



Quectel Wireless Solutions

Antenna Design and Services

Build a Smarter World

June, 2021

Duty of Confidentiality

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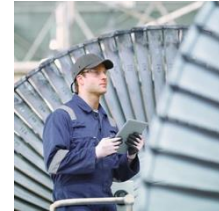
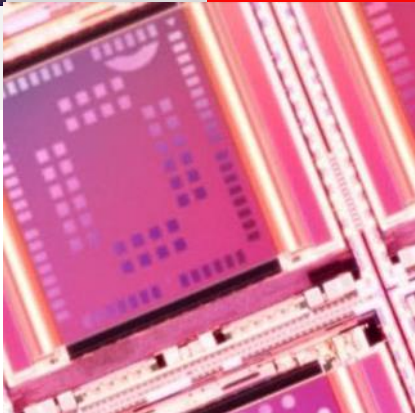
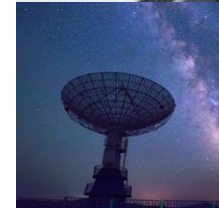
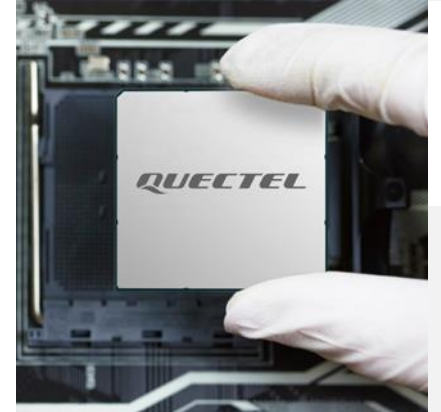
About Quectel

5G Product Portfolio

Antenna Products Portfolio

Customized Antenna Design

Quectel Antenna Advantages



Overview of Quectel as a Company



Founded in
October 2010

5 R&D Centers
globally:
*Shanghai, Hefei,
Foshan, Belgrade
and Vancouver*

Listed on the
Shanghai Stock
Exchange: Stock
Code 603236.SS

50+ sales offices,
90+ distributors
and 3,000+
employees
worldwide

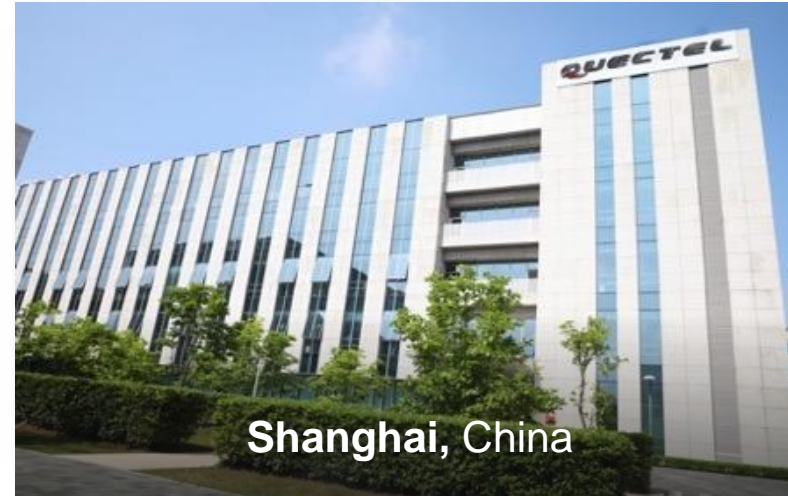
Monthly
production
capacity over
18 Mpcs

More than 6,000
customers
worldwide



Quectel's passion for a smarter world drives us to accelerate IoT innovation. A highly customer-centric organization, we create superior cellular and GNSS modules and antennas backed by outstanding support and services.

Antenna R&D Locations



Test and Measurement Capability

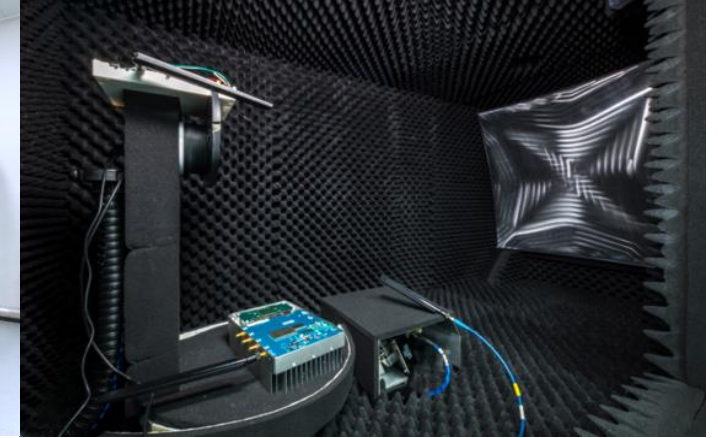


Test Item

- 5G/4G/3G/2G/LPWA Passive & Active Antenna Testing & Design
- Radiated Spurious Emissions Testing
- GNSS Radiated Sensitivity
- ISM Design & Testing
- Noise Control
- Wireless Device Design Consulting



5G OTA System



mmWave 5G Chamber



5G Sub 6 Chamber Ray Zone 2800



5G VNA



Consulting & Evaluation

- Feasibility & Architecture Study
- Risk Identification
- Initial Proof of Concept
- Antenna Component Selection



Manufacturing

- Antenna Sample
- Tooling & Molding
- Assembly and Production Test
- Delivery



Design

- Antenna Placement
- Antenna Layout Design
- RF Specification Design
- Antenna System Design & Optimization
- Gerber File Review



