

Two New Dual-Stepper Motor Drivers



Texas Instruments released two new dual-stepper motor drivers, the DRV8845 and the DRV8849, that can reduce the cost, size, and design time of a design with four H-bridges and Smart Tune. These two drivers have the capability of driving either 2 stepper motors, 4 brushed DC motors, or a combination of *both*.

Table 1. Motor Drive Capability

Device	Can Drive
DRV8849	2 × stepper
DRV8845	2 × stepper
	1 × stepper + 1 × BDC
	1 × stepper + 2 × BDC
	3 × BDC
	4 × BDC

Although released together, the DRV8845 and DRV8849 devices have a few key differences and similarities.

The DRV8845 and DRV8849 are *not* pin-to-pin compatible:

- DRV8845 comes in a 6mm × 6mm QFN 36-pin package, an industry common pinout
- DRV8849 comes in a 6mm × 6mm QFN 36-pin package with unique pinout and enhanced specifications

The purpose of making the DRV8845 an industry common pinout is to offer customers something familiar while still providing a quality TI device. This premium device gives the customer a competitive advantage with enhanced specifications and additional features. [Table 2](#) compares the DRV8845 and DRV8849 with popular competitors.

Table 2. DRV8845 Comparison to Popular Competitors

	DRV8845	Competitor A	Competitor B	Competitor C	DRV8849
Voltage Range	4.5V–38V	8V–36V	8V–40V	8V–36V	4.5V– 38V
Full Scale Current	1.5A	1.2A	1.6A	1.2A	1.5A
R _{DS(on)}	0.9Ω	1.4Ω	1Ω	1.4Ω	0.9Ω
Sleep current	< 3μA	N/A	< 10μA	N/A	< 3μA
Supply current (o/p ON)	< 14mA	< 18mA	< 23mA	< 18mA	< 14mA
Supply current (o/p OFF)	< 4.5mA	N/A	< 16mA	N/A	< 4.5mA
Current accuracy (100% current)	±2%	±5%	±5%	±5%	±5%
Interface	PH-Ixx	PH-Ixx	PH-Ixx	PH-Ixx	STEP-DIR
Configuration	2 Stepper or 4 BDC	2 Stepper or 4 BDC	2 Stepper or 4 BDC	2 Stepper or 4 BDC	Stepper and BDC
Microstep	Up to 1/4, higher microstepping with the VREF pin	1/4	1/4	1/4	1/256
Current Sense	External	External	External	External	Integrated
Decay	Smart Tune	Mixed	Mixed	Mixed	Smart Tune
Protection	UVLO, OCP, TSD	UVLO, OCP, TSD	UVLO, OCP, TSD	UVLO, OCP, TSD	UVLO, OCP, TSD
Package (mm)	QFN-36 (6mm × 6mm)	QFN-36 (6mm × 6mm)	QFN-36 (6mm × 6mm)	QFN-36 (6mm × 6mm)	QFN-36 (6mm × 6mm)

The DRV8845 outperforms the competitors in a few key areas:

- Lower $R_{DS(on)}$
- Higher current sense accuracy
- Additional features like Smart Tune

While things like lower $R_{DS(on)}$ and a higher current sense accuracy make a better device, what really sets the DRV8845 apart from the competitors is Smart Tune.

Smart Tune is an adaptive decay scheme that prevents loss of current regulation that often happens with fixed decay modes. Smart Tune can reduce design time, lower power and thermal dissipation, and minimize noise and vibration. *Both* the DRV8845 and DRV8849 have Smart Tune.

Smart Tune Benefits

Figure 1 shows a stepper motor current waveform and the thermal image of a stepper motor that is not using Smart Tune. Usually, the waveform looks like a sinusoidal wave but at the moment of capture, the waveform appears more like a square wave since there was a lot of distortion in the current waveform. The thermal image of the stepper motor is fairly hot, roughly 71.2°C or 160.16°F. This amount of heat can have a negative impact on systems long term.

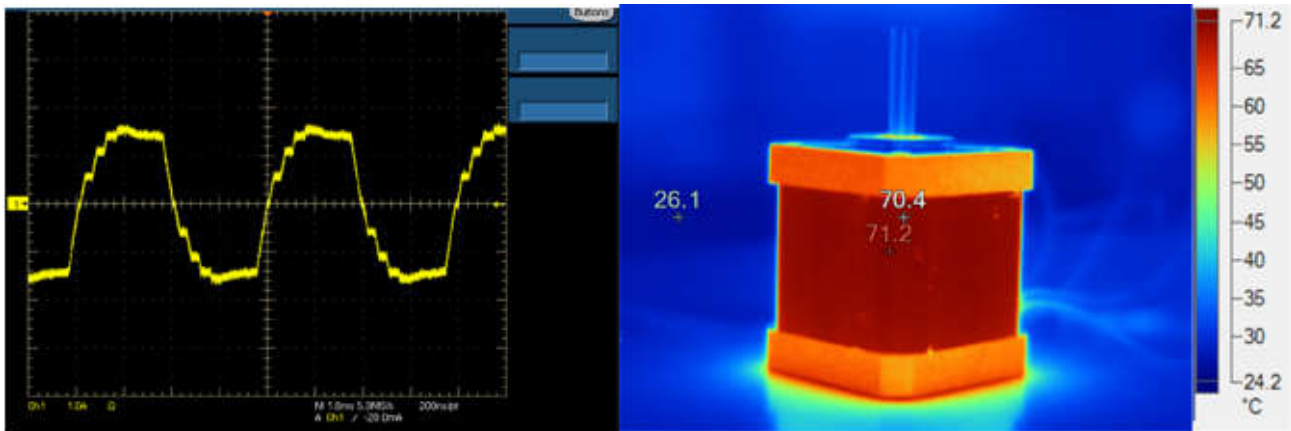


Figure 1. Stepper Motor Current Waveform and Thermal Image

As Figure 2 shows, when Smart Tune is implemented, the stepper motor current waveform is clearly a sinusoidal wave with little to no distortion and the stepper motor is 11°C (51.8°F) cooler.

