EQX EXPANSION MODULE · EQX2Gxx FAMILY

Quad-Band GSM/GPRS Cellular Expansion Module for EQSP32

1 Description

The **EQX2G-X** is a quad-band GSM/GPRS expansion module for the EQSP32 Industrial IoT controller, designed to provide wide-area cellular connectivity for remote installations, telemetry nodes, SMS alerting, and cloud backhaul. At its core, the module integrates a **SIM800-class GSM/GPRS modem**, offering proven carrier-grade reliability across GSM850, EGSM900, DCS1800 and PCS1900 networks. The modem is paired with an external antenna and a 2FF Mini-SIM card slot to ensure stable, industrial-grade operation.

Powered and connected entirely through the EQSP32 expansion connector, the EQX2G requires **no external power supply** or wiring beyond mounting it on the DIN rail and sliding it into the board-to-board connector. Upon power-up, the module is **automatically detected and indexed by the EQSP32**, ensuring seamless plug-and-play operation within existing or new installations.

The EQX2G features a compact **DIN-rail enclosure**, an external SMA antenna interface, and a carrier-approved SIM800-family modem core. The modem supports GPRS multi-slot class 12, enabling data services such as MQTT, HTTP/HTTPS requests, cloud reporting, and remote diagnostics.

The EQSP32 API provides a direct stream connection to the EQX2G modem, enabling full AT command control as well as seamless integration with third-party GSM/GPRS libraries designed for SIM800-class modems, such as TinyGSM. This allows developers to choose between low-level modem interaction and high-level abstractions for data sessions, MQTT, SMS, and HTTP workflows. EQ-AI further simplifies the process by automatically generating initialization code, AT command sequences, or third-party library integrations based on a natural-language description of the desired connectivity or application logic.

Firmware updates are applied directly through the module's front-facing USB-C port, allowing the EQX2G to receive the latest improvements and modem-control optimizations.

With its reliable SIM800-class modem engine, seamless integration and industrial field-ready design, the EQX2G is an ideal solution for adding cellular connectivity to any EQSP32-based system.

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2 Key Features

- Integrated SIM800-class GSM/GPRS modem
- 2G quad-band operation
- GPRS data services (multi-slot class 12)
- SMS messaging support (text and PDU)
- USSD support
- 2FF SIM card interface
- External SMA antenna connector
- Automatic module detection
- Direct stream API for AT command control
- Compatible with third-party SIM800 libraries (e.g., TinyGSM)
- Generative AI coding assistant trained with EQSP32 Library and EQX2G features
- Field-upgradeable firmware via USB-C
- Powered through EQSP32 expansion connector
- Compact, 2SU-wide (36 mm), DIN-rail mount enclosure
- IP20 Protection
- −20 °C to +55 °C operating ambient temperature

3 Applications

- Remote telemetry and field data acquisition
- SMS-based alert and notification systems
- Cloud reporting over GPRS
- Industrial equipment monitoring in remote sites
- Backup cellular connectivity when Ethernet or Wi-Fi is unavailable
- Remote diagnostics and service access
- Telemetry nodes for agriculture, energy, water, and environmental monitoring
- Distributed sensor networks with long-range backhaul
- Cellular gateway functions for standalone EQSP32 installations
- IoT devices requiring wide-area communication

4 Ordering Information

Part number	Description	Interfaces	Enclosure
EQX2G-X	Quad-Band GSM/GPRS Cellular Expansion Module for EQSP32	2G GSM/GPRS, Mini-SIM, SMA antenna	2SU (36 mm) DIN-rail, IP20

