Product: Mini Gateway
Date: August 2023
Serial Number: -----
Version: 1.0

Mini Gateway Description:

ABI Mini Gateway is a secure and easy to use IOT device, targeting data aquisition & controling devices remotely. Users can define rules on the device resulting in events happening according to stakeholders requirements.

This device is available in two alternatives giving Lora/Cellular connectivity in exchange. One regular mini Gateway is available with multiple connectivities including BLE, ZigBee, Ethernet wifi & Lora/Cellular as well as a half duplex ModBus RTU connectivity.

We can control up to 4 devices & aquire 3 status from 3 digital inputs.

CONTENTS

1 Features

1.1 General Specifications Overview

Characteristics	Details
Supply Voltage	12 VDC
Inputs	3x Digital input
Outputs	2 Relays (NO) 2 Relays (NO/NC) 12A each
Processor	Dual core ESP32 - DOWDQ6
Program Memory	S20 KB of RAM
Flash Memory	None
Flash QSPI Interface	16 MB Flash QSPI. Shared between program usage and data logging
Programming method	Arduino/C++ , ESP-IDF/C
Communication	Ethernet, RS_485Wi-Fi 2.4 GHz and Bluetooth LE 4.2 supported by firmware, 5.1 supported by hardware, ZigBee, Cellular, Lora
Security	ATECC608B Crypto Microchip
Degree of Protection	IP20 / IP10
Certifications	cULus, ENEC, FCC, CE, CB, UKCA

1.2 Processor

Component	Details	
ST STM32H747XI Processor Espress if esp32 DOWDQ6 Processor	Dual-core	Arm Cortex-M7 core at up to 480 MHz + Arm 32 bit Cortex-M4 core at up to 240 MHz
	Flash Memory	16 MB of QSPI flash shared with SPIFFS
	Programming Memory	520 KB of RAM

1.3 Security

Component	Details
ATECC608B Crypto Microchip	Cryptographic co-processor with secure hardware-based key storage
	Protected storage for up to 16 Keys, certificates or data
	Networking key management support
	Secure boot support
	Guaranteed unique -72bit serial number

1.4 Communication

Interfaces	Type	Protocols/Technologies supported
Ethernet	100/10BASE-T Port	TCP/IP, MODBUS TCP
RS-485	Half-duplex without termination resistance	MODBUS RTU, Custom serial communication
Wireless connectivity	Wi-Fi®	2.4 GHz
	Bluetooth® Low Energy	4.2 BR/EDR and Bluetooth LE specifications
	ZigBee	802.15.4 with texas instrument z stack firmware

1.5 Inputs

Characteristics	Details
Number of inputs	1x Analog/Digital inputs
Inputs overvoltage protection	Yes (max. 20V)
Antipolarity protection	Yes
Input impedance	1.39 kΩ

1.5.1 Digital Inputs

Characteristics	Details
Digital Input voltage logic level	VIL Max: 1.8 VDC. VHL Min: 3.6 VDC
Digital Input current	5.6 mA at 10V
Cycle time for analog input acquisition	5 µs

1.6 Outputs

Characteristics	Details
Number of outputs	2x relays (NO), 2x relays (NO/NC)
Max current per relay	12A
Max peak current per relay	16A
Continuous current per terminal	12A
Short-circuit protection	No, external fuse required
Relay rated voltage	250 VAC / 24 VDC
Relay Max voltage	440 VAC / 300 VDC
Rated load AC1	3000 VA
Rated load AC15 (230 VAC)	720 VA (NO) / 360 VA (NC)
Relay mechanical frequency	18,000 per hour
Relay electrical frequency	1800 operation/hr at reted load
Impulsive witestand voltage	10 kV
life expectancy	20,000,000
contact resistance	100 mΩ

2 Ratings

2.1 Recommended Operating Conditions

Description	Value
Temperature Operating Range	0...70 °C (-40...85 °C)*
Protection degree rating	IP20 / IP10

