
DAM-C3220 CAN Repeater User's Manual



Beijing ART Technology Development Co., Ltd.

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Chapter 1 Overview

DAM-C3220 is a CAN bus data repeater device, compatible with CAN bus standard, can extend the distance communication of the CAN bus network, and increase the equipment number of CAN bus network.

DAM-C3220 supports CAN2.0A and CAN2.0B protocol, compatible with ISO 11898-2 protocol, there are two CAN interfaces, two optical isolators and two termination resistors, each CAN interface can drive 100 nodes, the communication speed up to 800Kbps, use differential signal transmission, with long-distance anti-jamming communication capability, can realize data communication in long-distance and harsh environment.

DAM-C3220 built-in optical isolator, provide 2500Vrms isolation voltage, achieve the device and power to isolate, can effectively prevent the lightning and interference.

Module Features

- Voltage Input Range: +10V~+30V
- Supports CAN2.0A and CAN2.0B protocol
- Compatible with ISO 11898-2 protocol
- Network Topology: tree, star
- Communication Rate: up to 800Kbps
- Signal Delay: 200ns
- Drive Capacity: 100 nodes (each CAN interface)
- Opto-isolation: 2500Vrms
- Power Consumption: 2W (max)
- Integrated terminal impedance 120R (can be removed by jumper)
- Operating Environment: -25 °C to 75 °C, relative humidity 5% to 95%
- Dimension: 122 mm x 72 mm x 35 mm

Chapter 2 Hardware Description

2.1 Hardware Layout



2.2 Main Components Function

2.2.1 CAN Communication Interface

10-pin cable definition

| Pin | Name | Function |
|-----|--------|--|
| 1 | CANH1 | The first channel CANH signal line. |
| 3 | CANL1 | The first channel CANL signal line. |
| 5 | GND1 | The first channel CAN signal reference ground. |
| 7 | EARTH1 | Protected. |
| 9 | V+ | The positive of power input. |
| 10 | V- | The negative of power input. |
| 14 | EARTH2 | Protected. |
| 16 | GND2 | The first second CAN signal reference ground. |
| 18 | CANH2 | The second channel CANH signal line. |

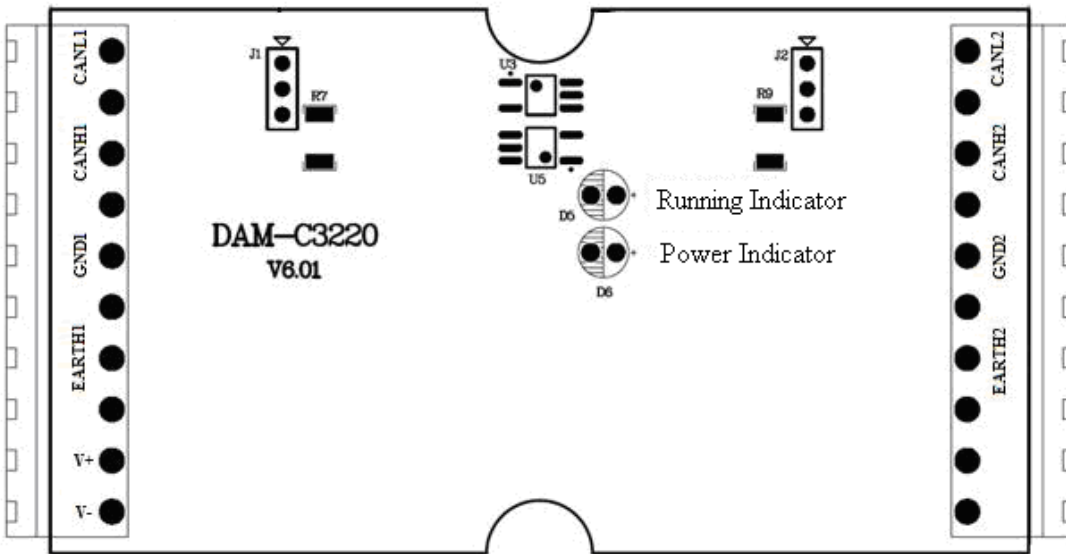
| | | |
|----|-------|--------------------------------------|
| 20 | CANL2 | The second channel CANL signal line. |
|----|-------|--------------------------------------|

2.2.2 Indicator

RUN: running lights. Flashing for data transfer, and the flash frequency changes with the speed of data transfer rate.
 POWER: Power Indicator. On for normal.

