



LB1945H

PWM Current Control Type Stepping Motor Driver

Preliminary

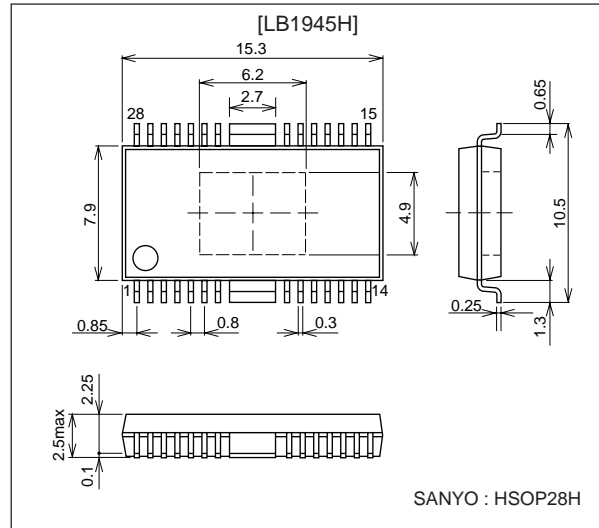
Features

- PWM current control (external excitation)
- Load current digital selection (1-2, W1-2, and 2 phase excitation drives possible)
- Built-in upper/lower diode
- Simultaneous ON prevention function (feedthrough current prevention)
- Built-in thermal shutdown circuit
- Built-in noise canceler

Package Dimensions

unit: mm

3233-HSOP28H



Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum motor supply voltage	V _{BB} max		30	V
Output peak current	I _{OPEAK}	tw ≤ 20 μs	1.0	A
Output continuous current	I _O max		0.8	A
Logic supply voltage	V _{CC} max		6.0	V
Logic input voltage range	V _{IN} max		-0.3 to V _{CC}	V
Emitter output voltage	V _E max		1.0	V
Allowable power dissipation	P _d max	Ta = 25°C, with specified substrate*	1.9	W
Operating temperature	T _{opr}		-20 to +90	°C
Storage temperature	T _{stg}		-55 to +150	°C

* Specified substrate: 114.3 × 76.1 × 1.6 mm³, glass epoxy

Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Motor supply voltage	V _{BB}		10 to 28	V
Logic supply voltage	V _{CC}		4.75 to 5.25	V
Reference voltage	V _{REF}		1.5 to 5.0	V

■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

■ SANYO assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all SANYO products described or contained herein.

LB1945H

Electrical Characteristics at Ta = 25°C, VBB = 24V, VCC = 5V, VREF = 5.0V

Parameter	Symbol	Conditions	Ratings			Unit			
			min	typ	max				
Output Block	Output stage supply current	I _{BB ON}	I ₁ = 0.8V, I ₂ = 0.8V, ENABLE = 0.8V			0.5	1.0	2.0	mA
		I _{BB OFF}	ENABLE = 3.2V					0.2	mA
	Output saturation voltage	V _{osat 1}	I _o = +0.5A sink		0.3	0.5	V		
		V _{osat 2}	I _o = +0.8A sink		0.5	0.7	V		
		V _{osat 3}	I _o = -0.5A source		1.6	1.8	V		
		V _{osat 4}	I _o = -0.8A source		1.8	2.0	V		
	Output leakage current	I _{o1(leak)}	V _o = V sink				50	μA	
		I _{o2(leak)}	V _o = 0V source	-50				μA	
Output sustain voltage	V _{SUS}	L = 3.9 mH I _o = 1.0A *1	30				V		
Logic Block	Logic supply current	I _{CC ON}	I ₁ = 0.8V, I ₂ = 0.8V, ENABLE = 0.8V			50.0	70.0	92.0	mA
		I _{CC OFF}	ENABLE = 3.2V			7.0	10.0	13.0	mA
	Input voltage	V _{IH}		3.2				V	
		V _{IL}					0.8	V	
	Input current	I _{IH}	V _{IH} = 3.2V	35	50	65		μA	
		I _{IL}	V _{IL} = 0.8V	7	10	13		μA	
	Set current control threshold value	V _{ref} /V _{sen}	I ₁ = 0.8V, I ₂ = 0.8V	9.5	10	10.5			
			I ₁ = 3.2V, I ₂ = 0.8V	13.5	15	16.5			
			I ₁ = 0.8V, I ₂ = 3.2V	25.5	30	34.5			
	Reference current	I _{ref}	V _{ref} = 5.0V, I ₁ = 0.8V, I ₂ = 0.8V	17.5	25	32.5		μA	
CR pin current	I _{CR}	CR = 1.0V	-1.0				mA		
Thermal shutdown temperature	T _{TSD}			170			°C		
Temperature hysteresis width	ΔT _{TSD}			40			°C		

