Ordering number:EN3473

Monolithic Digital IC

LB1673M

3-Phase Brushless, Sensorless Motor Driver

Applications

Rotational control of brushless motors for use in audio applications such as headphone stereos, micro-cassette recorders, mini-cassette recorders.

Function and Features

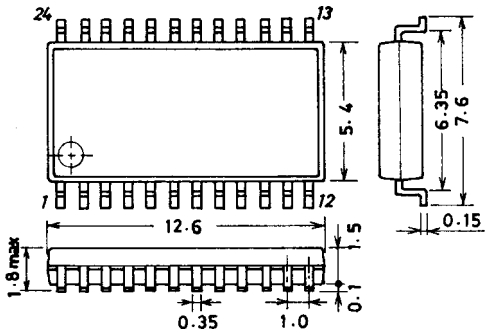
- Brushless, sonsorless motor drive (3-phase half-wave drive).
- Bidirectional motor drive.
- On-chip speed control function (V servo type).
- On-chip reference votlage.
- On-chip one comparator (PNP input, NPN open collector output).

Package Dimensions

unit:mm

3112-MFP24S

[LB1673M]



SANYO : MFP24S

Specifications

Absolute Maximum Ratings at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		5	V
Output Transistor Breakdown votlage	V_{SUS} max		10	V
Output current	I_M		1	A
Allowable power dissiaption	Pd max		0.58	W
Operating temperature	Topr		0 to +80	˚C
Storage temperature	Tstg		–40 to +125	˚C

Allowable Operating Conditions at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	V_{CC}		1.0 to 3.5	V

SANYO Electric Co.,Ltd. Semiconductor Bussiness Headquaters

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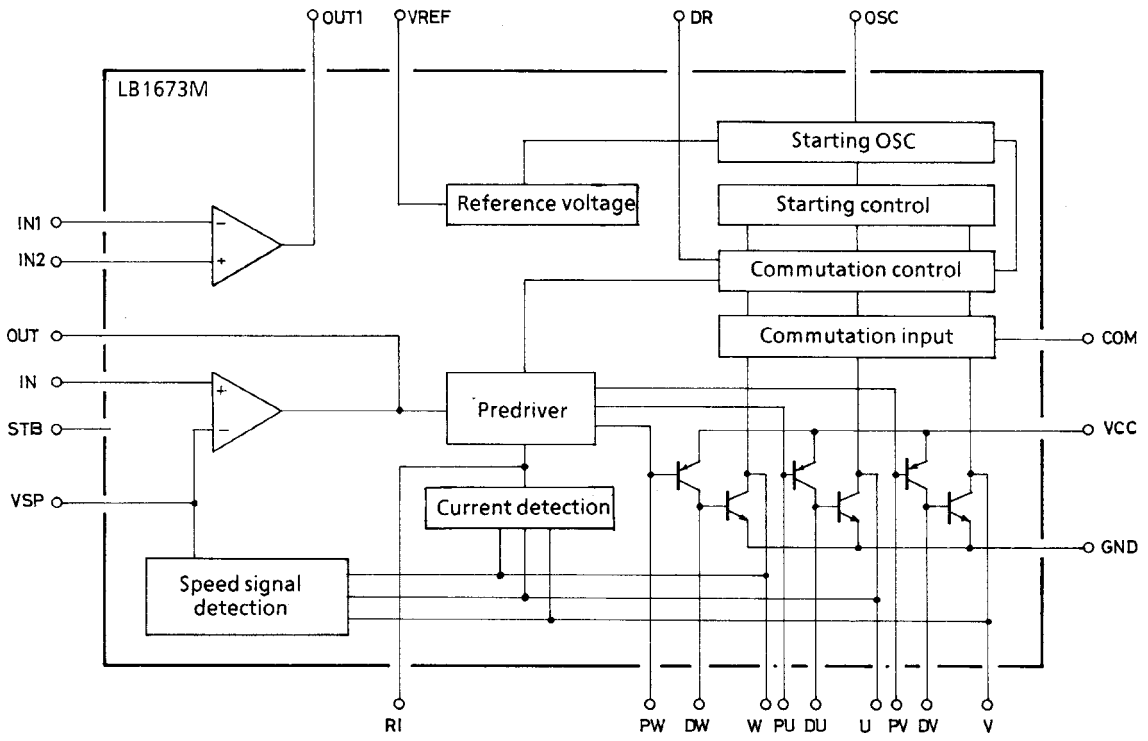
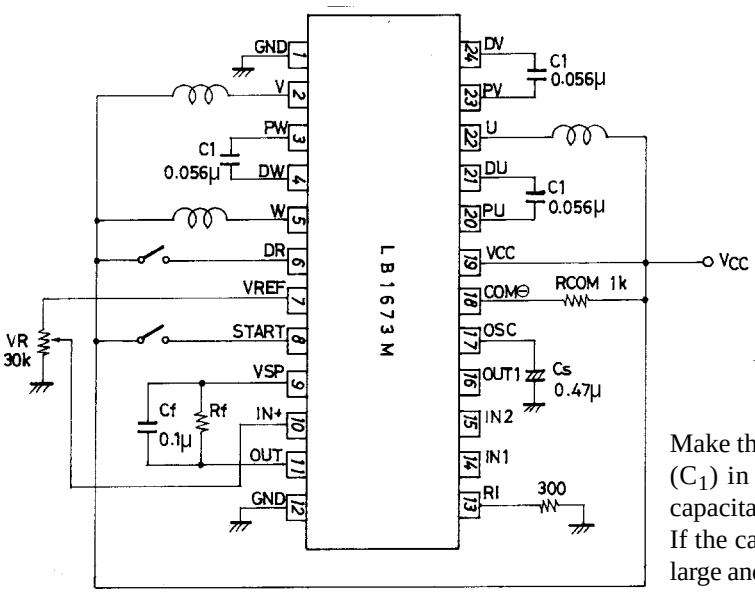
Electrical Characteristics at Ta = 25˚C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply current 1	$I_{CC}(L)$	START pin low		0	10	mA
Supply current 2	$I_{CC}(H)$	START pin high		4.8	10	µA
Reference votlage	Vref		0.49	0.52	0.55	V
Voltage characteristic of reference voltage	$\frac{\Delta Vref}{Vref/\Delta V_{CC}}$	V_{CC}=1 to 3.5V		0.3	1.0	%/V
Load characterisric of reference voltage	$\frac{\Delta Vref}{\Delta Iref}$	Iref=0 to –60µA		–0.03		mV/µA
Temperature characteristic of reference voltage	$\frac{\Delta Vref}{Vref}/\Delta Ta$	Ta=0 to +80˚C		0		%/˚C
Speed signal detection accuracy	Vsp	V_{IN}=500mV	135	145	155	mV
Speed signal correlation error			–5		5	%
Voltage characteristic of speed signal	$\frac{\Delta Vsp}{Vsp}/\Delta V_{CC}$	V_{CC}=1 to 3.5V		0.2	1.0	%/V
Temperature characteristic of speed signal	$\frac{\Delta Vsp}{Vsp}/\Delta Ta$	Ta=0 to +60˚C		0		%/˚C
Current detection accuracy	V_{RI}	V_{IN1}=0.3V, V_{IN2}=1V	50	65	80	mV
Current detection ratio	K_I	V_{IN2}=1 to 1.3V	0.14	0.17	0.25	
Pin OSC flow-out current	I_{OSC}	Measured as pin OSC is 0.4V	2.6	3.8	5.0	µA
Starting pulse width	T_{OSC}	C_S=0.47µF		60		ms
COM pull-in current	V_{COM} Θ	Short V_{CC} with COM	20	30	40	µA
Output saturation votlage	Vsat	V_{CC}=1V, I_m=0.2A		0.09	0.25	V
Logic input high-level voltage	V_H		0.9			V
Logic input low-level votlage	V_L				0.3	V
Comparator offset votlage	V_{OFF}		–10		+10	mV
Comparator output current	I_{OFF}	V_{CC}=1V, OUT1=V_{CC}	100			µA

