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Rugged NVIDIA® Jetson Edge AI Computers

Ready for Edge AI Application Deployments

www.neousys-tech.com

Rugged Jetson Edge AI Computers Ideal for Field Deployments

Environmental challenges come into play when deploying systems into the field, challenges such as temperature, dust, vibration, etc. When you throw in other field limitations like unstable power, need for ignition power control in a vehicle, insufficient connectivity/ function/ installation space, etc. are what users may encounter on a daily basis, and can slow down project developments. For a system to operate stably and reliably in the field, a lot of extra resources are spent, time to design, development and tests are done behind the scenes.

Neousys edge AI platforms powered by NVIDIA® Jetson system-on-module are fully integrated with Neousys DNA characteristics that are designed to thrive in harsh environments and operate in limited conditions. Neousys systems can easily be implemented into solutions and deployed into the field, saving cost, additional testing and development time.

By supporting various camera interfaces, the platform enables significant AI performance and vision capability for AI-based video analytics or pre-processing applications in vehicles, roadside or robotics.

Ready for Deployment

Wide Temperature Fanless Operation

Unique and efficient thermal design capable of operating from -25°C and up to 70°C. Benefited by the low power consumption of Jetson system-on-module, NRU series comes in fanless design that can overcome dusty environments in confined spaces.

Versatile Camera Interfaces Support

Compatible with PoE/ USB3/ GMSL interfaces to support IP, GigE, PTZ, GMSL, and GMSL2 cameras for different vision-based applications that require image acquisition, and low latency in dynamic lighting conditions.

Efficient and Powerful AI Performance

Offers significant AI inference performance up to 275 TOPS while consuming minimum power. This efficiency allows longer battery operating time in AGV/ AMR applications.

5+ Years Longevity

Thanks to NVIDIA® Jetson system-on-module, the platforms feature long product life cycle to reduce maintenance cost and development effort.

Ready for In-vehicle/ Mobile Applications

Featuring damping brackets, screw-lock mechanism, wide-range DC input, ignition control, CAN bus, and wireless module for communication, NRU series is designed to operate reliably in in-vehicle conditions.

Rugged AI NVR for Intelligent Video Analytics

Designed for Roadside/ In-vehicle IVA Applications

NRU-S series is a one-stop AI network video recorder (NVR). Different to a SoM development board, the NRU coupled the Jetson platform with industrial grade power and thermal design. It offers fanless operation from -25°C to 70°C, and can be deployed on the roadside or in a vehicle for AI-based video analytics applications.

POE+/ POE++ CAMERA SUPPORT

Features IEEE 802.3bt PoE+ GbE ports for IP/ industrial GigE cameras that can deliver power and transmit data on the same cable. The PoE++ GbE port supports PTZ cameras for large field of view and precision surveillance.

REAL-TIME AI VIDEO TRANSCODING

Capable of video storage, decoding, encoding, inference and streaming back to the video management system for AI-based IVA to enable real-time responses.

FLEXIBLE EXPANSION FOR CUSTOMIZATION

Supports mini-PCIe and M.2 socket for WiFi/ GNSS/ NVMe storage/ V2X/ CAN/ 4G/ 5G modules and external connectivity for customized requirements.

HIGH PERFORMANCE & EASY ACCESS STORAGE

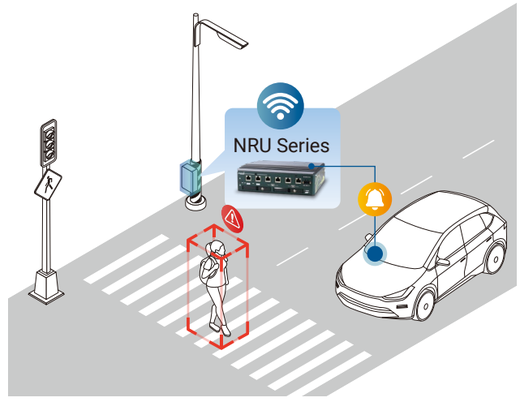
The system comes with two front-accessible 2.5" HDD/ SSD trays for easy access storage and an M.2 2280 socket for fast NVMe SSD read/write performance.

