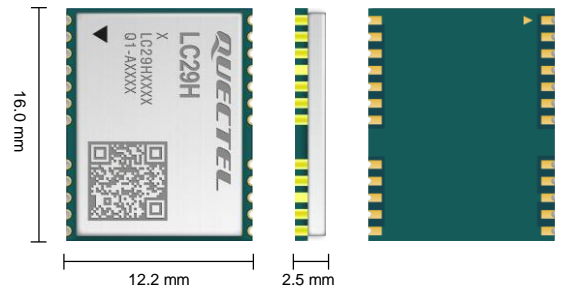


# Quectel LC29H Series

## Dual-Band Multi-Constellation GNSS Module with RTK and DR Functions



LC29H is a series of dual-band, multi-constellation GNSS modules that support the concurrent reception of global GNSS constellations such as GPS, BDS, Galileo and GLONASS.

Compared to GNSS modules that track only L1 signals, the LC29H series can track a higher number of visible satellites in multi bands, thereby significantly mitigating the multipath effect in deep urban canyons and improving positioning accuracy. By having an internal LNA and SAW filter, the module achieves improved sensitivity and anti-interference capability. Featuring dual frequency support, the module delivers enhanced accuracy values of 1 m in autonomous mode and centimeter levels in the RTK capable variants. The optional DR function ensures the module's superior positioning performance even in weak signal areas or when GNSS signals are not available.

Based on the receiver chip using 12 nm technology, the LC29H series provides advanced power management enabling low-power GNSS sensing and position fix, which makes the module an ideal solution for power-sensitive and battery-powered systems.

Featuring high-precision positioning and low power consumption makes the LC29H series perfectly suited for applications such as real time tracking and sharing economy related services.



## Key Features

- ✓ Multi-GNSS engine for GPS, GLONASS, BDS, Galileo and QZSS
- ✓ Reception of L1 and L5 GNSS bands signals concurrently
- ✓ Integrated DR function (optional)
- ✓ RTK (optional) providing sub-meter accuracy with fast convergence time and outstanding performance
- ✓ Output GNSS and IMU raw data messages (optional)
- ✓ Integrated LNA for high sensitivity
- ✓ Integrated SAW filter for noise cancellation
- ✓ UART, I2C and SPI\* interfaces
- ✓ Integrated AGNSS function
- ✓ Integrated AIC and jamming function



