Quectel GNSS Module

Product Overview

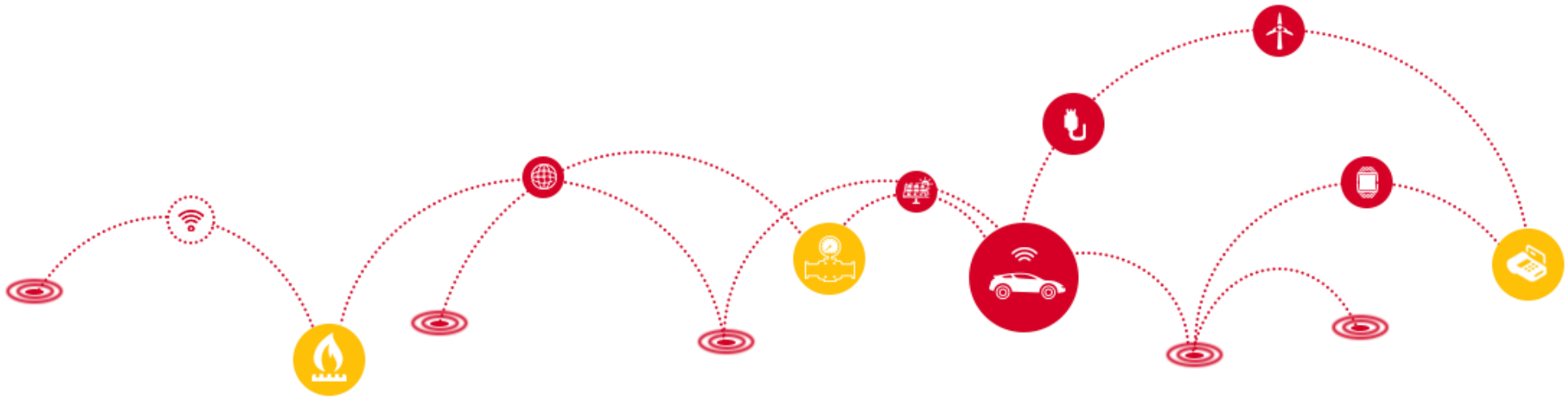
February, 2020

GNSS Module Roadmap

Product Overview

Technologies

Application



GNSS Modules Roadmap

GPS Only		**L70 series** L70/ L70-R/ L70-RL					
GNSS		**L76 series** L76-LB/ L76-L/ L76 **L26 series** L26-LB		**L26-DR series** ADR/ UDR versions		**L26-T**	 **L26-P**
Multi-band GNSS				**LC79D series** LC79D (A) – Standalone mode LC79D (B) – Host mode			 **LG69T series** AA/ AF/ AP/ AB versions
Automotive Grade				**L26-DR series** ADRA version			 **LG69T series** AA/ AF/ AP/ AB versions  **L26-T**
Integrated Antenna		**L8x series** L80/ L80-R / L86/ LC86L					

Standard GNSS | **GNSS+DR** | **Timing** | **High Precision (cm level)**

GNSS Modules Summary − L7x Series

Module Series	Dimensions (mm)	Chipset Supplier	Chipset	GNSS	Multi-band GNSS	Precision	Auto Grade	Applications
L7x series	L70/ L70-R	10.1 × 9.7 × 2.5	Airoha	MT3339/7			2.5 m	GPS tracker
	L76-LB	10.1 × 9.7 × 2.5	Airoha	AG3331	●		2.5 m	GNSS tracker/ smart city
	L76/ L76-L	10.1 × 9.7 × 2.5	Airoha	MT3333	●		2.5 m	GNSS tracker
	L76K	10.1 × 9.7 × 2.0	Zhongke Microelectronics	AT6558R	●		2.5 m	GNSS tracker
	LC79D	10.1 × 9.7 × 2.4	Broadcom	BCM47755	●	●	1 m	GNSS tracker / two and four wheels accurate vehicles / sharing mobility/ POS for police officers/ delivery robots

GNSS Modules Summary – L26 Series

Module Series		Dimensions (mm)	Chipset Supplier	Chipset	GNSS	Multi-band GNSS	Precision	Auto Grade	Applications
L26 series	L26-LB	12.2 × 16.0 × 2.3	Airoha	AG3331	●		2.5m		DVR/ T-BOX/ GNSS tracker
	L26-T	12.2 × 16.0 × 2.3	ST	Teseo III	●		2m	●	Timing system (dedicated firmware)
	L26-DR	12.2 × 16.0 × 2.3	ST	Teseo III	●		1~2 m	●	T-BOX/ OBD/ automotive navigation system/ car sharing
	L26-P	12.2 × 16.0 × 2.3	ST	Teseo III	●		< 1 m		T-BOX/ car sharing

GNSS Modules Summary – GNSS with Integrated Antenna

Module Series		Dimensions (mm)	Chipset Supplier	Chipset	GNSS	Multi-band GNSS	Precision	Auto Grade	Applications
L8x series	L80/ L80-R	16.0 × 16.0 × 6.45	Airoha	MT3339/7			2.5 m		GPS tracker/ T-BOX
	L86	18.4 × 18.4 × 6.45	Airoha	MT3333	●		2.5 m		GNSS tracker/ T-BOX
	LC86L	16.0 × 16.0 × 6.45	Airoha	AG3331	●		2.5 m		GNSS tracker/ T-BOX/ smart city
	L89	26.4 × 18.4 × 6.8	ST	Teseo III	●	●	2.5 m		AIS 140 devices
	L89H	26.4 × 18.4 × 6.8	Airoha	AG3335	●	●	1 m		AIS 140 devices
L96	L96	14.0 × 9.6 × 2.0	Airoha	MT3333	●		2.5 m		Wearable devices

