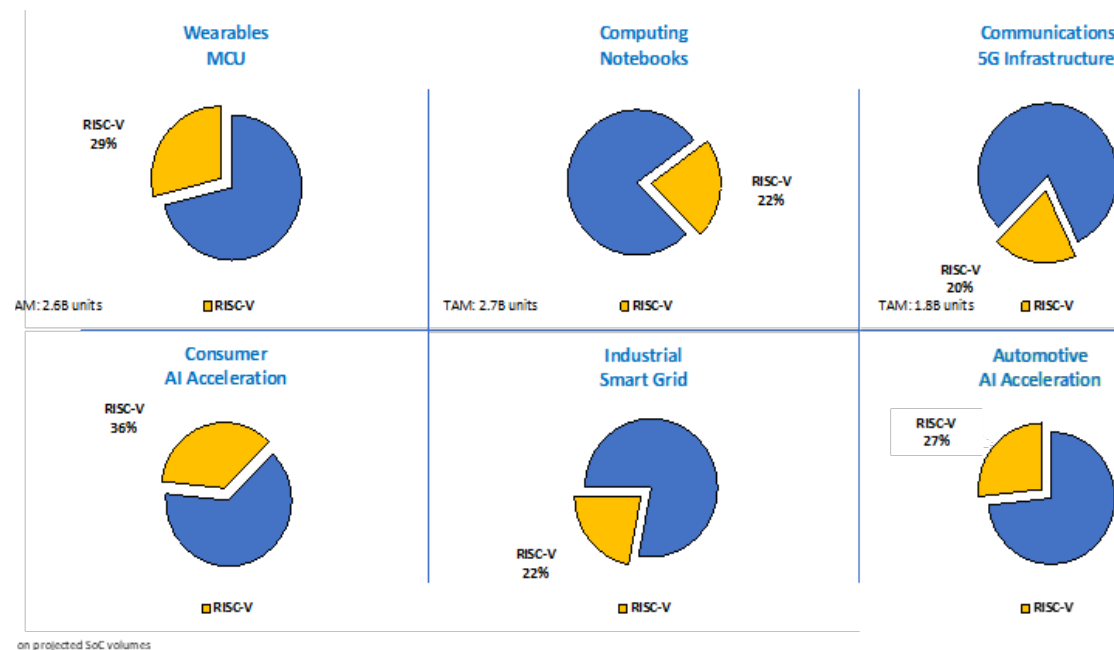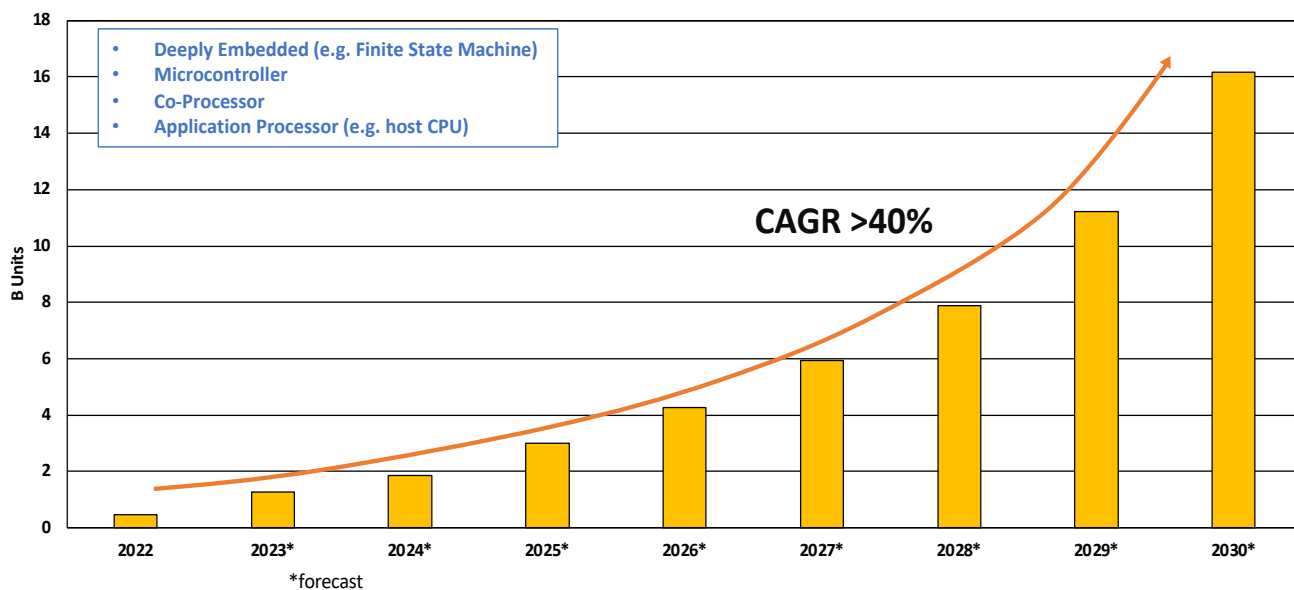# RISC-V Market Analysis Report: Application Forecasts in a Heterogeneous World

