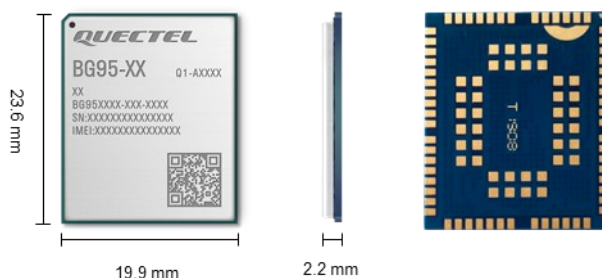


Quectel BG95 Series

LTE Cat M1/ Cat NB2/ EGPRS Module



BG95 is a series of multi-mode LPWA modules supporting LTE Cat M1/Cat NB2/EGPRS and integrated GNSS. It is 3GPP Rel-14 compliant and offers maximum data rates of 588 kbps downlink and 1119 kbps uplink under LTE Cat M1. It features ultra-low power consumption by leveraging the integrated RAM/flash as well as the ARM Cortex A7 processor supporting ThreadX, achieving up to 70 % reduction in PSM leakage and 85 % reduction in eDRX current consumption compared to its predecessor.

BG95 boasts a comprehensive set of hardware-based security features and enables trusted applications to run directly on the Cortex A7 TrustZone engine. Additionally, BG95 provides pin-to-pin compatibility with Quectel LTE Cat 4 modules EG91/EG95, LTE Cat M1/Cat NB1/EGPRS module BG96, NB-IoT module BC95-G, UMTS/HSPA modules UG95/UG96 and GSM/GPRS module M95.

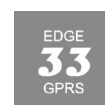
With a cost-effective SMT form factor of 23.6 mm × 19.9 mm × 2.2 mm and high integration level, BG95 enables integrators and developers to easily design their applications and take advantage from the module’s low power consumption and mechanical intensity. Its advanced LGA package allows fully automated manufacturing for high-volume applications. A rich set of Internet protocols, industry-standard interfaces and abundant functions extend the applicability of the module to a wide range of M2M applications such as wireless POS, smart metering, tracking, wearable devices, etc.

Key Features

- ✓ LTE Cat M1/Cat NB2/EGPRS module with ultra-low power consumption
- ✓ Easy migration from Quectel GSM/GPRS, UMTS/HSPA and LTE modules
- ✓ Integrated RAM/flash in the baseband chipset
- ✓ Comprehensive set of hardware-based security features
- ✓ Support VoLTE (Cat M1 only), CS voice for GSM, QuecOpen[®], eSIM, etc.
- ✓ Fast time-to-market: reference designs, evaluation tools and timely technical support minimize design-in time and development efforts
- ✓ Compact SMT form factor ideal for size-constrained applications with tight space
- ✓ Robust mounting and interfaces



