矽源特科技
ChipSourceTek

CST6116

SinglechannelDCmotordriverchip

User Manual

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V1.2

CST6116 Introduction:

CST6116 is a single channel brushless DC motor driver chip. The maximum continuous output current can reach 1400mA (VDD=5V, RL=3 Ω), and the peak current can reach 2A. The chip is equipped with a power MOS full bridge driver, which can drive forward, backward, stop, and brake functions. At the same time, it is equipped with an overtemperature protection circuit to ensure the safety of chip operation 。

The full bridge driving architecture and driving method can save peripheral filtering circuits, save costs, and facilitate applications. CST6116 has a built-in thermal protection function with hysteresis effect and minimal circuit static power consumption (less than 1uA)。

CST6116 Advantage:

Single channel full bridge drive circuit
Working voltage range (1.8V~7V)
Low standby current (typ. 0.1uA)
There are four functions: forward/reverse/stop/brake
Built in overheat protection circuit with hysteresis effect (TSD)
Packaging form: SOT23-6

CST6116 Application:

DC brush motor drive
Toy car motor drive
Toy aircraft tail motor drive

CST6116 OrderInformation:

PartNo.	Package	Mark*	Tape/Reel
CST6116	SOT23-6	CST-LOGO: CST6116	3000/Reel

CST6116 Pin diagram and description:

Number	Name	input/output	Pin illustrate
1	OUTB	O	Drive B output
2	GND	--	Connect to board ground
3	INB	I	Control signal B input terminal
4	INA	I	Control signal A input terminal
5	VDD	O	Power supply
6	OUTA	O	Drive A output

CST6116 Function Description:

Input Logic Truth Table

INA	INB	OUTA	OUTB	Function
L	L	Hi-Z	Hi-Z	Standby
H	L	H	L	Forward
L	H	L	H	Retreat
H	H	L	L	Brake

CST6116 Absolute maximum rating（TA=25℃）:

Parameter	symbol	Value	Unit
Supply voltage	V_{DDMAX}	7.2	V
Maximum output voltage	V_{OUTMAX}	VDD	V
Maximum input voltage	V_{INMAX}	VDD	V
Peak output current	I_{OUTMAX}	2	A
Maximum continuous output current	I_{OUT}	1.5	A
Maximum power consumption		0.6	W
Operating temperature range	Topr	-20~+85	℃
Junction temperature	T_J	150	℃
Storage temperature	Tstg	-55~150	℃
Welding temperature	T_{LED}	350-370	℃

Note: 1. During use, exceeding the absolute maximum rated value specified above may cause circuit breakdown, burning, and other issues 。

2. The maximum continuous output current depends on the heat dissipation conditions。

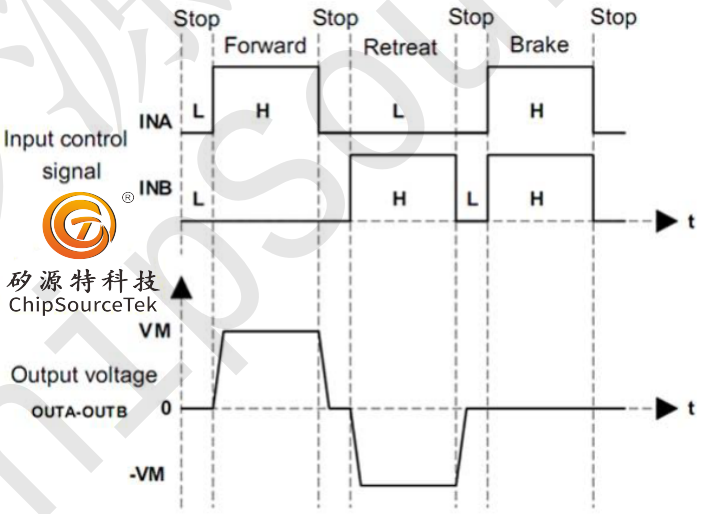
CST6116 Recommended operating conditions（TA=25℃）:

Parameter	Symbol	Mini	Typical	Max	Unit
Supply voltage	VDD	1.8	--	6.5	V
Input voltage	VIN	0	--	VDD	V
Continuous output current	Io	--	±1400	±1500	mA

CST6116 Electrical characteristics（TA=25℃，VDD=5V，RL=15Ω，unless otherwise noted）：

Parameter	Symbol	Test conditions	Mini	Typical	Mix	Unit
VDD standby current	I_{VDDST}	INA=INB=L Output no-load			10	uA
VDD static current	I_{VDD}	INA=H, INB=L or INA=L, INB=H or INA=H, INB=H Output no-load		120		uA
Input pull-down resistance value	R_{IN}			150		kΩ
Input the lowest high-level voltage	V_{INH}		2			V
Input the highest low-level voltage	$V_{IN}L$				0.8	V
Output resistance	R_{ON1}	IO=±200mA		0.5		Ω
OTP temperature	T_{SD}			165		℃
TSD Hysteresis	T_{SDH}			30		℃

