

## IQ2306 Position Module

### 1 Features

- Low power position control
- Precise to 0.022°
- 4.8% more shaft power than same sized motors
- Built-in minimum jerk trajectory generator
- Multi-turn position control with tunable PID
- Voltage controller
- PWM controller
- Coast and brake modes
- No minimum speed
- Built-in linear motion conversion
- Silent motion
- Immediate reversibility
- Backdrivable
- Regenerative braking
- Active freewheeling
- Current limiter<sup>1</sup>
- Temperature limiter
- Serial (UART) w/ access to control parameters
- (Optional) 1-2ms PWM
- (Optional) Oneshot (42, 125)
- (Optional) MultiShot
- (Optional) DShot (150-1200) (autodetect)
- (Optional) Step/direction input
- (Optional) Anticogging torque ripple reduction

### 2 Applications

- Robotics
- Gimbals
- CNC machines
- 3D printers
- Laboratory devices
- Automated manufacturing machinery
- Haptic devices
- Hobby/Maker devices



### 3 Description

The IQ2306 Position Module is an integrated motor and controller with a wide range of position based applications. Its performance is comparable to or better than other 2306 sized (NEMA 11, 28mm stepper) motors and can operate at any speed between -4,800 and 4800 RPM thanks to its sensed control. Its closed-loop PID controller tracks targets across multiple revolutions, making it ideal for applications with transmissions, both rotary and linear. This sits on top of a voltage controller, which compensates for varying input voltages. Finally, the core is a raw PWM controller. Any of the above controllers can be used by the user. The IQ2306 Position Module has a built-in rotary to linear calculation converter, which allows the user to communicate to the firmware in native linear units. The onboard minimum jerk trajectory generator with 32 segment queue produces smooth, human like motions with minimal computation and communication overhead from the application controller.

<sup>1</sup>Estimated,  $\pm 20\%$

## 4 Motor Specifications

Description	Symbol	Value	Unit	Notes
Speed Constant	$K_v$	180	RPM/V	
Torque/EMF Constant	$K_t$	0.053	N m A <sup>-1</sup>	
Resistance	$R$	4.7	$\Omega$	25°C
Mass	$m$	37.4	g	Without wires/accessories
Continuous Torque	$\tau_c$	65	N mm	25°C ambient
Continuous Torque	$\tau_c$	130	N mm	In airflow, 25°C ambient
Continuous Current	$I_S$	1.3	A	Motor current, 25°C ambient
Continuous Current	$I_S$	2.5	A	Motor current, in airflow, 25°C ambient
Pulsed Current	$I_{SP}$	5.3	A	Maximum supply voltage limited
No Load Speed	$\omega_0$	199	rad s <sup>-1</sup>	@ $V_{CC} = 10\text{ V}$
No Load Current	$I_0$	0.02	A	@ $V_{CC} = 10\text{ V}$

## 5 Electrical Specifications

Description	Symbol	Min	Max	Unit	Notes
Supply Voltage	$V_{CC}$	5	25.2	V	Designed for 2S-6S LiPo, use with caution on 6S
Digital Logic Voltage	$V_L$	-0.3	7.3	V	3.3 V system, 5 V tolerant
Temperature	$T$	-20	105	°C	

