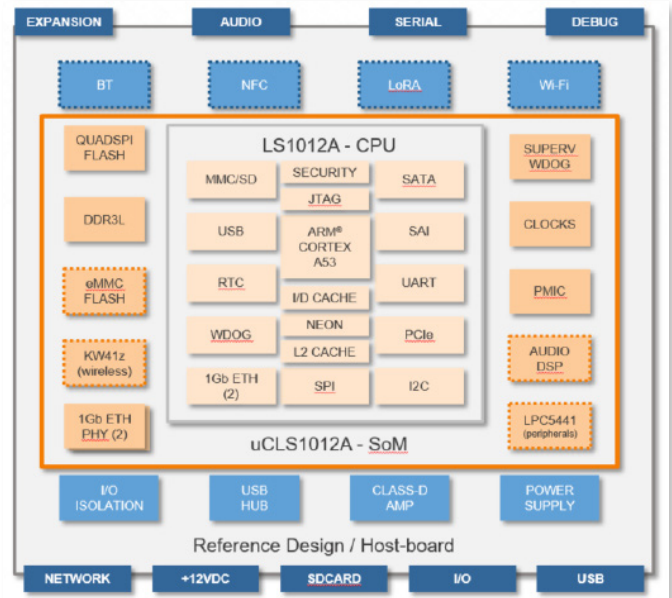# uCLS1012A

▶Gateway Module
- preproduction -

overview

The uCLS1012A is a 64-bit System-on-Module (SoM) that uses an NXP QorIQ® LS1012A communications processor. The CPU features an Arm® Cortex®-A53 core running at 800MHz and offers hardware acceleration for packet processing and security. In addition to the CPU, the module supports concurrent BLE and Thread® wireless networking, audio and extra peripheral expansion. The module is ideal for applications that require a combination of CPU performance, high-speed secure networking and wired or wireless peripheral connectivity, including sensor gateways, communication hubs and secure edge devices.

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. Additional controllers on-board the module support concurrent BLE (PAN) and Thread (6LoWPAN) 802.15.4 wireless operation, wide-band voice communication and peripheral expansion for general purpose I/O, serial or parallel connectivity. 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, voice, video (camera) and management middleware as well as IoT gateway solutions stacks. Various types of engagement packages are available for support, customization and system level solution development.

Reference Design / Host-board

High-performance communications with Thread, BLE and voice.

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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 evaluations of Arcturus voice, video, management middleware and Mbarx Secure IoT solutions. The 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 Solution Kits

Specialized Application Solution Kits are available for compile-time integration and custom application code development using Arcturus middleware or Mbarx Secure IoT solutions. Application Solutions Kits include direct support from Arcturus.

Mbarx Secure IoT Gateway Solutions

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 in an Arcturus test lab. Mbarx components work seamlessly 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**

Peripheral Expander (optional)

- NXP LPC54113 microcontroller
- 3x UART with RTS/CTS flow control
- I2C, SPI, 16x I/O,
- RTC, Temp sensor
- Up to - 38 I/O, 7x I2C, 5x UART, 12x ADCs***

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
*** various configurations, selectable in software

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- **64-bit NXP LS1012A CPU**
- **800MHz ARMv8, Cortex-A53 core**
- **BLE and Thread connectivity**
- **Voice, Video and Management Middleware**
- **Mbarx Secure IoT Gateway Stacks**

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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)
LPC54113 Peripheral Expander			
Host Interface	LS1012A - SPI (SDHC2, CS_0)	-	optional component
	2x UART	I2C, SPI, I2S, I/O	CTS / RTS flow control
	UART	I2C, SPI, I2S, I/O	Tx and Rx only
	I2C	UART, SPI, I2S, I/O	
	SPI	UART, I2C, I2S, I/O	
	8x Inputs	UART, I2S, SPI, I2C	
	8x Outputs	UART, I2S, SPI, I2C	
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-MOD-FC	uCLS1012A Module with 64Mbyte flash, 1Gbyte DDR-SDRAM, 2x 1Gig ETH, KW41Z, LPC54413 (preliminary)
uCLS1012A-MOD-LC	uCLS1012A Module with 64Mbyte flash, 1Gbyte DDR-SDRAM. 2x 1Gig ETH (preliminary)

development kit

Development kit includes:

- uCLS1012A-MOD-FC - uCLS1012A 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)
- Arcturus VoIP demo (preinstalled)
- Arcturus management middleware and webUI (preinstalled)
- Arcturus camera controller and video server demo (preinstalled)
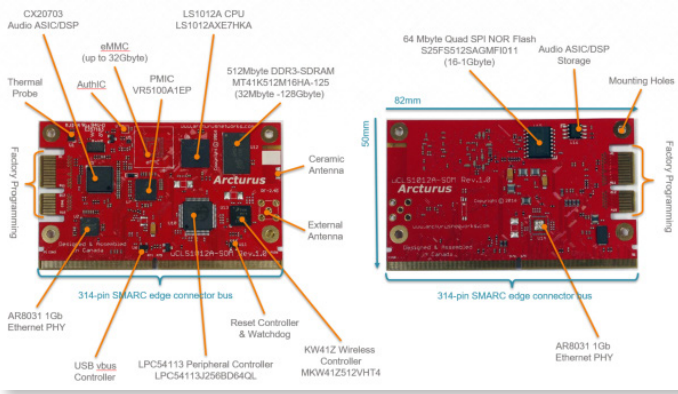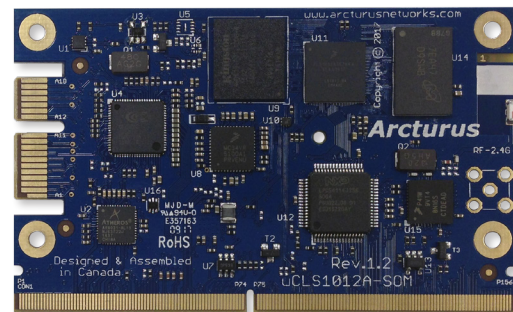- Linux BSP (download)
- Installation support (email)

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- **64-BIT NXP LS1012A CPU**
- **800MHz ARMV8, CORTEX-A53 CORE**
- **BLE AND THREAD CONNECTIVITY**
- **VOICE, VIDEO AND MANAGEMENT MIDDLEWARE**
- **MBARX SECURE IOT GATEWAY STACKS**

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