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MOTOROLA

Automotive Selector Guide

Quarter 3, 2001

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Product information for:

- Automotive SMARTMOS™
- Automotive Sensors
- Automotive Microcontrollers:
  - 8-Bit 68HC05, 68HC08, and 68HC11
  - 16-Bit 68HC12 and 68HC16
  - 32-Bit 683XX, PowerPC™, and M•CORE™
- LIN Technology for Automotive

Digital DNA™ from Motorola

WHAT'S NEW!

Section	Description
SMARTMOS™	Addition of MC33889, MC33989, MC33394, MC33099, MC33794, and MC33888 devices
Sensors	Addition of MPXA6115, PPXy8010, PPXY8020, and PPXY8030 devices
	Removal of PPH6700A6 device
68HC08 Family	Removal of PC68HC908EY8 device
	Upgrade of XC68HC908AS60A, XC68HC08AS32, XC68HC908AZ60A, and XC68HC08AZ60 to MC qualification status
68HC12 and 68HC16 Families	Removal of PC68HC912GA32 device
	Upgrade of PC68HC912D60A to MC qualification status
LIN	Removal of PC68HC908EY8 device
683XX/Power PC Families	Removal of MMC2103 and MMC2111 devices
System Example Diagrams	Revision of direct injection system example

E-SWITCH Higher reliability for instrumentation and body control may be achieved by automakers with the replacement of traditional electromechanical relays by an electronic solution that is flexible, cost effective, and intelligent. E-SWITCH is the ideal answer for today's automakers seeking reduced cost, weight, and size for electronic control modules. With the E-SWITCH products Motorola, Inc., is introducing a new family of intelligent power switches for automotive applications. The newest member of the E-SWITCH Family is the MC33888, a fully integrated intelligent lamp and inductive load driver, is currently available. Product samples and data sheets are available upon request. For more information, please see the SMARTMOS section.

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MOTOROLA SMARTMOS SOLUTIONS

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.

Occupant Safety SMARTMOS squib drivers, power supplies, communications interfaces, and other devices for occupant safety systems are in vehicles around the globe.

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Multiplex Transceivers — LIN, ISO9141, J1850 Physical Interfaces

Device	Description	Main Characteristics	Package	Bus Type and Standard	Protection	Supply	I Standby Max	Other Features	Control and Status Reporting	MC Status
MC33199	ISO9141 serial link driver	K&L lines (at 200kbps)	SO14	ISO9141, K and L lines	I lim, thermal	5V & 12V battery	—	Baud rate up to 200kbps	—	Now
MC33290	ISO9141 serial link interface	K line only — OBD II compatible	SO8/8P	ISO9141 K line	I lim, thermal	5V & 12V battery	50µA	Sleep mode	Parallel com	Now
MC33390	J1850 serial transceiver with enhanced ground	J1850 low-speed multiplexing bus with enhanced ground	SO8	J1850	I lim	—	—	—	—	Now
MC33399	LIN: local interconnect network physical interface	LIN: local interconnect network physical interface	SO8	LIN single wire	I lim, thermal	12V battery	50µA	Wakeup input pin, control of external voltage regulator	Parallel com	4Q01
MC33990	J1850 serial transceiver w/ enhanced ground	J1850 multiplexing bus w/ enhanced ground	SO8	J1850	I lim	—	—	—	—	4Q01

Multiplex Transceivers — CAN Physical Interface Components

Device	Description	Main Characteristics	Package	Bus Type and Standard	Protection	Supply	I Standby Max	Other Features	Control and Status Reporting	MC Status
MC33388	CAN low-speed fault tolerant physical interface	CAN low-speed fault tolerant physical interface	SO14	CAN low-speed, dual wires	Fault tolerant	5V & 12V battery	25µA	Wakeup input pin, fault tolerant physical interface	Parallel com	Now
MC33389	System based chip	Dual Vreg+LS CAN+WDG+3 wakeup inputs	HSOP20/ SO28	CAN low-speed, dual wires	Fault tolerant	12V battery	150µA	Dual voltage regulator, watchdog, wake up input, sleep mode, cyclic sense	SPI 2MHz	3Q01
MC33889	System based chip LITE with low-speed CAN	SBC dual Vreg, LS CAN, 2 wakeup inputs	SO28	CAN low-speed, dual wires	Fault tolerant	12V battery	100µA	Dual voltage regulator, watchdog, wake input, sleep and stop modes	SPI, 5MHz	1Q02
MC33989	System based chip with high-speed CAN	SBC dual Vreg, HS CAN, 4 wakeup inputs	SO28	CAN high-speed, dual wires, ISO11898	Fault tolerant	12V battery	100µA	Dual voltage regulator, watchdog, wake input, sleep and stop modes	SPI, 5MHz	4Q01

SMARTMOS

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Multiplex Transceivers — Distributed Systems Interface Components

Device	Description	Main Characteristics	Package	System Type	No. of Channels	Current Limit	Max Voltage	Communications	MC Status
MC33790	DSIP — 2-channel DSI physical interface for bus masters	Dual current-limited waveshaped outputs, current sensing inputs, 3.3V and 5V	SOW16	DIST	2	150mA	26.5	SPI	Now

Power ICS — Low-Side Switches

Device	Description	Main Characteristics	Package	No. of Channels	High/Low	Ron (mΩ)	I Lim	I Standby Max	Protection	Control	Status Reporting	MC Status
MC33291	BOSS — basic octal serial switch w/SPI	8 times 500mA, at T_A = 125°C	SOW24	8	L	1000	1–3A	25µA	S/C, I, T	SPI	SPI	Now
MC33298	OSS — octal serial switch w/SPI	8 times 1000mA, at T_A = 125°C	SOW24	8	L	650	3–6A	50µA	S/C, I, T	SPI	SPI	Now
MC33385	Quad low-side driver	4 times 2A, at Tamb = 125°C	HSOP20, SO28	4	L	500	3A	—	S/C, I, T	Parallel com	SPI	Now
MC33397	SCOWL — selectively configurable outputs for worldwide loads	User configurable to be: 6 x 900mΩ outputs OR 2 x 300mΩ outputs at T_J = 25°C (1.5W & 500mΩ at T_J = 150°C)	SOW24 QFN32 (7x7)	2 or 6	L	2X300, 6X900	1.5A	10µA	S/C, I, T	SPI	SPI	3Q01
MC33880	COSS — configurable octal serial switch w/SPI	8 output hardware configurable high-side/ low-side switch with 8-bit serial input control	SOW28 QFN32 (7x7)	8	H/L	1400	1.2A	25µA	S/C, I, T	SPI	SPI w/2 PWM	4Q01

Power ICS — High-Side Switches

MC33143	Dual high-side switch	2 times 1A, at Tamb = 125°C	SOW24	2	H	380	3–6A	300µA	S/C, I, T	Parallel com	2 status pins	Now
MC33286	Gemini — dual high-side switch	2 times 3.5A*	SOW20	2	H	2x35	30A	5µA	S/C, I, T	Parallel com	1 St/Chnl (OT / OL)	Now
MC33288	Flasher — dual high-side switch with current sense	2 times 8A*	HSOP20	2	H	2x25	30A	5µA	S/C, I, CR, T	Parallel com	1 St/Dev (OT / OL)	Now
MC33289	DHSS — dual high-side switch for inductive loads	2 times 3A*	SOW20	2	H	2x40	9A	5µA	S/C, I, T	Parallel com	1 St/Chnl (OT / OL)	Now
MC33486	DHSB — dual high-side for H-bridge	2 times 10A*	HSOP20	2	H	15	35A	5µA	S/C, I, CM, T	Parallel com		Now
MC33487	Flasher lite — dual 20mΩ high-side driver with current sense	2 times 4.5A*	SOW20	2	H	2x25	40A	5µA	S/C, I, CR, T	Parallel com	1 St/Chnl (OT / OL)	2Q01
MC33880	COSS — configurable octal serial switch w/SPI	8 output hardware configurable high-side/ low-side switch with 8-bit serial input control	SOW28 QFN32 (7x7)	8	H/L	1400	1.2A	25µA	S/C, I, T	SPI	SPI w/2 PWM	4Q01

Power ICS — H-Bridges and Configurable Switches

MC33186	150mΩ H-bridge	40V/150mΩ per FET	HSOP20	4	H/L	150	6A	20mA	S/C, I, T	Parallel com	1 status pin (OC, OT)	Now
MC33192	Mi-bus interface stepper motor con.		16SO	—	—	—	—	—	—	—	—	Now
MC33486	DHSB — dual high-side for H-bridge, protects and controls 2 external low-side FETs	10A*	HSOP20	2	H	2x15	35A	5µA	S/C, I, CR, T	Parallel com	1 status pin (OC, OT)	2Q01
MC33886	ETHIC — H-bridge	(225mΩ@150°C)	HSOP20 QFN44 (9x9)	4	H/L	120	6A	20mA	S/C, I, T	Parallel com	1 status pin (OC, OT)	2Q01
MC33887	FIESTA — H-bridge with sleep mode and current sense	(130mΩ@25°C)	SO28 QFN44 (9x9)	4	H/L	130	6A	25µA	S/C, I, T	Parallel com	1 status pin (OC, OT)	4Q01

S/C = short circuit
I = current limitation
CR = current recopy function
OT = over temperature protection
OL = open load protection
OC = over current protection
T = temperature sense

Power ICS — H-Bridges and Configurable Switches (Continued)

Device	Description	Main Characteristics	Package	No. of Channels	High/Low	Ron (mΩ)	I LIM.	I Standby Max	Protection	Control	Status Reporting	MC Status
MC33253	Full bridge pre-driver for body electronic application	Full bridge pre-driver, 1A pulse current, cross conduction suppression, global enable, body electronic application	SO28	4	H/L	N/A	N/A	100µA	No mosfet protection	Parallel com	No status	1Q02
MC33888	QHSOLSS — Quad high side with current sense +8 low sides (relays, LEDs...)	Various 10A to 500mA*	MO188	12	H	2x10, 2x40, 8x500	45/20	5µA	S/C, I, CR, T	SPI or parallel com	SPI	4Q01

Power ICS — Pre-Drivers (TMOS)

Device	Description	Main Characteristics	Package	Operating Voltage	Input Control	Output Drives High/Low Side Drive Current	Protection	Status Reporting	MC Status
MC33091	High-side, N-channel MOSFET driver for driving loads with high in-rush current — lamp driver	Single-channel high-side MOSFET driver with fault report pin	SO8	7V to 28V	1 CMOS logic	1H	SC overvoltage rev. battery	/Fault	Now
MC33198	High-side, N-channel MOSFET driver for driving loads with high in-rush current — lamp driver	Single-channel high-side MOSFET driver with 1kHz PWM capability and status report pin	SO8	7V to 20V	1 CMOS logic	1H 110µA typ.	SC overvoltage load dump	Status	Now
MC33253	Full bridge driver with AOP for body electronic and powertrain applications	Full bridge driver, fast PWWM capability, cross conduction protection, global enable	SO28	5.5V to 55V	4 invert. 4 non-invert. CMOS, LSTTL logic	2H, 2L 1A pulse	SC overvoltage undervoltage	Current sense output ISout	1Q02
MC33285	Dual high-side N-channel MOSFET driver	Single channel high-side MOSFET driver with fault report pin	SO8	7V to 40V	1 analog	2H 110µA typ.	SC overvoltage load dump rev. battery	N/A	Now
MC33883	Full bridge pre-driver for power train application	Full bridge driver, fast PWM capability, global enable	SO20	5.5V to 55V	4 non-invert. CMOS, LSTTL logic	2H, 2L 1A pulse	overvoltage undervoltage	N/A	3Q01

Power Supply — Switching Regulators

Device	Description	Main Characteristics	Package	Operating Input Voltage	Output Voltages	Protection	MC Status
MC33394	Multi output power supply for engine control unit supports Spanish Oak/Black Oak Family of MCUs with precise power sequencing, 12V system	Step-down/step up switching preregulator, 7 voltage regulators (5V, 3.3V, 2.6V adj.), 2.6V standby regulator, switched battery output, power sequencing, resets, SPI, high-speed CAN transceiver with wake-up function	HSOP44 QFN44	3.5V to 18V (50V transient)	5V @ 400mA 3x5V @ 100mA 5V/3.3V @ 150mA 3.3V @ 120mA 2.6V-adjustable @ 400mA 2.6V-adjustable @ 60mA standby switched battery	SC to GND, SC to battery, I-lim.,therm.	4Q01

Power Supply — Linear Regulators

Device	Description	Main Characteristics	Package	Bus Type and Standard	Protection	Supply	I Standby Max	Other Features	MC Status
MC33389	System base chip	Dual Vreg+LS CAN+Wdg+3 wakeup inputs	HS0P20 SO28	Low speed, dual	Fault tolerant	12V battery	150µA	Dual voltage regulator, watchdog, wakeup input, sleep	3Q01
MC33889	System based chip LITE with low-speed CAN	SBC dual Vreg, LS CAN, 2 wakeup inputs	SO28	CAN low speed, dual wires	Fault tolerant	12V battery	100µA	Dual voltage regulator, watchdog, wakeup input, sleep and stop modes, cyclic sense	4Q01
MC33989	System based chip with high-speed CAN	SBC dual Vreg, HS CAN, 4 wakeup inputs	SO28	CAN high speed, dual wires, ISO11898	I lim, thermal	12V battery	100µA	Dual voltage regulator, watchdog, wakeup input, sleep and stop modes, cyclic sense	1Q02

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Peripheral and Special Function — Alternator Voltage Regulators

Device	Description	Package	Main Characteristics	Operating Voltage	MC Status
MC33092A	Alternator voltage regulator with load response control — 9SI — GM type	SOW20	LRC response during initial start. Programmable LRC rates from 2.5 to 10 sec. Fault detection of undervoltage/overvoltage, phase loss and high remote sense resistance.	4.5V to 24V	Now
MC33099	Alternator voltage regulator with load response control — GM type	SOW16	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.	4.5V to 24V	1Q02

Peripheral and Special Function — Contact Monitor and Accessory Control

Device	Description	Package	Main Characteristics	Operating Voltage	MC Status
MC33187	Long duration timer	8SO	Target application: Rear defog long duration timer; 400mA output current capability; Integrated input debounce circuitry	5 to 18V	Now
MC33193	Direction indicator	8SO	Drive external relay, lamp failure detection, replacement of UAA1041	8 to 18V	Now
MC33197A	Wiper timer designed for harsh automotive applications. Performs the intermittent, afterwash, and continuous wiper timer functions.	8SO	Designed to drive a wiper motor relay; Adjustable time interval of less than 500ms to more than 30s; Intermittent control pin can be switched from GND to Vbat; Integrated relay driver with free wheeling protection diode	8 to 16V	Now
MC33287	Contact monitoring + dual low-side switch	SO20	Contact monitor + dual 500mA low side	2	Now
MC33884	Multiple contact monitoring	SO24	12 inputs contact monitoring (6 GND, 2 Vbat, 4 configurable), pulse wetting current Master, slave, and low-power mode INT capability	12	2Q01

