

IOT-GATE-RPI5

Reference Guide



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Table 1 **Revision Notes**

Date	Description
May 2026	• Initial release

Please check for a newer revision of this manual at the Compulab website <https://www.compulab.com>. Compare the revision notes of the updated manual from the website with those of the printed or electronic version that you have.

1 INTRODUCTION

1.1 About This Document

This document is part of a set of reference documents providing information necessary to operate and program Compulab IOT-GATE-RPI5 product.

1.2 Related Documents

For additional information, refer to the documents listed in [Table 2](#).

Table 2 **Related Documents**

Document	Location
IOT-GATE-RPI5 Resources	https://www.compulab.com/products/iot-gateways/iot-gate-rpi5-industrial-raspberry-pi-iot-edge-gateway/#devres

2 OVERVIEW

2.1 Highlights

IOT-GATE-RPI5 is a miniature, highly integrated industrial IoT gateway optimized for low-cost applications.

- Powered by Raspberry Pi 5 Compute Module
- Broadcom BCM2712 quad-core Cortex-A76, 2.4 GHz
- Up to 16GB RAM, 64GB eMMC
- 2x LAN, LTE modem, WiFi 802.11ac, Bluetooth 5.0
- 2x RS485 | CAN bus, USB3.0 and digital I/O
- Wide temperature range of -40C to 80C
- Fanless design in an aluminum, rugged housing
- Designed for reliability and 24/7 operation
- Fully compatible with Raspberry Pi OS

2.2 Specifications

The "Option" column specifies the IOT-GATE-RPI5 configuration option required to have the particular feature.

"+" means that the feature is always available.

Table 3 Features and Configuration options

Feature	Description	Option
CPU, Memory and Storage		
CPU	Broadcom BCM2712 quad-core Cortex-A76, 2.4 GHz	+
GPU	Broadcom VideoCore VII OpenGL ES 3.1, Vulkan 1.2	+
RAM	2GB – 16GB, LPDDR4	D
Storage	16GB – 64GB eMMC flash, soldered on-board	N
	256GB NVME flash, optional module	NB
AI accelerator	Hailo-8L, optional M.2 module	AIHL
Network		
Cellular Modem	4G/LTE CAT-4 cellular module, Telit LE910 Worldwide LTE, UMTS/HSPA	JT910G
	SIM card socket	+
WiFi and Bluetooth	802.11ac WiFi interface Bluetooth 5.0 BLE 2.4GHz / 5GHz rubber duck antenna	WB
LAN	1000Mbps Ethernet port, RJ45 connector	+
	100Mbps Ethernet port, RJ45 connector	
Wireless Mesh	Bluetooth mesh, Thread, Zigbee Nordic Semiconductor nRF52840 / Silicon Labs MGM240	WMN
GNSS	GPS Implemented with Telit LE910 module	JT910G
I/O		
Industrial I/O	2x RS485 (half-duplex) CAN-FD ports Isolated, terminal-block connector	SIO
	4x digital outputs / inputs Isolated, 24V compliant with EN 61131-2, terminal-block connector	
USB	1x USB3.0 port, type-A connector 1x USB2.0 port, type-A connector	+
Display Output	2x DVI-D, up to 4Kp60	+
System		
RTC	Real time clock with on-board coin-cell battery	+
Watchdog	Hardware watchdog	+
Debug	1x serial console via UART-to-USB bridge, micro-USB connector	+
	USB programming port, micro-USB connector	+
	TPM 2.0, Infineon SLB9673	+
Indicators	1x programmable dual-color LED 1x power LED	+
POE	Support for PoE 802.3af (powered device)	+

Table 4 Electrical, Mechanical and Environmental Specifications

Electrical Specifications	
Power Supply	12V-24V DC (-20%/+20%) Reverse voltage protection
Power consumption	3W - 9W, depending on system load and configuration
Mechanical Specifications	
Dimensions (H x W x D)	105 x 80 x 30 mm
Weight	550 gram
Housing material	Aluminum
Cooling	Passive cooling, fanless design
Reliability and Environmental	
MTTF	> 200,000 hours
Warranty	5 years
Operation temperature (case)	Commercial: 0° to 60° C
	Industrial: -40° to 80° C
Storage temperature	-40° to 85° C
Relative humidity	10% to 90% (operation)
	05% to 95% (storage)