Model Name	NRU-120S	NRU-52S+/ NRU-52S	NRU-222S	NRU-220S
System-on-Module	Jetson AGX Xavier™	Jetson Orin™ NX/ Xavier™ NX	Jetson AGX Orin™	
AI Performance	32 TOPS	100 TOPS	275 TOPS	
Ethernet Port	4x GbE PoE+ ports	4x GbE PoE++ ports	2x 2.5 GbE & 4x GbE PoE+ ports via M12 Connectors	2x 2.5 GbE & 4x GbE PoE+ ports

Real-time Infrastructure-based Analytics

In this application, the role of Neousys NRU computer is to identify and predict possible dangers between pedestrians, vehicles, or other road users. Our customer integrated an NRU computer into the roadside management system to offer real-time infrastructural perception. The system offers full situation awareness and sends warnings to connected autonomous vehicles approaching the area.

As a power-efficient wide-temperature edge AI computer to be deployed in confined and dusty roadside-outdoor environments, NRU platform connected with IP cameras and sensors receive video and data to enable real-time perception for AI applications such as object recognition, pedestrian detection, etc., and sends alert to the moving connected and autonomous vehicles approaching that particular intersection in advance.

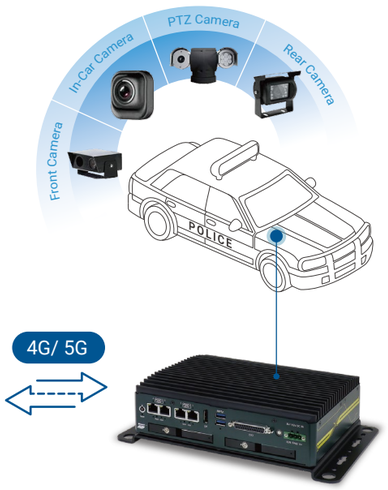


Automatic License Plate Recognition on Vehicle

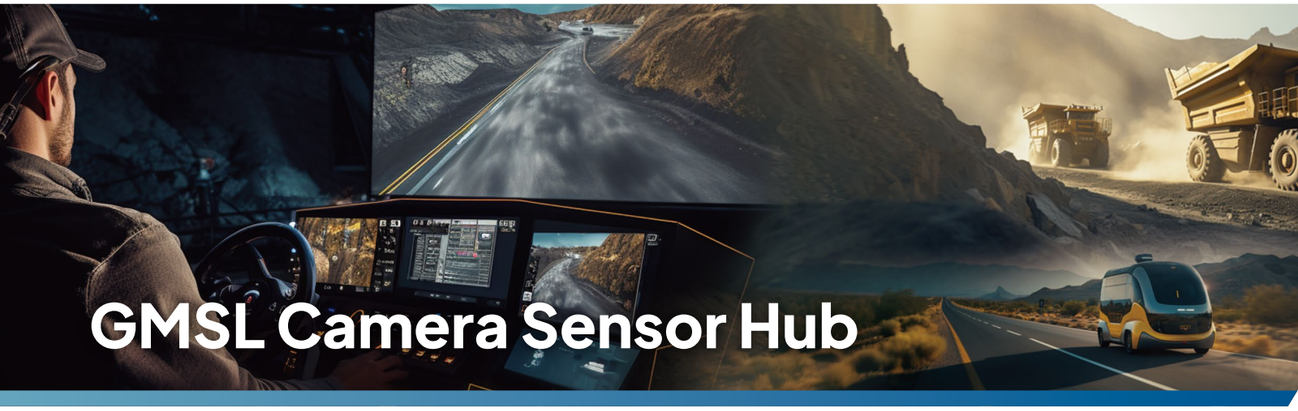
AI-based ALPR (automated license plate recognition) helps police acquire clear plate images as evidence to issue fines, or to detect and find stolen vehicles. It provides higher accuracy under dynamic lighting conditions than CPU-based LPR. The data can initially be checked against a smaller database stored on police vehicles or uploaded back onto the server to be crosschecked with the backlogged database.

By connecting IP cameras via PoE, NRU series can offer up to 275 TOPS for video analytics with H.264/H.265 video decoding and real-time inference capability. The recognized licenses can then be cross-checked with plate information stored in the database, or uploaded to central control for processing via 5G/ 4G wireless network.

