

GD32: Smart Innovation Platform for MCU Solution

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About GigaDevice

Founded in 2004

**The Largest Volume
Fabless SPI NOR Flash
Supplier, World Wide**

**The 1st GD32 ARM[®]
Cortex[®]-M MCU in China**

**Gigadevice Innovation:
The 1st 8-pin SPI NAND
Flash in the World**

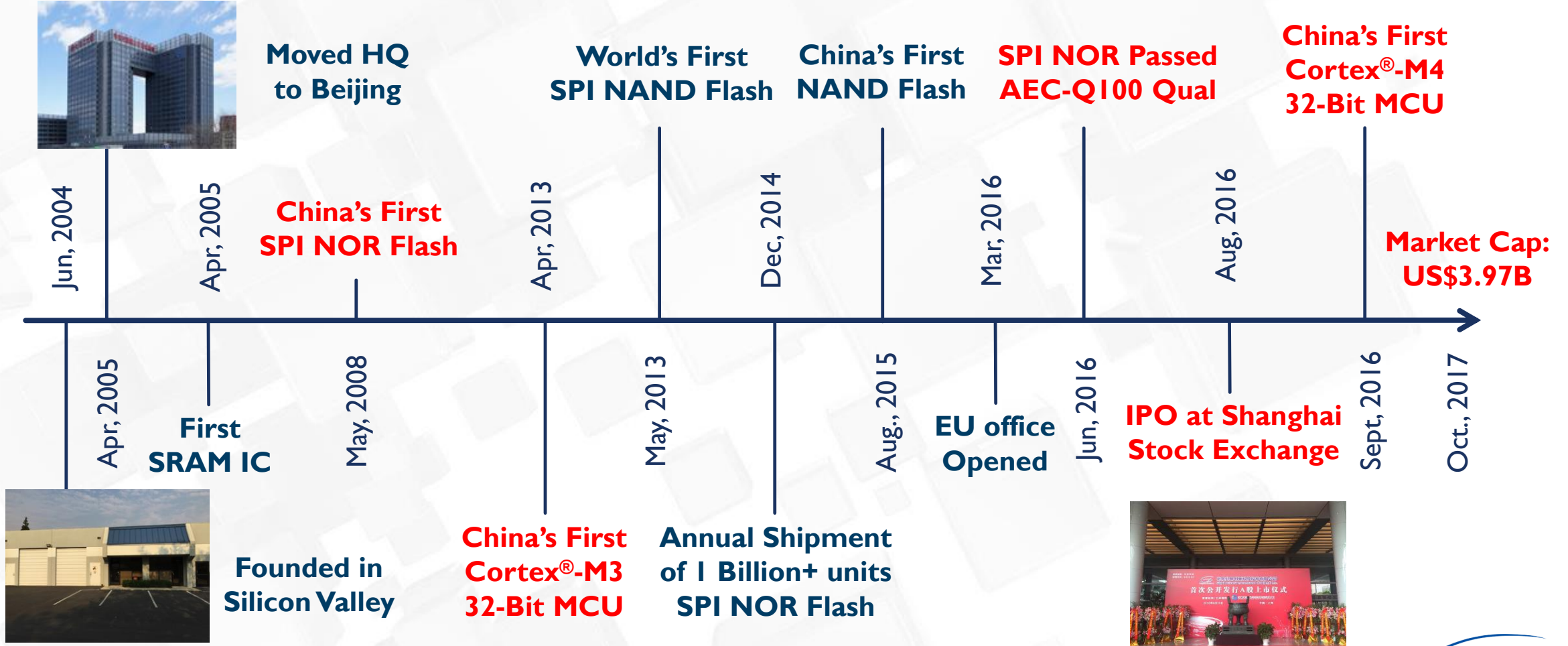
Sales Office Worldwide



Company Profile - Numbers

2004	Year Established
3	Worldwide Ranking of Serial NOR Flash Suppliers
1	Worldwide First 8-pin Serial NAND Flash Supplier
1 & 1	China Market Share of Flash & 32-bit Arm MCU
400+	Number of Employees
220+	Number of Patents Granted
1,600,000,000+	Annual Serial Flash Shipment Units in 2016

Company Profile - Timeline

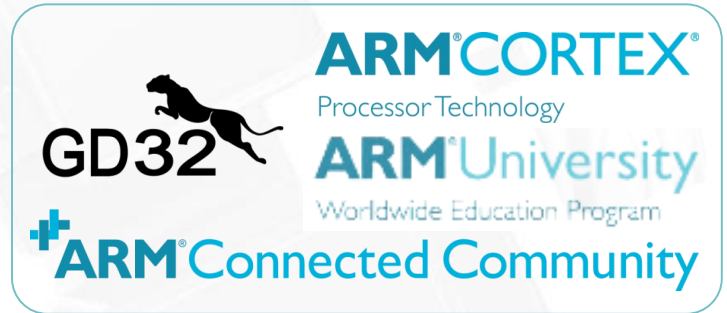


GD32 MCU Introduction

With GigaDevice rich memory and controller IC design experiences...

- 2005 – SRAM
- 2008 – SPI NOR Flash
- 2013 – 32-bit Cortex®-M3 MCU
- 2016 – 32-bit Cortex®-M4 MCU

All the No.1 Product
in mainland China



GD32 Family of 32-bit ARM® MCUs

- ✓ Latest 32-bit ARM® Cortex®-M core
- ✓ 19 complete product lines
- ✓ >300 P/Ns for selection
- ✓ Excellent performance & real-time response
- ✓ Optimized active power consumption
- ✓ Outstanding ESD & EMC level
- ✓ Rich peripherals & interface combination
- ✓ Comprehensive IDE & software compatible



- High performance
- Cost-effective
- Easy use

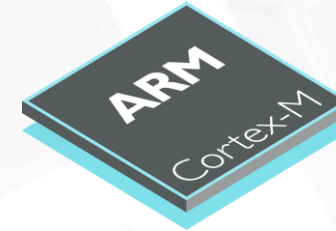
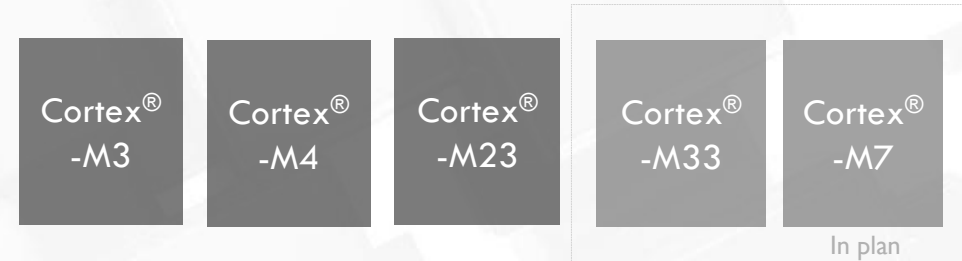
GD32 MCU Product Trend

- Standard ARM® Cortex® -M core
- Multiple integrated peripherals
- Complete product lines for selection
- IDE & software compatible

