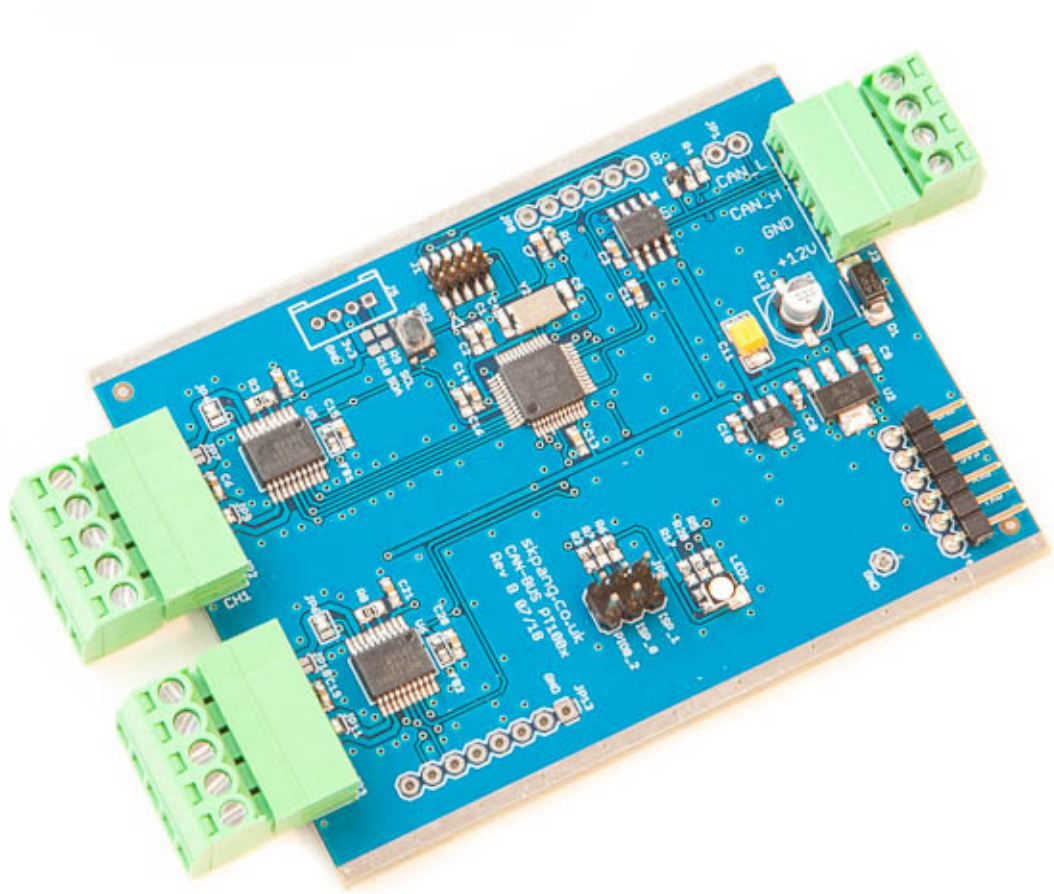
Dual PT100 RTD to CAN-Bus Converter

v1.0 August 2018



Product name	Dual PT100 RTD to CAN-Bus Converter
Model number	CAN-PT100-DUO
Manufacturer	SK Pang Electronics Ltd

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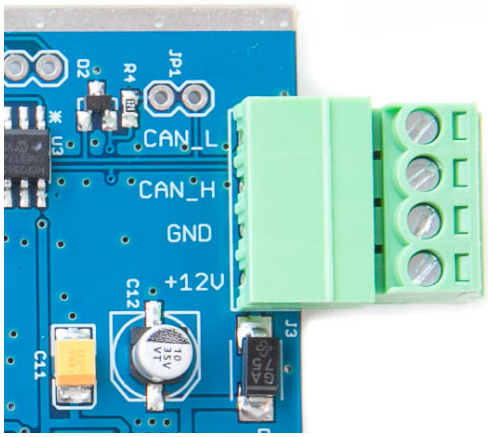
1. Introduction

This is a two channel PT100 RTD to CAN-Bus converter. Based on the MAX31865 integrated circuit. It also an UART for serial outputt. On board RGB LED for status indication. Firmware upgradable via CAN, UART or SWD.

