XYGStudy RM530N-GL

Quectel RM530N-GL IoT 5G Global Band Module User Manual

Model: RM530N-GL | Brand: XYGStudy

1. Introduction

This manual provides essential information for the installation, operation, and maintenance of the Quectel RM530N-GL IoT 5G Global Band Module. The RM530N-GL is a high-performance 5G Sub-6GHz and mmWave module designed for Internet of Things (IoT) and enhanced Mobile Broadband (eMBB) applications. It adheres to the 3GPP Release 16 specification and supports both 5G non-standalone (NSA) and standalone (SA) modes. Its M.2 form factor ensures compatibility with a wide range of devices.

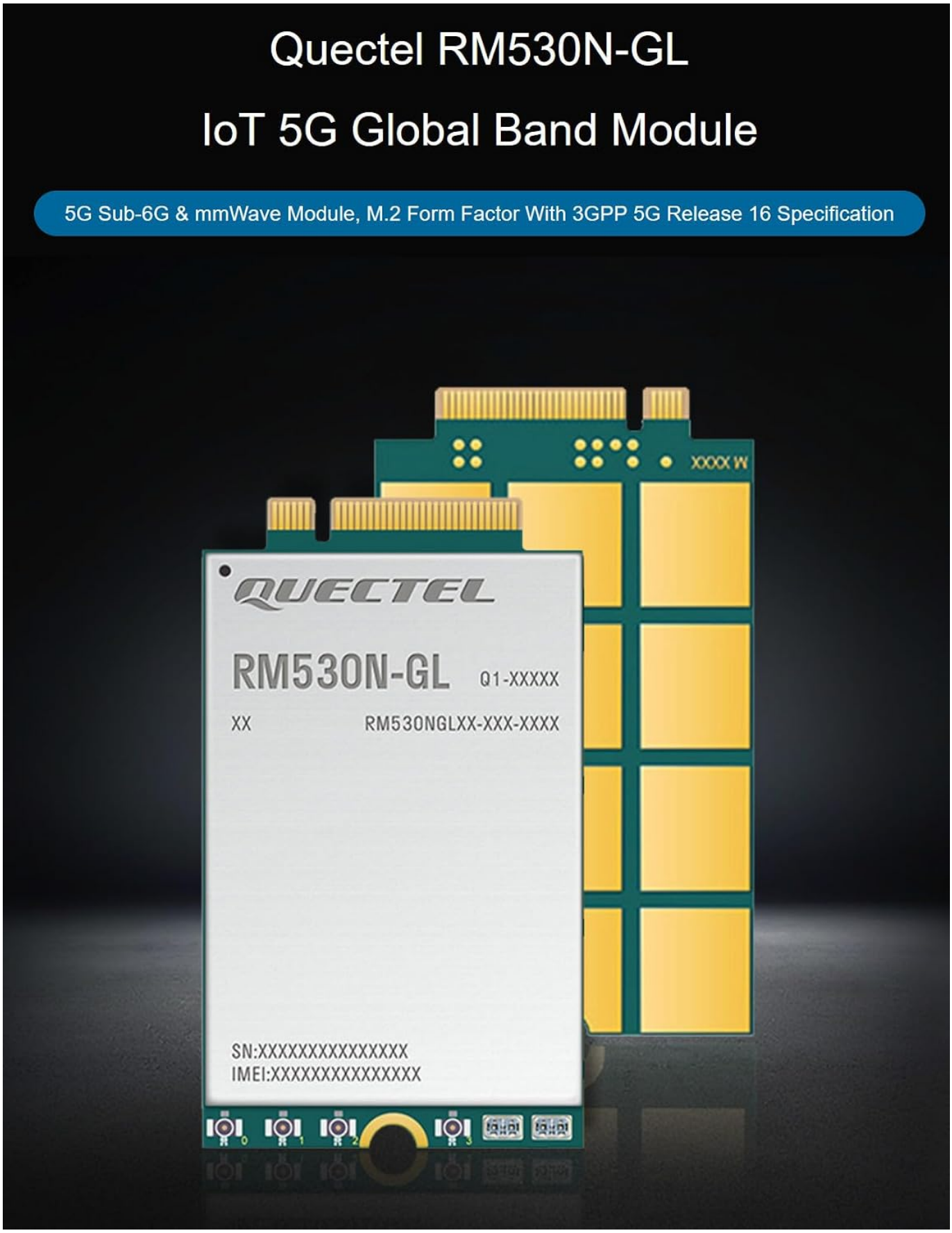


Figure 1: Quectel RM530N-GL IoT 5G Global Band Module overview.

