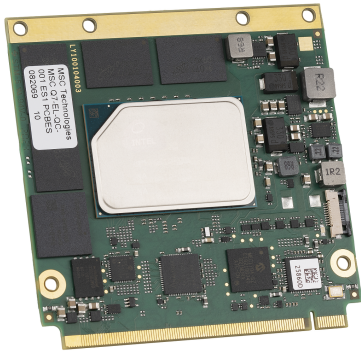


## MSC Q7-EL

Intel® Atom™ x6000E /  
Pentium® / Celeron® N and J  
Series SOC



70 x 70 mm



6 / 12 W



-40 +85



IoT Solutions  
Alliance



## Description

The new MSC Q7-EL module features Intel's next-generation low-power, multi-core system-on-chip (SOC) Atom generation (codenamed "Elkhart Lake"). Built on 10nm process technology the SoC integrates the next generation Intel Atom processor core architecture and graphics accelerators, memory controller and rich I/O functionality into a single package. The module is designed for extended temperature range and 24/7 operation making it an ideal platform for mission critical tasks that require a reliable and performant compute base. It provides significant performance gains over previous Atom generations allowing for technology upgrades within existing power and cooling requirements defined by the system design.

The new MSC Q7-EL offers triple independent display support with a maximum of 4k resolution, DirectX 12, fast LPDDR4x memory with up to 16GB and optional IB ECC capabilities, eMMC 5.1, USB 3.1 and PCIe Gen3 on a power saving and cost-efficient Q7 module.

Different SOC's with dual- and quad-core processors are supported by this design. In addition to an extensive set of interfaces and features, the MSC Q7-EL offers 1 Gigabit Ethernet with Time-Sensitive Networking (TSN) and 1 CAN-FD interface.

For evaluation and design-in of the MSC Q7-EL module, Avnet Embedded provides a suitable Q7 2.1 development platform. A complete, ready-to-run Starterkit is also available.

## Highlights

- Intel Atom x6xxxRE, Real-time Embedded SKU's, dual/quad-core (6W-12W)
- Intel Atom x6xxxE, Embedded SKU's, dual/quad-core (6W-12W)
- Intel Pentium/Celeron J64xx, PC Client SKU's, quad-core (6W-12W)
- Intel Pentium/Celeron N6xxx, PC Client SKU's, dual/quad-core (6.5W-12W)
- Integrated Intel UHD Graphics (Gen11)
- Up to 16GB LPDDR4x SDRAM with IB ECC (only Atom SKU's)
- Up to 256GB eMMC 5.1 Flash (optional)
- 2x SATA-III interface (6Gbps)
- 1x DP++
- 2x eDP 1.3 (1x DP) / MIPI-DSI 1.2 / 1 x dual channel LVDS
- Triple Independent Display support
- DirectX, OpenGL 4.5, OpenCL 1.2, Vulkan v1.1
- Up to 4x PCI Express x1/x2/x4 Gen. 3
- 2x USB 3.1 Host interfaces
- 8x USB 2.0 Host interfaces
- 1x USB 3.0/2.0 Dual Role Port (Host/Device)
- 1x Gigabit Ethernet with TSN/TCC
- 1x SGMII Interface on SATA-Port1 (optional)
- UART, LPC, SPI, I2C, SMBus
- 1x CAN-FD
- HD Audio, SD Card interface
- Trusted Platform Module (optional)
- Qseven Rev. 2.1 compliant
- UEFI Firmware

