Ordering number : ENA2088

# LA6585FA

**Monolithic Linear IC**

# BTL Drive Single-Phase Full-Wave Fan Motor Driver

ON Semiconductor®

http://onsemi.com

## Overview

The LA6585FA is a single-phase bipolar fan motor driver that achieves quite operation, power savings, silent operation and high efficiency that suppresses reactive current through BTL output linear drive. It provides lock protection and rotation signal circuits on chip, and is optimal for applications that require high reliability and low noise, such as notebook personal computers, power supplies in consumer electronic equipment, car audio, and CPU cooling systems.

## Features

- BTL output single-phase full-wave linear drive (gain resistor : 1 to 360kΩ, 51dB)
- Supports low-voltage drive and features a wide usable voltage range (2.2 to 14.0V)
- Low saturation output (high side + low side saturation voltage : Vosat (total) = 1.2V (typical), $I_O$ = 250mA)
- Built-in lock protection and automatic return circuits
- Built-in FG output
- Built-in Hall sensor bias (VHB = 1.5V)
- Thermal protection circuit
- Small-sized, high thermal capacity package

## Specifications

### Absolute Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ max | | 15 | V |
| Output current | $I_{OUT}$ max | | 0.5 | A |
| Output voltage | $V_{OUT}$ max | | 15 | V |
| FG output pin oiutput withstand voltage | $V_{FG}$ max | | 15 | V |
| FG output current | $I_{FG}$ max | | 10 | mA |
| Allowable power dissipation | Pd max | When mounted on a circuit board *1 | 400 | mW |
| Operating temperature | Topr | | -30 to +90 | °C |
| Storage temperature | Tstg | | -55 to +150 | °C |

*1 Specified circuit board : 114.3 × 76.1 × 1.6mm³, paper phenol.

Caution 1) Absolute maximum ratings represent the value which cannot be exceeded for any length of time.

Caution 2) Even when the device is used within the range of absolute maximum ratings, as a result of continuous usage under high temperature, high current, high voltage, or drastic temperature change, the reliability of the IC may be degraded. Please contact us for the further details.

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

**Recommended Operating Conditions** at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|---|---|---|---|---|
| Supply voltage | $V_{CC}$ | | 2.2 to 14.0 | V |
| Common-phase input voltage range of hall input | VICM | | 0 to $V_{CC}$ -1.5 | V |

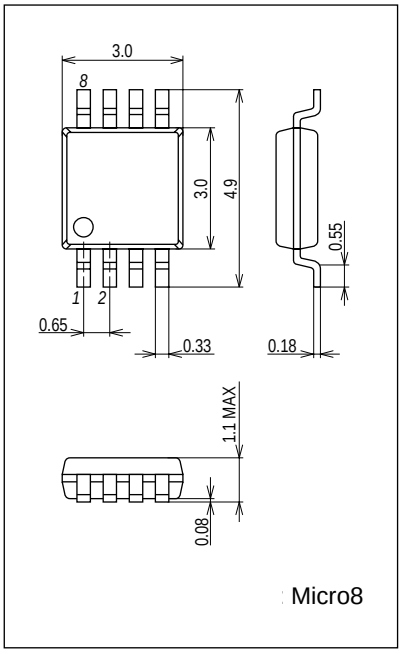
**Electrical Characteristics** at Ta = 25°C, $V_{CC}$ = 12V, Unless otherwise specified.

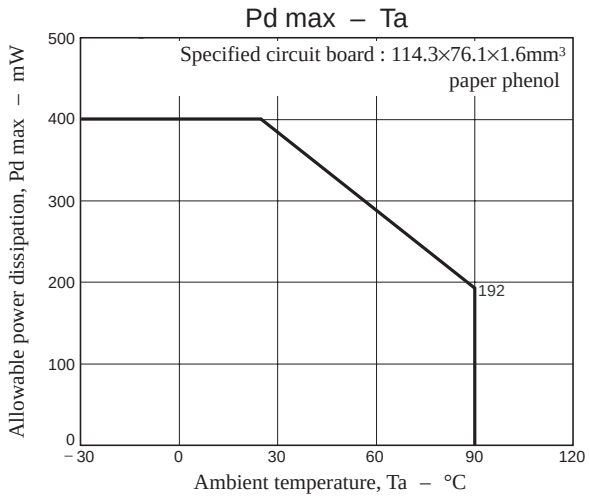
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Circuit current | $I_{CC}1$ | Drive mode (CT = low) | 3 | 6 | 9 | mA |
| | $I_{CC}2$ | Lock protection mode (CT = high) | 2.5 | 5 | 7.5 | mA |
| Lock detection capacitor charge current | ICT1 | | 0.9 | 1.2 | 1.5 | µA |
| Capacitor discharge current | ICT2 | | 0.10 | 0.18 | 0.25 | µA |
| Capacitor charge/discharge current ratio | RCT | RCD = ICT1/ICT2 | 5 | 6.5 | 8 | |
| CT charge voltage | VCT1 | | 1.3 | 1.5 | 1.7 | V |
| CT discharge voltage | VCT2 | | 0.3 | 0.5 | 0.7 | V |
| OUT output low saturation voltage | $V_{OL}$ | $I_O$ = 200mA | | 0.25 | 0.45 | V |
| OUT output high saturation voltage | $V_{OH}$ | $I_O$ = 200mA | | 0.95 | 1.2 | V |
| Hall input sensitivity | VHN | Zero peak value (including offset and hysteresis) | | 7 | 15 | mV |
| FG output pin low-level voltage | VFG | IFG = 5mA | | 0.15 | 0.3 | V |
| FG output pin leakage current | IFGL | VFG = 15V | | 1 | 30 | µA |

