

Ordering number : ENN6188A

Monolithic Digital IC



# LB1964T

## Fan Motor Single-Phase Full-Wave Driver

### Overview

The LB1964T is a driver for single-phase bipolar drive fan motors that features compact and low-profile MSOP-8 package. Low-saturation output and low-voltage operation make it ideal for applications that require small size and high efficiency, such as notebook computers and CPU cooling fans.

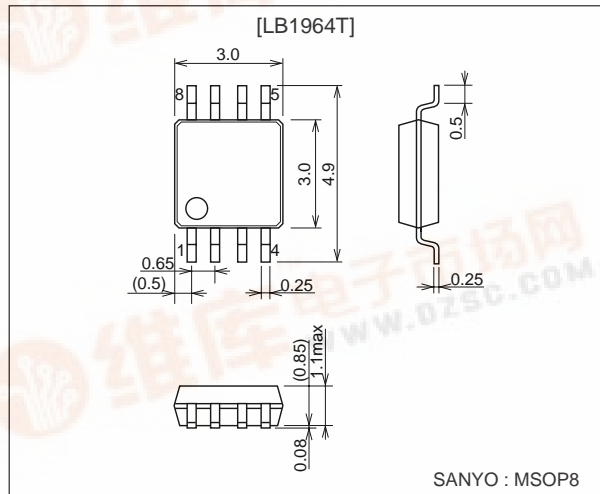
### Features

- Single-phase full-wave drive
- Low-voltage operation ( $V_{CC} = 2.0V$  min.)
- Low-saturation output (upper side + lower side saturation voltage:  $V_{osat}$  (total) = 0.3V typ.,  $I_o = 100$  mA)
- Ultraminiature package ( $3.0 \times 4.9 \times 0.93$  mm<sup>3</sup>)
- FG output
- Built-in thermal protection circuit

### Package Dimensions

unit: mm

3245-MSOP8



### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ C$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC}$ max		9	V
Allowable power dissipation	$P_d$ max	With specified substrate*	370	mW
OUT output current	$I_{OUT}$ max		0.3	A
OUT output withstand voltage	$V_{OUT}$ max		9	V
FG output withstand voltage	$V_{FG}$ max		7	V
FG output current	$I_{FG}$ max		5	mA
Operating temperature	$T_{opr}$		-20 to +85	$^\circ C$
Storage temperature	$T_{stg}$		-55 to +150	$^\circ C$

\* Specified substrate ( $20.0 \times 10.0 \times 0.8$  mm<sup>3</sup> paper phenol)

#### Allowable Operating Ranges at $T_a = 25^\circ C$

Parameter	Symbol	Conditions	Ratings	Unit
Power supply voltage	$V_{CC}$		2 to 8	V
Hall input common mode input voltage range	$V_{ICM}$		0.2 to $V_{CC}-1$	V

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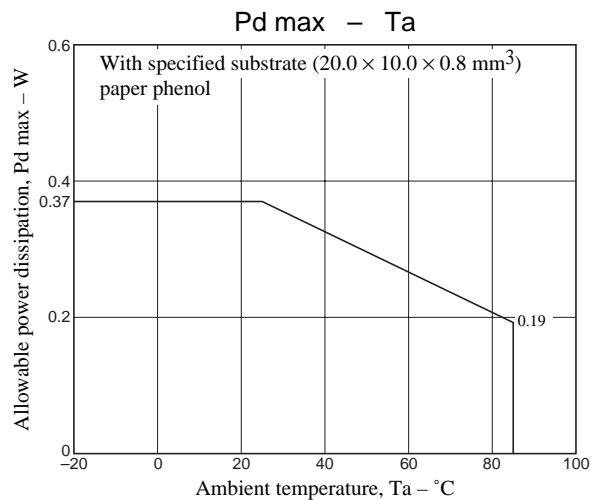
### Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 3.3\text{V}$ , unless otherwise specified

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	$I_{CC}$			3	4.5	mA
OUT output Low saturation voltage	$V_{OL}$	$I_O = 100\text{ mA}$		0.2	0.3	V
OUT output High saturation voltage	$V_{OH}$	$I_O = 100\text{ mA}$		0.2	0.3	V
Hall bias voltage	$V_{HB}$	$R_H = 360\Omega$	1.17	1.27	1.37	V
Hall input sensitivity	$V_{HN}$	Zero peak value		1	7	mV
FG output Low voltage	$V_{FG}$	$I_{FG} = 3\text{ mA}$		0.2	0.3	V
FG output leak current	$I_{FGL}$	$V_{FG} = 7\text{V}$			30	$\mu\text{A}$
Thermal protection operating temperature	TTSD	Assured design target*	150	180	200	$^\circ\text{C}$

