

CloudGate



User guide

CloudGate LTE WW (CG0114)

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CloudGate LTE WW

Model: CG0114

The CloudGate LTE WW is a 4G multiband M2M gateway providing internet connectivity at LTE Cat 3 data rates.

Customs code (used for shipping) for CloudGate LTE WW is 8517620090.

The base unit is designed around a main board and a WWAN module. It's main features are listed in the table below:

Feature	Description
WWAN LTE	<ul style="list-style-type: none"> Supported frequency bands: 700/800/850/900/1800/1900/2100/2600/AWS (B1, 2, 3, 4, 5, 7, 8, 13, 17, 18, 19, 20) Maximum connectivity speed: 100 Mbps down, 50 Mbps up (Cat 3) theoretical LTE data rates
WWAN 3G/2G	<ul style="list-style-type: none"> 3G bands: UMTS/HSDPA/HSUPA/HSPA+: 850/900/1900/2100 MHz and AWS band (1700/2100 MHz) (B 1, 2, 4, 5, 8) 2G bands: GSM/GPRS/EDGE: 850/900/1800/1900 MHz Maximum connectivity speed DC-HSPA+: 42 Mbps (Cat 24) down and 5.76 Mbps (Cat 6) up RX diversity: Simultaneous Equalization and Rx Diversity on all bands
GPS	<ul style="list-style-type: none"> High sensitivity A-GPS /A-GLONASS receiver (SUPL 1.0 & SUPL 2.0)
Antenna connectors	<ul style="list-style-type: none"> 1 x SMA: WWAN Main 1 x SMA: WWAN Div/GPS
Ethernet (IEEE 802.3)	<ul style="list-style-type: none"> 10/100Mb/s RJ45 Connector
Visual indicators	<ul style="list-style-type: none"> Seven 3 color LEDs showing system status and signal strength

Feature	Description
SIM	<ul style="list-style-type: none"> • USIM/SIM class B and class C
MicroSD card reader	<ul style="list-style-type: none"> • For additional storage (FAT32). Located underneath the Cellular modem PCB inside the CloudGate LTE WW.
Power input	<ul style="list-style-type: none"> • DC input voltage: 9-33 V DC • Connector type: Micro-Fit 3.0™, Dual row, 4 circuits
Expansion Card Slots	<ul style="list-style-type: none"> • Two expansion card slots (one at the front and one at the back side of the device) • Expansion boards for I/O functions, such as Serial, USB, GPIO, WLAN, Accelerometer, etc.
Metal case	<ul style="list-style-type: none"> • Aluminum housing • Dimensions: 115 x 105 x 45 mm (excluding antenna connectors) • Weight: 304 g • Mounting: bulkhead - 6 x M4 mounting holes or DIN rail with adapter
Environmentals	<ul style="list-style-type: none"> • Operating temperature: -30°C to 70°C (*) • Storage temperature: -40°C to 85°C • Humidity operational: 5% - 95% non condensing
Certification	<ul style="list-style-type: none"> • CE, FCC, IC, PTCRB
Standard compliance	<ul style="list-style-type: none"> • ROHS, Reach
CloudGate Universe	<ul style="list-style-type: none"> • Device can be configured OTA using CloudGate Universe

(*) See Safety Warning in the Environmental Specifications section

A more detailed hardware description can be found in the corresponding subsections.

A datasheet of the CloudGate LTE WW can be found [here](#).

The CloudGate LTE WW has two expansion card slots that allow to insert a variety of expansion cards.

1.2.1. Main Board

The CloudGate LTE WW is designed around a main board and a 4G WWAN module. The processor on the main board controls all the interfaces. The WWAN module provides the wireless connectivity to to the internet.

The CloudGate also has two expansion board connectors to allow insertion of dedicated expansion cards.

The block diagram shows the overview.

Main Board Block Diagram (PDF)

Power Input

- V_PWR: min 9V DC, max 33V DC

Internal Power Supply

- Power input: V_PWR, min 9V DC, max 33V DC
- Stable 3.4V power rail
- Reverse polarity protection
- Over-voltage protection up to 60V
- Current limiter at 1.2A
- One-time fuse of 2A

Main Board Processor

- Freescale i.MX280 @ 450 MHz
 - 128 MB RAM
 - 512 MB Flash memory
 - Ethernet interface
 - interfaces to the two expansion board connectors

Primary Expansion Card Slot

The primary expansion board has the following interfaces:

- Power supply: V_PWR, 3V4, 3V3
- 24 MHz clock signal
- Master reset signal
- High speed USB interface
- High speed OTG USB interface
- SDIO interface
- GPIO signals

- Serial interface

Secondary Expansion Card Slot

The secondary expansion board has the following interfaces:

- Power supply: V_PWR, 3V4, 3V3
- 24 MHz clock signal
- Master reset signal
- High speed USB interface
- SDIO interface
- GPIO signals

WWAN module

The WWAN module in the CloudGate LTE WW is the LN930 module. It supports LTE Cat 3.

Front and Back View

The CloudGate Base Unit is assembled in the top half of the device. The bottom half is available to insert expansion cards.

The front and back side of the CloudGate housing are closed by means of metal panels that are secured with Torx T6 screws.

The top panels are designed by Option and cannot be changed, since they provide the interfaces of the base unit. The bottom panels can be customized to match the external interfaces of the expansion card.

Front View



Connectors and LED indicators on the top front panel

On the front side of the device we can see the following connectors:

1	WWAN Diversity and GPS antenna connector	SMA-female
2	Ethernet port	10/100 Mbps RJ-45
3	WWAN Main antenna connector	SMA-female
4	Torx T6 screws	-

A detailed description of the LEDs is given in the section about the LED Indicators.

Bottom Front Panel

The bottom front panel covers the front expansion slot and has to be removed when installing a Primary Expansion Card.

