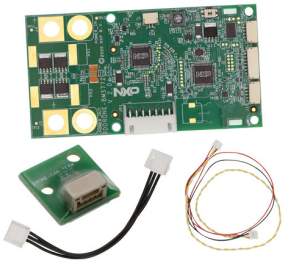
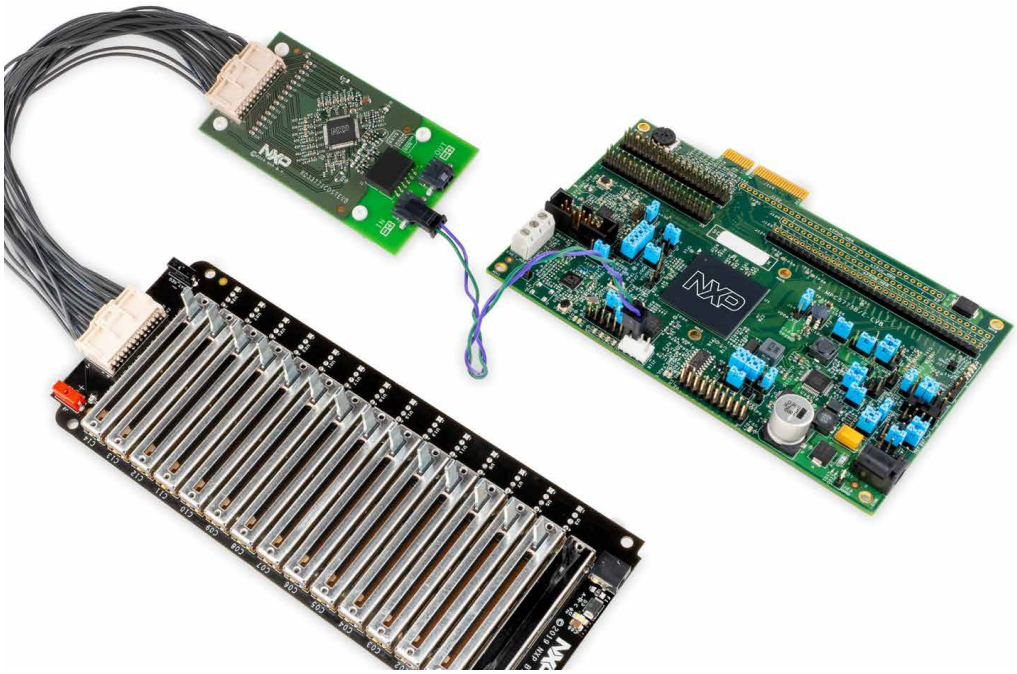


NXP Battery Management System User Guide

Quick Start Guide
Battery Management System (BMS) with MPC5775B-EVB and RD33771CDSTEVB



NXP evaluation boards for high-voltage battery management

REQUIRED HARDWARE FOR THE DEMO

Board Part Number	Description
MPC5775B-EVB	MPC5775B EVB with MC33664 TPL interface support
RD33771CDSTEVB	MC33771C based Battery Cell Controller Evaluation board
BATT-14CEMULATOR	14 Cell battery emulator board
PCAN-USB adapter	CAN monitor

MPC5775B-EVB

BATT-14CEMULATOR

RD33771CDSTEVB

PCAN-USB

REQUIRED SOFTWARE FOR THE DEMO

Item	Description
S32 Design Studio IDE	NXP S32 Design Studio IDE for PowerPC V2.1
MPC5775B-BatterySystem SDK	S32DS based Jumpstart demo software for the MPC5775B-EVB using SDK 3.0.0 with FreeRTOS
MPC5775B-BatterySystem GUI	Graphic User Interface software to monitor battery status via C
Python 3.7 64-bit with PyQt5 and NumPy	Install the Python 64-bit version, then install the PyQt5 and NumPy packages

Contents

Download Software

Download installation software and documentation under "**Jump Start Your Design**" at nxp.com/MPC5775B-BatterySystem

GET TO KNOW THE BMS DEMO

Note: Numbers correspond to the steps to follow for setup.