Equivalent Circuit Block Diagram

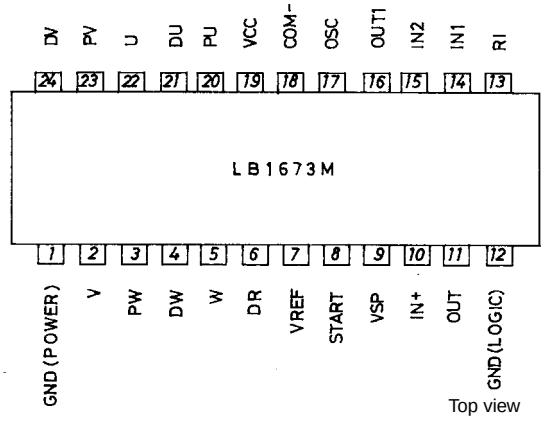


Sample Peripheral Circuit



Unit (resistance : Ω, capacitance : F)

Pin Assignment



Top view

Make the capacitance of the oscillation blocking capacitor (C_1) in the output section as small as possible and the capacitance of C_2 as large as possible.

If the capacitance of the capacitor in the output section is large and the capacitance of C_S is small, the starting votlage may rise at low temperatures. In 3V-use, reverse rotation of a motor would not be well, consider the resistance of Rcom.

Pin Description

Pin No.	Pin name	Description
1	GND	GND pin for the whole circuit.
2	V	V phase output pin
3	PW	W phase output drive transistor base
4	DW	W phase output transistor base
5	W	W phase output pin
6	DR	Pin for selecting the direction of rotation (H : forward)
7	Vref	Reference voltage (0.5V)
8	START	High active
9	Vsp	Speed signal (induced voltage) detection
10	IN⊕	Speed signal error amp reference input
11	OUT	Speed signal error amp output. The motor current is fed back.
12	GND	GND pin for logic circuiit.
13	RI	Pin for detecting the motor current
14	IN1	⊖input of internal comparator (PNP base input)
15	IN2	⊕ input of internal comparator (PNP base input)
16	OUT1	Output of internal comparator (NPN open collector)
17	OSC	Pin for setting the starting pulse width
18	COM⊖	Pin for providing a supplementary function for the current control circuit at the time of start or selection of direction of rotation
19	V_{CC}	Power supply pin
20	PU	U phase output drive transistor base
21	DU	U phase output transistor base
22	U	U phase output pin
23	PV	V phase output drive transisitor base
24	DV	V phase output transistor base