The image above displays the Quectel RM530N-GL module, highlighting its compact M.2 form factor. This module is engineered for global 5G connectivity, supporting both Sub-6GHz and mmWave bands, making it suitable for advanced IoT and eMBB deployments.

2. Key Features

The Quectel RM530N-GL module offers a robust set of features for demanding wireless communication applications:

- **5G Sub-6GHz and mmWave Support:** Optimized for IoT/eMBB applications, supporting both frequency ranges.
- **3GPP Release 16 Specification:** Adheres to the latest industry standards for 5G technology.
- **NSA and SA Modes:** Supports both non-standalone and standalone 5G network architectures.
- **M.2 Form Factor:** Standardized M.2 design for easy integration into various host devices.
- **Multi-Constellation GNSS Receiver:** Integrated high-precision GNSS (GPS, GLONASS, BDS, Galileo) for accurate positioning.
- **Wide Network Standard Coverage:** Full support for 5G, 4G (LTE-A), and 3G networks.
- **Industrial-Grade Design:** Suitable for industrial and commercial applications requiring reliability and durability.
- **Compatibility:** Compatible with Quectel RM520N 5G module series for flexible design options.
- **Rich Network Protocols:** Integrates multiple industry-standard interfaces and supports various drivers and software functions (USB/PCIe drivers for Windows 7/8/8.1/10, Linux, and Android).
- **DFOTA and VoLTE Support:** Supports Delta Firmware Over-The-Air (DFOTA) and Voice over LTE (VoLTE) (optional).

3. Package Contents

Verify that all items are present and in good condition upon opening the package.

- Quectel RM530N-GL Module x1
- Pi5-Camera-Cable x1 *(Note: This item is listed in the product description but is typically not part of a standard module package.)*

Important Note: This is an M.2 module without an antenna or base board. It is recommended to use it with a compatible 5G antenna and 5G DONGLE HAT (sold separately).