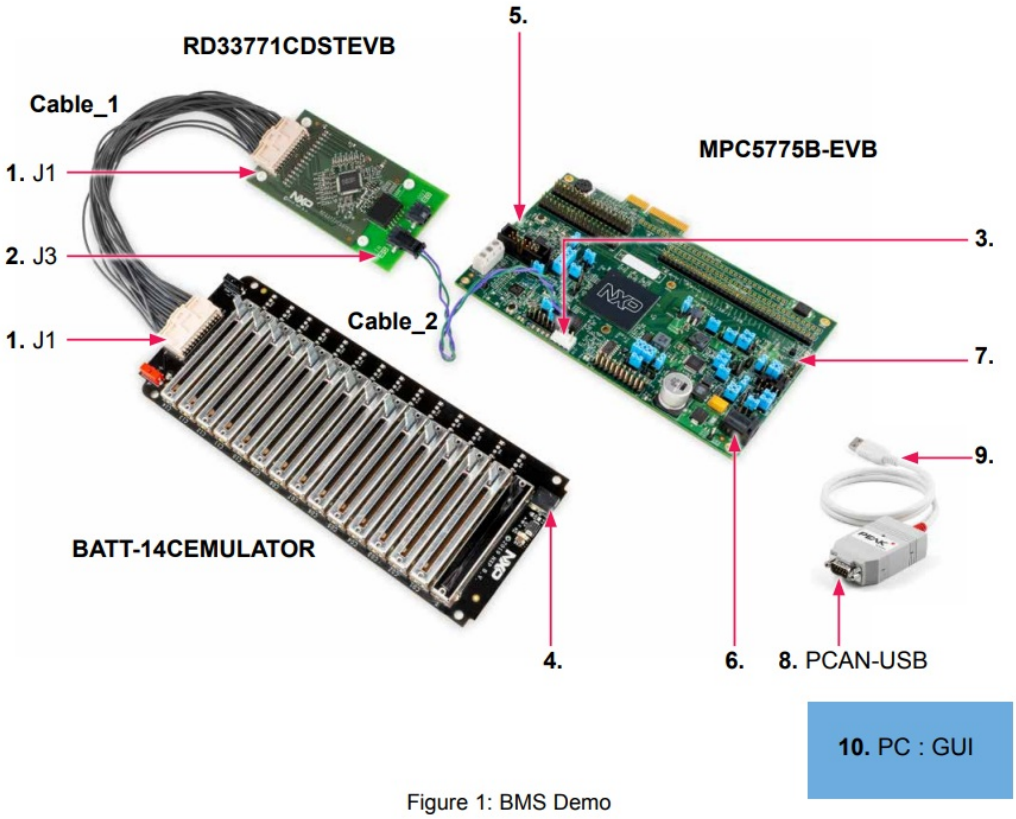
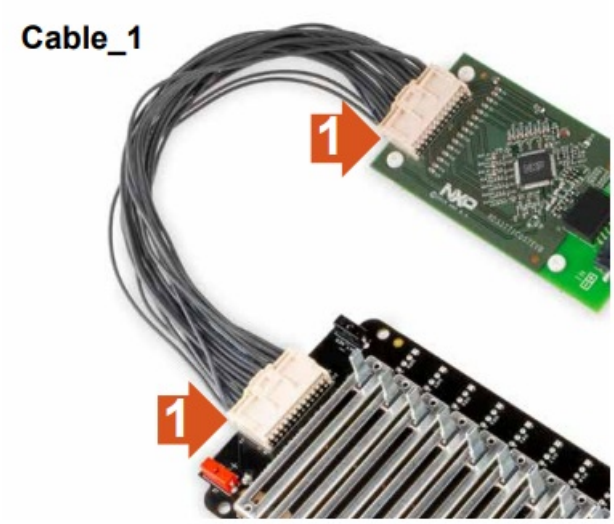


Figure 1: BMS Demo

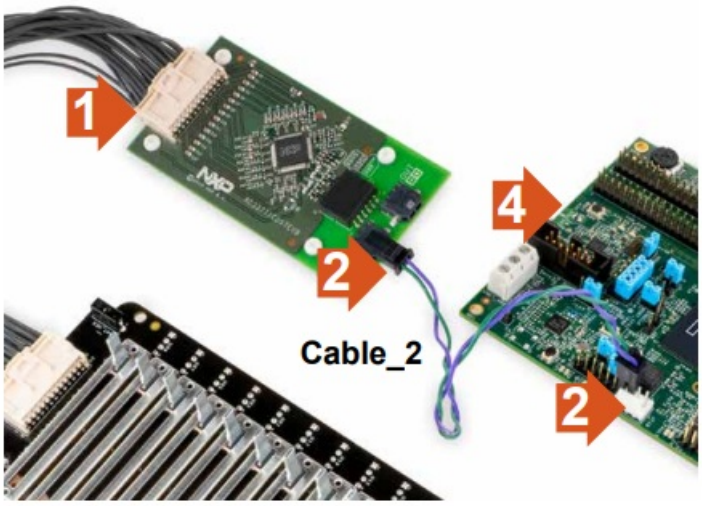
STEP-BY-STEP INSTRUCTIONS FOR BMS DEMO SETUP

1. Connect BATT14CEMULATOR and RD33771CDSTEVB



Connect the battery cell emulator board (BATT-14CEMULATOR) and the cell controller board (RDCV33771C) using Cable_1.