Option provides a custom panel for the following primary expansion cards:

- Low Cost Serial Card
- Industrial Serial Card
- Ethernet Switch
- Ethernet Switch with PoE
- Telematics Card
- Breadboard Card

Back View



Connector and button on the top back panel

1	Power connector	<ul style="list-style-type: none">• 9-33 VDC• Micro-Fit 3.0, dual row, 4 circuits
2	Reset button	<ul style="list-style-type: none">• The explanation on how to use the reset button is explained here

The functionality of the button is explained in the section about the Reset button

Behind the top back panel there is a socket for insertion of a SIM card.
Please also refer to the section about the SIM Card Interface for more details.

Bottom Back Panel

The bottom back panel covers the back expansion slot and has to be removed when installing a Secondary Expansion Card.

Option provides a custom panel for the following secondary expansion cards:

- WLAN Expansion Card
- WLAN Access Point Card

1.2.3. LED Indicators



LED	Description
WLAN State	<p>Indicates the connection status of the WLAN interface</p> <p>Off: not installed Orange: WLAN board = OK, client not connected and AP not enabled Orange blinking: AP disabled and Client connected / data traffic Red: board error/ (Any that causes AP or Client not to work) Green: AP enabled Green flashing: AP enabled and Client connected/data traffic</p>
WLAN Client Signal Strength	<p>Indicates the signal strength of the WLAN CLIENT interface when connected to a WLAN access point</p> <p>Off: The WLAN CLIENT is off or not connected Orange: The WLAN Client is receiving a moderate signal strength Red: The WLAN Client is receiving bad signal strength Green: The WLAN client is receiving good signal strength Green flashing: n/a</p>
GPS/Aux State	<p>Indicates the GPS operation</p> <p>Off: off Orange: on, no fix Red: error</p>

LED	Description
	<p>Green: on, has fix Green flashing: n/a</p>
GPS/Aux signal strength	<p>Indicates the signal strength of the GPS</p> <p>Off: no signal Orange: moderate GPS signal Red: bad GPS signal Green: good GPS signal Green flashing: n/a</p>
System State	<p>Indicates successful power on and device readiness</p> <p>Off: no power Orange: booting Red: error Green: on Green flashing: n/a</p>
WWAN State	<p>Indicates 3G/4G interface availability and use</p> <p>Off: no power or not connected Orange: on, not connected Red: WWAN error Green: on, connected Green flashing: data traffic</p>
WWAN Signal Strength	<p>Indicates 3G/4G interface signal strength</p> <p>Off: no power or not connected Red: bad signal strength ≤ -104dbm when connected to 3G Orange: moderate signal strength ≥ -111dbm & < -94dbm when connected to 4G ≥ -104dbm & < -94dbm when connected to 3G Green: good signal strength (≥ -94dbm)</p>

Special LED functions:

During a software download from CloudGate Universe

When the CloudGate is downloading new firmware from the CloudGate Universe the LED behaviour is different compared to normal behaviour. In this situation the LEDs are

moving fast from left to right and back. The colors of the LEDs indicate the next:

- Orange: A new firmware is being downloaded
- Green: The download was successful. (This will be followed by a reset of the CloudGate)
- Red: The download was not successful.

During the bootup process

When the CloudGate is booting up, the System State LED behaviour is different compared to normal behaviour. In this situation the System State LED flashes red and orange. This process is expected behavior and can take up to a minute.

Please note that this only applies on CloudGate devices with a '2' as the third digit in the serial number, f.e. MJ2xxxxxx. CloudGate devices with a '1' will show their System State LED solid orange during the early boot process.

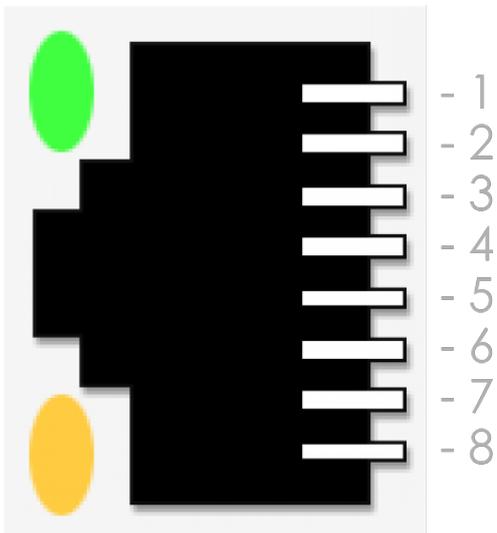
1.2.4. Ethernet Interface

This section describes the Ethernet interface on the CloudGate main board.

Ethernet Interface

- RJ-45 receptacle tab on top
- 10/100 Mbps
- 100BASE-TX
- Auto-MDIX

Pinout



Yellow LED:

- Active when operating speed is 100 Mbps
- Inactive when operating speed is 10 Mbps or when not connected

Green LED:

- Active when valid links are detected
- Blinks when activity is detected
- Inactive when not connected

Pin #	Function
1	TX/RX+
2	TX/RX-
3	RX/TX+
4	Not used

Pin #	Function
5	Not used
6	RX/TX-
7	Not used
8	Not used

IMPORTANT: The auto-MDIX feature is always activated on the CloudGate. This feature automatically detects the required cable connection type (straight or crossed), and configures the connection appropriately, removing the need for crossover cables. In order for auto-MDIX to work correctly, auto-negotiation (auto speed and auto duplex) must be enabled on both sides of the link. Note that auto negotiation is always active on the CloudGate.

