

SANYO

No. 3473

LB1673M**3-Phase Brushless, Sensorless
Motor Driver****Applications**

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

Functions and Features

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

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

			unit
Maximum Supply Voltage	V_{CC} max	5	V
Output Transistor Breakdown Voltage	V_{SUS} max	10	V
Output Current	I_M	1	A
Allowable Power Dissipation	P_d max	0.58	W
Operating Temperature	T_{opr}	0 to +80	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 to +125	$^\circ\text{C}$

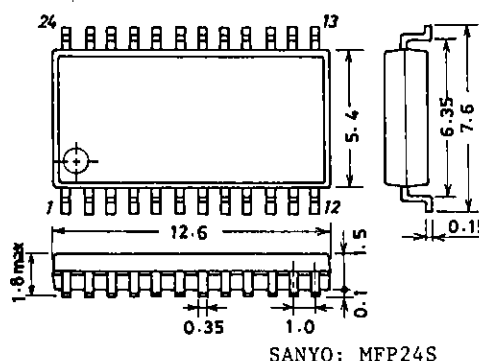
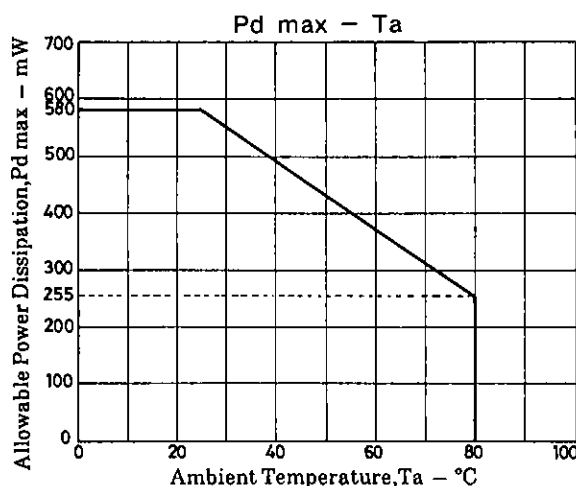
Allowable Operating Conditions at $T_a = 25^\circ\text{C}$,

			unit
Supply Voltage	V_{CC}	1.0 to 3.5	V

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 1.5\text{V}$ unless otherwise specified

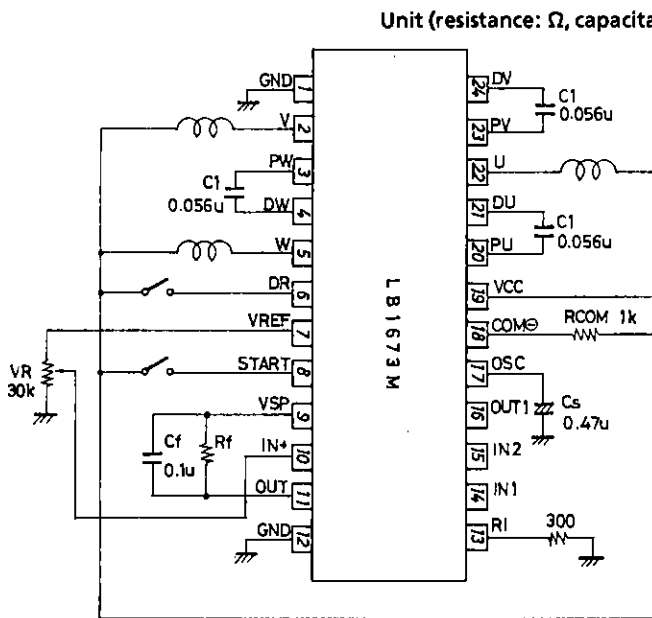
			min	typ	max	unit
Supply Current 1	$I_{CC}(L)$	START pin 'L'		0	10	mA
Supply Current 2	$I_{CC}(H)$	START pin 'H'		4.8	10	μA
Reference Voltage	V_{ref}		0.49	0.52	0.55	V
Voltage Characteristic of Reference Voltage	$\frac{\Delta V_{ref}}{V_{ref}/\Delta V_{CC}}$	$V_{CC} = 1 \text{ to } 3.5\text{V}$		0.3	1.0	%/V

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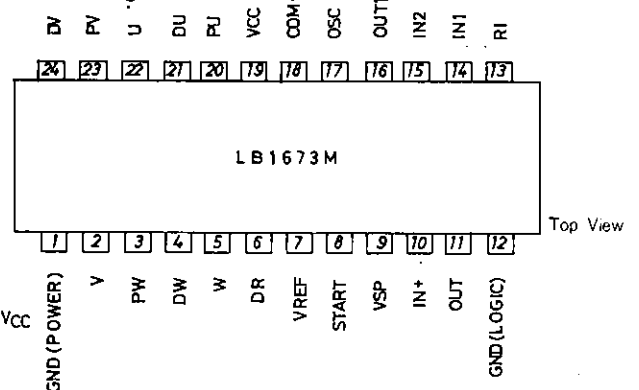
**Package Dimensions 3112
(unit: mm)**

LB1673M

Sample Peripheral Circuit



Pin Assignment



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_3 is small, the starting voltage may rise at low temperatures. In 3V-use, reverse rotation of a motor would not be well, consider the resistance of R_{com} .