3 CORE SYSTEM COMPONENTS

3.1 Raspberry Pi 5 module

IOT-GATE-RPI5 is built around the Raspberry Pi 5 module (CM5), which provides the following key features:

- Broadcom BCM2712 quad-core Cortex-A76, 2.4 GHz
- 2GB to 16GB LPDDR4 and 16GB to 64GB eMMC
- Wireless LAN and Bluetooth 5.0, BLE (optional)
- Onboard Gigabit Ethernet PHY
- Dual display interface (up to 4Kp60)

3.2 Memory

3.2.1 DRAM

IOT-GATE-RPI5 is available with 2GB to 16GB of onboard LPDDR4 memory.

3.2.2 Primary Storage

IOT-GATE-RPI5 features up to 64GB of soldered on-board eMMC memory for storing the bootloader and operating system (Kernel and root filesystem). The remaining eMMC space is used to store general-purpose (user) data.

3.2.3 Secondary Storage

IOT-GATE-RPI5 features an optional NVME SSD storage implemented with an M.2 module that can be used for storing additional data or back-up of the primary storage.

3.3 Cellular

IOT-GATE-RPI5 can be optionally assembled a mini-PCIe cellular modem module. To set up IOT-GATE-RPI5 for cellular functionality, install an active SIM card into SIM socket located behind the side panel service bay door. Remove the service bay door to access the SIM socket.

Modem antenna connection is available via SMA connector on the IOT-GATE-RPI5 front panel.

NOTE: Cellular modem is present only in gateways ordered with the “JT910G” configuration option

NOTE: Cellular antenna is NOT included with the gateway and should be ordered separately

3.4 WiFi and Bluetooth

IOT-GATE-RPI5 features optional on-board 802.11ac WiFi and Bluetooth 5.0 BLE interfaces.

WiFi / Bluetooth antenna connection is available via RP-SMA connector on the IOT-GATE-RPI5 main panel.

NOTE: IOT-GATE-RPI5 models ordered with WiFi / Bluetooth (“WB”) option are supplied with a 2.4GHz / 5GHz rubber duck antenna

3.5 Wireless Mesh

IOT-GATE-RPI5 can be optionally assembled with wireless mesh communication module based on Nordic Semiconductor nRF52840. The antenna connection of the installed module is available via RP-SMA connector on the IOT-GATE-RPI5 front panel.

Note: GNSS antenna connection is not available in IOT-GATE-RPI5 models assembled with the mesh communication module

3.6 Ethernet

IOT-GATE-RPI5 incorporates two Ethernet ports:

- ETH0 – 1000Mbps port implemented with Raspberry Pi 5 module
- ETH1 – 100Mbps port implemented with Microchip LAN9514 controller

3.7 Serial Debug Console

IOT-GATE-RPI5 features a serial debug console via a UART-to-USB bridge over micro USB connector located on the main panel.

3.8 Industrial I/O Terminal Block

IOT-GATE-RPI5 features an 18-pin terminal block containing several I/O interfaces.

For connector pin-out please refer to section 5.4.

3.8.1 RS485 and CAN Bus

IOT-GATE-RPI5 features up to two programmable RS485 / CAN-FD ports. Each port can be individually programmed to operate in RS485 or CAN mode.

RS485 key characteristics:

- 2-wire, half-duplex
- Programmable baud rate of up to 1Mbps
- Galvanic isolation from the main unit
- Optional 120Ω termination resistors controlled by external pins

CAN bus key characteristics:

- Support for CAN-FD and CAN 2.0B
- Galvanic isolation from the main unit
- Optional 120Ω termination resistors controlled by external pins

NOTE: RS485 / CAN ports are only present in gateways ordered with the “SIO” ordering option

NOTE: 120Ω termination resistors are enabled by default. To disable termination resistors, connect PORTx_TRM pins to ISO1_GND

3.8.2 Digital inputs and outputs

IOT-GATE-RPI5 provides four programmable signals which can be used as either digital inputs or outputs. Key characteristics:

- Designed for 24V PLC applications
- Digital outputs maximal output current – 1A per channel
- Digital inputs self-powered with current limit

Table 5 Digital I/O Characteristics

Parameter	Description	Min	Typ.	Max	Unit
VDC	External power supply voltage	6	24	30	V
VIN _{TLH}	Low to High input voltage		9.4	11	V
VIN _{THL}	High to Low input voltage	5	7.5		V
VIN _{HYST}	Input trigger hysteresis	1.2		2.6	V
IOUT	Maximum output current per channel			1	A

NOTE: digital inputs and outputs are only present in gateways ordered with the “SIO” ordering option

3.9 USB Programming Port

IOT-GATE-RPI5 features a USB programming interface that allows to access the on-board primary eMMC storage using the RPI boot utility.

