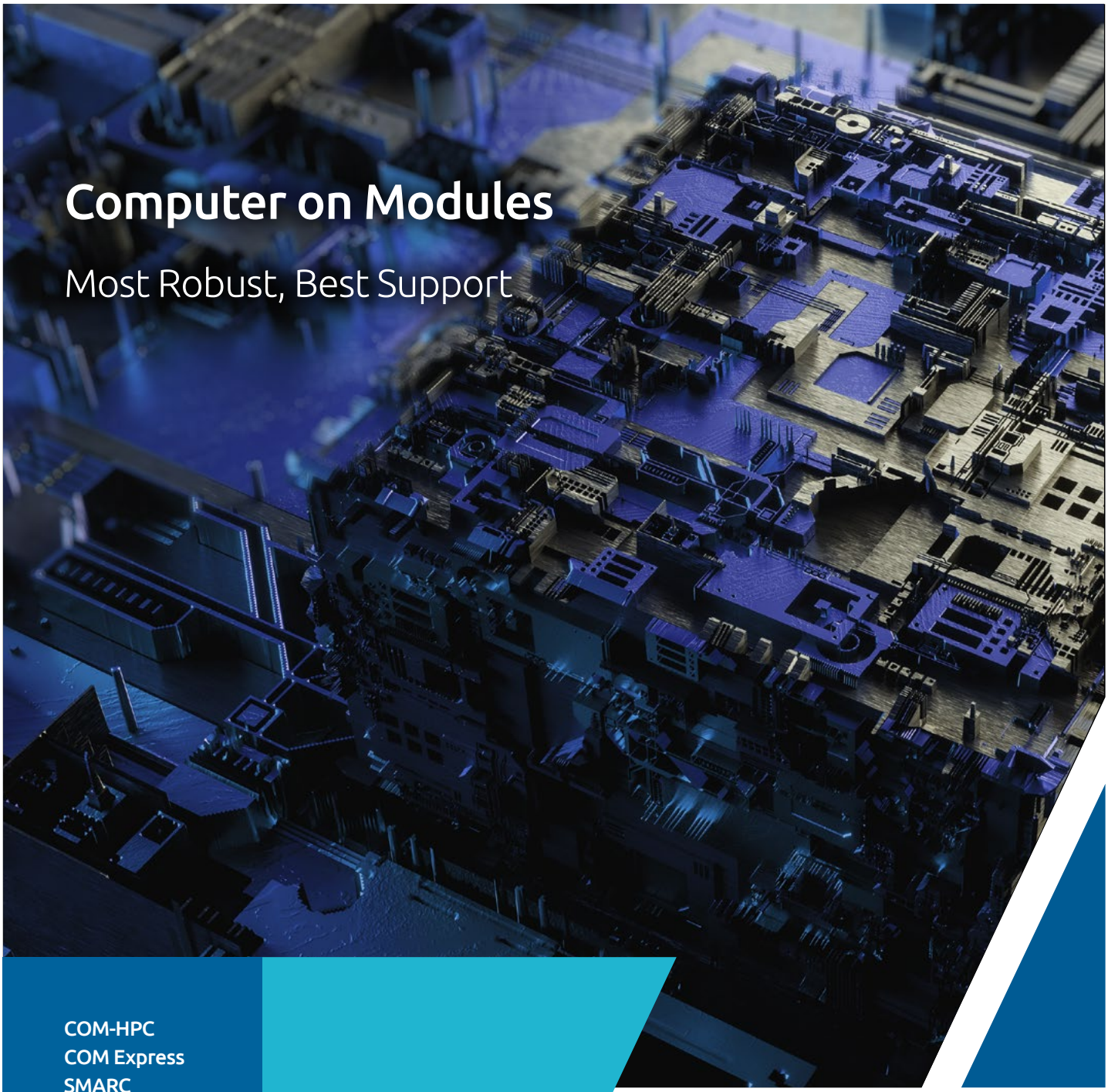
ADLINK
LEADING EDGE COMPUTING



Computer on Modules

Most Robust, Best Support

COM-HPC
COM Express
SMARC
Qseven
ETX

COM-HPC™ COM Express SMARC module Qseven ETX®

October 2023

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Why ADLINK

Innovation Support at Your Fingertips

Always pioneering
to empower you with the latest,
cutting-edge technologies

As a major contributor to open-source standardization, such as PICMG and SGET, ADLINK is always one step ahead to provide you with the latest technologies, including x86, ARM, sensors, middleware, virtualization, artificial intelligence & IoT integration, wireless, 5G, and more.

Committed to accomplishing your innovations, turning concepts into products, ADLINK helps to reduce your time to market and total costs of ownership significantly by offering:

- Utilization of off-the-shelf hardware and software components and enabling connection to all relevant vertical ecosystems
- Hardware modularization and OS abstraction allowing application code reusability
- The best, localized R&D resource support in your language across the globe
- Carrier board design and manufacturing services with redundant production sites
- Regional Advanced SI (signal integrity) labs for convenient, instant on-site validation and certification



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Global Carrier Design Service

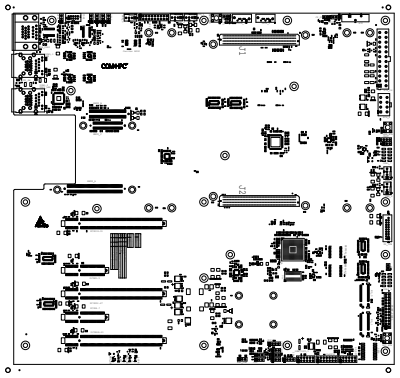
Don't want to spend time and resources on developing your own carrier boards?

No problem! With ADLINK's global carrier board design service, we can take care of this job for you. Outsourcing a carrier board design to us is fast and cost-effective compared to a full custom solution. We will help you get your product to market in a minimum amount of time and for a fraction of the cost of a full design. Our local R&D teams in Germany and the US are ready to serve you in your own time zone and in your own language.



How we can support you when designing your own carrier board?

Of course, if you decide to design your own carrier boards, we will support you where possible, this starting with the initial design phase and extending to prototype sample testing.



Carrier Design Phase

Get Our Carrier Reference Schematics!

We provide schematics, layout and mechanical files to our customers for all COM form factors, giving you a head start and providing a reference platform to test your carrier against later.

Schematic Review Service

We are ready to help you review your schematics before going to the layout phase.

Pre or Post Layout Simulation

If you're unsure about any high speed signaling and routing lengths in your design, we can support pre layout simulation that will inform you about optimal placement or post layout simulation that will provide you with a high level of confidence that your design will function as intended.

Carrier Prototype Verification

BIOS Modification Service

Signal Integrity Verification

At our headquarters in Taipei, our SI lab is available to help customers with module / carrier signal quality verification. We invite your carrier board engineer to take his board and visit us.

Based on SI reports, he can easily consult module designer on how potential design-to-application barriers could be resolved.

Power Sequence Verification

Even the most advanced LAB testing of your module/ carrier combination can never really cover how end users are going to operate the systems in the field. Especially unforeseen power on and power off operation can lead to hanging systems that in the worst case not recoverable. ADLINK provides a power test procedure called "Monkey Testing" that covers testing of any possible power sequence in the field. If still any mismatches between carrier and modules are found, we can simply update the module by firmware at OS time since its power sequence is MCU controlled.

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Core Values

Always Keeping Your Innovations Secured

***Securing** each piece of **information**,*
***data transmission**, and everything in between*



Driven to safeguard client products and data free of cyberattacks and mitigate vulnerabilities, ADLINK has always been at the forefront of the latest security technologies and best-practice infrastructures, for hardware and software alike.

How? ADLINK does so by actively collaborating with a spate of security partners to accomplish its ever-evolving, all-around security mechanisms. These security attributes include, but are not limited to, the following.

Arm	FOUNDRIES	Exset Labs
■ SystemReady compliance ■ Parsec security certification ■ PSA certification	■ Linux microPlatform ■ Secure for life ■ Deployment, maintenance, OTA	■ Security pentesting ■ Code hardening ■ Compliance reports

Safekeeping with round-the-clock
system monitoring and error logging

With decades of endeavor in administering foolproof security and assurance measures, ADLINK is well aware of the necessity of a developer's application or product to be easily monitored and managed, especially remotely, for timely responses and immediate actions whenever needed.

In this regard, ADLINK is backed by partnerships with the likes of SEMA and Allxon and continues to add to its growing list of partnerships in bringing full-scale remote management and error logging functions, including:

- Varied means of control across different system levels, both in-band and out-of-band
- Real-time monitoring of CPU/GPU performance, memory usage, user access, power consumption, temperature, etc.
- Remote control and updating of the system's varying components, interfaces, and firmware
- Collecting and retrieving system / error logs for event analysis and troubleshooting

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ARM SystemReady

Certified, ensuring generic OSs
to 'just work' right off the shelf

With uncompromising efforts in delivering a seamless development experience, ADLINK has been an active participant in the Arm SystemReady compliance certification program since its launch in 2020.

By proactively contributing to and meeting Arm SystemReady standards, ADLINK ensures that generic off-the-shelf operating systems 'just work' – enabling generic operating systems, and subsequent layers of software, to work out of the box on Arm-based hardware.

ADLINK eliminates the need for custom-engineered firmware, thus significantly reducing both the cost and time to market for Arm-based hardware, including infrastructure edge and embedded IoT systems.

Arm SystemReady IR for embedded devices

Find ADLINK products with the Arm SystemReady IR band stamp, which ensures Arm-based embedded devices supported by mainline Linux/BSD suiting both custom and prebuilt operating system images.



- For embedded Linux ecosystem
- Mainline Linux support for SoC
- Suiting custom (Yocto, OpenWRT, buildroot) and prebuilt (Debian, Fedora, SUSE, Ubuntu) system images

Arm SystemReady SR for servers & workstations

Find ADLINK products with the Arm SystemReady SR band stamp, which ensures Arm-based servers or workstations to offer seamless interoperability with standard operation systems, hypervisors, and software, i.e. Windows, VMware, Linux, and BSD.



- For Windows, VMware, Linux, and BSD ecosystem
- Supporting old OSs to run on new hardware and vice versa
- Suiting generic off-the-shelf OSs

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Extreme Rugged





Our Extreme Rugged boards are designed for harsh environments from the ground up. To support the extremes of shock, vibration, humidity and temperature, care is given to component selection, circuit design, PCB layout and materials, thermal solutions, enclosure design, and manufacturing process. Robust test methods, including Highly Accelerated Life Testing (HALT), ensure optimal product design phases and meet stringent requirements such as -40°C to 85°C operating temperature range, MIL-STD, shock & vibration, and long-term reliability.

