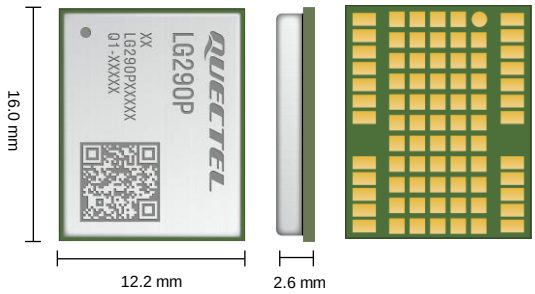
Quectel LG290P Series

Multi-Constellation and Quad-Band High-Precision GNSS Modules



Quectel LG290P series is a quad-band, multi-constellation high-precision GNSS module series, which supports simultaneous reception of GPS, GLONASS, Galileo, BDS, QZSS and NavIC constellations, as well as SBAS augmentation systems (WAAS, EGNOS, BDSBAS, MSAS, GAGAN and SDCM). It also supports Precise Point Positioning services like PPP-B2b and PPP-HAS.

The LG290P series integrates professional-grade interference detection and cancellation algorithm to effectively mitigate multiple narrow-band interferences, significantly enhancing signal reception performance, particularly in complex electromagnetic environments. Furthermore, it supports multi-constellation, quad-band RTK algorithms, ensuring fast and reliable high-precision positioning even in challenging environments like urban canyons and under dense foliage. Notably, the series features the RTK HOLD function, which leverages observation data model prediction technology to maintain high-precision positioning for up to 10 minutes during unexpected RTK differential service interruptions.

The LG290P series supports integrity information detection functions, such as protection levels, which can assist in control decision-making for applications like automated navigation. Firmware security is fortified via on-chip memory ECC (Error Correction Code) verification and the Secure Boot mode. Additionally, the module offers extensive peripheral interfaces, including UART and I2C*, to meet diverse user application requirements.

With its high precision and low power consumption, the LG290P series is an ideal choice for high-precision navigation applications such as intelligent robots, precision agriculture, mining, surveying and mapping, lawn mower and autonomous driving.

Key Features

- Multi-GNSS constellation for GPS, GLONASS, Galileo, BDS, QZSS and NavIC
- SBAS system (WAAS, EGNOS, BDSBAS, MSAS, GAGAN and SDCM)
- Reception of L1, L2, L5 and E6 GNSS quad-band signals concurrently
- High update rate up to 20 Hz even in RTK mode
- Quad-band RTK with fast convergence time and high accuracy
- Excellent urban canyon performance
- Built-in professional-grade NIC anti-jamming unit to suppress multiple narrow-band interference sources
- Abundant interfaces: UART and I2C*(Only supported by LG290P (03))
- PPP-HAS E6/PPP-B2b/RTKHOLD/AGNSS* technology


