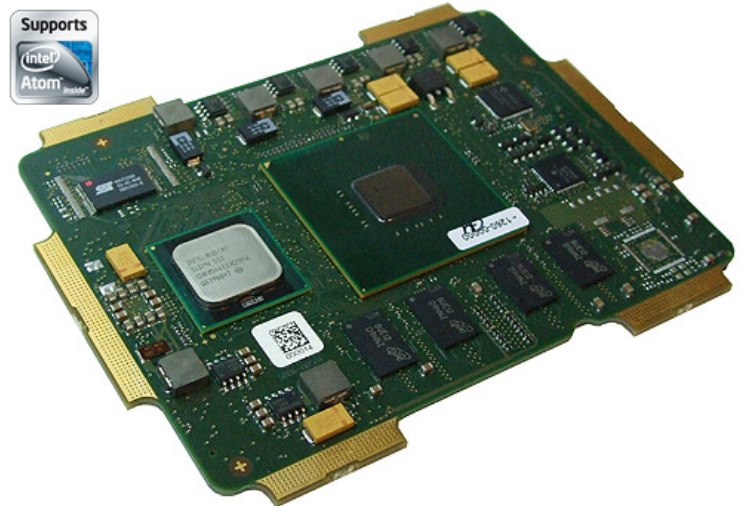# XM1L – ESMexpress® COM with Intel® Atom™ XL

- **Intel® Atom™ Z510P, Z530P, Z510PT, Z520PT**
- **Up to 2 GB DDR2 SDRAM**
- **Up to 2 PCI Express®**
- **Up to 1 Gb Ethernet**
- **1 SATA port**
- **8 USB 2.0**
- **SDVO, LVDS**
- **Intel® HD Audio**
- **-50°C to +85°C Tcase screened or qualified**
- **Conduction cooling**

The XM1L is a Computer-On-Module of the ESMexpress® family. Together with an application-specific carrier board it forms a semi-custom solution for industrial, harsh, mobile and mission-critical environments.

The XM1L is controlled by the Intel® Atom™ XL processor, an IA-32 core based on 45nm process technology which is qualified for the industrial temperature range. Due to the power architecture of the Intel® Atom™ CPU, the XM1L has a total power consumption of max. 5 to 7 Watts, while having a clock frequency of up to 1.6 GHz.

