



SANYO Semiconductors

DATA SHEET

LB11862M — Monolithic Digital IC Single-Phase Full-Wave Fan Motor Driver

Overview

The LB11862M is optimal for small fan applications, especially CPU cooling fans, due to its single-phase full-wave drive technique and the compact package.

Low switching noise and effective motor drive are further advantages.

Features

- Support for 5V/12V dual power supply voltage.
- Built-in regenerative circuit allows use of reverse-connection protection diode.
- Built-in Hall amplifier with hysteresis (supports core without commutating pole).
- Built-in lockup protection and automatic recovery circuits.
- Latch-type lockup detection output (RD) is low during rotation and high during stop.
- Hall bias pin and start/stop pin allow reduced current drain in standby mode.
- Built-in thermal protection circuit.

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC \text{ max}}$		17	V
Maximum output current	$I_{OUT \text{ max}}$		0.8	A
Maximum output withstand voltage	$V_{OUT \text{ max}}$		17	V
RD maximum output withstand voltage	$V_R \text{ max}$		17	V
RD maximum output current	$I_R \text{ max}$		5	mA
HB maximum output current	$I_B \text{ max}$		10	mA
ST maximum input voltage	$V_{ST \text{ max}}$		15	V
Allowable power dissipation	$P_d \text{ max}$	Mounted on the specified board*	800	mW
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

*Specified board : $114.3 \times 76.2 \times 1.5$ mm, glass epoxy.

- Any and all SANYO Semiconductor products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO Semiconductor representative nearest you before using any SANYO Semiconductor products described or contained herein in such applications.
- SANYO Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO Semiconductor products described or contained herein.

SANYO Semiconductor Co., Ltd.

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

LB11862M

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

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		3.8 to 16.8	V
ST input high-level voltage	STH		3 to 14	V
ST input low-level voltage	STL		-0.3 to 0.4	V
Hall input common-mode input voltage range	VICM		0.2 to $V_{CC}-1.5$	V

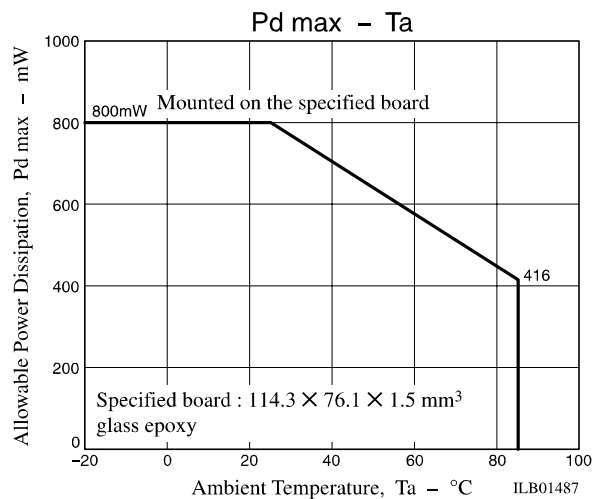
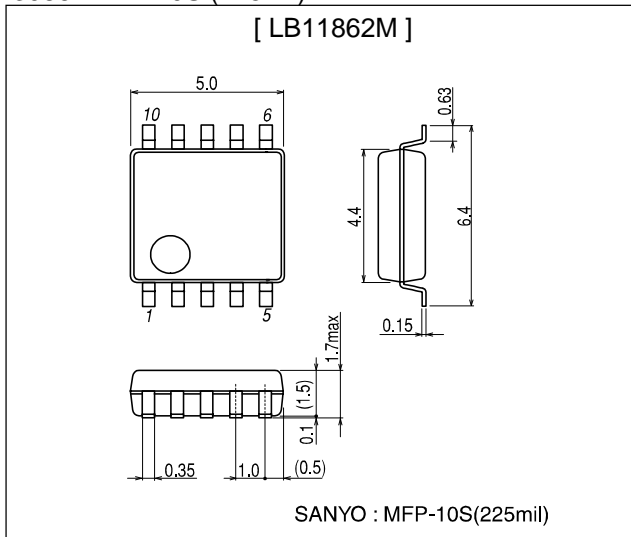
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$, unless otherwise specified.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Circuit current	I_{CC}	Operating mode (CT = L, ST = L)		12	17	mA
		Lock protecting mode (CT = H, ST = L)		2.5	4.0	mA
		Standby mode (ST = H)		110	150	μA
Lock detection capacitor charging current	ICT1	$V_{CT} = 0.2\text{V}$	1.5	2.1	3.0	μA
Capacitor discharging current	ICT2	$V_{CT} = 3.0\text{V}$	0.21	0.35	0.50	μA
Capacitor charging/discharging current ratio	RCT	$RCD = ICT1/ICT2$	5.0	6.0	8.0	-
CT charging voltage	VCT1		2.55	2.75	2.95	V
CT discharging voltage	VCT2		1.6	1.8	2.0	V
Output low-level voltage	V_{OL}	$I_O = 200\text{mA}$		0.2	0.3	V
Output high-level voltage	V_{OH}	$I_O = 200\text{mA}$	3.9	4.1		V
Hall input sensitivity	VHN	Zero peak value. (Including offset, hysteresis)		7	15	mV
RD output pin low-level voltage	VRD	$IR_D = 5\text{mA}$		0.1	0.3	V
RD output pin leakage current	IRDL	$VR_D = 15\text{V}$			30	μA
HB output low-level voltage	VHBL	$I_{HB} = 5\text{mA}$		1.0	1.3	V
ST pin input current	IST	$V_{ST} = 5\text{V}$		75	100	μA

