

MOTOROLA

Automotive Selector Guide

Quarter 4, 2000

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

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



- Visit <http://www.pemicro.com/ics08> for FREE windows-based development software, including simulators, assemblers, and debuggers for Motorola's M68HC08 Family of microcontrollers.
- Visit <http://www.mcu.motsps.com> to view Motorola's offering in technical support, including development tools, documentation, new searchable FAQs, and freeware.
- Visit <http://www.mot-sps.com/automotive/lldrivers/index.html> for the latest information on Motorola Low-Level Drivers for Powertrain applications.
- Visit <http://www.mot-sps.com/products/microcontrollers/software> for information on Motorola OSEK products, including documentation, order information, and product support.

WHAT'S NEW!

Section	Description
SMARTMOS	Upgrade of MC333388D and MC33393TM to MC qualification status
68HC05 Family	Removal of MC68HC705C8A, MC68HC05C9A, MC68HC05E16, XC68HC705E24, XC68HC05P18 devices (end of life)
68HC08 Family	Upgrade of PC68HC08AB16A and PC68HC908AB32A to MC qualification status
	Upgrade of PC68HC908RK2 to XC qualification status
	Removal of XC68HC08AS20 (end of life), XC68HC908GP20, MC68HC908GP32, PC68HC08GR8, PC68HC908GR8, MC68HC08JK3, MC68HC908JK3, PC68HC08KX8, PC68HC908KX8, XC68HC908MR24, PC68HC908MR32 devices (not automotive qualified)
	Addition of PC68HC908AZ60A, PC68HC08AZ32A, XC908AS60A, XC08AZ60A devices
68HC12 Family	Upgrade of PC68HC12BC32 and PC68HC912BD32 to XC qualification status
	Addition of PC68HC12D60, PC68HC912D60A, XC68HC912DG128A, XC68HCDT128A devices
PowerPC Family	Removal of MPC509 (end of life)
M•CORE Family	Addition of MMC2107 and MMC211 devices
Local Interconnect Network (LIN)	Removal of MC68HC908JK3, MC68HC908JK1, PC68HC908KX8, XC68HC908MR24, XC68HC908GP20, and MC68HC908GP32 devices
System Example Diagrams	Addition of Adaptive Suspension Diagram and Antilock Braking System Diagram

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.

For additional information, please visit:

Documentation

<http://mcu.motps.com/documentation/index.html>

(mask set errata, specifications, application notes, and other literature)

Automotive Home Page

<http://www.mot-sps.com/automotive/>

Motorola Automotive SMARTMOS (Sheet 1 of 3)

Device	Package	Description	Status	Switches ⁽¹⁾	Interface	$V_{BDSS}/R_{DSON}^{(2)}/I_{Load}$	H Bridge	Driver	Bus Physical Interface	Timer	Comments	Documentation
High-Side Drivers												
MC33091AD/P	8SO/8P	High-side TMOS driver	MC	—	—	—	—	High-side TMOS driver	—	—		MC33091A/D
MC33143DW	24SOWB	Dual high-side switch	MC	Dual high side	Parallel	10V/0.2 Ω /2.0A	—	—	—	—		MC33143/D
MC33198D	8SO	High-side TMOS driver	MC	—	—	—	—	High-side TMOS driver	—	—		MC33198/D
MC33285D	8SO	Dual high-side TMOS driver	MC	—	Parallel	—	—	Dual high-side TMOS driver	—	—	PWM capability	Contact sales
MC33286DW/DH	SO20WB/HSOP20	Dual high-side switch (Gemini) (R_{DSON} : 35m Ω)	XC	Dual high side	Parallel	40V/35m Ω /3A–6A	—	—	—	—	Resistive loads/motor control with diagnostics	Contact sales
MC33288DH	HSOP20	Dual high-side switch (R_{DSON} : 25m Ω) flasher	MC	Dual high side	Parallel	40V/25m Ω /5A–10A	—	—	—	—	Resistive loads/motor control with diagnostics and current recopy function	Contact sales
MC33289DW	SO20WB	Dual high-side switch (R_{DSON} : 40m Ω) solenoids	PC	Dual high side	Parallel	40V/40m Ω /3A–6A	—	—	—	—	Inductive loads with diagnostics	Contact sales
MC33486DH	HSOP20	Dual high-side switch for H bridge (R_{DSON} : 15m Ω) motors	PC	Dual high side	Parallel	40V/15m Ω /10A–20A	H bridge	—	—	—	Motor control with diagnostics and current recopy function	Contact sales

Motorola Automotive SMARTMOS (Sheet 2 of 3)

Device	Package	Description	Status	Switches ⁽¹⁾	Interface	$V_{BDSS}/R_{DSON}^{(2)}/I_{Load}$	H Bridge	Driver	Bus Physical Interface	Timer	Comments	Documentation
Low-Side Drivers												
MC33287DW	SO20WB	Contact monitoring + dual low-side protected driver	MC	Dual low side	Parallel	65V/1.40Ω/0.5A	—	—	—	—	Contact monitoring	Contact sales
MC33291DW	24SOWB	Basic octal serial switch (BOSS)	MC	8 low-side switches	SPI	65V/1Ω/0.5A	—	—	—	—	Serial control with diagnostics	MC333291/D
MC33293AT/TV	15SIP	Dual low-side driver (R_{DSON} : 0.25Ω)	MC	Quad low side	Parallel	80V/0.25Ω/1.0A	—	—	—	—		MC33293/D
MC33298DW/P	24 SOWB/ 20 DIP	Octal serial switch with serial peripheral interface I/O	MC	8 low-side switches	SPI	75V/0.45Ω/1.0A	—	—	—	—	Serial control with diagnostics	MC33298/D
MC33385DH/DW	HSOP20	Quad low-side driver	MC	Quad low side	Parallel	50V/0.25Ω/2.0A	—	—	—	—	SPI diagnostics	MC33385/D
Multiplexed Transceivers												
MC33199D	14SO	ISO9141 serial link driver (has K&L lines)	MC	—	—	—	—	—	ISO9141 serial link XSCVR	—	K&L lines (at 200kbps)	MC33199/D
MC33290D/P	8SO/8P	ISO9141 serial link interface (K line)	MC	—	—	—	—	—	ISO9141 serial link XSCR	—	K line only — OBD II compatible	MC33290/D
MC33388D	14SO	CAN physical interface	MC	—	—	—	—	—	CAN low-speed tolerant physical interface (125kbps)	—	CAN differential bus driver	MC33388/D
MC33389DH/DW	HSOP20/ SO28WB	System basis chip	PC	—	SPI	—	—	—	CAN low-speed tolerant physical interface (125kbps)	—	System basis chip with CAN XSCVR, 2 V-regulators, reset, IRQ	MC33389/D
MC33390D	8SO	J1850 serial link transceiver	MC	—	—	—	—	—	J1850 serial link XSCVR	—	GM/Chrysler J1850 Class B	MC33390/D
MC33790	16SOIC	2-channel DSI physical interface for bus masters	PC	—	—	—	—	—	—	—	Physical interface for DSI master nodes	Contact sales
Motor Driver/Controller												
MC33186DH1R2	HSOP20	150-mΩ H-bridge driver	MC	—	—	40V/0.15Ω	H bridge	—	—	—		Contact sales
MC33192DW	16SOWB	Stepper motor controller, MI bus interface	MC	—	MI bus	—	Stepper motor controller	—	—	—	Mechatronics connector package	MC33192/D
MC33393TM		Stepper motor controller with RAM, ROM, EEPROM, and HC05 core	MC	H bridge	MI bus	—	Stepper motor controller	—	—	16-Bit	Mechatronics connector on-chip oscillator	Contact sales
Alternator/Voltage Regulators												
MC33092ADW	SO20WB	Alternator regulator —GM/9si	MC	—	—	—	—	—	—	—	9si alternator voltage regulator	MC33092/D
MC33099DW	SO20WB	Alternator regulator —GM/9si	MC	—	—	—	—	—	—	—	9si alternator voltage regulator	Contact sales

Motorola Automotive SMARTMOS (Sheet 3 of 3)

Device	Package	Description	Status	Switches ⁽¹⁾	Interface	$V_{BDSS}/R_{DSON}^{(2)}/I_{Load}$	H Bridge	Driver	Bus Physical Interface	Timer	Comments	Documentation
Automotive Accessory Controls												
MC33187D/P	8SO/8P	Long duration automotive timer	MC	—	—	—	—	—	—	Long duration timer		MC33187/D
MC33193D/P	8SO/8P	Automotive direction indicator	MC	—	—	—	—	—	—	—	Direction indicator	MC33193/D
MC33197AD/P	8SO/8P	Automotive wash/wiper timer	MC	—	—	—	—	—	—	Wash wiper timer		MC33197/D
RF Transmitters/Receivers												
MC33491	14TSSOP	PLL tuned UHF transmitter (ASK and FSK modulation)	MC	—	—	—	—	—	—	—		Contact sales
MC33590	32LQFP	PLL tuned UHF AM receiver	MC	—	—	—	—	—	—	—		Contact sales
MC33690	SO20WB	Standalone TAG reader (with integrated voltage regulator and ISO9141)	MC	—	—	—	—	—	—	—		Contact sales

1. Protection of FET switches which may include short circuit, current limit, over temperature, over voltage, reverse battery, and loss of ground protection

2. R_{DSON} at $T_A = 25^\circ\text{C}$ (all)

Distributed Systems Interface Components

Device	Package	Description	Status	Bus Physical Interface	Comments	Documentation
MC68HC55	16SOIC	2-channel SPI to DSI protocol converter for bus masters	MC	—	Turns any MCU into a DSI master	MC68HC55/D
MC33790	16SOIC	2-channel DSI physical interface for bus masters	XC	—	Physical interface for DSI master nodes	Contact sales

MOTOROLA AUTOMOTIVE SENSORS

Motorola This year, Motorola's sensor business proudly celebrates its 20th anniversary as a volume supplier of MEMS-based pressure sensors and will ship its 300 millionth unit.

