nanoX-AL

**COM Express Mini Size Type 10 Module with Intel Atom® E3900 series SoC and Pentium®/Celeron® SoC**

**Features**

- Intel Atom® E3900 series (formerly codename: Apollo Lake) and Pentium®/Celeron® SoC, supporting full virtualization (VT-d/VT-x)
- Up to 8GB Dual Channel soldered non-ECC DDR3L at 1867/1600MHz
- Newest Intel® Gen9 Low Power graphics, up to 4k resolution and H.265 codec
- Multiple PCIe x1 Gen2 (configurable to x2, x4), GbE
- Two SATA 6 Gb/s, two USB 3.0 and six USB 2.0, eMMC 5.0 (build option)
- Supports Smart Embedded Management Agent (SEMA) functions
- Extreme Rugged operating temperature: -40°C to +85°C (build option for E39XX SKUs)

**Specifications**

**Core System**
- **CPU**
  - Intel Atom® E3900 series (formerly codename: Apollo Lake) and Pentium®/Celeron® SoC
  - Atom™ E3950 1.6/2.0GHz (Turbo), 12W (4C/1866)
  - Atom™ E3940 1.6/1.8GHz (Turbo), 9W (4C/1866)
  - Atom™ E3930 1.3/1.8GHz (Turbo), 6W (2C/1866)
  - Pentium® N4200 1.1/2.5GHz (Turbo), 6W (4C/1866) (by project basis)
  - Celeron® N3350 1.1/2.3GHz (Turbo), 6W (2C/1866) (by project basis)
- Supports: Intel® TXT, Intel® SSE4.2, Intel® 64 Architecture, IA 32-bit, Intel® AES-NI, dual or quad Out-of-Order Execution (OOE) processor cores, PCLMULQDQ Instruction DRNG
- Note: Availability of features may vary between processor SKUs.

**Memory**
- Up to 8 GB Dual channel DDR3L at 1867/1600 MHz non-ECC
- 2GB is single channel
- 4/8GB is dual channel

**Embedded BIOS**
- AMI EFI with CMOS backup in 16MB SPI BIOS

**Cache**
- 2MB for all SKUs

**Expansion Busses**
- Multiple PCI Express x1 Gen2: Lanes 0/1/2/3 (configurable to 3x1, 1x2x2x1)
- LPC bus, SMBus (system), I2C (user)

**SEMA® Board Controller**
- Supports: Voltage/current monitoring, power sequence debug support, AT/ATX mode control, logistics and forensic information, flat panel control, general purpose I2C, failsafe BIOS (dual BIOS), watchdog timer and fan control

**Debug Headers**
- 40-pin multipurpose flat cable connector for use with DB-40 debug module providing: BIOS POST code LED, BMC access, SPI BIOS flashing, power testpoints, debug LEDs
- MIPI6 header for iCE debug of CPU/chipset on break out board (build option)

**Video**
- **GPU Feature Support**
  - Intel® Generation 9 LP Graphics Core Architecture, supporting 2 independent and simultaneous display combinations of DisplayPort, HDMI, LVDS or eDP outputs
  - Hardware encode/transcode (including HEVC)
  - DirectX 12, DirectX 11.3, DirectX 10, DirectX 9.3 support
  - OpenGL 4.3 and ES 3.0 support
  - OpenCL 2.0 support
- **Digital Display Interface**
  - DDI0 supportss DisplayPort/HDMI/DVI
  - LVDS
  - Single channel 18/24-bit LVDS from eDP-to-LVDS IC
  - eDP
  - 4 lane support (build option, in place of LVDS)

**Audio**
- **Chipset**
  - Intel® HD Audio integrated in SoC
- **Audio Codec**
  - On carrier miniBASE-10R

**Ethernet**
- Intel® MAC/PHY: Intel® Ethernet i210
- Interface: 10/100/1000 GbE connection
- Notes:
  - Intel® Ethernet i211 is supported by project basis
  - Support IEEE 1588 and GbE_SDP

Note: “build option” indicates an alternative BOM configuration to support additional or alternative functions that are not available on the standard product.
Be aware that these “build option” part numbers will need to be newly created and this will result in production lead times.
Specifications

- **I/O Interfaces**
  - USB: 2x USB 1.1/2.0/3.0 (USB 0,1) and 6x USB 1.1/2.0 (USB 2,3,4,5,6,7)
  - USB OTG support on USB 2.0 port 7 with Yocto Linux
  - SATA: Two ports SATA 6Gb/s (SATA0,1)
  - Serial: 2 UART ports
  - eMMC: eMMC 5.0 (8/16/32GB, build option)
  - GPIO/SD: 4 GPO and 4 GPI
  - SD signal is a build option supported by project basis
  - Note: eMMC/SD boot device support depends on OS

- **Super I/O**
  - Supported on carrier if needed (standard support for W83627DHG-P)

- **TPM (build option)**
  - Chipset: Infineon
  - Type: TPM 2.0

- **Power**
  - Standard Input: ATX: 12V±5%, SVsb ±5%; AT: 12V±5%
  - Wide Input: ATX: 4.75-20 V, SVsb ±5%; AT: 4.75-20V (Standard Temp. only)
  - Management: ACPI 5.0 compliant, Smart Battery support
  - Power States: C1-C6, S0, S3, S4, S5 and S5 ECO mode (Wake on USB S3/S4, WOL S3/S4/S5)
  - ECO mode: Supports deep S5 mode for power saving

