Ordering number : ENN7714

SANYO Semiconductors
DATA SHEET

Monolithic Digital IC

LB1948M — Low saturation voltage drive forward/reverse 12 V motor driver

Overview

The LB1948M is a two-channel low saturation voltage forward/reverse motor driver IC. It is optimal for motor drive in 12V system products and can drive either two DC motors, one DC motor using parallel connection, or a two-phase bipolar stepping motor with 1-2 phase excitation mode drive.

Applications

12V low saturation voltage forward/reverse motor drive

Features

- Supports 12V power supply systems
- Low saturation voltage: V_O (sat)=0.5V (typical) at I_O=400mA
- Zero current drawn in standby mode
- Braking function
- Supports parallel connection: $I_O$max=1.6A, V_O (sat)=0.6V (typical) at I_O= 800mA
- Built-in spark killer diode
- Thermal shutdown circuit
- Miniature package: MFP-10S (6.5 × 5.1mm)

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		–0.3 to +20	V
Output voltage	V_{OUT}		–0.3 to +20	V
Input voltage	V_{IN}		–0.3 to +18	V
Ground pin source current	I_{GND}	Per channel	800	mA
Allowable power dissipation	Pd max1	Independent IC	350	mW
	Pd max2	Mounted on a circuit board*	870	mW
Operating temperature	Topr		–20 to +85	°C
Storage temperature	Tstg		–40 to +150	°C

*: On the stipulated circuit board (114.3 × 76.1 × 1.6tmm, glass epoxy)

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Allowable Operating Ranges at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		2.5 to 16	V
Input high-level voltage	V_{IH}		1.8 to 10	V
Input low-level voltage	V_{IL}		–0.3 to +0.7	V

Electrical Characteristics at Ta=25°C, V_{CC}=12V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	$I_{CC}0$	IN1, 2, 3, 4=0V (Standby mode)		0.1	10	μA
	$I_{CC}1$	*1 (Forward or reverse mode)		15	21	mA
	$I_{CC}2$	*2 (Brake mode)		30	40	mA
Output saturation voltage	$V_{O\ (sat)}1$	I_{OUT}=200mA (High Side and Low Side)	—	0.25	0.35	V
	$V_{O\ (sat)}2$	I_{OUT}=400mA (High Side and Low Side)	—	0.50	0.75	V
Input current	I_{IN}	V_{IN}=5V		85	110	μA
[Spark Killer Diode]						
Reverse current	IS (leak)				30	μA
Forward voltage	V_{SF}	I_{OUT}=400mA			1.7	V

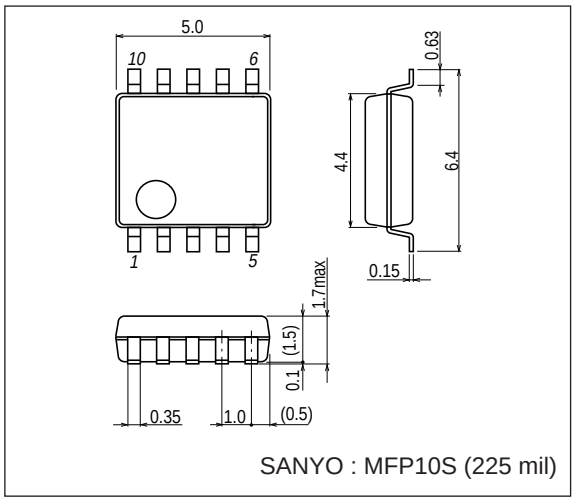
*1: IN1/IN2/IN3/IN4=H/L/L/L or L/H/L/L or L/L/H/L or L/L/L/H

