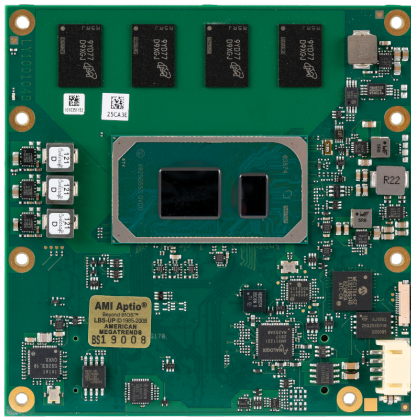


MSC C6C-TLU

Intel® Core™ 11th Generation



95 x 95



tbd



-40 +85



IoT Solutions Alliance

COM Express

Description

The MSC C6C-TLU module is based on the 11th Gen Intel® Core™ processor generation (codename "Tiger Lake UP3"). Built on 10nm process technology the processor integrates the next generation Intel micro architecture and graphics accelerators, memory controller and rich I/O functionality into a single package. The board is ideal for mission critical applications, that require the durability of a well-designed board including memory-down, 24/7 continuous operation, extended temperature specification, shock and vibration product performance and optional conformal coating.

It provides significant performance gains over previous Intel Core generations allowing for technology upgrades within existing power and cooling requirements defined by the system design. Typical applications are industrial IoT, medical equipment, on-board units, way-side controllers and outdoor POS terminals. The MSC C6C-TLU can drive up to four independent displays with a maximum of 4k resolution. The COM Express Type 6 interface allows direct access to display interfaces including DisplayPort, HDMI and the choice of LVDS versus eDP. With a maximum capacity of 32GB fast LPRRD4X memory soldered to the board the product satisfies even demanding applications. Optional in-band ECC capabilities allow for protecting code and data kept in memory. High speed IO includes up to nine PCIe Gen 3 lanes and four USB 3.1 interfaces. Mass storage can be supported via two SATA channels.

Highlights

- Scalable CPU performance
- Quad and dual core variants
- Power efficient processors
- Rugged module design
- 24/7 operation
- Extended temperature variants
- Optional conformal coating
- Long-term product availability
- Integrated Intel Gen12 graphics, max. 96 execution units
- Up to 32GB LPDDR4X memory, chip-down, dual-channel
- In-band ECC option
- Two SATA 6Gb/s mass storage interfaces
- Three DisplayPort/HDMI interfaces
- LVDS and Embedded DisplayPort interface
- Up to four independent displays
- DirectX 12, OpenGL 4.6, OpenCL 1.2/2.x driver support
- Four USB 3.1 Gen1/2 and eight USB 2.0 interfaces
- Two UARTs
- Up to nine PCI Express™ Gen 3 lanes
- One Gb Ethernet port
- TSN, TCC support
- UEFI Firmware
- Trusted Platform Module TPM 2.0

