All in one, High-performance, Hardened

InVehicle G814 Series

Cellular Gateway for Railway

The InVehicle G814 cellular gateway provides high-speed and secure network access for public transportation, including 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 TNC RF connectors and M12 connectors are specially designed for rail environment.

Applications

- Public Transport ITS
- Internet of Vehicles
- Passenger Wi-Fi
- Passenger Infotainment
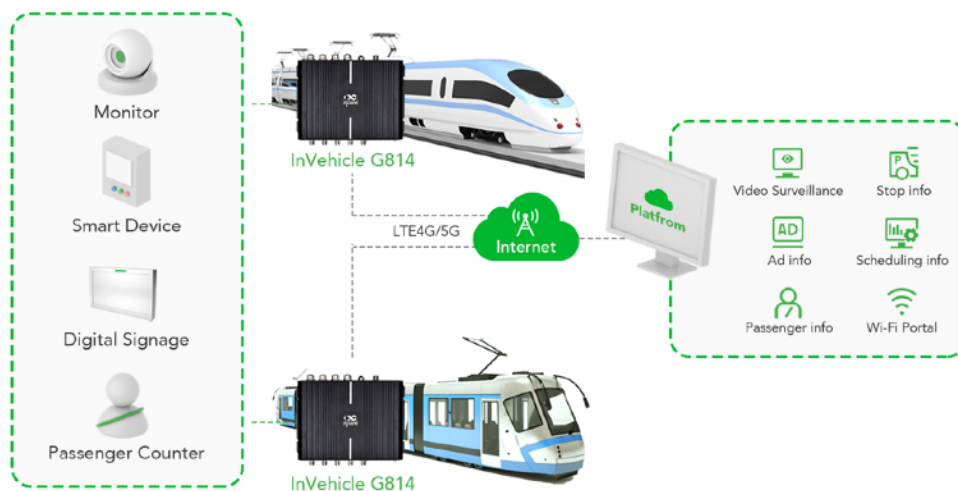
Features and Advantages

+ 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 TNC connectors for rail transit

+ Easy to manage and deploy in large scale

+ OTA upgrade service

+ Integrated OBD-II/J1939/diagnostic interface

+ Industrial-grade chip, communication module and electronic components

+ Support C/C++ Python and Docker for secondary development

● **Robust network access capability**

Supports 5G download speed up to 5 Gbps NSA, 4.2 Gbps SA and upload speed up to 450 Mbps, backward compatible with 4G/3G.

● **Designed for railway**

Designed for challenging operating environments in railway. Industrial-grade processor chip ensures continuous operation on-board vehicles. Meet the railway standards EN50155 and EN45545

● **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.

● **Developer features**

The comprehensive secondary development platform opens key system resources to users, facilitating fast development and deployment of custom applications. Integrating cloud-end IoT SDK, enables quick building of AWS, Azure and other mainstream clouds based applications.

● **Support InHand Device Manager**

Device Manager platform enables you to manage and monitor VG814 devices with convenience. It can quickly integrate devices and manage them with just a few clicks. The cloud deployment delivers easy-to-use experience.

Product Specifications

InVehicle G814 Hardware Specifications

Core

CPU	ARM Cortex A7 (quad-core)	Frequency	717MHz
RAM	1GB DDR3L	FLASH	8GB eMMC

WWAN

Cellular	5G SA/NSA Sub6 4G LTE CAT6/CAT4	SIM	2 x Mini SIM 2FF
MIMO	5G :4x4 4G : 2x2	Antenna Connector	TNC

GNSS

GNSS Receiver	GPS, GLONASS, Galileo, Beidou	Antenna Connector	TNC
Dead Reckoning	Supported with builtin sensors (accelerometer and gyroscope)		
Accuracy	2.5m CEP、 Support ADR		
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 5G: 17dBm 1200Mbps	Working Mode	AP / Client
MIMO	2 x 2 Mu-MIMO	Antenna Connector	TNC

