

## ANALOG PRODUCTS

### MC33991 FACT SHEET



#### APPLICATIONS

- Driving Low-Power 2-Phase Bipolar Stepper Motors
- Automotive Gauge Clusters
- Mirror Positioning
- Headlight Leveling
- Tachograph
- Drivers for Multimedia Applications
- Digital Clocks

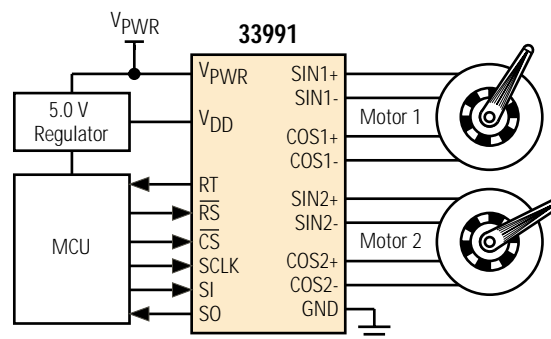
#### 33991 GAUGE DRIVER INTEGRATED CIRCUIT (GDIC)

The 33991 is a Serial Peripheral Interface (SPI) controlled, dual stepper motor driver IC. This monolithic IC consists of four dual output H-Bridge coil drivers and their associated control and management logic. Each pair of H-Bridge drivers automatically controls the speed, direction, and magnitude of current through the two coils of a two-phase instrumentation stepper motor, similar to an MMT-licensed AFIC 6405.

A special patent-pending circuit detects motor stall accurately and allows simple end-stop detection.

The GDIC is ideal for use in instrumentation systems that require distributed and flexible stepper motor gauge driving. The device simplifies the use of stepper motors by including all the logic required to manage the motion of the stepper without requiring significant processor overhead. SPI communications are used to request a motor position and the IC completely manages the acceleration, stepping, and deceleration of the motor to arrive correctly at the requested position. Updated requests can be received at any time and the logic correctly acts upon the latest position request. Both motors can be controlled and driven independently.

Simplified Application Diagram



#### CUSTOMER BENEFITS


- Simple system design with direct interfacing to a microprocessor
- Low system cost, minimal component count, and simple circuit hook-up
- Full management of movement of two motors
- Low  $V_{DD}$  current consumption
- Analog microstepping for low EMI
- Fully protected against faulted motors

Performance	Typical Values
Operating Voltage	9.0 – 26 V
Motor Drivers	2
Drive Current	$\pm 30$ mA
Control	SPI
Operating Temp	$-40^{\circ}\text{C} \leq T_A \leq 125^{\circ}\text{C}$

## FEATURES

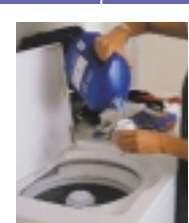
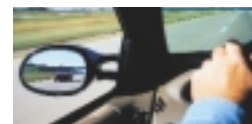
- Compatible with MMT-licensed two-phase stepper motors
- Minimal processor overhead required
- Fully integrated pointer movement and position state machine with air core movement emulation
- Analog microstepping with positioning to any microstep
- Designed for a constant acceleration of  $4500^{\circ}/s^2$  and maximum pointer velocity of  $400^{\circ}/s$
- Pointer calibration by return to zero
- 16-bit word SPI-controlled
- Calibrate-able internal clock
- Low sleep mode current
- Internal regulator to minimize IDD consumption
- Additional devices available for comparison in Analog Selector Guide SG1002/D

Protection	Detect	Limiting	Shut Down	Status Reporting
Over Voltage	•		•	•
Under Voltage	•			•
Over Current/SC	•	•	•	•
Over Temperature	•		•	
SPI Framing Error	•			

Ordering Information	Package	Ship Method	Motorola Part Number
	24 SOICW	Rail T/R	**33991DW **33991DWR2
Data Sheet Order Number			MC33991/D
Contact Sales for Evaluation Kit Availability			
**Prefix Index: PC = Eng Samples; XC = In Qual; MC = Production			

## QUESTIONS

- Do you need to driver small stepper motors with a simple microcontroller?
- Do you have power supply constraints?
- Are you looking for a simple interface to the motor controller?
- Do you need to detect motor end-stop stalling?
- Do you want to eliminate production calibration of motor positions?



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MC33991FS/D  
Rev. 0