



Anti-lock braking power & control IC

TPIC7218

8-channel integrated valve driver

The TPIC7218 is an antilock brake controller designed for use in harsh automotive environments, requiring few external components. It has eight high current low-side drivers for use with solenoid valves, four configurable wheel speed sense inputs capable of handling both Intelligent and Active sensors, and high-side gate drivers for controlling two external N-channel MOSFETs for use with a pump motor and master relay. Besides this main functionality, the TPIC7218 also has drivers for warning lamps, a high-side gate driver for controlling an external N-channel MOSFET for use with a relay, K-line driver, and various I/O pins for other common antilock braking needs. The TPIC7218 boosts an internal charge-pump allowing the high-side drivers to use inexpensive N-channel MOSFETs. The digital I/O pins can be configured for both 5 volt and 3.3V levels for easy connection to any microprocessor. The TPIC7218 uses standard SPI protocol for communication.



Airbag squib driver

TPIC71004

2/4/8-channel squib drivers

The TPIC71004 is a quad channel squib driver for airbags deployment in automotive applications. Each channel consists of a high side and a low side switch with independent control logic for protection against inadvertent deployment. Both the high and the low side switches have internal current limits, over-temperature protection. The IC registers are used for four channel configuration, control and status monitoring. To prevent inadvertent deployment, the high and the low side switches will be turned on only if the proper configuration sequence is used and multiple inputs to the deploy controller logic are at the correct level. The registers are programmed using a serial communications interface. The maximum on time for each channel is limited by programmable Firing Time Out Timer to prevent excessive power dissipation. In addition, a current limit register is used to program the maximum current through the switches during a deployment. The current limitation on the low side switch is larger than the corresponding high side switch. During deployment, the low side switch will be full enhanced and operate with RDS_ON mode and the high side switch will be in current regulation mode.

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Application Specific Standard Products for Automotive Safety



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Integrated Safety system power supply IC (Preview)

TPS65381

Wide input voltage, 5 rail power supply with functional safety features

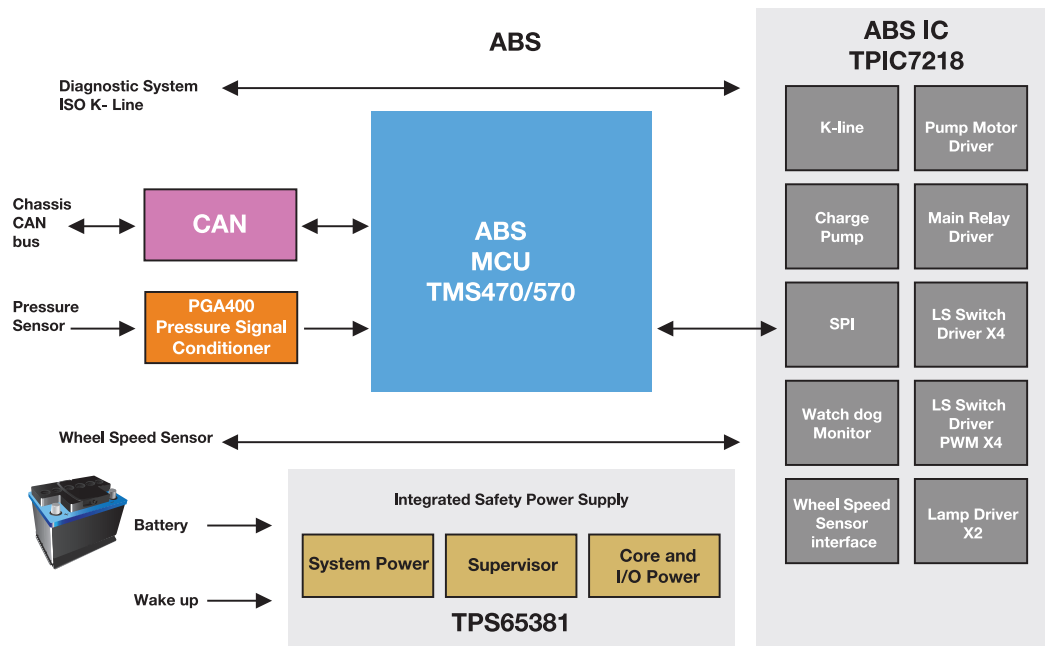
The TPS65381 is a multi-rail power supply designed to meet ISO 26262 ASIL-D specifications. It is intended to supply microcontrollers like the Hercules™ Safety MCUs from Texas Instruments and other integrated circuits and sensors in safety critical applications. An asynchronous buck switch-mode converter with internal FET converts the input voltage to a 6V pre-regulator output to supply the other low voltage rails. Two integrated linear regulators and the adjustable linear regulator controller can be used to power the MCU core and I/O voltage, a CAN and other system components. The sensor power supply with short-to-ground and short-to-battery protection is used to power a sensor outside the electronic control unit ECU. Reverse battery protection can be obtained by using the charge pump output to control an external NMOS transistor. The device includes an independent monitoring unit, which monitors under- and overvoltage on all regulator outputs, battery voltage and internal supplies supply rails. The TPS65381 functional safety architecture features a question-answer watchdog, MCU Error Signal monitor, clock monitoring on internal oscillators, a reset circuit for the MCU and a Safing-path Enable circuit for peripheral power stages.



