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IoT
Solutions

A4EON[®]
an ASUS[®] ASSOC. CO.

UNLOCKING MORE POWERFUL AND EFFICIENT COMPUTING SOLUTIONS WITH 11TH GEN INTEL[®] CORE[™] U



ROBOT



RETAIL



WAREHOUSE



TRANSPORTATION



Introduction

A leading manufacturer in embedded boards, systems, developer boards and Industrial PC solutions, AAEON is dedicated to bringing the latest technology to industrial grade platforms to power next generation embedded applications from automation to AI Edge Computing and more. AAEON is unleashing a broad product portfolio featuring the 11th Generation Intel[®] Core™ U embedded processors, formerly Tiger Lake, taking advantage of the technological benefits of the CPU platform to deliver higher performance with greater efficiency and better cost to performance than previous generations of embedded processors.

AAEON combines our years of experience and expertise in designing hardware solutions with our partnerships with suppliers and customers to design, develop and deliver the products that meet the needs of today's applications while driving the deployment of tomorrow's. AAEON has developed nine product solutions utilizing the 11th Gen Intel Core across four of our business divisions, including our UP Bridge-the-Gap brand. These solutions are designed to fit key roles and requirements in almost any vertical market, powering a wide range of applications.



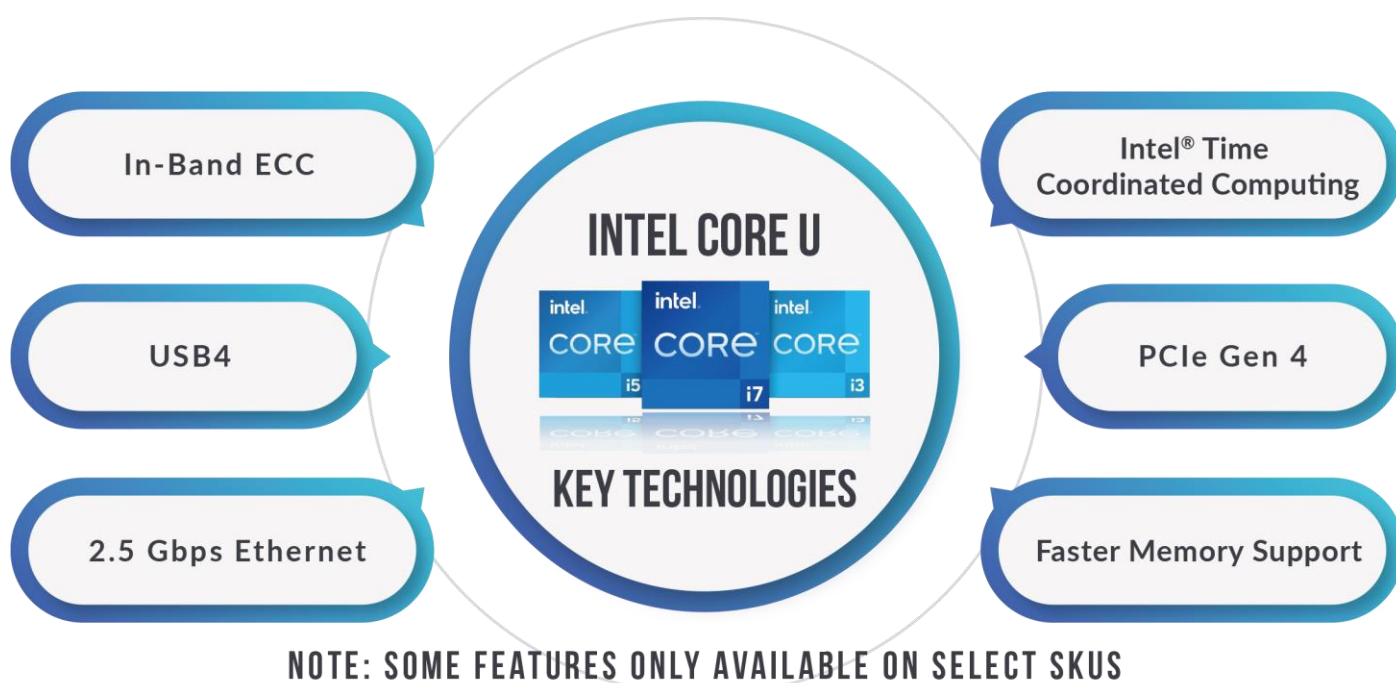
Why AAEON?

AAEON delivers not only industry leading design and innovation in our products, but also a range of services and support to ensure our customers get the product they need. From OEM/ODM services to providing software and SDK support, helping to accelerate development and reduce time to market, helping save costs.



Introduction to 11th Gen Intel® Core™ U

The 11th Generation Intel® Core™ U embedded processors (formerly Tiger Lake UP3) is the latest in Intel's line of embedded processors, built on the Willow Cove microarchitecture, and built using Intel's third generation 10 nm process node known as 10SF (10 nm SuperFin). Compared to previous generation embedded processors, the 11th Generation Intel Core U delivers higher performance and greater efficiency at lower costs, providing outstanding price to performance. The platform also delivers a host of technologies built around IoT-centric deployment, powering faster and more flexible communication. Additionally, the system provides several key benefits making it the perfect platform for a wide range of embedded applications.



