# GD32VF103

## RISC-V内蔵MCUのご紹介

GD32 product family and development ecosystem

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www.GigaDevice.com

# 会社概要

## Key Facts

- Founded in Silicon Valley in 2004, moved headquarter to Beijing in 2005, 1200+ employees globally;
- Successfully listed in the Shanghai Stock Exchange in 2016 (SSE 603986);
- A semiconductor technology leader in China focusing on Flash Memory, Microcontroller, Sensor.

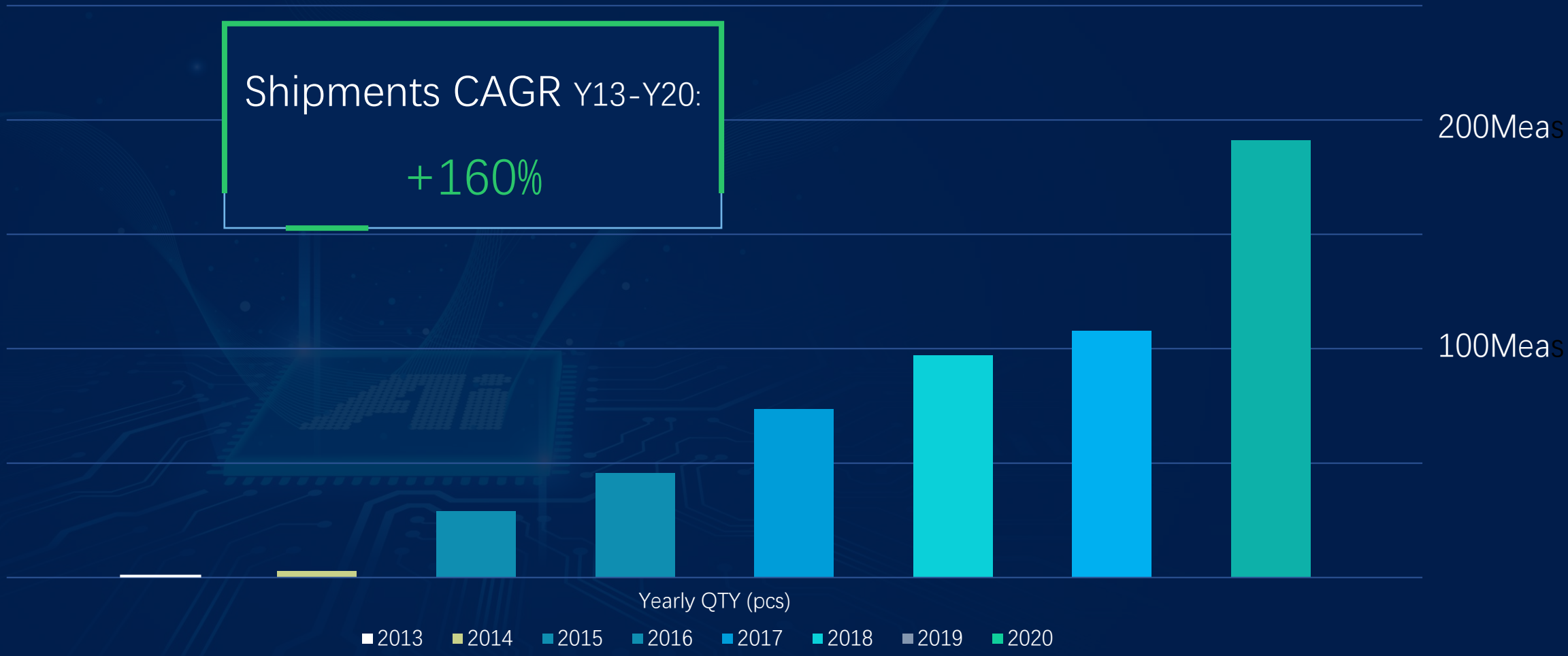
## Industry Leadership

- No.1 fabless Flash Memory supplier worldwide
- Top 3 NOR Flash supplier worldwide
- China’s No.1 32-bit Arm® general-purpose MCU supplier
- China’s No.2 fingerprint sensor supplier
- 1282 patents filed, 789 granted
- ISO9001 and ISO14001 certified

