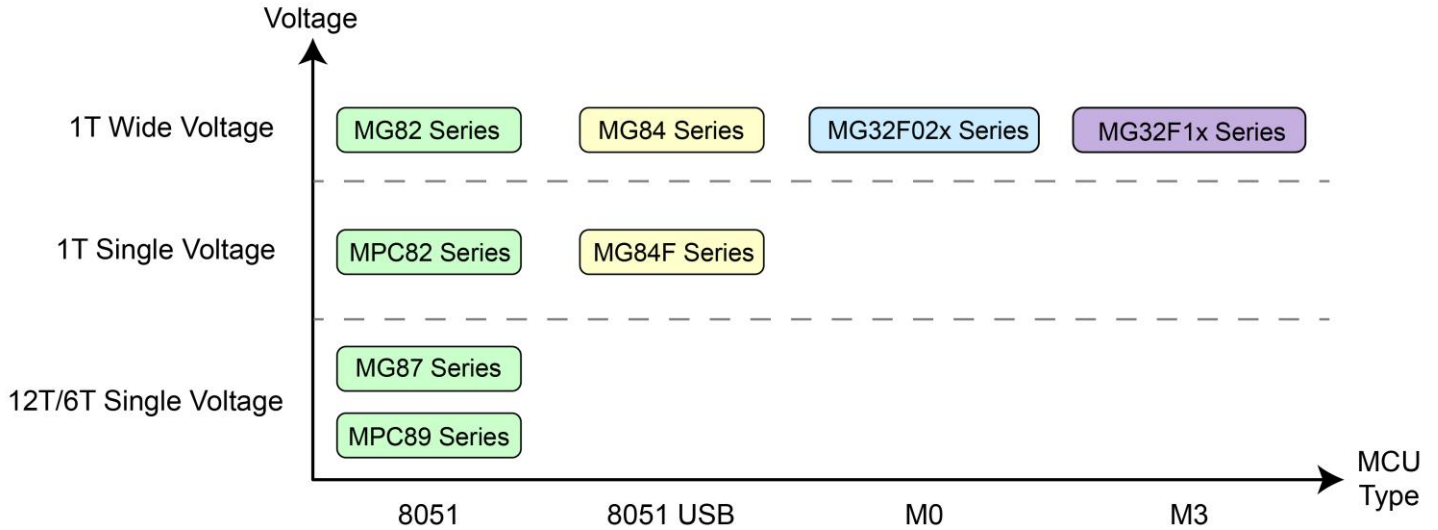
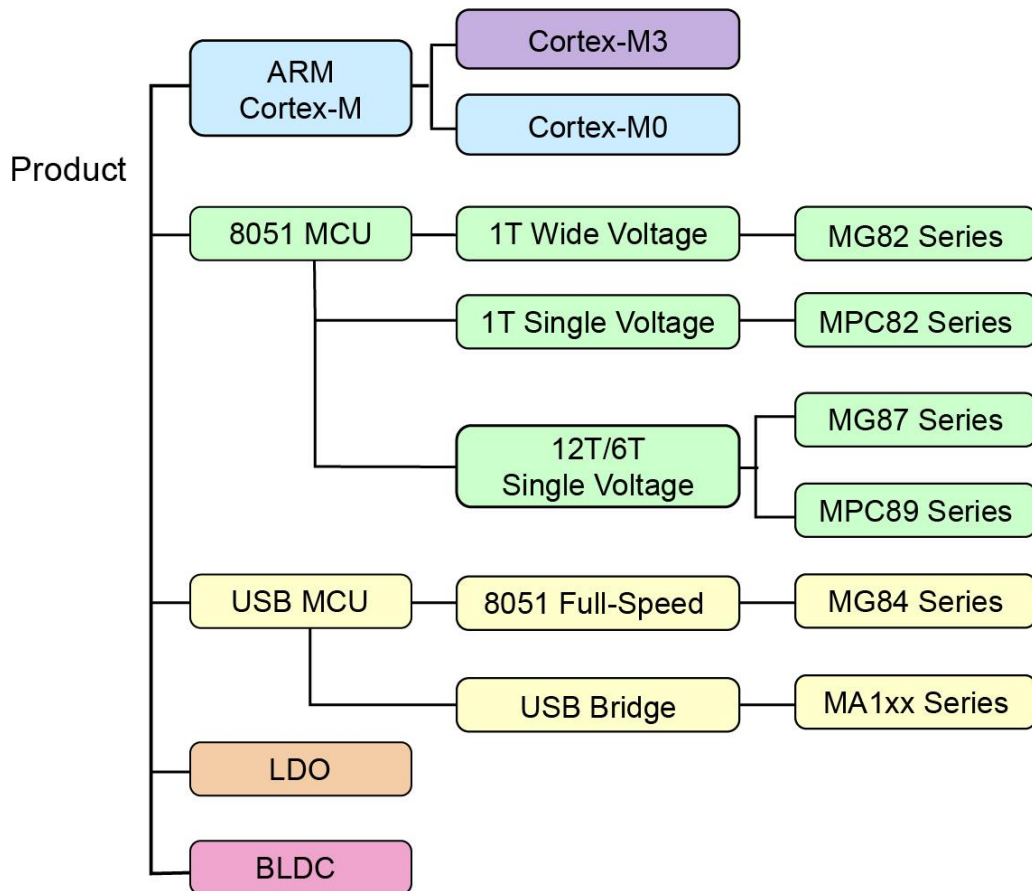


## 2023 Product Selection Guide

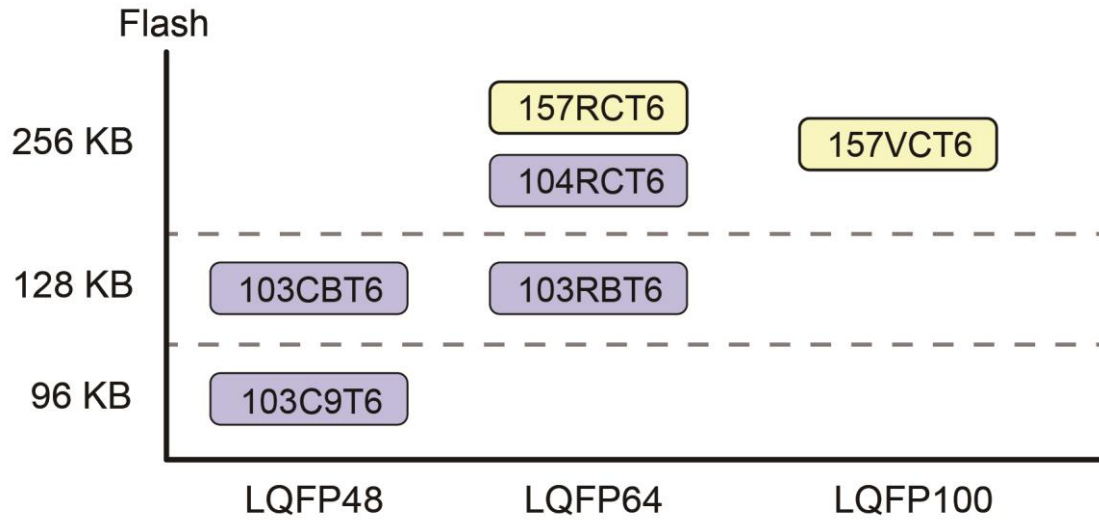
### 8 bit 8051/32 bit Cortex-M0/M3 Flash MCUs



