STM32G0 MCU Series
Efficiency at its Best
# Key Messages of STM32G0 Series

1. **Efficient**
   - Arm® Cortex®-M0+ at 64 MHz
   - Compact cost: maximum I/Os count
   - Best RAM/Flash Ratio
   - Smallest possible package down to 8-pin
   - Very low power consumption (3 µA in stop, <100µA/MHZ in Run)
   - Accurate internal high-speed clock 1% RC
   - Best optimization, down to each and every detail
   - Offers the best value for money

2. **Robust**
   - Low electromagnetic susceptibility, EMC
   - Clock Monitoring and 2 Watchdogs
   - Error correction on Flash
   - IoT ready with embedded security
   - Hardware AES-256 encryption or the new Securable Memory Area.
   - Safe Firmware upgrade / Install

3. **Simple**
   - Easy to configure thanks to the intuitive and graphic STM32CubeMX configuration tool.
   - Easy to develop based on the Hardware Abstraction Layer library (HAL) or the low-layer library (LL) allowing maximum re-use and faster time-to-market.
Reducing BOM Cost

New platform optimized with 1 power supply pair only up to 64-pin packages

smaller package
less surrounding components
Innovations for Your Benefit

• No external clock  
  Accurate internal high speed clock +/-1% for 0 / 90°C  
  -10cts

• No decoupling capacitances  
  Remove up to 6 decoupling capacitors for supply and clocks  
  -4cts

• Smaller PCB  
  Smaller package, less components: save on PCB area  
  -1cts

Additional benefits for your convenience:

• USB-C power delivery  
  Integrated transceivers, pull-up/down resistors and digital  
  -15cts

• Secure programming  
  In house or at 3rd parties  
  -25cts
Providing More Performance

Do not compromise on performance with STM32G0

- Up to 64 MHz/ 59 DMIPS
- Up to >142 CoreMark Result
- Arm Cortex-M0+ with Memory Protection Unit (MPU)
- Flexible DMA up to 12 channels
When Mainstream MCU Series meets low-power requirements

<table>
<thead>
<tr>
<th>Mode</th>
<th>Current (nA)</th>
<th>Wake-up Sources</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V&lt;sub&gt;BAT&lt;/sub&gt;</strong></td>
<td>10 / 400</td>
<td>Tamper: few I/Os, RTC</td>
<td>25°C, VDD = 3V</td>
</tr>
<tr>
<td><strong>SHUTDOWN</strong></td>
<td>40 / 500</td>
<td>Wake-up sources: reset pin, few I/Os, RTC</td>
<td></td>
</tr>
<tr>
<td><strong>STANDBY</strong></td>
<td>200 / 500</td>
<td>Wake-up sources: + BOR, IWDG</td>
<td></td>
</tr>
<tr>
<td><strong>STOP</strong></td>
<td>Flash-RTC: off-off/off-on/on-off</td>
<td>Wake-up sources: + all I/Os, PVD, COMPs, LPUART, LPTIM, I²C, UART, USB</td>
<td></td>
</tr>
<tr>
<td><strong>SLEEP</strong></td>
<td>24 MHz, V&lt;sub&gt;DD&lt;/sub&gt; = 3 V, PLL=on</td>
<td>Wake-up sources: any interrupt or event</td>
<td></td>
</tr>
<tr>
<td><strong>RUN at 64 MHz</strong></td>
<td>&lt;100</td>
<td></td>
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</tr>
</tbody>
</table>

Note: * without RTC / with RTC
Ready for Tomorrow

Faster, more accurate analog and digital functions

- More RAM for Flash
  - Up to 36KB SRAM for 128KB and 64KB Flash memory

- Timers frequency up to 128 MHz resolution (<8 ns)
  - Advanced control capabilities

- 12-bit ADC up to 2.5 MSPS (0.4µs) conversion time
  - 16-bit oversampling by hardware

- 32 Mbit/s SPI, 7 Mbaud/s USART, 1Mbit/s I²C communication

Budget MCU world
**Smart Peripherals**

**V\textsubscript{BAT} with RTC**
for battery backup
400 nA in \( V\textsubscript{BAT} \) mode
for RTC and
20x 32-bit backup registers

