

# TRENZ ELECTRONIC CATALOGUE

## Electronic Design Service

Development, Manufacture and Supply  
of FPGA and SoC Modules

*- Trenz goes SPACE -  
New space grade device  
on page 6, designed for  
cubesat missions.*

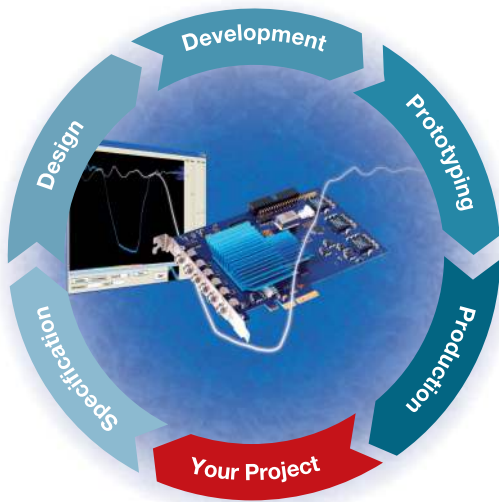
updated February 2023

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**FPGA** inside



Trenz Electronic GmbH operates as a provider of development services in the electronic industry since 1992. Our services include design-in support as well as turnkey designs which typically covers all steps from product specification, hardware and software design up to prototyping and production.



We are particularly specialized in the design of high-speed data acquisition, high-accuracy measurement and embedded digital signal processing systems based on FPGA and CPU architectures.

Many of our products are compatible with some widespread form factors. We also provide SoM products for Automotive industry and high-end applications.

In the event that an off-the-shelf FPGA board won't fit the customers requirements, the design can be easily adapted by our comprehensive engineering design service.

Our in-house EMS (Electronic Manufacturing Service) and worldwide supply of FPGA and SoC modules complete the portfolio. All modules produced by Trenz Electronic GmbH are developed and manufactured in Germany.

Other assembly options of our modules for cost or performance optimization plus high volume prices are available on request. Also, cooling solutions and several carrier boards are at hand.

## Hardware Design

- System architecture and design
- Hardware integration (Design-In)
- Ultrafast digital logic
- Analog and mixed signal
- Digital signal processing
- Schematic capture and PCB layout

## HDL Design

- FPGA and System-On-Chip design
- System design and synthesis
- HDL design (VHDL, Verilog)
- Integration of soft-cores
- USB, PCI-Express, Gigabit Ethernet
- Ultrafast ADC/DAC interfaces

## Software Development

- Device driver and application software development
- Software and Firmware development

- Extended device life cycle
- Rugged for industrial applications
- Automotive grade available
- Small and powerful
- Customizable
- Development and design service
- Rapid Prototyping
- Cooling solutions
- Carrier and testboards
- Free documentation and designs
- Sales worldwide
- In-house EMS
- Developed & produced in Germany



Trenz Electronic is certified partner in the AMD Partner Program.



ISO 9001:2015  
(quality management)  
certified



ISO 14001:2015  
(environmental  
management) certified

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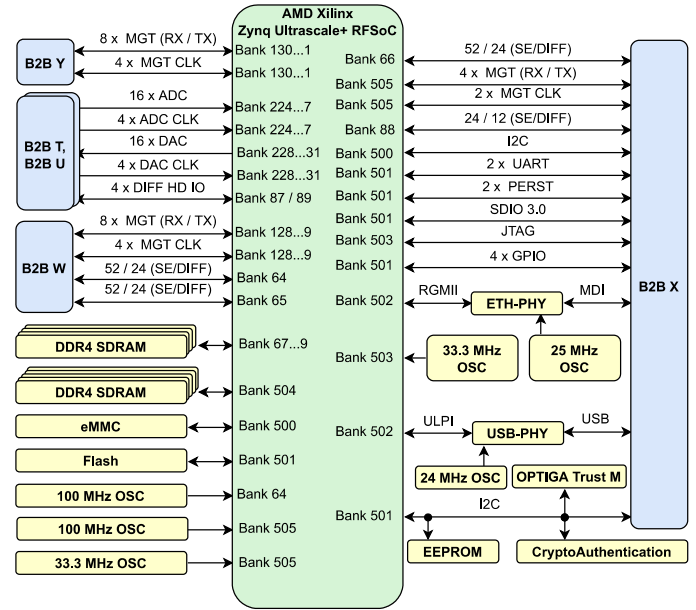


**NEW** **AM0070 Andromeda RFSoc Series**  
**AMD Zynq UltraScale+ RFSoc, DDR4, Flash, Ethernet**



6.4 x 8 cm form factor

<http://trenz.org/am0070-info>



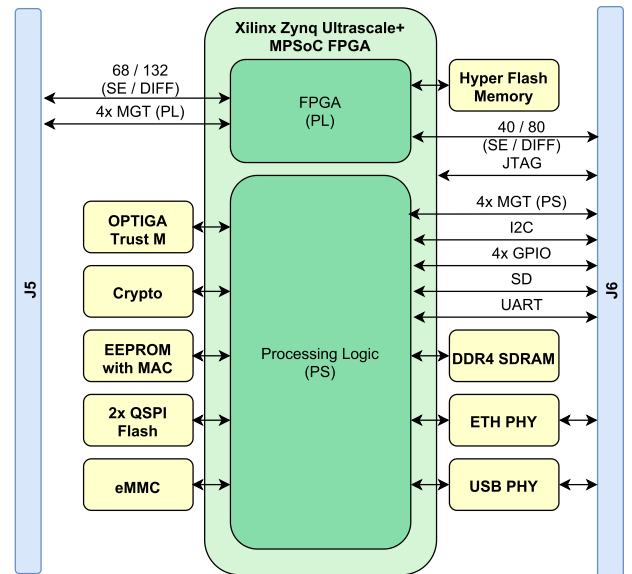
Device list	Connectors	SDRAM max	Flash	e.MMC	Ethernet	USB	Other Features
ZU29DR, ZU39DR, ZU49DR	5 x Samtec ADM6 4 x 60-pin	4 GB DDR4 64-bit (PS) with ECC 8 GB DDR4 64-bit (PL)	2 x 64 MB	8 GB	2 x 1 Gbit	USB2.0	OPTIGA Trust M, Crypto Authentication, Oscillator

**NEW** **AM0010 Andromeda MPSoC Series**  
**AMD Zynq UltraScale+ MPSoC, DDR4, Flash, Ethernet, USB**



4 x 5.6 cm form factor

<http://trenz.org/am0010-info>



Device list	Connectors	SDRAM max	Flash	e.MMC	Ethernet	USB	Other Features
ZU1CG-ZU5CG, ZU1EG-ZU5EG, ZU4EV, ZU5EV	2 x Samtec ADM6 4 x 60-pin	4 GB DDR4 64-bit (PS) with ECC	2 x 64 MB	8 GB	1 Gbit	USB2.0 OTG	Total I/O: 204, optional HyperRAM, MAC address serial EEPROM with EUI-48 node identity, security controller, Crypto Authentication



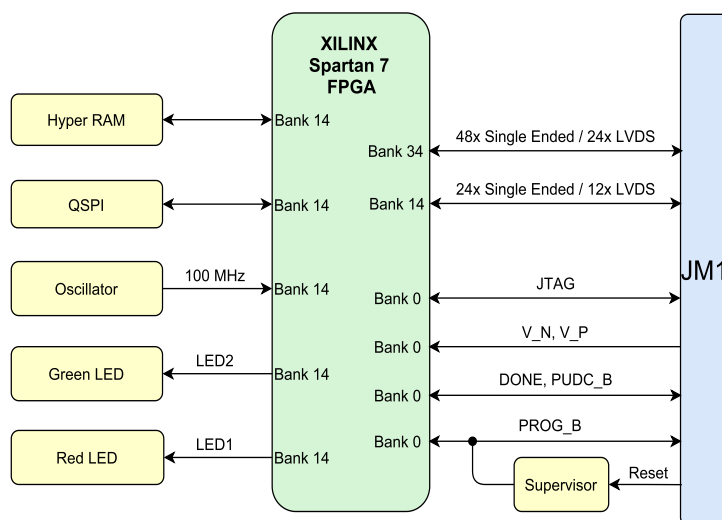
**NEW TE0717 Series**  
**AMD Spartan-7, HyperRAM, Flash, 100MHz Oscillator**



**AMD**  
**SPARTAN<sup>7</sup>**



2.5 x 3.5 cm form factor



<http://trenz.org/te0717-info>

Device list	Connector	HyperRAM	Flash	Other Features
S6, S15, S25, S50	1 x Samtec 100-pin LSHM	64 Mbit	64 Mbit	Baseboard available, oscillator 100 MHz, green and red LED, single supply

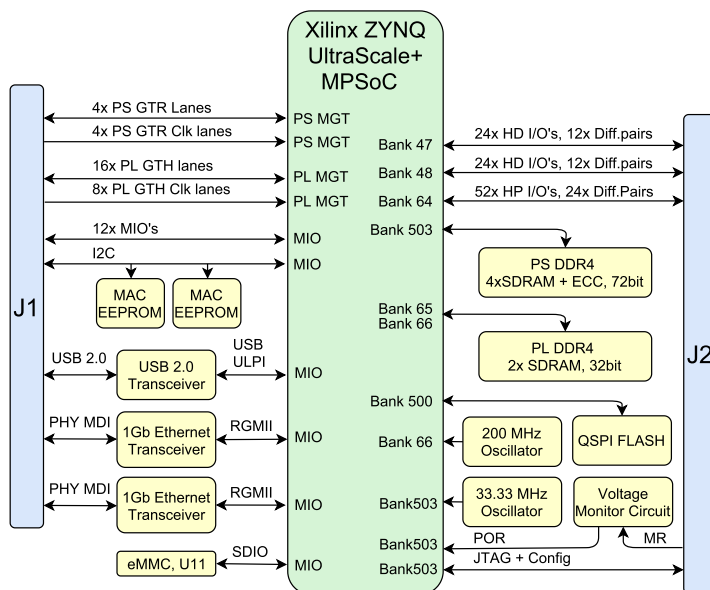
**NEW TE0806 Series**  
**AMD Zynq UltraScale+ MPSoC, DDR4 (PS + PL domain), Flash, Ethernet, USB**



**AMD**  
**ZYNQ**  
 UltraScale+



5.5 x 7.6 cm form factor



<http://trenz.org/te0806-info>

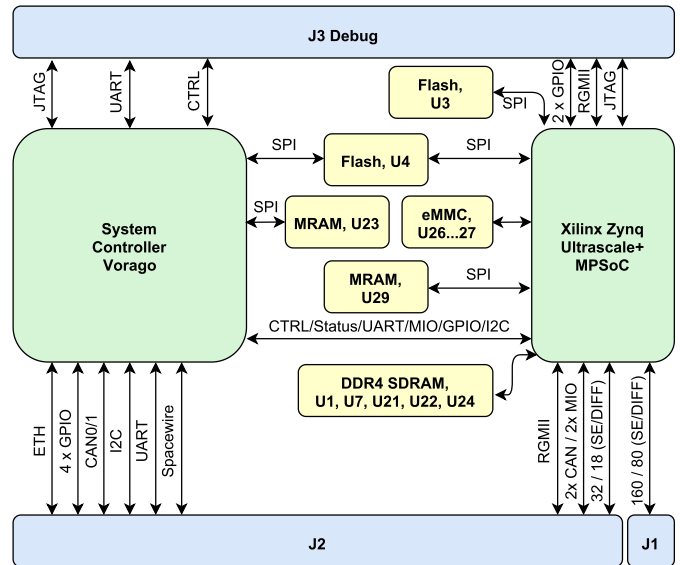
Device list	Connectors	SDRAM max	Flash max	e.MMC max	Ethernet PHY	USB PHY	Total I/O	Gbit Transceiver	Other Features
ZU4, ZU5, ZU7, CG, EG, EV support, 900 Pin packages	2 x Samtec ADM6	8 GB DDR4 64-bit (PS) with ECC 4 GB DDR4 32-bit (PL)	512 MB	64 GB	2 x 1 Gbit	USB2.0 OTG	48 PI HD + 52 PL HP 14 MIOs + I2C	4 x GTR + 16 x GTH	Transceiver clock in-/outputs, 2 x MAC address serial EEPROM, single 5-12V power required

**NEW TE0812 Series**  
 Latest MPSoC chip technology in space, designed for cubesat missions



Radiation hardened

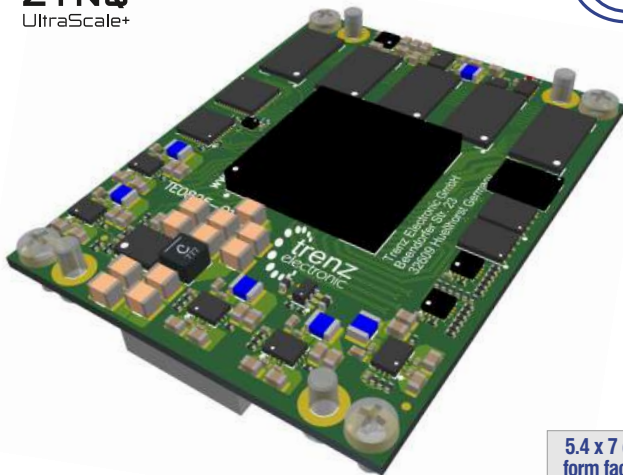
9 x 9 cm form factor



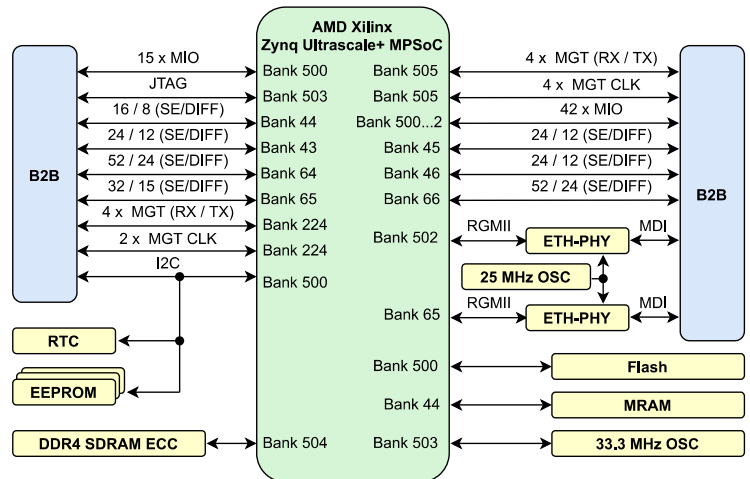
<http://trenz.org/te0812-info>

Device list	Pin Packages	Connectors	SDRAM max	e.MMC	Flash	Total I/O	Gbit Transceivers	Other Features
ZU6	C900	2 x B2B Samtec APM6 1 x Debug Samtec LSHM	4 GB DDR4 with ECC	2 x 32 GB	2 x 128 MB	127	16 (12 x PL; 4 x PS)	2 x 4 MByte MRAM, on board Vorago VA41630, ETH, 2x Analog input, UART, 2 x CAN, PPSIn/PPSOut, I2C, 12V power supply

**NEW TE0825 Series**  
 AMD Zynq UltraScale+ MPSoC, Automotive, DDR4, Flash, EEPROM



5.4 x 7 cm form factor



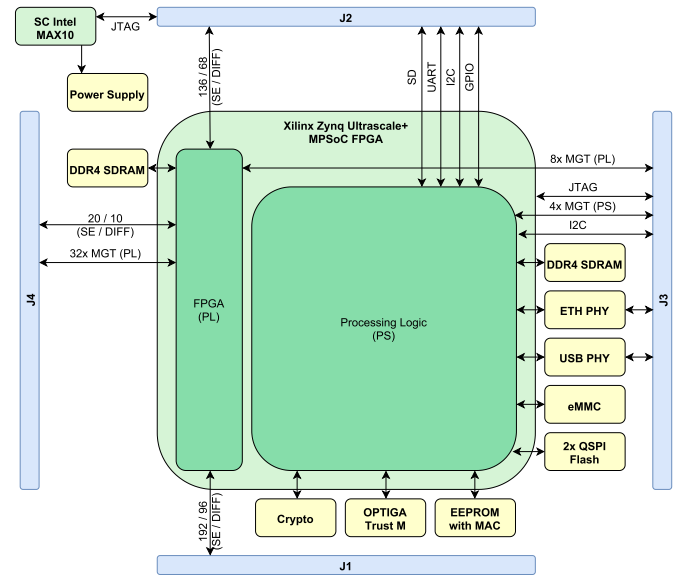
<http://trenz.org/te0825-info>

Device list	Connectors	SDRAM	Flash	EEPROM	Ethernet PHY	Total I/O	Gbit Transceiver	Other Features
ZU2, ZU3, ZU4, ZU5	2 x Samtec ADM6, 1 x Samtec UMPT, 4 x 60 pin	8 GB DDR4 with ECC	256 MB	64 kByte, 2 x with MAC address	2 x 1 Gbit	136 PL HP + 88 PL HD 57 PS MIO	4 x GTR + 4 x GTH	real time clock, Oscillator, power connector (UMPT), ETH, JTAG

**NEW TE0865 Series**  
**AMD Zynq UltraScale+ MPSoC, DDR4, Flash, Ethernet, USB**



7.5 x 10 cm form factor



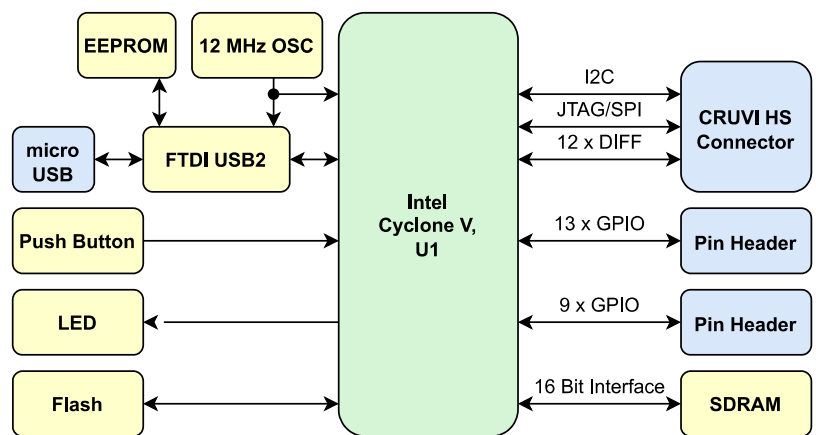
<http://trenz.org/te0865-info>

Device list	Pin Packages	Connectors	SDRAM max	Flash	Ethernet PHY	Total I/O	Gbit Transceivers	Other Features
ZU11, ZU17, ZU19	C1760	4 x Samtec ADM6 4 x 60-pin	8 GB DDR4 64-bit (PS) with ECC, 8 GB DDR4 64-bit (PL)	2 x 64 MB	1 Gbit	240 PL HP 96 PL HD 21 MIOs	32 x GTH, 16 x GTY, 4 x GTR	USB PHY, e.MMC, 12V single supply

**NEW TEI0050 Series**  
**Intel Cyclone V, SDRAM, Flash, EEPROM**



2.5 x 7.07 cm form factor



<http://trenz.org/tei0050-info>

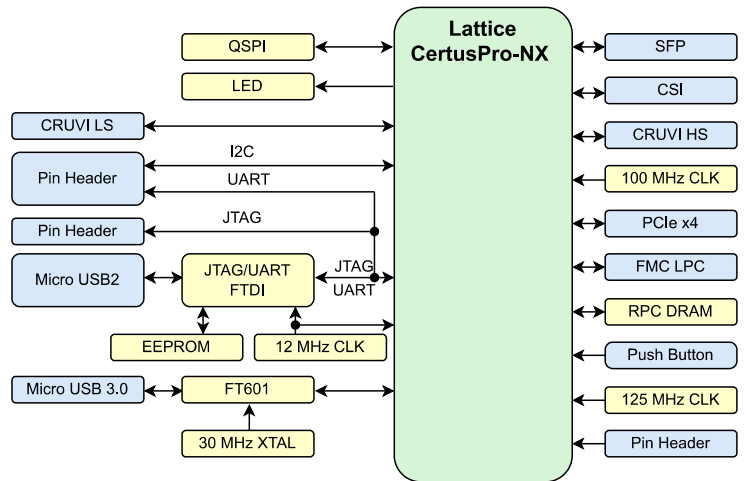
Device list	Pin Package	Connectors	SDRAM	Flash	Other Features
Intel Cyclone V	U15 Ultra FineLine BGA 325 Pins	CRUVE, 2 x 14 Pin Header	8 MB	up to 256 MB possible	USB-to-JTAG/GPIO-FTDI, user push buttons and LEDs



**NEW TEL0003 Series**  
**Lattice CertusPro-NX, CRUVI, DRAM, Flash**



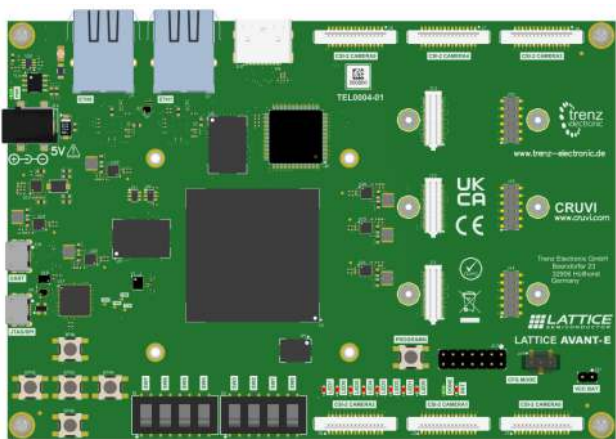
10.7 x 16.8 cm form factor



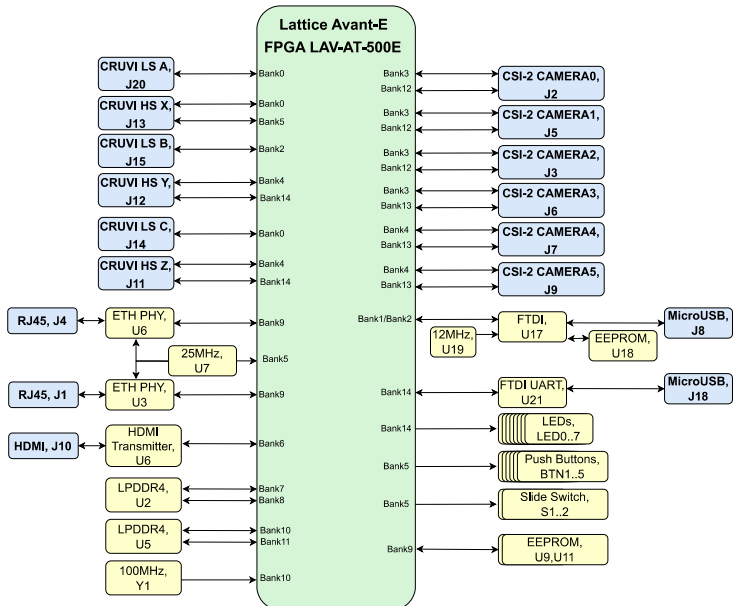
<http://trenz.org/tel0003-info>

Device list	On-Board	DRAM	Flash	Interface	Other Features
CertusPro-NX	USB3.0 to FIFO Bridge USB to FIFO FTDI	2 x 32 MB RPC	32 MB QSPI	CRUVI, PCI x 4, FMC (MGT/GPIO/JTAG/I2C), SFP+, USB3.0, USB2.0 (JTAG + UART), 3 x Pin Header	Oscillator, user LEDs, push buttons, DIP Switch, EEPROM

**NEW TEL0004 Series**  
**Lattice Avant Evaluation Board, CRUVI, DRAM, Flash**



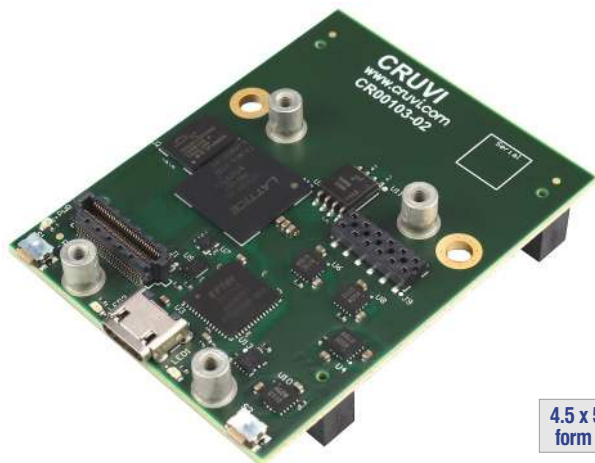
11 x 16 cm form factor



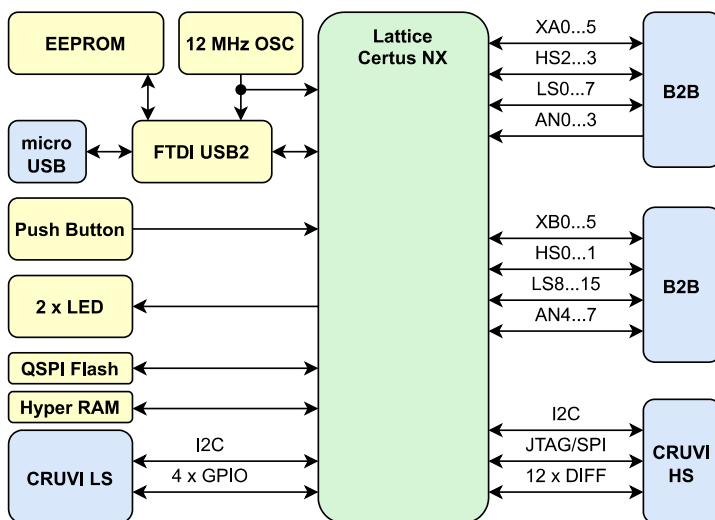
<http://trenz.org/tel0004-info>

Device list	SDRAM	Flash	Interface	Other Features
Lattice Avant-E (LAV-AT- 500E)	2 x 8 Gbit LPDDR4	32 MB SPI/QUAD Boot	2 Gbit Ethernet PHY, HDMI Transmitter, 2 x Micro-USB connector, 6 x MIPI CSI-2, 3 x CRUVIs	user LEDs, push buttons, Slide Switch, 2 x EEPROM with MAC address