LTE Cat M1 & Cat NB2



EGPRS



LGA Package



Embedded Abundant Protocols



DFOTA



USB 2.0 Interface



Ultra-low Power Consumption



Quectel Enhanced AT Commands



Integrated RAM/Flash in Chipset

Version: 1.9 | Status: Released

Quectel BG95 Series

| LPWA Module | BG95-M1 | BG95-M2 | BG95-M3 | BG95-M4 | BG95-M5 | BG95-M6 | BG95-MF | BG95-M9 |
|--------------------------------|--|--|--|---|--|--|--|--|
| Region/Operator | Global | Global | Global | Global | Global | Global | Global | Global |
| Dimensions (mm) | 23.6 × 19.9 × 2.2 | 23.6 × 19.9 × 2.2 | 23.6 × 19.9 × 2.2 | 23.6 × 19.9 × 2.2 | 23.6 × 19.9 × 2.2 | 23.6 × 19.9 × 2.2 | 23.6 × 19.9 × 2.2 | 23.6 × 19.9 × 2.2 |
| Temperature Range | | | | | | | | |
| Operating Temperature | -35 °C to +75 °C | -35 °C to +75 °C | -35 °C to +75 °C | -35 °C to +75 °C | -35 °C to +75 °C | -35 °C to +75 °C | -35 °C to +75 °C | -35 °C ~ +75 °C |
| Extended Temperature | -40 °C to +85 °C | -40 °C to +85 °C | -40 °C to +85 °C | -40 °C to +85 °C | -40 °C to +85 °C | -40 °C to +85 °C | -40 °C to +85 °C | -40 °C ~ +85 °C |
| Frequency Bands | | | | | | | | |
| LTE-FDD | Cat M1 Only: B1/2/3/4/5/8/12/13/18/19/20/25/26/27/28/66/85 | Cat M1: B1/2/3/4/5/8/12/13/18/19/20/25/26/27/28/66/85 Cat NB2: B1/2/3/4/5/8/12/13/18/19/20/25/28/66/71/85 | Cat M1: B1/2/3/4/5/8/12/13/18/19/20/25/26/27/28/66/85 Cat NB2: B1/2/3/4/5/8/12/13/18/19/20/25/28/66/71/85 | Cat M1: B1/2/3/4/5/8/12/13/18/19/20/25/26/27/28/31 ^① /66/72 ^② /73 ^③ /85 Cat NB2: B1/2/3/4/5/8/12/13/18/19/20/25/28/31 ^① /66/72 ^② /73 ^③ /85 | Cat M1: B1/2/3/4/5/8/12/13/18/19/20/25/26/27/28/66/85 Cat NB2: B1/2/3/4/5/8/12/13/18/19/20/25/28/66/71/85 | Cat M1: B1/2/3/4/5/8/12/13/18/19/20/25/26/27/28/66/85 Cat NB2: B1/2/3/4/5/8/12/13/18/19/20/25/28/66/71/85 | Cat M1: B1/2/3/4/5/8/12/13/18/19/20/25/26/27/28/66/85 Cat NB2: B1/2/3/4/5/8/12/13/18/19/20/25/28/66/71/85 | Cat M1: B1/2/3/4/5/8/12/13/18/19/20/25/26/27/28/31 ^① /66/72 ^② /73 ^③ /85/87/88 Cat NB2: B1/2/3/4/5/8/12/13/18/19/20/25/28/31 ^① /66/72 ^② /73 ^③ /85/86/87/88 |
| EGPRS | - | - | 850/900/1800/1900 MHz | - | 850/900/1800/1900 MHz | - | - | - |
| GNSS | GPS/GLONASS/BDS/Galileo/QZSS | GPS/GLONASS/BDS/Galileo/QZSS | GPS/GLONASS/BDS/Galileo/QZSS | GPS/GLONASS/BDS/Galileo/QZSS | GPS/GLONASS/BDS/Galileo/QZSS | GPS/GLONASS/BDS/Galileo/QZSS | GPS/GLONASS/BDS/Galileo/QZSS | GPS/GLONASS/BDS/Galileo/QZSS |
| Wi-Fi (For Positioning) | - | - | - | - | - | - | 2.4 GHz | - |
| Data Transmission | | | | | | | | |
| LTE-M Data Rate (kbps) | Cat M1: Max. 588 (DL) Max. 1119 (UL) | Cat M1: Max. 588 (DL) Max. 1119 (UL) | Cat M1: Max. 588 (DL) Max. 1119 (UL) | Cat M1: Max. 588 (DL) Max. 1119 (UL) | Cat M1: Max. 588 (DL) Max. 1119 (UL) | Cat M1: Max. 588 (DL) Max. 1119 (UL) | Cat M1: Max. 588 (DL) Max. 1119 (UL) | Cat M1: Max. 588 (DL) Max. 1119 (UL) |
