# 2026

# Professional MCU Design House

8051 MCU

Arm® Cortex®-M0+/M0

Arm® Cortex®-M3

BLDC

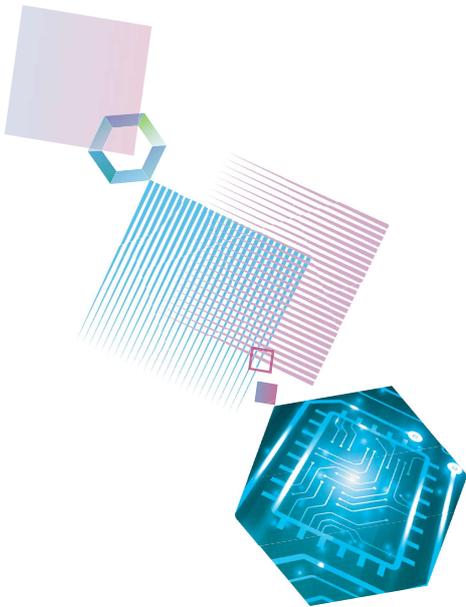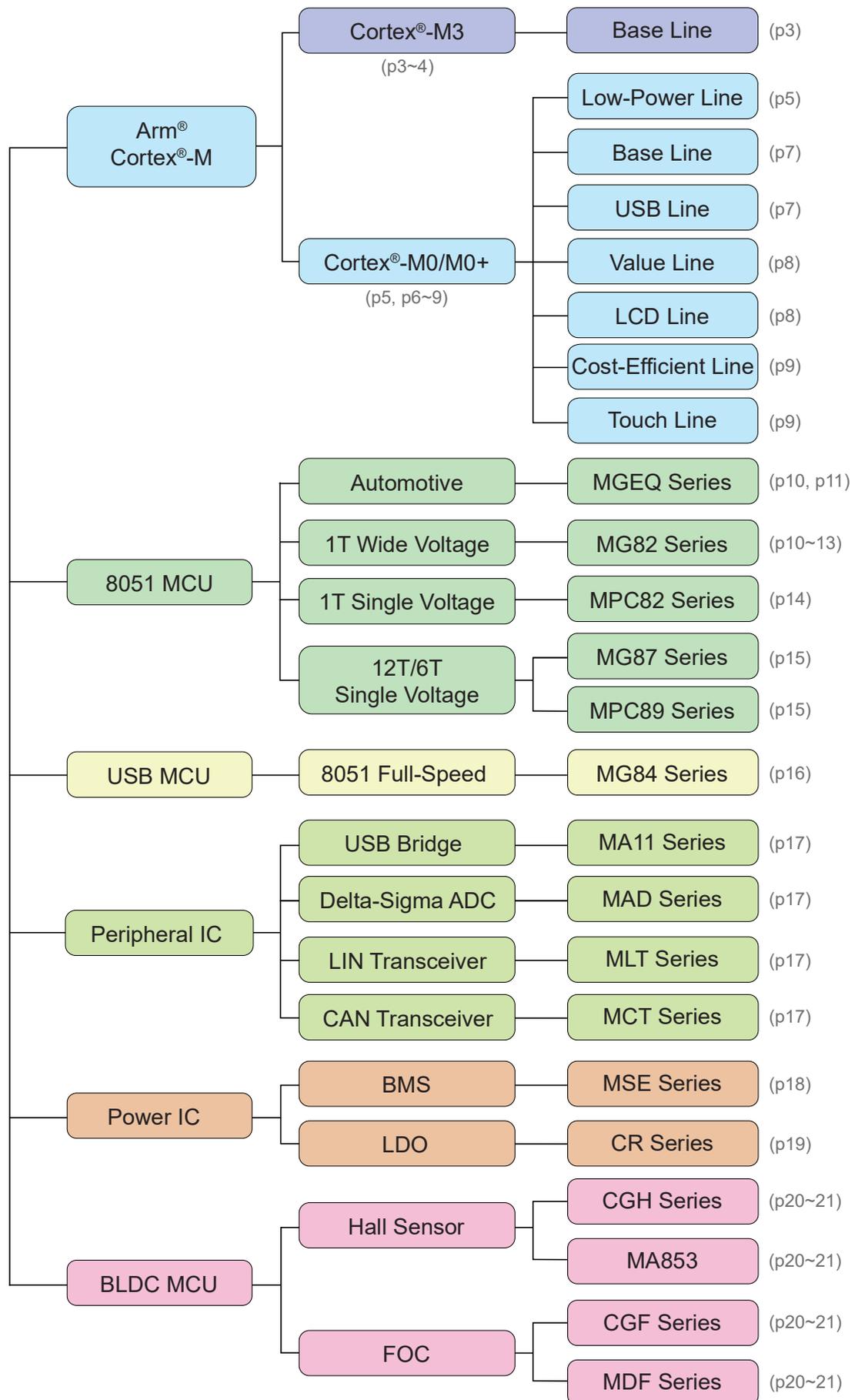Power IC

Peripheral IC

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# Company Overview

Megawin Technology was founded by a team of professionals specializing in MCU hardware and software platforms, dedicated to delivering comprehensive and competitive MCU solutions. In addition to a diverse IC product lineup, we also offer essential development tools—including ICE , Writers, and ISP Programmers—to help customers accelerate project start-up and shorten time-to-market.

To meet the demands of harsh application environments, we continuously optimize product performance, enhance noise immunity, and expand operating voltage and temperature ranges. We also integrate analog signal modules and a variety of serial communication interfaces to simplify signal acquisition and improve digital system integration. In response to the growing demand for mobile and low-power applications, reducing overall MCU power consumption has become a core focus of our design, enabling customers to build more efficient and competitive products.

At Megawin Technology, we uphold the values of integrity, open-mindedness, and teamwork. We collaborate closely with world-class suppliers and system partners to ensure high-quality services and achieve win-win outcomes. While continuing to strengthen our USB series MCUs, we have also leveraged our technical foundation in 8051 platforms to successfully introduce the Arm® Cortex®-M0/M0+ and M3 cores, launching the high-performance, secure, and market-proven 32-bit MG32F MCU series. Our products deliver stable performance, high security, and strong market competitiveness. We believe that only by continuously improving our technology and service can we earn the lasting trust of leading system providers. By focusing on product refinement and embracing the spirit of being small yet refined — and excellent., we strive toward sustainable growth — the core of Megawin Technology's brand philosophy.

Since 2023, we have actively expanded into the fields of new energy and energy-saving applications, developing a range of power management ICs (PMICs), including LDOs, MOSFETs, and BMS chips, as well as dedicated MCUs for BLDC motor control. These efforts have already yielded stable progress in product rollout and mass production. In 2024, we introduced our first peripheral IC—the first-generation ΔΣ ADC—and continue to invest in next-generation ΔΣ ADCs and related ICs such as LIN/CAN transceivers, to address increasingly diverse market needs.

"Practical foundation, innovation-driven change" is the core value that drives our continuous progress. At Megawin Technology, we challenge ourselves with high standards and embrace disruptive innovation to stay ahead in a rapidly changing market. Becoming a world-class MCU supplier is not just our goal—it is our commitment.

## Product Category

- Arm® Cortex®-M
  - Cortex®-M3 (p3~4)
    - Base Line (p3)
  - Cortex®-M0/M0+ (p5, p6~9)
    - Low-Power Line (p5)
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    - Value Line (p8)
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    - Cost-Efficient Line (p9)
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- 8051 MCU
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    - MGEQ Series (p10, p11)
  - 1T Wide Voltage
    - MG82 Series (p10~13)
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- Peripheral IC
  - USB Bridge
    - MA11 Series (p17)
  - Delta-Sigma ADC
    - MAD Series (p17)
  - LIN Transceiver
    - MLT Series (p17)
  - CAN Transceiver
    - MCT Series (p17)

- Power IC
  - BMS
    - MSE Series (p18)
  - LDO
    - CR Series (p19)

- BLDC MCU
  - Hall Sensor
    - CGH Series (p20~21)
    - MA853 (p20~21)
  - FOC
    - CGF Series (p20~21)
    - MDF Series (p20~21)

## Arm® Cortex®-M3 Series

M3 Series (MG32F103/104/157) are based on Arm® Cortex®-M3 as the core, with the excellent computing performance of the existing Arm® Cortex®-M0 MCU to strengthen technology development, improve Core computing performance, Flash supports Cache fast access to greatly reduce read latency.

## M3 Features

● Core efficiency improvement
● Flash equipped Cache to enhance efficiency
  ▲ Flash 96~256KB
● Clock source up to 96MHz
● All series support USB 2.0 Device

● MG32F157 other features:
  ▲ Flash 256KB，RAM 64KB
  ▲ Support 1 CAN2.0B, communications interface increased to 15
  ▲ Support hardware AES encryption algorithm
  ▲ 3 sets of ADCs, 2 sets can be synchronously sampled
  ▲ Support 3 sets of OPA and 2 sets of DAC
  ▲ Support 3 sets of I$^2$S
  ▲ Support SDIO
  ▲ up to 100 Pin, multiple pins support 5V input; no conversion circuit required
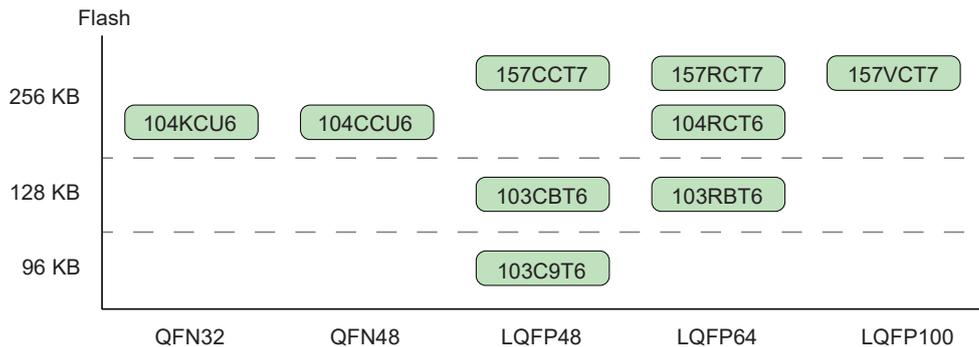
## Typical Applications

● Sweeping Robot
● High-end Smart Lock
● Aerial Camera
● Thermal Printer / POS
● Brushless Motor Control
● Outdoor Energy Storage Power Supply
● Charging Station/Charging Gun

# Recommended Applications

| | Features | Applications pictures |
|---|---|---|
| **Smart Lock** | ● Electronic Lock MCU Control<br>▲ Keyboard(I/O)<br>▲ Touch(I2C)<br>▲ Fingerprint(SPI/UART)<br>▲ NFC(UART)<br>▲ Motor(PWM)<br>▲ Voice(DAC/Flash)<br>▲ RF(SPI)<br>▲ Data record(EEPROM/Flash) | (Recomm. Series: MG32F103) |
| **Thermal printer** | ● Thermal printer application usually use M3<br>▲ 128KB ~256KB Flash;  ▲ At least 20KB RAM<br>▲ Generate QR code: 72MHz~120MHz<br>● Print width of printer<br>▲ 58~72mm; ▲ Taxi, store | (Recomm. Series: MG32F104) |
| **Energy Storage Power Supply** | ● 3 x 12-Bit ADC<br>  (charge detection / current and voltage sampling)<br>● 1 x CAN2.0B bus (as communication)<br>● Support SMBus (as BMS communication)<br>● 96MHz High-speed main frequency (energy saving)<br>● Sine wave PWM (for inverter) | (Recomm. Series: MG32F157) |
| **Charging Gun & Charging Station** | AC Charging Gun (IC-CPD) solution, its achievable functions:<br>▲ Set indicator lights and digital display to show operating status<br>▲ Protection functions such as leakage, short circuit, overvoltage, undervoltage, and overcurrent to ensure safe and reliable operation of the charging gun.<br>▲ Charging power, default 7KW, optional 1.7KW, 3.3KW, 7KW, 12KW<br>▲ Optional charging current display<br>▲ Optional emergency stop switch power-off protection to prevent unexpected situations<br>▲ Required Input voltage: 220V±15%<br>▲ Charging time: 6-7 hours to fully charge | (Recomm. Series: MG32F10x/F157) |

# Arm® Cortex®-M3 Base Line

Flash

| | | | | | |
|---|---|---|---|---|---|
| 256 KB | | | 157CCT7 | 157RCT7 | 157VCT7 |
| | 104KCU6 | 104CCU6 | | 104RCT6 | |
| 128 KB | | | 103CBT6 | 103RBT6 | |
| 96 KB | | | 103C9T6 | | |
| | QFN32 | QFN48 | LQFP48 | LQFP64 | LQFP100 |

| Part No. | Vdd | Flash ROM | Data RAM | Max Freq. | 20-Bit Timer | IO | 12-Bit ADC | Comp. | Features | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| **MG32F103** | 2V~3.6V | 96KB 128KB | 28KB | 72MHz | 4+RTC | 37 51 | 10-CH 16-CH | 2 | UARTx3, I²C x2, SPI Mx1, SPI S x2,QSPI,I²S,USB, LED SEG x8 | LQFP48 LQFP64 |
| **MG32F104** | 2V~3.6V | 256KB | 36KB | 96MHz | 4+RTC | 25 39 51 | 10-CH 16-CH | 2 | UARTx3, I²C x2, SPI Mx1, SPI S x2,QSPI,I²S,USB, LED SEG x8 | QFN32 QFN48 LQFP64 |
| **MG32F157** | 2V~3.6V | 256KB | 64KB | 96MHz | 8+RTC | 37 51 80 | 18-CH | 3*1 | UARTx5, I²C x2, SPIx3, QSPI,CAN,USB,SDIO CRC,OPA x3,AES,DAC x2,ADC x3 | LQFP48 LQFP64 LQFP100 |

