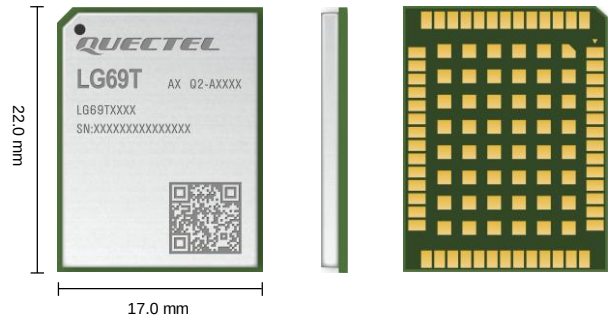


Quectel LG69T Series

Automotive Grade Dual-Band Multi-Constellation GNSS Module Integrating DR/RTK



The LG69T series features the fifth generation of STMicroelectronics® positioning receiver platform with 80 tracking channels and 4 fast acquisition channels. This series has dual band (L1 + L5 or L1 + L2) variants supporting up to 4 concurrent global constellations (GPS, Galileo, BDS and GLONASS) + QZSS and optionally integrates RTK and Dead Reckoning technology enabling the best performance in a variety of applications. The LG69T series is designed and manufactured according to the Quality Management System based on IATF 16949:2016 Standard.

With dead reckoning capability and an integrated inertial measurement unit (IMU), the LG69T (AA) provides continuous meter level positioning (without RTK corrections). The integrated state-of-the-art algorithms fuse the IMU data, GNSS measurements, wheel tick sensor input and vehicle dynamics, to provide accurate positioning in areas where GNSS alone would fail. It is ideal for vehicle markets such as Automotive Navigation, ADAS and V2X.

The LG69T (AM) supports standard RTCM correction from third-party base stations or correction networks to achieve centimeter level positioning in seconds. Providing up to 10 Hz navigation rates makes the LG69T series suitable for applications such as drones, delivery robots, precision agriculture, mining and marine management, automotive telematics as well as ADAS and DMS.

The module is designed for easy integration with minimum requirements for external components or powerful co-processors and due to its small size and light weight is well-suited for mass market adoption.



Key Features

- ✓ Concurrent reception of up to 4 constellations (GPS, Galileo, BDS, GLONASS (optional)) as well as QZSS (optional)
- ✓ RTK (optional) provides centimetre-level accuracy with fast convergence time and outstanding performance
- ✓ No need for external co-processor
- ✓ Up to 10 Hz GNSS raw data output
- ✓ Integrated LNA for improved sensitivity
- ✓ DR algorithms (optional)
- ✓ Designed and manufactured according to the Quality Management System based on IATF 16949:2016 Standard



