晶心科技

法人說明會
報告

張弘毅

發言人

113年3月4日

投資安全聲明

除本文包含的歷史資訊外，本演示文稿中涉及的事項均為前瞻性陳述，涉及某些可能導致實際結果出現重大差異的風險和不確定性，包括但不限於天氣、競爭產品和定價的影響、半導體產品供需的全行業變化、快速的技術變革、半導體行業週期、 和一般經濟狀況。

除法律要求外，晶心不承擔因新資訊、未來事件或其他原因而更新任何前瞻性陳述的義務。

報告標題

- 晶心公司簡介
- 財務與經營狀況
- 關鍵應用與趨勢
- 研發暨技術能量

晶心科技公司簡介

晶心亮點

- 2005年3月設立於台灣新竹科學園區。
- 根基穩健的高科技上市公司。
- 員工人數超過500人；80%為工程師。
- 獲得TSMC 2015年新的 IP OIP Award 。
- 晉升為RISC-V國際聯盟(前身為RISC-V基金會) 首席會員。 (2020)
- 獲得AI Global Media頒發「2020年最傑出嵌入式處理器IP供應商」。
- EE Awards亞洲金選獎 -「Taiwan 產品獎」,「Asia 企業獎」(2021)
- 2023亞太區 前五百大高成長企業

晶心任務

- 創新架構高效能/低功耗嵌入式處理器。

晶心利基

- 智能及環保之電子設備
- 雲端應用,人工智慧及物聯網

晶心科技公司現況

晶心科技指標性資訊

19 Years
Pureplay CPU vendor

500+
Employee , > 80% R&D

400+ Customers
Licensing AndesCore™

14Bn+ SoC
Total Customer Shipment

2023年營運數字

Revenue $ Growth
1.04 Bn, NT$
13.5% YoY

License $ Growth
18.3% YoY

Royalty $ Growth
-1.2% YoY

SoC Shipping Q'ty
2.1Bn

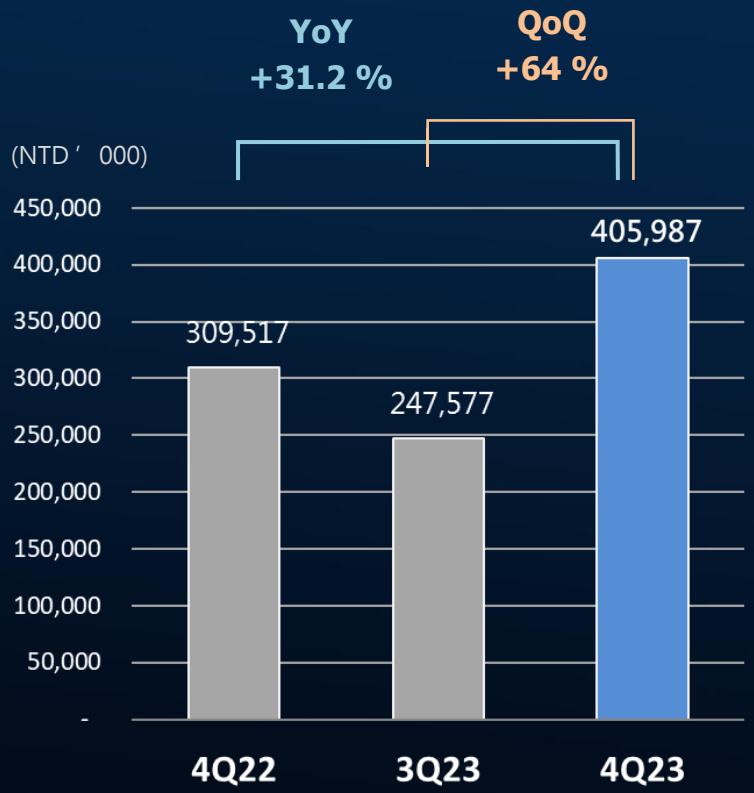
晶心科技參與RISC-V International (RVI) 組織的工作

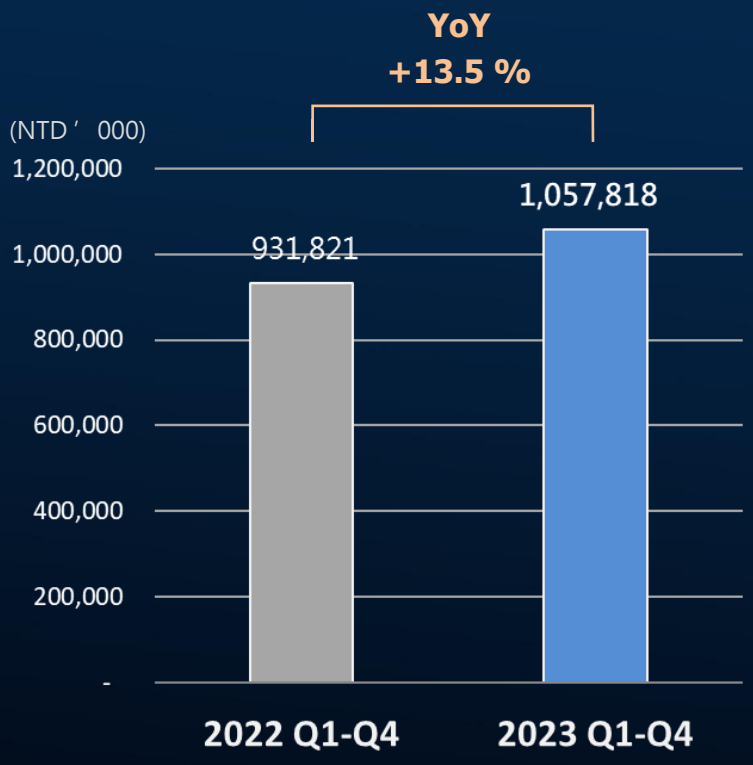
Founding & Premier Member from 2016

- Board of Directors
- Technical Steering Committee
- Chairs/Co-Chairs of Task Groups
- Ambassador

