# InnoAGE™

## M.2 S80 3TI7

- The World's first hybrid SSD with an Azure Sphere inside

- End-to-end security from edge to cloud

- Hardware level allows easy and simple development

- Supports out-of-band network management and diverse platforms

- Supports wireless 2.4/5GHz dual-band 802.11 a/b/g/n WiFi

- Supports Ethernet

## Introduction

The InnoAGE™ SSD comes with a Microsoft Azure Sphere inside, and is further integrated with Innodisk's customized firmware, software, and hardware technology. This new solution enables multifunctional management: smart data analysis and updates, data security, and remote control through the cloud, while benefitting from the power of the Azure Sphere to guarantee secured communications between the SSD and the cloud.

The InnoAGE™ SSD delivers an easy-to-use interface with its customized cloud management platform. In technical terms, the Innodisk-developed firmware receives commands from the Azure Sphere via a second connection to Azure. Therefore, it is able to execute SSD debugging messages as well as monitor read/write behavior patterns to increase the storage device's lifespan. Most importantly, system operators can quickly revert to the default settings from the cloud-based dashboard in the case of a device or system crash.

In other words, the InnoAGE™ SSD is designed for both in-band and out-of-band network management, providing full recovery even when the operating system has crashed or is severely impaired to the extent that in-band management would be of little help.

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## Specifications

| | |
|---|---|
| Interface | SATA III |
| Flash Type | 3D TLC |
| Capacity | 64GB~512GB |
| Flash Endurance | 3,000 P/E cycles |
| Max. Channels | 4 |
| Sequential R/W (MB/sec, max.)* | 560 / 330 MB/s |
| 4KB Random (QD32) R/W (IOPS)** | 85,000/70,000 |
| Max. Power Consumption | 3W |
| Thermal Sensor | √ |
| ATA Security | √ |
| S.M.A.R.T. | √ |
| Dimension (WxLxH) | 22.00 X 80.00 X 3.50 mm |
| Environment | Vibration: 20G @7~2000Hz<br>Shock: 1500G @ 0.5ms<br>Storage Temperature: -55°C to +95°C<br>MTBF: 3 million hours |

\* Performance based on CrystalDiskMark 5.01 with file size 1000MB

| Quick Erase | Security Erase | Destroy | Recovery | iAnalyzer | S.M.A.R.T. |
|---|---|---|---|---|---|
| V | V | V | V | V | V |

| iData Guard | iPower Guard | ATA Security | TRIM | AES 256bits | |
|---|---|---|---|---|---|
| V | V | V | V | V | |
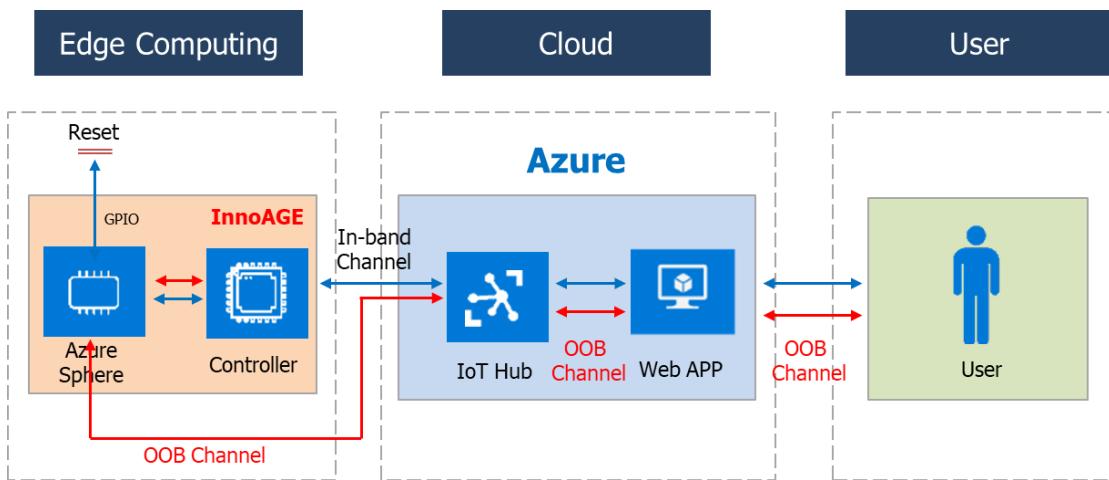
## Ordering Information