The USB programming connector is located behind the side panel service bay door.

3.10 Remote Power CNTL Input

A remote power button can be connected to the CNTL pin on the DC power terminal block. Pressing the button changes the power state of the system. Connect the button between the CNTL pin and common ground pin.

Table 6 Power Button Control

Current State	Press	Resulting State
ON	Long	OFF (forced hardware shutdown)
OFF	Short	ON

Warning: Connecting the Remote Power Button input to DC voltage may damage the device.

***** Only connect the input pin to GND via contact switch *****

4 SYSTEM LOGIC

4.1 Power Subsystem

4.1.1 Power Rails

IOT-GATE-RPI5 is powered from a single power rail through the DC power connector.

4.1.2 Power Modes

IOT-GATE-RPI5 supports the following hardware power modes.

Table 7 Power modes

Power Mode	Description
ON	All internal power rails are enabled. Mode entered automatically when the main power supply is connected.
OFF	CPU core power rails are off. All peripheral power rails are off.

4.1.3 RTC Back-Up Battery

IOT-GATE-RPI5 features a 120mAh coin cell lithium battery, which maintains the on-board RTC whenever the main power supply is not present.

4.2 Real-Time Clock

IOT-GATE-RPI5 RTC is implemented with the CM5 real-time clock (RTC) chip. IOT-GATE-RPI5 back-up battery keeps the RTC running to maintain clock and time information whenever the main power supply is not present.