Product page and ordering: erqos.com/product/eqx2g

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5 Block Diagram

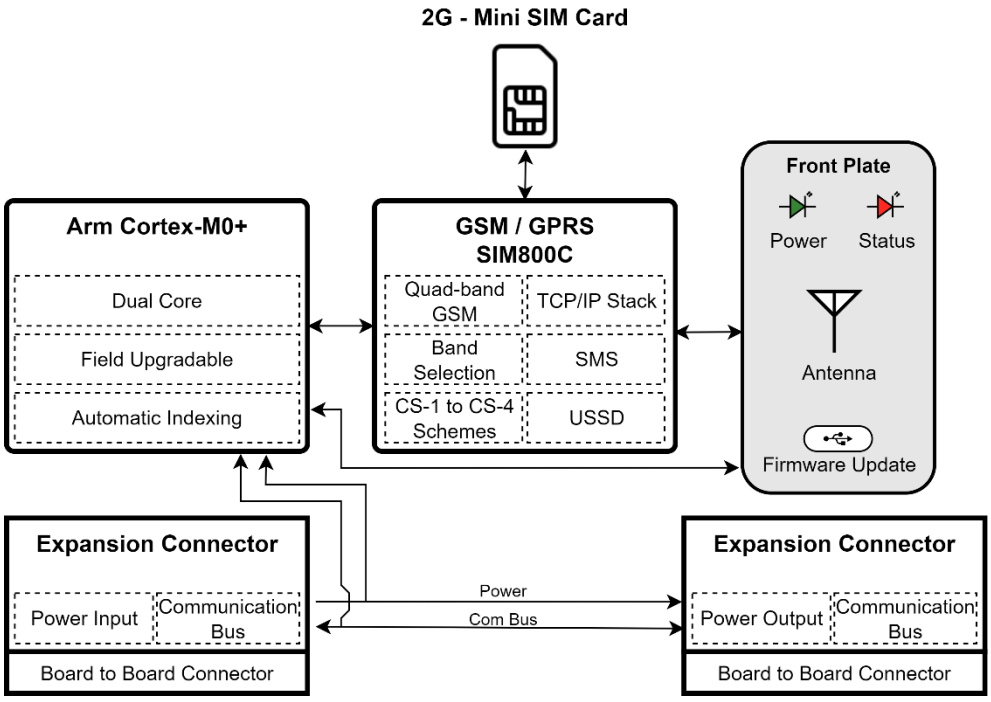

Figure 5-1. EQX2G-X block diagram

6 Specifications

6.1 System Specifications

Table 6-1. System Specifications

Section	Features
Power Management	Supplied by the board-to-board connector
2G GSM/GPRS Modem	Integrated SIM800-class GSM/GPRS modem 2G quad-band operation GPRS multi-slot class 12 Supports SMS (text and PDU) Supports USSD
SIM Interface	2FF Mini-SIM card slot (protected SIM interface)
Antenna	External for -X module variant
Indications	Green LED for power indication Red LED for device status
Enclosure	Easy standard DIN rail push-fit mounting with spring mechanism IP20
Expandability	Push-fit expansion module mounting Automatic module detection and characterization
Firmware Update	Front-facing USB-C for easy firmware upgrades
Environment	–20 °C to +55 °C

7 Connecting EQX2G

To install the EQX2G GSM/GPRS expansion module, mount it next to the EQSP32 controller on the DIN rail and simply slide it until the board-to-board connector is fully inserted into the expansion interface. The module is powered entirely from the EQSP32 and requires **no external power supply**.

When adding new modules to the system, it is recommended to disconnect the power before inserting or removing any expansion units. After applying power, the EQSP32 automatically detects and indexes all connected expansion modules, including the EQX2G, enabling immediate plug-and-play operation.

For safety and ease of use, it is strongly recommended that a main circuit breaker is used to fully isolate the system's AC/DC power source when installing or rearranging modules.

