# DS-1400 Series

13/12th Generation Intel Core Series Processors, High Performance & PCIe Expandable Rugged Embedded Computer, Supports up to 2x PCI/PCIe Expansion Slot

CONTROL ENGINEERING 2024 PRODUCT OF THE YEAR Bronze Award

VISION SYSTEMS DESIGN 2024 Innovators Awards BRONZE HONOREE

## High Performance | Highly Expandable

DS-1402, 12th Gen. Intel Alder Lake-S Rugged Embedded Computer

## Overview

CONTACT

The DS-1400 Series is high-performance, expandable, and rugged embedded computer, boasting outstanding performance as well as rich industrial I/O interfaces and robust functionalities. To meet various application needs, it has dual PCI/PCIe expansion capability and it can also flexibly expand the required I/O and specific functions through Cincoze's unique CMI, CFM, and MEC modules. Moreover, the DS-1400 Series has passed multiple international certifications, ensuring stable and reliable performance in diverse harsh environments. It is an ideal choice for manufacturing and railway applications.

### Key Features

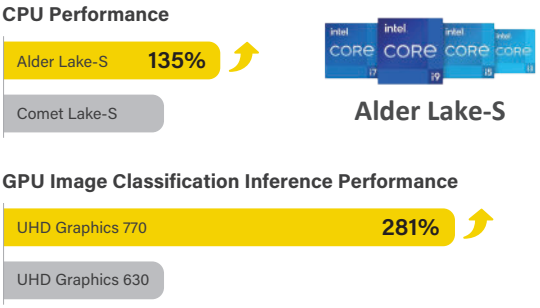
- Intel® 13/12th Gen Raptor Lake-S/Alder Lake-S Core™ i9/i7/i5/i3 Processors (max 65 W TDP)
- 2x DDR5 SO-DIMM Sockets, Supports ECC/non ECC type Memory, Up to 4800MHz, 64GB
- 2x GbE LAN and optional 2x 10GbE LAN
- 2x 2.5" SATA storage, 3x mSATA sockets, 1x M.2 key M for NVMe SSD
- Up to 2x PCI/PCIe expansion slots
- Optional CMI modules for I/O expansion
- Optional CFM modules for ignition sensing & PoE
- Wide operating temperature -40°C to 70°C
- MIL-STD-810G military standard and EN50155 (EN 50121-3-2 only)
- Safety Standard: UL, cUL, CB, IEC, EN 62368-1
- Support Intel® OpenVINO™ Dev Kit
- Intel® ESDQ (Edge Software Device Qualification) Certified: the Edge Insights for AMR software package

### Certifications

EN 50121-3-2 MIL-STD-810G EN 62368-1 c UL us LISTED CB

## Rapid Processing and Inference

The DS-1400 Series supports 13/12th gen Intel® Core™ i9/i7/i5/i3 (Raptor Lake-S/Alder Lake-S) processors based on the Intel 7 process, with up to 24 cores (8P + 16E) and 32 threads, delivering more than 1.35x the speed of Comet Lake-S platform. The Intel® Xe architecture of the UHD 770 graphics chip boosts GPU image classification inference performance to 2.8x the speed of Comet Lake-S, providing the processing performance needed for AI and edge computing.

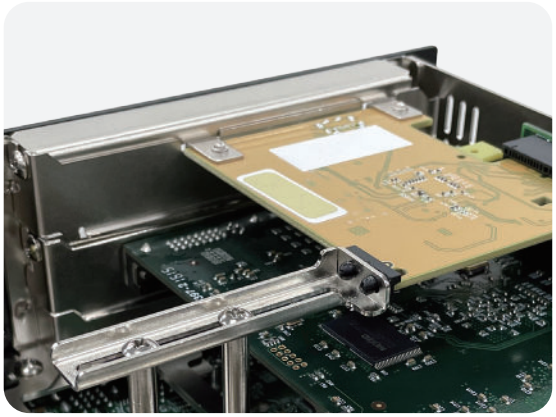


## Industrial I/O and Modular Expansion

The DS-1400 Series offers a vast array of industrial-focused I/O including up to 2x GbE LAN, 6x USB 3.2, and 2x USB 2.0, 2x RS232/422/485, 2x 2.5" SATA, 3x mSATA, 1x M.2 key M for NVMe SSD, 2x SIM card slots, 3x full-size Mini-PCIe and quad independent displays (DisplayPort, HDMI, VGA). It also features modular expansion through Cincoze's CMI/CFM modules, adding additional I/O or other functionality such as high-speed 10GbE LAN, PoE, and IGN (power ignition sensing).

## PCI/PCIe Add-on Cards

The DS-1400 Series accommodates up to dual PCI/PCIe expansion slots. It can support a maximum of one 110W add-on card with dimensions of 111 x 235 mm. This flexible slot allows integration of I/O, GPU, image capture, data acquisition, and motion control cards to suit specific application needs.



## Adjustable
## PCIe Card Retainer

A patented adjustable PCIe card retainer can securely fasten add-on cards. This unique design effectively prevents the cards from loosening due to vibrations in high-vibration environments, ensuring the stable operation of the system.

Patent No. I773359

## Robust and Reliable

The DS-1400 Series is built tough, reflected in its industrial-grade protection design and industry certifications in different fields. In addition to features such as wide temperature (-40 - 70°C), wide voltage input (9 - 48 VDC), overvoltage, overcurrent, and ESD protection, it also complies with the US military shock vibration standard MIL-STD-810G. Product safety and reliability are further ensured with internationally recognized UL 62368-1 safety certification. For more secure railway computing, it also passes the EMC EN 50121-3-2 standard in EN 50155.

