


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 $T_a = 25^\circ\text{C}$

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	$P_d \text{ max}$		2.2	W
Operating temperature	T_{opr}		-20 to +75	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +125	$^\circ\text{C}$

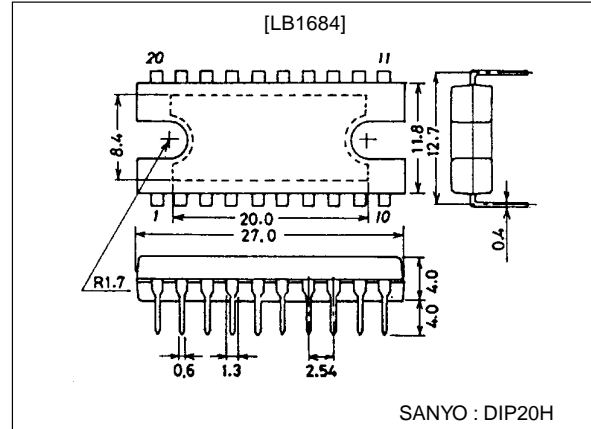
Allowable Operating Conditions at $T_a = 25^\circ\text{C}$

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



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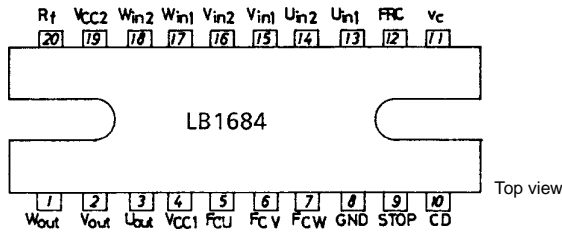
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LB1684

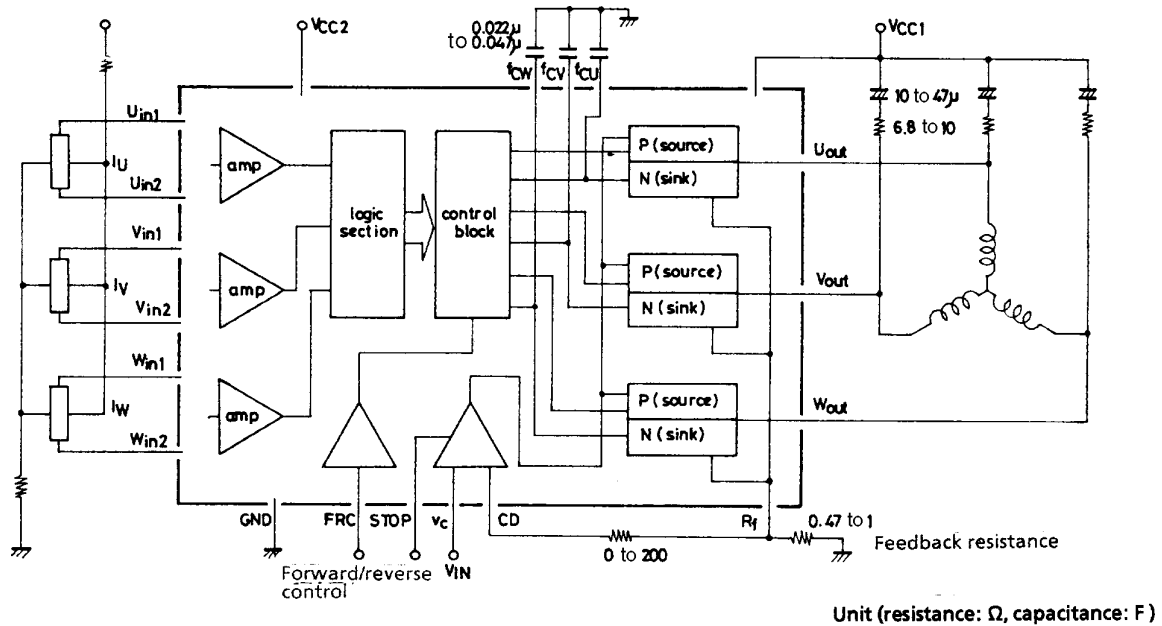
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC1}=12\text{V}$, $V_{CC2}=5.0\text{V}$

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

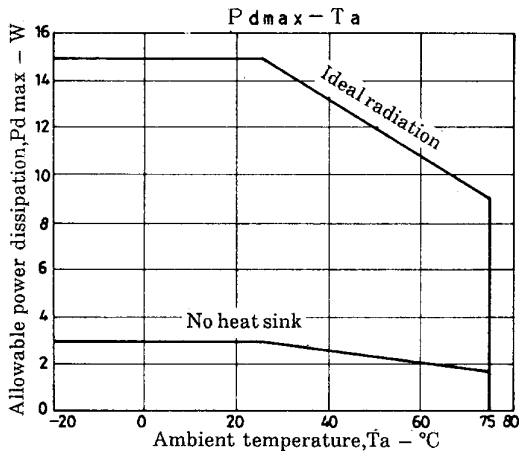


Equivalent Circuit Block Diagram



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}	5	Frequency characteristic compensation pin.
F_{CV}	6	Closed-loop oscillation in current-controlled system (including motor, F-V converter) is stopped.
F_{CW}	7	
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 $gm=0.44A/V$ 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.

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