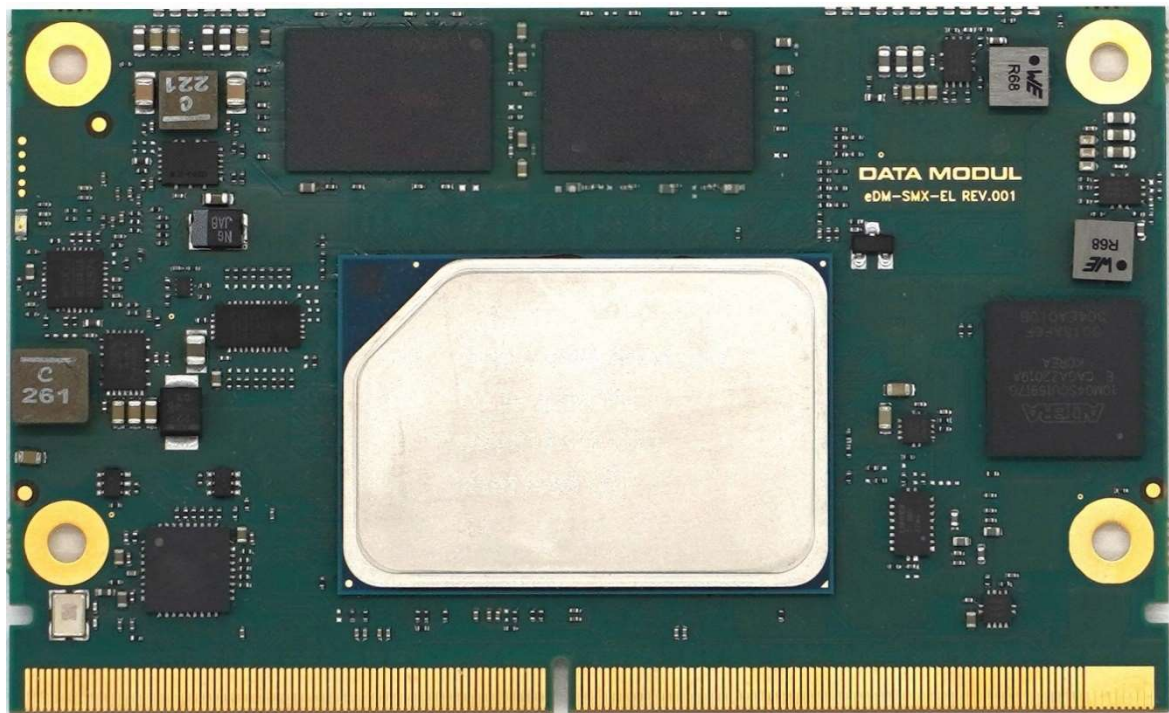**DATA MODUL**

Datasheet

eDM-SMX-EL

SMARC module
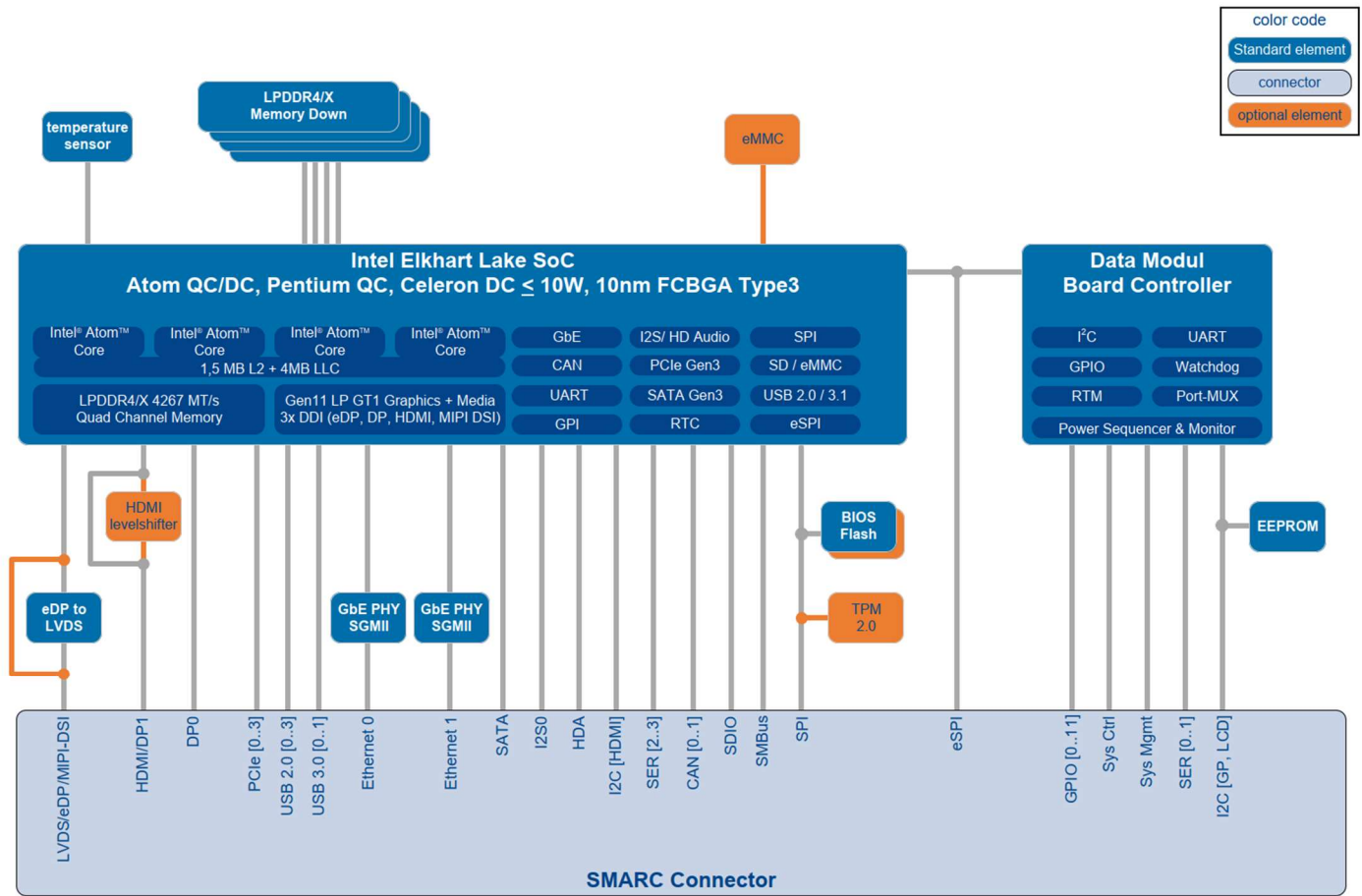

FEATURES

> Intel® Atom® x6000E, Celeron® and Pentium® Processor Series ("Elkhart Lake")

> Intel UHD Graphics (Gen 11LP)

> Up to 16 GByte LPDDR4X memory down with Inband ECC support

> Industrial temperature range

> Up to 2x Gigabit Ethernet

DATA MODUL

TECHNICAL INFORMATION

Form factor	SMARC 2.1
Dimension	82 x 50 mm
CPU	Intel® Atom® x6000E, Celeron® and Pentium® Processor Series ("Elkhart Lake")
Memory	From 2 Gbyte to 16 GByte LPDDR4X memory down with up to 4267 MT/s (LPDDR4 on request) and Inband ECC support
Mass Storage	Up to 64 GByte onboard flash eMMC 5.1 (Other memory density on request)
Graphics	Intel® UHD Gfx Gen 11LP
Display/Monitor Interfaces	1x LVDS dual channel up to 1920x1200 @60Hz (on request eDP or MIPI-DSI with 4kp60) 2x DP++ / Digital Display Interface (DDI) up to 4kp60 (on request 1x HDMI 1.4b)
Ethernet	Up to 2x GbE Ethernet (on request 2.5 GbE Ethernet)
Sound	HD Audio
I/O Interfaces	2x USB 3.1 Gen2 (10 Gbps) 6x USB 2.0 (480 Mbits) 1x SATA Gen3 Up to 4x PCIe Gen3 (configurable as 4 x1, 2 x2 or 1 x4) 1x SDIO 2x CAN 4x UART (2x with RTS and CTS) 1x SPI 1x eSPI 12x GPIOs 3x I2C
Special Features	Automatic BIOS recovery (on request)
Security and Features	Trusted Platform Module TPM 2.0 (on request)
BIOS	AMI Aptio V Display control and auto detection Backlight control Secure boot customization on request
Data Modul Embedded Controller (DMEC)	Multistage Watchdog (supports window mode) I2C fast mode up to 800 kHz and multi-master support, automatic bus clear feature Running time meter and Boot counter UARTs are 16550a compliant and support legacy I/O addresses (no extra driver required) Alternate GPIO functions including PWM (2x 8bit or 1x 16bit, supports center mode), DSR/DTR and one additional I2C
Power Supply	5V
Operating Systems	Microsoft® Windows 10, Windows 10 IoT , Linux, Yocto
Temperature	Commercial Temperature: 0°C to +60°C operating, -20°C to +80°C storage Industrial temperature: -40°C to +85°C operating,-40°C to +85°C storage
Humidity	Operating: ‹ 80% RH non-condensing
Safety, Shock and Vibration	Designed to meet EN60950, IEC/EN60068-2-27 and IEC/EN60068-2-6
Available Certificates	RoHS, REACH, UL