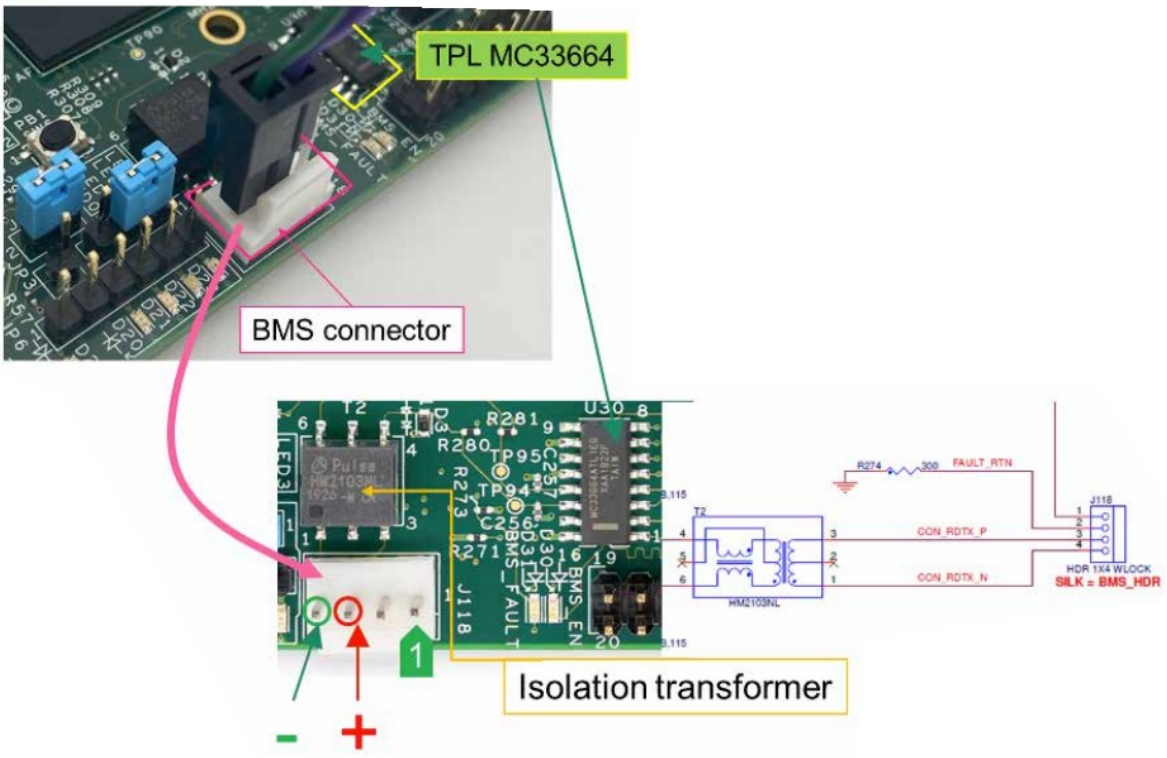
2.Connect RD33771CDSTEVB and MPC5775B-EVB for TPL link



Connect the cell controller board with the battery management board using the Cable_2 as shown in the figure to the right. This will establish the TPL link for communication.
Either J1 or J2 can be connected to the RD33771CDSTEVB.
User must connect positive (+) terminal of MPC5775B-EVB's BMS interface connector (J118 – pin 3,4) to BMS cell controller module positive (+) terminal and negative terminal to the negative terminal as shown in the next slide.

BMS APPLICATION SPECIFIC CONNECTIONS

APPLICATION-SPECIFIC ITEM	MPC5775B-EVB	MPC5775E-EVB
Battery management connector	J118	Not supported



PIN	DESCRIPTION	J118 REMARKS
1	FAULT_IN	For TPL connection use pin 3 and 4. Connect the positive to positive and negative to negative.
2	FAULT_RTN	
3	TPL_P positive terminal	
4	TPL_N negative terminal	

