PolarFire SoC how we got here.

A Leading Provider of Smart, Connected and Secure Embedded Control Solutions

Tim Morin

11/5/2020

Agenda

- Introducing PolarFire SoC
- The Icicle Kit
- Development Tools
- MI-V Ecosystem

Introducing PolarFire SoC

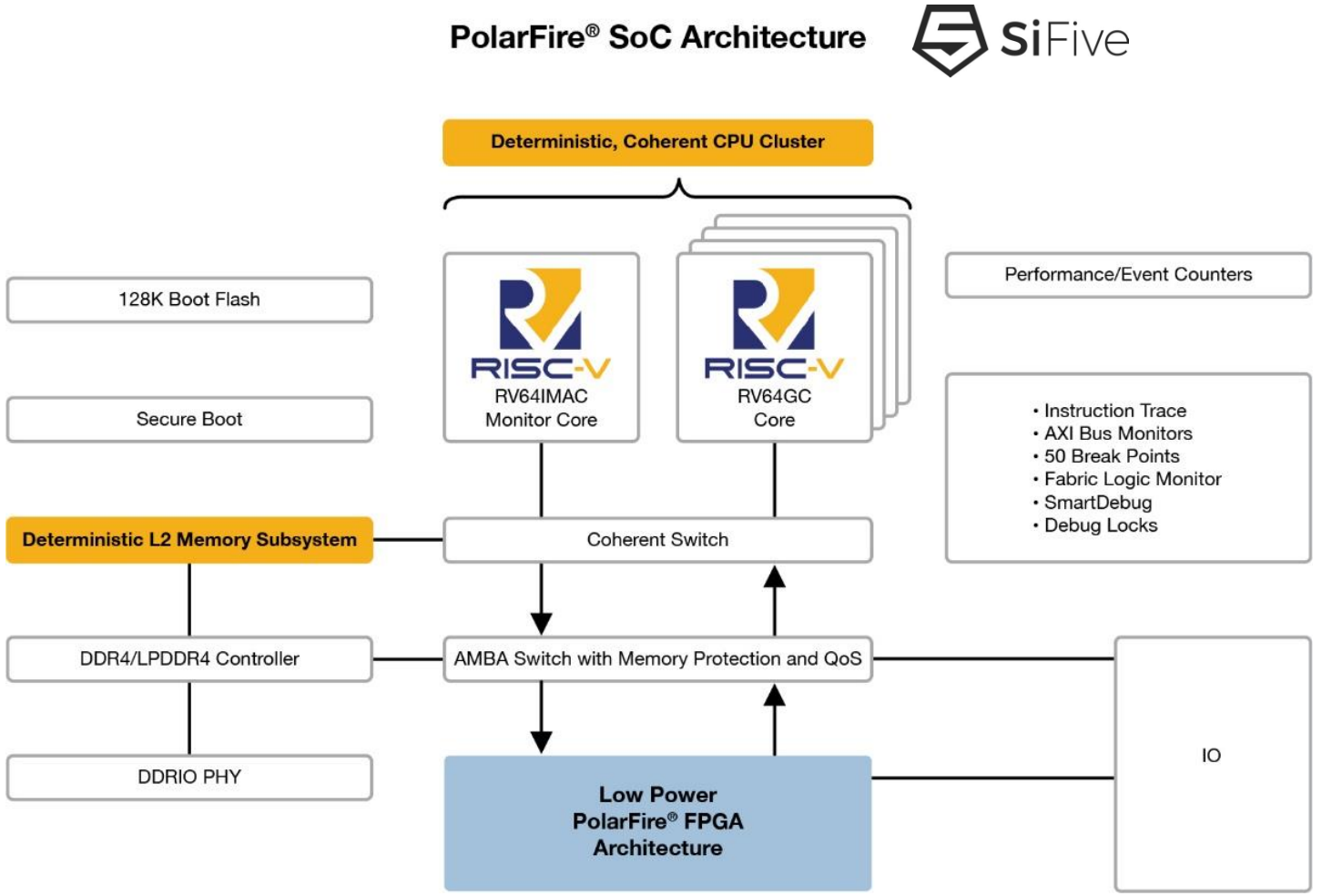
PolarFire SoC - RISC-V Enabled Innovation Platform

Highly Differentiated

- Low power, high performance SoC
  - Thermal efficiency
  - Solutions ~50% power of competition
- Unique AMP mode for mixed real-time and Linux operation
- Defense grade security with Spectre/Meltdown immunity
- Exceptional reliability (SEU Configuration Immune)
- Smallest form factors

Freedom to Innovate in

- Linux and Real-Time
- Thermal and Power Constrained Systems
- Securely Connected IoT Systems
- Mixed Criticality Systems



Open. Lowest Power. Programmable RISC-V Solutions.

