TRIA™
AN AVNET COMPANY



EMBEDDED COMPUTER MODULES & BOARDS

March / 2026

WELCOME TO TRIA



"At Tria Technologies, we ensure your path to market is defined by innovation, not infrastructure hurdles. We combine specialized engineering agility with global scale to simplify your development journey – all backed by Avnet's world-class supply chain.

We deliver more than hardware; our production-ready software stack and custom software capabilities manage low-level complexities, allowing your team to focus on unique IP. By leveraging our modular technologies, OEMs drastically reduce R&D cycles and reach the market faster. We are your strategic partner, committed to transforming vision into market-leading reality."

Dr. Daniel N. Denzler,
Managing Director & Senior Director, Business Line
Tria Technologies

"Our aim is to deliver outstanding engineering performance that gives our customers a leadership position in their markets. With more than 35 years of experience in design, engineering and manufacturing, we are proud to be at the forefront of embedded computing and electronics."

Silvano Geissler,
Vice President Product Creation
Tria Technologies



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ABOUT US

Colorful Ideas. Powerful Innovation.
Tria Technologies designs and delivers embedded compute solutions for OEMs worldwide.

Our mission is to simplify development, reduce risk, and accelerate time-to-market through platform technologies, strong partnerships, and advanced manufacturing. Working closely with OEMs and industry leaders, we provide scalable, tailored solutions from concept to mass production.

Backed by Avnet's worldwide sales and logistics network, we help customers bring innovation to market faster.

Compute modules
The largest portfolio of standard modules & SBCs, built on open standards.

World class partners
Close partnership with Intel, NXP, Qualcomm, AMD, Renesas etc.

In-house manufacturing
European design & manufacturing, global logistics, teams all over the world.

900+
Customers served annually.

3.0m+
Systems & boards built annually

300+
Hardware & Software engineers

800+
Operations employees.

600k Sq. Ft.
Manufacturing footprint

10+
Global locations







LARGEST COM MODULE PORTFOLIO







35+ YEARS KNOW-HOW

BEST TEAM



TIMELINE

2024 Tria Technologies is created

2021 MSC becomes Avnet Embedded

2018 MSC joins Avnet Integrated

2013 MSC bought by Avnet

2012 MSC is founding member of SGeT

2006 MSC Technologies joins PICMG

2001 Avnet EMG Ltd is founded

2000 OEM systems manufacturing begins

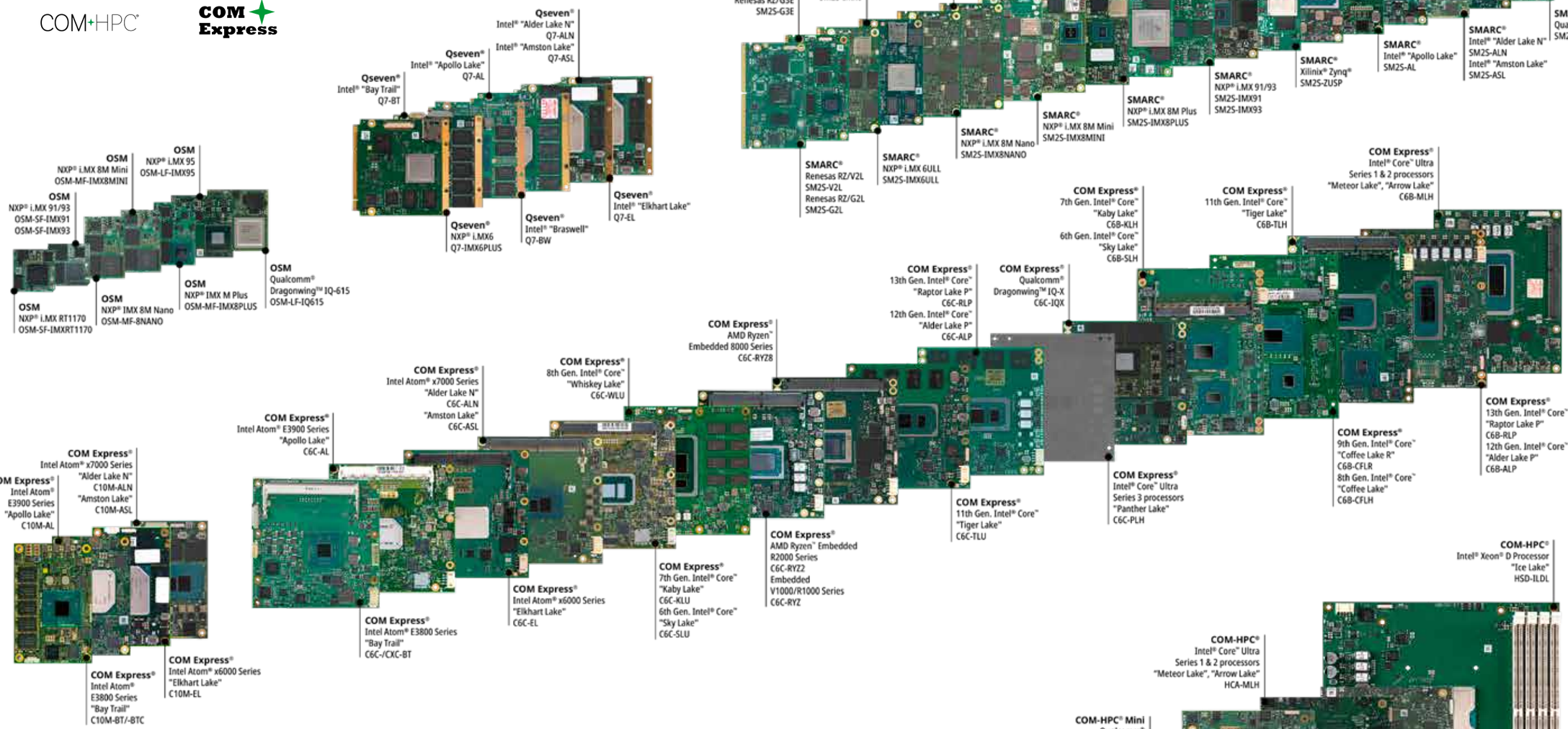
1987 Establishment of the first design center and PCB assembly

1982 MSC Technologies is founded

ONE OF THE LARGEST GLOBAL COM MANUFACTURERS

TRIA

OPEN STANDARD MODULE™ · SEVEN · SMARC module · COM-HPC® · COM Express



intel · NXP · Qualcomm · AMD · RENESAS

Industrial quality built for reliability, endurance and longevity

Explore our award-winning range of standard computer-on-modules

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TRIA EMBEDDED COMPUTE HIGHLIGHTS

Qualcomm

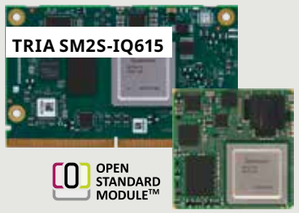
SMARC module



Qualcomm Dragonwing Q5 / Q6

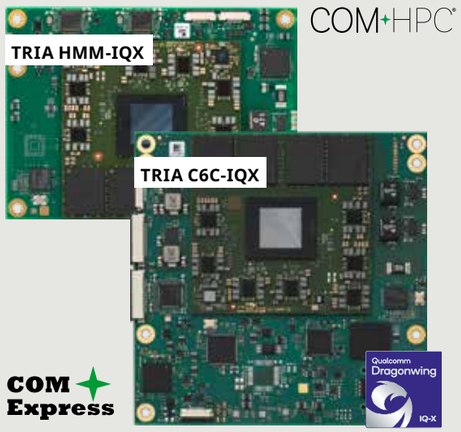
VISIONAI-KIT 6490

SMARC module



Qualcomm Dragonwing IQ6

TRIA OSM-LF-IQ615



COM-HPC®

Qualcomm®

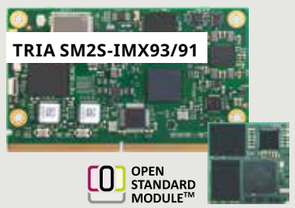
We offer high-performance, Qualcomm-based modules delivering advanced connectivity and intelligent edge computing for modern IoT and embedded applications.

Android · Windows · Linux



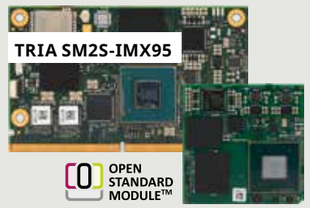
NXP® i.MX 95, i.MX 93 and i.MX 91 Applications Processors

SMARC module



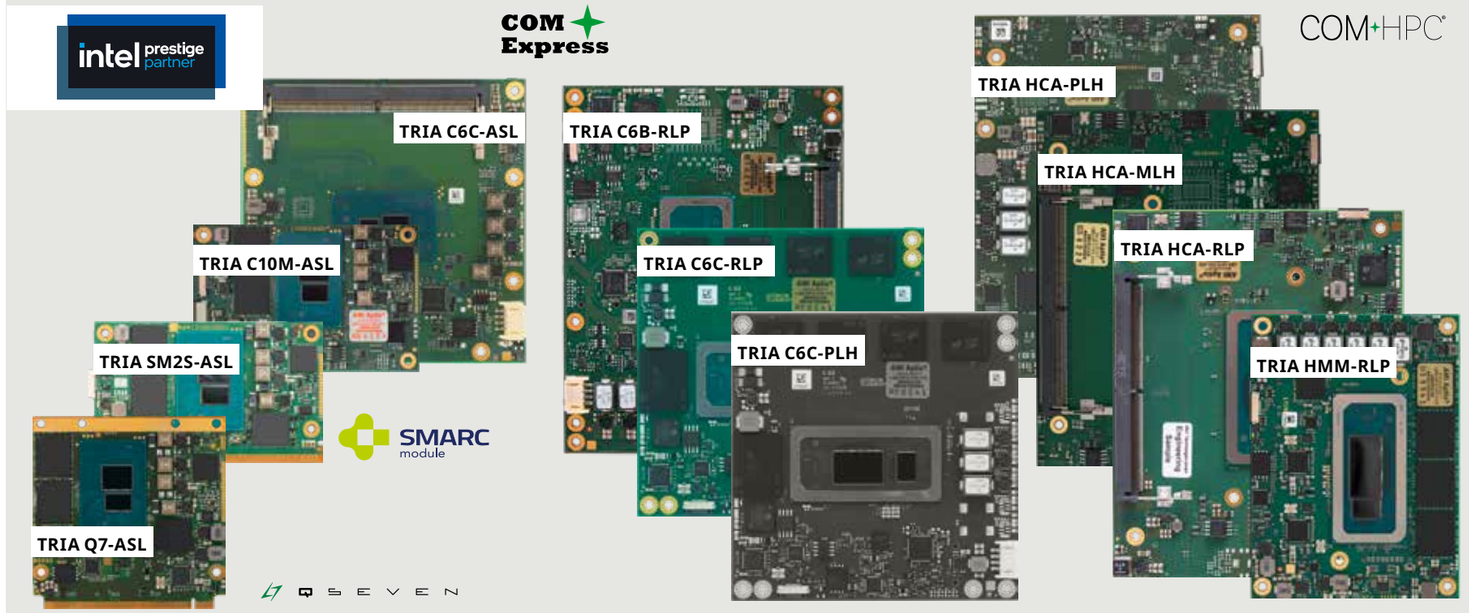
TRIA OSM-SF-IMX93/91

SMARC module



TRIA OSM-LF-IMX95

Scalable processing platforms combining high performance with exceptional energy efficiency:
- i.MX 95 for advanced edge vision and audio AI
- i.MX 93/91 series optimized for versatile, low-power edge applications



Latest Intel Atom® X7000 Series

(products former codenamed "Amston Lake", "Twin Lake") High performance x86 processing with industrial temperature ranges.

Intel® 13. Generation

(products formally Raptor Lake P) "iCore" performance on Industrial temp. COM Express® (Basic/Compact) and COM-HPC®.

Intel® Core™ Ultra

(products formally Meteor Lake /Panther Lake highest performance on COM Express® Basic and COM-HPC®.

AMD

COM Express



AMD RYZ 8000

High-performance x86 processing, built-in AI acceleration and versatile I/O. Ideal for demanding embedded, media, AI-edge or industrial applications.

RENESAS

SMARC module



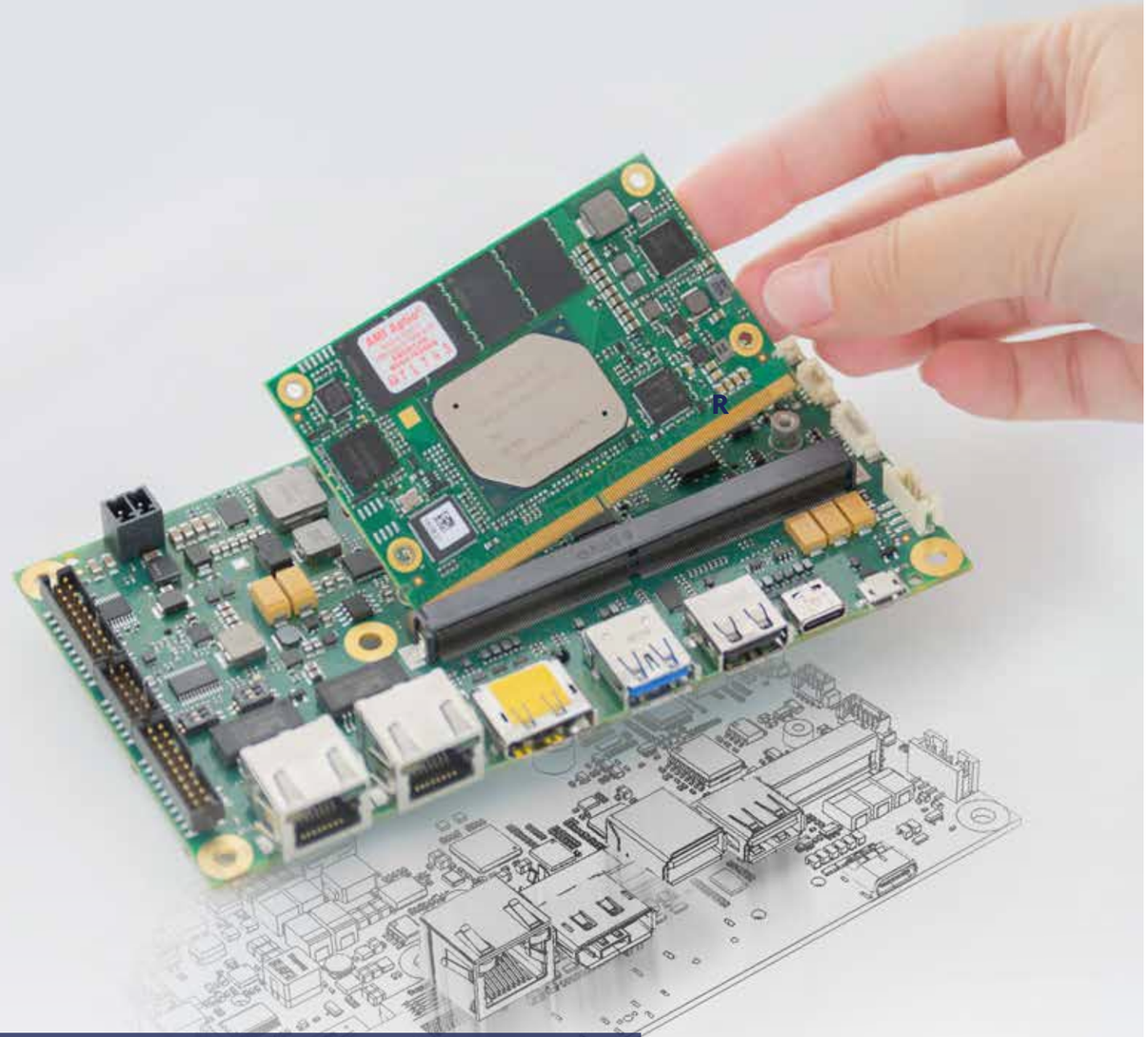
Renesas RZ/G3E

Delivers efficient processing, integrated AI, and robust connectivity in a compact SMARC module for modern industrial and IoT solutions.

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Copyright Tria Technologies

SCALABILITY OF PERFORMANCE



‘Scalability of Performance’ describes how our COMs enable different modules, with varying performance and feature sets, to be used interchangeably on the same carrier board.

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VERTICAL MARKETS

Rising popularity on Embedded Computer Technology by Open Standards

Tria computer-on-modules are used by customers across all major industry verticals.



Industrial Automation/Robotics



Mobile Plant Machinery



Medical



Professional Consumer



Building Management



EV Charging



HVAC



POS / POI



Energy & Power Efficient / Low Power



Security

Copyright Tria Technologies

STRATEGIC PARTNERS

x86 and Arm® Partners

BIOS Partners	Software Innovation*	Technology Community	BSP Focus	Standardization Groups

*Market leading in-house embedded software team

- ✓ **Technology Focus**
  x86 and Arm® architectures
- ✓ **Platform**
  Re-use in custom boards and systems
- ✓ **Flexibility**
  Best-in-class rapid customization
- ✓ **Support and Service**
  Intensive design partner to customers
- ✓ **Open Standards Executive Member**
  Leading PICMG and SGeT standards innovator



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STANDARDS INNOVATOR

The evolution of Open Industry SOM/COM Standards

1992 PC-104
2000 ETX
2005 COM Express®
2008 Qseven®
2016 SMARC® 2.x
2020 COM-HPC®
2022 OSM

With a large team of experts across mechanical, thermal, high-speed signaling, networking, power management and software design, Tria leverages thousands of projects to deliver the benefits of open standards:

- ✓ Lower risk than proprietary solutions
- ✓ Longevity through multiple generations of compatible platforms
- ✓ Open competition and multiple vendors
- ✓ Cost efficiency at scale
- ✓ Simplified development



Executive Member of PICMG (PCI Industrial Computer Manufacturers Group)

COM Express
COM-HPC

- Tria engineers have contributed to every COM Express® revision at PICMG.
- As an Intel Early Access Partner, we are dedicated to a fully scalable roadmap.
- Together with Avnet engineers, we developed the COM-HPC® signal simulation and integrity specifications. Tria delivered the industry's first COM-HPC® proof of concept.

Founding member of SGeT (Standardization Group for Embedded Technologies)

SMARC module
Qseven
OPEN STANDARD MODULE

- SMARC® 2.x was created at SGeT by workgroups including several Tria engineers. First SMARC® 2.x Product to Market by Tria.
- Qseven® Founding Member
  open Standard was created by Tria and two other companies

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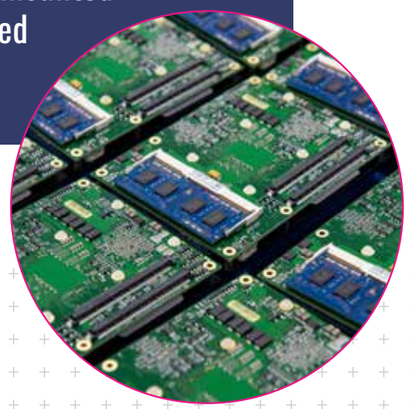
LEADING-EDGE MANUFACTURING



With state-of-the-art production equipment and advanced automation, we deliver best-in-class throughput and minimal manufacturing costs to the highest quality standards.

Competitive Advantage – Production Flexibility

- Customized BIOS
- Memory Configuration
- Depopulation of parts
- Preload OS
- Cooling mounted and tested

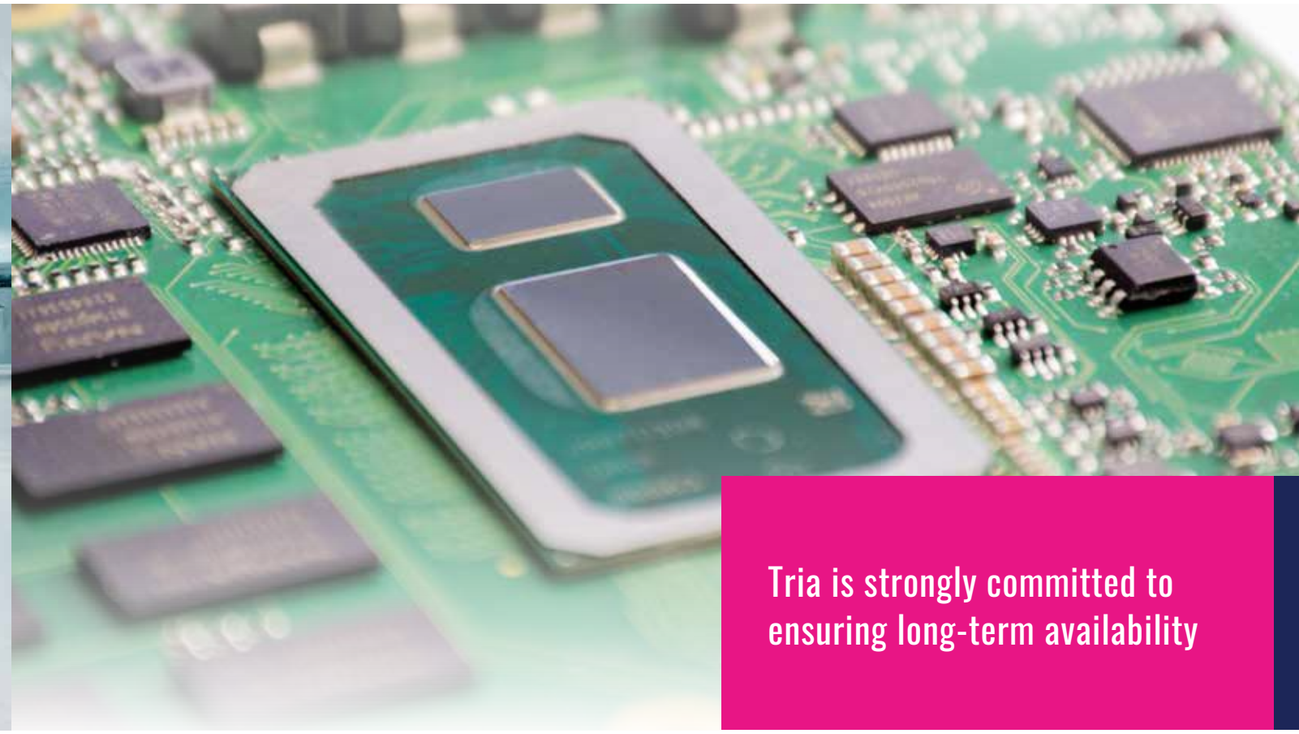


Best-in-Class Quality

Tria's product engineering, test development and production teams work closely together to deliver optimized product quality. Our advanced SAP-integrated MES and quality systems ensure full product traceability, including strict version control for every unit produced.

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PRODUCT LONGEVITY

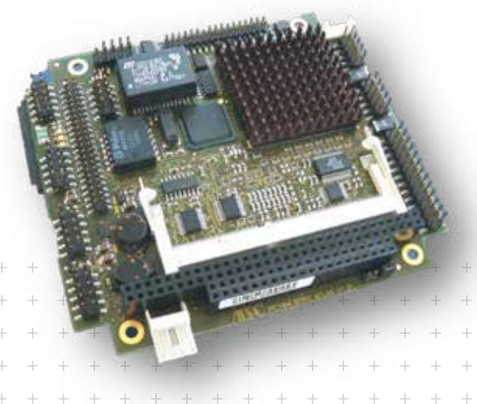


Tria is strongly committed to ensuring long-term availability

Industrial products typically have life cycles of 10–15 years, often extended through maintenance and repair programs.

With strict version control, continuous component risk analysis and alternative part designs, our Proactive Obsolescence Management ensures long-term reliability.

For high-volume projects, **Last Time Buy (LTB) programs** can extend EOL and LTS dates, ensuring continued access to critical components, even after silicon EOL notice.



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OFF-THE-SHELF CARRIER BOARDS

SIMPLEFLEX

SimpleFlex is the intelligent combination of a standard Computer-On-Module (COM) with a standard carrier board. It combines the advantages of Standard Single Board Computer (SBC) and Custom Single Board Computer by choosing the COM from a huge portfolio of CPU, I/O and memory configuration options.

	Standard SBC	Custom SBC	SimpleFlex
Low cost	✓✓✓	✓✓✓	✓✓✓
Flexible	– –	✓✓	✓✓✓
Time to Market	✓✓✓	– –	✓✓✓
Low Development cost/risk	✓✓✓	– –	✓✓✓

Optimized for low production cost and simple customization

- Application-ready Arm® and x86 scalability
- Industrial temperature range: -40°C to +85°C
- Built-in versatility with over 30 interface options
- Fast and simple connectivity for HMI and IoT gateways

No Development, just Selection and Configuration



Serial Production

90 Days

Delivery

Optimized Product

Interface Configuration

48h

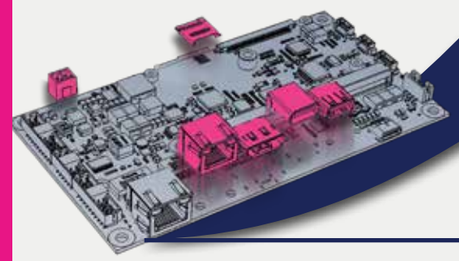
Evaluation

Selection Com & Carrier

Idea

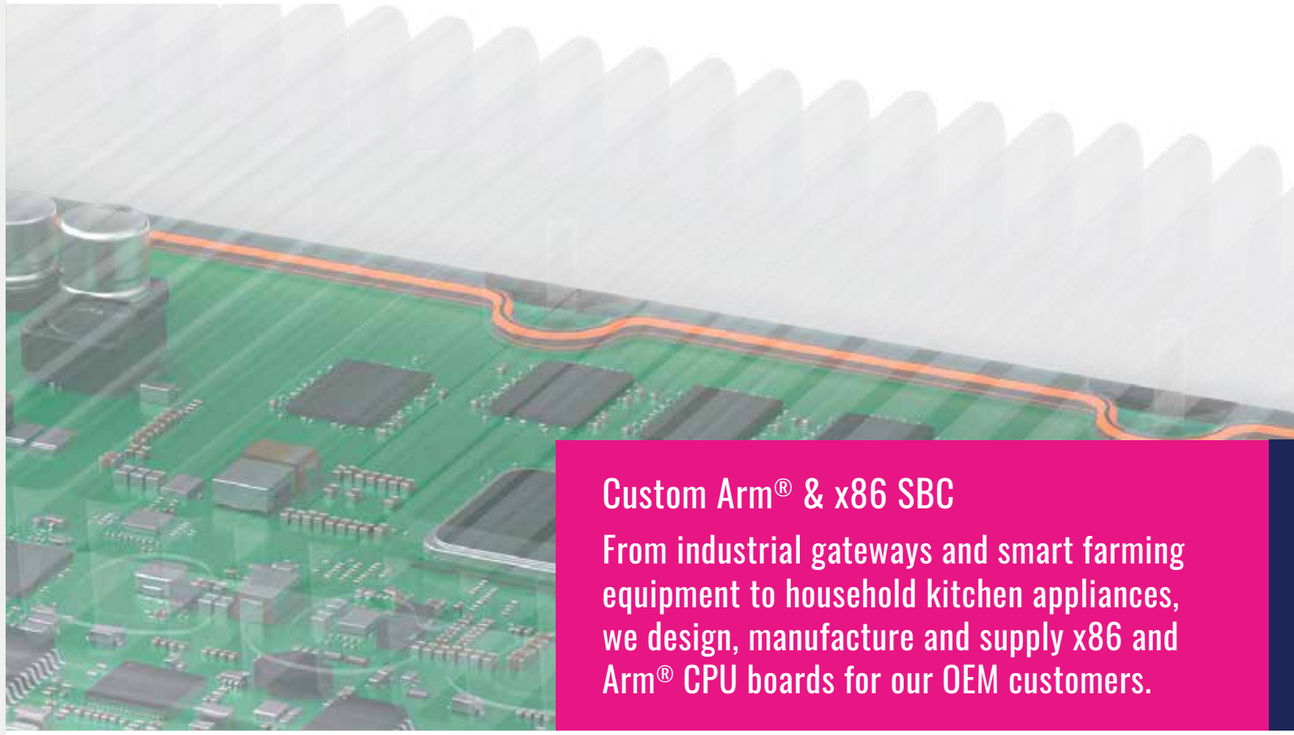
SMARC module

SEVEN



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BOARD CUSTOMIZATION



Custom Arm® & x86 SBC

From industrial gateways and smart farming equipment to household kitchen appliances, we design, manufacture and supply x86 and Arm® CPU boards for our OEM customers.

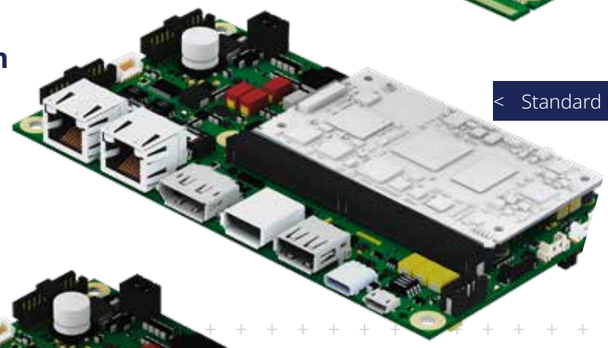
Standard modules (COM) are our design IP for custom board + system solutions



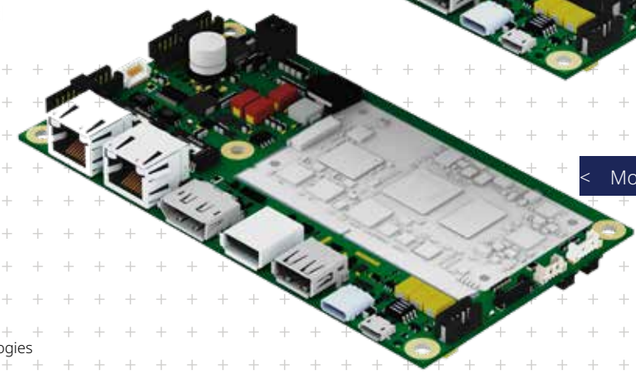
< Standard module

Custom Board Design

- From Standard to Full-Custom
- Custom Development:
  - Carrier boards
  - Single-Board Computers
  - Add-on boards
  - Non-standard



< Standard module on custom baseboard



< Module technology into full-custom design

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CUTTING-EDGE CUSTOM SOLUTIONS

HMI Systems | Box PC's | AI Edge Systems | Compute Units

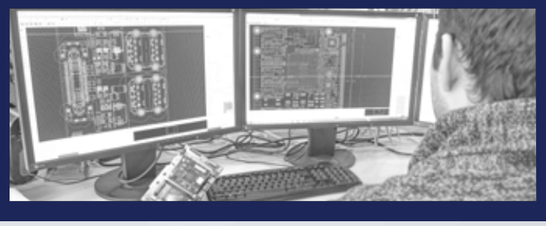
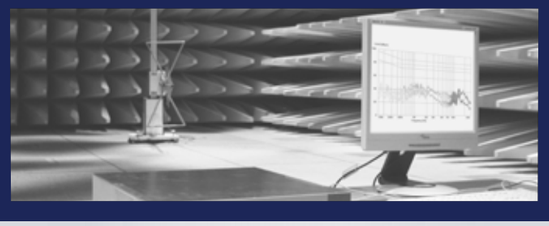
Looking for more than a compute or display solution?

Our experts combine deep knowledge of compute, display and chassis technologies to design complete systems tailored for OEMs.

