‘COTS’ Modules

- for 35 years

Flemming CHRISTENSEN
(Flemming.C@sundance.com)
Managing Director

www.SUNDANCE.com

THE BUSINESS

Established in 1989 by Flemming CHRISTENSEN

- Employee Owned and a *'Life-Style'* company
- 8x people with 300+ years experience, in the UK
  - 3x with accredited AMD FPGA training
- Similar-sized sister company in the USA
- Always designed and built our own products
- BSI - ISO9001-2015 certified since 2003

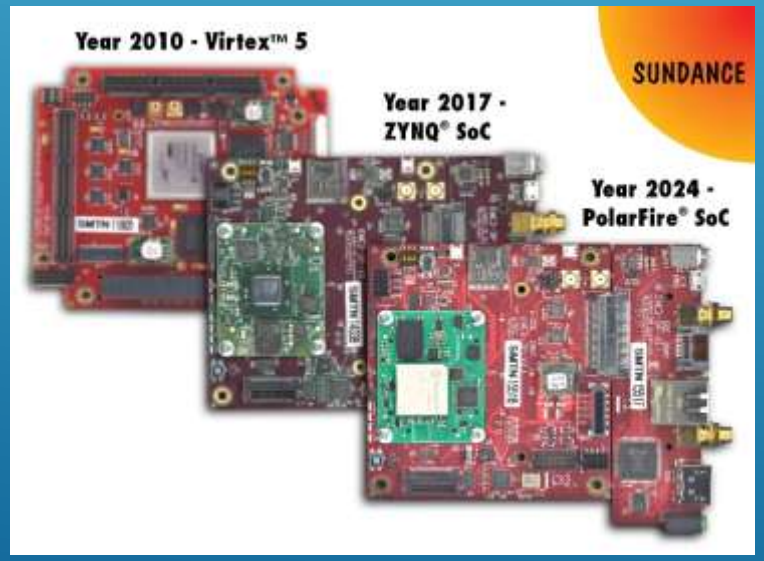
THE BUSINESS

Distribution Partners/Activities

- Sundance Store | Sundance and 3rd party products

Technology Focus

- Edge-AI Acceleration, Vision, Sensor & Robotics
- Low-volume, high-tech manufacturing,
- In-House Manufacturing/Testing
- TRL3 (Prototype Boards)
- TRL8 (Application System)



www.SUNDANCE.com

INDUSTRY FIRST COTS FPGA MODULE

- This, the SMT308, a "TIM40" form-factor Module for pre-processing of Video streams
- Complementing TI's TMS320C40 DSPs with Parallel Interfaces to build Multiprocessing Systems.
- That was in 1993 and the first "Industry Standard" Module with an XILINX FPGA.
- tim_spec_v1.01.pdf (syndex.org)

FIRST QUESTION

SUNDANCE

How many of you are using "System-on-Modules" ?

