

PRODUCT SELECTION GUIDE



About Us

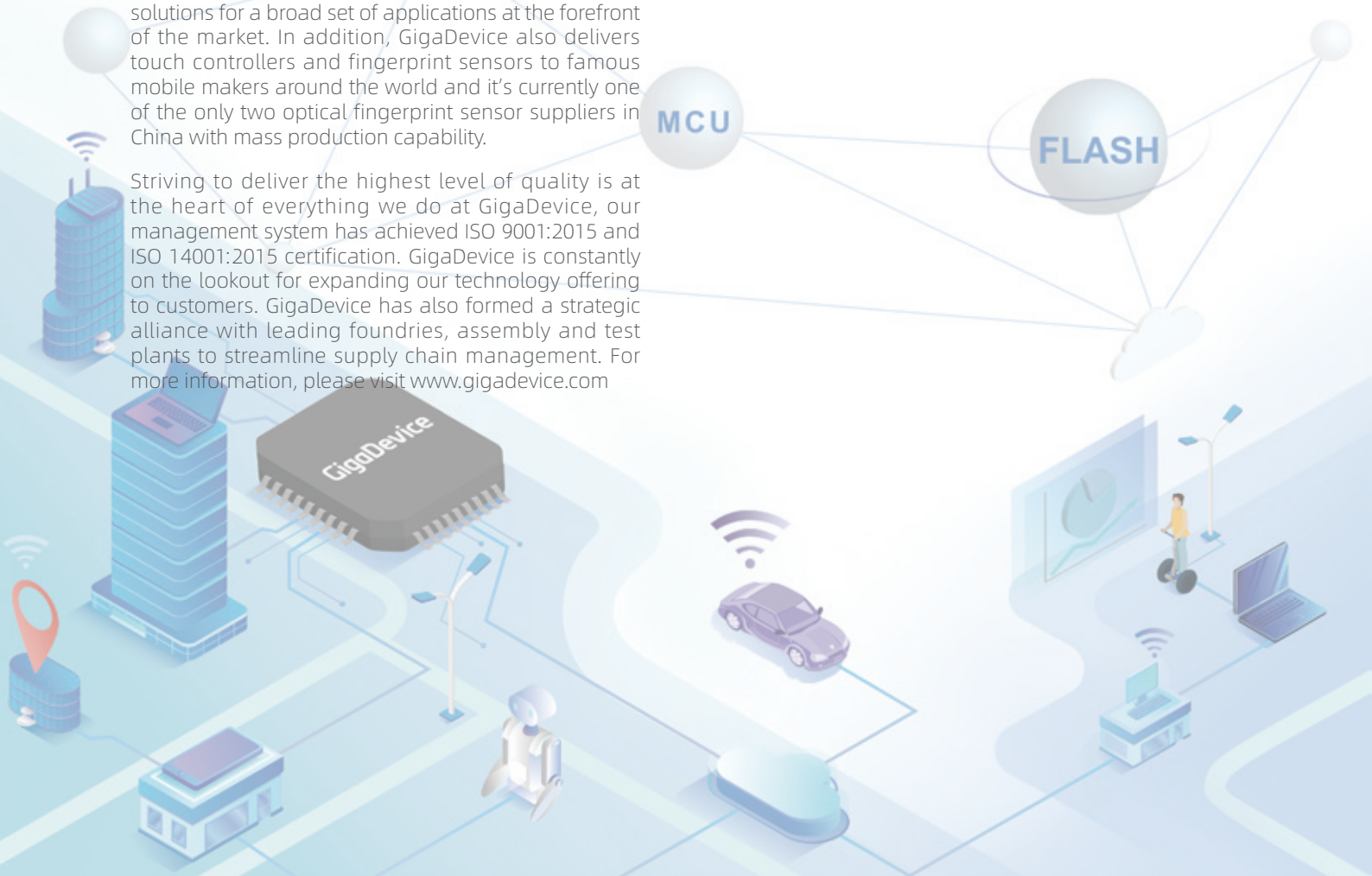
Founded in 2005 and headquartered in Beijing, GigaDevice Semiconductor (Beijing) Inc. was successfully listed on the Shanghai Stock Exchange in August 2016. With more than 800 employees, GigaDevice is a leading fabless semiconductor company dedicated to developing advanced memory technologies, MCU and sensor solutions. It is a global company with branch offices located in Beijing, Shanghai, Shenzhen, Hefei, Xi'an, Chengdu, Suzhou, Taiwan, the United States, South Korea, Japan, the United Kingdom, and Singapore, providing local support at customers' fingertips.

GigaDevice has three major product lines: FLASH memory, 32-bit general-purpose MCU and intelligent Human-Machine Interface (HMI) sensor chips. Having dedicated to high performance, low power products, GigaDevice offers turnkey solutions for market segments ranging from industrial, automotive, computing, consumer, IoT, mobile application to network/telecommunications. GigaDevice is currently ranked as the No. 1 SPI NOR FLASH supplier in China and No. 3 in the worldwide with an annual shipment of over 2 billion units and accumulated shipments over 10 billion since its inception. GigaDevice GD32 MCU is a leader in China's high performance 32-bit general-purpose microcontroller market. With a total of more than 300 million units shipped and over 350 products for selection in 24 family series, GigaDevice can provide solutions for a broad set of applications at the forefront of the market. In addition, GigaDevice also delivers touch controllers and fingerprint sensors to famous mobile makers around the world and it's currently one of the only two optical fingerprint sensor suppliers in China with mass production capability.

Striving to deliver the highest level of quality is at the heart of everything we do at GigaDevice, our management system has achieved ISO 9001:2015 and ISO 14001:2015 certification. GigaDevice is constantly on the lookout for expanding our technology offering to customers. GigaDevice has also formed a strategic alliance with leading foundries, assembly and test plants to streamline supply chain management. For more information, please visit www.gigadevice.com

Contents

- 01 > GD32 MCU
- 16 > SPI NOR Flash
- 24 > SPI NAND Flash
- 26 > Parallel NAND Flash
- 28 > Flash Package Options
- 30 > Sensor