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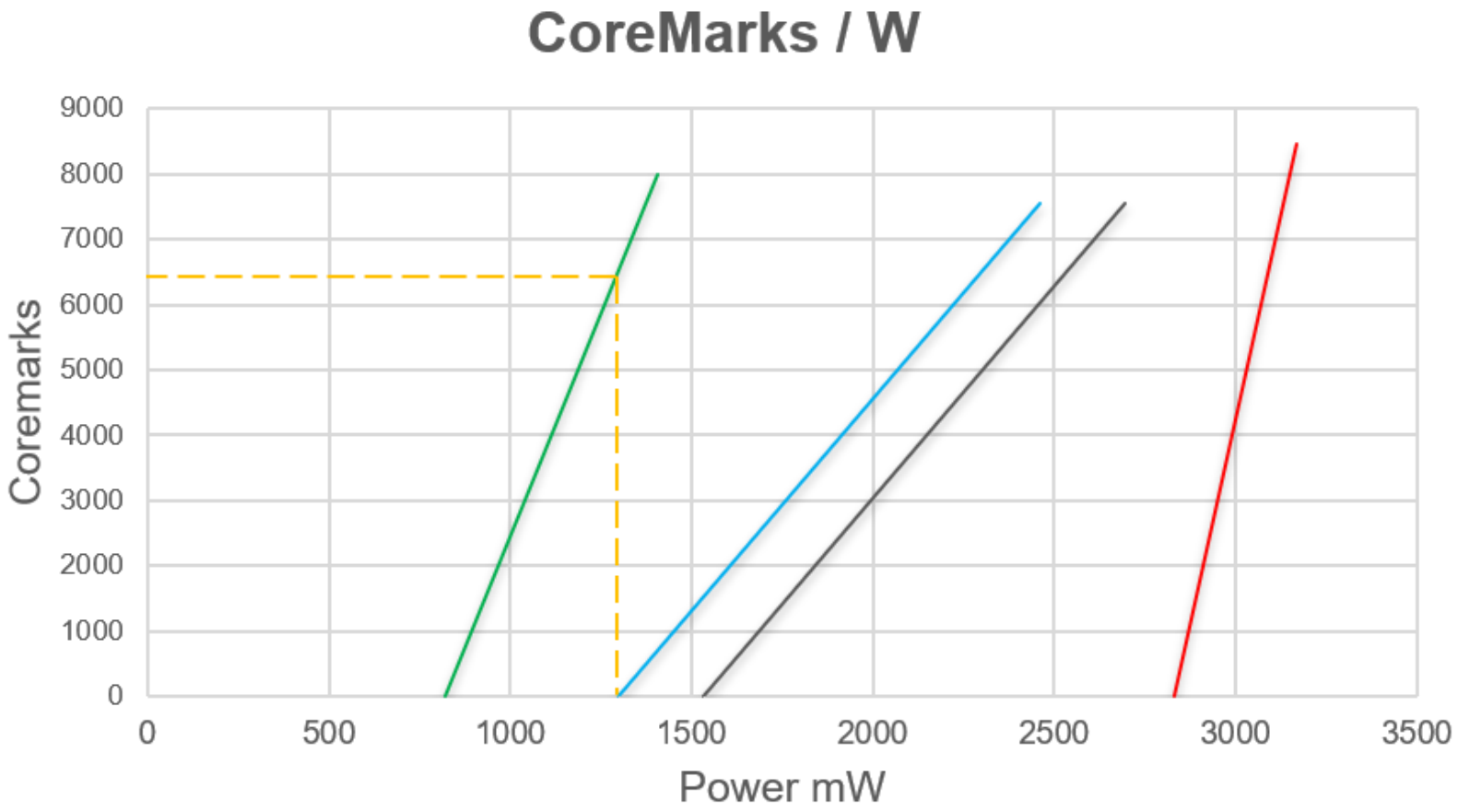
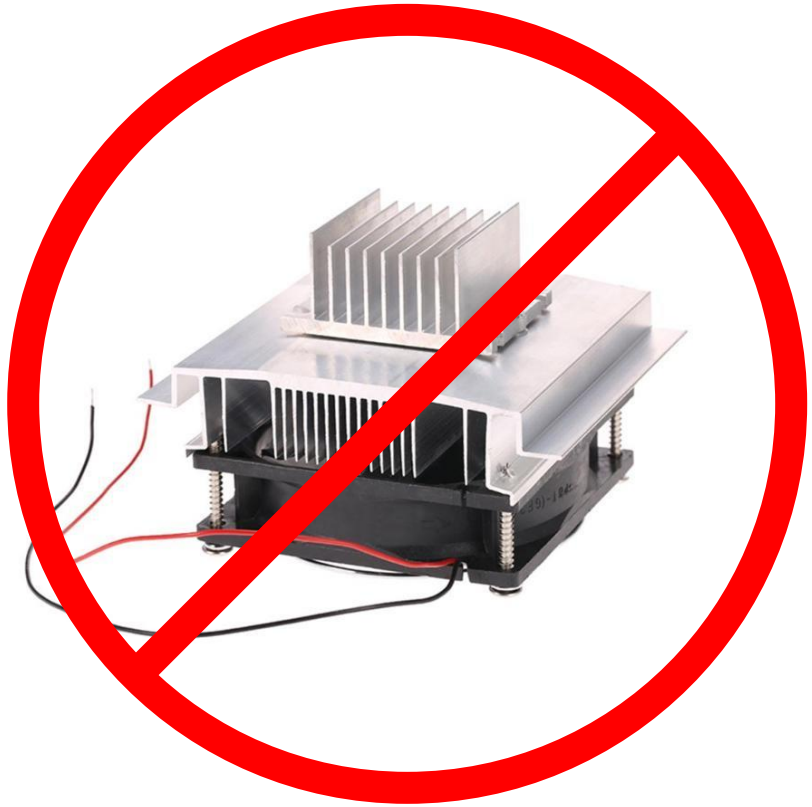
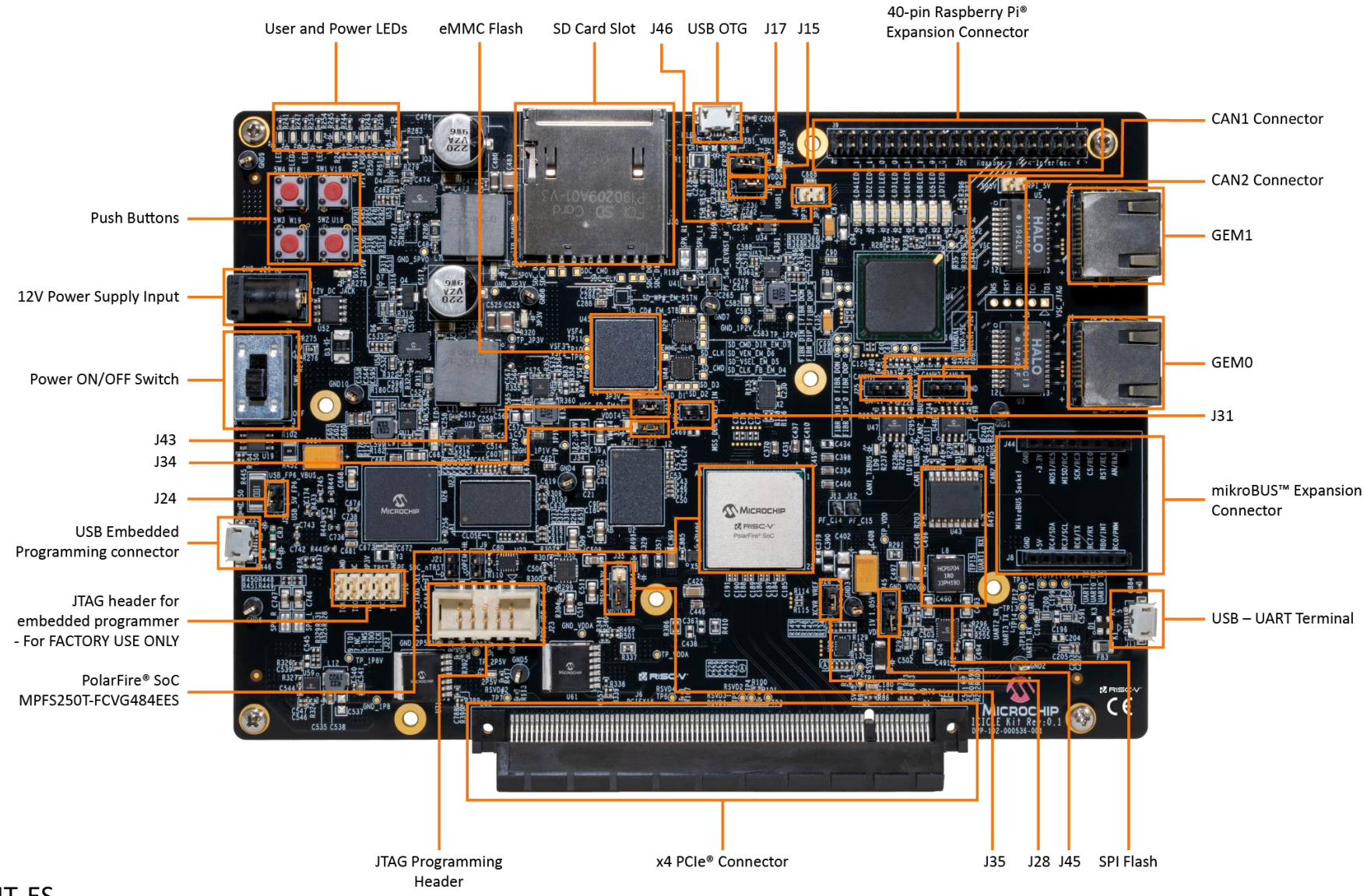
Market Leading Power efficiency





