ECS-M.2/FPGA

PCI Express® EtherCAT® SubDevice Interface in M.2 Form Factor

Convert your Embedded System into an EtherCAT SubDevice

- *Add EtherCAT SubDevice (ECS) functionality to your embedded PC*
- *The EtherCAT SubDevice Controller address space is directly mapped to the PCI Express address space.*
- *M.2 form factor 2280 or 2260 for smaller embedded devices like IPCs or Raspberry Pi*

Simple Configuration and Rapid Application Development

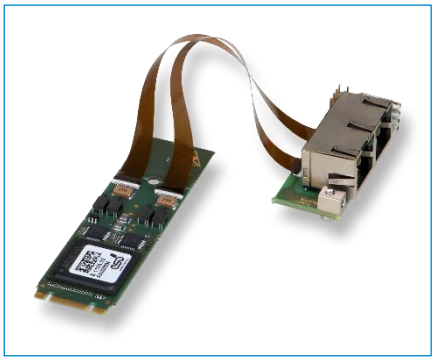
- *Easy configuration by esd's EtherCAT MainDevice or other MainDevices*
- *Sample EtherCAT SubDevice Information File (ESI file in XML format) is provided*
- *esd's EtherCAT SubDevice API library and sample code for rapid application development are included*

Bus Master Support

- *The FPGA contains Bus Master DMA support to offload the CPU from copying the output process image data into the host memory. This is utilized by the esd EtherCAT SubDevice Stack.*

Customization on Request

- *Customized configurations are available on request.*



EtherCAT SubDevice Interface for PCIe

The ECS-M.2/FPGA is an EtherCAT SubDevice in M.2 form factor. It is based on a Beckhoff IP core implemented in an Altera® FPGA, configured with 8 FMMUs, 8 Sync Managers, 60 kB DPRAM, and 64-bit Distributed Clocks.
Two EtherCAT ports (IN/OUT) are available via FFC connectors on the board edge and can be connected to RJ45 sockets using the supplied breakout adapter.

Versatile Application

The module supports standard EtherCAT protocols including CoE, FoE, and EoE, enabling the PCI Express host system to operate as a flexible EtherCAT I/O node accessible by the MainDevice.

DC Sync and Latch Signals

For system synchronization, the EtherCAT Distributed Clock signals (2x Sync, 2x Latch I/Os) are provided as physical I/Os via breakout adapter.

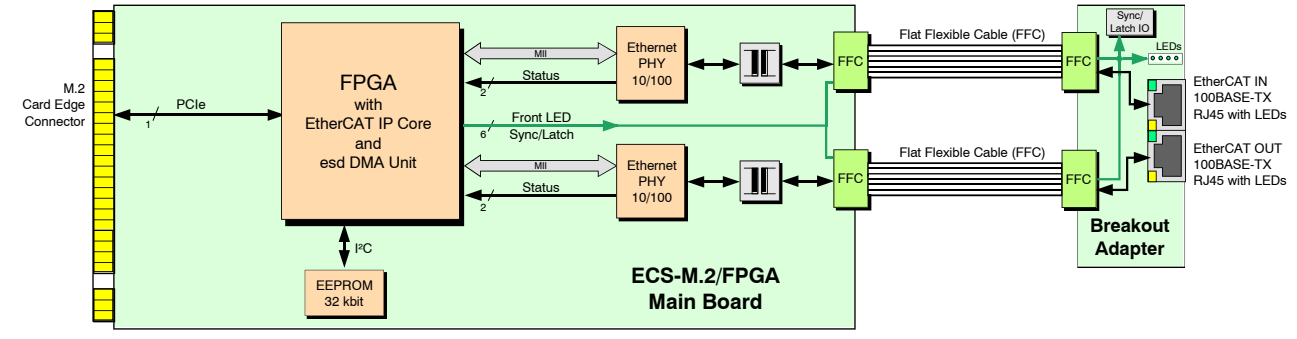
Software Support

The scope of delivery includes the esd EtherCAT SubDevice stack in binary form together with device drivers for Windows® and Linux®.
Documentation and example applications are provided.
Support for additional operating systems, in particular real-time operating systems, is available on request.

Related Products

This product is also available as PCI Express card ECS-PCIe/FPGA.
Variants for Compact PCI® Serial, XMC and PMC systems are offered as ECS-CPCIs/FPGA, ECS-XMC/FPGA and ECS-PMC/FPGA.

This product is under development.
It will be available Q3 2026.
All data specified here are preliminary and may be subject to change!



Technical Specifications:

PCI Express Interface:	
PCIe endpoint	*FPGA*
PCIe port	*According to PCI Express Spec. R1.0a, 1 lane*
Form factor	*M.2, 2280 can be shortened to 2260*
Connectors	*M.2 card edge, B+M keying*
EtherCAT SubDevice:	
Controller	*Beckhoff IP Core integrated in FPGA + 2x MII PHY (Micrel KSZ8081MNX)*
Interface	*2x RJ45 socket, 100BASE-TX, 100 Mbit/s, according to IEEE 802.3, galvanically isolated, located on breakout adapter*
LEDs	*Link/Activity per port, Error, Run, 2x User LEDs*
General:	
Power supply voltage	*3.3 V DC from PCI Express M.2 connector*
Power consumption	*Max 3.3 W*

General (continued)	
Ambient temp.	*0 °C ... +65 °C*
Relative humidity	*Max. 90 % (non-condensing)*
Dimensions	*22 mm x 80/60 mm x 4.5 mm (main board)* *19 mm x 50.5 mm x 18 mm (breakout adapter)*
Weight	*Approx. 24 g (Adapter and cables included)*

Order Information:		
Hardware		*Order No.*
ECS-M.2/FPGA	*PCIe card in M.2 form factor including breakout adapter with two RJ45 sockets, Flat Flexible Cables (100 mm length), esd EtherCAT® SubDevice stack binary, drivers and manuals*	*E.1105.02*

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File: ECS-M2-FPGA_Datasheet_en_11.docx

All data are subject to change without prior notice.
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