**NEW CR00103 CRUVI Certus-NX Baseboard**  
 Lattice Certus-NX, HyperRAM, Flash, EEPROM



4.5 x 5,7 cm form factor



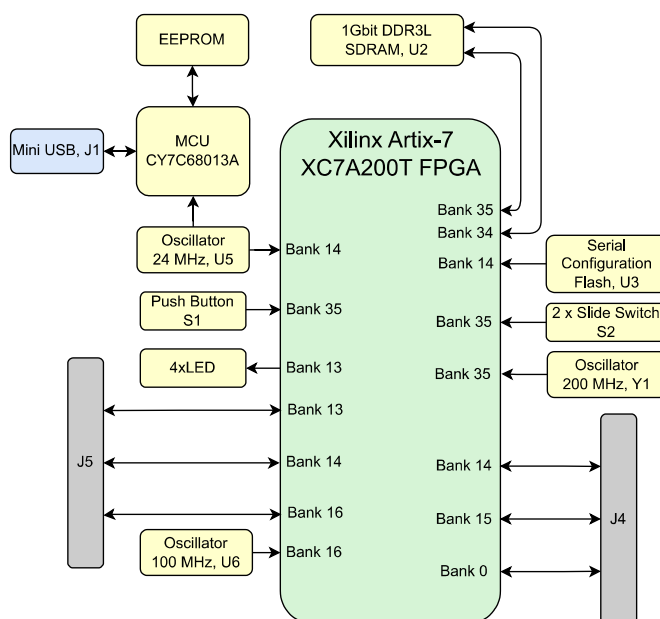
<http://trenz.org/cr00103-info>

Device list	Interface	RAM	Flash	Other Features
Lattice Certus-NX	CRUVI (2 x 34 Pin Header, 1 x High Speed 60 Pin Header, 1 x Low Speed 12 Pin Header), micro USB	8 MB HyperRAM	32 MB	USB to FIFO FTDI (JTAG/GPIO), user LEDs, push buttons

**NEW TE0763 Series**  
 AMD Artix-7 FPGA, 200K, DDR3L, Flash



4.05 x 4.75 cm form factor



<http://trenz.org/te0763-info>

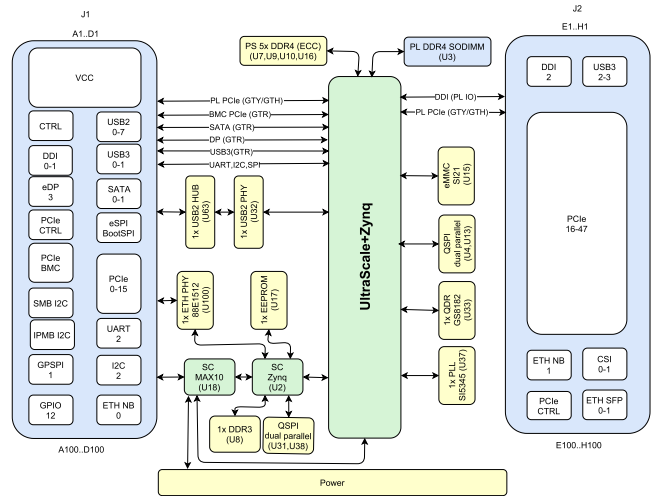
Device list	On-Board	DRAM	Flash	Interface	Other Features
200T	HS-USB Microcontroller	125 MB DDR3L SDRAM	32 MB SPI/QUAD Boot	2 x 80 pin B2B connectors, B2B USB, Reset IN, 100 x IOs, 6 x CLK IN, FPGA JTAG	user LEDs, push buttons, DIP Switch,

**NEW TE0830 Series (COM-HPC™ PICMG Standard)**  
**AMD Zynq UltraScale+ Module with ZU11EG up to ZU19EG, 12 x 12 cm (Client Size B)**



12 x 12 cm form factor

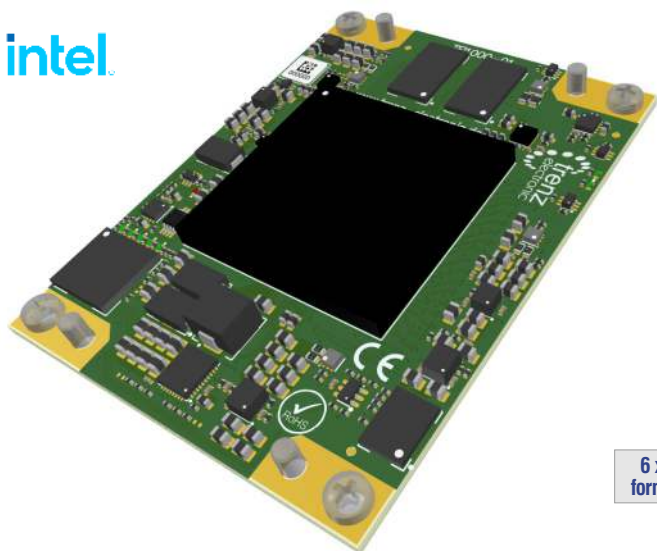
COM-HPC™ is the new released PICMG standard for high-performance Computer-on-Modules (COMs). The pinout and majority of the functionality were recently officially approved.



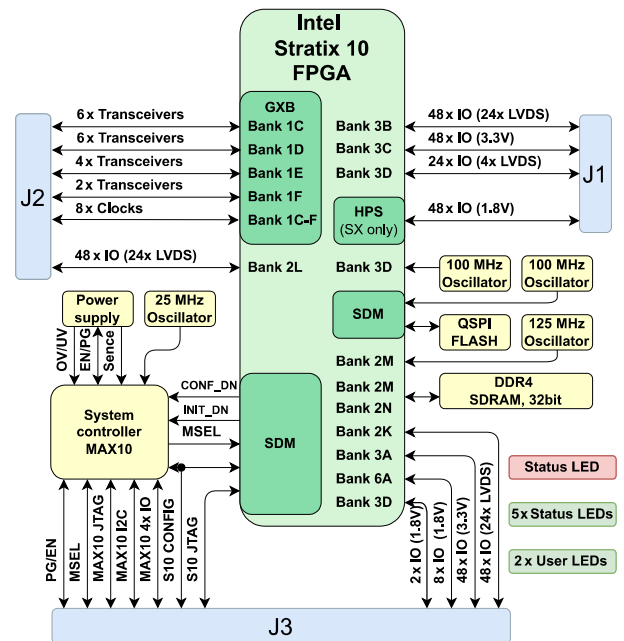
<http://trenz.org/te0830-info>

Device list	Pin Packages	Connectors	SDRAM max	Gbit Transceivers	Other Features
ZU11, ZU17, ZU19	FFVC1760	2 x 400 Pin COM-HPC	bis 8 GB DDR4 (PS) with ECC bis 16 GB DDR4 (SODIMM) (PL)	32 x GTH, 16 x GTY, 4 x GTR	1Gbit ETH PHY, USB PHY, e.MMC, System Controller, CLK Management, diverse IOs, 12V single supply

**NEW TEI1000 Series**  
**Intel Stratix 10 SX or GX, SDRAM, Flash, MAX10 System Controller**



6 x 8 cm form factor



<http://trenz.org/tei1000-info>

Device list	Connector	SDRAM	QSPI Flash	Gbit Transceivers	Total IOs	Other Features
Stratix 10 SX or GX	3 x 240 pin BGA	2 GB	512 Mbit	18 x GXT	250 x PL 48 x CPU	MAX10 System Controller, Status and User LEDs, 1.8V, 3.3V and variable IO



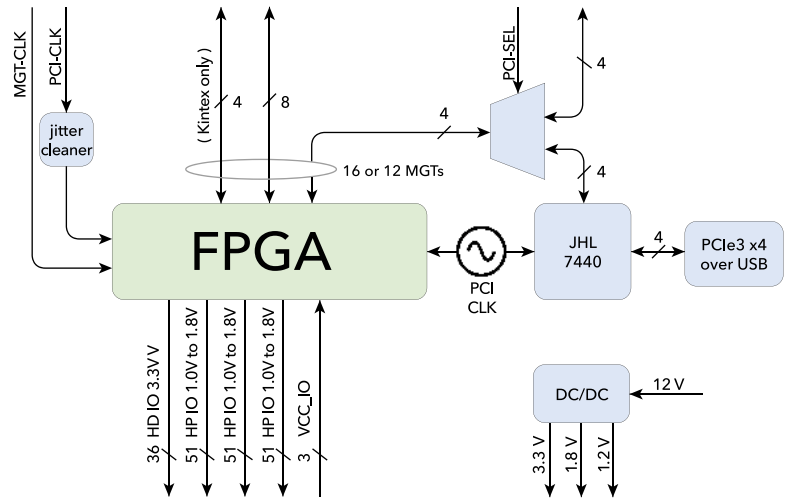
**NEW TEC0217 Series**  
**Micromodule with Artix/Kintex Ultrascale+**

TEC0217 is an FPGA module optimized to provide high MGT performance at relatively low cost. All 12 or 16 MGT lanes are available on the B2B connector. Of these, 4 lanes can optionally be routed to an onboard intel Thunderbolt 4 device controller JHL7440 to access the board via PCI over USB. An interface like this can connect to any Thunderbolt port and to USB ports that support PCIe over USB.



5.2 x 9.6 cm form factor

<http://trenz.org/tec0217-info>



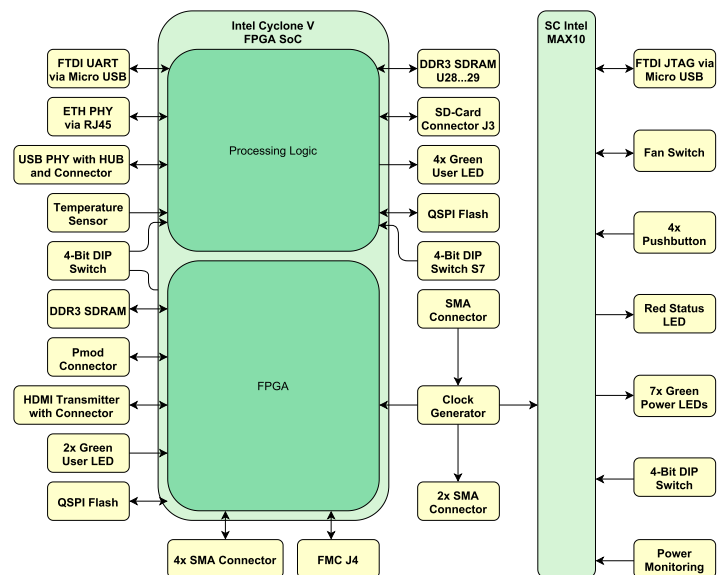
Device list	MGT count	MGT speed	MGT Type	PCI	System Logic Cells (K)	UltraRAM (Mb)	DSP Slices	HP IO (3 Banks with individually selectable IO voltage)	HD IO 3.3V
AU10P, AU15P, AU20P, AU25P, KU3P, KU5P	12-16	16.3 - 32.75 Gbps	GTH GTY	PCIe4x8 PCIe3x8 PCIe3x16	96 up to 475	only for KU3P (13.5) and KU5P (18.0)	400 up to 1.824	153	58 in 29 differential pairs

**NEW TEI0022 DataStorm DAQ**  
**M-Board FMC Carrier for M-Series Precision Converters**



13 x 16 cm form factor

<http://trenz.org/tei0022-info>



Device list	SDRAM max	Flash	On Board	Interface	Other Features
Cyclone V 5CSEMA5F31C8N	1 GB for HPS 1 GB for FPGA	32 MB SPI for HPS 32 MB SPI for FPGA	Up to 7 x SMA connector, temperature sensor, Intel MAX 10 for board management	Connectors: LPC FMC, 4 x Pmod, JTAG, UART via microUSB B (for FPGA and HPS), 4 x USB2.0 host, Ethernet, SD card, HDMI	Power: 12V input supply voltage

# TE0710 Series

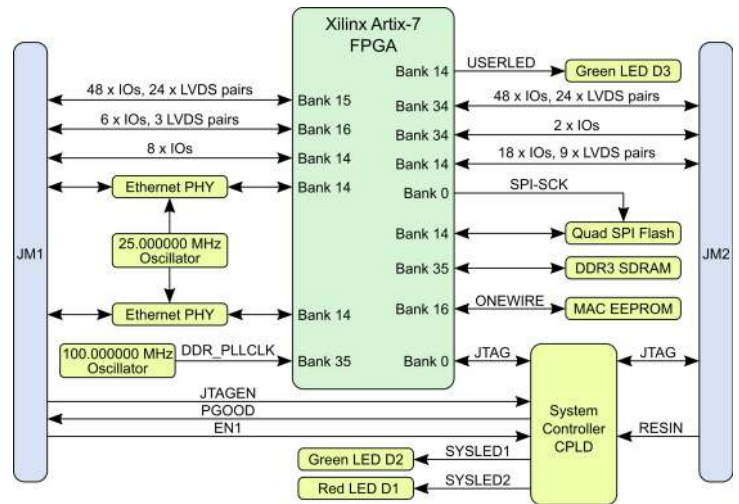
AMD Artix-7, DDR3, Flash, 2 x 100 Mbit Ethernet, EEPROM



**AMD**  
ARTIX 7



4 x 5 cm form factor



<http://trenz.org/te0710-info>

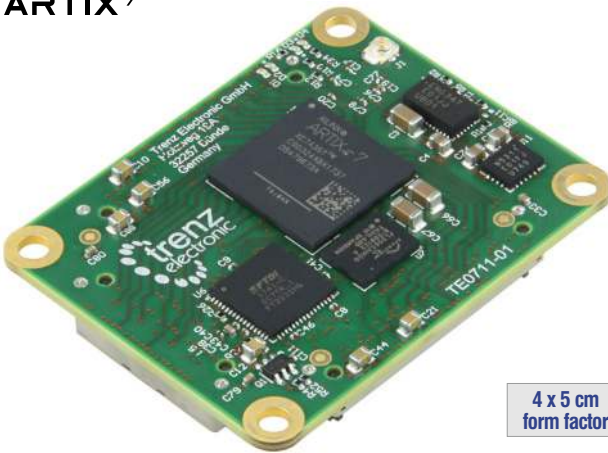
Device list	Connectors	SDRAM max	Flash	Ethernet PHY	Total I/O	Other Features
35T, 50T, 75T, 100T	2 x Samtec LSHM	512 MB DDR3	32 MB	2 x 100 Mbit	112 (51 differential pairs + 10 single-ended)	JTAG, 100 MHz MEMS oscillator, user LED, single supply

# TE0711 Series

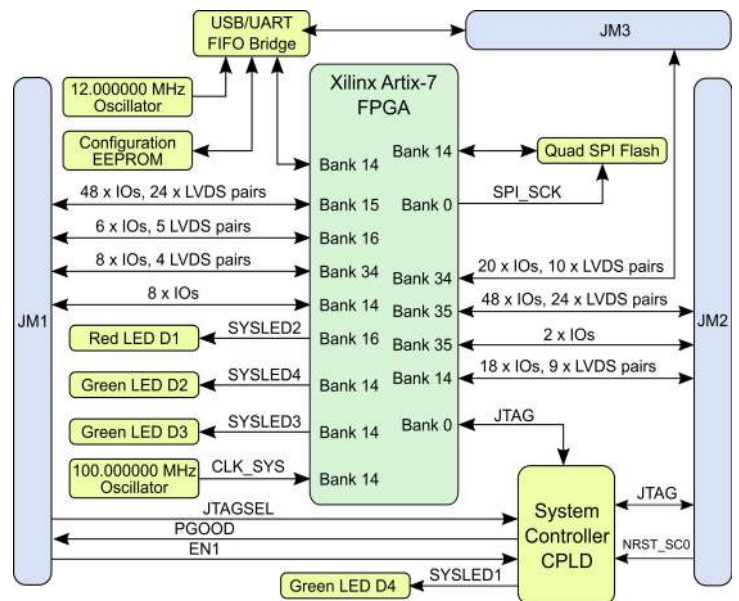
AMD Artix-7, Flash, USB, FTDI USB to UART/FIFO bridge, high pin count



**AMD**  
ARTIX 7



4 x 5 cm form factor



<http://trenz.org/te0711-info>

Device list	Connectors	Flash	MEMS Oscillator	USB PHY	Total I/O	Other Features
35T, 50T, 75T, 100T	3 x Samtec LSHM	32 MB	100 MHz	USB2.0 UART/FIFO	178 (84 differential pairs)	4 LEDs, single supply

# TE0712 Series

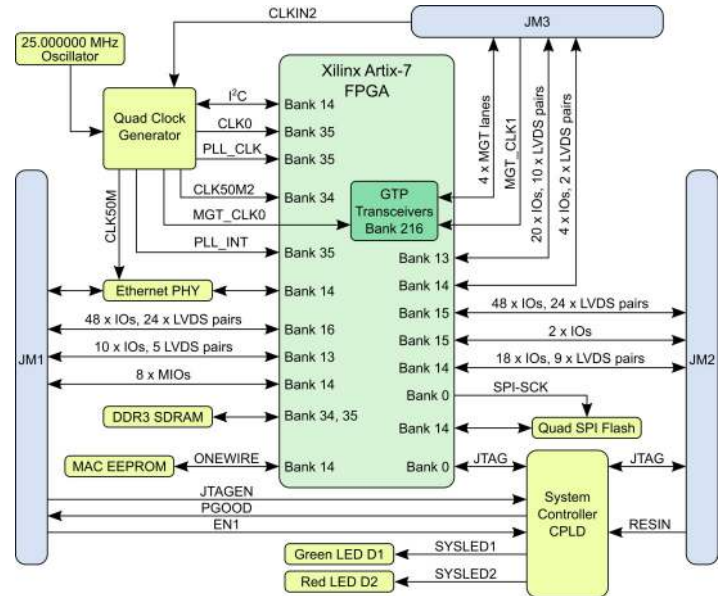
## AMD Artix-7, DDR3, Flash, Ethernet, 4 x GTP Transceiver

**AMD**  
**ARTIX 7**



4 x 5 cm form factor

<http://trenz.org/te0712-info>



Device list	Connectors	SDRAM max	Flash	EEPROM	Ethernet PHY	Total I/O	Gbit Transceivers	Other Features
35T, 50T, 75T, 100T, 200T	3 x Samtec LSHM	1 GB DDR3	32 MB	MAC Address	100 Mbit	158	4 x GTP	Programmable clock generator, single supply

# TE0713 Series

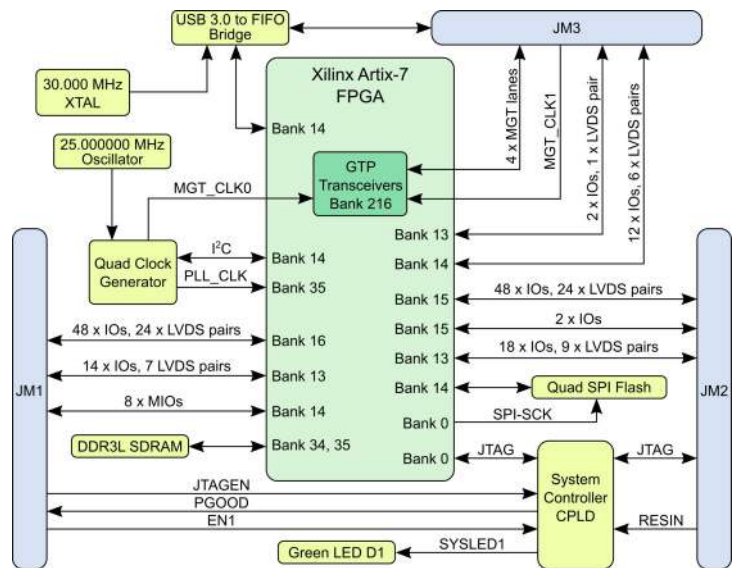
## AMD Artix-7, DDR3L, Flash, USB3.0 to FIFO Bridge, 4 x GTP Transceiver

**AMD**  
**ARTIX 7**



4 x 5 cm form factor

<http://trenz.org/te0713-info>



Device list	Connectors	SDRAM max	Flash	USB PHY	Total I/O	Gbit Transceivers	Other Features
15T - 200T	3 x Samtec LSHM	1 GB DDR3L	32 MB	USB3.0	152	4 x GTP	Programmable clock generator, single supply



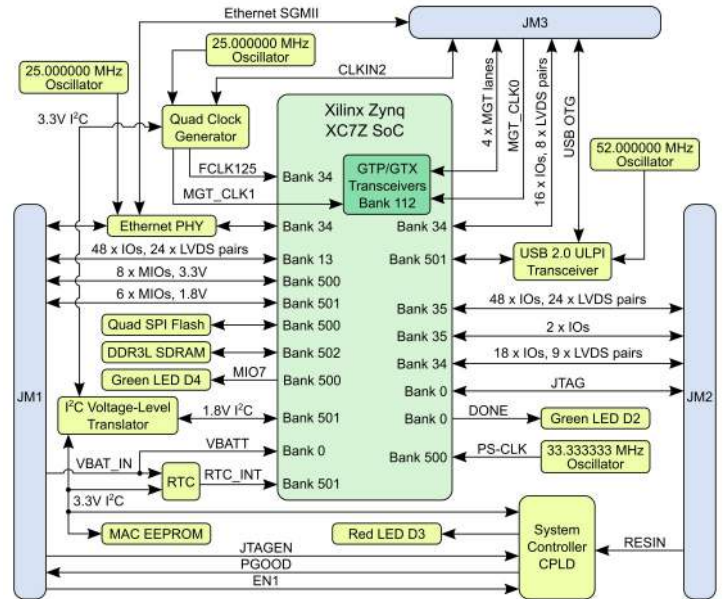
# TE0715 Series

AMD Zynq-7000, DDR3, Flash, Ethernet, USB, 4 High Speed Serial Transceivers



4 x 5 cm form factor

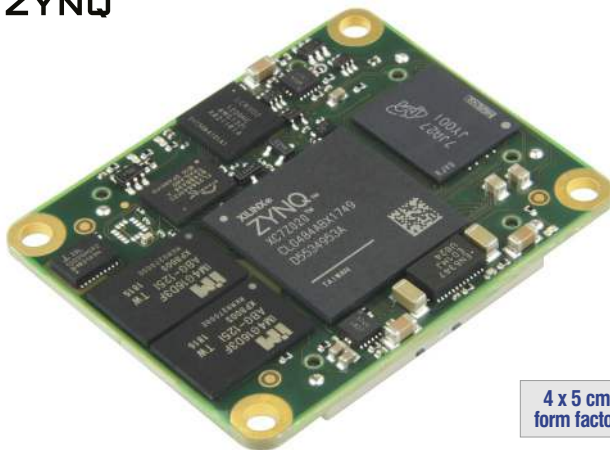
<http://trenz.org/te0715-info>



Device list	Connectors	SDRAM max	Flash	Ethernet PHY	USB PHY	Total I/O	Gbit Transceivers	Other Features
Z-7015, Z-7030, Z-7012S	3 x Samtec LSHM	1 GB DDR3	32 MB	1 Gbit	USB2.0	132 + 14 MIO	Z-7015: 4 x GTP Z-7030: 4 x GTX	Programmable clock generator, real time clock, single supply

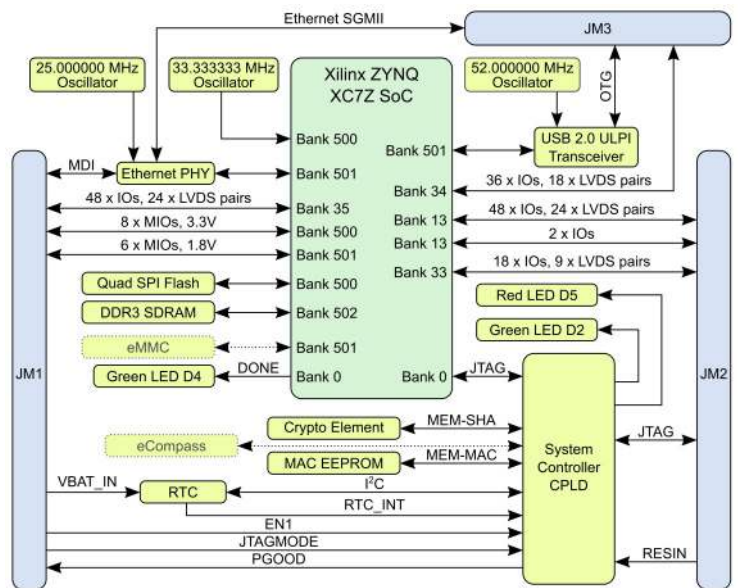
# TE0720 GigaZee Series

AMD Zynq-7000, DDR3, Flash, Ethernet, USB, e.MMC, Automotive Grade available



4 x 5 cm form factor

<http://trenz.org/te0720-info>



Device list	Connectors	SDRAM max	Flash max	e.MMC max	Ethernet PHY	USB PHY	Total I/O	Other Features
Z-7020, Z-7014S, XA7Z020-1CLG484Q	3 x Samtec LSHM	1 GB DDR3	64 MB	32 GB	1 Gbit	USB2.0	152 + 14 MIO	Real time clock, MAC address, 2k serial EEPROM, 3 user LEDs, single supply