### Product Category

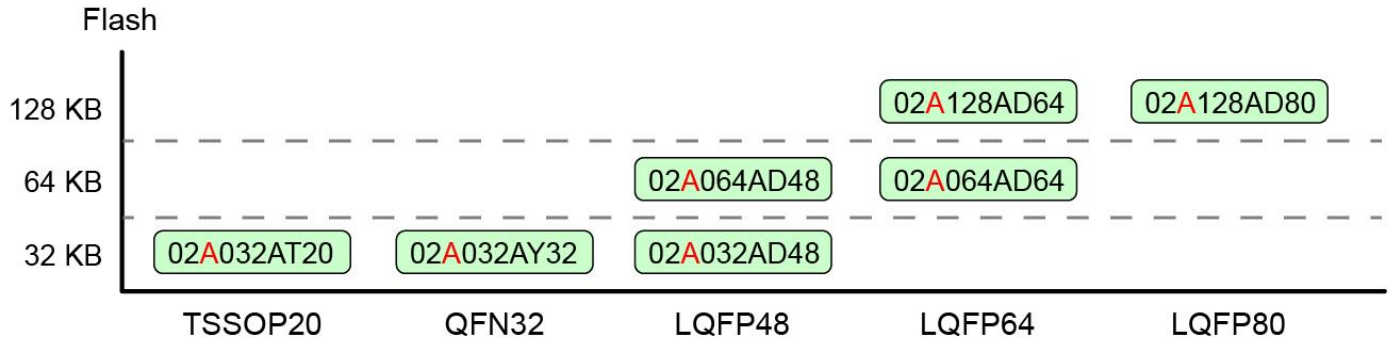


## ARM Cortex-M3 Base Line : MG32F1x Series



| Item         | Vdd     | Flash ROM | Data RAM | Max Freq. | 20-Bit Timer | IO | 12-Bit ADC | Comp. | Features                                                                                   | Package |
|--------------|---------|-----------|----------|-----------|--------------|----|------------|-------|--------------------------------------------------------------------------------------------|---------|
| MG32F103C9T6 | 2V~3.6V | 96KB      | 28 KB    | 72MHz     | 4+RTC        | 37 | 10-CH      | 2     | UARTx3, I <sup>2</sup> C x2, SPI M x1, SPI S x2, QSPI, I <sup>2</sup> S, USB, LED SEG x8   | LQFP48  |
| MG32F103CBT6 | 2V~3.6V | 128KB     | 28 KB    | 72MHz     | 4+RTC        | 37 | 10-CH      | 2     | UARTx3, I <sup>2</sup> C x2, SPI M x1, SPI S x2, QSPI, I <sup>2</sup> S, USB, LED SEG x8   | LQFP48  |
| MG32F103RBT6 | 2V~3.6V | 128KB     | 28 KB    | 72MHz     | 4+RTC        | 51 | 16-CH      | 2     | UARTx3, I <sup>2</sup> C x2, SPI M x1, SPI S x2, QSPI, I <sup>2</sup> S, USB, LED SEG x8   | LQFP64  |
| MG32F104RCT6 | 2V~3.6V | 256KB     | 36 KB    | 96MHz     | 4+RTC        | 51 | 16-CH      | 2     | UARTx3, I <sup>2</sup> C x2, SPI M x1, SPI S x2, QSPI, I <sup>2</sup> S, USB, LED SEG x8   | LQFP64  |
| MG32F157RCT6 | 2V~3.6V | 256KB     | 64 KB    | 96MHz     | 8+RTC        | 51 | 18-CH      | 3     | UARTx5, I <sup>2</sup> C x2, SPIx3, QSPI, CAN, USB, SDIO, ADC x3, CRC, OPA x3, AES, DAC x2 | LQFP64  |
| MG32F157VCT6 | 2V~3.6V | 256KB     | 64 KB    | 96MHz     | 8+RTC        | 80 | 18-CH      | 3     | UARTx5, I <sup>2</sup> C x2, SPIx3, QSPI, CAN, USB, SDIO, ADC x3, CRC, OPA x3, AES, DAC x2 | LQFP100 |

## ARM Cortex-M0 Base Line : MG32F02A Series



| Item                      | Vdd       | Flash ROM | Data RAM | Max. Freq. | Timer | IO       | 12-Bit ADC | Comp. | Features                                                                          | CCP <sup>*4</sup> | ISP/IAP           | Package                    |
|---------------------------|-----------|-----------|----------|------------|-------|----------|------------|-------|-----------------------------------------------------------------------------------|-------------------|-------------------|----------------------------|
| MG32F02A032 <sup>*1</sup> | 1.8V~5.5V | 32KB      | 4096B    | 48MHz      | 5+RTC | 17/29/44 | 12-CH      | 2     | UART <sup>*2</sup> x2, I <sup>2</sup> C, SPI/QPI, PWM, CRC32, DMA                 | 4-CH              | YES <sup>*3</sup> | TSSOP20<br>QFN32<br>LQFP48 |
| MG32F02A064 <sup>*1</sup> | 1.8V~5.5V | 64KB      | 8192B    | 48MHz      | 7+RTC | 44/59    | 16-CH      | 2     | UART <sup>*5</sup> x7, I <sup>2</sup> C x2, SPI <sup>*6</sup> x4, CRC32, DMA, DAC | 8-CH              | YES <sup>*3</sup> | LQFP48<br>LQFP64           |
| MG32F02A128 <sup>*1</sup> | 1.8V~5.5V | 128KB     | 16384B   | 48MHz      | 7+RTC | 59/73    | 16-CH      | 2     | UART <sup>*5</sup> x7, I <sup>2</sup> C x2, SPI <sup>*6</sup> x4, CRC32, DMA, DAC | 8-CH              | YES <sup>*3</sup> | LQFP64<br>LQFP80           |

<sup>\*1</sup> Support M-LINK ICE;

<sup>\*2</sup> All UART support SPI Master;

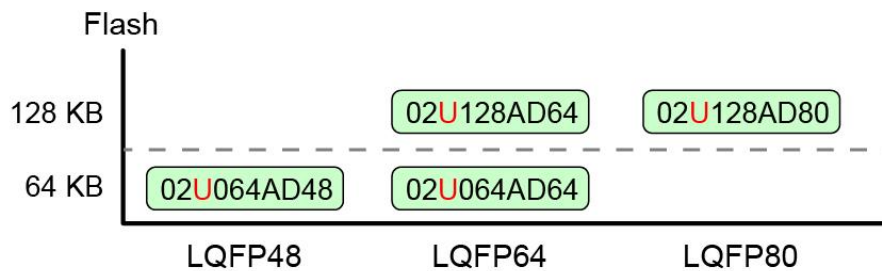
<sup>\*3</sup> Share with all Flash zone;

<sup>\*4</sup> CCP: Input Capture/Output Compare/PWM;

<sup>\*5</sup> Advanced UART x 3: Support SPI Master/Slave(UART 0/1/2 modules);Basic UART x 4:UART only(UART 4/5/7 modules);

<sup>\*6</sup> 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 : MG32F02U Series



| Item                      | Vdd       | Flash ROM | Data RAM | Max. Freq. | Timer | IO    | 12-Bit ADC | Comp. | Features                                                                               | CCP <sup>*3</sup> | ISP/IAP           | Package          |
|---------------------------|-----------|-----------|----------|------------|-------|-------|------------|-------|----------------------------------------------------------------------------------------|-------------------|-------------------|------------------|
| MG32F02U064 <sup>*1</sup> | 1.8V~5.5V | 64KB      | 16384B   | 48MHz      | 7+RTC | 41/56 | 16-CH      | 2     | UART <sup>*4</sup> x7, I <sup>2</sup> C x2, SPI <sup>*5</sup> x4, USB, CRC32, DMA, DAC | 8-CH              | YES <sup>*2</sup> | LQFP48<br>LQFP64 |
| MG32F02U128 <sup>*1</sup> | 1.8V~5.5V | 128KB     | 16384B   | 48MHz      | 7+RTC | 56/70 | 16-CH      | 2     | UART <sup>*4</sup> x7, I <sup>2</sup> C x2, SPI <sup>*5</sup> x4, USB, CRC32, DMA, DAC | 8-CH              | YES <sup>*2</sup> | LQFP64<br>LQFP80 |

<sup>\*1</sup> Support M-LINK ICE;

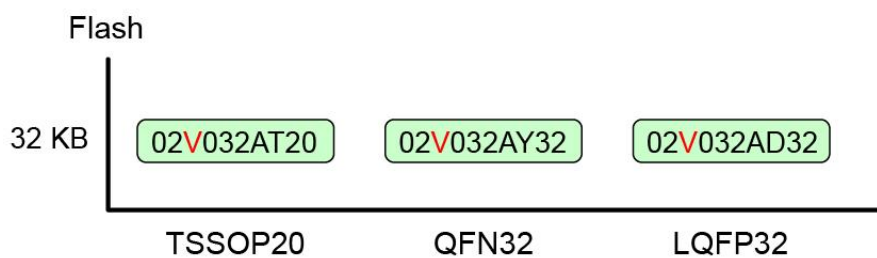
<sup>\*2</sup> Share with all Flash zone;

<sup>\*3</sup> CCP: Input Capture/Output Compare/PWM;

