

**LB1684****3-Phase DD Motor Driver****Overview**

The LB1684 is a 3-phase DD motor driver IC ideally suited for use in low-supply VCR capstan motor drive, drum motor drive, and floppy disk motor drive applications.

Features

- Designed for 5V-supply control system.
- Voltage-control system/current-control system available.
- Speed control available.
- Bidirectional control available.
- 20V/1.5A rating.

Specifications**Absolute Maximum Ratings at Ta = 25°C**

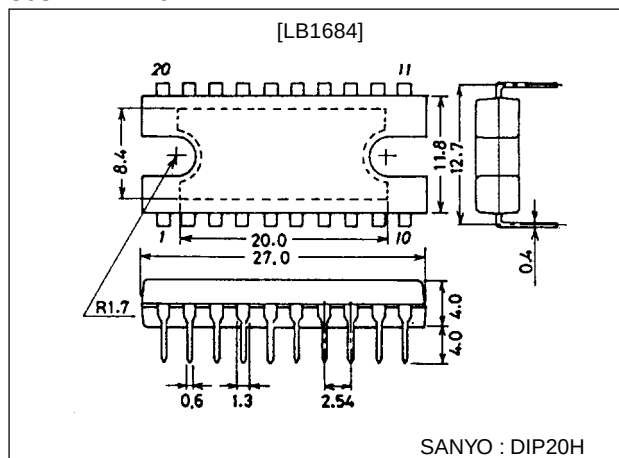
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC1}		22	V
	V _{CC2}		7	V
Output current	I _O		1.5	A
Allowable power dissipation	P _d max		2.2	W
Operating temperature	T _{opr}		-20 to +75	°C
Storage temperature	T _{stg}		-55 to +125	°C

Allowable Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V _{CC1}		7.0 to 2.0	V
	V _{CC2}		4.3 to 6.3	V

Package Dimensions

unit:mm

3037A-DIP20H

■ 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.

SANYO Electric Co.,Ltd. Semiconductor Business Headquarters

TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

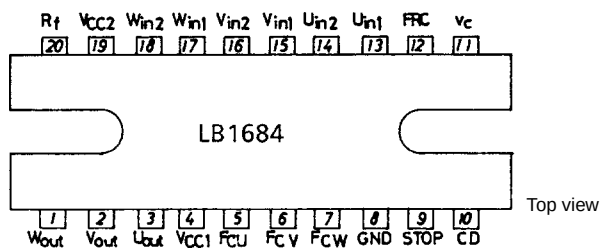
83198HA (KT)/3290TA, TS No.3381-1/4

LB1684

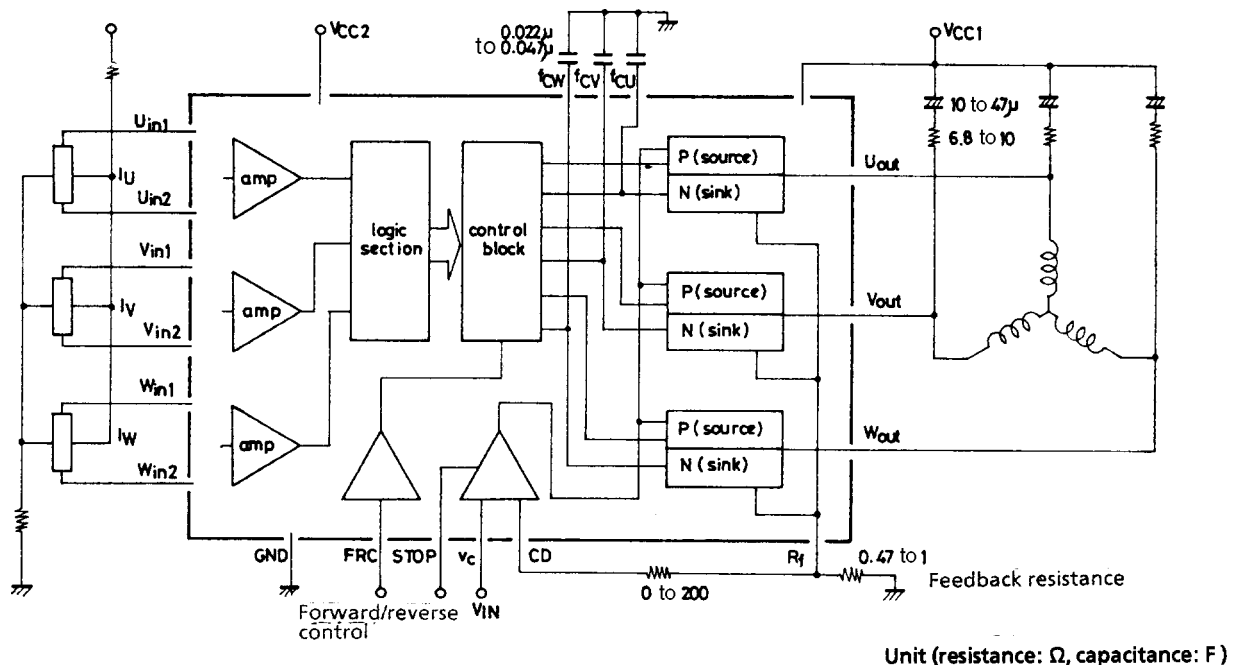
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC1}=12\text{V}$, $V_{CC2}=5.0\text{V}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current	$I_{CC}(\text{off})$	$V_C=0\text{V}$, $I_{CC1}+I_{CC2}$		13	18	mA
	$I_{CC}(\text{dri})$	$V_C=4\text{V}$, I_{CC2}		20	40	mA
Output saturation voltage	$V_O(\text{sat})1$	$I_{OUT}=0.58\text{A}$ sink+source		1.4	2.1	V
	$V_O(\text{sat})2$	$I_{OUT}=1\text{A}$ sink+source		2.0	3.5	V
Common-mode input voltage range			1.3		$V_{CC2}-1.3$	V
Motor forward rotation input voltage range			2.0		V_{CC2}	V
Motor reverse rotation input voltage range			0		0.3	V
Interphase current variation		Driver stage	-25	0	+25	%
		Output stage	-25	0	+25	%
Speed control voltage (OFF)	V_{C1}	$R_f=0$, $R_S=0$, FC pin $\rightarrow$ GND current $5\mu\text{A}$			2.1	V
Speed control voltage (ON)	V_{C2}	$R_f=0$, $R_S=0$, FC pin $\rightarrow$ GND current 0.5mA	2.38		2.58	V
	V_{C3}	$R_f=1\Omega$, $R_S=100\Omega$, $V_{Rf}=100\text{mV}$		2.7		V
Closed-Loop voltage gain		$R_f=1\Omega$, $R_S=100\Omega$, $I_L=100\text{mA}$		0.44		A/V
Input sensitivity		Hall input		20		mV peak