**TRNG & AES**
for Security
128-/256-bit AES
key encryption hardware accelerator

**Comparators**
2 instances
Down to 30ns propagation delay

**DAC**
2x 12-bit DAC,

**ADC**
16x12-bit, 16-bit oversampling
2.5MSPS (0.4\( \mu \)s)

**Timers**
8ns PWM resolution
Advanced control
16- and 32-bit

**I/Os**
Up to 92 fast I/Os

**FD CAN**
Up to 2 instances

**USB-C Power Delivery**
Up to 2 ports with dead-battery management

**USB**
USB 2.0
Full speed
Device / Host

**SPI / UART / I\textsubscript{2}C**
4x SPIs
8 USART\( 's \) (ISO 7816, LIN, IrDA, modem)
3 I\textsubscript{2}C
**Smart Integration**

**Save on battery life**
- **Low consumption** process and design
- **Low-Power UART**: wake-up on frame
- **Low-Power Timer**: counts and generate signals
- **PC** wake-up on address

**Save on BOM cost**
- **+/−1% high speed clock internal** from 0 to 90°C
- **+/−2% high speed clock internal** from -40 to 125°C
- **IO maximization**: smaller package footprint

**More flexibility**
- **More RAM** or **more safety** with parity enable/disable
- **Dynamic DMA** assignment on **DMAMUX**
- **All IOs** with external interrupt capability

**Always keep control**
- **Diagnose, react**
  - **Main Clock monitoring**
  - **Backup clock** and interrupts
  - **Voltage monitoring**: programmable interrupts and reset
  - **Window watchdog** on CPU clock
  - **Independent watchdog** on independent clock
  - **Checksum** by hardware
  - **ECC** on Flash, **Parity** on RAM

**High temperature**
- from -40°C up to + 125°C

**High robustness**
- **Highly immune** to fast-transients
- **Robust IOs** against negative injections
Smart Applications

- **Lighting**
  - High temperature 125°C
  - Fast CPU 64MHz
  - Advanced timers with high-resolution 7.8ns
  - Fast comparators
  - ADC-12bit, DAC-12bit
  - Low-thickness packages
  - AES & security for secure upgrades

- **Consumer objects**
  - Smartphones, IoT devices, rechargeable connected devices, drones, toys
  - Low-thickness, small form-factor
  - 64MHz CPU with DMA
  - Low consumption in run and low-power, fast wake-up
  - USB type-C Power Delivery 3.0
  - USB FS 2.0 dev/host crystal-less

- **Industrial devices**
  - Motor control
  - Advanced control
  - Air conditioning, e-bikes, industrial equipments
  - High temperature 125°C
  - CANFD support
  - SPI, USART, I²C
  - Advanced timers with high-resolution 7.8ns
  - Real Time Clock with backup registers
  - AES & security for secure upgrades

- **Smart Home**
  - Home appliances, alarms and safety, advanced user interfaces
  - High temperature 125°C
  - Safety monitoring features
  - More RAM for flash
  - Low consumption <100µA/MHz in run
Wider Platform

Portfolio stretched for efficient budget applications

More memory and pin counts

Big Flash
Small package
512KB Flash memory

512 K
256 K
128 K
64 K
32 K
16 K

8-pin
20-pin
28-pin
32-pin
48-pin
64-pin
100-pin

Pins

Flash size (bytes)

More packages

SO / TSSOP
WLCSP
BGA
QFN
LQFP
### STM32G0 Portfolio

**Flash memory size / RAM size (bytes)**

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>512 K / 144 K</td>
<td>STM32G0C1KE, STM32G0C1CE, STM32G0C1RE, STM32G0C1VE, STM32G0B1KE, STM32G0B1CE, STM32G0B1RE, STM32G0B1VE, STM32G0B1KC, STM32G0B1CC, STM32G0B1RC, STM32G0B1VC</td>
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<tr>
<td>256 K / 144 K</td>
<td>STM32G0C1KC, STM32G0C1CC, STM32G0C1RC, STM32G0C1VC, STM32G0B1KC, STM32G0B1CC, STM32G0B1RC, STM32G0B1VC</td>
</tr>
<tr>
<td>128 K / 36 K</td>
<td>STM32G0811G, STM32G081KB, STM32G081CB, STM32G081RB, STM32G081EB*</td>
</tr>
<tr>
<td>64 K / 36 K</td>
<td>STM32G071G, STM32G071KB, STM32G071CB, STM32G071RB, STM32G071EB*</td>
</tr>
<tr>
<td>64 K / 8 K</td>
<td>STM32G031G, STM32G031KB, STM32G031CB, STM32G031C8, STM32G031Y8*</td>
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<tr>
<td>32 K / 8 K</td>
<td>STM32G041G, STM32G041KB, STM32G041CB, STM32G041C8</td>
</tr>
<tr>
<td>16 K / 8 K</td>
<td>STM32G031J4, STM32G031F4, STM32G031G4, STM32G031K4, STM32G031C4</td>
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</tbody>
</table>