*1Comparator shared with OPA

## Arm® Cortex®-M0+ Series

The MG32L series is Megawin Technology's entry-level 32-bit low power MCU. It uses Arm® Cortex®-M0+ as the core and has the advantage of low power consumption. It is more suitable for battery-related products and other applications.
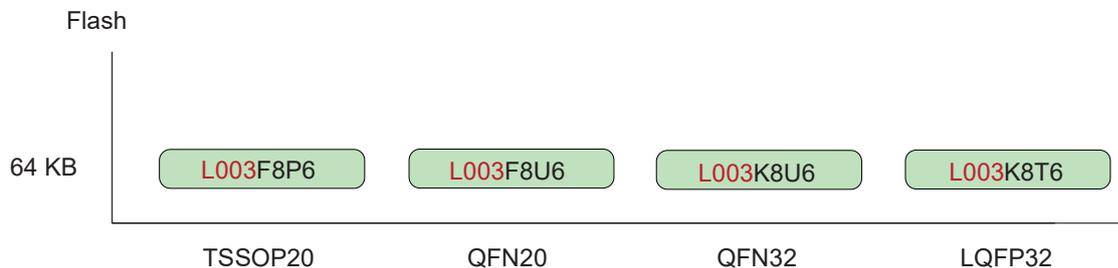
## M0+ Features

● Power consumption of only 1.8mA at full speed (24MHz)
● Measured power consumption of just 890nA in sleep (STOP) mode
● Hardware calendar function RTC (Real-Time Clock/Calendar)

## Typical Applications

● Smoke detector
● Charging gun
● Smart lock
● Massage device/Fascia gun

## Low-Power Line Arm® Cortex®-M0+

Flash

| | | | |
|---|---|---|---|
| 64 KB | L003F8P6 | L003F8U6 | L003K8U6 | L003K8T6 |
| | TSSOP20 | QFN20 | QFN32 | LQFP32 |

| Part No. | Vdd | Flash ROM | Data RAM | Max Freq. | Timer | IO | 12-Bit ADC | ACMP. | Features | CCP[*4] | ISP/IAP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG32L003[*1] | 2.5V~ 5.5V | 64KB | 4KB | 24MHz | 9+RTC LP Timer | 16/28 | 15-CH | 1[*5] | UART[*2]x2,LPUART, I²C,SPI,PWM, CRC16,1-Wire | 6-CH | YES[*3] | TSSOP20 QFN20 QFN32 LQFP32 |

[*1] Support M-LINK ICE;
[*2] UART x2: Support SPI Master mode, not support Slave mode;
[*3] Share with all Flash zone;
[*4] CCP: Input Capture/Output Compare/PWM;
[*5] Low Voltage Detector (LVD) / Voltage Comparator (ACMP)
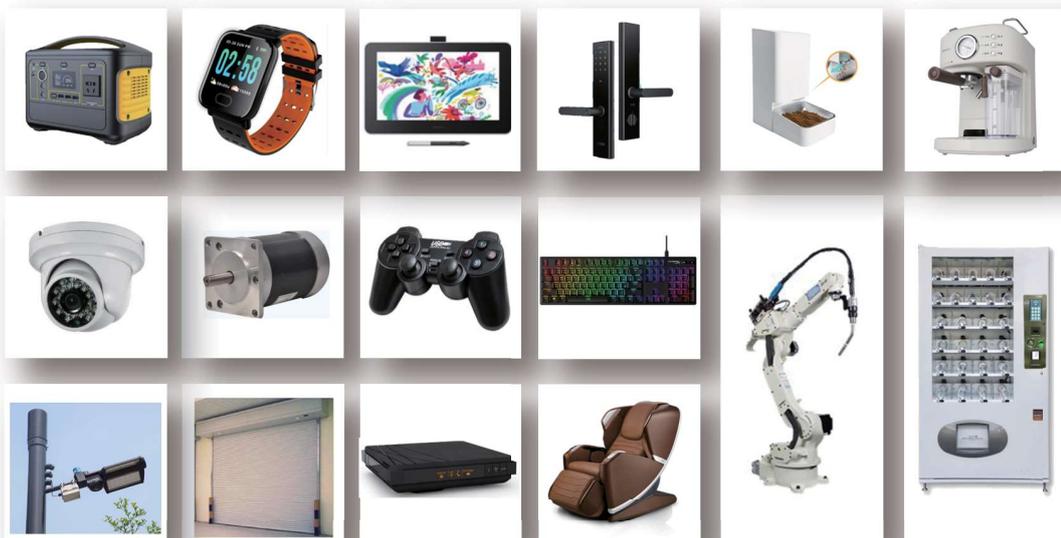
# M0 Series

## Arm® Cortex®-M0 Series

Base on ARM® Cortex®-M0 32-bit core, it is developed with excellent noise immunity capability and excellent encryption technology of traditional 8051 MCU. Built-in PWM function with center/edge-align and dead time control, flexible pin alternate function selection, multiple reset resources, high speed I/O modules and fast comparators (ACMP) can be quickly imported and applied to complex electrical engineering control systems with multiple sets of high-speed peripheral hardware such as UART, SPI, I2C and CRC.

## M0 Features

- ADC (Analog-to-digital converter)
- DAC (Digital-to-analog converter)
- NCO (Numerically Controlled Oscillator)
- CCL (Configurable Custom Logic)
- EMB + 8080 LCD/OLED interface
- Signal Capture W/ DMA
- Hardware Divider
- Support USB 2.0 (total 15 end-points)
- Low power consumption: power down to 1.25uA
- ASB (ARGB Series Bus)
- PWM: up to 96MHz (output 2 different frequency)
- Built-in a temperature sensor in ADC macro
- **Easily initialize various peripherals (Keil Wizard, MG32CoGen)**

## Typical Applications

- Motor Applications
- Robot Arm
- Industrial Control Instrument
- Electric Metering / BMS / PES
- Modem / Router
- Rolling Shutter Door
- Smart Street Light, LED Light Strip(ARGB)
- Monitoring System
- Smart Bracelet
- Electronic Drawing Board
- Smart Electronic Locks
- Pet feeder
- Coffee Machine

# Arm® Cortex®-M0 Base Line
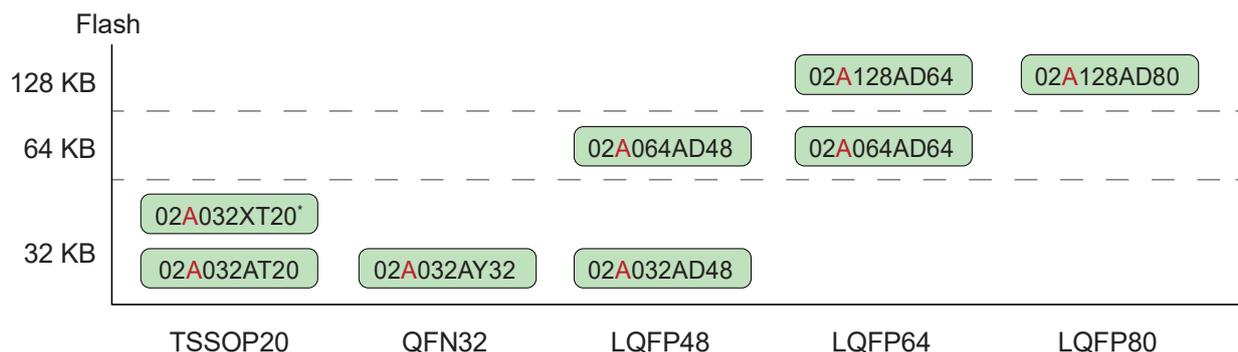
Flash



|  | 128 KB | | | | 02A128AD64 | 02A128AD80 |
| 64 KB | | | | 02A064AD48 | 02A064AD64 | |
| 32 KB | 02A032XT20* | | | | | |
| | 02A032AT20 | 02A032AY32 | 02A032AD48 | | | |
| | TSSOP20 | QFN32 | LQFP48 | LQFP64 | LQFP80 | |

| Part No. | Vdd | Flash ROM | Data RAM | Max. Freq. | Timer | IO | 12-Bit ADC | Comp. | Features | CCP*4 | ISP/IAP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG32F02A032*1 | 1.8V~ 5.5V | 32KB | 4KB | 48MHz | 5+RTC | 17/29/44 | 12-CH | 2 | UART*2 x2, I²C,SPI/QPI, PWM,CRC32, DMA | 4-CH | YES*3 | TSSOP20 QFN32 LQFP48 |
| MG32F02A064*1 | 1.8V~ 5.5V | 64KB | 8KB | 48MHz | 7+RTC | 44/59 | 16-CH | 2 | UART*5x7, I²Cx2,SPI*6 x4, CRC32,DMA,DAC,EMB | 8-CH | YES*3 | LQFP48 LQFP64 |
| MG32F02A128*1 | 1.8V~ 5.5V | 128KB | 16KB | 48MHz | 7+RTC | 59/73 | 16-CH | 2 | UART*5x7, I²Cx2,SPI*6 x4, CRC32,DMA,DAC,EMB | 8-CH | YES*3 | LQFP64 LQFP80 |

\* MG32F02A032XT20 Supports operation temperature: -40~125°C;
*1 Support M-LINK ICE;
*2 All UART support SPI Master;
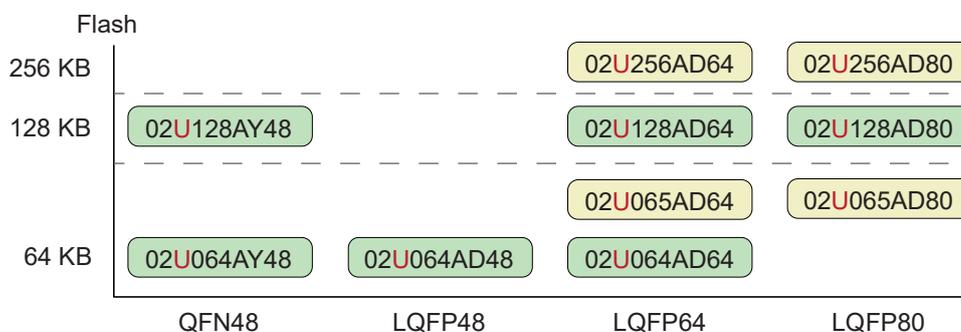*3 Share with all Flash zone;
*4 CCP: Input Capture/Output Compare/PWM;
*5 Advanced UART x 3: Support SPI Master/Slave (UART 0/1/2 modules); Basic UART x 4: UART only (UART 4/5/6/7 modules).
*6 Advanced SPI x 1: Support SPI/QPI/OPI (SPI 0 modules); Basic SPI x 3: Standard SPI only (Configurable in UART 0/1/2 modules).

