



## Embedded Motherboards AMD Ryzen™ Industrial Single Board Computer

The rise of IoT and Edge Computing has boosted the advancements of embedded systems that allow the migration of intelligence from the cloud to the edge. As computing hardware becomes smaller and more powerful, many industries are implementing robust single-board computers for various embedded systems applications. Single board computers are perfect for space-constrained applications that require powerful computing in a small form factor design.

A single-board computer is an all-in-one solution where the CPU, GPU, RAM, Chipset, I/O ports, etc., are soldered onto a single motherboard. Due to all the parts and components being molded onto a single plastic circuit board (PCB), SBCs are considerably smaller than most of the standard motherboard form factors, such as ATX standard form factors. However, despite the smaller size, SBCs are remarkably powerful and capable of performing complex tasks and even machine learning applications.

Therefore, SBCs implementation in embedded solutions is increasingly popular due to their tiny size, powerful computing, and commercial-off-the-shelf (COTS) computer systems that are deployment ready for any embedded system applications.

### Key Applications



Digital  
Signage



Smart  
Retail  
& Kiosks



Casino &  
Gaming  
Machines



IIoT &  
Robotics



In-Vehicle  
Infotainment

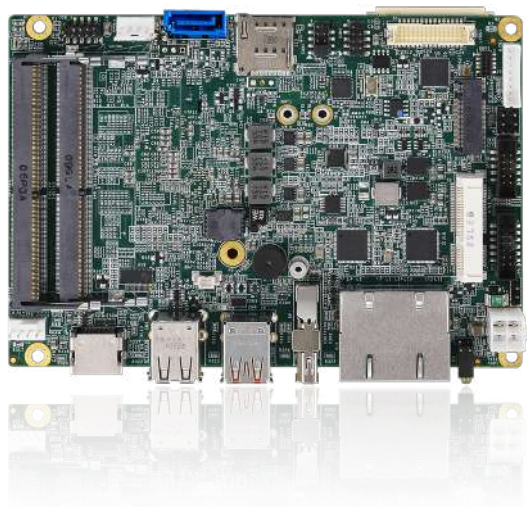


Smart  
Building



## Premio AMD Embedded Solutions – Ryzen™ V1000 & R1000 Series

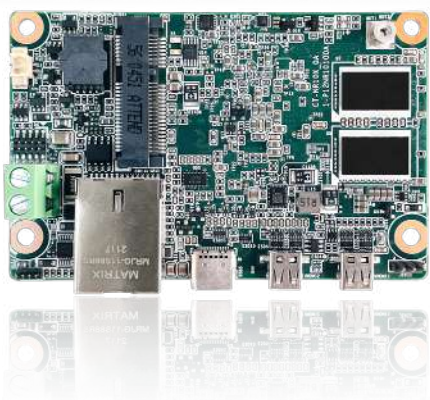
Premio's new SBCs lineup now supports AMD Ryzen™ Embedded SoCs (System on Chip) that provide a new class of performance in a seamlessly integrated single-board solution. Our new CT-DR101 Series features a 3.5" Industrial-Grade SBC that delivers blazing-fast performance powered by the AMD Ryzen™ Embedded R1606G/V1605B processors. In addition, our embedded AMD Ryzen™ portfolio also includes a mini-1.8" SBC (FEMTO-ITX) with AMD Ryzen™ Embedded R1606G processor to power ultra-small, embedded deployments at the rugged edge.