Motorola will also surpass the 30 million units shipped mark on our accelerometer sensors in custom automotive applications. Our legacy and reputation for quality positions us as the automotive market leader for sensing solutions.

Accelerometers We combine both bulk and 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. 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 small package and integrated circuit design offer alternatives to a full module solution.

Applications Motorola’s automotive sensors are designed for a variety of applications ranging from safety and performance to comfort and control. Our parts are ideal for barometric absolute pressure (BAP), manifold absolute pressure (MAP), turbo booster, vacuum pump, brake booster, safety belt pretensioner, occupant detection, lumbar support seat bladders, tire pressure monitoring (TPMS), and front and side impact sensing systems.

Got a new idea? We have applications engineers ready to assist you on your new design. Call (602) 244-4556, or, for additional information, please visit:

Automotive Home Page
<http://www.mot-sps.com/automotive>

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
X	1	40g	50mV/g	12g	-40°C to +125°C	400Hz	SO-16	Yes
X	1	100g	20mV/g	12g	-40°C to +125°C	400Hz	SO-16	Yes
XY	2	50g	40mV/g	12g	-40°C to +125°C	400Hz	SO-20	Yes
Z	1	50g	40mV/g	30g	-40°C to +125°C	400Hz	SO-16	Yes
Z	1	100g	20mV/g	75g	-40°C to +125°C	400Hz	SO-16	Yes
Z	1	250g	8mV/g	75g	-40°C to +125°C	400Hz	SO-16	Yes

1. The product parameters are typical values at $V_{DD} = 5V$ and $T = 25^{\circ}C$, 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	8-pin, surface mount, small outline package (SOP)	Available now	MPXA4100A/D
MPXA4101A	102	4.59	54	±1.8	8-pin, surface mount, small outline package (SOP)	Available now	MPXA4101A/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	8-pin, surface mount, small outline package (SOP)	Available now	MPXA4115A/D
MPXV4115V	115	4.4	38.26	±1.5	8-pin, surface mount, small outline package (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	6-pin unibody package	Available now	MPX4250A/D
MPXV5004	4	3.9	1000	±2.5	8-pin, surface mount, small outline package (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, small outline package, DIP, or surface mount	Available now	MPXV5010/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

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 0.65 μ technology (80% UDR) to 0.5 μ technology (85% and

below UDR). A number of new devices will be introduced in 2000 at 0.5 μ .

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.

For additional information, please visit:

Documentation

<http://mcu.mot.sps.com/documentation/index.html>

(mask set errata, specifications, application notes, and other literature)

Automotive Home Page

<http://www.mot-sps.com/automotive/>

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	16K	1K	—	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	908AB32	Now		MC68HC08AB16A/D
MC68HC908AB32A	—	1K	32K	512	4-CH + 4-CH 16-Bit I/C, O/C, or PWM	—	SCI SPI	—	8-CH 8-Bit	—	Y	64 QFP(FU)	5.0	8.0 Max	C, V, M	—	Now		MC68HC908AB32A/D
MC68HC908AS60	—	2K	60K FLASH	1K	6-CH	40/46	SCI SPI	J1850 (VPW)	15-CH 8-Bit	—	Y	52 PLCC(FN) 64 QFP(FU)	—	—	C, V, M	—	Now	On-chip charge pump for FLASH memory	MC68HC908AS60/D
XC68HC908AS60A	—	2K	60K FLASH	1K	6-CH + 2-CH 16-Bit I/C, O/C, or PWM	40/46	SCI SPI	J1850 (VPW)	15-CH 8-Bit	—	Y	52 PLCC(FN) 64 QFP(FU)	—	—	C, V, M	908AZ60A	LTD	0.5 μ recommended for new design-ins.	Contact sales
MC68HC08AS32	32K	1024	—	512	6-CH	40/46	SCI SPI	J1850	8-CH 8-Bit	—	Y	52 PLCC(FN)	5.0	8.0 Max	C, V, M	908AS60	Now		MC68HC08AS32/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
MC68HC908AZ60	—	2K	60K FLASH	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	—	Y	64 QFP(FU)	5.0	8.0 Max	C, V, M	—	Now	Not recommended for new design-ins. Use 0.5μ PC68HC908AZ60A.	MC68HC908AZ60/D
PC68HC908AZ60A	—	2K	60K FLASH	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	—	Y	64 QFP(FU)	5.0	8.0 Max	C, M, V	—	Q1 01	5V FLASH. 0.5μ recommended for new design-ins.	Contact sales
XC68HC08AZ32	32K	1K	—	512	4-CH + 2-CH 16-Bit I/C, O/C, or PWM	48	SCI SPI	CAN 2.0a/2.0b	8-CH 8-Bit or 15-CH 8-Bit	—	Y	64 QFP(FU)	5.0	8.0 Max	C, M, V	908AZ60	Now	Not recommended for new design-ins. Use 0.5μ PC68HC08AZ32A.	HC08AZ32TS/D
PC68HC908AZ32A	32K	1K	—	512	4-CH + 2-CH 16-Bit I/C, O/C, or PWM	48	SCI SPI	CAN 2.0a/2.0b	8-CH 8-Bit or 15-CH 8-Bit	—	Y	64 QFP(FU)	5.0	8.0 Max	C, M, V	908AZ60A	Q2 01	0.5μ shrink	Contact sales
XC68HC08AZ60	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	—	Y	64 QFP(FU)	5.0	8.0	V	908AZ60	Q4 00		MC68HC08AZ60/D
XC68HC08AZ60A	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	—	Y	64 QFP(FU)	5.0	8.0	V	908AZ60A	LTD	0.5μ shrink	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	Q1 01	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	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	—	Q1 01	RC oscillator option, LVR with selectable trip points, 6-pin LED drive	MC68HC908JL3/H
XC68HC908RK2	—	128	2K FLASH	—	2-CH, 16-Bit	14	—	—	—	—	Y	20 SOIC(DW) 20 SSOP(SD)	1.8 to 3.6	4.0 Max	C	—	Now	Low-power embedded FLASH routine	MC68HC908RK2/D
PC68HC908RF2	—	128	2K FLASH	—	1-CH, 16-Bit	12	—	—	—	—	Y	32 LQFP(FA)	1.8 to 3.6	4.0 Max	C	—	Now	RF transmitter integrated	Contact sales

68HC08 Reference Manuals

CPU08RM/AD
TIM08RM/AD

CPU Reference Manual
Timer Reference Manual

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 is implementing a new split-gate FLASH cell, providing great reliability benefits by using a proven technology.

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.

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

For additional information please visit:

Documentation

<http://mcu.motsps.com/documentation/index.html>

(mask set errata, specifications, application notes, and other literature)

Automotive Home Page

<http://www.mot-sps.com/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
MC68HC812A4	—	1K	—	4K	8-CH, 16-Bit	Up to 91	2 SCI 1 SPI	—	8-CH 8-Bit	—	112 LQFP 100 LQFP	3.3, 5.0	8.0	C	—	Now	PLL non-muxed bus, BDM	MC68HC812A4TS/D
MC68HC912B32	—	1K	32K FLASH	768	8-CH, 16-Bit	Up to 63	1 SCI 1 SPI	J1850	8-CH 8-Bit	4-CH 8-Bit or 2-CH 16-Bit	80 QFP	5.0	8.0	C, V, M ⁽¹⁾	—	Now	J1850 muxed bus, BDM	MC68HC912B32/D
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⁾	—	Now	MSCAN module on board, BDM, includes ABS timer to offload wheel speed interrupts	MC68HC912B32TS/D
PC68HC12BC32	32K	1K	—	768	8-CH, 16-Bit	Up to 64	1 SCI 1 SPI	CAN 2.0a/b	8-CH 8-Bit	4-CH 8-Bit	80 QFP	5.0	8.0	C, V, M ⁽¹⁾	HC912BC32	Now		Contact sales
PC68HC912BD32	—	1K	32K	768	8-CH, 16-Bit Enhanced capture timer (ECT)	51	1 SCI 1 SPI	byteflight	8-CH 8-Bit	4-CH 8-Bit	80 QFP	5.0	10.0	C	—	LTD		MC68HC912BD32/D