Central Control Room



NRU Series



GMSL Camera Sensor Hub

A Sensor Hub/ Perception Unit for Autonomous Vehicles and Teleoperation

Due to difficulties deploying GMSL automotive cameras on x86 infrastructure, the NRU-V series was created. It is a rugged sensor hub with GMSL/ GMSL2 automotive camera and LiDAR connectivity. Ideal for applications that require low latency and high image quality in variable lighting conditions, it can be deployed for teleoperation or autonomous driving.

GMSL/GMSL2 CAMERAS FOR VARIABLE LIGHTING ENVIRONMENTS

GMSL cameras feature IP67 characteristic, high dynamic range (>120dB HDR), auto white balance (AWB), and LED flickering mitigation (LFM) to obtain high-quality images with minimal latency for dynamic lighting conditions.

UNIQUE SYNCHRONIZATION MECHANISM

Capable of acquiring images simultaneously from all of GMSL cameras connected to the platform, and align with sensors such as GPS PPS signal and LiDAR for accurate view of environments.

REAL-TIME LIVE STREAM H.264/ H.265 ENCODED VIDEOS

Supports H.264/ H.265 video codec to encode video captured by GMSL cameras and live stream with minimal loss and latency via 5G/ 4G network.

BUILT-IN 10GBASE-T ETHERNET

The built-in 10GBASE-T connection allows for complex raw camera images to be promptly transmitted to a powerful x86 GPU server for multiple AI modules and perception processing.

Deploy an Edge AI Computer or Accommodated a Frame Grabber in Host Computers for Autonomous Applications

NRU-51V+/ NRU-51V NRU-110V

Rugged Camera Sensor Hub

Turnkey solution with on-board deserializers for automotive GMSL/ GMSL2 camera inputs.

PCIe-GL26

GMSL2 Camera Frame Grabber Card

Enables AI capabilities when installed into a computer with PCIe expansion.

Sony IMX390 CMOS Sensor Camera

Intel® RealSense™ D457 GMSL2 Camera

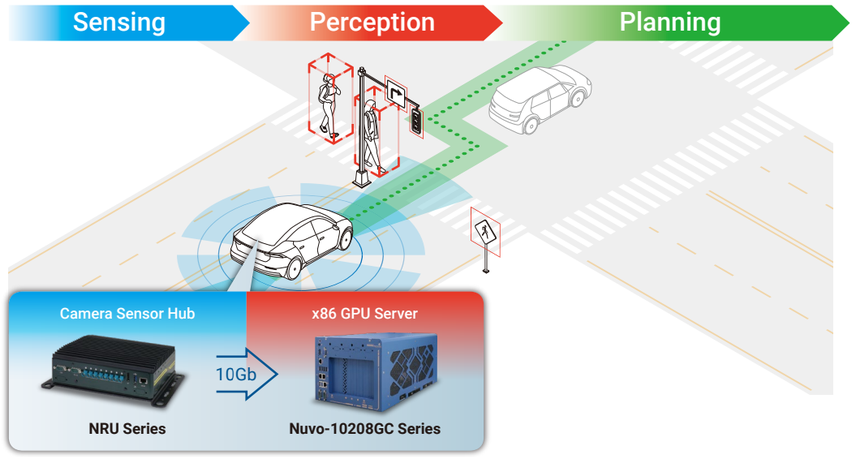
Tier IV C1

Compatible GMSL/ GMSL2 Cameras

Autonomous Shuttle Bus

Acting as a shuttle bus, autonomous vehicles operate under constrained areas traveling from A to B, and vice versa. To cope and recognize conditions along the planned route, autonomous vehicles require sensing, perception and planning capabilities.

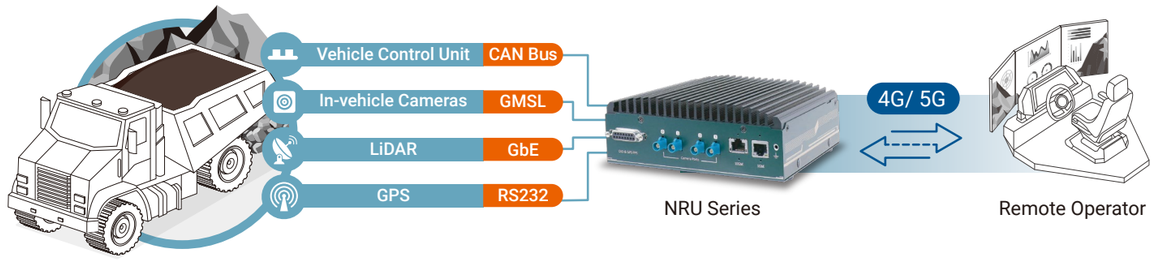
In this use case, NRU series can act as a camera sensor hub to collect synchronized data from sensors, and transfer raw camera images through its built-in 10GBASE-T Ethernet to another powerful GPU server for perception processing, enabling multiple AI models for complicated road conditions such as pedestrian detection, traffic light detection, lane detection, vehicle movement prediction, etc.



