

## ANALOG PRODUCTS

### MC33993 FACT SHEET



### 33993 MULTIPLE SWITCH DETECTION INTERFACE

The 33993 is designed to independently monitor the OPEN/CLOSE status of up to 22 switches. Eight programmable sense inputs verify a connection to ground or  $V_{BAT}$  while 14 additional programmable inputs verify a connection to ground only. A 22:1 analog multiplexer is incorporated to read input analog voltages.

The 33993 interfaces to a microcontroller via 3.3/5.0 V SPI protocol. Whenever a switch changes state, the microcontroller is automatically alerted.

A Sleep mode provides a low quiescent current for critical power conservative applications. The Normal mode accommodates programming; e.g., pull-up or pull-down contact detection currents, contact wetting current, wetting current time, Interrupt time, AMUX.

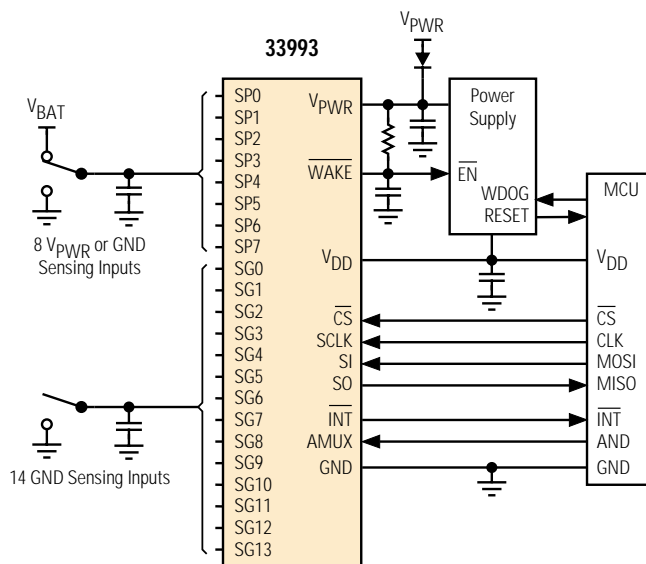
#### APPLICATIONS

- Automotive Systems
- Aircraft Systems
- Industrial Control Systems
- Process Control Systems
- Security Systems
- Critical Systems Requiring Switch Status Verification for Safety, Operation, or Process Control Purposes

#### CUSTOMER BENEFITS

- Optimized switch OPEN/CLOSE status verification of multiple switches with changes immediately reported to the MCU
- Programmable levels of verification performance
- Simple interfacing to industry-standard 3.3/5.0 V MCUs having SPI
- Surface-mounted device requiring minimal PC board space and few components, enhancing application reliability and lower costs
- Simple system power conservation solution providing a WAKE output with which the MCU power supply can be enabled when MCU activation is required

Simplified Application Diagram



Performance	Typical Values
Inputs	22
Switch Voltage Range	- 14 - $V_{PWR}$
Operating Voltage	5.5 - 26 V ( $V_{PWR}$ )
Contact Wetting Current	2.0 or 16 mA
Quiescent Current:	
$V_{PWR}$	< 100 $\mu$ A
$V_{DD}$	< 10 $\mu$ A
Control	SPI
Operating Temp	-40°C $\leq T_A \leq$ 125°C


SPECIAL FUNCTION  
CONTACT MONITOR

## FEATURES

- WAKE Output on Change of Monitored OPEN/CLOSE Switch Status
- Active Interrupt Low on Change of Switch Status
- 8 Programmable Independent Inputs to Verify Connection to VBAT or Ground
- 14 Programmable Independent Inputs to Verify Connection to Ground
- Program-Selectable Contact Wetting Currents
- Program-Selectable Wetting Current Time
- Programmed Pull-Up or Pull-Down Switch Contact Detect Currents
- 22:1 Analog Multiplex Output for Analog Readout of Inputs
- Command Normal and Sleep Modes
- Over Temperature Shutdown with Hysteretic Recovery
- Additional devices available for comparison in Analog Selector Guide SG1002/D

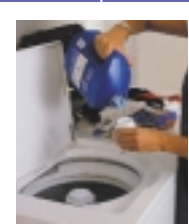
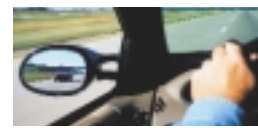
### Protection

Internal 4.0 kV ESD protection of inputs

Ordering Information	Package	Ship Method	Motorola Part Number
	32 SOICW	Rail T/R	**33993DWB **33993DWBR2
Data Sheet Order Number			MC33993/D
Contact Sales for Evaluation Kit Availability			
**Prefix Index: PC = Eng Samples; XC = In Qual; MC = Production			

## QUESTIONS

- Do you need to confirm the status of multiple switches in your system?
- Do you need to verify a switch is connected to V<sub>BAT</sub> or Ground?
- Do you need a switch verification device capable of analog voltage multiplex read-out of sensing inputs?
- Do you need a switch verification device that is also capable of controlling small LEDs as well as FET transistors?
- Do you need a switch verification device programmed and controlled via SPI?
- Do you need a switch monitoring device that "sleeps" so long as switches do not change status and alerts the MCU when a switch state changes?



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