ARTERY

AT32 | MICROCONTROLLER SELECTION GUIDE

2025

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ARTERY 雅特力

Innovation leader in 32-bit microcontroller technology

Founded in 2016, ARTERY Technology is a professional design company that is committed to promoting innovative development of the 32-bit microcontroller industry, supported by its state-of-the-art R&D technology, a comprehensive set of IP databases, and deep expertise in resource integration. It has set up R&D centers, sales service offices, and technical support centers in Taiwan, Chongqing, Shenzhen, Suzhou, and Shanghai.

ARTERY has been invested in pursuing scientific and technological innovation for a smarter future. It emphasizes the delivery of robust, reliable, and competitive products to customers worldwide, with a focus on ARM® Cortex®-M4/M0+ 32-bit microcontrollers. Since its official launch in 2018, ARTERY products have found their applications in a wide range of fields including industrial control, motor control, vehicles, consumption, business, 5G, and the Internet of Things, to accelerate industrial transformation and upgrading.
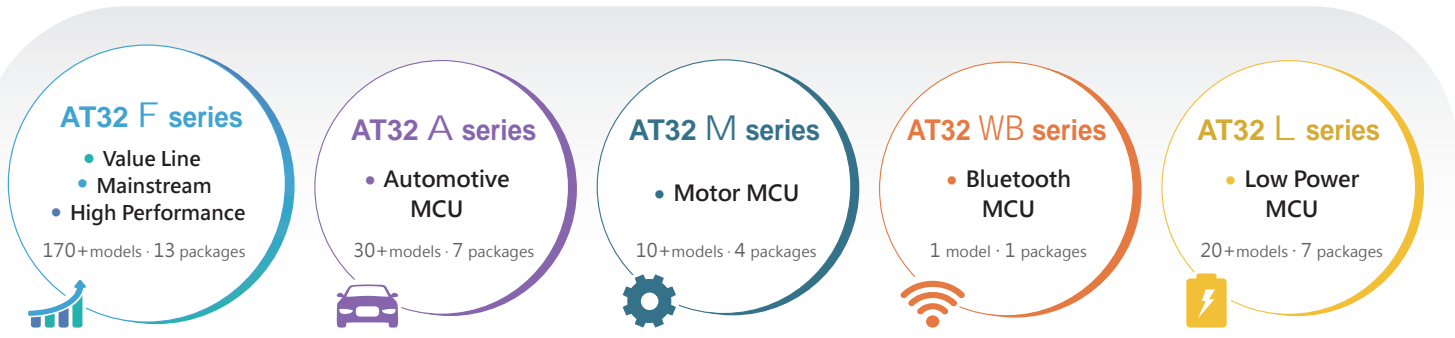
ARTERY has established partnerships with multiple third-party online platforms to contribute to building a robust and resilient industrial ecosystem in the microcontroller sector, with consistent efforts made to bring better user experience and technical support.

AEC-Q100 Qualification

Bluetooth SIG BQB Qualification

IEC 60730 Safety Standard Class B

ISO 9001 Certification

Industrial Chip Temperature Range

Contents

AT32 M4/M0+ MCU FAMILY

AT32 **F** series
- Value Line
- Mainstream
- High Performance

170+models · 13 packages

AT32 **A** series
- Automotive MCU

30+models · 7 packages

AT32 **M** series
- Motor MCU

10+models · 4 packages

AT32 **WB** series
- Bluetooth MCU

1 model · 1 packages

AT32 **L** series
- Low Power MCU

20+models · 7 packages

Value Line

M4 AT32F425
- Cortex®-M4, 96MHz CPU
- 64KB Flash, 20KB SRAM
- OTG, CAN, ADC, 4xUSART

p.06

M4 AT32F421
- Cortex®-M4, 120MHz CPU
- 64KB Flash, 16KB SRAM
- CMP, ADC, 2xUSART

p.07

M4 AT32F415
- Cortex®-M4, 150MHz CPU
- 256KB Flash, 32KB SRAM
- OTG, 2xCMP, CAN, ADC

p.08

M4F AT32F423
- Cortex®-M4F, 150MHz CPU
- 256KB Flash, 48KB SRAM
- OTG, 2xDAC, 2xCAN
- 24ch 5.33Msps ADC

p.09

Mainstream

M4F AT32F413
- Cortex®-M4F, 200MHz CPU
- 256KB Flash, 64KB SRAM
- 2xCAN, 2xADC, 5xUART, USB

p.10

M4F AT32F402 F405
- Cortex®-M4F, 216MHz CPU
- 256KB Flash, 96+6KB SRAM
- CAN, 8xUART, QSPI
- **HS**+FS OTG with PHY

p.11-12

M4F AT32F403A F407
- Cortex®-M4F, 240MHz CPU
- 1024KB Flash, 224KB SRAM
- 2xCAN, 8xUART, USB
- 3xADC, XMC, EMAC

p.13-14

M4F F455 F456 F457
- Cortex®-M4F, 192MHz CPU
- 512KB Flash, 128+16KB SRAM
- AES/TRNG, 3xCAN(FD)
- QSPI, SDRAM, EMAC

p.15-17

Sample available : 2025/03

Automotive

M4F AT32A423
- Cortex®-M4F, 150MHz CPU
- 256KB Flash, 48KB SRAM
- OTG, 2xDAC, 2xCAN
- 24ch 5.33Msps ADC
- **AEC-Q100** Qualification

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M4F AT32A403A
- Cortex®-M4F, 200MHz CPU
- 1024KB Flash, 224KB SRAM
- 2xCAN, 8xUART, USB, XMC
- 3xADC, EMAC
- **AEC-Q100** Qualification

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High Performance

M4F AT32F435 F437
- Cortex®-M4F, 288MHz CPU
- 4032KB Flash, 512KB SRAM
- 2xOTG, 2xCAN, 8xUART
- 3x5.33Msps ADC, EMAC
- 2xQSPI, SDRAM

p.21-22

Bluetooth

M4 AT32WB415
- Cortex®-M4, 150MHz CPU
- 256KB Flash, 32KB SRAM
- OTG, 2xCMP, CAN
- 4xUART, ADC
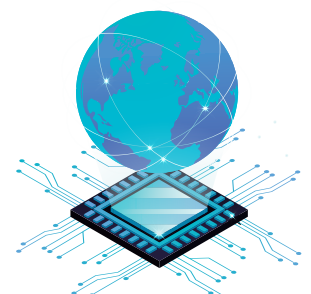- Bluetooth® 5.0 dual mode

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Motor

M4F AT32M412 M416
- Cortex®-M4F, 180MHz CPU
- 128KB Flash, 16KB SRAM
- 4xOP(with PGA)
- 2xCMP, 2xDAC
- CAN(FD)

p.24-25

Low Power

M0+ AT32L021
- Cortex®-M0+, 80MHz CPU
- 64KB Flash, 8+1KB SRAM
- 4xUSART, CAN, ADC

p.05

AT32 MCU

AT32 M4/M0+ MCU FAMILY

CPU Speed

Low Power | **Bluetooth** | **Value Line** | **Motor** | **Automotive** | **Mainstream** | **High Performance**

M4F
AT32F437
AT32F435
288MHz
4032KB
1024KB
256KB

M4F
AT32F407
AT32F403A
240MHz
1024KB
512KB
256KB

M4F
AT32F405
AT32F402
216MHz
256KB
128KB

M4F
AT32F457
AT32F456
AT32F455
192MHz
512KB
256KB

M4F
AT32F413
200MHz
256KB
128KB
64KB

M4F
AT32M416
AT32M412
180MHz
128KB
64KB

M4F
AT32A403A
200MHz
1024KB
512KB
256KB

M4F
AT32A423
150MHz
256KB
128KB
64KB

M4
AT32WB415
150MHz
256KB

M0+
AT32L021
80MHz
64KB
32KB
16KB

M4
AT32F425
96MHz
64KB
32KB

M4
AT32F421
120MHz
64KB
32KB
16KB

M4
AT32F415
150MHz
256KB
128KB
64KB

M4F
AT32F423
150MHz
256KB
128KB
64KB

FLASH

SRAM

8+1KB
32KB
20KB
8/16KB
32KB
32/48KB
16KB
32/48KB
96/224KB
96+12/128+16
16/32/64KB
64+6/96+6KB
96/224KB
384/512KB

- All devices could operate in the -40 ℃~105 ℃ temperature
- Proprietary security library (sLib) better protects core algorithm in specified areas
- All devices are pin-to-pin compatible (except AT32F405), allowing rapid product upgrades

Naming Rules

| AT32 | F | 4 | 03 | A | R | C | T | 7 |

Family
- AT32 : 32位MCU

Product Category
- A : Automotive
- F : Fundamental
- L : Low-Power
- W : Wireless
- M : Motor

Cortex-
- 4 : M4 Core
- 0 : M0+ Core

Product Series

Extended Code

Pin Count

F	20
E	24
G	28
K	32
T	36
C	48
R	64
V	100
Z	144
I	176
N	216

Flash Size(KB)

0	1
1	2
2	4
3	8
4	16
5	24
6	32
7	48
8	64
9	72
A	96
B	128
Z	192
C	256
D	448
E	512
F	768
G	1024
H	1536
I	2048
K	3072
M	4032

Package
- P : TSSOP
- T : LQFP
- U : QFN
- Y : WLCSP

Operating Temperature
- 6 : -40~85 ℃
- 7 : -40~105℃
- 3 : -40~125℃

Package List

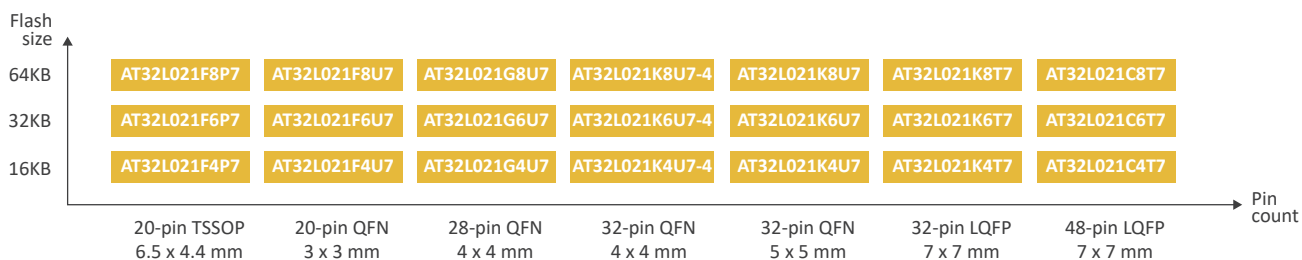| 20-pin TSSOP 6.5 x 4.4 mm | 24-pin TSSOP 7.8 x 4.4 mm | 20-pin QFN 3 x 3 mm | 28-pin QFN 4 x 4 mm | 32-pin QFN 4 x 4 mm | 32-pin QFN 5 x 5 mm | 36-pin QFN 6 x 6 mm | 48-pin QFN 6 x 6 mm | 48-pin QFN 7 x 7 mm |

| 32-pin LQFP 7 x 7 mm | 48-pin LQFP 7 x 7 mm | 64-pin LQFP 7 x 7 mm | 64-pin LQFP 10 x 10 mm | 100-pin LQFP 14 x 14 mm | 144-pin LQFP 20 x 20 mm |

AT32L021

The AT32L021 (L : Low Power) series is based on ARM® Cortex®-M0+ 32-bit core operating at a frequency of up to 80 MHz. This device features 64 KB Flash memory and 8+1 KB SRAM (with parity check). It also embeds a programmable 4 KB boot memory - configurable as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 64+4 KB. In addition, the device offers 1x CAN, 4x USARTs (support RS-485 mode), 2x SPIs/I²Ss, 2x I²Cs, 1x 16-bit advanced timer, 5x 16-bit general-purpose timers, 1x 16-bit basic timer, and a 12-bit high-speed 2 Msps ADC particularly suited for fast data acquisition, industrial control and motor applications. Furthermore, the device has the ability to enter/leave low-power mode at faster speed. It requires merely around 9uA of current consumption and 17us wakeup time in Deepsleep mode, and even only 1.2uA in Standby mode, contributing to prolonged battery life. With this, the AT32L021 series is considered to be a perfect choice for entry-level low-power MCU applications.

The AT32L021 device operates in the temperature range of -40 ℃ to 105℃. It can supplied in a variety of package types from larger to small to meet memory demands. With powerful on-chip resources, higher integration and cost-effectiveness, the AT32L021 series is thus suitable for applications that require low-power consumption such as IoT, wireless communication, motor control and consumer electronics.

- **Max Frequency :** 80 MHz
- **Operating Voltage :** 1.71-3.6V
- **Operating Temperature :** -40-105°C
- **Key Features :** 64+4KB Flash, 8+1KB SRAM, CAN, 4x USARTs, 2x SPIs, 2x I²Cs, 12-bit ADC, Deepsleep~9uA ; Standby~1.2uA
- **Main Applications :** IoT, wireless communication, OBD, BMS, RF industrial control, small-sized meters, motor control, 5G

Flash size							
64KB	AT32L021F8P7	AT32L021F8U7	AT32L021G8U7	AT32L021K8U7-4	AT32L021K8U7	AT32L021K8T7	AT32L021C8T7
32KB	AT32L021F6P7	AT32L021F6U7	AT32L021G6U7	AT32L021K6U7-4	AT32L021K6U7	AT32L021K6T7	AT32L021C6T7
16KB	AT32L021F4P7	AT32L021F4U7	AT32L021G4U7	AT32L021K4U7-4	AT32L021K4U7	AT32L021K4T7	AT32L021C4T7
	20-pin TSSOP 6.5 x 4.4 mm	20-pin QFN 3 x 3 mm	28-pin QFN 4 x 4 mm	32-pin QFN 4 x 4 mm	32-pin QFN 5 x 5 mm	32-pin LQFP 7 x 7 mm	48-pin LQFP 7 x 7 mm

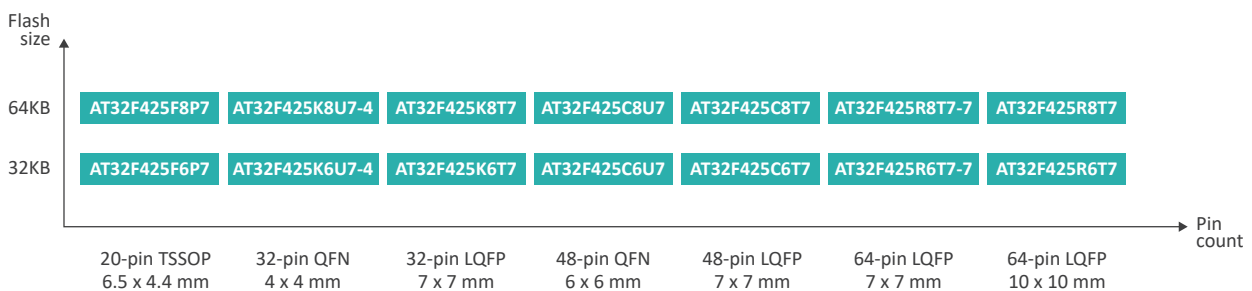| Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)F/H I²S	USART/UART	OTG	CAN	IRTMR	ADC Engine	12-bit ADC ch.	Package
AT32L021F4P7	80	16	8+1	15	1	-	5	1	1	1	1	1	2	1	0/1	2/2	-	1	1	1	9	TSSOP20 6.5 x 4.4 mm
AT32L021F6P7	80	32	8+1	15	1	-	5	1	1	1	1	1	2	1	0/1	2/2	-	1	1	1	9	
AT32L021F8P7	80	64	8+1	15	1	-	5	1	1	1	1	1	2	1	0/1	2/2	-	1	1	1	9	
AT32L021F4U7	80	16	8+1	15	1	-	5	1	1	1	1	1	2	1	0/1	2/2	-	1	1	1	9	QFN20 3 x 3 mm
AT32L021F6U7	80	32	8+1	15	1	-	5	1	1	1	1	1	2	1	0/1	2/2	-	1	1	1	9	
AT32L021F8U7	80	64	8+1	15	1	-	5	1	1	1	1	1	2	1	0/1	2/2	-	1	1	1	9	
AT32L021G4U7	80	16	8+1	23	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	10	QFN28 4 x 4 mm
AT32L021G6U7	80	32	8+1	23	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	10	
AT32L021G8U7	80	64	8+1	23	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	10	
AT32L021K4U7-4	80	16	8+1	27	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	11	QFN32 4 x 4 mm
AT32L021K6U7-4	80	32	8+1	27	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	11	
AT32L021K8U7-4	80	64	8+1	27	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	11	
AT32L021K4U7	80	16	8+1	27	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	11	QFN32 5 x 5 mm
AT32L021K6U7	80	32	8+1	27	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	11	
AT32L021K8U7	80	64	8+1	27	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	11	
AT32L021K4T7	80	16	8+1	25	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	10	LQFP32 7 x 7 mm
AT32L021K6T7	80	32	8+1	25	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	10	
AT32L021K8T7	80	64	8+1	25	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	10	
AT32L021C4T7	80	16	8+1	39	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	15	LQFP48 7 x 7 mm
AT32L021C6T7	80	32	8+1	39	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	15	
AT32L021C8T7	80	64	8+1	39	1	-	5	1	1	1	1	1	2	2	0/2	4/0	-	1	1	1	15	

