

# Automotive

**Quarter 1, 2012**

**SG187Q12012 Rev 45**

**Analog and Mixed-Signal Products**

**Power Management Products**

**Sensor Products**

**Access and Remote Control Products**

**S08 8-Bit Microcontroller Products**

**S12 and S12X 16-Bit Microcontroller Products**

**56F8xxx Digital Signal Controller Products**

**Qorivva MPC55xx and MPC56xx 32-Bit Products**

**MPC52xx and MPC51xx 32-Bit Products**

**i.MX 32-Bit Automotive Products**



# 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 flexibility, durability, efficiency, precision, high-performance analog, and robustness.

**Packaging** — Freescale devices may be offered in EPP and RoHS compliant packages.

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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 6 @ 1000	2 @ 6.0 6 @ 2.0	30	SPI, Parallel	SPI	Open Load detect, Overcurrent protect, Overvoltage protect, Shorted Load detect, Undervoltage 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	SPI, Parallel	SPI Status Flags	Shorted Load detect, Thermal protect	32-pin SOICW Exposed Pad	Production EVB
MC33812	Engine control power IC, with 3 Low-Side drivers, one pre-driver, +5V pre-regulator, ISO-9141 physical interface and MCU watchdog circuit.	3	L	2 @ 4.0 1 @ 1.5	2 @ 200 1 @ 1000	2 @ 6.0 1 @ 2.0	2 @ 1000 1 @ 20	Parallel	Parallel	Overcurrent, Outputs Short to Battery, Overtemperature 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 RDS(on)) 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, 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 10)										

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 PRODUCTS (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 <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>
MC06XS3517	Penta High Side Switch (3 x 6mΩ, 2 x 17 mΩ), 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 6mΩ), 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 7mΩ), 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 9mΩ), 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 mΩ, 2 x 12 mΩ), 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, Overcurrent Shutdown, Overtemperature, Short Circuit	24-pin PQFN	Production EVB †PL
MC10XS3425	Quad High Side Switch (2 x 10 mΩ, 2 x 25mΩ), 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 10 mΩ, 2 x 35 mΩ), 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, Overcurrent Shutdown, Overtemperature, Short Circuit	24-pin PQFN	Production EVB †PL
MC10XS3535	Penta High-Side Switch (3 x 10mΩ, 2 x 35 mΩ), 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, Overcurrent Shutdown, Overtemperature, Short Circuit	24-pin PQFN	Production EVB †PL
MC10XS4200	Dual High Side Switch (2 x 10mΩ), 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 mΩ), with PWM, Protection, Diagnostics and SPI Control	4	H	6.0	15	30	5.0	SPI and Parallel	SPI	Fail Safe Mode, Overcurrent Shutdown, Overtemperature, Short Circuit	24-pin PQFN	Production EVB †PL
MC20XS4200	Dual High Side Switch (2 x 20mΩ), 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 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
MC33981	Single High-Side Switch (4.0 mΩ), with PWM, Protection and Diagnostics	1	H	40.0	4	100	5.0	Parallel	Status Pin, Current Monitor, Temperature	Overcurrent, Overtemperature, Short Circuit, Undervoltage Lock Out	16-pin PQFN	Production †PL
MC33982	Self Protected 2 mΩ Switch with Diagnostic and Protection	1	H	30.0	2	100 or 150 Selectable	5.0	SPI and Parallel	SPI	Temp Sense, Over/Undervoltage, Shutdown, Overcurrent, Reverse Polarity, Current Recopy	16-pin PQFN	Production EVB
MC33984	Self Protected 4 mΩ Switch with Diagnostic and Protection	2	H	15.0	4	75 or 100 Selectable	5.0	SPI and Parallel	SPI	Temp Sense, Over/Undervoltage, Shutdown, Overcurrent, Reverse Polarity, Current Recopy	16-pin PQFN	Production EVB
MC33988	Self Protected 8 mΩ Switch with Diagnostic and Protection	2	H	7.5	8	45 or 60 Selectable	5.0	SPI and Parallel	SPI	Temp Sense, Over/Undervoltage, Shutdown, Overcurrent, Reverse Polarity, Current Recopy	16-pin PQFN	Production EVB
MC35XS3400	Quad High-Side Switch (4 x 35 mΩ), with PWM, Protection, Diagnostics and SPI Control	4	H	6.0	35	30	5.0	SPI and Parallel	SPI	Fail Safe mode, Overcurrent Shutdown, Overtemperature, Short Circuit	24-pin PQFN	Production EVB †PL
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, Overcurrent Shutdown, Overtemperature, Short Circuit	24-pin PQFN	Production EVB †PL

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## ANALOG AND MIXED-SIGNAL PRODUCTS (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>
MM908E621	Integrated Quad Half-Bridge and Triple High-Side with Embedded MCU and LIN for High End Mirror											
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											

See Embedded MCU + Power/ 8-Bit Intelligent Distributed Controllers (page 10)

See Embedded MCU + Power/ S12 MagniV Mixed-Signal MCUs (page 10)

1. Products available with SPI Control work with the KITUSBSPIEVME and the KITUSBSPIDGLEVME 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))

## ANALOG AND MIXED-SIGNAL PRODUCTS (continued)

### Power Actuation — H-Bridges and Motor Drivers

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	Control <sup>1</sup>	Status/Fault Reporting	Protection Features	Packaging	Status <sup>2</sup>
MC33186	H-Bridge Driver (5.0 A)	2	H/L	5.0	150	6.5	20 mA	Parallel	1 Status Pin	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	8	H/L	0.35	550	1.2	25 μA	SPI w/2 PWM	SPI	Short Circuit, Current Limit, Temp Sense	32-pin SOICW Exposed Pad	Production EVB †PL
MC33880	Configurable Eight Output SPI Controlled Switch	8	H/L	0.5	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)	2			120	6.0	20 mA	Parallel	1 Status Pin (Overcurrent/Overtemp)	Short Circuit, Current Limit, Temp Sense	20-pin HSOP	Production EVB
MC33887	H-Bridge Driver with Sleep Mode (5.2 A)	2			130	6.0	25 μA	Parallel	1 Status Pin (Overcurrent/Overtemp)	Short Circuit, Current Limit, Temp Sense	20-pin HSOP, 36-pin PQFN, 54-pin SOICW Exposed Pad	Production EVB †PL
MC33899	Programmable H-Bridge Power IC	2			100	11.5	50 μA	SPI and Parallel	SPI	Open Circuit detect, Undervoltage, Overtemperature Shutdown, Output Short Circuit Current Limit	30-pin HSOP	Production
MC33926	5.0 A Throttle Control H-Bridge	2			120	8.0	50 μA	Parallel	Status Flag	Output Short Circuit Protect, Overcurrent Limit, Overtemperature	32-pin PQFN	Production EVB
MC33931	5.0 A Throttle Control H-Bridge	2			120	8.0	50 μA	Parallel	Status Flag	Output Short Circuit Protect, Overcurrent Limit, Overtemperature	44-pin HSOP	Production EVB ('932)
MC33932	5.0 A Throttle Control Dual H-Bridge	4			120	8.0	50 μA	Parallel	Status Flag	Output Short Circuit Protect, Overcurrent Limit, Overtemperature	44-pin HSOP	Production EVB

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

### 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	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 mA (typ)	SPI	Open Load detect, Overcurrent, Overvoltage, Shorted Load detect, Undervoltage, Thermal	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	32-pin SOICW Exposed Pad	Production EVB
MC33812	Single cylinder Engine control IC.	Engine control power IC, with 3 Low-Side drivers, one pre-driver, +5V pre-regulator, ISO-9141 physical interface and MCU watchdog circuit.	4.5 to 36	Parallel	2L, 4.0 A (typ) 1L, 1.5 A (typ)	Parallel	Overcurrent, Outputs Short to Battery, Overtemperature 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	Overvoltage, Undervoltage	20-pinSOICW	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 deadline (shoot-through protect).	8.0 to 58	Parallel, SPI	3 H, 3 L, 1.0 A (typ)	SPI	Programmable Deadline, Reverse Charge Injection	54-pin SOICW Exposed Pad	Production EVB †PL

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

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## 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 6 @ 2.0 1 @ 2.8 1 @ 1.0	2 @ 700 6 @ 1000 1 @ 250 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 See Signal Conditioning (page 7)	5 input solenoid monitoring to verify proper electrical and mechanical solenoid operation.	—	—	SPI	10.5 to 15.5	16-pin SOICW	Production EVB †PL
MC33812	Single cylinder Engine control IC	Engine control power IC, with 3 Low-Side drivers, one pre-driver, +5V pre-regulator, ISO-9141 physical interface and MCU watchdog circuit.	2 @ 6.0 1 @ 2.0	2@200 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	5.0 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	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 deadtime (shoot-through protect).	—	—	SPI, Parallel	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 See Signal Conditioning (page 7)	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.	—	—	SPI	5.5 to 26.5	32-pin SOICW Exposed Pad	Production EVB †PL

1. Products available with SPI Control work with the KITUSBSP1EVME and the KITUSBSP1DGLVME USB-SPI Interface Boards.
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### Communication Transceivers — CAN 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					
MC33742	System Basis Chip with Enhanced High-Speed CAN (250k to 1Mbps)	Dual V <sub>REG</sub> Enhance HS CAN with Bus failure diagnostic capability, 4 wake-up inputs.	CAN High-Speed dual wire	5.5 to 27	60	150	Low power modes, remote and local wake-up capabilities	SPI (for diag)	Current and thermal protection for CAN and regulator	28-pin SOICW, 48-pin QFN	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-up 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, Undervoltage lockout detect 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-up input, sleep mode, and cyclic sense	SPI	n/a	28-pin SOICW	Production EVB †PL
MC33903	System Basis Chip(SBC)-Gen 2-with High Speed CAN & LIN Interfaces	High speed CAN and 1 or 2 LIN physical interface. 5.0 or 3.3 V VDD regulator.	CAN high-speed, dual wires, LIN single wire	5.5 to 27	15	35	Fail-safe state machine, Configurable I/O, MUX - out, pin compatible with MC33905	"safe" SPI	Overcurrent, Overtemperature, Short circuit, protect	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	Fail-safe state machine, Configurable I/O, MUX - out, pin compatible with MC33905	"safe" SPI	Overcurrent, Overtemperature, Short circuit, protect	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	Fail-safe state machine, Configurable I/O, MUX - out, SAFE output, Low power modes w/INT and RST capability.	"safe" SPI	Overcurrent, Overtemperature, Short circuit, protect	32-pin SOICW Exposed Pad, 54-pin SOIC Exposed Pad	Production EVB †PL
MC33909	System Basis Chip with Multiple Switch-to-Ground Interface	See System Basis Chip (page 9)									

1. Products available with SPI Control work with the KITUSBSP1EVME and the KITUSBSP1DGLVME USB-SPI Interface Boards.
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## 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	Engine control power IC, with 3 Low-Side drivers, one pre-driver, +5V pre-regulator, ISO-9141 physical interface and MCU watchdog circuit.	ISO-9141	4.5 to 36	—	—	MCU watchdog timer, +5V pre-regulator for MCU, MCU power on RESET	Parallel	Overcurrent Outputs Short to Battery, Overtemperature Protect	32-pin SOICW	Production EVB Ref.Dsgn.
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.	CAN high-speed, dual wires, LIN single wire	5.5 to 27	15	35	Fail-safe state machine, Configurable I/O, MUX - out, pin compatible with MC33905	"safe" SPI	Overcurrent, Overtemperature, Short circuit, protec	32-pin SOICW Exposed Pad	Production EVB('905)
MC33905	System Basis Chip (SBC)-Gen 2-with High Speed CAN & LIN Interfaces	High speed CAN and 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	Fail-safe state machine, Configurable I/O, MUX - out, SAFE output, Low power modes w/INT and RST capability.	"safe" SPI	Overcurrent, Overtemperature, Short circuit and undervoltage 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 9)									
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 (x2) †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 Transceiver - 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/an/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, 5.0V 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 (IC) (SBC)	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 wavelshaped 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

### 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 -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

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)

## 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 (250K to 1Mbps)	SBC, Dual V <sub>REG</sub> Enhance HS CAN with Bus failure diagnostic capability, 4 wake-up inputs.	CAN High-Speed dual wires	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	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-up 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 CAN and 1 or 2 LIN physical interface. 5.0 or 3.3 V VDD regulator.	CAN high-speed, dual wires, LIN single wire	5.5 to 27	15	35	Fail-safe state machine, Configurable I/O, MUX - out, pin compatible with MC33905	"safe" SPI	Overcurrent, Overtemperature, Short circuit, protec	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	Fail-safe state machine, Configurable I/O, MUX - out, pin compatible with MC33905	"safe" SPI	Overcurrent, Overtemperature, Short circuit and undervoltage 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	Fail-safe state machine, Configurable I/O, MUX - out, SAFE output, Low power modes w/INT and RST capability.	"safe" SPI	Overcurrent, Overtemperature, Short circuit and undervoltage 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			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 drives & 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-up input, sleep and stop modes	SPI	Current limitation, thermal	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 + 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/10mA & 60mA, 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, 128K/96K Bytes Flash, 6K Bytes RAM, 4K 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)

### 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; 2 x 750 mΩ Half-Bridges; 1 x 185 mΩ High-Side; 2 x 440 mΩ High-Side; Switched 5.0 V Output (25 mA)			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; 2 x 750 mΩ Half-Bridges; 1 x 185 mΩ High-Side; 2 x 440 mΩ High-Side; Switched 5.0 V Output (25 mA) 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, 2 x 2.5 Ω High-Side Switches for Relay Control	8-Bit MCU MC68HC908EY16	HC08 Core, 16K Flash, 512 Bytes RAM, ESCI, 8-Channel 10-bit ADC, Two 16-bit 2 Channel Timers, Internal Clock Generator	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; 1 x 600 mΩ High-Side; 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; 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))

### 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 Selectable Dual High-Side and Dual Low Side Switches with Embedded S12 MCU + Power + LIN	7 Ω High-Side Switches, 2.5 Ω Low-Side Switches for relay drive	16-Bit MCU	S12 16-Bit Core, 32K Flash, 2K 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 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	16-Bit MCU 16-Bit MCU	S12 16-Bit Core, 64K/48K Flash, 2K 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, wakeup 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))

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# 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 PRODUCTS

### Power Management — Linear Regulators

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					
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	150	—	Programmable voltage regulator, power sequencing, adjustable OSC - Switcher	None	Reverse Battery Protect, Undervoltage and Overvoltage Lockout, Reset monitor signals for regulators (4)	32-pin SOICW	Production EVB
MC33742	System Basis Chip with enhanced High-Speed CAN (250k to 1Mbps)	SBC, Dual V <sub>REG</sub> Enhance HS CAN with Bus failure diagnostic capability, 4 wake-up inputs; Pin and function compatible with MC33989	CAN HS dual wire	5.5 to 27	60	150	Low power modes Remote and local wake-up input capabilities	SPI	Current and thermal protection for CAN and regulator	28-pin SOICW	Product †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-up input, sleep & 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 9)									
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-up input, sleep and stop modes	SPI	Current limitation, thermal	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))

### Power Management — Switching Regulators

Product	Description	Main Characteristics	Operating Voltage (V)	Output Voltages	Protection Features	Packaging	Status
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, 2.0 to 3.3 V, 1.5 to 3.3 V, 1.0 to 5.0 V, 5.0 V	Reverse Battery Protect, Undervoltage and Overvoltage Lockout, Reset monitor signals for regulators (4)	32-pin SOICW	Production EVB

## Automotive Alternator Voltage Regulators (LIN 1.3 protocol 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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# FREESCALE SEMICONDUCTOR AUTOMOTIVE SENSORS

Sensor Products — Freescale is a leading sensor supplier for automotive safety and is expanding into advanced safety systems such as Tire Pressure Monitoring Systems (TPMS) and Electronic Stability Control (ESC), which are new growth areas in active safety.

