coolgear

1 Port Serial RS232 to CAN Bus Adapter

w/Metal Case

Model Number: *CG-1P232CAN*

Installation Guide

Coolgear, Inc.

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Revision History

Revision	Date	Comments
1.0	04/25/2024	First Release

1. Introduction

Thank you for purchasing Coolgear's 1 Port Serial RS232 to CAN Bus Adapter. A Controller Area Network (CAN) is a high-integrity asynchronous serial bus system for networking intelligent devices. It is often used in automotive and industrial systems. The CG-1P232CAN is designed to make a fast, simple way to communicate with CAN bus devices. Connected to a serial port on your computer, the CG-1P232CAN instantly adds an industrial CAN bus channel to your host system.

TheCG-1P232CANprovides a cost-effective solution for customers to enable communication with CAN bus devices. The solution designed by ARM Cortex-M0 32-bit microcontroller makes it very flexible in handling small burst of CAN frames at a high speed.

Plugging the CG-1P232CAN into the serial port, The CG-1P232CANadapter provides instant connectivity to CAN bus devices. The CG-1P232CANprovides an industrial solution for applications of CAN bus multi-drop communications over short and long distances.

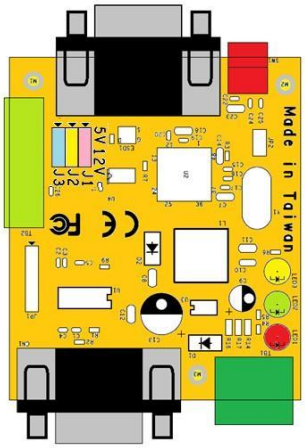
The CG-1P232CAN provides DC +5V/+12V 500mA power for external devices and is powered from an external DC 12V power supply.

Features:

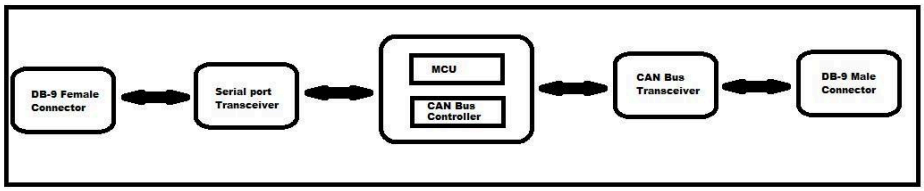
- ✔ Adds a CAN bus port on your computer by connecting to the RS-232 serial port
- ✔ One DB9 female connector (serial port)
- ✔ One DB9 male connector (CAN bus port)
- ✔ Includes one serial cable. Cable length: 100cm
- ✔ Powered by external DC 12V power adapter
- ✔ Provides DC +5V/+12V 500mA power for external devices
- ✔ LEDs indicate initialization and CAN bus status
- ✔ CAN bus speed up to 1Mbits
- ✔ Supports CAN 2.0A and CAN 2.0B protocols
- ✔ Supported CAN modes
- ✔ Standard mode: normal operation on CAN bus
- ✔ Listen mode: passive receiving of CAN frames
- ✔ Echo mode: transmitter also receives sent frames (for testing purposes)
- ✔ CG-1P232CAN can be controlled over serial port using simple ASCII commands
- ✔ Wide ambient temperature operation 0°C to 60°C (32°F to 140°F)
- ✔ CE, FCC approval
- ✔ Designed by ARM Cortex-M0 32-bit microcontroller
- ✔ Drivers provided for Windows and Linux OS
- ✔ Supports SocketCAN (slcan driver) since kernel 2.6.38+

2. DIAGRAM OF CG-1P232CAN

PCB LAYOUT

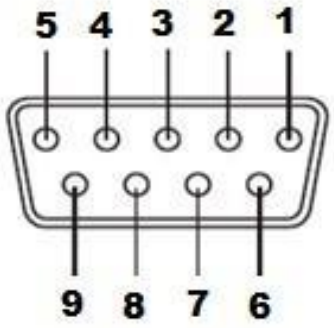


BLOCK DIAGRAM



3. PIN-OUT INFORMATION

Following are the pin-out of connector for RS-232 serial port signals:

