InHand Networks

MATLOG NEATECH Group.

High-performance, All in one, Open

# InVehicle Gateway 814 Series

## Cellular Gateway for Information Technology for Public Transport (ITxPT)

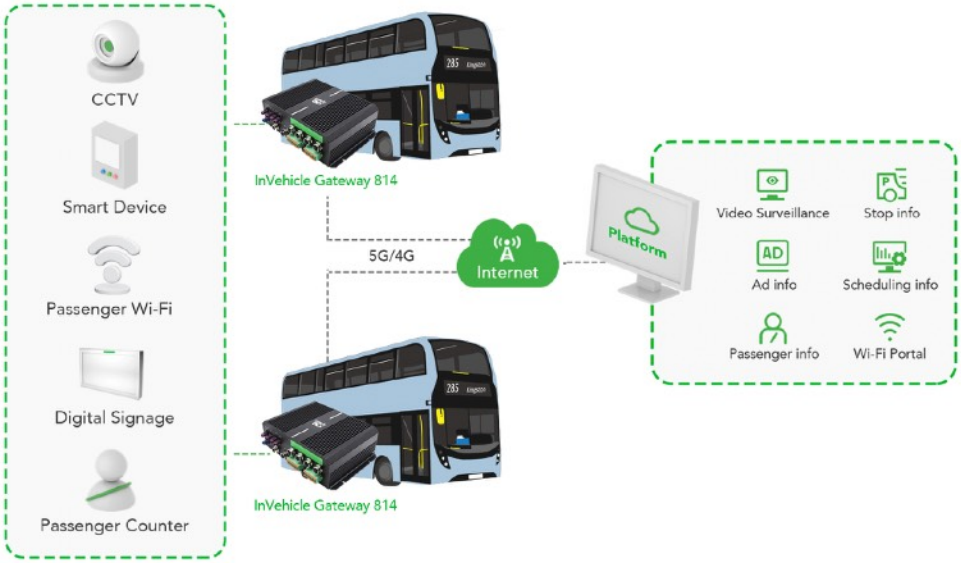
The InVehicle G814 cellular gateway provides high-speed and secure network access for public transportation, including bus, tram, metro, light rail and train. Its all in one design integrates 5G or LTE Advanced, high-speed Wi-Fi, Gigabit Ethernet and CANBus to provide fast, reliable and secure network access for in-vehicle networking and Internet connectivity.

The gateway is embedded with powerful edge computing capability and supports fast custom application development by using Python or Docker. It also supports Microsoft Azure and AWS IoT cloud platform integration.

The ITxPT compliant FAKRA RF connectors and M12 connectors are specially designed for plug & play ITxPT applications.

**Applications**

- Fleet Management
- Vehicle Telematics
- Passenger Wi-Fi
- Passenger Infotainment
- Public Transport ITS



# Features and Advantages

+ Supports 5G or LTE-A
+ Built-in link redundancy, dual SIM, link backup
+ Dual-band Gigabit Wi-Fi and High Speed Ethernet
+ M12-X and FAKRA connectors for vehicle environment
+ Easy to manage and deploy in large scale
+ OTA upgrade service
+ Integrated OBD-II/J1939/ diagnostic interface
+ Industrial-grade chips, communication module and electronic components
+ Support C/C++, Python and Docker application development

- Robust network access capability

  Supports 5G download speed up to 5 Gbps NSA , 4.2Gbps SA and upload speed up to 650 Mbps， backward compatible with 4G/3G.

- Designed for Information Technology for Public Transport

  Designed for challenging operating environments in bus. Industrial-grade processor chip ensures continuous operation on-board vehicles.

- Global satellite positioning

  72-channel high-precision high-sensitivity global satellite positioning system. Update location information 10 times in 1 second， tracks vehicle locations precisely at any time anywhere.

- Vehicle diagnostics collection

  Integrates multiple interfaces including OBD-II and J1939 to collect vehicles diagnostics, and API interface to upload the data to the application platform in real time.

- All in one design multi business involved

  4 Gigabit Ethernet interfaces to provide high-speed traffic link for vehicle area network. Integrates multiple channels of I/O inputs, outputs, and analog inputs, RS232/RS485 serial port connect more devices.

- Edge computing

  Outstanding edge computing capabilities extend analytical calculation to the network edge within the vehicle, improving the efficiency of data processing, which meets the basic need for real-time business and application intelligence in the Internet of Vehicles (IoV) industry.

