Ordering number : ENA2036B

LB1848MC

Monolithic Digital IC

Low-Voltage/Low Saturation Voltage Type Bidirectional Motor Driver

ON Semiconductor®

http://onsemi.com

Overview

The LB1848MC is 2-channel low-voltage, low saturation voltage type bidirectional motor driver IC that is optimal for use as 2-phase stepping motor drivers in printers, cameras and other portable equipment. The output circuits are of the bipolar type, with PNP transistors in the upper side and NPN transistors in the lower side, and they achieve low saturation output and low power characteristics despite being provided in a miniature package.

The LB1848MC products can directly control a motor from signals from a microcontroller. The LB1848MC is optimal for 2-phase excitation drive for 2-phase stepping motors using 3-input logic (ENA, IN1 and IN2).

Another point is that these IC include built-in thermal shutdown circuits so that IC scorching or burning is prevented in advance even if the IC output is shorted.

Functions

- Optimal for 2-phase excitation drive for 2-phase stepping motors
- Low saturation voltage. V_O (sat) = 0.55V typical at I_O = 400mA
- Through-current prevention circuit
- Standby current: Zero
- Thermal shutdown circuit
- No limitations on the magnitude relationship between the power supply voltage (V_{CC}) and the input voltage (V_{IN})
- "Soft off" function that reduces power supply line noise when switching from drive to standby modes. (Requires the use of one external capacitor.)

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		-0.3 to +8.0	V
Output voltage	V_{OUT}		V_{CC} + V_{SF}	V
Input voltage	V_{IN}		-0.3 to +8.0	V
Ground pin outflow current	I_{GND}	Per channel	800	mA
Allowable power dissipation	Pd max	When mounted*	820	mW
Operating temperature	Topr		-20 to +85	°C
Storage temperature	Tstg		-40 to +150	°C

*1: When mounted on the specified printed circuit board (114.3mm × 76.2mm × 1.5mm), glass epoxy board

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

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 Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		2.5 to 7.5	V
Input high-level voltage	V_{IH}		2.5 to 7.5	V
Input low-level voltage	V_{IL}		-0.3 to +0.7	V

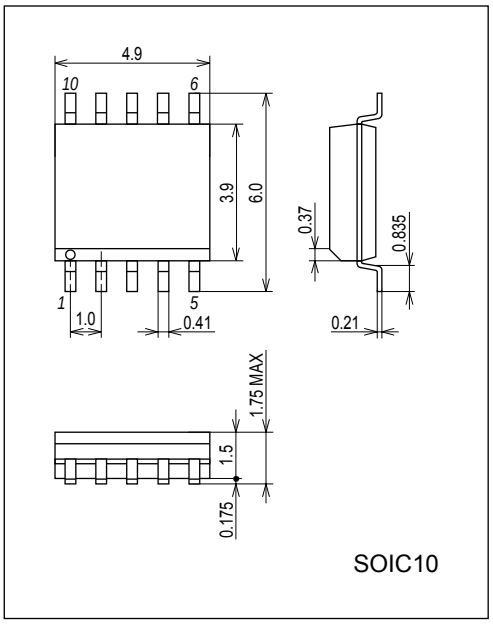
Electrical Characteristics at Ta = 25°C, V_{CC} = 5V

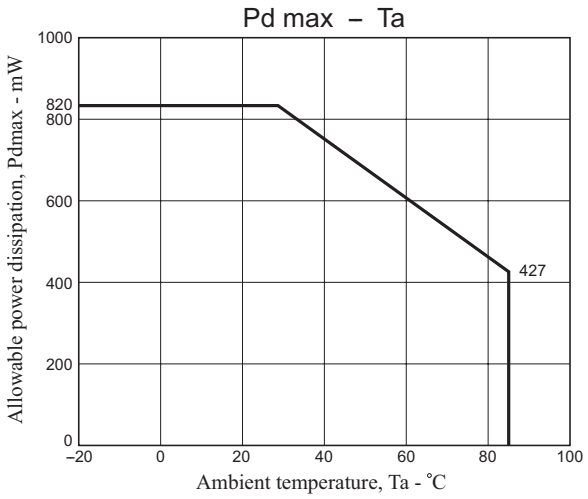
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Current drain	$I_{CC}0$	ENA = 0V, V_{IN} = 3V or 0V	-	0.1	10	μA
	$I_{CC}1$	ENA = 3V, V_{IN} = 3V or 0V	-	25	35	mA
Output saturation voltage	$V_{OUT}1$	ENA = 3V, V_{IN} = 3V or 0V, V_{CC} = 3 to 7.5V, I_{OUT} = 200mA	-	0.27	0.4	V
	$V_{OUT}2$	ENA = 3V, V_{IN} = 3V or 0V, V_{CC} = 4 to 7.5V, I_{OUT} = 400mA	-	0.55	0.8	V
Input current	I_{IN}	V_{IN} = 5V	-	75	100	μA
	I_{ENA}	ENA = 5V	-	85	110	μA
Spark Killer Diode						
Reverse current	I_S (leak)		-	-	30	μA
Forward voltage	V_{SF}	I_{OUT} = 400mA	-	-	1.7	V