Safety and Sensors — Distributed Interface Component

Device	Description	Main Characteristics	Package	System Type	No. of Channels	Current Limit	Max Voltage	Communications	MC Status
MC33790	DSIP — 2-channel DSI physical interface for bus masters	Dual current-limited waveshaped outputs, current sensing inputs, 3.3V and 5V	SOW16	DIST	2	150mA	26.5	SPI	Now
MC33794	ODS — occupant detect E-Field sensor for MCU support	125kHz generator, shield driver, 9 electrodes + 2 V_{ref} outputs, detector, 5V regulator, MCU support	HSOP44 QFN44 (9x9)	Conventional distributed	11	75mA	40	ISO9141	Now
MC68HC55	2-channel SPI to DSI protocol converter for bus masters	Turns any MCU into a DSI master	SO16	—	—	—	—	SPI	Now

Transmitters/Receivers

Device	Description	Package	Status	Switches	Interface	VBDSS/ RDS ON(2)/ LOAD	H Bridge	Driver	Bus Physical Interface	Timer	Comments	Documentation
MC33492	PLL tuned UHF transmitter (AM/FM)	14TSSOP	XC	—	—	—	—	—	—	—		Contact sales
MC33591	PLL tuned UHF receiver (AM/FM)	24LQFP	XC	—	—	—	—	—	—	—		Contact sales
MC33690	Standalone TAG reader (with integrated voltage regulator and ISO9141)	SO20WB	MC	—	—	—	—	—	—	—		Contact sales

MOTOROLA AUTOMOTIVE SENSORS

Sensor Products Division Our focus for 2001 is on new products that will continue to meet customers' needs. The first of these new automotive sensors is our 5g and 8g Inertial Sensor devices that were released in Q1. The introduction of our new media resistant automotive pressure sensors, MPXAZ4100A and MPXAZ4115A, took place in Q2. In Q3, we are proud to announce the release of our three TPMS sensors. The devices offer the flexibility of three different maximum pressure ranges to suit your needs. We have product engineers available to help with your design.

Accelerometers We use surface micromachining technology for a capacitive "sensing" structure. A g-cell is coupled with a control chip for signal application, signal conditioning low-pass filter, and temperature compensation. Options for sensing directions, g-ranges, and packaging allow for design versatility and systems flexibility.

Pressure Sensors Our pressure sensors are silicon micromachined devices with integrated on-chip circuitry. These devices are ideal for microprocessor interface and are designed to perform in the automotive environment. The smaller packaging options and integrated circuit design offer alternatives to a full module solution.

Tire Pressure Monitor System (TPMS) Sensors We have comprised a Tire Pressure Monitoring System chip set which communicates using the car's Remote Keyless Entry (RKE) system. This chip set is made up of the MC68HC908RF2, which is a MCU+RF Transmitter housed in a single package, the MC33591, which is the RF Receiver, and one of the pressure sensors listed in the Tire Pressure Monitor System Sensors table. The device is a CMOS-based surface micromachined pressure sensor. By using a CMOS-based technology, we are able to add such features as power control, battery voltage detection, and wakeup. The TPM sensor is housed in our newly-designed super-small outline package (SSOP).

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.

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Inertial Sensors(1)

Sensing Direction	Number of Axes of Sensitivity	G-Range	AC Sensitivity	Equivalent Self-Test Output	Temperature Range	Roll-Off Frequency	Package	Status Pin	Samples
X	1	40g	50mV/g	12g	–40°C to +125°C	400Hz	SO-16	Yes	Available
X	1	100g	20mV/g	12g	–40°C to +125°C	400Hz	SO-16	Yes	Available
XY	2	50g	40mV/g	12g	–40°C to +125°C	400Hz	SO-20	Yes	Available
Z	1	50g	40mV/g	30g	–40°C to +125°C	400Hz	SO-16	Yes	Available
Z	1	100g	20mV/g	75g	–40°C to +125°C	400Hz	SO-16	Yes	Available
Z	1	250g	8mV/g	75g	–40°C to +125°C	400Hz	SO-16	Yes	Available
Z	1	5g	400mV/g	3g	–40°C to +105°C	50Hz	SO-16	Yes	LTD, full production Q3 2001
Z	1	8g	250mV/g	5g	–40°C to +105°C	300Hz	SO-16	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. Other trim range specifications can be developed upon request. Please consult your Motorola sales representative.

Sensors

Pressure Sensors

Device	Maximum Pressure Rating (kPa)	Full Scale Span Voltage (Typical) (Vdc)	Sensitivity (mV/kPa)	Accuracy 0–85°C (% of V_{FSS})	Package	Samples	Documentation
MPX4100A	105	4.59	54	±1.8	6-pin unibody package; 8-pin SO surface mount	Available now	MPX4100A/D
MPXA4100A	105	4.59	54	±1.8	Surface mount, SOP	Available now	MPX4100A/D
MPXAZ4100A	105	4.59	54	±1.8	Surface mount, SOP — Media Resistant Package	Available now	MPX4100A/D
MPXA4101A	102	4.59	54	±1.8	SOP	Available now	MPX4101A/D
MPX4101A	102	4.59	54	±1.8	6-pin unibody package; 8-pin SO surface mount	Available now	MPX4101A/D
MPX4115A	115	4.59	45.9	±1.5	6-pin unibody package; 8-pin SO surface mount	Available now	MPX4115A/D
MPXA4115	115	4.59	45.9	±1.5	Surface mount, SOP	Available now	MPX4115A/D
MPXAZ4115	115	4.59	45.9	±1.5	Surface mount, SOP — Media Resistant Package	Available now	MPX4115A/D
MPXV4115V	115	4.4	38.26	±1.5	Surface mount, SOP or DIP	Available now	MPXV4115V/D
MPX4200A	200	4.5	25.5	±1.5	6-pin unibody package	Available now	MPX4200/D
MPX4250A	250	4.7	20	±1.5	SOP	Available now	MPX4250A/D
MPXV5004	4	3.9	1000	±2.5	Surface mount, SOP or DIP	Available now	MPXV5004G/D
MPX5010	10	4.5	450	±5.0	6-pin unibody package	Available now	MPX5010/D
MPXV5010	10	4.5	450	±5.0	8-pin, SOP, DIP, or surface mount	Available now	MPX5010/D
MPX5100	100	4.5	4.5	±2.5	6-pin unibody package	Available now	MPX5100/D
MPX5700	700	4.5	6.4	±2.5	6-pin unibody package	Available now	MPX5700/D
MPX5999	1000	4.5	4.5	±2.5	6-pin unibody package	Available now	MPX5999D/D
MPXA6115	115	4.59	45.9	±1.5	SOP	Available now	MPX6115A/D

Tire Pressure Monitor System (TPMS) Sensors(1), (2), (3)

Device	Maximum Pressure Rating (kPa)	Full Scale Span Voltage (Typical) (Vdc)	Sensitivity (kPa/bit)	Accuracy (–20 to 70°C)	Package	Supply Voltage (V)	Operating Modes			Samples
							Mode	Response Time (µs)	Current (µA)	
PPXY8010	450	Digital	2.5	±7.5kPa	Super small outline package (SSOP)	2.1 – 3.3	Standby/reset Measure temp Measure pressure Output read	— 70 100 50	0.8 500 1400 300	Evaluation samples now/ full production Dec. 2001
PPXY8020	637.5		2.5	±7.5kPa		2.7 – 3.6				
PPXY8030	1275		2.5	±15kPa		2.7 – 3.6				

1. Wakeup set at 3 second intervals.
2. Temperature sensor sensitivity is 1.01°C/bit. Absolute error of the temperature sensor at T = 25°C is 2°C.
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.

THE MOTOROLA 68HC08 8-BIT MICROCONTROLLER FAMILY

68HC08 Motorola's 68HC08 Family represents one of the leading device 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 devices) 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 devices from 0.65µ technology (80% UDR) to 0.5µ technology (85% and below UDR). A number of new devices were introduced in 2000 at 0.5µ and more will follow in 2001.

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

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68HC08 Family (Sheet 1 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Pkg Option	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	FLASH or OTP	Avail.	Comments	Documentation
MC68HC08AB16A	512	1K	—	512	4-CH + 4-CH 16-Bit	51	SCI SPI	—	8-CH 8-Bit	See Timer	Y	64 QFP(FU)	5.0	8.0 Max	C, V, M	908AB32	Production	Recommended for new design-ins.	MC68HC08AB16A/D
MC68HC908AB32	—	1K	32K	512	4-CH + 4-CH 16-Bit I/C, O/C, or PWM	51	SCI SPI	—	8-CH 8-Bit	See Timer	Y	64 QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	Order part number SC510727.	MC68HC908AB32A/D
MC68HC908AS60A	—	2K	60K FLASH	1K	6-CH 16-Bit I/C, O/C, or PWM	40/50	SCI SPI	J1850 (VPW)	15-CH 8-Bit	See Timer	Y	52 PLCC(FN) 64 QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	Recommended for new design-ins.	MC68HC908AZ60A/D
MC68HC08AS32	32K	1024	—	512	6-CH + 2-CH 16-Bit I/C, O/C, or PWM	40/46	SCI SPI	J1850	8-CH 8-Bit	See Timer	Y	52 PLCC(FN) 64 QFP(FN)	5.0	8.0 Max	C, V, M	908AS60A	Production	Recommended for new design-ins.	MC68HC08AS32/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 QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	Recommended for new design-ins.	MC68HC908AZ60A/D

68HC08 Family (Sheet 2 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Pkg Option	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	FLASH or OTP	Avail.	Comments	Documentation
PC68HC08AZ32A	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 QFP(FU)	5.0	8.0 Max	C, V, M	908AZ60A	Samples	Recommended for new design-ins.	MC68HC08AZ32A/D
MC68HC08AZ60	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 QFP(FU)	5.0	8.0 Max	C, V, M	908AZ60A	Production		MC68HC08AZ60/D
MC68HC08JL3	4K	128	—	—	2-CH 16-Bit I/C, O/C, or PWM	23	—	—	8-CH 8-Bit	See Timer	Y	28 DIP(P) 28 SOIC(DW)	3.0, 5.0	8.0 Max	C, M	908JL3	Samples	Auto qual 3Q01. RC oscillator option, LVR with selectable trip points, 6-pin LED drive. PPAP not available.	MC68HC08JL3/H
MC68HC908JL3	—	128	4K FLASH	—	2-CH 16-Bit I/C, O/C, or PWM	23	—	—	12-CH 8-Bit	See Timer	Y	28 DIP(P) 28 SOIC(DW)	3.0, 5.0	8.0 Max	C. M	—	Samples	Auto qual TBD. RC oscillator option, LVR with selectable trip points, 6-pin LED drive. PPAP not available.	MC68HC908JL3/H
MC68HC908RK2	—	128	2K FLASH	—	2-CH, 16-Bit	14	—	—	—	See Timer	Y	20 SOIC(DW) 20 SSOP(SD)	1.8 to 3.6	4.0 Max	C	—	Production	Low-power embedded FLASH routine	MC68HC908RK2/D
XC68HC908RF2	—	128	2K FLASH	—	1-CH, 16-Bit	12	—	—	—	See Timer	Y	32 LQFP(FA)	1.8 to 3.6	4.0 Max	C	—	Production	RF transmitter integrated	MC68HC908RF2/D

68HC08 Reference Manuals

CPU08RM/AD	HC08 CPU Reference Manual
TIM08RM/AD	HC08 Timer Reference Manual

68HC08 Emulators, Cables, and Adapters

Device	Platform	Emulation Modules	Packages Supported	Flex Cable	Target Head Adapter	Surface Mount Adapter
68HC08AS20/32/60 68HC908AS32/48/60 68HC908AS60A	M68MMPFB0508 or M68MMDS0508	M68EM08AS60	52 PLCC-FN	M68CBL05C	X68TC08AX48FN52	
			64 QFP-FU	M68CBL05C	X68TC08AX48FU64	M68TQS064SAG1(2) M68TQP064SA1(2)
68HC08AZ32/60 68HC908AZ60 68HC908AZ60A 68HC908AZ32A	M68MMPFB0508 or M68MMDS0508	M68EM08AZ60	52 PLCC-FN	M68CBL05C	X68TC08AX48FN52	
			64 QFP-FU	M68CBL05C	X68TC08AX48FU64	M68TQS064SAG1(2) M68TQP064SA1(2)

1. Each QFP target head adapter includes one TQSOCKET with guides (M68TQSxxxSyG1) and one TQPACK disposable surface mount adapter (M68TQPxxxSy1 – 1.2-mm lead length or M68TQPxxxSyMO1 – 1.6-mm lead length). Order additional TQPACKs and TQSOCKETs (optional) using part numbers referenced in the Surface Mount Adapters column to support multiple target systems.

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

68HC12 Motorola's 68HC12 and 68HC16 Families of microcontrollers represent two of the leading device families currently 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.

Next Generation HC12 Continuing Motorola's legacy of best in class automotive MCUs, Motorola announces a full family of 0.25µ, 16-bit devices based on the powerful MC9S12 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. Full details of the 128/64/32K derivatives will be included in later editions of the selector guide.