### CT-DR101

#### 3.5" Industrial SBC

Configured with AMD Ryzen™ Embedded R1606G/V1605B Processors



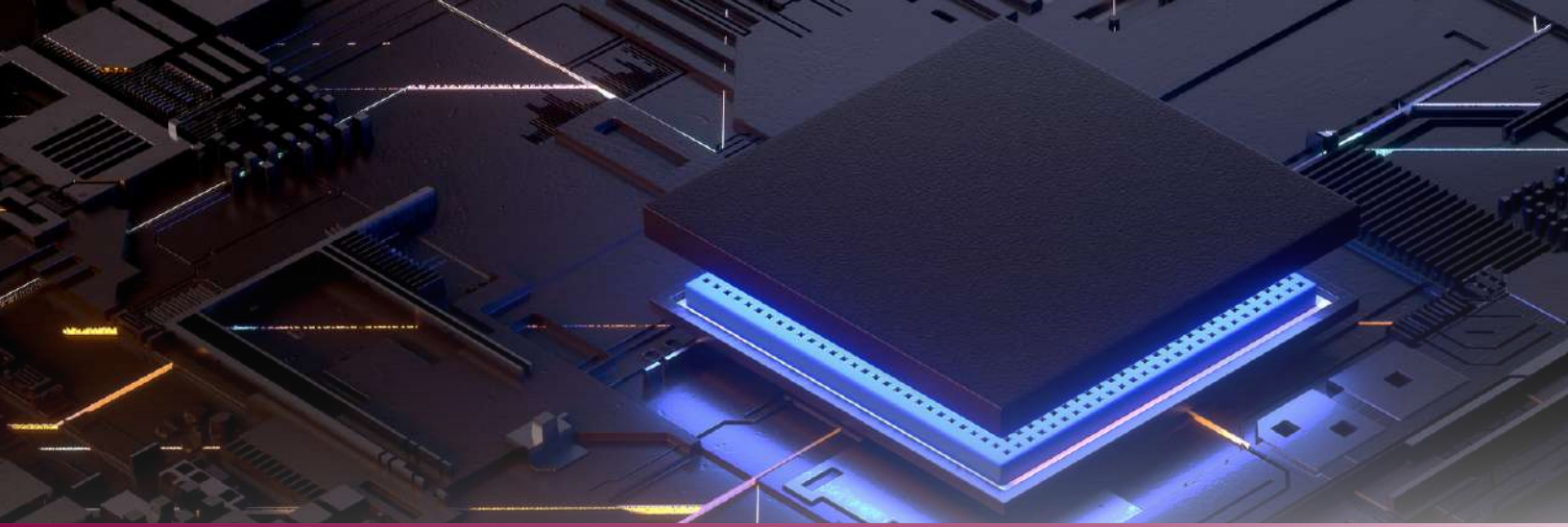
### CT-NR101

#### 1.8" Industrial SBC

Configured with AMD Ryzen™ Embedded R1606G Processor







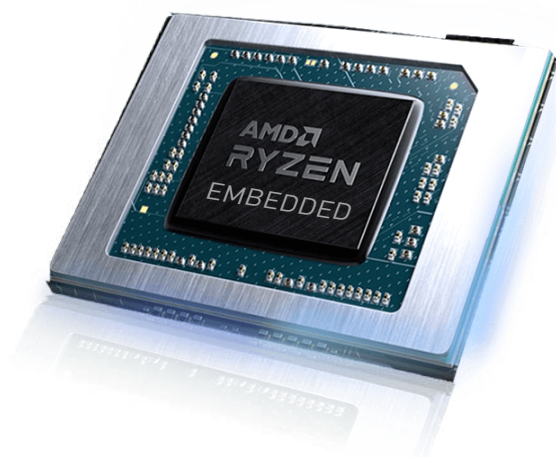
## Introducing AMD Ryzen™ Embedded SoCs

The AMD Ryzen™ Embedded processor integrates the breakthrough performance of the "Zen" CPU and "Vega" GPU architectures in a single SoC solution that sets a new standard in processing power for next-generation embedded designs.

The Ryzen™ Embedded CPUs bring multi-threaded performance to the single-chip solution. In addition, delivering discrete-GPU caliber graphics and multimedia processing allows our SBCs to achieve new levels of processing efficiency and design versatility.