Our Zero Defects process and Automotive Electronics Council (AEC) membership are critical in providing world-class quality solutions from entry-level to the high end.

Applications — Freescale Semiconductor automotive sensors are designed for a variety of applications ranging from safety and performance to comfort and control. Our sensors are used in under-hood and in-cabin applications, and are compatible with Freescale microcontroller families.

For additional information, visit [www.freescale.com/automotive](http://www.freescale.com/automotive)

## AUTOMOTIVE SENSORS

### Pressure Sensors

Product	Maximum Pressure Rating (kPa)	Full Scale Span Voltage (Typical) (Vdc)	Sensitivity (mV/kPa)	Accuracy 0°C to 85°C (% of V <sub>FSS</sub> )	Packaging	Status
MPX4100A	105	4.6	54	±1.8	Small Outline Package (SOP)	Available
MPXAZ4100A	105	4.6	54	±1.8	SOP — media resistant package	Available
MPX4115	115	4.6	46	±1.5	Super-Small Outline Package (SSOP)	Available
	115	4.4	38	±1.5		Available
MPX4250	250	4.7	20	±1.5	SSOP	Available
	250	4.7	19	±1.4	SSOP	Available
MPXV5004	4	3.9	1000	±2.5	SOP	Available
MPXV5010G	10	4.5	450	±5.0	SOP	Available
MPX5100	100	4.5	45	±2.5	6-pin unibody package	Available
MPX5700	700	4.5	6.4	±2.5	6-pin unibody package	Available
MPX5999D	1000	4.5	4.5	±2.5	6-pin unibody package	Available
MPXH6101	102	4.6	54	±1.8	SSOP	Available
MPXV6115V	115	4.6	45.9	±1.5	SOP	Available
MPXV7007	7	4.0	286	±5.0	SOP	Available
MPXV7025	25	4.5	90	±5.0	SOP	Available

### Barometric Absolute Pressure (BAP) and Manifold Absolute Pressure (MAP) Sensors

Product	Maximum Pressure Rating (kPa)	Full Scale Span Voltage (Typical) (Vdc)	Sensitivity (mV/kPa)	Accuracy 0°C to 85°C (% of V <sub>FSS</sub> )	Packaging	Status
MPXH6101A	102	4.6	54	±1.8	Super-Small Outline Package (SSOP)	Available
MPXA6115A	115	4.6	45.9	±1.5	SOP	Available
MPXAZ6115A	115	4.5	45.9	±1.5	SOP	Available
MPXHZ6115	115	4.5	45.9	±1.5	SSOP	Available
MPXHZ6115A	115	4.5	45.9	±1.5	SSOP	Available
MPXH6250A	250	4.7	20	±1.5	SSOP	Available
MPXHZ6250	250	4.7	20	±1.5	SSOP	Available
MPXH6300	300	4.7	16	±1.8	SSOP	Available
MPXH6400	400	4.7	12	±1.5	SSOP	Available
MPXHZ6400	400	4.7	12	±1.5	SSOP	Available

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# AUTOMOTIVE SENSORS (continued)

## Inertial Sensors<sup>1</sup>

Product	Sensing Direction	Acceleration (±g)	Sensitivity (mV/V/g)	Sensitivity (count/g)	Temperature Range	Roll-Off Frequency	Analog	Digital	Communication	Packaging	Status	Replacement Part	Alternate Parts
<b>Analog Sensors:</b>													
MMA1260EG	Z	1.5g	240	—	-40°C to +105°C	50 Hz	Yes	—	—	16-pin SOIC	EOL	MMA1260KEG	n/a
MMA1270EG	Z	2.5g	150	—	-40°C to +105°C	50 Hz	Yes	—	—	16-pin SOIC	EOL	MMA1270KEG	n/a
MMA1250EG	Z	5g	80	—	-40°C to +105°C	50 Hz	Yes	—	—	16-pin SOIC	EOL	MMA1250KEG	n/a
MMA1220EG	Z	8g	50	—	-40°C to +85°C	250 Hz	Yes	—	—	16-pin SOIC	EOL	MMA1220KEG	n/a
MMA1213EG	Z	50g	40	—	-40°C to +125°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	n/a	MMA8104TKEG, MMA5106KW
MMA1211EG	Z	150g	2.6	—	-40°C to +125°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	n/a	MMA8115TKE, MMA5112KW
MMA1212EG	Z	200g	2	—	-40°C to +105°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	n/a	MMA8125TKEG, MMA5124KW
MMA1200EG	Z	250g	1.6	—	-40°C to +125°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	n/a	MMA8125TKEG, MMA5124KW
MMA2260EG	X	1.5g	240	—	-40°C to +105°C	50 Hz	Yes	—	—	16-pin SOIC	EOL	n/a	MMA6900KQ
MMA2240EG	X	7g	300	—	-40°C to +125°C	50 Hz	Yes	—	—	16-pin SOIC	EOL	MMA2240KEG	n/a
MMA2244EG	X	20g	100	—	-40°C to +125°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	MMA2244KEG	n/a
MMA2201EG	X	40g	10	—	-40°C to +125°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	MMA2201KEG	n/a
MMA2202EG	X	50g	8	—	-40°C to +125°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	MMA2202KEG	n/a
MMA2204EG	X	100g	4	—	-40°C to +125°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	MMA2204KEG	n/a
MMA2300EG	X	250g	1.6	—	-40°C to +125°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	MMA2300KEG	n/a
MMA2301EG	X	200g	2	—	-40°C to +125°C	400 Hz	Yes	—	—	16-pin SOIC	EOL	MMA2301KEG	n/a
MMA6222AEG	XY	20/20	23.4/23.4	—	-40°C to +125°C	400 Hz	Yes	—	—	20-pin SOIC	EOL	MMA6222KEG	n/a
MMA3201EG	XY	40g	10	—	-40°C to +125°C	400 Hz	Yes	—	—	20-pin SOIC	EOL	MMA6222AKEG	n/a
MMA3221EG	XY	50/20	40/100	—	-40°C to +125°C	400 Hz	Yes	—	—	20-pin SOIC	EOL	MMA3201KEG	n/a
MMA6255AEG	XY	50/50	9.37/9.37	—	-40°C to +125°C	400 Hz	Yes	—	—	20-pin SOIC	EOL	MMA6255KEG	n/a
MMA3204EG	XY	100/30g	4/13	—	-40°C to +125°C	400 Hz	Yes	—	—	20-pin SOIC	EOL	MMA6255AKEG	n/a
MMA3202EG	XY	100/50g	4/8	—	-40°C to +125°C	400 Hz	Yes	—	—	20-pin SOIC	EOL	MMA3204KEG	n/a
MMA621010AEG	XY	100/100	4.68/4.68	—	-40°C to +125°C	400 Hz	Yes	—	—	20-pin SOIC	EOL	MMA621010KEG	n/a
<b>Digital Sensors:</b>													
MMA5106W	Z	60g	—	8	-40°C to +125°C	400 Hz	—	Yes	PSI5	16-pin QFN	EOL	MMA5106KW	n/a
MMA5112W	Z	120g	—	4	-40°C to +125°C	400 Hz	—	Yes	PSI5	16-pin QFN	EOL	MMA5112KW	n/a
MMA5124W	Z	240g	—	2	-40°C to +125°C	400 Hz	—	Yes	PSI5	16-pin QFN	EOL	MMA5124KW	n/a
MMA5148W	Z	480g	—	1	-40°C to +125°C	400 Hz	—	Yes	PSI5	16-pin QFN	EOL	MMA5148KW	n/a
MMA5206W	X	60g	—	8	-40°C to +125°C	400 Hz	—	Yes	PSI5	16-pin QFN	EOL	MMA5206KW	n/a
MMA5212W	X	120g	—	4	-40°C to +125°C	400 Hz	—	Yes	PSI5	16-pin QFN	EOL	MMA5212KW	n/a
MMA5224W	X	240g	—	2	-40°C to +125°C	400 Hz	—	Yes	PSI5	16-pin QFN	EOL	MMA5224KW	n/a
MMA5248W	X	480g	—	1	-40°C to +125°C	400 Hz	—	Yes	PSI5	16-pin QFN	EOL	MMA5248KW	n/a
MMA2602W	X	25g	—	20.48	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA2602KW	n/a
MMA2605W	X	50g	—	10.24	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA2605KW	n/a
MMA2606W	X	62.5g	—	8.192	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA2606KW	n/a

## Inertial Sensors<sup>1</sup>

Product	Sensing Direction	Acceleration (±g)	Sensitivity (mV/V/g)	Sensitivity (count/g)	Temperature Range	Roll-Off Frequency	Analog	Digital	Communication	Packaging	Status	Replacement Part	Alternate Parts
MMA2612W	X	125g	—	4.096	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA2612KW	n/a
MMA2618W	X	187g	—	2.731	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA2618KW	n/a
MMA2631W	X	312g	—	1.638	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA2631KW	n/a
MMA1605W	Z	50g	—	10.24	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA1605KW	n/a
MMA1606W	Z	62.5g	—	8.192	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA1606KW	n/a
MMA1612W	Z	125g	—	4.096	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA1612KW	n/a
MMA1618W	Z	187g	—	2.731	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA1618KW	n/a
MMA1631W	Z	312g	—	1.638	-40°C to +125°C	400 Hz	—	Yes	DSI	16-pin QFN	EOL	MMA1631KW	n/a
MMA6222EG	XY	20/20	—	24	-40°C to +125°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA2301KEG	n/a
MMA6255EG	XY	50/50	—	9.76	-40°C to +125°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA3221KEG	n/a
MMA621010EG	XY	100/100	—	4.88	-40°C to +125°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA3202KEG	n/a
MMA6851Q	X	25g	—	20.479	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6851KQ	n/a
MMA6852Q	X	35g	—	13.947	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6852KQ	n/a
MMA6853Q	X	50g	—	9.766	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6853KQ	n/a
MMA6854Q	X	75g	—	6.51	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6854KQ	n/a
MMA6855Q	X	120g	—	4.096	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6855KQ	n/a
MMA6856Q	X	60g	—	8.192	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6856KQ	n/a
MMA6811Q	XY	60g/25g	—	8.192/20.479	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6811KQ	n/a
MMA6813Q	XY	50g/50g	—	9.766/9.766	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6813KQ	n/a
MMA6821Q	XY	120g/25g	—	4.096/20.479	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6821KQ	n/a
MMA6823Q	XY	120g/60g	—	4.096/8.192	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6823KQ	n/a
MMA6826Q	XY	60g/60g	—	8.192/8.192	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6826KQ	n/a
MMA6827Q	XY	120g/120g	—	4.096/4.096	-40°C to +105°C	400 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6827KQ	n/a
MMA6900Q	XY	3.5g	—	291.5	-40°C to +105°C	50 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6900KQ	n/a
MMA6901Q	XY	5g	—	203.6	-40°C to +105°C	50 Hz	—	Yes	SPI	16-pin QFN	EOL	MMA6901KQ	n/a

1. Freescale Semiconductor reserves the right to modify product specifications and/or introduction dates without any further notice. The product parameters are typical values at  $V_{DD} = 5\text{ V}$  and  $T = 25^\circ\text{C}$ , unless otherwise specified. Additional sensitivity and expanded temperature ranges are available upon request. Consult your Freescale Semiconductor sales representative.

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## AUTOMOTIVE SENSORS (continued)

### Tire Pressure Monitoring Systems

Product	Flash	RAM	RF Transmitter Frequency	Protocols Supported	Clock Type	Timer	Pressure Range	Pressure Sensor Accuracy	Package	Temperature Range	Status	Replacement Part	Alternate Parts	Market Focus
MPXY8300A	16 KB	512 B	315/434MHz	ASK and FSK Modulation	OSC	2-CH, 16-bit PWM	100 - 800 kPA	±10 kPA	SOIC-20 WB	-40 to 125°C	EOL	n/a	MPXY8600A	Automotive Pressure Range (with XZ-Axis Accelerometer)
MPXY8300B	16 KB	512 B	315/434MHz	ASK and FSK Modulation	OSC	2-CH, 16-bit PWM	100 - 800 kPA	±10 kPA	SOIC-20 WB	-40 to 125°C	EOL	n/a	MPXY8500B MPXY8500D	Automotive Pressure Range (with Z-Axis Accelerometer)
MPXY8300C	16 KB	512 B	315/434MHz	ASK and FSK Modulation	OSC	2-CH, 16-bit PWM	100 - 800 kPA	±10 kPA	SOIC-20 WB	-40 to 125°C	EOL	n/a	MPXY8500C	Automotive Pressure Range (without an Accelerometer)
MPXY8310A	16 KB	512 B	315/434MHz	ASK and FSK Modulation	OSC	2-CH, 16-bit PWM	100 - 450 kPA	±7 kPA	SOIC-20 WB	-40 to 125°C	EOL	n/a	MPXY8610A	Automotive Pressure Range (with XZ-Axis Accelerometer)
MPXY8310B	16 KB	512 B	315/434MHz	ASK and FSK Modulation	OSC	2-CH, 16-bit PWM	100 - 450 kPA	±7 kPA	SOIC-20 WB	-40 to 125°C	EOL	n/a	MPXY8510B MPXY8510D	Automotive Pressure Range (with Z-Axis Accelerometer)
MPXY8310C	16 KB	512 B	315/434MHz	ASK and FSK Modulation	OSC	2-CH, 16-bit PWM	100 - 450 kPA	±7 kPA	SOIC-20 WB	-40 to 125°C	EOL	n/a	MPXY8510C	Automotive Pressure Range (without an Accelerometer)
MPXY8320A	16 KB	512 B	315/434MHz	ASK and FSK Modulation	OSC	2-CH, 16-bit PWM	100 - 1500 kPA	±20 kPA	SOIC-20 WB	-40 to 125°C	EOL	n/a	MPXY8620A	Truck Tire Pressure Range (with XZ-Axis Accelerometer)
MPXY8320B	16 KB	512 B	315/434MHz	ASK and FSK Modulation	OSC	2-CH, 16-bit PWM	100 - 1500 kPA	±20 kPA	SOIC-20 WB	-40 to 125°C	EOL	n/a	MPXY8620B	Truck Tire Pressure Range (with Z-Axis Accelerometer)
MPXY8320C	16 KB	512 B	315/434MHz	ASK and FSK Modulation	OSC	2-CH, 16-bit PWM	100 - 1500 kPA	±20 kPA	SOIC-20 WB	-40 to 125°C	EOL	n/a	MPXY8620C	Truck Tire Pressure Range (without an Accelerometer)

## FREESCALE SEMICONDUCTOR ACCESS AND REMOTE CONTROL PRODUCTS

For additional information, visit:  
Documentation, Tool, and Product Libraries  
[www.freescale.com](http://www.freescale.com)

Automotive Home Page  
[www.freescale.com/automotive](http://www.freescale.com/automotive)

## ACCESS AND REMOTE CONTROL PRODUCTS

### GPS Downconverter

Product	RF Freq (MHz)	Supply Voltage Range (Vdc)	Supply Current (Typ) (mA)	Standby Current (mA)	Conversion Gain (typ) (dB)	Packaging	System Applicability	Documentation
MRFC1505A	1575.42	2.7 to 3.3	28	3	105	48-pin LQFP (Case No 932)	GPS	MRFC1505

# FREESCALE SEMICONDUCTOR LOCAL INTERCONNECT NETWORK (LIN) SOLUTIONS

Freescale Semiconductor and LIN—As the only semiconductor member of the LIN consortium, Freescale Semiconductor has the industry's most advanced range of components, software, tools, and support available.

