Ordering number : EN5798

Monolithic Digital IC

LB1855NM

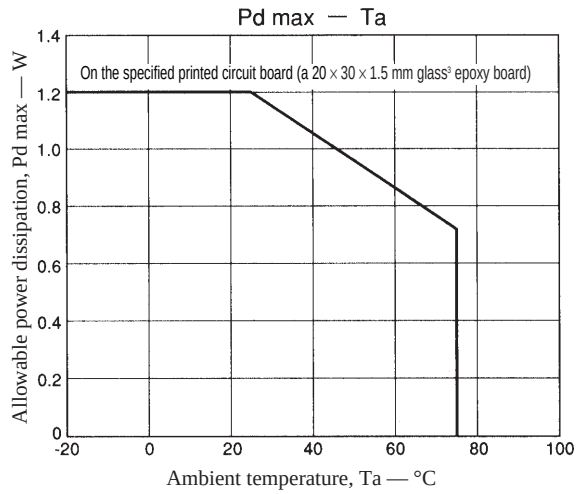
3-Phase Brushless Motor Driver

Overview

The LB1855NM is a 3-phase brushless motor driver IC that is optimal for VCR drum motor drive.

Features

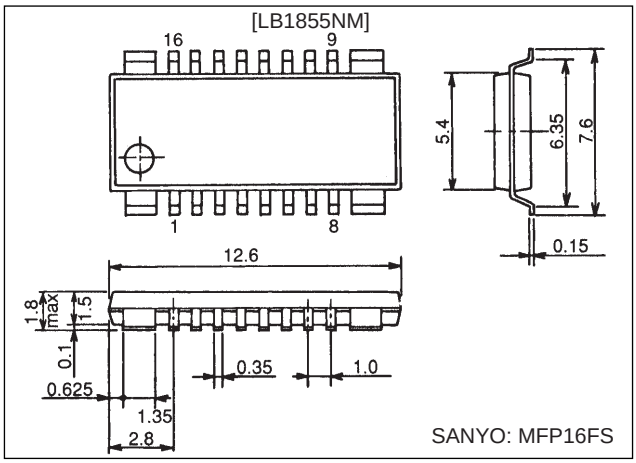
- Current linear drive
- No output electrolytic capacitors required.
- Current limiter circuit built in
- AGC circuit built in
- Thermal shutdown circuit built in



Package Dimensions

unit: mm

3097-MFP16FS



Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		20	V
Maximum output current	I_O max		1.2	A
Allowable power dissipation	Pd max	On the specified printed circuit board (a 20 × 30 × 1.5 mm³ glass epoxy board)	1.2	W
Operating temperature	Topr		–20 to +75	°C
Storage temperature	Tstg		–55 to +150	°C

Allowable Operating Ranges at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply current	V_{CC}		7 to 18	V
Hall input amplitude	V_{HALL}	Between the Hall inputs	70 to 300	mVp-p

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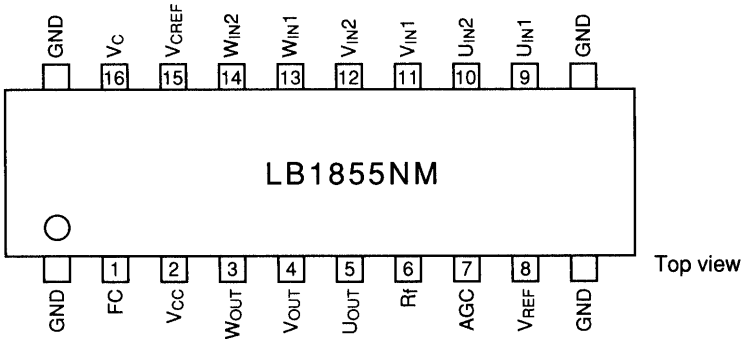
Electrical Characteristics at Ta = 25°C, V_{CC} = 12 V