<sup>\*4</sup> Advanced UART x 3: Support SPI Master/Slave(UART 0/1/2 modules);Basic UART x 4:UART only(UART 4/5/7 modules);

<sup>\*5</sup> 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 Value Line : MG32F02V Series



| Item                            | Vdd       | Flash ROM | Data RAM | Max. Freq. | Timer | IO    | 12-Bit ADC | Comp. | Features                                                               | CCP <sup>*4</sup> | ISP/IAP           | Package                    |
|---------------------------------|-----------|-----------|----------|------------|-------|-------|------------|-------|------------------------------------------------------------------------|-------------------|-------------------|----------------------------|
| <b>MG32F02V032<sup>*1</sup></b> | 1.8V~3.6V | 32KB      | 4096B    | 48MHz      | 6+RTC | 17/29 | 8-CH       | NA    | UART <sup>*5</sup> x3, I <sup>2</sup> C x2<br>SPI/QPI, PWM, CRC32, DMA | 6-CH              | YES <sup>*3</sup> | TSSOP20<br>LQFP32<br>QFN32 |

<sup>\*1</sup> Support M-LINK ICE;

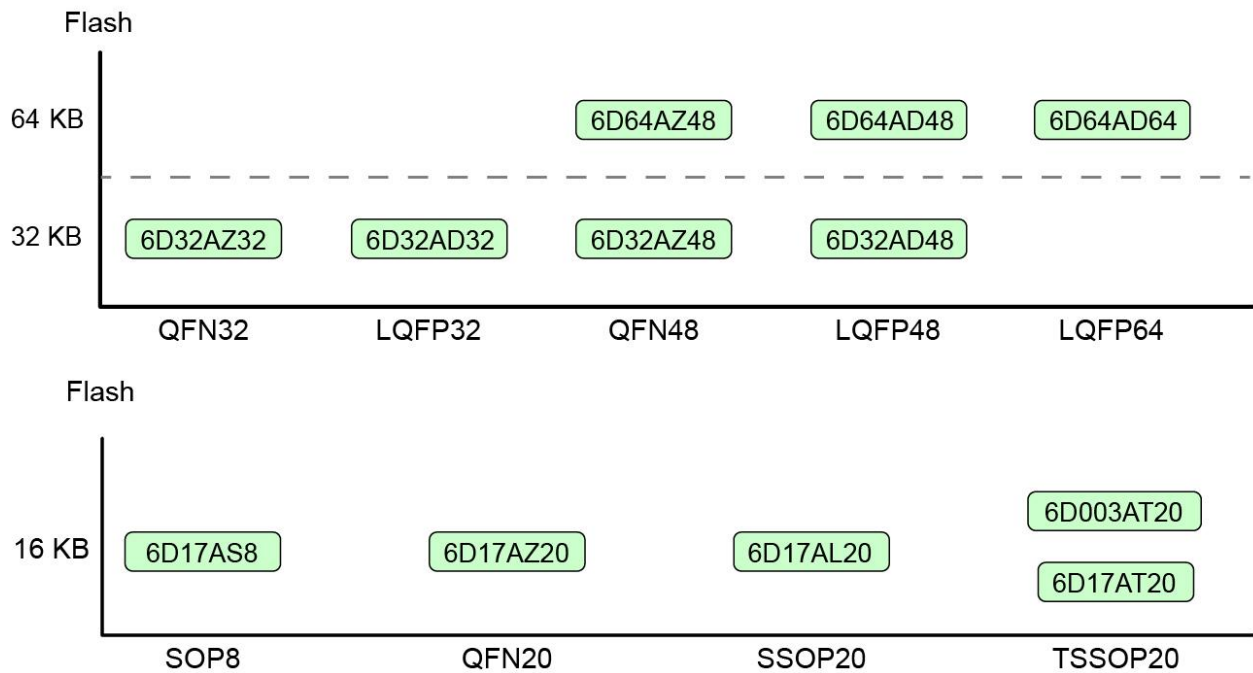
<sup>\*2</sup> All UART support SPI Master/Slave;

<sup>\*3</sup> Share with all Flash zone;

<sup>\*4</sup> CCP: Input Capture/Output Compare/PWM.

<sup>\*5</sup> Advanced UART x 3: Support SPI Master/Slave(UART 0/1/2 modules)

## 1T 8051 Wide Voltage Base Line : MG82F6D Series with 12 Bit ADC



| Item                     | Operating Voltage | Flash ROM | Max. Operation Freq. | Timer (16-Bit) | 12-Bit ADC | Features                                                                        | PCA  | WDT               | ISP                       | Package Type                       |
|--------------------------|-------------------|-----------|----------------------|----------------|------------|---------------------------------------------------------------------------------|------|-------------------|---------------------------|------------------------------------|
|                          |                   | Data RAM  |                      | IO             | ACMP       |                                                                                 | PWM  |                   | IAP                       |                                    |
| MG82F6D003 <sup>*1</sup> | 1.8V~5.5V         | 16KB      | 36MHz <sup>*6</sup>  | 4 + RTC        | 8-CH       | UART <sup>*2</sup> x2 SPI, I <sup>2</sup> C, S/W I <sup>2</sup> C, LIN, CRC16   | 1    | YES <sup>*3</sup> | 7.5KB Max.                | TSSOP20                            |
|                          |                   | 1024B     |                      | 17             | NA         |                                                                                 | 8-CH |                   | 15.5KB Max. <sup>*4</sup> |                                    |
| MG82F6D17 <sup>*1</sup>  | 1.8V~5.5V         | 16KB      | 36MHz <sup>*6</sup>  | 4 + RTC        | 8-CH       | UART <sup>*2</sup> x2 SPI, I <sup>2</sup> C, S/W I <sup>2</sup> C, LIN, CRC16   | 1    | YES <sup>*3</sup> | 7.5KB Max.                | SOP8<br>QFN20<br>SSOP20<br>TSSOP20 |
|                          |                   | 1024B     |                      | 17             | NA         |                                                                                 | 8-CH |                   | 15.5KB Max. <sup>*4</sup> |                                    |
| MG82F6D32 <sup>*1</sup>  | 1.8V~5.5V         | 32KB      | 36MHz <sup>*6</sup>  | 4 + RTC        | 10-CH      | UART <sup>*2</sup> x4 SPI, I <sup>2</sup> C x2 S/W I <sup>2</sup> C, LIN, CRC16 | 1    | YES <sup>*3</sup> | 7.5KB Max.                | QFN32<br>LQFP32<br>QFN48<br>LQFP48 |
|                          |                   | 2048B     |                      | 44             | 2          |                                                                                 | 8-CH |                   | 31.5KB Max. <sup>*4</sup> |                                    |
| MG82F6D64 <sup>*1</sup>  | 1.8V~5.5V         | 64KB      | 36MHz <sup>*6</sup>  | 5 + RTC        | 16-CH      | UART <sup>*2</sup> x4 SPI, I <sup>2</sup> C x2 S/W I <sup>2</sup> C, LIN, CRC16 | 1    | YES <sup>*3</sup> | 7.5KB Max.                | QFN48<br>LQFP48<br>LQFP64          |
|                          |                   | 4096B     |                      | 59             | 3          |                                                                                 | 8-CH |                   | 63.5KB Max. <sup>*4</sup> |                                    |

Support Code Protection

<sup>\*1</sup> Support OCD ICE, except sop8;

<sup>\*2</sup> Support SPI Master Mode;

