

<b>SANYO</b>	No. 3473	<b>LB1673M</b>
		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 Ta = 25°C**

			unit
Maximum Supply Voltage	V <sub>CC</sub> max	5	V
Output Transistor Breakdown Voltage	V <sub>SUS</sub> max	10	V
Output Current	I <sub>M</sub>	1	A
Allowable Power Dissipation	P <sub>d</sub> max	0.58	W
Operating Temperature	T <sub>opr</sub>	0 to +80	°C
Storage Temperature	T <sub>stg</sub>	-40 to +125	°C

**Allowable Operating Conditions at Ta = 25°C,**

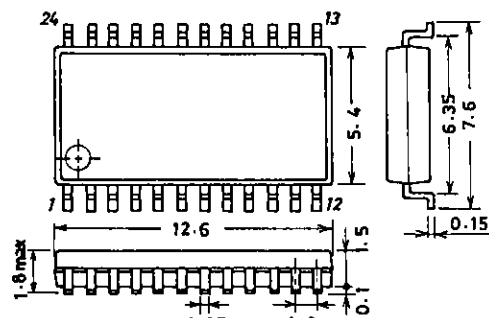
			unit
Supply Voltage	V <sub>CC</sub>	1.0 to 3.5	V

**Electrical Characteristics at Ta = 25°C, V<sub>CC</sub> = 1.5V unless otherwise specified**

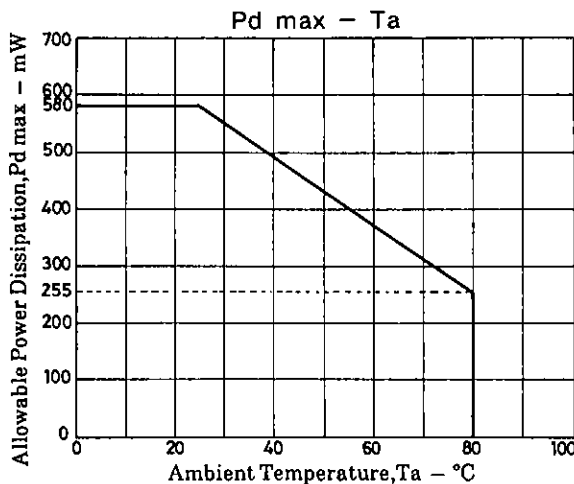
			min	typ	max	unit
Supply Current 1	I <sub>CC(L)</sub>	START pin 'L'		0	10	mA
Supply Current 2	I <sub>CC(H)</sub>	START pin 'H'		4.8	10	μA
Reference Voltage	V <sub>ref</sub>		0.49	0.52	0.55	V
Voltage Characteristic of Reference Voltage	$\frac{\Delta V_{ref}}{V_{ref}/\Delta V_{CC}}$	V <sub>CC</sub> = 1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