Intel® Iris® Xe Graphics

The 11th Generation Intel Core U embedded processors include the Intel® Iris® Xe embedded graphics processor† featuring up to 96 execution units, 50% more than the previous generation. Intel Iris Xe is capable of delivering video quality up to 8K 12-bit HDR on a single display, or 4K 10-bit HDR on two displays. It is also capable of powering up to four independent displays at 4K 60Hz, a feature which every AAEON embedded solution with 11th Generation Intel Core U supports.

Additionally, the Iris Xe graphics can be leveraged for powering AI applications thanks to compatibility with the Intel distribution of OpenVINO™ toolkit. This helps to offload inference processing from the CPU, increasing overall AI compute performance. Additionally, it can work in tandem with AI modules such as the AI Core X and AI Core XM 2280 from AAEON, powered by the Intel® Movidius® Myriad™ X.

†Intel Iris Xe only available on Core i7 and Core i5 processors.

The AAEON Advantage

AAEON leverages the benefits and technologies of the 11th Generation Intel Core U processors to deliver hardware platform solutions to meet the needs of our customers, through providing compact, efficient, high-performance systems and boards that come at a price point well within budget. AAEON focuses on the needs of clients and builds solid relationships with our technology partners to deliver solutions that help accelerate deployment and reduce time to market as well as costs. To achieve this, we focus on four key advantages: Price to Performance, Compact Size, Embedded Deployment, and Rugged Design.

Price to Performance

The 11th Generation Intel Core U processors achieve greater performance than previous generation while coming in at a comparable or even lower price. AAEON passes this benefit on to our customers by listening to our customers to determine exactly the features they need, avoiding waste by cutting out features that are not desired or wanted.

Compact Size

By utilizing embedded processors, AAEON can deliver the performance of the 11th Generation Intel Core U processor on highly compact form factors, such as the NanoCOM-TGU built on the COM Express Mini Type 10 form factor, or the BOXER-6450-TGU designed to fit into tight spaces such as machine cabinets or robots.

Embedded Deployment

AAEON brings industry leading experience and expertise to developing platforms built for embedded deployment. From reliable designs to fan-less systems that keep dust and contaminants out, AAEON hardware solutions leverage the efficiency of the 11th Generation Intel Core U processors to deliver computing capabilities exactly where it needs to be.

Rugged Design

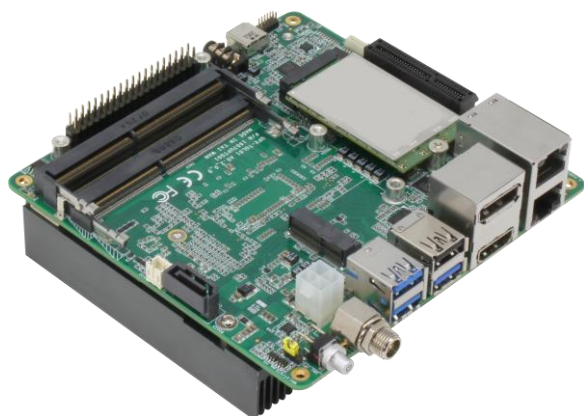
AAEON platforms are built to work in a wide range of environments, from retail stores to manufacturing facilities. With the low TDP of the 11th Generation Intel Core U processors, AAEON boards and systems feature wide voltage inputs as well as innovative thermal design that wide operating temperatures and support for extended temperature range CPUs.

Built for the Edge

AAEON is helping to accelerate AI Edge Computing by delivering platform solutions designed to take advantage of the latest in AI and Edge technology. From multiple expansion slots to high bandwidth LAN connections, as well as AI solutions ready to go out of the box, users and developers both can find the hardware they need to deploy their AI Edge applications quickly and easily.

Extreme Edge Performance with UP Xtreme i11

The pinnacle of flexibility, the UP Bridge-the-Gap brand of embedded developer boards from AAEON delivers two powerful solutions with the 11th Generation Intel Core U processors, the UP Xtreme i11 board and the UPX-Edge i11 system solution. This latest generation platform delivers processing performance up to 20% higher than previous generation boards, supporting up to 64GB SO-DIMM memory.



UP Xtreme i11 with 5G module (sold separately)

The UP Xtreme i11 takes full advantage of Intel's IoT-centric design to deliver a platform built for AI at the Edge. Utilizing the industrial platform Intel Core U processors, the UP Xtreme i11 supports a range of technologies that deliver higher bandwidth connections for real-time applications with 2.5 Gbps Ethernet LAN supporting both Intel® Time Coordinated Computing (Intel® TCC) and Time-Sensitive Networking (TSN). The UP Xtreme i11 supports Wi-Fi 6 and features an M.2 2230 slot for users to deploy their preferred wireless networking modules. Additionally, the UP Xtreme i11 provides higher bandwidth expansion slots, including an PCIe Gen 4 [x4] slot and an M.2 3052 slot designed

and tested to support the most popular 5G modules on the market.