CST6116 Typical waveform:



CST6116 Application Description:

1、Working mode

a) Standby mode

In standby mode, INA=INB=L. All internal circuits, including the driving power transistor, are in a closed state. The circuit consumes extremely low current. At this time, both the motor output terminals OUTA and OUTB are in a high resistance state。

b) Forward mode

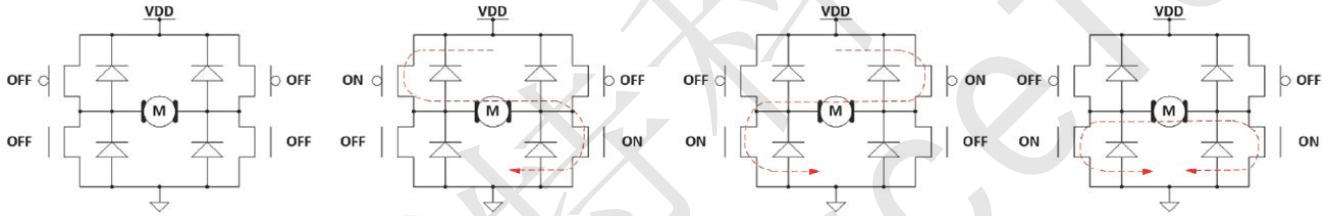
The definition of forward rotation mode is: INA=H, INB=L. At this time, the motor drive end OUTA outputs a high level, and the motor drive end OUTB outputs a low level. The motor drive current flows from OUTA to the motor and from OUTB to the ground. At this time, the rotation of the motor is defined as forward rotation mode。

c) Inversion mode

The definition of reverse mode is: INA=L, INB=H. At this time, the motor drive end OUTB outputs a high level, and the motor drive end OUTA outputs a low level. The motor drive current flows from OUTB to the motor and from OUTA to the ground. At this time, the rotation of the motor is defined as reverse mode。

d) Braking mode

The definition of braking mode is: INA=H, INB=H. At this time, both the motor drive end OUTA and OUTB output low levels. The energy stored in the motor will be quickly released through the OUTA end NMOS tube or OUTB end NMOS, and the motor will stop rotating in a short period of time. Note that in braking mode, the circuit will consume static power consumption。

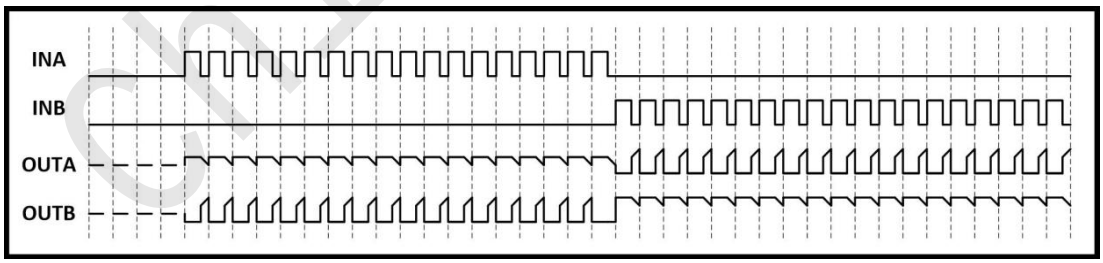


Standby mode　　Foreward mode　　Reversal mode　　Brake mode

e)PWM mode A

When the input signal INA is a PWM signal, INB=0 or INA=0, and INB is a PWM signal, the rotational speed of the motor will be controlled by the duty cycle of the PWM signal. In this mode, the motor drive circuit switches between conduction and standby modes. In standby mode, all power transistors are turned off, and the energy stored inside the motor can only be slowly released through the body diode of the power MOSFET。

Note: Due to the presence of high resistance in the working state, the speed of the motor cannot be accurately controlled through the duty cycle of the PWM signal. If the frequency of the PWM signal is too high, the motor will fail to start。