GNSS Modules Summary – High Precision GNSS

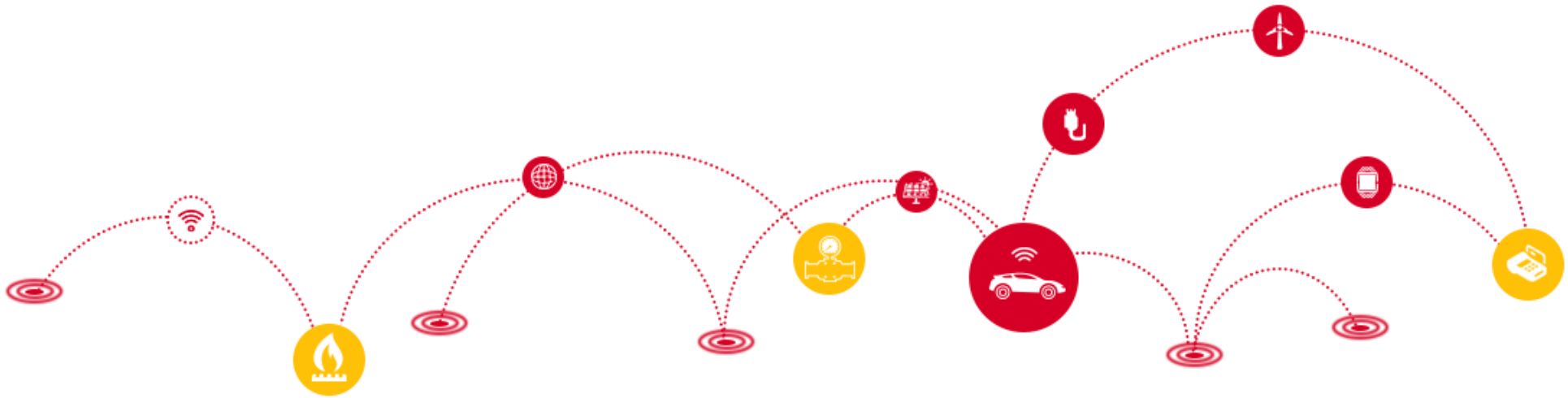
Module Series		Dimensions (mm)	Chipset Supplier	Chipset	GNSS	Multi-band GNSS	Precision	Auto Grade	Applications
L7x series	LC79D	10.1 × 9.7 × 2.4	Broadcom	BCM47755	●	●	1 m		GNSS tracker / two and four wheels accurate vehicles / sharing mobility/ POS for police officers/ delivery robots
L26 series	L26-T	12.2 × 16.0 × 2.3	ST	Teseo III	●		< 1 m	●	Timing system
	L26-P	12.2 × 16.0 × 2.3	ST	Teseo III	●		< 1 m	●	T-BOX/ car sharing
LG69T	LG69T	22.0 × 17.0 × 2.4	ST	Teseo V	●	●	cm	●	ADAS/ autonomous driving/ precision agriculture/ robotic lawn mower/ robot

GNSS Module Roadmap

Product Overview

Technologies

Application

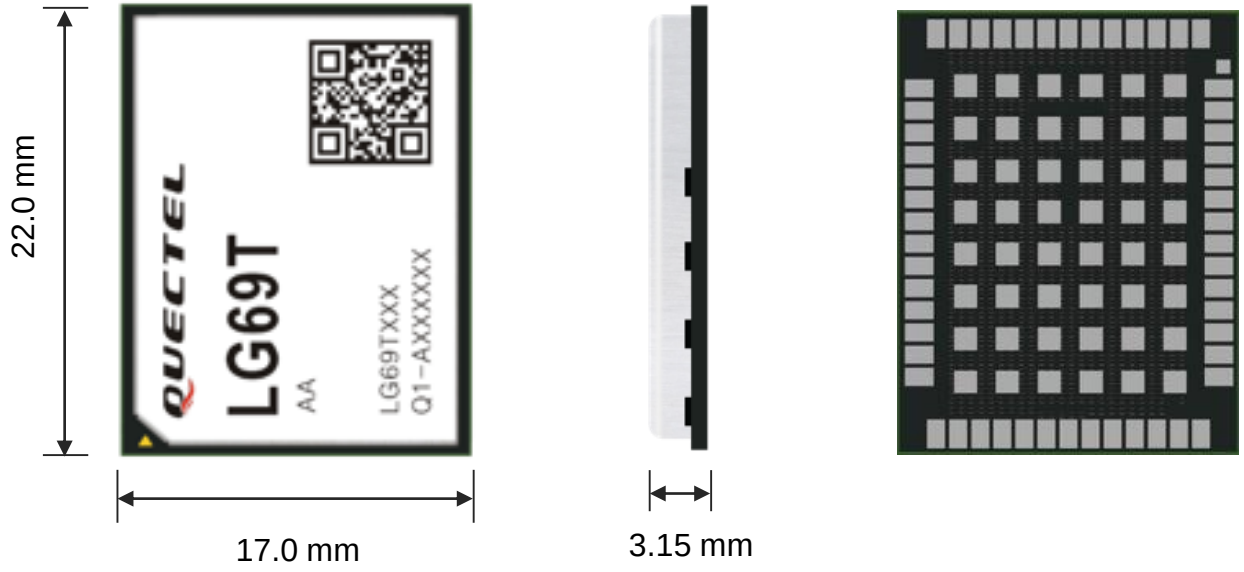


LG69T GNSS Module Overview

LG69T is a series automotive grade, dual-band, high precision GNSS modules based on the fifth generation platform of ST.

The module includes four variants:

- LG69T (AA) features raw data output and has to work with an external application processor.
- LG69T (AF) features dual-band standalone positioning and DR function.
- LG69T (AP) integrates RTK and DR, and therefore outputs high precision results.
- LG69T (AB) is ASILB compliant and supports raw data output.



LG69T series are distinguished from each other with different OCs (ordering codes).

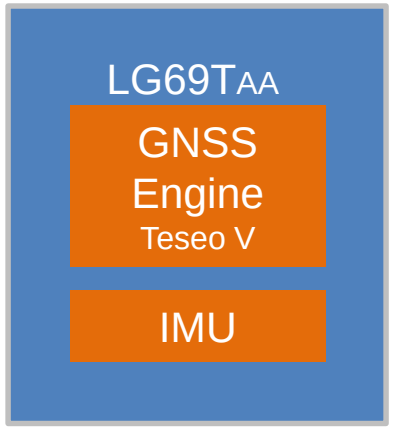
LG69T Series

Dual-Band Automotive Grade GNSS Modules

Automotive Grade

LG69T (AA)

Raw Data Output

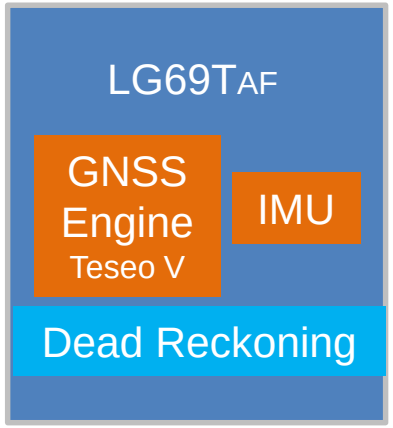


- ST Teseo V
- L1+L5 Dual-Band GNSS
- GNSS Raw Data Output
- Sensor Raw Data Output
- Base station(under plan, no IMU inside)
- Automotive Grade

Automotive Grade

LG69T (AF)

DR Integrated

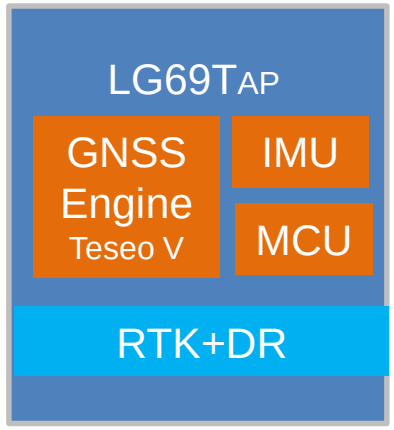


- ST Teseo V
- L1+L5 Dual-Band GNSS
- DR Integrated
- Automotive Grade

Automotive Grade

LG69T (AP)