Technical Data - MSC C6C-TLU

Technology	x86
Formfactor	COM Express Compact
CPU	<p>Intel® Core™ i7-1185GRE quad-core 2.8/4.4 GHz, 8 threads, 96 EUs, 12MB L2, 28/15/12W TDP/cTDP down1/2, extended temperature</p> <p>Intel® Core™ i7-1185G7E quad-core 2.8/4.4 GHz, 8 threads, 96 EUs, 12MB L2, 28/15/12W TDP/cTDP down1/2</p> <p>Intel® Core™ i5-1145GRE quad-core 2.6/4.1 GHz, 8 threads, 80 EUs, 8MB L2, 28/15/12W TDP/cTDP down1/2, extended temperature</p> <p>Intel® Core™ i5-1145G7E quad-core 2.6/4.1 GHz, 8 threads, 80 EUs, 8MB L2, 28/15/12W TDP/cTDP down1/2</p> <p>Intel® Core™ i3-1115GRE dual-core 3.0/3.9 GHz, 4 threads, 48 EUs, 6MB L2, 28/15/12W TDP/cTDP down1/2, extended temperature</p> <p>Intel® Core™ i3-1115G4E dual-core 3.0/3.9 GHz, 4 threads, 48 EUs, 6MB L2, 28/15/12W TDP/cTDP down1/2</p> <p>Intel® Celeron® 6305E dual-core 1.8 GHz, 2 threads, 48 EUs, 4MB L2, 15W TDP</p> <p>Note: support for 24/7 operation supported by selected processor variants. Please see the order reference for details. Additional configuration settings may apply which are defined in the product manual.</p>
Chipset	Integrated in Multi-Chip-Package
RAM	Up to 32 GB SDRAM (up to LPDDR4X-4267); dual channel operation; memory down
Storage Interfaces	2x SATA 6Gb/s
USB	4x USB 3.1 Gen 1/Gen 2 8x USB 2.0
Serial Interfaces	2x high-speed serial ports from PCH
Bus Interfaces	PCI Express Gen3, 1x4 + 5x1 LPC bus (Low Pin Count bus; no DMA support)
Display Controller	<p>Integrated Intel Gen12 Gfx Engine</p> <p>Up to 96 execution units (EU)</p> <p>3D Acceleration: DirectX® 10/11/12, OpenGL 4.6, OpenCL™ 1.2/2.x; Video Decode/Encode: MPEG2, JPEG, HEVC, VP9, SCC, AV1, AVC</p>
Display Interfaces	<p>Four independent displays supported</p> <p>3x Digital Display Interface (DP 1.4, HDMI 2.0b)</p> <p>1x Embedded DisplayPort 1.4b</p> <p>1x LVDS 24bit, dual-channel;</p>
Network Interface	<p>10/100/1000Base-TX with TSN support</p> <p>I-Temp variants: Intel® i225-IT (1Gbit maximum at extended temperatures)</p> <p>C-Temp variants: Intel® i225-LM</p>
Audio Interface	High Definition Audio
Security Device	TPM 2.0

Miscellaneous	<p>Watchdog Timer: Initiates system reset, programmable</p> <p>Fan Supply: 4-pin header for CPU fan, PWM speed controlled and PWM speed control for system fan supported</p> <p>RTC battery: external</p> <p>System Monitoring: voltage, temperature, CPU fan, system fan</p>
Feature Highlights	Type 6 pin-out
Firmware	<p>UEFI Firmware: AMI Aptio® V</p> <p>Security: TPM 2.0 support, TCG compliant</p> <p>Power Management: ACPI Active fan control</p> <p>USB: USB legacy support (keyboard, mouse, storage)</p> <p>Monitoring: System Monitoring Health Monitoring</p> <p>MSC Adv. Boot Device Selection: Boot device priority setting based on physical interfaces</p>
OS Support	Windows 10 IoT Enterprise RS5 (64bit) BSP for Linux (Yocto)
Power Requirement	Voltage: +8.5V to +20V, +5V Stby optional Power Consumption: tbd W to tbd W (typ.)
Environment	<p>Ambient Temperature: 0° ... 60°C (operating) -25° ... 85°C (storage) Extended temp. variants: -40 ... +85°C (operating)</p> <p>Humidity: 5 ... 95% (operating, non-condensing), 5 ... 95% (storage, non-condensing)</p>
Dimensions	95mm x 95mm
Certificates	UL / CE

Order Reference - MSC C6C-TLU

Order Number	Description	Reference	Cat*
87769	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i7-1185GRE quad-core, 2.8/4.4GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 96 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 32GB LPDDR4X-4267 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1185GRE-5N301I PCBFTX	OR
87767	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i7-1185GRE quad-core, 2.8/4.4GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 96 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 16GB LPDDR4X-4267 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1185GRE-4N301I PCBFTX	PV
87765	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i7-1185GRE quad-core, 2.8/4.4GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 96 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 8GB LPDDR4X-4267 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1185GRE-3N301I PCBFTX	PV
87763	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i7-1185G7E quad-core, 2.8/4.4GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 96 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 32GB LPDDR4X-4267 memory.	MSC C6C-TLU-1185G7E-5N301C PCBFTX	OR
110677	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i5-1145GRE quad-core, 2.6/4.1GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 80 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 32GB LPDDR4X-4267 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1145GRE-5N301I PCBFTX	OR
87761	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i5-1145GRE quad-core, 2.6/4.1GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 80 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 16GB LPDDR4X-4267 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1145GRE-4N301I PCBFTX	OR