2.2.3 Termination resistor

DAM-C3220 has two internal jumpers JP1 and JP2, used to select the termination resistor of 1-ch and 2-ch CAN signals.

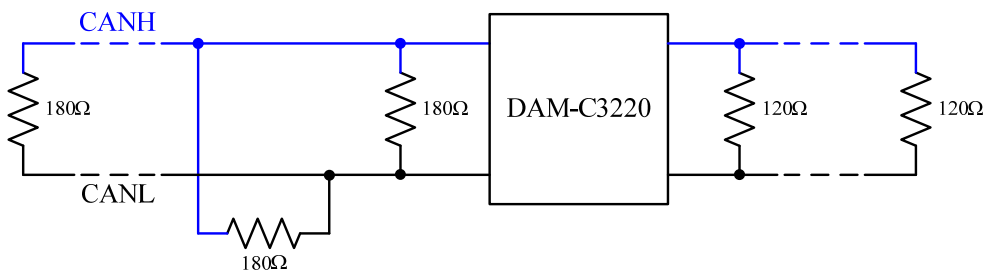


When the jumper pins 2-3 shorted, it will automatically access the 120Ohm (internal) termination resistor, when 1-2 pins are shorted, do not access the termination resistor.

| Termination Resistor | JP1 | JP2 |
|-------------------------|-----|-----|
| 120Ohm (internal) | | |
| No termination resistor | | |

Note: To change the status of the jumper JP1/JP2, we should open the case.

Users can also use external termination resistor. The termination resistor between CANH and CANL signals equivalent to 60ohm, if not select the internal termination resistor, the external resistor application is shown as the following.

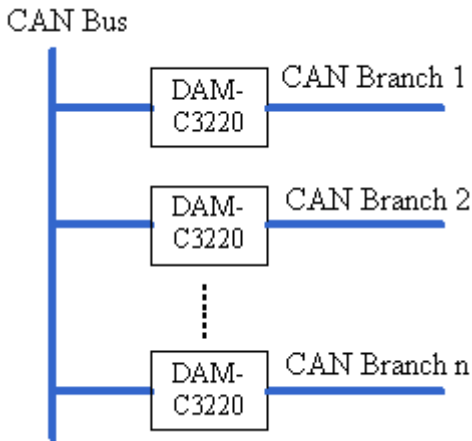


2.3 CAN Bus Connection Device

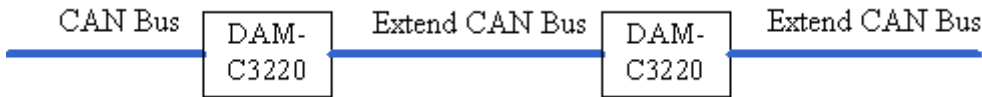
DAM-C3220 receives data from CAN1 and sends the data from the CAN2, or receives the data from the CAN2 and send the data from the CAN1.

Industrial topology connection is as follows:

2.3.1 Branch Connection



2.3.2 Extension Connection



2.4 Transmission Cable

CAN bus using two differential signal lines for transmission, transmission media can use shielded twisted pair (STP), unshielded twisted pair (UTP) or ribbon cable.

The DC parameters of the CAN bus:

| Cross-sectional area (mm ²) | Resistance (ohms/Km) |
|---|----------------------|
| ~0.25 (AWG23) | < 90 |
| ~0.5 (AWG20) | < 50 |
| ~0.8 (AWG18) | < 33 |
| ~1.3 (AWG16) | < 20 |

The AC parameters of the CAN bus: 120 ohms impedance, 5ns/m delay.

2.5 Drive Capability and Baud Rate

The relationship between bus distance and the baud rate as follows:

| Baud Rate (bit/s) | Not use DAM-C3220, The ideal bus length (m) | The largest number of the DAM-C3220 |
|----------------------|--|--|
| 800K | 50 | 1 |
| 500K | 100 | 2 |
| 250K | 250 | 6 |
| 125K | 500 | 12 |
| 50K | 1000 | 25 |
| 20K | 2500 | 62 |
| 10K | 5000 | 125 |

Note: the ideal bus distance will reduce the 40m if we add one DAM-C3220 CAN repeater, it will reduce the 80m if we add two DAM-C3220 CAN repeaters, and so on. For example, if we select 250K baud rate, use 2 DAM-C3220, then the ideal distance bus is $250 - 40 \times 2 = 170\text{m}$.