## Specifications

| Model Name | DS-1400 | DS-1401 | DS-1402 |
|---|---|---|---|
| **System** | | | |
| Processor | ▪ 13th Generation Intel® Raptor Lake-S Series CPU:<br>- Intel® Core™ i9-13900E 24 Cores Up to 5.2 GHz, TDP 65W<br>- Intel® Core™ i7-13700E 16 Cores Up to 5.1 GHz, TDP 65W<br>- Intel® Core™ i5-13500E 14 Cores Up to 4.6 GHz, TDP 65W<br>- Intel® Core™ i5-13400E 10 Cores Up to 4.6 GHz, TDP 65W<br>- Intel® Core™ i3-13100E 4 Cores Up to 4.4 GHz, TDP 60W<br>- Intel® Core™ i9-13900TE 24 Cores Up to 5.0 GHz, TDP 35W<br>- Intel® Core™ i7-13700TE 16 Cores Up to 4.8 GHz, TDP 35W<br>- Intel® Core™ i5-13500TE 14 Cores Up to 4.5 GHz, TDP 35W<br>- Intel® Core™ i3-13100TE 4 Cores Up to 4.1 GHz, TDP 35W<br>▪ 12th Generation Intel® Alder Lake-S Series CPU:<br>- Intel® Core™ i9-12900E 16 Cores Up to 5 GHz, TDP 65W<br>- Intel® Core™ i7-12700E 12 Cores Up to 4.8 GHz, TDP 65W<br>- Intel® Core™ i5-12500E 6 Cores Up to 4.5 GHz, TDP 65W<br>- Intel® Core™ i3-12100E 4 Cores Up to 4.2 GHz, TDP 60W<br>- Intel® Core™ i9-12900TE 16 Cores Up to 4.8 GHz, TDP 35W<br>- Intel® Core™ i7-12700TE 12 Cores Up to 4.7 GHz, TDP 35W<br>- Intel® Core™ i5-12500TE 6 Cores Up to 4.3 GHz, TDP 35W<br>- Intel® Core™ i3-12100TE 4 Cores Up to 4.0 GHz, TDP 35W<br>- Intel® Pentium® G7400E 2 Cores Up to 3.6 GHz, TDP 46W<br>- Intel® Pentium® G7400TE 2 Cores Up to 3.0 GHz, TDP 35W<br>- Intel® Celeron® G6900E 2 Cores Up to 3.0 GHz, TDP 46W<br>- Intel® Celeron® G6900TE 2 Cores Up to 2.4 GHz, TDP 35W | | |
| Chipset | ▪ Intel R680E Chipset | | |
| Memory | ▪ 2x DDR5 4800 MHz SO-DIMM Socket, Supports Un-buffered and ECC Type, Up to 64GB | | |
| BIOS | ▪ AMI BIOS | | |
| **Graphics** | | | |
| Graphics Engine | ▪ Integrated Intel® UHD Graphics 770: Core™ i9/i7/i5<br>▪ Integrated Intel® UHD Graphics 730: Core™ i3<br>▪ Integrated Intel® UHD Graphics 710: Pentium®/Celeron® | | |
| Maximum Display Output | ▪ Supports Quad Independent Display | | |
| VGA | ▪ 1x VGA Connector : 1920 x 1080@60Hz | | |
| DP | ▪ 2x DP Connector : 4096 x 2304@60Hz<br>* Verified maximum DP resolution: 3840x2160 @60Hz | | |
| HDMI | ▪ 1x HDMI Connector : 4096x2160@30Hz<br>* Verified maximum resolution: 3840x2160 @30Hz | | |
| **Audio** | | | |
| Audio Codec | ▪ Realtek® ALC888, High Definition Audio | | |
| Line-out | ▪ 1x Line-out, Phone Jack 3.5mm | | |
| Mic-in | ▪ 1x Mic-in, Phone Jack 3.5mm | | |
| **I/O** | | | |
| LAN | ▪ 2x GbE LAN, RJ45<br>- GbE1: Intel® I219<br>- GbE2: Intel® I210 | | |
| COM | ▪ 2x RS-232/422/485 with Auto Flow Control (Supports 5V/12V), DB9 | | |
| USB | ▪ 2 x USB 3.2 Gen2x1 (10Gbps), Type A<br>▪ 4 x USB 3.2 Gen1x1 (5Gbps), Type A<br>▪ 2 x USB 2.0 (480Mbps), Type A | | |
| PS/2 | ▪ 1 x PS/2, 6 Pin Mini-DIN Female Connector | | |

