
QUECTEL
Quectel
GNSS Module
Product Overview
Build a Smarter World

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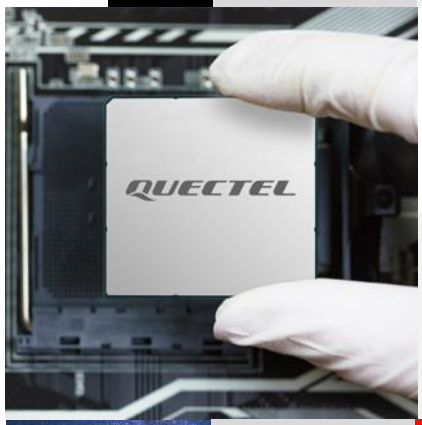
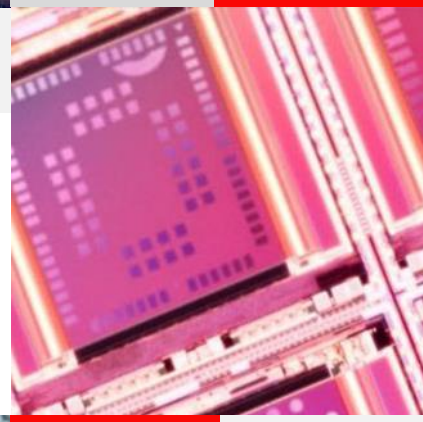
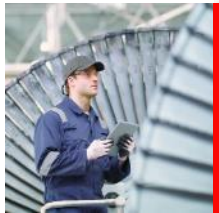






GNSS Introduction

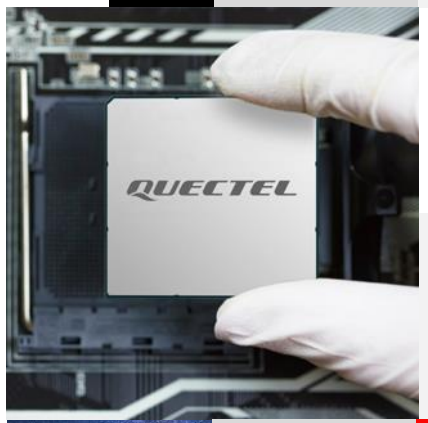
GNSS Module Portfolio

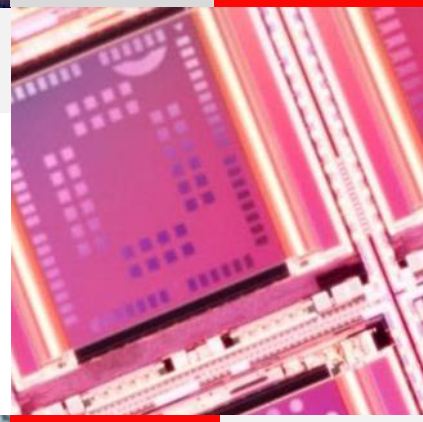
Specifications & Timelines

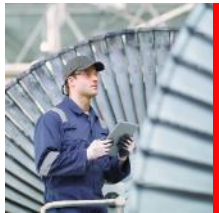
Enhanced Technologies

Typical Applications

Quectel GNSS Advantages







Build a Smarter World

GNSS (Global Navigation Satellite System)

- Space-based radio-navigation system providing all-weather, 3-dimensional coordinate, velocity and time information anywhere on or near the Earth.
- Consist of global and regional navigation systems.

Global System

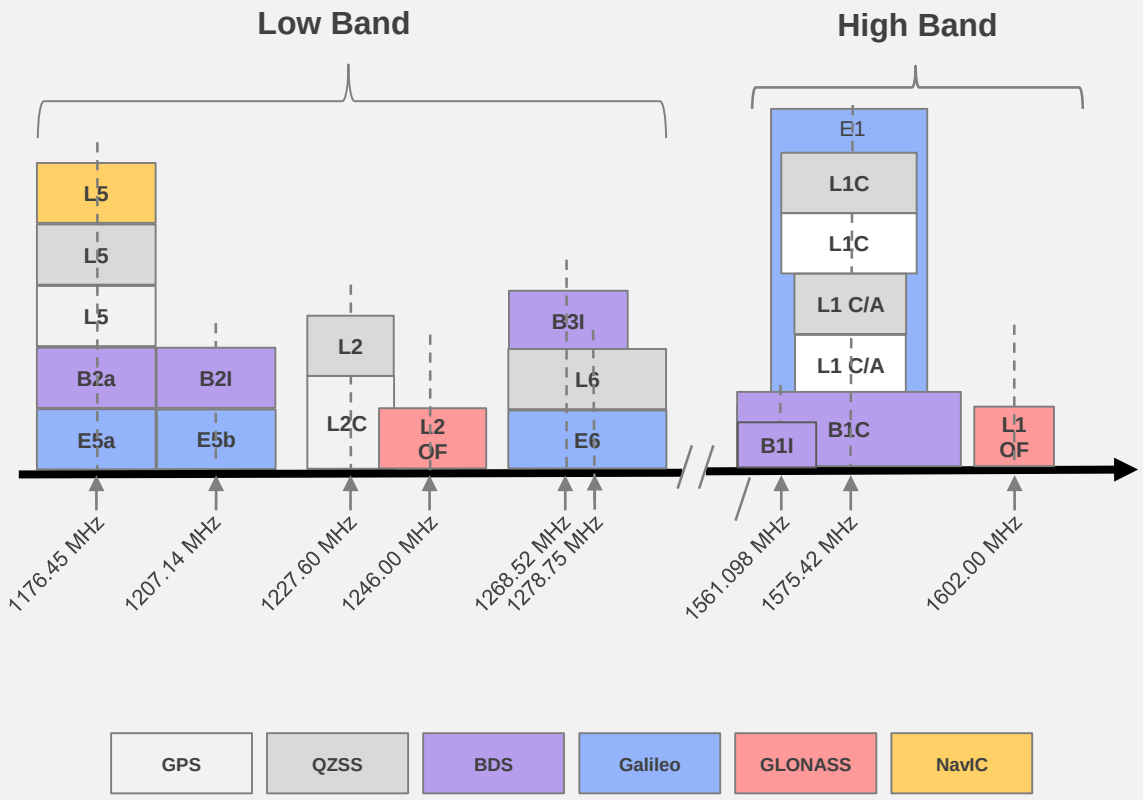
GPS GLONASS Galileo BDS

Regional System

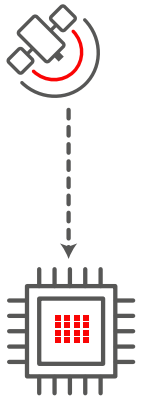
QZSS NavIC

GPS L1C/A/ L1C/ L2/ L5
GLONASS L1OF/ L2OF
Galileo E1/ E5a/ E5b/ E6
BDS B1I/ B1C/ B2a/ B2I/ B3I

QZSS L1C/A/ L1C/ L2/ L5/ L6
NavIC L5



Technologies

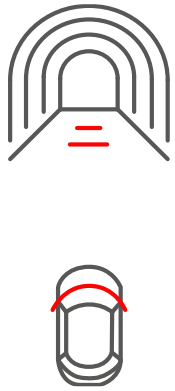


Standard Precision (SPG)

- Meter level positioning accuracy
- Cost-optimized
- Small footprint available
- Low power consumption

Application Fields

- Asset tracking
- Navigation
- Sharing economy

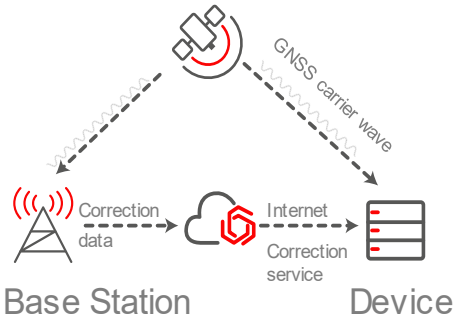


Dead Reckoning (DR)

- Full-coverage positioning
- Decimeter to centimeter level positioning accuracy with RTK

Application Fields

- Road-vehicle navigation
- Shared e-scooter

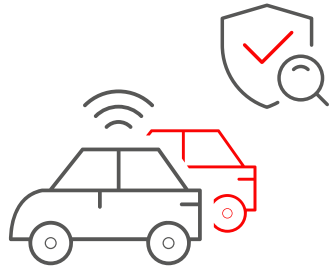


High Precision (HPG)

- Decimeter to centimeter level positioning accuracy

Application Fields

- Autonomous vehicle
- Robotic lawn mower
- Precision agriculture
- Unmanned aerial vehicle (UAV)

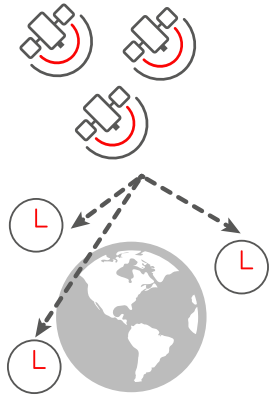


ASIL

- Functional safety
- ASIL-B compliant

Application Fields

- Advanced driver-assistance system (ADAS)
- Driver monitor system (DMS)



Timing

- Nanosecond level accuracy clock
- 1PPS/ 10 MHz time-pulse frequency

Application Fields

- Wireless base station
- Power distribution
- Financial application
- Industrial field

1PPS: One Pulse Per Second RTK: Real-Time Kinematic ASIL: Automotive Safety Integrity Level

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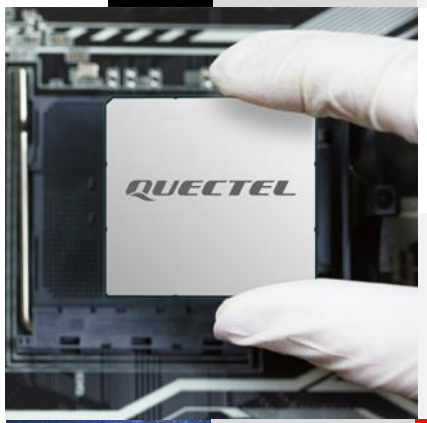
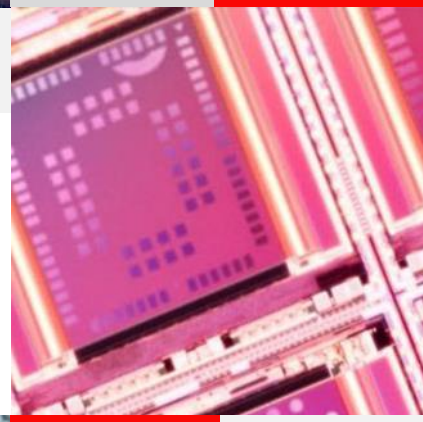