RTK+DR Integrated



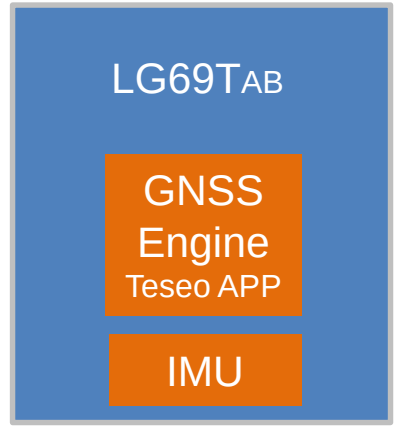
- ST Teseo V
- L1+L5 Dual-Band GNSS
- High Performance MCU Embedded
- RTK+DR Integrated for High Precision Positioning (cm level)
- GNSS Raw Data Output
- Sensor Raw Data Output
- Automotive Grade

Standard Automotive Grade

Automotive Grade

LG69T (AB)

ASIL B Compliant



- ST Teseo App
- L1+L5 Dual-Band GNSS
- GNSS Raw Data Output
- Automotive Grade
- ASIL B Compliant

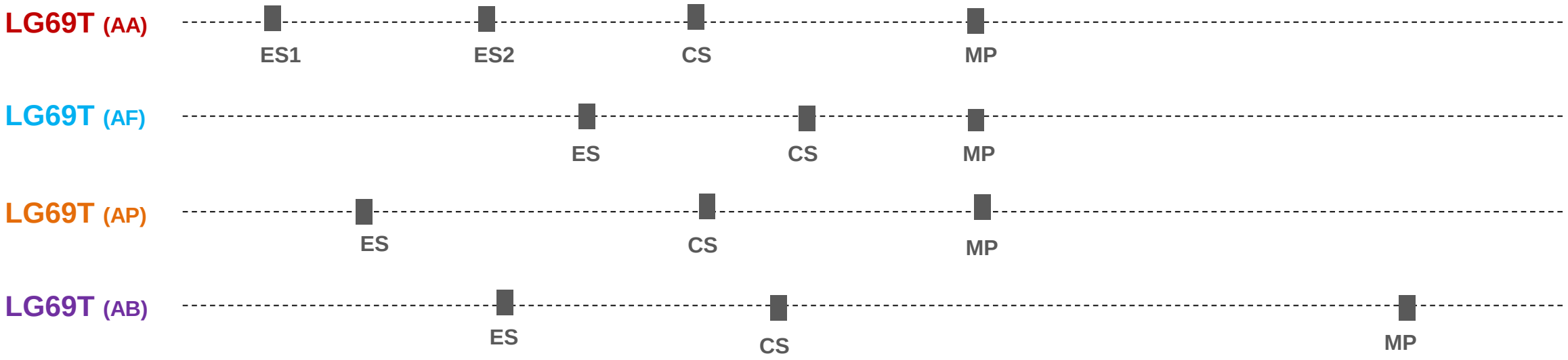
ASILB Grade

LG69T series are distinguished from each other with different OCs (ordering codes).

LG69T Timeline

2019			2020											2021			
Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.

Project Schedule

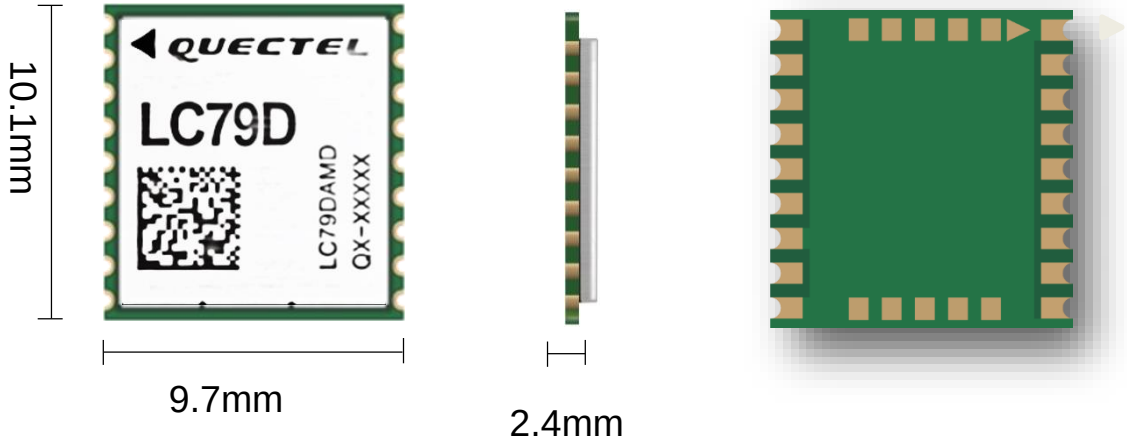


ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.
CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.
MP: Hardware and software ready for mass production. For certification status, please refer to the "certification schedule".

Regulatory Certification Schedule

LC79D GNSS Module Overview

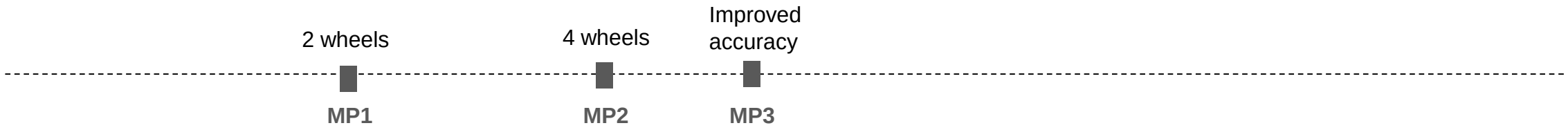
- 28-pin LCC package
- L1+L5 dual band
- Support searching and tracking GPS L1 C/A, GPS L5, GLONASS L1, Galileo E1/E5a, IRNSS L5, BeiDou B1I and QZSS L1/L5 satellites simultaneously
- High sensitivity: -163 dBm @ Tracking
- Default baud rate: 115200 bps
- Power supply voltage: 1.7~1.9 V, typ. 1.8 V
- Integrated LNA
- Dual-SAW integrated for more effective anti-jamming capability
- Quectel proprietary SDK commands are supported
- Support standalone or host mode
- Dead Reckoning supported (based on dedicated firmware versions)



LC79D Timeline

2020											
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

Project Schedule



- Version for standard LC79D has been MP
- MP1: version for two-wheel ADR / UDR
- MP2: version for four-wheel ADR/ UDR
- MP3: version for improved accuracy (sub meter level)

GPS Module Specifications

L70 GPS Module

10.1mm × 9.7mm × 2.5mm
MT3339

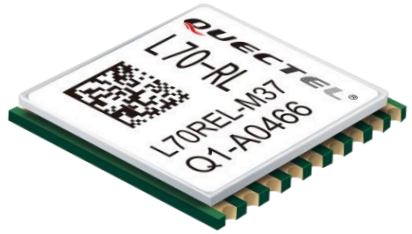
- 18-pin LCC package
- GPS, QZSS
- High sensitivity: -165dBm @Tracking
- Default baud rate: 9600bps
- Voltage 2.8V to 4.3V, 3.3V typ.
- Low power consumption:
  12 mA (GPS)@Tracking mode
  18 mA (GPS)@Acquisition mode
  7 μA @Backup mode
- AGPS function: EASY™ technology, EPO
- Multiple power saving modes (AlwaysLocate™/ Periodic mode/ Standby mode/ Backup mode)
- FLP mode: only 5mA in static receiving
- Support SDK commands

