Config Wizard Tool for MOTIX™ single half-bridge IC's BTN9970, BTN9990, BTN7030

User manual

About this document

Scope and purpose

This tool is a graphical user interface to control the motor control shields of Infineon's MOTIX™ single half-bridge IC's BTN9970, BTN9990 and BTN7030.

With this tool two high current PN half bridges with integrated driver IC, BTN9970 and BTN9990, can be controlled to drive e.g. brushed DC motors.

Intended audience

This document is addressed to embedded hardware and / or software developers which are familiar with motor control schemes and intend to evaluate the IC'S BTN9970, BTN9990, BTN7030.

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1 Setup for BTN9970 and BTN9990

Required hardware:

- µIO Stick, see Figure 1.
- BTN9970 / BTN9990 motor control shield, see Figure 1, Figure 2 and Figure 3.
- 12V DC power supply, which is able to provide sufficient current for the motor load. For evaluation purpose motor loads which less than 10A current consumption are recommended.

Connections:

- Connect µIO Stick to the BTN9970 / BTN9990 motor control shield as shown in Figure 1. Check for correct connection of cable to the 16-pin header, Connector µIO on the board. Red wire at the cable indicates pin 1.
- Connect a motor load between the ports OUT1 and OUT2 at the connector X2, see Figure 2 and Figure 3.
- Connect µIO Stick to a free USB port at a PC or Laptop
- Connect a 12V power supply at the ports V_{BAT} and GND at connector X1, Figure 3. Turn on the power supply at the latest, when all other components including motor are connected properly and the tool has been opened on the PC / Laptop.