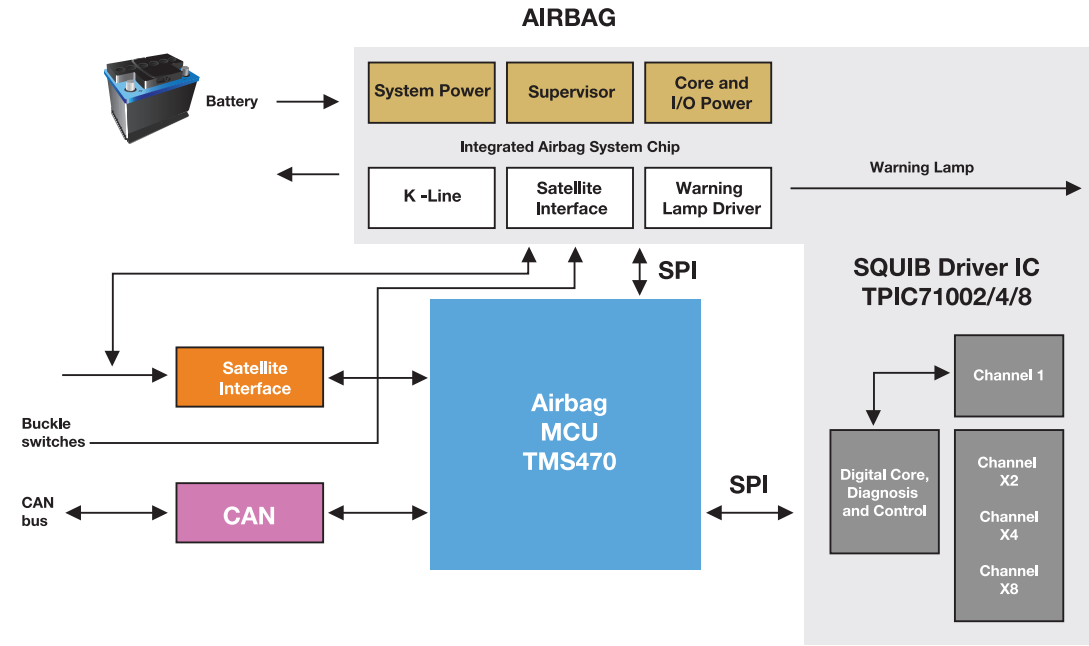
Hercules™ ARM® Safety MCU's

Hercules safety microcontrollers are based on TI's 20+ years of safety-critical system expertise, industry collaboration and proven hardware for the automotive market. The platform consists of three ARM® Cortex™-based microcontroller families (RM48x, TMS570 and TMS470M) that deliver scalable performance, connectivity, memory and safety features. Unlike many microcontrollers that rely heavily on software for safety capabilities, Hercules microcontrollers implement safety in hardware to maximize performance and reduce software overhead. The Hercules RM4x family provides the highest level of performance for broad safety applications, including medical and industrial, and are developed to the IEC 61508 SIL-3 safety standard. The Hercules TMS570 family provides high performance for transportation applications and is very well suited for applications that need to meet IEC 61508 SIL-3 or ISO 26262 ASIL-D requirements. The Hercules TMS470M family cost efficiently meets the needs of applications that require less performance and lower safety levels.