ARM Powered®

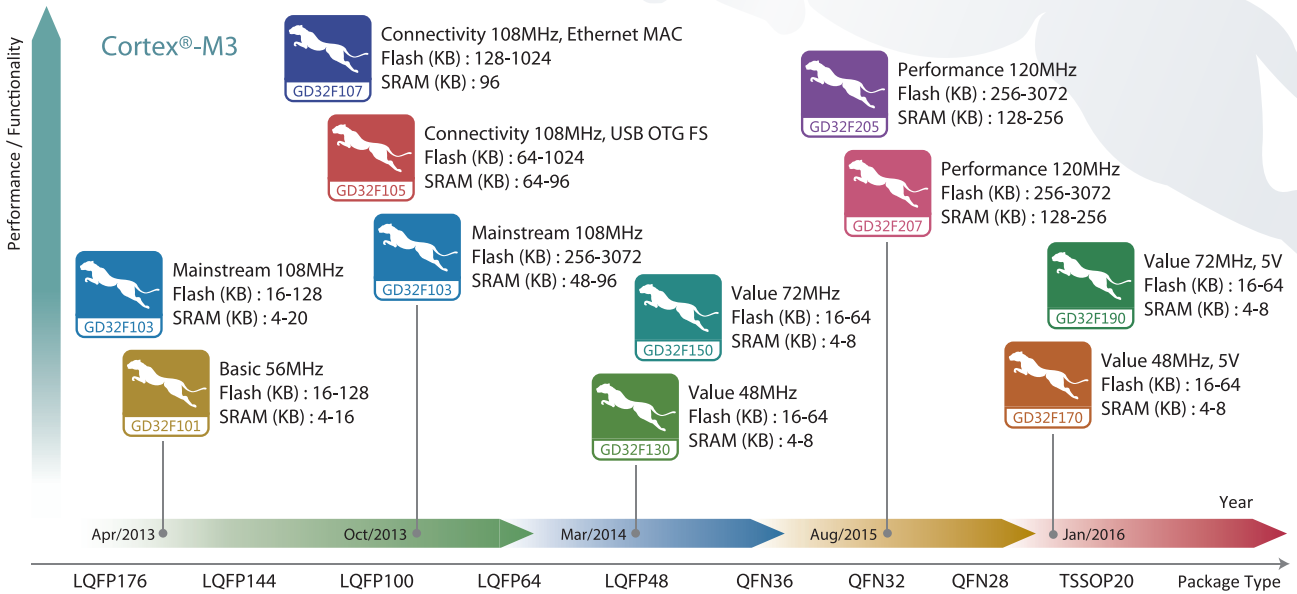
ARM CORTEX
Processor Technology

ARM University
Worldwide Education Program

ARM Connected Community

GD32 MCU

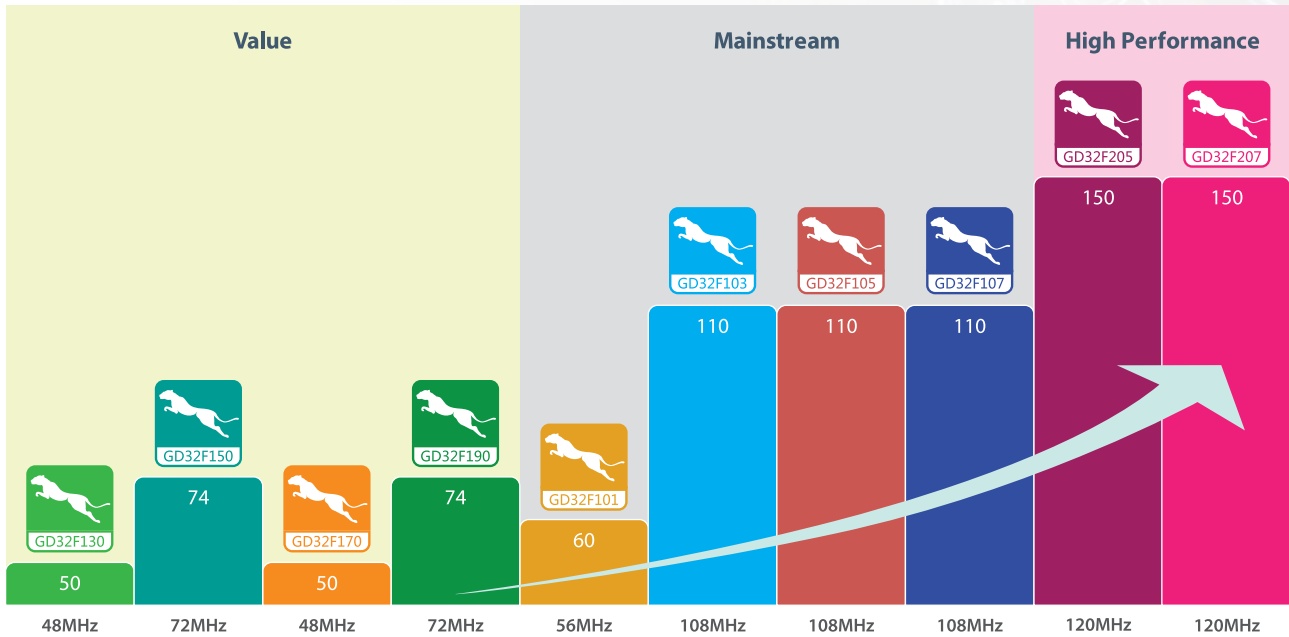
GD32 Cortex®-M3 MCU Portfolios



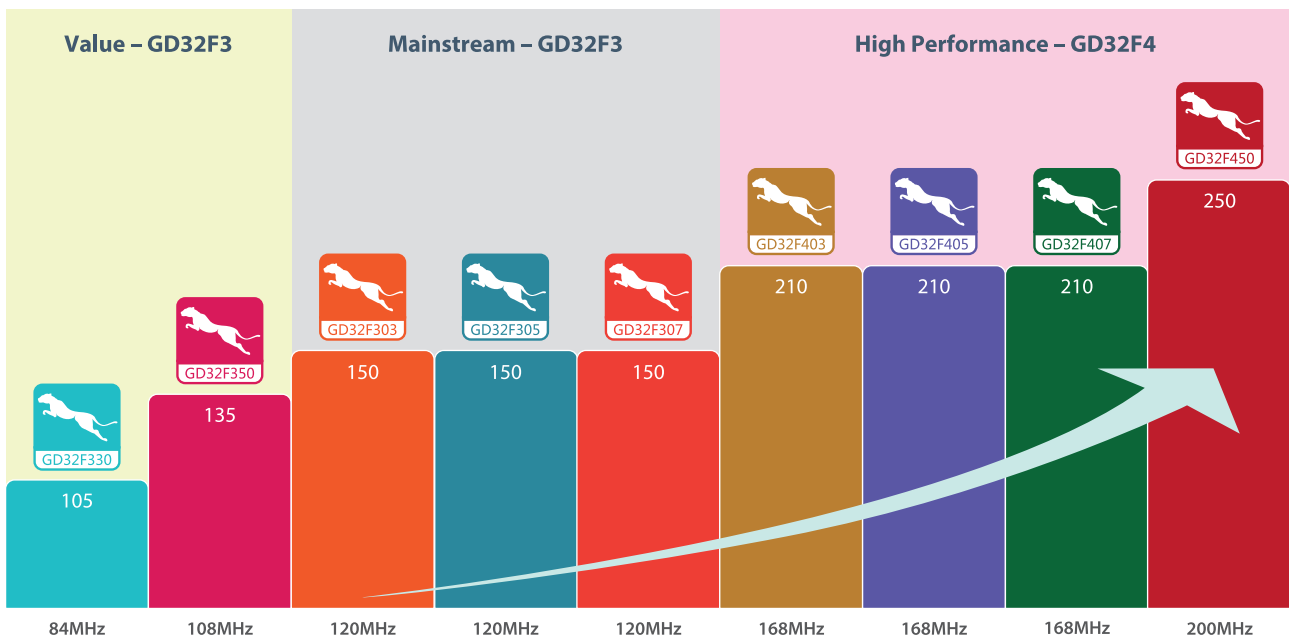
GD32 Cortex®-M4 MCU Portfolios



GD32 Cortex®-M3 MCU 200+ Part numbers



GD32 Cortex®-M4 MCU 100+ Part numbers



GD32 Cortex®-M23 MCU 20+ Part numbers



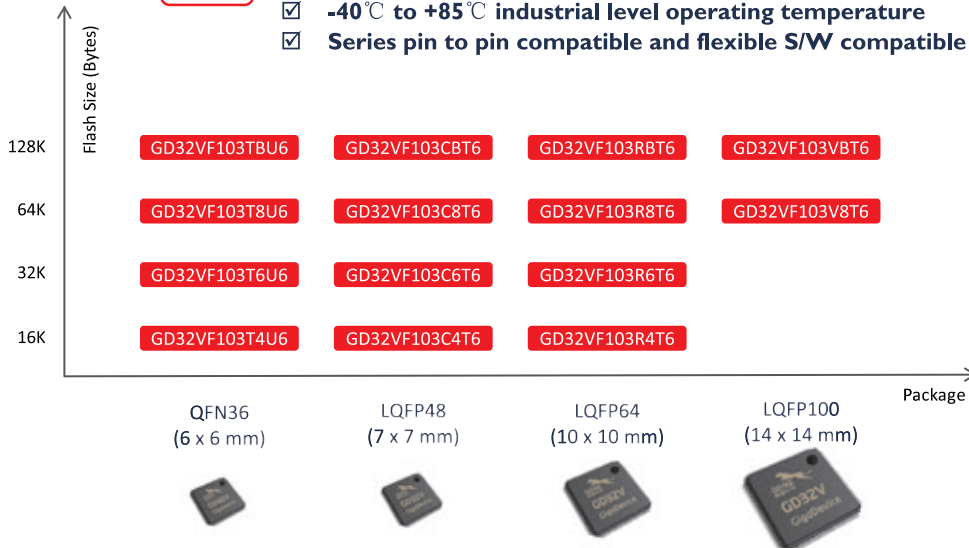
- ☑ **GD32E230 & GD32E231 & GD32E232 Arm Cortex®-M23 value line @ 72MHz**
- ☑ **16K-64K Flash, 4K-8K SRAM**
- ☑ **1.8-3.6V supply; 5V tolerance I/Os**
- ☑ **-40°C to +85°C industrial level operating temperature**
- ☑ **Series pin to pin compatible and flexible S/W compatible**



GD32VF103 RISC-V MCU 14 Part numbers



- ☑ **GD32VF103 RISC-V Bumblebee Core Mainstream Line**
- ☑ **Max F_{cpu} 108MHz, 16K-128K Flash, 6K-32K SRAM**
- ☑ **2.6-3.6V supply; 5V tolerance I/Os; all support USB OTG & CAN 2.0B**
- ☑ **-40°C to +85°C industrial level operating temperature**
- ☑ **Series pin to pin compatible and flexible S/W compatible**



GD32 Arm® MCU Product Family

Performance		Arm® Cortex®-M 32-bit MCUs					
		Cortex®-M23	Cortex®-M3		Cortex®-M4		
GD32 MCU Family	High-Performance				GD32F450 200MHz, 3M Flash, 512K RAM	GD32F407 168MHz, 3M Flash, 192K RAM	
			GD32F205 120MHz, 3M Flash, 256K RAM	GD32F207 120MHz, 3M Flash, 256K RAM	GD32F405 168MHz, 3M Flash, 192K RAM	GD32F403 168MHz, 3M Flash, 128K RAM	
	Mainstream		GD32F105 108MHz, 1M Flash, 96K RAM	GD32F107 108MHz, 1M Flash, 96K RAM	GD32F305 120MHz, 1M Flash, 96K RAM	GD32F307 120MHz, 1M Flash, 96K RAM	
			GD32F103 108MHz, 3M Flash, 96K RAM	GD32F101 56MHz, 3M Flash, 80K RAM	GD32F303 120MHz, 3M Flash, 96K RAM	GD32E103 120MHz, 128K Flash, 32K RAM	
	Entry-Level		GD32E232 72MHz, 64K Flash, 8K RAM				
		GD32E231 72MHz, 64K Flash, 8K RAM	GD32F170 48MHz, 64K Flash, 8K RAM	GD32F190 72MHz, 64K Flash, 8K RAM			
		GD32E230 72MHz, 64K Flash, 8K RAM	GD32F130 48MHz, 64K Flash, 8K RAM	GD32F150 72MHz, 64K Flash, 8K RAM	GD32F330 84MHz, 128K Flash, 16K RAM	GD32F350 108MHz, 128K Flash, 16K RAM	
Specific				GD32FFPR 168MHz, 1M Flash, 128K RAM			

MCU Package Types

LQFP176 (24*24mm)	LQFP144 (20*20mm)	LQFP100 (14*14mm)	LQFP64 (10*10mm)	LQFP48 (7*7mm)	LQFP32 (7*7mm)			
								
BGA176 (10*10mm)	BGA100 (7*7mm)	QFN36 (6*6mm)	QFN32 (5*5mm)	QFN32 (4*4mm)	QFN28 (4*4mm)	QFN24 (3*3mm)	TSSOP20 (6.5*4.4mm)	LGA20 (3*3mm)
								

GD32 Development Ecosystem



GD32V series of 32-bit RISC-V MCUs Selection Guide



Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity							EXMC	Analog Interface		Package	
			Flash	SRAM		GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART+UART	I ² C	SPI	CAN 2.0B	USB 2.0 FS	I ² S	SDIO		Ether-net	12bit ADC Units (CHs)		12bit DAC Units
GD32VF103	GD32VF103T4U6	108	16K	6K	up to 26	2	1	2	1	2	1	2+0	1	1	2	OTG					2(10)	2	QFN36
	GD32VF103T6U6	108	32K	10K	up to 26	2	1	2	1	2	1	2+0	1	1	2	OTG					2(10)	2	QFN36
	GD32VF103T8U6	108	64K	20K	up to 26	4	1	2	1	2	1	2+0	1	1	2	OTG					2(10)	2	QFN36
	GD32VF103TBU6	108	128K	32K	up to 26	4	1	2	1	2	1	2+0	1	1	2	OTG					2(10)	2	QFN36
	GD32VF103C4T6	108	16K	6K	up to 37	2	1	2	1	2	1	2+0	1	1	2	OTG					2(10)	2	LQFP48
	GD32VF103C6T6	108	32K	10K	up to 37	2	1	2	1	2	1	2+0	1	1	2	OTG					2(10)	2	LQFP48
	GD32VF103C8T6	108	64K	20K	up to 37	4	1	2	1	2	1	3+0	2	3	2	OTG	2				2(10)	2	LQFP48
	GD32VF103CBT6	108	128K	32K	up to 37	4	1	2	1	2	1	3+0	2	3	2	OTG	2				2(10)	2	LQFP48
	GD32VF103R4T6	108	16K	6K	up to 51	2	1	2	1	2	1	2+0	1	1	2	OTG					2(16)	2	LQFP64
	GD32VF103R6T6	108	32K	10K	up to 51	2	1	2	1	2	1	2+0	1	1	2	OTG					2(16)	2	LQFP64
	GD32VF103R8T6	108	64K	20K	up to 51	4	1	2	1	2	1	3+2	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32VF103RBT6	108	128K	32K	up to 51	4	1	2	1	2	1	3+2	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32VF103V8T6	108	64K	20K	up to 80	4	1	2	1	2	1	3+2	2	3	2	OTG	2			•	2(16)	2	LQFP100
GD32VF103VBT6	108	128K	32K	up to 80	4	1	2	1	2	1	3+2	2	3	2	OTG	2			•	2(16)	2	LQFP100	

GD32E23x series of 32-bit ARM® Cortex®-M23 MCUs Selection Guide

Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity							Analog Interface		Package		
			Flash	SRAM		GPTM (32bit)	GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART	I ² C	SPI	USB 2.0 FS	I ² S	Comp	OP-AMP	12bit ADC Units (CHs)		12bit DAC Units	
GD32E230	GD32E230F4P6	72	16K	4K	up to 15		4	1	1	1	2	1	1	1	1		1	1			1(9)		TSSOP20
	GD32E230F6P6	72	32K	6K	up to 15		4	1	1	1	2	1	2	1	1		1	1			1(9)		TSSOP20
	GD32E230F8P6	72	64K	8K	up to 15		4	1	1	1	2	1	2	2	2		1	1			1(9)		TSSOP20
	GD32E230F4V6	72	16K	4K	up to 15		4	1	1	1	2	1	1	1	1		1	1			1(9)		LGA20
	GD32E230F6V6	72	32K	6K	up to 15		4	1	1	1	2	1	2	1	1		1	1			1(9)		LGA20
	GD32E230F8V6	72	64K	8K	up to 15		4	1	1	1	2	1	2	2	2		1	1			1(9)		LGA20
	GD32E230G4U6	72	16K	4K	up to 23		4	1	1	1	2	1	1	1	1		1	1			1(10)		QFN28
	GD32E230G6U6	72	32K	6K	up to 23		4	1	1	1	2	1	2	1	1		1	1			1(10)		QFN28
	GD32E230G8U6	72	64K	8K	up to 23		5	1	1	1	2	1	2	2	2		1	1			1(10)		QFN28
	GD32E230K4U6	72	16K	4K	up to 27		4	1	1	1	2	1	1	1	1		1	1			1(10)		QFN32
	GD32E230K6U6	72	32K	6K	up to 27		4	1	1	1	2	1	2	1	1		1	1			1(10)		QFN32
	GD32E230K8U6	72	64K	8K	up to 27		5	1	1	1	2	1	2	2	2		1	1			1(10)		QFN32
	GD32E230K4T6	72	16K	4K	up to 25		4	1	1	1	2	1	1	1	1		1	1			1(10)		LQFP32

Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity						Analog Interface		Package		
			Flash	SRAM		GPTM (32bit)	GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART	I ² C	SPI	USB 2.0 FS	I ² S	Comp	OP-AMP		12bit ADC Units (CHs)	12bit DAC Units
GD32E230	GD32E230K6T6	72	32K	6K	up to 25		4	1	1	1	2	1	2	1	1		1	1		1(10)		LQFP32
	GD32E230K8T6	72	64K	8K	up to 25		5	1	1	1	2	1	2	2	2		1	1		1(10)		LQFP32
	GD32E230C4T6	72	16K	4K	up to 39		4	1	1	1	2	1	1	1	1		1	1		1(10)		LQFP48
	GD32E230C6T6	72	32K	6K	up to 39		4	1	1	1	2	1	2	1	1		1	1		1(10)		LQFP48
	GD32E230C8T6	72	64K	8K	up to 39		5	1	1	1	2	1	2	2	2		1	1		1(10)		LQFP48
GD32E231	GD32E231C4T6	72	16K	4K	up to 39		4	1	1	1	2	1	1	1	1		1	1	2	1(10)		LQFP48
	GD32E231C6T6	72	32K	6K	up to 39		4	1	1	1	2	1	2	1	1		1	1	2	1(10)		LQFP48
	GD32E231C8T6	72	64K	8K	up to 39		5	1	1	1	2	1	2	2	2		1	1	2	1(10)		LQFP48
GD32E232	GD32E232E4U7	72	16K	4K	up to 23	1	4	1	2	1	2	1	2	2	1		1			1(13)	4	QFN24
	GD32E232E6U7	72	32K	6K	up to 23	1	4	1	2	1	2	1	2	2	1		1			1(13)	4	QFN24
	GD32E232E8U7	72	64K	8K	up to 23	1	5	1	2	1	2	1	2	2	2		1			1(13)	4	QFN24
	GD32E232K4Q7	72	16K	4K	up to 28	1	4	1	2	1	2	1	2	2	1		1			1(16)	4	QFN32
	GD32E232K6Q7	72	32K	6K	up to 28	1	4	1	2	1	2	1	2	2	1		1			1(16)	4	QFN32
	GD32E232K8Q7	72	64K	8K	up to 28	1	5	1	2	1	2	1	2	2	2		1			1(16)	4	QFN32

GD32E1 series of 32-bit ARM® Cortex®-M4F MCUs Selection Guide



Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity						EXMC	Analog Interface		Package		
			Flash	SRAM		GPTM (16bit)	Adv TM (16bit)	Bsc TM (16bit)	SysTick (24bit)	WDG	RTC	USART +UART	I ² C	SPI	CAN 2.0B	USB 2.0 FS	I ² S		SDIO	Ether-net		12bit ADC Units (CHs)	12bit DAC Units
GD32E103	GD32E103T8U6	120	64K	20K	up to 26	4	1	2	1	2	1	2+0	1	1	2 x FD	OTG					2(10)	2	QFN36
	GD32E103TBU6	120	128K	32K	up to 26	4	1	2	1	2	1	2+0	1	1	2 x FD	OTG					2(10)	2	QFN36
	GD32E103C8T6	120	64K	20K	up to 37	10	1	2	1	2	1	3+0	2	3	2 x FD	OTG	2				2(10)	2	LQFP48
	GD32E103CBT6	120	128K	32K	up to 37	10	1	2	1	2	1	3+0	2	3	2 x FD	OTG	2				2(10)	2	LQFP48
	GD32E103R8T6	120	64K	20K	up to 51	10	2	2	1	2	1	3+2	2	3	2 x FD	OTG	2				2(16)	2	LQFP64
	GD32E103RBT6	120	128K	32K	up to 51	10	2	2	1	2	1	3+2	2	3	2 x FD	OTG	2				2(16)	2	LQFP64
	GD32E103V8T6	120	64K	20K	up to 80	10	2	2	1	2	1	3+2	2	3	2 x FD	OTG	2			•	2(16)	2	LQFP100
	GD32E103VBT6	120	128K	32K	up to 80	10	2	2	1	2	1	3+2	2	3	2 x FD	OTG	2			•	2(16)	2	LQFP100

GD32F4 series of 32-bit ARM® Cortex®-M4F MCUs Selection Guide



Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity										EXMC/SDRAM	Analog Interface		Package	
			Flash	SRAM		GPTM (16bit)	Adv TM (16bit)	GPTM (32bit)	Bsc TM (16bit)	WDG	RTC	USART+UART	I ² C	SPI	CAN 2.0B	USB OTG	I ² S	SDIO	LCD-TFT	Camera	ETH MAC		IPA	12bit ADC Units (CHs)		12bit DAC Units
GD32F450	GD32F450VET6	200	512K	256K	up to 82	8	2	2	2	2	1	4+4	3	5	2	FS+HS	2	1	1	1	1	1	1/0	3(16)	2	LQFP100
	GD32F450VGT6	200	1024K	256K	up to 82	8	2	2	2	2	1	4+4	3	5	2	FS+HS	2	1	1	1	1	1	1/0	3(16)	2	LQFP100
	GD32F450VIT6	200	2048K	512K	up to 82	8	2	2	2	2	1	4+4	3	5	2	FS+HS	2	1	1	1	1	1	1/0	3(16)	2	LQFP100
	GD32F450VKT6	200	3072K	256K	up to 82	8	2	2	2	2	1	4+4	3	5	2	FS+HS	2	1	1	1	1	1	1/0	3(16)	2	LQFP100
	GD32F450ZET6	200	512K	256K	up to 114	8	2	2	2	2	1	4+4	3	6	2	FS+HS	2	1	1	1	1	1	1/1	3(24)	2	LQFP144
	GD32F450ZGT6	200	1024K	256K	up to 114	8	2	2	2	2	1	4+4	3	6	2	FS+HS	2	1	1	1	1	1	1/1	3(24)	2	LQFP144
	GD32F450ZIT6	200	2048K	512K	up to 114	8	2	2	2	2	1	4+4	3	6	2	FS+HS	2	1	1	1	1	1	1/1	3(24)	2	LQFP144
	GD32F450ZKT6	200	3072K	256K	up to 114	8	2	2	2	2	1	4+4	3	6	2	FS+HS	2	1	1	1	1	1	1/1	3(24)	2	LQFP144
	GD32F450IGH6	200	1024K	256K	up to 140	8	2	2	2	2	1	4+4	3	6	2	FS+HS	2	1	1	1	1	1	1/1	3(24)	2	BGA176
	GD32F450IHH6	200	2048K	512K	up to 140	8	2	2	2	2	1	4+4	3	6	2	FS+HS	2	1	1	1	1	1	1/1	3(24)	2	BGA176
GD32F450IKH6	200	3072K	256K	up to 140	8	2	2	2	2	1	4+4	3	6	2	FS+HS	2	1	1	1	1	1	1/1	3(24)	2	BGA176	
GD32F405	GD32F405RET6	168	512K	192K	up to 51	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1				3(16)	2	LQFP64
	GD32F405RGT6	168	1024K	192K	up to 51	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1				3(16)	2	LQFP64
	GD32F405RKT6	168	3072K	192K	up to 51	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1				3(16)	2	LQFP64
	GD32F405VGT6	168	1024K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1				3(16)	2	LQFP100
	GD32F405VKT6	168	3072K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1				3(16)	2	LQFP100
	GD32F405VGH6	168	1024K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1				3(16)	2	BGA100
	GD32F405VKH6	168	3072K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1				3(16)	2	BGA100
	GD32F405ZGT6	168	1024K	192K	up to 114	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1				3(24)	2	LQFP144
	GD32F405ZKT6	168	3072K	192K	up to 114	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1				3(24)	2	LQFP144
GD32F407	GD32F407RET6	168	512K	192K	up to 51	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1			3(16)	2	LQFP64
	GD32F407RGT6	168	1024K	192K	up to 51	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1			3(16)	2	LQFP64
	GD32F407RKT6	168	3072K	192K	up to 51	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1			3(16)	2	LQFP64
	GD32F407VET6	168	512K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/0	3(16)	2	LQFP100
	GD32F407VGT6	168	1024K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/0	3(16)	2	LQFP100
	GD32F407VKT6	168	3072K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/0	3(16)	2	LQFP100
	GD32F407VEH6	168	512K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/0	3(16)	2	BGA100
	GD32F407VGH6	168	1024K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/0	3(16)	2	BGA100
	GD32F407VKH6	168	3072K	192K	up to 82	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/0	3(16)	2	BGA100
	GD32F407ZET6	168	512K	192K	up to 114	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/1	3(24)	2	LQFP144
	GD32F407ZGT6	168	1024K	192K	up to 114	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/1	3(24)	2	LQFP144
	GD32F407ZKT6	168	3072K	192K	up to 114	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/1	3(24)	2	LQFP144
	GD32F407IEH6	168	512K	192K	up to 140	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/1	3(24)	2	BGA176
	GD32F407IGH6	168	1024K	192K	up to 140	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/1	3(24)	2	BGA176
	GD32F407IKH6	168	3072K	192K	up to 140	8	2	2	2	2	1	4+2	3	3	2	FS+HS	2	1		1	1		1/1	3(24)	2	BGA176

Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity										EXMC/SDRAM	Analog Interface		Package		
			Flash	SRAM		GPTM (16bit)	Adv TM (16bit)	GPTM (32bit)	Bsc TM (16bit)	WDG	RTC	USART +UART	I ² C	SPI	CAN 2.0B	USB OTG	I ² S	SDIO	LCD-TFT	Cam era	ETH MAC		IPA	12bit ADC Units (Chs)		12bit DAC Units	
GD32F403	GD32F403RCT6	168	256K	64K	up to 51	8	2		2	2	1	3+2	2	3	2	OTG	2	1						0/0	3(16)	2	LQFP64
	GD32F403RET6	168	512K	96K	up to 51	8	2		2	2	1	3+2	2	3	2	OTG	2	1						0/0	3(16)	2	LQFP64
	GD32F403RGT6	168	1024K	128K	up to 51	8	2		2	2	1	3+2	2	3	2	OTG	2	1						0/0	3(16)	2	LQFP64
	GD32F403RIT6	168	2048K	128K	up to 51	8	2		2	2	1	3+2	2	3	2	OTG	2	1						0/0	3(16)	2	LQFP64
	GD32F403RKT6	168	3072K	128K	up to 51	8	2		2	2	1	3+2	2	3	2	OTG	2	1						0/0	3(16)	2	LQFP64
	GD32F403VCT6	168	256K	64K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	LQFP100
	GD32F403VET6	168	512K	96K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	LQFP100
	GD32F403VGT6	168	1024K	128K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	LQFP100
	GD32F403VIT6	168	2048K	128K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	LQFP100
	GD32F403VKT6	168	3072K	128K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	LQFP100
	GD32F403VCH6	168	256K	64K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	BGA100
	GD32F403VEH6	168	512K	96K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	BGA100
	GD32F403VGH6	168	1024K	128K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	BGA100
	GD32F403VIH6	168	2048K	128K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	BGA100
	GD32F403VKH6	168	3072K	128K	up to 80	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(16)	2	BGA100
	GD32F403ZCT6	168	256K	64K	up to 112	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(21)	2	LQFP144
	GD32F403ZET6	168	512K	96K	up to 112	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(21)	2	LQFP144
	GD32F403ZGT6	168	1024K	128K	up to 112	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(21)	2	LQFP144
	GD32F403ZIT6	168	2048K	128K	up to 112	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(21)	2	LQFP144
	GD32F403ZKT6	168	3072K	128K	up to 112	8	2		2	2	1	3+2	2	3	2	OTG	2	1						1/0	3(21)	2	LQFP144

GD32F3 series of 32-bit ARM® Cortex®-M4 MCUs Selection Guide



Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity								EXMC	Analog Interface		Package			
			Flash	SRAM		GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART +UART	I ² C	SPI	CAN 2.0B	USB 2.0 FS	I ² S	SDIO	Ether-net		12bit ADC Units (Chs)	12bit DAC Units				
GD32F303	GD32F303CCT6	120	256K	48K	up to 37	4	1	2	1	2	1	3	2	3	1	1	2							3(10)	2	LQFP48
	GD32F303CET6	120	512K	64K	up to 37	4	1	2	1	2	1	3	2	3	1	1	2							3(10)	2	LQFP48
	GD32F303CGT6	120	1024K	96K	up to 37	10	1	2	1	2	1	3	2	3	1	1	2							3(10)	2	LQFP48
	GD32F303RCT6	120	256K	48K	up to 51	4	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP64
	GD32F303RET6	120	512K	64K	up to 51	4	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP64
	GD32F303RGT6	120	1024K	96K	up to 51	10	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP64
	GD32F303RIT6	120	2048K	96K	up to 51	10	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP64
	GD32F303RKT6	120	3072K	96K	up to 51	10	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP64
	GD32F303VCT6	120	256K	48K	up to 80	4	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP100
	GD32F303VET6	120	512K	64K	up to 80	4	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP100
	GD32F303VGT6	120	1024K	96K	up to 80	10	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP100
	GD32F303VIT6	120	2048K	96K	up to 80	10	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP100
	GD32F303VKT6	120	3072K	96K	up to 80	10	2	2	1	2	1	5	2	3	1	1	2	1						3(16)	2	LQFP100
	GD32F303ZCT6	120	256K	48K	up to 112	4	2	2	1	2	1	5	2	3	1	1	2	1						3(21)	2	LQFP144
	GD32F303ZET6	120	512K	64K	up to 112	4	2	2	1	2	1	5	2	3	1	1	2	1						3(21)	2	LQFP144
	GD32F303ZGT6	120	1024K	96K	up to 112	10	2	2	1	2	1	5	2	3	1	1	2	1						3(21)	2	LQFP144
	GD32F303ZIT6	120	2048K	96K	up to 112	10	2	2	1	2	1	5	2	3	1	1	2	1						3(21)	2	LQFP144
	GD32F303ZKT6	120	3072K	96K	up to 112	10	2	2	1	2	1	5	2	3	1	1	2	1						3(21)	2	LQFP144

GD32F3 series of 32-bit ARM® Cortex®-M4 MCUs Selection Guide



Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity							EXMC	Analog Interface		Package	
			Flash	SRAM		GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART +UART	I ² C	SPI	CAN 2.0B	USB 2.0 FS	I ² S	SDIO		Ether-net	12bit ADC Units (CHs)		12bit DAC Units
GD32F305	GD32F305RBT6	120	128K	64K	up to 51	4	1	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F305RCT6	120	256K	96K	up to 51	4	1	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F305RET6	120	512K	96K	up to 51	4	2	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F305RGT6	120	1024K	96K	up to 51	10	2	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F305VCT6	120	256K	96K	up to 80	4	1	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F305VET6	120	512K	96K	up to 80	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F305VGT6	120	1024K	96K	up to 80	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F305ZCT6	120	256K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
	GD32F305ZET6	120	512K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
GD32F307	GD32F307ZGT6	120	1024K	96K	up to 112	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
	GD32F307RCT6	120	256K	96K	up to 51	4	1	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP64
	GD32F307RET6	120	512K	96K	up to 51	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP64
	GD32F307RGT6	120	1024K	96K	up to 51	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP64
	GD32F307VCT6	120	256K	96K	up to 80	4	1	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F307VET6	120	512K	96K	up to 80	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F307VGT6	120	1024K	96K	up to 80	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F307ZCT6	120	256K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
	GD32F307ZET6	120	512K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
GD32F307ZGT6	120	1024K	96K	up to 112	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144	

Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity							Analog Interface		Package		
			Flash	SRAM		GPTM (32bit)	GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART	I ² C	SPI	USB 2.0 FS	I ² S	CEC	Comp	12bit ADC Units (CHs)		12bit DAC Units	
GD32F330	GD32F330F4P6	84	16K	4K	up to 15	1	4	1			1	2	1	1	1	1					1(9)		TSSOP20
	GD32F330F6P6	84	32K	4K	up to 15	1	4	1			1	2	1	2	1	1					1(9)		TSSOP20
	GD32F330F8P6	84	64K	8K	up to 15	1	4	1			1	2	1	2	2	2					1(9)		TSSOP20
	GD32F330G4U6	84	16K	4K	up to 23	1	4	1			1	2	1	1	1	1					1(10)		QFN28
	GD32F330G6U6	84	32K	4K	up to 23	1	4	1			1	2	1	2	1	1					1(10)		QFN28
	GD32F330G8U6	84	64K	8K	up to 23	1	5	1			1	2	1	2	2	2					1(10)		QFN28
	GD32F330K4U6	84	16K	4K	up to 27	1	4	1			1	2	1	1	1	1					1(10)		QFN32
	GD32F330K6U6	84	32K	4K	up to 27	1	4	1			1	2	1	2	1	1					1(10)		QFN32
	GD32F330K8U6	84	64K	8K	up to 27	1	5	1			1	2	1	2	2	2					1(10)		QFN32
	GD32F330C4T6	84	16K	4K	up to 39	1	4	1			1	2	1	1	1	1					1(10)		LQFP48
	GD32F330C6T6	84	32K	4K	up to 39	1	4	1			1	2	1	2	1	1					1(10)		LQFP48
	GD32F330C8T6	84	64K	8K	up to 39	1	5	1			1	2	1	2	2	2					1(10)		LQFP48
	GD32F330CBT6	84	128K	16K	up to 39	1	5	1			1	2	1	2	2	2					1(10)		LQFP48
	GD32F330R8T6	84	64K	16K	up to 55	1	5	1			1	2	1	2	2	2					1(16)		LQFP64
	GD32F330RBT6	84	128K	16K	up to 55	1	5	1			1	2	1	2	2	2					1(16)		LQFP64

GD32F1 series of 32-bit ARM® Cortex®-M3 MCUs Selection Guide



Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity						Analog Interface		Package				
			Flash	SRAM		GPTM (32bit)	GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART	I²C	SPI	USB 2.0 FS	I²S	CEC	12bit ADC Units (CHs)		12bit DAC Units			
GD32F130	GD32F130F4P6	48	16K	4K	up to 15	1	4	1		1	2	1	1	1	1							1(9)		TSSOP20
	GD32F130F6P6	48	32K	4K	up to 15	1	4	1		1	2	1	2	1	1							1(9)		TSSOP20
	GD32F130F8P6	48	64K	8K	up to 15	1	4	1		1	2	1	2	2	2							1(9)		TSSOP20
	GD32F130G4U6	48	16K	4K	up to 23	1	4	1		1	2	1	1	1	1							1(10)		QFN28
	GD32F130G6U6	48	32K	4K	up to 23	1	4	1		1	2	1	2	1	1							1(10)		QFN28
	GD32F130G8U6	48	64K	8K	up to 23	1	5	1		1	2	1	2	2	2							1(10)		QFN28
	GD32F130K4T6	48	16K	4K	up to 27	1	4	1		1	2	1	1	1	1							1(10)		QFN32
	GD32F130K6T6	48	32K	4K	up to 27	1	4	1		1	2	1	2	1	1							1(10)		QFN32
	GD32F130K8T6	48	64K	8K	up to 27	1	5	1		1	2	1	2	2	2							1(10)		QFN32
	GD32F130K4U6	48	16K	4K	up to 27	1	4	1		1	2	1	1	1	1							1(10)		QFN32
	GD32F130K6U6	48	32K	4K	up to 27	1	4	1		1	2	1	2	1	1							1(10)		QFN32
	GD32F130K8U6	48	64K	8K	up to 27	1	5	1		1	2	1	2	2	2							1(10)		QFN32
	GD32F130C4T6	48	16K	4K	up to 39	1	4	1		1	2	1	1	1	1							1(10)		LQFP48
	GD32F130C6T6	48	32K	4K	up to 39	1	4	1		1	2	1	2	1	1							1(10)		LQFP48
GD32F130C8T6	48	64K	8K	up to 39	1	5	1		1	2	1	2	2	2							1(10)		LQFP48	
GD32F130R8T6	48	64K	8K	up to 55	1	5	1		1	2	1	2	2	2							1(16)		LQFP64	
GD32F150	GD32F150G4U6	72	16K	4K	up to 24	1	5	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1(10)	1	QFN28
	GD32F150G6U6	72	32K	6K	up to 24	1	5	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1(10)	1	QFN28
	GD32F150G8U6	72	64K	8K	up to 24	1	5	1	1	1	2	1	2	2	2	1	1	1	1	1	1	1(10)	1	QFN28
	GD32F150K4U6	72	16K	4K	up to 27	1	5	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1(10)	1	QFN32
	GD32F150K6U6	72	32K	6K	up to 27	1	5	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1(10)	1	QFN32
	GD32F150K8U6	72	64K	8K	up to 27	1	5	1	1	1	2	1	2	2	2	1	1	1	1	1	1	1(10)	1	QFN32
	GD32F150C4T6	72	16K	4K	up to 39	1	5	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1(10)	1	LQFP48
	GD32F150C6T6	72	32K	6K	up to 39	1	5	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1(10)	1	LQFP48
	GD32F150C8T6	72	64K	8K	up to 39	1	5	1	1	1	2	1	2	2	2	1	1	1	1	1	1	1(10)	1	LQFP48
	GD32F150R4T6	72	16K	4K	up to 55	1	5	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1(16)	1	LQFP64
	GD32F150R6T6	72	32K	6K	up to 55	1	5	1	1	1	2	1	2	1	1	1	1	1	1	1	1	1(16)	1	LQFP64
	GD32F150R8T6	72	64K	8K	up to 55	1	5	1	1	1	2	1	2	2	2	1	1	1	1	1	1	1(16)	1	LQFP64

Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity							Analog Interface		Package					
			Flash	SRAM		GPTM (32bit)	GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART	I²C	SPI	CAN 2.0B	I²S	LCD	OP-amp	Comp		12bit ADC Units (CHs)	12bit DAC Units			
GD32F170	GD32F170T4U6	48	16K	4K	up to 28	1	4	1		1	2	1	1	1	1	2								1(10)		QFN36
	GD32F170T6U6	48	32K	4K	up to 28	1	4	1		1	2	1	2	1	2									1(10)		QFN36
	GD32F170T8U6	48	64K	8K	up to 28	1	5	1		1	2	1	2	3	3	2								1(10)		QFN36
	GD32F170C4T6	48	16K	4K	up to 39	1	4	1		1	2	1	1	1	1	2								1(10)		LQFP48
	GD32F170C6T6	48	32K	4K	up to 39	1	4	1		1	2	1	2	1	1	2								1(10)		LQFP48
	GD32F170C8T6	48	64K	8K	up to 39	1	5	1		1	2	1	2	3	3	2								1(10)		LQFP48
	GD32F170R8T6	48	64K	8K	up to 55	1	5	1		1	2	1	2	3	3	2								1(16)		LQFP64
	GD32F190T4U6	72	16K	4K	up to 28	1	5	1	1	1	2	1	1	1	1	2	1			2	2			1(10)	2	QFN36
GD32F190T6U6	72	32K	6K	up to 28	1	5	1	1	1	2	1	2	1	1	2	1			2	2			1(10)	2	QFN36	
GD32F190T8U6	72	64K	8K	up to 28	1	5	1	1	1	2	1	2	3	3	2	2			2	2			1(10)	2	QFN36	
GD32F190C4T6	72	16K	4K	up to 39	1	5	1	1	1	2	1	1	1	1	2	1	4x18		2	2			1(10)	2	LQFP48	
GD32F190C6T6	72	32K	6K	up to 39	1	5	1	1	1	2	1	2	1	1	2	1	4x18		2	2			1(10)	2	LQFP48	
GD32F190C8T6	72	64K	8K	up to 39	1	5	1	1	1	2	1	2	3	3	2	2	4x18		2	2			1(10)	2	LQFP48	
GD32F190R4T6	72	16K	4K	up to 55	1	5	1	1	1	2	1	1	1	1	2	1	8x32		3	2			1(16)	2	LQFP64	
GD32F190R6T6	72	32K	6K	up to 55	1	5	1	1	1	2	1	2	1	1	2	1	8x32		3	2			1(16)	2	LQFP64	
GD32F190R8T6	72	64K	8K	up to 55	1	5	1	1	1	2	1	2	3	3	2	2	8x32		3	2			1(16)	2	LQFP64	

GD32F1 series of 32-bit ARM® Cortex®-M3 MCUs Selection Guide



Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity						EXMC	Analog Interface		Package		
			Flash	SRAM		GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART (UART)	I ² C	SPI	CAN 2.0B	USB 2.0 FS	I ² S		SDIO	Ether-net		12bit ADC Units (CHs)	12bit DAC Units
GD32F103	GD32F103T4U6	108	16K	6K	up to 26	2	1		1	2	1	2	1	1	1	1					2(10)		QFN36
	GD32F103T6U6	108	32K	10K	up to 26	2	1		1	2	1	2	1	1	1	1					2(10)		QFN36
	GD32F103T8U6	108	64K	20K	up to 26	3	1		1	2	1	2	1	1	1	1					2(10)		QFN36
	GD32F103TBU6	108	128K	20K	up to 26	3	1		1	2	1	2	1	1	1	1					2(10)		QFN36
	GD32F103C4T6	108	16K	6K	up to 37	2	1		1	2	1	2	1	1	1	1					2(10)		LQFP48
	GD32F103C6T6	108	32K	10K	up to 37	2	1		1	2	1	2	1	1	1	1					2(10)		LQFP48
	GD32F103C8T6	108	64K	20K	up to 37	3	1		1	2	1	3	2	2	1	1					2(10)		LQFP48
	GD32F103CBT6	108	128K	20K	up to 37	3	1		1	2	1	3	2	2	1	1					2(10)		LQFP48
	GD32F103R4T6	108	16K	6K	up to 51	2	1		1	2	1	2	1	1	1	1					2(16)		LQFP64
	GD32F103R6T6	108	32K	10K	up to 51	2	1		1	2	1	2	1	1	1	1					2(16)		LQFP64
	GD32F103R8T6	108	64K	20K	up to 51	3	1		1	2	1	3	2	2	1	1					2(16)		LQFP64
	GD32F103RBT6	108	128K	20K	up to 51	3	1		1	2	1	3	2	2	1	1					2(16)		LQFP64
	GD32F103RCT6	108	256K	48K	up to 51	4	2	2	1	2	1	5	2	3	1	1	2	1			3(16)	2	LQFP64
	GD32F103RDT6	108	384K	64K	up to 51	4	2	2	1	2	1	5	2	3	1	1	2	1			3(16)	2	LQFP64
	GD32F103RET6	108	512K	64K	up to 51	4	2	2	1	2	1	5	2	3	1	1	2	1			3(16)	2	LQFP64
	GD32F103RFT6	108	768K	96K	up to 51	10	2	2	1	2	1	5	2	3	1	1	2	1			3(16)	2	LQFP64
	GD32F103RGT6	108	1024K	96K	up to 51	10	2	2	1	2	1	5	2	3	1	1	2	1			3(16)	2	LQFP64
	GD32F103RIT6	108	2048K	96K	up to 51	10	2	2	1	2	1	5	2	3	1	1	2	1			3(16)	2	LQFP64
	GD32F103RKT6	108	3072K	96K	up to 51	10	2	2	1	2	1	5	2	3	1	1	2	1			3(16)	2	LQFP64
	GD32F103V8T6	108	64K	20K	up to 80	3	1		1	2	1	3	2	2	1	1				•	2(16)		LQFP100
	GD32F103VBT6	108	128K	20K	up to 80	3	1		1	2	1	3	2	2	1	1				•	2(16)		LQFP100
	GD32F103VCT6	108	256K	48K	up to 80	4	2	2	1	2	1	5	2	3	1	1	2	1		•	3(16)	2	LQFP100
	GD32F103VDT6	108	384K	64K	up to 80	4	2	2	1	2	1	5	2	3	1	1	2	1		•	3(16)	2	LQFP100
	GD32F103VET6	108	512K	64K	up to 80	4	2	2	1	2	1	5	2	3	1	1	2	1		•	3(16)	2	LQFP100
	GD32F103VFT6	108	768K	96K	up to 80	10	2	2	1	2	1	5	2	3	1	1	2	1		•	3(16)	2	LQFP100
	GD32F103VGT6	108	1024K	96K	up to 80	10	2	2	1	2	1	5	2	3	1	1	2	1		•	3(16)	2	LQFP100
	GD32F103VIT6	108	2048K	96K	up to 80	10	2	2	1	2	1	5	2	3	1	1	2	1		•	3(16)	2	LQFP100
	GD32F103VKT6	108	3072K	96K	up to 80	10	2	2	1	2	1	5	2	3	1	1	2	1		•	3(16)	2	LQFP100
	GD32F103ZCT6	108	256K	48K	up to 112	4	2	2	1	2	1	5	2	3	1	1	2	1		•	3(21)	2	LQFP144
	GD32F103ZDT6	108	384K	64K	up to 112	4	2	2	1	2	1	5	2	3	1	1	2	1		•	3(21)	2	LQFP144
	GD32F103ZET6	108	512K	64K	up to 112	4	2	2	1	2	1	5	2	3	1	1	2	1		•	3(21)	2	LQFP144
	GD32F103ZFT6	108	768K	96K	up to 112	10	2	2	1	2	1	5	2	3	1	1	2	1		•	3(21)	2	LQFP144
GD32F103ZGT6	108	1024K	96K	up to 112	10	2	2	1	2	1	5	2	3	1	1	2	1		•	3(21)	2	LQFP144	
GD32F103ZIT6	108	2048K	96K	up to 112	10	2	2	1	2	1	5	2	3	1	1	2	1		•	3(21)	2	LQFP144	
GD32F103ZKT6	108	3072K	96K	up to 112	10	2	2	1	2	1	5	2	3	1	1	2	1		•	3(21)	2	LQFP144	

GD32F1 series of 32-bit ARM® Cortex®-M3 MCUs Selection Guide



Series	Part No.	Max Speed (MHz)	Memory (Bytes)		I/O	Timer						Connectivity						EXMC	Analog Interface		Package		
			Flash	SRAM		GPTM (16bit)	Advanced TM (16bit)	Basic TM (16bit)	SysTick (24bit)	WDG	RTC	USART (UART)	I ² C	SPI	CAN 2.0B	USB 2.0 FS	I ² S		SDIO	Ether-net		12bit ADC Units (CHs)	12bit DAC Units
GD32F105	GD32F105R8T6	108	64K	64K	up to 51	4	1	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F105RBT6	108	128K	64K	up to 51	4	1	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F105RCT6	108	256K	96K	up to 51	4	1	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F105RDT6	108	384K	96K	up to 51	4	2	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F105RET6	108	512K	96K	up to 51	4	2	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F105RFT6	108	768K	96K	up to 51	10	2	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F105RGT6	108	1024K	96K	up to 51	10	2	2	1	2	1	5	2	3	2	OTG	2				2(16)	2	LQFP64
	GD32F105V8T6	108	64K	64K	up to 80	4	1	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F105VBT6	108	128K	64K	up to 80	4	1	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F105VCT6	108	256K	96K	up to 80	4	1	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F105VDT6	108	384K	96K	up to 80	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F105VET6	108	512K	96K	up to 80	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F105VFT6	108	768K	96K	up to 80	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F105VGT6	108	1024K	96K	up to 80	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F105ZCT6	108	256K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
	GD32F105ZDT6	108	384K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
GD32F105ZET6	108	512K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144	
GD32F105ZFT6	108	768K	96K	up to 112	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144	
GD32F105ZGT6	108	1024K	96K	up to 112	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144	
GD32F107	GD32F107RBT6	108	128K	96K	up to 51	4	1	2	1	2	1	5	1	3	2	OTG	2			•	2(16)	2	LQFP64
	GD32F107RCT6	108	256K	96K	up to 51	4	1	2	1	2	1	5	1	3	2	OTG	2			•	2(16)	2	LQFP64
	GD32F107RDT6	108	384K	96K	up to 51	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP64
	GD32F107RET6	108	512K	96K	up to 51	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP64
	GD32F107RFT6	108	768K	96K	up to 51	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP64
	GD32F107RGT6	108	1024K	96K	up to 51	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP64
	GD32F107VBT6	108	128K	96K	up to 80	4	1	2	1	2	1	5	1	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F107VCT6	108	256K	96K	up to 80	4	1	2	1	2	1	5	1	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F107VDT6	108	384K	96K	up to 80	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F107VET6	108	512K	96K	up to 80	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F107VFT6	108	768K	96K	up to 80	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F107VGT6	108	1024K	96K	up to 80	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP100
	GD32F107ZCT6	108	256K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
	GD32F107ZDT6	108	384K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
	GD32F107ZET6	108	512K	96K	up to 112	4	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
	GD32F107ZFT6	108	768K	96K	up to 112	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144
GD32F107ZGT6	108	1024K	96K	up to 112	10	2	2	1	2	1	5	2	3	2	OTG	2			•	2(16)	2	LQFP144	