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Open-source Prototyping

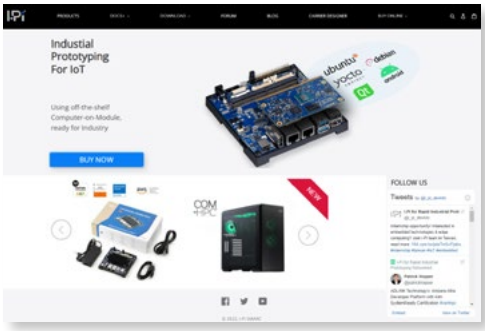
I-Pi

The 1-stop solution to prototyping your edge, IoT innovations rapidly and conveniently

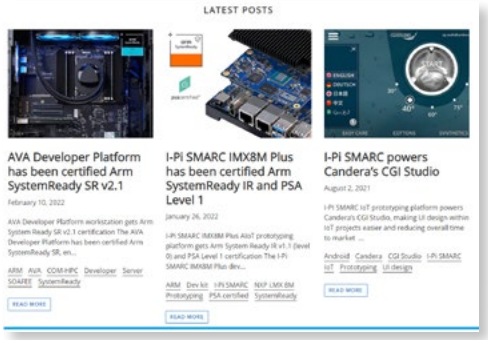
Explicitly for open-source developing, ADLINK has established its I-Pi wiki, a website and 1-stop service for any software developer, novice or professional, to transform their embedded ideas into real-life applications.

From designing to prototyping and evaluating, visit https://www.ipi.wiki/ now to get started with the development kit of your choice delivered right to your doorsteps.

Readily-accessible online help and technical support forums are also provided on I-Pi wiki just 1 click away.



Browse for industrial development delivered right to your doorstep



Stay posted with I-Pi blogs for the latest technology trends

Development kits currently available include I-Pi SMARC RB5,I-Pi SMARC IMX8M Plus, I-Pi SMARC Elkhart Lake, COM Express Type 6 Alder Lake-P, COM Express Type 10 Elkhart Lake, Ampere Altra Developer Platform, and more.





Readily accessible online help (DOCS+) and forums for on-the-spot tech support



Subscribe to the I-Pi YouTube channel to embrace embedded computing of the future

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Starter Kits

Simply lower costs and accelerate your development processes

As a worldwide leader in Computer-on-Modules, ADLINK understands the developers' needs for affordable and comprehensive development kits.

ADLINK offers an extensive collection of Starter Kits, including for COM-HPC, COM Express, and SMARC, in aiding engineers and system integrators to reduce their products' time to market and accelerate project schedules.



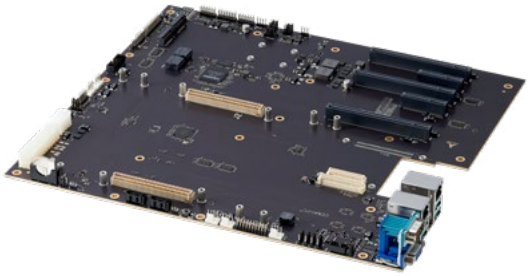


Reference Carrier Boards

Instantaneous evaluating module capabilities for application prospects

In addition to starter kits, ADLINK also offers a wide variety of Reference Carrier Boards.

Using a reference carrier board, developers can emulate the functionalities of their desired end products against the selected COMs for software development and hardware verifications instantly.



COM-HPC Server Base



Express Base6 R3.1



I-Pi SMARC Plus carrier board

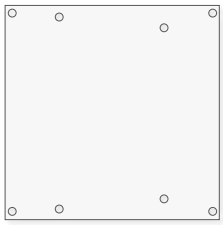
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Form Factor Overview

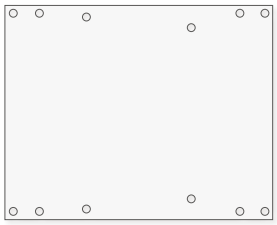
COM-HPC™



Server Type

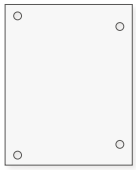


Size D
(160 x 160mm)

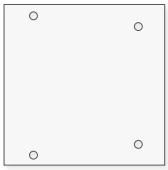


Size E
(200 x 160mm)

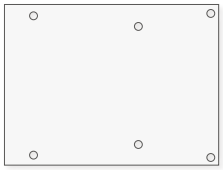
Client Type



Size A
(95 x 120mm)



Size B
(120 x 120mm)



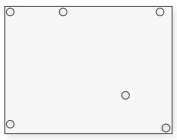
Size C
(160 x 120mm)

COM-HPC is the new PICMG standard for high-performance Computer-on-Modules. It aims to drive the newest breed of embedded edge servers with limitless scalability for today and tomorrow.

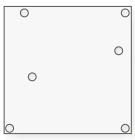
COM-HPC supports up to 64 general-purpose PCIe Gen4 or Gen5 lanes, eight 25GbE ports, and a maximum of four USB 4 ports. The COM-HPC specification defines 5 different module sizes, with the larger Size D and E (Server Type) serving next-gen headless edge servers and accommodating up to 8 DIMMs. In contrast, the smaller Size A, B, and C (Client Type) targets visual-oriented client platforms utilizing SO-DIMMs, or soldered onboard memory, and supporting up to 4 video displays.

COM Express

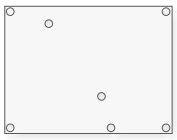




Type 6 Basic
(125 x 95mm)



Type 6 Compact
(95 x 95mm)



Type 7 Basic
(125 x 95mm)



Type 10 Mini
(84 x 55mm)

COM Express, defined by PICMG, is the most widely adopted COM standard and is based on serial interfaces including PCI Express, SATA, USB, LVDS/eDP, and DDI. It allows designers and system integrators to utilize the latest technologies with straight off-the-shelf modules of varied sizes for their edge applications. ADLINK has heavily invested in the development and maintenance of the PICMG® COM Express® specification since its creation.

Revision 3.1

COM Express R3.1

As a chair of the PICMG subcommittee, ADLINK has helped to define the COM Express COM.0 Revision 3.1. This revision upgrades the Type 6 and 7 definitions with several new interface support, such as USB 4, PCIe Gen4 on the Type 6 and 10G CEI-mode Ethernet on the Type 7.

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SMARC module





Short size
(82 x 50mm)

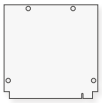
ADLINK has been a pioneer in the development of the SMARC specification — a business-card-sized Computer-on-Module targeting ultra-low power ARM- and x86-based embedded applications. SMARC's 314-pin edge connector not only provides access to commonly found low-level interfaces, such as I2C, I2S, UART, CAN, SPI, and GPIO, but also fully supports more complex I/O including LVDS, HDMI, DP, eDP, GbE, USB 3.x, PCIe, and SATA. There's no question why SMARC is the fastest growing product line in the embedded COM market today.

Revision 2.1

With Revision 2.1, SMARC establishes itself as the very first open specification of AI on Module (AIOM). By adding support for up to 4 MIPI CSI camera inputs and 4 GbE Ethernet ports by multiplexing SerDes, it is now readily compatible with NPU-integrated SoCs and can utilize up to 4 GigE Vision cameras for various video-based and AI-vision applications.

Qseven





(70x70mm)

Qseven® is a versatile, small Computer-on-Module standard. With its 230-pin edge connector, it mainly focuses on traditional low-power x86 Intel Atom® designs. Since Qseven is not able to support all modern interfaces and has only partial coverage for ARM features, there has been an eminent, accelerated migration of low-power COM projects from Qseven to SMARC.

ETX®





(114 x 95mm)

ETX®, one of the oldest Computer-on-Module specifications, supports legacy interfaces such as ISA bus, Parallel ATA (IDE), and PS/2 keyboard/mouse. ADLINK is highly committed to this product line and is one of the only vendors that offers customers a migration path for ETX even beyond 2025.

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COM-HPC

COM-HPC is the new PICMG standard introduced by PICMG to complement COM Express in response to the ever-evolving digital transformation. Providing standards for two module types – Server Type and Client Type – COM-HPC offers substantially higher data bandwidths for delivering superior I/O performance while featuring high-performance computing and high-speed transmission with limitless scalability.





Server Type Pin Definition

Aimed for next-gen headless edge servers, COM-HPC Server Type features up to 64 general-purpose PCIe Gen4 or Gen5 lanes, eight 25GbE ports, and can accommodate up to 8 DIMM slots. Additionally, it provides the IPMB function for convenient out-of-band monitoring and management. COM-HPC Server Type is suitable for both ARM and x86 architectures.

J1	J2
Power	48x PCIe
16x PCIe 1x PCIe_BMC	
4x ETH_KR (max. 25G) 1x ETH_LED_I2C	
8x USB 2.0	
2x USB 3.x (upgrade)	
2x USB 4/3.x (upgrade)	
USB 4 sideband	
2x SATA	
1x NBASE-T (max. 10G)	4x ETH_KR (max. 25G)
eSPI	
12x GPIO / BOOT_SPI / GPP_SPI / 2x I2X / SMB / 2x URAT	RSVD

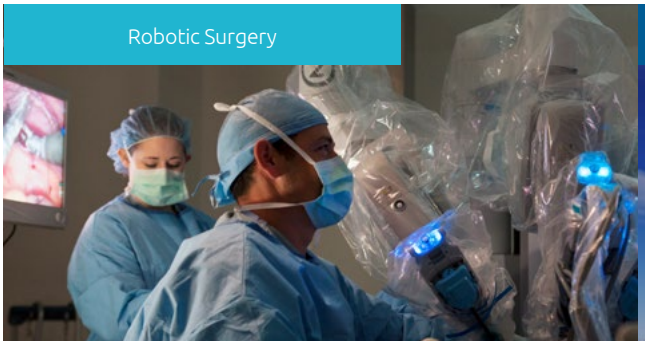
Client Type Pin Definition

Targeting visual-oriented applications, such as medical imaging, gaming, and testing measurement, COM-HPC Client Type provides system integrators with up to 4 USB4 and 4 video displays, plus dual Ethernet, all compacted in a modest size utilizing SO-DIMMs or soldered onboard memory.

