

Analog, Mixed Signal, and Power Management

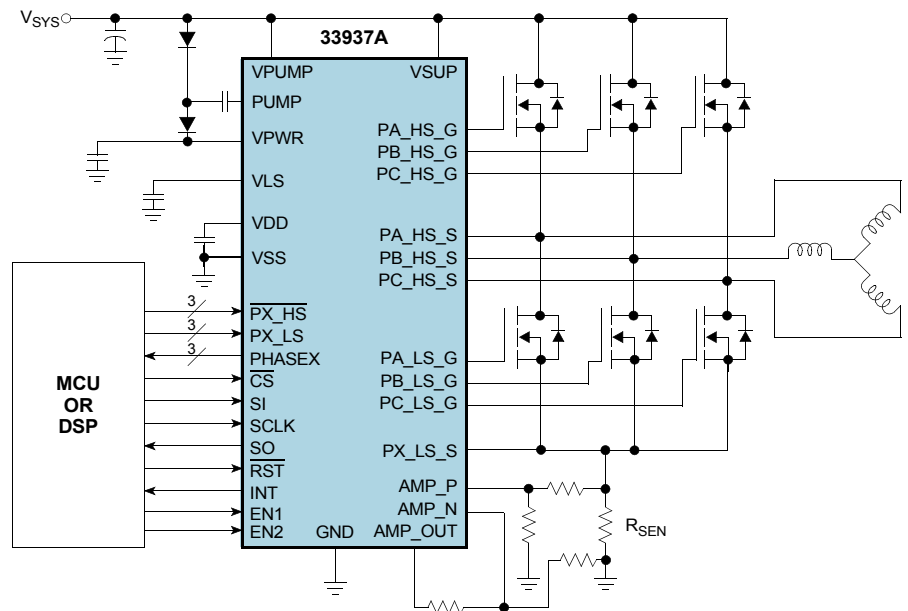
# MC33937

## Three-phase Field Effect Transistor Pre-driver

### Applications

- Automotive systems
- Cooling fan
- Water pump
- Actuator controls
- Fuel pump
- Electro-hydraulic and electric power steering
- Engine control
- Motor control

### MC33937 Simplified Application Drawing



### Overview

Automotive system performance continues to increase significantly. Semiconductor components continue to meet this challenge. The MC33937 device is a field effect transistor (FET) pre-driver designed to drive three-phase motor control configurations with stable digital accuracy. It is easily configured for systems driving brushless DC (BLDC), permanent magnet (PM) or switched reluctance (SR) motors with or without sensors. Typical applications include the cooling fan, water pump, fuel pump, electro-hydraulic, and electric power steering.

The MC33937 device is extremely flexible and offers precise and complete control of speed, torque and power. It collects the logic and functions required to control and protect a DC motor with up to three phases. With its flexible configurability, the operation range is from below 6.0 V to over 55 V system voltage. The versatile SPI programming interface gives the user fine control of phase timing, programmable protection and detailed diagnostics. No other device is as well suited for fractional to integral horsepower motor control and places as much control in the hands of the user.

The IC interfaces to a 5.0 V or 3.0 V MCU via six direct input control signals, an SPI port for device setup and asynchronous reset, enable, and interrupt signals.

## Features

- Designed for 8.0 to 40 V operation
- Extended operating range from 6.0 to 58 V covers 12 V, 24 V, and 42 V systems by design
- Protection against reverse charge injection from  $C_{GD}$  and  $C_{GS}$  of external FETs
- Charge pump to support full FET drive at low battery voltages
- Programmable dead time via the SPI port
- Simultaneous output capability via safe SPI commands

## Questions

- Does your gate driver need to operate in environments up to 135 °C?
- Do you need to operate at system voltages less than 8.0 V?
- Do you need to operate at system voltages up to 58 V?
- Does your system require a programmable dead time?
- Do you need a strong gate drive for large FETs?
- Do you need both a pre-driver and a current sense amplifier?
- Do you need to be able to drive different types of motors with the same pre-driver?

## Orderable Parts

Part Number	Temperature Range	Package
MC33937APEK/R2	-40 °C to 135 °C	54 SOICW-EP

## Parametric Table

Performance	Typical Values
Operating Voltage	6.0 to 58 V
PWM Frequency	DC to $\geq 20$ kHz
Gate Drive Capability	$>1.0$ A
Control/Communication	SPI and parallel
FET Drivers	6

## Development Tools

Part Number	Description
KIT33937AEKEVBE	Evaluation board to demonstrate the key features of MC33937

## Documentation

Document Number	Type	Description
MC33937	Data Sheet	Presents the specifications for the product
SG1002	Selector Guide	Analog and power management device comparison
SG187	Selector Guide	Automotive device comparison
AN2409	Application Note	Small Outline Integrated Circuit Fine Pitch Package

## Benefits

- Precise, complete control of speed, torque, and power
- Explicit control of each driver
- Ideally suited for microcontroller interfacing
- Increased diagnostic and fault reporting that protect the driver and load
- Highly integrated solution
- Robust solution for harsh environments
- Improved reliability

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