1.1. Features

- Two channels
- Compatible with 2-, 3-, and 4-Wire Sensor Connections
- High Accuracy Facilitates Meeting Error Budgets
  - 15-Bit ADC Resolution; Nominal Temperature
  - Resolution 0.03125NC (Varies Due to RTD Nonlin-earity)
- Total Accuracy Over All Operating Conditions:
  - 0.5NC (0.05% of Full Scale) max
- Programmable CAN message interval
- 6 to 20v supply voltage range
- UART serial output
- Firmware upgradable via UART, CAN or ISP

1.2. CAN and Power Connection

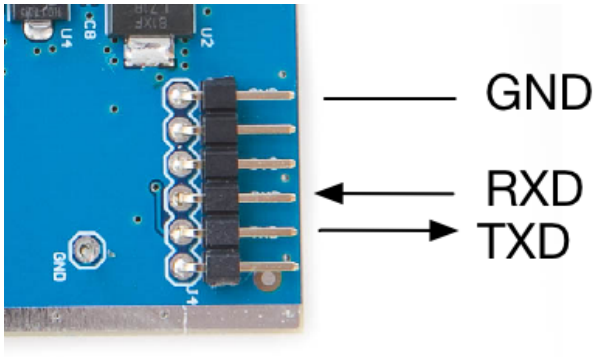


The CAN and power are connected via J3.

1.3. 120Ω Terminator

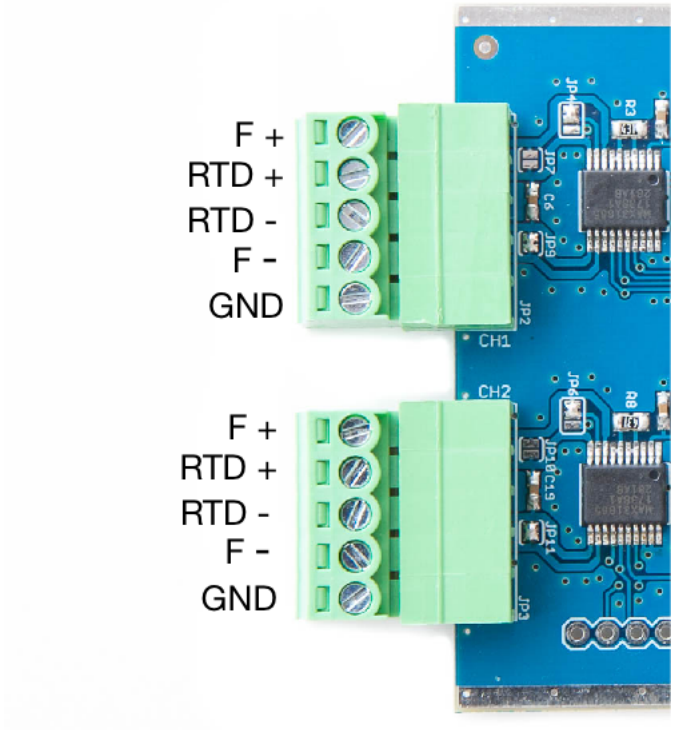
There is a 120Ω fitted to the board. To use the terminator solder a 2way header pin to JP1 then insert a jumper.

