

Highly integrated, high-performance, low-power AEC-Q100 Grade 2 qualified automotive Bluetooth LE SoC, suitable for automotive applications

The Goodix GR5405 is a highly integrated, high-performance, low-power automotive Bluetooth LE 5.3 SoC. This device is AEC-Q100 Grade 2 certified and features an extensive operating temperature range from -40°C to 105°C. It is ideal for various automotive applications, including digital car key and Tire Pressure Monitoring System (TPMS). GR5405 also supports Bluetooth mesh networking protocols.

GOODiX
GR5405



Key Features

- Up to 64 MHz Arm®Cortex®-M4F CPU
- 96 KB RAM and 512 KB Flash
- Low-power consumption: 3.3 μ A in sleep mode @ 3.3 V VBAT input, with 48 KB data retained; 2.6 μ A in ultra deep sleep mode with no memory data retained
- Bluetooth LE 5.3 transceiver integrating Controller and Host layers
- TX current: 6.7 mA @ 0 dBm, 3.3 V VBAT input
- RX current: 5.7 mA @ LE 1Mbps
- RX sensitivity: -99 dBm @ 1 Mbps
- TX power: up to 15 dBm
- 24 I/Os, SPI, I2C, UART, DMA, ADC, PWM, and Timer

Packages

- Wettable flank-plated QFN40: 6.0 mm x 6.0 mm x 0.75 mm
- RoHS-compliant

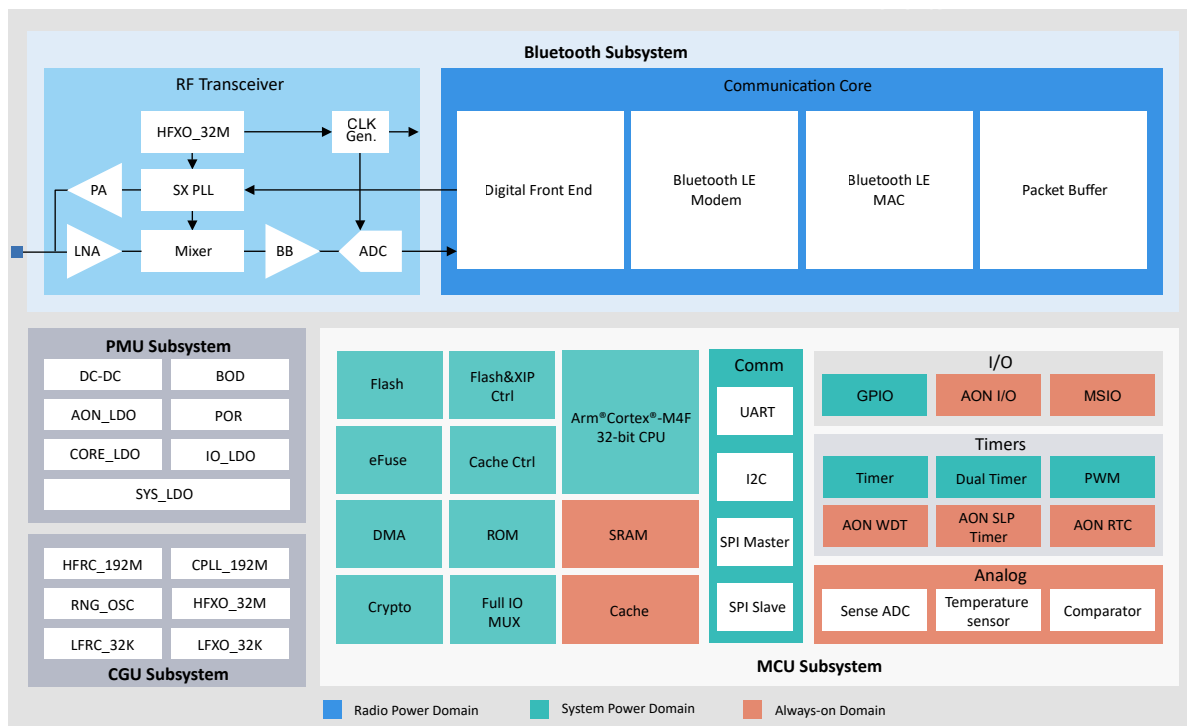


QFN40

Product Part Number

Part Number	CPU	RAM	SiP Flash	I/O Number	Temperature	Package (mm)
GR5405BENE	Cortex®-M4F	96 KB	512 KB	24	-40°C to 105°C	QFN40 (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 15 dBm
- RX sensitivity: -99 dBm @ 1 Mbps
- Power consumption at 3.3 V VBAT
 - 6.7 mA TX current @ 0 dBm output power (DC-DC supply, 64 MHz system clock)
 - 87 mA TX current @ 15 dBm output power (SYS_LDO supply, 64 MHz system clock)
 - 5.7 mA RX current @ 1 Mbps (DC-DC supply, 64 MHz system clock)
- Up to eight simultaneous connections

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
- 39 μ A/MHz CoreMark running from Flash @ 3.3 V, 64 MHz from HFRC

On-chip Memory

- ROM for chip bootloader, system drivers, and Bluetooth LE Protocol Stack code
- 96 KB RAM for data and instruction code, with retention capabilities in sleep mode
- 512 KB Flash for code, system parameter configuration, and user data

Low-power Consumption

- Sleep mode: 3.3 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: 2.6 μ A (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

I/O Peripherals

- 24 multiplexed I/O pins in total
 - Nine general-purpose I/O (GPIO) pins with configurable pull-up/pull-down resistors
 - Eight always-on I/O (AON I/O) pins, supporting wakeup from sleep mode
 - Seven 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 five 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, supporting LIN protocol adaption
- 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: 2.3 V–3.6 V
- I/O voltage: 2.3 V–3.6 V

Security

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

Operating Temperature

- -40°C to 105°C

Qualification

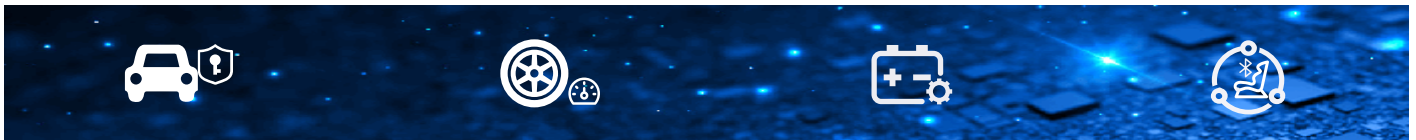
- AEC-Q100 Grade2

Packages

- Wettable flank-plated QFN40: 6.0 x 6.0 x 0.75 mm, 0.5 mm pitch

Applications

GR5405 can be used in a rich set of automotive applications.



- Digital car key
- Tire Pressure Monitoring System (TPMS)
- Automotive battery pack monitoring
- Wireless connection in smart cabin (V2X)

Support



We offer a wide range of online resources that are accessible anytime, anywhere at [High Performance Bluetooth Products](#).



Get answers from 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.