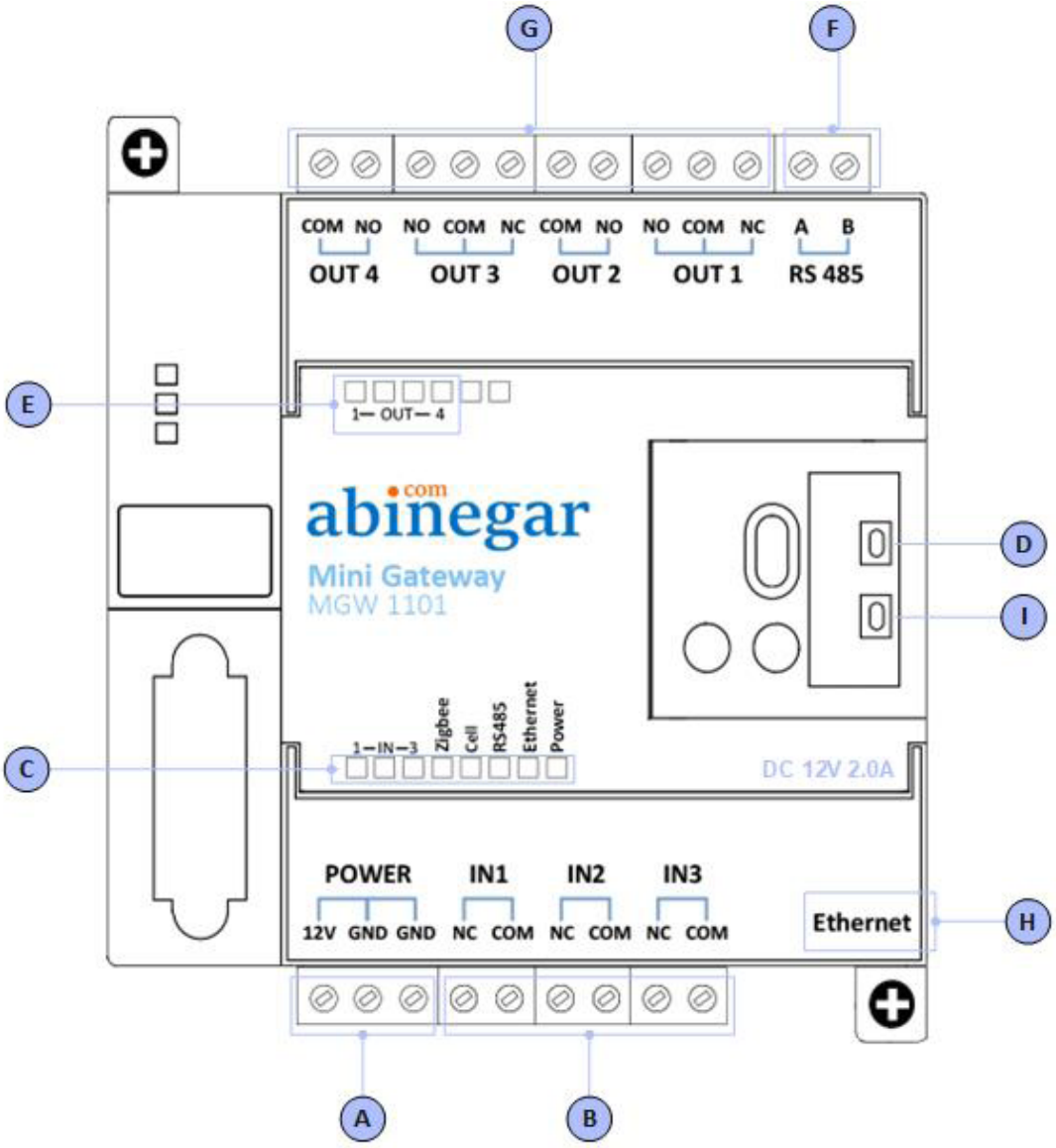
* Optional (Industrial)