Teleoperation of Off-highway Vehicles

Teleoperation plays an important role in autonomous off-highway vehicles for mining, agriculture, construction and logistics. It removes the operator from danger, reduces operation costs and increases efficiency. With a single operator, it is possible to monitor and control a fleet of vehicles remotely and safely.

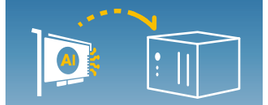
By deploying NRU series into off-highway vehicles, it provides great video encoding capability with GMSL cameras to compress the video streams with minimal loss and live stream via 5G with minimum latency. The system is capable of fanless operation in -25°C to 70°C temperatures, consumes minimum power, and offer impeccable reliability.



Intelligent Frame Grabber Card

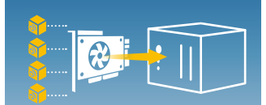
Add AI Performance to Computer Vision Applications

Neousys intelligent frame grabber cards are innovative industrial-grade solutions for AI capability upgrade on existing solutions. For ease of integrating into existing 19" rack-mount IPC or expansion box PCs, Neousys carefully designed the cards' power, thermal and mechanical aspects, allowing the cards to consume minimal energy, expel less heat, and use less resources while maximizing AI performance.



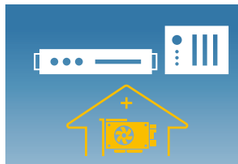
POWER-EFFICIENT AI PERFORMANCE

Offers up to 100 TOPS INT8 of AI inference performance, the card can offload the deep-learning image processing from host computer by pre-processing the data.



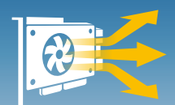
POE+ OR USB CAMERAS EXPANSION

Expand PoE+ or USB cameras connectivity for host computer to enable data pre-processing and intelligent video analytics on a PCIe card.



CONVENIENT AND EFFECTIVE UPGRADE

Available in standard single-slot and half-length form factor for existing 19" rack-mount IPC or expansion box PC. They are also Windows and Linux compatible.



BUILT FOR INDUSTRIAL ENVIRONMENTS

With the heatsink designed to completely engage with the SoM module to effectively regulate thermals, the cards are capable of operating from -25°C to 60°C wide temperature range for the most of existing AOI systems on the market.

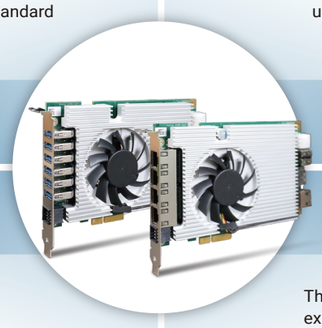
AI Upgrade Made Easy

Compared to traditional GPU card-based AI upgrade, which needs at least two PCIe slots, the cards only need one half-length, standard height PCIe slot.

The cards can quickly adapt to existing rule-based 19" rack mount IPC without upgrading the CPU and GPU card.

Minimal PCIe Slot Requirement

Minimal Performance Upgrade Cost



Minimal Thermal and Power Requirements

Minimal Software Upgrade Effort

The -25 to 60°C wide-temperature operation is compatible with most systems. It can also be powered by the PCIe connector directly, without the need for an extra power cable.