Testing & Certification

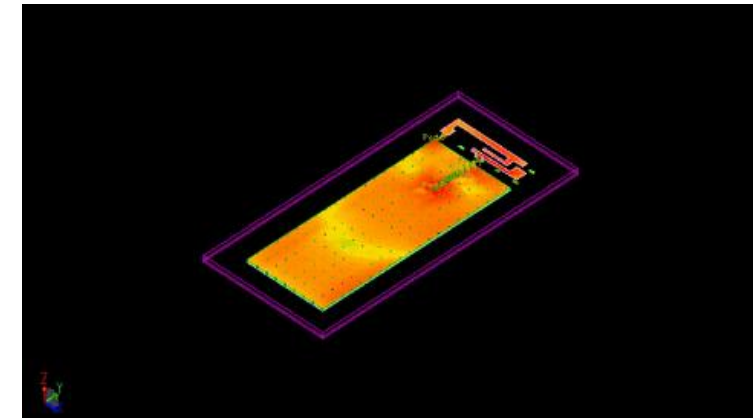
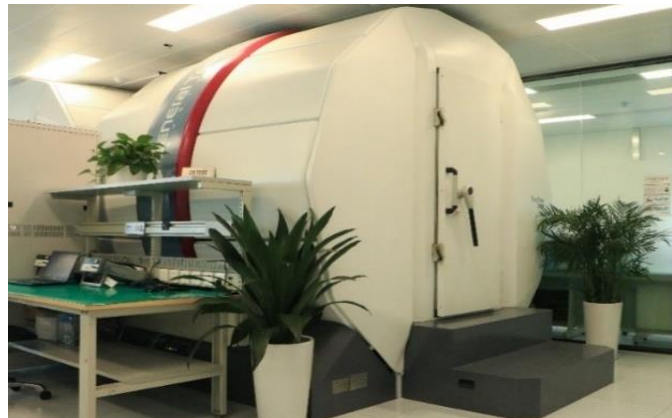
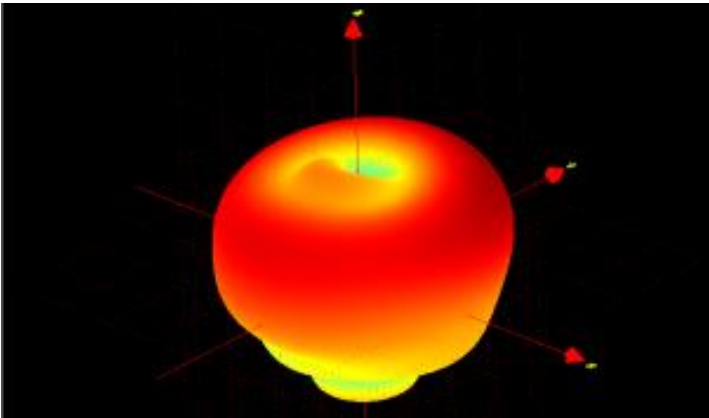
- Antenna OTA Testing
- Interference Mitigation
- Support for CE/FCC/PTCRB Radio Approval
- Pre-certification OTA Testing for 2G/3G/4G/5G



Service Packages



- Antenna Scheme Feasibility Study
- RF Review and Analysis of 3D Model
- Customized Antenna Design
- Passive Cellular Antenna Testing with Optimization
- OTA Active Testing: TRP/TIS
- GNSS Field Testing
- Noise Control & Debug
- Pre-certification Services (e.g. CE/FCC/PTCRB)





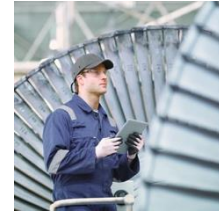
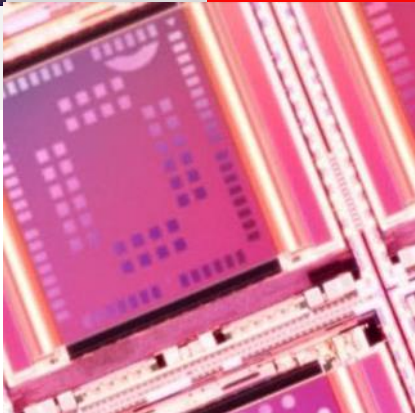
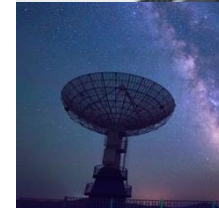
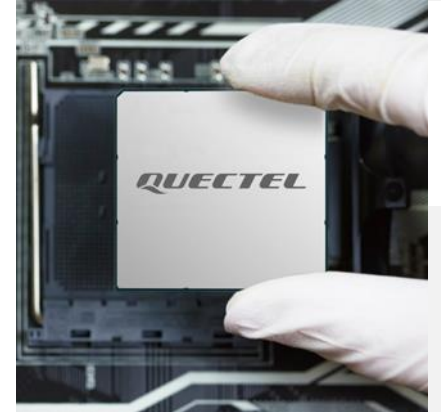
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5G Product Portfolio

