Three Phase sinusoidal BLDC Motor controller

Description

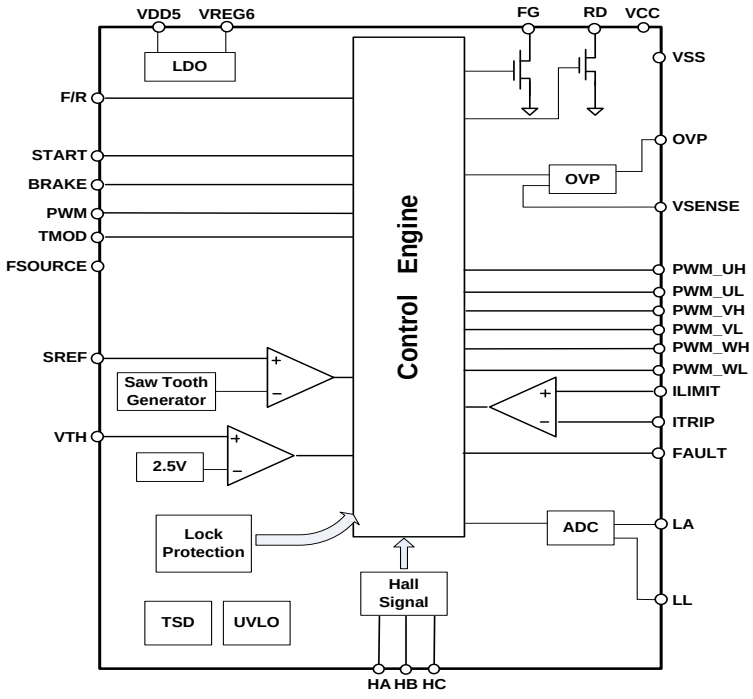
The FT1006 is a Three Phase sinusoidal Brushless DC (BLDC) Motor controller. It comes with the advanced Hall sensor design. Using the Hall sensor signals, the control system is able to execute the PWM commutation by switching the 3-Phase inverter. Due to its adaptive features and wide power-supply range capabilities, it is intended to cover a wide range of motor characteristics, while requiring little tuning from the user. Speed adjustment can be achieved through either direct-PWM or analog voltage control. Speed indicator is provided through a Frequency Generator output (FG×3), generating digital pulse with its frequency proportional to the speed of the motor. FT1006 has an automatic internal bootstrap charge management scheme ensuring that the bootstrap capacitor is always sufficiently charged for safe operation of the power MOSFETS.

Protection functions of FT1006 are comprehensive including lock protection and automatic recovery, under voltage, thermal shutdown, current limit and over current protections. These prevent the control circuits and the motor from being damaged, particularly under stressed applications and demanding environments.

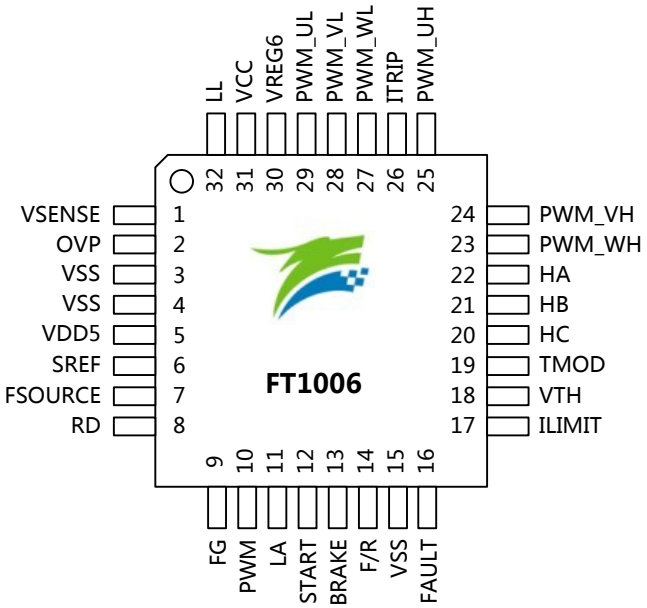
Feature

- Support space vector pulse width modulation (SVPWM)
- 180° sinusoidal drive, for high efficiency and low acoustic noise
- Two speed adjustment methods can be selected (direct-PWM and analog voltage control)
- Lead angle control
- FG (Frequency Generator) and RD (Rotation detection) output
- Current limit and over current protection
- Built-in lock protection and automatic recovery circuit
- Built-in thermal shutdown protection (TSD)
- Built-in under voltage lock out protection. (UVLO)

Block Diagram



Pin Assignment



Pin Configuration

PIN NO.	PIN Name	Type	Description
1	VSENSE	I	Motor Drive Voltage-Sensing Resistor. Designed for determining the voltage level of over-voltage protections.
2	OVP	O	Motor Drive Over-Voltage Protection Output. It can be connected to an external power transistor for discharging the back EMF.
3	VSS	GND	Signal and power ground.
4	VSS	GND	Signal and power ground.
5	VDD5	O	Digital power output, LDO DC5V output for digital signal.
6	SREF	I	Analog input voltage for speed adjustment.
7	FSOURCE	I	Test signal input, connect to GND.
8	RD	O	Open drain. Motor rotate detection output.
9	FG	O	Open drain. Frequency Generator, speed signal output.
10	PWM	I	PWM input for speed adjustment. Internal pull-up
11	LA	I	Lead angle select analog input
12	START	I	Motor start input. High: Start; Low: Free. Internal pull-up
13	BRAKE	I	Brake signal input, Low: Brake. Internal pull-up.
14	F/R	I	Motor rotation direction input
15	VSS	GND	Signal and power ground.
16	FAULT	I	Over current protection input. Internal pull-up
17	ILIMIT	I	Current limit analog input
18	VTH	I	Over-temperature protection
19	TMOD	I	Test signal input, connect to GND

PIN NO	PIN Name	Type	Description
20	HC	I	Hall C Sensor Input. Phase-W magnetic field detection.
21	HB	I	Hall B Sensor Input. Phase-V magnetic field detection.
22	HA	I	Hall A Sensor Input. Phase-U magnetic field detection.
23	PWM_WH	O	PWM output of phase W. High side
24	PWM_VH	O	PWM output of phase V. High side
25	PWM_UH	O	PWM output of phase U. High side
26	ITRIP	I	Current sensor voltage feedback analog input
27	PWM_WL	O	PWM output of phase W. Low side
28	PWM_VL	O	PWM output of phase V. Low side
29	PWM_UL	O	PWM output of phase U. Low side
30	VREG6	O	LDO output
31	VCC	POWER	Power supply
32	LL	I	Lower limit control for lead angle

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may be damaged or may not function or be operational above these ratings and stressing the device to/above these levels is not recommended. Fortior does not recommend exceeding or designing about the Absolute Maximum Ratings.

Parameter	Symbol	Condition	Ratings	Unit
Power supply voltage	V_{cc}max		30.0	V
RD/FG output current	I_{FG}max		10	mA
Operating temperature	Topr		-40~+125	℃
Storage temperature	Tstg		-65~+150	℃

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications.

Symbol	Parameter	Min.	Typ.	Max.	Unit
Power supply voltage	V_{cc}	3.7	12	18	V