AGNSS Technology



Ultra Low Power Consumption



Ultra Compact Size



Tracking Sensitivity: -165 dBm



Operating Temperature Range: -40 to +85 °C



Anti-jamming



RoHS Compliant



Multi-constellation System

# Quectel LC29H Series

GNSS Module	LC29H (AA)	LC29H (BA)	LC29H (CA)
<b>Dimensions</b>	12.2 mm × 16.0 mm × 2.5 mm	12.2 mm × 16.0 mm × 2.5 mm	12.2 mm × 16.0 mm × 2.5 mm
<b>Weight</b>	Approx. 0.9 g	Approx. 0.9 g	Approx. 0.9 g
<b>Temperature Range</b>			
<b>Operating Temperature</b>	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C
<b>Storage Temperature</b>	-40 °C to +90 °C	-40 °C to +90 °C	-40 °C to +90 °C
<b>GNSS Features</b>			
<b>Supported Bands</b>	GPS/ QZSS: L1 C/A, L5 GLONASS: L1 Galileo: E1, E5a BDS: B1I, B2a	GPS/ QZSS: L1 C/A, L5 GLONASS: L1 Galileo: E1, E5a BDS: B1I, B2a	GPS/ QZSS: L1 C/A, L5 GLONASS: L1 Galileo: E1, E5a BDS: B1I, B2a
<b>Default GNSS Constellations</b>	GPS + GLONASS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS
<b>Number of Concurrent GNSS</b>	4 + QZSS	4 + QZSS	4 + QZSS
<b>SBAS</b>	WAAS, EGNOS, MSAS and GAGAN	WAAS*, EGNOS*, MSAS* and GAGAN*	WAAS*, EGNOS*, MSAS* and GAGAN*
<b>Function(s)</b>	Standard	RTK + DR (integrated IMU)	DR (integrated IMU)
<b>Horizontal Position Accuracy</b>	Autonomous <sup>①</sup> : 1 m	Autonomous <sup>①</sup> : 1 m RTK <sup>②</sup> : < 0.1 m + 1 ppm	Autonomous <sup>①</sup> : 1 m
<b>DR Position Error (ADR)</b>	-	4-wheeler: < 2 % of distance traveled without GNSS 2-wheeler: < 4 % of distance traveled without GNSS	4-wheeler: < 2 % of distance traveled without GNSS 2-wheeler: < 4 % of distance traveled without GNSS
<b>DR Position Error (UDR)</b>	-	4-wheeler: < 3 % of distance traveled without GNSS 2-wheeler: < 6 % of distance traveled without GNSS	4-wheeler: < 3 % of distance traveled without GNSS 2-wheeler: < 6 % of distance traveled without GNSS
<b>Velocity Accuracy<sup>③</sup></b>	0.03 m/s	0.03 m/s	0.03 m/s
<b>Accuracy of 1PPS Signal<sup>③</sup></b>	20 ns	20 ns	20 ns
<b>RTK Convergence Time</b>	-	RTK <sup>②</sup> : < 10 s	-
<b>TTF (with AGNSS)<sup>④</sup></b>	Full Cold Start: 5 s	Full Cold Start: 5 s	Full Cold Start: 5 s
