GR5525 Product Brief

Single-mode, low-power, high-performance Bluetooth 5.3 System on Chip (SoC) targeting at wearables and Internet of Things (IoT) applications

Based on ARM® Cortex®-M4F CPU core, the GR5525 series integrates Bluetooth 5.3 Protocol Stack, a 2.4 GHz RF transceiver, on-chip programmable Flash memory, SRAM, and a rich set of peripherals. The device can be configured as a Broadcaster, an Observer, a Central or a Peripheral, and supports the combination of all the above roles, making it an ideal choice for Internet of Things (IoT) and smart wearable devices. In addition, it also supports Bluetooth Low Energy (Bluetooth LE) direction finding (AoA/AoD).

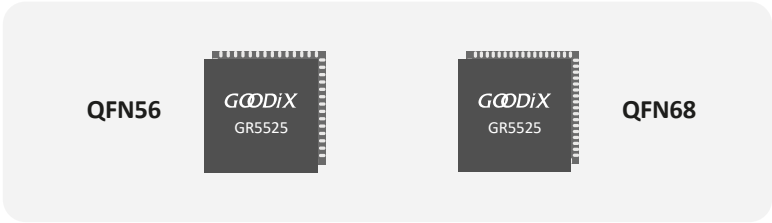
Key Features

- Up to 96 MHz Arm®Cortex®-M4F CPU
- 256 KB SRAM and up to 1 MB internal Flash
- Bluetooth LE 5.3 transceiver integrating Controller and Host layers
- TX current: 6.3 mA @0 dBm, 3.3 V VBAT input
- RX current: 5.3 mA @ 1 Mbps, 0 dBm, 3.3 V VBAT input
- RX sensitivity: -97 dBm @1 Mbps and -93 dBm @2 Mbps
- TX power: -20 dBm to +7 dBm
- Security: AES, HMAC, PKC, TRNG, secure boot, and secure key storage
- Up to 50 I/Os, QSPI, SPI, DSPI, I2S, I2C, UART, DMA, ADC, PDM, PWM
- AoA/AoD support

Packages

GR5525 offers QFN56 and QFN68 packages to support different environmental requirements.