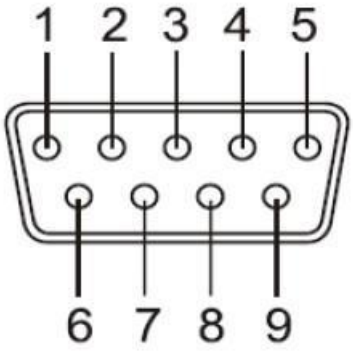


DB9 Female connector pin numbers

RS-232 Serial Port Pin-out for DB9 Female Connector

Pin Number	Signals	Description
1	DCD	Data Carrier Detect
2	RxD	Receive Serial Data
3	TxD	Transmit Serial Data
4	-	Reserved
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	-	Reserved

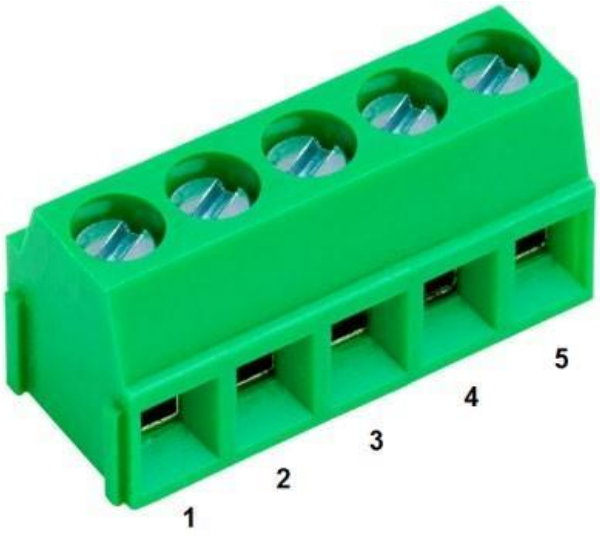
Following are the pin-out of DB-9 male connector and terminal block for CAN bus signals:



DB9 Male connector pin numbers

CAN Bus Pin-out for DB9 Male Connector

Pin Number	Signals	Description
1	CAN_V+	Provides +DC 5V or 12V power (optional)
2	CAN_L	CAN_L bus line (dominant level is low)
3	CAN_GND	Signal ground
4	-	Reserved
5	-	Reserved
6	CAN_GND	Signal ground
7	CAN_H	CAN_H bus line (dominant level is high)
8	-	Reserved
9	CAN_V+	Provides +DC 5V or 12V power (optional)



Terminal block connector pin numbers

CAN Bus Pin-out for 5-pin Terminal Block

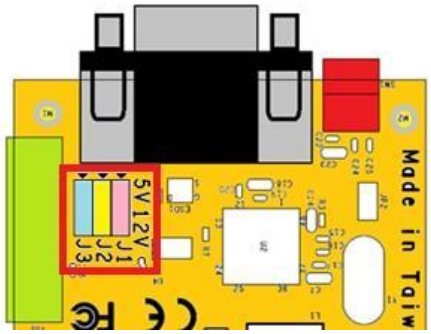
Pin Number	Signals	Description
1	CAN_GND	Signal ground
2	CAN_H	CAN_H bus line (dominant level is high)
3	CAN_L	CAN_L bus line (dominant level is low)
4	-CAN_V+	Provides +DC 5V or 12V power (optional)
5	CAN_GND	Signal ground

Enabling the DC +5V or DC +12V Power for External Devices

Outside the unit, there is a 3-pin DIP switch (SW) which are settings used for enabling 5V or 12V (500mA max.) power for external devices.