# GD32 MCUの歩み


- China's Most Prominent ARM® MCU Product Family
- China's 1st ARM® Cortex®-M3/M4/M23/M33 MCU Series
- World's 1st 32-bit General-purpose RISC-V MCU Series
- China's No.1 Local 32-bit MCU Supplier
- MCU Annual Shipment > 200,000,000 ea
- MCU > 10 Years Longevity Guarantee

# GD32 年間出荷数量



# GD32 製品ファミリ

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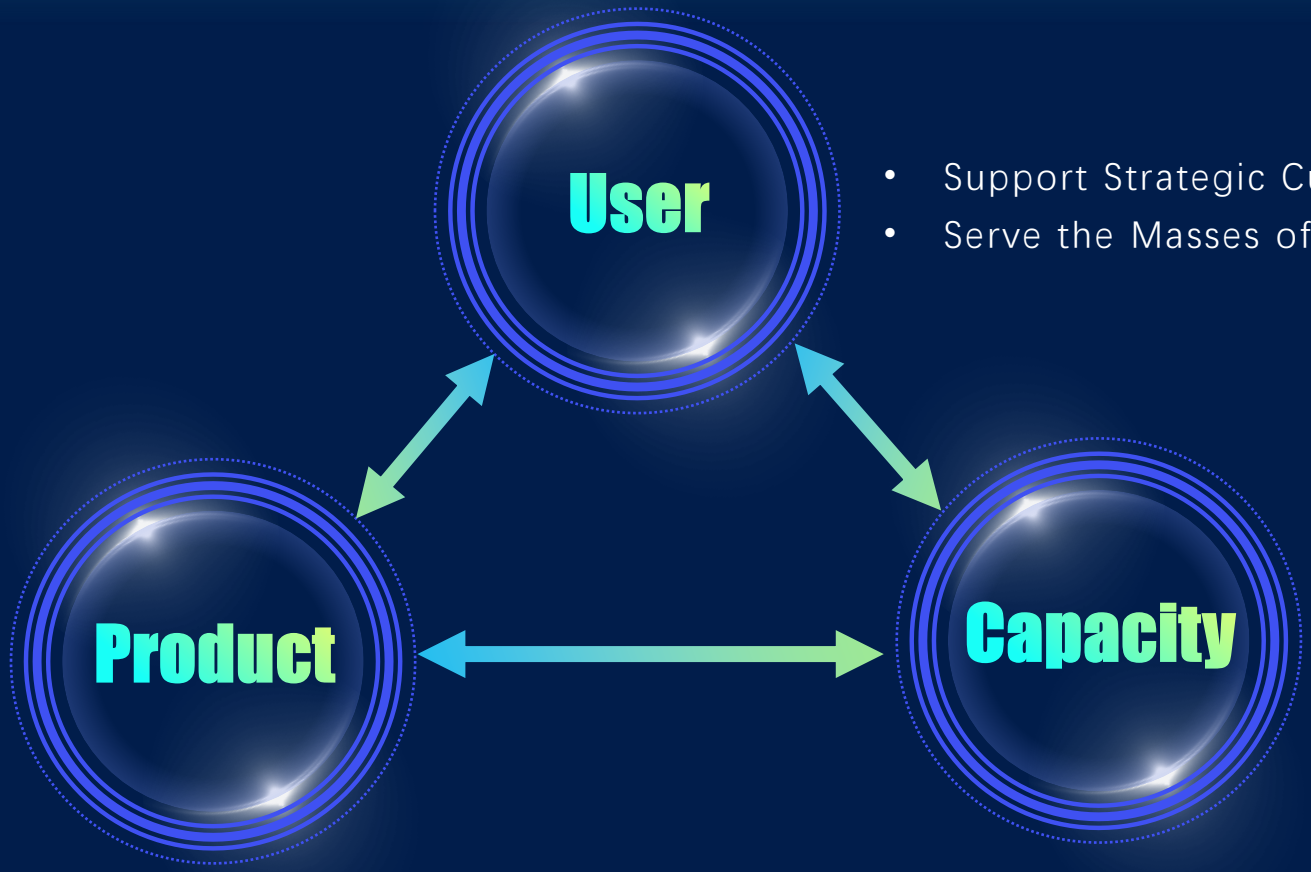
| | Type | Arm® Cortex®-M 32-bit MCUs (Flash KB/RAM KB) | | | | RISC-V MCUs |
|---|---|---|---|---|---|---|
| | Core | Cortex®-M23 | Cortex®-M3 | Cortex®-M4 | Cortex®-M33 | RISC-V |
| GD32 MCU Family | High-Performance | | **GD32F205** 120MHz, 3M/256K<br>**GD32F207** 120MHz, 3M/256K | **GD32F450** 200MHz, 3M/512K<br>**GD32F407** 168MHz, 3M/192K<br>**GD32F405** 168MHz, 3M/192K<br>**GD32F403** 168MHz, 3M/128K | **GD32E505** 180MHz, 512K/128K<br>**GD32E507** 180MHz, 512K/128K<br>**GD32E503** 180MHz, 512K/128K | |
| | Main-stream | **GD32L233** 64MHz, 256K/32K | **GD32F105** 108MHz, 1M/96K<br>**GD32F107** 108MHz, 1M/96K<br>**GD32F103** 108MHz, 3M/96K<br>**GD32F101** 56MHz, 3M/80K | **GD32F305** 120MHz, 1M/96K<br>**GD32F307** 120MHz, 1M/96K<br>**GD32F303** 120MHz, 3M/96K<br>**GD32E103** 120MHz, 128K/32K<br>**GD32C103** 120MHz, 128K/32K | **GD32E501** 100MHz, 512k/32K | **GD32VF103** 120MHz, 128K/32K |
| | Entry-Level | **GD32E232** 72MHz, 64K/8K<br>**GD32E231** 72MHz, 64K/8K<br>**GD32E230** 72MHz, 64K/8K | **GD32F170** 48MHz, 64K/8K<br>**GD32F190** 72MHz, 64K/8K<br>**GD32F130** 48MHz, 64K/8K<br>**GD32F150** 72MHz, 64K/8K | **GD32F330** 84MHz, 128K/16K<br>**GD32F350** 108MHz, 128K/16K | 33 Series<br>400+ Part Numbers | |
| | Specific | | | **GD32FFPR** 168MHz, 1M/128K | **GD32EPRT** 168MHz, 384K/96K+4M | |