*1: Assured design target value, not measured

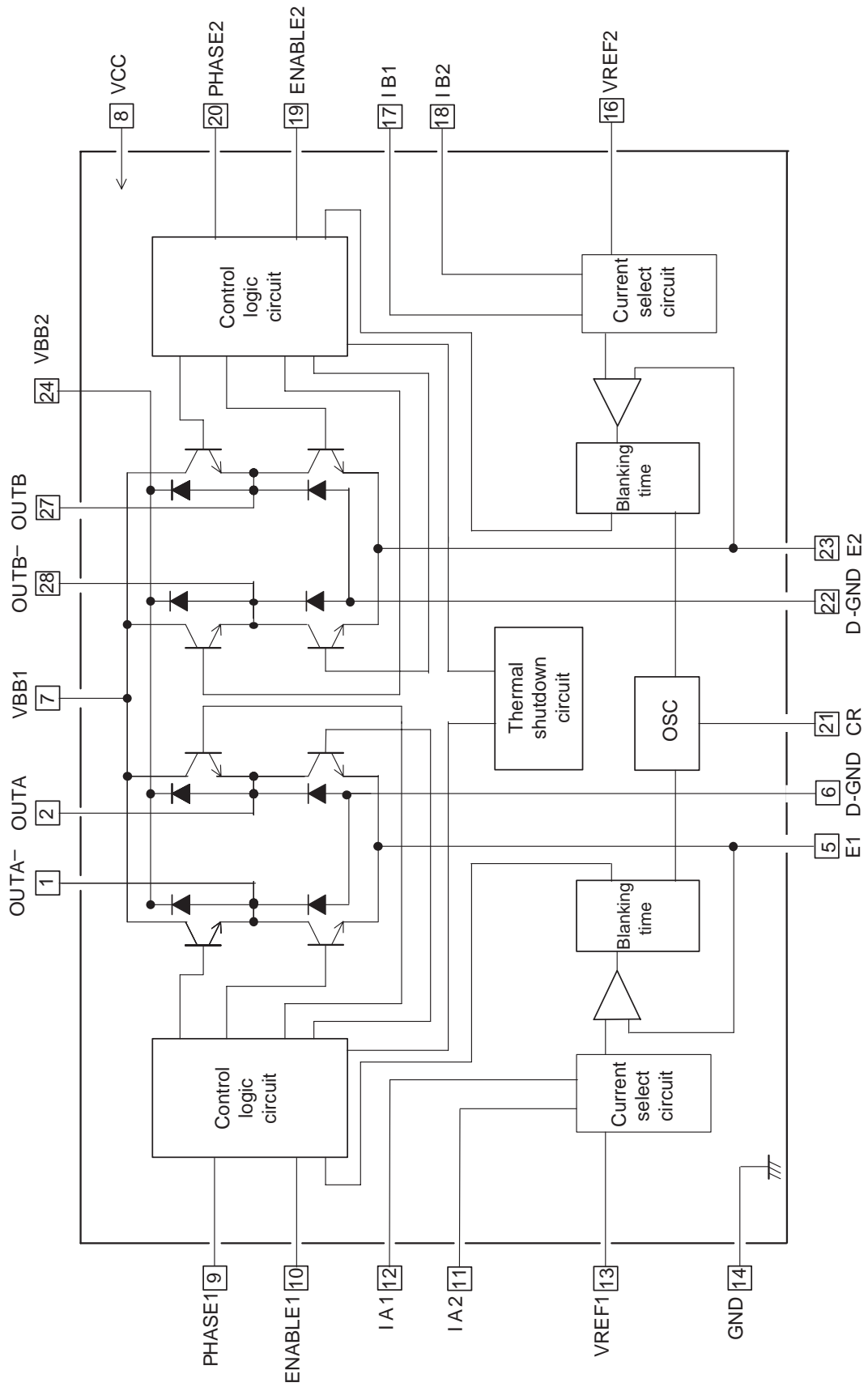
Truth Table

ENABLE	PHASE	OUTA	OUTA ⁻
L	H	H	L
L	L	L	H
H	-	OFF	OFF

I1	I2	Output current
L	L	$V_{ref} / (10 \times R_E) = I_{out}$
H	L	$V_{ref} / (15 \times R_E) = I_{out} \times 2/3$
L	H	$V_{ref} / (30 \times R_E) = I_{out} \times 1/3$
H	H	0