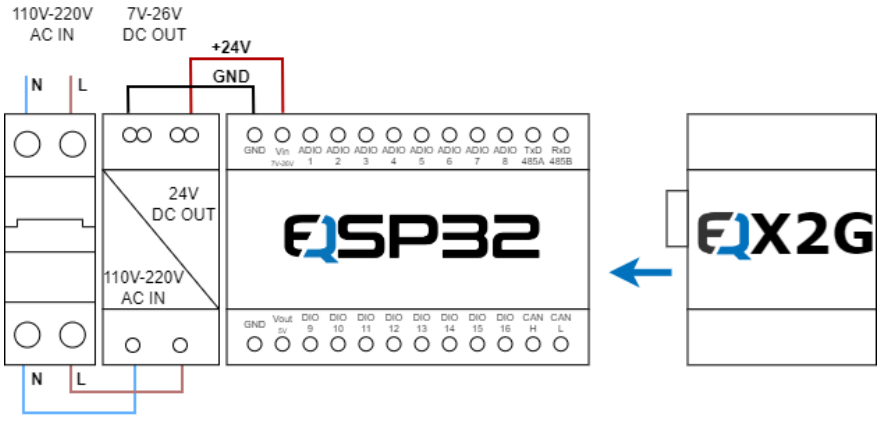

Figure 7-1. Slide EQX2G to connect on EQSP32

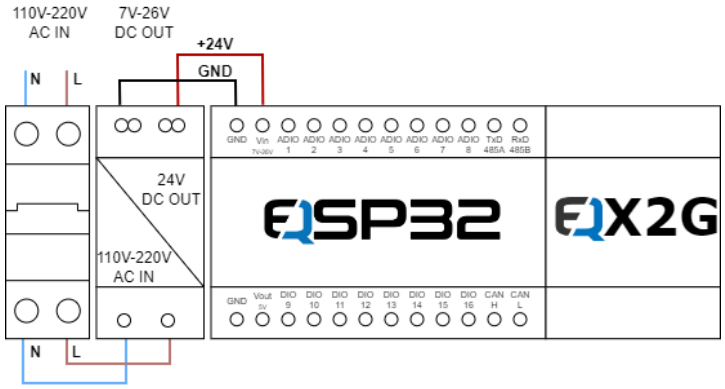

Figure 7-2. Connected EQX2G on EQSP32

> **WARNING**
> Make sure that the appropriate ground fault circuit breaker, fuses or circuit breakers and any other necessary protective components are used if there is any risk of user electrocution.

8 Visual Indications

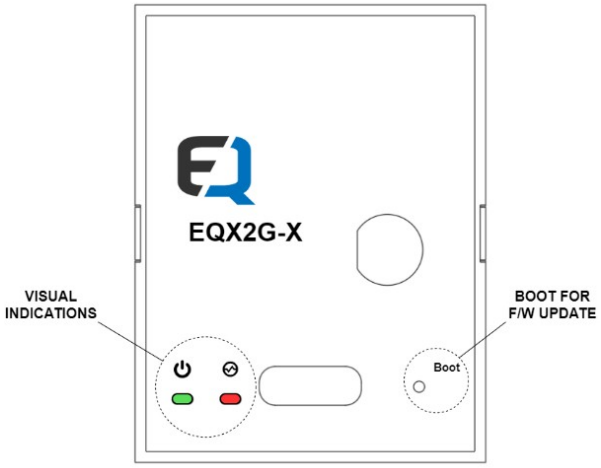

Figure 8-1. Front panel: LEDs and Boot button

When the module is connected and the system is powered on, the POWER LED should light up solid green.

If the STATUS LED is solid red after the automatic detection, it means that the EQX2G module is not communicating with the EQSP32.

During data exchange between the main EQSP32 unit and the EQX2G module, the STATUS LED will be flashing for each transaction.

8.1 LED Indications

Table 8-1. LED indications

State	Meaning	Pattern
Power LED		
On	Powered on	
Off	No power	

State	Meaning	Pattern
Status LED		
Off	No errors, no communication	
Fast Flashing	Data exchange	
Blinking	Auto indexing issue	
Blink Off	Hardware detection failed	
On	Communication error	

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9 External Interfaces

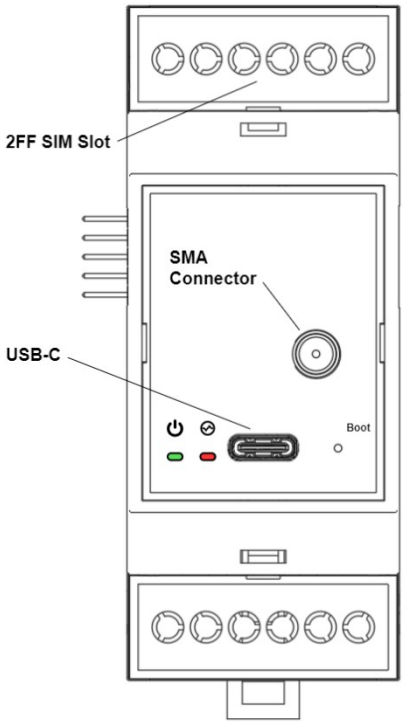

Figure 9-1. EQX2G-X interfaces and front panel

2FF SIM Slot – 2FF Mini-SIM card slot

SMA Connector – External antenna connector

USB-C – Firmware update port

9.1 2FF SIM Slot – Mini-SIM Card Slot

The EQX2G includes a protected **2FF Mini-SIM card slot** located inside the module's enclosure. To access the SIM slot, the **terminal guard must first be removed**.

To remove the terminal guard, insert a small flat-head screwdriver into the release opening and gently lever the guard outward until it pops free. Once removed, the SIM card slot becomes fully exposed.

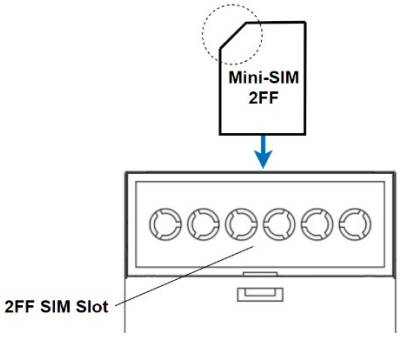

Figure 9-2. Mini-SIM card insertion

Insert the SIM card **exactly as shown in the diagram**, with the **notch positioned at the upper-left corner** and the gold contacts facing downwards (towards the base of the module). Push the SIM card fully into the slot until it seats securely.