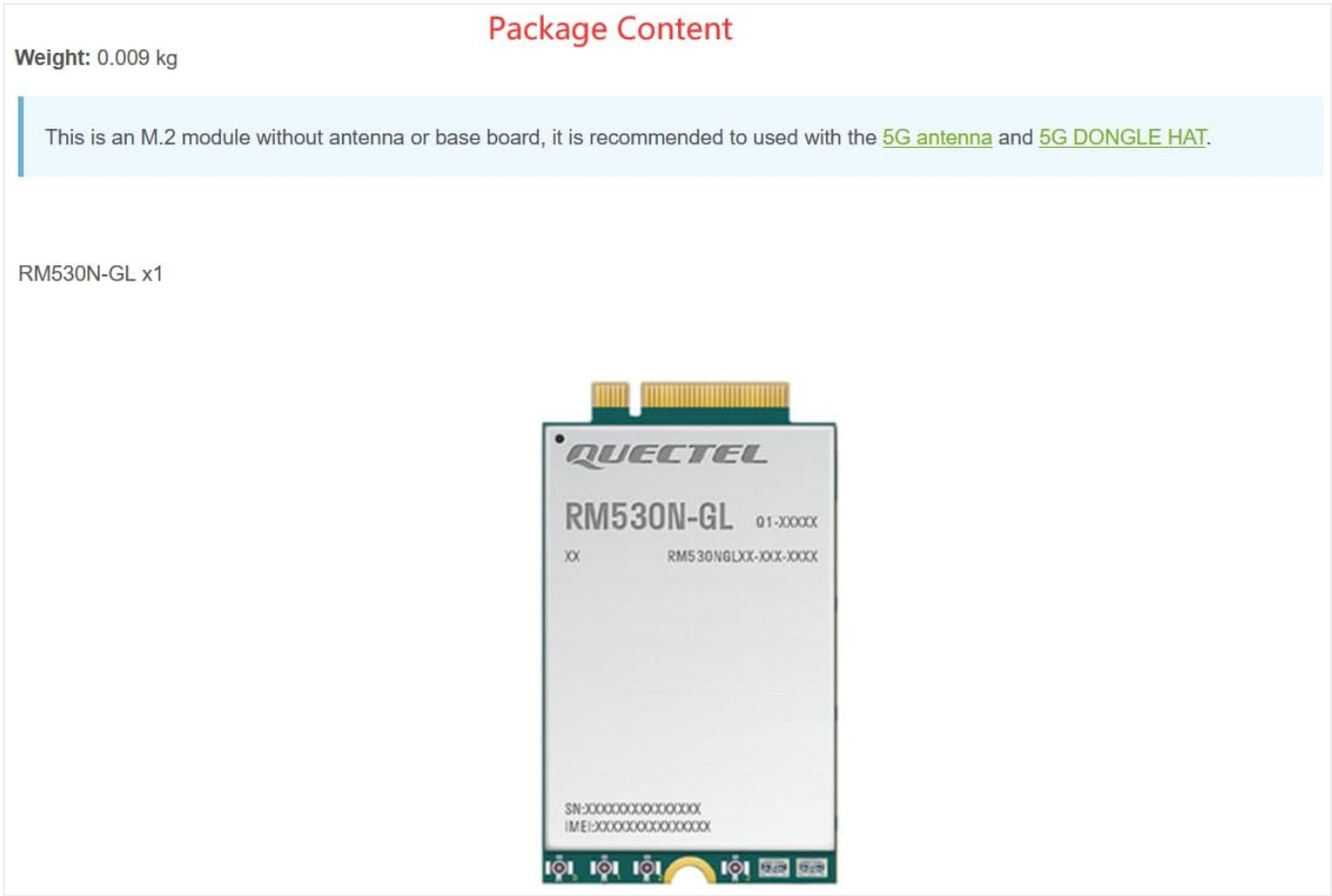


Figure 2: Quectel RM530N-GL module and important note regarding accessories.

The image shows the RM530N-GL module itself and reiterates that additional components like antennas or baseboards are not included and must be acquired separately for full functionality.

4. Setup and Installation

The RM530N-GL module is designed for integration into host devices with an M.2 slot. Follow these general steps for installation:

1. **Preparation:** Ensure the host device is powered off and disconnected from any power source. Wear an anti-static wrist strap to prevent electrostatic discharge (ESD) damage.
2. **Locate M.2 Slot:** Identify the compatible M.2 slot on your host device's motherboard or expansion board. The RM530N-GL uses an M.2 form factor.
3. **Insert Module:** Gently align the RM530N-GL module with the M.2 slot's keying and insert it at a 30-degree angle. Apply even pressure until the module is fully seated.
4. **Secure Module:** Push the module down towards the motherboard and secure it with the provided screw (usually with the host device) into the standoff.
5. **Connect Antennas:** If using external antennas, carefully connect them to the appropriate antenna connectors on the module. Refer to the module's pinout diagram for correct placement.
6. **Power On:** Once the module is securely installed and antennas are connected, reassemble your host device and power it on.
7. **Driver Installation:** Install the necessary drivers for the RM530N-GL module on your operating system (Windows, Linux, Android). Drivers are typically provided by the module manufacturer or can be downloaded from their official website.

For detailed pinout diagrams and specific integration guidelines, refer to the official Quectel RM530N-GL Hardware Design document.

5. Operating Principles

The Quectel RM530N-GL module operates as a cellular communication device, enabling 5G, 4G, and 3G connectivity for your host system.

- **Network Connectivity:** The module automatically detects and connects to available cellular networks based on the inserted SIM card and configured network settings. It supports both 5G NSA (Non-Standalone) and SA (Standalone) modes, allowing it to function in current and future 5G deployments.
- **Data Transmission:** Once connected, the module facilitates high-speed data transmission over 5G, LTE, or 3G networks, suitable for various IoT and eMBB applications.
- **GNSS Functionality:** The integrated multi-constellation GNSS receiver provides precise location data, supporting GPS, GLONASS, BDS, and Galileo systems. This feature is crucial for applications requiring accurate positioning.
- **Software Interface:** Communication with the host system is typically managed via USB or PCIe interfaces. AT commands are commonly used for configuration and control of the module's functions.