PolarFire SoC Icicle Kit



MPFS-ICICLE-KIT-ES
MSRP $489 – Shipping

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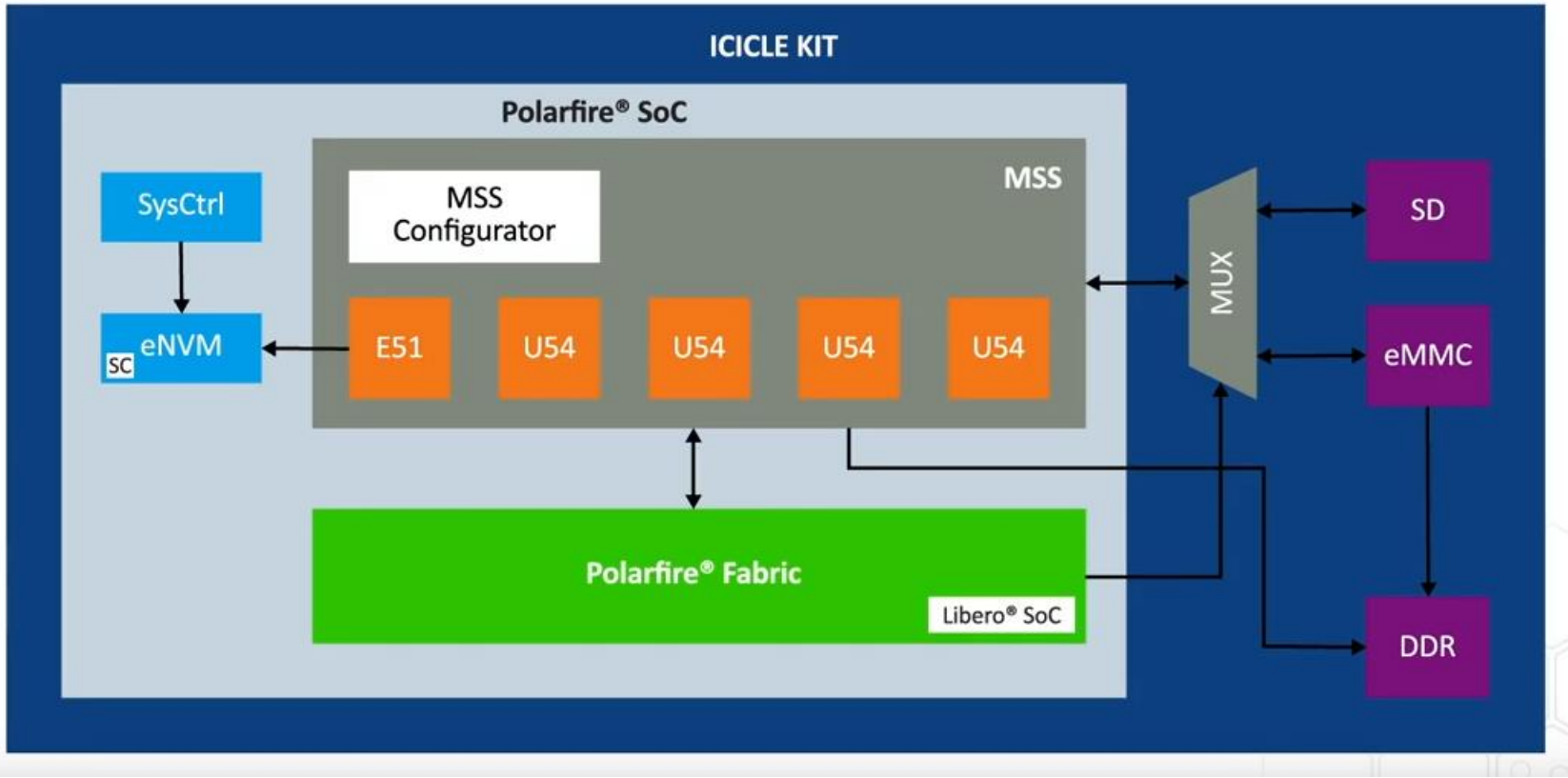
The Boot Process