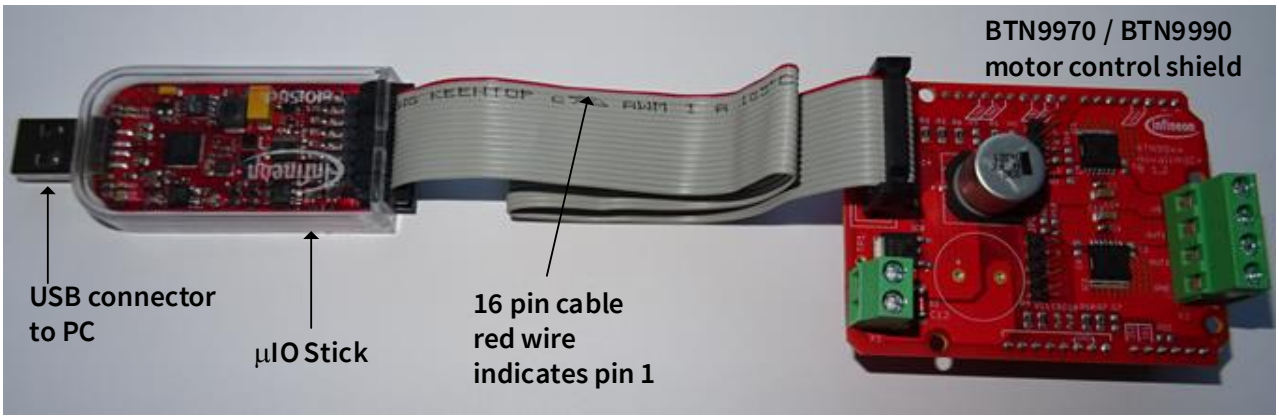


Figure 1: µIO Stick connected to BTN9970 / BTN9990 motor control shield

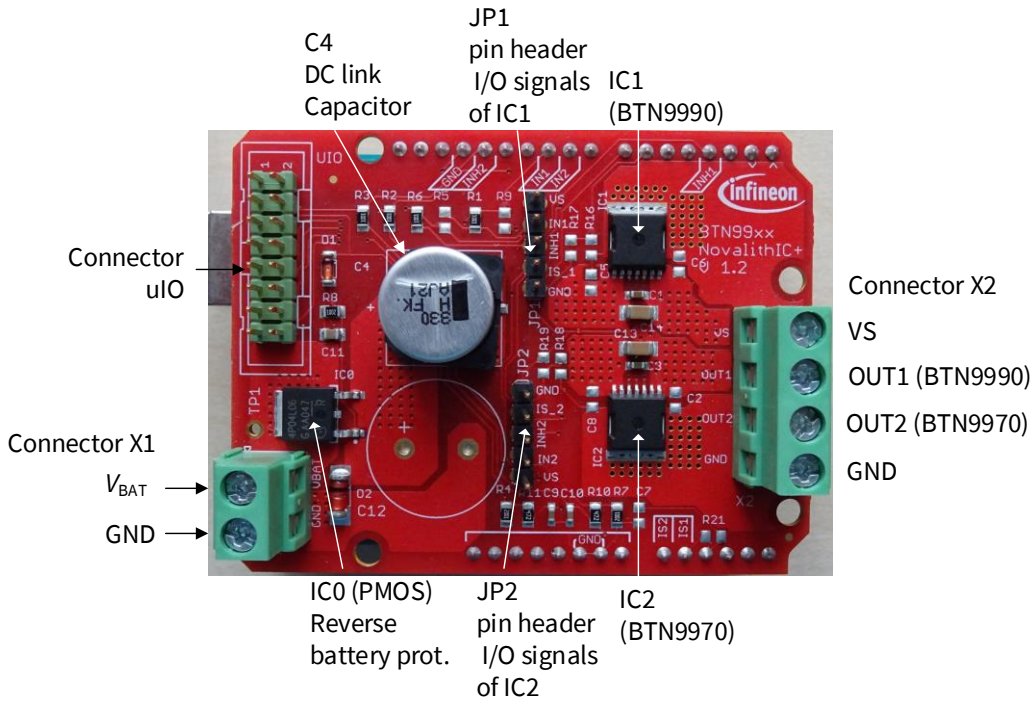


Figure 2: BTN9970 / BTN9990 motor control shield with its connections

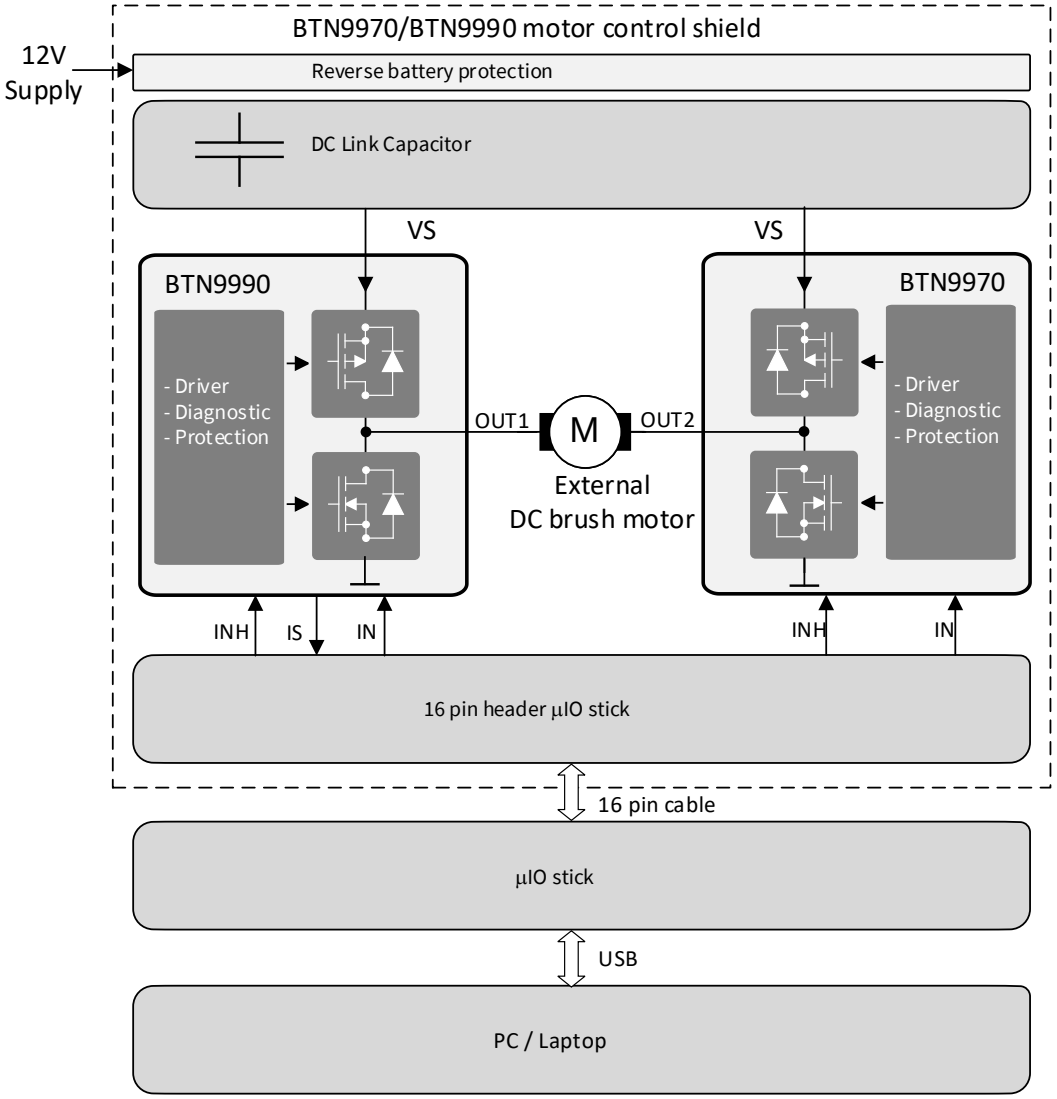
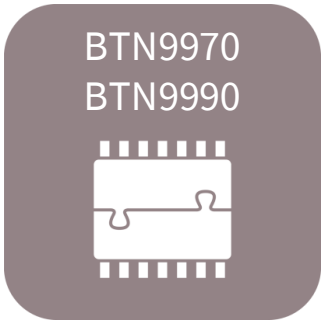