The key of the UP Xtreme i11 is being AI ready out of the box. This is thanks to compatibility with the Intel distribution of OpenVINO toolkit, allowing developers and users to take advantage of the onboard Intel Iris Xe graphics chipset. Additionally, the UP Xtreme i11 expands the scalability potential of the UP ecosystem, whether it's migrating a proof of concept from another UP board, up grading from the previous generation UP Xtreme, or adding on AI modules to the UP Xtreme i11 thanks to its M.2 2280 and PCIe Gen 4 slots. The UP Xtreme i11 also features USB4.0 Type C and a 40-pin GPIO header.

The UPX-Edge i11 brings all the features of the UP Xtreme i11 to a system level solution. Built compact and rugged, it is the perfect solution for AI Edge developers needing a standalone system to power their applications. The UPX-Edge i11 delivers the same technologies and performance capabilities of the 11th Generation Intel Core U processors, along with external GPIO and several antenna slots to support 5G networks, as well as Wi-Fi Edge gateway applications. The UPX-Edge i11 is even more compact than the previous generation design, making it easier to deploy right where you need it.



UPX-Edge i11

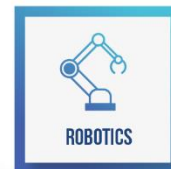
The UP Xtreme i11 is available as an Intel Foundation kit, including everything you need to get your proof of concept or application up and running quickly. You can find the UP Xtreme i11 Foundation Kit on Intel's website at <https://up-board.org/up-xtreme-i11-edge-compute-enabling-kit/>

AAEON Embedded Board Solutions

AAEON is the industry leader in developing compact embedded solutions designed to power a wide range of applications, from AI Edge computing to automation, Smart Factory, and more. AAEON delivers the 11th Generation Intel Core U processors on four compact platforms utilizing popular form factors and designed for industrial use. Each offer high performance, broad I/O features, and expansion support to power any project. Every board supports the extended temperature range Intel Core U embedded processors, delivering greater reliability and consistent performance in any environment.

GENE-TGU6 Subcompact Board

The GENE-TGU6 subcompact board brings the power of 11th Generation Intel Core U processors to the 3.5" subcompact form factor, roughly the same footprint as a typical 3.5" hard drive. The board delivers greater flexibility for developers and users, taking full advantage of the Intel Core U capabilities with support for up to 64 GB of memory, multi-monitor support for up to 4 independent displays at 4K 60Hz, and greater expandability with two M.2 slots and one Mini Card slot. The GENE-TGU6 is built to power advanced embedded applications, such as AI Edge Server, Edge IoT Gateway, Robotics and Autonomous Guided Vehicles (AGVs).



PICO-TGU4

Many of AAEON's PICO-ITX boards are often compared to a certain popular maker board. Besides the compact size, there is no comparison between the high performance, capabilities, and industrial design of the PICO-TGU4 with consumer grade boards. The PICO-TGU4 delivers great performance along with up to 32 GB of onboard LPDDR4x memory. The PICO-TGU4 features an M.2 2280 slot featuring PCIe Gen 4 speeds, supporting the next generation of AI accelerators, as well as a Mini PCIe slot with support for Wi-Fi, Bluetooth and more. The PICO-ITX also delivers greater flexibility with four USB3.2 ports and four USB2.0, for a total of eight USB ports; as well as dual LAN ports, with Intel i225 2.5 Gbps and Intel i219 with Intel® vPro support.



COM-TGUC6

AAEON brings the 11th Generation Intel Core U to the COM Express Compact Type 6 form factor with the COM-TGUC6. Supporting up to 64GB of RAM, the COM-TGUC6 features a compact, low-profile design, allowing it to easily fit in anywhere it's needed. The board supports a wide range of high-bandwidth I/O options including the Intel® i225 chipset onboard to power 2.5 Gbps ethernet, as well as four USB3.2 Gen 2 ports, and PCI Express Graphics (PEG) Gen 4 [x4] expansion lanes. The COM-TGUC6 also supports up to three DDI outputs, one VGA, and features LVDS and eDP support, perfect for digital signage or smart display applications.



NanoCOM-TGU

The NanoCOM-TGU is the ultimate expression of compact size, ease of maintenance, and powerful computing capabilities. Built to the COM Express Type 10 mini form factor, the NanoCOM-TGU allows users to deploy the 11th Generation Intel Core U processors into any tight space where it's needed. And by using the COM Express platform, it is even easier to upgrade existing systems as well as perform any maintenance needed. The NanoCOM-TGU features onboard NVMe storage for fast read and write speeds, as well as 16GB of LPDDR4x memory, and support for 2.5 Gbps ethernet.