WAN/LAN Switchover Feature

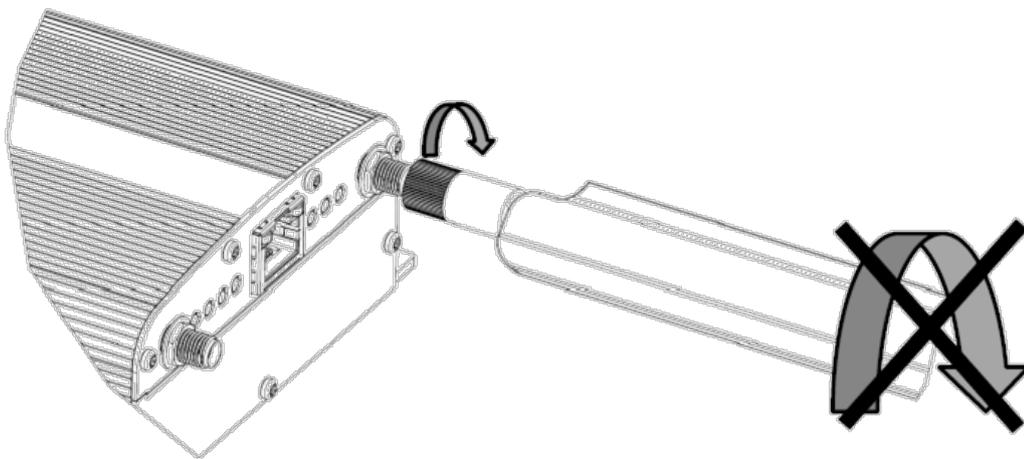
The WAN/LAN switchover feature is a mechanism to maximize the internet connectivity via the Ethernet port.

The description of the related configuration parameters and the switchover mechanism itself can be found in the Ethernet Tab section of the CloudGate Setup Guide.

RF and antenna specifications of the CloudGate LTE WW

Warning for antenna assembly

The antenna has to be assembled in such a way that only the nut is rotating onto the SMA connector. The antenna body itself may not be rotated. In this way the inner conductor of the antenna is sliding into the SMA connector without rotation. This is the best way to provide a reliable RF contact.



WWAN Interface

Supported Frequencies

- LTE bands: 700, 800, 850, 900, 1800, 1900, 2100, 2600 MHz, AWS
- WCDMA bands: 850, 900, 1800, 1900 MHz
- GSM, GPRS, and EDGE bands: 850, 900, 1800, 1900 MHz

Output Power

Conducted output power values, measured at the SMA connector of the CloudGate:

- Power Class 3 for LTE
- Power Class 3 (0.25 W, 24 dBm) for UMTS 850/900/1900/2100 MHz bands
- Power Class E2 (0.5 W, 27 dBm) for EDGE 850/900 MHz bands
- Power Class E2 (0.4 W, 26 dBm) for EDGE 1800/1900 MHz bands
- Power Class 4 (2 W, 33 dBm) for GSM, GPRS 850/900 MHz bands
- Power Class 1 (1 W, 30 dBm) for GSM, GPRS 1800/1900 MHz bands

Antenna Interfaces

Main WWAN Antenna

The main antenna is labelled WWAN Main on the front panel. Learn about antenna recommendations for the CloudGate LTE WW.

Connectors

- The RF connector on the CloudGate is SMA female.



- The antenna itself or the connector to the antenna should be SMA male.



Frequency Range

- Allows all frequency bands which the integrator wants to use

Performance

- Radiation pattern: Omni-directional
- Efficiency over all used frequencies: > 50%
- Maximum VSWR: < 2.5:1 with 50 ohm reference impedance

Polarization

- Linear

RF EXPOSURE WARNING

To comply with regulatory requirements, please check the maximum allowed antenna gain for your your external antenna! The maximum gain is specified for each product in

the certification information section of the CloudGate LTE WW.

Diversity WWAN Antenna

The diversity antenna is labelled WWAN Div GPS on the front panel. Learn about antenna recommendations for the CloudGate LTE WW.

IMPORTANT: The diversity antenna is by default disabled (from firmware version 1.9.0 onwards). Learn how to enable the diversity antenna.

Connectors

- Uses the same type of connector as the main WWAN antenna

Frequency range

- Receive diversity only works on WCDMA and LTE bands
- Only WCDMA and LTE bands have to be supported by the diversity antenna.
- The antenna must also support the GPS frequency if GPS functionality is desired on the CloudGate.

Efficiency

- Radiation pattern: Omni-directional
- Efficiency over all used frequencies: > 25%
- Maximum VSWR: < 2.5:1 with 50 ohm reference impedance

Polarization

- Linear

Mutual coupling (main antenna and diversity antenna)

- Isolation: > 8 dB
- Envelope correlation coefficient: < 0.5

GPS Antenna

There are two hardware variants of CloudGate LTE WW: one with passive GPS and one with active GPS.

- This section explains the variant with passive GPS antenna, it has no power supply for active antennas on the RF connector. For accurate GPS operation make sure the GPS antenna has a clear view of the sky.
- The variant with active GPS is explained in the section about Active GPS

Maximum VSWR

- < 2.5:1 with 50 ohms reference impedance

Polarization

- RHCP antenna or a vertical polarized antenna

Frequency range

- Frequency range for GPS: 1575.42 MHz \pm 1 MHz

Efficiency

- Efficiency: > 50%.

Important: a CloudGate LTE WW with active GPS does not support the MIMO LTE antenna. Instead it must be equipped with an active GPS antenna. See the relevant section about Active GPS for more information.

RF EXPOSURE WARNING

To comply with regulatory requirements, please check the maximum allowed antenna gain for your external antenna! The maximum gain is specified for each product in the certification information section of the CloudGate LTE WW.

Antenna recommendations for the CloudGate LTE WW

A number of good antennas are available on the market for use with the CloudGate. Below is a list of antennas which can be used as a reference for each functionality.

The antenna's below, made by Taoglas, are available via DigiKey.

The antenna's below, made by Grand-Tek, are only available via OPTION or a CloudGate reseller. Please get in contact with your OPTION point of contact for more information.

