

Ordering number : ENN6204

Monolithic Digital IC



LB1867M

Two-Phase Brushless Fan Motor Driver

Overview

The LB1867M is a 2-phase unipolar brushless motor driver. With only a few peripheral parts, lockup protection and automatic recovery can be implemented. The IC can be configured for 12V or 24V operation and a wide range of variations, from LOW speed to H-High speed and from 60 cm to 120 cm square using the same PCB. This makes it easy to design highly reliable fan motor installations.

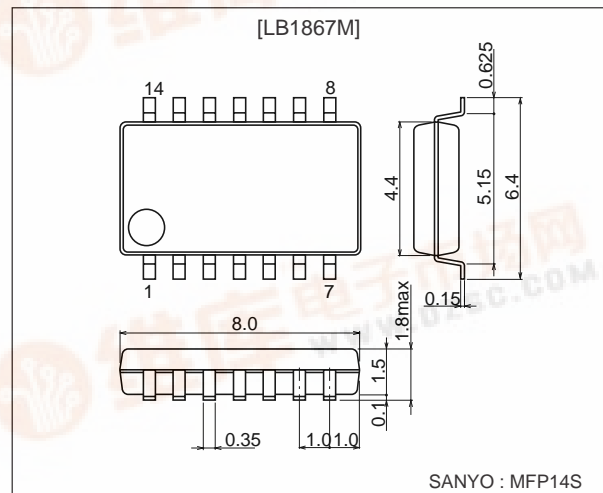
Functions and Features

- Output protection Zener diode with variable withstand voltage
Z1, Z2 pins open: VOLM = 57V (24V specification)
Z1, Z2 pins shorted: VOLM = 32V (12V specification)
External Zener diode connected across Z1 - VCC pins:
support for fans with large drive current
- External resistor allows configuration for 12V or 24V.
- Direct Hall element connection possible (built-in Hall amplifier with hysteresis supports core without auxiliary electrode)
- Built-in output transistor with 1.0A output current (strengthened negative-current support for core without auxiliary electrode)
- Built-in rotation detection function: Low during rotation and High during stop
- Built-in lockup protection with automatic recovery
- Built-in thermal shutdown

Package Dimensions

unit: mm

3111-MFP14S



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Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum input current	ICC max	$t \leq 20 \text{ ms}$	200	mA
Maximum applied output voltage	VOOUT max		Internal	V
Maximum output current	IOOUT max		1.0	A
Maximum current flowing into RD pin	IRD max		10	mA
Maximum RD applied voltage	VRD max		30	V
Allowable power dissipation	Pd max	*With specified substrate	800	mW
Operating temperature	Topr		-30 to +80	$^\circ\text{C}$
Storage temperature	Tstg		-55 to +150	$^\circ\text{C}$

*Printed circuit board ($20 \times 15 \times 1.5 \text{ mm}^3$ glass epoxy)