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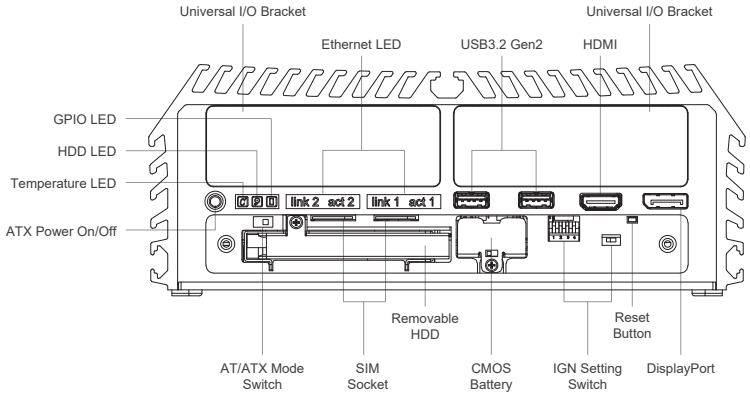
|---|---|---|---|
| **Storage** | | | |
| SSD/HDD | ▪ 1x 2.5" Front Accessible SATA HDD/SSD Bay ( SATA 3.0 )<br>▪ 1x 2.5" Internal SATA HDD/SSD Bay ( SATA 3.0 ) | | |
| mSATA | ▪ 3x mSATA Socket ( SATA 3.0, shared by Mini-PCIe socket ) | | |
| M.2 SSD | ▪ 1x M.2 Key M Type 2280 Socket, Support PCIe Gen3 x4 NVMe SSD or SATA SSD ( SATA 3.0 ) | | |
| RAID | ▪ Support RAID 0/1/5/10 | | |
| **Expansion** | | | |
| PCI Express | | ▪ 1x PCI/PCIe Expansion Slot with Optional Riser Card<br>* Supports maximum dimensions of add-on card (H x L) : 111 x 235 mm | ▪ 2x PCI/PCIe Expansion Slot with Optional Riser Card<br>* Supports maximum dimensions of add-on card (H x L) : 111 x 235 mm |
| Mini PCI Express | ▪ 3x Full-size Mini-PCIe Socket | | |
| SIM Socket | ▪ 2x SIM Socket | | |
| CMI (Combined Multiple I/O) Interface | ▪ 2x High Speed CMI Interface for optional CMI Module Expansion<br>▪ 2x Low Speed CMI Interface for optional CMI Module Expansion | | |
| CFM (Control Function Module) Interface | ▪ 1x CFM IGN Interface for optional CFM-IGN Module Expansion | | |
| **Other Function** | | | |
| External FAN Connector | ▪ 1x External FAN Connector, 4-pin Terminal Block (Support Smart Fan by BIOS) | | |
| Power Ignition Sensing | ▪ Support Power Ignition Sensing Function with Delay Time Management and Selectable 12V/24V (With Optional CFM Module) | | |
| Clear CMOS Switch | ▪ 1x Clear CMOS Switch | | |
| Reset Button | ▪ 1x Reset Button | | |
| Instant Reboot | ▪ Support 0.2sec Instant Reboot Technology | | |
| Watchdog Timer | ▪ Software Programmable Supports 256 Levels System Reset | | |
| **Power** | | | |
| Power Button | ▪ 1x ATX Power On/Off Button | | |
| Power Mode Switch | ▪ 1x AT/ATX Mode Switch | | |
| Power Input | ▪ 9 - 48VDC, 3-pin Terminal Block | | |
| Remote Power On/Off | ▪ 1x Remote Power On/Off, 2-pin Terminal Block | | |
| Remote Power LED | ▪ 1x Remote Power LED, 2-pin Terminal Block | | |
| Max. Power Consumption | ▪ 35W CPU: 206.93W<br>▪ 65W CPU: 250.56W<br>- Test conducted with CPU, 1x RAM, and 1x storage<br>- 100% load during burn-in testing | | |
| Inrush Current (Peak) | ▪ 35W CPU: 6.283 A@24V<br>▪ 65W CPU: 6.655 A@24V | | |
| **Physical** | | | |
| Dimension( W x D x H ) | ▪ 227 x 261 x 88 mm | ▪ 227 x 261 x 108 mm | ▪ 227 x 261 x 128 mm |
| Weight Information | ▪ 4.5 kg | ▪ 5.02 kg | ▪ 5.44 kg |
| Mechanical Construction | ▪ Extruded Aluminum with Heavy Duty Metal | | |
| Mounting | ▪ Wall | | |
| Physical Design | ▪ Fanless Design<br>▪ Cableless Design<br>▪ Jumper-less Design<br>▪ Unibody Design | | |

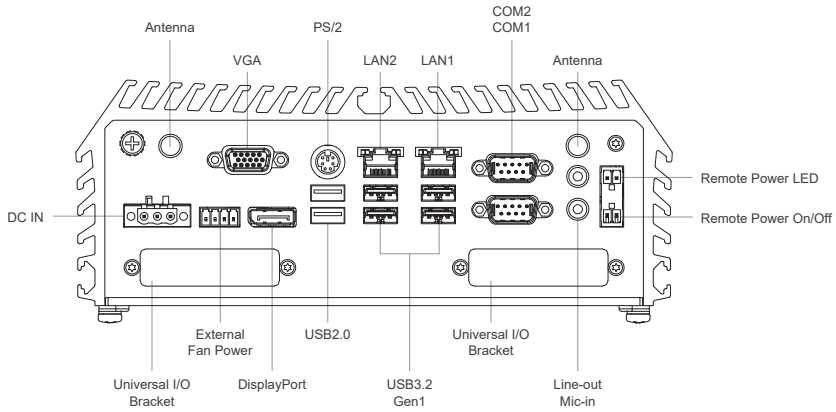
| | |
|---|---|
| **Reliability & Protection** | |
| Reverse Power Input Protection | ▪ Yes |
| Over Voltage Protection | ▪ Protection Range: 51~58V<br>▪ Protection Type: shut down operating voltage, re-power on at the preset level to recover |
| Over Current Protection | ▪ 15A |
| CMOS Battery Backup | ▪ SuperCap Integrated for CMOS Battery Maintenance-free Operation |
| MTBF | ▪ 371,274 Hours<br>- Database: Telcordia SR-332 Issue3, Method 1, Case 3 |
| **Operating System** | |
| Windows | ▪ Windows®11, Windows®10 |
| Linux | ▪ Ubuntu Desktop 22.04 LTS |
| **Environment** | |
| Operating Temperature | ▪ 35W TDP Processor: -40°C to 70°C<br>▪ 65W TDP Processor: -40°C to 50°C (With External Fan Kit)<br>- With extended temperature peripherals; Ambient with air flow<br>- According to IEC60068-2-1, IEC60068-2-2, IEC60068-2-14 |
| Storage Temperature | ▪ -40°C to 85°C |
| Relative Humidity | ▪ 95%RH @ 70°C (non-Condensing) |
| Shock | ▪ MIL-STD-810G |
| Vibration | ▪ MIL-STD-810G |
| EMC | ▪ CE, UKCA, FCC, ICES-003 Class A<br>▪ EN 50155 (EN 50121-3-2 Only) |
| EMI | ▪ CISPR 32 Conducted & Radiated: Class A<br>▪ EN/BS EN 50121-3-2 Conducted & Radiated: Class A<br>▪ EN/BS EN IEC 61000-3-2 Harmonic current emissions: Class A<br>▪ EN/BS EN61000-3-3 Voltage fluctuations & flicker<br>▪ FCC 47 CFR Part 15B, ICES-003 Conducted & Radiated: Class A |
| EMS | ▪ EN/IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV<br>▪ EN/IEC 61000-4-3 RS: 80 MHz to 1000 MHz: 20 V/m<br>▪ EN/IEC 61000-4-4 EFT: AC Power: 2 kV; Signal: 2 kV<br>▪ EN/IEC 61000-4-5 Surges: AC Power: 2 kV<br>▪ EN/IEC 61000-4-6 CS: 10V<br>▪ EN/IEC 61000-4-8 PFMF: 50 Hz, 1A/m<br>▪ EN/IEC 61000-4-11 Voltage Dips & Voltage Interruptions: 0.5 cycles at 50 Hz |
| Safety | ▪ UL, cUL, CB, IEC, EN 62368-1 |