L70-R GPS Module

10.1mm × 9.7mm × 2.5mm
MT3337

- 18-pin LCC package
- GPS, QZSS
- High sensitivity: -165dBm @Tracking
- Default baud rate: 9600bps
- Voltage 2.8V to 4.3V, 3.3V typ.
- Low power consumption:
  13 mA(GPS)@Tracking mode
  16 mA(GPS)@Acquisition mode
  8 μA @Backup mode
- AGPS function: EASY™ technology, EPO
- Multiple power saving modes (Standby mode/ Backup mode)

L70-RL GPS Module



10.1mm × 9.7mm × 2.5mm
MT3337

- 18-pin LCC package
- GPS, QZSS
- High sensitivity: -167dBm @Tracking
- Default baud rate: 9600bps
- Voltage 2.8V to 4.3V, 3.3V typ.
- Low power consumption:
  18 mA(GPS) @Tracking mode
  21 mA(GPS) @Acquisition mode
  8 μA @Backup mode
- AGPS function: EASY™ technology, EPO
- Integrated LNA
- Multiple power saving modes (Standby mode/ Backup mode)

GNSS Module Specifications (1)

L76 GNSS Module

10.1mm × 9.7mm × 2.5mm
MT3333

- 18-pin LCC package
- GPS, GLONASS, Galileo and QZSS
- High sensitivity: -165dBm @Tracking
- Default baud rate: 9600bps
- Voltage 2.8V to 4.3V, 3.3V typ.
- Low power consumption:
  18 mA (GPS+GLONASS) @Tracking mode
  25 mA (GPS+GLONASS) @Acquisition mode
  7 μA @Backup mode
- AGPS function: EASY™ technology, EPO
- Multiple power saving modes (AlwaysLocate™/ Periodic mode/ Standby mode/ Backup mode)
- LOCUS, built-in logger solution
- Support SDK commands

L76-L GNSS Module

10.1mm × 9.7mm × 2.5mm
MT3333

- 18-pin LCC package
- GPS, GLONASS, Galileo and QZSS
- High sensitivity: -167dBm @Tracking
- Default baud rate: 9600bps
- Voltage 2.8V to 4.3V, 3.3V typ.
- Low power consumption:
  22 mA (GPS+GLONASS) @Tracking mode
  29 mA (GPS+GLONASS) @Acquisition mode
  7 μA @Backup mode
- AGPS function: EASY™ technology, EPO
- Integrated LNA
- Multiple power saving modes (AlwaysLocate™/ Periodic mode/ Standby mode/ Backup mode)
- LOCUS, built-in logger solution
- Support SDK commands

L76-LB GNSS Module

10.1mm × 9.7mm × 2.5mm
AG3331

- 18-pin LCC package
- GPS, GLONASS and QZSS
- High sensitivity: -165dBm @Tracking
- Default baud rate: 9600 bps
- Voltage 2.8V to 4.3V, 3.3V typ.
- Low power consumption:
  30.3 mA (GPS+GLONASS) @Tracking mode
  31.6 mA (GPS+GLONASS) @Acquisition mode
  7 μA @Backup mode
- AGPS function: EASY™/ EPO
- Multiple power saving modes: Periodic mode/ Standby mode/ Backup mode

L26-LB GNSS Module

12.2mm × 16.0mm × 2.3mm
AG3331

- 24-pin LCC package
- GPS, GLONASS and QZSS
- High sensitivity: -165dBm @Tracking
- Default baud rate: 9600bps
- Voltage 2.8V to 4.3 V, 3.3V typ.
- Low power consumption:
  28.0 mA (GPS+GLONASS) @Tracking mode
  30.3 mA (GPS+GLONASS) @Acquisition mode
  8.8 μA @Backup mode
- AGPS function: EASY™/ EPO
- Integrated LNA
- Multiple power saving modes: Periodic mode/ Standby mode/ Backup mode
- Short-circuit protection / detection for active antenna
- Support SDK commands

GNSS Module Specifications (2)

L26 GNSS Module

12.2mm × 16.0mm × 2.4mm
MT3333

- 24-pin LCC package
- GPS, GLONASS, Galileo and QZSS
- High Sensitivity: -167dBm @Tracking
- Default baud rate: 9600bps
- Voltage 2.8V to 4.3 V, 3.3V typ.
- Low power consumption:
  21 mA (GPS+GLONASS) @Tracking mode
  29 mA (GPS+GLONASS) @Acquisition mode
  7 μA @Backup mode
- AGPS function: EASY™ technology, EPO
- Integrated LNA
- Multiple power saving modes (AlwaysLocate™/ Periodic mode/ Standby mode/ Backup mode)
- LOCUS, built-in logger solution
- Short-circuit protection / detection for active antenna
- Support SDK commands

L26-DR GNSS Module

12.2mm × 16.0mm × 2.3mm
Teseo III

- 24-pin LCC package
- GPS, BeiDou, GLONASS, Galileo and QZSS
- High Sensitivity: -162dBm @Tracking
- Default baud rate: 115200bps
- Voltage 3.0 V to 3.6 V, 3.3V typ.
- Low power consumption
  58 mA (GPS) @Tracking mode
  72 mA (GPS) @Acquisition mode
- Integrated LNA
- Support DR (Dead Reckoning)
- Support AGPS
- Sensor integrated
- Sensor raw data output
- Host wake up function
- Short-circuit protection / detection for active antenna
- Qualifed with AEC-Q100

L26-T GNSS Module

12.2mm × 16.0mm × 2.3mm
Teseo III

- 24-pin LCC package
- GPS, BeiDou, GLONASS, Galileo and QZSS
- High Sensitivity: -162dBm@Tracking
- Default baud rate: 9600bps
- Voltage 3.0 V to 3.6 V, 3.3V typ.
- Low power consumption
  51 mA (GPS) @Tracking mode
  64 mA (GPS) @Acquisition mode
- Integrated LNA
- Support Timing
- Support raw data output (separate firmware)
- Support AGPS
- Short-circuit protection / detection for active antenna

L26-P* GNSS Module

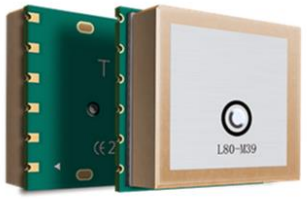
12.2mm × 16.0mm × 2.3mm
Teseo III

- 24-pin LCC package
- GPS, BeiDou, GLONASS, Galileo and QZSS
- Default baud rate: 115200bps
- Voltage 3.0 V to 3.6 V, 3.3V typ.
- Low power consumption
  52 mA (GPS) @Tracking mode
  65 mA (GPS) @Acquisition mode
- Integrated LNA
- Support GNSS raw data and sensor raw data output
- Support AGPS
- Short-circuit protection / detection for active antenna

"" means under development.*
① means preliminary data for reference only.

