Digital Single Phase BLDC Motor Driver

1. Description

The iT8320 is a single phase, brushless DC motor controller. It is composed of MOSFET, gate driver and control logic which can provide minimal components of total BOM to save total cost.

The iT8320 provides various parameters to tune motor efficiently and quickly, ex: poles, Lead Angel, target speed and PWM duty …etc.

The iT8320 is equipped with TSD, OCP, OVP, Lockout protections

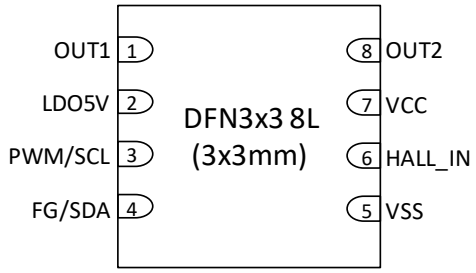
2. Applications

BLDC motors and fans

3. Features

- Direct PWM control
- Supports Hall IC
- Wide Range 3.5V to 16V Operating Input
- Integrated Power MOSFETs
- Programmable Multi Points Speed Curve
- Adjustable Lead Angle ± 45°
- 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 and Automatic Recovery

4. Pin Assignments



5. Marking Information

Product Name	Marking
iT8320	 x：Date code □：Package type

6. Ordering Code

iT8320□ Assembly Package	E：DFN3x3 8L

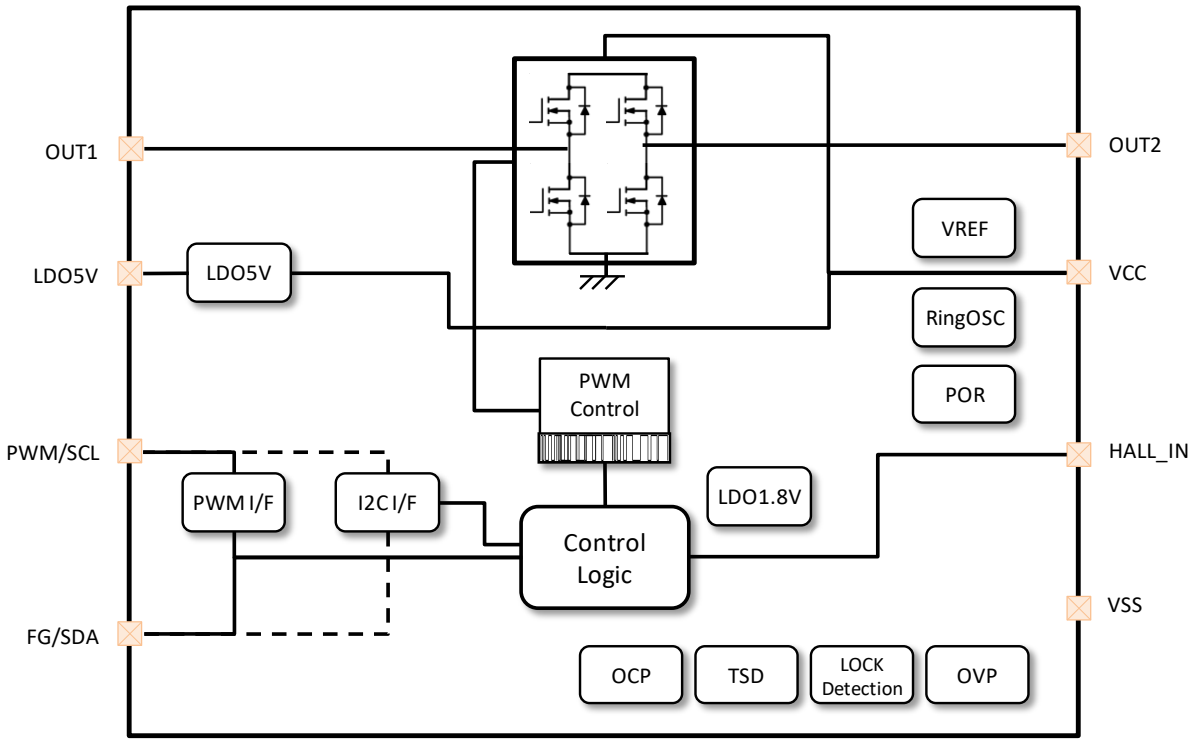
Note: inergy defines " Green " as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC / JEDEC J-STD-020C)

7. Pin Definitions

iT8320E DFN 3x3

Pin No.	Symbol	Description
1	**OUT1**	Driving motor output
2	**LDO5V**	DC5V output
3	**PWM/SCL**	Direct PWM input/ SCL
4	**FG/SDA**	Speed signal output / SDA
5	**VSS**	Ground pin
6	**HALL_IN**	External hall IC signal in
7	**VCC**	Power supply pin
8	**OUT2**	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 COM, 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	22	V
I_O	Output Current (peak, <100ms)	2.4	A
P_D	Package power dissipation @ $T_A \leq +25\ ^oC$	2.0	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 (DFN-8L 3*3)	50	^oC / W
T_J	Junction temperature	150	^oC
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)	- 40	125	^oC