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
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 QFP	5.0	8.0	C, V, M ⁽¹⁾	HC912BE32	Now	J1850 muxed bus	MC68HC912B32TS/D
XC68HC912D60	—	2K	60K FLASH	1K	8-CH, 16-Bit buffered input captures	Up to 66, plus up to 18 input only lines	2 SCI 1 SPI	CAN 2.0a/b	2 x 8-CH 10-Bit ⁽²⁾	4-CH 8-Bit or 2-CH 16-Bit	80 QFP ⁽²⁾ 112 LQFP	5.0	8.0	C, V, M ⁽¹⁾	—	Now	Use 0.5μ PC68HC912D60A for new design-ins.	MC68HC912D60/D
PC68HC912D60A	—	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	CAN 2.0a/b	2 x 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	80 QFP ⁽²⁾ 112 QFP	5.0	8.0			Smpl Q4 00	0.5μ technology, 5V FLASH, MC plan Q4 00.	MC68HC912D60/D
PC68HC12D60	60K	2K	—	1K	8-CH, 16-Bit enhanced capture timer (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 QFP	5.0	8.0			Smpl Q4 00		MC68HC912D60/D
XC68HC12DG128	128K	8K	—	2K	8-CH, 16-Bit buffered input captures	Up to 68, plus up to 18 input only lines	2 SCI 1 SPI	2 X CAN 2.0a/b	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⁾	HC912DG128	LTD	Ideal for gateway applications	Contact sales
XC68HC912DG128	—	8K	128K FLASH	2K	8-CH, 16-Bit buffered input captures	Up to 68, plus up to 18 input only lines	2 SCI 1 SPI	2 x CAN 2.0a/b	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⁾	—	Now	Use 0.5μ XC68HC912DG128A for new design-ins.	MC68HC912DG128/D
XC68HC912DG128A	—	8K	128K FLASH	2K	8-CH, 16-Bit enhanced capture timer (ECT)	Up to 67, plus up to 18 input only lines	2 SCI 1 SPI	2 x CAN 2.0ab	2 x 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	112 LQFP	5.0	8.0			LTD	0.5μ technology, 5V FLASH, MC plan Q4 00. Ideal for gateway applications	MC68HC912DT128A/D
XC68HC912DT128A	—	8K	128K FLASH	2K	8-CH, 16-Bit enhanced capture timer (ECT)	Up to 67, plus up to 18 input only lines	2 SCI 1 SPI	3 x CAN 2.0a/b	2 x 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	112 LQFP	5.0	8.0			LTD	0.5μ technology recommended for new design-ins. 5V FLASH, MC plan Q4 00. Ideal for gateway applications	MC68HC912DT128A/D

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

68HC12 Reference Manual

CPU12RM/AD

68HC12 Reference Manual

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	C	—	Now	MC68HC16Y1UM/AD
MC68HC16Y1	48K	2K	0	SCIM	GPT+TPU	MCCI	ADC	160 QFP	5.0	16	C, V, M	HC916Y1	Now	MC68HC16Y1UM/AD
MC68HC916Y3	0	4K	96+4	SCIM2	GPT+TPU2	QSM MCCI	ADC	160 QFP	5.0	16	C	—	Now	MC68HC16Y3PP/D (MC68HC16Y3/916Y3UM/ AD on web only)
MC68HC16Y3	96K	4K	0	SCIM2	GPT+TPU2	QSM MCCI	ADC	160 QFP	5.0	16	C, V, M	HC916Y3	Now	MC68HC16Y3PP/D (MC68HC16Y3/916Y3UM/ AD on web only)
MC68HC916Y5	0	4K	160	SLIM+ACS	TPU2+CTM3	RSPI MCCI	QADC	160 QFP	5.0	20	C, V	—	LTD	Contact sales
MC68HC16Y5	160K	4K	0	SLIM+ACS	TPU2+CTM3	RSPI MCCI	QADC	160 QFP	5.0	20	C, V	HC916Y5	LTD	Contact sales
MC68HC16Z3	8K	4K	0	SIM	GPT	QSM	ADC	132 PQFP 144 LQFP	5.0	16, 20, 25	C, V, M	—	Now	MC68HC16ZUM/AD

68HC16 Reference Manuals

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

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

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

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

68HC05 Family

THE MOTOROLA 68HC05 8-BIT MICROCONTROLLER FAMILY

68HC05 Motorola's 68HC05 Family represents one of the leading device families currently used in automotive applications.

Automotive The 68HC05 Family is 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 Family also is widely used in many white good or non-automotive applications.

Memory The 68HC05 Family has 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:

Documentation

<http://mcu.mot.sps.com/documentation/index.html>

(mask set errata, specifications, application notes, and other literature)

Automotive Home Page

<http://www.mot-sps.com/automotive/>

68HC05 Family (Sheet 1 of 3)

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	—	Now	705B32 has OTP for SDIP	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	2.1	C, V, M	705B16 705B32	Now	SCI has synchronous 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	2.1	C, V	705B16 705B32	Now	SCI has synchronous 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	52 SDIP(B) 52 PLCC(FN) 64 QFP(FU)	3.3, 5.0	2.1	C, V, M	705B16 See comment	Now	SCI has synchronous master SPI like capability	MC68HC05B6/D
XC68HC705B32	—	528	32K	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	C	—	Limited	SCI has synchronous master SPI like capability	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	Now	SCI has synchronous master SPI like capability 0–70°C temp. only for SDIP; –40 to +85 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	2.1	C, V, M	705C8A	Now	High-speed select on RVU header, low-voltage 2.4V to 3.6V @ 1MHz, bus available	HC05C8AGRS/D

68HC05 Family (Sheet 2 of 3)

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	SCI SPI	—	—	—	Y	40 DIP(P) 42 SDIP(B) 44 PLCC(FN) 44 QFP(FB)	3.3, 5.0	2.1	C	—	Now	'A' features	HC705C9AGRS/D
MC68HC705E6	—	128	6K	160	16-Bit 1 I/C, 2 O/C MFT, RTI	36	—	—	4-CH 8-Bit	—	Y	28 SOIC(DW) 44 QFP(FB)	—	—	C	—	Now	Keyboard interrupt, LVI	MC68HC05E6/D
MC68HC05E6	5.9K	128	—	WR160	16-Bit 1 I/C, 1 O/C MFT, RTI	36	—	—	4-CH 8-Bit	—	Y	28 SOIC(DW) 44 QFP(FB)	—	2.1	C	705E6	Now	Keyboard interrupt, LVI	MC68HC05E6/D
XC68HC705H12	—	256	12K	256	2x 16-Bit 2 I/C, 2 O/C	32	SPI SCI	—	4-CH 8-Bit	8-CH 8-Bit	Y	52 PLCC(FN)	5.0	—	C	—	Now	Power drivers for two major and four minor gauges	HC05H12GRS/D
XC68HC05H12	12K	256	—	256	2x 16-Bit 2 I/C, 2 O/C	32	SPI SCI	—	4-CH 8-Bit	8-CH 8-Bit	Y	52 PLCC	5.0	2.1	C	705H12	Now	Power drivers for two major and four minor gauges	HC05H12GRS/D
MC68HC705J1A	—	64	1.2K	—	MFT, RTI	14	—	—	—	—	Y	20 DIP(P) 20 SOIC(DW)	3.3, 5.0	4.0	C, V	—	Now	RC option now available	MC68HC705J1A/D
MC68HC05J1A	1.2K	64	—	—	MFT, RTI	14	—	—	—	—	Y	20 DIP(P) 20 SOIC(DW)	2.0, 3.3, 5.0	2.1	C, V	705J1A	Now	Keyboard scan, mask selectable pulldowns/interrupt on I/O low voltage 1.8V	MC68HC05J1A/D MC68HC05J1AAD/D
XC68HC705JJ7	—	224	6K+ 64 Bit PEP	—	16-Bit 1 I/C, 1 O/C MFT, RTI	14	SIOP	—	4-CH 12-Bit	—	Y	20 DIP(P) 20 SOIC(DW)	3.3, 5.0	2.1	C	—	Now		HC705JJ7GRS/D
MC68HC05JJ6	6K	224	—	—	16-Bit 1 I/C, 1 O/C MFT, RTI	14	SIOP	—	4-CH 12-Bit	—	Y	20 DIP(P) 20 SOIC(DW)	3.3, 5.0	2.1	C	705JJ7	Now		HC05JJ6GRS/D
XC68HC705JP7	—	224	6K+ 64 Bit PEP	—	16-Bit 1 I/C, 1 O/C MFT, RTI	22	SIOP	—	4-CH 12-Bit	—	Y	28 DIP(P) 28 SOIC(DW)	3.3, 5.0	2.1	C	—	Now		HC705JJ7GRS/D
MC68HC05JP6	6K	224	—	—	16-Bit 1 I/C, 1 O/C MFT, RTI	22	SIOP	—	4-CH 12-Bit	—	Y	28 DIP(P) 28 SOIC(DW)	3.3, 5.0	2.1	C	705JP7	Now		HC05JJ6GRS/D
XC68HC805K3	—	64	920 EEPROM	920 + 16 PEEP	MFT, RTI	10	—	—	—	—	Y	16 DIP(P) 16 SOIC(DW)	3.3, 5.0	2.1	C	—	Now	FLASH-like emulator	HC805K3GRS/D
MC68HC05K3	0.9K	64	—	16 PEEP	MFT, RTI	10	—	—	—	—	Y	16 DIP(P) 16 SOIC(DW) 20 SSOP(SD)	3.3, 5.0	2.1	C	805K3	Now	Personality EEPROM RTI, keyboard scan Low power 2.5V 0.7V @ 0.5MHz bus	MC68HC05K3/D
MC68HC705KJ1	—	64	1.2K	—	MFT, RTI	10	—	—	—	—	Y	16 DIP(P) 16 SOIC(DW) 16 CERDIP(S)	3.3, 5.0	4.0	C	—	Now	Very low-cost OTP, windowed ceramic DIP package available (S)	MC68HC705KJ1/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	—	Now	Umbrella OTP for P1A, P4A, and P9A	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)	3.3, 5.0	2.1	C, V, M	705P6A	Now		MC68HC05P6/D MC68HC05P6AD/D