# GD32 継続的な価値の提案




- Support Strategic Customers
- Serve the Masses of Users

- Extensive Product Coverage
- Focus on General and Vertical Markets
- Stable and Reliable Quality

- Multi-production Line Resource
- Stable Supply Guarantee
- Flexible Deployment

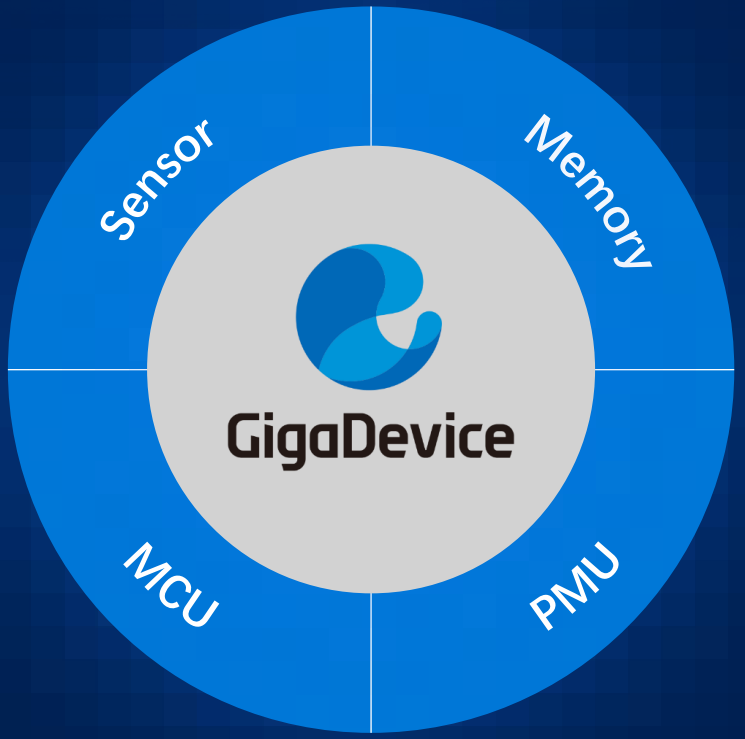
# GD32 グローバルサービスネットワーク

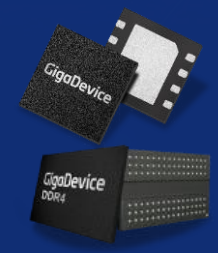

| US | Europe | Asia |
| --- | --- | --- |
| San Jose, CA<br>Dallas, TX<br>Boston, MA | London, UK<br>Munich, Germany | Beijing(HQ),<br>Hefei, Shanghai,<br>Xi'an, Shenzhen,<br>Taiwan, Singapore,<br>Korea, Japan |