*2: IN1/IN2/IN3/IN4=H/H/L/L or L/L/H/H

Package Dimensions

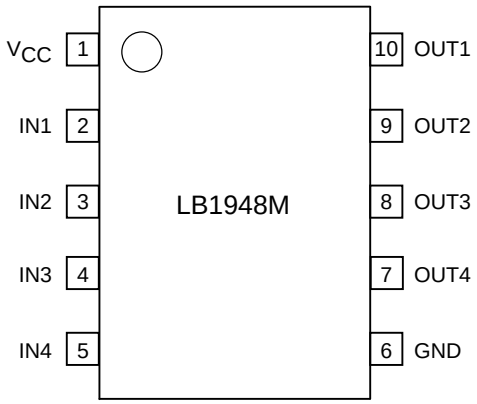
unit : mm

3086B

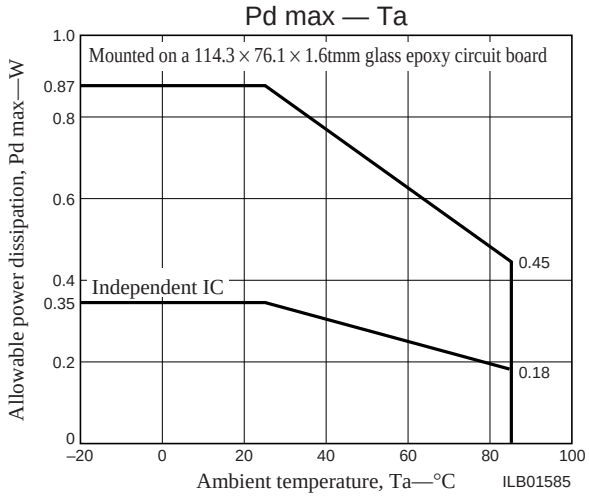


SANYO : MFP10S (225 mil)