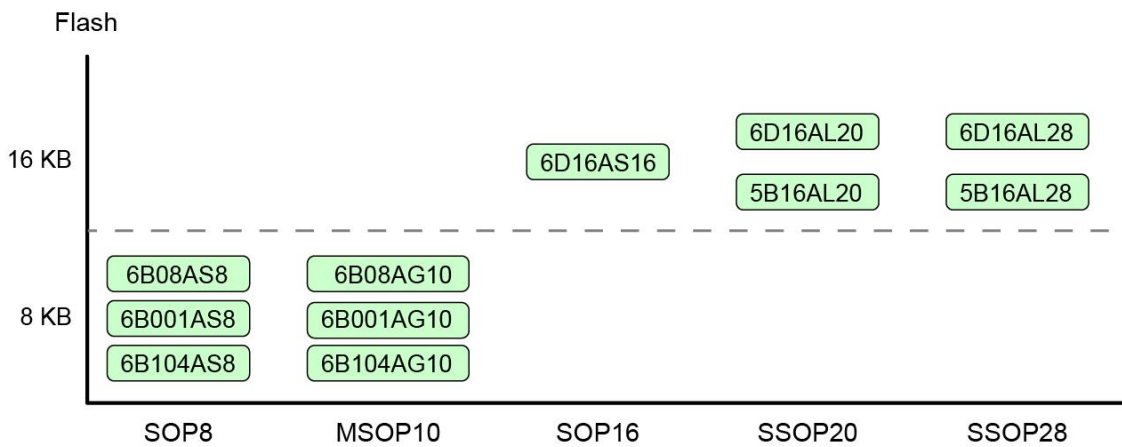
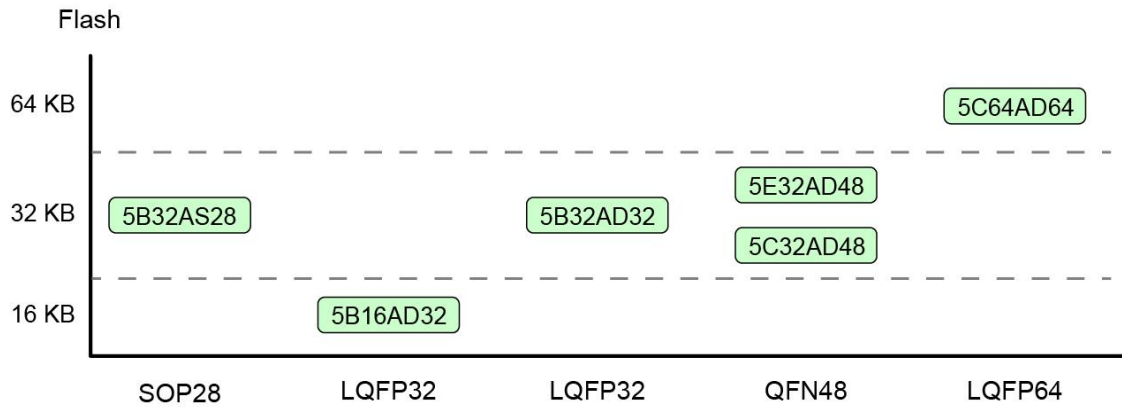
<sup>\*3</sup> Support Watch Mode;

<sup>\*4</sup> Support S/W setting;

<sup>\*5</sup> Used internal RC oscillator 11.059MHz as default. Frequency deviation: at 25°C, under ±1%; at -40°C ~85°C, under ±1.5%; at -40°C ~125°C, under ±2%;

<sup>\*6</sup> 12MHz and 11.059MHz as internal RC oscillator, used 12MHz as default. Frequency deviation: at 25°C, under ±1%; at -40°C ~105°C, under ±2%.

## 1T 8051 Wide Voltage Base Line : MG82FG5x/6x Series with 10 Bit ADC



| Item                     | Operating Voltage | Flash ROM | Max. Operation Freq. | Timer (16-Bit) | 10-Bit ADC         | Features                                                                           | PCA   | WDT               | ISP                           | Package Type     |
|--------------------------|-------------------|-----------|----------------------|----------------|--------------------|------------------------------------------------------------------------------------|-------|-------------------|-------------------------------|------------------|
|                          |                   | Data RAM  |                      | IO             | ACMP               |                                                                                    | PWM   |                   | IAP                           |                  |
| MG82F6B08 <sup>*1</sup>  | 2.4V~5.5V         | 8KB       | 16MHz <sup>*6</sup>  | 3 + RTC        | 6-CH               | UART <sup>*2</sup> , SPI, LIN<br>S/W I <sup>2</sup> C, I <sup>2</sup> C, CRC16     | 1     | YES <sup>*3</sup> | 3.5KB Max.                    | SOP8<br>MSOP10   |
| MG82F6B001 <sup>*1</sup> |                   | 1024B     |                      | 6/8            | 1                  |                                                                                    | 4-CH  |                   | EEPROM 512B<br>IAP Default NA |                  |
| MG82F6B104 <sup>*1</sup> |                   | 1024B     |                      |                |                    |                                                                                    |       |                   |                               |                  |
| MG82FG5B16 <sup>*1</sup> | 1.8V~5.5V         | 16KB      | 25MHz <sup>*5</sup>  | 3 + RTC        | 8-CH               | UART <sup>*2</sup> x2, SPI, 7816, LIN<br>S/W I <sup>2</sup> C, I <sup>2</sup> C x2 | 1     | YES <sup>*3</sup> | 4KB Max.                      | SSOP20           |
|                          |                   | 1024B     |                      | 17/25/29       | NA                 |                                                                                    | 8-CH  |                   | 15.5KB Max. <sup>*4</sup>     | SSOP28<br>LQFP32 |
| MG82F6D16 <sup>*1</sup>  | 1.8V~5.5V         | 16KB      | 32MHz <sup>*5</sup>  | 3 + RTC        | 8-CH               | UART <sup>*2</sup> , SPI, LIN<br>I <sup>2</sup> C, S/W I <sup>2</sup> C, CRC16     | 1     | YES <sup>*3</sup> | 7.5KB Max.                    | SOP16            |
|                          |                   | 1024B     |                      | 25             | 1                  |                                                                                    | 6-CH  |                   | 15.5KB Max. <sup>*4</sup>     | SSOP20<br>SSOP28 |
| MG82F5B32 <sup>*1</sup>  | 1.8V~5.5V         | 32KB      | 32MHz                | 3 + RTC        | 8-CH <sup>*7</sup> | UART <sup>*2</sup> x2, SPI<br>7816, LIN, I <sup>2</sup> C                          | 1     | YES <sup>*3</sup> | 4KB Max.                      | SOP28            |
|                          |                   | 2048B     |                      | 17/25/29       | NA                 |                                                                                    | 8-CH  |                   | 31.5KB Max. <sup>*4</sup>     | LQFP32           |
| MG82FG5C32 <sup>*1</sup> | 1.8V~5.5V         | 32KB      | 32MHz <sup>*5</sup>  | 5 + RTC        | 16-CH              | UART <sup>*2</sup> x4, SPI/QPI<br>I <sup>2</sup> C x 2, LIN, 7816 x 3              | 2     | YES <sup>*3</sup> | 7.5KB Max.                    | LQFP48           |
|                          |                   | 2048B     |                      | 44/59          | 3                  |                                                                                    | 12-CH |                   | 31.5KB Max. <sup>*4</sup>     |                  |
| MG82FG5C64 <sup>*1</sup> | 1.8V~5.5V         | 64KB      | 32MHz <sup>*5</sup>  | 5 + RTC        | 16-CH              | UART <sup>*2</sup> x4, SPI/QPI<br>I <sup>2</sup> C x 2, LIN, 7816 x 3              | 2     | YES <sup>*3</sup> | 7.5KB Max.                    | LQFP64           |
|                          |                   | 4096B     |                      | 59             | 3                  |                                                                                    | 12-CH |                   | 63.5KB Max. <sup>*4</sup>     |                  |
| MG82G5E32 <sup>*1</sup>  | 1.8V~5.5V         | 32KB      | 32MHz <sup>*5</sup>  | 4 + RTC        | 8-CH               | UART <sup>*2</sup> x2, SPI, I <sup>2</sup> C<br>S/W I <sup>2</sup> C, CRC16        | 1     | YES <sup>*3</sup> | 7.5KB Max.                    | LQFP48           |
|                          |                   | 2048B     |                      | 44             | 2                  |                                                                                    | 8-CH  |                   | 31.5KB Max. <sup>*4</sup>     |                  |

Support Code Protection;<sup>\*1</sup> Support OCD ICE, except sop8;<sup>\*2</sup> Support SPI Master Mode;