Compact Industrial Systems

AAEON is delivering a pair of compact, fanless systems featuring the 11th Generation Intel Core U processors, designed for consistent, reliable performance in any environment. With slim, low impact footprint and lightweight design, the BOXER-6643-TGU and BOXER-6450-TGU are designed to easily fit into and onto any application, from machine control cabinets, to AGVs and robotics. Both offer broad I/O features including 2.5Gbps ethernet, and take advantage of the Intel Iris Xe graphics to help power AI at the Edge.



BOXER-6643-TGU

The BOXER-6643-TGU leverages the combination of 11th Generation Intel Core U processor and Intel Iris Xe to bring a compact embedded system capable of powering AI Edge applications such as AGVs and robotics. Built for rugged environments, its fanless design keeps dust and contaminants out. It also features a cable-less design, meaning every component, including the SATA III 2.5” bay, is connected directly to the main board, eliminating the chance of components coming loose in high-vibration environments. Additionally, the system supports NVMe storage, as well as the latest in high-speed communication with both 2.5 Gbps LAN and support for 5G cellular modules.



BOXER-6643-TGU



BOXER-6450-TGU (Preliminary)

BOXER-6450-TGU

The BOXER-6450-TGU is designed to deploy into any tight space, such as machine cabinets, to deliver the power of the 11th Generation Intel Core U processors to powering machine controllers, human-machine interface (HMI), as well as industrial IoT and Edge applications. The BOXER-6450-TGU leverages Intel technology to deliver high-speed processing capabilities with 32GB of 4267MHz LPDDR4x, helping to eliminate bottlenecks and deliver real-time results. With a wide operating temperature of -20° to 50°C, the system provides reliable consistent performance thanks to its fanless design.

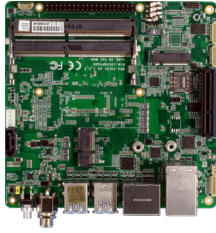
Note: Preliminary specifications, details for BOXER-6450-TGU may change

MIX-TLUD1: Industrial Motherboard Solution

AAEON is bringing the 11th Generation Intel Core U processors to IPC applications with the MIX-TLUD1 industrial Mini-ITX motherboard. The MIX-TLUD1 combines the Intel Core processor with up to 64GB of 3200MHz DDR4 memory to ensure top end processing performance. Additionally, the board leverages the embedded Intel Iris Xe to power up to four displays at 4K 60Hz simultaneously, achievable thanks to two HDMI2.0 and two DP1.4 displays. Additionally, the MIX-TLUD1 features LVDS/eDP output for panel displays and other embedded applications. This brilliant display support is perfect for applications such as Digital Signage and airport X-ray security machines.

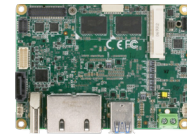
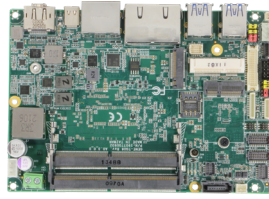
The MIX-TLUD1 delivers a host of high-speed I/O ports, including a total of four USB3.2 Gen2 ports (two rear I/O ports, two front I/O header), 2.5Gbps Ethernet and 1Gbps Ethernet, as well as PCIe 3.0 [x4], M.2 2280 and Mini PCIe expansion slots. The MIX-TLUD1 offers a low-profile design that can easily fit into tight spaces, delivering workstation capabilities to a wide range of applications.





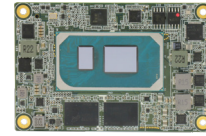
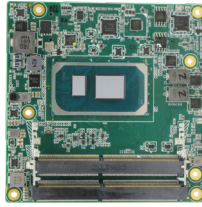
MODEL	UP Xtreme i11
System	
Processor	11th Gen Intel® Core™ Processor SoC Core i7-1185GRE Core i5-1145GRE Core i3-1115GRE Celeron® 6305E
Graphics	Intel® Iris® Xe graphics
I/O	RJ45 Ethernet Connector x 2 HDMI/DP Stack Connector x 1 Power Button / LED x 1 DC Connector (Lockable) x 1 10-pin USB 2.0 x 2 / HSUART x 1 SATA Connector with Power Connector (5V, GND) x 1 4pin Fan Connector x1 6pin Front Panel Header M.2 2230 E Key x 1 M.2 2280 M Key x 1 USB 4.0 40-pin HAT Connector x 1 M.2 3052 B Key x 1 with SIM 10-pin RS232/422/485 Pin Header x 2 Alternative 4pin ATX Connector Behind DC Connector
Camera	—
USB	USB 3.2 Gen 2 Type A x 3 USB 2.0 x 1 USB4.0 x 1 Type-C
Expansion	M.2 2230 E Key x 1 M.2 2280 M Key x 1 M.2 3052 B Key x 1 40-pin HAT Connector x 1 PCIe x 4 Slot
RTC	RTC battery, CR2032 x 1
Power	12V
Dimension	120.35 x 122.5 mm
Memory	DDR4 S0-DIMM Slot x 2 (up to 64GB 3200Mhz)
Storage	SATA3 (6Gb/s) x 1: a. SATA Connector x 1 b. M.2 2280 M Key NVMe(PCIe [x2])
Display Interface	HDMI 2.0 x 1 DP 1.4 x 1 + eDP x 1, 4K at 60hz internal panel
Ethernet	Intel® i225IT (TSN) x 1, Intel® i219 (vPRO) x 1
TPM	—
OS Support	Win 10/IOT Linux Ubuntu 20.04 with Kernel 5.4 Linux Yocto 3.0 with Kernel 5.4
Operating Temperature	32°F ~ 140°F (0°C ~ 60°C)
Operation Humidity	0% ~ 90% relative humidity, non-condensing
Certification	CE/FCC class A, RoHS Compliant, REACH

