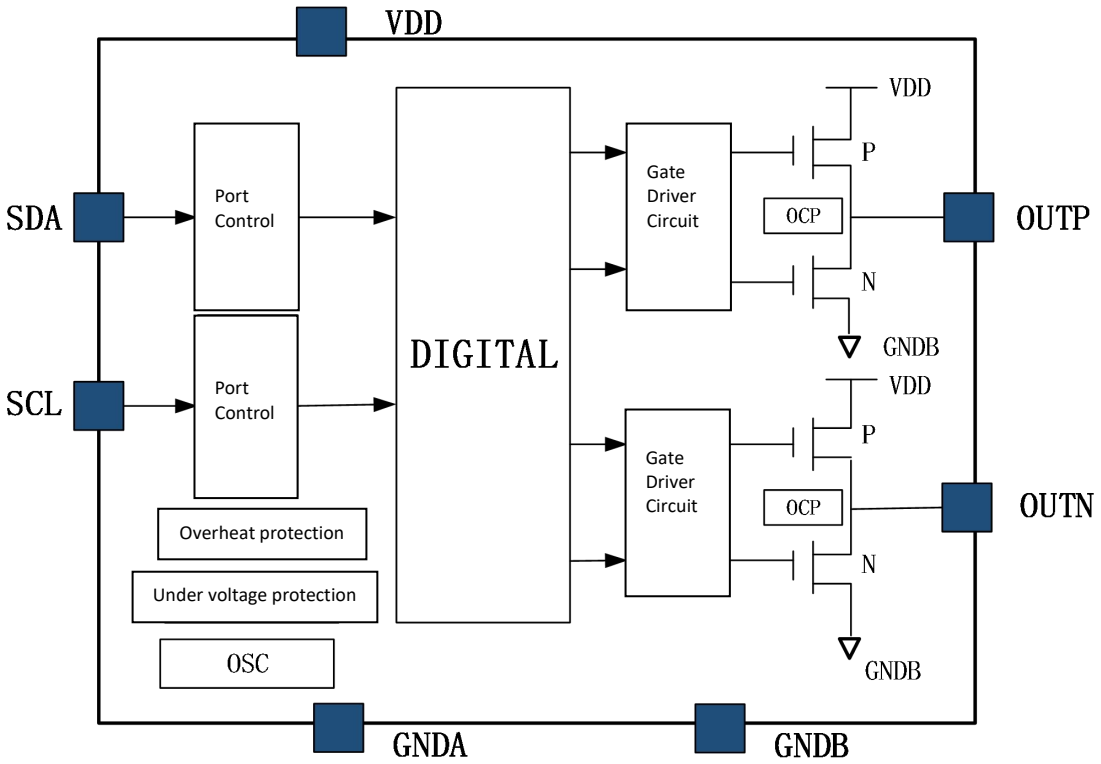
Characterization

This chip is a DC brush motor driver IC with an integrated H-bridge driver circuit using N-channel and P-channel power MOSFETs, which is suitable for driving brush DC motors. This product has excellent performance and reliable quality.

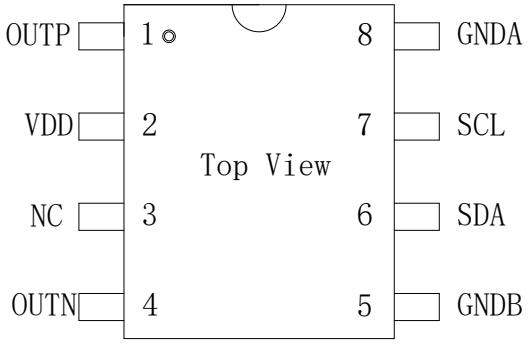
Functional features

- Working voltage range: 2.8v~9.5v
- Low standby current (less than 0.1 μ A)
- Low static working current
- Integrated H-bridge drive circuit
- Motor soft start
- MOSFET on internal resistance: hs+ls 3.7 ohms
- Protective features
  -VDD undervoltage lockout
  -Overcurrent protection
  -Overheat protection
- Two packaging forms are provided: sop8 SOT23-6
- Application fields: smart locks, toys, consumer products.