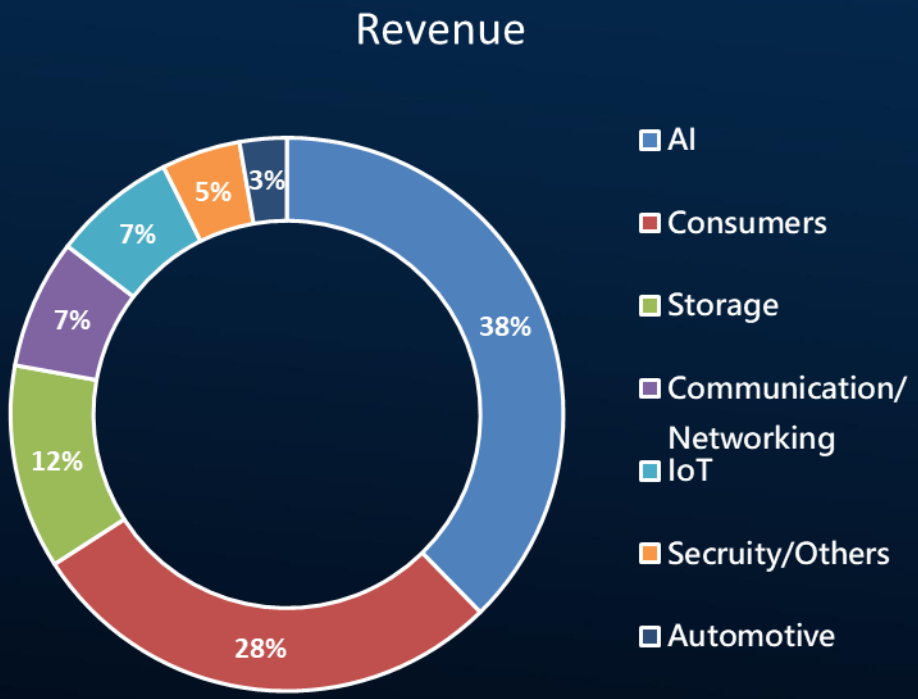
財務與經營狀況

4Q23 整體營收分析

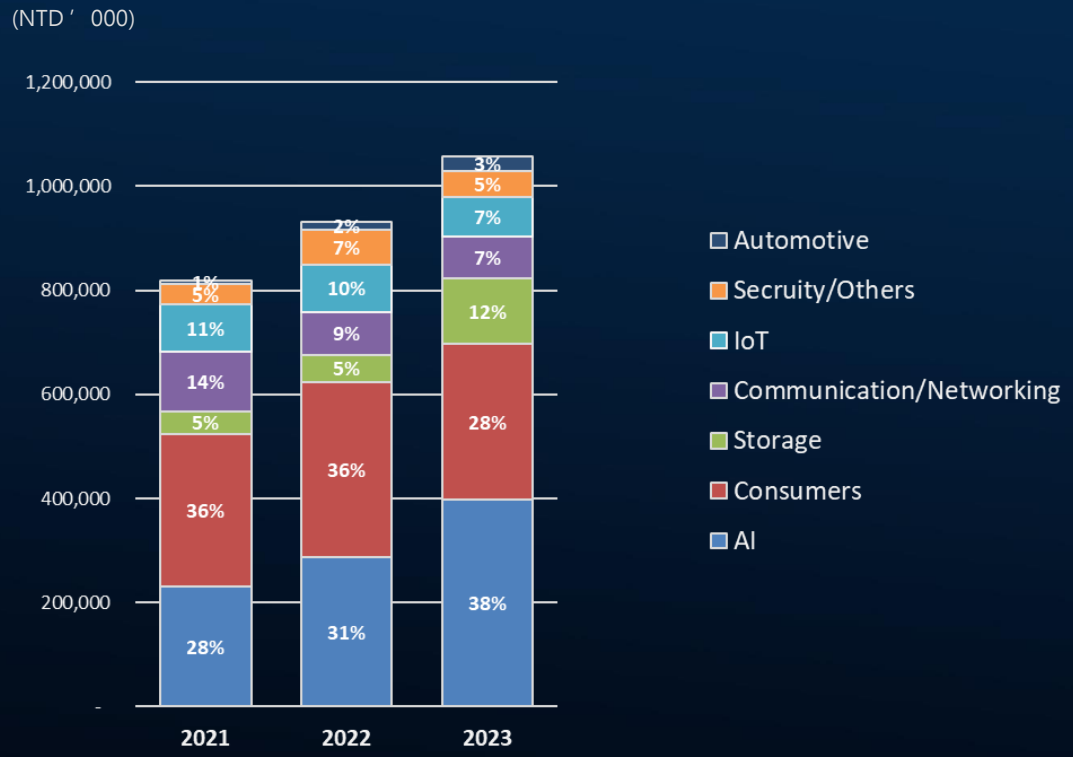

YoY
+31.2 %
QoQ
+64 %
(NTD ' 000)
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
-
309,517
247,577
405,987
4Q22
3Q23
4Q23


