)
- Frequency Band: ISM 2.4 GHz (2.4 GHz – 2.4835 GHz)
- Channels: 11 - 26
- RF Data Rate: 250 Kbps
- Transmit Power: Typ. 19 ± 1 dBm
- Receiver Sensitivity: -97 dBm
- Topology: Star / Tree / Mesh
- Outdoor Range: 1000 m (with 2 dBi Antenna)
- Network Capacity: 32 nodes (Routers & End Devices)*
  *Based on user’s configuration
- Range Extenders: Maximum 5 Hops
- Function: Coordinator

General
- Connectors: 1 x plug-in terminal block (#14 – 22 AWG)
- 1x USB-type A connector (type A to B cable provided)
- Protocol: Modbus RTU
- Power Input: Unregulated 10 – 30 Vdc
- Battery Input: 2 x AA Alkaline
- Power Consumption: 0.8 W @ 24 Vdc
  0.5 W @ 5 Vdc (USB)
  0.3 W @ 3 Vdc (Battery AA * 2)

Common Specifications

Environment
- Operating Temperature: -20°C – 70°C (-4°F – 157.9°F)
- Battery Power: 0°C – 50°C (32°F – 122°F)
- Storage Temperature: -40°C - 85°C (-40°F – 184°F)
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- Storage Humidity: 0-95% RH

Ordering Information
- ADAM-2520Z Wireless Modbus RTU Gateway

NEW
2.4 GHz IEEE 802.15.4 compliant RF
Provides RS-422/485 and USB interfaces
Multiple power input design
Outdoor range up to 1000 m
Supports battery input with 2 x AA Alkaline batteries

RoHS COMPLIANT
2002/95/EC

11-9
8
5
4
10
3
2
1

Serial Communication Cards
Device Servers & Gateways
Industrial Ethernet
Automation Software
Operator Panels
Automatic Logic Controllers
Embedded Auto. Computers
PACs
MCM 0D
Unregulated Power Supplies
RS-485 I/O
Ethernet I/O
DAQ Boards

Online Download www.advantech.com/products
SHOP ONLINE at www.airlinehyd.com
800-999-7378
## Specifications

### Temperature Sensor Input
- **Operating Range**: -20°C ~ 70°C (-4°F ~ 157.9°F)
- **Resolution**: 0.02°C (0.04°F)
- **Accuracy**: ±1.0°C (33.8°F) @ 0°C ~ +35°C
- **Response Rate**: ±1°C/min.
- **Long Term Drift**: < 0.04°C/Year (0.07°F/Year)

### Humidity Sensor Input
- **Operating Range**: 0 ~ 100% RH
- **Resolution**: 0.15% RH
- **Accuracy**: ±3.0% RH
- **Repeatability**: ±0.1% RH
- **Response Time**: 8 seconds (Achieving 63% of a step function)
- **Long Term Drift**: 0.5% RH/Year

---

## Ordering Information

- **ADAM-2031Z**: Wireless Temperature & Humidity Sensor Node
- **ADAM-2632Z**: Wireless Temperature & Humidity CO2 Sensor Node

## Common Specifications

<table>
<thead>
<tr>
<th>Wireless Communication</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IEEE Standard</strong></td>
<td>IEEE 802.15.4</td>
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<td><strong>Modulation Type</strong></td>
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<tr>
<td><strong>Channels</strong></td>
<td>11 - 26</td>
</tr>
<tr>
<td><strong>RF Data Rate</strong></td>
<td>250 Kbps</td>
</tr>
<tr>
<td><strong>Transmit Power</strong></td>
<td>ADAM-2031Z: Typ. 3 ± 1 dBm</td>
</tr>
<tr>
<td></td>
<td>ADAM-2632Z: Typ. 19 ± 1 dBm</td>
</tr>
<tr>
<td><strong>Receiver Sensitivity</strong></td>
<td>-97 dBm</td>
</tr>
<tr>
<td><strong>Topology</strong></td>
<td>Star / Tree / Mesh</td>
</tr>
<tr>
<td><strong>Outdoor Range</strong></td>
<td>ADAM-2031Z: 110 m</td>
</tr>
<tr>
<td></td>
<td>ADAM-2632Z: 1000 m</td>
</tr>
<tr>
<td><strong>Function</strong></td>
<td>End Device</td>
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<table>
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<tr>
<th>General</th>
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<tbody>
<tr>
<td><strong>Connectors</strong></td>
<td>1 x plug-in terminal block (#14 – 22 AWG)</td>
</tr>
<tr>
<td><strong>Power Input</strong></td>
<td>Unregulated 10 ~ 30 Vcc</td>
</tr>
<tr>
<td><strong>Battery Input</strong></td>
<td>2 x AA Alkaline</td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>0.3 W @ 24 Vcc</td>
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<td></td>
<td>Battery AA * 2</td>
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<td></td>
<td>420 uW @ 3 Vcc (1 minute Tx Interval)</td>
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<td></td>
<td>240 uW @ 3 Vcc (2 minute Tx Interval)</td>
</tr>
<tr>
<td></td>
<td>150 uW @ 3 Vcc (5 minute Tx Interval)</td>
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</tbody>
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<th>Environment</th>
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<tbody>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>ADAM-2031Z: -20°C ~ 70°C (-4°F ~ 157.9°F)</td>
</tr>
<tr>
<td></td>
<td>ADAM-2632Z: -10°C ~ 50°C (14°F ~ 122°F)</td>
</tr>
<tr>
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<tr>
<td><strong>Storage Temperature</strong></td>
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</tr>
<tr>
<td><strong>Operating Humidity</strong></td>
<td>20–95% RH</td>
</tr>
<tr>
<td><strong>Storage Humidity</strong></td>
<td>0–95% RH</td>
</tr>
</tbody>
</table>
ADAM-2017Z
ADAM-2018Z

