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

- **No decoupling capacitors** -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

Performance with 0, 1 and 2 wait state

![Graph showing performance with different wait states and system frequencies.](image)

- **Coremark score**
- **System frequency**
- **142.88 Coremark Result**
- **64 MHz/ 59 DMIPS**
- **Prefetch on**
- **Prefetch off**
- **Flexible DMA up to 12 channels**
When Mainstream MCU Series meets low-power requirements

<table>
<thead>
<tr>
<th>Mode</th>
<th>Wake-up time</th>
<th>Wake-up Sources</th>
<th>I/O Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V_{BAT}</strong></td>
<td>10 nA / 400 nA*</td>
<td>Tamper: few I/Os, RTC</td>
<td></td>
</tr>
<tr>
<td><strong>SHUTDOWN</strong></td>
<td>40 nA / 500 nA*</td>
<td>Wake-up sources: reset pin, few I/Os, RTC</td>
<td></td>
</tr>
<tr>
<td><strong>STANDBY</strong></td>
<td>200 nA / 500 nA*</td>
<td>Wake-up sources: + BOR, IWDG</td>
<td></td>
</tr>
<tr>
<td><strong>STOP</strong></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>
<td></td>
</tr>
<tr>
<td><strong>SLEEP</strong></td>
<td>800 µA</td>
<td>Wake-up sources: any interrupt or event</td>
<td></td>
</tr>
</tbody>
</table>
| **RUN at 64 MHz**| <100 µA / MHz |                   | 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\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 (0.4µs)

**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 / I\textsubscript{2}C**
4x SPIs
8 USARTs (ISO 7816, LIN, IrDA, modem)
3 I\textsubscript{2}C

**FD CAN**
Up to 2 instances
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

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

Air conditioning, e-bikes, industrial equipments
- High temperature 125°C
- CANFD support
- SPI, USART, I²C
- Advanced timers with high-resolution 7.8ns
- Advanced comparators
- ADC-12bit, DAC-12bit
- Low-thickness packages
- AES & security for secure upgrades

Consumer objects

Industrial devices
- Motor control
- Advanced control

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

Lighting
Wider Platform

Portfolio stretched for efficient budget applications

- More memory and pin counts
  - Big Flash Small package
  - 512KB Flash memory

- More packages
  - SO / TSSOP
  - WLCSP
  - BGA
  - QFN
  - LQFP
STM32G0 Portfolio

Availability: NOW
### STM32G0: Great Investment

#### Keep releasing your growing creativity

<table>
<thead>
<tr>
<th>High-performance</th>
<th>Mainstream</th>
<th>Ultra-low-power</th>
<th>Wireless</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cortex-M0+ Radio Co-processor</td>
<td>Cortex-M0 Cortex-M3 Cortex-M4 Cortex-M7</td>
<td>Cortex-M0+ Cortex-M33 Cortex-L0 Cortex-L1 Cortex-L5 Cortex-L4 Cortex-L4+</td>
<td>Cortex-M3 Cortex-M33 Cortex-M4 Cortex-M7</td>
</tr>
</tbody>
</table>

**Note:**
- **STM32G0:** Great Investment
- **STM32:** Life augmented

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**STM32G0**

- Ultra-low-power
- Mainstream
- High-performance

**ARM Cortex:**

- Cortex-M0
- Cortex-M0+
- Cortex-M3
- Cortex-M33
- Cortex-M4
- Cortex-M7
### 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**

<table>
<thead>
<tr>
<th>System</th>
<th>Arm® Cortex®-M0+ CPU Up to 64 MHz</th>
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<tbody>
<tr>
<td></td>
<td>Nested vector interrupt Controller (NVIC)</td>
</tr>
<tr>
<td></td>
<td>SW debug</td>
</tr>
<tr>
<td></td>
<td>Memory Protection Unit</td>
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<tr>
<td></td>
<td>AHB-Lite bus matrix</td>
</tr>
<tr>
<td></td>
<td>APB bus</td>
</tr>
<tr>
<td></td>
<td>Up to 128-Kbyte Flash memory</td>
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<tr>
<td></td>
<td>Up to 36-Kbyte SRAM</td>
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<tr>
<td></td>
<td>20-byte backup registers</td>
</tr>
<tr>
<td></td>
<td>Boot ROM</td>
</tr>
<tr>
<td></td>
<td>7-channel DMA</td>
</tr>
<tr>
<td></td>
<td>Analog</td>
</tr>
<tr>
<td></td>
<td>Temp. sensor</td>
</tr>
<tr>
<td></td>
<td>1x 12-bit ADC SAR 16-channels / 2.5 MSPS</td>
</tr>
<tr>
<td></td>
<td>1x 12-bit DAC 2ch</td>
</tr>
<tr>
<td></td>
<td>2x comparators</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connectivity</th>
<th>2x SPI (PS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4x USART (2x with LIN, smartcard, IrDA, modem control)</td>
</tr>
<tr>
<td></td>
<td>1x LPUART</td>
</tr>
<tr>
<td></td>
<td>2x I²C (SMBus, PMBus, Fast Mode Plus)</td>
</tr>
<tr>
<td></td>
<td>USB Power Delivery (incl. BMC + PHY)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control</th>
<th>1x 32-bit timer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1x16-bit Motor C. timer</td>
</tr>
<tr>
<td></td>
<td>( f_{\text{MAX}} = 128 \text{ MHz} )</td>
</tr>
<tr>
<td></td>
<td>4 PWM + 3 compl.</td>
</tr>
<tr>
<td></td>
<td>5x16-bit timers</td>
</tr>
<tr>
<td></td>
<td>2 PWM each one with ( f_{\text{MAX}} = 128 \text{ MHz} )</td>
</tr>
<tr>
<td></td>
<td>2x Low-power timers</td>
</tr>
</tbody>
</table>

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

No compromise on what matters

• 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
STM32G0 Ecosystem

Go fast, be first

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
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
Summary

3 Keys of STM32G0 Series

1. Efficient
2. Robust
3. Simple