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

For additional information, please visit:

Motorola's Documentation, Tool, and Product Libraries
motorola.com/semiconductors
(Then click on documentation, tools, or products)

Automotive Home Page
motorola.com/semiconductors/automotive/

68HC12 Family (Sheet 1 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	Pkg Options	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	FLASH or OTP	Avail.	Comments	Documentation
PC9S12DP256	—	12K	256K FLASH	4K	8-CH, 16-Bit	Up to 45	2 SCI 3 SPI	Up to 5 CAN and 1 x J1850	2 x 8-CH 10-Bit	8-CH 8-Bit or 4-CH 16-Bit	112 LQFP 80 QFP	5.0	25.0	C, V, M(1)	—	Samples	First device as part of full family roll-out. Recommended for new design-ins.	MC9S12DP256/D CPU12RM/AD
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 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 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 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 enchanced 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 QFP	5.0	8.0	C, V, M(1)	HC912B32	Production	J1850 muxed bus	MC68HC912B32TS/D CPU12RM/AD

68HC12/68HC16 Families

68HC12 Family (Sheet 2 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	Pkg Options	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	FLASH or OTP	Avail.	Comments	Documentation
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 QFP(2) 112 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 QFP(2) 112 LQFP	5.0	8.0	C, V, M(1)	HC912D60A	Production		MC68HC912D60/D CPU12RM/AD
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^2C	2 x 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	112 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^2C	2 x 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	112 LQFP	5.0	8.0	C, V, M(1)	—	Production	0.5µ technology. 5V FLASH. Ideal for gateway applications	MC68HC912DT128A/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
2. 1 x 8-CH 10-bit ATD in 80 QFP option

68HC16 Family

Device	ROM (Bytes)	RAM (Bytes)	FLASH (Kbytes)	Device Integration	Timers	Serial Communication	Analog	Package Options	Operating Voltage (V)	Operating Frequency (MHz)	Temperature	FLASH or OTP	Avail.	Documentation
XC68HC916Y1	0	2K+2K	48+2	SCIM	GPT+TPU	MCCI	ADC	160 QFP	5.0	16.0	C	—	Production	MC68HC16Y1UM/AD
MC68HC16Y1	48K	2K	0	SCIM	GPT+TPU	MCCI	ADC	160 QFP	5.0	16.0	C, V, M	HC916Y1	Production	MC68HC16Y1UM/AD
MC68HC916Y3	0	4K	96+4	SCIM2	GPT+TPU2	QSM MCCI	ADC	160 QFP	5.0	16.0	C	—	Production	MC68HC16Y3PP/D (MC68HC16Y3/916Y3UM/AD on web only)
MC68HC16Y3	96K	4K	0	SCIM2	GPT+TPU2	QSM MCCI	ADC	160 QFP	5.0	16.0	C, V, M	HC916Y3	Production	MC68HC16Y3PP/D (MC68HC16Y3/916Y3UM/AD on web only)
MC68HC916Y5	0	4K	160	SLIM+ACS	TPU2+CTM3	RSPI MCCI	QADC	160 QFP	5.0	20.0	C, V	—	Samples	Contact sales
MC68HC16Y5	160K	4K	0	SLIM+ACS	TPU2+CTM3	RSPI MCCI	QADC	160 QFP	5.0	20.0	C, V	HC916Y5	Samples	Contact sales
MC68HC16Z3	8K	4K	0	SIM	GPT	QSM	ADC	132 PQFP 144 LQFP	5.0	16.0, 20.0, 25.0	C, V, M	—	Production	MC68HC16ZUM/AD

68HC16 Reference Manuals

CPU16RM/AD	68HC16 CPU 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 Reference Manual
MCCIRM/AD	Multi-Channel Communication Interface Reference Manual
SCIMRM/AD	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 68HC05, 68HC08, 68HC11, 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 0.5µ 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. Further details about this family will be included in later editions of the selector guide; contact sales for more information.

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		Now	Now	Now
LIN slave	Now	Now	Now	Now
Operating system		Now	Now	Now

LIN Physical Interface

Device	Supply	Wakeup	Sleep Mode	Slew Rate	I Standby Max
MC33399D	7V to 27V	Several Modes	Yes	1 to 2V/µs	50µA

Local Interconnect Network

Local Interconnect Network

Mechatronics LIN Slave MCU

Device	ROM (Bytes)	RAM (Bytes)	FLASH (Bytes)	EEPROM (Bytes)	Timer	Pkg Option	Comments	Documentation
MC33393TM	—	64	—	1K	16-Bit	SO8	Timer, oscillator, 2 x 175 mA H-bridge, mechatronics	Contact sales for product reviews

LIN Slave MCUs

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	A/D	PWM	COP	Pkg Option	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	FLASH or OTP	Avail.	Comments	Documentation
MC68HC805PV8	—	192	8K EEPROM	128	16-Bit 2 I/C, 2 O/C	20	—	6-CH 8-Bit	1-CH	Y	28 SOIC(DW)	3.3, 5.0	2.1	C, V, M	805PV8	Production	4.2 MHz high speed available; on-chip 40mVreg	MC68HC05PV8/D
MC68HC05PV8A	8K	192	—	128	6-Bit 2 I/C, 2 O/C	20	—	6-CH 8-Bit	1-CH	Y	28 SOIC(DW)	3.3, 5.0	2.1	C, V, M	805PV8	Production		MC68HC05PV8/D
MC68HC08AB16A	16K	512	—	—	4-CH + 2-CH, 16-Bit I/C, O/C, or PWM	51	SCI SPI	8-CH 8-Bit	See Timer	Y	28 QFP	5.0	8.0 Max	C, V, M	—	Production	Recommended for new design-ins.	MC68HC08AB16A/D
MC68HC908AB32	—	1K	32K	512	4-CH + 4-CH, 16-Bit I/C, O/C, or PWM	51	SPI, SCI	8-CH 8-Bit	See Timer	Y	64 QFP (FU)	5.0	8.0 Max	C, V, M	—	Production	Order # SC510727	MC68HC908AB32A/D
MC68HC908JL3	—	128	4K FLASH	—	2-CH, 16-Bit I/C, O/C, or PWM	23	—	12-CH 8-Bit	See Timer	Y	28 DIP(P) 28 SOIC(DW)	3.0, 5.0	8.0 Max	C, M	—	Samples (TBD)	Automotive qual TBD RC oscillator option, LVR w/ selectable trip points, 6-pin LED drive	MC68HC908JL3/H
MC68HC08JL3	4K	128	—	—	2-CH, 16-Bit I/C, O/C, or PWM	23	—	8-CH 8-Bit	See Timer	Y	28 DIP(P) 27 SOIC(DW)	3.0, 5.0	8.0 Max	C, M	908JL3	Samples	Automotive qual TBD RC oscillator option, LVR with selectable trip points, 8-pin LED drive, PPAP not available	MC68HC08JL3/H

LIN Master MCUs

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	A/D	Mux	PWM	COP	Pkg Option	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	OTP	Avail.	Comments	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 QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	Recommended for new design-ins	MC68HC908AZ60A/D
PC68HC08AZ32A	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 QFP(FU)	5.0	8.0 Max	C, V, M	908AZ60A	Samples	Recommended for new design-ins CAN 2.0a and 2.0b	MC68HC08AZ32A/D
PC9S12DP256	—	12K	256K FLASH	4 K	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 LQFP 80 QFP	5.0	25.0	C, V, M[1]	—	Samples	First device as part of full family roll-out; recommended for new design-ins	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 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 QFP(FU)	5.0	8.0 Max	C, V, M	—	Production	BDM, enhanced timer	MC68HC912B32/D
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 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	1 K	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 QFP	5.0	8.0	C, V, M[1]	—	Samples Q2 01	0.5µ technology, 5V FLASH, MC plan Q2 01	MC68HC912D60/D
MC68HC912DG128A	—	8K	128K FLASH	2 K	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 LQFP	5.0	8.0	C, V, M[1]	—	Production	0.5µ technology, 5V FLASH, ideal for gateway applications. Replacement for XC68HCDG128.	MC68HC912DT128A/D
MC68HC912DT128A	—	8K	128K FLASH	2 K	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 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		80 QFP 112 LQFP	5.0	8.0	C, V, M[1]	912DG60A	Production		MC68HC912D60/D

1. M temperature range limited to single-chip mode

Local Interconnect Network

THE MOTOROLA 68HC05 AND 68HC11 8-BIT MICROCONTROLLER FAMILIES

68HC05 and 68HC11 Motorola's 68HC05 and 68HC11 Families represents two of the leading device families currently used in automotive applications.

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.

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.

For additional information, please visit:

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Automotive Home Page
motorola.com/semiconductors/automotive/

68HC05 Family (Sheet 1 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Pkg Option	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	FLASH or OTP	Avail.	Comments	Documentation
MC68HC705B16	—	352	14.8K	256	16-Bit 2 I/C, 2 O/C	32	SCI See comment	—	8-CH 8-Bit	2-CH 8-Bit	Y	52 PLCC(FN) 64 QFP(FU)	3.3, 5.0	2.1	C, V, M	—	Production	705B32 has OTP for SDIP, SCI has synchronous master SPI like capability	MC68HC05B6/D
MC68HC05B6	5.8K	176	—	256	16-Bit 2 I/C, 2 O/C	32	SCI See comment	—	8-CH 8-Bit	2-CH 8-Bit	Y	56 SDIP(B) 52 PLCC(FN) 64 QFP(FU)	3.3, 5.0	4.0	C, V, M	705B16 705B32	Production	SCI has synchro-nous master SPI like capability	MC68HC05B6/D
MC68HC05B8	7K	176	—	256	16-Bit 2 I/C, 2 O/C	32	SCI See comment	—	8-CH 8-Bit	2-CH 8-Bit	Y	56 SDIP(B) 52 PLCC(FN) 64 QFP(FU)	3.3, 5.0	4.0	C, V	705B16 705B32	Production	SCI has synchro-nous master SPI like capability	MC68HC05B6/D
MC68HC05B16	14.75K	352	—	256	16-Bit 2 I/C, 2 O/C	32	SCI See comment	—	8-CH 8-Bit	2-CH 8-Bit	Y	56 SDIP(B) 52 PLCC(FN) 64 QFP(FU)	3.3, 5.0	4.0	C, V, M	705B16 See comment	Production	SCI has synchro-nous master SPI like capability See also MC68HC08AB16A	MC68HC05B6/D
MC68HC05B32	32K	528	—	256	16-Bit 2 I/C, 2 O/C	32	SCI See comment	—	8-CH 8-Bit	2-CH 8-Bit	Y	56 SDIP(B) 52 PLCC(FN) 64 QFP(FU)	3.3, 5.0	2.1	See comments	705B32	Production	SCI has synchro-nous master SPI like capability 0–70°C temp. only for SDIP; –40 to +85°C for PLCC/QFP	MC68HC05B6/D
MC68HC05C8A	8K	176	—	—	16-Bit 1 I/C, 1 O/C	31	SCI SPI	—	—	—	Y	40 DIP(P) 42 SDIP(B) 44 PLCC(FN) 44 QFP(FB)	3.3, 5.0	4.0	C, V	705C8A	Production	High-speed select on RVU header, low-voltage 2.4V to 3.6V @ 1MHz, bus available	HC05C8AGRS/D

68HC05 Family (Sheet 2 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	MUX	A/D	PWM	COP	Pkg Option	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	FLASH or OTP	Avail.	Comments	Documentation
MC68HC705C9A	—	352	16K	—	16-Bit 1 I/C, 1 O/C	31	—	—	—	—	Y	40 DIP(P) 42 SDIP(B) 44 PLCC(FN) 44 QFP(FB)	3.3, 5.0	2.1	C	—	Production	`A' features	HC705C9AGRS/D
MC68HC705P6A	—	176	4.5K	—	16-Bit 1 I/C, 1 O/C	21	SIOP	—	4-CH 8-Bit	—	Y	28 DIP(P) 28 SOIC(DW)	3.3, 5.0	2.1	C	—	Production	Umbrella OTP for P1A, P4A, P9A See also FLASH MC68HC908JL3	HC705P6AGRS/D
MC68HC05P6	4.5K	176	—	—	16-Bit 1 I/C, 1 O/C	21	SIOP	—	4-CH 8-Bit	—	Y	28 DIP(P) 28 SOIC(DW) 28 SSOP (SD)	3.3, 5.0	2.1	C, V, M	705P6A	Production	See also FLASH MC68HC908JL3	MC68HC05P6/D MC68HC05P6AD/D
XC68HC805P18B	—	192	—	8K +128	16-Bit 1 I/C, 1 O/C	20	SIOP	—	4-CH 8-Bit	—	Y	28 DIP(P) 28 SOIC(DW)	—	—	C	—	Production		HC805P18GRS/D
MC68HC805PV8	—	192	8K EEPROM	128	16-Bit 2 I/C, 2 O/C	20	—	—	6-CH 8-Bit	1-CH	Y	28 SOIC(DW)	3.3, 5.0	2.1	C, V, M	805PV8	Production	4.2MHz high speed available; on-chip 40mVreg	HC05PV8GRS/D
MC68HC05PV8A	8K	192	—	128	16-Bit 2 I/C, 2 O/C	20	—	—	6-CH 8-Bit	1-CH	Y	28 SOIC(DW)	3.3, 5.0	2.1	C, V, M	805PV8	Production		HC05PV8GRS/D
XC68HC705X4	—	176	4K	—	16-Bit 1 I/C, 1 O/C	16	—	CAN	—	—	Y	28 SOIC(DW)	5.0	2.1	C	—	Production	2MHz bus speed only	MC68HC05X4/D
MC68HC05X4	4K	176	—	—	16-Bit 1 I/C, 1 O/C MFI, RTI	16	—	CAN	—	—	Y	28 SOIC(DW)	5.0	2.1	C	705X4 (limited)	Production	2MHz bus speed only	MC68HC05X4/D
MC68HC705X32	—	528	32K	256	16-Bit 2 I/C, 2 O/C	32	SCI	CAN	8-CH 8-Bit	2-CH 8-Bit	Y	64 QFP(FU)	5.0	4.0	C, V, M	—	Production	4MHz bus speed available See also FLASH MC68HC908AB32	MC68HC05X16/D
MC68HC05X16	14.75K	352	—	256	16-Bit 2 I/C, 2 O/C	32	SCI	CAN	8-CH 8-Bit	2-CH 8-Bit	Y	64 QFP(FU)	—	2.1	C, V, M	705X32	Production	2MHz bus speed only See also MC68HC08AB16A	MC68HC05X16/D
MC68HC05X32	—	528	32K	256	16-Bit 2 I/C, 2 O/C	32	SCI	CAN	8-CH 8-Bit	2-CH 8-Bit	Y	64 QFP(FU)	5.0	2.1	C, V, M	—	Production	4MHz bus speed available See also FLASH MC68HC908AB32	MC68HC05X16/D

68HC05 Reference Manuals

M68HC05AG/AD	Applications Guide
M68HC05TB/D	Understanding Small Microcontrollers Text Book