SW		FUNCTION
PIN 1	ON	Enable DB9 pin 1 to provide 5V or 12V power for external devices
	OFF	Disable the 5V or 12V power on pin 1
PIN 2	ON	Enable DB9 pin 9 to provide 5V or 12V power for external devices
	OFF	Disable the 5V or 12V power on pin 9
PIN 3	ON	Enable terminal block pin 4 to provide 5V or 12V power for external devices
	OFF	Disable the 5V or 12V power on terminal block pin 4

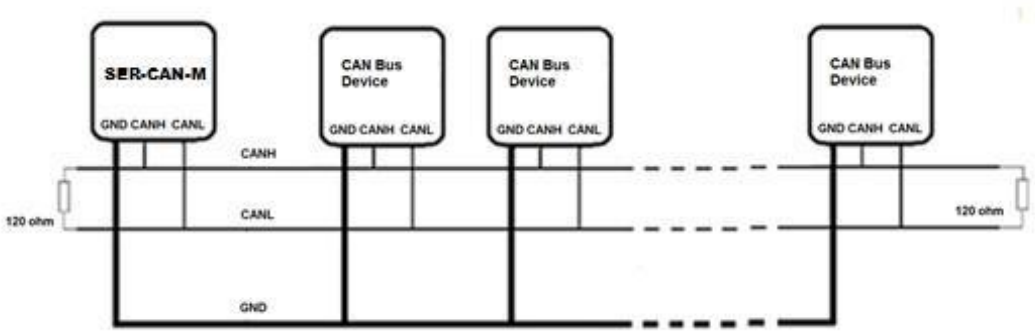
Inside the unit, there are three 3-pin header blocks (J1, J2, J3) which are jumpers for selecting 5V or 12V power for external devices.



JUMPER	FUNCTION
J1 pin 1, 2 short	Select DB9 pin 1 to provide 5V power for external devices
J1 pin 2, 3 short	Select DB9 pin 1 to provide 12V power for external devices
J2 pin 1, 2 short	Select DB9 pin 9 to provide 5V power for external devices
J2 pin 2, 3 short	Select DB9 pin 9 to provide 12V power for external devices
J3 pin 1, 2 short	Select terminal block pin 4 to provide 5V power for external devices
J3 pin 2, 3 short	Select terminal block pin 4 to provide 12V power for external devices

Termination Resistors

The serial to CAN adapter does not provide CAN bus termination resistors. A CAN bus network requires 120Ω termination resistors at each end. Generally, this must be done in the cabling. Since this depends on the installation of connections, please check your CAN bus cable specification for proper impedance matching.



4. FUNCTION DESCRIPTION

LED Indicators

The CG-1P232CANadapter has three LEDs (red LED, green LED, yellow LED) to indicate power and CAN bus statuses. The red LED indicates CG-1P232CAN adapter power; the green LED indicates CAN bus data activity and the yellow LED indicates a CAN bus error.

Following are the definition of different LED combinations:

A: Power up (device initialized)
After CG-1P232CAN powers up (device initialized), the red LED turns on and the green & yellow LEDs flash four times to indicate that the CG-1P232CANadapter has been initialized.

B: CAN bus channel open/close
When CAN bus channel opens, the green LED will turn on to indicate that the CAN bus channel is open; When CAN bus channel closes, the green LED will turn off to indicate that the CAN bus channel is closed.

C: CAN Bus Data Activity
When a CAN data frame is sent or received, the green LED flashes continuously to indicate CAN bus data I/O activity.

D: CAN Bus Error
When an error occurs on the CAN bus, the yellow LED flashes continuously to indicate CAN bus error.

ASCII Command Set

With simple ASCII commands the CG-1P232CAN adapter can be controlled over the serial port. Users can send/receive commands from any simple serial terminal program.

Example: Set bitrate to 500Kbps, open CAN channel, send CAN frame (ID = 002h, DLC = 3, Data = 11 22 33), close CAN:

Command	Response	Function
S6[CR]	[CR]	Set bitrate of CG-1P232CAN adapter to 500Kbps
O[CR]	[CR]	Open CAN channel
t0023112233[CR]	z[CR]	Send CAN message (ID = 002h, DLC = 3, Data = 11 22 33)
C[CR]	[CR]	Close CAN channel

Command List

The commands are line based and terminated with newline character CR (0xD).
On error the response will be 0x7 (BELL).

The "help" command ('**H', 'h' or '?')** will list supported commands.