Ensure your operating system has the correct drivers installed and that your application software is configured to communicate with the module.

6. Technical Specifications

Below are the detailed technical specifications for the Quectel RM530N-GL module.

Specifications

5G SUB-6		RM500U-CN	RM500Q-GL	RM502Q-AE	RM520N-GL	RM530N-GL
						
5G Standard		3GPP R15			3GPP R16	
5G		Sub-6 GHz				Sub-6G & mmWave
Region / Provider		China	Global (except US)	Global (except China)	Global	
Operating temperature		-30 °C ~ +75 °C				
Extension temperature		-40 °C ~ +85 °C				
Dimensions		30.0 × 52.0 × 2.3 (mm)				
Weight		8.9 (g)	8.7 (g)			8.8 (g)
Power supply		3.3~4.4 V, typical 3.7 V	3.135~4.4 V, typical 3.7 V			
Power consumption		90 µA @ shutdown 3.7 mA @ hibernate TBD @ USB 2.0, idle TBD @ USB 3.0, idle	70 µA @ shutdown 4.0 mA @ hibernate 32 mA @ USB 2.0, idle 54 mA @ USB 3.0, idle	80 µA @ shutdown 4.2 mA @ hibernate 39 mA @ USB 2.0, idle 54.5 mA @ USB 3.0, idle	195 µA @ shutdown 4.7 mA @ hibernate 41 mA @ USB 2.0, idle 60 mA @ USB 3.0, idle	173 µA @ shutdown 5.1 mA @ hibernate 51 mA @ USB 2.0, idle 69 mA @ USB 3.0, idle
FREQUENCY BAND						
5G	5G NR	-				n257, n258, n260, n261
	5G NR NSA	n41, n78, n79	n41, n77, n78, n79	n1, n2, n3, n5, n7, n8, n12, n20, n25, n28, n38, n40, n41, n48, n66, n71, n77, n78, n79	n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n25, n26, n28, n29, n30, n38, n40, n41, n48, n66, n70, n71, n75, n76, n77, n78, n79	
	5G NR SA	n1, n28, n41, n77, n78, n79	n1, n2, n3, n5, n7, n8, n12, n20, n25, n28, n38, n40, n41, n48*, n66, n71, n77, n78, n79		n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n25, n26, n28, n29, n30, n38, n40, n41, n48, n66, n70, n71, n75, n76, n77, n78, n79	
LTE	LTE-FDD	B1, B2, B3, B5, B7, B8, B20, B28	B1, B2, B3, B4, B5, B7, B8, B12(B17), B13, B14, B18, B19, B20, B25, B26, B28, B29, B30, B32, B66, B71			
	LTE-TDD	B34, B38, B39, B40, B41	B34, B38, B39, B40, B41, B42, B43, B48			
	LAA	-	B46			
UMTS	WCDMA	B1, B2, B5, B8	B1, B2, B3, B4, B5, B6, B8, B19		B1, B2, B4, B5, B8, B19	
GNSS		-	GPS / GLONASS / BeiDou (Compass) / Galileo / QZSS (only supported by RM520N-GL and RM530N-GL)			
DATA RATE						
5G mmWave		-				downlink 4 Gbps; uplink 1.4 Gbps
5G SA Sub-6		downlink 2 Gbps; uplink 1 Gbps	downlink 2.1 Gbps; uplink 900 Mbps	downlink 4.2 Gbps; uplink 450 Mbps	downlink 2.4 Gbps; uplink 900 Mbps	



5G NSA Sub-6	downlink 2.2 Gbps; uplink 575 Mbps	downlink 2.5 Gbps; uplink 600/650 Mbps	downlink 5 Gbps; uplink 650 Mbps	downlink 3.4 Gbps; uplink 550 Mbps
LTE	downlink 600 Mbps; uplink 150 Mbps	downlink 1.0 Gbps; uplink 200 Mbps	downlink 2 Gbps; uplink 200 Mbps	downlink 1.6 Gbps; uplink 200 Mbps
UMTS	downlink 42.2 Mbps; uplink 11 Mbps	downlink 42 Mbps; uplink 5.76 Mbps		

Figure 3: Overview of Quectel 5G module specifications, including RM530N-GL.

