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## TMC2211 Smart Pin-Configurable Integrated Stepper Driver

### General Description

The TMC2211STEPSTICK board allows an uncomplicated first evaluation of the TMC2211 and provides full control of all its features.

The TMC2211 is a smart pin-configurable, high-performance, stepper motor controller and driver IC. It features the industry's most advanced stepper motor driver based on a 256-microstep, built-in indexer and fully integrated 65V, 3.0A<sub>MAX</sub> H-bridges. It also includes nondissipative integrated current sensing (ICS).

### Features

- 4.5V to 65V DC Single-Supply Voltage Range
- Current Ratings per H-Bridge (25°C, typ):
  - 2A<sub>RMS</sub> (2.8A sine peak) at V<sub>S</sub> = 24V
  - 1.7A<sub>RMS</sub> (2.4A sine peak) at V<sub>S</sub> = 48V
- 2.2V to 5.5V Logic I/O Supply Voltage
- Configuration Pins and Resistors

### Table 1. Content

ITEM	DESCRIPTION
TMC2211STEPSTICK	TMC2211STEPSTICK Board

### Documents Needed

- TMC2211 Data Sheet

[Ordering Information](#) appears at end of user guide.

## Getting Started

### Required Items

- TMC2211STEPSTICK
- A compatible motor (e.g., a Qmot stepper motor)
- Power supply
- Cables to interface with the motor and power supply
- 0.64mm pin headers with 2.54mm pitch
- 1mm-to-1.5mm flathead screwdriver

### Precautions

- Do not exceed the board's maximum rated supply voltage.
- Do not connect or disconnect the motor while the board is powered.
- Make sure the used board, cables, and motor are in a good state before using them.
- Ensure to use the appropriate protection while working with high voltages. In some countries, voltages higher than 50V are considered dangerous.
- Do not touch the power stage section of the board during operation as it might get hot.

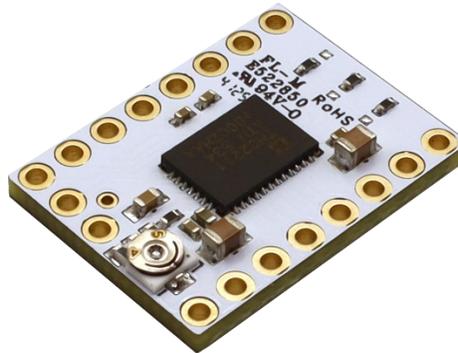


Figure 1. TMC2211STEPSTICK

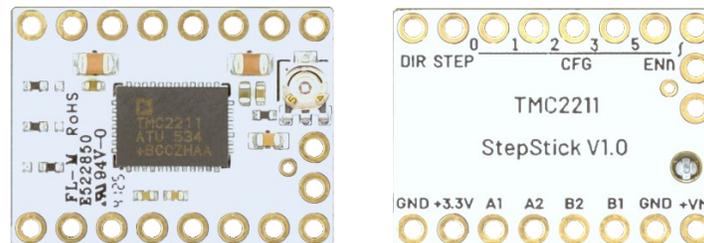


Figure 2. TMC2211STEPSTICK Top (left) and Bottom (right) Views



**Table 4. Pin Configuration for CFG5**

CFG5	CHOPPER MODE
Low	SpreadCycle
High	StealthChop

**Resistor Configuration**

The following configuration options require a change in the placement of the 0Ω jumper resistors.

**Note:** All configuration changes that involve soldering need to be performed while the PCB is disconnected from the power supply. Any deviations from the configurations shown in [Table 5](#) can cause permanent damage to the PCB and/or the power supply due to shorted power rails.

**Table 5. Resistor Configuration for CFG6 and CFG7**

CFG7	CFG6	HOLD CURRENT REDUCTION	R205	R206	R207	R208
Low	Low	No reduction (IHOLD = IRUN)	Do not place	Placed	Do not place	Placed
Low	High	Reduction to 50% (IHOLD = ½ IRUN)	Placed	Do not place	Do not place	Placed
High	Low	Reduction to 25% (IHOLD = ¼ IRUN)	Do not place	Placed	Placed	Do not place
High	High	Reduction to 12.5% (IHOLD = 1/8 IRUN)	Placed	Do not place	Placed	Do not place

**Table 6. Resistor Configuration for CFG4**

CFG4	DIGITAL CURRENT SCALE	R203	R204
Low	IRUN = 23 (75%)	Do not place	Placed
High	IRUN = 31 (100%)	Placed	Do not place

**Current Setting**

The maximum motor current is defined by the full-scale current ( $I_{FS}$ ), which is set by resistors R201 and R202 at the  $I_{REF}$  pin of the TMC2211. Additionally, see [Table 6](#) for the IRUN current configuration.