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32F425

The AT32F425 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 96 MHz. This device features a digital signal processor (DSP), up to 64 KB Flash memory and 20 KB SRAM. It also embeds a 4 programmable KB boot memory - configurable as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 64+4 KB. In addition, the device offers 1x OTG controller (support Xtal-less in device mode), 1x CAN, 4x USARTs, 3x SPIs/I²Ss (support full-duplex), 2x I²Cs, 1x 16-bit advanced timer, 6x 16-bit and 1x 32-bit general-purpose timers, 2x 16-bit basic timers, 1x 12-bit 16-channel high speed 2 Msps ADC. It also supports an independent 24-channel PWM output which is made possible through the combination between timers. Almost all I/Os in the AT32F425 series are 5 V tolerant with port remapping capabilities, outperforming its counterparts in USB OTG application field.

The AT32F425 device operates in the temperature range of -40 °C to 105 °C. It can supplied in a diverse range of package types including LQFP64, LQFP48, QFN48, LQFP32, QFN32 and mini TSSOP20 to meet diversified memory requirements. With powerful on-chip resources, higher integration and cost-effectiveness, the AT32F425 series is considered to be the best choice for application scenarios requiring high-speed computing power and USB functions such as gaming, industrial automation, motor control, IoT and consumer electronics.

- **Max Frequency** : 96 MHz
- **Operating Voltage** : 2.4-3.6V
- **Operating Temperature** : -40-105°C
- **Key Features** : 64+4 KB Flash, 20 KB SRAM, USB OTG, CAN, 4x USARTs, 12-bit ADC
- **Main Applications** : gaming keyboard, gaming mouse, USB accessories, micro printer, OBD, industrial control, motor control, 5G

Flash size

64KB	AT32F425F8P7	AT32F425K8U7-4	AT32F425K8T7	AT32F425C8U7	AT32F425C8T7	AT32F425R8T7-7	AT32F425R8T7
32KB	AT32F425F6P7	AT32F425K6U7-4	AT32F425K6T7	AT32F425C6U7	AT32F425C6T7	AT32F425R6T7-7	AT32F425R6T7
	20-pin TSSOP 6.5 x 4.4 mm	32-pin QFN 4 x 4 mm	32-pin LQFP 7 x 7 mm	48-pin QFN 6 x 6 mm	48-pin LQFP 7 x 7 mm	64-pin LQFP 7 x 7 mm	64-pin LQFP 10 x 10 mm

Pin count

Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Timer								Connectivity								Analog Interface		Package
					Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)I2(F/H)²S	USART/UART	OTG	CAN	IRTMR	ADC Engine	12-bit ADC ch.	
AT32F425F6P7	96	32	20	15	1	1	6	2	1	1	1	1	2	2	0/2	2/2	FS	1	1	1	9	TSSOP20 6.5 x 4.4 mm
AT32F425F8P7	96	64	20	15	1	1	6	2	1	1	1	1	2	2	0/2	2/2	FS	1	1	1	9	
AT32F425K6U7-4	96	32	20	27	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	10	QFN32 4 x 4 mm
AT32F425K8U7-4	96	64	20	27	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	10	
AT32F425K6T7	96	32	20	25	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	10	LQFP32 7 x 7 mm
AT32F425K8T7	96	64	20	25	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	10	
AT32F425C6U7	96	32	20	39	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	10	QFN48 6 x 6 mm
AT32F425C8U7	96	64	20	39	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	10	
AT32F425C6T7	96	32	20	39	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	10	LQFP48 7 x 7 mm
AT32F425C8T7	96	64	20	39	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	10	
AT32F425R6T7-7	96	32	20	55	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	16	LQFP64 7 x 7 mm
AT32F425R8T7-7	96	64	20	55	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	16	
AT32F425R6T7	96	32	20	55	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	16	LQFP64 10 x 10 mm
AT32F425R8T7	96	64	20	55	1	1	6	2	1	1	1	1	2	3	0/3	4/0	FS	1	1	1	16	

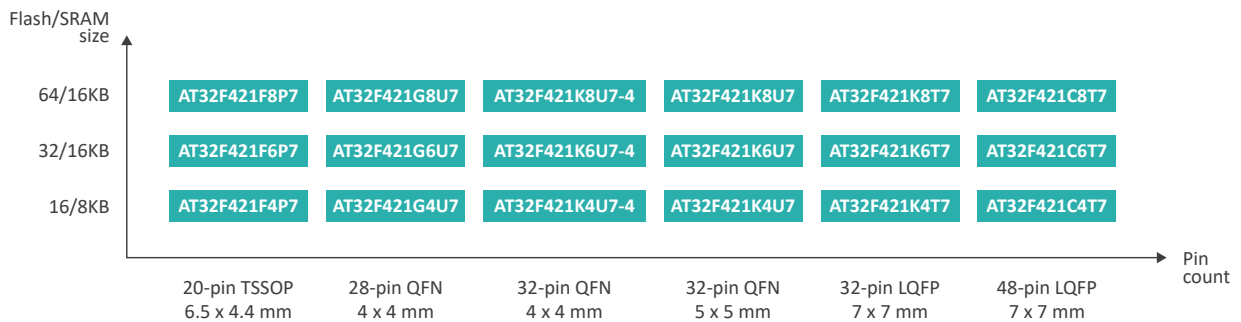(1) F/H: Full Duplex I²S / Half Duplex I²S   (2) Each 2 Half Duplex could be combined with 1 Full Duplex

AT32F421

The AT32F421 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 120 MHz.This device features a digital signal processor (DSP), up to 64 KB Flash memory and 16 KB SRAM, 2x USARTs, 2x SPIs/I²Ss, 2x I²Cs, 1x 16-bit advanced timer, 5x 16-bit general-purpose timers, 1x high-speed rail to rail input/output analog voltage comparator and 1x 12-bit 15-chan-nel high-speed 2 Msps ADC for fast data acquisition, mixed signal processing, industrial control and motor applications. All I/Os in the AT32F421 series have fast toggling capability and almost all of them are 5V tolerant.

The device operates in the temperature range of -40 ℃ to 105 ℃. It can be supplied in a rich choice of package types such as LQFP48, LQFP32, QFN32, QFN28 and mini TSSOP20 to meet diverse memory demands. The provision of powerful on-chip resourc-es, higher integration and cost-effectiveness makes AT32F421 series stand out from the fierce market in terms of competitiveness.

- **Max Frequency**：120 MHz
- **Operating Voltage**：2.4-3.6V
- **Operating Temperature**：-40-105°C
- **Key Features**：ultra-value M4, 16 KB SRAM, 1x CMP, 12-bit ADC, hardware infrared (IR) timer
- **Main Applications**：oT node, wireless charging, motor control, industrial automation, household electric appliances, electronic toy, robot, 5G

Flash/SRAM size

64/16KB	AT32F421F8P7	AT32F421G8U7	AT32F421K8U7-4	AT32F421K8U7	AT32F421K8T7	AT32F421C8T7
32/16KB	AT32F421F6P7	AT32F421G6U7	AT32F421K6U7-4	AT32F421K6U7	AT32F421K6T7	AT32F421C6T7
16/8KB	AT32F421F4P7	AT32F421G4U7	AT32F421K4U7-4	AT32F421K4U7	AT32F421K4T7	AT32F421C4T7

| 20-pin TSSOP 6.5 x 4.4 mm | 28-pin QFN 4 x 4 mm | 32-pin QFN 4 x 4 mm | 32-pin QFN 5 x 5 mm | 32-pin LQFP 7 x 7 mm | 48-pin LQFP 7 x 7 mm |

Pin count

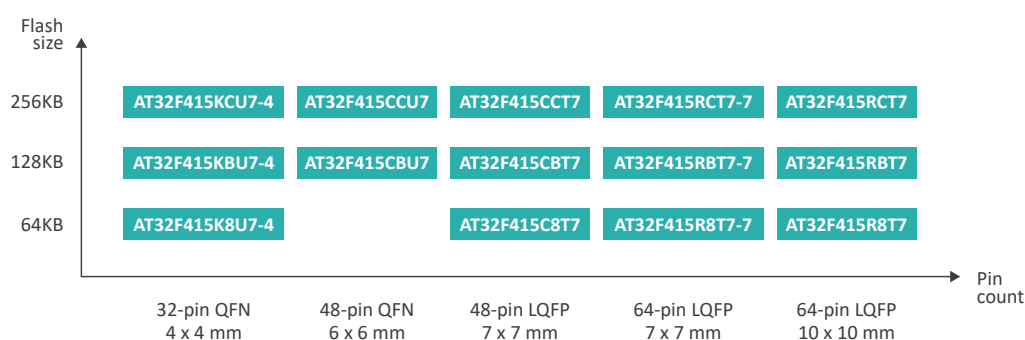| Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)(F/H) I²S	USART/UART	OTG	CAN	IRTMR	ADC Engine	12-bit ADC ch.	DAC Engine	CMP	Package
AT32F421F4P7	120	16	8	15	1	-	5	1	1	1	1	1	2	1	0/1	1/1	-	-	1	1	9	-	1	TSSOP20 6.5 x 4.4 mm
AT32F421F6P7	120	32	16	15	1	-	5	1	1	1	1	1	2	1	0/1	1/1	-	-	1	1	9	-	1	
AT32F421F8P7	120	64	16	15	1	-	5	1	1	1	1	1	2	1	0/1	1/1	-	-	1	1	9	-	1	
AT32F421G4U7	120	16	8	23	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	10	-	1	QFN28 4 x 4 mm
AT32F421G6U7	120	32	16	23	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	10	-	1	
AT32F421G8U7	120	64	16	23	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	10	-	1	
AT32F421K4U7-4	120	16	8	27	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	11	-	1	QFN32 4 x 4 mm
AT32F421K6U7-4	120	32	16	27	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	11	-	1	
AT32F421K8U7-4	120	64	16	27	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	11	-	1	
AT32F421K4U7	120	16	8	27	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	11	-	1	QFN32 5 x 5 mm
AT32F421K6U7	120	32	16	27	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	11	-	1	
AT32F421K8U7	120	64	16	27	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	11	-	1	
AT32F421K4T7	120	16	8	25	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	10	-	1	LQFP32 7 x 7 mm
AT32F421K6T7	120	32	16	25	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	10	-	1	
AT32F421K8T7	120	64	16	25	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	10	-	1	
AT32F421C4T7	120	16	8	39	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	15	-	1	LQFP48 7 x 7 mm
AT32F421C6T7	120	32	16	39	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	15	-	1	
AT32F421C8T7	120	64	16	39	1	-	5	1	1	1	1	1	2	2	0/2	2/0	-	-	1	1	15	-	1	

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32F415

The AT32F415 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 150 MHz. This device features a digital signal processor (DSP), up to 256 KB Flash memory and 32 KB SRAM, 5x UARTs, 2x SPIs/I²Ss, 2x I²Cs, 1x SDIO, 1x CAN (active 2.0B), 1x 16-bit advanced timer, 5x 16-bit and 2x 32-bit general-purpose timers, 1x 14-channel DMA controller, 2x high-speed rail-to-rail input/output analog voltage comparators, 1x 12-bit 16-channel high-speed 2 Msps ADC. All I/Os have fast toggling capability and almost all of them are 5V tolerant.

The device operates in the temperature range of -40 ℃ to 105 ℃. It can be supplied in a variety of package types including LQFP64, LQFP48, QFN48 and QFN32 in response to diverse memory requirements. With powerful on-chip resources, higher integration and cost-effectiveness, the AT32F415 series can be used in the application scenarios that require fast computing power and USB feature such as gaming, industrial automation, motor control, IoT and consumer electronics.

- **Max Frequency :** 150 MHz
- **Operating Voltage :** 2.6-3.6V
- **Operating Temperature :** -40-105°C
- **Key Features :** 32 KB SRAM, USB OTG, 2x CMPs, CAN, sLib, ERTC
- **Main Applications :** micro printer, barcode scanner, electric scooter controller, gaming keyboard/mouse, gaming pad, PC accessories, industrial control, surveillance, 5G

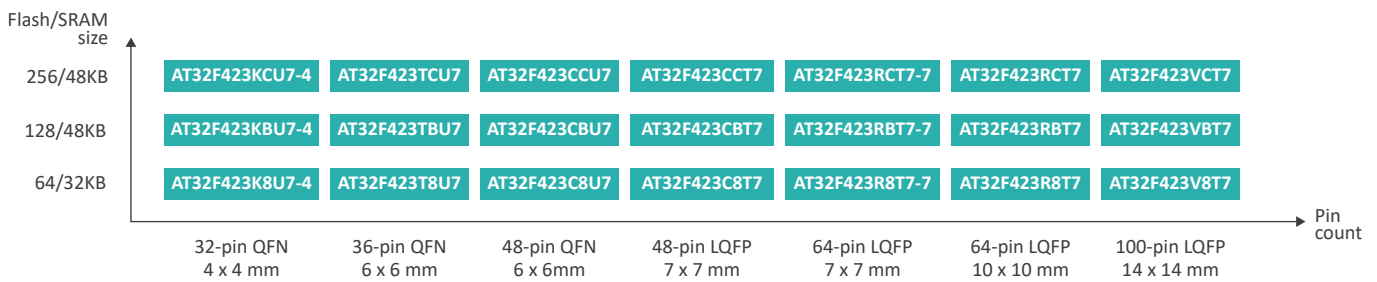| Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)(F/H) I²S	USART/UART	SDIO	OTG	CAN	ADC Engine	12-bit ADC ch.	DAC Engine	CMP	SPIM	Package
AT32F415K8U7-4	150	64	32	27	1	2	5	-	1	1	1	1	2	2	0/2	2/0	1	FS	1	1	10	-	2	-	QFN32 4 x 4 mm
AT32F415KBU7-4	150	128	32	27	1	2	5	-	1	1	1	1	2	2	0/2	2/0	1	FS	1	1	10	-	2	-	
AT32F415KCU7-4	150	256	32	27	1	2	5	-	1	1	1	1	2	2	0/2	2/0	1	FS	1	1	10	-	2	-	
AT32F415CBU7	150	128	32	39	1	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	1	1	10	-	2	-	QFN48 6 x 6 mm
AT32F415CCU7	150	256	32	39	1	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	1	1	10	-	2	-	
AT32F415C8T7	150	64	32	39	1	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	1	1	10	-	2	-	LQFP48 7 x 7 mm
AT32F415CBT7	150	128	32	39	1	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	1	1	10	-	2	-	
AT32F415CCT7	150	256	32	39	1	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	1	1	10	-	2	-	
AT32F415R8T7-7	150	64	32	55	1	2	5	-	1	1	1	1	2	2	0/2	3/2	1	FS	1	1	16	-	2	-	LQFP64 7 x 7 mm
AT32F415RBT7-7	150	128	32	55	1	2	5	-	1	1	1	1	2	2	0/2	3/2	1	FS	1	1	16	-	2	-	
AT32F415RCT7-7	150	256	32	55	1	2	5	-	1	1	1	1	2	2	0/2	3/2	1	FS	1	1	16	-	2	-	
AT32F415R8T7	150	64	32	55	1	2	5	-	1	1	1	1	2	2	0/2	3/2	1	FS	1	1	16	-	2	-	LQFP64 10 x 10 mm
AT32F415RBT7	150	128	32	55	1	2	5	-	1	1	1	1	2	2	0/2	3/2	1	FS	1	1	16	-	2	-	
AT32F415RCT7	150	256	32	55	1	2	5	-	1	1	1	1	2	2	0/2	3/2	1	FS	1	1	16	-	2	-	

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32F423

The AT32F423 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 150 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), up to 256 KB Flash memory and 48 KB SRAM. It also embeds a programmable 20 KB boot memory - configurable as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 256+20 KB. In addition, the device incorporates XMC interface (for PSRAM and NOR extension, or 8080/6800 mode parallel LCD), 1x OTG controller (support Xtal-less in device mode), 2x CANs, 8x USARTs, 3x SPIs/I²Ss (full-duplex support), 3x I²Cs, 1x 16-bit advanced timer, 8x 16-bit general-purpose timers, 1x 32-bit general-purpose timer, 2x 16-bit basic timers, 1x 12-bit 24-channel high-speed 5.33 Msps ADC and 2x 12-bit DACs. All I/Os in the AT32F423 series have fast toggling capability and almost all of them are 5V tolerant.