68HC05 Family

68HC05 Family (Sheet 3 of 3)

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
XC68HC805P18	—	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, V, M	—	Now		HC805P18GRS/D
MC68HC805PV8	—	192	8K EEPROM	128	15-Bit 16-Bit 2 I/C, 2 O/C	20	—	—	6-CH 8-Bit	1	Y	28 SOIC(DW)	—	—	—	—	Now	4.2MHz high speed available; on-chip 40mVreg.; hyperintegration device	MC68HC05PV8/D
MC68HC05PV8A	8K	192	—	128	15-Bit 16-Bit 2 I/C, 2 O/C	20	—	—	6-CH 8-Bit	1	Y	28 SOIC(DW)	—	2.1	—	805PV8	Now	Hyperintegration device	MC68HC05PV8/D
XC68HC705V8	—	512	12K	128	16-Bit	22	SPI	J1850	16-CH 8-Bit	1-CH 6-Bit	Y	56 SDIP(B) 68 PLCC(FN) 64 QFP(FU)	—	—	—	N/A	Now	System chip voltage regulator and transceiver	HC705V8GRS/D
XC68HC05V7	10K	386	—	128	16-Bit	22	SPI	J1850	16-CH 8-Bit	1-CH 6-Bit	Y	56 SDIP(B) 68 PLCC(FN)	—	2.1	—	705V8	Now	System chip voltage regulator and transceiver	HC05V7GRS/D
XC68HC705V12	—	384	12K	256	16-Bit 1 I/C, 1 O/C 8-Bit, RTI	23	SPI	J1850	5 CH 8-Bit	2-CH 6-Bit	Y	68 PLCC(FN)	—	—	C, V, M	—	Now	Bridge drivers for 6 gauges: 4 minor – 180° 2 major – 360°	HC705V12GRS/D
MC68HC05V12	12K	384	—	256	16-Bit 1 I/C, 1 O/C 8-Bit, RTI	23	SPI	J1850	5 CH 8-Bit	2-CH 6-Bit	Y	68 PLCC(FN)	—	—	C, V, M	705V12	Now	Bridge drivers for 6 gauges: 4 minor – 180° 2 major – 360°	HC05V12GRS/D
XC68HC705X4	—	176	4K	—	16-Bit 1 I/C, 1 O/C	16	—	CAN	—	—	Y	28 SOIC(DW)	5.0	2.1	C, V, M	—	Now	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)	Now	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	—	Now	4MHz bus speed available	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	Now	2MHz bus speed only	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	—	Now	4MHz bus speed available	MC68HC05X16/D

68HC05 Reference Manuals

M68HC05AG/AD
M68HC05TB/D

Applications Guide
Understanding Small Microcontrollers Text Book

THE MOTOROLA 68HC11 8-BIT MICROCONTROLLER FAMILY

68HC11 Heritage Motorola's 68HC11 Family represents one of the leading 8-bit families in the automotive industry. With more than 40 variants and well over 100 M units sold, it is an industry standard.

Automotive The 68HC11 Family has various on-board peripherals such as memory, as well as timers and analog-to-digital converters, suitable for many applications including body electronics applications, air conditioning, window lift, motor control, etc.

Memory The 68HC11 Family has several memory options such as ROM, EEPROM, and OTP.

Service Motorola offers a full range of services to accompany all of our microcontrollers, which includes software solutions and support as well as a wide range of low-cost development tools.

For additional information, please visit:

Documentation

<http://mcu.motps.com/documentation/index.html>

(mask set errata, specifications, application notes, and other literature)

Automotive Home Page

<http://www.mot-sps.com/automotive/>

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	—	Now	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	—	Now	64K external address bus, 3MHz, C temperature	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	Now	64K external address bus	MC68HC11D3/D
MC68HC811E2	—	256	—	2048	16-Bit, 3IC, 4OC, RTI, pulse accumulator	38	SPI SCI	8-CH 8-Bit	—	52 PLCC 52 LQFP	5.0	2.0 Max	C, V, M	—	Now	Secure device available, EEPROM block protect	MC68HC11E/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	—	Now	EEPROM block protect 4MHz available, contact factory	MC68HC11E/D
MC68HC11E0	—	512	—	—	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	38	SPI SCI	8-CH 8-Bit	—	52 PLCC 64 QFP 52 LQFP	3.0, 5.0	3.0 Max	C, V, M	711E9	Now	Low-voltage parts available, 2MHz, -20° to 70°C	MC68HC11E/D
MC68HC11E1	—	512	—	512	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	22	SPI SCI	8-CH 8-Bit	—	52 PLCC 64 QFP 52 LQFP	3.0, 5.0	3.0 Max	C, V, M	711E9	Now	Low-voltage parts available, 2MHz, -20° to 70°C	MC68HC11E/D
MC68HC11E9	12K	512	—	512	16-Bit, 3/4IC, 4/5OC, RTI, pulse accumulator	38	SPI SCI	8-CH 8-Bit	—	52 PLCC 64 QFP 52 LQFP	3.0, 5.0	3.0 Max	C, V, M	711E9	Now	Low-voltage parts available, 2MHz, -20° to 70°C 4MHz available, contact factory	MC68HC11E/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
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	—	Now	4MHz available, contact factory	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	Now	4MHz available, contact factory	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	—	Now	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	—	Now	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	—	Now	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	—	Now	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)	Now	5MHz non-mux bus, extended memory map, 4 chip selects	MC68HC11K4/D
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	—	Now	4MHz non-mux bus, no MMU, no chip selects, low-power mode, security option available	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	Now	4MHz non-mux bus, no MMU, no chip selects, low-power mode, security option available	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	—	Now	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	—	Now	64K external address bus, MI-bus interface, PLL clock circuitry	MC68HC11P2/D

68HC11 Reference Manual

PowerPC Family

Device	ROM (Bytes)	RAM (Bytes)	FLASH (Bytes)	Device Integration	Timer	Serial	MUX	A/D	PWM	Operating Voltage	Operating Frequency (MHz)	Temperature	Package Options	Comments	Documentation
MPC555	0	26K + 6K for TPUs	448K	USIU	50-channel timer system: 2 TPU3 + MIOS1	QSMCM (2 SCI + QSPI) + 2 TOUCAN	—	2 QADC (10-Bit A/D with 64 result registers on each)	—	3.3Vdc for core, 5.0Vdc for FLASH	40	C, V, M	272 PBGA	PowerPC core with FPU Samples available now	MPC555UM/AD MPC509UM/AD RCPUMRM/D SIURM/D TPURM/AD

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
MMC2103	64K FLASH	2K SRAM	0	16-Bit, 2-CH PWM, 4-CH DASM	QSPI, QSCI, SCI, BDLC, DSIM, CAN	10-Bit, 10-CH QADC	3.3, 5	33	C, V, M	100 QFP	Now	1H01
MMC2107	128K FLASH	8K SRAM	0	Dual 4-CH capture/compare, 3-CH PWM	SCI	10-Bit, 8-CH QADC	3.3, 5	33		100 LQFP 144 LQFP	Now	PPAP not available
MMC2111	128K FLASH	4K SRAM	0	16-Bit, 2-CH PWM, 4-CH DASM	QSPI, QSCI, SCI, BDLC, DSIM, CAN, SPI	10-Bit, 10-CH QADC	3.3, 5	33	C, V, M	112 QFP	Samples Q400	2H01

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, 20, 25	C, V, M	132 PQFP 144 LQFP	Now		MC68332UM/AD MC68LK332EC16/D
MC68336	0	4K+3.5K	0	SIM	TPU CTM4	QSM	QADC	5.0	20, 25	C, V, M	160 QFP	Now		MC68336/376PP/D MC68336/376UM/AD
MC68F375	5K	6K – TPU 5K – SRAM	256K	SCIM2	CTM9 TPU3	2 SCI TOUCAN Queued SPI	QADC64/ AMUX	3.3, 5.0	33	M	217 PBGA	LTD		Contact sales
MC68376	8K	4K+3.5K	0	SIM	TPU CTM4	QSM TOUCAN	QADC	5.0	20, 25	C, V, M	160 QFP	Now		MC68336/376PP/D MC68336/376UM/AD

683xx Reference Manuals

CPU32RM/AD	683xx CPU32 Reference Manual
SIMRM/AD	System Integration Module Reference Manual
TPURM/AD	TPU Reference Manual
GPTRM/AD	General-Purpose Timer Reference Manual
QSMRM/AD	Queued Serial Module Reference Manual
ADCRM/AD	Analog-to-Digital Reference Manual
CTMRM/D	Configurable Timer 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 hyperintegration and Mechatronics 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.