L1 + L5 or L1 + L2
Dual Bands



Multi-Constellation
System



Low Power Consumption



DR



RTK



Operating Temperature
Range: -40 °C to +85 °C/105 °C



RoHS Compliant

Quectel LG69T Series

GNSS Module	LG69T (AQ)*	LG69T (AI)	LG69T (AJ)	LG69T (AB)
Dimensions (mm)	22.0 × 17.0 × 3.3	22.0 × 17.0 × 3.3	22.0 × 17.0 × 3.3	22.0 × 17.0 × 3.3
Weight (g)	Approx. 1.9	Approx. 1.9	Approx. 1.9	Approx. 1.9
Temperature Range				
Operating Temperature	-40 °C to +85 °C	-40 °C to +105 °C	-40 °C to +105 °C	-40 °C to +105 °C
Storage Temperature	-40 °C to +95 °C	-40 °C to +105 °C	-40 °C to +105 °C	-40 °C to +105 °C
GNSS Features				
Supported Bands	GPS: L1 C/A; L5 Galileo: E1; E5a BDS: B1I; B2a	GPS/QZSS: L1 C/A; L2C or L5 Galileo: E1; E5b or E5a BDS: B1I; B2I or B2a GLONASS: L1; L2	GPS/QZSS: L1 C/A; L5 Galileo: E1; E5a BDS: B1I; B2a	GPS/QZSS: L1 C/A; L2C or L5 Galileo: E1; E5b or E5a BDS: B1I; B2I or B2a GLONASS: L1
Functions	PVT ^① (DR + RTK)	GNSS raw data	GNSS raw data + IMU raw data	GNSS raw data
Integrated IMU	Supported	-	Supported	-
Default GNSS Constellations	GPS + BDS + Galileo	GPS + BDS + Galileo + QZSS + GLONASS	GPS + BDS + Galileo + QZSS	GPS + BDS + Galileo + QZSS + GLONASS
Channels	80 Tracking Channels 4 Fast Acquisition Channels	80 Tracking Channels 4 Fast Acquisition Channels	80 Tracking Channels 4 Fast Acquisition Channels	80 Tracking Channels 4 Fast Acquisition Channels
SBAS	-	-	-	-
Horizontal Position Accuracy	Autonomous ^② : 1.0 m* RTK ^③ : 0.01 m* + 1ppm	Autonomous ^② : 1.0 m RTK ^③ : Centimeter level (Depending on external Precision Positioning Engine)	Autonomous ^② : 1.0 m RTK ^③ : Centimeter level (Depending on external Precision Positioning Engine)	Autonomous ^② : 1.0 m* RTK ^③ : Centimeter level (Depending on external Precision Positioning Engine)
Velocity Accuracy ^④	Without Aid: 0.1 m/s	Without Aid: 0.1 m/s	Without Aid: 0.1 m/s	Without Aid: 0.1 m/s
Acceleration Accuracy ^④	Without Aid: 0.1 m/s ²	Without Aid: 0.1 m/s ²	Without Aid: 0.1 m/s ²	Without Aid: 0.1 m/s ²
Convergence Time	RTK ^③ : TBD	-	-	-
Accuracy of 1PPS Signal ^④	100 ns	100 ns	100 ns	TBD
TTFF (with AGNSS)	-	-	-	-
TTFF (without AGNSS) ^④	Cold Start: TBD Warm Start: TBD Hot Start: TBD	Cold Start: 36 s Warm Start: 30 s Hot Start: 3 s	Cold Start: 36 s Warm Start: 30 s Hot Start: 3 s	Cold Start: 36 s* Warm Start: 30 s* Hot Start: 3 s*
Sensitivity (@ Default Constellations) ^⑤	Acquisition: TBD Tracking: TBD Reacquisition: TBD	Acquisition: -145 dBm Tracking: -160 dBm Reacquisition: -153 dBm	Acquisition: -145 dBm Tracking: -160 dBm Reacquisition: -153 dBm	Acquisition: -144 dBm* Tracking: -159 dBm* Reacquisition: -153 dBm*
Dynamic Performance ^④	Maximum Altitude: 18000 m Maximum Velocity ^⑥ : 515 m/s Maximum Acceleration ^⑥ : 4g	Maximum Altitude: 18000 m Maximum Velocity ^⑥ : 515 m/s Maximum Acceleration ^⑥ : 4g	Maximum Altitude: 18000 m Maximum Velocity ^⑥ : 515 m/s Maximum Acceleration ^⑥ : 4g	Maximum Altitude: 18000 m Maximum Velocity ^⑥ : 515 m/s Maximum Acceleration ^⑥ : 4g
Update Rate (Max.)	PVT ^① : 10 Hz IMU raw data: 26 Hz*	GNSS raw data: 10 Hz	GNSS raw data: 10 Hz IMU raw data: 100 Hz	GNSS raw data: 10 Hz
Interfaces				
UART	× 2 UART1/UART2: 115200–921600 bps (Adjustable) 460800 bps (Default)	× 2 UART1: 115200–921600 bps (Adjustable) 460800 bps (Default) UART2: 460800 bps	× 2 UART1: 115200–921600 bps (Adjustable) 460800 bps (Default) UART2: 460800 bps	× 2 UART1: 115200–921600 bps (Adjustable) 460800 bps (Default) UART2*: TBD
Protocols				
Protocols	NMEA 0183/RTCM 3.x	RTCM 3.x	RTCM 3.x	RTCM 3.x
External Antenna Interface				
Antenna Type	Active	Active	Active	Active
Antenna Power Supply	External or Internal (through VDD_RF)	External or Internal (through VDD_RF)	External or Internal (through VDD_RF)	External or Internal (through VDD_RF)
Electrical Characteristics				
Supply Voltage Range	3.0–3.6 V, Typ. 3.3 V	3.0–3.6 V, Typ. 3.3 V	3.0–3.6 V, Typ. 3.3 V	3.0–3.6 V, Typ. 3.3 V @ VCC 1.14–1.29 V, Typ. 1.2 V @ VCC_CORE
I/O Voltage	VCC	VCC	VCC	VCC
Current Consumption (@ Default Constellations, 3.3 V) ^④	Normal Operation: Acquisition: TBD Tracking: TBD Power Saving Mode: Backup mode: TBD	Normal Operation: Acquisition: 295 mA Tracking: 295 mA Power Saving Mode: Backup mode: 55 µA	Normal Operation: Acquisition: 245 mA Tracking: 245 mA Power Saving Mode: Backup mode: 55 µA	Normal Operation: Acquisition: 65 mA* @ VCC Acquisition: 235 mA* @ VCC_CORE Tracking: 65 mA* @ VCC Tracking: 236 mA* @ VCC_CORE Power Saving Mode: Backup mode: 110 µA*
Certifications				
Regulatory	Europe: CE*	-	-	Europe: CE*
Others	RoHS	RoHS	RoHS	RoHS, ASIL-B*
Quality & Reliability				
Quality & Reliability	-	Manufactured and fully tested in ISO/TS 16949 certified production sites	Manufactured and fully tested in ISO/TS 16949 certified production sites	Manufactured and fully tested in ISO/TS 16949 certified production sites