GNSS Module (with Integrated Antenna) Specifications (1)

L80 GPS Module



16.0mm × 16.0mm × 6.45mm
MT3339

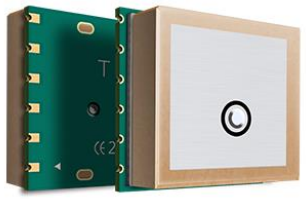
- 12-pin LCC package
- GPS, QZSS
- Patch antenna (15.0mm × 15.0mm × 4.0mm) on the top of module
- High sensitivity: -165dBm @Tracking
- Default baud rate: 9600bps
- Voltage 3.0V to 4.3V, 3.3V typ.
- Low power consumption
  20 mA(GPS) @Tracking mode
  25 mA(GPS) @Acquisition mode
  7 μA @Backup mode
- Short-circuit protection / detection for active antenna
- Active antenna switching function
- Integrated LNA
- Large size of pins (Length=1.5mm; Width=1.0mm)
- AGPS function: EASY™ technology, EPO
- Multiple power saving modes (AlwaysLocate™/ Periodic mode/ Standby mode/ Backup mode)
- FLP mode: only 50% power consumption of normal mode
- LOCUS, built-in logger solution
- Support SDK commands

L86 GNSS Module

18.4mm × 18.4mm × 6.45mm
MT3333

- 12-pin LCC package
- GPS, GLONASS, Galileo and QZSS
- Patch antenna (18.4mm × 18.4mm × 4.0mm) on the top of module
- High sensitivity: -167dBm @Tracking
- Default baud rate: 9600bps
- Voltage 3.0V to 4.3V, 3.3V typ.
- Low power consumption
  26 mA (GLONASS+GPS) @Tracking mode
  30 mA (GLONASS+GPS) @Acquisition mode
  7 μA @Backup mode
- Short-circuit protection / detection for active antenna
- Active antenna switching function
- Integrated LNA
- Large size of pins (Length=1.5mm; Width=1.0mm)
- AGPS function: EASY™ technology, EPO
- Multiple power saving modes (AlwaysLocate™/ Periodic mode/ Standby mode/ Backup mode)
- LOCUS, built-in logger solution
- Support SDK commands

L80-R GPS Module



16.0mm × 16.0mm × 6.45mm
MT3337

- 12-pin LCC package
- GPS, QZSS
- Patch antenna (15.0mm × 15.0mm × 4.0mm) on the top of module
- High sensitivity: -165dBm @Tracking
- Default baud rate: 9600bps
- Voltage 3.0V to 4.3V, 3.3V typ.
- Low power consumption
  20 mA(GPS) @Tracking mode
  25 mA(GPS) @Acquisition mode
  7 μA @Backup mode
- Integrated LNA
- Large size of pins (Length=1.5mm; Width=1.0mm)
- AGPS function: EASY™ technology, EPO
- Multiple power saving modes (Standby mode/ Backup mode)

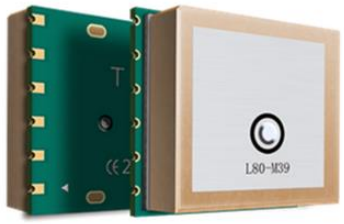
L96 GNSS Module

14.0mm × 9.6mm × 2.0mm
MT3333

- 31-pin LCC package
- GPS, GLONASS, BeiDou, Galileo (RLM supported) and QZSS
- Chip antenna embedded on the top of module
- High sensitivity: -165dBm @Tracking
- Default baud rate: 9600bps
- Voltage 2.8V to 4.3V, 3.3V typ.
- Low power consumption
  20 mA (GLONASS+GPS) @Tracking mode
  25 mA (GLONASS+GPS) @Acquisition mode
  7 μA @Backup mode
- Integrated LNA
- AGPS function: EASY™ technology, EPO
- Multiple power saving modes (AlwaysLocate™/ Periodic mode/ Standby mode/ Backup mode)
- LOCUS, built-in logger solution
- Support SDK commands
- Dual SAW filters integrated for noise cancellation

GNSS Module (with Integrated Antenna) Specifications (2)

LC86L* GNSS Module



16.0mm × 16.0mm × 6.45mm
AG3331

- 12-pin LCC package
- GPS, BeiDou, GLONASS (optional) and QZSS
- Patch antenna (15.0mm × 15.0mm × 4.0mm) on the top of module
- High sensitivity: -165dBm @Tracking
- Default baud rate: 9600bps
- Voltage 3.0V to 4.3V, 3.3V typ.
- Low power consumption
  TBD @Tracking mode
  TBD @ Acquisition mode
  TBD @ Backup mode
- Short-circuit protection / detection for active antenna
- Active antenna switching function
- Integrated LNA
- Large size of pins (Length=1.5mm; Width=1.0mm)
- AGNSS function: EASY™ technology, EPO
- Multiple power saving modes (Periodic mode/ Standby mode/ Backup mode)
- FLP mode: only 50% power consumption of normal mode
- LOCUS, built-in logger solution
- Support SDK commands

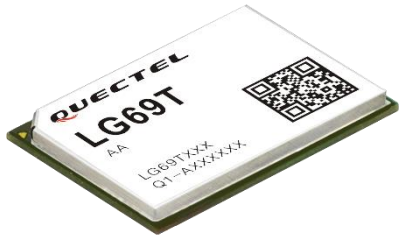
Dual-band GNSS Module Specifications

LC79D Dual-band GNSS Module

10.1mm × 9.7mm ×2.4mm
BCM47755

- 28 pins with LCC+LGA
- Dual band GNSS module (L1, L5)
- GPS L1 C/A, GPS L5, GLONASS L1, Galileo E1/E5a, IRNSS L5, BeiDou B1 and QZSS L1/L5 work simultaneously
- High sensitivity: -163dBm @Tracking
- Default baud rate: 115200bps
- Voltage 1.7V~1.9V, typical 1.8V
- Low power consumption
  43 mA @Tracking mode
  47 mA @Acquisition mode
- Integrated LNA
- Power saving mode: Sleep mode
- Support SDK commands
- Dual modes: standalone mode and host based mode

LG69T* Dual-band GNSS Module



22.0mm × 17.0mm ×2.4mm
Teseo V

- 54 pins with LGA
- Dual band GNSS module (L1, L5)
- GPS L1/L5, Galileo E1/E5a, IRNSS L5, BeiDou B1C/B2a and QZSS L1/L5 work simultaneously
- High sensitivity: -161dBm① @Tracking
- Default baud rate: 115200bps
- Voltage 3.0V~3.6V, typical 3.3V
- Low power consumption
  TBD @Tracking mode
  TBD @Acquisition mode
- Power saving mode: Backup mode
- Support SDK commands*
- Automotive grade

L89 IRNSS Module

26.4mm × 18.4mm × 6.8mm
Teseo III

- 16 pins with LCC
- GPS, Galileo, IRNSS/QZSS
- IRNSS module, AIS140 compliance
- Dual antenna embedded: patch antenna (18.4mm × 18.4 mm × 4.0mm) for L1 band, chip antenna for L5 band
- High sensitivity: -163dBm @Tracking
- Default baud rate: 9600bps
- Voltage 3.1V to 4.3V, 3.3V typ.
- Low power consumption
  95 mA (GPS+Galileo+IRNSS) @Tracking mode
  99 mA (GPS+Galileo+IRNSS) @Acquisition mode
- Short-circuit protection / detection for active antenna
- Active antenna switching function
- Integrated LNA
- Large size of pins (Length=1.5mm; Width=1.0mm)
- Support AGPS
- Power saving mode: Backup mode
- Support SDK commands*
- Pin-to-pin compatible with L80 and L86