Cost Benefits from LIN—A LIN sub-bus system uses a single-wire implementation and self-synchronization, without a crystal or ceramic resonator, in the slave node. With these cost benefits, high-end comfort and convenience features no longer need to be limited only to top-of-the-line cars.

Embedded Controllers—Since the LIN sub-bus is based on common UART/SCI interface hardware, the 8-bit 68HC08, and 16-bit S12 and S12X Families provide the industry's broadest range of performance and features, affording designers the freedom to choose parts ideally suited to their needs.

Advanced Integration with LIN—Microcontrollers will evolve in the LIN environment to integrate the voltage regulator, physical interface, and high-voltage I/O to provide space, cost, and reliability benefits. Freescale Semiconductor solutions provide this capability today.

Software for LIN—Freescale Semiconductor is working closely with the leading LIN tool supplier to ensure a first class, seamless development and debug environment for Freescale Semiconductor LIN products.

For additional information, visit:

Local Interconnect Network (LIN) Home Page  
[www.lin-subbus.org](http://www.lin-subbus.org)

Automotive Home Page

## LIN Software Products

Product	68HC05	68HC08	S08	S12	S12X
LIN master	n/a	Available	Available	Available	Available
LIN slave	Available	Available	Available	Available	Available
Operating system	n/a	Available	Available	Available	Available

## LIN Physical Layer Transceivers

Product	Description	Main Characteristics	Bus Type and Standard	Protection Features	Operating Voltage (V)	Current Limitation Standby (µA)		Other Features	Control and Status Reporting	Packaging	Status
						Typ	Max				
MC33399	See <i>Network Transceivers — LIN, ISO-9141, J-1850 Physical Interface Components</i> (page 7)r										
MC33661	See <i>Network Transceivers — LIN, ISO-9141, J-1850 Physical Interface Components</i> (page 7)										
MC33662	See <i>Network Transceivers — LIN, ISO-9141, J-1850 Physical Interface Components</i> (page 7)										

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## MCU CHOICES BY APPLICATION

Application	Microcontroller
Transmission, Engine Control and Management Interfaces	MPC5674F, MPC5673F, MPC563xM, MPC5567, MPC5566, MPC5565, MPC5554, MPC5553, MPC5533, <b>S12XE, S12P, S12G</b>
Hybrid and Electric Auxiliaries	MPC5674F, MPC5673F, MPC563xM, MPC5567, MPC5566, MPC5565, MPC5554, MPC5553, MPC5533
Watchdog	<i>S08QD4, S08SG, S08AW, S08SC4</i> , <b>S12P, S12G</b>
High Temperature	<i>S08SG, SCC5566</i>
Body Control Module and Gateway	MPC5668x, MPC560xB, MPC551x, <i>S08SC4</i> , <b>S12G, S12XE</b>
HVAC, Lighting, Seats, Window Lift, Doors, Sun Roof	MPC560xB, <b>S12XS, S12P, S12G, S12XH, S12XHY</b> , <i>S08D, S08AW, S08EL, S08SG, S08SC4</i> , <b>S12VR64</b>
Body Motor Control	<i>S08MP16, S08SC4</i> , <b>S12G, S12VR64</b>
Infotainment	i.MX25, i.MX31, i.MX35, i.MX51
Telematics	MPC5200, MPC5125, MPC5123, i.MX35, i.MX51
Instrument Cluster	<i>S08LG</i> , <b>S12H, S12XH, S12XHY</b> , MPC5121e, MPC560xS, i.MX51, MPC5645S
Braking Systems	MPC564xL, MPC560xP, <b>S12XE, S12XS</b> , MPC5675K
Electronic Power Steering	MPC564xL, MPC560xP, <b>S12G</b> , MPC5675K
Semi-Active Suspension	MPC564xL, MPC5567, MPC5675K
Airbag	MPC560xP, <b>S12XF, S12XE, S12XS</b> , <i>S08SG</i> , MPC5675K
Electronic Stability Control	MPC564xL, MPC560xP, MPC5567, MPC5675K
Lane Departure	MPC564xL, MPC5561, MPC5125, MPC5675K, i.MX51
Advanced Cruise Control	MPC564xL, MPC5561, MPC5675K
Pre-crash, Blindspot Detection, Backup Warning	MPC5561, MPC564xL, MPC5125, MPC5604E, MPC5675K
Advanced Driver Assistance Systems	MPC5604E, MPC5675K
Ethernet	MPC5553, MPC5566, MPC5567, MPC560xS, MPC5668x, MPC5121e, MPC5125, all i.MX
FlexRay (tm)	MPC5668x, MPC564xL, MPC560xP, MPC551xG, MPC5674F, MPC5673F, MPC5567, MPC5561, <b>S12XF</b> , MPC5604E
CAN	<i>S08D</i> , all <b>S12(X)</b> , all MPC5xxx
LIN	<i>S08SG, S08EL, S08AW, S08D, S08SC4</i> , <b>S12P, S12XS, S12XE, S12G, S12XH, S12VR64</b>
	<b>NOTE:</b> 32-bit in plain, <b>16-bit in bold</b> , <i>8-bit in italics</i>

## S08 8 - BIT MICROCONTROLLERS

S08 Core Technology — Optimized for extreme operating economy with a number of low-power options, Freescale's S08 core is particularly attractive for automotive applications. Multiple stop modes, along with wait and standby modes, will help achieve new thresholds in low-power performance under a variety of operating conditions. The S08 core allows efficient, compact, modular coding with full 16-bit stack-pointer and stack-relative addressing, which permit various instruction sizes and enable memory interface in multiple mechanisms and addressing modes. The object code is also compatible with Freescale's legacy HC05 and HC08 cores.

S08 Family Benefits — Freescale's S08 families help save cost, reduce board space, increase performance and improve quality through extensive on-chip integration. No longer are external components required, such as an external crystal, LVI circuit, voltage regulator, I/O mux, watchdog circuit or EEPROM. With on-chip emulation and debug, changes can be made in application and in real-time, reducing development time. Also, with the S08 CPU running at 40 MHz, MCUs are able to quickly accomplish a task and go back to sleep. Quick execution translates into power savings, which allows customers to add more embedded content while staying within their power bud-

### S08 Families (Sheet 1 of 3)

Device	Bus Frequency	Flash	RAM	EEPROM	CAN	UART	SPI	I <sup>2</sup> C	SLIC	Analog (ADC)	Timer	Clock	Additional Features	Operating Voltage	Temp. Range <sup>1</sup>	Package Options	In Production
S08DZ128	20 MHz	128 KB	8 KB	Up to 2 KB	1	2xSCI	2	2	—	24-CH, 12-bit ADC, 2 comparators	Up to 12-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	48 LQFP, 64 LQFP, 100 LQFP	√
S08DZ96	20 MHz	96 KB	6 KB	Up to 2 KB	1	2xSCI	2	2	—	24-CH, 12-bit ADC, 2 comparators	Up to 12-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	48 LQFP, 64 LQFP, 100 LQFP	√
S08DZ60	20 MHz	60 KB	4 KB	Up to 2 KB	1	2xSCI	1	1	—	Up to 24-CH, 12-bit ADC, 2 comparators	Up to 6-CH+2-CHCH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP, 64 LQFP	√
S08DZ48	20 MHz	48 KB	3 KB	Up to 1.5 KB	1	2xSCI	1	1	—	Up to 24-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP, 64 LQFP	√
S08DZ32	20 MHz	32 KB	2 KB	Up to 1 KB	1	2xSCI	1	1	—	Up to 24-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP, 64 LQFP	√
S08DZ16	20 MHz	16 KB	1 KB	Up to 512B	1	2xSCI	1	1	—	Up to 16-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP	√
S08DV128	20 MHz	128 KB	6 KB	—	1	2xSCI	2	2	—	24-CH, 12-bit ADC, 2 comparators	Up to 12-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	48 LQFP, 64 LQFP, 100 LQFP	√
S08DV96	20 MHz	96 KB	4 KB	—	1	2xSCI	2	2	—	24-CH, 12-bit ADC, 2 comparators	Up to 12-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	48 LQFP, 64 LQFP, 100 LQFP	√
S08DV60	20 MHz	60 KB	3 KB	—	1	2xSCI	1	1	—	Up to 16-CH, 12-bit ADC, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP, 64 LQFP	√
S08DV48	20 MHz	48 KB	2 KB	—	1	2xSCI	1	1	—	Up to 16-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP, 64 LQFP	√
S08DV32	20 MHz	32 KB	2 KB	—	1	2xSCI	1	1	—	Up to 16-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP, 64 LQFP	√
S08DV16	20 MHz	16 KB	1 KB	—	1	1xSCI	1	1	—	Up to 16-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP	√
S08DN60	20 MHz	60 KB	2 KB	Up to 2 KB	—	1xSCI	1	1	—	Up to 16-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP, 64 LQFP	√
S08DN48	20 MHz	48 KB	2 KB	Up to 1.5 KB	—	1xSCI	1	1	—	Up to 16-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP, 64 LQFP	√

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

## S08 Families (Sheet 2 of 3)

Device	Bus Frequency	Flash	RAM	EEPROM	CAN	UART	SPI	I <sup>2</sup> C	SLIC	Analog (ADC)	Timer	Clock	Additional Features	Operating Voltage	Temp. Range <sup>1</sup>	Package Options	In Production
S08DN32	20 MHz	32 KB	1 KB	Up to 1 KB	—	1xSCI	1	1	—	Up to 16-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP, 64 LQFP	√
S08DN16	20 MHz	16 KB	512 B	Up to 512B	—	1xSCI	1	1	—	Up to 16-CH, 12-bit, 2 comparators	Up to 6-CH+2-CH	MCG (PLL, FLL, OSC)	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	32 LQFP, 48 LQFP	√
S08AW60	20 MHz	60 KB	2 KB	—	—	2xSCI	1	1	—	Up to 16-CH, 10-bit	Up to 6-CH+2-CH	ICG	40 MHz CPU, KBI, ICE, BDM, Temp Sensor	2.7 to 5.5	C, V, M	64 QFP, 64 LQFP, 48 QFN, 44 LQFP	√
S08AW48	20 MHz	48 KB	2 KB	—	—	2xSCI	1	1	—	Up to 16-CH, 10-bit	Up to 6-CH+2-CH	ICG	40 MHz CPU, KBI, ICE, BDM, Temp Sensor	2.7 to 5.5	C, V, M	64 QFP, 64 LQFP, 48 QFN, 44 LQFP	√
S08AW32	20 MHz	32 KB	2 KB	—	—	2xSCI	1	1	—	Up to 16-CH, 10-bit	Up to 6-CH+2-CH	ICG	40 MHz CPU, KBI, ICE, BDM, Temp Sensor	2.7 to 5.5	C, V, M	64 QFP, 64 LQFP, 48 QFN, 44 LQFP	√
S08AW16A	20 MHz	16 KB	1 KB	—	—	2xSCI	1	1	—	Up to 8-CH, 10-bit	Up to 4-CH+2-CH	ICG	40 MHz CPU, KBI, ICE, BDM, Temp Sensor	2.7 to 5.5	C, V, M	48 QFN, 44 QFP, 32 LQFP	√
S08EL32	20 MHz	32 KB	1 KB	Up to 512 B	—	1xSCI	1	1	1	Up to 16-CH, 10-bit, 2 comparators	4-CH+2-CH	ICS	LIN Auto-Baud/Synch, 40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	28 TSSOP, 20 TSSOP	√
S08EL16	20 MHz	16 KB	1 KB	Up to 512 B	—	1xSCI	1	1	1	Up to 16-CH, 10-bit, 2 comparators	4-CH+2-CH	ICS	LIN Auto-Baud/Synch, 40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	28 TSSOP, 20 TSSOP	√
S08SL16	20 MHz	16 KB	512 B	Up to 256 B	—	1xSCI	1	1	1	Up to 16-CH, 10-bit, 1 comparator	2-CH+2-CH	ICS	LIN Auto-Baud/Synch, 40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	28 TSSOP, 20 TSSOP	√
S08SL8	20 MHz	8 KB	512 B	Up to 256 B	—	1xSCI	1	1	1	Up to 16-CH, 10-bit, 1 comparator	2-CH+2-CH	ICS	LIN Auto-Baud/Synch, 40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	28 TSSOP, 20 TSSOP	√
S08SG32	20 MHz	32 KB	1 KB	—	—	1xSCI	1	1	—	Up to 16-CH, 10-bit, 1 comparator	2-CH+2-CH	ICS	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M, J, W	28 TSSOP, 20 TSSOP, 16 TSSOP	√
S08SG16	20 MHz	16 KB	1 KB	—	—	1xSCI	1	1	—	Up to 16-CH, 10-bit, 1 comparator	2-CH+2-CH	ICS	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M, J, W	28 TSSOP, 20 TSSOP, 16 TSSOP	√
S08SG8	20 MHz	8 KB	512 B	—	—	1xSCI	1	1	—	Up to 12-CH, 10-bit, 1 comparator	Up to 2-CH+2-CH	ICS	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	20 TSSOP, 16 TSSOP, 8 SOIC	√
S08SG4	20 MHz	4 KB	256 B	—	—	1xSCI	1	1	—	Up to 12-CH, 10-bit, 1 comparator	Up to 2-CH+2-CH	ICS	40 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	20 TSSOP, 16 TSSOP, 8 SOIC	√
S08LG32	20 MHz	32 KB	2 KB	—	—	2xSCI	1	1	—	Up to 16-CH, 12-bit	Up to 2-CH+6-CH	ICS	40 MHz CPU, Up to 37x8/41x4 LCD Driver, Watchdog OSC/Timer, RTC, KBI, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V	80 LQFP, 64 LQFP, 48 LQFP	√
S08LG16	20 MHz	18 KB	2 KB	—	—	2xSCI	1	1	—	Up to 16-CH, 12-bit	Up to 2-CH+6-CH	ICS	40 MHz CPU, Up to 29x8/33x4 LCD Driver, Watchdog OSC/Timer, RTC, KBI, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V	64 LQFP, 48 LQFP	√