All Series Compatible

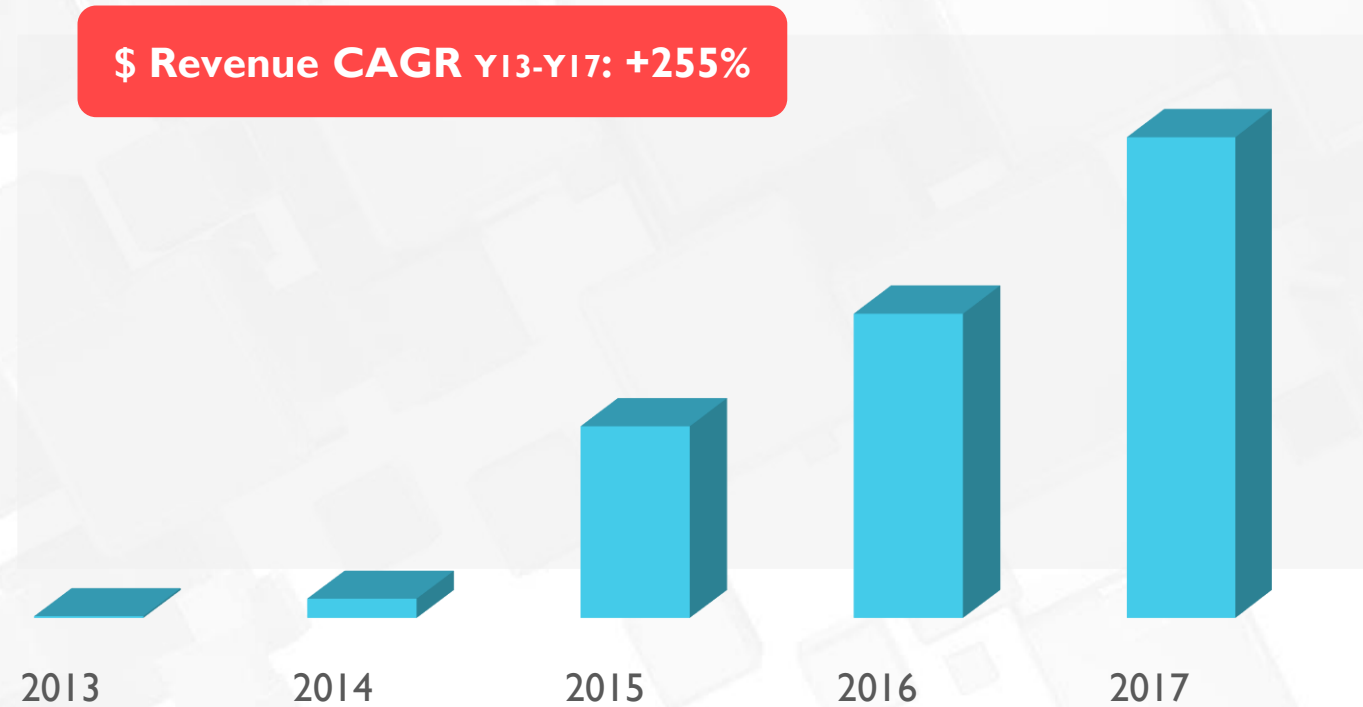


- Scalable architecture
- Fit for simple to complex application
- Same development experiences
- Consolidated development costs



- Leading high performance
- Ultra low power
- Advanced analog functions
- Wireless connection

Yearly Shipped Quantities



- GD32 32-bit Arm Cortex® **MCU shipment has grown rapidly** since the introduction in 2013.
- 2017 will be a record-breaking year for both Flash & MCU due to **global shortage**.