Presented by The SHD Group:

**Principal Analyst
Richard Wawrzyniak
r.wawrzyniak@theshdgroup.com**

**RISC-V International Summit
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RISC-V Projected to be in Billions of Devices, Gaining Significant Market Penetration

- Deeply Embedded (e.g. Finite State Machine)
- Microcontroller
- Co-Processor
- Application Processor (e.g. host CPU)

CAGR >40%

*forecast

B Units

2022 2023* 2024* 2025* 2026* 2027* 2028* 2029* 2030*

Wearables MCU
RISC-V 29%
AM: 2.6B units
RISC-V

Computing Notebooks
RISC-V 22%
TAM: 2.7B units
RISC-V

Communications 5G Infrastructure
RISC-V 20%
TAM: 1.8B units
RISC-V

Consumer AI Acceleration
RISC-V 36%
RISC-V

Industrial Smart Grid
RISC-V 22%
RISC-V

Automotive AI Acceleration
RISC-V 27%
RISC-V

on projected SoC volumes

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RISC-V Gaining Ground in Many Markets

Datacenter - AI Accelerator
MTIA: Meta Training and Inference Accelerator

- RISC-V via Andes AX25-V100
- Custom extensions: for new interfaces, instructions and registers

Figure 3: High-level architecture of the accelerator

Courtesy of ISCA & Meta
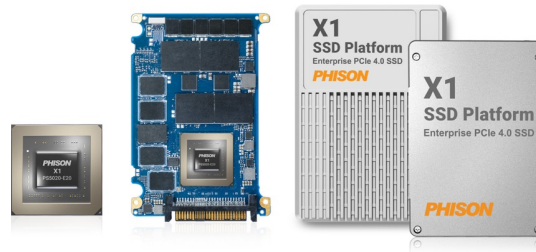
MCU - Consumer
Renesas Voice-Control ASSP Solution