THE MOTOROLA 68HC11 8-BIT MICROCONTROLLER FAMILY

68HC11 Family (Sheet 1 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	A/D	PWM	Pkg Options	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	FLASH or OTP	Avail.	Comments	Documentation
MC68HC11D0	—	192	—	—	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator, watchdog	32	SPI SCI	—	—	40 PDIP 44 QFP 44 PLCC	3.0, 5.0	3.0 Max	C, V, M	—	Production	64K external address bus, low-voltage version available	MC68HC11D3/D
MC68HC711D3	—	192	4K	—	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator, watchdog	32	SPI SCI	—	—	40 PDIP 44 PLCC 44 QFP 44 CLCC	5.0	3.0 Max	C, V, M	—	Production	64K external address bus, 3MHz, C temperature. See also FLASH MC68HC908JL3	MC68HC711D3/D
MC68HC11D3	4K	192	—	—	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator, watchdog	32	SPI SCI	—	—	40 PDIP 44 QFP 44 PLCC	3.0, 5.0	3.0 Max	C, V, M	711D3	Production	64K external address bus See also FLASH MC68HC908JL3	MC68HC11D3/D
MC68HC711E9	—	512	12K	512	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	38	SPI SCI	8-CH 8-Bit	—	52 PLCC 52 CLCC 64 QFP	5.0	3.0 Max	C, V, M	—	Production	EEPROM block protect 4MHz available, contact factory	MC68HC11E/D
MC68HC711E20	—	768	20K	512	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	38	SPI SCI+	8-CH 8-Bit	—	52 PLCC 64 QFP 52 CLCC	5.0	4.0 Max	C, V, M	—	Production	4MHz available, contact factory See also FLASH MC68HC908AB32	MC68HC11E/D
MC68HC11E20	20K	768	—	512	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	38	SPI SCI+	8-CH 8-Bit	—	52 PLCC 64 QFP 52 CLCC	5.0	3.0 Max	C, V, M	711E20	Production	4MHz available, contact factory See also FLASH MC68HC908AB32	MC68HC11E/D
MC68HC11F1	—	1K	—	512	16-Bit, 3/4IC, 4/5OC, watchdog, RTI, pulse accumulator	30	SPI SCI	8-CH 8-Bit	—	68 PLCC 80 LQFP	3.0, 5.0	5.0 Max	C, V, M	—	Production	64K external address bus, 4 programmable chip selects, 4MHz non-mux address/data bus, low-voltage version	MC68HC11F1/D
MC68HC11FC0	—	1K	—	—	6-Bit, 3/4IC, 4/5OC, watchdog, RTI, pulse accumulator	—	SPI SCI	—	—	80 LQFP 64 QFP	3.0, 5.0	5.0 Max	C	—	Production	64K external address bus, 4 programmable chip selects, extra pair of power/ GND pins	MC68HC11FTS/D
MC68HC11K0	—	768	—	—	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	62	SPI SCI+	8-CH 8-Bit	4-CH 8-Bit or 2-CH 16-Bit	84 PLCC 80 QFP	3.0, 5.0	4.0 Max	C, V, M	—	Production	5MHz non-mux bus, extended memory map, 4 chip selects	MC68HC11K4/D
MC68HC11K1	—	768	—	640	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	62	SPI SCI+	8-CH 8-Bit	4-CH 8-Bit or 2-CH 16-Bit	84 PLCC 80 QFP	3.0, 5.0	4.0 Max	C, V, M	—	Production	5MHz non-mux bus, extended memory map, 4 chip selects	MC68HC11K4/D
MC68HC11K4	24K	768	—	640	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	62	SPI SCI+	8-CH 8-Bit	4-CH 8-Bit or 2-CH 16-Bit	84 PLCC 80 QFP	3.0, 5.0	4.0 Max	C, V, M	711K4 (limited)	Production	5MHz non-mux bus, extended memory map, 4 chip selects See also FLASH MC68HC908AB32	MC68HC11K4/D

68HC11 Family (Sheet 2 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH or OTP (Bytes)	EEPROM (Bytes)	Timer	I/O	Serial	A/D	PWM	Pkg Options	Oper. Voltage (V)	Oper. Freq. (MHz)	Temp.	FLASH or OTP	Avail.	Comments	Documentation
MC68HC711KS2	—	1K	32K	640	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	51	SPI+ SCI+	8-CH 8-Bit	4-CH 8-Bit or 2-CH 16-Bit	68 PLCC 80 LQFP	5.0	4.0 Max	C, V, M	—	Production	4MHz non-mux bus, no MMU, no chip selects, low-power mode, security option available See also FLASH MC68HC908AB32	MC68HC11K/D
MC68HC11KS2	32K	1K	—	640	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	51	SPI+ SCI+	8-CH 8-Bit	4-CH 8-Bit or 2-CH 16-Bit	68 PLCC 80 LQFP	5.0	4.0 Max	C, V, M	711KS2	Production	4MHz non-mux bus, no MMU, no chip selects, low-power mode, security option available See also FLASH MC68HC908AB32	MC68HC11K/D
MC68HC11KW1	—	768	—	640	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	80	SPI+ SCI+	10-CH 10-Bit	4-CH 8-Bit	100 LQFP	5.0	4.0 Max	C	—	Production	4MHz non-mux bus, 2 extra timers, 4 chip selects, extended memory map	MC68HC11KW1/D
MC68HC711P2	—	1K	32K	640	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	62	Triple SPI SCI	8-CH 8-Bit	4-CH 8-Bit	84 PLCC	5.0	4.0 Max	C	—	Production	64K external address bus, MI-bus interface, PLL clock circuitry See also FLASH MC68HC908AB32	MC68HC11P2/D

68HC11 Reference Manual

M68HC11RM/AD 68HC11 Reference Manual

683XX/PowerPC Families

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

Automotive At the heart of the industry's smartest automotive systems is the PowerPC 32-bit RISC core, a high-performance MCU that provides customers with added performance to tackle increasingly complex control functions. The PowerPC 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.

MPC561 Since the introduction of the MPC555 in 1998, the MPC5XX Family has rapidly gained acceptance as a leading microcontroller architecture in powertrain control and is beginning to see design-ins into applications such as dashboard and suspension control. The MPC5XX Family provides the performance and integration of powerful peripherals that systems designers require for embedded applications. The MPC561, a FLASHless microcontroller, gives designers a cost-effective choice for applications not requiring the higher performance of embedded FLASH or those that require larger memory arrays than currently available on chip. It also moves the PowerPC Family into lower cost application areas. The MPC561 complements the MPC555 and MPC565, which provide 448K bytes and 1 megabyte of on-board FLASH, respectively. Engineering samples available now. Additional PowerPC product family members are in development with product announcements expected later this year.

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.

For additional information, please visit:

Documentation, Tool, and Product Libraries
motorola.com/semiconductors
(Then click on documentation, tools, or products)

Automotive Home Page
motorola.com/semiconductors/automotive

PowerPC Family (Sheet 1 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH (Bytes)	Device Integration	Timer	Serial	MUX	A/D	PWM	Operating Voltage	Operating Frequency (MHz)	Temp.	Package Options	Comments	Documentation
MPC555/6	0	26K + 6K for TPU	448K	USIU	50-channel timer system: 2 TPU3 + MIOS1	QSMCM (2 SCI + QSPI) + 2 TOUCAN	2 x TOUCAN	2 QADC64 (10-Bit A/D with 64 result registers each)	8 x PWM	3.3Vdc for core, 5.0Vdc for FLASH	40.0	M	272 PBGA	Production available now MPC556 offers code compression support	MPC555UM/AD TPURM/AD RCPURM/AD
MPC561/2	0	32K + 8K for TPU + 2K for DECRAM	0	USIU	54-channel timer system: 2 TPU3 + MIOS14	QSMCM (2 SCI + 1 QSPI) + 3 TOUCAN	3 x TOUCAN	2 QADC64E (10-Bit A/D with 64 result registers each) 32 channels on chip	12 x PWM	2.6Vdc for core, 5.0Vdc for A/D and I/O	40.0 or 56.0	M	388 PBGA	Samples 2H 2001 MPC562 offers code compression support	MPC561UM/AD TPURM/AD RCPURM/AD
MPC563/4	0	32K + 8K for TPU + 2K for DECRAM	512K	USIU	54-channel timer system: 2 TPU3 + MIOS14	QSMCM (2 SCI + 1 QSPI) + 3 TOUCAN	3 x TOUCAN	2 QADC64E (10-Bit A/D with 64 result registers each) 32 channels on chip	12 x PWM	2.6Vdc for core, 5.0Vdc for A/D and I/O	40.0 or 56.0	M	388 PBGA	Samples 2H 2001 MPC564 offers code compression support	MPC561UM/AD TPURM/AD RCPURM/AD

PowerPC Family (Sheet 2 of 2)

Device	ROM (Bytes)	RAM (Bytes)	FLASH (Bytes)	Device Integration	Timer	Serial	MUX	A/D	PWM	Operating Voltage	Operating Frequency (MHz)	Temp.	Package Options	Comments	Documentation
MPC565/6	0	36K + 10K for TPU + 4K for DECRAM	1M	USIU	70-channel timer system: 3 TPU3 + MIOS14	QSMCMx2 (4 SCI + 2 QSPI) + 3 TOUCAN	3 x TOUCAN	2 QADC64E (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	40.0 or 56.0	M	388 PBGA	Samples 2H 2001 MPC566 offers code compression support	MPC565UM/AD TPURM/AD RCPURM/AD

Device	Processor Speed (Typ)	Drystone Performance (MIPS)	Microprogrammable Module	Translation Lookaside Buffers	FPU Floating Point Unit	Parallel (Bits)	Power Dissipation (Typ)	Miscellaneous Peripherals	Cache-L1 Instructional	Cache-L1 Data
MPC823E	81 MHz	105 + 80 MHz	CPM	8-entry	—	53	170 m @ 25 MHz	2 UARTs, 1 IC, 1 SPI, USB	16 KBytes	8 KBytes

M•CORE Devices

Device	ROM or EPROM (Bytes)	RAM (Bytes)	EEPROM (Bytes)	Timer	Serial	A/D	Operating Voltage (V)	Operating Frequency (MHz)	Temperature	Package Options	Available	MC
MMC2107	128K FLASH	8K SRAM	0	Dual 4-CH capture/compare, 3-CH PWM	SCI	10-Bit, 8-CH QADC	3.3, 5.0	33.0		100 LQFP 144 LQFP	Production	PPAP not available

683XX Family

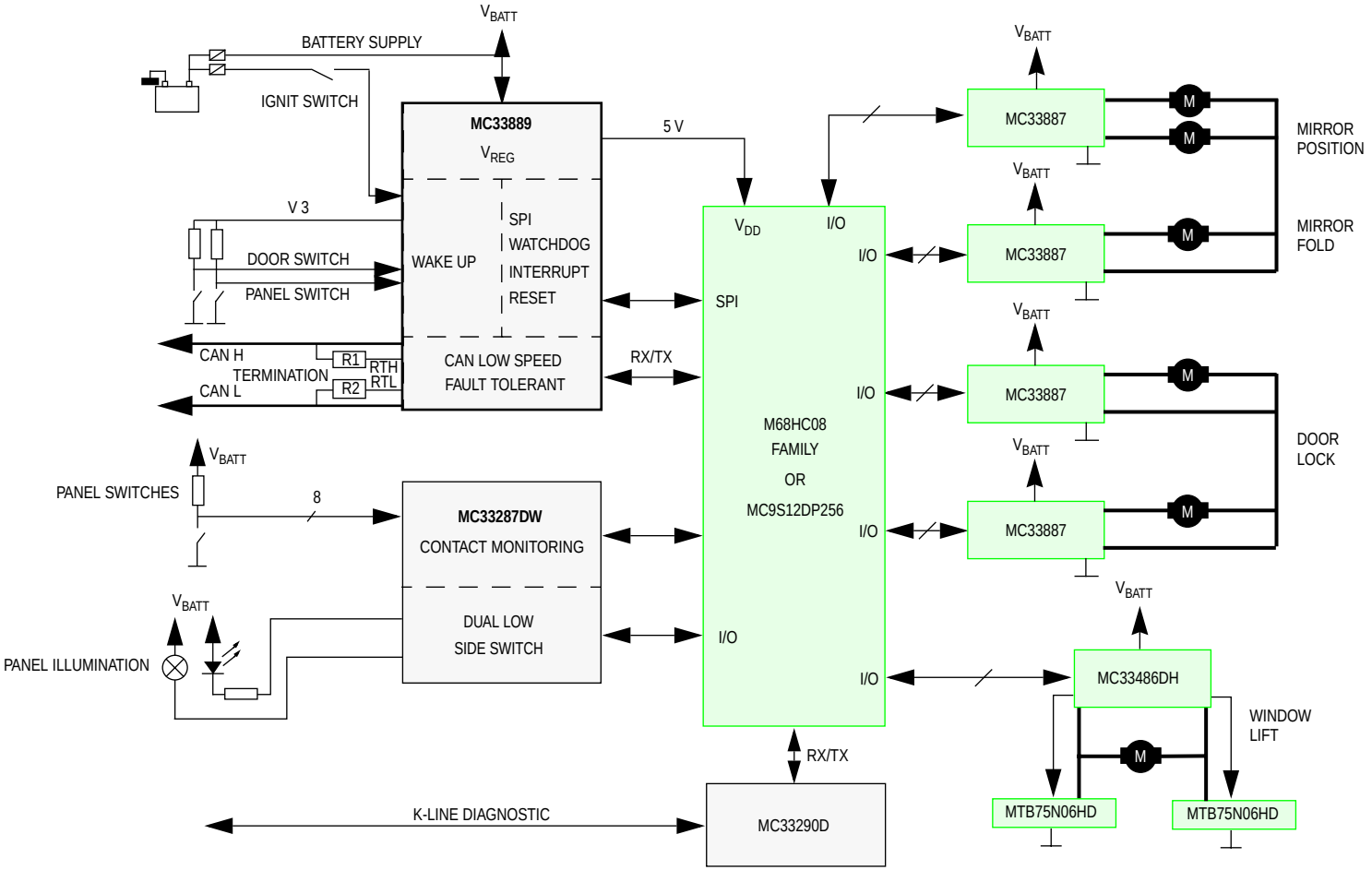
Device	ROM (Bytes)	RAM (Bytes)	FLASH (Bytes)	Device Integration	Timer	Serial	A/D	Operating Voltage (V)	Operating Frequency (MHz)	Temperature	Package Options	Avail.	Comments	Documentation
MC68332	0	2K	0	SIM	TPU	QSM	—	5.0	16.0, 20.0, 25.0	C, V, M	132 PQFP 144 LQFP	Production		MC68332UM/AD MC68LK332EC16/D SCIMRM/AD
MC68336	0	4K+3.5K	0	SIM	TPU CTM4	QSM	QADC	5.0	20.0, 25.0	C, V, M	160 QFP	Production		MC68336/376PP/D MC68336/376UM/AD SCIMRM/AD
MC68F375	8K	6K TPU 8K SRAM	256K	SCIM2	CTM9 TPU3	2 SCI TOUCAN Queued SPI	QADC64/ AMUX	3.3, 5.0	33.0	M	217 PBGA	Production		MC683F375UM/AD SCIMRM/AD
MC68376	8K	4K+3.5K	0	SIM	TPU CTM4	QSM TOUCAN	QADC	5.0	20.0, 25.0	C, V, M	160 QFP	Production		MC68336/376PP/D MC68336/376UM/AD SCIMRM/AD