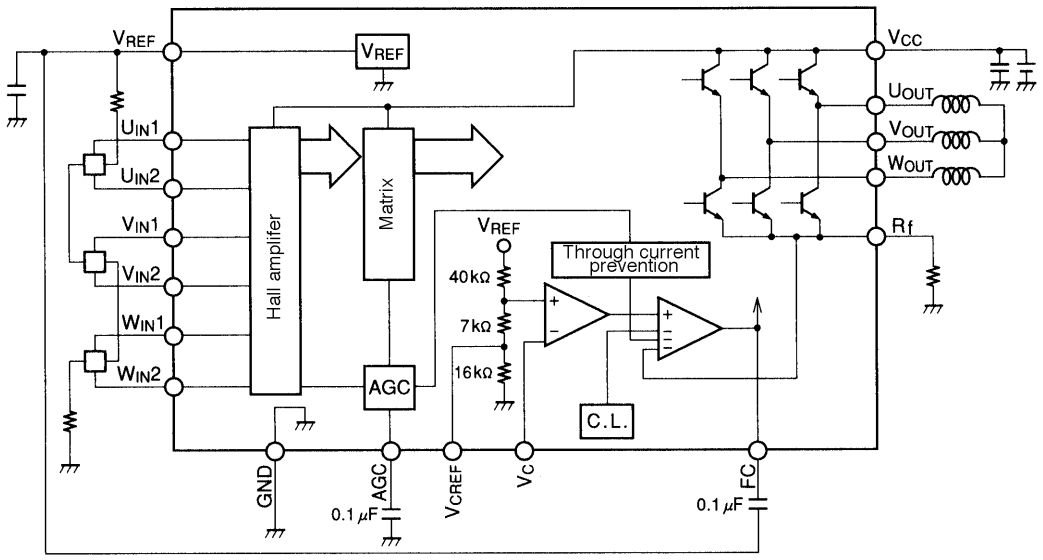
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current	I_{CC}	V_C = GND			8	mA
Reference voltage	V_{REF}	I_R = 8 mA	6.0	6.3	6.6	V
[Saturation voltage]						
Upper side	$V_{sat}1$	I_O = 1 A		1.5	1.9	V
Lower side	$V_{sat}2$	I_O = 1 A		0.8	1.2	V
[Leakage current]						
Upper side	$I_{OL}1$	V_{CC} = 18 V			50	μA
Lower side	$I_{OL}2$	V_{CC} = 18 V			50	μA
[Hall Amplifier]						
Input offset voltage	V_{HO}	*	–10		+10	mV
Common-mode input voltage range	V_{HCM}		2.2		V_{CC} – 0.7	V
[Control Amplifier]						
Control reference voltage	$V_{REF}1$	(the V_{CREF} pin voltage) × 23/16	2.1	2.3	2.5	V
Control Gm	VG	Rf = 1Ω		1		A/V
Input current	I_{IN}				10	μA
[Thermal Shutdown Circuit]						
Operating temperature	T_{TSD}	*		180		°C
Hysteresis	ΔT_{TSD}	*		15		°C

Note: Items marked with an asterisk (*) are design target values and are not tested.

Pin Assignment



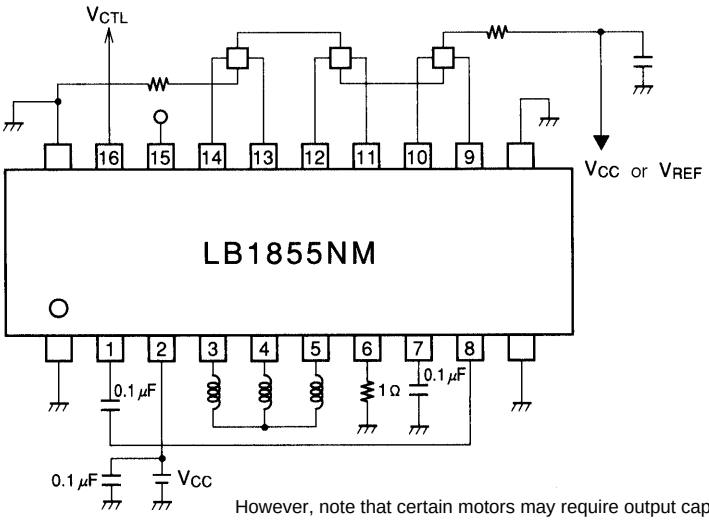
Block Diagram



However, note that certain motors may require output capacitors to prevent oscillation.