## 6 Electrical Interface

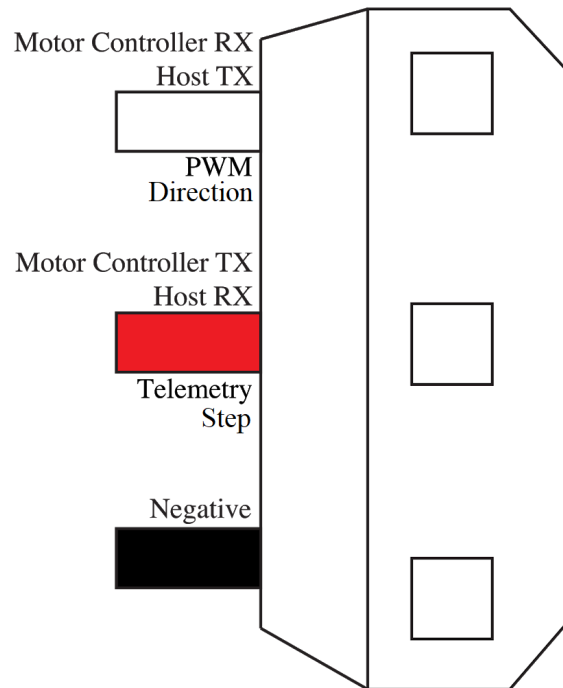


Figure 1: JR Servo Communication Connector

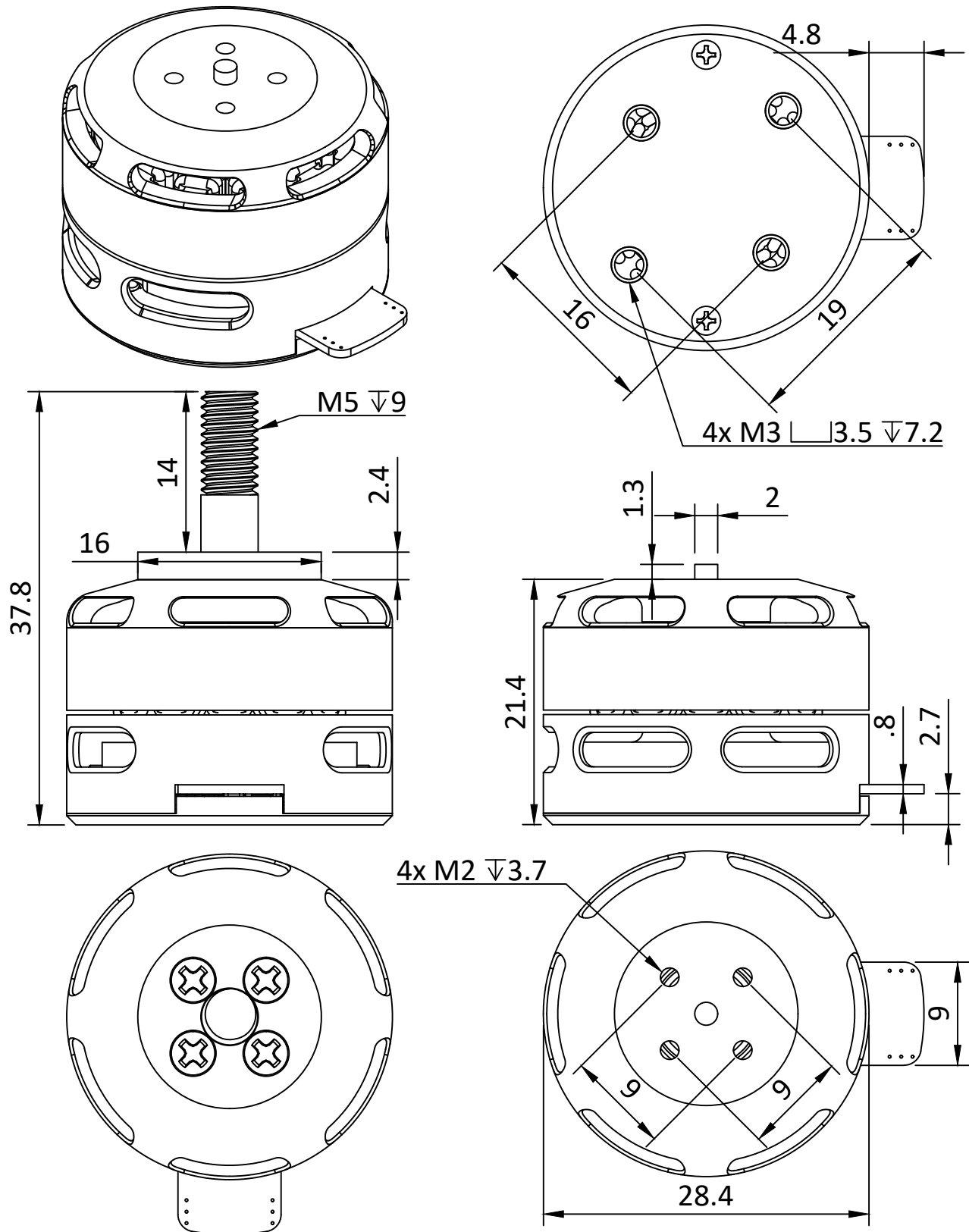
## 6.1 Communication Wiring

The standard communication