# uCLS1012A
IoT Module

overview

The uCLS1012A is a 64-bit System-on-Module (SoM) that uses an NXP QorIQ® LS1012A communications processor. The module is ideal for edge IoT and connected industry applications that require digital networking performance combined with wired or wireless peripheral connectivity, including sensor gateways, communication hubs and secure edge devices.

The CPU features an Arm® Cortex®-A53 core running at 800MHz and offers hardware acceleration for packet processing and security. The Arm v8 architecture supports standard Docker containers, simplifying code development and deployment. In addition to the CPU, the module supports optional BLE and Thread® wireless networking, audio and voltage tolerant I/O expansion.

The 82x50mm uCLS1012A module implements the LS1012A CPU, SPI NOR flash, DDR3-SDRAM, 2x 1Gb Ethernet, PCIe, USB 3.0, SDHC, SATA, I2C, SPI, UART, reset and power management functions. Optional controllers support concurrent BLE (PAN) and Thread (6LoWPAN) 802.15.4 wireless operation, wide-band voice communication and I/O connectivity with flexible voltage tolerance. The module integrates using a 314-pin SMARC compatible edge connector and requires minimal external circuity for basic applications.

Arcturus offers a development kit, OS software, plus available SIPxtream™ hardened voice and video communications and Mbarx™ Secure IoT solution stacks. Various types of engagement packages are available for support, customization and system-level solution development.

arm GOLD PARTNER NXP
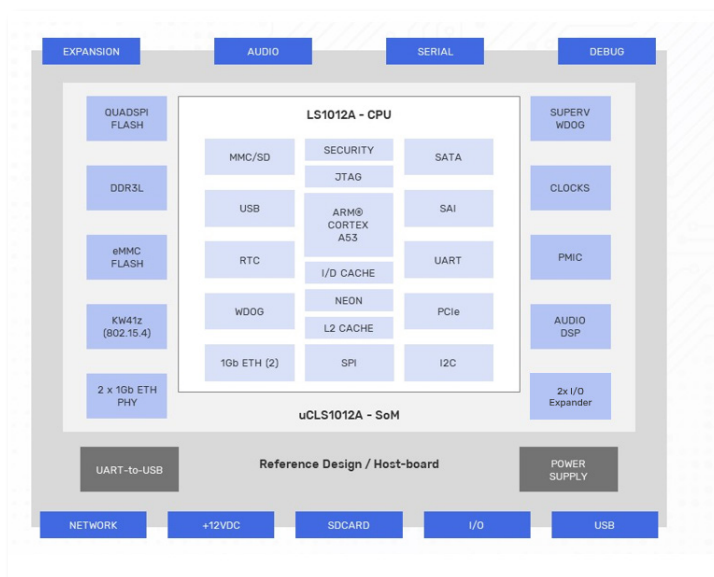
High-performance edge communications.

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software and solutions

Arcturus offers several levels of software, solutions and support, starting with a development kit for evaluation and enablement.

Development kit

A cost-effective development kit is available for evaluation of module hardware. The development kit includes access to a dedicated support site for documentation, Mbarx tools and Linux BSP download. Installation support is provided with the development kit.

Application Software Enablement

Arcturus provides specialized software including Mbarx Secure IoT endpoint or gateway stacks and SIPxtream hardened voice / video communications. Demos are available along with compile-time integration options for host applications, customization and support. Arcturus software is bundled easily with hardware and can be factory programmed to simplify production.

Mbarx Secure IoT Gateway

Mbarx Site Controller gateway stack is for the secure management of remote IoT sites. A demonstration of this capability is built into Mbarx System Manager tool, allowing secure management of devices at a remote Arcturus test lab. Mbarx components work with each other to form a system-level, chain-of-trust architecture for connected devices.

Mbarx Operations Controller gateway stack is for interactive workflow systems that require users, groups, notifications and device operational control. It is ideal for developing applications such as patient care systems or building access controllers. It supports workflow control of voice, video, SMS and provides interactive html5 presentation.