**Pin count**

- 8-pin SON
- 20-pin TSSOP
- 28-pin UFQFN
- 32-pin LQFP/QFN
- 48-pin LQFP/QFN
- 64-pin LFQFP UFBGA (0.5 mm pitch)
- 100-pin LFQFP

**Availability:** 2020
### STM32G0: Great Investment

#### Keep releasing your growing creativity

<table>
<thead>
<tr>
<th>MPUs</th>
<th>High-performance MCUs</th>
<th>Mainstream MCUs</th>
<th>Ultra-low-power MCUs</th>
<th>Wireless MCUs</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>STM32G0</td>
<td>STM32F0</td>
<td>STM32L0</td>
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<tr>
<td></td>
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<td>STM32F1</td>
<td>STM32F1</td>
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<td>STM32F2</td>
<td>STM32F2</td>
<td>STM32L4</td>
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<td>STM32F3</td>
<td>STM32F3</td>
<td>STM32L4+</td>
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<td>STM32F4</td>
<td>STM32F4</td>
<td>STM32L5</td>
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<td>STM32H7</td>
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<td>STM32H8</td>
<td>STM32H8</td>
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#### ARM

- Cortex®-M0
- Cortex®-M0+
- Cortex®-M3
- Cortex®-M4
- Cortex®-M33
- Cortex®-M7
- Dual Cortex®-M7 & Cortex®-M4
- Dual Cortex®-A7 & Cortex®-M4

**Note**: Cortex-M0+ Radio Co-processor
Access Line

Advanced features and solutions

- 32-bit Arm Cortex-M0+ core
- 1.7 to 3.6V power supply
- RAM maximization
- 1% internal clock
- Direct Memory Access (DMA)
- Communication peripherals
- USB-C Power Delivery

- Timers up to 2xfcpu resolution
- Real-time Clock
- I/O ports maximization
- 12-bit Ultra-fast ADC
- 12-bit DAC
- Comparators
- Safety features
- Advanced Security features
No compromise on what matters

- 32-bit Arm Cortex-M0+ core
- 2.0 to 3.6V power supply
- RAM maximization
- 1% internal clock
- Direct Memory Access (DMA)
- Communication peripherals

- Timers
- Real-time Clock
- I/O ports maximization
- 12-bit Ultra-fast ADC
- Safety features
Integrated security features, ready for tomorrow’s needs

**Firmware IP protection**
- Mutual distrustful
- Secret key storage
- Authentication

**Secure firmware upgrade**

**User Flash**
- Standard user flash by default
- Can be secured once exiting
- No more access nor debug
- Configurable size
- Good fit to store critical data
  - Critical routines
  - Keys

**Securable Memory Area**
- Securable Memory Area
- Execute-only Protection
- Read-out Protection
- Write Protection
- Memory Protection Unit (MPU)
- AES-256 / SHA-256 Encryption
- True Random Number Generator
- Unique ID
HARDWARE TOOLS

STM32 Nucleo  
Flexible prototyping

Discovery kit  
Key feature prototyping

Evaluation board  
Full feature evaluation

SOFTWARE TOOLS

STM32CubeMX featuring intuitive pin selection, clock tree configuration, code generation and power consumption calculation

Go fast, be first
STM32G0 Ecosystem

Platform approach or custom code: you choose

EMBEDDED SOFTWARE

- Open-source TCP/IP stack (lwIP)
- USB Host and Device library from ST
- STemWin graphical stack library from ST and SEGGER
- Open-source FAT file system (FatFs)
- Open-source real-time OS (FreeRTOS)
- Dozens of examples

- STM32G0 Hardware Abstraction Layer (HAL) portable APIs
- High-performance, light-weight low-layer (LL) APIs
- High coverage for most STM32 peripherals
- Production-ready and fully qualified
- Dozens of usage examples
- Open-source BSD license
Releasing Your Creativity

1. Efficient
2. Robust
3. Simple

www.st.com/STM32G0