

Analog Solutions—Robust, Reliable Performance

# Analog Products for the Industrial Market

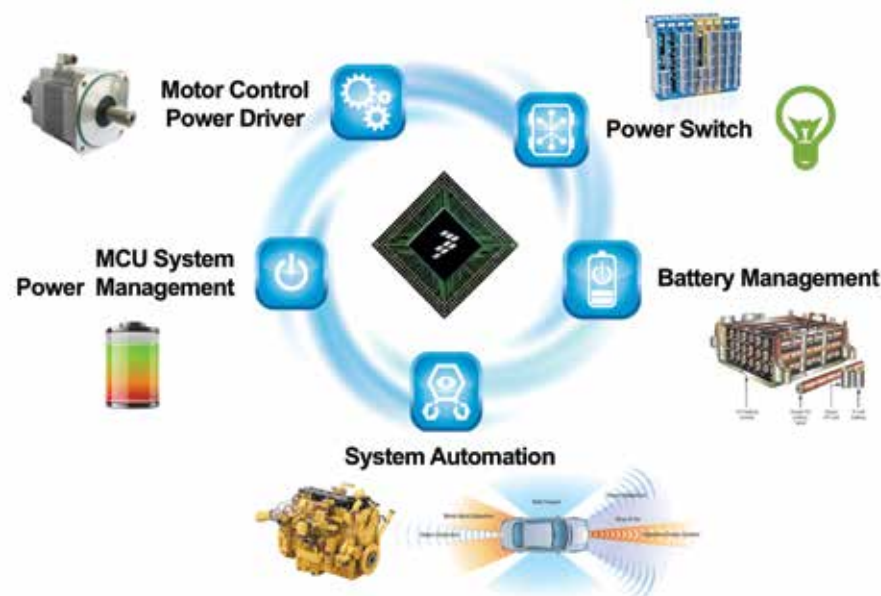
## Making Embedded Systems Better

Leveraging a legacy of automotive analog leadership, Freescale also provides industrial solutions designed for safety, reliability and performance. As the preferred Freescale MCU partner, our robust, reliable, high-performance analog solutions bridge real-world signals with connected processor intelligence, enabling complete embedded system solutions. These analog products are designed for a broad array of applications, including factory automation systems, industrial networking and power management equipment, portable medical products, smart home and building controls as well as energy storage systems.

Freescale's products are designed and manufactured with rigorous process controls and qualified using industry standard methodologies designed to yield defect rates in line with the stringent requirements of the industrial market. With more than 30 years in the automotive industry, Freescale is a trusted partner, providing the highest quality products with robust, rugged and differentiated features ideal for operation in harsh environments and high-performance requirements. In addition, Freescale's product longevity program ensures availability of many analog products for a minimum of 10 or 15 years from the time of release.

Freescale is the optimal choice for functional safety with industry-leading quality and reliability, deep auto experience, vast resources for development and innovation and strategic alliances with third-party experts. Functional safety is critical to maintaining high operational availability and ensuring predictable system behavior in response to unexpected system faults.

## Freescale Analog MCU Attach



## Target Applications

- Factory automation Programmable Logic Control (PLC), I/O, robotics, functional safety systems
- Building and home automation HVAC, elevators, security camera and access control
- Energy conversion and storage UPS, grid storage, battery management systems
- Industrial transportation special vehicles, engine control, e-bikes, CAN nodes
- Medical electronics motor drivers, power management for portable systems



Building on a 35-year legacy of exceeding the stringent safety requirements of the automotive industry, products in Freescale's expanded analog portfolio are well equipped to meet the equally rigorous safety requirements of the industrial space. Many products feature advanced functional redundancies, system health monitoring and system fault controls that play critical roles in system safety.

## Freescale: A Leader in Analog Solutions

Expanding on more than 30 years of innovation, Freescale is a leading provider of high-performance products that use SMARTMOS technology combining digital, power and standard analog functions. Freescale supplies 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.