KINTEX ULTRASCALE – TE0841

TE0841- Public Docs - Trenz Electronic Wiki

Module with AMD Kintex™ UltraScale™ KU040

1+ Price: €1310.00

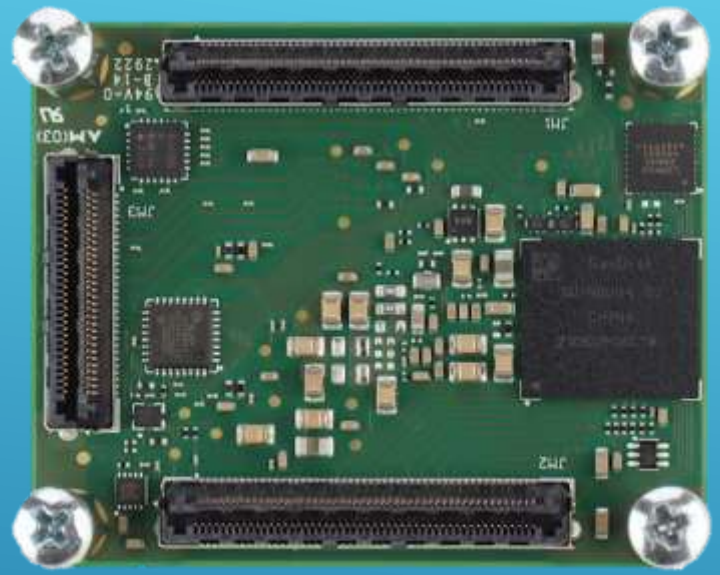
XCKU040-1SFVA784I AMD | DigiKey

1+ Price: £1726.00

ZYNQ ULTRASCALE+ - TE0820

SUNDANCE

TE0820 - Public Docs - Trenz Electronic Wiki



Module with AMD Zynq™ UltraScale+™ ZU3EG-1E — **1+ Price: £250.00**

XCZU3EG-1SFVC784E AMD | DigiKey — **1+ Price: £439.00**

ZYNQ ULTRASCALE+ - TE0821

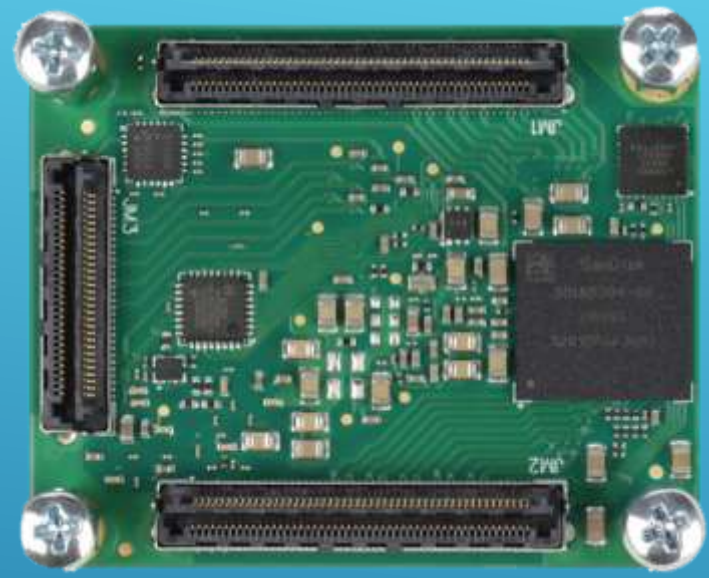
TE0821 - Public Docs - Trenz Electronic Wiki

Module with AMD Zynq™ UltraScale+™ ZU2CG-1E — **1+ Price: £250.00**

XCZU2CG-1SFVC784E AMD | DigiKey — **1+ Price: £235.00**

ZYNQ ULTRASCALE+ - TE0823

TE0823 - Public Docs - Trenz Electronic Wiki



Module with AMD Zynq™ UltraScale+™ 3CG-L1I

1+ Price: £527.00

XCZU3CG-L1SFVC784I AMD | DigiKey

1+ Price: £523.00

ZYNQ – TE0715

TE0715 - Public Docs - Trenz Electronic Wiki

Module with AMD Zynq™ 7012S-1C

1+ Price: £230.00

XC7Z012S-1CLG485C AMD | DigiKey

1+ Price: £89.00

ZYNQ – TE0720

SUNDANCE

TE0720 - Public Docs - Trenz Electronic Wiki

Module with AMD Zynq™ 7020-1Q Automotive — **1+ Price: £225.00**

XA7Z020-1CLG484Q AMD | DigiKey — **1+ Price: £153.00**

ARTIX-7 – TE0710

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TE0710 - Public Docs - Trenz Electronic Wiki