| NB-IoT Data Rate (kbps) | - | Cat NB2: Max. 127 (DL) Max. 158.5 (UL) Cat NB1: Max. 32 (DL) Max. 70 (UL) | Cat NB2: Max. 127 (DL) Max. 158.5 (UL) Cat NB1: Max. 32 (DL) Max. 70 (UL) | Cat NB2: Max. 127 (DL) Max. 158.5 (UL) Cat NB1: Max. 32 (DL) Max. 70 (UL) | Cat NB2: Max. 127 (DL) Max. 158.5 (UL) Cat NB1: Max. 32 (DL) Max. 70 (UL) | Cat NB2: Max. 127 (DL) Max. 158.5 (UL) Cat NB1: Max. 32 (DL) Max. 70 (UL) | Cat NB2: Max. 127 (DL) Max. 158.5 (UL) Cat NB1: Max. 32 (DL) Max. 70 (UL) | Cat NB2: Max. 127 (DL) Max. 158.5 (UL) Cat NB1: Max. 32 (DL) Max. 70 (UL) |
| EDGE Data Rate (kbps) | - | - | Max. 296 (DL) Max. 236.8 (UL) | - | Max. 296 (DL) Max. 236.8 (UL) | - | - | - |
| GPRS Data Rate (kbps) | - | - | Max. 107 (DL) Max. 85.6 (UL) | - | Max. 107 (DL) Max. 85.6 (UL) | - | - | - |
| Interfaces | | | | | | | | |
| (U)SIM | × 1 (1.8 V only) | × 1 (1.8 V only) | × 1 (1.8 V only) | × 1 (1.8 V only) | × 1 (1.8 V only) | × 1 (1.8 V only) | × 1 (1.8 V only) | × 1 (1.8 V only) |
| UART | × 3 | × 3 | × 3 | × 3 | × 3 | × 3 | × 3 | × 3 |
| USB 2.0 | × 1 | × 1 | × 1 | × 1 | × 1 | × 1 | × 1 | × 1 |
| PCM | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE* Only) | × 1 (for VoLTE* Only) |
| I2C | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE Only) | × 1 (for VoLTE* Only) | × 1 (for VoLTE* Only) |
| Antenna | × 2 | × 2 | × 2 | × 2 | × 2 | × 2 | × 3 | × 2 |
| GPIO | × 9 | × 9 | × 9 | × 9 | × 9 | × 9 | × 7 | × 9 |
| GRFC | × 2 | × 2 | × 2 | - | × 2 | × 2 | × 2 | - |
| Voice | | | | | | | | |
| Voice | VoLTE for Cat M1 | VoLTE for Cat M1 | VoLTE for Cat M1 CS Voice for GSM | VoLTE for Cat M1 | VoLTE for Cat M1 CS Voice for GSM | VoLTE for Cat M1 | VoLTE* for Cat M1 | VoLTE* for Cat M1 |
| SMS | | | | | | | | |
| SMS | Point-to-point MO/MT SMS Cell Broadcast Text and PDU Mode | Point-to-point MO/MT SMS Cell Broadcast Text and PDU Mode | Point-to-point MO/MT SMS Cell Broadcast Text and PDU Mode | Point-to-point MO/MT SMS Cell Broadcast Text and PDU Mode | Point-to-point MO/MT SMS Cell Broadcast Text and PDU Mode | Point-to-point MO/MT SMS Cell Broadcast Text and PDU Mode | Point-to-point MO/MT SMS Cell Broadcast Text and PDU Mode | Point-to-point MO/MT SMS Cell Broadcast Text and PDU Mode |
| Enhanced Features | | | | | | | | |
| DFOTA | ● | ● | ● | ● | ● | ● | ● | ● |
| QuecOpen® | ● | ● | ● | ● | ● | ● | * | * |
| QuecLocator® | Cell ID Positioning | Cell ID Positioning | Cell ID Positioning | Cell ID Positioning | Cell ID Positioning | Cell ID Positioning | Cell ID Positioning Wi-Fi Positioning | Cell ID Positioning |
| SoftSIM | ● | ● | ● | ● | ● | ● | ● | ● |
| IoT Platform Access | AWS/ Azure | AWS/ Azure | AWS/ Azure | AWS/ Azure | AWS/ Azure | AWS/ Azure | AWS/ Azure | AWS/Azure |

