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MOTOROLA ANALOG PRODUCTS

SMARTMOS™ Motorola's SMARTMOS 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 Motorola's 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.

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Power ICs — Low-Side Switches (Solid State Intelligent Switches)

Product	Description	No. of Outputs	High Side or Low Side	Continuous Current Each Output (A)	$R_{DS(on)}$ (m Ω) of Each Output	Current Limitation (A)	Current Limitation Standby Max (μ A)	Protection Features	Control	Status/Fault Reporting	Packaging	Status
MC33291	(1.2 Ω $R_{DS(on)}$) Smart Eight Output Switch with SPI Interface	8	L	0.35	1000	1 to 3.0	25	Short Circuit, Current Limit, Temp Sense	SPI	SPI	24-pin SOICW	Production EVB
MC33291L	(1.6 Ω $R_{DS(on)}$) Smart Eight Output Switch with SPI Interface	8	L	0.35	1400	1 to 3.0	25	Short Circuit, Current Limit, Temp Sense	SPI	SPI	24-pin SOICW	Production EVB
MC33298	(0.8 Ω $R_{DS(on)}$) Smart Eight Output Switch with SPI I/O Control	8	L	0.5	650	3 to 6.0	50	Short Circuit, Current Limit, Temp Sense	SPI	SPI	24-pin SOICW	Production EVB
MC33385	(0.25 Ω $R_{DS(on)}$) Quad Low-Side Injector Driver	4	L	2.0	500	3.0	6 mA	Short Circuit, Current Limit, Temp Sense	Parallel	SPI	20-pin HSOP	Production
MC33397	(0.9 Ω $R_{DS(on)}$) Smart Dual/Hex Output Switch with SPI and Parallel Input Control	2 or 6	L	0.35	2 x 223, 6 x 700	1.5	10	Short Circuit, Current Limit, Temp Sense	SPI	SPI	24-pin SOICW 32-pin QFN (7 x 7)	Production EVB
MC33880	(1.0 Ω $R_{DS(on)}$) Configurable Eight Output SPI Controlled Switch	8	H/L	0.5	550	1.2	25	Short Circuit, Current Limit, Temp Sense	SPI w/2 PWM	SPI	32-pin SOICW Exposed Pad 28-pin SOICW	Production EVB
MC33882	(0.8 Ω $R_{DS(on)}$) Smart Six Output Switch with SPI and Parallel Input Control	8	L	1.0	375	3.0	10	Short Circuit, Current Limit, Temp Sense	SPI	SPI	30-pin HSOP 32-pin QFN (7 x 7)	Production
PC33996	16 Output Hardware Low-Side Switch with 24-Bit Serial Input Control	16	L	0.5	450	1 to 2.5	50	Short Circuit, Current Limit, Temp Sense, Open Load	SPI	SPI	32-pin SOICW	Samples Now Production April 2004 EVB
PC33999	16 Output Hardware Low-Side Switch with 24-Bit Serial Input Control and 8 Parallel Control	16	L	0.5	450	1 to 2.5	50	Short Circuit, Current Limit, Temp Sense, Open Load	SPI Parallel	SPI	54-pin SOICW	Samples Now Production May 2004 EVB

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Analog Products

Power ICs — High-Side Switches (Solid State Intelligent Switches)

Product	Description	No. of Outputs	High Side or Low Side	Continuous Current Each Output (A)	$R_{DS(on)}$ (m Ω) of Each Output	Current Limitation (A)	Current Limitation Standby Max (μ A)	Protection Features	Control	Status/Fault Reporting	Packaging	Status
MC33143	Smart Dual High-Side Switch	2	H	3.0	380	3 to 6	300	Short Circuit, Current Limit, Temp Sense	Parallel	2 Status Pins	24-pin SOICW	Production
MC33286	Dual High-Side Switch	2	H	6.0	2 x 35	30	5	Short Circuit, Current Limit, Temp Sense	Parallel	1 Status Pin (Overtemp / Openload)	20-pin SOICW	Production
MC33288	Solid State Relay for High-Current Incandescent Lamps	2	H	8.0	2 x 20	30	5	Short Circuit, Current Limit, Temp Sense	Parallel	1 Status Pin (Overtemp / Openload)	20-pin HSOP	Production
MC33289	Dual High-Side Switch for Inductive Load	2	H	4.0	2 x 40	9	5	Short Circuit, Current Limit, Temp Sense, Current Recopy	Parallel	1 Status Pin (Overtemp / Openload)	20-pin SOICW	Production EVB
MC33486	Dual High-Side Switch for H-Bridge	2	H	10	15	35	5	Short Circuit, Current Limit, Temp Sense, Current Recopy	Parallel	1 Status Pin (Overtemp / Overcurrent)	20-pin HSOP	Production
MC33880	Configurable Eight Output SPI Controlled Switch	8	H/L	0.5	550	1.2	25	Short Circuit, Current Limit, Temp Sense	SPI w/2 PWM	SPI	28-pin SOICW 32-pin SOIC Exposed Pad	Production EVB
MC33888	Quad High-Side Switch and Octal Low-Side Switch	12	H	2 @ 10 A 8 @ 500 mA 2 @ 5 A	2 x 10, 2 x 40, 8 x 600	45/20	5	Short Circuit, Current Limit, Temp Sense, Current Recopy	SPI	SPI	64-pin HQFP 35-pin PQFN	Production
MC33982	Self Protected 2 m Ω Switch with Diagnostic and Protection	1	H	60.0	2	100 or 150 Selectable	5	Current Limit, Temp Sense, Over/Under Voltage, Shutdown, Reverse Polarity	SPI	SPI	16-pin PQFN	Production EVB
PC33984	Self Protected 4 m Ω Switch with Diagnostic and Protection	2	H	20.0	4	Programmable	5	Over / Under Voltage Independent Thermal Shutdown	SPI	SPI	16-pin PQFN	Samples Now Production May 2004

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Power ICs — H-Bridges and Configurable Switches (Totem-Pole Output Devices)

Product	Description	Main Characteristics	No. of Outputs	R _{DS(on)} (mΩ) of Each Output	Current Limitation (A)	Current Limitation Standby Max	Protection Features	Control	Status Reporting	Packaging	Status
MC33186	H-Bridge Driver (5 A)	40 V/150 mΩ per FET	2	150	6	20 mA	Short Circuit, Current Limit, Temp Sense	Parallel	1 Status Pin (Overcurrent/Overtemp)	20-pin HSOP	Production
MC33395	Three-Phase Bridge Gate Driver IC (5 μs Dead Time)	Three-channel high-side/three-channel low-side MOSFET driver with fault report pin, mode selectable	6	n/a	Internal comparator	60 mA	Current Limit, Temp Sense	Parallel	No Status	32-pin SOICW	Production
MC33395T	Three-Phase Bridge Gate Driver IC (1 μs Dead Time)										
MC33486	Dual High-Side Switch for H-Bridge	40 mΩ, 10 A	2	2 x 15	35	5 μA	Short Circuit, Current Limit, Temp Sense, Current Recopy	Parallel	1 Status Pin (Overcurrent/Overtemp)	20-pin HSOP	Production
MC33886	H-Bridge Driver (5.2 A)	225 mΩ @150°C	2	120	6	20 mA	Short Circuit, Current Limit, Temp Sense	Parallel	1 Status Pin (Overcurrent/Overtemp)	20-pin HSOP	Production EVB
MC33887	H-Bridge Driver with Sleepmode (5.2 A)	130 mΩ @ 25°C, sleep mode, current sense	2	130	6	25 μA	Short Circuit, Current Limit, Temp Sense	Parallel	1 Status Pin (Overcurrent/Overtemp)	20-pin HSOP 54-pin SOICW	Production EVB
MC33895	Quad half bridge with LIN physical interface and low power mode	Low power mode 4 x Half Bridge Outputs (4 x 500 mΩ) 1 x High Side Output (700 mΩ) 1 x switchable 5V output LIN Physical Layer	5	4 x 500 1 x 700	5	100 μA	Current Voltage and Thermal Protection and Reporting for LIN, HS/HB and Hall Ports	SPI	TBD	32-pin QFN (7 x 7)	Production
MC33922	Dual H-Bridge Driver with Sleepmode (5.2 A)	130 mΩ @ 25°C, sleep mode, current sense	2	130	6	25 μA	Short Circuit, Current Limit, Temp Sense	Parallel	1 Status Pin (Overcurrent/Overtemp)	29-pin PQFN (10 x 10)	Production EVB

Note: Peak Current Limitation

Power ICs — Pre-Drivers (High-Side MOSFET Gate Drivers)

Product	Description	Main Characteristics	Operating Voltage (V)	Input Control	Output Drives High/Low Side Drive Current	Protection Features	Status Reporting	Packaging	Status
MC33198	High-Side, N-Channel MOSFET Gate Driver for Driving Loads with High In-Rush Current — Lamp Driver	Single-channel high-side MOSFET gate driver with 1 kHz PWM capability and status report pin	7 to 20	1 CMOS logic	1H 110 μA typ.	Short Circuit, Overvoltage Load Dump	1 Status Pin	8-pin SOICN	Production
MC33285	Dual High-Side TMOS Driver	Dual channel high-side MOSFET gate driver with fault report pin	7 to 40	1 analog	2H 110 μA typ.	Short Circuit Overvoltage Load Dump Rev. Battery	None	8-pin SOICN	Production
MC33395	Three-Phase Bridge Gate Driver IC (5 μs Dead Time)	Three-channel high-side/three-channel low-side MOSFET driver with fault report pin, mode selectable	5.5 to 26	1 CMOS logic	3H, 3L	Overvoltage Current Limit, Thermal Unit	None	32-pin SOICW	Production
MC33395T	Three-Phase Bridge Gate Driver IC (1 μs Dead Time)								
MC33883	H-Bridge Pre-Driver	Full bridge driver, fast PWM, global enable	6 to 55	4 non-invert CMOS, LSTTL logic	2H, 2L 1A pulse	Overvoltage, Undervoltage	None	20-pin SOICN	Production EVB

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Analog Products

Embedded MCU

Product	Description	Main Characteristics	Bus Type and Standard	Protection Features	Operating Voltage (V)	Current Limitation Standby (μ A)		Other Features	Control and Status Reporting	Packaging	Status
						Typ	Max				
MM908E624	DC Motor Control Using Relays (for example, Window Lift, Sun Roof, and Power Seats)	Voltage Regulator 5.0 /50 mA, LIN Physical Layer with Selectable Slewrates, Window Watchdog with Selectable Timing, Normal/Stop/Sleep Mode Control	LIN single wire	Current voltage and thermal protection and reporting for LIN, regulator, HS/HB and Hall ports	8 to 18	20	TBD	3 x Hall sensor inputs 1 x Analog inputs with current source wake up input	4 MHz SPI (for diag)	54-pin SOIC-EP	Production EVB
MM908E625	Mirror Control, Stepper Motor Control, Door Lock	Voltage Regulator 5.0 V/60 mA, LIN Physical Layer with Selectable Slewrates, Timeout Watchdog with Periodic wake up Feature, Normal/Stop Mode Control	—	—	—	—	—	3 x 2 pin Hall sensor inputs with cyclic wake up feature, Analog input with current source	—	54-pin SOICWB-EP	Production EVB

Power Management — Switching Regulators

Product	Description	Main Characteristics	Operating Input Voltage	Output Voltages	Protection Features	Packaging	Status
MC33394	Multi-Output Power Supply	Step-down/step-up switching pre-regulator, 8 voltage regulators (5 V, 3.3 V, 2.6 V adj.), 2.6 V adj. standby regulator, switched battery output, power sequencing, resets, SPI, high-speed CAN transceiver with wake-up function	4.0 V to 26.5 V (45 V transient)	5 V @ 400 mA 3 x 5 V @ 100 mA 5 V/3.3 V @ 150 mA 3.3 V @ 120 mA 2.6 V-adjustable @ 400 mA 2.6 V-adjustable @ 50 mA standby switched battery	Short circuit to GND, short circuit to battery, current limit, thermal	44-pin HSOP 44-pin QFN 54-pin SOICW	Production EVB
MC33397	3.3/5.0 Volt Switching Power Supply	Step-down switching pre-regulator, 5 voltage regulators (5 V, 3.3 V), 3.3 V standby regulator, power sequencing, and reset	6.0 V to 26.5 V (40 V transient)	5 V @ 1400 mA 2 x 5 V @ 200 mA 3.3 V @ 400 mA typ 3.3 V @ 10 mA	Undervoltage shutdown, V_{DDH} current limit, V_{KAM} current limit, short circuit to GND, short circuit to V_{PWR}	24-pin SOICW	Production EVB
MC33398	2.6/5.0 Volt Switching Power Supply	Step-down switching pre-regulator, 5 voltage regulators (5 V, 2.6 V), 2.6 V standby regulator, power sequencing, and reset	6.0 V to 26.5 V (40 V transient)	5 V @ 1400 mA 2 x 5 V @ 200 mA 2.6 V @ 400 mA 2.6 V @ 10 mA	Undervoltage shutdown, V_{DDH} current limit, V_{KAM} current limit, short circuit to GND, short circuit to V_{PWR}	24-pin SOICW	Production EVB

Power Management — Linear Regulators

Product	Description	Main Characteristics	Bus Type and Standard	Protection Features	Operating Voltage (V)	Current Limitation Standby (μ A)		Other Features	Diagnostics	Packaging	Status
						Typ	Max				
MC33389A MC33389C MC33389D	System Basis Chip	Dual 5.0 V regulators LS CAN, Watchdog, 3 wake up inputs	CAN low-speed, dual wires	Fault tolerant	5.5 to 27	—	150	Dual voltage regulator, watchdog, wake up input, sleep mode, cyclic sense	SPI 2 MHz	28-pin SOICW 20-pin HSOP	Production EVB
MC33689	System Basis Chip with enhanced LIN physical interface	Low power modes with remote and local wake up; 5V/60mA V_{REG} with reset and selectable W/D; enhanced LIN physical layer (same as MC33661)	LIN single wire	Current and thermal protection for LIN, regulator and HS switches	5.5 to 27	30	50	Dual HS switch (150 mA) and single HS switch (50 mA) 2 wake up input Sense amplifier Over and Under voltage detection	SPI 4 MHz	32-pin SOICW	Production EVB
MC33742	System Basis Chip with enhanced High Speed CAN (250k to 1Mbps)	SBC, Dual V_{REG} , Enhance HS CAN with Bus failure diagnostic capability, 4 wake up inputs; Pin and function compatible with MC33989	CAN HS dual wire	Current and thermal protection for CAN and regulator	5.5 to 27	60	150	Low power modes Remote and local wake up input capabilities	SPI 4 MHz	28-pin SOICW	Production EVB
MC33889B MC33889C	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	Fault tolerant	5.5 to 27	60	100	Dual voltage regulator, watchdog, wake input, sleep and stop modes	SPI 4 MHz	28-pin SOICW	Production EVB
MC33989	System Basis Chip with High Speed CAN	Dual 5.0 V regulators HS CAN, 4 wake up inputs	CAN high speed, dual wires	Current limitation, thermal	5.5 to 27	80	150	Dual voltage regulator, watchdog, wake input, sleep and stop modes	SPI 4 MHz	28-pin SOICW	Production EVB

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Analog Products

Communication Protocols — LIN, ISO-9141, J-1850 Physical Interfaces

Product	Description	Main Characteristics	Bus Type and Standard	Protection Features	Operating Voltage (V)	Current Limitation Standby (μ A)		Other Features	Control and Status Reporting	Packaging	Status
						Typ	Max				
MC33290	Serial ISO-9141 K-Line Interface	K line only — OBD II compatible	ISO-9141 K line	Current limitation, thermal	8.0 to 18	—	50	Sleep mode	Parallel Communication	8-pin SOICN	Production
MC33390	Serial Link J-1850 Bus Transceiver	J-1850 low-speed multiplexing bus	J-1850	Current limitation	9.0 to 16	—	65	Sleep mode	Parallel Communication	8-pin SOICN	Production
MC33399	Local Interconnect Network-LIN-Physical Layer	LIN: local interconnect network physical interface	LIN single wire	Current limitation, thermal	7.0 to 27	—	50	Wakeup input pin, control of external voltage regulator	Parallel Communication	8-pin SOICN	Production EVB
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; Pin and function compatible with MC33399	LIN single wire	Current and thermal protection	5.5 to 27	8	20	Compatibility with 5.0V and 3.3V micros. Wakeup input Control of external regulator	Parallel Communication	8-pin SOICN	Production EVB
MC33689	System Basis Chip with enhanced LIN physical interface	Low power modes with remote and local wake up; 5V/60mA V_{REG} with reset and selectable W/D; enhanced LIN physical layer (same as MC33661)	LIN single wire	Current and thermal protection for LIN, regulator and HS switches	5.5 to 27	30	50	Dual HS switch (150 mA) and single HS switch (50 mA) 2 wake up input Sense amplifier Over and under voltage detection	4MHz SPI (for diag)	32-pin SOICW	Production EVB
MC33742	System Basis Chip with enhanced High Speed CAN (250k to 1Mbps)	SBC, Dual V_{REG} , Enhance HS CAN with Bus failure diagnostic capability, 4 Wakeup inputs; Pin and function compatible with MC33989	CAN HS dual wire	Current and thermal protection for CAN and regulator	5.5 to 27	60	150	Low power modes Remote and local wake up capabilities	4MHz SPI (for diag)	28-pin SOICW	Production EVB
MC33895	Quad half bridge with LIN physical interface and low power mode	Low power mode 4 x Half Bridge Outputs (4 x 500 m Ω) 1 x High Side Output (700 m Ω) 1 x switchable 5V output LIN Physical Layer	LIN single wire	Current voltage and thermal protection and reporting for LIN, HS/HB and Hall ports	8 to 18	—	100	3 x Hall sensor inputs 1 x Analog inputs with current source wake up input PWM feature	4MHz SPI (for diag)	32-pin QFN (7 x 7)	Production
MC33990	Serial Link J-1850 Bus Transceiver	J-1850 multiplexing bus with loss of ground protection	J-1850	Current limitation	9.0 to 16	—	20	Internally reverse battery protected	Parallel Communication	8-pin SOICN	Production

Communication Protocols — CAN Physical Interface Components

Product	Description	Main Characteristics	Bus Type and Standard	Protection Features	Operating Voltage (V)	Current Limitation Standby (μ A)		Other Features	Control and Status Reporting	Packaging	Status
						Typ	Max				
MC33388	Fault-Tolerant CAN Interface	CAN low-speed fault tolerant physical interface	CAN low-speed, dual wires	Fault tolerant	6.0 to 27	25	25	Wakeup input pin, fault tolerant physical interface	Parallel Communication	14-pin SOICN	Production EVB
MC33389A MC33389C MC33389D	System Basis Chip	Dual V_{REG} , LS CAN, Watchdog, 3 wake up inputs	CAN low-speed, dual wires	Fault tolerant	5.5 to 27	150	150	Dual voltage regulator, watchdog, wake up input, sleep mode, cyclic sense	SPI 2 MHz	28-pin SOICW 20-pin HSOP	Production EVB
MC33889B MC33889C	System Basis Chip Lite with Low-Speed CAN	Dual V_{REG} , LS CAN, 2 wake up inputs	CAN low-speed, dual wires	Fault tolerant	5.5 to 27	100	100	Dual voltage regulator, watchdog, wake input, sleep and stop modes	SPI 4 MHz	28-pin SOICW	Production EVB
MC33897	Single-Wire CAN	33.3K Standard data rate, wake up capability (GMW3089 v2.1 compatible)	SW CAN	Thermal Shutdown, Current Limit	6.0 to 27	80	80	Regulator Control Output	2 Mode Control Pins	8-pin SOIC	Production
MC33989	System Basis Chip with High-Speed CAN	SBC dual V_{REG} , HS CAN, 4 wake up inputs	CAN high-speed, dual wires	—	5.5 to 27	150	150	Dual voltage regulator, watchdog, wake input, sleep mode, and cyclic sense	SPI 4 MHz	20-pin HSOP 28-pin SOICW	Production EVB

Communication Protocols — Distributed Systems Interface Components

Product	Description	Main Characteristics	System Type	No. of Channels	Current Limit (mA)	Max Voltage	Communications	Packaging	Status
MC33790	Distributed System Interface (DSI) Physical Interface (DSIP)	Dual current-limited waveshaped outputs, current sensing inputs, 3.3 V and 5 V	Distributed	2	150	26.5	DSI	16-pin SOICW	Production EVB
MC33793	Distributed System Interface (DSI) Share Interface Sensor	4-channel, 8-bit A-to-D converter, 5 V regulated output from DSI bus, configurable I/O, fault tolerant, high drive output	Distributed	4	6	40	DSI	16-pin SOICN	Production EVB
MC68HC55	2-Channel SPI and DSI Protocol Converter for Bus Masters	Allows any MCU with an SPI to use a DSI Bus	Distributed	2	—	n/a	SPI/DSI	16-pin SOICN	Production EVB

Safety, Security, and Sensors

Product	Description	Main Characteristics	No. of Channels	Current Limit (mA)	Max Voltage	Communications	Packaging	Status
MC33790	2-Channel DSI Physical Interface for Bus Masters	Dual current-limited waveshaped outputs, current sensing inputs, 3.3 V and 5 V	2	150	26.5	DSI	16-pin SOICW	Production EVB
MC33793	DSI Slave for Remote Sensing	4-channel 8-bit A-to-D converter, 5 V regulated output from DSI bus, configurable I/O, fault tolerant, high drive output	4	6	40	DSI	16-pin SOICN	Production EVB
MC33794	Electric Field Imaging Devices	125 kHz generator, shield driver, 9 electrodes + 2 V_{REF} outputs, detector, 5 V regulator, MCU support	11	75	40	ISO-9141	44-pin HSOP 54-pin SOICW	Production EVB
MC68HC55	2-Channel SPI to DSI Protocol Converter for Bus Masters	Allows any MCU with an SPI to use a DSI bus	2	n/a	n/a	SPI/DSI	16-pin SOICN	Production