# Arm® Cortex®-M0 USB Line

Flash



| 256 KB | | | 02U256AD64 | 02U256AD80 |
| 128 KB | 02U128AY48 | | 02U128AD64 | 02U128AD80 |
| | | | 02U065AD64 | 02U065AD80 |
| 64 KB | 02U064AY48 | 02U064AD48 | 02U064AD64 | |
| | QFN48 | LQFP48 | LQFP64 | LQFP80 |

| Part No. | Vdd | Flash ROM | Data RAM | Max. Freq. | Timer | IO | 12-Bit ADC | Comp. | Features | CCP*3 | ISP/IAP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG32F02U064*1 | 1.8V~ 5.5V | 64KB | 16KB | 48MHz | 7+RTC | 41/56 | 16-CH | 2 | UART*4 x7,I²C x2, SPI*5 x4, USB,CRC32, DMA, DAC, EMB | 8-CH | YES*2 | QFN48 LQFP48 LQFP64 |
| MG32F02U065*1 | 1.8V~ 5.5V | 64KB | 16KB | 48MHz | 7+RTC | 41/56 | 16-CH | 2 | UART*4 x7,I²C x2, SPI*5 x4, USB,CRC32,DMA,DAC,EMB,ARGB | 8-CH | YES*2 | LQFP64 LQFP80 |
| MG32F02U128*1 | 1.8V~ 5.5V | 128KB | 16KB | 48MHz | 7+RTC | 56/70 | 16-CH | 2 | UART*4 x7,I²C x2, SPI*5 x4, USB,CRC32, DMA, DAC, EMB | 8-CH | YES*2 | QFN48 LQFP64 LQFP80 |
| MG32F02U256*1 | 1.8V~ 5.5V | 256KB | 32KB | 48MHz | 7+RTC | 56/70 | 16-CH | 2 | UART*4 x7,I²C x2, SPI*5 x4, USB,CRC32, DMA, DAC, EMB | 8-CH | YES*2 | LQFP64 LQFP80 |

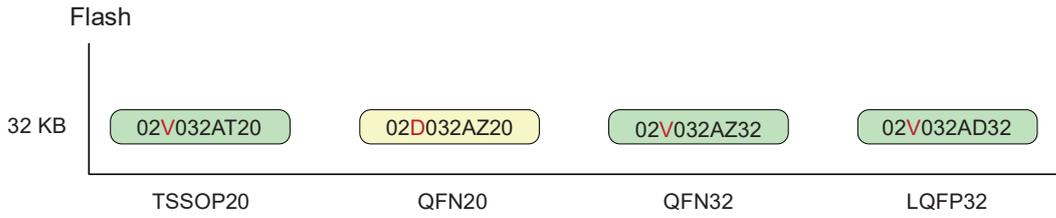<Models in the yellow grid will be launched soon.>

*1 Support M-LINK ICE;
*2 Share with all Flash zone;
*3 CCP: Input Capture/Output Compare/PWM;
*4 Advanced UART x 3: Support SPI Master/Slave (UART 0/1/2 modules); Basic UART x 4: UART only (UART 4/5/6/7 modules);
*5 Advanced SPI x 1: Support SPI/QPI/OPI (SPI 0 module); Basic SPI x 3: Standard SPI only (Configurable in UART 0/1/2 modules).
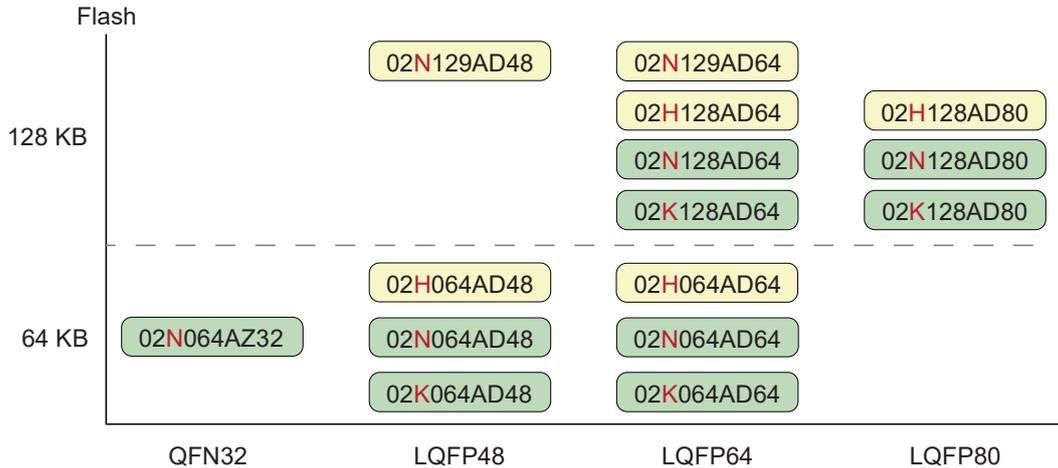
# Arm® Cortex®-M0 Value Line

Flash

32 KB

| 02V032AT20 | 02D032AZ20 | 02V032AZ32 | 02V032AD32 |
|---|---|---|---|
| TSSOP20 | QFN20 | QFN32 | LQFP32 |

| Part No. | Vdd | Flash ROM | Data RAM | Max Freq. | Timer | IO | 12-Bit ADC | Comp. | Features | CCP*4 | ISP/IAP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG32F02V032*1 | 1.8V~3.6V | 32KB | 4KB | 48MHz | 6+RTC | 17/29 | 8-CH | NA | UART*2 x3, I2C x2 SPI/QPI,PWM CRC32,DMA,ASB | 6-CH | YES*3 | TSSOP20 LQFP32 QFN32 |
| MG32F02D032*1 | 2.7V~5.5V | 32KB | 2KB | 24MHz | 3 | 13 | 4-CH | NA | UART*2, I2C, SPI PWM, DAC x2 | 2-CH | YES*3 | QFN20 |

<Models in the yellow grid will be launched soon.>
*1 Support M-LINK ICE;   *2 Advanced UART x2: Support SPI Master/Slave (UART 0/1 modules);
*3 Share with all Flash zone;   *4 CCP: Input Capture/Output Compare/PWM.

# Arm® Cortex®-M0 LCD Line

Flash

128 KB

| 02N129AD48 | 02N129AD64 | | |
| | 02H128AD64 | 02H128AD80 | |
| | 02N128AD64 | 02N128AD80 | |
| | 02K128AD64 | 02K128AD80 | |

64 KB

| | 02H064AD48 | 02H064AD64 | |
| 02N064AZ32 | 02N064AD48 | 02N064AD64 | |
| | 02K064AD48 | 02K064AD64 | |
| QFN32 | LQFP48 | LQFP64 | LQFP80 |

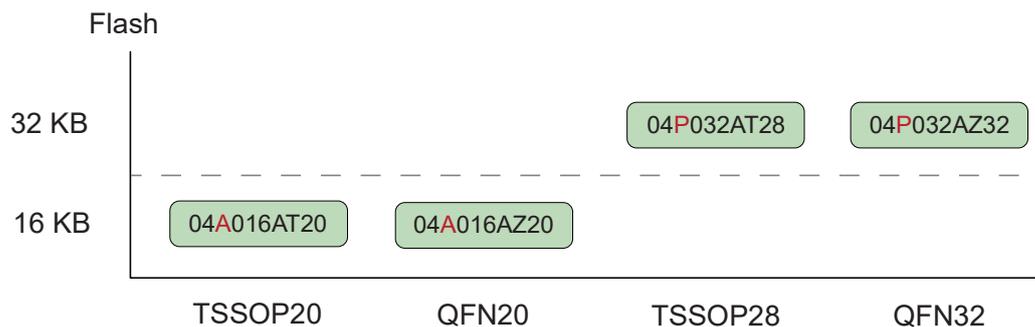| Part No. | Vdd | Flash ROM | Data RAM | Max. Freq. | Timer | IO | 12-Bit ADC | Comp. | Features | CCP*3 | ISP/IAP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG32F02K064*1 | 1.8V~5.5V | 64KB | 10KB | 48MHz | 7+RTC | 44/59 | 16-CH | 2 | UARTx7,I2Cx2,SPIx4,LIN,LCD,OPA,DMA,CRC32 | 8-CH | YES*2 | LQFP48 LQFP64 |
| MG32F02K128*1 | 1.8V~5.5V | 128KB | 16KB | 48MHz | 7+RTC | 59/73 | 16-CH | 2 | UARTx7,I2Cx2,SPIx4,LIN,LCD,OPA,DMA,CRC32 | 8-CH | YES*2 | LQFP64 LQFP80 |
| MG32F02N064*1 | 1.8V~5.5V | 64KB | 10KB | 48MHz | 5+RTC | 29/44/59 | 16-CH | 2 | UARTx7,I2Cx2,SPIx4,LIN,LCD,CAN,OPA,DMA,CRC32 | 8-CH | YES*2 | QFN32 LQFP48 LQFP64 |
| MG32F02N128*1 | 1.8V~5.5V | 128KB | 16KB | 48MHz | 5+RTC | 59/73 | 16-CH | 2 | UARTx7,I2Cx2,SPIx4,LIN,LCD,CAN,OPA,DMA,CRC32 | 8-CH | YES*2 | LQFP64 LQFP80 |
| MG32F02N129*1 | 1.8V~5.5V | 128KB | 16KB | 72MHz | 5+RTC | 44/59 | 16-CH | 2 | UARTx3,I2Cx2, SPI, LIN, CANx2, DMA,CRC32 | 8-CH | YES*2 | LQFP48 LQFP64 |
| MG32F02H064*1 | 1.8V~5.5V | 64KB | 10KB | 48MHz | 7+RTC | 44/59 | 16-CH | 2 | UARTx7,I2Cx2,SPIx4,LIN,LCD,OPA,DMA,CRC32,△-Σ ADC | 8-CH | YES*2 | LQFP64 LQFP80 |
| MG32F02H128*1 | 1.8V~5.5V | 128KB | 16KB | 48MHz | 7+RTC | 59/73 | 16-CH | 2 | UARTx7,I2Cx2,SPIx4,LIN,LCD,OPA,DMA,CRC32,△-Σ ADC | 8-CH | YES*2 | LQFP64 LQFP80 |

<Models in the yellow grid will be launched soon.>
MG32F02N129: Support operation temperature: -40~125°C
*1 Support M-LINK ICE;
*2 Share with all Flash zone;
*3 CCP: Input Capture/Output Compare/PWM.

# Arm® Cortex®-M0 Cost-Efficient Line

Flash
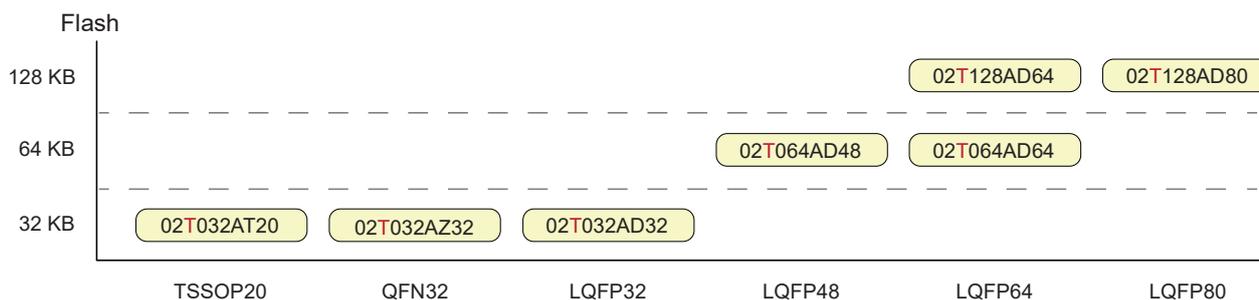
| | | | |
|---|---|---|---|
| 32 KB | | 04P032AT28 | 04P032AZ32 |
| 16 KB | 04A016AT20 | 04A016AZ20 | |
| | TSSOP20 | QFN20 | TSSOP28 | QFN32 |

| Part No. | Vdd | Flash ROM | Data RAM | Max Freq. | Timer | IO | 12-Bit ADC | Comp. | Features | CCP*2 | ISP/IAP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG32F04A016*1 | 2V~5.5V | 16KB | 2KB | 48MHz | 3 | 18 | 8-CH | NA | UARTx2,SPI,I²C, CRC32,UID | 5-CH | NA | QFN20 TSSOP20 |
| MG32F04P032*1 | 2.5V~5.5V | 32KB | 4KB | 60MHz | 5 | 26 | 10-CH | 2 | OPAx2,USART, DMA,UID,HW Divider | 5-CH | YES | TSSOP28 QFN32 |

*1 Support M-LINK ICE;
*2 CCP: Input Capture/Output Compare/PWM.

# Arm® Cortex®-M0 Touch Line

Flash

| | | | |
|---|---|---|---|
| 128 KB | | | 02T128AD64 | 02T128AD80 |
| 64 KB | | 02T064AD48 | 02T064AD64 |
| 32 KB | 02T032AT20 | 02T032AZ32 | 02T032AD32 |
| | TSSOP20 | QFN32 | LQFP32 | LQFP48 | LQFP64 | LQFP80 |

| Part No. | Vdd | Flash ROM | Data RAM | Max Freq. | Timer | IO | 12-Bit ADC | Comp. | Features | CCP*4 | ISP/IAP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG32F02T032*1 | 1.8V~5.5V | 32KB | 4KB | 48MHz | 6+RTC | 17/29 | 8-CH | NA | UART*2 x3,I²C x2 SPI/QPI,PWM,CRC32 DMA,Touch Key x10 | 6-CH | YES*3 | TSSOP20 LQFP32 QFN32 |
| MG32F02T064*1 | 1.8V~5.5V | 64KB | 10KB | 48MHz | 7+RTC | 44/59 | 16-CH | 2 | UART*2 x7,I²C x2,SPIx4 LIN,LCD,OPA,CRC32, DMA,Touch Key x16 | 8-CH | YES*3 | LQFP48 LQFP64 |
| MG32F02T128*1 | 1.8V~5.5V | 128KB | 16KB | 48MHz | 7+RTC | 59/73 | 16-CH | 2 | UART*2 x7,I²C x2,SPIx4 LIN,LCD,OPA,CRC32, DMA,Touch Key x16 | 8-CH | YES*3 | LQFP64 LQFP80 |

<Models in the yellow grid will be launched soon.>

*1 Support M-LINK ICE;
*2 Advanced UART x2: Support SPI Master/Slave (UART 0/1 modules);
*3 Share with all Flash zone;
*4 CCP: Input Capture/Output Compare/PWM;

## MGEQ1C064 Features

### Automotive Grade Processes(AEC-Q100 Grade 2 Certification)

- 64KB Flash、4KB SRAM
- Operating Voltage: 2.4~5.5V
- Max. Operation Freq.: 36MHz
- UART 4 sets、Have QPI / SPI / IIC
- Support LIN bus protocol
- ADC 16-Channel1.0Msps
- Central Aligned PWM 144MHz