The AT32F423 operates in the temperature range of -40 °C to 105 °C. It can be supplied in a variety of of package types to meet diverse memory demands. With powerful on-chip resources, higher integration and cost-effectiveness, the AT32F423 series is suitable for such applications as industrial automation, motor control, IoT, consumer electronics, among many others.

- **Max Frequency :** 150 MHz
- **Operating Voltage :** 2.4-3.6V
- **Operating Temperature :** -40-105°C
- **Key Features :** 24-channel 5.33 Msps ADC engine, 2x DACs, USB OTG, 8x USARTs, 2x CANs and XMC
- **Main Applications :** sweeping robot, LED control card, household electric appliances, IoT node, motor control, industrial automation, industrial control, surveillance, robot, 5G

Flash/SRAM size							
256/48KB	AT32F423KCU7-4	AT32F423TCU7	AT32F423CCU7	AT32F423CCT7	AT32F423RCT7-7	AT32F423RCT7	AT32F423VCT7
128/48KB	AT32F423KBU7-4	AT32F423TBU7	AT32F423CBU7	AT32F423CBT7	AT32F423RBT7-7	AT32F423RBT7	AT32F423VBT7
64/32KB	AT32F423K8U7-4	AT32F423T8U7	AT32F423C8U7	AT32F423C8T7	AT32F423R8T7-7	AT32F423R8T7	AT32F423V8T7
Pin count	32-pin QFN 4 x 4 mm	36-pin QFN 6 x 6 mm	48-pin QFN 6 x 6mm	48-pin LQFP 7 x 7 mm	64-pin LQFP 7 x 7 mm	64-pin LQFP 10 x 10 mm	100-pin LQFP 14 x 14 mm

Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Advanced	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²c	SPI	(1)(2)(F/H) I²S	USART/UART	CAN	OTG	IRTMR	(3)ADC Engine	12-bit ADC ch.	DAC Engine	XMC	Package
AT32F423K8U7-4	150	64	32	27	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	QFN32 4 x 4 mm
AT32F423KBU7-4	150	128	48	27	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	
AT32F423KCU7-4	150	256	48	27	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	
AT32F423T8U7	150	64	32	29	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	QFN36 6 x 6 mm
AT32F423TBU7	150	128	48	29	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	
AT32F423TCU7	150	256	48	29	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	
AT32F423C8U7	150	64	32	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	QFN48 6 x 6 mm
AT32F423CBU7	150	128	48	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	
AT32F423CCU7	150	256	48	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	
AT32F423C8T7	150	64	32	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	LQFP48 7 x 7 mm
AT32F423CBT7	150	128	48	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	
AT32F423CCT7	150	256	48	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	
AT32F423R8T7-7	150	64	32	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	LQFP64 7 x 7 mm
AT32F423RBT7-7	150	128	48	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	
AT32F423RCT7-7	150	256	48	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	
AT32F423R8T7	150	64	32	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	LQFP64 10 x 10 mm
AT32F423RBT7	150	128	48	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	
AT32F423RCT7	150	256	48	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	
AT32F423V8T7	150	64	32	87	1	1	8	2	1	1	1	1	3	3	0/3	8/0	2	FS	1	1	24	2	1	LQFP100 14 x 14 mm
AT32F423VBT7	150	128	48	87	1	1	8	2	1	1	1	1	3	3	0/3	8/0	2	FS	1	1	24	2	1	
AT32F423VCT7	150	256	48	87	1	1	8	2	1	1	1	1	3	3	0/3	8/0	2	FS	1	1	24	2	1	

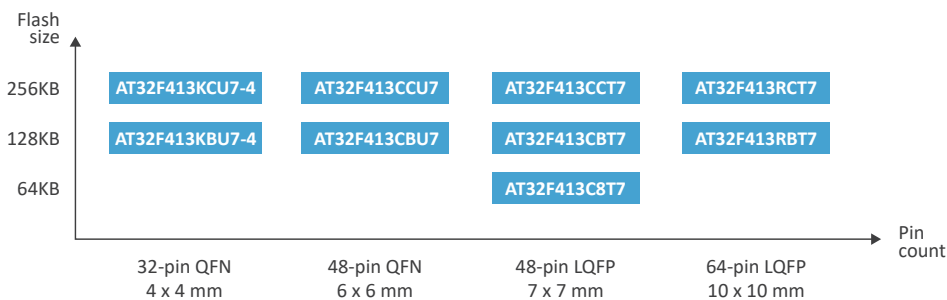(1) F/H: Full Duplex I²S / Half Duplex I²S   (2) Each 2 Half Duplex could be combined with 1 Full Duplex   (3) 5.33 Msps ADC

AT32F413

The AT32F413 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 200 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), rich peripherals and flexible clock control mechanism. It embeds up to 256 KB Flash memory and 64 KB SRAM, and up to 16 MB SPIM extended memory. In particular, it comes with zero-wait Flash memory access further enhancing its operation performance. In addition, the AT32F413 series offers an extensive range of peripherals for enhanced connectivity. They include 1x USB interface, 2x CANs, 1x SDIO, 5x UARTs, 2x SPIs/I²Ss, 2x I²Cs, 2x 16-bit advanced timers, 5x 16-bit general-purpose timers, 2x 32-bit general-purpose timers, 2x 12-bit 16-channel high-speed 2 Msps ADCs, and independent VBAT battery-powered domain. All I/Os of the AT32F413 series have fast toggling capability and almost all of them are 5V tolerant.

The AT32F413 series operates in the temperature range of -40 ℃ to 105℃. It can be supplied in various package types including LQFP64, LQFP48, QFN48 and QFN32 to meet diverse demands. The AT32F413 series is suitable for those applications that require high-speed computing power with affordable prices, including consumer electronics, industrial automation, motor control, IoT, among others.

- **Max Frequency :** 200 MHz
- **Operating Voltage :** 2.6-3.6V
- **Operating Temperature :** -40 to 105 ℃
- **Key Features :** 64 KB SRAM, USB Xtal-less, sLib, 2x CANs, SPIM extend memory (program execution and data encryption)
- **Main Applications :** micro printer, stage lighting, electric scooter controller, three-axis stabilizer, flight controller, industrial control, surveillance, 5G

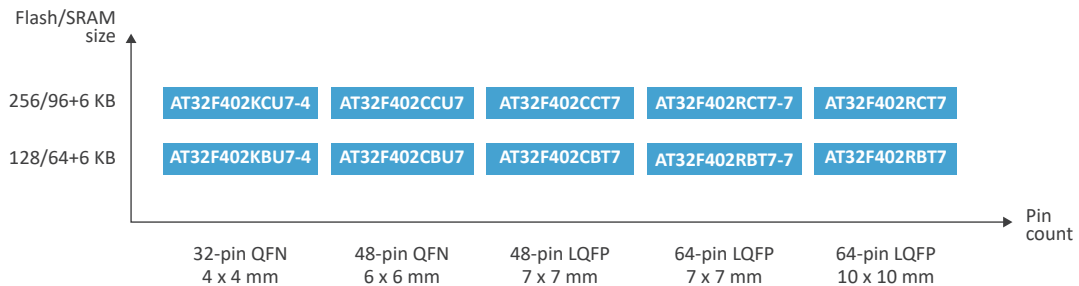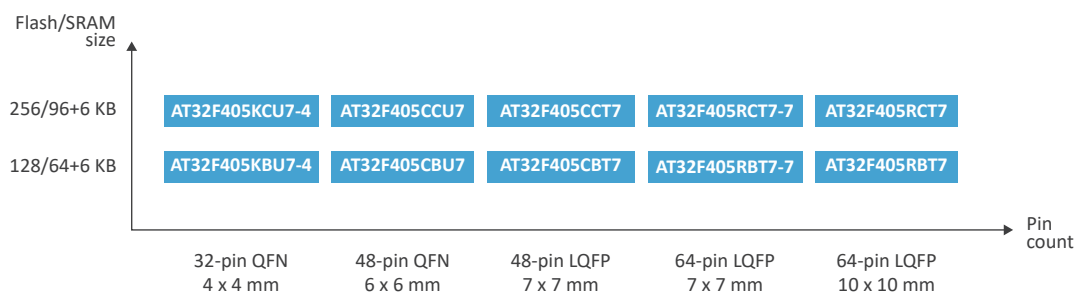| Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC	I²C	SPI	(1)(F/H) I²S	USART/UART	SDIO	USB Device	CAN	ADC Engine	12-bit ADC ch.	DAC Engine	XMC	SPIM	Package
					Timer								Connectivity							Analog Interface					
AT32F413KBU7-4	200	128	32/16/64	27	1	2	5	-	1	1	1	1	2	2	0/2	2/0	1	FS	2	2	10	-	-	1	QFN32 4 x 4 mm
AT32F413KCU7-4	200	256	32/16/64	27	1	2	5	-	1	1	1	1	2	2	0/2	2/0	1	FS	2	2	10	-	-	1	
AT32F413CBU7	200	128	32/16/64	39	1	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	2	2	10	-	-	1	QFN48 6 x 6 mm
AT32F413CCU7	200	256	32/16/64	39	2	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	2	2	10	-	-	1	
AT32F413C8T7	200	64	32	39	1	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	2	2	10	-	-	1	LQFP48 7 x 7 mm
AT32F413CBT7	200	128	32/16/64	39	1	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	2	2	10	-	-	1	
AT32F413CCT7	200	256	32/16/64	39	2	2	5	-	1	1	1	1	2	2	0/2	3/0	1	FS	2	2	10	-	-	1	
AT32F413RBT7	200	128	32/16/64	55	1	2	5	-	1	1	1	1	2	2	0/2	3/2	1	FS	2	2	16	-	-	1	LQFP64 10 x 10 mm
AT32F413RCT7	200	256	32/16/64	55	2	2	5	-	1	1	1	1	2	2	0/2	3/2	1	FS	2	2	16	-	-	1	

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32F402

The AT32F402 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 216 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), up to 256 KB Flash memory and 96+6 KB SRAM (the first 48KB with parity check). It also embeds a programmable 20 KB boot memory - configurable as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 256+20 KB. In addition, the device incorporates 1x USB OTG controller (support Xtal-less in device mode), 1x QSPI, 1x CAN, 8x UARTs, 3x SPIs/I²Ss and 1x separate full-duplex I²S, 3x I²Cs, 1x 16-bit advanced timer, 7x 16-bit general-purpose timers, 1x 32-bit gener-al-purpose timer, 2x 16-bit basic timers, 1x 12-bit 16-channel high-speed 2 Msps ADC. All I/Os of the AT32F402 series boast fast toggling capability and almost all of them are 5V tolerant.

The device operates in the temperature range of -40 ℃ to 105 ℃. It can be supplied in a rich choice of packages, including LQFP64, LQFP48, QFN48 and QFN32 to meet diverse demands. The AT32F402 series can be widely used for applications such as gaming, industrial automation, USB accessory, IoT and consumer electronics.

- **Max Frequency :** 216 MHz
- **Operating Voltage :** 2.4-3.6V
- **Operating Temperature :** -40-105°C
- **Key Features :** 96+6KB SRAM, USB OTG, QSPI, full-duplex I²S, 8x UARTs, CAN
- **Main Applications :** gaming keyboard, gaming mouse, gaming pad, PC accessories, LED control card, audio device, micro printer, barcode scanner, industrial control, surveillance, 5G

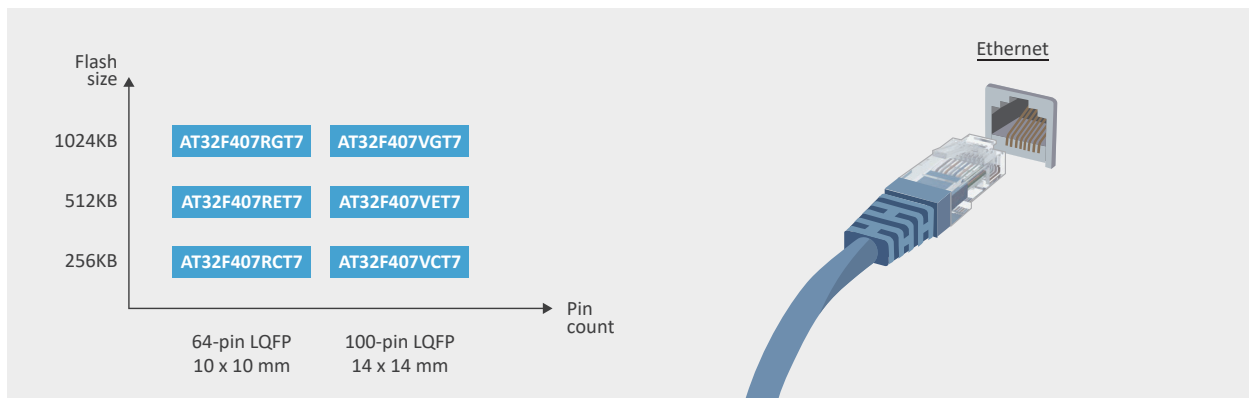| Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	QSPI	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)(F/H) I²S	USART/UART	OTG	CAN	IRTMR	ADC Engine	12-bit ADC ch.	Package
AT32F402KBU7-4	216	128	64+6	28	1	1	1	7	2	1	1	1	1	3	2	1/2	5/2	FS	1	1	1	10	QFN32 4 x 4 mm
AT32F402KCU7-4	216	256	96+6	28	1	1	1	7	2	1	1	1	1	3	2	1/2	5/2	FS	1	1	1	10	
AT32F402CBU7	216	128	64+6	40	1	1	1	7	2	1	1	1	1	3	3	1/3	5/2	FS	1	1	1	10	QFN48 6 x 6 mm
AT32F402CCU7	216	256	96+6	40	1	1	1	7	2	1	1	1	1	3	3	1/3	5/2	FS	1	1	1	10	
AT32F402CBT7	216	128	64+6	40	1	1	1	7	2	1	1	1	1	3	3	1/3	5/2	FS	1	1	1	10	LQFP48 7 x 7 mm
AT32F402CCT7	216	256	96+6	40	1	1	1	7	2	1	1	1	1	3	3	1/3	5/2	FS	1	1	1	10	
AT32F402RBT7-7	216	128	64+6	56	1	1	1	7	2	1	1	1	1	3	3	1/3	6/2	FS	1	1	1	16	LQFP64 7 x 7 mm
AT32F402RCT7-7	216	256	96+6	56	1	1	1	7	2	1	1	1	1	3	3	1/3	6/2	FS	1	1	1	16	
AT32F402RBT7	216	128	64+6	56	1	1	1	7	2	1	1	1	1	3	3	1/3	6/2	FS	1	1	1	16	LQFP64 10 x 10 mm
AT32F402RCT7	216	256	96+6	56	1	1	1	7	2	1	1	1	1	3	3	1/3	6/2	FS	1	1	1	16	

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32F405

The AT32F405 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 216 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), up to 256 KB Flash memory and 96+6 KB SRAM (parity checking is supported for the first 48KB). It also embeds a programmable 20 KB boot memory - configurable as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 256+20 KB. In addition, it incorporates independent HS USB OTG (embedded PHY) and FS USB OTG (support Xtal-less in device mode), 1x QSPI, 1x CAN, 8x UARTs, 3x SPIs/I²Ss and 1x separate full-duplex I²S, 3x I²Cs, 1x 16-bit advanced timer, 7x 16-bit general-purpose timers, 1x 32-bit general-purpose timer, 2x 16-bit basic timers, 1x 12-bit 16-channel high-speed 2 Msps ADC. All I/Os of the AT32F405 series have fast toggling capability and almost all of them are 5V tolerant.