## Technical Data - MSC Q7-EL

<b>Technology</b>	x86
<b>Formfactor</b>	Qseven
<b>CPU</b>	<p>Intel Atom x6425RE Processor, quad-core 1.9GHz, 32EU, TCC, IBECC, 12W, IUC  Intel Atom x6416RE Processor, quad-core 1.7GHz, 16EU, TCC, IBECC, 9W, IUC  Intel Atom x6414RE Processor, quad-core 1.5GHz, 16EU, TCC, IBECC, 9W, IUC  Intel Atom x6214RE Processor, dual-core 1.4GHz, 16EU, TCC, IBECC, 6W, IUC  Intel Atom x6212RE Processor, dual-core 1.2GHz, 16EU, TCC, IBECC, 6W, IUC  Intel Atom x6425E Processor, quad-core 2.0/3.0GHz, 32EU, IBECC, 12W, EUC  Intel Atom x6413E Processor, quad-core 1.5/3.0GHz, 16EU, IBECC, 9W, EUC  Intel Atom x6211E Processor, dual-core 1.3/3.0GHz, 16EU, IBECC, 6W, EUC  Intel Pentium J6426 Processor, quad-core 2.0/3.0GHz, 32EU, 10W, PUC  Intel Pentium N6415 Processor, quad-core 1.2/3.0GHz, 16EU, 6.5W, PUC  Intel Celeron J6413 Processor, quad-core 1.8/3.0GHz, 16EU, 10W, PUC  Intel Celeron N6211 Processor, quad-core 1.2/3.0GHz, 16EU, 6.5W, PUC</p> <p>Intel® Technologies:  Enhanced Intel® SpeedStep® Technology  Intel® Virtualization Technology (VTx-2, VT-d)  Intel® Trusted Execution Engine (TXE)  Intel® Time Coordinated Computing (TCC)  Precision Time Measurement (PTM)  Precision Time Measurement (PTP)</p> <p>IUC - Intel Industrial Use Conditions  EUC - Intel Embedded Use Conditions  PUC - Intel PC Client Use Conditions</p>
<b>Chipset</b>	Integrated in SOC
<b>RAM</b>	Up to 16GB LPDDR4x SDRAM, up to 4267MT/s, IBECC (only Atom SKU's), soldered
<b>Flash</b>	Up to 256GB eMMC 5.1 Flash (optional)
<b>Storage Interfaces</b>	2x SATA-III 6Gbps 1x SD 3.01/SDIO 3.0
<b>USB</b>	2x USB 3.1, 6x USB 2.0, 1x Dual Role Port (Host/Device)* or 1x USB 3.1, 8x USB 2.0, 1x Dual Role Port (Host/Device)*
	*One USB 3.1 port according to Qseven Rev. 2.1 (only SS signals)
<b>Serial Interfaces</b>	1x UART (no handshake)
<b>Bus Interfaces</b>	Up to 4x PCI-Express x1 Gen. 3 lanes 1x LPC Bus 1x I2C Bus 1x SPI Bus 1x SMBus 1x CAN-FD (Flexible Data-Rate)
<b>Display Controller</b>	Integrated Intel UHD Graphics (Gen11) Up to 32 execution units (EU) 3D Acceleration: DirectX, OpenGL 4.5, OpenCL 1.2, Vulkan 1.0 Video Decode: MPEG-2, H.265/HEVC (L5.1), H.264, (L5.2), VC-1, WMV9, VP8, VP9, MVC, JPEG/MJPEG