Build a Smarter World

GNSS Module Portfolio

DR/ HPG

LG69T Series
- TESEO V
- Automotive
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1 + L2 or L1 + L5
- DR/ RTK/ Raw Data

LG69T (AB)
- TESEO APP
- Automotive
- GPS/ GLO/ GAL/ BDS/ QZSS
- L1 + L2 or L1 + L5
- Raw Data/ ASIL-B

L26-DR
- TESEO III
- Automotive
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1
- DR

LC29H Series
- AG3335
- Industrial
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1 + L5
- DR/ RTK

L26-P
- TESEO III
- Industrial
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1
- Raw Data

LC02H Series NEW
- AG3335
- Industrial
- GPS/ GOL/ GAL/ BDS/ QZSS/ SBAS
- L1
- RTK

Timing

LC98S
- TESEO III
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1
- 1PPS

LC99T NEW
- TESEO V
- GPS/ GLO/ GAL/ BDS/ QZSS/ NavIC/ SBAS
- L1 + L5
- 1PPS/ 10 MHz time-pulse frequency

LC26G-T NEW
- AG3352
- Industrial
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1
- 1PPS

L26-T
- TESEO III
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1
- 1PPS

LC29T NEW
- TESEO V
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1
- 1PPS/ 10 MHz time-pulse frequency

SPG (Dual-band)

LC79H
- AG3335
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1 + L5

LC29H (AA)
- AG3335
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1 + L5

SPG (Single-band)

L76-L
- MT3333
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS

LC76G NEW
- AG3352
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS

LC76F
- GK9501
- GPS/ GLO/ GAL/ QZSS/ SBAS

LG77L
- MT3333
- GPS/ GAL/ BDS/ GLO/ QZSS/ SBAS

L26
- MT3333
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS

LC26G NEW
- AG3352
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS

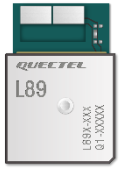
Integrated Antenna

L86
- MT3333
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1

LC86L
- MT3333
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1

LC86G NEW
- AG3352
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1

L96
- MT3333
- GPS/ GLO/ GAL/ BDS/ QZSS/ SBAS
- L1



L89 R2.0
- AG3335MN
- GPS/ GLO/ GAL/ BDS/ QZSS/ NavIC/ SBAS
- AIS140 Compliant
- L1 + L5

GLO: GLONASS
GAL: Galileo
DR: Dead Reckoning
RTK: Real-Time Kinematic
SPG: Standard Precision GNSS
HPG: High Precision GNSS
ASIL: Automotive Safety Integrity Level
AIS140: Automotive Industry Standard 140

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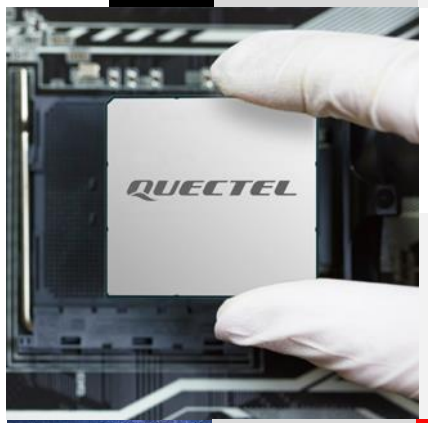
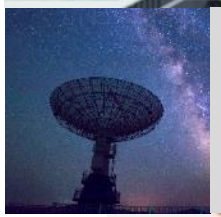
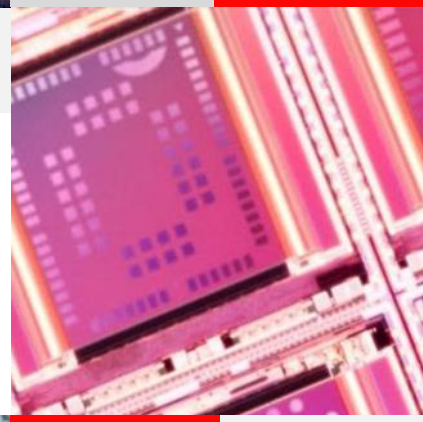


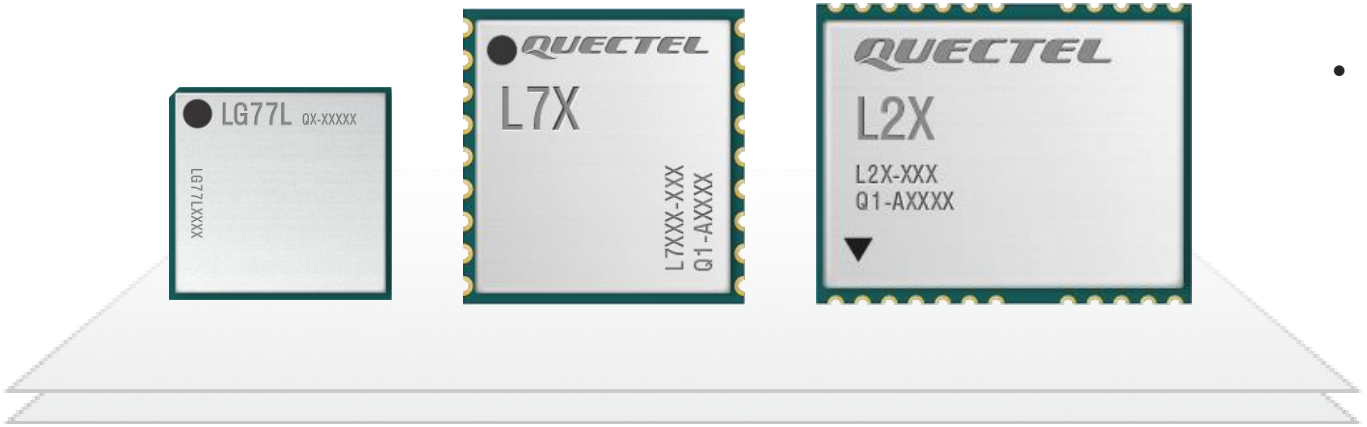




Build a Smarter World

SPG Modules

- Multi-constellation
- Multi-band①
- AGNSS



- High reliability

- Cost-optimized
- Low power consumption

- Multiple industry standard footprints
- Pin-to-pin compatible product iterations

①: Supported on specified variants. SPG: Standard Precision GNSS AGNSS: Assisted GNSS, shortening Time To First Fix

SPG Module Specifications – Single-band

Variant			L76-L	LC76F	LC76G (AB)	LC76G (PA)	L26	LC26G (AB)	LG77L (IC)
Typical Characteristics			Cost-optimized	Support I2C	All Constellations	Low Power Consumption	Multi-constellation	All Constellations	Small Footprint
General	Band		L1				L1		L1
	Size (mm)		10.1 × 9.7				16 × 12.2		7 × 7
	Chipset		MT3333	GK9501	AG3352	AG3352	MT3333	AG3352	MT3333
	Precision (CEP 50)		2.5 m	2.5 m	1.5 m	1.5 m	2.5 m	1.5 m	2.5 m
GNSS	Default		GPS + GLNOASS + QZSS	GPS + GLONASS + QZSS	GPS + GLNOASS + Galileo + BDS + QZSS	GPS + GLNOASS + Galileo + BDS + QZSS	GPS + GLNOASS + QZSS	GPS + GLNOASS + Galileo + BDS + QZSS	GPS + GLNOASS + QZSS
	Supported	GPS/ QZSS	●	●	●	●	●	●	●
		GLONASS	●	●	●	●	●	●	●
		Galileo	●	●	●	●	●	●	●
		BDS	●	-	●	●	●	●	●
		NavIC	-	-	-	-	-	-	-
		SBAS	●	●	●	●	●	●	●
Interface			UART/ I2C	UART/ I2C	UART/ I2C/ SPI*	UART/ I2C	UART	UART/ I2C	UART/ I2C
Firmware Upgrade			●	●	●	●	●	●	●
Power Supply (Typ.)			3.3 V	3.3 V	3.3 V	3.3 V	3.3 V	3.3 V	3.3 V
Power Consumption① (Tracking)			31 mA	30 mA	36 mA	10 mA	21 mA	36 mA	23 mA
Project Stage			MP	MP	CS	CS	MP	CS	MP

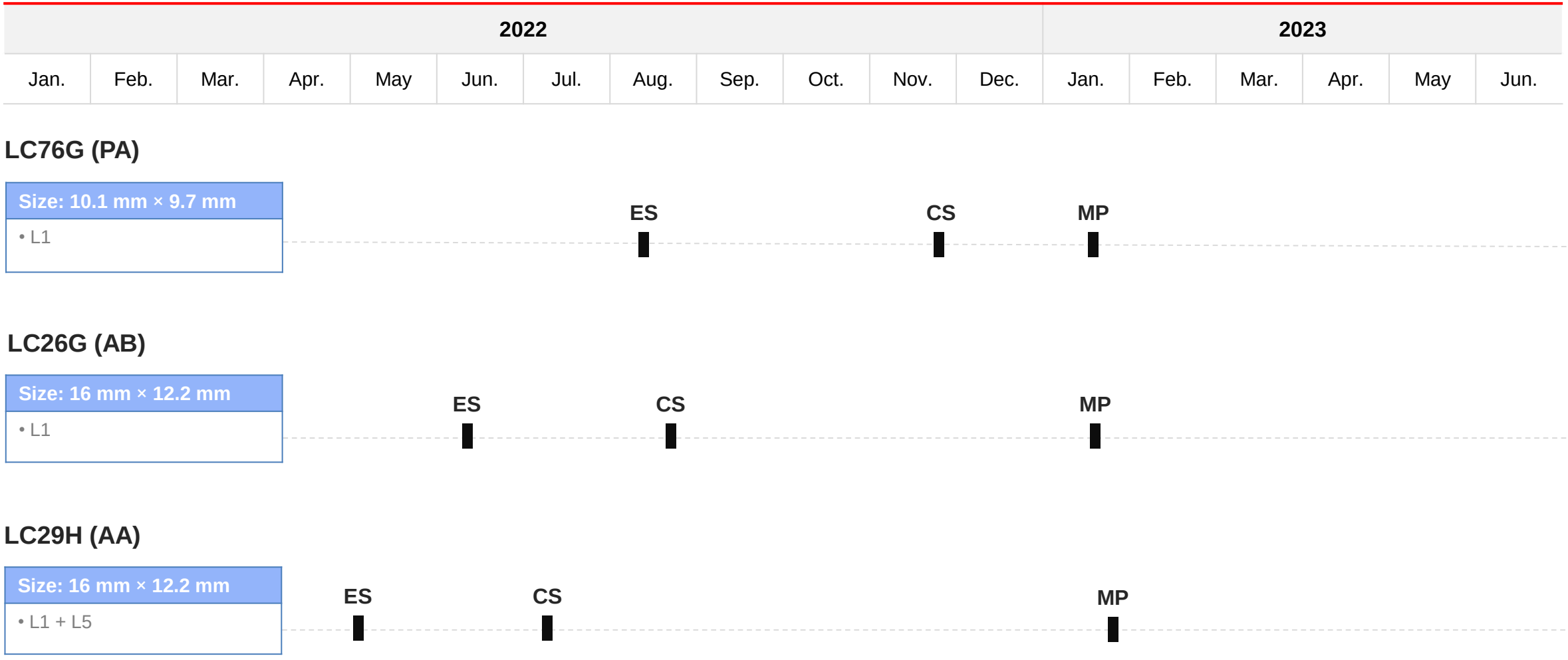
①: Tested under default constellations ●: Supported -: Unsupported *：Under development CEP: Circular Error Probable MP: Mass Production CS: Commercial Sample ES: Engineering Sample