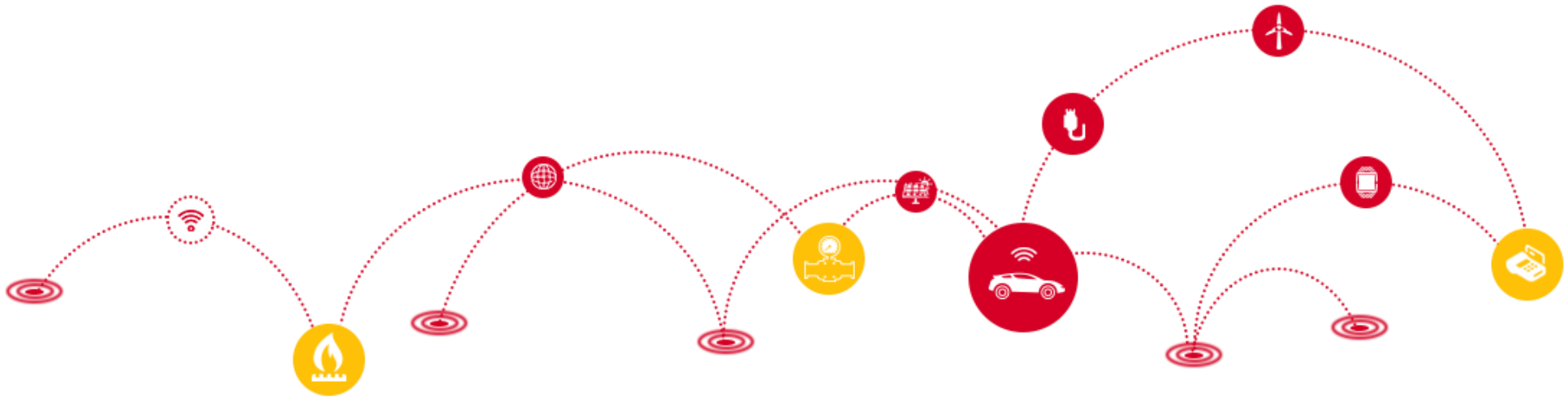
"" means under development.*
① means preliminary data for reference only.

GNSS Module Roadmap

Product Overview

Technologies

Application



Global Navigation System Change

Multi-band and more viewable satellites will significantly enhance the positioning performance.

GPS

- 31 Satellites
- L1/L2/L5

BeiDou

- 36 Satellites
- B1I/B3I/B1C/B2a/B2b

GLONASS

- 23 Satellites
- L1OF/L2OF

Galileo

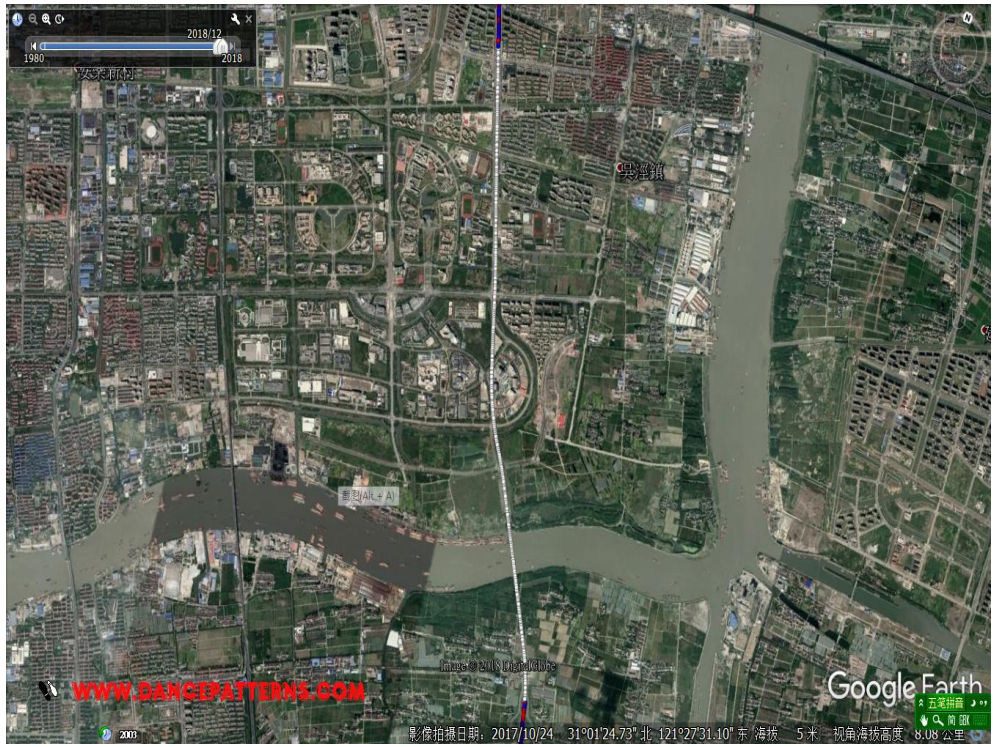
- 26 Satellites
- E1/E5a/E5b/E6

Till 2020

Positioning Technology Trends

Full Coverage Positioning - Dead Reckoning

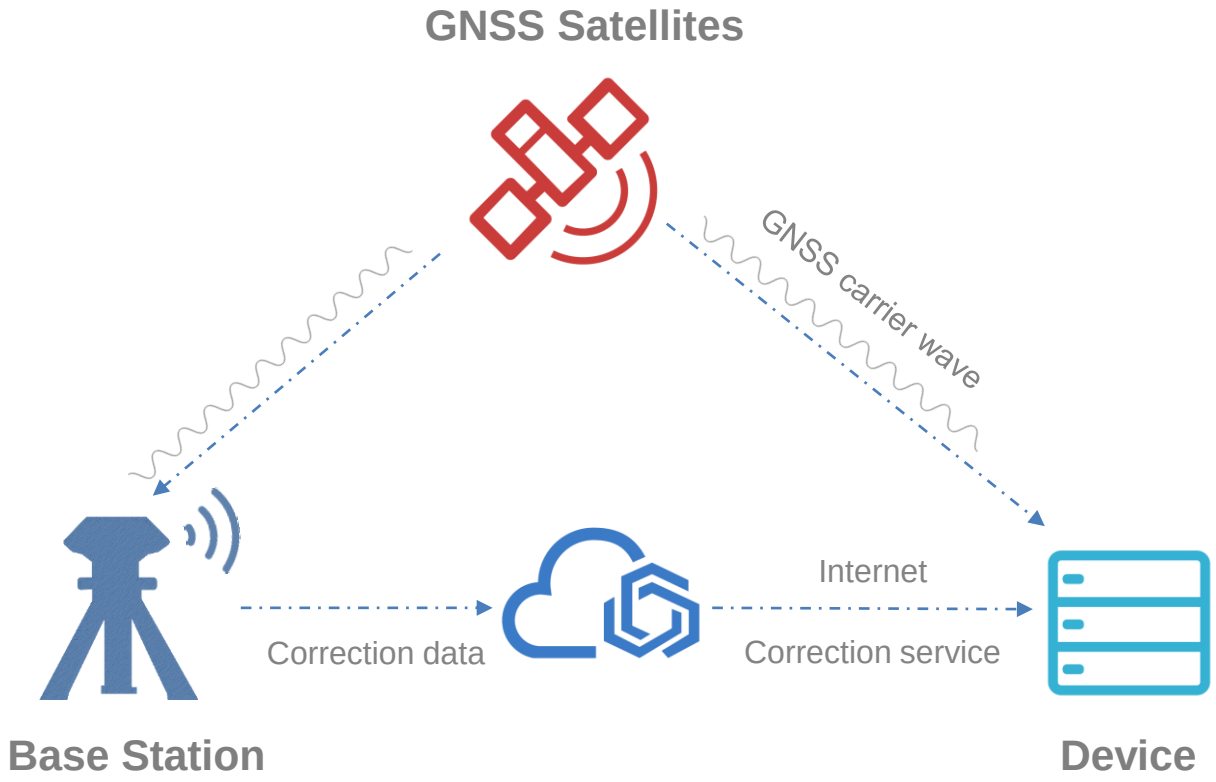
Dead Reckoning (DR) technology fuses GNSS and INS sensor together to provide a continuous high accuracy position. Using this technology, the GNSS receiver provides accurate position & time to the navigation system as long as the reception signals are good, once the reception signals are poor the INS sensor will continue to provide the information till the reception signals are improved. Based on this technology, device can get full coverage positioning or navigation even in parking garages, tunnels, and urban canyons.