- CRC16 (Cyclic Redundancy Check)
- EMB(External Memory Bus) can use with DMA
- IO Number 44, Package LQFP48
- Operating Temperature: -40~105°C
- For future upgrades: support OTA

  (Over-the-Air Technology)

Power Seat

Headlights

In-Vehicle Control

Wireless Charging

Power Tailgate

Dynamic Taillights

Windscreen Wipers

Air Conditioning Control

Driving Recorder

Rearview Mirror

Windows Control

Automotive Lighting

## MG82F6D Series Features

### 6D Series excellent features

**12Bit/1.2Msps ADC.**
- ◆ Accurate sampling without distortion
- ◆ High-speed capture without loss

**HW CRC16.**
- ◆ Ensure correct power-on and transmission
- ◆ Support IEC 60730

**High speed DMA transmission**
- ◆ P2P
- ◆ M2P
- ◆ P2M

ADC

Megawin 6D Series

MEM

DMA

Peripherals

**High standard ESD anti-interference.**
- ◆ HBM : 8KV
- ◆ MM : 450V
- ◆ CDM : 1KV

**High-speed PWM.**
- ◆ Support 144Mhz High-speed PWM
- ◆ PCA with additional timer provides multiple PWM frequencies

**Easy-to-use Keil Wizard.**
- ◆ Coding helper
- ◆ Accurate project development

Powerful

Cost-effective

### Other features:

- Up to 4 sets of UARTs, which can be connected to various sensors
- Exclusive hardware Duty Capture to capture pulse and high-speed PWM signal
- Provides EMB (External Memory Bus) to expand NAND/8080LCM

# 8051 MCU Typical Applications

- Industrial Instruments
- Industrial Control and Automation
- Home Appliance Display Panel
- Wireless Charging
- Mahjong Machine
- Sensor Applications
- Power Converter
- Electronic Cigarette
- LED Display Equipment/Light Control
- Battery Management System (BMS)
- Electronic Lock
- Sensor Alarm
- UV Disinfection Lamp
- Medical Device Control

# Automotive-Grade MCU: MGEQ1C064

| Part No. | Operating Voltage | Flash ROM | Max. Operation Freq. | Timer (16-Bit) | 12-Bit ADC | Features | PCA | WDT | ISP | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Data RAM | | IO | ACMP | | PWM | | IAP | |
| MGEQ1C064*1 | 2.4V~5.5V | 64KB | 36MHz | 5 + RTC | 16-CH | UART*2x2,SPI,I2Cx2 S/W I2C,LIN,CRC16 | 1 | YES*2 | 7.5KB Max. | LQFP48 |
| | | 4KB | | 44 | 3 | | 8-CH | | 63.5KB Max.*3 | |

Passed the certification of AEC-Q100 Grade 2 (Support operation temperature: -40~105°C)
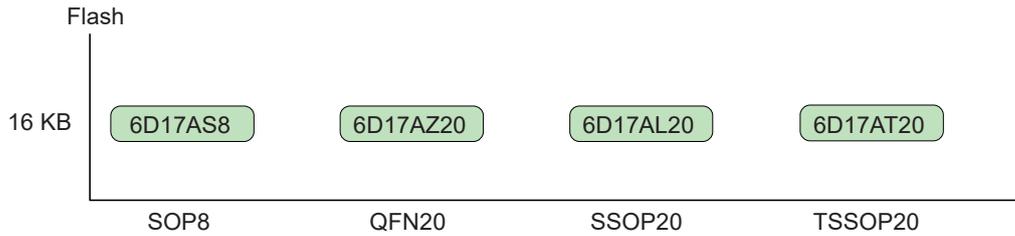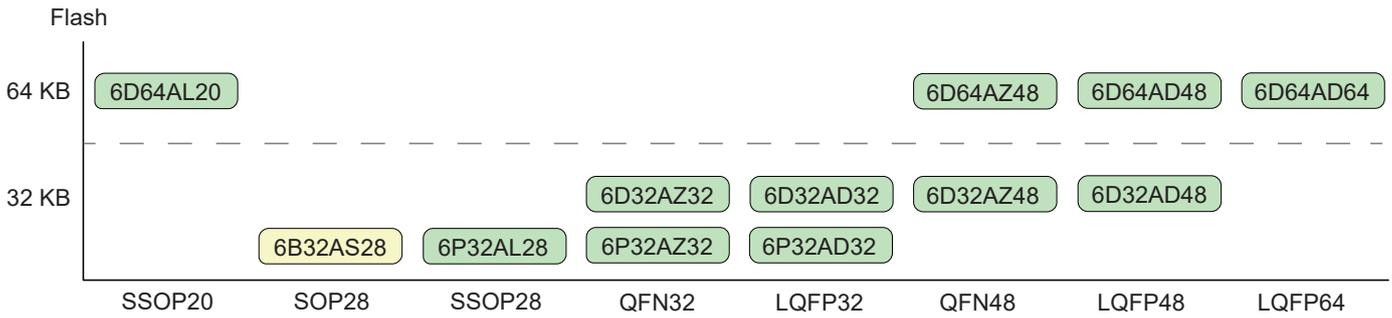Support Code Protection
*1 Support SPI Master Mode;
*2 Support Watch Mode;
*3 Support S/W setting.

# 1T 8051 Wide Voltage Base Line

Flash

| 64 KB | 6D64AL20 | | | | | 6D64AZ48 | 6D64AD48 | 6D64AD64 |

| 32 KB | | | | 6D32AZ32 | 6D32AD32 | 6D32AZ48 | 6D32AD48 | |
| | | 6B32AS28 | 6P32AL28 | 6P32AZ32 | 6P32AD32 | | | |

| SSOP20 | SOP28 | SSOP28 | QFN32 | LQFP32 | QFN48 | LQFP48 | LQFP64 |

Flash

| 16 KB | 6D17AS8 | 6D17AZ20 | 6D17AL20 | 6D17AT20 |

| SOP8 | QFN20 | SSOP20 | TSSOP20 |

| Part No. | Operating Voltage | Flash ROM | Max. Operation Freq. | Timer (16-Bit) | 12-Bit ADC | Features | PCA | WDT | ISP | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Data RAM | | IO | ACMP | | PWM | | IAP | |
| MG82F6D17[*1] | 1.8V~5.5V | 16KB | 36MHz[*5] | 4 + RTC | 8-CH | UART[*2] x2, SPI, I²C S/W I²C, LIN,CRC16 | 1 | YES[*3] | 7.5KB Max. | SOP8 QFN20 |
| | | 1KB | | 5/17 | NA | | 8-CH | | 15.5KB Max.[*4] | SSOP20 TSSOP20 |
| MG82F6B32[*1] | 2.2V~5.5V | 32KB+6KB | 25MHz[*5] | 4 + RTC | 8-CH | UART[*2] x2, SPI, I²C CRC16, LED SEG x8 | NA | YES[*3] | 6KB | SOP28 |
| | | 2KB | | 26 | NA | | 4-CH | | | |
| MG82F6P32[*1] | 1.8V~5.5V | 32KB | 32MHz[*5] | 6 + RTC | 8-CH | OPAx2, PGA, PD en/decoder,DMA UART[*2] x2, SPI, I²Cx2 S/W I²C, CRC16/32 | 2 | YES[*3] | 7.5KB Max. | SSOP28 QFN32 LQFP32 |
| | | 2KB | | 25/29 | 2 | | 8-CH | | 31.5KB Max.[*4] | |
| MG82F6D32[*1] | 1.8V~5.5V | 32KB | 36MHz[*5] | 4 + RTC | 10-CH | UART[*2] x2, SPI, I²Cx2 S/W I²C, LIN,CRC16 | 1 | YES[*3] | 7.5KB Max. | QFN32 LQFP32 QFN48 LQFP48 |
| | | 2KB | | 29/44 | 3 | | 8-CH | | 31.5KB Max.[*4] | |
| MG82F6D64[*1] | 1.8V~5.5V | 64KB | 36MHz[*5] | 5 + RTC | 16-CH | UART[*2] x4, SPI, I²Cx2 S/W I²C, LIN,CRC16 | 1 | YES[*3] | 7.5KB Max | SSOP20 QFN48 LQFP48 LQFP64 |
| | | 4KB | | 44/59 | 3 | | 8-CH | | 63.5KB Max.[*4] | |

<Models in the yellow grid will be launched soon.>
Support Code Protection
[*1] Support M-LINK ICE, except SOP8;
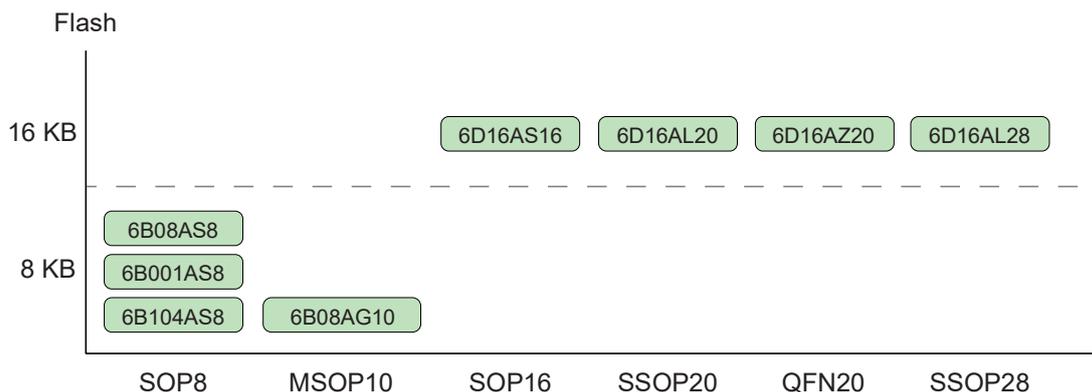[*2] Support SPI Master Mode;
[*3] Support Watch Mode;
[*4] Support S/W setting;
[*5] 12MHz and 11.059MHz as internal RC oscillator, used 12MHz as default. Frequency deviation: at 25℃, under ±1% ; at -40℃~105℃, under ±2%.

# 1T 8051 Wide Voltage Base Line

Flash

| | | | | | |
|---|---|---|---|---|---|
| 64 KB | | | | | 5C64AD64 |
| 32 KB | 5B32AL20 | 5B32AS28 | 5B32AD32 | 5E32AD48 / 5C32AD48 | |
| | SSOP20 | SOP28 | LQFP32 | LQFP48 | LQFP64 |

Flash

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 KB | | | 6D16AS16 | 6D16AL20 | 6D16AZ20 | 6D16AL28 |
| 8 KB | 6B08AS8 / 6B001AS8 / 6B104AS8 | 6B08AG10 | | | | |
| | SOP8 | MSOP10 | SOP16 | SSOP20 | QFN20 | SSOP28 |

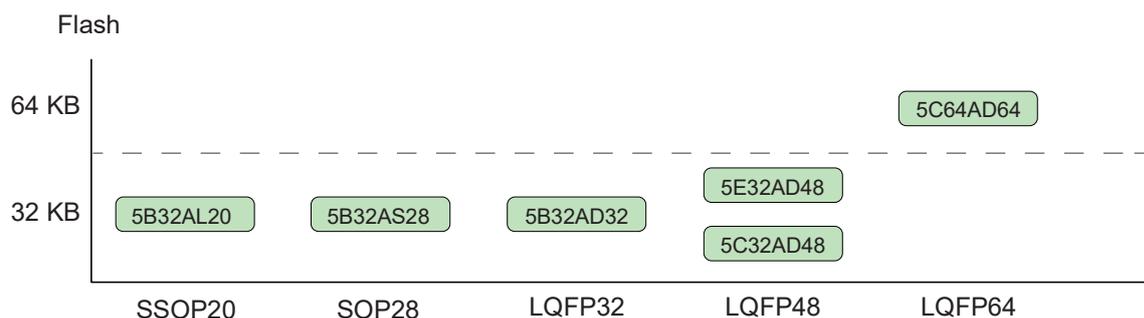| Part No. | Operating Voltage | Flash ROM | Max Operation Freq. | Timer (16-Bit) | 10-Bit ADC | Features | PCA | WDT | ISP | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Data RAM | | IO | ACMP | | PWM | | IAP | |
| MG82F6B08[*1] MG82F6B001[*1] MG82F6B104[*1] | 2.4V~5.5V | 8KB | 16/22.12 MHz[*6] | 3 + RTC | 6-CH | UART[*2],SPI,LIN S/W I²C,I²C,CRC16 | 1 | YES[*3] | 3.5KB Max. | SOP8 MSOP10 |
| | | 1KB | | 6/8 | 1 | | 4-CH | | EEPROM 512B IAP Default NA | |
| MG82F6D16[*1] | 1.8V~5.5V | 16KB | 32MHz[*5] | 3 + RTC | 8-CH | UART[*2],SPI,LIN I²C,S/W I²C,CRC16 | 1 | YES[*3] | 7.5KB Max. | SOP16 SSOP20 QFN20 SSOP28 |
| | | 1KB | | 13/17/25 | 1 | | 6-CH | | 15.5KB Max.[*4] | |
| MG82F5B32[*1] | 1.8V~5.5V | 32KB | 32MHz[*5] | 3 + RTC | 8-CH[*7] | UART[*2]x2,SPI ISO-7816,LIN,I²C | 1 | YES[*3] | 4KB Max. | SSOP20 SOP28 LQFP32 |
| | | 2KB | | 25/29 | NA | | 8-CH | | 31.5KB Max.[*4] | |
| MG82FG5C32[*1] | 1.8V~5.5V | 32KB | 32MHz | 5 + RTC | 16-CH | UART[*2]x4,SPI/QPI I²Cx2,LIN,ISO-7816x3 | 2 | YES[*3] | 7.5KB Max. | LQFP48 |
| | | 2KB | | 44 | 3 | | 12-CH | | 31.5KB Max.[*4] | |
| MG82FG5C64[*1] | 1.8V~5.5V | 64KB | 32MHz[*5] | 5 + RTC | 16-CH | UART[*2]x4,SPI/QPI I²Cx2,LIN,ISO-7816x3 | 2 | YES[*3] | 7.5KB Max. | LQFP64 |
| | | 4KB | | 59 | 3 | | 12-CH | | 63.5KB Max.[*4] | |
| MG82G5E32[*1] | 1.8V~5.5V | 32KB | 32MHz[*5] | 4 + RTC | 8-CH | UART[*2]x2,SPI,I²C S/W I²C,CRC16 | 1 | YES[*3] | 7.5KB Max. | LQFP48 |
| | | 2KB | | 44 | 2 | | 8-CH | | 31.5KB Max.[*4] | |