After inserting the SIM card, reattach the terminal guard by snapping it back into place.

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9.2 SMA Connector – External Antenna Connector

The SMA connector on the **EQX2G-X** is designed for attaching an external GSM/GPRS antenna.
This connector provides a secure, threaded RF interface compatible with a wide range of **quad-band cellular antennas**, allowing the module to achieve optimal signal quality in industrial environments, control cabinets, remote installations, or metal enclosures where internal antennas would be unreliable.

If an internal antenna EQX2G module is used, there will be no SMA connector for an external antenna.

9.3 USB-C – Firmware Update Port

The front-facing USB-C port on the EQX2G module is used exclusively for firmware updates and maintenance operations. When connected to a computer, the module can enter maintenance mode and appear as a USB mass-storage device for easy drag-and-drop firmware flashing.

USB-C power is intended **only** for firmware upgrades.
Although the module will power on through USB, the GSM/GPRS modem **does not activate** when powered solely from USB. Full modem operation requires power from the EQSP32 board-to-board expansion connector.

10 Power Distribution

The EQX2G module is powered entirely through the **EQSP32 board-to-board expansion connector** and requires **no external power supply**. All internal circuitry—including the GSM/GPRS modem, SIM interface, status indicators and MCU subsystems—is supplied and current-limited by the EQSP32 controller. Power is automatically routed and protected through the EQSP32's internal distribution network, ensuring stable operation even during high-current GSM transmission bursts.

Although the module may be powered through its **front-facing USB-C port**, this USB power is intended **only for firmware updates and maintenance**. **The GSM/GPRS modem itself does not activate when powered exclusively from USB.** Full modem functionality is available only when the module receives power through the EQSP32's board-to-board connector.

Because power is delivered directly through the slide-to-connect mechanical interface, the EQX2G becomes fully operational immediately upon docking—no external terminals, wiring, or additional power cabling are required.

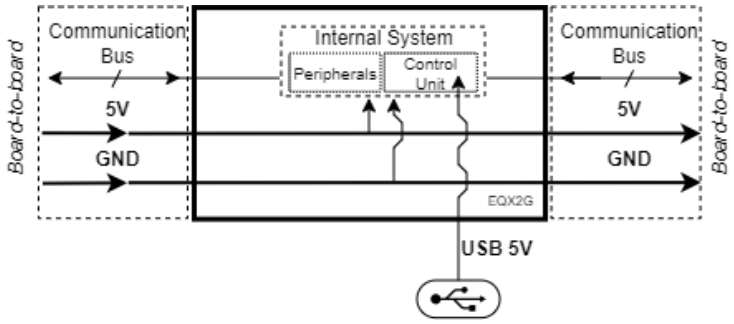

Figure 10-1. Power distribution

11 GSM Modem Usage

11.1 Library Reference and Usage

The EQX2G module communicates with the EQSP32 controller through a dedicated stream, the ***eqx2gStream*** (also available as `eqx2gSerial`), exposed by the EQSP32 API.

The ***eqx2gStream*** is fully defined inside the EQSP32 API library and exposed as a global Stream like any Serial port.

This stream can be used in two ways:

- either **by attaching a stream**-based third-party SIM800-compatible modem library—such as TinyGSM—to handle high-level GSM/GPRS operations,
- or by **directly** reading and writing AT commands through the raw EQX2G stream (*eqx2gStream*) for full low-level control.

One EQX2G can be used on each EQSP32. Check `eqsp32.isModuleDetected( EQX2G() )` before using the stream. If the connection to the module is lost, run the modem start-up sequence again once the module is detected again.

After power-up, the modem needs time to start and to register on the network. Wait until it answers AT commands and reports the network registration before using it.

The module and the modem communicate at 9600 baud, about 960 bytes per second, without flow control. Keep sustained transfers below this rate and read the stream regularly: the module buffers about 1 KB in each direction, and bytes beyond that are lost.

The table below summarizes the corresponding usage patterns and references.