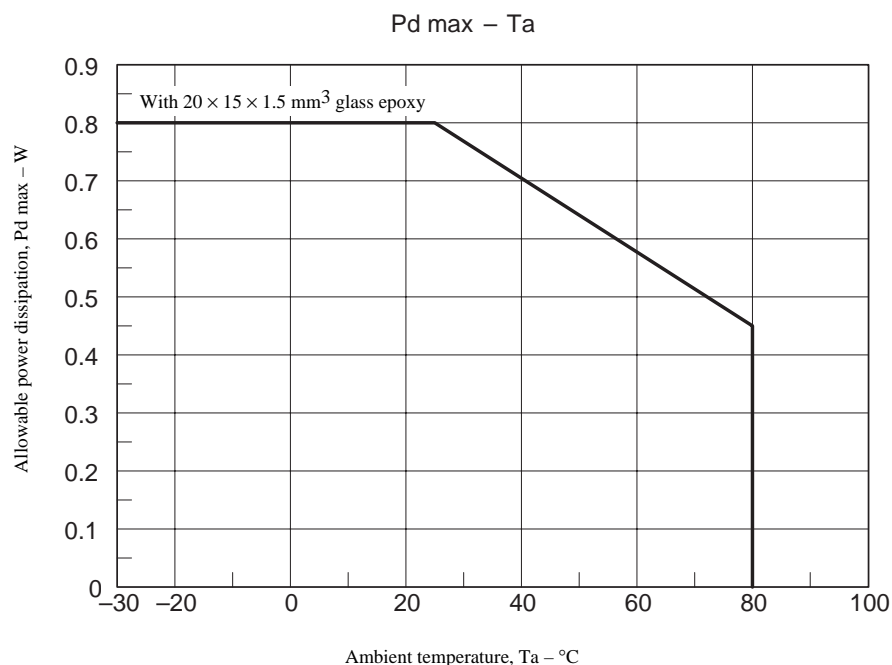
Allowable Operating Ranges at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	ICC		6.0 to 50	mA
Common mode input voltage range	VICM		0.2 to $V_{IN}-1.5$	V

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $I_{cc} = 10 \text{ mA}$

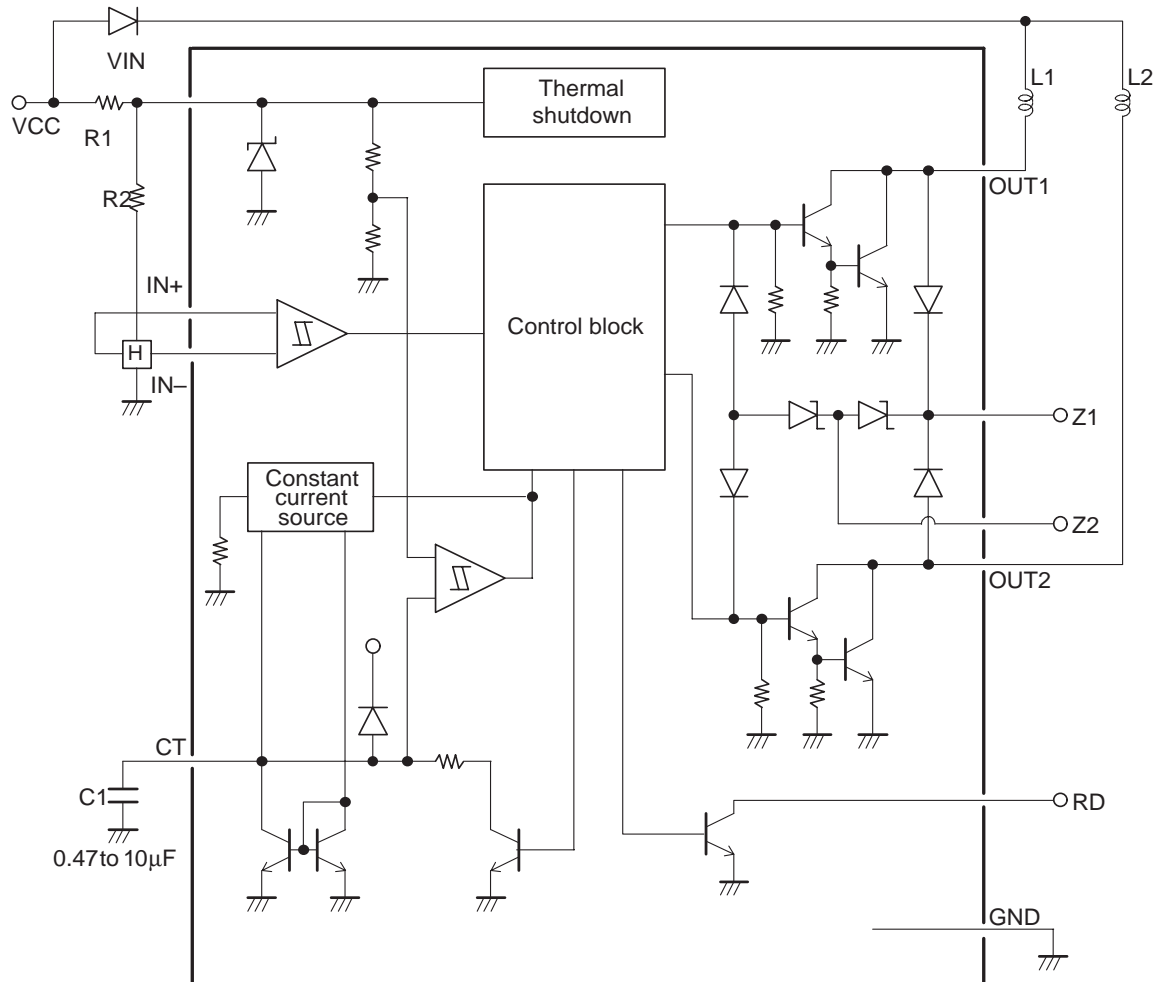
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output limiter withstand voltage	VOLM1	Z1, Z2 open	54	57	60	V
	VOLM2	Z1, Z2 short	31	33	35	V
Output saturation voltage	Vosat 1 2	$I_o = 0.5\text{A}$		0.95	1.2	V
		$I_o = 1.0\text{A}$		0.15	1.5	V
VIN voltage	VIN	ICC = 7.0 mA	6.4	6.7	7.0	V
Hall input sensitivity (at zero peak)	VHN	Including offset and hysteresis			20	mV
RD output saturation voltage	VRDsatsat	IRD = 5 mA		0.1	0.3	V
CT drain current	IC1	C = GND	2.7	3.8	4.9	μA
CT discharge current	IC2	C = VIN	0.19	0.30	0.41	μA
Comp input threshold voltage	VTH1		0.77	0.8VIN	0.83	V
	VTH2		0.42	0.45VIN	0.48	V
Thermal protection operating temperature	TSD	Design target value*		180		$^\circ\text{C}$
Thermal protection circuit hysteresis	ΔTSD	Design target value*		40		$^\circ\text{C}$