Support Code Protection;[*1] Support M-LINK ICE, except SOP8;[*2] Support SPI Master Mode;
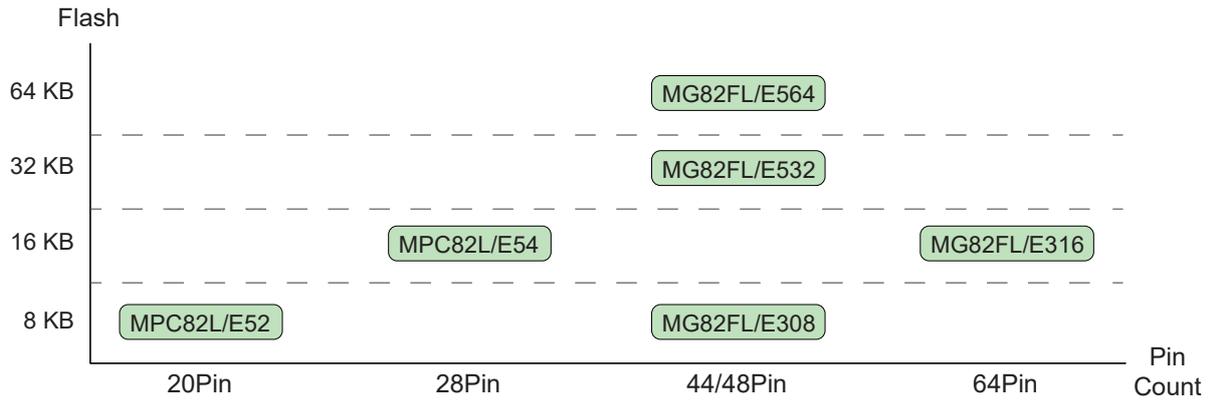[*3] Support Watch Mode;[*4] Support S/W setting;
[*5] 12MHz and 11.059MHz as internal RC oscillator, used 12MHz as default. Frequency deviation: at 25℃, under ±1% ; at -40℃~85℃, under ±2%;
[*6] 16MHz and 22.12MHz as internal RC oscillator. Frequency deviation: at 25℃, under ±2% ; at -40℃~85℃, under ±3.8%;
[*7] Factory default 10 Bit,200Ksps; Program adjustment 12 Bit,400Ksps.

# 1T 8051 Single Voltage MCU

Flash



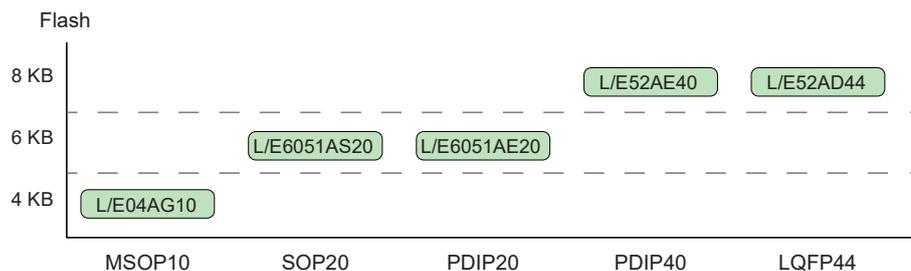| Part No. | Operating Voltage | Flash ROM | Max Operation Freq. | Timer (16-Bit) | ADC | Comm. | PCA | WDT | Code Protection | ISP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Data RAM | | IO | ACMP | | PWM | | | IAP | |
| **MPC82L/E52** | L:2.4V~3.6V E:4.5V~5.5V | 8KB | 25MHz | 2 | 8-Bit,8-CH | UART,SPI | 1 | YES | YES | 3KB Max. | PDIP20 SOP20 TSSOP20 |
| | | 256B | | 15 | NA | | 2-CH | | | 7.5KB Max. | |
| **MPC82L/E54** | L:2.4V~3.6V E:4.5V~5.5V | 15.5KB | 25MHz | 2 | 10-Bit,8-CH | UART,SPI | 1 | YES | YES | 3.5KB Max. | PDIP28 SOP28 SSOP28 |
| | | 512B | | 23 | NA | | 4-CH | | | 15KB Max. | |
| **MG82FL/E532**[*1] | L:2.4V~3.6V E:4.5V~5.5V | 32KB | 24MHz[*2] | 3 | 10-Bit,8-CH | UARTx2,SPI | 1 | YES[*4] | YES | 4KB Max. | LQFP44 LQFP48 |
| | | 1280B | | 45 | NA | | 6-CH | | | 32KB Max.[*5] | |
| **MG82FL/E564**[*1] | L:2.4V~3.6V E:4.5V~5.5V | 64KB | 24MHz[*2] | 3 | 10-Bit,8-CH | UARTx2,SPI | 1 | YES[*4] | YES | 4KB Max. | LQFP44 LQFP48 |
| | | 1280B | | 45 | NA | | 6-CH | | | 63.5KB Max.[*5] | |
| **MG82FL/E308** | L:2.4V~3.6V E:4.5V~5.5V | 8KB | 24MHz[*3] | 3 | NA | UART | NA | YES | YES | 4KB Max. | LQFP48 |
| | | 512B | | 45 | 1 | | 1-CH | | | 8KB Max.[*5] | |
| **MG82FL/E316** | L:2.4V~3.6V E:4.5V~5.5V | 16KB | 24MHz[*3] | 3 | NA | UART | NA | YES | YES | 4KB Max. | LQFP64 |
| | | 512B | | 57 | 1 | | 1-CH | | | 15.5KB Max.[*5] | |

[*1] Support M-LINK ICE;
[*2] Used internal RC oscillator 22.118MHz as default. Frequency deviation: at 25°C,under ±1%; at-20°C ~50°C,under ±2% ; at-40°C ~85°C, under ±4%;
[*3] Internal RC oscillator 12MHz as default. Frequency deviation: at 25°C,under ±1%; at-20°C ~50°C,under ±2% ; at-40°C ~85°C, under ±4%;
[*4] Support Watch Mode;
[*5] Support S/W setting.
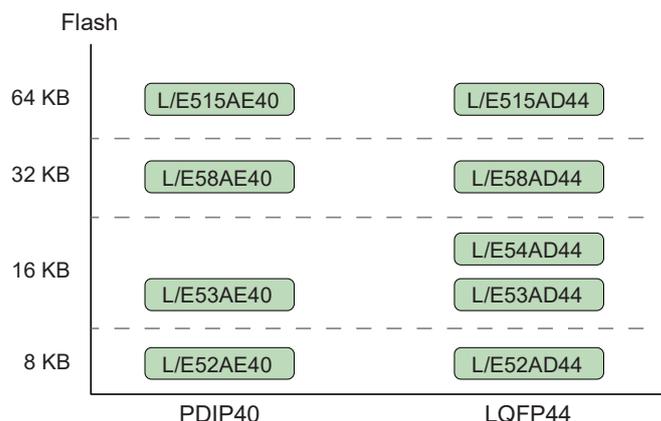
# 12T/6T 8051 Single Voltage **with internal RC oscililator** MCU

Flash

| | | | | |
|---|---|---|---|---|
| 8 KB | | | L/E52AE40 | L/E52AD44 |
| 6 KB | L/E6051AS20 | L/E6051AE20 | | |
| 4 KB | L/E04AG10 | | | |
| | MSOP10 | SOP20 | PDIP20 | PDIP40 | LQFP44 |

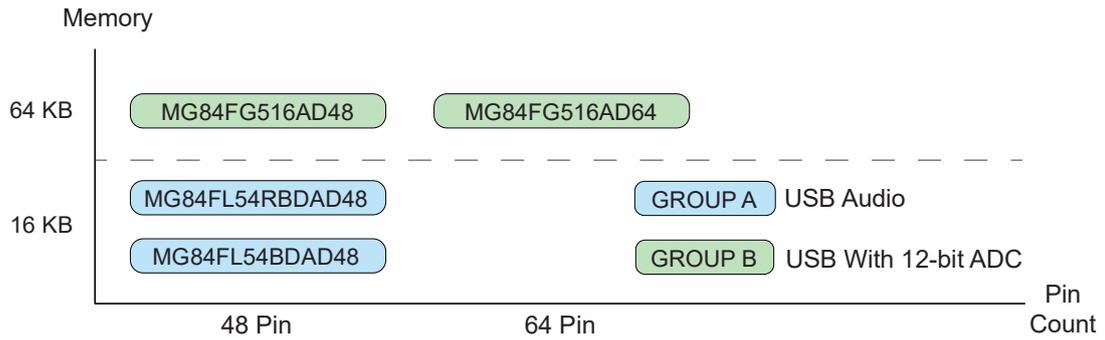| Part No. | Operating Voltage | Flash ROM / Data RAM | Max. Operation Freq. | Timer (16-Bit) / IO | ACMP | Comm. | PCA / PWM | WDT | ISP / IAP | Package |
|---|---|---|---|---|---|---|---|---|---|---|
| **MG87FL/E52*** | L:2.4V~3.6V E:4.5V~5.5V | 8KB | 48MHz @ 12T 24MHz @ 6T | 3 | NA | UART | NA | YES | 3.5KB Max. | PDIP40 LQFP44 |
| | | 256B | | 32/36 | | | NA | | S/W setting | |
| **MG87FL/E6051*** | L:2.4V~3.6V E:4.5V~5.5V | 6KB | 48MHz @ 12T 24MHz @ 6T | 2 | 1 | UART | NA | YES | 3.5KB Max. | PDIP20 SOP20 |
| | | 256B | | 17 | | | 1-CH | | S/W setting | |
| **MG87FL/E04** | L:2.4V~3.6V E:4.5V~5.5V | 4KB | 22.118MHz/Int RC | 2 | 1 | UART | NA | YES | 1.5KB | MSOP10 |
| | | 256B | | 7 | | | 1-CH | | S/W setting | |

Support Code Protection
* Built-in internal RC oscillator with ±1% frequency deviation at 25°C. And there are 6 kinds of frequency selectable: 6M/11.059M/12M/22.118M/24M/24.576MHz.