# ギガデバイス製品ポートフォリオの連携

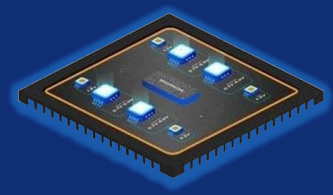
External Perception


System Control



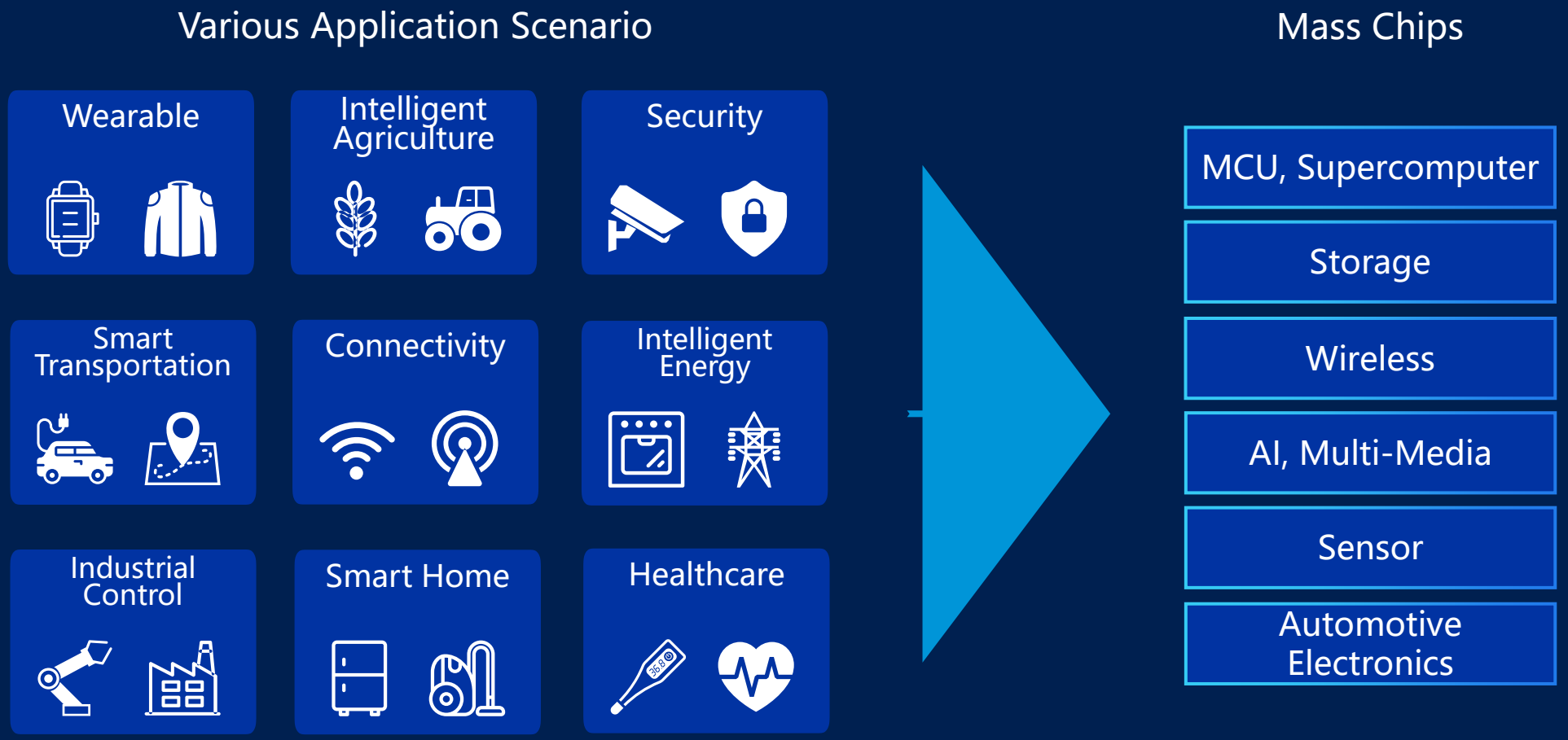




Store Key Information



PMIC & Signal Chain

# 新たなIoTアプリケーション



# IoTアプリケーションのトレンドと課題

## CHALLENGES

**01**

Low Power
Portable Device