Antenna Products Portfolio

Customized Antenna Design

Quectel Antenna Advantages



5G Antenna Solutions



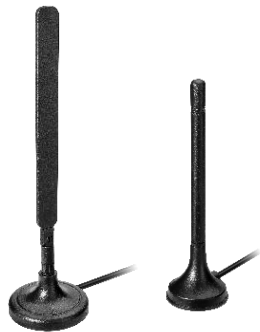
Terminal Antenna



External Antenna



Combined Antenna



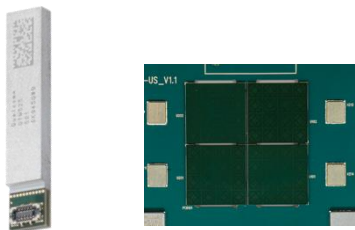
Magnetic Antenna



Embedded PCB Antenna



Embedded FPC Antenna

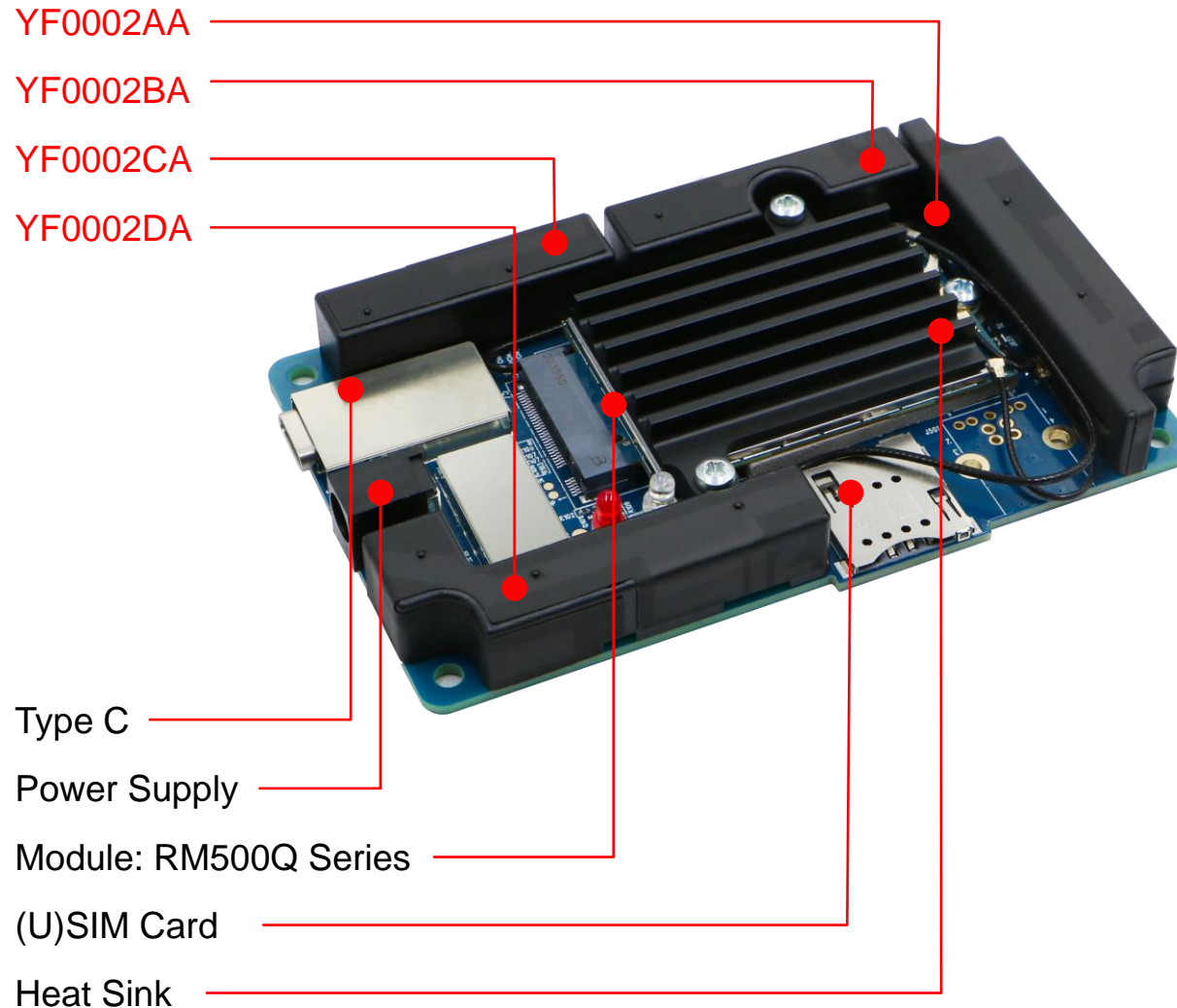


mmWave Antenna



High-integrated Antenna for 5G Modules

Antenna Application – 5G Antenna with Module



Customized 5G antennas designed for Quectel RM500Q series module on EVB

With this highly integrated solution, option to build into any connected solution to reduce time to market. The isolation between each antenna is 10–12 dB in low band, 15–20 dB in mid/high band.

- 4 × 4 5G MIMO
- 700–960/1710–2690/3300–5000 MHz
- Designed for RM500Q series
- Low profile, small form factor
- Ease of installation
- Cost effective
- Host PCB Dimension: 100 mm × 60 mm

Antenna Application – 5G Combined Antenna



YB0006AA 7-in-1 5G MIMO

- 2G/3G/4G/5G & Wi-Fi 2.4/5G & GNSS B1/L1
- 700–960/1710–2690/3300–6000 & 2400–2500/5100–5900 & 1561/1575 MHz
- IP67 rated enclosure
- Designed for high performance
- Low loss braided coax cable assembly
- Antenna dimension: 133 mm × 73 mm × 19 mm

Typical Applications

- Passenger Bus/Rail/Air Applications
- Automotive and Heavy Equipment Vehicle Tracking and Telematics
- Remote Asset and Pipeline Monitoring
- HD Video over LTE
- First Responder and Emergency Services
- M2M/IoT Applications



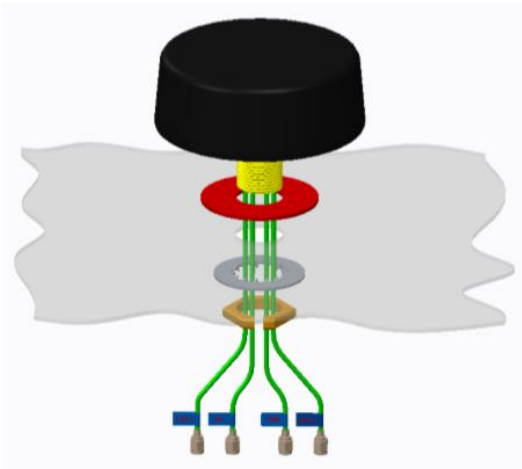
YB0007AA 4-in-1 5G MIMO

- Made for RM500Q series with shared GNSS L1+L5 connections
- 700–960/1710–2690/3300–5000 MHz
- IP67 rated enclosure
- Designed for high performance
- Low loss braided coax cable assembly
- Antenna dimension: Ø 120 mm × 43 mm

