

### Features

- Compact size high-performance CEA-709 network node
- ARM7 CPU @ 20 MHz (LC3020B-240)
- 2 MB FLASH memory
- 8 MB SDRAM memory
- L-Chip™ based CEA-709 network interface
- 2 x UART
- CSI (SPI) interface, master and slave mode
- Watchdog timer, 2 x 16-bit hardware timer
- Clock and reset generation on-board
- Up to 72 user programmable I/Os
- I/O, address and data bus available on connector for user expansion
- JTAG interface for software debugging
- Supports various transceivers: FT-10/LPT-10, TP-1250, RS-485, PLT-22
- Bit rates between 300 bit/s and 1.25 Mbit/s
- RTEMS real-time multitasking operating system (incl. TCP/IP stack and Web server)
- ORION protocol stack for high-speed CEA-709 connectivity
- L-Core support library (high-level API for on-board flash file system, watchdog timer, etc.)
- Powerful Eclipse software development environment for Windows or Linux
- GNU toolchain
- No additional license fees (when using the L-Core XP module)
- Small form factor: 55 x 29 mm
- Fits in low priced 98 pin PCI Express connector
- 3.3 VDC supply voltage @ 200 mA

### Overview

The L-Core™ suite is LOYTEC's contribution to the emerging embedded market having a need for high-performance embedded nodes in control networks. LC3020 controller based platforms offer a high grade of flexibility and power without a bottle-neck between the application and the network, making it an ideal basis for the development of next generation devices like high-speed gateways or sophisticated controller applications.

The L-Core XP philosophy is to provide a solution for building high-performance CEA-709 nodes at a very affordable cost. This can be achieved by either using the L-CORE XP module, a core module (size of 55 x 29 mm only!) that comes with a powerful ARM7 CPU LC3020, 2 MB FLASH memory, 8 MB SDRAM, clock and reset circuitry, or by designing the L-Core components directly onto the target hardware.



The L-Core XP helps developers to concentrate on the application when building new CEA-709 nodes. LOYTEC provides a complete Open Source Real-Time Multitasking Operating System (RTEMS - see also <http://www.rtems.com>) as well as a library including LOYTEC's high performance ORION protocol stack for L-Core XP. And the best of all - when using the L-CORE module it is royalty free.

The development kit uses the popular GNU-Tools integrated into the powerful Eclipse software development environment. These tools can either be installed on a native Linux host PC or on a Windows® platform.

### Architecture

An L-Core-based node consists of the L-Core XP module and a motherboard. The L-Core XP module is a low-cost, high performance CEA-709 network node. Its small style form-factor measures only 55 x 29 mm and it is only 7.2 mm thin. A powerful ARM7 CPU executes the RTEMS real-time operating system, the ORION protocol stack, and leaves enough horse power for computing intensive user applications. 2 megabytes of on-board flash and 8 megabyte on-board SDRAM allow room for the most demanding user programs.

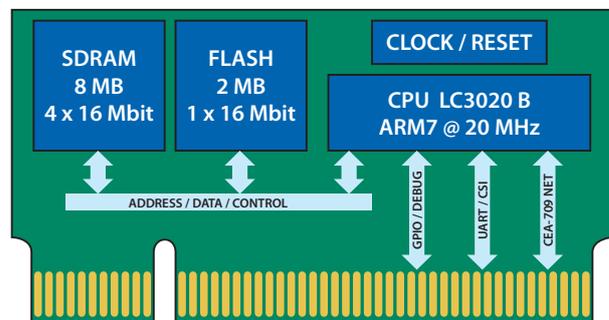
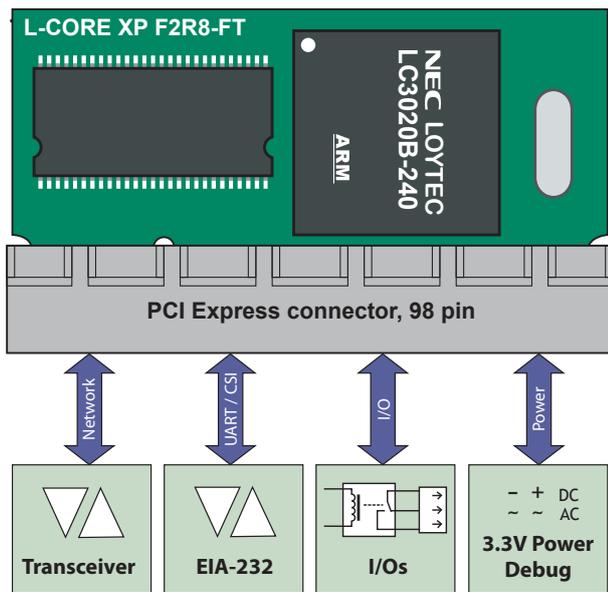