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BLOCK DIAGRAM

color code
Standard element
connector
optional element

temperature sensor

LPDDR4/X Memory Down

eMMC

Intel Elkhart Lake SoC
Atom QC/DC, Pentium QC, Celeron DC ≤ 10W, 10nm FCBGA Type3

| Intel® Atom™ Core | Intel® Atom™ Core | Intel® Atom™ Core | Intel® Atom™ Core |
| 1,5 MB L2 + 4MB LLC | | | |

GbE	I2S/ HD Audio	SPI
CAN	PCIe Gen3	SD / eMMC
UART	SATA Gen3	USB 2.0 / 3.1
GPI	RTC	eSPI

LPDDR4/X 4267 MT/s Quad Channel Memory

Gen11 LP GT1 Graphics + Media 3x DDI (eDP, DP, HDMI, MIPI DSI)

Data Modul Board Controller

I²C	UART
GPIO	Watchdog
RTM	Port-MUX
Power Sequencer & Monitor	

HDMI levelshifter

BIOS Flash

EEPROM

eDP to LVDS

GbE PHY SGMII
GbE PHY SGMII

TPM 2.0

SMARC Connector

SMARC connector signals: LVDS/eDP/MIPI-DSI, HDMI/DP1, DP0, PCIe [0..3], USB 2.0 [0..3], USB 3.0 [0..1], Ethernet 0, Ethernet 1, SATA, I2S0, HDA, I2C [HDMI], SER [2..3], CAN [0..1], SDIO, SMBus, SPI, eSPI, GPIO [0..11], Sys Ctrl, Sys Mgmt, SER [0..1], I2C [GP, LCD]

CPU Variants

Processor	TDP	Cores	Base / Max. Turbo frequency	L2 cache	Use Condition	Graphics Gen 11
Intel® Atom® x6211E	6 W	2	1.3 / 3.0 GHz	1.5 MB	Embedded	16 EU
Intel® Atom® x6413E	9 W	4	1.5 / 3.0 GHz	1.5 MB	Embedded	16 EU
Intel ® Atom® x6425E	12 W	4	2.0 / 3.0 GHz	1.5 MB	Embedded	32 EU
Intel® Atom® x6212RE	6 W	2	1.2 GHz	1.5 MB	Industrial	16 EU
Intel® Atom® x6425RE	12 W	4	1.9 GHz	1.5 MB	Industrial	32 EU

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ORDERING INFORMATION

Article	Part Nr.	Description
eDM-SMX-EL-6211E	12049568	SMARC CPU Module with Intel® Atom® x6211E Processor 1.2/3.0 GHz Dual Core and 4 Gbyte 4267 MT/s LPDDR4X memory down.
eDM-SMX-EL-6413E	12049570	SMARC CPU Module with Intel® Atom® x6413E Processor 1.5/3.0 GHz Quad Core, 8 Gbyte 4267 MT/s LPDDR4X memory down and 16 GByte Onboard Flash.
eDM-SMX-EL-6425E	12048995	SMARC CPU Module with Intel® Atom® x6425E Processor 1.8/3.0 GHz Quad Core, 16 Gbyte 3200 MT/s LPDDR4X memory down and 64 GByte Onboard Flash.
eDM-SMX-EL-6212RE	12049571	SMARC CPU Module with Intel® Atom® x6212RE Processor 1.2 GHz Dual Core, 4 Gbyte 4267 MT/s LPDDR4X memory down. Operating temperature range from -40°C to 85°C.
eDM-SMX-EL-6425RE	12049572	SMARC CPU Module with Intel® Atom® x6425RE Processor 1.9 GHz Quad Core, 8 Gbyte 4267 MT/s LPDDR4X memory down, 32 GByte Onboard Flash. Operating temperature range from -40°C to 85°C.

Accessories	Part Nr.	Description
eDM-CB-SM-IPCS	12048321	Carrier Board for SMARC 2.0 modules
eDM-SMX-EL-eCH	12050607	Heatspreader for eDM-SMX-EL Intel® Atom® x6000E Processors
eDM-SMX-EL-eCP	12050608	Passiv cooling solution for eDM-SMX-EL Intel ® Atom® x6000E Processors