The device operates in the temperature range of -40 ℃ to 105 ℃. It can be supplied in various package types including LQFP64, LQFP48, QFN48 and QFN32 to meet diverse demands. With built-in HS+FS OTG feature (each with independent PHY), the AT32F405 series is particularly suitable for applications like gaming, industrial automation, USB accessories, IoT, consumer electronics, among others.

- **Max Frequency :** 216 MHz
- **Operating Voltage :** 2.4-3.6V
- **Operating Temperature :** -40 to 105 ℃
- **Key Features :** 96+6KB SRAM, HS+FS USB OTG (embedded PHY), QSPI, full-duplexed I²S, 8x UARTs, CAN
- **Main Applications :** gaming keyboard/mouse, gaming pad, PC accessories, LED control card, audio device, micro printer, barcode scanner, industrial control, surveillance, 5G

Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	QSPI	Timer								Connectivity								Analog Interface		Package
						Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	[1](F/H) I²S	USART/UART	OTGHS	OTGFS	CAN	IRTMR	ADC Engine	12-bit ADC ch.	
AT32F405KBU7-4	216	128	64+6	25	1	1	1	7	2	1	1	1	1	3	2	1/2	5/2	1	1	1	1	1	10	QFN32 4 x 4 mm
AT32F405KCU7-4	216	256	96+6	25	1	1	1	7	2	1	1	1	1	3	2	1/2	5/2	1	1	1	1	1	10	
AT32F405CBU7	216	128	64+6	37	1	1	1	7	2	1	1	1	1	3	3	1/3	5/2	1	1	1	1	1	10	QFN48 6 x 6 mm
AT32F405CCU7	216	256	96+6	37	1	1	1	7	2	1	1	1	1	3	3	1/3	5/2	1	1	1	1	1	10	
AT32F405CBT7	216	128	64+6	37	1	1	1	7	2	1	1	1	1	3	3	1/3	5/2	1	1	1	1	1	10	LQFP48 7 x 7 mm
AT32F405CCT7	216	256	96+6	37	1	1	1	7	2	1	1	1	1	3	3	1/3	5/2	1	1	1	1	1	10	
AT32F405RBT7-7	216	128	64+6	53	1	1	1	7	2	1	1	1	1	3	3	1/3	6/2	1	1	1	1	1	16	LQFP64 7 x 7 mm
AT32F405RCT7-7	216	256	96+6	53	1	1	1	7	2	1	1	1	1	3	3	1/3	6/2	1	1	1	1	1	16	
AT32F405RBT7	216	128	64+6	53	1	1	1	7	2	1	1	1	1	3	3	1/3	6/2	1	1	1	1	1	16	LQFP64 10 x 10 mm
AT32F405RCT7	216	256	96+6	53	1	1	1	7	2	1	1	1	1	3	3	1/3	6/2	1	1	1	1	1	16	

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32F407

The AT32F407 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 240 MHz. It features a single-precision floating point unit (FPU), digital signal processor (DSP). It is also provided with rich peripherals and flexible clock control mechanism for various applications. In addition, the device incorporates up to 1 MB Flash and 224 KB SRAM, with zero-wait Flash access outperforming its counterparts in terms of performance.

The AT32F407 series also offers 8x UARTs, 2x CANs, and IEEE-802.3 10/100 Mbps Ethernet port controller suitable for IoT and USB applications (no external crystal oscillator is required), leading to higher reliability and lower cost of terminal products. The AT32F407 device operates in the temperature range of -40 ℃ to 105 ℃, and it can be supplied with a rich choice of package types for diverse demands. With its powerful on-chip resources, higher integration and cost-effectiveness, the AT32F407 series can be widely used in application scenarios such as industrial automation, motor control, IoT and consumer electronics.

- **Max Frequency :** 240 MHz
- **Operating Voltage :** 2.6-3.6V
- **Operating Temperature :** -40-105°C
- **Key Features :** 1 MB Flash, 224 KB SRAM, 10/100 Mbps Ethernet, 3x ADC engines, 8x UARTs, 2x CANs, XMC, USB Xtal-less, SPIM extend memory (execution program and data encryption)
- **Main Applications :** IoT gateway, serial server, micro printer, stage lighting, industrial control, surveillance, LED display, industrial robot, 5G

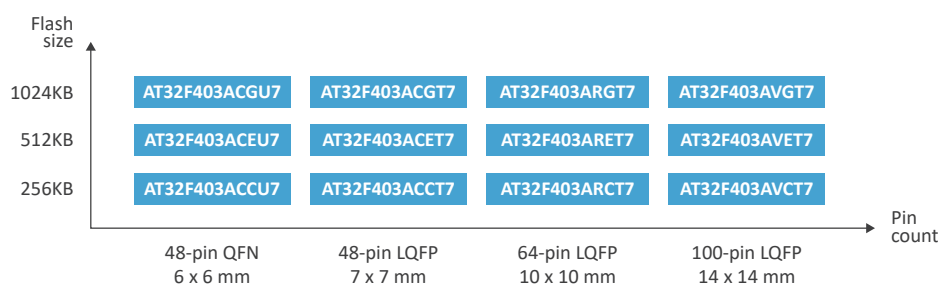| Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Timer								Connectivity							Analog Interface			XMC	SPIM	Package
					Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC	I²C	SPI	(1)(F/H) I²S	USART/UART	SDIO	USB Device	CAN	Ethernet MAC	ADC Engine	12-bit ADC ch.	DAC Engine			
AT32F407RCT7	240	256	96+128	51	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	LQFP64 10 x 10 mm
AT32F407RET7	240	512	96+128	51	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	
AT32F407RGT7	240	1024	96+128	51	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	
AT32F407VCT7	240	256	96+128	80	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	LQFP100 14 x 14 mm
AT32F407VET7	240	512	96+128	80	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	
AT32F407VGT7	240	1024	96+128	80	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32F403A

The AT32F403A series is based on ARM® Cortex®-M4 32-bit core and advanced process, operating at a frequency of up to 240 MHz. It features a single precision floating-point unit (FPU), digital signal processor (DSP), rich peripherals and flexible clock control mechanism, up to 1 MB Flash memory and 224 KB SRAM, with its zero-wait Flash access far beyond its counterparts in terms of performance.

The AT32F403A series is also equipped with Security Library (sLib) to enhance protection of specified program area. This sLib area is used for IDH to program core algorithms and for downstream customers to perform secondary development. In addition, the device features 8x UARTs and 2x CANs for IoT applications and USB applications without the need of external crystal oscillators, leading to enhanced reliability and lower cost of terminal products.

The AT32F403A series operates in the temperature range of -40 to 105 ℃ . It can supplied in a diverse choice of package types to meet memory requirements. With powerful on-chip resource allocation, higher integration and cost-effectiveness, the AT32F403A series can be widely used in applications that require higher performance but with lower price such as industrial automation, motor control, IoT and consumer electronics.

- **Max Frequency :** 240 MHz
- **Operating Voltage :** 2.6-3.6 V
- **Operating Temperature :** -40 to 105 ℃
- **Key Features :** 1 MB Flash, 224 KB SRAM, 3x 12-bit ADC engines, 8x UARTs, 2x CANs, XMC, USB Xtal-less, SPIM extend memory (execution program and data encryption)
- **Main Applications :** sweeping robot, micro printer, stage lighting, HMI, LED display, QR code scanner, electric scooter controller, flight controller, industrial control, 5G

Flash size

	48-pin QFN 6 x 6 mm	48-pin LQFP 7 x 7 mm	64-pin LQFP 10 x 10 mm	100-pin LQFP 14 x 14 mm
1024KB	AT32F403ACGU7	AT32F403ACGT7	AT32F403ARGT7	AT32F403AVGT7
512KB	AT32F403ACEU7	AT32F403ACET7	AT32F403ARET7	AT32F403AVET7
256KB	AT32F403ACCU7	AT32F403ACCT7	AT32F403ARCT7	AT32F403AVCT7

Pin count

Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC	I²C	SPI	[1](F/H) I²S	USART/UART	SDIO	USB Device	CAN	ADC Engine	12-bit ADC ch.	DAC Engine	XMC	SPIM	Package
AT32F403ACCU7	240	256	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	3	10	2	-	1	QFN48 6 x 6 mm
AT32F403ACEU7	240	512	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	3	10	2	-	1	
AT32F403ACGU7	240	1024	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	3	10	2	-	1	
AT32F403ACCT7	240	256	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	3	10	2	-	1	LQFP48 7 x 7 mm
AT32F403ACET7	240	512	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	3	10	2	-	1	
AT32F403ACGT7	240	1024	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	3	10	2	-	1	
AT32F403ARCT7	240	256	96+128	51	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	3	16	2	1	1	LQFP64 10 x 10 mm
AT32F403ARET7	240	512	96+128	51	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	3	16	2	1	1	
AT32F403ARGT7	240	1024	96+128	51	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	3	16	2	1	1	
AT32F403AVCT7	240	256	96+128	80	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	3	16	2	1	1	LQFP100 14 x 14 mm
AT32F403AVET7	240	512	96+128	80	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	3	16	2	1	1	
AT32F403AVGT7	240	1024	96+128	80	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	3	16	2	1	1	

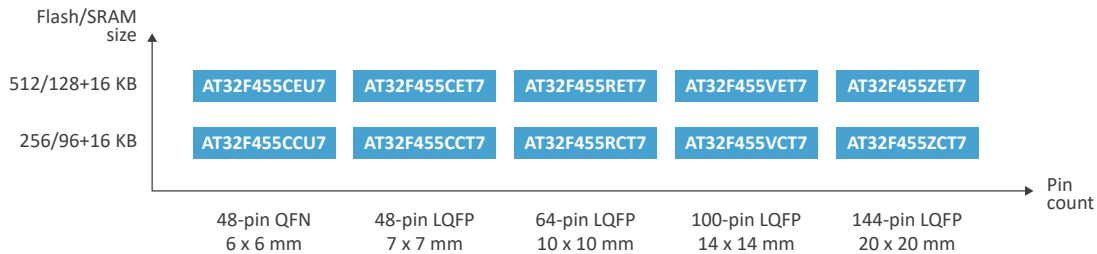(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32F455

The AT32F455 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 192 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), up to 512 KB Flash memory and 128+16 KB SRAM. It also embeds a 26 KB programmable boot memory - configurable as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 512+26 KB.

In addition, the device offers a rich choice of peripherals and advanced I/O ports, including up to 3x I²Cs, 4x SPIs/I²Ss(2x full-duplex), 1x full-duplex I²SF, 8x USARTs, 3x CANs, 1x SDIO, 1x OTGFS, 1x QSPI interface for supporting external SPI memory or SPI RAM, and 1x XMC interface that supports SDRAM, SRAM, PSRAM, NOR Flash, and other memory extensions. Additionally, it features 2x 12-bit 16-channel high-speed 5.33Msps ADCs, 2x 12-bit DACs, 8x 16-bit general-purpose timers, 2x 32-bit general-purpose timers, 2x basic timers, 1x AES hardware accelerator, and 1x TRNG. All these features are designed to enhance code and data protection while ensuring high performance.

The AT32F455 series operates in the temperature range of -40 ℃ to 105 ℃, and can be supplied in a diverse range of package types to meet market demands. More importantly, the microcontroller products are fully pin-to-pin within the AT32F455 series, which provides strong compatibility and can greatly shorten application development cycles. The AT32F455 series is thus particularly suited for industrial automation, motor control, Internet of Things (IoT), consumer electronics, among many others.