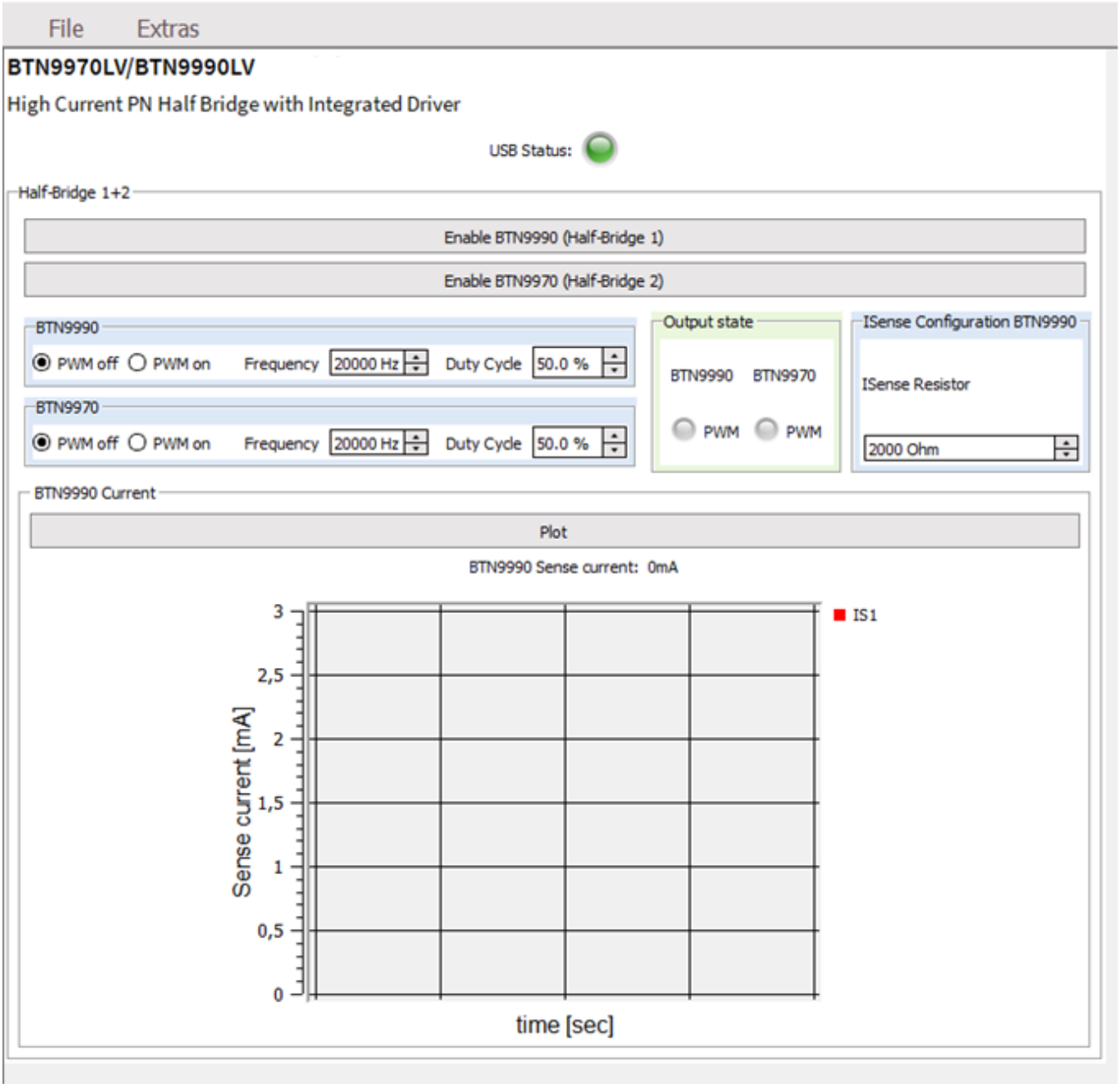
Figure 3: Setup overview and functional block diagram of the BTN9970 / BTN9990 motor control shield

2 Open tool for BTN9970 and BTN9990

Select icon below to open the tool.

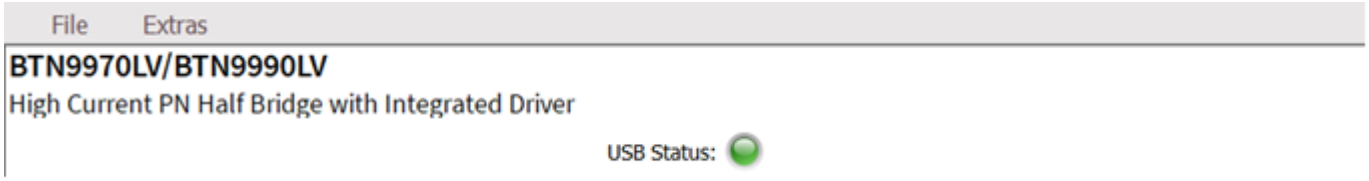


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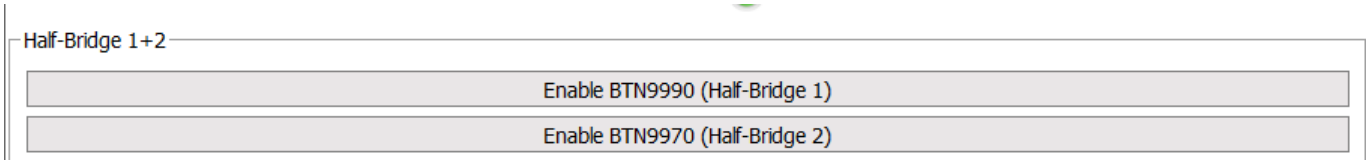
3 Description of the graphical user interface for BTN9970 and BTN9990