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Analog Products

Peripheral and Special Function — Alternator Voltage Regulators

Product	Description	Main Characteristics	Regulator Voltage	Operating Voltage (V)	Packaging	Status
MC33099 MC33099C	Adaptive Alternator Voltage Regulator	Internal lamp driver. LRC response during initial start. Programmable LRC rates from 1.8 to 7.4 sec. Fault detection of undervoltage/overvoltage, phase loss and high remote sense resistance.	14.8 14.6	4.5 to 24 V	16-pin SOICW	Production May 2004
MC33092A	Alternator Voltage Regulator with Load Response Control-9SI-GM type	LRC response during initial start. Programmable LRC rates from 2.5 to 1 sec. Fault detection of undervoltage/overvoltage, phase loss and high remote sense resistance.	n/a	4.5 V to 24 V	16-pin SOICW	Production February 2004

Peripheral and Special Function — Contact Monitor

Product	Description	Main Characteristics	Operating Voltage (V)	Packaging	Status
MC33287	Contact Monitoring and Dual Low-Side Protected Driver	Contact monitor and dual 500 mA low-side	7.0 V to 18 V	20-pin SOICW	Production
MC33884	Switch Monitor Interface	12 inputs contact monitoring (6 GND, 2 Vbat, 4 configurable), pulse wetting current Master, slave, and low-power mode interrupt capability	7.0 V to 26 V	24-pin SOICW	Production
MC33972	Multiple Switch detection interface with suppressed wake-up	Multiple switch detection interface with suppressed wake-up designed to detect closing and opening of up to 22 switch contacts	5.5 V to 26 V	32-pin SOICW	Production
MC33991	Dual Gauge Driver Integrated Circuit	4 Dual Output H-Bridge coil drivers, MMT-licensed two phase stepper motor compatible, Analog microstepping (12 steps/deg of pointer movement)	6.2 V to 26 V (nominal)	24-pin SOICW	Production EVB
MC33993	22 input Multiple Switch detect interface SW TO GND	2 inputs contact monitoring (14 GND and 8 configurable), pulse wetting current, low-power mode, interrupt capability, wake-up	5.5 V to 26.5 V	32-pin SOICW	Production EVB

Peripheral and Special Function — Accessory Control

Product	Description	Main Characteristics	Operating Voltage (V)	Packaging	Status
MC33970	Dual Gauge Driver Large Pointer	4 Dual Output H-Bridge coil drivers, MMT-licensed two phase stepper motor compatible, Analog microstepping (12-steps/deg of pointer movement)	6.2 V to 26 V	24-pin SOICW	Production
MC33971	Single Gauge Driver Integrated Circuit	Monolithic IC has 4 Output H-Bridge coil drivers and their associated control and management logic, automatically controls speed, direction, and magnitude of current	6.2 V to 26 V	24-pin SOICW	Production
MC33974	Dual Switch Motors	2 inputs contact monitoring (14 GND and 8 configurable), pulse wetting current, low-power mode, interrupt capability, wake-up	6.2 V to 26 V	24-pin SOICW	Production
MC33991	Dual Gauge Driver Integrated Circuit	4 Dual Output H-Bridge coil drivers, MMT-licensed two phase stepper motor compatible, Analog microstepping (12 steps/deg of pointer movement)	6.2 V to 26 V	24-pin SOICW	Production EVB

MOTOROLA ACCESS AND REMOTE CONTROL PRODUCTS

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Transmitters and Receivers

Product	Description	Packaging	Band	Data Rate	MCU Interface	Operating Voltage	Status
TRANSMITTER (TANGO3)							
MC33493	PLL-tuned UHF transmitter, OOK/FSK modulation, -40°C to +125°C	14-pin TSSOP	315/434/868MHz	1–11 kbps	2 logic lines	1.8–3.6V	Available
RECEIVER (ROMEO2)							
MC33591	PLL-tuned UHF receiver, OOK/FSK modulation, IF BW = 500kHz, -40°C to +85°C	24-pin LQFP	315/434MHz	1–11 kbps	SPI	5V	Available
MC33592	PLL-tuned UHF receiver, OOK modulation, IF BW = 300kHz, -40°C to +85°C	24-pin LQFP	315/434MHz	1–11 kbps	SPI	5V	Available
MC33593	PLL-tuned UHF receiver, OOK/FSK modulation, IF BW = 500kHz, -40°C to +85°C	24-pin LQFP	868MHz	1–11 kbps	SPI	5V	Available
MC33594	PLL-tuned UHF receiver, OOK/FSK modulation (data manager in FSK only), IF BW = 500kHz, -40°C to +105°C extended temperature	24-pin LQFP	315/434MHz	1–11 kbps	SPI	5V	Available
TAG READER (STARC) FOR IMMOBILIZER APPLICATIONS							
MC33690	Stand-alone TAG reader with voltage regulator	20-pin SOIC	125kHz	0.5–8 kbps	K line (ISO-9141)	12V	Available

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Comments	Documentation
MC68HC908RK2	n/a	128	2K Flash	n/a	2-CH, 16-Bit	14	n/a	n/a	n/a	See Timer	Y	20-pin SSOP(SD)	1.8 to 3.6	4.0 Max	C	Flash	Available	Low-power embedded Flash routine	MC68HC908RK2/D
MC68HC908RF2	n/a	128	2K Flash	n/a	1-CH, 16-Bit	12	n/a	n/a	n/a	See Timer	Y	32-pin LQFP(FA)	1.8 to 3.6	4.0 Max	C, M	Flash	Available	RF transmitter integrated	MC68HC908RF2/D

Access/Remote Control

GPS Downconverter

Product	RF Freq. (MHz)	Supply Voltage Range (Vdc)	Supply Current (Typ) (mA)	Standby Current (mA)	Conversion Gain (typ) (dB)	Case No. Package	System Applicability	Documentation
MRFIC1505	1575.42	2.7 to 3.3	28	3	105	932 48-pin LQFP	GPS	MRFIC1505/D

MOTOROLA AUTOMOTIVE SENSORS

Sensor Products Division Our focus is on new products that will continue to meet customers' needs. We are proud to announce the Tire Pressure Monitoring Sensors, which expand the pressure sensor automotive portfolio. These products are ideal for tire pressure measurement. The expansion of our Low g accelerometer product offering has continued with the new Low g x-axis accelerometers. Low g accelerometers are ideal for automotive applications involving small movements such as tilt, vibration, shock, and inclination.

Accelerometers We use surface micromachining technology for a capacitive "sensing" structure. A g-cell is coupled with a control chip for signal amplification, signal conditioning, low-pass filter, and temperature compensation.

Pressure Sensors Our pressure sensors are silicon micromachined products with integrated on-chip circuitry. These devices are ideal for a microprocessor interface and are designed to perform in the automotive environment.

Tire Pressure Monitoring Sensors The device is a CMOS-based pressure and temperature sensor housed in our newly designed super-small outline package (SSOP). By using a CMOS-based surface micromachining technology, we are able to offer a device with low power consumption for this application.

Applications Motorola's 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 the Motorola Microcontroller Families.

Got a new idea? Our marketing and engineering support staff is ready to assist you on your new design. Call (480) 413-3333, or, for additional information, please visit the Automotive Home Page at:

www.motorola.com/semiconductors/automotive

Tire Pressure Monitoring Sensors^{(1), (2), (3)}

Product	Maximum Operating Pressure (kPa)	Full Scale Span Output (Digital)	Pressure Sensitivity (kPa/count)	Best Pressure Accuracy (-25°C to 70°C)	Packaging	Best Temperature Accuracy (+25°C)	Supply Voltage (V)
MPXY8020A	637.5	8-bit	2.5	±7.5k Pa	8-pin SSOP	±4°C	2.1 – 3.6

1. Pressure accuracy varies with temperature, pressure, and supply voltage. Temperature accuracy varies with temperature.

2. Wake-up pulse set at 3 second intervals. See product specification for operating mode details.

3. Motorola reserves the right to modify product specifications and/or introduction dates without any further notice. The product parameters are typical values unless otherwise specified. Other specifications can be developed upon request. Please consult your Motorola sales representative.

Mode	Typical Response Time (μs)	Typical Current (μA)	Status
Standby/reset	—	0.6	Available
Measure temp	100	400	
Measure pressure	500	1300	
Output read	50	400	

Pressure Sensors

Product	Maximum Pressure Rating (kPa)	Full Scale Span Voltage (Typical) (Vdc)	Sensitivity (mV/kPa)	Accuracy 0–85°C (% of V _{FSS})	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
MPXA4101A	102	4.6	54	±1.8	SOP	Available
MPX4101A	102	4.6	54	±1.8	6-pin unibody package	Available
MPX4250A	250	4.7	20	±1.5	SOP	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	Super-small outline package (SSOP)	Available
MPXA6115A	115	4.6	45.9	±1.5	SOP	Available
MPXAZ6115A	115	4.6	45.9	±1.5	SOP	Available
MPXH6115A	115	4.6	45.9	±1.5	SSOP	Available
MPXHZ6115A	115	4.6	45.9	±1.5	SSOP	Available
MPXV6115V	115	4.6	45.9	±1.5	SOP	Available
MPXH6250	250	4.7	20	±1.5	SOP	Available
MPXH6300	300	4.7	16	±1.8	SSOP	Available
MPXH6400	400	4.7	12	±1.5	SSOP	Available

Inertial Sensors⁽¹⁾

Product	Sensing Direction	G-Range	AC Sensitivity	Equivalent Self-Test Output	Temperature Range	Roll-Off Frequency	Packaging	Status Pin	Status
MMA1260D	Z	1.5g	1200mV/g	2g	–40°C to +105°C	50Hz	16-pin SOIC	Yes	Available
MMA2260D	X	1.5g	1200mV/g	2g	–40°C to +105°C	50Hz	16-pin SOIC	Yes	Available
MMA1270D	Z	2.5g	750mV/g	1.7g	–40°C to +105°C	50Hz	16-pin SOIC	Yes	Available
MMA1250D	Z	5g	400mV/g	3g	–40°C to +105°C	50Hz	16-pin SOIC	Yes	Available
MMA1220D	Z	8g	250mV/g	5g	–40°C to +85°C	250Hz	16-pin SOIC	Yes	Available
MMA2201D	X	40g	50mV/g	12g	–40°C to +85°C	400Hz	16-pin SOIC	Yes	Available
MMA3201D	XY	40g	500mV/g	12g	–40°C to +85°C	400Hz	16-pin SOIC	Yes	Available
MMA2202D	XY	50g	40mV/g	12g	–40°C to +85°C	400Hz	16-pin SOIC	Yes	Available
MMA1200D	Z	250g	8mV/g	75g	–40°C to +85°C	400Hz	16-pin SOIC	Yes	Available
MMA2300D	X	250g	8mV/g	30g	–40°C to +125°C	400Hz	16-pin SOIC	Yes	Available

1. Motorola 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 V and T = 25°C, unless otherwise specified. Additional sensitivity and expanded temperature ranges are available upon request. Please consult your Motorola sales representative.

THE MOTOROLA 68HC08 8-BIT MICROCONTROLLER FAMILY

68HC08 Motorola's 68HC08 Family represents one of the leading product families currently used in automotive applications and is an industry standard architecture.

Memory The 68HC08 Family offers significantly improved performance over the 68HC05, with increased C compiler code efficiency and the option of on-chip Flash memory and EEPROM. The HC908AZ60 is the world's first 8-bit MCU with integrated Flash programmable memory, EEPROM, and CAN/J1850.

msCAN The integrated msCAN module (available on selected products) offers designers a cost-effective CAN controller which is compliant with parts 2.0a and 2.0b of the CAN specification.

Technology Motorola is aggressively transferring products from 0.65μ technology (80% UDR) to 0.5μ technology (85% and below UDR).

Support and Services Motorola offers a full range of services to accompany all of our microcontrollers, which includes software development tools and product applications support.

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68HC08 Family (Sheet 1 of 6)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC08AB16A	16K	512K	—	512	4-CH + 4-CH 16-Bit	51	SCI SPI	—	8-CH 8-Bit	See Timer	Y	64-pin QFP(FU)	5.0	8.0 Max	C, M	908AB32	Production	Recommended for new design-ins	MC68HC08AB16A/D
MC68HC08AS32A	32K	1K	—	512	15-CH 8-Bit	40/46	SCI SPI	J1850	8-CH 8-Bit	See Timer	Y	52-pin PLCC(FN) 64-pin QFP(FU)	5.0	8.0 Max	C, V, M	908AS60A	Production	Recommended for new design-ins	MC68HC08AS32/D
MC68HC08AZ32A	32K	1K	—	512	4-CH + 4-CH 16-Bit I/C, O/C, or PWM	48	SCI SPI	CAN 2.0a/2.0b	15-CH 8-Bit	See Timer	Y	64-pin QFP(FU)	5.0	8.0 Max	C, V, M	908AZ60A	Production	Recommended for new design-ins	MC68HC08AZ32A/D
MC68HC08AZ60A	60K	2K	—	1K	6-CH + 2-CH 16-Bit I/C, O/C, or PWM	48	SCI SPI	CAN 2.0a/2.0b	15-CH 8-Bit	See Timer	Y	64-pin QFP(FU)	5.0	8.0 Max	C, V, M	908AZ60A	Production	80% UDR	MC68HC08AZ60/D
MC68HC08EY16	16K	512K	—	—	Dual 2-CH 16-Bit IC, OC, or PWM	24	ESCI SPI	—	8-CH 10-Bit	See Timer	Y	32-Pin QFP(FA)	5.0	8.0	C, V, M	908EY16	Available	Enhanced SCI	MC68HC908EY16/D
MC68HC08JK3E	4K	128K	—	—	2-CH 16-Bit IC, OC, or PWM	15	—	—	12-CH 8-Bit	See Timer	Y	20-Pin DIP(P) 20-Pin SOIC(DW)	3.0, 5.0	8.0	C, M	—	Available	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	MC68HC08JL3/H
MC68HC08JL3	4K	128K	—	—	2-CH, 16-Bit I/C, O/C, or PWM	23	—	—	12-CH 8-Bit	See Timer	Y	28-pin DIP(P) 28-pin SOIC(DW)	3.0, 5.0	8.0 Max	C, M	908JL3	Production	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	MC68HC08JL3/H

68HC08 Family

68HC08 Family (Sheet 2 of 6)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC08JL3E	4K	128K	—	—	2-CH 16-Bit IC, OC, or PWM	23	—	—	12-CH 8-Bit	See Timer	Y	28-Pin DIP(P) 28-Pin SOIC(DW) 48-Pin LQFP(FA)	3.0, 5.0	8.0	C, M	—	Available	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	MC68HC908JL3/H
MC68HC908AB32	—	1K	32K Flash	512	4-CH + 4-CH 16-Bit I/C, O/C, or PWM	51	SCI SPI	—	8-CH 8-Bit	See Timer	Y	64-pin QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	Order part number SC510727	MC68HC908AB32/D
MC68HC908AS32A	—	1K	32K	512	15-CH 8-Bit	40	SCI SPI	J1850	8-CH 8-Bit	See Timer	Y	52-pin PLCC(FN)	5.0	8.0 Max	C, V, M	—	Production	Recommended for new design-ins	MC68HC908AS32A/D
MC68HC908AS60A	—	2K	60K Flash	1K	6-CH 16-Bit I/C, O/C, or PWM	40/50	SCI SPI	J1850	15-CH 8-Bit	See Timer	Y	52-pin PLCC(FN) 64-pin QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	Recommended for new design-ins	MC68HC908AZ60A/D
MC68HC908AZ60A	—	2K	60K Flash	1K	6-CH + 2-CH 16-Bit I/C, O/C, or PWM	50	SCI SPI	CAN 2.0a/2.0b	15-CH 8-Bit	See Timer	Y	64-pin QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	Recommended for new design-ins	MC68HC908AZ60A/D
MC68HC908EY16	—	512K	16K Flash	—	2-CH + 2-CH 16-Bit I/C, O/C, or PWM	24	ESCI SPI	—	8-CH 10-Bit	See Timer	Y	32-pin QFP(FA)	3.0, 5.0	8.0 Max	C, V, M	—	Production	First product of the MC68HC908EYx Family for LIN and general market	MC68HC908EY16/D
MC68HC908EY8	—	256K	8K Flash	—	Dual 2-CH 16-Bit IC, OC, or PWM	24	ESCI SPI	—	8-CH 10-Bit	See Timer	Y	32-Pin QFP(FA)	5.0	8.0	C, V, M	—	Available	Enhanced SCI	MC68HC908EY16/D
MC68HC908GR16A	—	1K	16K Flash	—	Dual 2-CH 16-Bit IC, OC, or PWM	Up to 37	ESCI SPI	—	6-CH 10-Bit	See Timer	Y	32-Pin LQFP(FJ) 48-Pin LQFP(FA)	3.0, 5.0	8.0	C, V, M	—	Available	1-8MHz crystal Enhanced SCI	MC68HC908GZ16/D
MC68HC908GR8A	—	384K	7.5K Flash	—	2-CH + 1-CH 16-Bit IC, OC, or PWM	21	SCI SPI	—	4-CH 8-Bit	See Timer	Y	28-Pin SOIC (DW) 28-Pin DIP(P) 32-Pin LQFP(FA)	3.0, 5.0	8.0	C	—	Available	1-8MHz crystal	MC68HC908GR8/D
MC68HC908GZ16	—	1K	16K Flash	—	Dual 2-CH, 16-Bit I/C, O/C, or PWM	Up to 37	ESCI SPI	—	8-CH 10-Bit	See Timer	Y	32-pin QFP(FJ) 48-pin LQFP(FA)	3.0, 5.0	8.0 Max	C, V, M	—	Available	MSCAN 2.0	MC68HC908GZ16/D
MC68HC908GR32A	—	1.5K	32K Flash	—	2-CH + 6-CH 16-Bit IC, OC, or PWM	Up to 50	ESCI SPI	—	24-CH 10-Bit	See Timer	Y	32-pin LQFP (FJ) 48-pin LQFP (FA) 64-pin QFP (FU)	3.0, 5.0	8.0	C, V, M	—	Available	1-8MHz high frequency oscillator	MC68HC908GR60A/D

68HC08 Family (Sheet 3 of 6)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC908GZ32	—	1.5K	32K Flash	—	6-CH + 2-CH, 16-Bit IC, OC, or PWM	Up to 53	ESCI, SPI	CAN	8-CH to 24- CH, 10-Bit	See Timer	Y	32-pin LQFP(FJ) 48-pin LQFP(FA) 64-pin QFP(FU)	3.3, 5.0	8.0	C, V, M	—	Available	Enhanced SCI	MC68HC908GZ60/D
MC68HC908GR48A	—	1.5K	48K Flash	—	2-CH + 6-CH, 16-Bit IC, OC, or PWM	Up to 50	ESCI SPI	—	24-CH 10-Bit	See Timer	Y	32-pin LQFP(FJ) 48-pin LQFP(FA) 64-pin QFP(FU)	3.0, 5.0	8.0	C, V, M	—	Available	1-8MHz high frequency oscillator	MC68HC908GR60A/D
MC68HC908GZ48	—	1.5K	48K Flash	—	6-CH + 2-CH, 16-Bit IC, OC, or PWM	Up to 53	ESCI, SPI	CAN	8-CH to 24- CH, 10-Bit	See Timer	Y	32-pin LQFP(FJ) 48-pin LQFP(FA) 64-pin QFP(FU)	3.3, 5.0	8.0	C, V, M	—	Available	Enhanced SCI	MC68HC908GZ60/D
MC68HC908GR60A	—	2K	60K Flash	—	2-CH + 6-CH, 16-Bit IC, OC, or PWM	Up to 50	ESCI SPI	—	24-CH 10-Bit	See Timer	Y	32-pin LQFP(FJ) 48-pin LQFP(FA) 64-pin QFP(FU)	3.0, 5.0	8.0	C, V, M	—	Available	1-8MHz high frequency oscillator	MC68HC908GR60A/D
MC68HC908GZ60	—	2K	60K Flash	—	6-CH + 2-CH, 16-Bit IC, OC, or PWM	Up to 53	ESCI, SPI	CAN	8-CH to 24- CH, 10-Bit	See Timer	Y	32-pin LQFP(FJ) 48-pin LQFP(FA) 64-pin QFP(FU)	3.3, 5.0	8.0	C, V, M	—	Available	Enhanced SCI	MC68HC908GZ60/D
MC68HC908GZ8	—	1K	8K Flash	—	Dual 2-CH, 16-Bit I/C, O/C, or PWM	Up to 37	ESCI SPI	—	8-CH 10-Bit	See Timer	Y	32-pin QFP(FJ) 48-pin LQFP(FA)	3.0, 5.0	8.0 Max	C, V, M	—	Available	MSCAN 2.0	MC68HC908GZ16/D
MC68HC908JK1E	—	128K	1.5K Flash	—	2-CH 16-Bit IC, OC, or PWM	15	—	—	12-CH 8-Bit	See Timer	Y	20-Pin DIP(P) 20-Pin SOIC(DW)	3.0, 5.0	8.0	C, M	—	Available	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	MC68HC908JL3/H
MC68HC908JK3E	—	128K	4K Flash	—	2-CH 16-Bit IC, OC, or PWM	15	—	—	12-CH 8-Bit	See Timer	Y	20-Pin DIP(P) 20-Pin SOIC(DW)	3.0, 5.0	8.0	C, M	—	Available	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	MC68HC908JL3/H
MC68HC908JK8	—	256K	8K Flash	—	Dual 2-CH 16-Bit IC, OC, OR PWM	14	SCI	—	14-CH 8-Bit	See Timer	Y	20-Pin PDIP(JP) 20-Pin SOIC(JDW)	3.0, 5.0	8.0	C	—	Available	RC oscillator option. Programmable LVI	MC68HC908JL8/D
MC68HC908JL3	—	128K	4K Flash	—	2-CH, 16-Bit I/C, O/C, or PWM	23	—	—	12-CH 8-Bit	See Timer	Y	28-pin DIP(P) 28-pin SOIC(DW)	3.0, 5.0	8.0 Max	C, M	—	Production	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	MC68HC908JL3/H
MC68HC908JL3E	—	128K	4K Flash	—	2-CH 16-Bit IC, OC, or PWM	23	—	—	12-CH 8-Bit	See Timer	Y	28-Pin DIP(P) 28-Pin SOIC(DW) 48-Pin LQFP(FA)	3.0, 5.0	8.0	C, M	—	Available	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	MC68HC908JL3/H
MC68HC908JL8	—	256K	8K Flash	—	Dual 2-CH 16-Bit IC, OC, or PWM	up to 26	SCI	—	14-CH 8-Bit	See Timer	Y	28-Pin DIP (P) 28-Pin SOIC(ADW) 32-Pin LQFP (FA)	3.0, 5.0	8.0	C	—	Available	RC oscillator option. Programmable LVI	MC68HC908JL8/D
MC68HC908KX8	—	192K	8K Flash	—	2-CH 16-Bit IC, OC, or PWM	13	SCI	—	4-CH 8-Bit	See Timer	Y	16-Pin DIP(P) 16-Pin SOIC(DW)	3.0, 5.0	8.0	C, V, M	—	Available	Internal Clock Generator (ICG)	MC68HC908KX8/D