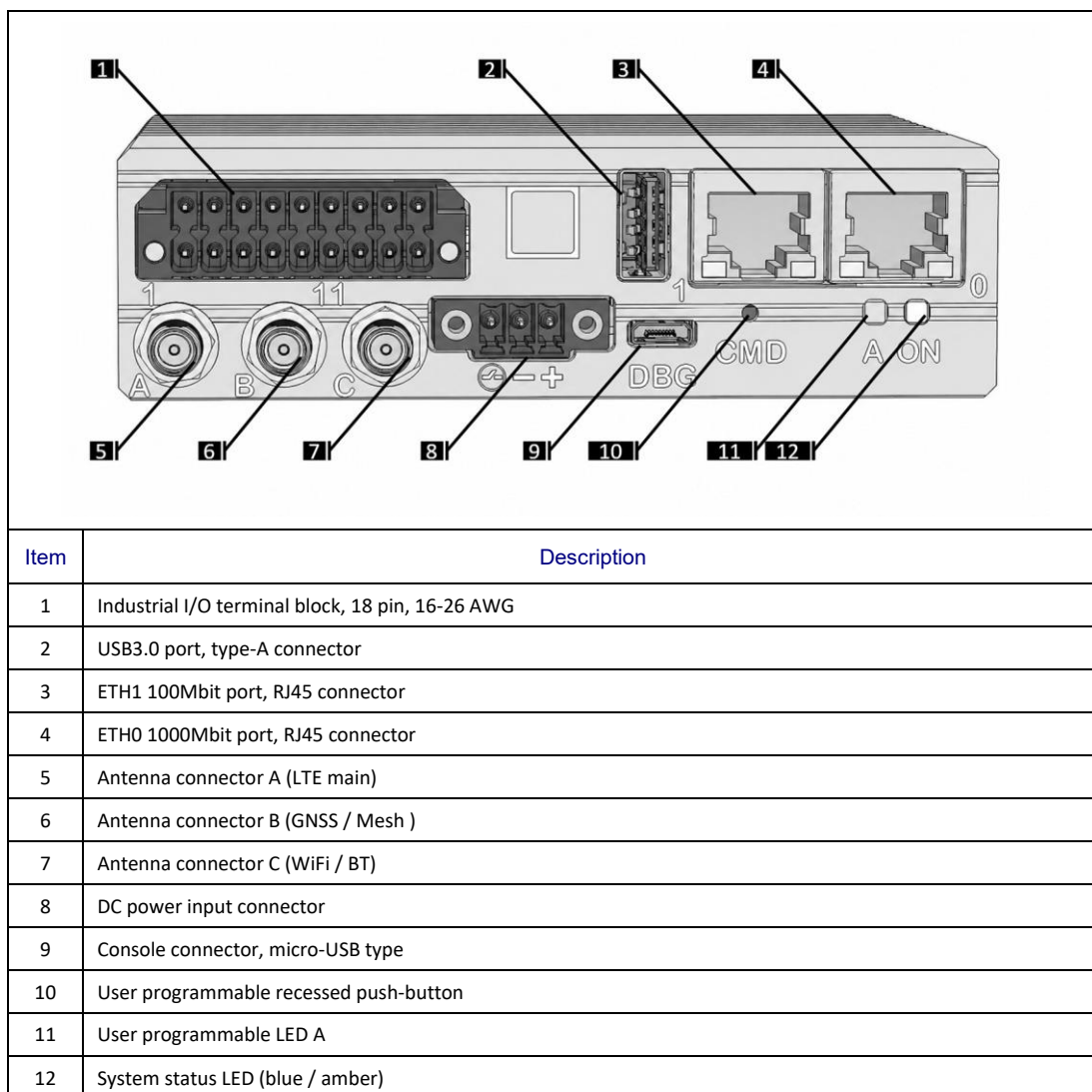
4.3 Trusted Platform Module

IOT-GATE-RPI5 is assembled with an Infineon SLB 9673 TPM2.0 compatible device.