SPG Module Specifications – Dual-band

Variant			LC79H (AL)	LC29H (AA)
Typical Characteristics			Small Footprint, PVT	Industry Standard Footprint
General	Band		L1 + L5	L1 + L5
	Size (mm)		10.1 × 9.7	16 × 12.2
	Chipset		AG3335M	AG3335M
	Precision (CEP 50)		1.0 m	1.0 m
GNSS	Default		GPS + GLONASS + Galileo + BDS + QZSS + SBAS	GPS + GLONASS + Galileo + BDS + QZSS + SBAS
	Supported	GPS/ QZSS	●	●
		GLONASS	●	●
		Galileo	●	●
		BDS	●	●
		NavIC	-	-
		SBAS	●	●
Interface			UART/ I2C*	UART/ I2C/ SPI*
Firmware Upgrade			●	●
Power Supply (Typ.)			1.8 V	3.3 V
Power Consumption① (Tracking)			33 mA	24 mA
Project Stage			MP	CS

①: Tested under default constellations PVT: Position, Velocity and Time

SPG Module Timelines

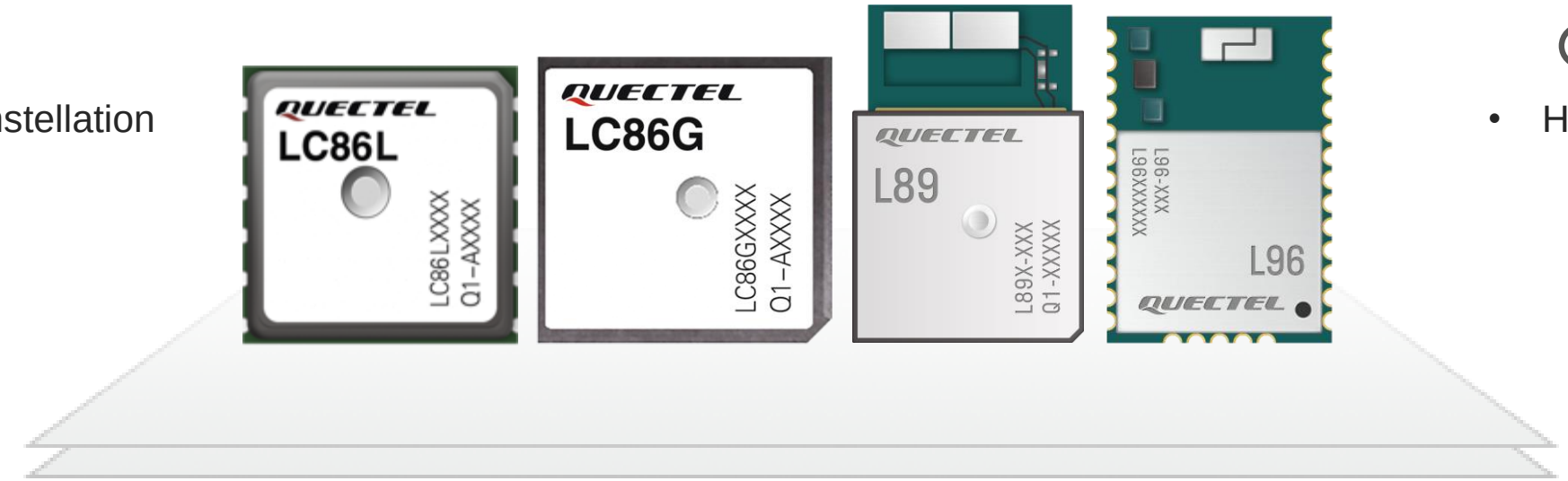


ES: Engineering samples ready. Basic functions are available for customers' simple demo purpose.
CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.
MP: Hardware and software ready for mass production.

The timeline may be adjusted according to the actual development status.

Integrated Antenna GNSS Modules

- Multi-constellation
- AGNSS



- High reliability

- Integrated antenna
- Integrated LNA

AGNSS: Assisted GNSS, shortening Time To First Fix. LNA: Low-Noise Amplifier

Integrated Antenna GNSS Module Specifications

Variant			L96	L89 R2.0	L86	LC86G (LA)	LC86G (AA)	LC86G (AB)	LC86L (IC)
Typical Characteristics			Compact Antenna	Support NavIC	All Constellations, Low Power Consumption	Large Size Antenna, All Constellations	Compact Antenna, Multi-constellation (including BDS)	Compact Antenna, Multi-constellation (including GLONASS)	Compact Footprint, All Constellations
General	Band		L1	L1 + L5	L1	L1			L1
	Size (mm)		14 × 9.6	26.4 × 18.4	18.4 × 18.4	18.4 × 18.4	16 × 16	16 × 16	16 × 16
	Chipset		MT3333	AG3335MN	MT3333	AG3352	AG3352	AG3352	MT3333
	Precision (CEP 50)		2.5 m	1.8 m	2.5 m	1.5 m	1.5 m	1.5 m	2.5 m
GNSS	Default		GPS + GLONASS + QZSS + SBAS	GPS + Galileo + QZSS + NavIC + SBAS	GPS + GLNOASS + QZSS	GPS + GLNOASS + Galileo + BDS + QZSS	GPS + Galileo + BDS	GPS + GLONASS + Galileo	GPS + GLNOASS + QZSS + SBAS
	Supported	GPS/ QZSS	●	●	●	●	●	●	●
		GLONASS	●	●	●	●	-	●	●
		Galileo	●	●	●	●	●	●	●
		BDS	●	●	●	●	●	-	●
		NavIC	-	●	-	-	-	-	-
		SBAS	●	●	●	●	●	●	●
Interface			UART/ I2C	UART/ I2C	UART	UART	UART	UART	UART
Power Supply (Typ.)			3.3 V	3.3 V	3.3 V	3.3 V	3.3 V	3.3 V	3.3 V
Power Consumption① (Tracking)			20 mA	32 mA	26 mA	33 mA	29 mA	29 mA	30 mA
Project Stage			MP	MP	MP	CS	CS	ES	MP

①: Tested under default constellations ●: Supported -: Unsupported CEP: Circular Error Probable MP: Mass Production CS: Commercial Sample ES: Engineering Sample

LC86G Series Timelines

2022												2023					
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.

LC86G (LA)

With 18 mm × 18 mm antenna

- L1

ES CS MP

LC86G (AA)

With 16 mm × 16 mm antenna

- L1

ES CS MP

LC86G (AB)

With 16 mm × 16 mm antenna

- L1

ES CS MP

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.

The timeline may be adjusted according to the actual development status.

DR/ HPG Modules

- DR/ RTK
- Up to centimeter level positioning accuracy

- High reliability
- Up to 105 ℃ operating temperature①

- Automotive or industrial grade
- IATF 16949 compliant①
- ASIL-B compliant①

- Abundant successful customer applications

①: Supported on specified variants. HPG: High Precision GNSS DR: Dead Reckoning RTK: Real-Time Kinematic ASIL: Automotive Safety Integrity Level ATF: International Automotive Task Force

L26 Series Specifications

Variant			L26-DR (UDR)	L26-DR (ADR)	L26-P
Typical Characteristics			UDR	ADR	IMU & Raw Data
General	**Grade**		Industrial	Automotive	Industrial
	Band		L1		L1
	Size (mm)		12.2 × 16		12.2 × 16
	Chipset		TESEO III		TESEO III
	Precision (CEP 50)		1.5 m		Depending on external RTK
Technology	**DR**		UDR	ADR	-
	Raw Data		-	-	IMU & Raw Data
GNSS	**Default**		GPS + GLONASS + Galileo + SBAS	GPS + GLONASS + Galileo + SBAS	GPS + BDS + SBAS
	Supported	**GPS/ QZSS**	●	●	●
		GLONASS	●	●	●
		Galileo	●	●	●
		BDS	●	●	●
		NavIC	-	-	-
		SBAS	●	●	●
Interface			UART/ SPI*	UART/ SPI*	UART/ SPI*
Power Supply (Typ.)			3.3 V	3.3 V	3.3 V
Power Consumption① (Tracking)			81 mA	74 mA	62 mA
Project Stage			MP	MP	MP

①: Tested under default constellations ●: Supported -: Unsupported *: Under development CEP: Circular Error Probable RTK: Real-Time Kinematic UDR: Untethered Dead Reckoning
ADR: Automotive Dead Reckoning IMU: Inertial Measurement Unit MP: Mass Production

LC29H Series Specifications

Variant			LC29H (BA)	LC29H (CA)	LC29H (DA)	LC29H (EA)	LC29H (BS)
Typical Characteristics			DR + RTK	DR Only	RTK (1 Hz)	RTK (10 Hz)	Base Station
General	**Grade**		Industrial				Industrial
	Band		L1 + L5				L1 + L5
	Size (mm)		12.2 × 16				12.2 × 16
	Chipset		AG3335A/T			AG3335A	AG3335M
	Precision (CEP 50)		10 cm	1 m	1 cm	1 cm	-
Technology	**IMU**		●	●	-	-	-
	RTK		●	-	●	●	-
	DR①		●	●	-	-	-
	Raw Data		-	-	-	-	●
GNSS	**Default**		GPS + GLONASS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS + SBAS
	Supported	**GPS/ QZSS**	●	●	●	●	●
		GLONASS	●	●	●	●	●
		Galileo	●	●	●	●	●
		BDS	●	●	●	●	●
		NavIC	-	-	-	-	-
		SBAS	●	●	●	●	●
Interface			UART/ I2C/ SPI*	UART/ I2C/ SPI*	UART/ I2C/ SPI*	UART/ I2C/ SPI*	UART/ I2C/SPI*
Power Supply (Typ.)			3.3 V	3.3 V	3.3 V	3.3 V	3.3 V
Power Consumption① (Tracking)			30 mA	28 mA	25 mA	25 mA	25 mA
Project Stage			CS (4 wheel DR + RTK) ES (2 wheel DR + RTK)	MP (2 wheel DR) CS (4 wheel DR)	CS	Developing	ES

