

CAN to UART Converter Board

V3.0 July 2023

Product name	CAN to UART Converter Board
Model number	CAN-UART2
Manufacturer	SK Pang Electronics Ltd

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1. Introduction

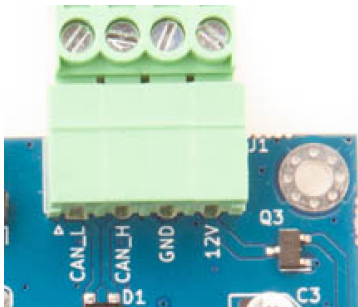
This board converts CAN message into UART and vice versa. CAN and UART baud rate is programmable via a CAN message. The UART's voltage level can be 3.3v or 5.0v selectable via solder bridges. On board RGB LED for status indication. Firmware upgradable via UART or ICSP.

1.1. Features

- Programmable CAN baud rate
- Programmable UART baud rate
- RGB LED status indicator
- Firmware upgradable via UART or ICSP
- Selectable UART logic voltages (3.3v or 5v)
- 8v to 24v supply voltage with reverse polarity protection
- Powerful dsPIC33CK256MP502 micro-controller
- Programmable CAN ID for receive and transmit
- CAN configuration message at 0x7E5
- CAN FD compatible. Requires firmware upgrade

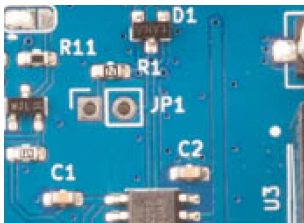
1.2. CAN and Power Connection

The CAN and power are connected via J3.



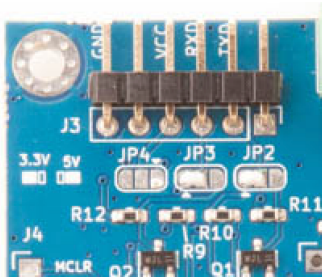
1.3. 120Ω Terminator

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



1.4. UART Connection and Voltage Select

The factory default UART logic voltage is 3.3v



The UART connection is via J3. The UART voltage is selectable via JP2,3 Solder the bridges on the left for 3.3v. Solder the bridges on the right for 5v. Photo shown 3.3v been selected.

WARNING : Do NOT connect a 5v UART when the UART voltage has been set to 3.3v. This will damage the board.

1.5. RGB LED

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

Colour and State	Function
RGB sequence	Booting up
Flashing green	Operational
Flashing blue	CAN Receive data, UART transmit
Flashing red	UART receive, CAN transmit
Fast flashing blue	Firmware upgrade or baudrate changed, waiting for power cycle
Solid red	Unit fault

2. CAN to UART Usage

Default board ID(Tx) is 0x400 and the board listens on 0x401 with Standard ID (11-bit). This ID can be re-program to used Extended ID (29-bit).

The board has a factory default of baudrate of 500kbps for CAN and 115200bps for UART.

On receiving UART message, it is buffered until 8 characters are received then it is sent out on the CAN-bus with a CAN ID of 0x400. If a CR (return) and LF (line feed) is received before 8 characters it will be sent out straight away.

The board is waiting for a CAN message on CAN ID of 0x401. When a message is received it is sent out on the UART with the message length determined by the CAN message DLC.

For example:

UART received message

Hello + CR + LF

It will send out on the CAN-bus

ID:0x400 Len:8 Data:48 65 6C 6C 6F 0D 0A

CAN received message and transmit to UART

CAN listen on 0x401

ID:0x401 Len:8 Data:48 45 4C 4C 4F 0D 0A 00

It will sent out

HELLO + CR LF

3. Reset to Factory Defaults

The board can be reset to factory defaults.

1.6. Procedure

With the power removed from the board, place a jumper on JP8, across RA0 and 3.3v Power up the board. Wait until the LED is flashing blue. Remove the jumper and power cycle the board.

4. BOARD CONFIGURATION Data Format

The board configuration can be changed by sending a CAN frame with ID of 0x7E5

1.7. Unit Configuration

CAN ID	DLC	D0	D1	D2	D3	D4	D5	D6	D7
0x7E5	8	BOARD_ID0_CMD	BOARD_ID1	BOARD_ID2	BOARD_ID3	Data0	Data1	Data2	Data3

BOARD_ID0_CMD

7	6	5	4	3	2	1	0
CMD				BOARD_ID0			

Bit	Field	Description
7-5	CMD	000(0) = Set new node ID (Tx) 001(1) = Set new listen ID (Rx) 010(2) = Set CAN baudrate 011(3) = Set UART baudrate 100(4) = Reboot 101(5) = Print version on UART
4-0	BOARD_ID0	Board ID<28:24>

BOARD_ID1

7	6	5	4	3	2	1	0
BOARD ID<23:16>							

BOARD_ID2

7	6	5	4	3	2	1	0
Board ID<15:8>							

BOARD_ID3

7	6	5	4	3	2	1	0
Board ID<7:0>							

Data0

7	6	5	4	3	2	1	0
0	0	IDEN	NBID				

CMD=0,1

Bit	Field	Description
7-6	NA	Must be 0
5	IDEN	0 = Standard Identifier 1 = Extended Identifier
4-0	NBID	New board ID<28:24>

