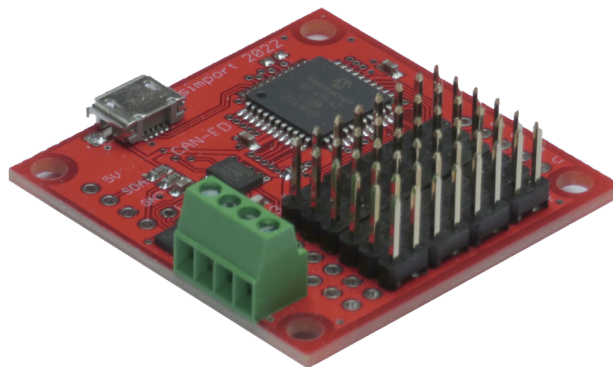




CAN in Simulation Keyboard Module



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Keyboard Module

The Keyboard module is equipped with 24 digital inputs designed to accommodate various types of switches, particularly pushbuttons. When these switches are closed, they establish a connection to ground. Consequently, a ,key down‘ message is generated. Conversely, when the switch subsequently opens, a ,key up‘ message is generated, indicating the release of the key. While the ,key down‘ message transmits a predefined keycode for every input along with a modifier byte, the ,key up‘ message contains a keycode value of zero.

CAN ID	node ID	data type	service code	message code	data byte 0	data byte 1	data byte 2	data byte 3
720h	node	0Bh	item	num	mod	key	0	0

Keyboard Module Message

The keycodes employed in data byte 1 (*key*) are in accordance with the HID Usage Table 0x07 designated for USB Keyboards and Keypads, as defined and published by the USB Implementer’s Forum ([Link](#)). For a comprehensive keycode table, please refer to the appendix or download it from the following location ([Link](#)).

The modifier byte (*mod*) operates on a bitwise level and indicates which modifier key(s) (*Ctrl*, *Shift*, *Alt*, *Gui*) are being pressed simultaneously with the key.

It’s structure is as follows:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
left Ctrl	left Shift	left Alt	left GUI	right Ctrl	right hift	right Alt	right GUI

Modifier Bit Assignment

Here are the *parameters* associated with the encoder module:

Offset	The keyboard module is capable of handling up to 24 keys, each of which is assigned a unique ID (<i>item</i> in the <i>service code</i> byte). Starting with the <i>offset</i> value, the 24 keys are given consecutive ID values, which will be included in the CAN message sent by the board. Since the ID values are 1 byte wide, up to 256 different keys can be distinguished under a given Node-ID.
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Keystroke	The keyboard module transmits <i>keystroke</i> values along with a keycode (representing the specific key pressed) and a modifier that signifies a combination involving the Shift, Ctrl, Alt, and GUI key(s). Each input has its own associated keystroke, which can be configured individually.
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Parameter Setting

To modify the parameters of a module, the *Module Configuration Service* (MCS) is utilized. The MCS is assigned a unique CAN-ID of *7D0h* (equivalent to decimal value *2000*):

CAN ID	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
7D0h	node	12h	0Dh	pid	pdat1	pdat2	0	0

node-ID: node ID (node)
data type: UCHAR (10) for pid=1 or UCHAR2 (18) for pid=5
service code: MCS (0D)
message code: parameter ID (pid = 1 or 5)
message data: Byte 4: offset / modifier (pdat1)
Byte 5: keycode (pdat2)

The parameter ID is used to identify which specific parameter needs to be modified, and Byte 4 and Byte 5 contain the value(s) of the parameter(s) to be changed.

<i>pid</i>	<i>parameter</i>	<i>value (range)</i>
1	offset	1 ... 255
5	keystroke	modifier/keycode pair

Parameter ID Values

Upon completion of the parameter modification request, the response message will have a message code of 0 (zero) if the operation was successful. However, if the requested parameter is out of the valid range or the parameter ID is invalid, the response message will contain a message code of -6.

CAN-ID Setting

The CAN-ID range for keyboard module messages is *720h* .. *727h* (decimal *1824* .. *1831*).

To change the CAN-ID of the keyboard module, the *CAN Identifier Setting Service* (CSS) can be used. The message code (parameter ID) should be set to 0.