Wireless 6-ch Analog Input Node
Wireless 6-ch Thermocouple Input Node

Specifications

Analog Input
- Channels: 6 Non-Isolation (Differential)
- Input Max Voltage: ±15V
- Common Mode Volts: 10 Vrms
- Input Impedance: >10 MΩ (Voltage), 120 Ω (Current)
- Input Type: mV, V, mA
- Input Range: ±150mV, ±500mV, ±1V, ±5V, ±10V, ±20mA, 0-20mA, 4-20mA
- Accuracy: ±0.1% or better (Voltage) or ±0.2% or better (Current) at 25°C
- Span Drift: ±30 ppm/°C
- Zero Drift: ±6 μV/°C
- CMR @ 50/60 Hz: 100 dB
- NMR @ 50/60 Hz: 65 dB
- Resolution: 16-bit

Ordering Information

ADAM-2018Z

Specifications

Analog Input
- Channels: 6 Non-Isolation (Differential)
- Input Max Voltage: ±1V
- Common Mode Volts: 10 Vrms
- Input Impedance: >10 MΩ (Voltage), 54 Ω (Current)
- Input Type: V, mV, mA (Configure Different Range for Each Channel)
- Input Range: Voltage Range: ±150mV, ±500mV, ±1V
- Current Range: ±20mA, 0~20mA, 4~20mA
- Thermocouple Range: J, K, T, E, R, S, B
- Accuracy: ±0.1% or better (Voltage) at 25°C
- ±0.2% or better (Current) at 25°C
- ±2°C or better (Thermocouple) at 25°C
- Span Drift: ±30 ppm/°C
- Zero Drift: ±6 μV/°C
- Resolution: 16-bit
- Sampling Rate: 12 samples/second (total)
- CMR @ 50/60 Hz: 100 dB
- NMR @ 50/60 Hz: 65 dB
- Resolution: 16-bit

Ordering Information

Common Specifications

Wireless Communication
- IEEE Standard: IEEE 802.15.4
- Modulation Type: DSSS (O-QPSK)
- Frequency Band ISM: 2.4 GHz (2.4 GHz - 2.4835 GHz)
- Channels: 11 - 26
- RF Data Rate: 250 Kbps
- Transmit Power Typ.: 3.1 dBm
- Receiver Sensitivity: -97 dBm
- Topology: Star / Tree / Mesh
- Outdoor Range: 110 m
- Function: End Device

General
- Connectors: 1 x plug-in terminal block (#14 – 22 AWG)
- Power Input: Unregulated 10 – 30 VDC
- Battery Input: 2 x AA Alkaline
- Power Consumption: Battery AA x 2
- 420 uW @ 3 Vcc (1 minute Tx Interval)
- 240 uW @ 3 Vcc (2 minute Tx Interval)
- 150 uW @ 3 Vcc (5 minute Tx Interval)

Environment
- Operating Temperature: External Power -20°C – 70°C (-4°F – 157.9°F)
- Battery Power 0°C – 50°C (32°F – 122°F)
- Storage Temperature: -40°C – 85°C (-40°F – 184°F)
- Operating Humidity: 20-95% RH
- Storage Humidity: 0-95% RH

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NEW
RoHS COMPLIANT
2002/95/EC
Specifications

Digital Input
- **Channels**: 8
- **Input Resistance**: 10 Kohm
- **Input Level**
  - Logic Level 0: 0~0.8 V\text{max}
  - Logic Level 1: 2.0 V\text{min}~5.0 V\text{max}
  - Supports wet and dry contacts

Ordering Information
- **ADAM-2051Z**: Wireless 8-ch Digital Input Node
- **ADAM-2051PZ**: Wireless 8-ch Digital Input Node with Power Amplifier

Common Specifications

Wireless Communication
- **IEEE Standard**: IEEE 802.15.4
- **Modulation Type**: DSSS (OOKPSK)
- **Frequency Band**: ISM 2.4 GHz (2.4 GHz ~ 2.4835 GHz)
- **Channels**: 11 - 26
- **RF Data Rate**: 250 Kbps
- **Transmit Power Typ.**
  - ADAM-2051Z: Typ. 3 ± 1 dBm
  - ADAM-2051PZ: Typ. 19 ± 1 dBm
- **Receiver Sensitivity**: -97 dBm
- **Topology**: Star / Tree / Mesh
- **Outdoor Range**
  - ADAM-2051Z: 110 m
  - ADAM-2051PZ: 1000 m
- **Function**: End Device

Environment
- **Operating Temperature**
  - External Power: -20°C ~ 70°C (-4°F ~ 157.9°F)
  - Battery Power: 0°C ~ 50°C (32°F ~ 122°F)
- **Storage Temperature**: -40°C ~ 85°C (-40°F ~ 184°F)
- **Operating Humidity**: 20-95% RH
- **Storage Humidity**: 0-95% RH

General
- **Connectors**: 1 x plug-in terminal block (#14 ~ 22 AWG)
- **Power Input**: Unregulated 10 ~ 30 V\text{DC}
- **Battery Input**: 2 x AA Alkaline
- **Power Consumption**
  - Battery AA * 2: 380 uW @ 3 V\text{DC} (1 minute Tx Interval)
  - 220 uW @ 3 V\text{DC} (2 minute Tx Interval)
  - 130 uW @ 3 V\text{DC} (5 minute Tx Interval)

Ordering Information
- **ADAM-2051Z**: Wireless 8-ch Digital Input Node
- **ADAM-2051PZ**: Wireless 8-ch Digital Input Node with Power Amplifier