Dual CAN-Bus Interface Documentation

Introduction

The CANipulator is a CAN-Bus interface that allows the bridging, translation, baud-matching, or manipulation of traffic on two CAN networks between nodes. The integrated CAN transceivers support throughput of up to 1Mb/s. Termination resistors are selectable through jumpers, and CAN connections are exposed on Molex DuraClik connectors. This setup allows for bridging two distinct CAN networks or devices, enabling tasks such as linking isolated networks, translating messages between devices and networks, integrating devices into incompatible networks, or adjusting baud rates for compatibility. Robust automotive-grade voltage regulation ensures protection against transients and reverse-polarity.

At the core of the CANipulator is an Espressif ESP32-C6-WROOM-1U module, featuring a 32-bit RISC-V processor running at up to 160MHz, along with a secondary low-power core operating at up to 20MHz. The module includes 512kB of static RAM (SRAM), 320kB of on-chip flash memory, and an additional 4MB of off-chip flash memory integrated into the module. It also supports single-band 2.4GHz Wi-Fi 6, Bluetooth 5 Low Energy (BLE), and IEEE 802.15.4 wireless communication.

Electrical Characteristics

Input Voltage: 5V to 36V (40V absolute max)

Typical Input Voltage: 10V to 15V

I/O Pin Voltage: 3.3V max

Operating current: ≈100mA (standard mode)

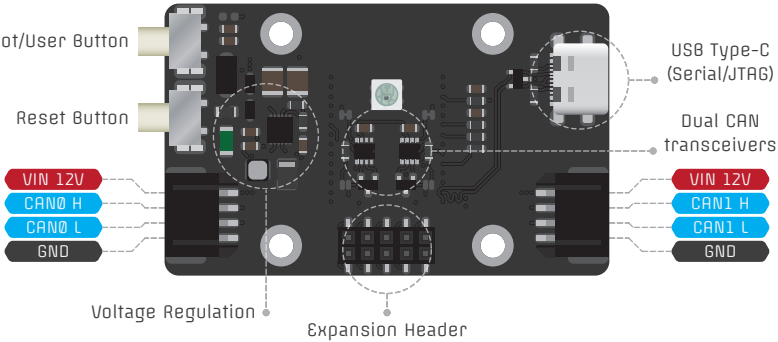
Operating temperature: -40°C to +85°C

Maximum CAN transceiver speed: 1 Mbps

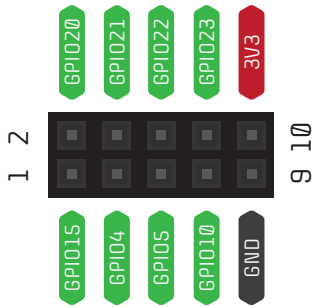
Notes:

1) Left/right VIN rails are connected
2) Both 120Ω CAN termination resistors are disconnected by default
3) CAN0/CAN1 Connector part numbers:
Molex DuraClik pigtail 218323-1041; or
Molex DuraClik female housing 560123-0400
Molex DuraClik housing retainer 560125-0400
Molex DuraClik crimp terminal 560124-0101
4) Enclosure: Hammond Mfg. 1593KBK

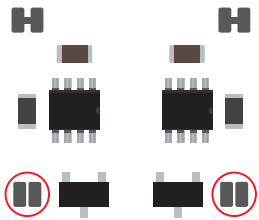
Overview



Expansion Header Pinout



Termination Resistor Jumpers

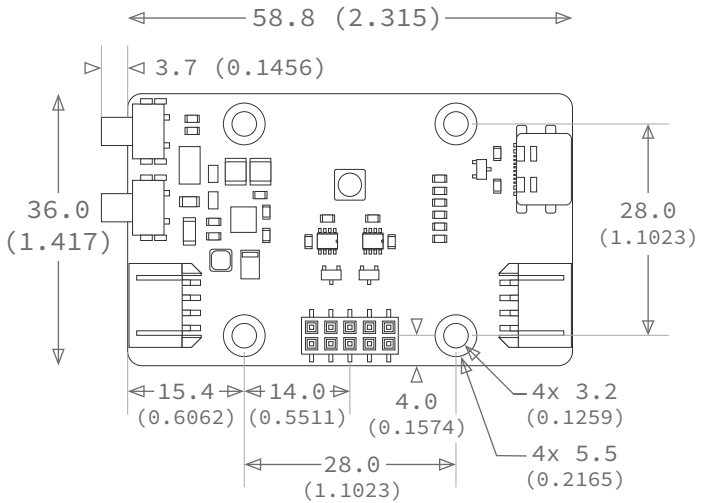


Solder jumper(s) for termination

I/O Usage & Functions

GPIO0	CAN0 RS - Pull high for standby, low for high-speed mode
GPIO1	CAN1 RS - Pull high for standby, low for high-speed mode
GPIO2	CAN1 Shutdown - Pull high for shutdown
GPIO3	CAN0 Shutdown - Pull high for shutdown
GPIO4	Unused - Connected to expansion header pin 3
GPIO5	Unused - Connected to expansion header pin 5
GPIO6	Unused
GPIO7	Unused
GPIO8	Addressable RGB LED data pin
GPIO9	Connected to Boot button for user button function
GPIO10	Unused - Connected to expansion header pin 7
GPIO11	Unused
GPIO12	USB D-
GPIO13	USB D+
GPIO15	Unused - Connected to expansion header pin 1
GPIO16	CAN0 RX
GPIO17	CAN0 TX
GPIO18	CAN1 RX
GPIO19	CAN1 TX
GPIO20	Unused - Connected to expansion header pin 2
GPIO21	Unused - Connected to expansion header pin 4
GPIO22	Unused - Connected to expansion header pin 6
GPIO23	Unused - Connected to expansion header pin 8

Mechanical



Dimensions: milimeters (inches)

Mounting hole pattern designed for Hammond Mfg. enclosure 1593KBK.