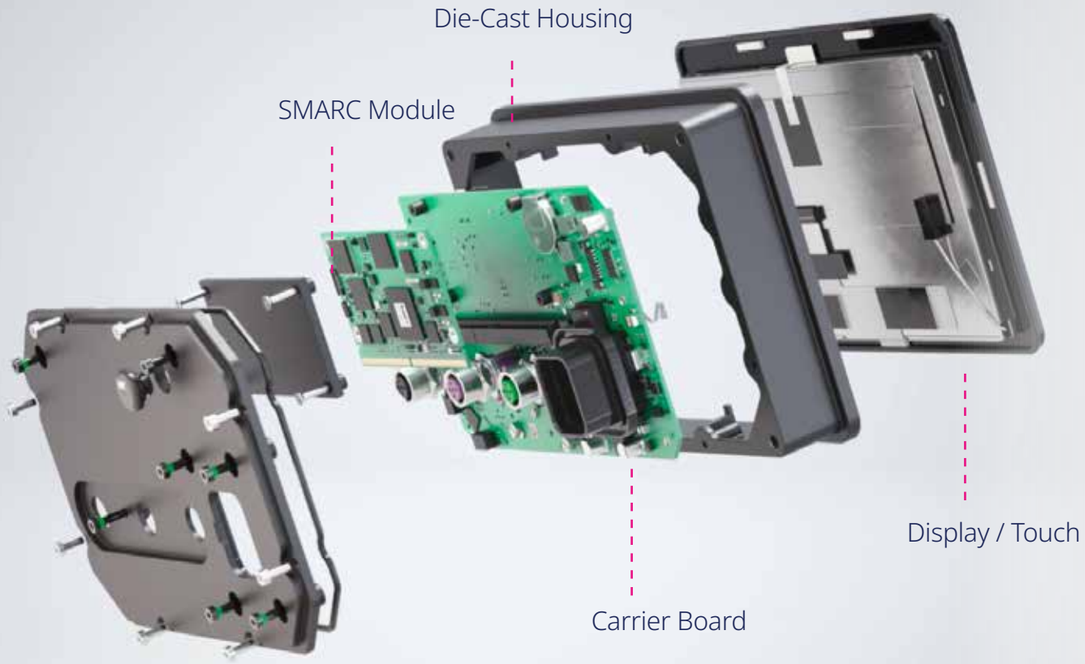
Full-Cycle Innovation: From Concept to Certified System and Manufacturing.

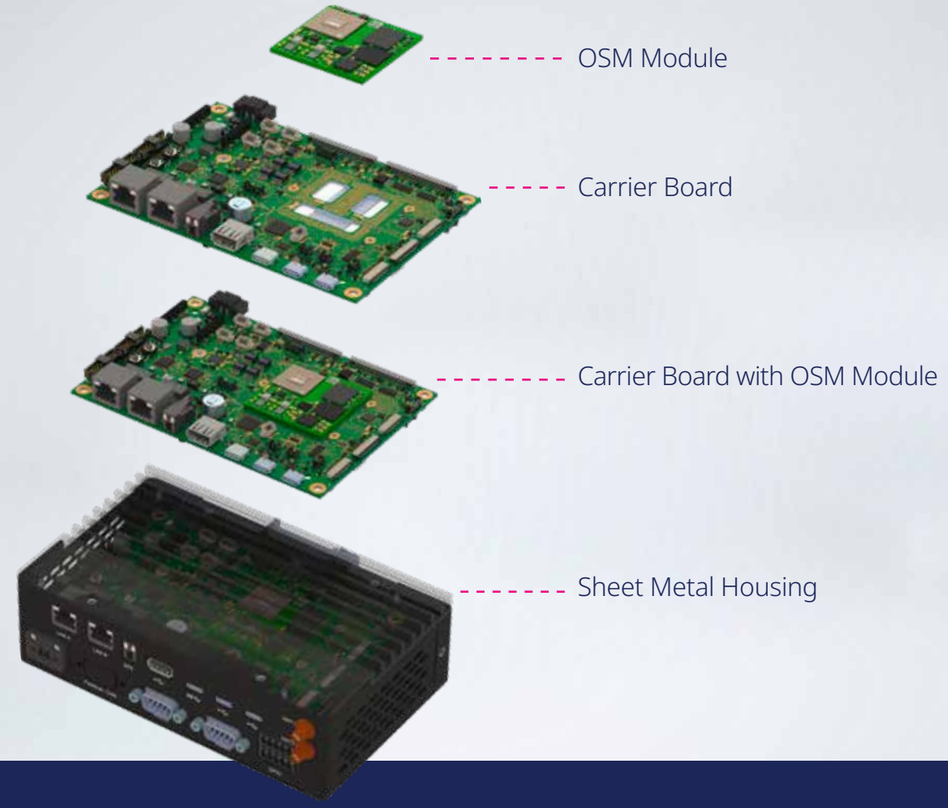
From the initial idea all the way to final system production, the Innovation Platform Industrial Edge Node enables a seamless journey from design and verification through board production right up to system manufacturing bringing true industrial innovation to life.

IDEA / CONCEPT > SYSTEM DESIGN > HW- / SW-DESIGN > VERIFICATION / CERTIFICATION > BOARD PRODUCTION > SYSTEM MANUFACTURING







HMI Systems

Tria HMI system solutions are tailored to meet the specific requirements of our focus verticals, integrating our extensive experience in display, touch, and CPU technologies.

Modular Systems

Our innovation platforms and AI Edge System solutions are based on existing building blocks, our broad portfolio of CPU technologies and are designed for reliable operation.

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LINUX. WINDOWS. ANDROID.



Tria software is designed to run industrial applications seamlessly on Tria hardware, helping you bring products to market faster.

We enable innovators in industrial embedded systems to build secure, modular software platforms they can rely on, backed by long-term support (LTS) that provides security updates over extended periods.

Fully tested and maintained **Yocto BSPs** are available across all our platforms, complemented by **AMI UEFI/BIOS** for all x86 and selected **Arm** platforms.

Professional Services

- **BIOS/UEFI Customization**
- **OS Customization**
- **Android HAL & Frameworks**
- **Secure Boot Provisioning & Integration**
- **OTA Integration**
- **GUI & App Development**
- **AI Integration**
- **Connectivity**

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CYBER RESILIENCE EMBEDDED

CRA READY



Be ready for the European Cyber Resilience Act (CRA)

Official CRA timeline	
Nov 2024	**CRA** Publication
Dec 2024	**CRA** Entry into force
Jun 2026	**CRA** Certification bodies can start certification
Sep 2026	**CRA** Manufacturer reporting obligations
Dec 2027	**CRA** Full regulatory applicability

Cyber Resilience and Long-Term Support (LTS)

- **CRA compliance support for x86 and Arm**
- **Vulnerability monitoring and management**
- **SBOM generation**
- **Automated testing**
- **LTS for x86 and Arm**
- **Security and Architecture Consulting**
- **Connectivity**

Our **BSPs** and **UEFI/BIOS** are aligned with the requirements of the EU Cyber Resilience Act (CRA), providing a solid foundation for customers to develop and deliver CRA-compliant products.

Our secure software approach is built around **Yocto-based BSPs** and **UEFI/BIOS** implementations, supported by long-term maintenance, continuous vulnerability monitoring, and CRA-ready reporting.
We also provide value-added tools and services helping our customers on their journey towards CRA compliance. For example consulting services for structured CVE management, ensuring security issues are handled transparently across the full product lifecycle.

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YOCTO: THE INDUSTRY STANDARD FOR EMBEDDED

CRA READY

Yocto is the industry standard for embedded Linux, delivering lean, reproducible builds without licensing fees. Tria pairs Yocto expertise with industrial-grade compute modules. Our BSPs support over 600 Tria board variants including integrated wireless modules and security tooling.

Board Support Packages

for 600+ variants, supporting current Yocto releases and Linux LTS kernels for stability and long lifecycle maintenance:

- ✓ Ready-to-use Linux distribution
- ✓ Wi-Fi, Bluetooth, Thread
- ✓ OTA and fleet management tools
- ✓ Vulnerability monitoring and management

Every module ships with a unique Project ID to ensure correct BSP and build configuration from day one.

Build System

with proven Yocto layers, Git repositories, and tooling – all maintained and used internally:

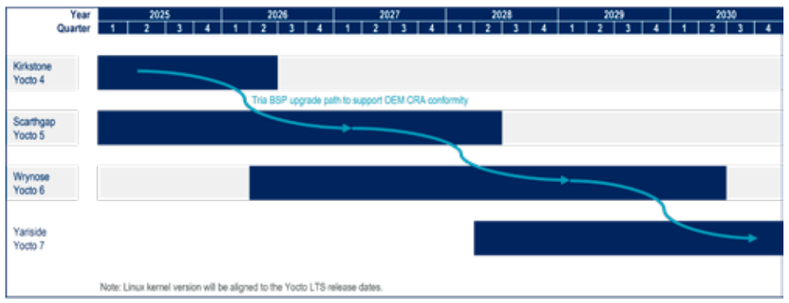
- ✓ Central Git repo with maintained layers
- ✓ One-command setup script
- ✓ Documented build flow
- ✓ Clean baseline for your apps, CI/CD, and security
- ✓ Tailor Yocto to your needs with our experts
- ✓ Secure boot integration
- ✓ GUI and app development
- ✓ AI integration

Rapid Prototyping Support

- ✓ Simplify debugging, using the Tria platform to deploy applications on physical prototypes
- ✓ A wide selection of pre-built software stacks for fast testing on Tria boards on our Incubator Store
- ✓ Rapid HMI Prototyping using Tria hardware
- ✓ Tria Integrated Development Tools support environments like VS Code (for Flutter/web) and Qt Creator
- ✓ Benchmarking built-in across Tria modules for easy performance evaluation that easily migrates prototypes between platforms

Yocto Release Strategy

- ✓ 4-year patch cycle per LTS release
- ✓ Concurrent support for two LTS versions
- ✓ Long term software upgrade path with CRA-compliant cadence



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VISION AI KIT: READY TO BUILD, FASTER TIME-TO-MARKET

Move from concept to deployment faster with our Vision AI Kits, built around Qualcomm® Dragonwing processors. Ideal for multi-camera perception systems, robotics platforms, or advanced vision analytics, these kits deliver the performance and scalability you need.

Perfect for exploring, testing and scaling solutions across industries, including industrial automation, robotics, logistics, retail analytics, smart cities and beyond.

Tria Vision AI Kits – your complete, ready-use hardware and software bundle:

- ✓ Carrier, compute module / SIP, power supply and camera
- ✓ Prebuilt embedded software, ready to use
- ✓ Quick start and training guides
- ✓ Customer support for your AI projects
- ✓ Long-term support via integration with the standard Tria Yocto BSP

Designed for High-Impact Vision AI Use Cases:

- ✓ **Object Detection:** Identify and locate multiple objects in real time
- ✓ **Object Classification:** Accurately categorize objects within a scene
- ✓ **Pose Detection:** Analyze body, limb, or object posture for robotics, AR/VR and safety applications
- ✓ **Image Segmentation:** Generate pixel-precise scene understanding
- ✓ **Mono Depth Segmentation:** Estimate depth from single-camera input for navigation and spatial reasoning

Two Kits. Unlimited Innovation.

Vision AI-Kit with TRIA SM2S-QCS6490

- ✓ Optimized for high-efficiency edge AI applications
- ✓ 12.5 TOPS of AI compute
- ✓ 4x MIPI-CSI camera interfaces
- ✓ Perfect for compact, precise multi-camera setups

Vision AI-Kit with Qualcomm IQ-9075M SiP

- ✓ Built for demanding, large-scale AI vision
- ✓ 100 TOPS of AI performance
- ✓ Supports up to 16 cameras
- ✓ Ideal for robotics, autonomous navigation and large-area monitoring systems



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FROM MODULE TO SYSTEM: YOUR ALL-IN-ONE WIRELESS SOLUTION



The world is becoming wireless

Modern IoT, industrial and mobility solutions rely on stable, secure and certified connectivity. As applications grow smarter and more connected, reliable wireless communication is no longer optional - it's essential. To meet this demand, we are expanding our product range and service with a new generation of high-performance wireless solutions.

Tria Technologies offers state-of-the-art Wi-Fi + Bluetooth + Thread tri-radio combo modules - available as stand-alone solutions or as a one-stop-shop when combined with our compute modules and complete system solutions.

These modules enable robust multi-protocol connectivity for embedded, industrial and consumer applications and integrate seamlessly into existing platforms.

Benefits

LONGEVITY
Full control of the supply chain for reliability

ONE-STOP-SHOP
Wireless, compute, and system platforms

PRE-CERTIFICATION
Save T2M & certification cost

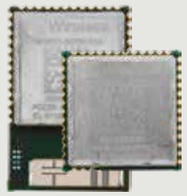
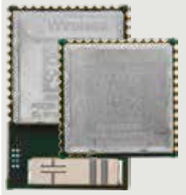
UNIFIED
Software and support across compute and RF

BLUETOOTH SIG LISTING
Save cost and speed time-to-market

DECADE OF EXPERIENCE
Integrating communication technologies

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TRIA Go-To Solution Combo Wi-Fi + Bluetooth

Specs	SPB611 (Wi-FI 6)	SPB209 (Wi-FI 5)
Manufacturer	Tria Technologies	Tria Technologies
		
Wi-Fi	Wi-FI 6 (802.11ax) Dual-Band	Wi-FI 5 (802.11ac) Dual-Band
Silicon	NXP IW611/2	Marvell/NXP 88W8887
Wi-Fi 5 GHz	1x1 80 MHz (600 Mbps)	1x1 80 MHz (433Mbps)
Wi-Fi 2.4 GHz	1x1 20 MHz (143 Mbps)	1x1 20 MHz (80 Mbps)
Bluetooth	Bluetooth 5.2	Bluetooth 4.2
Optional	- 802.15.4 (Thread/Matter, ZigBee) - Antenna on module - LTE filter	- Antenna on module - LTE filter
Hardware interface	4-bit SDIO 3.0, HS-UART	4-bit SDIO 3.0, UART
Features	Power save modes, roaming, Soft-AP, Wi-Fi direct and infrastructure mode	
Dimensions	14 x14 x 2.5 mm	
Supply voltage	3.3V +/- 5%	
Operating tem.	-40° to 85°C	

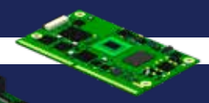
SMARC® Modules with Wi-Fi 6	SMARC® Modules with Wi-Fi 5
Tria Technologies	Tria Technologies
 TRIA SM2S-IMX95	 TRIA SM2S-IMX8PLUS
 TRIA SM2S-IMX93	 TRIA SM2S-IMX8
 TRIA SM2S-QCS6490	 TRIA SM2S-IMX8MINI
 TRIA SM2S-QCS5430	

Wireless Integration Options

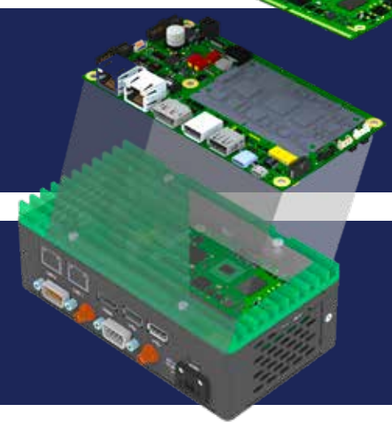
Stand-alone
Use on customer hardware



Short range RF module



Accelerate Time-to-Market
Use a compute module with integrated wireless and take advantage of Tria's unified hardware and software integration, with wireless fully supported in the BSP.



Maximum flexibility
Mounted on carrier board or customized SBC
Hardware and software integration: benefit from Trias's unified software, wireless included in BSP

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COM STARTER-KIT

COM DISPLAY/TOUCH OPTIONS

Tria COM Starter Kits make getting started simple, no matter the form factor. Choose your module (OSM, Qseven, SMARC, COM-HPC, or COM Express) and receive a complete kit with everything required for fast, hassle-free setup. Shown below is an example featuring a SMARC® module.

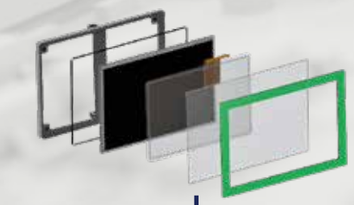
Tria Display Kits are the perfect complement to our full range of Computer-On-Module (COM) carrier boards and Starter Kits. Available in a variety of popular sizes and resolutions, they connect directly to the LVDS and backlight outputs of the baseboards. Each kit includes a high-performance LCD panel with capacitive touch assembly, a PCAP touch controller, and all necessary cables, providing a ready-to-use experience with no installation required.



SMARC® quick start reference
Select SMARC® module



Starterkit



Displaykit
5“, 7“, 10.1“ and 12.1“ TFT Include LVDS cable, Backlight Cable PCAP touch with USB Controller

Fast and easy – reducing time and costs right from the start.



Power supply

Cooling solution

SMARC® Evaluation Platform EP1

HDMI and DP
LVDS and eDP
2x Ethernet
PCIe x4 Gen. 2
2x USB 3.0
2x USB 2.0
2x CAN 2.0B
SPI, I2C, GPIO

SOFTWARE

Tria BSP
YOCTO LINUX®
U-BOOT

SUPPORT

1. **/SIMPLEPLUS** Touchstack:
   LCD with PCAP touch sensor, cover lens and housing
2. 3-way cable for LVDS data and power:
   - Suitable LVDS connector to fit SimplePlus LCD
   - JILI30 connector to fit LVDS socket of Tria carrier boards
   - Backlight power connector to fit B/L socket of Tria carrier boards
3. USBmini to USB cable:
   Connects SimplePlus touch controller to USB port of carrier board
4. FFC to USBmini adapter board:
   Makes SimplePlus touch controller accessible by USBmini cable

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SUPPORT & SERVICES



We're here to help

**Need support with your project?
The first step is to speak to your
Account or Program manager.**

DEDICATED SUPPORT AT TRIA-TECHNOLOGIES.COM
Head to our dedicated support page
(tria-technologies.com/support) to access
a comprehensive support knowledgebase,
raise a support ticket and download software tools.

Note: An account is required to access online support.

KNOW-HOW
Access to technical support knowledge base and useful information

TICKET SYSTEM
Raise and manage technical support requests

SOFTWARE TOOLS
Downloadable software tools and associated support

Worldwide Premium Support

Our dedicated technical solution engineers bring deep expertise across Tria Technologies hardware platforms, carrier boards, I/O modules and the wider embedded ecosystem. So, you gain direct access to specialists who know your hardware inside and out – enabling rapid diagnosis, precise resolution, and proactive guidance at every stage.

Our Support Services provide the stability and confidence your business depends on.

Services

- Technical issue and request tracking
- Design experience sharing
- Baseboard design reviews and debugging
- Baseboard design guidelines and trainings
- Benchmark performance comparisons
- MTBF calculations
- Vibration testing on request
- Reference schematics
- RoHS / REACH / Conflict Minerals / CE / UL documentation
- Customized Starter Kits
  ... up to joint simulation, measurement, test and bring-up at our R&D Labs

Benefits

- ✓ Single point of contact for all technical inquiries
- ✓ Access to our premium ticket system for communication and history tracking
- ✓ Support teams in US and Europe allow for fast response time in your time zone
- ✓ Web based online documentation
- ✓ More than a century of engineering experience in the support team

Quick access to:

REGISTER TO GET ACCESS

TRIA HELP CENTER

TRIA TECHNICAL DOCUMENTATION CENTER (TECHDOC)

Contact us:

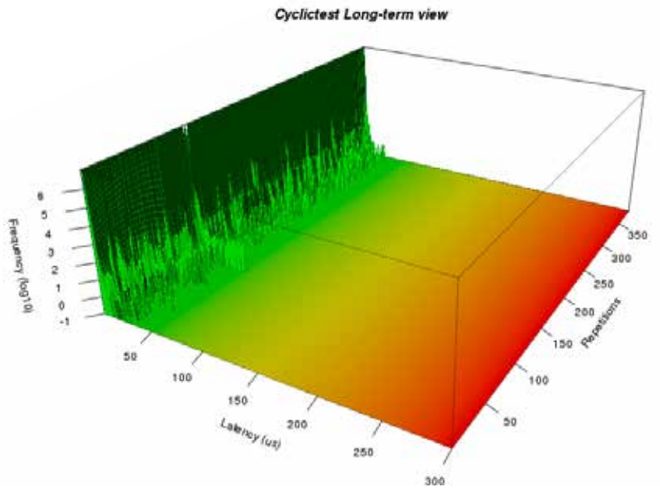
support.boards@tria-technologies.com +49 (0) 89 419 193-199

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REALTIME CAPABILITIES

Our Products are designed to meet real-time requirements for mission critical applications, and they are subjected to long-term testing of their real-time capabilities as part of our product qualification.

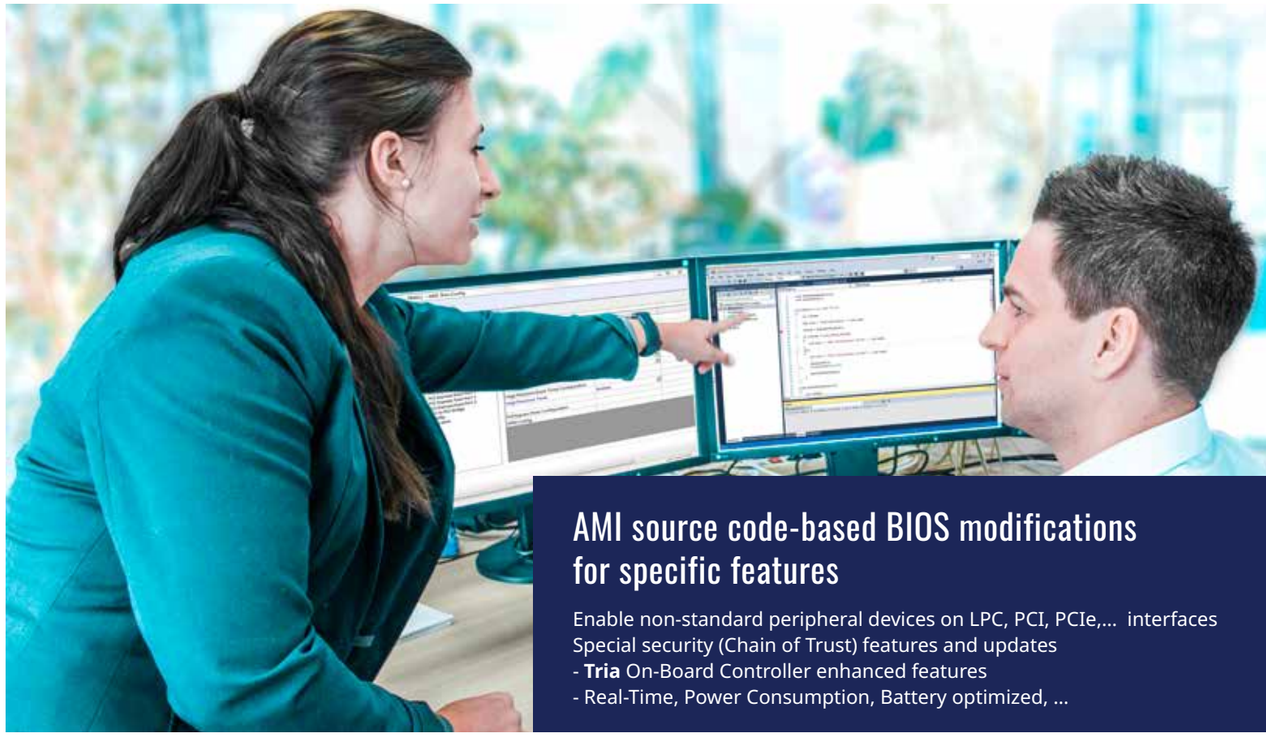


Open Source Automation Development Lab (OSADL). Standard reference benchmark for measuring and verifying real-time capabilities of Linux® based computing systems. We run our products in OSADL test environment, the OSADL QA Farm (www.osadl.org) over years.

Mission-critical equipment for robotics, autonomous vehicles and machine control require predictable response times and deterministic and repeat-able compute performance.

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OEM BIOS TOOLS AND CUSTOMIZATION SERVICE



AMI source code-based BIOS modifications for specific features

Enable non-standard peripheral devices on LPC, PCI, PCIe,... interfaces
Special security (Chain of Trust) features and updates
- **Tria** On-Board Controller enhanced features
- Real-Time, Power Consumption, Battery optimized, ...

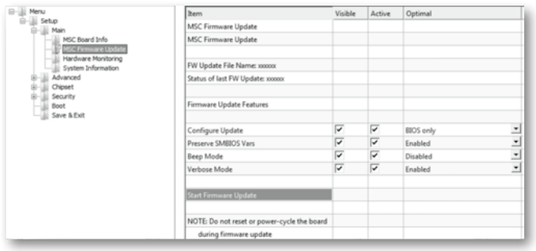
Simplify development and updates with our innovative solutions

Tria BIOS Update Tool

Autoflash* available for:

- UEFI shell
- Linux®
- Windows
- Via LAN network

*integrated into every BIOS

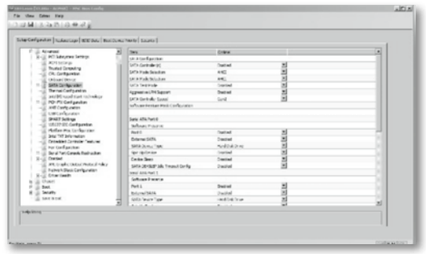


Tria BIOS Config Tool

Windows based

Customization of default BIOS setup parameters, such as:

- Custom LCD panel timing
- Boot priority settings
- Adding a custom boot logo / splashscreen



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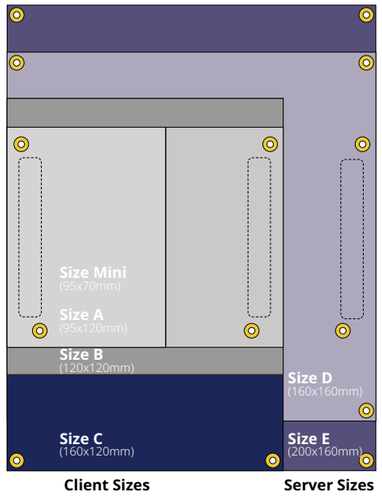
COM-HPC®

COM-HPC® is a new Computer-on-Module standard designed by the PICMG® (PCI Industrial Computer Manufacturers Group). It is intended for applications such as artificial intelligence, machine vision, edge computing and network infrastructure, that require new levels of system throughput and interconnect bandwidth.

COM-HPC® Properties

The standard defines three types of interfaces, Mini, Client and Server, giving designers multiple choices of scalability and IO connectivity that best fit to their target application. The feature rich IO includes PCIe Gen 5 scaling up to 65 lanes, USB4 with subsequent USB options, multiple Ethernet interfaces covering up to 100G bandwidth, and, for Mini and Client, multiple graphic interfaces.

Module form factors ranging from small to tall provide the right mix of board flavors for different performance classes. COM-HPC Mini in combination with the Mini interface is intended for applications with space constraints but needing uncompromised performance. Modules with Client interface based on form factor COM-HPC Sizes A, B or C extend performance and connectivity to the next level. For server and data processing applications, the Server interface is combined with the larger form factors Size D and E to host larger memory arrays, CPUs, or FPGAs.



Specs	COM-HPC Mini	COM-HPC Client	COM-HPC Server
PCIe (Gen 1, 2, 3, 4, 5) (*maximum bandwidth, unidirectional)	- 16x (512Gbps)	- 49x (1568Gbps)	- 65x (2080Gbps)
Ethernet	- 2x NBASE-T Ethernet (up to 10Gb) - 2x SGMII (shared with PCIe)	- 2x NBASE-T Ethernet (up to 10Gb) - 2x KR Ethernet (up to 25Gb) - 1x KR CEI	- 1x NBASE-T Ethernet (up to 10Gb) - 8x KR Ethernet (up to 25Gb) - 2x KR CEI
Graphics / Multimedia	- 2x DDI (shared with USB4) - 4x USB4 (DP alternate mode, 2 shared with DDI) - eDP - I2S / HDA Digital Audio / Soundwire	- 3x DDI - 4x USB4 (DP alternate mode) - eDP - I2S / HDA Digital Audio / Soundwire	
Data I/O	- 2x Serial Port - 1x CAN - 4x USB 2.0 / 3.2 Gen 2 / USB4 - 4x USB 2.0 - 1x USB Clients out of 8 - 1x USB C PD I2C / USB4 PRTCTL - 2x MIPI-CSI connectors	- 2x Serial Port - 4x USB 2.0 / 3.2 Gen 2 / USB4 - 4x USB 2.0 - 1x USB Clients out of 8 - 1x USB C PD I2C / USB4 PRTCTL - 2x MIPI-CSI	- 2x Serial Port - 4x USB 2.0 / 2x 3.2 Gen 1, 2x 3.2 Gen 2 / USB4 - 4x USB 2.0 - 1x USB Client out of 8 - 1x USB C PD I2C / USB4 PRTCTL
Storage	- 2x SATA (max. 6Gbps/ch.)	- 2x SATA (max. 6Gbps/ch.)	- 2x SATA (max. 6Gbps/ch.)
System I/O & Controls	- 1x eSPI, 1x SPI - 1x SMB, 2x I2C - 8x GPIO - Reset, WDT etc. - Power Management - FUSA	- 1x eSPI, 1x SPI - 1x IPMB, 1x SMB, 2x I2C - 8x GPIO - Reset, WDT etc. - Power Management - FUSA	- 1x eSPI, 1x SPI - 1x IPMB, 1x SMB, 2x I2C - 8x GPIO - Reset, WDT etc. - Power Management - FUSA
Power	- 12V (wide range), 107W input power	- 12V (fixed / wide range), 358W / 251W input power - 5V Standby, 5W	- 12V (fixed), 358W input power - 5V Standby, 5W
Form Factor	COM-HPC Mini	preferred Size A, B, C / allowed Size D, E	preferred Size D, E / allowed Size A, B, C

Note: Maximum possible number of functions and interfaces shown. Product implementations may support subsets of functions, less interfaces or lower bandwidths.