Matched Modules

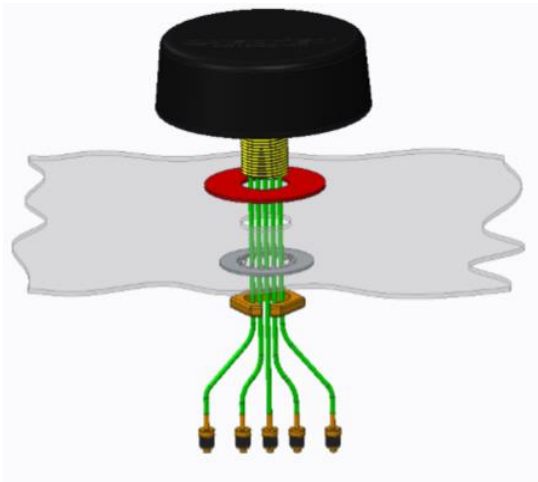
- RM50xQ Series/RG50xQ Series/
- RM510Q-GL(Sub-6 Antennas)/
- SA800U-WF/AG55xQ Series

Combo Antenna Variations for Same Housing



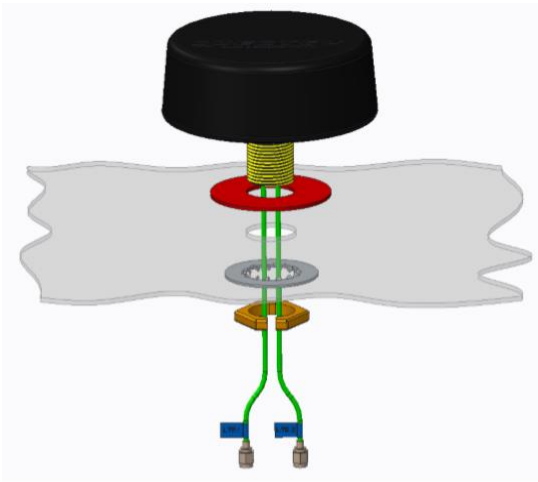
OC: YB0007xx
5G 4in1 MIMO

5G LMH*2
5G MH*2



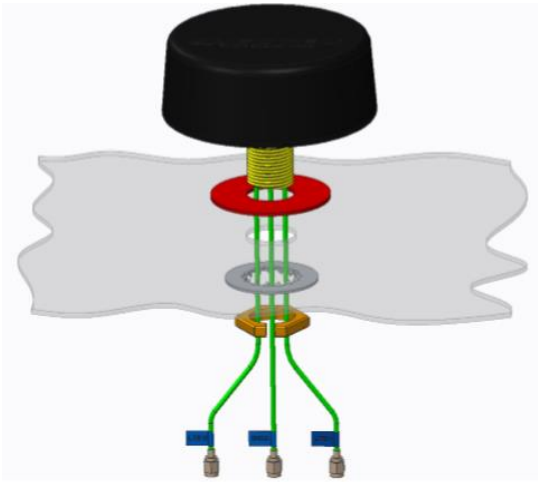
OC: YB0022AA
4G&Wi-Fi&GNSS 5in1 MIMO

LTE*2
Wi-Fi*2
GNSS*1



OC: YB0032AA
4G 2in1 MIMO

LTE Main
LTE Diversity



OC: YB0033AA
4G&GNSS 3in1 MIMO

LTE Main
LTE Diversity
GNSS



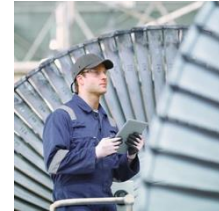
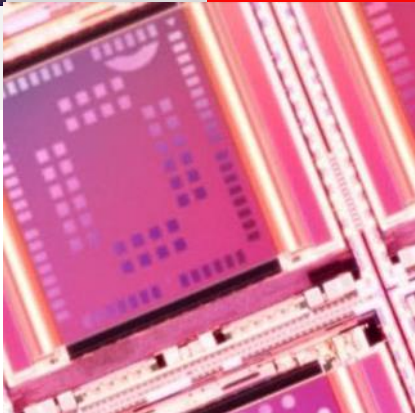
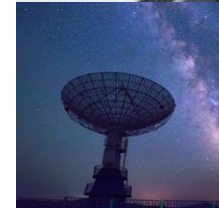
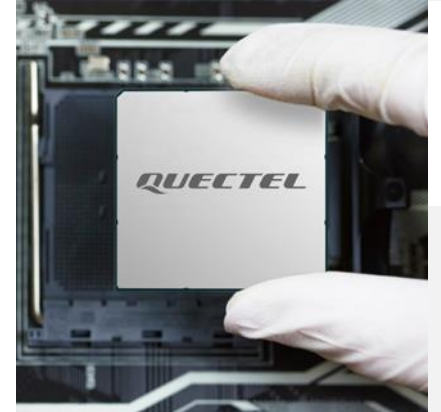
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5G Product Portfolio

Antenna Products Portfolio

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Quectel Antenna Advantages

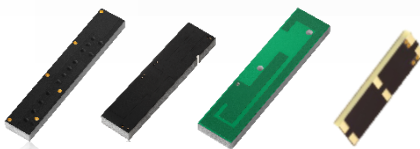


Cellular Antennas



Internal/
Embedded

LTE (4G)



YC0001AA
YC0002AA
YC0003AA
YC0017BA



YF0022AA
YFCA002AA

5G



YP0009CA



YF0020AA



YF0002AA
YF0002DA



**5G SMD
YC0018**

5G (Mid-High Bands)



YP0009AA
YP0009BA



YF0017AA
YF0017BA



YF0002BA
YF0002CA

External-
Direct
Mount



YCN001AA
YE0002AA
YE0013AA
YGL001AA

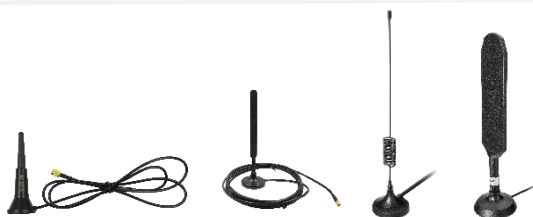


YE0001BA
YE0003AA
YE0007AA
YE0025AA

External-
Cabled



YB0010AA
YB0016AA
YE0006AA
YE0010AA
YE0021AA
YE0029AA



YE0027AA
YE0028AA
YE0037AA
YXH001AA

External-
Cabled
Combo



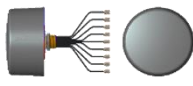
YB0015AA (LTE + GNSS + Wi-Fi)
YB0031AA (LTE +GNSS)
YB0033AA (LTE x 2 + GNSS)



