Ordering number : EN7193B

LB1941T

ON Semiconductor®

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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 = 400mA when Rf = 0.5Ω)
- 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 Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		-0.3 to +10.5	V
Output current	I_O max		600	mA
Output applied voltage	V_O max		-0.3 to V_{CC}+0.3	V
Input applied voltage	V_{IN} max	IN1, IN2	-0.3 to +10.5	V
Allowable power dissipation	Pd max	Mounted on a specified board.*	400	mW
Operating temperature	Topr		-20 to +75	°C
Storage temperature	Tstg		-55 to +150	°C

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

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.

Allowable Operating Range at Ta = 25°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 Ta = 25°C

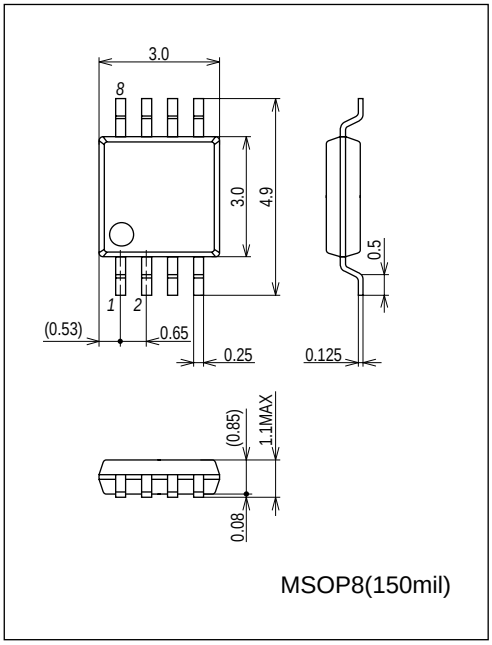
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby Current dissipation	I_{STB}	V_{CC} = 8.5V			1.0	μA
Constant-current H bridge drive circuit						
Output saturation voltage	V_O(sat)1	V_{CC} = 3V, I_O = 200mA (Upper + Lower side)		0.20	0.35	V
	V_O(sat)2	V_{CC} = 4V, I_O = 400mA (Upper + Lower side)		0.50	0.70	V
Output constant current	I_{OUT}	V_{CC} = 4V, R_L = 3Ω, RF = 0.5Ω	375	400	424	mA
Temperature dependence of output constant current (reference Ta = 25°C)	ΔI_O	V_{CC} = 4V, R_L = 3Ω, RF = 0.5Ω * (Ta = –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

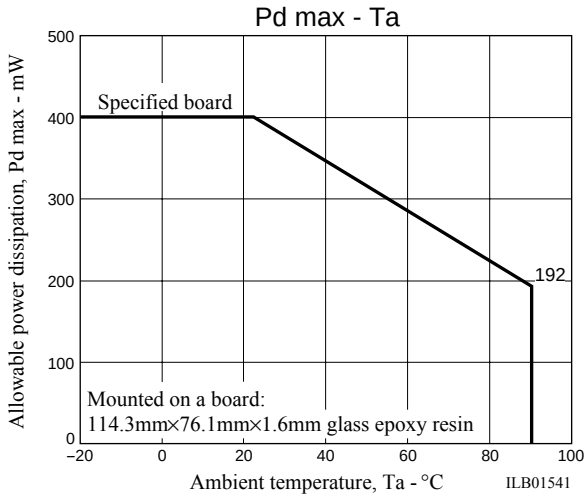
Note*: These items are design target values and are not tested.