SPI NOR Flash

GD SPI NOR Flash Features



- ◆ **Single Power Supply Voltage**
- Voltage range: 2.7V~3.6V
- ◆ **High Speed Clock Frequency**
- Maximum 166MHz for fast read with 30pF load*
- Dual I/O Data transfer up to 332Mbits/s
- Quad I/O Data transfer up to 664Mbits/s
- Continuous Read With 8/16/32/64-Byte Wrap
- ◆ **Flexible Memory Architecture**
- Sector Size: 4K Bytes
- Block Size: 32/64K Bytes

- ◆ **Single Power Supply Voltage**
- Voltage range: 2.3V~3.6V
- ◆ **High Speed Clock Frequency**
- Maximum 104MHz for fast read with 30pF load*
- Dual I/O Data transfer up to 208Mbits/s
- Quad I/O Data transfer up to 416Mbits/s
- Continuous Read With 8/16/32/64-Byte Wrap
- ◆ **Flexible Memory Architecture**
- Sector Size: 4K Bytes
- Block Size: 32/64K Bytes

- ◆ **Single Power Supply Voltage**
- Voltage range: 1.65V~2.0V
- ◆ **High Speed Clock Frequency**
- Maximum 166MHz for fast read with 30pF load*
- Dual I/O Data transfer up to 332Mbits/s
- Quad I/O Data transfer up to 664Mbits/s
- QPI Data transfer up to 664Mbits/s
- Continuous Read With 8/16/32/64-Byte Wrap
- ◆ **Flexible Memory Architecture**
- Sector Size: 4K Bytes
- Block Size: 32/64K Bytes

- ◆ **Single Power Supply Voltage**
- Voltage range: 1.65V~3.6V
- ◆ **High Speed Clock Frequency**
- Maximum 104MHz for fast read with 30pF load*
- Dual I/O Data transfer up to 208Mbits/s
- Quad I/O Data transfer up to 416Mbits/s
- Continuous Read With 8/16/32/64-Byte Wrap
- ◆ **Flexible Memory Architecture**
- Sector Size: 4K Bytes
- Block Size: 32/64K Bytes

* This feature is available on most of devices. Please refer to page 16-19.



GD SPI NOR Flash Part Number Definition



GD SPI NOR Flash Feature List

Flash Type	3.0V						2.5V		1.8V								1.65V-3.6V				
	GD25 F	GD25 X	GD25 Q	GD25 B	GD25 R	GD25 S	GD25 D	GD25 VQ	GD25 VE	GD25 LX	GD25 LT	GD25 LR	GD25 LF	GD25 LQ	GD25 LB	GD25 LH	GD25 LE	GD25 LD	GD25 WQ	GD25 WD	
Part No.	xxE xxF	xxE	xxC xxD xxE	xxC xxD xxE	xxC xxD xxE	xxD	xxD	xxC	xxC	xxE	xxE	xxC xxD xxE	xxE	xxC xxD xxE	xxC xxD xxE	xxC xxD xxE	xxC xxD xxE	xxC	xxE	xxC	
Single I/O (1-1-1)
Dual Output (1-1-2)
Dual I/O (1-2-2)
Quad Output (1-1-4)
Quad I/O (1-4-4)
Octal Output (1-1-8)
Octal I/O (1-8-8)
QPI (4-4-4)
OPI (8-8-8)
HOLD# Pin
H/W Reset (RESET# Pin)
S/W Reset
H/W Write Protection (WP# Pin)
S/W Write Protection
Enhanced Block Protection
Volatile & Non-volatile Status Register Bit
Output Driver Strength	*	.	*	*	*	*	.	*	*	.	.	*
Security Registers with OTP Locks
SFDP Register
DTR

* This feature is supported by part of family

Part No.	Density	Voltage	Organization	I/O Bus	Frequency (MHz)	Packages
GD25LE16E	16Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	133MHz(x1, x2, x4) 66MHz(DTR)	SOP8 208mil USON8 3x2mm (0.45mm) WLCSP (3-2-3 ball array)
GD25LQ16E	16Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	133MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil USON8 3x2mm (0.45mm) USON8 3x4mm WSON8 6x5mm WLCSP (3-2-3 ball array)
GD25LH16E	16Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	133MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil USON8 3x2mm (0.45mm) USON8 3x4mm WSON8 6x5mm
GD25LB16E	16Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	133MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil USON8 3x2mm (0.45mm) USON8 3x4mm WSON8 6x5mm
GD25LB16C	16Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) LGA8 3x2mm WSON8 6x5mm
GD25LE16C	16Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) LGA8 3x2mm WSON8 6x5mm WLCSP (4-4 or 3-3 ball array)
GD25LH16C	16Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) LGA8 3x2mm WSON8 6x5mm
GD25LQ16C	16Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) LGA8 3x2mm WSON8 6x5mm WLCSP (4-4 or 3-3 ball array)
GD25LF80E	8Mb	1.65V-2.0V	4KB / 32KB / 64KB	Single / Dual / Quad	166MHz(x1, x2, x4) 104MHz(DTR)	SOP8 208mil USON8 3x2mm (0.45mm) USON8 3x4mm
GD25LE80E	8Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	133MHz(x1, x2, x4) 66MHz(DTR)	SOP8 208mil USON8 3x2mm (0.45mm) WLCSP (4-4 or 3-3 ball array)
GD25LQ80E	8Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	133MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil USON8 3x2mm (0.45mm)
GD25LH80E	8Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	133MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil USON8 3x2mm (0.45mm)
GD25LD80C	8Mb	1.65V-2.0V	4KB / 32KB / 64KB	Single / Dual Output	50MHz(x1) 40MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm)
GD25LE80C	8Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm WLCSP (4-4 or 3-3 ball array)
GD25LH80C	8Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x2mm (0.55mm) USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm WLCSP (4-4 or 3-3 ball array)
GD25LQ80C	8Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x2mm (0.55mm) USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm WLCSP (4-4 or 3-3 ball array)
GD25LQ40E	4Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	133MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm) USON8 3x4mm
GD25LD40C	4Mb	1.65V-2.0V	4KB / 32KB / 64KB	Single / Dual Output	50MHz(x1) 40MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm) USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LE40C	4Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LH40C	4Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x2mm (0.55mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LQ40C	4Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil TSSOP8 173mil USON8 3x2mm (0.45mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LQ20E	2Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	133MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm) USON8 3x4mm
GD25LD20C	2Mb	1.65V-2.0V	4KB / 32KB / 64KB	Single / Dual Output	50MHz(x1) 40MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm) USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LE20C	2Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LH20C	2Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x2mm (0.55mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LQ20C	2Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil TSSOP8 173mil USON8 3x2mm (0.45mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LD10C	1Mb	1.65V-2.0V	4KB / 32KB / 64KB	Single / Dual Output	50MHz(x1) 40MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm)
GD25LE10C	1Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LH10C	1Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x2mm (0.55mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LQ10C	1Mb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil TSSOP8 173mil USON8 3x2mm (0.45mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LD05C	512Kb	1.65V-2.0V	4KB / 32KB / 64KB	Single / Dual Output	50MHz(x1) 40MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm)
GD25LE05C	512Kb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LH05C	512Kb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil USON8 3x2mm (0.45mm) USON8 3x2mm (0.55mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25LQ05C	512Kb	1.65V-2.1V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil VSOP8 150mil VSOP8 208mil TSSOP8 173mil USON8 3x2mm (0.45mm) USON8 3x3mm USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm
GD25WQ256E	256Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP16 300mil WSON8 6x5mm WSON8 8x6mm TFBGA24 8x6mm (5x5 ball array)
GD25WQ128E	128Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 208mil SOP16 300mil USON8 4x4mm (0.45mm) WSON8 6x5mm WSON8 8x6mm TFBGA24 8x6mm (5x5 ball array)
GD25WQ64E	64Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 208mil USON8 3x4mm USON8 4x4mm (0.45mm) WSON8 6x5mm TFBGA24 8x6mm (5x5 ball array) WLCSP (3-2-3 ball array)
GD25WQ32E	32Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil USON8 3x2mm (0.45mm) USON8 3x4mm
GD25WQ16E	16Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil USON8 3x2mm (0.45mm)
GD25WQ80E	8Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual / Quad	104MHz(x1, x2, x4)	SOP8 150mil SOP8 208mil USON8 3x2mm (0.45mm)
GD25WD80C	8Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual Output	100MHz(x1) 80MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm)
GD25WD40C	4Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual Output	100MHz(x1) 80MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm)
GD25WD20C	2Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual Output	100MHz(x1) 80MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm)
GD25WD10C	1Mb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual Output	100MHz(x1) 80MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm)
GD25WD05C	512Kb	1.65V-3.6V	4KB / 32KB / 64KB	Single / Dual Output	100MHz(x1) 80MHz(x2)	SOP8 150mil SOP8 208mil TSSOP8 173mil DIP8 300mil USON8 1.5x1.5mm USON8 3x2mm (0.45mm)

Product Series

3V

Q: Quad I/O, General
 B: Quad I/O, QE=1
 F: Quad I/O, DTR, QE=1
 X: Octal I/O
 D: Dual Output
 R: Quad I/O, QE=1, Stack RPMC
 S: Quad I/O, Stack Die, QE=1
 T: Quad I/O, High Performance

2.5V

VQ: Quad I/O, General
 VE: Quad I/O, Low Power

1.8V

LT: Quad I/O, High Performance
 LR: Quad I/O, QE=1, Stack RPMC
 LX: Octal I/O
 LQ: Quad I/O, General
 LB: Quad I/O, QE=1
 LF: Quad I/O, DTR, QE=1

LH: Quad I/O, Faster tpp
 LD: Dual Output
 LE: Quad I/O, Low Power

1.65V~3.6V

WQ: Quad I/O
 WD: Dual Output



SPI NAND Flash



GD SPI NAND Flash Features

3.3V

- ◆ Power Supply Voltage: 2.7V~3.6V
- ◆ High Speed Clock Frequency:
 - Up to 120MHz for fast read with 30pF load
 - Quad I/O Data transfer up to 480Mbit/s
- ◆ Flexible Memory Architecture:
 - 2048Byte page for read and program
 - 128KByte per block for erase
- ◆ Enhanced Access Performance:
 - 2KByte cache for fast random read
 - Cache Read and Cache Program
- ◆ Advanced Feature for SPI NAND:
 - Internal ECC algorithm
 - Internal data move by page with ECC
 - Promised good block-0 with ECC

1.8V

- ◆ Power Supply Voltage: 1.7V~2.0V
- ◆ High Speed Clock Frequency:
 - Up to 120MHz for fast read with 30pF load
 - Quad I/O Data transfer up to 480Mbit/s
- ◆ Flexible Memory Architecture:
 - 2048Byte page for read and program
 - 128KByte per block for erase
- ◆ Enhanced Access Performance:
 - 2KByte cache for fast random read
 - Cache Read and Cache Program
- ◆ Advanced Feature for SPI NAND:
 - Internal ECC algorithm
 - Internal data move by page with ECC
 - Promised good block-0 with ECC

GD SPI NAND Flash Product List

3.3V

Part No.	Density	Frequency	I/O Bus	Page Size	Package
GD5F1GQ4UxxxG	1Gb	120MHZ	x1/x2/x4	2KB+128B	WS0N8 8*6mm/WS0N8 6*5mm
GD5F1GQ4UxxxH	1Gb	120MHZ	x1/x2/x4	2KB+64B	WS0N8 8*6mm/WS0N8 6*5mm
GD5F1GQ5UxxxG	1Gb	133MHZ	x1/x2/x4	2KB+128B	WS0N8 8*6mm
GD5F1GQ5UxxxH	1Gb	133MHZ	x1/x2/x4	2KB+64B	WS0N8 8*6mm
GD5F2GQ5UxxxG	2Gb	104MHZ	x1/x2/x4	2KB+128B	WS0N8 8*6mm
GD5F2GQ5UxxxH	2Gb	104MHZ	x1/x2/x4	2KB+64B	WS0N8 8*6mm
GD5F4GQ6UxxxG	4Gb	104MHZ	x1/x2/x4	2KB+128B	WS0N8 8*6mm
GD5F4GQ6UxxxH	4Gb	104MHZ	x1/x2/x4	2KB+64B	WS0N8 8*6mm

Note: For other Part Number options, please contact GigaDevice sales.

