

SANYO

No.3346

LB1688**3-Phase Brushless Motor Driver****Applications**

The LB1688 is a 3-phase brushless motor driver IC ideally suited for use in VTR capstan motor, drum motor drive applications.

Features and Functions

- (1) 120° voltage linear type
- (2) Soft switching type eliminating noises caused by current switching and making the values of external capacitors smaller (comparable to those of chip capacitors)
- (3) On-chip thermal shutdown

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

| | | | unit |
|-----------------------------|----------------------|-------------|------------------|
| Maximum Supply Voltage | $V_{CC\text{ max1}}$ | 20 | V |
| | $V_{CC\text{ max2}}$ | 7.0 | V |
| Output Supply Voltage | $V_{OUT.V.W.}$ | 22 | V |
| Output Current | I_{OUT} | 1.5 | A |
| Allowable Power Dissipation | $P_{d\text{ max}}$ | 2.1 | W |
| Operating Temperature | T_{opr} | -20 to +75 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 to +125 | $^\circ\text{C}$ |

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

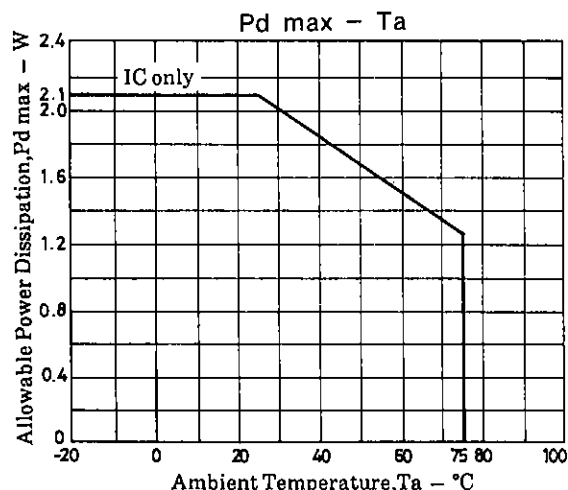
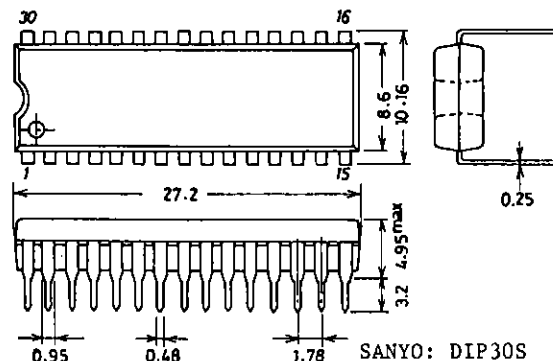
| | | | unit |
|----------------|-----------|------------|------|
| Supply Voltage | V_{CC1} | 8.5 to 18 | V |
| | V_{CC2} | 4.3 to 6.5 | V |

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC1} = 12\text{V}$, $V_{CC2} = 5\text{V}$

[Power Supply]

| | | | min | typ | max | unit |
|------------------|-----------|-------------------------|-----|-----|-----|------|
| Supply Current 1 | I_{CC1} | $V_C = 0, R_L = \infty$ | 17 | 30 | | mA |
| Supply Current 2 | I_{CC2} | $V_C = 0$ | 6.5 | 9.5 | | mA |