# 12T/6T 8051 Single Voltage **without internal RC oscililator** MCU

Flash

| | | |
|---|---|---|
| 64 KB | L/E515AE40 | L/E515AD44 |
| 32 KB | L/E58AE40 | L/E58AD44 |
| 16 KB | | L/E54AD44 |
| | L/E53AE40 | L/E53AD44 |
| 8 KB | L/E52AE40 | L/E52AD44 |
| | PDIP40 | LQFP44 |

| Part No. | Operating Voltage | Flash ROM / Data RAM | Max. Operation Freq. | Timer (16-Bit) / IO | ACMP | Comm. | PCA / PWM | WDT | Code Protection | ISP / IAP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MPC89L/E52** | L:2.4V~3.6V E:4.5V~5.5V | 8KB | 48MHz @ 12T 24MHz @ 6T | 3 | NA | UART | NA | YES | YES | 4KB Max. | PDIP40 LQFP44 |
| | | 512B | | 32/36 | | | NA | | | 6KB Max. | |
| **MPC89L/E53** | L:2.4V~3.6V E:4.5V~5.5V | 15KB | 48MHz @ 12T 24MHz @ 6T | 3 | NA | UART | NA | YES | YES | 4KB Max. | PDIP40 LQFP44 |
| | | 512B | | 32/36 | | | NA | | | NA | |
| **MPC89L/E54** | L:2.4V~3.6V E:4.5V~5.5V | 16KB | 48MHz @ 12T 24MHz @ 6T | 3 | NA | UART | NA | YES | YES | 4KB Max. | LQFP44 |
| | | 1280B | | 32/36 | | | NA | | | 46KB Max. | |
| **MPC89L/E58** | L:2.4V~3.6V E:4.5V~5.5V | 32KB | 48MHz @ 12T 24MHz @ 6T | 3 | NA | UART | NA | YES | YES | 4KB Max. | PDIP40 LQFP44 |
| | | 1280B | | 32/36 | | | NA | | | 30KB Max. | |
| **MPC89L/E515** | L:2.4V~3.6V E:4.5V~5.5V | 63KB | 48MHz @ 12T 24MHz @ 6T | 3 | NA | UART | NA | YES | YES | 4KB Max. | PDIP40 LQFP44 |
| | | 1280B | | 32/36 | | | NA | | | NA | |

# 8051 USB MCU

Memory



64 KB    MG84FG516AD48      MG84FG516AD64

16 KB    MG84FL54RBDAD48      GROUP A   USB Audio

         MG84FL54BDAD48      GROUP B   USB With 12-bit ADC

48 Pin        64 Pin       Pin Count

## MG84 (USB FS )

| Part No. | Operating Voltage | Flash ROM | Max. Operation Freq. | Timer (16-Bit) | ADC | Comm. | PCA | WDT | End Points | ISP | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Data RAM | | IO | ACMP | | PWM | | | IAP | |
| **MG84FL54BD** | 2.7V~3.6V | 16KB | 24MHz | 3 | NA | USB, UART, TWI(I²C), SPI | NA | NA | 4 | 4KB Max. | LQFP48 |
| | | 832B | | 36 | NA | | NA | | | 15KB Max. | |
| **MG84FL54RBD** | 2.7V~3.6V | 16KB | 24MHz | 3 | NA | USB, UART, TWI(I²C), SPI | NA | NA | 6 | 4KB Max. | LQFP48 |
| | | 256B | | 31 | NA | | NA | | | 15KB Max. | |
| **MG84FG516**[*1] | 2.0V~5.5V | 64KB | 32MHz[*2] | 4 | 12-Bit, 8-CH | USB, UARTx2, TWI(I²C), SPI | 1 | YES[*4] | 11 | 4KB Max. | LQFP48 |
| | | 4352B | | 41/55 | NA | | 6-CH | | | 63.5KB Max.[*5] | LQFP64 |

[*1] Support M-LINK ICE;
[*2] Used internal RC oscillator 12MHz as default. Frequency deviation: at 25℃, under ±1% ; at -40℃~85℃, under ±1.5% ; at USB activated, under ±0.25%;
[*3] Support SPI Master Mode;
[*4] Support Watch Mode;
[*5] Support S/W setting.

## USB Bridge

This product segment can support USB to transfer data or command to other interface, for example UART, I2C, SPI…etc., even GPIO or PWM control. Different USB Bridges can meet different product requirements. It has good compatibility and performance, reducing the requirement for design resources. It also provides easy-to-use development UI interface and library to reduce time to market.

USB bridge chips can be applied in products such as gas detectors, gyroscopes, LED controllers, EEPROM SPI/I2C devices, bill counters, and more.

| Part No. | Operating Voltage | USB Speed | Function | Features | Driver | Package |
|---|---|---|---|---|---|---|
| MA111 | 2.4V~5.5V | Full Speed[*1] | USB HID to Serial Bridge | UART, SPI Master, TWI(I2C) Master, GPIO | FREE | SOP16, QFN16 |
| MA112 | 3.0V~5.5V | Full Speed[*1] | USB to UART Data Bridge MS Windows Driver Supported | Virtual COM (TXD/RXD) | OS | SOP16, QFN16 |
| MA113 | 3.0V~5.5V | Full Speed[*1] | USB Data Bridge for UART, RS-232 Modem signal, RS-485 MS Windows Standard Driver supported | Virtual COM(TXD/RXD), RS-232 Modem Signals RS-485 Transceiver Control | OS | SOP16, QFN16 |

[*1] Built in internal RC oscillator 12MHz as default. Frequency deviation: at 25°C, under ±1% ; at -40°C~85°C, under ±1.5%, USB online mode ±0.25%.

## Delta-Sigma ADC

This series of ADC chips belongs to Delta-Sigma ($\Delta\Sigma$) type. It is embedded a precision 24-bit analog-to-digital converter with a 4th-order Delta-Sigma ($\Delta\Sigma$) modulator and a digital filter, analog input multiplexer with some differential inputs (multiple sets), a low-noise input buffer, a low-noise programmable gain amplifier (PGA) and a serial interface control block.

This series of $\Delta\Sigma$ ADC chips can be widely used in fields such as communication systems, instrumentation, electronic scales, industrial automation, medical equipment, and more.

Electronic Scale　　Body Fat Scale　　Forehead Thermometer　　Blood Pressure Meter　　Glucometer　　Handheld Measurement Tools　　Measuring Instruments　　Smart Transmitter

| Part No. | Operating Voltage | Power(mA) | ENOB (Bits) | ADC Channel (diff) | AD Rate (Hz) | PGA | Features | Package |
|---|---|---|---|---|---|---|---|---|
| MAD2402 | 2.5V~5.5V | 0.7 | 19.8 | 1 | 1280 | 128 | SIF (Serial Interface) | SOP8, DIP8 |
| MAD2418 | 5V | 7 | 23 | 4 | 30K | 64 | SPI | SSOP28W |
| MAD2404 | 2.7V~5.3V | 1 | 22 | 2 | 80 | 128 | SIF (Serial Interface) | TSSOP24 |

<Models in the yellow grid will be launched soon.>

## LIN / CAN Transceiver

| Part No. | Data Transmission Standard | Operating Voltage | Data Rate (bps) | LDO | Operating Temperature (°C) | Package |
|---|---|---|---|---|---|---|
| MLT1021 | LIN2.x | 5V~27V | 20K | NA | -40 ~ 105 | SOP8 |
| MLT1021R | LIN2.x | 5V~27V | 20K | 3.3/5V | -40 ~ 105 | SOP10 |
| MLT1021S | LIN2.x | 5V~27V | 20K | NA | -40 ~ 105 | SOP8 |
| MCT1042 | CAN2.0x/CAN-FD | 3.3V~5V | 5M | NA | -40 ~ 125 | SOP8 |

<Models in the yellow grid will be launched soon.>
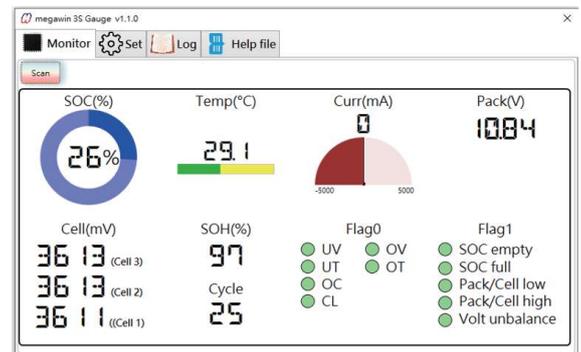
# Power IC Series

## BMS Series

Battery Management System (BMS) is a system that manages batteries, usually with the function of measuring battery voltage and othe information to prevent or avoid abnormal conditions such as over-discharge, over-charge, and over-temperature. Megawin's BMS products offer a total solution, including MCU algorithm, hardware design, UI software, etc., to accelerated user development time and lower the threshold for user to enter the market, providing portable lithium-ion battery applications.

## BMS Features

● Megawin Smooth Energy Gauge Algorithm, provide SOC/SOH

● Wake-up with current detection, include Voltage /

   Current / Temperature measurement function

● Provide storage area for cell production history data

● Automatic cell behavior (abnormality) status recording

### ▌BMS (MSE03GM1) GUI

● Support adjust the parameters, includes V/I/T battery information

● Built-in calibration provides quick li-battery calibration

● Product Monitoring Functions , display SOC/SOH etc.

● Built-in Battery Abnormal Record Condition , read history

   data for analysis



## BMS Applications

● Power tool battery pack

● Electric Drill

● Electric Wrench

● Military Knife Saw

● Vacuum cleaner

● Shoe washing brush

● Toy

● Small Fan



## Power IC (BMS)

| Part No. | Type | Number of series cells | Battery chemistry | Operating Voltage | Features | Package |
|---|---|---|---|---|---|---|
| MSE03GM1 | Gauge | 3 | NCA | 8.1V ~ 12.75V | UART, I²C | LQFP48 |
| MSE01PC1 | Battery Passport | 1 | NCM, NCA, LTO, LiFePO$_4$ | 1.8V ~ 5V | NFC, UART | QFN20 |
| MSE06GC1 | Gauge | 6 | NCA, LiFePO$_4$ | 6V ~ 30V | I²C | QFN32 |

<Models in the yellow grid will be launched soon.>

# LDO Series

Megawin's linear low dropout regulator (LDO) solution can convert higher input voltage into a stable output voltage in a variety of applications, which has the following characteristics:

# LDO Features

● EN turns off LDO to save power

(notes: If there is an EN Pin requirement, the EN pin function must be selected, and it is a SOT 235 package.)

● Superior Line Regulation, high PSRR anti-ripple interference
● Ultra-low $I_Q$ value, improve voltage conversion efficiency

## LDO: Voltage/current/power selection

● Choose the right LDO according to the application
- Input voltage：100V (max)
- Output voltage：5V/3.3V (CR2105: $V_{out}$ is adjustable)
- Input current：0.3A (max)
● Power is related to package limitations, resulting in temperature rise

Formula $P_{LDO} = (V_{in} - V_{out}) \times I_{out}$
Condition：$V_{out} = 3.3$ V，$I_{out} = 50$mA

When $V_{in} = 9$ V, LDO power 0.285W
When $V_{in} = 15$ V, LDO power 0.585W

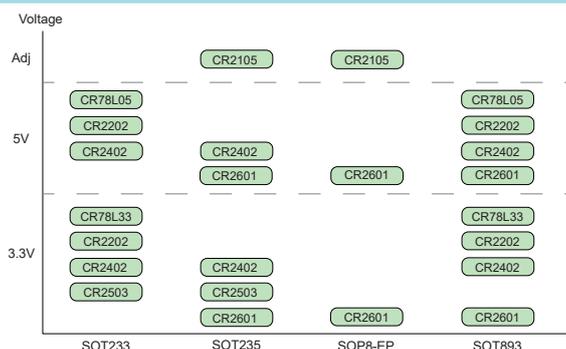Due to the power, the latter can only choose SOP8-EP packages.

| Package | Power (Max) |
|---|---|
| SOT233 | 0.4W |
| SOT235 | 0.4W |
| SOT893 | 1.8W |
| SOP8-EP | 2.2W |

## LDO Applications

● Motor, Fan, Servo Motor Applications
● Charger application
● Intelligent detection
● Smart Meter/ Smart Water Meter
● Mouse, Power Bank
● Telcom and Servo Power
● Battery Management (BMS)

# Power IC (LDO)



*1 Adj: means the voltage can be adjusted.

| Part No. | Min. $V_{IN}$(V) | Max. $V_{IN}$(V) | $I_{OUT}$ (mA) | $V_{OUT}$ (V) | $I_Q$ (uA) | $\triangle V_{LINE}$ (%) | $\triangle V_{LOAD}$ (%) | PSRR @1KHz(dB) | $C_{OUT}$ (uF) | EN | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CR78L33 CR78L05 | 7 | 30 | 100 | 3.3/5 | 300 | 0.3 | 0.3 | 84 | 0.1 | NA | SOT233 SOT893 |
| CR2105 | 7 | 100 | 50 | Adj*1 | 23 | 0.18 | 1.25 | 65 | 10 | Yes | SOT235 SOP8-EP |
| CR2202 | 2.7 | 24 | 150 | 3.3/5 | 1.5 | 0.06 | 0.15 | 80 | 1 | NA | SOT233 SOT893 |
| CR2402 | 2.7 | 40 | 250 | 3.3/5 | 1.5 | 0.06 | 0.6 | 80 | 1 | Yes | SOT233 SOT235 SOT893 |
| CR2503 | 2.5 | 6 | 300 | 3.3 | 0.5 | 0.6 | 1 | 60 | 1 | Yes | SOT233 SOT235 |
| CR2601 | 2.7 | 60 | 150 | 3.3/5 | 2.8 | 0.01 | 1.5 | 60 | 1 | Yes | SOT235 SOT893 SOP8-EP |

# BLDC Series

## BLDC

8-bit/32-bit MCU BLDC Motor Controllers or ASICs with integrated up to 600V gate drivers; some models support sensorless 3-Phase PMSM/BLDC FOC Motor Control with multiple protection features and parameters configuration capability.