NOTE:

- ①: LTE-FDD B31/ 72/ 73 for BG95-M4 supports Power Class 2 and Power Class 3.
- ②: LTE-FDD B31/ 72/ 73 for BG95-M9 supports Power Class 2 (26 dBm) while other LTE bands supports Power Class 3 (23 dBm).
- : supported.
- *: under development/planning.

Quectel BG95 Series

| LPWA Module | BG95-M1 | BG95-M2 | BG95-M3 | BG95-M4 | BG95-M5 | BG95-M6 | BG95-MF | BG95-M9 |
|---|---|--|--|---|--|--|---|--|
| Software Features | | | | | | | | |
| Protocols | PPP/TCP/UDP/SSL/TLS/FTP (S)/HTTP(S)/NITZ/PING/MQTT/LwM2M/CoAP/IPv6 | PPP/TCP/UDP/SSL/TLS/FTP (S)/HTTP(S)/NITZ/PING/MQTT/LwM2M/CoAP/IPv6 | PPP/TCP/UDP/SSL/TLS/FTP (S)/HTTP(S)/NITZ/PING/MQTT/LwM2M/CoAP/IPv6 | PPP/TCP/UDP/SSL/TLS/FTP (S)/HTTP(S)/NITZ/PING/MQTT/LwM2M/CoAP/IPv6 | PPP/TCP/UDP/SSL/TLS/FTP (S)/HTTP(S)/NITZ/PING/MQTT/LwM2M/CoAP/IPv6 | PPP/TCP/UDP/SSL/TLS/FTP (S)/HTTP(S)/NITZ/PING/MQTT/LwM2M/CoAP/IPv6 | PPP/TCP/UDP/SSL/TLS/FTP (S)/HTTP(S)/NITZ/PING/MQTT/LwM2M/CoAP/IPv6 | PPP/TCP/UDP/SSL/TLS/FTP (S)/HTTP(S)/NITZ/PING/MQTT/LwM2M/CoAP/IPv6 |
| USB Serial Driver | Windows 7/8/8.1/10/11, Linux 2.6-5.15, Android 4.x-12.x | Windows 7/8/8.1/10/11, Linux 2.6-5.15, Android 4.x-12.x | Windows 7/8/8.1/10/11, Linux 2.6-5.15, Android 4.x-12.x | Windows 7/8/8.1/10/11, Linux 2.6-5.15, Android 4.x-12.x | Windows 7/8/8.1/10/11, Linux 2.6-5.15, Android 4.x-12.x | Windows 7/8/8.1/10/11, Linux 2.6-5.15, Android 4.x-12.x | Windows 7/8/8.1/10/11, Linux 2.6-5.15, Android 4.x-12.x | Windows 7/8/8.1/10/11, Linux 2.6-5.15, Android 4.x-12.x |
| GNSS/RIL Driver | Android 4.x-12.x | Android 4.x-12.x | Android 4.x-12.x | Android 4.x-12.x | Android 4.x-12.x | Android 4.x-12.x | Android 4.x-12.x | Android 4.x-12.x |
| Certifications | | | | | | | | |
| Carrier | Europe: Deutsche Telekom America: Verizon/AT&T/T-Mobile/Sprint/U.S. Cellular Canada: IC Japan: JATE/TELEC Australia/New Zealand: RCM | Europe: Vodafone/Deutsche Telekom America: Verizon/AT&T/T-Mobile/Sprint/U.S. Cellular Canada: Rogers/Telus Brazil: Anatel Mexico: IFETEL Japan: JATE/TELEC Australia/New Zealand: RCM Singapore: IMDA | Europe: Vodafone/Deutsche Telekom/Telefónica/Orange America: Verizon/AT&T/T-Mobile/Sprint/U.S. Cellular Canada: Rogers/Telus Brazil: Anatel Claro | Europe: Deutsche Telekom Brazil: Anatel Australia/New Zealand: RCM | Europe: Vodafone/Deutsche Telekom America: Verizon/AT&T/T-Mobile Japan: NTT DOCOMO/KDDI Australia: Telstra Canada: Rogers | Europe: Vodafone/Deutsche Telekom America: Verizon/AT&T/T-Mobile South Korea: KT/SKT/LGU+ Japan: NTT DOCOMO/KDDI Australia: Telstra | Europe: Vodafone/Deutsche Telekom America: Verizon/AT&T* | TBD |