- **Max Frequency :** 192 MHz
- **Operating Voltage :** 2.4-3.6 V
- **Operating Temperature :** -40 to 105 ℃
- **Key Features :** up to 512+26KB Flash, 128+16KB SRAM, OTG, 3x CANs, QSPI, XMC, 2x 5.33 Msps ADCs, 2x DACs
- **Main Applications :** micro printer, sweeping robot, charging pile, DTU, HMI, PLC, surveillance, digital intercom, motor control

Part No.	Frequency (MHz)	Flash(KB)	SRAM(KB)	I/O	QSPI	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)(F/H)I²S	USART/UART	SDIO	OTG	CAN	IRTMR	Ethernet MAC	(2)ADC Engine	12-bit ADC ch.	DAC Engine	XMC	SDRAM	TRNG	AES	Package
AT32F455CCU7	192	256	96+12	39	1	2	2	8	2	1	1	1	1	3	4	3/5	7	1	FS	3	1	-	2	10	2	-	-	1	1	QFN48 6 x 6 mm
AT32F455CEU7	192	512	128+16	39	1	2	2	8	2	1	1	1	1	3	4	3/5	7	1	FS	3	1	-	2	10	2	-	-	1	1	
AT32F455CCT7	192	256	96+12	39	1	2	2	8	2	1	1	1	1	3	4	3/5	7	1	FS	3	1	-	2	10	2	-	-	1	1	LQFP48 7 x 7 mm
AT32F455CET7	192	512	128+16	39	1	2	2	8	2	1	1	1	1	3	4	3/5	7	1	FS	3	1	-	2	10	2	-	-	1	1	
AT32F455RCT7	192	256	96+12	53	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	-	1	1	LQFP64 10 x 10 mm
AT32F455RET7	192	512	128+16	53	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	-	1	1	
AT32F455VCT7	192	256	96+12	85	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	1	1	1	LQFP100 14 x 14 mm
AT32F455VET7	192	512	128+16	85	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	1	1	1	
AT32F455ZCT7	192	256	96+12	117	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	1	1	1	LQFP144 20 x 20 mm
AT32F455ZET7	192	512	128+16	117	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	1	1	1	

(1) F/H: Full Duplex I²S / Half Duplex I²S (Half-duplex I²S1/4 shares pins with Full-duplex I²S2/3 and SPI, while I²SF5 is a separate Full-duplex)   (2) 5.33 Msps ADC
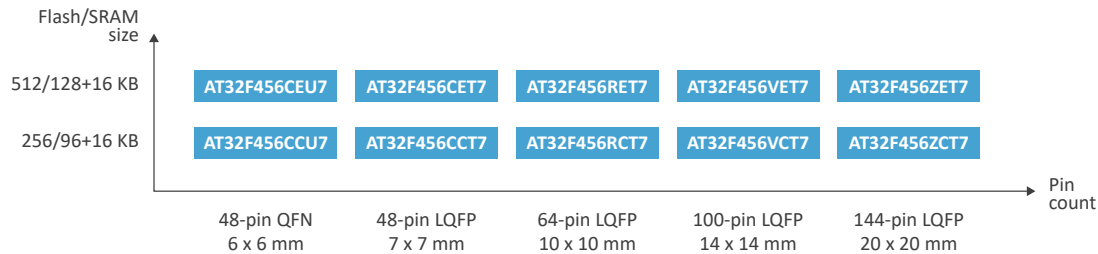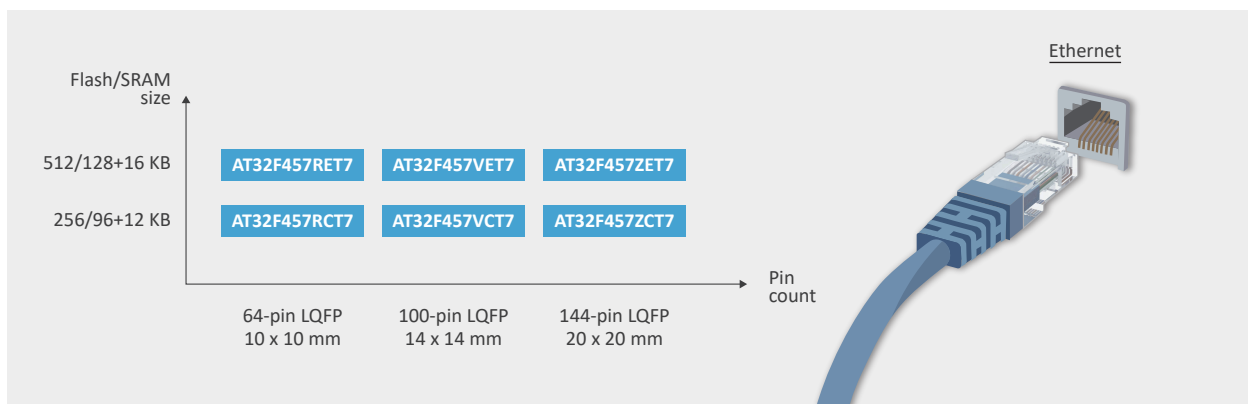* Sample available : 2025/03

AT32F456

The AT32F456 series is based on ARM®Cortex®-M4 32-bit core operating at a frequency of up to 192 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), up to 512 KB Flash and 128+16 KB SRAM. It also embeds a 26 KB programmable boot memory - configurable as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 512+26 KB.

In addition, the device offers a rich choice of peripherals and advanced I/O ports, including up to 3x I²Cs, 4x SPIs/I²Ss(2x full-duplex), 1x full-duplex I²SF, 8x USARTs, 1x SDIO, 1x OTGFS, and 3x CAN-FDs (compatible with CAN 2.0B, at a higher communication rate), 1x QSPI interface for supporting external SPI memory or SPI RAM, and 1x XMC interface that supports SDRAM, SRAM, PSRAM, NOR Flash, and other memory extensions. Additionally, it features 2x 12-bit 16-channel high-speed 5.33Msps ADCs, 2x 12-bit DACs, 8x 16-bit general-purpose timers, 2x 32-bit general-purpose timers, 2x basic timers, 1x AES hardware accelerator, and 1x TRNG. All these features are designed to enhance code and data protection while ensuring high performance.

The AT32F456 series operates in the temperature range of -40 ℃ to 105 ℃, and can be supplied in a diverse range of package types to meet market demands. More importantly, the products within the AT32F456 series are pin-to-pin compatible and thus can greatly shorten application development cycles . The AT32F456 series is thus considered the preferred choice for a wide range of mainstream applications, particularly for industrial automation, motor control, Internet of Things (IoT), consumer electronics, among many others.

- **Max Frequency :** 192 MHz
- **Operating Voltage :** 2.4-3.6 V
- **Operating Temperature :** -40 to 105 ℃
- **Key Features :** up to 512+26KB Flash, 128+16KB SRAM, OTG, 3x CAN-FDs, QSPI, XMC, 2x 5.33Msps ADCs, 2x DACs
- **Main Applications :** micro printer, sweeping robot, charging pile, DTU, HMI, PLC, surveillance, digital intercom, motor control

Flash/SRAM size

512/128+16 KB	AT32F456CEU7	AT32F456CET7	AT32F456RET7	AT32F456VET7	AT32F456ZET7
256/96+16 KB	AT32F456CCU7	AT32F456CCT7	AT32F456RCT7	AT32F456VCT7	AT32F456ZCT7
	48-pin QFN 6 x 6 mm	48-pin LQFP 7 x 7 mm	64-pin LQFP 10 x 10 mm	100-pin LQFP 14 x 14 mm	144-pin LQFP 20 x 20 mm

Pin count

Part No.	Frequency (MHz)	Flash(KB)	SRAM(KB)	I/O	QSPI	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)(F/H)I²S	USART/UART	SDIO	OTG	CAN-FD	IRTMR	Ethernet MAC	(2)ADC Engine	12-bit ADC ch.	DAC Engine	XMC	SDRAM	TRNG	AES	Package
AT32F456CCU7	192	256	96+12	39	1	2	2	8	2	1	1	1	1	3	4	3/5	7	1	FS	3	1	-	2	10	2	-	-	1	1	QFN48 6 x 6 mm
AT32F456CEU7	192	512	128+16	39	1	2	2	8	2	1	1	1	1	3	4	3/5	7	1	FS	3	1	-	2	10	2	-	-	1	1	
AT32F456CCT7	192	256	96+12	39	1	2	2	8	2	1	1	1	1	3	4	3/5	7	1	FS	3	1	-	2	10	2	-	-	1	1	LQFP48 7 x 7 mm
AT32F456CET7	192	512	128+16	39	1	2	2	8	2	1	1	1	1	3	4	3/5	7	1	FS	3	1	-	2	10	2	-	-	1	1	
AT32F456RCT7	192	256	96+12	53	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	-	1	1	LQFP64 10 x 10 mm
AT32F456RET7	192	512	128+16	53	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	-	1	1	
AT32F456VCT7	192	256	96+12	85	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	1	1	1	LQFP100 14 x 14 mm
AT32F456VET7	192	512	128+16	85	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	1	1	1	
AT32F456ZCT7	192	256	96+12	117	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	1	1	1	LQFP144 20 x 20 mm
AT32F456ZET7	192	512	128+16	117	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	-	2	16	2	1	1	1	1	

(1) F/H: Full Duplex I²S / Half Duplex I²S (Half-duplex I²S1/4 shares pins with Full-duplex I²S2/3 and SPI, while I²SF5 is a separate Full-duplex)   (2) 5.33 Msps ADC
* Sample available : 2025/03

AT32F457

The AT32F457 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 192 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), up to 512 KB Flash and 128+16 KB SRAM. It also embeds a 26 KB programmable boot memory - configurable as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 512+26 KB.

In addition, the device offers a rich choice of peripherals and advanced I/O ports, including up to 3x I²Cs, 4x SPIs/I²Ss (2x full-duplex), 1x full-duplex I²SF, 8x USARTs, 3x CAN-FDs, 1x SDIO, 1x OTGFS, IEEE 1588 standard Ethernet MII/RMII controller interface, 1x QSPI interface for supporting external SPI memory or SPI RAM, and 1x XMC interface that supports SDRAM, SRAM, PSRAM, NOR Flash, and other memory extensions. Additionally, it features 2x 12-bit 16-channel high-speed 5.33Msps ADCs, 2x 12-bit DACs, 8x 16-bit general-purpose timers, 2x 32-bit general-purpose timers, 2x basic timers, 1x AES hardware accelerator, and 1x TRNG. All these features are designed to enhance code and data protection while ensuring high performance.

The AT32F457 operates in the temperature range of -40 ℃ to 105 ℃, and can be supplied in a diverse range of package types to meet market demands. More importantly, the microcontroller products are fully pin-to-pin within the AT32F457 series, which provides strong compatibility and can greatly shorten application development cycles. The AT32F457 series can be used for a wide range of mainstream applications, particularly for industrial automation, motor control, Internet of Things (IoT), consumer electronics.

- **Max Frequency :** 192 MHz
- **Operating Voltage :** 2.4-3.6 V
- **Operating Temperature :** -40 to 105 ℃
- **Key Features :** up to 512+26KB Flash, 128+16KB SRAM, OTG, 3x CAN-FDs, QSPI, XMC, 2x 5.33 Msps ADCs, 2x DACs, EMAC
- **Main Applications :** gateway, micro printer, charging pile, HMI, PLC, surveillance

	Flash/SRAM size		
512/128+16 KB	AT32F457RET7	AT32F457VET7	AT32F457ZET7
256/96+12 KB	AT32F457RCT7	AT32F457VCT7	AT32F457ZCT7
	64-pin LQFP 10 x 10 mm	100-pin LQFP 14 x 14 mm	144-pin LQFP 20 x 20 mm

Part No.	Frequency (MHz)	Flash(KB)	SRAM(KB)	I/O	QSPI	Timer								Connectivity									Analog Interface			XMC	SDRAM	TRNG	AES	Package
						Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)I²F/H|I²S	USART/UART	SDIO	OTG	CAN-FD	IRTMR	Ethernet MAC	(2)ADC Engine	12-bit ADC ch.	DAC Engine					
AT32F457RCT7	192	256	96+12	53	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	1	2	16	2	1	-	1	1	**LQFP64** 10 x 10 mm
AT32F457RET7	192	512	128+16	53	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	1	2	16	2	1	-	1	1	
AT32F457VCT7	192	256	96+12	85	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	1	2	16	2	1	1	1	1	**LQFP100** 14 x 14 mm
AT32F457VET7	192	512	128+16	85	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	1	2	16	2	1	1	1	1	
AT32F457ZCT7	192	256	96+12	117	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	1	2	16	2	1	1	1	1	**LQFP144** 20 x 20 mm
AT32F457ZET7	192	512	128+16	117	1	2	2	8	2	1	1	1	1	3	4	3/5	8	1	FS	3	1	1	2	16	2	1	1	1	1	

(1) F/H: Full Duplex I²S / Half Duplex I²S (Half-duplex I²S1/4 shares pins with Full-duplex I²S2/3 and SPI, while I²SF5 is a separate Full-duplex)   (2) 5.33 Msps ADC
* Sample available : 2025/03

AT32A Automotive-grade MCU Family

The AT32A Automotive MCU Family is designed to comply with Automotive AEC-Q100 standards including an accelerated environmental stress test, accelerated lifetime simulation test, package assembly integrity test, and electrical verification test.

The AT32A403A and AT32A423 of the family are both AEC-Q100-qualified microcontrollers created to cover the requirements for a new era of automotive electronics. They support various automotive application scenarios such as body, ADAS, in-car entertainment systems, and new energy vehicle BMS.

AEC-Q100 Standard	High Performance	High Reliability	High Safety	Wide Coverage

AT32A Automotive MCU

- **High Integration**
  - CAN 2.0 interface with a rate of up to 1Mbit/s
  - ADC/DAC/USB OTG/UART/XMC/Ethernet
  - Multiple package options for NEV applications

- **AEC-Q100 Standards Qualified**
  - Operating temperature range from -40 to 105°C
  - Multiple verification tests including accelerated environment stress test
  - 2x watchdog timers

- **Chip Features / Data Security**
  - Programmable Flash memory
  - Software/hardware encryption and decryption
  - Hardware CRC calculation unit

Main Applications of AT32A MCU

- **Vehicle System**
  - ADAS 360° Look Around
  - Car GPS tracker
  - Car Multimedia
  - Air Conditioning Panel

- **Body Control**
  - Car Trunk Control
  - LED Lighting
  - Electric Windows
  - BCM

- **Vehicle Communication System**
  - OBDII Diagnostic Box
  - CAN Bus Protocol Box
  - Car T-BOX

- **New Energy System**
  - BMS

Multimedia Info-system

Security System

Car Safety Assistance

Instrument Control
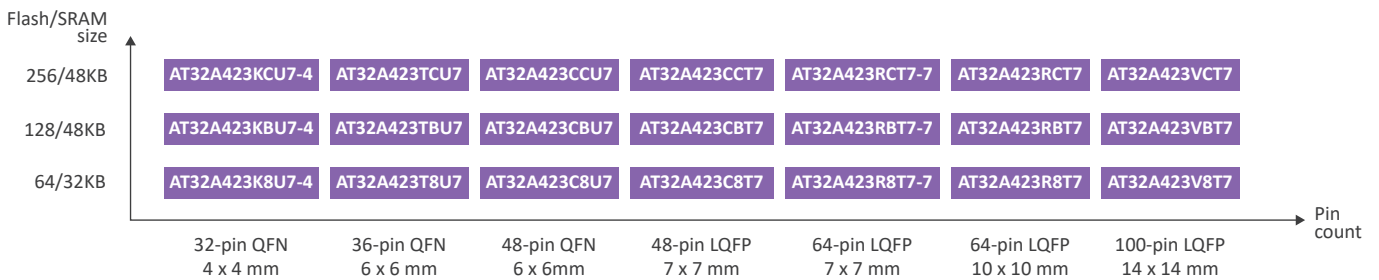
Trunk Control

Charging pile
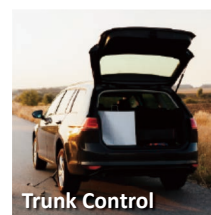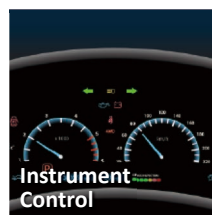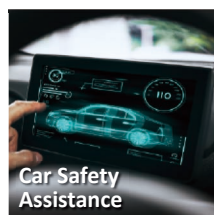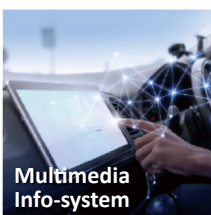
AT32A423

The AT32A423 (A : Automotive) series is based on ARM® Cortex®-M4F 32-bit core operating at a frequency of up to 150 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), up to 256 KB Flash memory and 48 KB SRAM. It also embeds a 20 KB with two functions: one that serves as a Bootloader, and another one that is one-time configurable as user instruction and data memory for achieving a maximum of 256 + 20 KB. It incorporates XMC interface (for PSRAM and NOR extension, or 8080/6800 mode parallel LCD), 1x OTG controller (support Xtal-less in device mode), 2x CANs, 8x USARTs, 3x SPIs/I²Ss (full-duplex support), 3x I²Cs, 1x 16-bit advanced timer, 8x 16-bit general-purpose timers, 1x 32-bit general-purpose timer, 2x 16-bit basic timers, 1x 12-bit 24-channel high-speed 5.33 Msps ADC and 2x 12-bit DACs. All I/Os have fast toggling capability and almost all of them are 5V tolerant. They can be used for a variety of purposes such as port remapping.

The AT32A423 operates in the temperature range of -40℃~105℃, and is highly adaptable to complex working environments. It has successfully passed AEC-Q100 qualification and complies with automotive grade reliability test standards. To meet diverse memory demands, AT32A423 provides a rich choice of package types. With powerful on-chip resources, higher integration, and cost-effectiveness, the AT32A423 series offers robust solutions for various automotive scenarios. It can be widely used in vehicle scenarios such as driving recorders, in-car audio and video, ADAS, 360 panoramic views, car central control, kick tailgate control, charging piles, etc.

