

# Analog, Mixed-Signal and Power Management

Quarter 1, 2012

SG1002Q12012 Rev 0

Analog, Mixed-Signal and Power Management

- Power Actuation
- Communication Transceivers
- Signal Conditioning
- System Basis Chip
- Embedded MCU plus Power
- Audio and Video
- Power Management

Access and Remote Control



# FREESCALE SEMICONDUCTOR ANALOG AND MIXED-SIGNAL PRODUCTS

The product categories range from Power Actuation and Communication Transceivers to Signal Conditioning and Embedded MCU + Power. Power Actuation covers a broad range of load control and drivers, including motor control.

**SMARTMOS™**—Freescale Semiconductor SMARTMOS technology allows designers to interface high-precision components with the harsh automotive environment.

**Cost-Effective**—Ideally suited for rugged automotive applications, SMARTMOS solutions offer a cost-effective blend of analog, digital, and robust power silicon that enables integrated, mixed signal, power control ICs.

**Functionality**—SMARTMOS solutions implement traditional analog functions with smaller die size, and a modular process produces components with the minimum number of process steps for each circuit, minimizing overhead.

**Benefits**—Freescale Semiconductor SMARTMOS technology brings a wide range of benefits to today's designs, including component reductions, power capability, durability, efficiency, precision, high-performance analog, and robustness.

**Packaging** - Freescale device may be offered in EPP and RoHS compliant packages; view the external web for specifics.

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## ANALOG AND MIXED-SIGNAL PRODUCTS

*Power Actuation — Low Side Switches (Solid State Intelligent Switches)*

| Product   | Description  | No of Outputs  | High Side or Low Side | Continuous Current Each Output (A) | R <sub>DS(ON)</sub> (mΩ) of Each Output | Current Limitation (A) | Current Limitation Standby Max (μA) | Control <sup>1</sup> | Status/Fault Reporting | Protection Features   | Packaging   | Status <sup>2</sup>       |
|-----------|--|--|-----------------------|------------------------------------|---|------------------------|-------------------------------------|----------------------|------------------------|---|---|---------------------------|
| MC33800   | Engine Control IC, with Eight Low Side Switches, Two Constant Current Low Side Switches and Six MOSFET gate pre-drivers                        | 8  | L                     | 8 @ 0.35                           | 2 @ 700<br>6 @ 1000                     | 2 @ 6.0<br>6 @ 2.0     | 30                                  | Parallel, SPI        | SPI                    | Open Load detect, Over-current protect, Over-voltage protect, Short Load detect, Under-voltage protect, Thermal protect | 54-pin SOICW Exposed Pad                                      | Production EVB            |
| MC33810   | Engine Control Integrated Circuit capable of driving a combination of four Low Side loads and four MOSFETs or IGBT gates                       | 4  | L                     | 1.0                                | 100                                     | 6.0                    | 30                                  | Parallel, SPI        | SPI Status Flags       | Shorted Load detect, Thermal protect  | 32-pin SOICW Exposed Pad                                      | Production EVB            |
| MC33812   | Engine control power IC, with three Low Side drivers, one pre-driver, +5V pre-regulator, ISO-9141 physical interface and MCU watchdog circuit. | 3  | L                     | 2L @ 4.0<br>1L @ 1.5               | 2 @ 200<br>1 @ 1000                     | 2 @ 6.0<br>1 @ 2.0     | 2 @ 1000<br>1 @ 20                  | Parallel             | Parallel               | Over-current, Outputs Short to Battery, Over-temperature protect  | 32-pin SOICW Exposed Pad                                      | Production EVB Ref. Dsgn. |
| MC33879   | (1.0 Ω R <sub>DS(ON)</sub> ) Configurable Eight Output SPI Controlled Switch   | 8  | H/L                   | 0.35                               | 550                                     | 1.2                    | 25                                  | SPI w/ 2 PWM         | SPI                    | Short-circuit, Current Limit, Temp Sense  | 32-pin SOICW Exposed Pad                                      | Production EVB †PL        |
| MC33882   | (0.8 Ω R <sub>DS(on)</sub> ) Smart Six Output Switch with SPI and Parallel Input Control   | 8  | L                     | 1.0                                | 375                                     | 3.0                    | 10                                  | SPI                  | SPI                    | Short-circuit, Current Limit, Temp Sense  | 30-pin HSOP, 32-pin SOICW Exposed Pad, 32-pin QFN Exposed Pad | Production                |
| MC33996   | 16 Output Hardware Low Side Switch with 24-Bit Serial Input Control  | 16   | L                     | 0.5                                | 450                                     | 1.0 to 2.5             | 50                                  | SPI                  | SPI                    | Short-circuit, Current Limit, Temp Sense, Open Load   | 32-pin SOICW  | Production EVB            |
| MC33999   | 16 Output Hardware Low Side Switch with 24-Bit Serial Input Control and 8 Parallel Control   | 16   | L                     | 0.5                                | 450                                     | 1.0 to 2.5             | 50                                  | SPI and Parallel     | SPI                    | Short-circuit, Current Limit, Temp Sense, Open Load   | 54-pin SOICW  | Production EVB            |
| MM912_634 | Integrated S12 MagniV Based Relay Drivers with LIN   | See Embedded MCU + Power/ S12 MagniV Mixed-signal MCUs (page 11) |                       |                                    |   |                        |                                     |                      |                        |   |   |                           |

1. Products available with SPI Control work with the KITUSBSPIEVME and the KITUSBSPIIDGLEVME USB-SPI Interface Boards.

2. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

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# ANALOG AND MIXED-SIGNAL PRODUCT (CONTINUED)

## Power Actuation — High Side Switches (Solid State Intelligent Switches)

| Product    | Description  | No of Outputs | High Side or Low Side | Continuous Current Each Output (A) | $R_{DS(ON)}$ (m $\Omega$ ) of Each Output | Current Limitation (A) | Current Limitation Standby Max ( $\mu$ A) | Control <sup>1</sup> | Status/Fault Reporting                   | Protection Features  | Packaging                | Status <sup>2</sup> |
|------------|--|---------------|-----------------------|------------------------------------|---|------------------------|---|----------------------|--|--|--------------------------|---------------------|
| MC06XS3517 | Penta High Side Switch (3 x 6m $\Omega$ , 2 x 17 m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control   | 5             | H                     | 2.8                                | 3 X 6, 2 X 17                             | 48, 96                 | 5.0                                       | SPI                  | SPI                                      | Over-current, Over-temperature, Over-voltage, Under-voltage & Short-circuit protect      | 24-pin PQFN              | Mar. 2012           |
| MC06XS4200 | Dual High Side Switch (2 x 6m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control (24V)                  | 2             | H                     | 9.0                                | 2 X 6                                     | 30, 90                 | 10  | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 23-pin PQFN              | 2Q 2012             |
| MC07XS3200 | Dual High Side Switch (2 x 7m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control                        | 2             | H                     | 26.0                               | 2 X 7                                     | 46, 93                 | 5.0                                       | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 32-pin SOICW Exposed Pad | 3Q 2012             |
| MC09XS3400 | Quad High Side Switch (4 x 9m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control                        | 4             | H                     | 6.0                                | 4 X 9                                     | 42, 89                 | 5.0                                       | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 24-pin PQFN              | Mar. 2012           |
| MC10XS3412 | Quad High Side Switch (2 x 10 m $\Omega$ , 2 x 12 m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control  | 4             | H                     | 6.0                                | 2 x 10, 2 x 12                            | 30                     | 5.0                                       | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 24-pin PQFN              | Production EVB †PL  |
| MC10XS3425 | Quad High Side Switch (2 x 10 m $\Omega$ , 2 x 25m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control   | 4             | H                     | 6.0                                | 2 X 10, 2 X 25                            | 39, 78                 | 5.0                                       | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 32-pin SOICW Exposed Pad | 3Q 2012             |
| MC10XS3435 | Quad High Side Switch (2 x 12 m $\Omega$ , 2 x 35 m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control  | 4             | H                     | 6.0                                | 2 x 10, 2 x 35                            | 30                     | 5.0                                       | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 24-pin PQFN              | Production EVB †PL  |
| MC10XS3535 | Penta High Side Switch (3 x 10 m $\Omega$ , 2 x 35 m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control | 5             | H                     | 2.8, 5.5                           | 3x10, 2x35                                | 30, 60                 | 2.0                                       | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 24-pin PQFN              | Production EVB †PL  |
| MC10XS4200 | Dual High Side Switch (2 x 10m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control (24V)                 | 2             | H                     | 6.0                                | 2 X 10                                    | 18, 55                 | 10  | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 23-pin PQFN              | Mar. 2012           |
| MC15XS3400 | Quad High Side Switch (4 x 15 m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control                      | 4             | H                     | 6.0                                | 15  | 30                     | 5.0                                       | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 24-pin PQFN              | Production EVB †PL  |
| MC20XS4200 | Dual High Side Switch (2 x 20m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control (24V)                 | 2             | H                     | 3.0                                | 2 X 20                                    | 9.0, 27                | 10  | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 23-pin PQFN              | Mar. 2012           |
| MC33879    | (1.0 $\Omega$ $R_{DS(ON)}$ ) Configurable Eight Output SPI Controlled Switch                                       | 8             | H/L                   | 0.35                               | 550                                       | 1.2                    | 25  | SPI w/ 2 PWM         | SPI                                      | Short-circuit, Current Limit, Temp Sense   | 32-pin SOICW Exposed Pad | Production EVB †PL  |
| MC33981    | Single High Side Switch (4.0 m $\Omega$ ), with PWM, Protection and Diagnostics                                    | 1             | H                     | 40.0                               | 4   | 100                    | 5.0                                       | Parallel             | Status Pin, Current Monitor, Temperature | Over-current, Over-temperature, Short-circuit, Under-voltage Lock Out                    | 16-pin PQFN              | Production †PL      |
| MC33982    | Self Protected 2.0 m $\Omega$ Switch with Diagnostic and Protection  | 1             | H                     | 30.0                               | 2   | 100 or 150 Selectable  | 5.0                                       | SPI and Parallel     | SPI                                      | Temp Sense, Over/Under-voltage, Shutdown, Over-current, Reverse Polarity, Current Recopy | 16-pin PQFN              | Production EVB      |
| MC33984    | Self Protected 4.0 m $\Omega$ Switch with Diagnostic and Protection  | 2             | H                     | 15.0                               | 4   | 75 or 100 Selectable   | 5.0                                       | SPI and Parallel     | SPI                                      | Temp Sense, Over/Under-voltage, Shutdown, Over-current, Reverse Polarity, Current Recopy | 16-pin PQFN              | Production EVB      |
| MC33988    | Self Protected 8.0 m $\Omega$ Switch with Diagnostic and Protection  | 2             | H                     | 7.5                                | 8   | 45 or 60 Selectable    | 5.0                                       | SPI and Parallel     | SPI                                      | Temp Sense, Over/Under-voltage, Shutdown, Over-current, Reverse Polarity, Current Recopy | 16-pin PQFN              | Production EVB      |
| MC35XS3400 | Quad High Side Switch (4 x 35 m $\Omega$ ), with PWM, Protection, Diagnostics and SPI Control                      | 4             | H                     | 6.0                                | 35  | 30                     | 5.0                                       | SPI and Parallel     | SPI                                      | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit                   | 24-pin PQFN              | Production EVB †PL  |