ABS Block Diagram



Airbag Diagram



Product selection for the functional blocks

Functional Block	Part Number	Description
System Power	TPS40200-Q1	DC/DC Controllers (External Switch), Wide-Input-Range Non-Synchronous Voltage-Mode Controller
	TL5001A-Q1	DC/DC Controllers (External Switch), Pulse-Width-Modulation Control Circuit
	TPS40210-Q1	DC/DC Controllers (External Switch), 4.5-V to 52-V Input, Current-Mode Boost Controller
	MC33063A-Q1	Boost Switch-Mode Regulators, 1.5-A Peak Boost/Buck/Inverting Switching Regulator
	TPS54262-Q1	DC/DC Converter, 2A, 60V Step-Down DC/DC Converter with Low Iq, Voltage Supervision and Reset
	TPS57060-Q1	DC/DC Converter, 3.5V to 60V Input, 0.5A, 2.5MHz Step Down SWIFT™ Converter with Eco-Mode™
	TPS57160-Q1	DC/DC Converter, 3.5V to 60V, 1.5A Step Down SWIFT™ Converter with Eco-Mode™
	TPS54162-Q1	DC/DC Converter, 1A, 60V Step-Down DC/DC Converter with Low Iq, Voltage Supervision and Reset
Core and I/O power	TLE4275-Q1	Single Channel LDO, 5-V Low-Dropout Voltage Regulator
	TPS7A63xx-Q1	Automotive Catalog 300-mA 40-V LDO With Ultra-Low IQ and Watchdog
	TPS7A62xx-Q1	Single Channel LDO, 300-mA 40-V Low-Dropout Regulator With Ultra-Low Quiescent Current
	TLV700xx-Q1	Automotive Catalog 300mA, Low IQ, Low Dropout Regulator
	TPS76333-Q1	Single Channel LDO, Low-Power 150-mA Low-Dropout Linear Regulator
Voltage Supervisor	TPS76501-Q1	Single Channel LDO, Ultra-Low Quiescent, Current 150-mA Low-Dropout Voltage Regulator
	TPS76950-Q1	Single Channel LDO, Ultralow-Power 100-mA Low-Dropout Linear Regulator
	TPS3808G01-Q1	Automotive Catalog Low Quiescent Current, Programmable-Delay Supervisory Circuit
Integrated Safety Power Supply	TPS3823-33-Q1	Automotive Catalog Supply Voltage Supervisor w/Watchdog Input and Manual Reset
	TPS3824-33-Q1	Automotive Catalog Supply Voltage Supervisor w/Watchdog Input, RESET, /RESET
CAN Transceiver	TPS65381-Q1	Multi-Rail Power Supply for Microcontrollers in Safety Critical Applications
	SN65HVDAS40-Q1	CAN, EMC-Optimized High-Speed CAN Transceiver
	SN65HVDAS41-Q1	CAN, EMC-Optimized High-Speed CAN Transceiver w/ wake
MCU	SN65HVDAS42-Q1	CAN, EMC-Optimized High-Speed CAN Transceiver
	TMS570	32-Bit ARM Dual Core Cortex™-R4F Microcontroller Family
Pressure Sensor Signal Conditioner	TMS470M	32-Bit ARM Cortex-M3 Microcontroller Family
Squib Driver IC	PGA400-Q1	Sensor Signal Conditioner for Resistive and Capacitive Sensors
Airbag Analog System IC	TPIC71002/4/8	2, 4 and 8 Channel Squib Driver IC with Safety Logic
	TPIC71212	12 channel Squib Driver + Power management + PSIS sensor interface (preview)

*For applications requiring fluid pressure sensing

TPIC7218 Features

- Digital and PWM low side drivers with integrated FETs.
- Relay drivers with built-in diagnostics.
- Supports active and intelligent wheel speed sensors with integrated VDA protocol decoding.

TPIC71002/4/8 Features

- Loop diagnostics monitor and reporting.
- Two logic inputs providing independent safety logic for enabling/disabling deployment.
- Each output capable of 1.2A/1.75A firing current from 10V...35V.
- No external clamping device, driving large inductive load up to 100uH.
- Programmable firing time up to 8.2 ms.
- Four independent avalanche voltage and thermally protected low-side drivers.

TPS65381 Features

- Multi-Rail Power Supply
 - Input voltage range: 5.8V to 36 V ; 4.5V to 5.8V (limited functionality)
 - 6V asynchronous switch-mode pre-regulator
 - 5V and 5V/3.3V linear regulators with internal FET
 - 0.8...3.3V selectable adjustable linear regulator controller with external FET
 - Sensor supply with internal FET, adjustable output voltage (tracking/non-tracking), and
 - Reverse battery protection with external FET
- Power Supply and System Monitoring:
- Microcontroller Interface for functional safety features
- SPI Interface for diagnostic, configuration and Q&A watchdog
- Safing-path Enable circuit for peripheral power stages

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