



**ANALOG  
PRODUCTS**

**MC33395  
FACT SHEET**

**POWER ICs  
H-BRIDGE**

**APPLICATIONS**

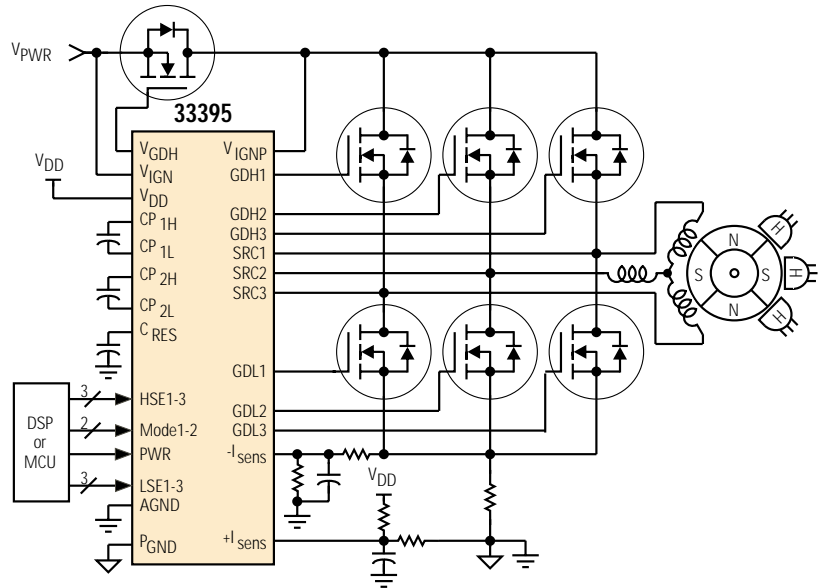
- Automotive Systems
- Marine Electromechanical Systems
- Aircraft Electromechanical Systems
- Industrial Automation and Robotics
- 3-Phase DC-AC Power Inverters and UPS Systems
- DC-Powered Refrigeration Compressors

**33395 THREE-PHASE BRIDGE GATE DRIVER IC**

The 33395 combines gate drive, charge pump, current sense, and protection circuitry necessary to drive a 3-phase bridge using six external N-channel power MOSFETs. Mode logic is incorporated to route a pulse width modulated (PWM) signal to either the low-side FETs or high-side FETs of the bridge, or to provide complementary PWM outputs to both the low and high sides of the bridge. Pulse width modulation frequencies up to 28 kHz are possible.

Very few external components are required to implement the 3-phase bridge gate driver: three tiny capacitors for the charge pump, a current sense resistor, and a few current limit comparator biasing resistors. Built-in protection circuitry prevents damage to the MOSFET bridge as well as the drive IC, and includes over voltage shutdown, over temperature shutdown, over current shutdown, under voltage shutdown, reverse battery detect, and supply cut-off (via external reverse battery MOSFET).

**Simplified Application Diagram**



**CUSTOMER BENEFITS**


- Integrated drive and protection solution for 3-phase power MOSFET bridges
- Inputs compatible with 5.0 V CMOS logic
- Provides interface from microcontroller or DSP to a 3-phase MOSFET bridge
- Two input control bits provide four possible PWM output drive modes
- Works with low-cost N-channel MOSFETs
- Low-system cost with minimal component count
- High-reliability circuitry

| Performance             | Typical Values                 |
|-------------------------|--------------------------------|
| Outputs                 | 6                              |
| Gate Drive Current      | 1.0 A peak                     |
| Operating Voltage       | 5.5 – 18 V                     |
| Switching Time          | 1.0 μs                         |
| ESD                     | ± 2000 V                       |
| Operating Temp          | -40°C ≤ T <sub>A</sub> ≤ 125°C |
| Junction Operating Temp | -40°C ≤ T <sub>J</sub> ≤ 150°C |

## FEATURES

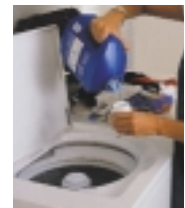
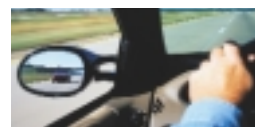
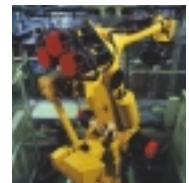
- Drives six N-channel low  $R_{DS(on)}$  power MOSFETs
- Built-in charge pump
- Built-in current sense comparator
- Built-in PWM mode control logic
- Built-in circuit protection
- Designed for fractional to integral hp BLDC motors
- Additional devices available for comparison in Analog Selector Guide SG1002/D

| Protection       | Detect | Limiting | Shut Down | Auto Retry |
|------------------|--------|----------|-----------|------------|
| Over Voltage     | •      |          | •         | •          |
| Under Voltage    | •      |          | •         | •          |
| Over Current     | •      | •        |           |            |
| Over Temperature | •      |          | •         | •          |
| Reverse Battery  | •      |          | •         |            |

| Ordering Information   | Package  | Ship Method | Motorola Part Number       |
|--|----------|-------------|----------------------------|
|  | 32 SOICW | Rail<br>T/R | **33395DWB<br>**33395DWBR2 |
| Data Sheet Order Number  |          |             | MC33395/D                  |
| Contact Sales for Evaluation Kit Availability                                      |          |             |                            |
| **Prefix Index:<br>PC = Eng Samples; XC = In Qual; MC = Production                 |          |             |                            |

## QUESTIONS

- Are you designing a brushless DC-motor controller?
- Do you need to interface a DSP or microcontroller to a power FET three-phase bridge?
- Would a gate-driver IC with built-in system protection features benefit your design?
- Does your circuit need to withstand long time-constant voltage transients?
- Is proven IC robustness important to your product?



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MC33395FS/D  
Rev. 1

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