3. Power up BATT14CEMULATOR&RD33771CDSTEVB

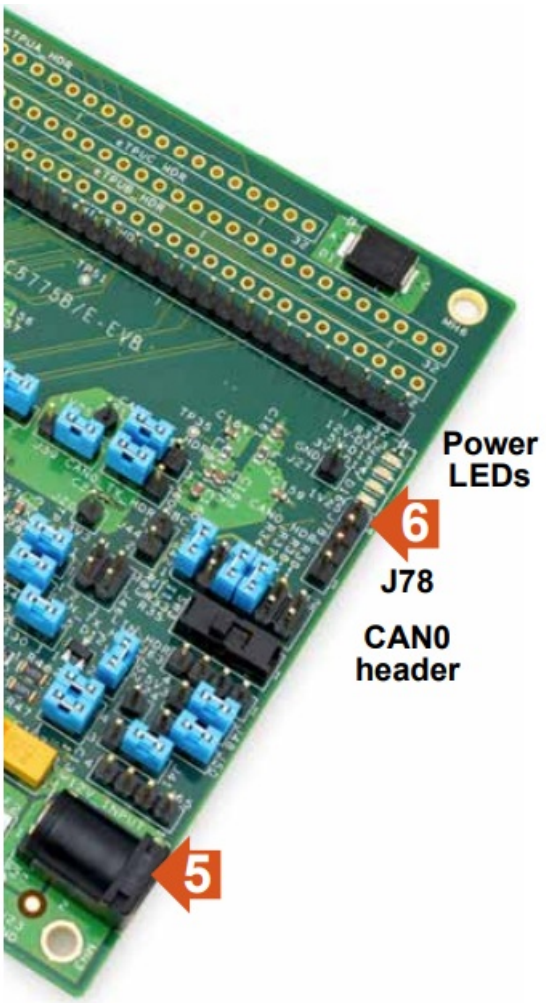
Connect the power supply to the BATT14CEMULATOR. Powering the emulator board also powers the RDCV33771C cell controller board.

4. Connect the USB serial cable to MPC5775B-EVB and PC

Connect the micro-USB cable to the J116 micro-USB port for OpenSDA connection for programming and debug.

Connect the USB side to the computer. Refer to MPC5775B-EVB QSG for more information.

5. Power the MPC5775B-EVB



Connect 12V power supply to the power socket on the Development board.
Make sure the status LEDs D14, D15, D16, and D32 for voltage levels 3.3V, 5V, 1.25V, and 12V supply respectively are glowing green on the board.

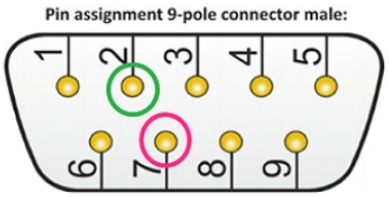
6. Connect the CAN with the PCAN tool

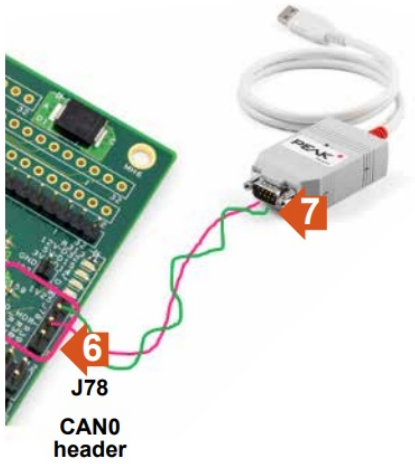
Connect CAN High and Low signals of J78 to PCAN tool CAN high and low.
MPC5775B-EVB:
J78 pin 2 is CAN0_High
J78 pin 3 is CAN0_Low

PIN	DESCRIPTION	REMARKS
1	5V	TJA1145T PHY needs to be enabled via DSPI_B, Chip select CSB1. Use J58 & J60 for CAN module selection. By default connected to FlexCAN_A/MCAN0.
2	CAN1_0H	
3	CAN1_0L	
4	GND	

7. Connect the CAN with the PCAN tool

Connect the CAN_H and CAN_L signals of J78 of MPC5775B-EVB to PCAN USB CAN_H (pin 7) and CAN-L (pin 2) via two jumper cables.



