



SANYO Semiconductors

DATA SHEET

LB1941T — Monolithic Linear IC For Digital Cameras Constant Current Forward/Reverse Driver IC

Overview

The LB1941T is a single-channel forward/reverse driver IC that provides a constant current control function. Its low-saturation output makes it appropriate for voice coil motor control, and it is optimal for use as the shutter driver IC in digital cameras.

Functions

- Constant current control ($I_O = 400\text{mA}$ when $R_f = 0.5\Omega$)
- Ultraminiature package (MSOP8: 150mil)
- Built-in thermal protection circuit
- Includes a rapid charge/rapid discharge circuit for stable shutter operation.
- Built-in reference voltage circuit (0.2V typical)

Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC\text{ max}}$		-0.3 to +10.5	V
Output current	$I_O\text{ max}$		600	mA
Output applied voltage	$V_O\text{ max}$		-0.3 to $V_{CC}+0.3$	V
Input applied voltage	$V_{IN\text{ max}}$	IN1, IN2	-0.3 to +10.5	V
Allowable power dissipation	$P_d\text{ max}$	Mounted on a specified board.*	400	mW
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

Note*: Mounted on a board: 114.3mm×76.1mm×1.6mm, glass epoxy resin.

■ Any and all SANYO Semiconductor Co.,Ltd. products described or contained herein are, with regard to "standard application", intended for the use as general electronics equipment (home appliances, AV equipment, communication device, office equipment, industrial equipment etc.). The products mentioned herein shall not be intended for use for any "special application" (medical equipment whose purpose is to sustain life, aerospace instrument, nuclear control device, burning appliances, transportation machine, traffic signal system, safety equipment etc.) that shall require extremely high level of reliability and can directly threaten human lives in case of failure or malfunction of the product or may cause harm to human bodies, nor shall they grant any guarantee thereof. If you should intend to use our products for applications outside the standard applications of our customer who is considering such use and/or outside the scope of our intended standard applications, please consult with us prior to the intended use. If there is no consultation or inquiry before the intended use, our customer shall be solely responsible for the use.

■ Specifications of any and all SANYO Semiconductor Co.,Ltd. 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.

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

60607 MS IM / N2502 AS (OT) No.7193-1/4

LB1941T

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

Parameter	Symbol	Conditions	Ratings	Unit
Function-guaranteed voltage range	VOPR		2.5 to 10	V
Constant-current set range	I _{OUT}	Set with RFG-GND resistance	50 to 500	mA
Input low level voltage	V _{IL}	IN1, IN2	-0.3 to +0.5	V
Input high level voltage	V _{IH}	IN1, IN2	2.0 to 10	V

