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Marlin Technologies Configurable CANbus Bridge

Overview
The 505650 is a 2 channel Isolated CANbus bridge for connecting CANbus networks. Each channel has two pins for CANH and CANL allowing for termination to be added externally without splicing. It is fully encapsulated in urethane and is IP67 rated. While connected to CAN channel 1 with Marlin's CAN USB Programmer, the user can configure settings on channel 1 and channel 2 via xml 14066S_. See 14067U_ for a detailed user guide.

Connections

J1-1	Power
J1-2	Do Not Connect
J1-3	Channel 1 CANH
J1-4	Channel 1 CANH
J1-5	Channel 1 CANL
J1-6	Channel 1 CANL
J1-7	Channel 2 CANL
J1-8	Channel 2 CANL
J1-9	Channel 2 CANH
J1-10	Channel 2 CANH
J1-11	Channel 2 CAN Shield
J1-12	Ground

Operating Voltage: 9-36VDC

Operating Temperature: -40ºC to 85ºC

Mechanical: Ref MTI Drawing 013743O_

Ingress Protection Rating: IP67

Channel 1 Baud Rate: 250Kbit/s, 500Kbit/s, 1Mbit/s (configurable)

Channel 2 Baud Rate: 250Kbit/s, 500Kbit/s, 1Mbit/s (configurable)

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Filtering

To allow bus load management, each channel can be configured to pass or block messages based upon the entire CAN ID, J1939 PGN or J1939 Source Address. Up to 40 filters can be applied to each channel.

Filter Types:

Each channel has a filter type that will determine whether a message received on one channel is bridged to the other channel.

1. ***None*****:** Filtering is disabled. All messages received on this channel are bridged to the other channel.

2. ***Block ID*****:** The entire CAN ID of the received message is compared to all 40 filter parameters for the channel. If a match is found, the message is discarded. If no match found, the message is bridged to the other channel.

3. ***Block J1939 PGN*****:** The J1939 PGN of the received message is compared to all 40 filter parameters for the channel. If a match is found, the message is discarded. If no match found, the message is bridged to the other channel. **This filter does not affect standard messaging. All standard messages will be passed.**

4. ***Block J1939 Source Address*****:** The J1939 Source Address of the received message is compared to all 40 filter parameters for the channel. If a match is found, the message is discarded. If no match found, the message is bridged to the other channel. **This filter does not affect standard messaging. All standard messages will be passed.**

5. ***Pass ID*****:** The entire CAN ID of the received message is compared to all 40 filter parameters for the channel. If a match is found, the message is bridged to the other channel. If no match found, the message is discarded.

6. ***Pass J1939 PGN*****:** The J1939 PGN of the received message is compared to all 40 filter parameters for the channel. If a match is found, the message is bridged to the other channel. If no match found, the message is discarded. **This filter does not affect standard messaging. All standard messages will be blocked.**

7. ***Pass J1939 Source Address*****:** The J1939 Source Address of the received message is compared to all 40 filter parameters for the channel. If a match is found, the message is bridged to the other channel. If no match found, the message is discarded. **This filter does not affect standard messaging. All standard messages will be blocked.**