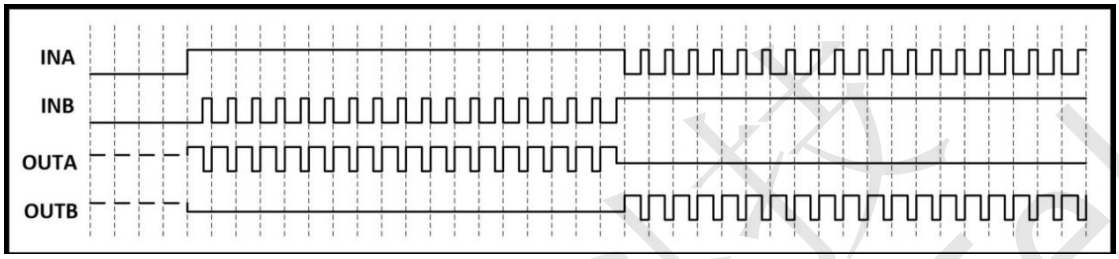


Schematic diagram of PWM mode A signal waveform

f)PWMmodeB

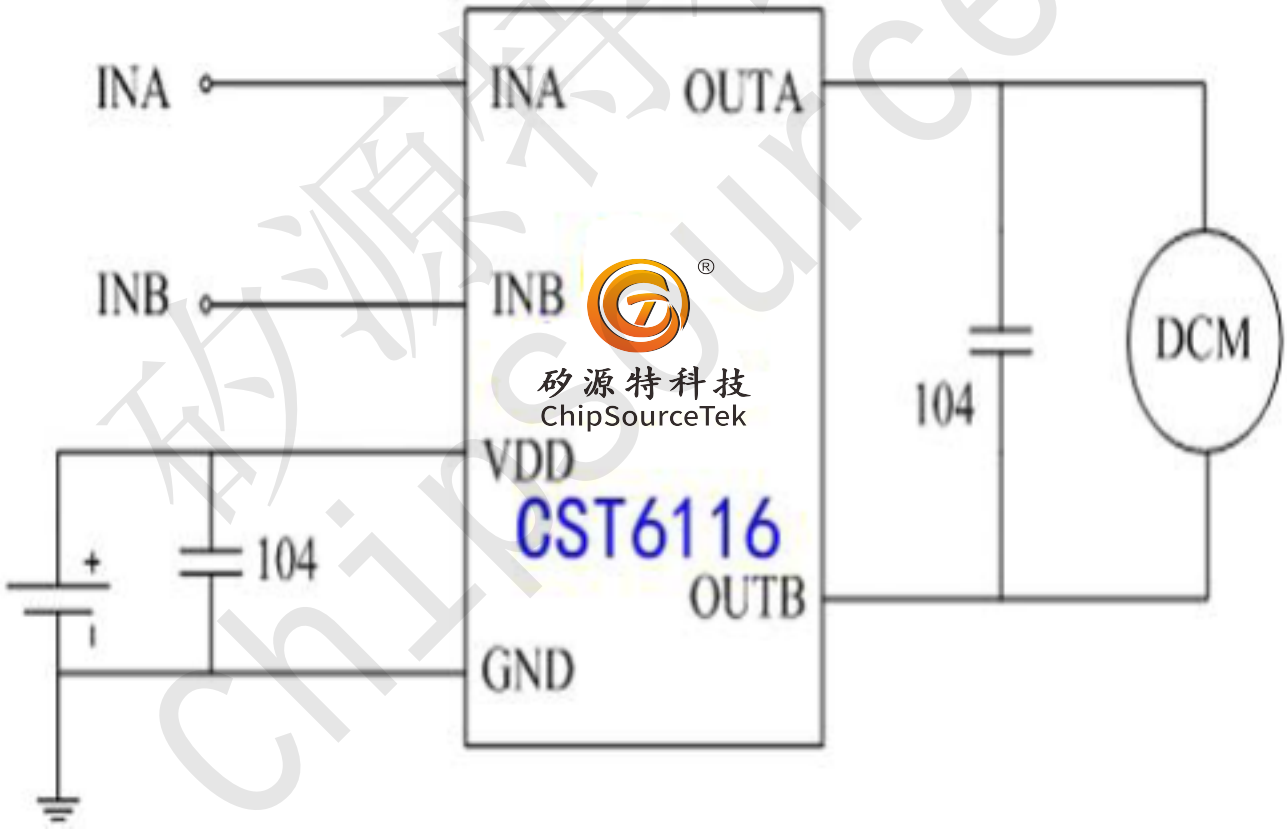
When the input signal INA is a PWM signal, INB=1 or INA=1, and INB is a PWM signal, the rotational speed of the motor will be controlled by the duty cycle of the PWM signal. In this mode, the motor drive circuit outputs between conduction and braking modes, and the energy stored by the motor in braking mode is quickly released through the low side NMOS transistor。

Attention: Due to the presence of a braking state in the working state, the motor energy can be quickly released, and the motor speed can be accurately controlled through the duty cycle of the PWM signal. However, it must be noted that if the PWM signal frequency is too low, it will cause the motor to fail to rotate continuously and smoothly due to entering the braking mode. To reduce motor noise, it is recommended that the PWM signal frequency be greater than 20KHz and less than 40KHz。



Schematic diagram of PWM mode B signal waveform

CST6116 Typical application circuit diagram:



CST6116 Typical application circuit

Note: 1. The C4/104P capacitor in the figure is connected in parallel to the motor rather than placed on the PCB. If the motor is not connected in parallel, a position can be reserved on the PCB.。

2. Compared to the general application of similar products in the market, C1, C2, and C3 in the figure can be omitted, reducing peripheral devices and saving costs.

CST6116 Special precautions:

It is generally recommended to add 104 capacitors for CST6116 power supply to the ground. If the power supply fluctuates greatly or the output drive current is large, it is recommended to add 10uF-330uF electrolytic capacitor, which can be selected according to the actual situation.

CST6116 is sensitive to static electricity. Anti static measures need to be taken during packaging, transportation, processing, and other processes.

CST6116 Package information: