Analog—Robust, reliable solutions

Multiple Switch Detection Interface (MSDI)

NXP's configurable and integrated I/O-multiple switch detection interface delivers strong, reliable and cost-effective results for automotive and industrial applications.

TARGET APPLICATIONS

- Automotive systems
  - Heating ventilation and air conditioning
  - Lighting
  - Central gateway/in-vehicle networking
  - Gasoline engine management
  - Body electronics
- Industrial control systems
  - Programmable logic control (PLC)
  - Process control, temperature control
  - I/O Control

OVERVIEW

Our interface technology is designed to translate either 22 or 33 I/Os into a single MCU SPI bus and multiplex the analog inputs in a single management decision system. The devices can be set in sleep mode, or low power auto-wake mode to reduce the quiescent current a few tens of microamperes. The programmable wetting current reduces the operating current for better energy efficiency.

The multiple switch detect devices operate in "Normal", "Low power" or "Polling" mode selected through SPI command or an interrupt. The behavior of the device in these modes can be programmed by loading appropriate registers. While the system configured in suppressed wakeup mode ignores any change of switch state to keep the quiescent current low, in the auto wakeup mode the device enters normal mode when there is a change in the switch state. The switch status, either open or closed, transfers to the MCU through an SPI. Additionally, the integrated selectable wetting current that is individually selectable provides a flexible solution for managing a large number of inputs across long distances.

The NXP family of configurable I/O-switch detect interface systems significantly reduces the component count while delivering robust, reliable solutions to automotive and industrial applications.

FEATURES AND BENEFITS

- SPI aggregation—reduces the necessary GPIO on the MCU
- Multiple switch-to-ground or programmable high-/low-side current sources
- Independent programmable wetting current
- Optimized switch OPEN/CLOSE status verification of multiple switches with changes immediately reported to the MCU
- Advanced diagnostics through SPI include interrupt, overtemperature, overvoltage and undervoltage
- Advanced power management and wakeup features monitor for events, even if the system is powered down
- Extremely low quiescent current in low-power mode
- Smallest integrated configurable I/O device provides significant space savings vs. discrete solutions
- Analog multiplexer significantly increases the number of I/Os that can be interfaced on the MCU
- Battery sense, die temperature sense contribute to functional safety and BOM reduction
- Robust EMC includes 8 KV ESD protection, small RC and continuous operation during load dump

DEVICE TABLE

Part #	Temp. Range °C	Package Style and L x W (mm) Footprint	Description
MC33972 MC34972	-40 to +125 -40 to +85	SOICW-EP 32 (7.5 x 11)	MSDI with suppressed wake-up, ideal for automotive and industrial products requiring low sleep-state currents
MC33975 MC34975	-40 to +125 -40 to +85	SOICW-EP 32 (7.5 x 11)	MSDI with suppressed wake-up designed to detect the closing and opening of 22 switch contacts
MC33978 MC34978	-40 to +125 -40 to +105	QFN-EP 32/ SOICW-EP 32 (5 x 5)	MSDI designed to detect the closing and opening of up to 22 switch contacts
CD1030 (New)	-40 to +125	LQFP-EP 48 (7 x 7)	MSDI for translating 33 I/Os onto a single MCU SPI bus
CD1020 (New)	-40 to +125	QFN-EP 32 (5 x 5)	Cost optimized MSDI to detect the closing and opening of up to 22 switch contacts

A LEADER IN ANALOG SOLUTIONS

Expanding on more than 30 years of innovation, NXP is a leading provider of high-performance products that use SMARTMOS technology, combining digital, power and standard analog functions. We supply 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 for complete embedded systems.

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