## Benefits: AMD Ryzen™ Embedded SoCs

- Low-Power TDP Designs (12-25 watt)
- Next Generation x86 "Zen" Cores (2 and 4 Core options)
- Multiple 4K Displays with Integrated Graphics in "Vega" GPU
- Up to dual-channel 64-bit DDR4 Up to 2400 MT/s
  - ECC Memory Support
- AMD Secure Processor (PSP) for data security and encryption
- 10-year embedded long-life and availability



## Top-Level Feature Comparison Between R1606G vs. V1605B

Model	TDP Range	CPU Core Thread Count	CPU Base Freq. (up to)	1T Boost Freq. GHz (up to)	Graphics Computing Units (SIMD)	GPU Freq. GHz (up to)	L2 Cache	Package	Max DDR4 Rate (MT/s)	Junction Temperature Range (°C)
R1606G	12-25 W	2/4	2.6	3.5	3	1.2	1 MB	FP5	2,400	0°C~105°C
V1605B	12-25 W	4/8	2	3.6	8	1.1	2 MB	FP5	2,400	0°C~105°C



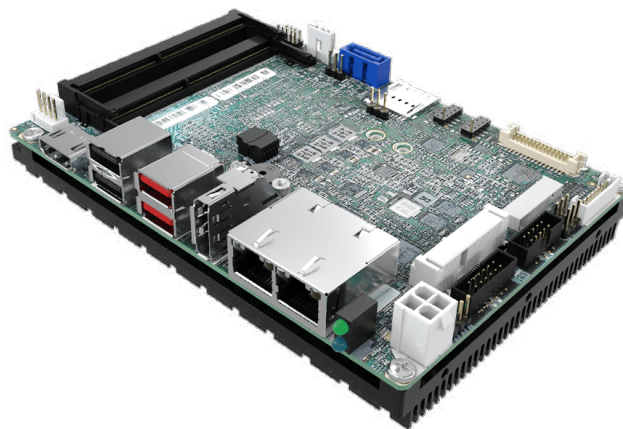
## CT-DR101 3.5" SBC with R1606G & V1605B

The CT-DR101 Series features groundbreaking AMD Ryzen™ Embedded R1606G & V1605B SoCs and two DDR4 SO-DIMM slots with up to 32GB of ECC/non-ECC memory to handle powerful data processing and smooth multitasking from various IoT sensors and devices at the rugged edge.

The CT-DR101 also supports rich I/O configurations and expandability on a compact 3.5" embedded SBC form factor. The 3.5-inch SBC is configured with various I/Os, multiple 4K resolution display ports, SATA, mPCIe, and M.2 expansion slots to ensure compatibility and expandability. The 3.5" CT-DR101 SBC is ideal for numerous embedded applications due to its form factor that is small enough to fit into tight spaces while hosting powerful feature-rich I/O ports and expansion slots.