Electrical Characteristics at $T_a = 25^\circ\text{C}$

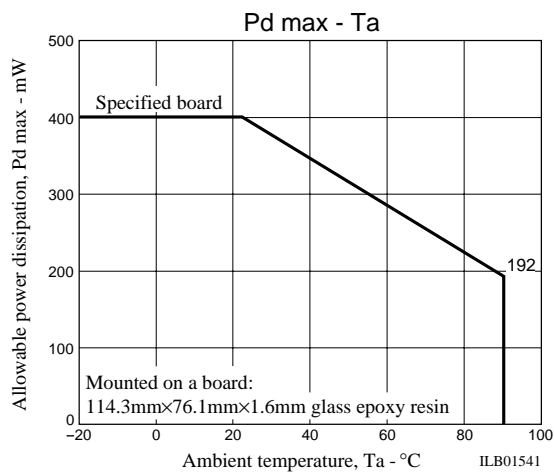
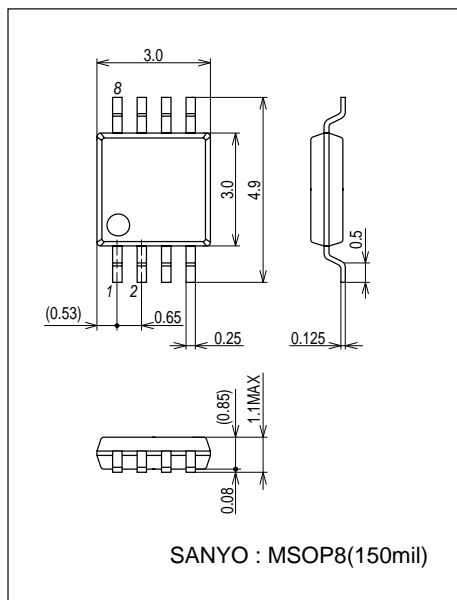
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby Current dissipation	I _{STB}	V _{CC} = 8.5V			1.0	μA
Constant-current H bridge drive circuit						
Output saturation voltage	V _{O(sat)1}	V _{CC} = 3V, I _O = 200mA (Upper + Lower side)		0.20	0.35	V
	V _{O(sat)2}	V _{CC} = 4V, I _O = 400mA (Upper + Lower side)		0.50	0.70	V
Output constant current	I _{OUT}	V _{CC} = 4V, R _L = 3Ω, R _F = 0.5Ω	375	400	424	mA
Temperature dependence of output constant current (reference T _a = 25°C)	ΔI _O	V _{CC} = 4V, R _L = 3Ω, R _F = 0.5Ω * (T _a = -10 to +60°C)	-2		+2	%
Operating current dissipation	I _{CC}	V _{CC} = 4V, R _L = 0Ω, (No load, full drive)		14	21	mA
Thermal protection operating temperature	TSD	Design target value *	150	180	210	°C
Control input circuit						
Control pin maximum input current	I _{IH}	V _{IH} = 5.5V, V _{CC} = 5.5V		80	100	μA
	I _{IL}	V _{IL} = GND	-1		0	μA

Note*: These items are design target values and are not tested.

Package Dimensions

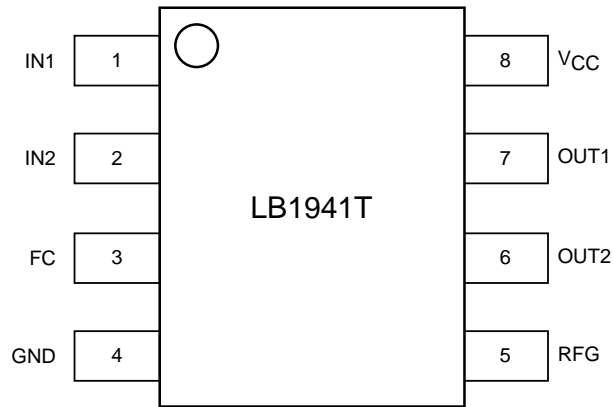
unit : mm (typ)