Package Dimensions

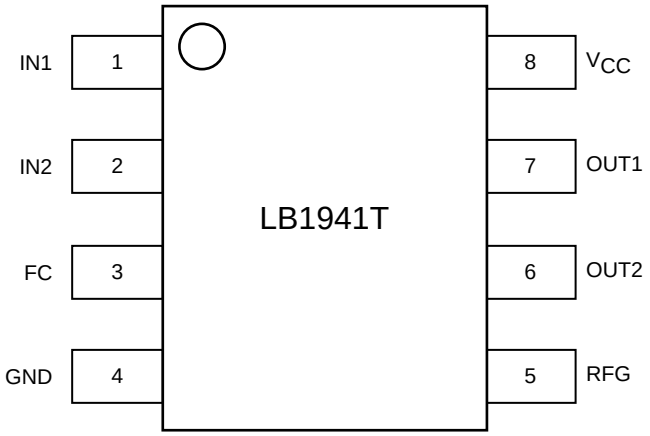
unit : mm (typ)

3245B



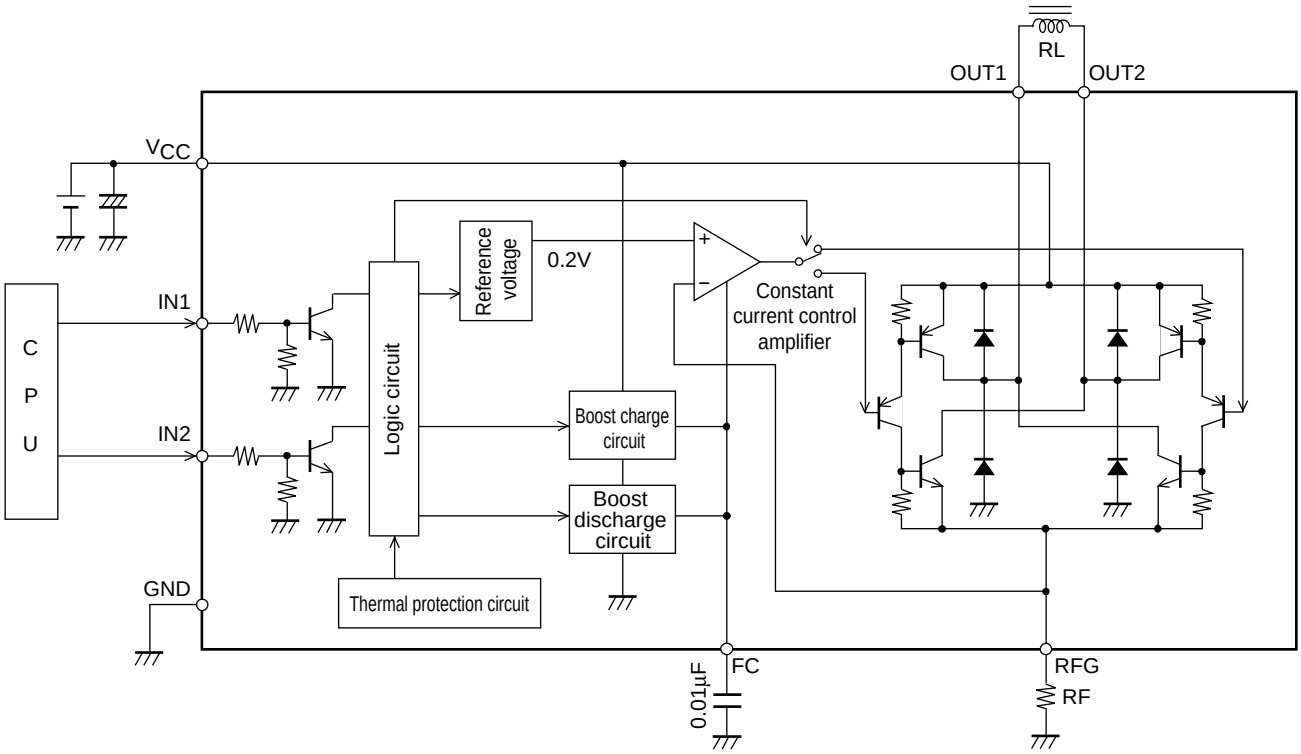


Pin Assignment



Top view

Block Diagram



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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 0.1µF 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 1 .....All circuits in IC are not operating and the current dissipation is almost zero.

Standby state 2 .....The 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.