Module with it AMD Artix™ 7 XC7AT-2FGG484I — **1+ Price: £116.00**

XC7A35T-2FGG484I AMD | DigiKey — **1+ Price: £70.00**

ARTIX-7 – TE0711

TE0711 - Public Docs - Trenz Electronic Wiki

Module withAMD Artix™ 7 XC7A35T-2CSG324I

1+ Price: £108.00

XC7A35T-2CSG324I AMD | DigiKey

1+ Price: £57.00

ARTIX-7 – TE0712

TE0712 - Public Docs - Trenz Electronic Wiki

Module with AMD Artix™ 7 XC7A100T-2FGG484C — **1+ Price: £230.00**

XC7A100T-2FGG484C AMD | DigiKey — **1+ Price: £147.00**

ARTIX-7 – TE0713

SUNDANCE

TE0713 - Public Docs - Trenz Electronic Wiki

Module with AMD Artix™ 7 XC7A35T-2FGG484I

1+ Price: £167.00

XC7A35T-2FGG484I AMD | DigiKey

1+ Price: £70.00

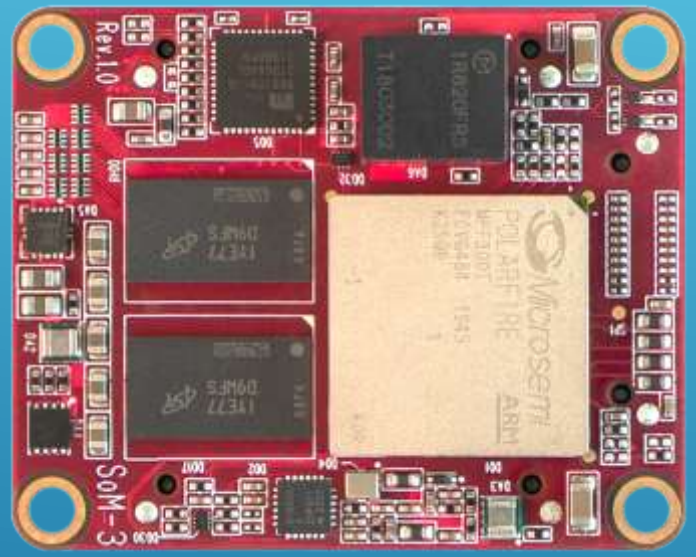
POLARFIRE SOC – TEM0007

TEM0007 - Public Docs - Trenz Electronic Wiki

Module with PolarFire® SoC MPFS095T-1FCVG484I — **1+ Price: £259.00**

MPFS095T-1FCVG484I | DigiKey — **1+ Price: £174.00**

POLARFIRE FPGA – SOM3-MPF300



[SoM3-MPF300-1-E - Sundance Store]

[MPF300T-1FCVG484E | DigiKey]

1+ Price: £1175.00

1+ Price: £443.00

ZYNQ ULTRASCALE+ – "SBC" ON A MODULE

https://store.sundance.com/product/vcs3/

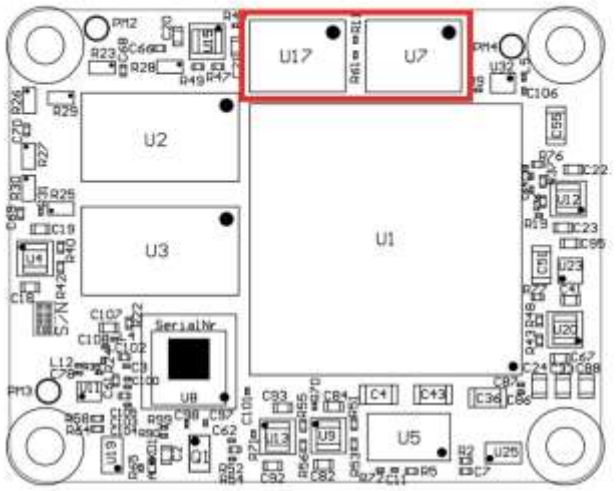
- Cloud-less Computing
  - Low-Power Edge-AI
- Used in Mining Systems
  - (Monitoring of people)
- Used in AgriTech
  - (Precision spraying)
- Thermal and 3D imaging

THE TRENZ WAY – TE0820-01 TO -02

How to manage lifetime supply and End-of-Life?

Method of Identification

Locate Flash on topside of PCB:



N25Q256A11E1240E	N25Q512A11G1240E
	

Changes

#1 Change SPI Flash from N25Q256A11E1240E to N25Q512A11G1240E

Type: BOM change

Reason: N25Q256A11E1240E became obsolete, replacement part not available for purchase. This is only interim solution because N25Q512A11G1240E is also obsolete already. It will be changed after the replacement parts get available.