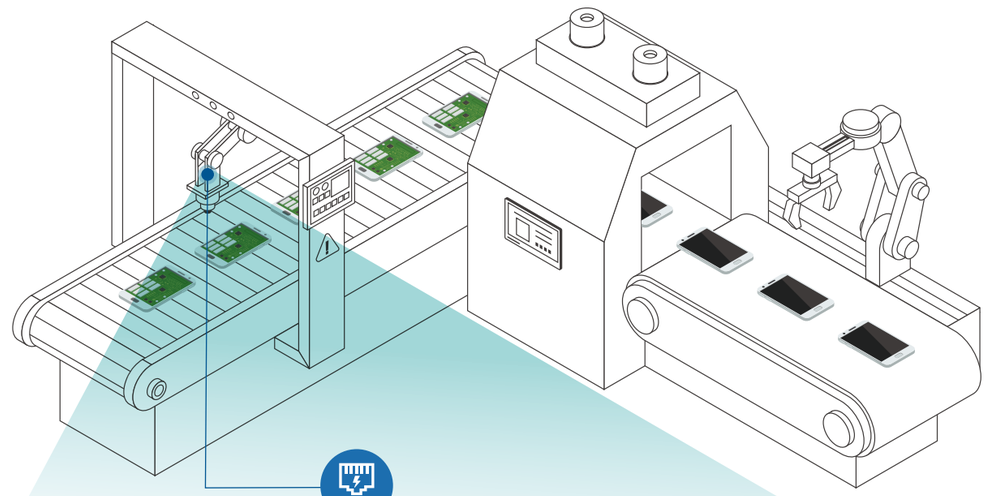
The software modification on the existing AOI system is minimized since the major AI inspection task will be completed on the cards, from video streaming, image pre-processing, and inference.

AI-powered Inspection

AI overcomes inspection challenges traditional rule-based AOI solutions face, such as defects on transparent, reflective, and complex surfaces. It enables deep learning-based vision inspection for AOI demands from automotive, semiconductor, food, metal treatment, glass, oil and gas industries, to increase the efficiency and accuracy of recognition and identification. However, the upgrade from a CPU-based AOI system to a CPU plus GPU-based AOI system is costly.

PCIe -NX154PoE can quickly adapt to existing rule-based 19" rack mount IPC without upgrading the CPU. It offloads the host CPU with built-in computing power performance. PCIe-NX154PoE obtains camera video data, runs AI inference, and only sends the result back to the host PC. Furthermore, while expanding the AI inspection scenarios on the existing AOI system, the system integrator can add additional PCIe-NX154PoE for more AI performance and camera connectivity while maintaining minimum load from host CPU.

Being wide operating temperature capable, Windows and Linux compatible, compact single-slot width, half-length PCIe card footprint, it can be installed into most if not all box PCs.



Specification Table




	Rugged AI NVR			GMSL Camera Sensor Hub
Model Name	**NRU-220S/NRU-222S**	**NRU-52S+/NRU-52S**	**NRU-120S**	**NRU-51V+/NRU-51V**
Chassis				
Dimensions (W x D x H)	230 x 173 x 66 mm	173 x 144 x 60 mm	230 x 173 x 66 mm	173 x 144 x 60 mm
Weight	2.6 kg	1.4 kg	2.7 kg	1.4 kg
Chassis Construction	Aluminum alloy with heavy duty metal	Aluminum alloy with heavy duty metal	Aluminum alloy with heavy duty metal	Aluminum alloy with heavy duty metal
System				
Processor	NVIDIA® Jetson AGX Orin™	NVIDIA® Jetson Orin™ NX NVIDIA® Jetson Xavier™ NX	NVIDIA® Jetson AGX Xavier™	NVIDIA® Jetson Orin™ NX NVIDIA® Jetson Xavier™ NX
Memory	32GB/ 64GB	Orin™ NX 8GB/ 16GB Xavier™ NX 8GB/ 16GB	32GB	Orin™ NX 8GB/ 16GB Xavier™ NX 8GB/ 16GB
I/O Interface				
PoE/GMSL/GMSL2	IEEE 802.3at PoE+ PSE for Port 3 ~ Port 6	IEEE 802.3bt PoE++ for 4 GbE ports	IEEE 802.3at PoE+ for 4 GbE ports	4x GMSL2 FAKRA Z
Ethernet	2x 2.5GbE + 4x shared GbE ports (NRU-220S: via RJ45 / NRU-222S: via M12)	4x GbE ports	-	1x 10GBASE-T 10G 1x 1GBASE-T 1GbE
Video Port	1x DisplayPort	1x DisplayPort	2x DisplayPort	1x DisplayPort
Serial Port	1x isolated RS-485 2x RS-232	1x RS-232/422/485	1x RS-232	1x RS-232/422/485
USB 2.0	2	-	-	-
USB 3.2/ USB 3.1	1	2	3	2
CAN Bus	2x CAN 2.0	1x CAN 2.0	1x CAN 2.0	1x CAN 2.0
Digital I/O	4 DI + 4 DO	1x GPS PPS, 3 DI + 4 DO	1x GPS PPS, 3 DI + 4 DO	1x GPS PPS, 3 DI + 4 DO
Storage Interface				
SATA HDD	2x front-accessible 2.5" 7mm SSD	-	2x front-accessible 2.5" SSD	-
M.2 (M-key)	1x M.2 M-key	-	1	-
Expansion Bus				
Mini PCI-E	2	2	1	2
M.2 (B-key/E-Key)	1x M.2 B-key	1x M.2 B-key	-	1x M.2 B-key
SIM	3	2	1	2
Power Supply				
DC Input	8V to 48V DC	8V to 35V DC	8V to 35V DC	8V to 35V DC
Ignition Control	Built-in	Built-in	Built-in	Built-in
Environmental				
Operating Temperature	-25°C ~ 70°C (30W TDP mode)	-25°C ~ 70°C (15W TOP mode with 50W PoE++) -25°C ~ 70°C with optional fan kit (15W TOP mode with 144W PoE++)	-25°C ~ 50°C (MAX TDP mode) -25°C ~ 70°C (30W TDP mode) -25°C ~ 70°C with optional fan kit (all modes)	-25°C ~ 60°C (15W TDP mode) -25°C ~ 70°C with optional fan kit (15W TDP mode)
Certification	CE/ FCC, MIL-STD-810H	CE/ FCC, MIL-STD-810G	CE/ FCC, MIL-STD-810G	CE/ FCC, MIL-STD-810G