### Key Applications

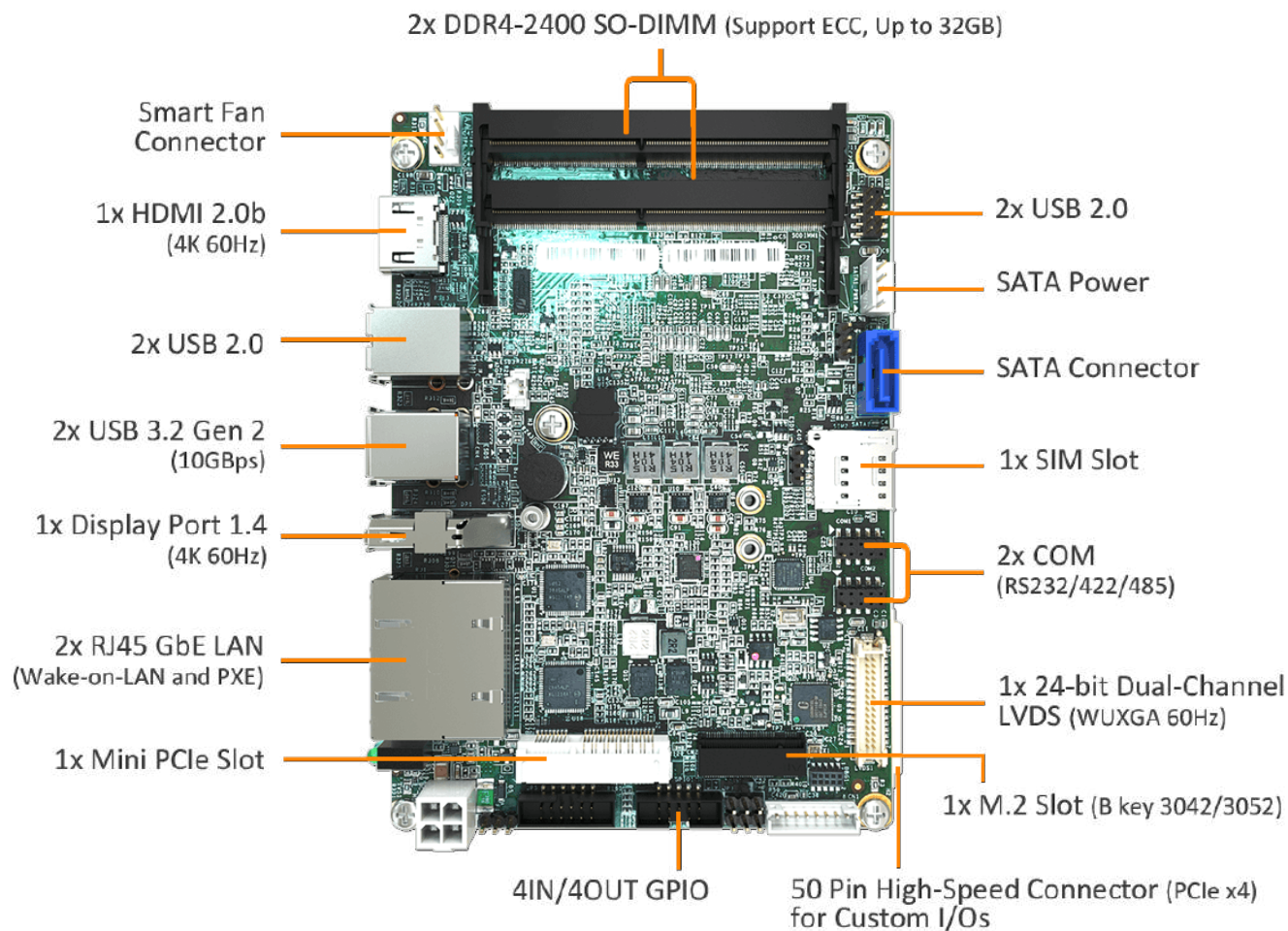
- AMD Ryzen™ Embedded R1606G/V1605B (12-25W TDP)
- 2x DDR4 2400 SO-DIMM Up to 32GB (ECC/non-ECC)
- 1x SIM Card Slot for 4G/LTE or 5G Cellular
- Triple Independent Display: 4K HDMI, 4K DP, LVDS WUXGA
- I/O: 2x GbE LAN, 2x USB 3.2 (10GB), 2x USB 2.0
- Wide Operating Temperature: -40°C ~ 75°C
- Expansion: 1x M.2, 1x mPCIe, 1x SATA
- 50 Pin High Speed Connector (PCIe x4) for customizable I/O
- Wireless Support: Bluetooth 5 and Wi-Fi 6
- TPM 2.0



### Triple Ultra-High-Resolution Displays

With AMD Ryzen™ Embedded SoC processor, the 3.5" CT-DR101 SBC can support three independent ultra-high-resolution displays, including two separate 4K displays and one brilliant WUXGA display. The WUXGA display resolution offers a high-resolution display in a wide 1920 x 1200 aspect ratio that can display two full pages of text side by side. In addition, for wide compatibility, the 3.5" supports HDMI, DisplayPort, and LVDS port. LVDS connectivity allows reliable data transmission between the SBC and an external HMI or industrial panel display.