# TE0741 Series

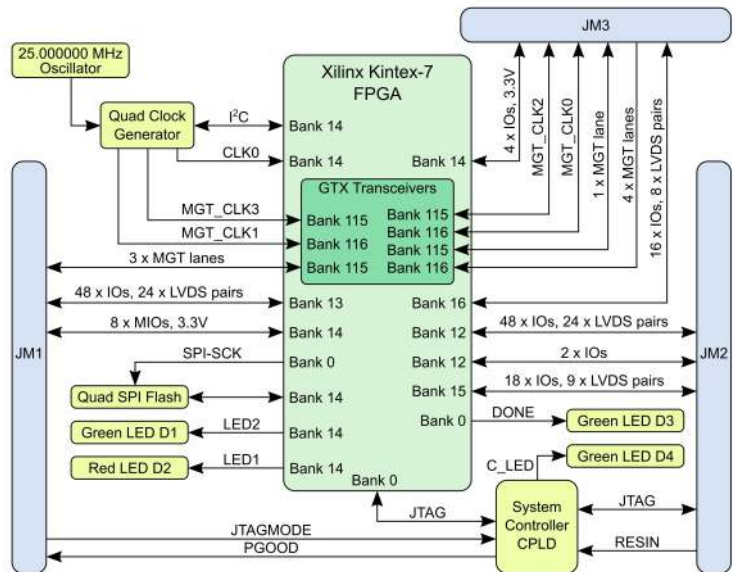
AMD Kintex-7, Flash, 8 High Speed Serial Transceivers, 25 MHz Oscillator

**AMD**  
**KINTEX<sup>7</sup>**



4 x 5 cm form factor

<http://trenz.org/te0741-info>



Device list	Connectors	Flash	Total I/O	Gbit Transceivers	Other Features
70T, 160T, 325T, 410T	3 x Samtec LSHM	32 MB	144 (94 for 70T variant)	8 x MGTs	Programmable clock generator, single supply

# TE0841 Series

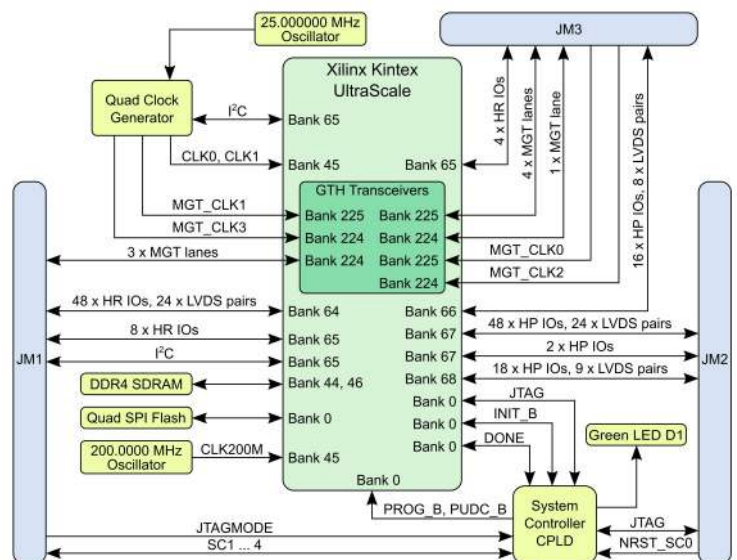
AMD Kintex UltraScale, DDR4, Flash, 8 x GTH Transceiver

**AMD**  
**KINTEX<sup>UltraScale+</sup>**



4 x 5 cm form factor

<http://trenz.org/te0841-info>



Device list	Connectors	SDRAM max	Flash	Total I/O	Gbit Transceivers	Other Features
KU035, KU040	3 x Samtec LSHM	4 GB DDR4	64 MB	60 x HR I/Os 84 x HP I/Os	8 x GTH	Programmable clock generator, single supply







# TE0823 Series

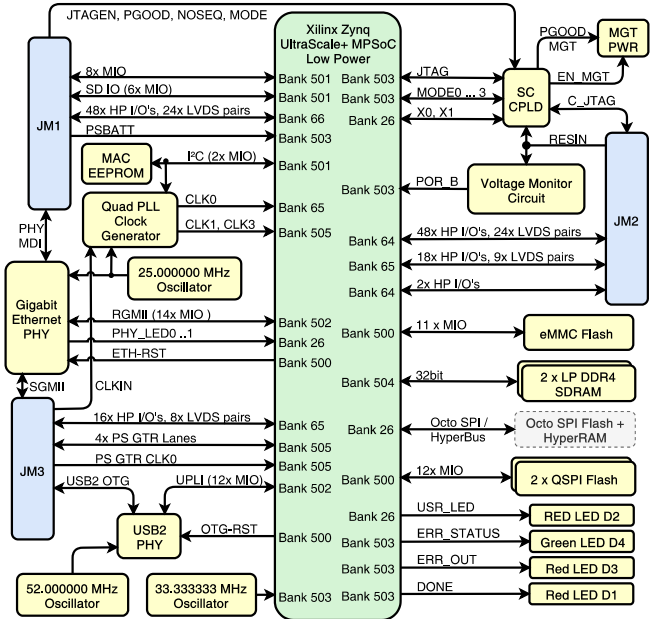
AMD Zynq UltraScale+ Low Power FPGA, LPDDR4, Flash, USB, Ethernet, e.MMC



Optional HyperRAM/  
OctalRAM/HyperFlash/  
xSPI Flash

4 x 5 cm  
form factor

<http://trenz.org/te0823-info>



Device list	Pin Packages	Connectors	SDRAM max	Flash	e.MMC	Ethernet PHY	USB PHY	Total I/O	Gbit Transceiver	Other Features
ZU2CG - ZU5CG, ZU2EG - ZU5EG, ZU4EV, ZU5EV	784	3 x Samtec LSHM	2 GB LPDDR4	128 MB	8 - 64 GB	1 Gbit	USB2.0 OTG	132 HP + 14 MIO	4 x PS GTR	GPU/VCU depending on device, programmable clock generator, single supply

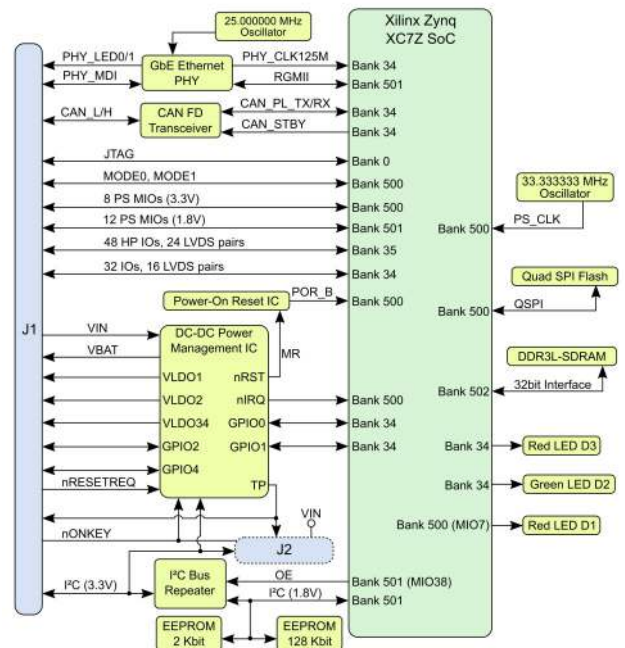
# TE0724 Series

AMD Zynq-7000, DDR3L, Flash, Ethernet, EEPROM, CAN



4 x 6 cm  
form factor

<http://trenz.org/te0724-info>



Device list	Connectors	SDRAM max	Flash max	EEPROM	Ethernet PHY	Total I/O	Other Features
Z-7010, Z-7020	1 x Samtec ST5	1 GB DDR3L	64 MB	MAC Address	1 Gbit	PL: 80 PS: 20	CAN, single supply

# TE0803/TE0813 "UltraSoM+" Series

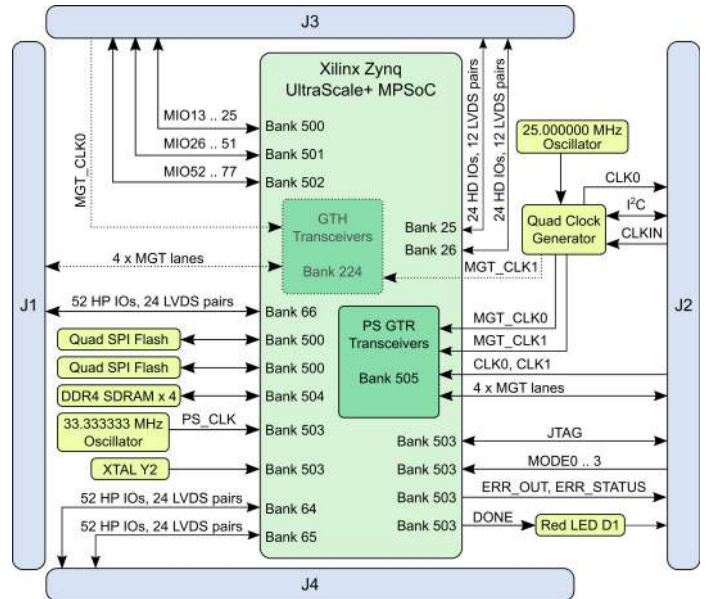
## AMD Zynq UltraScale+, DDR4, Flash, 8 High Speed Serial Transceivers



5.2 x 7.6 cm form factor

Compatible with TEBF0808/818

<http://trenz.org/te0803-info>



Device list	Pin Packages	Connectors	SDRAM max	Flash	Total I/O	Gbit Transceivers	Other Features
ZU2CG - ZU5CG, ZU2EG - ZU5EG, ZU4EV, ZU5EV	C784	4 x Samtec ST5 (TE0803) 4 x Samtec ADM6 (TE0813)	8 GB DDR4	128	204 + 65 MIO	4 x PS GTR 4 x PL GTH (ZU4+ZU5 only)	GPU/VCU depending on device, EEPROM MAC address, programmable clock generator, single supply

# TE0807/TE0817 "UltraSoM+" Series

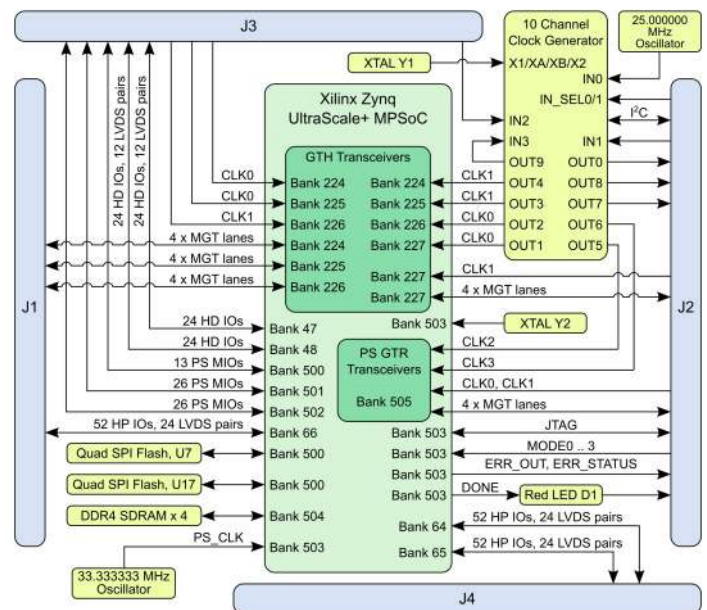
## AMD Zynq UltraScale+, DDR4, Flash, 20 High Speed Serial Transceivers



5.2 x 7.6 cm form factor

Compatible with TEBF0808/818

<http://trenz.org/te0807-info>



Device list	Pin Package	Connectors	SDRAM max	Flash	Total I/O	Gbit Transceivers	Other Features
ZU4CG - ZU7CG, ZU4EG - ZU7EG, ZU4EV - ZU7EV	B900	4 x Samtec ST5 (TE0807) 4 x Samtec ADM6 (TE0817)	8 GB DDR4	128 MB	204 + 65 MIO	4 x GTR, 16 x GTH	GPU and VCU, programmable clock generator, single supply

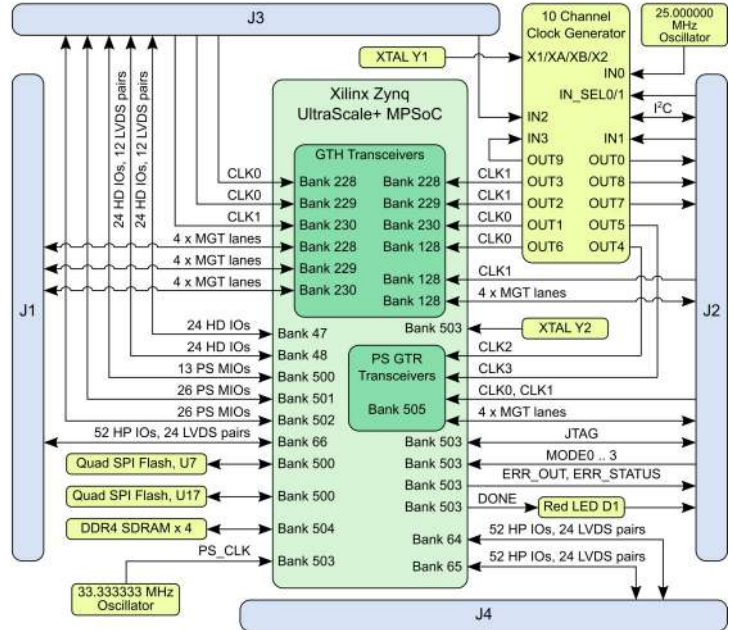


# TE0808/TE0818 "UltraSoM+" Series

AMD Zynq UltraScale+, DDR4, Flash, 20 High Speed Serial Transceivers



5.2 x 7.6 cm form factor



Compatible with TEBF0808/818

<http://trenz.org/te0808-info>

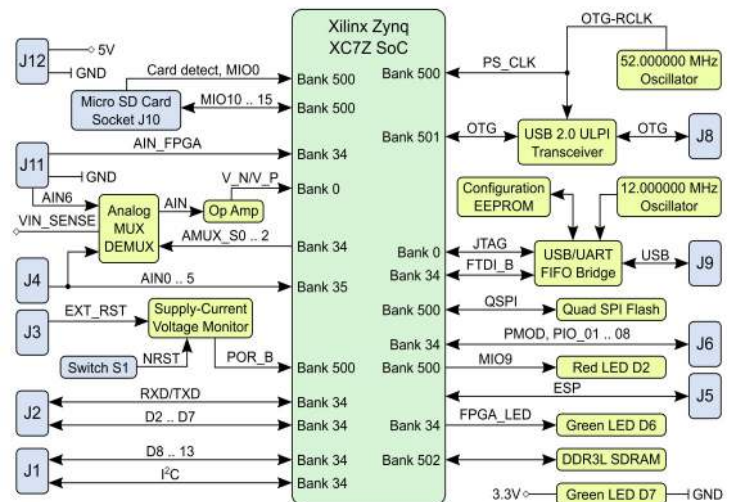
Device list	Pin Package	Connectors	SDRAM max	Flash	Total I/O	Gbit Transceivers	Other Features
ZU6CG, ZU9CG, ZU6EG, ZU9EG, ZU15EG	C900	4 x Samtec ST5 (TE0808) 4 x Samtec ADM6 (TE0818)	8 GB DDR4	128 MB	204 + 65 MIO	4 x GTR, 16 x GTH	GPU/VCU depending on device, programmable clock generator, single supply

# TE0726 "ZynqBerry" Series

AMD Zynq-7000, Form Factor like Raspberry Pi 2, DDR3L, Flash, Ethernet, USB, HDMI



6.35 x 9.3 cm form factor



Raspberry Pi 2 compatible

<http://trenz.org/te0726-info>

Device list	Connectors	SDRAM max	Flash	Ethernet PHY	USB PHY	Total I/O	Other Features
Z-7010, Z-7007S	40-pin "HAT" headers	512 MB DDR3L	16 MB	100 Mbit	4 x USB2.0 Host	26	DSI display connector, CSI-2 camera connector, micro SD card slot, 3.5 mm audio plug, HDMI type A



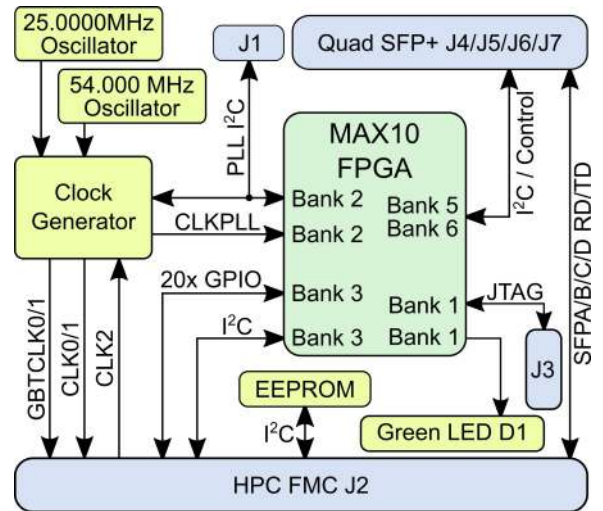


# TEF0008 Series

FMC Card with four SFP+ 10 Gbit Ports based on VITA 57.1 FMC HPC Standard



6.9 x 8.4 cm form factor



<http://trenz.org/tef0008-info>

It is intended for use on a FMC HPC carrier and can not be used stand-alone.

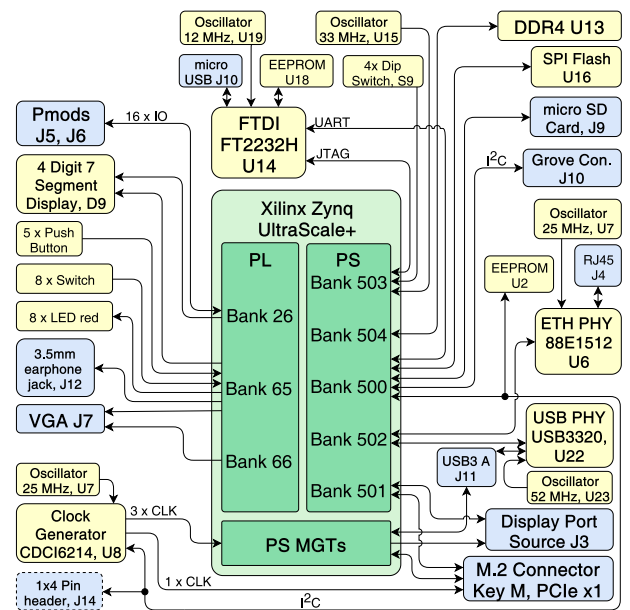
Connector	Dimension	SFP+	Other Features
HPC FMC	69 x 84 mm, SFP+ connector excluded (+ 5.5 mm)	4 SFP+ 10 Gbit ports for fiber optical SFP modules	Low-jitter programmable clock generator, 3.3V to 1.8V DCDC converter, 128 Kbit EEPROM, status LED (green)

# TE0802 MPSoC Development Board

AMD Zynq UltraScale+, LPDDR4, Flash, Ethernet, USB, Audio, Display



10 x 10 cm form factor



<http://trenz.org/te0802-info>

Device list	SDRAM max	Flash	Ethernet RJ45	USB	User I/O	Audio	Other Features
ZU1CG ZU2CG	2 GB LPDDR4	32 MB	1 Gbit	USB3.0 Host (type A connector)	2 Pmod connectors	3.5 mm jack (PWM output)	EEPROM, USB JTAG/UART microUSB, microSD card, M2 PCIe SSD support, display, power: 5V plug

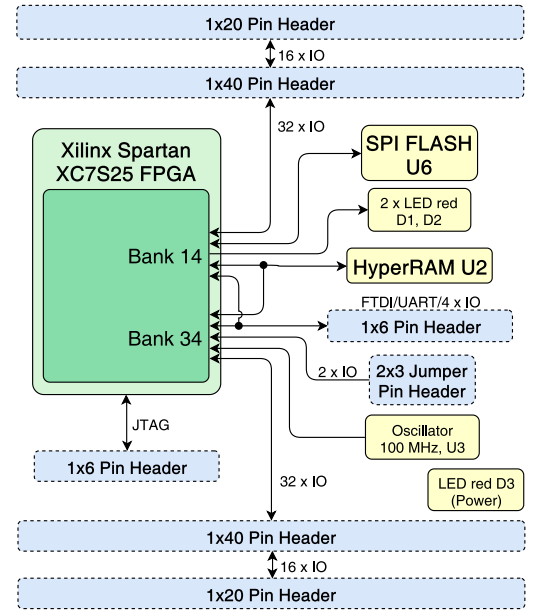
# TE0890 "S7 Mini" Series

## AMD Spartan-7, Fully Open-Source Module with HyperRAM



2.7 x 5.2 cm form factor

<http://trenz.org/te890-info>



Device list	Footprint compatible	Config PROM	HyperRAM DRAM	Total I/O	Interface(s)	Supply	Other Features
7S25	7S6, 7S15, 7S50 FTGB-196 devices	64 Mb	64 Mb	Dual-Pinout DIP-40 or 50mil 80 pin for 32 or 64 FPGA 3.3V I/Os	Standard 1x6 FTDI cable serial	5V input	23K Logic Cells, 29K Flops, 45 36Kb BRAMs, 80 mults., fully open source

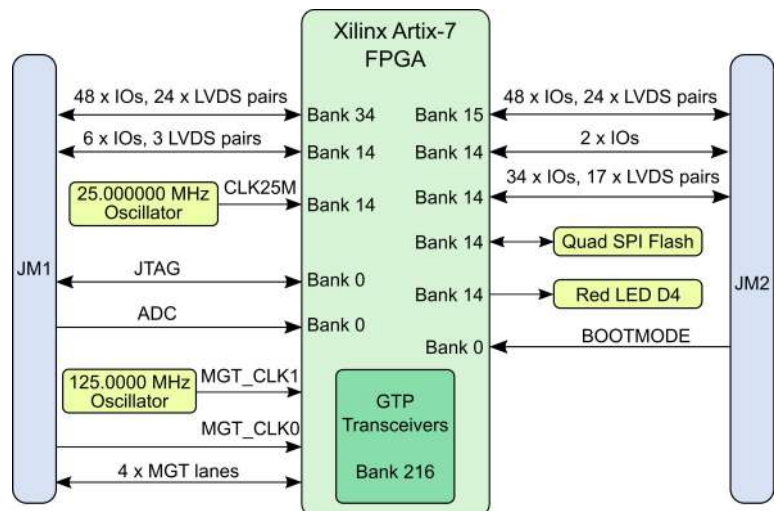
# TE0714 Series

## AMD Artix-7, Flash, 4 x GTP Transceiver, Form Factor 3 x 4 cm only



3 x 4 cm form factor

<http://trenz.org/te0714-info>



Device list	Connectors	Flash	Total I/O	Gbit Transceivers	Config. Voltage (B14)	Other Features
15T, 35T, 50T	2 x Samtec LSHM	16 MB	138 + 5 (QSPI or user I/Os)	4 x GTP	3.3V or 1.8V	Differential MEMS oscillator for MGT clocking, XADC analog input, eFUSE bit-stream encryption (AES), single supply

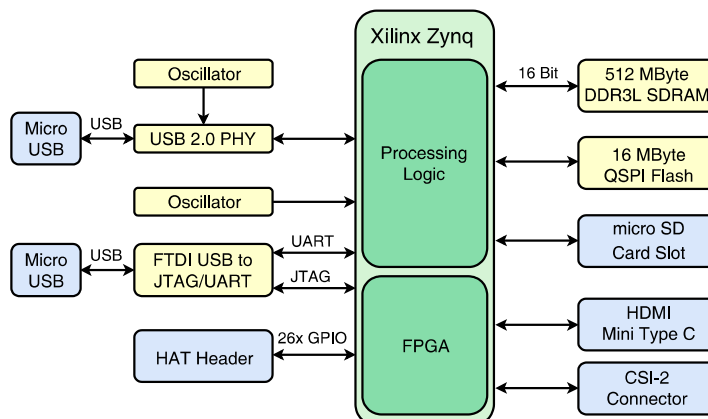


# TE0727 "ZynqBerryZero" Series

AMD Zynq-7000, Raspberry Pi Zero Form Factor, DDR3L, Flash, USB, mini HDMI



3 x 6.5 cm form factor



<http://trenz.org/te0727-info>

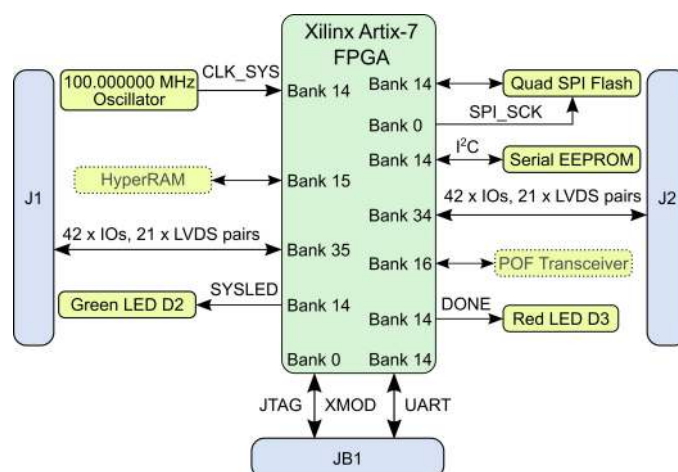
Device list	SDRAM max	Flash	HAT header	Total I/O	Other Features
Z-7010	512 MB DDR3L	16 MB	40-pin	26 GPIO	2 x microUSB2.0, microSD card slot, Mini HDMI type C, CSI-2 connector (camera)

# TE0725 Series

AMD Artix-7, Flash, HyperRAM, 2 x 50-pin Headers, 2.54 mm Pitch



3.5 x 7.3 cm form factor



<http://trenz.org/te0725-info>

The TE0725LP series is the same form factor, but w/o POF adapter and depending on variant 3.3 or 1.8V main power VIN, 4 diff. pairs in extra header J3, system clock 25 MHz (can be customized on request).

