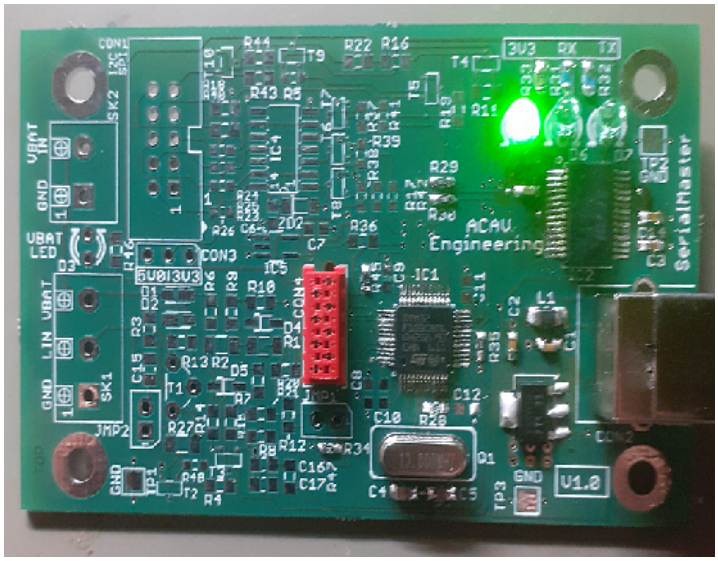
Serial Master Adapter

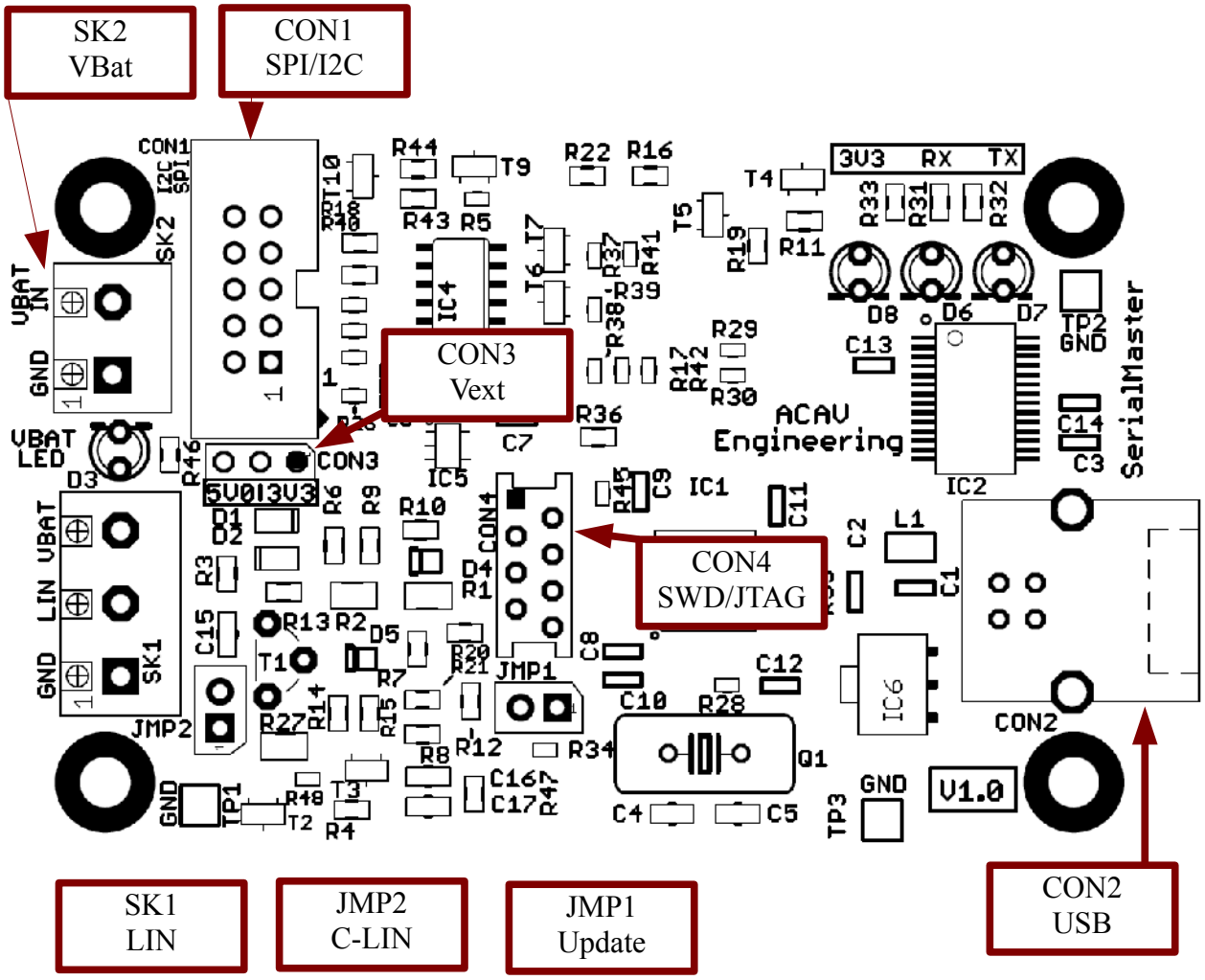
Description



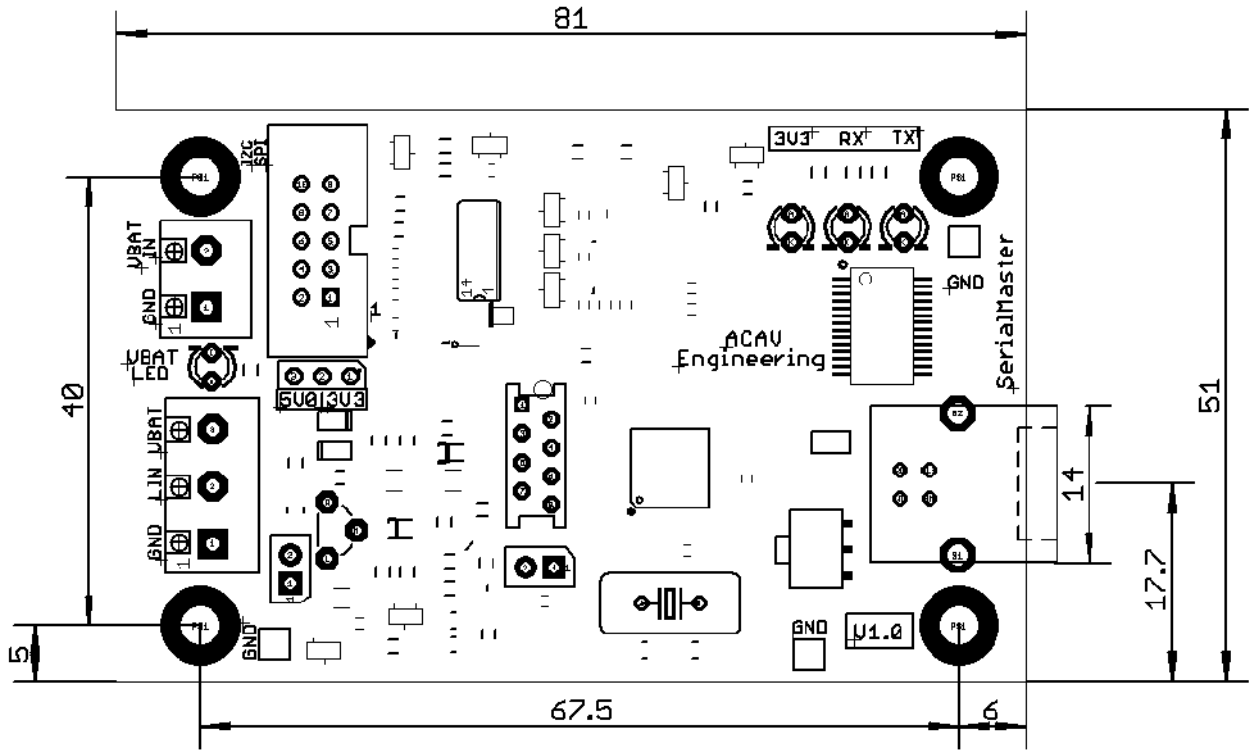
TOC

1. Connector overview

Size: 51x81mm



2. Mechanical



3. Connector description

3.1. LIN

SK2				
Pin 1	GND	connected to USB-GND connected to LIN-GND		From PSU
Pin 2	Vbat	connected to LIN-Vbat	8V - 28V	From PSU

Only necessary for LIN mode

SK1				
Pin 1	GND	connected to USB-GND connected to LIN-GND		To DUT
Pin 2	LIN			To DUT
Pin 3	Vbat	connected to LIN-Vbat	8V - 28V	To DUT

Only necessary for LIN mode

JP2	
Open	Master Capacitor on LIN-BUS **not** connected
Close	Master Capacitor on LIN-BUS connected

Only necessary for LIN mode

3.2. General

JP1	Controller Update
Open	Normal Controller mode
Close	Controller in Update Mode