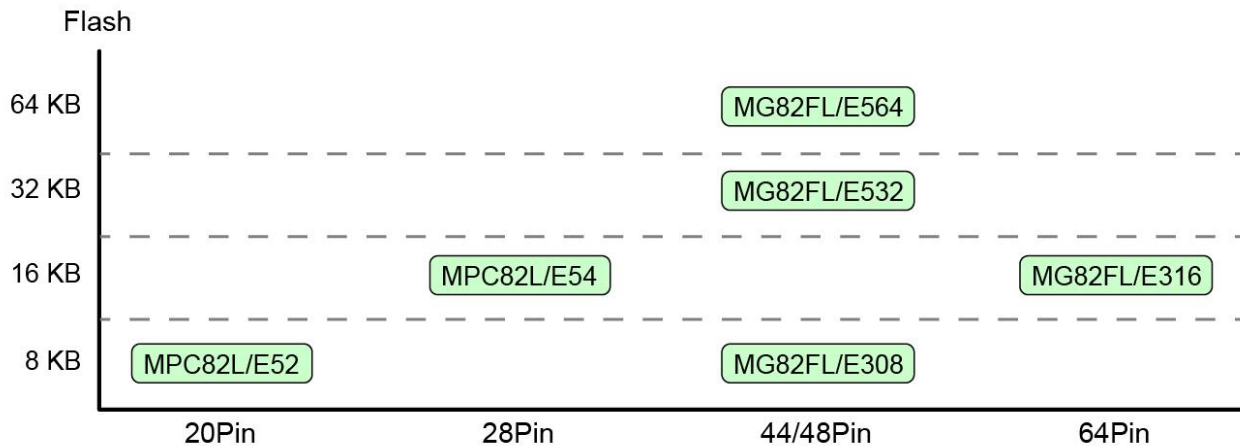
<sup>\*3</sup> Support Watch Mode;<sup>\*4</sup> Support S/W setting;

<sup>\*5</sup> 12MHz and 11.059MHz as internal RC oscillator, used 12MHz as default. Frequency deviation: at 25°C, under ±1%; at -40°C~85°C, under ±2%;

<sup>\*6</sup> 16MHz is internal RC oscillator. Frequency deviation: at 25°C, under ±1%; at -40°C~85°C, under ±4.5%;

<sup>\*7</sup> Factory default 10 Bit, 200Kbps; Program adjustment 12Bit, 400Kbps.

## 1T 8051 Single Voltage MCU : MPC82/MG82F Series



### MPC82/MG82F Series (1T)

| Item                      | Operating Voltage | Flash ROM | Max. Operation Freq. | Timer (16-Bit) | ADC          | Comm.         | PCA  | WDT               | Code Protection | ISP                       | Package Type               |
|---------------------------|-------------------|-----------|----------------------|----------------|--------------|---------------|------|-------------------|-----------------|---------------------------|----------------------------|
|                           |                   | Data RAM  |                      | IO             | ACMP         |               | PWM  |                   |                 | IAP                       |                            |
| MPC82L/E52                | L:2.4V~3.6V       | 8KB       | 25MHz                | 2              | 8-Bit, 8-CH  | UART, SPI     | 1    | YES               | YES             | 3KB Max.                  | PDIP20<br>SOP20<br>TSSOP20 |
|                           | E:4.5V~5.5V       | 256B      |                      | 15             | NA           |               | 2-CH |                   |                 | 7.5KB Max.                |                            |
| MPC82L/E54                | L:2.4V~3.6V       | 15.5KB    | 25MHz                | 2              | 10-Bit, 8-CH | UART, SPI     | 1    | YES               | YES             | 3.5KB Max.                | PDIP28<br>SOP28<br>SSOP28  |
|                           | E:4.5V~5.5V       | 512B      |                      | 23             | NA           |               | 4-CH |                   |                 | 15KB Max.                 |                            |
| MG82FL/E532 <sup>*1</sup> | L:2.4V~3.6V       | 32KB      | 24MHz <sup>*2</sup>  | 3              | 10-Bit, 8-CH | UART x 2, SPI | 1    | YES <sup>*4</sup> | YES             | 4KB Max.                  | LQFP44<br>LQFP48           |
|                           | E:4.5V~5.5V       | 1280B     |                      | 45             | NA           |               | 6-CH |                   |                 | 32KB Max. <sup>*5</sup>   |                            |
| MG82FL/E564 <sup>*1</sup> | L:2.4V~3.6V       | 64KB      | 24MHz <sup>*2</sup>  | 3              | 10-Bit, 8-CH | UART x 2, SPI | 1    | YES <sup>*4</sup> | YES             | 4KB Max.                  | LQFP44<br>LQFP48           |
|                           | E:4.5V~5.5V       | 1280B     |                      | 45             | NA           |               | 6-CH |                   |                 | 63.5KB Max. <sup>*5</sup> |                            |
| MG82FL/E308               | L:2.4V~3.6V       | 8KB       | 24MHz <sup>*3</sup>  | 3              | NA           | UART          | NA   | YES               | YES             | 4KB Max.                  | LQFP48                     |
|                           | E:4.5V~5.5V       | 512B      |                      | 45             | 1            |               | 1-CH |                   |                 | 8KB Max. <sup>*5</sup>    |                            |
| MG82FL/E316               | L:2.4V~3.6V       | 16KB      | 24MHz <sup>*3</sup>  | 3              | NA           | UART          | NA   | YES               | YES             | 4KB Max.                  | LQFP64                     |
|                           | E:4.5V~5.5V       | 512B      |                      | 57             | 1            |               | 1-CH |                   |                 | 15.5KB Max. <sup>*5</sup> |                            |

<sup>\*1</sup> Support OCD ICE;

<sup>\*2</sup> Used internal RC oscillator 22.118MHz as default. Frequency deviation: at 25℃, under ±1%; at -20℃~50℃, under ±2%; at -40℃~85℃, under ±4%;

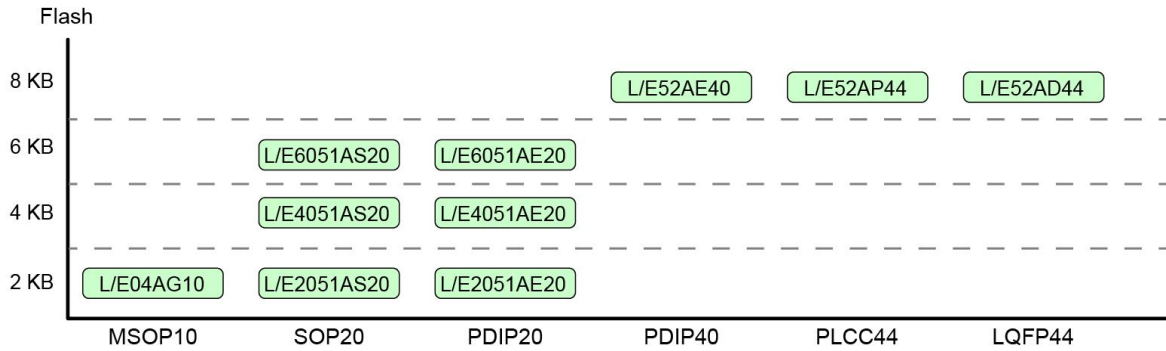
<sup>\*3</sup> Internal RC oscillator 12MHz as default. Frequency deviation: at 25℃, under ±1%; at -20℃~50℃, under ±2%; at -40℃~85℃, under ±4%;

<sup>\*4</sup> Support Watch Mode;

<sup>\*5</sup> Support S/W setting.