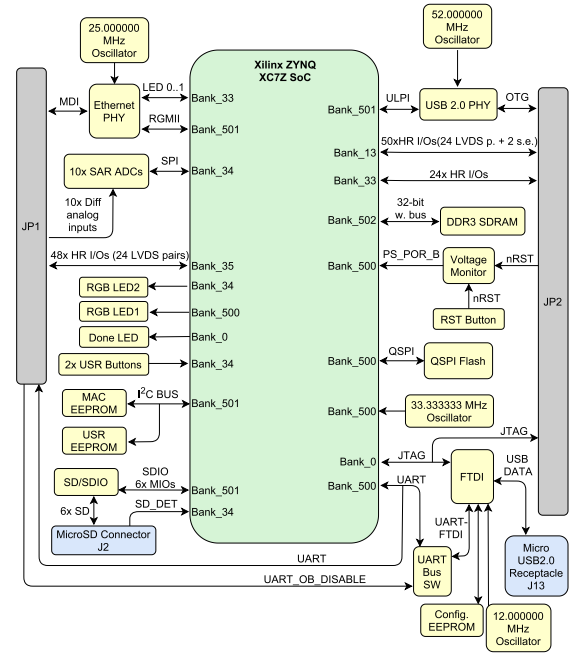
Device list	Connectors	HyperRAM max	Flash	EEPROM	Total I/O	Other Features
15T, 35T, 50T, 75T, 100T	2 x 50-pin headers	8 MB	32 MB	16 KB	87	Optional POF (Plastic Optical Fiber) adapter (125/250 Mbit/s), single supply

# TE0716 Series

AMD Zynq-7000, DDR3L, Flash, Ethernet, USB PHY, low power SAR ADCs



4.5 x 6.5 cm form factor



<http://trenz.org/te0716-info>

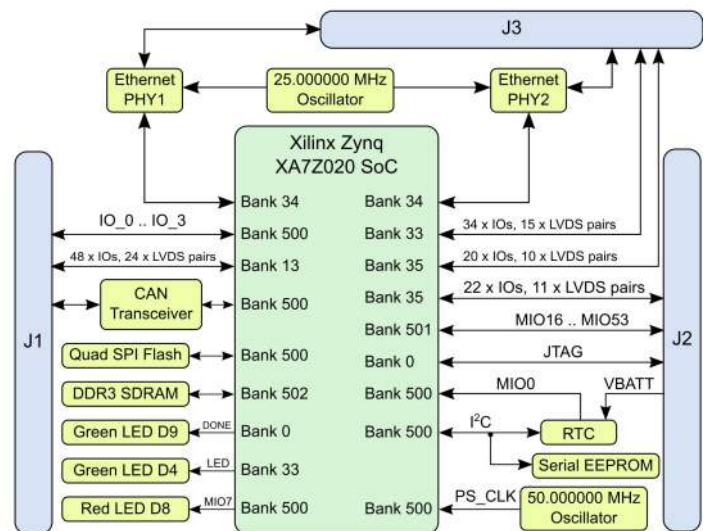
Device list	Connectors	SDRAM max	Flash	Ethernet PHY	USB PHY	Total I/O	Gbit Transceiver	Other Features
Z-7020	2 x FCI Bergstak	1 GB DDR3L	32 MB	1 Gbit	USB2.0	120 x HR PL	2 x PS MIOs	On board 10x 12-bit low power SAR ADCs up to 2 MSPS, low power oscillators, USB2.0 to UART/JTAG interface, EEPROM

# TE0728 Series

AMD Zynq-7000, DDR3, Flash, 2 x Ethernet, CAN, Automotive



6 x 6 cm form factor



<http://trenz.org/te0728-info>

Device list	Connectors	SDRAM max	Flash	EEPROM	Ethernet PHY	Total I/O	Other Features
XA7Z020 (automotive FPGA)	3 x Samtec SEM	512 MB DDR3	16 MB	8 KByte	2 x 100 Mbit	124 + 30 MIO	Automotive, real time clock, CAN, single supply

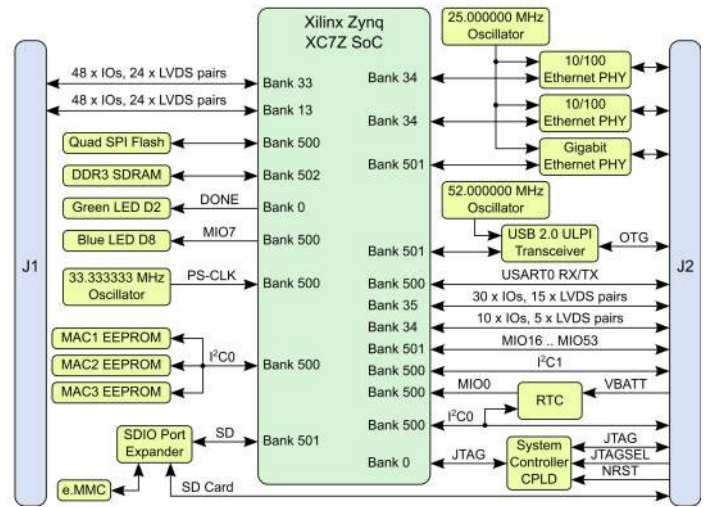
# TE0729 Series

AMD Zynq-7000, DDR3, Flash, 3 x Ethernet, 3 x EEPROM, USB, e.MMC

**AMD**  
**ZYNQ**



5.2 x 7.6 cm form factor



<http://trenz.org/te0729-info>

Device list	Connectors	SDRAM max	Flash	e.MMC	Ethernet PHY	USB PHY	EEPROM	Total I/O	Other Features
Z-7020	3 x Samtec LSHM	512 MB DDR3	32 MB	4 - 64 GB	2 x 100 Mbit, 1 Gbit	USB2.0 OTG	2 x MAC address	136 + 14 MIO	Real time clock, single supply

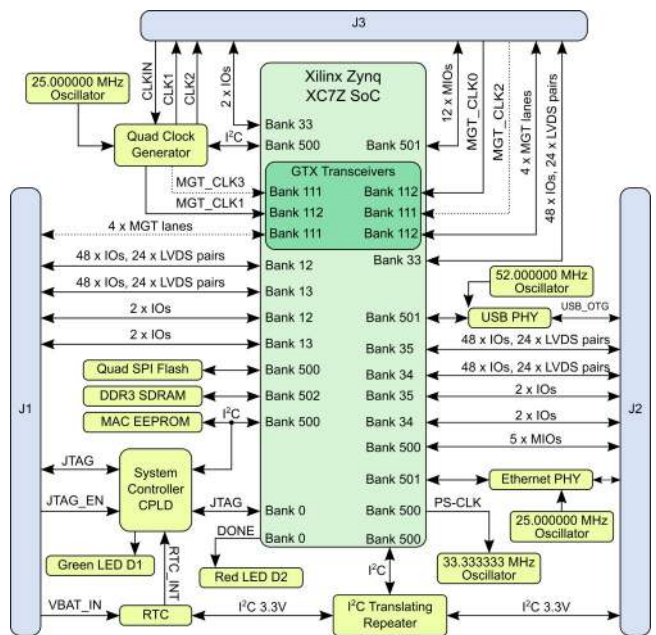
# TE0745 Series

AMD Zynq-7000, DDR3L, Flash, USB, Ethernet, 8 x GTX

**AMD**  
**ZYNQ**



5.2 x 7.6 cm form factor



<http://trenz.org/te0745-info>

Device list	Connectors	SDRAM max	Flash	Ethernet PHY	USB PHY	Total I/O	Gbit Transceivers	Other Features
Z-7030, Z-7035, Z-7045	3 x Samtec ST5	1 GB DDR3L	64 MB	1 Gbit	USB2.0 OTG	250 + 6 MIO	8 x GTX	Real time clock, single supply



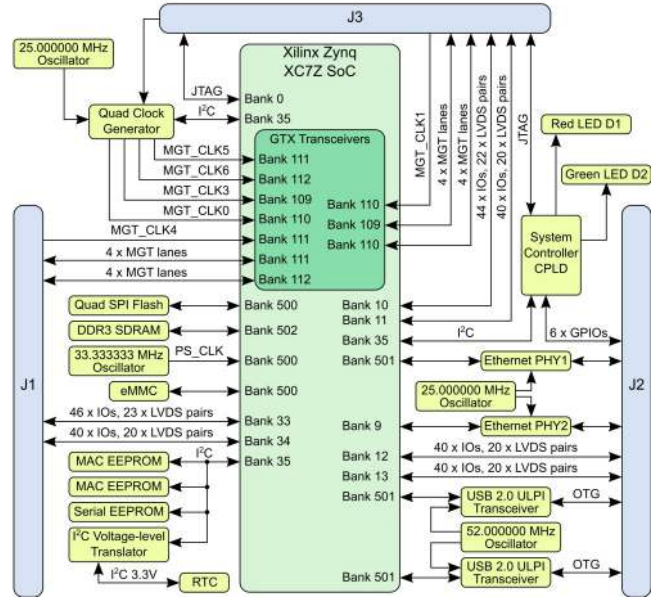
# TE0782 Series

AMD Zynq-7000, DDR3, Flash, 2 x GBit Ethernet, 2 x USB, e.MMC, 16 x Transceivers



8.5 x 8.5 cm form factor

<http://trenz.org/te0782-info>



Device list	Connectors	SDRAM max	Flash	e.MMC	Ethernet PHY	USB PHY	Total I/O	Gbit Transceivers	Other Features
Z-7035, Z-7045, Z-7100	3 x Samtec QTH	1 GB DDR3	32 MB	4 - 64 GB	2 x 1 Gbit	2 x USB2.0 OTG	250 + 2 MIO	16 x GTX	Programmable clock generator, real time clock, single supply

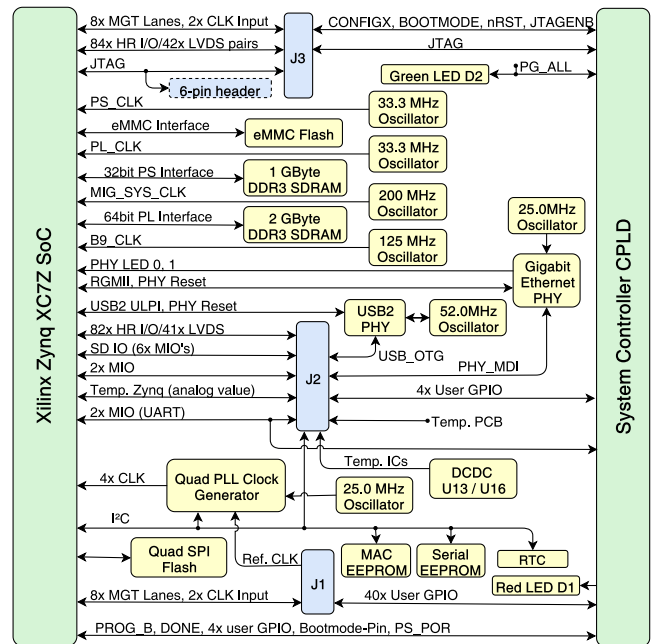
# TE0783 Series

AMD Zynq-7000, Memory on both PS and PL, Flash, Ethernet, USB, e.MMC

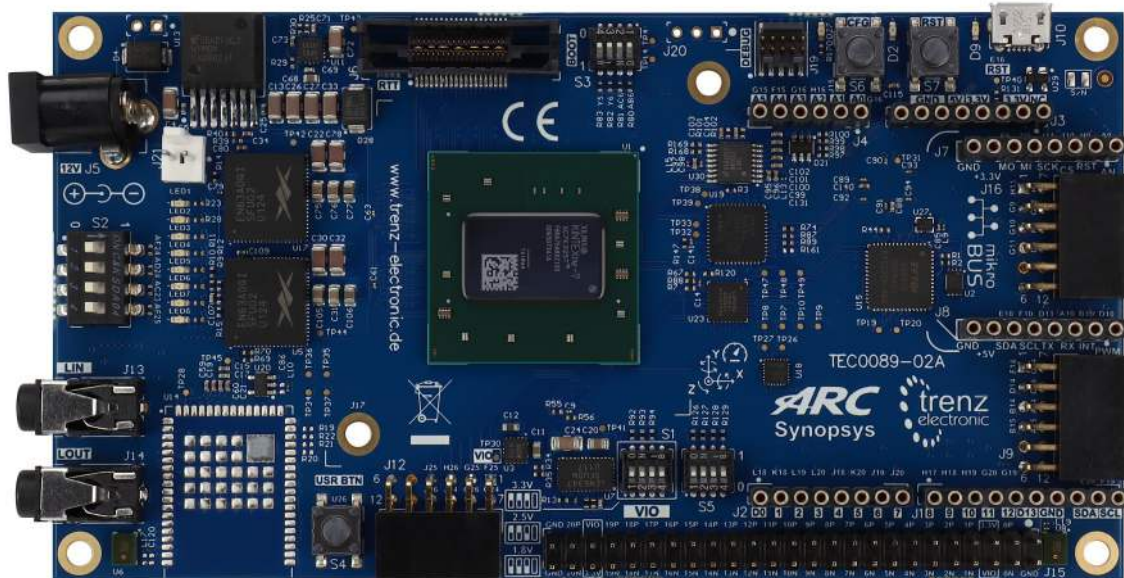


8.5 x 8.5 cm form factor

<http://trenz.org/te0783-info>



Device list	Connectors	SDRAM max	Flash	e.MMC	Ethernet PHY	Total I/O	Gbit Transceivers	Other Features
Z-7035, Z-7045, Z-7100	3 x Samtec QTH	1 GB DDR3 32-bit (PS) 2 GB DDR3 64-bit (PL)	32 MB	4 - 64 GB	1 Gbit	166	16 x GTX 4 x GT	USB2.0 OTG, programmable clock generator, real time clock, single supply



The DesignWare® ARC® EM Software Development Platform is a flexible platform for rapid software development on ARC EM processors and subsystems. It is intended to accelerate software development and debug of ARC EM processor-based systems for a wide range of ultra-low power embedded applications such as IoT, sensor fusion, and voice applications. It includes an FPGA-based hardware board with commonly used peripherals and interfaces for extensibility. Downloadable platform packages containing different hardware configurations enable the board to be programmed with different ARC EM processors and subsystems. The packages also contain the necessary software configuration information for the toolchain and embARC Open Software Platform.

The development platform is supported by Synopsys' MetaWare Development Tool Kit, which includes a compiler, debugger and libraries optimized for maximum performance with minimal code size. The embARC Open Software Platform (OSP), available online from [embarc.org](http://embarc.org), gives developers online access to device drivers, FreeRTOS, middleware and examples that enables them to quickly start software development for their ARC-based embedded systems.

Each hardware configuration includes an ARC EM processor and subsystem with access to 16 MB of PSRAM, 16 MB of SPI Flash and a wide range of peripherals such as Audio Line In/Out, UART, SPI, I2C, and ADC. A 9-D motion sensor enable fast development of IoT applications. Two digital MEMS micro-phones can also be used for the development of voice applications. The hardware is extensible using the popular Arduino® interface and extension is also possible with Diligent Pmod Interfaces, mikroBUS headers and a 50-pin header. Debug and trace are handled with USB/JTAG interfaces and a NEXUS interface for ARC Real-Time Trace (RTT). The board includes a micro-SD card slot for loading application software.

### Key Features

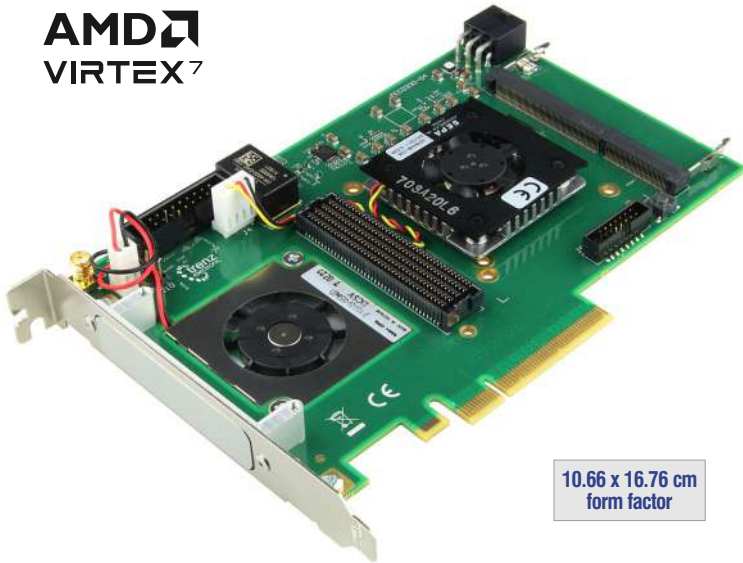
- Xilinx Kintex-7 XC7K325T-2FBG676C
- 32 MByte Quad-SPI Flash memory (for configuration and operation)
- USB-JTAG bridge FT2232H
- FPGA configuration through JTAG and SPI Flash memory
- SPI Flash configuration through JTAG and USB
- Connectors
  - Arduino compatible pin headers
  - MicroBUS compatible pin headers
  - 3 x Pmod compatible pin headers
  - 50 pin header 2.54mm (40 single-ended IO, 20 differential lanes, variable VCCIO)
  - Mictor debug connector
  - 10 pin debug connector 2 mm
- 2 x 8 MByte PSRAM
- 32 MByte User Quad-SPI Flash memory
- Micro SDcard Socket
- 3-axis gyroscope, 3-axis accelerometer, 3-axis magnetometer
- Stereo audio codec MAX9880A
- 2 x PDM microphones
- 2 x 3.5mm RCA audio jacks (input/output)
- 100 MHz user clock oscillator SiT8008
- Status LEDs, power LED
- 12V sower supply (separately included in the scope of delivery)
- Dimensions: 72,5 x 137 mm
- Article number: TEC0089-02-D2C-1-D

Available at <http://trenz.org/tec0089>



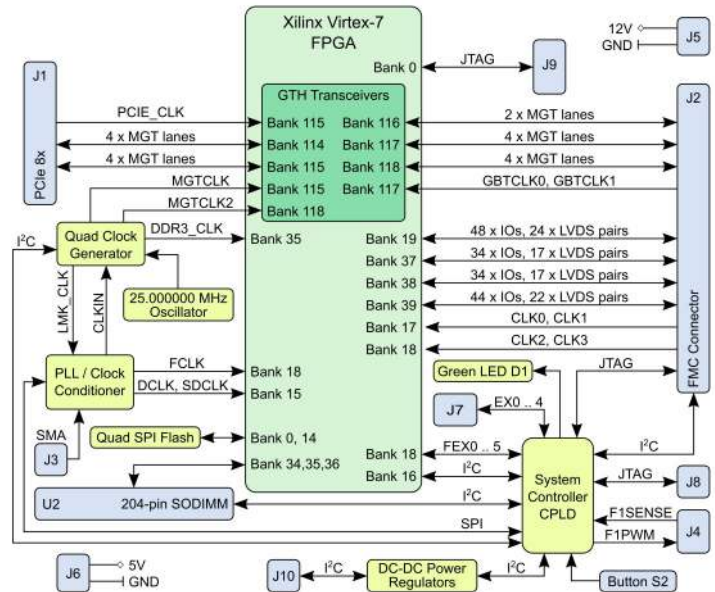
# TEC0330 PCIe FMC Carrier

AMD Virtex-7, FMC HPC, 8 lane PCIe GEN2 card, DDR3 SODIMM Socket



10.66 x 16.76 cm form factor

<http://trenz.org/tec0330-info>



Device list	SDRAM	Flash	Total I/O	Gbit Transceivers	Gbit Transceivers Transmission Rate	Other Features
XC7VX330T	DDR3 SODIMM Socket	32 MB	Up to 202 FPGA I/O pins on FMC connector	10 on FMC 8 on PCIe lanes	13.1 Gbit/s	FMC High Pin Count (HPC) connector, programmable clock generator

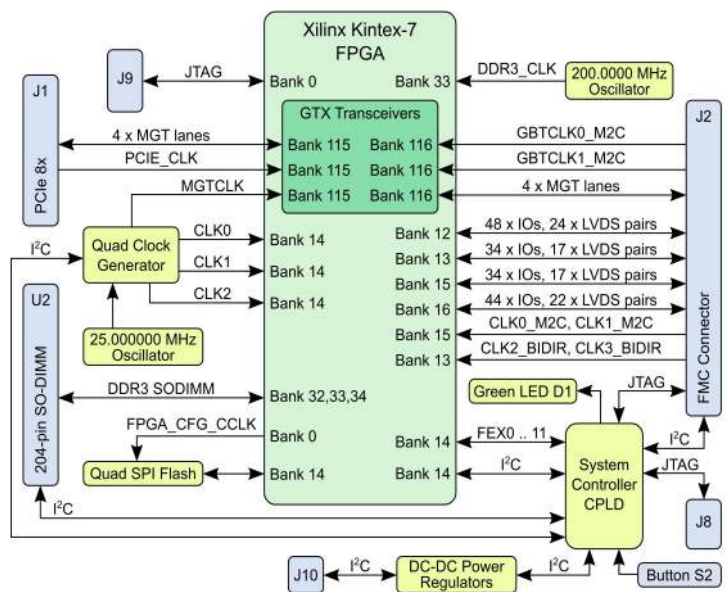
# TEF1001 PCIe FMC Carrier

AMD Kintex-7, FMC HPC, 4 lane PCIe GEN2 card, DDR3 SO-DIMM Socket



10.66 x 16.76 cm form factor

<http://trenz.org/tef1001-info>



Device list	SDRAM	Flash	Total I/O	Gbit Transceivers	Other Features
XC7K160T	8 GB DDR3 (max) SODIMM Socket	32 MB	160 on FMC connector	4 on FMC 4 on PCIe lanes	Vita 57.1 FMC HPC slot, programmable clock generator, 200 MHz low jitter LVDS oscillator

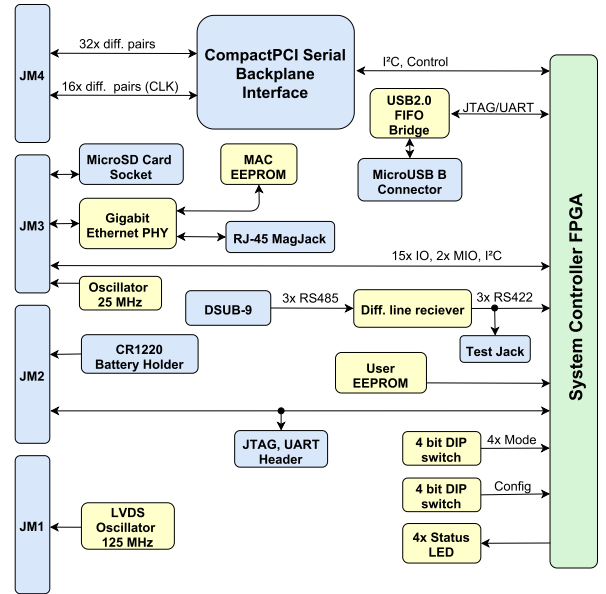


# TEC0810 CompactPCI Serial Card

for Trenz Electronic modules TE0803, TE0807 and TE0808, 3U Form Factor



<http://trenz.org/tec0810-info>



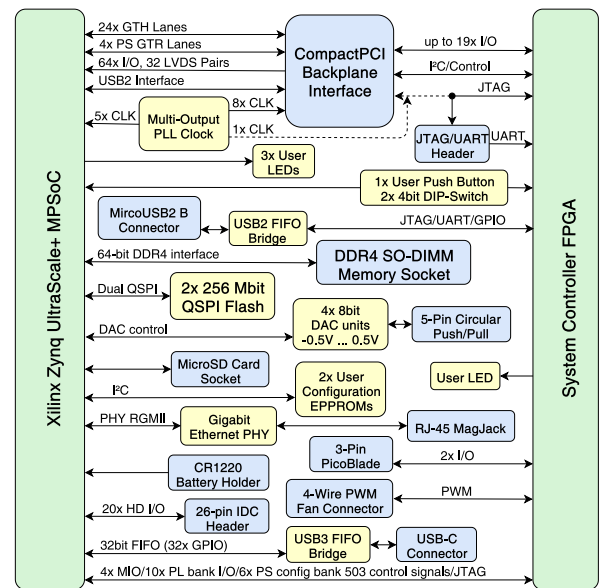
System controller	Front side interface connectors	EEPROM	Rear I/O	GTR/GTH	Other Features
Intel MAX 10	1 Gbit Ethernet, 3 x RS485 receiver (DSUB-9), microUSB to JTAG/UART bridge, 4 x status LEDs	128 Kbit	(32+16) x differential pairs on J6 and J5 backplane connectors	GTR and GTH of the module are not accessible	125 MHz LVDS oscillator, LVCMOS output 25-MHz oscillator, 2 x 4-bit DIP switch, coin cell battery holder, microSD card socket