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## ANALOG AND MIXED-SIGNAL PRODUCT (CONTINUED)

### Power Actuation — High Side Switches (Solid State Intelligent Switches) (continued)

| Product    | Description   | No of Outputs  | High Side or Low Side | Continuous Current Each Output (A) | R <sub>DS(ON)</sub> (mΩ) of Each Output | Current Limitation (A) | Current Limitation Standby Max (μA) | Control <sup>1</sup> | Status/Fault Reporting | Protection Features  | Packaging   | Status <sup>2</sup> |
|------------|---|--|-----------------------|------------------------------------|---|------------------------|-------------------------------------|----------------------|------------------------|--|-------------|---------------------|
| MC35XS3500 | Penta High Side Switch (5 x 35 mΩ), with PWM, Protection, Diagnostics and SPI Control                           | 5  | H                     | 2.8                                | 35                                      | 30                     | 2.0                                 | SPI and Parallel     | SPI                    | Fail Safe Mode, Over-current Shutdown, Over-temperature, Short-circuit | 24-pin PQFN | Production EVB †PL  |
| MM908E621  | Integrated Quad Half-bridge and Triple High Side with Embedded MCU and LIN for High End Mirror                  | See Embedded MCU + Power/ 8-bit Intelligent Distributed Controllers(page 11) |                       |                                    |   |                        |                                     |                      |                        |  |             |                     |
| MM908E622  | Integrated Quad Half-bridge, Triple High Side and EC Glass Driver with Embedded MCU and LIN for High End Mirror |  |                       |                                    |   |                        |                                     |                      |                        |  |             |                     |
| MM908E624  | Triple High Side Switch with Embedded MCU+Power+LIN   |  |                       |                                    |   |                        |                                     |                      |                        |  |             |                     |
| MM908E625  | Quad Half H-Bridge with P/S + HC08 + LIN  |  |                       |                                    |   |                        |                                     |                      |                        |  |             |                     |
| MM912_634  | Integrated S12 MagniV Based Relay Drivers with LIN  |  |                       |                                    |   |                        |                                     |                      |                        |  |             |                     |

1. Products available with SPI Control work with the KITUSBSPIEVME and the KITUSBSPIDGLEVME USB-SPI Interface Boards.
2. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

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# ANALOG AND MIXED-SIGNAL PRODUCT (CONTINUED)

## Power Actuation — H-Bridges and Motor Drivers

| Product   | Description  | Main Characteristics   | No of Outputs | R <sub>DS(ON)</sub> (mΩ) of Each Output | Peak Current Limitation (A) | Current Limitation Standby Max | Control <sup>1</sup> | Status Reporting                        | Protection Features  | Packaging                              | Status <sup>2</sup>  |
|-----------|--|--|---------------|---|-----------------------------|--------------------------------|----------------------|---|--|--|----------------------|
| MC33186   | H-Bridge Driver (5.0 A)  | 40 V/150 mΩ per FET  | 2             | 150                                     | 6.5                         | 20 mA                          | Parallel             | 1 Status Pin (Over-current / Over-temp) | Short-circuit, Current Limit, Temp Sense   | 20-pin HSOP                            | Production           |
| MC33879   | (1.0 Ω R <sub>DS(ON)</sub> ) Configurable Eight Output SPI Controlled Switch | (1.0 Ω R <sub>DS(ON)</sub> ) Configurable Eight Output SPI Controlled Switch   | 8             | 550                                     | 1.2                         | 25 μA                          | SPI w/2 PWM          | SPI                                     | Short-circuit, Current Limit, Temp Sense   | 32-pin SOICW Exposed Pad               | Production EVB †P L  |
| MC33880   | Configurable Eight Output SPI Controlled Switch                              | (1.0 Ω R <sub>DS(ON)</sub> ) Configurable Eight Output SPI Controlled Switch   | 8             | 550                                     | 1.2                         | 25 μA                          | SPI w/2 PWM          | SPI                                     | Short-circuit, Current Limit, Temp Sense   | 32-pin SOICW                           | Production EVB       |
| MC33886   | H-Bridge Driver (5.2 A)  | 225 mΩ @ 150°C   | 2             | 120                                     | 6.0                         | 20 mA                          | Parallel             | 1 Status Pin (Over-current / Over-temp) | Short-circuit, Current Limit, Temp Sense   | 20-pin HSOP                            | Production EVB       |
| MC33887   | H-Bridge Driver with Sleep Mode (5.2 A)                                      | 130 mΩ @ 25°C, sleep mode, current sense   | 2             | 130                                     | 6.0                         | 25 μA                          | Parallel             | 1 Status Pin (Over-current / Over-temp) | Short-circuit, Current Limit, Temp Sense   | 20-pin HSOP, 54-pin SOICW, 36-pin PQFN | Production EVB †P L  |
| MC33899   | Programable H-Bridge Power IC  | Designed to drive a DC motor in both forward and reverse shaft rotation under Pulse Width Modulation (PWM) of speed and torque.          | 2             | 100                                     | 11.5                        | 50 μA                          | SPI and Parallel     | SPI                                     | Open Circuit detect, Under-voltage, Over-temperature Shutdown, Output Short Protect, Short-circuit Current Limit | 30-pin HSOP                            | Production           |
| MC33926   | 5.0 A Throttle Control H-Bridge  | H-Bridge power IC for DC servo motor control like engine throttle control. Load can be PWM'ed up to 20 kHz.                              | 2             | 120                                     | 8.0                         | 50 μA                          | Parallel             | Status Flag                             | Output Short Circuit Protect, Over-current Limit, Over-temperature   | 32-pin PQFN                            | Production EVB †P L  |
| MC33931   | 5.0 A Throttle Control H-Bridge  | H-Bridge power IC for DC servo motor control like engine throttle control. Load can be PWM'ed up to 11 kHz                               | 2             | 120                                     | 8.0                         | 50 μA                          | Parallel             | Status Flag                             | Output Short-circuit Protect, Over-current Limit, Over-temperature   | 44-pin HSOP                            | Production EVB (932) |
| MC33932   | 5.0 A Throttle Control Dual H-Bridge   | H-Bridge power IC for DC servo motor control like engine throttle control. Load can be PWM'ed up to 11 kHz                               | 4             | 120                                     | 8.0                         | 50 μA                          | Parallel             | Status Flag                             | Output Short-circuit Protect, Over-current Limit, Over-temperature   | 44-pin HSOP                            | Production EVB       |
| MC34933   | Dual H-Bridge Motor Driver   | Monolithic dual H-Bridge driver IC with charge pump.   | 2             | 400                                     | 1.0                         | 1 μA                           | Parallel             | —                                       | Shoot Through Protect, Under-voltage Detect, Thermal detection   | 16-pin UDFN                            | Production †P L      |
| MPC17C724 | 0.4A Dual H-Bridge Motor Driver IC   | H-Bridge driver for bipolar stepper motors and brush DC motors. Load can be PWM'ed up to 200 kHz, for speed/ torque and current control. | 2             | 1000                                    | 0.80                        | 1 μA                           | Parallel             | —                                       | Shoot Through Protect, Under-voltage Detect  | 16-pin QFN                             | Production EVB       |
| MPC17510  | 0.45 Ω H-Bridge  | Single 15 V H-Bridge with charge pump  | 2             | 450                                     | 3.0                         | 1.0 mA                         | Parallel             | Shutdown Under-voltage                  | Shoot Through Under-voltage Detect   | 24-pin TSSOP                           | Production           |
| MPC17529  | 0.7 Ω Dual 6.8 V with Charge Pump, 3.3 V Logic                               | Dual 6.8 V with Charge Pump  | 2             | 700                                     | 1.4                         | 1.0 mA                         | Parallel             | Shutdown Under-voltage                  | Shoot Through Under-voltage Detect   | 20-pin VMFP                            | Production           |
| MPC17531  | 0.7 Ω Dual 8.6 V with Charge Pump and Sleep Mode                             | Dual 8.6 V with Charge Pump  | 2             | 800                                     | 1.4                         | 1.0 mA                         | Parallel             | Shutdown Under-voltage                  | Shoot Through Under-voltage Detect   | 20-pin VMFP, 24-pin QFN                | Production           |
| MPC17533  | 0.7 Ω Dual 6.8 V External Charge Pump  | Dual 6.8 V external Charge Pump  | 2             | 800                                     | 1.4                         | < 200 μA                       | Parallel             | Shutdown Under-voltage                  | Shoot Through Under-voltage Detect   | 16-pin VMFP                            | Production           |

1. Products available with SPI Control work with the KITUSBSP1EVME and the KITUSBSP1DGLVME USB-SPI Interface Boards

2. †P L denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

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## ANALOG AND MIXED-SIGNAL PRODUCT (CONTINUED)

### Power Actuation — H-Bridge Stepper Motors

| Product   | Description   | Main Characteristics  | Operating Voltage (V) | Packaging                | Status <sup>1</sup>       |
|-----------|---|---|-----------------------|--------------------------|---------------------------|
| MM908E626 | Stepper Motor Control, Quad Half-bridge with Embedded MCU and LIN for High Temperature T <sub>J</sub> = 135°C. See Embedded MCU + Power (page 10) | Voltage Regulator 5.0 V/60 mA, LIN Physical Layer with Selectable Slewrates | 5 to 28               | 54-pin SOICW Exposed Pad | Production EVB (†625) †PL |

1. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

## ANALOG AND MIXED-SIGNAL PRODUCT (CONTINUED)

### Power Actuation — Pre-Drivers (High-Side MOSFET Gate Drivers)

| Product | Description                                    | Main Characteristics   | Operating Voltage (V) | Control <sup>1</sup>           | Output Drives High/Low Side, Drive Current | Status Reporting <sup>1</sup> | Protection Features   | Packaging                | Status <sup>2</sup>       |
|---------|--|--|-----------------------|--------------------------------|--|-------------------------------|---|--------------------------|---------------------------|
| MC33800 | Engine Control Integrated Circuit              | Engine control IC, with six MOSFET gate pre-drivers, eight Low Side Switches, and two constant current Low Side switches                     | 5.0 to 36             | Parallel, SPI                  | 6 H, 2.0 mA (typ)                          | SPI                           | Open Load Detect, Over-current Protect, Over-voltage Protect, Shorted Load Detect, Under-voltage Protect, Thermal Protect | 54-pin SOICW Exposed Pad | Production EVB            |
| MC33810 | Automotive Engine Control IC                   | Engine control IC with four MOSFET/IGBT gate drivers and four Low Side switches.   | 4.5 to 36             | Parallel, SPI                  | 4 L, 780 µA (typ)                          | SPI, Status Flags             | Shorted Load Detect, Thermal Protect  | 32-pin SOICW Exposed Pad | Production EVB            |
| MC33812 | Single Cylinder Engine Control IC              | Engine control power IC with three Low Side driver, one pre-driver, +5V pre-regulator, IOS-9141 physical interface and MCU watchdog circuit. | 4.5 to 36             | Parallel                       | 2L, 4.0 A (typ)<br>1L, 1.5 A (typ.)        | Parallel                      | Over-current Outputs Short to Battery, Over-temperature Protect   | 32-pin SOICW Exposed Pad | Production EVB Ref. Dsgn. |
| MC33883 | Quad TMOS driver, for fuel injector            | Quad TMOS driver, in H-Bridge configuration  | 5.5 to 28/55          | 4 non-invert CMOS, LSTTL logic | n/a  | None                          | Over-voltage, Under-voltage   | 20-pin SOICW             | Production EVB            |
| MC33937 | Three-Phase Field Effect Transistor Pre-Driver | Triple High Side and Low Side FET pre-drivers, with parallel & SPI control and programmable shoot-through protect.                           | 8.0 to 58             | Parallel, SPI                  | 3 H, 3 L, 1.0 A (typ)                      | SPI                           | Programmable Deadtime, Reverse Charge Injection Protect   | 54-pin SOICW Exposed Pad | Production EVB †PL        |