<b>Display Interfaces</b>	Three independent displays supported  1x DP++ 2x eDP 1.3 (1x DP)/ MIPI-DSI 1.2 / 1x dual channel LVDS Dual-Channel LVDS 24/18 bit up to 1920 x 1200 @ 60Hz or Embedded DisplayPort 1.3 up to 4096 x 2160 @ 60Hz and MIPI-DSI x4 Interface up to 2560 x 1600 @ 60Hz (optional)
<b>Network Interface</b>	10/100/1000Base-T 1x SGMII Interface on SATA-Port1 (optional)
<b>Audio Interface</b>	High Definition Audio
<b>Security Device</b>	Infineon Trusted Platform Module 2.0 (optional)
<b>Miscellaneous</b>	Watchdog Timer: Initiates system reset, (programmable, 1s ... 255h) Fan Supply: PWM Speed Control for system fan on carrier board RTC battery: external System Monitoring: Voltage, Temperature, CPU Fan, System Fan
<b>Feature Highlights</b>	Qseven Rev.2.1 compliant
<b>Firmware</b>	AMI Aptio UEFI
<b>OS Support</b>	Windows 10 IoT Enterprise RS5 (64bit) Linux (Yocto Project)
<b>Power Requirement</b>	+5V +/-5% +5V Standby
<b>Environment</b>	Temperature Range: Commercial: 0° ... 60°C (operating)    -20° ... 85°C (storage) Extended: -25° ... 85°C (operating)    -40° ... 85°C (storage) Industrial: -40° ... 85°C (operating)    -40° ... 85°C (storage)  Humidity: 5 ... 95% (operating, non-condensing) 5 ... 95% (storage, non-condensing)
<b>Dimensions</b>	70 x 70 mm
<b>Certificates</b>	UL / CE
<b>Cooling</b>	Heatspreader Heatsink
<b>Carrier</b>	MSC Q7-MB-EP5 MSC Q7-MB-EP6

## Order Reference - MSC Q7-EL

Order Number	Description	Reference	Cat*
76106	Qseven 2.1 module with Intel Atom x6425RE, Quad-Core (1.9GHz), 12W, 16GB LPDDR4x (3200 MT/s), IB ECC, 32EU, TCC, 64GB eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, LVDS, IUC (Industrial use conditions), industrial temperature -40...+85°C	MSC Q7-EL-x6425RE-46N0211I PCBFTX	PV
76102	Qseven 2.1 module with Intel Atom x6414RE, Quad-Core (1.5GHz), 9W, 4GB LPDDR4x (3733 MT/s) IB ECC, 16EU, TCC, 32GB eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, LVDS, IUC (Industrial use conditions), industrial temperature -40...+85°C	MSC Q7-EL-x6414RE-25N0211I PCBFTX	PV
76098	Qseven 2.1 module with Intel Atom x6212RE, Dual-Core (1.2GHz), 6W, 4GB LPDDR4x (3733 MT/s) IB ECC, 16EU, TCC, 16GB eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, LVDS, IUC (Industrial use conditions), industrial temperature -40...+85°C	MSC Q7-EL-x6212RE-24N0211I PCBFTX	PV
76104	Qseven 2.1 module with Intel Atom x6425E, Quad-Core (2.0GHz/3.0GHz), 12W, 16GB LPDDR4x (3200 MT/s), IB ECC, 32EU, 64GB eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, LVDS, EUC (Embedded use conditions), extended temperature -25°C...+85°C	MSC Q7-EL-x6425E-46N0211E PCBFTX	PV
76100	Qseven 2.1 module with Intel Atom x6413E, Quad-Core (1.5GHz/3.0GHz), 9W, 8GB LPDDR4x (3733 MT/s), IB ECC, 16EU, 32GB eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, LVDS, EUC (Embedded use conditions), extended temperature -25°C...+85°C	MSC Q7-EL-x6413E-35N0211E PCBFTX	PV
76096	Qseven 2.1 module with Intel Atom x6211E, Dual-Core (1.3GHz/3.0GHz), 6W, 4GB LPDDR4x (3733 MT/s), IB ECC, 16EU, 16GB eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, LVDS, EUC (Embedded use conditions), extended temperature -25°C...+85°C	MSC Q7-EL-x6211E-24N0211E PCBFTX	PV
98119	Qseven 2.1 module with Intel Atom x6425E, Quad-Core (2.0GHz/3.0GHz), 12W, 16GB LPDDR4x (3200 MT/s), IB ECC, 32EU, no eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, eDP, IUC (Industrial use conditions), industrial temperature -40...+85°C	MSC Q7-EL-x6425E-4NN0111I PCBFTX	OR
93069	Qseven 2.1 module with Intel Atom x6425E, Quad-Core (2.0GHz/3.0GHz), 12W, 8GB LPDDR4x (3733 MT/s), IB ECC, 32EU, no eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, LVDS, EUC (Embedded use conditions), extended temperature -25°C...+85°C	MSC Q7-EL-x6425E-3NN0211E PCBFTX	OR
95692	Qseven 2.1 module with Intel Atom x6425RE, Quad-Core (1.9GHz), 12W, 16GB LPDDR4x (3200 MT/s), IB ECC, 32EU, TCC, no eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, eDP, IUC (Industrial use conditions), industrial temperature -40...+85°C	MSC Q7-EL-x6425RE-4NN0111I PCBFTX	OR
76094	Qseven 2.1 module with Intel Pentium J6426, Quad-Core (2.0GHz/3.0GHz), 10W, 16GB LPDDR4x (3200 MT/s), 32EU, 64GB eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, LVDS, PUC (PC Client use conditions), standard temperature 0...+60°C	MSC Q7-EL-J6426-46N0211C PCBFTX	OR