connector is a JR type servo connector with 15cm of wire. These connectors have 0.1in spacing and can be inserted into standard perfboard and breadboards with a 3x1 0.1in male-to-male header. Black is minus (ground). Red is motor controller TX (host RX) and telemetry output. White is motor controller RX (host TX) and pwm input.

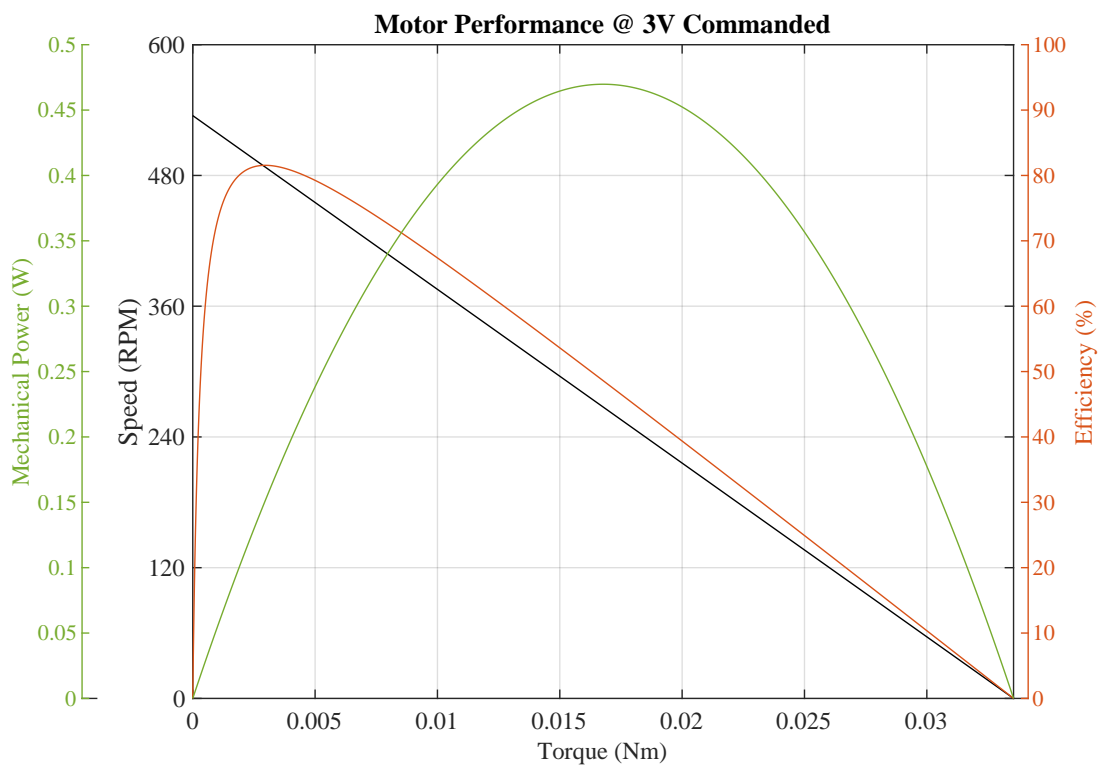
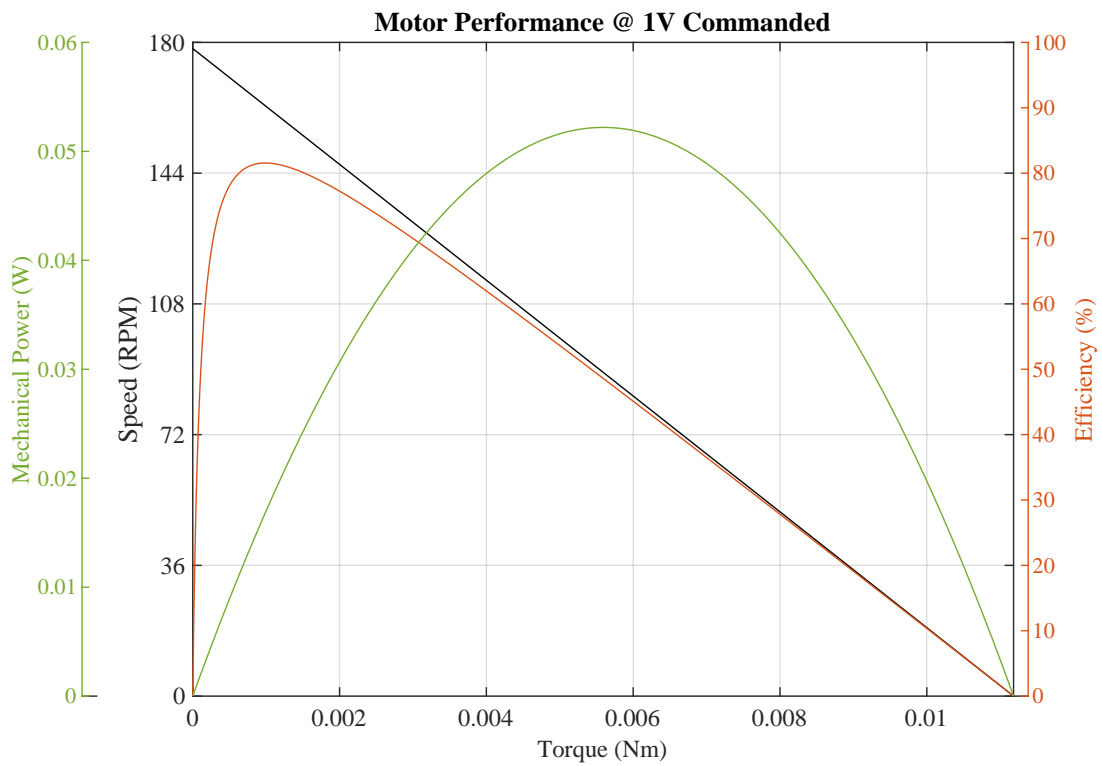
## 6.2 Supply Wiring