J1	J2
Power	DDI 3
8x USB 2.0	2x USB 4/3.x upgrade
2x USB 4/3.x upgrade	32x PCIe
Audio I2S/Soundwire	
DDI 1	
DDI 2	
eDP/DSI	
IPMB & PCIe	
eSPI	
2x SATA	NBASE-T (max.10G) 1
16x PCIe	2x MIPI-CSI
	2x ETH_KR (max.25G)
	PCIe Target
NBASE-T (max.10G) 0	RSVD

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Applications









Ampere Altra Developer Platform



COM-HPC Development Kits



- One-click Buy & Ship
- Easy "How-to's"
- Online documentation
- Forum support

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COM-HPC

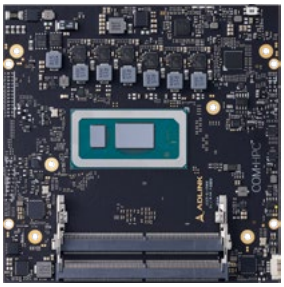
Server Type

	COM-HPC-ALT	COM-HPC-sIDH
		
		New
SoC	Ampere Altra / Altra Max M128-26 M96-28 Q80-26 Q64-22 Q32-17	Intel® Xeon® D-2700 D-2796TE D-2775TE D-2752TER D-2733NT D-2712T (formerly "Ice Lake-D")
Memory	768 GB DDR4 at 3200/2666 MT/s	512 GB DDR4 at 3200/2666 MT/s
BIOS Type	TianoCore EDK II	AMI Aptio V
Ethernet KR	Up to 4x 10GBASE-KR (TBC)	Up to 8x 10GBASE-KR (25G, 40G, 100G, TBC)
NBASE-T Ethernet	Intel® i210 GbE	Intel® i225 ,up to 2.5GbE
Remote Management	Dedicated interfaces PCIe_BMC IPMB (via MMC, opt.)	Dedicated interfaces PCIe_BMC IPMB (via MMC, opt.)
PCI Express	64 PCI Express Lanes : 3x PCI Express x16 Gen4 (x16, x8, x4) 2x PCI Express x8 Gen4 (x8, x4, x2)	48 PCI Express Lanes: 2x PCI Express x16 Gen4 (x16, x8, x4) 2x PCI Express x8 Gen3 (x8, x4, x2)
USB	4x USB 3.X/2.0	4x USB 3.X/2.0
Serial ATA	-	2x at 6Gb/s
TPM	TPM 2.0	TPM 2.0
Management Bus	2x I2C, SMBus	2x I2C, SMBus
Embedded Features	EAPI/SEMA, Debug/JTAG	EAPI/SEMA, Debug/JTAG
Power Supply	12 V / 5Vsb ±5% (ATX) 12V ±5% (AT)	12 V / 5Vsb ±5% (ATX) 12V ±5% (AT)
Operating Temperature	Standard: 0°C to 60°C	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (selected SKUs)
Form Factor & Compatibillity	PICMG COM-HPC: Rev 1.0 Server Type size E: 200 x 160 mm	PICMG COM-HPC: Rev 1.0 Server Type size D: 160 x 160 mm
OS Support	CentOS debian fedora Ubuntu yocto PROJECT	yocto PROJECT

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COM-HPC®

Client Type

	COM-HPC-cRLS	COM-HPC-cADP
		
	New	
CPU	13th Gen Intel® Core™ Core™ i9-13900E Core™ i7-13700E Core™ i5-13500E Core™ i5-13400E Core™ i3-13100E (formerly "Raptor Lake-S")	12th Gen Intel® Core™ Core™ i7-12800HE Core™ i5-12600HE Core™ i3-12300HE (formerly "Alder Lake-P")
Chipset	-	-
Memory	128 GB DDR5 at 4000 MT/s	64 GB DDR5 at 4800 MT/s
BIOS Type	AMI UEFI	AMI UEFI
Graphics Outputs	eDP 1.4 (or MIPI-DSI) 2x DDI (DP/HDMI) 2x DP (one through USB4) 4 independent displays 4K at DP/eDP	eDP 1.4 (or MIPI-DSI) 2x DDI (DP/HDMI) 2x DP (one through USB4) 4 independent displays 4K at DP/eDP
Audio	1x HD Audio or 1x I2S	1x HD Audio or 1x I2S
Camera	-	-
LAN	2x Intel® i226 2.5GbE (TSN @ IT)	Intel® i225V/IT 2.5GbE (TSN @ IT)
USB	4x USB 3.X/2.0/1.1 8x USB 2.0	2x USB4/3.X/2.0 2x USB 3.X/2.0 4x USB 2.0
Serial ATA	-	-
PCI Express	30 PCI Express Lanes : 16x PCI Express Gen5 (x16, x8, x4, x1) 8x PCI Express Gen4 (x4, x2) 6x PCI Express Gen3 (x4, x2)	24 PCI Express Lanes : 1x PCI Express x8 Gen4 2x PCI Express x4 Gen4 2x PCI Express x4 Gen3 (x4, x2, x1)
TPM	TPM 2.0	TPM 2.0
Management Bus	PCIe_BMC IPMB	2x I2C, SMBus
Embedded Features	EAPI/SEMA Debug/JTAG	EAPI/SEMA Debug/JTAG
Power Supply	12V ±5% / 5Vsb ±5% (ATX) 12V ±5% (AT)	8.5-20 V / 5Vsb ±5% (ATX) 8.5-20V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibillity	PICMG COM-HPC: Rev 1.0 Client Type size C: 160 x 120 mm	PICMG COM-HPC: Rev 1.0 Client Type size B: 120 x 120mm
OS Support	yocto PROJECT, Windows	yocto PROJECT, Windows

Notes:

- VxWorks is supported by project basis.

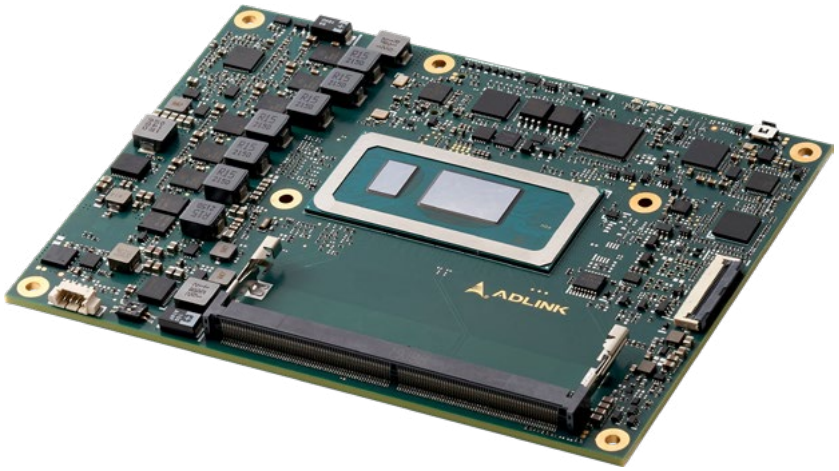
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COM Express

Type 6 Basic Size

Transforming your everyday edge computing

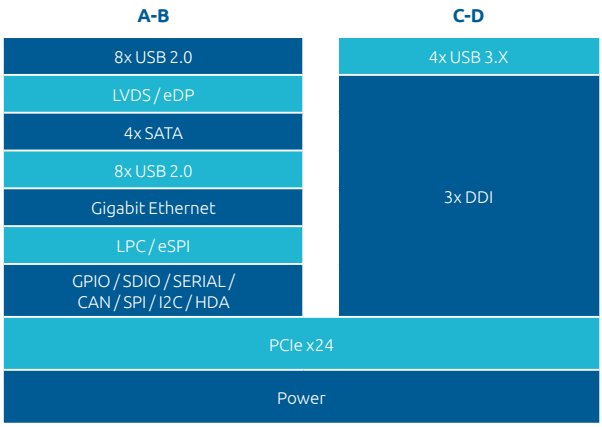
COM Express Type 6 Basic size is the most popular and widely used form factor on the market. With two COM Express connectors and pinouts closely similar to the common x86 based silicon, the Type 6 Basic size yields up to 75 watts, making it well-fitted for various embedded computing applications, including medical, gaming, test & measurement, industrial automation, and more. Topping off, its latest revision – R3.1 – has also added support for several advanced interfaces, such as PCIe Gen4 and USB4.



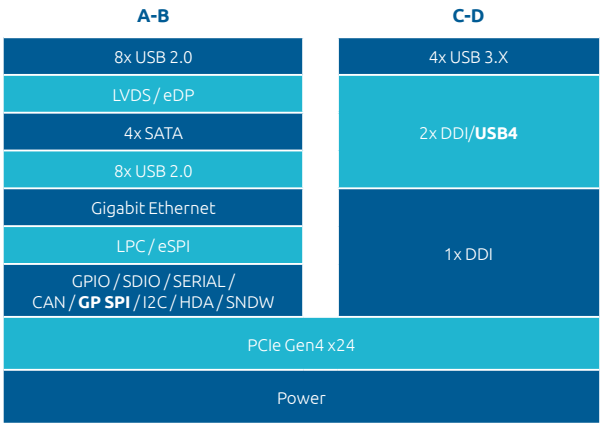
x86

EXTREME RUGGED

Pin Definition
Type 6 Rev 3.0 Basic Size Modules



Pin Definition
Type 6 Rev 3.1 Basic Size Modules



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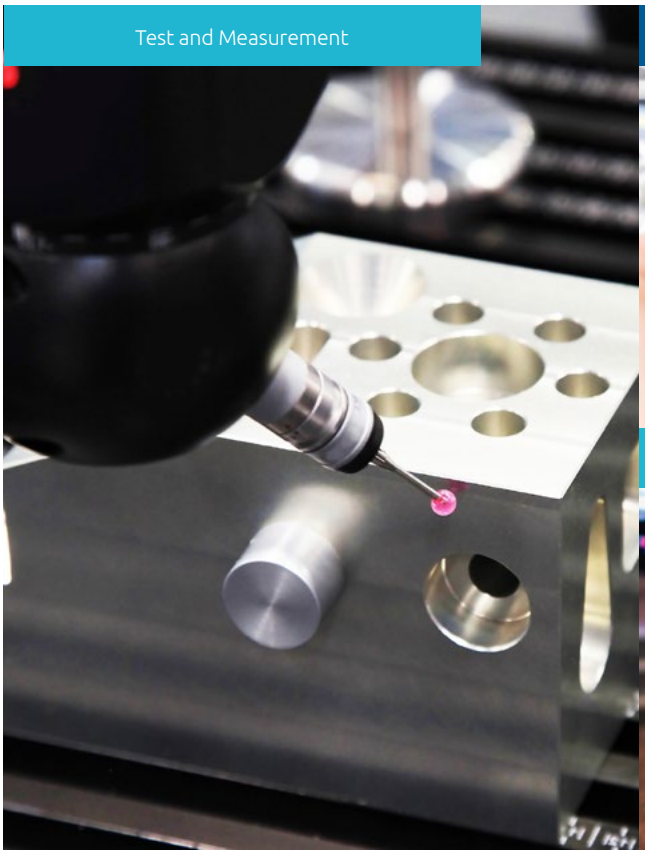
COM Express