For additional information, please visit:

LIN Home Page
<http://www.lin-subbus.org/>

Automotive Home Page
<http://www.mot-sps.com/automotive>

LIN Software Products

Product	M68HC05	M68HC08	M68HC12	Available
LIN Master		X	X	Now
LIN Slave	X	X	X	Now
Operating System		X	X	Now

LIN Physical Interface

Device	Supply	Wakeup	Sleep Mode	Slew Rate
MC33399D	7 V to 27 V	Several Modes	Yes	1 to 2 V/ μ s

Hyperintegration / Mechatronics LIN Slave MCUs

Device	ROM (Bytes)	RAM (Bytes)	FLASH (Bytes)	EEPROM (Bytes)	Timer	Pkg Option	Comments	Documentation
MC68HC05PV8	8K	192	—	128	15-Bit 16-Bit 2I/C, 2O/C	28 SOIC(DW)	Timer, PWM, A/D, Oscillator, Vreg, HV I/O, op amp, physical I/F	M68HC05PV8/D
MC68HC805PV8	—	192	8K	128	15-Bit 16-Bit 2I/C, 2O/C	28 SOIC(DW)	Timer, PWM, A/D, Oscillator, Vreg, HV I/O, op amp, physical I/F, relay drivers	M68HC05PV8/D
MC33393TM	—	64	—	1K	16-Bit		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
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	—	Now	RC oscillator option, LVR w/ selectable trip points, 6-pin LED drive	MC68HC908JL3/H
MC68HC08AB16A	16K	512S	—	—	4-CH + 2-CH 16-Bit I/C, O/C, or PWM	23	SCI SPI	8-CH 8-Bit	See Timer	Y	28 QFP	5.0	8.0 Max	C	—	Now		HC08AZ32TS/D

Local Interconnect Network

Local Interconnect Network

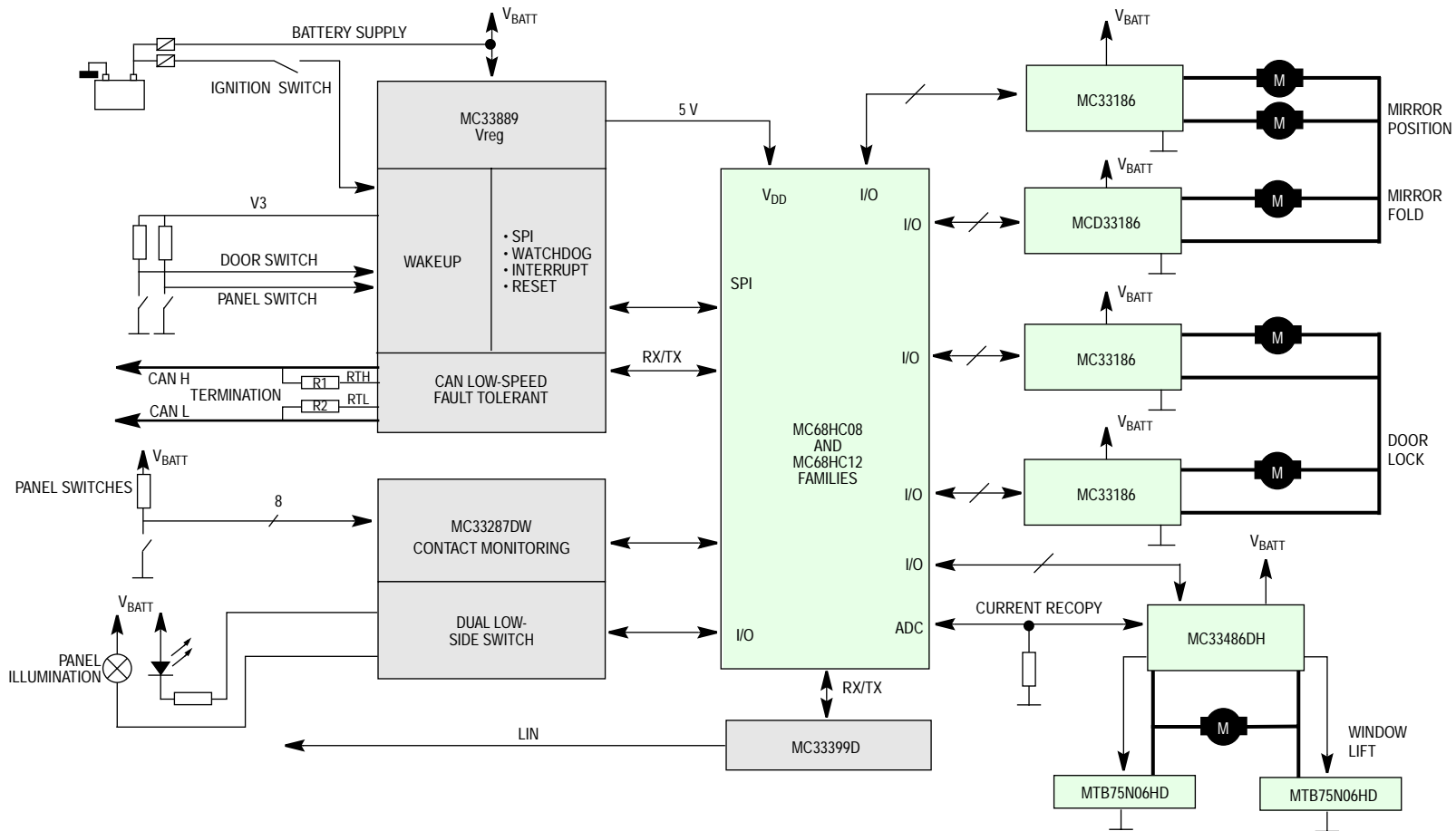
LIN Master MCUs

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.	OTP	Avail.	Comments	Documentation
MC68HC908AZ60	—	2K	60K FLASH	1K	6-CH + 2-CH 16-Bit I/C, O/C, or PWM	48	SCI SPI	15-CH 8-Bit	See Timer	Y	64 QFP(FU)	5.0	8.0 Max	C, M, V	—	Now	Use 0.5μ PC68HC908AZ60A for new design-ins.	MC68HC908AZ60/D
XC68HC08AZ32	32K	1K	—	512	4-CH + 2-CH 16-Bit I/C, O/C, or PWM	48	SCI SPI	8-CH 8-Bit	See Timer	Y	64 QFP(FU)	5.0	8.0 Max	C, M, V	908AZ60	Now	Use 0.5μ PC68HC08AZ32A for new design-ins. CAN 2.0a and 2.0b	HC08AZ32TS/D
MC68HC912B32	—	1K	32K FLASH	768	8-CH 16-Bit I/C or O/C, RTI, Pulse Accumulator	Up to 63	SCI SPI J1850	8-CH 8-Bit	4-CH 8-Bit or 2-CH 16-Bit	Y	80 QFP(FU)	5.0	8.0 Max	C, M, V	—	Now	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 CAN	8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	Y	80 QFP(FU)	5.0	8.0 Max	C, M, V	—	Now	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 CAN	8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	Y	80 QFP(FU)	5.0	8.0 Max	C, M, V	—	Now	msCAN CAN 2.0a and 2.0b, BDM	MC68HC912B32TS/D
XC68HC912D60	—	2K	60K FLASH	1K	8-CH 16-Bit I/C or O/C, RTI, Pulse Accumulator	Up to 66 I/O (18 input only)	Dual SCI SPI, CAN	Dual 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	Y	80 QFP(FU) 112 LQFP(PV)	5.0	8.0 Max	C, M, V	—	LTD	Use 0.5μ PC68HC912D60A for new design-ins.	MC68HC912D60/D
XC68HC912DG128	—	8K	128K FLASH	2K	8-CH 16-Bit I/C or O/C, RTI, Pulse Accumulator	Up to 68	2 SCI SPI	Dual 8-CH 10-Bit	4-CH 8-Bit or 2-CH 16-Bit	Y	112 LQFP	3.0, 5.0	8.0 Max	C	—	LTD		MC68HC912DG128/D

PowerPC Family

Device	ROM (Bytes)	RAM (Bytes)	FLASH (Bytes)	Device Integration	Timer	Serial	MUX	A/D	PWM	Operating Voltage	Temperature	Operating Frequency	Package Options	Comments	Documentation
MPC555	0	26K + 6K for TPUs	448K	USIU	50-channel timer system: 2 TPU3 + MIOS1	QSMCM (2 SCI + QSPI) + 2 TOUCAN	—	2 QADC (10-Bit A/D with 64 result registers on each)	—	3.3Vdc for core, 5.0Vdc for FLASH	C, V, M	40MHz	272 PBGA	PowerPC core with FPU Samples available now	MPC555UM/AD MPC509UM/AD RCPUMRM/D SIURM/D TPURM/AD

