# DC Motor Control HAT with TLE94112ES

Quick Start Guide V1.0.0



The TLE94112ES HAT is a DC Motor Control board that is capable to drive up to six independent or eleven cascaded bidirectional DC motors.

The HAT can be controlled by a Raspberry Pi board via an SPI interface and features an Infineon TLE94112ES, a twelve-fold half-bridge driver with integrated MOSFETs. The HAT has an active reverse polarity protection with the p-channel MOSFET <u>IPD50P04P4L-11</u> and is able to power a Raspberry Pi via the DC/DC-converter <u>TLS4125D0EP 50V</u>. To ensure the use of multiple HATs on one Raspberry Pi the CS pin can be changed via jumpers.

All software is released into the public domain and available as open source libraries on GitHub.



- > Supply voltage is typ. **12V** (max. 20V)
- > All outputs can drive up to 0.9A
- Outputs can be used stand-alone or combined to increase driving capability up to
   3.6A
- The default CS-pin is CS0, but it can be changed via jumpers to CS1, CS2 or CS3
- > Via pin header 8 the input voltage can be bridged to another HAT





- The HAT includes an EEPROM which stores vendor, product and interface information and can automatically enable the SPI interface of the Raspberry Pi.
- In case multiple HATs are stacked, the EEPROM on all but one HAT need to be disabled. This can be done by closing the solder bridge marked with A+1





### HAT Overview





# Pinout Diagram

	Cinfineon
	3.3V 1 2 5V
Bin number	SDA1 - 2 - 3 - 0 - 4 - 5V
Baseborny Bi GBIO number	SCL1 - 3 - 5 - 0 - 6 - GND
Raspberry Pi GFIO number	GPIO CLK - 4 - 7 - 0 - 8 - 14 - TXD0
Raspberry Pi pin function	GND 9-0 -10-15-RXD0
Connected to	SPI1 CS1 -17 - 11 12 - 18 - PCM CLK
	GPIO GEN2 -27 - 13 - 0 - 14 GND
	SPI0 CS3 - GPIO GEN3 - 22 - 15 - 0 - 16 - 23 - GPIO GEN4
	3.3V
	MOSI - SPI0 MOSI - 10 - 19 - 20 - GND GND
TARV O	MISO - SPI0 MISO - 9 - 21 - 0 - 22 - 25 - GPIO GEN6 - SPI0 CS2
	SCLK - SPI0 SCLK -11 -23 24 - 8 - SPI0 CS0 - SPI0 CS0
	GND 25 0 - 26 7 SPI0 CS1 - SPI0 CS1
	ID_SD - EEPROM SD - 27 - 28 EEPROM SC - ID_SC
	5 - 29 - 30 - GND GND
	6 - 31 - 0 - 32 - 12 - PWM0
=\	PWM1 -13 - 33 34
8	PCM FS -19 - 35 - 0 - 36 - 16 - SPI1 CS2
	EN TLE94112
	GND 39 40 21 PCM DOUT



#### > Check if your Raspberry Pi is compatible with the HAT

Raspberry Pi Model	Compatibility
1 Model A	No
1 Model A+	Yes
1 Model B	No
1 Model B+	Yes
2 Model B	Yes
2 Model B v1.2	Yes
3 Model A+	Yes
3 Model B	Yes
3 Model B+	Yes
4 Model B	Yes
Zero	Yes
Zero W	Yes



## **Getting Started**

- > Check if ...
  - ... the correct CS pin is selected





- > Connect
  - the HAT to the Raspberry Pi via the 40 pin pinheader,
  - a 12V power supply unit to VBAT and GND (The Pi is also powered now) and
  - a DC motor to outputs 1 and 5





#### Getting Started (Software)

- > As soon as the Pi is powered, make sure it is connected to the internet
  - Either via Wi-Fi or via an ethernet cable
- > There are two options to access the Raspberry Pi
  - Connect the Pi via a HDMI cable to a monitor
  - or download <u>Putty</u> and access the Pi via its IP address

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	Close window on exit: Always Never Only on clean exit						

For further information please refer to the official Rasberry Pi documentation





#### Getting Started (Software)

- > When the Pi is all set up, go to Infineon GitHub
- > Look for <u>multi-half-bridge</u>, you can find all information there
- Clone the git repository with
  - git clone https://github.com/Infineon/multi-half-bridge.git
  - This repository includes the TLE94112ES library and usage examples

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- The bcm2835 library provided by airspayce is required by the library and can be installed automatically, using the script install\_requirements.sh in src/framework/raspberrypi
- > For this, execute
  - cd multi-half-bridge/src/framework/raspberrypi
  - sudo chmod +x ./install\_requirements.sh
  - ./install\_requirements.sh
  - More information about this library can be found <u>here</u>



- For a quick first test, example code can be found here: /src/framework/raspberrypi/examples
- > To **compile** the basicTest example
  - execute "cd /src/framework/raspberrypi/"
  - and then compile the code with "make examples/basicTest".
    - if you compiled another example before execute "make clean" before compiling
- > To run the code on the Raspberry Pi
  - change to folder "build" and execute the code
    - ../../build/basicTest

# infineon

#### **Schematics**





## **Revision History**

> Version 1.0.0: Initial Release



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