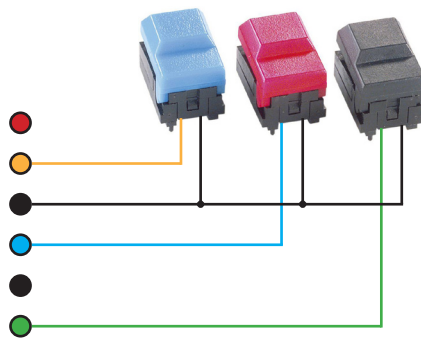
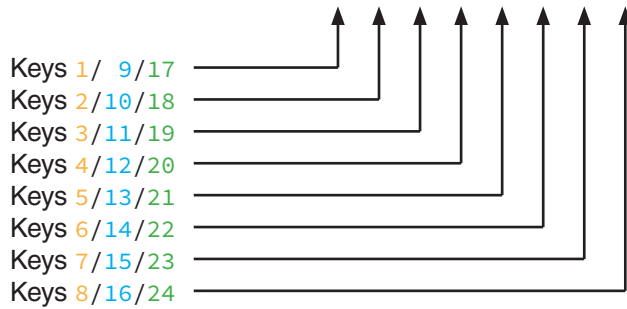
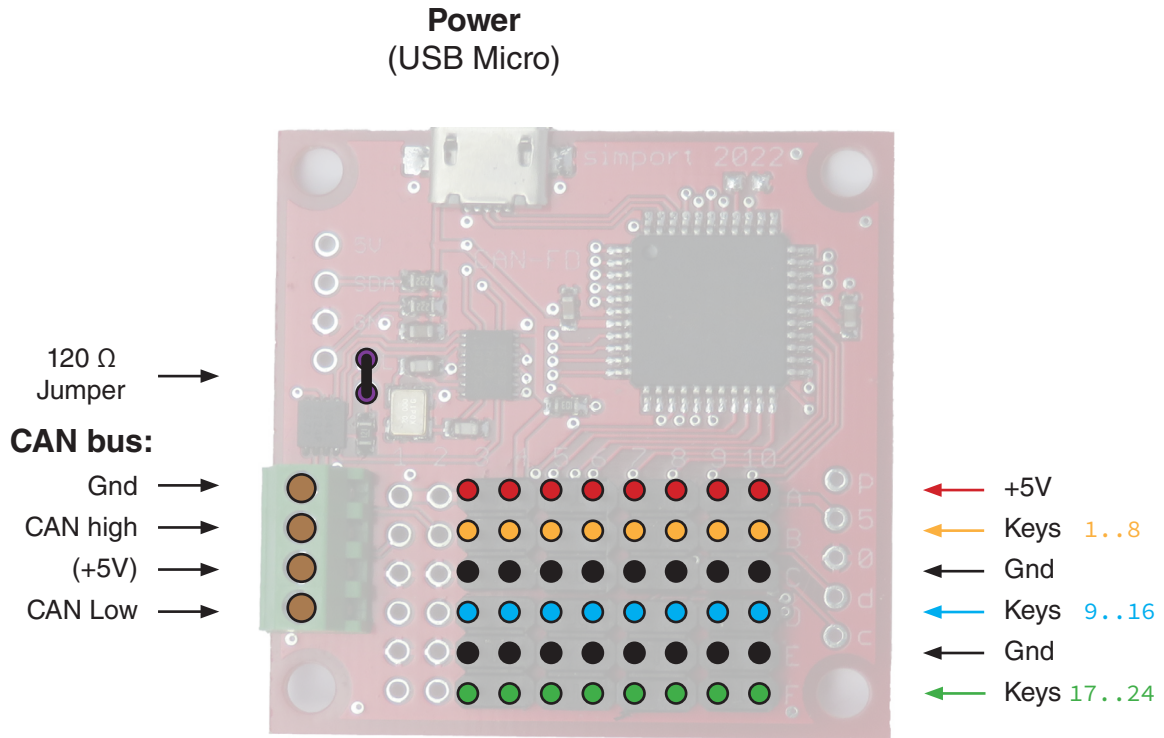
Node-ID Setting

To change the Node-ID of the keyboard module, the *Node ID Setting Service* (NIS) can be used. Node-ID values are in the range of 1 to 255.