Special landmark for GD32

GD32

4 Years

GD32

Apr/16, 2013
Born in Beijing

100,000,000 pcs
total shipment

May, 2017
New Beginning

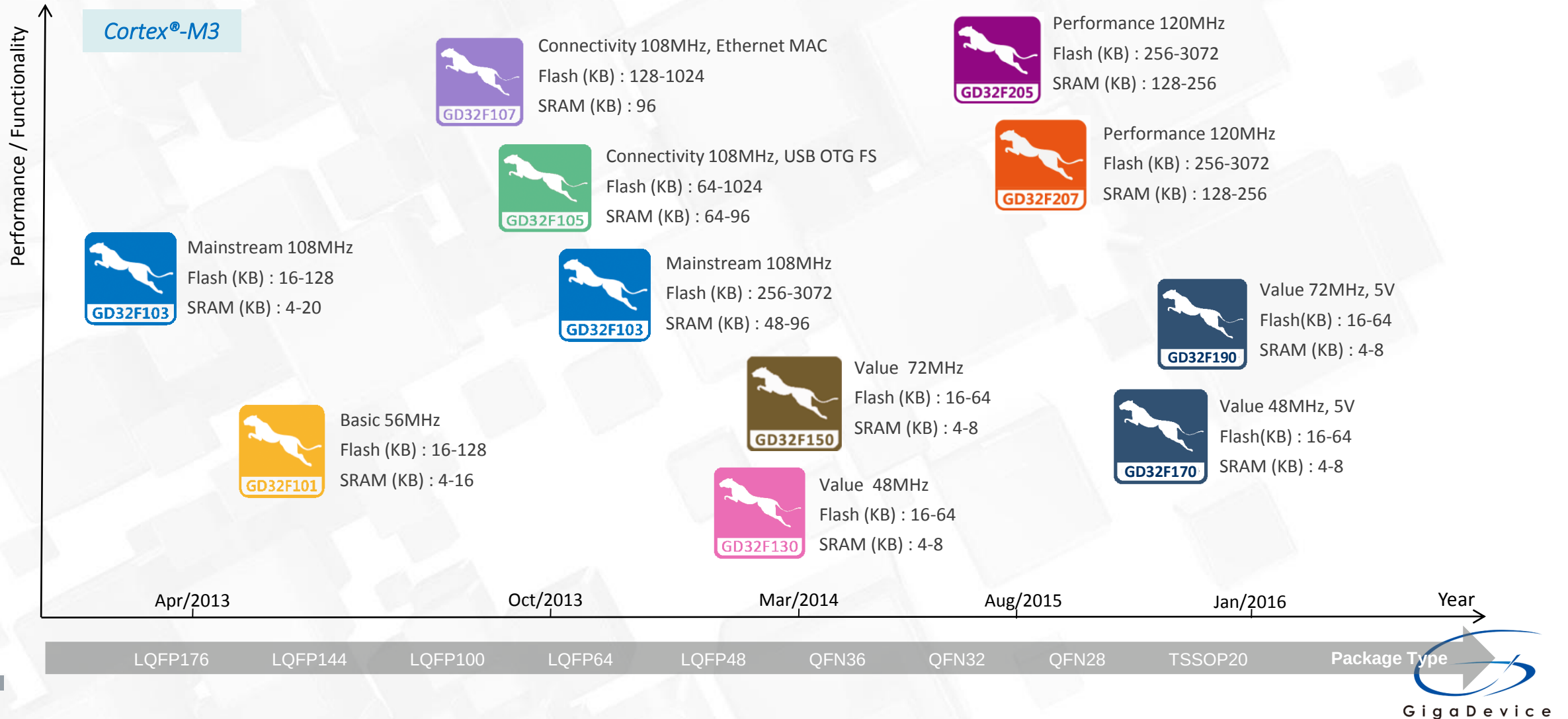
GD32F103/GD32F101系列
大容量增强型MCU



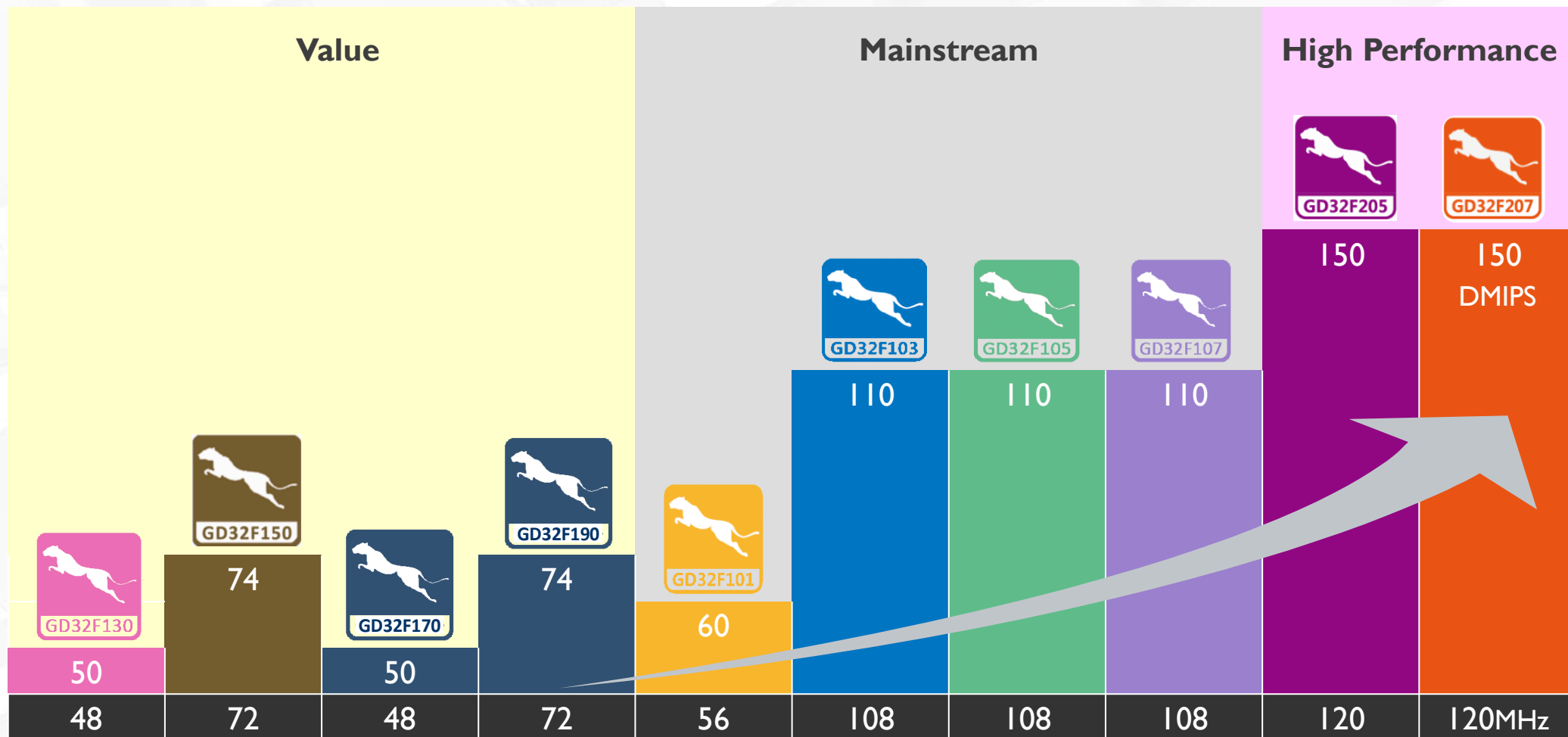


Products

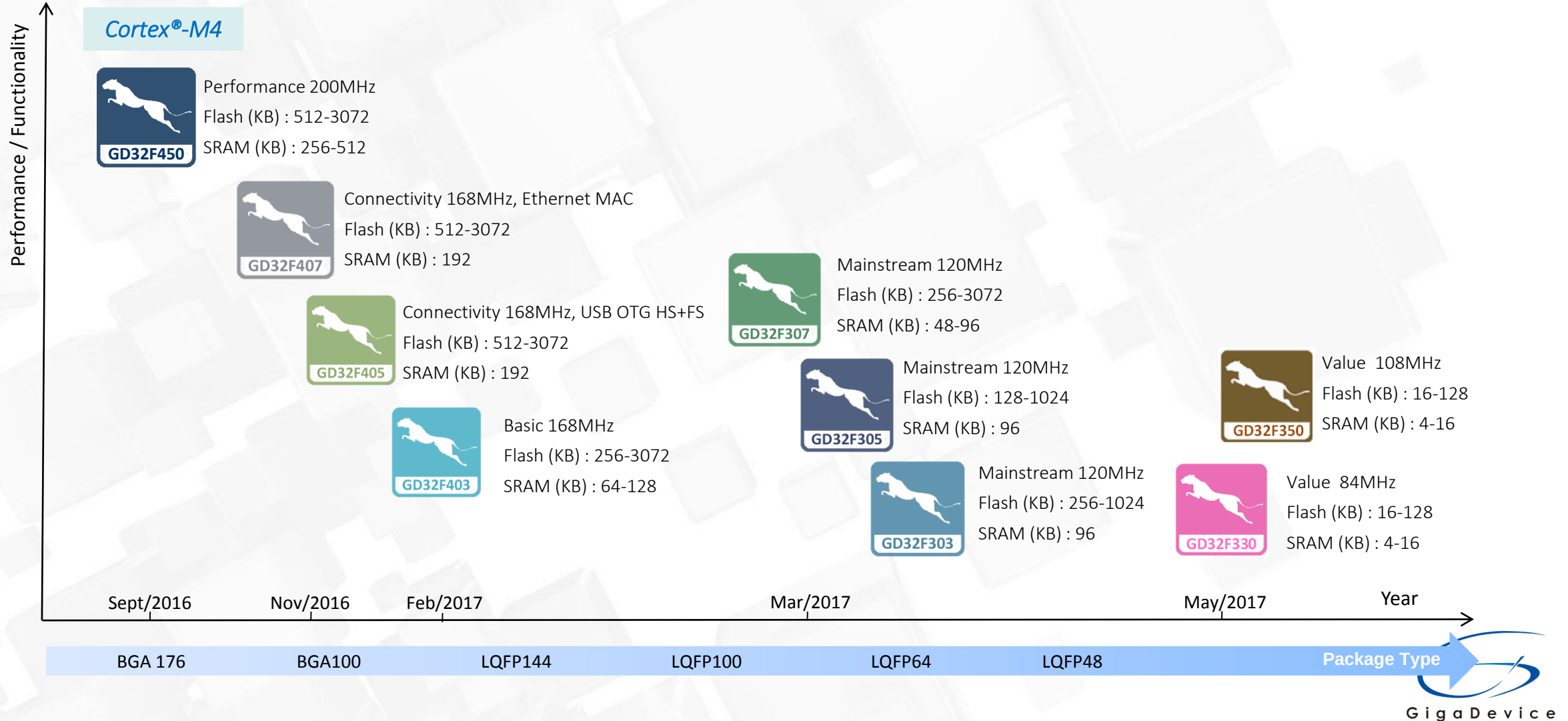
GD32 Cortex[®]-M3 MCU Portfolios



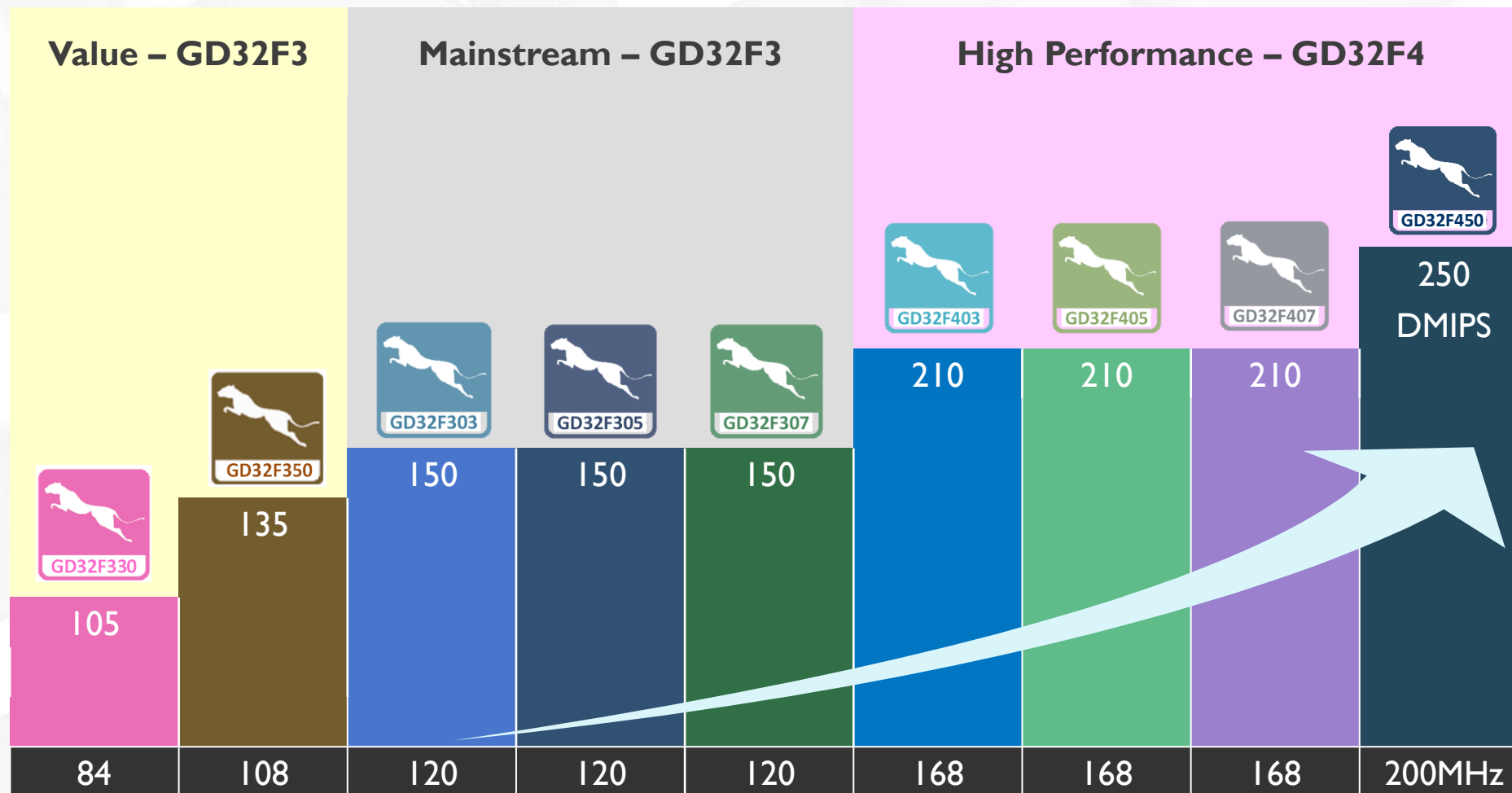
GD32 Cortex[®]-M3 Portfolios ~200P/N



GD32 Cortex[®]-M4 MCU Portfolios



GD32 Cortex[®]-M4 Portfolios ~100P/N



GD32F4 Cortex[®]-M4 series

GD32F4

4 families to expand F4 series and re-enforce leading position on high performance 32-bit MCUs.