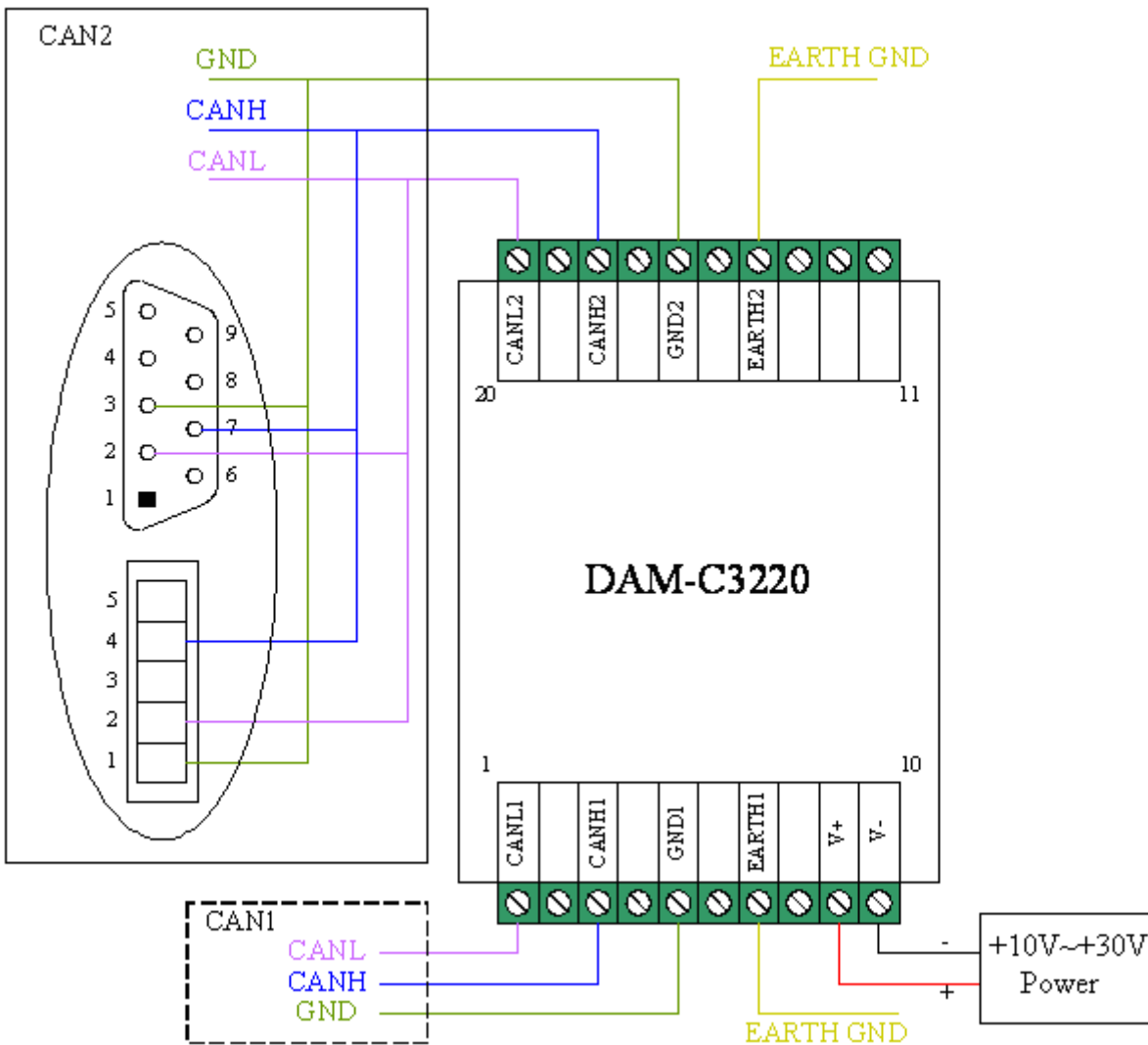
Determine the number of DAM-C3220, calculate the corresponding distance of the CAN bus, according to the table, we can know when use different transmission line, the maximum number of nodes and the maximum length.