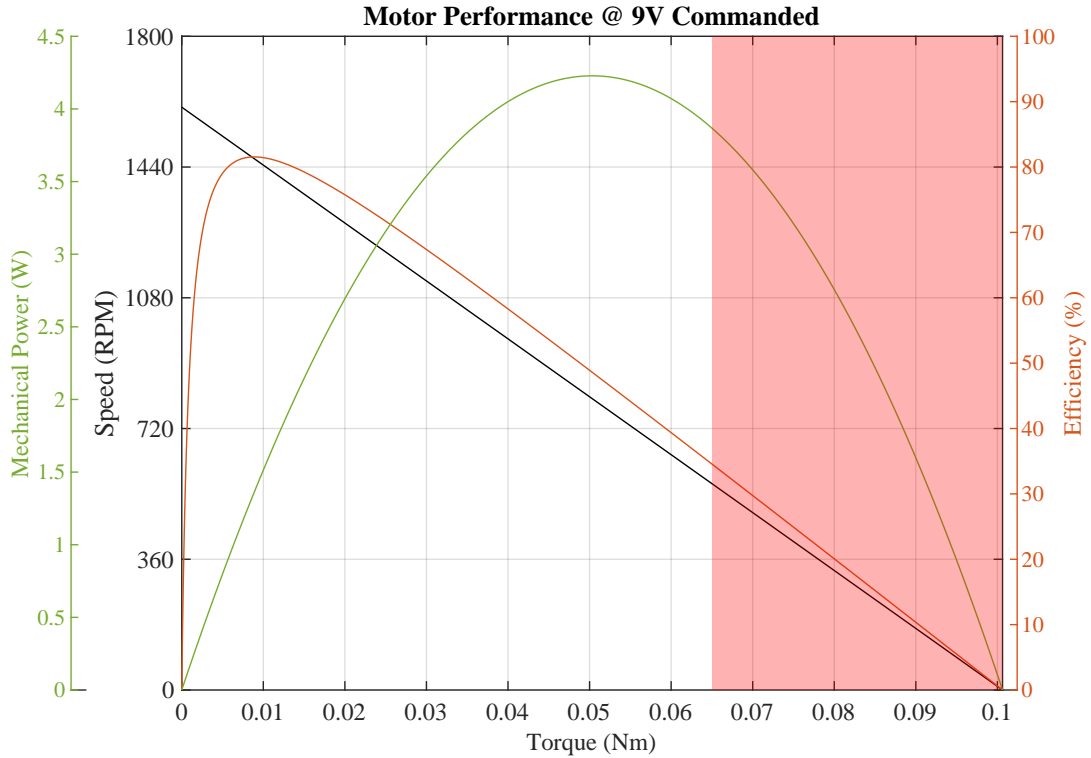
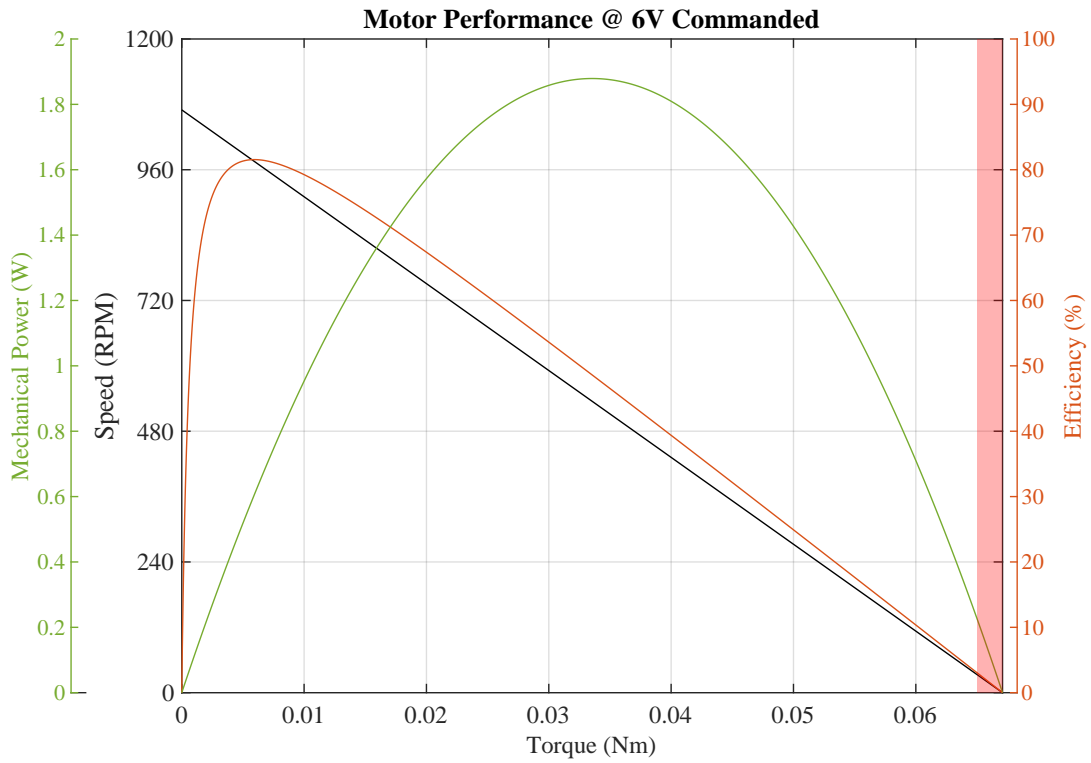
Power is transmitted to the IQ2306 Position Module via the two supplied 16 AWG (1.31 mm<sup>2</sup>), silicone encased, 15cm long wires. Black is minus (ground). Red is positive.