Package Dimensions

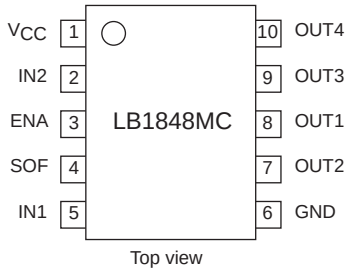
unit : mm (typ)

3426A



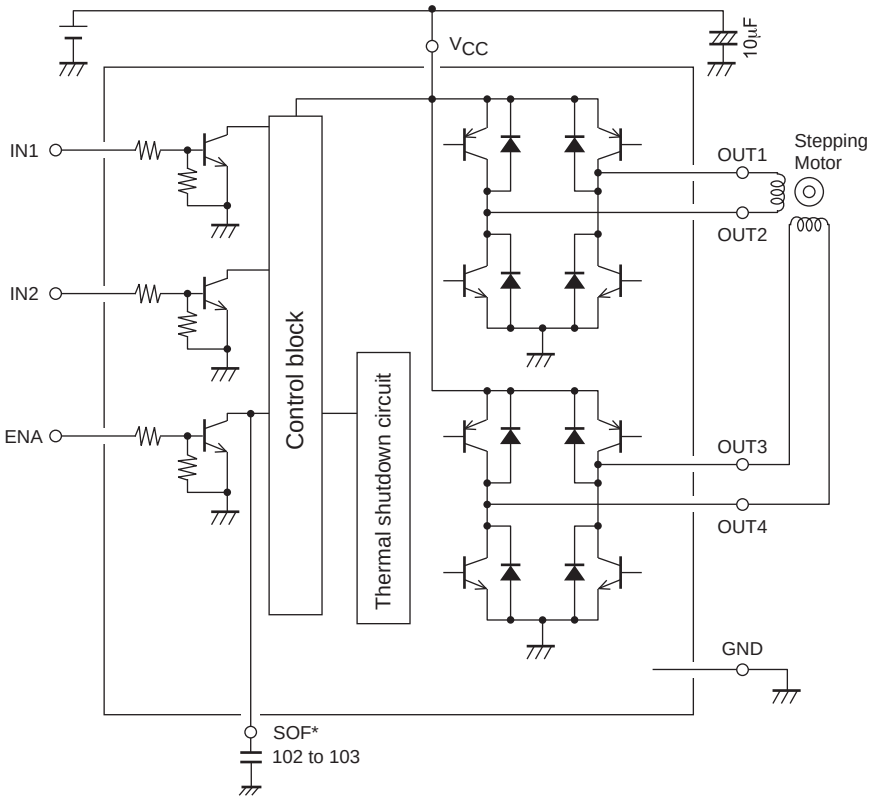


Pin Assignment



Top view

Block Diagram



Note: When the “soft off” function is used, a capacitor must be connected to the SOF pin. IF this function is not used, this pin must be left open with absolutely no signals or lines connect.