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



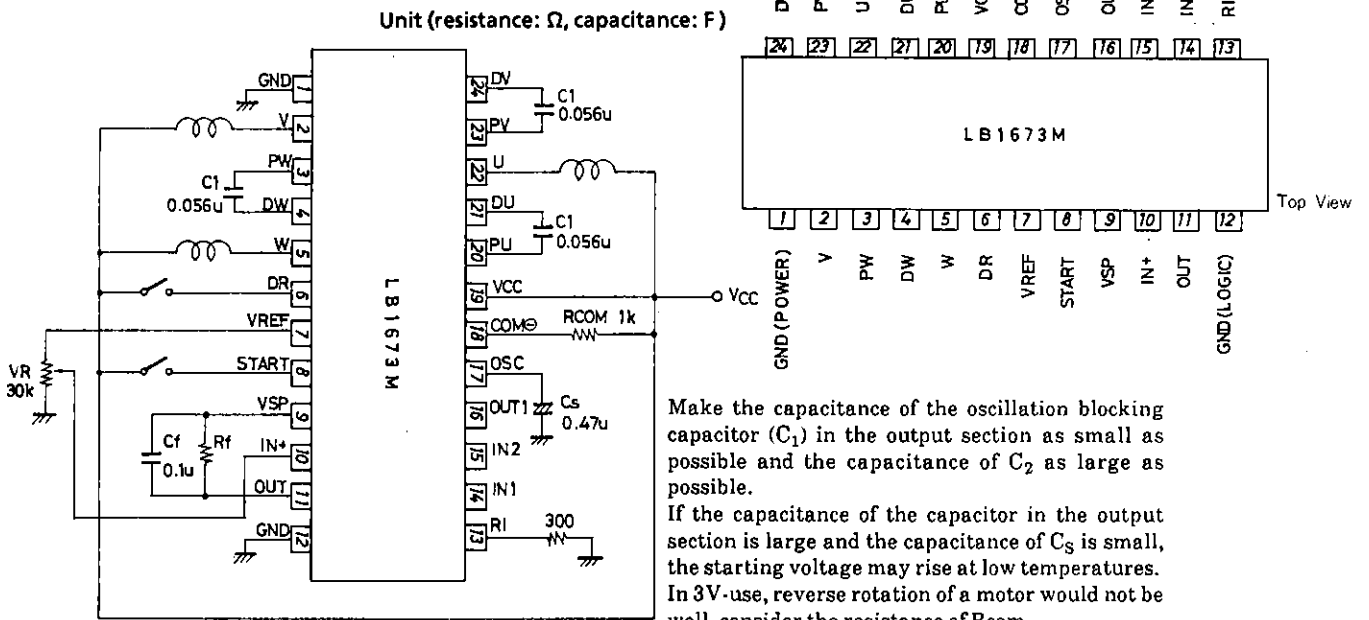
SANYO: MFP24S



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## Sample Peripheral Circuit

## Pin Assignment



## Pin Description

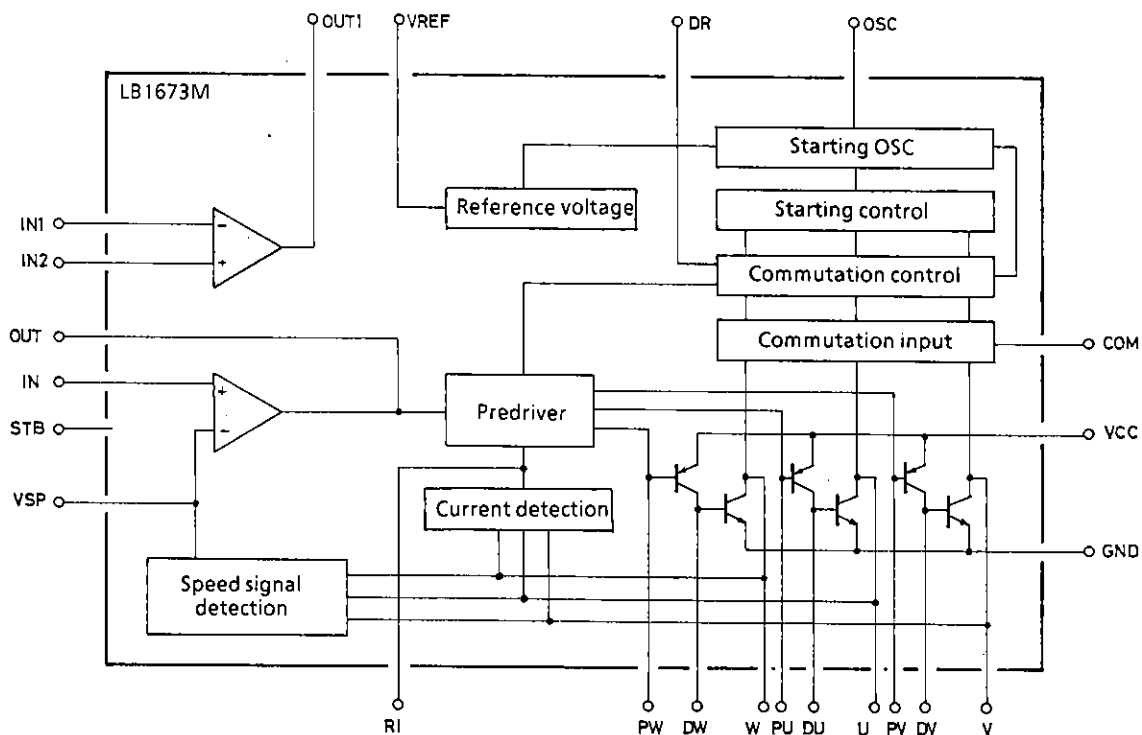
Pin No.	Pin Name	Description
1	GND	GND pin for the whole circuit
2	V	V phase output pin
3	PW	W phase output drive transistor base
4	DW	W phase output transistor base
5	W	W phase output pin
6	DR	Pin for selecting the direction of rotation (H : forward)
7	Vref	Reference voltage (0.5V)
8	START	High active
9	Vsp	Speed signal (induced voltage) detection
10	IN $\ominus$	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 <sub>I</sub>	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	VCC	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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			min	typ	max	unit
Load Characteristic of Reference Voltage	$\frac{\Delta V_{ref}}{\Delta I_{ref}}$	$I_{ref} = 0 \text{ to } -60 \mu\text{A}$		-0.03		$\text{mV}/\mu\text{A}$
			Temperature Characteristic of Reference Voltage	$\frac{\Delta V_{ref}}{\Delta T_a}$	$T_a = 0 \text{ to } +80^\circ\text{C}$	0
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
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	$\mu\text{A}$
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	$\mu\text{A}$
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			$\mu\text{A}$

Equivalent Circuit Block Diagram



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