Order Reference - MSC C6C-TLU

Order Number	Description	Reference	Cat*
87759	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i5-1145GRE quad-core, 2.6/4.1GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 80 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 8GB LPDDR4X-4267 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1145GRE-3N301I PCBFTX	PV
87757	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i5-1145GRE quad-core, 2.6/4.1GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 80 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 4GB LPDDR4X-4267 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1145GRE-2N301I PCBFTX	PV
87755	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i5-1145G7E quad-core, 2.6/4.1GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 80 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 16GB LPDDR4X-4267 memory.	MSC C6C-TLU-1145G7E-4N301C PCBFTX	OR
87752	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i3-1115GRE dual-core, 3.0/3.9GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 48 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 16GB LPDDR4X-3733 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1115GRE-4N301I PCBFTX	OR
87753	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i3-1115GRE dual-core, 3.0/3.9GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 48 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 8GB LPDDR4X-3733 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1115GRE-3N301I PCBFTX	PV
87689	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i3-1115GRE dual-core, 3.0/3.9GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 48 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 4GB LPDDR4X-3733 memory, in-band ECC; -40...+85°C, recommended for 24/7 operation.	MSC C6C-TLU-1115GRE-2N301I PCBFTX	PV
87687	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Core U i3-1115G4E dual-core, 3.0/3.9GHz, 28/15/12W cTDP; Graphics: Intel Gen 12, 48 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 8GB LPDDR4X-3733 memory.	MSC C6C-TLU-1115G4E-3N301C PCBFTX	OR

*COM products are divided in two categories, „PV“ (preferred variant) and „OR“ (on request).

Order Reference - MSC C6C-TLU

Order Number	Description	Reference	Cat*
87771	COM Express Type 6 Compact module (95mm x 95mm); CPU: Intel Celeron 6305E dual-core, 1.8GHz, 15W TDP; Graphics: Intel Gen 12, 48 EUs; 3x DP/HDMI; 1x LVDS; 1x eDP; Ethernet: Intel i225 Gbit; HD audio; 2x SATA, 4x USB3, 8x USB2, PCIe Gen 3 1x4+5x1; TPM 2.0; 4GB LPDDR4X-3733 memory.	MSC C6C-TLU-6305E-2N301C PCBFTX	OR

*COM products are divided in two categories, „PV“ (preferred variant) and „OR“ (on request).

Accessories

Order Number	Description	Reference
Carrier Options		
67295	COM Express Type 6 Evaluation Carrier Board with PCI Express x4/x16 slot, USB 3.0/2.0, GbE, SATA, DisplayPort, eDP/LVDS, VGA and HD audio interfaces; Mini PCI Express socket, SD card slot, ATX power connector and single 12V power jack. Dimensions: 170mm x 170mm (Mini-ITX form factor)	MSC C6-MB-EV-001 PCBFTX
41857	COM Express Type 6 Evaluation Carrier Board with various PCI Express x1, x4 and x16 slots, USB 3.0/2.0, GbE, SATA, DisplayPort, HDMI, LVDS, eDP, VGA, HD audio interfaces; mSATA and Mini PCI Express sockets, POST code display, ATX power connector. Dimensions: 305 x 244 mm (ATX form factor)	MSC C6-MB-EVA PCBFTX
Cooling Options		
79809	Fan kit for Heatsink MSC HCA-ALP/RLP-0x HSI-xxx, MSC C6B-ALP/RLP-0x HSI-xxx, MSC C6B-TLH-0x HSI-xxx, MSC C6C-ALP/RLP-0x HSI-xxx, MSC C6C-TLU-0x HSI-xxx, MSC C6C-WLU-0x HSI-xxx, MSC C6C-ALN-0x HSI-xxx, MSC C6C-EL-0x HSI-xxx, MSC C6C-RYZx-0x HSI-xxx, PWM fan 80x80x15mm.	MSC C6C-FANKIT-01-HSF-001
84373	Passive Heatsink for C6C-TLU. Single-piece aluminum profile with fins, standoffs without thread (2.7mm inner diameter), screws and thermopad for the thermal contact to SOC and memory.	MSC C6C-TLU-01 HSI-001
84375	Heatspreader for C6C-TLU. Single-piece aluminum profile, standoffs without thread (2.7mm inner diameter), screws and thermopad for the thermal contact to SOC and memory.	MSC C6C-TLU-01 HSP-001
84377	Heatspreader for C6C-TLU. Single-piece aluminum profile with threaded standoffs (M2.5), screws and thermopad for the thermal contact to SOC and memory.	MSC C6C-TLU-02 HSP-001

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