Main WWAN Antenna

Option A



Taoglas TG.30.8113

- Recommended as the standard Main antenna
- Operating temperature range: -40°C to +85°C

Option B



Grand-Tek OA-LTE-01-01-GTT

- Recommended as the standard Main antenna
- Operating temperature range: -10°C to +55°C

Diversity and GPS Antenna

Option A



Taoglas TG.30.8113

- Recommended as Diversity and GPS antenna
- Operating temperature range: -40°C to +85°C

Option B



Grand-Tek OA-LTE-01-01-GTT

- Recommended as Diversity antenna
- Operating temperature range: -10°C to +55°C

Important: a CloudGate LTE WW with active GPS does not support the MIMO LTE antenna. Instead it must be equipped with an active GPS antenna. See the relevant section about Active GPS for more information.

Related Topics

[RF Specifications of the CloudGate LTE](#)

[3G Connection Tab](#)

CloudGate LTE WW with active GPS

Customers who need active GPS have to order a dedicated variant of the CloudGate. This variant supplies 3.4V to the SMA connector in order to power the LNA in the active GPS antenna.

Requirements for the active GPS antenna

- Support GPS and Glonass
- Noise Figure < 2dB
- Preferably built-in pre-filter: this gives some freedom in positioning the two antennas (main antenna and GPS). No pre-filter means the antennas should be separated > 1m
- 15-30dB gain @ 3.4V

Example Toaglass AA.161.301111



This antenna has a 3m extension cable for optimal positioning, e.g. on a dashboard of a car.

A datasheet of the Toaglass antenna AA.161.301111 can be found [here](#).

Warning: a standard CloudGate LTE WW can not be upgraded in the field. The support for active GPS is implemented in the factory. There is a dedicated order number for a CloudGate LTE WW with active GPS

Warning: a CloudGate LTE WW with active GPS does not support a MIMO LTE antenna

1.6. Power Requirements

Base Unit Power Supply

The symbol on the label at the bottom side of the CloudGate shows the power requirements:

9-33V  1.2A

- Input voltage must be between 9V - 33V DC
- Internal electronic fuse limits the input current to 1.2A

For the power cable between the external power supply unit and the CloudGate Option recommends to use a power cable that has a wire thickness of 22 AWG!

SAFETY WARNING

This CloudGate operates on DC power provided by a DC power supply or by an AC power adapter. Only use power supplies in the range 9-33V DC and make sure the product is installed near a power outlet that is easily accessible.
When using the KNX card, only use a 24Vdc power supply.

SAFETY WARNING

When using an AC adapter make sure that the ambient temperature doesn't exceed the specified temperature limits of the AC adapter.

SAFETY WARNING

The CloudGate is regarded a Class III equipment: this means that the protection against electrical shock is provided by means of power supplied by an SELV (Safety Extra Low Voltage) circuit and that the CloudGate does not generate hazardous voltages within itself.

When using an AC power adapter make sure it provides protection against electrical shock, class II, and that it is certified for the country where it will be used.

As a reference, the power supply available from Option has the following parameters:

- Output voltage 12V DC
- Max output current 1A

In case you would like to use an industrial power supply Option recommends the next:

<http://www.us.tdk-lambda.com/ftp/Specs/dspa.pdf>

It can be sourced through Farnel, Mouser, Digikey, ...

Power Connector

The power connector is a Micro-Fit connector from Molex (MX-43025-0400)

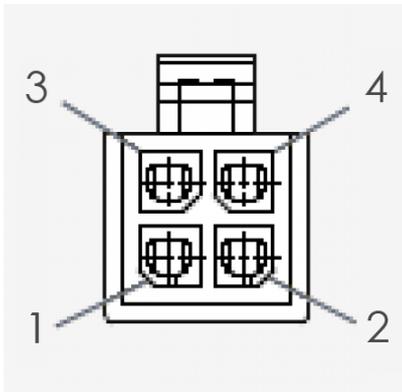


[Power Connector Drawing \(PDF\)](#)

[Power Connector Datasheet \(PDF\)](#)

Pinout

The following drawing shows the pinout of the power connector, seen from the terminal side.



Pin #	Function
1	Input voltage
2	GND
3	Ignition sense input
4	Not connected

Ignition sense

The input range for the Ignition Sense pin is 0-33V

Signal levels:

$V_{ILmax} = 2.7V$

$V_{IHmin} = 4.1V$

In words: the input signal will be read as a '0' when the level is lower than 2.7V and will

be read as a '1' when the level is higher than 4.1V.
Levels in between are undefined/unpredictable.

The explanation about the ignition sense feature and how to use it can be found in the Software Developer Kit, under the title "How to use the ignition sense".

Power Consumption

You can find here a document describing all the different power consumption numbers

Preventing Fuse Overload

SAFETY WARNING

On old CloudGate models, a huge inrush current caused by capacitors inside the CloudGate may cause an internal fuse to break. When using an external power supply with an output voltage higher than 15V, Option recommends using a special cable which will reduce the amplitude of these charge currents. This cable can be obtained at your CloudGate distributor.

If the fifth digit of the serial number of the CloudGate is a "C", the CloudGate is an older model and susceptible to this remark. If the fifth digit is not a "C", the fuse of your CloudGate will not get broken due to these charge currents.

1.2.6.1. Internal Power Circuits

The voltage applied by the power adapter to the CloudGate is converted into different voltage rails on the main board. Two different power circuits make five different voltage rails.

Dedicated high current power circuit

- Provides two different voltage rails which both can deliver high current levels:
 - V_PWR: At the power adapter input of the CloudGate there is an overvoltage protection circuit and a current limiter of 1.2A. The V_PWR is the voltage level behind the current limiter. The protection circuit causes a little voltage drop lower than 1V.
 - 3V4: the 3V4 is a power rail generated by a dedicated power circuit on the main board. The 3V4 is used on the main board and is also available on the expansion boards.

