Digital Single Phase BLDC Motor Controller

1. Description

The iT8300T is a single phase, brushless DC motor controller. It is composed of hall element, MOSFET, gate driver and control logic which can provide minimal components of total BOM to save total cost.

The iT8300T provides various parameters to tune motor efficiently and quickly, ex: poles, Lead Angel, target speed and PWM duty …etc. All the parameters shall be set via inergy's software "INGUI"

The iT8300T is equipped TSD, OCP, OVP, UVP, Lockout protections

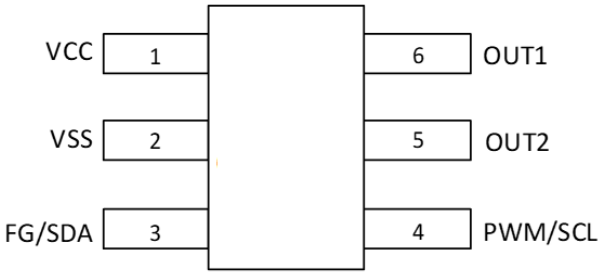
2. Applications

BLDC motors and fans

3. Features

- Direct PWM control
- Embedded Hall Sensor
- Wide Range 3.5V to 16V Operating Input
- Integrated Power MOSFETs
- Programmable Speed Curve
- Adjustable Lead Angle ± 90°
- Adjustable Lockout Detection and Automatic Recovery
- Adjustable Silence Current Control
- Selectable FG/Alarm/RD Signal Output
- 1KHz~100KHz PWM Input Frequency Range
- 25K/50KHz Output Switching Frequency
- Cycle by Cycle Current Limit
- Selectable Open Loop and Close Loop
- Adjustable Input Duty and Output Duty Slope
- Soft Start and Kick Start
- TSD, OCP, OVP, UVP, and Automatic Recovery