Command	Response	Function
H[CR]	[CR]	List all supported commands
h[CR]	[CR]	
?[CR]	z[CR]	

Example: H[CR]

Return Code
List of Supported Commands:
'O' – Open the channel in Normal mode
'L' – Open the channel in Listen Only mode
'Y' – Open the channel in Loopback mode
'C' – Close CAN Channel
'S' – Set standard CAN bitrate
's' – Set non-standard CAN bitrate
't' – Transmit a standard frame
'T' – Transmit an extended frame
'r' – Transmit a standard remote request frame
'R' – Transmit an extended remote request frame
'Z' – Set timestamp on/off
'm' – Set acceptance mask
'M' – Set acceptance filter
'F' – Read status flag
'V' – Check software version
'N' – Check serial number

'm' – Set acceptance mask
'M' – Set acceptance filter
'RST' – Reset CG-1P232CAN Adapter
'H', 'h' or '?' – List supported commands

Opening the CAN Bus Channel

The CAN bus channel will be opened with the command O[CR], L[CR] or Y[CR]. The command O[CR] will open the CAN bus channel in normal operation mode, the command L[CR] will open the CAN bus channel in listen only mode, in which no bus interaction will be done from the controller. the command Y[CR] will open the CAN bus channel in a loop-back mode, in which the CG-1P232CANadapter will also receive the frames that it sends. Before you use one of the commands, you should set a bitrate with the commands S or s.

Command	Response	Function
O[CR]	[CR]	Open the channel in Normal mode
L[CR]	[CR]	Open the channel in Listen Only mode
Y[CR]	[CR]	Open the channel in Loopback mode

Closing the CAN Bus Channel

The CAN bus channel will be closed with the command C[CR]. The command can only be used if the CAN bus channel is open.

Command	Response	Function
C[CR]	[CR]	Close the CAN channel if it is opened

Setting CAN Bitrate (Standard)

The CAN bus bitrate can be set with the command SX[CR]. The command can only be used if the CAN bus channel is closed.

Command	Response	Function
S6[CR] S00[CR]	[CR]	Set bitrate of CG-1P232CAN adapter to 500Kbps
S0[CR]	[CR]	Open CAN channel
S1[CR] S2[CR]	[CR]	Send CAN message (ID = 002h, DLC = 3, Data = 11 22 33)

S3[CR]	[CR]	Close CAN channel
S4[CR]	[CR]	
S5[CR]	[CR]	
S6[CR]	[CR]	
S7[CR]	[CR]	
S8[CR]	[CR]	Set the CAN bus bitrate to 1M

5. Specifications

General

Serial Port	Bosch C_CAN module
Can Bus	Supports CAN 2.0A and CAN 2.0B
Chipset	ARM Cortex-M0 32-bit microcontroller

Can Bus

Number of Ports	1
Connector	DB9 male connector
CAN Bus Speed	CAN 2.0A / 2.0B 5kbps to 1Mbps for transmit & receive
Signals	CAN_H, CAN_L, CAN_GND, CAN_V+
CAN Bus Controller	Bosch C_CAN module
LED	Power, CAN bus data activity, CAN bus error
CAN Bus Mode	Standard mode: normal operation on CAN bus Listen mode: passive receiving of CAN Frames Echo mode: transmitter also receives sent frames (for testing purposes)
Protection	+/-16 KV ESD protection for CAN signals

Software Features

API Library	Supports C/C++, C#, VB.NET and LabVIEW
Utility	On-board firmware update utility
Monitoring Tools	Supported by CANHacker, Titan CAN test program

Power Requirement

Power Input	DC 12V external power adapter
Power Consumption	Max. 80mA@12VDC (no external devices)

Mechanical

Casing	SECC sheet metal (1mm)
Dimensions	81 mm x 81 mm x 24 mm (L x W x H)
Weight	175g

Environmental

Operating Temperature	0°C to 55°C (32°F to 131°F)
Storage Temperature	-20°C to 75°C (-4°F to 167°F)
Operating Humidity	5% to 95% RH
Safety Approvals	CE, FCC

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Safety

- Read the entire Installation Guide before implementing this product for your application. This guide contains important information about electrical connections that must be followed for safe and proper operation.
- Inspect the product closely for visual defects before putting it to use.
- Keep away from areas where moisture builds, this product contains electrical components that can be damaged by moisture build up, this can adversely affect your equipment connected to it.
- Do not disassemble the product. Handling the product's internal components can expose it to ESD (Electro-Static Discharge) hazards that can affect the function of the device.
- If this product is not functioning properly, email our support team at support@coolgear.com.