1.8V

Part No.	Density	Frequency	I/O Bus	Page Size	Package
GD5F1GQ4RxxxG	1Gb	120MHZ	x1/x2/x4	2KB+128B	WS0N8 8*6mm/WS0N8 6*5mm
GD5F1GQ4RxxxH	1Gb	120MHZ	x1/x2/x4	2KB+64B	WS0N8 8*6mm/WS0N8 6*5mm
GD5F1GQ5RxxxG	1Gb	104MHZ	x1/x2/x4	2KB+128B	WS0N8 8*6mm
GD5F1GQ5RxxxH	1Gb	104MHZ	x1/x2/x4	2KB+64B	WS0N8 8*6mm
GD5F2GQ5RxxxG	2Gb	80MHZ	x1/x2/x4	2KB+128B	WS0N8 8*6mm
GD5F2GQ5RxxxH	2Gb	80MHZ	x1/x2/x4	2KB+64B	WS0N8 8*6mm
GD5F4GQ6RxxxG	4Gb	80MHZ	x1/x2/x4	2KB+128B	WS0N8 8*6mm
GD5F4GQ6RxxxH	4Gb	80MHZ	x1/x2/x4	2KB+64B	WS0N8 8*6mm

Note: For other Part Number options, please contact GigaDevice sales.

GD SPI NAND Flash Part Number Definition



Parallel NAND Flash

GD Parallel NAND Flash Features



- | | |
|--|---|
| <ul style="list-style-type: none"> ◆ Power Supply: 2.7V ~ 3.6V ◆ Density: 1Gb / 2Gb / 4G / 8G / 16G ◆ Page Size: 2048Byte + 128Byte / 2048Byte + 64Byte ◆ Flash Array to Register Time: 25us ◆ IO Read Performance: 20ns / 25ns ◆ Bus Width: x8 or x16 options ◆ Temperature Range: -40° C to 85° C / -40° C to 105° C ◆ ONFI 1.0 Compatible | <ul style="list-style-type: none"> ◆ Power Supply: 1.7V ~ 1.95V ◆ Density: 1Gb / 2Gb / 4G / 8G / 16G ◆ Page Size: 2048Byte + 128Byte / 2048Byte + 64Byte ◆ Flash Array to Register Time: 25us ◆ IO Read Performance: 25ns / 45ns ◆ Bus Width: x8 or x16 options ◆ Temperature Range: -40° C to 85° C / -40° C to 105° C ◆ ONFI 1.0 Compatible |
|--|---|

GD Parallel NAND Flash Product List

3.3V

Part No.	Density	Sequential Access Time	I/O Bus	Page Size	ECC Requirement	Package
GD9FU1GxF2A	1Gb	25ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FU1GxF3A	1Gb	25ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FU2GxF2A	2Gb	20ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FU2GxF3A	2Gb	20ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FU4GxF2A	4Gb	20ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FU4GxF3A	4Gb	20ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FU8GxE2A	8Gb	20ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FU8GxE3A	8Gb	20ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FUAGxD2A	16Gb	20ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FUAGxD3A	16Gb	20ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9AU2GxF3A*	2Gb	20ns	x8/x16	2KB+64B	Internal 4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9AU4GxF3A*	4Gb	20ns	x8/x16	2KB+64B	Internal 4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9AU8GxE3A*	8Gb	20ns	x8/x16	2KB+64B	Internal 4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9AUAGxD3A*	16Gb	20ns	x8/x16	2KB+64B	Internal 4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm

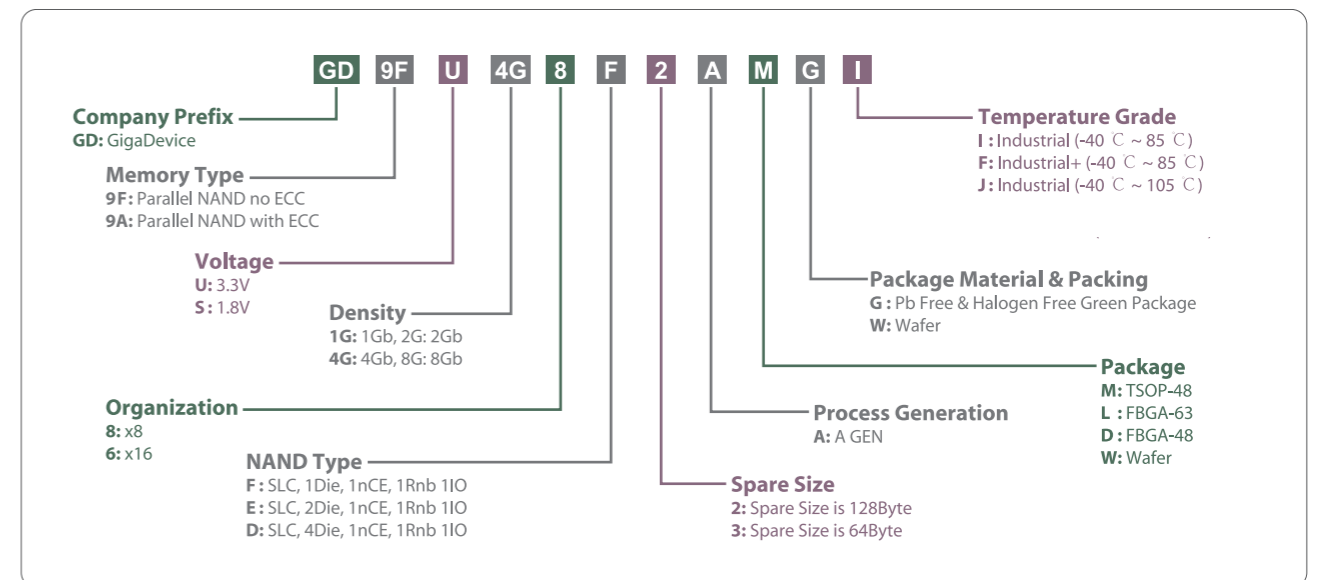
Note: The device has internal 4bit/512B ECC, doesn't need host ECC*.

1.8V

Part No.	Density	Sequential Access Time	I/O Bus	Page Size	ECC Requirement	Package
GD9FS1GxF2A	1Gb	45ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FS1GxF3A	1Gb	45ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FS2GxF2A	2Gb	25ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FS2GxF3A	2Gb	25ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FS4GxF2A	4Gb	25ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FS4GxF3A	4Gb	25ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FS8GxE2A	8Gb	25ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FS8GxE3A	8Gb	25ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FSAGxD2A	16Gb	25ns	x8/x16	2KB+128B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9FSAGxD3A	16Gb	25ns	x8/x16	2KB+64B	4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9AS2GxF3A*	2Gb	25ns	x8/x16	2KB+64B	Internal 4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9AS4GxF3A*	4Gb	25ns	x8/x16	2KB+64B	Internal 4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9AS8GxE3A*	8Gb	25ns	x8/x16	2KB+64B	Internal 4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm
GD9ASAGxD3A*	16Gb	25ns	x8/x16	2KB+64B	Internal 4bit/512B	TSOP48 20*12mm/ BGA63 9*11mm

Note: The device has internal 4bit/512B ECC, doesn't need host ECC*.


GD Parallel NAND Flash Part Number Definition




Flash Package Options


Note:

1. The values provided are the normal values for length, width and pitch, as well as the max values for thickness.
2. The pictures are for reference only. Please always verify your selection with the product data sheet.

T		SOP8 150mil Length(Normal) 4.90 Width(Normal) 6.00 Thickness(Max) 1.75 Pitch(Normal) 1.27 mm
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P		DIP8 300mil Length(Normal) 9.32 Width(Normal) 7.94 Thickness(Max) 3.50 Pitch(Normal) 2.54 mm
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U		USON8 3*2mm (0.55mm) Length(Normal) 3.00 Width(Normal) 2.00 Thickness(Max) 0.60 Pitch(Normal) 0.50 mm
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Q		USON8 4*4mm (0.45mm) Length(Normal) 4.00 Width(Normal) 4.00 Thickness(Max) 0.50 Pitch(Normal) 0.80 mm
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S		SOP8 208mil Length(Normal) 5.23 Width(Normal) 7.90 Thickness(Max) 2.16 Pitch(Normal) 1.27 mm
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Z		TFBGA-24ball 6*8mm (4*6ball array) Length(Normal) 6.00 Width(Normal) 8.00 Thickness(Max) 1.20 Pitch(Normal) 1.00 mm
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E		USON8 3*2mm (0.45mm) Length(Normal) 3.00 Width(Normal) 2.00 Thickness(Max) 0.50 Pitch(Normal) 0.50 mm
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W		WSON8 6*5mm Length(Normal) 6.00 Width(Normal) 5.00 Thickness(Max) 0.80 Pitch(Normal) 1.27 mm
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M		VSOP8 150mil Length(Normal) 4.90 Width(Normal) 6.00 Thickness(Max) 0.90 Pitch(Normal) 1.27 mm
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B		TFBGA-24ball 6*8mm (5*5ball array) Length(Normal) 6.00 Width(Normal) 8.00 Thickness(Max) 1.20 Pitch(Normal) 1.00 mm
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H		USON8 3*3mm Length(Normal) 3.00 Width(Normal) 3.00 Thickness(Max) 0.60 Pitch(Normal) 0.50 mm
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Y		WSON8 8*6mm Length(Normal) 8.00 Width(Normal) 6.00 Thickness(Max) 0.80 Pitch(Normal) 1.27 mm
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M		TSOP48 Length(Normal) 12.0 Width(Normal) 20.0 Thickness(Max) 1.20 Pitch(Normal) 0.50 mm
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8		LGA8 3*2mm Length(Normal) 3.00 Width(Normal) 2.00 Thickness(Max) 0.50 Pitch(Normal) 0.50 mm
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N		USON8 3*4mm Length(Normal) 3.00 Width(Normal) 4.00 Thickness(Max) 0.60 Pitch(Normal) 0.80 mm
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L		WLCSP Depends on specific product
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V		VSOP8 208mil Length(Normal) 5.28 Width(Normal) 7.90 Thickness(Max) 1.00 Pitch(Normal) 1.27 mm
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9		LGA8 8*6mm Length(Normal) 8.00 Width(Normal) 6.00 Thickness(Max) 0.80 Pitch(Normal) 1.27 mm
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J		USON8 4*4mm (0.55mm) Length(Normal) 4.00 Width(Normal) 4.00 Thickness(Max) 0.60 Pitch(Normal) 0.80 mm
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L		FBGA63 Length(Normal) 9.00 Width(Normal) 11.0 Thickness(Max) 1.00 Pitch(Normal) 0.80 mm
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F		SOP16 300mil Length(Normal) 10.30 Width(Normal) 10.35 Thickness(Max) 2.75 Pitch(Normal) 1.27 mm
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K		USON8 1.5*1.5mm Length(Normal) 1.50 Width(Normal) 1.50 Thickness(Max) 0.50 Pitch(Normal) 0.40 mm
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Capacitive Fingerprint Sensor