**02**

Security Design
Information Safety

**03**

Moore's law slowdown
Dennard Scaling failed

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# 世界をリードするRISC-V MCU

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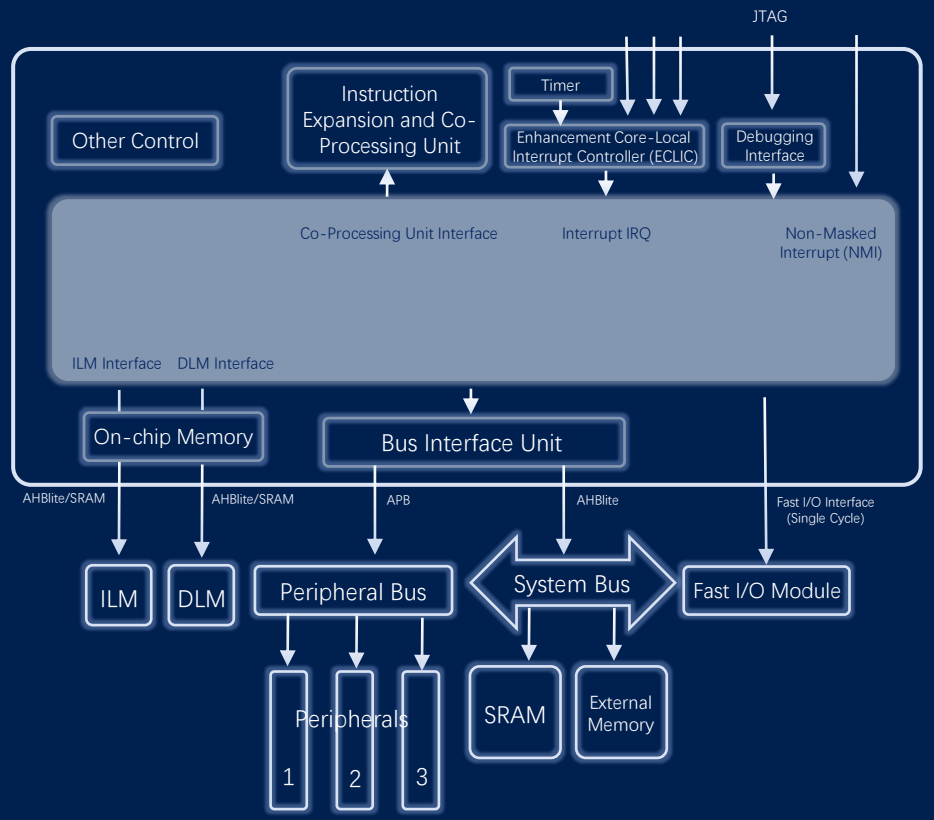
# 完全に最適化されたRISC-Vプロセッサコア