68HC08 Family (Sheet 4 of 6)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC908MR16	—	768K	16K Flash	—	4-CH, 2-CH 16-Bit IC, OC, or PWM	44	SCI SPI	—	10-CH 10-Bit	See Timer	Y	56-Pin SDIP(B) 64-Pin QFP(FU)	5.0	8.0	C, V	—	Available	PWM for 3-phase motor control	MC68HC908MR32/D
MC68HC908MR32	—	768K	32K Flash	—	4-CH, 2-CH 16-Bit IC, OC, or PWM	44	SCI SPI	—	10-CH 10-Bit	See Timer	Y	56-Pin SDIP(B) 64-Pin QFP(FU)	5.0	8.0	C, V	—	Available	PWM for 3-phase motor control	MC68HC908MR32/D
MC68HC908MR8	—	384K	8K Flash	—	4-CH, 2-CH 16-Bit IC, OC, or PWM	44	SCI SPI	—	10-CH 10-Bit	See Timer	Y	56-Pin SDIP(B) 64-Pin QFP(FU)	5.0	8.0	C, V	—	Available	PWM for 3-phase motor control	MC68HC908MR32/D
MC68HC908QF4	—	128K	4K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	—	—	4-CH, 10-Bit	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.3, 5.0	8.0	C, V, M	—	Available	—	—
MC68HC908QL2	—	128K	2K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	SLIC	LIN	6-CH, 10-Bit	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.3, 5.0	8.0	C, V, M	—	Available	Slave LIN-node Interface Controller (SLIC) enables full LIN messaging buff- ering of identifier and 8 data bytes. Selectable 3.2 or 6.4 MHz internal bus operation. Trimmable (+25%) 3.2 MHz internal OSC (+5% accuracy), external resonator/ XTAL, selectable trip point LVI, auto wake up from stop, KBI	MC68HC908QL4/D
MC68HC908QL3	—	128K	4K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	SLIC	LIN	—	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.3, 5.0	8.0	C, V, M	—	Available	Slave LIN-node Interface Controller (SLIC) enables full LIN messaging buff- ering of identifier and 8 data bytes. Selectable 3.2 or 6.4 MHz internal bus operation. Trimmable (+25%) 3.2 MHz internal OSC (+5% accuracy), external resonator/ XTAL, selectable trip point LVI, auto wake up from stop, KBI.	MC68HC908QL4/D

68HC08 Family (Sheet 5 of 6)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC908QL4	—	128K	4K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	SLIC	LIN	6-CH, 10-Bit	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.3, 5.0	8.0	C, V, M	—	Available	Slave LIN-node Interface Controller (SLIC) enables full LIN messaging buff- ering of identifier and 8 data bytes. Selectable 3.2 or 6.4 MHz internal bus operation. Trimable (+/-25%) 3.2 MHz internal OSC (+/-5% accuracy), external resonator/XTAL, selectable trip point LVI, auto wake up from stop, KBI	MC68HC908QL4/D
MC68HC908QY1	—	128K	1.5K Flash	—	2-CH 16-Bit IC, OC, or PWM	14	—	—	—	See Timer	Y	16-Pin SOIC(DW) 16-PIN DIP(P) 16-Pin TSSOP(DT)	3.0, 5.0	8.0	C	—	Available	Trimable (±25%) 3.2 MHz internal OSC (±5% accuracy), external RC, external clock or external resona- tor/XTAL, select- able trip point LVI, auto wake up from stop, KBI	MC68HC908QY4/D
MC68HC908QY2	—	128K	1.5K Flash	—	2-CH 16-Bit IC, OC, or PWM	14	—	—	4-CH 8-Bit	See Timer	Y	16-Pin SOIC(DW) 16-PIN DIP(P) 16-Pin TSSOP(DT)	3.0, 5.0	8.0	C	—	Available	Trimable (±25%) 3.2 MHz internal OSC (±5% accuracy), external RC, external clock or external resona- tor/XTAL, select- able trip point LVI, auto wake up from stop, KBI	MC68HC908QY4/D
MC68HC908QY4	—	128K	4K Flash	—	2-CH 16-Bit IC, OC, or PWM	14	—	—	4-CH 8-Bit	See Timer	Y	16-Pin SOIC(DW) 16-PIN DIP(P) 16-Pin TSSOP(DT)	3.0, 5.0	8.0	C	—	Available	Trimable (±25%) 3.2 MHz internal OSC (±5% accuracy), external RC, external clock or external resona- tor/XTAL, select- able trip point LVI, auto wake up from stop, KBI	MC68HC908QY4/D

68HC08 Family

68HC08 Family (Sheet 6 of 6)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC908QY8	—	256K	8K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	ESCI	—	4-CH, 10-Bit	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.0, 5.0	8.0	C, V, M	—	Q3/2004	Trimmable (+-25%) 3.2MHz internal OSC (+_5% accuracy), external resonator/XTAL, selectable trip point LVI, auto wake up from stop, KBI	—
MC68HC908RF2	—	128K	2K Flash	—	1-CH, 16-Bit	12	—	—	—	See Timer	Y	32-pin LQFP(FA)	1.8 to 3.6	4.0 Max	C	—	Production	RF transmitter integrated	MC68HC908RF2/D
MC68HC908RK2	—	128K	2K Flash	—	2-CH, 16-Bit	14	—	—	—	See Timer	Y	20-pin SSOP(SD)	1.8 to 3.6	4.0 Max	C	—	Production	Low-power embedded Flash routine	MC68HC908RK2/D
MC908AZ32A	—	1K	32K Flash	512	6-CH + 2-CH 16-Bit IC, OC, or PWM	52	SCI SPI	CAN 2.0a/2.0b	15-CH 8-Bit	See Timer	Y	64-pin QFP(FU)	5.0	8.0	C, V, M	—	Available	—	—
MC9S12E64	—	8K	64K Flash	—	Three 4-CH, 16-Bit IC, OC, or PWM	Up to 90	SCI, SPI, I2C	—	16-CH, 10-Bit	See Timer	Y	112-pin LQFP(PV) 80-pin QFP(FU)	3.3, 5.0	16, 25	C, M	—	Available	Two D/A converters	9S12E128DGV1/D CPU12RM/D

68HC08 Reference Manuals

CPU08RM/AD
TIM08RM/AD

HC08 CPU Reference Manual
HC08 Timer Reference Manual

THE MOTOROLA HCS12 16-BIT MICROCONTROLLER FAMILY

HCS12 Continuing Motorola's legacy of best in class automotive MCUs, Motorola announces a full family of 0.25μ, 16-bit products based on the powerful HCS12 CPU. The entire family utilizes the latest synthesized design techniques, and will be pin compatible and memory upgradeable, with a variety of on-chip peripheral options. Leading this family is the MC9S12DP256 with 256K Flash memory and five integrated CAN modules. (These products were previously known as STAR12.)

For additional information, please visit:

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Automotive Home Page

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HCS12 Family (Sheet 1 of 2)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC9S12DP512	—	14K	512K Flash	4K	8-CH, 16-Bit ECT	Up to 91	2 SCI 3 SPI IIC	5 CAN	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25/33	C, V, M ⁽¹⁾	—	Available	—	MC9S12DP256/D CPU12RM/AD
MC9S12C32	—	2K	32K Flash	—	8-CH, 16-Bit IC, OC, or PWM	Up to 60	SCI SPI	CAN	8-CH, 10-Bit	See Timer	48-pin LQFP 52-pin LQFP 80-pin QFP	3.15 to 5.5	16/25	C	—	Available	—	9S12C32DGV1/D CPU12RM/D
MC9S12DP256B	—	12K	256K Flash	4K	8-CH, 16-Bit ECT	Up to 91	2 SCI 3 SPI IIC	5 CAN	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	—	9S12DP256BDGV2/D CPU12RM/AD
MC9S12DT256B	—	12K	256K Flash	4K	8-CH, 16-Bit ECT	Up to 91	2 SCI 3 SPI IIC	3 CAN	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	Family offers pin-for-pin compatibility	9S12DP256BDGV2/D CPU12RM/AD
MC9S12DJ256B	—	12K	256K Flash	4K	8-CH, 16-Bit ECT	Up to 91	2 SCI 3 SPI IIC	2 CAN and 1xJ1850	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	—	9S12DP256BDGV2/D CPU12RM/AD
MC9S12DJ256B	—	12K	256K Flash	4K	8-CH, 16-Bit ECT	Up to 59	2 SCI 2 SPI IIC	2 CAN and 1xJ1850	1 x 8-CH 10-Bit	7-CH, 8-Bit or 3-CH, 16-Bit	80-pin QFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	—	9S12DP256BDGV2/D CPU12RM/AD
MC9S12DG256B	—	12K	256K Flash	4K	8-CH, 8-Bit ECT	Up to 91	2 SCI 3 SPI IIC	2 CAN	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	—	9S12DP256BDGV2/D CPU12RM/AD
MC9S12DB128B	—	8K	128K Flash	2K	8-CH, 16-Bit IC, OC, PA	Up to 91	2 SCI 2 SPI	1 CAN Byteflight	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	80-pin QFP (FU) 112-pin LQFP (PV)	5.0	25.0	C, V, M	—	Available	—	9S12DT128BDGV1/D CPU12RM/AD
MC9S12DT128B	—	8K	128K Flash	2K	8-CH, 16-Bit ECT	Up to 91	2 SCI 2 SPI IIC	3 CAN	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	—	9S12DT128BDGV1/D CPU12RM/AD
MC9S12DJ128B	—	8K	128K Flash	2K	8-CH, 16-Bit ECT	Up to 91	2 SCI 2 SPI IIC	2 CAN and 1xJ1850	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	—	9S12DT128BDGV1/D CPU12RM/AD

HCS12 Family

HCS12 Family (Sheet 2 of 2)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC9S12DJ128B	—	8K	128K Flash	2K	8-CH, 16-Bit ECT	Up to 59	2 SCI 2 SPI IIC	2 CAN and 1xJ1850	1 x 8-CH 10-Bit	7-CH, 8-Bit or 3-CH, 16-Bit	80-pin QFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	—	9S12DT128BDGV1/D CPU12RM/AD
MC9S12DG128B	—	8K	128K Flash	2K	8-CH, 16-Bit ECT	Up to 91	2 SCI 2 SPI IIC	2 CAN	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	—	9S12DT128BDGV1/D CPU12RM/AD
MC9S12DG128B	—	8K	128K Flash	2K	8-CH, 16-Bit ECT	Up to 59	2 SCI 2 SPI IIC	2 CAN	1 x 8-CH 10-Bit	7-CH, 8-Bit or 3-CH, 16-Bit	80-pin QFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	—	9S12DT128BDGV1/D CPU12RM/AD
MC9S12DJ64	—	4K	64K Flash	1K	8-CH, 16-Bit ECT	Up to 91	2 SCI 1 SPI IIC	1 CAN and 1xJ1850	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	Emulator DP256 product available now	MC9S12DP256/D CPU12RM/AD
MC9S12DJ64	—	4K	64K Flash	1K	8-CH, 16-Bit ECT	Up to 59	2 SCI 1 SPI IIC	1 CAN and 1xJ1850	1 x 8-CH 10-Bit	7-CH, 8-Bit or 3-CH, 16-Bit	80-pin QFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	Emulator DP256 product available now	MC9S12DP256/D CPU12RM/AD
MC9S12D64	—	4K	64K Flash	1K	8-CH 16-Bit ECT	Up to 91	2 SCI 1 SPI IIC	1 CAN	2 x 8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	112-pin LQFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	Emulator DP256 product available now	MC9S12DP256/D CPU12RM/AD
MC9S12D64	—	4K	64K Flash	1K	8-CH, 16-Bit ECT	Up to 59	2 SCI 1 SPI IIC	1 CAN	1 x 8-CH 10-Bit	7-CH, 8-Bit or 3-CH, 16-Bit	80-pin QFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	Emulator DP256 product available now	MC9S12DP256/D CPU12RM/AD
MC9S12D32	—	2K	32K Flash	1K	8-CH, 16-Bit ECT	Up to 59	2 SCI 1 SPI	1 CAN	1 x 8-CH 10-Bit	7-CH, 8-Bit or 3-CH, 16-Bit	80-pin QFP	5.0	25.0	C, V, M ⁽¹⁾	—	Available	Emulator DP256 product available now	MC9S12DP256/D CPU12RM/AD
MC9S12H256	—	12K	256K Flash	4K	8-CH, 16-Bit	99 plus 18 inputs	SCI, SPI, IIC	2 CAN 2.0a/2.0b	16-CH 10-Bit	6-CH 8-Bit or 3-CH 16-Bit	112-pin LQFP 144-pin LQFP	5.0	16.0	C, V	—	Production	32 x 4 liquid crystal display (LCD) controller/driver and a motor pulse width modulator (MC) consisting of 24 high current outputs suited to drive up to 6 stepper motors	9S12H256DGV1/D CPU12RM/AD
MC9S12H128	—	6K	128K Flash	2K	8-CH 16-Bit	61	SCI, SPI	2 CAN 2.0a/2.0b	8-CH 10-Bit	2-CH 8-Bit	112-pin LQFP	5.0	16.0	C,V	—	Production	28 x 4 liquid crystal display (LCD) controller/driver and a motor pulse width modulator (MC) consisting of 24 high current outputs suited to drive up to 6 stepper motors	—
MC9S12T64	—	2K + 2K CALRAM	64K Flash	—	8-CH, 16-Bit IC, OC, PA	25	2 SCI 1 SPI	—	8-CH 10-Bit	8-CH, 8-Bit or 4-CH, 16-Bit	80-pin QFP (PK)	5.0	16.0	C, V, M	—	Available	FBDM (Fast Background Debug Mode)	9S12T64BDGV1/D CPU12RM/AD

M68KIT912DP256: Evaluation board kit for MC9S12DP256, includes evaluation boards, serial debugger interface, and evaluation compiler.

1. M temperature range limited to single-chip mode

THE MOTOROLA 68HC12 AND 68HC16 16-BIT MICROCONTROLLER FAMILIES

68HC12 Motorola's 68HC12 and 68HC16 Families of microcontrollers represent two of the leading product families used in automotive applications.

Automotive The 68HC12 Family is based around Motorola's CPU12 core and is complemented by various on-board peripherals such as memory, timers, and analog-to-digital converters as well as communications modules such as CAN, SCI, and SPI. The HC12 Family primarily is targeted at automotive applications.

Memory Flash is the dominant memory type used by the 16-bit families. Motorola has implemented a new split-gate Flash cell, providing great reliability benefits by using a proven technology.

NmsCAN The integrated msCAN module (available on selected HC12 products) offers designers a cost-effective CAN controller which is compliant with parts 2.0a and 2.0b of the CAN specification.

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68HC12 Family (Sheet 1 of 2)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
XC68HC912B32	—	1K	32K Flash	768	8-CH, 16-Bit	Up to 63	1 SCI 1 SPI	J1850	8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	80-pin QFP	5.0	8.0	C, V, M ⁽¹⁾	—	Production	J1850 muxed bus, BDM	MC68HC912B32/D CPU12RM/AD
XC68HC912BC32	—	1K	32K Flash	768	8-CH, 16-Bit	Up to 63	1 SCI 1 SPI	CAN 2.0a/b	8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	80-pin QFP	5.0	8.0	C, V, M ⁽¹⁾	—	Production	MSCAN module on board, BDM	MC68HC912B32TS/D CPU12RM/AD
XC68HC12BC32	32K	1K	—	768	8-CH, 16-Bit	Up to 63	1 SCI 1 SPI	CAN 2.0a/b	8-CH 10-Bit	4-CH 8-Bit	80-pin QFP	5.0	8.0	C, V, M ⁽¹⁾	HC912BC32	Production	CAN 2.0a/b compatible	MC68HC912B32TS/D CPU12RM/AD
MC68HC12BE32	32K	1K	—	768	8-CH, 16-Bit enhanced capture timer (ECT)	Up to 63	1 SCI 1 SPI	J1850	8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	80-pin QFP	5.0	8.0	C, V, M ⁽¹⁾	HC912B32	Production	J1850 muxed bus	MC68HC912B32TS/D CPU12RM/AD
MC68HC912D60A	—	2K	60K Flash	1K	8-CH, 16-Bit ECT	Up to 66, plus up to 18 input only lines	2 SCI 1 SPI	CAN 2.0a/b	2 x 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	80-pin QFP ⁽²⁾ 112-pin LQFP	5.0	8.0	C, V, M ⁽¹⁾	—	Production	0.5μ technology, 5V Flash. Replacement for XC68HC912D60	MC68HC912D60A/D CPU12RM/AD
XC68HC12D60	60K	2K	—	1K	8-CH, 16-Bit ECT	Up to 66, plus up to 18 input only lines	2 SCI 1 SPI	CAN 2.0a/b	2 x 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	80-pin QFP ⁽²⁾ 112-pin LQFP	5.0	8.0	C, V, M ⁽¹⁾	HC912D60A	Production	—	MC68HC912D60/D CPU12RM/AD

68HC12 Family (Sheet 2 of 2)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC912DG128A	—	8K	128K Flash	2K	8-CH, 16-Bit ECT	Up to 67, plus up to 18 input only lines	2 SCI 1 SPI	2 x CAN 2.0a/b I ² C	2 x 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	112-pin LQFP	5.0	8.0	C, V, M ⁽¹⁾	—	Production	0.5μ technology, 5V Flash. Ideal for gateway applications. Replacement for XC68HC912DG128	MC68HC912DT128A/D CPU12RM/AD
MC68HC912DT128A	—	8K	128K Flash	2K	8-CH, 16-Bit ECT	Up to 67, plus up to 18 input only lines	2 SCI 1 SPI	3 x CAN 2.0a/b I ² C	2 x 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	112-pin LQFP	5.0	8.0	C, V, M ⁽¹⁾	—	Production	0.5μ technology, 5V Flash. Ideal for gateway applications	MC68HC912DT128A/D CPU12RM/AD

M68DB912DP256: Daughter board for M68KIT912DP256

1. M temperature range limited to single-chip mode
2. 1 x 8-CH 10-bit ATD in 80 QFP option

68HC16 Family

Product	ROM (Bytes)	RAM (Bytes)	Flash (Kbytes)	Product Integration	Timers	Serial Communication	Analog	Packaging	Operating Voltage (V)	Operating Frequency (MHz)	Temperature	Flash or OTP	Status	Documentation
MC68HC16Z3	8K	4K	0	SIM	GPT	SCI, queued SPI	8-CH 10-BIT	132-pin PQFP 144-pin LQFP	5.0	16, 25	C, V	n/a	Production	MC68HC16ZUM/AD

68HC16 Reference Manuals

CPU16RM/AD
SIMRM/AD
TPURM/AD
GPTRM/AD
QSMRM/AD

68HC16 CPU Reference Manual
System Integration Module Reference Manual
Timer Processor Unit Reference Manual
General-Purpose Timer Reference Manual
Queued Serial Module Reference Manual

ADCRM/AD
CTMRM/D
MCCIRM/AD
SCIMRM/AD

Analog-to-Digital Converter Reference Manual
Configurable Timer Reference Manual
Multi-Channel Communication Interface Reference Manual
Single-Chip Integration Module Reference Manual

MOTOROLA LOCAL INTERCONNECT NETWORK (LIN) SOLUTIONS

Motorola and LIN As the only semiconductor member of the LIN consortium, Motorola 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 68HC12 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. Motorola's solutions provide this capability today.

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

68HC(9)08EYx Family Motorola is pleased to announce the design of the first family of dedicated LIN devices. A member of the high-performance HC08 Family of 8-bit MCUs, the 68HC(9)08EYx Family is based on 0.5 μ technology and includes all of the peripherals necessary for a wide range of LIN applications, whether master or slave. Device peripheral features include an Enhanced Serial Communications Interface (ESCI) and stable on-chip RC oscillator with an accuracy of 2%, both of which are key features when synchronizing with the LIN protocol bus.