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 Reference Manual
SCIMRM/D	Single-Chip Integration Module Reference Manual

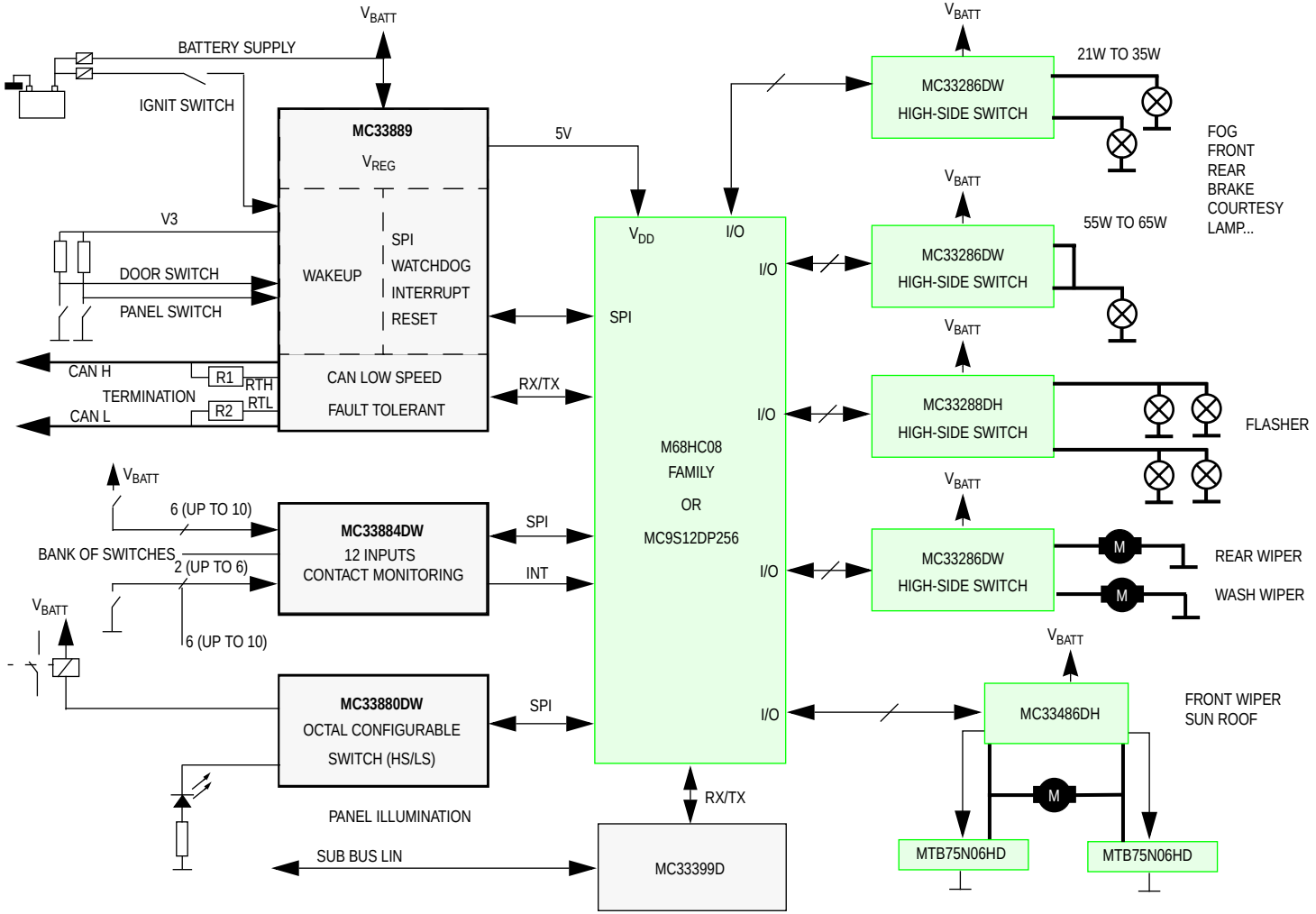
Automotive Door System

Automotive Door System Example



Device Application	Suggested Device	Device Highlights
System basis chip with CAN XSCVR, 2V regulators, reset, IRQ	MC33889	SPI, CAN low-speed tolerant physical interface (125kbps)
Contact monitoring and dual low-side protected driver	MC33287DW	Parallel interface, V_{BDSS} = 65V, R_{DSON} = 1.4Ω, I_{Load} = 0.5A
LIN physical interface	MC33399D	Supply 7V to 27V, several wakeup modes, sleep mode, slew rate 1 to 2V/µs
Microcontroller	MC9S12DP256	256K FLASH, 12K RAM, 4K EEPROM, up to 5 CAN and 1 J1850, 2 x SPI, 2 x SCI
Microcontroller	MC68HC908AZ60A	60K FLASH, 2K RAM, 1K EEPROM, CAN, 64 QFP(FU), 0.5µ device
High-side driver	MC33486DH	Motor control with diagnostics and current recopy function, H-bridge, V_{BDSS} = 40V, R_{SDON} = 15MΩ, I_{Load} = 1-A – 20A
TMOS power FET	MTB75N06HD	60V, 0.01Ω
ISO 9141 serial link interface	MC33290D	ISO 9141 K line — OBD II compatible, 5V and 12V battery, 50µA sleep mode
H-bridge	MC33887DW	120 mΩ typical R_{SDON} per output transistor at T_J = 25°C

Body Controller Switching Unit Example

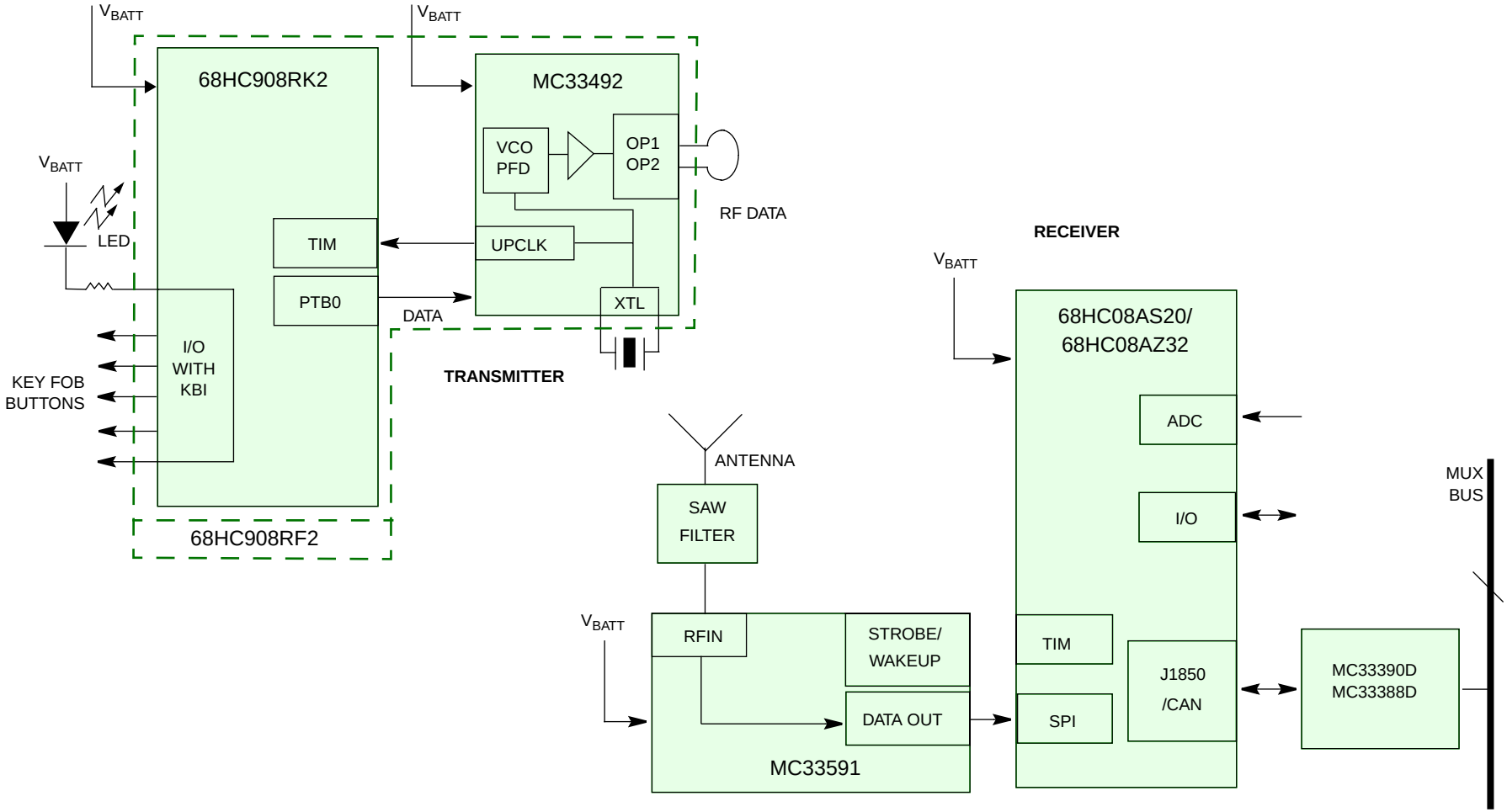


Device Application	Suggested Device	Device Highlights
System basis chip with CAN XSCVR, 2V regulators, reset, $\overline{IRQ}$	MC33889	SPI, CAN low-speed tolerant physical interface (125kbps)
Contact monitoring and dual low-side protected driver	MC33287DW	Parallel interface, V_{BDSS} = 65V, R_{DSON} = 1.4Ω, I_{Load} = 0.5A
LIN physical interface	MC33399D	Supply 7V to 27V, several wakeup modes, sleep mode, slew rate 1 to 2V/µs
Microcontroller	MC68HC908AZ60A	60K FLASH, 2K RAM, 1K EEPROM, CAN, 64 QFP(FU), 0.5µ device
Motor driver/controller	MC33186DH1R2	150MΩ H-bridge driver, V_{BDSS} = 40V, R_{DSON} = 0.15Ω
High-side driver	MC33486DH	Motor control with diagnostics and current recopy function, H-bridge, V_{BDSS} = 40V, R_{SDON} = 15MΩ, I_{Load} = 1-A – 20A
TMOS power FET	MTB75N06HD	60V, 0.01Ω
Microcontroller	MC9S12DP256	256K FLASH, 12K RAM, 4K EEPROM, timer, up to 5 CAN, 1 x J1850

Intelligent Switches Unit

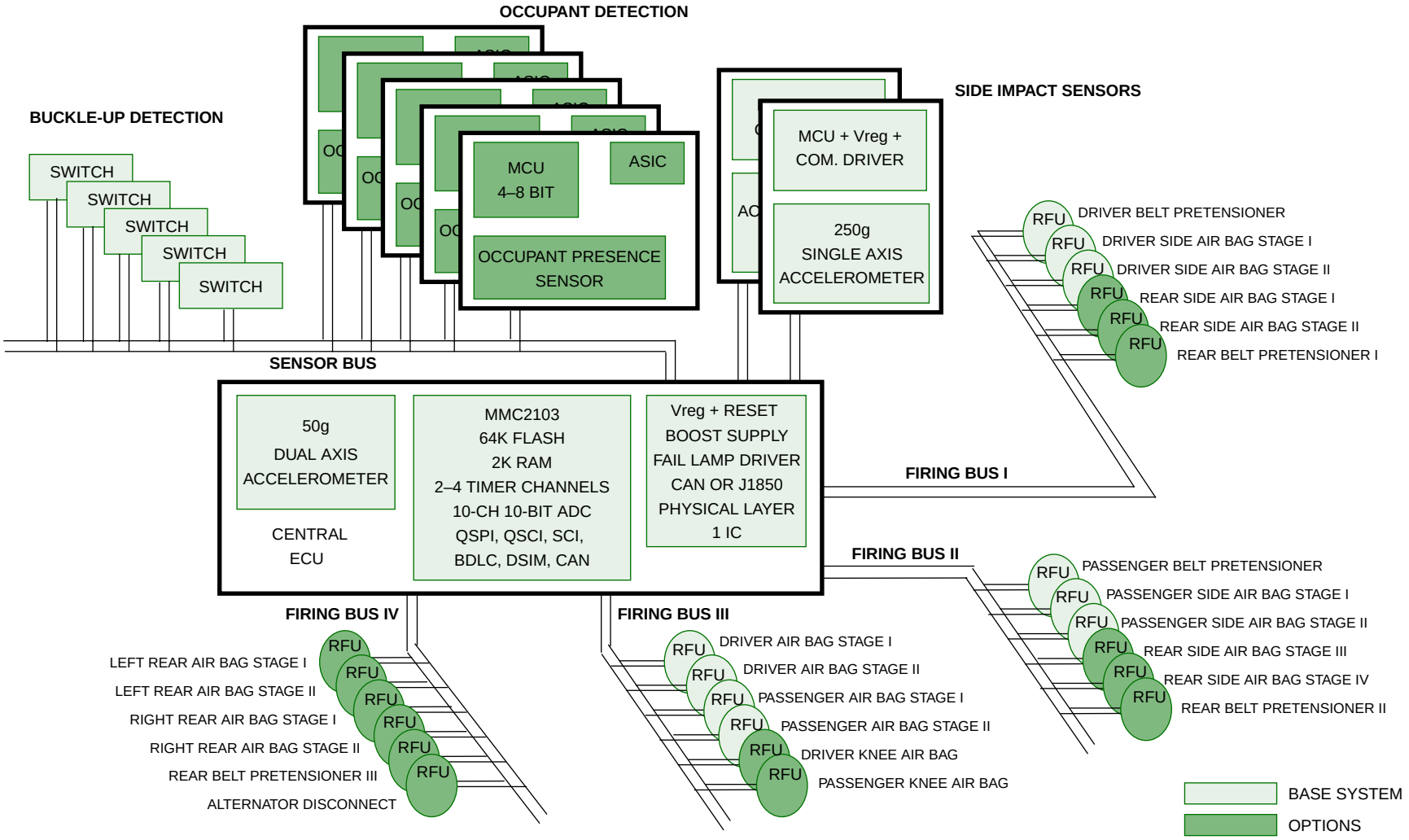
RKE Transmitter/Receiver

RKE Transmitter/Receiver System Example



Device Application	Suggested Device	Device Highlights
Microcontroller	MC68HC908RK2	2K FLASH, 128K RAM, timer, low-power embedded FLASH routine
Microcontroller	XC68HC908RF2	2K FLASH, 128K RAM, timer, integrated RF transmitter
RF transmitter/receiver	MC33492	PLL tuned UHF transmitter (ASK and FSK modulation)
RF transmitter/receiver	MC33591	PLL tuned UHF AM receiver
Microcontroller	XC68HC08AS32	20K ROM, 1K RAM, 512 EEPROM, timer, A/D, SCI, SPI, J1850
J1850 serial link transceiver	MC33390D	GM/Chrysler J1850 Class B
CAN physical interface	MC33388D	SPI, CAN low-speed tolerant physical interface (125kbps)