<b>TTF (without AGNSS)<sup>③</sup></b>	Full Cold Start: 26 s Warm Start: 16 s Hot Start: 1 s	Full Cold Start: 26 s Warm Start: 16 s Hot Start: 1 s	Full Cold Start: 26 s Warm Start: 16 s Hot Start: 1 s
<b>Sensitivity</b>	Acquisition: -147 dBm Tracking: -165 dBm Reacquisition: -159 dBm	Acquisition: -145 dBm Tracking: -165 dBm Reacquisition: -157 dBm	Acquisition: -145 dBm Tracking: -165 dBm Reacquisition: -157 dBm
<b>Dynamic Performance<sup>③</sup></b>	Maximum Altitude: 10000 m Maximum Velocity <sup>⑤</sup> : 500 m/s Maximum Acceleration <sup>⑥</sup> : 4g	Maximum Altitude: 10000 m Maximum Velocity <sup>⑤</sup> : 500 m/s Maximum Acceleration <sup>⑥</sup> : 4g	Maximum Altitude: 10000 m Maximum Velocity <sup>⑤</sup> : 500 m/s Maximum Acceleration <sup>⑥</sup> : 4g
<b>Nav. Update Rate</b>	1–10 Hz	1 Hz/ 10 Hz	1 Hz/ 10 Hz
<b>Raw Data Update Rate</b>	GNSS: 1 Hz	GNSS: 1 Hz IMU: 100 Hz (Max.)*	GNSS: 1 Hz IMU: 100 Hz (Max.)*
<b>Certifications</b>			
<b>Regulatory</b>	Europe: CE	Europe: CE	Europe: CE
<b>Others</b>	RoHS	RoHS	RoHS
<b>Interfaces</b>			
<b>I2C</b>	Up to 400 kbps	Up to 400 kbps	Up to 400 kbps
<b>UART</b>	Adjustable: 9600–3000000 bps Default: 115200 bps	Adjustable: 9600–3000000 bps Default: 115200 bps	Adjustable: 9600–3000000 bps Default: 115200 bps
<b>Protocol</b>			
<b>Protocol</b>	NMEA 0183/ RTCM 3.x	NMEA 0183/ RTCM 3.x	NMEA 0183/ RTCM 3.x
<b>External Antenna Interface</b>			
<b>Antenna Type</b>	Active or Passive	Active or Passive	Active or Passive
<b>Antenna Power Supply</b>	External or VDD_RF pin of module	External or VDD_RF pin of module	External or VDD_RF pin of module
<b>Electrical Characteristics</b>			
<b>Supply Voltage Range</b>	3.1–3.6 V, Typ. 3.3 V	3.1–3.6 V, Typ. 3.3 V	3.1–3.6 V, Typ. 3.3 V
<b>I/O Voltage</b>	Typ. 2.8 V	Typ. 2.8 V	Typ. 2.8 V
<b>Current Consumption (@ Default GNSS Constellations, 3.3 V)<sup>③</sup></b>	<b>Normal Operation:</b> 23 mA (75.9 mW) @ Acquisition 23 mA (75.9 mW) @ Tracking <b>Power Saving Mode:</b> 22 µA (0.073 mW) @ Backup Mode	<b>Normal Operation:</b> 32 mA (105.6 mW) @ Acquisition 32 mA (105.6 mW) @ Tracking <b>Power Saving Mode:</b> 22 µA (0.073 mW) @ Backup Mode	<b>Normal Operation:</b> 30 mA (99 mW) @ Acquisition 30 mA (99 mW) @ Tracking <b>Power Saving Mode:</b> 22 µA (0.073 mW) @ Backup Mode