## DS-1400 External Layout

### Front I/O

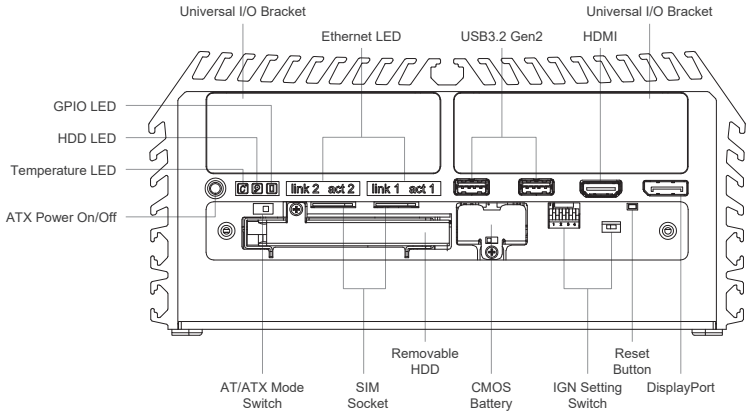



### Rear I/O

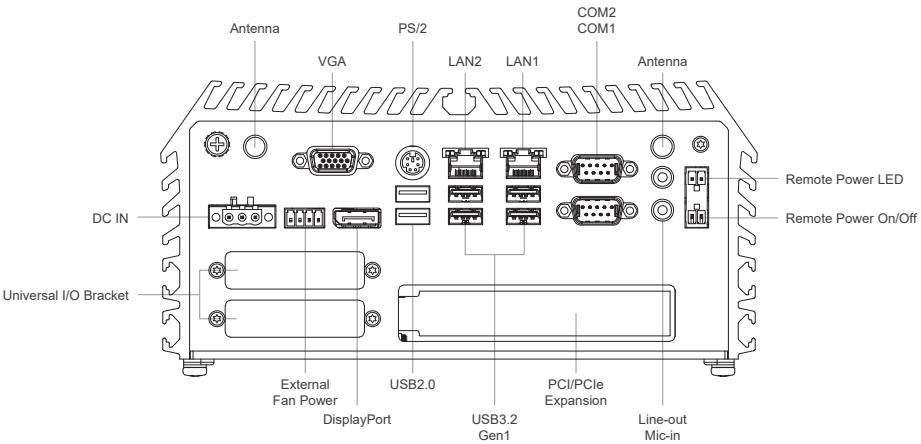



## DS-1401 External Layout

### Front I/O

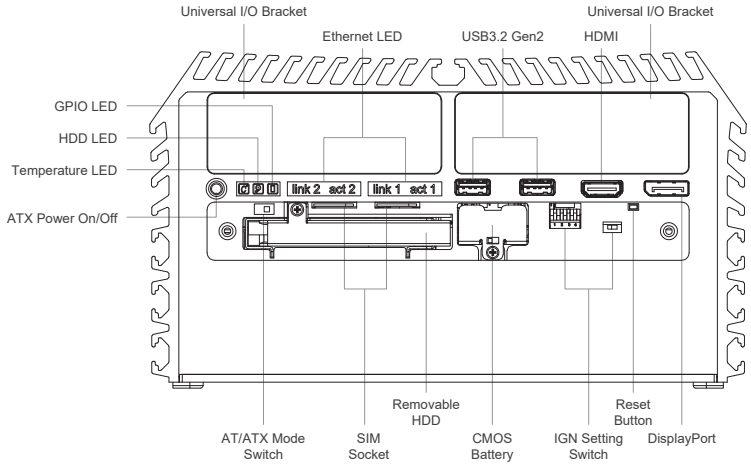



### Rear I/O

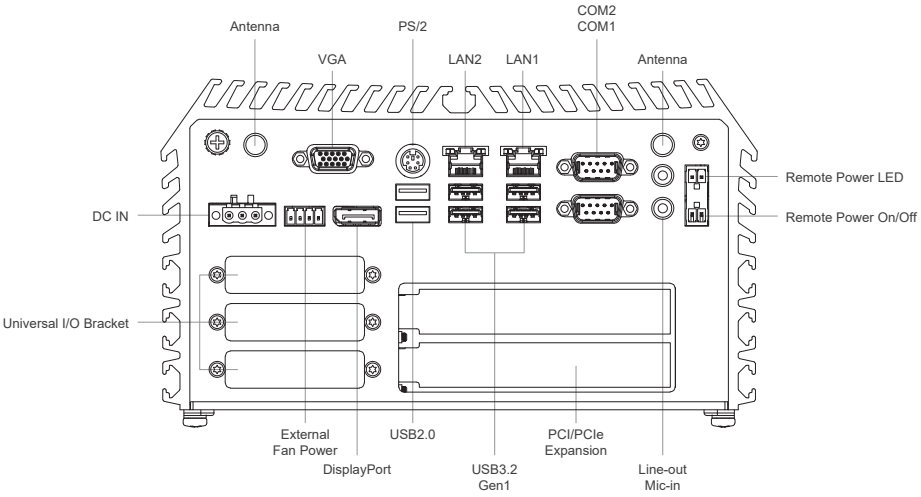


## DS-1402 External Layout

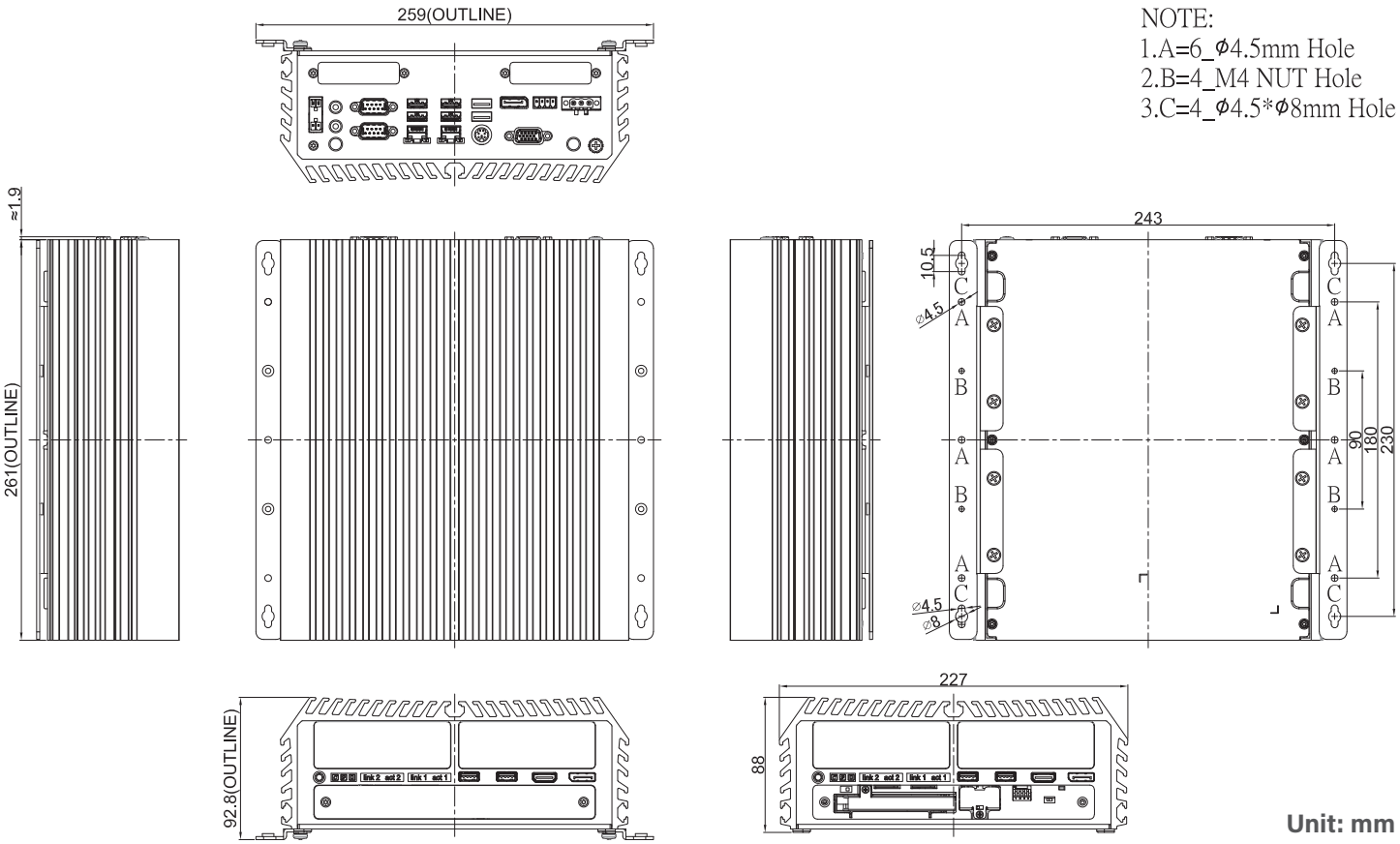
### Front I/O




### Rear I/O



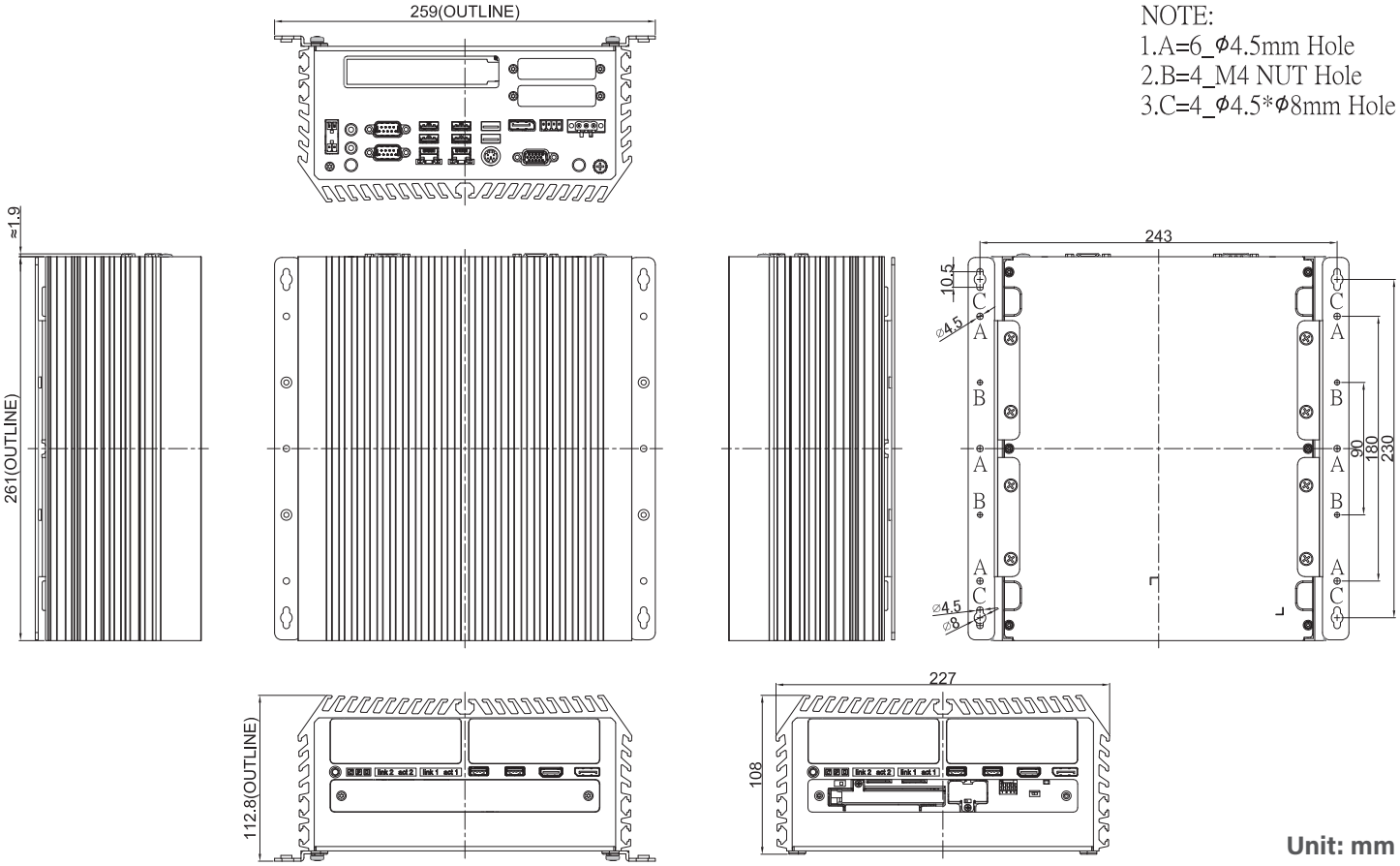