1.4. UART Connection



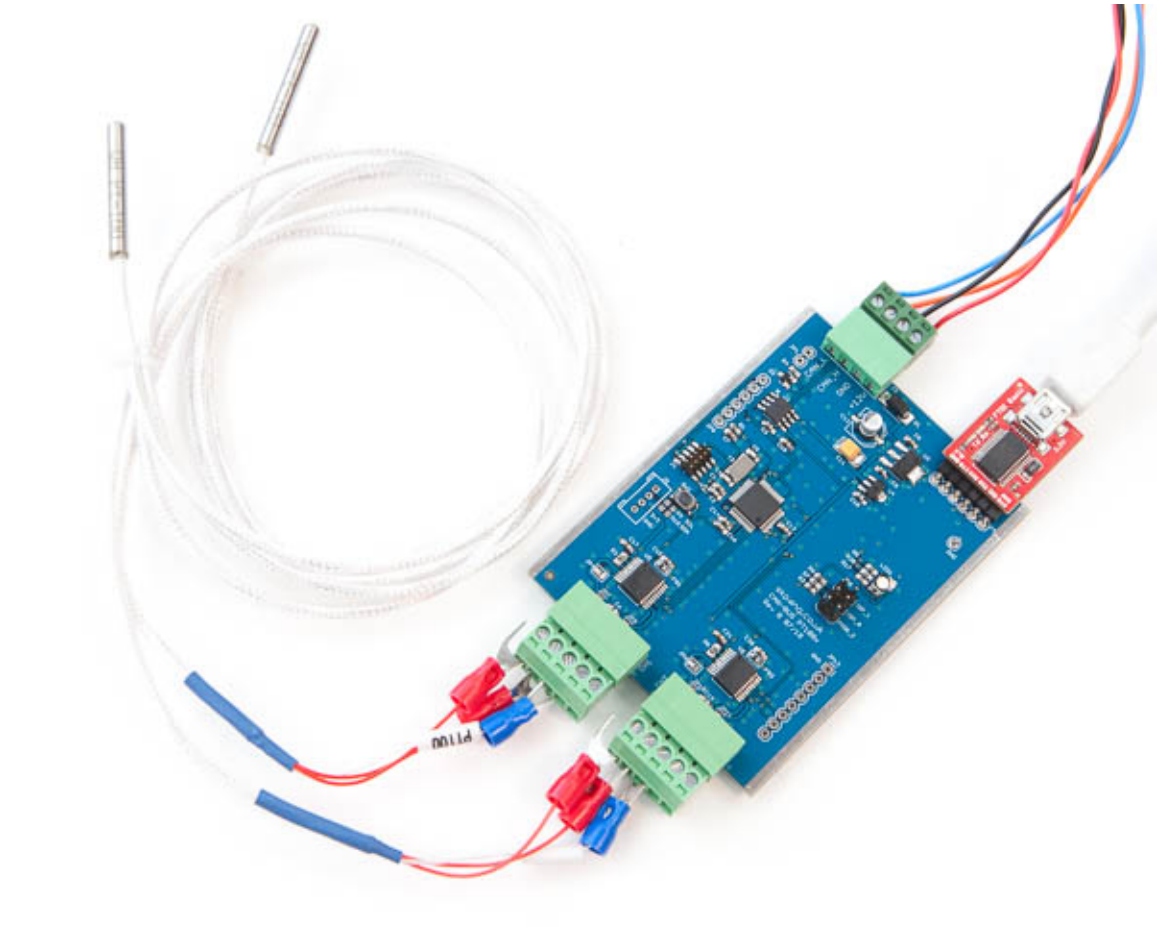
The UART connection is via J4. The UART voltage is 3.3v

1.5. PT100 Connection



The PT100 connection for Channel 1 is on JP2 and for Channel 2 is on JP1.

The default is 3-wire PT100 RTD sensor.



1.6. RGB LED

There is a RGB LED fitted to the board. This colour and function are:

Colour and State	Function
Flashing white	Booting up
Flashing blue	Transmit data
Flashing yellow	Set to factory defaults, waiting for power cycle
Solid blue	Baudrate changed, waiting for power cycle
Solid red	Unit fault

2. CAN Message Format

The default CAN ID is 0x700 at 500kbps for Channel 1 and 0x701 for Channel 2. The ID can be change, see section 4.

