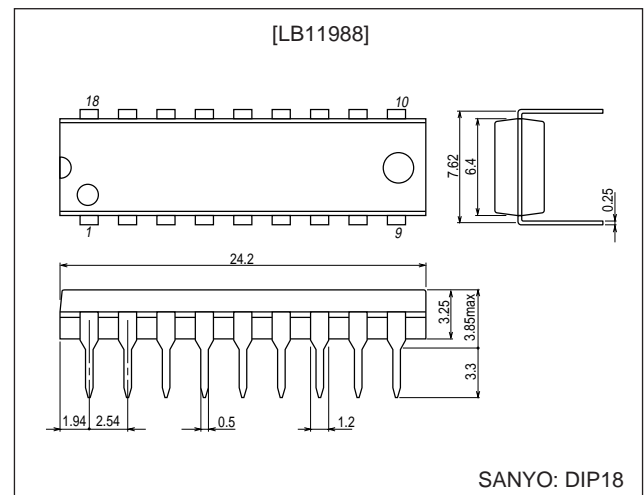


**LB11988****Refrigerator Fan Motor Driver****Functions**

- Three-phase full-wave current linear drive
- Built-in current limiter circuit
- Built-in saturation prevention circuits in both the upper and lower sides of the output stage.
- FG amplifier
- Thermal shutdown circuit

Package Dimensions

unit: mm

3007A-DIP18**Specifications****Absolute Maximum Ratings at Ta = 25°C**

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|--------------------|----------------|-------------|------|
| Maximum supply voltage | V _{CCmax} | | 24 | V |
| | V _{Smax} | | 24 | V |
| Maximum output current | I _{Omax} | | 1.3 | A |
| Allowable power dissipation | P _{dmax} | Independent IC | 1.13 | W |
| Operating temperature | T _{opr} | | -30 to +75 | °C |
| Storage temperature | T _{stg} | | -55 to +150 | °C |

Allowable Operating Ranges at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|----------------------|-------------------|---------------------|------------|--------|
| Supply voltage | V _S | | 5 to 22 | V |
| | V _{CC} | | 7 to 22 | |
| Hall input amplitude | V _{HALL} | Between Hall inputs | ±30 to ±80 | mV 0-P |

■ Any and all SANYO products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your SANYO representative nearest you before using any SANYO products described or contained herein in such applications.

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SANYO Electric Co.,Ltd. Semiconductor Company

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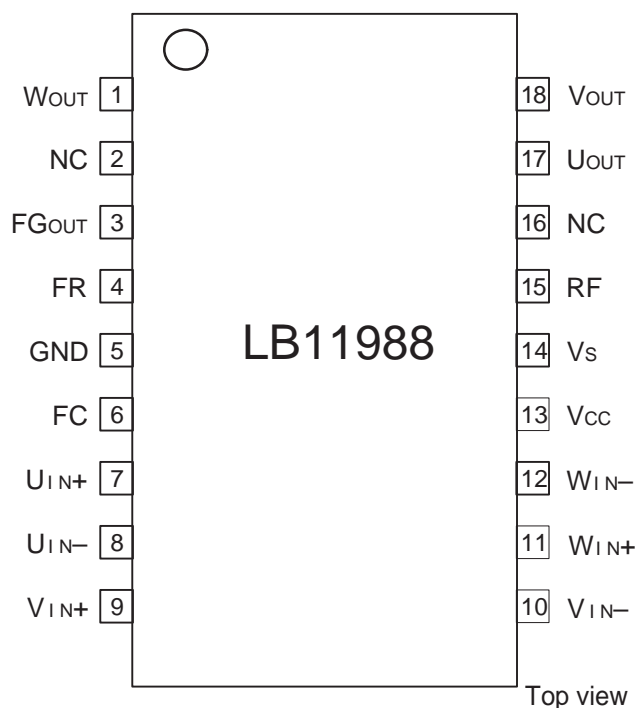
LB11988

Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{CC} = 12\text{ V}$, $V_S = 12\text{ V}$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|--|------------------|---|---------|------|--------------|------------------|
| | | | min | typ | max | |
| V_{CC} current drain | I_{CC} | $R_L = 560\ \Omega$ (Y) | | 15 | 24 | mA |
| [Output] | | | | | | |
| Output saturation voltage | V_{Osat1} | $I_O = 500\text{ mA}$, $R_f = 0.5\ \Omega$, Sink + Source (Saturation prevention function included) | | 2.1 | 2.6 | V |
| | V_{Osat2} | $I_O = 1.0\text{ A}$, $R_f = 0\ \Omega$, Sink + Source (Saturation prevention function included) | | 2.6 | 3.5 | V |
| Output leakage current | I_{oleak} | | | | 1.0 | mA |
| [Hall Amplifier] | | | | | | |
| Input offset voltage | V_{off} (HALL) | | -6 | | +6 | mV |
| Input bias current | I_b (HALL) | V_{IN} , W_{IN} | | 1 | 3 | μA |
| Common-mode input voltage | V_{cm} (HALL) | | 3 | | $V_{CC} - 3$ | V |
| [FR] | | | | | | |
| Threshold voltage | V_{FRTH} | | 4 | | 8 | V |
| Input bias current | I_b (FR) | | -5 | | | μA |
| [Current Limiter] | | | | | | |
| LIM pin current limit level | I_{LIM} | $R_f = 0.5\ \Omega$, With the Hall input logic states fixed (U, V, W = high, high, low) | | 1 | | A |
| [Saturation] | | | | | | |
| Saturation prevention circuit lower side voltage setting | V_{Osat} (DET) | $R_L = 560\ \Omega$ (Y), $R_f = 0.5\ \Omega$, The voltage between each lower output and the corresponding R_f . | | 0.28 | | V |
| [FG Amplifier] | | | | | | |
| Upper side output saturation voltage | V_{satu} (SH) | | 11.8 | | | V |
| Lower side output saturation voltage | V_{satd} (SH) | | | | 0.3 | V |
| Hysteresis | V_{hys} | | | 23 | | mV |
| TSD operating temperature | T-TSD | Design target value* | | 170 | | $^\circ\text{C}$ |

Note *: Items shown to be design target values in the conditions column are not measured.

Pin Assignment



Truth Table and Control Functions

| | Source → sink | Hall input | | | FR |
|---|---------------|------------|---|---|----|
| | | U | V | W | |
| 1 | V → W | H | H | L | H |
| | W → V | | | | L |
| 2 | U → W | H | L | L | H |
| | W → U | | | | L |
| 3 | U → V | H | L | H | H |
| | V → U | | | | L |
| 4 | W → V | L | L | H | H |
| | V → W | | | | L |
| 5 | W → U | L | H | H | H |
| | U → W | | | | L |
| 6 | V → U | L | H | L | H |
| | U → V | | | | L |

Note: The "H" state for FR is defined as a voltage of 8 V or higher, and the "L" state for FR is defined as a voltage of 4 V or lower. (When $V_{CC} = 12\text{ V}$.)

Note: For the Hall inputs, the input high state is defined to be the state where the (+) input is higher than the corresponding (-) input by 0.01 V or higher, and the input low state is defined to be the state where the (+) input is lower than the corresponding (-) input by 0.01 V or higher.

Note: Since this drive technique is a 180° current application scheme, the phases other than the sink and the source phases will not turn off.