Status LED for connection to µIO Stick:
Green indicates µIO Stick is connected;
Red indicates µIO Stick is not connected



Enable / Disable of the two half bridges BTN9990 (Half-Bridge 1)and BTN9970 (Half Bridge 2):

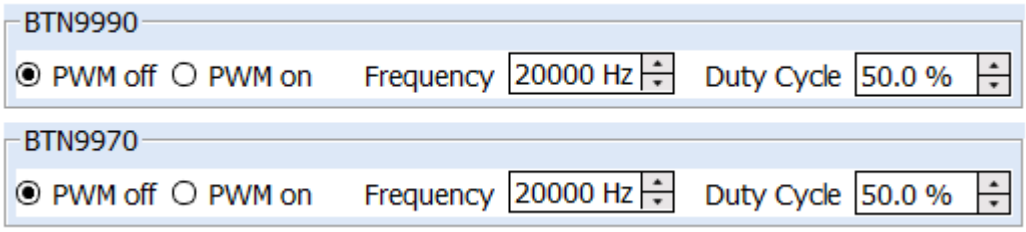
If disabled, OUT 1 / 2 are high impedance. If enabled, status of OUT 1 / 2 pins depends on PWM off / on setting.



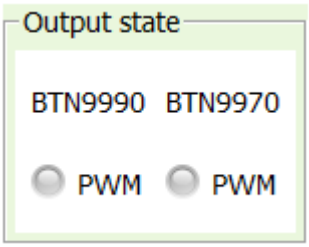
Control of outputs OUT 1 and OUT2:
Below picture shows the default setting of the outputs of both devices BTN9970 and BTN9990.
In the frequency filed a maximum PWM frequency of 20kHz can be selected.
The duty cycle range is between 0% and 100%, default 50%.

0% duty cycle corresponds to output OUT1 /2 set to low (connected to GND).

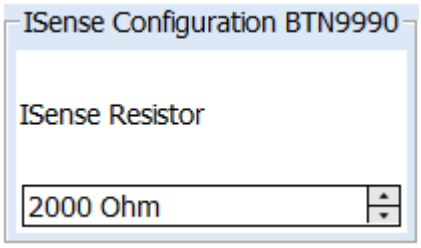
100% duty cycle connects the output OUT 1 / 2 permanently to the supply voltage.



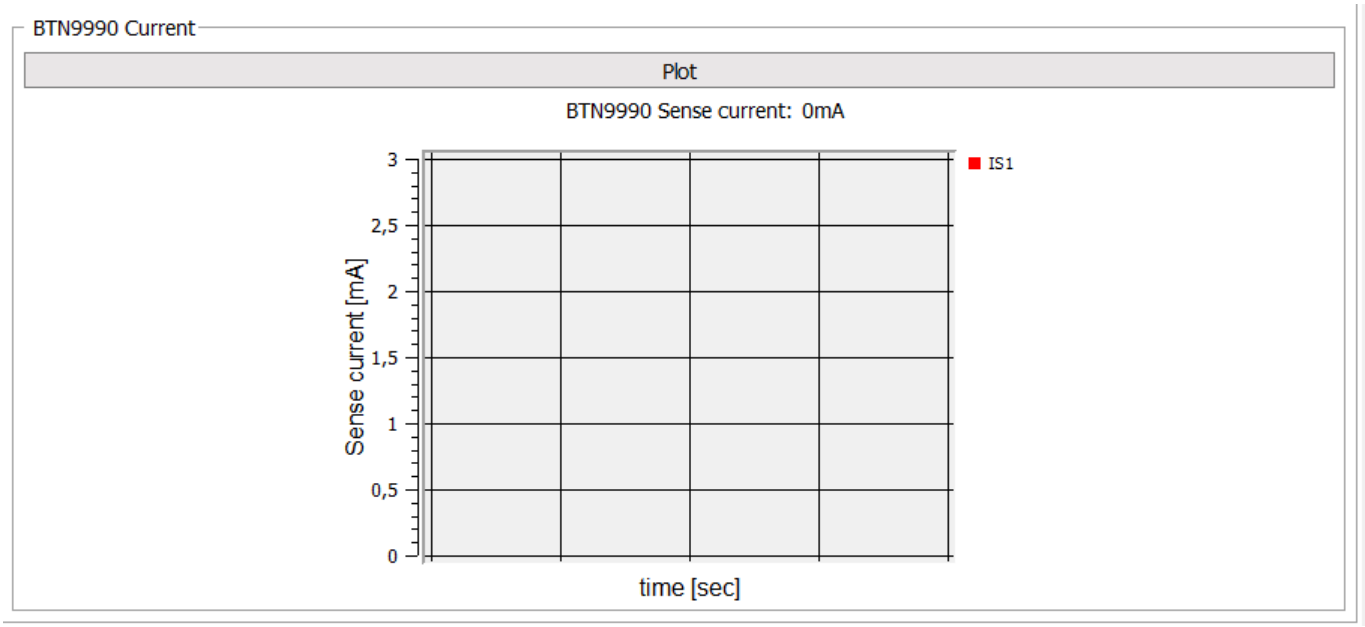
Output state indicator field
The indicators turn to green if the corresponding device is enabled and PWM is turned on.