## S08 Families (Sheet 3 of 3)

Device	Bus Frequency	Flash	RAM	EEPROM	CAN	UART	SPI	I <sup>2</sup> C	SLIC	Analog (ADC)	Timer	Clock	Additional Features	Operating Voltage	Temp. Range <sup>1</sup>	Package Options	In Production
S08MP16	20MHz	16 KB	1 KB	—	—	1xSCI	1	1	—	13-CH, 12-bit, 3 comparators	6-CH+2-CH, 16-bit Flextimer with PWM functions	ICS	40 MHz CPU, PGA, PDB (x2), MTIM, RTC, POR, KBI, COP, CRC, ICE, BDM, 5-bit DAC (3x), Temp Sensor	2.7 to 5.5	C, V, M	48 LQFP	√
S08SC4	20MHz	4 KB	256 B	—	—	1xSCI	—	—	—	8-CH, 10-bit	2-CH, 16-bit with PWM functions	ICS	40 MHz CPU, Watchdog, COP, Internal Clock Generator, OSC/Timer KBI, Low Voltage Detect, POR, BDM, Temp Sensor	4.5 to 5.5	C, V, M	16 TSSOP	√
S08QD4	8 MHz	4 KB	256 B	—	—	—	—	—	—	4-CH, 10-bit	2-CH+1-CH	ICS	16 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	8 SOIC	√
S08QD2	8 MHz	2 KB	128 B	—	—	—	—	—	—	4-CH, 10-bit	2-CH+1-CH	ICS	16 MHz CPU, Watchdog OSC/Timer, COP, LVI, ICE, BDM, POR, KBI, Temp Sensor	2.7 to 5.5	C, V, M	8 SOIC	√

1. C = -40°C to +85°C, V = -40°C to +105°C, M = -40°C to +125°C, J = -40°C to +140°C, W = -40°C to +150°C

## S12 AND S12X 16-BIT MICROCONTROLLERS

S12 and S12X Cores — The S12X family offers 32-bit performance with all of the advantages and efficiencies of a 16-bit MCU. Based on the S12 core, S12X devices deliver 2 to 5 times the performance of a 25 MHz S12 MCU, while retaining code compatibility for easy migration. 172 additional instructions were added to the S12X core to improve paging capability and execute 32-bit calculations.

Furthermore, S12X devices offers an industry first-the XGATE module. This versatile, efficient coprocessor delivers up to 80 MIPS of additional processing power to off-load, from the main CPU, tasks such as basic gateway activity and peripheral-related processing. The parallel architecture enables more deterministic handling of interrupts

and allows design engineers to avoid conflict between core functions and interrupt processing.

For additional information, visit:

Freescale Semiconductor Documentation, Tool, and Product Libraries  
[www.freescale.com](http://www.freescale.com)

Automotive Home Page  
[www.freescale.com/automotive](http://www.freescale.com/automotive)

### S12 and SX12 Families

Device	Bus Frequency	Flash	RAM	Data Flash	EEPROM	XGATE	MPU	ECC	FlexRay	CAN	SCI	SPI	i <sup>2</sup> C	Analog (ADC)	PWM	Motor	SSD	ECT	Timer	PIT	LCD	KWU	EBI	Operating Voltage	Temp. Range <sup>1</sup>	Package Options	In Production
S12VR64	25 MHz	64 KB	2 KB	—	512 B	—	—	√	—	—	2	1	—	6-CH, 10-bit	up to 8-CH, 8-bit	—	—	—	4-CH, 16-bit	—	—	—	—	6.0 to 18	M	32 LQFP, 48 LQFP	
S12XEP100	50 MHz	1 MB	64 KB	—	4 KB	√	√	√	—	5	8	3	2	2x16-CH, 12-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	8-CH, 16-bit	8-CH	—	25	√	3.13 to 5.5	C, V, M	112 LQFP, 144 LQFP, 208 MAPBGA	√
S12XEP768	50 MHz	768 KB	48 KB	—	4 KB	√	√	√	—	5	8	3	2	2x16-CH, 12-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	8-CH, 16-bit	8-CH	—	25	√	3.13 to 5.5	C, V, M	112 LQFP, 144 LQFP, 208 MAPBGA	√
S12XEQ512	50 MHz	512 KB	32 KB	—	4 KB	√	√	√	—	4	6	3	2	2x12-CH, 12-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	8-CH, 16-bit	8-CH	—	25	√	3.13 to 5.5	C, V, M	80 LQFP, 112 LQFP, 144 LQFP	√
S12XEQ384	50 MHz	384 KB	24 KB	—	4 KB	√	√	√	—	4	4	3	1	2x12-CH, 12-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	25	√	3.13 to 5.5	C, V, M	80 LQFP, 112 LQFP, 144 LQFP	√
S12XET256	50 MHz	256 KB	16 KB	—	4 KB	√	√	√	—	3	4	3	1	2x12-CH, 12-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	25	√	3.13 to 5.5	C, V, M	80 LQFP, 112 LQFP, 144 LQFP	√
S12XHY256	40 MHz	256 KB	12 KB	8 KB	—	—	—	√	—	2	2	1	1	Up to 12-CH, 10-bit	8-CH, 8-bit, 4-CH, 16-bit	4	4	—	8-CH+8-CH 16-bit	—	40x4	25	—	4.5 to 5.5	C, V, M	100 LQFP, 112 LQFP,	√
S12G192	25 MHz	192 KB	11 KB	—	4 KB	—	—	√	—	1	3	3	—	16-CH, 10-bit	8-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	—	—	3.13 to 5.5	M	20 TSSOP, 32 LQFP, 48 LQFP, 48 QFN, 64 LQFP, 100 LQFP	
S12G192A	25 MHz	192 KB	11 KB	—	4 KB	—	—	√	—	1	3	3	—	16-CH, 10-bit	8-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	—	—	3.13 to 5.5	M	20 TSSOP, 32 LQFP, 48 LQFP, 48 QFN, 64 LQFP, 100 LQFP	
S12G240	25 MHz	240 KB	11 KB	—	4 KB	—	—	√	—	1	3	3	—	16-CH, 10-bit	8-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	—	—	3.13 to 5.5	M	20 TSSOP, 32 LQFP, 48 LQFP, 48 QFN, 64 LQFP, 100 LQFP	
S12G240A	25 MHz	240 KB	11 KB	—	4 KB	—	—	√	—	1	3	3	—	16-CH, 10-bit	8-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	—	—	3.13 to 5.5	M	20 TSSOP, 32 LQFP, 48 LQFP, 48 QFN, 64 LQFP, 100 LQFP	

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

## S12 and SX12 Families

Device	Bus Frequency	Flash	RAM	Data Flash	EEPROM	XGATE	MPU	ECC	FlexRay	CAN	SCI	SPI	ꝑC	Analog (ADC)	PWM	Motor	SSD	ECT	Timer	PIT	LCD	KWU	EBI	Operating Voltage	Temp. Range <sup>1</sup>	Package Options	In Production
S12GN32	25 MHz	32 KB	2 KB	—	1 KB	—	—	√	—	—	1	1	—	8-CH, 10-bit	6-CH, 8-bit	—	—	—	6-CH, 16-bit	—	—	—	—	3.13 to 5.5	M	20 TSSOP, 32 LQFP, 48 LQFP, 48 QFN, 64 LQFP, 100 LQFP	
S12G128	25 MHz	128 KB	8 KB	—	4 KB	—	—	—	—	1	3	3	—	12-CH, 10-bit	8-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	—	—	3.13 to 5.5	M	48 LQFP, 64 LQFP, 100 LQFP	
S12G96	25 MHz	96 KB	8 KB	—	3 KB	—	—	—	—	1	3	3	—	12-CH, 10-bit	8-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	—	—	3.13 to 5.5	M	48 LQFP, 64 LQFP, 100 LQFP	
S12XS256	40 MHz	256 KB	12 KB	8 KB	—	—	—	√	—	1	2	1	—	16-CH, 12-bit	8-CH, 8-bit	—	—	—	8-CH, 16-bit	4-CH	—	18	—	3.13 to 5.5	C, V, M, J	64 LQFP, 80 QFP, 112 LQFP, KGD	√
S12XS128	40 MHz	128 KB	8 KB	8 KB	—	—	—	√	—	1	2	1	—	16-CH, 12-bit	8-CH, 8-bit	—	—	—	8-CH, 16-bit	4-CH	—	18	—	3.13 to 5.5	C, V, M, J	64 LQFP, 80 QFP, 112 LQFP, KGD	√
S12XS64	40 MHz	64 KB	4 KB	4 KB	—	—	—	√	—	1	2	1	—	16-CH, 12-bit	8-CH, 8-bit	—	—	—	8-CH, 16-bit	4-CH	—	18	—	3.13 to 5.5	C, V, M, J	64 LQFP, 80 QFP, 112 LQFP, KGD	√
S12XF512	50 MHz	512 KB	32 KB	—	4KB	√	—	√	√	1	2	2	—	16-CH, 12-bit	6-CH, 15-bit	—	—	—	8-CH, 16-bit	4-CH	—	11	—	3.13 to 5.5	C, V, M	112 LQFP, 64 LQFP	√
S12XF384	50 MHz	384 KB	24 KB	—	4KB	√	—	√	√	1	2	2	—	16-CH, 12-bit	6-CH, 15-bit	—	—	—	8-CH, 16-bit	4-CH	—	11	—	3.13 to 5.5	C, V, M	112 LQFP, 64 LQFP	√
S12XF256	50 MHz	256 KB	20 KB	—	2 KB	√	—	√	√	1	2	2	—	16-CH, 12-bit	6-CH, 15-bit	—	—	—	8-CH, 16-bit	4-CH	—	11	—	3.13 to 5.5	C, V, M	112 LQFP, 64 LQFP	√
S12XF128	50 MHz	128 KB	16 KB	—	2 KB	√	—	√	√	1	2	2	—	16-CH, 12-bit	6-CH, 15-bit	—	—	—	8-CH, 16-bit	4-CH	—	11	—	3.13 to 5.5	C, V, M	112 LQFP, 64 LQFP	√
S12XHZ512	40 MHz	512 KB	32 KB	—	4 KB	√	—	—	—	2	2	1	2	16-CH, 10-bit	8-CH, 8-bit	24/6	6	8-CH, 16-bit	—	4-CH	32x4	8	√	4.5 to 5.5	C, V, M	112 LQFP, 144 LQFP	√
S12XHZ384	40 MHz	384 KB	28 KB	—	4 KB	√	—	—	—	2	2	1	2	16-CH, 10-bit	8-CH, 8-bit	24/6	6	8-CH, 16-bit	—	4-CH	32x4	8	√	4.5 to 5.5	C, V, M	112 LQFP, 144 LQFP	√
S12XHZ256	40 MHz	256 KB	16 KB	—	4 KB	√	—	—	—	2	2	1	2	16-CH, 10-bit	8-CH, 8-bit	24/6	6	8-CH, 16-bit	—	4-CH	32x4	8	√	4.5 to 5.5	C, V, M	112 LQFP, 144 LQFP	√
S12XDP512	40 MHz	512 KB	32 KB	—	4 KB	√	—	—	—	5	6	3	2	8-CH + 16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	24	√	3.15 to 5.5	C, V, M	112 LQFP, 144 LQFP	√
S12XDT512	40 MHz	512 KB	20 KB	—	4 KB	√	—	—	—	3	6	3	1	8-CH + 16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	24	√	3.15 to 5.5	C, V, M	80 QFP, 112 LQFP, 144 LQFP	√
S12XDT384	40 MHz	384 KB	20 KB	—	4 KB	√	—	—	—	3	4	3	1	8-CH + 16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	24	√	3.15 to 5.5	C, V, M	80 QFP, 112 LQFP, 144 LQFP	√
S12XDQ256	40 MHz	256 KB	16 KB	—	4 KB	√	—	—	—	4	4	3	1	8-CH + 16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	24	√	3.15 to 5.5	C, V, M	80 QFP, 112 LQFP, 144 LQFP	√
S12XDT256	40 MHz	256 KB	16 KB	—	4 KB	√	—	—	—	3	4	3	1	8-CH + 16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	24	√	3.15 to 5.5	C, V, M	80 QFP, 112 LQFP, 144 LQFP	√
S12XD256	40 MHz	256 KB	14 KB	—	4 KB	√	—	—	—	1	4	3	1	8-CH + 16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	24	√	3.15 to 5.5	C, V, M	80 QFP, 12 LQFP, 144 LQFP	√
S12XDG128	40 MHz	128 KB	12 KB	—	2 KB	√	—	—	—	2	2	2	1	16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	24	—	3.15 to 5.5	C, V, M	80 QFP, 112 LQFP	√
S12XD128	40 MHz	128 KB	8 KB	—	2 KB	√	—	—	—	1	2	2	1	16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	24	—	3.15 to 5.5	C, V, M	80 QFP, 112 LQFP	√
S12XD64	40 MHz	64 KB	4 KB	—	1 KB	√	—	—	—	1	2	2	1	8-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	2-CH	—	24	—	3.15 to 5.5	C, V, M	80 LQFP	√