## 12T/6T 8051 Single Voltage with Internal RC Oscillator MCU : MG87 Series

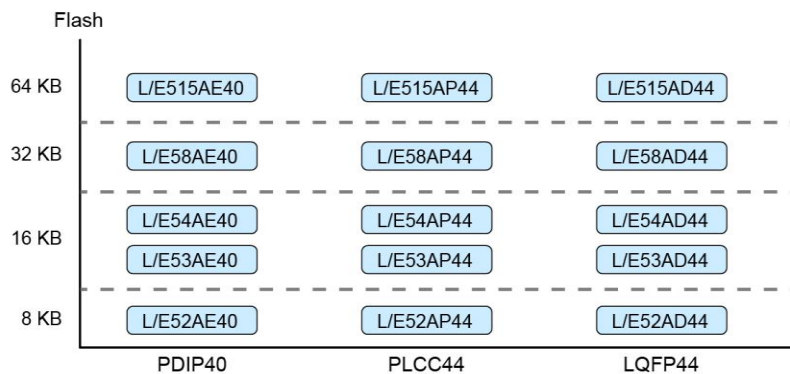


| Item          | Operating Voltage          | Flash ROM | Max. Operation Freq.      | Timer (16-Bit) | ACMP | Comm. | PCA  | WDT | ISP         | Package Type               |
|---------------|----------------------------|-----------|---------------------------|----------------|------|-------|------|-----|-------------|----------------------------|
|               |                            | Data RAM  |                           | IO             |      |       | PWM  |     | IAP         |                            |
| MG87FL/E52*   | L:2.4V~3.6V<br>E:4.5V~5.5V | 8KB       | 48MHz @ 12T<br>24MHz @ 6T | 3              | NA   | UART  | NA   | YES | 3.5KB Max.  | PDIP40<br>PLCC44<br>LQFP44 |
|               |                            | 256B      |                           | 32/36          |      |       | NA   |     | S/W setting |                            |
| MG87FL/E2051* | L:2.4V~3.6V<br>E:4.5V~5.5V | 2KB       | 48MHz @ 12T<br>24MHz @ 6T | 2              | 1    | UART  | NA   | YES | 3.5KB Max.  | PDIP20<br>SOP20            |
|               |                            | 256B      |                           | 17             |      |       | 1-CH |     | S/W setting |                            |
| MG87FL/E4051* | L:2.4V~3.6V<br>E:4.5V~5.5V | 4KB       | 48MHz @ 12T<br>24MHz @ 6T | 2              | 1    | UART  | NA   | YES | 3.5KB Max.  | PDIP20<br>SOP20            |
|               |                            | 256B      |                           | 17             |      |       | 1-CH |     | S/W setting |                            |
| MG87FL/E6051* | L:2.4V~3.6V<br>E:4.5V~5.5V | 6KB       | 48MHz @ 12T<br>24MHz @ 6T | 2              | 1    | UART  | NA   | YES | 3.5KB Max.  | PDIP20<br>SOP20            |
|               |                            | 256B      |                           | 17             |      |       | 1-CH |     | S/W setting |                            |
| MG87FL/E04    | L:2.4V~3.6V<br>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

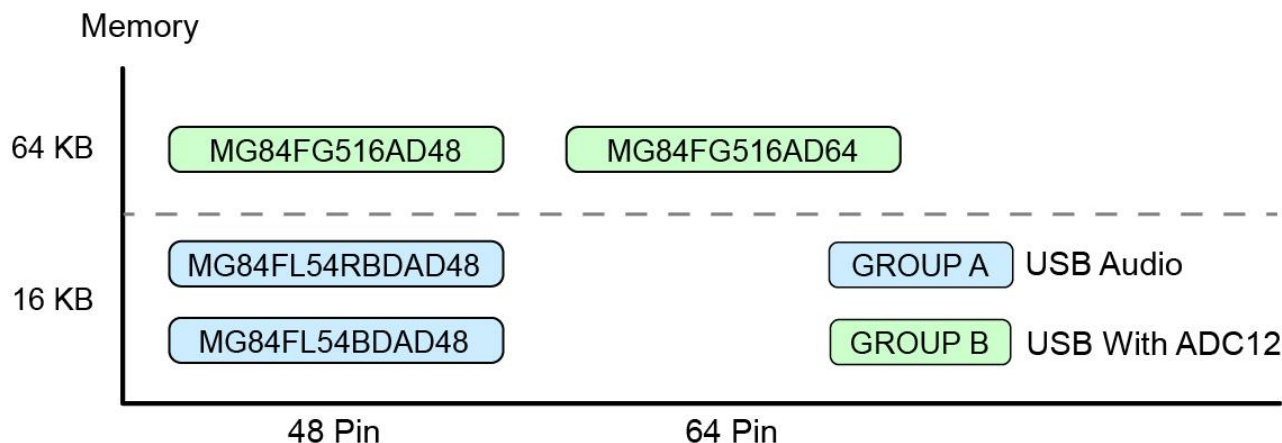
\* Built-in internal RC oscillator with  $\pm 1\%$  frequency deviation at 25°C. And there are 6 kinds of frequency selectable: 6M/11.059M/12M/22.118M/24M/24.576MHz.

## 12T/6T 8051 Single Voltage without Internal RC Oscillator MCU : MPC89 Series



| Item        | Operating Voltage          | Flash ROM | Max. Operation Freq.      | Timer (16-Bit) | ACMP | Comm. | PCA | WDT | Code Protection | ISP       | Package Type               |
|-------------|----------------------------|-----------|---------------------------|----------------|------|-------|-----|-----|-----------------|-----------|----------------------------|
|             |                            | Data RAM  |                           | IO             |      |       | PWM |     |                 | IAP       |                            |
| MPC89L/E52  | L:2.4V~3.6V<br>E:4.5V~5.5V | 8KB       | 48MHz @ 12T<br>24MHz @ 6T | 3              | NA   | UART  | NA  | YES | YES             | 4KB Max.  | PDIP40<br>PLCC44<br>LQFP44 |
|             |                            | 512B      |                           | 32/36          |      |       | NA  |     |                 | 6KB Max.  |                            |
| MPC89L/E53  | L:2.4V~3.6V<br>E:4.5V~5.5V | 15KB      | 48MHz @ 12T<br>24MHz @ 6T | 3              | NA   | UART  | NA  | YES | YES             | 4KB Max.  | PDIP40<br>PLCC44<br>LQFP44 |
|             |                            | 512B      |                           | 32/36          |      |       | NA  |     |                 | NA        |                            |
| MPC89L/E54  | L:2.4V~3.6V<br>E:4.5V~5.5V | 16KB      | 48MHz @ 12T<br>24MHz @ 6T | 3              | NA   | UART  | NA  | YES | YES             | 4KB Max.  | PDIP40<br>PLCC44<br>LQFP44 |
|             |                            | 1280B     |                           | 32/36          |      |       | NA  |     |                 | 46KB Max. |                            |
| MPC89L/E58  | L:2.4V~3.6V<br>E:4.5V~5.5V | 32KB      | 48MHz @ 12T<br>24MHz @ 6T | 3              | NA   | UART  | NA  | YES | YES             | 4KB Max.  | PDIP40<br>PLCC44<br>LQFP44 |
|             |                            | 1280B     |                           | 32/36          |      |       | NA  |     |                 | 30KB Max. |                            |
| MPC89L/E515 | L:2.4V~3.6V<br>E:4.5V~5.5V | 63KB      | 48MHz @ 12T<br>24MHz @ 6T | 3              | NA   | UART  | NA  | YES | YES             | 4KB Max.  | PDIP40<br>PLCC44<br>LQFP44 |
|             |                            | 1280B     |                           | 32/36          |      |       | NA  |     |                 | NA        |                            |





### MG84 Series (USB FS)

| Item                    | Operating Voltage | Flash ROM | Max. Operation Freq. | Timer (16-Bit) |              | Comm.                                   | PCA  | WDT               | End Points | ISP                       | Package Type |
|-------------------------|-------------------|-----------|----------------------|----------------|--------------|-----------------------------------------|------|-------------------|------------|---------------------------|--------------|
|                         |                   | Data RAM  |                      | IO             | ACMP         |                                         | PWM  |                   |            | IAP                       |              |
| MG84FL54BD              | 2.7V~3.6V         | 16KB      | 24MHz                | 3              | NA           | USB, UART, TWI(I <sup>2</sup> C), 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(I <sup>2</sup> C), SPI   | NA   | NA                | 6          | 4KB Max.                  | LQFP48       |
|                         |                   | 256B      |                      | 31             | NA           |                                         | NA   |                   |            | 15KB Max.                 |              |
| MG84FG516 <sup>*1</sup> | 2.0V~5.5V         | 64KB      | 32MHz <sup>*2</sup>  | 4              | 12-Bit, 8-CH | USB, UARTx2, TWI(I <sup>2</sup> C), SPI | 1    | YES <sup>*4</sup> | 11         | 4KB Max.                  | LQFP48       |
|                         |                   | 4352B     |                      | 41/55          | NA           |                                         | 6-CH |                   |            | 63.5KB Max. <sup>*5</sup> | LQFP64       |

<sup>\*1</sup> Support OCD ICE;

<sup>\*2</sup> Used internal RC oscillator 12MHz as default. Frequency deviation: at 25°C, under ±1%; at -40°C~85°C, under ±2%; at USB activated, under ±0.25%;

<sup>\*3</sup> Support SPI Master Mode;

<sup>\*4</sup> Support Watch Mode;