Applications

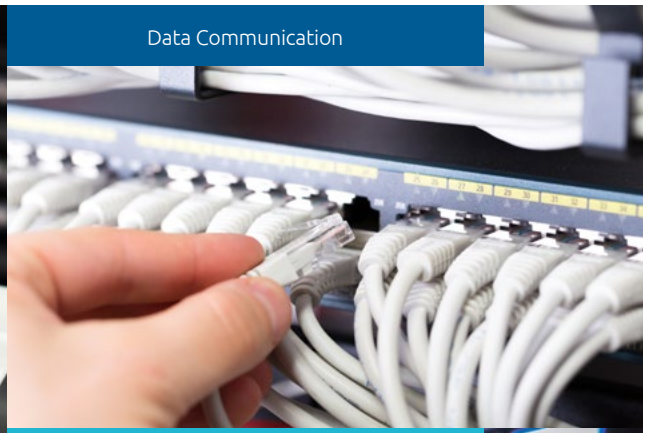
Medical



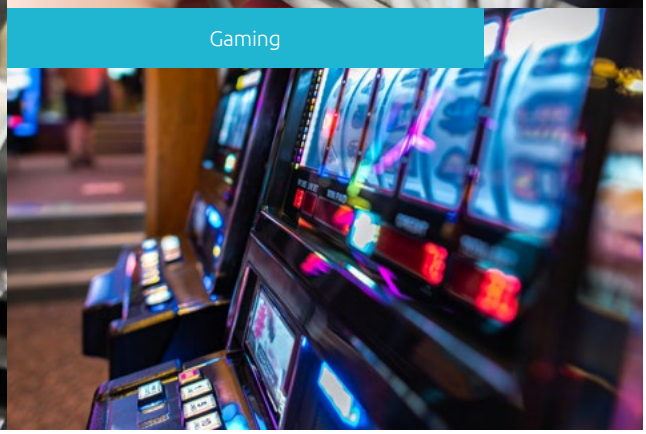
Test and Measurement



Data Communication



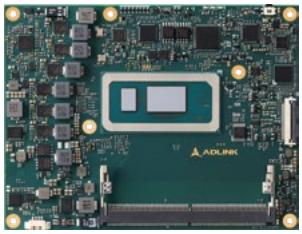
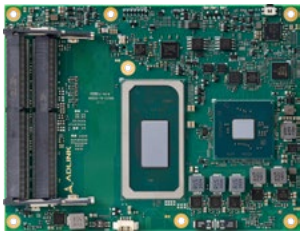
Gaming



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COM Express

Type 6 Basic Size

	Express-RLP	Express-ADP	Express-TL
	 New		
CPU	13th Gen Intel® Core™ i7-13800HE/HRE i5-13600HE/HRE i3-13300HE/HRE (formerly "Raptor Lake-P")	12th Gen Intel® Core™ i7-12800HE i5-12600HE i3-12300HE (formerly "Alder Lake-P")	11th Gen Intel® Core™ Intel® Xeon® W/Celeron® 6000 W-11865MRE / i7-11850HE W-11555MRE / i5-11500HE W-11155MRE / i3-11100HE (formerly "Tiger Lake-H")
Chipset	-	-	RM590E QM580E/HM570E
Memory	64 GB DDR5 at 4800MT/s	64 GB DDR5 at 4800MT/s	128 GB DDR4 at 3200/2666 MT/s
BIOS Type	AMI UEFI	AMI UEFI	AMI Aptio V
Graphics Outputs	LVDS (or eDP 1.4) 3x DDI (DP/HDMI or VGA) 2xUSB4/THB4 4 independent displays 4K at DP/eDP	LVDS (or eDP 1.4) 3x DDI (DP/HDMI or VGA) 2xUSB4/THB4 4 independent displays 4K at DP/eDP	LVDS (or eDP 1.4) 3x DDI (DP/HDMI or VGA) 4 independent displays 8K at DP/eDP
Graphics Features	DX 12, OpenGL 4.6, Vulkan 1.2, Mesa 3D, OneVPL, HDCP 2.3	DX 12, OpenGL 4.6, Vulkan 1.2, Mesa 3D, OneVPL, HDCP 2.3	DX 12, OpenGL 4.5, ES 2.0, OpenCL 2.1
LAN	Intel® i225V/IT 2.5GbE(TSN @ IT)	Intel® i225V/IT 2.5GbE (TSN @ IT)	Intel® i225V/IT 2.5GbE (TSN @ IT)
USB	4x USB 3.X/2.0, 4x USB 2.0	4x USB 3.X/2.0, 4x USB 2.0	4x USB 3.X/2.0, 4x USB 2.0
Serial ATA	2x at 6Gb/s	2x at 6Gb/s	4x at 6Gb/s
PCI Express	PCI Express x16 Gen4 (or 2x8 or 1x8 plus 2x4) 5x PCI Express x1 Gen3	PCI Express x16 Gen4 (or 2x8 or 1x8 plus 2x4) 5x PCI Express x1 Gen3	PCI Express x16 Gen4 (or 2x8 or 1x8 plus 2x4) 8x PCI Express x1 Gen3
Audio	Integrated on SoC	Integrated on SoC	ALC886 (carrier board)
TPM	TPM 2.0	TPM 2.0	TPM 2.0
Management Bus	I²C, SMBus	I²C, SMBus	I²C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	8.5-20 V / 5Vsb ±5% (ATX) 8.5-20V (AT)	8.5-20 V / 5Vsb ±5% (ATX) 8.5-20V (AT)	8.5-20 V / 5Vsb ±5% (ATX) 8.5-20V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibility	PICMG COM.0 R3.1, Type 6 Basic size: 95 x 125 mm	PICMG COM.0 R3.1, Type 6 Basic size: 95 x 125 mm	PICMG COM.0 R3.0, Type 6 Basic size: 95 x 125 mm
OS Support	Ubuntu yocto PROJECT	Ubuntu yocto PROJECT	yocto PROJECT

Notes:

- VxWorks is supported by project basis.
- TPM is supported by BOM option.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.
- For more CPU options please refer to online data sheet or user manual.

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COM Express

Type 6 Basic Size

	Express-CFR	Express-CF/CFE	Express-KL/KLE
			
CPU	9th Gen Intel® Core™, Xeon® E-2276ME i7-9850H i3-9100H (formerly "Coffee Lake-H Refresh")	8th Gen Intel® Core™, Xeon® E-2176M i7-8850H i5-8400H i3-8100H (formerly "Coffee Lake-H")	7th Gen Intel® Core™, Xeon® E3-1505M i7-7820EQ i5-7440EQ i3-7100E (formerly "Kaby Lake-H")
Chipset	CM246 (ECC) QM370/HM370 (non-ECC)	CM246 (ECC) QM370/HM370 (non-ECC)	CM238 (ECC) QM175/HM175 (non-ECC)
Memory	96 GB DDR4 at 2400/2133 MT/s	96 GB DDR4 at 2400/2133 MT/s (ECC for Express-CFE)	32 GB DDR4 at 2133/1867 MT/s (ECC for Express-KLE)
BIOS Type	AMI Aptio V	AMI Aptio V	AMI Aptio V
Graphics Outputs	LVDS (or eDP 1.4) 3x DDI (DP/HDMI or VGA)	LVDS (or eDP 1.4) 3x DDI (DP/HDMI or VGA)	LVDS (or eDP 1.4) 3x DDI (DP/HDMI or VGA)
Graphics Features	DX 12, OpenGL 4.5 and ES 2.0, OpenCL 2.1 H.265(HEVC) 10-bit codec / VP9 10-bit decodes	DX 12, OpenGL 4.5 and ES 2.0, OpenCL 2.1 H.265(HEVC) 10-bit codec / VP9 10-bit decode	DX 12, OpenGL 4.4 and ES 2.0, OpenCL 2.1 H.265(HEVC) 10-bit codec / VP9 10-bit decode
LAN	Intel® i219LM/V	Intel® i219LM/V	Intel® i219LM/V
USB	4x USB 3.X/2.0, 4x USB 2.0	4x USB 3.X/2.0, 4x USB 2.0	4x USB 3.X/2.0, 4x USB 2.0
Serial ATA	4x at 6Gb/s	4x at 6Gb/s	4x at 6Gb/s
PCI Express	PCI Express x16 Gen3 (or 2x8 or 1x8 plus 2x4) 8x PCI Express x1 Gen3	PCI Express x16 Gen3 (or 2x8 or 1x8 plus 2x4) 8x PCI Express x1 Gen3	PCI Express x16 Gen3 (or 2x8 or 1x8 plus 2x4) 8x PCI Express x1 Gen3
Audio	ALC886 (carrier board)	ALC886 (carrier board)	ALC886 (carrier board)
TPM	TPM 2.0	TPM 2.0	TPM 2.0
Management Bus	I2C, SMBus	I2C, SMBus	I2C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	8.5-20 V / 5Vsb ±5% (ATX) 8.5-20V (AT)	8.5-20 V / 5Vsb ±5% (ATX) 8.5-20V (AT)	8.5-20 V / 5Vsb ±5% (ATX) 8.5-20V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibillity	PICMG COM.0 R3.0, Type 6 Basic size: 95 x 125 mm	PICMG COM.0 R3.0, Type 6 Basic size: 95 x 125 mm	PICMG COM.0 R2.1, Type 6 Basic size: 95 x 125 mm
OS Support	yocto PROJECT, Windows	yocto PROJECT, Windows	yocto PROJECT, Windows

Notes:

- VxWorks is supported by project basis.
- TPM is supported by BOM option.
- For more CPU options please refer to online data sheet or user manual.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.

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COM Express

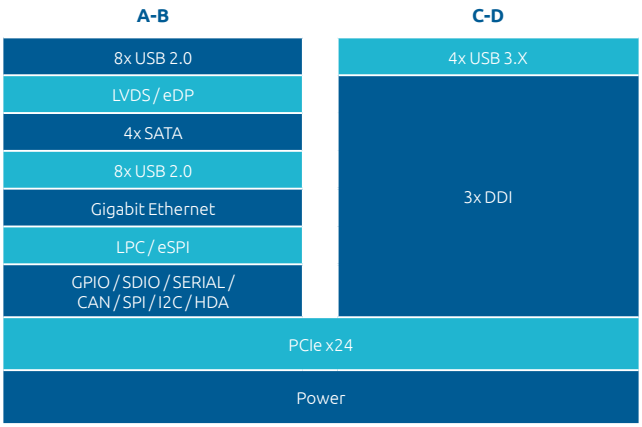
Type 6 Compact Size

Significantly lowered power envelopes

COM Express Type 6 Compact size, shorter in length than the Basic size, is ideally suited for single-chip x86 SoCs, and features proficient performance at significantly lowered power envelopes of 5 to 30 watts. COM Express Type 6 Compact size targets mid- to entry-level applications such as transportation, robotics, edge servers, industrial control, and HMIs in a spate of industries.