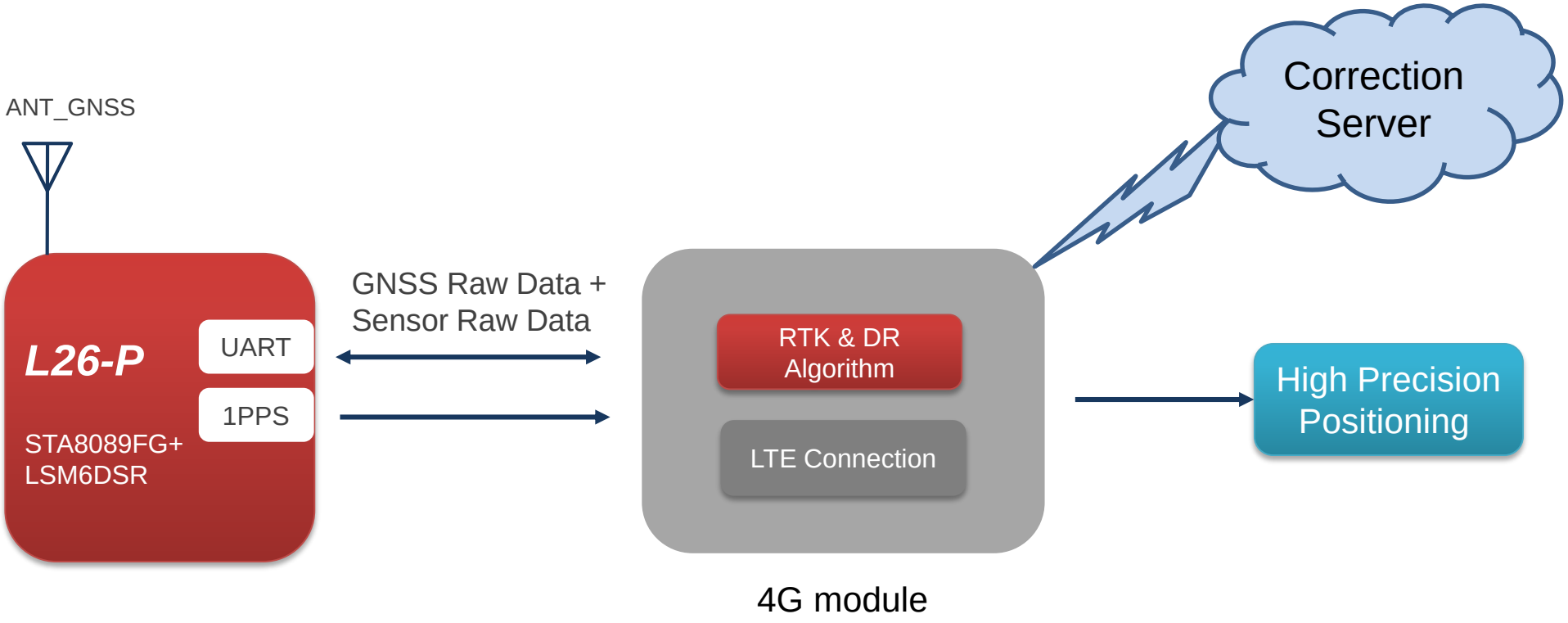
High Precision Positioning - RTK

Real-Time Kinematic (RTK) Positioning Process:

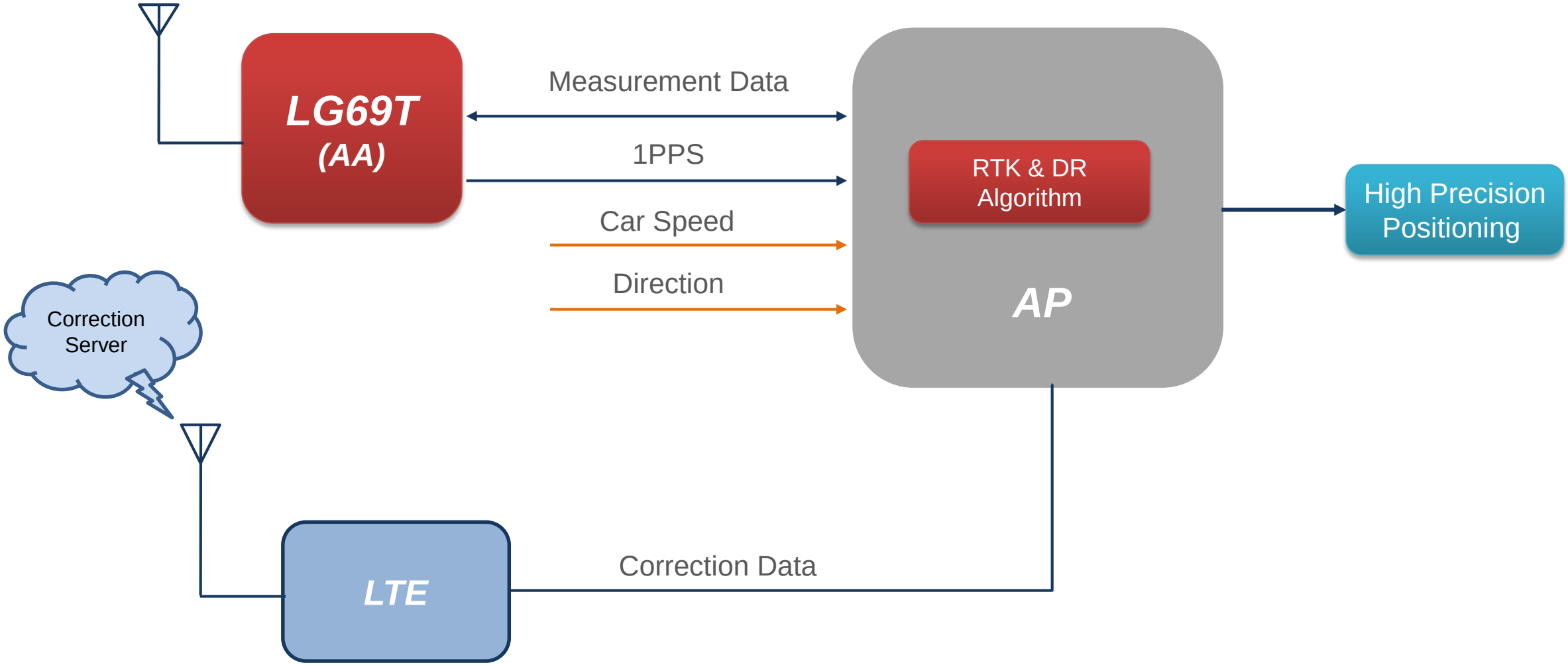
- Satellites broadcast the signal
- The base station calculates the common errors based on carrier phase, and then transfer them to the cloud server
- The device or receiver calculates a precise position with the carrier phase it received and the correction data from correction server