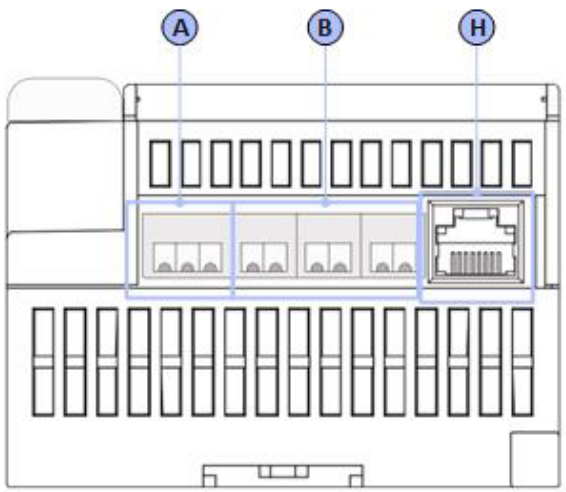
2.2 Power Specification

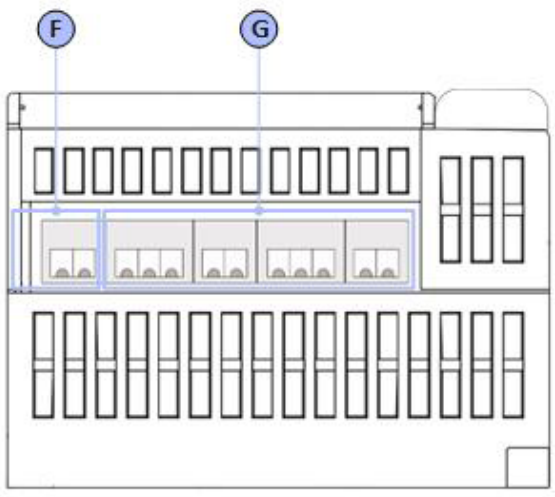
Property	Min	Typ	Max	Unit
Supply voltage	-	12	-	V
Permissible range	9	-	15.6	V
Power consumption (12V)	0.6	-	1.5	W

3 Functional Overview

3.1 Product View







A. Power supply terminals 12V
B. Digital input terminals
C. Conductivity & input indicators
D. Reset button
E. Output indicators
F. RS485 terminals
G. Output relay terminals
H. ethernet port
I. User button

Item	Feature	Item	Feature
3A	Power Supply Terminals 24...12 VDC	3H	Ethernet Port Status LEDs
3B	I1...I8 digital/analog input terminals (10-0V) configurable via IDE	3I	Label Holder
3C	Reset Button	3J	RS485- terminal block (for Modbus RTU or proprietary communication)
3D	User Programmable button	3K	USB-C® for programming and data logging
3E	Status LEDs 4...1 (User Programmable)	3M	Ethernet port
3F	Relay Output Terminals 4...1, NO contact (SPST) 10A 250 VAC	3N	Port for communication and connection of auxiliary modules
3G	Functional Earth		

3.2 Microcontroller

The microcontroller is a dual-core esp32 DOWDQ6. The processors are Xtenso running at up to 240 MHz.
Abinegar mini Gateway can be programmed using the libraries developed for it as part of the standard Arduino Core library & also on the ESP-IDF platform running on VS code.

3.3 Encryption

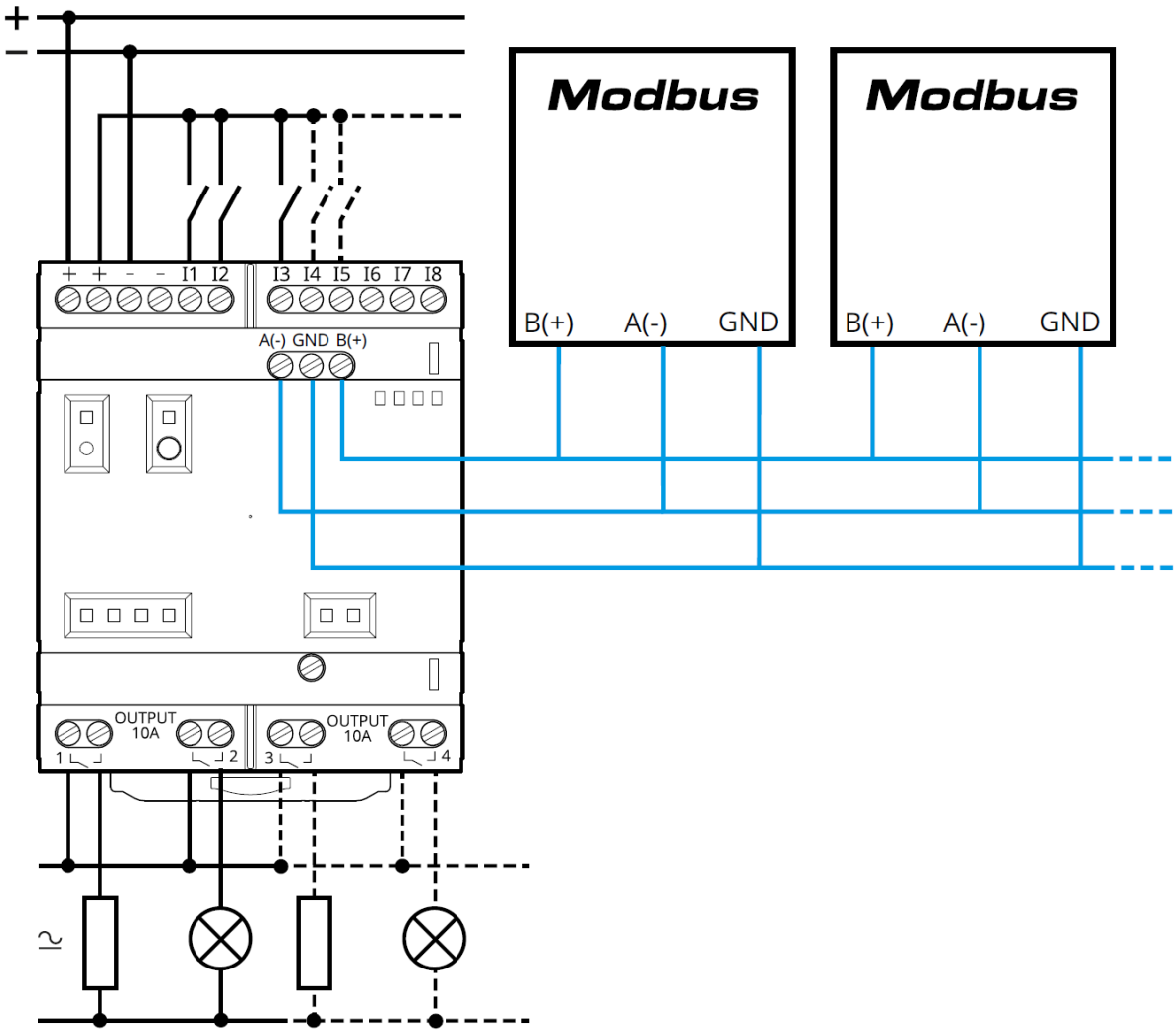
Encryption capabilities are provided by the ATECC608B chipset. This crypto-chip can be used to store sensitive information like security keys to connect to the other third-party services, protecting ABI mini Gateway from any unauthorized access in any kind of industrial and professional environment.