NOTE:

- ① PVT stands for Position, Velocity and Time.
- ② CEP, 50 %, 24 hours static, -130 dBm and more than 6 SVs.
- ③ CEP, 50 %, with active high-precision antennas in an open-sky environment and within 1 km from the base station.
- ④ CEP, 50 %, all satellites at -130 dBm.
- ⑤ Demonstrated with a low noise external LNA.

- ⑥ ITAR limits.
- * Preliminary data.
- * Under development/planning.
- All measurements are conducted at room temperature.

Quectel LG69T Series

GNSS Module	LG69T (AD)	LG69T (AA)	LG69T (AM)	LG69T (AS)
Dimensions (mm)	22.0 × 17.0 × 3.1	22.0 × 17.0 × 3.1	22.0 × 17.0 × 3.3	22.0 × 17.0 × 3.3
Weight (g)	Approx. 1.9	Approx. 1.9	Approx. 1.9	Approx. 1.9
Temperature Range				
Operating Temperature	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C
Storage Temperature	-40 °C to +95 °C	-40 °C to +95 °C	-40 °C to +95 °C	-40 °C to +95 °C
GNSS Features				
Supported Bands	GPS/QZSS: L1 C/A; L5 Galileo: E1; E5a BDS: B1I; B2a	GPS/QZSS: L1 C/A; L5 Galileo: E1; E5a BDS: B1I; B2a	GPS: L1 C/A; L5 Galileo: E1; E5a BDS: B1I; B2a	GPS/QZSS: L1 C/A; L5 Galileo: E1; E5a BDS: B1I; B2a
Function(s)	PVT ^① /GNSS raw data ^②	IMU raw data + DR/ IMU raw data + GNSS raw data ^②	PVT ^① (RTK)	Base station
Integrated IMU	-	Supported	-	-
Default GNSS Constellations	GPS + BDS + Galileo + QZSS	GPS + BDS + Galileo + QZSS	GPS + BDS + Galileo	GPS + BDS + Galileo + QZSS
Channels	80 Tracking Channels 4 Fast Acquisition Channels	80 Tracking Channels 4 Fast Acquisition Channels	80 Tracking Channels 4 Fast Acquisition Channels	80 Tracking Channels 4 Fast Acquisition Channels
SBAS	WAAS, EGNOS*, MSAS and GAGAN	WAAS, EGNOS*, MSAS and GAGAN	-	-
Horizontal Position Accuracy	Autonomous ^③ : 1.0 m RTK ^④ : Centimeter level (Depending on external Precision Positioning Engine)	Autonomous ^③ : 1.0 m RTK ^④ : Centimeter level (Depending on external Precision Positioning Engine)	Autonomous ^③ : 1.0 m RTK ^④ : 0.01 m + 1ppm	-
Velocity Accuracy ^⑤	Without Aid: 0.1 m/s	Without Aid: 0.1 m/s	Without Aid: 0.1 m/s	-
Acceleration Accuracy ^⑤	Without Aid: 0.1 m/s ²	Without Aid: 0.1 m/s ²	Without Aid: 0.1 m/s ²	-
Convergence Time	-	-	RTK ^④ : 10 s	-
Accuracy of 1PPS Signal ^⑤	100 ns	100 ns	100 ns	100 ns
TTFF (with AGNSS)	Cold Start: TBD	Cold Start: TBD	-	-
TTFF (without AGNSS) ^⑥	Cold Start: 36 s Warm Start: 30 s Hot Start: 3 s	Cold Start: 36 s Warm Start: 30 s Hot Start: 3 s	Cold Start: 40 s Warm Start: TBD Hot Start: 4.5 s	-
Sensitivity (@ Default Constellations) ^⑥	Acquisition: -145 dBm Tracking: -160 dBm Reacquisition: -153 dBm	Acquisition: -145 dBm Tracking: -160 dBm Reacquisition: -153 dBm	Acquisition: -145 dBm Tracking: -160 dBm Reacquisition: -153 dBm	Acquisition: -145 dBm Tracking: -159 dBm Reacquisition: -153 dBm