Figure 1: L-Core XP F2R8-FT block diagram

The motherboard has a 98 position connector (to plug in the L-Core XP module, an CEA-709 transceiver, sensors/actuators and, if required, other peripherals).



**Figure 2:** Block diagram of a typical network node using the L-Core XP F2R8-FT module

## Development

Standard GNU tools like C-compiler and source-level debugger can be used to develop and debug the application code that will be linked to the pre-compiled RTEMS real-time operating system and ORION CEA-709 protocol stack.

Specifications	
Dimensions (mm)	55 x 29 x 7.2 (L x W x H)
Weight	10 g
Installation	PCIe connector 98 pin
Operating temperature	0 °C to 60 °C
Power supply	3.3 VDC ±5% , 200 mA
Processor	LC3020B, ARM7TDMI-S, 20 MHz
Memory	8 MB SDRAM, 2 MB Flash
Interfaces	2 x CEA-709 2 x UART CSI (SPI) master and slave mode 72 user programmable I/Os JTAG interface

Order Number	Configuration
L-COREXP-F2R8	L-Core XP module, ARM7 CPU @ 20 MHZ LC3020B-240, 2 MB flash memory, 8 MB SDRAM
L-CORE-KIT	The package for the developer: ORION protocol stack library, RTEMS and GNU source code, Eclipse IDE, complete user documentation, L-COREXP-F8R8B16 core module, development board for L-COREXP-F8R8B16 module, application notes, 12 month free updates and new releases
LTRAIN-LCORE	Two days training course on L-Core XP essentials

LC3020, L-Chip, L-Core, L-DALI, L-GATE, L-INX, L-IOB, L-IP, L-MBUS, LPA, L-Proxy, L-Switch, L-Term, L-VIS, L-WEB, and ORION stack are trademarks of LOYTEC electronics GmbH. Other trademarks and trade names used in this document refer either to the entities claiming the markets and names, or to their products. LOYTEC disclaims proprietary interest in the markets and names of others.

LOYTEC reserves the right to make changes to these specifications without further notice for performance, reliability, production technique, and other considerations.

To get started with L-Core XP we recommend ordering the L-CORE-KIT (Design Kit for ORION Embedded Controller Core Modules), which includes:

- RTEMS 4.6 operating system including BSP (Source Code and Binary)
- GNU development environment for Linux and Windows® (Source Code and Binary)
- Eclipse Integrated Development Environment
- Full featured ORION protocol stack library
- L-Core XP Hardware Support Library (high-level functions to use on-board flash memory, CPU watchdog timer, etc.)
- L-COREXP-F8R16B16 core module
- L-CONTROL XP development board
- Complete documentation
- LC3020 reference design schematics
- Application notes

For a quick start LOYTEC offers a two days training course on all the L-Core XP essentials. Designing a high-performance CEA-709 network node has never been easier or faster. Within just a few hours developers can put new network nodes in operation.

## Licensing

When using the L-Core XP modules there are no additional fees - everything is already included in the module price. When designing the L-Core XP circuitry onto a custom board design a small royalty applies in order to use the ORION Stack™ library.