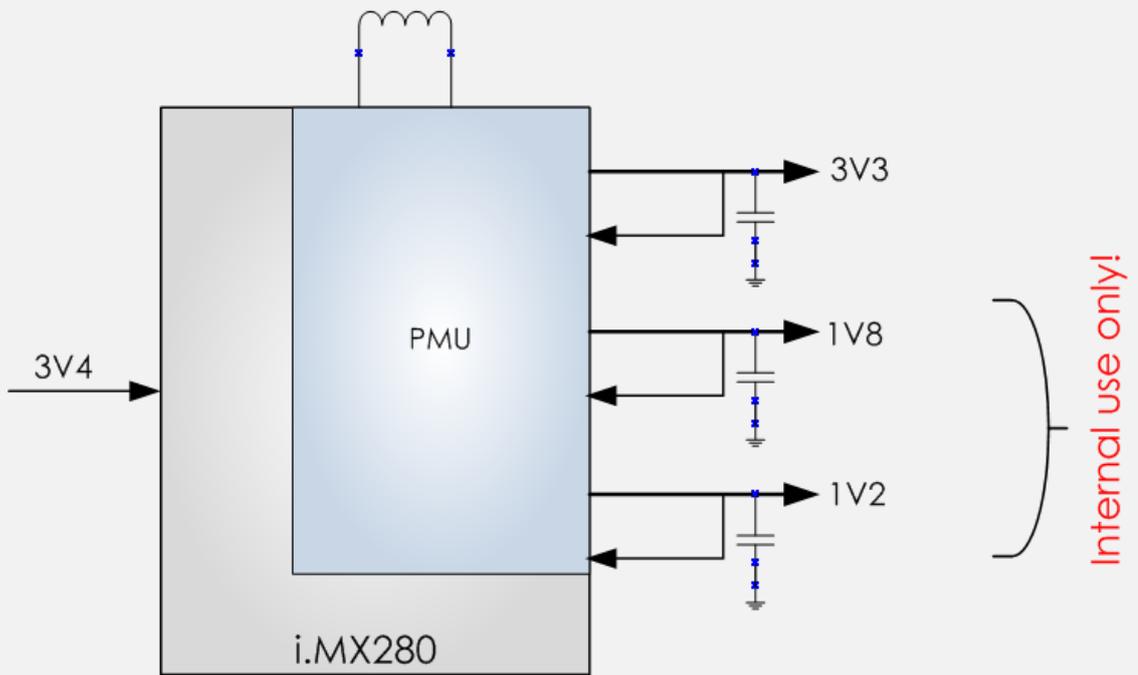
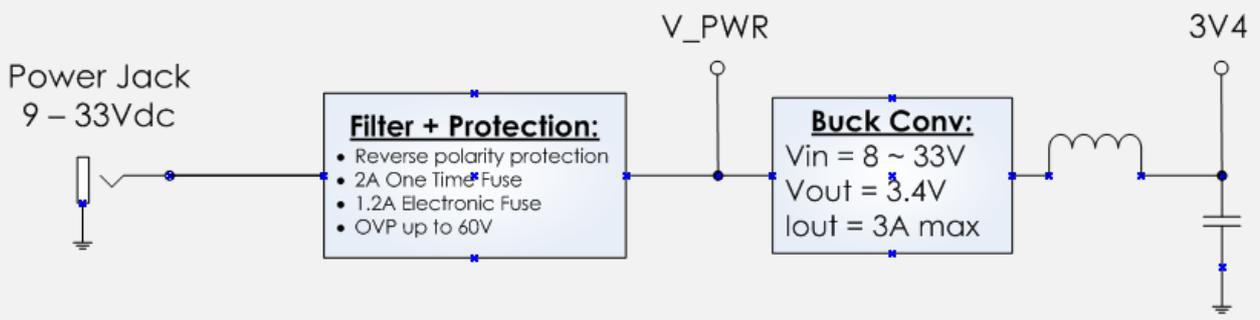
Low power circuit generated by the micro controller

- Provides three voltage rails for very limited power:
 - 3V3: A 3.3V power rail provided by the micro controller is used on the mainboard and also accessible to the expansion boards
 - 1V8: A 1.8V power rail provided by the micro controller and only used on the main board
 - 1V2: A 1.2V power rail provided by the micro controller and only used on the main board

Voltage Rail	Voltage	Usage	Max Current
V_PWR	Equals the voltage applied by the power adapter, minus the drop over the protection circuit	Use for power-hungry devices	Current is limited to 1.2A
3V4	3.4V	Powers all standard digital components on the expansion cards	3A maximum of which the main board is already using 1.5A. Only 1.5A is left for both expansion cards. (The sum of both expansion cards should be lower than 1.5A)
3V3	3.3V	Powers low power components or level	The DC/DC Converter is a triple

		translators, e.g. between I/O signals from the processor and circuitry on the main board or on the expansion cards	output buck converter (3V3, 1V8 and 1V2). The maximum output current capability of each output of the converter is dependent on the loads on the other two outputs.
1V8	1.8V	Internal use on the main board only	Internal use only
1V2	1.2V	Internal use on the main board only	Internal use only

Internal Power Circuits Block Diagram



SIM Card Requirements

The CloudGate has an integrated (U)SIM interface compatible with the ISO7816 IC card standard. The 3GPP standard defines three operational voltages for the supply voltage of the SIM card: 1.8V, 3V and 5V. The CloudGate supports two voltages: 1.8V and 3V. The 5V-only SIM cards are rarely used and are not supported by the CloudGate.

General requirements:

- Changing of SIM cards while in operating mode, the so called "SIM card hot-swapping", is not supported.
- Detection of the SIM card removal can take up to 30 seconds.
- The CloudGate will not be able to communicate with the SIM card after re-insertion. As a result, the CloudGate needs to be reset after re-insertion of the SIM.