YB0006AA (7in1)



YB0007xx (5Gx4)

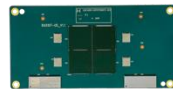


**5G combo
9in1**

5G mmWave



YM0011AA



RA510TRWAA-
N00-NNNNA

Wi-Fi/Bluetooth and GNSS Antennas



Internal/
Embedded
Ceramic
SMD

Wi-Fi/Bluetooth (Dual)

YC0009AA
YC0010AA
YC0011AA

Internal/
Embedded
Cabled

YF0011AA
YF0029AA

External-
Direct
Mount

YE0031AA
YE0032AA
YE0038AA

Wi-Fi 6E (Tri-band)

YF0026AA
YF0027AA

YEW004AA
YEW001AA

Internal/
Embedded
Passive

Internal/
Embedded
Active

External-
Cabled
Active

GNSS

YG0005AA
YG0062AA

YG0021AA
YG0015AA

YG0035AA
YLY001CA

With L5

YC0008AA
YG0030AA
YCG0012AA

GNSS L1&L2&L5 L6
YFGA001AA

GNSS L1&L2&L5
YG0063AA

YB0017AA
YG0028AA



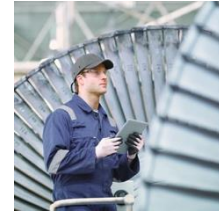
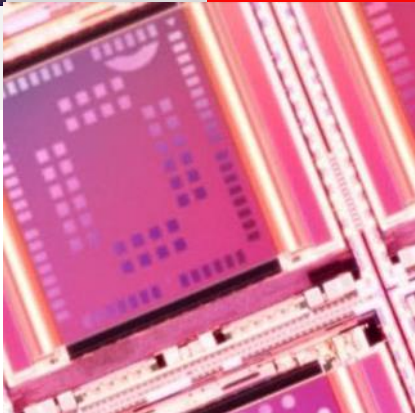
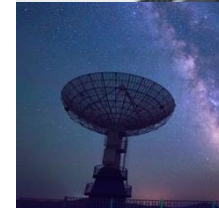
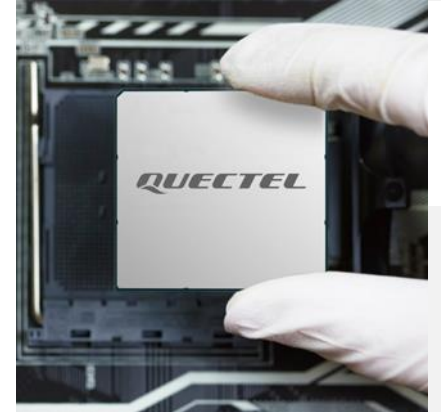
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5G Product Portfolio

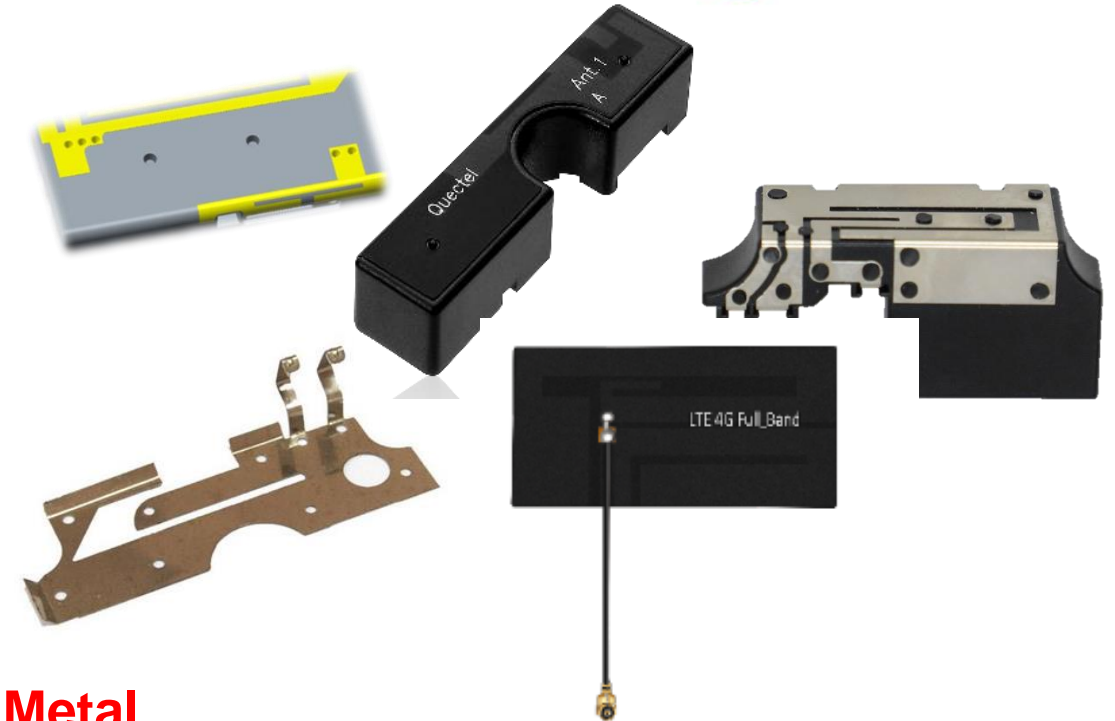
Antenna Products Portfolio

Customized Antenna Design

Quectel Antenna Advantages



Customized Antenna Technologies



LDS (Laser Direct Structuring)

- The prevailing antenna manufacturing technology on the market
- High design flexibility but double-curved surface not possible
- SMT component integration possible
- Can be more expensive than FPC and Sheet Metal
- Short design cycle (Samples with 7 days turnaround after design)