- **eNVM contains Start up code - called Hart Software Services**

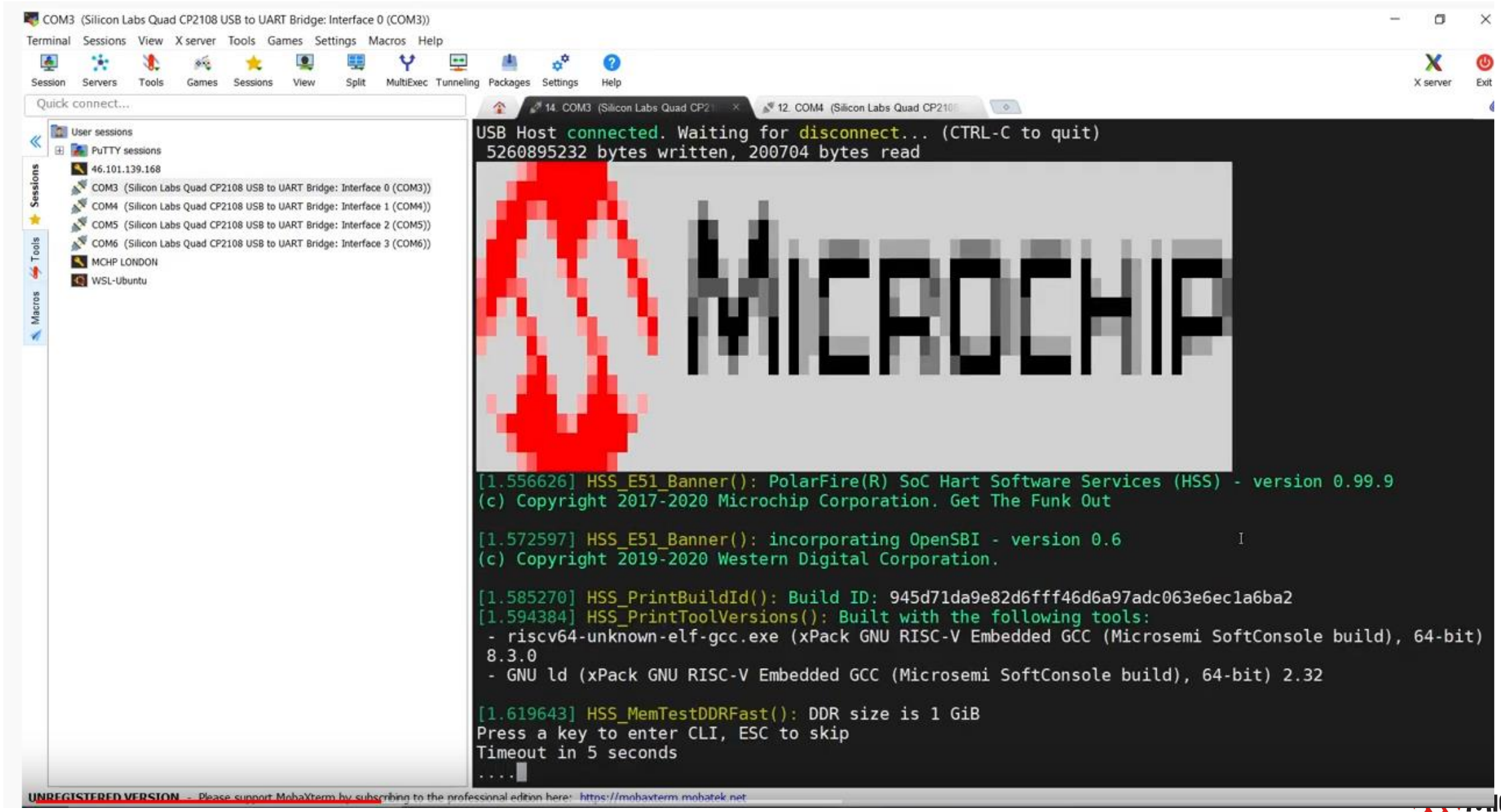


Cable Connections

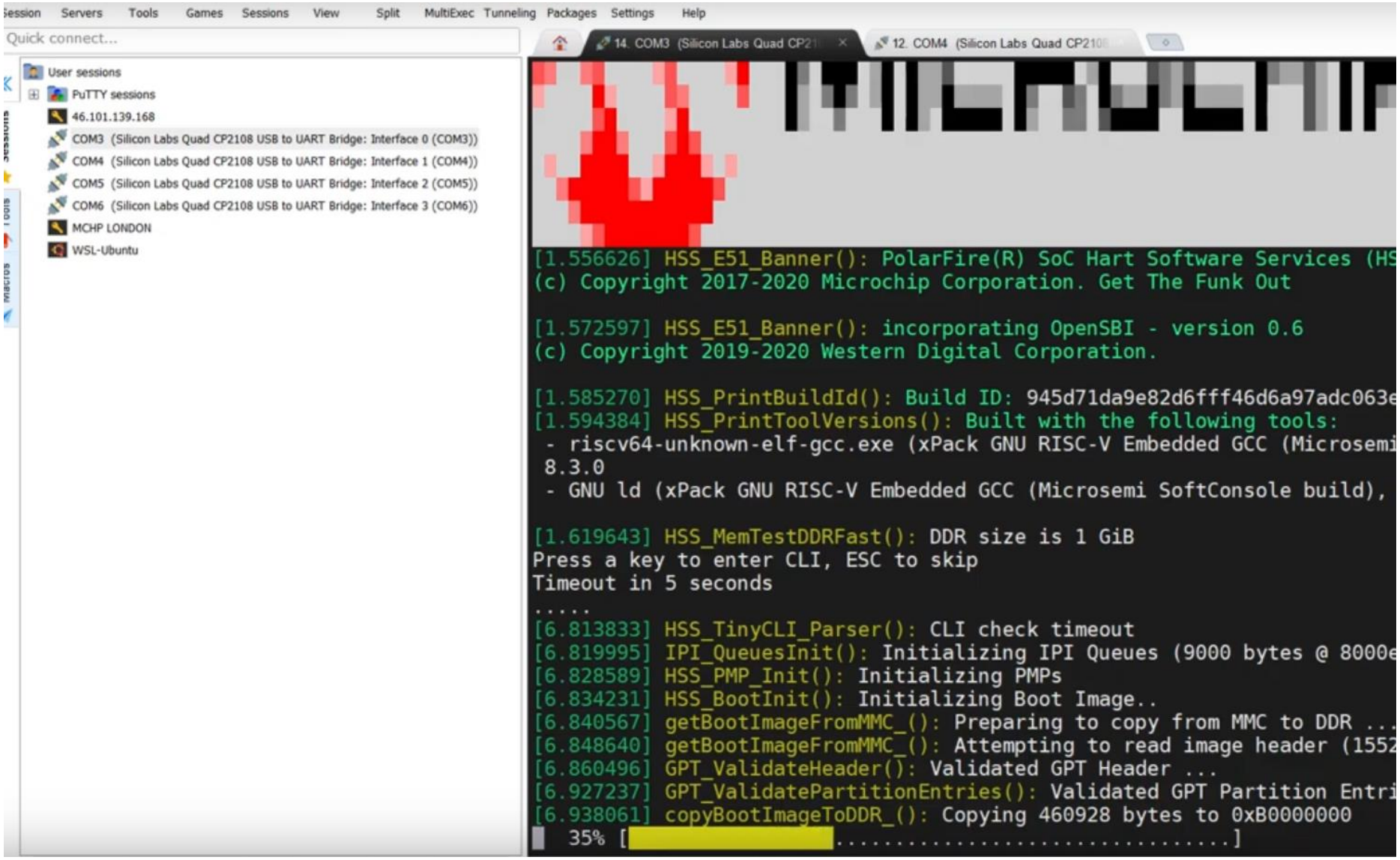
- **Com port 0 : Hart Software Services messages**
- **Com port 1 : Linux Boot messages**