- Fleet management platform

  Supports access to InHand or a 3rd-party fleet management platform to perform: task assignment, route planning, vehicle tracking, real-time messaging, geofencing, etc. Supports network management, reducing the complexity of device management and service deployment.

# Product Specifications

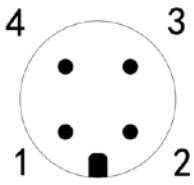
| InVehicle G814 Hardware Specifications | | | |
|---|---|---|---|
| **Core** | | | |
| CPU | ARM Cortex A7 (quad-core) | Frequency | 717MHz |
| RAM | 1GB DDR3L | FLASH | 8GB eMMC |
| **WWAN** | | | |
| Celluar | 5G Sub6 / 4G CAT6 | SIM | 2 x SIM 2FF |
| MIMO | 5G 4x4 / 4G 2x2 | Antenna Connector | FAKRA D-coded male |
| | | | |
| GNSS Receiver | GPS, GLONASS, Galileo, Beidou | Antenna Connector | FAKRA C-coded male |
| Dead Reckoning | supported with builtin sensors (accelerometer and gyroscope) | | |
| Accuracy | 2.5m CEP | | |
| Sensitivity | -160dBm | Location Update Rate | MAX 10Hz |
| ADR | 2 % of distance travelled without GNSS | | |
| **Wi-Fi** | | | |
| Frequency | 2.4G / 5GHz dual-band | Protocol | Wi-Fi 5 |
| Maximum Output | 2.4G: 17dBm<br>5G: 17dBm | Working Mode | AP / Client |
| MIMO | 2 x 2 | Antenna Connector | FAKRA I-coded male |
| **Ethernet** | | | |
| Ports | 4 x Gigabit Ethernet | Connector | M12 X-coded female |
| **Serial port, Audio, USB, IO** | | | |
| Serial port | 1xRS485 1xRS232 | Audio | Left channel、Right channel、Mic In |
| Standard | 1 x USB 3.0 | Connector | USB Type A |
| DI | 11 x digital input | DO | 4 x digital output |
| **CAN** | | | |
| CANBus | 1 x CAN 2.0B | CANBus FMS | 1 x CAN 2.0B<br>M12 A-coded female |
| **LED** | | | |
| Indicator | System, Cellular, Signal, GNSS, Wi-Fi 2.4G, Wi-Fi 5G | | |
| **Power Supply** | | | |
| Power Connector | M12 A-coded male | Input Voltage | 9~48VDC |
| Pin Definition | V+, V-, Ignition, NC (4 pins) | | |
| Standby Power | 0.0416 W | Operating Power | 6.240 W |
| Peak Power | 15.192 W | | |
| **Mechanical** | | | |
| Mounting | Wall mounting | Ingress Protection | IP53 |
| Cooling | Fanless cooling | Enclosure | Aluminum |
| Dimensions (W x H x D) | 223 x 66.2 x 181.36mm | Weight | 1340g |
| **Environmental** | | | |
| Operating Temperature | -30 °C ~ +70 °C | Storage Temperature | -40 °C ~ +85 °C |
| Humidity | 95% RH @ 40°C | | |
| **Compliance** | | | |
| Vehicle Standard | ECE R10, ECE R118 | | |
| Rail | EN45545-2, EN50155, EN50121, EN61373 | | |
| Certifications | CE, UKCA, RoHS, E-Mark, ITxPT | | |