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

## Order Reference - MSC Q7-EL

Order Number	Description	Reference	Cat*
76108	Qseven 2.1 module with Intel Celeron J6413, Quad-Core (1.8GHz/3.0GHz), 10W, 8GB LPDDR4x (3733 MT/s), 16EU, 16GB eMMC, 1x GbE LAN, 2x USB 3.1, 6x USB 2.0 (1x Host/Device), TPM 2.0, LVDS, PUC (PC Client use conditions), standard temperature 0...+60°C	MSC Q7-EL-J6413-34N0211C PCBFTX	OR

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

## Accessories

Order Number	Description	Reference
<b>Carrier Options</b>		
67690	Qseven Rev. 2.0 compatible embedded platform (148 x 102mm), 10-28V input voltage, 1x RS232 on DB9 connector, 1x RS485 on pin header, 1x RS232 no handshake on pin header, dual RJ45 LAN connector with LED, 1x SATA, 1x mSATA slot, SD card holder, 1x USB 3.0 connector, 2x USB 2.0 connector, 1x USB 2.0 on pin row, 1x microUSB 2.0 OTG, CAN, I2C, LPC/GPIO on pin header, I2C/SMBus, SPI, DisplayPort connector, LVDS/eDP on JIL130 connector, regulated backlight supply, mini PCI Express slot, HD Audio, CMOS battery. Commercial temperature range 0..+70°C	MSC Q7-MB-EP6-601 PCBFTX
<b>Cooling Options</b>		
82416	Passive Heatsink for Q7-EL (only variants with Atom) with through-hole distance bolts, consisting of a single-piece aluminium profile with fins and thermo pad for the thermal contact to the CPU, M3 mounting holes for an optional fan	MSC Q7-EL-01 HSI-001
84847	Heatspreader for Q7-EL (only variants with Atom) with through-hole distance bolts, only offers a 70x65mm aluminium plane to mount a heatsink or thermally connect to a cooler	MSC Q7-EL-01 HSP-001
84848	Passive Heatsink for Q7-EL (only variants with Pentium/Celeron) with through-hole distance bolts, consisting of a single-piece aluminium profile with fins and thermo pad for the thermal contact to the CPU, M3 mounting holes for an optional fan	MSC Q7-EL-02 HSI-001
84849	Heatspreader for Q7-EL (only variants with Pentium/Celeron) with through-hole distance bolts, only offers a 70x65mm aluminium plane to mount a heatsink or thermally connect to a cooler	MSC Q7-EL-02 HSP-001
97724	Heatspreader for Q7-EL (only variants with Atom) with through-hole distance bolts and 4 through-holes in the heatrail part, all holes for countersunk screws, only offers a 70x65mm aluminium plane to mount a heatsink or thermally connect to a cooler	MSC Q7-EL-03-HSP-001
1053769	Heat rail for Q7 baseboards. Recommended for conductive heat transfer from the Q7 module to the Q7 baseboard. Already assembled on all MSC baseboards.	MSC Q7-XXX-01 HTR-001