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COM-HPC® OVERVIEW

Specs	TRIA HCA-ALP	TRIA HCA-RLP
Technology	x86	x86
		
Form Factor	COM-HPC® Client Size A, 95 mm x 120 mm	COM-HPC® Client Size A, 95 mm x 120 mm
CPU	**12th Gen Intel® Core™ processors** **H-series** **- i7-12800HE** 14C/20T, 2.4GHz, 96 EUs, 24MB L3, 45/35W cTDP **- i5-12600HE** 12C/16T, 2.5GHz, 80 EUs, 18MB L3, 45/35W cTDP **- i3-12300HE** 8C/12T, 1.9GHz, 48 EUs, 12MB L3, 45/35W cTDP **P-series** **- i7-1270PE** 12C/16T, 1.8GHz, 96 EUs, 24MB L3, 28/20W cTDP **- i5-1250PE** 12C/16T, 1.7GHz, 80 EUs, 12MB L3, 28/20W cTDP **- i3-1220PE** 8C/12T, 1.5GHz, 48 EUs, 12MB L3, 28/20W cTDP **U-series** **- i7-1265UE** 10C/12T, 1.7GHz, 96 EUs, 12MB L3, 15/12W cTDP **- i5-1245UE** 10C/12T, 1.5GHz, 80 EUs, 12MB L3, 15/12W cTDP **- i3-1215UE** 6C/8T, 1.2GHz, 64 EUs, 10MB L3, 15/12W cTDP **- 7305E** 5C/5T, 1.0GHz, 48 EUs, 8MB L3, 15/12W cTDP	**13th Gen Intel® Core™ processors** **H-series** **- i7-13800HE** 14C/20T, 2.5GHz, 96 EUs, 24MB L3, 45/35W cTDP **- i7-13800HRE** 14C/20T, 2.5GHz, 96 EUs, 24MB L3, 45/35W cTDP, TCC/TSN, IBECC, ET **- i5-13600HE** 12C/16T, 2.7GHz, 80 EUs, 18MB L3, 45/35W cTDP **- i5-13600HRE** 12C/16T, 2.7GHz, 80 EUs, 18MB L3, 45/35W cTDP, TCC/TSN, IBECC, ET **- i3-13300HE** 8C/12T, 2.1GHz, 48 EUs, 12MB L3, 45/35W cTDP **- i3-13300HRE** 8C/12T, 2.1GHz, 48 EUs, 12MB L3, 45/35W cTDP, TCC/TSN, IBECC, ET **P-series** **- i7-1370PE** 14C/20T, 1.9GHz, 96 EUs, 24MB L3, 28/20W cTDP **- i7-1370PRE** 14C/20T, 1.9GHz, 96 EUs, 24MB L3, 28/20W TDP, TCC/TSN, IBECC, ET **- i5-1350PE** 12C/16T, 1.8GHz, 80 EUs, 12MB L3, 28/20W cTDP **- i5-1350PRE** 12C/16T, 1.8GHz, 80 EUs, 12MB L3, 28/20W TDP, TCC/TSN, IBECC, ET **- i5-1340PE** 12C/16T, 1.8GHz, 80 EUs, 12MB L3, 28/20W cTDP **- i3-1320PE** 12C/12T, 1.7GHz, 48 EUs, 12MB L3, 28/20W cTDP **- i3-1320PRE** 8C/12T, 1.7GHz, 48 EUs, 12MB L3, 28/20W cTDP, TCC/TSN, IBECC, ET, TCC/TSN, IBECC, ET **U-series** **- i7-1365UE** 10C/12T, 1.7GHz, 96 EUs, 12MB L3, 15/12W cTDP **- i7-1365URE** 10C/12T, 1.7GHz, 96 EUs, 12MB L3, 15/12W cTDP, TCC/TSN, IBECC, ET **- i5-1345UE** 10C/12T, 1.4GHz, 80 EUs, 12MB L3, 15/12W cTDP **- i5-1345URE** 10C/12T, 1.4GHz, 80 EUs, 12MB L3, 15/12W cTDP, TCC/TSN, IBECC, ET **- i5-1335UE** 10C/12T, 1.3GHz, 80 EUs, 12MB L3, 15/12W cTDP **- i3-1315UE** 6C/8T, 1.2GHz, 64 EUs, 10MB L3, 15/12W cTDP **- i3-1315URE** 6C/8T, 1.2GHz, 64 EUs, 10MB L3, 15/12W cTDP, TCC/TSN, IBECC, ET **- U300E** 5C/6T, 1.1GHz, 48 EUs, 8MB L3, 15/12W cTDP
Chipset	Integrated in System-on-Chip	Integrated in System-on-Chip
DRAM	2x 262-pin SO-DIMM socket for up to 2x 32GB DDR5 SDRAM (DDR5-4800); dual channel operation; minimum capacity 1x 8GB single channel operation	2x 262-pin SO-DIMM socket for up to 2x 32GB DDR5 SDRAM (DDR5-4800); dual channel operation; minimum capacity 1x 8GB single channel operation in-band ECC (IBECC)
Storage Interfaces	2x SATA channels (up to 6Gb/s), optional optional on-board NVMe, up to 256GB	2x SATA channels (up to 6Gb/s), optional optional on-board NVMe, up to 256GB
USB	2x USB4 / 2x USB 3.2 (Gen 1 & 2) / 8x USB 2.0	2x USB4 / 2x USB 3.2 (Gen 1 & 2) / 8x USB 2.0
Bus Interfaces	PCI Express® Graphics (PEG) 1x8, PCIe Gen 4 PCI Express® Gen 4, up to 2x4 PCI Express® Gen 3, up to 8x1, flexible bifurcation options	PCI Express® Graphics (PEG) 1x8, PCIe Gen 5 PCI Express® Gen 4, up to 2x4 PCI Express® Gen 3, up to 8x1, flexible bifurcation options
Display Controller	Intel® Iris® Xe architecture Graphics, up to 96 execution units (EU)	Intel® Iris® Xe architecture Graphics, up to 96 execution units (EU)
Display Interfaces	Four independent displays supported 3x Digital Display Interface (DP 1.4a, HDMI 2.0b) 1x Embedded DisplayPort 1.4b	Four independent displays supported Up to 2x USB4 ports (DP tunneling) 3x Digital Display Interface (DP 1.4a, HDMI 2.0b) 1x Embedded DisplayPort 1.4b
Network Interface	Two 10/100/1000Base-TX, 2.5G based on Intel i226	Two 10/100/1000Base-TX, 2.5G based on Intel i226
Audio Interface	High Definition Audio	High Definition Audio
Security Device	TPM 2.0	TPM 2.0
OS Support	Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)	Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)
Power Requirements	Voltage: +8V to +20V, +5V Stby optional, +3V RTC voltage Power Consumption: 20 W to 64 W (typ.)	Voltage: +8V to +20V, +5V Stby optional, +3V RTC voltage Power Consumption: 20 W to 64 W (typ.)
Operating Temp.	0° ... 60°C (operating) -25° ... 85°C (storage)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)	

Errors and omissions excepted.

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COM-HPC® OVERVIEW

COM-HPC® MINI OVERVIEW

COM-HPC®

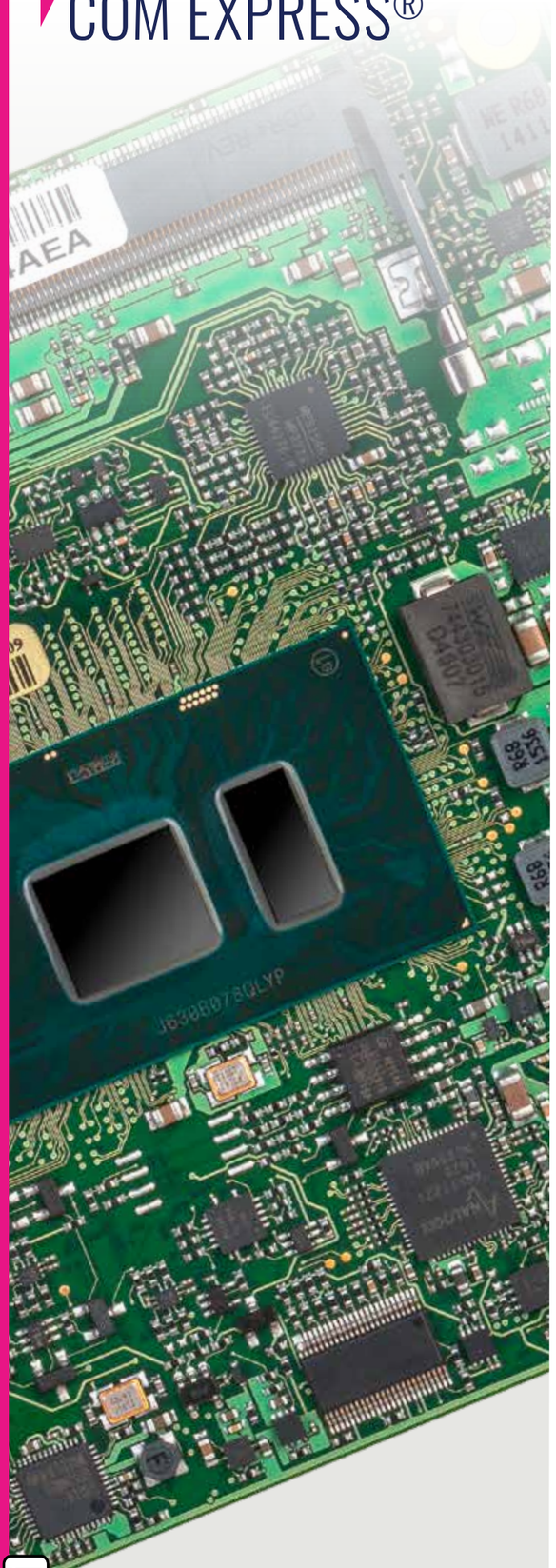
Specs	TRIA HCA-MLH	TRIA HCA-PLH	TRIA HSD-ILDL		TRIA HMM-RLP	TRIA HMM-IQX
Technology	x86	x86	x86		x86	Arm®
						
Form Factor	COM-HPC® Client Size A, 95 mm x 120 mm	COM-HPC® Client Size A, 95 mm x 120 mm	COM HPC® Server Size D, 160 mm x 160 mm		COM-HPC® Mini, 95 mm x 70 mm	COM-HPC® Mini, 95 mm x 70 mm
CPU	**Intel® Core™ Ultra Processors Series 1** - **Ultra 7 165H** 16C/22T, 1.4GHZ, 128 EUs, 24MB L3, vPRO®, 28W BP - **Ultra 7 155H** 16C/22T, 1.4GHZ, 128 EUs, 24MB L3, 28W BP - **Ultra 5 135H** 14C/18T, 1.7GHZ, 128 EUs, 18MB L3, vPRO®, 28W BP - **Ultra 5 125H** 14C/18T, 1.2GHZ, 112 EUs, 18MB L3, 28W BP - **Ultra 7 165U** 12C/14T, 1.7GHZ, 64 EUs, 12MB L3, vPRO®, 15W BP - **Ultra 7 155U** 12C/14T, 1.7GHZ, 64 EUs, 12MB L3, 15W BP - **Ultra 5 135U** 12C/14T, 1.6GHZ, 64 EUs, 12MB L3, vPRO®, 15W BP - **Ultra 5 125U** 12C/14T, 1.3GHZ, 64 EUs, 12MB L3, 15W BP **Intel® Core™ Ultra Processors Series 2** - **Ultra 9 285H** 16C/22T, 2.9GHZ, 128EUs, 24MB L3, vPRO®, 45W BP **- Ultra 7 265H** 16C/22T, 2.2GHZ, 128EUs, 24MB L3, vPRO®, 28W BP **- Ultra 7 255H** 16C/22T, 2.0GHZ, 128EUs, 24MB L3, 28W BP **- Ultra 5 235H** 14C/18T, 2.4GHZ, 128EUs, 18MB L3, vPRO®, 28W BP **- Ultra 5 225H** 14C/18T, 1.7GHZ, 112EUs, 18MB L3, 28W BP **- Ultra 7 265U** 12C/14T, 2.1GHZ, 64EUs, 12MB L3, vPRO®, 15W BP **- Ultra 7 255U** 12C/14T, 2.0GHZ, 64EUs, 12MB L3, 15W BP **- Ultra 5 235U** 12C/14T, 2.0GHZ, 64EUs, 12MB L3, vPRO®, 15W BP **- Ultra 5 225U** 12C/14T, 1.5GHZ, 64EUs, 12MB L3, 15W BP	**Intel® Core™ Ultra Processors Series 3** - **Ultra X9 388H** 16C, 2.1GHZ, 12Xe, 25W BP - **Ultra 9 386H** 16C, 2.1GHZ, 4Xe, 25W BP - **Ultra X7 368H** 16C, 2.0GHZ, 12Xe, 25W BP - **Ultra 7 366H** 16C, 2.0GHZ, 4Xe, 25W BP - **Ultra X7 358H** 16C, 1.9GHZ, 12Xe, 25W BP - **Ultra 7 356H** 16C, 1.9GHZ, 4Xe, 25W BP - **Ultra 7 365 8C**, 2.4GHZ, 4Xe, 25W BP - **Ultra 7 355 8C**, 2.3GHZ, 4Xe, 25W BP - **Ultra 5 338H** 12C, 1.9GHZ, 10Xe, 25W BP - **Ultra 5 336H** 12C, 1.9GHZ, 4Xe, 25W BP - **Ultra 5 335 8C**, 2.2GHZ, 4Xe, 25W BP - **Ultra 5 325 8C**, 2.1GHZ, 4Xe, 25W BP	**Intel® Xeon® processor** **- D-1746TER**, ten-core, 2.0GHz, 67W TDP, 8 Eth ports, 100G, DDR4-2667, I-temp **- D-1735TR**, eight-core, 2.2GHz, 59W TDP, 8 Eth ports, 50G, DDR4-2933, C-temp **- D-1732TE**, eight-core, 1.9GHz, 52W TDP, 8 Eth ports, 50G, DDR4-2667, I-temp **- D-1715TER**, four-core, 2.4GHz, 50W TDP, 8 Eth ports, 50G, DDR4-2667, I-temp **- D-1712TR**, four-core, 2.0GHz, 40W TDP, 8 Eth ports, 50G, DDR4-2400, C-temp		**13th Gen Intel® Core™ processors** **H-series** - i7-13800HE/HRE 14C/20T, 2.5GHz, 96 EUs, 24MB L3, 45/35W cTDP - i5-13600HE/HRE 12C/16T, 2.7GHz, 80 EUs, 18MB L3, 45/35W cTDP - i3-13300HE/HRE 8C/12T, 2.1GHz, 48 EUs, 12MB L3, 45/35W cTDP **P-series** - i7-1370PE/PRE 14C/20T, 1.9GHz, 96 EUs, 24MB L3, 28/20W cTDP - i5-1350PE/PRE 12C/16T, 1.8GHz, 80 EUs, 12MB L3, 28/20W cTDP - i5-1340PE 12C/16T, 1.8GHz, 80 EUs, 12MB L3, 28/20W cTDP - i3-1320PE/PRE 8C/12T, 1.7GHz, 48 EUs, 12MB L3, 28/20W cTDP **U-series** - i7-1365UE/URE 10C/12T, 1.7GHz, 96 EUs, 12MB L3, 15/12W cTDP - i5-1345UE/URE 10C/12T, 1.4GHz, 80 EUs, 12MB L3, 15/12W cTDP - i5-1335UE 10C/12T, 1.3GHz, 80 EUs, 12MB L3, 15/12W cTDP - i3-1315UE/URE 6C/8T, 1.2GHz, 64 EUs, 10MB L3, 15/12W cTDP - U300E 5C/6T, 1.1GHz, 48 EUs, 8MB L3, 15/12W cTDP **Processor variants with marking RE support TCC/TSN, IBECC, extended temperatures**	**Qualcomm Dragonwing™ IQ-X** - IQX7181MD 12 core, 3.4GHz - IQX5121MD 8 core, 3.4GHz
Chipset	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip		Integrated in System-on-Chip	Integrated in System-on-Chip
DRAM	2x 262-pin SO-DIMM socket for up to 2x 48GB DDR5 SDRAM (DDR5-5600); dual channel operation; minimum capacity 1x 8GB single channel operation; in-band ECC (OS dependent)	LPDDR5 memory, up to 9600 MT/s; memory-down Capacity options: 16GB, 32GB, 64GB Inband ECC (IB-ECC) option (OS dependent)	Up to 256GB DDR4, 4x 288pin DIMM, 2 channels, 2 DIMMs per channel		Up to 64 GB SDRAM (up to LPDDR5-6400)	Up to 64GB LPDDR5 SDRAM, up to 8448 MT/s
Storage Interfaces	2x SATA channels (up to 6Gb/s), optional optional on-board NVMe, up to 256GB	2x SATA channels (up to 6Gb/s), optional	2x SATA 6Gb/s		Up to 2x SATA 6Gb/s optional on-board NVMe, up to 256GB	-
USB	2x USB4 / 2x USB 3.2 (Gen 1 & 2) / 8x USB 2.0	1x USB4 / 2x USB 3.2 (Gen 1 & 2) / 8x USB 2.0	2x USB 3.2 Gen 2 / 2x USB 3.2 Gen 1 / 4x USB 2.0		Up to 2x USB4, up to 4x USB 3.2 Gen 2x1, 8x USB 2.0	Up to 2x USB4, up to 4x USB 3.2 Gen 2x1, 8x USB 2.0
Bus Interfaces	PCI Express® Graphics (PEG) 1x8, PCIe Gen 5 PCI Express® Gen 4, up to 2x4 PCI Express® Gen 3, up to 8x1, flexible bifurcation options	PCI Express® Graphics Gen 5, 1x8 or 2x4 lanes PCI Express® Gen 5, 1x4 PCI Express® Gen 4, 6x1, flexible bifurcation options PCI Express® Gen 3, 1x	16x PCI Express® Gen 4, bifurcation x16, x8, x4, max. 4 root ports, NTB x16, x8 16x PCI Express® Gen 3, bifurcation x8, x4, x2, max. 8 root ports 1x PCI Express® Gen3 for optional BMC on carrier, connected with PCIe_BMC		PCI Express® Gen 4, up to 2x4 PCI Express® Gen 3, up to 8x1, flexible bifurcation options	PCI Express® Gen 4, up to 1x8 + 1x4/2x2 PCI Express® Gen 3, 2x1 +1x2/1x1
Display Controller	Intel® Arc™ Graphics, up to 128 execution units (EU)	Intel Xe Graphics, up to 12 Xe cores	-		Intel® Iris® Xe architecture Graphics, up to 96 execution units (EU)	Qualcomm® Adreno™ GPU
Display Interfaces	Four independent displays supported Up to 2x USB4 ports (DP tunneling) 3x Digital Display Interface (DP 2.1, HDMI 2.1) 1x Embedded DisplayPort 1.4b	Four independent displays supported 1x USB4/USB-C ports (DP tunneling) 3x Digital Display Interface (DP 2.1, HDMI 2.1) 1x Embedded DisplayPort 1.4b	-		Up to four independent displays supported Up to 2x USB4 ports (DP tunneling) Up to 2x Digital Display Interface (DP 1.4a, HDMI 2.0b) 1x Embedded DisplayPort 1.4b	Up to four independent displays supported Up to 2x USB4 ports (DP tunneling) Up to 2x Digital Display Interface (DP 1.4) 1x Embedded DisplayPort 1.4b
Network Interface	Two 10/100/1000Base-TX, 2.5G based on Intel i226	Two 10/100/1000Base-TX, 2.5G based on Intel i226	1x 1000BASE-T / 2.5GBASE-T, TSN (i225) / Up to 4x 25KR Ethernet / Up to 8x 10G Ethernet max. aggregated Ethernet bandwidth 100Gb		Two 10/100/1000Base-TX, 2.5G based on Intel i226	Two 10/100/1000Base-TX, 2.5G
Audio Interface	High Definition Audio	High Definition Audio	-		High Definition Audio Optional SoundWire	SoundWire
Security Device	TPM 2.0	TPM 2.0	TPM 2.0		TPM 2.0	TPM 2.0
OS Support	Windows 10 IoT Enterprise 2021 LTSC Windows 11 IoT Enterprise LTSC / BSP for Linux (Yocto)	Windows 11 IoT Enterprise LTSC BSP for Linux (Yocto)	Microsoft Windows® 10 IoT Enterprise / BSP for Linux® (Yocto Project®) EAPI (HW Programming Interface)		Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise LTSC BSP for Linux® (Yocto Project®)	Microsoft Windows® 11 IoT Enterprise LTSC (future availability) BSP for Linux® (Yocto Project®)
Power Requirements	Voltage: +8V to +20V, +5V Stby optional, +3V RTC voltage Power Consumption: TBD	Voltage: +8V to +20V, +5V Stby optional, +3V RTC voltage Power Consumption: TBD	Voltage: +12V, +5V Stby optional Power Consumption: 54 W to 89 W (typ.)		Voltage: +8V to +20V, +3V RTC voltage Power Consumption: TBD	Voltage: +8V to +18V, +3V RTC voltage Power Consumption: TBD
Operating Temp.	0° ... 60°C (operating) -25° ... 85°C (storage)	0° ... 60°C (operating) -25° ... 85°C (storage)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)		-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	TBD (operating) -25° ... 85°C (storage) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)				5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)	

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COM Express® is a widely adopted COM standard in the embedded world, defined by PICMG® (PCI Industrial Computer Manufacturers Group) in 2005. Since its introduction and through subsequent updates, COM Express® has become a versatile and highly scalable standard, supporting both small, cost-sensitive applications and high-end computing and graphics-intensive solutions.

It is designed for the latest chipsets and serial signaling protocols, including PCI Express Gen 4, SATA, USB4, and high-resolution video interfaces. COM Express® Type 10 and 6 interfaces support graphics applications, while Type 7 enables embedded server technology on compact modules.

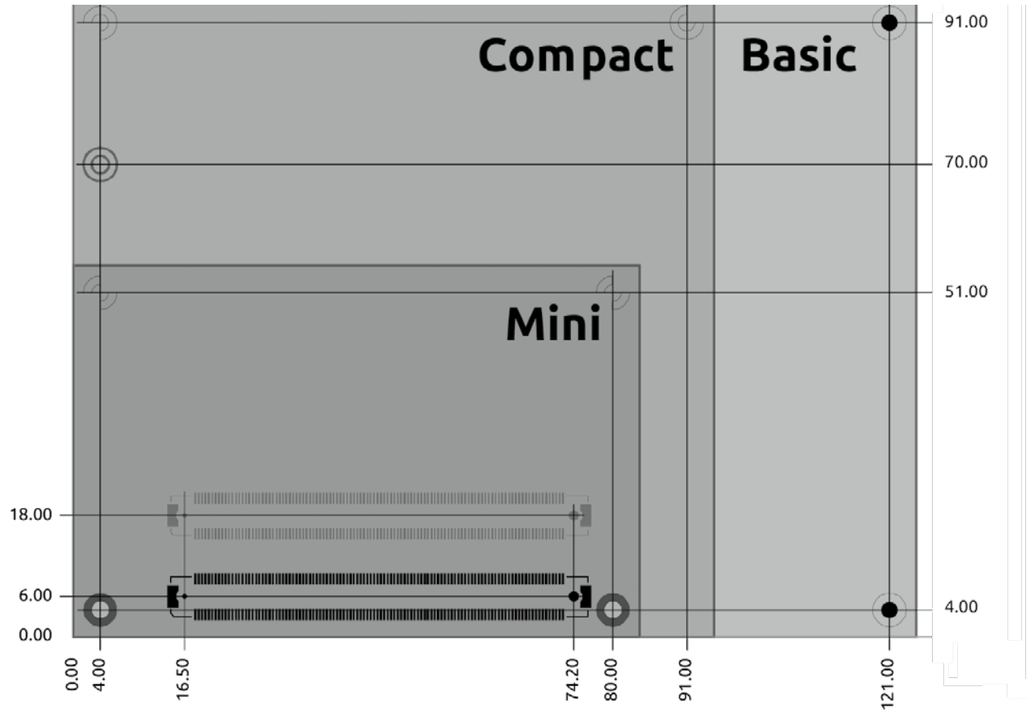
COM Express® Properties

The COM Express® Standard supports four sizes: Mini, Compact, Basic and Extended. All sizes utilize two high-speed, 220-pin connectors except for the Mini format which only supports one connector. Signal distribution of this connector is similar to the other formats but by no means identical.

- **Common for all Form Factors**
- **Extended only**
- **Basic only**
- **Compact only**
- **Compact and Basic only Mini only**

Specs	Type 10	Type 6
PCIe (Gen 1, 2, 3, 4) (*maximum bandwidth, unidirectional)	- x4 (64Gbps)	- x8 (128Gbps) - x16 (256Gbps) - PCIe / PEG
Ethernet	- 1x NBASE-T Ethernet (up to 10Gb)	- 1x NBASE-T Ethernet (up to 10Gb)
Graphics / Multimedia	- 1x DDI - LVDS Ch. A / eDP - HDA Digital Audio / Soundwire	- 3x DDI - 2x USB4 (DP alternate mode) - LVDS Ch. A / eDP - LVDS Ch. B - 1x VGA - HDA Digital Audio / Soundwire
Data I/O	- 1x Serial Port / CAN - 1x Serial Port - 2x USB 2.0 / 3.2 - 6x USB 2.0 - 2x USB Clients out of 8 - 2x MIPI-CSI connectors	- 1x Serial Port / CAN - 1x Serial Port - 2x USB4 (on DDI) - 4x USB 2.0 / 3.2 - 4x USB 2.0 - 2x USB Clients out of 8 - 2x MIPI-CSI connectors
Storage	- 2x SATA (max. 6Gbps/ch.)	- 4x SATA (max. 6Gbps/ch.)
System I/O & Controls	- LPC / eSPI - 2x SPI - 1x SMB, 1x I2C - 4x GPI, 4xGPO or 1x SDIO - Reset, SPKR, WDT etc. - Power Management	- LPC / eSPI - 2x SPI - 1x SMB, 1x I2C - 4x GPI, 4xGPO or 1x SDIO - Reset, SPKR, WDT etc. - Power Management
Power	- 12V, 68W or wide input, 28W - 5V Standby, 9W	- 12V, 137W - 5V Standby, 9W
Form Factor	Mini	Compact, Basic, Extended

Note: Maximum possible number of functions and interfaces shown. Product implementations may support subsets of functions, less interfaces or lower bandwidths.



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COM EXPRESS® TYPE 6 BASIC OVERVIEW

Specs	TRIA C6B-SLH	TRIA C6B-KLH		TRIA C6B-CFLH	TRIA C6B-CFLR	TRIA C6B-TLH
Technology	x86	x86		x86	x86	x86
						
Form Factor	COM Express® Basic FF, Dimension: 95 mm x 125 mm	COM Express® Basic FF, Dimension: 95 mm x 125 mm		COM Express® Basic FF, Dimension: 95 mm x 125 mm	COM Express® Basic FF, Dimension: 95 mm x 125 mm	COM Express® Basic FF, Dimension: 95 mm x 125 mm
CPU	**Intel® Core™ Processor** **- i7-6820EQ** (4C, 2.8/3.5GHz, 8MB cache, 45W) **- i7-6822EQ** (4C, 2.0/2.8GHz, 8MB cache, 25W) **- i5-6440EQ** (4C, 2.7/3.4GHz, 6MB cache, 45W) **- i5-6442EQ** (4C, 1.9/2.7GHz, 6MB cache, 25W) **- i3-6100E** (2C, 2.7GHz, 3MB cache, 35W) **- i3-6102E** (2C, 1.9GHz, 3MB cache, 25W) **Intel® Celeron® Processor** **- G3900E** (2C, 2.4GHz 2MB cache, 35W) **- G3902E** (2C, 1.6GHz 2MB cache, 25W) **Intel® Xeon® Processor** **- E3-1505M v5** (4C, 2.8/3.7GHz, 8MB cache, 45W 35W cTDP) **- E3-1505L v5** (4C, 2.0/2.8GHz, 8MB cache, 25W)	**Intel® Core™ Processor** **- i7-7820EQ** (4C, 3.0/3.7GHz, 8MB cache, 45/35W cTDP) **- i5-7440EQ** (4C, 2.9/3.6GHz, 6MB cache, 45/35W cTDP) **- i5-7442EQ** (4C, 2.1/2.9GHz, 6MB cache, 25W TDP) **- i3-7100E** (2C, 2.9GHz, 3MB cache, 35W TDP) **- i3-7102E** (2C, 2.1GHz, 3MB cache, 25W TDP) **Intel® Xeon® Processor** **- E3-1505M v6** (4C, 3.0/4.0GHz, 8MB cache, 45/35W cTDP), **- E3-1505L v6** (4C, 2.2/3.0GHz, 8MB cache, 25W TDP)		**Intel® Core™ Processor** **- i7-8850H** (6C, 2.6/4.3GHz, 9M cache, 45/35W cTDP) **- i5-8400H** (4C, 2.5/4.2GHz, 8M cache, 45/35W cTDP) **- i3-8100H** (4C, 3.0GHz, 6M cache, 45/35W cTDP) **Intel® Xeon® Processor** **- E-2176M** (6C, 2.7/4.4GHz, 12M cache, 45/35W cTDP)	**Intel® Xeon® Processor** **- E-2276ME** (6C, 2.8/4.5GHz, 12MB cache, 45/35W TDP/cTDP) **- E-2276ML** (6C, 2.0/4.2GHz, 12MB cache, 25W TDP) **- E-2254ME** (4C, 2.6/3.8GHz, 8MB cache, 45/35W TDP/cTDP) **- E-2254ML** (4C, 1.7/3.5GHz, 8MB cache, 25 TDP) **Intel® Core™ Processor** **- i7-9850HE** (6C, 2.7/4.4GHz, 9MB cache, 45/35W TDP/cTDP) **- i7-9850HL** (6C, 1.9/4.1GHz, 9MB cache, 25W TDP) **- i3-9100HL** (4C, 1.6/2.9GHz, 6MB cache, 25W TDP) **Intel® Celeron® Processor** **- G4930E** (4C, 2.4GHz, 2MB cache, 35W TDP) **- G4932E** (4C, 1.9GHz, 2MB cache, 25W TDP)	**Intel® Core™ Processor** **- i7-11850HE**, 8C/16T, 2.6/4.7 GHz, 32EUs, 24M L3, 45/35W TDP/cTDP down **- i5-11500HE**, 6C/12T, 2.6/4.5 GHz, 32EUs, 12M L3, 45/35W TDP/cTDP down **- i3-11100HE**, 4C/8T, 2.4/4.4 GHz, 16EUs, 8M L3, 45/35WTDP/cTDP down **Intel® Celeron® Processor 6600HE**, 2C/2T, 2.6 GHz, 16EUs, 8M L3, 35W TDP **Intel® Xeon® Processor** **- W-11865MRE**, 8C/16T, 2.6/4.7 GHz, 32EUs, 24M L3, 45/35W TDP/cTDP down, extended temp. **- W-11555MRE**, 6C/12T, 2.6/4.5 GHz, 32EUs, 12M L3, 45/35W TDP/cTDP down, extended temp. **- W-11155MRE**, 4C/8T, 2.4/4.4 GHz, 16EUs, 8M L3, 45/35W TDP/cTDP down, extended temp. **- W-11865MLE**, 8C/16T, 1.5/4.5 GHz, 32EUs, 24M L3, 25W **- W-11555MLE**, 6C/12T, 1.9/4.4 GHz, 32EUs, 12M L3, 25W **- W-11155MLE**, 4C/8T, 1.8/3.1 GHz, 16EUs, 8M L3, 25W
Chipset	Intel® Platform Controller Hubs (PCH) QM170, HM170 or CM236	Intel® Platform Controller Hubs (PCH) QM170, HM170 or CM236		Intel® Platform Controller Hubs (PCH) QM370 or CM246	Intel® Platform Controller Hubs (PCH) QM370 or CM246	Intel® Platform Controller Hubs (PCH) RM590E, QM580E or HM570E
DRAM	2x 260-pin SO-DIMM socket for up to 2x 16GB DDR4 SDRAM (DDR4-2133); dual channel operation; ECC option	2x 260-pin SO-DIMM socket for up to 2x 16GB DDR4 SDRAM (DDR4-2133); dual channel operation; ECC option		2x 260-pin SO-DIMM socket for up to 2x 16GB DDR4 SDRAM (DDR4-2666[1]); dual channel operation; ECC option	2x 260-pin SO-DIMM socket for up to 2x 16GB DDR4 SDRAM (DDR4-2666[1]); dual channel operation; ECC option	2x 260-pin SO-DIMM socket for up to 2x 32GB DDR4 SDRAM (DDR4-3200); dual channel operation; minimum capacity 1x 8GB single channel operation; ECC option
Storage Interfaces	4x SATA channels (up to 6Gb/s)	4x SATA channels (up to 6Gb/s)		4x SATA channels (up to 6Gb/s)	4x SATA channels (up to 6Gb/s)	4x SATA channels (up to 6Gb/s) optional on-board NVMe, up to 256GB
USB	4x USB 3.0/2.0, 4x USB 2.0	4x USB 3.0/2.0, 4x USB 2.0		4x USB 3.1 (Gen 1 & 2)/2.0, 4x USB 2.0	4x USB 3.1 (Gen 1 & 2)/2.0, 4x USB 2.0	4x USB 3.1 (Gen 1 & 2), 8x USB 2.0
Bus Interfaces	8x PCI Express® x1 Gen 3, 1x PCI Express® Graphics (PEG) x 16 Gen. 3 LPC bus (Low Pin Count bus; no DMA support)	8x PCI Express® x1 Gen 3, 1x PCI Express® Graphics (PEG) x 16 Gen. 3 LPC bus (Low Pin Count bus; no DMA support)		8x PCI Express x1 Gen 3 1x PCI Express® Graphics (PEG) x 16 Gen. 3 LPC bus (Low Pin Count bus; no DMA support)	8x PCI Express x1 Gen 3 1x PCI Express® Graphics (PEG) x 16 Gen. 3 LPC bus (Low Pin Count bus; no DMA support)	8x PCI Express® x1 Gen 3 1x PCI Express® Graphics (PEG) x 16 Gen 4 LPC bus (Low Pin Count bus; no DMA support)
Display Controller	Integrated Intel HD graphics Gen. 9	Integrated Intel HD graphics Gen. 9		Integrated Intel UHD graphics Gen. 9	Integrated Intel UHD graphics Gen. 9	Integrated Intel® UHD graphics
Display Interfaces	Three independent displays supported 3x Digital Display Interface (DP 1.2, HDMI 1.4b) 1x Embedded DisplayPort 1.3 1x LVDS 24bit, dual-channel	Three independent displays supported 3x Digital Display Interface (DP 1.2, HDMI 1.4b) 1x Embedded DisplayPort 1.4 1x LVDS 24bit, dual-channel		Three independent displays supported 3x Digital Display Interface (DP 1.2, HDMI 1.4b) 1x Embedded DisplayPort 1.4 1x LVDS 24bit, dual-channel	Three independent displays supported 3x Digital Display Interface (DP 1.2, HDMI 1.4b) 1x Embedded DisplayPort 1.4 1x LVDS 24bit, dual-channel	Four independent displays supported 3x Digital Display Interface (DP 1.4, HDMI 2.0b) 1x Embedded DisplayPort 1.4b 1x LVDS 24bit, dual-channel
Network Interface	10/100/1000Base-T (integrated in PCH, Intel® i219LM PHY)	10/100/1000Base-T (integrated in PCH, Intel® i219LM PHY)		10/100/1000Base-T (integrated in PCH, Intel® i219LM PHY)	10/100/1000Base-T (integrated in PCH, Intel® i219LM PHY)	10/100/1000Base-T, 2.5G (Intel i225)
Audio Interface	High Definition Audio	-		High Definition Audio	High Definition Audio	High Definition Audio
Security Device	TPM 1.2	High Definition Audio		TPM 2.0	TPM 2.0	TPM 2.0
OS Support	Microsoft Windows® 7, 8, 8.1, 10 (embedded) BSP for Linux® on request EAPI (HW Programming Interface)	Microsoft Windows® 7, 8, 8.1, 10 (embedded) BSP for Linux® on request EAPI (HW Programming Interface)		Microsoft Windows® 10 IoT Enterprise BSP for Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT Enterprise BSP for Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT Enterprise RS5 (64bit) BSP for Linux® (Yocto Project®)
Power Requirements	Voltage: +12V +/-10%, 5V Stby optional Power Consumption: 35 W to 55 W (typ.)	Voltage: +12V +/-10%, 5V Stby optional Power Consumption: 35 W to 55 W (typ.)		Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: 35 W to 55 W (typ.)	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: 35 W to 55 W (typ.)	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: 36 W to 62 W (typ.)
Operating Temp.	0° ... 60°C (operating) -25° ... 85°C (storage)	0° ... 60°C (operating) -25° ... 85°C (storage)		0° ... 60°C (operating) -25° ... 85°C (storage)	0° ... 60°C (operating) -25° ... 85°C (storage)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)			5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)		