Dhrystone Test: *1.42* DMIPS/MHz

CoreMark® Test: *3.34* CoreMark/Mhz

- Two-stage Variable-length Pipeline Microarchitecture
- Streamlined Dynamic Branch Predictor and Instruction Pre-fetch Unit
- Support RISC-V RV32IMAC Instruction Set
- Support 32-bit Wide Instruction memory (ILM) and data memory (DLM)
- AHB with 32-bit Data, for ILM/DLM Accesses
- Integrated Hardware Multiplier and Divider
- Incorporate Low-power Design Concepts

- Provide up to 68 External Interrupts
- 16 Nested with Programmable Priority Levels

- Standard JTAG Interfaces and RISC-V Debug Standards
- Suitable Hardware Breakpoints and Interactive Debugging

Advanced Micro-architecture Design to Balance Performance And Die Size Requirements

# 最適化されたオンチップリソース


**Efficient Data Processing**

Two Multi-channel DMA
Efficient Communication between Memory and Peripherals
Reduce CPU Workload

**Generate Complex Waveforms**

Advanced Timer
General-purpose Timer
Three-phase PWM Complementary Outputs
No CPU Assistance Required

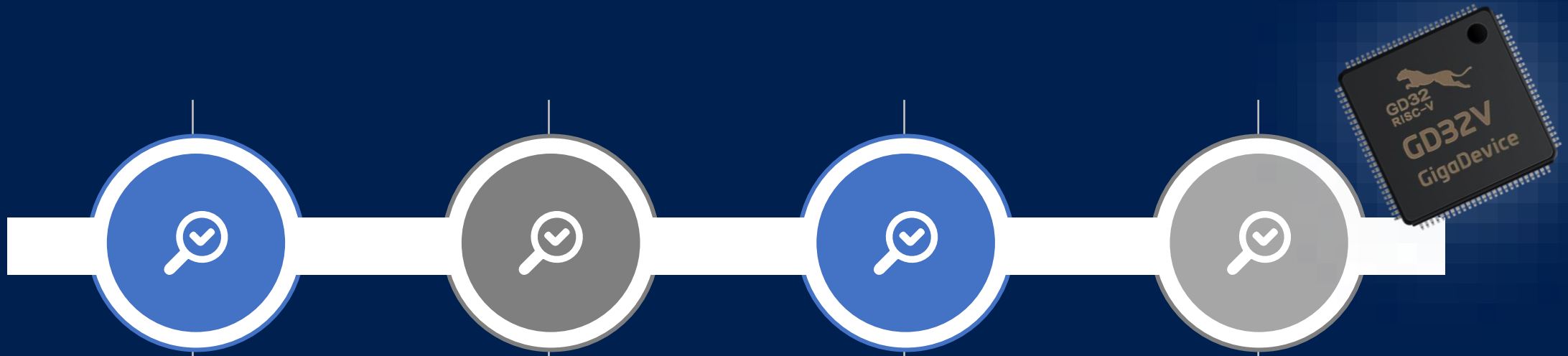
**Signal Chain Integration**

High Speed ADC
Dual-channel DAC

**Security**

96-bit Unique ID
gFlash® Patented Technology
High-speed Core Accesses to Flash in Zero Wait Time