Package Dimensions

unit : mm

3086B-MFP10S (225mil)



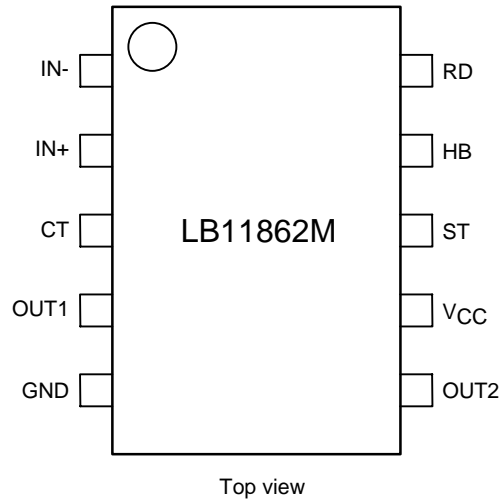
LB11862M

Truth Table

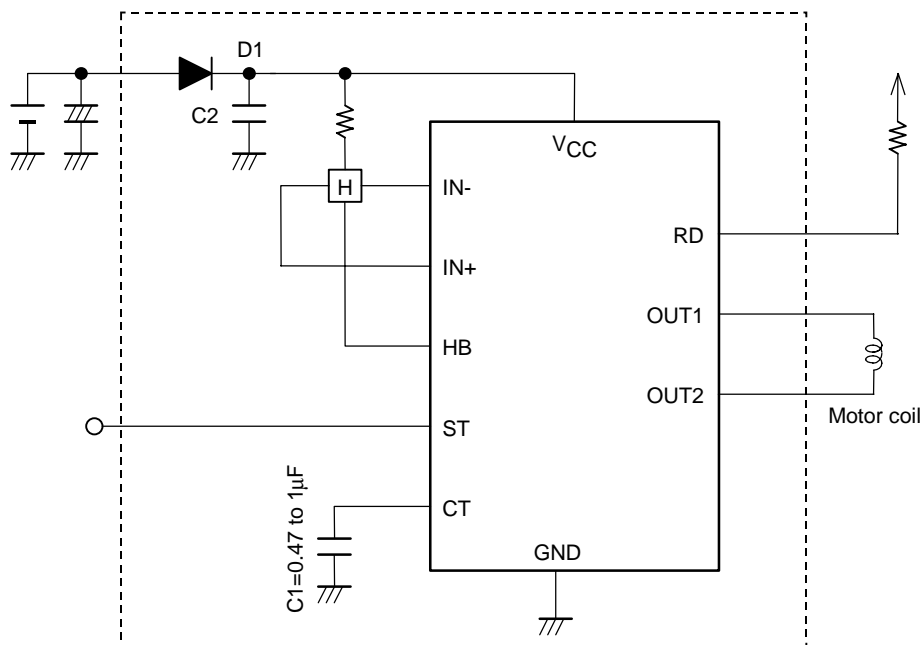
ST	IN-	IN+	CT	OUT1	OUT2	RD	HB	Mode
H	-	-	-	off	off	off	off	Standby
L	H	L	L	H	L	L	L	Operating
	L	H		L	H			
			H	off	off	off	L	Lock protection

(The RD output is latched at "L"-level in operating mode and "H"-level in stop mode.)