## Analog Portfolio Summary for Industrial Market

| Family                           | Device                                             | Description                                                                                                                                                                                                                                                                                     |
|----------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interface and Transceivers       | MC34901<br>MC34CM0902                              | Robust, system-cost effective single / dual CAN high-speed physical layer, offering lowest quiescent current (8 $\mu$ A) while exceeding stringent EMC/ESD requirements without external choke                                                                                                  |
|                                  | MC33664                                            | 2 Mbps isolated network high-speed transceiver with dual SPI architecture to conveniently interface a microcontroller up to 15-node system with Battery Cell Controller devices MC33771 / MC33772                                                                                               |
|                                  | MC34978                                            | 36 V Analog switch interface multiplexer for translating 22 I/Os onto a single MCU SPI bus with very low quiescent current (30 $\mu$ A), configurable wetting currents (from 2 mA to 20 mA), integrated temperature and supply sensors and available in a small 5 mm x 5 mm QFN package         |
| System Power Management          | MC34FS6407<br>MC34FS6408                           | 36 V System Basis Chip with energy-efficient DC/DC power conversion up to 1.5 A (2.0 A on Vpre) and low-voltage operation with advanced functional safety mechanisms and integrated CAN transceiver                                                                                             |
|                                  | MC34FS4409                                         | 32 V System Basis Chip with energy-efficient DC/DC pre-regulator and power management up to 0.5A (2.0 A on Vpre) with multiple switch to ground I/Os, safety measures and robust CAN transceiver                                                                                                |
|                                  | MC34903<br>MC34904<br>MC34905                      | 28 V System Basis Chip for flexible and safe power management up to 400 mA with multiple low dropout (LDO) regulators with low quiescent current (down to 15 $\mu$ A), integrated CAN high-speed transceiver and built-in safety features                                                       |
|                                  | MMPF0100<br>MMPF0200                               | Most economical quick-turn programmable 14-channel, 11.7 A (7.5 A for MMPF0200) system power management solutions with fully configurable voltages, sequencing and timings optimized for use with i.MX 6 series applications processors                                                         |
|                                  | MC33PF3000/1<br>MC34PF3000/1                       | Optimized quick-turn programmable 12-channel, 7.3 A system power management solutions with fully configurable voltages, sequencing and timings optimized for use with i.MX 7 and i.MX 6 series applications processors available in a 7 mm x 7 mm package                                       |
|                                  | MC34VR500                                          | 9-channel power management IC, optimized to work with LayerScape LS1 network processor systems with custom pre-programmed output voltages, sequencing, and timings                                                                                                                              |
| Battery Management               | MC33771<br>MC33772                                 | 3 to 14-cell Li-Ion Battery Cell Controller compatible for 5 V up to 1000 V packs with 2 Mbps transformer coupled daisy chain transceivers, 300 mA passive cell balancing and shunt current sensor                                                                                              |
|                                  | MM912_637<br>MM921_638                             | 16-bit integrated MCU with 3 x 16-bit ADC for precision lead acid and Li-Ion battery monitoring solutions with low system power consumption for mission-critical applications up to 52 V and higher voltage battery pack monitoring                                                             |
|                                  | MC34671/3<br>MC34674/5                             | Scalable high input voltage linear chargers for single cell Li-Ion and Li-Polymer batteries up to 1.2 A charge current with constant voltage accuracy down to 0.4% and constant current accuracy down to 5% available into a small 8-lead 2 mm x 3 mm x 0.65 mm UDFN thermally enhanced package |
|                                  | MC32BC3770                                         | 2.0 A switch-mode charger with intelligent power-path for 1-cell Li-Ion and Li-Polymer battery                                                                                                                                                                                                  |