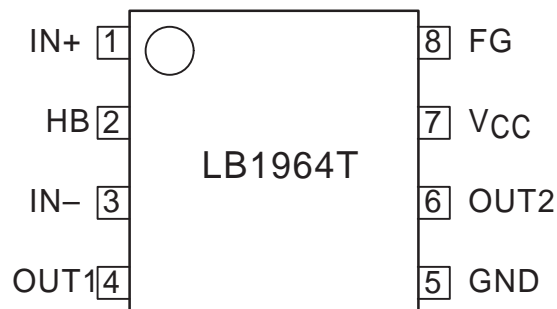
\* Assured design target: Target value, not measured individually

### Truth Table

IN-	IN+	OUT1	OUT2	FG	Mode
H	L	H	L	L	Rotating
L	H	L	H	Off	
-	-	Off	Off	-	In thermal protection



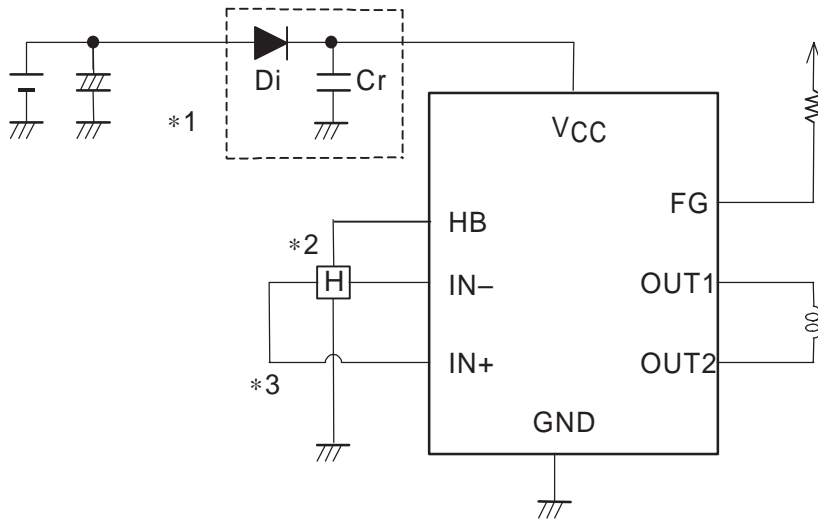
### Pin Assignment



Top view

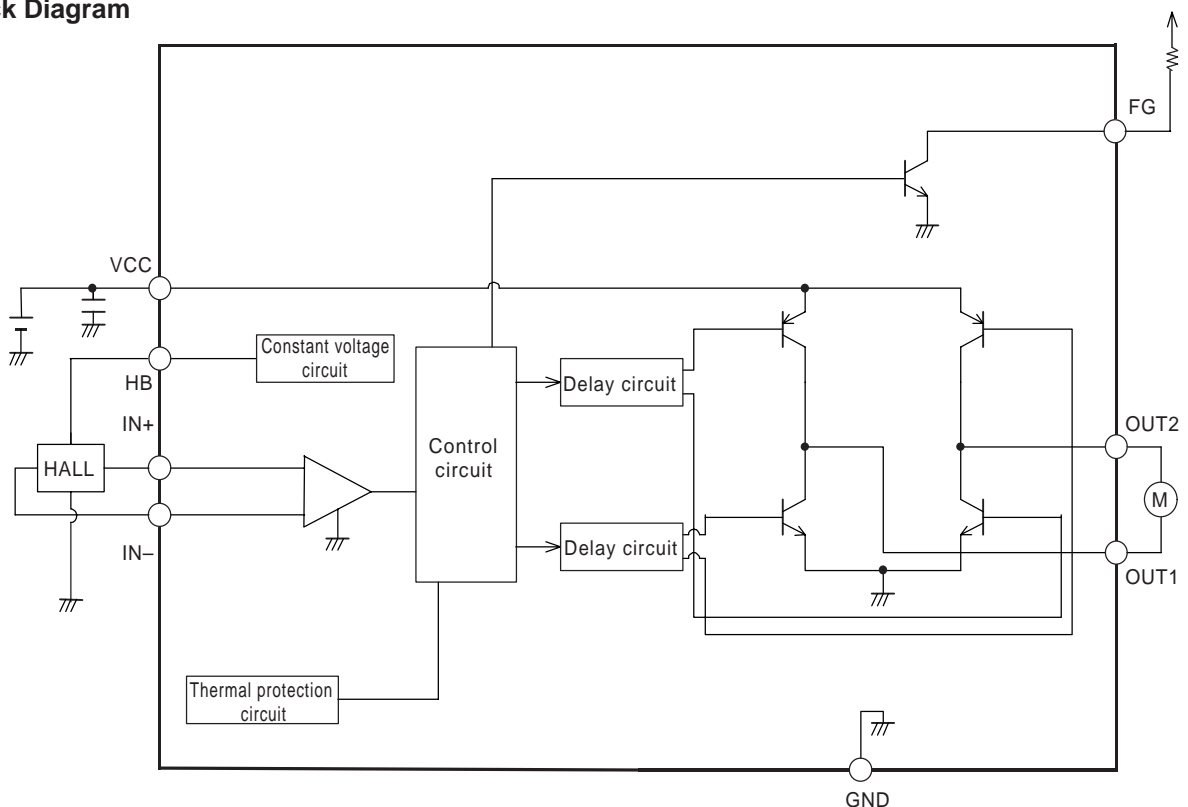
## LB1964T

### Sample Application Circuit

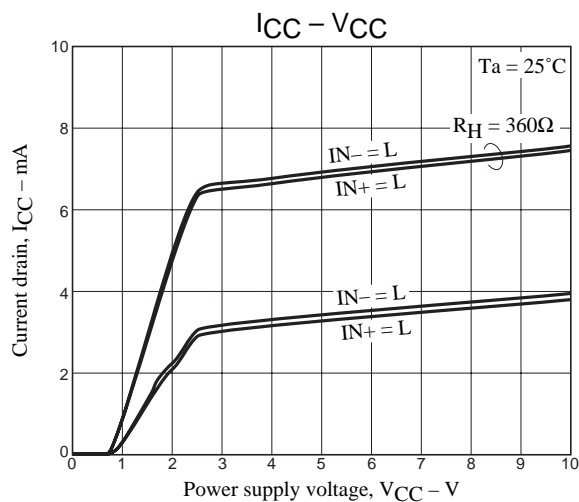
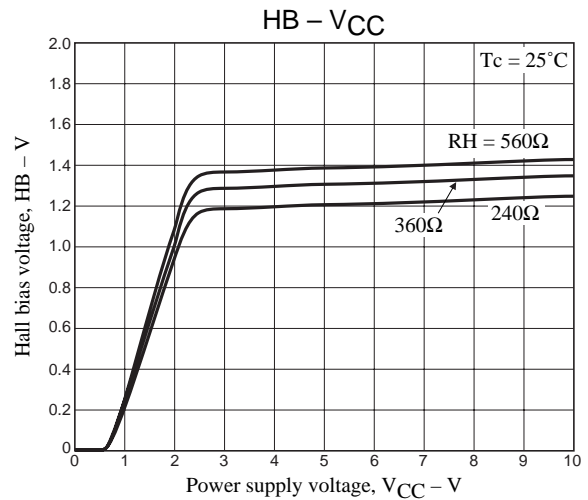
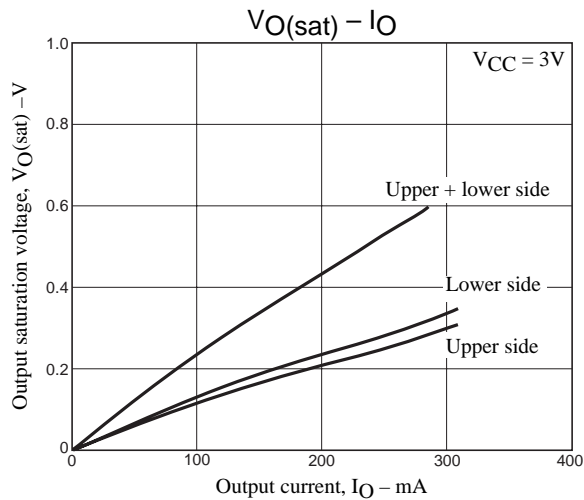


- \*1 When a diode is used to protect the IC from destruction in case of reverse connection, the capacitor Cr must be inserted to provide a regenerative current route. Similarly, a capacitor is needed in the power supply line, even if no diode is used.
- \*2 The Hall element is supplied with a constant-voltage bias of approx. 1.27V from the HB pin. This ensures stable output with good temperature characteristics from the Hall element. Because the LB1964T incorporates a Hall amplifier with low offset, it provides coil output with a stable duty.
- \*3 The Hall amplifier does not have a hysteresis characteristic. The OUT1 and IN- pins are at the same phase, and by arranging the two pins next to each other, chatter during phase switching is prevented. However, if the wiring leading to the IN- pin is long, some noise interference may occur. In such a case, the following steps should be considered:
  - (1) Arrange parts layout with priority to proximity of Hall element and IC, to allow short Hall element output wiring.
  - (2) Insert a resistor of about 10 to 100 k $\Omega$  between OUT1 and IN- to create a hysteresis characteristic.

### Block Diagram



## LB1964T



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