GD32F450 Stretch Performance – 200MHz CPU+FPU

- Cortex[®]-M4 with Graphic TFT display engine
- Support image accelerator with external SDRAM



GD32F407 Innovative Connectivity – 168MHz CPU+FPU

- Support Ethernet and two USB OTG: FS+HS
- BGA176 10x10mm for more IO extension



GD32F405 Balance Connectivity – 168MHz CPU+FPU

- Balance between performance, connectivity and cost
- Smaller CM4, BGA100 7x7mm for a 3072KB



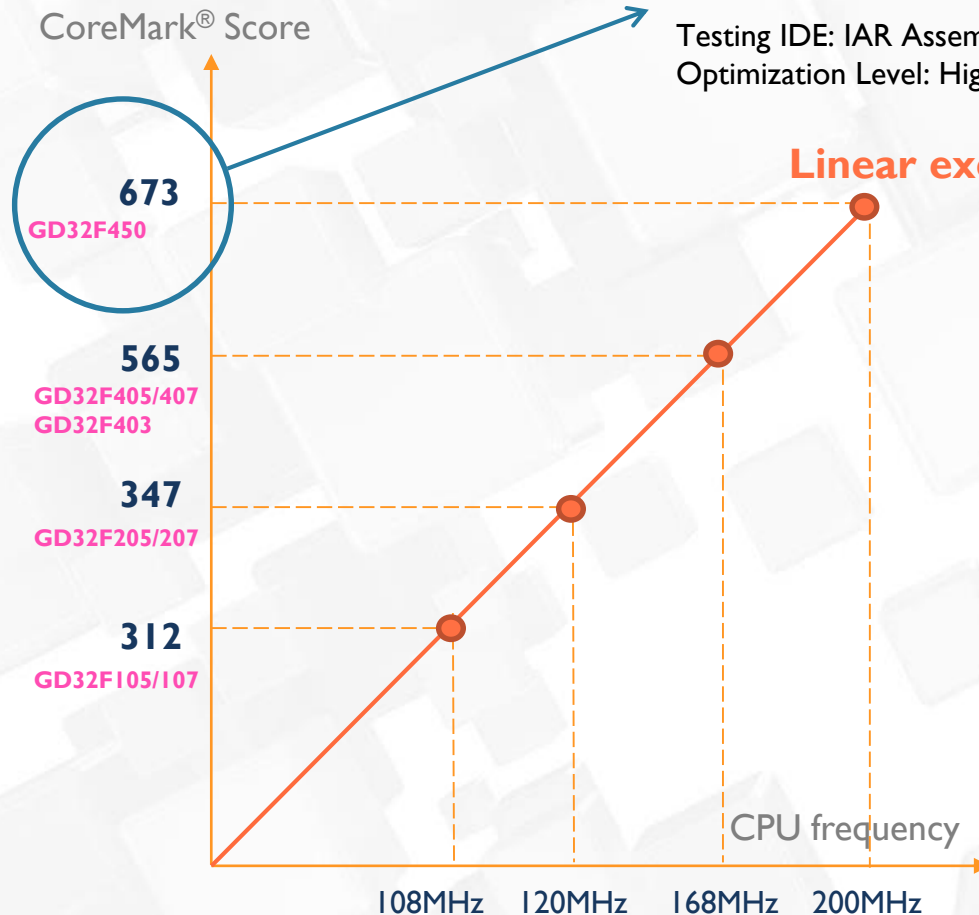
GD32F403 Performance Entry – 168MHz CPU+FPU

- Basic level with balance of performance and cost
- Smaller CM4, BGA100 7x7mm for a 3072KB

New GD32F4, Leading Performance

#1 Cortex®-M4 rank on CoreMark®

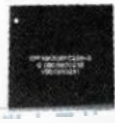
Testing IDE: IAR Assembler for ARM 7.40.2.8542
Optimization Level: High Speed, No size constraint



- Up to 200 MHz / 250 DMIPS with **Flash access Zero wait-state**
- Up to 673 CoreMark Result
- ARM Cortex®-M4 DSP + floating-point unit (FPU)

New GD32F450, High Integration

Stretch Performance of GD32F4



BGA176 (10 x 10 mm)
LQFP144 (20 x 20 mm)
LQFP100 (14 x 14 mm)

- Cortex®-M4 Core @ 200 MHz
- Support H/W DSP instructions + FPU
- Zero-wait state execution from Flash memory
- Flash from 512 KB to 3072 KB
- SRAM from 256KB to 512KB
- EXMC interface support external SDRAM & SRAM
- Up to 8 x UART (9Mbit/s)
- Up to 6 x SPI (30Mbit/s)
- Up to 3 x I2C (400Kbit/s)
- Up to 2 x CAN2.0B
- Up to 2 x I2S
- Support SDIO, Ethernet MAC
- Support USB OTG FS + HS
- 8-14bit Camera Interface + IPA
- LCD-TFT controller up to XGA resolution
- Up to 3 x 12bit, 2.6M SPS ADCs (up to 24 chs)
- Up to 2 DACs
- Standby Current @ 2uA

GD32F450 Portfolios



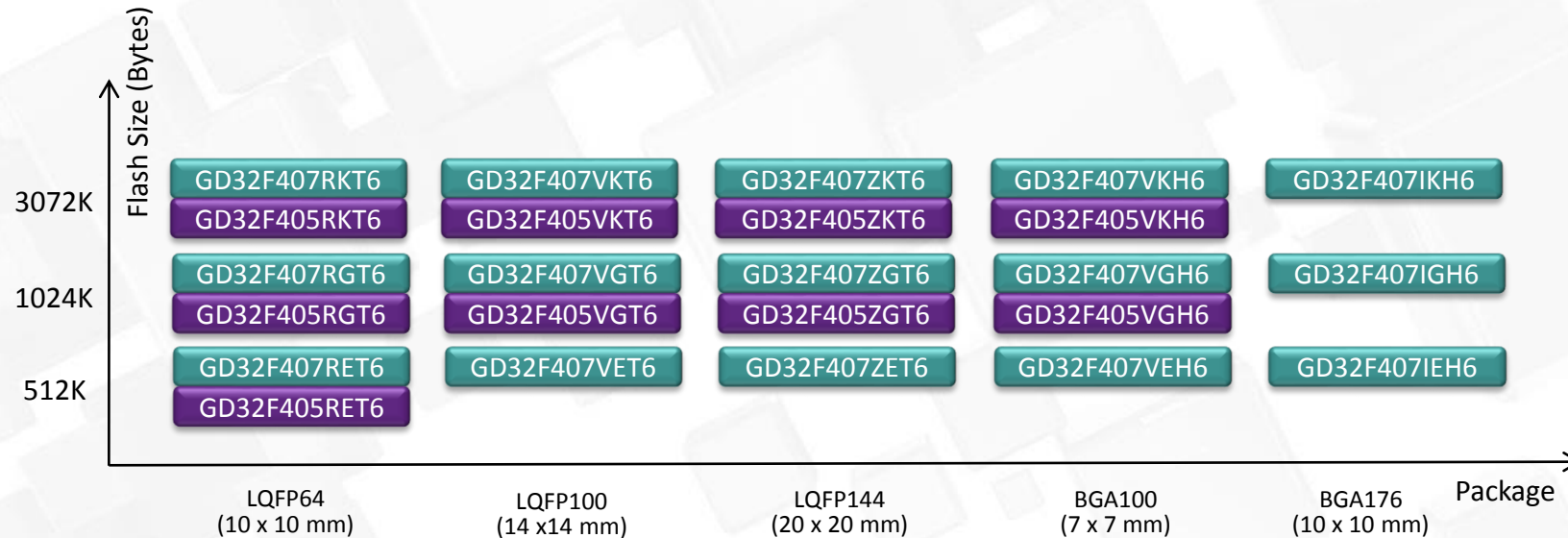
- ✓ **GD32F450 Cortex®-M4 stretch performance line**
- ✓ **256K-3072K Flash, 256K-512K SRAM**
- ✓ **2.6-3.6V supply; 5V tolerance I/Os**
- ✓ **-40°C to +85°C industrial level operating temperature**
- ✓ **Series pin to pin compatible and flexible S/W compatible**