For additional information, please visit:

LIN Home Page

www.lin-subbus.org

Automotive Home Page

motorola.com/semiconductors/automotive

LIN Software Products

Product	68HC05	68HC08	68HC12	MC9S12DP256
LIN master		Available	Available	Available
LIN slave	Available	Available	Available	Available
Operating system		Available	Available	Available

LIN Physical Interface

Product	Supply	Wakeup	Sleep Mode	Slew Rate	Standby Max	Packaging	Protection	Additional Information	Control Status and Recording	Status
MC33399D	7 V to 27 V	Several Modes	Yes	1 to 2 V/ μ s	50 μ A	S08	1 LIM thermal	Wakeup input pin Control of external voltage regulator	Parallel communication	Available

Mechatronics LIN Slave MCU

Product	ROM (Bytes)	RAM (Bytes)	Flash (Bytes)	EEPROM (Bytes)	Timer	Packaging	Additional Information	Documentation
MC33393TM	—	64	—	1K	16-Bit	8-pin SO	Timer, oscillator, 2 x 175 mA H-bridge, mechatronics	Contact sales for product reviews

Local Interconnect Network

LIN Slave MCUs (Sheet 1 of 3)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC08AB16A	16K	512K	—	512K	4-CH + 2-CH, 16-Bit I/C, O/C, or PWM	51	SCI, SPI	8-CH 8-Bit	See Timer	Y	64-pin QFP (FU)	5.0	8.0 Max	C, V	—	Production	Recommended for new design-ins	MC68HC08AB16A/D
MC68HC908AB32	—	1K	32K Flash	512K	4-CH + 4-CH, 16-Bit I/C, O/C, or PWM	51	SPI, SCI	8-CH 8-Bit	See Timer	Y	64-pin QFP (FU)	5.0	8.0 Max	C, V, M	—	Production	Order # SC510727	MC68HC908AB32A/D
MC68HC908EY16	—	512K	16K Flash	—	2-CH + 2-CH, 16-Bit I/C, O/C, or PWM	24	ESCI, SPI	8-CH 10-Bit	See Timer	Y	32-pin QFP (FA)	3.0, 5.0	8.0 Max	C, V, M	—	Samples	AdrenaLIN 16K device	MC68HC908EY16/D
MC68HC908JL3	—	128K	4K Flash	—	2-CH, 16-Bit I/C, O/C, or PWM	23	—	12-CH 8-Bit	See Timer	Y	28-pin DIP (P) 28-pin SOIC (DW)	3.0, 5.0	8.0 Max	C, M	—	Production	Automotive qual TBD RC oscillator option, LVR w/ selectable trip points, 6-pin LED drive	MC68HC908JL3/H
MC68HC08JL3	4K	128K	—	—	2-CH, 16-Bit I/C, O/C, or PWM	23	—	12-CH 8-Bit	See Timer	Y	28-pin DIP (P) 28-pin SOIC (DW)	3.0, 5.0	8.0 Max	C, M	908JL3	Production	RC oscillator option, LVR with selectable trip points, 8-pin LED drive	MC68HC08JL3/H
MC68HC908GR8A	—	384K	7.5K Flash	—	2-CH + 1 CH 16-Bit IC, OC, or PWM	21	SCI SPI	4-CH 8-Bit	See Timer	Y	28-Pin SOIC (DW) 28-Pin DIP(P) 32-Pin LQFP(FA)	3.0, 5.0	8.0	C	—	Available	1-8MHz crystal	MC68HC908GR8/D
MC68HC908GR16A	—	1K	16K Flash	—	Dual 2-CH 16-Bit IC, OC, or PWM	Up to 37	ESCI	6-CH 10-Bit	See Timer	Y	32-Pin LQFP(FJ) 48-Pin LQFP(FA)	3.0, 5.0	8.0	C, V, M	—	Available	1-8MHz crystal Enhanced SCI	MC68HC908GZ16/D
MC68HC908GR32A	—	1.5K	32K Flash	—	2-CH + 6-CH, 16-Bit IC, OC, or PWM	Up to 50	ESCI SPI	24-CH 10-Bit	See Timer	Y	32-Pin LQFP(FJ) 48-Pin LQFP(FA) 64-Pin QFP (FU)	3.0, 5.0	8.0	C, V, M	—	Available	1-8MHz high frequency oscillator	MC68HC908GR60A/D
MC68HC908GR48A	—	1.5K	48K Flash	—	2-CH + 6-CH, 16-Bit IC, OC, or PWM	Up to 50	ESCI SPI	24-CH 10-Bit	See Timer	Y	32-Pin LQFP(FJ) 48-Pin LQFP(FA) 64-Pin QFP (FU)	3.0, 5.0	8.0	C, V, M	—	Available	1-8MHz high frequency oscillator	MC68HC908GR60A/D
MC68HC908GR60A	—	2K	60K Flash	—	2-CH + 6-CH, 16-Bit IC, OC, or PWM	Up to 50	ESCI SPI	24-CH 10-Bit	See Timer	Y	32-Pin LQFP(FJ) 48-Pin LQFP(FA) 64-Pin QFP (FU)	3.0, 5.0	8.0	C, V, M	—	Available	1-8MHz high frequency oscillator	MC68HC908GR60A/D
MC68HC908EY8	—	256K	8K Flash	—	Dual 2-CH 16-Bit IC, OC, or PWM	24	ESCI SPI	8-CH 10-Bit	See Timer	Y	32-Pin QFP(FA)	5.0	8.0	C, V, M	—	Available	Enhanced SCI	MC68HC908EY16/D
MC68HC08EY16	16K	512K	—	—	Dual 2-CH 16-Bit IC, OC, or PWM	24	ESCI SPI	8-CH 10-Bit	See Timer	Y	32-Pin QFP(FA)	5.0	8.0	C, V, M	908EY16	Available	Enhanced SCI	MC68HC908EY16/D
MC68HC908MR16	—	768K	16K Flash	—	4-CH +2-CH 16-Bit IC, OC, or PWM	44	SCI SPI	10-CH 10-Bit	See Timer 6-CH, 12-Bit	Y	56-Pin SDIP(B) 64-Pin QFP(FU)	5.0	8.0	C, V	—	Available	PWM for 3-phase motor control	MC68HC908MR32/D
MC68HC908MR32	—	768K	32K Flash	—	4-CH + 2-CH 16-Bit IC, OC, or PWM	44	SCI SPI	10-CH 10-Bit	See Timer 6-CH 12-Bit	Y	56-Pin SDIP(B) 64-Pin QFP(FU)	5.0	8.0	C, V	—	Available	PWM for 3-phase motor control	MC68HC908MR32/D
MC68HC908MR8	—	384K	8K Flash	—	4-CH +2-CH 16-Bit IC, OC, or PWM	44	SCI SPI	10-CH 10-Bit	See Timer 6-CH 12-Bit	Y	56-Pin SDIP(B) 64-Pin QFP(FU)	5.0	8.0	C,V	—	Available	PWM for 3-phase motor control	MC68HC908MR32/D

LIN Slave MCUs (Sheet 2 of 3)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC908QY4	—	128K	4K Flash	—	2-CH 16-Bit IC, OC, or PWM	14	—	4-CH 8-Bit	See Timer	Y	16-Pin SOIC(DW) 16-PIN DIP(P) 16-Pin TSSOP(DT)	3.0, 5.0	8.0	C	—	Available	Trimable (±25%) 3.2 MHz internal OSC (±5% accuracy), external RC, external clock or external resonator/XTAL, selectable trip point LVI, auto wake up from stop, KBI	MC68HC908QY4/D
MC68HC908QY2	—	128K	1.5K Flash	—	2-CH 16-Bit IC, OC, or PWM	14	—	4-CH 8-Bit	See Timer	Y	16-Pin SOIC(DW) 16-PIN DIP(P) 16-Pin TSSOP(DT)	3.0, 5.0	8.0	C	—	Available	Trimable (±25%) 3.2 MHz internal OSC (±5% accuracy), external RC, external clock or external resonator/XTAL, selectable trip point LVI, auto wake up from stop, KBI	MC68HC908QY4/D
MC68HC908QY1	—	128K	1.5K Flash	—	2-CH 16-Bit IC, OC, or PWM	14	—	—	See Timer	Y	16-Pin SOIC(DW) 16-PIN DIP(P) 16-Pin TSSOP(DT)	3.0, 5.0	8.0	C	—	Available	Trimable (±25%) 3.2 MHz internal OSC (±5% accuracy), external RC, external clock or external resonator/XTAL, selectable trip point LVI, auto wake up from stop, KBI	MC68HC908QY4/D
MC68HC908JK8	—	256K	8K Flash	—	Dual 2-CH 16-Bit IC, OC, OR PWM	14	SCI	14-CH 8-Bit	See Timer	Y	20-Pin PDIP(JP) 20-Pin SOIC(JDW)	3.0, 5.0	8.0	C	—	Available	RC oscillator option Programmable LVI.	MC68HC908JL8/D
MC68HC908JL3E	—	128K	4K Flash	—	2-CH 16-Bit IC, OC, or PWM	23	—	12-CH 8-Bit	See Timer	Y	28-Pin DIP(P) 28-Pin SOIC(DW) 48-Pin LQFP(FA)	3.0, 5.0	8.0	C, M	—	Available	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	MC68HC908JL3/H
MC68HC908KX8	—	192K	8K Flash	—	2-CH 16-Bit IC, OC, or PWM	13	SCI	4-CH 8-Bit	See Timer	Y	16-Pin DIP(P) 16-Pin SOIC(DW)	3.0, 5.0	8.0	C, V, M	—	Available	Internal Clock Generator (ICG)	MC68HC908KX8/D
MC68HC908QF4	—	128K	4K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	CAN	4-CH, 10-Bit	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.3, 5.0	8.0	C, V, M	—	Available	—	—

LIN Slave MCUs (Sheet 3 of 3)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	A/D	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	Flash or OTP	Status	Additional Information	Documentation
MC68HC908QL4	—	128K	4K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	SLIC	6-CH, 10-Bit	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.3, 5.0	8.0	C, V, M	—	Available	Slave LIN-node Interface Controller (SLIC) enables full LIN messag- ing buffering of identifier and 8 data bytes. Select- able 3.2 or 6.4 MHz internal bus operation, trimmable (+-25%) 3.2 MHz internal OSC (+-5% accuracy), external resonator/XTAL., selectable trip point LVI, auto wake up from stop, KBI	—
MC68HC908QL3	—	128K	4K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	SLIC	—	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.3, 5.0	8.0	C, V, M	—	Available	Slave LIN-node Interface Controller (SLIC) enables full LIN messag- ing buffering of identifier and 8 data bytes. Select- able 3.2 or 6.4 MHz internal bus operation, Trimmable (+-25%) 3.2 MHz internal OSC (+-5% accuracy), external resonator/XTAL., selectable trip point LVI, auto wake up from stop, KBI	—
MC68HC908QL2	—	128K	2K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	SLIC	6-CH, 10-Bit	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.3, 5.0	8.0	C, V, M	—	Available	Slave LIN-node Interface Controller (SLIC) enables full LIN messag- ing buffering of identifier and 8 data bytes. Select- able 3.2 or 6.4 MHz internal bus operation, Trimmable (+-25%) 3.2 MHz internal OSC (+-5% accuracy), external resonator/XTAL., selectable trip point LVI, auto wake up from stop, KBI	—
MC68HC908QY8	—	256K	8K Flash	—	2-CH, 16-Bit IC, OC, or PWM	13	ESCI	4-CH, 10-Bit	See Timer	Y	16-pin PDIP(P) 16-pin SOIC(DW) 16-pin TSSOP(DT)	3.0, 5.0	8.0	C, V, M	—	Q3, Q4	Trimmable (+-25%) 3.2MHz internal OSC (+ _5% accuracy), external resonator/ XTAL, selectable trip point LVI, auto wake up from stop, KBI	—

LIN Master MCUs (Sheet 1 of 2)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	A/D	Mux	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	OTP	Status	Additional Information	Documentation
MC68HC908AZ60A	—	2K	60K Flash	1K	6-CH + 2-CH, 16-Bit I/C, O/C, or PWM	48	SCI SPI	15-CH 8-Bit	CAN 2.0a/2.0b	See Timer	Y	64-pin QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	Recommended for new design-ins	MC68HC908AZ60A/D
MC68HC08AZ60	60K	2K	—	1K	6-CH + 2-CH, 16-Bit I/C, O/C, or PWM	48	SCI SPI	15-CH 8-Bit	CAN 2.0a/2.0b	See Timer	Y	64-pin QFP(FU)	5.0	8.0 Max	C, V, M	908AZ60A	Production	80% UDR	MC68HC08AZ60/D
MC68HC08AZ32A	32K	1K	—	512	4-CH + 4-CH, 16-Bit I/C, O/C, or PWM	48	SCI SPI	15-CH 8-Bit	CAN 2.0a/2.0b	See Timer	Y	64-pin QFP(FU)	5.0	8.0 Max	C, V, M	908AZ60A	Production	Recommended for new design-ins CAN 2.0a and 2.0b	MC68HC08AZ32A/D
MC9S12DP256B	—	12K	256K Flash	4K	8-CH, 16-Bit	Up to 45	2 SCI 1 SPI	2 x 8-CH 10-Bit	Up to 5 CAN and 1 x J1850	8-CH, 8-Bit or 4-CH, 16-Bit	Y	112-pin LQFP 80-pin QFP	5.0	25.0	C, V, M ⁽¹⁾	—	Production	Please refer to 68HC12 Family section for more derivatives	MC9S12DP256/D
XC68HC912B32	—	1K	32K Flash	768	8-CH, 16-Bit I/C or O/C, RTI, pulse accumulator	Up to 63	SCI SPI	8-CH 8-Bit	J1850	4-CH, 8-Bit or 2-CH, 16-Bit	Y	80-pin QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	J1850, muxed bus, BDM	MC68HC912B32/D
MC68HC12BE32	32K	1K	—	768	8-CH, 16-Bit I/C or O/C, RTI, pulse accumulator	Up to 63	SCI, SPI	8-CH 10-Bit	CAN J1850	4-CH, 8-Bit or 2-CH, 16-Bit	Y	80-pin QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	BDM, enhanced timer	MC68HC912B32/D
MC68HC908GZ60	—	2K	60K Flash	—	6-CH + 2-CH, 16-Bit IC, OC, or PWM	Up to 53	ESCI, SPI	8-CH to 24-CH, 10-Bit	CAN	See Timer	Y	32-pin LQFP 48-pin LQFP 64-pin QFP	3.3/5.0	8.0	C, V, M	—	Available	Enhanced SCI	—
MC68HC908GZ48	—	1.5K	48K Flash	—	6-CH + 2-CH, 16-Bit IC, OC, or PWM	Up to 53	ESCI, SPI	8-CH to 24-CH, 10-Bit	CAN	See Timer	Y	32-pin LQFP 48-pin LQFP 64-pin QFP	3.3/5.0	8.0	C, V, M	—	Available	Enhanced SCI	—
MC68HC908GZ32	—	1.5K	32K Flash	—	6-CH + 2-CH, 16-Bit IC, OC, or PWM	Up to 53	ESCI, SPI	8-CH to 24-CH, 10-Bit	CAN	See Timer	Y	32-pin LQFP 48-pin LQFP 64-pin QFP	3.3/5.0	8.0	C, V, M	—	Available	Enhanced SCI	—
XC68HC912BC32	—	1K	32K Flash	768	8-CH, 16-Bit I/C or O/C, RTI, pulse accumulator	Up to 63	SCI, SPI	8-CH 10-Bit	CAN J1850	4-CH, 8-Bit or 2-CH, 16-Bit	Y	80-pin QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	msCAN CAN 2.0a and 2.0b, BDM	MC68HC912B32TS/D
MC68HC912D60A	—	2K	60K Flash	1K	8-CH, 16-Bit enhanced capture timer (ECT)	Up to 66, plus up to 18 input-only lines	2 SCI 1 SPI	2 x 8-CH 10-Bit	CAN 2.0a/2.0b	4-CH, 8-Bit or 2-CH, 16-Bit	Y	112-pin QFP	5.0	8.0	C, V, M ⁽¹⁾	—	Production	0.5μ technology, 5V Flash	MC68HC912D60/D
MC68HC912DG128A	—	8K	128K Flash	2K	8-CH, 16-Bit buffered input captures	Up to 67, plus up to 18 input-only lines	2 SCI 1 SPI	2 x 8-CH 10-Bit	2 x CAN 2.0a/2.0b	4-CH, 8-Bit or 2-CH, 16-Bit	Y	112-pin LQFP	5.0	8.0	C, V, M ⁽¹⁾	—	Production	0.5μ technology, 5V Flash, ideal for gateway applications, replacement for XC68HCDG128	MC68HC912DT128A/D

LIN Master MCUs (Sheet 2 of 2)

Product	ROM (Bytes)	RAM (Bytes)	Flash or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	A/D	Mux	PWM	COP	Packaging	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	OTP	Status	Additional Information	Documentation
MC68HC912DT128A	—	8K	128K Flash	2K	8-CH, 16-Bit buffered input captures	Up to 67, plus up to 18 input-only lines	2 SCI 1 SPI	2 x 8-CH 10-Bit	3 x CAN 2.0a/2.0b	4-CH, 8-Bit or 2-CH, 16-Bit	Y	112-pin LQFP	5.0	8.0	C, V, M ⁽¹⁾	—	Production	0.5μ technology, 5V Flash, ideal for gateway applications	MC68HC912DT128A/D
XC68HC12D60	60K	2K	—	1K	8-CH, 16-Bit enhanced capture timer (ETC)	Up to 66, plus up to 18 input only lines	2 SCI 1 SPI	2 x 8-CH 10-Bit	CAN 2.0a/2.0b	4-CH, 8-Bit or 2-CH, 16-Bit	Y	80-pin QFP 112-pin LQFP	5.0	8.0	C, V, M ⁽¹⁾	912DG60A	Production	—	MC68HC912D60/D
MC908AZ32A	—	1K	32K Flash	512	6-CH + 2-CH, 16-Bit IC, OC, or PWM	52	SCI SPI	15-CH, 8-Bit	CAN 2.0a/2.0b	See Timer	Y	64-pin QFP	5.0	8.0	C, V, M	—	Available	—	—

1. M temperature range limited to single-chip mode

The Motorola 68HC05 and 68HC11 8-Bit Microcontroller Families

68HC05 and 68HC11 Motorola's 8-bit 68HC05 and 68HC11 Families represent two of the main product families in Motorola's legacy of best in class MCUs

Automotive The 68HC05 and 68HC11 Families are complemented by various on-board peripherals such as memory, as well as timers and analog-to-digital converters. Targeted at many applications including body electronics applications, air conditioning, and window lift, the 68HC05 and 68HC11 Families also are widely used in many white good or non-automotive applications.

Memory The 68HC05 and 68HC11 Families have several memory options such as ROM, EEPROM, and OTP and are available in a range of memory sizes (4K – 32K).

Service Motorola offers a full range of services to accompany all of our microcontrollers which include software solutions and support as well as suitable development tools.

Product Motorola is committed to serving the 8-bit market and has extensive offerings of 68HC05 and 68HC11 products for automotive applications.

For a full list of Motorola's 8-bit 68HC05 and 68HC11 products, please visit:

Motorola Microcontroller Selector Guide:

<http://e-www.motorola.com/brdata/PDFDB/docs/SG1006.pdf>

Motorola Online Product Library:

http://e-www.motorola.com/webapp/sps/library/prod_lib.jsp

Motorola Documentation, Tool, and Product Libraries:

motorola.com/semiconductors

(then click Products or Design Support for Documentation and Tools)

Motorola Automotive Home Page:

<http://motorola.com/semiconductors/automotive>

68HC05 Reference Manuals

M68HC05AG/AD — Applications Guide

M68HC05TB/D — Understanding Small Microcontrollers Text Book

68HC11 Reference Manual

M68HC11RM/D — 68HC11 Reference Manual

THE MOTOROLA 683XX AND PowerPC ISA MICROCONTROLLER FAMILIES

32-Bit Legacy Motorola's PowerPC ISA and MC683XX Families of microcontrollers (MCU) represent two of the leading product families currently used in automotive applications.

Automotive At the heart of the industry's smartest automotive systems is the PowerPC ISA 32-bit RISC core, a high-performance MCU that provides customers with added performance to tackle increasingly complex control functions. The PowerPC ISA Family is code compatible and complemented by various on-board peripherals such as memory, timers, and analog-to-digital converters as well as communications modules such as CAN, SCI, and SPI.

Memory Flash is the dominant memory type used by the 32-bit families. Motorola is implementing a new split-gate Flash cell, providing great reliability benefits by using a proven technology.

MPC5554 The MPC5554 32-bit embedded microcontroller from Motorola offers the high-performance PowerPC BookE compliant core and a number of improvements over the MPC500 family, including the addition of a DMA controller, larger flash array, improved analog-to-digital conversion capabilities, and enhanced timer peripherals (eMIOS and eTPU). With 2MB of on-chip Flash memory available, the MPC5554 can provide the performance and functionality

necessary for executing complex automotive applications such as engine management and electronic transmission control, as well as general applications such as robotics and avionics control. The MPC5500 Family provides the performance and integration of powerful peripherals that systems designers require for embedded applications, and was designed to be the next generation of the MPC500 family, considered as a standard for products manufactured by automotive industry leaders in North America, Europe, and Japan. Limited engineering samples are available now under NDA.

Service Motorola offers a full range of services to accompany all of its microcontrollers, along with software solutions, support, and a wide range of low-cost development tools.

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MPC5XX Family (Sheet 1 of 2)

Product	ROM (Kbytes)	RAM (Kbytes)	Flash (Kbytes)	Product Integration	Timer	Serial	MUX	A/D	PWM	Operating Voltage	Operating Frequency (MHz)	Temp.	Packaging	Additional Information	Documentation
MPC555	0	26 + 6 for TPU	448	USIU	50-channel timer system: 2 TPU3 + MIOS1	QSMCM (2 SCI + QSPI) + 2 TouCAN	2 x TouCAN	2 QADC (10-Bit A/D with 64 result registers each) 32 channels on chip	8 x PWM	3.3 Vdc for core, 5.0 Vdc for Flash	40	A, C, M	272-ball PBGA	Available	MPC555UM/AD TPURM/AD RCPURM/AD
MGT560	0	24 + 4 for TPU + 4 for DECRAM	0	USIU	1 TPU3 MIOS 14	QSMCM (2 SCI + QSPI) + 2 TouCAN	2 x TouCAN	1 QADC (10-Bit A/D with 64 result registers each) 32 channels on chip	5 x PWM	2.6 Vdc for core, 3.3 Vdc for A/D and I/O	40 or 56	V	208-ball MAPBGA	Available	MGT560RM/D
MPC561	0	32 + 8 for TPU + 2 for DECRAM	0	USIU	54-channel timer system: 2 TPU3 + MIOS14	QSMCM (2 SCI + 1 QSPI) + 3 TouCAN	3 x TouCAN	2 QADC (10-Bit A/D with 64 result registers each) 32 channels on chip	12 x PWM	2.6 Vdc for core, 5.0 Vdc for A/D and I/O	40, 56, 66	C, M	388-ball PBGA	Available	MPC561UM/AD TPURM/AD RCPURM/AD
MPC562	0	32 + 8 for TPU + 2 for DECRAM	0	USIU	54-channel timer system: 2 TPU3 + MIOS14	QSMCM (2 SCI + 1 QSPI) + 3 TouCAN	3 x TouCAN	2 QADC (10-Bit A/D with 64 result registers each) 32 channels on chip	12 x PWM	2.6 Vdc for core, 5.0 Vdc for A/D and I/O	40, 56, 66	C, M	388-ball PBGA	Available Offers code compression	MPC561UM/AD TPURM/AD RCPURM/AD

MPC5XX Family (Sheet 2 of 2)

Product	ROM (Kbytes)	RAM (Kbytes)	Flash (Kbytes)	Product Integration	Timer	Serial	MUX	A/D	PWM	Operating Voltage	Operating Frequency (MHz)	Temp.	Packaging	Additional Information	Documentation
MPC563	0	32 + 8 for TPU + 2 for DECRAM	512	USIU	54-channel timer system: 2 TPU3 + MIOS14	QSMCM (2 SCI + 1 QSPI) + 3 TouCAN	3 x TouCAN	2 QADC (10-Bit A/D with 64 result registers each) 32 channels on chip	12 x PWM	2.6 Vdc for core, 5.0 Vdc for A/D and I/O	40, 56, 66	C, M	388-ball PBGA	Available	MPC563UM/AD TPURM/AD RCPURM/AD
MPC564	0	32 + 8 for TPU + 2 for DECRAM	512	USIU	54-channel timer system: 2 TPU3 + MIOS14	QSMCM (2 SCI + 1 QSPI) + 3 TouCAN	3 x TouCAN	2 QADC (10-Bit A/D with 64 result registers each) 32 channels on chip	12 x PWM	2.6 Vdc for core, 5.0 Vdc for A/D and I/O	40, 56, 66	C, M	388-ball PBGA	Available Offers code compression	MPC563UM/AD TPURM/AD RCPURM/AD
MPC565	0	36 + 10 for TPU + 4 for DECRAM	1M	USIU	70-channel timer system: 3 TPU3 + MIOS14	QSMCM x 2 (4 SCI + 2 QSPI) + 3 TouCAN	3 x TouCAN 1 x J1850	2 QADC (10-Bit A/D with 64 result registers each) 40 channels on chip	12 x PWM	2.6Vdc for core, 5.0Vdc for A/D and I/O	40 or 56	C, M	388-ball PBGA	Available	MPC566UM/AD TPURM/AD RCPURM/AD
MPC566	0	36 + 10 for TPU + 4 for DECRAM	1M	USIU	70-channel timer system: 3 TPU3 + MIOS14	QSMCM x 2 (4 SCI + 2 QSPI) + 3 TouCAN	3 x TouCAN 1 x J1850	2 QADC (10-Bit A/D with 64 result registers each) 40 channels on chip	12 x PWM	2.6Vdc for core, 5.0Vdc for A/D and I/O	40 or 56	A, C, M	388-ball PBGA	Available Offers code compression	MPC566UM/AD TPURM/AD RCPURM/AD
MPC5554	0	64 + 32 for cache + 15 for eTPU	2M	SIU	88-channel timer system: 2 eTPU + eMIOS	2 eSCI + 4 DSPI + 3 FlexCAN		2 eQADC (12-bit A/D with unlimited queuing via eDMA) 40 channels on chip	24 x PWM	3.3/5.0 Vdc for logic and EBI, 5.0 Vdc for A/D and IO, (1.5 Vdc internally regulated for core)	80, 112, 132	C, M	416-ball PBGA	Available under NDA	—

Note: All package, speed, and temperature combinations may not be valid. Consult factory to verify.