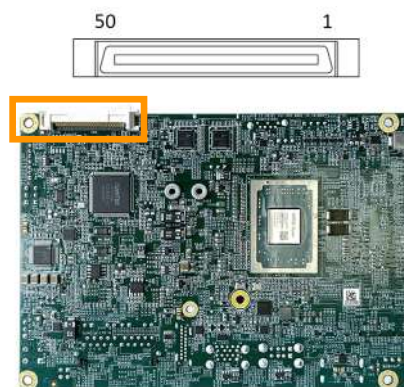
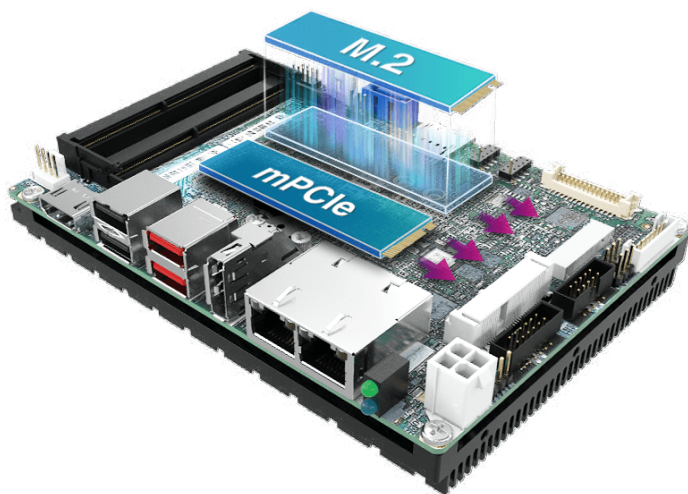


UHD 4K Display	1 x DisplayPort 1.4 (DP++)	3840 x 2160	60Hz
UHD 4K Display	1 x HDMI 2.0b	3840 x 2160	60Hz
WUXGA Display	1x 24-bit Dual Channel LVDS	1920 x 1200	60Hz



## Robust Expansion Ports for Scalability

The CT-DR101 offers a wide range of scalability through various expansion slots, including mPCIe, M.2, SATA, and a dedicated slim high-speed port. These robust expansion slots can support various performance accelerators such as SSD storage, wireless cards, 4G/5G module, AI accelerators, and even a separated custom board for even richer I/O ports. In addition, a key differentiator for this 3.5" SBC is a 50-pin high-speed connector (PCIe x4) that can be used for even more customizable I/O in PCIe Gen 3 throughput and signals. System integrators can leverage this unique feature and design custom I/O boards tailored for their applications



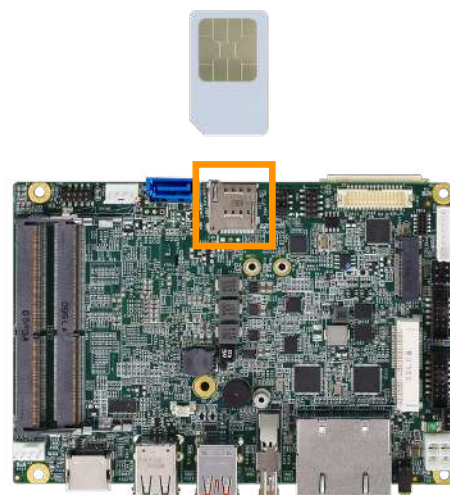
Bottom View

## Blazing Fast 5G Connectivity

The CT-DR101 now supports 5G cellular connectivity with a built-in SIM card slot for uncompromising wireless connectivity at the edge. With a built-in SIM card slot, the 3.5" SBC can support 4G/LTE or 5G cellular connectivity through its plug-and-play M.2 module. Moreover, the CT-DR101 also supports Bluetooth 5 and Wi-Fi 6 for high-speed wireless connectivity.