Learn how to install a SIM card.

1.2.8. Reset Button



On the back side of the unit there is a reset button behind the hole in the top panel (indicated by the "2" in the picture above).

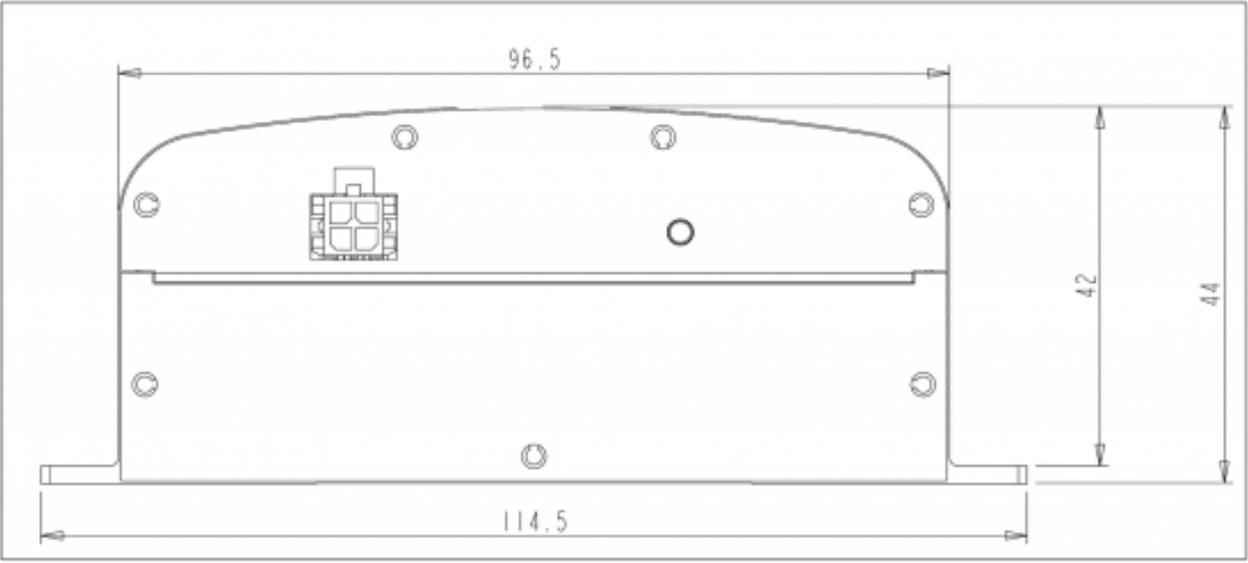
This button allows to restart the unit or to reset it to the factory settings:

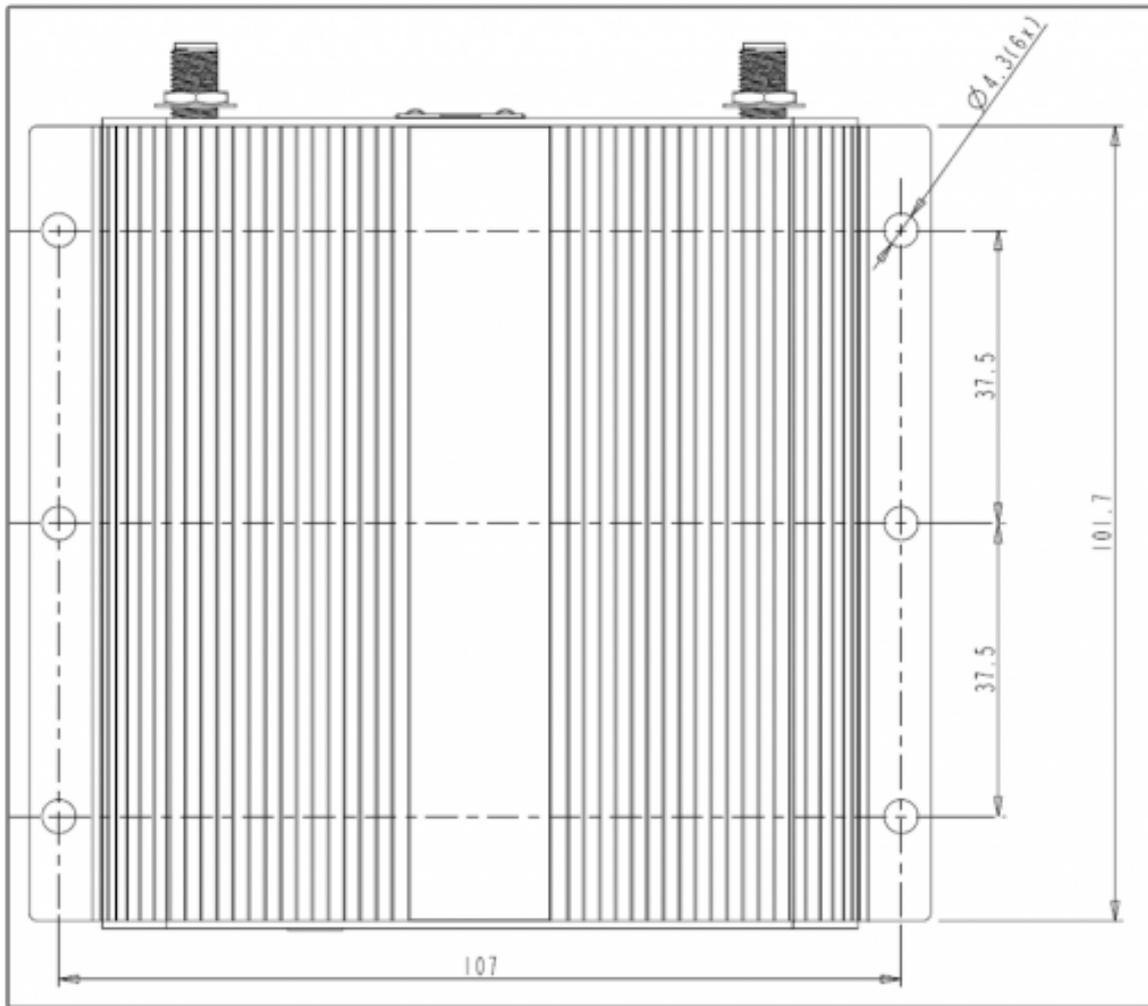
- press and hold for less than ten seconds to reset the unit to the last working settings,
- press and hold for ten seconds or more to reset the unit to factory settings.