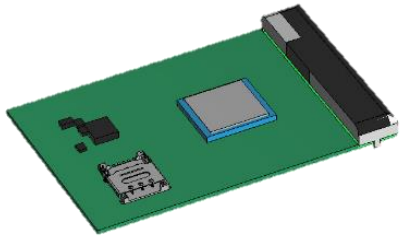
FPC (Flexible Printed Circuit)

- Traditional antenna manufacturing technology
- Cost-effective
- Can be integrated with spring contacts for ease of assembly
- Limited layout complexity
- Cost between that of Sheet Metal and LDS
- Sample manufacturing cycle time in 7 days

Sheet Metal

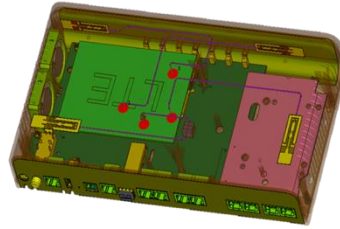
- The most capable 3D antenna manufacturing technology on the market
- Design flexibility guaranteed
- Antenna volume and RF performance improved
- Conformal geometric designs with chassis
- Low assembly cost
- High yield
- Higher tooling cost than that of FPC and LDS

Customized Antenna Design Process



Concept

- Architecture Review
- Antenna Placement
- Antenna Layout



ME Design

- Antenna Design
- Gerber File Review
- Antenna System Design & Optimization



Sample

- Engineering Sample
- Antenna Integration
- Noise Debugging
- Performance Optimization