YoY
+13.5 %
(NTD ' 000)
1,200,000
1,000,000
800,000
600,000
400,000
200,000
-
931,821
1,057,818
2022 Q1-Q4
2023 Q1-Q4

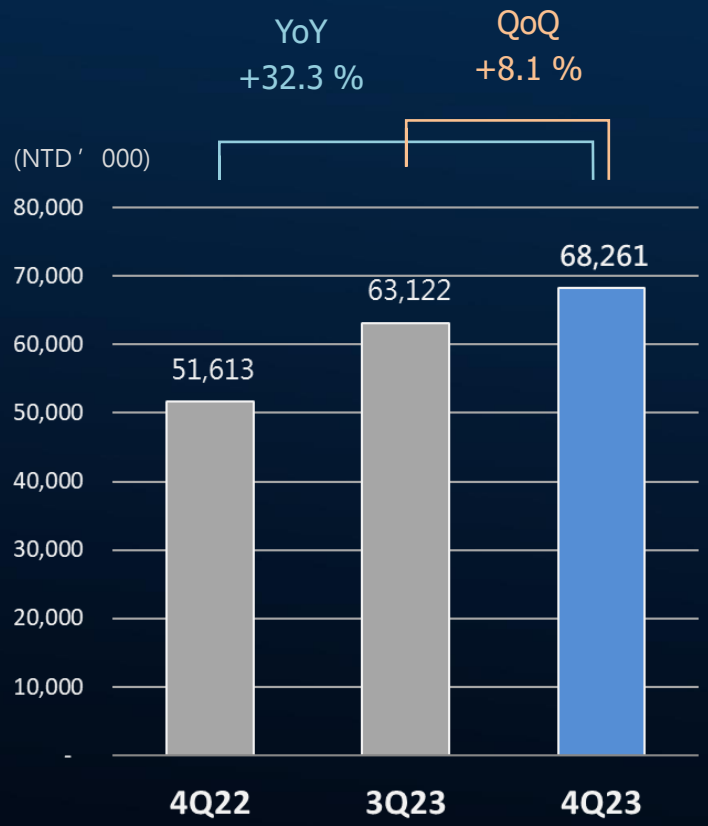
2023 Q1-Q4 營收應用類別分析

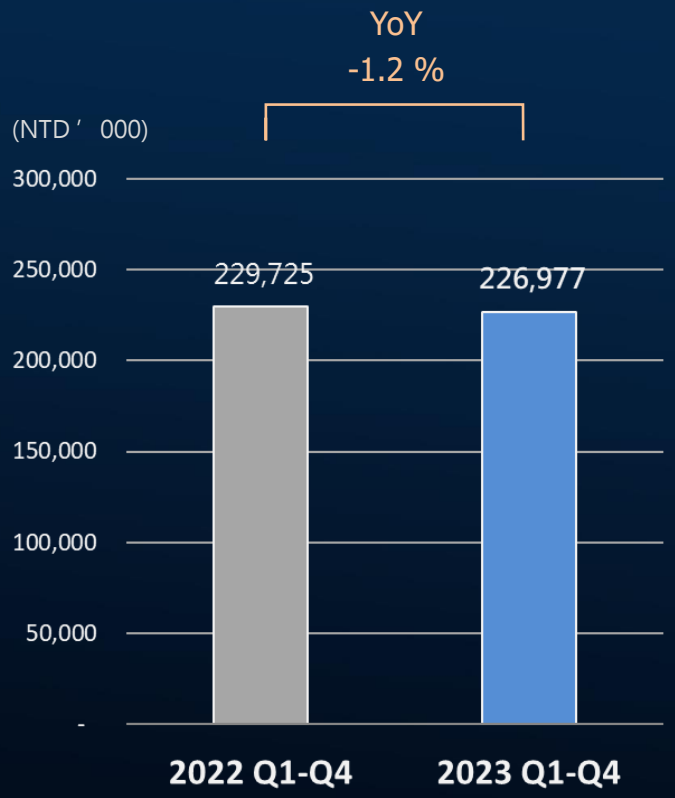


2021 to 2023 營收應用類別分析

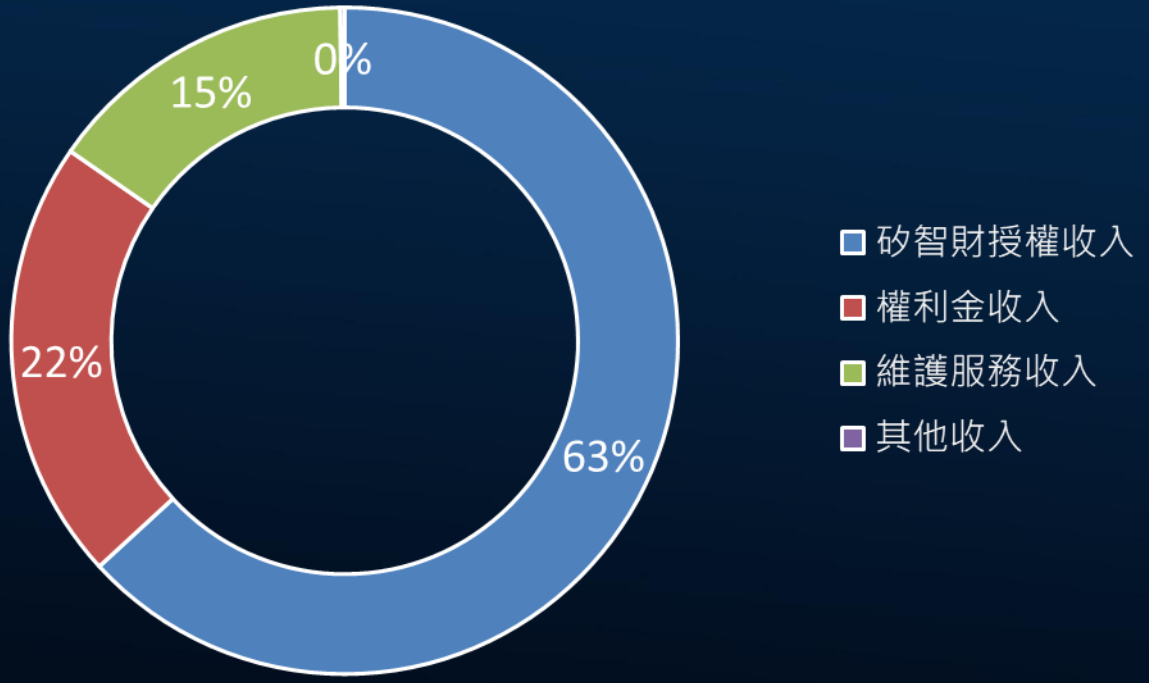


4Q23 權利金收入分析

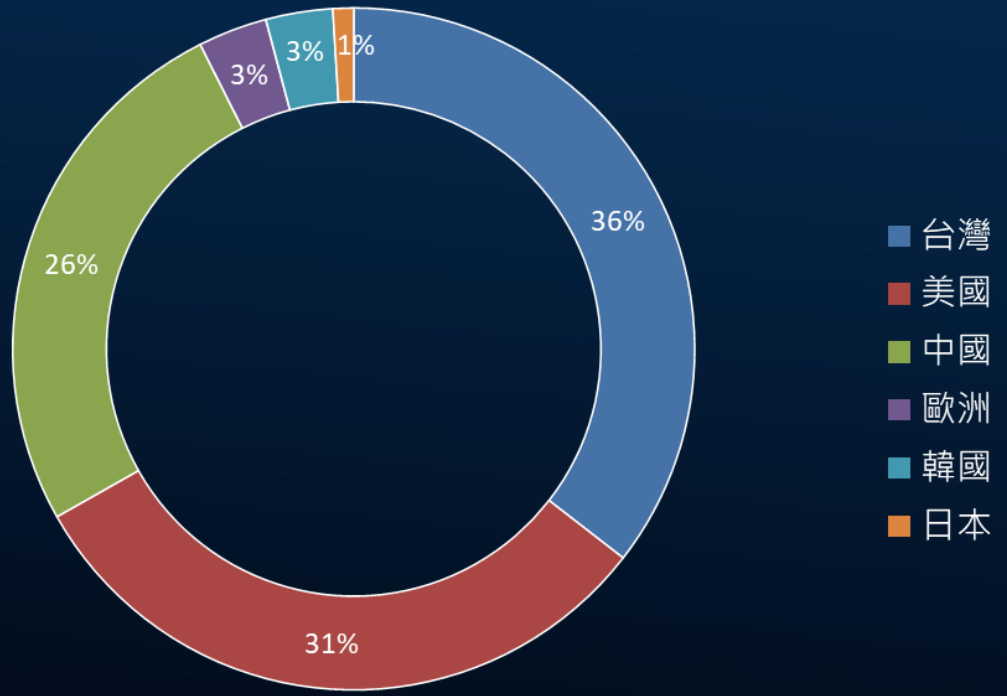