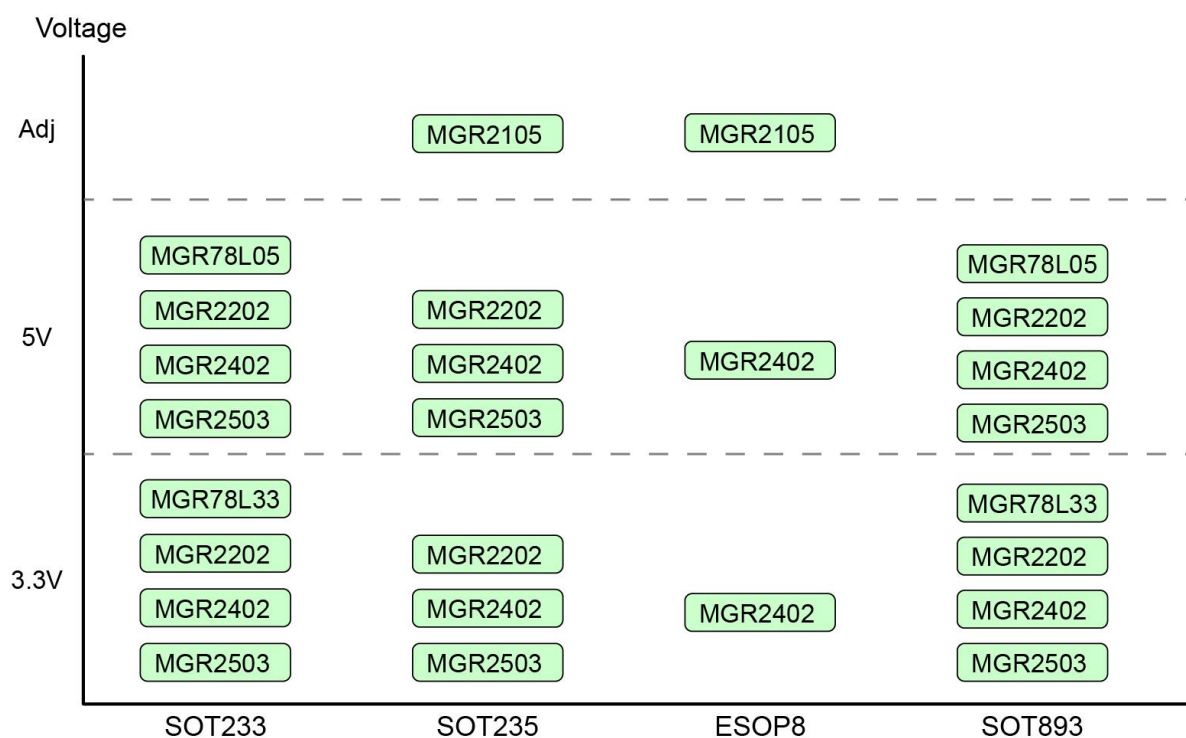
<sup>\*5</sup> Support S/W setting.

### MA1xx Series USB Bridge

| Item  | Operating Voltage | USB Speed                | Function                                               | Features                                             | Driver | Package Type |
|-------|-------------------|--------------------------|--------------------------------------------------------|------------------------------------------------------|--------|--------------|
| MA111 | 2.4V~5.5V         | Full Speed <sup>*1</sup> | USB HID to Serial Bridge                               | UART, SPI Master, TWI(I <sup>2</sup> C) Master, GPIO | FREE   | SOP16, QFN16 |
| MA112 | 3.0V~5.5V         | Full Speed <sup>*1</sup> | USB to UART Data Bridge<br>MS Windows Driver Supported | Virtual COM (TXD/RXD)                                | OS     | SOP16, QFN16 |

<sup>\*1</sup> Built-in internal RC oscillator 12MHz as default. Frequency deviation: at 25°C, under ±1%; at -40°C~85°C, under ±4%, USB online mode under ±0.25%.

## LDO Product

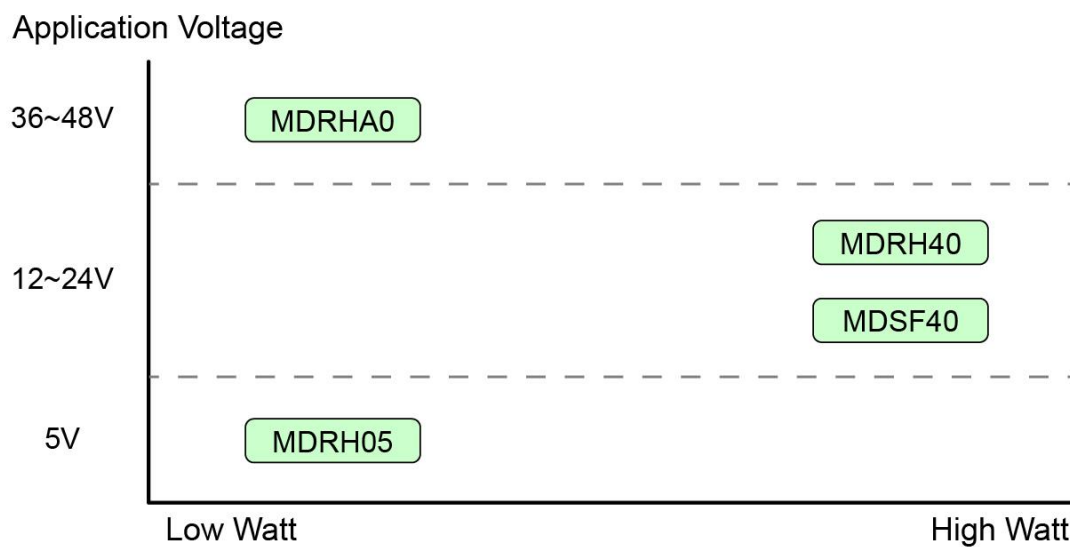


| Item                 | Min.<br>V <sub>IN</sub> (V) | Max.<br>V <sub>IN</sub> (V) | I <sub>OUT</sub><br>(mA) | V <sub>OUT</sub><br>(V) | I <sub>Q</sub><br>(μA) | R <sub>ON</sub><br>(Ω) | ΔV <sub>LINE</sub><br>(%/V) | ΔV <sub>LOAD</sub><br>(mV) | PSRR<br>@1kHz(dB) | C <sub>OUT</sub><br>(μF) | EN | Package                             |
|----------------------|-----------------------------|-----------------------------|--------------------------|-------------------------|------------------------|------------------------|-----------------------------|----------------------------|-------------------|--------------------------|----|-------------------------------------|
| MGR78L33<br>MGR78L05 | V <sub>OUT</sub> +2         | 30                          | 100                      | 3.3/5                   | 300                    | ~20                    | 5                           | 20                         | > 80              | 0.1                      | N  | SOT233<br>SOT893                    |
| MGR2105              | 7                           | 100                         | 50                       | Adj                     | 35                     | ~50                    | 3mV                         | 20                         | 65                | 10                       | Y  | SOT235<br>ESOP8                     |
| MGR2202              | 2.7                         | 24                          | 150                      | 3.3/5                   | 1.52                   | < 5                    | 0.01                        | 45                         | > 80              | 1                        | N  | SOT233<br>SOT235<br>SOT893          |
| MGR2402              | 2.7                         | 40                          | 250                      | 3.3/5                   | 1.2                    | 4                      | 0.01                        | 15                         | > 80              | 1                        | Y  | SOT233<br>SOT235<br>SOT893<br>ESOP8 |
| MGR2503              | 2.5                         | 5.5                         | 300                      | 3.3/5                   | 0.5                    | 1.33                   | 0.1/0.3                     | 12/30<br>(1 to 150mA)      | 55-60             | 1                        | Y  | SOT233<br>SOT235<br>SOT893          |

## Package Type-LDO

| Code | Description | Code | Description |
|------|-------------|------|-------------|
| G    | SOT         | V    | 23-3        |
| S    | ESOP        | B    | 23-5        |
|      |             | X    | 89-3        |
|      |             | 8    | 8           |

