



Analog Solutions – Robust Reliable Performance

# MC33GD3000

## Three-phase field effect transistor pre-driver

### Overview

Automotive system performance continues to increase significantly. Semiconductor components continue to meet this challenge. The MC33GD3000 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 synchronic motor (PMSM) 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.

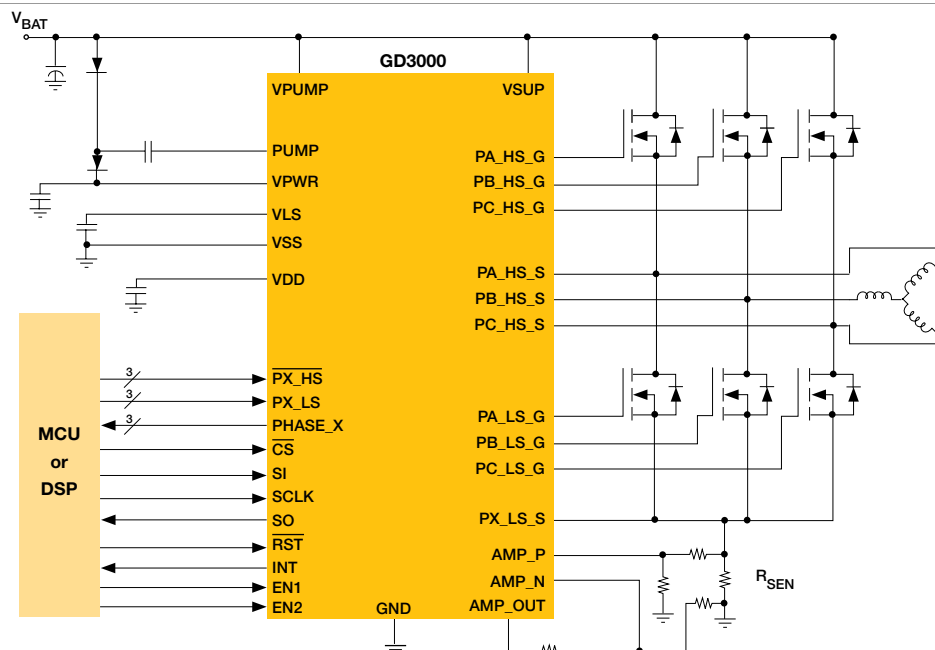
The GD3000's extensive and flexible features allow a user to realize precise and complete control of speed, torque and power, thereby increasing safety in the end application. It integrates the logic as well as the sensing, monitoring, and control functions required to control and protect a DC motor with up to three phases. The versatile SPI programming interface gives the user easy access to control of FET phase timing, programmable protection and detailed diagnostics. No other device is as well suited for fractional to integral horse-power motor control and places as much control in the hands of the user.

The GD3000 interfaces directly to 5.0 V or 3.0 V MCUs via six direct input control signals, a SPI port for device setup, and asynchronous reset, enable, and interrupt signals. The device is compatible with a wide range of MOSFETs which makes it easy to implement in scalable solutions. Additionally, the GD3000 is designed to reduce PCB size by including an internal charge pump, consequently eliminating external charge pump specific components.

### Target Applications

- Automotive systems
- Cooling fan
- Water pump
- Actuator controls
- Fuel pump
- Electric power steering
- Transmission pump
- Motor control

### MC33GD3000 Simplified Application Drawing



## Freescale: A Leader in Analog Solutions

Expanding on more than 30 years of innovation, Freescale is a leading provider of high-performance products that use SMARTMOS technology combining digital, power and standard analog functions. Freescale supplies analog and power management ICs that are advancing the automotive, consumer, industrial and networking markets. Analog solutions interface with real-world signals to control and drive complete embedded systems.



56-pin QFN  
98ASA00654D  
EP SUFFIX (Pb-Free)

## MC33GD3000 Product Differentiation

	Features	Benefits
<b>Scalability</b>	Wide (6.0 V–58 V) supply voltage operating range	One motor drive solution that can cover 12 V and 24 V applications
	Powerful gate drive, > 1.0 A at 620nC	Drive powerful motors which require large FET drivers capable of sourcing sufficient current to achieve desired speed and torque
	On-chip charge pump	Guarantees proper operation of external FETs, even when the supply voltage dips below 5.0 V
<b>Safety</b>	75 V Transient spike tolerant	Protects motor and MOSFETs, while maintaining device functionality
	Rich diagnostic features and fault reporting for all outputs	User can easily monitor against faults in real-time, allowing protection of external FETS and motor
<b>Size</b>	8x8 QFN package (64 mm square board space)	Enables the use of smaller printed circuit boards

## Orderable Parts

Part Number	Temperature Range	
MC33GD3000EP/R2	-40 °C to 125 °C	56 QFN-EP

## Parametric Table

Specification	Typical Values
Extended Operating Voltage	6.0 to 58 V
PWM Input Control	DC to ≥ 50 kHz
Gate Drive Capability	> 1.0 A
Control/Communication	SPI and parallel
Dead Time Programming Range	10 ns to 12 μs
Control/Communication	SPI and parallel
FET Drivers	Voltage transients of -7.0 V up to +75 V without permanent damage

## Development Tools

Part Number	Description
FRDM-GD3000-EVB	Evaluation board to demonstrate the key features of the GD3000
TWR-MC-LV3PH	Tower System board
TPP-GD3000-RC2	Processor Expert Software

## Documentation

Document Number	Type	
MC33GD3000	Data Sheet	Presents the specifications for the product
SG1002	Selector Guide	Analog and power management device comparison
SG187	Selector Guide	Automotive device comparison
AN1902	Application Note	Small Outline Integrated Circuit Fine Pitch Package

For more information please visit [freescale.com/analog](http://freescale.com/analog)

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