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

#### 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

#### 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

#### 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** -10cts
  Accurate internal high speed clock +/-1% for 0 / 90°C

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

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

**Additional benefits for your convenience:**

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

- **Secure programming** -25cts
  In house or at 3rd parties
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
Low-power Modes Efficiency

When Mainstream MCU Series meets low-power requirements

<table>
<thead>
<tr>
<th>Mode</th>
<th>Current (μA)</th>
<th>Wake-up Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{BAT}</td>
<td>10 nA / 400 nA*</td>
<td>Tamper: few I/Os, RTC</td>
</tr>
<tr>
<td>SHUTDOWN</td>
<td>40 nA / 500 nA*</td>
<td>Wake-up sources: reset pin, few I/Os, RTC</td>
</tr>
<tr>
<td>STANDBY</td>
<td>200 nA / 500 nA*</td>
<td>Wake-up sources: + BOR, IWDG</td>
</tr>
<tr>
<td>STOP</td>
<td>3.0 μA / 5 μA / 8 μA</td>
<td>Wake-up sources: + all I/Os, PVD, COMPs, LPUART, LPTIM, I²C, UART, USB</td>
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<tr>
<td>SLEEP</td>
<td>800 μA</td>
<td>Wake-up sources: any interrupt or event</td>
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<tr>
<td>RUN at 64 MHz</td>
<td>&lt;100 μA / MHz</td>
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Conditions: 25°C, V_{DD} = 3V

Note: * without RTC / with RTC
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**
**Smart Peripherals**

- **V$_{BAT}$ with RTC**
  - for battery backup
  - 400 nA in V$_{BAT}$ 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 (0.4µs)

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

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

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

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

- **SPI / UART / I²C**
  - 4x SPIs
  - 8 USARTs (ISO 7816, LIN, IrDA, modem)
  - 3 I²C

- **FD CAN**
  - Up to 2 instances

- **OBD**
  - Industrial
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

Smart Integration
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

**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

**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**
- Smart Home
- Lighting
- Industrial devices
- Motor control
- Advanced control
- 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

**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
Wider Platform

Portfolio stretched for efficient budget applications

Flash size (bytes)

More memory and pin counts

Big Flash
Small package

512KB Flash memory

More packages

SO / TSSOP
WLCSP
BGA
QFN
LQFP

Pin count

STM32 G0
STM32G0: Great Investment

Keep releasing your growing creativity

<table>
<thead>
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<th>MPUs</th>
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<td>STM32F9</td>
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<td>Cortex®-M0</td>
</tr>
<tr>
<td>Dual Cortex®-M7 &amp; Cortex®-M4</td>
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Note: Cortex-M0+ Radio Co-processor
## 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**

### System

- **Power supply**
  - POR/PDR/PVD/BOR
- **Xtal oscillator**
  - 32 kHz + 4 to 48 MHz
- **Internal RC oscillators**
  - 32 kHz (±5%) + 16 MHz (±1%)
- **PLL + Prescaler**
- **Clock control**
- **RTC/AWU**
- **Systick timer**
- **2x watchdogs**
  - (independent and window)
- **60 I/Os on 64 pins**
- **Cyclic redundancy check (CRC)**

### ARM® Cortex®-M0+ CPU
- **Up to 64 MHz**
- **Nested vector interrupt Controller (NVIC)**
- **SW debug**
- **Memory Protection Unit**

### AHB-Lite bus matrix

### APB bus

- **Up to 128-Kbyte Flash memory**
- **Up to 36-Kbyte SRAM**

### 20-byte backup registers

### Boot ROM

### 7-channel DMA

### Analog

- **Temp. sensor**
- **1x 12-bit ADC SAR**
  - 16-channels / 2.5 MSPS
- **1x 12-bit DAC 2ch**
- **2x comparators**

### Encryption
- **AES (256-bit)**
- **True RNG**

### Connectivity

- **2x SPI (IFS)**
- **4x USART**
  - (2x with LIN, smartcard, IrDA, modem control)
- **1x LPUART**
- **2x PCIe**
  - (SMBus, PMBus, Fast Mode Plus)
- **USB Power Delivery**
  - (incl. BMC + PHY)

### Control

- **1x 32-bit timer**
- **1x 16-bit Motor C. timer**
  - $f_{MAX} = 128$ MHz
  - 4 PWM + 3 compl.
- **5x 16-bit timers**
  - 2 PWM each one with $f_{MAX} = 128$ MHz
- **2x Low-power timers**

- **Timers up to 2xcpu 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

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<td></td>
<td>Boot ROM</td>
</tr>
<tr>
<td></td>
<td>7-channel DMA</td>
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</tbody>
</table>

- Timers
- Real-time Clock
- I/O ports maximization
- 12-bit Ultra-fast ADC
- Safety features
More Security

Integrated security features, ready for tomorrow’s needs

Firmware IP protection

Mutual distrustful

Secret key storage

Authentication

Secure firmware upgrade

User Flash

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

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

Secure firmware upgrade

Secret key storage

Authentication

Firmware IP protection

STM32 G0
STM32G0 Ecosystem

Go fast, be first

**HARDWARE TOOLS**
- STM32 Nucleo
- Discovery kit
- Evaluation board

**SOFTWARE TOOLS**
- STM32CubeMX featuring intuitive pin selection, clock tree configuration, code generation and power consumption calculation

Flexible prototyping
Key feature prototyping
Full feature evaluation
**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

STM32 GO

www.st.com/STM32G0