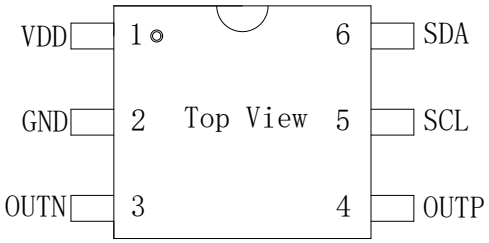
Internal structure block diagram



Pin arrangement



SOP8



SOT23-6

Pin function

Pin name	Pin serial number		I/O	Pin function description
	SOP8	SOT23-6		
SCL	7	5	I	I2C communication clock end
SDA	6	6	I	I2C communication data terminal
OUTP	1	4	O	Forward rotation output
OUTN	4	3	O	Reverse output
VDD	2	1	P	Power end
GND	--	2	P	Grounding terminal
GNDA	8	--	P	Logic control circuit ground terminal
GNDB	5	--	P	Output power tube ground terminal
NC	3	--	P	not used

Integrated circuits are electrostatic sensitive devices, which are prone to generate a large amount of static electricity when used in dry seasons or dry environments. Electrostatic discharge may damage integrated circuits. Titan Micro Electronics recommends taking all appropriate preventive measures for integrated circuits. Improper operation and welding may cause ESD damage or performance degradation, and the chip cannot work normally.

Limit parameter

parameter			minimum	maximum	Unit
VDD			-0.3	10	V
working temperature			-40	85	°C
Storage temperature, Tstg			-60	160	°C
Working humidity			20	85	%
Storage humidity			20	90	%
Electrostatic level	All feet	HBM	±4		kV
		CDM	±1		kV

(1) For these grades in the above table, the chip may cause permanent damage to the device and reduce the reliability of the device under long-term use conditions. We do not recommend that the chip work beyond these limit parameters under any other conditions;

(2) All voltage values are tested relative to the system ground.

Range of recommended working conditions

parameter		minimum	maximum	Unit
VDD	Motor operating voltage	2.8	9.5	V
I OUT	Motor DC current	0	0.5	A
TA	Ambient operating temperature	-40	85	℃

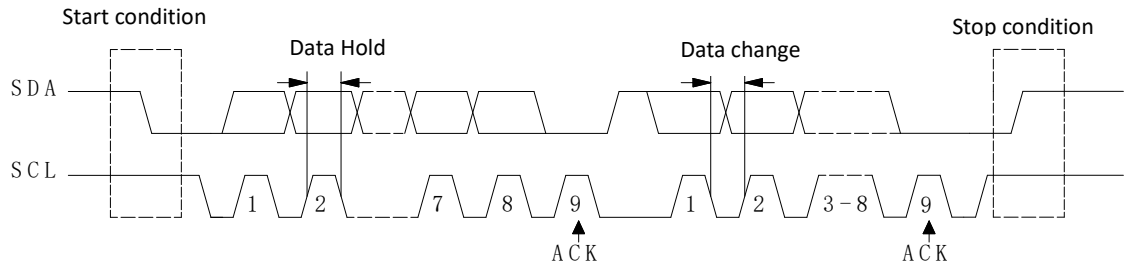
Electrical characteristic parameters (t=25 ℃)

parameter	Symbol	condition	minimum value	Typical value	Maximum value	Unit
Power parameters						
VDD standby current	I VDDST	VDD=6V； Register write: ina=inb=l	--	14	--	nA
VDD static supply current	I VDD	VDD=6V； Register writing: ina=h, inb=l; Output suspended	--	305	--	μA
Input logic level						
Input high level	V TH	VDD=6V	--	2.1	--	V
Input low level	V TL	VDD=6V	--	1.1	--	V
PMOS on resistance	R ON1	IO= -50mA， VDD=6V	--	1.7	--	Ω
NMOS on resistance	R ON2	IO=50mA， VDD=6V	--	2	--	Ω
protection circuit						
Overcurrent protection threshold	I OCP		550	--	--	mA
Overcurrent retry time	t RETRY		--	1	--	ms
Over temperature protection threshold	T TSD		--	160	--	℃
Heat recovery temperature value			--	120	--	℃
VDD undervoltage	V UVLO		--	2.8	--	V

Motor soft start function

The driving waveform is PWM, and it takes 16ms to increase the output duty cycle from 0% to 100%.

Temporal characteristic



Function description

This chip uses I2C protocol 2-wire serial interface to transmit data, including a serial data line SDA and a clock line SCL. The two lines have built-in pull-up resistors, and the bus is at high level when idle.