115.2 k baud
No flow control
No parity

Com Port 0 = Hart Software Services Boot up



Copy U-boot from eMMC to DDR



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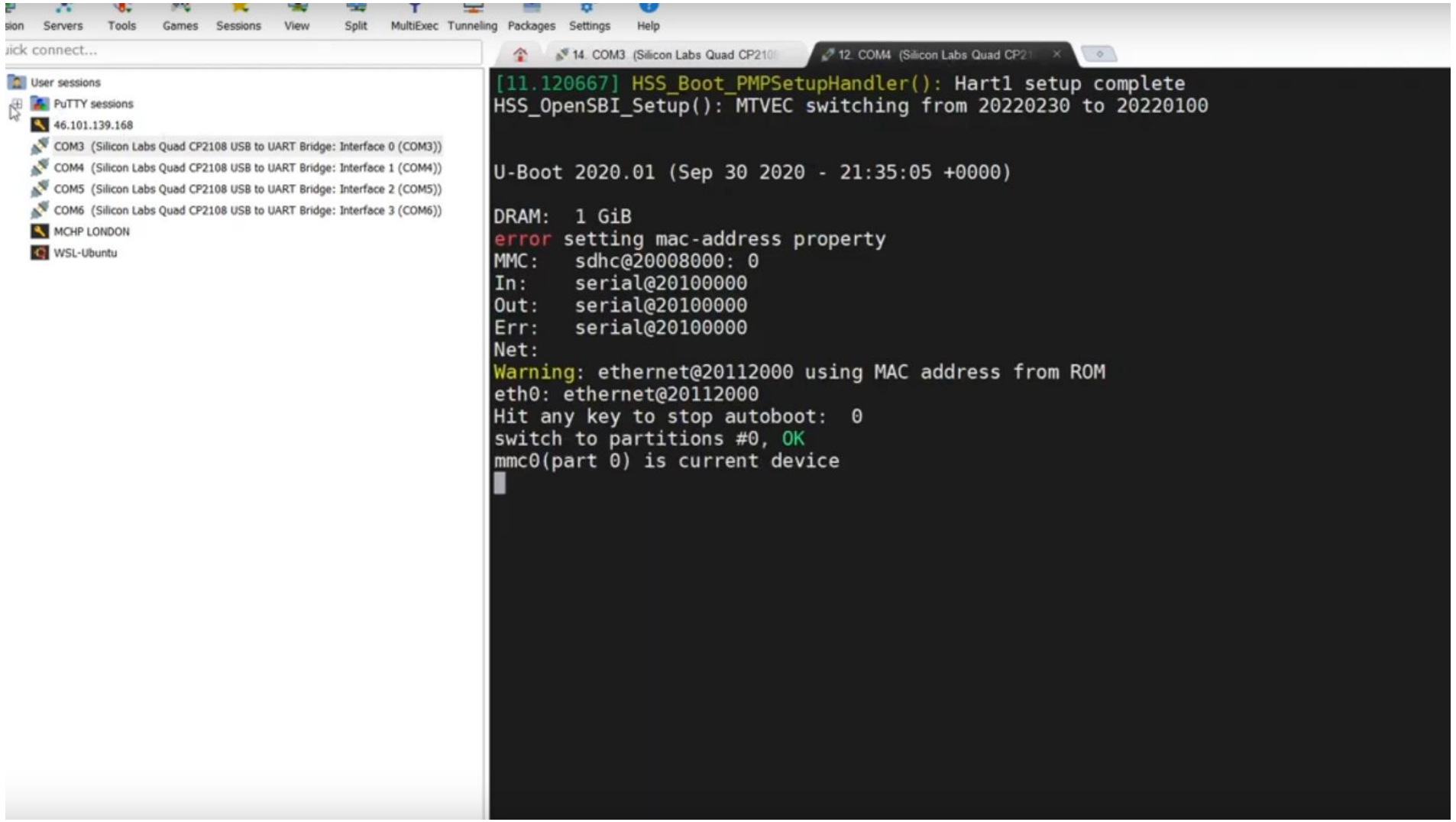
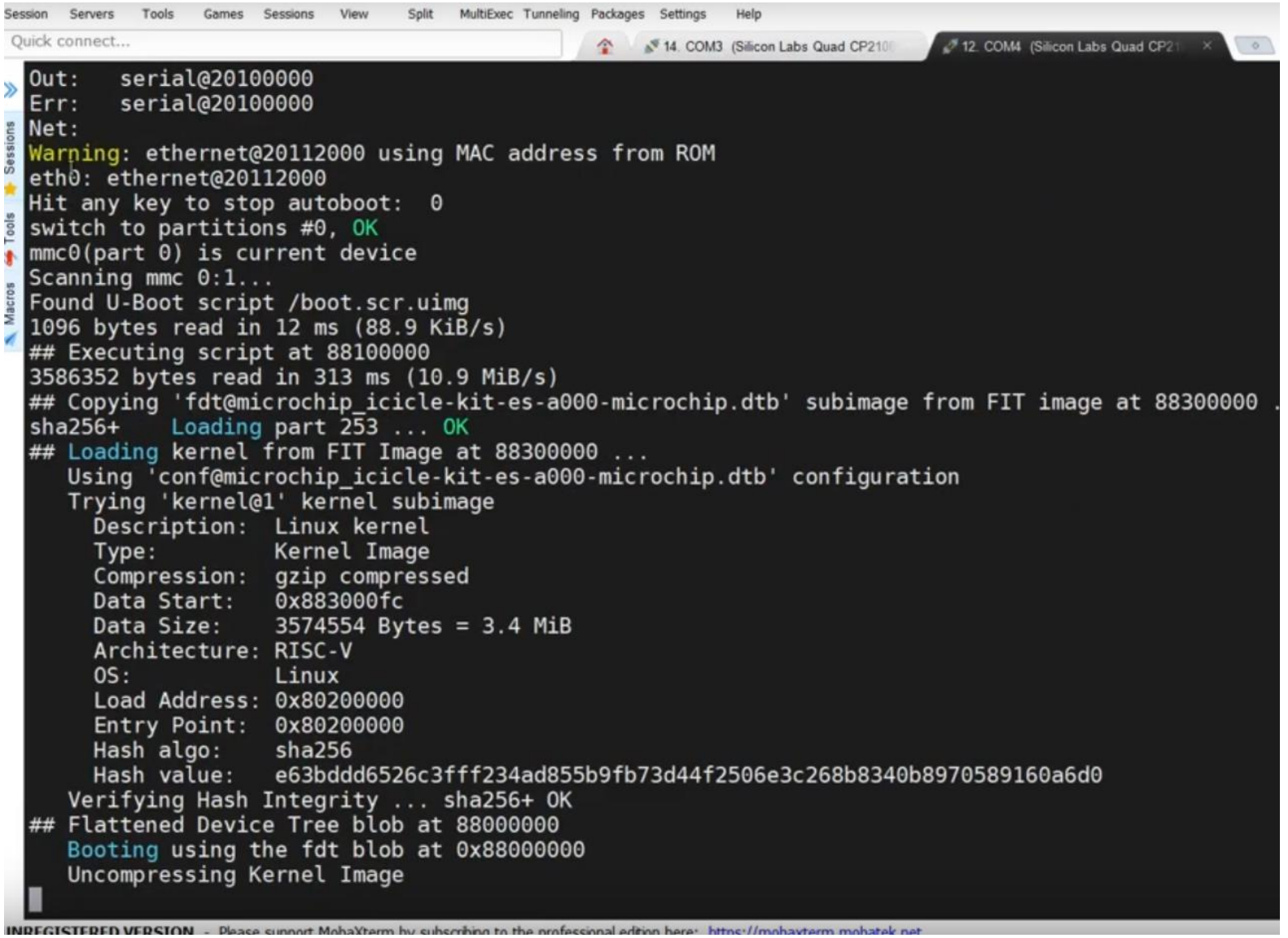
U boot running