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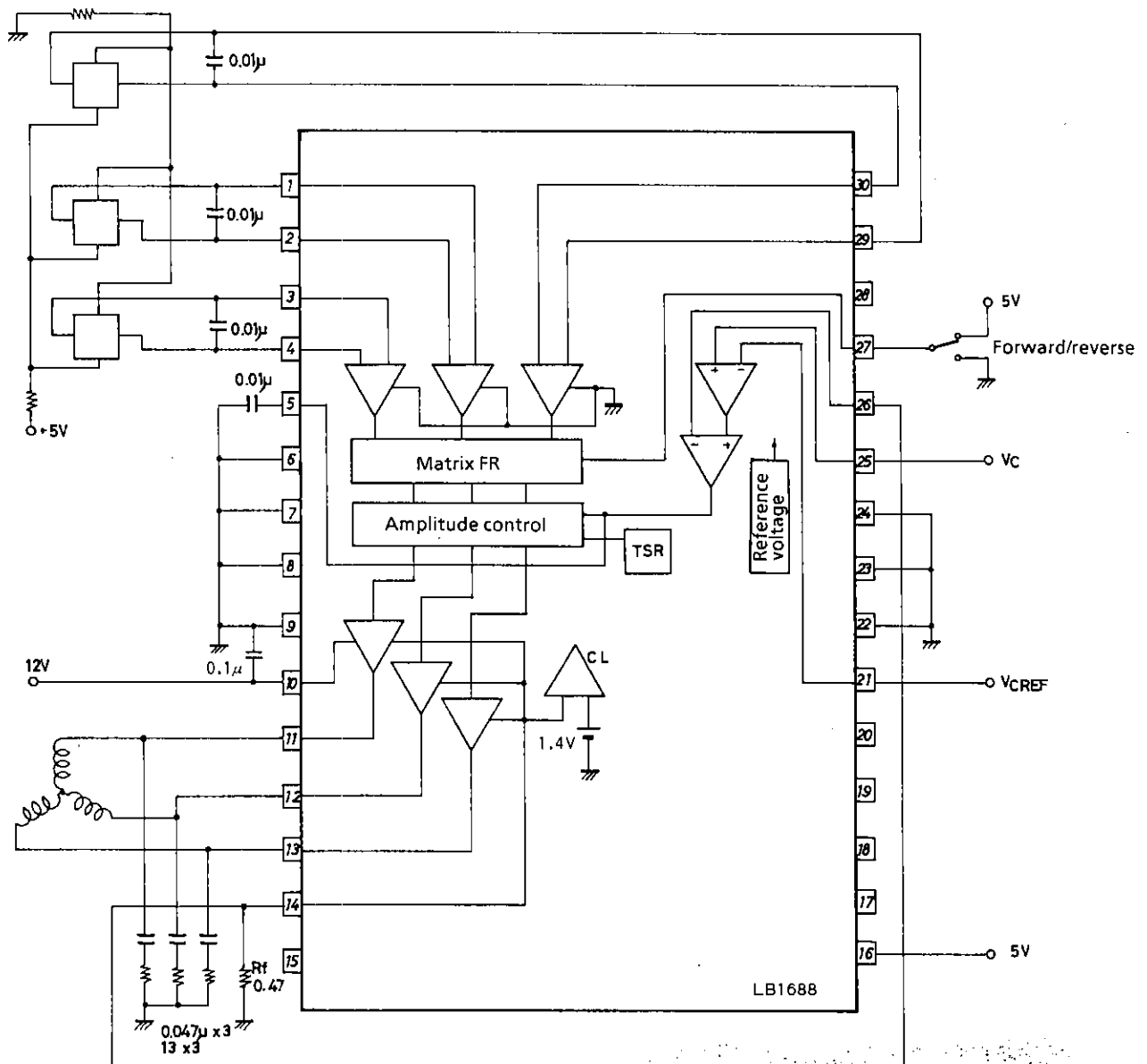
**Package Dimensions 3061-D30SNIC (unit: mm)**

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| [Output] | | | min | typ | max | unit |
|--------------------------------|------------------|---------------------------------|-----|-----|-----|-------------|
| Output Saturation Voltage | $V_{O(sat)1}$ | $I_{OUT} = 0.5A, sink + source$ | | 1.6 | 2.2 | V |
| | $V_{O(sat)2}$ | $I_{OUT} = 1.0A, sink + source$ | | 2.0 | 3.0 | V |
| Output TRS Voltage | $V_{O(sus)}$ | $I_{OUT} = 20mA$ (See note.) | 20 | | | V |
| Output Quiescent Voltage | V_{OQ} | $V_C = 0$ | 5.8 | 6.1 | 6.4 | V |
| [Hall Input-Output] | | | | | | |
| Hall Amp Input Offset Voltage | $V_H offset$ | | -5 | | +5 | mV |
| Hall Amp Input Bias Current | $I_H bias$ | | | 1 | 5 | μA |
| Hall Amp Common-Mode | $V_H ch$ | | 1.3 | | 3.7 | V |
| Input Voltage Range | | | | | | |
| Hall Input-Output Voltage Gain | G_{VHO} | | | 43 | | dB |
| [Control-Output] | | | | | | |
| Control-Output Drive Gain | G_{VCO} | | 38 | 41 | 44 | dB |
| Control-Output CH Difference | ΔG_{VCO} | | -2 | | +2 | dB |
| [Motor Detection] | | | | | | |
| Thermal Shutdown Temperature | T_{SD} | (See note.) | 150 | 180 | 210 | $^{\circ}C$ |
| Thermal Shutdown Hysteresis | ΔT_{SD} | (See note.) | | 15 | | $^{\circ}C$ |