Product	Processor Speed (Typ)	Drystone Performance (MIPS)	Microprogrammable Module	Translation Lookaside Buffers	FPU Floating Point Unit	I/O (Bits)	Power Dissipation (Typ)	Other Peripherals Video/LCD Controller	Serial Interfaces	Cache-L1 Instructional KBytes	Cache-L1 Data KBytes
MPC823E	66, 75 MHz	99 @ 75 MHz	CPM	8-entry	—	53	750 mW @ 66 MHz	2 UARTs, 1 IC, 1 SPI, USB	UART (up to 4), 1 I2C, 1 SPI, USB, 16 x 16 MAC, PCMCIA/ATA, CODEC Interface	16	8

683XX Family

Product	ROM (Kbytes)	RAM (Kbytes)	Flash (Kbytes)	Device Integration	Timer	Serial	A/D	Operating Voltage (V)	Operating Frequency (MHz)	Temp	Packaging	Status	Additional Information	Documentation
MC68331	0	0	0	SIM	GPT	SCI, queued SPI	n/a	5.0	16, 20, 25	C, V, M	132-pin PQFP 144-pin LQFP	Available	2.7 V–3.6 V, 16 MHz version (MC68CK331) MC68CK331 is on end of life	MC68331UM/AD MC68CK331EC16/D
MC68332	0	2	0	SIM	TPU	SCI, queued SPI	n/a	5.0	16, 20, 25	C, V, M	132-pin PQFP 144-pin LQFP	Available	3.0 V–3.6 V, 16 MHz version (MC68LK332)	MC68332UM/AD MC68LK332EC16/D
MC68336	0	4 + 3.5	0	SIM	TPU CTM4	SCI, queued SPI	Queued 16-CH 10-Bit	5.0	20, 25	C, V, M	160-pin QFP	Available	—	MC68336/376PP/D MC68336/376UM/AD
MC68376	8	4 + 3.5	0	SIM	TPU CTM4	CAN, SCI, queued SPI	Queued 16-CH 10-Bit	5.0	20, 25	C, V, M	160-pin QFP	Available	—	MC68336/376PP/D MC68336/376UM/AD

Note: All package, speed, and temperature combinations may not be valid. Consult factory to verify.

683xx Reference Manuals

CPU32RM/AD, CPU32 Reference Manual
SIMRM/AD, System Integration Module Reference Manual
TPURM/AD, Timer Processor Unit Reference Manual
GPTRM/AD, General-Purpose Timer Reference Manual

QSMRM/AD, Queued Serial Module Reference Manual
ADCRM/AD, Analog-to-Digital Converter Reference Manual
CTMRM/D, Configurable Timer Module Reference Manual

SG187–33

Hybrid (MCU + DSP) Controllers

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

56F8300 High-Performance Flash Series The MC56F8300 Series of hybrid controllers combines the 56800E hybrid core with flash memory, motor control peripherals, and built-in safety features targeted specifically for automotive applications to provide 60MIPS of performance over the full -40 to 125C 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 hybrid controller devices including software, support, training, and internal and 3rd party development tools.

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56800E FAMILY

56F8300 Series General Purpose 16-Bit Fixed Point^{Note}

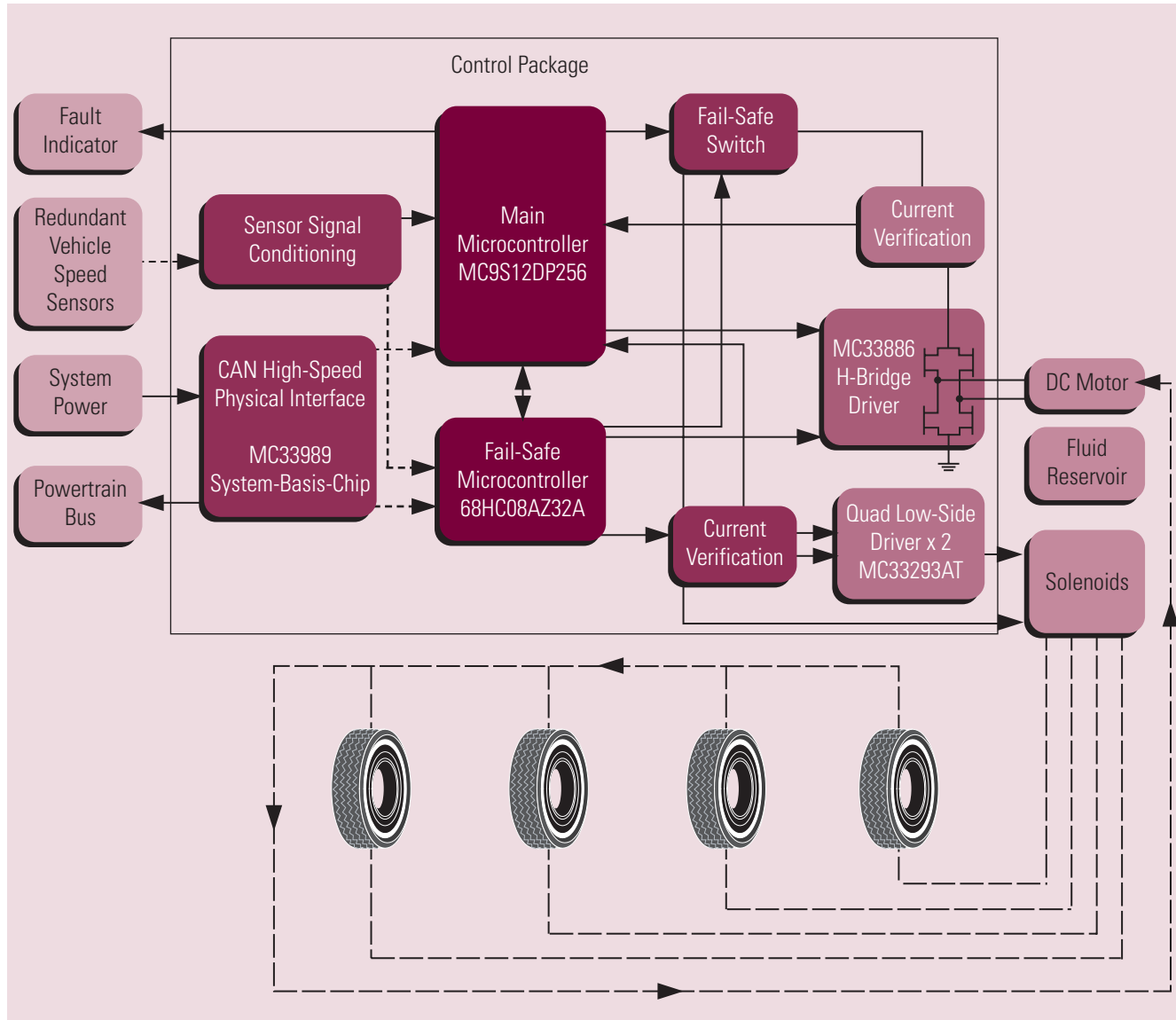
Product	Performance	Flash/RAM	Off-Chip Memory Expansion (EMI)	Peripherals	Packaging	Additional Information
MC56F8322VFA60	60 MHz 60 MIPS	48KB / 12KB	n/a	2 SPI, 2 SCI, 2 ADC, PWM, COP, PLL, Decoder, 2 Quad Timers, FlexCAN	48-pin LQFP	Industrial (-40°C to 105°C), MCU-friendly instruction set, Enhanced OnCE for debug, on-chip relaxation oscillator, temperature sensor and up to 21 GPIOs. Order two-unit sample pack as SPAK56F8322VFA60. S, MOQ of 250.
MC56F8322MFA60	60 MHz 60 MIPS	48KB / 12KB	n/a	2 SPI, 2 SCI, 2 ADC, PWM, COP, PLL, Decoder, 2 Quad Timers, FlexCAN	48-pin LQFP	Extended (-40°C to 125°C) MCU-friendly instruction set, Enhanced OnCE for debug, on-chip relaxation oscillator, temperature sensor, and up to 21 GPIOs. Order two-unit sample pack as SPAK56F8322MFA60. S, MOQ of 250.
MC56F8323VFB60	60 MHz 60 MIPS	48KB / 12KB	n/a	2 SCI, 2 SPI, 2 ADC, PWM, COP, PLL, Decoder, 2 Quad Timers, FlexCAN	64-pin LQFP	Industrial (-40°C to 105°C), MCU-friendly instruction set, Enhanced OnCE for debug, on-chip relaxation oscillator, temperature sensor, and up to 27 GPIOs. Order two-unit sample pack as SPAK56F8323VFB60. S, MOQ of 160.
MC56F8323MFB60	60 MHz 60 MIPS	48KB / 12KB	n/a	2 SCI, 2 SPI, 2 ADC, PWM, COP, PLL, Decoder, FlexCAN	64-pin LQFP	Extended (-40°C to 125°C), MCU-friendly instruction set, Enhanced OnCE for debug, on-chip relaxation oscillator, temperature sensor, and up to 27 GPIOs. Order two-unit sample pack as SPAK56F8323MFB60. S, MOQ of 160.
MC56F8345VFG60	60 MHz 60 MIPS	144KB / 12KB	n/a	2 SCI, 2 SPI, 4 ADC, PWM, COP, PLL, 2 Decoders, 4 Quad Timers, FlexCAN	128-pin LQFP	Industrial (-40°C to 105°C), MCU-friendly instruction set, Enhanced OnCE for debug, temperature sensor, and up to 49 GPIOs. Order two-unit sample pack as SPAK56F8345VFG60. S, MOQ of 72.
MC56F8345MFG60	60 MHz 60 MIPS	144KB / 12KB	n/a	2 SCI, 2 SPI, 4 ADC, 2 PWMs, COP, PLL, 2 Decoders, 4 Quad Timers, FlexCAN	128-pin LQFP	Extended (-40°C to 125°C), MCU-friendly instruction set, Enhanced OnCE for debug, temperature sensor, and up to 49 GPIOs. Order two-unit sample pack as SPAK56F8345MFG60. S, MOQ of 72.
MC56F8346VFB60	60 MHz 60 MIPS	144KB / 12KB	Yes	2 SPI, 2 SCI, 4 ADC, 2 PWM, COP, PLL, 2 Decoders, 4 Quad Timers, FlexCAN	144-pin LQFP	Industrial (-40°C to 105°C), MCU-friendly instruction set, Enhanced OnCE for debug, temperature sensor, and up to 62 GPIOs. Order two-unit sample pack as SPAK56F8346VFB60. S, MOQ of 60.
MC56F8346MFB60	60 MHz 60 MIPS	144KB / 12KB	Yes	2 SPI, 2 SCI, 4 ADC, 2 PWM, COP, PLL, 2 Decoders, 4 Quad Timers, FlexCAN	144-pin LQFP	Extended (-40°C to 125°C), MCU-friendly instruction set, Enhanced OnCE for debug, temperature sensor, and up to 62 GPIOs. Order two-unit sample pack as SPAK56F8346MFB60. S, MOQ of 60.
MC56F8356VFB60	60 MHz 60 MIPS	280KB / 20KB	Yes	2 SPI, 2 SCI, 4 ADC, 2 PWM, COP, PLL, 2 Decoders, 4 Quad Timers, FlexCAN	144-pin LQFP	Industrial (-40°C to 105°C), MCU-friendly instruction set, Enhanced OnCE for debug, temperature sensor, and up to 62 GPIOs. Order two-unit sample pack as SPAK56F8356VFB60. S, MOQ of 60.
MC56F8356MFB60	60 MHz 60 MIPS	280KB / 20KB	Yes	2 SPI, 2 SCI, 4 ADC, 2 PWM, COP, PLL, 2 Decoders, 4 Quad Timers, FlexCAN	144-pin LQFP	Extended (-40°C to 125°C), MCU-friendly instruction set, Enhanced OnCE for debug, temperature sensor, and up to 62 GPIOs. Order two-unit sample pack as SPAK56F8356MFB60. S, MOQ of 60.
MC56F8357VPY60	60 MHz 60 MIPS	280KB / 20KB	Yes	2 SPI, 2 SCI, 4 ADC, 2 PWM, COP, PLL, 2 Decoders, 4 Quad Timers, FlexCAN	160-pin LQFP	Industrial (-40°C to 105°C), MCU-friendly instruction set, Enhanced OnCE for debug, temperature sensor, and up to 76 GPIOs. Order two-unit sample pack as SPAK56F8357VPY60. S, MOQ of 60.
MC56F8357MPY60	60 MHz 60 MIPS	280KB / 20KB	Yes	2 SPI, 2 SCI, 4 ADC, 2 PWM, COP, PLL, 2 Decoders, 4 Quad Timers, FlexCAN	160-pin LQFP	Extended (-40°C to 125°C), MCU-friendly instruction set, Enhanced OnCE for debug, temperature sensor, and up to 76 GPIOs. Order two-unit sample pack as SPAK56F8357MPY60. S, MOQ of 60.

Note: Contact your local Motorola Sales Office or authorized Motorola distributor for product availability.

**Hybrid (MCU + DSP)
Controller**

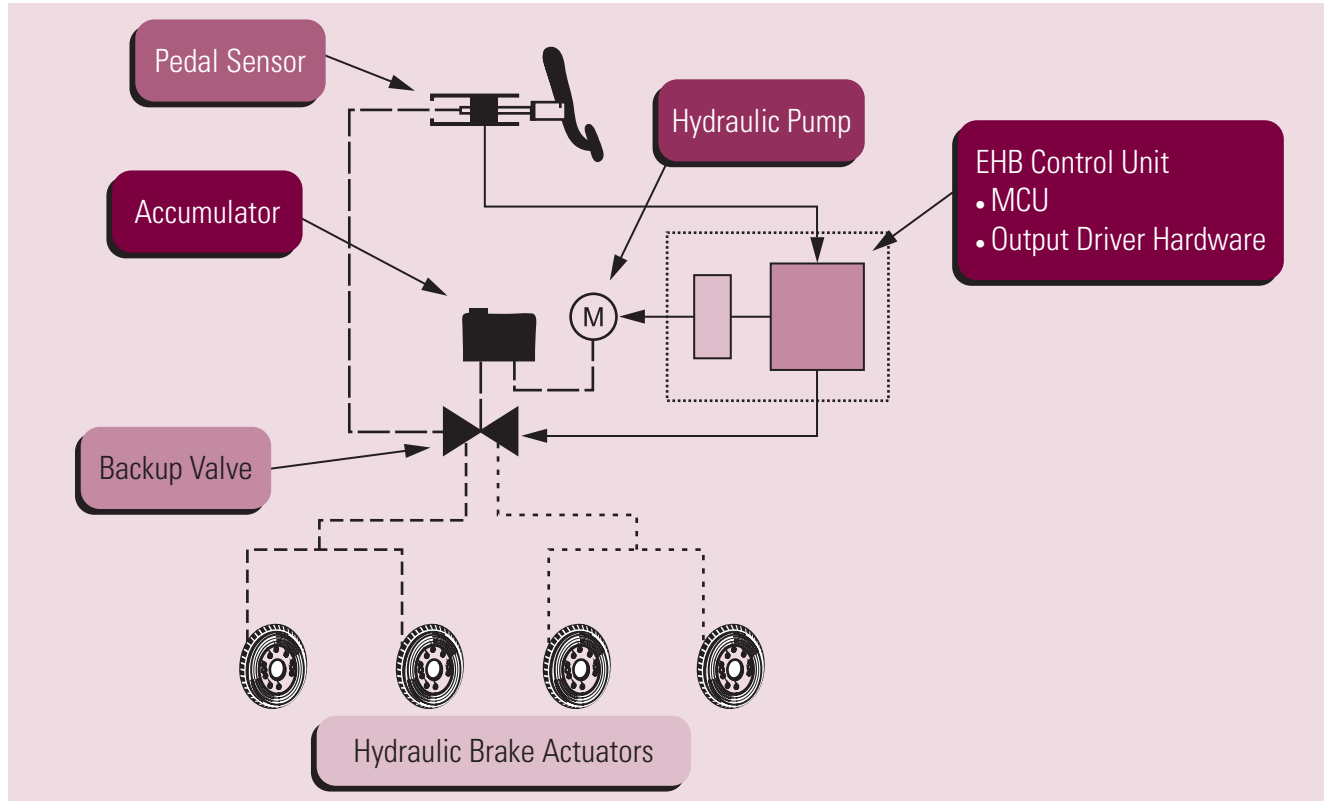
Block Diagrams

Anti-Lock Braking System Control Package



For additional application information, refer to SG2006/D, *Anti-Lock Braking Systems*.

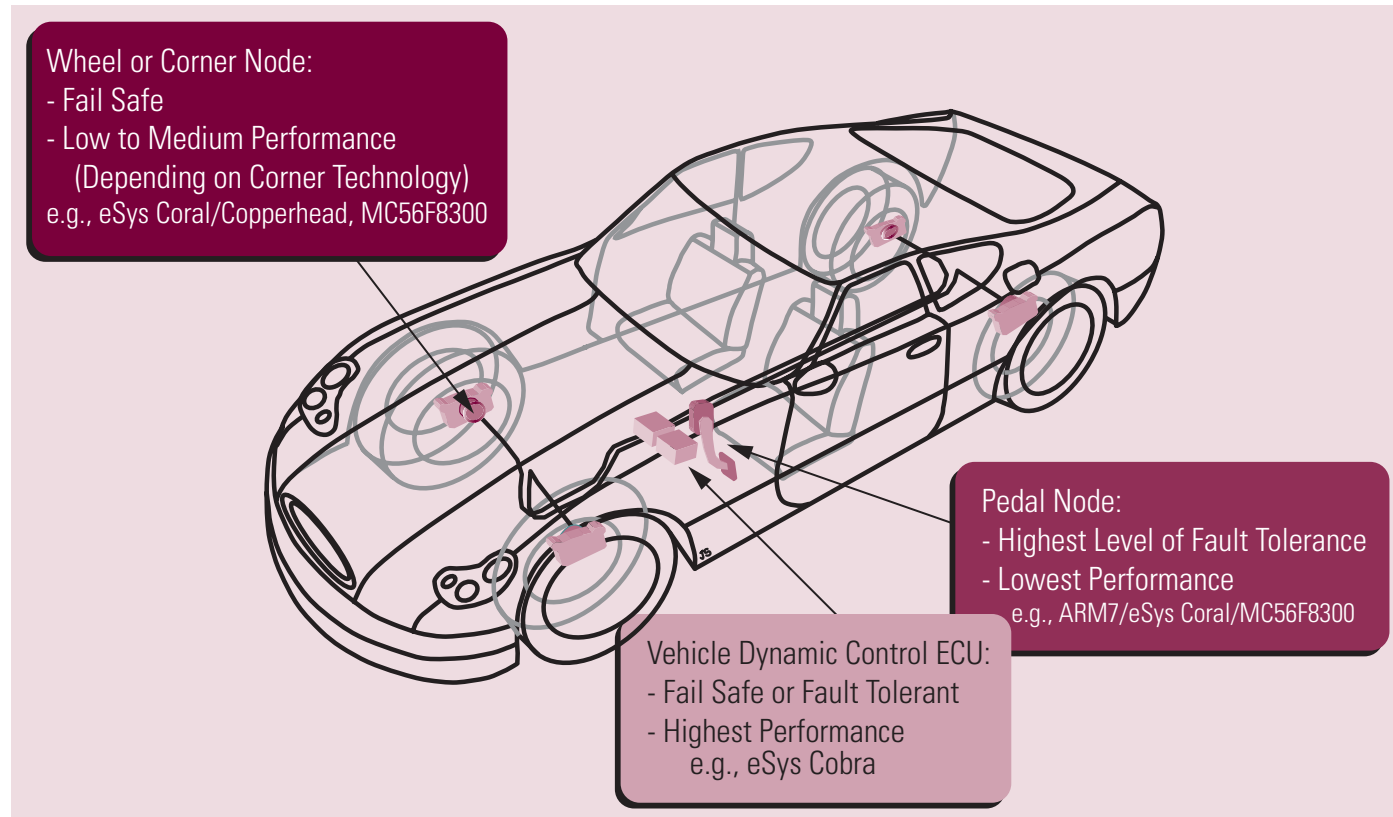
Electrohydraulic Braking Block Diagram



For additional application information, refer to SG2007/D, *Electrohydraulic Braking*.