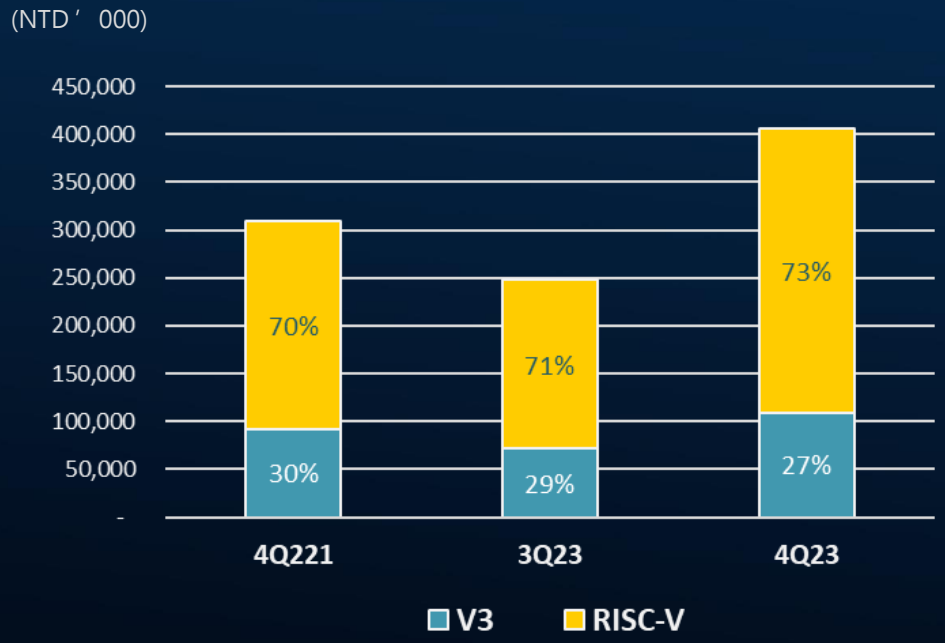
2023 Q1-Q4 營收商業模式分析



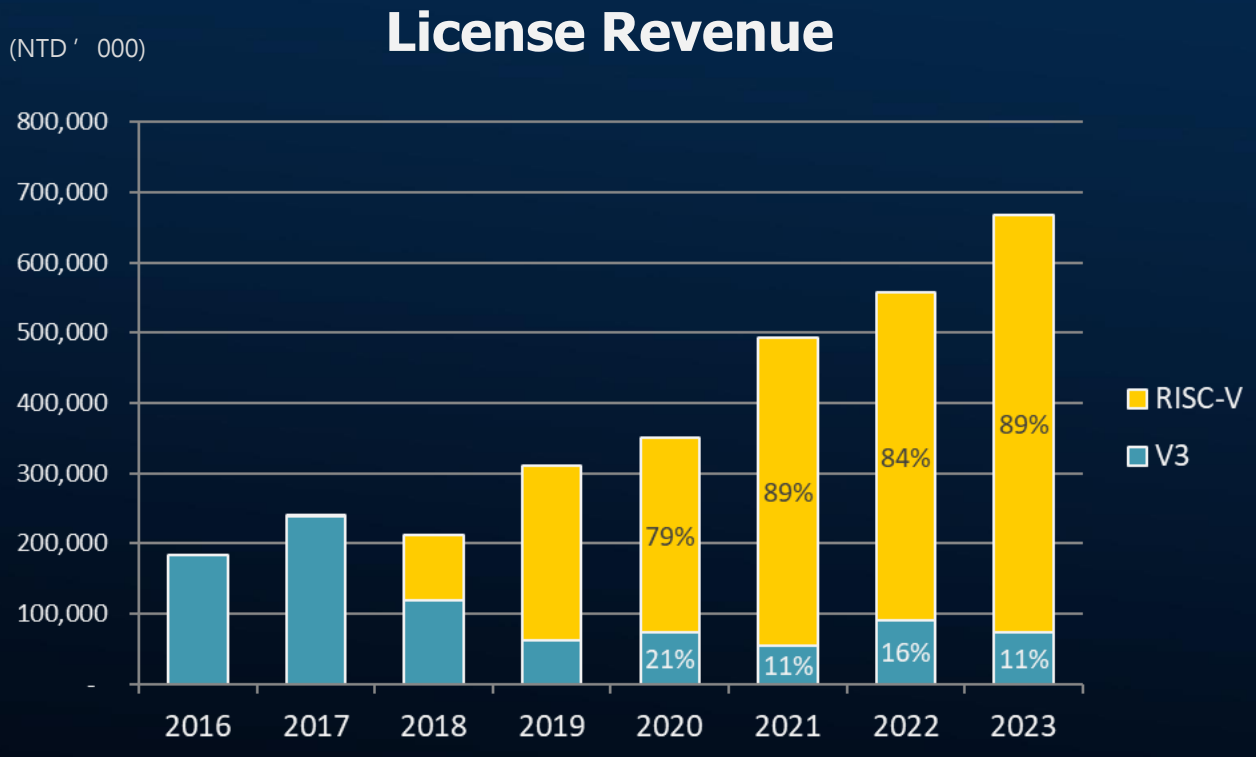
2023 Q1-Q4 地區別營收分析



4Q23 RISC-V營收佔比分析



歷年授權金收入分析

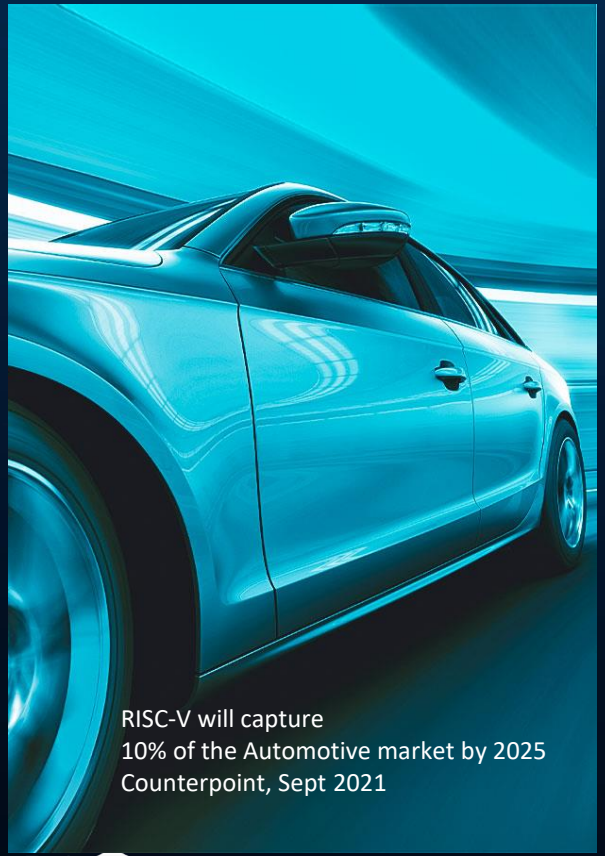

License Revenue
(NTD ' 000)
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
-
2016
2017
2018
2019
2020
2021
2022
2023
79%
21%
89%
11%
84%
16%
89%
11%
RISC-V
V3