The image provides a comparative table of specifications for various Quectel 5G modules, with the RM530N-GL column detailing its specific features such as 5G standard, operating temperature, dimensions, power supply, power consumption, frequency bands (5G NR, LTE, WCDMA), and data rates.

Quectel RM530N-GL Key Specifications

Feature	Specification
Model Name	RM530N-GL
Part Number	RM530N-GL
Form Factor	M.2
5G Standard	3GPP Release 16
5G Modes	Sub-6GHz & mmWave, NSA & SA
Connectivity Technology	5G, LTE, 3G, Wi-Fi (Host dependent), Bluetooth (Host dependent), USB, Ethernet (Host dependent), GNSS
GNSS Support	GPS, GLONASS, BDS, Galileo
Operating System Support	Linux, Android, Windows (with appropriate drivers)
Dimensions (L x W x H)	52.0 x 30.0 x 2.3 mm (approx.)
Item Weight	Approximately 0.009 kg (0.02 lbs)
Wireless Type	5 GHz Radio Frequency (for mmWave)
Processor Brand	ARM (internal to module)

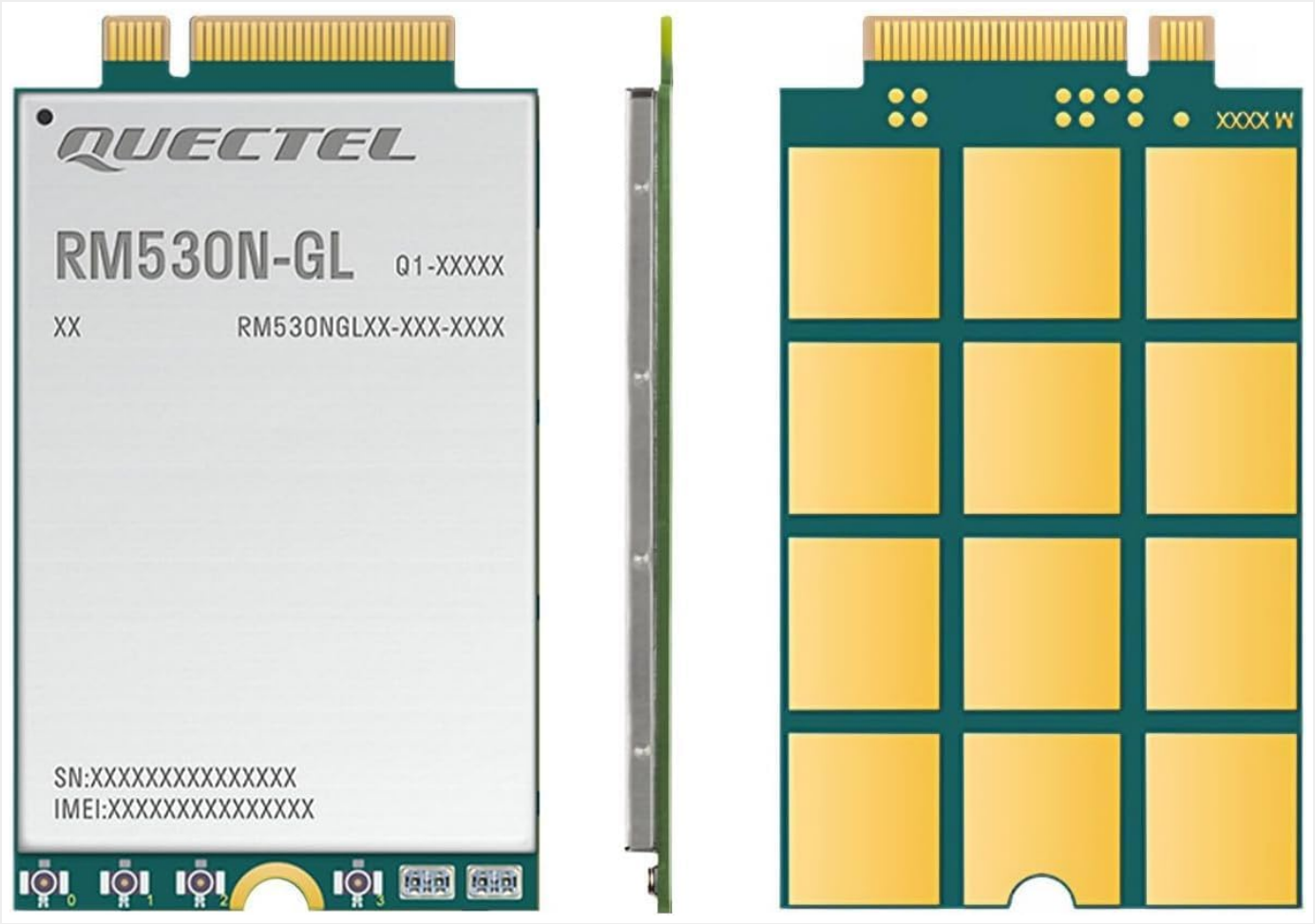
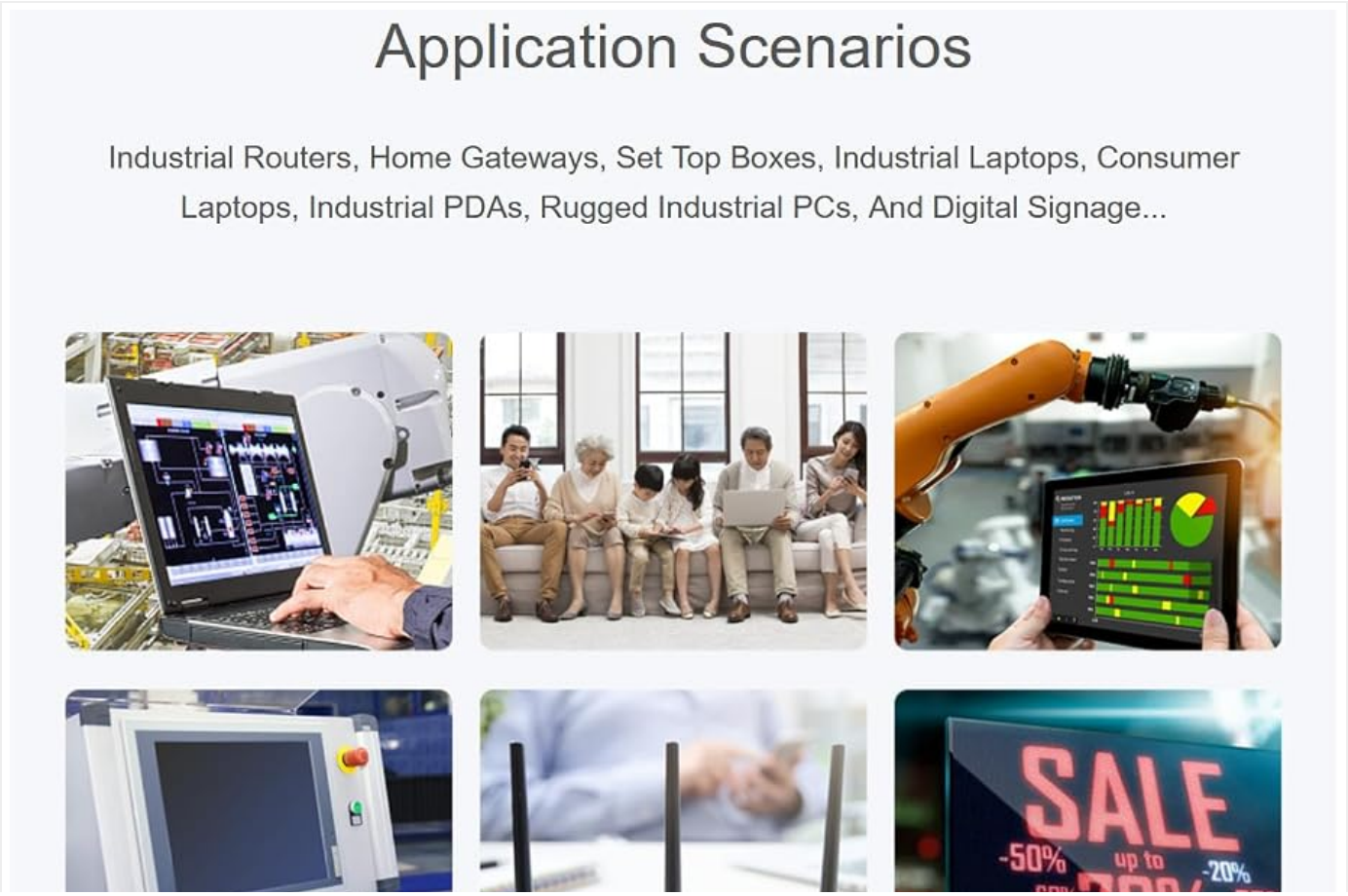