①: 2 wheel ADR and 4 wheel ADR & UDR are supported by different software versions ②: Tested under default constellations DR: Dead Reckoning CS: Commercial Sample ES: Engineering Sample

LG69T Series Specifications

Variant			LG69T (AA)	LG69T (AQ)	LG69T (AM)
Typical Characteristics			IMU & GNSS Raw Data	Industrial, RTK + DR	Automotive, RTK
General	Grade		Automotive	Industrial	Automotive
	Operating Temperature		-40 ℃ to 85 ℃	-40 ℃ to 85 ℃	
	Band		L1 + L5	L1 + L5	
	Size (mm)		22 × 17	22 × 17	
	Chipset		TESEO V	TESEO V	
	Precision (CEP 50)		cm① / 1 m②	1 cm	
Technology	RTK		-	●	●
	DR		-	●	-
	IMU		●	●	-
	Raw Data		●	-	-
GNSS	Default		GPS + Galileo + BDS + QZSS	GPS + Galileo + BDS	GPS + Galileo + BDS
	Supported	GPS	●	●	●
		QZSS	●	-	-
		GLONASS	-	-	-
		Galileo	●	●	●
		BDS	●	●	●
		SBAS	●	-	-
Interface			UART	UART	UART
Power Supply (Typ.)			3.3 V	3.3 V	3.3 V
Power Consumption③ (Tracking)			237 mA	TBD	340 mA
Project Stage			CS	ES	CS

①: Depending on external Precision Positioning Engine ②: Without external Precision Positioning Engine ③: Tested under default constellations IMU: Inertial Measurement Unit TBD: To Be Determined

LG69T Series Specifications

Variant			LG69T (AS)	LG69T (AB)
Typical Characteristics			Automotive, Base Station	ASIL-B
General	Grade		Automotive	Automotive & ASIL-B
	Operating Temperature		-40 ℃ to 85 ℃	-40 ℃ to 105 ℃
	Band		L1 + L5	L1 + L5/ L1 + L2
	Size (mm)		22 × 17	22 × 17
	Chipset		TESEO V	TESEO APP
	Precision (CEP 50)		-	cm①
Technology	RTK		-	-
	DR		-	-
	IMU		-	-
	Raw Data		Base Station	●
GNSS	Default		GPS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS
	Supported	GPS/ QZSS	●	●
		GLONASS	-	●
		Galileo	●	●
		BDS	●	●
		SBAS	-	-
Interface			UART	UART
Power Supply (Typ.)			3.3 V	3.3 V @ VCC; 1.2 V @ VCC_CORE
Power Consumption② (Tracking)			360 mA	65 mA @ VCC; 236 mA @ VCC_CORE
Project Stage			CS	CS

①: Depending on external Precision Positioning Engine ②: Tested under default constellations

LG69T Series Specifications

Variant			LG69T (AJ)	LG69T (AI)
Typical Characteristics			IMU & GNSS Raw Data	GNSS Raw Data
General	Grade		Automotive	
	Operating Temperature		-40 ℃ to 105 ℃	
	Band		L1 + L5	L1 + L5/ L1 + L2
	Size (mm)		22 × 17	22 × 17
	Chipset		TESEO V	
	Precision (CEP 50)		cm①	cm①
Technology	IMU		●	-
	Raw Data		IMU & GNSS Raw Data	GNSS Raw Data
GNSS	Default		GPS + Galileo + BDS + QZSS	GPS + GLONASS + Galileo + BDS + QZSS
	Supported	GPS/ QZSS	●	●
		GLONASS	-	●
		Galileo	●	●
		BDS	●	●
		SBAS	-	-
Interface			UART	UART
Power Supply (Typ.)			3.3 V	3.3 V
Power Consumption② (Tracking)			245 mA	295 mA
Project Stage			MP	MP

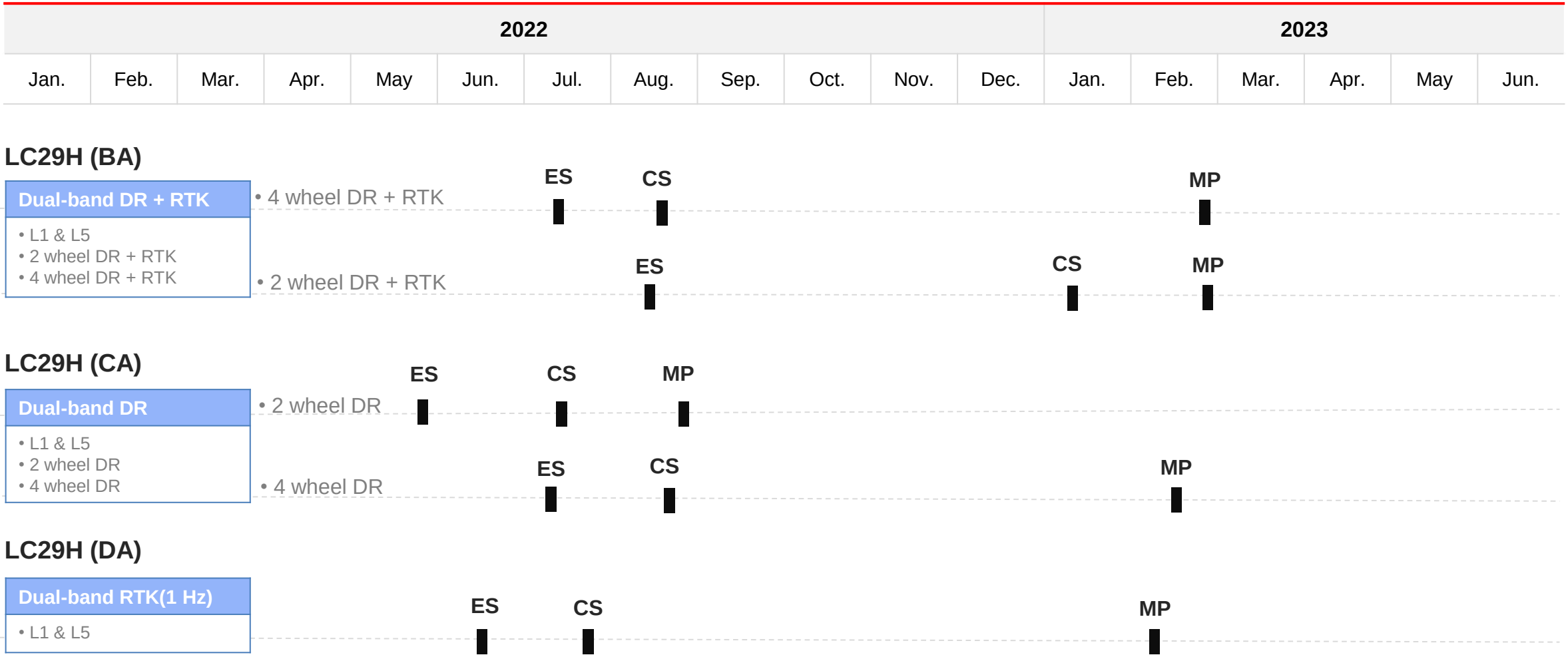
①: Depending on external Precision Positioning Engine ②: Tested under default constellations

LC02H Series Specifications

Variant			LC02H (AA)	LC02H (BA)
Typical Characteristics			Orientation Measurement	
General	Grade		Industrial	
	Band		L1	
	Size (mm)		24 × 22	
	Chipset		AG3335	
	Orientation Accuracy		Heading Angle Accuracy: 0.2 °/m Tilt Angle Accuracy: 0.3 °/m	Heading Angle Accuracy: 0.2 °/m Tilt Angle Accuracy: 0.3 °/m Roll Angle Accuracy①: 1.2 °/m
	Precision (CEP 50)		1.5 m	1.5 m
Technology	IMU		-	●
	RTK		●	●
	DR		-	-
GNSS	Default		GPS + GLONASS + Galileo + BDS + QZSS + SBAS	GPS + GLONASS + Galileo + BDS + QZSS + SBAS
	Supported	GPS/ QZSS	●	●
		GLONASS	●	●
		Galileo	●	●
		BDS	●	●
		NavIC	-	-
		SBAS	●	●
Interface			UART/ SPI*/ I2C②	UART/ SPI*/ I2C②
Power Supply (Typ.)			3.3 V	3.3 V
Power Consumption③ (Tracking)			103 mA	108 mA
Project Stage			Developing	Developing

①: The roll angle depends on the IMU output ②: Multiplexed with SPI interface ③:Tested under default constellations

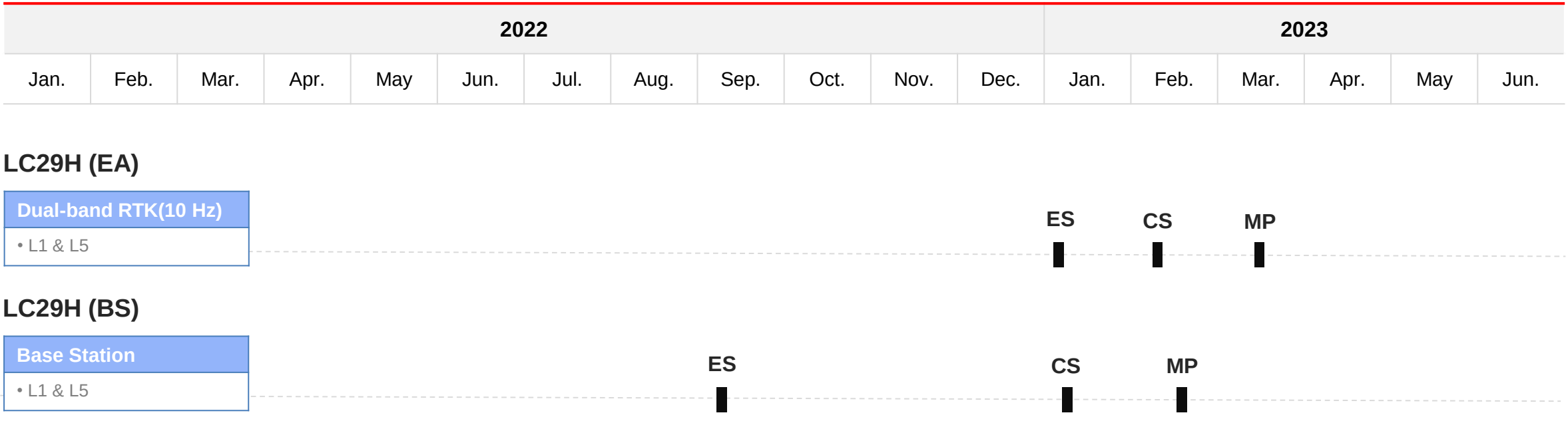
LC29H Series Timelines



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.