Un compressing Linux Kernel



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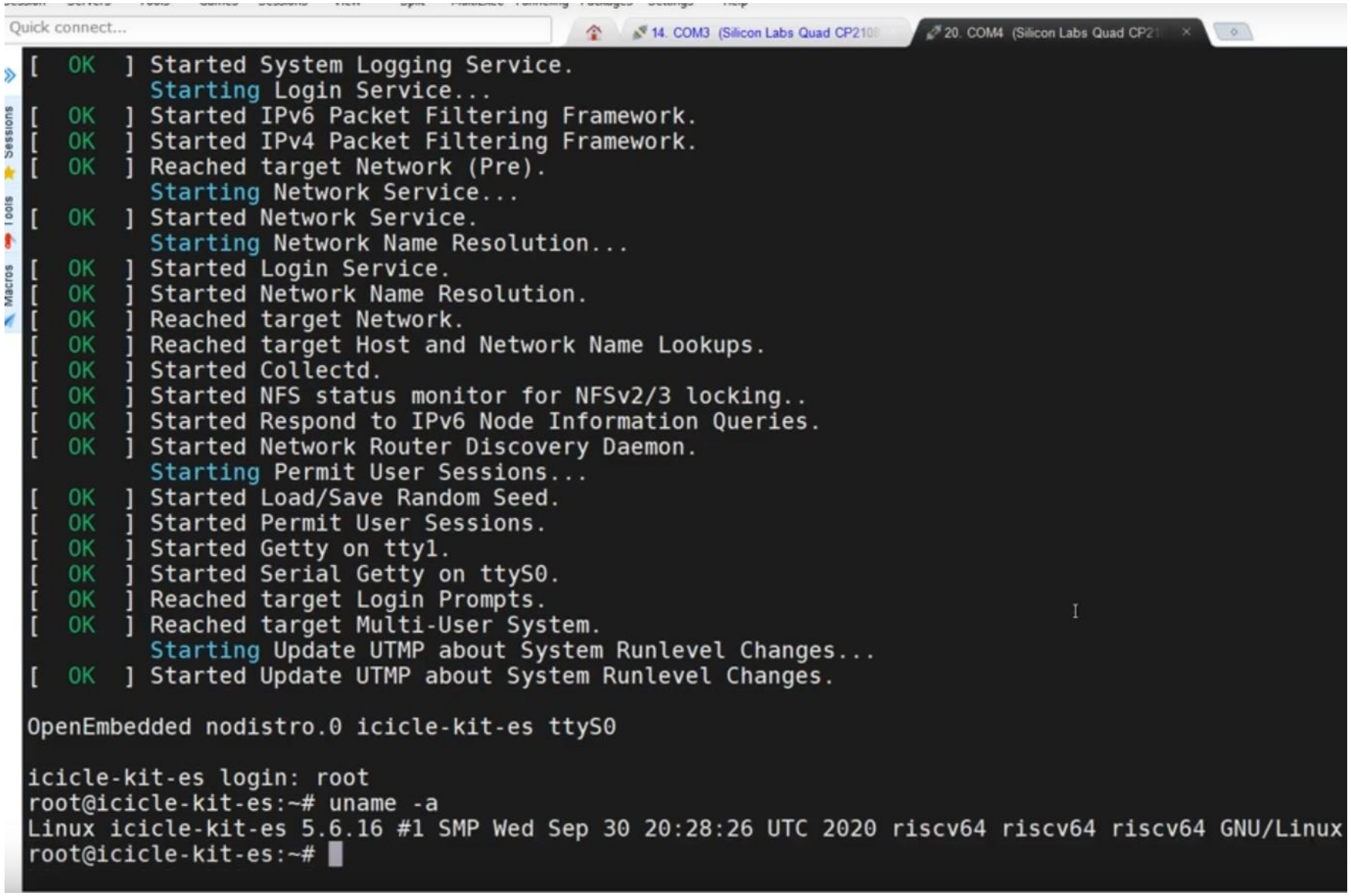
Linux booted



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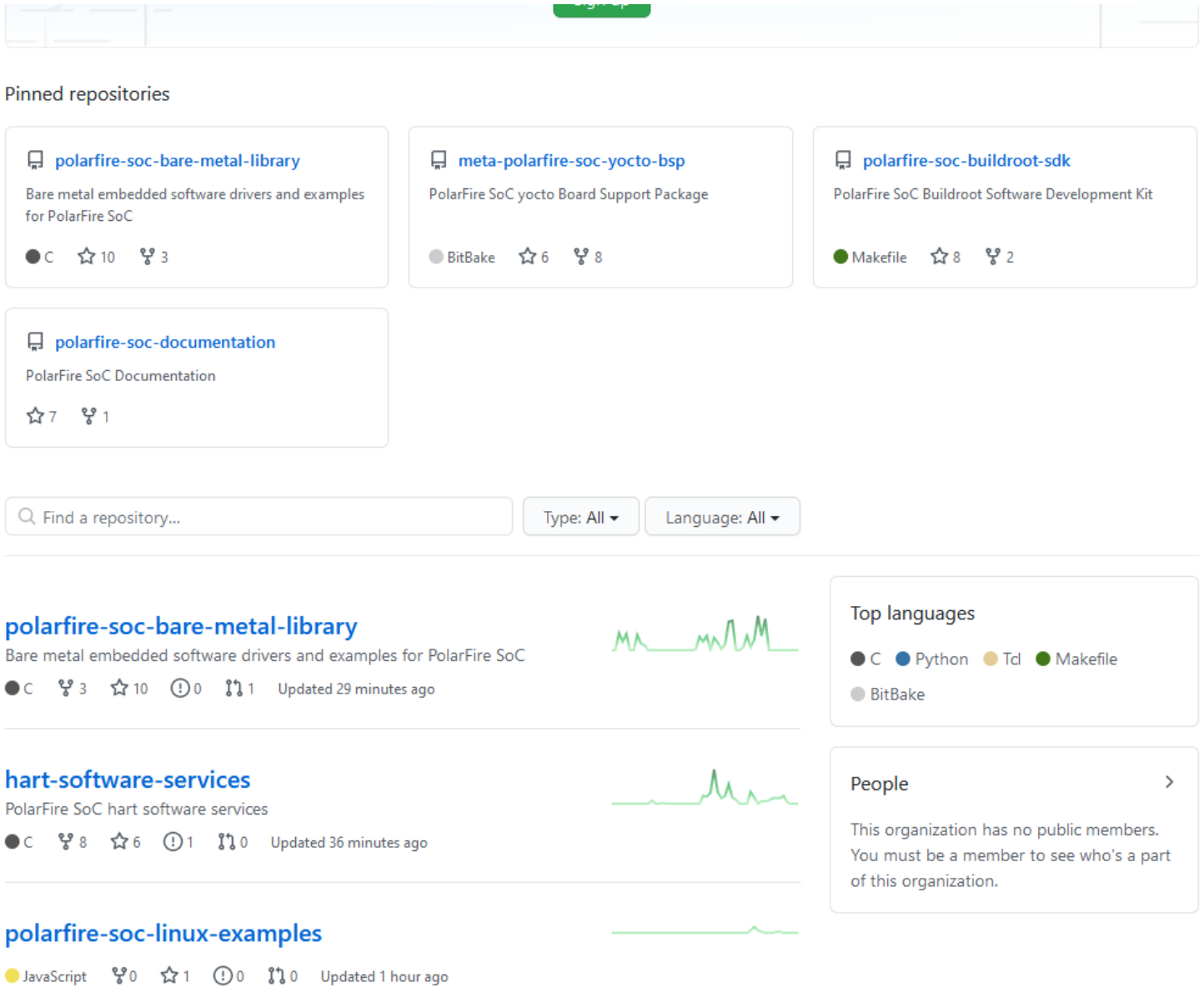
PolarFire Soc GitHub



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PolarFire SoC on the RISC-V exchange

- **New website to bring everything together**

RISC-V Exchange

The RISC-V Exchange provides a window into work that pec
software. This section of our website will grow as hardware

- **Available Boards** – see below
- **Available Cores & SoCs**
- **Available Software**
- **Available Books**

RISC-V Exchange: Avail

Site Feedback

Discussion about this site, its organization, how it works, and how we can improve it.