Test

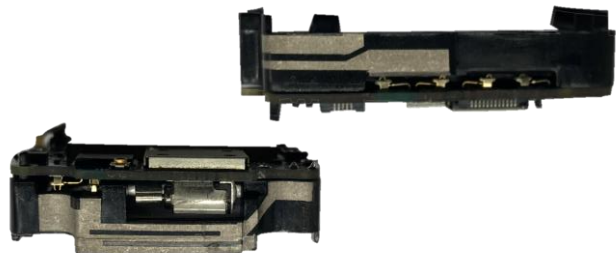
- RF Test
- OTA Test



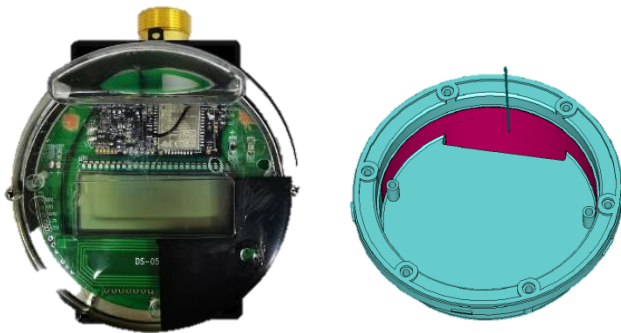
Manufacture & Deliver

- Assembly Production
- Manufacture Test
- Packaging and Supply

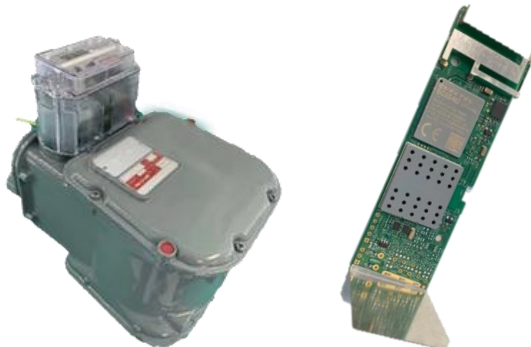
Customized Antenna Case



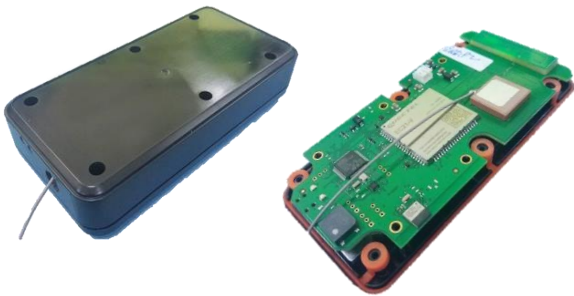
Wearable Device - LDS



Water Metering - FPC



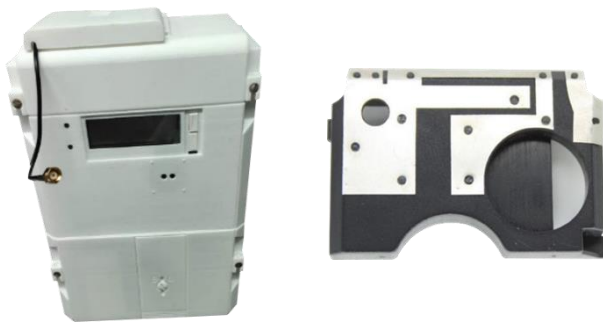
Gas Metering - Sheet Metal



Tracker - PCB & Ceramic Chip

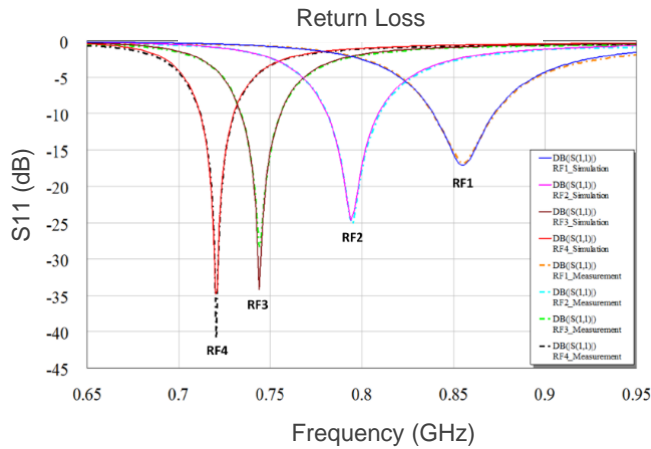
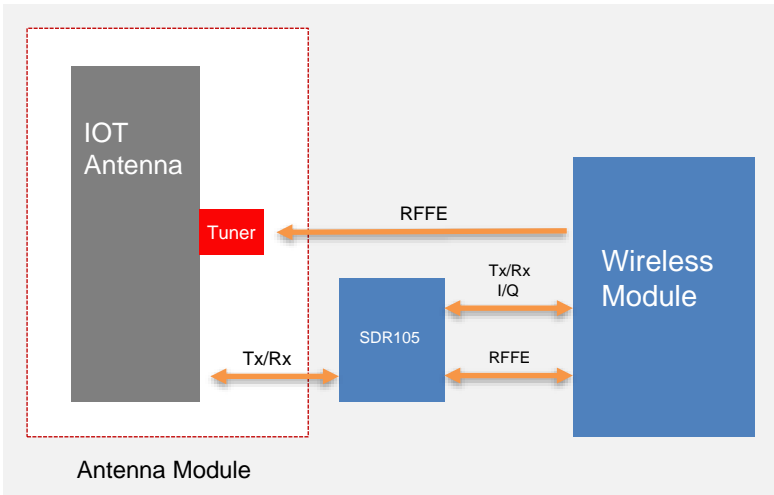
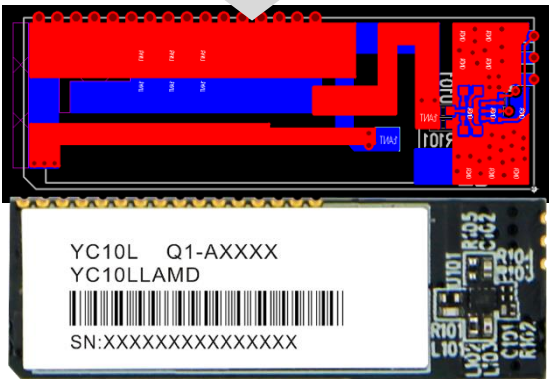
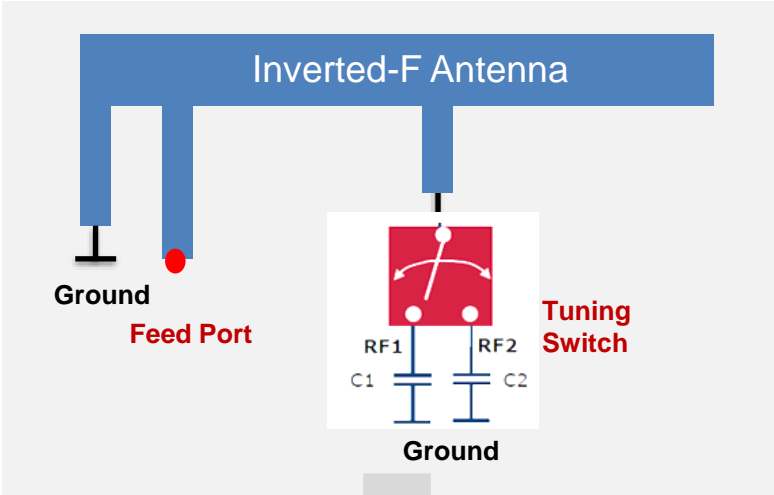
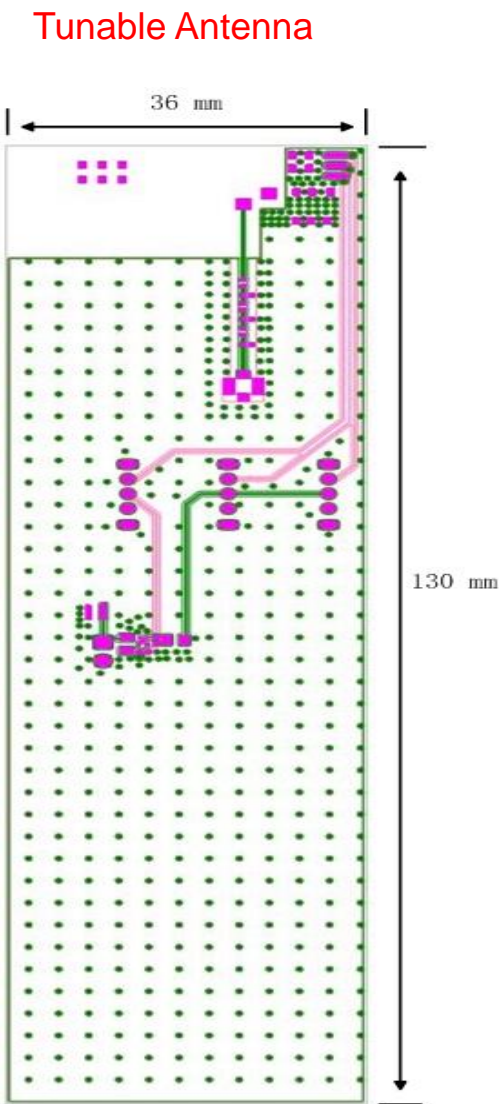


MiFi - Sheet FPC



Electricity Metering - Stamped Metal

Quectel Antenna Services



Tunable antenna solution is a standard module, including an antenna and a tuner. It is able to support global NB-IoT/Cat M frequency bands. It can be used across many different IoT device categories, and it benefits our customers:

- Lower antenna cost and shorter development time.
- No more customization and ease of SMT assembly.