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COM EXPRESS® TYPE 6 BASIC OVERVIEW

TYPE 6 BASIC/COMPACT OVERVIEW

Specs	TRIA C6B-ALP	TRIA C6B-RLP	TRIA C6B-MLH	TRIA C6C-SLU	TRIA C6C-KLU	TRIA C6C-WLU
Technology	x86	x86	x86	x86	x86	x86
						
Form Factor	COM Express® Basic FF, Dimension: 95 mm x 125 mm	COM Express® Basic FF, Dimension: 95 mm x 125 mm	COM Express® Basic FF, Dimension: 95 mm x 125 mm	COM Express® Compact FF, Dimension: 95 mm x 95 mm		
CPU	**12th Gen Intel® Core™ processors** **H-series** **- i7-12800HE** 14C/20T, 2.4GHz, 96 EUs, 24MB L3, 45/35W cTDP **- i5-12600HE** 12C/16T, 2.5GHz, 80 EUs, 18MB L3, 45/35W cTDP **- i3-12300HE** 8C/12T, 1.9GHz, 48 EUs, 12MB L3, 45/35W cTDP **P-series** **- i7-1270PE** 12C/16T, 1.8GHz, 96 EUs, 24MB L3, 28/20W cTDP **- i5-1250PE** 12C/16T, 1.7GHz, 80 EUs, 12MB L3, 28/20W cTDP **- i3-1220PE** 8C/12T, 1.5GHz, 48 EUs, 12MB L3, 28/20W cTDP **U-series** **- i7-1265UE** 10C/12T, 1.7GHz, 96 EUs, 12MB L3, 15/12W cTDP **- i5-1245UE** 10C/12T, 1.5GHz, 80 EUs, 12MB L3, 15/12W cTDP **- i3-1215UE** 6C/8T, 1.2GHz, 64 EUs, 10MB L3, 15/12W cTDP **- 7305E** 5C/5T, 1.0GHz, 48 EUs, 8MB L3, 15/12W cTDP	**13th Gen Intel® Core™ processors** **H-series** **- i7-13800HE/HRE** 14C/20T, 2.5GHz, 96 EUs, 24MB L3, 45/35W cTDP **- i5-13600HE/HRE** 12C/16T, 2.7GHz, 80 EUs, 18MB L3, 45/35W cTDP **- i3-13300HE/HRE** 8C/12T, 2.1GHz, 48 EUs, 12MB L3, 45/35W cTDP **P-series** **- i7-1370PE/PRE** 14C/20T, 1.9GHz, 96 EUs, 24MB L3, 28/20W cTDP **- i5-1350PE/PRE** 12C/16T, 1.8GHz, 80 EUs, 12MB L3, 28/20W cTDP **- i5-1340PE** 12C/16T, 1.8GHz, 80 EUs, 12MB L3, 28/20W cTDP **- i3-1320PE/PRE** 8C/12T, 1.7GHz, 48 EUs, 12MB L3, 28/20W cTDP **U-series** **- i7-1365UE/URE** 10C/12T, 1.7GHz, 96 EUs, 12MB L3, 15/12W cTDP **- i5-1345UE/URE** 10C/12T, 1.4GHz, 80 EUs, 12MB L3, 15/12W cTDP **- i5-1335UE** 10C/12T, 1.3GHz, 80 EUs, 12MB L3, 15/12W cTDP **- i3-1315UE/URE** 6C/8T, 1.2GHz, 64 EUs, 10MB L3, 15/12W cTDP **- U300E 5C/6T,** 1.1GHz, 48 EUs, 8MB L3, 15/12W cTDP **Processor variants with marking RE support TCC/TSN, IBECC, extended temperatures**	**Intel® Core™ Ultra Processors Series 1** - **Ultra 7 165H** 16C/22T, 1.4GHZ, 128 EUs, 24MB L3, vPRO®, 28W BP - **Ultra 7 155H** 16C/22T, 1.4GHZ, 128 EUs, 24MB L3, 28W BP - **Ultra 5 135H** 14C/18T, 1.7GHZ, 128 EUs, 18MB L3, vPRO®, 28W BP - **Ultra 5 125H** 14C/18T, 1.2GHZ, 112 EUs, 18MB L3, 28W BP - **Ultra 7 165U** 12C/14T, 1.7GHZ, 64 EUs, 12MB L3, vPRO®, 15W BP - **Ultra 7 155U** 12C/14T, 1.7GHZ, 64 EUs, 12MB L3, 15W BP - **Ultra 5 135U** 12C/14T, 1.6GHZ, 64 EUs, 12MB L3, vPRO®, 15W BP - **Ultra 5 125U** 12C/14T, 1.3GHZ, 64 EUs, 12MB L3, 15W BP **Intel® Core™ Ultra Processors Series 2** **- Ultra 9 285H** 16C/22T, 2.9GHZ, 128EUs, 24MB L3, vPRO®, 45W BP **- Ultra 7 265H** 16C/22T, 2.2GHZ, 128EUs, 24MB L3, vPRO®, 28W BP **- Ultra 7 255H** 16C/22T, 2.0GHZ, 128EUs, 24MB L3, 28W BP **- Ultra 5 235H** 14C/18T, 2.4GHZ, 128EUs, 18MB L3, vPRO®, 28W BP **- Ultra 5 225H** 14C/18T, 1.7GHZ, 112EUs, 18MB L3, 28W BP **- Ultra 7 265U** 12C/14T, 2.1GHZ, 64EUs, 12MB L3, vPRO®, 15W BP **- Ultra 7 255U** 12C/14T, 2.0GHZ, 64EUs, 12MB L3, 15W BP **- Ultra 5 235U** 12C/14T, 2.0GHZ, 64EUs, 12MB L3, vPRO®, 15W BP **- Ultra 5 225U** 12C/14T, 1.5GHZ, 64EUs, 12MB L3, 15W BP	**Intel® Core™ Processor** **- i7-6600U** dual-core 2.6/3.4GHz, 4MB L2, 15W TDP, 7.5/25W cTDP **- i5-6300U** dual-core 2.4/3.0GHz, 3MB L2, 15W TDP, 7.5/25W cTDP **- i3-6100U** dual-core 2.3GHz, 3MB L2, 15W TDP, 7.5 cTDP **Intel® Celeron® 3955U** dual-core 2.0GHz, 2MB L2, 15W TDP, 10W cTDP	**Intel® Core™ Processor** **- i7-7600U** dual-core 2.8/3.9GHz, 4MB L2, 15W cTDP **- i5-7300U** dual-core 2.6/3.5GHz, 3MB L2, 15W cTDP **- i3-7100U** dual-core 2.4GHz, 3MB L2, 15W cTDP **Intel® Celeron® 3965U** dual-core 2.2GHz, 2MB L2, 15W TDP	**Intel® Core™ Processor** **- i7-8665UE** quad-core 1.7/4.4 GHz, 8MB L2, 15W TDP **- i5-8365UE** quad-core 1.6/4.1 GHz, 6MB L2, 15W TDP **- i3-8145UE** dual-core 2.2/3.9 GHz, 4MB L2, 15W TDP **Intel® Celeron® Processor 4305UE** dual-core 2.0 GHz, 2MB L2, 15W TDP
Chipset	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip
DRAM	2x 262-pin SO-DIMM socket for up to 2x 32GB DDR5 SDRAM (DDR5-4800); dual channel operation; minimum capacity 1x 8GB single channel operation	2x 262-pin SO-DIMM socket for up to 2x 32GB DDR5 SDRAM (DDR5-4800); dual channel operation; minimum capacity 1x 8GB single channel operation; in-band ECC	2x 262-pin SO-DIMM socket for up to 96GB DDR5-5600 SDRAM; dual channel; min. capacity 1x 8GB single channel; in-band ECC (OS dependent)	2x 260-pin SO-DIMM socket for up to 2x 16 GB DDR4 SDRAM (DDR4-2133); dual channel operation	2x 260-pin SO-DIMM socket for up to 2x 16 GB DDR4 SDRAM (DDR4-2133); dual channel operation	Up to 2x 8 GB DDR4 SDRAM (DDR4-2400); dual channel operation; memory down
Storage Interfaces	2x SATA channels (up to 6Gb/s) optional on-board NVMe, up to 256GB	2x SATA channels (up to 6Gb/s) optional on-board NVMe, up to 256GB	2x SATA channels (up to 6Gb/s) optional on-board NVMe, up to 256GB	Up to 3x SATA 6Gb/s	Up to 3x SATA 6Gb/s	2x SATA 6Gb/s
USB	4x USB 3.2 (Gen 1 & 2), 8x USB 2.0	4x USB 3.2 (Gen 1 & 2), 8x USB 2.0	Up to 2x USB4, 3x USB 3.2 (Gen 1 & 2), 8x USB 2.0	4x USB 3.0/2.0, 4x USB 2.0	4x USB 3.0/2.0, 4x USB 2.0	4x USB 3.1/2.0,4x USB 2.0
Bus Interfaces	PCI Express® Graphics (PEG) 1x8, PCIe Gen 4, on -H series PCI Express® 1x4, Gen 4 PCI Express® 4x1 lanes, configurable up to x4, Gen 3 LPC bus (Low Pin Count bus, no DMA support)	PCI Express® Graphics (PEG) 1x8, PCIe Gen 4, on -H series PCI Express® 1x4, Gen 4 PCI Express® 4x1 lanes, configurable up to x4, Gen 3 LPC bus (Low Pin Count bus, no DMA support)	PCI Express® Gen 4, 1x8 & 1x4, optional PCI Express® Gen 4, 1x4 PCI Express® Gen 3, up to 8x1, bifurcation options LPC bus (Low Pin Count bus, no DMA support)	8x PCI Express® x1 Gen 3 LPC bus (Low Pin Count bus; no DMA support)	8x PCI Express® x1 Gen 3 LPC bus (Low Pin Count bus; no DMA support)	9x PCI Express® x1 Gen3, LPC bus (Low Pin Count bus; no DMA support)
Display Controller	Intel® Iris® Xe architecture Graphics, Up to 96 execution units (EU)	Intel® Iris® Xe architecture Graphics, Up to 96 execution units (EU)	Intel® Arc™ Graphics, up to 128 execution units (EU)	Integrated Intel HD graphics Gen. 9	Integrated Intel HD graphics Gen. 9	Integrated Intel HD graphics Gen. 9
Display Interfaces	Four independent displays supported 3x Digital Display Interface (DP 1.4a, HDMI 2.0b) 1x Embedded DisplayPort 1.4b 1x LVDS 24bit, dual-channel	Four independent displays supported 3x Digital Display Interface (DP 1.4a, HDMI 2.0b) 1x Embedded DisplayPort 1.4b 1x LVDS 24bit, dual-channel	Four independent displays supported Up to 2x USB4 ports (DP tunneling) 3x Digital Display Interface (DP 2.1, HDMI 2.1) 1x Embedded DisplayPort 1.4b 1x LVDS 24bit, dual-channel	Two independent displays supported 2x Digital Display Interface (DP 1.2, HDMI 1.4b) 1x Embedded DisplayPort 1.4 1x LVDS 24bit, dual-channel	Two independent displays supported 2x Digital Display Interface (DP 1.2, HDMI 1.4b) 1x Embedded DisplayPort 1.4 1x LVDS 24bit, dual-channel	Three independent displays supported 2x Digital Display Interface (DP 1.2, HDMI 1.4b) 1x Embedded DisplayPort 1.4 1x LVDS 24bit, dual-channel
Network Interface	10/100/1000Base-T, 2.5G, TSN (Intel i226)	10/100/1000Base-T, 2.5G, TSN (Intel i226)	10/100/1000Base-T, 2.5G, TSN (Intel i226)	10/100/1000Base-T (Intel i219)	10/100/1000Base-T (Intel i219)	10/100/1000Base-T (Intel i219)
Audio Interface	High Definition Audio	High Definition Audio	High Definition Audio	High Definition Audio	High Definition Audio	High Definition Audio
Security Device	TPM 2.0	TPM 2.0	TPM 2.0	TPM 1.2	TPM 1.2	TPM 2.0
OS Support	Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)	Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)	Windows® 10 IoT Enterprise 2021 LTSC Windows® 11 IoT Enterprise LTSC BSP for Linux® (Yocto Project®)	Microsoft Windows® 7, 8, 8.1, 10 (embedded) BSP for Linux® on request EAPI (HW Programming Interface)	Microsoft Windows® 7, 8, 8.1, 10 (embedded) BSP for Linux® on request EAPI (HW Programming Interface)	Microsoft Windows® 10 (embedded) BSP for Linux® (Yocto Project®) EAPI (HW Programming Interface)
Power Requirements	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: 20 W to 64 W (typ.)	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: 20 W to 64 W (typ.)	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: TBD	Voltage: 12V +-5%, 5V Stby optional Power Consumption: 17 W to 19 W (typ.)	Voltage: 12V +-5%, 5V Stby optional Power Consumption: 17 W to 19 W (typ.)	Voltage: 12V +-5%, 5V Stby optional Power Consumption: 17 W to 19 W (typ.)
Operating Temp.	-25° ... 85°C (storage) 0° ... 60°C (commercial)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	0° ... 60°C (operating) -25° ... 85°C (storage)	0° ... 60°C (operating) -25° ... 85°C (storage)	0° ... 60°C (operating) -25° ... 85°C (storage)	0° ... 60°C (operating) -25° ... 85°C (storage)
Humidity	5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)		5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)			

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Specs	TRIA C6C-TLU	TRIA C6C-ALP	TRIA C6C-RLP	TRIA C6C-IQX	TRIA C6C-RYZ	TRIA C6C-RYZ2	TRIA C6C-RYZ8
Technology	x86	x86	x86	Arm®	x86	x86	x86
							
Form Factor	COM Express® Compact FF, Dimension: 95 mm x 95 mm		COM Express® Compact FF, Dimension: 95 mm x 95 mm		COM Express® Compact FF, Dimension: 95 mm x 95 mm		COM Express® Compact FF, Dimension: 95 mm x 95 mm
CPU	**Intel® Core™ Processor** **- i7-1185GRE** quad-core 2.8/4.4 GHz, 8 threads, 96 EUs, 12MB L2, 28/15/12W cTDP up/TDP/cTDP down, ext. temp. **- i7-1185G7E** quad-core 2.8/4.4 GHz, 8 threads, 96 EUs, 12MB L2, 28/15/12W cTDP up/TDP/cTDP down **- i5-1145GRE** quad-core 2.6/4.1 GHz, 8 threads, 80 EUs, 8MB L2, 28/15/12W cTDP up/TDP/cTDP down, ext. temp. **- i5-1145G7E** quad-core 2.6/4.1 GHz, 8 threads, 80 EUs, 8MB L2, 28/15/12W cTDP up/TDP/cTDP down **- i3-1115GRE** dual-core 3.0/3.9 GHz, 4 threads, 48 EUs, 6MB L2, 28/15/12W cTDP up/TDP/cTDP down, ext. temp. **- i3-1115G4E** dual-core 3.0/3.9 GHz, 4 threads, 48 EUs, 6MB L2, 28/15/12W cTDP up/TDP/cTDP down **Intel® Celeron® 6305E** dual-core 1.8 GHz, 2 threads, 48 EUs, 4MB L2, 15W TDP	**12th Gen Intel® Core™ processors** **H-series** **- i7-12800HE** 14C/20T, 2.4GHz, 96 EUs, 24MB L3, 45/35W cTDP **- i5-12600HE** 12C/16T, 2.5GHz, 80 EUs, 18MB L3, 45/35W cTDP **- i3-12300HE** 8C/12T, 1.9GHz, 48 EUs, 12MB L3, 45/35W cTDP **P-series** **- i7-1270PE** 12C/16T, 1.8GHz, 96 EUs, 24MB L3, 28/20W cTDP **- i5-1250PE** 12C/16T, 1.7GHz, 80 EUs, 12MB L3, 28/20W cTDP **- i3-1220PE** 8C/12T, 1.5GHz, 48 EUs, 12MB L3, 28/20W cTDP **U-series** **- i7-1265UE** 10C/12T, 1.7GHz, 96 EUs, 12MB L3, 15/12W cTDP **- i5-1245UE** 10C/12T, 1.5GHz, 80 EUs, 12MB L3, 15/12W cTDP **- i3-1215UE** 6C/8T, 1.2GHz, 64 EUs, 10MB L3, 15/12W cTDP **- 7305E** 5C/5T, 1.0GHz, 48 EUs, 8MB L3, 15/12W cTDP	**13th Gen Intel® Core™ processors** **H-series** **- i7-13800HE/HRE** 14C/20T, 2.5GHz, 96 EUs, 24MB L3, 45/35W cTDP **- i5-13600HE/HRE** 12C/16T, 2.7GHz, 80 EUs, 18MB L3, 45/35W cTDP **- i3-13300HE/HRE** 8C/12T, 2.1GHz, 48 EUs, 12MB L3, 45/35W cTDP **P-series** **- i7-1370PE/PRE** 14C/20T, 1.9GHz, 96 EUs, 24MB L3, 28/20W cTDP **- i5-1350PE/PRE** 12C/16T, 1.8GHz, 80 EUs, 12MB L3, 28/20W cTDP **- i5-1340PE** 12C/16T, 1.8GHz, 80 EUs, 12MB L3, 28/20W cTDP **- i3-1320PE/PRE** 8C/12T, 1.7GHz, 48 EUs, 12MB L3, 28/20W cTDP **U-series** **- i7-1365UE/URE** 10C/12T, 1.7GHz, 96 EUs, 12MB L3, 15/12W cTDP **- i5-1345UE/URE** 10C/12T, 1.4GHz, 80 EUs, 12MB L3, 15/12W cTDP **- i5-1335UE** 10C/12T, 1.3GHz, 80 EUs, 12MB L3, 15/12W cTDP **- i3-1315UE/URE** 6C/8T, 1.2GHz, 64 EUs, 10MB L3, 15/12W cTDP **- U300E** 5C/6T, 1.1GHz, 48 EUs, 8MB L3, 15/12W cTDP **Processor variants with marking RE support TCC/TSN, IBECC, extended temperatures**	**Qualcomm Dragonwing™ IQ-X** - IQX7181MD 12 core, 3.4GHz - IQX5121MD 8 core, 3.4GHz	**AMD Ryzen™ Embedded** **- V1807B**, quad-core Processor, 3.35/3.8GHz, 2MB L2 / 4MB L3, 11 GPU CU, 45W (35-54W) TDP, max. DDR4-3200 **- V1756B**, quad-core Processor, 3.25/3.6GHz, 2MB L2 / 4MB L3, 8 GPU CU, 45W (35-54W) TDP, max. DDR4-3200 **- V1605B**, quad-core Processor, 2.0/3.6GHz, 2MB L2 / 4MB L3, 8 GPU CU, 15W (12-25W) TDP, max. DDR4-2400 **- V1404I**, quad-core Processor, 2.0/3.6GHz, 2MB L2 / 4MB L3, 8 GPU CU, 15W (12-25W) TDP, max. DDR4-2400, industrial temp. range **- V1202B**, dual-core Processor, 2.3/3.2GHz, 1MB L2 / 4MB L3, 3 GPU CU, 15W (12-25W) TDP, max. DDR4-2400 **- R1606G**, dual-core Processor, 2.6/3.5GHz, 1MB L2 / 4MB L3, 3 GPU CU, 15W (12-25W) TDP, max. DDR4-2400 **- R1505G**, dual-core Processor, 2.4/3.3GHz, 1MB L2 / 4MB L3, 3 GPU CU, 15W (12-25W) TDP, max. DDR4-2400	**AMD Ryzen™ Embedded** **- R2544**, quad-core Processor, 3.35/3.7GHz, 2MB L2 / 4MB L3, 8 GPU CU, 45W (35-54W) TDP, max. DDR4-3200; **- R2514**, quad-core Processor, 2.1/3.7GHz, 2MB L2 / 4MB L3, 8 GPU CU, 15W (12-35W) TDP, max. DDR4-2667; **- R2314**, quad-core Processor, 2.1/3.5GHz, 2MB L2 / 4MB L3, 6 GPU CU, 15W (12-35W) TDP, max. DDR4-2667; **- R2312**, dual-core Processor, 2.7/3.5GHz, 1MB L2 / 4MB L3, 3 GPU CU, 15W (12-25W) TDP, max. DDR4-2400	**AMD Ryzen™ Embedded 8000 Series** **- 8845HS**, eight core, 3.8/5.1GHz, 8MB L2 / 16MB L3, 6 WGP, 45W (35-54W) TDP, DDR5-5600 **- 8645HS**, six core, 4.3/5.0GHz, 6MB L2 / 16MB L3, 4 WGP, 45W (35-54W) TDP, DDR5-5600 **- 8840U**, eight core, 3.3/5.1GHz, 8MB L2 / 16MB L3, 6 WGP, 28W (15-30W) TDP, DDR5-5600 **- 8640U**, six core, 3.5/4.9GHz, 6MB L2 / 16MB L3, 4 WGP, 28W (15-30W) TDP, DDR5-5600
Chipset	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip
DRAM	Up to 32 GB SDRAM (up to LPDDR4X-4267); dual channel operation; memory down	Up to 32 GB SDRAM (up to LPDDR5-5200; dual channel operation; memory down)	Up to 64 GB SDRAM (up to LPDDR5-6000) dual channel operation; memory down)	Up to 64GB LPDDR5 SDRAM, up to 8448 MT/s	2x 260-pin SO-DIMM socket for up to 2x 16 GB DDR4 SDRAM (DDR4-3200 max); ECC option; dual channel operation	2x 260-pin SO-DIMM socket for up to 2x 16 GB DDR4 SDRAM (DDR4-3200 max); ECC option; dual channel operation	2x 262-pin SO-DIMM socket for up to 2x 48 GB DDR5 SDRAM (DDR5-5600 max); ECC option; dual channel operation
Storage Interfaces	2x SATA 6Gb/s	2x SATA 6Gb/s, on-board NVMe, up to 256GB (opt.)	on-board NVMe, up to 256GB (opt.)	-	2x SATA 6Gb/s	2x SATA 6Gb/s	to 256GB (opt.)
USB	4x USB 3.1 Gen 1/Gen 2, 8x USB 2.0	4x USB 3.2 Gen 1/Gen 2, 8x USB 2.0	Up to 2x USB4, 4x USB 3.2 Gen 1/Gen 2, 8x USB 2.0	Up to 2x USB4, up to 4x USB 3.2 Gen 1x1 or 2x USB3.2 Gen 2x1, 8x USB 2.0	Up to 4x USB 3.1/2.0, 4x USB 2.0	Up to 4x USB 3.2 Gen1/2.0, 4x USB 2.0	2x USB 3.2 Gen 1/Gen 2, 8x USB 2.0
Bus Interfaces	PCI Express® Gen3, 1x4 + 5x1 LPC bus (Low Pin Count bus; no DMA support)	PCI Express® Gen 4, 1x8, optional PCI Express® Gen 4, 1x4, optional PCI Express® Gen 4, 1x4 PCI Express® Gen 3, up to 8x1, bifurcation options LPC bus (Low Pin Count bus, no DMA support)	PCI Express® Gen 4, 1x8, optional PCI Express® Gen 4, 1x4, optional PCI Express® Gen 4, 1x4 PCI Express® Gen 3, up to 8x1, bifurcation options LPC bus (Low Pin Count bus, no DMA support)	PCI Express® Gen 4, up to 1x8 + 1x4/2x2 PCI Express® Gen 3, 2x1 +1x2/1x1	PCI Express® Gen 3, 1x8/2x4 (PEG port), depending on rocessor variant PCI Express® Gen 2/3, up to 8x1, bifurcation options LPC bus (Low Pin Count bus, no DMA support)	PCI Express® Gen 3, 1x8/2x4 (PEG port), depending on rocessor variant PCI Express® Gen 2/3, up to 8x1, bifurcation options LPC bus (Low Pin Count bus, no DMA support)	PCI Express® Gen 4, 1x8/2x4 (PEG port) PCI Express® Gen 4, 1x4, optional PCI Express® Gen 4, 1x4, bifurcation options PCI Express® Gen 3, 4x1, optional LPC bus (Low Pin Count bus, no DMA support)
Display Controller	Integrated Intel Gen12 Gfx Engine Up to 96 execution units (EU)	Intel® Iris® Xe architecture Graphics, Up to 96 execution units (EU)	Intel® Iris® Xe architecture Graphics, Up to 96 execution units (EU)	Qualcomm® Adreno™ GPU	GPU Vega core, up to 11 CUs	GPU Vega core, up to 8 CUs	Radeon RDNA3, up to six work group processors
Display Interfaces	Four independent displays supported 3x Digital Display Interface (DP 1.4, HDMI 2.0b) 1x Embedded DisplayPort 1.4b 1x LVDS 24bit, dual-channel	Four independent displays supported 3x Digital Display Interface (DP 1.4, HDMI 2.0b) 1x Embedded DisplayPort 1.4b 1x LVDS 24bit, dual-channel	Four independent displays supported Up to 2x USB4 ports (DP tunneling) 3x Digital Display Interface (DP 1.4, HDMI 2.0b) 1x Embedded DisplayPort 1.4b 1x LVDS 24bit, dual-channel	Up to four independent displays supported Up to 2x USB4 ports (DP tunneling) Up to 3x Digital Display Interface (DP 1.4) 1x Embedded DisplayPort 1.4b 1x LVDS 24bit, dual-channel	Up to four independent displays supported Up to 3x Digital Display Interface (DP 1.4, HDMI 2.0b) 1x Embedded DisplayPort 1.3 1x LVDS 24bit, dual-channel	Up to four independent displays supported Up to 3x Digital Display Interface (DP 1.4, HDMI 2.0b) 1x Embedded DisplayPort 1.3 1x LVDS 24bit, dual-channel	Up to four independent displays supported Up to 3x Digital Display Interface (DP 2.1, HDMI 2.1) 1x Embedded DisplayPort 1.5 1x LVDS 24bit, dual-channel
Network Interface	10/100/1000Base-T with TSN support (Intel i225)	10/100/1000Base-T, 2.5G (Intel i226)	10/100/1000Base-T, 2.5G (Intel i226)	10/100/1000Base-T, 2.5G	10/100/1000Base-T (Intel i210)	10/100/1000Base-T (Intel i210)	10/100/1000Base-T, 2.5G (Intel i226)
Audio Interface	High Definition Audio	High Definition Audio	High Definition Audio	SoundWire	High Definition Audio	High Definition Audio	High Definition Audio
Security Device	TPM 2.0	TPM 2.0	TPM 2.0	TPM 2.0	TPM 2.0	TPM 2.0	TPM 2.0
OS Support	Microsoft Windows® 10 IoT Enterprise RS5 (64bit) BSP for Linux® (Yocto Project®)	Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)	Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)	Windows 11 IoT Enterprise LTSC (future availability) / BSP for Linux (Yocto)	Microsoft Windows® 10 IoT Enterprise (64-bit) Microsoft Windows® 10 Linux®, (Yocto Project®)	Windows® 10 21H2 LTSC Windows® 11 21H2 GAC Linux®, (Yocto Project®)	Windows® 11 22H2 GAC Linux®, (Yocto Project®)
Power Requirements	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: 14W to 35W (typ.)	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: 22W to 49W (typ.)	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: 22W to 49W (typ.)	Voltage: +8V to +18V, +3V RTC voltage Power Consumption: TBD	Voltage: +12V primary power supply input, +5V Stby opt. Power Consumption: 28 W to 64 W (typ.)	Voltage: +12V primary power supply input, +5V Stby opt. Power Consumption: tbd	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: TBD
Operating Temp.	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	-25° ... 85°C (storage) 0° ... 60°C (commercial)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	TBD (operating) -25° ... 85°C (storage) 40° ... 85°C (industrial)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	-25° ... 85°C (storage) 0° ... 60°C (commercial)	-25° ... 85°C (storage) 0° ... 60°C (commercial)
Humidity	5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)			5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)			