The XM1L accommodates up to 2 GB of directly soldered main memory and supports other memory like USB Flash on the carrier board.
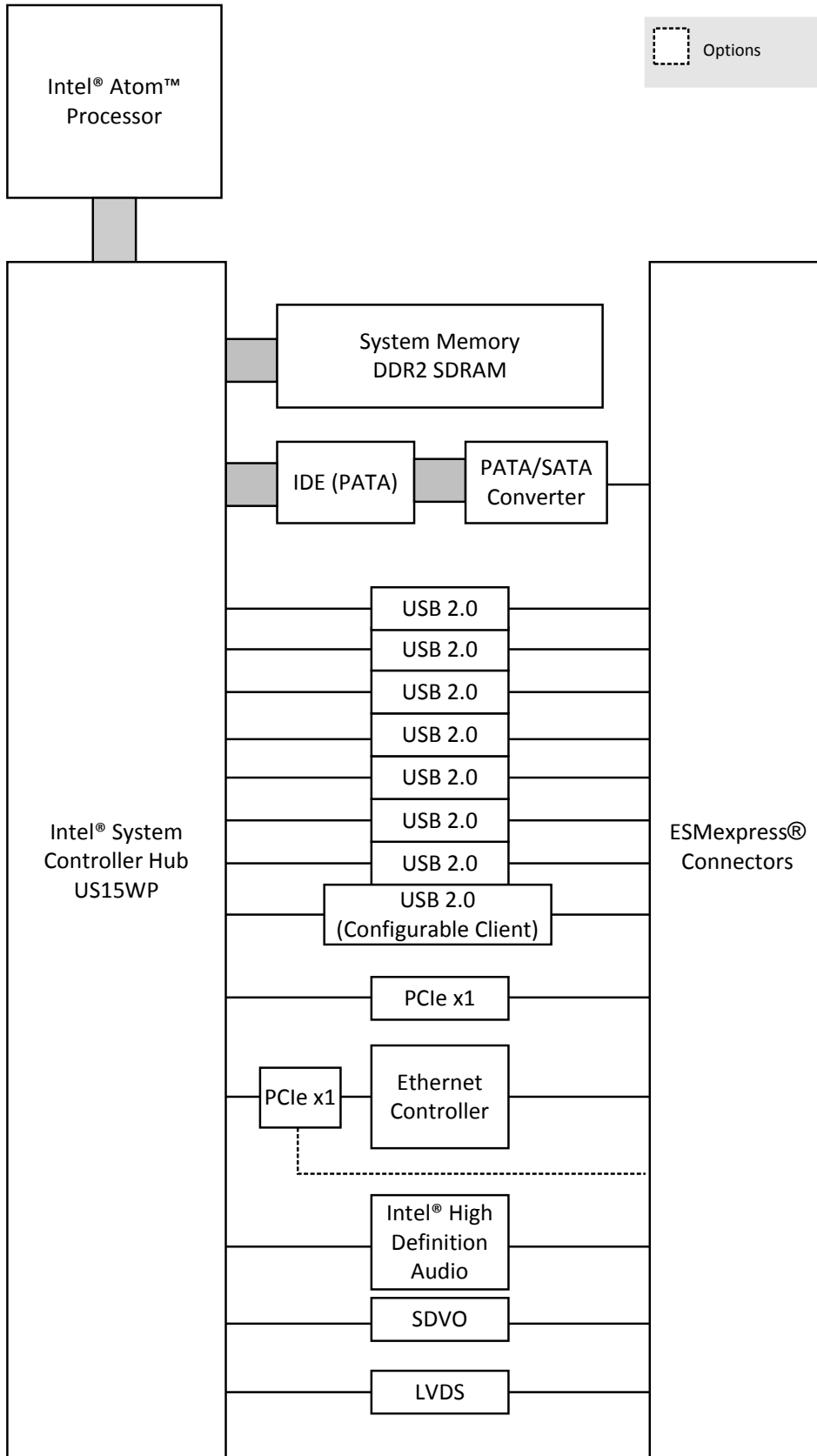
Interfaces from the Intel® System Controller Hub US15WP are optimized using exclusively modern serial standards and are all routed from the XM1L for availability on any ESMexpress® carrier board. Depending on the version of XM1L, those interfaces include a combination of PCI Express® links, LVDS, SDVO, high-definition audio, SATA, Ethernet with wake-on-LAN functionality, and USB. Additional COM interfaces can be made available on the carrier board via USB to COM conversion.

The XM1L is completed by a board management controller for temperature and power supervision. It comes with a Phoenix® Award BIOS configurable for the final application.

The XM1L is screened or qualified for operation from -50°C to +85°C (Tcase). As all ESMexpress® modules it is embedded in a covered frame. This ensures EMC protection and allows efficient conductive cooling. Air cooling is also possible by applying a heat sink on top of the cover. Where operation temperatures are moderate, the module may even do without the frame and cover, with a suitable low-power processor and airflow. ESMexpress® modules are firmly screwed to a carrier board and come with rugged industry-proven connectors supporting high frequency and differential signals. Only soldered components are used to withstand shock and vibration, and the design is optimized for conformal coating. All ESMexpress® modules support a single 95x125mm form factor.

For evaluation and development purposes an ATX carrier board is available. The ESMexpress® module can be evaluated on a COM Express™ carrier board via an adapter from ESMexpress® to COM Express™.

Diagram

Technical Data

CPU	■ Intel® Atom™ Z510P, Z530P, Z510PT or Z520PT
	   □ Up to 1.6GHz processor core frequency
	   □ 400MHz or 533MHz system bus frequency
	■ Chipset
	   □ Intel® system controller hub US15WP

Memory	■ 512KB L2 cache integrated in Atom processor
	■ Up to 2GB DDR2 SDRAM system memory
	   □ Soldered
	   □ 400/533MHz memory bus frequency locked to the FSB frequency

Serial ATA (SATA)	■ One port via ESMexpress® connector ■ Transfer rates up to 100MB/s ■ Via PATA-to-SATA converter

Graphics	■ Integrated in Intel® System Controller Hub US15WP
	■ Maximum resolution: 1600x1200 pixels
	■ 1 SDVO port (not available on board version 15XM01L02)
	■ 1 LVDS port
	   □ 112MHz maximum pixel clock
	   □ 18 or 24bits pixel color depths
	■ Available via ESMexpress® connector