5G/4G/LTE



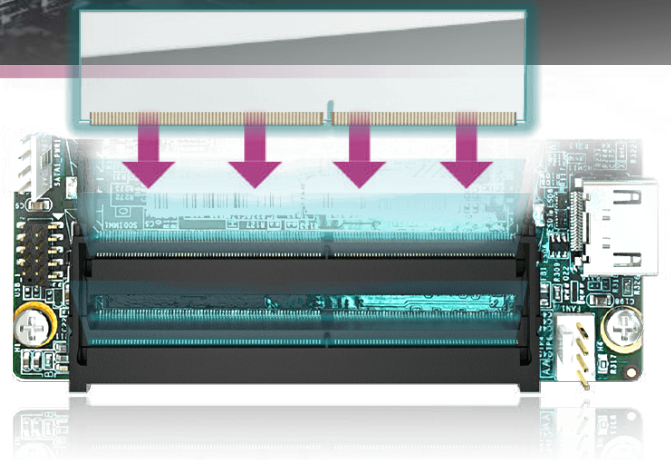
Top View





## Reliable ECC Memory Support

The CT-DR101 supports Error Correcting Code (ECC) memory for mission-critical deployments that require high-performance systems to operate reliably 24/7. With ECC memory, the system can detect and correct common memory errors on the RAM. ECC RAM can immediately detect and fix memory errors before they can cause data corruption or even systems crashes.



## Optimal Security and Encryption

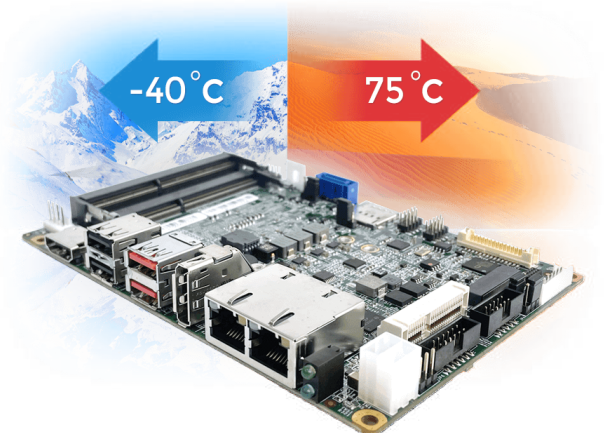
With the AMD Ryzen™ Embedded SoC, the system is equipped with next-generation AMD Secure Processor (PSP) to ensure optimal security and encryption, which include:

- fTPM2.0, crypt-offload, platform secure boot, integrated DRM
- Field Programmable Keys
- Secure Memory Encryption Support (SME).

Moreover, there is an additional TPM 2.0 chipset for integrated hardware encryption for an even higher level of security.

## Industrial Grade Design for Optimal Durability

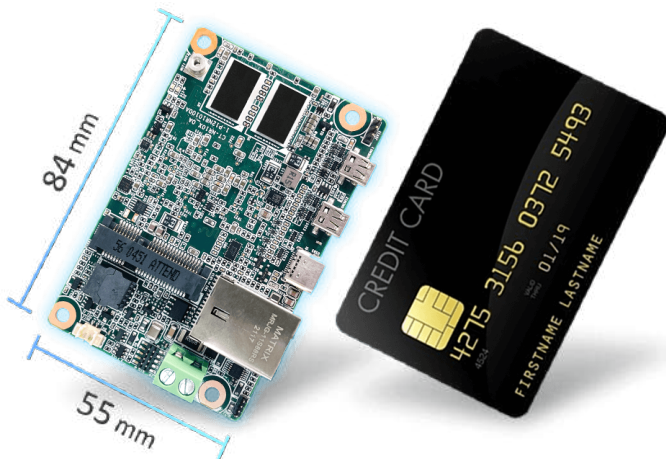
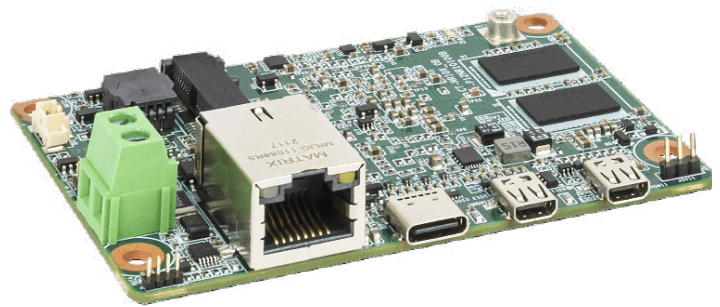
The CT-DR101 is designed, tested, and built for outstanding durability amid extreme industrial deployments. The system is built out of industrial-grade materials from its motherboard, chipsets, power chokes, I/Os, resistors, and capacitors are all selectively chosen for the best industrial performance. In addition, the 3.5" CT-DR101 SBC can also withstand a wide range of temperatures ranging from -40°C to 75°C.