Truth Tables

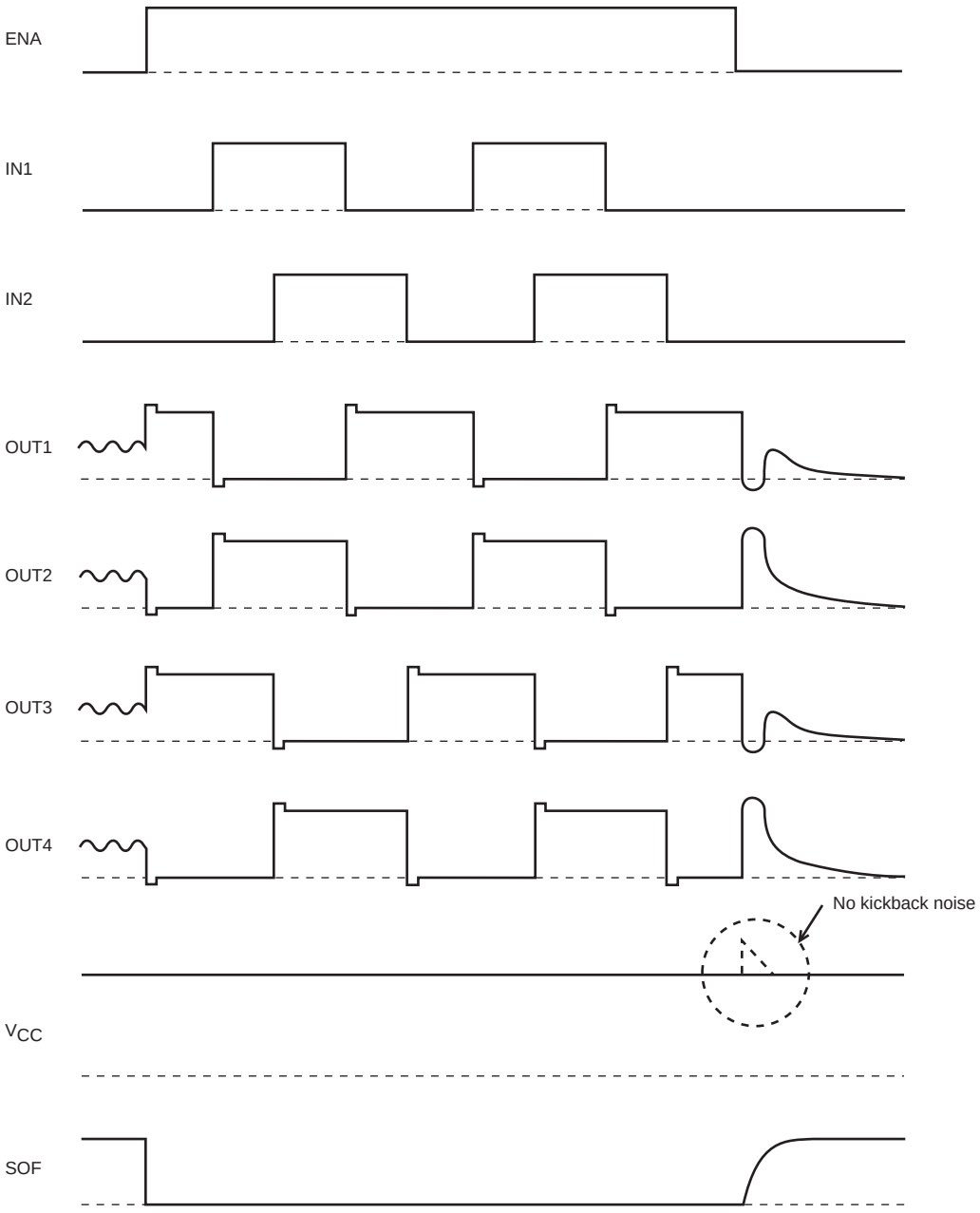
ENA	IN1	IN2	OUT1	OUT2	OUT3	OUT4
L	-	-	OFF	OFF	OFF	OFF
H	L	L	H	L	H	L
	L	H	H	L	L	H
	H	H	L	H	L	H
	H	L	L	H	H	L

Note: *1 "-" indicates a "don't care" input.

SOF pin (“Soft off” function) operation

The soft off function reduces power supply line noise due to the kickback current generated when the stepping motor drive mode is switched from drive to standby. The “soft off” function provided by this IC operates when a capacitor (0.001 to 0.01μF) is connected between the SOF pin and ground. (Leave the SOF pin open to disable the soft off function.)

The waveforms for each pin are shown below.