## S12 and SX12 Families

Device	Bus Frequency	Flash	RAM	Data Flash	EEPROM	XGATE	MPU	ECC	FlexRay	CAN	SCI	SPI	i <sup>2</sup> C	Analog (ADC)	PWM	Motor	SSD	ECT	Timer	PIT	LCD	KWU	EBI	Operating Voltage	Temp. Range <sup>1</sup>	Package Options	In Production
S12XB256	33 MHz	256 KB	10 KB	—	2 KB	√				1	2	1	1	16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	4-CH	—	24		3.15 to 5.5	C, V, M	80 QFP, 112 LQFP	√
S12XB128	33 MHz	128 KB	6 KB	—	1 KB	√				1	2	1	1	16-CH, 10-bit	8-CH, 8-bit	—	—	8-CH, 16-bit	—	2-CH	—	24		3.15 to 5.5	C, V, M	80 QFP, 112 LQFP	√
S12P128	32 MHz	128 KB	6 KB	4 KB	—			√		1	1	1	—	10-CH, 12-bit	6-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	12		3.13 to 5.5	C, V, M	80 QFP, 64 LQFP, 48 QFN	√
S12P96	32 MHz	96 KB	6 KB	4 KB	—			√		1	1	1	—	10-CH, 12-bit	6-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	12		3.13 to 5.5	C, V, M	80 QFP, 64 LQFP, 48 QFN	√
S12P64	32 MHz	64 KB	4 KB	4 KB	—			√		1	1	1	—	10-CH, 12-bit	6-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	12		3.13 to 5.5	C, V, M	80 QFP, 64 LQFP, 48 QFN	√
S12P32	32 MHz	32 KB	2 KB	4 KB	—			√		1	1	1	—	10-CH, 12-bit	6-CH, 8-bit	—	—	—	8-CH, 16-bit	—	—	12		3.13 to 5.5	C, V, M	80 QFP, 64 LQFP, 48 QFN	√
S12HZ128	25 MHz	128 KB	6 KB	—	2 KB					2	2	1	1	16-CH, 10-bit	6-CH, 8-bit	16/4	4	—	8-CH, 8-bit	—	32x4	8		4.5 to 5.5	C, V, M	112 LQFP	√
S12HZ64	25 MHz	64 KB	4 KB	—	1 KB					1	1	1	—	8-CH, 10-bit	4-CH, 8-bit	16/4	4	—	8-CH, 8-bit	—	24x4	8		4.5 to 5.5	C, V, M	80 QFP, 112 LQFP	√
S12HN64	25 MHz	64 KB	4 KB	—	1 KB						1	1	—	8-CH, 10-bit	4-CH, 8-bit	16/4	4	—	8-CH, 8-bit	—	24x4	8		4.5 to 5.5	C, V, M	80 QFP, 112 LQFP	√
S12HY64	32 MHz	64 KB	4 KB	4 KB	—					1	1	1	1	8-CH, 10-bit	8-CH, 8-bit	16/4	Support	—	8-CH+8-CH 16-bit	—	40x4	22		3.13 to 5.5	C, V, M	64 LQFP, 100 LQFP	√
S12HA64	32 MHz	64 KB	4 KB	4 KB	—						1	1	1	8-CH, 10-bit	8-CH, 8-bit	16/4	Support	—	8-CH+8-CH 16-bit	—	40x4	22		3.13 to 5.5	C, V, M	64 LQFP, 100 LQFP	√
S12HY48	32 MHz	48 KB	4 KB	4 KB	—					1	1	1	1	8-CH, 10-bit	8-CH, 8-bit	16/4	Support	—	8-CH+8-CH 16-bit	—	40x4	22		3.13 to 5.5	C, V, M	64 LQFP, 100 LQFP	√
S12HA48	32 MHz	48 KB	4 KB	4 KB	—						1	1	1	8-CH, 10-bit	8-CH, 8-bit	16/4	Support	—	8-CH+8-CH 16-bit	—	40x4	22		3.13 to 5.5	C, V, M	64 LQFP, 100 LQFP	√
S12HY32	32 MHz	32 KB	2 KB	4 KB	—					1	1	1	1	8-CH, 10-bit	8-CH, 8-bit	16/4	Support	—	8-CH+8-CH 16-bit	—	40x4	22		3.13 to 5.5	C, V, M	64 LQFP, 100 LQFP	√
S12HA32	32 MHz	32 KB	2 KB	4 KB	—						1	1	1	8-CH, 10-bit	8-CH, 8-bit	16/4	Support	—	8-CH+8-CH 16-bit	—	40x4	22		3.13 to 5.5	C, V, M	64 LQFP, 100 LQFP	√

1. C = -40°C to +85°C, V = -40°C to +105°C, M = -40°C to +125°C, J = -40°C to +140°C, W = -40°C to +150°C

## DIGITAL SIGNAL CONTROLLERS

**56800E Core**—The 56800E MCU+DSP core was architected specifically to provide users the ease of use of an MCU together with the performance of a DSP in a single core.

**56F8300 High-Performance Flash Series**—The MC56F8300 series of controllers combines the 56800E core with flash memory, motor control peripherals, and built-in safety features targeted specifically for automotive applications to provide 60 MIPS of performance over the full -40°C to 125°C temperature range.

**Memory**—On-board memory includes program flash and RAM, data flash and RAM, and BootFlash with EEPROM emulation capability. The modified Harvard architecture enables users to perform up to three simultaneous memory accesses.

**Service**—A full-range of services is offered for the controller devices including software, support, training, and internal and third-party development tools.

For additional information, visit:

Documentation, Tool, and Product Libraries:  
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### 56F8xxx Family

Product	ROM (KB)	RAM	Flash	Timer	Serial	GPIO (pins)	A/D	PWM	Operating Voltage (V)	Operating Frequency (MHZ)	Temperature	Packaging	Additional Information
56F8013	0	4K	16K	4 x 16-bit	1 SCI/LIN + 1 SPI + 1 I <sup>2</sup> C	26	1 x 4-CH 12-bit	1 x 6-CH	3.3	32	C, M	32-pin LQFP	mcPWM with center alignment, 1 x 4 channel Quad Decoder
56F8355	n/a	20K	280K	16 x 16-bit	2 SCI/LIN + 2 SPI + 1 CAN + 1 I <sup>2</sup> C	49	4 x 4-CH 12-bit	2 x 6-CH	3.3	60	C, M	128-pin LQFP	mcPWM with center alignment, 2 x 4 channel Quad Decoder

## QORIVVA 32-BIT MICROCONTROLLERS

**Qorivva MPC56xx** — Leveraging the success of the Qorivva MPC55xx family, Freescale has begun introducing the next generation (90nm) of 32-bit microcontrollers, which are built on Power Architecture™ technology: the family. The microcontrollers offer advanced features that help make cars safer and more fuel efficient while reducing harmful emissions. The Qorivva MPC56xx MCUs target a broad range of powertrain, safety, chassis, instrument cluster, body electronics and gateway applications.

The Qorivva MPC56xx family includes an array of package options for system performance needs and embedded Flash requirements. To assist in system development, the Qorivva MPC56xx family offers support including application software, development tools, training, documentation and technical support.

The Qorivva MPC56xx portfolio will continue to grow with devices that offer expanded sets of memory, connectivity and performance options.

For additional information, visit:

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[www.freescale.com/Qorivva](http://www.freescale.com/Qorivva)

### Qorivva MPC56xx Family

Device	Core Platform	Bus Frequency	Program Flash	SRAM	DMA	EEPROM	MPU/MMU	CTU	SCI (LIN/Flex)	DSP/ICAN	CAN	I <sup>2</sup> C	FlexRay™	Ethernet (100BaseT)	MLB	eTPU	eMIOS	Motor Control Timers	PIT	Analog (ADC)	Operating Voltage	Temp. Range <sup>1</sup>	Debug	Package Options	In Production
MPC5676R	Dual e200z7	2x180 MHz	6 MB	384 KB	96-CH	64 KB Data Flash	32 entry	√	3	5	4	√				96-CH	Up to 32-CH, 16-bit			Up to 64-CH, 12-bit 12 xDEC Filters Quad 64-CH	3.3V, 5V	M	Nexus 3+	416 BGA, 516 BGA	
MPC5674F	e200z7	150, 200, 264 MHz	4 MB	256 KB	64-CH + 32-CH	Emulated in Program Flash	√	√	3	4 (MSB)	4	√				2x32-CH	32-CH			Quad 64-CH	3.3V, 5V	M	Nexus 3+	324 BGA, 416 BGA, 516 BGA	
MPC5673F	e200z7	150, 200, 264 MHz	3 MB	192 KB	64-CH + 32-CH	Emulated in Program Flash	√	√	3	4 (MSB)	4	√				2x32-CH	32-CH			Quad 64-CH	3.3V, 5V	M	Nexus 3+	324 BGA, 416 BGA, 516 BGA	
MPC5645S	e200z4d	16 MHz	2 MB	64 KB	16-CH	Emulated in Program Flash	16 entry		3	2	3	4					16-CH, 16-bit		8-CH	16-CH, 10-bit	3.3V, 5V	V	Nexus 3+	176 LQFP, 416 TEPBGA	
MPC5675K	Dual e200z7d	45 MHz	2 MB	512 KB	32-CH	Emulated in Program Flash	64 entry	√	4	3	4	3	opt.	√					4-CH	4-CH, 12-bit	3.3V, 5V	M, V	Nexus 3+	473 MAPBGA, 275 MAPBGA	
MPC5668G	e200z6 + e200z0	128 MHz	2 MB	592KB	16-CH	Emulated in Program Flash			6	4	6	4	√	√	√		16-CH, 24-bit		8-CH	36-CH, 10-bit	3.3V, 5V	V	Nexus3 on z6 and Nexus 2+	208 MAPBGA	√
MPC5668E	e200z0 + e200z0	116 MHz	2 MB	128 KB	32-CH	Emulated in Program Flash	16 entry	√	12	4	5	4					32-CH, 16-bit		8-CH	64-CH, 10-bit	3.3V, 5V	V, M	JTAG, Nexus3 on z6 and Nexus2+	208 MAPBGA, 256 MAPBGA only for devt.	√

## Qorivva MPC56xx Family

Device	Core Platform	Bus Frequency	Program Flash	SRAM	DMA	EEPROM	MPU/MMU	CTU	SCI (LINFlex)	DSPI	CAN	i <sup>2</sup> C	FlexRay™	Ethernet (100BaseT)	MLB	eTPU	eMIOS	Motor Control Timers	PIT	Analog (ADC)	Operating Voltage	Temp. Range <sup>1</sup>	Debug	Package Options	In Production
MPC5604E	e200z0h	40 MHz	512 KB	96 KB	16-CH	Emulated in Program Flash			2	3	1	2		√					4	8-CH, 10-bit	3.0V, 3.6V	M	Nexus 2+	100 LQFP, 64 LQFP	
MPC5634M	e200z3	60, 80 MHz	1.5M	94 KB	32-CH	Emulated in Program Flash	8 Entry		2	2	2	0				32-CH	16-CH, 24-bit		5-CH	Dual 34-CH, 12-bit	5V	M	Nexus 2+ Wide trace port in Vertical Calibration System	144 LQFP, 176 LQFP, 208 MAPBGA	√
MPC5633M	e200z3	40, 60, 80 MHz	1M	64 KB	32-CH	Emulated in Program Flash	8 Entry		2	2	2	0				32-CH	16-CH, 24-bit		5-CH	Dual 34-CH, 12-bit	5V	M	Nexus 2+ Wide trace port in Vertical Calibration System	100 LQFP, 144 LQFP, 176 LQFP, 208 MAPBGA	√
MPC5632M	e200z3	40, 60 MHz	768 KB	48 KB	32-CH	Emulated in Program Flash	8 Entry		2	2	2	0				32-CH	8-CH, 24-bit		5-CH	Dual 32-CH, 12-bit	5V	M	Nexus 2+ Wide trace port in Vertical Calibration System	100 LQFP, 144 LQFP	√
MPC5643L	e200z4x2	80/120 MHz	1 MB	128 KB	16-CH	64 KB Data Flash	16 Entry	√	2	3	2	0	√					46-Ch. eTimer/PWM/STM	4-Ch.	Dual 16-Ch., 12-bit	3.3V	M	Nexus 3+	144 LQFP, 257 MAPBGA	
MPC5646C	e200z4 + e200z0	120 MHz, 60 MHz	3 MB	256 KB	16-CH	64 KB Data Flash	16 Entry	√	10	8	6	1	√	√			64-CH, 16-bit		Up to 8-CH	Up to 29-CH, 12-bit, Up to 33-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 3+	256 BGA, 208 LQFP, 176 LQFP	
MPC5646B	e200z4	120 MHz	3 MB	192 KB	16-CH	64 KB Data Flash	16 Entry	√	10	8	6	1	√				64-CH, 16-bit		Up to 8-CH	Up to 29-CH, 12-bit, Up to 33-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 3+	256 BGA, 208 LQFP, 176 LQFP	
MPC5645C	e200z4 + e200z0	120 MHz, 60 MHz	2 MB	256 KB	16-CH	64 KB Data Flash	16 Entry	√	10	8	6	1	√	√			64-CH, 16-bit		Up to 8-CH	Up to 29-CH, 12-bit, Up to 33-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 3+	256 BGA, 208 LQFP, 176 LQFP	
MPC5645B	e200z4	120 MHz	2 MB	160 KB	16-CH	64 KB Data Flash	16 Entry	√	10	8	6	1	√				64-CH, 16-bit		Up to 8-CH	Up to 29-CH, 12-bit, Up to 33-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 3+	256 BGA, 208 LQFP, 176 LQFP	
MPC5644C	e200z4 + e200z0	120 MHz, 60 MHz	1.5 MB	192 KB	16-CH	64 KB Data Flash	16 Entry	√	10	8	6	1	√	√			64-CH, 16-bit		Up to 8-CH	Up to 29-CH, 12-bit, Up to 33-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 3+	256 BGA, 208 LQFP, 176 LQFP	
MPC5644B	e200z4	120 MHz	1.5 MB	128 KB	16-CH	64 KB Data Flash	16 Entry	√	10	8	6	1	√				64-CH, 16-bit		Up to 8-CH	Up to 29-CH, 12-bit, Up to 33-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 3+	256 BGA, 208 LQFP, 176 LQFP	
MPC5607B	e200z0	64 MHz	1.5 MB	96 KB	16-CH	64 KB Data Flash	8 Entry	√	Up to 10	6	6	1					64-CH, 16-bit			16-CH, 10/12-bit & up to 32-Ch., 10-bit	3.3V, 5V	C, V, M	Nexus 2+ (208MAPBGA Emul. Only Package) JTAG	176 LQFP	√
MPC5606B	e200z0	64 MHz	1 MB	80KB	16-CH	64 KB Data Flash	8 Entry	√	Up to 8	Up to 6	6	1					64-CH, 16-bit			16-CH, 10/12-bit & up to 32-Ch., 10-bit	3.3V, 5V	C, V, M	Nexus 2+ (208MAPBGA Emul. Only Package) JTAG	144 LQFP, 176 LQFP	√
MPC5605B	e200z0	64 MHz	768 KB	64KB	16-CH	64 KB Data Flash	8 Entry	√	Up to 8	Up to 6	6	1					64-CH, 16-bit			16-CH, 10/12-bit & up to 32-Ch., 10-bit	3.3V, 5V	C, V, M	Nexus 2+ (208MAPBGA Emul. Only Package) JTAG	100 LQFP, 144 LQFP, 176 LQFP	√
MPC5604B	e200z0	64 MHz	512 KB	32KB		64 KB Data Flash	8 Entry	√	4	3	3	1					56-CH, 16-bit		up to 6-CH	up to 36-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 2+ (208MAPBGA Emul. Only Package) JTAG	100 LQFP, 144 LQFP	√
MPC5603B	e200z0	64 MHz	384 KB	28KB		64 KB Data Flash	8 Entry	√	4	3	3	1					56-CH, 16-bit		up to 6-CH	up to 36-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 2+ (208 MAPBGA Emul. Only Package) JTAG	100 LQFP, 144 LQFP	√
MPC5602B	e200z0	64 MHz	256 KB	24KB		64 KB Data Flash	8 Entry	√	3	3	2	1					56-CH, 16-bit		up to 6-CH	up to 36-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 2+ (208 MAPBGA Emul. Only Package) JTAG	100 LQFP, 144 LQFP	√
MPC5604C	e200z0	64 MHz	512 KB	48 KB		64 KB Data Flash	8 Entry	√	4	3	6	1					28-CH, 16-bit		3-CH	28-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 2+ (208 MAPBGA Emul. Only Package) JTAG	100 LQFP	√
MPC5603C	e200z0	64 MHz	384 KB	40 KB		64 KB Data Flash	8 Entry	√	4	3	6	1					28-CH, 16-bit		3-CH	28-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 2+ (208 MAPBGA Emul. Only Package) JTAG	100 LQFP	√
MPC5602C	e200z0	64 MHz	256 KB	32 KB		64 KB Data Flash	8 Entry	√	4	3	6	1					28-CH, 16-bit		3-CH	28-CH, 10-bit	3.3V, 5V	C, V, M	Nexus 2+ (208 MAPBGA Emul. Only Package) JTAG	100 LQFP	√
MPC5601D	e200z0	48 MHz	128 KB	12 KB	16-CH	64 KB Data Flash		√	3	2	1						Up to 28-CH, 16-bit		Up to 4-CH	Up to 33-CH, 12-bit	3.3V, 5V	C, V, M	JTAG	100 LQFP, 64 LQFP	
MPC5602D	e200z0	48 MHz	256 KB	16 KB	16-CH	64 KB Data Flash		√	3	2	1						Up to 28-CH, 16-bit		Up to 4-CH	Up to 33-CH, 12-bit	3.3V, 5V	C, V, M	JTAG	100 LQFP, 64 LQFP	