# GD32V、セキュリティ用に設計




**Application precise isolation**

Application isolation based security ID

**Anti side channel attack**

Randomization
Running time and smoothing power

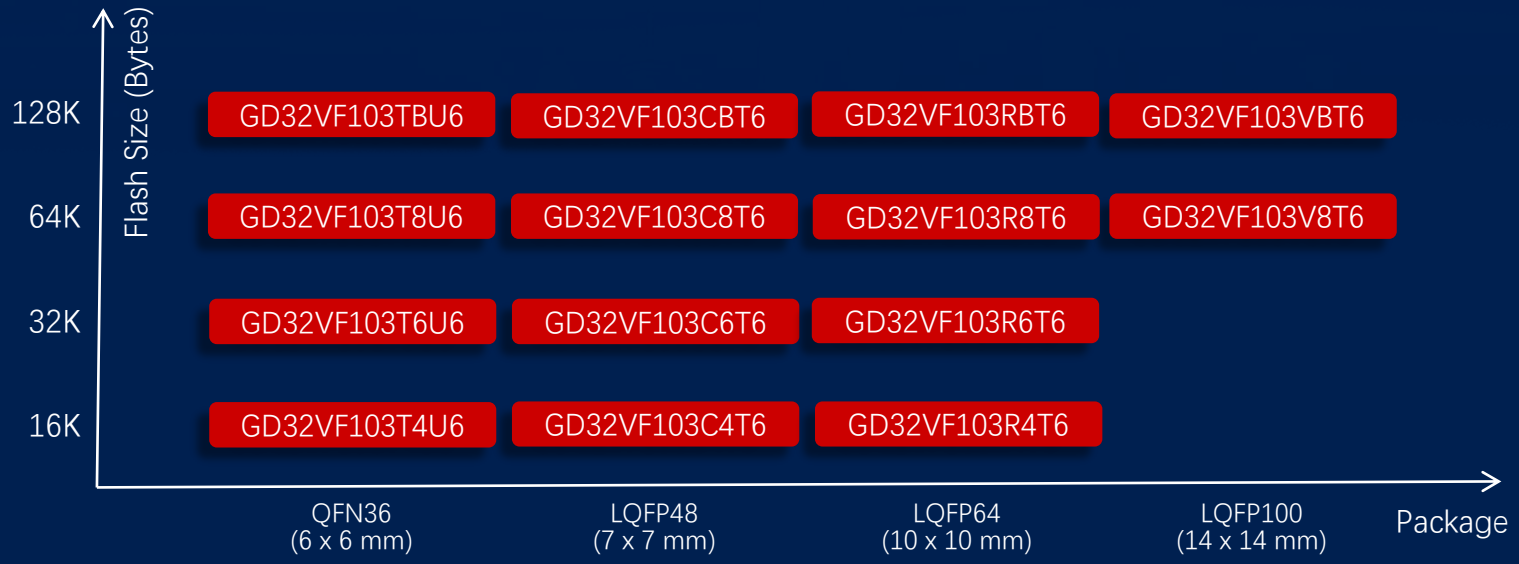
**Hardware encryption acceleration**

ECC、HASH、AES、DES

**Security boot**

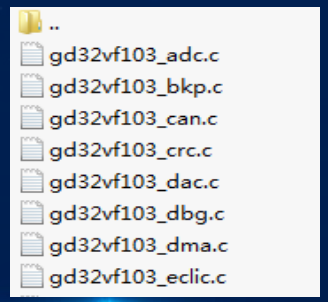
# GD32VF103 RISC-V メインストリーム ポートフォリオ

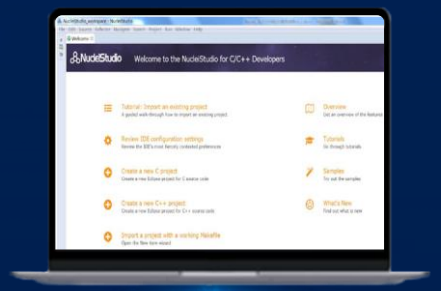
- ☑ GD32VF103 RISC-V Bumblebee Core Mainstream Line
- ☑ Max $F_{cpu}$ 108MHz, 16K-128K Flash, 8K-32K SRAM
- ☑ 2.6-3.6V supply; 5V tolerance I/Os; all support USB OTG & CAN 2.0B
- ☑ -40℃ to +85℃ industrial level operating temperature
- ☑ Series pin to pin compatible and flexible S/W compatible

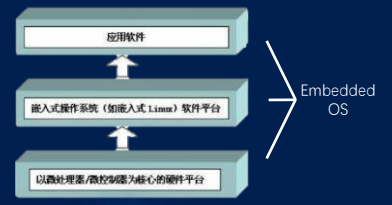




GigaDevice RISC-V 芯来科技 NUCLEI

# RISC-V開発プラットフォーム READY




**Software Library**

GD32V Library

**IDE**

Nuclei Studio
IoT Studio
SEGGER Embedded Studio
IAR Embedded Workbench
for RISC-V