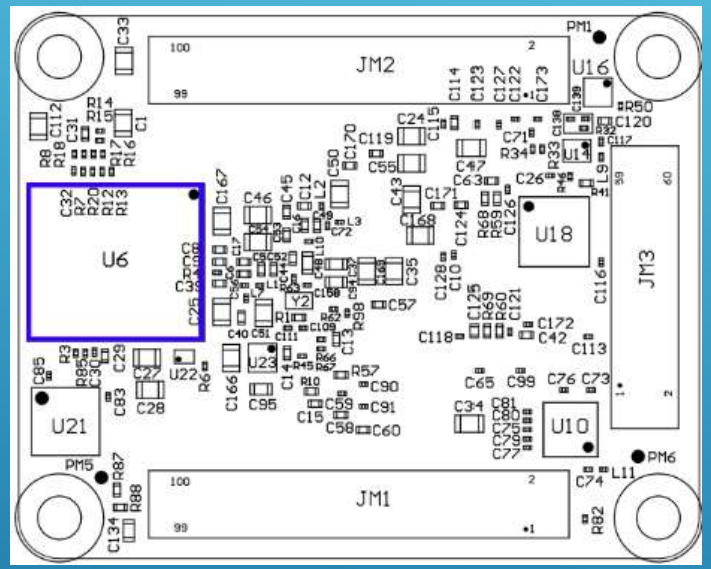
Impact: Size changed from 256 MBit to 512 MBit per chip. JEDEC ID changed from BB19h to BB20h both with manufacturer ID: 20h.

PCN-20171117 TE0820-02 SPI Flash Change

PCN Number	PCN-20171117
Title	PCN-20171117 TE0820-02 SPI Flash Change
Subject	BOM change
Issue Date	20171117

THE TRENZ WAY – TE0820-02 TO -03

How to manage lifetime supply and End-of-Life?



#2 Change eMMC from MTFC4GACAJCN-4M IT to IS21ES08G-JCLI

Type: BOM change

Reason: Improve availability.

Impact: The eMMC capacity changed from 4 GByte to 8 GByte.

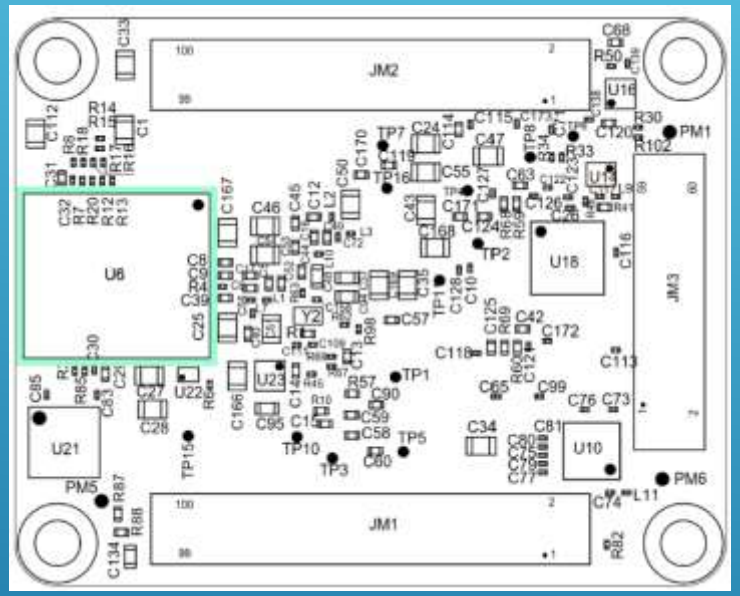
MTFC4GACAJCN-4M IT	IS21ES08G-JCLI
	

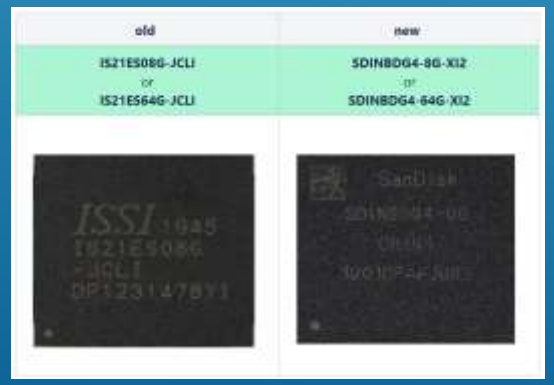
PCN-20190110a TE0820-03-* SPI Flash and eMMC Change -

PCN Number	PCN-20190110a
Title	TE0820-03-* SPI Flash and eMMC Change
Subject	BOM change
Issue Date	2019-10-02

THE TRENZ WAY – TE0820-03 TO -04

How to manage lifetime supply and End-of-Life?