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COM EXPRESS® TYPE 6 COMPACT OVERVIEW

Specs	TRIA C6C-BT	TRIA C6C-BW	TRIA C6C-AL	TRIA C6C-EL	TRIA C6C-ALN	TRIA C6C-ASL
Technology	x86	x86	x86	x86	x86	x86
						
Form Factor	COM Express® Compact FF, Dimension: 95 mm x 95 mm	COM Express® Compact FF, Dimension: 95 mm x 95 mm	COM Express® Compact FF, Dimension: 95 mm x 95 mm	COM Express® Compact FF, Dimension: 95 mm x 95 mm	COM Express® Compact FF, Dimension: 95 mm x 95 mm	COM Express® Compact FF, Dimension: 95 mm x 95 mm
CPU	**Intel Atom® Processor** **- E3845** quad-core 1.91GHz, 10W TDP **- E3827** dual-core 1.75GHz, 8W TDP **- E3826** dual-core 1.46GHz, 7W TDP **- E3825** dual-core 1.33GHz, 6W TDP **- E3815** single-core 1.46GHz, 5W TDP **- E3805** dual-core 1.33GHz, 3W TDP (no graphics) **Intel® Celeron® Processor** **- N2807** dual-core 1.58/2.16GHz, 4.3W TDP **- N2930** quad-core 1.83/2.16GHz, 7.5W TDP **- J1900** quad-core 2.00/2.42GHz, 10W TDP	**Intel Atom® x5-E8000** quad-core 1.04/2.0GHz, 2MB Cache, 5W TDP **Intel® Pentium® N3710** quad-core 1.6/2.56GHz, 2MB Cache, 6W TDP **Intel® Celeron® Processor** **- N3160** quad-core 1.6/2.24GHz, 2MB Cache, 6W TDP **- N3060** dual-core 1.6/2.48GHz, 2MB Cache, 6W TDP **- N3010** dual-core 1.04/2.24GHz, 2MB Cache, 4W TDP	**Intel Atom® Processor** **- E3950** quad-core 1.6/2.0GHz, 18 EU GFX, 12W **- E3940** quad-core 1.6/1.8GHz, 12 EU GFX, 9.5W **- E3930** dual-core 1.3/1.8GHz, 12 EU GFX, 6.5W **Intel® Pentium® N4200** quad-core 1.1/2.5GHz, 18 EU GFX, 6W **Intel® Celeron® N3350** dual-core 1.1/2.4GHz, 12 EU GFX, 6W	**Intel Atom® Processor** **- x6425RE**, quad-core / 4T, 1.9GHz, 32EU, IBECC, TCC, 12W, IUC **- x6416RE**, quad-core / 4T, 1.7GHz, 16EU, IBECC, TCC, 9W, IUC **- x6414RE**, quad-core / 4T, 1.5GHz, 16EU, IBECC, TCC, 9W, IUC **- x6214RE**, dual-core / 2T, 1.4GHz, 16EU, IBECC, TCC, 6W, IUC **- x6212RE**, dual-core / 2T, 1.2GHz, 16EU, IBECC, TCC, 6W, IUC **- x6425E**, quad-core / 4T, 2.0/3.0GHz, 32EU, IBECC, 12W, EUC **- x6413E**, quad-core / 4T, 1.5/3.0GHz, 16EU, IBECC, 9W, EUC **- x6211E**, dual-core / 2T, 1.3/3.0GHz, 16EU, IBECC, 6W, EUC **Intel® Pentium® Processor** **- J6426**, quad-core / 4T, 2.0/3.0GHz, 32EUs, 10W, PUC **- N6415**, quad-core / 4T, 1.2/3.0GHz, 16EU, 6W, PUC **Intel® Celeron® Processor** **- J6413** quad-core / 4T, 1.8/3.0GHz, 16EU, 10W, PUC **- N6211** dual-core / 2T, 1.2/3.0GHz, 16EU, 6W, PUC	**Intel® Core™ Processor** **- i3-N355,** eight-core, 1.8GHz, 32EU, 9/15W, PUC **- i3-N305**, eight-core, 1.0GHz/1.8GHz, 32EU, 9/15W, PUC **Intel Atom® Processor** **- x7425E**, four-core, 1.5GHz, 24EU, TCC, 12W, EUC **- x7213E**, two-core, 1.7GHz, 16EU, TCC, 10W, EUC **- x7211E**, two-core, 1.0GHz, 16EU, TCC, 6W, EUC **Intel® Processor** **- N250,** quad-core, 1.2GHz, 32EU, 6W, PUC **- N200**, quad-core, 1.0GHz, 32EU, 6W, PUC **- N150,** quad-core, 1.0GHz, 24EU, 6W, PUC **- N97**, quad-core, 2.0GHz, 24EU, 12W, PUC **- N50**, dual-core, 1.0GHZ, 16EU, 6W, PUC EUC - Intel Embedded Use Conditions PUC - Intel PC Client Use Conditions	**Intel Atom® Processor** **- x7835RE**, eight-core, 1.3GHz, 32EU, TCC, 12W, IUC/EUC, ET **- x7433RE**, four-core, 1.5GHz, 32EU, TCC, 9W, IUC/EUC, ET **- x7213RE**, two-core, 2.0GHz, 16EU, TCC, 9W, IUC/EUC, ET **- x7211RE**, two-core, 1.0GHz, 16EU, TCC, 6W, IUC/EUC, ET **- x7405C**, quad-core, 2.2GHz, no GPU, TCC, 12W, EUC, CT **- x7203C**, dual-core, 2.0GHz, no GPU, TCC, 9W, EUC, CT ET- Extended Temperature CT- Commercial Temperature EUC - Intel Embedded Use Conditions IUC - Intel Industrial Use Conditions
Chipset	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip
DRAM	Up to 8GB DDR3L (1333), 2x 204 pin SO-DIMM	Up to 8GB DDR3L (1333), 2x 204 pin SO-DIMM	2x 204-pin SO-DIMM socket for up to 2x 4 GB (dual channel operation) or 1x 8 GB	2x 204-pin SO-DIMM socket for up to 2x 16 GB (dual channel operation) or 1x 16 GB	1x 262-pin SO-DIMM socket for up to 16 GB DDR5-4800 In-band ECC (on selected variants)	1x 262-pin SO-DIMM socket for up to 16 GB DDR5-4800 In-band ECC (on selected variants)
Storage Interfaces	2x SATA 3Gb/s; PATA option for CXC-BT	2x SATA 6Gb/s	Up to 2x SATA 6Gb/s	Up to 2x SATA 6Gb/s	Up to 2x SATA 6Gb/s	Up to 2x SATA 6Gb/s
USB	4x USB 2.0, 4x USB 2.0 (optional hub)	4x USB 3.0/2.0, 4x USB 2.0	4x USB 3.0/2.0, 4x USB 2.0	2x USB 3.1/2.0, 6x USB 2.0	Up to 4x USB 3.2 Gen 2 (10Gb/s), 8x USB 2.0	Up to 4x USB 3.2 Gen 2 (10Gb/s), 8x USB 2.0
Bus Interfaces	Up to 5x PCI Express x1 Gen 2, LPC bus (Low Pin Count bus)	Up to 5x PCI Express® x1 Gen 2 LPC bus (Low Pin Count bus)	Up to 5x PCI Express® x1 LPC bus (Low Pin Count bus; no DMA support)	8x PCI Express® x1 LPC bus (Low Pin Count bus; no DMA support)	Up to 6x PCI Express x1 Gen 3, LPC bus (Low Pin Count bus; no DMA support)	Up to 6x PCI Express x1 Gen 3, LPC bus (Low Pin Count bus; no DMA support)
Display Controller	Integrated Intel HD graphics Gen. 7	Integrated Intel HD graphics Gen. 8	Integrated Intel HD graphics Gen. 9	Integrated Intel graphics Gen11LP	Integrated Intel® UHD graphics	Integrated Intel® UHD graphics
Display Interfaces	Two independent displays supported 1x Digital Display Interface (DP 1.1a, HDMI 1.4a) on C6C-BT only 1x Embedded DisplayPort 1.3 on C6C-BT only 1x LVDS 24bit, dual-channel VGA	Two independent displays supported 2x Digital Display Interface (DP 1.1a, HDMI 1.4b) 1x Embedded DisplayPort 1.4 1x LVDS 24bit, dual-channel	Three independent displays supported 2x Digital Display Interface (DP 1.2a, HDMI 1.4b) 1x Embedded DisplayPort 1.3 1x LVDS 24bit, dual-channel	Three independent displays supported 2x Digital Display Interface (DP 1.4, HDMI 1.4b) 1x Embedded DisplayPort 1.3 1x LVDS 24bit, dual-channel	Three independent displays supported: 2x Digital Display Interface (DP, HDMI) 1x Embedded DisplayPort LVDS 24bit, dual-channel	Three independent displays supported: 2x Digital Display Interface (DP, HDMI) 1x Embedded DisplayPort LVDS 24bit, dual-channel
Network Interface	10/100/1000Base-T (Intel i210)	10/100/1000Base-T (Intel i210)	10/100/1000Base-T (Intel i210)	10/100/1000Base-T (SoC integrated controller)	10/100/1000Base-T, 2.5G,TSN (Intel i226)	10/100/1000Base-T, 2.5G,TSN (Intel i226)
Audio Interface	High Definition Audio	High Definition Audio	High Definition Audio	High Definition Audio	High Definition Audio	High Definition Audio
Security Device	TPM 1.2 (option)	TPM 1.2	TPM 2.0	TPM 2.0	TPM 2.0	TPM 2.0
OS Support	Microsoft Windows® 7, 8, 8.1, 10 (embedded) BSP for Linux® on request EAPI (HW Programming Interface)	Microsoft Windows® 7, 8, 8.1 (embedded) BSP for Linux® on request EAPI (HW Programming Interface)	Microsoft Windows® 10 (embedded) BSP for Linux® on request EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT Enterprise RS5 (64bit) Linux® (Yocto Project®) Kernel 5.4	Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)	Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)
Power Requirements	Voaltage: Wide range input +5 ... +17V, 5V Stby optional Power Consumption: 8 W (typ.) up to 14 W (typ.)	Voltage: Wide range input +5 ... +17V, 5V Stby optional Power Consumption: 7 W (typ.) up to 9 W (typ.)	Voltage: +5 ... +20V, 5V Stby optional Power Consumption: 7 W to 14 W (typ.)	Voltage: +8.5 ... +20V, 5V Stby optional Power Consumption: 7 W to 14 W (typ.)	Voltage: +8.5 ... +20V, 5V Stby optional Power Consumption: tbd	Voltage: +8.5 ... +20V, 5V Stby optional Power Consumption: tbd
Operating Temp.	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	-25° ... 85°C (storage) 0° ... 60°C (commercial)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	-25° ... 85°C (storage) 0° ... 60°C (commercial)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)			5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)		

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COM EXPRESS® TYPE 10 MINI OVERVIEW

Specs	TRIA C10M-BT/BTC	TRIA C10M-AL	TRIA C10M-EL		TRIA C10M-ALN	TRIA C10M-ASL
Technology	x86	x86	x86		x86	x86
						
Form Factor	COM Express® Mini, Dimension: 84 mm x 55 mm	COM Express® Mini, Dimension: 84 mm x 55 mm	COM Express® Mini, Dimension: 84 mm x 55 mm		COM Express® Mini, Dimension: 84 mm x 55 mm	COM Express® Mini, Dimension: 84 mm x 55 mm
CPU	**Intel Atom® Processor** **- E3845** quad-core 1.91GHz, 10W TDP **- E3827** dual-core 1.75GHz, 8W TDP **- E3826** dual -core 1.46GHz, 7W TDP **- E3825** dual -core 1.33GHz, 6W TDP **- E3815** single-core 1.46GHz, 5W TDP **- E3805** dual-core 1.33GHz, 3W TDP (no graphics) **Intel® Celeron® Processor** **- N2807** dual-core 1.58/2.16GHz, 4.3W TDP **- N2930** quad-core 1.83/2.16GHz, 7.5W TDP **- J1900** quad-core 2.00/2.42GHz, 10W TDP	**Intel Atom® Processor** **- X7-E3950** quad-core 1.6/2.0GHz, 18 EU GFX, 12W **- X5-E3940** quad-core 1.6/1.8GHz, 12 EU GFX, 9.5W **- X5-E3930** dual-core 1.3/1.8GHz, 12 EU GFX, 6.5W **Intel® Pentium® Processor** **- N4200** quad-core 1.1/2.5GHz, 18 EU GFX, 6W **Intel® Celeron® Processor** **- N3350** dual-core 1.1/2.4GHz, 12 EU GFX, 6W	**Intel Atom® Processor** **- x6425RE**, quad-core / 4T, 1.9GHz, 32EU, IBECC, TCC, 12W, IUC **- x6414RE**, quad-core / 4T, 1.5GHz, 16EU, IBECC, TCC, 9W, IUC **- x6212RE**, dual-core / 2T, 1.2GHz, 16EU, IBECC, TCC, 6W, IUC **- x6425E**, quad-core / 4T, 2.0/3.0GHz, 32EU, IBECC, 12W, EUC **- x6413E**, quad-core / 4T, 1.5/3.0GHz, 16EU, IBECC, 9W, EUC **- x6211E**, dual-core / 2T, 1.3/3.0GHz, 16EU, IBECC, 6W, EUC **Intel® Pentium® Processor** **- J6426**, quad-core / 4T, 2.0/3.0GHz, 32EUs, 10W, PUC **- N6415**, quad-core / 4T, 1.2/3.0GHz, 16EU, 6W, PUC **Intel® Celeron® Processor** **- J6413** quad-core / 4T, 1.8/3.0GHz, 16EU, 10W, PUC **- N6211** dual-core / 2T, 1.2/3.0GHz, 16EU, 6W, PUC		**Intel® Core™ i3-N305,** eight-core, 1.0GHz/1.8GHz, 32EU, 9/15W, PUC **Intel® Core 3 N355,** eight-core, 1.8GHz, 32EU, 9/15W, PUC **Intel Atom® x7425E,** four-core, 1.5GHz, 24EU, TCC, 12W, EUC **Intel Atom® x7213E,** two-core, 1.7GHz, 16EU, TCC, 10W, EUC **Intel Atom® x7211E,** two-core, 1.0GHz, 16EU, TCC, 6W, EUC **Intel® Processor N200,** quad-core, 1.0GHz, 32EU, 6W, PUC **Intel® Processor N250,** quad-core, 1.2GHz, 32EU, 6W, PUC **Intel® Processor N150,** quad-core, 1.0GHz, 24EU, 6W, PUC **Intel® Processor N97,** quad-core, 2.0GHz, 24EU, 12W, PUC **Intel® Processor N50,** dual-core, 1.0GHZ, 16EU, 6W, PUC EUC - Intel Embedded Use Conditions PUC - Intel PC Client Use Conditions	**Intel Atom® x7835RE**, eight-core, 1.3GHz, 32EU, TCC, 12W, IUC/EUC, ET **Intel Atom® x7433RE**, four-core, 1.5GHz, 32EU, TCC, 9W, IUC/EUC, ET **Intel Atom® x7213RE**, two-core, 2.0GHz, 16EU, TCC, 9W, IUC/EUC, ET **Intel Atom® x7211RE**, two-core, 1.0GHz, 16EU, TCC, 6W, IUC/EUC, ET **Intel Atom® x7405C**, quad-core, 2.2GHz, no GPU, TCC, 12W, EUC, CT **Intel Atom® x7203C**, dual-core, 2.0GHz, no GPU, TCC, 9W, EUC, CT Note: base frequency shown, other frequencies supported ET- Extended Temperature CT- Commercial Temperature EUC - Intel Embedded Use Conditions IUC - Intel Industrial Use Conditions
Chipset	Integrated in System-on-Chip	Integrated in System-on-Chip	Integrated in System-on-Chip		Integrated in System-on-Chip	Integrated in System-on-Chip
DRAM	up to 8GB DDR3L@1.35V SDRAM (DDR1333) soldered on board, ECC optional	up to 8GB DDR3L@1.35V SDRAM soldered on board, ECC optional	Up to 16GB LPDDR4x SDRAM, up to 4267MT/s, soldered on board, in-band ECC optional		Up to 16GB LPDDR5 SDRAM, up to 4800MT/s, IBECC (only Atom SKU´s), soldered	Up to 16GB LPDDR5 SDRAM, up to 4800MT/s, IBECC (only Atom SKU´s), soldered
Storage Interfaces	2x SATA 3Gb/s	2x SATA 6Gb/s	2x SATA 6Gb/s		1x SATA 6Gb/s	1x SATA 6Gb/s
USB	1x USB 3.0, 4x USB 2.0,3x USB 2.0 (optional hub)	2x USB 3.0, 6 x USB 2.0, 1 x USB 2.0/3.0 client	2x USB 3.0, 8 x USB 2.0		2x USB 3.2 Gen 2 (10Gb/s), 8 x USB 2.0	2x USB 3.2 Gen 2 (10Gb/s), 8 x USB 2.0
Bus Interfaces	3x PCI Express® x1 Gen 2 LPC bus (Low Pin Count bus)	4x PCI Express® x1 Gen 2 LPC bus (Low Pin Count bus)	4x PCI Express® x1 Gen 3 LPC bus (Low Pin Count bus)		4x PCI Express x1 Gen 3 (1x PCI Express x4 Gen 3 on request), LPC bus (Low Pin Count bus; no DMA support) (eSPI on request)	4x PCI Express x1 Gen 3 (1x PCI Express x4 Gen 3 on request), LPC bus (Low Pin Count bus; no DMA support) (eSPI on request)
Display Controller	Integrated Intel HD graphics Gen. 7	Integrated Intel HD graphics Gen. 9	Integrated Intel HD graphics Gen. 9		Integrated Intel UHD Graphics (Gen12)	Integrated Intel UHD Graphics (Gen12)
Display Interfaces	1x Digital Display Interface (DP 1.1a, HDMI 1.4a) 1x Embedded DisplayPort 1.3 1x LVDS 24bit, dual-channel	Two independent displays supported 1x Digital Display Interface (DP 1.2a, HDMI 1.4b) 1x Embedded DisplayPort 1.3 1x LVDS 24bit, dual-channel	Two independent displays supported 1x Digital Display Interface (DP 1.4, HDMI 1.4b) 1x Embedded DisplayPort 1.3 1x LVDS 24bit, dual-channel		Two independent displays supported: 1x Digital Display Interface (DP, HDMI) 1x Embedded DisplayPort (on variants without LVDS only); LVDS 24bit, single-channel (not on all variants);	Two independent displays supported: 1x Digital Display Interface (DP, HDMI) 1x Embedded DisplayPort (on variants without LVDS only); LVDS 24bit, single-channel (not on all variants);
Network Interface	10/100/1000Base-T (Intel® i210)	10/100/1000Base-T (Intel® i210)	10/100/1000Base-T (SoC integrated controller)		10/100/1000Base-TX, 2.5G based on Intel i226	10/100/1000Base-TX, 2.5G based on Intel i226
Audio Interface	High Definition Audio	High Definition Audio	High Definition Audio		High Definition Audio	High Definition Audio
Security Device	TPM 1.2 (option)	TPM 2.0 (option)	TPM 2.0		TPM 2.0	TPM 2.0
OS Support	Microsoft Windows® 7 Microsoft Windows® 10, Windows 10 IoT Core BSP for Linux® on request, EAPI (HW Programming Interface)	Microsoft Windows® 10 (embedded) BSP for Linux® on request EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT Enterprise RS5 (64bit) Linux® (Yocto Project®) Kernel 5.4		Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)	Microsoft Windows® 10 IoT Enterprise 2021 LTSC Microsoft Windows® 11 IoT Enterprise 2024 LTSC BSP for Linux® (Yocto Project®)
Power Requirements	Voltage: +5 ... +20V, 5V Stby optional Power Consumption: 8 W (typ.) up to 14 W (typ.)	Voltage: +5 ... +20V, 5V Stby optional Power Consumption: 7 W (typ.) up to 14 W (typ.)	Voltage: +5 ... +20V, 5V Stby optional Power Consumption: 8 W (typ.) up to 17 W (typ.)		Wide range input +5 ... +20V, 5V Stby optional, Power Consumption: 8W (typ.) up to 17W (typ.)	Wide range input +5 ... +20V, 5V Stby optional, Power Consumption: 8W (typ.) up to 14W (typ.)
Operating Temp.	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)		-25° ... 85°C (storage) 0° ... 60°C (commercial)	-25° ... 85°C (storage) 0° ... 60°C (commercial) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)				5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)	

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SMARC® 2.X



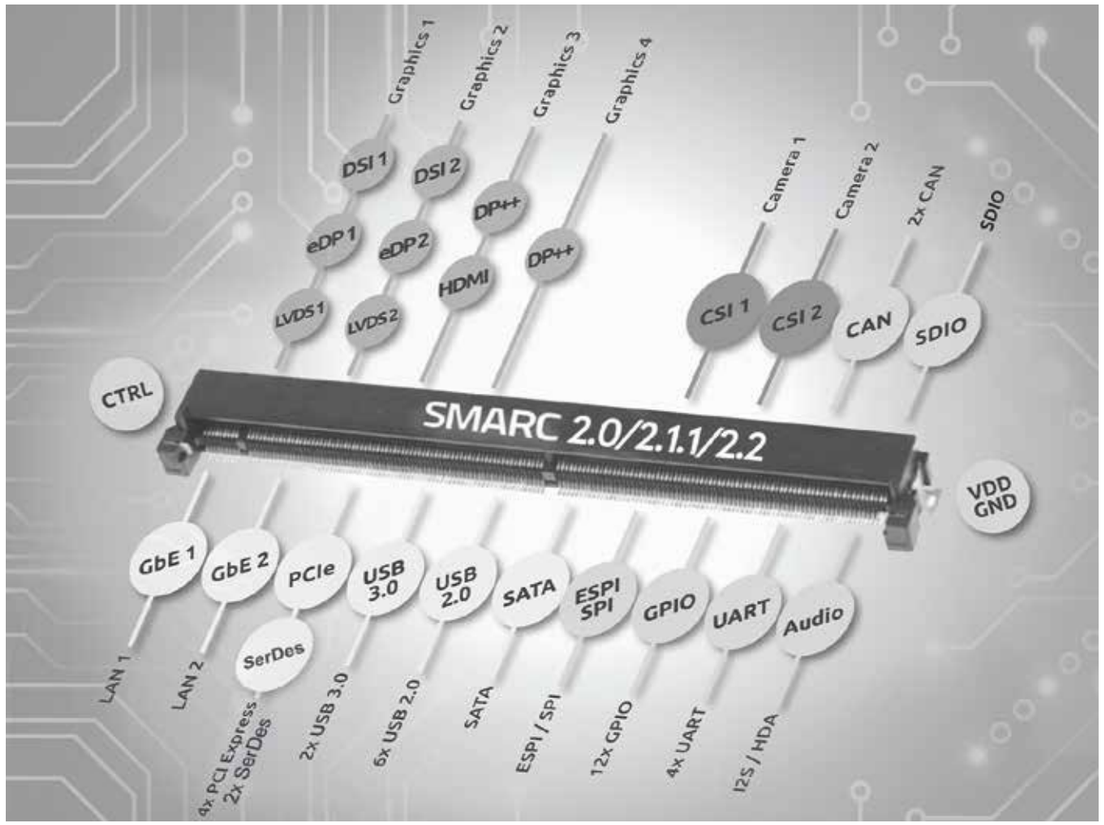
SMARC module

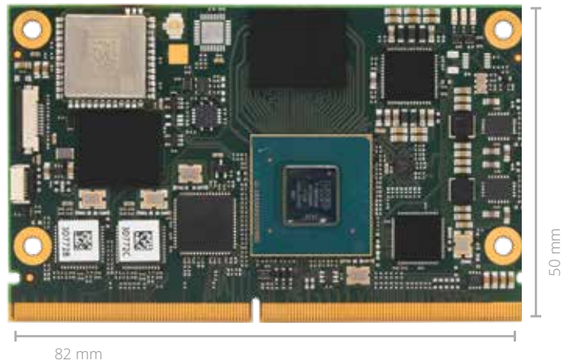
The recent revision 2.2 of the SMARC® module standard (Smart Mobility ARChitecture) has become the best and most future-proof standard for small Form Factor embedded modules.

With 314 pins available on its inexpensive and robust MXM3 connector, SMARC® has ample space for proven and popular interfaces. There are up to 4 PCIe lanes with alternate use of 2 lanes for SerDes Ethernet, up to 2 USB 3.X and up to 6 USB 2.0 interfaces to allow extremely flexible connectivity to general purpose devices. The panel interface can be a dual channel LVDS, that also allows two independent displays or alternatively be embedded DisplayPort (eDP) or MIPI-DSI. Up to 2 DisplayPort or HDMI interfaces, dual 2.5 Gigabit Ethernet ports, Audio interfaces, that can be either HDA, I2S or SoundWire and up to 4 UARTs are available.

The SMARC® standard allows wireless connectivity to be built directly into the module itself. Which means WiFi, Bluetooth or other RF technologies can be fully integrated on the SMARC® module – including the radio, RF front end and antenna connections.

By placing the entire wireless subsystem on the module, there's no need to add separate wireless components to the carrier board. RF layout and certification are handled at the module level, which reduces design complexity, lowers risk and helps customers speed up their time-to-market.





SMARC® 2.x Properties

The SMARC® 2x Standard uses the inexpensive, robust and proven MXM-3 connector, and there are versions available which are certified for automotive use.

Its edge contacts deliver reliable, low-resistance, high-speed performance, usable even for advanced signal speed up to Gigabit Ethernet, PCI-Express and SATA. The Standard defines two Module sizes:
82mm x 50mm (short size) and
82mm x 80mm (full size).

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SMARC® OVERVIEW

Specs	TRIA SM2S-RYZ2	TRIA SM2S-RYZ	TRIA SM2S-ALN	TRIA SM2S-ASL	TRIA SM2S-EL	TRIA SM2S-AL
Technology	x86	x86	x86	x86	x86	x86
						