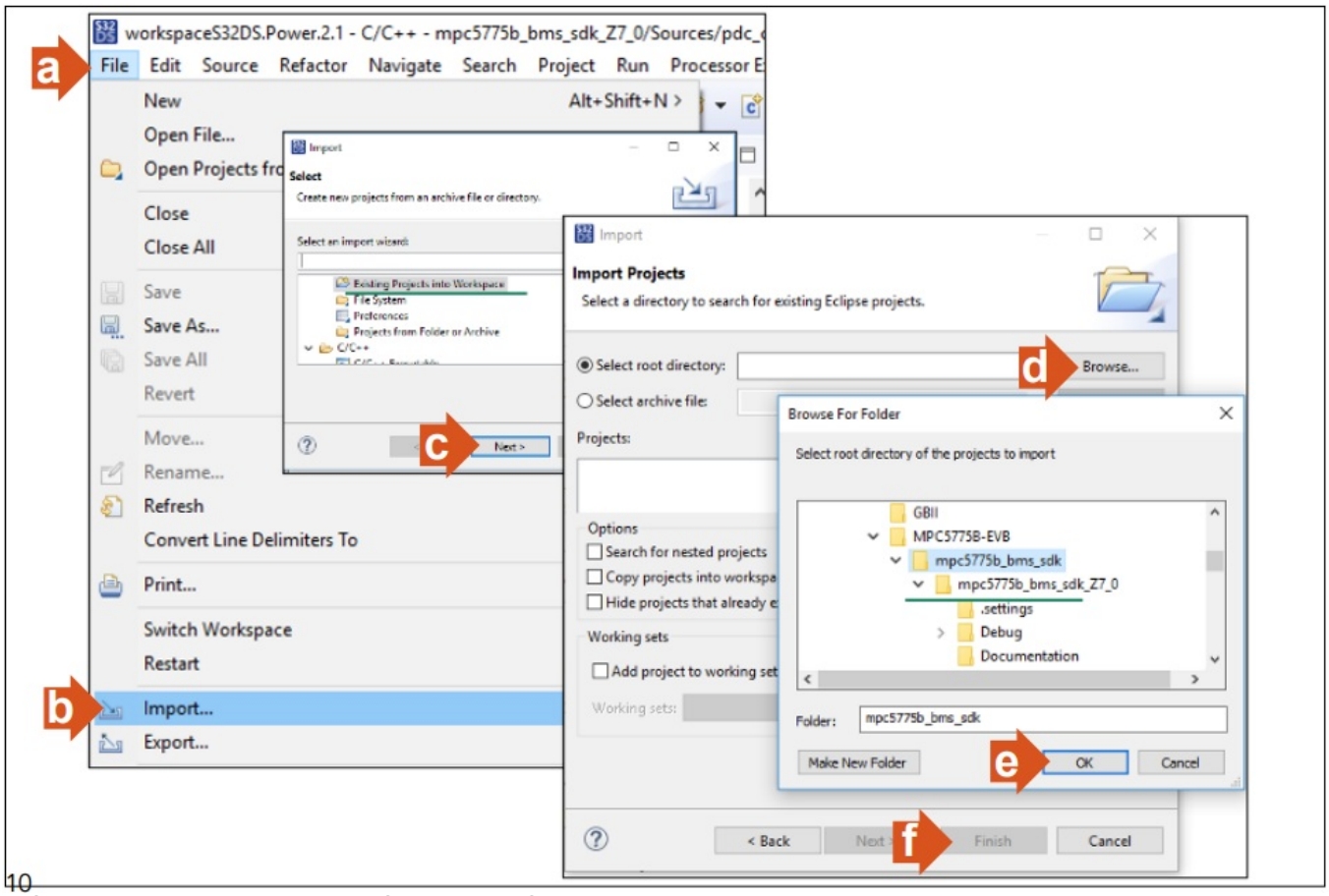


Pin Configuration

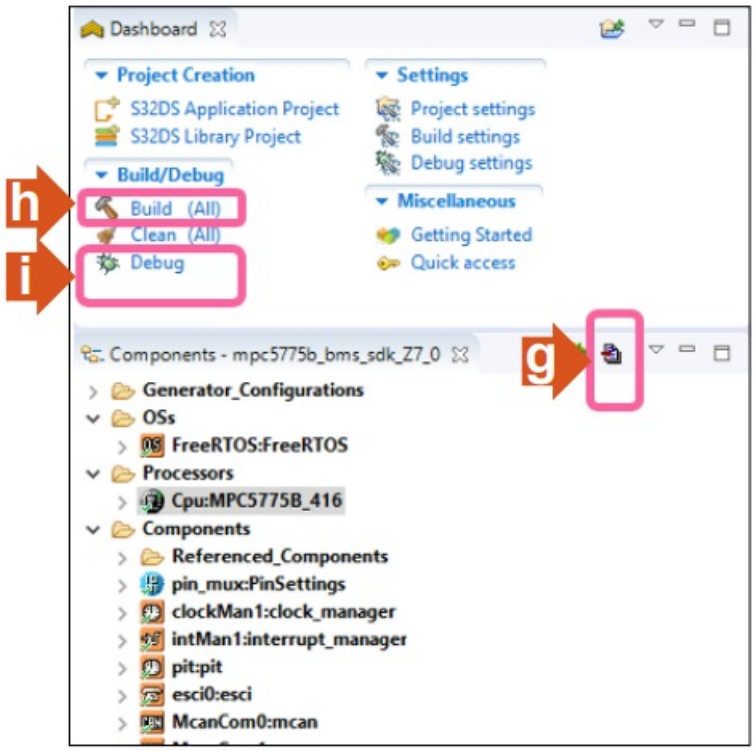
1. +12V/+5V/Not Connected 2. CAN-L 3. CAN-GND/Not Connected 4. Not Connected 5. Not Connected	6. CAN-GND/Not Connected 7. CAN-H 8. Not Connected 9. +12V/+5V/Not Connected