| Regulatory | Global: GCF Europe: CE North America: PTCRB America: FCC The UK: UKCA Canada: IC Japan: JATE/TELEC Australia/New Zealand: RCM | Global: GCF Europe: CE North America: PTCRB America: FCC The UK: UKCA Canada: IC Brazil: Anatel Mexico: IFETEL Japan: JATE/TELEC Australia/New Zealand: RCM Singapore: IMDA | Global: GCF Europe: CE North America: PTCRB America: FCC The UK: UKCA Canada: IC Brazil: Anatel Mexico: IFETEL Japan: JATE/TELEC Australia/New Zealand: RCM China: CCC Taiwan, China: NCC | Global: GCF Europe: CE Brazil: Anatel Australia/New Zealand: RCM | Global: GCF Europe: CE North America: PTCRB America: FCC The UK: UKCA Canada: IC Brazil: Anatel South Korea: KC Japan: JATE/TELEC Australia/New Zealand: RCM | Global: GCF Europe: CE North America: PTCRB America: FCC The UK: UKCA Canada: IC Brazil: Anatel South Korea: KC Japan: JATE/TELEC Australia/New Zealand: RCM | Global: GCF Europe: CE North America: PTCRB America: FCC Canada: IC Australia/New Zealand: RCM | Europe: CE* Australia/New Zealand: RCM* Brazil: Anatel* |
| Others | RoHS | RoHS/ATEX | RoHS/PEN | RoHS | RoHS | RoHS | RoHS | RoHS |
| Electrical Features | | | | | | | | |
| Supply Voltage ^① (V) | 2.6-4.8, typ. 3.3 | 2.6-4.8, typ. 3.3 | 3.3-4.3, typ. 3.8 | 3.2-4.2, typ. 3.8 | 3.3-4.3, typ. 3.8 | 3.3-4.3, typ. 3.8 | 3.3-4.3, typ. 3.8 | 3.2-4.2, typ. 3.8 |
| Max Output Power (dBm) | Power Class 5 21 @ LTE Bands | Power Class 5 21 @ LTE Bands | Power Class 5 21 @ LTE Bands | Power Class 2 26 @ B31/ 72/ 73 Power Class 3 23 @ B31/ 72/ 73 Power Class 5 21 @ other LTE Bands | Power Class 3 23 @ LTE Bands | Power Class 3 23 @ LTE Bands | Power Class 5 21 @ LTE Bands | Power Class 2 26 @ B31/ 72/ 73 Power Class 3 23 @ other LTE Bands |
| Power Consumption @ PSM (µA) | 4 | 3.9 | 3.9 | 4 | 6 | 5 | 4 | 4.4 |