System Solutions

System Solutions engagements combine Arcturus hardware, software and expertise to create turn-key systems for OEMs. Packages are tailored to specific project needs and leverage a broad portfolio of software and tools.

features

CPU Complex

- NXP QorIQ LS1012A CPU
- 64-bit, 800MHz, Arm v8, Cortex-A53 core
- NEON co-processor and DP FPU
- 256 KB L2 cache with ECC

Memory

- 1Gbyte DDR3-SDRAM (up to 128Gbyte)
- 64 Mbyte Quad SPI NOR flash (up to 128Mbyte)
- 4 Gbyte eMMC Flash (up to 32Gbyte optional)

CPU Peripherals

- 2x 1Gb Ethernet (PHYs on module)
- PCI Express Gen2
- SATA Gen3
- USB 3.0
- SD 3.0/SDIO/eMMC
- SPI, UART, I2C, I2S,/SAI
- UART(Tx/Rx)
- Additional UART with RTS/CTS flow control*
- Additional 1xI2S**

I/O Expander (optional)

- Up to 2x NXP PCA9575 I/O expanders
- Up to 16x GPIO (flexible voltage range)

Wireless Peripheral Controller (optional)

- NXP Kinetis KW41z microcontroller
- Integrated multiprotocol 2.4GHz radio
- Thread (6LoWPAN), IEEE 802.15.4 MAC/PHY
- BlueTooth Low Energy (BLE) v4.2
- Concurrent Thread and BLE operation
- Optional FSK and SMAC modes
- Ceramic or external antenna options
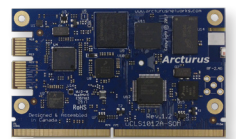- 5x ADC, SPI, I2C, 5x GPIO

Audio Subsystem (optional)

- Conexant CX20703 audio subsystem with DSP
- 16-bit PCM with 16KHz sample rates
- Audio intelligibility enhancements (AEC, AGC, noise reduction)
- Far-field mic, beam forming (optional)
- Line input (differential pair) – 1.0 Vrms (2.8Vp-p) @ 5-15 kΩ
- Line output – (differential pair) – 1.0 Vrms (2.8Vp-p) @ 5-15 kΩ
- Digital microphone input
- Optional digital I2S output
- Low-power mono class-D amp up to 1W (4/8Ω)

Connectivity and Physical

- 314-pin SMARC edge connector form-factor
- 82x50mm
- 3.3 VDC power input
- -40 to +105°C operating range (Tj)

Host Board and Reference

- 12VDC power supply input
- Board level power supply and connectors
- USB CONSOLE connector
- 2x RJ45 Ethernet connectors
- USB 3.0 hub with USB connectors
- mPCIe connector
- Digital and analog audio connectors
- Class-D audio power amp with speaker output
- 8x inputs (push buttons) and 8 outputs (LEDs)
- Isolation on dedicated I/O
- Arduino compatible expansion connector
- Optional LoRA, Wi-Fi and BlueTooth via 3rd party modules

module configuration without KW41zconnected
*** module configuration without CX20703 connected**

- **64-BIT NXP LS1012A CPU**
- **800MHZ ARMV8, CORTEX-A53 CORE**
- **BLE AND THREAD CONNECTIVITY**
- **LINUX BSP AND DOCKER SUPPORT**
- **MBARX AND SIPXTREAM SOFTWARE**