USB CHARGING & CONNECTIVITY EXPERTS

Within Every Great Machine

For over 20 years our rugged, off-the-shelf USB hubs, chargers, and serial products are ready to go for your next project. Based in the US, Coolgear has successfully engineered and deployed millions of connectivity solutions into industrial, medical, automotive, commercial, and aerospace industries.

We understand the importance of reliability, build quality, & consider all our customers' applications as critical, wanting to ensure long-lasting event-free integrations.

Compliance Statement

View compliance within the product's respective Technical Data Sheet, found on the product's online listing.

Technical Support

When you reach out to Coolgear support, you'll find yourself in the hands of a solution-oriented and knowledgeable expert ready to answer whatever question you throw at them. If you ever need help with your product, visit coolgear.com/support for support tickets, downloads, and other support resources. For the latest drivers, please visit coolgear.com/download.

Product Standard Warranty

One (1) Year Warranty from Date of Purchase Invoice. Coolgear will repair or replace any Product determined to be defective and which has been returned, at your risk and expense, to Coolgear. Where Coolgear determines in its sole judgment that repair or replacement of such Product is not reasonable, Coolgear will keep the non-conforming Product and refund to you the amount you paid for such Product. Returned Products shall be subject to the balance of the Warranty Period otherwise applicable. Any reconditioned parts used by Coolgear shall be subject to all the same provisions as otherwise applicable to new parts. THE FOREGOING DESCRIBES COOLGEAR'S SOLE LIABILITY, AND YOUR SOLE REMEDY, FOR ANY BREACH OF WARRANTY. IF YOU DO NOT AGREE WITH THE TERMS OF THIS LIMITED WARRANTY, YOU MUST RETURN THE PRODUCTS UNUSED AND IN THEIR ORIGINAL CONTAINERS TO YOUR ORIGIN OF PURCHASE.

Limitation of Liability

This Limited Warranty does not cover: (i) defects or damages resulting from natural causes, casualty, accident, misuse or abuse, neglect, alterations, service or repair by other than Coolgear, including without limitation by you; (ii) improper installation or de-installation, operation or maintenance, improper connections with peripherals or other causes not arising out of defects in the materials or workmanship of Products; (iii) any Product for which the warranty sticker has been removed, modified or defaced; (iv) normal wear and tear; (v) damage to or loss of repaired or replaced Products during shipping by Coolgear except when such damage or loss is caused by poor or inadequate packaging by Coolgear; or (vi) Products purchased outside the United States. UNDER NO CIRCUMSTANCES WILL COOLGEAR BE LIABLE FOR ANY LOSS OF USE, INTERRUPTION OF BUSINESS OR ANY INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE OR CONSEQUENTIAL DAMAGES OF ANY KIND (INCLUDING LOST PROFITS) REGARDLESS OF THE FORM OF ACTION WHETHER IN CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT PRODUCT LIABILITY OR OTHERWISE, EVEN IF COOLGEAR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN NO EVENT SHALL THE TOTAL LIABILITY OF COOLGEAR HEREUNDER EXCEED THE GREATER OF $50.00 OR THE AMOUNT YOU ACTUALLY PAID FOR THE PRODUCT GIVING RISE TO SUCH LIABILITY, REGARDLESS OF THE CAUSE OF ACTION, IN CONTRACT, TORT, STRICT LIABILITY OR OTHERWISE. NOT ALL JURISDICTIONS ALLOW SUCH LIMITATIONS OF DAMAGES SO THE FOREGOING LIMITATIONS MAY NOT APPLY TO YOU.