V3/25

Next Generation Secure, Smart, Standardized, and Connected IoT: Powerful NXP Edge Processing with NXP Wi-Fi 6E and Bluetooth 5.4

Our customers asked for a peripheral rich and robust SoM that simplifies their BOM, has reliable connectivity, uses a standard form factor, and is globally certified. One with multiple software options, a proven security architecture, long term software support, and security fixes.

Our new Nitrogen93 SOM is powered by **NXP's next generation i.MX 93** processor, **NXP PMIC PCA9451A,** and our Sona IF573 Wi-Fi 6E / Bluetooth 5.4 radio based on **Infineon's CYW55573.** It features high performance LPDDR4 RAM, and eMMC storage. We combine this with our common SMARC carrier board; together they serve as a single board computer (SBC) that can speed your product to market. Alternately, work with us to create a custom carrier that fits your mechanical, environmental, temperature, and interface requirements.

- **Powerful Heterogenous Multiprocessing:** Up to 1.7 GHz dual-core Cortex-A55 microprocessor and 250 MHz Cortex-M33 microcontroller allow you to run Linux and an RTOS on dedicated, hardware-firewalled subsystems.
- **Dedicated Machine Learning:** High-performance edge ML via an integrated Arm Ethos™-U65 microNPU, delivering up to .7 TOPS.
- **Diversity of Interfaces:** Multiple display, network, data, audio and camera interfaces.
- **SMARC 2.1.1 Standard Form Factor: 82mm x 50mm** SMARC edge connector form factor which includes **onboard ethernet PHYs**. One design supports multiple processor, memory, and wireless configurations.
- **Hardware Upgrade Roadmap:** Build a product design that can easily be upgraded to the latest processors and wireless options as future Laird Connectivity SOMs based on the SMARC standard are released.
- **Advanced Common Carrier/Development Board:** Display, camera, audio, Ethernet, USB, CAN, I2C, SPI, UART, and more. Use in development, as an SBC equivalent in a product, or as reference designs for your carrier board design
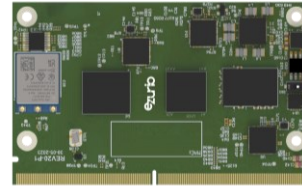
- Optional **Wi-Fi 6E** (802.11ax) and **Bluetooth 5.4** Classic & Low Energy (LE)
- **Operating Temperate Range**
  - Commercial Rating (0° to +70 °C)
  - Industrial Rating (-40° to +85 °C)
- **Multiple high performance memory options**:
  - 2GB LPDDR4 / 16GB eMMC
  - 4GB LPDDR4 / 16GB eMMC
- Extensive range of **pre-certified antennas** for Sona IF573
- **US based manufacturing with Global Options:** Assembled in USA for local customers and US market needs. Global manufacturing capability as part Ezurio footprint, growing reach to EMEA & APAC regions.
- **Diverse Software and Board Support Options:** Choose Yocto Linux / Buildroot Linux for Cortex-A55s, Zephyr RTOS/FreeRTOS for the Cortex-M33.
- **Secure and Encrypted Boot, Secure Enclave, and Secure File Storage:** Robust, secure, and optionally encrypted boot mechanism to ensure only trusted software boots on your device. Optionally store and use secure keys, certs, and credentials in run-time isolated trusted environment.
- **Power Efficient:** NXP PMIC, power optimized LPDDR4 and eMMC memory, core shut off, clock/voltage scaling, low power interfaces, power optimized single stream Wi-Fi enable highly optimized power consumption.
- **Long term hardware availability and software support:** Laird Connectivity's products are specifically designed to meet the needs of the industrial and medical markets, which typically require 10 year or more product lifecycles. Long-term software support includes LTS Yocto Linux and Zephyr RTOS support with vulnerability remediation.

Key Features

Reliable Connectivity: Optional Wi-Fi 6E and BT 5.4

Excellent Wi-Fi and BT Classic / LE connectivity in difficult environments, plus enterprise Wi-Fi support via WPA3-Enterprise for more secure robust connections.

ML, Graphics, Vision, Audio, and Industrial Peripherals

1 TOPS Machine Learning NPU, MIPI-DSI, LVDS, or parallel display, MIPI-CSI camera interface, I2S audio interfaces, 2x CAN/CAN-FD, 2x Gbit Ethernet, more

Secure Enclave and Secure Boot Powered by I.MX 93

Dedicated on-board security hardware, secure boot Linux, and high-performance and flexible secure storage system for passwords, certificates, and data storage.

Robust Software and Speed to Market

Choose from Yocto Linux or Buildroot Linux for the Cortex-A55s, Zephyr RTOS and FreeRTOS for the Cortex-M33

Global Radio Approvals

SKUs with Sona IF573 carry several modular FCC, IC, CE, UKCA, RCM, MIC, KC and Bluetooth SIG approvals.

Personal Support from Design to Manufacture

Our industry-renowned support and field application engineering team is passionate about helping you speed your design to market.