The timeline may be adjusted according to the actual development status.

LC29H Series Timelines



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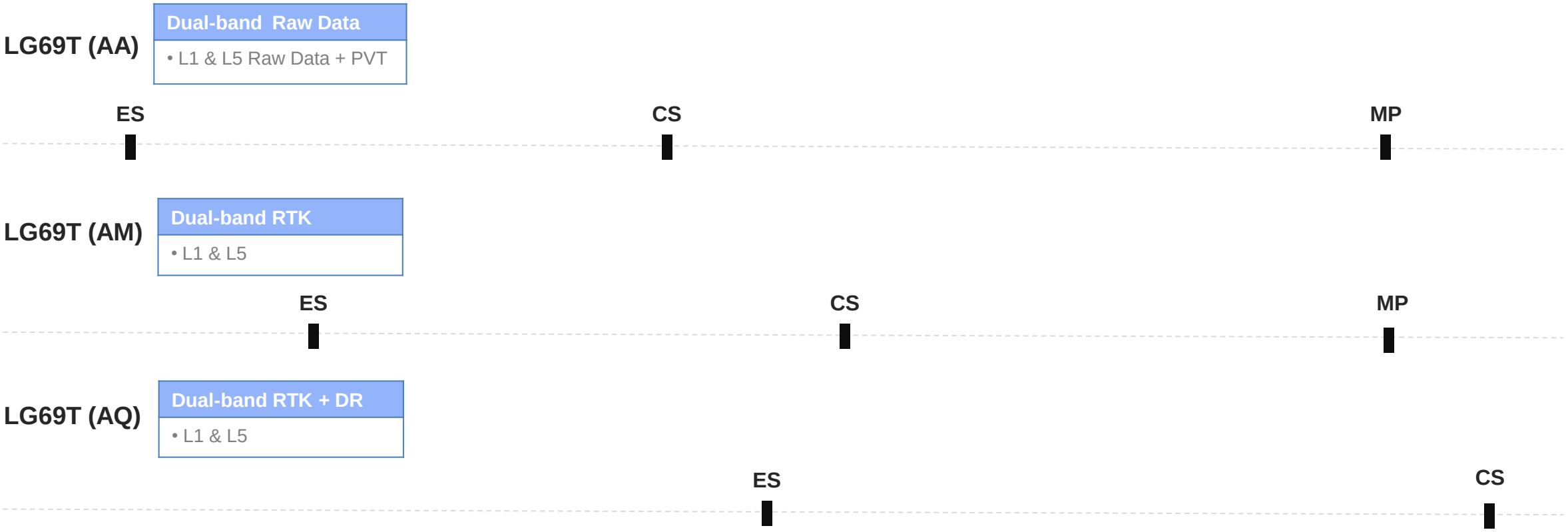
CS: Commercial samples ready. Stable hardware design and quite stable software design. New software features can be added upon request.
MP: Hardware and software ready for mass production.

The timeline may be adjusted according to the actual development status.

LG69T Series Timelines

2021			2022											2023		
Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.



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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.

The timeline may be adjusted according to the actual development status.

LG69T Series Timelines

2021			2022												2023		
Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.

LG69T (AS)

Base Station

- L1 & L5

ES — CS — MP

LG69T (AB)

Dual-band Raw Data

- L1 & L2
- L1 & L5

ES — CS — MP

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.

The timeline may be adjusted according to the actual development status.

LC02H Series Timelines

2023											
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.

LC02H (AA)

Orientation Measurement (Static)

- L1

LC02H (BA)

Orientation Measurement (Dynamic)

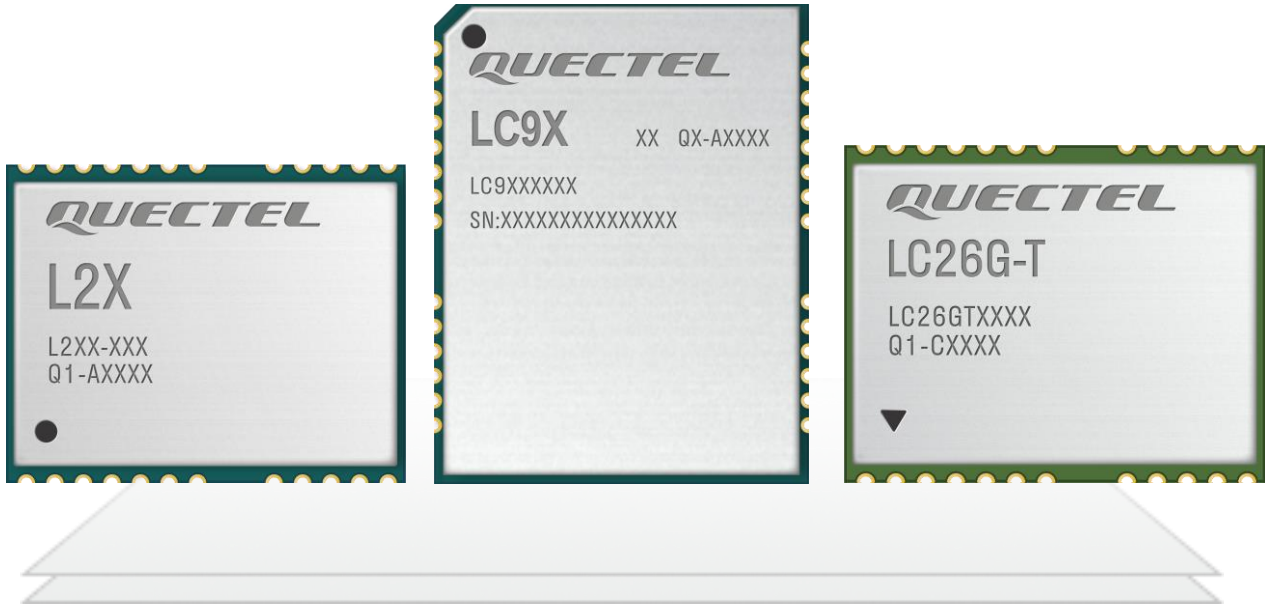
- L1

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.

The timeline may be adjusted according to the actual development status.

Timing GNSS Modules

- Nanosecond level accuracy
- 1PPS/ 10 MHz time-pulse frequency



- High reliability

- Multi-constellation
- Multi-band
- Single-satellite timing

- Widely used on 4G/ 5G base stations
- Suitable for Open Radio Access Network (O-RAN)

Timing GNSS Module Specifications

Variant			LC98S	LC99T	L26-T	LC29T	LC26G-T (AA)
Typical Characteristics			Single-band	Dual-band, All Constellations	Single-band	Single-band, All Constellations	Single-band, All Constellations
General	Band		L1	L1 + L5	L1		
	Size (mm)		22.4 × 17		12.2 × 16		
	Chipset		TESEO III	TESEO V	TESEO III	TESEO V	AG3352
	Precision 1PPS (@ 1σ)		< 6.8 ns	< 6 ns	< 6.8 ns	< 6 ns	< 8 ns
	10 MHz Output		-	●	-	●	-
GNSS	Default		GPS + BDS + QZSS	GPS + GLONASS + Galileo + BDS + NavIC	GPS + GLONASS + Galileo	GPS + GLONASS + Galileo + BDS	GPS + GLONASS + Galileo + BDS + QZSS
	Supported	GPS/ QZSS	●	●	●	●	●
		GLONASS	●	●	●	●	●
		Galileo	●	●	●	●	●
		BDS	●	●	●	●	●
		NavIC	-	●	-	-	-
		SBAS	●	●	●	●	●
Interface			UART	UART	UART	UART	UART/ I2C
Power Supply (Typ.)			3.3 V	3.3 V	3.3 V	3.3 V	1.8 V
Power Consumption① (Tracking)			74 mA	285 mA	75 mA	232 mA	36 mA
Project Stage			MP	ES	MP	ES	Developing

①: Tested under default constellations ●: Supported -: Unsupported *：Under development CEP: Circular Error Probable ES: Engineering Sample MP: Mass Production

LC29T & LC99T Timelines

2022						2023					
Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.

LC29T

Single-band

- 1PPS + 10 MHz

LC99T

Dual-band

- 1PPS

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.

The timeline may be adjusted according to the actual development status.

LC26G-T Timelines

2023											
Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.

LC26G-T (AA)

单频
• 1PPS

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.

The timeline may be adjusted according to the actual development status.