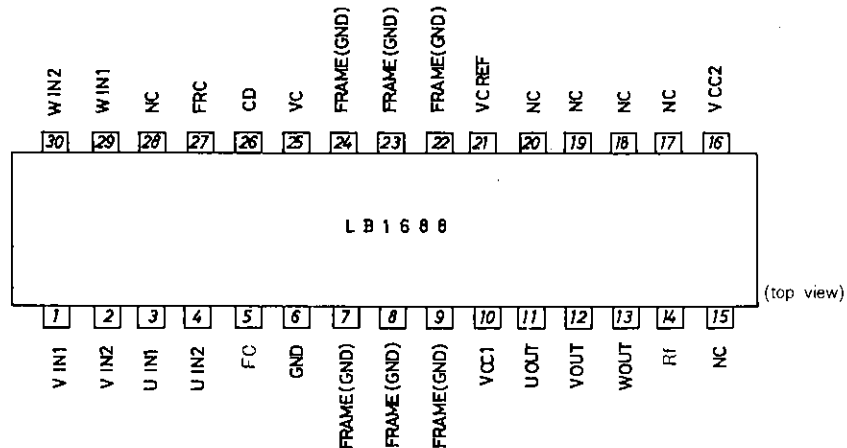
Note : Values shown are design targets only. No measurements have been taken.

Equivalent Circuit Block Diagram

Unit (resistance: Ω , capacitance: F)

LB1688

Pin Assignment



Note : All FRAME pins are connected to GND.

Pin Description

| Pin Name | Pin No. | Description |
|-------------------------------------|---------|--|
| U _{IN1} , U _{IN2} | 3, 4 | U phase hall element input pin. 'H' of logic : $V_{IN1} > V_{IN2}$ |
| V _{IN1} , V _{IN2} | 1, 2 | V phase hall element input pin. 'H' of logic : $V_{IN1} > V_{IN2}$ |
| W _{IN1} , W _{IN2} | 29, 30 | W phase hall element input pin. 'H' of logic : $V_{IN1} > V_{IN2}$ |
| U _{OUT} | 11 | U phase output pin |
| V _{OUT} | 12 | V phase output pin |
| W _{OUT} | 13 | W phase output pin |
| V _{CC1} | 10 | Power supply pin for applying output |
| V _{CC2} | 16 | Power supply pin for applying voltage to each section other than output section. This voltage must be stabilized to be free from ripple, noise, etc. |
| R _f | 14 | Output current detect pin. By connecting R _f across this pin and GND pin, output current is detected as voltage. The result is used to control the overcurrent protection circuit. |
| CD | 26 | Pin for fetching current (voltage) detected with R _f . Takes feedback from R _f to reduce output voltage gain. Ground when not in use. |
| FC | 5 | Frequency characteristic correction |
| V _C | 25 | Speed-phase control pin Control is of voltage-controlled type that controls output voltage. |
| V _{CREF} | 21 | Control reference voltage |
| GND | 6 | GND for other than output Minimum potential of output transistor is at R _f pin. |
| F/RC | 27 | Forward/reverse control pin By setting this pin to 'H' (more than 2.0V)/'L' (less than 0.3V), truth value is changed to perform forward/reverse rotation. |

Truth Table

| | Source Sink | Input | | | Forward/Reverse Control F/R C |
|---|-------------------|-------|---|---|----------------------------------|
| | | U | V | W | |
| 1 | W phase → V phase | H | H | L | L |
| | V phase → W phase | | | | H |
| 2 | W phase → U phase | H | L | L | L |
| | U phase → W phase | | | | H |
| 3 | V phase → W phase | L | L | H | L |
| | W phase → V phase | | | | H |
| 4 | U phase → V phase | L | H | L | L |
| | V phase → U phase | | | | H |
| 5 | V phase → U phase | H | L | H | L |
| | U phase → V phase | | | | H |
| 6 | U phase → W phase | L | H | H | L |
| | W phase → U phase | | | | H |

Input:

H: High level. One of the inputs should have a potential at least 0.2V higher than the other.

L: Low level. One of the inputs should have a potential at least 0.2V lower than the other.

Forward/reverse control:

H: 2.0 to V_{CC2}

L: 0 to 0.3V

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