This design has a simple power connector that accepts 8.5V to 32V. The speed input to the DRV8307 is set by resistors R13 and R14, and they are set for a constant 79% duty cycle. Motor current is limited to 5.2A using the DRV8307 V\textsubscript{LIMITER} feature.
Test Setup
Subsequent data was taken with 24V applied.
Maximum motor power is 28.8W, at 201 mNm (28.5 oz-in).
Power Efficiency vs Torque

Power Efficiency = Motor Power / Supply Power = (Torque * Speed) / (Voltage * Current).
Motor speed was measured from the frequency of one Hall signal, and converted to this analog waveform. Spin-up time was 60ms. The steady-state value represents 2227 RPM.
Motor speed was measured from the frequency of one Hall signal, and converted to this analog waveform. Spin-up time was 500ms. The steady-state value represents 1767 RPM.
Thermal Images with 2.2A, 200 mNm Load, and 1310 RPM

Max = 67.3
Avg = 30.2
Min = 25.9

Max = 110.6
Avg = 37.4
Min = 29.3

Hottest part is inside the motor

Max = 76.3
Avg = 37.0
Min = 29.4

Power FETs
Flutter with No Load (measured from a Hall signal)

0.37%

Flutter is a measure of rotational speed jitter, and it measures the edge variation of a periodic signal generated by the motor. It is most accurately measured from a serpentine board trace that senses magnetic reluctance, but in this case a Hall signal was used. The DRV8307 commutates based on 1 Hall sensor, and that improves flutter.
This is the duty cycle speed input to the DRV8307 pin “PWM”.

Input clock to the DRV8307
The motor has 10 permanent magnet poles, so there are 5 Hall cycles per revolution. \( 185.6 \text{Hz} / 5 \times 60 = 2227 \text{ RPM} \).
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