CON4	Debug / Programming
1	Vtarget = 3V3, Sense connection, do not power
2	SWDIO/TMS
3	SWCLK/TCLK
4	SWO/TDO
5	TDI
6	nRST
7	nc
8	GND

3.3. SPI/I2C

CON 3	SPI/I2C Voltage Level
Open	An external voltage of 2V .. 5.5V must be applied at CON1, the internal power consumption is < 10mA
1-2 Closed	The internal voltage of 3V3 is used as SPI/I2C voltage level and applied at CON1, external power consumption is limited to 20mA
2-3 Closed	The internal voltage of 5V is used as SPI/I2C voltage level and applied at CON1, external power consumption is limited to 50mA

This jumper sets the voltage reference levels for the SPI and I2C interface. It is not necessary to supply external circuits through CON1 if an internal voltage is selected.

CON1	SPI/I2C	
1	GND	
2	MISO	Adapter Input in Adapter SPI Master Mode
3	GND	
4	MOSI	Adapter Output in Adapter SPI Master Mode, PushPull
5	SCK	Adapter Output in Adapter SPI Master Mode, PushPull
6	nCS	Adapter Output in Adapter SPI Master Mode, PushPull
7	nc	
8	SDA	bidirectional
9	SCL	bidirectional
10	Vref	Reference voltage, see CON3

4. LIN

The LIN Bus is capable of at minimum 20 kBps.

The LIN Bus is capable of running within a voltage range of 10 V to 24 V (nominal),
an extended range of 8V to 28V is possible, a short time overvoltage of up to 40V will not destroy the driver circuit but can generate excessive heat.

The LIN specific pullup is 1.5k ohms, an additional capacitor can be activated with JMP2.

The output drivers current is limited to 50mA (70mApk) but a low shortage to Vbat will generate excessive heat in the driver transistor and should be avoided.

The software will detect an overcurrent condition and will return this condition in the status.

5. SPI

The SPI is capable of master mode only.
The SPI is capable of running within a voltage range of 2.5 V to 5 V (nominal), applied voltages above 5.6 V will be limited and can destroy the input/output driver if used extended periods of time.
The achievable bitrate is 1 Mbit with delay at the outputs. Please check conditions before use !

MISO Input to internal circuit delay	: < 20ns, all voltage levels
MOSI/SCK/nCS int. circuit to output delay, L -> H	: < 25ns, all voltage levels
MOSI/SCK/nCS int. circuit to output delay, L -> H	: <75ns (2V5); <65ns (3V3); <55ns (5V)

Shorting the SPI outputs to GND or Vref will result in permanent damage to the driver !

6. I2C

The I2C interface is capable of master mode and slave mode.
The I2C interface is capable of running within a voltage range of 2.5 V to 5 V (nominal), applied voltages above 5.6 V will be limited and can destroy the input/output driver if used extended periods of time.
The achievable bitrate is 400 kbit. Please check conditions before use !

Rise time (adapter receiving, 75%) :	< 200ns (5V) ; < 300ns (3V3) ; < 350ns (2V5)
Rise time (adapter transmitting, 75%):	< 500ns (5V) ; < 250ns (3V3) ; < 200ns (2V5)
Fall time (adapter receiving):	< 200ns, all voltage levels
Fall time (master receiving):	< 200ns, all voltage levels

Shorting the SPI outputs to Vref will result in permanent damage to the driver !

7. Software interface

When plugging in the USB connector, the adapter will be recognized as an FTDI COM port.
The default setting is 115200,N,8,1

Every message starts with a SOP delimiter and ends with an EOP delimiter.

SOP delimiter: '!' as char
EOP delimiter: '!' as char

7.1. Serial Frame

0	1	2	3	4...N	N+1	
SOP	MODE	CMD	SUBCMD	Data	EOP	
'!'	'L'/'S'/'I'	'G'/'S'/'W'/'R'	See list	Data	'$'	

7.2. Serial Error Frame (Response only)

0	1	2	3	4	5
SOP	'E'	'R'	'R'	Error number Error char	EOP

This frame will be respond if a CMD or SUBCMD is unknown.

7.3. Mode List

MODE	CHAR
LIN	'L'
SPI	'S'
I2C	'I'

7.4. Command List

MODE	CHAR HOST to Adapter (Request)	CHAR Adapter to HOST (Response)	MODES
SET parameter	'S'	's'	LIN, SPI, I2C
GET parameter	'G'	'g'	LIN, SPI, I2C
WRITE Data	'W'	'w'	LIN, SPI, I2C
READ Data	'R'	'r'	LIN