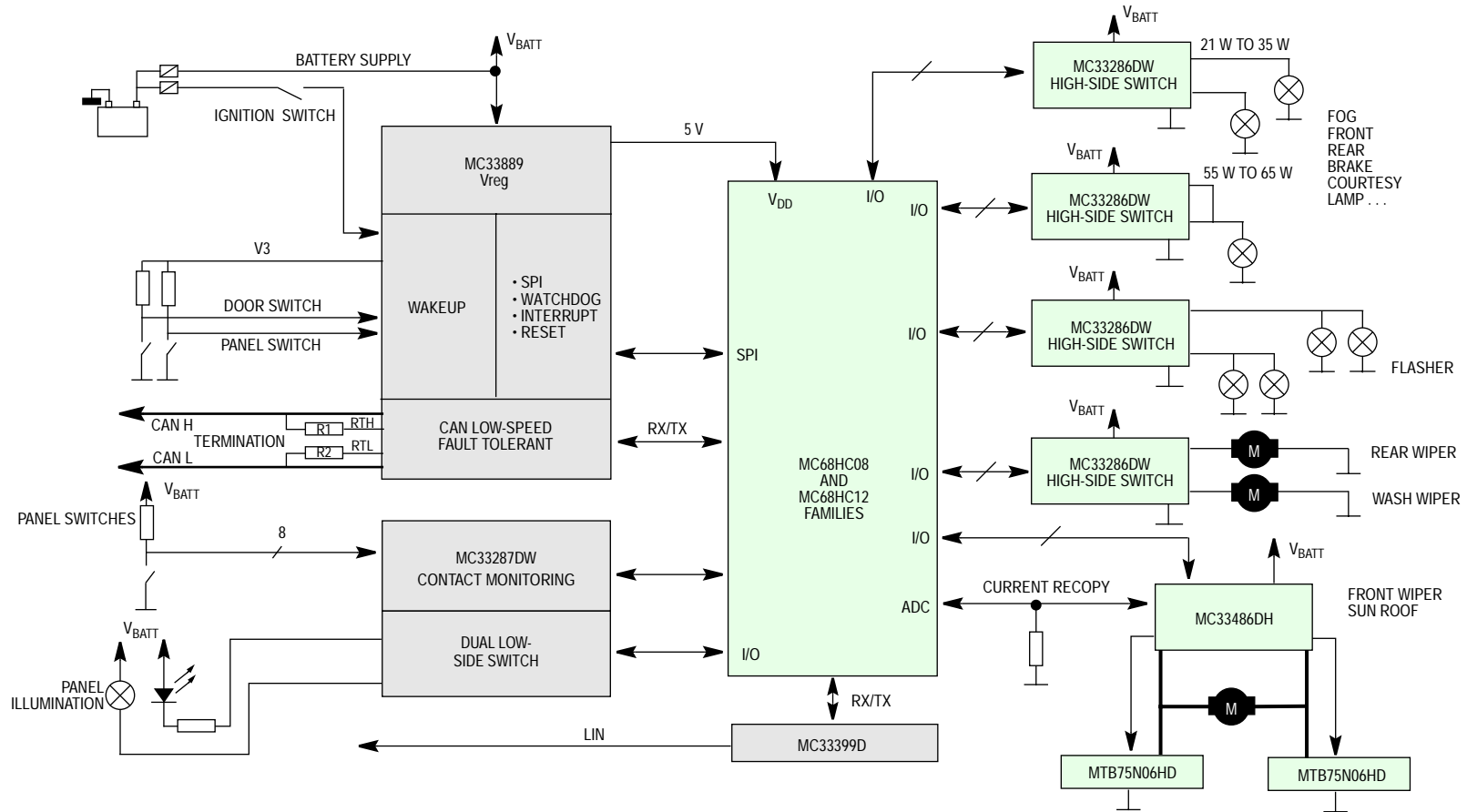
Automotive Door System Example



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, $V_{BDSS} = 65V$, $R_{DS(ON)} = 1.4\Omega$, $I_{Load} = 0.5A$
LIN physical interface	MC33399D	Supply 7V to 27V, several wakeup modes, sleep mode, slew rate 1 to 2V/ μ s
Microcontroller	XC68HC912BC32	32K FLASH, 1K RAM, 768 EEPROM, timer, PWM, A/D, SCI, SPI, CAN
Microcontroller	XC68HC912D60	60K FLASH, 2K RAM, 1K EEPROM, timer, PWM, 2 x A/D, 2 x SCI, SPI, CAN
Microcontroller	XC68HC08AZ32	32K ROM, 1K RAM, 512 EEPROM, timer, PWM, A/D, SCI, SPI, CAN
Motor driver/controller	MC33186DH1R2	150M Ω H-bridge driver, $V_{BDSS} = 40V$, $R_{DS(ON)} = 0.15\Omega$
High-side driver	MC33486DH	Motor control with diagnostics and current recopy function, H-bridge, $V_{BDSS} = 40V$, $R_{SD(ON)} = 15M\Omega$, $I_{Load} = 1-A - 20A$
TMOS power FET	MTB75N06HD	60V, 0.01 Ω