1. Products available with SPI Control work with the KITUSBSPIEVME and the KITUSBSPIDGLEVME USB-SPI Interface Boards.

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## ANALOG AND MIXED-SIGNAL PRODUCT (CONTINUED)

### Power Actuation — LED Drivers

| Product | Description   | Main Characteristics   | Operating Input Voltage (V) | Output Voltages     | Protection Features   | Packaging              | Status <sup>1</sup>             |
|---------|---|--|-----------------------------|---------------------|---|------------------------|---------------------------------|
| MC34844 | 10 Channel LED Backlight Driver with Integrated Power Supply      | High efficiency LED driver for use in backlighting LCD displays. Capable of driving more than 150 LEDs, in 10 parallel strings, with 50/80 mA per string. Currents in the 10 strings are matched to within ±2%. Controlled through an I <sup>2</sup> C bus. Contains a PWM generator for LED dimming.  | 7.0 to 28                   | 60 V, @ 3.0 A       | Under-voltage Lockout, Over-voltage protection. Over-temperature protect. Over-current protection. Output Short protect | 32-pin QFN Exposed Pad | Production EVB <sup>2</sup> †PL |
| MC34845 | 6 Channel LED Backlight Driver with Integrated Power Supply       | High efficiency LED driver for use in backlighting LCD displays. Capable of driving more than 96 LEDs, in 6 parallel strings. Currents in the 6 strings are matched to within ±2%. Programmable LED current setting. Contains a PWM generator for LED dimming.   | 6.0 to 21                   | 60 V @ 2.1A         | Under-voltage Lockout, Over-voltage protection. Over-temperature & Over-current protect. Output Short and Open protect  | 24-pin QFN Exposed Pad | Production EVB †PL              |
| MC34848 | 8 Channel LED Backlight Driver with Integrated Boost Power Supply | High efficiency, LED driver for use in LCD backlighting applications. It is designed to support up to 160 mA/channels in scanning mode, or 80 mA/channels in local dimming mode. Current reference for LED current tolerance is accurate to ±1% channel-to-channel and IC-to-IC. The current can be programmed in both local dimming and scanning modes. | 12 to 28                    | 45 V (external FET) | LED short & open protect, Over-voltage protection. Over-temperature & Over-current protect.                             | 48-pin QFN Exposed Pad | Production †PL                  |

1. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

2. Supporting backlight EVB - KITLEDBKLT16EVBE

## ANALOG AND MIXED-SIGNAL PRODUCT (CONTINUED)

### Power Actuation — Squib Drivers

| Product | Description                  | Main Characteristics  | Regulation Voltage | Operating Voltage (V) | Packaging    | Status     |
|---------|------------------------------|---|--------------------|-----------------------|--------------|------------|
| MC33797 | Four Channel Squib Driver IC | Four-Channel High Side and Low Side 2.0 A FET Switches, Externally Adjustable FET Current Limiting, Adjustable Current Limit Range: 0.8 A to 2.0 A, 8-Bit SPI for Diagnostics and FET Switch Activation, Diagnostics for High Side Safing Sensor Status | 7.0 to 35          | 4.75 to 5.25          | 32-pin SOICW | Production |

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### Power Actuation — Powertrain Control and Engine Management

| Product | Description  | Main Characteristics  | Peak Current Limit (A)                   | R <sub>DS(on)</sub> (mΩ)                   | Control <sup>1</sup> | Operating Voltage (V) | Packaging                | Status <sup>2</sup>       |
|---------|--|---|--|--|----------------------|-----------------------|--------------------------|---------------------------|
| MC33800 | Engine Control Integrated Circuit  | Engine control IC, with six MOSFET gate pre-drivers, eight Low Side Switches, and two constant current Low Side switches  | 2 @ 6.0<br>6 @ 2.0<br>1 @ 2.8<br>1 @ 1.0 | 2 @ 700<br>6 @ 1000<br>1 @ 250<br>1 @ 1000 | SPI, Parallel        | 5.0 to 36             | 54-pin SOICW Exposed Pad | Production EVB            |
| MC33810 | Automotive Engine Control IC   | Engine control IC with four MOSFET/IGBT gate drivers and four Low Side switches.  | 6.0                                      | 100  | SPI, Parallel        | 4.5 to 36             | 32-pin SOICW Exposed Pad | Production EVB            |
| MC33811 | Solenoid Monitor Integrated Circuit  | 5 input solenoid monitoring to verify proper electrical and mechanical solenoid operation.  | See Pg. 8 Signal Cond.                   | See Pg. 8 Signal Cond.                     | SPI                  | 10.5 to 15.5          | 16-pin SOICW             | Production EVB †PL        |
| MC33812 | Single Cylinder Engine Control Integrated Circuit                                | Engine control power IC, with three Low Side drivers, one pre-driver, +5V pre-regulator, IOS-9141 physical interface and MCU watchdog circuit.                                      | 2 @ 6.0<br>1 @ 2.0                       | 2 @ 200<br>1 @ 1000                        | Parallel             | 4.5 to 36             | 32-pin SOICW Exposed Pad | Production EVB Ref. Dsgn. |
| MC33899 | Programmable H-Bridge Power IC   | Designed to drive a DC motor in both forward and reverse shaft rotation under Pulse Width Modulation (PWM) of speed and torque. Can be controlled by SPI or parallel control lines. | 15.0                                     | 90   | SPI, Parallel        | 6.0 to 26.5           | 30-pin HSOP              | Production                |
| MC33926 | 5.0A Throttle Control H-Bridge   | H-Bridge power IC for DC servo motor control like engine throttle control. Load can be PWM'ed up to 20 kHz  | 8.0                                      | 120  | Parallel             | 8.0 to 28             | 32-pin PQFN              | Production EVB †PL        |
| MC33937 | Three-Phase Field Effect Transistor Pre-Driver                                   | Triple High Side and Low Side FET pre-drivers, with parallel & SPI control and programmable shoot-through protect.  | —  | —  | Parallel, SPI        | 8.0 to 58             | 54-pin SOICW Exposed Pad | Production EVB †PL        |
| MC33975 | 22 input Multiple Switch Detect Interface with 32 mA Wetting Current and Wake-up | 22 inputs contact monitoring (14 GND, 8 configurable), 4.0 mA or 32 mA pulse wetting current, low-power mode interrupt capability, wake-up. External sensors current supply.        | —  | —  | SPI                  | 5.5 to 26.5           | 32-pin SOICW Exposed Pad | Production EVB †PL        |

1. Products available with SPI Control work with the KITUSBSPIEVME and the KITUSBSPIDGLEVME USB-SPI Interface Boards.

2. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### Communication Transceivers — CAN Physical Interface Components

| Product  | Description  | Main Characteristics  | Communication Protocol     | Operating Voltage (V) | Current Limit Standby (μA) |     | Other Features  | Control and Status Reporting <sup>1</sup> | Protection Features                                  | Packaging                            | Status <sup>2</sup> |
|----------|--|---|----------------------------|-----------------------|----------------------------|-----|---|---|--|--------------------------------------|---------------------|
|          |  |   |                            |                       | Typ                        | Max |   |   |  |                                      |                     |
| MC337425 | System Basis Chip with Enhanced High Speed CAN (250 k to 1.0 Mbps) | Dual V <sub>REG</sub> Enhance HS CAN with Bus failure diagnostics, 4 wake-up inputs.          | CAN high-speed dual wires  | 5.5 to 27             | 60                         | 150 | Low power modes, remote and local wake-up inputs                            | SPI (for diag)                            | Current and thermal protection for CAN and regulator | 28-pin SOICW, 48-pin QFN Exposed Pad | Production EVB †PL  |
| MC33889  | System Basis Chip Lite with Low Speed CAN                          | Dual V <sub>REG</sub> LS CAN, 2 wake-up inputs  | CAN low-speed, dual wires  | 5.5 to 27             | 100                        | 100 | Dual voltage regulator, watchdog, wake input, sleep and stop modes          | SPI                                       | Fault tolerant                                       | 28-pin SOICW                         | Production EVB      |
| MC33897  | Single-Wire CAN  | Low or high (33.3 kbps or 83.3 kbps) data rates, wake-up capability (GMW3089 v2.3 compatible) | Single-wire CAN            | 6.0 to 27             | 45                         | 60  | Regulator Control Output Waveshaping, Under-voltage lockout and loss of GND | 2 Mode Control Pins                       | Thermal shutdown, Current limit                      | 14-pin SOICN                         | Production          |
| MC33989  | System Basis Chip with High Speed CAN                              | Dual V <sub>REG</sub> HS CAN, 4 wake-up inputs  | CAN high-speed, dual wires | 5.5 to 27             | 150                        | 150 | Dual voltage regulator, watchdog, wake input, sleep mode, and cyclic sense  | SPI                                       | n/a  | 28-pin SOICW                         | Production EVB †PL  |

A change bar appears in the left margin to mark the location of new or revised information.