歷年權利金收入分析


Royalty Revenue
(NTD’ 000)
250,000
200,000
150,000
100,000
50,000
-
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
1%
6%
4%
99%
94%
96%
RISC-V
V3

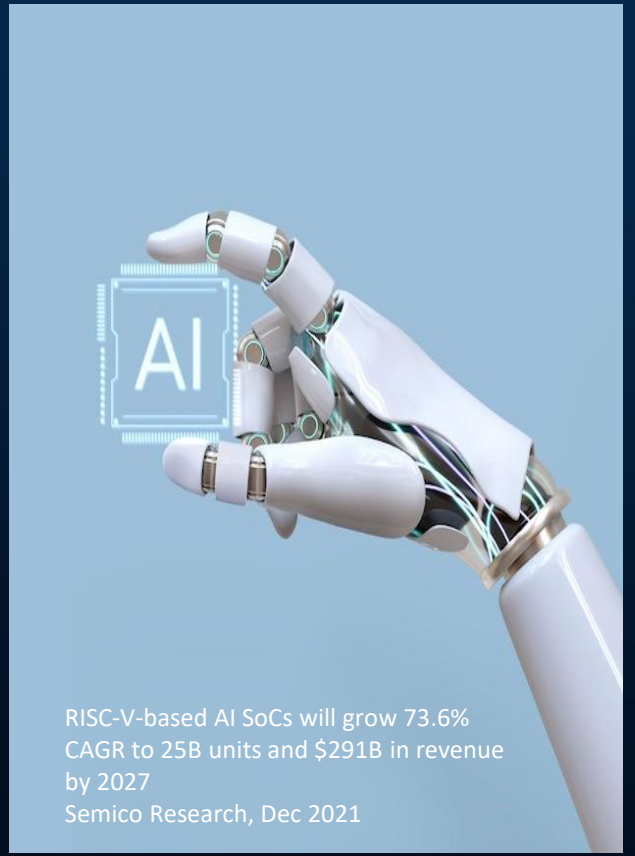
關鍵應用與趨勢

關鍵應用與趨勢



RISC-V will capture
10% of the Automotive market by 2025
Counterpoint, Sept 2021

RISC-V will command 28% of the
IoT market by 2025
Counterpoint, Sept 2021



RISC-V-based AI SoCs will grow 73.6%
CAGR to 25B units and $291B in revenue
by 2027
Semico Research, Dec 2021

產業領導者引領RISC-V成長勢頭

BOSCH Infineon NXP NORDIC SEMICONDUCTOR

Leading Semiconductor Industry Players Join Forces to Accelerate RISC-V

Aug. 2023

RENESAS

Renesas Extends Leading RISC-V Embedded Processing Portfolio with New Motor Control ASSP Solution

Sep. 2022

mobileye An Intel Company

Intel Mobileye EyeQ Ultra RISC-V processor targets Level 4 autonomous driving

Jan. 2022

European Processor Initiative epi

European processor project shows shift to RISC-V

Dec. 2021

NSI-TEXE

NSITEXE achieves world's first RISC-V processor with vector extension certified for ISO 26262 ASIL D ready product

Aug. 2021

Rambus

RISC-V crypto core is qualified to ASIL-D for automotive designs

Jan. 2020

Kneron

Kneron Unveils Its First RISC-V SoC Built for Autonomous, Assisted Driving

Nov. 2021

ILITEK I Love Innovation

Andes and IAR Together Enable Leading Vendor ILITEK to Accelerate the Development of its ISO 26262 Ready TDDI SoC ILI6600A

Feb. 2023

iar

Andes and IAR Systems enable leading automotive-focused IC design companies to accelerate time to market

Mar. 2022

Green Hills SOFTWARE

Andes Technology and Green Hills Software Team Up to Deliver Advanced Automotive Safety Platform for RISC-V

Aug. 2022

imperas

NSITEXE Selects ImperasDV for Automotive Quality RISC-V Processor Functional Design Verification

May 2022

Virtual Open Systems

VOSySmonitoRV, a Secure Monitor Layer for RISC-V Architecture Mixed-Critical Systems

PARASOFT

Andes Technology and Parasoft Collaborate to Provide Seamless Software Testing Tools for Automotive Functional Safety Applications

Dec. 2022

LDRA

Andes Technology Collaborates with LDRA to Deliver Integrated Tool Suite for Safety-Critical Software on Andes RISC-V CPU Solutions

Jan. 2023

Solid Sands

Upgrade to Solid Sands' latest SuperTest version supports Andes to its ambitions for further growth in the automotive sector

May 2023

晶心科技RISC-V IP支援車用電子

Since founded in March 2005,
Andes Technology is working step-by-step on
RISC-V for ISO 26262 Functional Safety

2016

Andes Joined RISC-V Foundation as one of the Founding Members

- Promoted as Founding Premier Member of RISC-V International in **2019**

2017

The First RISC-V Architecture AndesCore™ NX25 and N25 Released

- 25-Series became one of world's most licensed RISC-V CPUs

2020

Andes Development Process Certified for ISO 26262

- Andes became the first ISO 26262 certified RISC-V CPU IP supplier in the world

2022

AndesCore™ N25F-SE Certified for ISO 26262

- N25F-SE became the first full compliant ISO 26262 certified RISC-V CPU in the world

2024

AndesCore™ D25F-SE to be Released

- A series of Andes Functional Safety CPU cores will soon follow

AndesCore™ for Automotive Electronics

- **Supporting a Wide Variety of Functional Safety Applications:**
  - Dashboard display, in-car monitoring, keyless entry, lighting control, tire pressure monitoring, vision ADAS, microcontroller and many more
- **Developers using AndesCore™ Functional Safety Processors to:**
  - Introduce new electronic systems on automobiles
  - Upgrade existing systems that needs to be ISO 26262 compliant