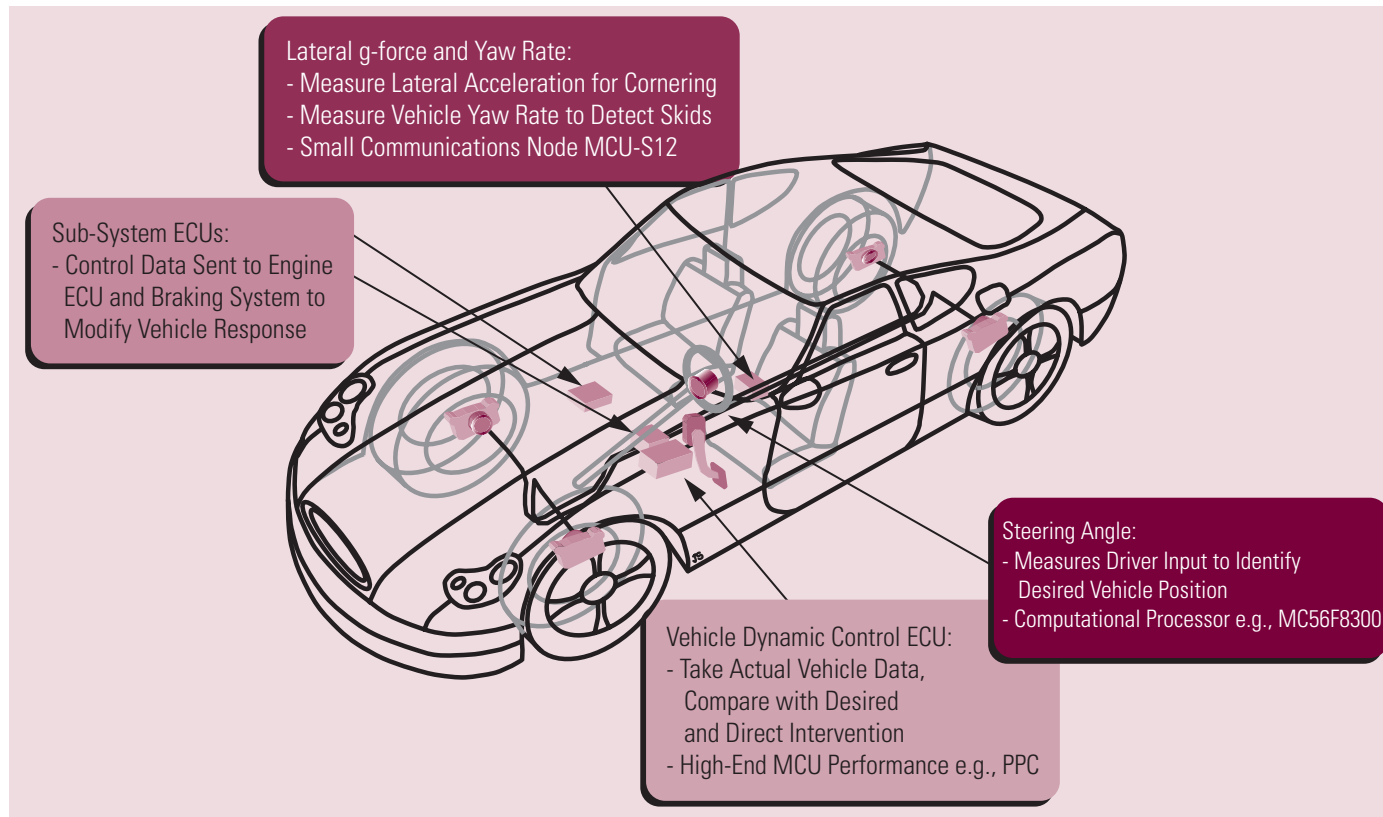
Block Diagrams

Electromechanical Braking Control Package



For additional application information, refer to SG2008/D, *Electromechanical Braking (Brake By-Wire)*.

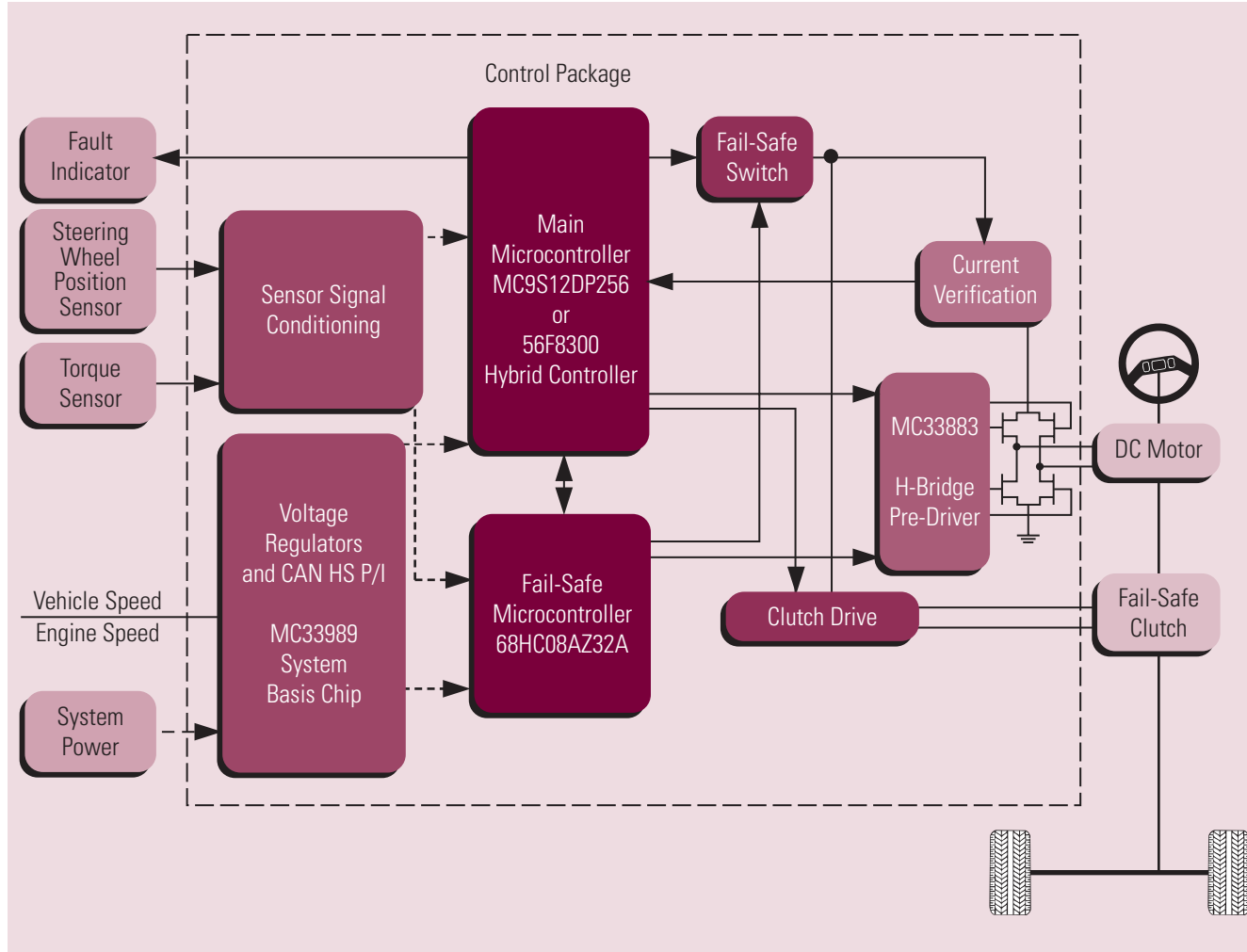
Electronic Stability Program



For additional application information, refer to SG2009/D, *Electronic Stability Program*.

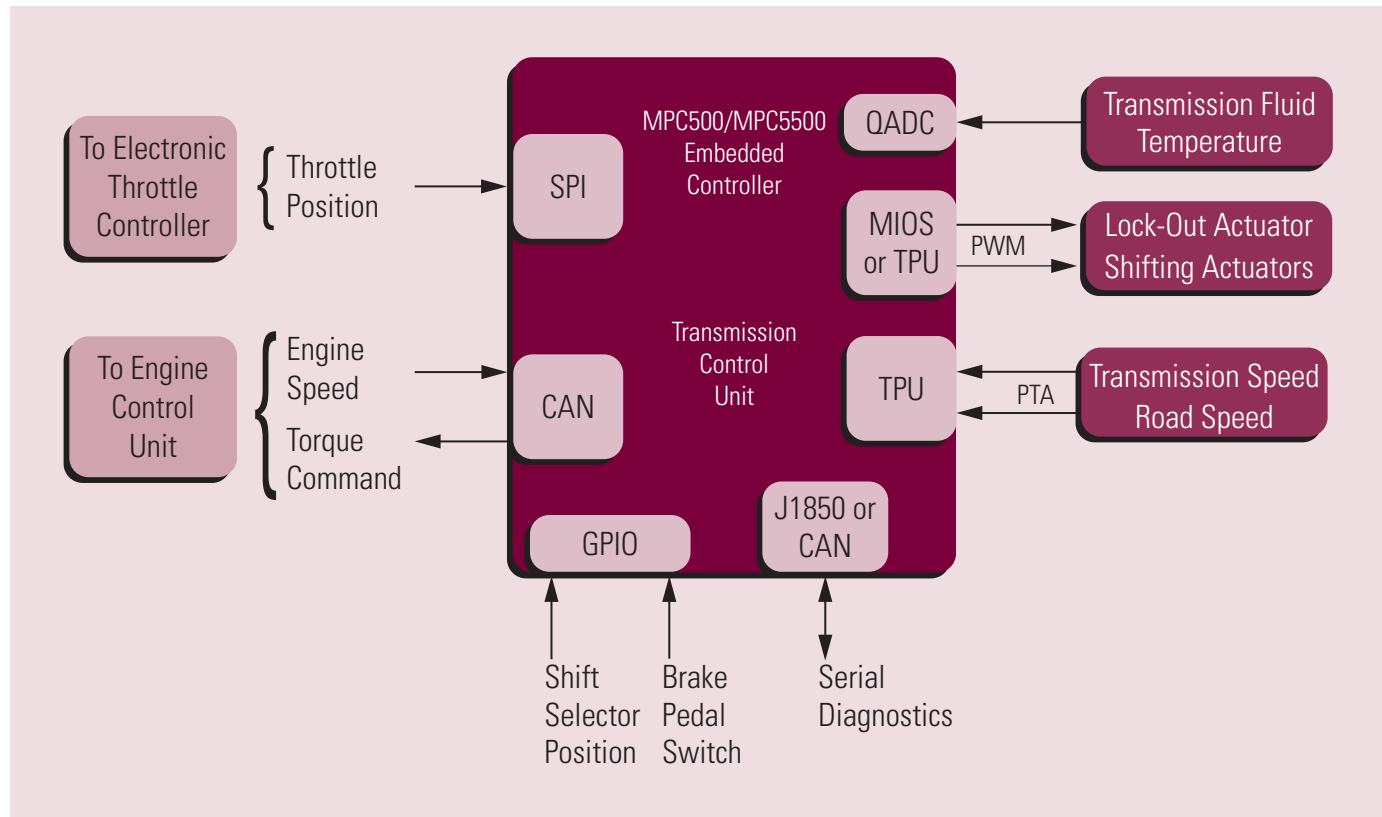
Block Diagrams

Steering—Electronic Power Assisted



For additional application information, refer to SG2010/D, *Steering—Electronic Power Assisted*.

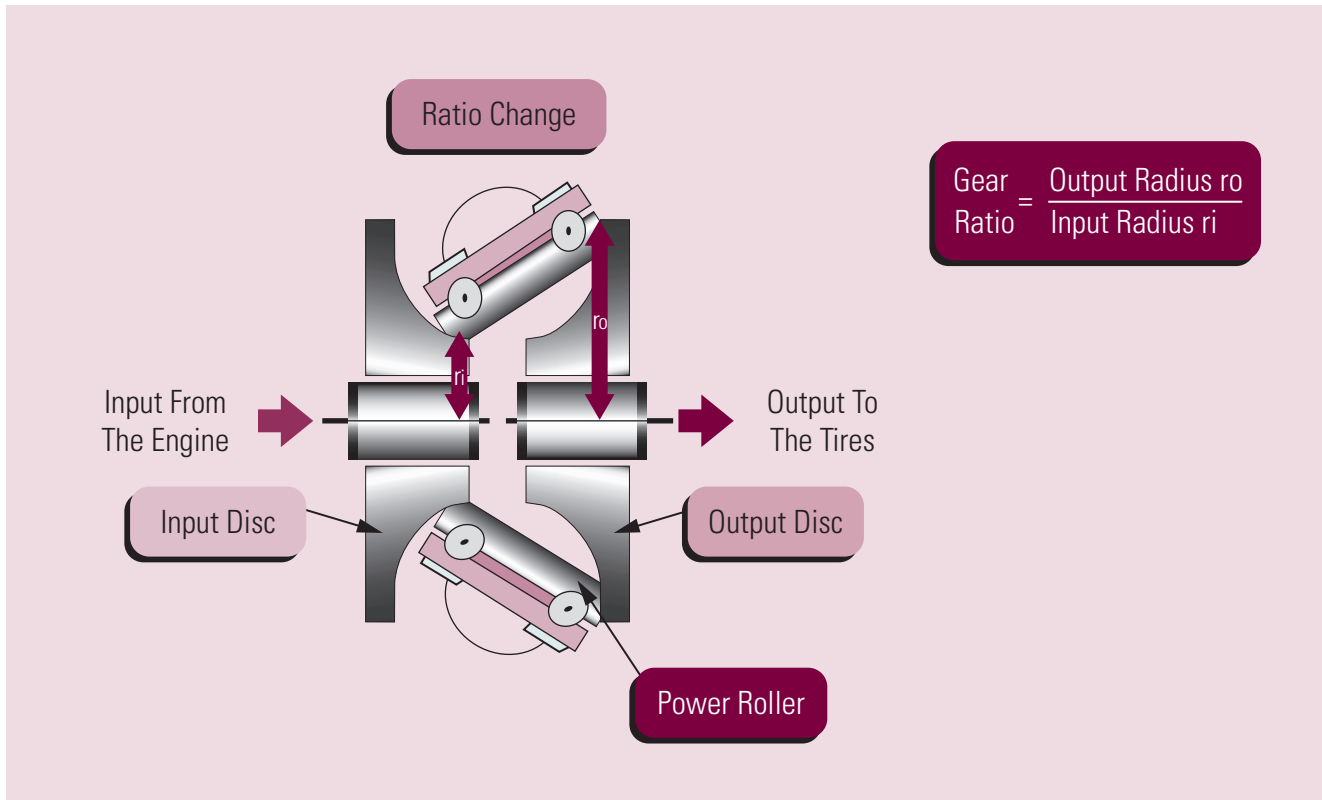
MPC500/MPC5500-Based Transmission Control Unit



For additional application information, refer to SG2023/D, *Electronic Transmission Control/Continuously Variable Transmission Control*.

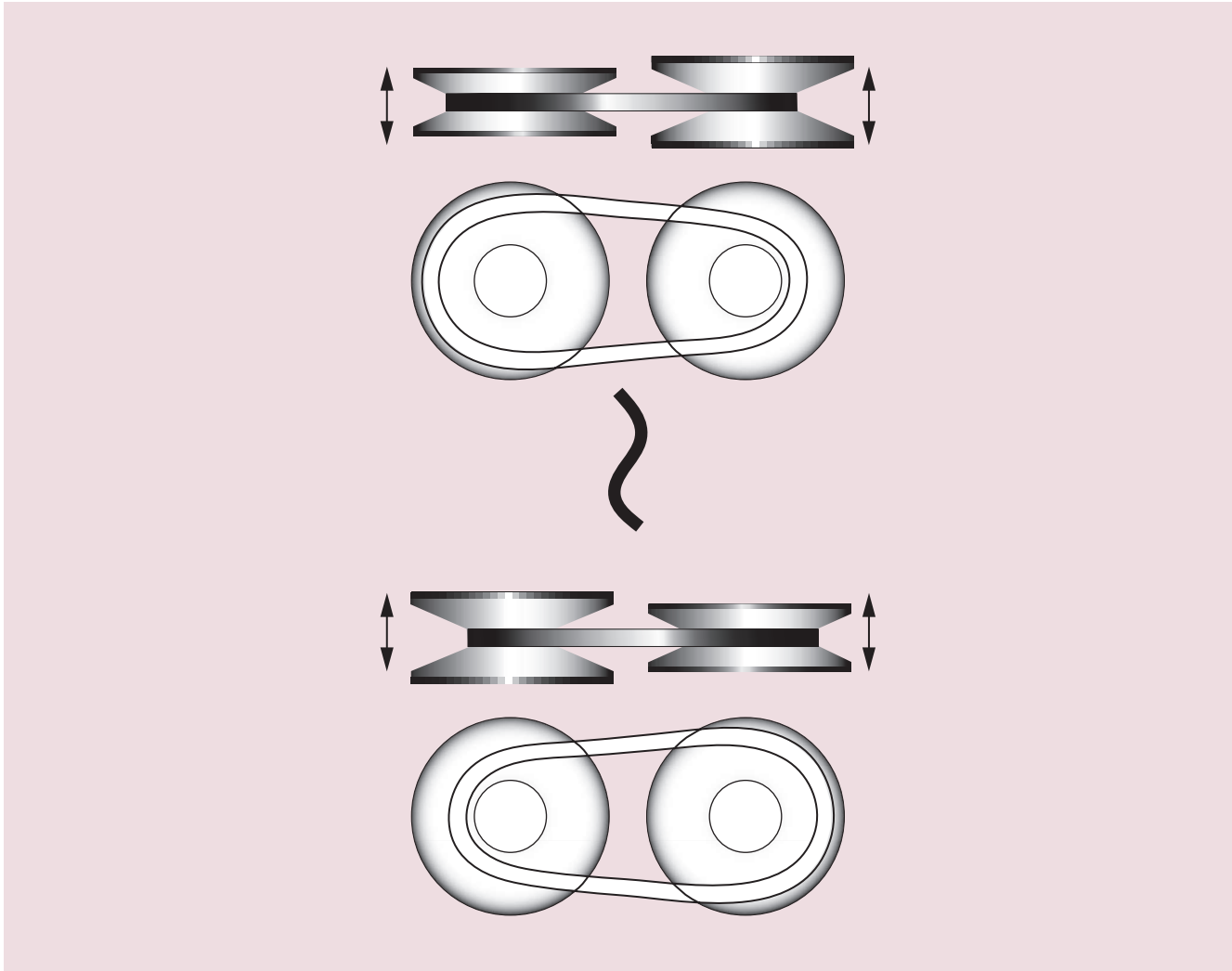
Block Diagrams

Gear Ratio of EXTROID CVT



For additional application information, refer to SG2023/D, *Electronic Transmission Control/Continuously Variable Transmission Control*.

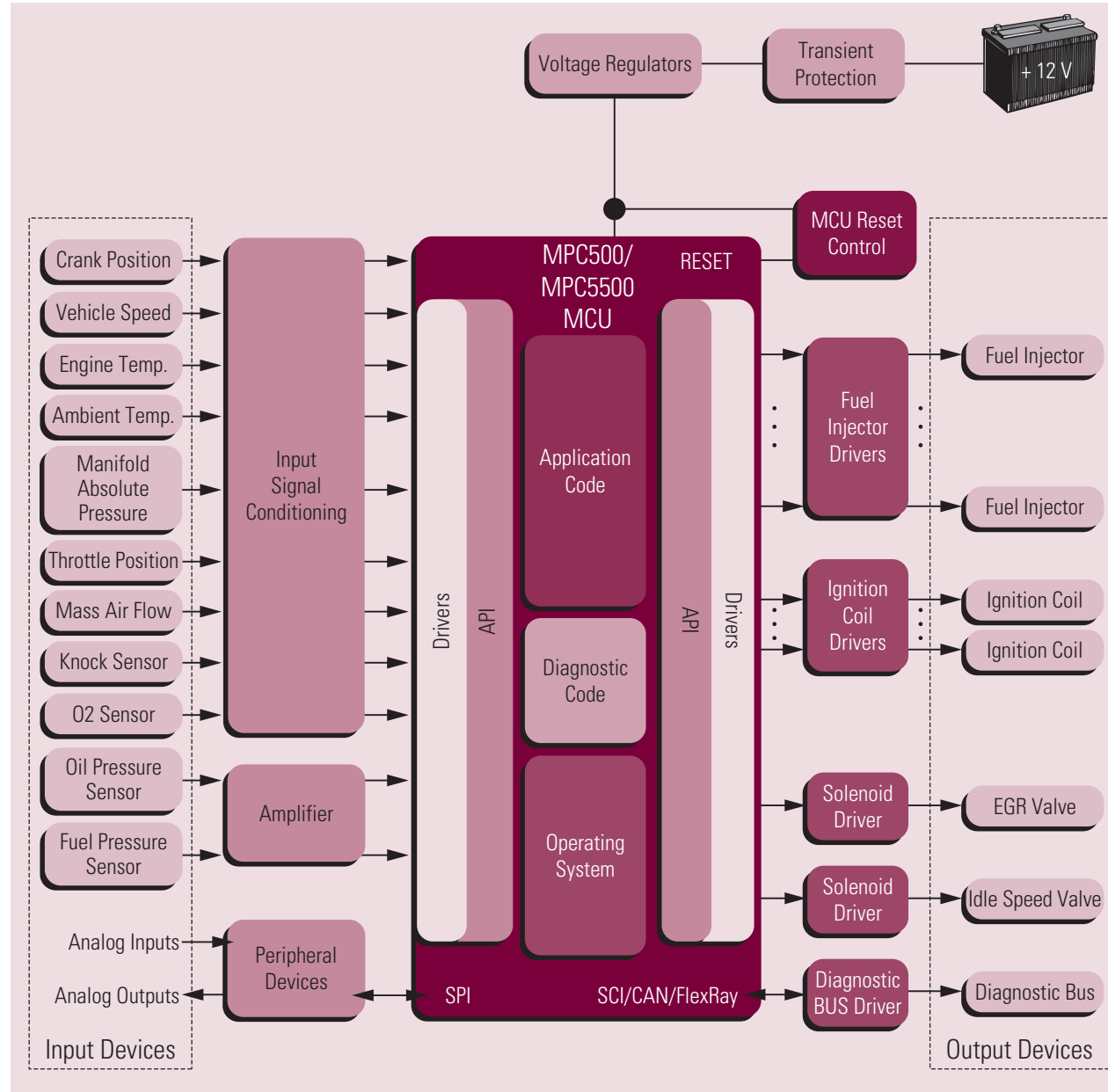
Belt-Driven CVT System



For additional application information, refer to SG2023/D, *Electronic Transmission Control/Continuously Variable Transmission Control*.

