

Analog, Mixed Signal and Power Management

# MC33781

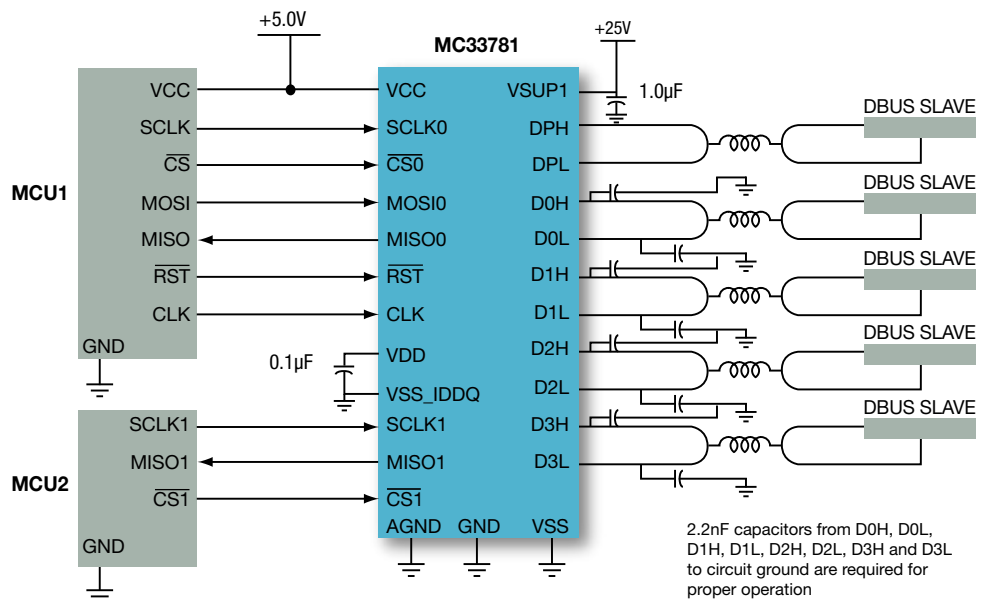
## Quad DSI 2.02 master with differential drive and frequency spreading

**SMARTMOS® device based on the DSI standard is designed to enhance safety bus performance and reduce the cost of airbag safety systems**

Freescall's MC33781 master interface device allows airbag manufacturers to add more collision sensors while reducing system cost and enhancing passenger safety. The device is designed for airbag safety systems that use the widely adopted Distributed Systems Interface (DSI) standard to connect remotely placed pressure, acceleration, occupant and buckle sensors to the main airbag electronic control unit.

The leading automotive safety bus standard, DSI supports point-to-point, parallel and daisy chain networks. Designed in collaboration with a key airbag system customer, the MC33781 incorporates the next-generation DSI version 2.02 protocol with differential drive, also known as DBUS.

MC33781 Simplified Application Diagram



The MC33781 is a master interface device for four differential DSI buses. It contains the logic to interface the buses to a standard serial peripheral interface (SPI) port and the analog circuitry to drive data and power over the bus, as well as receive data from the remote slave devices like the recently introduced MC33784.

The MC33781 provides more channels at a lower cost per channel, improved electromagnetic compatibility (EMC) performance and higher top-end bus speed. It can support full duplex data transfers at up to 200 kilobits per second on four independent channels. Frequency spreading further reduces interference by spreading the bus signal energy across many frequencies, thereby reducing the level of energy at any single frequency.

The device has a comprehensive set of fault detection features including overcurrent and overvoltage protection, CRC checking, thermal protection and power-on reset parity verification.

For system control, add a central module MCU such as one of the Freescale MAC7xxx family of 32-bit automotive microcontrollers. The MAC7xxx communicates with the MC33781 via SPI.

### MC33781 Applications

- Airbag safety systems that use the DSI standard to connect the main airbag electronic control unit to remote:
  - Acceleration sensors
  - Pressure sensors
  - Occupant sensors
  - Buckle sensors

### Selector Guide

Part Number	Temp. Ranges	Package	Speed
MCZ33781EK/R2	-40°C to +90°C	32-pin SOICW, EP	5 to 200 Kbps

### Documentation

Freescale Document Number	Title	Description
MC33781	Quad DSI 2.02 master with differential drive and frequency spreading	Data Sheet
SG1002	Analog, mixed signal and power management	Selector Guide
SG187	Automotive	Selector Guide
AN3760	Implementing a DSI network using the MC33781 and the MC33784	Application Note

### MC33781 Key Features

- Four independent differential DSI channels with a pseudo bus switch feature on channel 0
- Data rate up to 200 kbps full duplex per channel
- Dual SPI
- Enhanced bus fault performance
- Automatic message cyclical redundancy checking (CRC) generation and checking for each channel
- Enhanced register set with addressable buffer; enables queuing of four independent slave commands at one time for each channel
- 8-bit to 16-bit messages with 0 bits to 8 bits of CRC
- Independent frequency spreading for each channel
- 32-pin SOICW exposed pad

### Comprehensive Silicon Solutions for Airbag Systems

Freescale is a leading supplier of semiconductor products for airbag applications, including the main electronic control unit (ECU) to satellite airbag modules. The company's offerings for airbag systems include 16-bit S12 and 32-bit Power Architecture® MCUs, pressure and acceleration sensors, and analog devices based on SMARTMOS technology. Freescale is well positioned to supply the critical semiconductor elements of today's and tomorrow's airbag systems.

Freescale has been supplying innovative semiconductors to the automotive market for the past 50 years and will continue collaborating with key business partners to develop safer, lighter and more fuel-efficient vehicles.

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