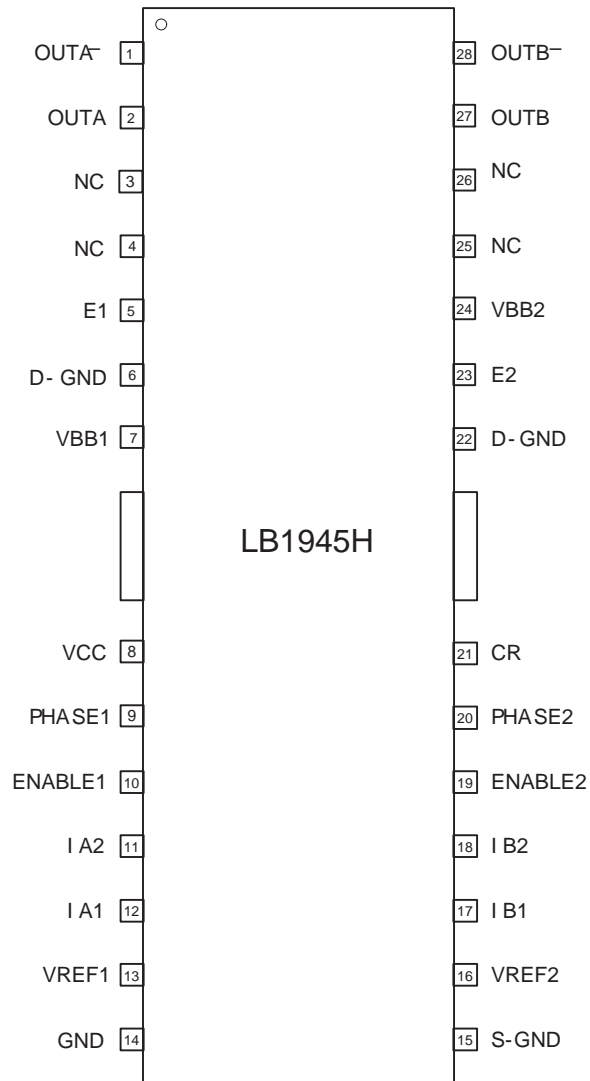
Note: Output is OFF when ENABLE = H or when I1 = I2 = H.