Pin Assignment



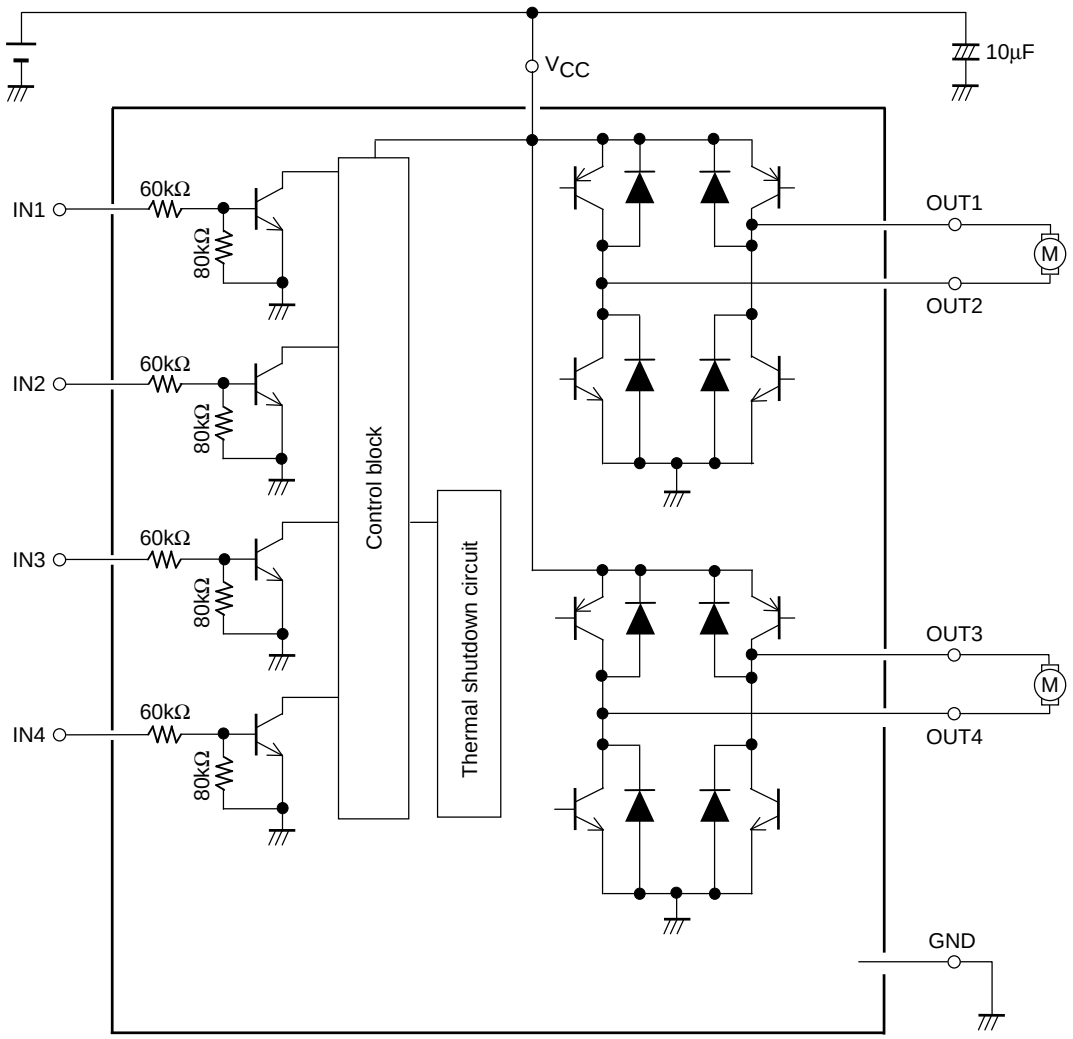
Top view ILB01591



Truth Table

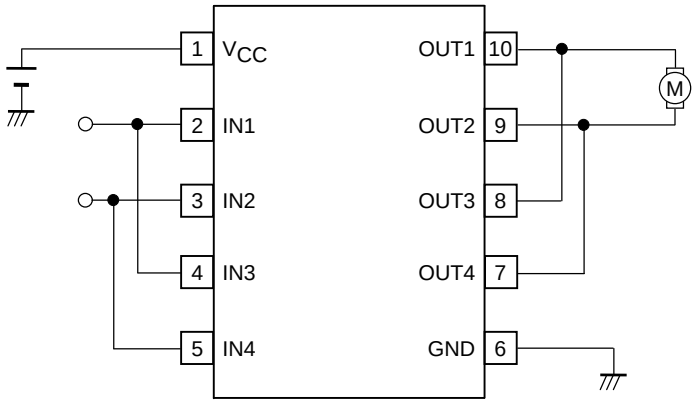
Input				Output				Notes	
IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4		
L	L	L	L	OFF	OFF	OFF	OFF	Standby mode	
L	L			OFF	OFF			1CH	Standby mode
H	L			H	L				Forward
L	H			L	H				Reverse
H	H			L	L				Brake
		L	L			OFF	OFF	2CH	Standby mode
		H	L			H	L		Forward
		L	H			L	H		Reverse
		H	H			L	L		Brake