In-car Monitoring

Head Lights

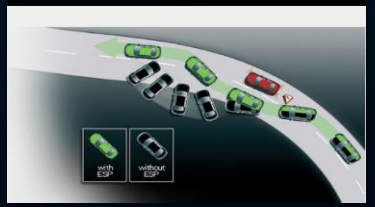
Keyless Control

Blind Spot Monitor

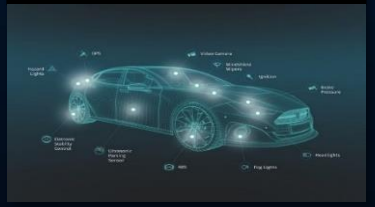
Touch & Display

EPS

ESC



Sensors & Actuators

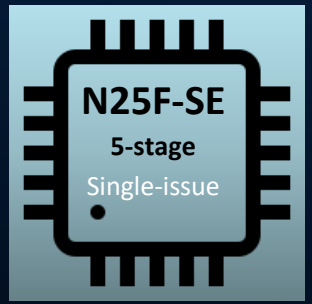


BMS

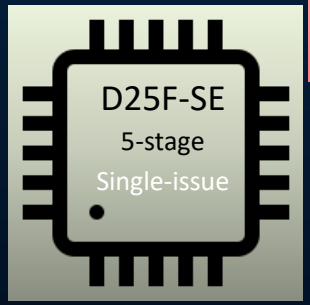
Andes FUSA Roadmap

Computing Power

Mainstream Processing

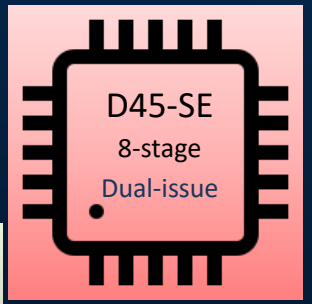


ASIL-B Compliant
IP: Available now
Already Certified



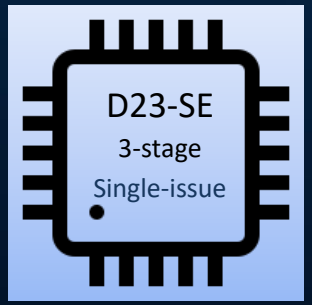
ASIL-B Compliant
IP: Available now
Certified: Q1, 2024

Mission Critical



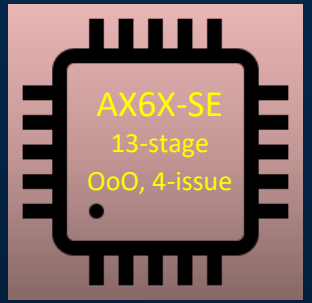
ASIL-D Compliant
ASIL-B Supported
IP: Available now
Certified: Q3, 2024

Low Power & Security



ASIL-D Compliant
ASIL-B Supported
IP: Q2, 2024
Certified: Q4, 2024

High Performance



ASIL-D Compliant

2023 2024 2025 2026

Note: roadmap subject to change without notice

晶心科技車用電子生態系統

- **Co-working with global leading suppliers in the automotive industry**
- **Andes and ecosystem partners jointly deliver the trusted RISC-V automotive solutions to designers complying with the standard of functional safety ISO 26262**
- **Partner Ecosystem Catalogs**

Security

- Rambus — HSM / RoT
- SECURE-IC — Securyzr™ SE
- Virtual Open Systems — VOSySmonitoRV
- Beanpod / TrustKernel — TEE

Safety RTOS

- WITTENSTEIN — SAFERTOS
- Microsoft — Microsoft Azure RTOS
- WNDRVR — VxWorks

AUTOSAR

- VECTOR — AUTOSAR
- SIEMENS — Capital VSTAR, Nucleus SafetyCert
- FPT Software — MaaZ AUTOSAR

Compiler / Debugger

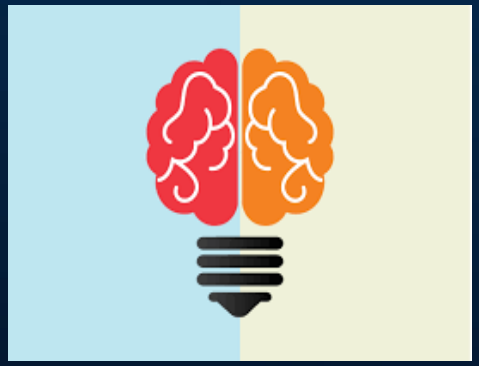
- iar — EWRISCV
- Green Hills SOFTWARE — MULTI IDE / Compiler RTOS
- TASKING — RiscFree IDE/Compiler
- ASHLING — Compiler
- LAUTERBACH DEVELOPMENT TOOLS — TRACE32 Debugger

Tool

- LDRA ASSURED — LDRA Tool Suite
- PARASOFT — Parasoft C/C++ Test

RISC-V for Datacenter & Cloud

RISC-V offers unique Opportunity for accelerators

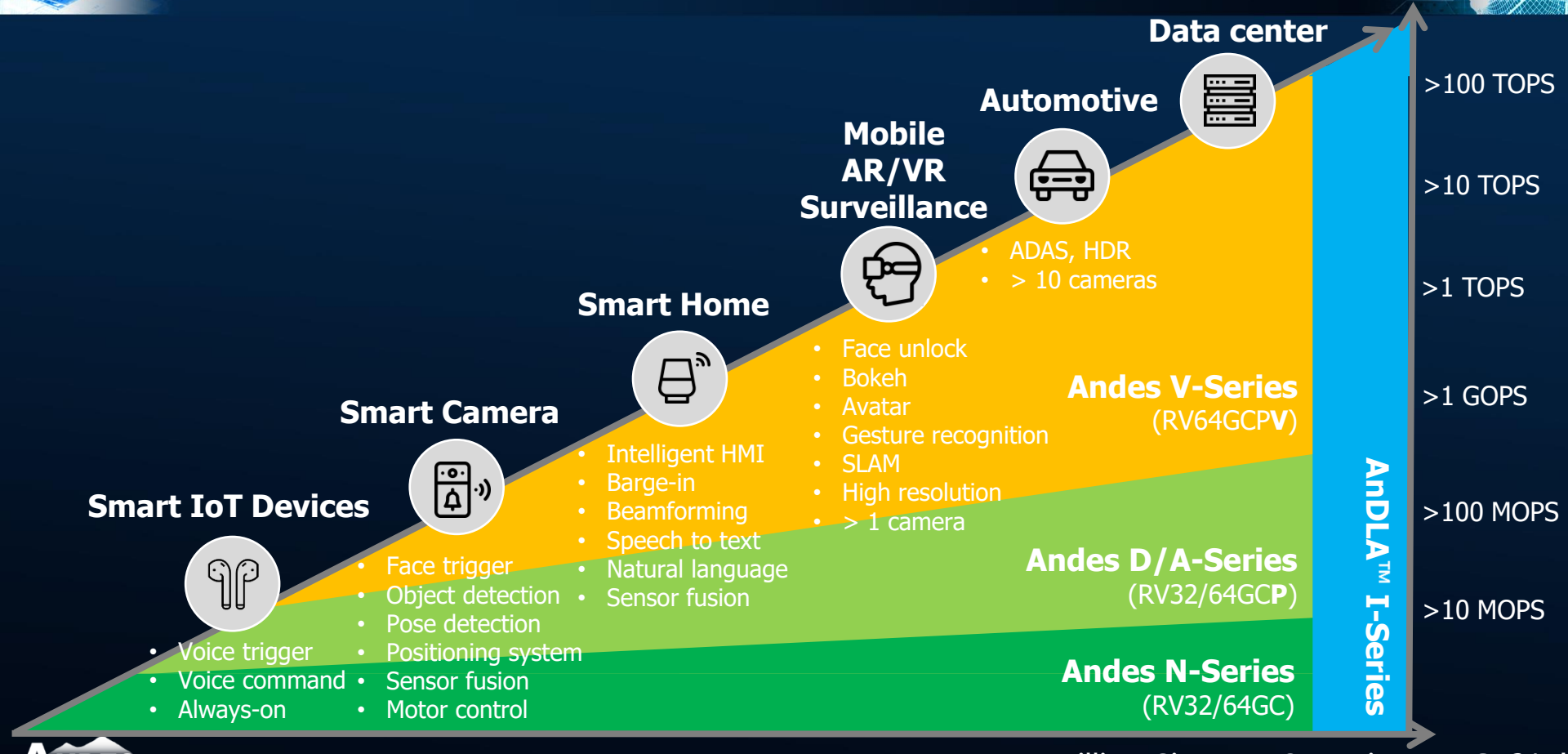


Custom computing for AI and other emerging workloads

Achieve your performance and power targets

RISC-V CPU core market will grow 115% CAGR, capturing > 14% of all CPU cores by 2025