8. Import the MPC5775B_BMS_SDK_SW project to S32DS

Run the S32DS for PowerPC 2.1 and follow the steps “a to f” to import the MPC5775B_BMS_ SDK_SW project.



9. Generate Processor Expert Codes and Compile the binary image



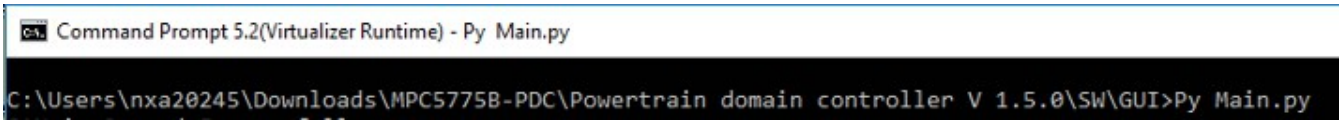
Then build and run the program.
Follow the steps “g” to “i” to generate the processor expert codes, compile and build the image. Refer to the MPC5775B-EEVB QSG to debug/flash the image.

10. Connect the PCAN tool USB to the PC

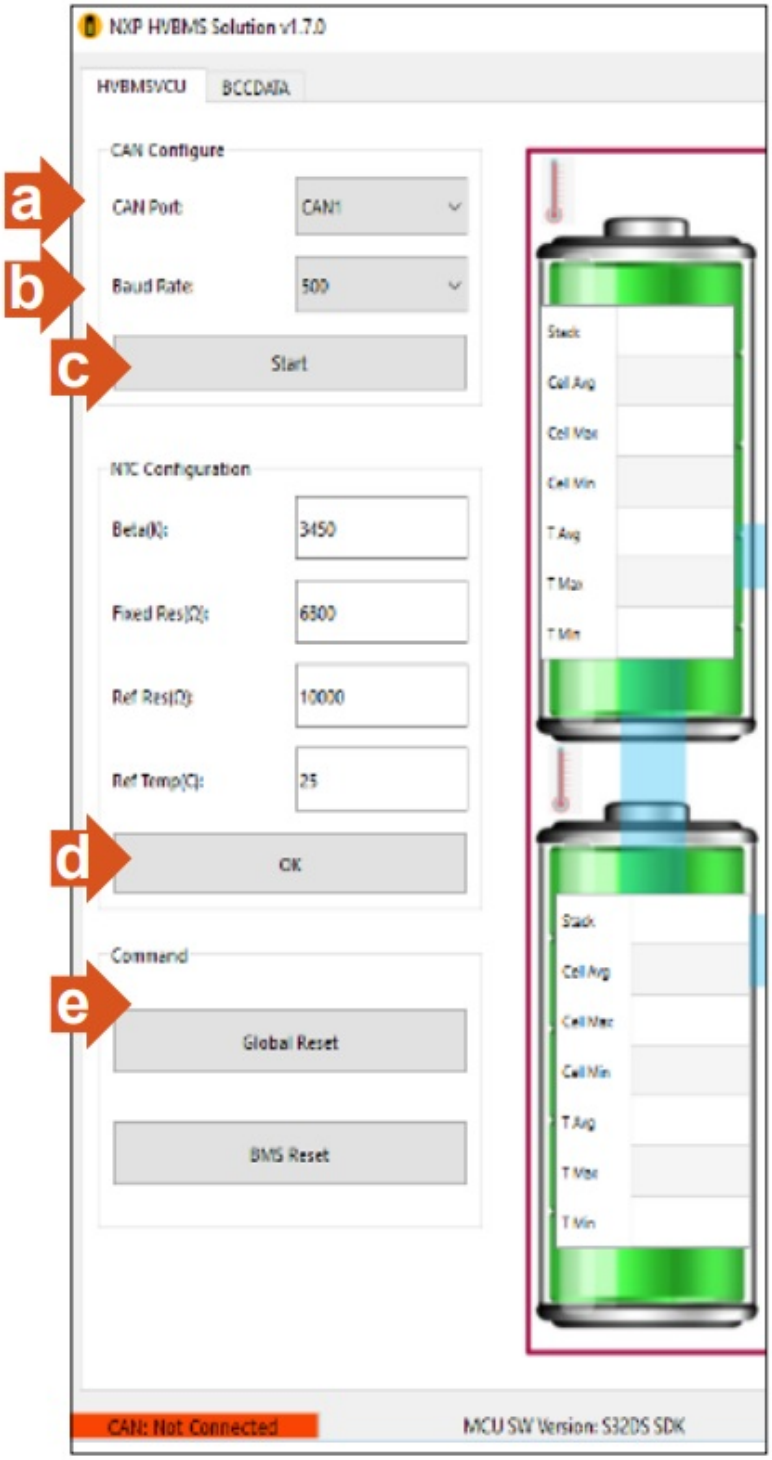
Connect the USB connector of the PCAN tool to the computer USB port.