Model	UPX-Edge i11
System	
CPU	11th Gen Intel® Core™ Processor SoC Core i7-1185GRE Core i5-1145GRE Core i3-1115GRE Celeron® 6305E
Memory	DDR4 S0-DIMM Slot x 2 (up to 64GB 3200Mhz)
Graphics	Intel® Iris® Xe graphics
Storage	SATA CONN x 1 with POWER CONN M.2 2280 M Key NVMe(PCIe [x2])
Ethernet	Intel® i225IT (TSN) x 1, Intel® i219 (vPRO) x 1
WiFi/BT	Optional
Audio	Realtek ALC888s x 1 (Mic /Line out)
USB	USB 3.2 Gen2 x 3 USB 2.0 x 1 (Type A) USB 4.0 via USB type C
Expansion Slot	M.2 2230 E-Key x 1 M.2 2280 M-Key x 1 M.2 3052 B-Key x 1 with SIM SATA3.0 with power connector x 1
I/O Placements	
Power	12V DC-in (Lockable plug)/ Phoenix connector
USB	USB3.2 Gen2 x 3 USB2.0 x 1 (Type A) USB4.0 via USB type C
Display Port	HDM 2.0 x 1 /DP 1.4 x 1 eDP x 1, 4K at 60hz panel
Ethernet	Intel® i225IT (TSN) x 1, Intel® i219 (vPRO) x 1
COM	RS232/422/485 x 2
Environment	
Power	12V (AT & ATX)
Form Factor	124mm x 152mm x 66.5mm
Gross Weight	GW: 2.3kg
Operating Temperature	32°F ~ 140°F (0°C ~ 60°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
Certification	CE,FCC Class A
OS Support	Windows 10 /IOT, Yocto 3.1, Ubuntu 20.04.02



MODEL	GENE-TGU6
System	
Form Factor	3.5" SubCompact Board
CPU	Intel® 11th Generation Core™ i7/i5/i3/Celeron SoC i7-1185G7E (4C, 1.7GHz, up to 4.4GHz, TDP-up 28W) i5-1145G7E (4C, 1.5GHz, up to 4.1GHz, TDP-up 28W) i3-1115G4E (2C, 2.2GHz, up to 3.9GHz, TDP-up 28W) Celeron® 6305E (2C, 1.80GHz, TDP 15W)
CPU Frequency	Up to 4.4GHz
Chipset	Integrated SoC
Memory Type	DDR4 3200MHz SODIMM x2 (Dual Channel ,Non-ECC)
Max. Memory Capacity	Up to 64GB
BIOS	AMI UEFI
Wake on LAN	Yes
Watchdog Timer	255 Levels
Power Requirement	+9 ~ 36V (Optional: +12V)
Power Supply Type	AT/ATX (Default: AT)
Power Consumption (Typical)	TBD
Dimension (L x W)	5.75" x 4" (146mm x 101.7mm)
Operating Temperature	32°F ~ 140°F (0°C ~ 60°C)
Storage Temperature	-4°F~176°F (-20°C ~ 80°C)
Operating Humidity	0-90% @ 40°C, non-condensing
MTBF (Hours)	TBD
Certification	CE/FCC Class A
Display	
VGA/LCD Controller	Intel® Iris® Xe Graphics Intel® UHD Graphics for 11th Gen Intel® Processors
Video Output	DP 1.4a x 2 HDMI 2.0b x 1 Dual Channel 18/24bit LVDS/eDP x 1 (Default: LVDS)
Backlight Inverter Supply	Max 12V, 2A
I/O	
Ethernet	Intel® i219-LM, 10/100/1000Base, RJ45 x 1 (Support Vpro) Intel® i225-LM, 10/100/1000/2500Base, RJ45 x 1 (Support Vpro)
Audio	High Definition Audio Interface, Line-in/Line-out/MIC (Without Amplifier)
USB Port	USB3.2 GEN2 x 4 (Rear I/O) USB3.2 GEN2 Type C x 1 (Rear I/O) USB2.0 x 2 (Pin header)
Serial Port	RS-232/422/485 x 4 (COM2 support 5V/12V/RI)
Parallel Port	—
HDD Interface	—
FDD Interface	—
SSD	SATA 3.0 x 1, SATA power connector x 1(+5V)
Expansion Slot	Full size mSATA/mPCIe x 1 With Nano-SIM (mSATA as default, select by BIOS), M.2 E key 2230x 1 (For WIFI/BT, PCIe/USB signal only), M.2 M key 2280 PCIe x 4
DIO	8bit
SIM	x1(NANO-SMI)
TPM	TPM 2.0
Touch	x1
Others	SMBUS x1, I2C x1 (Optional)