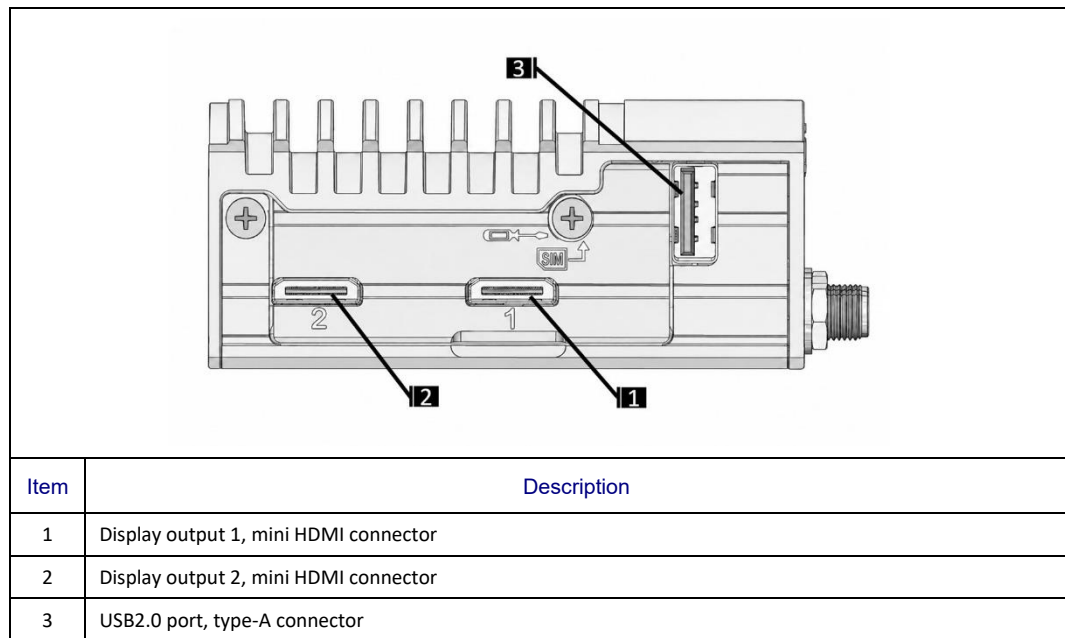
5 INTERFACES AND CONNECTORS

5.1 Connector Locations

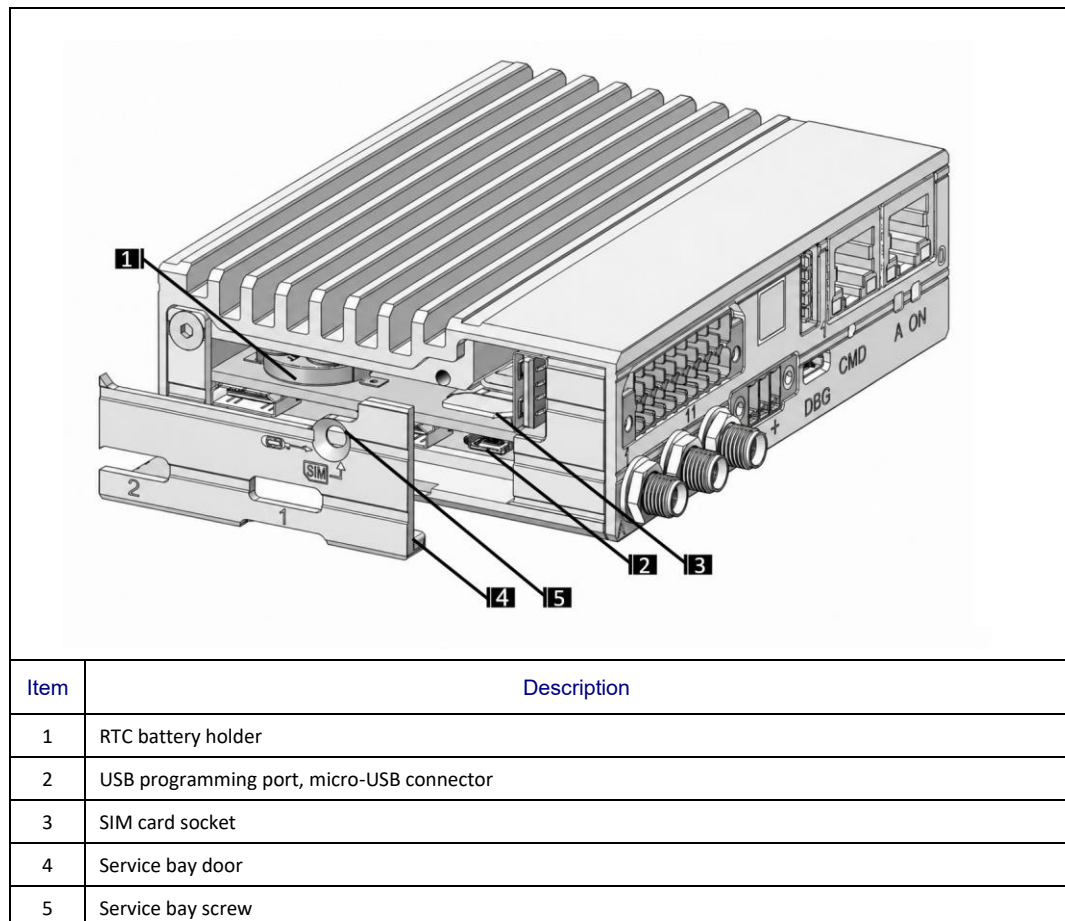
5.1.1 Main Panel



5.1.2 Side Panel



5.1.3 Service Bay



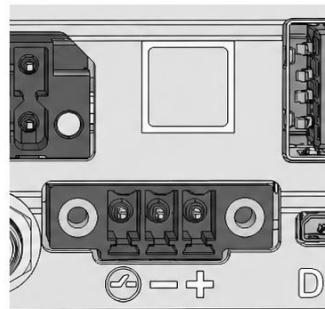
5.2 DC Power Connector

DC power input connector.

Table 8 Power connector pin-out

Pin	Signal Name	Description
1	CNTL	Programmable power control
2	V-	V0 DC pin
3	V+	V+ DC pin

Table 9 Power connector data

Connector type	Pin numbering
3-pin dual-row plug with screw terminal connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26 Connector P/N: Jinling PJL15EDGRM-35003B02 Mating connector P/N: Jinling PJL15EDGKM-35003B01 * Connector is compatible with Phoenix Contacts “MC 1.5/3.5mm” terminal block series NOTE: Compulab supplies the mating connector with the gateway unit	

5.3 USB Host Connectors

IOT-GATE-RPI5 features two USB host ports available through standard type-A USB connectors:

- USB3.0 port is located on the main panel
- Additional USB2.0 port is located on the side panel

5.4 Industrial I/O Connector

IOT-GATE-RPI5 industrial I/O signals are routed to terminal block. Connector pin-out is shown below. For additional details please refer to section 3.8.