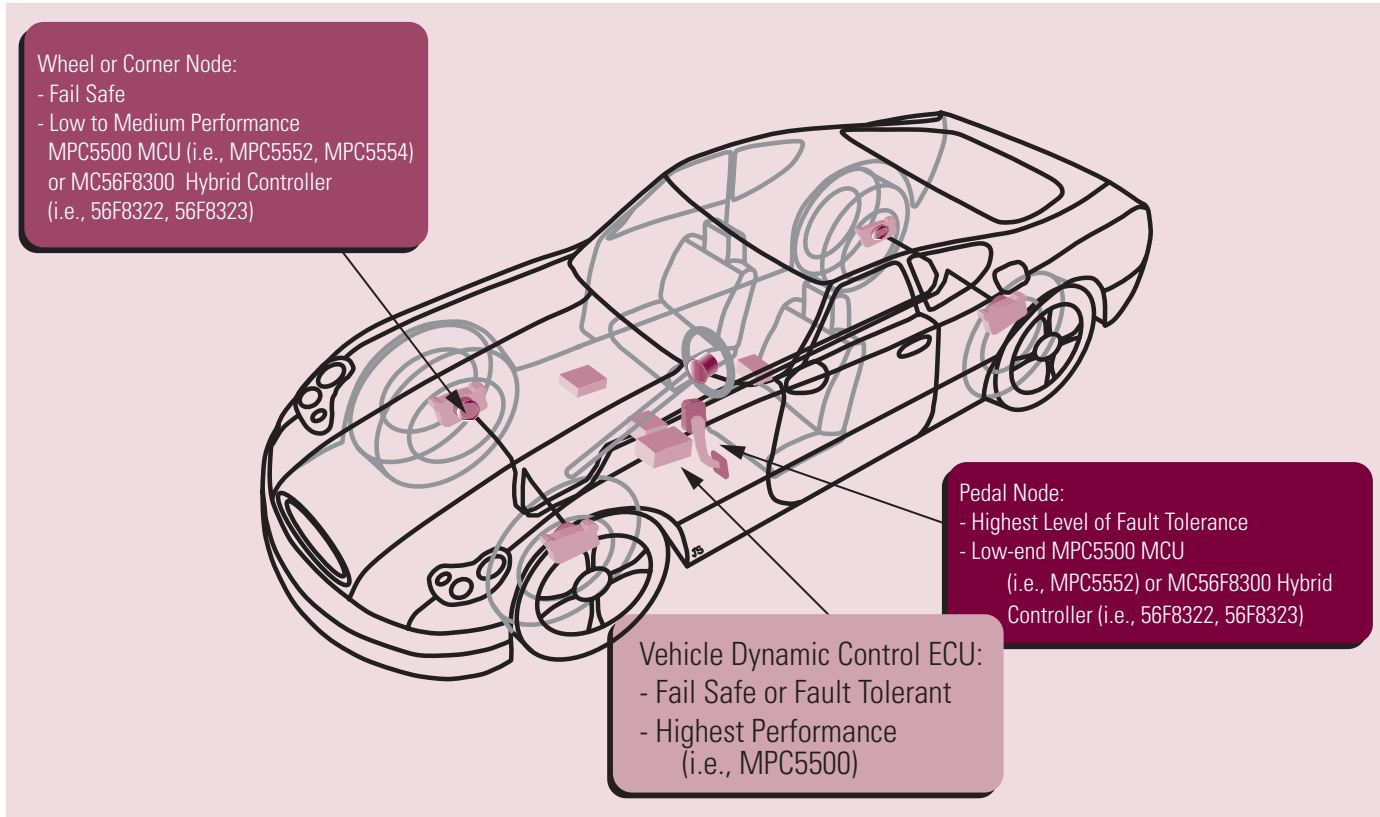
Block Diagrams

Engine Control System Block Diagram



For additional application information, refer to SG2024/D, *Gasoline Engine Management*.

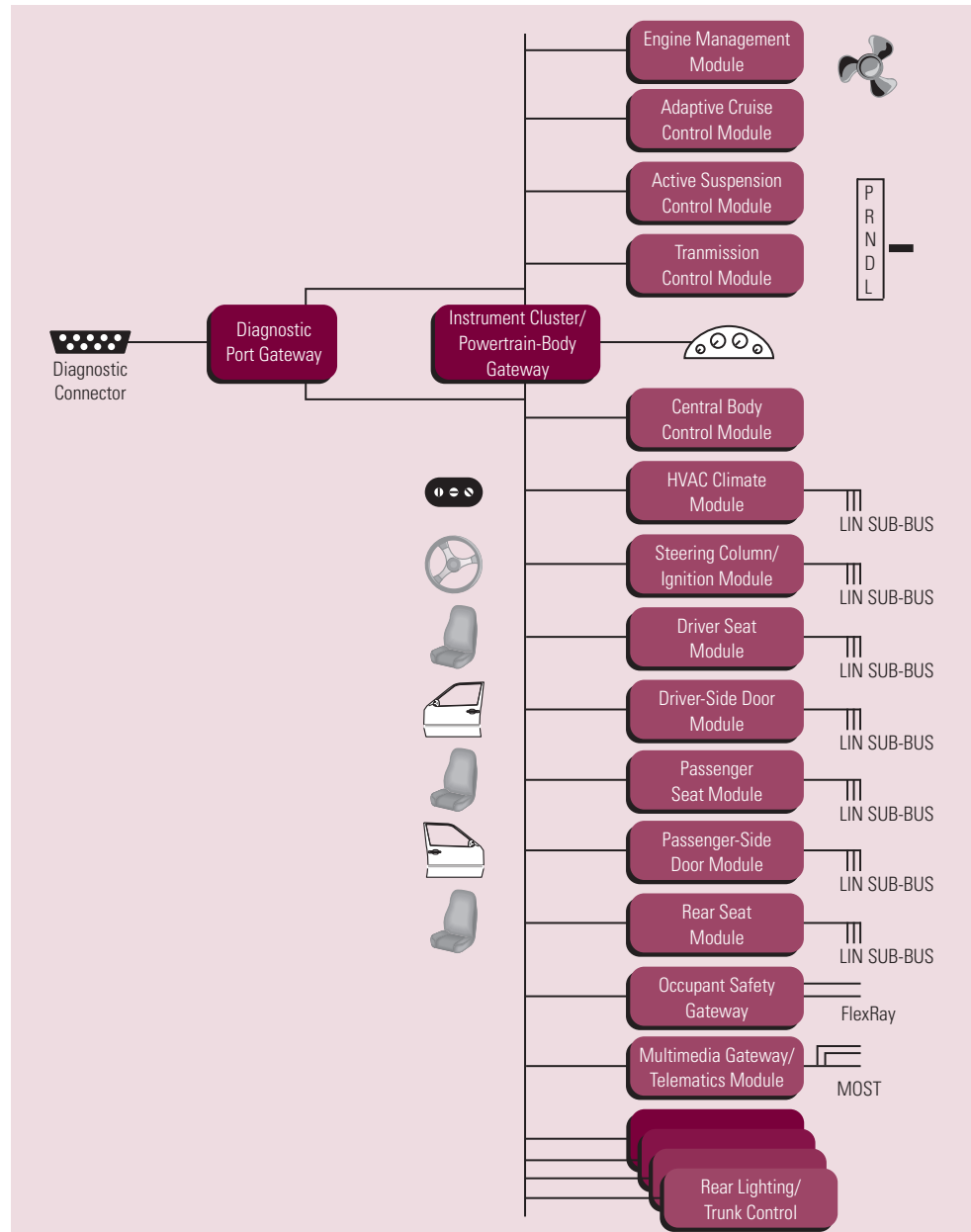
Brake By-Wire System Architecture and Performance Requirements



For additional application information, refer to SG2031/D, *By-Wire*.

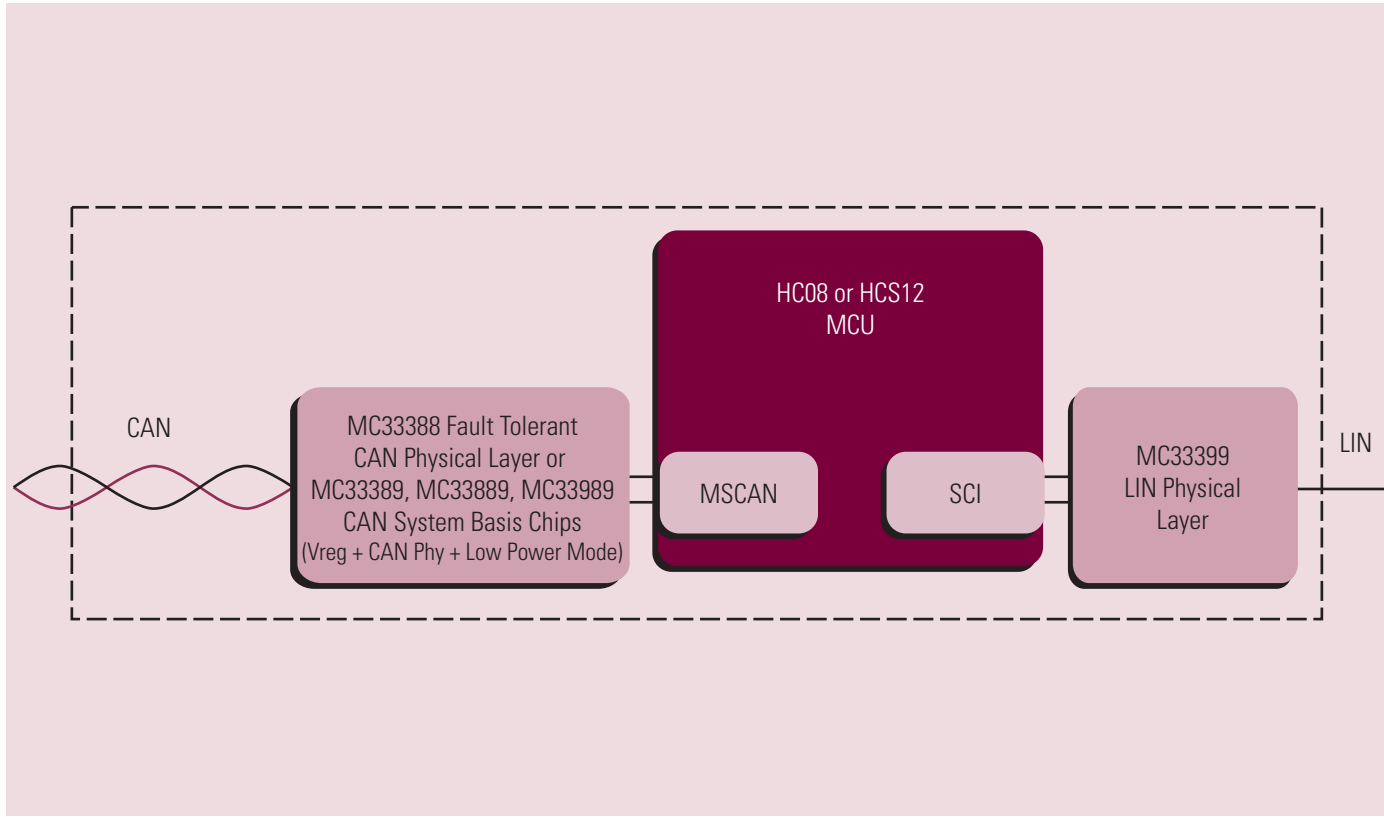
Block Diagrams

Automotive CAN Networks



For additional application information, refer to SG2032/D, *Automotive Controller Area Network (CAN) Applications*.

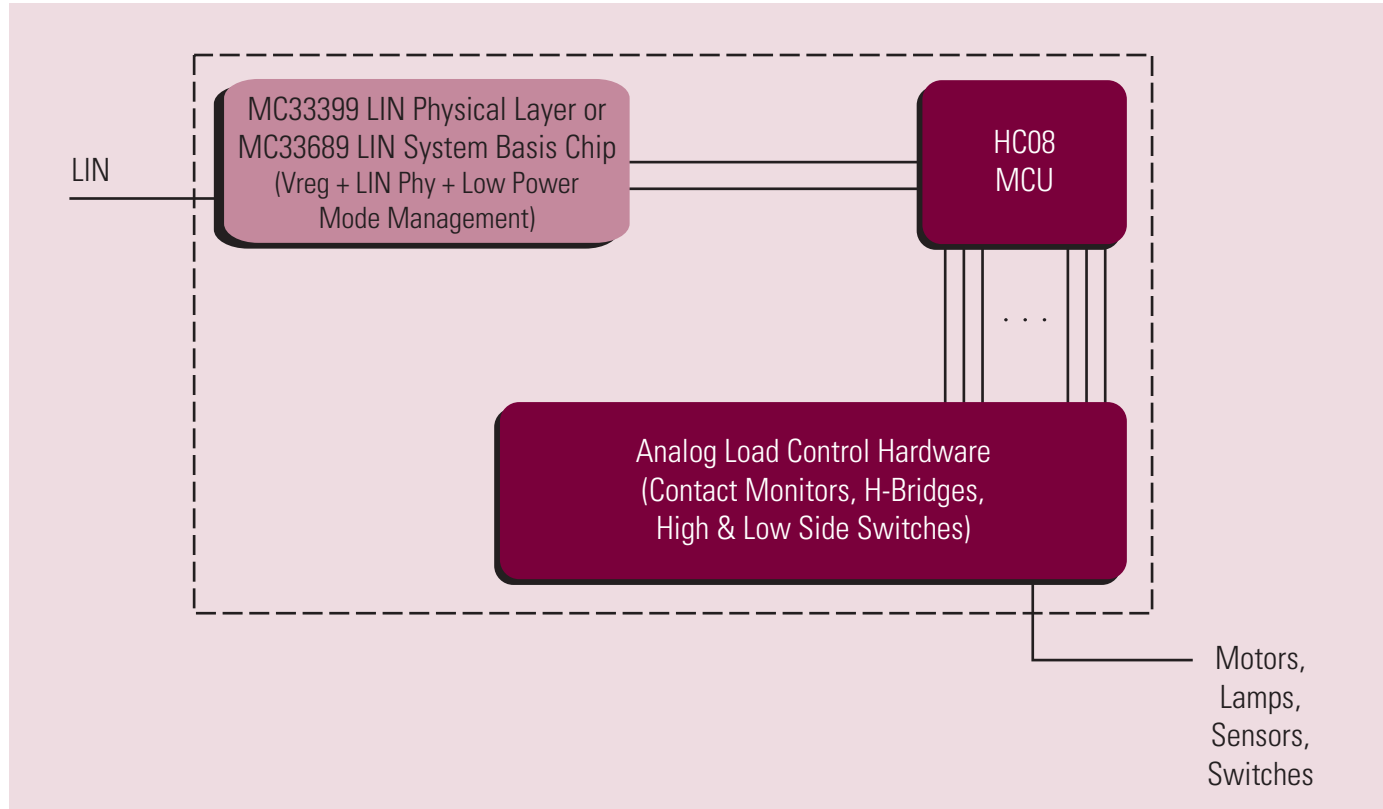
Typical LIN Master Module



For additional application information, refer to SG2034/D, *Automotive Local Interconnect Network (LIN) Applications*.

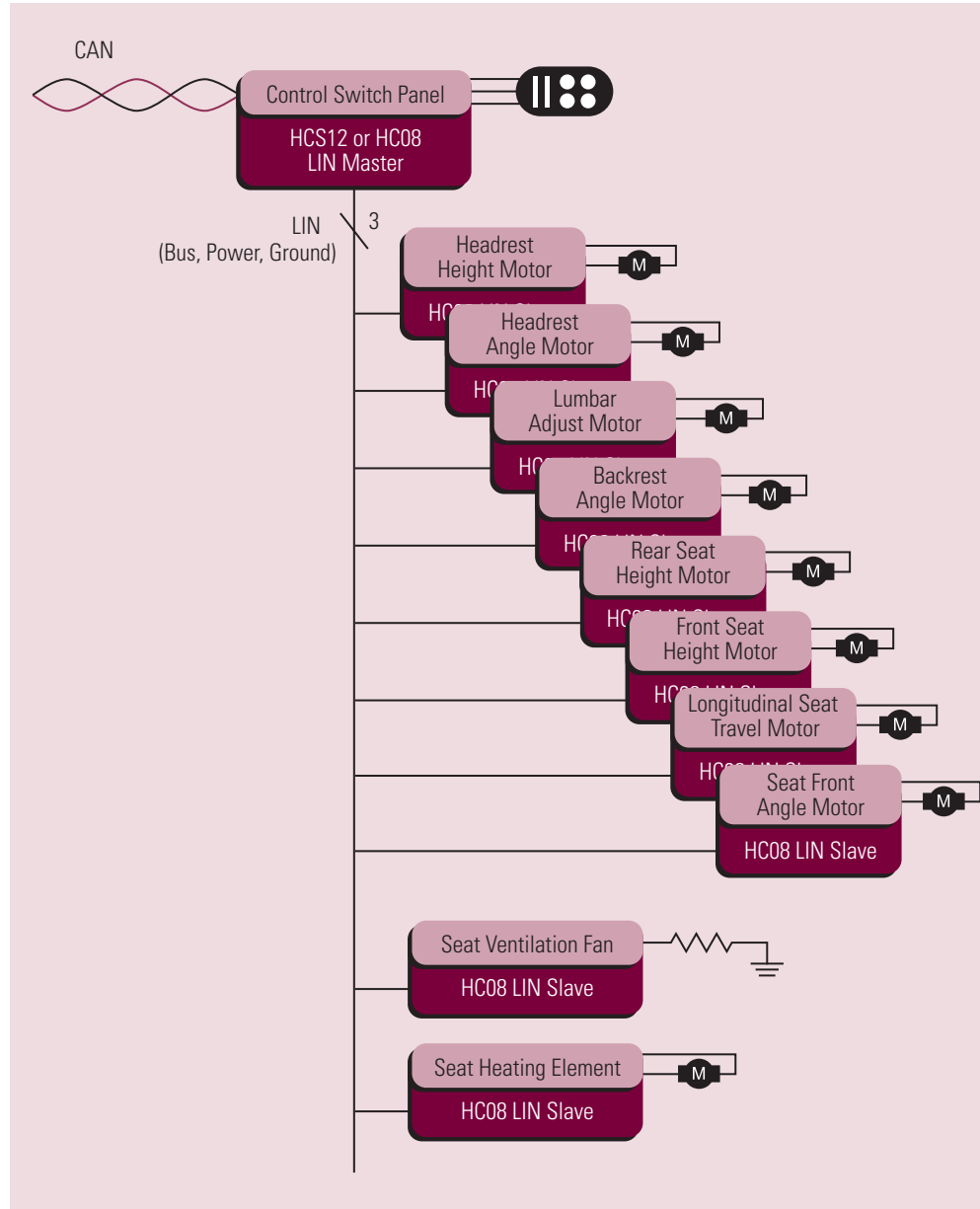
Block Diagrams

Typical LIN Slave Module



For additional application information, refer to SG2034/D, *Automotive Local Interconnect Network (LIN) Applications*.

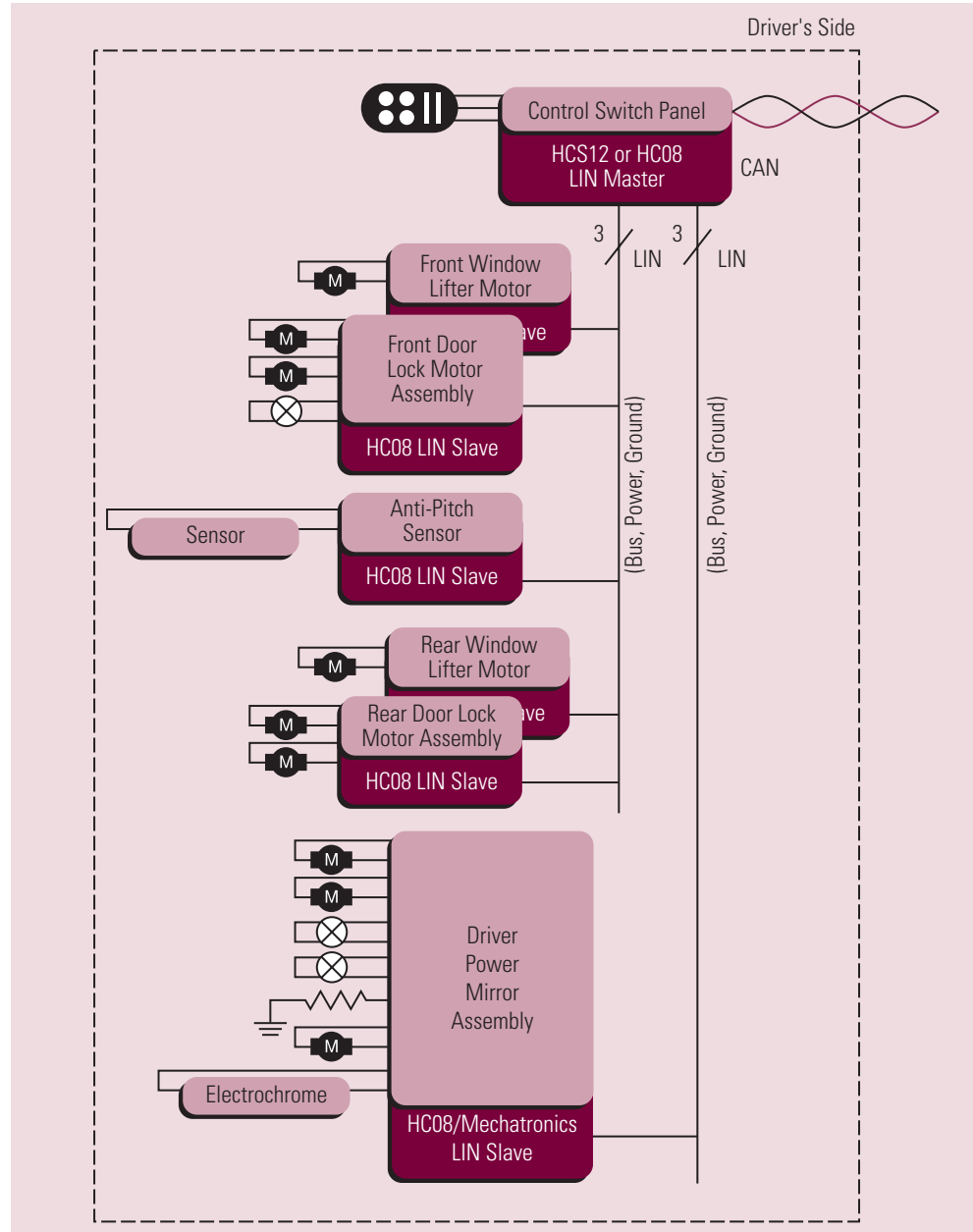
Automotive LIN Door System Block Diagram



For additional application information, refer to SG2034/D, *Automotive Local Interconnect Network (LIN) Applications*.