Ethernet

Ports	4 x Gigabit Ethernet	Connector	M12 X-Coded female

Serial port, USB, IO

Serial port	2xRS232 1xRS485		
Standard	1 x USB 3.0	Connector	USB Type A
DI	11 x digital input	DO	4 x digital output

Additional Interfaces

CANBus	1 x CAN 2.0B	CANBus FMS	1 x CAN 2.0B 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
Pin Definition	V+、 V-、 Ignition、 NC (4 pins)
Input Voltage	9-36VDC
Standby Power	0.006W - monitors ignition signal only; system starts on ignition
Operating Power	16.00W - average when RF module running at full load
Peak Power	20.0W - peak value when RF module running at full load

Mechanical

Mounting	Wall mounting	Ingress Protection	IP40
Cooling	Fanless cooling	Enclosure	Aluminum
Dimensions (W x H x D)	223 x 178 x 66.2 mm	Weight	1438 g

Environmental

Operating Temperature	-30 °C ~ +70 °C	Storage Temperature	-40 °C ~ +85 °C
Humidity	95% RH @ 40°C	Start-up	-35 °C

Compliance

Rail Standard	EN50155 EN50121-3-2 EN61373 EN45545-2
Certification	CE, RoHS, E-Mark

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 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

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 WEP/TKIP/AES encryption
Other	Multiple SSIDs, Captive Portal

Network Management

Configuration	HTTP, HTTPS, Telnet, SSH
Upgrade	WebUI, Device Manager
Diagnostic	ping, traceroute, tcpdump, speed test

Edge Computing Framework

Computing Platform	Integrates network, computing, storage, runtime and application hosting
Computing Engine	C/C++, Python and Docker
SDK	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. 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

InHand Networks

Connector Pin Assignment

PWR	PIN	Signal
	1	VIN+
	2	IGT
	3	VIN−
	4	NC

PWR 4Pin
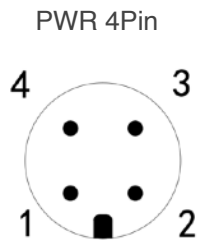
FMS	PIN	Signal
	1	CAN1_H
	2	CAN1_L
	3	GND
	4	NC

FMS 4Pin

EXT
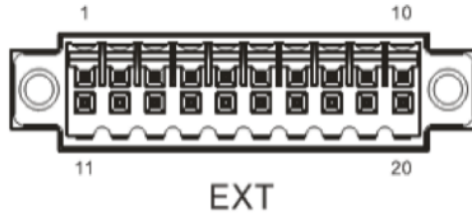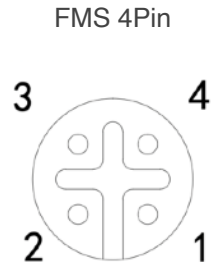
PIN	1	2	3	4	5	6	7	8	9	10
Signal	GND	DO2	DO4	WHEEL TICK*	GND	RS232_RX1	RS232_RX2	GND	CAN0_L	RS485_A
PIN	11	12	13	14	15	16	17	18	19	20
Signal	GND	DO3	PPS	FWD*	GND	RS232_TX1	RS232_TX2	GND	CAN0_H	RS485_B

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

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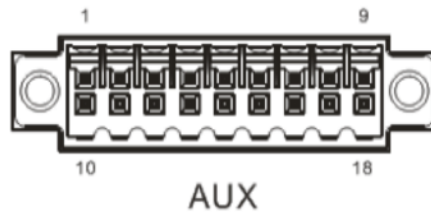
PIN	1	2	3	4	5	6	7	8	9
Signal	DI1	DI2	DI3	DI4	DI5	DI6	DI7	DI8	GND
PIN	10	11	12	13	14	15	16	17	18
Signal	GND	GND	GND	GND	DI9	DO1	DI10	DI11	GND