## Package Dimensions

unit : mm (typ)

3427

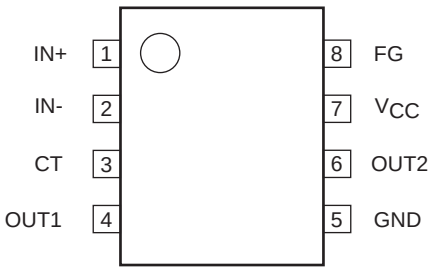


## Truth Table

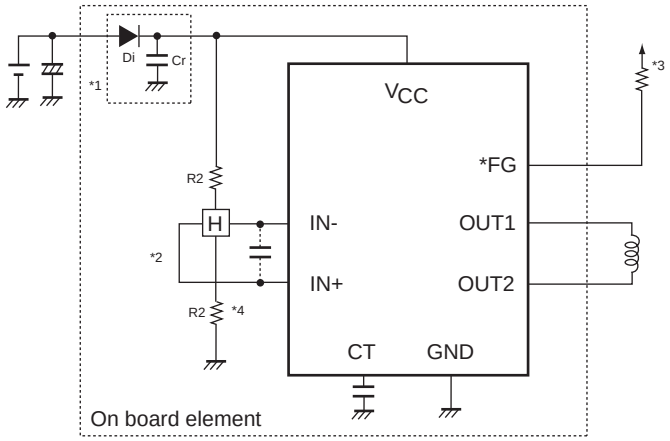
| IN– | IN+ | CT | OUT1 | OUT2 | FG | Mode |
|---|---|---|---|---|---|---|
| High | Low | Low | High | Low | Low | During rotation |
| Low | High | | Low | High | High | |
| – | – | High | Off | Off | – | Lock protection |

## Pin Assignment




Top view

## Application Circuit Example



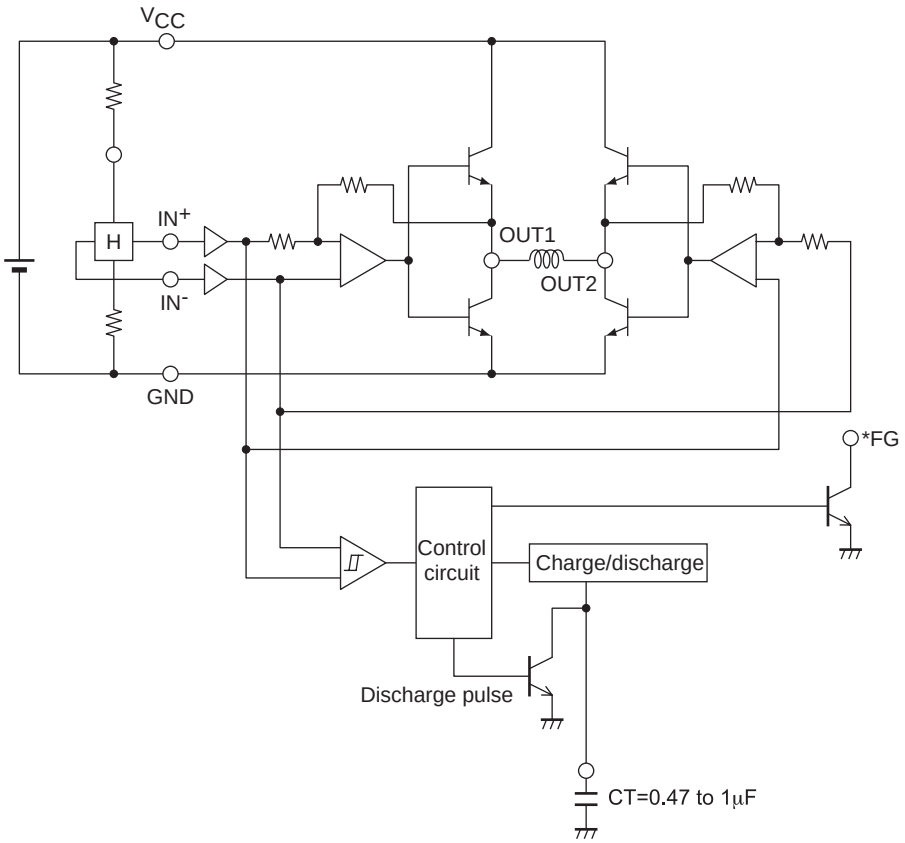

*1. If the diode Di (which protects the IC destruction by reverse connection) is used, it is necessary to insert the capacitor Cr and provide a regenerative current route. Similarly, if there is no nearby capacitor on the fan power supply line, Cr will also be necessary to improve reliability.

*2. If the Hall sensor bias is taken from $V_{CC}$, a 1/2 $V_{CC}$ bias, as shown in the figure, must be used.
Linear drive is implemented by amplifying the Hall sensor output and applying voltage control to the coil. If the Hall effect sensor provides a strong output, the startup characteristics and efficiency will be good, then even quieter operation will be achieved by adjusting the Hall effect sensor.

*3. This pin must be left open if unused.

*4. If the line from the Hall sensor output to the Hall sensor input of IC are long, noise may enter the system from that line. If that becomes a problem, insert a capacitor as shown in the figure.

## Internal Equivalent Circuits



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