4. Pin Assignments



5. Marking Information

Product Name	Marking
iT8300T	 X：Date code □□：Internal code

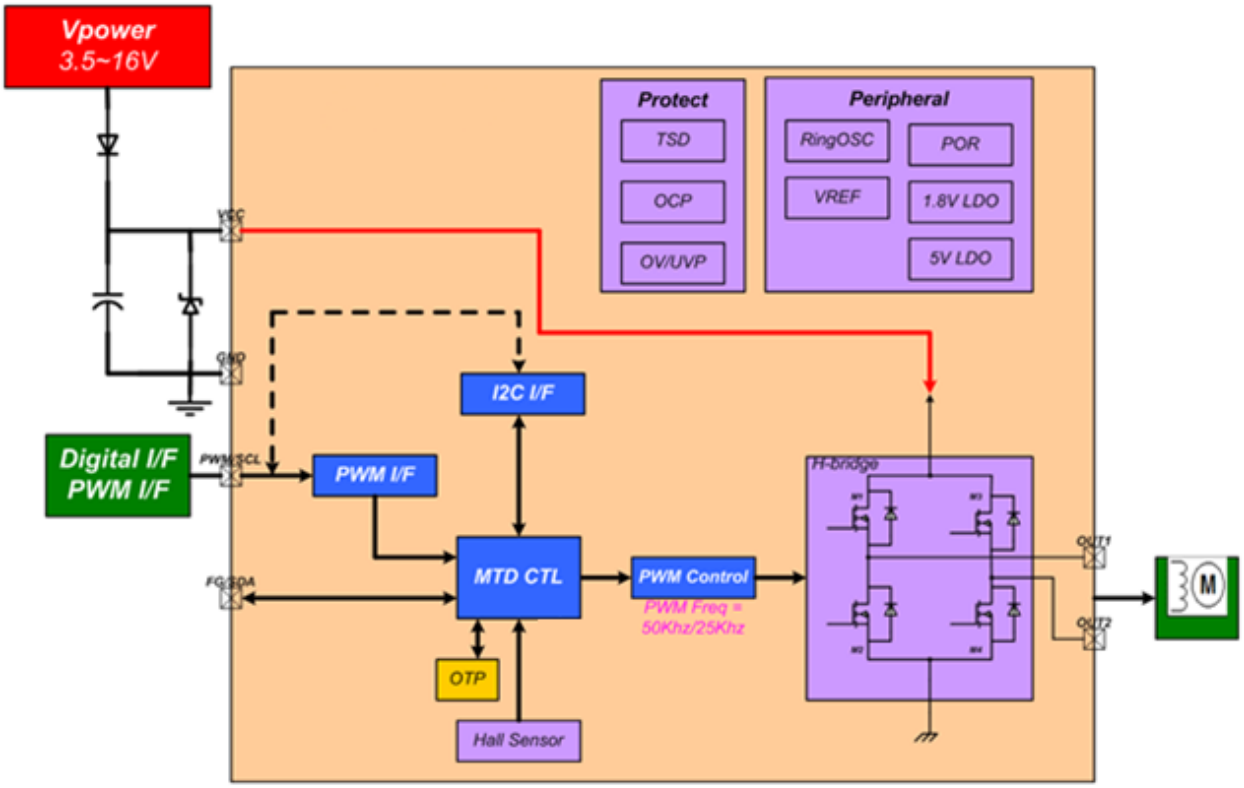
6. Ordering Code

Ordering Code
iT8300T

7. Pin Definitions

Pin No.	Symbol	Description
1	**VCC**	Power supply pin
2	**VSS**	Ground pin
3	**FG/SDA**	Speed signal output / SDA
4	**PWM/SCL**	Direct PWM input/ SCL
5	**OUT2**	Driving motor output
6	**OUT1**	Driving motor output

8. Block Diagram



9. Absolute Maximum Ratings

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to GND, all currents are defined positive into any lead. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

Symbol	Parameter	Limitation	Unit
V_{CC}	Supply Voltage	20	V
V_O	Output Voltage	18	V
I_O	Output Current	1.2	A
P_D	Package power dissipation @ $T_A \leq +25$ ℃	0.8	W
V_{FG}	FG/Alarm/RD signal output voltage	18	V
I_{FG}	FG/Alarm/RD signal sink current	0.01	A
R_{thJA}	Thermal resistance, junction to ambient	192	℃ / W
T_J	Junction temperature	150	℃
T_S	Storage temperature	-55~150	
T_L	Lead temperature (soldering 10 seconds)	260	

10. Recommended Operating Conditions

Symbol	Parameter	Min	Max	Unit
V_{CC}	Operating supply voltage	3.5	16	V
V_{PWM}	PWM input voltage	-0.3	5.5	V
D_{PWM}	Duty of PWM input	0	100	%
F_{PWMIN}	Frequency of PWM input	1K	100K	Hz
T_A	Ambient temperature (*1)	- 50	125	℃

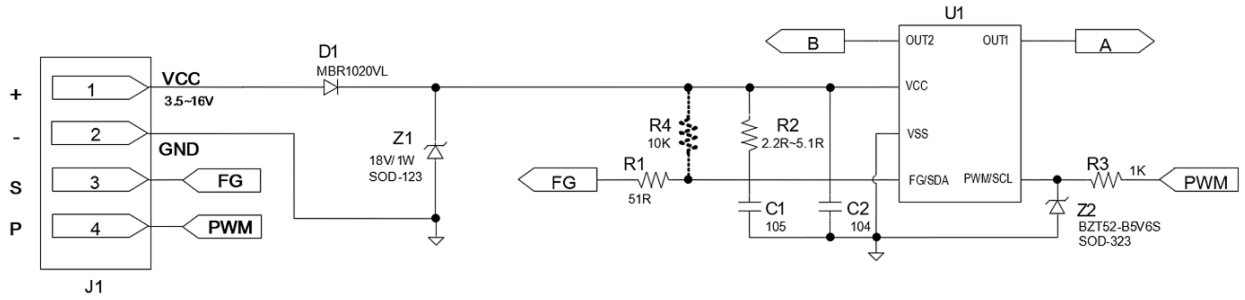
*1 Note：Please do not exceed T_j limitation