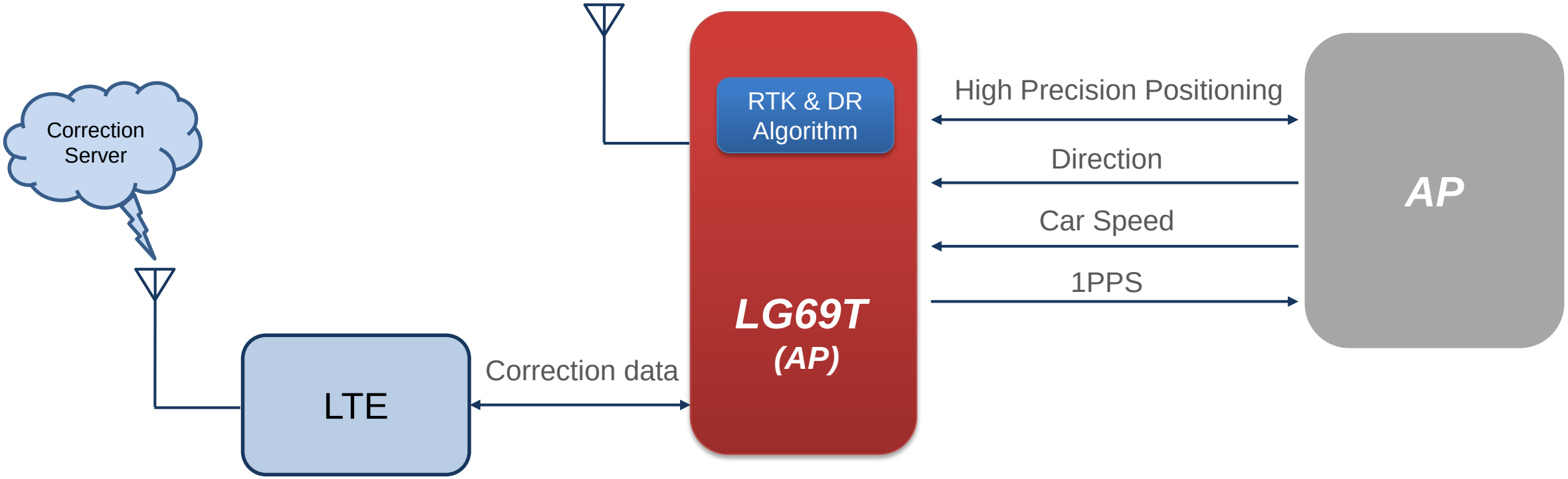
RTK Application Architecture - Single-band Module



LG69T (AA) Application Architecture



LG69T (AP) Application Architecture



Dual-band Benefits

The modulation of L5/E5a GNSS signals combined with L1/E1 C/A signals, enables multiband receivers to achieve improved accuracy and better multipath rejection, as well as better interference immunity than only with L1/B1/E1 alone.

These refinements are key for navigation in dense urban canyon environments.

Signal Attribute	L1	L5	E5	Benefits
Chipping Rate (10x higher)	☐	■	■	Multipath Rejection
Increased Signal Power (up to 3dB)	☐	■	■	Better Weak Signal Tracking
Pilot Signal	☐	■	■	6dB Better Weak Signal Tracking
Ionospheric Estimation (using dual frequency)	☐	■	■	Sub-meter Accuracy in Open Sky
Error Correction Code on Nav Messages	☐	■	■	More Reliable Autonomous Cold Start
More Frequent Nav Messages	☐	☐	■	Faster Autonomous Cold Start
50MHz Signal Bandwidth (using E5B)	☐	☐	■	Further Improvement in Multipath Rejection
Secondary Codes	☐	■	■	Reduced Signal Cross Correlation

☐ *means the GNSS band does not support the corresponding signal attribute.*
■ *means the GNSS band supports the corresponding signal attribute.*

GNSS Module Roadmap

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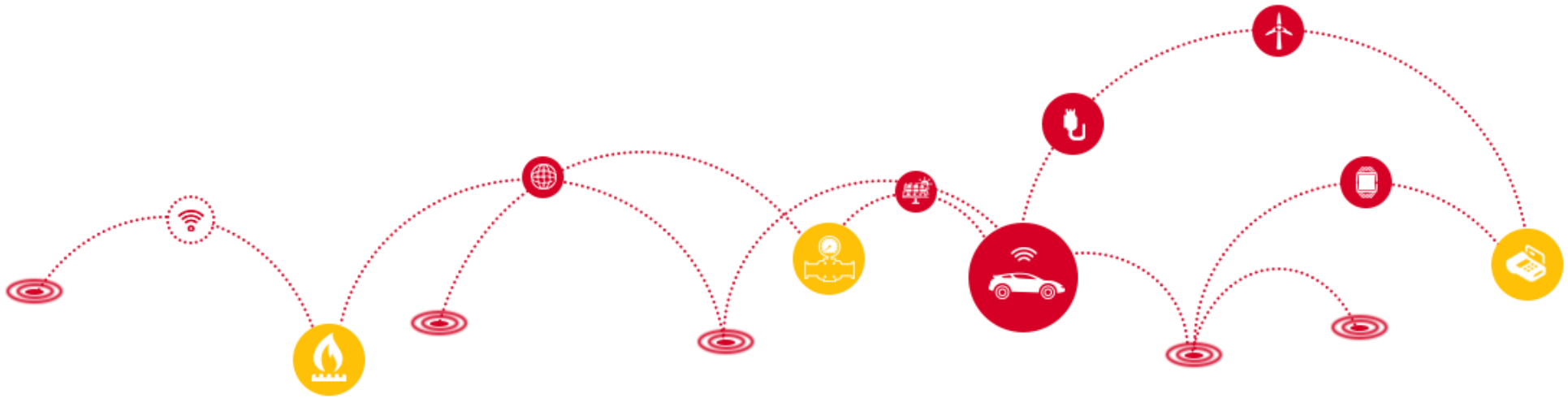

Target Applications

Personal & Pet Tracker

Wearable Devices (e.g. smartwatch)

Vehicle Tracker

ADAS & Self-driving

Shared Mobility

Smart Agriculture

Thank you!

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