Data1 CMD=0,1

7	6	5	4	3	2	1	0
New board ID<23:16>							

Data2 CMD=0,1

7	6	5	4	3	2	1	0
New board ID<15:8>							

Data3

7	6	5	4	3	2	1	0
DATA3							

DATA3 : CMD=0,1

Bit	Field	Description
7-0		New board ID<7:0>

DATA3 : CMD=2 Set CAN baudrate

Bit	Field	Description
7-4	NA	Must be 0
3-0	Baudrate	000 = 125kbps 001 = 250kbps 010 = 500kbps 011 = 1000kbps

DATA3 : CMD=3 Set UART baudrate

Bit	Field	Description
7-4	NA	Must be 0
3-0	Baudrate	000 = 9600bps 001 = 14400bps 010 = 19200bps 011 = 38400bps

DATA3 : CMD=4 Reboot

Bit	Field	Description
7-1	NA	Must be 0
0	Reboot	1 = Reboot board

DATA3 : CMD=5 Print version on UART

Bit	Field	Description
7-1	NA	Must be 0
0	Version	1 = Print version out

Example1: Current board ID is 0x400. Set new board ID to 0x312 with Standard Identifier.

ID:7E5 DLC:8 Data:00 00 04 00 00 00 03 12

Example2: Current board ID is 0x412. Set new board ID to 0x12345678 with Extended Identifier.

ID:7E5 DLC:8 Data:00 00 04 12 32 34 56 78

Example3: Current board ID is 0x400. Set new listen ID to 0x312 with Standard Identifier.

ID:7 E5 DLC:8 Data:20 00 04 00 00 00 03 12

Example4: Current board ID is 0x412. Set new listen ID to 0x12345678 with Extended Identifier.

ID:7E5 DLC:8 Data:20 00 04 12 32 34 56 78

Note Data0 bit 5 is set for Extended Identifier.

Example5: Current board ID is 0x400. Set new CAN baudrate to 1000kbps.

ID:7E5 DLC:8 Data:40 00 04 00 00 00 00 03

After a valid new CAN baudrate is received the blue LED will flash continuously and a power cycle is required in order to use the new CAN baudrate.

101 = 115200bps

Example6: Current board ID is 0x400. Set new UART baudrate to 14400kbps.

ID:7E5 DLC:8 Data:40 00 04 00 00 00 00 01

After a valid new UART baudrate is received the blue LED will flash five times and the board will power cycle.

Example7: Current board ID is 0x400. Set to reboot the board.

Data3 Reboot

001 = Reboot

ID:7E5 DLC:8 Data:80 00 04 00 00 00 00 01

Example7: Current board ID is 0x400. Set to print out versions.

ID:7E5 DLC:8 Data:80 00 04 00 00 00 00 01

1.8. Defaults

The board is shipped with the following defaults:

Board ID (CAN Tx ID) : 0x400

Listen ID (CAN Rx ID) : 0x401

CAN Baudrate : 500kbps

UART Baudrate : 115200bps

IO pins : All input

5. Firmware Update

The board firmware can be updated via the UART. This requires a FTDI UART to USB board. Ensure the voltage level matches on the FTDI board matches the CAN-UART board.

Power down the board and place a jumper JP8, across RA0 and GND Power up the board. Wait until the LED is flashing blue.

1.9. Update via Serial

Download the java Unified Bootloader Host Application from:

<https://ww1.microchip.com/downloads/aemDocuments/documents/MCU16/ProductDocuments/SoftwareTools/UnifiedHost-1.19.0.zip>

[U16/ProductDocuments/SoftwareTools/UnifiedHost-1.19.0.zip](https://ww1.microchip.com/downloads/aemDocuments/documents/MCU16/ProductDocuments/SoftwareTools/UnifiedHost-1.19.0.zip)

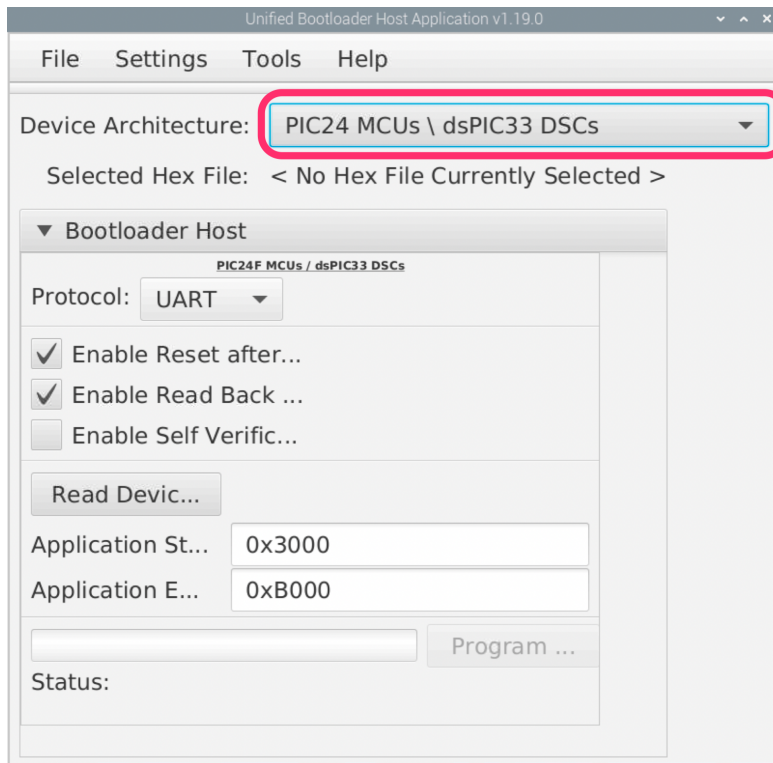
Unzip the file and change into the directory:

```
cd UnifiedHost-1.19.0
```