3.4 Ethernet

TCP/IP and Modbus TCP communication are supported. The 100/10 Ethernet physical interface is directly connected to the internal Ethernet MAC and provides full-duplex communication.

3.5 Modbus RTU

Modbus RTU communication is supported using mini gateway RS-485 physical interface. The wiring indication may vary depending on the connected device. In case the above connection indication is not resulting in consistent data transmission, invert the wires between A(-) and B(+) and retry.



Modbus RTU wiring diagram using the RS-485 interface

3.6 Wi-Fi® and Bluetooth® Low Energy

ESP32 as an SOC allows simultaneous management of Wi-Fi® and Bluetooth® connectivity. The Wi-Fi® interface can be operated as an Access Point, as a Station or as a dual-mode simultaneous AP/STA, and can handle up to 65 Mbps transfer rate. Bluetooth® interface supports Bluetooth® Low Energy (4.2).

With an internet connection, the Wi-Fi® communication can be used for connecting to other third-party services.

3.7 Relay Outputs

Mini Gateway has two NO/NC & two NO powerful 12A relays which are capable of actuating on loads at a rated voltage of 250 VAC and up to a maximum switching voltage of 440 VAC.

In the case of ABI mini Gateway, relays have a Maximum Peak Current of 15A.

The Rated Load is the maximum resistive load that a contact can make, carry and break repeatedly.