EEPROM Memory Locations For Filter Parameters

CAN 1 Filter Type: 0x10 - 0 = No Filtering - 1 = Block ID - 2 = Block J1939 PGN - 3 = Block J1939 Source Address - 4 = Pass ID - 5 = Pass J1939 PGN - 6 = Pass J1939 Source Address All other = No filter	CAN 2 Filter Type: 0x200 - 0 = No Filtering - 1 = Block ID - 2 = Block J1939 PGN - 3 = Block J1939 Source Address - 4 = Pass ID - 5 = Pass J1939 PGN - 6 = Pass J1939 Source Address All other = No filter
CAN 1 Baud Rate: 0x11 - 1 = 1 Mb/sec - 3 = 500Kb/sec - 7 = 250 Kb/sec - *Any other value will result in no change	CAN 2 Baud Rate: 0x201 - 0 = 1 Mb/sec - 1 = 500Kb/sec - 3 = 250 Kb/sec - *Any other value will result in no change
CAN 1, Filter 01: 0x12 – 0x15 CAN 1, Filter 02: 0x16 – 0x19 CAN 1, Filter 03: 0x1A – 0x1D CAN 1, Filter 04: 0x1E – 0x21 CAN 1, Filter 05: 0x22 – 0x25 CAN 1, Filter 06: 0x26 – 0x29 CAN 1, Filter 07: 0x2A – 0x2D CAN 1, Filter 08: 0x2E – 0x31 CAN 1, Filter 09: 0x32 – 0x35 CAN 1, Filter 10: 0x36 – 0x39 CAN 1, Filter 11: 0x3A – 0x3D CAN 1, Filter 12: 0x3E – 0x41 CAN 1, Filter 13: 0x42 – 0x45 CAN 1, Filter 14: 0x46 – 0x49 CAN 1, Filter 15: 0x4A – 0x4D CAN 1, Filter 16: 0x4E – 0x51 CAN 1, Filter 17: 0x52 – 0x55 CAN 1, Filter 18: 0x56 – 0x59 CAN 1, Filter 19: 0x5A – 0x5D CAN 1, Filter 20: 0x5E – 0x61 CAN 1, Filter 21: 0x62 – 0x65 CAN 1, Filter 22: 0x66 – 0x69 CAN 1, Filter 23: 0x6A – 0x6D CAN 1, Filter 24: 0x6E – 0x71 CAN 1, Filter 25: 0x72 – 0x75 CAN 1, Filter 26: 0x76 – 0x79 CAN 1, Filter 27: 0x7A – 0x7D CAN 1, Filter 28: 0x7E – 0x81 CAN 1, Filter 29: 0x82 – 0x85 CAN 1, Filter 30: 0x86 – 0x89 CAN 1, Filter 31: 0x8A – 0x8D CAN 1, Filter 32: 0x8E – 0x91 CAN 1, Filter 33: 0x92 – 0x95 CAN 1, Filter 34: 0x96 – 0x99 CAN 1, Filter 35: 0x9A – 0x9D CAN 1, Filter 36: 0x9E – 0xA1 CAN 1, Filter 37: 0xA2 – 0xA5 CAN 1, Filter 38: 0xA6 – 0xA9 CAN 1, Filter 39: 0xAA – 0xAD CAN 1, Filter 40: 0xAE – 0xB1	CAN 2, Filter 01: 0x202 – 0x205 CAN 2, Filter 02: 0x206 – 0x209 CAN 2, Filter 03: 0x20A – 0x20D CAN 2, Filter 04: 0x20E – 0x211 CAN 2, Filter 05: 0x212 – 0x215 CAN 2, Filter 06: 0x216 – 0x219 CAN 2, Filter 07: 0x21A – 0x21D CAN 2, Filter 08: 0x21E – 0x221 CAN 2, Filter 09: 0x222 – 0x225 CAN 2, Filter 10: 0x226 – 0x229 CAN 2, Filter 11: 0x22A – 0x22D CAN 2, Filter 12: 0x22E – 0x231 CAN 2, Filter 13: 0x232 – 0x235 CAN 2, Filter 14: 0x236 – 0x239 CAN 2, Filter 15: 0x23A – 0x23D CAN 2, Filter 16: 0x23E – 0x241 CAN 2, Filter 17: 0x242 – 0x245 CAN 2, Filter 18: 0x246 – 0x249 CAN 2, Filter 19: 0x24A – 0x24D CAN 2, Filter 20: 0x24E – 0x251 CAN 2, Filter 21: 0x252 – 0x255 CAN 2, Filter 22: 0x256 – 0x259 CAN 2, Filter 23: 0x25A – 0x25D CAN 2, Filter 24: 0x25E – 0x261 CAN 2, Filter 25: 0x262 – 0x265 CAN 2, Filter 26: 0x266 – 0x269 CAN 2, Filter 27: 0x26A – 0x26D CAN 2, Filter 28: 0x26E – 0x271 CAN 2, Filter 29: 0x272 – 0x275 CAN 2, Filter 30: 0x276 – 0x279 CAN 2, Filter 31: 0x27A – 0x27D CAN 2, Filter 32: 0x27E – 0x281 CAN 2, Filter 33: 0x282 – 0x285 CAN 2, Filter 34: 0x286 – 0x289 CAN 2, Filter 35: 0x28A – 0x28D CAN 2, Filter 36: 0x28E – 0x291 CAN 2, Filter 37: 0x292 – 0x295 CAN 2, Filter 38: 0x296 – 0x299 CAN 2, Filter 39: 0x29A – 0x29D CAN 2, Filter 40: 0x29E – 0x2A1