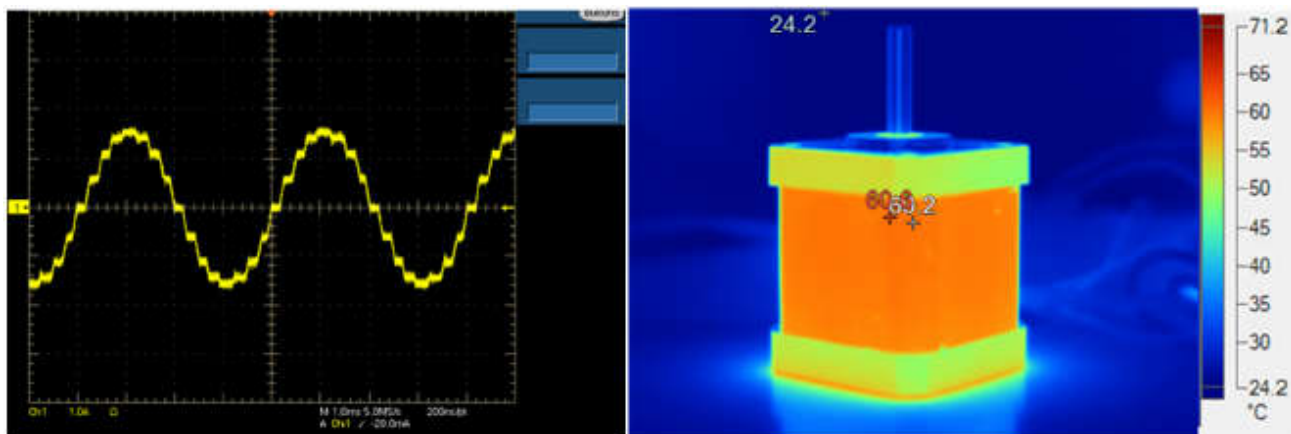


Figure 2. Stepper Motor Current Waveform and Thermal Image With Smart Tune

Learn more about Smart Tune by reading the [Getting smart about tuning your stepper motor](#) technical article and the [Smart tune for quiet and smooth stepper motor operation](#) application brief.

Integrated Current Sensing in the DRV8849

Integrated current sensing provides the ability to monitor and regulate current using integrated components rather than requiring external shunt resistors. Additionally, removing external shunt resistors eliminates heat sources from designs. The amount of space savings provided by the integrated current sensing feature of the DRV8845 and DRV8849 devices is illustrated with the following information.

Figure 3 shows how much board space is required for the DRV8845 with the external shunt resistors outlined in red. The area of this image using DRV8845 is an estimated 660mm² (about 22mm × 30mm). If the DRV8849 is used, there is no need for the external shunt resistors allowing users to scale down the PCB layout. The area of Figure 4 using the DRV8849 is an estimated 120mm² (about 12mm × 10mm).

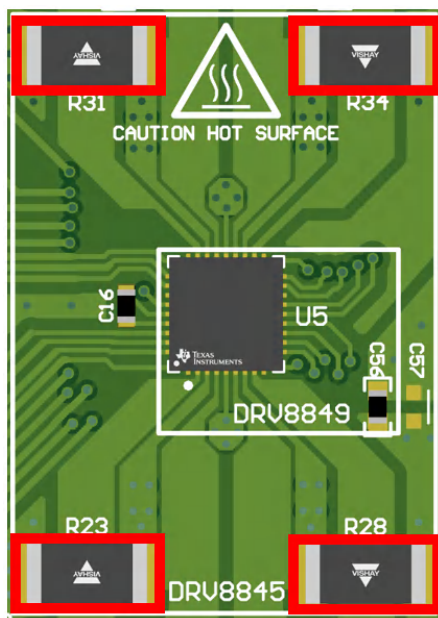


Figure 3. DRV8849 Board Space

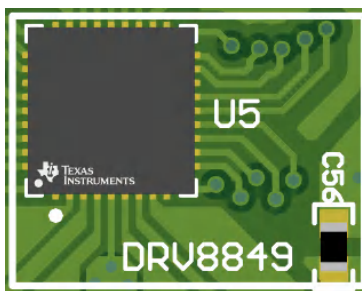


Figure 4. DRV8849 Board Space

See the [Advantages of Integrated Current Sensing](#) application brief for more information.

To summarize, the DRV8845 and DRV8849:

- Use Smart Tune to reduce design time, lower power and thermal dissipation, and minimize noise and vibration.
- Are great products for applications like IP cameras, printers and scanners, EPOS, and currency counters

The DRV8845:

- Has an industry common footprint

The DRV8849:

- Has integrated current sensing

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