Manufacturing and Quality Control



Manufacturing

Strong delivery capability with contract manufacturers



Strong Operation and Supply Chain Management

- Work closely with engineering and production group
- Process control and monitoring of suppliers
- Strict new product introduction process



Approved Supplier Management

- Rigorous approval process
- Strategic approach depending on commodity



Quality Control

Manufactured in ISO 9001, IATF 16949 or ISO 14000 certified factories





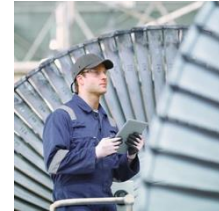
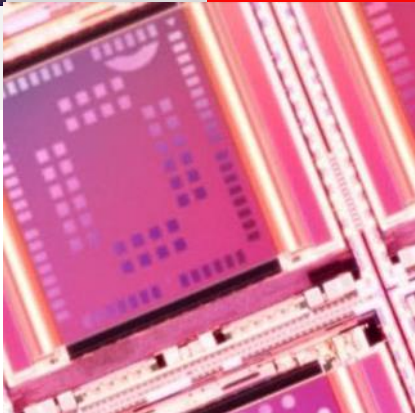
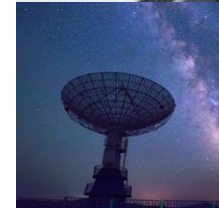
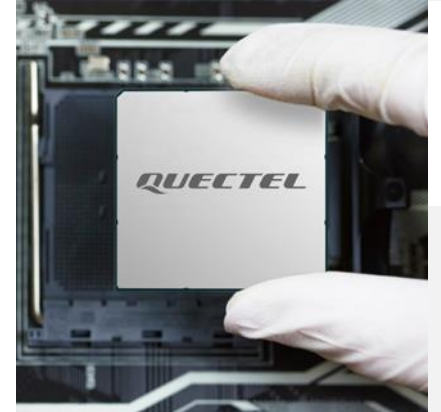
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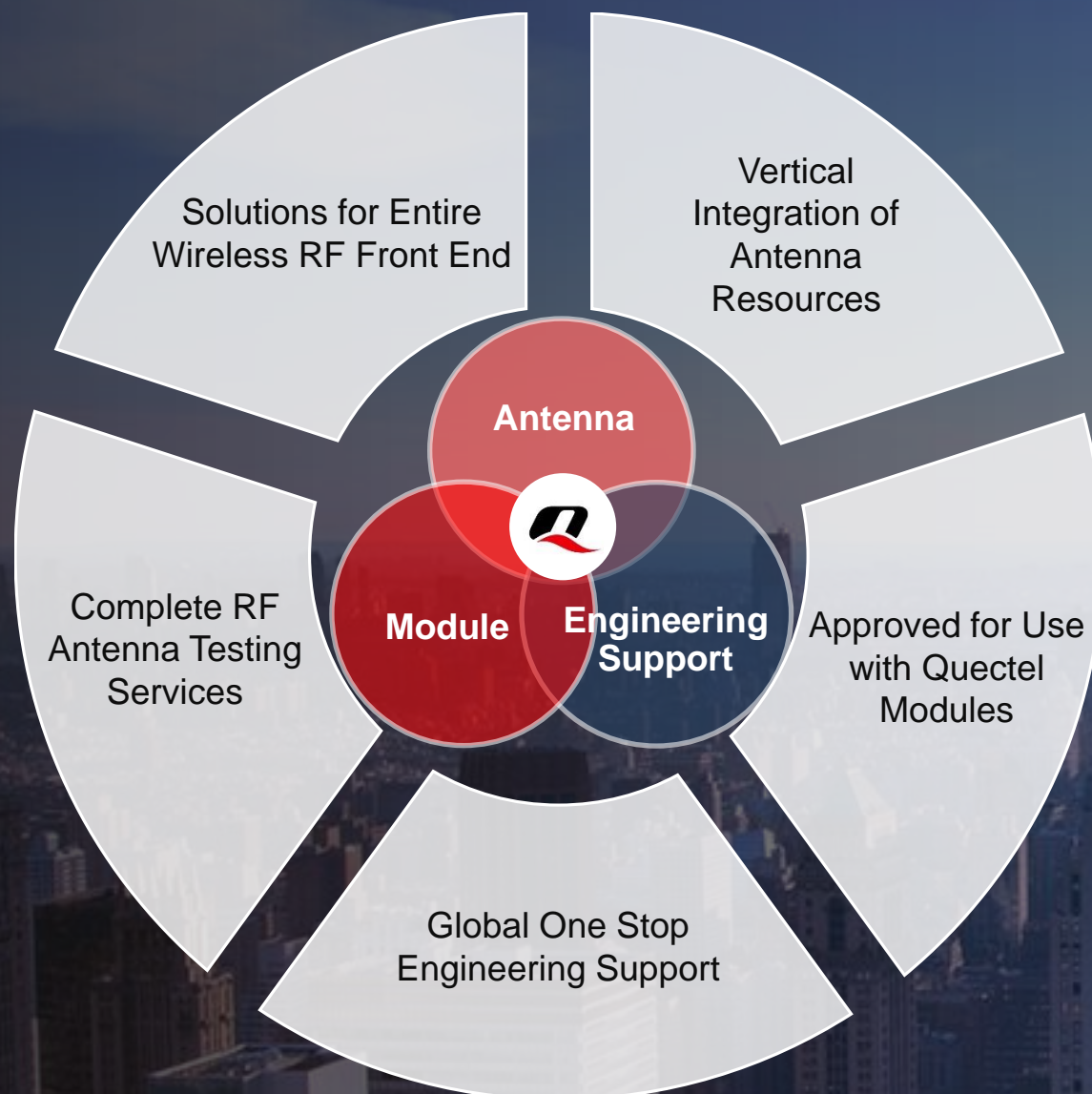
Antenna Products Portfolio

Customized Antenna Design

Quectel Antenna Advantages



Why Quectel?



Sourcing antennas and modules from Quectel offers many distinct advantages

- Development is simplified because Quectel has control of modules, interconnects and antennas. This allows for quick RF design and debug, accelerating time to market.
- Pre-compliance/OTA testing for carrier acceptance streamlined with Quectel supplying two key components.
- A large selection of standard antenna products.
- Full customized antenna design, integration and manufacturing capability.
- Dedicated teams of experts worldwide providing support such as feasibility studies, RF design reviews and testing.
- M2M/IoT modules can't work without the antenna and vice-versa.



The number one cellular module vendor in the world and a leading GNSS module supplier

- Unbeatable choice from the broadest module portfolio in the world
- The highest quality products for the best possible prices
- Superb support with the largest R&D team in the industry
- Continuous innovation – first to market with 5G, LPWA, CV2X, snapdragon
- A passionate, dedicated team of “Quectelers” ensure our customers always come first

Thank You

Build a Smarter World

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