Form Factor	SMARC® 2.1.1, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm	SMARC® 2.0, Dimension: 82 mm x 50 mm
CPU	**AMD Ryzen™ Embedded** - **R2514**, QC (8 threads) 2.1-3.7GHz, 15W (12-35W) - **R2314**, QC (4 threads) 2.1-3.5GHz, 15W (12-35W) - **R2312**, DC (4 threads) 2.7-3.5GHz, 15W (12-25W)	**AMD Ryzen™ Embedded** **- V1404I**, QC (8 threads) 2.0-3.6GHz, 15W (12-25W) **- R1606G**, DC (4 threads) 2.6-3.5GHz, 15W (12-25W) **- R1505G**, DC (4 threads) 2.4-3.3GHz, 15W (12-25W) **- R1305G**, DC (4 threads) 1.5-2.8GHz, 8W (8-10W) **- R1102G**, DC (2 threads) 1.2/2.6GHz, 6W	**Intel® Core™ Processor** - **i3-N305**, OC, 1.0GHz-1.8GHz, 32EU, 9-15W, PC Client **Intel Atom® Processor** - **x7425E**, QC, 1.5GHz, 24EU, TCC, IBECC, 12W, Emb. - **x7213E**, DC, 1.7GHz, 16EU, TCC, IBECC, 10W, Emb. - **x7211E**, DC, 1.0GHz, 16EU, TCC, IBECC, 6W, Emb. **Intel® Celeron® Processor** - **N200**, QC, 1.0GHz, 32EU, 6W, PC Client - **N97**, QC, 2.0GHz, 24EU, 12W, PC Client - **N50**, DC, 1.0GHZ,16EU, 6W, PC Client	**Intel Atom® Processor** **- x7835RE**, OC, 1.3GHz, 32EU, TCC, IBECC, 12W, Ind. **- x7433RE**, QC, 1.5GHz, 32EU, TCC, IBECC, 9W, Ind. **- x7213RE**, DC, 2.0GHz, 16EU, TCC, IBECC, 9W, Ind. **- x7211RE**, DC, 1.0GHz, 16EU, TCC, IBECC, 6W, Ind. **- x7405C**, QC, 2.2GHz, no GPU, TCC, IBECC, 12W, emb. **- x7203C**, DC, 2.0GHz, no GPU, TCC, IBECC, 9W, emb. Note: base frequency shown, other frequencies supported	**Intel Atom® Processor** **- x6425RE**, QC, 1.9GHz, 32EU, TCC, IBECC, 12W, Ind. **- x6414RE**, QC, 1.5GHz, 16EU, TCC, IBECC, 9W, Ind. **- x6212RE**, DC, 1.2GHz, 16EU, TCC, IBECC, 6W, Ind. **- x6425E**, QC, 2.0-3.0GHz, 32EU, IBECC, 12W, Emb. **- x6413E**, QC, 1.5-3.0GHz, 16EU, IBECC, 9W, Emb. **- x6211E,** DC, 1.3-3.0GHz, 16EU, IBECC, 6W, Emb. **Intel® Pentium® Processor** **- J6426**, QC, 2.0-3.0GHz, 32EU, 10W, PC Client **- N6415**, QC, 1.2-3.0GHz, 16EU, 6.5W, PC Client **Intel® Celeron® Processor** **- J6413**, QC, 1.8-3.0GHz, 16EU, 10W, PC Client **- N6211**, QC, 1.2-3.0GHz, 16EU, 6.5W, PC Client	**Intel Atom® Processor** **- E3950**, QC, 1.6-2.0GHz, 18 EU, 12W **- E3940**, QC, 1.6-1.8GHz, 12 EU, 9,5W **- E3930**, DC, 1.3-1.8GHz, 12 EU, 6.5W **Intel® Pentium® N4200**, QC, 1.1-2.5GHz, 18 EU, 6W **Intel® Celeron® N3350**, DC, 1.1-2.4GHz, 12 EU, 6W
DRAM	Up to 8GB 2667MT/s DDR4 (2400MT/s with R2312)	Up to 8GB 2400MT/s DDR4	Up to 16GB LPDDR5 with up to 4.800 MT/s, IBECC (only Atom SKU´s), soldered	Up to 16GB LPDDR5 with up to 4.800 MT/s, IBECC, soldered	Up to 16GB LPDDR4x with up to 4.267MT/s, IBECC (only Atom SKU´s), soldered	Up to 8GB 2400MT/s LPDDR4, quad-channel, soldered
Flash	Up to 256GB eMMC V5.0 Flash, soldered (optional)	Up to 256GB eMMC V5.0 Flash, soldered (optional)	Up to 256GB eMMC V5.1 Flash, soldered (optional)	Up to 256GB eMMC V5.1 Flash, soldered (optional)	Up to 256GB eMMC V5.1 Flash, soldered (optional)	Up to 64GB eMMC V5.x Flash, soldered (optional)
Storage Interfaces	1x SATA-III 6Gbps	1x SATA-III 6Gbps	1x SATA-III 6Gbps	1x SATA-III 6Gbps	1x SATA-III 6Gbps 1x SD 3.01/SDIO 3.0	1x SATA-III 6Gbps 1x SD 3.01
USB	4x USB 2.0 2x USB 3.1	2x USB 3.0 4x USB 2.0	2x USB 3.2 Gen2 (up to 10Gb/s) 6x USB 2.0	2x USB 3.2 Gen2 (up to 10Gb/s) 6x USB 2.0	2x USB 3.1 (1x Host/Device) 6x USB 2.0 (1x Host/Device)	2x USB 3.0 6x USB 2.0 (1x Host/Device)
Bus Interfaces	Up to 4x PCI-Express Gen. 3 lanes (PCIe x2 and 2x PCIe x1 or PCIe x2) 1x I2C Bus 1x SPI Bus 1x SMBus	Up to 4x PCI-Express Gen. 3 lanes (PCIe x2 and 2x PCIe x1 or PCIe x2) 1x I2C Bus 1x SPI Bus 1x SMBus	Up to 4x PCI-Express® x1 Gen. 3 1x I2C Bus, 1x SMBus 1x SPI Bus (Boot) 1x SPI Bus (general purpose)/ eSPI (optional)	Up to 4x PCI-Express® x1 Gen. 3 1x I2C Bus, 1x SMBus 1x SPI Bus (Boot) 1x SPI Bus (general purpose)/ eSPI (optional)	Up to 4x PCI-Express® x1 Gen. 3 1x I2C Bus, 1x SMBus 1x SPI Bus (Boot) 1x SPI Bus (general purpose)/ eSPI (optional) 2x CAN-FD (Flexible Data-Rate)	Up to 4x PCI-Express® x1 Gen. 2 1x I2C Bus, 1x SMBus 2x SPI Bus (Boot/SIO)
Display Controller	AMD Radeon™ GPU with up to 8 Compute Units	AMD Vega GPU	Integrated Intel® UHD Graphics Gen. 12	Integrated Intel® UHD Graphics Gen. 12 (only Atom x7000RE Series)	Integrated Intel® UHD Graphics Gen. 11	Integrated Intel® HD Graphics Gen. 9
Display Interfaces	2x DP++ Dual-channel LVDS interface, 18 or 24 Bit (optional up to 2 x eDP 1.4)	2x DP++ Dual-channel LVDS interface, 18 or 24 Bit (optional up to 2 x eDP 1.4)	2x DP++ Dual-Channel LVDS interface, 18 or 24 Bit (optional eDP 1.4b or MIPI-DSI)	2x DP++ Dual-Channel LVDS interface, 18 or 24 Bit (optional eDP 1.4b or MIPI-DSI)	2x DP++ Dual-Channel LVDS interface, 18 or 24 Bit (optional eDP 1.3 or MIPI-DSI)	2x DP++ Dual-Channel LVDS interface, 18 or 24 Bit (optional eDP 1.3 or MIPI-DSI)
Network Interface	Up to 2x 10/100/1000Base-T	Up to 2x 10/100/1000Base-T	2x 10/100/1000Base-T, up to 2.5G based on Intel i226 1x SGMII Interface on PCIE-D (opt. only Atom SKU´s)	2x 10/100/1000Base-T, up to 2.5G based on Intel i226 1x SGMII Interface (up to 2.5Gbps) on PCIE-D (only Atom x7000RE Series)	2x 10/100/1000Base-T 1x SGMII Interface on PCIE-D (opt.)	Up to 2x 10/100/1000Base-T
Audio Interface	HDA Audio	HDA Audio	HDA and I2S or 2x I2S Audio	HDA and I2S or 2x I2S Audio	HDA and I2S or 2x I2S Audio	HDA and I2S Audio
Security Device	Trusted Platform Module (TPM) 2.0 (optional)	Trusted Platform Module (TPM) 2.0 (optional)	Trusted Platform Module (TPM) 2.0 (optional)	Trusted Platform Module (TPM) 2.0 (optional)	Trusted Platform Module (TPM) 2.0 (optional)	Trusted Platform Module (TPM) 2.0 (optional)
OS Support	Microsoft Windows® 10/11 IoT (64bit) Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT (64bit) Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT (64bit) Microsoft Windows® 11 IoT Enterprise 2024 LTSC Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT (64bit) Microsoft Windows® 11 IoT Enterprise 2024 LTSC Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT (64bit) Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT (64bit) Linux® (Yocto Project®) EAPI (HW Programming Interface)
Power Requirements	Voltage: +5V +/-5%, 5V Standby Power Consumption: 12-15 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 6-15 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 8-17W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 8-17W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 6-15W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 7-14 W typ.
Operating Temp.	0° ... 60°C (commercial)	0° ... 60°C (commercial) -40° ... 85°C (industrial) only with V1404I CPU	0° ... 60°C (commercial)	0° ... 60°C (commercial) Atom x7000C Series -25°C ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 60°C (commercial) -25°C ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 60°C (commercial) -25°C ... 85°C (extended) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)				5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)	

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SMARC® OVERVIEW

Specs	TRIA SM2S-IMX95	TRIA SM2S-IMX93	TRIA SM2S-IMX91		TRIA SM2S-QCS6490	TRIA SM2S-QCS5430	TRIA SM2S-IQ615
Technology	Arm®	Arm®	Arm®		**Arm®**	**Arm®**	Arm®
							
Form Factor	SMARC® 2.2, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm		SMARC® 2.2 Dimension: 82 mm x 50 mm	SMARC® 2.2 Dimension: 82 mm x 50 mm	SMARC® 2.2 82 mm x 50 mm
CPU	**NXP® i.MX 95 Arm® Cortex®-A55 Applications Processor** **- i.MX 95x6,** hexa-core, 1.6 - 2.0GHz **- i.MX 95x4,** quad-core, 1.6 - 2.0GHz different versions with options for ISP, NPU, GPU, VPU, Display Controller Arm® Cortex®-M7 Real Time Processor at 800MHz Arm® Cortex®-M33 Real Time Processor at 333MHz NXP eIQ® Neutron NPU with 2.0 TOPS/s	**NXP® i.MX 93 Arm® Cortex®-A55 Applications Processor** **- i.MX 9352,** dual-core, NPU, 1.5 - 1.7GHz **- i.MX 9332,** dual-core, 1.5 - 1.7GHz **- i.MX 9351,** single-core, NPU, 1.5 - 1.7GHz **- i.MX 9331,** single-core, 1.5 - 1.7GHz Arm® Cortex®-M33 Real Time Processor at 250MHz Arm® Ethos-U65 microNPU with 256 MACs/Cycle	**NXP® i.MX 91 Arm® Cortex®-A55 Applications Processor** **- i.MX 9131,** single-core, 1.4GHz		**Qualcomm Dragonwing™ QCS6490:** 1x A78@2.7GHz, 3x A78@2.4GHz, 4xA55@1.95GHz 2x HVX, 4K-HMX 1.45GHz (12.15 INT8 TOPS)	**Qualcomm Dragonwing™ QCS5430:** 2x A78@2.1GHz, 4xA55@1.8GHz 2x HVX, 4K-HMX 1.45GHz (3.5 INT8 TOPS)	**Qualcomm Dragonwing™ IQ615:** - dual core Arm Cortex-A76 up to 1.9GHz - hexa core Arm Cortex-A55 up to 1.6GHz Hexagon™ V66 DSP with Dual hexagon Vector Spectra™ 230 image processing engine (ISP) Adreno 443 VPU Video Decode/Encode
DRAM	Up to 16GB 6400MT/s LPDDR5 SDRAM, soldered, inline ECC support	Up to 2GB 3700MT/s LPDDR4 SDRAM, soldered, inline ECC support	Up to 2GB 2400MT/s LPDDR4 SDRAM, soldered, inline ECC support		Up to 16GB 6400MT/s LPDDR5 SDRAM, soldered, non ECC	Up to 16GB 6400MT/s LPDDR5 SDRAM, soldered, non ECC	Up to 8GB 3110MT/s LPDDR4 SDRAM, soldered
Flash	Up to 256GB eMMC Flash, QSPI NOR Flash (optional)	Up to 256GB eMMC Flash	Up to 256GB eMMC Flash		Up to 1TB UFS memory	Up to 1TB UFS memory	Up to 256GB eMMC Flash
Storage Interfaces	1x MMC/SD/SDIO	1x MMC/SD/SDIO	1x MMC/SD/SDIO		NVME (carrier) SD-Card (carrier)	NVME (carrier) SD-Card (carrier)	1x MMC/SD/SDIO
USB	1x USB 2.0 Host/Client, 1x USB 3.0 Host or 1x USB 2.0 Host/Client, 2x USB 2.0 Host, 2x USB 3.0	1x USB 2.0 Host/Client, 4x USB 2.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host	1x USB 2.0 Host/Client, 4x USB 2.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host		2x USB 3.1 Host interfaces 5x USB 2.0 Host interfaces	2x USB 3.1 Host interfaces 5x USB 2.0 Host interfaces	1x USB 2.0 Host/Client, 1x USB 3.0 Host or 1x USB 2.0 Host/Client, 2x USB 2.0 Host, 2x USB3.1 host (optional)
Bus Interfaces	2x PCI Express® x1 Gen. 3 5x I2C up to 400 Kbit/s 2x SPI (with two chip selects) 2x CAN-FD / CAN 2.0B	4x I2C up to 400 Kbit/s 2x SPI (with two chip selects) 2x CAN-FD / CAN 2.0B	4x I2C up to 400 Kbit/s 2x SPI (with two chip selects) 2x CAN-FD / CAN 2.0B		Up to 4x PCI-Express x1 Gen. 3 5x I^2C (1x general, 2x CAM, 1x LCD, 1x PM) 2x SPI Bus 1x SDIO 2x CAN2.0-FD	Up to 4x PCI-Express x1 Gen. 3 5x I^2C (1x general, 2x CAM, 1x LCD, 1x PM) 2x SPI Bus 1x SDIO 2x CAN2.0-FD	Up to 3x PCI-Express x1 Gen. 2 5x I^2C (1x general, 3x CAM, 1x PM) 1x SPI, 1x SPI/QSPI
Display Controller	Arm Mali™ G310 2D/3D GPU	Pixel processing pipeline (PXP) engine	not available		Adreno 643 GPU @ up to 812MHz	Adreno 642L GPU @ up to 315MHz	Adreno 612 GPU
Display Interfaces	Dual-channel LVDS interface, 18 or 24 bit or 2x single-channel LVDS interface or 1x MIPI-DSI and 1x single channel LVDS 1x HDMI (optional)	Single-channel LVDS interface, 18 or 24 bit or 1x MIPI-DSI	not available		MIPI-DSI 4 - lane / Display FHD+ @144Hz LVDS (optional instead of MIPI-DSI) 1920x1200 WUXGA 60Hz DP 1.4 (2 lane), eDP/DP (4 lane)	MIPI-DSI 4 - lane / Display FHD+ @120Hz LVDS (optional instead of MIPI-DSI) 1920x1200 WUXGA 60Hz DP 1.4 (2 lane), eDP/DP (4 lane)	Dual-channel LVDS interface, 18 or 24 bit or 1x MIPI-DSI 1x DP v.1.4 (up to 4 Displays)
Network Interface	2x 10/100/1000BASE-T Ethernet 10 Gigabit Ethernet (SerDes, optional) WiFi/BT module (optional)	2x 10/100/1000BASE-T Ethernet WiFi/BT module (optional)	2x 10/100/1000BASE-T Ethernet WiFi/BT module (optional)		2x 10/100/1000Base-T	2x 10/100/1000Base-T	2x 10/100/1000BASE-T Ethernet, 1x SGMII on PCIeD (optional)
Audio Interface	2x I2S Audio	2x I2S Audio	1x I2S Audio		2x I2S Audio	2x I2S Audio	2x I2S Audio
Security Device	Integrated advanced security, safety, and reliability Trusted Platform Module (TPM) 2.0 (optional)	Integrated advanced security, safety, and reliability Trusted Platform Module (TPM) 2.0 (optional)	Integrated advanced security, safety, and reliability Trusted Platform Module (TPM) 2.0 (optional)		TPM 2.0 HW Key manager and ECC, Secure boot, Crypto engines, Key provisioning security, Qualcomm® Trusted Execution Environment (TEE), Qualcomm® Content Protection (Widevine), Secure camera/UI(Widevine), Secure camera/UI	TPM 2.0 HW Key manager and ECC, Secure boot, Crypto engines, Key provisioning security, Qualcomm® Trusted Execution Environment (TEE), Qualcomm® Content Protection (Widevine), Secure camera/UI(Widevine), Secure camera/UI	Advanced Security, Safety, and Reliability integrated in the SOC Trusted Platform Module (TPM) 2.0 (optional)
OS Support	Linux® Board Support Package Android Board Support Package (on request)	Linux® Board Support Package Android Board Support Package (on request)	Linux® Board Support Package Android Board Support Package (on request)		Windows 11 IoT / Yocto Linux / Ubuntu Linux (on request) Android	Windows 11 IoT / Yocto Linux / Ubuntu Linux (on request) Android	Linux® Board Support Package Android Board Support Package (on request)
Power Requirements	Voltage: +5V +/-5%, 5V Standby Power Consumption: 8-10 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 2-4 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 2-3 W typ.		Power Supply +5V +/-5%, 5V Standby Power Consumption 7W typ. (tbd: depending on CPU, CPU load and onboard features)	Power Supply +5V +/-5%, 5V Standby Power Consumption 5W typ. (tbd: depending on CPU, CPU load and onboard features)	Voltage: +5V +/-5%, 5V Standby Power Cosumption: tbd
Operating Temp.	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)		0° ... 70°C (commercial) -30° ... 85°C (extended) -25° ... 85°C (extended)	0° ... 70°C (commercial) -30° ... 85°C (extended) -25° ... 85°C (extended)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)				5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)		

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SMARC® OVERVIEW

Specs	TRIA SM2S-IMX8	TRIA SM2S-IMX8M	TRIA SM2S-IMX8PLUS		TRIA SM2S-IMX8MINI	TRIA SM2S-IMX8MLC	TRIA SM2S-IMX8NANO
Technology	Arm®	Arm®	Arm®		Arm®	Arm®	Arm®
							
Form Factor	SMARC® 2.1.1, Dimension: 82 mm x 50 mm	SMARC® 2.0, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm		SMARC® 2.0, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm
CPU	**NXP® i.MX 8QuadMax Applications Processor** - 2x Arm® Cortex®-A72, 4x A53, 2x M4F **NXP™ i.MX 8QuadPlus Applications Processor** - 1x Arm® Cortex®-A72, 4x A53, 2x M4F Arm® Cortex®-A72 with 1.3GHz (Ind.) or 1.6GHz (Auto.) Arm® Cortex®-A53 with 1.1GHz (Ind.) or 1.2GHz (Auto.) Arm® Cortex®-M4F Real Time Processor at 266MHz	**NXP® i.MX 8M Arm® Cortex®-A53 Applications Processor** **- i.MX 8M Quad**, quad-core, 1.3-1.5GHz **- i.MX 8M Dual**, dual-core, 1.3-1.5GHz **- i.MX 8M QuadLite**, quad-core, 1.3-1.5GHz Arm® Cortex®-M4 Real Time Processor at 266MHz	**NXP® i.MX 8M Plus Arm® Cortex®-A53 Applications Processor** **- i.MX 8M Plus Quad**: - NPU, ISP, VPU, HIFI4, CAN, 1.6 - 1.8GHz - ISP, VPU, CAN, 1.6 - 1.8GHz **- i.MX 8M Plus QuadLite**: CAN, 1.6 - 1.8GHz **- i.MX 8M Plus Dual**: NPU, ISP, VPU, HIFI4, AN, 1.6 - 1.8GHz Arm® Cortex®-M7 Real Time Processor at 800MHz		**NXP® i.MX 8M Mini Arm® Cortex®-A53 Applications Processor** **- i.MX 8M Mini Solo**, single-core, 1.6-1.8GHz **- i.MX 8M Mini Dual**, dual-core, 1.6-1.8GHz **- i.MX 8M Mini Quad**, quad-core, 1.6-1.8GHz **- i.MX 8M Mini SoloLite**, single-core, 1.6-1.8GHz **- i.MX 8M Mini DualLite**, dual-core, 1.6-1.8GHz **- i.MX 8M Mini QuadLite**, quad-core, 1.6-1.8GHz Arm® Cortex®-M4 Real Time Processor at 400MHz	**NXP® i.MX 8M Mini Arm® Cortex®-A53 Applications Processor** **- i.MX 8M Mini Solo,** single-core, 1.6-1.8GHz **- i.MX 8M Mini Dual,** dual-core, 1.6-1.8GHz **- i.MX 8M Mini Quad,** quad-core, 1.6-1.8GHz **- i.MX 8M Mini SoloLite,** single-core, 1.6-1.8GHz **- i.MX 8M Mini DualLite,** dual-core, 1.6-1.8GHz **- i.MX 8M Mini QuadLite,** quad-core, 1.6-1.8GHz Arm® Cortex®-M4 Real Time Processor at 400MHz	**NXP® i.MX 8M Nano Arm® Cortex®-A53 Applications Processor** **- i.MX 8M Nano Solo**, single-core, 1.4 - 1.5GHz **- i.MX 8M Nano Dual**, dual-core, 1.4 - 1.5GHz **- i.MX 8M Nano Quad**, quad-core, 1.4 - 1.5GHz **- i.MX 8M Nano SoloLite**, single-core, 1.4 - 1.5GHz **- i.MX 8M Nano DualLite**, dual-core, 1.4 - 1.5GHz **- i.MX 8M Nano QuadLite**, quad-core, 1.4 - 1.5GHz Arm® Cortex®-M7 Real Time Processor at 750MHz
DRAM	Up to 8GB 3200MT/s LPDDR4 SDRAM, soldered, non ECC	Up to 4GB 3200MT/s LPDDR4 SDRAM, soldered, non ECC	Up to 8GB 4000MT/s LPDDR4 SDRAM, soldered, inline ECC support		Up to 4GB 3000MT/s LPDDR4 SDRAM, soldered, non ECC	Up to 4GB 2400MT/s DDR4 SDRAM, soldered, no ECC	Up to 2GB 2400MT/s DDR4 SDRAM, soldered, non ECC
Flash	Up to 64GB eMMC Flash, QSPI NOR Flash (optional)	Up to 64GB eMMC Flash, QSPI NOR Flash (optional)	Up to 256GB eMMC Flash, QSPI NOR Flash (optional)		Up to 64GB eMMC Flash, QSPI NOR Flash (optional)	Up to 64GB eMMC Flash, QSPI NOR Flash (optional)	Up to 256GB eMMC Flash, QSPI NOR Flash (optional)
Storage Interfaces	1x SATA-III 6Gbps 1x MMC/SD/SDIO	1x MMC/SD/SDIO	1x MMC/SD/SDIO		1x MMC/SD/SDIO 1x Micro SD Card Socket (optional)	1x MMC/SD/SDIO	1x MMC/SD/SDIO
USB	1x USB 2.0 Host/Client, 2x USB 2.0 Host, 2x USB 3.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host	1x USB 2.0 Host/Client, 2x USB 2.0 Host, 2x USB 3.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host, 2x USB 3.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host	1x USB 2.0 Host/Client, 2x USB 2.0 Host, 2x USB3.0 Host or 1x USB 3.0 Host/Client, 3x USB 2.0 Host, 1x USB3.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host		1x USB 2.0 Host/Client, 4x USB 2.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host	1x USB 2.0 Host/Client, 4x USB 2.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host (optional)	4x USB 2.0 Host or 1x USB 2.0 Host/Client
Bus Interfaces	2x PCI Express® x1 Gen. 3 6x I2C up to 400 Kbit/s 2x SPI (with two chip selects) 2x CAN-FD / 2.0B	2x PCI Express® x1 Gen. 2 6x I2C up to 400 Kbit/s Up to 2x SPI (with two chip selects) Up to 2x CAN 2.0B (optional)	1x PCI Express® x1 Gen. 3 5x I2C up to 320 Kbit/s 2x SPI (with two chip selects) 2x CAN-FD / 2.0B		1x PCI Express® x1 Gen. 2 4x I2C up to 400 Kbit/s Up to 2x SPI (with two chip selects) Up to 2x CAN 2.0B (optional)	1x PCI Express® x1 Gen. 2 4x I2C up to 400 Kbit/s 2x SPI (with two chip selects)	4x I2C up to 400 Kbit/s 2x SPI (with two chip selects)
Display Controller	Dual Vivante GC7000Lite/XSVX 2D/3D GPU	Vivante GC7000Lite 3D GPU	Vivante GC7000UL 2D/3D GPU		Vivante GC NanoUlta 3D GPU	Vivante GC NanoUlta 3D GPU	Vivante GC7000UL 3D GPU
Display Interfaces	Dual-channel LVDS interface, 18 or 24 bit or 2x single-channel LVDS interface or 2x MIPI-DSI HDMI 2.0a or DP 1.3	Dual-channel LVDS interface, 18 or 24 bit or 1x MIPI-DSI HDMI 2.0a or DP 1.3	Dual-channel LVDS interface, 18 or 24 bit or 2x single-channel LVDS interface or 1x MIPI-DSI and 1x single channel LVDS 1x HDMI		Dual-channel LVDS interface, 18 or 24 bit or 1x MIPI-DSI	Dual-channel LVDS interface, 18 or 24 bit or 1x MIPI-DSI	Dual-channel LVDS interface, 18 or 24 bit or 1x MIPI-DSI
Network Interface	2x 10/100/1000BASE-T WiFi/BT module (optional)	1x 10/100/1000BASE-T WiFi/BT module (optional)	2x 10/100/1000BASE-T Ethernet WiFi/BT module (optional)		Up to 2x 10/100/1000BASE-T WiFi/BT module (optional)	1x 10/100/1000BASE-T Ethernet	1x 10/100/1000BASE-T Ethernet
Audio Interface	2x I2S Audio	2x I2S Audio	2x I2S Audio		2x I2S Audio	2x I2S Audio	1x I2S Audio
Security Device	Integrated advanced security, safety, and reliability	Integrated advanced security, safety, and reliability	Integrated advanced security, safety, and reliability		Integrated advanced security, safety, and reliability	Integrated advanced security, safety, and reliability	Integrated advanced security, safety, and reliability
OS Support	Linux® (Yocto Project®) Android Board Support Package (on request)	Linux® (Yocto Project®) Android Board Support Package (on request)	Linux® (Yocto Project®) Android Board Support Package		Linux® (Yocto Project®) Android Board Support Package	Linux® (Yocto Project®) Android Board Support Package (on request)	Linux® (Yocto Project®) Android Board Support Package (on request)
Power Requirements	Voltage: +5V +/-5%, 5V Standby Power Consumption: 7-14 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 3-6 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 2-7 W typ.		Voltage: +5V +/-5%, 5V Standby Power Consumption: 2-5 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 2-5 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 2-4 W typ.
Operating Temp.	0° ... 70°C (commercial) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)		0° ... 70°C (commercial) -25°C ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -40° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)				5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)		

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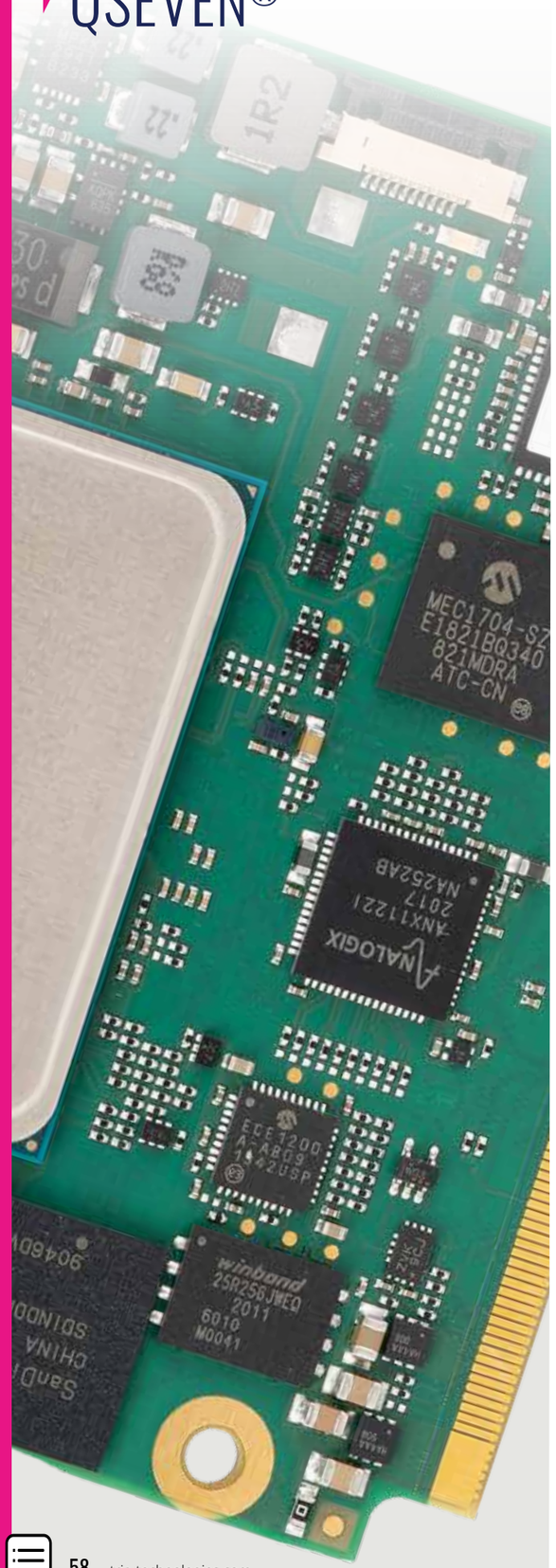
SMARC® OVERVIEW

Specs	TRIA SM2S-G3E	TRIA SM2S-G2L	TRIA SM2S-V2L		TRIA SM2S-IMX6	TRIA SM2S-ZUSP
Technology	Arm®	Arm®	Arm®		Arm®	Arm®
						
Form Factor	SMARC® 2.2, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm	SMARC® 2.1.1, Dimension: 82 mm x 50 mm		SMARC® 2.0, Dimension: 82 mm x 50 mm	SMARC® 2.0, Dimension: 82 mm x 50 mm
CPU	**Renesas RZ/G3E family** - Dual Core Arm Cortex-A55 at 1.8GHz, with NPU, secure - Dual Core Arm Cortex-A55 at 1.8GHz, no NPU, secure - Quad Core Arm Cortex-A55 at 1.8GHz, with NPU, secure - Quad Core Arm Cortex-A55 at 1.GHz, non NPU, secure - Arm® Cortex®-M33 real-time processor @ 200 MHz	**Renesas RZ/G2L family** - Single Core Arm® Cortex®-A55 at 1.2GHz, secure - Single Core Arm® Cortex®-A55 at 1.2GHz, non-secure - Dual Core Arm® Cortex®-A55 at 1.2GHz, secure - Dual Core Arm® Cortex®-A55 at 1.2GHz, non-secure Arm® Cortex®-M33 Real Time Processor at 200MHz	**Renesas RZ/V2L family** - Single Core Arm® Cortex®-A55 at 1.2GHz, secure - Single Core Arm® Cortex®-A55 at 1.2GHz, non-secure - Dual Core Arm® Cortex®-A55 at 1.2GHz, secure - Dual Core Arm® Cortex®-A55 at 1.2GHz, non-secure Arm® Cortex®-M33 Real Time Processor at 200MHz Embedded DRP-AI (Dedicated AI-Accelerator)		**NXP® i.MX 6 Arm® Cortex®-A9:** **- i.MX 6QuadPlus**, quad-core, 800MHz...1.2GHz **- i.MX 6Quad**, quad-core, 800MHz...1.2GHz **- i.MX 6DualPlus**, dual-core, 800MHz...1.2GHz **- i.MX 6Dual**, dual-core, 800MHz...1.2GHz **- i.MX 6DualLite**, dual-core, 800MHz...1.0GHz **- i.MX 6Solo**, single-core, 800MHz...1.0GHz	**Xilinx® Zynq® UltraScale+™ MPSoC** **- ZU2CG, ZU3CG, ZU4CG or ZU5CG** - Dual core Arm® Cortex®-A53 Processor up to 1.3GHz - Dual core Arm® Cortex®-R5 Processor up to 533MHz **- ZU2EG, ZU3EG, ZU4EG, ZU5EG, ZU4EV or ZU5EV** - Quad core Arm® Cortex®-A53 Processor up to 1.5GHz - Dual core Arm® Cortex®-R5 Processor up to 600MHz
DRAM	Up to 8 GB LPDDR4 SDRAM, soldered, up to 3200 MT/s, inline ECC support	Up to 2GB 1600MT/s DDR4 SDRAM, soldered, inline ECC support	Up to 2GB 1600MT/s DDR4 SDRAM, soldered, inline ECC support		Up to 4GB DDR3L SDRAM (DDR-1066), soldered, non ECC	Up to 8GB DDR4-2400, soldered, PS-DDR4, ECC (optional) Up to 2GB DDR4-2133, soldered, PL-DDR4 (optional)
Flash	Up to 256 GB eMMC Flash	Up to 256GB eMMC Flash	Up to 256GB eMMC Flash		Up to 64GB eMMC Flash	Up to 64GB eMMC Flash, QSPI NOR Boot Flash
Storage Interfaces	1x MMC / SD / SDIO	1x MMC/SD/SDIO (optional, SDIO and WiFi/BT are mutually exclusive)	1x MMC/SD/SDIO (optional, SDIO and WiFi/BT are mutually exclusive)		1x SATA-II (3Gbps, not supported by Solo/DualLite) 1x MMC/SD/SDIO, Micro SD Card Socket	1x SATA-III (6Gbps) 1x MMC/SD/SDIO
USB	1x USB 2.0 Host/Client and 3x USB 2.0 Host, 2x USB 3.2 Gen 1 Host or 1x USB 2.0 Host, 1x USB 3.2 Gen 2 x 1 Host (optional)	1x USB 2.0 Host/Client, 4x USB 2.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host (optional)	1x USB 2.0 Host/Client, 4x USB 2.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host (optional)		1x USB 2.0 Host/Client, 4x USB 2.0 Host or 1x USB 2.0 Host/Client, 5x USB 2.0 Host or 1x USB 2.0 Host/Client, 1x USB 2.0 Host	1x USB 3.0/2.0 Host, 3x USB 2.0 Host, 1x USB 2.0 Host/Client or 1x USB 3.0/2.0 Host, 2x USB 2.0 Host, 1x USB 2.0 Host/Client or 1x USB 3.0 Host, 1x USB 2.0 Host, 1x USB 2.0 Host/Client
Bus Interfaces	5x I2C (up to 400 kbit/s) 2x SPI (with multiple chip selects) 2x CAN-FD / CAN 2.0B 1x PCI Express Gen 3	4x I2C up to 400 Kbit/s 2x SPI (with two chip selects) 2x CAN-FD	4x I2C up to 400 Kbit/s 2x SPI (with two chip selects) 2x CAN-FD		1x PCI Express® x1 5x I2C up to 400 Kbit/s 2x SPI (with two chip selects) 2x CAN 2.0B	1x PCI Express® x1 Gen. 2 (5Gbps) using ZU2/3 devices 2x PCI Express® x2 Gen. 3 (8Gbps) using ZU4/5 devices 3x I2C up to 400 Kbit/s 2x SPI (with two chip selects) 2x CAN 2.0B
Display Controller	Arm Mali™-G52 2D/3D GPU	Arm Mali™-G312D/3D GPU	Arm Mali™-G31 2D/3D GPU		Integrated Video, 2D and 3D GPU	Arm® Mali™-400 MP2 GPU (EG/EV only)
Display Interfaces	Dual-channel LVDS interface, 18 or 24 bit or 1x MIPI-DSI HDMI 2.0b	Dual-channel LVDS interface, 18 or 24 bit or 1x MIPI-DSI	Dual-channel LVDS interface, 18 or 24 bit or 1x MIPI-DSI		HDMI 2.0a Dual-channel LVDS interface, 18 or 24 bit Also usable as 2x single-channel LVDS interfaces	DP 1.2a Dual-channel LVDS interface, 18 or 24 bit (optional)
Network Interface	2x 10/100/1000BASE-T Ethernet	2x 10/100/1000BASE-T Ethernet WiFi/BT module (optional)	2x 10/100/1000BASE-T Ethernet WiFi/BT module (optional)		1x 10/100/1000BASE-T Ethernet	Up to 2x 10/100/1000Base-T
Audio Interface	2x I2S Audio	2x I2S Audio	2x I2S Audio		1x I2S Audio	optional / WiFi/BT module (optional)
Security Device	Integrated advanced security, safety, and reliability Trusted Platform Module (TPM) 2.0 (optional)	Integrated advanced security, safety, and reliability Trusted Platform Module (TPM) 2.0 (optional)	Integrated advanced security, safety, and reliability Trusted Platform Module (TPM) 2.0 (optional)		Integrated advanced security, safety, and reliability Trusted Platform Module (TPM) 1.2, optional	Integrated advanced security, safety, and reliability
OS Support	Linux® Board Support Package Android Board Support Package (on request)	Linux® Board Support Package Android Board Support Package (on request)	Linux® Board Support Package Android Board Support Package (on request)		Linux® (Yocto Project®) Android Board Support Package (on request)	Linux® (Yocto Project®) Android Board Support Package (on request)
Power Requirements	Supply voltage: +5 V +/-5 % Standby: +5 V +/-5 % Typical power consumption: approx. 3–5 W	Voltage: +5V +/-5%, 5V Standby Power Consumption: 4-6 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 4-6 W typ.		Voltage:+5V +/-5%, 5V Standby Power Consumption: 4-6 W typ.	Voltage: +5V +/-5%, 5V Standby Power Consumption: 5-15 W typ. (depending on MPSoC and PL)
Operating Temp.	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)		0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 85°C (extended) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)				5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)	