## Features

### 8051 core BLDC:

- CGH0x1A: with external Hall IC
- CGF0x2A: FOC* Control (Sensorless)
  - ▲ Can be collaborated to FOC Intelligent Tuning System to optimize the motor performance.
  - ▲ CGH001A/CGF002A: without Gate Driver
- Built-in MDE HW efficient computing and protection
- Can be used with various gate drivers according to the applications
- MOSFET elements P+N / N+N

**▎Function Diagram** (CGH021A)



(*MDE: Motor Driving Engine)

FOC Intelligent Tuning System

| Option | Value |
|---|---|
| Motor basic parameters | |
| Stator Line-Line Resistance ( unit : mΩ) | 2930 |
| Stator Line-Line Inductance ( unit : uH ) | 2850 |
| PWM frequency ( unit : Hz ) | 14000 |
| DC bus Voltage ( unit : V ) | 36 |
| Rshunt(unit: 0.1mR) | 1000 |
| OPA GAIN | 2.5 Gain |
| Motor Pole | 8 |
| Motor rated maximum speed | 6000 |
| Watt Maximum | 60 |

Motor basic parameters

(*FOC : Field-Oriented Control)

### Arm® Cortex®-M0 BLDC:

MDF1x1A:

- Arm® Cort ex®-M0 core 60MHz freq.: Faster control
- FOC control support 1/2-shunt current sampling
- FOC algorithm library & Motor control library
- Built-in 40V ~ 600V Gate Driver & 5V LDO
- 2 sets OPA used for sampling phase current
- Drive MOS  P+N / N+N
- Hall Sensor / Sensor-less control: Sine-wave, Square-wave

**▎Function Diagram** (MDF121A)
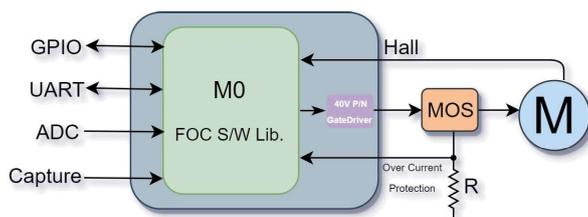


## Typical Applications

- Fresh Air System, Air-Condition, Water Pump/Drain Pump
- High-Speed Hair Dryer, Turbo Fan, Nail Polishers
- Ceiling Fan, Standing Fan / Wall Fan / Air Purifier
- Servo Fan

# BLDC

built-in gate driver

| | | | |
|---|---|---|---|
| 600V | CGH081A | CGF082A | MDF181A |
| 200V | CGH061A | CGF062A | |
| 150V | | | MDF151A |
| 40V | CGH021A | CGF022A | MDF121A |
| 12V | MA853 | | |
| without gate driver | CGH001A | CGF002A | MDF101A |

With external Hall Sensor          FOC

## 8051 core BLDC

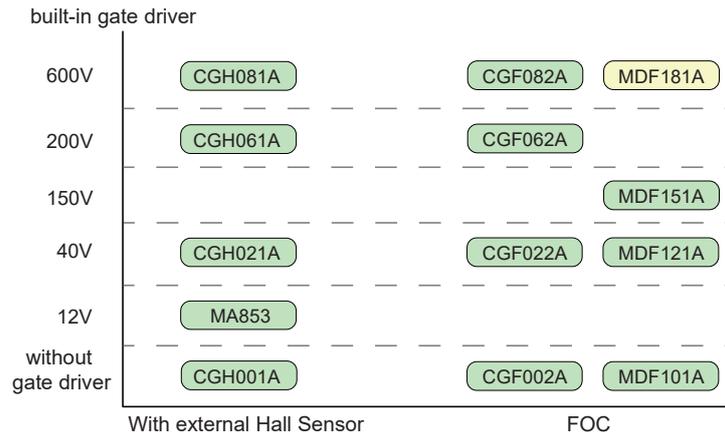| Part No. | Mode | Gate Driver | | V<sub>IN</sub> | LDO | VDD | Max Freq. | ADC 10-Bit | Capture 16-Bit | OPA*1 | Operation Temp. | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Voltage | Type | | | | | | | | | |
| CGH001A | Hall | NA | | 5V | NA | 4.5~5.5V | 48MHz | 8 CH | 1 CH | 1 set | -40℃~105℃ | SSOP28 QFN32 |
| CGH021A | Hall | 40V | P+N | 40V | 5V/30mA | 4.5~5.5V | 48MHz | 8 CH | 1 CH | 1 set | -40℃~105℃ | SSOP28W QFN40 |
| CGH061A | Hall | 200V | N+N | 15V | 5V/30mA | 4.5~5.5V | 48MHz | 8 CH | 1 CH | 1 set | -40℃~105℃ | LQFP48 |
| CGH081A | Hall | 600V | N+N | 15V | 5V/30mA | 4.5~5.5V | 48MHz | 8 CH | 1 CH | 1 set | -40℃~105℃ | LQFP48 |
| CGF002A | FOC | NA | | 5V | NA | 4.5~5.5V | 48MHz | 8 CH | 1 CH | 1 set | -40℃~105℃ | LQFP48 |
| CGF022A | FOC | 40V | P+N | 40V | 5V/30mA | 4.5~5.5V | 48MHz | 8 CH | 1 CH | 1 set | -40℃~105℃ | LQFP48 |
| CGF062A | FOC | 200V | N+N | 15V | 5V/30mA | 4.5~5.5V | 48MHz | 8 CH | 1 CH | 1 set | -40℃~105℃ | QFN40 LQFP48 |
| CGF082A | FOC | 600V | N+N | 15V | 5V/30mA | 4.5~5.5V | 48MHz | 8 CH | 1 CH | 1 set | -40℃~105℃ | LQFP48 |

*1 OPA: For peripheral use.

## Arm® Cortex®-M0 BLDC

| Part No. | Mode | Gate Driver | | V<sub>IN</sub> | LDO | VDD | Max Freq. | ADC 12-Bit | Capture 16-Bit | OPA*1 | Operation Temp. | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Voltage | Type | | | | | | | | | |
| MDF101A | FOC | NA | | 5V | NA | 2.5~5.5V | 60MHz | 10 CH | 5 CH | 2 set | -40℃~105℃ | TSSOP28 QFN32 |
| MDF121A | FOC | 40V | P+N | 40V | 5V/30mA | 2.5~5.5V | 60MHz | 10 CH | 5 CH | 2 set | -40℃~105℃ | QFN32 |
| MDF151A | FOC | 150V | N+N | 21V 13V | 12V/300mA 5V/30mA | 2.5~5.5V | 60MHz | 10 CH | 5 CH | 2 set | -40℃~105℃ | QFN32 QFN40 LQFP48 |
| MDF181A | FOC | 600V | N+N | 15V | 5V/30mA | 2.5~5.5V | 60MHz | 10 CH | 5 CH | 2 set | -40℃~105℃ | LQFP48 |

<Models in the yellow grid will be launched soon.>   *1 OPA: For Current Detection

## ASIC BLDC

| Part No. | Mode | Gate Driver | | V<sub>IN</sub> | LDO | VDD | Max Freq. | ADC 12-Bit | Capture 16-Bit | OPA*1 | Operation Temp. | Package |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Voltage | Type | | | | | | | | | |
| MA853 | 180°/150° Sine-wave | 12V | N+N | 9~16V | 5V | 2.0~5.5V | 48MHz | 2 CH | 2 CH | 2 set | -40℃~105℃ | QFN32 |

# ECO System

- 8bit Development : Keil IDE
- 32bit Development : Keil IDE, VS Code, Eclipse
- Compiler tool chain : Keil C, GCC, SDCC
- M0 Graphical tool for initial setting : CoGen, Wizard

- Debugger : OCD, M-Link
- MP Programmer : U1-Plus
- 3rd party programmer : Hi-Lo, Xeltek, Elnec
- Support ICP/IAP/ISP, Online/Offline programming

## Development IDE

**ECOSYSTEM**

## Debugger and MP tools

## Support

## High-Reliability

- SW API and Middleware for all peripheral:
  ADC/DAC/ACMP/CAN/LIN/Timer/PWM/RTC/ SPI/I2C/CCL/CRC/AES128/IEC60730/ARGB
- Rich sample project to reduce design cycle
- SecureBoot with 96bit UID

- Excellent noise Immunity
- ESD : 8KV Grade for HBM
       450V for MM
       1KV for CDM

# Development Platform

● Megawin MCU Easy-to-use Development Platform

### Feature 01(HW)

*M-Link simulator and U1 Plus-D ...

*Reference design, EVB ...

### Feature 02(SDK)

*More than 700 Driver API

*Detailed code comments and high readability

### Feature 03(TOOL)

*Keil Wizard/CoGen assists in quick project setup

*Support fast platform switching

### Feature 04(DOC)
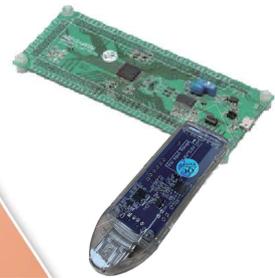
*Software and hardware documents

*Technology Application Tutorials

**Development hardware**

**Lots of reference codes**

**Easy to use wizard/CoGen**

**Detailed documentation**

# Development tool: MG32CoGen

● Megawin GUI Code Generator(MG32CoGen)
● Adds a variety of new peripheral initialization: ADC, UART, TIMER, SPI, LCD, CAN, ASB...
● Graphic interface help developer quickly complete I/O pin configuration
　 and Clock system planning
● Intuitive use interface reduce development period effectively



# Development tool: Keil Wizard

● Easy-to-use Keil Wizard supports all 8051/M0 series
● Code generated quickly by combo box and check box
● Support rich peripherals

# Megawin Arduino®-Throne

## Product: Arduino®-Throne

## Features:

① Supports Arduino® IDE

② Based on 32-Bit MCU core, operating frequency up to 36MHz

③ 128KB Flash, 16KB SRAM for more programming capacity

④ Switchable 3.3V/5V MCU power, supports multiple sensors power

⑤ Up to 47 GPIO pins, all of which can be set as external interrupt inputs

⑥ Increase pin drive current to drive sensors with different currents

⑦ Supports I2C/SPI/UART and USB 2.0 Full-Speed

⑧ Provides 7 sets of 8-bit PWMs with frequency and duty cycle fast adjustment

⑨ Supports 16 ADC channels for setting different reference voltage sources

⑩ Provides one 12-bit DAC with adjustable voltage output

(TH244A001)

Buy "Arduino®-Throne" on Alibaba
(Store name:
 **MEGAWIN TECHNOLOGY CO., LTD.**)

or https://megawinmcu.en.alibaba.com/

## Arduino®-Throne v.s Arduino® UNO R3

| | Arduino® Official | Megawin Technology |
|---|---|---|
| **Development Board** | Arduino® UNO R3 | Arduino®-Throne (TH244A001) |
| **MCU Core** | 8-bit AVR®, 16MHz MCU (AVR ATmega328P) | 32-bit Arm® Cortex®-M0, 36MHz MG32F02U128 (64-pin LQFP) |
| **Flash / EEPROM / SRAM** | 32KB / 1KB / 2KB | 128KB / - / 16KB |
| **Operating Voltage** | 5V | 3.3V/5V switchable |
| **Communication Interface** | I²C, SPI, UART | I²C, SPI, UART, USB |
| **Development Environment** | Arduino® | Arduino®, Keil |
| **I/O Drive Current** | 20mA | 40mA (5V) / 13mA (3.3V) |
| **I/O Numbers** | 14 | 47 (46 of them are on-board buttons, which are convenient for users to use as pushbuttons) |
| **On-board Buttons** | 0 | 1 set |
| **External Interrupts** | 2 | Any pin can be set as an external interrupt input |
| **PWM** | 6-CH (Not support fast frequency modification) | 7-CH, 8-bit default 1KHz, Specialized design of functions to support rapid modification of frequency 300Hz~5KHz adjustable |
| **Analog Input ADC** | 6-CH, 8-bit | 16-CH, 10-bit (8-bit/10-bit/12-bit) |
| **Programming Method** | Programming via COM port | Programming via COM port |

# Diverse Product Lines
# Versatile Applications
# Your Trusted Partner

Arm® Cortex®-M0+/M0

Arm® Cortex®-M3

USB

8051

Power IC

BLDC

Wireless Charger Application

Battery Management System

Smart light control

Portable energy storage

Communication (Drone)

Washing machine panel

Thermal printer

Meter

Smart bracelet

Massage chair

Smart water meter

Fan

Electronic locks

Monitoring system

Ventilation Mechanical Control system

Ceiling fan

Standing fan

Electronic drawing board
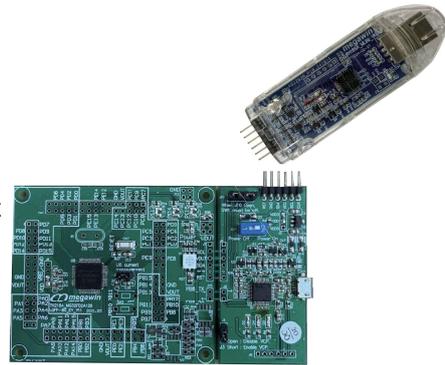
Hair Dryer

Pet feeder

Coffee machine

Smart Street Light

# Development Tools(1)

**EVB
+
M-Link
(TH185)**

- USB Plug & Play
- Support Keil RVMDK development environment
- Support on-line debug
- Support on-line chip programming

**U1 Plus-D
Writer
(TH200)**

- USB Plug & Play
- Support online and offline programming modes
- Automatic serial number insertion
- Maximum programming counts limitation support
- Online software update
- User-defined IAP space
- User-defined ISP space for self ISP code insertion
- Support LCD Display
- Provide signals such as start,busy,pass and fail, which can be combined with automatic programmer