# TEC0850 CompactPCI Serial Card

AMD Zynq UltraScale+, 3U Form Factor, DDR4 SODIMM, Flash, Ethernet



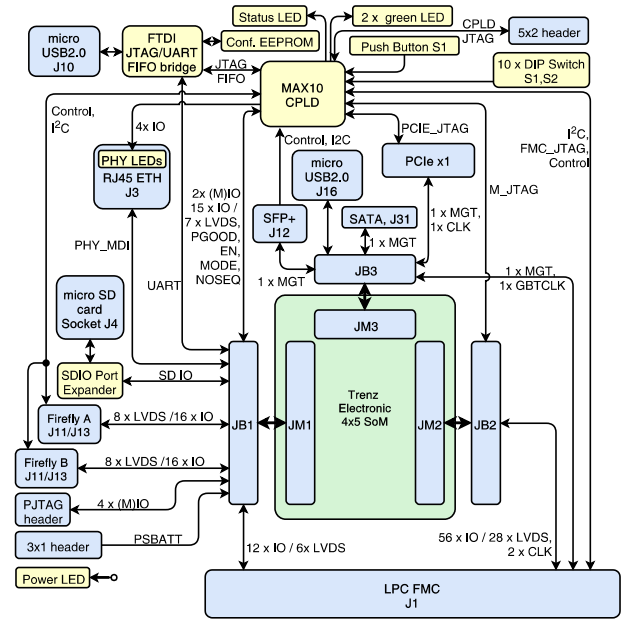
<http://trenz.org/tec0850-info>



Device list	Form Factor	DDR4 SODIMM	Flash max	USB	Total I/O	Ethernet	Gbit Transceivers	Other Features
ZU15EG, 1156 Pin Packages	3U	8 GB (32 GB max)	512 MB	USB3.0	32 x differential pairs	1 Gbit	24 on PL side 4 on PS side	JTAG/UART via MicroUSB, 2 x EEPROM, real time clock, Zynq MPSoC cooling fan connector

# TEF1002 PCIe FMC Carrier

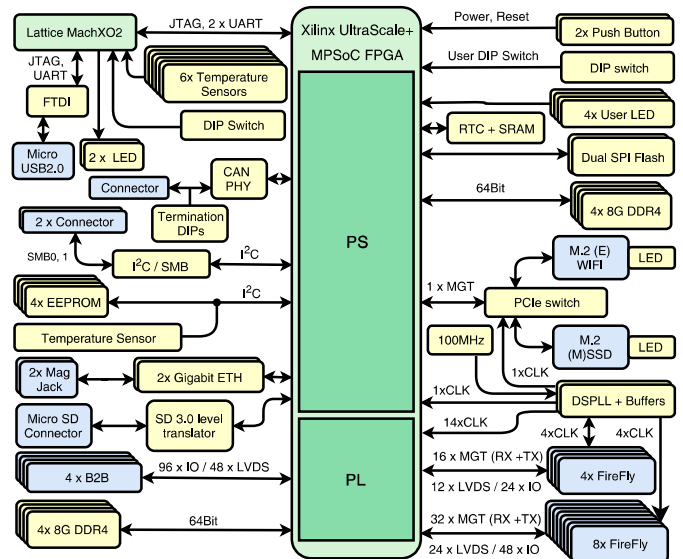
## PCIe Carrier for Trenz Electronic 4 x 5 Modules and LPC FMC



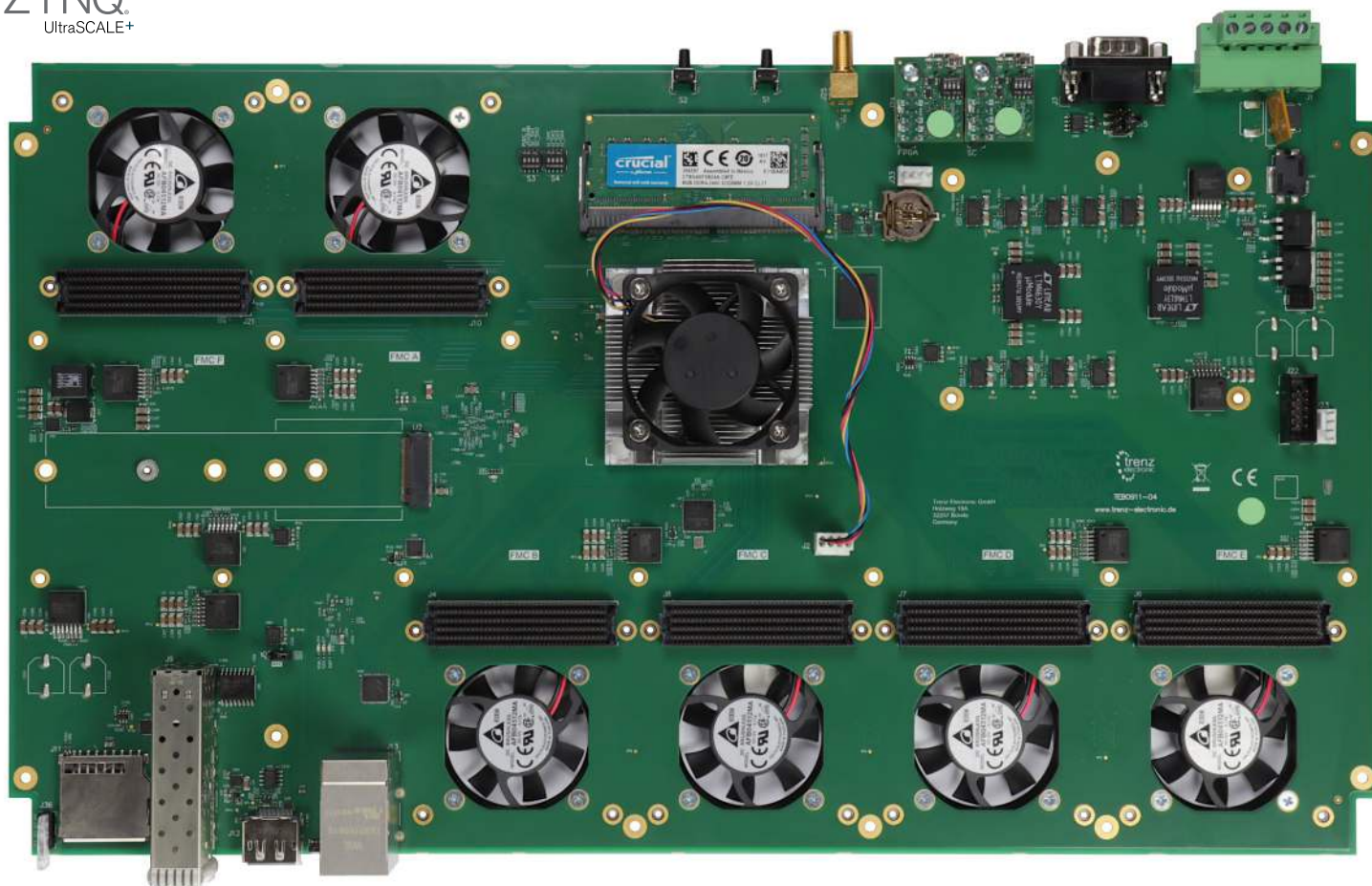
PCIe Carrier	Connectors	Other Features
For 4 x 5 cm modules	LPC FMC, SFP+, PCIe x1, SATA with pin 7 power configuration for SATADoM, RJ45 Gigabit Ethernet, micro USB to JTAG/UART bridge, 2 x 8 LVDS (FireFly), microUSB, microSD card	MAX 10 CPLD, 4 x LED, module reset button, 10 x configuration/user dip switch

# TEB0912 Series

## AMD Zynq UltraScale+ MPSoC with Firefly socket, 4 GB SDRAM on both PL and PS



Device list	Firefly sockets	SDRAM max	Flash	Ethernet	Header	Connectors	Other Features
ZU11 - ZU19	4 x to GTY (copper/optical) 4 x for custom 8 lane JESD204B ADC 4 x for custom 8 lane JESD204B DAC	4 GB DDR4 64-bit (PS) 4 GB DDR4 64-bit (PL)	128 MB	2 x RJ45 1 Gigabit	4x IDC for PL HD IO/LVDS	M2 PCIe SSD, M2 WAN/WLAN slot (PCIe/USB), microSD card (SD 2.0)	Onboard USB JTAG and UART, 2 x Si5395 low jitter PLL, single 12V input



## Key Features

The TEB0911 UltraRack+ board is integrating a Xilinx Zynq UltraScale+ MPSoC with 2 x 64 MByte Flash memory for configuration and operation, DDR4-SDRAM SO-DIMM socket with 64-bit wide data bus, 22 MGT lanes and powerful switch-mode power supplies for all on-board voltages. The TEB0911 board exposes the pins of the Zynq MPSoC to accessible connectors and provides a whole range of on-board components to test and evaluate the Zynq UltraScale+ MPSoC and for developing purposes. The board is capable to be fitted to an enclosure, whereby on the enclosure's rear and front panel, I/O's, LVDS-pairs and MGT lanes are accessible through 6 on-board FMC connectors and other standard high-speed interfaces, namely USB3, SFP+, SSD, GbE, etc.

- Xilinx Zynq UltraScale+ MPSoC
  - 1156 Pin Package
  - Assembly options: ZU6, ZU9, ZU15
- 64-bit DDR4 SODIMM (PS connected)
- M2 PCIe SSD (1-Lane)
- e.MMC (bootable)
- 2 x 64 MByte Dual QSPI Flash (bootable)
- System controller (LCMXO2-7000HC)
  - Power sequencing
  - IO expander
- Configurable PLLs
  - GTH/GTP reference CLKs

### Front Panel

- 4 x FMC
  - 4 GTH per FMC
  - 68 ZynqMP PL IO per FMC
- DisplayPort (2-lanes)
- RJ45 ETH + dual USB3 combo
- Dual Stack SFP+
- SD (bootable)
- Status LEDs

### Back Panel

- 2 x FMC
  - 4/2 GTH
  - 12 ZynqMP PL IO per FMC
- 56 SC IO
- USB JTAG/UART ZynqMP
- USB JTAG/GPIO FMC
- CAN FD (DB9 connector)
- SMA (external CLK)
- 5-pin 24V power connector

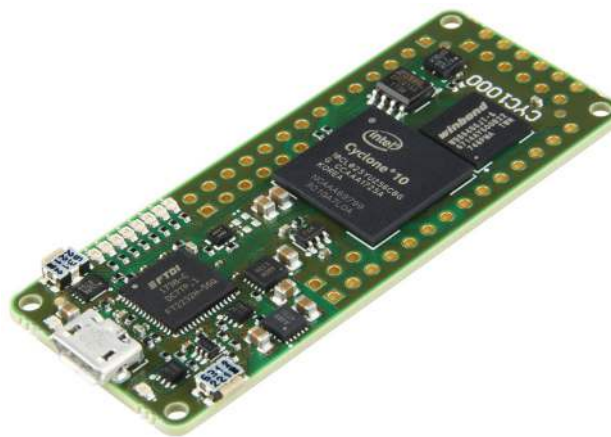
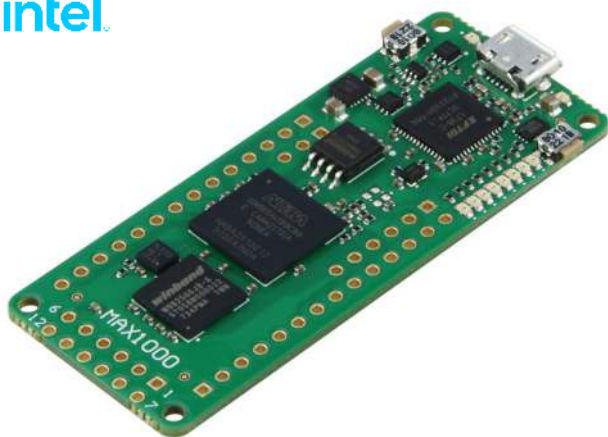
### Additional Information

- 40.6 x 23.43 cm board size
- Other assembly options for cost or performance optimization plus high volume prices available on request.



# TEI0001 "MAX1000" and TEI0003 "CYC1000" Series

## Arduino MKR Standard 2.5 x 6.15 cm



Resources <http://trenz.org/tei0001-info>

"MAX1000" IoT/Maker board, TEI0001 series, MAX 10 10M08SAU 169C8G or 10M16SAU169C8G FPGA, 8/16 kLE, 8 to 32 MByte SDRAM (max. 64 MByte), 8 MByte Flash, USB programmer on-board, JTAG and UART over Micro USB2.0 connector, ADC 8 x 12 Bit, 12 MHz oscillator, optional MEMS oscillator, optional Pmod headers, supply USB/pins, 2 switches, 8 configurable and 2 status LEDs, power can be supplied as 5V from the USB port or via a separate pin.

Resources <http://trenz.org/tei0003-info>

"CYC1000", TEI0003 series, Cyclone 10CL025YU256 C8G FPGA, 25 kLE, optional 10CL006, 10CL010, 10CL016, 8 MByte SDRAM, 2 MByte Flash, 21 I/O Arduino MKR compatible headers, JTAG and UART over Micro USB2 connector, LIS3DH 3-axis accelerometer, 2 x 14-pin headers providing 23 GPIOs, 1 x 3-pin header providing 2 GPIOs, Pmod: 2 x 6-pin support, 8 configurable and 2 status LEDs, user push button, 5V single power supply with on-board voltage regulators

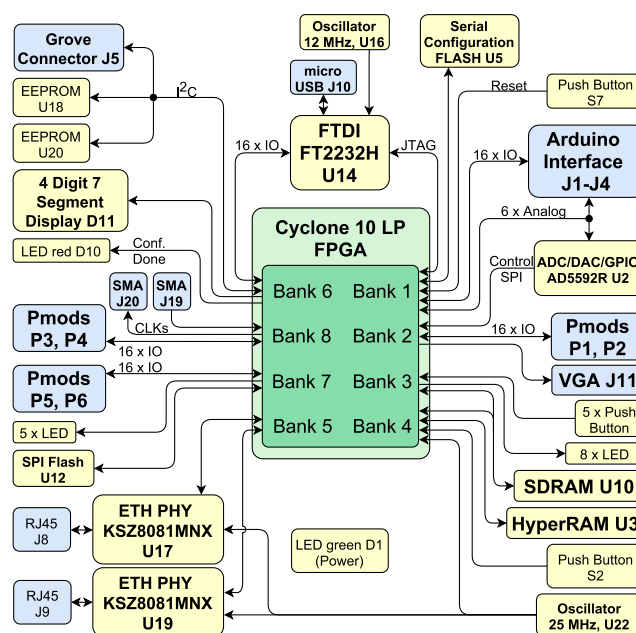
# TEI0009 C10LP RefKit Development Board

## Intel Cyclone 10 LP, Integrated USB Programmer2, 2 x 10/100 Ethernet, USB2.0



9.5 x 11 cm form factor

<http://trenz.org/tei0009-info>



Device list	Connectors	SDRAM max	User Flash QSPI	HyperRAM max	Flash max	Ethernet PHY	USB	Other Features
Cyclone 10 LP 10CL055YU484C8G 55 kLE in 484-pin	QSE (for LVDS), Pmod, Arduino, SMA	512 Mbit	Up to 512 Mbit	128 Mbit	32 Mbit	2 x 10/100	USB2.0	Integrated USB programmer2

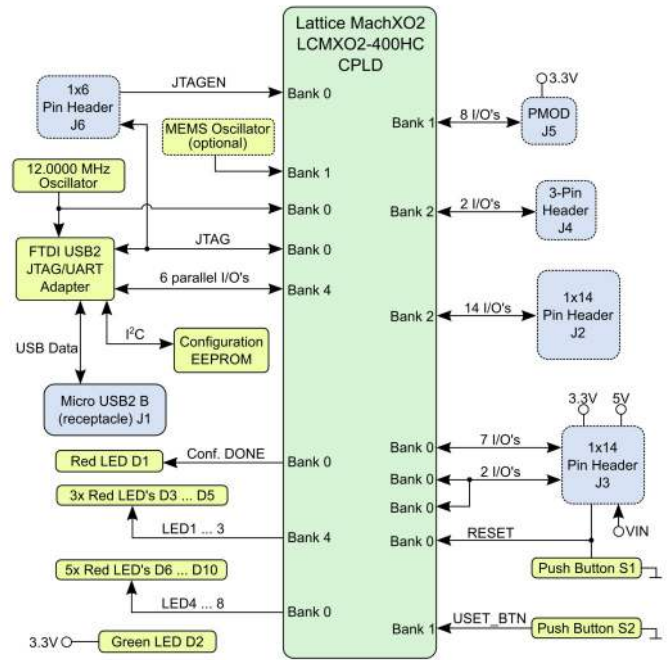
# TEL0001 "LXO2000" Series

Lattice X02 FPGA, Arduino MKR Standard, on-board USB/JTAG and USB/serial



2.5 x 6.15 cm form factor

<http://trenz.org/tel0001-info>



Device list	On-Board	Total I/O	Clock Oscillator	Other Features
X02-4000	USB/JTAG, USB/serial	22 on MKR header, 2 I/O on additional header, optional Pmod header + 8	100 MHz MEMS	8 LEDs, 2 push buttons, supply: USB or 5V from pin header, RC-networks

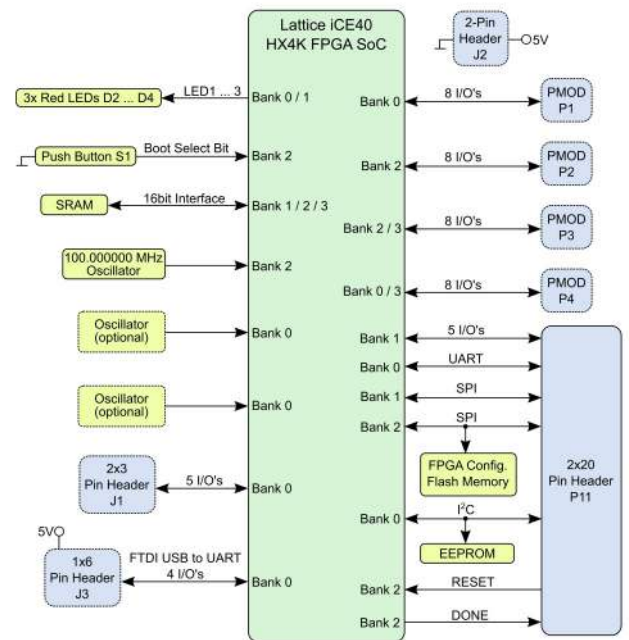
# TE0876 IceZero Series

Lattice ICE40HX, Raspberry Pi HAT compatible, SRAM, Flash, Open-Source



5.6 x 3.05 cm form factor

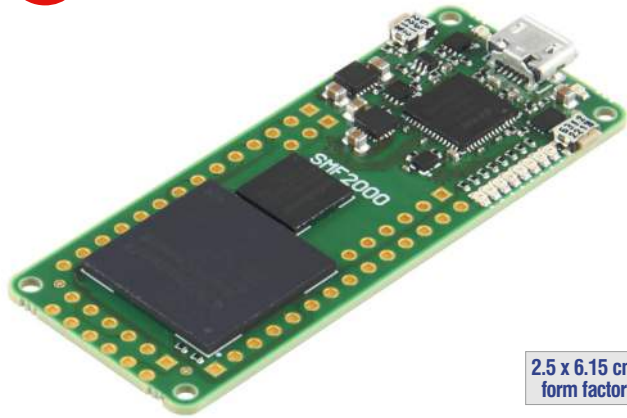
<http://trenz.org/te0876-info>



Device list	Connectors	SDRAM max	Flash	Other Features
Lattice ICE40	4 2x6-pin Pmod connectors (no default)	4 Mbit external SRAM	8 MB	100 MHz user clock, 3 user LED, supported by fully open source FPGA toolchain, fast FPGA configuration from Raspberry Pi, full FPGA design flow on Raspberry Pi (all open source)

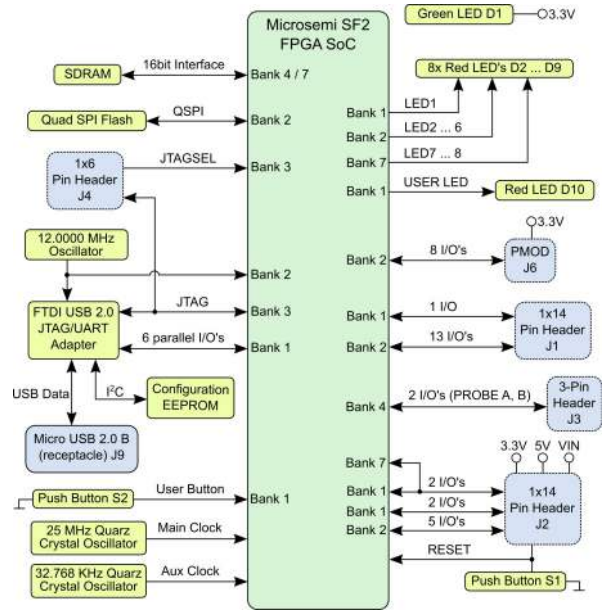
# TEM0001 "SMF2000" Series

Microchip SmartFusion 2, Arduino MKR Standard, SDRAM, Flash, UART/JTAG



2.5 x 6.15 cm form factor

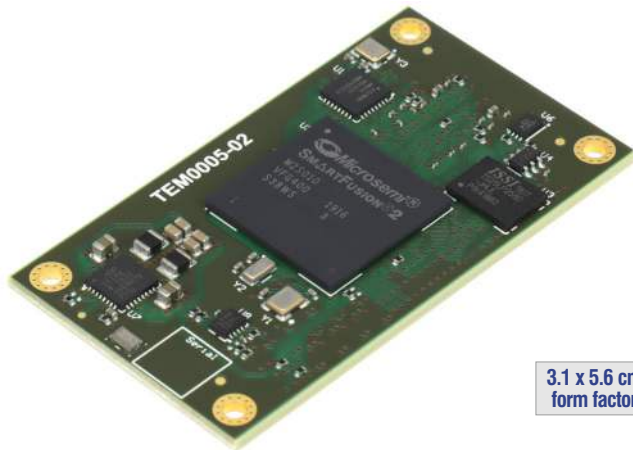
<http://trenz.org/smf2000-info>



Device list	SDRAM	Flash	Clocks	JTAG/UART	Total I/O	Other Features
M2S010-VFG400	8 MB	8 MB	25 MHz system clock 32.768 kHz auxiliary clock	microUSB2.0 connector	31 (8 I/O 1 x Pmod header, 23 I/O 2 x 14-pin header)	1 x 3-pin header for LiveProbes, 9 user LEDs, 1 user push button

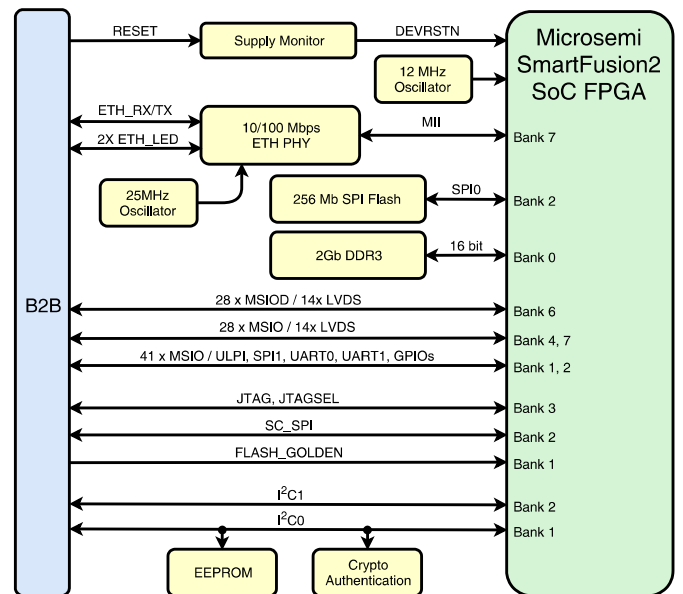
# TEM0005 Series

Microchip SmartFusion 2 SoC, DDR3, Flash, Ethernet, EEPROM



3.1 x 5.6 cm form factor

<http://trenz.org/tem0005-info>



Device list	Connectors	SDRAM max	Flash	Ethernet PHY	Total I/O	Other Features
M2S010, supports up to M2S050	1 x Samtec ST5 160 pin	8 Gb DDR3, optional DDR3L	32 MB	100 Mbps	105	Optional crypto authentication device, serial EEPROM for MAC address, power supply monitor