## DS-1400 Dimensions




NOTE:
1.A=6_Φ4.5mm Hole
2.B=4_M4 NUT Hole
3.C=4_Φ4.5*Φ8mm Hole

Unit: mm

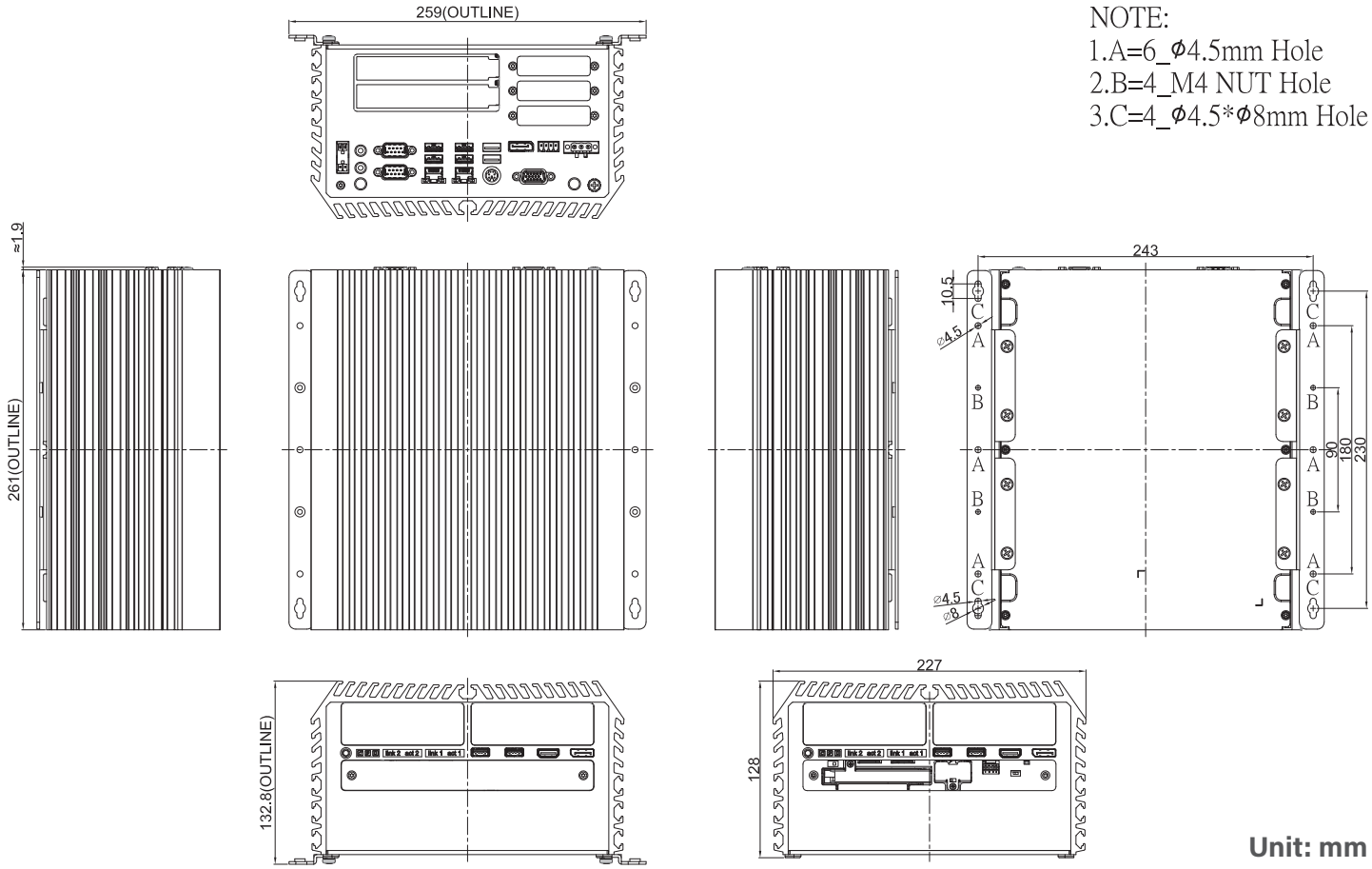
## DS-1401 Dimensions




NOTE:
1.A=6_Φ4.5mm Hole
2.B=4_M4 NUT Hole
3.C=4_Φ4.5*Φ8mm Hole

Unit: mm

## DS-1402 Dimensions




NOTE:
1.A=6_Φ4.5mm Hole
2.B=4_M4 NUT Hole
3.C=4_Φ4.5*Φ8mm Hole

Unit: mm

# Ordering Information

## Available Models

| Model No. | Description |
|---|---|
| DS-1400-R10 | 13/12th Generation Intel Core Series Processors, High Performance, Expandable and Modular Rugged Embedded Computer |
| DS-1401-R10 | 13/12th Generation Intel Core Series Processors, High Performance and PCIe Expandable Rugged Embedded Computer with 1x PCI/PCIe Expansion Slot |
| DS-1402-R10 | 13/12th Generation Intel Core Series Processors, High Performance and PCIe Expandable Rugged Embedded Computer with 2x PCI/PCIe Expansion Slot |