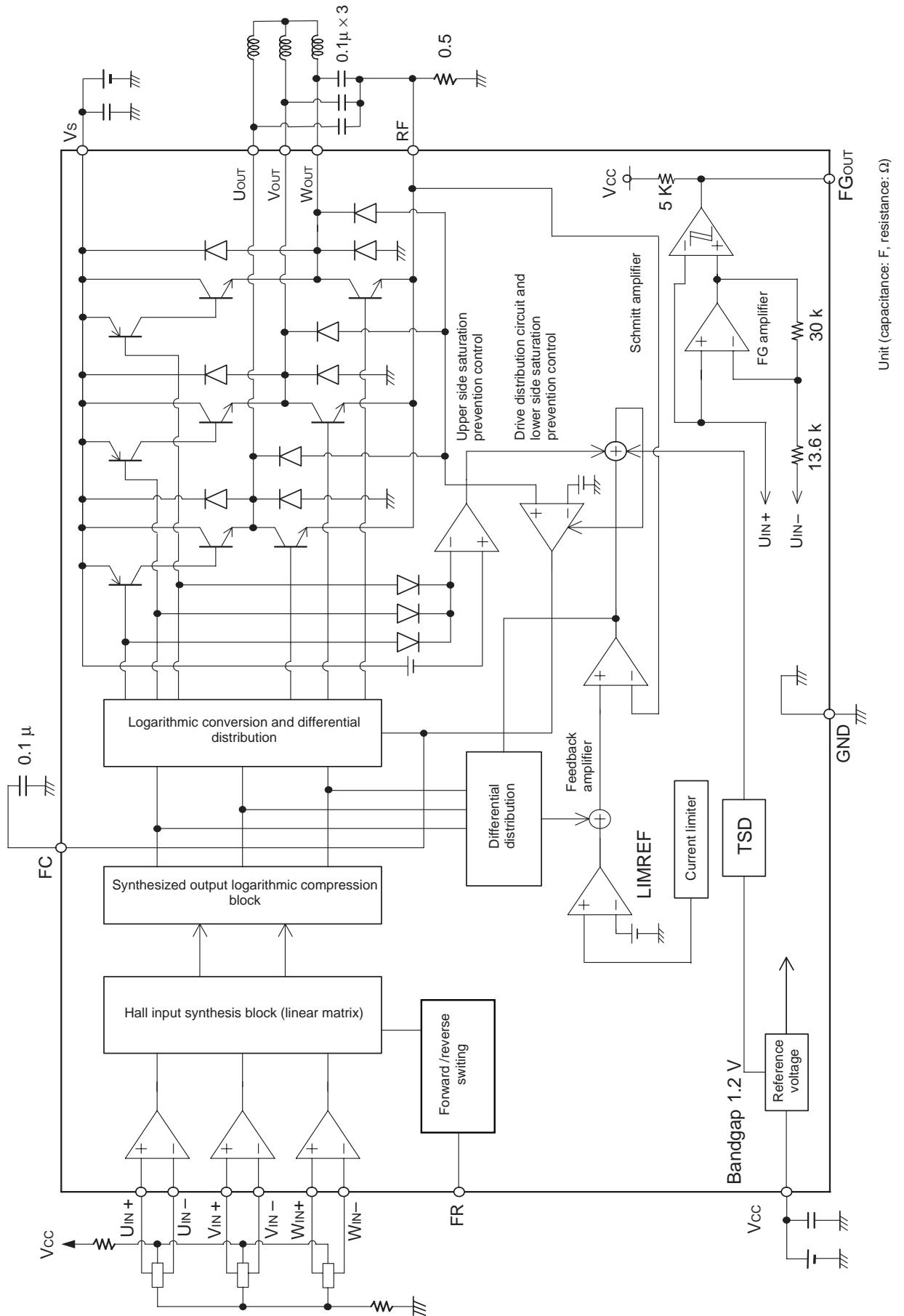
Pin Functions

| Pin No. | Pin | Function |
|---------|--------------------|---|
| 5 | GND | Ground for circuits other than the output transistors. Note that the Rf pin will be at the lowest potential of the output transistors. |
| 3 | FG-OUT | This is the FG amplifier output pin. Internally, it is a resistive load. |
| 4 | FR | Forward/reverse switching pin |
| 6 | FC | Corrects the frequency characteristics of the saturation prevention circuit loop and current limiter circuit. |
| 7, 8 | U_{IN+}, U_{IN-} | U-phase Hall input. Logic high refers to the state where $IN+ > IN-$. V-phase Hall input. Logic high refers to the state where $IN+ > IN-$. W-phase Hall input. Logic high refers to the state where $IN+ > IN-$. |
| 9, 10 | V_{IN+}, V_{IN-} | |
| 11, 12 | W_{IN+}, W_{IN-} | |
| 13 | V_{CC} | Power supply provided to all IC internal circuits other than the output block. This voltage must be stabilized so that ripple and noise do not enter the IC. |
| 14 | V_S | Output block power supply |
| 15 | Rf | Used for output current detection. The current limiter circuit operates using the resistor (Rf) connected between this pin and ground. Note that the lower side saturation prevention circuit operates according to the voltage that appears on this pin. Since the over-saturation level is set by this voltage, the response of the lower side saturation prevention circuit may be degraded in the large current region if the value of Rf is made extremely small. |
| 17 | U_{OUT} | U-phase Hall output V-phase Hall output W-phase Hall output (These pins include internal spark killer diodes.) |
| 18 | V_{OUT} | |
| 1 | W_{OUT} | |

Equivalent Circuit Diagrams

| Pin | Equivalent circuit diagrams |
|--|--|
| <p>U_{IN} (+) U_{IN} (-) V_{IN} (+) V_{IN} (-) W_{IN} (+) W_{IN} (-)</p> | |
| <p>U_{OUT} V_{OUT} W_{OUT} RF Vs</p> | <p>Lower side oversaturation prevention circuit input block.</p> |
| <p>FR</p> | |
| <p>FC</p> | |
| <p>FG_{OUT}</p> | |

Block Diagram



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