| Power Consumption @ LTE Cat M1 (mA) | Sleep Mode: 1.7 @ DRX = 1.28 s 0.577 @ e-DRX = 81.92 s Idle Mode: 20 @ DRX = 1.28 s 19.57 @ e-DRX = 81.92 s Active Mode: 210 @ 21 dBm, GNSS off | Sleep Mode: 1.68 @ DRX = 1.28 s 0.549 @ e-DRX = 81.92 s Idle Mode: 21.2 @ DRX = 1.28 s 20.6 @ e-DRX = 81.92 s Active Mode: 212 @ 21 dBm, GNSS off | Sleep Mode: 1.89 @ DRX = 1.28 s 0.63 @ e-DRX = 81.92 s Idle Mode: 18.9 @ DRX = 1.28 s 18.2 @ e-DRX = 81.92 s Active Mode: 193 @ 21 dBm, GNSS off | Sleep Mode: 1.53 @ DRX = 1.28 s 0.554 @ e-DRX = 81.92 s Idle Mode: 18.2 @ DRX = 1.28 s 17.7 @ e-DRX = 81.92 s Active Mode: 185 @ 21 dBm, GNSS off 190 @ 23 dBm, GNSS off 226 @ 26 dBm, GNSS off | Sleep Mode: 1.56 @ DRX = 1.28 s 0.72 @ e-DRX = 81.92 s Idle Mode: 17.3 @ DRX = 1.28 s 16.6 @ e-DRX = 81.92 s Active Mode: 226 @ 23 dBm, GNSS off | Sleep Mode: 1.42 @ DRX = 1.28 s 0.58 @ e-DRX = 81.92 s Idle Mode: 18.5 @ DRX = 1.28 s 18.2 @ e-DRX = 81.92 s Active Mode: 204 @ 23 dBm, GNSS off | Sleep Mode: 1.59 @ DRX = 1.28 s 0.58 @ e-DRX = 81.92 s Idle Mode: 18.5 @ DRX = 1.28 s 17.97 @ e-DRX = 81.92 s Active Mode: 207 @ 23 dBm, GNSS off | Sleep Mode: 1.37 @ DRX = 1.28 s 0.62 @ e-DRX = 81.92 s Idle Mode: 14.49 @ DRX = 1.28 s 13.92 @ e-DRX = 81.92 s Active Mode: 207 @ 23 dBm, GNSS off 282 @ 26 dBm, GNSS off |
| Power Consumption @ LTE Cat NB1 (mA) | - | Sleep Mode: 1.55 @ DRX = 1.28 s 0.592 @ e-DRX = 81.92 s Idle Mode: 16.8 @ DRX = 1.28 s 16.4 @ e-DRX = 81.92 s Active Mode: 162 @ 21 dBm, GNSS off | Sleep Mode: 1.49 @ DRX = 1.28 s 0.67 @ e-DRX = 81.92 s Idle Mode: 14.8 @ DRX = 1.28 s 14.3 @ e-DRX = 81.92 s Active Mode: 154 @ 21 dBm, GNSS off | Sleep Mode: 1.4 @ DRX = 1.28 s 0.588 @ e-DRX = 81.92 s Idle Mode: 14.5 @ DRX = 1.28 s 14.1 @ e-DRX = 81.92 s Active Mode: 146 @ 21 dBm, GNSS off 147 @ 23 dBm, GNSS off 195 @ 26 dBm, GNSS off | Sleep Mode: 1.43 @ DRX = 1.28 s 0.68 @ e-DRX = 81.92 s Idle Mode: 13.5 @ DRX = 1.28 s 13.1 @ e-DRX = 81.92 s Active Mode: 190 @ 23 dBm, GNSS off | Sleep Mode: 1.31 @ DRX = 1.28 s 0.55 @ e-DRX = 81.92 s Idle Mode: 14.2 @ DRX = 1.28 s 14 @ e-DRX = 81.92 s Active Mode: 173 @ 23 dBm, GNSS off | Sleep Mode: 1.43 @ DRX = 1.28 s 0.56 @ e-DRX = 81.92 s Idle Mode: 14.2 @ DRX = 1.28 s 14.1 @ e-DRX = 81.92 s Active Mode: 181 @ 21 dBm, GNSS off | Sleep Mode: 1.36 @ DRX = 1.28 s 0.72 @ e-DRX = 81.92 s Idle Mode: 14.78 @ DRX = 1.28 s 13.93 @ e-DRX = 81.92 s Active Mode: 180 @ 23 dBm, GNSS off 263 @ 26 dBm, GNSS off |

NOTE:

- ①: please refer to the hardware design manual to see more specific requirements for the power supply voltage.
- *: under development/planning.
- : supported.
- TBD: to be determined.