



ON Semiconductor®

<http://onsemi.com>

LB1960MC

Monolithic Digital IC For Fan Motor 2-phase Half-Wave Driver

Overview

The LB1960MC is a 2-phase half-wave driver for fan motor. The LB1960MC is a compact package. Low external parts count, easy wiring, and small PCB area allow use also with miniature fan motors.

Functions

- Dual power supply voltage design (5/12V) and wide voltage handling range. (3V also supported for rotation functions only)
- Constant-voltage Hall bias power supply (1.3V across HB to GND) assures stable Hall output over entire temperature and power supply voltage range. External limiting resistor not required.
- Built-in Hall amplifier with hysteresis (supports core without commutating pole).
- Built-in lockup protection and automatic recovery circuits (External capacitor for rotation detection need only be 0.1 μ F, allowing compact, cost-saving design).
- Built-in output transistor with output withstand voltage 24V (max)/output current 500mA (average), 1A (peak).
- Built-in thermal protection circuit.

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max		18	V
Maximum output current	I _{OUT} ave		500	mA
	I _{OUT} peak	t ≤ 1ms	1000	mA
Maximum output voltage	V _{OUT} max		Internal	V
Maximum HB output current	I _H max		10	mA
Allowable power dissipation	P _d max	Mounted on a specified board *	750	mW
Operating temperature	T _{opr}		-30 to +85	°C
Storage temperature	T _{stg}		-55 to +150	°C

* Specified board: 114.3mm × 76.1mm × 1.6mm, glass epoxy board.

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

LB1960MC

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

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}		3.6 to 17	V
Common mode input voltage range	V_{COM}		0.2 to HB	V

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 12\text{V}$

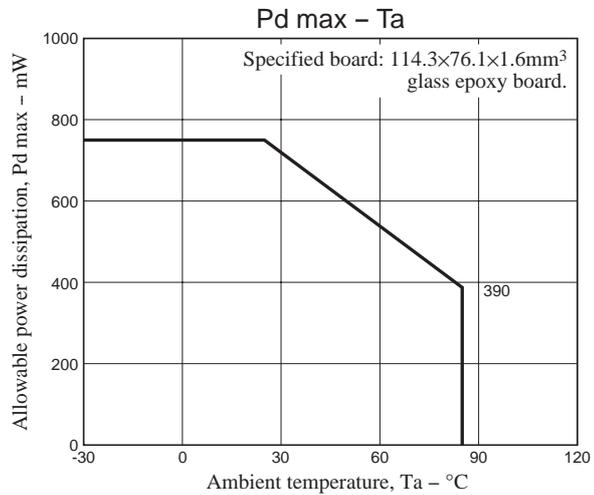
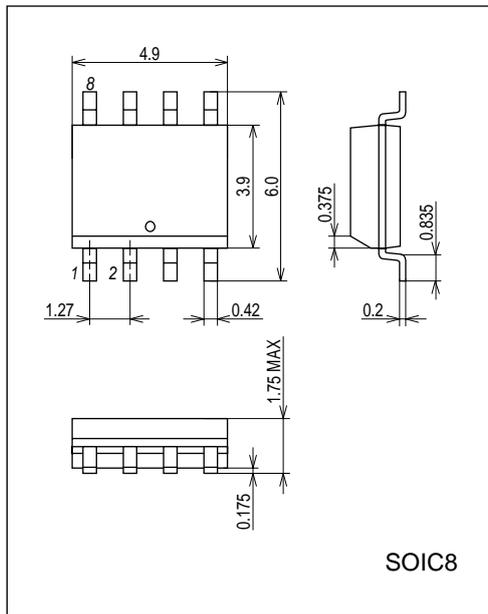
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current	I_{CC}	In drive mode (CT = L)		2.3	4	mA
		In lockup protection mode (CT = H)		3	5	mA
CT capacitor charge current	I_{CT1}	$V_{CT} = 0.2\text{V}$	0.8	1.2	2.0	μA
Capacitor discharge current	I_{CT2}	$V_{CT} = 8\text{V}$	0.16	0.24	0.4	μA
Capacitor charge/discharge current ratio	R_{CT}	$R_{CT} = I_{CT1}/I_{CT2}$	4.0	5.0	7.0	
CT charge voltage	V_{CT1}		6.8	7.2	7.6	V
CT discharge voltage	V_{CT2}		1.4	1.6	1.8	V
Output limiter withstand voltage	V_{OLM}	$I_O = 1\text{mA}$	22.5	23.5	24.5	V
Output saturation voltage	V_{OSat}	$I_O = 50\text{mA}$		1.0	1.3	V
Hall input sensitivity	V_{HN}	Including offset and hysteresis		6	12	mV
HB output H voltage	V_{HBH}	$R_H = 350\Omega$	1.1	1.3	1.5	V
Thermal protection trigger temperature	TSD	Assured design target *	180	180	210	$^\circ\text{C}$