Andes RISC-V Processors to Fit Your AI



MTIA: Meta Training/Inference Accelerator

- ISCA 2023 paper, "MTIA: First Generation Silicon Targeting Meta's Recommendation Systems"
- Proc-A/B: AX25-V100, an early version of the popular NX27V
- Custom extensions: for new interfaces, instructions and registers
- Performs quite well on low and medium complexity models

Figure 3: High-level architecture of the accelerator

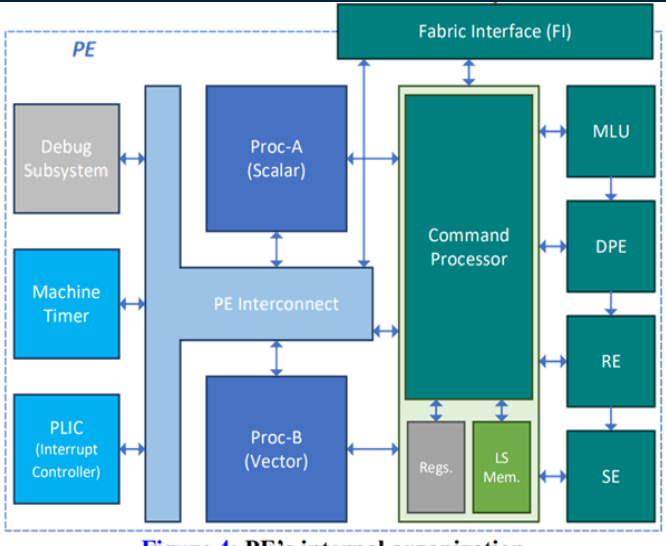
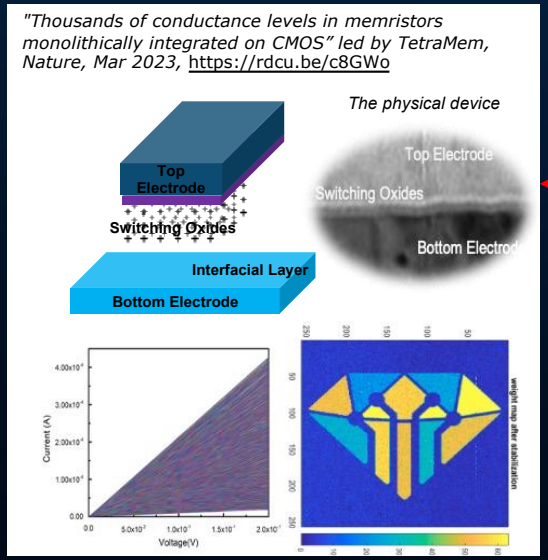


Figure 4: PE's internal organization

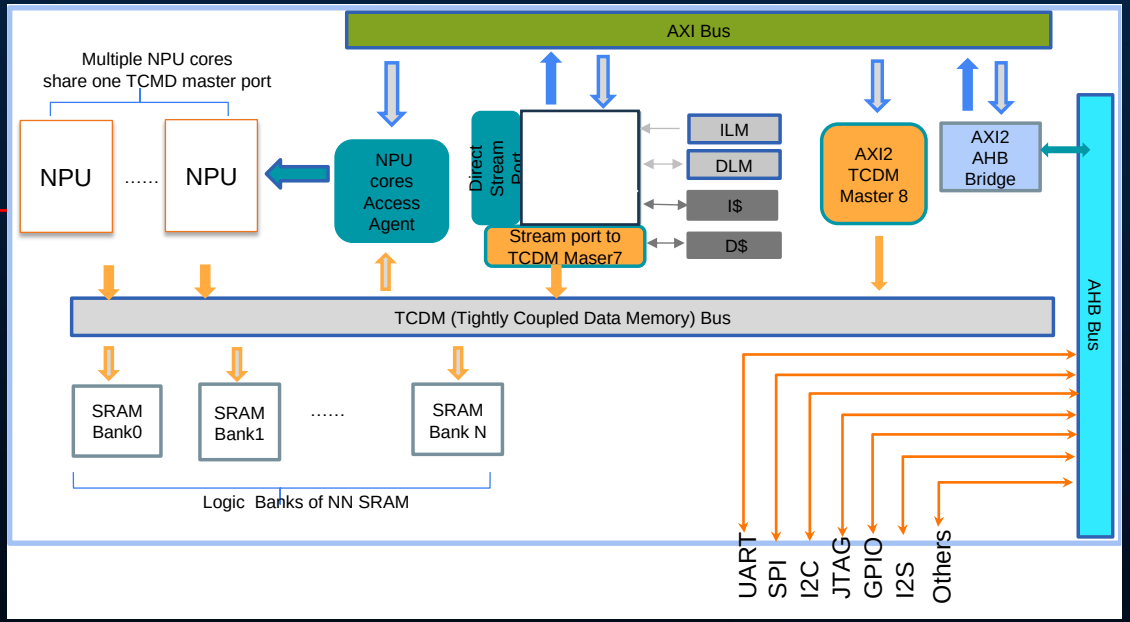
All photos: courtesy of ACM

Edge AI With Analog In-Memory Computing

- TetraMem Analog In-Memory-Computing MX200 (RRAM-based)
- 8-bit 256x256 (64K) MAC Engines, >30 TOPS/W performance
- ML core operators (conv, gemm) processed in NPU
- Remaining operations processed in RISC-V Vector processors and control CPU