GNSS Introduction

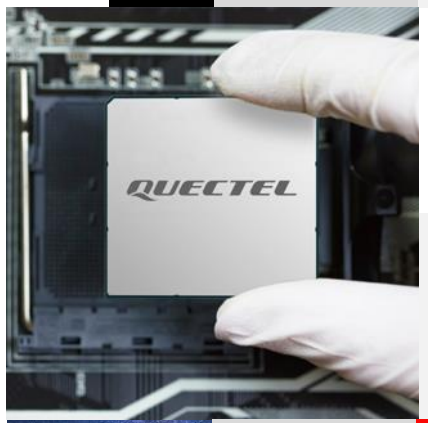
GNSS Module Portfolio

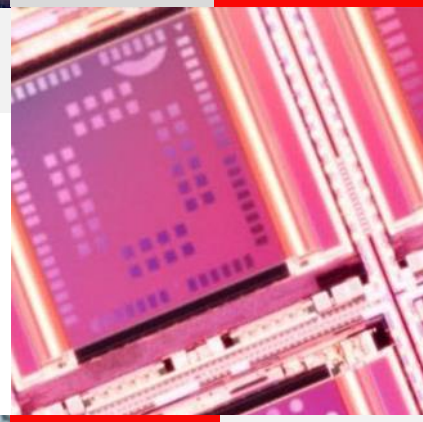
Specifications & Timelines

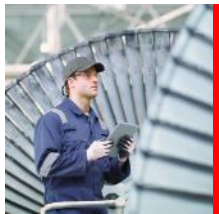
Enhanced Technologies

Typical Applications

Quectel GNSS Advantages



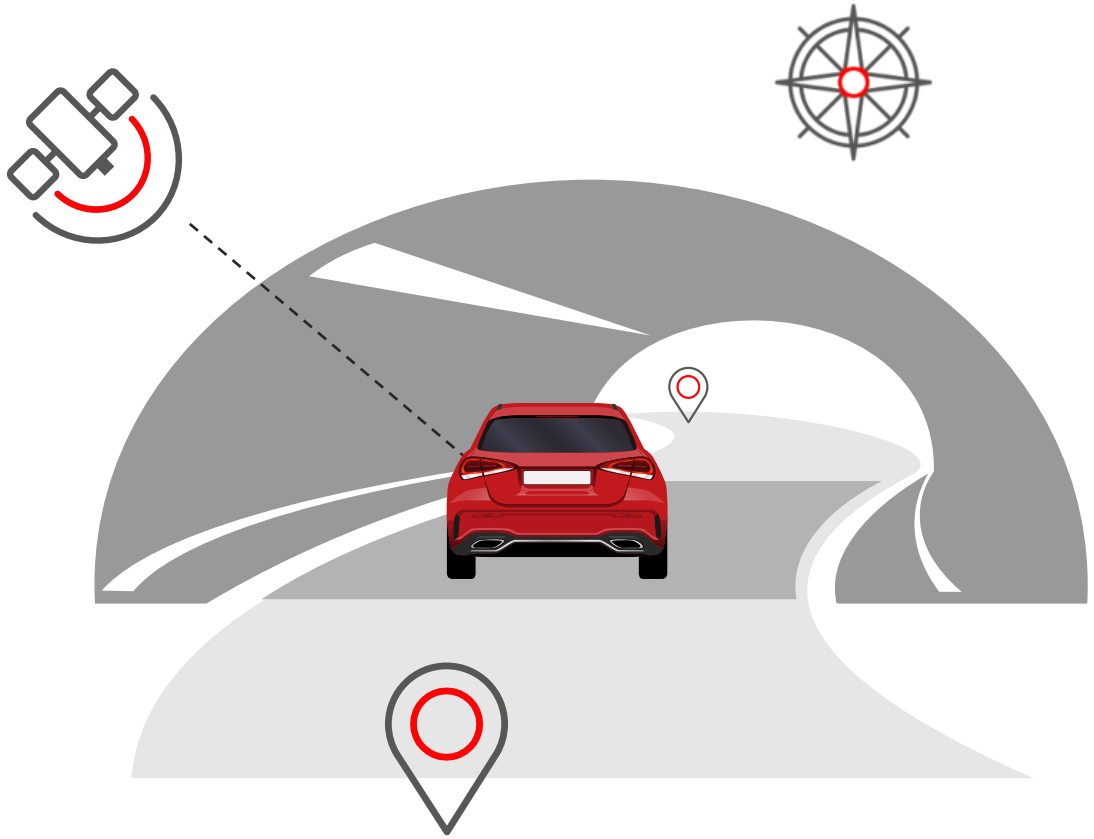




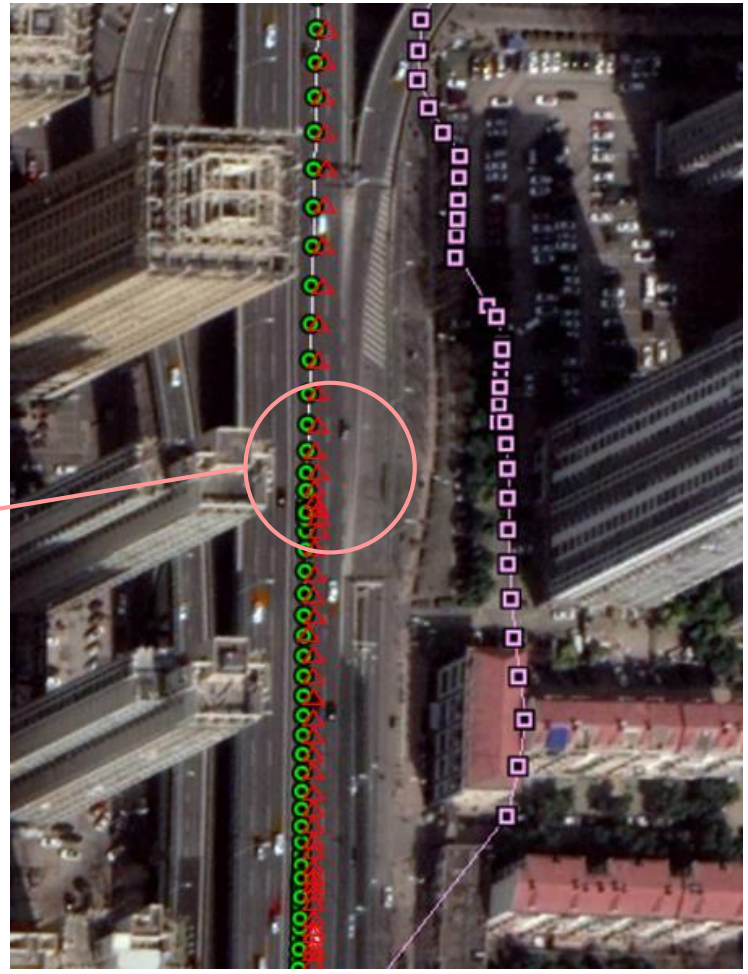
Build a Smarter World

Dead Reckoning (DR)

- DR uses GNSS and INS (Internal Navigation System) in a fused solution to provide continuous high accuracy positioning. If the GNSS visibility drops due to obstructions, the INS will provide the information until the satellite visibility improves.
- Based on this technology, the device can get full coverage positioning or navigation even in parking garages, tunnels and urban canyons.



DR Performance



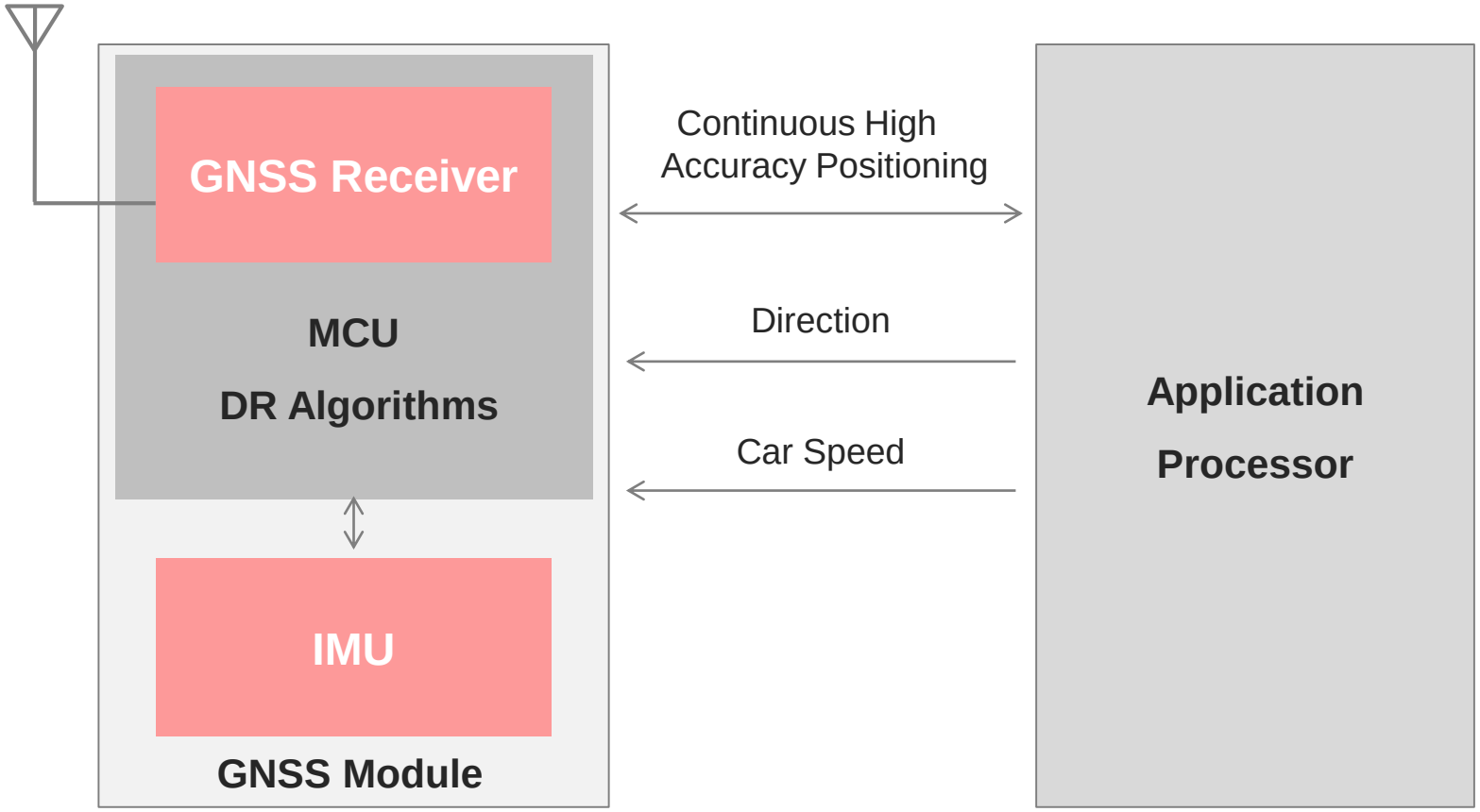
Tested Module	Horizontal Position Accuracy		
	(CEP 50)	(CEP 68)	(CEP 95)
GNSS Module (without DR)	10.61 m	26.42 m	46.32 m
GNSS Module (with DR)	2.12 m	5.16 m	8.65 m

: GNSS Module (with DR) : GNSS Module (without DR) : Reference position (POS320)

Testing Environment: Driving under the elevated road with high buildings on both sides.
Result: The accuracy can be improved to meter level after using DR technology.