The potentiometer R201 can be adjusted by using a 1mm-to-1.5mm flathead screwdriver in the through-hole.

Depower the TMC2211STEPSTICK and measure the resistance between the  $I_{REF}$  pin and GND with a multimeter.

Set the desired resistance through potentiometer R201 as follows:

- 12kΩ corresponds to 2.05A<sub>RMS</sub>.
- 36kΩ corresponds to 0.68A<sub>RMS</sub> (This is the typical default setting of the potentiometer.).
- 56kΩ corresponds to 0.44A<sub>RMS</sub>.

More calculation examples and a formula are given by the TMC2211 data sheet.

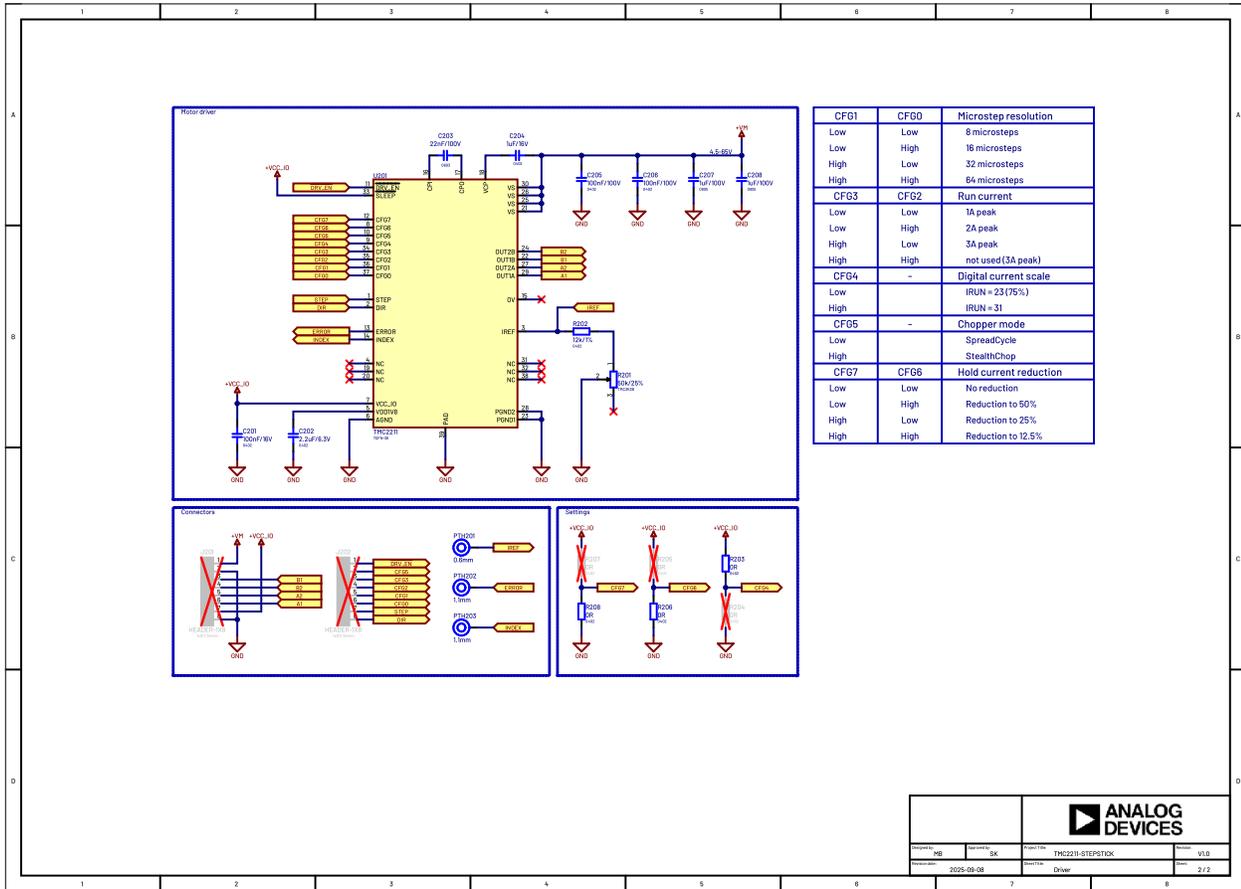
## Ordering Information

PART	TYPE
TMC2211STEPSTICK	StepStick

## TMC2211STEPSTICK Bill of Materials

PART	QTY	PACKAGE	MANUFACTURER	MANUFACTURER PN
C201	1	0402	Kemet	C0402C104K4RAC7867
C202	1	0402	Murata Electronics	GRM155R60J225KE01D