Dynamic Performance ^⑥	Maximum Altitude: 18000 m Maximum Velocity ^⑦ : 515 m/s Maximum Acceleration ^⑦ : 4g	Maximum Altitude: 18000 m Maximum Velocity ^⑦ : 515 m/s Maximum Acceleration ^⑦ : 4g	Maximum Altitude: 18000 m Maximum Velocity ^⑦ : 515 m/s Maximum Acceleration ^⑦ : 4g	Maximum Altitude: 18000 m Maximum Velocity ^⑦ : 515 m/s Maximum Acceleration ^⑦ : 4g
Update Rate (Max.)	PVT ^① : 1 Hz GNSS raw data: 10 Hz	PVT ^① (DR): 1 Hz GNSS raw data: 10 Hz IMU raw data: 100 Hz	PVT ^① : 10 Hz	GNSS raw data: 1 Hz
Interfaces				
UART	× 2 UART1: 115200–921600 bps (Adjustable) 460800 bps (Default) UART2: 460800 bps	× 2 UART1: 115200–921600 bps (Adjustable) 460800 bps (Default) UART2: 460800 bps	× 2 UART1/UART2: 115200–921600 bps (Adjustable) 460800 bps (Default)	× 2 UART1/UART2: 115200–921600 bps (Adjustable) 460800 bps (Default)
Protocols				
Protocols	NMEA 0183/RTCM 3.x	NMEA 0183/RTCM 3.x	NMEA 0183/RTCM 3.x	RTCM 3.x
External Antenna Interface				
Antenna Type	Active	Active	Active	Active
Antenna Power Supply	External or Internal (through VDD_RF)	External or Internal (through VDD_RF)	External or Internal (through VDD_RF)	External or Internal (through VDD_RF)
Electrical Characteristics				
Supply Voltage Range	3.0–3.6 V, Typ. 3.3 V	3.0–3.6 V, Typ. 3.3 V	3.0–3.6 V, Typ. 3.3 V	3.0–3.6 V, Typ. 3.3 V
I/O Voltage	VCC	VCC	VCC	VCC
Current Consumption (@Default Constellations, 3.3 V) ^⑤	Normal Operation: Acquisition: 219 mA Tracking: 216 mA Power Saving Mode: Backup mode: 55 µA	Normal Operation: Acquisition: 242 mA Tracking: 237 mA Power Saving Mode: Backup mode: 55 µA	Normal Operation: Acquisition: 340 mA Tracking: 345 mA Power Saving Mode: Backup mode: 55 µA	Normal Operation: Acquisition: 360 mA Tracking: 360 mA Power Saving Mode: Backup mode: 55 µA
Certifications				
Regulatory	Europe: CE	Europe: CE	Europe: CE	Europe: CE
Others	RoHS	RoHS	RoHS	RoHS
Quality & Reliability				
Quality & Reliability	Manufactured and fully tested in ISO/TS 16949 certified production sites	Manufactured and fully tested in ISO/TS 16949 certified production sites	Manufactured and fully tested in ISO/TS 16949 certified production sites	Manufactured and fully tested in ISO/TS 16949 certified production sites

NOTE:

- ① PVT stands for Position, Velocity and Time.
- ② DR function and GNSS raw data are supported by different firmware versions.
- ③ CEP, 50 %, 24 hours static, -130 dBm, more than 6 SVs.
- ④ CEP, 50 %, with active high-precision antennas in an open-sky environment and within 1 km from the base station.
- ⑤ CEP, 50 %, all satellites at -130 dBm.
- ⑥ Demonstrated with a low noise external LNA.
- ⑦ ITR limits.
- ♦ Preliminary data.
- * Under development/planning.
10. All measurements are conducted at room temperature.