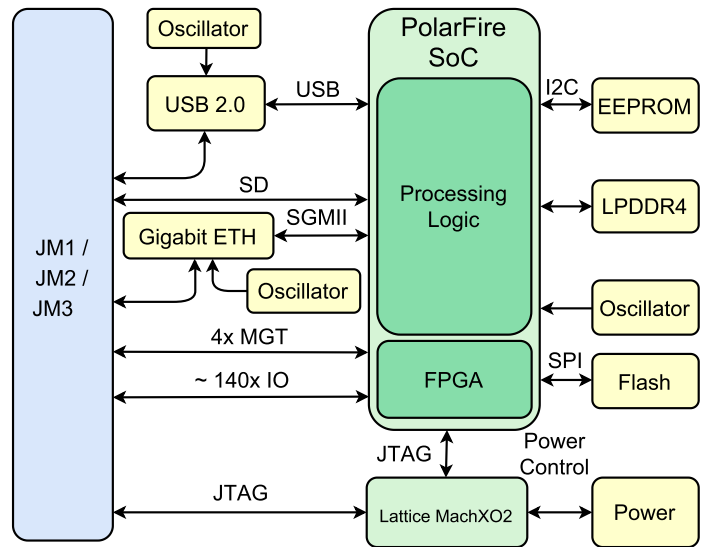
# TEM0007 Series

Microchip PolarFire Multi-Core RISC-V SoC FPGA, LPDDR4, Flash, Ethernet, EEPROM



4 x 5 cm form factor

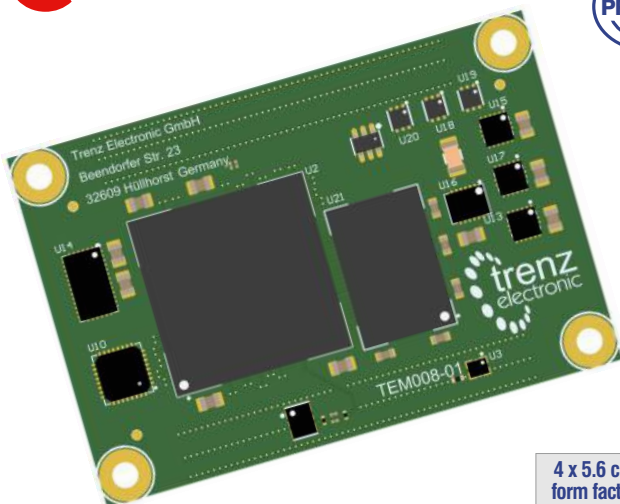
<http://trenz.org/tem0007-info>



Device list	Pin Package	Connectors	SDRAM max	Flash	Ethernet	Other Features
MPFS250T-1	FCVG484I	3 x Samtec LSHM	1 GB LPDDR4	64 MB	1 Gbit	EEPROM MAC address, USB2.0

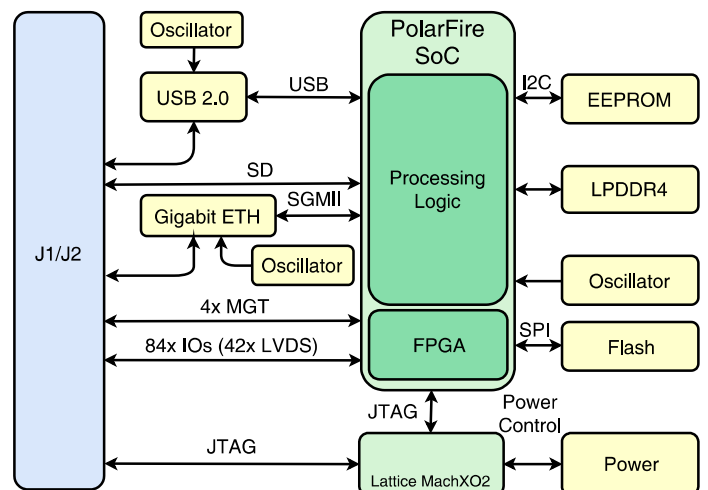
# TEM0008 Series

Microchip PolarFire Multi-Core RISC-V SoC FPGA, LPDDR4, Flash, Ethernet, USB



4 x 5.6 cm form factor

<http://trenz.org/tem0008-info>



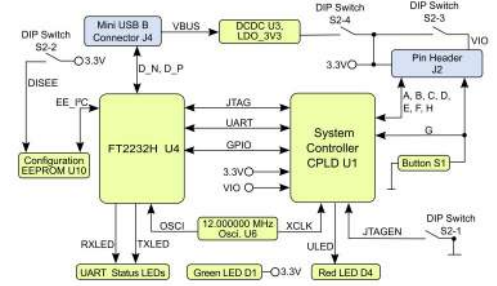
Device list	Pin Package	Connectors	SDRAM max	Flash	Ethernet	Other Features
MPFS250T-1	FCVG484	2 x Samtec ADM6	1 GB LPDDR4	64 MB	1 Gbit	EEPROM MAC address, USB2.0

## TE0790 and TE0790-L FTDI JTAG Adapter XMOD Form Factor, FT2232H, Lattice X02-256 CPLD



for **AMD** together we advance\_ or **LATTICE** SEMICONDUCTOR.

- Two versions available:
- 1) Compatible with Xilinx tools (TE0790-02)
  - 2) Not compatible with Xilinx tools (TE0790-02L) can be used independently.



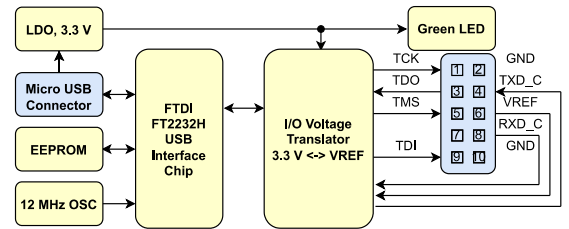
<http://trenz.org/te0790-info>

Device	Form Factor	FT2232H	Total I/O	Other Features
Lattice X02-256 CPLD	XMOD, M3 mounting hole	Mini USB connector, channel B RX/TX LEDs, EEPROM	8 universal I/O pins	Step down DCDC converter for optional power supply via USB-power, 4 position DIP switch

## TEM0009 FPGA USB-Programmer JTAG For Development with Microchip FPGAs



for **MICROCHIP**



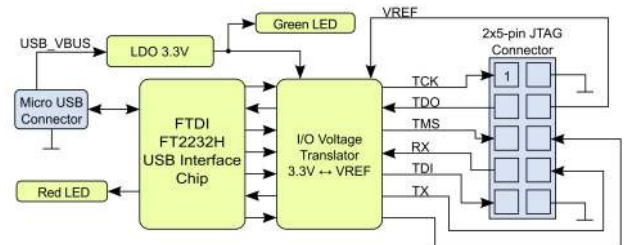
<http://trenz.org/tem0009-info>

Supported by	JTAG Connector	USB	Voltage levels	Other Features
Libero SoC	Standard 2 x 5-pin header	MicroUSB connector USB2.0 HS support	0.8V - 3.6V	Green power-on LED

## TEI0004 ARROW USB Programmer2 For Development with Intel FPGAs



for **intel**



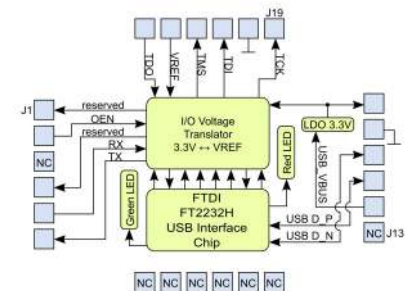
<http://trenz.org/tei0004-info>

Supported by	JTAG Connector	USB	Voltage levels	Other Features
Intel Quartus programmer	Standard 2 x 5-pin 2.54 mm header	MicroUSB connector USB2.0 HS support	0.8V - 3.6V	Additional support for UART, red activity LED, green power-on LED

## TEI0005 FPGA Programmer2 SMD Module FT2232H based JTAG Programmer, Surface-Mount Module

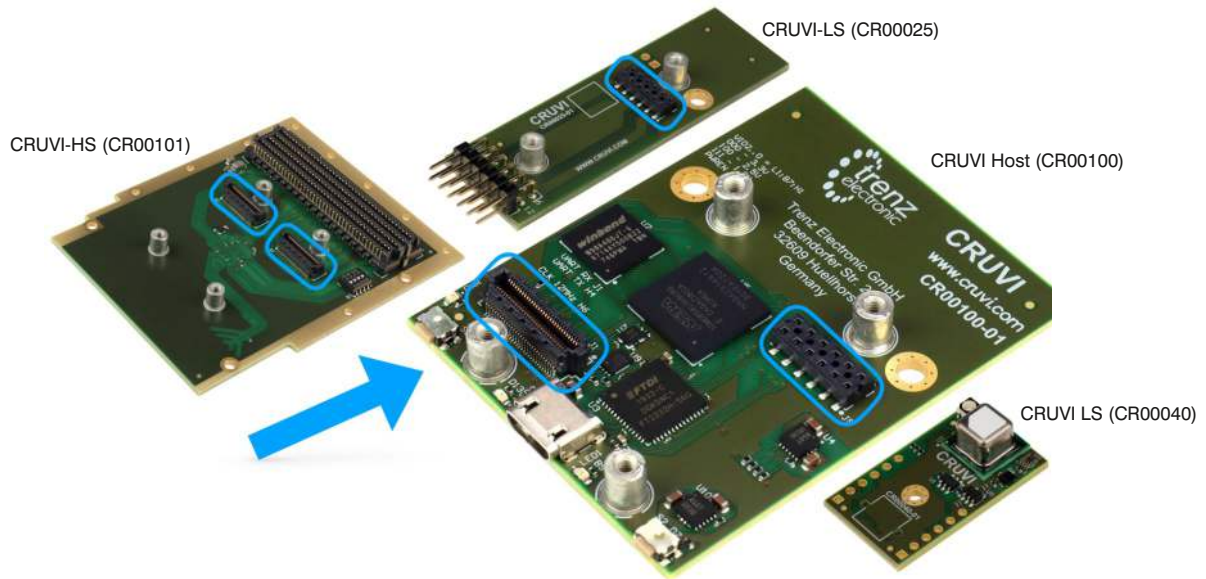


for **intel**



Device list	Supported	Powered	Compatible	Other Features
FTDI FT2232H USB2.0 interface	by Intel Quartus (JTAG mode only)	via USB	SMT pick and place assembly process	Additional UART channel available, activity LEDs, UART interface available, two I/O pins reserved for future use

<http://trenz.org/tei0005-info>



The picture shows FMC to CRUVI-HS, PMoD to CRUVI-LS, CRUVI Host with LS and HS slot and CRUVI LS modules. CRUVI fills the space between PMoD and FMC card, it can be smaller and cheaper than SYZYGY.

	FMC LPC	SYZYGY	CRUVI HS	PMoD	CRUVI LS
Single ended I/O	68	28	37 (28+9)	8	8
Differential I/O pairs	36	10	12	-	-
Management I2C	I2C	SmartVIO	I2C/SMBUS	No	I2C (shared)
Mounting hole(s)	Yes	2 one side	1..6	No	1..6
Power Supply	Adj., 3.3V, 12V	Adj., 3.3V, 5V	Adj., 3.3V, 5V	3.3V	3.3V, 5V
License	VITA \$\$\$	Free	Free	Free	Free



TEB0707

### CRUVI Carrier board with 3 CRUVI slots (3 x HS, 1 x LS)

This board accepts Trenz 4 x 5 SoM and converts into a CRUVI compatible host carrier board. Three CRUVI slots are provided with HS connector support. One slot supports also LS.



CR00140

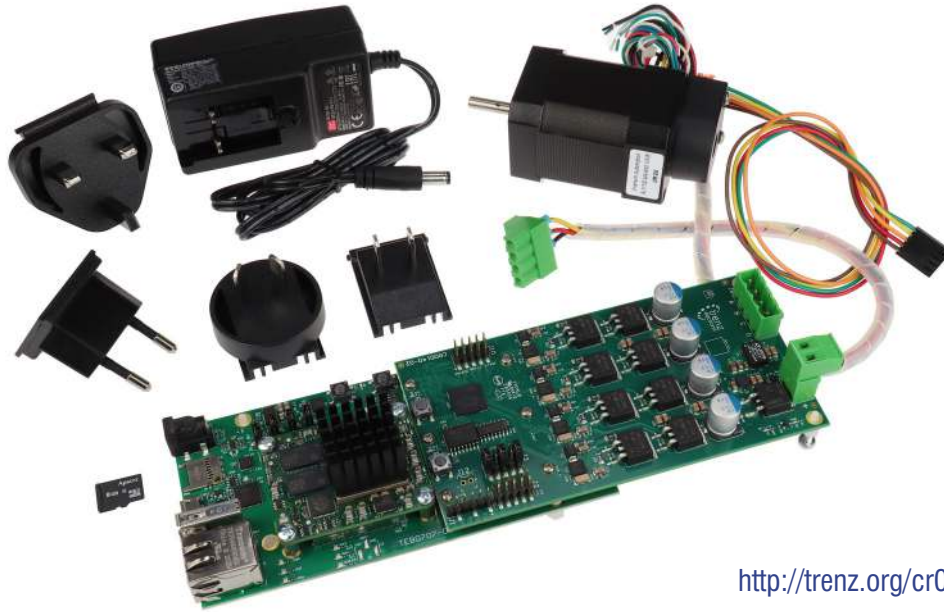
### Industrial Motor controller board with CRUVI connector

This board allows motor control applications with any CRUVI carrier that supports at least one HS slot. IO Voltage range supported 1.2 to 3.3V. There are total 4 phases available for either one 3 phase or two 2 phase motors. Pin headers are available for rotation sensor connections. There is current measurement on two phases and DC link voltage.



# CR00140 Control Development Kit

## AMD Zynq-7000



<http://trenz.org/cr00140-info>

### Motor Control Development Kits:

A CRUVI motor driver module CR00140-02, a carrier board TEB0707 and a MPSoC (TE0820/Xilinx UltraScale+) or SoC (TE0720/Xilinx Zynq-7020) module including a heat sink. Supplied with a universal plug-in power supply with four adapters, a DC motor including cable for CRUVI CR00140 and an 8 GB micro SD card.

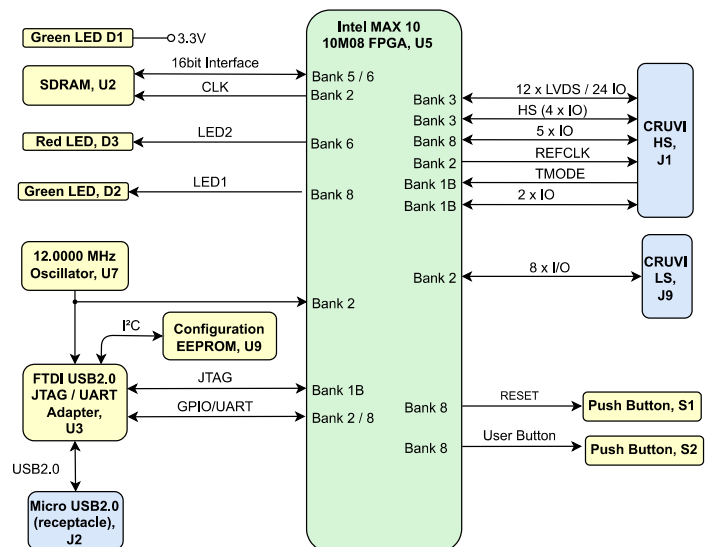
- CR00140-02-K0A with MPSoC TE0820
- CR00140-02-K1A with SoC TE0720

# CR00100 CRUVI Series

## Intel MAX 10 CRUVI, SDRAM, USB



4.5 x 5.7 cm form factor



<http://trenz.org/cr00100-info>

Device list	Connectors	SDRAM max	Total I/O	Other Features
Intel MAX 10	CRUVI (1 x HS, 1 x LS), 2 x 34 Pin Header	8 MB	37 + 8	USB2.0, user push button and LEDs

# CR00200 and CR00202 CRUVI Adapter

## Ethernet adapter and dual ethernet adapter



2.2 x 5.75 cm form factor

<http://trenz.org/cr00200-info>

### On Board

- CRUVI HS Connector
- ETH PHY
- 25 MHz Oscillator

### RAM/Speicher

- Serielles EEPROM mit EUI-48 Node Identity

### Schnittstelle

- CRUVI
- RJ45

Power via CRUVI



4.4 x 5.75 cm form factor

<http://trenz.org/cr00202-info>

### On Board

- CRUVI HS Connector
- 2 x ETH PHY
- 25 MHz Oscillator

### RAM/Speicher

- 2 x Serielles EEPROM mit EUI-48 Node Identity

### Schnittstelle

- CRUVI
- 2 x RJ45

Power via CRUVI

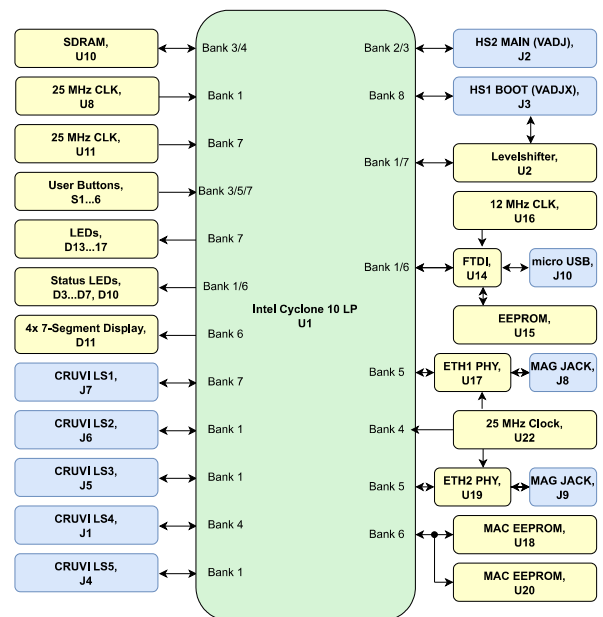
# CR00109 CRUVI Development Board

## Intel Cyclone 10 LP, with CRUVI LS and CRUVI HS, 2 x 10/100 Ethernet, microUSB



11.65 x 15 cm form factor

<http://trenz.org/cr00109-info>



Device list	Connectors	SDRAM max	Other Features
Cyclone 10 LP	CRUVI LS, CRUVI HS, CRUVI HS & BOOT, USB to Multipurpose FIFO IC, 2xRJ45, micro USB	8 MB SDRAM	2 x 10/100 Ethernet PHY, 2 x MAC EEPROM, Oscillator, 4 x 7-Segment-Display, user buttons, user LEDs, status LEDs

The carrier boards are baseboards for 4 x 5 SoMs, which exposes the modules B2B-connector-pins to accessible connectors and provides a whole range of on-board components to test and evaluate Trenz Electronic 4 x 5 SoMs.

### TE0701

- Overvoltage-, undervoltage- and reversed- supply-voltage-protection
- Barrel jack for 12V power supply
- Carrier Board System-Controller CPLD
- Mini CameraLink connector
- RJ45 Gigabit Ethernet MagJack
- FPGA Mezzanine Card (FMC-LPC) connector
- USB JTAG- and UART interface with Mini-USB connector
- HDMI transmitter with HDMI connector
- 8 x user LEDs, 2 x user push buttons, 2 x DIP switch
- Pmod connectors, Micro SD card socket and Micro-USB interface



### TE0703

- 2 x VG96 connectors (mounting holes and solder pads)
- SDIO port expander with voltage-level translation
- Micro SD card socket
- 4 x user LEDs, 1 x user-push button, 2 x user configurable DIP switches
- Mini USB connector (USB JTAG and UART interface)
- RJ45 Gigabit Ethernet socket with 4 integrated LED's.
- USB host connector
- Barrel jack for 5V power supply input
- DCDC step-down converter for 3.3V power supply
- USB JTAG and UART interface



### TE0705

*TE0705 carrier board is a simplified version of the TE0701. It provides a cost-effective way to connect Trenz 4 x 5 modules and connect them to your own circuits. As little as possible has been changed in functionality except the functionality that was removed. Changes from TE0701:*

- Pmod connectors changed to IDC headers
- HDMI removed
- CL connector removed
- USB connector position changed
- 5 pin header support added on both USB interfaces
- 12V DC power input connector changed to different type
- FMC connector removed and replaced by two dual row 100 mil pin headers



### TE0706

- VG96 connector and 50-pin IDC male connector socket
- SDIO port expander with voltage-level translation
- Micro SD card socket and a USB type A connector
- One user push button, user configurable DIP switch
- Two RJ45 Gigabit Ethernet MagJack
- One Ethernet PHY
- Barrel jack for 5 V power supply input
- DCDC step- down converter for 3.3V power supply
- JTAG pins on 12-pin header
- Three VCCIO selection jumper



### TEB0707

TEB0707 is a carrier board for 4 x 5 Trenz Electronic modules. It provides three high speed and one low speed CRUVI extension connectors.

- Intel MAX 10 FPGA
- FTDI FT2223
- Gigabit RJ45 LAN socket
- MicroSD card socket
- Micro USB2.0 socket
- USB A socket
- 6 x user LEDs (3 x green, 3 x red)
- 5V input power supply





Following carrier boards are baseboards for specific Trenz Electronic SoMs, which exposes the module's B2B-connector-pins to accessible connectors and provides a whole range of on-board components to test and evaluate Trenz Electronic SoMs.

## TEBF0808/ TEBF0818

- Mini-ITX form factor
  - ATX power supply connector (12V only supply required)
  - Optional 12V standard power plug
  - USB3.0 with USB3.0 HUB
  - FMC HPC slot (1.8V max VCCIO)
  - MicroSD card (bootable) and e.MMC (bootable)
  - PCIe slot - one PCIe lane (16 lane connector)
  - Fan connectors, PC enclosure, FMC fan
  - Intel front panel- and HDA audio-connector
  - CAN FD transceiver (10 pin IDC connector)
  - Displayport Single Lane
  - One SATA Connector
  - Dual SFP+
  - Gigabit Ethernet RJ45
  - One Samtec FireFly (4 GT lanes bidir.)
  - One Samtec FireFly connector for reverse loopback
  - 20 pins ARM JTAG connector (PS JTAG0)
  - Size: 170 mm × 170 mm
- Designed for Trenz Electronic's  
TE080x MPSoC series TE0803/0807/0808  
TE081x MPSoC series TE0813/0817/0818



## TEBA0841

- VG96 connector and 50-pin IDC male connector socket
- SDIO port expander with voltage-level translation
- Micro SD card socket and a USB type A connector
- One user push button, user configurable DIP switch
- Two RJ45 Gigabit Ethernet MagJack
- One Ethernet PHY
- Barrel jack for 5 V power supply input
- DCDC step- down converter for 3.3V power supply



## TEB0729

- Trenz TE0729 module socket (2 x Samtec BTE/BSE connectors 120 pins)
- 5V board supply via DC jack
- Three RJ45 Ethernet sockets
- One MicroUSB and one SD card connector
- One 128K I2C CMOS Serial EEPROM
- One 2K I2C Serial EEPROM
- XMOD (TE0790) pin header
- Two pin header FPGA bank power supply
- One VBat pin header and two VG96 pin header
- One user push button, one LED (red), user switch FPGA boot mode



## TEB0745

- Trenz Electronic TE0745 module socket (3 x Samtec ST5 connectors 160 pins)
- 24V power supply over ARKZ950/2 connecting terminal
- XMOD (TE0790) Pin Header (JTAG / UART)
- One EMI Network Filter
- MicroSD connector
- RJ45 Ethernet connector
- USB Host connector
- Eight SFP connector
- Six pin header 50 pol. (FPGA bank I/O and power)
- Six pin header 12 pol. (FPGA bank I/O and power)



20 x 23,1 cm  
form factor

## TEBA0714

- Trenz Electronic TE0714 module socket (2 x Samtec LSHM connectors 100 pins)
- XMOD (TE0790) pin header
- Two pin headers 50 pol. (FPGA bank I/O and power)
- SFP connector
- LDO voltage regulator 3.3V to 2.5V
- Two user LEDs (red/green) and one LED (red)
- One pin header 16 pol. (JTAG, MGT-CLK, boot mode, XADC, I/O's)
- One pin header 10 pol. (I/O)
- One pin header for FPGA bank power VCCIO34
- One pin header for FPGA bank power V\_CFG (1.8 VOUT, 2.5V, 3.3 VOUT)



# Trenz Electronic Starter Kits

## Pre-assembled and ready-to-use

In general our Starter Kits contain a Trenz Electronic micromodule with a pre-assembled heat sink mounted on a Trenz Electronic baseboard. The TE08xx series modules are build in a black Core V1 Mini-ITX Enclosure. All this provided with a fitting power supply including different adapters, a micro SD card, a USB cable plus screws and bolts. Different module variants can be integrated on request.

	Starter Kit 720	Starter Kit 729	Starter Kit 803	Starter Kit 807	Starter Kit 808
<b>Module</b>	TE0720	TE0729	TE0803	TE0807	TE0808
<b>FPGA</b>	AMD Zynq-7020	AMD Zynq-7020	AMD Zynq UltraScale+	AMD Zynq UltraScale+	AMD Zynq UltraScale+
<b>Baseboard</b>	TE0703	TEB0729	TEBF0808	TEBF0808	TEBF0808
<b>Enclosure</b>	-	-	Core V1 Mini-ITX	Core V1 Mini-ITX	Core V1 Mini-ITX
<b>Power Supply</b>	Universal power supply unit	Universal power supply unit	Be Quiet! 400W ATX Power Supply	Be Quiet! 400W ATX Power Supply	Be Quiet! 400W ATX Power Supply
<b>Heat Sink</b>	Heat sink for TE0720, spring-loaded embedded	KK0729-02TE TE custom built	BGA Heat sink	SuperGRIP/ MaxiFLOW Heat sink	BGA Heat sink
<b>USB Cable</b>	✓	✓	✓	✓	✓
<b>MicroSD Card</b>	✓	✓	✓	✓	✓
<b>Screws &amp; Bolts</b>	✓	✓	✓	✓	✓



Starter Kit 720



Starter Kit 729



Starter Kit 80x

Photo shows similar product.