Pin Definition Type 6 Compact Size Modules



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COM Express

Applications

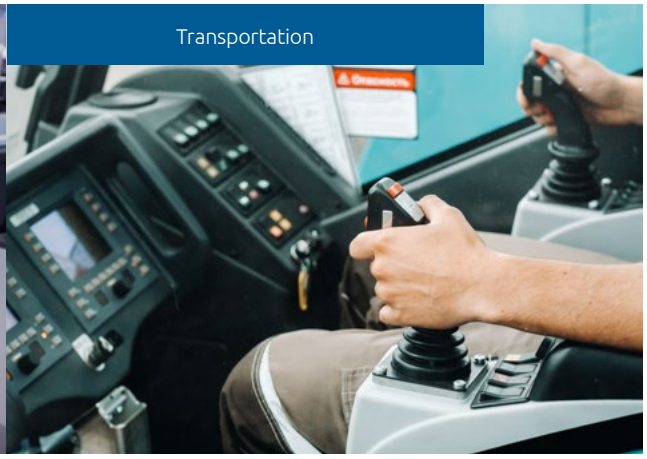
Industrial Automation



Robotics



Transportation





COM Express Type 6 Development Kits

- One-click Buy & Ship
- Easy "How-to's"
- Online documentation
- Forum support

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COM Express

Type 6 Compact Size

	cExpress-TL	cExpress-AR
		
SoC	11th Gen Intel® Core™ i7-1185G7E i5-1145G7E i3-1115G4E (formerly "Tiger Lake-UP3")	AMD Ryzen™ Embedded V2748 V2546 V2718 V2516 (formerly "V2000")
Memory	64 GB DDR4 IBECC at 3200/2666 MT/s	64 GB DDR4 at 3200/2666 MT/s
BIOS Type	AMI Aptio V	AMI Aptio V
Bootloader	-	-
Graphics Outputs	LVDS (or eDP1.4) 3x DDI (DP/HDMI or VGA) 4 independent displays 8K at DP/eDP	LVDS (or eDP1.3) 3x DDI (DP/HDMI or VGA)
Graphics Features	DX 12, OpenGL 4.5 and ES 2.0, OpenCL 2.1 H.265(HEVC) 10-bit codec, VP9 10-bit decode	DX 12, OpenGL 4.6 and ES 3.0, OpenCL 2.1 H.265(HEVC) 10-bit codec, VP9 10-bit decode
LAN	Intel® i225V/IT 2.5GbE (TSN @ IT)	Intel® i225V/IT 2.5GbE
USB	4x USB 3.X/2.0, 4x USB 2.0	4x USB 3.X/2.0, 4x USB 2.0
Serial ATA	2x at 6Gb/s	2x at 6Gb/s
PCI Express	1x PCIe x4 Gen4 at PEG 4x PCIe x1 Gen3 (PCIe switch by project)	1x PCIe x8 Gen2 at PEG 6x PCIe x1Gen3
eMMC (opt.)	-	-
SD	-	-
Audio	ALC886 (carrier board)	ALC886 (carrier board)
TPM	TPM 2.0 (optional)	TPM 2.0 (optional)
Management Bus	I2C, SMBus	I2C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	8.5-20V / 5Vsb ±5% (ATX), 8.5-20V (AT)	8.5-20V / 5Vsb ±5% (ATX), 8.5-20V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibility	PICMG COM.0 R3.0 Type 6 Compact size: 95 x 95 mm	PICMG COM.0 R3.0 Type 6 Compact size: 95 x 95 mm
OS support	yocto PROJECT, Windows	yocto PROJECT, Windows

Notes:

- VxWorks is supported by project basis.
- TPM is supported by BOM option.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.

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COM Express

Type 6 Compact Size

	cExpress-WL	cExpress-KL
		
SoC	8th Gen Intel® Core™ i7-8665UE/i5-8365UE/i3-8145UE (formerly "Whiskey Lake-U")	7th Gen Intel® Core™ i7-7600U/i5-7300U/i3-7100U (formerly "Kaby Lake-U")
Memory	64 GB DDR4 at 2133/1867 MT/s	32 GB DDR4 at 2133/1867 MT/s
BIOS Type	AMI Aptio V	AMI Aptio V
Bootloader	Slim Bootloader	-
Graphics Outputs	LVDS (or eDP1.4) 2x DDI (DP/HDMI or VGA)	LVDS(oreDP1.4) 2x DDI (DP/HDMI or VGA)
Graphics Features	DX 12, OpenGL 4.5 and ES 2.0, OpenCL 2.1 H.265(HEVC) 10-bit codec, VP9 10-bit decode	DX 12, OpenGL 4.4 and ES 2.0, OpenCL 2.1 H.265(HEVC) 10-bit codec, VP9 10-bit decode
LAN	Intel® i219LM/V	Intel® i219LM/V
USB	4x USB 3.X/2.0, 4x USB 2.0	4x USB 3.X/2.0, 4x USB 2.0
Serial ATA	3x at 6Gb/s	3x at 6Gb/s
PCI Express	1x PCIe x1 Gen3 at PEG 8x PCIe x1Gen3	5x PCIe x1 Gen3 (3965U supports Gen2) (6 PCIex1 w/o GbE, opt.)
eMMC (opt.)	16-64 GB (by project)	-
SD	Yes	-
Audio	ALC886 (carrier board)	ALC886 (carrier board)
TPM	TPM 2.0 (optional)	TPM 2.0 (optional)
Management Bus	I2C, SMBus	I2C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	5-20V / 5Vsb ±5% (ATX), 5-20V (AT)	5-20V / 5Vsb ±5% (ATX), 5-20V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibility	PICMG COM.0 R3.0 Type 6 Compact size: 95 x 95 mm	PICMG COM.0 R2.1, Type 6 Compact size: 95 x 95 mm
OS support	yocto PROJECT, Windows	yocto PROJECT, Windows

Notes:

- VxWorks is supported by project basis.
- TPM is supported by BOM option.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.

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COM Express

Type 6 Compact Size

	cExpress-SL	cExpress-ALN
		
		Preliminary
SoC	6th Gen Intel® Core™ i7-6600U/i5-6300U/i3-6100U (formerly "Sky lake")	7th Gen Intel® Atom™ & Processor N series x7425E x7413E x7211 i3-N305 (formerly "Alder Lake-N")
Memory	32 GB DDR4 at 2133/1867 MT/s	Up to 16GB LPDDR5 at 4800MT/s support IBECC
BIOS Type	AMI Aptio V	AMI Aptio V
Bootloader	-	-
Graphics Outputs	LVDS(oreDP1.4) 2x DDI (DP/HDMI or VGA)	LVDS (or eDP1.4b) and 3xDDI (DP 1.4/HDMI 2.0b)
Graphics Features	DX 12, OpenGL 4.4 and ES 2.0, OpenCL 2.1 H.265(HEVC) 10-bit codec, VP9 10-bit decode	DX12.1, OpenGL4.6, Open GL 4.6, H.265(HEVC)8- bit codec, OneAPI
LAN	Intel® i219LM/V	Intel® i226 IT/V
USB	4x USB 3.X/2.0, 4x USB 2.0	2x USB 3.X Gen2, 8x USB 2.0
Serial ATA	3x at 6Gb/s	2x at 6Gb/s
PCI Express	5x PCIe x1 Gen3 (3965U supports Gen2) (6 PCIex1 w/o GbE, opt.)	Up to 8 PCIe GEN3 x1 (HSIO 11 support SATA and PCIe , PCIe Switch IC BOM option)
eMMC (opt.)	-	eMMC 5.1
SD	-	-
Audio	ALC886 (carrier board)	ALC886 (carrier board)
TPM	TPM 2.0 (optional)	TPM 2.0 (optional)
Management Bus	I2C, SMBus	I2C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	5-20V / 5Vsb ±5% (ATX), 5-20V (AT)	5-20V/ 5Vsb±5%(ATX), 5-20V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard :0°C to +60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibility	PICMG COM.0 R2.1, Type 6 Compact size: 95 x 95 mm	PICMG COM.0 R3.1, Type 6 Compact size: 95 x 95 mm
OS support	yocto PROJECT	Ubuntu yocto PROJECT

Notes:

- VxWorks is supported by project basis.
- TPM is supported by BOM option.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.

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COM Express

Type 6 Compact Size

	cExpress-EL	cExpress-AL
		
SoC	Intel Atom® x6000E series x6425E/x6413E/x6211E x6425RE/x6414RE/x6412RE (formerly "Elkhart Lake")	Intel Atom® E3950/E3940/E3930 (formerly "Apollo Lake")
Memory	32 GB DDR4 IBECC at 3200/2666 MT/s	32 GB DDR4 at 2133/1867 MT/s
BIOS Type	AMI Aptio V	AMI Aptio V
Bootloader	-	-
Graphics Outputs	LVDS (oreDP1.4) 2x DDI (DP/HDMI or VGA)	LVDS(oreDP1.4) 2x DDI (DP/HDMI or VGA)
Graphics Features	DX12, OpenGL4.5, ES3.2, OpenCL 2.0 H.265 (HEVC) 8-bit codec, VP9 8-bit decode	DX 12, OpenGL 4.4 and ES 2.0, OpenCL 2.1 H.265(HEVC) 10-bit codec, VP9 10-bit decode
LAN	MaxLinear® GPY 2.5GbE (TSN @ GPY215)	Intel® i219LM/V
USB	2x USB 3.X/2.0, 6x USB 2.0 (USB 3 hub by project)	4x USB 3.X/2.0, 4x USB 2.0
Serial ATA	2x at 6Gb/s	3x at 6Gb/s
PCI Express	6x PCIe x1 Gen3	5x PCIe x1 Gen3 (3965U supports Gen2) (6 PCIex1 w/o GbE, opt.)
eMMC (opt.)	16-64 GB (by project)	-
SD	Yes	-
Audio	ALC886 (carrier board)	ALC886 (carrier board)
TPM	TPM 2.0 (optional)	TPM 2.0 (optional)
Management Bus	I2C, SMBus	I2C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	8.5-20V / 5Vsb ±5% (ATX), 8.5-20V (AT)	5-20V / 5Vsb ±5% (ATX), 5-20V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibility	PICMG COM.0 R3.0, Type 6 Compact size: 95 x 95 mm	PICMG COM.0 R2.1, Type 6 Compact size: 95 x 95 mm
OS support	yocto PROJECT	yocto PROJECT

Notes:

- VxWorks is supported by project basis.
- TPM is supported by BOM option.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.