Sense Resistor Configuration BTN9990:
In this field, the sense resistor of BTN9990 can be adapted in case it has been modified on the board. Default is 2kΩ. Usually, not modification is required here.



BTN9990 IS current sensing:
With enabling "Plot", the sense current value provided by BTN9990 (Half-Bridge 1) is plotted in the graph window. With this tool, only the sense current of BTN9990 Half-Bridge 1 high side switch can be plotted. Due to limited sample rate of the tool, the values plotted are not real time measures in case PWM control with duty cycle < 100% is used for Half-Bridge 1.



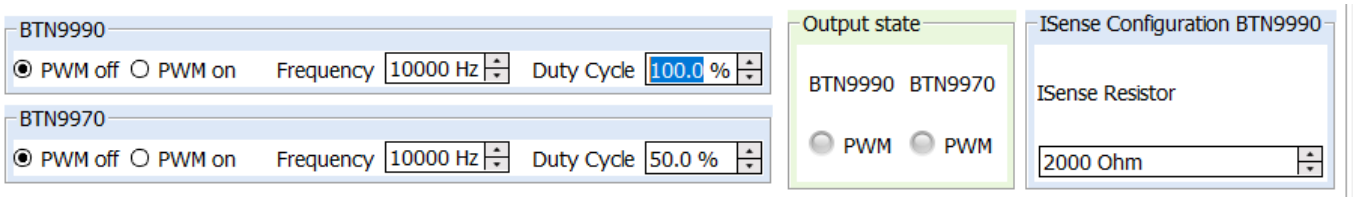
4 Example for BTN9970 and BTN9990

The following example shows the configuration of the tool to drive a DC brush motor in a full bridge configuration, as shown in Figure 3. A motor needs to be connected between outputs OUT1 and OUT2.

PWM frequency should be 10kHz, the duty cycle is 50%.

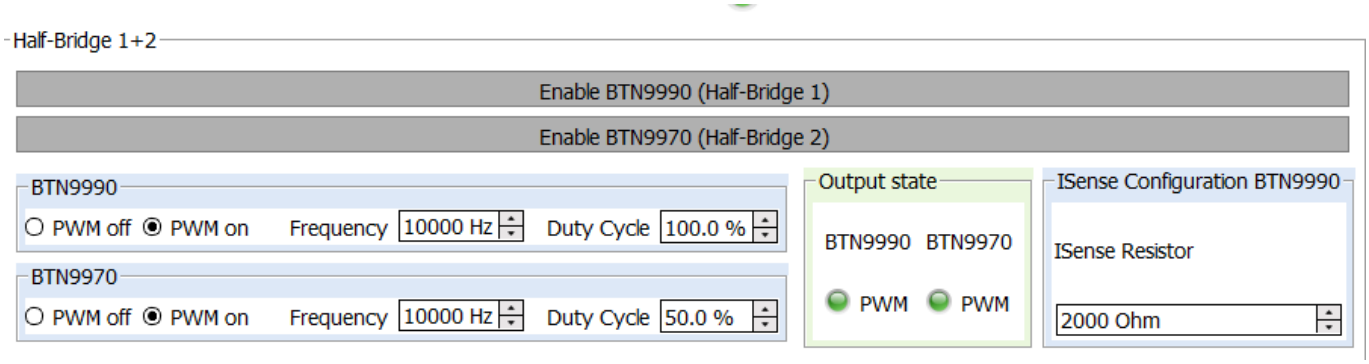
Half bridge 1 (BTN9990) output is driven high (connect to supply voltage), half bridge 2 (BTN9970) is controlled via PWM to control the motor to approximately half of maximum speed.

The setting is shown below



To get the motor spinning both PWM on buttons need to be selected and both devices have to be enabled.

See settings below.



Changing the frequency of BTN9970 (half bridge 2), the speed of the motor can be modified.

5 Setup for BTN7030

Required hardware:

- µIO Stick, see Figure 1.
- BTN7030 motor control shield, see **Fehler! Verweisquelle konnte nicht gefunden werden.**.
- 12V DC power supply, which is able to provide sufficient current for the motor load.

Connections:

- Connect µIO Stick to the BTN7030 motor control shield. Red wire at the cable indicates pin 1.
- Connect a motor load to the two output banana connectors OUT1 and OUIT2 (green) see Figure 5. The board includes 2 x BTN7030 half bridge devices which are connected in a full bridge configuration, see Figure 6.
- Connect µIO Stick to a free USB port at a PC or Laptop
- Connect a 12V power supply at the banana connectors. VS (Red) = 12V, GND (black). Turn on the power supply at the latest, when all other components including motor are connected properly and the tool has been opened on the PC / Laptop.