Sample Application Circuit

Hall input voltage range: 2.2 to (V_{CC} – 0.7) V DC
70 mV p-p to 300 mV p-p AC



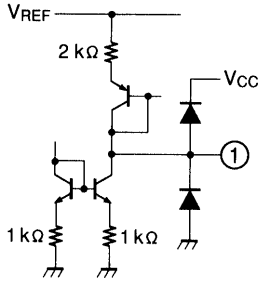
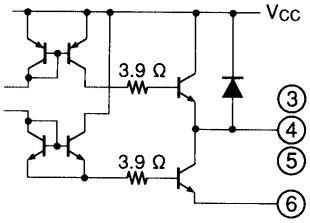
However, note that certain motors may require output capacitors to prevent oscillation.

Truth Table

Item	Source → sink	Input		
		U	V	W
1	V phase → W phase	H	H	L
2	U phase → W phase	H	L	L
3	W phase → V phase	L	L	H
4	V phase → U phase	L	H	L
5	U phase → V phase	H	L	H
6	W phase → U phase	L	H	H

Input: "H" indicates that the input phase 1 is at least 0.2 V higher than phase 2.
"L" indicates that the input phase 1 is at least 0.2 V lower than phase 2.

Pin Functions

Pin No.	Pin	Pin voltage (V)	Pin description	Equivalent circuit
1	FC		• Frequency characteristics correction Oscillation in the current control closed loop can be prevented by inserting a capacitor between this pin and VREF.	
2	V_{CC}	7 to 18	• Power supply pin	
3 4 5	W_{OUT} V_{OUT} U_{OUT}		• Outputs pin	
6	R_f		• Ground for the output transistor The output current can be detected as a voltage by inserting the resistor Rf between this pin and ground to provide fixed current drive. The current limiter also operates by detecting this voltage.	

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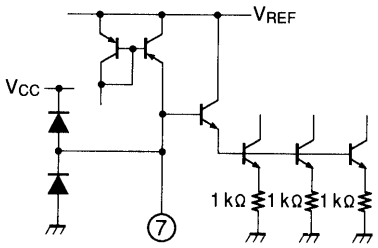
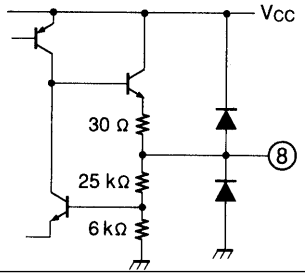
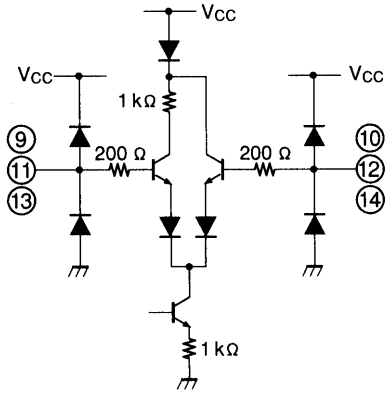
Pin No.	Pin	Pin voltage (V)	Pin description	Equivalent circuit
7	AGC		• AGC pin The Hall amplifier gain can be controlled according to the amplitude of the Hall input by inserting a capacitor between this pin and ground.	
8	V_{REF}		• Internal reference voltage. About 6.3 V.	
9 10 11 12 13 14	$U_{IN}1$ $U_{IN}2$ $V_{IN}1$ $V_{IN}2$ $W_{IN}1$ $W_{IN}2$	2.2 to V_{CC} – 0.7	• Hall element inputs pin	
15 16	V_{CREF} V_C	0 to 5	• Speed control pin This IC adopts a current control type in which the output current is controlled by the pin 16 voltage. The control start voltage changes about 1.3 to 1.4 V if pin 15 is connected to ground.