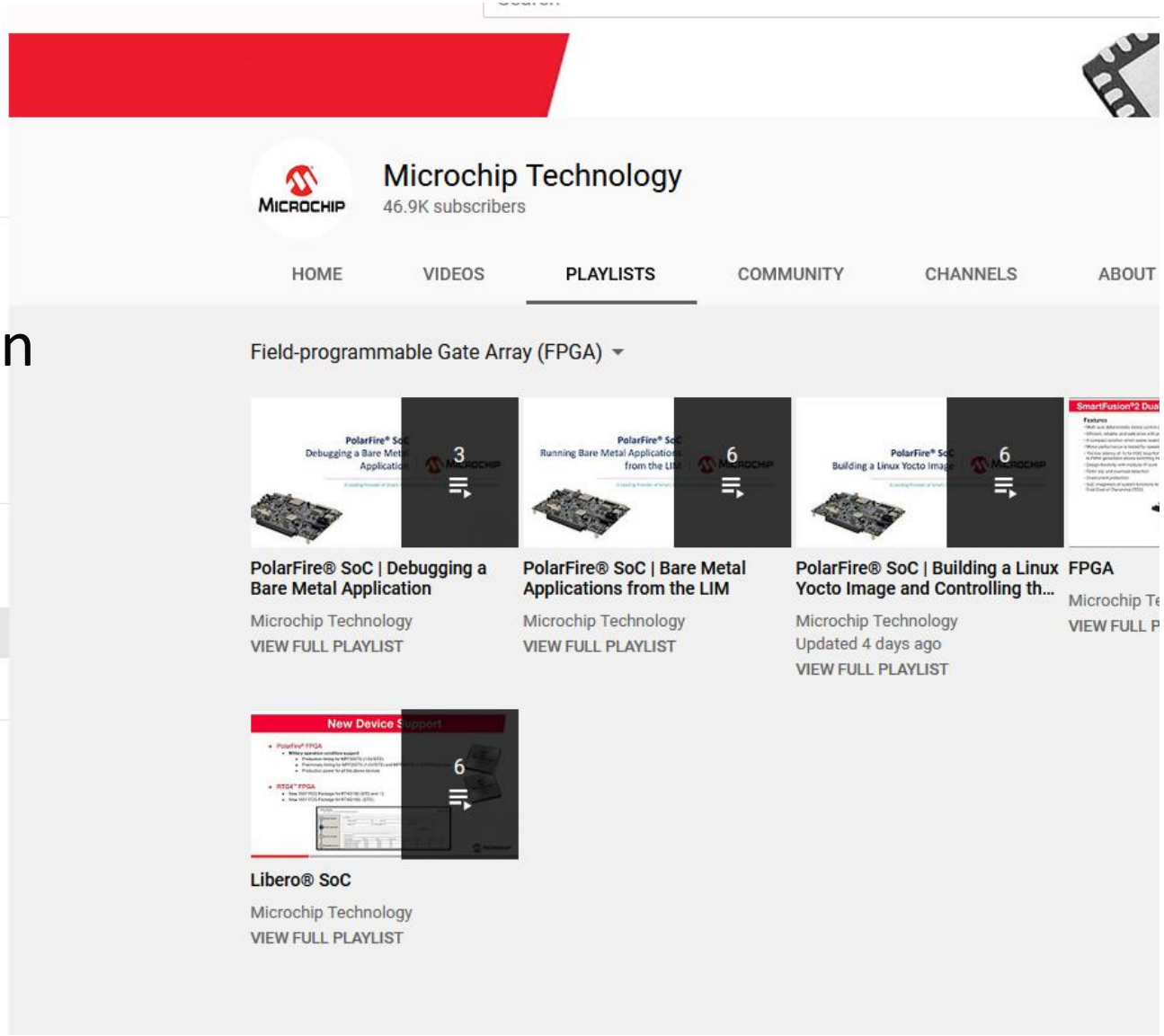
PolarFire SoC Icicle Kit

This is the place to discuss the PolarFire SoC icicle Kit. This category will be moderated by Microchip Engineers to help you on your way. Thanks for showing up and sharing with us.

- Yocto Project
- Buildroot Project
- PolarFire SoC Bare Metal Projects
- Restoring to Factory Defaults
- Hart Software Services
- General

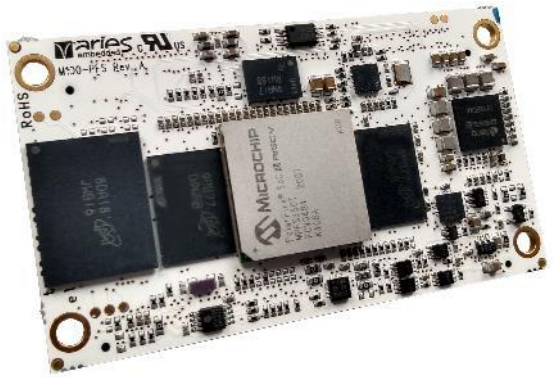
PolarFire SoC on YouTube

- **Playlists of 3-5 minute how-to videos**
  - 6 playlists by end of November
  - Debugging a bare metal application
    - Out of the box
    - Using the LIM
    - Using DDR
    - Adding a peripheral to the fabric
  - Build Linux using Yocto
    - Adding a peripheral to the fabric



System On Modules

Coming Soon



Aries Embedded

Trenz

https://www.crowdsupply.com/ali-uzel/savvy-v

Sundance DSP

https://www.crowdsupply.com/sundance-dsp/polarberry

Digitalcore

Mi-V Ecosystem Partners

Where to buy the Icicle Kit?

- **CrowdSupply**
  - https://www.crowdsupply.com/microchip/polarfire-soc-icicle-kit
- **Mouser**
  - https://www.mouser.com/new/microchip/microchip-polarfire-soc-icicle-kit/
- **Digi-key**
  - https://www.digikey.com/en/product-highlight/m/microchip-technology/mpfs-icicle-kit-es--polarfire-soc-fpga-icicle-kit
- **Arrow**
  - https://www.arrow.com/en/products/mpfs-icicle-kit-es/microsemi
- **Avnet**
  - https://www.avnet.com/wps/portal/silica/products/new-products/npi/2020/microchip-polarfire-soc/

PolarFire SoC – Best in Class!

- **PolarFire FPGA Award Winning Features**
  - 30-50% Lower power
  - Defense grade security
  - Exceptional reliability
  - Smallest, lowest power, secure form factors – 11x11, 16x16, 19x19

- **Plus Microprocessor Subsystem**
  - Linux and real time in a deterministic, coherent CPU cluster
  - 30-50% Lower power
  - Defense grade secure boot
  - Spectre/Meltdown immune
  - SECDED on all memories

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Important Links

- **PolarFire SoC:** www.microsemi.com/polarfiresoc
- **Solutions:** www.microsemi.com/polarfiresoc#getting-started
- **Icicle Kit:** www.microsemi.com/icicle
- **Software:**
  - MSS Configurator: https://www.microsemi.com/product-directory/soc-design-tools/5587-pfsoc-mss-configurator-tool
  - Libero SoC: www.microsemi.com/liberosoc
  - SoftConsole: www.microsemi.com/softconsole
- **Marketing Contact:** polarfiresoc@microchip.com
- **Tech support:** https://soc.microsemi.com/Portal/Default.aspx
- **Tech Videos:** https://www.youtube.com/c/MicrochipTech/playlists?view=50&sort=dd&shelf_id=4

Thank You!

