Ordering number : EN6204A

SANYO Semiconductors
DATA SHEET

LB1867M — Monolithic Digital IC 2-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 60cm to 120cm square using the same PCB. This makes it easy to design highly reliable fan motor installations.

Features

- Output protection Zener diode with variable withstand voltage
  - Z1, Z2 pins open: V_OLM = 57V (24V specification)
  - Z1, Z2 pins shorted: V_OLM = 32V (12V specification)
  - External Zener diode connected across Z1 – V_{CC} 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

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum input current	I_{CC} max	t ≤ 20ms	200	mA
Maximum applied output voltage	V_{OUT} max		Internal	V
Maximum output current	I_{OUT} max		1.0	A
Maximum current flowing into RD pin	I_{RD} max		10	mA
Maximum RD applied voltage	V_{RD} max		30	V
Allowable power dissipation	Pd max	Mounted on a specified board *	800	mW
Operating temperature	Topr		-30 to +80	°C
Storage temperature	Tstg		-55 to +150	°C

* Specified board: 20mm × 15mm × 1.5mm, glass epoxy board.

Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Input current range	I_{CC}		6.0 to 50	mA
Common mode input voltage range	V_{ICM}		0.2 to V_{IN}-1.5	V

Electrical Characteristics at Ta = 25°C, I_{CC} = 10mA

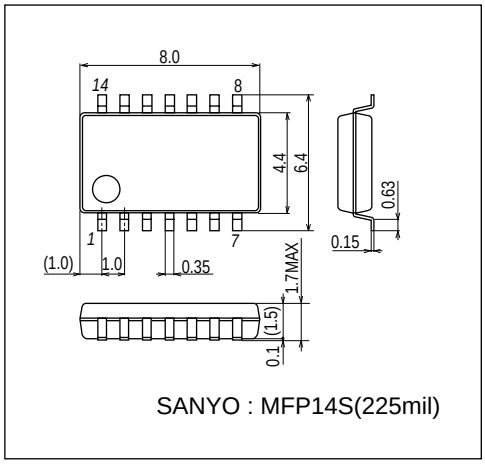
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output limiter withstand voltage	V_OLM1	Z1, Z2 open	54	57	60	V
	V_OLM2	Z1, Z2 short	31	33	35	V
Output saturation voltage	$V_O$sat1	I_O = 0.5A		0.95	1.2	V
	$V_O$sat2	I_O = 1.0A		1.15	1.5	V
V_{IN} voltage	V_{IN}	I_{CC} = 7.0mA	6.4	6.7	7.0	V
Hall input sensitivity (at zero peak)	V_{HN}	Including offset and hysteresis			20	mV
RD output saturation voltage	V_{RD}sat	I_{RD} = 5mA		0.1	0.3	V
CT drain current	IC1	C = GND	2.7	3.8	4.9	μA
CT discharge current	IC2	C = V_{IN}	0.19	0.30	0.41	μA
Comp input threshold voltage	V_{TH}1		0.77	0.8V_{IN}	0.83	V
	V_{TH}2		0.42	0.45V_{IN}	0.48	V
Thermal protection operating temperature	TSD	Design target value *		180		°C
Thermal protection circuit hysteresis	ΔTSD	Design target value *		40		°C

* Design target value, Do not measurement.

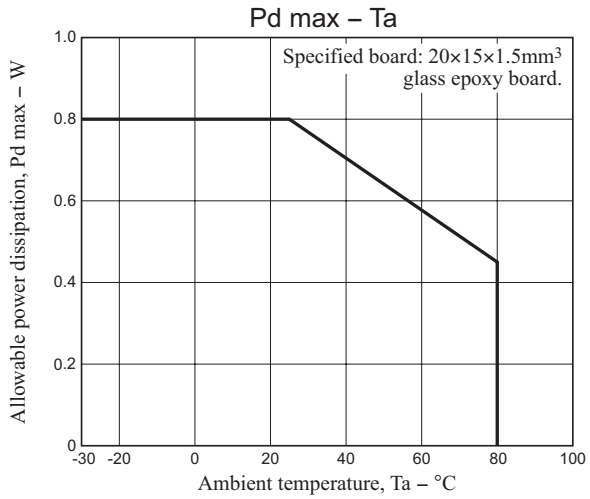
Package Dimensions

unit : mm (typ)

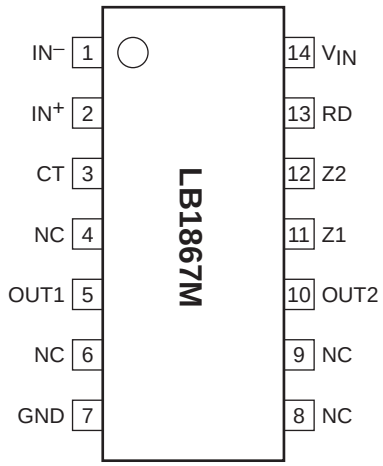
3111A



SANYO : MFP14S(225mil)



