

<b>SANYO</b>	No.3321	Monolithic Digital IC
		<b>LB1656M</b>
<b>2-Phase Stepping Motor Driver</b>		

The LB1656M is a dual bridge driver IC suited for use in 2-phase bipolar stepping motor driver for FDD (3 to 5.25 inches) head actuator. The maximum driver current  $\times$  voltage is  $0.33A \times 12V$ /bridge.

**Features**

- Power save function
- $\phi 1, \phi 2$  direction inputs are used to make driver output selection.
- Low saturation voltage
- Low current dissipation
- Direct controllable from MPU due to low input current
- Input level : TTL, LSTTL, 5V CMOS compatible
- On-chip thermal shutdown (TSD) circuit

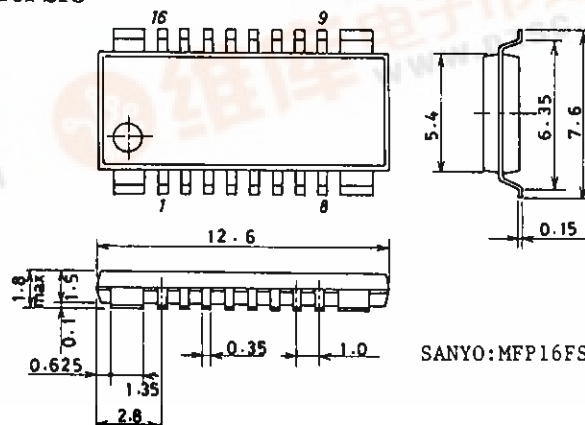
**Absolute Maximum Ratings at  $T_a = 25^\circ C$**

			unit
Logic Section Supply Voltage	$V_{CC}$	7	V
Seeking Supply Voltage	$V_{S1}$	15	V
Holding Supply Voltage	$V_{S2}$	7	V
Input Voltage	$V_I$	0 to $V_{CC}$	V
Peak Seeking Current	$I_{O\ peak}$	$t \leq 5ms$	500 mA
Continuous Seeking Current	$I_{OS}$		330 mA
Holding Current	$I_{OH}$		200 mA
Allowable Power Dissipation	$P_d\ max$	0.9	W
Operating Temperature	$T_{opr}$	-20 to +70	$^\circ C$
Storage Temperature	$T_{stg}$	-55 to +125	$^\circ C$

**Allowable Operating Conditions at  $T_a = 25^\circ C$**

		min	typ	max	unit
Logic Section Supply Voltage	$V_{CC}$	4.5	5.0	5.5	V
Seeking Supply Voltage	$V_{S1}$	10.2	12.0	13.8	V
Holding Supply Voltage	$V_{S2}$	4.5	5.0	5.5	V

**Package Dimensions 3097-M16FSIC**  
(unit: mm)



SANYO:MFP16FS



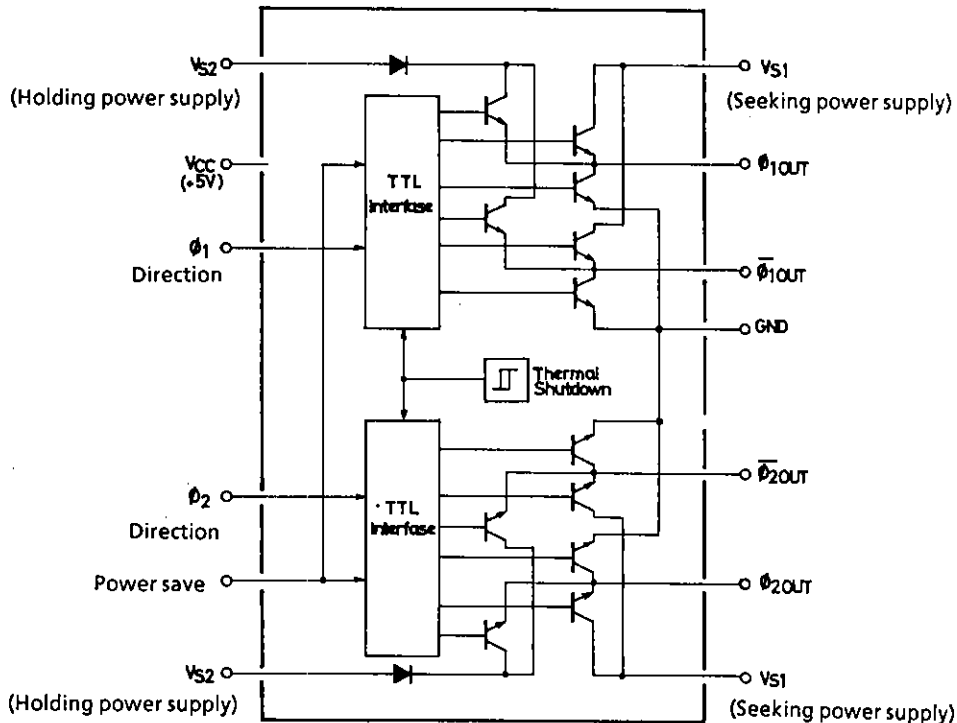
## LB1656M

**Electrical Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $V_{S2} = 5\text{V}$ ,  $V_{S1} = 12\text{V}$**

			min	typ	max	unit	
Input 'L'-Level Voltage	$V_{IL}$				0.8	V	
Input 'H'-Level Voltage	$V_{IH}$		2.0			V	
Input 'L'-Level Current	$I_{IL}$	$V_I = 0.8\text{V}$	-10		+10	$\mu\text{A}$	
Input 'H'-Level Current	$I_{IH}$	$V_I = 2\text{V}$		2	10	$\mu\text{A}$	
		$V_I = 5\text{V}$		0.3	1.0	mA	
Current Dissipation	$I_{CC}$	$P_S = 0.8\text{V}$ $V_{CC}$		25	33	mA	
		$P_S = 0.8\text{V}$ $V_{S1, \text{Note 1}}$		6	10	mA	
		$P_S = 0.8\text{V}$ $V_{S2, \text{Note 2}}$				0.1	mA
		$P_S = 2\text{V}$ $V_{CC}$		25	33	mA	
		$P_S = 2\text{V}$ $V_{S1, \text{Note 1}}$		1	2	mA	
		$P_S = 2\text{V}$ $V_{S2, \text{Note 2}}$		2.5	4	mA	
Output Transistor Voltage	$V_{(BR)CER}$	$I_C = 10\text{mA}$	18			V	
$V_{S1}$ Saturation Voltage	$V_{CE(sat)1}$	$P_S = 0.8\text{V}, I_O = 330\text{mA}, \text{Note 3}$		1.5	2.0	V	
$V_{S2}$ Saturation Voltage	$V_{CE(sat)2}$	$P_S = 2.0\text{V}, I_O = 130\text{mA}, \text{Note 3}$		1.5	2.0	V	
Clamp Voltage	$V_F$	$I_F = 330\text{mA}$ Upper		3		V	
		$I_F = 330\text{mA}$ Lower		1.5		V	
Delay Time	$t_{PLH}$			4		$\mu\text{s}$	
	$t_{PHL}$			2		$\mu\text{s}$	
TSD Operating Temperature	TSD			150		$^\circ\text{C}$	
TSD Hysteresis	$\Delta T$			25		$^\circ\text{C}$	

- Note) 1. Measure sum of currents at pins 4 and 13.  
 2. Measure sum of currents at pins 5 and 12.  
 3. Measure sum of saturation voltages at upper and lower level.