- RISC-V via Andes D25F

RISC-V MCU Turnkey Voice HMI Solution

Enterprise Storage – Computing
Phison X1 Enterprise Storage

- RISC-V via Andes N25F with custom extensions
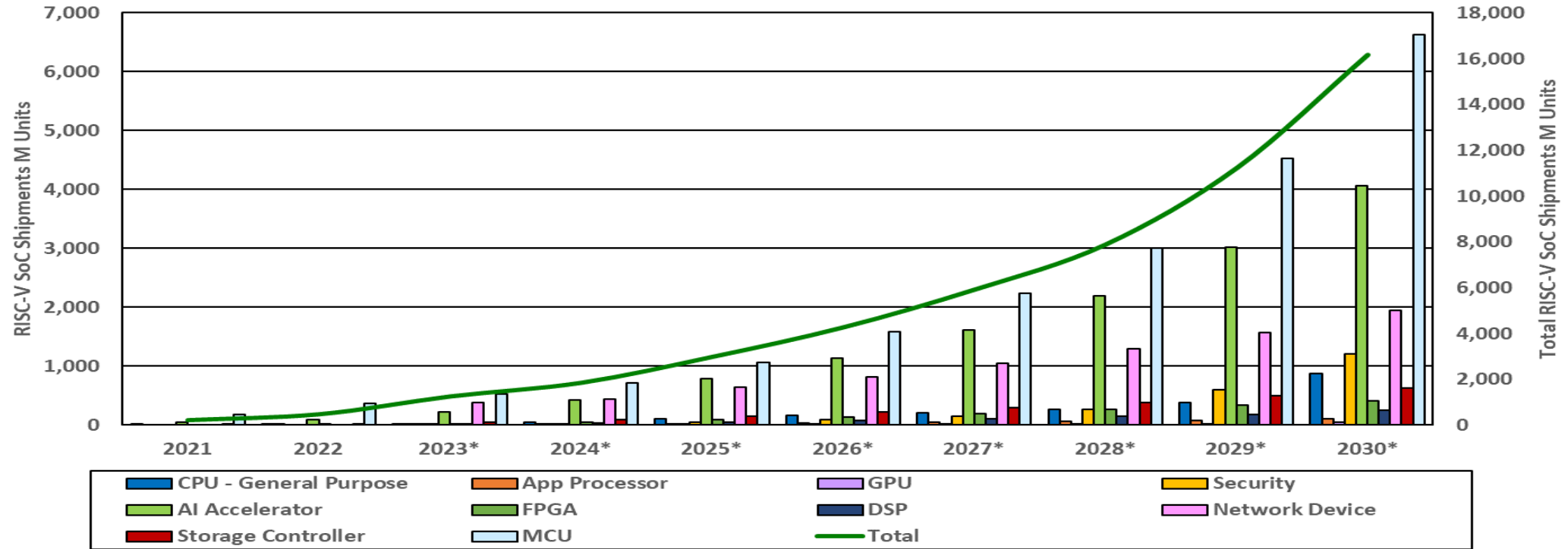- For AI, HPC, and Hyperscale Datacenters