3245B



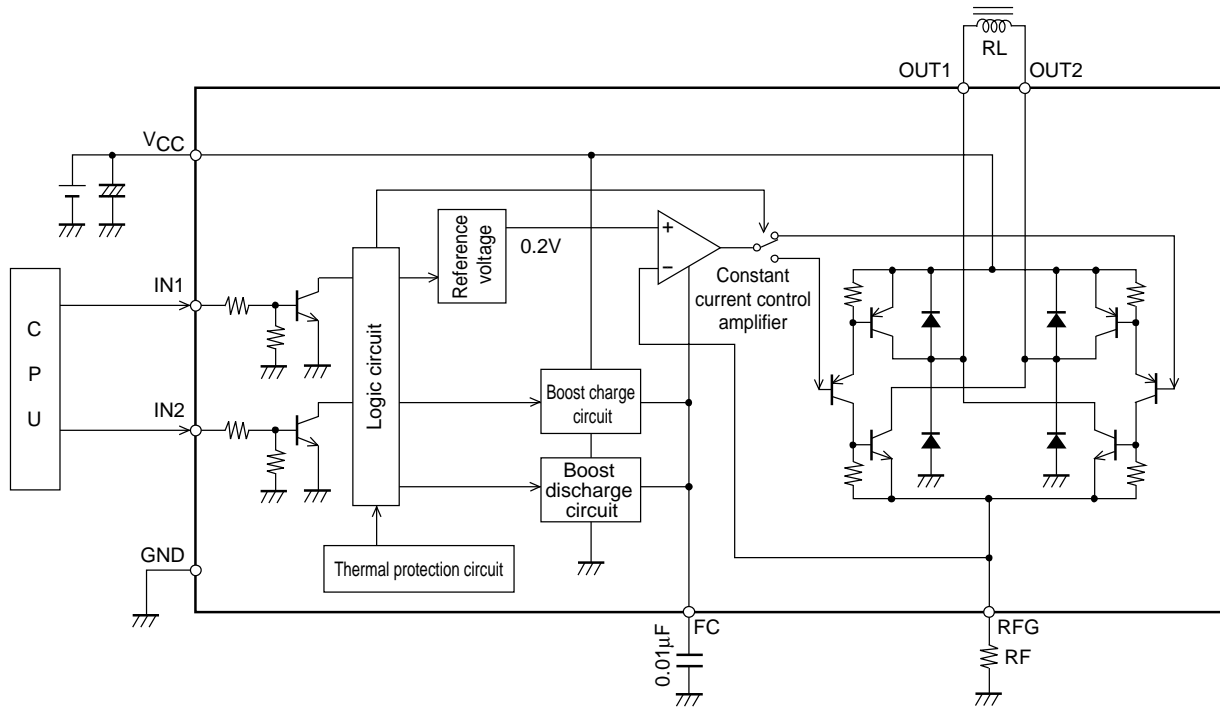
LB1941T

Pin Assignment



Top view

Block Diagram



ILB01540

Boost charge and discharge circuits

In order to keep the output response time constant during mode transfer from the standby state to forward (reverse) rotation, this IC incorporates boost charge and discharge circuits for external capacitor connected to the FC pin. The external capacitor connected to the FC pin is for output phase compensation (to suppress oscillation), for which 0.01 to 0.1 μ F is recommended. Note that increase in the capacitor value results in increase in the time necessary for the constant current control to rise.

Truth Table

Input		Output		Mode
IN1	IN2	OUT1	OUT2	
L	L	OFF	OFF	Standby 1*
H	L	H	L	Forward rotation
L	H	L	H	Reverse rotation
H	H	OFF	OFF	Standby 2*

Cautions for use

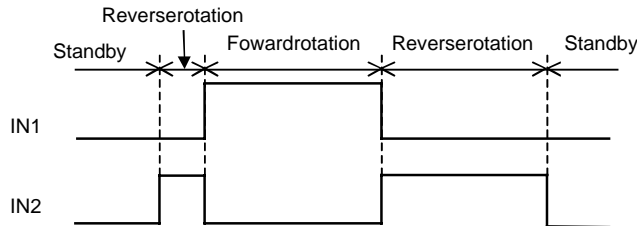
Standby states 1 and 2 in the above truth table differ as follows:

Standby state 1All circuits in IC are not operating and the current dissipation is almost zero.

Standby state 2The constant-current control amplifier output in IC is in the full drive condition. Both OUT1 and OUT2 are OFF. The current dissipation is a few mA.

During mode transfer from the standby state 1 to forward (reverse) rotation, the current rises from the output current zero condition to the required constant current value. On the other hand, during mode transfer from the standby state 2 to forward (reverse) rotation, full drive is applied once to the output, then the current lowers to the required current value.

Therefore, select the standby 1 state when putting IC in the standby state. A typical drive sequence is shown in the figure below.



- SANYO Semiconductor Co.,Ltd. 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 Co.,Ltd. products described or contained herein.
- SANYO Semiconductor Co.,Ltd. strives to supply high-quality high-reliability products, however, any and all semiconductor products fail or malfunction with some probability. It is possible that these probabilistic failures or malfunction could give rise to accidents or events that could endanger human lives, trouble that could give rise to smoke or fire, or accidents 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 Co.,Ltd. products described or contained herein are controlled under any of applicable local export control laws and regulations, such products may require 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 consent 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 Co.,Ltd. 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.
- Upon using the technical information or products described herein, neither warranty nor license shall be granted with regard to intellectual property rights or any other rights of SANYO Semiconductor Co.,Ltd. or any third party. SANYO Semiconductor Co.,Ltd. shall not be liable for any claim or suits with regard to a third party's intellectual property rights which has resulted from the use of the technical information and products mentioned above.

This catalog provides information as of June, 2007. Specifications and information herein are subject to change without notice.