Module Information Service

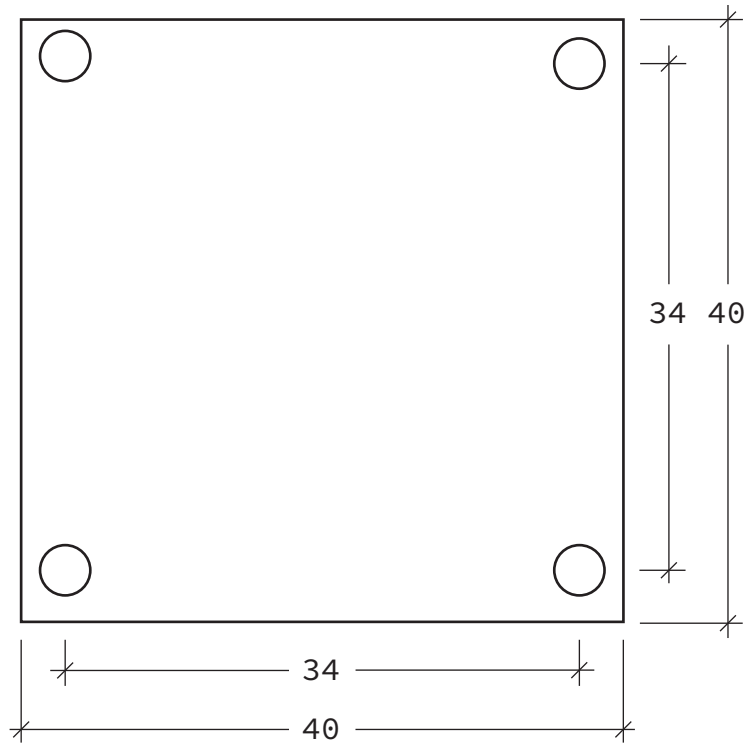
The CAN bus messages are designed to be triggered only when there is a change in the state of any key pressed or released. The *Module Information Service* (MIS) allows for the simultaneous interrogation of all keys at once. As a result, a total of 24 messages are generated, providing an up-to-date reflection of the current presets of all key inputs on the board.

Board Layout



Example Wiring

Board Dimensions



Appendix

Keycode Tables

<i>code</i>	<i>name</i>
0	Reserved
1	Keyboard Error Roll Over
2	Keyboard POST Fail
3	Keyboard Error Undefined
4	Keyboard a and A
5	Keyboard b and B
6	Keyboard c and C
7	Keyboard d and D
8	Keyboard e and E
9	Keyboard f and F
0A	Keyboard g and G
0B	Keyboard h and H
0C	Keyboard i and I
0D	Keyboard j and J
0E	Keyboard k and K
0F	Keyboard l and L
10	Keyboard m and M
11	Keyboard n and N
12	Keyboard o and O
13	Keyboard p and P
14	Keyboard q and Q
15	Keyboard r and R
16	Keyboard s and S
17	Keyboard t and T
18	Keyboard u and U
19	Keyboard v and V
1A	Keyboard w and W
1B	Keyboard x and X
1C	Keyboard y and Y
1D	Keyboard z and Z
1E	Keyboard 1 and !
1F	Keyboard 2 and @

<i>code</i>	<i>name</i>
20	Keyboard 3 and #
21	Keyboard 4 and \$
22	Keyboard 5 and %
23	Keyboard 6 and ^
24	Keyboard 7 and &
25	Keyboard 8 and *
26	Keyboard 9 and (
27	Keyboard 0 and)
28	Keyboard Return (ENTER)
29	Keyboard ESCAPE
2A	Keyboard DELETE (Backspace)
2B	Keyboard Tab
2C	Keyboard Spacebar
2D	Keyboard - and (underscore)
2E	Keyboard = and +
2F	Keyboard [and {
30	Keyboard] and }
31	Keyboard \and
32	Keyboard Non-US # and ~
33	Keyboard ; and :
34	Keyboard ' and “
35	Keyboard ^ and ~
36	Keyboard , and <
37	Keyboard . and >
38	Keyboard / and ?
39	Keyboard CapsLock
3A	Keyboard F1
3B	Keyboard F2
3C	Keyboard F3
3D	Keyboard F4
3E	Keyboard F5
3F	Keyboard F6