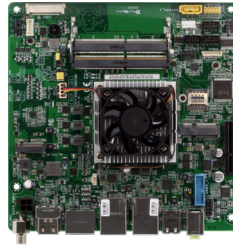
MODEL	PICO-TGU4
System	
Form Factor	PICO-ITX
CPU	Intel® 11th Generation Core™ i7/i5/i3/Celeron SoC i7-1185G7E (4C, 1.8GHz, up to 4.4GHz, TDP-up 28W) i5-1145G7E (4C, 1.5GHz, up to 4.1GHz, TDP-up 28W) i3-1115G4E (2C, 2.2GHz, up to 3.9GHz, TDP-up 28W) Celeron® 6305E (2C, 1.8GHz, TDP 15W) (i7-1185GRE/i5-1145GRE/i3-1115GRE by customer's request)
CPU Frequency	Up to 4.4GHz
Chipset	Intel® Tiger Lake-UP3 SoC Processor
Memory Type	LPDDR4x 3200 MHz on board memory, In-Band ECC (select SKUs)
Max. Memory Capacity	Up to 32GB
BIOS	AMI UEFI
Wake On LAN	Yes
Watchdog Timer	255 Levels
Power Requirement	+12V AT/ATX (default)
Power Supply Type	Lockable & phoenix Terminal co-lay
Power Consumption (Typical)	Intel® i7-1185G7E, LPDDR4x on board 32GB, 2.89A@ +12V
System Cooling	Heat-spreader and cooler optional
Dimension	3.94" x 2.84" (100mm x 72mm)
Gross Weight	0.55 lb (0.25 Kg)
Operating Temperature	32°F ~ 140°F (0°C ~ 60°C)
Storage Temperature	-40°F ~ 176°F (-40°C ~ 80°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing
MTBF (Hours)	424,208
Certification	CE/FCC Class A
OS support	Windows 10 (64bit), Linux Ubuntu 20.04.2/Kernel 5.8
Display	
Chipset	11th Generation Intel® Core™ i7/i5/i3/Celeron SoC
Resolution	HDMI2.0b x 1, 4Kx2K 60Hz eDP x 1, up to HBR3, 8Kx4K 30Hz
LCD Interface	—
I/O	
Storage/SSD	SATA x 1, SATA Power (5V) x 1
Ethernet	Intel® i225, 10/100/1000/2500Base, RJ45 x1 Intel® i219, 10/100/1000Base, RJ45 x1
USB Port	2 x USB3.2 Gen 2/rear IO, 2 x USB3.2 Gen 1/header, 4 x USB2.0/header
Serial Port	RS-232/422/485 x 2
Audio	High Definition Audio Interface, Line-in/Line-out/MIC (optional)
DIO	8-bit
Expansion Slot	M.2 M key 2280 x 1 (PCIe GEN4 as default, SATA select by HW BOM), Full size mPCIe/mSATA or USB2.0 x 1 (PCIe as default, SATA select by BIOS), SMBUS/I2C and eSPI x 1 (SMBUS as default, I2C select by HW BOM)
SIM	—
TPM	2.0