| Capacity | Standard Temperature (0°C~70°C) | Industrial Temperature (-40°C~85°C) |
|---|---|---|
| 64GB | DTM28-64GDK1EC*DFXXG | DTM28-64GDK1EW*DFXXG |
| 128GB | DTM28-A28DK1EC*QFXXG | DTM28-A28DK1EW*QFXXG |
| 256GB | DTM28-B56DK1EC*QFXXG | DTM28-B56DK1EW*QFXXG |
| 512GB | DTM28-C12DK1EC*QFXXG | DTM28-C12DK1EW*QFXXG |
| Note | XXG: 10G-50G<br>*1: with Ethernet daughter board; 2: with Wi-Fi antenna | |
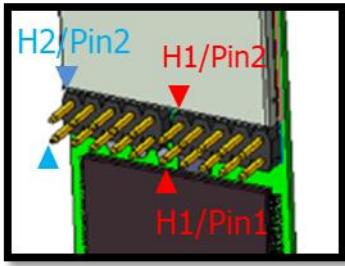
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# Edge to Cloud System Architecture



# InnoAGE M.2 (S80) External Pin Definition

| Pin Header 1 | Recovery, Reset and External Reserved GPIO |
|---|---|

| PC_RST | Recovery | GPIO 66 | GPIO 68 | GPIO 0 |
|---|---|---|---|---|
| H1/Pin 1 | H1/Pin 3 | H1/Pin 5 | H1/Pin 7 | H1/Pin 9 |
| H1/Pin 2 | H1/Pin 4 | H1/Pin 6 | H1/Pin 8 | H1/Pin 10 |
| GND | GND | GND | GND | GND |

| Pin | Function | Direction | Notification |
|---|---|---|---|
| 1 | RC_RST* | O | Active low |
| | GPIO | I/O | Bi-direction, function programmable |
| 3 | Recovery* | I | Active low |
| | GPIO | I/O | Interrupt-capable and bi-direction, function programmable |
| 5 | GPIO | I/O | Bi-direction, function programmable |
| | TX | O | TX of UART, pair with pin 7 |
| 7 | GPIO | I/O | Bi-direction, function programmable |
| | RX | I | RX of UART, pair with pin 5 |
| 9 | GPIO | I/O | Interrupt-capable and bi-direction, function programmable |
| | PWM | O | PWM control, frequency/duty TBD |
| 2/4/6/8/10 | GND | | System GND |
| * Default setting function $V_O$ range: $-0.28<V_{OL}<0.4$; $2.4<V_{OH}<3.63$ (V) $V_I$ range: $-0.28<V_{IL}<0.28$; $2.0<V_{IH}<3.63$ (V) | | | |