11. Electrical Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{cc}	Circuit Current	Vcc=12V		6		mA
TH_{PG}	Vcc power good threshold		-15%	3	+15%	V
HYS_{PG}	Vcc power good hysteresis		0.1	0.4	0.6	V
TH_{ov}	Vcc over voltage threshold			19.5		V
HYS_{ov}	Vcc over voltage hysteresis			1		V
TH_{uv}	Vcc under voltage threshold			8		V
HYS_{uv}	Vcc under voltage hysteresis			1		V
TH_{tsd}	Thermal shutdown threshold		140	150	160	℃
HYS_{tsd}	Thermal shutdown hysteresis			25		℃
TH_{tam}	Thermal alarm threshold		115	125	135	℃
HYS_{tam}	Thermal alarm hysteresis			25		℃
V_{PWMH}	PWM input high voltage		2.6		5.5	V
V_{PWML}	PWM input low voltage		-0.3		0.8	
F_{PWM}	PWM input frequency		1		100	kHz
R_{PWM}	PWM input internal pull-up resistance			20		kΩ
R_{PWM}	PWM input internal pull-down resistance			800		kΩ
R_{on}	High side + Low side resistance	I_O=0.5A/Vcc=12V Ta=25℃		0.9		Ω
R_{FG}	Internal resistance of FG			20		Ω
I_{oc}	Over current threshold				1.2	A
I_{lim}	Output current limit range	0.2A/step	0.2		1.2	A
F_{PWM}	PWM output frequency		-5%	25	+5%	kHz
			-5%	50	+5%	
LA	Lead Angle		-90		+90	°
T_{locd}	Lockout detect time	0.25/0.5sec	-5%	0.25	+5%	sec
T_{lodr}	Lock recovery time	2.5/5/7.5/10sec	-5%	2.5	+5%	sec
B_{OP}	Operate magnetic field		10		35	Gauss
B_{RP}	Release magnetic field		-35		-10	Gauss
B_{HYS}	magnetic field hysteresis	ABS(B_{OP}- B_{RP})		50		Gauss