1.2.9. Mechanical Drawings

- 3D file of the CloudGate.
- 3D file of the front plate of the expansion cards ⁽¹⁾

Below you can find the dimensions of the CloudGate.





The 6 mounting holes in the CloudGate housing allow mounting on a wall or on a DIN rail. See the details in the "Mounting" section of the CloudGate Installation Guide.

Note 1:

The front plate for the expansion cards, both at the front and at the back side of the CloudGate, are identical.

1.2.9.1. IP-65 Requirements

Below you can find the parts for the encasing which are needed to fulfill the requirements for IP-65.

All these parts can be ordered by TAKACHI:

- 1x box BCAF 203013G or BCPK 203013S,
- 1x plate BMP 2030P,
- 1 x screws (20pcs) MT4-8T,
- 1x bracket (2x4 pcs) BLF-2G(PC-GF) or CK-26P (metal SS)
- 3x cable gland MG-12S (3 inputs)

Environmental Specifications

- Operating temperature: -30°C to 70° (*) see Safety Warning below
- Storage temperature: -40°C to 85°C
- Humidity operational: 5% - 95% non condensing
- Operating altitude: up to 2000m

Safety Warning

When the device is installed in a location where the environmental temperature can rise above 60°C, the temperature of the surface might reach high values and therefore under these conditions the user needs to be warned in order to prevent accidental contact. For this purpose the device has to be installed in a restricted access location and a warning sticker, in accordance with IEC 60417-5041 (DB:2002-10), must be applied on a visible part of the unit.



Shock Resistance

The next tests have been performed on the CloudGate and passed:

- EUT state: operational
- Frequency range: 10 ... 2000Hz
- Overall acceleration: 3.6Grms
- Crest Factor: 3
- Orientation: 3 axis, X / Y / Z
- Test duration: 94 hours / axis
- Profile: See PSD table on 'additional info' sheet

Test	Details	Spec number
Resonance search and dwell (Search for critical resonances and stress these to verify the reliability of the EUT.)	<ul style="list-style-type: none"> • EUT state: operational • Frequency range: 10 ... 2000Hz • Overall acceleration: 3.6Grms • Crest Factor: 3 • Orientation: 3 axis, X / Y / Z • Test duration: 94 hours / axis • Profile: See PSD table on 'additional info' sheet 	IEC 60068-2-6
Vibration endurance (Simulate rough conditions over lifetime.)	ISO 16750-3	IEC 60068-2-53
Shock Vibration (Bump) (Simulate rough handling.)	<ul style="list-style-type: none"> • EUT state: operational • Acceleration: 10gn • Pulse width: 11ms • Waveform: Half-sine • Amount of bumps: 100 / axis • Orientation: 3 axis, X / Y / Z 	IEC60068-2-27
Guided drop test (Simulate impact caused by dropping the device.)	<ul style="list-style-type: none"> • EUT state: Non-operational • Drop height: 150cm • Drop surface: concrete floor • Amount of impacts: 6 (1 per orientation) • Orientation: 6 axis, X+/X- / Y+/Y- / Z+/Z- 	IEC60068-2-31

Railway applications

The CloudGate LTE has successfully been tested according to EN 50155. This standard applies to all electronic equipment installed on rail vehicles and associated with the accumulator battery of the vehicle or a low voltage power supply.

Conditions of operation

This device is suited for railway applications under the following conditions:

- altitude class AX (up to 2000m)
- ambient temperature class T3 (-25°C to +70°C)
- power supply: 24V DC
- interruptions of voltage supply class S1 (no interruptions)

Installation

The supply to the CloudGate LTE should be provided by a separate conductor connected as directly as possible to the source. This conductor should be used only for the supply to electronic circuits.

The installation of the electronic equipment shall be arranged so as to reduce, as far as possible, the effects of external electrical disturbances.

In order to offer sufficient electrical insulation, an external DC/DC convertor shall be used. Minimum isolation provided shall be 500Vdc. During the EN 50155 testing this DC/DC convertor was used for the insulation test.

Certification information for CloudGate LTE WW

Model: CG0114

This page offers an overview of the country certifications and operator approvals obtained per region. This CloudGate model is approved for use in the countries listed below. For use in other countries, please consult your sales contact.

- Australia
- Canada
- Chile
- Colombia
- El Salvador
- European Economic Area (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxemburg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom)
- Peru
- Singapore
- Switzerland
- Turkey
- United States

Before installing your CloudGate device, read the Safety Guidelines section in the CloudGate Installation Guide carefully. Not following these guidelines can cause harm to the CloudGate, yourself or other persons.



The CloudGate LTE WW complies with Australian regulatory requirements and carries the RCM mark.

The certificate can be found [here](#).

When used with an external power supply, make sure the EPS is certified for use in Australia and carries the RCM mark.



The CloudGate LTE WW can be used in Canada and complies with the applicable Industry Canada regulations.

The product completed PTCRB certification and is approved by the following network operators:

- Bell Mobility
- Rogers

The CloudGate LTE WW can be used in Class I Div 2 Hazardous Locations. [Click here](#) for conditions for use.