Multi-constellation


Quad-band


High update rate


Tracking Sensitivity: -160 dBm


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


Anti-jamming


RoHS Compliant


Ultracompact Size


AGNSS Technology

Version: 1.4 | Status: Released

Quectel LG290P Series

GNSS Module	LG290P (03)	LG290P (09)
Dimensions	12.2 mm × 16.0 mm × 2.6 mm	12.2 mm × 16.0 mm × 2.6 mm
Weight	Approx. 0.9 g	Approx. 0.9 g
Temperature Range		
Operating Temperature	-40 °C to +85 °C	-40 °C to +85 °C
Storage Temperature	-40 °C to +95 °C	-40 °C to +95 °C
GNSS Features		
Supported Bands	GPS: L1 C/A, L1C*, L5, L2C GLONASS: L1, L2 Galileo: E1, E5a, E5b, E6 BDS: B1I, B1C, B2a, B2b, B2I, B3I QZSS: L1 C/A, L1C*, L5, L2C, L6 NavIC: L5 SBAS: L1	GPS: L1 C/A, L1C*, L5, L2C GLONASS: L1, L2 Galileo: E1, E5a, E5b, E6 BDS: B1I, B1C, B2a, B2b, B2I, B3I QZSS: L1 C/A, L1C*, L5, L2C, L6 NavIC: L5 SBAS: L1
Default Constellations	GPS + GLONASS + Galileo + BDS + QZSS + NavIC	GPS + GLONASS + Galileo + BDS + QZSS + NavIC
Number of Tracking Channels	1040	1040
Number of Concurrent GNSS	5 + QZSS	5 + QZSS
SBAS	WAAS, EGNOS, BDSBAS, MSAS, GAGAN and SDCM	WAAS, EGNOS, BDSBAS, MSAS, GAGAN and SDCM
Horizontal Position Accuracy	Autonomous①: 0.7 m RTK②: 0.8 cm + 1 ppm	Autonomous①: 0.7 m RTK②: 0.8 cm + 1 ppm
Vertical Accuracy	Autonomous①: 2.5 m RTK②: 1.5 cm + 1 ppm	Autonomous①: 2.5 m RTK②: 1.5 cm + 1 ppm
Velocity Accuracy③	Without Aid: 0.03 m/s	Without Aid: 0.03 m/s④
Accuracy of 1PPS Signal③ (1σ)	5 ns	5 ns
RTK Convergence Time②	5 s	5 s
TTFF③ (without AGNSS)	Cold Start: 28 s Warm Start: 28 s Hot Start: 1.7 s	Cold Start: 28 s Warm Start: 28 s Hot Start: 1.7 s
Sensitivity⑤ (@ Default Constellations)	Acquisition: -146 dBm Tracking: -160 dBm Reacquisition: -155 dBm	Acquisition: -146 dBm Tracking: -160 dBm Reacquisition: -155 dBm
Dynamic Performance③	Maximum Altitude: 18000 m Maximum Velocity: 515 m/s Maximum Acceleration: 4g	Maximum Altitude: 18000 m Maximum Velocity: 10 m/s Maximum Acceleration: -
Update Rate	Default: 10 Hz Max. 20 Hz	Default: 10 Hz Max. 20 Hz
Certifications		
Regulatory	**Europe**: CE	**Europe**: CE
Others	RoHS	RoHS
Interfaces		
I2C*	× 1 Data rate up to 400 kbps	-
UART	× 3 (UART1, UART2 and UART3) Adjustable: 9600–921600 bps Default: 460800 bps	× 3 (UART1, UART2 and UART3) Adjustable: 9600–921600 bps Default: 460800 bps
Protocols		
Protocols	NMEA 0183/RTCM 3.x	NMEA 0183/RTCM 3.x
Antenna Interface		
Antenna Type	External active antenna⑥	External active antenna⑥
Antenna Power Supply	External or Internal (via VDD_RF)	External or Internal (via VDD_RF)
Electrical Characteristics		
Supply Voltage Range (VCC)	3.0–3.6 V, Typ. 3.3 V	3.0–3.6 V, Typ. 3.3 V
I/O Voltage	Following VCC	Following VCC
Power Consumption③ (@ 3.3 V, Default Constellations)	**Normal Operation:** 99 mA (326.7 mW) @ Acquisition 99 mA (326.7 mW) @ Tracking **Power Saving Mode:** 18 μA (59.4 mW) @ Backup Mode	**Normal Operation:** 105.4 mA (347.82 mW) @ Acquisition 106.4 mA (351.12 mW) @ Tracking **Power Saving Mode:** 18 μA (59.4 mW) @ Backup Mode

NOTE:
*: Under development.
1. ①: CEP 50%; 24 hours static; instrument configuration: GPS L1 + L5, Galileo E1 + E5a and BDS B1I + B2a; -130 dBm.
2. ②: CEP 50%, with active high-precision GNSS antenna in an open-sky environment and within 1 km of the base station.
3. ③: Tested at room temperature, with typical operating voltage, and satellite signal of -130 dBm configured by the instrument.
4. ④: The LG290P (09) module is not designed for operating at 3D velocities exceeding 10 m/s.
5. ⑤: Tested with two external LNA with 18.5 dB gain and 0.85 dB noise figure (During the sensitivity test of tracking, ensure that there are no less than 12 satellites for GPS L1 and L5, 10 satellites for BDS B1I and B2a, and 10 satellites for Galileo E1 and E5a).
6. ⑥: To further mitigate the impact of out-of-band signals on GNSS module performance, you must choose the active antenna whose SAW filter is placed in front of the LNA in the internal framework. DO NOT place the LNA in the front.

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