Pin Assignment

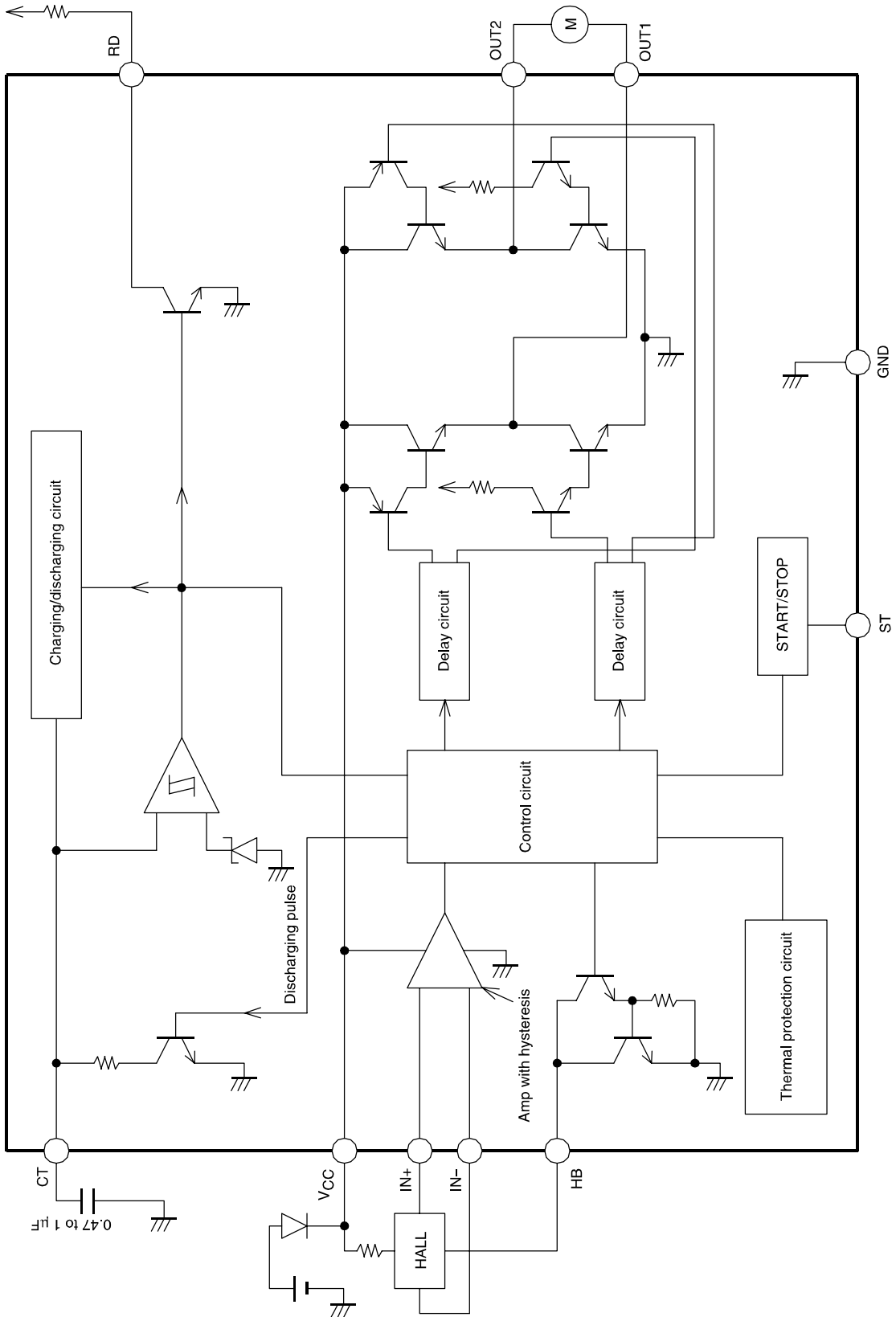


Sample Application Circuit



- (1) D1 is used to prevent IC destruction caused by reverse-connection. It can be omitted if no problems are expected.
- (2) C2 is used to apply a kickback regenerative current when using the IC with the coil current over 500 mA.
- (3) When CT is not used, it should be connected to ground.
- (4) When RD, ST, and HB are not used, they should be left open.

Block Diagram



- Specifications of any and all SANYO Semiconductor products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Semiconductor Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO Semiconductor products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Semiconductor Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO Semiconductor product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. SANYO Semiconductor believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of August, 2002. Specifications and information herein are subject to change without notice.