GD32F405/407 Portfolios



- ✓ GD32F405 and GD32F407 Cortex®-M4 connectivity line
- ✓ 512K-3072K Flash, 192K SRAM
- ✓ 2.6-3.6V supply; 5V tolerance I/Os
- ✓ -40°C to +85°C industrial level operating temperature
- ✓ Series pin to pin compatible and flexible S/W compatible

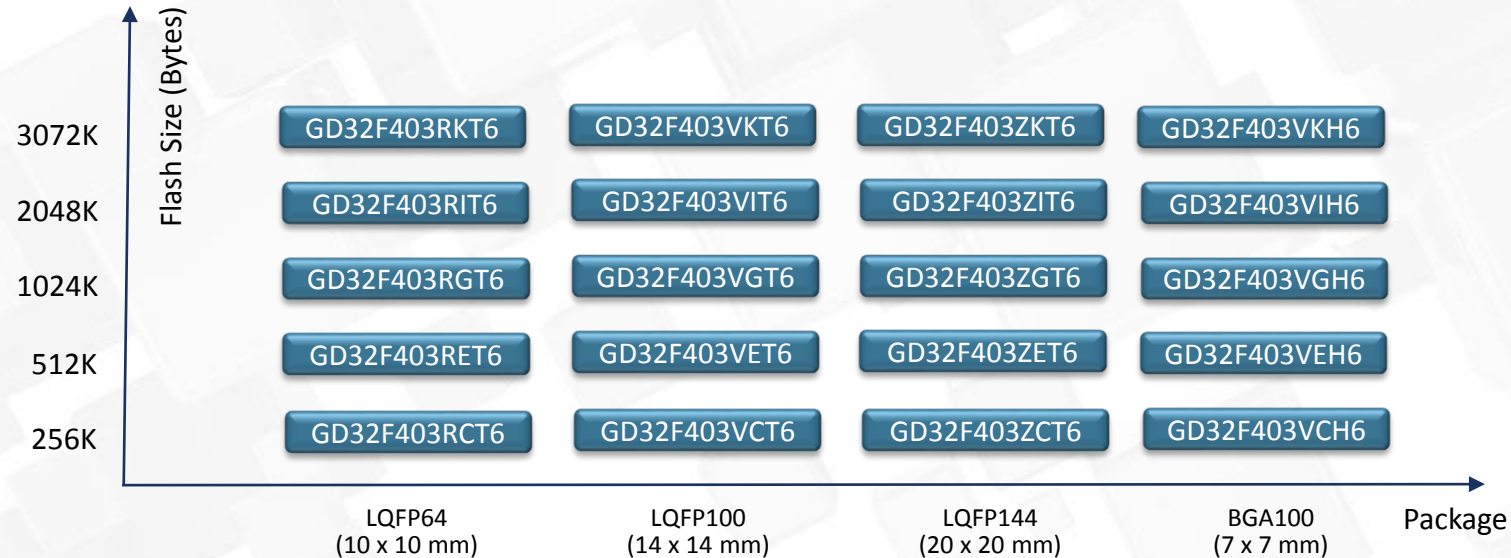


GD32F403 Portfolios



- ✓ **GD32F403 Cortex®-M4 performance line 168MHz**
- ✓ **256-3072KB Flash, 64-128KB SRAM**
- ✓ **2.6-3.6V supply; 5V tolerance I/Os**
- ✓ **-40°C to +85°C industrial level operating temperature**
- ✓ **Series pin to pin compatible and flexible S/W compatible**

**Performance
Balance**



GD32F3 Cortex[®]-M4 series

GD32F3

5 families from mainstream to value for mid-end and entry-end using of 32-bit MCUs.