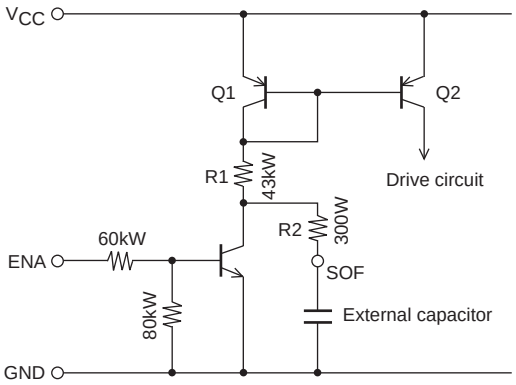


(Cautions)

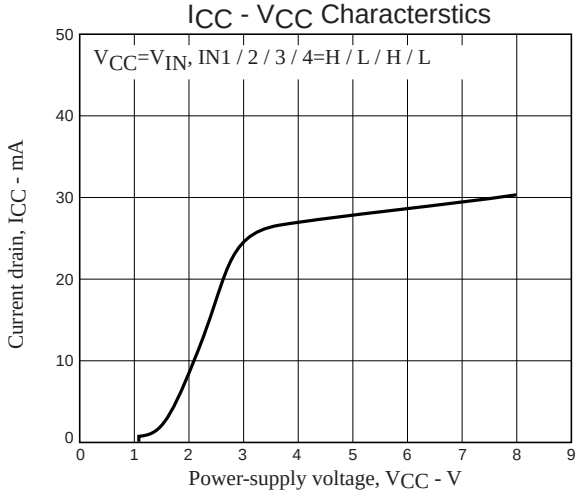
Pay attention to following two points in an application where the capacitor to GND is connected to the SOF pin:

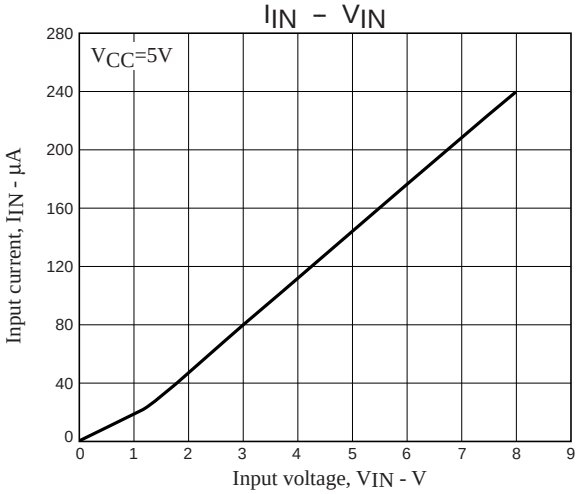
(1) Sudden startup of VCC power supply causes charging of the capacitor from the IC inside via the SOF pin at startup. During charging, the state equivalent to the one with the ENA input at "H" occurs, causing output of the corresponding logic to the output pin, which may result in driving of the load. (The output time period is dependent on the capacity of capacitor; about 2 ms for 0.01μF.)

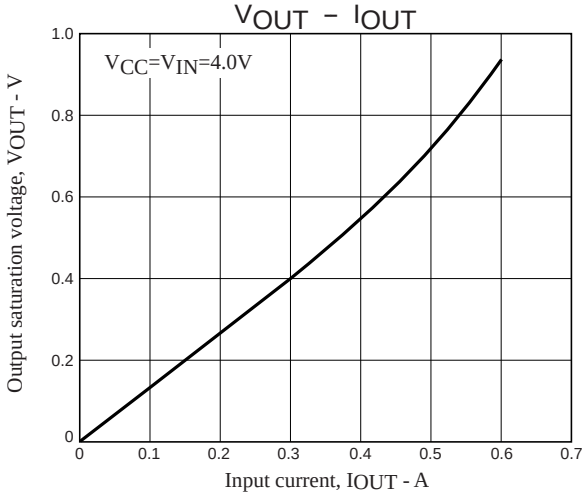
(2) To transfer from the drive mode to the standby mode by changing the ENA input from "H" to "L", the capacitor is charged from the IC inside via the SOF pin as in the case of above (1). During this charge period, the ENA input keeps the "H" condition in IC. By changing IN1/IN2 input at this time point, the output can be changed. (The time period is equal to that of (1) above.)



[SOF pin internal equivalent circuit diagram]







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