Figure 4: uIO Stick with cable

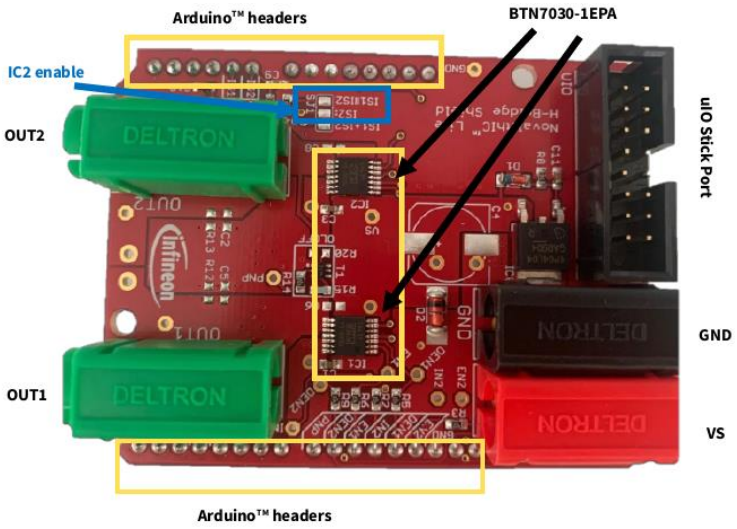


Figure 5: Motor control shield BTN7030

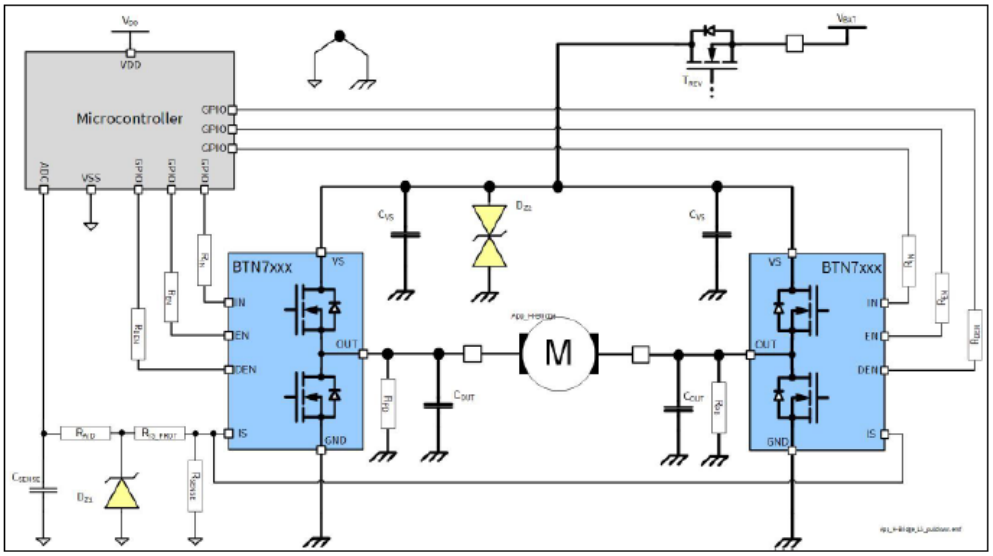
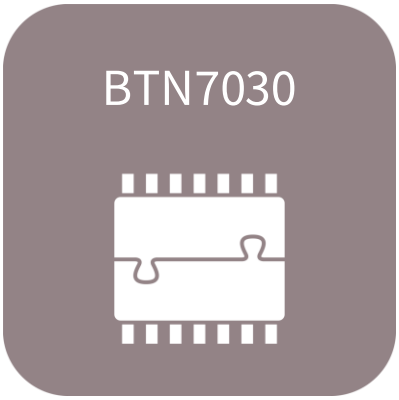