*1 Note：Please do not exceed T_j limitation

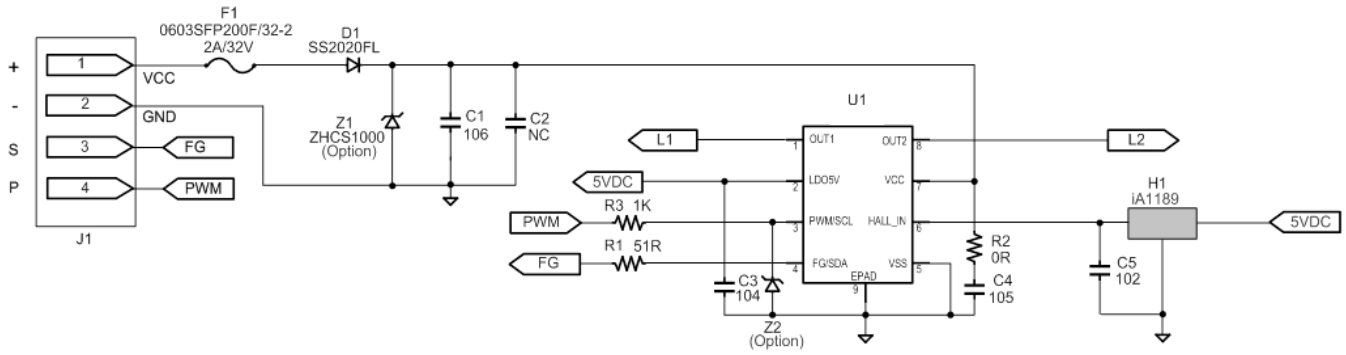
11. Electrical Characteristics

V_{CC}=12V, T_A = 25 ºC, unless otherwise specified. The V_{IN}, $V_{TH\ and}$ I_{IN} parameters are referenced to COM. The V_O and I_O parameters are referenced to COM and are applicable to the respective output leads: HO or LO.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
TH_{PG}	Vcc power good threshold		-15%	3	+15%	V
HYS_{PG}	Vcc power good hysteresis			0.4		V
TH_{ov}	Vcc over voltage threshold	Select by GUI	19.5		21.5	V
HYS_{ov}	Vcc Over voltage hysteresis			1		V
TH_{tsd}	Thermal shutdown threshold	Select by GUI	100		175	℃
HYS_{tsd}	Thermal shutdown hysteresis			50		℃
TH_{tam}	Thermal alarm threshold	Select by GUI	100		175	℃
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
V_{FGL}	FG low level voltage	I=10mA		0.3		V
I_{cc}	Circuit Current	Vcc=12V		8		mA
R_{on}	High side + Low side resistance	I_O=0.5A/Vcc=12V Ta=25℃		0.5		Ω
I_{oc}	Over current protection threshold				4	A
I_{lim}	Output current limit range	Select by GUI	0.6		2.4	A
F_{osc}	Internal oscillator frequency		-5%	26	+5%	MHz
F_{PWM}	PWM output frequency		-5%	25	+5%	kHz
			-5%	50	+5%	
LA	Lead Angle	Program by GUI	-45		+45	°
T_{locd}	Lockout detect time	0.25/0.5sec	-5%	0.25	+5%	sec
T_{lodr}	Lock recovery time	2.5/7/7.5/10sec	-5%	2.5	+5%	sec

12. Application Circuit

Typical

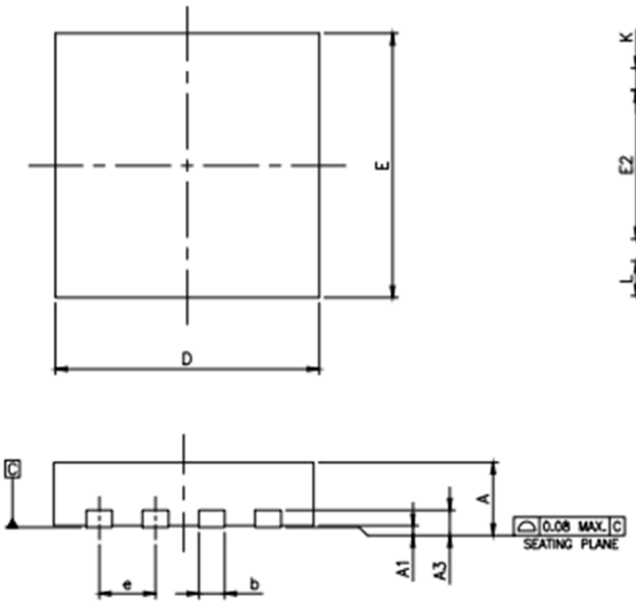


NOTE：

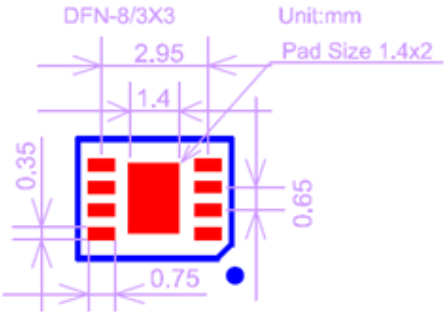
1. (IMPORTANT) C4 must be placed as close as possible to VCC pin.
2. Z2 is optional. It can be removed if PWM input voltage will not exceed to 5.5V.
3. R1 and R3 are optional for ESD protection.
4. F1 is optional for safety protection.

13. Package Information

iT8320E DFN8L 3x3 Dimensions



SYMBOL	Dimension in mm		
	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3		0.203 REF	
D		3.00 BSC	
E		3.00 BSC	
e		0.65 BSC	
K	0.20	-	-
D2	1.95	2.00	2.05
E2	1.60	1.65	1.70
L	0.35	0.40	0.45
b	0.25	0.30	0.35



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