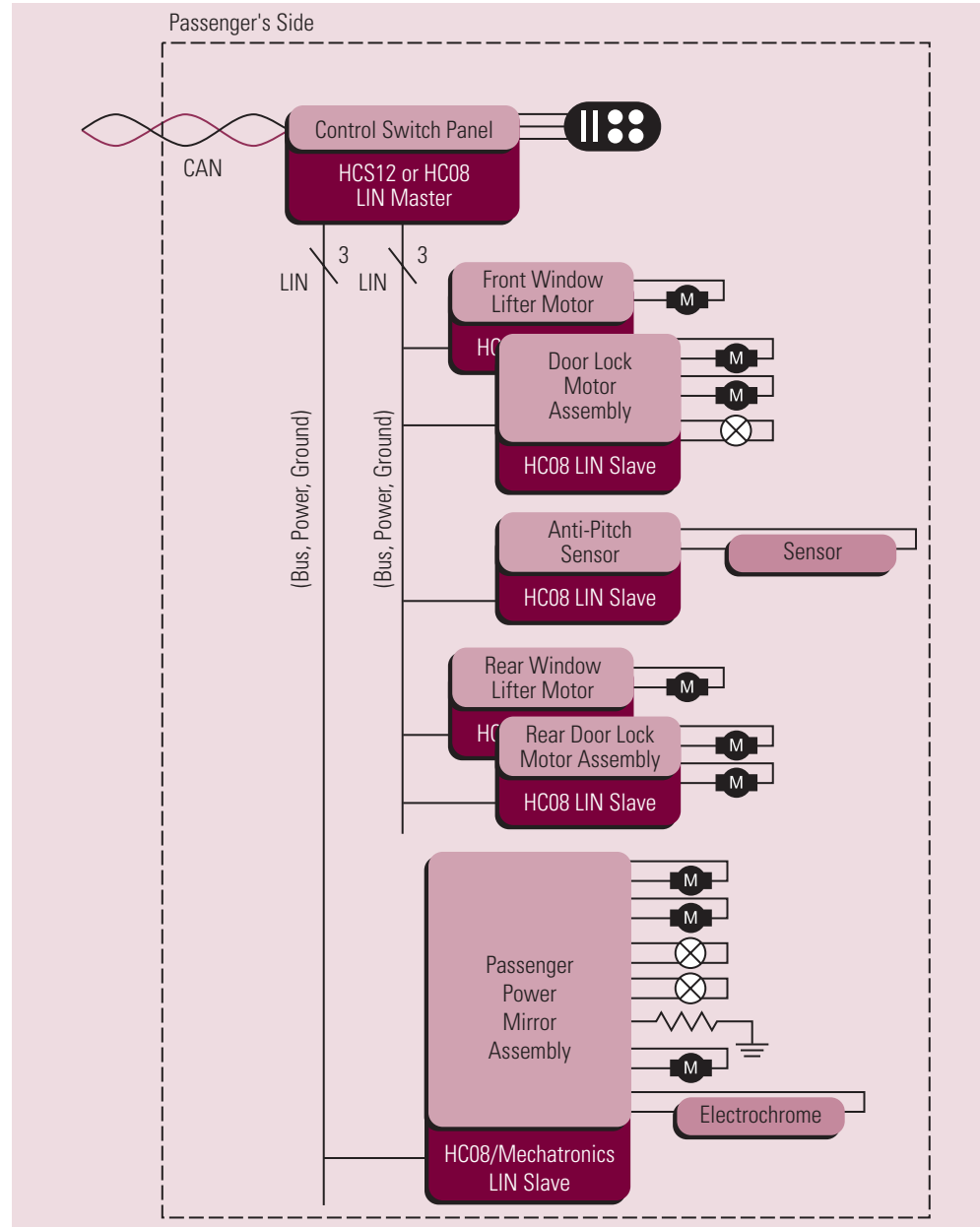
Block Diagrams

Driver's Side: LIN Door System Block Diagram



For additional application information, refer to SG2034/D, *Automotive Local Interconnect Network (LIN) Applications*.

Passenger's Side: LIN Door System Block Diagram

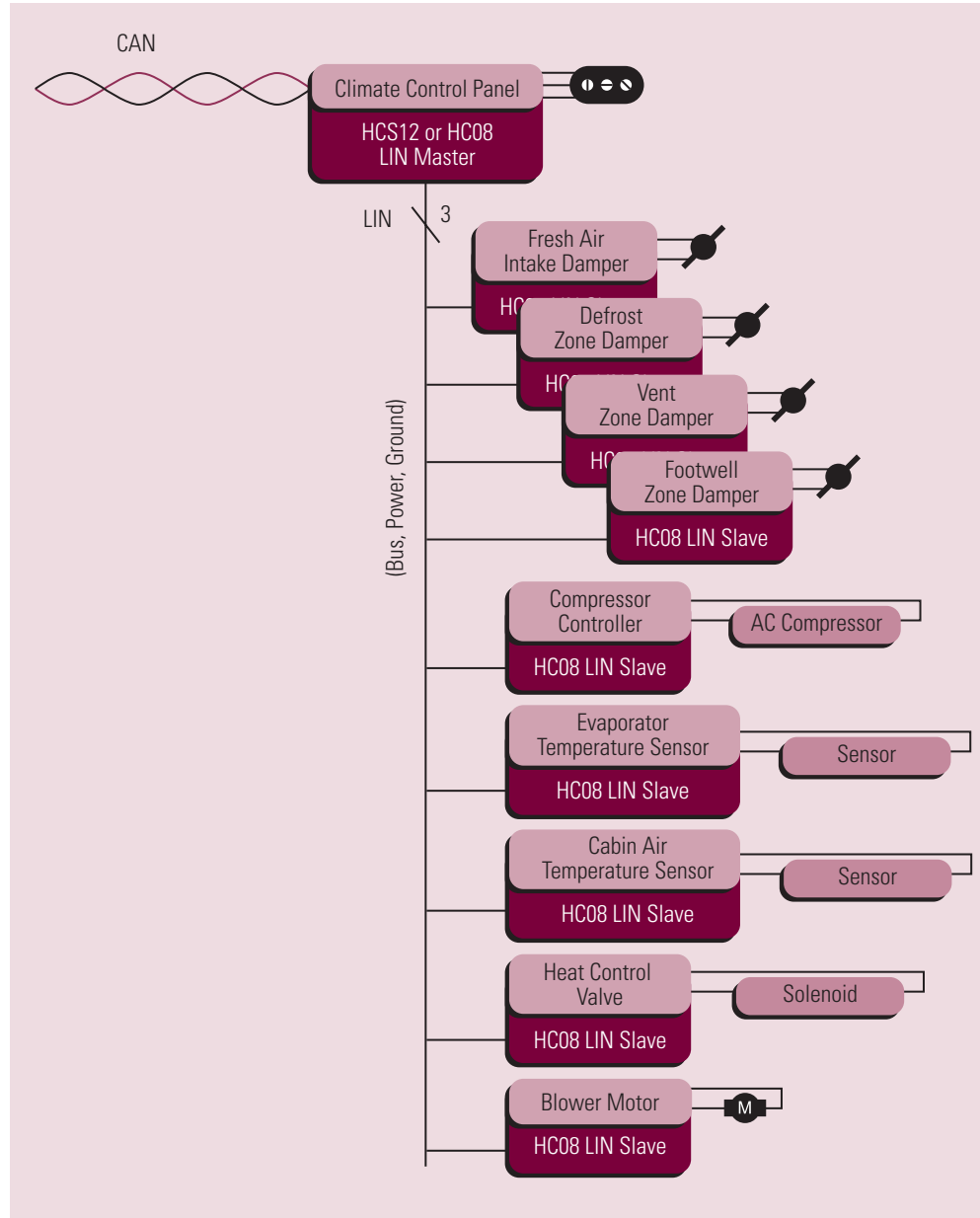


For additional application information, refer to SG2034/D, *Automotive Local Interconnect Network (LIN) Applications*.

SG187-51

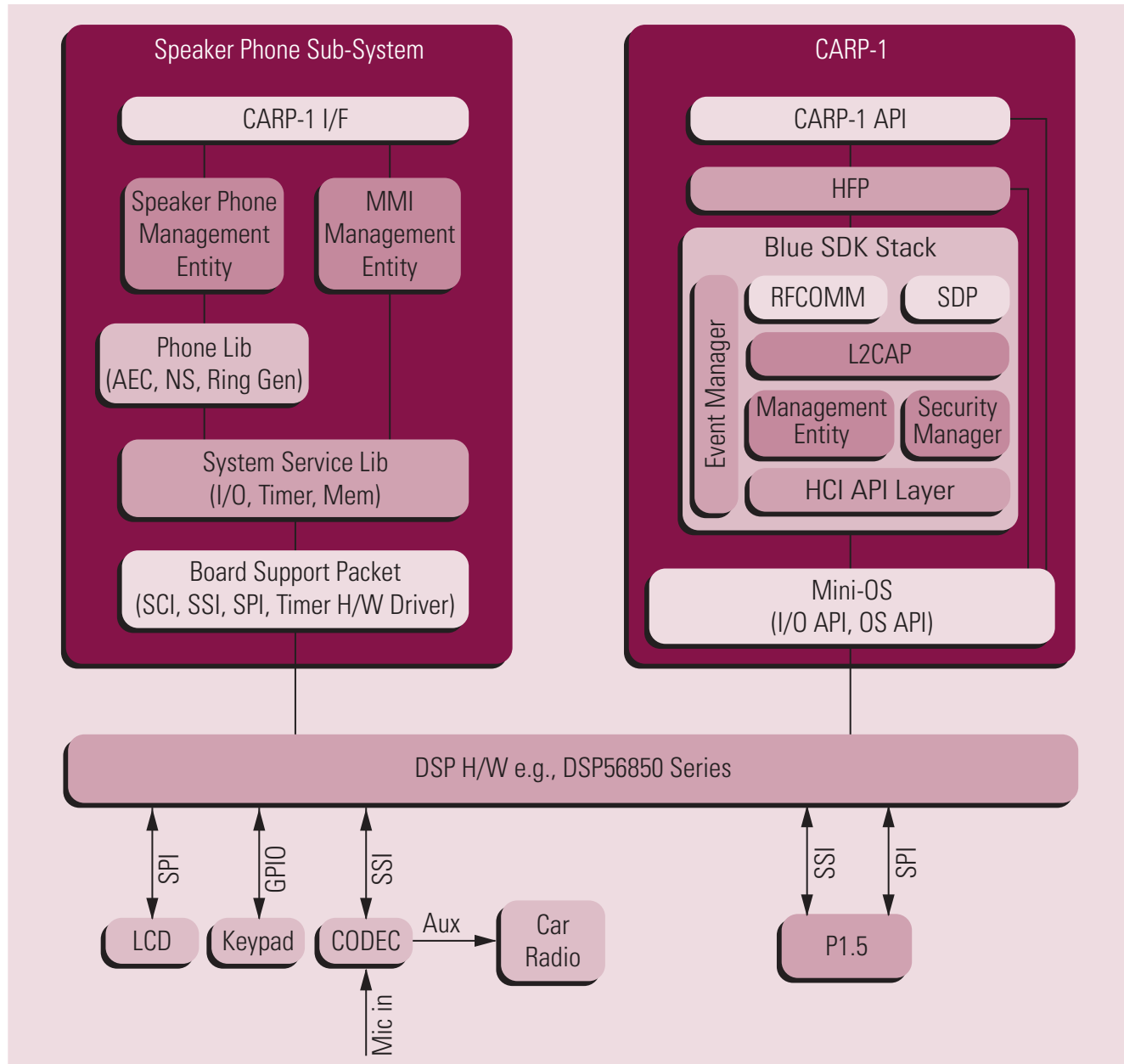
Block Diagrams

Automotive HVAC System Using LIN



For additional application information, refer to SG2034/D, *Automotive Local Interconnect Network (LIN) Applications*.

Low-Cost Bluetooth-Enabled Hands-Free Speaker Phone

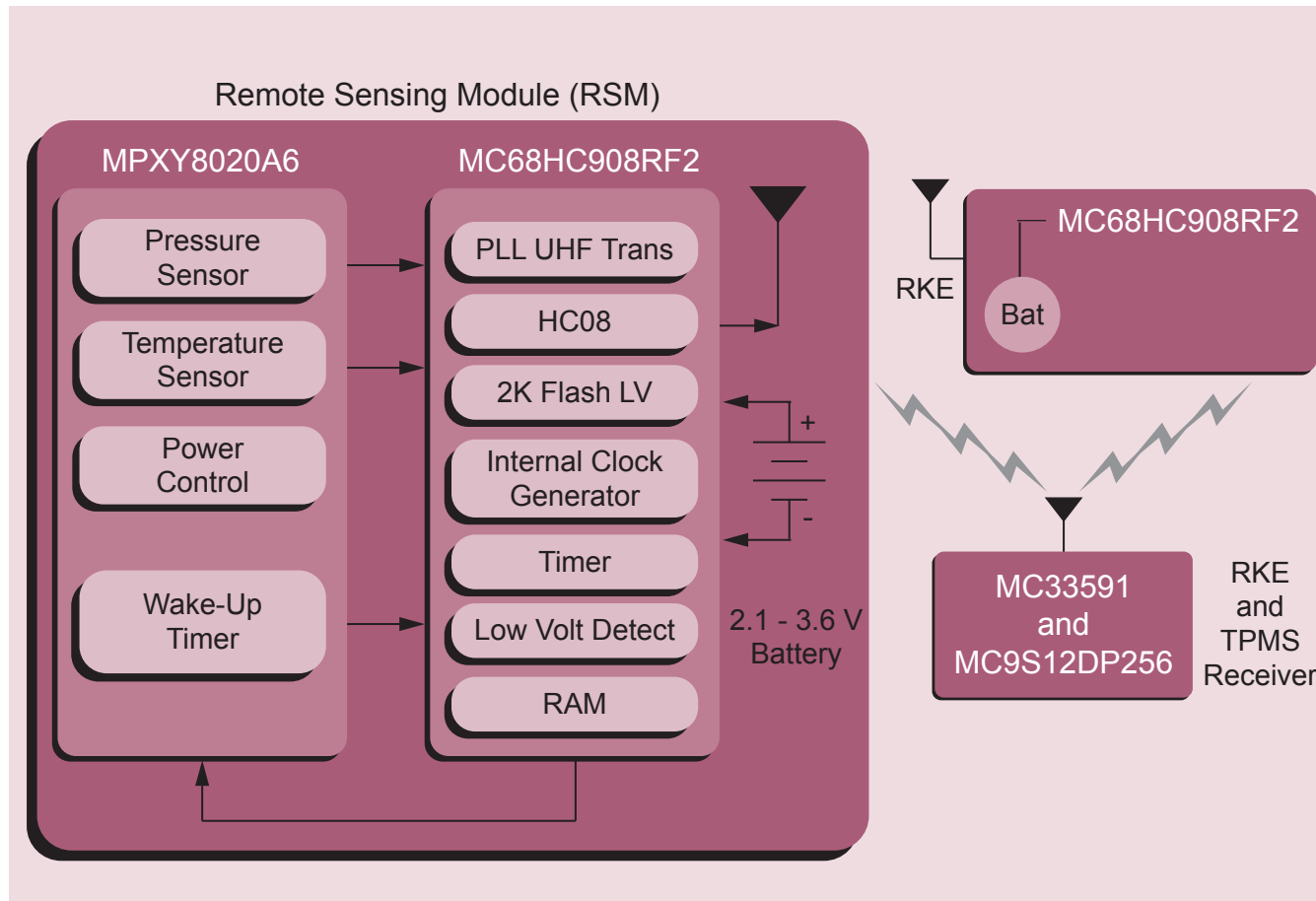


For additional application information, refer to SG2045/D, *Hands-Free Speaker Phone Via Bluetooth*.

SG187-53

Block Diagrams

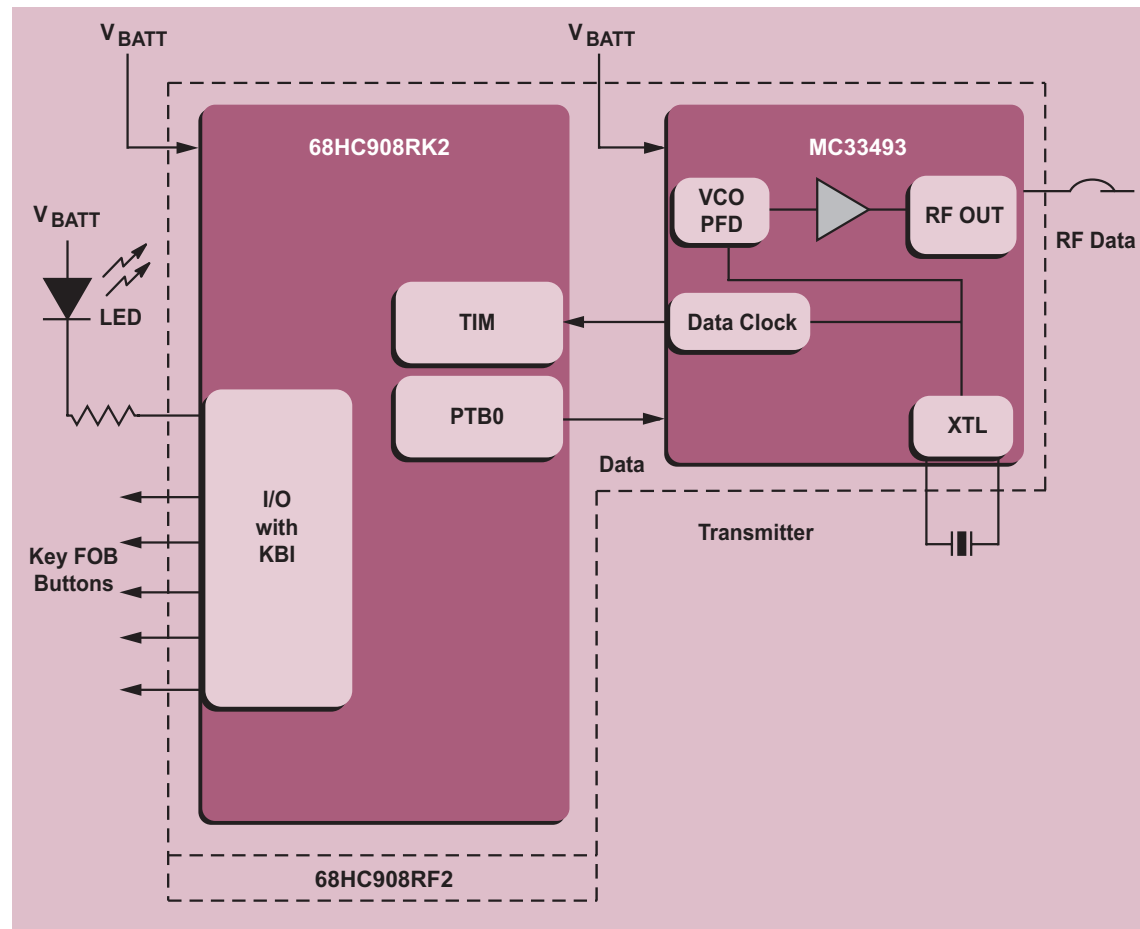
Tire Pressure Monitoring System (TPMS) Enabling Chip Set



For additional application information, refer to SG2011/D, *Tire Pressure Monitoring System*.

Product Application	Suggested Product	Product Highlights
Pressure sensor	MPXY8020A	Surface micromachined CMOS technology, power control, battery voltage detection, and wake up, SSOP package
UHF Receiver	MC33591	PLL-tuned UHF OOK receiver
UHF Transmitter + MCU (Flash)	MC68HC908RF2	2K user Flash ROM, 128 RAM, timer, integrated RF transmitter
Receiver Microcontroller	MC9S12DP256	256K Flash, 12K RAM, 4K EEPROM, up to 5 CAN, 1xJ1850, 256-MHz operating speed

RKE Transmitter System Example



Product Application	Suggested Product	Product Highlights
Microcontroller	MC68HC908RK2	2K Flash, 128 bytes RAM, timer, low-power embedded Flash routine
Microcontroller	MC68HC908RF2	2K Flash, 128 bytes RAM, timer, integrated RF transmitter
RF Transmitter/Receiver	MC33493	PLL tuned UHF transmitter (ASK and FSK modulation)
RF Transmitter/Receiver	MC33591/2/3/4	PLL tuned UHF ASK and FSK receiver
Microcontroller	XC68HC08AZ32A	32K ROM, 1K RAM, 512 EEPROM, timer, A/D, SCI, SPI, CAN 2.0a/b
J1850 Serial Link Transceiver	MC33390D/MC33990	J1850 serial transceiver with enhanced ground
CAN Physical Interface	MC33386D	SPI, CAN low-speed tolerant physical interface (125 kbps)
CAN Physical Interface	MC33889/MC3389A	CAN low-speed tolerant physical interface, dual voltage regulator, watchdog, sleep mode