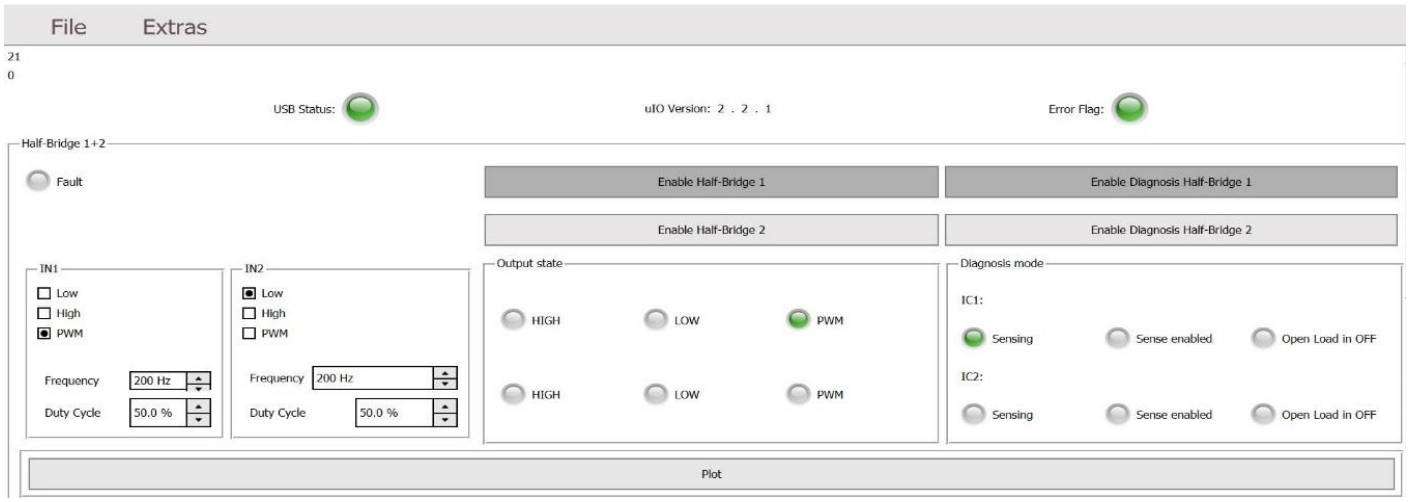
Figure 6: Simplified application circuit for full brdige configuration with 2 x BTN7030as implemented on motor control shield

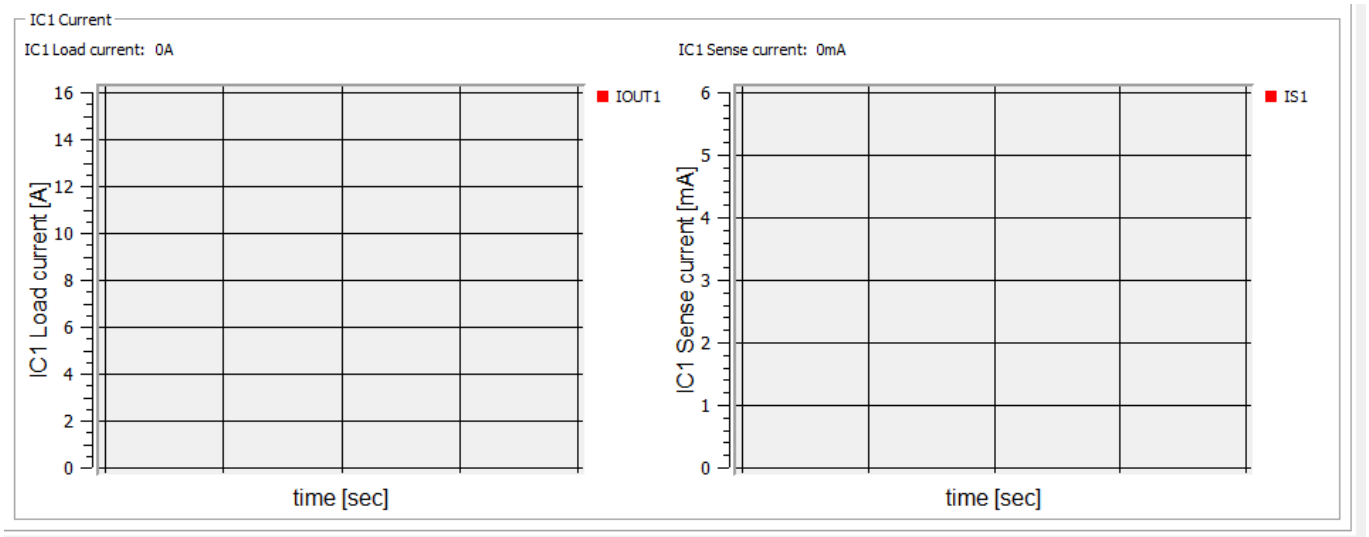
6 Open tool for BTN7030

Select icon below to open the tool.



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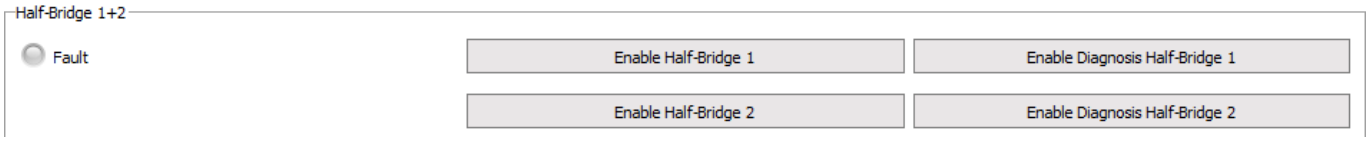




7 Description of the graphical user interface for BTN7030

Enable / Disable of the two half bridges BTN7030 and diagnosis.

If disabled, OUT 1 / 2 are high impedance. If enabled, status of OUT 1 / 2 pins depends on settings of IN1 and IN2 pin (Low, High, PWM). The device features diagnosis function which can be turned on/off by setting the buttons "Enable Diagnosis Half Bridges 1 / 2".