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

Package Dimensions

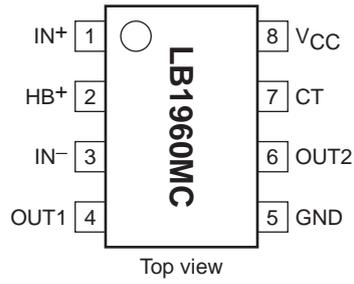
unit : mm (typ)

3424

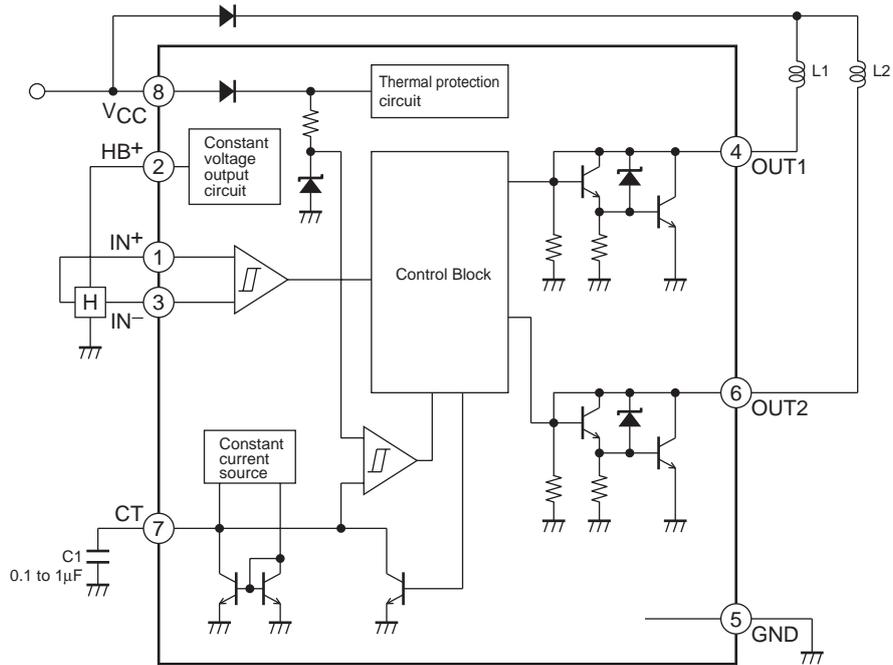


LB1960MC

Pin Assignment



Block Diagram

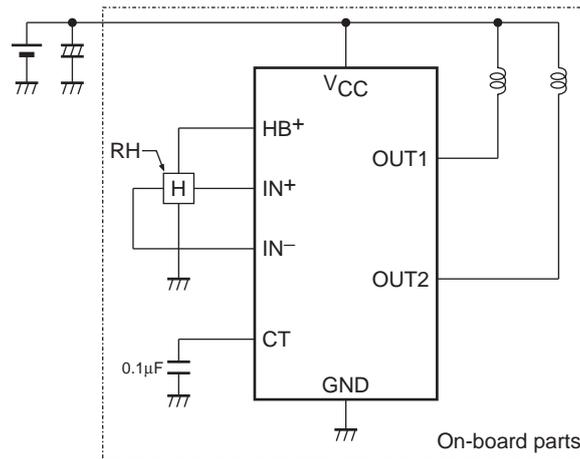


Truth Table

IN ⁻	IN ⁺	CT	OUT1	OUT2	Mode
H	L	L	L	H	Rotating
L	H		H	L	
-	-	H	OFF	OFF	Lock-up protection activated

LB1960MC

Application Circuit Example 5/12V power supply (3.8 to 18V)



Precautions

- If CT pin is connected to GND, the lockup protection and restart functions are disabled.
- In a circuit configuration as shown above, a power supply/GND reverse connection will cause a current to flow as follows: GND → OUT → coil → power supply. The value of this current is limited by the coil resistance. If it is less than 500mA, the IC will not be destroyed. If required, insert a diode between VCC and the coil.

ON Semiconductor and the ON logo are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.