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COM Express

Type 7 Basic Size

Serving servers with extended operating temperatures

A fundamental innovation in COM interfaces, COM Express Type 7 Basic size, designed for intermediate- to high-performance headless edge servers, offers up to 32 PCIe lanes and four 10GbE ports with an extended temperature tolerance. As of late, its suitability for a wide range of rugged and embedded industrial applications has been widened further with Revision 3.1, which adds a second PCIe clock for **PCIe Gen4**. The range of applications for Type 7 modules is very broad, including general-purpose rugged embedded computers, mission-critical servers, SDN appliances, signal processing & data acquisition appliances, network test equipment, satellite gateways, inflight entertainment systems, and more.



x86

EXTREME RUGGED

Pin Definition
Type 7 Rev 3.0 Basic Size Modules

A-B	C-D
4x USB 2.0	4x USB 3.X
2x SATA	4x 10G KR
Gigabit Ethernet	
NC-SI	
LPC / eSPI	
GPIO / SDIO / SERIAL / CAN / SPI / I2C / HDA / PCIe clock & RSVD	
PCIe x32	
Power	

Pin Definition
Type 7 Rev 3.1 Basic Size Modules

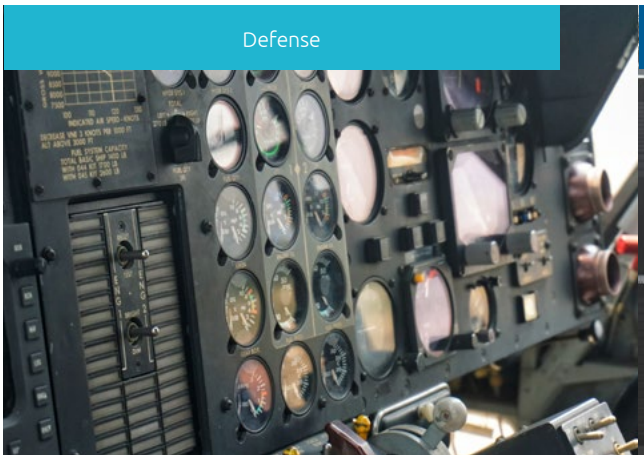
A-B	C-D
4x USB 2.0	4x USB 3.X
2x SATA	4x 10G KR **CEI mode**
Gigabit Ethernet	
NC-SI	
LPC / eSPI	
GPIO / SDIO / SERIAL / CAN / SPI / I2C / HDA / PCIe clock & 2nd PCIe clock / IPMB	
PCIe Gen4 x32	
Power	

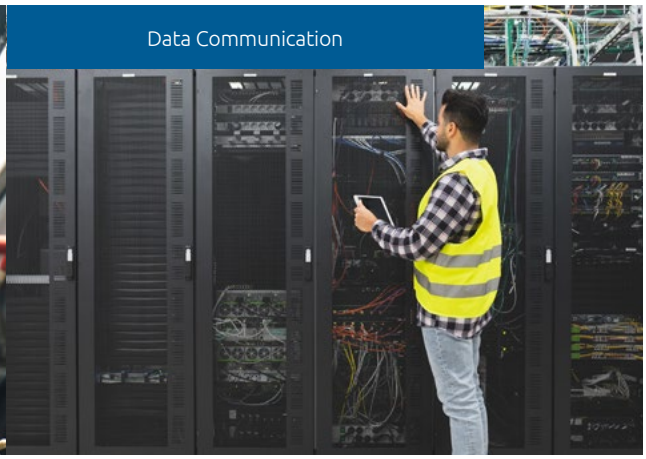
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COM Express

Applications









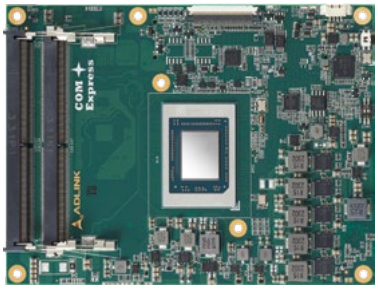
COM Express Type 7 Development Kits

- One-click Buy & Ship
- Easy "How-to's"
- Online documentation
- Forum support

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COM Express

Type 7 Basic Size

	Express-ID7	Express-VR7
		
	New	Preliminary
SoC	Intel® Xeon® D-1700 D-1746TER D-1735TR D-1732TE D-1715TER D-1712TR (formerly "Ice Lake-D")	AMD Ryzen Embedded V3C48 V3C44 V3C18I V3C18 V3C16 VC14 (formerly "V3000")
Memory	128 GB DDR4 at 3200/2666 MT/s (ECC / non-ECC)	Dual channel up to 4800 MT/s ECC/non-ECC DDR5 memory up to 64GB
BIOS Type	AMI Aptio V	AMI Aptio V
LAN	4x 10GBASE-KR Intel® i210/i211 (GbE, IEEE1588, NC-SI)	2x 10GBASE-KR, 1x 2.5GbE and 1000/100/10 Mbit/s
USB	4x USB 3.X/2.0	4x USB 3.X/2.0/1.1 (USB 0,1,2,3)
Serial ATA	2x at 6Gb/s	2x at 6Gb/s
PCI Express	PCI Express x16 Gen4 (or 2 x8 or 4 x4) PCI Express x8 Gen3 (x8, x4, x2) PCI Express x8 Gen3 (x8, x4, x2)	8 PCI Express Gen4 (1 x8, 2 x4), 4 PCI Express Gen4 (4 x1, 2 x2, 1 x4), 2 PCI Express Gen4 (1 x1, 1 x2)
eMMC (opt.)	-	
TPM	TPM 2.0	TPM 2.0
Management Bus	I2C, SMBus	I2C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	12 V / 5Vsb ±5% (ATX) 12 V (AT)	8.5-20V/5Vsb±5%(ATX)8.5-20V(AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibillity	PICMG COM.0 R3.1, Type 7 Basic size: 95 x 125 mm	PICMG COM.0: Rev 3.1 Type 7 Type 7 Basic size: 95 x 125 mm
OS Support	yocto PROJECT, Windows	Ubuntu, yocto PROJECT

Notes:

- TPM is supported by BOM option.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.

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COM Express

Type 7 Basic Size

	Express-BD7/BD74	Express-DN7
		
SoC	Intel® Xeon® D D-1559/D-1539/D-1519/D-1577/D-1548/D-1527 Pentium® D-1508 (formerly "Broadwell-DE")	Intel® Atom® C3000 C3808/C3708/C3508/ C3308/C3958/C3858/ C3758/C3558/C3538/ C3338 (formerly "Denverton-NS")
Memory	64 GB DDR4 at 2400/2133MT/s (ECC for Express-KLE)	96 GB DDR4 at 2400/2133 MT/s (ECC for Express-SLE)
BIOS Type	AMI Aptio V	AMI Aptio V
LAN	2x 10G BASE-KR Intel®i210/i211(GbE, IEEE1588, NC-SI)	4x 10GBASE-KR (max. 20G) Intel® i210/i211 (GbE, IEEE1588, NC-SI)
USB	4x USB 3.X/2.0	2x USB 3.X/2.0, 2x USB 2.0
Serial ATA	2x at 6Gb/s	2x at 6Gb/s
PCI Express	PCI Express x16 Gen3(or 2 x8 or 4 x4) PCI Express x8 Gen3 (x8, x4, x2) PCI Express x8Gen2(x8, x4, x2), w/o GbE	PCI Express x8 Gen3 (or 2x8 or 1x8 plus 2x4) PCI Express x8 Gen3 (x8, x4, x2), w/o GbE
eMMC (opt.)		8-32 GB (by project)
TPM	TPM2.0	TPM 2.0 (optional)
Management Bus	I2C, SMBus	I2C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	8.5-20V/5Vsb±5%(ATX)8.5-20V(AT)	8.5-20 V / 5Vsb ±5% (ATX) 8.5-20V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibillity	PICMG COM.0 R3.0, Type 7 Basic size: 95 x 125 mm	PICMG COM.0 R3.0, Type 7 Basic size: 95 x 125 mm
OS Support	yocto PROJECT	yocto PROJECT

Notes:

- TPM is supported by BOM option.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.

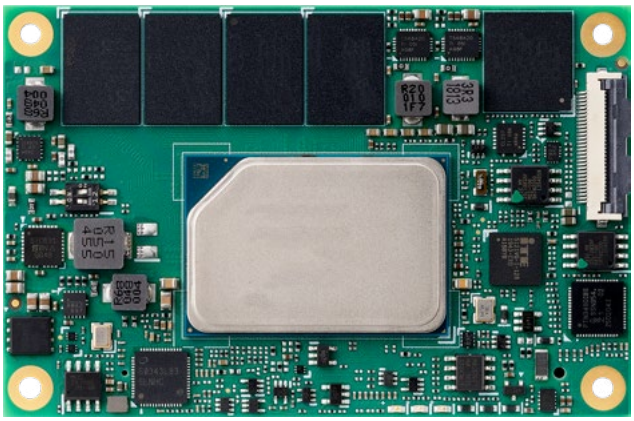
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COM Express

Type 10 Mini Size

Ultra-low power with soldered onboard memory

COM Express Type 10 Mini size features power envelopes of TDP 12W and lower and soldered onboard memory, yet still offering graphics display and optimized I/O capabilities needed for various technologically-advanced mobile solutions, such as handheld devices and controllers for industrial, medical, and transportation applications.



Pin Definition for Type 10 Mini Size Modules

A-B

8x USB 2.0 v2x USB 3.X
DDI
LVDS / eDP
4x SATA
Gigabit Ethernet
LPC / eSPI
GPIO / SDIO / SERIAL / CAN / SPI / I2C / HDA
PCIe x4
Power

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COM Express

Applications









COM Express Type 10 Development Kits

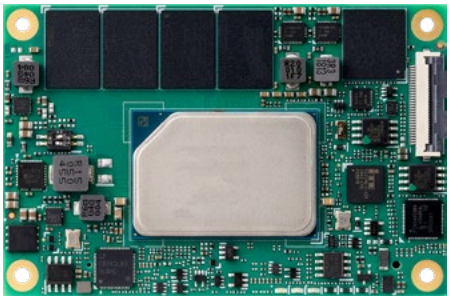
- One-click Buy & Ship
- Easy "How-to's"
- Online documentation
- Forum support

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COM Express

Type 10 Mini Size

nanoX-EL



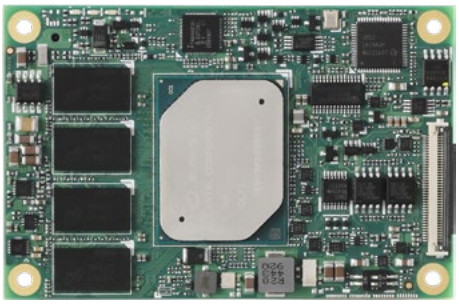
SoC	Intel Atom® x6000 x6425E x6413E x6211E (formerly "Elkhart Lake")
Memory (soldered)	16 GB LPDDR4 IBECC at 4267/3200 MT/s
BIOS Type	AMI Aptio V
Bootloader	-
Graphics Outputs	LVDS (or eDP1.4) 1x DDI (DP/HDMI)
Graphics Features	DX12, OpenGL4.5, ES3.2, OpenCL 2.0
LAN	MaxLinear® GPY 2.5GbE (TSN @ GPY215)
USB	2x USB 3.X/2.0, 6x USB 2.0
Serial ATA	2x at 6Gb/s
PCI Express	4x PCIe x1 Gen3 (x4, x2, x1)
eMMC (opt.)	16-64GB (by project)
SD (opt.)	Yes
Audio	ALC262 (carrier board)
TPM	TPM 2.0 (optional)
Management Bus	I2C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	4.75-20V / 5Vsb ±5% (ATX), 4.75-20V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibility	PICMG COM.0 R3.0 Type 10 Mini size: 84 x 55 mm
OS support	yocto PROJECT

Notes:

- VxWorks is supported by project basis.
- TPM, eMMC are supported by BOM option.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.