* Design target values are not measured.



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Block Diagram and Sample Application Circuit



Truth Table

IN+	IN-	CT	OUT1	OUT2	RD
H	L	L	H	L	L
L	H	L	L	H	L
H	L	H	H	H	H
L	H	H	H	H	H

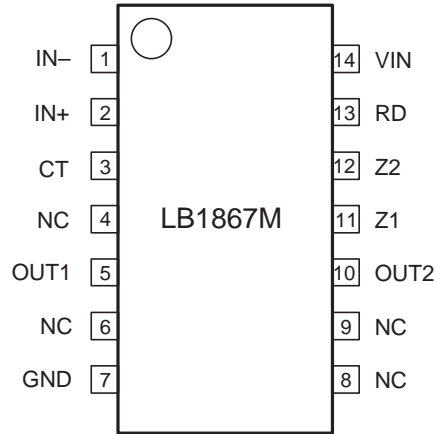
*RD is a latch type output

Pin Description

Pin name	Function
IN-	Hall input + pin Hysteresis amplifier
IN+	Hall input - pin Hysteresis amplifier
CT	Lockup protection time setting capacitor pin (0.47 to 4.7 μ F)
Z1	External Zener diode pin (external Zener diode to be connected between power supply and Z1)
Z2	Kickback absorption voltage alteration pin (shorted to Z1: 12V operation)
OUT1	Output 1 pin
OUT2	Output 2 pin
VIN	Regulated power supply input pin (limiting resistor to be inserted between power supply and VIN)
GND	GND pin
RD	Lockup detection pin (latch type)