Table 10 Industrial I/O connector pin-out

Pin	Signal Name	Description
1	AUX1	Reserved for future use
2	AUX2	Reserved for future use
3	AUX3	Reserved for future use
4	AUX4	Reserved for future use
5	AUX5	Reserved for future use
6	ISO2_GND	Isolated ground for DIO domain
7	DIO_VIN	Digital I/O external DC power input
8	DIO1	Digital input / output 1
9	DIO0	Digital input / output 0
10	DIO3	Digital input / output 3
11	DIO2	Digital input / output 2
12	PORTA_TRM	PORT-A: 120ohm termination control. Connect to ISO1_GND (pin 17) to disable the termination resistor
13	PORTA_NEG	PORT-A: RS485 negative / CAN low
14	PORTA_POS	PORT-A: RS485 positive / CAN high
15	PORTB_NEG	PORT-B: RS485 negative / CAN low
16	PORTB_POS	PORT-B: RS485 positive / CAN high
17	ISO1_GND	Isolated ground for RS485 / CAN domain
18	PORTB_TRM	PORT-B: 120ohm termination control. Connect to ISO1_GND (pin 17) to disable the termination resistor

Table 11 Industrial I/O add-on connector data

Connector type	Pin numbering
18-pin dual-row plug with push-in spring connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26 Connector P/N: JiLN PJL15EDGRHCM-35009B01 Mating connector P/N: JiLN PJL15EDGKNHM-35018B01 * Connector is compatible with Phoenix Contacts “dual MC 1.5/ 3.5mm” terminal block series NOTE: Compulab supplies the mating connector with the gateway unit	

5.5 Serial Debug Console

IOT-GATE-RPI5 serial debug console interface is routed to micro-USB connector located on the main panel.

5.6 RJ45 Ethernet Connectors

IOT-GATE-RPI5 features two RJ45 Ethernet connectors: ETH0 and ETH1.

- ETH0 – primary 1000Mbps port with PoE client capability
- ETH1 – secondary 100Mbps port

5.7 SIM card socket

IOT-GATE-RPI5 micro-SIM card socket is located behind the side panel service bay door.

Remove the service bay door to access the SIM socket.

5.8 Indicator LEDs

The tables below describe IOT-GATE-RPI5 indicator LEDs.

Table 12 System Status LED

LED State	Gateway Status
OFF	System is in OFF or deep-sleep state
Solid AMBER	System is in bootloader stage, before O/S boot
Blinking BLUE	System is running Raspberry Pi O/S. Normal operation mode

General purpose LEDs are controlled by SoC GPIOs.

5.9 Antenna Connectors

IOT-GATE-RPI5 features up to three connectors for external antennas.

Table 13 Default antenna connector assignment

Connector Name	Function	Connector Type
A	LTE main antenna	SMA
B	GNSS / Mesh antenna	RP-SMA
C	WiFi / BT antenna	RP-SMA

6 MECHANICAL DRAWINGS

- All dimensions are in millimeters.
- IOT-GATE-RPI5 3D model is available for download at:
<https://www.compulab.com/products/iot-gateways/iot-gate-rpi5-industrial-raspberry-pi-iot-edge-gateway/#devres>