Block Diagram



LB1945H

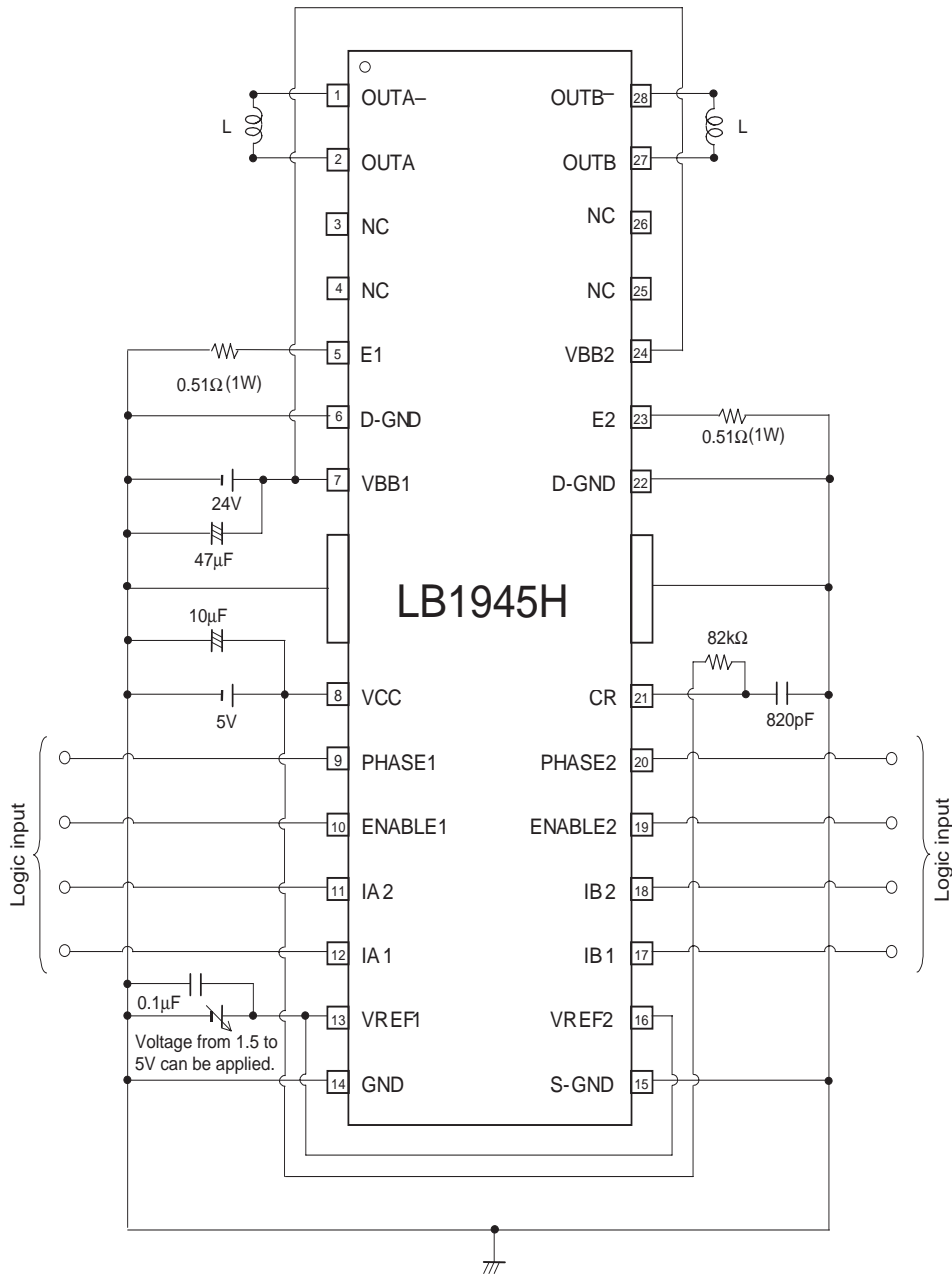
Pin Assignment



Top view

LB1945H

Sample Application Circuit



The fin on the bottom of HSOP-28H package and the fins between pins 7 and 8 and 21 and 22 should be grounded.

Pin Description

Pin name	Pin number	Function
V _{BB1}	7	Output stage power supply voltage pin.
V _{BB2}	24	Cathode pin for the upper-side diodes.
E1	5	Insert resistor R _E between these pins and ground to control set current.
E2	23	
OUTA	2	Output pins.
OUTA ⁻	1	
OUTB	27	
OUTB ⁻	28	
GND	14	Ground pin.
S-GND	15	Sense ground pin.
D-GND	6	Lower-side internal diode ground (anode)
	22	
CR	21	Triangular wave chopping with CR constant setting.
		Triangular wave OFF time is noise cancel time.
V _{REF1}	13	Output current setting pins. (Output current is set by inputting a 1.5V to 7.5V voltage.)
V _{REF2}	16	
PHASE1	9	Output phase select input pin.
PHASE2	20	High input: OUTA = H, OUTA ⁻ = L
		Low input: OUTA = L, OUTA ⁻ = H
ENABLE1	10	Output ON/OFF setting input pins. High input: output OFF Low input: output ON
ENABLE2	19	
IA1, IA2	12, 11	Output current setting digital input pins.
IB1, IB2	17, 18	Current is set to 1/3, 2/3, 1 by High and Low combinations.
V _{CC}	8	Logic block power supply voltage pin.

Usage Notes

1. V_{REF} pin

Because the V_{REF} pin is used as reference voltage input pin for the current setting, care must be taken to prevent noise from affecting the input.

2. GND pin

Because this IC switches large currents, the ground pattern must be designed with care. The fin on the bottom of the package and the fins between pins 7 and 8 and 21 and 22 should be grounded. Low-impedance patterns should be used in blocks where large currents flow, and these blocks should be separated from low-level signal blocks. In particular, the ground of the sense resistor R_E at pin E should be located close to the IC ground. Pattern layout should be designed so that the capacitors between V_{CC} and ground and V_{BB} and ground are close to V_{CC} and V_{BB}.

- Specifications of any and all SANYO products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- SANYO Electric Co., Ltd. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all SANYO products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of SANYO Electric Co., Ltd.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the SANYO product that you intend to use.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. SANYO believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

This catalog provides information as of August, 1999. Specifications and information herein are subject to change without notice.