**Program & Debug Tool**

GD-Link
SEGGER J-Link V10
IAR I-Jet

**Embedded OS**

µC/OS II
FreeRTOS
RT-Thread
LiteOS
TencentOS Tiny
OneOS

**Cloud Link**

AWS
Tencent Cloud

# RISC-Vコア内蔵GD32 開発エコシステム

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# GD32 開発エコシステム

## GD32 Tools

Full-function Eval-board
Learning Start Kit
Program and Debug Tool

## Third-party Tools

Mass Production Tool
Develop Board
IDE

## Embedded Software

OS and Cloud
GUI
Security Component
Embedded AI


- Expand the Ecosystem
- Focus on Applications
- Serve the Public

## Solutions

Industry Solutions
Innovation Solutions

## Fairs & Training

Online Training
Seminars and Exhibitions

## University Program

High-quality courses
Joint Laboratory
Teacher Training
Electronic Competitions

# RISC-V 開発プラットフォーム– SEGGER

SEGGER社は、2019年からGigaDeviceによって導入された世界で最初の市販RISC-Vコア内蔵MCUの完全サポートを発表しました

This support includes:

- ✓ SEGGER's Embedded Studio
- ✓ J-Link debug probe,
- ✓ Ozone debugger,
- ✓ SEGGER's emPack

with the RTOS embOS and Software Libraries in the fields of communication, data storage, compression and IoT, as well as the portfolio of Flasher production programmers.

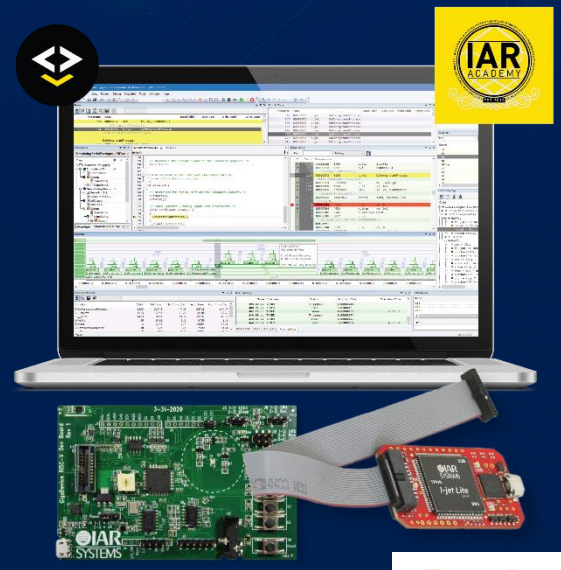
# RISC-V 開発プラットフォーム– IAR Systems

## IAR GD32V Evaluation Kit

1. IAR RISC-V GD32V EVAL BOARD
2. I-jet Lite debug probe
3. IAR EWRISCV for RISC-V 30-day evaluation license
4. IAR Academy On-Demand course introduction to RISC-V Evaluation Kit

IAR社は評価キットを提供します

商業的に実行可能な開発プロジェクトを持つ企業には無料で



**IAR Embedded Workbench For RISC-V  Ver1.30 Support GD32V MCU**

Free online video for the IDE and Evaluation Kit are available on YouTube, WeChat and other online platforms.

# RISC-V業界のエコシステムを継続的に拡大


RISC-V International

NUCLEI

China RISC-V Industry Alliance

China RISC-V Alliance

SEGGER

IAR Systems

RT-Thread

Huawei LiteOS

FreeRTOS

Tencent OS Tiny

# GD32 & サードパーティパートナーソリューション


**IAR Systems**

- ✓ RISC-V development kit jointly launched by GD32 and IAR systems.

**Motor Control**

- ✓ BLDC motor control solution based on GD32VF103 series.


**Seeed Studio**

- ✓ 1st RISC-V development board to run GUI, based on the GD32VF103 series and has a wealth of on-chip resources.

**Smart Car**

- ✓ Electromagnetic smart car based on GD32 RISC-V MCU.


**Tencent OS-tiny IoT**

- ✓ PM2.5 monitor built on Tencent OS-Tiny IoT Development Board.

**Mechanical Arm Control**

- ✓ Mechanical arm control solution based on GD32VF103 series.

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# ご清聴ありがとうございました!

GD32 product family and development ecosystem

***Visit us:***

*www.GD32MCU.com/en*

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