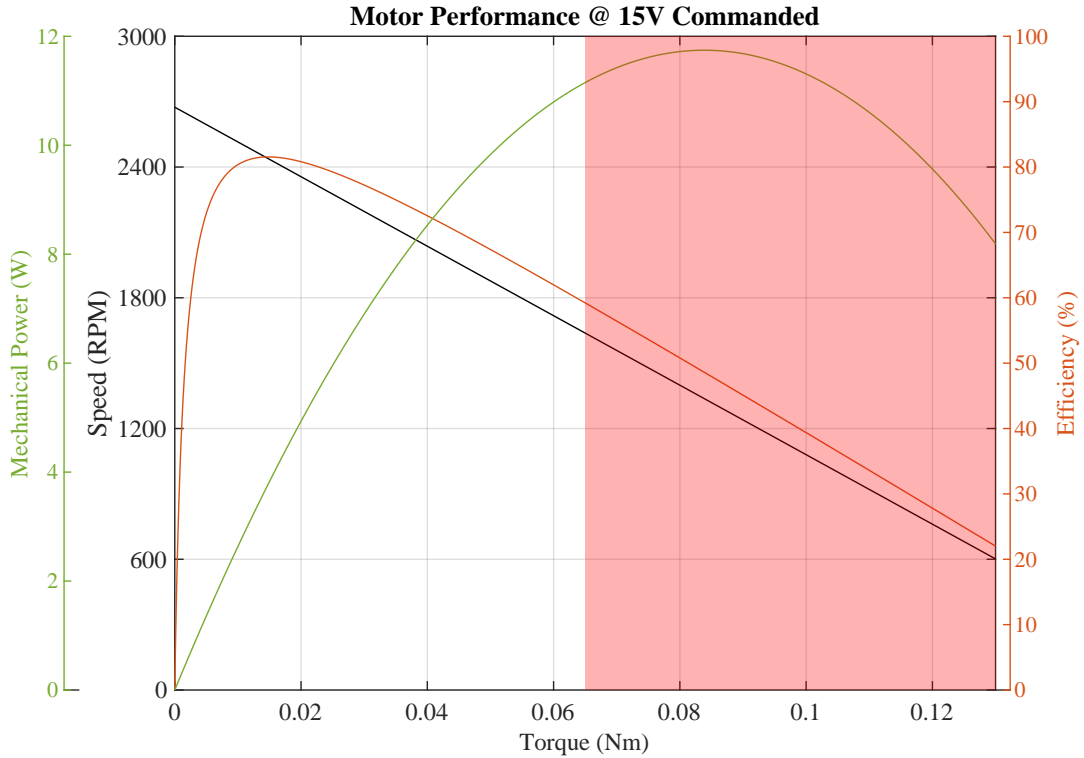
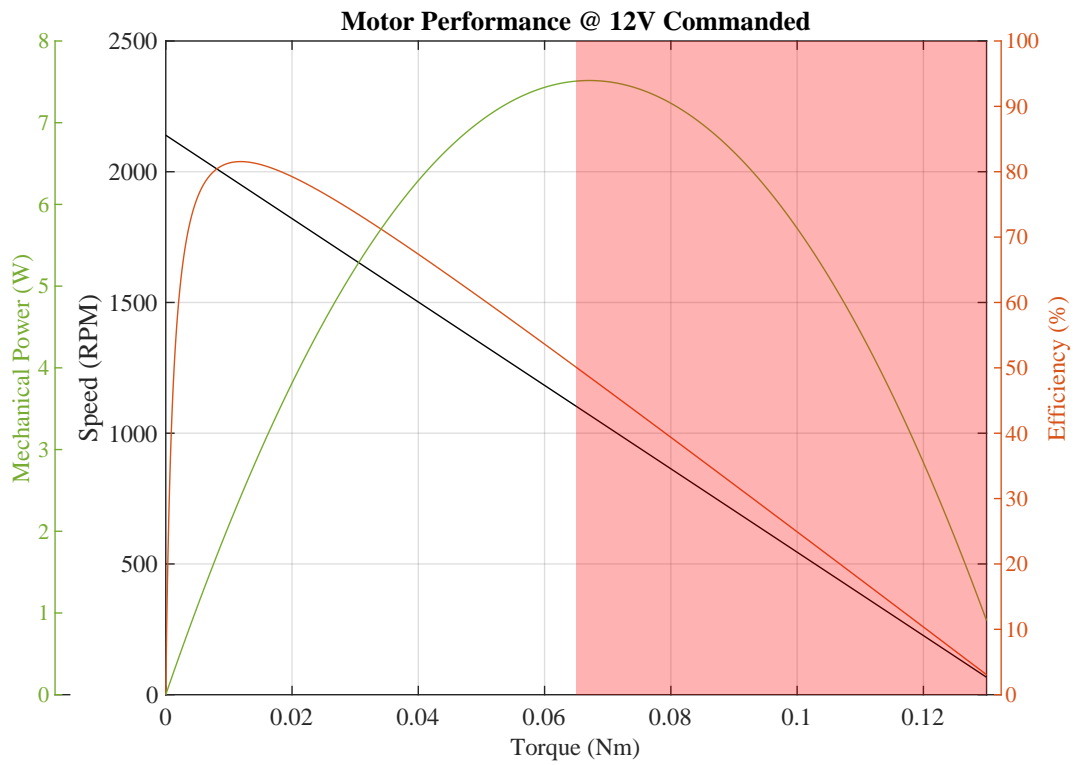
### 7 Mechanical Interface