**Pin Header 2**   SPI to Ethernet
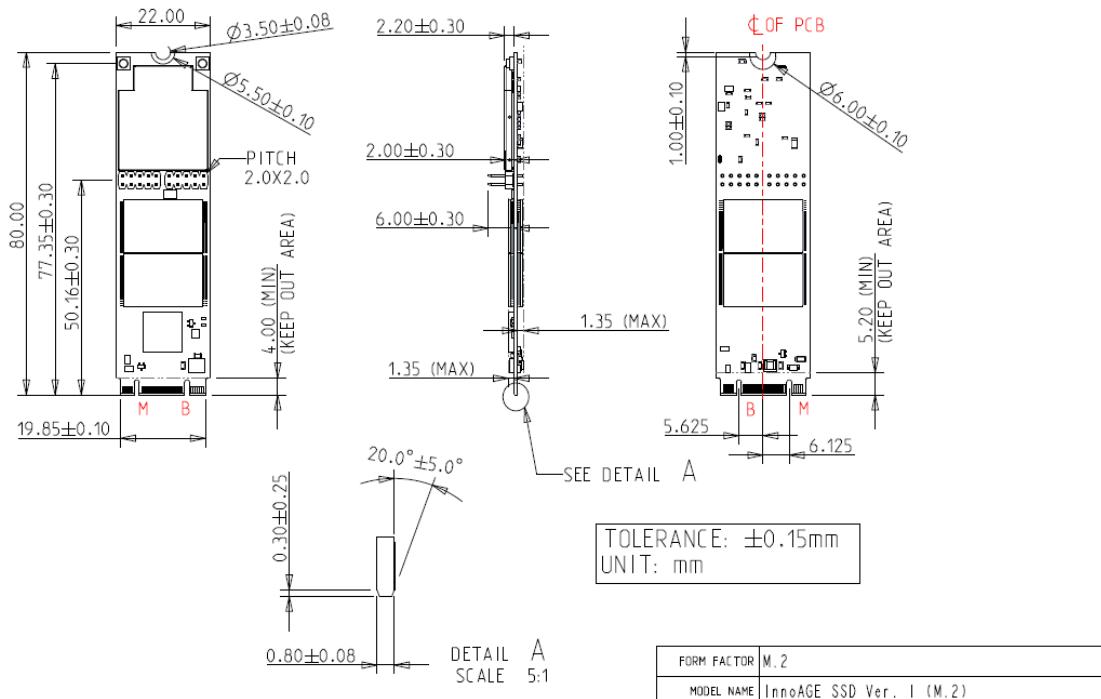
| INT | MISO | CLK | RST | GND |
|---|---|---|---|---|
| H2/Pin 1 | H2/Pin 3 | H2/Pin 5 | H2/Pin 7 | H2/Pin 9 |
| H2/Pin 2 | H2/Pin 4 | H2/Pin 6 | H2/Pin 8 | H2/Pin 10 |
| NC | NC | MOSI | CS | 3.3V |

| Pin | Function | Direction | Notification |
|---|---|---|---|
| 1 | INT* | I | Interrupt-capable GPIO |
| | PWM | O | PWM control, frequency/duty TBD |
| | GPIO | I/O | Bi-direction, function programmable |
| 3 | MISO* | I | MISO of SPI interface, pair with pin 5/6/8 |
| | DATA | I/O | CLK of I2C interface, pair with pin5 |
| | RX | I | RX of UART, pair with pin 5/6/8 |
| | GPIO | I/O | Bi-direction, function programmable |
| 5 | CLK* | O | CLK of SPI interface, pair with pin 3/6/8 |
| | TX | O | TX of UART, pair with pin 3/6/8 |
| | GPIO | I/O | Bi-direction, function programmable |
| 6 | MOSI* | O | MOSI of SPI interface, pair with pin 3/5/8 |
| | CLK | I/O | CLK of I2C interface, pair with pin 3 |
| | RTS | O | RTS of UART, pair with pin 3/5/8 |
| | GPIO | I/O | Bi-direction, function programmable |
| 7 | RST | I | SSD module reset pin, active low |
| 8 | CS* | O | CS of SPI interface, pair with pin 3/5/6 |
| | CTS | I | CST of UART, pair with pin 3/5/6 |
| | GPIO | I/O | Bi-direction, function programmable |
| 10 | 3V3 | | System power 3.3V |
| 9 | GND | | System GND |
| 2/4 | NC | | No internal connection |

\* Default setting function
$V_O$ range: $-0.28 < V_{OL} < 0.4$; $2.4 < V_{OH} < 3.63$ (V)
$V_I$ range: $-0.28 < V_{IL} < 0.28$; $2.0 < V_{IH} < 3.63$ (V)

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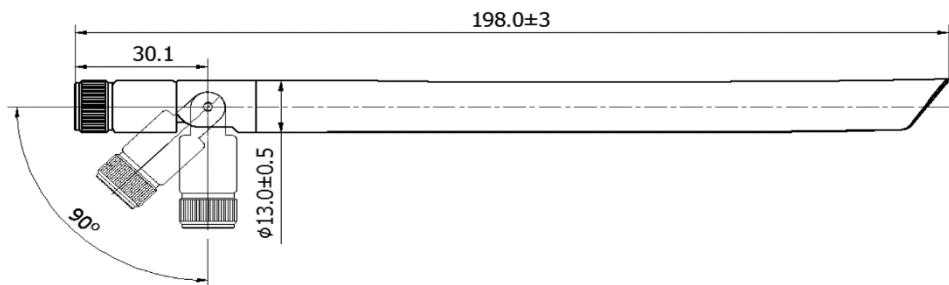
## Mechanism Design