Courtesy of Andes Technology

Application Processor – Edge Computing
Renesas RZ/Five Single Board Computer

- RISC-V via Andes AX45MP
- Supporting Linux Debian and Yocto distro

Courtesy of Renesas & Asus

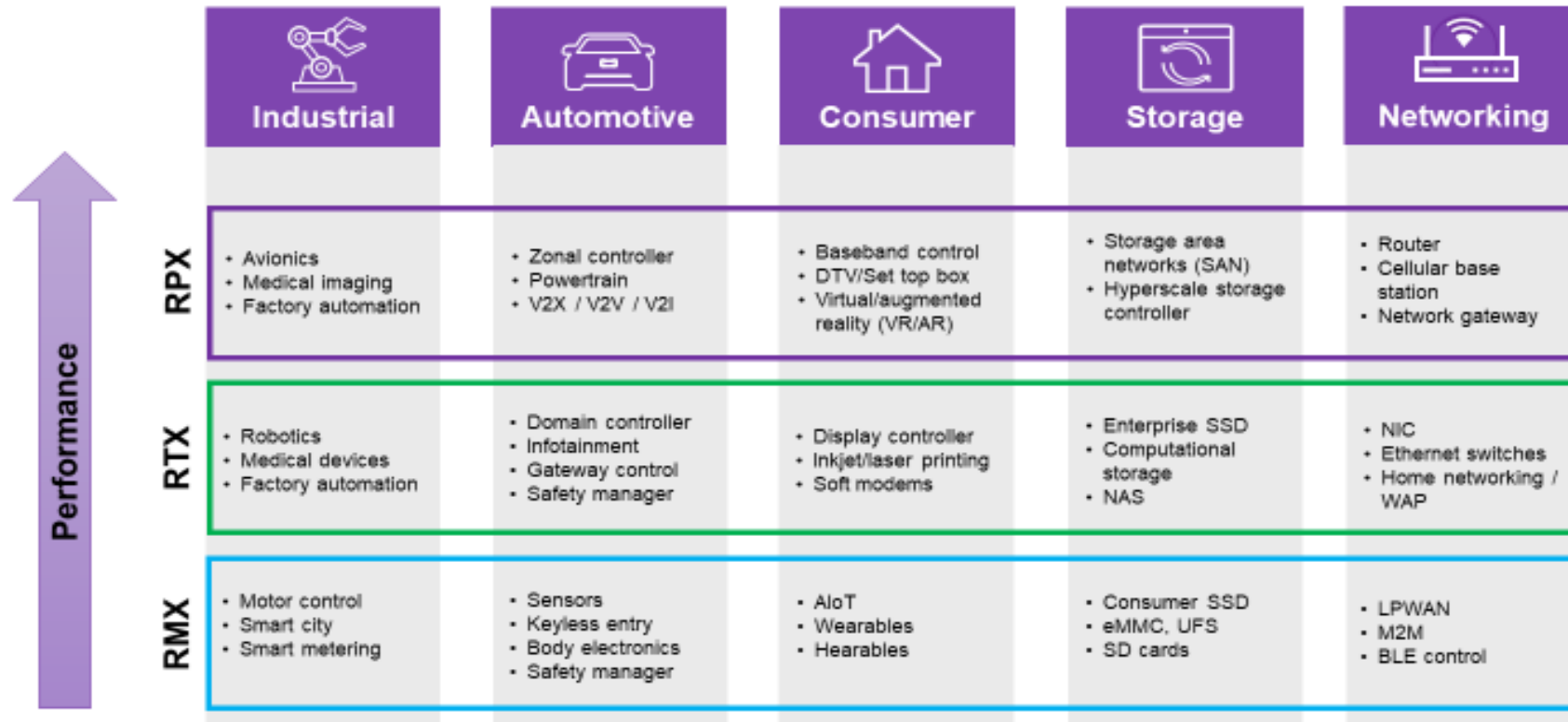the SHDgroup

RISC-V SoC Unit Shipment Projection

Forecast*

Source: The SHD Group November 2023

- We project the primary unit growth drivers for RISC-V will be MCU and AI Acceleration
- We believe applications based on LLMs and other new AI models will provide a stellar growth opportunity for new silicon.
- It is likely this type of application will require specialized silicon with the goal being to run on end-point ("edge") devices.
- This results in a re-invigoration of declining applications like Desktop PC and accelerates others into new upgrade cycles.

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New Companies are Entering the RISC-V Ecosystem