DSI Architecture Example

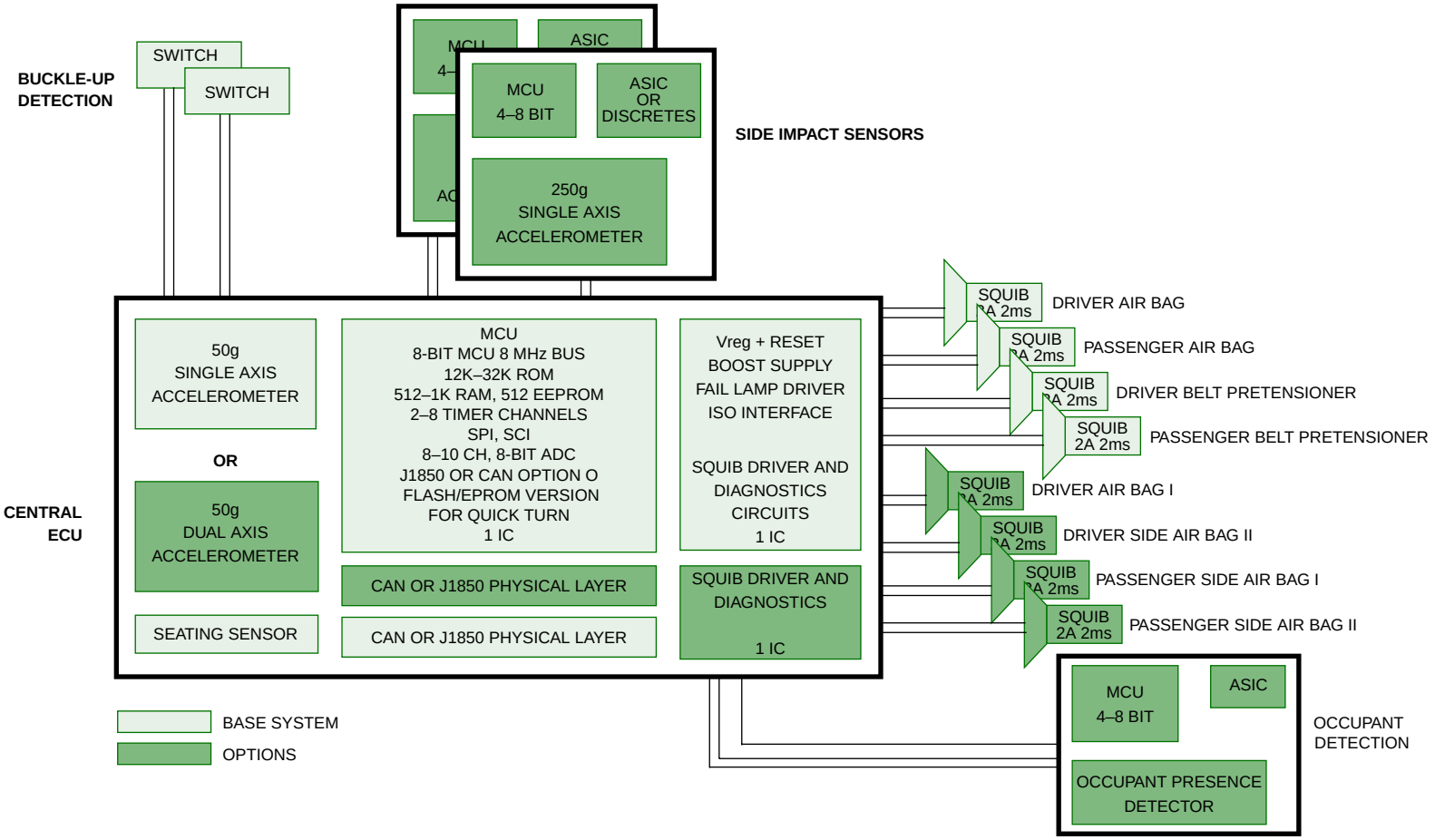


Device Application	Suggested Device	Device Highlights
DSI physical interface	MC33790	2-channel DSI physical interface for bus masters
M•CORE microcontroller	MMC2103	With on-chip 8-channel DSI bus master protocol module
DSI sensor	PC33793	Connects analog output sensors to the bus
DSI firing unit	PC33792	Connects remote squibs to the bus
Inertial sensor	50g	Dual axis, XY direction
Inertial sensor	250g	Single axis, Z direction

DSI Architecture

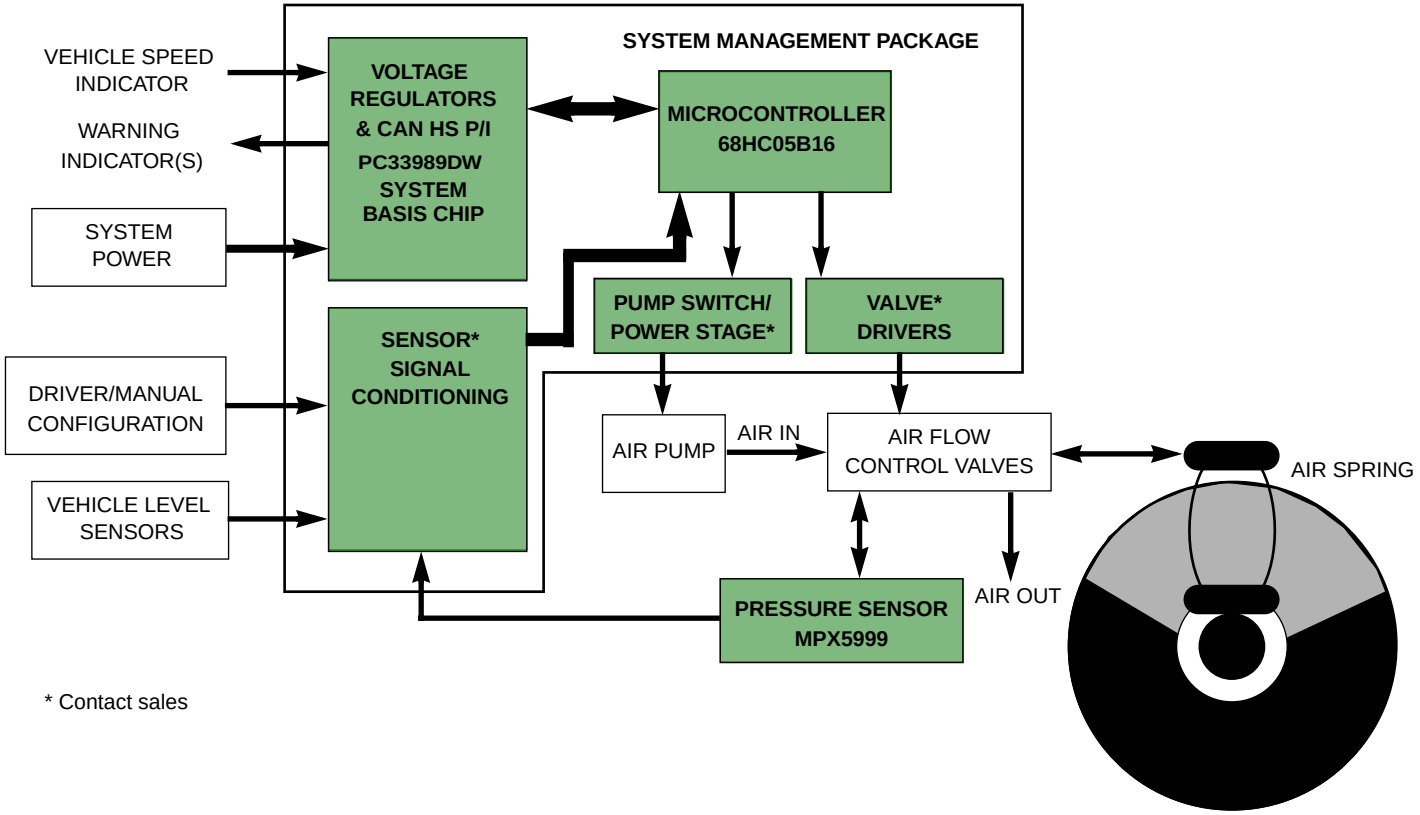
Single-Point Sensing

Motorola Single-Point Sensing Solution Example



Device Application	Suggested Device	Device Highlights
Inertial sensor	50g	Dual axis, XY direction
Inertial sensor	50g	Single axis, X or Z direction
Inertial sensor	250g	Single axis, Z direction
Microcontroller	MC68HC05PV8A	8K ROM, 192 RAM, 128 EEPROM, timer, PWM, A/D
CAN physical interface	MC33388D	SPI, CAN, low-speed tolerant physical interface (125kbps)
Microcontroller	XC68HC912BC32	32K FLASH, 1K RAM, 768 EEPROM, timer, PWM, A/D, SCI, SPI, CAN
Microcontroller	PC68HC08AZ32A	32K ROM, 1K RAM, 512 EEPROM, timer, PWM, A/D, SCI, SPI, CAN
Occupant detect E-Field sensor for MCU support	MC33794	125kHz generator, shield driver, 9 electrodes + 2 V_{ref} outputs, detector, 5V regulator, MCU support
Airbag squib driver	MC33795	Quad high- and low-side switches, 6 seat belt serve switches, 2 UARTs, 2 current mode receivers, built-in diagnostics

Adaptive Suspension

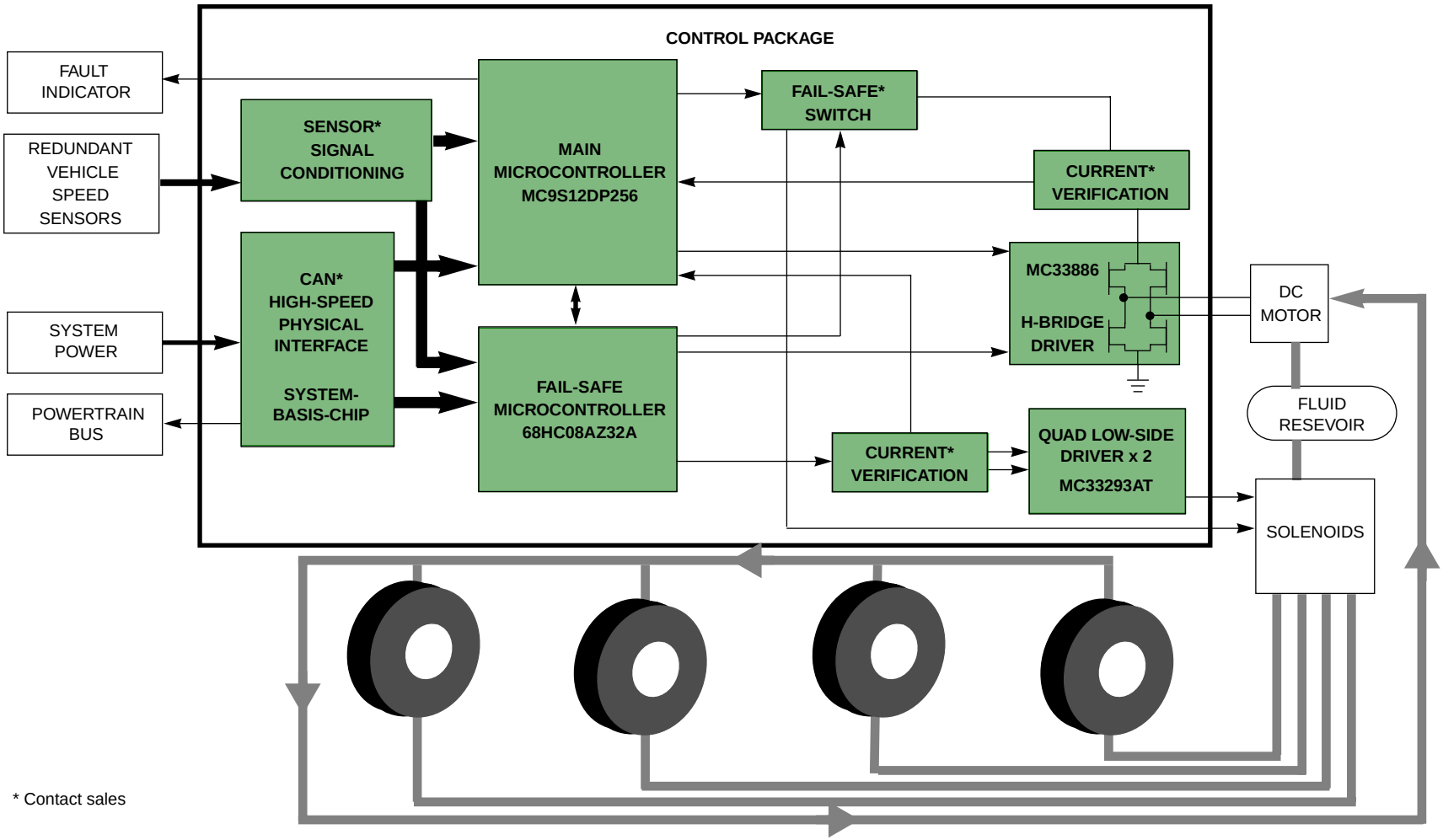


* Contact sales

Device Application	Suggested Device	Device Highlights
Main MCU	68HC05B16	14.75K ROM, 352K RAM, 256K EEPROM, timer, SCI, A/D, PWM
Pressure sensor	MPX5999	1000KPa max. pressure rating, 4.5-mV/KPa sensitivity, 6-pin unibody package
System basis chip	PC33989	Dual Vreg+LS CAN+Wdg+3 wakeup inputs, low speed, dual fault tolerant, 12V battery, 150µA, dual voltage regulator, watchdog, wakeup input, sleep