MODEL	COM-TGUC6	NanoCOM-TGU
System		
Form Factor	COM Express Compact size, 95mm x 95mm	COM Express Mini size, 84mm x 55mm
CPU	11th Generation Intel® Core™ Processor Family (formerly Tiger Lake UP3)	11th Generation Intel® Core™ Processor Family (formerly Tiger Lake UP3)
CPU Frequency	—	—
Chipset	SoC	SoC
Memory Type	DDR4 3200 MHz SODIMM x2 (Dual Channel) in-band ECC supported by SoC	Onboard LPDDR4x 3733 MHz memory in-band ECC supported by SoC
Max. Memory Capacity	Up to 64GB	Up to 16 GB
BIOS	AMI UEFI	AMI UEFI
Wake on LAN	Yes	Yes
Watchdog Timer	255 Levels	255 Levels
Power Requirement	Standard: +12V	Standard: +12V
Power Supply Type	—	—
Power Consumption (Typical)	12Vin, TDP up to 15~36W with i7 @ max loading, stable status	12Vin, TDP up to 15~36W with i7 @ max loading, stable status
Dimension (L x W)	3.75" x 3.75" (95mm x 95mm)	3.31" x 2.17" (84 mm x 55 mm)
Operating Temperature	32°F ~ 140°F (0°C ~ 60°C) Option : -40°C ~ +85°C (-40°C ~ +85°C)"	32°F ~ 140°F (0°C ~ 60°C) Option : -40°C ~ +85°C (-40°C ~ +85°C)
Storage Temperature	-4°F ~ 158°F (-20°C ~ 70°C)	-4°F ~ 158°F (-20°C ~ 70°C)
Operating Humidity	0% ~ 90% relative humidity, non-condensing	0% ~ 90% relative humidity, non-condensing
MTBF (hours)	TBD	TBD
Certification	CE/FCC	CE/FCC
Display		
VGA/LCD Controller	Intel® Iris® Xe Graphics Intel® UHD Graphics for 11th Gen Intel® Processors	Intel® Iris® Xe Graphics Intel® UHD Graphics for 11th Gen Intel® Processors
Video Output	LVDS/eDP x 1 (Default : LVDS) , DDI x 3, VGA x 1	eDP x 1, DDI x 1
LVDS Interface	—	—
I/O		
Ethernet	Intel® I225LM Gigabit Ethernet x 1	Intel® I219LM Gigabit Ethernet x 1
Audio	High Definition Audio Interface x 1	High Definition Audio Interface x 1
USB Port	USB3.2 Gen 2 x 4, USB2.0 x 8	USB3.2 Gen 2 x 2, USB2.0 x 8
Serial Port	2-wire UART x 2 (TX/RX)	2-wire UART x 2 (TX/RX)
HDD Interface	SATA 3.0 x 2	SATA 3.0 x 2
Onboard Storage	—	Onboard PCIe NVMe SSD x1, up to 256GB
Expansion Slot	PCIe 5 lanes, [x1] x 5, PEG[x4], I2C, LPC, SMBus	PCIe [x1] x 4 I2C, LPC, SMBus
GPIO	8-bit	8-bit
TPM	TPM 2.0 Optional	—



MODEL	BOXER-6643-TGU	BOXER-6450-TGU
System		
CPU	Intel® Core™ i7-1185G7E Intel® Core™ i5-1145G7E Intel® Core™ i3-1115G4E	Intel® Core™ i7-1185G7E, 1.80 GHz Intel® Core™ i5-1145G7E, 1.50 GHz Intel® Core™ i3-1115G4E, 2.20 GHz Intel® Celeron® 6305E Pro/Intel® SoCessor, 1.80 GHz
Chipset	Intel® SoC	Intel® SoC
System memory	DDR4 S0-DIMM x 2, up to 64GB	LPDDR4x 4267 MHz on board memory up to 32GB, In-Band ECC (select SKUs)
Display Interface	HDMI 1.4 x 2	HDMI2.0b x 1, 4Kx2K 60Hz
Storage Device	M.2 2280 M key slot x 1 (PCIex4), 2.5" SATA SSD/HDD bay x 1	2.5" SATA HDD/SSD Drive Bay x 1
Ethernet	Intel® i219 x 1, i225 x 1	Intel® i225, 10/100/1000/2500Base, 2.5GbE RJ45 x1 Intel® i219, 10/100/1000Base, 1GbE RJ45 x1
I/O	HDMI x 2 RJ-45 x 2 for 1G/2.5GbE LAN (i219 x 1, i225 x 1) USB 3.2 Gen 2 x 3 USB 2.0 x 1 DB-9 x 2 for RS-232/422/485 DB15 x1 Male for Digital I/O 8-channel Line out x 1 3 pin 9~36V Power Input x 1 Power Button with LED x 1	USB3.2 Gen2 x 2 USB2.0 x 4 RJ-45 x 2 for LAN (i225 x 1, i219 x 1) DB-9 x 2 for RS-232/422/485 Power Input x 1 Power Button x 1 DB-15 for DIO 8 bit x 1
Expansion	M.2 2280 M Key x 1 M.2 3052 B Key x 1 (for 5G module) Full-Size Mini Card x1 (mSATA/PCIe Default PCIe) SIM x 1	M.2 M key 2280 x 1 (PCIe GEN4 as default, SATA select by HW BOM) Full size USB2.0 or mSATA/mPCIe x 1 (PCIe as default, select by BIOS)
Indicator	Power / System LED	Power / System LED
OS Support	Windows® 10 IoT Enterprise 64-bit Linux Ubuntu 20.04.2	Win10 Enterprise 64bit Ubuntu 20.04.2
Power Supply		
Power Requirement	9-36V DC-in with 3-pin terminal block	12V DC In with lockable DC jack
Mechanical		
Mounting	Wallmount	Wallmount kit (default)
Dimensions (W x H x D)	9.84" x 5.62" x 2.03" (250 x 143 x 51.5) with bracket 7.87" x 5.62" x 1.75" (200 x 143 x 44.5) w/o bracket	6.5" x 4.6" x 2.2" (166 x 118 x 56 mm)
Gross Weight	3.3 lb (1.5 kg)	TBD
Net Weight	4.4 lb (2.0 kg)	TBD
Environmental		
Operating Temperature	-4°F ~ 140°F (-20°C ~ 60°C), according to IEC68-2-14 with 0.5 m/s AirFlow	Turbo on: -20°C ~ 40°C with 0.5m/s airflow Turbo off: -20°C ~ 50°C with 0.5m/s airflow
Storage Temperature	-40°F ~ 176°F (-40°C ~ 80°C)	-45°C ~ 80°C
Storage Humidity	5 ~ 95% @ 40°C, non-condensing	5 ~ 95% @ 40C, non-condensing
Anti-Vibration	2 Grms/5 ~ 500Hz/operation (with SSD)	SSD: Random, 5Grms, 5~500Hz HDD: Random, 1Grms, 5~500Hz
Anti-Shock	50G peak acceleration (11msec) (with SSD)	SSD: 50G @ wallmount, Half-sine, 11ms
Certification	CE/FCC class A	CE / FCC class A