PolarFire SoC Family

1st device

	Features	MPFS025T	MPFS095T	MPFS160T	MPFS250T	MPFS460T
FPGA Fabric	K Logic Elements (4LUT + DFF)	23	93	161	254	461
	Math Blocks (18x18 MACC)	68	292	498	784	1420
	LSRAM Blocks (20k bit)	84	308	520	812	1460
	uSRAM Blocks (64x12)	204	876	1494	2352	4260
	Total RAM Mbits	1.8	6.7	11.3	17.6	31.6
	uPROM Kbits	194	387	415	470	553
	User DLL's/PLL's	8 each	8 each	8 each	8 each	8 each
High Speed IO	250 Mbps to 12.5 Gbps SERDES Lanes	4	4	8	16	20
	PCIe Gen2 End Points/Root Ports	2	2	2	2	2
Total FPGA IO	HSIO+GPIO	108	276	312	372	468
Total MSS IO	MSS IO	136	136	136	136	136
MSS DDR DB	MSS DDR Data Bus	16	32	32	32	32
Packaging Commerical & Industrial RoHS	**Type/Size/Pitch**	**MSS IO / HSIO / GPIO / XCVRs**				
	FCSG325 (11x11, 11x14.5*, 0.5 mm)	102 / 32 / 48 / 2	102 / 32 / 48 / 2			
	FCSG536 (16x16, 0.5 mm)		136 / 60 / 108 / 4	136 / 60 / 108 / 4	136 / 60 / 108 / 4	
	FCVG484 (19x19, 0.8 mm)	136 / 60 / 48 / 4	136 / 60 / 84 / 4	136 / 60 / 84 / 4	136 / 60 / 84 / 4	
	FCVG784 (23x23, 0.8 mm)		136 / 144 / 132 / 4	136 / 144 / 168 / 8	136 / 144 / 180 / 8	
	FCG1152 (35x35, 1.0 mm)				136 / 144 / 228 / 16	136 / 180 / 288 / 20

Extended Commercial (0ºC-100ºC) and Industrial (-40ºC-100ºC) Temperature Support for all Die Package Combinations - RoHS only

Additional Temp Grade: Military (-55ºC-125ºC) - Leaded packages only

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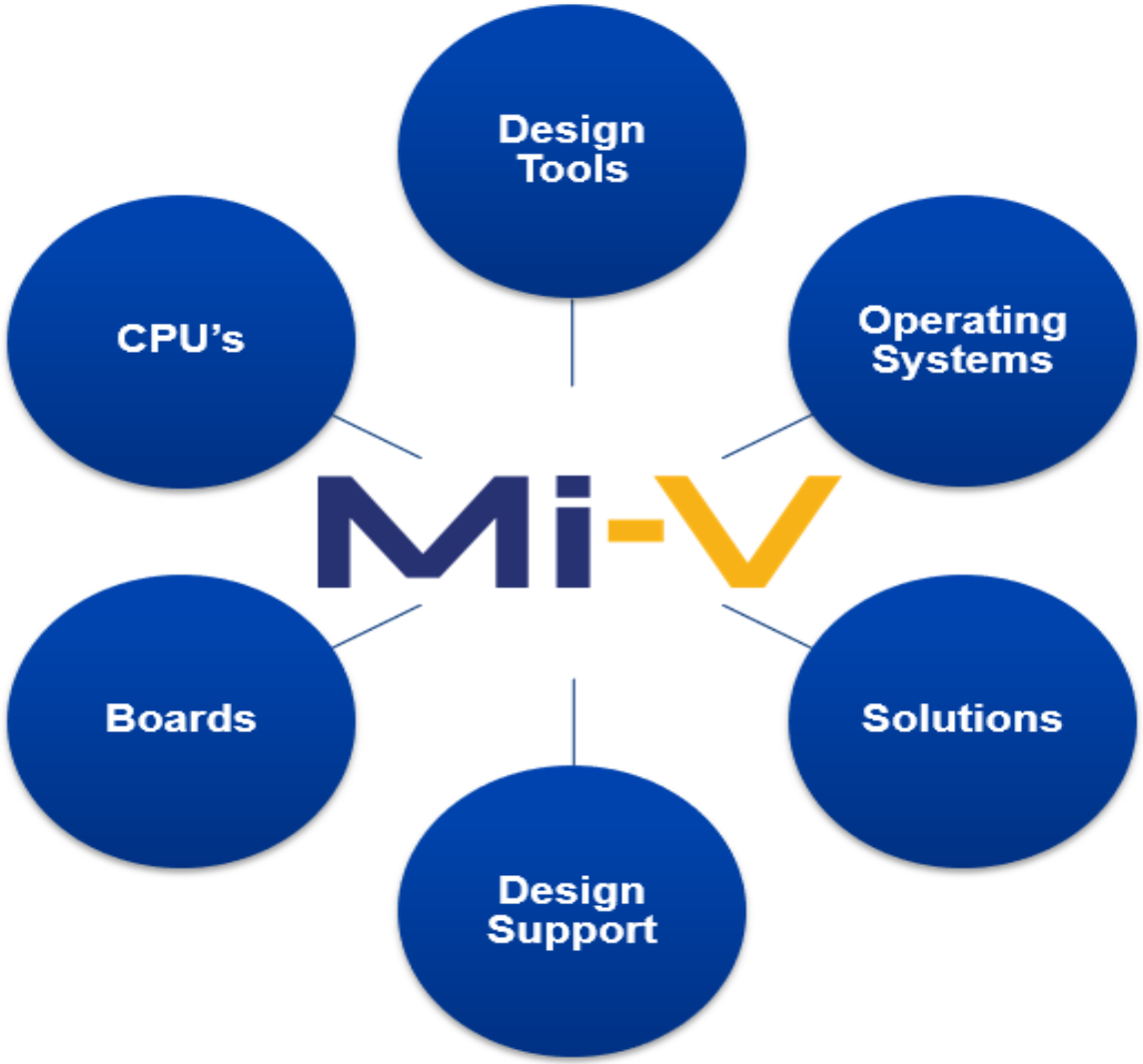
Microchip's Mi-V Ecosystem

A Leading Provider of RISC-V Based Solutions



Microchip's Comprehensive Ecosystem to Support RISC-V Development

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Mi-V Development Tools

IAR SYSTEMS

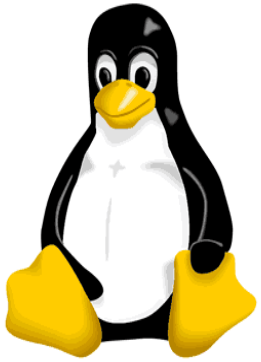
Green Hills® SOFTWARE

MULTI®

C/C++ support
ADA support on demand

AdaCore

Mi-V Operating System Support



Linux

yocto PROJECT

BuildRoot
Making Embedded Linux Easy

FreeBSD

Covers 99% of the embedded rich OS market

Mi-V Commercial Real Time Operating Systems

Mentor® A Siemens Business

BSP Available

WIND™

BSP Available

THREADX

Azure RTOS ThreadX

Micrium® Embedded Software

Covers >90% of the market

MICROCHIP

Mi-V Open Source 64-bit RTOS

amazon

Mi-V Middleware Solutions

Veridify Security

wolfSSL

MultiZone Security for RISC-V

0x5

HEX-Five™

Microchip