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COM Express

	nanoX-AL	nanoX-BT
		
SoC	Intel Atom® x7-E3950/x5-E3940/x5-E3930 (formerly "Apollo Lake")	Intel Atom® E3845/E3827/E3826/E3825/E3815/E3805 (formerly "Bay Trail")
Memory (soldered)	8 GB DDR3L at 1867/1600 MT/s	4 GB DDR3L at 1333 MT/s
BIOS Type	AMI Aptio V	AMI Aptio V
Bootloader	Coreboot	Coreboot
Graphics Outputs	LVDS (or eDP1.4) 1x DDI (DP/HDMI)	LVDS (oreDP1.2) 1x DDI (DP/HDMI)
Graphics Features	DX 11, OpenGL 4.3 and ES 3.0, OpenCL 2.0	DX 11, OpenGL 3.2 and ES 2.0, OpenCL 1.1
LAN	Intel® i210/i211 (IEEE 1588)	Intel® i210/i211 (IEEE 1588)
USB	2x USB 3.X/2.0, 6x USB 2.0	1x USB 3.X/2.0, 3x USB 2.0
Serial ATA	2x at 6Gb/s	2x at 3Gb/s
PCI Express	3x PCIe x1 Gen2 (x2, x1) (others by project)	3x PCIe x1 Gen2 (4x PCIe x1, w/o GbE, opt.)
eMMC (opt.)	8-32 GB (by project)	8-32 GB (by project)
SD (opt.)	Yes	Yes
Audio	ALC262 (carrier board)	ALC262 (carrier board)
TPM	TPM 2.0 (optional)	TPM 1.2 (optional)
Management Bus	I2C, SMBus	I2C, SMBus
Embedded Features	EAPI/SEMA, Backup BIOS, Debug/JTAG	EAPI/SEMA, Backup BIOS, Debug/JTAG
Power Supply	4.75-20V / 5Vsb ±5% (ATX), 4.75-20V (AT)	5-14V / 5Vsb ±5% (ATX), 5-14V (AT)
Operating Temperature	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)	Standard: 0°C to 60°C Extreme Rugged: -40°C to 85°C (standard 12V input only)
Form Factor & Compatibility	PICMG COM.0 R3.0 Type 10 Mini size: 84 x 55 mm	PICMG COM.0 R2.1 Type 10 Mini size: 84 x 55 mm
OS support	yocto PROJECT, Windows	yocto PROJECT, Windows

Notes:

- VxWorks is supported by project basis.
- TPM, eMMC are supported by BOM option.
- Optional -40°C to 85°C support: Standard product with 100% ETT screening available for selected CPU SKUs and std. 12V power supply only.
- All specifications are subject to change without further notice.

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SMARC

Covering ARM / x86 ecosystems

Short for Smart Mobility ARChitecture, the SMARC form factor is the only standard natively built for both ARM- and x86-based SoCs, allowing it to leverage the wide-ranging smart phone and tablet computer ecosystems. With 314-pins on a high-speed MXM3 connector, SMARC delivers a combination of high-performance computing, low power envelopes typically under 6W and no more than 15W, low cost, and the ability to withstand extreme environmental conditions, making it the ideal building blocks for portable and stationary embedded systems.



AIoM (AI on Module)

With the latest Revision 2.1, SMARC has positioned itself as the ideal standard for scalable, low-power, silicon-independent AIoM solutions in the industrial embedded market. Over the revision, SMARC adds the support for up to 4 MIPI CSI camera inputs specifically for SoCs with integrated NPUs (Neural Processing Units) used for video-based AI solutions, such as robotic vehicles and autonomous driving. Additionally, it also allows multiplexing SerDes signals over two PCIe x1 interfaces for a total of four GbE Ethernet ports to support up to 4 GigE Vision cameras for AI vision applications.

Pin Definition for SMARC

2x LVDS / DSI / eDP
HDMI / DP++
DP++
2x MIPI CSI
HDA / I2S
1x SATA
2x GbE
2x USB 3.X/2.0 (1x OTG) 4x USB 2.0 (1x OTG)
4x PCIe
SDIO / SPI / eSPI / 5x I2C 4x UART / 2x CAN / 12x GPIO
Power

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I-Pi SMARC Development Kits

ADLINK offers various out-of-the-box-ready development kits for developing, referencing, and prototyping your tailored, SMARC-driven applications. Visit https://www.ipi.wiki/ for more details and one-click purchase and shipping.





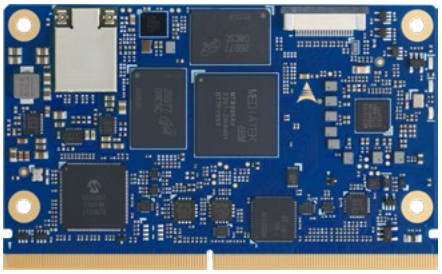
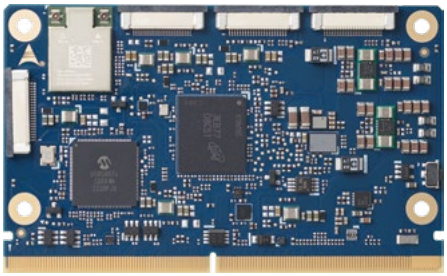






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SMARC module

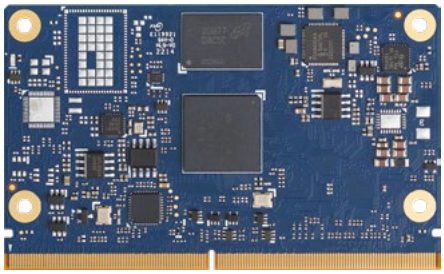
	LEC-MTK-I1200	LEC-RB5
		
	New	New
CPU	MediaTek® Genio 1200 Octa-core CPU 4x Cortex-A78 4x Cortex-A55	Qualcomm® QRB5165 SoC Qualcomm® Kryo™ 585 Octa-core CPU 8x Cortex-A77 cores
Memory/Storage	Up to 16 GB LPDDR4X UFS: 64/128/256GB	Up to 16 GB LPDDR5 UFS: 64/128/256GB
Cache	L2: 256KB per core	128KB / 256KB / 512KB
Boot Loader	U-Boot	U-Boot
Graphics Outputs	1x HDMI 1x LVDS 2x MIPI-DSI 4 lanes	1x HDMI 1x MIPI-DSI 4 lanes
Camera	3x MIPI-CSI 4 lanes	5x MIPI-CSI 4 lanes 1x MIPI-CSI 2 lanes
LAN	Up to 2x GbE	Up to 2x GbE
USB	2x USB 3.X, 4x USB 2.0	2x USB 3.X, 4x USB 2.0
Extension ports	4x UART 2x SPI 14x GPIO 1x SDIO	3x UART 2x SPI 14x GPIO 1x SDIO
Audio	1x I²S	1x I²S
PCI Express	1x PCIe x2 Gen3	2x PCIe x2 Gen3
TPM	TPM 2.0 (optional)	TPM 2.0 (optional)
SEMA Support	Yes	Yes
Power Supply	5.0 V DC±5%	5.0 V DC±5%
Operating Temperature	0°C to 60°C -40°C to 85°C (opt.)	0°C to 60°C -20°C to 85°C (opt.)
Form Factor & Compatibility	SMARC short size, 82 x 50 mm, SMARC specification v2.1.1	SMARC short size, 82 x 50 mm, SMARC specification v2.1.1
OS Support	android, Ubuntu, yocto PROJECT	Ubuntu, yocto PROJECT

Notes:

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SMARC module

	LEC-IMX8MP	LEC-IMX8MM
		
CPU	NXP i.MX 8M Plus Quad, QuadLite 4x Cortex-A53 cores, 1x M7 core	NXP i.MX 8M Mini, 4x Cortex-A53 cores, 1x M4 core
Memory/Storage	Up to 8 GB LPDDR4 at 4266 MT/s eMMC: 32/64GB	Up to 4 GB DDR4 at 4266 MT/s eMMC: 32/64/128GB
Cache	L2: 512KB ECC	L2: 512KB
Boot Loader	U-Boot	U-Boot
Graphics Outputs	1x HDMI 2x LVDS 1x MIPI-DSI 4 lanes	1x MIPI-DSI 4 lanes (or 2x LVDS via bridge)
Camera	1x MIPI-CSI 4 lanes 1x MIPI-CSI 2 lanes	1x MIPI-CSI 4 lanes
LAN	2x GbE (LAN0 with TSN)	1x GbE
USB	2x USB 3.X, 4x USB 2.0 (one shared with USB OTG on port 0)	5x USB 2.0 (one shared with USB OTG on port 0)
Extension ports	4x UART 2x SPI 14x GPIO 1x SDIO	4x UART 3x SPI 14x GPIO 1x SDIO
Audio	1x I²S	1x I²S
PCI Express	2x PCIe x1 Gen 2	1x PCIe Gen2
TPM	TPM 2.0 (optional)	TPM 2.0 (optional)
SEMA Support	Yes	Yes
Power Supply	5.0 V DC±5%	5.0 V DC±5%
Operating Temperature	0°C to 60°C -40°C to 85°C (opt.)	0°C to 60°C -40°C to 85°C (opt.)
Form Factor & Compatibility	SMARC short size, 82 x 50 mm, SMARC specification v2.1.1	SMARC short size, 82 x 50 mm, SMARC specification v2.1.1
OS Support	android, yocto PROJECT	yocto PROJECT

Notes:

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SMARC module

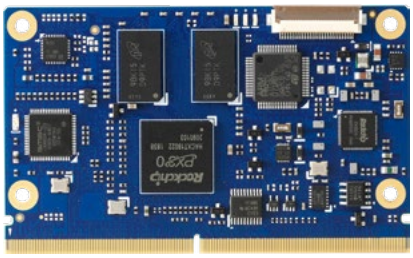
	LEC-EL	LEC-AL
	 New	
CPU	Intel Atom® X6425E Intel Atom® X6413 Intel Atom® X6211E Intel Atom® X6200FE (formerly "Elkhart Lake")	Intel Atom® E3900 Series, Intel® Pentium® N4200, Intel® Celeron® N3350 (formerly "Apollo Lake")
Memory/Storage	Up to 16 GB LPDDR4 at 4266 MT/s Up to 128 GB eMMC	Up to 8 GB DDR3L at 1867 MHz Up to 64 GB eMMC
Cache	1.5 MB system L2 cache 4MB LLC	L2: 2 MB
Boot Loader	AMI UEFI BIOS	AMI UEFI BIOS
Graphics Outputs	Dual channel LVDS 18/24-bit) HDMI/DP++, DP++	Dual channel LVDS (18/24-bit) HDMI/DP++, DP++
Camera	-	2x MIPI CSI camera
LAN	Dual 10/100/1000/ 2.5 Gbit Ethernet with TSN	Intel® i210IT MAC/PHY 1x GbE IEEE 1588
USB	2x USB 3.X host 6x USB 2.0 host	1x USB 3.X OTG 1x USB 3.X host 1x USB 2.0 OTG 1x USB 2.0 host
Extension ports	1x SATA 6Gb/s 4x UART 2x SPI 14x GPIO 1x SDIO	1x SATA 6Gb/s 4x UART 2x SPI 12x GPIO 1x SDIO
Audio	1x I²S, 1x HDA	1x HDA
PCI Express	4x PCIe x1 Gen3 (x4, x2, x1)	4x PCIe x1 Gen2 (x4, x2, x1)
TPM	TPM 2.0 (optional)	TPM 2.0 (optional)
SEMA Support	Yes	Yes
Power Supply	5.0 V DC±5%	5.0 V DC±5%
Operating Temperature	0°C to 60°C -40°C to 85°C (opt.)	0°C to 60°C -40°C to 85°C (opt.)
Form Factor & Compatibility	SMARC short size, 82 x 50 mm, SMARC specification v2.1	SMARC short size, 82 x 50 mm, SMARC specification v2.0
OS Support	Ubuntu yocto PROJECT	yocto PROJECT

Notes:

- All specifications are subject to change without further notice.

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LEC-PX30



CPU	Rockchip PX30 Quad-core 4x Cortex-A35 cores
Memory/Storage	Up to 4 GB DDR3L at 1066MHz eMMC: 32/64GB
Cache	L2: 256KB
Boot Loader	U-Boot
Graphics Outputs	LVDS (or MIPI-DSI, 4-lane)
Camera	-
LAN	Up to 2x 10/100Mbps
USB	3x USB 2.0 (one shared with USB OTG on port 0)
Extension ports	2x UART 2x SPI 12x GPIO 1x SDIO
Audio	1x I²S
PCI Express	-
TPM	TPM 2.0 (optional)
SEMA Support	Yes
Power Supply	3.0 V - 5.0 V DC±5%
Operating Temperature	0°C to 60°C -40°C to 85°C (opt.)
Form Factor & Compatibility	SMARC short size, 82 x 50 mm, SMARC specification v2.1
OS Support	android

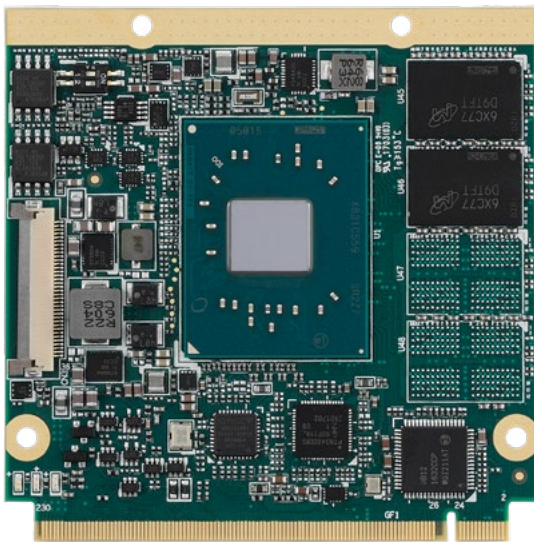
Notes:

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Qseven

Qseven® is an off-the-shelf, multi-vendor, computer-on-module that integrates all the core components of a typical PC packed in a slim design, to be mounted onto an application-specific carrier board. Its single ruggedized 230-pin MXM2 connector offers all the I/O interfaces necessary for mobile / ultra-mobile embedded applications, such as graphics, sound, mass storage, and networking, at power envelopes usually between 6 and 12 watts. Since its pinouts are mostly x86 x86-oriented, Qseven® is commonly built around "Atom level" x86 silicon.



Pin Definition for Q7

2x LVDS / DSI / eDP
HDMI / DP++
2x MIPI CSI
HDA / I2S
2x SATA
GbE
2x USB 3.X/2.0 (1x OTG) 4x USB 2.0 (1x OTG)
4x PCIe
SDIO / SPI / LPC or GPIO 5x I2C / 2x UART or CAN
Power

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	Q7-EL	Q7-AL
		
	Preliminary	
SoC	Intel Atom x6000 Series Atom® x6425RE, Atom® x6414RE, Atom® x6413E (formerly "Elkhart Lake")	Intel Atom® E3900 Series, Pentium® N4200 or Celeron® N3350 (formerly "Apollo Lake")
Memory	Up to 16 GB LPDDR4 at 4266 MHz	Up to 8 GB LPDDR4 at 2400 MHz
Cache	1.5MB system L2 cache 4MB LLC	L2: 2 MB
BIOS Type	AMI UEFI BIOS	AMI UEFI BIOS
Integrated Graphics	Intel® UHD Graphics for 10th Gen Intel® Processors, supports three independent displays, 4k video (up to 4096 x 2160@60fps)	9th Gen Intel® graphics core architecture with up to 18 execution units, supports three independent displays, 4k video (up to 4096 x 2160 @60fps)
Graphics Features	DirectX 12, OpenGL 4.5, OpenCL 2.0, ES 3.2	DirectX 12, OpenGL 4.2, OpenCL
Camera	-	2x MIPI CSI 2L/4L
LAN	MaxLinear® 2.5Gbit Ethernet with TSN	Intel® i210IT MAC/PHY, 1x GbE, IEEE 1588
USB	2x USB 3.X 6x USB 2.0	2x USB 3.X 6x USB 2.0
Serial ATA	2x SATA3 6Gb/s	2x SATA 6Gb/s to carrier or 1x SATA 6Gb/s to carrier and 1x onboard SATA SSD
PCI Express	4x PCIex1 Gen.3	3x PCIe x1
eMMC (opt.)	Onboard eMMC 5.1 (16-128 GB)	Onboard eMMC 5.0 (4-64 GB)
Audio	HDA	HDA
SEMA	Yes	Yes
Power Supply	Module Input Voltage: 5.0V Power Pins:12 pins, 6A at 5V Typical IO Voltage: 3.3V	Module Input Voltage: 5.0V Power Pins: 12 pins, 6A at 5V Typical IO Voltage: 3.3V
Operating Temperature	0°C to +60°C -40°C to +85°C	0°C to 60°C -40°c to 85°C
Form Factor & Compatibility	Qseven 2.1, Size: 70 x 70 mm	Qseven 2.1, Size: 70 x 70 mm
OS support	yocto PROJECT ·	yocto PROJECT ·

Notes:

- All specifications are subject to change without further notice.

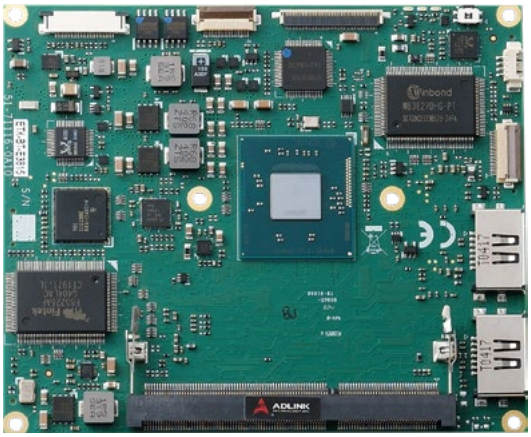
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ETX®

ETX

Legacy beyond 2025

ETX® is one of the earliest successful computer-on-module form factors. Today it is still widely used in applications such as industrial automation, transportation and medium and low level medical appliances. While high-end Intel® Core™ applications have mostly migrated to COM Express, ETX® is still prominent in the lower power segment, mostly notably using Intel® Atom® SoCs. Specifically, customers who have heavily invested in ISA and PCI controllers or peripheral technologies still pose great demand for ETX® through the years. To this extent, ADLINK is providing long-term support for ETX® well beyond 2025.



x86

EXTREME RUGGED

Pin Definition for ETX

X1	X2
4x USB 2.0/1.1	8/16-bit ISA
32-bit PCI-bus	
HD Audio	

X1	X2
Analog VGA	2x PATA
Dual LVDS	2x SATA
PS2 MS / KB 2x UART, LPT1	I2c / SMbus
	10/100 Mbps Ethernet

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ETX-BT



SoC	Intel Atom® E3800 series Celeron® N2930/J1900 (formerly "Bay Trail")
Memory	Up to 8GB DDR3L at 1333/1066MHz
Cache	L2: 512 kB to 2MB
BIOS Type	AMI Aptio EFI
TPM	Atmel AT97SC3204
Graphics Features	LVDS, DisplayPort, VGA Decode: H.264, MPEG2, MVC, VC-1, WMV9 and VP8 Encode: H.264, MPEG2 and MVC DirectX 11, OCL 1.1, OGL ES Halt/2.0/1.1, OGL 3.2
LAN	Intel® i211 MAC/PHY, supporting 10/100 Mbps (GbE via onboard connector)
USB	4x USB 2.0
PATA (IDE)	2x
SATA	2x SATA 3Gb/s
Audio	Integrated on E3800 SoC, Realtek ALC 262
SEMA Support	Yes
Power Supply	5V±5% / 5Vsb ±5% (ATX) 5V±5% (AT)
Operating Temperature	0°C to 60°C -40°C to 85°C (opt.)
Form Factor & Compatibility	ETX 3.02 Size: 95 x 114 mm
OS Support	

Notes:

- VxWorks is supported by project basis.
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