MODEL		MIX-TLUD1
System		
Processor	Intel® 11th Gen (Tiger Lake-UP3) Core™ Processors, up to 28W TDPs - i7-1185G7E, QC, Max Speed up to 4.4GHz - i5-1145G7E, QC, Max Speed up to 4.1GHz - i3-1115G4E, DC, Max Speed up to 3.9GHz - Celeron 6305E, DC, 1.8GHz	
Chipset	—	
Memory	DDR4 2666/3200 MHz SODIMM x 2, Up to 64GB	
I/O Chipset	IT5121E	
Ethernet	Intel® PCIe Gb LAN 219LM x 1 Intel® PCIe Gb LAN 225LM x 1	
Audio	Realtek® ALC897	
TPM	Nuvoton NPCT750 TPM2.0 onboard	
Expansion Slots	PCIe 3.0 [x4] x 1, mini-card x 1(PCIe/SATA; BOM Optional)	
BIOS	256Mbit Flash ROM, AMI BIOS	
H/W Monitor	Temperature Monitor on CPU/Chassis, Voltage Monitor on Vcore/5V/12V, Fan Monitor on CPU/Chassis	
WatchDog Timer	1~255 step by software program	
Smart Fan Control	CPU Fan/ Chassis Fan	
Wake On LAN/PXE	Yes (WOL / PXE)	
Power State	S3, S4, S5	
Graphics		
Graphics Chipset	Intel® Xe(Gen 12) Graphics	
Graphics Multi Display	Quad Display	
VGA	—	
DVI	—	
HDMI	HDMI 2.0	
Display Port	DP1.4	
LVDS	Up to 1920 x 1200 @60Hz, Dual Channel 18/24 bit (via CH7511B)	
eDP	eDP1.4b	
Backlight Control	—	
Environment & Power & ME		
Battery	Lithium battery	
Power Requirement	12(+/-5%) DC	
Operation Temperature	32°F ~122°F (0°C ~ 50°C)	
Storage Temperature	-40°F ~185°F (-40°C ~85°C)	
Operation Humidity	0%~90%RH, non-condensing	
Certificate	CE & FCC Class A	
Form Factor	Mini-ITX: 6.7" x 6.7" (170mm x 170mm)	
Weight	1.1 lb (0.5 Kg)	
MTBF (Hours)	—	
I/O		
Rear Panel I/O Ports	USB 3.2 Gen2 x 2, USB2.0 x 4, HDMI x 2, DP++ x 2, Mic-in x 1, Line out x 1, 1GbE x 1, 2.5GbE x 1, DC Jack x 1, BIOS recovery button x 1	
Internal I/O Connectors	M.2 M key (2280) for (NVMe;PCIex4) storage x 1, SATA 6.0Gb/s x 1, USB 3.0 Box header x 1 (support additional USB3.2 Gen1 x 2ports), 40-pin LVDS connector x 1, 40-pin eDP connector x 1, AAFP follow ASUS pin out x 1, Box header x 2 for COM (COM1/2: RS-232) , Digital I/O box header x 1, 4-pin CPU Fan connector x 1, 4-pin Chassis Fan connector x 1, Front Panel connector x 1, Chassis Intrusion x 1, Buzzer onboard x 1, Clear CMOS jumper x 1, AT/ATX mode select jumper x 1; SIM socket x 1	
OS		
OS Support	Windows® 10 64-bit, 20.04.2/Kernel 5.8	

About AAEON

Established in 1992, AAEON is one of the leading designers and manufacturers of industrial IoT and AI Edge solutions. With continual innovation as a core value, AAEON provides reliable, high-quality computing platforms including industrial motherboards and systems, rugged tablets, embedded AI Edge systems, uCPE network appliances, and LoRaWAN/WWAN solutions. AAEON also provides industry-leading experience and knowledge to provide OEM/ODM services worldwide. AAEON also works closely with cities and governments to develop and deploy Smart City ecosystems, offering individual platforms and end-to-end solutions. AAEON works closely with premier chip designers to deliver stable, reliable platforms, and is recognized as an Associate member of the Intel® Internet of Things Solutions Alliance. For an introduction to AAEON's expansive line of products and services, visit www.aaeon.com.