| InVehicle G814 Software Specifications | | | |
|---|---|---|---|
| **Network Connection** | | | |
| Network Access | APN, VPDN | LAN Protocol | ARP, Ethernet |
| Access Authentication | CHAP/PAP/MS-CHAP/ MS-CHAP V2 | VLAN | VIDs: 1-127 |
| **Network Protocols** | | | |
| IP Application | Ping, Traceroute, DHCP server/relay/client, DNS relay, DDNS, Telnet, SSH, HTTP, HTTPS, MQTT | | |
| IP Routing | Static routing, RIP, OSPF, BGP | | |
| **Network Security** | | | |
| Firewall | SPI, DoS attack defense, multicast/Ping probe filter, ACLs<br>Supports NAT, NAPT, DMZ, port mapping | | |
| User Level | 2 levels: administrator; read-only user | | |
| AAA | Local authentication, Radius, TACACS+, LDAP | | |
| Certificate | PEM, PKCS12, SCEP, CRL | | |
| VPN | IPsec VPN, OpenVPN, L2TP, GRE | | |
| **ITxPT** | | | |
| Services | Inventory, Time, GNSS, FMStoIP, MQTT broker | | |
| **Reliability** | | | |
| Redundancy | Floating Static Routes, VRRP, interface backup | | |
| Link Detection | Configurable target reachability detection to aid failover | | |
| Watchdog | Auto recovery from device faults | | |
| Offline Storage | Records key data to built-in storage when network is unavailable | | |
| **WLAN** | | | |
| Protocol | IEEE802.11 a/b/g/n/ac | | |
| Security | Shared key, WPA/WPA2 Personal/Enterprise authentication<br>WEP/TKIP/AES encryption | | |
| Other | Multiple SSIDs, Captive Portal | | |
| **Network Management** | | | |
| Configuration | HTPP, HTTPS, Telnet, SSH | | |
| Upgrade | WebUI, Device Manager | | |
| Diagnostic | ping, traceroute, tcpdump, speed test | | |
| **Edge Computing Framework** | | | |
| Edge Computing Platform | Integrates network, computing, storage, runtime and application hosting | | |
| Programmable | C/C++, Python and Docker | | |
| SDK | Standard Python 3 SDK, Docker SDK and Azure IoT Edge SDK | | |
| IDE | Visual Studio Code for APP development and debugging | | |
| API | FlexAPI over MQTT/HTTP/TCP | | |
| Cloud Integration | Microsoft Azure, AWS IoT and other third-party platforms supported | | |
| **Applications** | | | |
| Fleet Management | All in one design yet programmable with open interfaces.<br>It's one stop hardware & software solution for your Fleet Management | | |
| Vehicle Telematics | Rich interfaces and data such as GNSS, OBD-II, J1939, Modbus, IO for vehicle telematics and asset tracking | | |
| Passenger Wi-Fi & Infotainment | Increase passenger satisfaction by high speed and stable Internet connectivity for content delivery, along with seamless Wi-Fi experience | | |
| Public Transport ITS | Ensure passenger and driver safety, improve operational efficiency and emission reduction to form a green, safe and sustainable society | | |

## Connector Pin Assignment

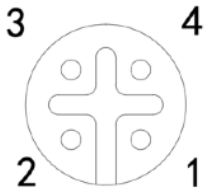
| PWR | PIN | Signal |
|---|---|---|
| | 1 | VIN+ |
| | 2 | IGT |
| | 3 | VIN– |
| | 4 | NC |

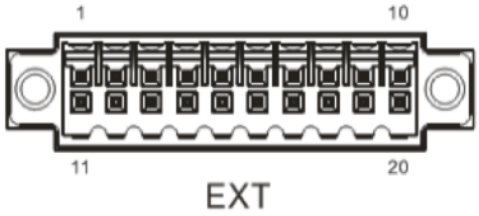
PWR 4 PIN




| FMS | PIN | Signal |
|---|---|---|
| | 1 | CAN1_H |
| | 2 | CAN1_L |
| | 3 | GND |
| | 4 | NC |

FMS 4 PIN

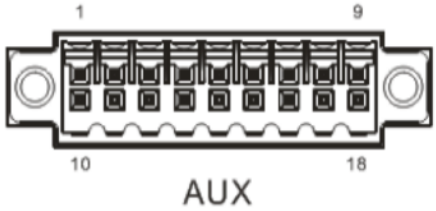



EXT

| PIN | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Signal | GND | DO2 | DO4 | WHEEL TICK* | GND | RS232_RX1 | L-Channel | GND | CAN0_L | RS485_B |
| PIN | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Signal | GND | DO3 | PPS | FWD* | GND | RS232_TX1 | R-Channel | Mic In | CAN0_H | RS485_A |

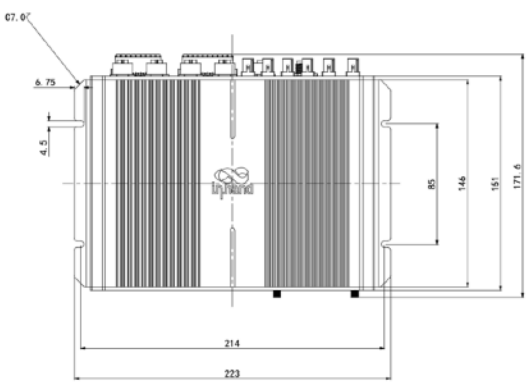
* WHEEL TICK and FWD is ADR function reserve PIN, VG814-NRQ3-W-Ga-V is supported.