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connectivity
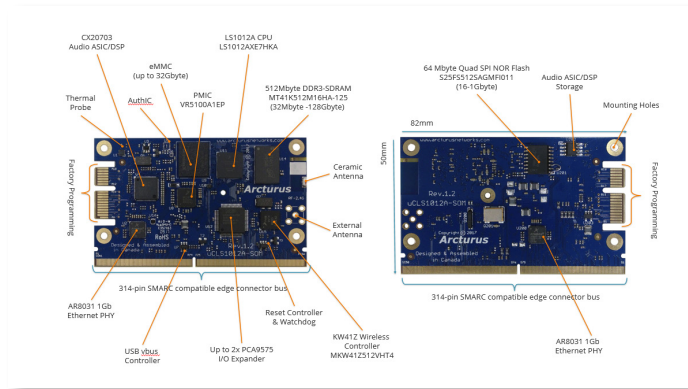
Component	Connectivity	Alt Function	Note
LS1012A CPU			No
	I2C1	Serial or I/O	Shared with PMIC, CX20703 and Temp probe
	USB3	-	VBUS control provided, external VBUS power required
	SDHC1		Available when not used for on board eMMC or SDCARD
	GPIO	-	Dedicated factory reset
	SERDES	-	PCIe or SATA
	UART1 (console)	-	Tx and Rx only
	UART2	I/O	CTS and RTS flow control - connected to KW41z by default
	SPI (SDHC2)	I/O	Two chip selects available (CS_1, CS_2)
PCA9575 I/O Expander (2)			
Host Interface	LS1012A - I2C (I2C1)	-	Optional components
	Up to 8x inputs (1.1 to 3.6 V)		Each PCA9575 supports 8x I/O
	Up to 8x outputs (1.1 to 3.6 V)		Voltage supplied externally
KW41Z Wireless Controller			
Host Interface	LS1012A - UART2	-	Optional component
	802.15.4 Radio	-	
	Thread / BLE stack	-	Additional software
	external antenna	-	SMA coaxial connector option
	onboard antenna	-	Ceramic antenna option
	4x ADC	-	
	SPI	-	
	5x GPIO	-	
	I2C	-	
CX20703 Audio Subsystem			
Host Interface	LS1012A - SAI2, I2C1	-	Optional component
	SPI Flash	-	Required by CX20703
	D-to-A / A-to-D	-	8 and 16 KHz sample rates
	1W low-power audio amplifier	-	Low power class-D
	digital audio in/out	-	I2S out, digital microphone in
	analog balanced audio in/out	-	
	audio intelligibility enhancements	-	AEC, noise reduction...
	GPIO	-	
ETH A Transceiver / Phy			
Host Interface	LS1012A - SGMIIA	-	Link, speed, activity LED outputs
ETH B Transceiver / Phy			
Host Interface	LS1012A - SGMIIB	-	optional component link, speed, activity LED outputs

ratings and physical

Powered Direct	Specification
Supply voltage	3.3VDC (nominal)
Tolerance range	TBD
Theoretical Max	TBD

Physical	Description
Dimensions (Module)	82mm (l) x 50mm (w)
Recommended Mating Connector	314 pin 0.5mm pitch R/A memory socket style connector JAE Electronics - MM70-314 e.g.: MM70-314-310B1-2-R300

orderable parts

Part Number	Description
uCLS1012A Development Kit	uCLS1012A Development Kit
uCLS1012A-IOT	uCLS1012A Module with 64Mbyte flash, 1Gbyte DDR-SDRAM, 2x 1Gig ETH, 2x PCA9575
uCLS1012A-VOIP	uCLS1012A Module with 64Mbyte flash, 1Gbyte DDR-SDRAM. 2x 1Gig ETH, 2x PCA9575, CX20703

development kit

Development kit includes:

- uCLS1012A-IOT module
- uCLS1012A module host board
- Cable Kit, headset with microphone, power supply
- Dedicated support site access (1 year)
- Documentation and reference schematics (download)
- Mbarx System Manager - (evaluation Windows / Mac)
- Mbarx Virtual Control Panel (Windows / Mac)
- Mbarx Site Controller Demo (provided in System Manager)
- Linux BSP (download)
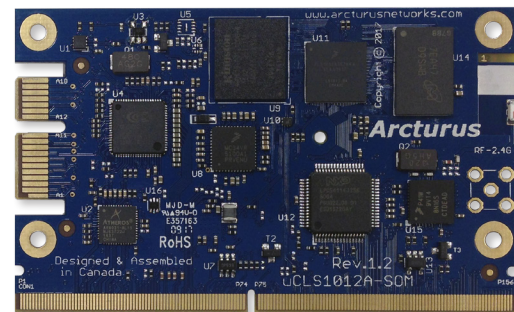- Installation support (email)

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