## Qorivva MPC56xx Family

Device	Core Platform	Bus Frequency	Program Flash	SRAM	DMA	EEPROM	MPU/MMU	CTU	SCI (LINFlex)	DSPI	CAN	I <sup>2</sup> C	FlexRay™	Ethernet (100BaseT)	MLB	eTPU	eMIOS	Motor Control Timers	PIT	Analog (ADC)	Operating Voltage	Temp. Range <sup>1</sup>	Debug	Package Options	In Production	
MPC5604P	e200z0	40/64 MHz	512 KB	40 KB	16-CH	64 KB Data Flash		√	2	4	2	0	√					20-CH eTimer/ PWM	4-CH	Dual 13-CH, 10-bit	3.3V, 5V	M	Nexus 2+	100 LQFP, 144 LQFP	√	
MPC5603P	e200z0	40/64 MHz	384 KB	36 KB	16-CH	64 KB Data Flash		√	2	4	2	0	√					20-CH eTimer/ PWM	4-CH	Dual 13-CH, 10-bit	3.3V, 5V	M	Nexus 2+	100 LQFP, 144 LQFP	√	
MPC5602P	e200z0	40/64 MHz	256 KB	20 KB	16-CH	64 KB Data Flash		√	2	3	2	0						14-CH eTimer/ PWM	4-CH	16-CH, 10-bit	3.3V, 5V	M	Nexus 1 (Emulation with MPC5604P)	64 LQFP, 100 LQFP		
MPC5601P	e200z0	40/64 MHz	192 KB	12 KB	16-CH	64 KB Data Flash			1	1	1	0						6-CH eTimer	4-CH	11-CH, 10-bit	3.3V, 5V	M	Nexus 1 (Emulation with MPC5604P)	64 LQFP, 100 LQFP		
MPC5644A	e200z4	120, 132, 150 MHz	4 MB	192 KB	64-CH	Emulated in Program Flash	24 entry MMU		3	3(MS B)	3		√			32-CH	24-bit			5-CH	Dual 40-CH, +2 DECFIL	3.3V, 5V	M	Nexus3+ Vertical Calibration system	176 QFP, 208 MAPBGA, 324 MAPBGA	
MPC5643A	e200z4	120, 132, 150 MHz	3 MB	192 KB	64-CH	Emulated in Program Flash	24 entry MMU		3	3(MS B)	3		√			32-CH	24-bit			5-CH	Dual 40-CH, +2 DECFIL	3.3V, 5V	M	Nexus3+ Vertical Calibration system	176 QFP, 208 MAPBGA, 324 MAPBGA	
MPC5642A	e200z4	120, 132, 150 MHz	2 MB	192 KB	64-CH	Emulated in Program Flash	24 entry MMU		3	3(MS B)	3		√			32-CH	24-bit			5-CH	Dual 40-CH, +2 DECFIL	3.3V, 5V	M	Nexus3+ Vertical Calibration system	176 QFP, 208 MAPBGA, 324 MAPBGA	

Device	Core Platform	Bus Frequency	Program Flash	SRAM	eDMA	Emulated EEPROM	TFT Drive	Stepper Drive	SCI (LINFlex)	DSPI	CAN	I <sup>2</sup> C	LCD	Sound Generator	Memory Expansion	MPU	eMIOS	Timers	Analog (ADC)	Operating Voltage	Temp. Range <sup>1</sup>	Debug	Package Options	In Production
MPC5606S	e200z0h	64 MHz	1 MB	48 KB + 160 KB Graphics RAM	16-CH	4x16 KB	Display Control Unit (DCU) with Parallel Data Interface (PDI)	6 gauges w/Stepper Stall Detect (SSD)	2	3	2	4	40x4	Yes (using eMIOS)	QuadSPI	12 entry	2-CH	Real Time Counter (RTC), Autonomous Periodic Interrupt (API), 4-CH 32-bit PIT and S/W watchdog timer.	16-CH, 10-bit	3.3V and 5V	C, V, M	Nexus 2+	144 LQFP, 176 LQFP	√
MPC5604S	e200z0h	64 MHz	512 KB	48 KB	16-CH	4x16 KB	No	6 gauges w/Stepper Stall Detect (SSD)	2	2	2	2	64x6	√		12 entry	2-CH	Real Time Counter (RTC), Autonomous Periodic Interrupt (API), 4-CH 32-bit PIT and S/W watchdog timer.	16-CH, 10-bit	3.3V and 5V	C, V, M	Nexus 1	100 LQFP, 144 LQFP	
MPC5602S	e200z0h	64 MHz	256 KB	24 KB	16-CH	4x16 KB	No	6 gauges w/Stepper Stall Detect (SSD)	2	3	1	2	64x6	√		12 entry	2-CH	Real Time Counter (RTC), Autonomous Periodic Interrupt (API), 4-CH 32-bit PIT and S/W watchdog timer.	16-CH, 10-bit	3.3V and 5V	C, V, M	Nexus 1	100 LQFP, 144 LQFP	

1. C = -40°C to +85°C, V = -40°C to +105°C, M = -40°C to +125°C, J = -40°C to +140°C, W = -40°C to +150°C  
 Note: specs given are for the largest package size stated.

**Qorivva MPC55xx** — Based on Power Architecture™ technology and system-on-chip (SoC) design, Qorivva MPC55xx microcontrollers offer advanced features that help make cars safer and more fuel efficient, while reducing harmful emissions. The Qorivva MPC55xx MCUs target a broad range of automotive applications, including powertrain control, advanced safety, driver assistance, chassis and body electronics.

The MPC55xx family includes an array of package options for systems performance needs and embedded flash requirements. Offering pin-compatibility throughout the entire flash-based family, engineers are given the ability to migrate their efforts from one design to another.

another, reducing development costs and improving time to market. To assist in development, the Qorivva MPC55xx family offers support including application software, development tools, training, documentation and technical support.

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## Qorivva MPC55xx Family

Device	Core Platform	Bus Frequency	Program Flash	SRAM	DMA	EEPROM	eSCI	DSPI	CAN	I <sup>2</sup> C	Flexray	Ethernet (100BaseT)	MLB	External Bus	Debug	eTPU	eMIOS	PIT	Analog (ADC)	Operating Voltage	Temp. Range <sup>1</sup>	Package Options	In Production
MPC5533	e200z3	40, 66, 80 MHz	768 KB	48 KB	32-CH	Emulated in program Flash	1	2	2					√	Nexus 3	32-CH,			40-CH, 12-bit	3.3V and 5V	M	208 MAPBGA, 324 PBGA	√
MPC5534	e200z3	40, 66, 80 MHz	1 MB	64 KB	32-CH	Emulated in program Flash	2	3	2					√	Nexus 3	32-CH,	24-CH, 24-bit		40-CH, 12-bit	3.3V and 5V	M	208 MAPBGA, 324 PBGA	√

## Qorivva MPC55xx Family

Device	Core Platform	Bus Frequency	Program Flash	SRAM	DMA	EEPROM	eSCI	DSPI	CAN	I <sup>2</sup> C	Flexray	Ethernet (100BaseT)	MLB	External Bus	Debug	eTPU	eMIOS	PIT	Analog (ADC)	Operating Voltage	Temp. Range <sup>1</sup>	Package Options	In Production
MPC5553	e200z6	80, 112, 132 MHz	1.5 MB	64 KB	32-CH	Emulated in program Flash	2	3	2			√		√	Nexus 3	32-CH, 24-CH	24-CH 24-bit		40-CH, 12-bit	3.3V and 5V	M	208 MAPBGA, 324 PBGA, 416 PBGA	√
MPC5554	e200z6	80, 112, 132 MHz	2 MB	64 KB	64-CH	Emulated in program Flash	2	4	3					√	Nexus 3	2x32-CH, 24-CH	24-CH 24-bit		40-CH, 12-bit	3.3V and 5V	M	416 PBGA	√
MPC5561	e200z6	80, 112, 132 MHz	1 MB	192 KB	32-CH	Emulated in program Flash	4	2	2		√			√	Nexus 3		24-CH 24-bit		40-CH, 12-bit	3.3V and 5V	C, M	324 PBGA	√
MPC5565	e200z6	80, 112, 132 MHz	2 MB	80 KB	32-CH	Emulated in program Flash	2	3	3					√	Nexus 3	32-CH, 24-CH	24-CH 24-bit		40-CH, 12-bit	3.3V and 5V	M	324 PBGA	√
MPC5566	e200z6	80, 112, 132, 144 MHz	3 MB	128 KB	64-CH	Emulated in program Flash	2	4	4			√		√	Nexus 3	2x32-CH, 24-CH	24-CH 24-bit		40-CH, 12-bit	3.3V and 5V	C, M	416 PBGA	√
MPC5567	e200z6	80, 112, 132 MHz	2MB	80 KB	32-CH	Emulated in program Flash	2	3	5		√	√		√	Nexus 3	32-CH, 24-CH	24-CH 24-bit		40-CH, 12-bit	3.3V and 5V	C, M	324 PBGA, 416 PBGA	√
MPC551x	optional e200z0	48 - 80 MHz	512 KB - 1.5 MB	32 - 80 KB	16-CH	Emulated in program Flash	6	3-4	5-6	1	optional			√	Nexus 2+		24-CH 16-bit	8-CH	40-CH, 12-bit	5V	C, V, M	144 LQFP, 176 LQFP, 208 MAPBGA	√

1. C = -40°C to +85°C, V = -40°C to +105°C, M = -40°C to +125°C, J = -40°C to +140°C, W = -40°C to +150°C.  
Note: specs given are for the largest package size stated.

## MPC52xx and MPC51xx Families

Device	Core Platform	Bus Frequency	Cache	Audio Acceleration	DRAM Bandwidth	Bus System	Graphics Acceleration	Display Controller	Memory Interface	External Memory Bus	PSC	I <sup>2</sup> C	CAN	USB 2.0	Secure Digital	Ethernet (100 BaseT)	Temp <sup>1</sup>	Package	In Production
MPC5200B	e300	400 MHz, 760 MIPS	16K I/D	None	300 MBs	Single port	None	None	16/32-bit DDR-I	NOR Flash	6	2	2	2 (USB 1.1)		√	C	272 TE-PBGA	√
MPC5121e	e300	400 MHz, 800 MIPS	32K I/D	AXE, 200 MHz, 32-bit RISC	1100 MBs	5-port 64-bit @200MHz	OpenGL-ES 1.1 OpenVG 1.0	1280x720 24-bit 3-plane blend	16/32-bit DDR-I/II & MobileDDR-I Controller	8/16-bit NAND Flash controller	12	3	4	2	MMC SD SDIO	√	C	516 PBGA	
MPC5123	e300	400 MHz, 800 MIPS	32K I/D	AXE, 200 MHz, 32-bit RISC	1100 MBs	5-port 64-bit @200MHz	None	1280x720 24-bit 3-plane blend	16/32-bit DDR-I/II & MobileDDR-I Controller	8/16-bit NAND Flash controller	12	3	4	2	MMC SD SDIO	√	C	516 PBGA	

1. C = -40°C to +85°C, V = -40°C to +105°C, M = -40°C to +125°C, J = -40°C to +140°C, W = -40°C to +150°C

# i.MX 32-BIT APPLICATIONS PROCESSORS

The AEC-Q100 automotive-qualified i.MX applications processors are based on ARM9 and ARM11 CPU cores coupled with a wide range of connectivity peripherals and hardware accelerators. Target automotive applications include infotainment, navigation, hands-free calling, telematics and fully configurable Instrumentation clusters.

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## i.MX Applications Processors

Device	Core Platform	CPU Frequency	Cache	SRAM	DMA	Video Accelerator	Graphics Accelerator	Image Processor	Camera Input	Display Interface	DRAM Support	Flash Support	USB (2.0)	CAN	MLB	SD/MMC SDIO	I <sup>2</sup> C	SPI	UART	Ethernet (100BaseT)	HDD Interface	SSI/I2S	Sample Rate Converter	SP DIF I/O	PIT	3.3V GPIO	Voltage	Temp. Range <sup>1</sup>	Package Options	In Production
i.MX251	ARM926	400 MHz	L1: 16 KB/16 KB I/D	128 KB	32-Ch.						SDRAM mDDR, DDR2	NOR, SLC NAND MLC NAND	HS OTG+HS Phy HS Host+FS Phy or ext. HS Phy	2		2	3	3	5	√	ATA-6	2			4	√	1.38V to 1.52V	C	400 MAPBGA	√
i.MX255	ARM926	400 MHz	L1: 16 KB/16 KB I/D	128 KB	32-Ch.				CCIR656	TFT up to 800x600	SDRAM mDDR, DDR2	NOR, SLC NAND MLC NAND	HS OTG+HS Phy HS Host+FS Phy or ext. HS Phy	2		2	3	3	5	√	ATA-6	2			4	√	1.38V to 1.52V	C	400 MAPBGA	√
i.MX351	ARM1136 w/Vector Floating Point	532 MHz	L1: 16 KB/16 KB I/D L2: 128 KB Unified	128 KB	32-Ch.						SDRAM mDDR, DDR2	NOR, SLC NAND MLC NAND	HS OTG+HS Phy HS Host+FS Phy or ext. HS Phy	2	√	3	3	2	3	√	ATA-6	2+ES AI	Yes, Async.	Yes	3	√	1.22V to 1.47V	C	400 MAPBGA	√
i.MX355	ARM1136 w/Vector Floating Point	532 MHz	L1: 16 KB/16 KB I/D L2: 128 KB Unified	128 KB	32-Ch.			√	CCIR656	TFT up to 800x600	SDRAM mDDR, DDR2	NOR, SLC NAND MLC NAND	HS OTG+HS Phy HS Host+FS Phy or ext. HS Phy	2	√	3	3	2	3	√	ATA-6	2+ES AI	Yes, Async.	Yes	3	√	1.22V to 1.47V	C	400 MAPBGA	√
i.MX356	ARM1136 w/Vector Floating Point	532 MHz	L1: 16 KB/16 KB I/D L2: 128 KB Unified	128 KB	32-Ch.		OpenVG 1.1	√	CCIR656	TFT up to 800x600	SDRAM mDDR, DDR2	NOR, SLC NAND MLC NAND	HS OTG+HS Phy HS Host+FS Phy or ext. HS Phy	2	√	3	3	2	3	√	ATA-6	2+ES AI	Yes, Async.	Yes	3	√	1.22V to 1.47V	C	400 MAPBGA	√
i.MX514	ARM Cortex A8 with VPU and NEON	600 MHz	L1: 32KB/32KB I/D L2: 256KB Unified	96 KB	32 Ch		OpenVG 1.1; OpenGL ES2.0	√	CCIR656	WXGA; Dual TFT	mDDR, DDR2	NOR, SLC NAND MLC NAND	HS OTG+HS Phy and 3x HS Host			4	3	2	3	√	ATA-6	3		Yes (Tx)	3	√	0.95V to 1.10V	C	529 MAPBGA	√
i.MX516	ARM Cortex A8 with VPU and NEON	600 MHz	L1: 32KB/32KB I/D L2: 256KB Unified	96 KB	32 Ch.	D1 encode; HD720 decode	OpenVG 1.1; OpenGL ES2.0	√	CCIR656	WXGA; Dual TFT	mDDR, DDR2	NOR, SLC NAND MLC NAND	HS OTG+HS Phy and 3x HS Host			4	3	2	3	√	ATA-6	3		Yes (Tx)	3	√	0.95V to 1.10V	C	529 MAPBGA	√