Dimensions（mm）
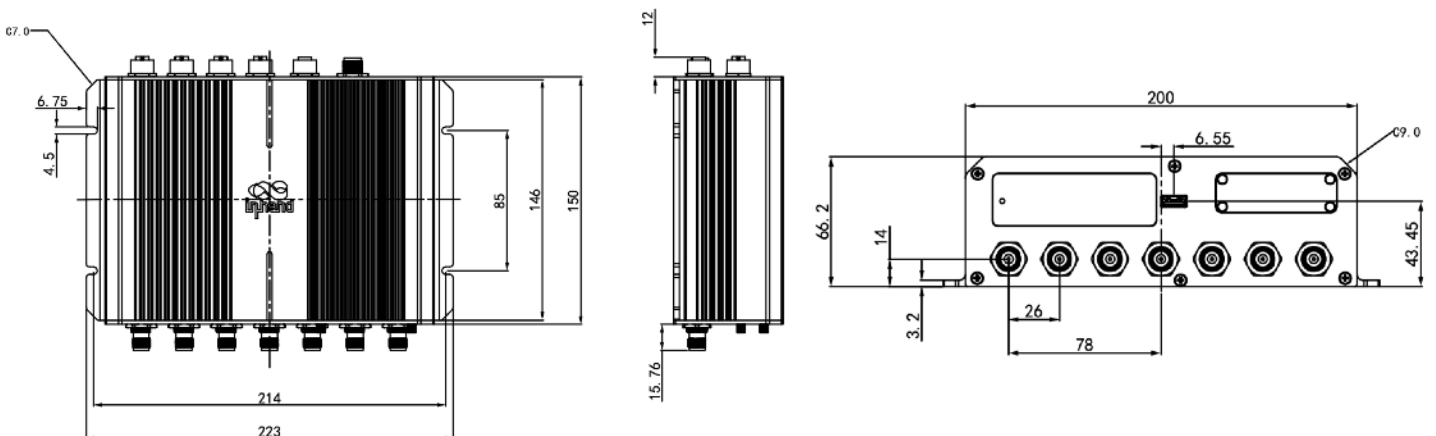
Ordering Guide

Model	Cellular Type	UE Category	CAN BUS	GNSS	Wi-Fi	Antenna Connector	Region
VG814-FS59-W-G-R	LTE-FDD B1/B3/B5/B7/B8/B18/B19/B20/B26/B28A/B28B LTE-TDD B38/B39/B40/B41 TD-SCDMA B39/ B34 UMTS/HSPA+ B1/B3/B5/B6/B8 GSM/GPRS/EDGE: 900/1800MHz	LTE Cat 6	2	√	√	TNC	Europe Africa APAC Ocenia
VG814-NRQ0-W-G-R	5G NR NSA:n38*/n41/n71/n77/n78/n79 5G NR SA:n1/n2/n3/n5/n7/n8/n12/n20/n25/n28*/ n38/n40/n41/n48/n66/n71/n77/n78/n79 LTE-FDD:B1/B2/B3/B4/B5/B7/B8/B12/B13/B14 /B17/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66/B71 LTE-TDD:B34/B38/B39/B40/B41/B42/B43/B48 WCDMA:B1/B2/B3/B4/B5/B8/B19	5G Sub6	2	√	√	TNC	Global (except North America)
VG814-NRQ3-W-G-R	5G NR NSA: n1/n2/n3/n5/n7/n8/n12/n20/n25/n28/n38 /n40/n41/n48*/n66/n71/n77/n78/n79 5G NR SA: n1/n2/n3/n5/n7/n8/n12/n20/n25/n28/n38 /n40/n41/n48*/n66/n71/n77/n78/n79 LTE-FDD:B1/B2/B3/B4/B5/B7/B8/B9/B12(B17)/B13/B14/B18 /B19/B20/B25/B26/B28/B29/B30/B32/B66/B71 LTE-TDD:B34/B38/B39/B40/B41/B42/B43/B48 LTE Category: DL CAT20/UL CAT18 LAA:B46 WCDMA Bands:B1/B2/B3/B4/B5/B6/B8/B19	5G Sub6	2	√	√	TNC	Global (except China)
Example:	VG814−FS59−W−R contain Wi−Fi 5, 4GE−M12, FMS, 2 x RS232, 1 x RS485, 4 x DO 1 x CAN2.0B 11*DI，TNC 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.