

GR533x Product Brief

Single-mode, low-power, high-performance Bluetooth 5.3 System on Chip (SoC), suitable for Internet of Thing (IoT) applications

Based on Arm® Cortex®-M4F CPU core running at 64MHz, the GR533x integrates a 2.4 GHz RF transceiver, Bluetooth LE 5.3 protocol stack, 512 KB on-chip Flash memory, 96 KB system SRAM, and a rich set of peripherals. It provides excellent RF performance, with a maximum of +15 dBm TX power, -99 dBm RX sensitivity and a maximum of 114 dB link budget in Bluetooth LE 1 Mbps mode. It also supports Bluetooth mesh networking protocols.

GOODiX
GR533x



Key Features

- Up to 64 MHz Arm®Cortex®-M4F CPU
- 96 KB RAM and 512 KB Flash
- Low-power consumption: 2.6 μ A in sleep mode @ 3.3 V VBAT input, with 48 KB data retained; 1.9 μ A in ultra deep sleep mode with no memory data retained
- Bluetooth LE 5.3 transceiver integrating Controller and Host layers
- TX current: 5.9 mA @ 0 dBm, 3.3 V VBAT input on GR5332; 3.8 mA @ 0 dBm, 3.3 V VBAT input on GR5331
- RX current: 4.9 mA @ LE 1Mbps on GR5332; 4.7 mA @ LE 1Mbps on GR5331
- RX sensitivity: -99 dBm @ 1 Mbps on GR5332 ; -97.5 dBm @ 1 Mbps on GR5331
- TX power: up to 15 dBm on GR5332; up to 6 dBm on GR5331
- Up to 32 I/Os, SPI, I2C, UART, DMA, ADC, PWM, and Timer

Packages

GR533x comes in QFN32 and QFN48 packages to support different environmental requirements.

- QFN32: 4.0 x 4.0 x 0.75 mm, 0.4 mm pitch
- QFN48: 6.0 x 6.0 x 0.75 mm, 0.4 mm pitch



QFN32



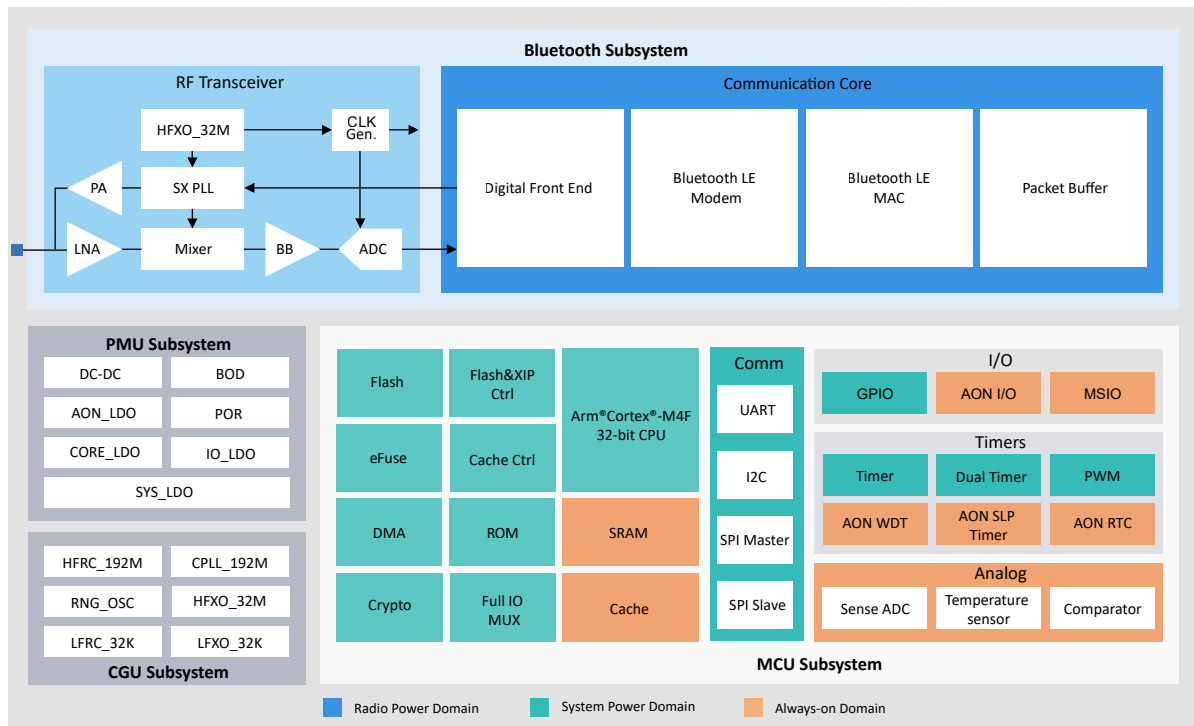
QFN48

Product Part Number

GR533x is available in multiple packages, meeting diverse project demands.