Changes

#1 Change eMMC (U6) from IS21ES08G-JCLI / IS21ES64G-JCLI to SDINBDG4-8G-XI2 / SDINBDG4-64G-XI2

Type: BOM change
Reason: Distributor informed about unforeseeable immediate EOL of parts. No official documents form manufacturer are available. No LTB, already confirmed orders were cancelled by distributor/manufacturer.
Impact: None. Replacement has same capacity as used on corresponding affected variant. Reference designs for vivado versions 2019.2 and 2020.2 were tested and work properly without any changes.

#2 Clock Revision Change (U14) SiT8008AI-73-XXS-52.000000E to SiT8008BI-73-XXS-52.000000E

Type: BOM change
Reason: Switch to actual revision. Revision A devices may be discontinued.
Impact: None.

PCN-20210615 TE0820-04 eMMC Change and Product Update

PCN Number	PCN-20210615
Title	TE0820-04 eMMC Change and Product Update
Subject	BOM change
Issue Date	2021-07-22

THE TRENZ WAY – TE0820-04 TO -05

How to manage lifetime supply and End-of-Life?

Changes

#1 Changed DCDC (U4, U9, U12, U13, U15, U20, U24, U26, U27) from MUN3CAD03-SE to TPS82085SIL and adapted voltage divider resistors.

Type: BOM Change

Reason: TPS82085SIL availability.

Impact: Minor changes in electrical characteristics.

#2 Changed DDR4 SDRAM (U2, U3) from K4A8G165WB-BIRC to K4A8G165WC-BITDTCV.

Type: BOM change

Reason: BOM Optimization.

Impact: New DDR timings may be considered in designs. DDR4 setup used in reference design is known to work still.

PCN-20231007 TE0820-05 DDR4 SDRAM and DCDC Change

PCN Number	PCN-20231007
Title	TE0820-05 DDR4 SDRAM and DCDC Change
Subject	BOM change
Issue Date	2023-10-23

TE0820 – GROWING & SUPPORTED

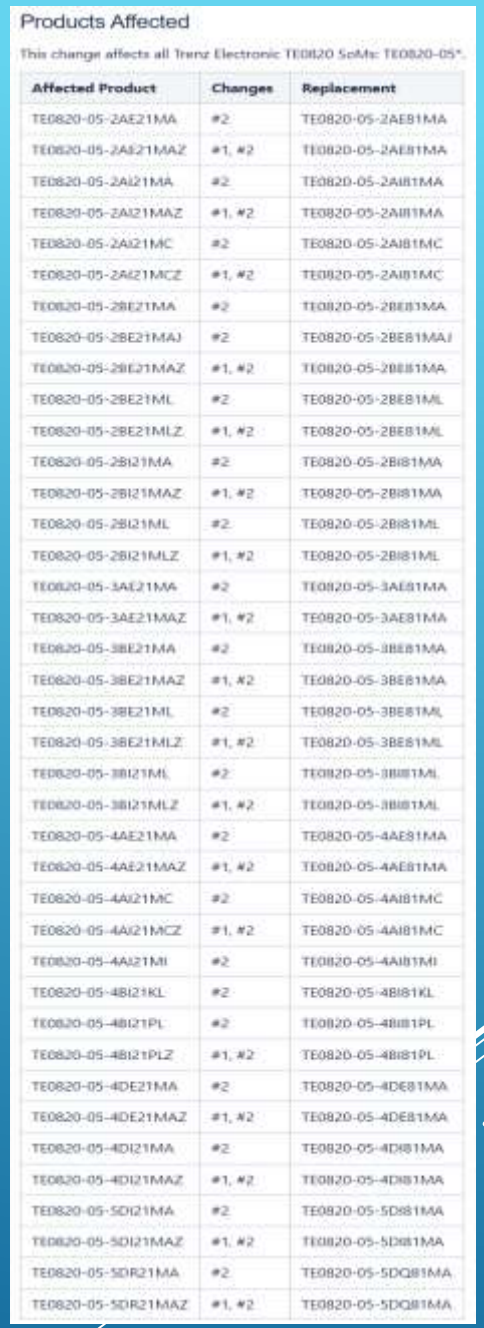
How TE0820 has grown and will continue until 2040!