## Package Checklist

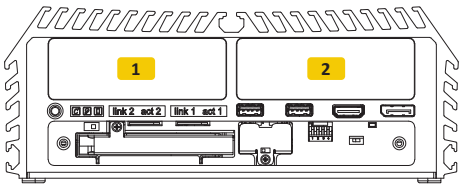
| | |
|---|---|
| ▪ DS-1400 Series Embedded System x1 | ▪ Heatsink Pack x1 |
| ▪ Wall Mounting Kit x 1 | ▪ Screw Pack x1 |
| ▪ Power Terminal Block Connector x 1 | ▪ Remote Function Terminal Block Connector x 2 |
| ▪ Fan Terminal Block Connector x 1 | |

## Optional Modules and Accessories

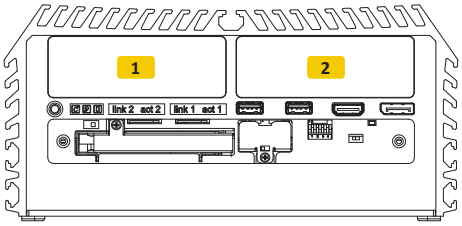
| Model No. | Description |
|---|---|
| CMI-LAN01-R12 | CMI Module with 4x RJ45 Intel I210 GbE LAN Ports |
| CMI-M12LAN01-R12 | CMI Module with 4x M12 Intel I210 GbE LAN Ports |
| CMI-XM12LAN01-R10 | CMI Module with M12 X-Coded Connector, 4x Intel I210 GbE LAN Ports |
| CMI-10GLAN03-R10 | CMI Module with 2x Intel X550 10GbE LAN, RJ45 Port |
| CMI-COM02 | CMI Module with 4x RS232/422/485 Serial Ports |
| CMI-ICOM01 | CMI Module with 4x Electrical Isolated RS-232 Serial Ports |
| CMI-DIO02 | CMI Module with 16x Optical Isolated DIO (8 in/8 out) |
| MEC-LAN-M102-30 | Mini-PCIe Module with 2x LAN Ports, 2x 30cm cable |
| MEC-USB-M102-30 | Mini-PCIe Module with 2x USB 3.2 Gen1 Ports, 1x 30cm cable |
| MEC-COM-M212-DB9 | Mini-PCIe Module with 2x RS-232 Serial Ports, 1x Standard DB9 Cable |
| UB1004 | Universal Bracket with 4x DB9 Cutout |
| UB1010 | Universal Bracket with 4x M12 Cutout |
| UB1012 | Universal Bracket with 4x RJ45 Cutout |
| UB1018 | Universal Bracket with DIO Cutout |
| UB1028 | Universal Bracket with 2x RJ45 Cutout |
| UB1030-R10 | Universal Bracket with 4x M12 X-Coded Cutout |
| UB0303 | 2x Universal Bracket each with 1x DB9 Cutout |
| UB0311 | Universal Bracket with 2x RJ45 Cutout |
| UB0314 | Universal Bracket with 2x USB Cutout |
| CFM-PoE03 | CFM Module with PoE Control Function, Individual Port 25.5W |

| | |
|---|---|
| CFM-IGN101 | CFM Module with Power Ignition Sensing Control Function, 12V/24V Selectable |
| FAN-EX101 | External Fan with 4pin Terminal Block Plug, Mounting Bracket, Support smart fan |
| FAN-UB100 | Exhaling fan with 4pin Connector, Universal Bracket |
| FAN-UB101 | Inhaling fan with 4pin Connector, Universal Bracket |
| GST120A24-CIN | Adapter AC/DC 24V 5A 120W with 3pin Terminal Block Plug and Tubes, Level VI |
| GST220A24-CIN | Adapter AC/DC 24V 9.2A 220W with 3pin Terminal Block Plug and Tubes, Level VI |
| GST360A24-CIN | Adapter AC/DC 24V 15A 360W with 3pin Terminal Block Plug and TUBES, Level VI |
| RSD-200D-24 | Railway Single Output DC-DC Converter 200W / DC 24V |
| RC-E16-01 | Riser Card with 1 x PCIex16 Slot |
| RC-PI-01 | Riser Card with 1 x PCI Slot |
| RC-E8E8-R10 | Riser Card with 2 x PCIex8 Slots |
| RC-E16E1-01 | Riser Card with 1x PCIex16, 1x PCIex1 slots, and auxiliary power connector, supports add-on cards up to 75W |
| RC-E16E1-02 | Riser Card with 1x PCIex16, 1x PCIex1 slots, and auxiliary power connector, supports add-on cards up to 130W |
| RC-E16PI-01 | Riser Card with 1x PCIex16 and 1x PCI Slots (PCIe x16 Slot Supports Single Deck Add-on Card) |
| RC-PIPI-01 | Riser Card with 2x PCI Slots |

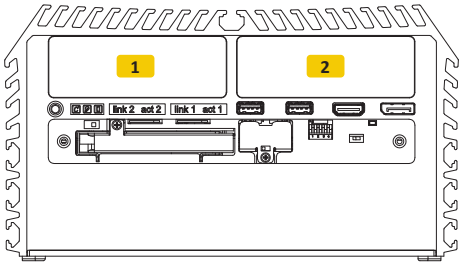
## Optional Module Configuration – Front side