| Smart High Side eXtreme Switches | MC34981                                            | High current and high frequency 30 A / 27 V, 60 kHz, 4 m $\Omega$ high side switch with protected half bridge configuration enabling up to a 25% board area reduction and module simplification                                                                                                 |
|                                  | MC34982/4/8                                        | Self protected multipurpose single 2 m $\Omega$ , dual 4 m $\Omega$ or 8 m $\Omega$ low RDS(on) SPI-driven high side switches for flexible load management from 7 A to 30 A                                                                                                                     |
|                                  | MC36XSD                                            | Scalable, programmable family of 24 A/36 V SPI-driven, dual-channel, smart high-side switches from 6-to-50 m $\Omega$ $R_{DS(on)}$ for up to a 30% board reduction, and optimum for dense high-current switching applications                                                                   |
|                                  | MC12XSF                                            | Scalable family of 22 A/18 V programmable penta, quad and triple high-side switches from 7-to-40 m $\Omega$ $R_{DS(on)}$ with wide range diagnostic current sensing for up to 30% smaller PCB and 50% lower component count                                                                     |
| Smart Low Side Switches          | MC33882                                            | Smart 6-output low-side switches able to control loads up to 1.0 A, daisy chainable SPI and parallel inputs control with PWM capability on all outputs                                                                                                                                          |
|                                  | MC33880<br>MC33879                                 | Configurable 8-output serial switches for load control up to 2.0 A with SPI, up to 2 direct control outputs for PWM applications and very low standby current, including monitoring and protection features                                                                                     |
|                                  | MC33996<br>MC33999                                 | 16-output low-side switches able to control loads up to 2.5 A, daisy chainable SPI with or without parallel inputs mode for PWM capability on all outputs                                                                                                                                       |
|                                  | MC34SB0800<br>MC34SB0410                           | Fully integrated octal, quad valves and pump controller system on chip solutions with SPI, PWM up to 5 kHz (5.0 A), real-time valve current regulation (2.25 A – 2% precision w/ calibration) and integrated safe MOSFET for switching off all valves at once in case of emergency              |
| Power Drivers                    | MPC17510/29<br>MPC17531/33<br>MPC17C724<br>MC34933 | Low operating voltage (2 V to 15 V) monolithic single and dual H-Bridge for portable applications designed with low quiescent, integrated protection and diagnostics, 1 A output drive and PWM control input frequency up to 200 kHz capabilities                                               |
|                                  | MC34931S<br>MC34932S                               | Medium operating voltage (5 V to 36 V) monolithic single and dual 5A H-Bridge power ICs designed for harsh environments with selectable slew rate control, PWM up to 20 kHz, integrated protection and diagnostics in a thermally enhanced package                                              |
|                                  | MC33HB2000<br>MC33HB2001                           | 3.0 A H-Bridge motor driver (5 V to 28 V) with SPI control for increased flexibility (current limits and slew rates configurable), low $R_{DS(on)}$ outputs (235 m $\Omega$ or 120 m $\Omega$ ), daisy chainable, real time current mirror and available in 32-lead SOIC and PQFN packages      |
|                                  | MC34937<br>MC34GD3000                              | 3-phase high current FET pre-driver (>1 A) with extended voltage range (6 V to 58 V), PWM (> 20kHz), robust fault-monitoring and failure protection for industrial brushless DC motor control (BLDC)                                                                                            |
| Gate Drivers                     | MC33883                                            | H-Bridge gate driver with charge pump, independent high and low side gate driver channels, PWM up to 100 kHz and up to 1.0 A peak gate driver current                                                                                                                                           |
| Small Engine Controllers         | MM912_812<br>MC33813/4                             | Engine control analog power ICs for 25-1000cc, 1- to 4-cylinder motorcycle and other small engines                                                                                                                                                                                              |

For more information visit [freescale.com/analogindustrial](http://freescale.com/analogindustrial)

Freescale and the Freescale logo are trademarks of Freescale Semiconductor, Inc., Reg. U.S. Pat. & Tm. Off. Layerscape and SMARTMOS are trademarks for Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners. © 2014–2015 Freescale Semiconductor, Inc.

Document Number: INDCONTANLPRDFL REV 6