- QFN56: 7.0 mm x 7.0 mm, 0.4 mm pitch
- QFN68: 7.0 mm x 7.0 mm, 0.35 mm pitch

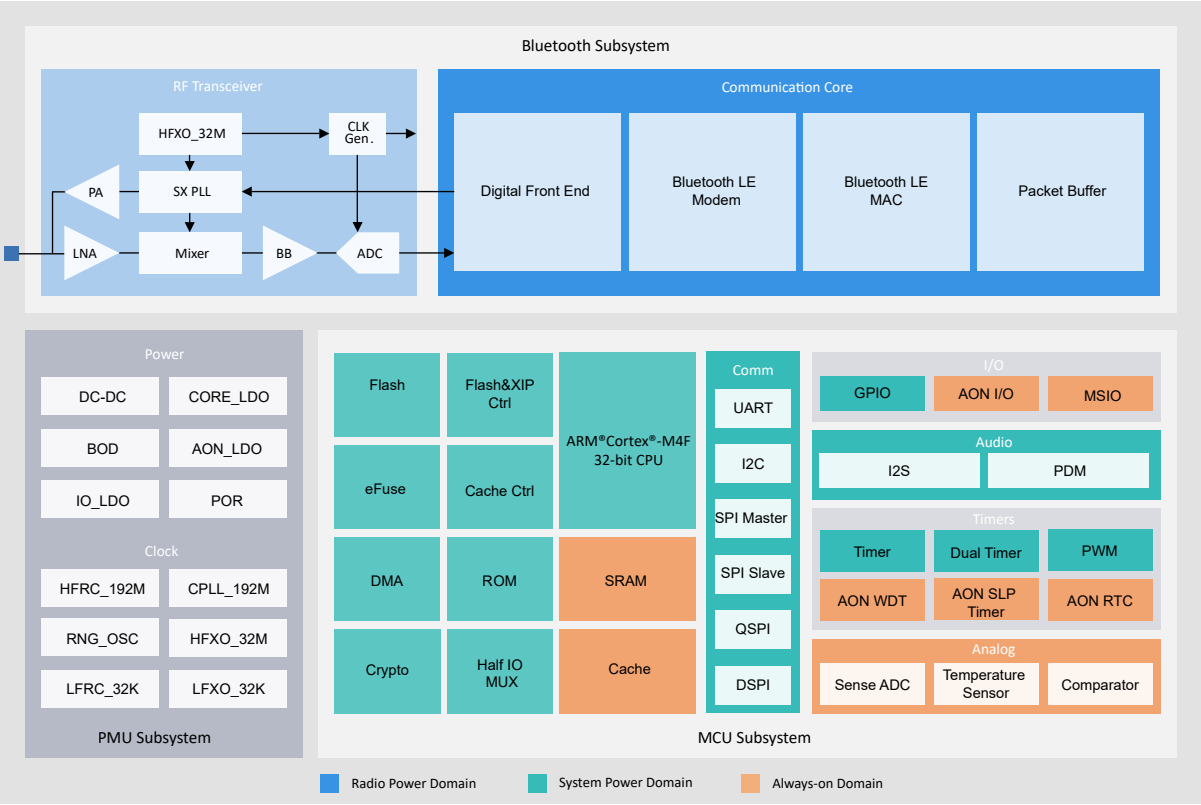


Product Part Number

GR5525 is available in multiple packages and provides system-in-package (SiP) Flash, meeting your diverse project demands.

Part Number	CPU	RAM	SiP Flash	I/O Voltage	I/O Number	Package (mm)
GR5525RGNI	Cortex®-M4F	256 KB	1 MB	1.8 V–3.6 V	50	QFN68 (7.0 x 7.0 x 0.85)
GR5525IGNI	Cortex®-M4F	256 KB	1 MB	1.8 V–3.6 V	39	QFN56 (7.0 x 7.0 x 0.75)
GR5525IENI	Cortex®-M4F	256 KB	512 KB	1.8 V–3.6 V	39	QFN56 (7.0 x 7.0 x 0.75)
GR5525I0NI	Cortex®-M4F	256 KB	N/A	Follow Flash	39	QFN56 (7.0 x 7.0 x 0.75)

Block Diagram



Specifications

Bluetooth LE 5.3 Transceiver

- Data rates: 1 Mbps, 2 Mbps, Long Range (500 kbps, 125 kbps)
- TX power: -20 dBm to +7 dBm
- RX sensitivity:
  - -97 dBm sensitivity @ 1 Mbps
  - -93 dBm sensitivity @ 2 Mbps
  - -101 dBm sensitivity @ LR 500 kbps
  - -103 dBm sensitivity @ LR 125 kbps
- TX current: 6.3 mA @ 0 dBm, 3.3 V VBAT input, 64 MHz
- RX current: 5.3 mA @ 1 Mbps, 3.3 V VBAT input, 64 MHz
- AoA and AoD direction finding

ARM® Cortex®-M4F 32-bit Micro-Processor with Floating Point

- Up to 96 MHz clock frequency
- Built-in Memory Protection Unit (MPU) supporting eight programmable regions
- Hardware Floating Point Unit (FPU)
- Built-in Nested Vectored Interrupt Controller (NVIC)
- Non-maskable Interrupt (NMI) input
- Serial Wire Debug (SWD) with 16 breakpoints, two watchpoints, and a debug timestamp counter
- 56 µA/MHz CoreMark running from Flash @ 3.3 V, 64 MHz from HFXO

On-chip Memory

- 256 KB RAM data memory with retention capabilities
- 8 KB cache RAM instruction memory with retention capabilities
- Stack ROM (including boot ROM and Bluetooth LE Stack)
- 1 MB internal QSPI Flash (512 KB for GR5525IENI, and external Flash for GR5525I0NI)

Low-power Consumption

- Ultra deep sleep mode: 5.0 µA (Typical), with no memory data in retention and wakeup sources from SLP Timer or AON I/Os
- OFF mode: 200 nA (Typical), with system in reset mode

Digital Peripherals

- 2 x general-purpose DMA engines with six channels and up to 16 programmable request/trigger sources