11. Run the GUI software

Open the windows “Command Prompt” and execute the “Py Main.py” in the command shell.
“Main.py” python file included in the GUI folder.
Make sure you first install the Python 3.7 64-bit version and necessary packages PyQt5 and NumPy prior to the above step. Refer the readme file in the downloaded software GUI folder.



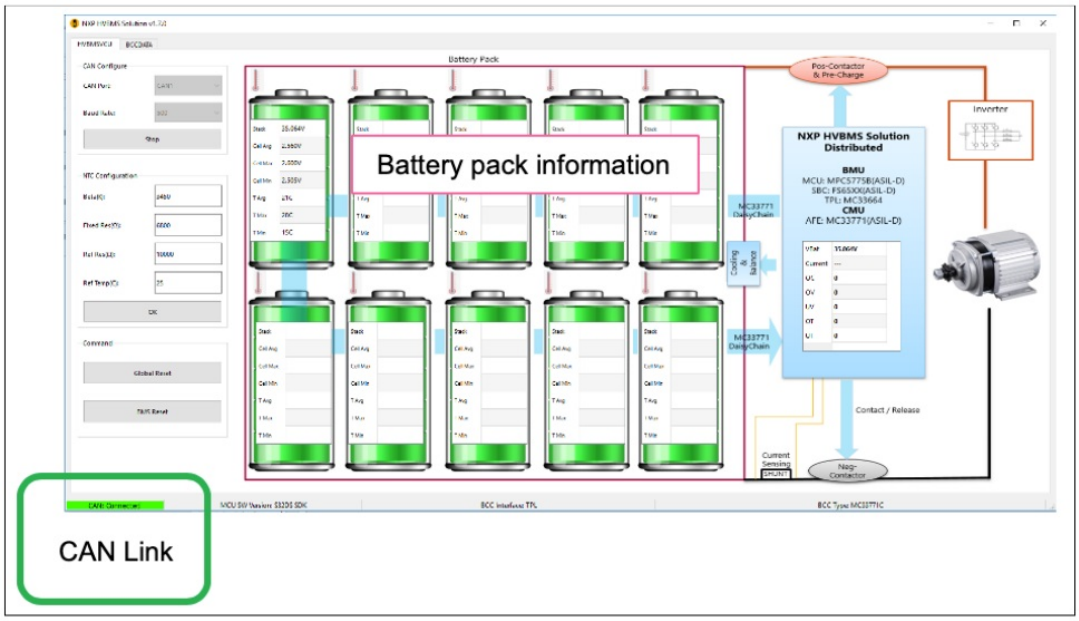
12. Setup the GUI link



a. Select CAN1
b. Set CAN baud rate to 500Kbps
c. Click “Start”, now the CAN link establish with the main controller board
d. Click “OK”
e. Initiate global reset to BMS system by clicking “Global Reset”
f. User able to observe the battery pack information shown in next slide