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### Communication Transceivers — CAN Physical Interface Components

| Product | Description   | Main Characteristics   | Communication Protocol                      | Operating Voltage (V) | Current Limit Standby (µA) |     | Other Features  | Control and Status Reporting <sup>1</sup> | Protection Features   | Packaging  | Status <sup>2</sup>      |
|---------|---|--|---|-----------------------|----------------------------|-----|---|---|---|--|--------------------------|
|         |   |  |   |                       | Typ                        | Max |   |   |   |  |                          |
| MC33903 | System Basis Chip(SBC)-Gen 2-with High Speed CAN & LIN Interfaces | High speed CANand 1 or 2 LIN physical interface. 5.0 or 3.3 V VDD regulator.                           | LIN single wire                             | 5.5 to 27             | 15                         | 35  | Config. I/O, MUX - out, pin compatible with MC33905                   | "safe" SPI                                | Over-current, Over-temperature, Short-circuit, Under-voltage detect | 32-pin SOICW Exposed Pad                           | Production EVB           |
| MC33904 | System Basis Chip(SBC)-Gen 2-with High Speed CAN Interface        | High speed CAN physical interface. 5.0 or 3.3 VDD and VAux regs w/current sharing.                     | CAN high-speed, dual wires                  | 5.5 to 27             | 15                         | 35  | Config. I/O, MUX - out, pin compatible with MC33905                   | "safe" SPI                                | Over-current, Over-temperature, Short-circuit, Under-voltage detect | 32-pin SOICW Exposed Pad                           | Production EVB('905) †PL |
| MC33905 | System Basis Chip(SBC)-Gen 2-with High Speed CAN & LIN Interfaces | High speed CAN & 1 or 2 LIN physical interfaces. 5.0 or 3.3 VDD and VAUX regulators w/current sharing. | CAN high-speed, dual wires. LIN single wire | 5.5 to 27             | 15                         | 35  | Config. I/O, MUX - out, SAFE output, Low power modes w/INT and Reset. | "safe" SPI                                | Over-current, Over-temperature, Short-circuit, Under-voltage detect | 32-pin SOICW Exposed Pad, 54-pin SOICW Exposed Pad | Production EVB †PL       |
| MC33909 | System Basis Chip with Multiple Switch-to-Ground Interface        | See System Basis Chip(page 10)   |   |                       |                            |     |   |   |   |  |                          |

1. Products available with SPI Control work with the KITUSBSPPIEVME and the KITUSBSPIDGLEVME USB-SPI Interface Boards.

2. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### Communication Transceivers — LIN, ISO-9141, J-1850 Physical Interface Components

| Product | Description   | Main Characteristics   | Communication Protocol | Operating Voltage (V) | Current Limitation Standby (µA) |     | Other Features   | Control and Status Reporting <sup>1</sup> | Protection Features   | Packaging   | Status <sup>2</sup>       |
|---------|---|--|------------------------|-----------------------|---------------------------------|-----|--|---|---|-------------|---------------------------|
|         |   |  |                        |                       | Typ                             | Max |  |   |   |             |                           |
| MC33399 | Local Interconnect Network (LIN) Physical Layer                       | Offers speed communication from 1.0 kbps to 20 kbps, and up to 60 kbps for Programming Mode. It supports LIN Protocol Specification 1.3. | LIN single wire        | 7.0 to 18             | 20                              | 50  | Wake-up input pin, control of external voltage regulator                               | Parallel                                  | Current limitation, Thermal protection                        | 8-pin SOICN | Production EVB            |
| MC33660 | ISO K Line Serial Link Interface                                      | ISO9141 physical interface device  | ISO9141                | 8.0 to 18             | —                               | 50  | Data rates up to 50 kbps   | Serial                                    | Output short-circuit Thermal protection                       | 8-pin SOICN | Production (EVB in Dsgn.) |
| MC33661 | eLIN – Enhanced LIN Physical Layer (Local Interconnect Network)       | Selectable slew rate for operations at 10, 20, 100 kbps; bus short to ground fail safe; excellent EMC behavior.                          | LIN single wire        | 7.0 to 18             | 8.0                             | 12  | Compatibility with 5.0 V and 3.3 V micros, wake-up input control of external regulator | Parallel                                  | Current limitation, Thermal protection                        | 8-pin SOICN | Production EVB            |
| MC33662 | LIN 2.1/SAE J2602-2 LIN Physical Layer Transceiver                    | Single wire LIN supports normal baud rates of 10 kbps (J) or 20 kbps (L) and fast rate of 100 kbps                                       | LIN single wire        | 7.0 to 18             | 6.0                             | 11  | Active bus waveshaping, EMI immunity, Local & Remote wakeup                            | Parallel                                  | Current limitation, Thermal protection                        | 8-pin SOICN | Production EVB            |
| MC33812 | Single Cylinder Engine Control IC                                     | See Powertrain Control and Engine Management devices (Page 6)  |                        |                       |                                 |     |  |   |   |             |                           |
| MC33903 | System Basis Chip(SBC)-Gen 2-with High Speed CAN & LIN Interfaces     | See System Basis Chip(page 10)   |                        |                       |                                 |     |  |   |   |             |                           |
| MC33905 | System Basis Chip(SBC)-Gen 2-with High Speed CAN & LIN Interfaces     | See System Basis Chip(page 10)   |                        |                       |                                 |     |  |   |   |             |                           |
| MC33909 | System Basis Chip with Multiple Switch-to-Ground Interface            | See System Basis Chip(page 10)   |                        |                       |                                 |     |  |   |   |             |                           |
| MC33910 | System Basis Chip with High Side Drivers and LIN Physical Interface   | LIN 2.0 compatible, 5.0 V60 mA LDO, 2 High Side drivers w/PWM, 1 analog/digital input  | LIN single wire        | 5.5 to 18             | 48                              | 80  | Hall Sensor supply, Configurable Window Watchdog                                       | SPI                                       | Multiple wake-up sources, LDO Fault Detect, Low Voltage Reset | 32-pin LQFP | Production EVB ('912) †PL |
| MC33911 | System Basis Chip with DC Motor Pre-driver and LIN Physical Interface | LIN 2.0 compatible, 5.0 V60 mA LDO, 1 High Side driver & 2 Low Side drivers w/PWM, 2 analog/digital inputs                               | LIN single wire        | 5.5 to 18             | 48                              | 80  | Configurable Window Watchdog   | SPI                                       | Multiple wake-up sources, LDO Fault Detect, Low Voltage Reset | 32-pin LQFP | Production EVB ('912) †PL |

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### Communication Transceivers — LIN, ISO-9141, J-1850 Physical Interface Components

| Product | Description   | Main Characteristics   | Communication Protocol | Operating Voltage (V) | Current Limitation Standby (μA) |     | Other Features  | Control and Status Reporting <sup>1</sup> | Protection Features   | Packaging   | Status <sup>2</sup>     |
|---------|---|--|------------------------|-----------------------|---------------------------------|-----|---|---|---|-------------|-------------------------|
|         |   |  |                        |                       | Typ                             | Max |   |   |   |             |                         |
| MC33912 | System Basis Chip with DC Motor Pre-driver and Current Sense and LIN Physical Interface | LIN 2.0 compatible, 5.0 V/60 mA LDO, 2 High Side drivers & 2 Low Side drivers w/PWM, 4 analog/digital inputs | LIN single wire        | 5.5 to 18             | 48                              | 80  | Hall Sensor supply, Configurable Window Watchdog, Current Sense | SPI                                       | Multiple wake-up sources, LDO Fault Detect, Low Voltage Reset | 32-pin LQFP | Production EVB (x2) †PL |

1. Products available with SPI Control work with the KITUSBSPiEVME and the KITUSBSPiDGLVME USB-SPI Interface Boards.

2. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### Communication Transceivers — Distributed Systems Interface (DSI) Components

| Product | Description  | Main Characteristics  | Max Data Rate | Operating Temp Range (°C) | Bus Sw. Resistance, typ/max (Ω) | Packaging                | Status                         |
|---------|--|---|---------------|---------------------------|---------------------------------|--------------------------|--------------------------------|
| MC33780 | Dual DSI Master with Differential Drive                                    | Bus controller for two differential DSI channels. SPI port for uC interface. Variable CRC generation and detection, thermal protection, frequency spreading.  | 150 kbps      | -40 to +85                | n/a                             | 16-pin SOICW             | Production                     |
| MC33781 | Quad DSI Master with Differential Drive                                    | Bus controller for four differential DSI channels. Dual SPI ports for uC and safing interfaces. Variable CRC generation and detection, comprehensive fault detection, thermal protection, frequency spreading                         | 200 kbps      | -40 to +90                | n/a                             | 32-pin SOICW Exposed Pad | Production                     |
| MC33784 | DSI Sensor Interface   | DSI slave device optimized as a sensor interface. Differential bus capability & dual bus switches for improved EMC performance, 2-channel 10-bit ADC, 5.0 V regulated output, 3 configurable logic pins, CRC generation and checking. | n/a           | -40 to +150               | 3.0/6.0                         | 16-pin SOICN             | Production                     |
| MC33789 | Airbag System Basis Chip (SBC) with Power Supply and PSI5 Sensor Interface | Air bag control module which monitors battery voltage, sensor status and supplies various voltages to the air bag system. Uses SPI for MCU communication. Uses PSI5 for satellite sensors communication.                              | 125 kbps      | -40 to +125               | n/a                             | 64-pin LQFP Exposed Pad  | Production EVB (contact sales) |
| MC33790 | Distributed System Interface (DSI) Physical Interface (DSIP)               | Dual current-limited waveshaped outputs, current sensing inputs, 3.3 V and 5.0 V  | 5 - 150 kbps  | -40 to +85                | 6.0                             | 16-pin SOICW             | Production                     |
| MC33793 | DSI Sensor Interface   | DSI slave device. 5.0 V regulated output, 4 configurable I/O pins (logic I/O or 8-bit ADC), fault tolerant, logic output high current buffer.   | n/a           | -40 to +125               | 4.0/8.0                         | 16-pin SOICN             | Production                     |

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### Signal Conditioning

| Product | Description   | Main Characteristics   | Switch Monitor Voltage (V) | Operating Voltage (V) | Packaging  | Status <sup>1</sup> |
|---------|---|--|----------------------------|-----------------------|--|---------------------|
| MC33811 | Solenoid Monitor Integrated Circuit   | 5 input solenoid monitoring to verify proper electrical and mechanical solenoid operation.   | 0 to 64                    | 10.5 to 15.5          | 16-pin SOICW   | Production EVB †PL  |
| MC33972 | 22 input Multiple Switch Detect Interface with 16 mA Wetting Current and Suppressed Wake-up | Multiple switch detection interface with suppressed wake-up designed to detect closing and opening of up to 22 switch contacts (14 GND, 8 configurable), wetting current of 2.0 mA or 16 mA. | -14 to 38<br>-14 to 40     | 5.5 to 26             | 32-pin SOICW, 32-pin SOICW Exposed Pad                           | Production EVB †PL  |
| MC33975 | 22 input Multiple Switch Detect Interface with 32 mA Wetting Current and Wake-up            | 22 inputs contact monitoring (14 GND, 8 configurable), 4.0 mA or 32 mA pulse wetting current, low-power mode interrupt capability, wake-up. Can supply current to external sensors.          | -14 to 38/40               | 5.5 to 26.5           | 32-pin SOICW Exposed Pad   | Production EVB †PL  |
| MC34825 | Micro-USB Interface IC  | Supports the UCS/OMTP recommended charger function as well as provides USB interface signal levels and other audio interface functions   | 0 to 28 (VBus only)        | 2.7 to 5.5            | 20-pin QFN Exposed Pad   | Production EVB      |
| MC34827 | Mini or Micro-USB Interface IC  | This is a dedicated IC for managing charging and signal multiplexing between multifunctional devices and their accessories, via a 5-pin Mini or Micro-USB connector.                         | 0 to 28 (VBus only)        | 2.7 to 5.5            | 20-pin 3x3 mm UTQFN Exposed Pad, 20-pin 3x4 mm UTQFN Exposed Pad | Production          |

1. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

A change bar appears in the left margin to mark the location of new or revised information.

# ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

## System Basis Chip

| Product | Description   | Main Characteristics   | Bus Type and Standard                       | Operating Voltage (V) | Current Limitation Standby (µA) |     | Other Features   | Diagnostics <sup>1</sup> | Protection Features   | Packaging  | Status <sup>2</sup>            |
|---------|---|--|---|-----------------------|---------------------------------|-----|--|--------------------------|---|--|--------------------------------|
|         |   |  |   |                       | Typ                             | Max |  |                          |   |  |                                |
| MC33742 | System Basis Chip with Enhanced High Speed CAN (250 k to 1.0 Mbps)                      | SBC, Dual V <sub>REG</sub> Enhance HS CAN with Bus failure diagnostic capability, 4 wake-up inputs   | CAN HS dual wire                            | 5.5 to 27             | 60                              | 150 | Low power modes, remote and local wake-up capabilities   | SPI                      | Current and thermal protection for CAN and regulator                | 28-pin SOICW, 48-pin QFN Exposed Pad               | Production EVB †PL             |
| MC33789 | Airbag System Basis Chip (SBC) with Power Supply and PSI5 Sensor Interface              | Air bag control module which monitors battery voltage, sensor status and supplies various voltages to the air bag system. Uses SPI for MCU communication. Uses PSI5 for satellite sensors communication. | PSI5  | 5.2 to 20             | -                               | -   | Safing state machine, 9 switch input monitors, 2 config. high/low side drivers, Power-on-reset, watchdog timer, Squib energy reserve | SPI                      | Safing state machine, Scrap mode                                    | 64-pin LQFP Exposed Pad                            | Production EVB (contact sales) |
| MC33889 | System Basis Chip with Low Speed Fault Tolerant CAN                                     | Dual 5.0 V regulators LS CAN, 2 wake-up inputs   | CAN low-speed, dual wires                   | 5.5 to 27             | 60                              | 100 | Dual voltage regulator, watchdog, wake input, sleep and stop modes   | SPI                      | Fault tolerant  | 28-pin SOICW                                       | Production EVB                 |
| MC33903 | System Basis Chip(SBC)-Gen 2-with High Speed CAN & LIN Interfaces                       | High speed CANand 1 or 2 LIN physical interface. 5.0 or 3.3 V VDD regulator.   | LIN single wire                             | 5.5 to 27             | 15                              | 35  | Config. I/O, MUX - out, pin compatible with MC33905  | "safe" SPI               | Over-current, Over-temperature, Short-circuit, Under-voltage detect | 32-pin SOICW Exposed Pad                           | Production EVB                 |
| MC33904 | System Basis Chip(SBC)-Gen 2-with High Speed CAN Interface                              | High-speed CAN physical interface. 5.0 or 3.3 VDD and VAUX regulators w/current sharing  | CAN high-speed, dual wires                  | 5.5 to 27             | 15                              | 35  | Config. I/O, MUX - out, pin compatible with MC33905  | "safe" SPI               | Over-current, Over-temperature, Short-circuit, Under-voltage detect | 32-pin SOICW Exposed Pad                           | Production EVB('905) †PL       |
| MC33905 | System Basis Chip(SBC)-Gen 2-with High Speed CAN & LIN Interfaces                       | High speed CAN & 1 or 2 LIN physical interfaces. 5.0 or 3.3 VDD and VAux regulators w/current sharing.   | CAN high-speed, dual wires. LIN single wire | 5.5 to 27             | 15                              | 35  | Config. I/O, MUX - out, SAFE output, Low power modes w/INT and RST capability.   | "safe" SPI               | Over-current, Over-temperature, Short-circuit, Under-voltage detect | 32-pin SOICW Exposed Pad, 54-pin SOICW Exposed Pad | Production EVB †PL             |
| MC33909 | System Basis Chip with Multiple Switch-to-Ground Interface                              | Two high speed CAN interfaces plus four LINs, compatible with specification 2.1 and SAEJ2602-2. Also contains 17 switch to ground inputs for switch detection.   | CAN high-speed, dual wires. LIN single wire | 3.5 to 27             | 125                             |     | Watchdog timer, Switched inputs wake-up, Fail safe mode  | SPI                      | Over-voltage  | 64-pin LQFP Exposed Pad                            | 4Q2012                         |
| MC33910 | System Basis Chip with High Side Drivers and LIN Physical Interface                     | LIN 2.0 compatible, 5.0 V 60 mA LDO, 2 High Side drivers w/PWM, 1 analog/digital input   | LIN single wire                             | 5.5 to 18             | 48                              | 80  | Hall Sensor supply, Configurable Window Watchdog   | SPI                      | Multiple wake-up sources, LDO Fault Detect, Low Voltage Reset       | 32-pin LQFP  | Production EVB ('912) †PL      |
| MC33911 | System Basis Chip with DC Motor Pre-driver and LIN Physical Interface                   | LIN 2.0 compatible, 5.0 V 60 mA LDO, 1 High Side driver & 2 Low Side drivers w/PWM, 2 analog/digital inputs  | LIN single wire                             | 5.5 to 18             | 48                              | 80  | Configurable Window Watchdog   | SPI                      | Multiple wake-up sources, LDO Fault Detect, Low Voltage Reset       | 32-pin LQFP  | Production EVB ('912) †PL      |
| MC33912 | System Basis Chip with DC Motor Pre-driver and Current Sense and LIN Physical Interface | LIN 2.0 compatible, 5.0 V 60 mA LDO, 2 High Side drivers & 2 Low Side drivers w/PWM, 4 analog/digital inputs   | LIN single wire                             | 5.5 to 18             | 48                              | 80  | Hall Sensor supply, Configurable Window Watchdog, Current Sense  | SPI                      | Multiple wake-up sources, LDO Fault Detect, Low Voltage Reset       | 32-pin LQFP  | Production EVB †PL             |
| MC33989 | System Basis Chip with High Speed CAN   | Dual 5.0 V regulators HS CAN, 4 wake-up inputs   | CAN high speed, dual wires                  | 5.5 to 27             | 80                              | 150 | Dual voltage regulator, watchdog, wake input, sleep and stop modes   | SPI                      | Current limitation, Thermal protection                              | 28-pin SOICW                                       | Production EVB †PL             |

1. Products available with SPI Control work with the KITUSBSPIEVME and the KITUSBSPIDGLEVME USB-SPI Interface Boards.

2. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

## ANALOG AND MIXED-SIGNAL PRODUCTS (continued)

### Embedded MCU plus Power

| Product   | Description                                     | Main Characteristics  | Power Features | MCU Reference | MCU Detail  | Additional Information   | Packaging              | Status                       |
|-----------|---|---|----------------|---------------|---|--|------------------------|------------------------------|
| MM912_637 | Intelligent Integrated Precision Battery Sensor | Battery voltage & current measurement with 16-bit sigma-delta ADC & IIR filter. Voltage Regulators: 2.5 V/10 mA & 60 mA, 5.0 V/80 mA. LIN 2.1 Physical Layer w/Selectable Slew rates and triggered wake-up, | —              | 16-Bit MCU    | S12 16-Bit Core, 128 k/96 k Bytes Flash, 6.0 k Bytes RAM, 4.0 k bytes data Flash, ESCI, 16-bit 4 Channel Timer, Internal Clock Generator, BDM | Selectable Internal or external temp sense, GPIO, including SPI functionality, internal or external oscillator. Window Watchdog with Selectable Timing, Normal/Stop/Sleep/Crank Mode Ctrl. | 48-pin QFN Exposed Pad | Production (EVB - Feb. 2012) |

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### 8-bit Intelligent Distributed Controllers

| Product   | Description  | Main Characteristics   | Power Features   | MCU Reference              | MCU Detail  | Additional Information  | Packaging                | Status <sup>1</sup>       |
|-----------|--|--|--|----------------------------|---|---|--------------------------|---------------------------|
| MM908E621 | DC Motor/Mirror Control and LIN Mirror Control, Integrated Quad Half-bridge and Triple High Side with Embedded MCU and LIN                   | Voltage Regulator 5.0 V/60 mA, LIN Physical Layer with Selectable Slew rates, Window Watchdog, "Normal/Stop/Sleep Mode "Control                        | 2 x 275 mΩ Half-bridges;<br>2 x 750 mΩ Half-bridges;<br>1 x 185 mΩ High Side;<br>2 x 440 mΩ High Side;<br>Switched 5.0 V Output (25 mA)                    | 8-Bit MCU<br>MC68HC908EY16 | HC08 Core, 16 k Flash, 512 Bytes RAM, ESCI, 8-Channel 10-bit ADC, Two 16-bit 2 Channel Timers, Internal Clock Generator | 2/3 Pin Hall Sensor Input, Analog Input with Current Source, 40 V Rated Wake-up Input, V <sub>SUP</sub> Chip Temp. and Current Sensing      | 54-pin SOICW Exposed Pad | Production                |
| MM908E622 | DC Motor/Mirror Control and LIN Mirror Control, Integrated Quad Half-bridge, Triple High Side and EC Glass Driver with Embedded MCU and LIN  | Voltage Regulator 5.0 V/60 mA, LIN Physical Layer with Selectable Slew rates, Window Watchdog, "Normal/Stop/Sleep Mode "Control                        | 2 x 275 mΩ Half-bridges;<br>2 x 750 mΩ Half-bridges;<br>1 x 185 mΩ High Side;<br>2 x 440 mΩ High Side;<br>Switched 5.0 V Output (25 mA)<br>EC Glass Driver |                            |   | 2/3 Pin Hall Sensor Input, Analog Input with Current Source, 40 V Rated Wake-up Input, V <sub>SUP</sub> Chip Temp. and Current Sensing      | 54-pin SOICW Exposed Pad | Production †PL            |
| MM908E624 | DC Motor Control Using Relays (for example, Window Lift, Sun Roof, and Power Seats), Triple High Side Switch with Embedded MCU + Power + LIN | Voltage Regulator 5.0 V/50 mA, LIN Physical Layer with Selectable Slew rates, Window Watchdog with Selectable Timing, Normal/Stop/Sleep Mode Control   | 1 x 7 Ω High Side,<br>2 x 2.5 Ω High Side Switches for Relay Control   |                            |   | Operational Amplifier, 2 x 40 V Rated Wake-up Inputs  | 54-pin SOICW             | Production EVB †PL        |
| MM908E625 | Mirror Control, Stepper Motor Control, Door Lock Quad Half-bridge and Single High Side with Embedded MCU and LIN                             | Voltage Regulator 5.0 V/60 mA, LIN Physical Layer with Selectable Slew rates, Timeout Watchdog with Periodic Wake-up Feature, Normal/Stop Mode Control | 4 x 400 mΩ Half-bridges with Current Control;<br>1 x 600 mΩ High Side;<br>Switched 5.0 V Output (25 mA)  |                            |   | 3 x 2 Pin Hall Sensor Inputs with Cyclic Wake-up Feature, Analog Input with Current Source, V <sub>SUP</sub> Chip Temp. and Current Sensing | 54-pin SOICW Exposed Pad | Production EVB            |
| MM908E626 | Stepper Motor Control, Quad Half-bridge with Embedded MCU and LIN  | Voltage Regulator 5.0 V/60 mA, LIN Physical Layer with Selectable Slew rates. High Temperature use, T <sub>J</sub> = 135°C                             | 4 x 400 mΩ Half-bridges with Current Control;<br>Switched 5.0 V Output (24 mA)   |                            |   | V <sub>SUP</sub> Chip Temperature and Current Sensing   | 54-pin SOICW Exposed Pad | Production EVB ('625) †PL |

1. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### S12 MagniV Mixed-signal MCUs

| Product            | Description   | Main Characteristics   | Power Features  | MCU Reference            | MCU Detail  | Additional Information   | Packaging                | Status <sup>1</sup> |
|--------------------|---|--|---|--------------------------|---|--|--------------------------|---------------------|
| MM912_634          | Integrated S12 MagniV Based Relay Drivers with LIN              | Cascaded dual Voltage Regulator 2.5 V/50 mA and 5.0 V/80 mA, LIN Physical Layer with Selectable Slew rates, Window Watchdog with SelectableDual High Side and Dual Low Side Switches with Embedded S12 MCU + Power + LIN | 7.0 Ω High Side Switches,<br>2.5 Ω Low Side Switches for Relay Control                          | 16-Bit MCU               | S12 16-Bit Core, 32 k Flash, 2.0 k Bytes RAM, ESCI, Multi channel 10-bit ADC, 16-bit 4 Channel Timer, Internal Clock Generator                                      | High Voltage Wake-up Inputs, Selectable Gain I-Sense, Battery Voltage Sense. Timing, Normal/Stop/Sleep Mode Control, Hall Supply of 18 V/30 mA | 48-pin LQFP Exposed Pad  | Production EVB †PL  |
| S12VR64<br>S12VR48 | S12 MagniV Mixed-Signal MCU for Relay Driven Motor Applications | Voltage regulator 5 V/20 mA, LIN physical layer, 2 Low Side drivers, up to 2 High Side drivers, VBAT sense, 4 high voltage inputs  | 18 Ω, 50 mA High Side Switches for LEDs, 4.5 Ω, 150 mA Low Side Switches for relay drive inputs | 16-Bit MCU<br>16-Bit MCU | S12 16-Bit Core, 64 k/48 k Flash, 2.0 k Bytes RAM, 512 Bytes EEPROM, SCI, SPI, 10-bit 6 or 2 ext. ADC channels, 16-bit 4 Channel Timer, 8-bit 8ch or 16-bit 4ch PWM | 5V Hall supply, temp.sense, wake-up GPIO, internal or external oscillator, watchdog.   | 48-pin LQFP, 32-pin LQFP | †PL                 |

1. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

A change bar appears in the left margin to mark the location of new or revised information.

## ANALOG AND MIXED-SIGNAL PRODUCTS (CONTINUED)

### Audio and Video

| Product  | Description                 | Main Characteristics   | Operating Voltage (V) | Power Dissipation (mW) | Frequency Band (KHz) | Additionaln Features  | Packaging              | Status <sup>1</sup> |
|----------|-----------------------------|--|-----------------------|------------------------|----------------------|---|------------------------|---------------------|
| SGTL5000 | Ultra Low-power Audio Codec | A low-power stereo codec that includes headphones amplifier and is designed to provide a comprehensive audio solution for portable products that require line-in, mic-in, line-out, headphone-out and digital I/O. | 1.62 to 3.6           | <10                    | .020 to 20           | PLL clocking; I <sup>2</sup> S, I <sup>2</sup> C and SPI communications; 2 internal power supplies; stereo line in; ADC & DAC; Mic/line-in; Integrated Digital Processing | 20-pin QFN, 32-pin QFN | Production EVB †PL  |

1. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

## ANALOG AND MIXED-SIGNAL PRODUCTS (continued)

### FREESCALE SEMICONDUCTOR POWER MANAGEMENT PRODUCTS

The Power Management products portfolio provides solutions for Linear and Switching voltage regulators. Hot Swap control and Power over Ethernet devices for use in applications ranging from Consumer and Industrial to Automotive. SMARTMOS™—Freescale Semiconductor SMARTMOS technology allows designers to interface high-precision components with the harsh automotive environment.

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## POWER MANAGEMENT

### Power Management — Linear Regulators

| Product | Description   | Main Characteristics   | Bus Type and Standard      | Operating Voltage (V)  | Current Limitation Typ(μA) | Standby Max(μA) | Other Features  | Diagnostics <sup>1</sup> | Protection Features  | Packaging                            | Status <sup>2</sup> |
|---------|---|--|----------------------------|------------------------|----------------------------|-----------------|---|--------------------------|--|--------------------------------------|---------------------|
| MC33730 | Switch Mode Power Supply with Multiple Linear Regulators and Power Sequencing | Step-down Switching regulator (2.0 A), with 3 Programmable Linear Regulators (15 mA, 15 mA, 15 mA) and two 5.0 V Sensor supplies (100 mA, 100 mA). | n/a                        | 4.5 to 28              | —                          | 500             | Programmable voltage regulator, power sequencing, adjustable OSC - Switcher | None                     | Reverse Battery Protect, Under-voltage & Over-voltage Lockout, Reset monitor signals for regulators (4)    | 32-pin SOICW Exposed Pad             | Production EVB      |
| MC33742 | System Basis Chip with Enhanced High Speed CAN (250 k to 1.0 Mbps)            | SBC, Dual V <sub>REG</sub> Enhance HS CAN with Bus failure diagnostic capability, 4 wake-up inputs; fully compatible with MC33989                  | CAN HS dual wire           | 5.5 to 27              | 60                         | 150             | Low-power modes, remote and local wake-up capabilities                      | SPI                      | Current and thermal protection for CAN and regulator   | 28-pin SOICW, 48-pin QFN Exposed Pad | Production †PL      |
| MC33889 | System Basis Chip with Low Speed Fault Tolerant CAN                           | Dual 5.0 V regulators LS CAN, 2 wake-up inputs   | CAN low-speed, dual wires  | 5.5 to 27              | 60                         | 100             | Dual voltage regulator, watchdog, wake input, sleep and stop modes          | SPI                      | Fault tolerant   | 28-pin SOICW                         | Production EVB      |
| MC33903 | System Basis Chip(SBC)-Gen 2-with High Speed CAN & LIN Interfaces             | See System Basis Chip - (Page 10)  |                            |                        |                            |                 |   |                          |  |                                      |                     |
| MC33904 | System Basis Chip(SBC)-Gen 2-with High Speed CAN Interfaces                   |  |                            |                        |                            |                 |   |                          |  |                                      |                     |
| MC33905 | System Basis Chip(SBC)-Gen 2-with High Speed CAN & LIN Interfaces             |  |                            |                        |                            |                 |   |                          |  |                                      |                     |
| MC33989 | System Basis Chip with High Speed CAN   | Dual 5.0 V regulators HS CAN, 4 wake-up inputs   | CAN high speed, dual wires | 5.5 to 27              | 80                         | 150             | Dual voltage regulator, watchdog, wake input, sleep and stop modes          | SPI                      | Current limitation, Thermal protection†  | 28-pin SOICW                         | Production EVB †PL  |
| MC34700 | 3.6 V/5.25 V 3-CH DC-DC converters and 1- 3.6 V Linear regulator.             | 3 adjustable Buck switching regulators and 1 adjustable Linear regulator. ±1.5% output voltage accuracy. 800 kHz switching frequency.              | n/a                        | 1.5 to 6.0 & 9.0 to 18 | 800                        | —               | Power-up sequencing, Separate enable functions                              | PGOOD signal             | Current limit, Short-circuit protect, Over-temperature protection, Over-voltage & Under-voltage protection | 32-pin QFN Exposed pad               | Production EVB †PL  |

1. Products available with SPI Control work with the KITUSBSPIEVME and the KITUSBSPIDGLEVME USB-SPI Interface Boards.

2. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

# POWER MANAGEMENT (continued)

## Power Management — Switching Regulators

| Product | Description   | Main Characteristics   | Operating Voltage (V)     | Output Voltages  | Protection Features  | Packaging                | Status <sup>1</sup>          |
|---------|---|--|---------------------------|--|--|--------------------------|------------------------------|
| MC33730 | Switch Mode Power Supply with Multiple Linear Regulators and Power Sequencing | Step-down switching regulator (2.0 A), with 3 Programmable Linear Regulators (15 mA, 15 mA, 15 mA) and 2 x 5.0 V sensor supply (100 mA, 100 mA).   | 4.5 to 28                 | 4.9 to 5.1 V,<br>2.0 to 3.3 V,<br>1.5 to 3.3 V,<br>1.0 to 5.0 V,<br>5.0 V  | Reverse Battery Protect, Under-voltage and Over-voltage Lockout, Reset monitor signals for regulators (4)                | 32-pin SOICW Exposed Pad | Production EVB               |
| MC34700 | 3.6 V/5.25 V 3-CH DC-DC converters and 1- 3.6 V Linear regulator.             | 3 adjustable Buck switching regulators and 1 adjustable Linear regulator. $\pm 1.5\%$ output voltage accuracy. 800 kHz switching frequency. The switching regulators utilize voltage-mode control with external compensation.  | 1.5 to 6.0 &<br>9.0 to 18 | 3.6 V (adj.) @400 mA<br>5.25 V (adj.) @1500 mA<br>2 - 3.6 V (adj.) @1250 mA  | Current limit, Short-circuit protect, Over-temperature protection, Over-voltage & Under-voltage protection.              | 32-pin QFN Exposed Pad   | Production EVB †PL           |
| MC34701 | Dual Output Power Supply Switching (1.5 A)                                    | Step-down switching regulator and Linear regulator with adjustable output voltage from 0.8 V to 5.0 V. Power sequencing, I <sup>2</sup> C bus interface, watchdog, voltage margining, reset.   | 2.8 to 6.0                | Adjustable   | Current limit, Under-voltage shutdown, Over-voltage detect, Over-temperature shutdown                                    | 32-pin SOICW             | Production EVB               |
| MC34702 | Dual Output Power Supply Switching (3.0 A)                                    | Step-down switching regulator and Linear regulator with adjustable output voltage from 0.8 V to 5.0 V. Power sequencing, I <sup>2</sup> C bus interface, watchdog, voltage margining, reset.   | 2.8 to 6.0                | Adjustable   | Current limit, Under-voltage shutdown, Over-voltage detect, Over-temperature shutdown                                    | 32-pin SOICW             | Production EVB               |
| MC34704 | Multiple Channel DC-DC Power Management IC                                    | Features 8(A) or 5(B) buck & boost DC/DC switching regulators, with up to $\pm 2\%$ output voltage accuracy. It provides dynamic voltage scaling on all regulators. It is capable of operating at a switching frequency of up to 2.0 MHz. The 34704 utilizes I <sup>2</sup> C programmability. | 2.7 to 5.5                | 15.0 V (adj.) @ 30 mA<br>15.0 V (adj.) @ 60 mA (A only)<br>5.0 V @ 500 mA (A only)<br>3 - 3.6 V (adj.) @ 300/500 mA<br>1.8 V (adj.) @ 550 mA<br>-9.0 V (adj.) @ 60 mA (A only) | Output Under-voltage & Over-voltage detect, Over-current limit detection and Short-circuit protect, Thermal limit detect | 56-pin QFN Exposed Pad   | Production EVB(A) EVB(B) †PL |
| MC34712 | Single Synchronous DDR Switch-Mode regulator ( $\pm 3.0$ A)                   | Synchronous buck switching regulator with adjustable output and an accuracy of $\pm 2\%$ and a programmable switch frequency of 200 kHz to 1.0 MHz.  | 3.0 to 6.0                | 0.7 to 1.35 V  | Over-current limit, Short-circuit protect, Thermal shutdown, Output Over-voltage & Under-voltage detect                  | 24-pin QFN               | Production EVB †PL           |
| MC34713 | Single Synchronous Buck Switching regulator (5.0 A)                           | Synchronous buck switching regulator with adjustable output and an accuracy of $\pm 2\%$ and a programmable switch frequency of 200 kHz to 1.0 MHz.  | 3.0 to 6.0                | 0.7 to 3.6 V   | Over-current limit, Short-circuit protect, Thermal shutdown, Output Over-voltage & Under-voltage detect                  | 24-pin QFN               | Production EVB †PL           |
| MC34716 | Dual Synchronous DDR Switch-Mode regulators (5.0 A, $\pm 3.0$ A)              | Synchronous buck switching regulators with adjustable outputs and an accuracy of $\pm 2\%$ and a programmable switch frequency of 200 kHz to 1.0 MHz.  | 3.0 to 6.0                | Chan. 1: 0.7 to 3.6 V,<br>Chan. 2: 0.7 to 1.35 V   | Over-current limit, Short-circuit protect, Thermal shutdown, Output Over-voltage & Under-voltage detect                  | 26-pin QFN               | Production EVB †PL           |
| MC34717 | Dual Synchronous Buck Switching regulators (5.0 A, 5.0 A)                     | Synchronous buck switching regulators with adjustable outputs and an accuracy of $\pm 2\%$ and a programmable switch frequency of 200 kHz to 1.0 MHz.  | 3.0 to 6.0                | Chan. 1: 0.7 to 3.6 V,<br>Chan. 2: 0.7 to 3.6 V  | Over-current limit, Short-circuit protect, Thermal shutdown, Output Over-voltage & Under-voltage detect                  | 26-pin QFN               | Production EVB †PL           |

1. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

## POWER MANAGEMENT (CONTINUED)

### LED Drivers

| Product | Description   | Main Characteristics   | Operating Voltage (V) | Output Voltages        | Protection Features  | Packaging              | Status <sup>1</sup>                |
|---------|---|--|-----------------------|------------------------|--|------------------------|------------------------------------|
| MC34844 | 10 Channel LED Backlight Driver with Integrated Power Supply      | High efficiency LED driver for use in backlighting LCD displays. Capable of driving more than 150 LEDs, in 10 parallel strings, with 50/80 mA per string. Currents in the 10 strings are matched to within $\pm 2\%$ . Controlled through an I <sup>2</sup> C bus. Contains an PWM generator for LED dimming.  | 7.0 to 28             | 60 V,<br>@ 3.0 A       | Under-voltage Lockout, Over-voltage protection. Over-temperature protect. Over-current protection. Output Short protect          | 32-pin QFN Exposed Pad | Production EVB <sup>2</sup><br>†PL |
| MC34845 | 6 Channel LED Backlight Driver with Integrated Power Supply       | High efficiency LED driver for use in backlighting LCD displays. Capable of driving more than 96 LEDs, in 6 parallel strings. Currents in the 6 strings are matched to within $\pm 2\%$ . Programmable LED current setting. Contains a PWM generator for LED dimming.  | 6.0 to 21             | 60 V<br>@ 2.1 A        | Under-voltage Lockout, Over-voltage protection. Over-temperature protect. Over-current protection. Output Short and Open protect | 24-pin QFN Exposed Pad | Production EVB<br>†PL              |
| MC34848 | 8 Channel LED Backlight Driver with Integrated Boost Power Supply | High efficiency, LED driver for use in LCD backlighting applications. It is designed to support up to 160mA /channels in scanning mode, or 80mA/ channels in local dimming mode. Current reference for LED current tolerance is accurate to $\pm 1\%$ channel-to-channel and IC-to-IC. The current can be programmed in both local dimming and scanning modes. | 12 to 28              | 45 V<br>(external FET) | LED short & open protect, Over-voltage protection. Over-temperature & Over-current protect.                                      | 48-pin QFN Exposed Pad | Production †PL                     |

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- Supporting backlight EVB - KITLEDCLKT16EVBE

## POWER MANAGEMENT (CONTINUED)

### Battery Management

| Product | Description  | Main Characteristics   | Operating Voltage (V)               | Output Voltages   | Protection Features   | Packaging               | Status         |
|---------|--|--|-------------------------------------|---|---|-------------------------|----------------|
| MC34671 | High-input Voltage Charger for Single-cell Li-Ion or Li-Polymer Batteries  | Fixed output charge voltage with $\pm 0.7\%$ voltage accuracy and a maximum user programmable charge current of 600 mA, with $\pm 5\%$ current accuracy. Supports trickle, CC and CV charge modes.   | 2.6 to 10                           | 4.2 V<br>@ 600 mA   | Under-voltage POR, Input Over-voltage protection above 11 V, Over-temperature protect. Tolerates input voltage up to 28 V DC.                         | 8-pin UDFN Exposed Pad  | Production EVB |
| MC34673 | High-input Voltage Charger for Single-cell Li-Ion or Li-Polymer Batteries  | Fixed output charge voltage with $\pm 0.7\%$ voltage accuracy and a maximum user programmable charge current of 1200 mA, with $\pm 6\%$ current accuracy. Supports trickle, CC, and CV charge modes.   | 2.6 to 6.6                          | 4.2 V<br>@ 1200 mA  | Under-voltage POR, Input Over-voltage protection above 6.8 V, Over-temperature protect. Tolerates input voltage up to 28 V DC.                        | 8-pin UDFN Exposed Pad  | Production EVB |
| MC34674 | High-input Voltage Travel Charger for Single-cell Li-Ion or Li-Polymer Batteries   | Fixed output charge voltage with $\pm 0.4\%$ voltage accuracy and a maximum factory selectable charge current of 1050 mA, with $\pm 8\%$ current accuracy. Supports trickle, CC, and CV charge modes. Interface to NTC thermistor.   | 4.3 to 10.0                         | 4.2 V<br>@ various currents - see Data Sheet  | Under-voltage POR, Input Over-voltage protection above 11 V, Over-temperature protect. Tolerates input voltage up to 28 V DC.                         | 8-pin UDFN Exposed Pad  | Production EVB |
| MC34675 | High-input Voltage Charger for Single-cell Li-Ion Batteries with Linear Regulator  | Fixed output charge voltage with $\pm 0.7\%$ voltage accuracy and a maximum user programmable charge current of 1000 mA, with $\pm 6\%$ current accuracy. Supports trickle, CC, CV and EOC charge modes. The 4.85 V linear regulator is capable of 10 mA output current                        | 4.3 to 6.6                          | 4.2 V @ 1000 mA<br>4.85 V @ 10 mA   | Under-voltage POR, Input Over-voltage protection above 6.8 V, Over-temperature protection. Tolerates input voltage up to 28 V DC.                     | 8-pin UDFN Exposed Pad  | Production EVB |
| MC34676 | High-input Voltage Charger for Single-cell Li-Ion Batteries with Linear Regulator and dual input voltage supplies (AC & USB) | Fixed output charge voltage with $\pm 0.7\%$ voltage accuracy and a maximum user programmable charge current of 400/1200 mA, with $\pm 5\%$ current accuracy. Supports trickle, CC, CV and EOC charge modes. The 4.85 V linear regulator function can supply 50 mA or 12 mA of output current. | 4.0 to 5.5 (USB)<br>4.0 to 6.6 (AC) | 4.2 V<br>@ various currents - see Data Sheet<br><br>4.85 V<br>@ various currents - see Data Sheet | Under-voltage POR, Input Over-voltage protection above 6.8 V (AC) or 5.8 V (USB), Over-temperature protection. Tolerates input voltage up to 28 V DC. | 12-pin UDFN Exposed Pad | Production EVB |

## POWER MANAGEMENT (CONTINUED)

### Power Management Integrated Circuits(PMIC)

| Product | Description  | Main Characteristics  | MCU Support                            | Operating Voltage (V) | Protection Features  | Light Management                       | Additional Features  | Packaging                                    | Status <sup>1</sup>          |
|---------|--|---|--|-----------------------|--|--|--|--|------------------------------|
| MC13783 | Highly Integrated, High Tier Power Management & Audio IC | 18 LDOs, 4 buck and 1 boost switching regulators; Li-Ion battery charging; 2 handset mic & 1 headset mic transmitter amplifiers; Earpiece, loudspeaker and headset receiver amplifiers; 13 bit voice Codec; 16 bit stereo record; 16 bit stereo DAC; multiple charging modes; Dual SPI and Dual SSI interfaces. | Single and dual i.MX31 and i.MX27      | 2.9 to 4.65           | Over-temperature, Over-voltage, Under-voltage  | 3 zone LED drivers, 3 zone RGB drivers | RTC, USB-OTG, CE936-A CarKit, Dynamic Voltage Scaling (DVS), Coincell, Touchscreen Interface | 247-pin BGA, (10x10 mm)                      | Production †PL               |
| MC13892 | Power Management Integrated Circuit (PMIC)               | 18 regulators: 12 LDOs, 4 buck switchers, 2 boost switchers; Li-Ion and Coin cell battery charging, single and serial path, SPI, I <sup>2</sup> C, 10 bit ADC with 8 channels, 3 GPO ADCs, mux and scaling circuitry included.  | i.MX27, i.MX35, i.MX37, i.MX51         | 2.55 to 4.65          | Over-temperature, Over-voltage, Over-current, Short-circuit  | 3 zone LED drivers, 3 zone RGB drivers | RTC, USB - OTG, Dynamic Voltage Scaling (DVS)  | 139-pin BGA (7x7 mm), 186 pin BGA (12x12 mm) | Production EVB (x2) †PL      |
| MC34704 | Multiple Channel DC-DC Power Management IC. (PMIC)       | Features 8(A) or 5(B) buck & boost DC/DC switching regulators, with up to ±2% output voltage accuracy. It is capable of operating at a switching frequency of up to 2.0 MHz. The 34704 utilizes I <sup>2</sup> C programmability.   | i.MX25, i.MX27                         | 2.7 to 5.5            | Output Under-voltage & Over-voltage detect, Over-current limit detection and Short-circuit protect, Thermal limit detect | –                                      | Dynamic Voltage Scaling (DVS)  | 56-pin QFN Exposed Pad                       | Production EVB(A) EVB(B) †PL |
| MC34708 | Power Management Integrated Circuit (PMIC)               | 5 programmable buck converters and 8 low drop out (LDO) regulators for primary use with Freescale i.MX series of microprocessors, graphics, peripheral and memory devices, as well as other system supplies. Li-Ion battery charger.  | i.MX50, i.MX53, i.MX35, i.MX37, i.MX51 | 3.0 to 4.5            | Regulators are over-voltage & under-current protected, Thermal limit protect, Battery mgmt. protect.                     | –                                      | 4 wire Touch Screen, PWM outputs, RTC, Coincell  | 206-pin MAPBGA (8x8 mm, 13x13 mm)            | Production EVB               |
| MC34709 | Power Management Integrated Circuit (PMIC)               | 5 programmable buck converters and 8 low drop out (LDO) regulators for primary use with Freescale i.MX series of microprocessors, graphics, peripheral and memory devices, as well as other system supplies.  | i.MX50, i.MX53, i.MX35, i.MX37, i.MX51 | 3.0 to 4.5            | Regulators are over-voltage & under-current protected, Thermal limit protect,  | –                                      | 4 wire Touch Screen, PWM outputs, RTC, Coincell  | 130-pin MAPBGA (8x8 mm)                      | Mar. 2012 (EVB - in Dsgn.)   |