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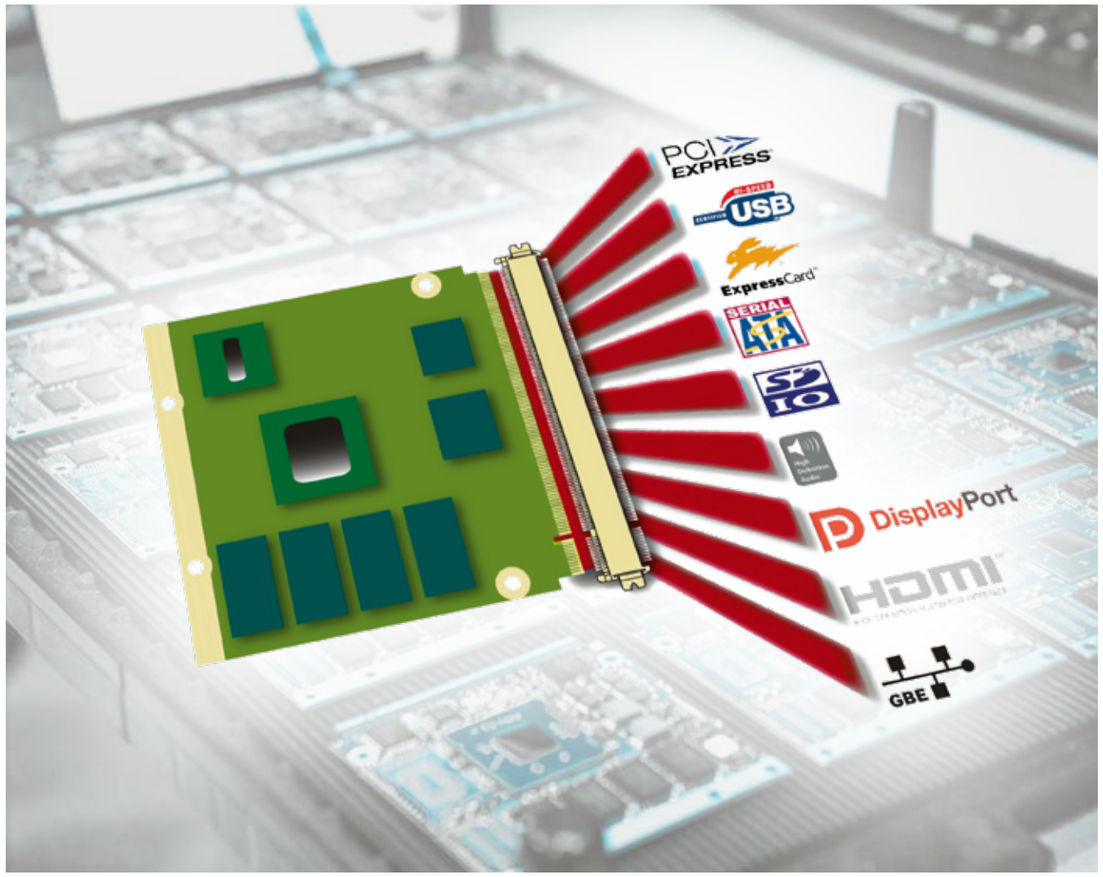
QSEVEN®

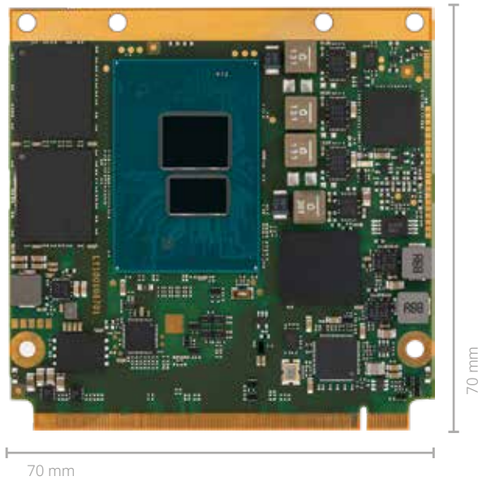


Qseven® is the most popular embedded Computer-On-Module standard for entry-level performance and low-power applications, offering an excellent price-to-performance ratio.

An open standard defined by the SGeT Standardization Group, Qseven® has leveraged advances in processor technology toward smaller, more power-efficient CPUs, becoming the most widely adopted standard for small form-factor modules in recent years.

The Qseven® specification has been extended to include module architectures based on the Arm® processor, which is renowned for its excellent performance to power ratio. Providing different processor architectures and a wide range of modules for commercial and extended temperature, together with matching baseboards, the MSC Qseven® family leads the way to feature rich and small, low power modular systems.





Qseven® 2.0/2.1 Properties

The Qseven® Standard uses the inexpensive, robust and proven MXM-2 connector, which provides 230 pin connections and there are versions available which are certified for automotive use.

Its edge contacts deliver reliable, low-resistance, high-speed performance, which is usable even for advanced signal speed up to Gigabit Ethernet, PCI-Express and SATA.

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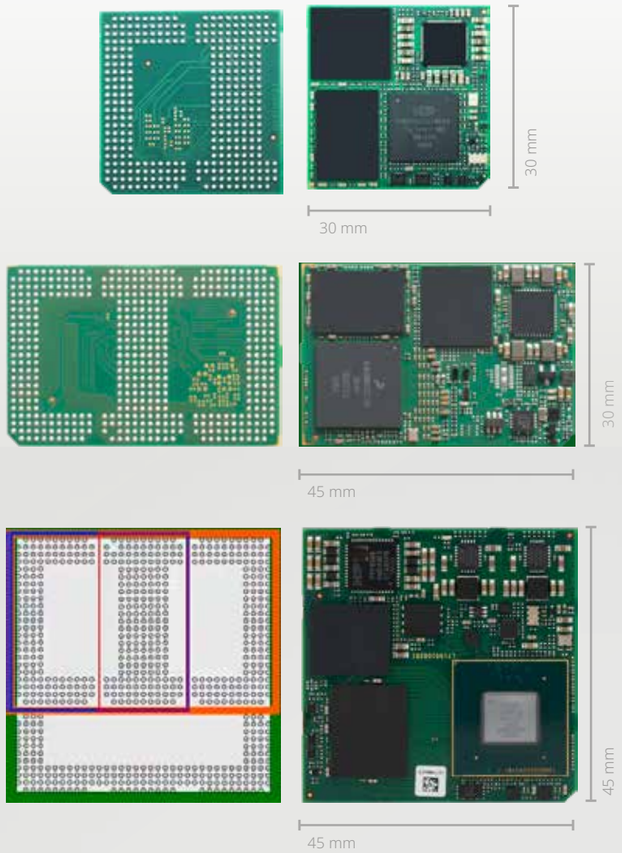
QSEVEN® OVERVIEW

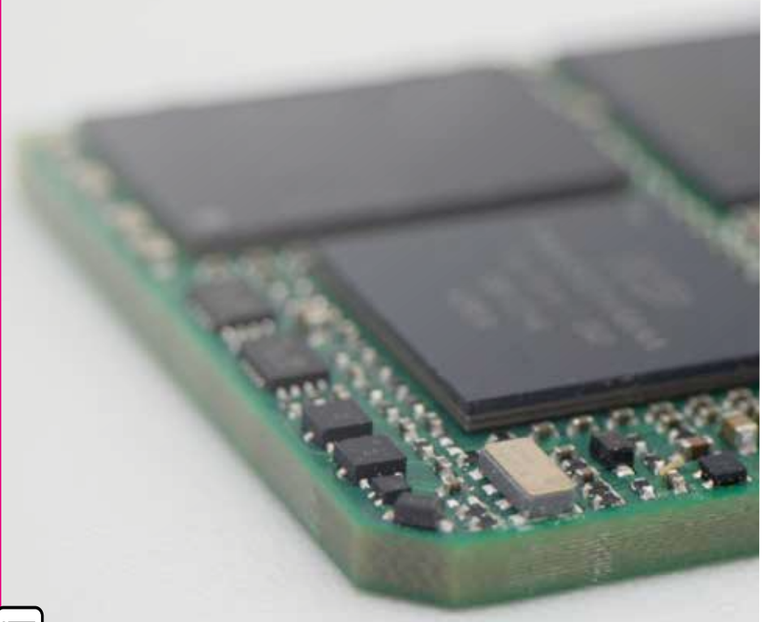
Specs	TRIA Q7-ASL	TRIA Q7-ALN	TRIA Q7-EL		TRIA Q7-AL	TRIA Q7-BT	TRIA Q7-IMX6PLUS
Technology	x86	x86	x86		x86	x86	Arm®
							
Form Factor	Qseven® Rev. 2.1 platform, Dimension: 70 mm x 70 mm	Qseven® Rev. 2.1 platform, Dimension: 70 mm x 70 mm	Qseven® Rev. 2.1 platform, Dimension: 70 mm x 70 mm		Qseven® Rev. 2.1 platform, Dimension: 70 mm x 70 mm	Qseven® Rev. 2.0 platform, Dimension: 70 mm x 70 mm	Qseven® Rev. 2.0 platform, Dimension: 70 mm x 70 mm
CPU	**Intel Atom® Processor** - **x7835RE**, octa-core, 1.3GHz, 32EU, TCC, 12W, IUC, ET - **x7433RE**, quad-core, 1.5GHz, 32EU, TCC, 9W, IUC, ET - **x7213RE**, dual-core, 2.0GHz, 16EU, TCC, 9W, IUC, ET - **x7211RE**, dual-core, 1.0GHz, 16EU, TCC, 6W, IUC, ET - **x7405C**, quad-core, 2.2GHz, no GPU, TCC, 12W, EUC, CT - **x7203C**, dual-core, 2.0GHz, no GPU, TCC, 9W, EUC, CT ET- Extended temperature CT- Commercial temperature EUC - Intel Embedded Use Conditions IUC - Intel Industrial Use Conditions PUC - Intel PC Client Use Conditions	**Intel Core™ Processor** **- i3-N355**, eight-core, 1.0GHz/1.9GHz, 32EU, 9/15W, PUC **- i3-N305**, eight-core, 1.0GHz/1.8GHz, 32EU, 9/15W, PUC **Intel Atom® Processor** **- x7425E**, four-core, 1.5GHz, 24EU, TCC, 12W, EUC **- x7213E**, two-core, 1.7GHz, 16EU, TCC, 10W, EUC **- x7211E**, two-core, 1.0GHz, 16EU, TCC, 6W, EUC **Intel® Processor** **- N250**, quad-core, 1.3GHz, 32EU, 6W, PUC **- N200**, quad-core, 1.0GHz, 32EU, 6W, PUC **- N150**, quad-core, 0.8GHz, 24EU, 6W, PUC **- N97**, quad-core, 2.0GHz, 24EU, 12W, PUC **- N50**, dual-core, 1.0GHZ, 16EU, 6W, PUC	**Intel Atom® Processor** **- x6425RE**, QC, 1.9GHz, 32EU, TCC, IBECC, 12W, Ind. **- x6414RE**, QC, 1.5GHz, 16EU, TCC, IBECC, 9W, Ind. **- x6212RE**, DC, 1.2GHz, 16EU, TCC, IBECC, 6W, Ind. **- x6425E**, QC, 2.0-3.0GHz, 32EU, IBECC, 12W, Emb. **- x6413E**, QC, 1.5-3.0GHz, 16EU, IBECC, 9W, Emb. **- x6211E**, DC, 1.3-3.0GHz, 16EU, IBECC, 6W, Emb. **Intel® Pentium® Processor** **- J6426**, QC, 2.0-3.0GHz, 32EU, 10W, PC Client **- N6415**, QC, 1.2-3.0GHz, 16EU, 6.5W, PC Client **Intel® Celeron® Processor** **- J6413**, QC, 1.8-3.0GHz, 16EU, 10W, PC Client **- N6211**, QC, 1.2-3.0GHz, 16EU, 6.5W, PC Client		**Intel Atom® Processor** **- E3950**, QC, 1.6-2.0GHz, 18 EU, 12W **- E3940**, QC, 1.6-1.8GHz, 12 EU, 9,5W **- E3930**, DC, 1.3-1.8GHz, 12 EU, 6.5W **Intel® Pentium® N4200**, QC, 1.1-2.5GHz, 18 EU, 6W **Intel® Celeron® N3350**, DC, 1.1-2.4GHz, 12 EU, 6W	**Intel Atom® Processor** **- E3845**, QC, 1.91GHz, 10W **- E3827**, QC, 1.75GHz, 8W **- E3826**, DC, 1.46GHz, 7W **- E3825**, DC, 1.33GHz, 6W **- E3815**, DC, 1.46GHz, 5W **- E3805**, DC, 1.33GHz, 3W (without graphic)	**NXP® i.MX 6 Arm® Cortex®-A9:** **- i.MX 6QuadPlus**, quad-core, 800MHz...1.2GHz **- i.MX 6Quad**, quad-core, 800MHz...1.2GHz **- i.MX 6DualPlus**, dual-core, 800MHz...1.2GHz **- i.MX 6Dual**, dual-core, 800MHz...1.2GHz **- i.MX 6DualLite**, dual-core, 800MHz...1.0GHz **- i.MX 6Solo**, single-core, 800MHz...1.0GHz
DRAM	Up to 32GB LPDDR5 SDRAM, up to 4800 MT/s, IBECC, soldered	Up to 32GB LPDDR5 SDRAM, up to 4800MT/s, IBECC, soldered	Up to 16GB LPDDR4x SDRAM, up to 4267MT/s, IBECC (only Atom SKU´s), soldered		Up to 8GB 1866 MT/s DDR3L SDRAM, dual-channel, soldered, ECC support (optional)	up to 4 GB LPDDR3-1333 SDRAM, soldered optional ECC	Up to 4GB DDR3L SDRAM (DDR-1066), soldered
Flash	Up to 256GB eMMC 5.1 Flash (optional)	Up to 256GB eMMC 5.1 Flash (optional)	Up to 256GB eMMC 5.1 Flash (optional)		Up to 64GB eMMC V5.0 Flash, soldered (optional)	Up to 64GB eMMC Flash, soldered (optional) Up to 32GB SATA NAND Drive, soldered (optional)	Up to 64GB eMMC Flash or (optional) Up to 1GB SLC NAND Flash (optional)
Storage Interfaces	2x SATA-III (6 Gbps)	2x SATA-3.2 6Gbps	2x SATA-III 6Gbps 1x MMC/SD/SDIO		2x SATA-III 6Gbps 1x MMC/SD/SDIO	2x SATA 3Gb/s	Micro SD Card Socket (optional) 1x SATA-II 3Gbps (not on Solo/DualLite CPU) 1x MMC/SD/SDIO
USB	2x USB 3.2, 6x USB 2.0, 1x Dual Role Port (Host/Device)* or 1x USB 3.2, 8x USB 2.0, 1x Dual Role Port (Host/Device)* *One USB 3.2 port according to Qseven Rev. 2.1 (only SS signals)	2x USB 3.2, 6x USB 2.0, 1x Dual Role Port (Host/Device)* or 1x USB 3.2, 8x USB 2.0, 1x Dual Role Port (Host/Device)* *One USB 3.2 port according to Qseven Rev. 2.1 (only SS signals)	2x USB 3.1, 6x USB 2.0, (1x Host/Device)* or 1x USB 3.1, 8x USB 2.0, (1x Host/Device)* *One USB 3.1 port according to Qseven® Rev. 2.1 (only SS signals)		3x USB 3.0, 3x USB 2.0, 1x USB 3.0/2.0 Host/Device* or 2x USB 3.0, 5x USB 2.0, 1x USB 2.0 Host/Device* or 1x USB 3.0, 7x USB 2.0, 1x USB 2.0 Host/Device* *One USB 3.0 port according to Qseven® Rev. 2.1 (only SS signals)	4x USB 2.0 Host or 6x USB 2.0 Host 1x USB 3.0 Host optional USB 2.0 Device optional USB 3.0 Device	1x USB 2.0 Host/Client, 1x USB 2.0 Host or 1x USB 2.0 Host/Client, 4x USB 2.0 Host
Bus Interfaces	Up to 4x PCIe Gen. 3 x1 lanes 1x I2C Bus 1x SPI Bus 1x LPC Bus 1x SMBus	Up to 4x PCI-Express x1 Gen. 3 lanes 1x I2C Bus 1x SPI Bus 1x LPC Bus 1x SMBus	Up to 4x PCI-Express® x1 Gen. 3 1x I2C Bus, 1x SMBus 1x SPI Bus 1x LPC Bus 1x CAN-FD (Flexible Data-Rate)		Up to 4x PCI-Express® x1 Gen. 2 1x I2C Bus, 1x SMBus 1x SPI Bus 1x LPC Bus	3x PCI-Express® x1 Gen. 2 1x I2C Bus, 1x SMBus 1x SPI Bus 1x LPC Bus	1x PCI Express® x1 Gen. 1 1x I2C, 1x SMBus 1x SPI (with two chip selects) 1x CAN 2.0B
Display Controller	Integrated Intel® UHD Graphics (Gen12), Up to 32 execution units	Integrated Intel UHD Graphics (Gen12) Up to 32 execution units (EU)	Integrated Intel UHD Graphics Gen. 11		Integrated Intel HD Graphics Gen. 9	Integrated Intel HD Graphics Gen. 7	Video, 2D and 3D Graphics Units integrated in i.MX6 Proc. OpenGL® ES 1.1/2.0/Halti, OpenVG™ 1.1, OpenCL™ 1.1 EP
Display Interfaces	1x DP++ 1x eDP 1.4b (or dual-channel LVDS) 2× Embedded DisplayPort 1.4b (optional) Dual-channel LVDS 18/24-bit up to 1920×1200 @ 60 Hz	1x DP++ 1x eDP 1.4b (1x DP) / 1x dual channel LVDS Dual-Channel LVDS 24/18 bit up to 1920 x 1200 @ 60Hz or 2x Embedded DisplayPort 1.4b up to 4096 x 2160 @ 60Hz	1x DP++ Dual-Channel LVDS 24/18 Bit (opt. eDP 1.3 or MIPI-DSI)		1x DP++ Dual-Channel LVDS 24/18 Bit (opt. eDP 1.3 or MIPI-DSI)	1x DP++ Dual-Channel LVDS 24/18 Bit (opt. eDP)	1x HDMI Dual-Channel LVDS 24/18 Bit (opt. eDP 1.4)
Network Interface	1x 10/100/1000Base-T Ethernet, up to 2.5GbE (Intel® i226) 1x SGMII on SATA-Port1 (optional)	1x 10/100/1000Base-T Ethernet, up to 2.5GbE (Intel® i226) 1x SGMII on SATA-Port1 (optional on Atom versions)	1x 10/100/1000Base-T Ethernet 1x SGMII Interface on SATA-Port1 (optional)		1x 10/100/1000Base-T Ethernet	1x 10/100/1000Base-T Ethernet	1x 10/100/1000BASE-T Ethernet
Audio Interface	High Definition Audio	High Definition Audio	HDA Audio		HDA Audio	HD Audio (I2S optional)	I2S Audio
Security Device	Trusted Platform Module 2.0 (optional)	Trusted Platform Module 2.0 (optional)	Trusted Platform Module 2.0 (optional)		Trusted Platform Module 2.0 (optional)	Trusted Platform Module (TPM) 1.2 (optional)	-
OS Support	Microsoft Windows® 10/11 LTSC Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 10/11 LTSC Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 10 IoT (64bit) Linux® (Yocto Project®) EAPI (HW Programming Interface)		Microsoft Windows® 10 IoT (64bit) Linux® (Yocto Project®) EAPI (HW Programming Interface)	Microsoft Windows® 7 / ES7 / 8 / 10 Linux® (Yocto Project®) EAPI (HW Programming Interface)	Linux® Board Support Package Android Board Support Package (on request)
Power Requirements	Voltage: +5V +/-5%, +5V Standby Power Consumption: 11-19W typ.	Voltage: +5V +/-5%, +5V Standby Power Consumption: 11-19W typ.	Voltage: +5V +/-5%, +5V Standby Power Consumption: 6-15W typ.		Voltage: +5V +/-5%, +5V Standby Power Consumption: 7-14W typ.	Voltage: +5V +/-5%, +5V Standby Power Consumption: 4-11 W typ.	Voltage: +5V +/-5%, +5V Standby Power Consumption: 4-6 W typ.
Operating Temp.	0° ... 60°C (commercial) -25°C ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 60°C (commercial)	0° ... 60°C (commercial) -25°C ... 85°C (extended) -40° ... 85°C (industrial)		0° ... 60°C (commercial) -40° ... 85°C (industrial)	0° ... 60°C (commercial) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)				5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)		

Errors and omissions excepted.

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OSM





OPEN STANDARD MODULE™

The idea of all Open Standard Modules™ (OSM) is to create a new, **futureproof**, and **versatile standard** for small, low-cost embedded computer modules that combines the following key features:

- Fully automated processing for soldering, assembly, and testing
- Pre-tinned LGA package for direct PCB soldering without connectors
- Predefined hardware interfaces
- Robust (shock, vibration)

For a growing number of IoT applications, this standard helps to combine the advantages of modular embedded computing with the increasing demands on cost, space, and interfaces.

OSM format	Dimensions	Pins
Size-S (small)	30 x 30 mm	332
Size-M (medium)	45 x 30 mm	476
Size-L (large)	45 x 45 mm	662

OSM modules are notably smaller than previous alternatives. Even the largest OSM module, at 45x45mm, is 58% smaller than the Qseven (70x70mm) standard and 51% smaller than SMARC (82x50mm).

This reduction in size is enabled by solder-on design without any connector, allowing for more interfaces on a smaller footprint. This advancement in miniaturization addresses the growing complexity of requirements, establishing the OSM standard as a pioneering solution.

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OSM SIZE-L OVERVIEW

Specs	TRIA OSM-LF-IQ615	TRIA OSM-LF-IMX95
Technology	Arm®	Arm®
		
Form Factor	OSM 1.2 standard (Size-L), Dimension: 45 mm x 45 mm OSM-LF, 662 Pin, RM 1,25 mm	OSM 1.2 standard (Size-L), Dimension: 45 mm x 45 mm OSM-LF, 662 Pin, RM 1,25 mm
CPU	**Qualcomm Dragonwing™ IQ615:** - dual core Arm® Cortex®-A76 up to 1.9GHz - hexa core Arm® Cortex®-A55 up to 1.6GHz Hexagon™ V66 DSP with Dual hexagon Vector Spectra™ 230 image processing engine (ISP) Adreno 443 VPU Video Decode/Encode	**NXP® i.MX 95 Arm® Cortex®-A55 Applications Processor** - i.MX 95x6, hexa-core, 1.6 - 2.0GHz - i.MX 95x4, quad-core, 1.6 - 2.0GHz - i.MX 95x2, dual-core, 1.6 - 2.0GHz different versions with options for ISP, NPU, GPU, VPU, Display Controller, 10GbE Arm® Cortex®-M7 Real Time Processor at 800MHz Arm® Cortex®-M33 Real Time Processor at 333MHz NXP eIQ® Neutron NPU with 2.0 TOPS/s
DRAM	Up to 8GB 3110MT/s LPDDR4 SDRAM, soldered	Up to 16GB 6400MT/s LPDDR5 SDRAM, soldered, inline ECC support
Flash	Up to 256GB eMMC Flash	Up to 256GB eMMC Flash
Storage Interfaces	1x UFS 2.1, 1x MMC/SD/SDIO	2x MMC/SD/SDIO
USB	1x USB 2.0 Host/Client, 1x USB 3.1 Host	1x USB 2.0 Host/Client, 1x USB 3.0 Host/Client
Bus Interfaces	1x PCI Express® x1 Gen.2 5x I²C (1x general, 2x CAM, 1x LCD, 1x PM) 1x SPI, 1x SPI/QSPI, 3x UART	2x PCI Express® x1 Gen. 3 5x I2C up to 400 Kbit/s 1x SPI, 1x SPI/QSPI (with two chip selects), 5x UART 2x CAN-FD / CAN 2.0B
IO Interfaces	19x GPIO, configurable as input or output	24x GPIO, configurable as input or output
Display Controller	Adreno 612 GPU	Arm Mali™ G310 GPU
Display Interfaces	1x MIPI-DSI 1x DP v.1.4 (up to 4 Displays)	Dual-channel LVDS interface, 18 or 24 bit 1x MIPI-DSI
Network Interface	1x Ethernet (RGMII interface) up to 1Gbps	2x Ethernet (RGMII interface) up to 1Gbps 1x Ethernet (SGMII interface) up to 10Gbps
Audio Interface	2x I2S Audio	2x I2S Audio
Security Device	Advanced Security, Safety, and Reliability integrated inthe SOC Trusted Platform Module (TPM) 2.0 (optional)	Advanced Security, Safety, and Reliability integrated in the SOC Trusted Platform Module (TPM) 2.0 (optional)
OS Support	Linux® (Yocto Project®) Android Board Support Package (on request)	Linux® (Yocto Project®) Android Board Support Package (on request)
Power Requirements	Voltage: +5V +/-5%, 5V Standby Power Cosumption: tbd	Voltage: +5V +/-5% Power Cosumption: 7-9W typ.
Operating Temp.	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)	

Errors and omissions excepted.