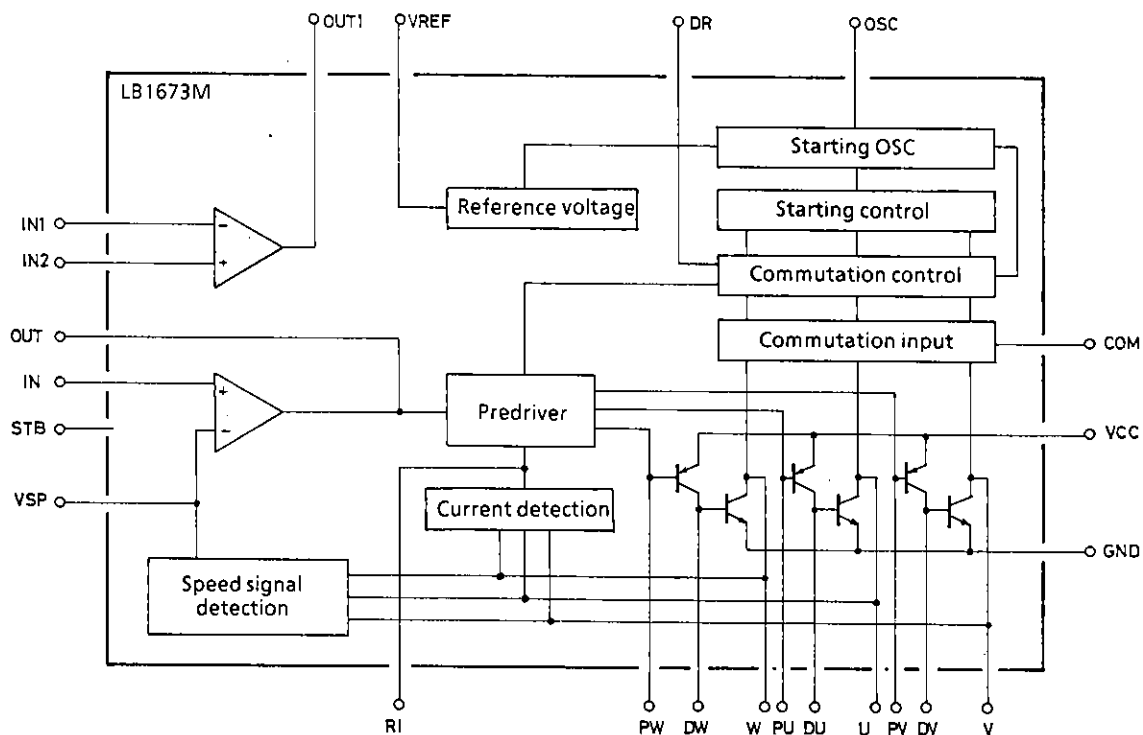
Pin Description

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 $\oplus$	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 circuit.
13	R _I	Pin for detecting the motor current
14	IN1	$\ominus$ input of internal comparator (PNP base input)
15	IN2	$\oplus$ 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 $\ominus$	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 transistor base
24	DV	V phase output transistor base

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Load Characteristic of Reference Voltage	$\frac{\Delta V_{ref}}{\Delta I_{ref}}$	$I_{ref} = 0 \text{ to } -60 \mu\text{A}$	min -0.03	typ	max	unit $\text{mV}/\mu\text{A}$
Temperature Characteristic of Reference Voltage	$\frac{\Delta V_{ref}}{\Delta T_a}$	$T_a = 0 \text{ to } +80^\circ\text{C}$		0		$\%/^\circ\text{C}$
Speed Signal Detection Accuracy	V_{sp}	$V_{IN} = 500\text{mV}$	135	145	155	mV
Speed Signal Correlation Error			-5		5	%
Voltage Characteristic of Speed Signal	$\frac{\Delta V_{sp}}{V_{sp}} / \Delta V_{CC}$	$V_{CC} = 1 \text{ to } 3.5\text{V}$		0.2	1.0	$\%/V$
Temperature Characteristic of Speed Signal	$\frac{\Delta V_{sp}}{V_{sp}} / \Delta T_a$	$T_a = 0 \text{ to } +60^\circ\text{C}$		0		$\%/^\circ\text{C}$
Current Detection Accuracy	V_{RI}	$V_{IN1} = 0.3\text{V}, V_{IN2} = 1\text{V}$	50	65	80	mV
Current Detection Ratio	K_I	$V_{IN2} = 1 \text{ to } 1.3\text{V}$	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}	$C_S = 0.47 \mu\text{F}$		60		ms
COM Pull-in Current	$V_{COM} \ominus$	Short V_{CC} with COM	20	30	40	μA
Output Saturation Voltage	V_{sat}	$V_{CC} = 1\text{V}, I_m = 0.2\text{A}$		0.09	0.25	V
Logic Input 'H'-Level Voltage	V_H		0.9			V
Logic Input 'L'-Level Voltage	V_L				0.3	V
Comparator Offset Voltage	V_{OFF}		-10		10	mV
Comparator Output Current	I_{OFF}	$V_{CC} = 1\text{V}, \text{OUT1} = V_{CC}$	100			μA

Equivalent Circuit Block Diagram



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