CAN ID	DLC	D0	D1	D2	D3	D4	D5	D6	D7
0x700	8	tempD0	tempD1	tempD2	tempD3	Fault	0	0	0

The temperature read is in a float variable format and it is transmitted in 4 bytes tempD0 to tempD4. The 4 bytes can be converted back to float by:

```
unsigned char data[4];
float temperature;
data[0] = rxmsg.buf[0]; /*CAN message in rxmsg.buf */
data[1] = rxmsg.buf[1];
data[2] = rxmsg.buf[2];
data[3] = rxmsg.buf[3];
memcpy(&temperature, data, 4); /* Convert 4 bytes data to temperature */
printf("Temperature %f \n", temperature);
```

1.7. Fault Code

The fault code is in D4. A 0x00 indicate no fault.

Below is a list of fault codes.

```
MAX31865_FAULT_HIGHTHRESH      0x80
MAX31865_FAULT_LOWTHRESH       0x40
MAX31865_FAULT_REFINLOW        0x20
MAX31865_FAULT_REFINHIGH       0x10
MAX31865_FAULT_RTDINLOW        0x08
MAX31865_FAULT_OVUV            0x04
```

3. Reset to Factory Defaults

The board can be reset to factory defaults.

1.8. Procedure

With the power removed from the board, place a jumper across PIO0_2. Power up the board. Wait until the LED is flashing yellow. Remove the jumper and power cycle the board.

4. BOARD CONFIGURATION Data Format

The board listens for a configuration message at CAN ID of 0x7E5.

1.9. Unit Configuration

CAN ID	DLC	D0	D1	D2	D3	D4	D5	D6	D7
0x7E5	8	CAN-ID_L	CAN-ID_H	Command	DataD0	DataD1	0	0xAA	0x55

D2 Command : 0x01 Set New CAN ID

0x02 Set CAN Baudrate

0x03 Set Tx Interval

0x04 Reboot

Current board CAN ID are in CAN-ID_L and CAN-ID_H. Default is 0x700.

Set New CAN ID 0x01

To set a new CAN ID issue a 0x01 command on D2.

Example : To change the CAN ID from 0x700 to 0x512 sent:

ID:0x7E5 DLC:8 Data : 00 07 01 12 05 00 AA 55

Set CAN Baudrate 0x02

To set a new CAN baudrate issue a 0x02 command on D2.

CAN Baudrate 0 : 125kbps

1 : 250kbps

2 : 500kbps (Factory default)

3 : 1000kbps

Example : To set the CAN baudrate to 1000kbps sent:

ID:0x7E5 DLC:8 Data : 00 07 02 03 00 00 AA 55

Set Tx Interval 0x03

This sets the time delay between each temperature transmission. The delay is in milli-seconds from 100 to 64000.

Example : To change the Tx Interval sent to 1500mS (0x05DC) interval sent :

ID:0x7E5 DLC:8 Data : 00 07 03 DC 05 00 AA 55

1.10. Defaults

The board is shipped with the following defaults:

CAN ID : 0x700

CAN Baudrate : 500kbps

Tx interval : 1000mS

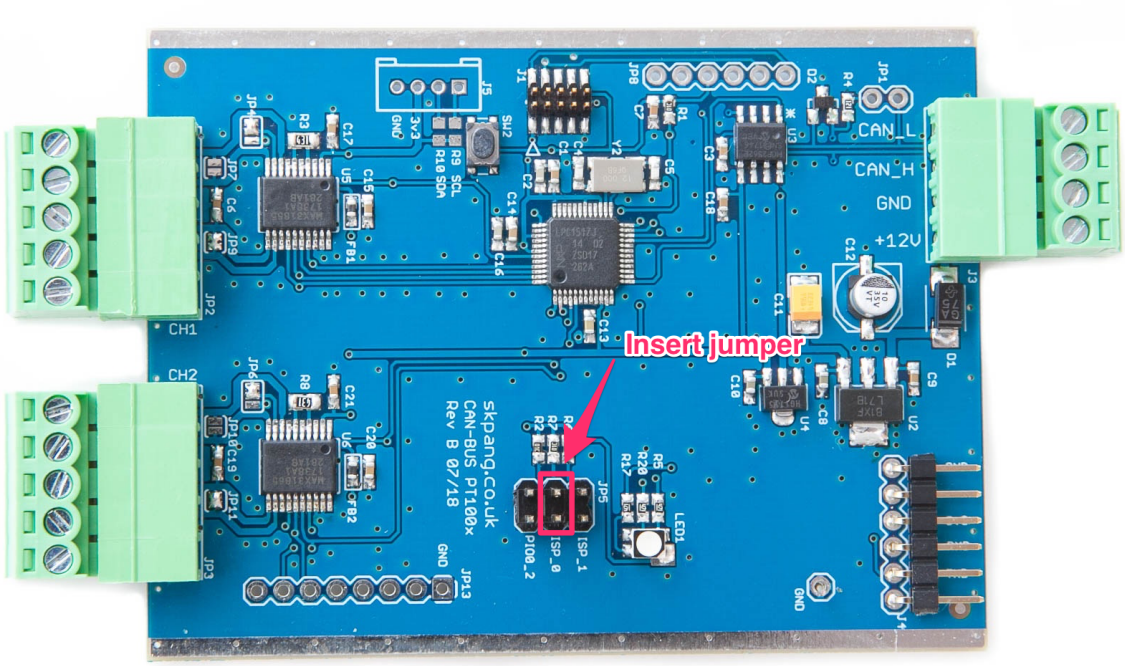
5. Firmware Update

The board firmware can be updated by serial or CAN.

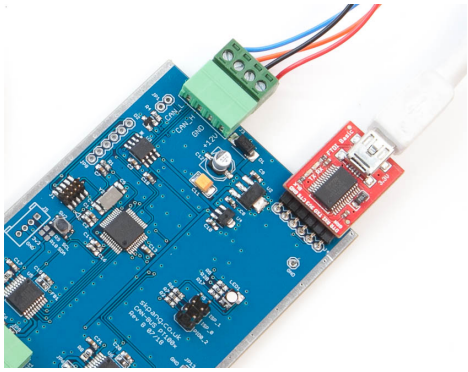
1.11. Update via Serial

Download and install Flash Magic software from Embedded Systems Academy.