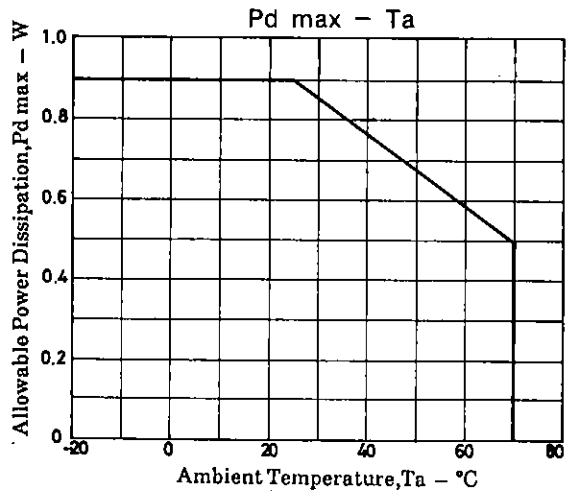
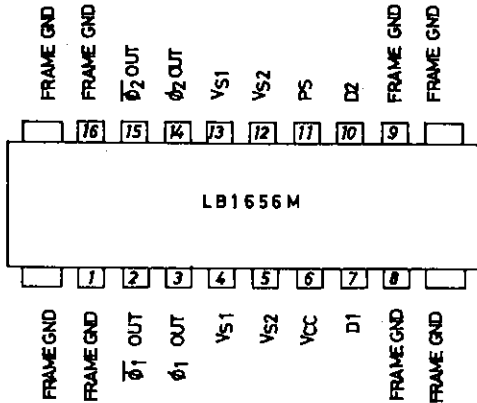
### Equivalent Circuit Block Diagram



The  $\phi_1$ ,  $\phi_2$  direction inputs are used to make driver output selection and the power save input is used to select the driver source output from between 5V supply and 12V supply.

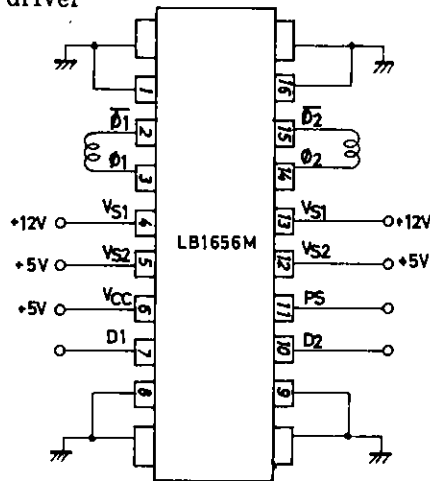
# LB1656M

## Pin Assignment

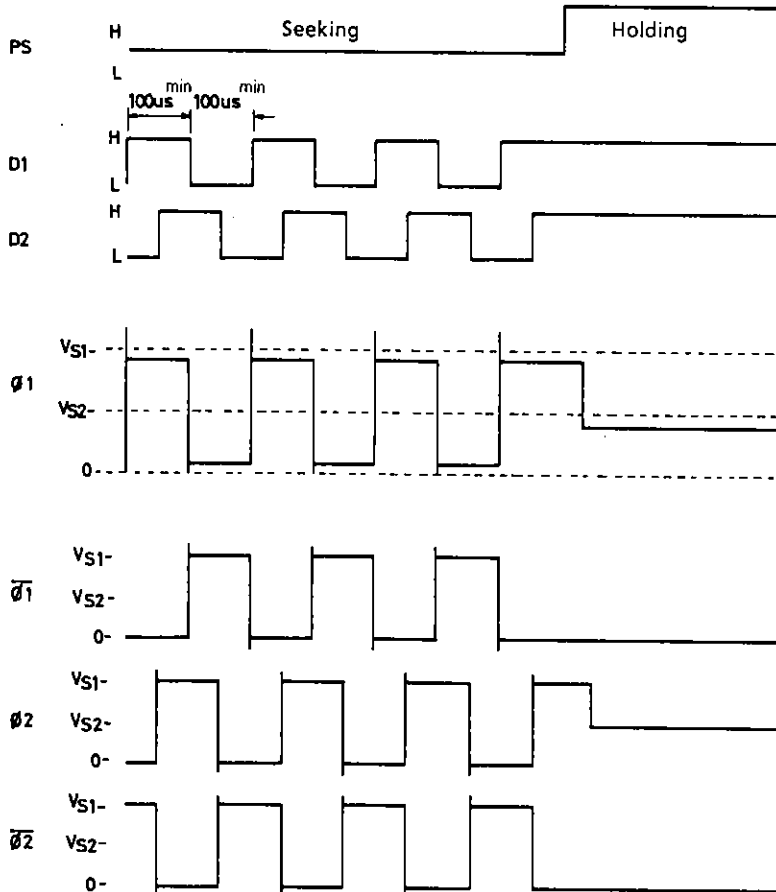


## Sample Application Circuit

2-phase bipolar stepping motor driver



## Timing Chart



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