ARC-V Processor IP Targets Broad Range of Applications

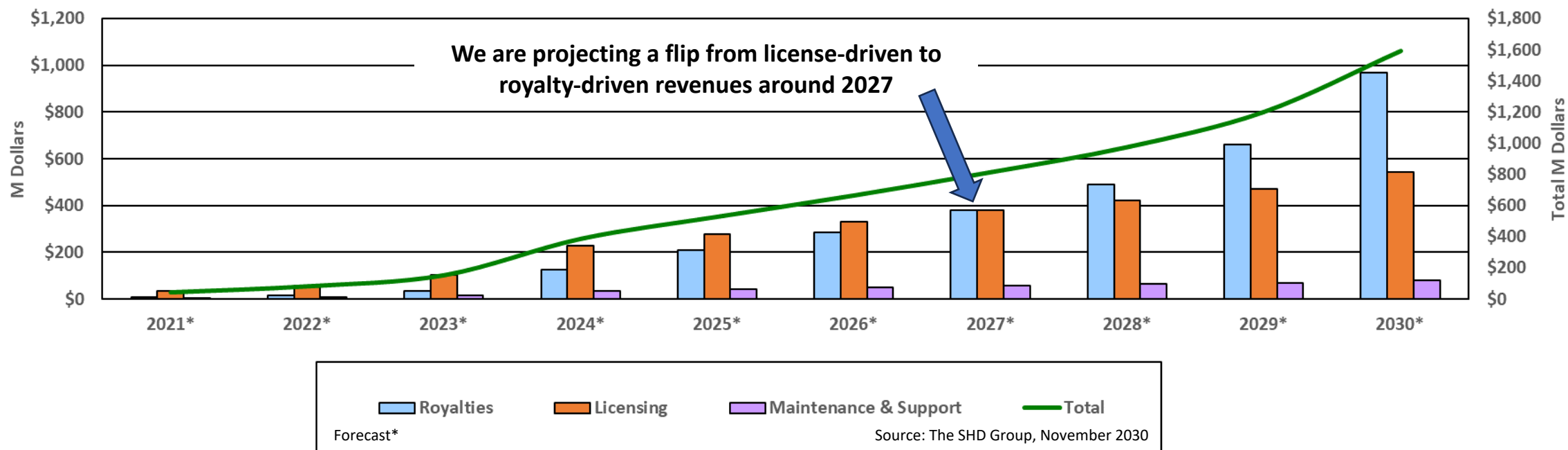|	Industrial	Automotive	Consumer	Storage	Networking
RPX	• Avionics • Medical imaging • Factory automation	• Zonal controller • Powertrain • V2X / V2V / V2I	• Baseband control • DTV/Set top box • Virtual/augmented reality (VR/AR)	• Storage area networks (SAN) • Hyperscale storage controller	• Router • Cellular base station • Network gateway
RTX	• Robotics • Medical devices • Factory automation	• Domain controller • Infotainment • Gateway control • Safety manager	• Display controller • Inkjet/laser printing • Soft modems	• Enterprise SSD • Computational storage • NAS	• NIC • Ethernet switches • Home networking / WAP
RMX	• Motor control • Smart city • Smart metering	• Sensors • Keyless entry • Body electronics • Safety manager	• AIoT • Wearables • Hearables	• Consumer SSD • eMMC, UFS • SD cards	• LPWAN • M2M • BLE control

Performance →

SYNOPSYS

Courtesy of Synopsys

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RISC-V Penetration by Functionality, by Revenue

- **RISC-V can be included in SoCs to perform one of more functions:**
  - Deeply embedded / FSM, MCU, CoProcessor, Apps processor
- **Numbers are indicative of how RISC-V is being adapted different functions**
- **These numbers are not additive since a part could have more than one of these resident**

Legend: Application Processor (e.g. Host CPU) — MCU — CoProcessor — deeply embedded (e.g. FSM)

Y-axis: RISC-V Functionality Penetration by Revenue (0% – 12%)

X-axis: 2021, 2022, 2023*, 2024*, 2025*, 2026*, 2027*, 2028*, 2029*, 2030*

Forecast*

Source: The SHD Group, November 2023

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RISC-V IP Market Revenues to Grow

We are projecting a flip from license-driven to royalty-driven revenues around 2027