Table 11-1. Library reference: GSM modem usage

Usage	
TinyGsm eqx2g(***eqx2gStream***);	Creates a TinyGSM modem object using the EQX2G stream (*eqx2gStream*) for high-level GSM/GPRS connectivity. Use all SIM800-compatible TinyGSM functions for connectivity and control.
eqx2gStream.write(...) ***eqx2gStream***.read()	Use the EQX2G stream directly like a standard Serial port to send raw AT commands and receive modem responses. Ideal for low-level control, debugging, and advanced AT workflows requiring full SIM800 command access.
`eqsp32.isModuleDetected( EQX2G() )`	Returns true while the EQX2G is detected

> **NOTE**
> ***If raw AT commands are used for controlling the EQX2G GSM modem, consult the official SIM800 AT Command Manual for the complete list of supported commands, syntax and operational details.***
> ***This ensures correct usage and prevents unexpected modem behavior during low-level operation.***

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12 Boot Button and Firmware Update

12.1 Boot Button

The Boot button is only used for entering the EQX2G module into firmware update mode (or maintenance mode). To enter maintenance mode, keep the Boot button pressed while powering up the module.

Another option is to keep the Boot button pressed while sending a reset command to the module via the serial terminal (`!RST=1`, 115200 baud).

Once the module is in maintenance mode, it will be shown as a storage device. Drag and drop the desired .uf2 firmware file into the RPI-RP2 storage device and the update will be performed automatically.

Once the update is done, the unit will be automatically rebooted.

Power cycle the system to trigger the automatic detection procedure and the system will be ready for normal operation.

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13 Mechanical Dimensions

All dimensions are measured in mm with a +/-0.1 tolerance.

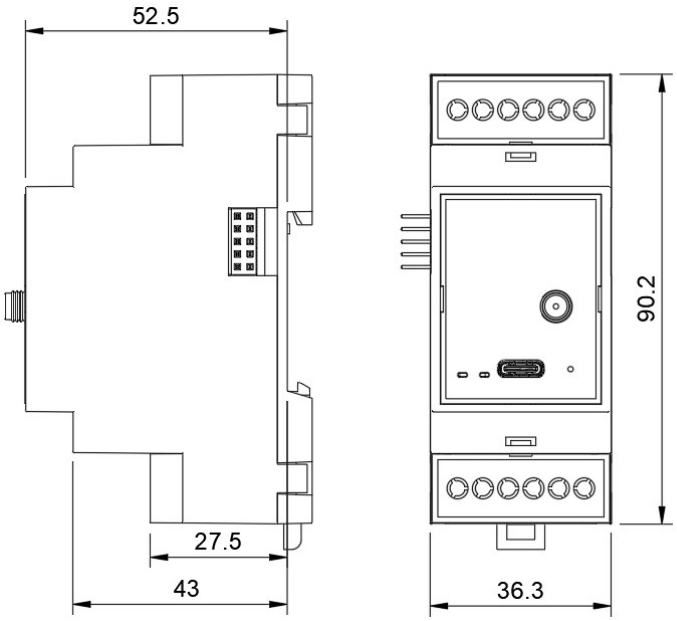

Figure 13-1. Mechanical dimensions: side and front views

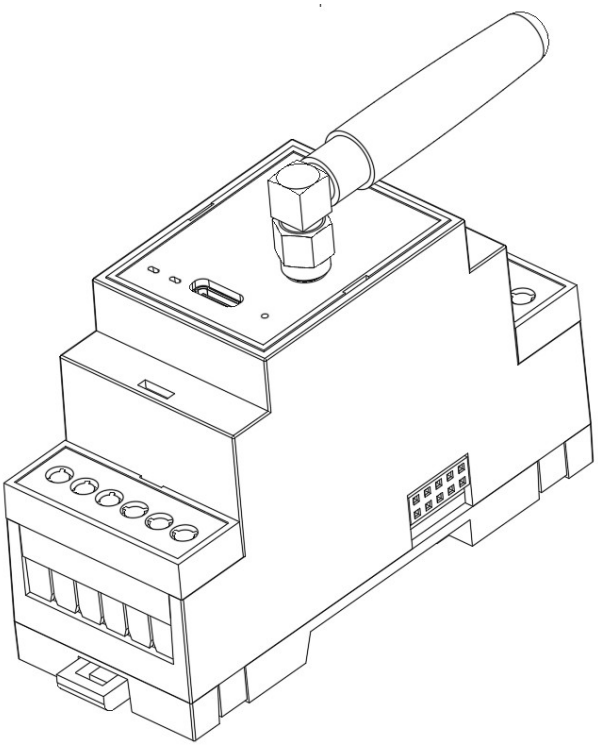

Figure 13-2. Mechanical dimensions: 3D view

14 Notices

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15 Revision History

VERSION	REVISION	STATUS
v1.1	**Rev102026**	**Released**

Table 15-1. Revision history

Version	Revision	Date	Status	Changes
v1.1	Rev102026	20 Oct 2026	Released	Added the modem start-up and data-rate notes.
v1.0	Rev101926	19 Oct 2026	Released	First released version.

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