LB1941T



Constant Current Forward/Reverse Driver IC for Digital Cameras

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.

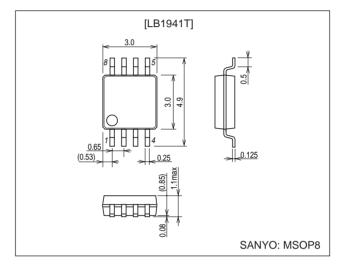
Functions and Features

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

Package Dimensions

unit: mm

3245A-MSOP8



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 (114.3 ×76.1 ×1.6 mm³: glass epoxy resin).

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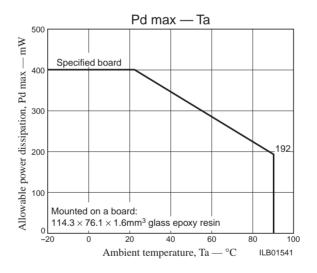
Allowable Operating Range at $Ta = 25^{\circ}C$

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	VIL	IN1, IN2	-0.3 to +0.5	V
Input high level voltage	V _{IH}	IN1, IN2	2.0 to 10	V

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

Sumbol	Conditions	Ratings			Unit	
Symbol Conditions		min	typ	max	Unit	
ISTB	V _{CC} = 8.5 V	_	—	1.0	μA	
[Constant-current H bridge drive circuit]						
V _O (sat)1	V_{CC} = 3 V, I _O = 200 mA (Upper + Lower side)	—	0.20	0.35	v	
V _O (sat)2	$V_{CC} = 4 \text{ V}, I_{O} = 400 \text{ mA} (Upper + Lower side})$	-	0.50	0.70		
I _{OUT}	$V_{CC} = 4 \text{ V}, \text{ R}_{L} = 3 \Omega, \text{ RF} = 0.5 \Omega$	375	400	424	mA	
Δl _O	$V_{CC} = 4 \text{ V}, \text{ R}_{L} = 3 \Omega, \text{ RF} = 0.5 \Omega^{*}$ (Ta = -10 to +60°C)	-2	_	+2	%	
Icc	V_{CC} = 4 V, R _L = 0 Ω (No load, full drive)	—	14	21	mA	
TSD	*	150	180	210	°C	
[Control input circuit]						
I _{IH}	$V_{IH} = 5.5 \text{ V}, V_{CC} = 5.5 \text{ V}$	—	80	100	μA	
Ι _{ΙL}	V _{IL} = GND	-1	_	0		
	V _O (sat)1 V _O (sat)2 I _{OUT} ΔI _O I _{CC} TSD	$\begin{tabular}{ c c c c c } \hline ISTB & V_{CC} = 8.5 \ V \\ \hline V_O(sat)1 & V_{CC} = 3 \ V, \ I_O = 200 \ mA \ (Upper + Lower side) \\ \hline V_O(sat)2 & V_{CC} = 4 \ V, \ I_O = 400 \ mA \ (Upper + Lower side) \\ \hline I_{OUT} & V_{CC} = 4 \ V, \ I_L = 3 \ \Omega, \ RF = 0.5 \ \Omega \\ \hline \Delta I_O & V_{CC} = 4 \ V, \ R_L = 3 \ \Omega, \ RF = 0.5 \ \Omega^* \\ (Ta = -10 \ to +60^\circ C) \\ \hline I_{CC} & V_{CC} = 4 \ V, \ R_L = 0 \ \Omega \ (No \ Ioad, \ full \ drive) \\ \hline TSD & * \\ \hline \end{tabular}$	$\begin{tabular}{ c c c c c } \hline & & & & & & & & & & & & & & & & & & $	Symbol Conditions min typ ISTB $V_{CC} = 8.5 \text{ V}$ — — — Vo(sat)1 $V_{CC} = 3 \text{ V}$, $I_O = 200 \text{ mA}$ (Upper + Lower side) — 0.20 $V_O(sat)2$ $V_{CC} = 4 \text{ V}$, $I_O = 400 \text{ mA}$ (Upper + Lower side) — 0.50 I_{OUT} $V_{CC} = 4 \text{ V}$, $R_L = 3 \Omega$, $RF = 0.5 \Omega$ 375 400 ΔI_O $V_{CC} = 4 \text{ V}$, $R_L = 3 \Omega$, $RF = 0.5 \Omega^*$ -2 — I_{CC} $V_{CC} = 4 \text{ V}$, $R_L = 0 \Omega$ (No load, full drive) — 14 TSD * 150 180 I _{IH} $V_{IH} = 5.5 \text{ V}$, $V_{CC} = 5.5 \text{ V}$ — 80	Symbol Conditions min typ max ISTB $V_{CC} = 8.5 \text{ V}$ — — 1.0 Vo(sat)1 $V_{CC} = 3 \text{ V}, \text{ I}_{O} = 200 \text{ mA}$ (Upper + Lower side) — 0.20 0.35 $V_O(sat)2$ $V_{CC} = 4 \text{ V}, \text{ I}_O = 400 \text{ mA}$ (Upper + Lower side) — 0.50 0.70 I_{OUT} $V_{CC} = 4 \text{ V}, \text{ R}_L = 3 \Omega, \text{ RF} = 0.5 \Omega$ 375 400 424 ΔI_O $V_{CC} = 4 \text{ V}, \text{ R}_L = 3 \Omega, \text{ RF} = 0.5 \Omega^*$ (Ta = -10 to +60°C) — -2 — +2 I_{CC} $V_{CC} = 4 \text{ V}, \text{ R}_L = 0 \Omega$ (No load, full drive) — 14 21 TSD * 150 180 210	

Note*: Design guarantee: Characteristics shown here are design targets and measurement with independent unit is not made before shipment.



Truth Table

In	Input		put	Mode
IN1	IN2	OUT1	OUT2	Wode
L	L	OFF	OFF	Standby 1*
Н	L	Н	L	Forward rotation
L	н	L	Н	Reverse rotation
Н	н	OFF	OFF	Standby 2*

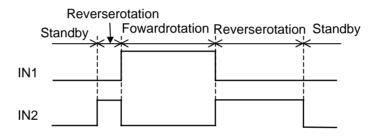
Cautions for use

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

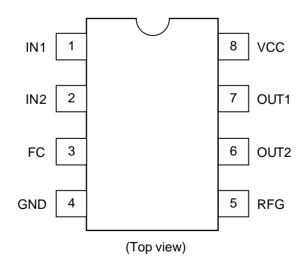
Standby state 1All circuits in IC are not operating and the current dissipation is almost zero.

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.

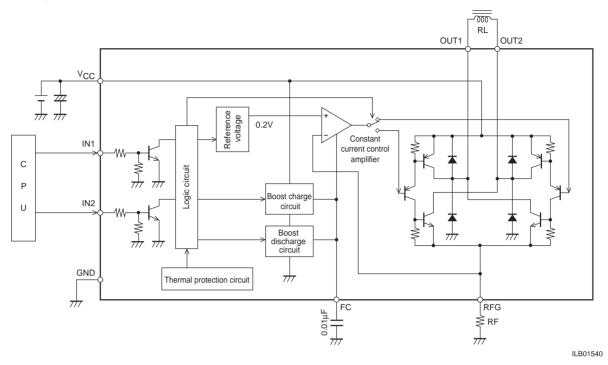
Therefore, select the standby 1 state when putting IC in the standby state. A typical drive sequence is shown in the figure below.



Pin Assignment



Block Diagram



[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.

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