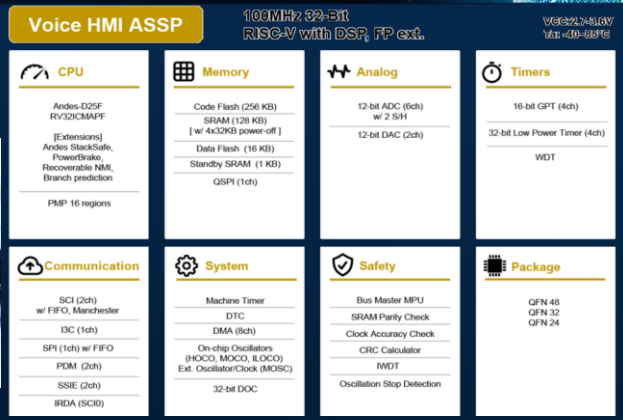


Powered by 8 bits multi-level RRAM device



Endpoint AI

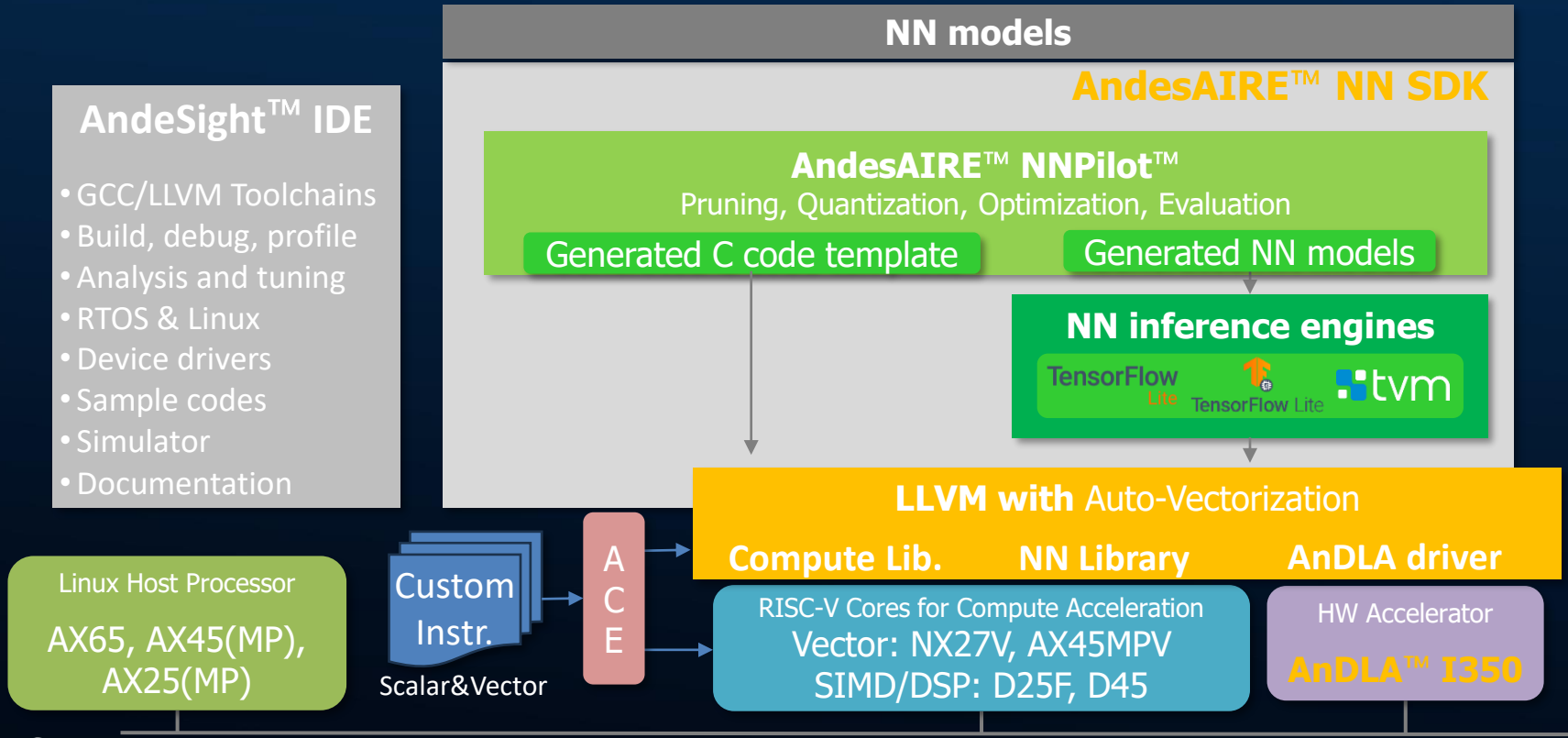
- Renesas R9A06G150 Voice-Control ASSP
  - With 100MHz DSP-capable D25F processor
  - ML-based voice recognition gets >50% speedup by using P-extension



- Spacetouch SPV60 Intelligent audio processor
  - High performance for customer development
    - 100 GOPS NPU for noise reduction, echo cancellation, howling suppression
    - uDSP for FFT/IFFT, atan, log, etc.
    - 400MHz D25F with ID caches/Local Memory
  - Rich audio interfaces and other peripherals
  - Applications:
    - Intelligent voice, smart earphone, professional audio

AndesAIRE™: Andes AI Runs Everywhere

HW/SW Solutions for AI from the Edge to the Cloud



AndesAIRE™ - Andes AI Runs Everywhere

Smart Camera

Smart Sensor

Smart Home Appliance

AIoT / tinyML

Robotics

Wearable

研發暨技術能量

晶心科技 RISC-V CPU Cores

AX60 Series 13-stage OOO Linux MP		AX65	AX66	AX6X-SE	A72~A78; N1/V1/X1
Categories	*Power-efficient*	*Mid-range*	*Extended*	*FUSA*	
45 Series 8-stage Superscalar	N45, NX45	D45	AX45MPV A45(MP), AX45(MP)	D45-SE	A53/55, R52/ R82, M7
27 Series 5-stage MemBoost		NX27V	A27(L2), AX27(L2)		A5/7/35
25 Series 5-stage Fast&Compact	N25F, NX25F	D25F	A25(MP), AX25(MP)	D25F-SE N25F-SE	A5/7/35, R4/5, M4/33
Compact Series	N22, N225	D23		D23-SE	M0/0+/3/33/4
Categories	*Embedded Control*	*Compute Acc.*	*Linux AP*	*FUSA*	*References*

- **To be released in 2024:** D25F-SE, D45-SE, AX66
- **Under Planning :** D23-SE, AX6X-SE

Note: roadmap subject to change without notice

RISC-V Continues to RISE Rapidly

- **RISE: RISC-V Software Ecosystem, a project under LF Europe**
- **To accelerate the development of RISC-V open source SW**
- **Led by industry leaders**
- **Areas to focus over time:**
  - Compilers & Toolchains
  - Language Runtimes
  - System Libraries
  - Debug & Profiling Tools
  - Simulator/Emulators
  - Kernel and Virtualization
  - Linus Distro Integration
  - System Firmware
- **More at** *https://riseproject.dev*

晶心科技合作夥伴暨生態系統

感謝聆聽