Figure 4: Detailed views of the Quectel RM530N-GL module, showing front, side, and back.

This image provides a clear visual representation of the RM530N-GL module from multiple angles, illustrating its physical design and M.2 interface. The front shows the Quectel branding and model number, while the back reveals the contact pads for connection.



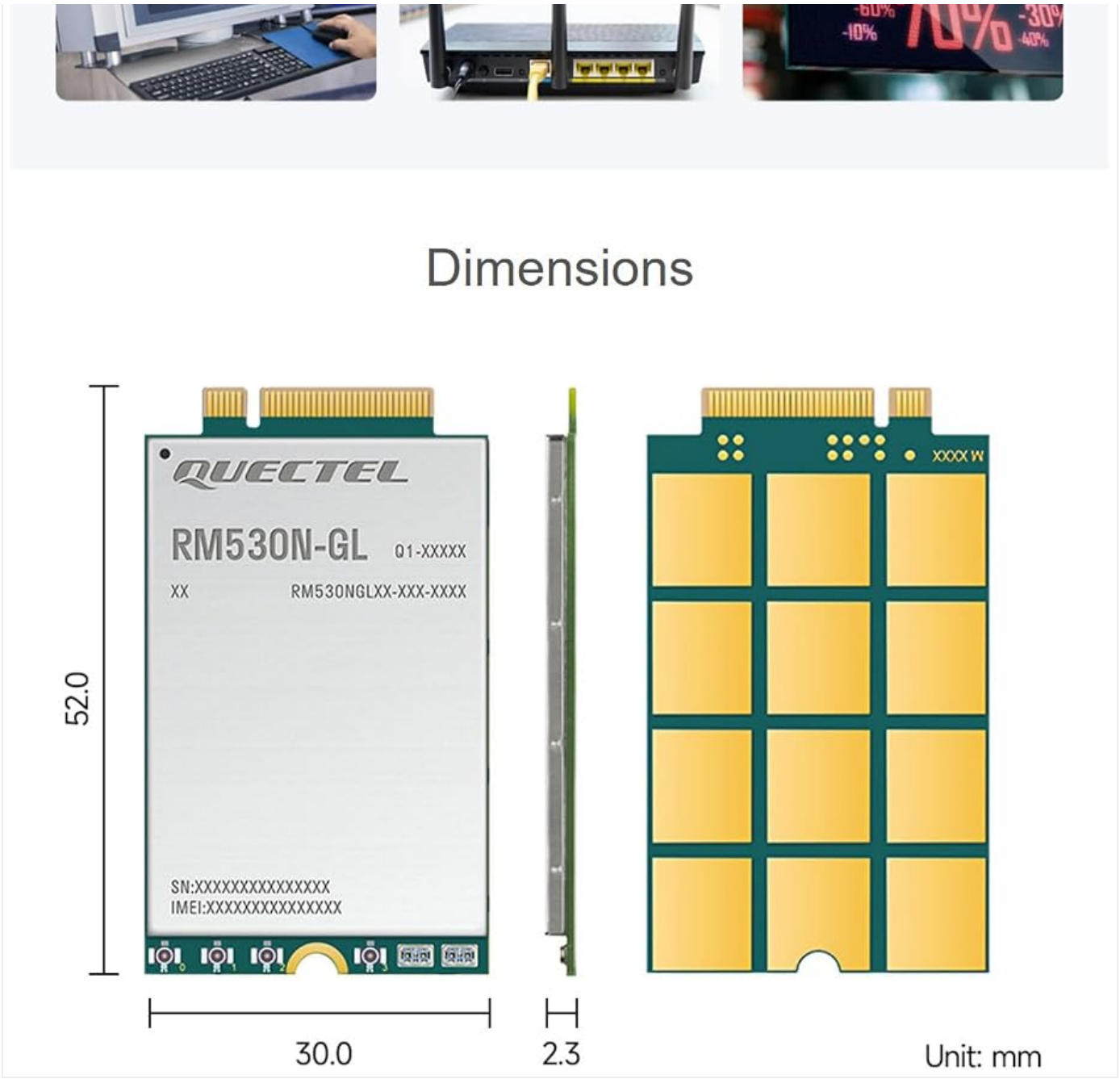


Figure 5: Examples of application scenarios for the Quectel RM530N-GL module.

The image illustrates various environments where the RM530N-GL module can be deployed, including industrial routers, home gateways, set-top boxes, industrial laptops, consumer laptops, industrial PDAs, rugged industrial PCs, video surveillance, and digital signage. These examples highlight the module's versatility in diverse IoT and eMBB applications.

7. Maintenance

The Quectel RM530N-GL module is designed for reliable operation with minimal maintenance.

- **Firmware Updates:** Periodically check the official Quectel website for firmware updates. Firmware updates can improve performance, add new features, or address security vulnerabilities. Follow the provided instructions carefully when performing updates. The module supports DFOTA (Delta Firmware Over-The-Air) for convenient updates.
- **Environmental Conditions:** Ensure the module operates within its specified temperature and humidity ranges to prevent damage and ensure optimal performance. Avoid exposure to extreme temperatures, moisture, or corrosive environments.
- **Physical Inspection:** Occasionally inspect the module and its connections for any signs of physical damage, loose connections, or dust accumulation. Clean gently with a soft, dry brush if necessary.

- **ESD Precautions:** Always observe electrostatic discharge (ESD) precautions when handling the module to prevent damage to sensitive electronic components.

8. Troubleshooting

If you encounter issues with your RM530N-GL module, consider the following troubleshooting steps:

1. **Module Not Detected:**
    - Ensure the module is correctly seated in the M.2 slot.
    - Verify that the host device's M.2 slot is enabled in the BIOS/UEFI settings.
    - Check if the necessary drivers are installed for your operating system.