USB	■ Eight USB 2.0 host ports (or 7 host ports and 1 client port, adjustable by software)
	   □ Via ESMexpress® connector
	   □ Six of these ports also support USB 1.1 (UHCI implementation)
	■ EHCI implementation
	■ Data rates up to 480Mbit/s

Ethernet	■ One 10/100/1000Base-T Ethernet channel via ESMexpress® connector ■ Ethernet controller is connected by one x1 PCIe® link ■ Two LED signals for LAN link, activity status and connection speed
PCI Express®	■ One x1 link to connect local 1000Base-T Ethernet controller ■ One x1 link via ESMexpress® connector ■ Second x1 link on ESMexpress® connector instead of Ethernet ■ Data rate 250MB/s in each direction (2.5 Gbit/s per lane)
GPIO	■ 1 line from PIC via ESMexpress® connector ■ Usable for LED
HD audio	■ Via ESMexpress® connector
Board Management Controller	■ Input voltage supervision ■ Power sequencing ■ Board monitoring ■ Watchdog ■ Accessible via SMBus
Miscellaneous	■ Real-time clock (with GoldCap or battery backup on the carrier board) ■ Wake-on-LAN ■ SMBus interface

Electrical Specifications	■ Supply voltage/power consumption:
	   □ +12V (9..16V), power consumption 5..7W (full load)
	   □ +5V standby voltage

Mechanical Specifications	■ Dimensions: 95mm x 125mm ■ ESMexpress® PCB mounted between a frame and a cover ■ Weight: 224g (incl. cover and frame)

Technical Data

Environmental Specifications	■ Temperature range (operation): -50..+85°C Tcase (ESMexpress® cover/frame) (screened with Atom Z510P and Z530P; qualified with Atom Z510PT and Z520PT) ■ Temperature range (storage): -50..+85°C ■ Relative humidity (operation): max. 95% non-condensing ■ Relative humidity (storage): max. 95% non-condensing ■ Altitude: -300m to + 3,000m ■ Shock: 15g/11ms (EN 60068-2-27) ■ Bump: 10g/16ms (EN 60068-2-29) ■ Vibration (sinusoidal): 1g/10..150Hz (EN 60068-2-6) ■ Conformal coating on request
MTBF	■ 464,343h @ 40°C according to IEC/TR 62380 (RDF 2000)
Safety	■ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers
EMC	■ EMC behavior depends on the system and housing surrounding the ESMexpress® module. MEN has performed general, successful EMC tests for ESMexpress® using the XC1 evaluation carrier according to EN 55022 (radio disturbance), IEC 61000-4-2 (ESD), IEC 61000-4-3 (electromagnetic field immunity), IEC 61000-4-4 (burst), IEC 61000-4-5 (surge) and IEC 61000-4-6 (conducted disturbances)
BIOS	■ Award BIOS
Software Support	■ Windows® ■ Linux ■ VxWorks® ■ QNX® (on request) ■ For more information on supported operating system versions and drivers see Downloads.

Configuration & Options

Standard Configurations

Article No.	CPU Type	Clock	System RAM	PCIe	Ethernet	Cover
15XM01L00	Z530P	1.6 GHz	1 GB	1	1	yes
15XM01L02	Z510P	1.1 GHz	512 MB	1	1	no

Options

CPU	■ Intel® Atom™ Z530P, 1.6GHz, 533MHz FSB ■ Intel® Atom™ Z510P, 1.1GHz, 400MHz FSB ■ Intel® Atom™ Z520PT, 1.33GHz, 533MHz FSB ■ Intel® Atom™ Z510PT, 1.1GHz, 400MHz FSB
Memory	■ System RAM □ 256 MB, 512 MB, 1 GB or 2GB
PCI Express®	■ Second PCI Express® lane on ESMexpress® connector □ Instead of the lane to the Ethernet controller
Operating Temperature	■ -40..+85°C Tcase (ESMexpress® cover/frame) qualified
Software Support	■ QNX® (on request)

Please note that some of these options may only be available for large volumes. Please ask our sales staff for more information.