During each data transmission, the controller generates a start signal, and uses synchronous serial transmission to transmit data. Tm6301 responds to an ACK response signal every time it receives a byte of data. Each byte sent to the SDA line must be 8 bits, and the number of bytes that can be sent per transmission is unlimited. Each byte must be followed by an ACK response signal. When an ACK signal is not required, input the low level "L" from the 8th falling edge of the SCL signal to the 9th falling edge of the signal. When the data is transmitted from the highest position, the controller terminates the bus transmission by generating a stop signal. When the start signal is re transmitted during the data transmission, the stop signal may not be passed.

When SCL is high, the data on SDA remains stable; When SCL is low, SDA change is allowed. If SCL is at high level and a falling edge is generated on SDA, it is considered as the starting signal; If SCL is at high level, the rising edge generated on SDA is considered as a stop signal. As shown in the above figure.

Data structure

(1) Formation start condition
(2) Send slave address
(3) Register address, transmission of display data
(4) Form stop condition

Start	Slave address (W)	ACK	Register address	ACK	data	ACK	Stop

Data register

Register name	Slave address	Register address	describe
CONTROL	0x6c	0x95	Output control and data validation
PCT_ CTL	0x6c	0x96	Overcurrent protection function switch

Register PCT_ CTL

D7	D6	D5	D4	D3	D2	D1	D0
—	—	—	—	—	—	—	OCP_ EN

D7~d1: not used;

D0: when it is 1, turn on the overcurrent protection function; When it is 0, the overcurrent protection function is turned off.

Register control

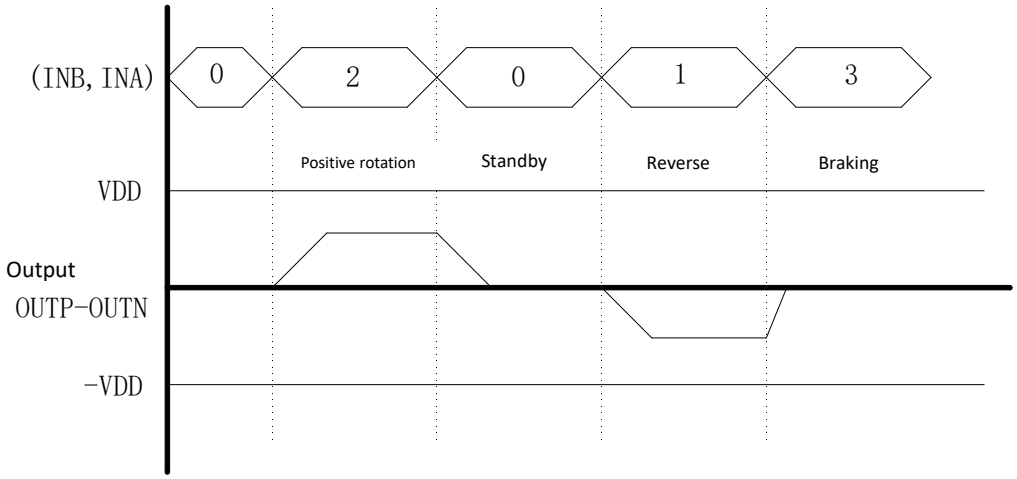
D7	D6	D5	D4	D3	D2	D1	D0
1	0	1	0	0	0	INB	INA

