# Linux-ready Cortex-A7 System on Module

## M-X6ULL

### Features
- NXP i.MX6ULL Cortex-A7 CPU, Up to 800MHz
- Linux kernel 4.14.x with boot loader & file system
- Toolchain: gcc 6.2.x + glibc 2.24
- 512MB DDR3/LvDDR3 SDRAM and 16MB DataFlash
- Micro-SD or 4G eMMC
- Dual 10/100MHz Ethernet interface
- 1x CAN, 2x OTG/HOST USB, 4 x UART & i2C / i2S/GPIO
- 24bits RGB display interface
- SODIMM 200 form factor, Compact size, 68 x 43mm
- Single 5VDC operation

## H/W Specifications

<table>
<thead>
<tr>
<th>CPU / Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU: NXP i.MX6ULL Cortex-A7 MPCore, Up to 800MHz</td>
</tr>
<tr>
<td>SDRAM: 512MB, DDR3/LvDDR3</td>
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<tr>
<td>DataFlash: 16MB</td>
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<tr>
<td>eMMC: 4GB (optional to Micro-SD I/F)</td>
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<table>
<thead>
<tr>
<th>Micro-SD 2.0 Interface</th>
</tr>
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<tbody>
<tr>
<td>Signals: cmd, clock, data0~3, card_detect</td>
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<tr>
<td>SDHC Compatible</td>
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<table>
<thead>
<tr>
<th>Network Interface</th>
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</thead>
<tbody>
<tr>
<td>Type: 2 x 10/100Mbps Ethernet</td>
</tr>
<tr>
<td>RMI interface</td>
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<thead>
<tr>
<th>CAN Interface</th>
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<tbody>
<tr>
<td>2 x Flexible Controller Area Network (FlexCAN)</td>
</tr>
<tr>
<td>CAN1~2: TX/RX, compliant to CAN 2.0 partA/B</td>
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</tbody>
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<table>
<thead>
<tr>
<th>UART Interface</th>
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<tbody>
<tr>
<td>UART1: TX, RX</td>
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<tr>
<td>UART2: TX, RX, RTS, CTS</td>
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<tr>
<td>UART5-6: TX, RX, CTS</td>
</tr>
<tr>
<td>Signal Level: 3.3V</td>
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<table>
<thead>
<tr>
<th>Common UART Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud Rate: up to 921.6Kbps</td>
</tr>
<tr>
<td>Parity: None, Even, Odd, Mark, Space</td>
</tr>
<tr>
<td>Data Bits: 5, 6, 7, 8</td>
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<tr>
<td>Stop Bits: 1, 1.5, 2</td>
</tr>
<tr>
<td>Flow Control: RTS / CTS, XON / XOFF, None</td>
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<tr>
<th>USB 2.0 Interface</th>
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<tbody>
<tr>
<td>Supports 480Mbps hi-speed mode</td>
</tr>
<tr>
<td>Two high-speed OTG 2.0 modules with integrated HS USB PHYs</td>
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<table>
<thead>
<tr>
<th>I2S Interface</th>
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</thead>
<tbody>
<tr>
<td>Transmit Signals: data, clock, sync</td>
</tr>
<tr>
<td>Receive Signals: data, clock, sync</td>
</tr>
</tbody>
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<table>
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<tr>
<th>I2C Interface</th>
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<tbody>
<tr>
<td>Signals: data, clock</td>
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<table>
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<tr>
<th>GPIO (General-purpose I/Os)</th>
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<tbody>
<tr>
<td>No. of Pins: 8</td>
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<tr>
<th>Console / Debug Ports</th>
</tr>
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<tbody>
<tr>
<td>Serial console port (UART interface)</td>
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</table>

## Display Interface
- One 24bits digital parallel display interface
- Support max 85 MHz display clock and up to WXGA (1366 x 768) at 60 Hz

## Touch Sensor Interface
- With touch controller to support 4-wire and 5-wire resistive touch panel

## General
- Power Input: +5VDC
- SODIMM 200P Form Factor
- Watch-Dog Timer: YES
- Real-Time Clock (RTC): YES
- Dimensions (W x L): 68 x 43 mm
- Mounting Hole x1 reserved, 2.0mm (M2) in diameter
- Consumption: 0.75Watts (Typical)

## S/W Specifications

### Operation System
- Linux kernel 4.14.x
- Support bootup from eMMC or SD card
- Boot Loader: U-Boot
- GUI Engine: X11

### Desktop Environment
- Matchbox (X11 Desktop Environment)
- Built-in Firefox / Chromium browser + virtual keyboard

### Software Development
- Toolchain: gcc 6.2.x + glibc 2.24
- Supports in-place C/C++ code compilation

### Package Management
- Repository: Artila self-maintained repository
- Command: Using standard apt-get command

### Popular Packages
- Web server: Apache/Nginx/Lighttpd
- Database: MySQL/SQLite3/PostgreSQL
- Script Language: PHP/Python/Perl/Nodejs
- Text editor: vim/nano/sed
- Administration: Webmin

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**CPU / Memory**
- CPU: NXP i.MX6ULL Cortex-A7 MPCore, Up to 800MHz
- SDRAM: 512MB, DDR3/LvDDR3
- DataFlash: 16MB
- eMMC: 4GB (optional to Micro-SD I/F)