GD32F307 Mainstream Connectivity – 120MHz Fcpu

- Cortex[®]-M4 Support Ethernet and USB OTG FS



GD32F305 Mainstream Connectivity – 120MHz Fcpu

- Support USB OTG FS with higher performance



GD32F303 Mainstream Balance – 120MHz Fcpu

- Best balance between performance, connectivity and cost



GD32F350 Value Connectivity – 108MHz Fcpu

- Value level with balance of CM4 performance and connectivity



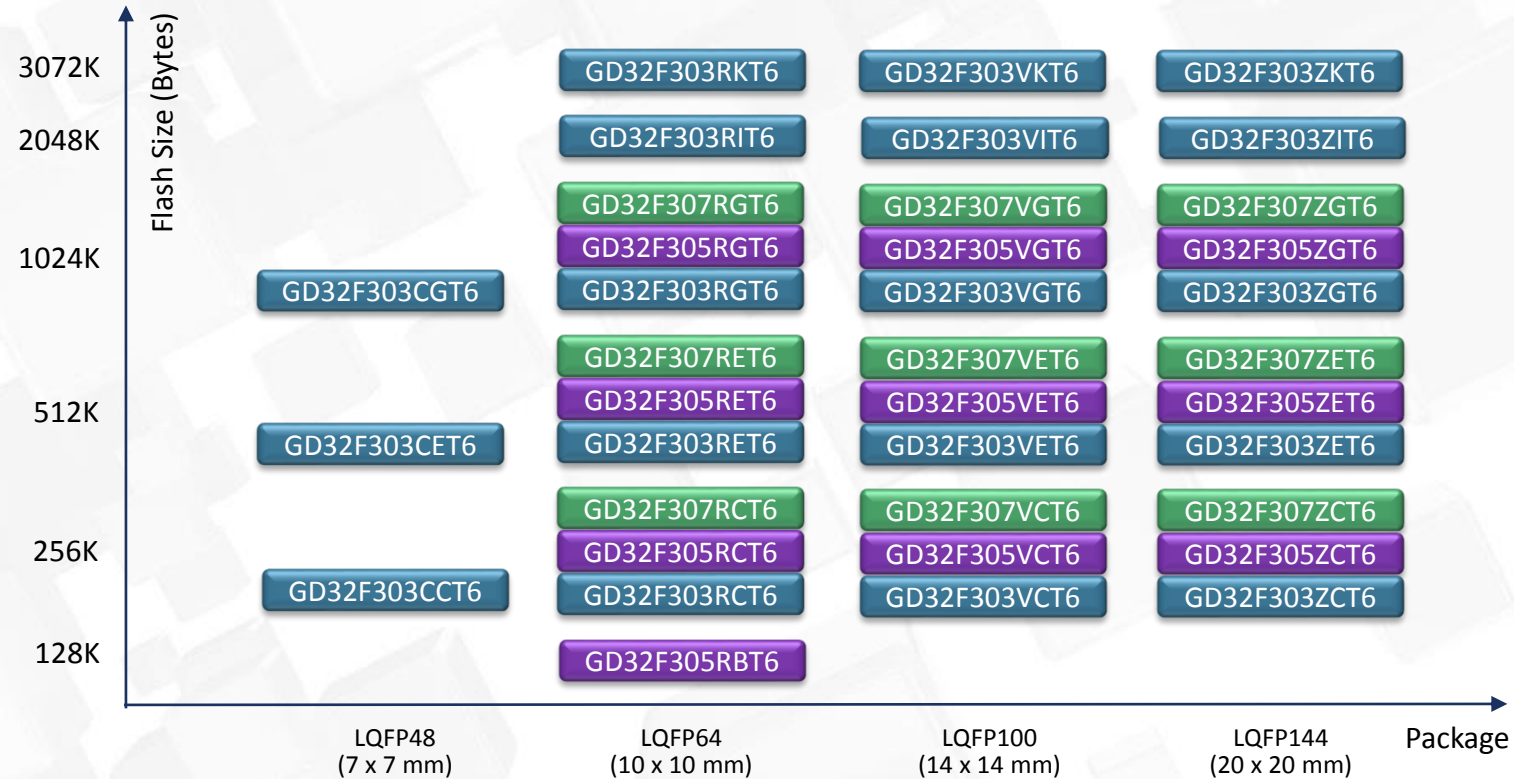
GD32F330 Value Entry – 84MHz Fcpu

- Value level for 32-bit entry and cost saver

GD32F30x Mainstream Portfolios



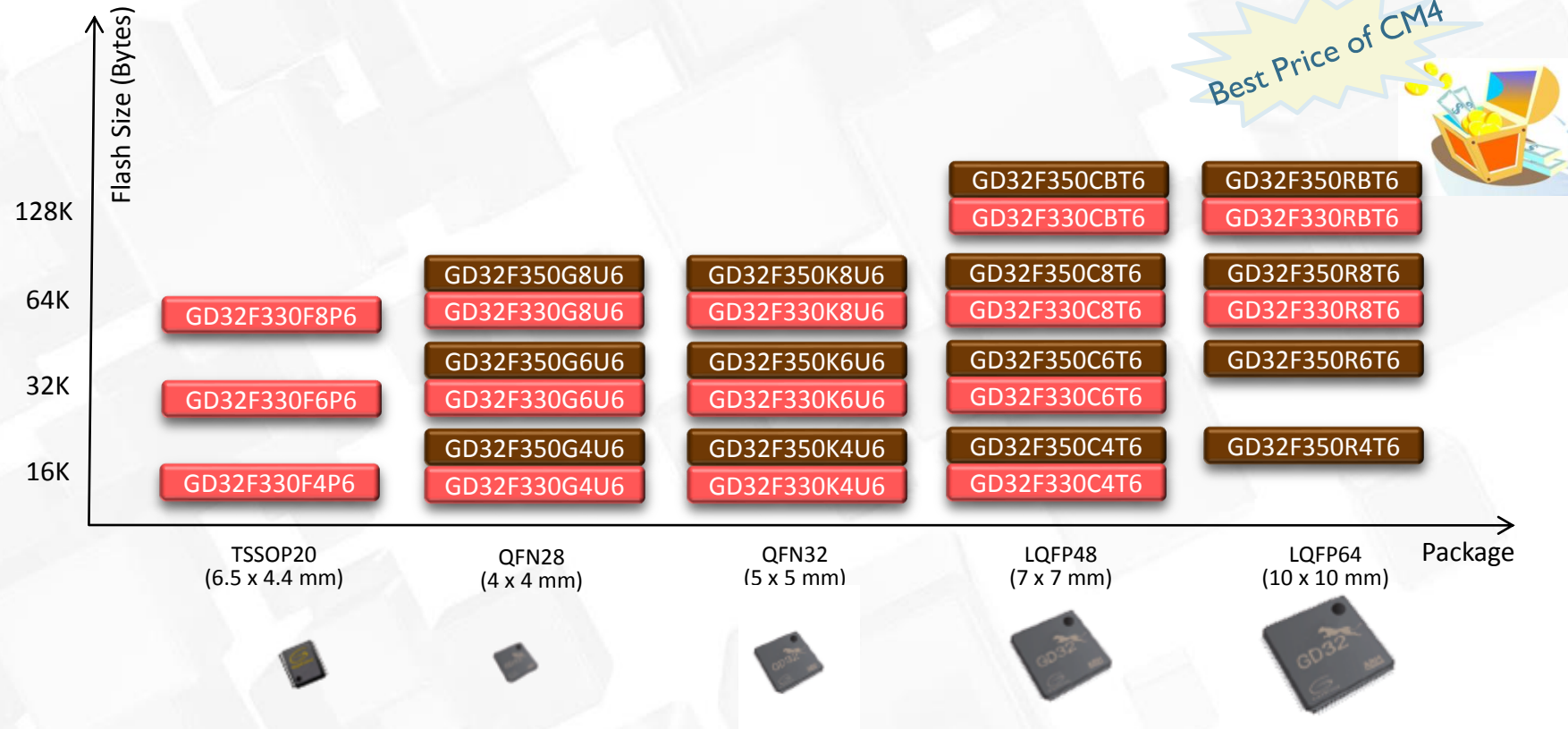
- ✓ **GD32F303/305/307 Cortex®-M4 mainstream line**
- ✓ **128-3072KB Flash, 48-96KB SRAM**
- ✓ **2.6-3.6V supply; 5V tolerance I/Os**
- ✓ **-40°C to +85°C industrial level operating temperature**
- ✓ **Series pin to pin compatible and flexible S/W compatible**



GD32F330/350 Value Portfolios



- ✓ **GD32F330 and GD32F350 value line**
- ✓ **16K-128K Flash, 4K-16K SRAM**
- ✓ **2.6-3.6V supply; 5V tolerance I/Os**
- ✓ **-40°C to +85°C industrial level operating temperature**
- ✓ **Series pin to pin compatible and flexible S/W compatible**



GD32F330/350 Advantage

GD32F3x0 series of value line Feature	Advantage
◆ ARM® Cortex-M4® 32-bit Core ◆ Flash access Zero wait-state ◆ 7 Channel DMA	Brings valued high-performance with higher real-time response speed
◆ 5 x 16-bit GP.Timer with PWM output ◆ 1 x 32-bit GP.Timer with PWM output ◆ 1 x Adv.Timer for 3-phase complementary output ◆ 1 x Basic counting Timer	Best choice for industrial control
10.5Mbit/s USART, 30Mbit/s SPI, 1MHz I2C	Basic communication interface integrated
◆ 12-bit 2.6M SPS ADC ◆ 12-bit DAC	Advanced analog peripherals integrated
2 * Watchdog, Calendar RTC POR/PDR/LVD, PLL, HSI/LSI	System cost down
Lowest Price down to U\$0.30/ea	BOM cost down for 8-bit & 16-bit upgrade

GD32F330Fxp6 Introduction



Simply entry CM4 with the best price!

- Cortex®-M4 Core @ 84 MHz
- Flash from 16 KB to 64 KB
- SRAM from 4 KB to 8 KB
- Up to 18KB ISP loader ROM
- Up to 2 x USART (10.5Mbit/s)
- Up to 2 x SPI (30Mbit/s)
- Up to 2 x I2C (1Mbit/s)
- 1 x 12bit, 2.6M SPS ADC (up to 9 chs),
- Three Power saving mode
- Battery supply for RTC and backup register
- Standby Current < 1uA

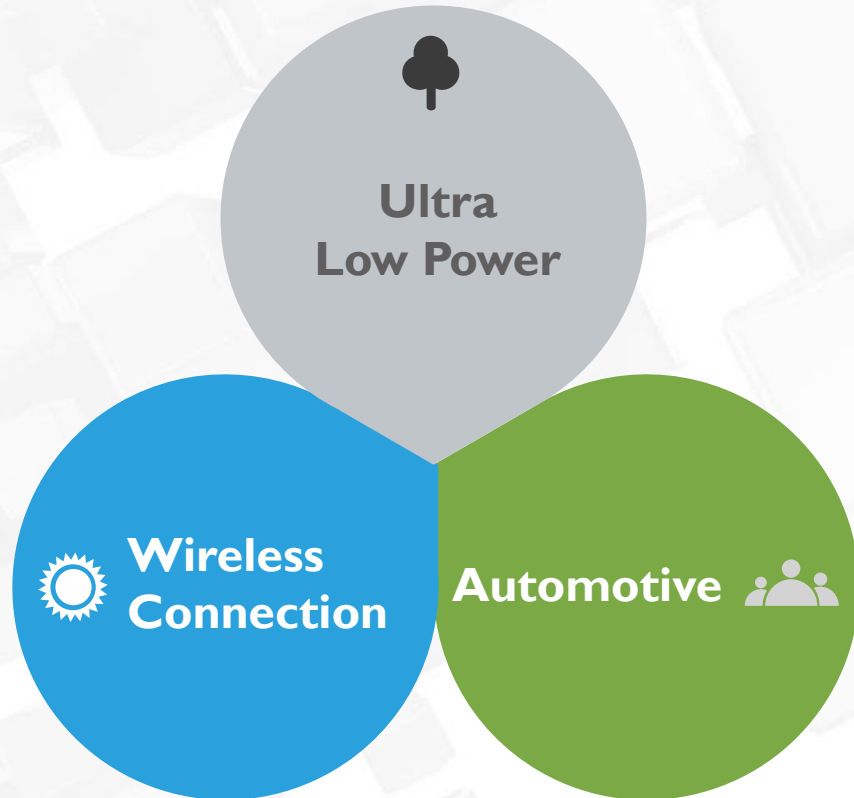
Price U\$0.30





Future Products

MCU Focus Application



Ultra Low Power

- Battery supply
- Portable application
- Wearable device

Wireless Connection

- WiFi
- BT5.x / BLE Audio
- Sub 1GHz
- LPWAN/NB-IoT

Automotive

- Automotive level (AEC-Q100/TS16949)
- Car body & ECU
- Navigation & Infotainment