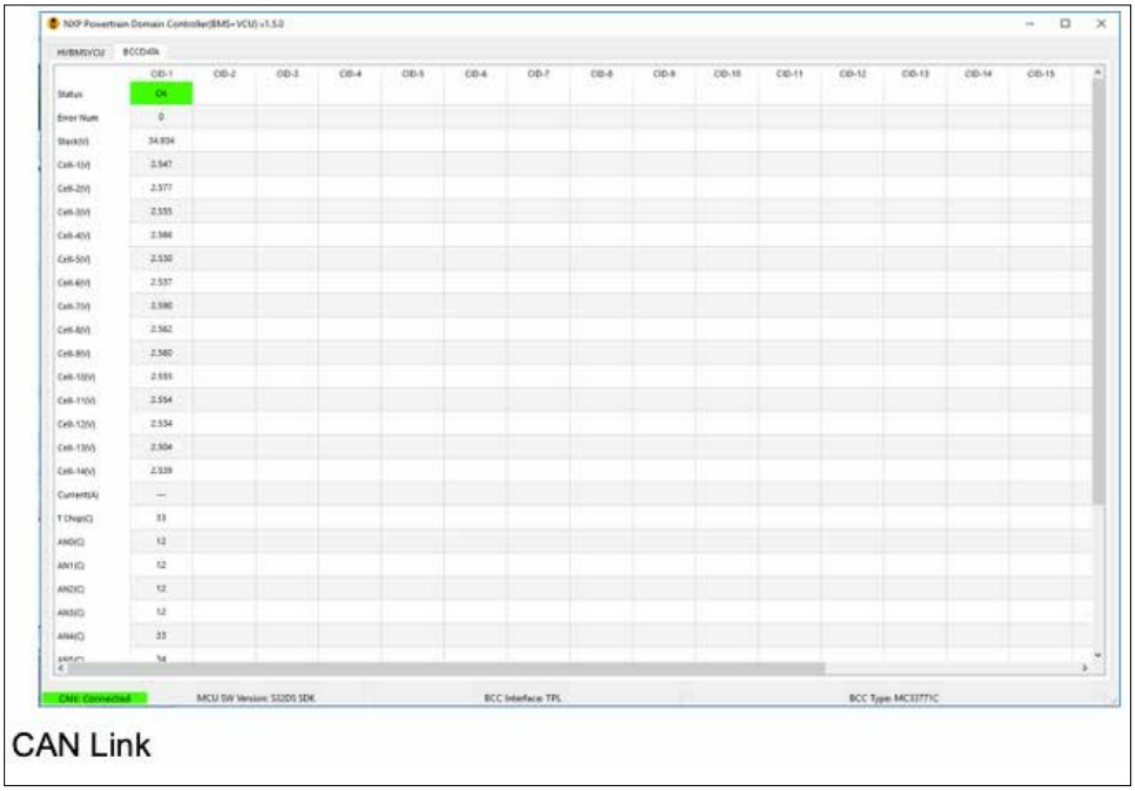
GUI INTERFACE 1/2

The figure below shows the GUI interface after communication has been established.



GUI INTERFACE 2/2

Adjust the battery levels via BATT-14CEMULATOR and observe the GUI for individual cell data in the “BCCDATA” tab.



REFERENCES

DOCUMENT	DESCRIPTION	LOCATION
MPC5775B-E-EVB-QSG	Quick Start Guide of MPC5775B-EVB	NXP web site
AN12875	Getting Started with MPC5775E-EVB and MPC5775B-EVB	NXP web site
MPC5775E RM	MPC5775E RM/MPC5775B Reference Manual	NXP web site
MPC5775E DS	MPC577E/MPC5775B Data Sheet	NXP web site
OpenSDA	OpenSDA User's guide	NXP web site
S32DS	S32 Design Studio for Power Architecture v2.1 – Windows/Linux	NXP web site
MC33FS6520LAE	MC33FS6520 System Basis Chip (Power supply and drivers) Data Sheet	NXP web site
FS65SBC-SDK-SW	FS6500/FS4500 Generic Embedded Software Driver (Software Development Kit)	NXP web site
TJA1100	TJA1100 100BASE-T1 PHY For Automotive Ethernet	NXP web site
TJA1145	High-speed CAN transceiver for partial networking	NXP web site
MC33664_SDS	Isolated Network High-Speed Transceiver Short Data Sheet	NXP web site
MC33664	Isolated Network High-Speed Transceiver Full Data Sheet	NXP web site
MC33771C	Battery Cell Controller Full Data Sheet	NXP web site
RD33771CDSTEVB	Evaluation Board for MC33771C BCC with Isolated Daisy Chain Communication	NXP web site
BATT-14CEMULATOR	14-Cell Battery Pack Emulator to Supply MC33771C BCC EVs	NXP web site
HM2102NL	Pulse Electronics Dual BMS transformer	Pulse Electronics
HM2103NL	Pulse Electronics Single BMS transformer	Pulse Electronics

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Get Started

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Document Number: BMSSOLQSG REV 0

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Documents / Resources

	NXP Battery Management System [pdf] User Guide MPC5775B-EVB, RD33771CDSTEVB, Battery, Management System, NXP

References

- MPC5775B+MC33771 BMS System | NXP Semiconductors
- NXP® Semiconductors Official Site | NXP Semiconductors
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