

SANYO Semiconductors DATA SHEET

LB1941GP —

Monolithic Linear IC

For Digital Cameras

Constant Current

Constant Current Forward/Reverse Driver

Overview

The LB1941GP 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

- High-performance dual operational amplifier
- Constant current control (I_O = 400 mA when Rf = 0.5Ω)
- 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)
- Ultraminiature package (VCT16 (2.6mm × 2.6mm)

Specifications

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.*	0.7	W
Operating temperature	Topr		-20 to +75	°C
Storage temperature	Tstg		-55 to +150	°C

Note*: Mounted on a board: 50×40×10.8 mm3: glass epoxy four-layer.

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

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Parameter	Symbol	Conditions	Ratings	Unit		
Function-guaranteed voltage range	VOPR		2.5 to 10	V		
Constant-current set range	lout	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	VIH	IN1, IN2	2.0 to 10	V		

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LB1941GP

Electrical Characteristics at Ta = 25°C

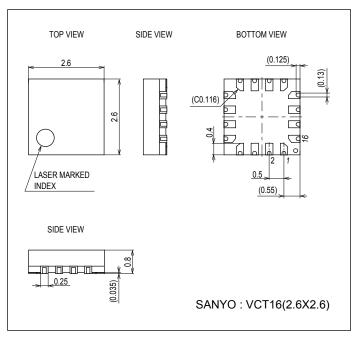
Descriptor	Complete al	O an distinguis	Ratings		11.2		
Parameter	Symbol	Conditions	min	typ	max	Unit	
Standby Current dissipation	ISTB	V _{CC} = 10V			1.0	mV	
Constant-current H bridge drive	Constant-current H bridge drive circuit						
Output saturation voltage 1	V _{OUT} 11	V _{CC} = 3V, I _O = 200mA (Lower side)		0.08	0.15	μА	
	V _{OUT} 12	V _{CC} = 3V, I _O = 200mA (Upper side)		0.12	0.23	V	
	V _{OUT} 1	V _{CC} = 3V, I _O = 200mA (Upper + Lower side)		0.20	0.35	V	
Output saturation voltage 2 *	V _{OUT} 21	V _{CC} = 4V, I _O = 500mA (Lower side)		0.25	0.38	V	
	V _{OUT} 22	V _{CC} = 4V, I _O = 500mA (Upper side)		0.35	0.52	V	
	V _{OUT} 2	V _{CC} = 4V, I _O = 500mA (Upper + Lower side)		0.60	0.90	V	
Output constant current 1	I _{OUT} 1	V_{CC} = 4V, R_L = 3 Ω , RF = 1 Ω	190	200	210	mA	
Output constant current 2 *	I _{OUT} 2	$V_{CC} = 4V, R_L = 3\Omega, RF = 0.5\Omega$	375	400	424	mA	
Temperature dependence of output constant current (reference Ta = 25°C)	ΔlO	$V_{CC} = 4V$, $R_L = 3\Omega$, $RF = 0.5\Omega$ * $(Ta = -10 \text{ to } +60^{\circ}\text{C})$	-2		+2	%	
Operating current dissipation	Icc	V_{CC} = 4V, R_L = 0 Ω , (No load, full drive)		14	21	mA	
Thermal protection operating temperature	TSD	*	150	180	210	°C	
Control input circuit							
Control pin maximum input current	I _{IH} 1	V _{IH} = 5.5V, V _{CC} = 5.5V		80	100	μА	
Current	I _{IH} 2	V _{IH} = 10V, V _{CC} = 10V		145	200	μА	
	IIL	V _{IL} = GND	-1		0	μА	

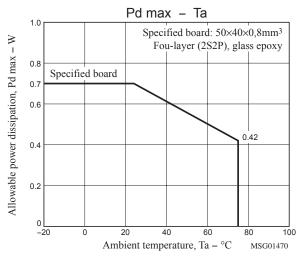
Note*: Design guarantee: Characteristics shown here are design targets and measurement with independent unit is not made before shipment.

Package Dimensions

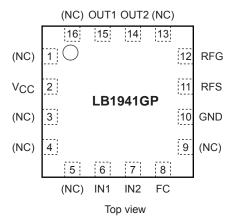
unit: mm (typ)

3318

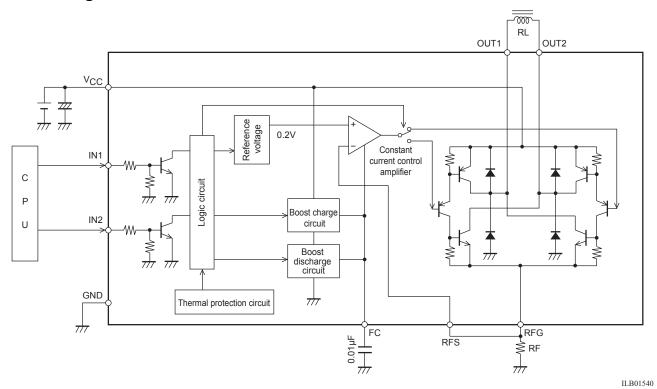




Pin Assignment



Block Diagram



Truth Table

Input		Output		Mode
IN1	IN2	OUT1	OUT2	
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

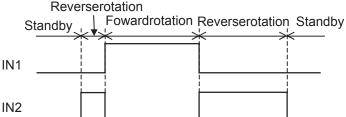
Standby states 1 and 2 in the above truth table differ as follows:

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

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.



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 $0.1\mu F$ 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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