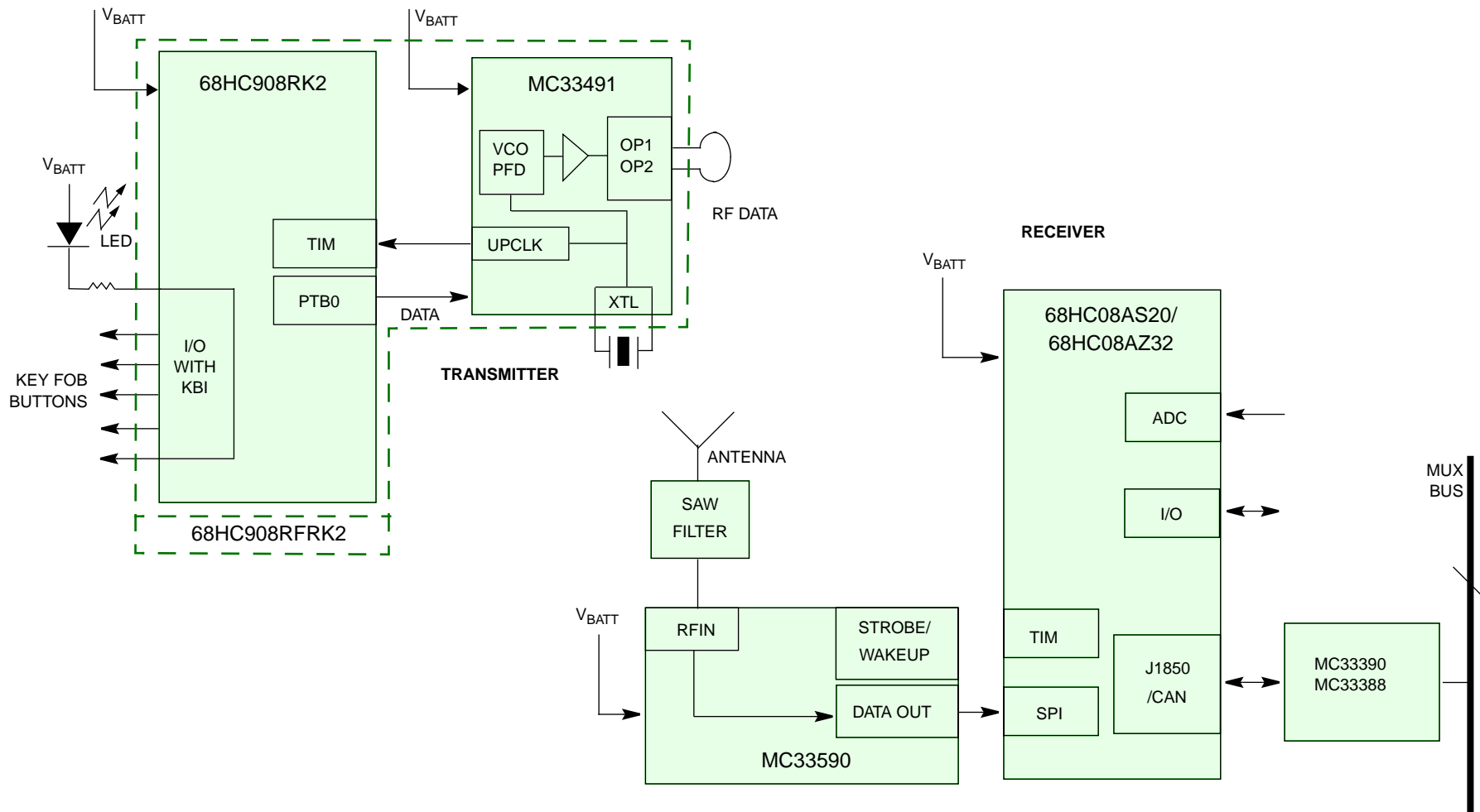
Intelligent Switches Unit

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, $V_{BDSS} = 65V$, $R_{DS(ON)} = 1.4\Omega$, $I_{LOAD} = 0.5A$
LIN physical interface	MC33399D	Supply 7V to 27V, several wakeup modes, sleep mode, slew rate 1 to 2V/ μs
Microcontroller	XC68HC912DG128	128K FLASH, 8K RAM, 2K EEPROM, timer, PWM, 2 x A/D, 2 x SCI, SPI, 2 x CAN
Microcontroller	XC68HC912D60	60K FLASH, 2K RAM, 1K EEPROM, timer, PWM, 2 x A/D, 2 x SCI, SPI, CAN
Microcontroller	MC68HC908AZ60	32K ROM, 1K RAM, 1K EEPROM, timer, PWM, A/D, SCI, SPI, CAN
Motor driver/controller	MC33186DH1R2	150M Ω H-bridge driver, $V_{BDSS} = 40V$, $R_{DS(ON)} = 0.15\Omega$
High-side driver	MC33486DH	Motor control with diagnostics and current recopy function, H-bridge, $V_{BDSS} = 40V$, $R_{SDON} = 15M\Omega$, $I_{Load} = 1A - 20A$
TMOS power FET	MTB75N06HD	60V, 0.01 Ω

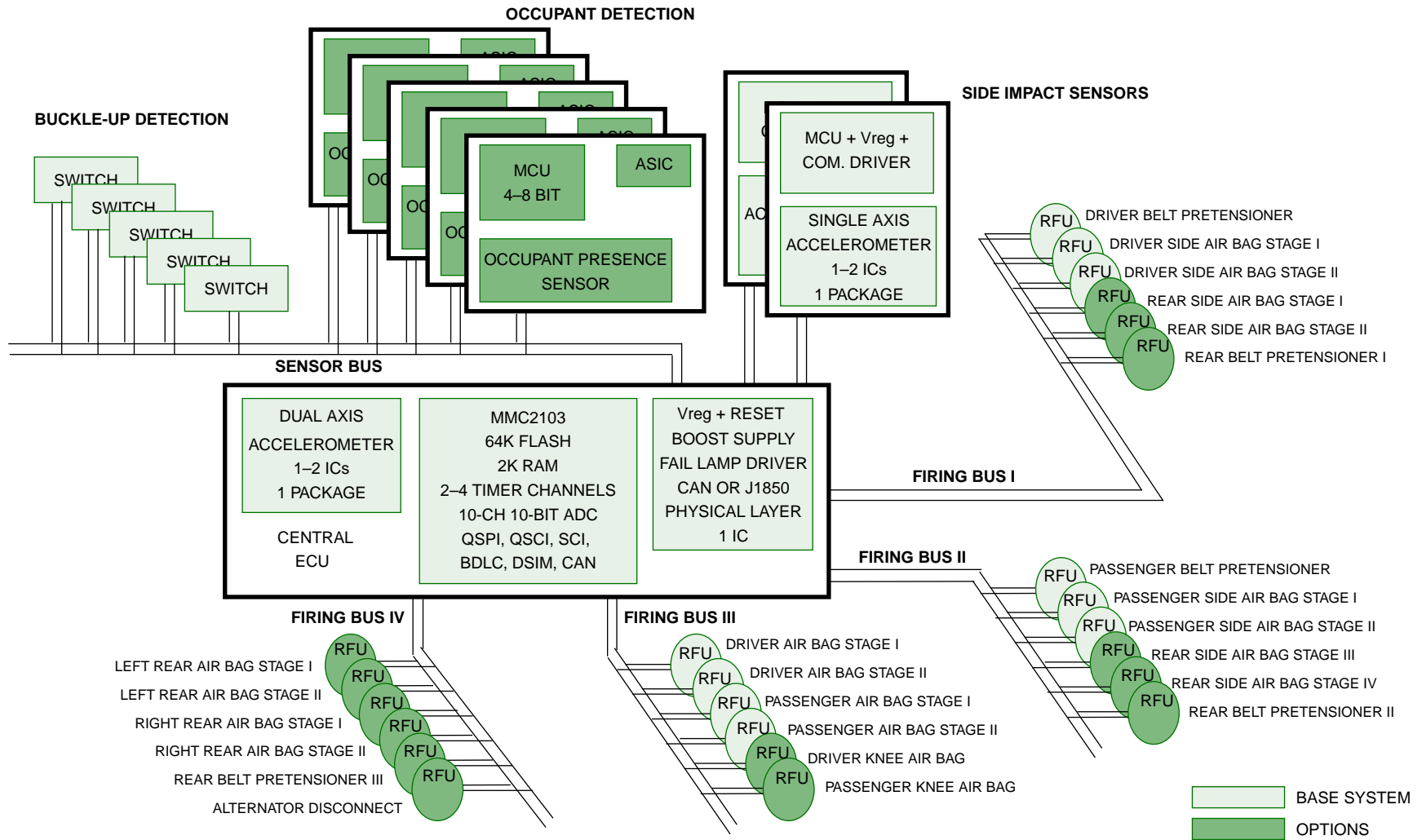
RKE Transmitter/Receiver System Example



Device Application	Suggested Device	Device Highlights
Microcontroller	PC68HC908RK2	2K FLASH, 128K RAM, timer, low-power embedded FLASH routine
Microcontroller	PC68HC908RFRK2	2K FLASH, 128K RAM, timer, integrated RF transmitter
RF transmitter/receiver	MC33491	PLL tuned UHF transmitter (ASK and FSK modulation)
RF transmitter/receiver	MC33590	PLL tuned UHF AM receiver
Microcontroller	XC68HC08AS32	20K ROM, 1K RAM, 512 EEPROM, timer, A/D, SCI, SPI, J1850
J1850 serial link transceiver	MC33390	GM/Chrysler J1850 Class B
CAN physical interface	MC33388D	SPI, CAN low-speed tolerant physical interface (125kbps)

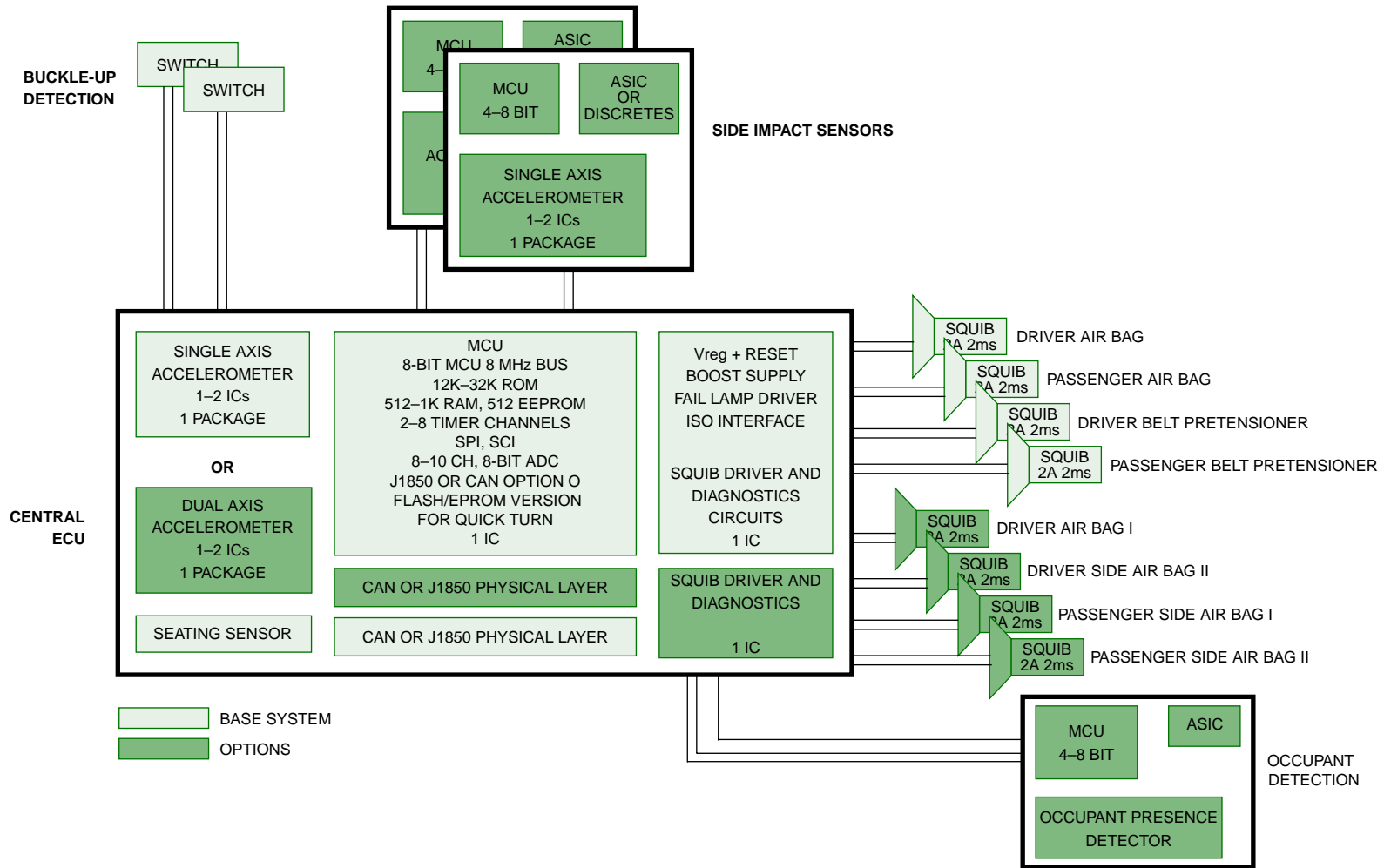
RKE Transmitter/Receiver

DSI Architecture Example



Device Application	Suggested Device	Device Highlights
DSI physical interface	MC3370	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