Block Diagram

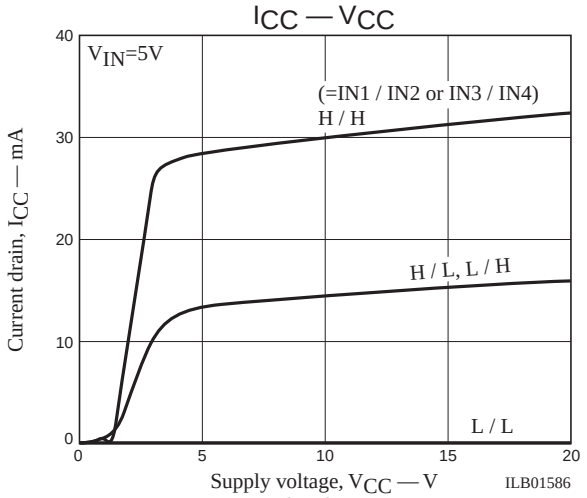


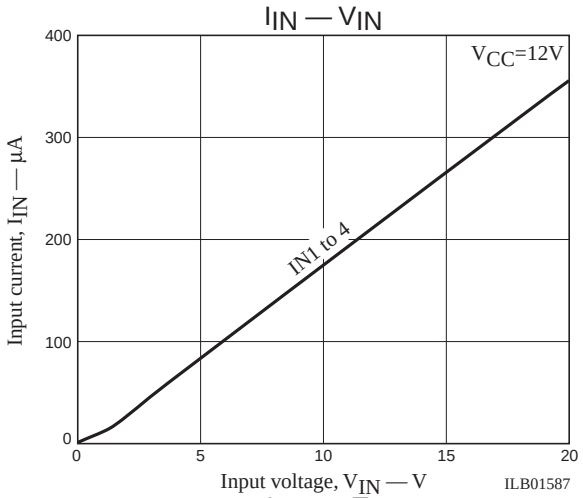
Design Documentation

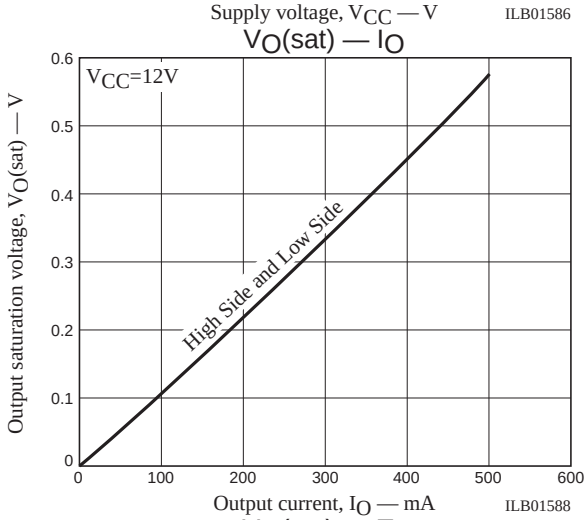
- Voltage magnitude relationship
  There are no restrictions on the magnitude relationships between the voltages applied to V_{CC} and IN1 to IN4.
- Parallel connection
  The LB1948M can be used as a single-channel H-bridge power supply by connecting IN1 to IN3, IN2 to IN4, OUT1 to OUT3, and OUT2 to OUT4 as shown in the figure. ($I_O$max=1.6A, V_O(sat)=0.6V (typical) at I_O=800mA)

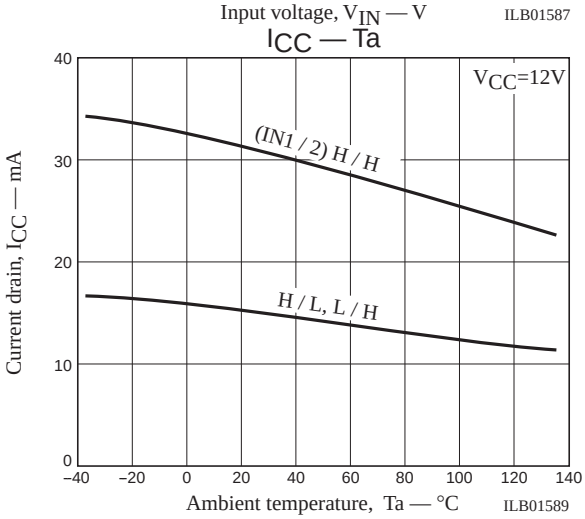


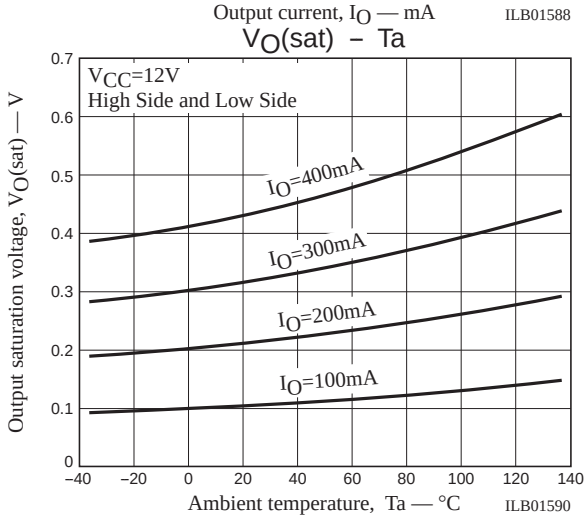
- Observe the following points when designing the printed circuit board pattern layout.
  — Make the V_{CC} and ground lines as wide and as short as possible to lower the wiring inductance.
  — Insert bypass capacitors between V_{CC} and ground mounted as close as possible to the IC.
  — Resistors of about 10KΩ must be inserted between the CPU output ports and the IN1 to IN4 pins if the microcontroller and the LB1948M are mounted on different printed circuit boards and the ground potentials differ significantly.


ICC — VCC
VIN=5V
(=IN1 / IN2 or IN3 / IN4)
H / H
H / L, L / H
L / L
Current drain, ICC — mA
Supply voltage, VCC — V
ILB01586


IIN — VIN
VCC=12V
IN1 to 4
Input current, IIN — µA
Input voltage, VIN — V
ILB01587


VO(sat) — IO
VCC=12V
High Side and Low Side
Output saturation voltage, VO(sat) — V
Output current, IO — mA
ILB01588


ICC — Ta
VCC=12V
(IN1 / 2) H / H
H / L, L / H
Current drain, ICC — mA
Ambient temperature, Ta — °C
ILB01589


VO(sat) – Ta
VCC=12V
High Side and Low Side
IO=400mA
IO=300mA
IO=200mA
IO=100mA
Output saturation voltage, VO(sat) — V
Ambient temperature, Ta — °C
ILB01590

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