- **Mechanical and Environmental**
  - Form Factor: PICMG COM.0 Rev 2.1, Type 10
  - Dimension: Compact size: 84 mm x 55 mm
  - **Operating Temperature**
    - Standard: 0°C to 60°C
    - Extreme Rugged: -45°C to +85°C (build option with E39XX SoC SKUs)
  - **Humidity**
    - 5-90% RH operating, non-condensing
    - 5-95% RH storage (and operating with conformal coating)
  - **Shock and Vibration**
    - IEC 60068-2-64 and IEC-60068-2-27
    - MIL-STD-202F, Method 213B, Table 213-I, Condition A and Method 214A, Table 214-I, Condition D
    - HALT
    - Thermal Stress, Vibration Stress, Thermal Shock and Combined Test

- **Operating Systems**
  - **Standard Support**
    - Windows 10 64-bit, Linux 64-bit, VxWorks 64-bit
  - **Extended Support (BSP)**
    - Linux 64-bit, VxWorks 64-bit

Note: “build option” indicates an alternative BOM configuration to support additional or alternative functions that are not available on the standard product. Be aware that these “build option” part numbers will need to be newly created and this will result in production lead times.
Functional Diagram

Intel® Atom™
Processor E3900

- **Soldered**
  - 2/4/8 GB DDR3L non-ECC

- **On break-out board**
  - MIPI60 60-pin

- **eMMC 5.0**
  - 8/16/32GB (build option)

**AB**

- **DDI0**
  - 4 lanes

- **8x USB 2.0/1.1 (port 0-7)**
  - (port 7 supports host and client mode)

- **2x USB 3.0 (port 0-1)**

- **4x PCIe x1 Gen2 (port 0-3)**
  - 3x1 (default), 1x2+2x1, 4x1 (project basis)
  - GBE0_SDP

- **4x PCIe x1 Gen2**

- **eDP x4 lanes**
  - (build option)

- **GBE0_SDP**

- **PCIe x1 Gen2**

- **MII60**
  - 60-pin

- **HP Audio**

- **2x SATA 6Gb/s**
  - (port 0/1)

- **2 UART (Tx/Rx)**

- **2x USB 3.0 (port 0-1)**

- **TI UART**

- **TPM 2.0**
  - (build option)

- **LPC Bus**

- **SMBus**

- **GPIO PCA9535**

- **4x GP0, 4x GPI (SDIO)**

- **GP I²C**

- **DDC I²C**

- **SPI_CS#**

- **SPI**

- **SEMA BMC**

- **LM73**

- **18/24-bit**

- **Single channel**

- **eDP to LVDS**

- **LVDS**

- **eDP**

- **SD**

- **I2C**

- **GPIO**

- **PCA9535**

- **SPI**

- **SPI0**

- **BIOS**

- **Super I/O**
  - LPC to UART

- **TPM 2.0**
  - (build option)

- **LPC to UART**
Ordering Information

- **nanoX-AL-E3950-2G**
  Mini COM Express Type10 with Intel® Apollo Lake-I Atom™ E3950 (4C), 2G memory
- **nanoX-AL-E3940-2G**
  Mini COM Express Type10 with Intel® Apollo Lake-I Atom™ E3940 (4C), 2G memory
- **nanoX-AL-E3930-2G**
  Mini COM Express Type10 with Intel® Apollo Lake-I Atom™ E3930 (2C), 2G memory
- **nanoX-AL-N4200-2G**
  Mini COM Express Type10 with Intel Apollo Lake Pentium® N4200 (4C)
- **nanoX-AL-N3350-2G**
  Mini COM Express Type10 with Intel Apollo Lake Celeron® N3350 (2C)

Notes:
1. Notes: the combination not listed above might be supported by project basis
2. N4200/N3350 is supported by project basis

Accessories

Heat Spreaders

- **HTS-nXAL-B-I**
  Heatspreader for nanoX-AL Atom® with threaded standoffs for bottom mounting
- **HTS-nXAL-BT-I**
  Heatspreader for nanoX-AL Atom® with through hole standoffs for top mounting
- **HTS-nXAL-B**
  Heatspreader for nanoX-AL Pentium®/Celeron® with threaded standoffs for bottom mounting
- **HTS-nXAL-BT**
  Heatspreader for nanoX-AL Pentium®/Celeron® with through hole standoffs for top mounting

Passive Heatsinks

- **THS-nXAL-B-I**
  Low profile heatsink for nanoX-AL Atom® with threaded standoffs for bottom mounting
- **THS-nXAL-BT-I**
  Low profile heatsink for nanoX-AL Atom® with through hole standoffs for top mounting
- **THS-nXAL-B**
  Low profile heatsink for nanoX-AL Pentium®/Celeron® with threaded standoffs for bottom mounting
- **THS-nXAL-BT**
  Low profile heatsink for nanoX-AL Pentium®/Celeron® with through hole standoffs for top mounting
- **THSH-cAL-B-I**
  High profile heatsink for nanoX-AL Atom® with threaded standoffs for bottom mounting
- **THSH-cAL-B**
  High profile heatsink for nanoX-AL Pentium®/Celeron® with threaded standoffs for bottom mounting

Starter Kit

- **COM Express Type 10 Starter Kit Plus**
  Starter Kit Plus Starter kit for COM Express Type 10