C203	1	0603	KEMET	C0603C223K1RACTU
C204	1	0402	Taiyo Yuden	MSASE105SB5105KFNA01
C205, C206	2	0402	Murata Electronics	GRM155R62A104KE14D
C207, C208	2	0805	KYOCERA AVX	08051C105K4T2A
R201	1	TMC3K3B	Teikoku Tshushin Kogyo Co. Ltd./NOBLE Electronics	TMC3K3B-B47K-TR
R202	1	0402	Panasonic Electronic Components	ERJ-2RKF1202X
R203, R206, R208	3	0402	Panasonic Electronic Components	ERJ-2GE0R00X
U201	1	TQFN-38	Analog Devices	TMC2211ATU+

## TMC2211STEPSTICK Schematic



TMC2211STEPSTICK Mechanical Dimensions

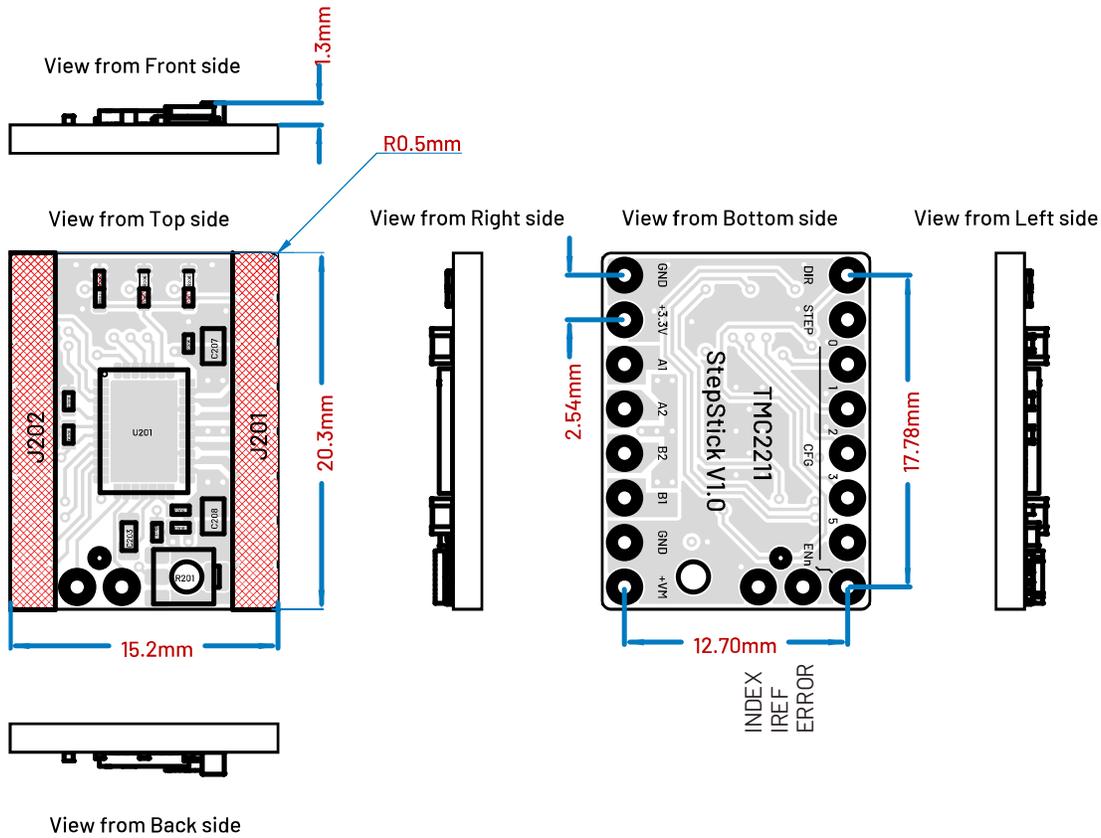


Figure 4. TMC2211STEPSTICK Component Placement—Top, Bottom, and Sides Including Dimensions

### Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	1/26	Initial release	—

## Notes

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