GD32E103 Series New Products



- ✓ GD32E103 Cortex®-M4 enhance line
- ✓ 64K-128K Flash, 20K-32K SRAM
- ✓ **1.8-3.6V supply**; 5V tolerance I/Os; all support USB OTG & CAN FD
- ✓ -40°C to +85°C industrial level operating temperature
- ✓ Series pin to pin compatible and flexible S/W compatible



COMING
SOON



Market Applications

GD32 Typical Application Market

Card Reader

- IC & RFID card reader
- Access Control
- ETC



New Energy Control

- Battery Charging & discharging
- LED road lamp, LED display Wall
- Solar power station & MPPT



Industrial Control

- Motor Control
- Inverter
- Industrial PLC



Security & Surveillance

- Alarm
- Video surveillance dome
- Fire and CO monitor



Micro Printer

- POS
- Embedded printer
- Electronic payment

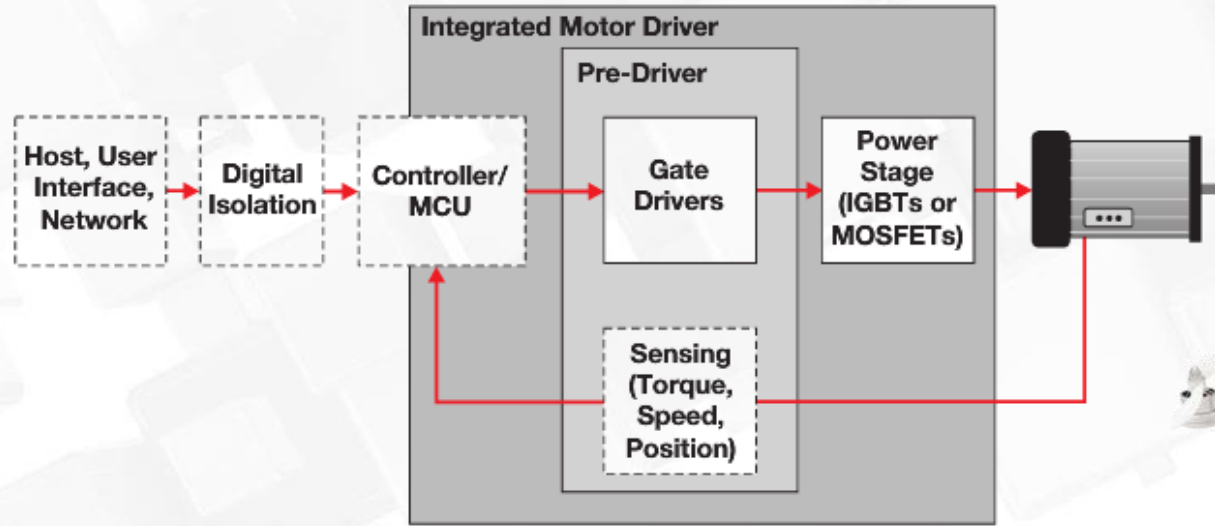


Medical & Health

- Oximeter, ECG
- Blood pressure meter
- Portable personal monitor



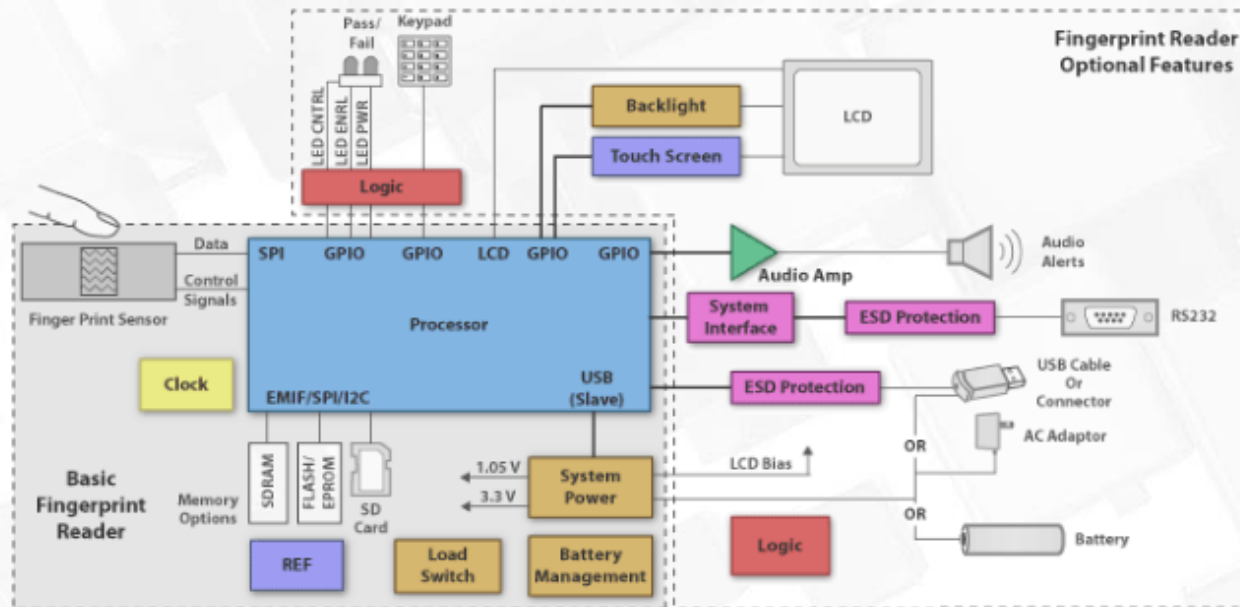
Focus Segment – Motor Control



- High performance processing
- Advanced ADC
- More analog peripherals integrated
- PWM control & FOC algorithm
- Sine wave & frequency conversion trend



Focus Segment – Fingerprint Identification



Widely used with rapid growth:

- Gate lock & safe case
- Identity card reader
- Tablet PC & Mobile
- Military application

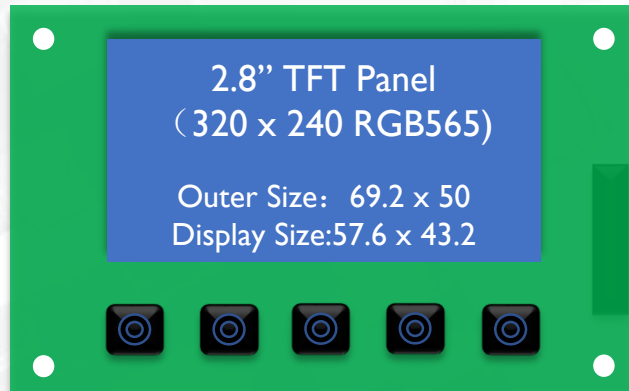


Focus Segment – Human Machine Interface



Segment LCD

- Drive Segment LCD directly
- Support up to 8 x 32 (8 COM and 32 SEG)
- LCD driver power supply from internal or input



TFT LCD

- Drive TFT LCD directly
- Support up to 1024 x 768
- TFT LCD driver integrated (GD32F4)
- Support capacitive touch node

Focus Segment – Wireless & Cloud



Huawei LiteOS eco-partner

- LiteOS implemented on GD32 platform link with Huawei Cloud & HiLink
- Boards, projects, solutions, Intelligent H/W, textbooks cooperation
- University program intensive cooperation