Application Areas

Energy Meters, Energy Storage Smart Electrical Panels

Smart City, Smart Camera

Smart Building Control, HVAC

Industrial Human Machine Interface (HMI)

Industrial IoT, Vision Systems

Commercial Food and Beverage Equipment

Specifications

Category	Feature	Specification	
Processors	Microprocessor	2x Cortex®-A55 cores @ up to 1.7 GHz	
	Microcontroller	1x Cortex®-M33 core @ 250 MHz	
	Graphics	2D Engine	
	Machine Learning	Arm Ethos™-U65 microNPU Neural Processing Unit (NPU) with up to 1 TOP/s	
Memory	RAM	2GB and 4GB	
	Storage	16GB. *(For custom sizes, please contact Sales)*	
Machine Learning	Neural Processing Unit	• Keyword detect, noise reduction, beamforming • Speech recognition • Human pose detection and gesture recognition	• Image recognition and beautification • Object detection and classification
Graphics and Video	Graphics Engine	2D Engine	
	Display Interfaces	• 1x MIPI DSI, up to 1920x1200p60 • 1x LVDS Tx, up to 1366x768p60 or 1280x800p60 • 1x Parallel Display, up to 1366x768p60 or 1280x800p60	
Vision	Camera	1x 2-lane MIPI CSI	
Audio	Audio Interfaces	2x I2S	
Peripherals	Input/Output	• 2x USB 2.0 with PHY • 2x Gbit Ethernet with PHY and support for Energy Efficient Ethernet, IEEE® 1588, AVB (One also supports TSN) • 2x CAN/CAN-FD	• 4x UART 5 Mbit/s • 5x I2C • 2x SPI • 1x SDIO 3.0/eMMC 5.1 • 14x GPIO
Optional Wireless Specification	Wi-Fi	Wi-Fi 6E (802.11ax)	
	Frequency	Dual-Band 2.4GHz & 5GHz	
	Bluetooth	Bluetooth 5.4	
	Transmit Power	+ 18 dBm (maximum)	
	Antenna Options	Onboard shared Wi-Fi/BT, 1 MHF4 connector shared Wi-Fi/BT, or 2 MHF4 separate Wi-Fi and BT	
	Raw Data Rates (Air)	Wi-Fi 6 600.5Mbit/s – MCS11, 80MHz, 1024QAM, SGI	
Key Wi-Fi Features	Wi-Fi 6E (802.11ax)	• IEEE 802.11 a/b/g/n/ac/ax • 20, 40 & 80MHz bandwidth support	• OFDMA
Key Bluetooth Features	Bluetooth	• Classic Bluetooth – BR / EDR • LE Secure Connections • Central / Peripheral Modes	• Up to 16 Bluetooth LE connections • LE Long Range (Coded PHY) • LE isochronous channels
Supply Voltage		5 V	
Physical	Dimensions	SMARC 2.1 Standard - 82mm x 50mm	
Environmental	Temp Range	0°C to +70°C (Commercial) and -40° to +85 °C (Industrial)	
Miscellaneous	Lead Free	Lead-free and RoHS-compliant	
	Carrier Board	Carrier board, accessories, and evaluation software	
Qualifications	Bluetooth® SIG	Bluetooth SIG Qualified Listing	
Regulatory	Approvals	FCC/IC/CE/MIC/RCM/KCC	

For full specifications on the Nitrogen93, please see the appropriate datasheet.

Ordering Information

Part	Description
N93_SMARC_SOM_1r16e	Nitrogen93 SMARC SOM: i.MX 93 Dual / 1GB / 16GB eMMC / 0 to +70°C / Without Wireless
N93_SMARC_SOM_2r16e	Nitrogen93 SMARC SOM: i.MX 93 Dual / 2GB / 16GB eMMC / 0 to +70°C / Without Wireless
N93_SMARC_SOM_1r16e_i	Nitrogen93 SMARC SOM: i.MX 93 Dual / 1GB / 16GB eMMC / -40 to +85°C / Without Wireless
N93_SMARC_SOM_2r16e_i	Nitrogen93 SMARC SOM: i.MX 93 Dual / 2GB / 16GB eMMC / -40 to +85°C / Without Wireless
N93_SMARC_SOM_1r16e_IF573_3M	Nitrogen93 SMARC SOM: i.MX 93 Dual / 1GB / 16GB eMMC / IF573 / 0 to +70°C
N93_SMARC_SOM_1r16e_IF573_3M_i	Nitrogen93 SMARC SOM: i.MX 93 Dual / 1GB / 16GB eMMC / IF573 / -40 to +85°C
N93_SMARC_SOM_2r16e_IF573_3M	Nitrogen93 SMARC SOM: i.MX 93 Dual / 2GB / 16GB eMMC / IF573 / 0 to +70°C
N93_SMARC_SOM_2r16e_IF573_3M_i	Nitrogen93 SMARC SOM: i.MX 93 Dual / 2GB / 16GB eMMC / IF573 / -40 to +85°C
SMARC_CAR_BRD	Universal Carrier Board - SMARC (Note - SOM sold separately)

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