2. **No Network Connection:**
    - Confirm that a valid and activated SIM card is inserted correctly.
    - Check antenna connections; ensure they are securely attached.
    - Verify network coverage in your area.
    - Ensure APN settings are correctly configured in your operating system or application.
    - Check module status indicators (if available on the host board) for network registration status.
3. **Slow Data Speeds:**
    - Check network signal strength. Weak signals can lead to slower speeds.
    - Ensure you are within a 5G/4G coverage area.
    - Verify that your data plan supports the expected speeds.
    - Update module firmware to the latest version.
4. **GNSS Not Functioning:**
    - Ensure the GNSS antenna (if external) is properly connected and has a clear view of the sky.
    - Verify that GNSS functionality is enabled in the module's configuration.
5. **Module Overheating:**
    - Ensure adequate airflow around the module and host device.
    - Verify that the ambient temperature is within the specified operating range.
    - Reduce workload if possible, or consider additional cooling solutions for the host device.

For more advanced diagnostics, consult the Quectel RM530N-GL AT Commands Manual and the Hardware Design document.

9. Warranty and Support

The Quectel RM530N-GL module is manufactured by Quectel and distributed by XYGStudy.

- **Warranty:** For information regarding the warranty period and terms, please refer to the documentation provided by your point of purchase or contact XYGStudy directly. Standard warranties typically cover manufacturing defects.
- **Technical Support:** For technical assistance, driver downloads, or further documentation, please contact XYGStudy via Amazon message as suggested in the product description. You may also find resources on the official Quectel website for general module information.
- **Contact Information:**

- **Seller:** XYGStudy
- **Amazon Support:** Utilize the Amazon messaging system to contact the seller for product-specific inquiries and resources.
- **Manufacturer:** Quectel (for general technical documentation and resources)

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