**Micro-SD 2.0 Interface**
- Signals: cmd, clock, data0~3, card_detect
- SDHC Compatible

**Network Interface**
- Type: 2 x 10/100Mbps Ethernet
- RMI interface

**CAN Interface**
- 2 x Flexible Controller Area Network (FlexCAN)
- CAN1~2: TX/RX, compliant to CAN 2.0 partA/B

**UART Interface**
- UART1: TX, RX
- UART2: TX, RX, RTS, CTS
- UART5-6: TX, RX, CTS
- Signal Level: 3.3V

**Common UART Parameters**
- Baud Rate: up to 921.6Kbps
- Parity: None, Even, Odd, Mark, Space
- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 1.5, 2
- Flow Control: RTS / CTS, XON / XOFF, None

**USB 2.0 Interface**
- Supports 480Mbps hi-speed mode
- Two high-speed OTG 2.0 modules with integrated HS USB PHYs

**I2S Interface**
- Transmit Signals: data, clock, sync
- Receive Signals: data, clock, sync

**I2C Interface**
- Signals: data, clock

**GPIO (General-purpose I/Os)**
- No. of Pins: 8

**Console / Debug Ports**
- Serial console port (UART interface)
**Linux-ready Cortex-A7 System on Module**

**M-X6ULL**

- **CPU:** NXP i.MX6ULL Cortex-A7 MPCore, Up to 800MHz
- **SDRAM:** 512MB, DDR3/DDR3L
- **NOR Flash:** 16MB
- **eMMC:** 4GB (optional to Micro-SD I/F)

**H/W Specifications**

**M-X6ULL SOM (CPU/Memory)**
- CPU: NXP i.MX6ULL Cortex-A7 MPCore, Up to 800MHz
- SDRAM: 512MB, DDR3/DDR3L
- NOR Flash: 16MB
- eMMC: 4GB (optional to Micro-SD I/F)

**Network Interface**
- 2x10/100Mbps Ethernet (RJ45)
- Protection: 1.5KV magnetic isolation

**TTY (Serial) Ports**
- 2 x Isolated RS-485 (1500Vrms isolation), Signal: Data+, Data-
- 1 x RS-232 (TXD/RX)
- Connector: RS-485/Terminal block, RS-232/D-Sub 9

**CAN Bus Ports**
- 2 x CAN bus 2.0 A/B compliant ports
- Speed: Up to 1Mbps

**Console / Debug Ports**
- 1 x microUSB console port
- Serial console port (inside the box)

**USB 2.0 Host Interface**
- 1 x USB OTG Port (microUSB connector)
- 1 x USB Host Port (USB Type-A connector)

**Audio Out**
- 1 x Line-out R/L port, optional Earphone R/L
- Connector: Earphone-Jack

**Digital Input**
- 2 x Digital input channels
- Isolation Protection: 2500Vrms (Photo-Coupler)
- Logical High: 5~24V
- Power Requirement
- Expansion
- 1 x miniPCIe Full-size socket
- 1 x micro-SIM card socket reserve

**Relay Output**
- 1 x Relay output channel
- Contact Rating: 30VDC@1A or 125VAC@0.5A

**SD Slot**
- 1 x microSD socket
- SD 2.0 compliant, supports SDHC

**Display Interface**
- 24bits LVDS interface & TTL display interface
- Support max 85 MHz display clock and up to WXGA (1366 x 768) at 60 Hz
- Support Pulse Width Modulation (PWM) to control brightness of LCD

**Touch Sensor Interface**
- Reserved touch sensor interface to support 5-wire resistive touch panel

**Expansion**
- 1 x miniPCIe Full-size socket
- 1 x micro-SIM card socket reserve

**GNSS/IMU/Cellular Specications**

**GNSS (Global Navigation Satellite System)**
- 72-channel u-blox MB e GNSS engine
- Support Dual Satellite: GPS & GLONAS
- -146dBm Tracking and Navigation Sensitivity
- Support AssistNow Online/Offline/Autonomous
- OMA SUPL & 3GPP Compliant
- Max nav. update rate: Single channel up to 18MHz
- 2 Concurrent GNSS /up to 10MHz
- Accuracy (Position): 2.5m CE
- 1 x Active Antenn

**IMU (Inertial Measurement Unit)**

**GNSS (Global Navigation Satellite System)**
- 1 x 3-Axis digital output Gyroscope
- Gyroscope has a programmable full-scale range of ±250, ±500, ±1000, and ±2000 degrees/sec and very low noise at
- ±0.1dps/Hz: Gyroscope operating current: 3.2mA
- 1 x 3-Axis Accelerometer (G-Sensor)
- ±2G/±4G/±8G/±16G user-programmable accelerometer full-scale range
- 16-bit data output
- 1 x 3-Axis Magnetometer (E-Compas)
- Build-in A to D converter for magnetometer data out 16 bit data
- each 3-Axis magnetic component (Sensitivity 0.15uT/LSB-typ.)

**Ordering Information**

**M-X6ULL**
- Linux-ready Cortex-A7 800MHz System on Module with 512MB SDRAM

**M-X6ULL Starter Kit**
- Includes one M-X6ULL SoM and one CB-X6ULL carrier board with power circuitry, Ethernet, Serial port/USB/CAN and SD/miniPCIe socket