### 1. InnoAGE M.2 (S80)
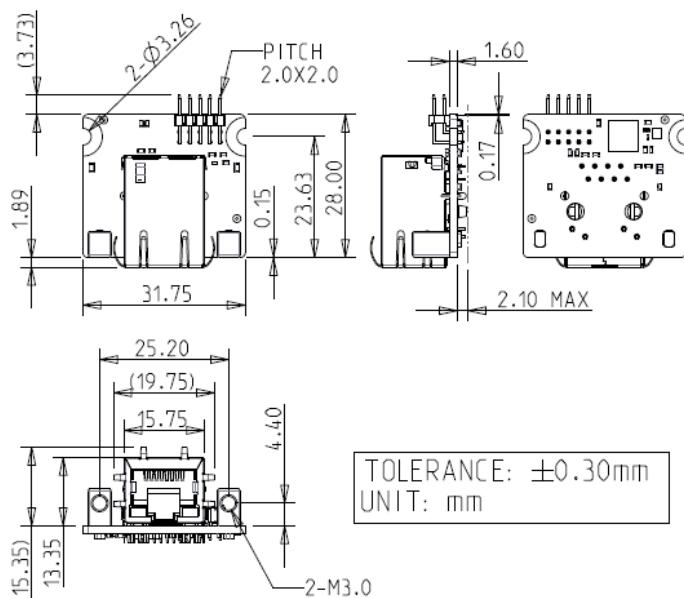


### 2. WiFi Antenna

| Standard | IEEE 802.11 a/b/g/n and 802.11 ac |
|---|---|
| Frequency | 2.4 to 2.49 GHz, 4.9 to 5.8GHz |
| Peak gain | 3.5 dBi @2.44 GHz, 5.8 dBi @5.5 GHz |
| CSWR | <2.1 |
| Feed impedance | 50 ohms |
| Power handling | 30 dBm |
| Interface | RPSMA |
| Antenna dimensions | $\Phi$13.0mmx198.0mm |
| Weight | 27.8g |
| Temperature range | -30'C to 75'C |
| Cover material (color) | Plastic (black) |
| Humidity range | 5% to 95% |
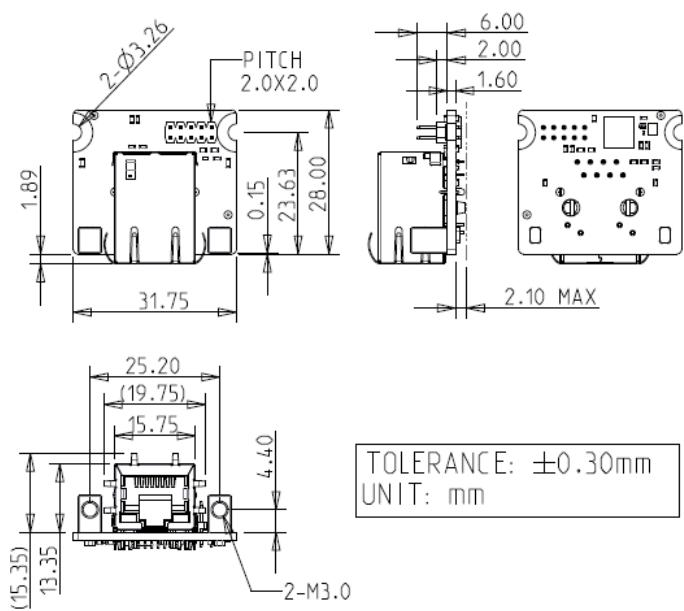
## 3. Ethernet Daughter Board

### (1) Horizontal type



TOLERANCE: ±0.30mm
UNIT: mm

### (2) Vertical type



TOLERANCE: ±0.30mm
UNIT: mm
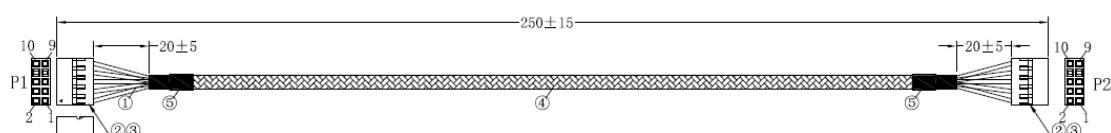
## 4. Cable Connection to Ethernet Daughter Board