**Arduino®-Throne
Development Kit
(TH244A001)**

- M0 MCU (MG32F02U128), operating frequency up to 36MHz
- 128KB Flash; 16KB SRAM
- Supports USB2.0
- Built-in ADC, DAC, I$^2$C, SPI, UART
- 47 GPIO for Arduino pinout at pitch 2.54mm female connectors
- Supports Arduino IDE

# Development Tools(2): BLDC Series EVB

**CG Series EVB**

CGH001A EVB
(TH259A)

CGH021A EVB
(TH260A)
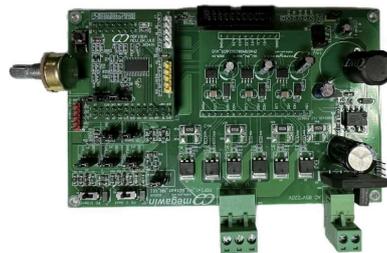
CGF002A EVB
(TH262A)

CGF022A EVB
(TH263A)

CGF082A EVB
(TH264A)

**MDF Series EVB**

MDF101A
+ 40V P/N Gate Driver EVB
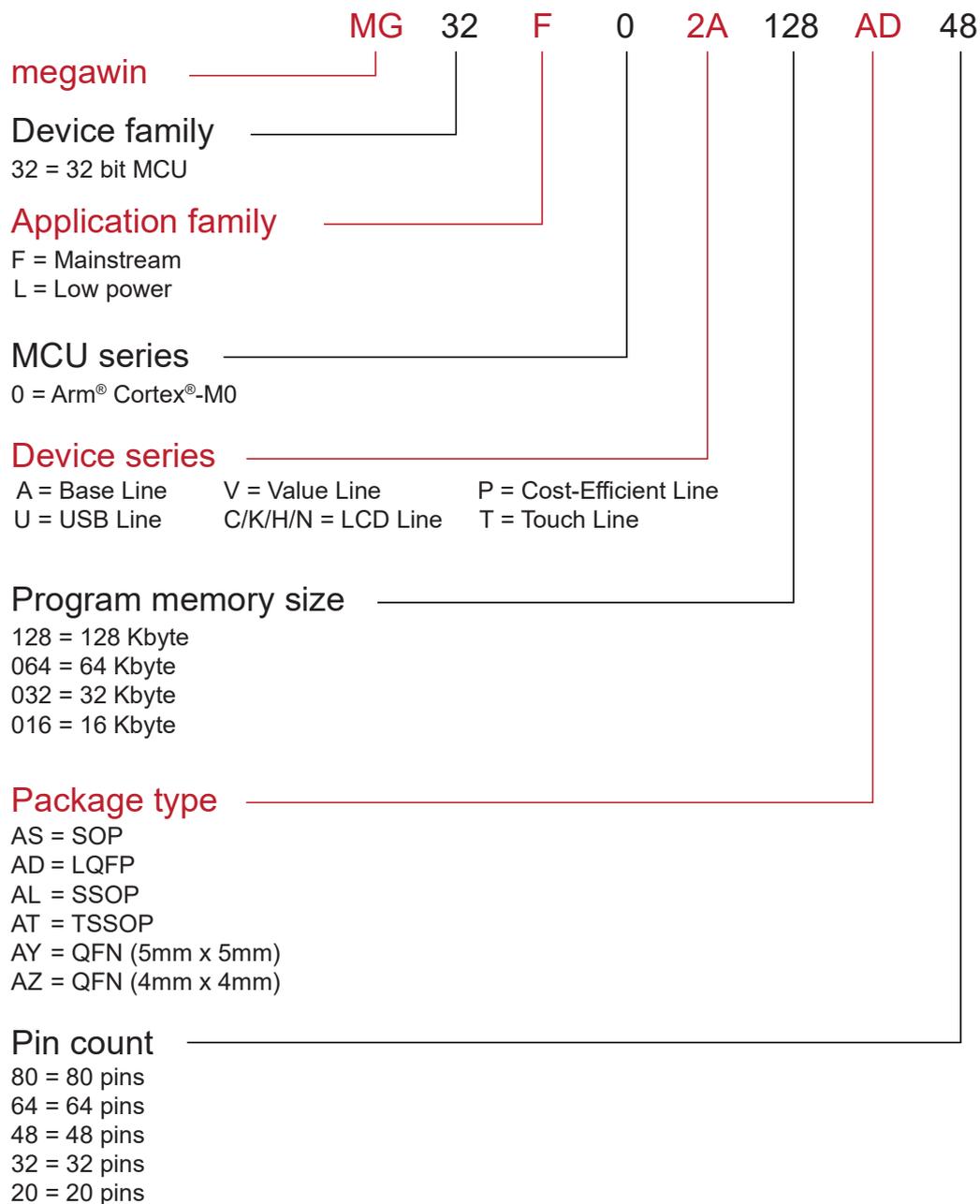
MDF101A
+ 600V N/N Gate Driver EVB
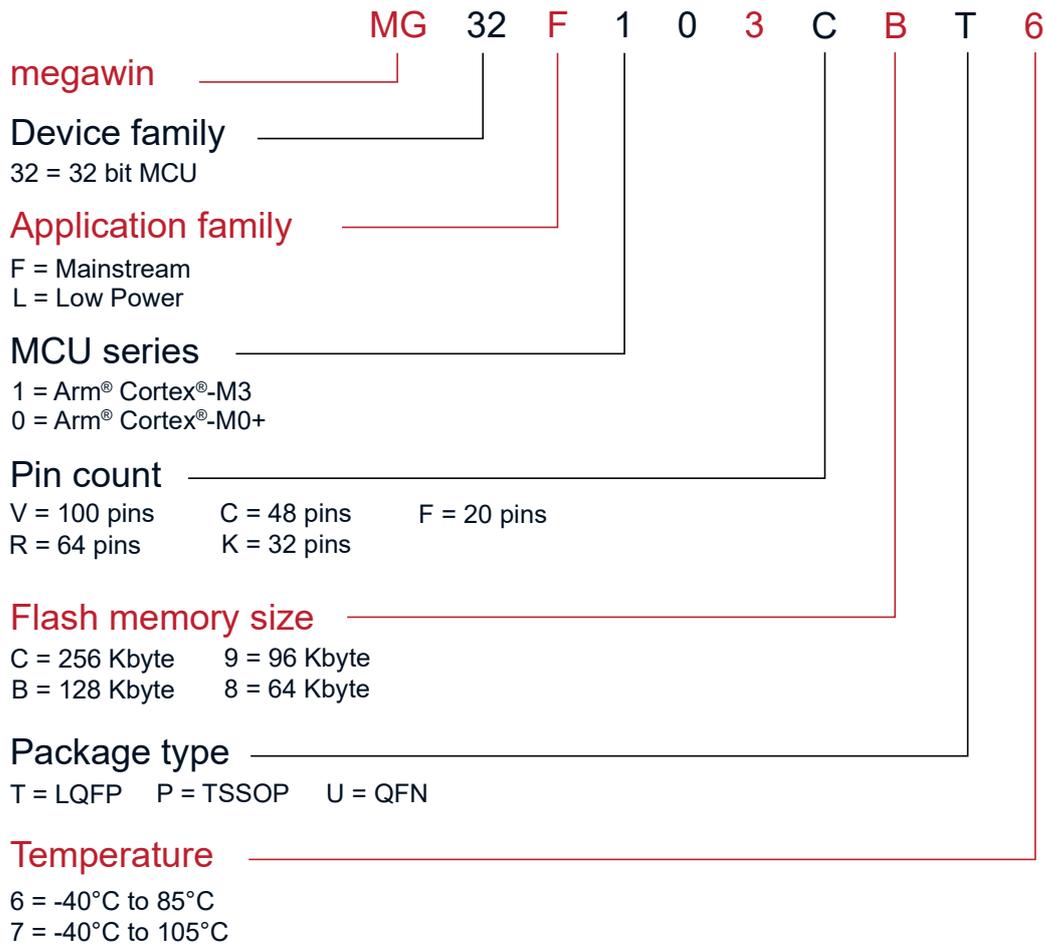
MDF121A EVB
(TH276A/TH277A)

# Package Type

| Code | Description | Code | Description | Code | Description |
|------|-------------|------|-------------|------|-------------|
| AB | COB | AC | LQFP (10mm x 10mm) | AD | LQFP (7mm x 7mm) |
| AE | PDIP | AF | PQFP | AG | MSOP |
| AL | SSOP | AM | TQFP | AP | PLCC |
| AS | SOP | AT | TSSOP | AY | QFN (5mm x 5mm) |
| HS | SOP (Heat Sink) | AK | TOxxx | AZ | QFN (4mm x 4mm) |
| AR | SOT | AI | Ink die | AN | DFN |
| AW | Wafer | WL | SSOPW (209mil Outline Dimensions) | AH | DICE |

# Ordering Information - M0

MG   32   F   0   2A   128   AD   48

**megawin**

**Device family**
32 = 32 bit MCU

**Application family**
F = Mainstream
L = Low power

**MCU series**
0 = Arm® Cortex®-M0

**Device series**
A = Base Line      V = Value Line        P = Cost-Efficient Line
U = USB Line       C/K/H/N = LCD Line    T = Touch Line

**Program memory size**
128 = 128 Kbyte
064 = 64 Kbyte
032 = 32 Kbyte
016 = 16 Kbyte

**Package type**
AS = SOP
AD = LQFP
AL = SSOP
AT = TSSOP
AY = QFN (5mm x 5mm)
AZ = QFN (4mm x 4mm)

**Pin count**
80 = 80 pins
64 = 64 pins
48 = 48 pins
32 = 32 pins
20 = 20 pins

# Ordering Information - M0+/M3

MG 32 F 1 0 3 C B T 6

**megawin**

**Device family**
32 = 32 bit MCU

**Application family**
F = Mainstream
L = Low Power

**MCU series**
1 = Arm® Cortex®-M3
0 = Arm® Cortex®-M0+

**Pin count**
V = 100 pins    C = 48 pins    F = 20 pins
R = 64 pins     K = 32 pins

**Flash memory size**
C = 256 Kbyte    9 = 96 Kbyte
B = 128 Kbyte    8 = 64 Kbyte

**Package type**
T = LQFP    P = TSSOP    U = QFN

**Temperature**
6 = -40°C to 85°C
7 = -40°C to 105°C

# Ordering Information - Automotive MCU

MG E Q1 C 064 AD 48

**megawin**

**MCU type**
E = 8 bit
T = 32 bit

**Automotive Grade**
Q = AEC-Q series
1 = Product series

**Temperature**
A = -40°C to 150°C
B = -40°C to 125°C
C = -40°C to 105°C

**Flash memory size**

**Package type**
AD = LQFP
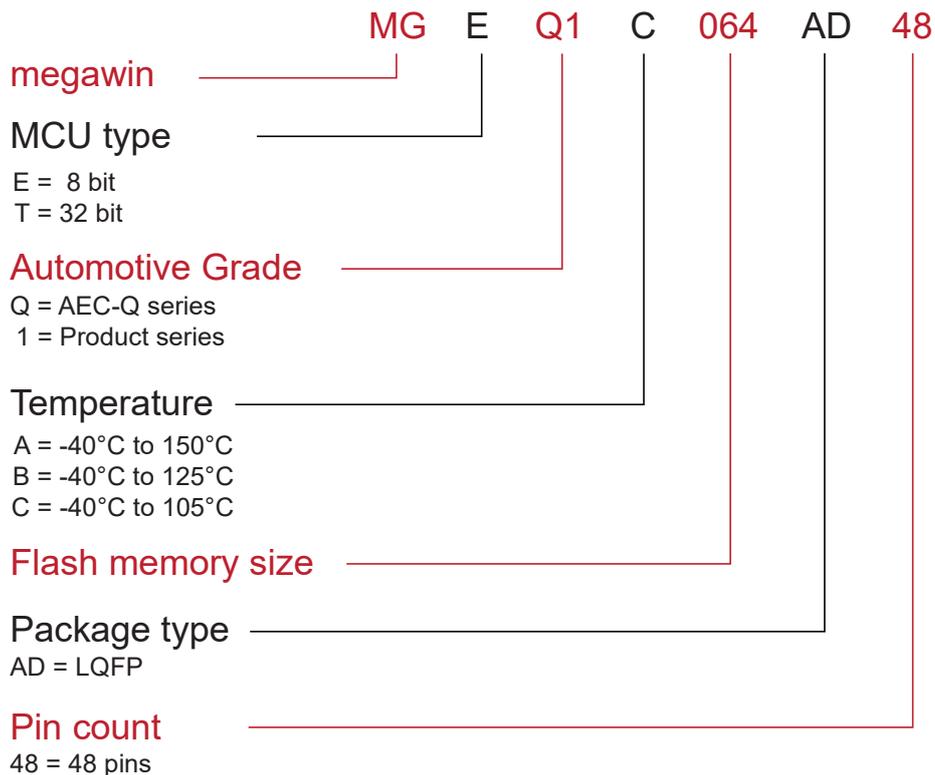
**Pin count**
48 = 48 pins

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