D7~d2: data validation, the corresponding data is 1010_ 00XX；

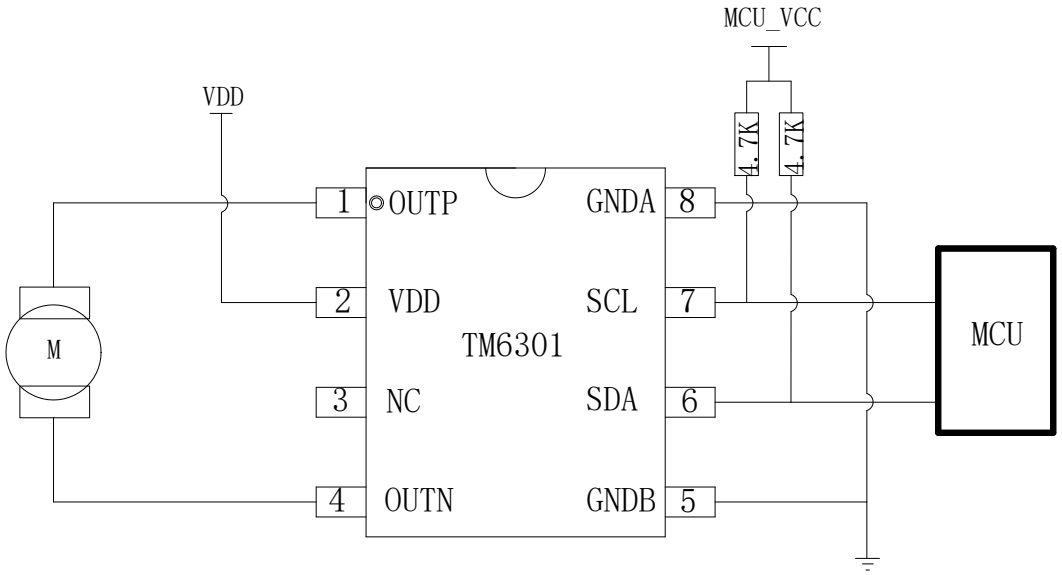
D1, d0: inb, ina, control output, corresponding truth table is as follows.

INB	INA	OUTP	OUTN	function
0	0	Z	Z	Standby
0	1	0	1	reversal
1	0	1	0	Forward rotation
1	1	0	0	braking