INDUSTRY CANADA REGULATIONS

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

External antennas

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter, IC 5131A-LN930, has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

To comply with Industry Canada regulations limiting both maximum RF output power and human exposure to RF radiation, maximum antenna gain must not exceed:

- 5.0 dBi in Cellular band (800 MHz)
- 3.0 dBi in PCS band (1900 MHz)
- 5.5 dBi in AWS band (1700 MHz)
- 5.0 dBi in 700 MHz band
- 5.0 dBi in 2500 MHz band

In addition the product shall be installed in a way that a distance of at least 20 cm is maintained between the antennas and the user's body.

REGULATIONS INDUSTRIE CANADA

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Antennas externes

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio, IC 5131A-LN930, a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

- 5.0 dBi dans la bande cellulaire (800 MHz)
- 3.0 dBi dans la bande SCP (1900 MHz)
- 5.5 dBi dans la bande AWS (1700 MHz)
- 5.0 dBi dans la bande 700 MHz
- 5.0 dBi dans la bande 2500 MHz

En plus, le produit doit être installé de manière à assurer une distance de séparation de 20 cm minimum entre le corps de l'utilisateur et les antennes.



The CloudGate LTE WW can be used in Chile and complies with the SUBTEL requirements.



The CloudGate LTE WW can be used in Colombia and complies with the CRC requirements.

The certificate can be found [here](#).

El Salvador **SIGET**

The CloudGate LTE WW can be used in El Salvador and complies with the SIGET requirements.

The certificate can be found [here](#).

European Economic Area

The CloudGate LTE WW complies with the essential requirements of the RED directive (2014/53/EU) issued by the Commission of the European Union and carries the CE mark. The product can be used in the following countries of the European Economic Area: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.

The RED EU Declaration of Conformity can be downloaded [here](#).

EU Regulatory Compliance Information

The CloudGate is constructed in such a way that it can be operated in the Member States of the EU without infringing applicable requirements on the use of the radio spectrum.

There are neither restrictions on putting into service nor requirements for authorisation of use related to this product. In these circumstances, there is no information related to this matter to be included on the packaging.

External antennas

To comply with the CE regulations, maximum antenna gain must not exceed:

- 3.7 dBi in band I (2100 MHz)
- 2.1 dBi in band III (1800 MHz)

- 4.4 dBi in band VII (2600 MHz)
- 1.7 dBi in band VIII (900 MHz)
- 2.0 dBi in band XX (800MHz)



E-mark

This product also complies with the Automotive EMC requirements according to regulation UN ECE-R10 revision 4 and EU Automotive EMC directive 2004/104/EC. It carries the E-mark E13.



EN 50155 (Railway)

This product has successfully been tested for compliance with standard EN 50155 and is suitable for railway applications. For more info on Railway applications, [click here](#)

Waste from Electrical and Electronic Equipment (WEEE)



■ Attention: Your product is marked with this symbol. Electrical and electronic equipment should not be disposed of with general household waste. There is a separate collection system for these items.

Please contact your supplier for information on their disposal policy. You may be charged for the costs of take-back and recycling. In some countries, small products in small quantities may be disposed of at designated collection facilities. Please contact your local authority for details.



Peru

The CloudGate LTE WW can be used in Peru and complies with the MINTC requirements.

The certificate can be found [here](#).



The CloudGate LTE WW has been registered with the Info-communications Development Authority of Singapore under regulation 20(6) of the Telecommunications (Dealers) Regulations (Cap 323, Rg 6) (the "Dealers Regulations") and is approved for sale in Singapore.

The certificate can be found [here](#).



The CloudGate LTE WW carries the CE mark and can be used in Switzerland.



The CloudGate LTE WW carries the CE mark and can be used in Turkey.



The CloudGate LTE WW can be used in the USA and complies with the applicable FCC rule parts.

The product completed PTCRB certification and is approved by the following network operators:

- AT&T
- Verizon

The CloudGate LTE WW can be used in Class I Div 2 Hazardous Locations. [Click here](#) for conditions for use.

FCC REGULATIONS

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Federal communications commission notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Exposure Information to Radio Frequency Energy

Users concerned with the risk of Radio Frequency exposure may wish to limit the duration of their calls and to position the antenna as far away from the body as is practical.

Modifications

Any changes or modifications made to this device that are not expressly approved by Option could void the user's authority to operate the equipment.

External antennas

To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, maximum antenna gain must not exceed:

- 5.0 dBi in Cellular band (800 MHz)
- 3.0 dBi in PCS band (1900 MHz)
- 5.5 dBi in AWS band (1700 MHz)
- 5.0 dBi in 700 MHz band
- 5.0 dBi in 2500 MHz band

In addition the product shall be installed in a way that a distance of at least 20 cm is maintained between the antennas and the user's body.

Class I Div 2 Hazardous Locations

Model: CG0114

Expansion card models CG2101, CG1102, CG1106, CG3102

This page offers information on using your CloudGate product in Class I Div 2 Hazardous Locations in the countries listed below. For use in other countries, please consult your sales contact.

Please read the safety guidelines carefully. Not following these guidelines can cause harm to the CloudGate, yourself or other persons.



Canada & United States

The CloudGate LTE WW can be used in Canada and the United States and was tested under following standards:

- CSA C22.2 No. 213-M1987 "Non-incendive electrical equipment for use in class I, division 2 hazardous locations"
- ANSI/ISA-12.12.01-2013 "Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations"

The above mentioned model can only be used in Hazardous Locations when marked with the 'MET RECOGNIZED' logo. The above mentioned expansion card models can only be used when marked with the text "C1D2" on the label. Other existing CloudGate models and other expansion cards that are not present in the list above, shall not be used in hazardous locations.

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only.

- [Hazardous locations safety guidelines](#)
- Normal locations safety guidelines

UL60950

The CloudGate LTE WW was successfully tested against the UL60950-1 safety standard.



P T I O N



WIRELESS TECHNOLOGY