## CT-NR101 1.8" SBC with R1606G

The CT-NR101 1.8" Embedded SBC is an extremely compact single board computer with an AMD Ryzen™ Embedded R1606G SoC processor that boosts performance to a new level. This credit card sized SBC comes in an 84 mm x 55 mm form factor, which is great for highly space-constrained embedded applications. In addition, The CT-NR101 supports dual independent 4K displays, expandable mPCIe slots, and a USB Type-C port, reinforcing its compatibility and scalability in this tiny but powerful SBC.



### Key Applications

- AMD Ryzen™ Embedded R1606G Series
- DDR4-2400 Single-Channel Memory (Up to 8GB)
- Dual Independent 4K Displays: 2 x Micro HDMI
- Internal eMMC Storage up to 64GB
- Expansion: 1x mCPIe, 1 x SMBus
- 1 x USB 3.2 (5GB) Type-C (5V/3A)
- 1 x Intel GbE LAN

### Dual UHD 4K Displays

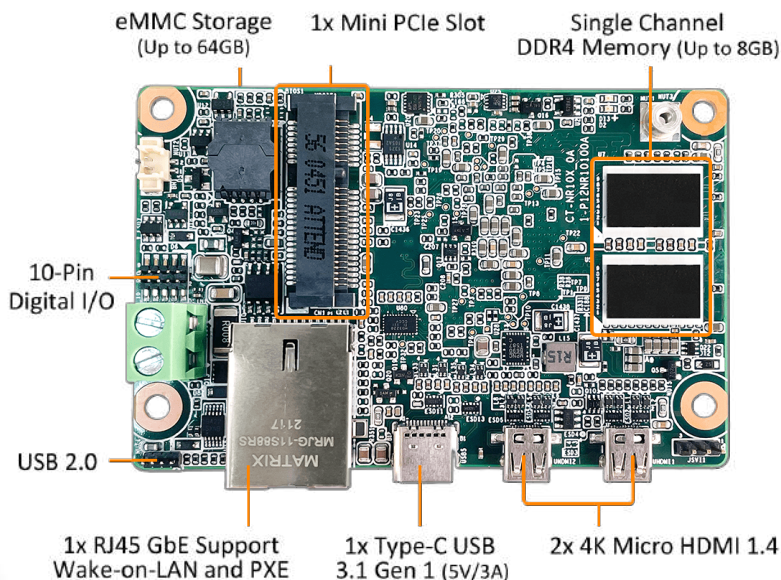
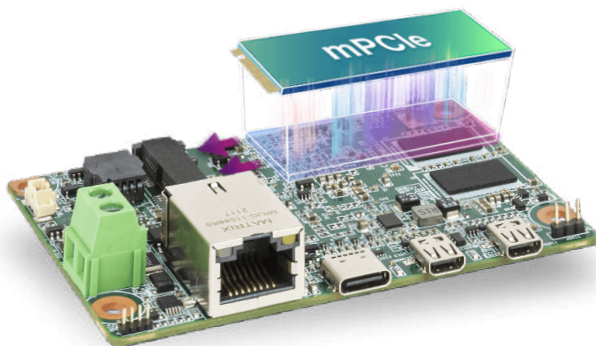
The 1.8" CT-NR101 supports dual ultra-high-definition 4K displays through its 2x micro-HDMI 1.4 ports. Powered by the AMD Ryzen™ Embedded R1606G, the CT-NR101 can handle powerful multimedia applications even from the smallest embedded systems.