	GMSL Camera Sensor Hub		Intelligent Frame Grabber Card	
Model Name	**NRU-110V**	**PCIe-GL26**	**PCIe-NX154PoE**	**PCIe-NX156U3**
Chassis				
Dimensions (W x D x H)	230 x 173 x 66 mm	167.7 x 111 mm	167.7 x 111 mm	167.7 x 111 mm
Weight	2.7 kg	0.43 kg	0.4 kg	0.4 kg
Chassis Construction	Aluminum alloy with heavy duty metal	Aluminum alloy with heavy duty metal	Aluminum alloy with heavy duty metal	Aluminum alloy with heavy duty metal
System				
Processor	NVIDIA® Jetson AGX Xavier™	NVIDIA® Jetson Xavier™ NX	NVIDIA® Jetson Orin™ NX	NVIDIA® Jetson Orin™ NX
Memory	32GB	8GB/ 16GB	8GB/ 16GB	8GB/ 16GB
I/O Interface				
PoE/GMSL/GMSL2	8x GMSL FAKRA Z	6x GMSL2 FAKRA Z	IEEE 802.3at PoE+ for 4 GbE ports	-
Ethernet	1x 10GBASE-T 10G	1x GbE port	4x 2.5GBASE-T	1x GbE port
Video Port	2x DisplayPort	1x DisplayPort	1x DisplayPort	1x DisplayPort
Serial Port	1x RS-232	1x RS-232	1x RS-232 1x isolated RS-485	1x RS-232 1x isolated RS-485
USB 2.0	-	2	2	2
USB 3.2/ USB 3.1	3	-	-	6
CAN Bus	1x CAN 2.0	1x CAN 2.0	-	-
Digital I/O	1x GPS PPS, 3 DI + 4 DO	1x GPS PPS	-	-
Storage Interface				
SATA HDD	-	-	-	-
M.2 (M-key)	1	1	1	1
Expansion Bus				
Mini PCI-E	1	-	-	-
M.2 (B-key/E-Key)	-	-	-	-
SIM	1	-	-	-
Power Supply				
DC Input	8 to 35V DC	12V DC or Powered by PCIe connector directly	12V DC or Powered by PCIe connector directly	12V DC or Powered by PCIe connector directly
Ignition Control	Built-in	-	-	-
Environmental				
Operating Temperature	-25°C ~ 50°C (MAX TDP mode) -25°C ~ 70°C (30W TDP mode) -25°C ~ 70°C with optional fan kit (all modes)	-25°C ~ 60°C (20W TDP mode)	-25°C ~ 60°C (20W TDP mode)	-25°C ~ 60°C (20W TDP mode)
Certification	CE/ FCC, MIL-STD-810G	CE/ FCC	CE/ FCC	CE/ FCC