Pin Assignment



Top view

Pin Function

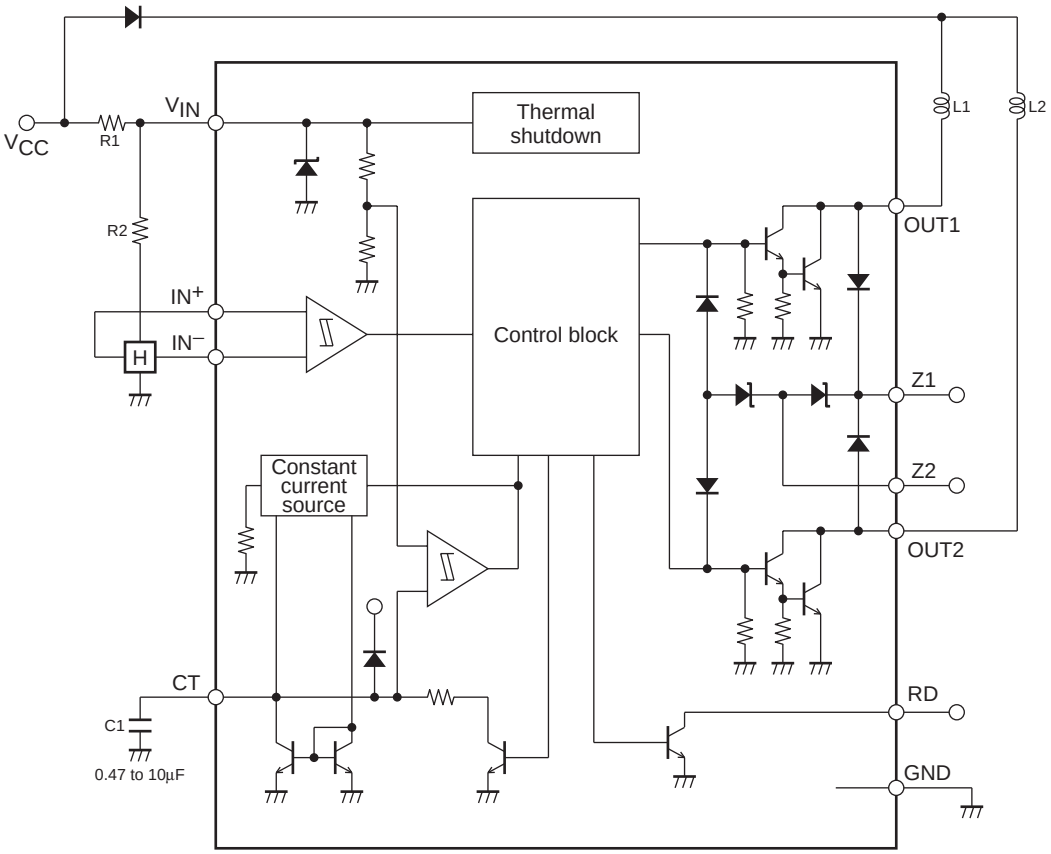
Pin No.	Pin name	Function
1	IN^-	Hall input + pin. Hysteresis amplifier
2	IN^+	Hall input – pin. Hysteresis amplifier
3	CT	Lockup protection time setting capacitor pin (0.47 to 4.7μF).
5	OUT1	Output 1 pin.
10	OUT2	Output 2 pin.
7	GND	GND pin.
11	Z1	External Zener diode pin (external Zener diode to be connected between power supply and Z1).
12	Z2	Kickback absorption voltage alteration pin (shorted to Z1: 12V operation).
13	RD	Lockup detection pin (latch type).
14	V_{IN}	Regulated power supply input pin (limiting resistor to be inserted between power supply and V_{IN}).

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

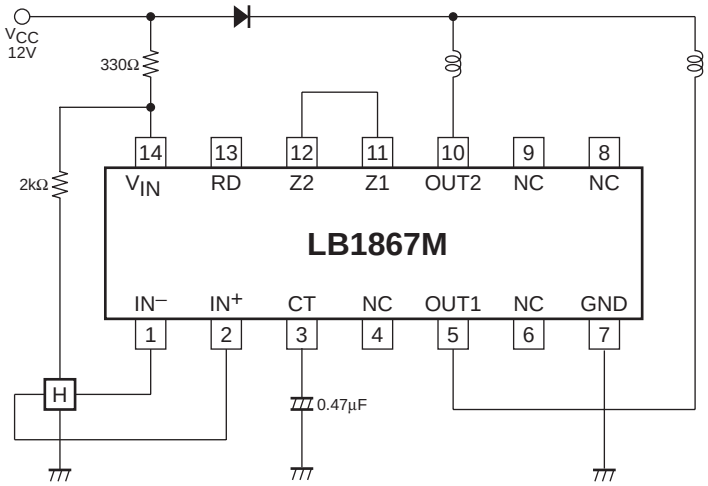
* RD is a latch type output

Block Diagram

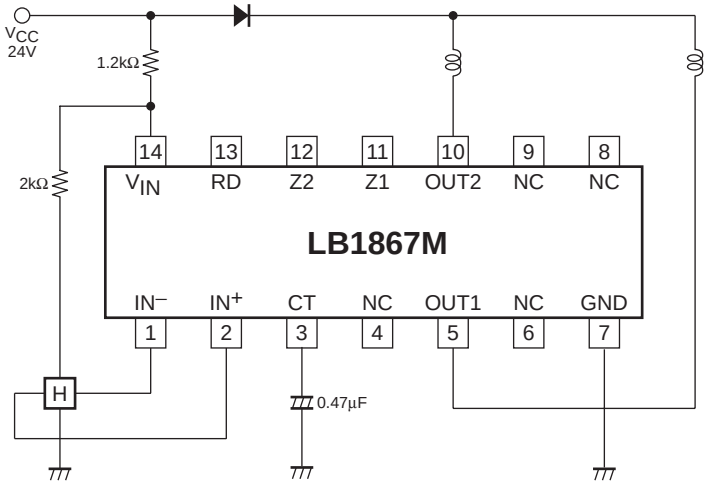


Application Circuit Example

(1) 12V supply voltage



(2) 24V supply voltage



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