Products Affected

This change affects all Trenz Electronic TE0820 SoMs: TE0820-02*.

Affected Product	Replacement
TE0820-02-02CG-1E	TE0820-02-02CG-1EA
TE0820-02-02EG-1E	TE0820-02-02EG-1EA
TE0820-02-02EG-1E3	TE0820-02-02EG-1EL
TE0820-02-03CG-1E	TE0820-02-03CG-1EA
TE0820-02-03EG-1E	TE0820-02-03EG-1EA
TE0820-02-03EG-1E3	TE0820-02-03EG-1EL
TE0820-02-04CG-1E	TE0820-02-04CG-1EA
TE0820-02-04EV-1E	TE0820-02-04EV-1EA

How TE0820 has grown from eight (8) build variations in 2017 to almost forty (40) in 2024 - and will continue until 2045!



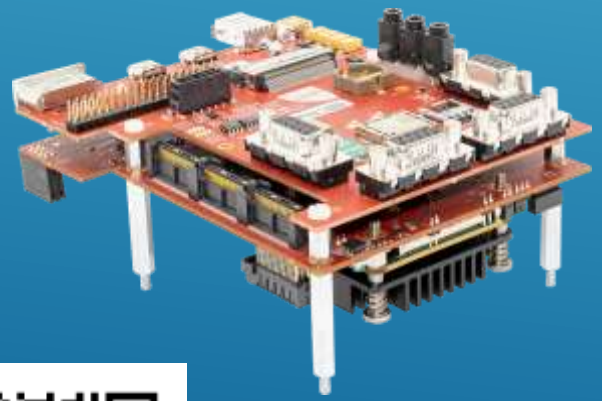
Products Affected

This change affects all Trenz Electronic TE0820 SoMs: TE0820-05*.