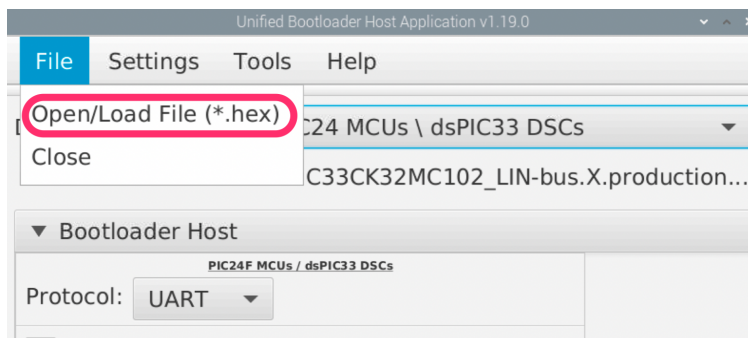
Start the app by:

```
java -jar UnifiedHost-1.19.1.jar
```

Select Device Architecture as PIC24 MCUs \ dsPIC33 DSCs

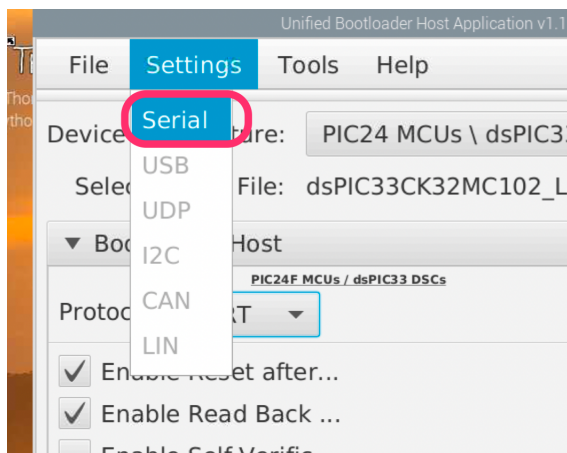


Now click File | Open/Load File (*.hex) to load the firmware hex file.

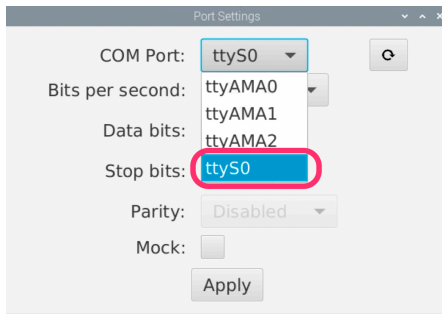


Select the required firmware hex file.

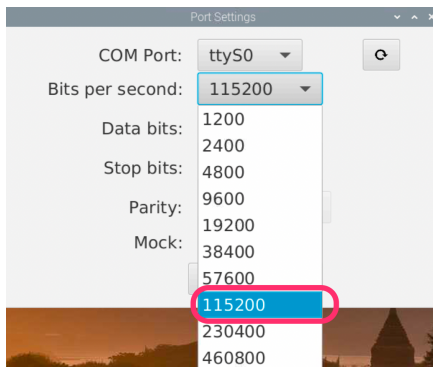
Now click Settings|Serial.



Select the correct COM Port for your FTDI board.

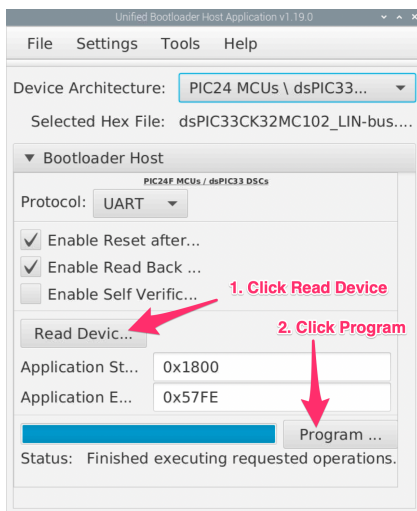


Select the Bits per second to be 115200:



Now click Apply.

Now click Read Device 1 follow by Program 2.



Check the Status shows Finished executing requested operations and no error shown.

Remove jumper from board and power cycle.

