

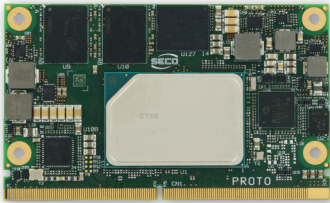


SM-C93

SMARC® Rel 2.1.1 compliant module with the Intel® Atom® x6000E Series and Intel® Pentium® and Celeron® N and J Series processors (formerly Elkhart Lake) for FuSa applications

The first SMARC module specifically designed for Functional Safety (FuSa) of Safety-related systems

HIGHLIGHTS

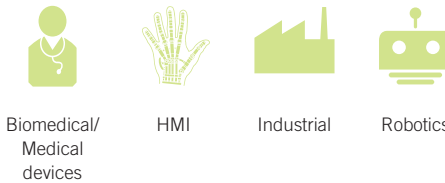


CPU Intel® Atom® x6000E Series and Intel® Pentium® and Celeron® N and J Series processors	CONNECTIVITY 2x GbE with precision time protocol IEEE 1588, optional SERDES for external 3rd Ethernet, 6x USB 2.0, 3x USB 3.1, up to 4x PCI-e
GRAPHICS Integrated Gen11 UHD Graphics controller supporting 3 independent displays	MEMORY Quad Channel LPDDR4x Soldered Down with IBCEC

Available in Industrial Temperature Range



MAIN FIELDS OF APPLICATION



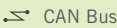

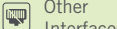

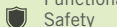

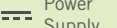
FEATURES

Processor	Intel® Atom™ x6000E CPUs certified for FuSa, compliant to IEC 61508 and ISO 13849 requirements for Functional Safety and Safety Integrity Levels: <ul style="list-style-type: none"> Atom™ x6427FE Quad Core @1.9GHz (no Turbo) 12W TDP w/ IBCEC, IHS and TCC, FuSa Certified - Ind. Temp. Range Atom™ x6200FE Dual Core @1.0GHz (no Turbo) 4.5W TDP no Graphics w/ IBCEC, IHS and TCC, FuSa Certified - Ind. Temp. Range 	Memory 32-bit LPDDR4x Soldered Down Memory Up to 16GB Quad Channel with In-Band Error Correction Code (IBCEC, Safety Related feature) supported 4GB Dual Channel, 8GB or 16GB Quad Channel supported Speed: 4267MT/s single rank (1GB / 2GB / 4GB / 8GB), 3733MT/s dual rank (16GB)
	Other Intel Atom™ x6000E, Pentium® and Celeron® N and J Series CPUs: <ul style="list-style-type: none"> Celeron® J6413 Quad Core @ 1.8GHz (3.0GHZ Turbo) 10W TDP - Comm. Temp. Range Celeron® N6211 Dual Core @1.2GHz (3.0GHZ Turbo) 6.5W TDP - Comm. Temp. Range Pentium® J6426 Quad Core @2GHz (3.0GHZ Turbo) 10W TDP - Comm. Temp. Range Pentium® N6415 Quad Core @1.2GHz (3.0GHZ Turbo) 6.5W TDP - Comm. Temp. Range Atom™ x6211E Dual Core @1.3GHz (3.0GHZ Turbo) 6W TDP w/ IBCEC and IHS - Ind. Temp. Range Atom™ x6413E Quad Core @1.5GHz (3.0GHZ Turbo) 9W TDP w/ IBCEC and IHS - Ind. Temp. Range Atom™ x6425E Quad Core @2GHz (3.0GHZ Turbo) 12W TDP w/ IBCEC and IHS - Ind. Temp. Range Atom™ x6212RE Dual Core @1.2GHz (no Turbo) 6W TDP w/ IBCEC, IHS and TCC - Ind. Temp. Range Atom™ x6414RE Quad Core @1.5GHz (no Turbo) 9W TDP w/ IBCEC, IHS and TCC - Ind. Temp. Range Atom™ x6425RE Quad Core @1.9GHz (no Turbo) 12W TDP w/ IBCEC, IHS and TCC - Ind. Temp. Range (*) IHS: Integrated Heatspreader; TCC: Time Coordinated Computing	Graphics Up to 3 independent displays Integrated Gen11 UHD Graphics controller with up to 32 EU 4K HW decoding and encoding of HEVC (H.265), H.264, VP8/VP9, WMV9/VC1 (decoding only) DirectX 12.1, OpenGL ES 3.1, OpenGL 4.5, OpenCL™ 1.2, Vulkan 1.0
Max Cores	4	Video Interfaces eDP 1.3 or Dual Channel 18/24bit LVDS interface (factory options) 2 x DP++ 1.4 or 1x DP++ 1.4 and 1x HDMI 1.4 interfaces
		Video Resolution Up to 4096x2160 @60Hz
		Mass Storage 1 x external S-ATA Gen3 Channel SDIO interface Optional eMMC 5.1 drive soldered on-board (Safety Related)
		Networking 2x Gigabit Ethernet PHY with precision clock synchronization and synchronous Ethernet clock output for IEEE 1588 (Safety Related – Black channel). Optional SERDES (SGMII) Interface for additional third Gigabit Ethernet (factory option, alternative to fourth PCI-e lane)
		USB 6 x USB 2.0 Host Ports 2 x USB 3.1 Gen2 Ports
		PCI-e Up to 4 x PCI-e Gen3 Lanes
		Audio HD Audio interface
		Serial Ports 2 x HS-UARTs (Safety Related) 2 x UARTs

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	CAN Bus	2x		Operating System	Microsoft® Windows 10 Enterprise (64 bit) Linux Yocto 64-bit
	Other Interfaces	Up to 14x GPIOs SM Bus Power Management Signals I2C Bus 1x SPI interface for boot 1x General Purpose SPI or eSPI (Factory Alternatives)		Operating Temperature*	-40°C ÷ +85°C (Industrial version)
	Functional Safety features	FuSa Interface signals for IEC 61508 and ISO 13849		Dimensions	50 x 82 mm
	Power Supply	+5V _{DC} and +3.3V _{RTC}	*Measured at any point of SECO standard heatspreader for this product, during any and all times (including start-up). Actual temperature will widely depend on application, enclosure and/or environment. Upon customer to consider application-specific cooling solutions for the final system to keep the heatspreader temperature in the range indicated.		

BLOCK DIAGRAM