Pin Assignment

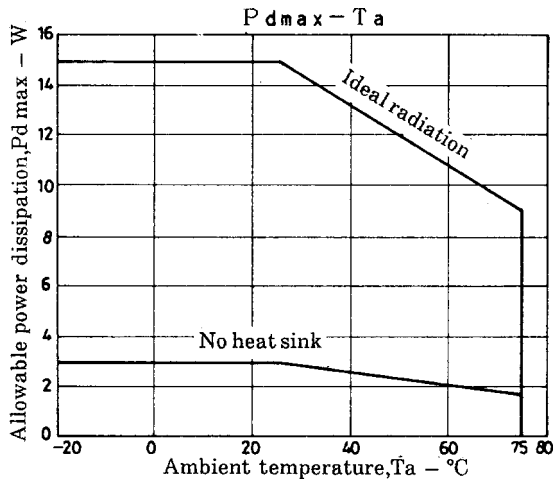


Equivalent Circuit Block Diagram



Truth Table

	Source Sink	Input			Forward/Reverse Control
		U	V	W	F/RC
1	W phase → V phase	H	H	L	L
	V phase → W phase				H
2	W phase → U phase	H	L	L	L
	U phase → W phase				H
3	V phase → W phase	L	L	H	L
	W phase → V phase				H
4	U phase → V phase	L	H	L	L
	V phase → U phase				H
5	V phase → U phase	H	L	H	L
	U phase → V phase				H
6	U phase → W phase	L	H	H	L
	W phase → U phase				H



Pin Description

Pin name	Pin No.	Description
U_{IN1} , U_{IN2}	13, 14	U phase Hall element input pin. High of logic : $V_{IN1} > V_{IN2}$
V_{IN1} , V_{IN2}	15, 16	V phase Hall element input pin. High of logic : $V_{IN1} > V_{IN2}$
W_{IN1} , W_{IN2}	17, 18	W phase Hall element input pin. High of logic : $V_{IN1} > V_{IN2}$
U_{OUT}	3	U phase output pin
V_{OUT}	2	V phase output pin
W_{OUT}	1	W phase output pin
V_{CC1}	4	Power supply pin for applying output
V_{CC2}	19	Power supply pin for applying voltage to each section other than output section. The control point of control voltage is at approximately 1/2 of this voltage. This voltage must be stabilized to be free from ripple, noise, etc.
R_f	20	Output current detect pin. By connecting R_f across this pin and GND pin, output current is detected as voltage.
C_D	10	Pin for fetching current (voltage) detected with R_f . By connecting a resistor across C_D pin and R_f pin, speed control start voltage can be fine-adjusted.
STOP	9	Overcurrent protection pin. Voltage being lower than that on C_D pin is taken to be identical to overcurrent flow, causing output to be cut off. For example, if STOP pin is set to 1.5V for $R_f=1\Omega$, approximately 1.5A or more flows at output, causing output to be cut off.
F_{CU} F_{CV} F_{CW}	5 6 7	Ferquency characteristic compensation pin. Closed-loop oscillation in current-controlled system (including motor, F-V converter) is stopped.
V_C	11	Speed/phase control pin. Control starts at approximately 1/2 of V_{CC2} . Control is of current-controlled type that controls output current. For $R_f=1\Omega$, LB1684 closed-loop has $g_m=0.44A/V$ typ, which can be adjusted by varying R_f .
GND	8	GND for other than output. Minimum potential of current transistor is at R_f pin.
F/R	12	Forward/reverse control pin. By setting this pin to high (more than 2.0V)/low (less than 0.3V), truth value is changed to perform forward/reverse rotation.

- 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 and all SANYO products described or contained herein fall under strategic products (including services) controlled under the Foreign Exchange and Foreign Trade Control Law of Japan, such products must not be exported without obtaining export license from the Ministry of International Trade and Industry 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, 1998. Specifications and information herein are subject to change without notice.