Overview

- ◆ Diverse shapes: round, square, rectangular etc
- ◆ All kinds of typical sizes: different diameters, different side lengths, especially ultra-narrow
- ◆ Front/Back/Edge-Mounted package sensor type supported
- ◆ Supports different surface materials: matte / glossy coating, ceramic / glass cover
- ◆ High Sensitivity, High SNR, High quality image.
- ◆ 256 true gray scale values, 8 bits per pixel.
- ◆ Support Standard SPI Bus Interface.
- ◆ Resolution:508 DPI

Fingerprint Identification

- ◆ Adaptive Calibration: automatically adjusts the sensor configuration according to the different types of fingerprint
- ◆ Adaptive for many kinds of algorithm includes finger pattern and feature points
- ◆ Getting the high definition fingerprint image without a metal ring module.
- ◆ Smart wake-up feature

Electrical Properties

- ◆ Supply Voltage: 2.6V~3.6V
- ◆ VDDIO Voltage: 1.8V~AVDD;
- ◆ Power Consumption:
 - Image scan Mode (Frame Rate>20F/s or custom):8.5mA (configurable)
 - Sleep Mode (Before awaken):100µA (Typically)
 - Deep sleep Mode: 30~100µA

Reliability

- ◆ Sensor ESD Performance
 - Air discharge : ±25.0 kV
 - Direct discharge : ±8.0 kV
- ◆ Sensor Latch-up Performance: ±400.00mA

Capacitive Fingerprint

Part No.	Type	Position	LGA Square Size		LGA Round size		Sensing Area	Pixel Array
GSL6157N	Coating	Side (super narrow)	14.3*2.4				8 x 1.8mm	160 x 36
GSL6150N	Coating	Postposition	Max:12x12	Min:7.5x7.5	Max:φ12	Min:φ8.5	4.0 x 3.2 mm	80 x 64
GSL6156E	Coating	Side	Max:16.4x6.9	Min:12x2.9	————	————	6.8 x 2.4mm	192 x 68
GSL6182E	Coating	Smart door lock /PC	Max:16x16	Min:13x13	Max:φ16	Min:φ13	8 x 8mm	160 x 160
GSL6185E	Coating	Smart door lock /PC	Max:16x16	Min:13x13	Max:φ16	Min:φ13	5.7 x 6.6mm	114 x 132
GSL6275E	Cover	Preposition	Max:16.4x6.9	Min:12.5x4.0	————	————	8.8 x 3.2 mm	176 x 64
GSL6250N	Cover	Postposition	Max:12x12	Min:7.5x7.5	Max:φ12	Min:φ8.5	4.0 x 3.2 mm	80 x 64
GSL6257N	Cover	Side (super narrow)	14.3*2.4				8 x 1.8mm	160 x 36

Optical Fingerprint Sensor



Overview

- ◆ Different types of optical sensors under the display: CCM (CSM), ultra-thin, TFT large area
- ◆ All kinds of OLED type supported(both rigid and flexible OLED)
- ◆ FRR ≤ 1.5%@FAR ≤ 1/50,000
- ◆ Enroll times ≤ 12 times
- ◆ All 360 degrees can be identified

CCM Sensor

- ◆ Large size pixel design for low-light under display fingerprint application
- ◆ Advanced Single-chip architecture
- ◆ Optimized lens design matching pixel array
- ◆ No flash supported
- ◆ Firstly introduce Chip-Scale Package in under-display fingerprint application

Ultrathin Sensor

- ◆ Ultrathin module thickness
- ◆ Optimized collimator design
- ◆ No lamination with OLED for high-yield manufacture
- ◆ High sensitivity and resolution for better fingerprint recognition

TFT Large Area Sensor

- ◆ System Optimized Design (ROIC/GateIC self-designed matching TFT sensor)
- ◆ Low TFT sensor leakage 10^{-14} (Ion/Ioff 1E8, better than normal 1E6)
- ◆ High-speed Scanning Supported(small size sensing with fast-read-out data)
- ◆ Both glass and PI substrate type supported
- ◆ High QE with optimized TFT sensor design

Optical Fingerprint Under OLED

Part No.	Position	Finger Sensing Area	Chip Sensing Area	Pixel Array	Supported Under Screen Height
GSL7000A	CCM	6.0 x 6.0 mm	2.0 x 2.0 mm	320 x 320	3.5~3.9mm
GSL7001A	CCM	6.0 x 6.0 mm	2.0 x 2.0 mm	320 x 320	3.5~3.9mm
GSL7301A	Ultrathin	6.0 x 6.0 mm	6.0 x 6.0 mm	88 x 86	0.5~1.0mm
GSL7303A	Ultrathin	6.0 x 9.0 mm	6.0 x 9.0 mm	180 x 280	0.3~0.8mm
GSL7305A	Ultrathin	6.0 x 6.0 mm	6.0 x 6.0 mm	180 x 180	0.3~0.8mm
GSL7253	TFT large area	30 x 20 mm	30 x 20 mm	300 x 200	0.3~0.6mm
GSL7001F	CSM	6.0 x 6.0 mm	2.0 x 2.0 mm	320 x 320	3.5~3.9mm

MEMS Ultrasonic Sensor



Fingerprint Identification

- ◆ High resolution 3D fingerprint image with epidermal and dermal skin
- ◆ Advanced ultrasonic sensor design in fingerprint application
- ◆ Creative CMOS and MEMS monolithic chip design
- ◆ Pulse echo and Beam-forming supported for higher sensitivity
- ◆ Better identification with water, cream, lotion fingerprint
- ◆ Capacitive smart wake-up supported
- ◆ Ultrathin thickness design (0.3mm supported)
- ◆ Under Flexible OLED supported
- ◆ Under different materials like cover-glass/metal/plastic etc

Ultrasonic FP Under OLED

Part No.	Position	Finger Sensing Area	Chip Sensing Area	Pixel Array	Supported Under Screen Height	Transmission Thickness
GSL8165A	Ultrathin	4.8 x 4.8 mm	4.8 x 4.8 mm	80 x 80	0.3~1mm	1mm glass/metal/OLED/etc
GSL8252	Ultrathin large area		30 x 20 mm	428 x 285	0.3~0.6mm	1mm glass/metal/OLED/etc

Ultrasonic-TOF

Part No.	Dimensions	Operating Range	Accuracy	Interface	Power @1 sample/sec @ max range	Power @30 sample/sec @ max range	Samlpe Rate	FOV	Application
GSL8300	3.5 x 3.5 x 1.25mm	Up to 60cm	<1.3 mm RMS	I2C	20 u A	230 u A	Up to 100 samples /sec @ 60cm	Up to 180 degree	Touchless gesture UI; VR/AR, Range & presense detection

Ultrasonic- Blood Pressure Monitoring

Part No.	Position	Dimensions	Operating Range	Accuracy	Samlpe Rate
GSL8011	wrist	6.4 x 6.4 x 0.5mm	Up to 1cm	<5 mmHg	Up to 1000 samples/sec

Capacitive Touchscreen Controller



Overview:

- ◆ Outstanding anti RF, LCD and power supply interference
- ◆ Detect up to 10 fingers
- ◆ Panel Thickness: glass up to 2.5mm, plastic up to 1.2mm
- ◆ I2C compatible slave mode 400KHz.
- ◆ I/O Interface: 1.8V /3.3V compatible

Recommended Capacitive Touch IC for Mobile Phone

Part No.	TP Type Supported	Channel Number	Recommended Dimensions
GSL1688F	Single layer multi-point (including double end pin, silver paste jumper), traditional DITO, silver paste free DITO, single-layer bridge building process	16 x 10	<4 inch
GSL1691F	Single layer multi-point (including double end pin, silver paste jumper), traditional DITO, silver paste free DITO, full ITO, sito	18 x 12	5 ~ 6 inch
GSL2682C	Single layer multi-point (including double end pin, silver paste jumper), traditional DITO, silver paste free DITO, single-layer bridge building process	23 x 12	<5 inch
GSL915	Single layer multi-point (including double end pin, silver paste jumper), traditional DITO, silver paste free DITO, single-layer bridge building process	26 x 14	<5 inch
GSL968	Single layer multi-point (including double end pin, silver paste jumper), traditional DITO, silver paste free DITO, single-layer bridge building process	17 x 10	4 inch
GSL2688	Single layer multi-point (including double end pin, silver paste jumper), traditional DITO, silver paste free DITO, single-layer bridge building process	26 x 16	5 ~ 6 inch
GSL2691	S+D37:D46 single layer multi-point (including double end pin, silver paste jumper), traditional DITO, silver paste free DITO, single-layer bridge building process	29 x 14	5 ~ 6 inch
GSL2038	Two points of single-layer partition (with silver paste, all ITO)	25	<3 inch
GSL2232	Two points of single-layer partition (with silver paste, all ITO)	32	3.5 ~ 4.5 inch
GSL2336	Two points of single-layer partition (with silver paste, all ITO)	36	4 ~ 5 inch
GSL2338	Two points of single-layer partition (with silver paste, all ITO)	40	4 ~ 6 inch

Recommended Capacitive Touch IC for Flat Panel

Part No.	TP Type Supported	Channel Number	Recommended Dimensions
GSL1680F	Traditional DITO (including dual-mode GFF), silver-free DITO, single-layer bridge	16 x 10	7 inch
GSL1686F	Single-layer multi-point (all ITO), single-layer multi-point double-terminal PIN, sliver jumper, traditional DITO, sliver free DITO, SITO	16 x 10	7 inch
GSL1681F	Single-layer multi-point (all ITO), single-layer multi-point double-terminal PIN, sliver jumper, traditional DITO, sliver free DITO, SITO	18 x 12	7 inch
GSL2681C	Traditional DITO (including dual-mode GFF), silver-free DITO, single-layer bridge	23 x 12	7 ~ 7.85 inch
GSL3670D	Single-layer multi-point (all ITO), single-layer multi-point double-terminal PIN, sliver jumper, traditional DITO, sliver free DITO, SITO	26 x 14	7.85 ~ 9 inch
GSL3676	Single-layer multi-point (all ITO), single-layer multi-point double-terminal PIN, sliver jumper, traditional DITO, sliver free DITO, SITO	28 x 18	9 ~ 10.1 inch
GSL3680	Single-layer multi-point (all ITO), single-layer multi-point double-terminal PIN, sliver jumper, traditional DITO, sliver free DITO, SITO	31 x 20	9 ~ 10.1 inch
GSL3692	Single-layer multi-point (all ITO), single-layer multi-point double-terminal PIN, sliver jumper, traditional DITO, sliver free DITO, SITO	32 x 24	9.7 ~ 12 inch
GSL5680	Single-layer multi-point (all ITO), single-layer multi-point double-terminal PIN, sliver jumper, traditional DITO, sliver free DITO, SITO	42 x 30	9.7 ~ 15 inch
GSL5690	Single-layer multi-point (all ITO), single-layer multi-point double-terminal PIN, sliver jumper, traditional DITO, sliver free DITO, SITO	72 x 40	<21.6 inch