Royalties ▢ Licensing ▢ Maintenance & Support ▢ Total ▬

Forecast*

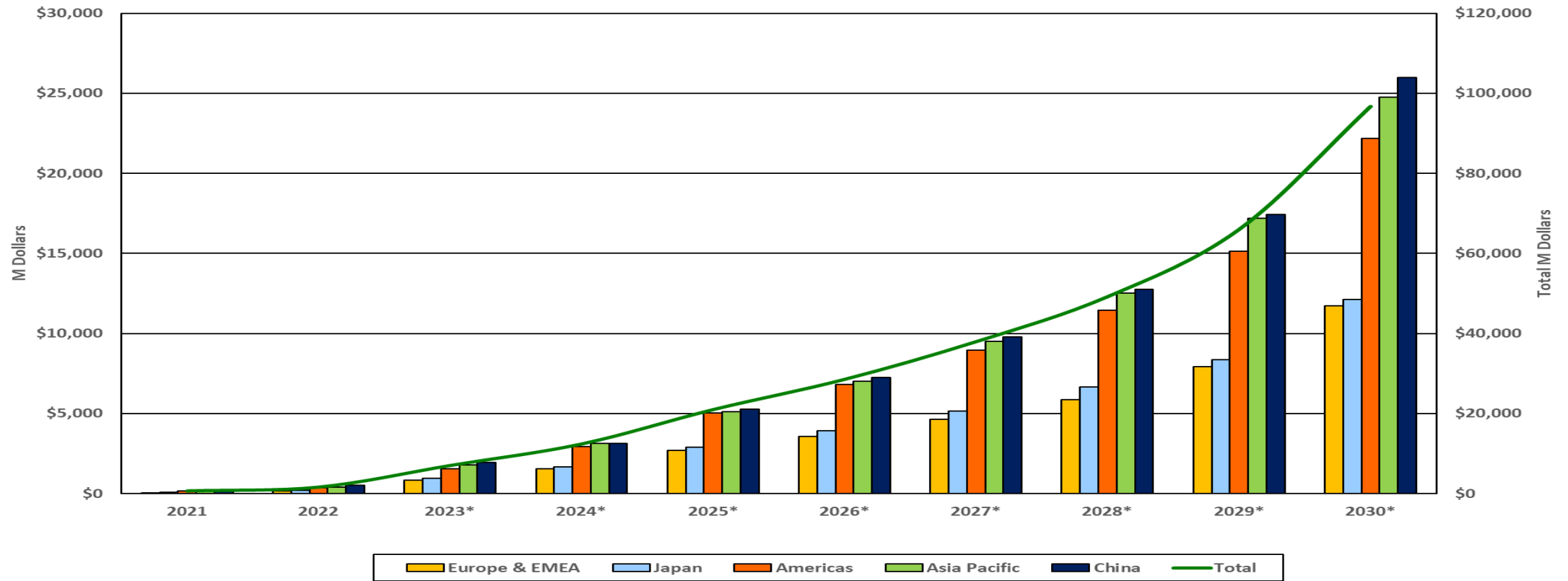Source: The SHD Group, November 2030

RISC-V vendors in shipping SoCs
- Andes Technology
- Codasip
- DIY (home grown RISC-V)
- SiFive
- T-Head

New sources of RISC-V IP expanding the market
- Imagination Technologies
- Synopsys
- Tenstorrent
- Ventana Microsystems
- others

We estimate Andes currently has over 30% SOM by unit volume

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RISC-V SoC Revenues on a Regional Basis

Forecast*

Source: The SHD Group November 2023

On a regional basis, China is likely to see the greatest expansion of RISC-V SoCs, followed by Asia Pacific and the Americas

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Summary

1. **In a heterogeneous SoC world, we expect multiple ISA's in many parts with different RISC-V cores for a variety of functions:**
   o deeply embedded, MCU, CoProcessor and Applications Processor (e.g. host)

2. **By 2030, we project that RISC-V will:**
   o Experience a >40% CAGR in unit shipments
   o See chip revenues achieve almost $100B
   o Deliver IP revenues in the area of $1.6B
   o Achieve nearly 25% penetration of the overall SoC market

3. **RISC-V adoption is projected to be highest in Consumer applications followed closely by Computer through 2030**
   o In the mid-term, a significant volume driver for RISC-V in the Computer market is likely to be SSD/flash.
   o Penetration of RISC-V into Data Center and other higher end applications is just starting and will begin accelerating around 2025

4. **RISC-V CPU IP vendors continue to increase performance every year bringing higher-end applications into range**

5. **Chiplets are not directly factored into this analysis, but this emerging technology represents another growth enabler for RISC-V-based products**

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A Word About This New Report

- **Thanks to sponsorships from leaders in the RISC-V industry,** *a free version of this report* **will be openly distributed and available to thousands of interested readers**
    - The full version of this report (appx. 200 pages) will be available to sponsors and for sale to others in the future

- **Both versions will include a** *RISC-V Ecosystem Directory*
    - This will include information from sponsors and other companies wishing to participate
    - We welcome and encourage any companies in the RISC-V ecosystem to complete an online Company Profile by visiting our website at: **https://theshdgroup.com** to be included in the directory

- **Limited sponsorships openings are still available**
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Thank you all for your time and attention

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