CEP: Circular Error Probable

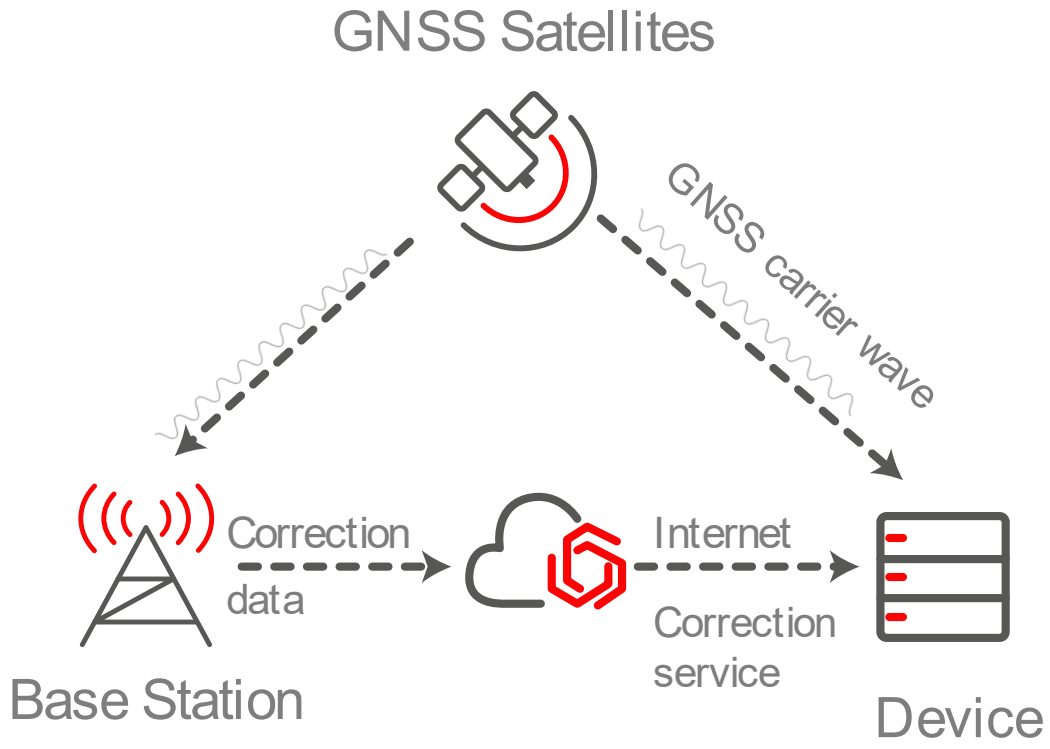
DR Application Architecture



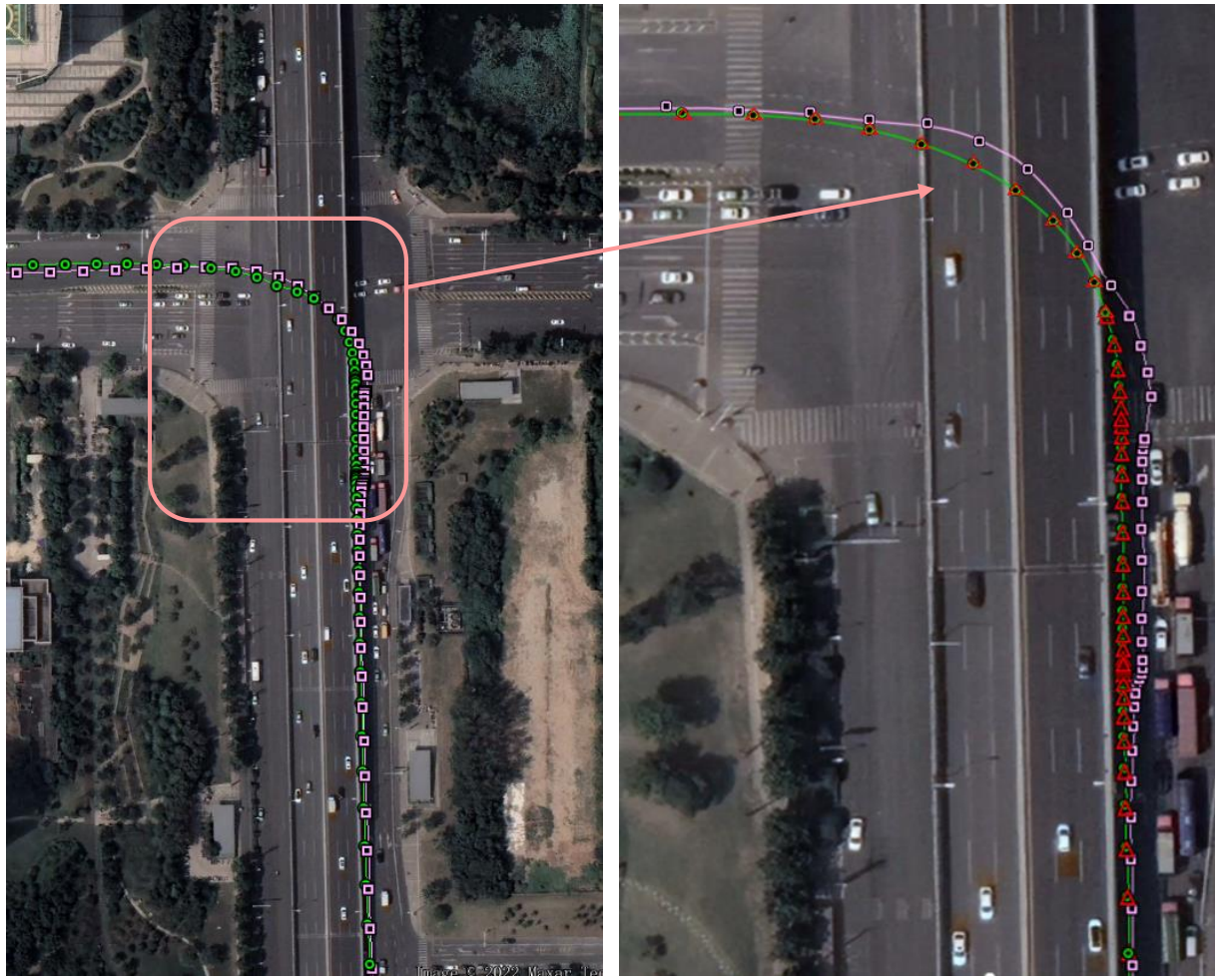
- GNSS module receives direction, car speed and runs DR algorithms to achieve continuous high accuracy positioning.

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.
- Based on this technology, the device can achieve up to centimeter level positioning accuracy.



RTK Performance

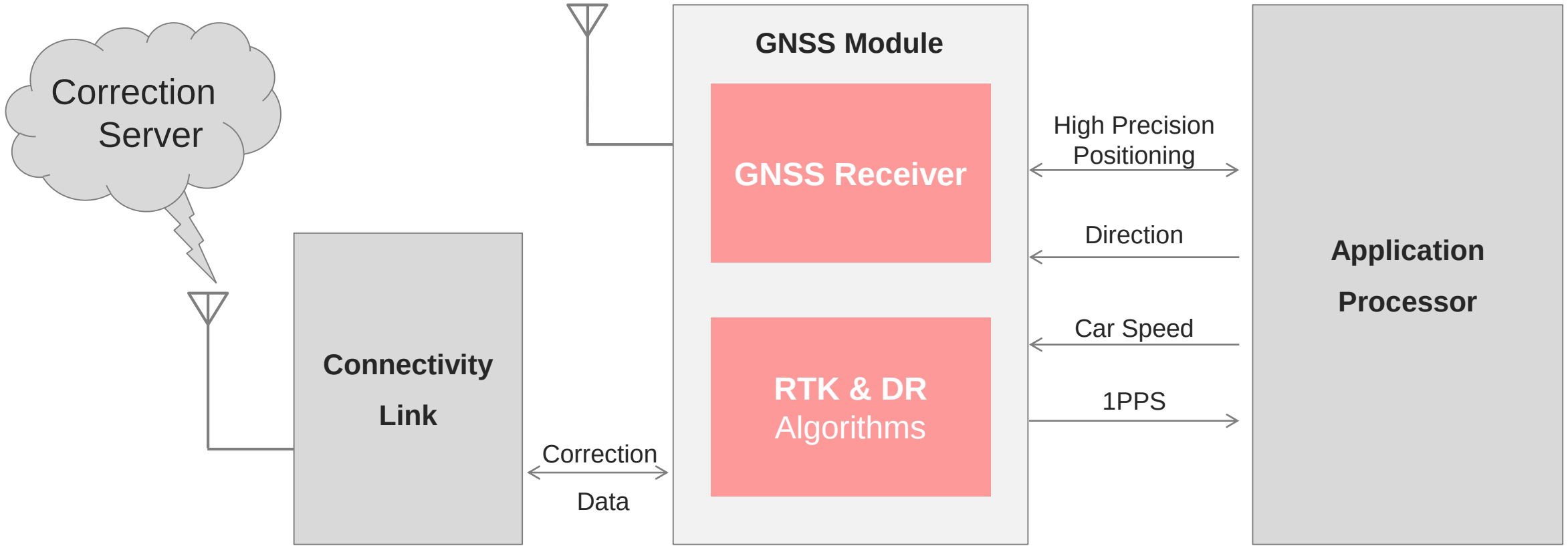


Tested Module	Horizontal Position Accuracy		
	(CEP 50)	(CEP 68)	(CEP 95)
GNSS Module (without RTK)	5.36 m	6.72 m	18.62 m
GNSS Module (with RTK)	0.02 m	0.03 m	0.61 m

: GNSS Module (with RTK) : GNSS Module (without RTK) : Reference position (POS320)

Testing Environment: Driving in an open sky environment.
Result: The accuracy can be improved to centimeter level after using RTK technology.

RTK Application Architecture



- GNSS module receives correction data, direction, car speed and runs RTK & DR algorithms to achieve centimeter level accuracy positioning.