Keycode Tables (continued)

<i>code</i>	<i>name</i>
40	Keyboard F7
41	Keyboard F8
42	Keyboard F9
43	Keyboard F10
44	Keyboard F11
45	Keyboard F12
46	Keyboard PrintScreen
47	Keyboard ScrollLock
48	Keyboard Pause
49	Keyboard Insert
4A	Keyboard Home
4B	Keyboard PageUp
4C	Keyboard Delete Forward
4D	Keyboard End
4E	Keyboard PageDown
4F	Keyboard RightArrow
50	Keyboard LeftArrow
51	Keyboard DownArrow
52	Keyboard UpArrow
53	Keypad NumLock and Clear
54	Keypad /
55	Keypad *
56	Keypad -
57	Keypad +
58	Keypad ENTER
59	Keypad 1 and End
5A	Keypad 2 and DownArrow
5B	Keypad 3 and PageDn
5C	Keypad 4 and LeftArrow
5D	Keypad 5
5E	Keypad 6 and RightArrow
5F	Keypad 7 and Home

<i>code</i>	<i>name</i>
60	Keypad 8 and UpArrow
61	Keypad 9 and PageUp
62	Keypad 0 and Insert
63	Keypad . and Delete
64	Keyboard Non-US \ and
65	Keyboard Application
66	Keyboard Power
67	Keypad =
68	Keyboard F13
69	Keyboard F14
6A	Keyboard F15
6B	Keyboard F16
6C	Keyboard F17
6D	Keyboard F18
6E	Keyboard F19
6F	Keyboard F20
70	Keyboard F21
71	Keyboard F22
72	Keyboard F23
73	Keyboard F24
74	Keyboard Execute
75	Keyboard Help
76	Keyboard Menu
77	Keyboard Select
78	Keyboard Stop
79	Keyboard Again
7A	Keyboard Undo
7B	Keyboard Cut
7C	Keyboard Copy
7D	Keyboard Paste
7E	Keyboard Find
7F	Keyboard Mute

Keycode Tables (continued)

<i>code</i>	<i>name</i>
80	Keyboard VolumeUp
81	Keyboard VolumeDown
82	Keyboard Locking CapsLock
83	Keyboard Locking NumLock
84	Keyboard Locking ScrollLock
85	Keypad Comma
86	Keypad EqualSign
87	Keyboard International 1
88	Keyboard International 2
89	Keyboard International 3
8A	Keyboard International 4
8B	Keyboard International 5
8C	Keyboard International 6
8D	Keyboard International 7
8E	Keyboard International 8
8F	Keyboard International 9
90	Keyboard LANG 1
91	Keyboard LANG 2
92	Keyboard LANG 3
93	Keyboard LANG 4
94	Keyboard LANG 5
95	Keyboard LANG 6
96	Keyboard LANG 7
97	Keyboard LANG 8
98	Keyboard LANG 9
99	Keyboard Alternate Erase
9A	Keyboard SysReq/Attention
9B	Keyboard Cancel
9C	Keyboard Clear
9D	Keyboard Prior
9E	Keyboard Return
9F	Keyboard Separator

<i>code</i>	<i>name</i>
A0	Keyboard Out
A1	Keyboard Oper
A2	Keyboard Clear/Again
A3	Keyboard CrSel/Props
A4	Keyboard ExSel
A5	Reserved
A6	Reserved
A7	Reserved
A8	Reserved
A9	Reserved
AA	Reserved
AB	Reserved
AC	Reserved
AD	Reserved
AE	Reserved
AF	Reserved
B0	Keypad 00
B1	Keypad 000
B2	Thousands Separator
B3	Decimal Separator
B4	Currency Unit
B5	Currency Sub-unit
B6	Keypad (
B7	Keypad)
B8	Keypad {
B9	Keypad }
BA	Keypad Tab
BB	Keypad Backspace
BC	Keypad A
BD	Keypad B
BE	Keypad C
BF	Keypad D