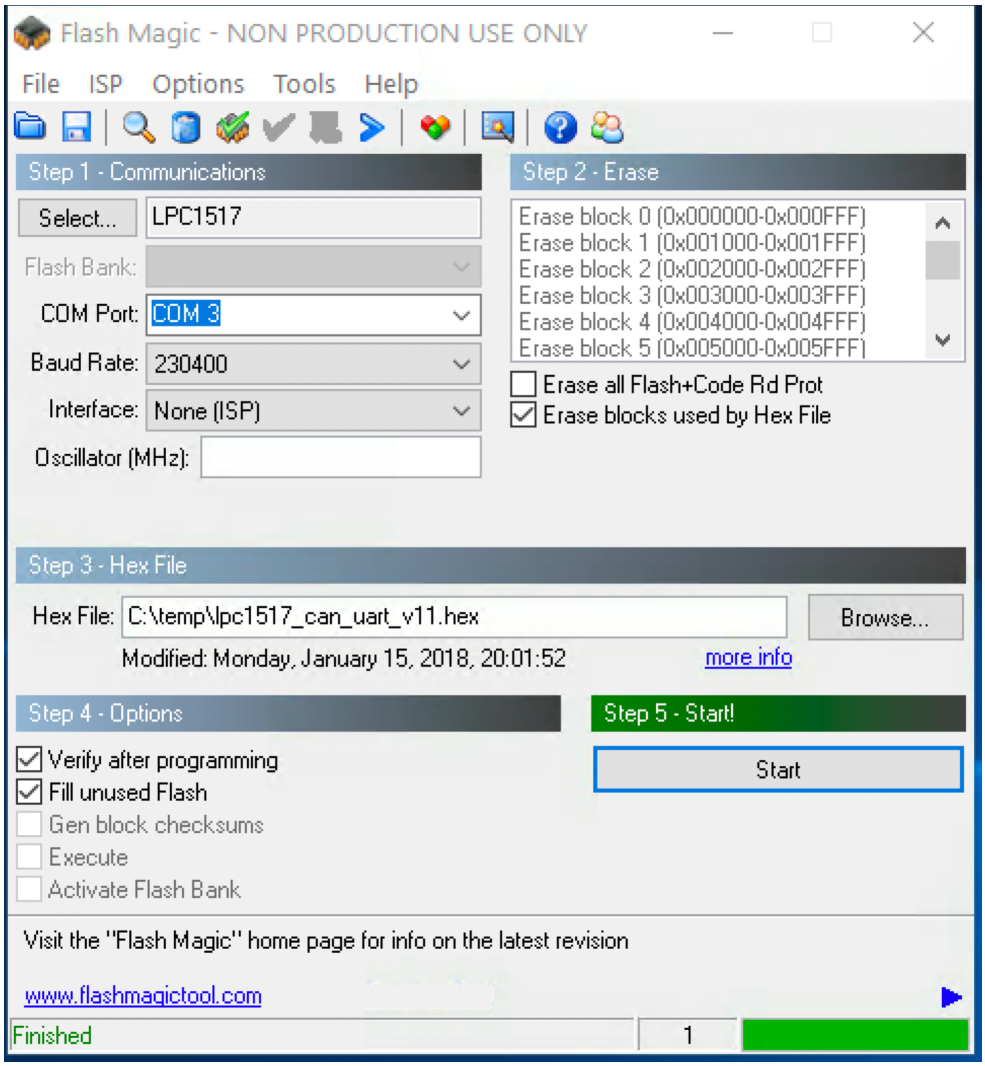
1. Power down the board and insert a jumper on ISP_0. Connect 12v to J3.



2. Insert a FTDI board into J4.



3. Start Flash Magic and select the LPC1517 device.
4. Click the Browse button and select new firmware hex file.
5. Click the Start button and wait.
6. Check it when finished with no errors.
7. Remove jumper on ISP_0 and power cycle.