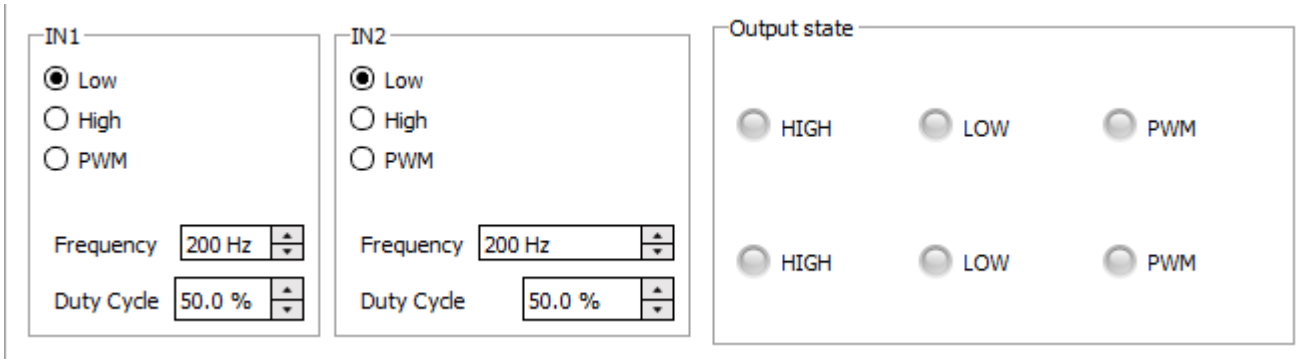
Control of outputs OUT1 and OUT2:
Below picture shows the default setting of the outputs of both devices BTN9970 and BTN9990.
In the frequency filed a maximum PWM frequency of 2kHz can be selected.
If button PWM is selected the corresponding output will be PWM'ed.

The duty cycle range is between 0% and 100%, default 50%.

0% duty cycle corresponds to output OUT1 /2 set to low (connected to GND).

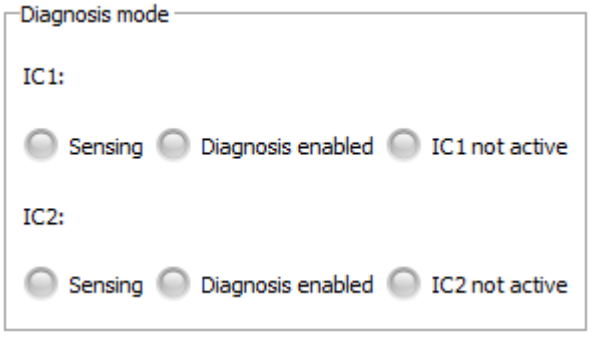
100% duty cycle connects the output OUT 1 / 2 permanently to the supply voltage.

The status of the outputs is shown in field "Output state" with highlighted button.



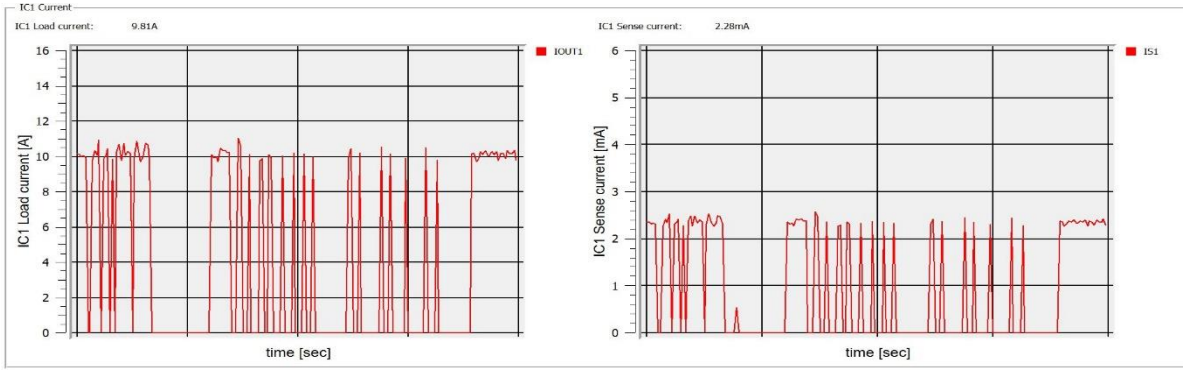
Diagnosis mode field

Status of diagnosis is shown in the field "Diagnosis mode"



Plot field area

If selected, the plot field area shows the IC1 sense current (half bridge 1) in the right graph and the corresponding IC1 load current in the left graph. The load current is calculated by the tool out of the IC1 sense current signal. The plots do not reflect real time values, due to sampling limitations of the tool. The load current and sense current signal can only be shown for IC1 (half-bridge 1), not for IC2 (half-bridge 2).



References

BTN9970LV-DataSheet

BTN9990LV-DataSheet

Web page for BTN9970 / BTN9990 motor control shield

User manual for BTN9970 / BTN990 motor control shield

BTN7030-1EPA Data Sheet

Web page for DC Motor Control Shield with BTN7030

User manual for Motor Control Shield with BTN7030-1EPA

Revision history

Document version	Date of release	Description of changes
1.0	2022-03-24	First version

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AppNote Number

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