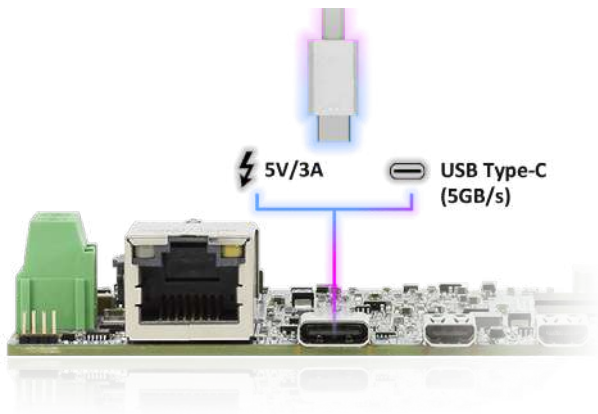
## Expandable mPCIe Slot

The 1.8" CT-NR101 has a dedicated mPCIe slot for additional performance accelerator expansion such as wireless cards, storage, or even AI accelerators. In addition, the scalable mPCIe slot provides a further performance enhancement for this ultra-small and lightweight SBC.



## USB Type-C Port

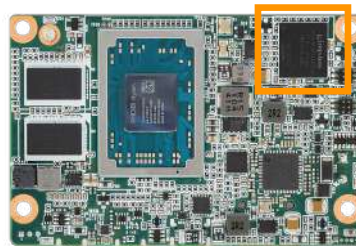
The USB Type-C port can support 5GB/s transfer speed and power (5V/3A) to an external device. With the mass adoption of USB Type-C, the CT-NR101 is future and deployment ready for various embedded applications at the edge.



## On-Board eMMC Storage

The 1.8" CT-NR101 is integrated with an embedded Multi Media Card (eMMC) made from NAND flash memory to provide fast storage performance in a space-constrained form factor.

The CT-NR101 can be configured with up to 64GB of eMMC storage.



Bottom View



**WE DESIGN,  
MANUFACTURE, AND  
SERVICE CUSTOMERS  
AROUND THE WORLD**



**NEW**



**3.5" SBC Industrial Motherboard**

**NEW**



**1.8" SBC Industrial Motherboard**

Processor	Support AMD Ryzen™ Embedded R1606G or V1605B Processor	Support AMD Ryzen™ Embedded R1606G Processor
System Memory	2x 260-Pin DDR4 2400 MHz SO-DIMM. Max. up to 32GB (ECC and Non-ECC)	DDR4-2400 Single-Channel Memory 4GB (Up to 8GB, Optional)
Display	1 x DisplayPort, 1 x HDMI, 1 x LVDS	2 x Micro HDMI
Storage	1x SIM socket (M.2 B Key attached) 1x M.2 B Key, 3042, Support SATA 1x SATA 7-Pin Connector	eMMC up to 64GB
Expansion	1 x Full-size Mini PCIe (PCIe x1, USB 2.0)	
I/O	1 x DisplayPort, 1x HDMI, 2x RJ45 2 x USB 3.2 Gen2 (10Gbps), 2x USB 2.0	2 x 5-pin header (4 In/4 Out), 1x RJ45 1 x USB 3.2 Gen 1 Type C (5V/3A) 1 x USB 2.0 (4-pin header, internal)
Internal I/O	2 x 6-Pin Front Panel Header 2 x RS-232/422/485 2 x 4-Bit DIO (4 In / 4 Out) 1 x Front Panel header 1 x 4-Pin FAN Connector 1 x RTC Battery Cable	1 x RTC battery cable
Power	ACPI OVP / OCP / Power reverse protection support, 4-pin power connector (internal), AT/ATX 12V	ACPI 2-pin Terminal Block Pitch=5.0mm, DC 12V
Operating Temperature	-40°C ~ 75°C	0°C ~ 60°C
Dimension	146 mm x 102 mm	84 mm x 55 mm