MERG Knowledgebase

CANLED64

NB. This kit has been discontinued, for new installations use the CANPAN

Overview

CANLED64 is a module for use with MERG CBUS that provides outputs for up to 64 LEDs. Primarily intended for use on control panels it can be used anywhere where the 8 outputs from the CANACC8 are insufficient or any other LED application such as colour light signals, traffic lights or building lighting.
See **How a Matrix works**

The hardware design uses a matrix arrangement for driving the LEDs. There are 4 row lines and 16 column lines. The column lines are constant current sinks so no series resistors are needed for the LEDs. The current, and hence brightness can be programmed with a resistor although individual LEDs all have the same current. The LED anodes must be connected to the row lines and the anodes to the column lines.

While the hardware is common, there are two variants of the firmware. The original CANLED2 code only allows one LED to be controlled (on or off) by a single event. In SLiM mode, the LED is selected by a 6 way DIL switch, giving one of 64. The polarity can be changed and also there is a facility for operating successive LEDs in pairs, as might be used for turnout position indication.

CANLED64 is a more recent variant that allows an event to set/clear any combination of LEDs. As this now needs 64 options per event, it is only practicable to use it in FLiM mode. The 'paired' mode is not used as each LED can be set on or off for every event. The two variants will be described separately.

Hardware options

MERG Kit 82

This module requires its own AC supply of 15V or 16V (RMS) AC at 50/60 Hz or a 12V DC supply if modified as detailed on this page.

MERG Kit 82 is no longer available from the kitlocker [http://merg.org.uk/merg_kitlocker/section.php?id=6] but the underlying info is still availabe. Kit 82 Build Information [https://www.merg.org.uk/merg_kitlocker/downloadit.php?fileid=327] (pdf)

Technical Bulletin G32-7 [https://merg.org.uk/merg_tbs/download.php?fileid=939&userid=9841] (pdf)

Firmware

Lead developer:- Roger Healey.

Current Firmware

(MERG kit 82) Current version '2g' This updated version allows the following options when teaching events. 1. Both On and Off events will be actioned 2. Only On events will be actioned. 3. Only Off events will be actioned. 4. An event can be defined to cause the specified LEDs to flash. FCU version 1.4.3.1 is needed to use these facilities.ied version of CANLED for using onboard FLASH for event storage. NB. CANLED64 has replaced original CANLED. In the Journal for Spring 2012 there is an article on building a CANLED to Relay driver interface. For convenience here is a copy of the article and the firmware needed for the PIC12F683 on the interface module. Can Led Relay
See also the CANRELAY page.

Beta Firmware

CANLED64_v2hBeta1 contains two changes to the current version. This version will now report the Physical PIC when properties are read. FCU version 1.4.7.19 is needed to show this information. A change has also been made to the behaviour when events are taught. Teaching events no longer actions the event data as it is being taught, it is hoped that this will prevent the occasional problems with the PIC resetting when events are being taught as the LEDs will not be change during event teaching. The new version can be down loaded from here.canled64-v2beta1.zip

Older Firmware

Previous versions now obsolete and archived for record.
Version '2-d' Version '2-k' Version '2-n' Version '2-r' Version '2-2e' Version '64-h' Version '64-j' Version '64-n' Version '64-p' Version '2f'

CANLED2

Setting up in SLiM mode

The module has a 6 way DIL switch for setting the LED the event is to apply to and four jumpers in a block labelled Ln,Un,Tg and Po. (Learn, Unlearn, Toggle and Polarity). The DIL switch sets binary numbers from 0 to 63 although for convention, the LEDs are numbered from 1 to 64. Select the LED required on these switches. Put the Ln jumper in. Send the event to be learned. This can be a long or short event. If you want that event to turn on the numbered LED and turn off the next one, put the Tg jumper in. To reverse the LED, put the Po jumper in as well. Then remove the Ln jumper. To unlearn that event, put both LN and Un jumpers in and send the event. To clear all events, put just the Un jumper in and cycle the power.

Setting up in FLiM mode

Node variables: 0

The basic version has no node variables. All LEDs are either ON or OFF.

FLiM mode setting is very similar to SLiM mode. Assuming the module has a NN and is already in FLiM mode, send the NNLRN to put the module into learn mode. Send the event(s) to be taught using EVLRN. This can be a long or short event. If a short event, it gives a LED a 'device number'. There is one EV attached to each event. (EV# = 1). The lower 6 bits (0 to 5) of

the EV make up the LED number, in the same way as for the DIL switches in SLiM mode. The top two bits correspond to the toggle and polarity jumpers. Bit 6 is toggle mode and bit 7 is polarity. Then take out of learn mode with NNULN. All events can be cleared with NNCLR.

The module ID number is 6 for the CANLED2. The manufacturer number is 165.