| Cross-sectional area (mm ²) | The nodes corresponding to the max length (m) | | | |
|--|---|----------|----------|-----------|
| | 16 nodes | 32 nodes | 64 nodes | 100 nodes |
| ~0.25 (AWG23) | <220 m | <200 m | <170 m | <150 m |
| ~0.5 (AWG20) | <390 m | <360 m | <310 m | <270 m |
| ~0.8 (AWG18) | <590 m | <550 m | <470 m | <410 m |
| ~1.3 (AWG16) | <980 m | <900 m | <780 m | <670 m |

Chapter 3 Hardware Description

3.1 Application Connection

DAM-C3220 can be connected to two CAN Bus, 2 CAN interfaces are connected to 2 CAN networks, as shown below, CAN2 interface connects with DB9 and DeviceNET or CANopen of the 5-pin socket.



3.2 Hardware Installation

DAM-C3220 can be installed in standard DIN rail inside the cabinet, it also can be installed by stacking mode.

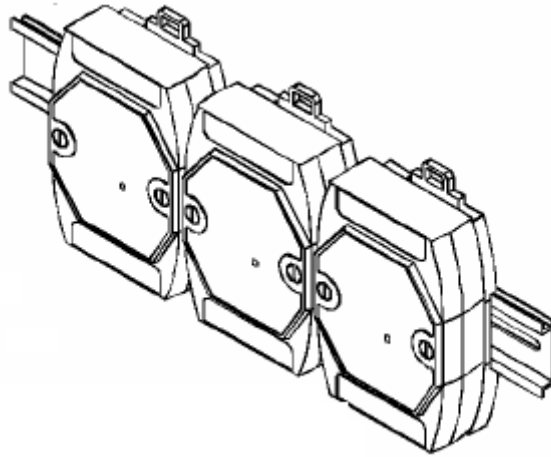


Fig.1 standard DIN installation

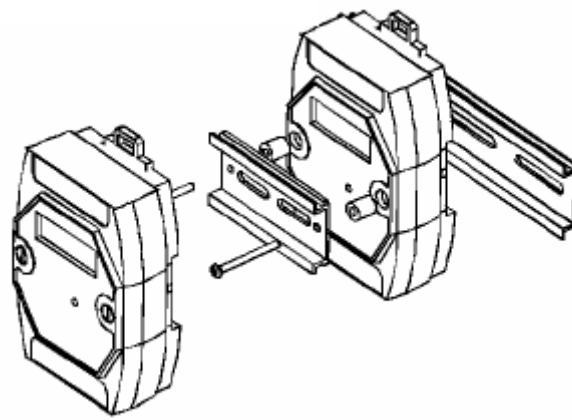


Fig.2 stack installation

Chapter 4 Notes and Warranty Policy

4.1 Notes

In our products' packing, user can find a user manual, a DAM-C3220 module and a quality guarantee card. Users must keep quality guarantee card carefully, if the products have some problems and need repairing, please send products together with quality guarantee card to ART, we will provide good after-sale service and solve the problem as quickly as we can.

When using DAM-C3220, in order to prevent the IC (chip) from electrostatic harm, please do not touch IC (chip) in the front panel of DAM-C3220 module.

4.2Warranty Policy

Thank you for choosing ART. To understand your rights and enjoy all the after-sales services we offer, please read the following carefully.

1. Before using ART's products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: www.art-control.com.
2. All ART products come with a limited two-year warranty:
 - The warranty period starts on the day the product is shipped from ART's factory
 - For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ART is not responsible for any loss of data.
 - Please ensure the use of properly licensed software with our systems. ART does not condone the use of pirated software and will not service systems using such software. ART will not be held legally responsible for products shipped with unlicensed software installed by the user.
3. Our repair service is not covered by ART's guarantee in the following situations:
 - Damage caused by not following instructions in the User's Manual.
 - Damage caused by carelessness on the user's part during product transportation.
 - Damage caused by unsuitable storage environments (i.e. high temperatures, high humidity, or volatile chemicals).
 - Damage from improper repair by unauthorized ART technicians.
 - Products with altered and/or damaged serial numbers are not entitled to our service.
4. Customers are responsible for shipping costs to transport damaged products to our company or sales office.
5. To ensure the speed and quality of product repair, please download an RMA application form from our company website.