## BLDC Product

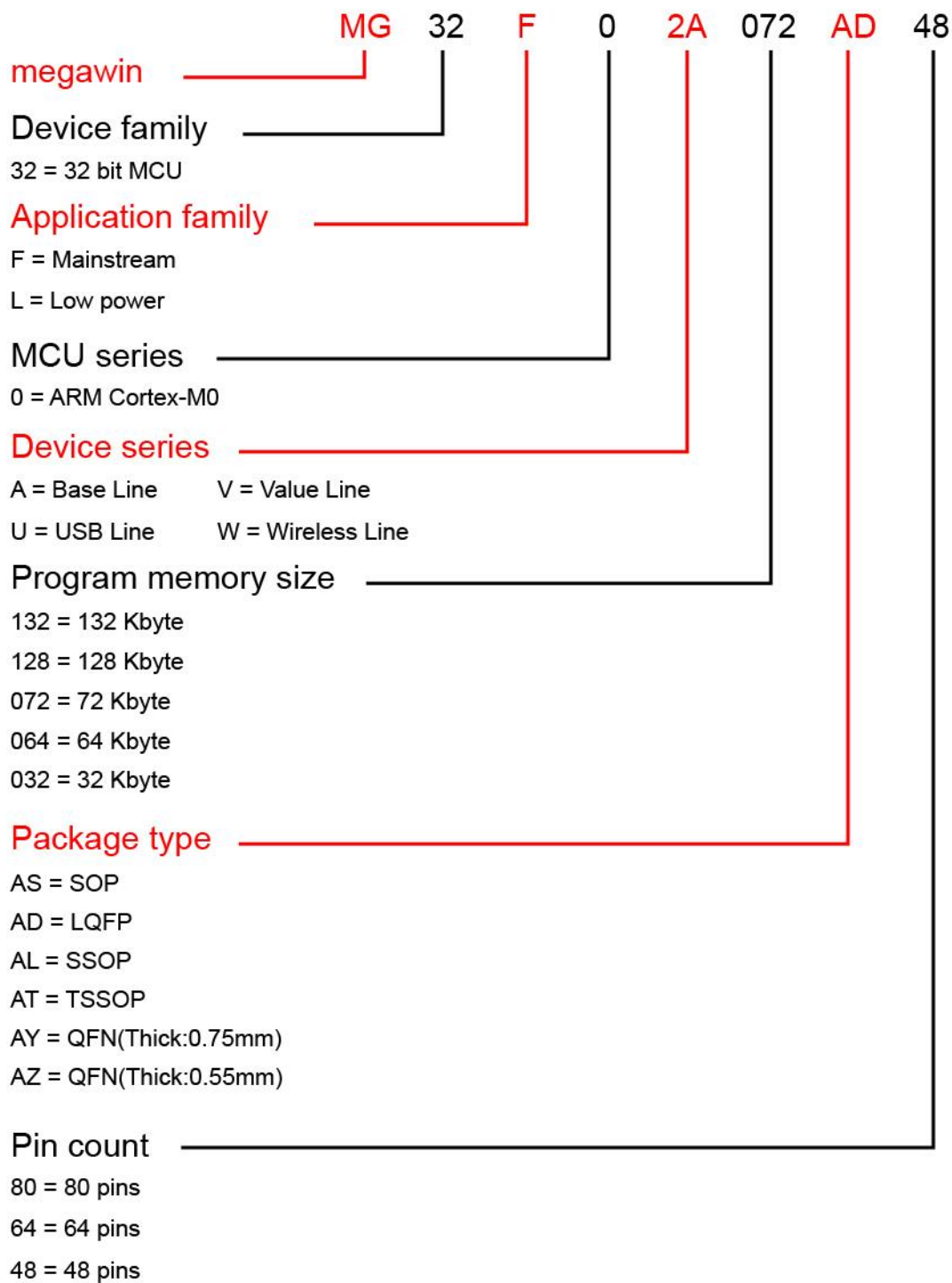


| Item          | Function                                     | eFlash | VIN   | ADC  | Package          |
|---------------|----------------------------------------------|--------|-------|------|------------------|
| <b>MDRH05</b> | 5V MCU(work w/external driver or IPM)        | 8KB    | 5V    | 8-CH | SSOP28           |
| <b>MDRH40</b> | Built-in 40V Gate Driver (P+N) + 5V LDO,VCC  | 8KB    | 40/5V | 4-CH | SSOP28W<br>QFN32 |
| <b>MDRHA0</b> | Built-in 100V Gate Driver (N+N) + 5V LDO,VCC | 8KB    | 15/5V | 4-CH | LQFP48           |
| <b>MDSF40</b> | Built-in 40V Gate Driver (P+N) + 5V LDO,VCC  | 16KB   | 40/5V | 8-CH | LQFP48           |

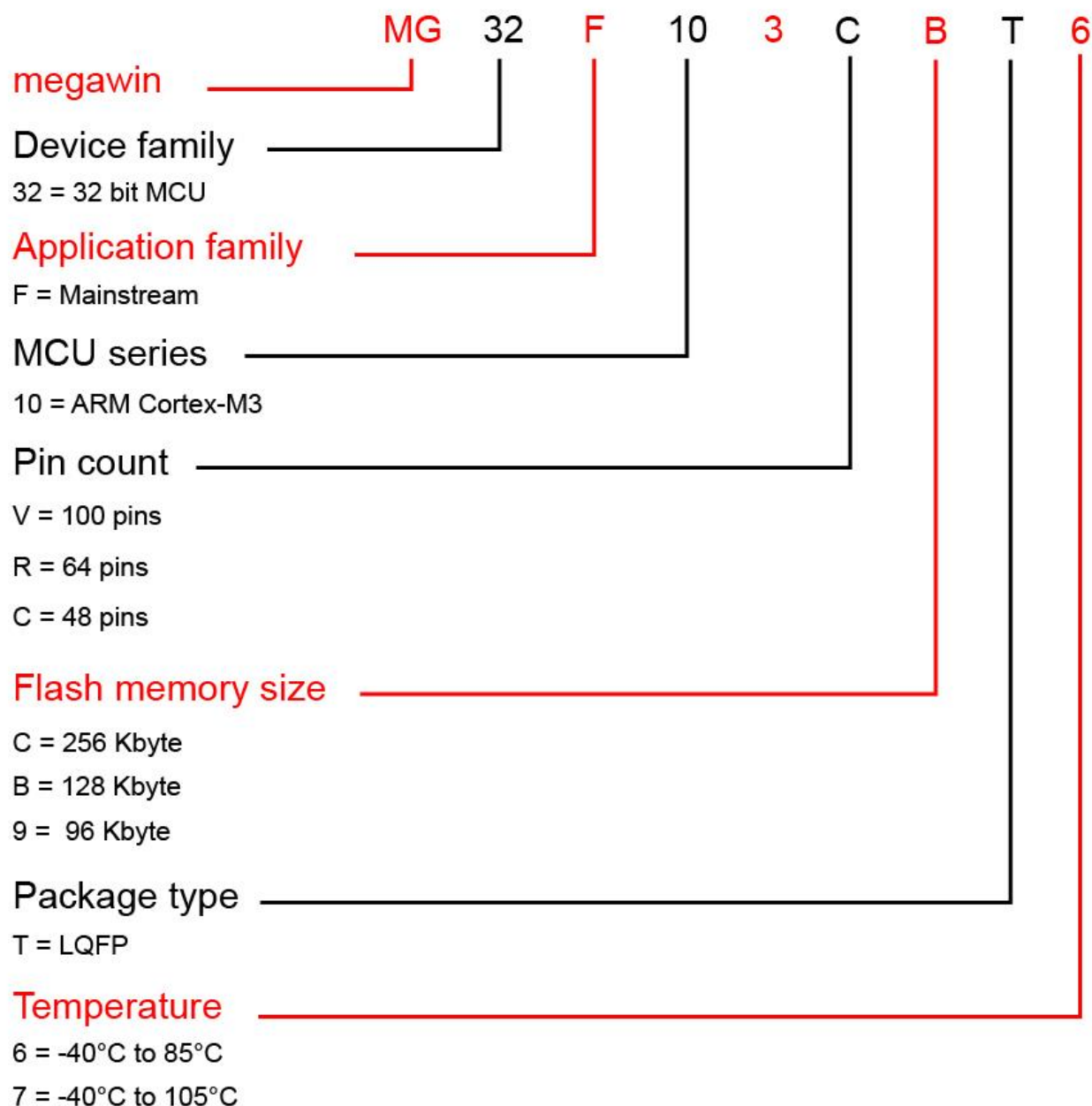
## Package Type

| 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(Thick:0.75mm) |
| HS   | SOP         | AK   | TOxxx             | AZ   | QFN(Thick:0.55mm) |
| AR   | SOT         | AI   | Ink die           | AN   | DFN               |
| AW   | Wafer       |      |                   | AH   | DICE              |

## Ordering Information



## Ordering Information-M3



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