

SANYO

No.3381

LB1684**3-Phase DD Motor Driver**

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

Features and Functions

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

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

			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	$^\circ\text{C}$

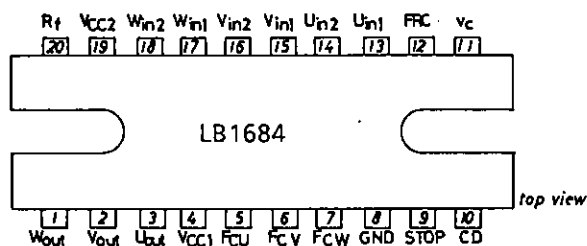
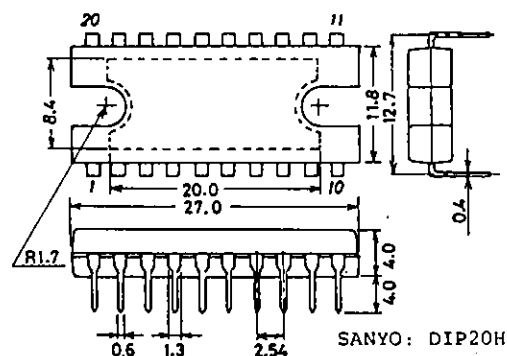
Allowable Operating Conditions at $T_a = 25^\circ\text{C}$

			unit
Supply Voltage	V_{CC1}	7.0 to 20	V
	V_{CC2}	4.3 to 6.3	V

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

		min	typ	max	unit
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

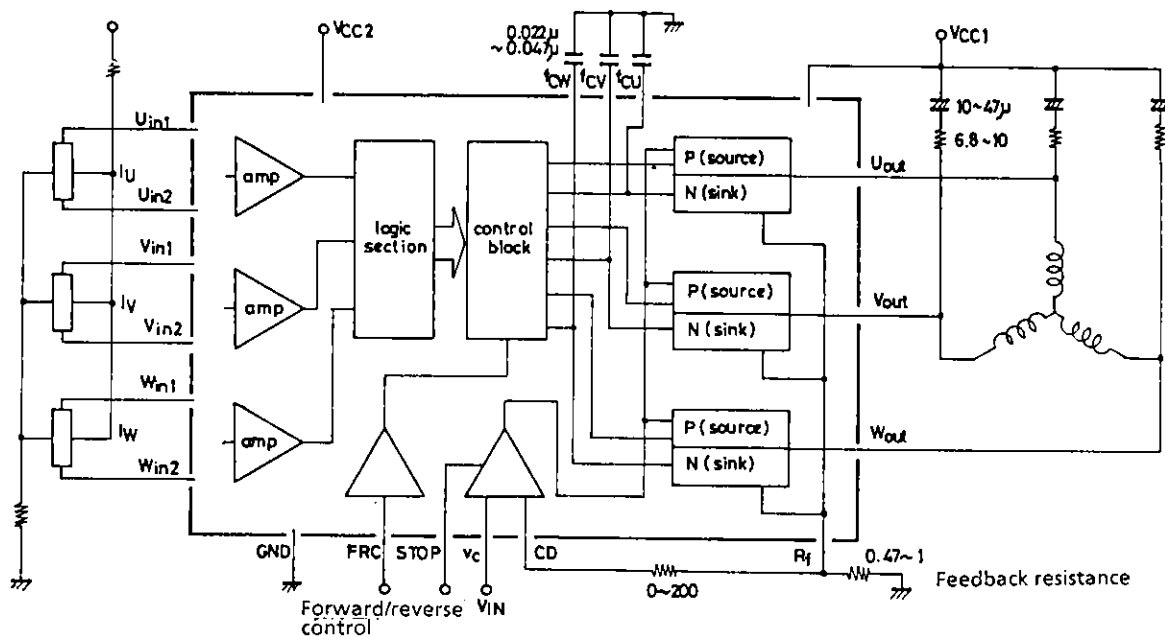
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Pin Assignment**Package Dimensions 3037A-D20HIC (unit: mm)**

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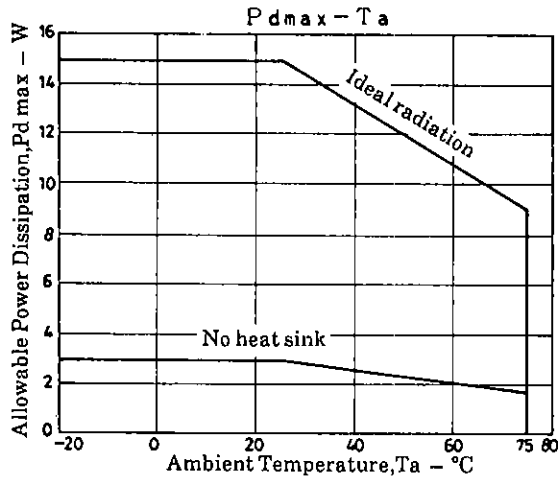
		min	typ	max	unit
Motor Forward Rotation		2.0		V_{CC2}	V
Input Voltage Range					
Motor Reverse Rotation		0		0.3	V
Input Voltage Range					
Interphase Current Variation	Driver stage	-25	0	+25	%
	Output stage	-25	0	+25	%
Speed Control Voltage (OFF)	V_{C1}			2.1	V
	$R_f=0, R_s=0,$ FC pin $\rightarrow$ GND current $5\mu A$				
Speed Control Voltage (ON)	V_{C2}	2.38		2.58	V
	$R_f=0, R_s=0,$ FC pin $\rightarrow$ GND current $0.5mA$				
	V_{C3}		2.7		V
	$R_f=1\Omega, R_s=100\Omega, V_{Rf}=100mV$				
Closed-Loop Voltage Gain	$R_f=1\Omega, R_s=100\Omega, I_L=100mA$	0.44			A/V
Input Sensitivity	Hall input		20		mVpeak

Equivalent Circuit Block Diagram and Peripheral Circuit

Unit (resistance: Ω , capacitance: F)

Truth Table

	Source	Input			Forward/Reverse Control
		U	V	W	
1	W phase $\rightarrow$ V phase	H	H	L	L
	V phase $\rightarrow$ W phase				H
2	W phase $\rightarrow$ U phase	H	L	L	L
	U phase $\rightarrow$ W phase				H
3	V phase $\rightarrow$ W phase	L	L	H	L
	W phase $\rightarrow$ V phase				H
4	U phase $\rightarrow$ V phase	L	H	L	L
	V phase $\rightarrow$ U phase				H
5	V phase $\rightarrow$ U phase	H	L	H	L
	U phase $\rightarrow$ V phase				H
6	U phase $\rightarrow$ W phase	L	H	H	L
	W phase $\rightarrow$ U phase				H



Pin Description

Pin Name	Pin No.	Description
U_{IN1}, U_{IN2}	13, 14	U phase hall element input pin. 'H' of logic : $V_{IN1} > V_{IN2}$
V_{IN1}, V_{IN2}	15, 16	V phase hall element input pin. 'H' of logic : $V_{IN1} > V_{IN2}$
W_{IN1}, W_{IN2}	17, 18	W phase hall element input pin. 'H' 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 $g_m = 0.44A/V$ typ, which can be adjusted by varying R_f .
GND	8	GND for other than output. Minimum potential of output transistor is at R_f pin.
F/R	12	Forward/reverse control pin. By setting this pin to 'H' (more than 2.0V)/'L' (less than 0.3V), truth value is changed to perform forward/reverse rotation.

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