Analog Peripherals

- 1 x 13-bit Sense ADC with sampling rate of 1 Msps, supporting up to eight external I/O channels and three internal signal channels
- Built-in die temperature and voltage sensors
- Low-power comparator, supporting wakeup from sleep mode

Flexible Serial Peripherals

- 4 x UART modules up to 2 Mbps with flow control and IrDA features
- 4 x I2C modules for peripheral communication, up to 3.4 MHz, operating as either Master or Slave
- 1 x I2S master interface and 1 x I2S slave interface
- PDM interface with hardware sampling rate converter
- 1 x 8-bit/16-bit/32-bit SPI master interface and 1 x SPI slave interface for host communication
- 1 x Dual-lane SPI (DSPI) interface for display, with MIPI DBI Type-C support
- 3 x Quad SPI (QSPI) interfaces, up to 48 MHz; supporting direct access via memory mapping when connecting with external NOR Flash

Specifications

I/O Peripherals

- Up to 50 multiplexed I/O pins in total
  - Up to 34 general-purpose I/O (GPIO) pins with configurable pull-up/pull-down resistors
  - Up to eight always-on I/O (AON I/O) pins, supporting wakeup from sleep mode
  - Up to eight mixed signal I/O (MSIO) pins, configurable to be digital/analog signal interfaces

Timers

- 2 x 32-bit general-purpose timers
- 1 x dual timer with two programmable 32-bit or 16-bit down counters
- 1 x sleep timer for waking the device up from sleep mode
- 2 x 3-channel PWMs with edge-aligned and center-aligned modes
- 2 x real-time counters (1 x Calendar, 1 x real-time counter)

Power Management

- On-chip DC-DC to provide RF analog voltage and supply core LDO
- On-chip I/O LDO to provide I/O voltage and supply external components
- Programmable thresholds for brownout detector (BOD)
- Supply voltage: 2.4 V–3.8 V
- I/O voltage: 1.8 V–3.6 V

Security

- Complete secure computing engine:
  - AES 128-bit/192-bit/256-bit symmetric encryption (ECB, CBC)
  - Hash-based Message Authentication Code (HMAC-SHA256)
  - Public key cryptography (PKC)
  - True random number generator (TRNG)
- Comprehensive security operation mechanism:
  - Secure boot
  - Encrypted firmware running directly from Flash
  - eFuse for encrypted key storage
  - Differentiate application data key and firmware key, supporting one data key per device/product

Operating Temeperature

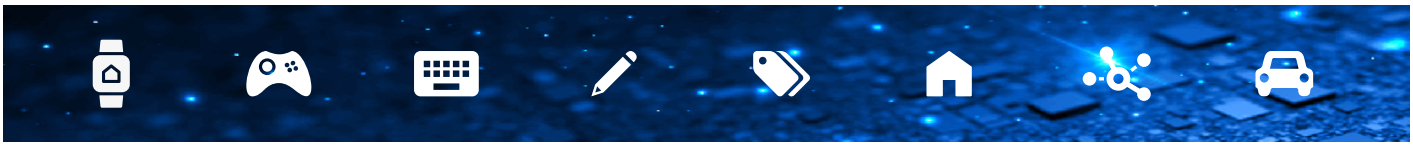
- Temperature range: -40°C to +85°C

Packages

- QFN68: 7.0 x 7.0 x 0.85 mm, 0.35 mm pitch
- QFN56: 7.0 x 7.0 x 0.75 mm, 0.4 mm pitch

Applications

GR5525 can be used in a rich set of applications.



Advanced Wearables

- Sport bracelet
- Smart watch

Bluetooth HID Devices

- Voice remote control
- Keyboard/Mouse
- Gaming controller
- Stylus pen

IoT Applications

- Smart lock and smart home
- Beacon and smart tracker
- Electronic shelf label (ESL)
- Mesh applications
- Asset tracking

Support

We offers a wide range of online resources that are accessible anytime, anywhere at High Performance Bluetooth Products.

Get answers to the most popular community Q&A and easily learn from others by Blogs.

Email us for any questions or problems you might have while reading docs at docs@reg.goodix.com