1. †PL denotes Product Longevity products - 10 years or 15 years ([www.freescale.com/productlongevity](http://www.freescale.com/productlongevity))

## POWER MANAGEMENT (CONTINUED)

### Power over Ethernet (PoE)

| Product | Description  | Main Characteristics   | Operating Voltage (V) | Max Current Limit (A) | Number of Channels | Protection Features   | Packaging    | Status         |
|---------|--|--|-----------------------|-----------------------|--------------------|---|--------------|----------------|
| MC34670 | IEE 802.3af Powered Device with Current Mode Switching Regulator | Integrated IEEE 802.3af Compliant Interface, Signature Detection and Power Classification Functionality, High Performance Current Mode Switching Regulator | 30 to 60              | 2.1                   | 1                  | Fast Short-circuit Detect, Thermal Shutdown, Over-voltage Shutdown, Inrush Current Limit, Over-voltage Lock Out | 20-pin SOICW | Production EVB |

## POWER MANAGEMENT (CONTINUED)

### Automotive Alternator Voltage Regulators(LIN 1.3 compliant)

| Product  | Description  | Main Characteristics   | Bus Type | Operating Voltage (Vdc) | Regulation Voltage (VDC) | Other Features   | Diagnostics   | Protection Features  | Packaging | Status     |
|----------|--|--|----------|-------------------------|--------------------------|--|---|--|-----------|------------|
| TC803100 | An integrated circuit intended to regulate the output voltage of an automotive alternator. It supplies a current via a high side MOSFET to the excitation coil of the alternator and provides an internal free-wheeling diode. | High Side field driver, Internal freewheeling diode, Up to 8.0 A rotor current (excitation coil), Load response control (LRC), LIN interface, Set point voltage selectable | LIN      | 8 to 27                 | 150                      | Factory Selectable Features: LRC Rate, LRC disable RPM, Self start, Self start threshold, Alternator Pole pairs, Thermal Fault Threshold, Thermal Compensation Threshold, Phase Sensitivity, Phase Start Regulating RPM, Phase Stop Regulating RPM | LIN communication used for Electrical, Mechanical and Thermal fault reporting | Load Dump Protection, Thermal protection, Thermal compensation | Die       | Production |

Note: Choice of 16 parametric fields may be specified by the customer. Contact sales for specific parameter combinations and part numbering.

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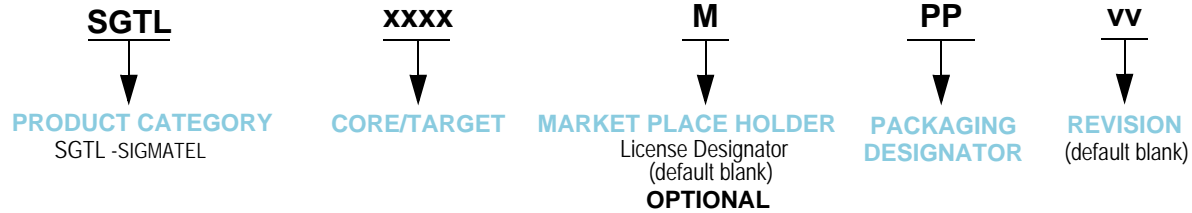
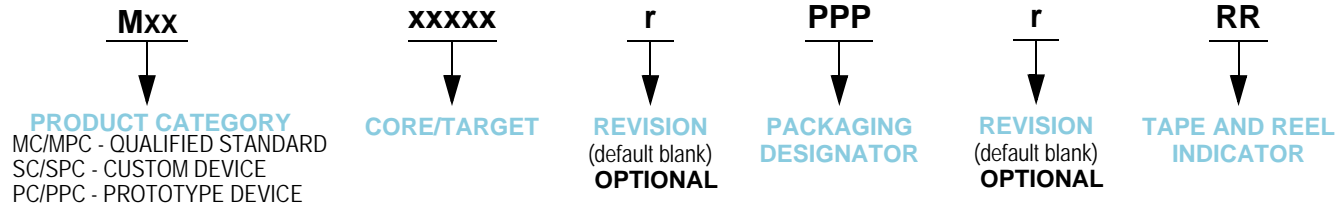
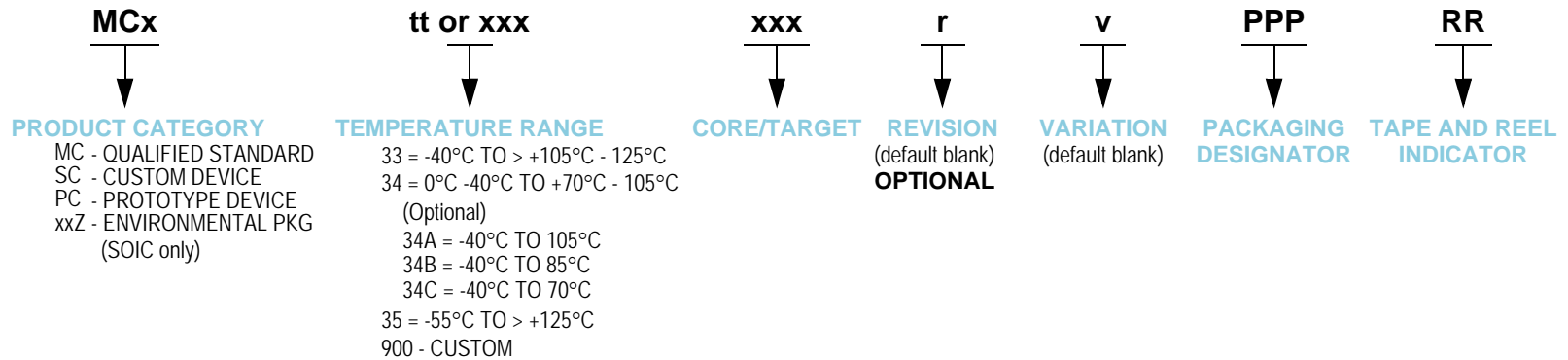
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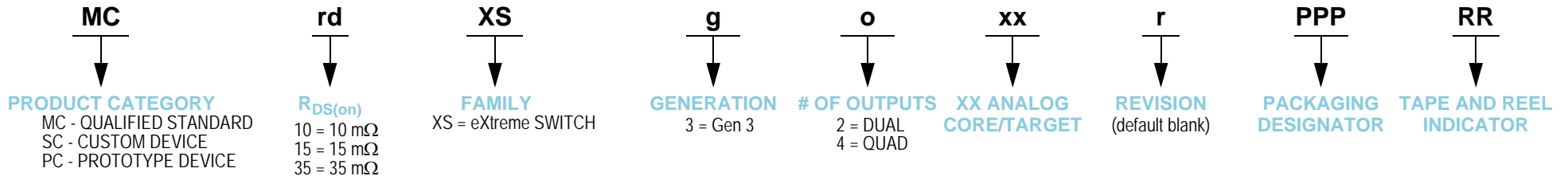
#### *Transmitters and Receivers*

| Product | RF Type     | RF Frequency      | Protocols Supported      | Clock Type                      | Bandwidth | Sensitivity                        | Temperature    | Package         | Additional Features   | In Production | Market Focus                                 |
|---------|-------------|-------------------|--------------------------|---------------------------------|-----------|------------------------------------|----------------|-----------------|---|---------------|--|
| MC33596 | Receiver    | 315 MHz - 915 MHz | OOK and FSK Demodulation | Programmable PLL and Strobe OSC | 380 kHz   | -103 dBm to -81 dBm typ in 4 steps | -40°C to +85°C | 32 LQFP, 32 QFN | RSSI (75 dB digital and 55 dB analog), Strobe OSC and Data Manager with clock recovery for Manchester coded signals | Yes           | UHF RF Receiver, RF, Remote and Secure Entry |
| MC33696 | Transceiver | 315 MHz - 915 MHz | OOK and FSK Demodulation | Programmable PLL and Strobe OSC | 380 kHz   | -103 dBm to -81 dBm typ in 4 steps | -40°C to +85°C | 32 LQFP, 32 QFN | RSSI (75 dB digital and 55 dB analog), Strobe OSC and Data Manager  | Yes           | Remote/Secure Entry (2-way RF)               |

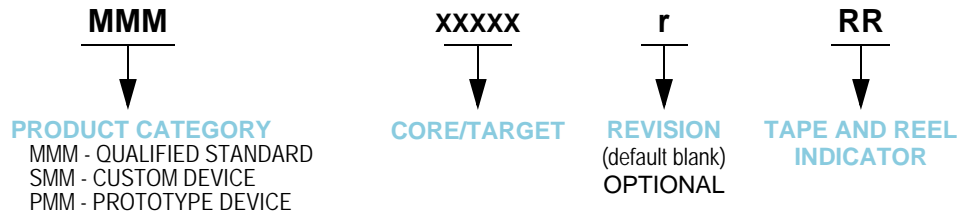
## Product Numbering — Analog Devices



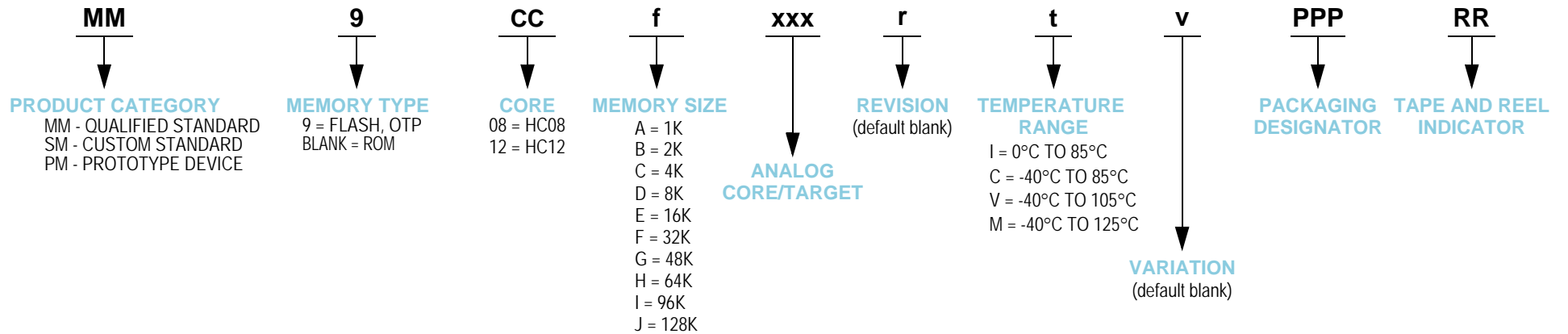
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## Product Numbering - RF Transceiver



## Product Numbering— Analog Embedded MCU plus Power Devices



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