12. Application Circuit

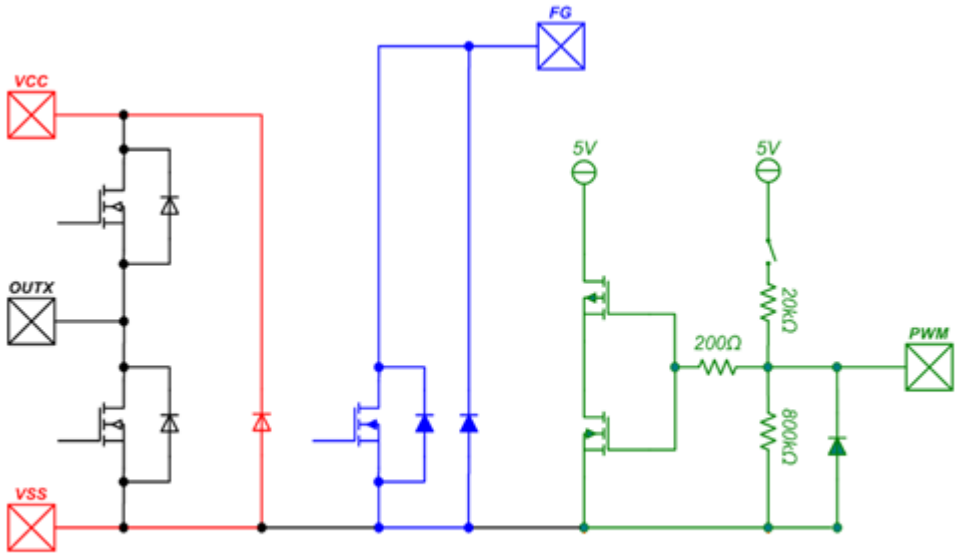
<Typical>



Note：

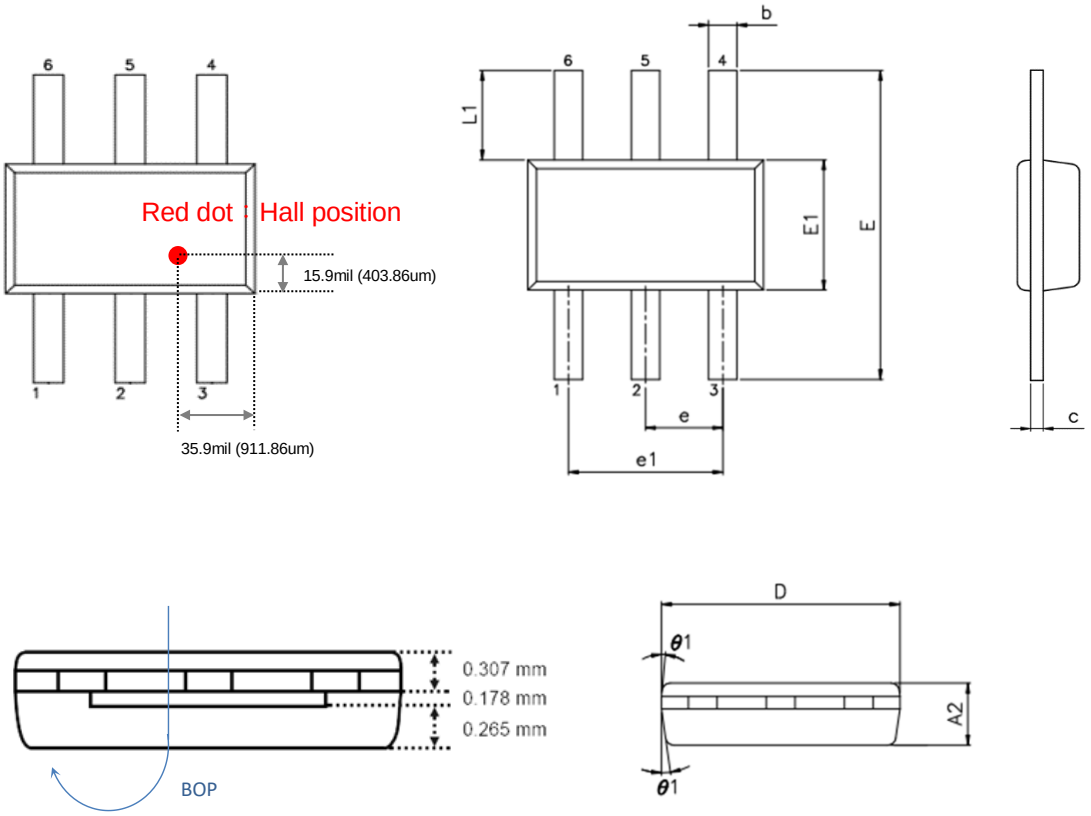
1. (IMPORTANT) C2 must be placed as close as possible to VCC pin.
2. Z2 is optional. It can be removed if PWM input voltage will not exceed to 5.5V.
3. R1 and R3 are for ESD protection.
4. The value of R3 will affect to V_{PWMH} and V_{PWML} of PWM.
5. R4 is for output TTL signal. Open drain signal keeps open.

13. I/O Equivalent Circuit



14. Package Information

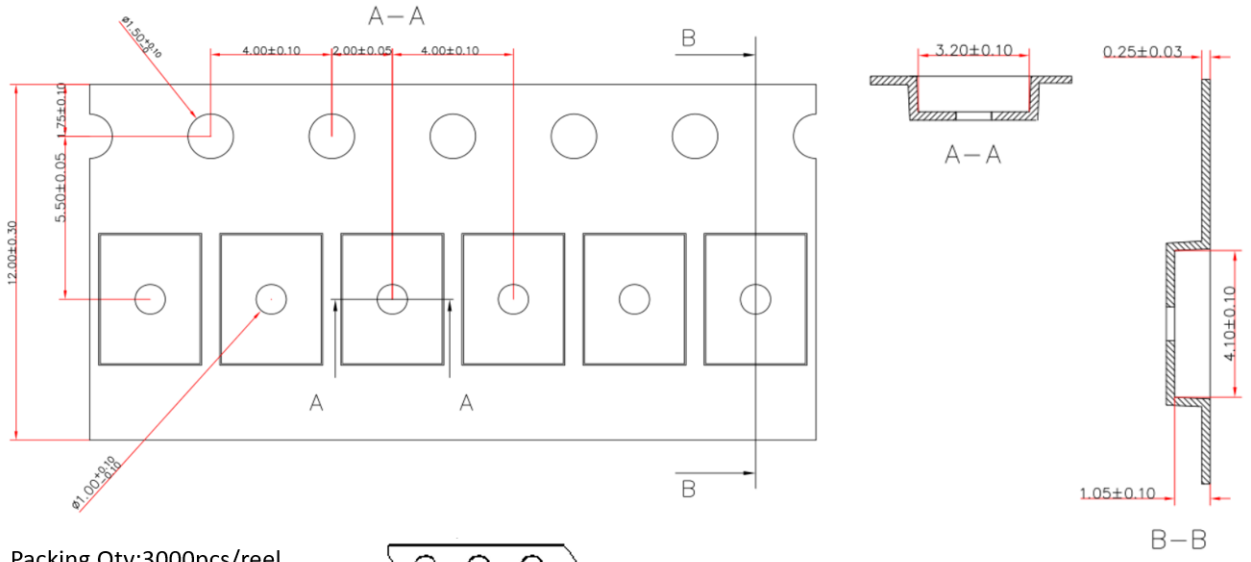
TSOT23-6L Dimensions



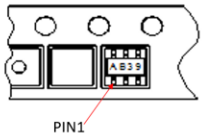
SYMBOL	Dimension in mm		
	MIN.	NOM.	MAX.
A2	0.700	0.750	0.800
b	0.350	-	0.500
c	0.080	-	0.200
D	2.800	2.900	3.020
E	3.600	3.800	4.000
E1	1.500	1.600	1.700
e	0.950 BSC		
e1	1.900 BSC		
L1	1.100 REF		
θ1	4°	10°	12°

15. Tape and Reel Information

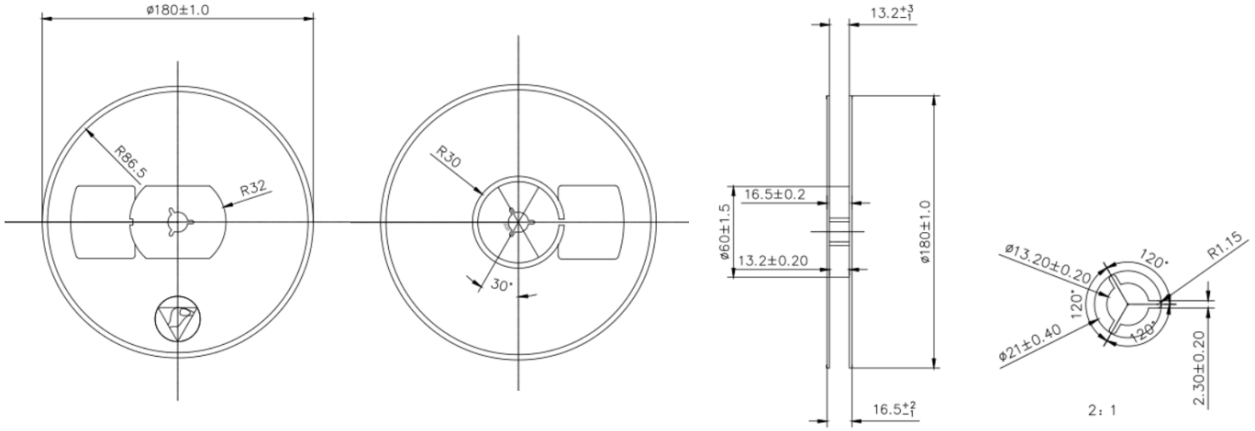
Tape



Packing Qty:3000pcs/reel
Trailer Tape Length:400mm
Leader Tape Length:400mm



Reel



COLOR:Blue

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