Adaptive Suspension

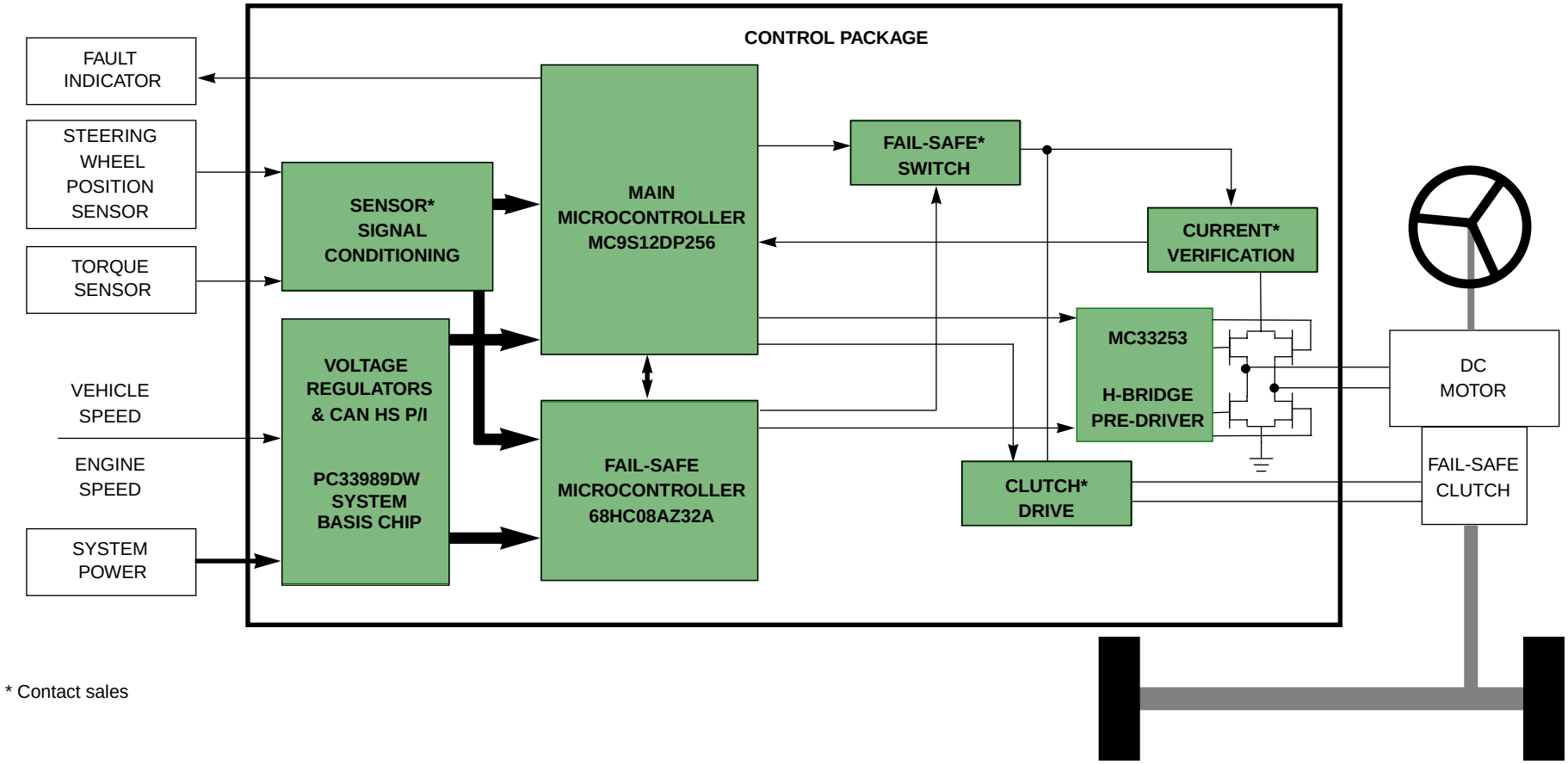
Antilock Braking System



* Contact sales

Device Application	Suggested Device	Device Highlights
Main MCU	MC9S12DP256	256K FLASH, 12K RAM, 4K EEPROM, timer, up to 5 CAN, 1 x J1850, 25MHz operating speed
H-bridge driver	MC33886	150-mΩ H-bridge driver
Low-side driver	MC33293AT	Dual low-side driver
Fail-safe MCU	PC68HC08AZ32A	32K ROM, 1K RAM, 512 bytes EEPROM, CAN 2.0a/b, 64 QFP packaging option

Electric Power Assist Steering System Example



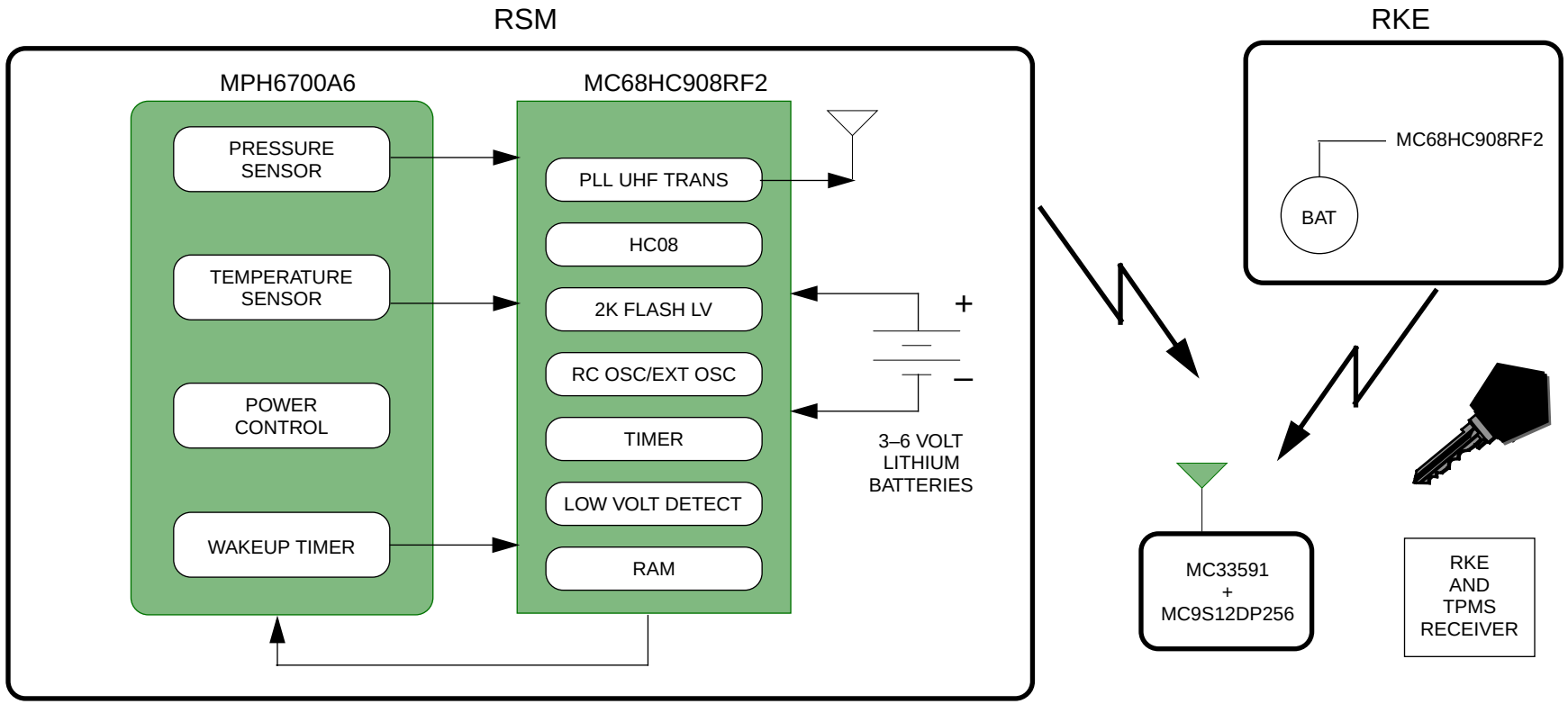
* Contact sales

Device Application	Suggested Device	Device Highlights
Main MCU	MC9S12DP256	256K FLASH, 12K RAM, 4K EEPROM, timer, up to 5 CAN, 1 x J1850, 25MHz operating speed
Fail-safe MCU	PC68HC08AZ32A	32K ROM, 1K RAM, 512 bytes EEPROM, CAN 2.0a/b, 64 QFP packaging option
H-bridge driver	MC33253	Full bridge pre-driver, 1A pulse current, global enable, SO20 packaging

Electric Power Assist

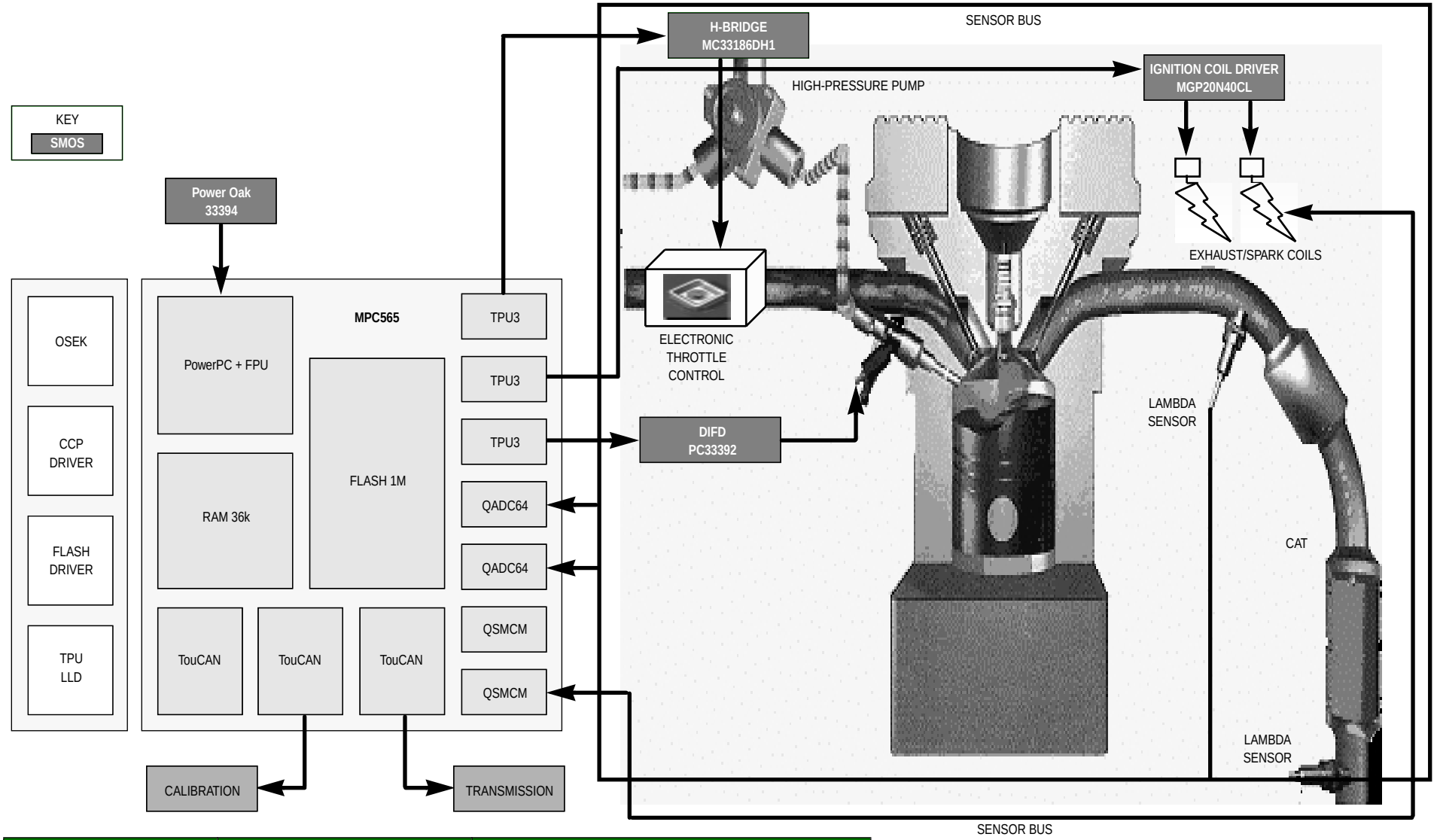
TPMS

Tire Pressure Monitoring System (TPMS) Enabling Chip Set



Device Application	Suggested Device	Device Highlights
Pressure sensor	MPH6700A6	Surface micromachined CMOS technology, power control, battery voltage detection, and wakeup, SSOP package
UHF receiver	MC33591	PLL tuned UHF AM 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, 25MHz operating speed

Direct Injection System Example

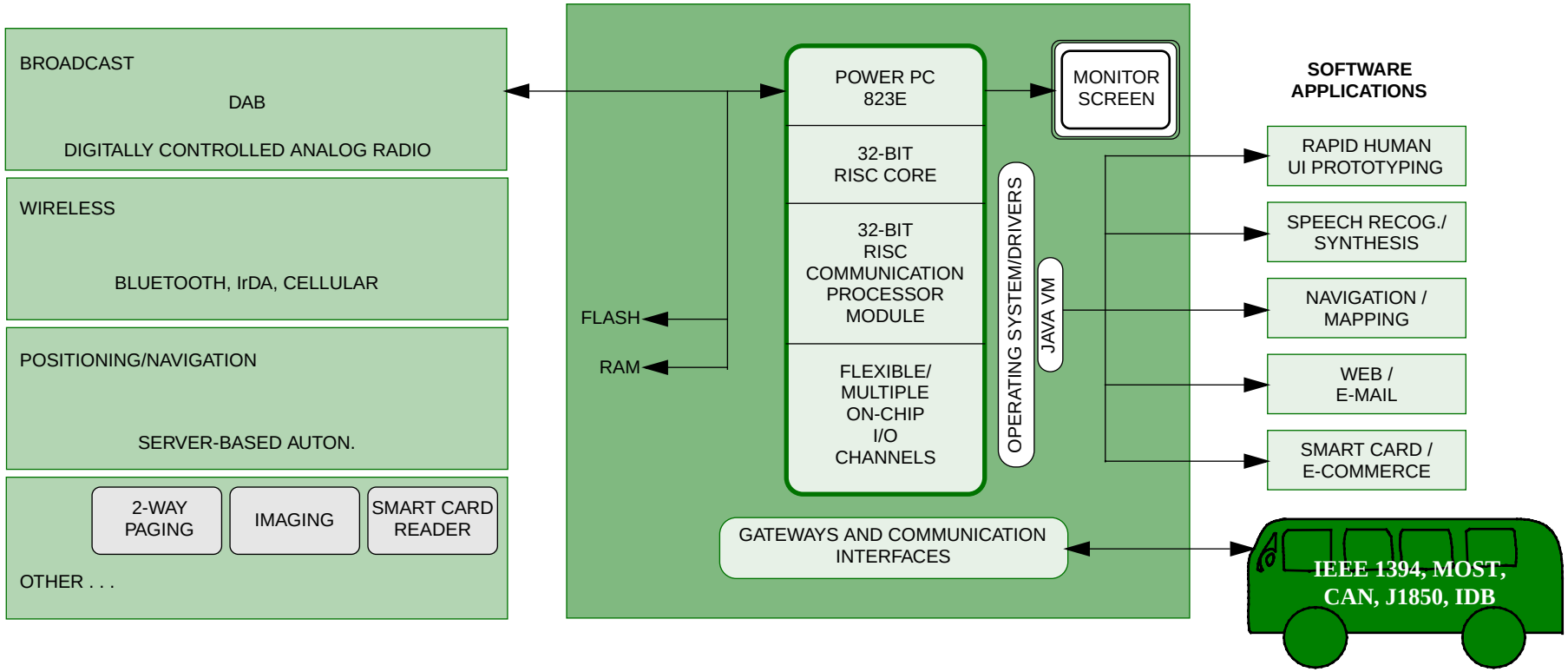


Device	Suggested Device	Device Highlights
PowerPC microcontroller	MPC565	1M FLASH, 36K RAM + 10K for TPU + 4K DECRAM
PowerOak	33394	MCU companion — voltage regulators + CAN transceiver + reset
H-bridge driver	MC33186DH1	150-mΩ H-bridge driver
Direct injection FET driver	PC33392	Direct fuel injection MOSFET driver and controller
Ignition coil driver	MCP20N40CL	Internally clamped, N-channel IGBT