Part Number	CPU	RAM	SiP Flash	I/O Number	Temperature	Package (mm)
GR5331AENI	Cortex®-M4F	96 KB	512 KB	16	-40°C to 85°C	QFN32 (4.0 x 4.0 x 0.75)
GR5331CENI	Cortex®-M4F	96 KB	512 KB	32	-40°C to 85°C	QFN48 (6.0 x 6.0 x 0.75)
GR5332AENE	Cortex®-M4F	96 KB	512 KB	16	-40°C to 105°C	QFN32 (4.0 x 4.0 x 0.75)
GR5332CENE	Cortex®-M4F	96 KB	512 KB	32	-40°C to 105°C	QFN48 (6.0 x 6.0 x 0.75)

Block Diagram



Specifications

Bluetooth LE 5.3 Transceiver

- Data rates: 1 Mbps, 2 Mbps, and Long Range (500 kbps, 125 kbps)
- TX power: up to 6 dBm on GR5331; up to 15 dBm on GR5332
- RX sensitivity: -97.5 dBm @ 1 Mbps on GR5331; -99 dBm @ 1 Mbps on GR5332
- Power consumption at 3.3 V VBAT input on GR5331:
 - 3.8 mA TX current @ 0 dBm output power (DC-DC supply, 16 MHz system clock)
 - 4.7 mA RX current @ 1 Mbps (DC-DC supply, 16 MHz system clock)
- Power consumption at 3.3 V VBAT input on GR5332:
 - 5.9 mA TX current @ 0 dBm output power (DC-DC supply, 16 MHz system clock)
 - 86.3 mA TX current @ 15 dBm output power (SYS_LDO supply, 64 MHz system clock)
 - 4.9 mA RX current @ 1 Mbps (DC-DC supply, 16MHz system clock)

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

- Up to 64 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
- 32 μ A/MHz CoreMark running from Flash @ 3.3 V, 64 MHz from HFRC

On-chip Memory

- 96 KB RAM data memory with retention capabilities
- 8 KB cache RAM instruction memory with retention capabilities
- ROM for boot and partial Bluetooth LE Protocol Stack code
- 512 KB internal Flash

Low-power Consumption

- Sleep mode: 2.6 μ A (Typical) at 3.3 V VBAT input, with 48 KB SRAM retention on, wakeup sources from AON I/Os, and LFXO_32K running
- Ultra deep sleep mode: 1.9 μ A (Typical), with no memory data in retention, wakeup sources from SLP Timer or AON I/Os
- OFF mode: 200 nA (Typical), with system in reset mode

I/O Peripherals

- Up to 32 multiplexed I/O pins in total
 - Up to 14 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 10 mixed signal I/O (MSIO) pins, configurable to be digital/analog signal interfaces

Digital Peripherals

- 1 x general-purpose DMA engine with five channels and 16 handshaking interfaces

Specifications

Analog Peripherals

- 1 x 13-bit Sense ADC with a 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 with Arbitrary Mapping on All Digital I/Os

- 2 x UART modules up to 2 Mbps with flow control and IrDA features
- 2 x I2C modules for peripheral communication, up to 1 MHz, operating as either Master or Slave
- 1 x 8-bit/16-bit/32-bit SPI master interface and 1 x SPI slave interface for host communication

Timers

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

Power Management

- On-chip DC-DC/SYS_LDO 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: 2.0 V–3.63 V
- I/O voltage: 1.8 V–3.6 V

Security

- AES 128-bit security module (ECB, CBC)
- True random number generator (TRNG)

Operating Temperature

- GR5331: -40°C to 85°C
- GR5332: -40°C to 105°C

Packages

- QFN32: 4.0 x 4.0 x 0.75 mm, 0.4 mm pitch
- QFN48: 6.0 x 6.0 x 0.75 mm, 0.4 mm pitch

Applications

GR533x can be used in a rich set of applications.



IoT Applications

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

Health and Medical Applications

- Thermometers
- SpO2 meters
- Blood glucose and pressure meters
- Weight scales

Bluetooth HID Devices

- Remote controls
- Gaming controller
- Stylus pen

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