We are offering different customized cooling solutions for a selection of modules.  
Please ask for special solutions at [sales@trenz-electronic.de](mailto:sales@trenz-electronic.de).

## Available cooling solutions

Trenz Electronic Article Numbers	
Module	Cooling Solution
TE0600	26920
TE0710	26925
TE0712	26924
TE0713	26924
TE0714	KK0714-02
TE0715	26923
TE0720	26922
TE0729	KK0729-02TE
TE0741	26921
TE0745	KK0745-02
TE0803	KK0803-04, 29665
TE0807	KK0807-02A
TE0808	KK0808-05, 30137, 29664 (REV05 only)
TE0820	28606
TE0821	28606
TE0823	28606
TE0841	28606
TEB0911	25130
TEF1001	25130
Heat Spreader Extension	KK0001-01



KK0803-04



KK0807-02A



KK0808-05



30137



25130



28606



29665



26924

Available at <http://trenz.org/Cooling-Solutions>



# Module series comparison table

## for Trenz Electronic Modules



Other assembly options for cost or performance optimization available on request.

	Device family	Device list	Form Factor/size [in cm]	Connectors	Programmable logic family	Processing system	SDRAM [in MByte] max	Flash [in MByte]	EEPROM
AM0010	Zynq UltraScale+	ZU1CG-ZU5CG, ZU1EG-ZU5EG, ZU4EV, ZU5EV	4 x 5.6	2 x Samtec ADM6	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	8192 DDR4 64-bit (PS) with ECC	2 x 64	1 x MAC
TE0710	Artix-7	35T, 50T, 75T, 100T	4 x 5	2 x Samtec LSHM	Artix-7	MicroBlaze	512 DDR3	32	-
TE0711	Artix-7	35T, 50T, 75T, 100T	4 x 5	2 x Samtec LSHM	Artix-7	MicroBlaze	-	32	-
TE0712	Artix-7	35T, 50T, 75T, 100T, 200T	4 x 5	3 x Samtec LSHM	Artix-7	MicroBlaze	1024 DDR3	32	MAC address
TE0713	Artix-7	15T - 200T	4 x 5	3 x Samtec LSHM	Artix-7	MicroBlaze	1024 DDR3L	32	-
TE0714	Artix-7	15T, 35T, 50T	4 x 3	2 x Samtec LSHM	Artix-7	MicroBlaze	-	16	-
TE0715	Zynq-7000	Z-7015, Z-7030	4 x 5	3 x Samtec LSHM	Z-7015: Artix-7 Z-7030: Kintex-7	2 x Cortex A9	1024 DDR3	32	MAC address
TE0716	Zynq-7000	Z-7020	4.5 x 6.5	2 x FCI Bergstak	Artix-7	2 x Cortex A9	1024 DDR3L	32	1 x MAC + 64 KByte
TE0717	Spartan-7	S6, S15, S25, S50	2.5 x 3.5	1 x Samtec LSHM	Spartan-7	MicroBlaze	-	8	-
TE0720	Zynq-7000	Z-7020	4 x 5	3 x Samtec LSHM	Artix-7	2 x Cortex A9	1024 DDR3	32	MAC address
TE0724	Zynq-7000	Z-7010, Z7020	6 x 4	1 x Samtec ST5	Artix-7	2 x Cortex A9	1024 DDR3L	64	MAC address
TE0825	Zynq UltraScale+	ZU2...ZU5, CG, EG, EV support, automotive support	5.4 x 7	2 x Samtec ADM6 1 x Samtec UMPT	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	8192 DDR4 with ECC	256	64 KByte
TE0729	Zynq-7000	Z-7020	5.2 x 7.6	2 x Samtec BTE	Artix-7	2 x Cortex A9	512 DDR3	32	3 x MAC address
TE0741	Kintex-7	70T, 160T, 325T, 410T	4 x 5	3 x Samtec LSHM	Kintex-7	MicroBlaze	-	32	-
TE0745	Zynq-7000	Z-7030, Z-7035, Z-7045	5.2 x 7.6	3 x Samtec ST5	Kintex-7	2 x Cortex A9	1024 DDR3L	64	MAC address
TE0782	Zynq-7000	Z-7035, Z-7045, Z-1000	8.5 x 8.5	3 x Samtec QTH	Kintex-7	2 x Cortex A9	1024 DDR3	32	2 x MAC + 16 KByte
TE0783	Zynq-7000	Z-7035, Z-7045, Z-1000	8.5 x 8.5	3 x Samtec QTH	Kintex-7	2 x Cortex A9	2024 DDR3 64-bit (PL) 1024 DDR3 32-bit (PS)	32	1 x MAC + 16 KByte
TE0803/ TE0813	Zynq UltraScale+	ZU2CG-ZU5CG, ZU2EG-ZU5EG, ZU4EV, ZU5EV	5.2 x 7.6	4 x Samtec St5 4 x Samtec ADM6	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	8192 DDR4	128	-
TE0806	Zynq UltraScale+	ZU4, ZU5, ZU7, CG, EG, EV support	5.5 x 7.6	2 x Samtec ADM6	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	8192 DDR4 64-bit (PS) with ECC 4096 DDR4 32-bit (PL)	2 x 64	2 x MAC address
TE0807/ TE0817	Zynq UltraScale+	ZU4CG-ZU7CG, ZU4EG-ZU7EG, ZU4EV-ZU7EV	5.2 x 7.6	4 x Samtec St5 4 x Samtec ADM6	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	8192 DDR4	128	16 KByte
TE0808/ TE0818	Zynq UltraScale+	ZU6EG, ZU9 EG, ZU15EG	5.2 x 7.6	4 x Samtec St5 4 x Samtec ADM6	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	8192 DDR4	128	16 KByte
TE0812	Zynq UltraScale+	ZU6	9 x 9	2 x Samtec AP6 1 x Samtec LSHM	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	1024 DDR4	2 x 64	-
TE0820	Zynq UltraScale+	ZU2CG-ZU5CG, ZU2EG-ZU5EG, ZU4EV, ZU5EV	4 x 5	3 x Samtec LSHM	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	4096 DDR4	128	-
TE0821	Zynq UltraScale+	ZU2CG-ZU5CG, ZU2EG-ZU5EG	4 x 5	3 x Samtec LSHM	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	4096 DDR4	128	1 x MAC
TE0823	Zynq UltraScale+	ZU2CG-ZU5CG, ZU2EG-ZU5EG	4 x 5	3 x Samtec LSHM	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	2024 LPDDR4	128	1 x MAC
TE0830	Zynq UltraScale+	ZU11EG, ZU17EG, ZU19EG	12 x 12	2 x 400-pin COM-HPC	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	16384 DDR4 SODIMM (PL) 8192 DDR4 72-bit SDRAM (PS)	512	MAC address
TE0835	Zynq UltraScale+ RFSoc	ZU25DR	6.5 x 9	2 x Samtec ST5	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	4096 DDR4	128	1 x MAC
AM0070	Zynq UltraScale+	ZU29DR, ZU39DR, ZU49DR	6.4 x 8	5 x Samtec ADM6	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	4096 DDR4 64-bit (PS) with ECC 8192 DDR4 64-bit (PL)	2 x 64	1 x MAC
TE0841	Kintex UltraScale	KU35, KU40	4 x 5	3 x Samtec LSHM	UltraScale+	MicroBlaze	4096 DDR4	64	-
TE0865	Zynq UltraScale+	ZU11, ZU17, ZU19	7.5 x 10	4 x Samtec ADM6	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	8192 DDR4 64-bit (PS) with ECC 8192 DDR4 64-bit (PL)	2 x 64	1 x MAC
TEB0911	Zynq UltraScale+	ZU6, ZU9, ZU15 (CG, EG)	40.6 x 23.43	6 x FMC HPC	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	8192 64-bit DDR4 SODIMM (PS)	2 x 64	3 x MAC + 16 KByte
TEB0912	Zynq UltraScale+	ZU11-ZU19	12 x 18	Firefly sockets	UltraScale+	Up to 4 x Cortex A53 + 2 x Cortex R5	4096 DDR4 (PS) 4096 DDR4 (PL)	2 x 64	4 x

# Module series comparison table

## for Trenz Electronic Modules

e.MMC	Ethernet PHY	USB PHY	Total I/O	Gbit Transceiver	Other Features
4-64 GByte	1 Gbit	USB2.0 OTG	PL: 204 MIO: 22	4 x GTR, 4 x GTH	GPU/VCU depending on device, security controller, crypto authentication
-	2 x 100 Mbit	-	112	-	Single supply
-	-	USB2.0 UART/FIFO	178	-	Single supply
-	100 Mbit	-	158	4 x GTP	Programmable clock generator, single supply
-	-	USB3.0	152	4 x GTP	Programmable clock generator, single supply
-	-	-	144	4 x GTP	Differential MEMS osc. for MGT clocking, XADC analog input, GT reference clock input, single supply
-	1 Gbit	USB2.0 OTG	132 + 14 MIO	Z-7015: 4 x GTP Z-7030: 4 x GTX	Programmable clock generator, real time clock, single supply
-	1 Gbit	USB2.0	120 x HR PL	2 x PS MIOs	On board 10 x 12-bit low power SAR ADCs up to 2 MSPS, low power oscillators, USB2.0 to UART/JTAG interface, single supply
-	-	-	72 HR	-	HyperRAM, 100 MHz clock oscillator, red and green LED, single supply
4 - 64 GByte	1 Gbit	USB2.0 OTG	152 + 14 MIO	-	Real time clock, single supply, automotive grad available
-	1 Gbit	-	PL: 80 PS: 20	-	CAN, single supply
-	2 x 1 Gbit	-	PL: 136 + 88 PS: 57	-	(Automotive), real time clock, oscillator
4 - 64 GByte	2 x 100 Mbit, 1 Gbit	USB2.0 OTG	136 + 14 MIO	-	Real time clock, single supply
-	-	-	144	8 x GTX	Programmable clock generator, single supply
-	1 Gbit	USB2.0 OTG	250 + 6 MIO	8 x GTX	Real time clock, single supply
4 - 64 GByte	2 x 1 Gbit	2 x USB2.0 OTG	250 + 2 MIO	16 x GTX	Programmable clock generator, real time clock, single supply
4 - 64 GByte	1 Gbit	USB2.0 OTG	166 + 12 MIO + 40 CPLD muxed IO	16 x GTX	Programmable clock generator, real time clock, single supply
-	-	-	156 + 65 MIO	4 x GTR (PS)	GPU/VCU depending on device, programmable clock generator, single supply
4-64 GByte	2 x 1 Gbit	USB2.0 OTG	48 PL HD + 52 PL HP, 14 MIOs + I2C	4 x GTR, 16 x GTH	GPU/VCU depending on device, transceiver clock in-/outputs, single 5-12V power required
-	-	-	204 + 65 MIO	4 x GTR, 16 x GTH	GPU/VCU depending on device, programmable clock generator, single supply
-	-	-	204 + 65 MIO	4 x GTR, 16 x GTH	GPU/VCU depending on device, programmable clock generator, single supply
2 x 128 GByte	2x RGMII (1x Debug) 100 Mbit for SC	-	127	16 (12 x PL, 4 x PS)	2 x 4 MByte MRAM, on board Vorago VA41630, 2 x analog input, UART, 2 x CAN, PPSIn/PPSOut, I2C, 12V power supply
8 - 64 GByte	1 Gbit	USB2.0 OTG	132 + 14 MIO	4 x GTR (PS)	GPU/VCU depending on device, programmable clock generator, real time clock, single supply
8 - 64 GByte	1 Gbit	USB2.0 OTG	34 HP, 96 HD + 14 MIO	4 x GTR (PS)	GPU/VCU depending on device, programmable clock generator, single supply
8 - 64 GByte	1 Gbit	USB2.0 OTG	132 HP + 14 MIO	4 x GTR (PS)	GPU/VCU depending on device, programmable clock generator, single supply
64 GByte	1 Gbit	USB2.0 OTG	x32 (15 diff.)	12 x GPIO	SC CLPD Intel MAX 10 & Xilinx Zynq-XC7Z010 on-board, interface: PCIe SMB, PCIe up to 48 lane, 4 x USB2.0, 1 x USB 3.0, 2 x UART, 1 x I2C SMB, 3 x I2C, DDI, Sata
-	1 Gbit	USB2.0 OTG	132 + 14 MIO	4 x GTR (PS)	Programmable clock generator, real time clock, single supply
8 GByte	2 x 1 Gbit	USB2.0	180 + 22 MIO 16 ADC, 16 DAC	4 x GTR 16 x GTY	OPTIGA Trust M, crypto authentication, oscillator
-	1 Gbit	-	144	8 x GTH	Programmable clock generator, single supply
8 GByte	1 Gbit	USB2.0	240 PL HP 96 PL HD 21 MIOs	32 x GTH, 16 x GTY, 4 x GTR	12V single supply
8 GByte	1 Gbit	USB2.0	408	22 x GTH	Active heat sink, GPU/VCU depending on device, M2 PCIe SSD, system controller, DisplayPort, RJ34 ETH + Dual USB3 Combo, Dual Stack SFP+, SD (bootable), USB JTAG/UART ZynqMP, USB JTAG/GPIO FMC, CAN FD (DB9 Connector), SMA (external CLK), 5-pin 24 V power connector
-	2 x Gbit	USB2.0	184	32 x GTH, 16 x GTY	4 x IDC for PL HD IO/LVDS, M2 PCIe SSD, M2 WAN/WLAN slot (PCIe/USB), on-board USB JTAG and UART, CAN, real time clock, single supply

# Module series comparison table for Trenz Electronic Modules



Other assembly options for cost or performance optimization available on request.

	Device family	Device list	Form Factor/size [in cm]	Connectors	Programmable logic family	Processing system (HW/SW)	SDRAM [in MByte] max	Flash [in MByte]	EEPROM
CR00100	MAX 10	10M08	4.48 x 5.75	CRUVI (1 x HS, 1 x LS)	MAX 10	-/+	8	-	Config. EEPROM
TEI0001	MAX 10	10M08	2.5 x 6.15	-	MAX 10	-/+	8-64	8	Config. EEPROM
TEI0003	Cyclone 10 LP	10CL025, 10CL006, 10CL010, 10CL016	2.5 x 6.15	-	Cyclone 10 LP	-/+	8	2	-
TEI0006	Cyclone 10 GX	10CX220, 10CX150, 10CX105	6 x 8	3 x Samtec ST5	Cyclone 10 GX	-/+	2024 DDR3	256	2 Kbit
TEI0009	Cyclone 10 LP	10CL055	9.5 x 11	-	Cyclone 10 LP	-/+	64	64	2 x MAC address
TEI0022	Cyclone V	5CSEMA5F31C8N	13 x 16	-	Cyclone V	+/+	1024 DDR3 (HPS) 1024 DDR3 (FPGA)	32 for HPS 32 for FPGA	2 Kbit
TEI0050	Cyclone V	5CEBA2U15C8N	2.5 x 7.07	CRUVI HS, 2 x 14 pin header	Cyclone V	+/+	8	8	Config. EEPROM

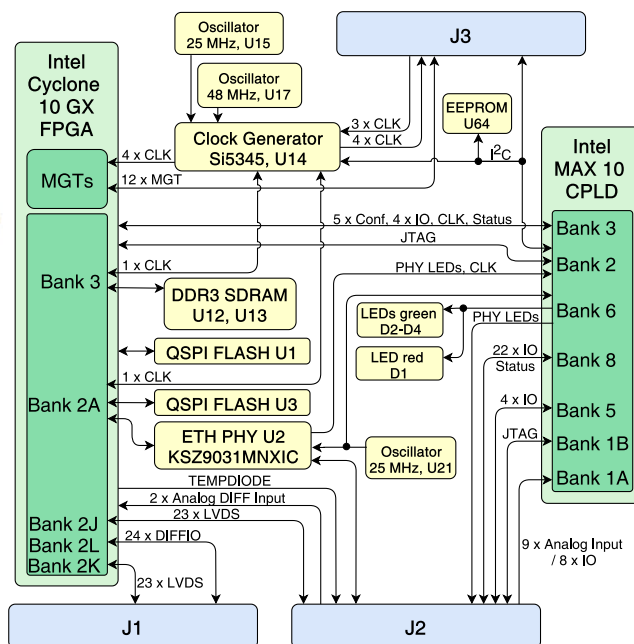
## TEI0006 Series

Intel Cyclone 10 GX SoM, DDR3, Flash, Ethernet, MAX 10 as power sequencer



6 x 8 cm form factor

<http://trenz.org/tei0006-info>



Device list	Connectors	SDRAM	Flash	Ethernet	Other Features
Cyclone 10 GX 10CX220YF78015G	3 x Samtec ST5	2 GB DDR3	256 MB	1 Gbit	Intel MAX 10 as power sequencer, EEPROM, 4 LEDs, 5V input voltage



e.MMC	Ethernet PHY	USB PHY	Total I/O	Gbit Transceiver	Other Features
-	-	-	24 + 4	-	User Push Button and LEDs
-	-	USB2.0	31	-	3-axis accelerometer, on-board USB Programmer, JTAG/UART over microUSB2.0 connector, Pmod header, 2 x 14 pin headers, 1 x 3 pin header, single supply
-	-	USB2.0	21	-	3-axis accelerometer, Pmod: 2 x 6 pin support, 8 user LED, 1 user push button, single supply
-	1 Gbit	-	226	-	Intel MAX 10 as system controller (CPLD), programmable oscillator, single supply, baseboard available
-	2 x 10/100 MBit/s	USB2.0	70	-	Up to 128 MByte HyerRAM, integrated USB Programmer2, Arduino and Pmod compatible pin headers, Grove connector, D-SUB connector for VGA, SMA connectors, 7-segment display
-	-	USB2.0	29	-	MEMS 3-axis accelerometer, fully calibrated single-chip temperature sensor, smoke detector, USB/JTAG programmer, single supply
-	-	-	24 + 24	-	USB-to-JTAG/GPIO-FTDI, user push button and LEDs

## TEIB0006

### Development Carrier Board for Trenz Electronic's TEI0006 FPGA Module



12 x 15 cm  
form factor

#### Key Features

##### RAM/Storage

- EEPROM

##### On Board

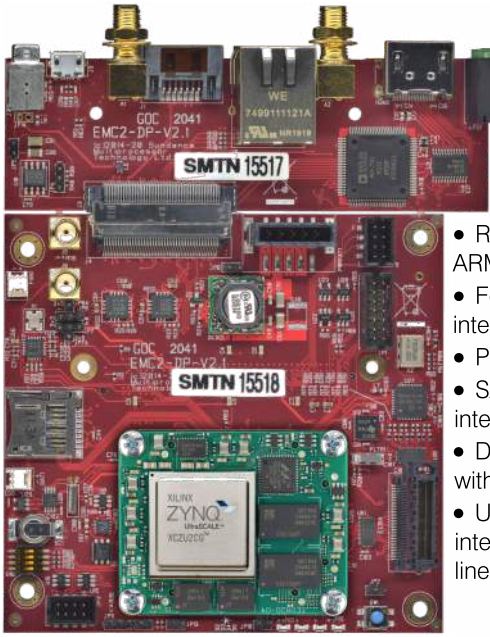
- 3 x LEDs (power, 2 x user)
- 3 x I/O expanders
- 3 x push buttons (2 x user, system controller config)
- DIP switch

##### Interface

- 2 x SFP connectors
- 3 x Samtec ST5 B2B connectors
- FMC HPC connector (10 x transceiver, 34 x LVDS on LA, 10 x LVDS on HA), VADJ = 1.8V
- Gigabit Ethernet connector
- USB2.0 - microUSB (JTAG/UART)
- USB3.0 - type C

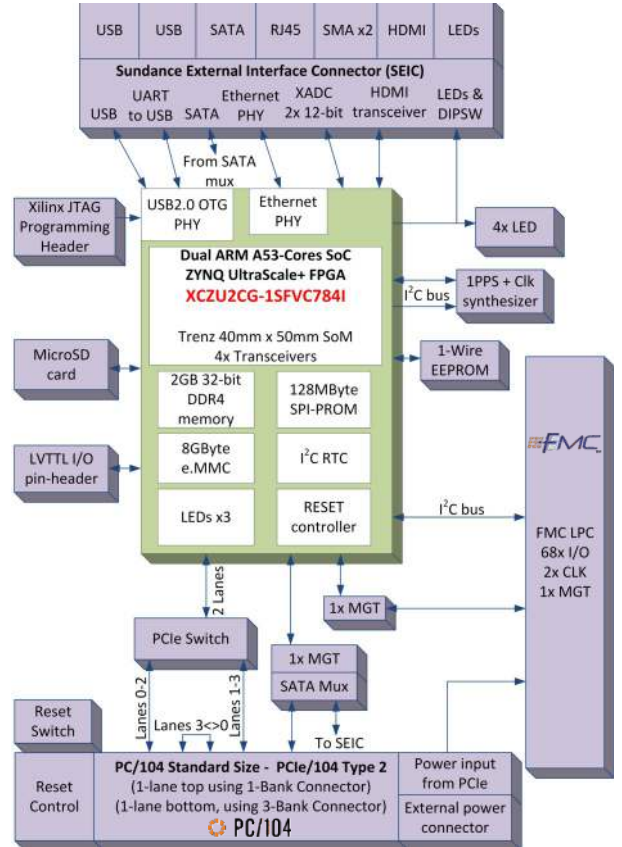
##### Power

- 12V input voltage

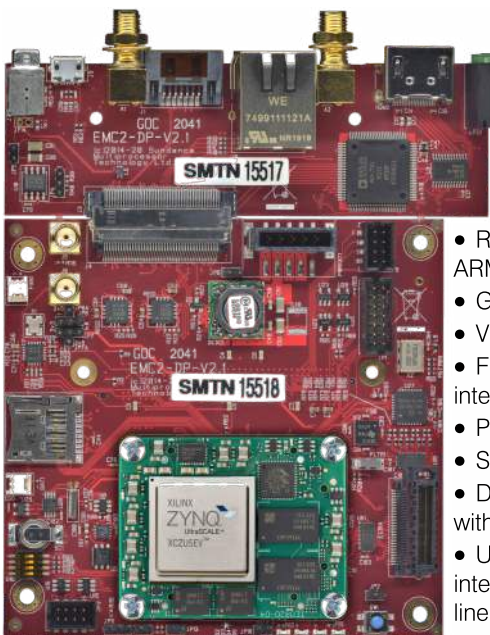


Xilinx Zynq UltraScale+  
XCZU2CG-1SFVC784I

- Application Processor: Dual-core ARM Cortex-A53 MPCore
- Real-Time Processor: Dual-core ARM Cortex-R5 MPCore
- Four high-speed serial I/O interfaces supporting:
  - PCI Express v2.1 compliant
  - SATA 3.1 specification compliant interface
  - DisplayPort source-only interface with video resolution up to 4k x 2k
  - USB 3.0 specification compliant interface implementing a 5 Gbit/s line rate

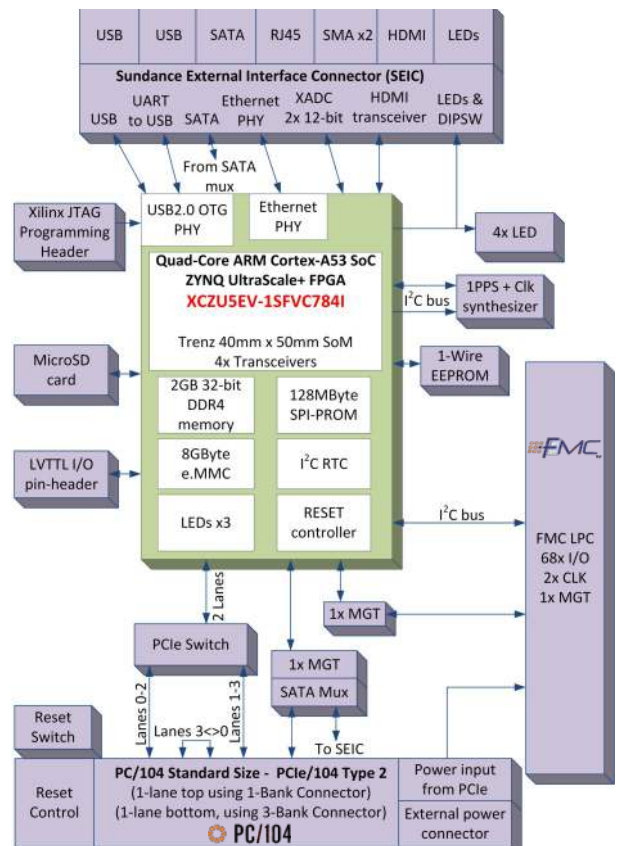


The EMC<sup>2</sup>-DP is a PCIe/104 OneBank™ Carrier for a Trez compatible SoC Module and has expansion for a VITA57.1 FMC™ LPC I/O board. The SEIC board contains LEDs, RS232, USB2.0, HDMI, 1Gb Ethernet and SATA. It can be customised for individual applications and bespoke connectors. This provides a total solution for any embedded application.