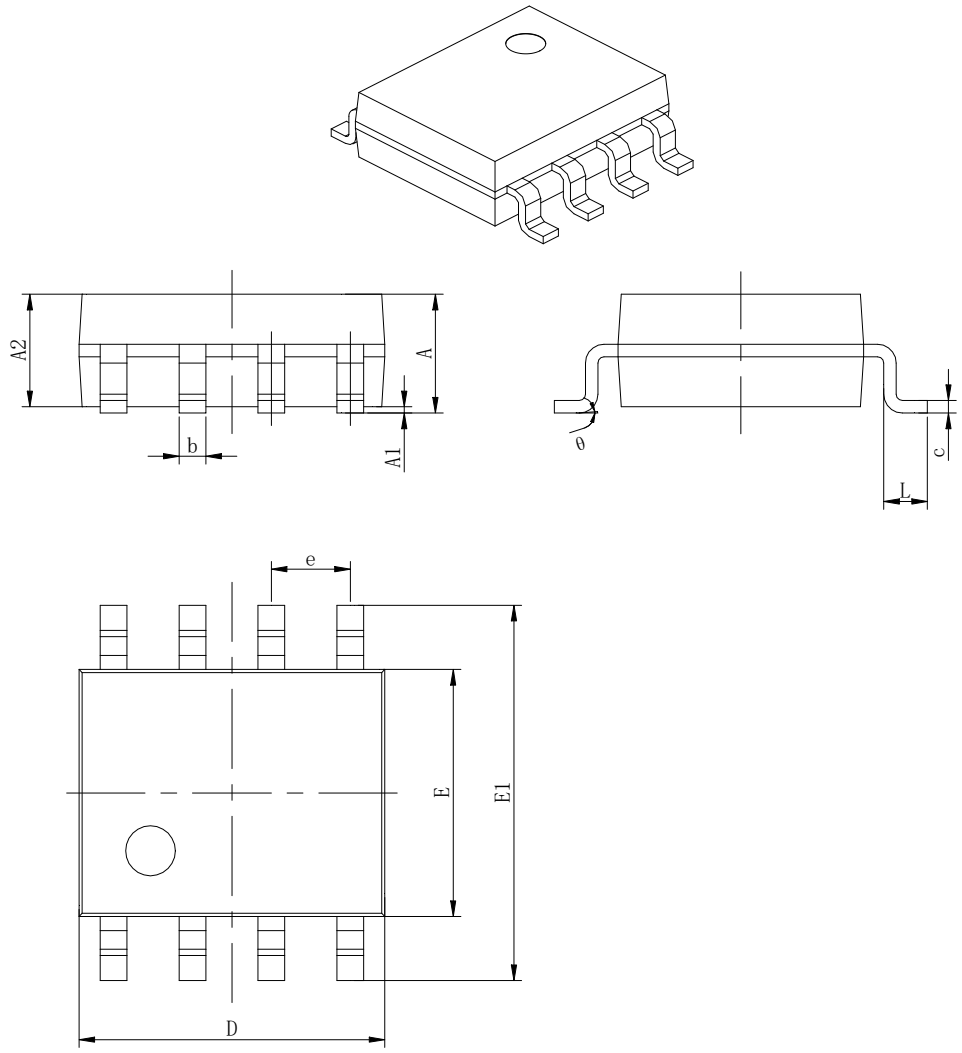
Typical waveform



Typical application circuit

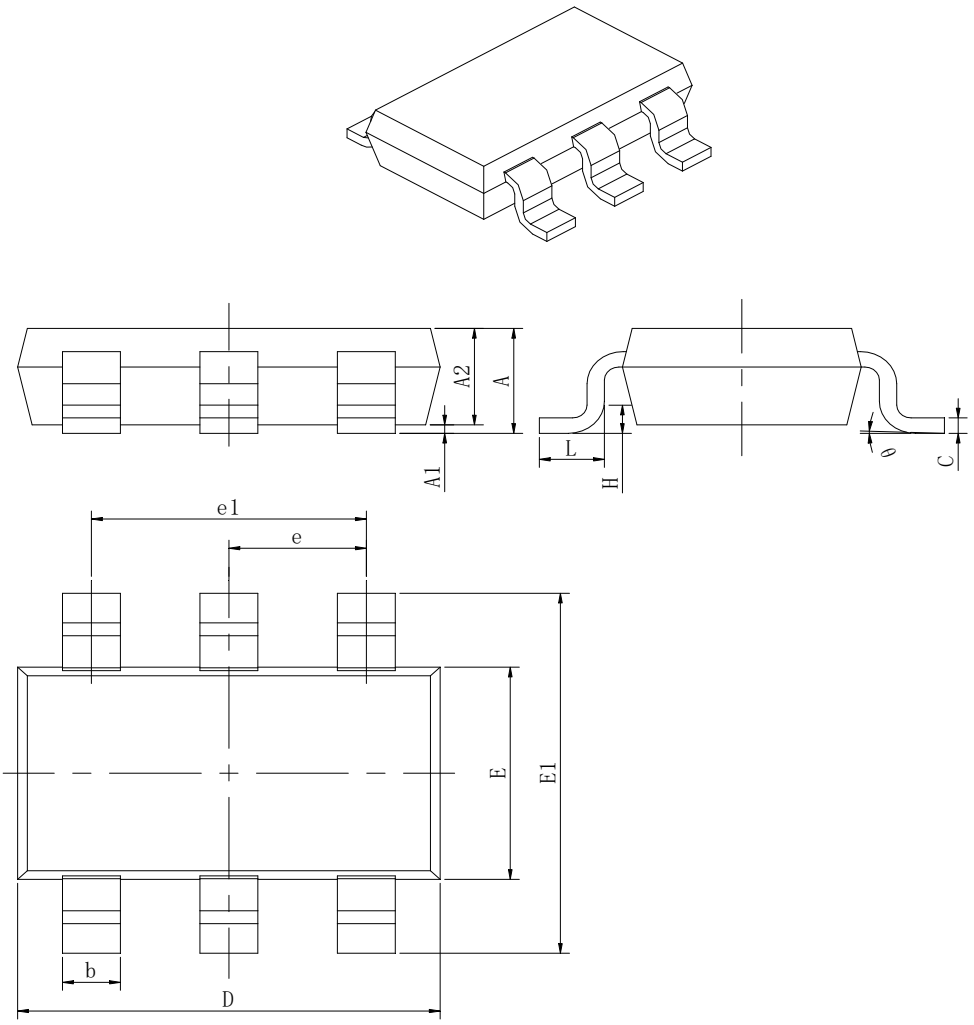


Packaging diagram (sop8)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Packaging diagram (SOT23-6)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	**Max**	**Min**	**Max**
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b	0.350	0.500	0.014	0.020
c	0.080	0.200	0.003	0.008
D	2.820	3.020	0.111	0.119
E	1.600	1.700	0.063	0.067
E1	2.650	2.950	0.104	0.116
e	0.95（BSC）		0.037(BSC)	
e1	1.90（BSC）		0.075(BSC)	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

All specs and applications shown above subject to change without prior notice.

Revision history

edition	Issue date	Introduction to revision
V1.0	2018-12-25	First edition release