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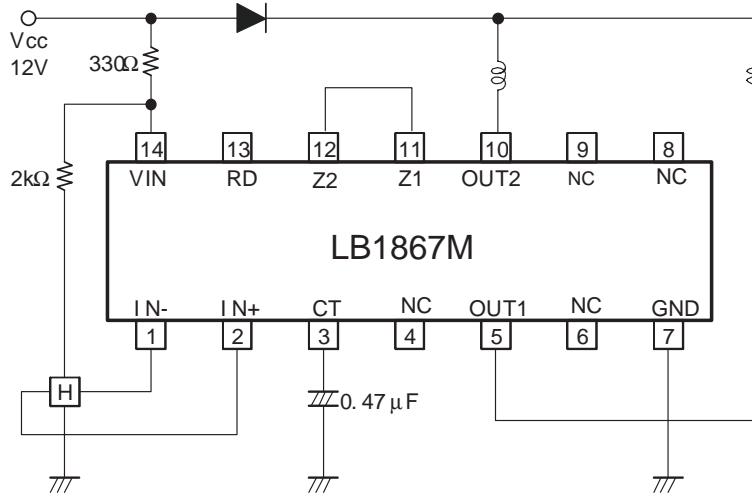
Pin Assignment



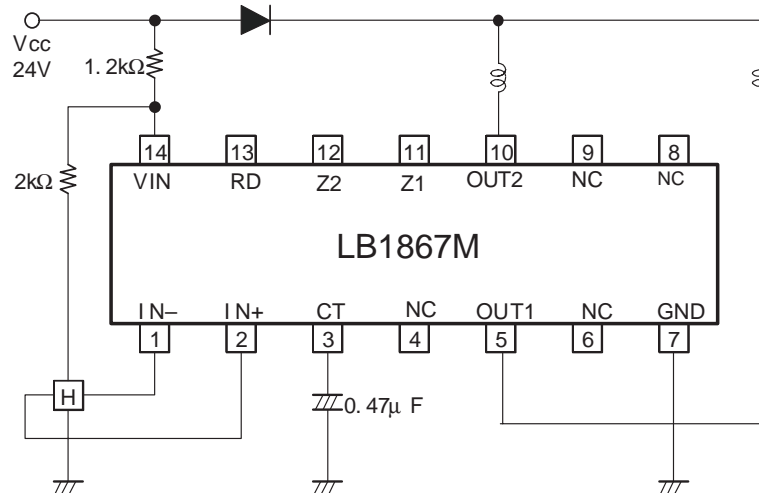
Top view

LB1867M Sample Application Circuits

(1) 12V supply voltage

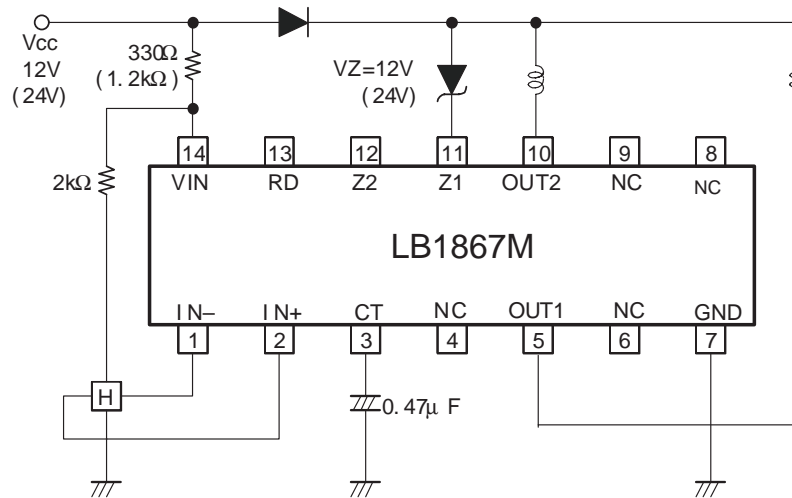


(2) 24V supply voltage



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(3) High-Power Fan (120 mm-HH-Speed)



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