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OSM SIZE-M OVERVIEW

OSM SIZE-S OVERVIEW

OPEN STANDARD MODULE™

Specs	TRIA OSM-MF-IMX8PLUS	TRIA OSM-MF-IMX8MINI	TRIA OSM-MF-IMX8NANO		TRIA OSM-SF-IMX93	TRIA OSM-SF-IMX91	TRIA OSM-SF-IMXRT1170
Technology	Arm®	Arm®	Arm®		Arm®	Arm®	Arm®
							
Form Factor	OSM 1.1 standard (Size-M), Dimension: 45 mm x 30 mm OSM-MF, 476 Pin, RM 1,25 mm	OSM 1.1 standard (Size-M), Dimension: 45 mm x 30 mm OSM-MF, 476 Pin, RM 1,25 mm	OSM 1.1 standard (Size-M), Dimension: 45 mm x 30 mm OSM-MF, 476 Pin, RM 1,25 mm		OSM 1.1 standard (Size-S), Dimension: 30 mm x 30 mm OSM-SF, 322 Pin, RM 1,25 mm	OSM 1.1 standard (Size-S), Dimension: 30 mm x 30 mm OSM-SF, 322 Pin, RM 1,25 mm	OSM 1.1 standard (Size-S), Dimension: 30 mm x 30 mm OSM-SF, 322 Pin, RM 1,25 mm
CPU	**NXP® i.MX 8M Plus Arm® Cortex®-A53 Applications Processor** **- i.MX 8M Plus Quad:** - NPU, ISP, VPU, HIFI4, CAN, 1.6 - 1.8GHz - ISP, VPU, CAN, 1.6 - 1.8GHz **- i.MX 8M Plus QuadLite:** CAN, 1.6 - 1.8GHz **- i.MX 8M Plus Dual:** NPU, ISP, VPU, HIFI4, CAN, 1.6 - 1.8GHz Arm® Cortex®-M7 Real Time Processor at 800MHz	**NXP® i.MX 8M Mini Arm® Cortex®-A53 Applications Processor** **- i.MX 8M Mini Solo**, single-core, 1.6-1.8GHz **- i.MX 8M Mini Dual**, dual-core, 1.6-1.8GHz **- i.MX 8M Mini Quad**, quad-core, 1.6-1.8GHz **- i.MX 8M Mini SoloLite**, single-core, 1.6-1.8GHz **- i.MX 8M Mini DualLite**, dual-core, 1.6-1.8GHz **- i.MX 8M Mini QuadLite**, quad-core, 1.6-1.8GHz Arm® Cortex®-M4 Real Time Processor at 400MHz	**NXP® i.MX 8M Nano Arm® Cortex®-A53 Applications Processor** **- i.MX 8M Nano Solo**, single-core, 1.4 - 1.5GHz **- i.MX 8M Nano Dual**, dual-core, 1.4 - 1.5GHz **- i.MX 8M Nano Quad**, quad-core, 1.4 - 1.5GHz **- i.MX 8M Nano SoloLite**, single-core, 1.4 - 1.5GHz **- i.MX 8M Nano DualLite**, dual-core, 1.4 - 1.5GHz **- i.MX 8M Nano QuadLite**, quad-core, 1.4 - 1.5GHz Arm® Cortex®-M7 Real Time Processor at 750MHz		**NXP® i.MX 93 Arm® Cortex®-A55 Applications Processors** - **i.MX 9352**, dual-core, NPU, 1.5 - 1.7GHz - **i.MX 9332**, dual-core, 1.5 - 1.7GHz - **i.MX 9351**, single-core, NPU, 1.5 - 1.7GHz - **i.MX 9331**, single-core, 1.5 - 1.7GHz Arm® Cortex®-M33 Real Time Processor at 250MHz Arm Ethos-U65 microNPU with 256 MACs/Cycle	**NXP® i.MX 91 Arm® Cortex®-A55 Applications Processor** **- i.MX 9131**, single-core, 1.4GHz	**NXP® i.MX 91 RT1170 CROSSOVER MCUs with up to 1GHz** **- i.MX RT1170** **- i.MX RT1171** **- i.MX RT1172** **- i.MX RT1173** **- i.MX RT1175** **- i.MX RT1176**
DRAM	Up to 8GB 4000MT/s LPDDR4 SDRAM, soldered, inline ECC support	Up to 4GB 3000MT/s LPDDR4, soldered, non ECC	Up to 1GB 3200MT/s LPDDR4 SDRAM, soldered, non ECC		Up to 2GB 3700MT/s LPDDR4 SDRAM, soldered, inline ECC support	Up to 2GB 2400MT/s LPDDR4 SDRAM, soldered, inline ECC support	Up to 2 MB SRAM (internal) + optional HyperRAM™ with up to 64MB
Flash	Up to 256GB eMMC Flash, QSPI NOR Flash (optional)	Up to 256GB eMMC Flash, QSPI NOR Flash (optional)	Up to 256GB eMMC Flash, QSPI NOR Flash (optional)		Up to 256GB eMMC Flash	Up to 256GB eMMC Flash	Up to 256MB QUAD SPI NOR Flash
Storage Interfaces	2x MMC/SD/SDIO	2x MMC/SD/SDIO	2x MMC/SD/SDIO		2x MMC/SD/SDIO	2x MMC/SD/SDIO	1x eMMC/SD
USB	1x USB 2.0 Host/Client, 1x USB 3.0 Host	1x USB 2.0 Host/Client, 1x USB 2.0 Host	1x USB 2.0 Host/Client		1x USB 2.0 Host/Client, 1x USB 2.0 Host	1x USB 2.0 Host/Client, 1x USB 2.0 Host	1x USB 2.0 Host/Client, 1x USB 2.0 Host
Bus Interfaces	1x PCI Express® x1 Gen. 3 2x I2C up to 400 Kbit/s 2x CAN-FD / CAN 2.0B 3x SPI (with two chip selects), 4x UART	1x PCI Express® x1 Gen.2 2x I2C up to 400 Kbit/s Up to 2x SPI (with two chip selects), 4x UART	2x I2C up to 400 Kbit/s 2x SPI (with two chip selects), 4x UART		2x I2C up to 400 Kbit/s 2x CAN-FD / CAN 2.0B 2x SPI (with two chip selects), 4x UART	2x I2C up to 400 Kbit/s 2x CAN-FD / CAN 2.0B 2x SPI (with two chip selects), 4x UART	Up to 2x I2C Up to 2x CAN-FD /CAN 2.0B 2x SPI (with two chip selects), 5x UART
IO Interfaces	30x GPIO, configurable as input or output 4x PWM	24x GPIO, configurable as input or output 4x PWM	24x GPIO, configurable as input or output 4x PWM		20x GPIO, configurable as input or output 2x PWM 2x Analog In (12-bit)	20x GPIO, configurable as input or output 2x PWM 2x Analog In (12-bit)	24x GPIO, configurable as input or output, 14x configurable as FlexIO up to 2x ADC inputs (12-bit) up to 6x PWM
Display Controller	Vivante GC7000UL 2D/3D GPU	Vivante GC NanoUlta 3D GPU	Vivante GC7000UL 3D GPU		Pixel processing pipeline (PXP) engine to support 2D image processing (i.e. Blending/Composition, Rotation, Resize, Color Space Conversion)	not available	2D GPU with Vector Graphics Acceleration
Display Interfaces	1x MIPI-DSI Display Interface, 4 lanes Single-channel LVDS interface, 18 or 24 bit (on RGB Pins)	1x MIPI-DSI Display Interface, 4 lanes, up to 1920x1080 @ 60fps	1x MIPI-DSI Display Interface, 4 lanes, up to 1920x1080 @ 60fps		MIPI-DSI Display Interface, 4 lanes, up to 1920x1080	not available	1x MIPI-DSI Display Interface
Network Interface	2x Gb Ethernet (RGMII interface)	1x Gb Ethernet (RGMII interface)	1x Gb Ethernet (RGMII interface)		2x Gb Ethernet (RGMII interface)	2x Gb Ethernet (RGMII interface)	1x Gb Ethernet (RGMII interface) 1x 100 Mbit Ethernet (RMII interface)
Audio Interface	2x I2S Audio	2x I2S Audio	1x I2S Audio		2x I2S Audio	1x I2S Audio	1x I2S Audio
Security Device	Integrated advanced security, safety, and reliability	Integrated advanced security, safety, and reliability	Integrated advanced security, safety, and reliability		Integrated advanced security, safety, and reliability	Integrated advanced security, safety, and reliability	Integrated advanced security, safety, and reliability Optional SE050 Secure Element
OS Support	Linux® (Yocto Project®) Android Board Support Package	Linux® (Yocto Project®) Android Board Support Package	Linux® (Yocto Project®) Android Board Support Package (on request)		Linux® (Yocto Project®) Android Board Support Package (on request)	Linux® (Yocto Project®) Android Board Support Package (on request)	NXP's MCUXpresso software and tools
Power Requirements	Voltage: +5V +/-5% Power Consumption: 2-6 W typ.	Voltage: +5V +/-5% Power Consumption: 2-5 W typ.	Voltage: +5V +/-5% Power Consumption: 2-4 W typ.		Voltage: +5V +/-5% Power Consumption: 2-4 W typ.	Voltage: +5V +/-5% Power Consumption: 2-4 W typ.	Voltage: +5V +/-5% Power Consumption: 1-2 W typ.
Operating Temp.	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25°C ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)		0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)	0° ... 70°C (commercial) -25° ... 85°C (extended) -40° ... 85°C (industrial)
Humidity	5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)					5 ... 95% (operating, non-cond.), 5 ... 95% (storage, non-cond.)	

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TRIA CARRIER BOARDS OVERVIEW

Specs	TRIA OSM-MB-EP5	TRIA SM2S-MB-EP5	TRIA Q7-MB-EP5
Platform	Embedded Platform OSM 1.1	Embedded Platform SMARC® 2.0/2.1.1	Embedded Platform Qseven® Rev. 2.0
	 SIMPLEFLEX	 SIMPLEFLEX	 SIMPLEFLEX
Highlights	The new OSM 1.1 embedded platform TRIA OSM-MB-EP5 offers a variety of interfaces commonly used in embedded applications such as Gigabit LAN, USB 3.0, USB 2.0, RS232/485 and CAN as well as DisplayPort and LVDS display interfaces. By design the EP5 was optimized for low production cost and simple customization. - OSM-SF/MF/LF - Reference Carrier + SBC solution - Input voltage 5VDC-36VDC - USB-C power input - MICROBUS Slot for different I/O expansions - LVDS/DSI/RGB Display support - M.2 Key-E, µSD Card, MIPI CSI-2 - Audio, USB 2.0, USB 3.0 - RS232, RS485, 2x UART - I2C, SPI, PWM, GPIO, ADC - 2x Gigabit Ethernet - WLAN/BT, 2x CAN - Industrial temp. range from - 40 to +85°C - Dimension 146 mm x 102 mm	The new SMARC® 2.0/2.1.1 embedded platform TRIA SM2-MB-EP5 offers Each offers a variety of interfaces commonly used in embedded applications such as Gigabit LAN, USB 3.0, USB 2.0, RS232/485 and CAN as well as DisplayPort and LVDS display interfaces. By design the EP5 was optimized for low production cost and simple customization. - For open-frame HMI applications with display size 7" and larger - Low-cost application board (for x86 and Arm® based SMARC® 2.0/2.1.1 modules) - LVDS display and backlight supply generated on board - USB Type C (with power delivery 5V/3A, alternate mode, USB-OTG) - 2x CAN interface (1x galvanically isolated) - Up to 2x Gigabit Ethernet - Industrial temperature range from - 40 to +85°C - WLAN / BT / NFC module (H&D Wireless SPB209A) opt. - Dimension: 146 x 80 mm	The new Qseven® Rev. 2.0 embedded platform TRIA Q7-MB-EP5 offers Each offers a variety of interfaces commonly used in embedded applications such as Gigabit LAN, USB 3.0, USB 2.0, RS232/485 and CAN as well as DisplayPort and LVDS display interfaces. By design the EP5 was optimized for low production cost and simple customization. - Low-cost application board for any Qseven® - Dual Gigabit Ethernet - Mini PCI Express® Card / mSATA Card socket - 1x USB 3.0, up to 3x USB 2.0 connectors - 1x USB 2.0 Host/Client on µUSB connector - DisplayPort, RS-232, RS-485 or opt. CAN - Dual-channel LVDS on JILI30 connector - WLAN / Bluetooth / NFC with antenna (optional) - 4-wire touch controller (optional) - I2S or HD Audio codec (optional) - SPI / I2C / GPIO on Feature Connector - Input voltage 10 to 36V - Industrial temperature versions available - Dimension: 148 x 102 mm

Specs	TRIA MaaXBoard OSM93	TRIA SM2-MB-EP2	TRIA SM2-MB-EP1
Platform	MaaXBoard	Embedded Platform SMARC® 2.0/2.1.1	Embedded Platform SMARC® 2.0/2.1.1
			
Highlights	MaaXBoard OSM93 features an NXP i.MX 93 based OSM compute module, with integrated AI/ML NPU accelerator, EdgeLock security enclave and Energy Flex architecture. The extremely compact SBC in R-Pi format is intended for rapid prototyping and evaluation of the TRIA OSM-SF-IMX93 module. - 2x Arm® Cortex®-A55 (@ up to 1.7 GHz) - 1x Arm Ethos-U65 NPU (@ 1 GHz / 0.5 TOPS) - EdgeLockTM Secure Enclave - 640 KB OCRAM w/ ECC - 2 GB LPDDR4 SDRAM - 16 GB eMMC 5.1 Flash| 16 MB QSPI NOR Flash - 2x USB 2.0 Host (type A) | 1x USB 2.0 Host (type C) - MIPI DSI Interface (4L) | MIPI CSI Camera Interface (2L) - 2x 1 Gbps Ethernet (1x TSN) - UART, SPI, I2C, I2S, GPIO interfaces - M.2 Connector: Wi-Fi 6/BT 5.3/802.15.4 option - DC Power supply: 5V/3A USB-C Power Adapter - Operating Temperature -40C..+85C - Dimensions: 85mm x 56mm	Offers many embedded interfaces such as dual Gigabit LAN, USB 3, USB 2, SATA, UART/RS232 and CAN as well as DVI/HDMI, embedded DisplayPort and LVDS display interfaces. In addition four PCI Express® sockets and a SD Card socket are supported. - Socket for SMARC® 2.1.1 modules - 4x PCI Express® x1 slots - 2x M.2 (Key B and Key E) - Mini-PCI-Express® Card slot - SD Card slot - 2x USB 3.0 interfaces (Type A and Type C) - USB 2.0 OTG, 2x USB 2.0 Host, - USB 2.0 Debug port (Type C with Serial Port on USB) - DVI/HDMI and 2x DisplayPort connectors - LVDS and eDP connectors - SATA connector and M.2 Key M (SATA only) - 2x GbE interfaces - 2x CAN interfaces - I2S audio and HD audio codec - 2x UART interfaces - Various additional SMARC® specific interfaces - ATX supply or Power jack for 8-24V input voltage - Dimension: 244 x 305 mm / ATX compliance	Offers many embedded interfaces such as dual Gigabit LAN, USB 3.0, USB 2.0, SATA, UART/RS232 and CAN as well as DVI/HDMI, embedded DisplayPort and LVDS display interfaces. In addition a PCI Express® socket and an SD Card socket are supported. - Socket for SMARC® 2.0/2.1.1 modules - PCI Express® x4 slot - SD card slot - Mini-PCI-Express® card slot - Two USB 3.0 interfaces - USB 2.0 OTG, two USB 2.0 Host - DVI/HDMI and DisplayPort connectors - LVDS and eDP connectors - SATA connector - Two GbE interfaces - Two CAN interfaces - I2S audio and HD audio codec - Two UART interfaces - Various additional SMARC® specific interfaces - Power jack for 12-24V input voltage - Dimension: 170 x 170 mm

TRIA C10-MB-EV	TRIA C6-MB-EV4M	TRIA C6-MB-EV4
COM Express Type 10 Carrier Board	COM Express Type 6 Carrier Board	COM Express Type 6 Carrier Board
		
This popular Mini-ITX format provides the interface infrastructure for COM Express® Type 6 modules and offers various PC type connectors for external access. - Socket for COM Express® Type 6 modules - PCI Express x16 slot (useable as PEG or x4) - PCI Express Mini Card slot - Four SATA connectors - Four USB 3.0 interfaces - Up to four USB 2.0 ports - Three DisplayPort connectors - LVDS and eDP connectors - GbE interface SD Card slot - HD audio codec - Super I/O - Various additional COM Express® specific interfaces - Power supply via ATX-style power connector or 12V-only power jack - Wide power input range - Dimension: 170 x 170 mm	This popular Mini-ITX format provides the interface infrastructure for COM Express® Type 6 modules and offers various PC type connectors for external access. - Socket for COM Express® Type 6 modules - One PCI Express® Gen4 x4 slot - One PCIe Express® Gen4 x16 (PEG) - One M.2 Key-M slot (PCIe Gen4) - Two SATA connectors - Four USB 3.1 Gen 1 / 2.0 connectors - Two USB 2.0 pin header - Two USB Type-C connectors - One DisplayPort++ connector - LVDS / eDP interface - LAN interface max 2.5GbE - COM Express® specific interfaces - Power supply connector, wide power input range - POST display (optional) - Mini-ITX form factor - Dimension: 170 x 170 mm	This carrier board supports PCI Express® Gen 4 and 2.5Gb Ethernet available with latest module generations. It is intended for evaluation, prototyping and software development. - Socket for COM Express® Type 6 modules - Compact/Basic form factors supported - Support for PCI Express® Gen 4 - One PCI Express® x4 slot - Three PCI Express® x1 slots shared with PCIe x4 slot - One PCI Express® x16 PEG slot - One M.2 Key-M Slot - Four SATA connectors - Four USB 3.1 Gen 1/2.0 connectors - Four USB 2.0 pin header - Three DisplayPort++ connectors - Audio codec; three audio jacks and SPDIF - LAN interface max 2.5GbE - SD Memory Card Socket - Power supply via ATX connector or wide input - POST display (optional) - ATX form factor - Dimension: 305 x 244 mm

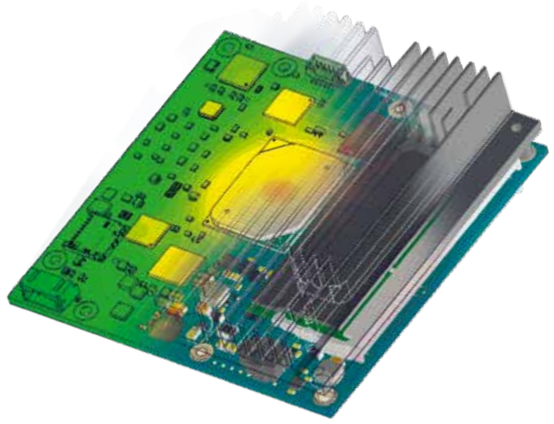
TRIA HM-MB-EV	TRIA HC-MB-EV	TRIA HS-MB-EV
COM-HPC Mini Carrier Board	COM-HPC Client Carrier Board	COM-HPC Server Carrier Board
		
Intended for design teams requiring fast enablement of COM-HPC Mini based solutions for lab evaluation, rapid prototyping and application development. Access to the reference design supports developing own COM-HPC Mini platforms. - Socket for a single COM-HPC® Mini module - One PCI Express® x4/x8 slot - Five PCI Express® x1 slots - One M.2 Key-M Slot - One M.2 Key-A slot - One SATA connector - One USB4 Type-C connector - Four USB 3.2 Gen 2×1 connectors - One USB 2.0 on pin header - One DisplayPort connector - One eDP connector - Audio codec (selectable on-board module) - Two LAN interfaces max 2.5GbE - Power input ATX P8-connector - Wide power input range - POST display - ATX form factor - Dimension: 305mm x 244mm	Intended for design teams that requiring easy and fast enablement of COM-HPC® based solutions for lab evaluation, rapid prototyping and application development. Engineers can use it as a reference design for developing their own COM-HPC® platform with client interface. - Socket for COM-HPC® Client modules, Size A, B, C - PCI Express® x16 slot (PEG/general PCIe) - PCI Express® x16 slot (general PCIe) - Three PCI Express® slots 1x4 - Support for PCIe Gen 3 and 4 - Two SATA connectors - M.2 socket for mass storage and AI modules - Two USB4 Gen 2x2, Type-C connectors - Two USB 3.2 Gen 2x1 Type-A connectors - Two 1G/2.5G/10GBASE-T connectors (RJ45) - Three DisplayPort connectors - One eDP connector - HDA audio codec - Various additional COM-HPC® specific interfaces - Power supply via ATX-style power connectors - Wide power input range - ATX form factor - Dimension: 305 x 244 mm	Intended for lab evaluation, rapid prototyping, and application development. Engineers can use it as a reference design for developing their own COM-HPC® platform. The COM-HPC® carrier provides a COM-HPC® Server interface with a rich set of I/O routed to the module socket. - COM-HPC® Server Carrier - Socket for COM-HPC® Server module with size D or E - One PCI Express® x16 slots - Two PCI Express® x8 slots - Two PCI Express® x4 slots - Two M.2 slots with PCIe x4 - All PCIe slots support up to Gen 4 - Four USB 3.2 Gen 1 (5Gbps) - Four SFP28 card cages for up to 25G Ethernet per port - Two 10GBASE-T connectors - One 1000BASE-T / 2.5GBASE-T connector - Two SATA connectors, up to 6Gbps - 2x UART ports - Connectors for optional BMC module and I/O break-out - Fan connector - ATX-style power connector and 12V single supply - POST code LED display - Dimension: 305 x 244 mm

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COOLING SOLUTIONS OVERVIEW





Thermal Simulations

- All cooling solutions are validated through thermal simulations
- Simulations ensure performance near optimal levels
- Thermal simulation and consulting available for customer projects

Cooling Options

- Extensive range of cooling solutions for COM products
- Options include heat spreaders, heatsinks, heat pipes, and fan-assisted heatsinks
- Cooling solutions can be customized for maximum efficiency and cost-effectiveness

SMARC® 2.x and Qseven® - Cooling Solutions

For all SMARC® and Qseven® modules, we offer tailored cooling solutions, which perfectly fit the geometry of the COM product. We also provide a heatspreader for each module and a single-piece heatsink for those of higher performance.



Heatspreaders: A heat spreader provides a flat mounting surface for attaching a cooling device or making thermal contact with a system's metal enclosure, while its underside is designed to contact the module's heat-generating parts of the module's geometry.



Heatsinks: Depending on the ambient temperature and the power dissipation of the module, forced airflow may or may not be required.

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COM Express® - Cooling Solutions

Depending on the computing performance, processor technology and system environment, COM Express® modules require different cooling measures. We have developed various solutions to help system designers to quickly solve the heat dissipation problems and ensure optimum environmental conditions for the module.

These off-the-shelf cooling solutions have been optimized in many ways, using thermal simulation and intensive climate chamber testing. Therefore we can offer cost-efficient monolithic aluminium coolers without extra heat transfer layers, minimized heat resistance, optional embedded heat pipe and industry proven fans.



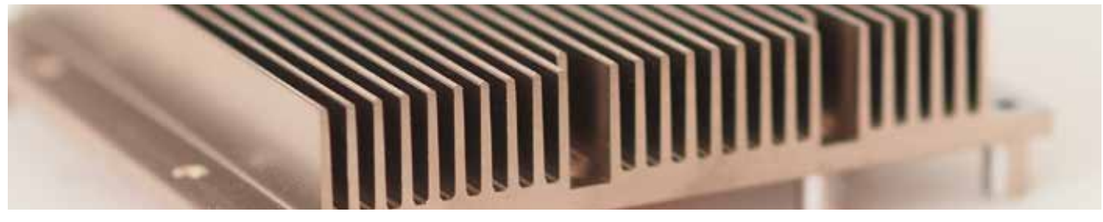
Heatspreaders: Standardized thermal interfaces with full interchangeability for easy integration into cooling concepts.



Passive cooling: Optimized heatsinks for best cooling performance even in industrial environments.



Active cooling: Heatsinks combined with a dedicated speed controlled fan. Off-the-shelf solutions for demanding ambient conditions.



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SYSTEM-ON-MODULES



FPGA MODULES

AMD

Proprietary SOM Form Factors

Unlock faster time-to-market and lower development risk by building your next design around a System-on-Module (SOM) powered by industry-leading AMD adaptive and high-performance processing technologies. By integrating advanced AMD SoCs, MPSoCs, and APSoCs into a compact, production-ready module, you gain the full performance of cutting-edge compute, graphics, and programmable logic – without the complexity of high-speed PCB design, DDR routing, power sequencing, and signal integrity challenges.

Our SOM architectures harness the scalability of the adaptive processing power of AMD Zynq, Zynq UltraScale+ MPSoC, and the latest Versal AI Edge APSoC devices. The result is flexible platforms that blends CPU performance, acceleration, and FPGA programmability – ideal for AI at the edge, industrial automation, medical imaging, aerospace, and high-reliability systems.

By decoupling the complex processor subsystem from your carrier board, System-on-Modules reduce engineering effort, simplify certification, streamline upgrades, and extend product life cycles. Focus your team on application innovation and differentiation, while leveraging a proven, production-validated compute core.

With System-On-Modules, you get performance without compromise, scalability without redesign, and innovation without delay.





UltraZed EG

Get started with Confidence

Accelerate your path from concept to production with a System-on-Module from Tria. Backed by strategic collaboration with AMD, Tria delivers production-ready SOM solutions built on industry-leading SoCs, MPSoCs, and adaptive processing platforms – combining high-performance compute, graphics, and programmable logic in a compact, validated module.

When you choose a Tria SOM, you gain more than advanced silicon – you gain access to world-class engineering support, reference designs, design services, and a secure global supply chain. From evaluation kits and rapid prototyping to life-cycle management and long-term availability, Tria simplifies development and reduces risk at every stage.

Start with a proven platform. Scale with confidence. Innovate without limits.

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PROPRIETARY SOM FORM FACTORS

Specs	PicoZed	UltraZed EG	UltraZed EV		XRF 8	XRF 16	VE2302
Technology	**Arm®**	**Arm®**	**Arm®**		**Arm®**	**Arm®**	**Arm®**
							
Form Factor	Proprietary: 102 x 57 mm Three B2B Connectors	Proprietary: 89 x 51 mm Three B2B Connectors	Proprietary: 102 x 63.5 mm Three B2B Connectors		Proprietary: 127 x 101 mm Four B2B Connectors	Proprietary: 127 x 101 mm Four B2B Connectors	Proprietary: 50 x 50 mm Three B2B Connectors
CPU	**AMD Zynq™ 7000 SoC** **- Z-7010, Z-7015, Z-7020** - Dual Arm® Cortex®-A9 Processor - Neon™ SIMD and FPU - Artix Programmable Logic **- Z-7030** - Dual Arm® Cortex®-A9 Processor - Neon™ SIMD and FPU - Kintex™ Programmable Logic	**AMD Zynq™ UltraScale+™ MPSoC** **- ZU3EG**** - Quad Arm® Cortex®-53 Processor - Dual Arm® Cortex®-R5F RPU - Arm® Mali®-400MP2 - 16nm Programmable Logic	**AMD Zynq™ UltraScale+ MPSoC** **- ZU7EV**** - Quad Arm® Cortex®-53 Processor - Dual Arm® Cortex®-R5F RPU - Arm® Mali®-400MP2 - H.264/H.265 Video Codec - 16nm Programmable Logic		**AMD Zynq™ UltraScale+ RFSoC** **- ZU47DR Gen3** - Quad Arm® Cortex®-53 Processor - Dual Arm® Cortex®-R5F RPU - 16nm Programmable Logic	**AMD Zynq™ UltraScale+ RFSoC** **- ZU49DR Gen3** - Quad Arm® Cortex®-53 Processor - Dual Arm® Cortex®-R5F RPU - 16nm Programmable Logic	**AMD Versal™ AI Edge** **- VE2302**** - Dual Arm® Cortex®-72 Processor - Dual Arm® Cortex®-R5F RPU - 34 AI Engine-ML - 464 DSP Engines - 7nm Programmable Logic
DRAM	1GB DDR3L @ Processor Subsystem	2GB DDR4 @ Processor Subsystem	1GB DDR4 @ Programmable Logic 4GB DDR4 @ Processor Subsystem		4GB DDR4 @ Programmable Logic 4GB DDR4 @ Processor Subsystem	4GB DDR4 @ Programmable Logic 4GB DDR4 @ Processor Subsystem	4GB LPDDR4
Flash	8 GB eMMC 128Mb QSPI Boot Storage	8 GB eMMC Dual 64MB QSPI Boot Storage 2Kb I2C EEPROM	8 GB eMMC Dual 64MB QSPI Boot Storage 2Kb I2C EEPROM		32GB eMMC 128MB QSPI Boot Storage	32GB eMMC 128MB QSPI Boot Storage	32GB eMMC 256MB OSPI Boot Storage
Storage Interfaces		SATA (GTR)	SATA (GTR)		SATA	SATA	
Network Interfaces	1x GbE	1x GbE	1x GbE		1x GbE	1x GbE	1x GbE
USB	USB 2.0	USB2.0 / USB3.0 (GTR)	USB2.0/USB3.0 (GTR)		USB 2.0/3.0 USB-UART	USB 2.0/3.0 USB-UART	USB 2.0
Bus Interfaces		PCIe Gen2 (GTR)	PCIe Gen2 (GTR)		PCIe Gen1/2 I2C SPI UART	PCIe Gen1/2 I2C SPI UART	PCIe Gen4 I2C SPI UART CAN-FD
Other Interfaces/ Functions	113 GPIOs (Z-7010) 148 GPIOs + 4 GTP Transceivers (Z-7015) 138 GPIOs (Z-7020) 148 GPIOs + 4 GTX Transceivers (Z-7030)	206 GPIOs + 4 GTR Transceivers 154 K Prog Logic Cells Display Port (GTR)	178 GPIOs + 4 GTR Transceivers 16 PL GTH Transceivers 504 K Prog Logic Cells Video Codec Unit (VCU) DisplayPort (GTR)		8x RF-ADC, 14-bit upto 5.0 GSPS 8x RF-DAC, 14-bit upto 8.92 GSPS USB-UART 16x Ultra-fast GTY Serial Transceivers 72x GPIOs 930 K Prog Logic Cells Ultra-low Jitter Prog Sampling Clocks Ext/On-board Prog TCXO Ref Clock	16x RF-ADC, 14-bit upto 2.5 GSPS 16x RF-DAC, 14-bit upto 9.85 GSPS USB-UART 16x Ultra-fast GTY Serial Transceivers 72x GPIOs 930 K Prog Logic Cells Ultra-low Jitter Prog Sampling Clocks Ext/On-board Prog TCXO Ref Clock	80 XPIO GPIO 22 HDIO GPIO 12 LPD MIO 13 PMC MIO 8 GTYP Serial Transceivers 329K Prog Logic Cells
Software/ OS Support	PetaLinux BSP	PetaLinux BSP	PetaLinux BSP		Avalon™ Software Suite	Avalon™ Software Suite	PetaLinux BSP
Core Power Requirements	5V to 12 V Input*	5V to 12 V Input*	5V to 12 V Input*		5.5V to 16V Input	5.5V to 16V Input	5V Input*
Operating Temp.	Commercial: 0° to 70°C Industrial: -40°C to +85°C	Commercial: 0° to 70°C Industrial: -40°C to +85°C	Extended: 0° to 85°C Industrial: -40°C to +85°C		Industrial: -40°C to +85°C	Industrial: -40°C to +85°C	Extended: 0° to 85°C Industrial: -40°C to +85°C

* Note: Additional input voltages may be required for IO bank voltages, transceivers, and VBAT.
** Note: Additional device options are available for custom builds

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QUALITY MANAGEMENT AND SUSTAINABILITY

Quality is fundamental to our work and it's a responsibility shared by everyone across the organization. From initial development to long-term service and support, it is embedded throughout the entire product lifecycle and strengthened through a culture of continuous improvement. This is how we consistently meet – and often exceed – our customers' expectations.

We have maintained certified management systems since 1999, with frameworks which address the normative requirements relating to quality, environmental management, occupational health and safety, sustainability and compliance. These standards underpin our operations and ensure we act responsibly, reliably and with long-term accountability.

- ✓ Manufacturing and assembly are conducted at our technology campuses, primarily in Germany.
- ✓ Project teams work closely with manufacturing and assembly to ensure consistent quality.
- ✓ Long-standing supplier partnerships safeguard component quality and provide comprehensive traceability across the supply chain.
- ✓ A comprehensive RMA and customer support process for reliability and responsive service.
- ✓ Long-term product support for the majority of our portfolio – in some cases extending to 35 years.
- ✓ High levels of quality certification, which can be found on our website. (13485:2016 only Eschbach)

ISO 45001:2018 ISO 13485:2016 ISO 14001:2015 ISO 9001:2015

Governance

We are committed to responsible environmental stewardship, sound social practices and robust corporate governance. Our approach is guided by comprehensive global policies addressing environmental protection, human rights, ethical conduct, responsible sourcing and workplace health and safety.
These policies ensure transparency, accountability, and sustainable business practices across Tria's global operations.

ENVIRONMENT

ETHICS AND COMPLIANCE

HUMAN RIGHTS

RESPONSIBLE SOURCING

WORKFORCE POLICIES



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OUR WORLDWIDE NETWORK

TRIA WORLDWIDE

Part of the Avnet family
Tria Technologies is a wholly owned subsidiary of Avnet Inc.

Tria's modules, systems and services are available worldwide through the Avnet distribution network. OEMs can incorporate Tria technology into their manufacturing workflow quickly and easily with Avnet's world-class logistics and supply chain integration.

1. Stutensee / Germany / Technology Campus
2. Eschbach / Germany / Technology Campus
3. Malta / Malta / Technology Campus
4. Munich / Germany / Design Center
5. Aachen / Germany / Design Center
6. Deggendorf / Germany / Design Center
7. Phoenix / USA / Technology Campus
8. Lyon / France / Design Center SW
9. Paris / France / Design Center SW
10. Seattle / USA / Design Center SW
11. Bristol / UK / Design Center SW

Headquarters Stutensee

Based in central Germany, our global headquarters leads the world in high-quality compute design and manufacturing.





Eschbach

In southern Germany, near Freiburg, Eschbach focuses on high-precision system assembly and integration, using cell-based assembly and robotics for industry-leading quality.

Malta

Our Malta Technology Campus manages the manufacturing and assembly of selected standard modules, as well as customer-specific projects for the EMEA region.





Phoenix, USA

Our US operations base in Chandler, Arizona serves as a global centre for design, integration and service, supporting North America and shipping to customers around the world.

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Use the QR code to connect with one of our Tria solutions experts and learn how we can guide you through your entire business journey.

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