Figure 1 IOT-GATE-RPI5 front

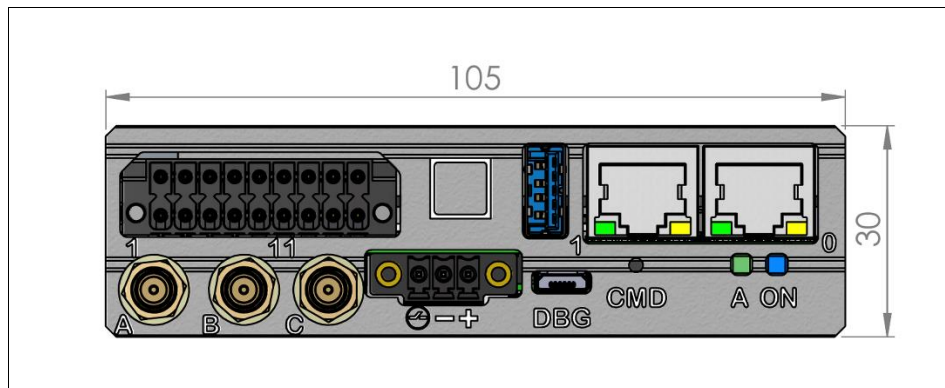


Figure 2 IOT-GATE-RPI5 back

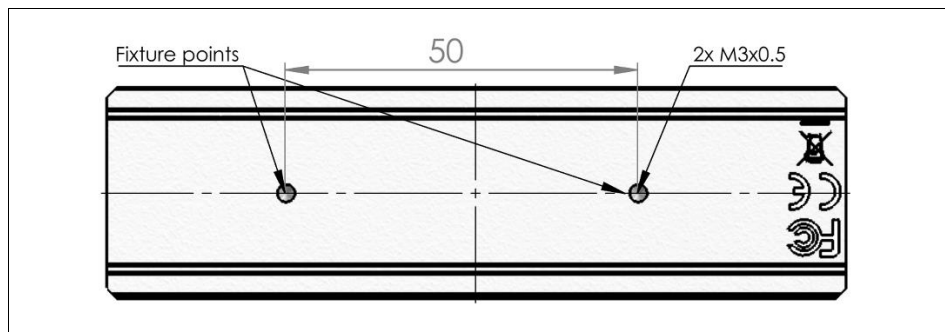
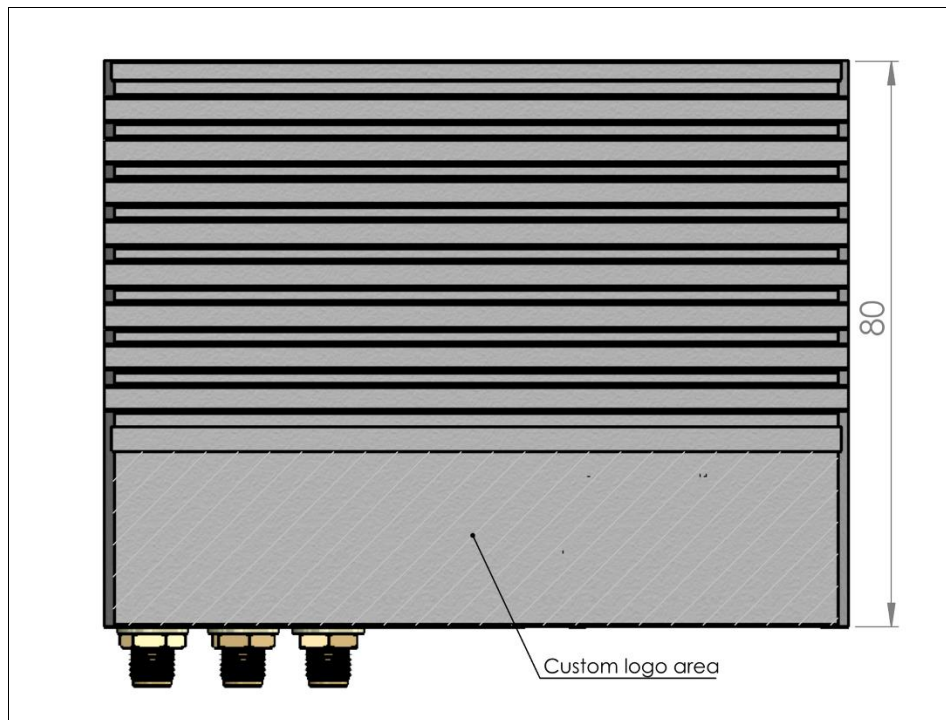


Figure 3 IOT-GATE-RPI5 top



7 OPERATIONAL CHARACTERISTICS

7.1 Absolute Maximum Ratings

Table 14 Absolute Maximum ratings

Parameter	Min	Max	Unit
Main power supply voltage	-0.3	32	V

NOTE: Stress beyond Absolute Maximum Ratings may cause permanent damage to the device

7.2 Recommended Operating Conditions

Table 15 Recommended Operating Conditions

Parameter	Min	Typ.	Max	Unit
Main power supply voltage	9.6	12-24	28.8	V