J1939 Source Address and NAME Field (Ref SAE J1939-81)

Default Source Address = 0x99
Self-Configurable from 0x99 to 0xA4
J1939 NAME Manufacturer Code = 0xA9 (Marlin Technologies, Inc.)
J1939 NAME Identity Number = 505650

Filter Operation

Each filter is comprised of 32 bits stored in the microcontroller's EEPROM memory in Big Endian or Motorola format. The example below shows the bit arrangement for CAN1 Filter 01.

EEPROM Address 0x12
Bit 8: Standard CAN Frame Select bit*
Bit 7: Unused
Bit 6: Unused
Bit 5: CAN ID Bit 29**
Bit 4: CAN ID Bit 28**
Bit 3: CAN ID Bit 27**
Bit 2: CAN ID Bit 26**
Bit 1: CAN ID Bit 25**

EEPROM Address 0x13
Bit 8: CAN ID Bit 24**
Bit 7: CAN ID Bit 23**
Bit 6: CAN ID Bit 22**
Bit 5: CAN ID Bit 21**
Bit 4: CAN ID Bit 20**
Bit 3: CAN ID Bit 19**
Bit 2: CAN ID Bit 18**
Bit 1: CAN ID Bit 17**

EEPROM Address 0x14
Bit 8: CAN ID Bit 16**
Bit 7: CAN ID Bit 15**
Bit 6: CAN ID Bit 14**
Bit 5: CAN ID Bit 13**
Bit 4: CAN ID Bit 12**
Bit 3: CAN ID Bit 11
Bit 2: CAN ID Bit 10
Bit 1: CAN ID Bit 9

EEPROM Address 0x15
Bit 8: CAN ID Bit 8
Bit 7: CAN ID Bit 7
Bit 6: CAN ID Bit 6
Bit 5: CAN ID Bit 5
Bit 4: CAN ID Bit 4
Bit 3: CAN ID Bit 3
Bit 2: CAN ID Bit 2
Bit 1: CAN ID Bit 1

* Set to 1 for Standard CAN Message, 0 for Extended ID Message
** Set to 0 if Standard CAN Frame Select bit = 1

CAN Bridge Beacon

In an application using multiple CAN bridges, the diagnostic LEDs can be commanded remotely by the Marlin CAN USB Programmer to determine which CAN bridge is being configured. PGN 65451 is used for this purpose. When a CAN Bridge receives 65451 with Byte 3 = 0x00(EEPROM Read Command), the CAN LEDs will both turn to solid amber and remain this way until 65451 with Byte 3 = 0x01(EEPROM Write Command) is received. Alternatively, if an EEPROM Write is undesirable, power to the CAN Bridge can manually be cycled. At this point, control of the LEDs will be given back to the CAN Bridge module.

PGN 65451 Marlin EEPROM Read/Write

Used to remotely command diagnostic LEDs
Source Address: N/A
Transmission Repetition Rate: N/A
Data Length: 8 Bytes
Extended Data Page: 0
Data Page: 0
PDU Format: 255
PDU Specific: 171
Default Priority: 6
Parameter Group Number: 65451 (0xFFAB)

Start Position	Length	Parameter Name
1.1-8	8 bits	EEPROM Address
2.1-8	8 bits	Don't Care
3.1-8	8 bits	0x00(EEPROM Read Command)
4.1-8	8 bits	Don't Care
5.1-8	8 bits	CAN Bridge HWID Low
6.1-8	8 bits	CAN Bridge HWID High
7.1-8	8 bits	Source Address of CAN Bridge being commanded
8.1-8	8 bits	Don't Care