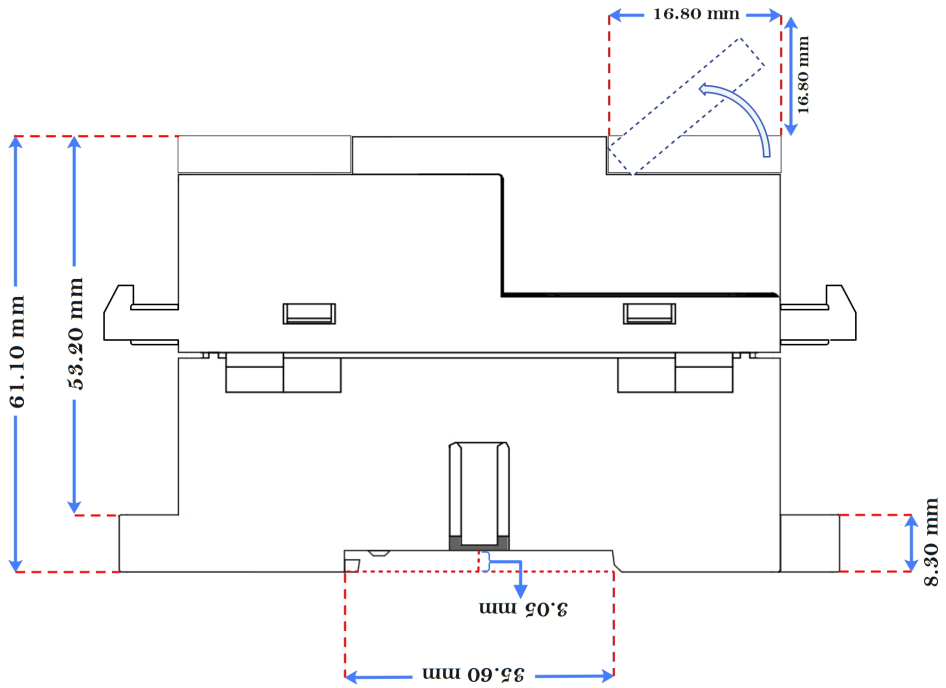
- For resistive or slightly inductive loads (AC1 classification), ABI›s Rated Load is 3000 VA.
- For small electromagnetic loads (> 72 VA) (AC15 classification) like power contactors, magnetic solenoid valves, electromagnets and AC single-phase supplies, ABI›s Rated Load is 720 VA.

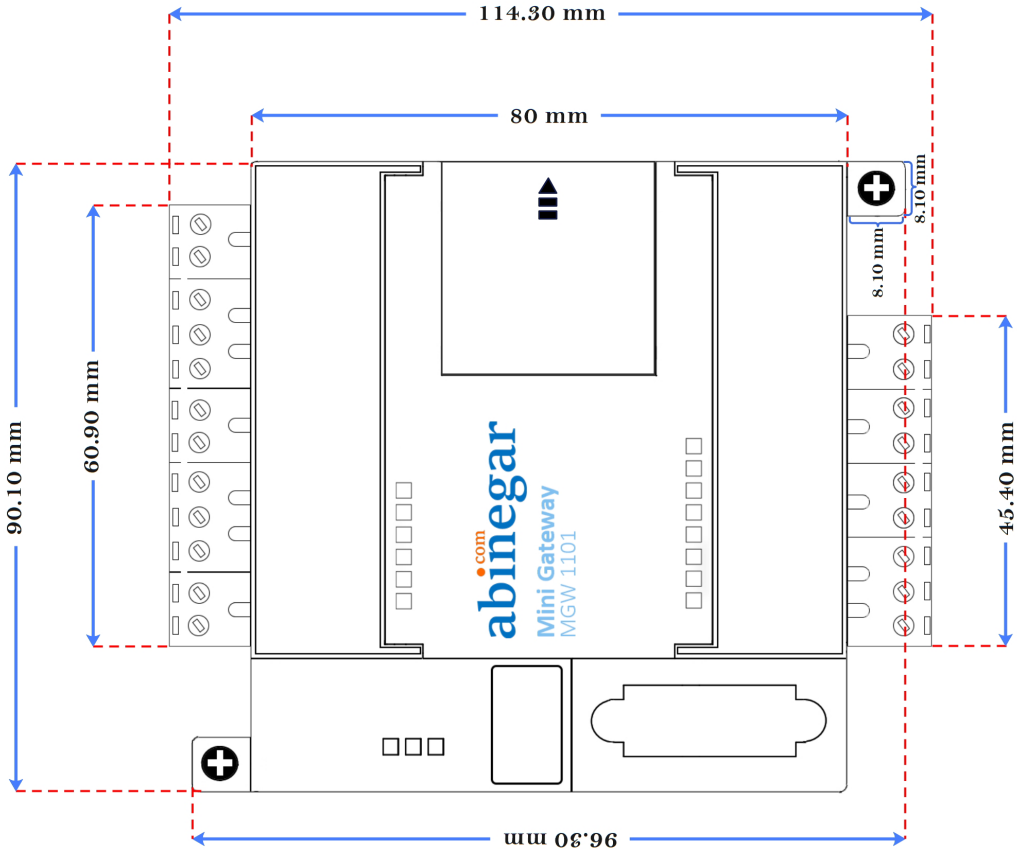
3.8 Programmable User Button

A pushbutton is accessible on the front panel of the mini Gateway. The functionality of this button can be configured via software.

4 Mechanical Information

4.1 Product Dimensions





5 Revision History

Date	Revision	Changes
--/--/2023	1	First Release