Note: Even in SLiM mode, it is possible to read the node parameters over the bus. A SLiM node has a default NN of 00 00 so a RQNPN command to NN of 00 00 will return the indexed parameter from that node. This may be useful for reading the code revision. Only one SLiM mode node can be active for this process or you will get a response from all of them. The CAN_ID will also be 00 00.

For bootloading in SLIM mode, the NN of 00 00 must be used and, again, only one SLiM mode module can be active for this.

CANLED64

This is a new code for the CANLED module. The upgrade arose from the desire to have many LEDs set or cleared by a single event, as would occur when setting routes. The problem was that each event now needed 64 bits for each event to identify the LEDs associated with that event and another 64 bits for each LED polarity. As individual LEDs could now be set ON or OFF with one event, the Toggle facility was not needed. While it is possible to set up a CANLED64 in SLiM mode, it is so tedious that only the FLiM setup will be described.

Setting up in FLiM mode

Node variables 0

The module ID number is 7 for the CANLED64.

Developer Information

CANLED2

Number of stored events 248 (EN# of 1 to 248)

Number of EVs per event 1 (EV# of 1)

EV1 determines which LED the event applies to and also the polarity and toggle mode. The lower 6 bits (0 to 5) set which LED the event applies to. One binary number per LED. Bit 6, if set reverses the polarity and bit 7, if set toggles between the LED number and the next one up.

As the CANLED is a consumer only, it has a default SLiM NN of 00 00. This is used for bootloading and readback of the node parameters.

Supported OpCodes (HEX value and mnemonic) in FLiM mode.

HEX	Mnemonic		HEX	Mnemonic		HEX	Mnemonic

*0D	QNN		59	WRACK			
10	RQNP		5C	BOOTM			
*11	RQMN		*5D	ENUM		98	ASON
42	SNN		6F	CMDERR		99	ASOF
50	RQNN		70	EVNLF		9B	PARAN
51	NNREL					9C	REVAL
52	NNACK		72	NENRD		B2	REQEV
53	NNLRN		73	RQNPN		B5	NEVAL
54	NNULN		74	NUMEV		*B6	PNN
55	NNCLR		*75	CANID		D2	EVLRN
56	NNEVN		90	ACON		D3	EVANS
57	NERD		91	ACOF		*E2	NAME
58	RQEVN		95	EVULN		EF	PARAMS
						F2	ENRSP

* These OpCodes are introduced for firmware from Major Version 2 for the CANLED64

CANLED64

EV Usage

Number of stored events: 255 (EN# of 1 to 255)

***Number of EVs per event:** 17 (EV# of 1 to 17)

Events are stored in Flash Memory, as does the CANLED2, but the data structure is different. The number of stored events now is 255 (EN# of 1 to 255) and the EVs per event is now 17.

EVs 1 to 8 are the 8 bytes representing the bit pattern of the 64 LEDs for that event, one bit per LED.
EVs 9 to 16 are the corresponding polarity bits for each LED. A 0 is normal polarity, a 1 is reversed.
EV# 17 defines the 'effects' associated with the event such as LEDs flashing and has the following values:

- 0xFF (255) Normal operation, both On and Off events behave normally.
- 0xFE (254) only On Events are actioned.

- 0xFD (253) only Off Events are actioned.
- 0xF8 (248) the event causes the selected LEDs to flash, LEDs set with a corresponding polarity bit will flash in anti-phase to normal LEDs. An On event starts the flashing, and Off event stops the flashing.

The last setting enables pairs of LEDs to flash alternately with the same event.

As only one EV can be taught per EVLRN message, it requires the configuration software to send the event 17 times, incrementing the EV# each time.

If taught as a short event, the 'device number' corresponds to the LED pattern rather than to individual LEDs although if only one LED is selected out of the possible 64, it can result in a DN for a LED. Given the possible 255 events, you can define a DN for each of the LEDs (64 short events) and have other DNs defining complete routes or lighting combinations etc.

Supported OpCodes (HEX value and mnemonic) in FLiM mode**

HEX	Mnemonic		HEX	Mnemonic		HEX	Mnemonic
*0D	QNN		59	WRACK			
10	RQNP		5C	BOOTM			
*11	RQMN		*5D	ENUM		98	ASON
42	SNN		6F	CMDERR		99	ASOF
50	RQNN		70	EVNLF		9B	PARAN
51	NNREL					9C	REVAL
52	NNACK		72	NENRD		B2	REQEV
53	NNLRN		73	RQNPN		B5	NEVAL
54	NNULN		74	NUMEV		*B6	PNN
55	NNCLR		*75	CANID		D2	EVLRN
56	NNEVN		90	ACON		D3	EVANS
57	NERD		91	ACOF		*E2	NAME
58	RQEVN		95	EVULN		EF	PARAMS
						F2	ENRSP

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