GNSS Introduction

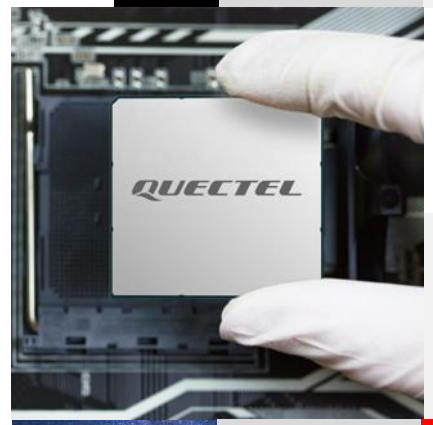
GNSS Module Portfolio

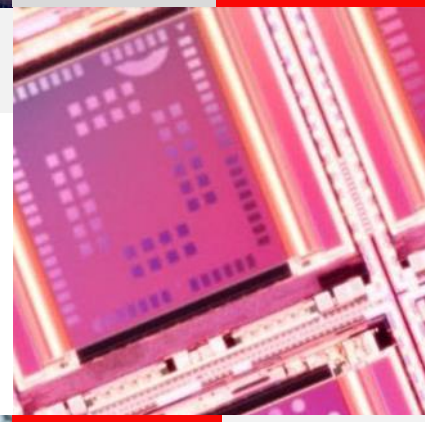
Specifications & Timelines

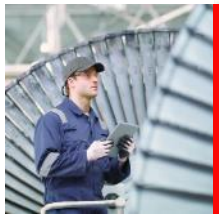
Enhanced Technologies

Typical Applications

Quectel GNSS Advantages







Build a Smarter World

Typical Applications – Positioning

Autonomous Vehicle

- ADAS
- Lane guidance
- Mapping collection

Precision Agriculture

- Automatic tillage and harvesting
- Accurate operation
- Reduced labor costs

UAV

- Formation flight performance
- UAVs for precision agriculture
- Firefighting UAVs

Robotic Lawn Mower

- Borderless automatic mowing
- Accurate operation
- Reduced labor costs

ADAS: Advanced Driver-assistance System UAV: Unmanned Aerial Vehicle

Typical Applications – Positioning

Shared E-Scooter

- Precise parking management
- Convenient operation and maintenance

Shuttle Bus

- Unmanned management
- Precise parking management
- Autonomous vehicle dispatching

Safety Helmets

- Precise personnel positioning and security control

ETC

- Automatic distance calculation of traveling distance, parking duration and road charge

ETC: Electronic Toll Collection

Typical Applications – Timing

Industrial Field

- Precise equipment synchronization

Power Distribution

- Electric power transmission and distribution equipment

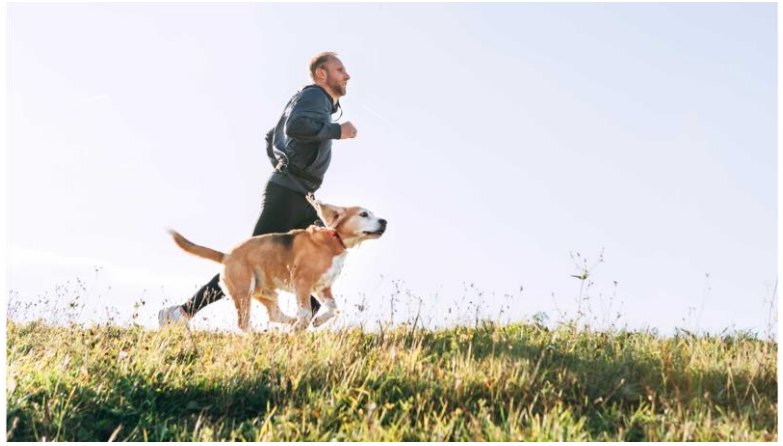
Wireless Base Station

- Time reference acquisition for 4G/ 5G base stations

Financial Application

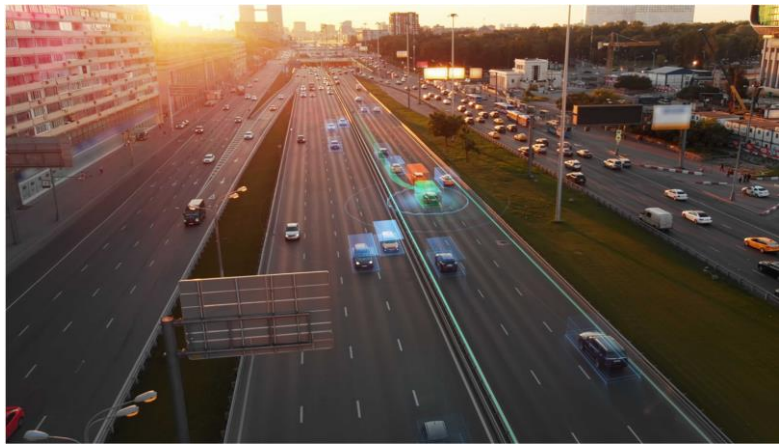
- Accurate time synchronization in financial networks

Typical Application Scenarios



Personal & Pet Trackers

OBD (On-board Diagnostics)



Vehicle Tracking

Asset Tracking

Shared Bike

Construction or Mining

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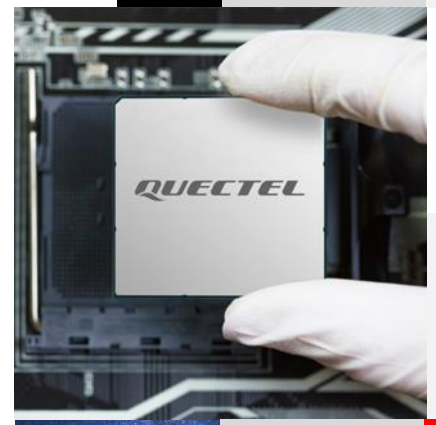
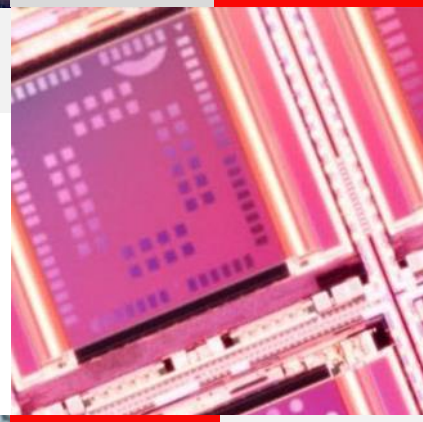


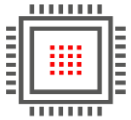


Build a Smarter World

Quectel GNSS Module Advantages

What Quectel Has

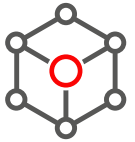
Design Assistance



Integrated Module

360 Degree Local Support

Fully-tested and Certified Modules



Standard Footprint Compatibility

What You Will Get

GNSS Testing and Antenna Tuning Services

Shortened Development Cycle

Multiple Compatible Modules for Supply Shortage

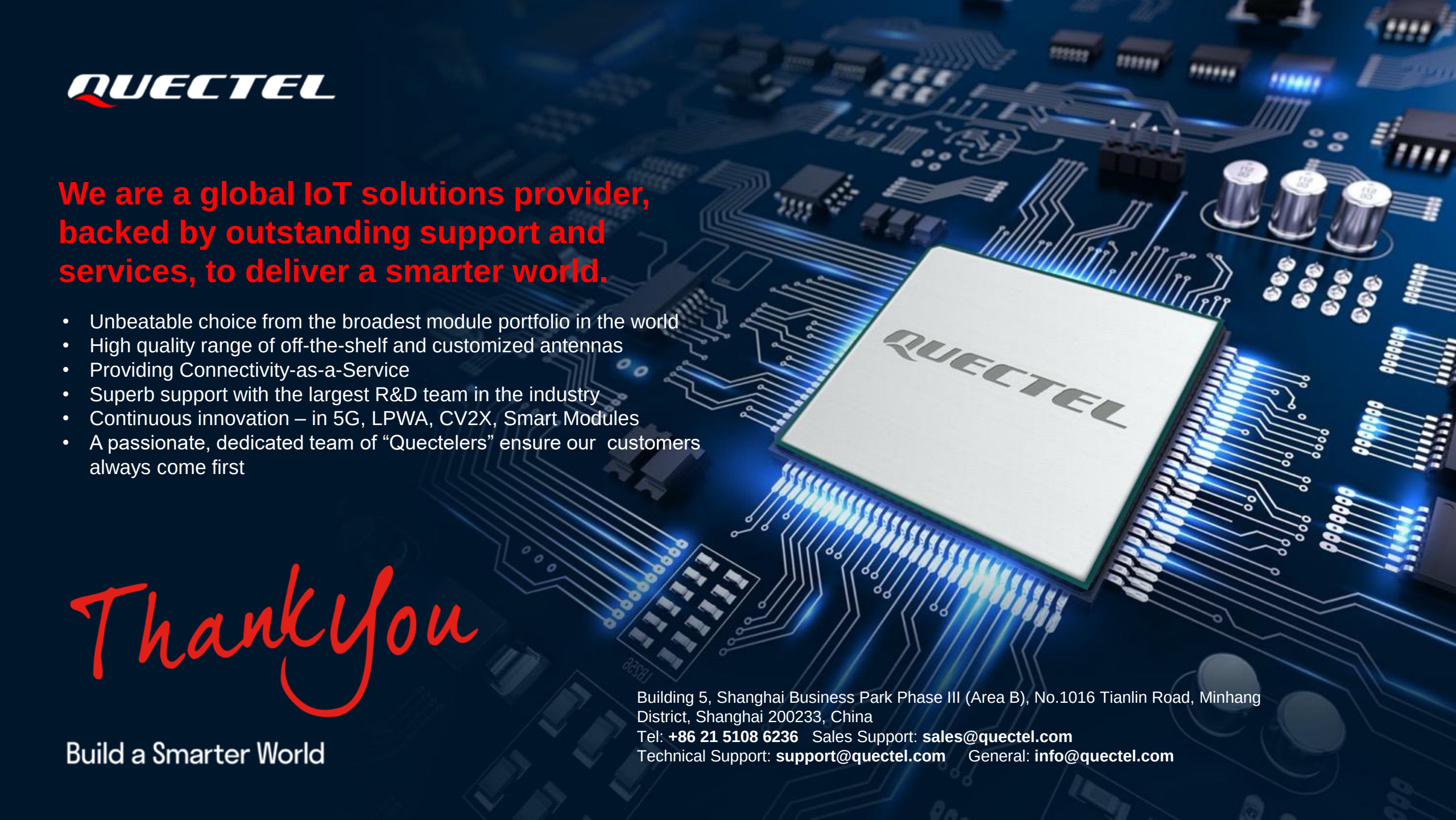
Perfect Results

Products can be released in shorter time. Additionally, R&D investment is minimized and stable supply can be guaranteed.

QUECTEL

We are a global IoT solutions provider, backed by outstanding support and services, to deliver a smarter world.

- Unbeatable choice from the broadest module portfolio in the world
- High quality range of off-the-shelf and customized antennas
- Providing Connectivity-as-a-Service
- Superb support with the largest R&D team in the industry
- Continuous innovation – in 5G, LPWA, CV2X, Smart Modules
- A passionate, dedicated team of “Quectelers” ensure our customers always come first



Thank You

Build a Smarter World

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