Ordering Information

Standard XM1L Models	**15XM01L00**	Intel® Atom™ Z530P, 1.6 GHz, 1 GB DDR2 RAM, 1 Gb Ethernet, 1x PCIe®, with cover, -50..+85°C Tcase screened
	15XM01L02	Intel® Atom™ Z510P, 1.1 GHz, 512 MB DDR2 RAM, 1 Gb Ethernet, 1x PCIe®, no J2, no cover, -50..+85°C Tcase screened
Related Hardware	**08AE12-00**	ESMexpress® module to COM Express™ carrier adapter, 0..+60°C
	08XC01-00	Evaluation and development board for all ESMexpress® modules (coming with top cover and frame), 0..+60°C, incl. faceplate, 4 GB USB Flash Disk and USB cable type A to A
	08XC02-00	Carrier board for ESMexpress® modules (Intel®), 4 GB USB Flash Disk, LVDS and DVI on board, 2 Fast Ethernet on M12, 1 SA-Adapter™ slot, 2 USB 2.0, PCI Express® Mini Card slot, 24V PSU (9..36VDC), -40..+85°C with qualified components
Miscellaneous Accessories	**0712-0019**	Standard ATX PSU, 350 W, 0..+40°C
Software: Linux		This product is designed to work under Linux. See below for potentially available separate software packages from MEN.
	13XM01-06	MDIS5™ low-level driver sources (MEN) for XM1, XM1L, MM1, MM2, XM2, F11S, F19P, F21P, F22P, G20, G22, SC21, SC27 and DC2 board controller
Software: Windows®		This product is designed to work under Windows®. See below for potentially available separate software packages from MEN.
	10F014-78	Windows® XP Embedded BSP (MEN) for F11S, F14, F15, F17, F18, F19P, F21P, G20, XM1, XM1L, XM2, MM1, MM2, SC21, SC24, DC1, DC2, RC1, BC50I, BC50M and BL50W
	10Y000-78	Windows® Embedded Standard 7 BSP for F11S, F19P, F21P, F22P, F75P, G20, G22, XM1L, XM2, MM1, MM2, SC21, SC24, SC27, BC50M, BC50I, BL50W, BL50S, DC13, F206, F210, F215, F216, G215, P506, P507 and P511
	13T009-70	Windows® HD audio driver (Realtek) for XM1, XM1L, MM1, MM2
	13T010-70	Windows® 32-bit network driver (Intel®) for XM1, XM1L, XM2, MM2, F11S, F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, G211, G211F, SC24, BC50I, BC50M and BL50W
	13T011-70	Windows® graphics driver (Intel®) for XM1, XM1L, MM1 and F11S
	13T012-70	Windows® XP/Vista chipset driver (Intel®) for XM1, XM1L, MM1 and F11S
	13T013-70	Windows® USB client driver installation package (Intel®) for XM1, XM1L and MM1
	13T014-70	Windows® Vista™ HD audio driver (Realtek) for XM1, XM1L and MM1
	13T015-70	Windows® Vista™ network driver (Intel®) for XM1, XM1L and F11S
	13T016-70	Windows® Vista™ chipset graphics driver (Intel®) for XM1, XM1L, MM1 and F11S
	13XM01-77	Windows® Installset (MEN) for XM1, XM1L, DC1, DC2 and SC21. (Includes all free drivers developed by MEN for the supported hardware.)
Software: VxWorks®		This product is designed to work under VxWorks®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.
	10XM01-60	VxWorks® BSP for XM1 and XM1L
	13XM01-06	MDIS5™ low-level driver sources (MEN) for XM1, XM1L, MM1, MM2, XM2, F11S, F19P, F21P, F22P, G20, G22, SC21, SC27 and DC2 board controller

Ordering Information

Software: Miscellaneous	Intel® software development products such as analyzers, compilers, threading tools etc. can be downloaded under www.intel.com/cd/software/products/asmo-na/eng/index.htm. IA-32 Intel® Architecture Software Developer's Manuals are available under www.intel.com/products/processor/manuals/index.htm.

For operating systems not mentioned here contact MEN sales.

Documentation	Compare Chart ESMexpress® Embedded System Modules » Download
	You can find general literature on MEN computer-on-modules, including presentations about ESMexpress®, ESMini™ and their cooling concept, in our Download Library.
20XM01L00	XM1L User Manual

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