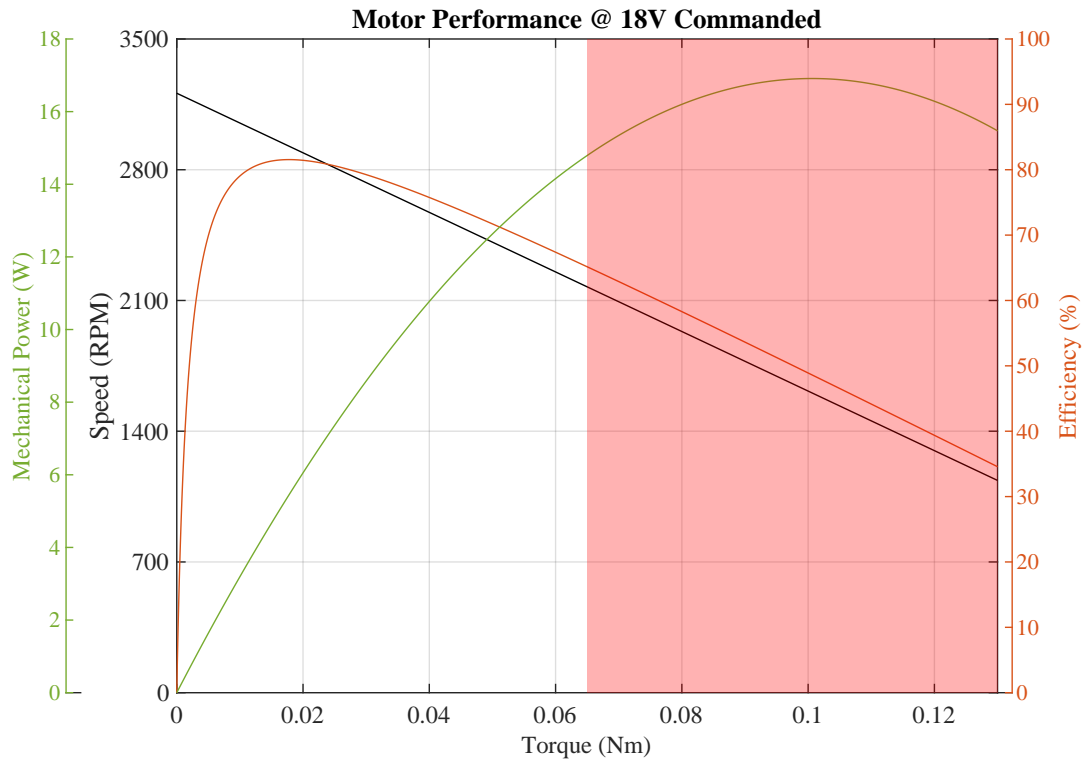


## 8 Motor Performance

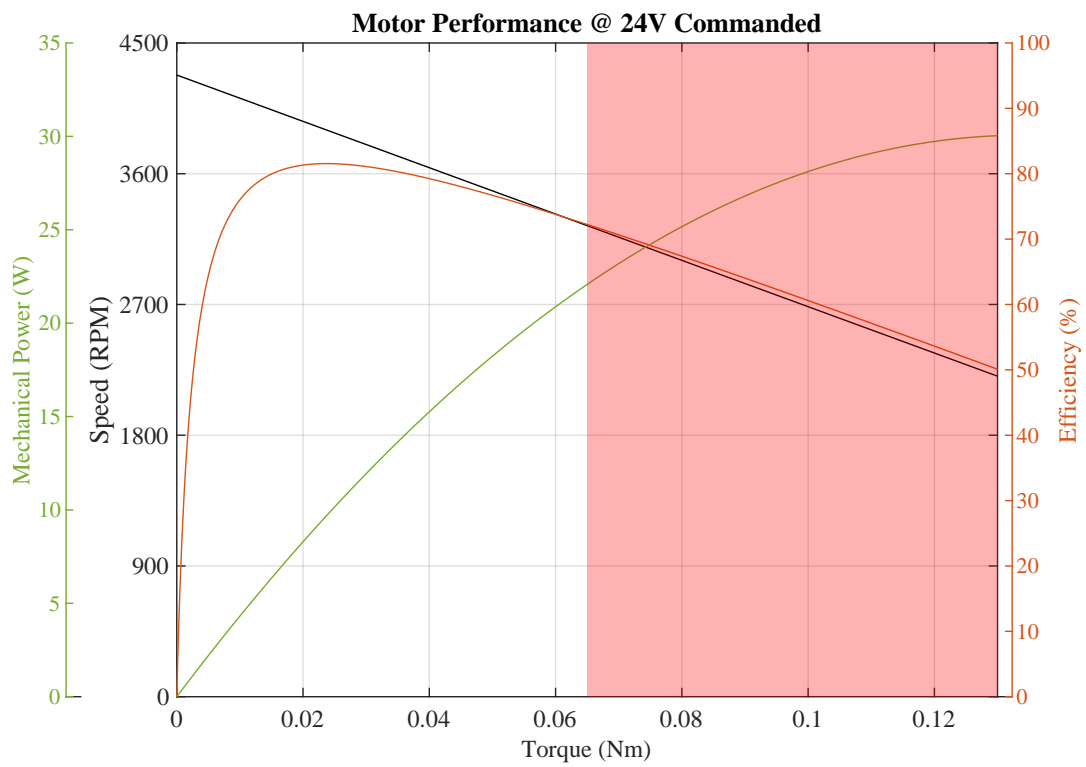












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