- **Max Frequency** : 150 MHz
- **Operating Voltage** : 2.4-3.6V
- **Operating Temperature** : -40-105°C
- **Key Features** : 24-channel 5.33 Msps ADC engine, 2x DACs, USB OTG, 8x USARTs, 2x CANs, XMC
- **Main Applications** : driving recorder, car audio and video, ADAS, 360 panoramic view, car central control, kick tailgate control, charging pile

Flash/SRAM size							
256/48KB	AT32A423KCU7-4	AT32A423TCU7	AT32A423CCU7	AT32A423CCT7	AT32A423RCT7-7	AT32A423RCT7	AT32A423VCT7
128/48KB	AT32A423KBU7-4	AT32A423TBU7	AT32A423CBU7	AT32A423CBT7	AT32A423RBT7-7	AT32A423RBT7	AT32A423VBT7
64/32KB	AT32A423K8U7-4	AT32A423T8U7	AT32A423C8U7	AT32A423C8T7	AT32A423R8T7-7	AT32A423R8T7	AT32A423V8T7
Pin count	32-pin QFN 4 x 4 mm	36-pin QFN 6 x 6 mm	48-pin QFN 6 x 6mm	48-pin LQFP 7 x 7 mm	64-pin LQFP 7 x 7 mm	64-pin LQFP 10 x 10 mm	100-pin LQFP 14 x 14 mm

Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Timer								Connectivity							Analog Interface			XMC	Package
					Advanced	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)(2)I/F/H I²S	USART/UART	CAN	OTG	IRTMR	(3)ADC Engine	12-bit ADC ch.	DAC Engine		
AT32A423K8U7-4	150	64	32	27	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	QFN32 4 x 4 mm
AT32A423KBU7-4	150	128	48	27	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	
AT32A423KCU7-4	150	256	48	27	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	
AT32A423T8U7	150	64	32	29	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	QFN36 6 x 6 mm
AT32A423TBU7	150	128	48	29	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	
AT32A423TCU7	150	256	48	29	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	11	2	-	
AT32A423C8U7	150	64	32	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	QFN48 6 x 6 mm
AT32A423CBU7	150	128	48	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	
AT32A423CCU7	150	256	48	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	
AT32A423C8T7	150	64	32	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	LQFP48 7 x 7 mm
AT32A423CBT7	150	128	48	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	
AT32A423CCT7	150	256	48	39	1	1	8	2	1	1	1	1	3	3	0/3	4/3	2	FS	1	1	17	2	-	
AT32A423R8T7-7	150	64	32	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	LQFP64 7 x 7 mm
AT32A423RBT7-7	150	128	48	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	
AT32A423RCT7-7	150	256	48	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	
AT32A423R8T7	150	64	32	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	LQFP64 10 x 10 mm
AT32A423RBT7	150	128	48	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	
AT32A423RCT7	150	256	48	53	1	1	8	2	1	1	1	1	3	3	0/3	5/3	2	FS	1	1	23	2	1	
AT32A423V8T7	150	64	32	87	1	1	8	2	1	1	1	1	3	3	0/3	8/0	2	FS	1	1	24	2	1	LQFP100 14 x 14 mm
AT32A423VBT7	150	128	48	87	1	1	8	2	1	1	1	1	3	3	0/3	8/0	2	FS	1	1	24	2	1	
AT32A423VCT7	150	256	48	87	1	1	8	2	1	1	1	1	3	3	0/3	8/0	2	FS	1	1	24	2	1	

(1) F/H: Full Duplex I²S / Half Duplex I²S   (2) Each 2 Half Duplex could be combined with 1 Full Duplex   (3) 5.33 Msps ADC
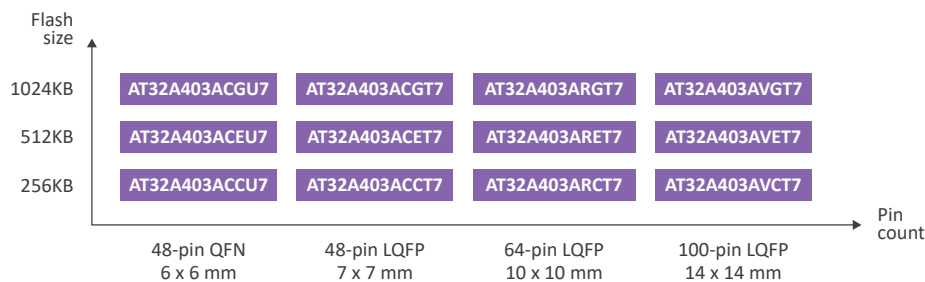
AT32A403A

The AT32A403A (A : Automotive) series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 200 MHz. It features a single-precision floating point unit (FPU), digital signal processor (DSP), rich peripherals, and flexible clock control mechanism, bringing a high level of integration and a great competitive edge. Additionally, it embeds up to 1 MB Flash memory and 224 KB SRAM, particularly its zero-wait Flash access overtaking its counterparts in terms of performance.

The device operates in the temperature range of -40 ℃ to 105 ℃. It incorporates 8x UARTs, 2x CANs, IEEE-802.3 10/100 Mbps Ethernet port controller, particularly suitable for vehicle networking and in-car audio and video systems, and a USB interface supporting crystal-less mode, enhancing reliability while at the same time lowering cost in the end products.

Reliability is considered one of the most important parts of automotive microcontrollers when it comes to ensuring safe driving in harsh environments. As ARTERY's first automotive MCU, the AT32A403A series, AEC-Q100 standards certified, is designed to address a wide variety of applications with demanding safety requirements such as body control, ADAS, in-car multimedia system, and BMS for new energy vehicles. Under AEC-Q100 standards, AT32A403A has successfully passed a series of reliability tests including Accelerated Environment Stress Tests, Accelerated Lifetime Simulation Tests, Package Assembly Integrity Tests, and Electrical Verification Tests.

- **Max Frequency :** 200 MHz
- **Operating Voltage :** 2.6-3.6V
- **Operating Temperature :** -40-105°C
- **Key Features :** 1 MB Flash, 224 KB SRAM, 10/100 Mbps Ethernet, 3x ADC engines, 8x UARTs, 2x CANs, EMAC, USB Xtal-less, SPIM extend memory (program execution and data encryption)
- **Main Applications :** new energy vehicle scenarios such as body control, ADAS , in-car audio and video, BMS, etc.

Flash size				
1024KB	AT32A403ACGU7	AT32A403ACGT7	AT32A403ARGT7	AT32A403AVGT7
512KB	AT32A403ACEU7	AT32A403ACET7	AT32A403ARET7	AT32A403AVET7
256KB	AT32A403ACCU7	AT32A403ACCT7	AT32A403ARCT7	AT32A403AVCT7
	48-pin QFN 6 x 6 mm	48-pin LQFP 7 x 7 mm	64-pin LQFP 10 x 10 mm	100-pin LQFP 14 x 14 mm → Pin count

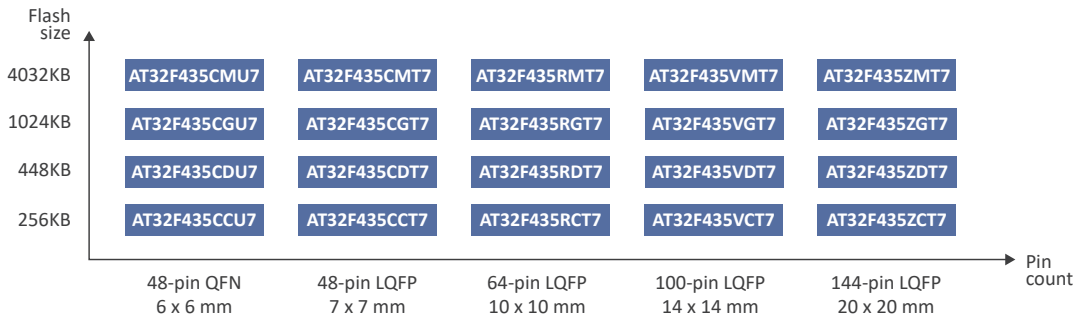| Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Timer								Connectivity								Analog Interface			XMC	SPIM	Package
					Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC	I²C	SPI	(1)(F/H) I²S	USART/UART	SDIO	USB Device	CAN	Ethernet MAC	ADC Engine	12-bit ADC ch.	DAC Engine			
AT32A403ACCU7	200	256	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	-	3	10	2	-	1	QFN48 6 x 6 mm
AT32A403ACEU7	200	512	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	-	3	10	2	-	1	
AT32A403ACGU7	200	1024	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	-	3	10	2	-	1	
AT32A403ACCT7	200	256	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	-	3	10	2	-	1	LQFP48 7 x 7 mm
AT32A403ACET7	200	512	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	-	3	10	2	-	1	
AT32A403ACGT7	200	1024	96+128	37	2	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FS	2	-	3	10	2	-	1	
AT32A403ARCT7	200	256	96+128	51	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	LQFP64 10 x 10 mm
AT32A403ARET7	200	512	96+128	51	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	
AT32A403ARGT7	200	1024	96+128	51	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	
AT32A403AVCT7	200	256	96+128	80	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	LQFP100 14 x 14 mm
AT32A403AVET7	200	512	96+128	80	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	
AT32A403AVGT7	200	1024	96+128	80	2	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FS	2	1	3	16	2	1	1	

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32F435

As a high performance microcontroller, the AT32F435 series is based on ARM® Cortex®-M4 32-bit core operatin at a frequency of up to 288 MHz. This device features a single precision floating-point unit (FPU) and digital signal processor (DSP) and it is provided with rich peripherals and flexible clock control mechanism for a wide range of applications. It incorporates embedded memories of up to 4032 KB Flash memory and 512 KB SRAM.

The AT32F435 series offers 2x OTG controllers (Xtal-less in device mode), 2x QSPIs (for external SPI Flash memory or SPI RAM extension), 8x UARTs, 2x CANs, 4x SPIs/I²Ss (2x full-duplex), 3x high-speed ADC engines (5.33 Msps), 8~14-bit digital video parallel interface (DVP) and XMC interface (for SDRAM, SRAM and PSRAM). The device operates in the temperature range of -40 ℃ to 105 ℃, with a rich choice of package types available for diverse demands. With powerful on-chip resources, higher integration and cost-effectiveness, the AT32F435 series is particularly suited for applications including industrial automation, motor control, IoT and consumer electronics.

- **Max Frequency :** 288 MHz
- **Operating Voltage :** 2.6-3.6V
- **Operating Temperature :** -40-105°C
- **Key Features :** up to 4032 KB Flash, up to 512 KB SRAM, SDRAM, 2x QSPIs, 2x OTGs, DVP, 3x 5.33 Msps ADC engines
- **Main Applications :** sweeping robot, micro printer, stage lighting, HMI, LED display, QR code scanner, surveillance, industrial control, 5G

Flash size					
4032KB	AT32F435CMU7	AT32F435CMT7	AT32F435RMT7	AT32F435VMT7	AT32F435ZMT7
1024KB	AT32F435CGU7	AT32F435CGT7	AT32F435RGT7	AT32F435VGT7	AT32F435ZGT7
448KB	AT32F435CDU7	AT32F435CDT7	AT32F435RDT7	AT32F435VDT7	AT32F435ZDT7
256KB	AT32F435CCU7	AT32F435CCT7	AT32F435RCT7	AT32F435VCT7	AT32F435ZCT7
	48-pin QFN 6 x 6 mm	48-pin LQFP 7 x 7 mm	64-pin LQFP 10 x 10 mm	100-pin LQFP 14 x 14 mm	144-pin LQFP 20 x 20 mm	Pin count

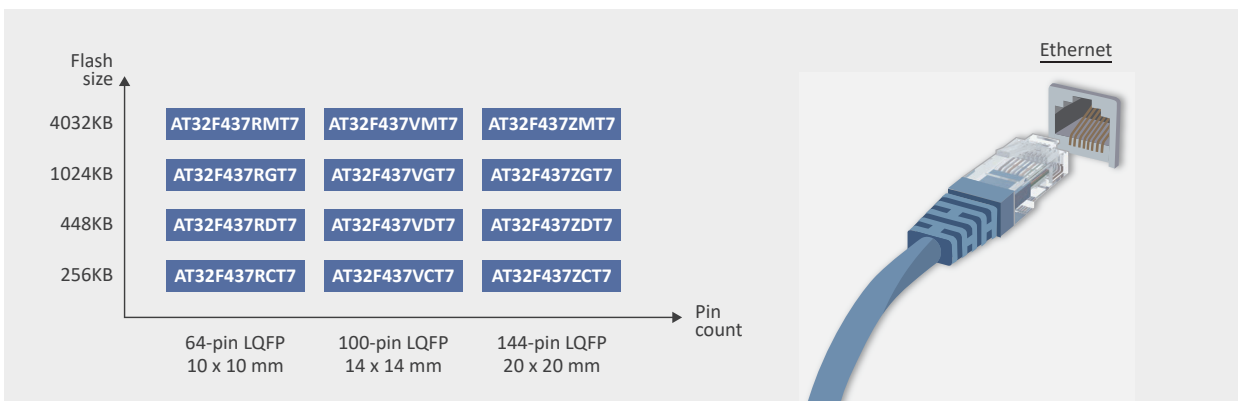| Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	QSPI	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)F/H I²S	USART/UART	SDIO	OTG	CAN	IRTMR	Ethernet MAC	(2)ADC Engine	12-bit ADC ch.	DAC Engine	XMC	SDRAM	DVP	Package
AT32F435CCU7	288	256	384/512	39	2	3	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FSx2	2	1	-	3	10	2	-	-	1	QFN48 6 x 6 mm
AT32F435CDU7	288	448	384/512	39	2	3	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FSx2	2	1	-	3	10	2	-	-	1	
AT32F435CGU7	288	1024	384/512	39	2	3	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FSx2	2	1	-	3	10	2	-	-	1	
AT32F435CMU7	288	4032	384/512	39	2	3	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FSx2	2	1	-	3	10	2	-	-	1	
AT32F435CCT7	288	256	384/512	39	2	3	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FSx2	2	1	-	3	10	2	-	-	1	LQFP48 7 x 7 mm
AT32F435CDT7	288	448	384/512	39	2	3	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FSx2	2	1	-	3	10	2	-	-	1	
AT32F435CGT7	288	1024	384/512	39	2	3	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FSx2	2	1	-	3	10	2	-	-	1	
AT32F435CMT7	288	4032	384/512	39	2	3	2	8	2	1	1	1	1	3	4	2/2	3/4	1	FSx2	2	1	-	3	10	2	-	-	1	
AT32F435RCT7	288	256	384/512	53	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	16	2	1	-	1	LQFP64 10 x10 mm
AT32F435RDT7	288	448	384/512	53	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	16	2	1	-	1	
AT32F435RGT7	288	1024	384/512	53	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	16	2	1	-	1	
AT32F435RMT7	288	4032	384/512	53	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	16	2	1	-	1	
AT32F435VCT7	288	256	384/512	84	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	16	2	1	1	1	LQFP100 14 x 14 mm
AT32F435VDT7	288	448	384/512	84	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	16	2	1	1	1	
AT32F435VGT7	288	1024	384/512	84	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	16	2	1	1	1	
AT32F435VMT7	288	4032	384/512	84	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	16	2	1	1	1	
AT32F435ZCT7	288	256	384/512	116	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	24	2	1	1	1	LQFP144 20 x 20 mm
AT32F435ZDT7	288	448	384/512	116	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	24	2	1	1	1	
AT32F435ZGT7	288	1024	384/512	116	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	24	2	1	1	1	
AT32F435ZMT7	288	4032	384/512	116	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	-	3	24	2	1	1	1	

(1) F/H: Full Duplex I²S / Half Duplex I²S   (2) 5.33 Msps ADC

AT32F437

As a high performance microcontroller, the AT32F437 series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 288 MHz. This device features a single precision floating-point unit (FPU) and digital signal processor (DSP) and it is provided with rich peripherals and a flexible clock control mechanism for a wide range of applications. It incorporates embedded memories of up to 4032 KB Flash memory and 512 KB SRAM.