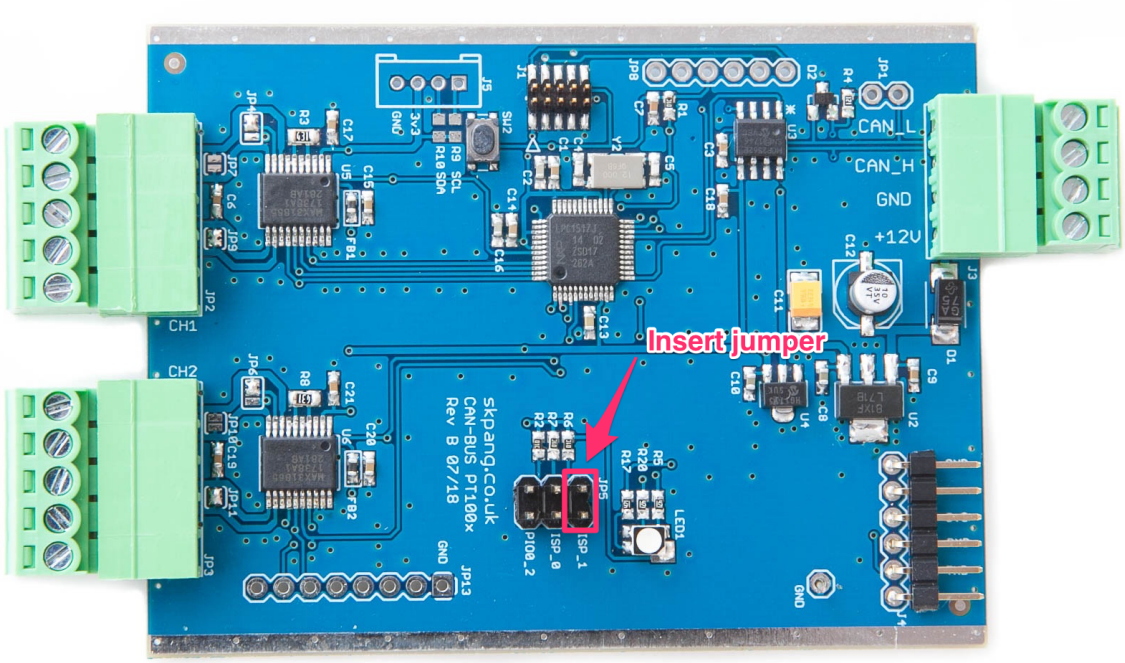


1.12. Update via CAN

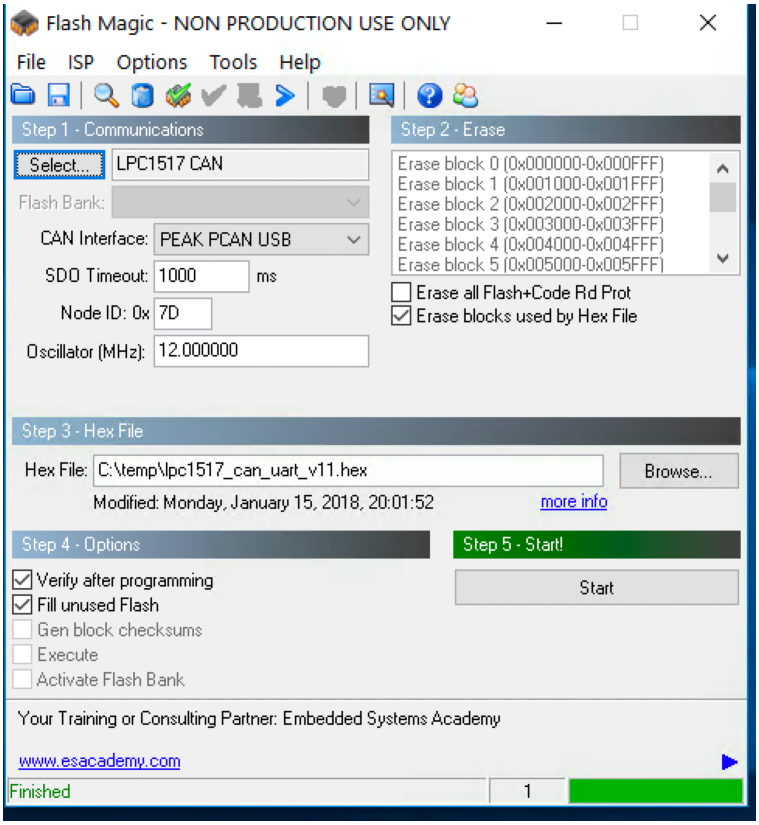
To update via CAN, insert a jumper on ISP_1. A PCAN-USB Pro from Peak System is required. Also Flash Magic software from Embedded Systems Academy. Ensure the PCAN-USB Pro driver is installed and working correctly first.

Note : This method of update requires the board to be removed from an existing CAN network because it operates at 100kbps.

1. Power down the board and insert a jumper across ISP_1 as shown below.



2. Ensure terminator JP1 is closed.Connect the CAN output from PCAN-USB Pro and power up the board via J3.
3. Start Flash Magic software.

4. 

5. Select LPC1517 CAN as the device.
6. Tick the checkbox Erase blocks used by Firmware, Verify after programming and Fill unused Flash.
7. Click the Browse button and select new firmware hex file.
8. Click the Start button and wait.
9. Check it when finished with no errors.
10. Remove jumper on ISP_1 and power cycle.