1. C = -40°C to +85°C, V = -40°C to +105°C, M = -40°C to +125°C, J = -40°C to +140°C, W = -40°C to +150°C

## — Definitions —

ADC — Analog-to-Digital Converter  
ASK — Amplitude Shift Keying Modulation  
BDM — Background Debug Mode  
CAN — Controller Area Network  
CDIP — Ceramic Dual In-Line Package  
CLCC — Ceramic Leaded Chip Carrier  
COP — Computer Operating Properly (Watchdog Timer)  
CPU16 — 16-bit Central Processor Unit (HC11 Compatible)  
CPU32 — 32-bit Central Processor Unit (68000 Compatible)  
CTM — Configurable Timer Module (Various Hardware Options)  
DAB — Digital Audio Broadcasting  
DIP — Dual In-line Package  
DSPI — Deserial Peripheral Interface  
EBI — External Bus Interface  
ECT — Enhanced Capture Timer  
eDMA — Enhanced Direct Memory Access Controller  
eTPU — Enhanced Timing Processor Unit  
eMIOS — Enhanced Modular Input Output System  
eQADC — Enhanced Queued Analog-to-Digital Converter  
eSCI — Enhanced Serial Communications Interface  
FSK — Frequency Shift Keying Modulation  
GPT — General-Purpose Timer Module (4 IC, 5 OC, 2 PWM)  
HQFP — Heatsink Quad Flat Package  
HSOP — Heatsink Small Outline Package  
i — Input-Only Port Pins  
i/o — Bidirectional Input and Output Port Pins  
I<sup>2</sup>C — Inter-Integrated Circuit  
IC — Input Capture  
ISPI — Interval Serial Peripheral Interface  
LQFP — Low-Profile Quad Flat Package (1.4mm thick)  
LVI — Low-Voltage Interrupt  
LVR — Low-Voltage Reset  
MCCI — Multi-Channel Communication Interface (2 SCI, SPI)  
MFT — Multi-Function Timer  
MUX — Multiplexed  
OC — Output Compare  
OOK — On-Off Keying  
PBGA — Plastic Ball Grid Array  
PDIP — Plastic Dual In-Line Package  
PEEP — Personality EEPROM  
PEP — Personality EPROM  
PLCC — Plastic Leaded Chip Carrier  
PLL — Phase-Locked Loop  
PQFP — Plastic Quad Flat Pack  
PWM — Pulse-Width Modulation  
QADC — Queued Analog-to-Digital Converter (10-bit)  
PQFN — Quad Flat No-Lead Package  
QFN — Quad Flat No-Lead Package

QFP — Quad Flat Package  
QSM — Queued Serial Module (SCI + QSPI)  
QSPI — Queued SPI  
RTI — Real-Time Interrupt  
SCI — Serial Communication Interface  
SCIE — Enhanced SCI  
SCIM — Single-Chip Integration Module  
SDIP — Shrink Dual In-line Package  
SIM — System Integration Module  
SIML — Low-Power System Integration Module  
SIOP — Simple Serial I/O Port  
SOICN — Small Outline Package Narrow Body  
SOICW — Small Outline Package Wide Body  
SPI — Serial Peripheral Interface  
ESPI — Enhanced SPI  
SRAM — Standby RAM Module  
SSOP — Shrink Small Outline Package  
TPU — Time Processor Unit (16 Programmable Channels)  
TPURAM — Standby RAM Module with TPU Emulation Capability  
TQFP — Thin Quad Flat Package (1.0mm thick)  
TSSOP — Thin Shrink Small Outline Package  
UART — Universal AsynchroNous Receiver/Transmitter  
UDFN — Ultra-thin dual flat no-lead package  
USB — Universal Serial Bus

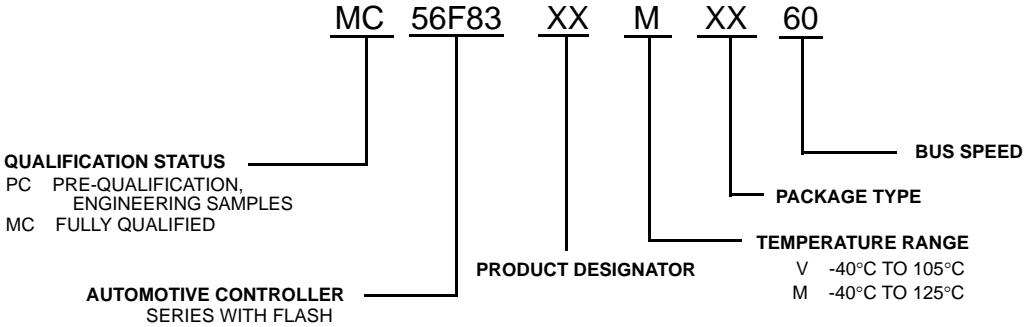
## — Package Designators —

B — Shrink DIP (70 mil spacing)  
DW — Small Outline (Wide-Body SOIC)  
DWB — Small Outline (Wide body SDIB) 0.65 pitch  
FA — 7 x 7 mm Quad Flat Pack (QFP)  
FB — 10 x 10 mm Quad Flat Pack (QFP)  
FC — QFN Quad Flat Pack  
FE — CQFP (windowed) — Samples Only  
FN — Plastic Quad (PLCC)  
FS — CLCC (windowed) — Samples Only  
FT — 28 x 28 mm Quad Flat Pack (QFP)  
FU — 14 x 14 mm Quad Flat Pack (QFP)  
FZ — CQFP (windowed) — Samples Only  
K — Cerdip (windowed) — Samples Only  
L — Ceramic Sidebrazed  
P — Dual in-Line Plastic  
PNA — PQFN Power QFN  
PNB — PQFN Power QFN  
PNC — PQFN Power QFN  
PU — 14 x 14 mm Low-Profile Quad Flat Pack (LQFP)  
PV — 20 x 20 mm Low-Profile Quad Flat Pack (LQFP)  
S — Cerdip (windowed) — Samples Only  
TM — Mechatronics Connector  
VR — Plastic Ball Grid Array (PBGA) with PB-free solder balls  
ZP — 27 x 27 mm Plastic Ball Grid Array (PBGA)

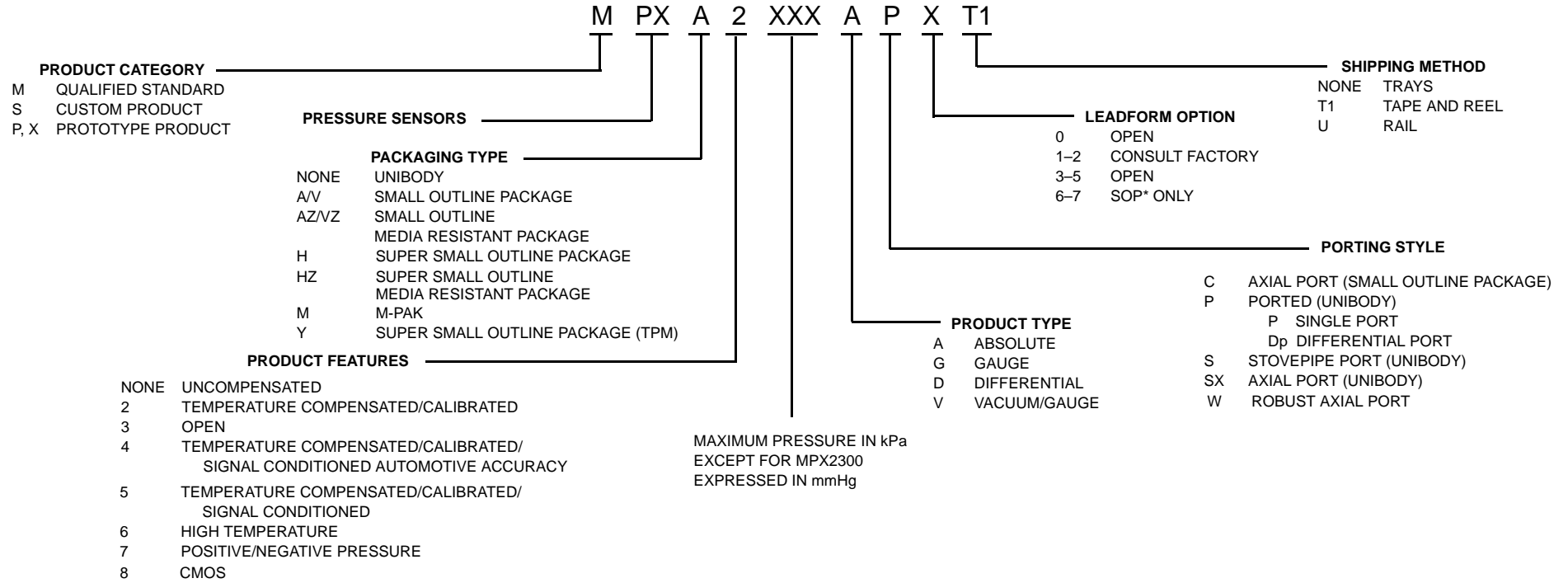
## — Pb-free —

AA — Pb-free 44 to 100 pin QFP  
AB — Pb-free 112 to 288 pin QFP  
AC — Pb-free 16 to 44 pin LQFP  
AE — Pb-free 48 to 64 pin LQFP  
AF — Pb-free 68 to 100 pin LQFP  
AG — Pb-free 108 to 144 pin LQFP  
AH — Pb-free 80 to 100 pin TQFP  
AI — Pb-free FQFP  
AJ — Pb-free CQFP  
AE — Pb-free 22 to 64 pin PDIP  
ED — Pb-free 6 to 20 pin PDIP  
EE — Pb-free PSDIP  
EF — Pb-free 8 to 16 pin SOIC  
EG — Pb-free 16 to 28 pin SOIC WIDE  
EH — Pb-free 132 pin PQFP  
EI — Pb-free PLCC  
EJ — Pb-free 8 to 24 pin TSSOP  
EK — Pb-free 32 to 54 pin SOIC WIDE  
EL — Pb-free 26 to 56 pin TSSOP  
EN — Pb-free 8 to 24 pin SSOP  
EO — Pb-free 26 to 56 pin SSOP  
EP — Pb-free QFN & MLF (Exposed Pad)  
ER — Pb-free CATV  
ES — Pb-free SENSOR  
ET — Pb-free RF (POWER CHIPS)  
EU — Pb-free MAC PAAC  
EV — Pb-free MFP (SOEIAJ)  
FC — Pb-free QFN & MLF (Regular)  
FE — Pb-free CerQuads  
VK — Pb-free MAPBGA  $\leq 1.3\text{mm}$  (THINMAP)  $< .7\text{mm}$  Pitch  
VL — Pb-free MAPBGA  $\leq 1.3\text{mm}$  (THINMAP)  $> .7\text{mm}$  Pitch  
VM — Pb-free MAPBGA  $1.6\text{mm}$   $> .7\text{mm}$  Pitch  
VN — Pb-free MAPBGA  $1.6\text{mm}$   $< .7\text{mm}$  Pitch  
VO — Pb-free MAPBGA  $1.35\text{mm}$   $< .7\text{mm}$  Pitch  
VP — Pb-free MAPBGA  $1.36\text{mm}$   $> .7\text{mm}$  Pitch  
VR — Pb-free PBGA  
VS — Pb-free FC-HiTCE LGA (without C5 sphere)  
VT — Pb-free FC PBGA  
VU — Pb-free FC-HiTCE  
VV — Pb-free TBGA  
VW — Pb-free HSOP  
VX — Pb-free SMT  
VY — Pb-free UNIBODY

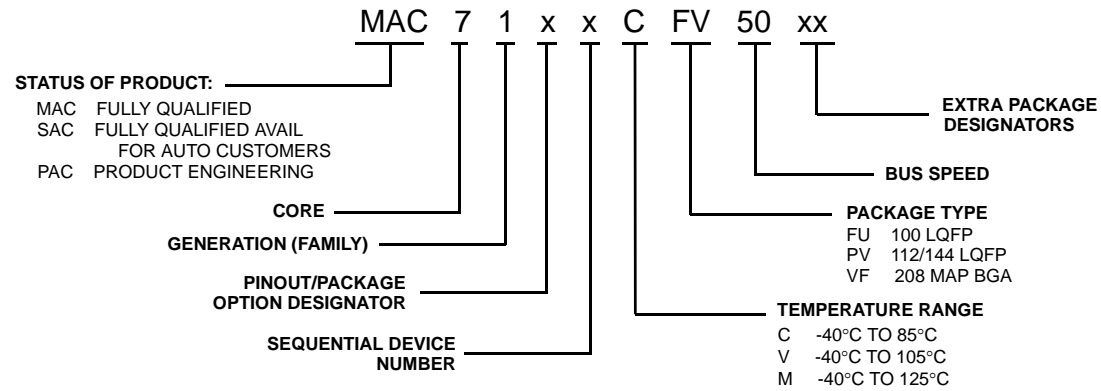
# Product Numbering System for MC56F8300 Digital Signal Controllers