The AT32F437 series offers 2x OTG controllers (Xtal-less in device mode), 2x QSPIs (for external SPI Flash memory or SPI RAM extension), 8x UARTs, 2x CANs, 4x SPIs/I²Ss (2x full-duplex), 3x high-speed ADC engines (5.33 Msps), 8~14-bit digital video parallel interface (DVP) and XMC interface (for SDRAM, SRAM and PSRAM), as well as IEEE-802.3 10/100 Mbps Ethernet port controller suitable for IoT applications. The AT32F437 series operates in the temperature range of -40 ℃ to 105 ℃, with a rich choice of package types available for diverse demands. With powerful on-chip resources, higher integration and cost-effectiveness, the product series is particularly suitable for applications including industrial automation, motor control, IoT and consumer electronics.

- **Max Frequency :** 288 MHz
- **Operating Voltage :** 2.6-3.6V
- **Operating Temperature :** -40-105°C
- **Key Features :** up to 4032 KB Flash, up to 512 KB SRAM, 10/100 Mbps Ethernet, 3x 5.33 Msps ADC engines, SDRAM, 2 x QSPIs, 2x OTGs, DVP
- **Main Applications :** IoT gateway, serial server, micro printer, stage lighting, HMI, LED display, QR code scanner, surveillance, industrial control, 5G

Part No.	Frequency (MHz)	Flash(KB)	SRAM(KB)	I/O	QSPI	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)(F/H)I²S	USART/UART	SDIO	OTG	CAN	IRTMR	Ethernet MAC	(2)ADC Engine	12-bit ADC ch.	DAC Engine	XMC	SDRAM	DVP	Package
AT32F437RCT7	288	256	384/512	53	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	16	2	1	-	1	LQFP64 10 x 10 mm
AT32F437RDT7	288	448	384/512	53	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	16	2	1	-	1	
AT32F437RGT7	288	1024	384/512	53	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	16	2	1	-	1	
AT32F437RMT7	288	4032	384/512	53	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	16	2	1	-	1	
AT32F437VCT7	288	256	384/512	84	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	16	2	1	1	1	LQFP100 14 x 14 mm
AT32F437VDT7	288	448	384/512	84	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	16	2	1	1	1	
AT32F437VGT7	288	1024	384/512	84	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	16	2	1	1	1	
AT32F437VMT7	288	4032	384/512	84	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	16	2	1	1	1	
AT32F437ZCT7	288	256	384/512	116	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	24	2	1	1	1	LQFP144 20 x 20 mm
AT32F437ZDT7	288	448	384/512	116	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	24	2	1	1	1	
AT32F437ZGT7	288	1024	384/512	116	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	24	2	1	1	1	
AT32F437ZMT7	288	4032	384/512	116	2	3	2	8	2	1	1	1	1	3	4	2/2	4/4	2	FSx2	2	1	1	3	24	2	1	1	1	

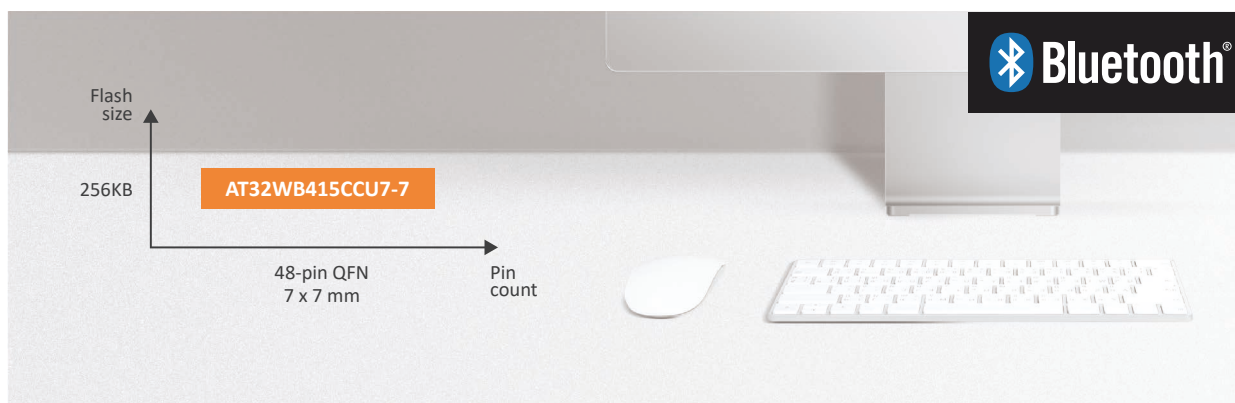(1) F/H: Full Duplex I²S / Half Duplex I²S   (2) 5.33 Msps ADC

AT32WB415

The AT32WB415 (WB : Wireless Bluetooth) series embed a low-power radio that is compliant with Bluetooth Low Energy SIG specification 5.0. It contains rich communication interfaces, Bluetooth radio frequency (RF) transceiver and baseband features, delivering robust wireless data signal processing capability, with up to -97 dBm sensitivity in Bluetooth RX, and -20 dBm ~ +4 dBm in Bluetooth TX. The antenna embedded in the device can cover as far as 30m, up to 2 Mbps, for powerful connectivity.

The device is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 150 MHz. It integrates a digital signal processor (DSP) and memory protection unit (MPU), up to 256 KB Flash memory and 32 KB SRAM. The device features a comprehensive range of peripherals, namely 1x 12-bit 8-channel ADC, 2x CMPs, 4x UARTs, 1x SPI, 1x I²C, 1x CAN, 1x advanced timer and 7x general purpose timers. The AT32WB415 series operates in the temperature range of -40 °C to 105 °C. Compared to legacy MCUs, in which functions are relatively scattered, AT32WB415 provides an all-in-one solution for the development of Bluetooth technology products. Besides, its reduced PCB size and the optimized RF layout will bring more excellent solutions for various applications such as consumer electronics, smart home, Internet of Things (IoT), among others.

- **Max Frequency :** 150 MHz
- **Operating Voltage :** 2.6-3.6V
- **Operating Temperature :** -40-105°C
- **Key Features :** Bluetooth 5.0, 256KB Flash, 32KB SRAM, 4x UARTs, USB OTG, CAN, 12-bit ADC, 2x CMPs
- **Main Applications :** IoT, wearables, PC accessories, household electric appliance, smart home, printer, electronic toy, robot

Flash size

256KB — AT32WB415CCU7-7

48-pin QFN 7 x 7 mm — Pin count

Part No.	Frequency (MHz)	Flash (KB)	SRAM (KB)	I/O	Timer								Connectivity						Analog Interface				Package
					Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)(F/H)I²S	USART/UART	CAN	OTG	ADC Engine	12-bit ADC ch.	DAC Engine	CMP	
AT32WB415CCU7-7	150	256	32	30	1	2	5	-	1	1	1	1	1	1	0/1	3/1	1	FS	1	8	-	2	**QFN48** 7x 7 mm

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32M412

The AT32M412 (M : Motor) series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 180 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), up to 128 KB Flash and 16 KB SRAM. It also embeds a 28 KB programmable boot memory - configured as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 128+28KB. Besides, the device is equipped with an additional 1KB OTP as data storage area. The AT32M412 series offers a rich choice of peripherals including up to 2x USARTs, 1x CAN, 2x I²Cs, 2x SPIs/I²Ss, 6x 16-bit general-purpose timers (including 1x PWM advanced timer for motor control), 2x basic timers, 1x low-power ERTC, 2x 12-bit 18-channel high-speed 2.5Msps ADCs, 2x 6-bit DACs, 2x CMPs, 4x OPs (support PGA mode), and up to 46 fast GPIO ports.

The device operates in the temperature range of -40 ℃ to 105 ℃, with a supply voltage of 2.4V to 3.6V, and can be supplied in a diverse range of package types to meet market demands. More importantly, the microcontroller products are fully pin-to-pin within the AT32M412 series, which provides strong compatibility and can greatly shorten application development cycles. The AT32M412 series can be used in motor control related applications including home appliances, industrial equipment, inverters.

- **Max Frequency** : 180 MHz
- **Operating Voltage** : 2.4-3.6V
- **Operating Temperature** : -40-105°C
- **Key Features** : 128+28KB Flash, 1KB OTP, 16KB SRAM, 4x OPs (with PGA mode), 2x CMPs, 2x ADCs, CAN
- **Main Applications** : electric two-wheelers, electric motorcycles, mopeds, washing machines, compressors, industrial inverters, fans, servo motors, power tools and other motor applications
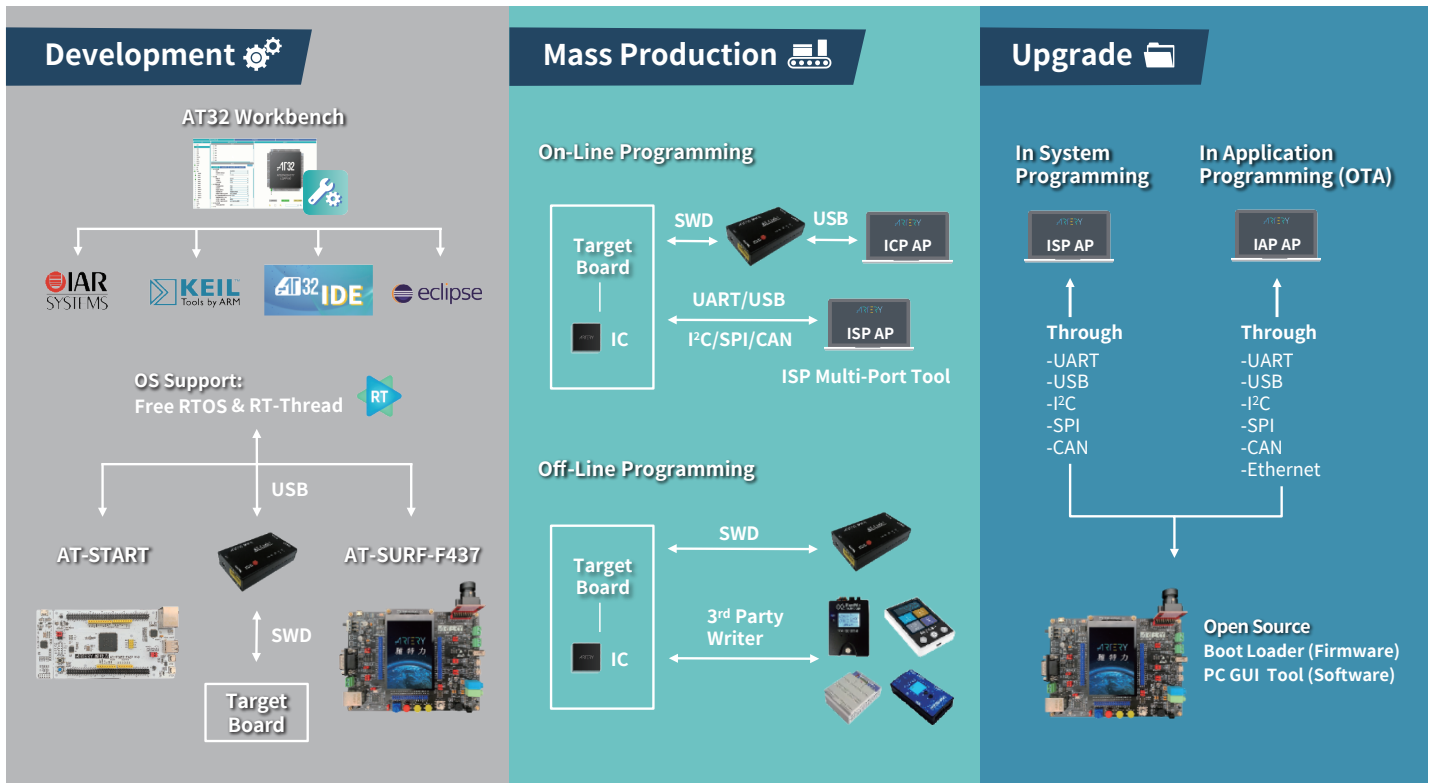

Flash size				
128KB	AT32M412EBP7	AT32M412KBU7-4	AT32M412KBT7	AT32M412CBT7
64KB	AT32M412E8P7	AT32M412K8U7-4	AT32M412K8T7	AT32M412C8T7
	24-pin TSSOP 7.8 x 4.4 mm	32-pin QFN 4 x 4 mm	32-pin LQFP 7 x 7 mm	48-pin LQFP 7 x 7 mm

Part No.	Frequency (MHz)	Flash(KB)	SRAM(KB)	I/O	Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)F/H I²S	USART/UART	CAN	IRTMR	ADC Engine	12-bit ADC ch.	DAC Engine	CMP	OP	Package
AT32M412E8P7	180	64	16	22	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	9	2	2	3	TSSOP24 7.8 x 4.4 mm
AT32M412EBP7	180	128	16	22	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	9	2	2	3	
AT32M412K8U7-4	180	64	16	31	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	12	2	2	3	QFN32 4 x 4 mm
AT32M412KBU7-4	180	128	16	31	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	12	2	2	3	
AT32M412K8T7	180	64	16	30	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	12	2	2	3	LQFP32 7 x 7 mm
AT32M412KBT7	180	128	16	30	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	12	2	2	3	
AT32M412C8T7	180	64	16	46	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	18	2	2	4	LQFP48 7 x 7 mm
AT32M412CBT7	180	128	16	46	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	18	2	2	4	

(1) F/H: Full Duplex I²S / Half Duplex I²S

AT32M416

The AT32M416 (M : Motor) series is based on ARM® Cortex®-M4 32-bit core operating at a frequency of up to 180 MHz. This device features a single-precision floating point unit (FPU), digital signal processor (DSP), up to 128 KB Flash and 16 KB SRAM. It also embeds a 28 KB programmable boot memory - configurable as a Bootloader or as one-time-programmable user instruction and data memory. The latter option can extend Flash memory up to 128+28 KB. Besides, the device is equipped with an additional 1KB OTP as data storage area. The AT32M416 series offers a rich choice of peripherals including up to 2x USARTs, 1x CAN-FD, 2x I²Cs, 2x SPIs/I²Ss, 6x 16-bit general-purpose timers (including 1x PWM advanced timer for motor control), 2x basic timers, 1x low-power ERTC, 2x 12-bit 18-channel high-speed 2.5Msps ADCs, 2x 6-bit DACs, 2x CMPs and 4x OPs (support PGA mode), and up to 46 fast GPIO ports.

The AT32M416 operates in the temperature range of -40 ℃ to 105 ℃, with a supply voltage of 2.4V to 3.6V. It can be supplied in a diverse range of package types to meet market demands. More importantly, the microcontroller products are fully pin-to-pin within the AT32M412 series, which provides strong compatibility and can greatly shorten application development cycles. This series is considered to be suited for motor control-related application scenarios, such as home appliances, industrial equipment, inverters, among many others.