DS-1400




DS-1401




DS-1402

| Model No. | Description | 1 | 2 |
|---|---|---|---|
| CMI-LAN01-R12/UB1012 | CMI Module with 4x Intel I210 GbE LAN, RJ45 Port / 1x Universal Bracket with 4x RJ45 Cutout | V | V |
| CMI-M12LAN01-R12/UB1010 | CMI Module with M12 Connector, 4x Intel GbE LAN / 1x Universal Bracket with 4x M12 Cutout | V | V |
| CMI-XM12LAN01-R10/UB1030-R10 | CMI Module with M12 X-Coded Connector, 4x Intel I210 GbE LAN Ports / Universal Bracket with 4x M12 X-Coded Cutout | V | V |
| CMI-10GLAN03-R10/UB1028 | CMI Module with 2x Intel X550 10GbE LAN, RJ45 Port / 1x Universal Bracket with 2x RJ45 Cutout | V | - |
| CMI-COM02/UB1004 | CMI Module with 4x RS232/422/485 Ports (Support 5V/12V) / 1x Universal Bracket with 4x DB9 Cutout | V | V |

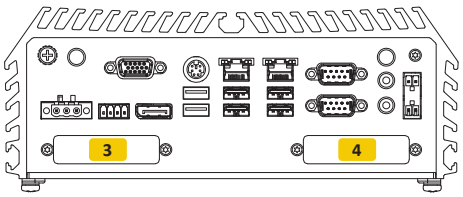
| Model No. | Description | 1 | 2 |
|---|---|---|---|
| CMI-ICOM01/UB1004 | CMI Module with 4 x isolated RS232 / 1x Universal Bracket with 4x DB9 Cutout | V | V |
| CMI-DIO02/UB1018 | CMI Module with 16DIO (8in 8out) / 1x Universal Bracket with DIO Cutout | V | V |

Remark:

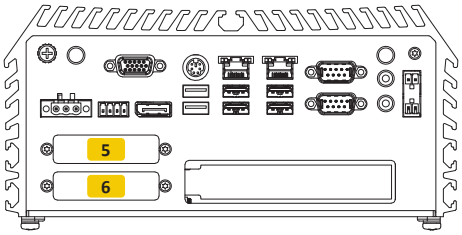
Maximum one CMI-COM02 or CMI-ICOM01 module can be installed in this system.

V : Compatible

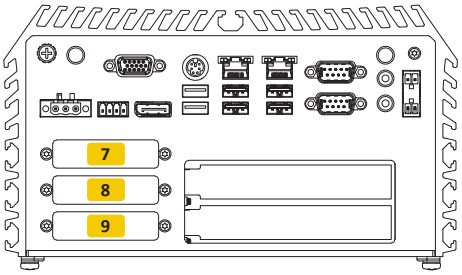
## Optional Module Configuration – Rear side




DS-1400




DS-1401




DS-1402

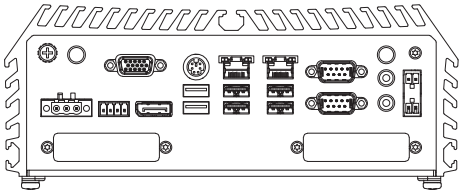
| Model No. | Description | DS-1400 | | DS-1401 | | DS-1402 | | |
|---|---|---|---|---|---|---|---|---|
| | | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| MEC-LAN-M102-30/UB0311 | Mini-PCIe Module with 2x LAN Ports, 2x 30cm cable / 1x Universal Bracket with 2x RJ45 Cutout | V | V | V | V | V | V | V |
| MEC-USB-M102-30/UB0314 | Mini-PCIe Module with 2x USB 3.2 Gen1 Ports, 1x 30cm cable, 1x Universal Bracket with 2x USB Cutout | V | - | V | V | V | V | V |
| MEC-COM-M212-DB9/UB0303 | Mini-PCIe Module with 2x RS-232 Ports, 1x Standard DB9 Cable / 2x Universal Bracket each with 1x DB9 Cutout | V | V | V | V | V | V | V |
| FAN-UB100 | Exhaling Fan with 4pin Connector, Universal Bracket | - | - | - | - | V | | |
| FAN-UB101 | Inhaling Fan with 4pin Connector, Universal Bracket | - | - | - | - | V | | |

Remark:

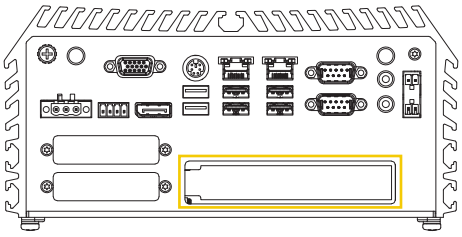
Maximum one CMI-COM02 or CMI-ICOM01 module can be installed in this system.

V : Compatible

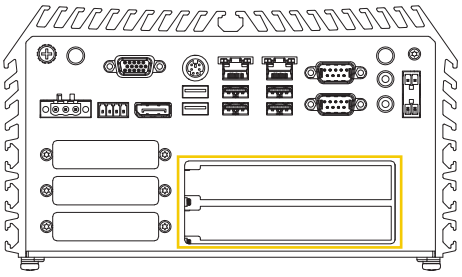
## Riser Card Configuration



DS-1400



DS-1401



DS-1402

| Model No. | Description | DS-1400 | DS-1401 | DS-1402 |
|---|---|---|---|---|
| RC-E16-01 | Riser Card with 1 x PCIex16 Slot | - | V | - |
| RC-PI-01 | Riser Card with 1 x PCI Slot | - | V | - |
| RC-E8E8-R10 | Riser Card with 2 x PCIex8 Slots | - | - | V |
| RC-E16E1-01 | Riser Card with 1x PCIex16, 1x PCIex1 slots, and auxiliary power connector, supports add-on cards up to 75W | - | - | V |
| RC-E16E1-02 | Riser Card with 1x PCIex16, 1x PCIex1 slots, and auxiliary power connector, supports add-on cards up to 130W | - | - | V |
| RC-E16PI-01 | Riser Card with 1x PCIex16 and 1x PCI Slots (PCIe x16 Slot Supports Single Deck Add-on Card) | - | - | V |
| RC-E16PI-01 | Riser Card with 2x PCI Slots | - | - | V |

Remark:

Maximum one CMI-COM02 or CMI-ICOM01 module can be installed in this system.

V : Compatible

Updated: Jan. 16, 2025

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