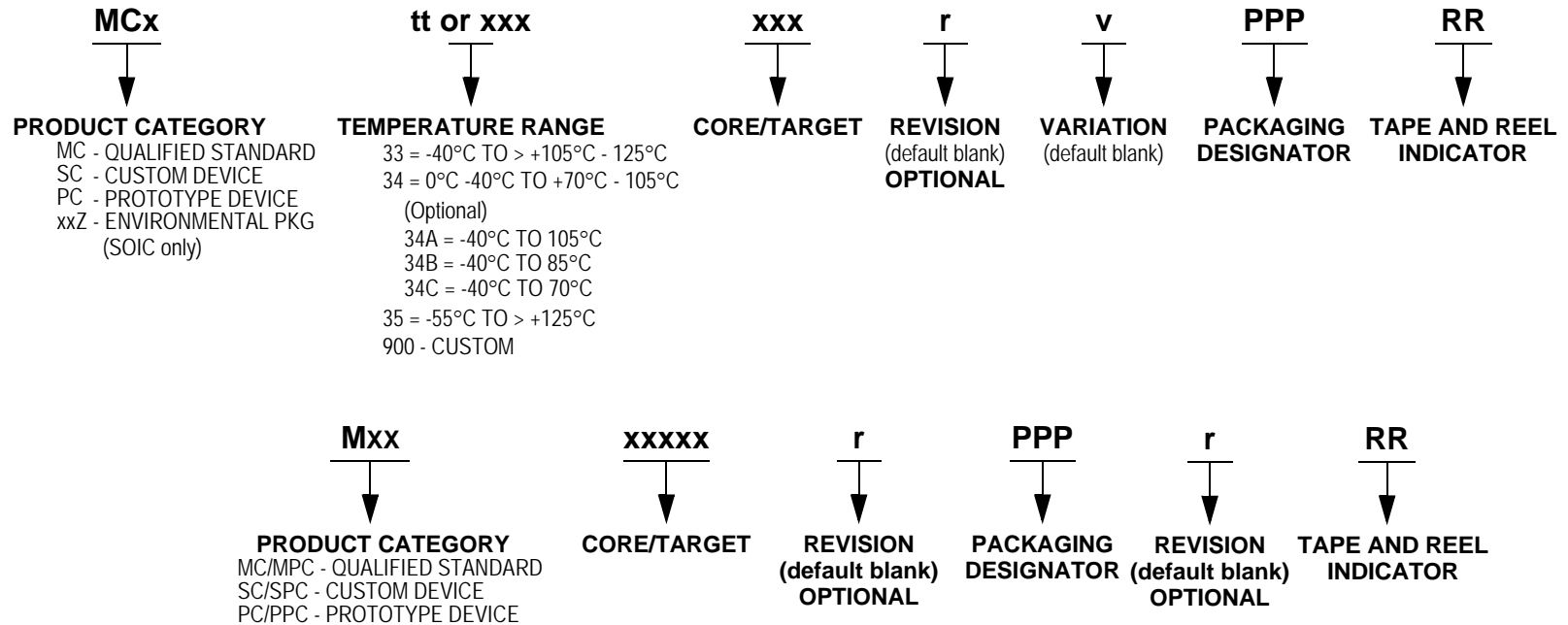
# Product Numbering System for Pressure Sensors



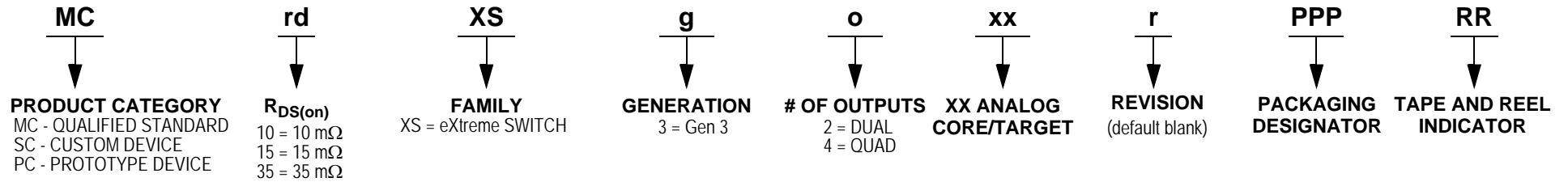
## Product Numbering System for ARM Devices



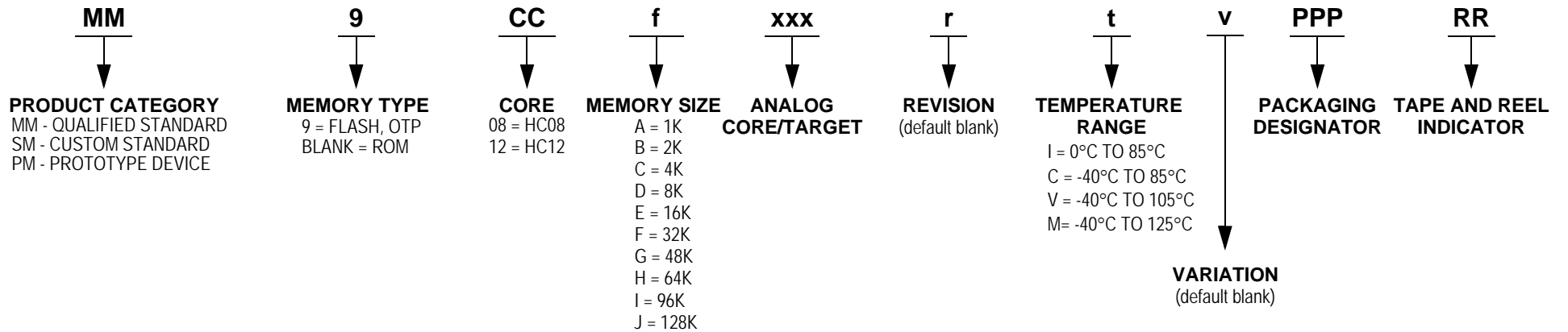
## Product Numbering System for Analog Devices



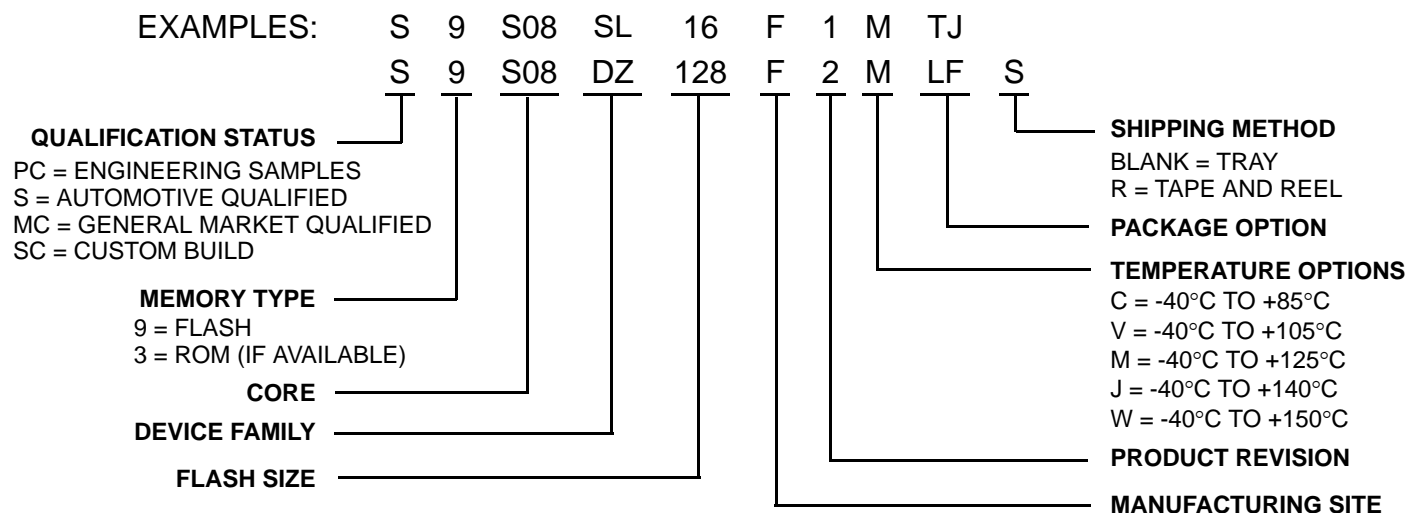
## Product Numbering System for Analog eXtreme Switch Devices



## Product Numbering System for Analog Embedded MCU and Power Devices

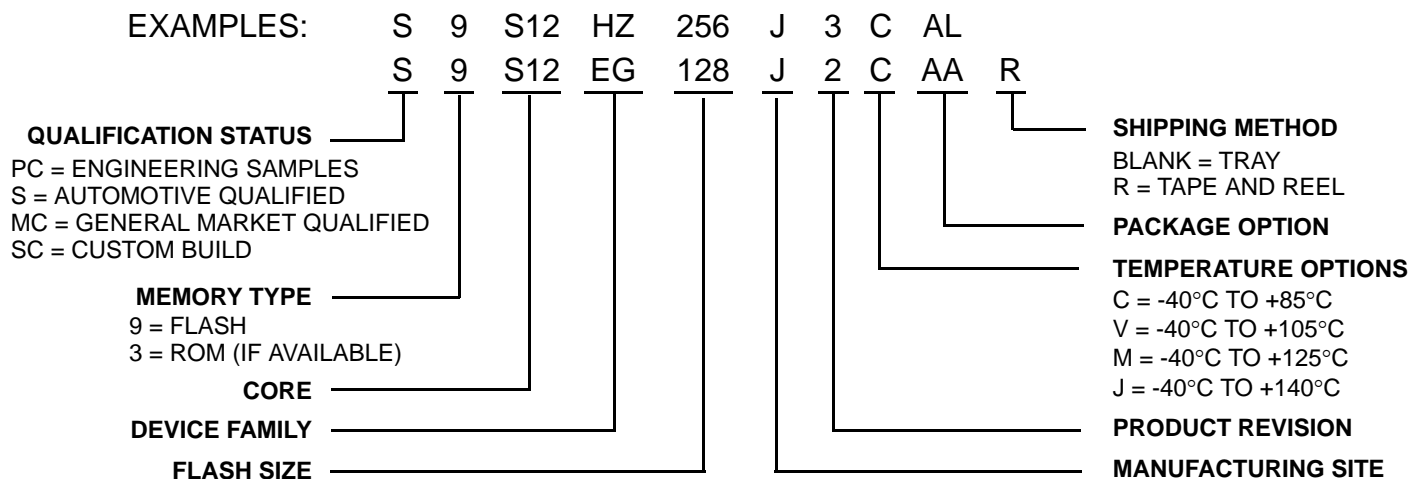


## 8-Bit Automotive Microcontroller Part Numbering System\*



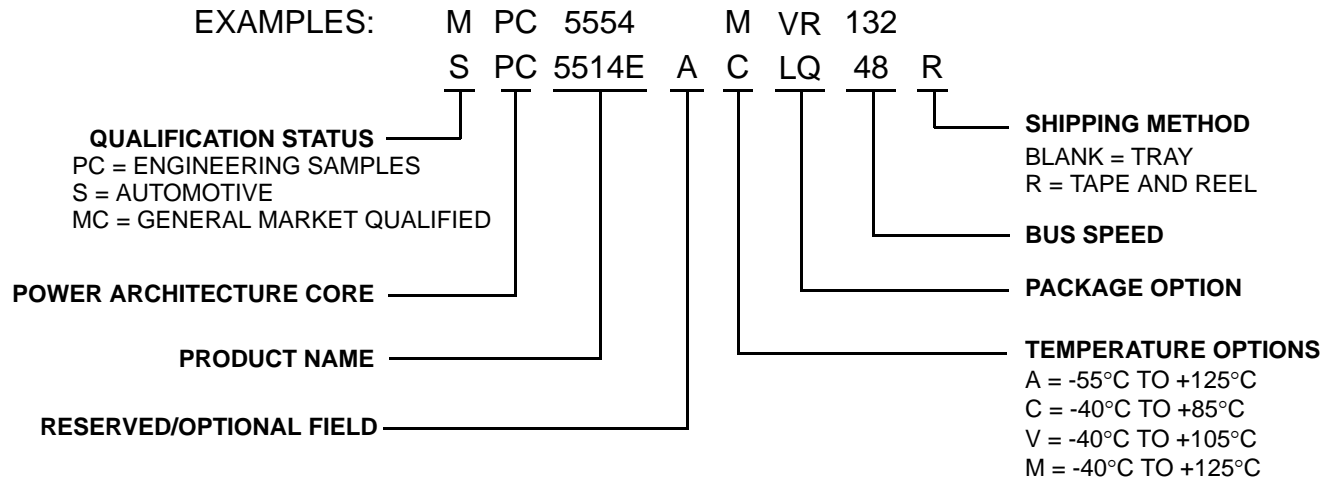
\*NOTE: Freescale's automotive part numbering system has evolved over time, so the decoder scheme shown above may not be relevant for the prior generations.

## 16-Bit Automotive Microcontroller Part Numbering System\*



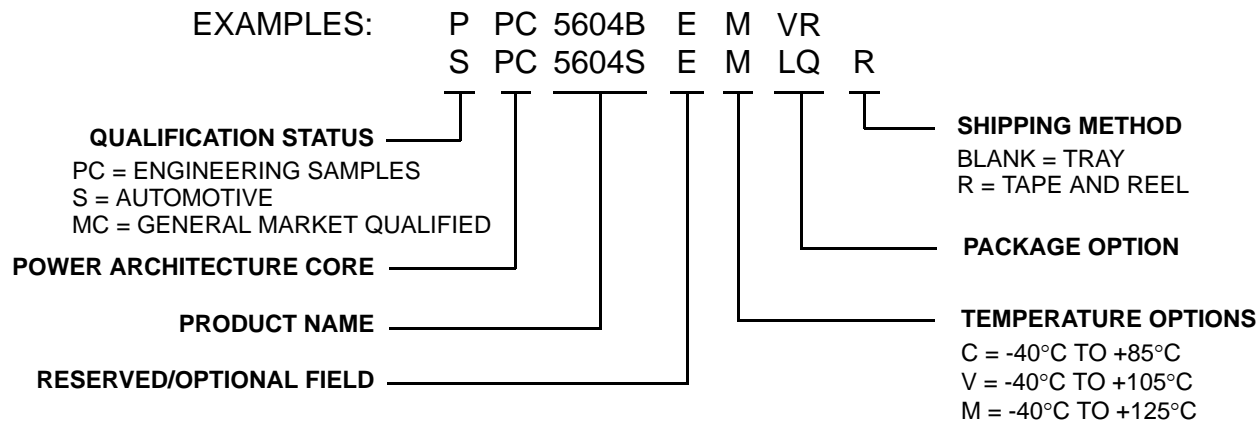
\*NOTE: Freescale's automotive part numbering system has evolved over time, so the decoder scheme shown above may not be relevant for the prior generations.

## 32-Bit Automotive Microcontroller Part Numbering System for Qorivva 55xx Devices\*



\*NOTE: Freescale's automotive part numbering system has evolved over time, so the decoder scheme shown above may not be relevant for the prior generations.

## 32-Bit Automotive Microcontroller Part Numbering System for Qorivva 56xx Devices\*



\*NOTE: Freescale's automotive part numbering system has evolved over time, so the decoder scheme shown above may not be relevant for the prior generations.

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