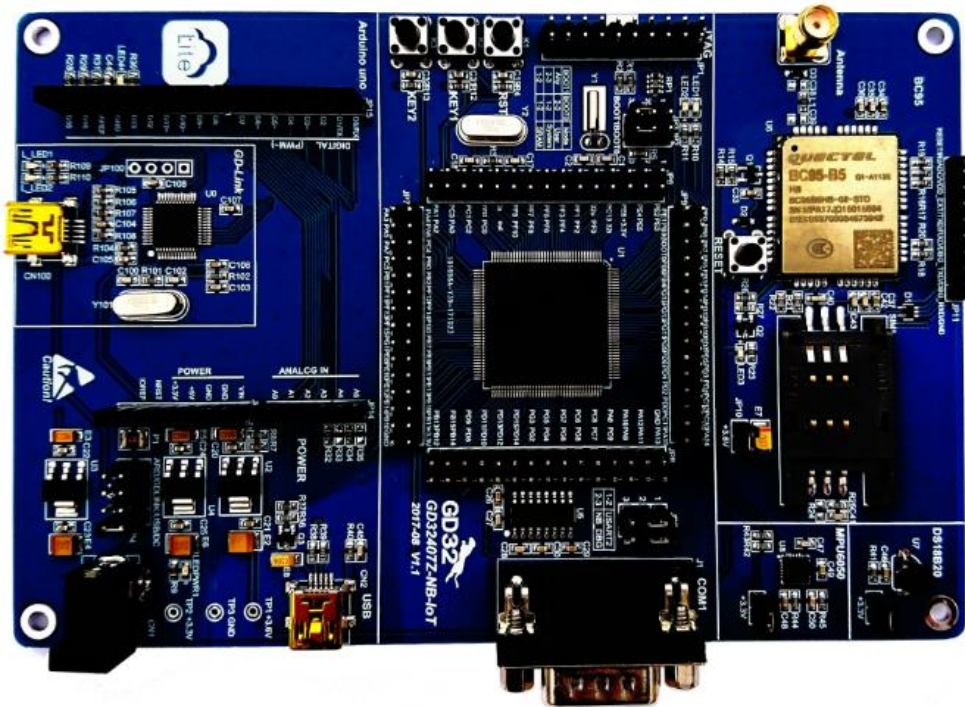


Alibaba YunOS eco-partner

- YunOS implemented on GD32 platform
- Boards, projects, solutions cooperation
- Support link to AliYun Cloud directly



GD32407Z-NB-IoT Full function Eval-board



Full function NB-IoT wireless Eval-board based on GD32F407ZKT6, with extension header of available I/Os for quick connection to prototyping board and easy probing.

- ◆ Support NB-IoT wireless connection with SIM-card.
- ◆ Support Huawei LiteOS & Huawei Cloud link
- ◆ Support peripherals Including: JTAG、BOOT、RTC、CAN、I2C、I2S、USART、SDIO、EXMC、SPI、ADC、DAC、USB 2.0 OTG
- ◆ GD-Link debugger & Programmer integrated
- ◆ Powered by USB port

Order code	Radio Frequency	Support Carrier	Retail Price
GD32407Z-NB-IoT/CT	850MHz	China Telecom	RMB 320
GD32407Z-NB-IoT/UM	900MHz	China Unicom China Mobile	RMB 320

IoT End Equipment

Intelligent Life



Smart lighting



Smart switch



Hoverboard



Smart healthcare



Robot



Drone



VR



Embedded WIFI module



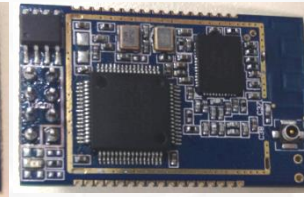
BLE Module



Gate Lock



Barcode scanning



Security

Industry Connectivity



RFID label



OBD

GD32 Development Eco-system

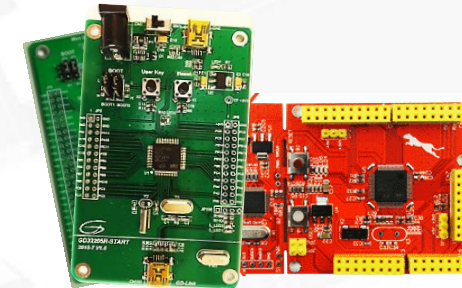
GD32 MCU full function Eval-board

- For on-chip function fully evaluation, including interfaces, external memory bus and LCD, etc.
- Extension header for available I/Os for quick connection to prototyping board and easy probing with onboard GD-link.



GD32 MCU learning starter kit

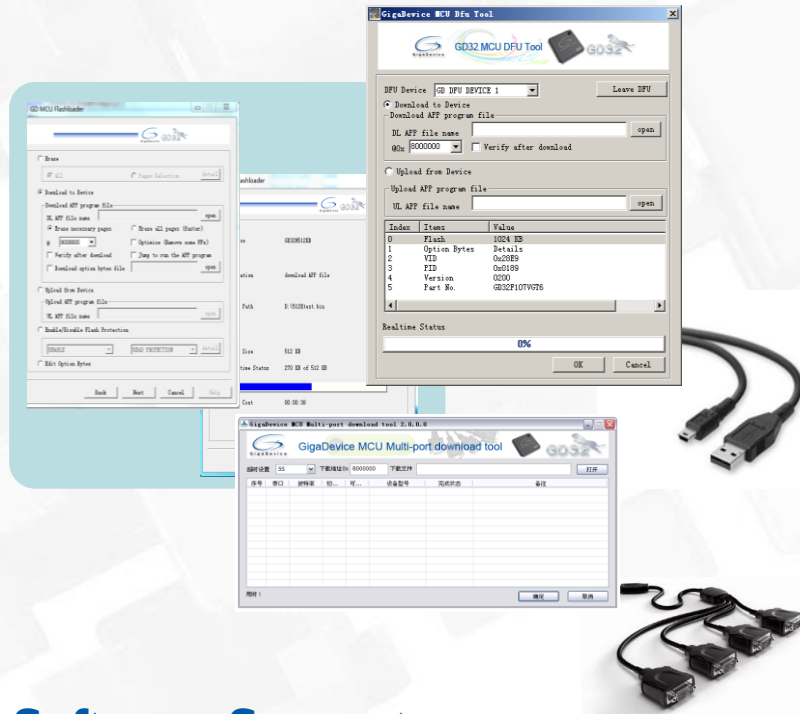
- Based on GD32 series MCU entry level starter kit, extension header for all package pins for quick connection to prototyping board and easy probing with onboard GD-link or other compatible simulators.
- Support Arduino compatible interface in selected model



Build GD32 development environment with H/W and S/W compatible



GD32 Development Tools



Software Support

- GD32 MCU ISP Programmer
- GD32 MCU DFU Tool
- GD32 MCU Multi-Port Download Tool



GD-Link 3-in-1 Tool

- GD-Link on-line Debugger
- GD-Link on-line Programmer
- GD-Link off-line Programmer

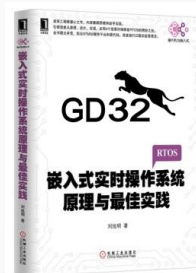
GD32 Development Tools



Products of Development Tools and Boards



Events & Activities



Programs for Teaching & Learning

- 01_GPIO_LED
- 02_GPIO_KeyBoard_Polling_mode
- 03_GPIO_KeyBoard_Interrupt_mode
- 04_USART1_Printf
- 05_USART1_Echo_Interrupt_mode
- 06_USART1_DMA
- 07_I2C_EEPROM
- 08_SPI_QSPI_Flash
- 09_EXMC_NandFlash
- 10_SDIO_SDCardTest
- 11_RTC_Calendar
- 12_ADC_Temperature_Sensor_REFINT_Channel
- 13_DAC_Output_Voltage_Value
- 14_CAN_Dual_CAN
- 15_CRYP
- 16_HASH
- 17_RNG
- 18_TLDI_without_GUI
- 19_Tamper_Waveform_Detection
- 20_USB_OTG_Device_Mouse
- 21_USB_OTG_Device_Usb_disk
- 22_USB_OTG_Device_VirtualCOMPort
- 23_USB_OTG_Host_Accesses_Usb_disk
- 24_ETH

Thanks!

Product Line

Multiplex products
Best peripherals

Series compatible
Easy to use

Eco-system



Service

Sufficient Capacity
Fast lead time

High Performance
Cost-effective

Quality



www.GD32MCU.com