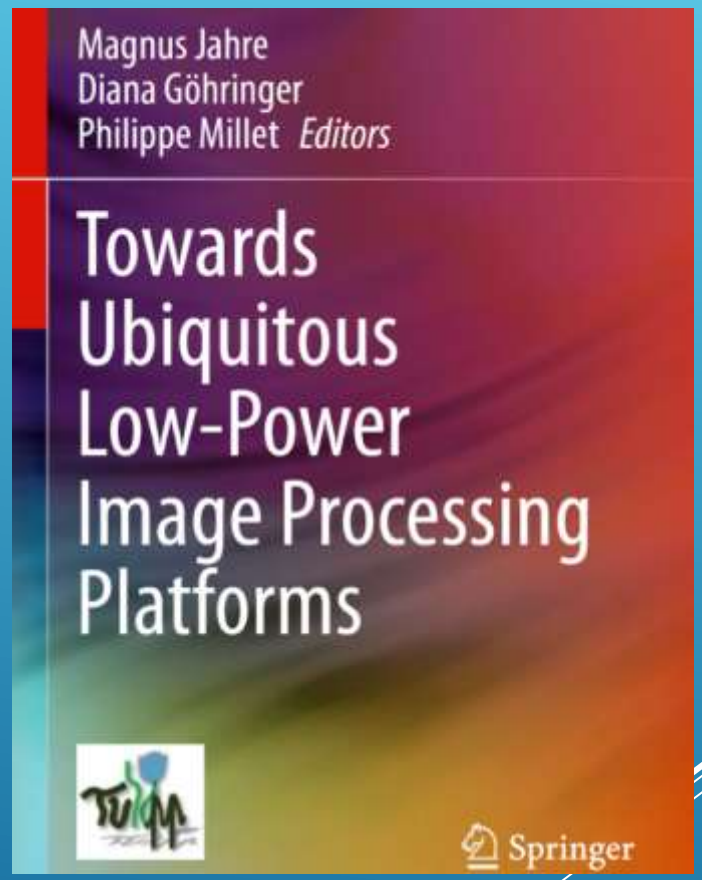
Affected Product	Changes	Replacement
TE0820-05-2AE21MA	#2	TE0820-05-2AE81MA
TE0820-05-2AE21MAZ	#1, #2	TE0820-05-2AE81MA
TE0820-05-2AI21MA	#2	TE0820-05-2AI81MA
TE0820-05-2AI21MAZ	#1, #2	TE0820-05-2AI81MA
TE0820-05-2AI21MC	#2	TE0820-05-2AI81MC
TE0820-05-2AI21MCZ	#1, #2	TE0820-05-2AI81MC
TE0820-05-2BE21MA	#2	TE0820-05-2BE81MA
TE0820-05-2BE21MAJ	#2	TE0820-05-2BE81MAJ
TE0820-05-2BE21MAZ	#1, #2	TE0820-05-2BE81MA
TE0820-05-2BE21ML	#2	TE0820-05-2BE81ML
TE0820-05-2BE21MLZ	#1, #2	TE0820-05-2BE81ML
TE0820-05-2BI21MA	#2	TE0820-05-2BI81MA
TE0820-05-2BI21MAZ	#1, #2	TE0820-05-2BI81MA
TE0820-05-2BI21ML	#2	TE0820-05-2BI81ML
TE0820-05-2BI21MLZ	#1, #2	TE0820-05-2BI81ML
TE0820-05-3AE21MA	#2	TE0820-05-3AE81MA
TE0820-05-3AE21MAZ	#1, #2	TE0820-05-3AE81MA
TE0820-05-3BE21MA	#2	TE0820-05-3BE81MA
TE0820-05-3BE21MAZ	#1, #2	TE0820-05-3BE81MA
TE0820-05-3BE21ML	#2	TE0820-05-3BE81ML
TE0820-05-3BE21MLZ	#1, #2	TE0820-05-3BE81ML
TE0820-05-3BI21ML	#2	TE0820-05-3BI81ML
TE0820-05-3BI21MLZ	#1, #2	TE0820-05-3BI81ML
TE0820-05-4AE21MA	#2	TE0820-05-4AE81MA
TE0820-05-4AE21MAZ	#1, #2	TE0820-05-4AE81MA
TE0820-05-4AI21MC	#2	TE0820-05-4AI81MC
TE0820-05-4AI21MCZ	#1, #2	TE0820-05-4AI81MC
TE0820-05-4AI21MI	#2	TE0820-05-4AI81MI
TE0820-05-4BI21KL	#2	TE0820-05-4BI81KL
TE0820-05-4BI21PL	#2	TE0820-05-4BI81PL
TE0820-05-4BI21PLZ	#1, #2	TE0820-05-4BI81PL
TE0820-05-4DE21MA	#2	TE0820-05-4DE81MA
TE0820-05-4DE21MAZ	#1, #2	TE0820-05-4DE81MA
TE0820-05-4DI21MA	#2	TE0820-05-4DI81MA
TE0820-05-4DI21MAZ	#1, #2	TE0820-05-4DI81MA
TE0820-05-5DI21MA	#2	TE0820-05-5DI81MA
TE0820-05-5DI21MAZ	#1, #2	TE0820-05-5DI81MA
TE0820-05-5DR21MA	#2	TE0820-05-5DQ81MA
TE0820-05-5DR21MAZ	#1, #2	TE0820-05-5DQ81MA

EMC2 – PC/104 CARRIER

- Developed for an EU-funded project, "TULLIPP",
- Carrier for Open-Source 40mm x 50mm SoM Modules



PC/104



SECOND QUESTION

SUNDANCE

Do you use 'Industry Standard' COTS Embedded Boards?