- **Max Frequency** : 180 MHz
- **Operating Voltage** : 2.4-3.6V
- **Operating Temperature** : -40-105°C
- **Key Features** : 128+28KB Flash, 1KB OTB, 16KB SRAM, 4x OPs (with PGA mode), 2x CMPs, 2x ADCs, CAN-FD
- **Main Applications** : electric two-wheelers, electric motorcycles, mopeds, washing machines, compressors, industrial inverters, fans, servo motors, power tools and other motor applications

Part No.	Frequency (MHz)	Flash(KB)	SRAM(KB)	I/O	Timer								Connectivity						Analog Interface			CMP	OP	Package
					Advanced TMR (16bit)	GPTMR (32bit)	GPTMR (16bit)	Basic TMR (16bit)	Systick (24bit)	WDT	WWDT	RTC (Enhanced)	I²C	SPI	(1)(F/H)I²S	USART/UART	CAN-FD	IRTMR	ADC Engine	12-bit ADC ch.	DAC Engine			
AT32M416E8P7	180	64	16	22	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	9	2	2	3	TSSOP24 7.8 x 4.4 mm
AT32M416EBP7	180	128	16	22	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	9	2	2	3	
AT32M416K8U7-4	180	64	16	31	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	12	2	2	3	QFN32 4 x 4 mm
AT32M416KBU7-4	180	128	16	31	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	12	2	2	3	
AT32M416K8T7	180	64	16	30	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	12	2	2	3	LQFP32 7 x 7 mm
AT32M416KBT7	180	128	16	30	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	12	2	2	3	
AT32M416C8T7	180	64	16	46	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	18	2	2	4	LQFP48 7 x 7 mm
AT32M416CBT7	180	128	16	46	1	-	5	2	1	1	1	1	2	2	0/2	2	1	1	2	18	2	2	4	

(1) F/H: Full Duplex I²S / Half Duplex I²S

Development Tools

Systematically, ARTERY provides a complete set of software (BSP, ICP/ISP/IAP) and hardware (AT-START board, SURF board and AT-Link Family) for engineers with the aim of making it easier the product development, programming and firmware upgrade.

- **AT32 MCU Production Trilogy**

Development ⚙

AT32 Workbench

- IAR SYSTEMS
- KEIL Tools by ARM
- AT32 IDE
- eclipse

OS Support:
Free RTOS & RT-Thread RT

USB

AT-START — **AT-SURF-F437**

SWD

Target Board

Mass Production 🏭

On-Line Programming

Target Board — SWD → — USB → **ICP AP**

IC — UART/USB — I²C/SPI/CAN → **ISP AP**

ISP Multi-Port Tool

Off-Line Programming

Target Board — SWD →

IC — 3rd Party Writer →

Upgrade 📁

In System Programming — **In Application Programming (OTA)**

ISP AP — **IAP AP**

Through
-UART
-USB
-I²C
-SPI
-CAN

Through
-UART
-USB
-I²C
-SPI
-CAN
-Ethernet

Open Source
Boot Loader (Firmware)
PC GUI Tool (Software)

AT32 Std BSP (Standard Library)

- **Project**

  - Applicable to AT32 MCU family
  - Support Keil MDK, IAR EWARM
  - Abundant example codes

- **Utilities**

  - sLib Demo / IAP Demo
  - Random Number Generator Demo

- **Middleware**

  - AT32 USB application cases
  - Support RT-Thread Studio / OS
  - Support FreeRTOS
  - Support LittlevGL graphic library
  - Support LwIP and FatFs

- **IEC 60730 CLASS B software library**

  - **Start-up detection**
    - CPU
    - Watchdog
    - Flash integrity
    - RAM function
    - System clock
    - Control flow

  - **Runtime detection**
    - Partial CPU core registers
    - Stack overflow
    - System clock running
    - Flash CRC segmented detection
    - Watchdog
    - Partial RAM self-check (through interrupt service routine)

IEC 60730 CLASS B software library ▲

AT32 Tooling System

- **ICP Tool (In-Circuit Programming)**

  - Program AT32 MCU using AT-Link / J-Link
  - Program both Flash memory and QSPI Flash
  - Program Option Byte (load from file or device)
  - Support sLib for secondary development and programming
  - Auto detection of SWD speed through AT-Link
  - AT-Link offline programming settings

- **ISP Tool (In-System Programming)**

  - Update AT32 MCU via UART or USB DFU
  - Program both Flash memory and SPIM Flash (Bank3)
  - Support .hex/.bin file format
  - Connect to multiple devices simultaneously (Multi-Port tool)

- **AT32 IDE Tool (Eclipse)**

  - Compatible with Windows® and Linux®
  - Contain a series of Eclipse programs and tools
  - Use GNU ARM toolchain to create projects
  - Use GDB for project debugging
  - Support internal memory and Flash memory access
  - Support setting of hardware interrupt and detection point

- **AT32 Workbench**

  - Multiple OS support: Windows®, Linux® etc.
  - Online code preview
  - Support PIN MUX configuration, use-defined PIN label
  - Multiple IDE support: Keil, IAR, AT32 IDE, Eclipse, etc.
  - Support software upgrade/ firmware download online

AT32 IDE Tool (Eclipse) ▲
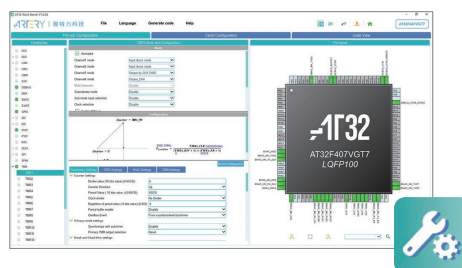
AT32 Workbench▲

AT32 MCU Evaluation Board

- **AT-START**

  - A simple and easy-to-use evaluation/development kit with rich interfaces, compatible with Arduino™ interface
  - Connect to main MCU using AT-Link
  - Compatible with Arduino™ Uno R3 hardware interface
  - Update code using UART/USB DFU

- **AT32WB415 Wireless Bluetooth Evaluation Board**

  - Compliant with Bluetooth® 5.0 specification
  - 2.4 GHz low-power transceiver
  - Operate at a frequency of up to 150 MHz / 256KB Flash
  - Sensitivity in Bluetooth TX: -20 dBm to +4 dBm
  - Powerful connectivity: 30 m, up to 2 Mbps
  - Rich peripherals (USB OTG, 2xCMPs, CAN) / 12-bit ADC
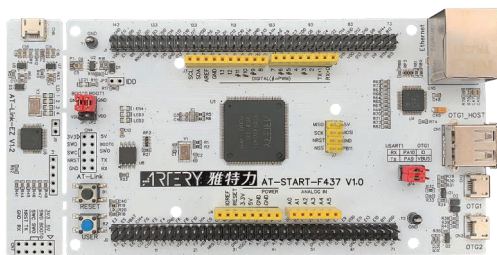
AT-START ▲
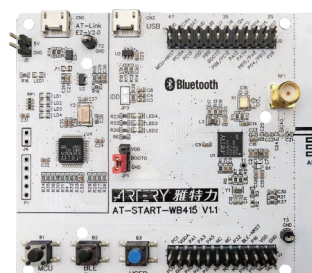
AT32WB415 ▲

AT32 MCU Evaluation Board

- **AT32 Audio Evaluation Board**

  - Support multi-media playback through audio signal processing
  - Standard Arduino™ Uno R3 extension interface
  - Support 2 MIC input / LINE IN / LINE OUT

- **AT32 LCD Evaluation Board**

  - 2.8-inch 240x320 TFT-LCD resistance touch screen

- **AT32 Video Evaluation Board**

  - Support multiple image data processing applications
  - Standard Arduino™ Uno R3 extension interface
  - SPI interface QVGA CMOS Sensor
  - 2.4-inch TFT LCD screen

- **AT32 Communication Evaluation Board**

  - Fast implementation of communication applications
  - Standard communication interfaces (RS-485 / CAN / I²C / SPI of receiver / transmitter)
  - Standard Arduino™ Uno R3 extension interface
  - Compatible with AT-START board

- **AT32F435 DVP Evaluation Board**

  - Built-in AT32F435VMT7 high-performance MCU
  - 32 MB SDRAM on board
  - 8 MB QSPI SRAM on board
  - 8080 TFT-LCD screen
  - Digital video parallel interface (DVP)

- **AT-SURF-F437**

  - 288 MHz ultra-high speed / Extend 32 MB SDRAM on board
  - Digital camera / 3.5-inch 480x320 TFT-LCD screen
  - Standard communication interface (RS-232, RS-485 and dual CANs of receiver / transmitter)
  - Dual OTGs and 10/100M Ethernet
  - MIC / LINE IN / LINE OUT

- **AT32 Ethernet Evaluation Board**

  - Default RMII connection with AT32 MCU mainboard
  - Supports different PHY chips on sub-boards

- **AT32 USBHS Adaptor**

  - High-speed USB interface
  - Supports UART, CAN, SPI, I2C, RS-485 communication

- AT32 QSPI LCD Evaluation Board
  - **Image display and touch drawing features**
  - **Compatible with AT-START series boards**

AT32-Audio-EV ▲

AT32-LCD-EV ▲

AT32-Video-EV ▲

AT32-Comm-EV ▲

AT32F435-DVP-EV ▲

AT-SURF-F437 ▲
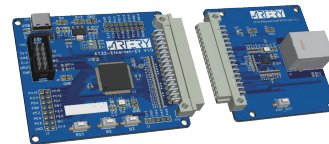
AT32-Ethernet-EV▲

AT32-USBHS-Adaptor ▲
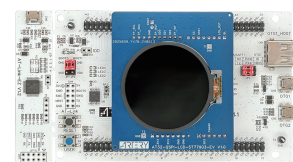
AT32-QSPI-LCD-EV ▲

AT32 Motor Control

▪ **AT32 Motor Evaluation Board**

  - General-purpose low voltage three-phase motor driver with brake resistor connector
  - Permanent magnet synchronous motor (PMSM) / brushless DC (BLDC) motor control
  - Support sensored square wave commutation mode / sensorless FOC control mode
  - Provide rotor position feedback by incremental encoder / Hall sensor
  - Various communication interfaces including USB / UART / SPI / I^{2}C
  - Input voltage: 12V ~ 60V, maximum output current: 30 A$_{PEAK}$

▪ **BSP: AT32 Motor Control Library**

  - Motor control library algorithm, which contains encoder / Hall sensor
    and sensorless FOC control related functions (applicable to 3-shunt /
    2-shunt / 1-shunt current sensing) and Hall sensor and sensorless
    6-step BLDC control related functions

▪ **UI: AT32 Motor Monitor Program**

  - Motor monitor program, which can monitor real-time motor par-
    ameters / status, dynamically display response waveforms and tune
    control parameters online
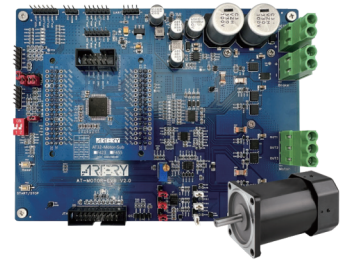
AT32-Motor-EV ▲

AT-Link Family (Debugging / Programming Tool)

There are four kinds of tools available for debugging and programming (also called AT-Link Family). They are AT-Link-Pro, AT-Link+, AT-Link-ISO+ and AT-Link-EZ. With various functions, the AT-Link Family, being small, portable, easy to operate, and stable, is particularly useful for AT32 MCU debugging and online/offline programming.

▪ **AT-Link-Pro**

  - IDE online debugging, online/offline programming, output voltage
    regulating, offline parameter settings and USB-to-serial interface
  - Support LCD display and touch operation

▪ **AT-Link+**

  - Support programming of AT32WB415 series MCUs
  - Designed with SPI, peripheral interfaces (I^{2}C / CAN) and multifunc-
    tional interface (MULTI FUNC)
  - Support online/offline programming

▪ **AT-Link-ISO+**

  - Support programming of AT32WB415 series MCUs
  - Enhanced isolation protection over AT-Link+

▪ **AT-Link-EZ (online programming is marked in yellow line)**
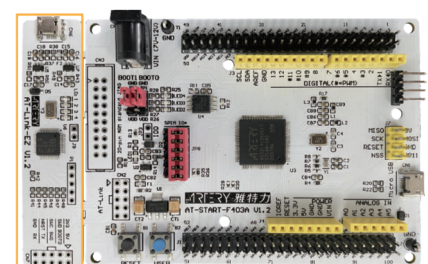

AT-Link-Pro ▲

Isolation Protection

AT-Link+ ▲   AT-Link-ISO+ ▲   AT-Link-EZ ▲

Development Tools

▪ Third-party programmer (in alphabetical order)

In addition to ICP/ISP tools, the following programmers, are also supported for programming.

- Armfly (www.armfly.com)
- Acroview (www.acroview.com)
- Amo (www.amomcu.cn)
- Alientek (www.alientek.com)
- DediProg (www.dediprog.com)
- Forcreat (www.forcreat.com)

- Galecomm (www.galecomm.com)
- Hi-Lo Systems (hilosystems.com)
- ICWORKSHOP (www.icworkshop.com)
- MaxWiz (www.maxwiz.com.cn)
- Prosystems (www.prosystems.com.cn)
- Rx-prog (www.rx-prog.com)

- System General (www.sg.com.tw)
- Sinaen (sinaen.diytrade.com)
- XELTEK (www.xeltek-cn.com)
- XWOPEN (www.xwopen.com)
- Zhifeng (bbzfkj.world.taobao.com)
- ZLG (www.zlg.cn)

* To find out more, please contact ARTERY marketing team.

AT32 Extensive Ecosystems

KEIL Tools by ARM   IAR SYSTEMS   eclipse   GCC   RT   OpenOCD

Bluetooth®   LVGL   freeRTOS   µC/OS RTOS and Stacks   RT-Thread   lwIP

* Trademarks mentioned are the property of their respective owners.

AT32 Diversified Application

A Smarter Future with AT32 MCU

Consumer

Communication Power

Commerce

Automotive

Industrial

Motor

Smart Home
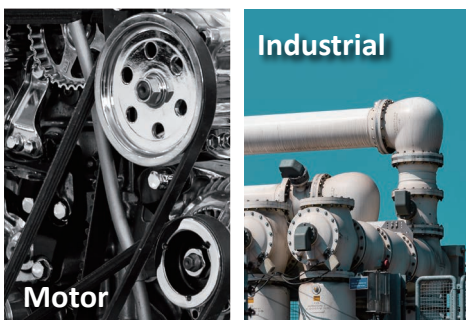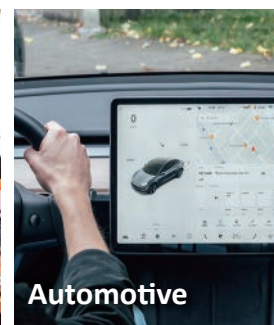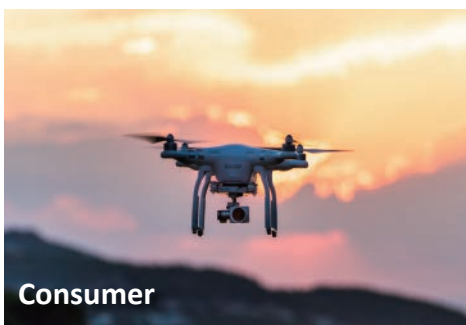
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Artery Technology
www.arterychip.com

- **Taiwan Office**   5F., No.1, Jinshan 8th St., East Dist.,
  Hsinchu City 30080 Taiwan
  886.3.577.8788

- **Shenzhen Office**   Rm.603, Block Western, Innovation & Technology Plaza Phase2,
  Tian An Cyber Park, Futian District, Shenzhen, China
  86.755.8390.0669 #62568

- **Chongqing Office**   10F., Kangtianxijinhui Bldg. 1, No.60, Kecheng Rd., Jiulongpo Dist.,
  Chongqing, China
  86.23.6868.8899

- **Suzhou Office**   Rm.1501, Ganghua Building,No.699 Tongyuan Rd.,
  Suzhou Industrial Park, Suzhou, China
  86.0512.6835.6375 #67001

- **Sale Service**   sales_artery@arterytek.com
- **Tech Support**   support_artery@arterytek.com
- **Others**   info@arterytek.com