Direct Injection System

Driver Information

Driver Information Systems, mobile*GT*™ Architecture



Device	Processor Speed (Typ)	Drystone Performance (MIPS)	Microprogrammable Module	Translation Lookaside Buffers	FPU Floating Point Unit	Parallel (Bits)	Power Dissipation (Typ)	Miscellaneous Peripherals	Cache-L1 Instructional	Cache-L1 Data
MPC823E	81 MHz	105 + 80	CPM	8-entry	—	53	170m @ 25MHz	2 UARTs, 1 IC, 1 SPI, USB	16 Kbytes	8 Kbytes

— 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)
DIP — Dual In-line Package
DTMF — Dual-Tone Multi-Frequency
FSK — Frequency Shift Keying Modulation
EBI — External Bus Interface
ECT — Enhanced Capture Timer
GPT — General-Purpose Timer Module (4 IC, 5 OC, 2 PWM)
IC — Input Capture
I^2C — Inter-Integrated Circuit
i/o — Bidirectional Input and Output Port Pins
i — Input-Only Port Pins
ISPI — Interval Serial Peripheral Interface
KBI — Keyboard Interrupt
LCD — Liquid Crystal Display
LTD — Limited Availability
LQFP — Low-Profile Quad Flat Pack
LVI — Low-Voltage Interrupt
LVR — Low-Voltage Reset
MC — Fully Qualified Production
MCCI — Multi-Channel Communication Interface (2 SCI, SPI)
MFT — Multi-Function Timer
MUX — Multiplexed
o — Output-Only Port Pins
OC — Output Compare
PC — Pre-Qualification, Engineering Samples Only
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)
QFP — Quad Flat Pack
QSM — Queued Serial Module (SCI + QSPI)
QSPI — Queued SPI
RTI — Real-Time Interrupt
SCI — Serial Communication Interface
SCI+ — 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
SPI — Serial Peripheral Interface
SPI+ — Enhanced SPI
SRAM — Standby RAM Module
TPU — Time Processor Unit (16 Programmable Channels)
TPURAM — Standby RAM Module with TPU Emulation Capability
UART — Universal Asynchronous Receiver/Transmitter
USB — Universal Serial Bus
XC — Initial Production Qualification, Not Fully Characterized

— Package Designators —

B — Shrink DIP (70 mil spacing)
DW — Small Outline (Wide-Body SOIC)
FA — 7 x 7 mm Quad Flat Pack (QFP)
FB — 10 x 10 mm Quad Flat Pack (QFP)
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 Sidebraze
P — Dual in-Line Plastic
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

Definitions

Nomenclature

Device Numbering System for Microcontrollers

MC 68HC 908 JK3 X XX

- **MC** — QUALIFICATION STATUS
- **68HC** — CORE
- **908** — 0x ROM, 70x OTP, 80x EEPROM, 90x FLASH
- **JK3** — FAMILY
- **X** — TEMPERATURE RANGE
  - C = –40°C to 85°C
  - V = –40°C to 105°C
  - M = –40°C to 125°C
- **XX** — PACKAGING DESIGNATOR

Device Numbering System for Pressure Sensors

M PX S 2 XXX A P X T1

- **M** — DEVICE CATEGORY
  - M QUALIFIED STANDARD
  - S CUSTOM DEVICE
  - P, X PROTOTYPE DEVICE
- **PX** — PRESSURE SENSORS
- **S** — PACKAGING TYPE
  - NONE UNIBODY
  - A/V SMALL OUTLINE PACKAGE
  - AZ SMALL OUTLINE MEDIA RESISTANT PACKAGE
  - H SUPER SMALL OUTLINE PACKAGE
- **2** — DEVICE FEATURES
  - NONE UNCOMPENSATED
  - 2 TEMPERATURE COMPENSATED/CALIBRATED
  - 3 OPEN
  - 4 TEMPERATURE COMPENSATED/CALIBRATED/ SIGNAL CONDITIONED AUTOMOTIVE ACCURACY
  - 5 TEMPERATURE COMPENSATED/CALIBRATED/ SIGNAL CONDITIONED
  - 6 OPEN
  - 7 OPEN
  - 8 OPEN
- **XXX** — MAXIMUM PRESSURE IN kPa, EXCEPT FOR MPX2300 EXPRESSED IN mmHg
- **A** — DEVICE TYPE
  - A ABSOLUTE
  - G GAUGE
  - D DIFFERENTIAL
- **P** — PORTING STYLE
  - C AXIAL PORT (SMALL OUTLINE PACKAGE)
  - P PORTED (UNIBODY)
    - P = SINGLE PORT
    - DP = DIFFERENTIAL PORT
  - S STOVEPIPE PORT (UNIBODY)
  - SX AXIAL PORT (UNIBODY)
- **X** — LEADFORM OPTION
  - 0 OPEN
  - 1–2 CONSULT FACTORY
  - 3–5 OPEN
  - 6–7 NGP* ONLY
- **T1** — SHIPPING METHOD
  - NONE TRAYS
  - T1 TAPE AND REEL
  - U RAIL

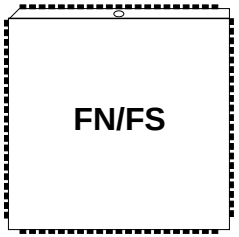
Device Numbering System for MPC5xx

K MPC 5xx L F M ZP 40

- **K** — SAMPLE PACK CONTAINING TWO PARTS; IF BLANK, THEN TRAY PARTS IS IMPLIED.
- **MPC** — QUALIFICATION STATUS
  - PPC = ENGINEERING SAMPLES
  - XPC = PILOT PRODUCTION
  - MPC = FULL SPEC QUALIFIED PRODUCT
- **5xx** — DEVICE DESIGNATOR
  - 500 – 599
- **L** — TPU MASK
  - BLANK
  - L = TPU2 A/G COMBO
- **F** — MEMORY TYPE
  - BLANK = NONE
  - F = FLASH
- **M** — TEMPERATURE RANGE
  - BLANK = –40°C to 70°C
  - C = –40°C to 85°C
  - V = –40°C to 105°C
  - M = –40°C to 125°C
  - (ALL MPC5xx PARTS ONLY AVAILABLE IN M TEMP)
- **ZP** — PACKAGE TYPE
  - ZP = 272 PIN PBGA
- **40** — BUS SPEED
  - 40 = 40 MHz
  - 56 = 56 MHz

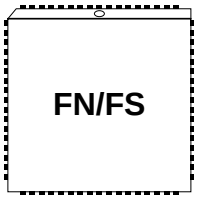
Package Options

84-Lead PLCC/CLCC



50 mil/1.27 mm Pitch
1.15 in x 1.15 in Body

68-Lead PLCC/CLCC



50 mil/1.27 mm Pitch
0.950 in x 0.950 in Body

52-Lead PLCC/CLCC

50 mil/1.27 mm Pitch
0.750 in x 0.750 in Body

44-Lead PLCC/CLCC

50 mil/1.27 mm Pitch
0.650 in x 0.650 in Body

28-Lead SOIC

50 mil/1.27 mm Pitch
18.0 mm x 7.5 mm Body

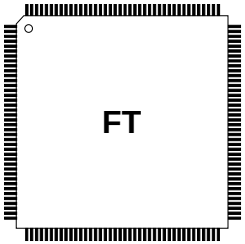
20-Lead SOIC

50 mil/1.27 mm Pitch
12.8 mm x 7.5 mm Body

16-Lead SOIC

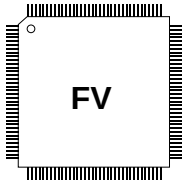
50 mil/1.27 mm Pitch
10.35 mm x 7.5 mm Body

160-Lead QFP



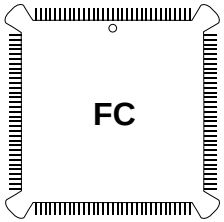
.65 mm Pitch
28 mm x 28 mm Body

144-Lead LQFP



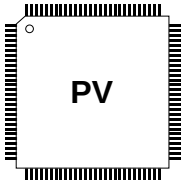
.5 mm Pitch
20 mm x 20 mm Body

132-Lead PQFP



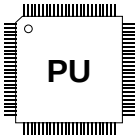
25 mil/06.35 mm Pitch
0.950 in x 0.950 in Body
(Nominal, w.o. Bumpers)

112-Lead LQFP



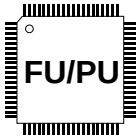
.65 mm Pitch
20 mm x 20 mm Body

100-Lead LQFP



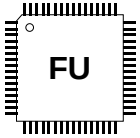
.5 mm Pitch
14 mm x 14 mm Body

80-Lead QFP/LQFP



.65 mm Pitch
14 mm x 14 mm Body

64-Lead QFP

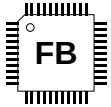


.8 mm Pitch
14 mm x 14 mm Body

52-Lead QFP

.65 mm Pitch
10 mm x 10 mm Body

44-Lead QFP

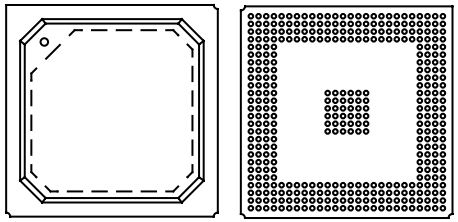


.8 mm Pitch
10 mm x 10 mm Body

32-Lead QFP

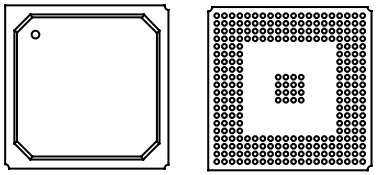
.8 mm Pitch
7 mm x 7 mm Body

388-Ball PBGA



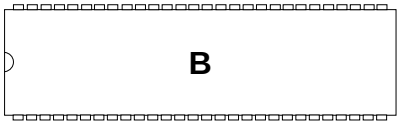
1 mm Pitch
27.0 mm x 27.0 mm Body

272-Ball PBGA



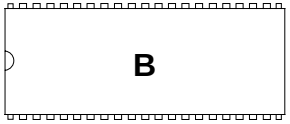
1.27 mm Pitch
27.0 mm x 27.0 mm Body

56-Pin Plastic SDIP



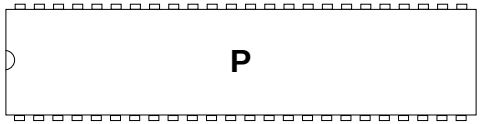
70 mil/1.778 mm Pitch
2.05 in x .55 in Body
(70 mil x 600 mil pin centers)

42-Pin Plastic SDIP



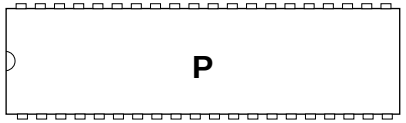
70 mil/1.778 mm Pitch
1.45 in x .55 in Body
(70 mil x 600 mil pin centers)

48-Pin Plastic DIP



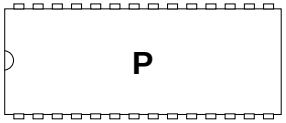
100 mil/2.54 mm Pitch
2.45 in x .55 in Body
(100 mil x 600 mil pin centers)

40-Pin Plastic DIP



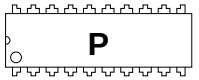
100 mil/2.54 mm Pitch
2.05 in x .55 in Body
(100 mil x 600 mil pin centers)

28-Pin DIP



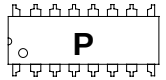
100 mil/2.54 mm Pitch
1.45 in x .55 in Body
(100 mil x 600 mil pin centers)

20-Pin Plastic DIP



100 mil/2.54 mm Pitch
.97 in x .29 in Body
(100 mil x 600 mil pin centers)

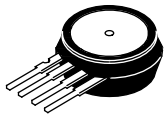
16-Pin Plastic DIP



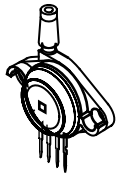
100 mil/2.54 mm Pitch
.75 in x .25 in Body
(100 mil x 600 mil pin centers)

Package Options

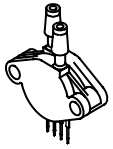
4-Pin



BASIC ELEMENT
CASE 344-15
SUFFIX A/D



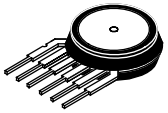
GAUGE PORT
CASE 344B-01
SUFFIX AP/GP



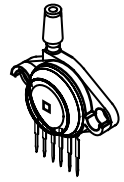
DUAL PORT
CASE 344C-01
SUFFIX DP

STOVEPIPE PORT
CASE 344E-01
SUFFIX AS/GS

6-Pin

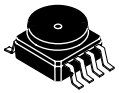


BASIC ELEMENT
CASE 867-08
SUFFIX A/D

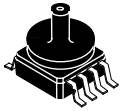


GAUGE PORT
CASE 867B-04
SUFFIX AP/GP

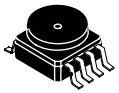
8-Pin



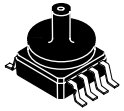
SUPER SMALL OUTLINE
(SURFACE MOUNT)
CASE 1317-02



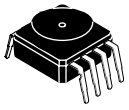
SUPER SMALL OUTLINE
(SURFACE MOUNT/PORTED)
CASE 1317A-02



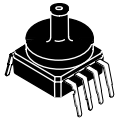
SMALL OUTLINE
(SURFACE MOUNT)
CASE 482-01



SMALL OUTLINE
(SURFACE MOUNT/PORTED)
CASE 482A-01



SMALL OUTLINE
(DIP)
CASE 482B-03



SMALL OUTLINE
(PORTED/DIP)
CASE 482C-03

How to reach us:

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