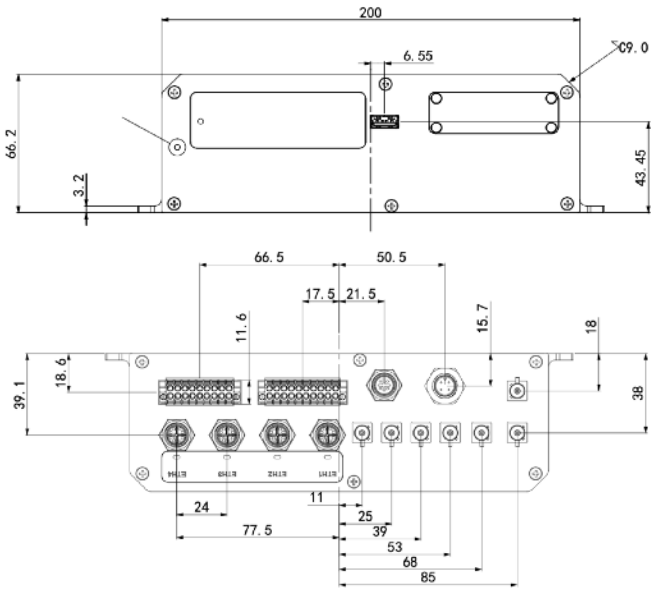



AUX

| PIN | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Signal | DI1 | DI2 | DI3 | DI4 | DI5 | DI6 | DI7 | DI8 | GND |
| PIN | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Signal | GND | GND | GND | GND | DI9 | DO1 | DI10 | DI11 | GND |

## Dimensions（mm）



# Ordering Guide

| Model | Cellular Type | Cellular | CANBUS | GNSS | Wi-Fi | Antenna Connector | Region |
|---|---|---|---|---|---|---|---|
| VG814-FQ59-W-G-V | LTE-FDD B1/B3/B5/B7/B8/B20/B28/B32<br>LTE-TDD B38/B40/B41<br>WCDMA B1/B3/B5/B8 | LTE Cat 6 | 2 | √ | √ | FAKRA | Europe<br>APAC |
| VG814-NRQ3-W-G-V | 5G NR NSA: n1/n2/n3/n5/n7/n8/n12/n20/n25/n28/n38<br>/n40/n41/n48*/n66/n71/n77/n78/n79<br>5G NR SA: n1/n2/n3/n5/n7/n8/n12/n20/n25/n28/n38<br>/n40/n41/n48*/n66/n71/n77/n78/n79<br>LTE-FDD:B1/B2/B3/B4/B5/B7/B8/B9/B12(B17)/B13/B14/B18<br>/B19/B20/B25/B26/B28/B29/B30/B32/B66/B71<br>LTE-TDD:B34/B38/B39/B40/B41/B42/B43/B48<br>LTE Category: DL CAT20/UL CAT18<br>LAA:B46 WCDMA Bands:B1/B2/B3/B4/B5/B6/B8/B19 | 5G Sub6<br>LTE CAT20 | 2 | √ | √ | FAKRA | Global (except China) |

Example: VG814-FS59-W-G-V contain Wi-Fi5, 4GE-M12, FMS, RS232, RS485, 4*DO, CAN2.0B 11xDI，ITxPT，FAKRA Antenna Connector

## About Us

InHand Networks is a global leader of Industrial IoT, with a record of tremendous success following groundbreaking innovation since our inception in 2001.
InHand serves world-class partners and customers with industrial M2M routers, gateways, industrial Ethernet switches, rugged computers and IoT management platforms. We provide IoT solutions for various vertical markets including Smart Grid, Industrial Automation, Remote Machine Monitoring, Smart Vending, Smart City, Retail and more.
Proudly bearing the marks of both Rockwell Automation Encompass Product Partner in Asia-Pacific and Schneider Electric CAPP Technology Partner, InHand Networks defines industrial innovation and reliability.

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