OPEN-SOURCE HARDWARE

SUNDANCE

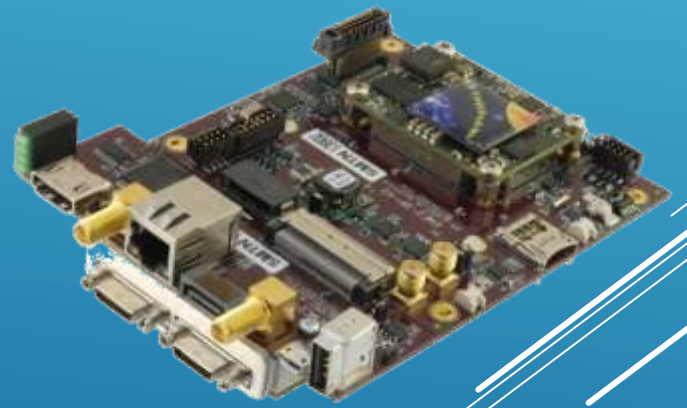
open source hardware

Introduced by CERN in 2007

Home · Wiki / CERN Open Hardware Licence · GitLab (ohwr.org)

Sundance added this in 2021:

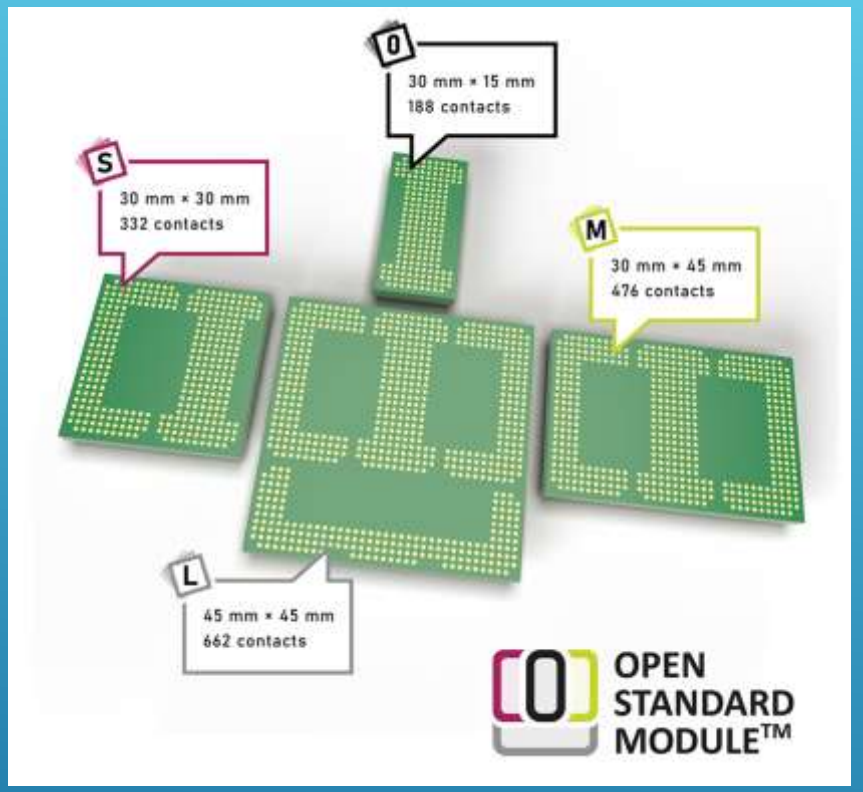
Home · Wiki · Projects / EMC2-DP · GitLab (ohwr.org)



PC/104

WHAT ABOUT OSM?

Open Standard Module (OSM) standard and specifications - SGET



AN FPGA MODULE STANDARD?

SUNDANCE

Harmonized FPGA Module (HFM) standard and specifications - SGET

SUMMARY

- *Main reasons for SoM Modules?*
  - Redundancy, Obsolescence & Cost
- *Why opt for "Open Hardware" Modules?*
  - You should get the circuit diagrams
- *Technical benefits?*
  - You can focus on carrier, firmware and software
  - Support from an experienced Team with sharing application
- *Commercial benefits?*
  - The cost of a typical SoM is similar to the cost of the device
  - Less stock, Less risk

LAST QUESTION – ANY QUESTIONS?