**NOTE:**

- ①: CEP, 50 %, 24 hours static, -130 dBm, more than 6 SVs.
- ②: CEP, 50 %, with active high-precision antennas in an open-sky environment and within 1 km from the base station.
- ③: Room temperature, all satellites at -130 dBm.
- ④: Open-sky, active high-precision antennas; less than 1 km baseline length is also required for LC29H (BA, DA, EA).
- ⑤: ITAR limits.
- ⑥: \* : Under development.

# Quectel LC29H Series

GNSS Module	LC29H (DA)	LC29H (EA)	LC29H (BS)
<b>Dimensions</b>	12.2 mm × 16.0 mm × 2.5 mm	12.2 mm × 16.0 mm × 2.5 mm	12.2 mm × 16.0 mm × 2.5 mm
<b>Weight</b>	Approx. 0.9 g	Approx. 0.9 g	Approx. 0.9 g
<b>Temperature Range</b>			
<b>Operating Temperature</b>	-40 °C to +85 °C	-40 °C to +85 °C	-40 °C to +85 °C
<b>Storage Temperature</b>	-40 °C to +90 °C	-40 °C to +90 °C	-40 °C to +90 °C
<b>GNSS Features</b>			
<b>Supported Bands</b>	GPS/ QZSS: L1 C/A, L5 GLONASS: L1 Galileo: E1, E5a BDS: B1I, B2a	GPS/ QZSS: L1 C/A, L5 GLONASS: L1 Galileo: E1, E5a BDS: B1I, B2a	GPS/ QZSS: L1 C/A, L5 GLONASS: L1 Galileo: E1, E5a BDS: B1I, B2a
<b>Default GNSS Constellations</b>	GPS + GLONASS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS
<b>Number of Concurrent GNSS</b>	4 + QZSS	4 + QZSS	4 + QZSS
<b>SBAS</b>	WAAS, EGNOS, MSAS and GAGAN	WAAS*, EGNOS*, MSAS* and GAGAN*	-
<b>Function(s)</b>	RTK	RTK	Base station
<b>Horizontal Position Accuracy</b>	Autonomous <sup>①</sup> : 1 m RTK <sup>②</sup> : 1 cm + 1 ppm	Autonomous <sup>①</sup> : 1 m RTK <sup>②</sup> : 1 cm + 1 ppm	-
<b>DR Position Error (ADR)</b>	-	-	-
<b>DR Position Error (UDR)</b>	-	-	-
<b>Velocity Accuracy<sup>③</sup></b>	0.03 m/s	0.03 m/s	-
<b>Accuracy of 1PPS Signal<sup>③</sup></b>	20 ns	20 ns	-
<b>RTK Convergence Time</b>	RTK <sup>②</sup> : < 10 s	RTK <sup>②</sup> : < 10 s	-
<b>TTFF (with AGNSS)<sup>④</sup></b>	Full Cold Start: 5 s	Full Cold Start: 5 s	-
<b>TTFF (without AGNSS)<sup>③</sup></b>	Full Cold Start: 26 s Warm Start: 16 s Hot Start: 1 s	Full Cold Start: 26 s Warm Start: 16 s Hot Start: 1 s	-
<b>Sensitivity</b>	Acquisition: -145 dBm Tracking: -165 dBm Reacquisition: -157 dBm	Acquisition: -145 dBm Tracking: -165 dBm Reacquisition: -157 dBm	Acquisition: -147 dBm Tracking: -165 dBm Reacquisition: -159 dBm
<b>Dynamic Performance<sup>③</sup></b>	Maximum Altitude: 10000 m Maximum Velocity <sup>⑤</sup> : 500 m/s Maximum Acceleration <sup>⑤</sup> : 4g	Maximum Altitude: 10000 m Maximum Velocity <sup>⑤</sup> : 500 m/s Maximum Acceleration <sup>⑤</sup> : 4g	Maximum Altitude: 10000 m Maximum Velocity <sup>⑤</sup> : 500 m/s Maximum Acceleration <sup>⑤</sup> : 4g
<b>Nav. Update Rate</b>	RTK: 1 Hz	RTK: 1–10 Hz	1–10 Hz
<b>Raw Data Update Rate</b>	GNSS: 1 Hz	GNSS: 10 Hz	GNSS: 1 Hz
<b>Certifications</b>			
<b>Regulatory</b>	Europe: CE	Europe: CE	Europe: CE
<b>Others</b>	RoHS	RoHS	RoHS
<b>Interfaces</b>			
<b>I2C</b>	Up to 400 kbps	Up to 400 kbps	Up to 400 kbps
<b>UART</b>	Adjustable: 9600–3000000 bps Default: 115200 bps	Adjustable: 9600–3000000 bps Default: 460800 bps	Adjustable: 9600–3000000 bps Default: 115200 bps
<b>Protocol</b>			
<b>Protocol</b>	NMEA 0183/ RTCM 3.x	NMEA 0183/ RTCM 3.x	NMEA 0183/ RTCM 3.x
<b>External Antenna Interface</b>			
<b>Antenna Type</b>	Active or Passive	Active or Passive	Active
<b>Antenna Power Supply</b>	External or VDD_RF pin of module	External or VDD_RF pin of module	External or VDD_RF pin of module
<b>Electrical Characteristics</b>			
<b>Supply Voltage Range</b>	3.1–3.6 V, Typ. 3.3 V	3.1–3.6 V, Typ. 3.3 V	3.1–3.6 V, Typ. 3.3 V
<b>I/O Voltage</b>	Typ. 2.8 V	Typ. 2.8 V	Typ. 2.8 V
<b>Current Consumption (@ Default GNSS Constellations, 3.3 V)<sup>③</sup></b>	<b>Normal Operation:</b> 30 mA (99 mW) @ Acquisition 30 mA (99 mW) @ Tracking <b>Power Saving Mode:</b> 22 µA (0.073 mW) @ Backup Mode	<b>Normal Operation:</b> 30 mA (99 mW) @ Acquisition 30 mA (99 mW) @ Tracking <b>Power Saving Mode:</b> 22 µA (0.073 mW) @ Backup Mode	<b>Normal Operation:</b> 23 mA (75.9 mW) @ Acquisition 23 mA (75.9 mW) @ Tracking <b>Power Saving Mode:</b> 22 µA (0.073 mW) @ Backup Mode

NOTE:

- ①: CEP, 50 %, 24 hours static, -130 dBm, more than 6 SVs.
- ②: CEP, 50 %, with active high-precision antennas in an open-sky environment and within 1 km from the base station.
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