Xilinx Zynq UltraScale+  
XCZU5EV-1SFVC784I

- Application Processor: Quad-Core ARM Cortex-A53 MPCore
- Real-Time Processor: Dual-core ARM Cortex-R5 MPCore
- GPU: Mali-400 MP2
- Video Codec: H.264 / H.265
- Four high-speed serial I/O interfaces supporting:
  - PCI Express v2.1 compliant
  - SATA 3.1 specification compliant
  - DisplayPort source-only interface with video resolution up to 4k x 2k
  - USB 3.0 specification compliant interface implementing a 5 Gbit/s line rate



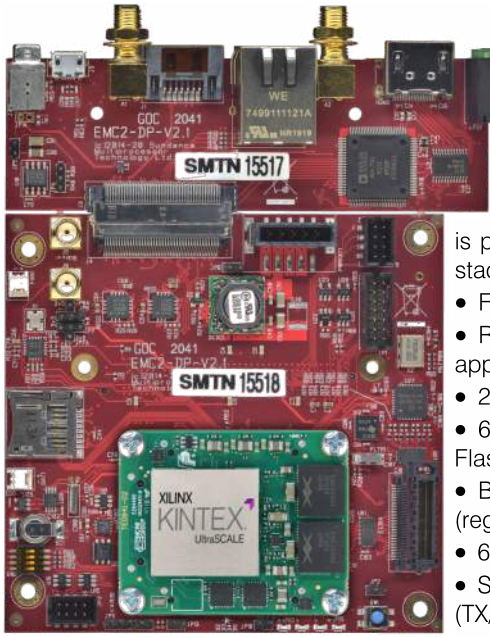
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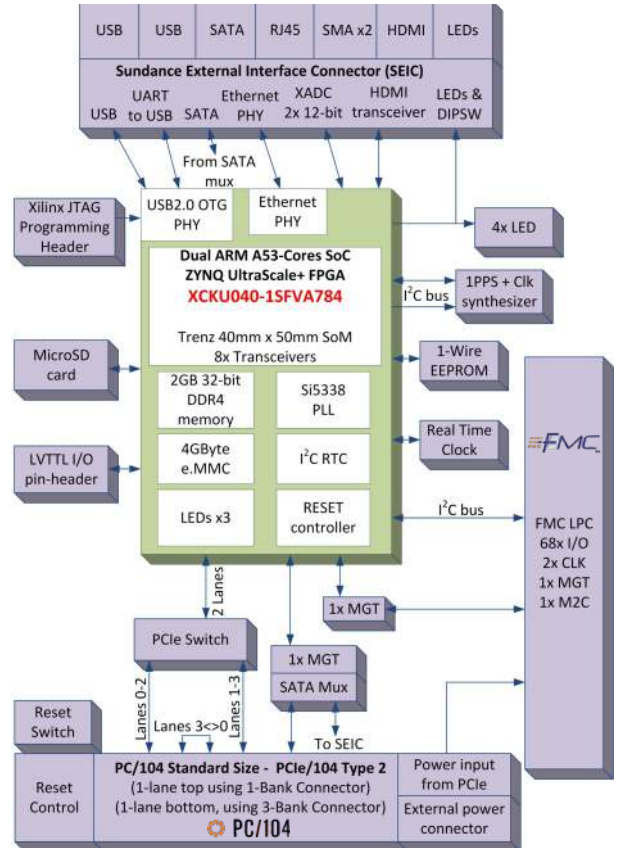
# Sundance EMC<sup>2</sup>-KU040

store.sundance.com/EMC2-KU040



The Trenz Electronic TE0841-02-41121-A is an industrial-grade FPGA module integrating a Xilinx Kintex UltraScale KU40. A large number of configurable I/O's is provided via rugged high-speed stacking strips.

- FPGA: XCKU040-1SFVA784I
- Rugged for industrial applications
- 2 x 1GB DDR4 SDRAM banks
- 64MB (512 MBit) QSPI Boot Flash
- B2B Connectors: 3 Razor Beam (regular 4 mm), total 260 terminals:
- 60 x HR I/Os, 84 x HP I/Os
- Serial transceiver: GTH 8 lanes (TX/RX)

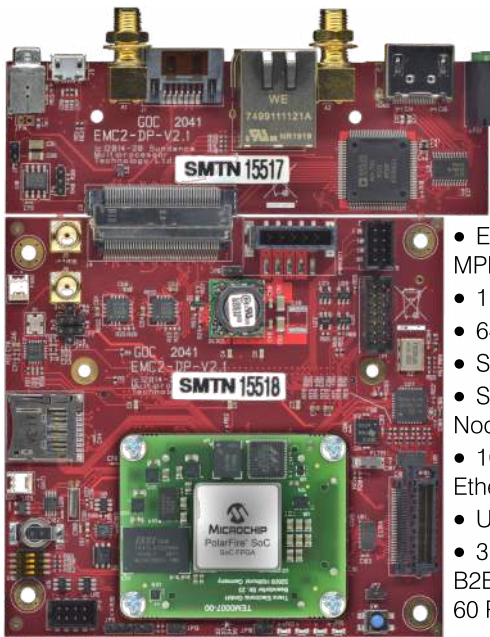


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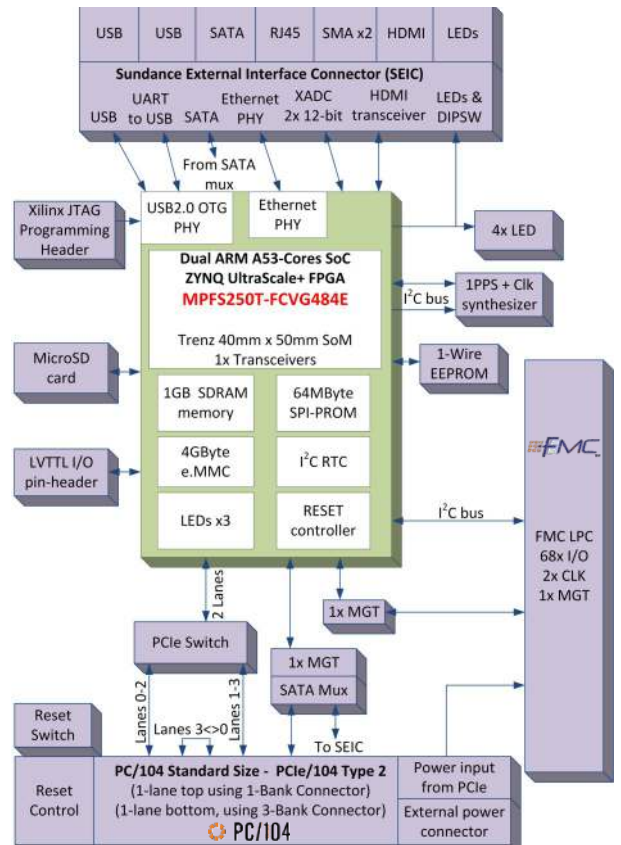
# Sundance EMC<sup>2</sup>-MPFS250

store.sundance.com/EMC2-MPFS250



This system utilises a Microchip PolarFire® SoC MPFS250T, which is a low cost, small-sized FPGA module.

- Extended commercial grade MPFS250T-FCVG484E FPGA
- 1 GByte LPDDR4 SDRAM
- 64 MByte SPI Flash Memory
- System Controller CPLD
- Serial EEPROM with EUI-48 Node Identity
- 10/100/1000 Mbps Gigabit Ethernet PHY
- USB 2.0 ULPI Transceiver
- 3 x Samtec LSHM B2B connectors (2 x 100 Pins, 1 x 60 Pins)



The EMC<sup>2</sup>-DP is a PCIe/104 OneBank™ Carrier for a Trenz compatible SoC Module and has expansion for a VITA57.1 FMC™ LPC I/O board. The SEIC board contains LEDs, RS232, USB2.0, HDMI, 1Gb Ethernet and SATA. It can be customised for individual applications and bespoke connectors. This provides a total solution for any embedded application.





## Ndigo6G-12 - versatile pulse acquisition platform

The Ndigo6G-12 offers 6,4 Gsps sample rate, 12 bits resolution and a greatly improved readout rate of 6,0 GB/s.



The Ndigo6G-12 is a hybrid ADC/TDC-solution for the acquisition of short pulses. It builds on the established platform of the Ndigo5G-10, but takes it to the next level in both, performance and flexibility. The Ndigo6G-12 is particularly well-suited for time of flight applications like LIDAR or TOF mass spectrometry. Pulse arrival times can be measured with an accuracy down to 5 ps in combination with information on pulse shape such as area or amplitude. Four channels at 1,6 Gsps with 12 Bits resolution can be recorded independently or combined to two or one channel(s) with higher dynamic range or up to 6,4 Gsps. The Ndigo6G-12 comprises, in addition, four TDC channels with a resolution of 13 ps.

Ndigo6G-12 - Data	
Optimized for	TOF applications
ADC channels	4
TDC channels	4
Gating channels	4
Connectors	10x LEMO 00
Sample rate single channel	6,4 Gsps
Sample rate multi channel	1,6 GSps
Resolution	12 bits
Double pulse resolution	TBD
Maximum bandwidth	TBD
TDC bin size	12 ps
Multihit	unlimited
Dead time between Groups	none
TDC readout rate	TBD
ADC readout rate	approx. 6 GByte/s
Range	TBD
Common start/stop	yes/yes
Number of boards that can be event-synchronized	8
Readout interface	PCIe3 x8
Time base	50 ppb on board or external 10 MHz clock
On-board calibration data storage	x
Adjustable trigger windows	x
Overlapping events possible	x
Easy to use Windows C API	x
In-system firmware update	x

### Zero suppression

Detect pulses above a certain threshold and only acquire the relevant data to massively reduce the amount of data that needs to be copied and analysed.

### Configurable DC offset

When acquiring unipolar pulses, shift the baseline to the edge of the ADC range to double your dynamic range.

### Flexible utility functions

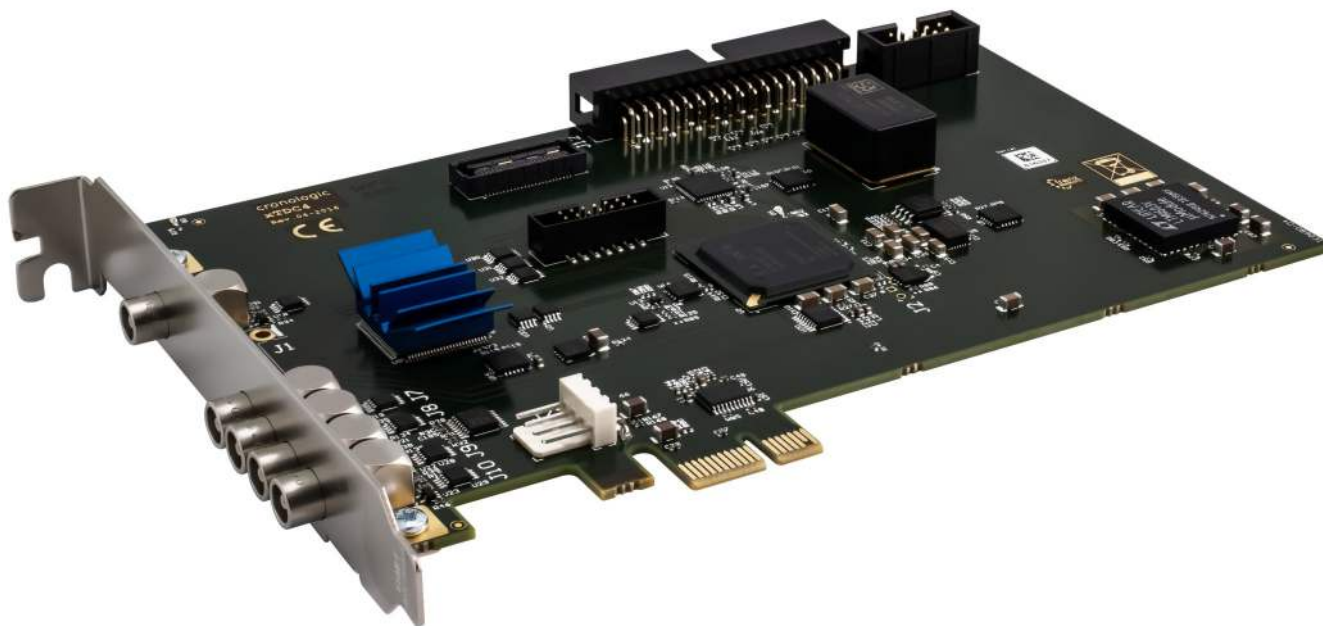
A multitude of useful details help you to create a highly integrated setup with a minimum of external components. Using the integrated TiGer timing pattern generator can provide digital pulse patterns to control your experiment or internal triggers. Use gate and veto functions with our gating logic. This also works across channels or from the additional digital input with a flexible trigger matrix.

### Streaming architecture

The buffers of the Ndigo6G-12 are only limited by the size of your PC's main memory. Data is streamed at a rate of 6,0 GByte/s concurrently to data acquisition. There is no dead time and latency is minimized.

## TimeTagger - low cost, mid resolution time-to-digital converter

If a resolution of 500ps is sufficient, the TimeTagger4G can replace our high end TDCs at a lower cost.



### Time to digital converter

cronologic has a wide series of high performance time to digital converters (TDC) with resolutions starting at 3ps. The current lineup contains boards with up to 10 channels.

cronologic presents an exciting series of low cost, mid resolution time-to-digital converters. The boards feature 500ps to 1ns single shot resolution at a high readout bandwidth.

Time Taggers are ideally suitable in applications that do not require highest single shot timing resolution, but high data acquisition rates and lowest multiple hit deadtime. These include certain types of mass spectroscopy (TOF-MS), time correlated single photon counting (TCSPC) and frequency counting applications.

The TimeTagger4-1G features a bin size of 1 ns. The TimeTagger4-2G provides a bin size of 500 ps.

### Low cost

The TimeTagger4 is available at the lowest cost, while still providing picosecond resolution.

### Bipolar

The threshold discriminators can use positive or negative threshold with configurable voltage. This allows you to use the xTDC with a wide range of detectors or constant fraction discriminators (CFD).

### TiGer timing generator

All inputs can also be used to output periodic pulse patterns to control your setup. The exact timing of these is measured by the TDC.

TimeTagger - Data	
Optimized for	low cost
TDC channels @ bin size	4 @500 ps
Connectors	5x LEMO 00
Bin size	500 ps / 1 ns
Double pulse resolution	1 ns
Multihit	1000x per start event
Dead time between groups	none
Resolution	12 bits
Readout rate	30 MHits/s
Maximum bandwidth	TBD
Range	8 ms, 2.147 s extended
Common start/stop	yes / no
Readout interface	PCIe x1
Time base	50 ppb on board

**Ndigo Crate**

With the Ndigo Crate it is possible to use up to 8 PCIe boards with a PC. The connection of the external chassis to the PC happens over PCIe 2 x16 for a full duplex bandwidth of 2x 8 GByte/s.

The enclosure was specifically designed to operate multiple synchronized cronologic digitizer boards to create a high speed data acquisition system. It can also be used to house other DAQ cards, GPUs for high performance computing, storage adapters or networking equipment.

The extension is fully transparent. The operating system can't distinguish between boards in the PCIe expansion box and boards inside the PC itself. No drivers are required.

The slot covers are on the front side of the enclosure to easily see status information and plug in cables during operation.

The crate is delivered as a set with cable and PC link board.



Facts	Crate	Crate-3	Crate-5
Connection to Host	PCIe 2.0 x16	PCIe 2.0 x16	PCIe 2.0 x16
Bandwidth to Host	8 GByte/s	8 GByte/s	8 GByte/s
Performance relative to 10Gbps Thunderbolt link	8x	8x	8x
PCIe3 x16 slots with 8 lanes	-	2	2
PCIe3 x16 slots with 4 lanes	-	3	3
PCIe2 x16 slots with 4 lanes	8	-	-
PCI slots 5V, 32 Bit, 33MHz	-	-	2
PCI slots 3V, 32 Bit, 66MHz	-	2	-
Availability	now	now	now
Cable and link boards	included	included	included
Cable Length	3 meters (1m, 2m and 5m upon request)		



Trenz Electronic is for more than 30 years the ideal partner to design an FPGA and SoC based system from scratch, or to complete and optimize an existing project.

Customers can choose from a wide range of module series including FPGA from manufacturers such as:

## AMD

Versal  
Zynq UltraScale+ and UltraScale  
Kintex UltraScale+ and UltraScale  
Zynq-7000  
Artix-7  
Kintex-7  
Spartan-7  
Virtex-7  
Spartan-6

## Intel

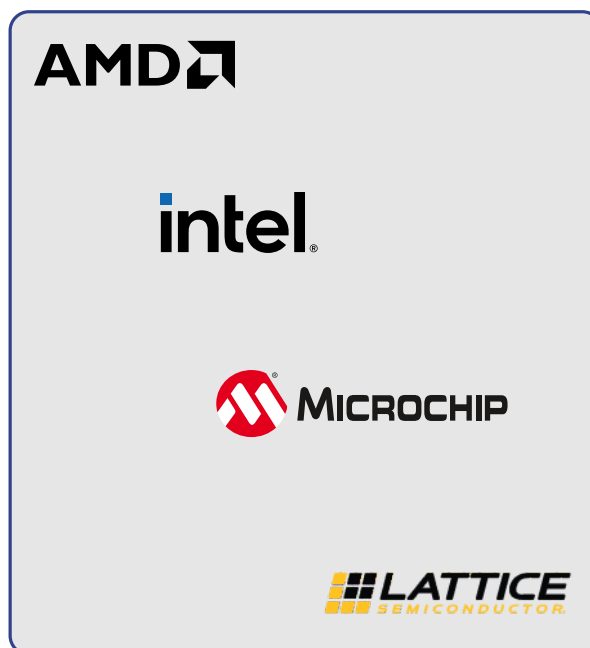
Agilex  
Stratix  
MAX 10  
Cyclone 10  
Cyclone V

## Microchip

PolarFire  
SmartFusion 2

## Lattice

Avant  
CertusPro-NX  
Certus-NX  
MachXO2  
iCE40



In addition, customer-specific modules can also be realized.

By closely coordinating all departments in one building, we cover the entire process from product specification, hardware and software development to prototyping and production.

Our developers discuss the possibilities of your request with you. Finally, we create the hardware and the PCB layout to produce the first prototypes.

The Design of software working on embedded systems has special requirements. Functional compatibility, software re-use, real-time performance, small-footprint - these are only some issues of the additional requirements concerning embedded software. We understand software as an integral part of the system and therefore we offer you these additional services.

During the entire development and production process, Trenz Electronic, as your reliable partner, is in regular contact with you to implement possible changes as quickly as possible.

As a service provider, the wishes of our customers are very important to us. Once the product has met your requirements, it goes into series production.



The modern, production-oriented storage system is an automated, highly flexible and expandable buffer storage unit for electronic components. It is ready for fast and smooth changeovers in our SMT line.

Trenz Electronic uses printing technology to make it possible to dispense solder paste for the most challenging circuit boards and components, with micrometer accuracy, maximum speed and perfect quality solder joints.



In the complex process of solder paste inspection (SPI), Trenz Electronic has the possibility to measure the paste volume with the highest precision in 3D. Furthermore, possible defects and bridges are detected.

To produce even faster, we use several production lines at the same time. Here, we can easily switch from full volume to batch size one and handle a wider variety of components with uncompromising manufacturing quality.







The Automatic Optical Inspection (AOI) is used to detect and report tolerance deviations in production using an image processing techniques.

For some applications, THT placement remains indispensable. THT assembly creates a strong connection between the components and the PCB. This makes it ideal for larger components that are exposed to high power and high voltages.



With our new X-ray machine, we use leading technology for precise analyses. The detailed 3D visualization masters the special requirements of our field of application.



# Official Trenz Electronic Distributor List as of February 2023

Current list with address is online at <http://trenz.org/distri>

## Worldwide

### Digi-Key Electronics

Web: [www.digikey.com](http://www.digikey.com)  
E-mail: [sales@digikey.com](mailto:sales@digikey.com)



### Mouser Electronics, Inc.

Web: [www.mouser.com](http://www.mouser.com)  
E-mail: [sales@mouser.com](mailto:sales@mouser.com)



### ARROW Electronics

Web: [www.arrow.com](http://www.arrow.com)  
Contact via form on website



### RS Components GmbH

Web: [de.rs-online.com](http://de.rs-online.com)  
E-mail: [bestellung@rs-components.com](mailto:bestellung@rs-components.com)



## EMEA

### AVNET Silica

Web: [www.avnet-silica.com](http://www.avnet-silica.com)  
E-mail: [trenz\\_sales@avnet.eu](mailto:trenz_sales@avnet.eu)



## APAC

### AVNET Asia Pacific

Web: [avnet.com/apac](http://avnet.com/apac)  
E-mail: [xilinxapac@avnet.com](mailto:xilinxapac@avnet.com)



### China & Taiwan

**Future Linking Solution Tech Co. Ltd.**  
Web: [www.fulso.com](http://www.fulso.com)  
E-mail: [liu@fulso.com](mailto:liu@fulso.com)

### Haley Technology Co. Ltd.

Web: [www.haleytech.com](http://www.haleytech.com)  
E-mail: [sales@haleytech.com](mailto:sales@haleytech.com)

### Czech Republic + Slovakia

**DFC Design, s.r.o.**  
Web: [www.dfcdesign.cz](http://www.dfcdesign.cz)  
E-mail: [info@dfcdesign.cz](mailto:info@dfcdesign.cz)

### France

**ERTIS SASU**  
Web: [www.ertis.fr](http://www.ertis.fr)  
E-mail: [sales@ertis.fr](mailto:sales@ertis.fr)

### Lextronic

Web: [www.lextronic.fr](http://www.lextronic.fr)  
E-mail: [lextronic@lextronic.fr](mailto:lextronic@lextronic.fr)

### India

**Microembesys Technologies Pvt Ltd.**  
Web: [www.microembesys.com](http://www.microembesys.com)  
E-mail: [info@microembesys.com](mailto:info@microembesys.com)

### ApexPlus Technologies

Web: [www.apexplustech.com](http://www.apexplustech.com)  
E-mail: [info@apexplustech.com](mailto:info@apexplustech.com)

### Sinelec Technologies Deutschland GmbH

Web: [www.sinelec-tech.com](http://www.sinelec-tech.com)  
E-mail: [contact@sinelec-tech.com](mailto:contact@sinelec-tech.com)  
(Europe and India)

### Italy

**mirifica s.r.l.**  
Web: [www.mirifica.it](http://www.mirifica.it)  
E-mail: [store@mirifica.it](mailto:store@mirifica.it)

### Japan

**Tokushu Denshi Kairo Inc.**  
Web: [www.tokudenkairo.co.jp](http://www.tokudenkairo.co.jp)  
E-mail: [info@tokudenkairo.co.jp](mailto:info@tokudenkairo.co.jp)

### Korea

**Inipro Inc.**  
Web: [www.inipro.net](http://www.inipro.net)  
E-mail: [webmaster@inipro.net](mailto:webmaster@inipro.net)

### Neocess Co., Ltd.

Web: [www.neocess.co.kr](http://www.neocess.co.kr)  
E-mail: [james@neocess.co.kr](mailto:james@neocess.co.kr)

### Poland

**BTC Korparacja**  
Web: [www.kamami.pl](http://www.kamami.pl)  
E-mail: [sprzedaz@kamami.pl](mailto:sprzedaz@kamami.pl)

### Russian Federation

**Active Supply LLC**  
Web: [www.activesupply.ru](http://www.activesupply.ru)  
E-mail: [info@activesupply.ru](mailto:info@activesupply.ru)

### Macro Group

Web: [www.macrogroupp.ru](http://www.macrogroupp.ru)  
E-mail: [fpga@macrogroupp.ru](mailto:fpga@macrogroupp.ru)

### Spain

**Cyberall Group**  
Web: [www.cyberallgroup.com](http://www.cyberallgroup.com)  
E-mail: [sales@cyberallgroup.com](mailto:sales@cyberallgroup.com)

### Turkey

**EKOM Elektronik A.S.**  
Web: [www.e-kom.com](http://www.e-kom.com)  
E-mail: [info@e-kom.com](mailto:info@e-kom.com)

### NanoManyetik Bilimsel CihazlarSan. ve Tic. Ltd. Sti.

Web: [www.nanomagnetics-inst.com](http://www.nanomagnetics-inst.com)  
E-mail: [sales@nanomagnetics-inst.com](mailto:sales@nanomagnetics-inst.com)

### Same Elektronik San. Ve Tic. A.S.

Web: [www.sameas.com.tr](http://www.sameas.com.tr)  
E-mail: [same@sameas.com.tr](mailto:same@sameas.com.tr)

### United Kingdom

**Sundance Multiprocessor  
Technology Ltd.**  
Web: [www.sundance.com](http://www.sundance.com)  
E-mail: [trenz@sundance.com](mailto:trenz@sundance.com)

### USA

**Concurrent EDA LLC**  
Web: [www.concurrenteda.com](http://www.concurrenteda.com)  
E-mail: [trenz@concurrenteda.com](mailto:trenz@concurrenteda.com)

### Canada

**MaxCom Global Inc.**  
Web: [www.maxcomglobal.ca](http://www.maxcomglobal.ca)  
E-mail: [richard@maxcomglobal.ca](mailto:richard@maxcomglobal.ca)

### Israel

**STG International Ltd.**  
Web: [www.stggroup.co.il](http://www.stggroup.co.il)  
E-mail: [oren.cohen@stggroup.co.il](mailto:oren.cohen@stggroup.co.il)



FPGA inside

### Trenz Electronic GmbH

Beendorfer Str. 23, 32609 Hüllhorst, Germany

CEO: Dipl.-Ing. Thorsten Trenz

### Local Court:

Amtsgericht Bad Oeynhausen, HRB 7185

Phone +49 5741 3200-0

E-Mail [info@trenz-electronic.de](mailto:info@trenz-electronic.de)

Website <http://www.trenz-electronic.de>



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