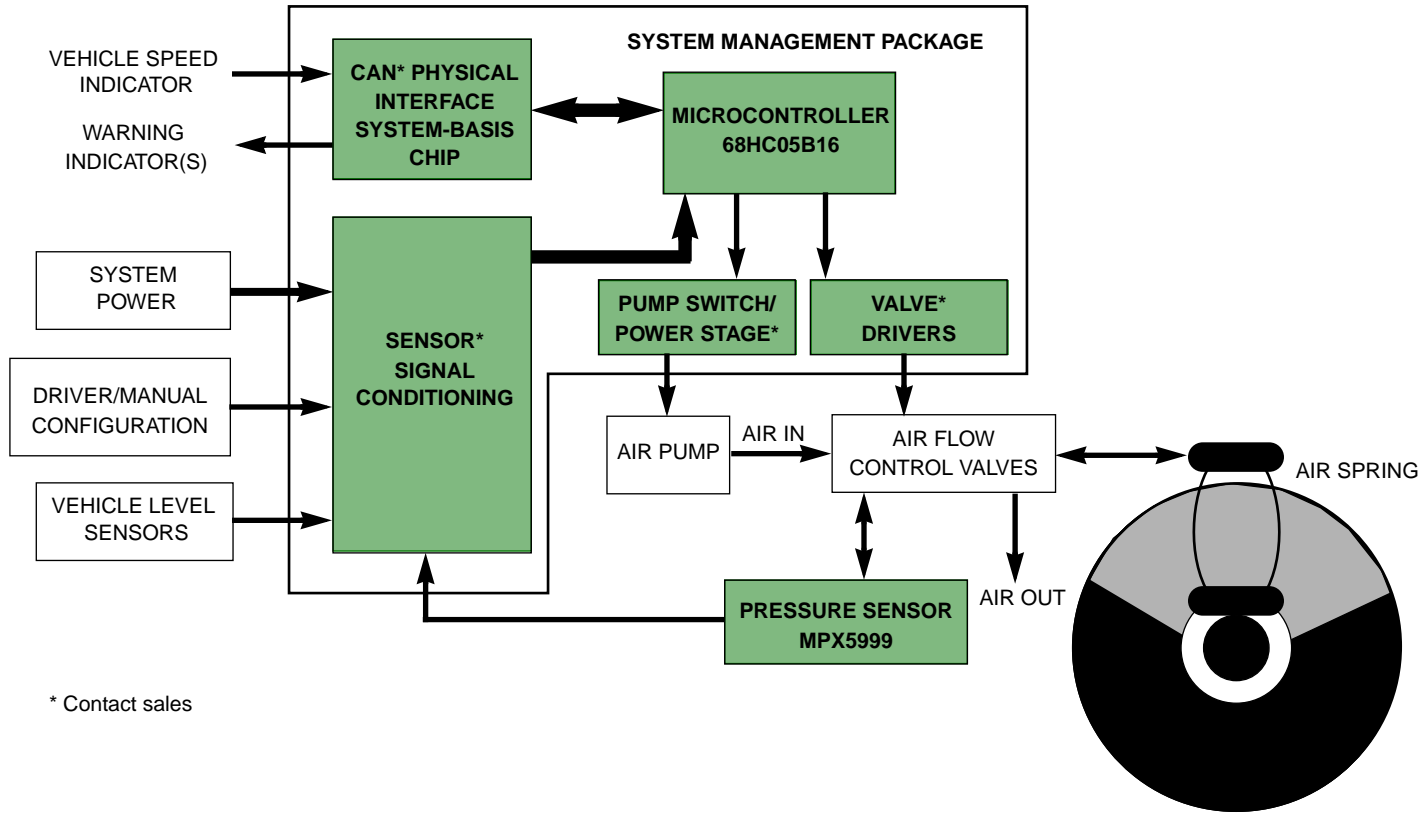
Motorola Single-Point Sensing Solution Example



Device Application	Suggested Device	Device Highlights
Sensor	XMMA3001D	Inertial sensor for acceleration/deceleration
Sensor	XMMA2001D	Inertial sensor for acceleration/deceleration
Microcontroller	MC68HC05PV8	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	XC68HC08AZ32	32K ROM, 1K RAM, 512 EEPROM, timer, PWM, A/D, SCI, SPI, CAN

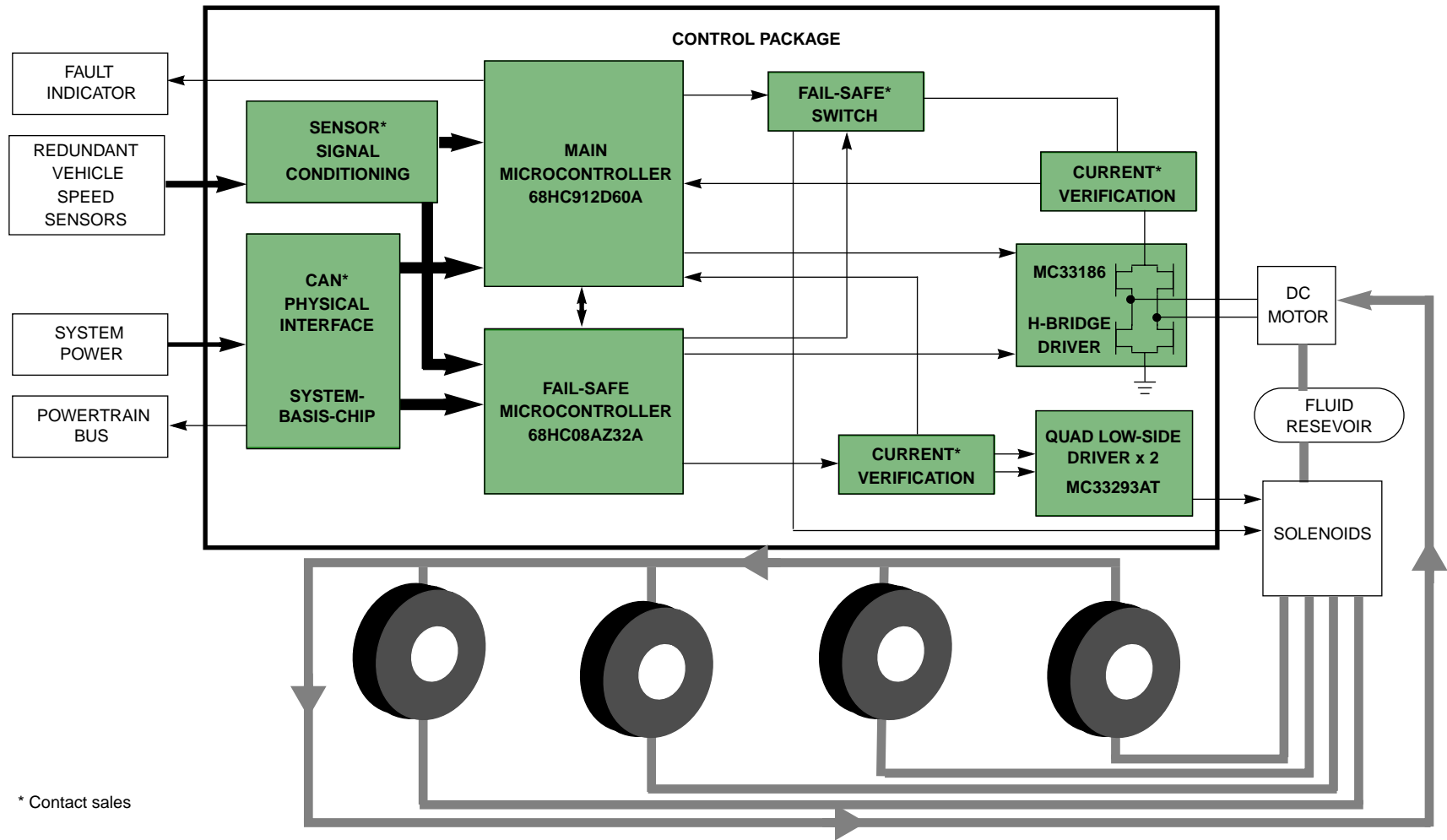
Adaptive Suspension

Adaptive Suspension



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

Antilock Braking System

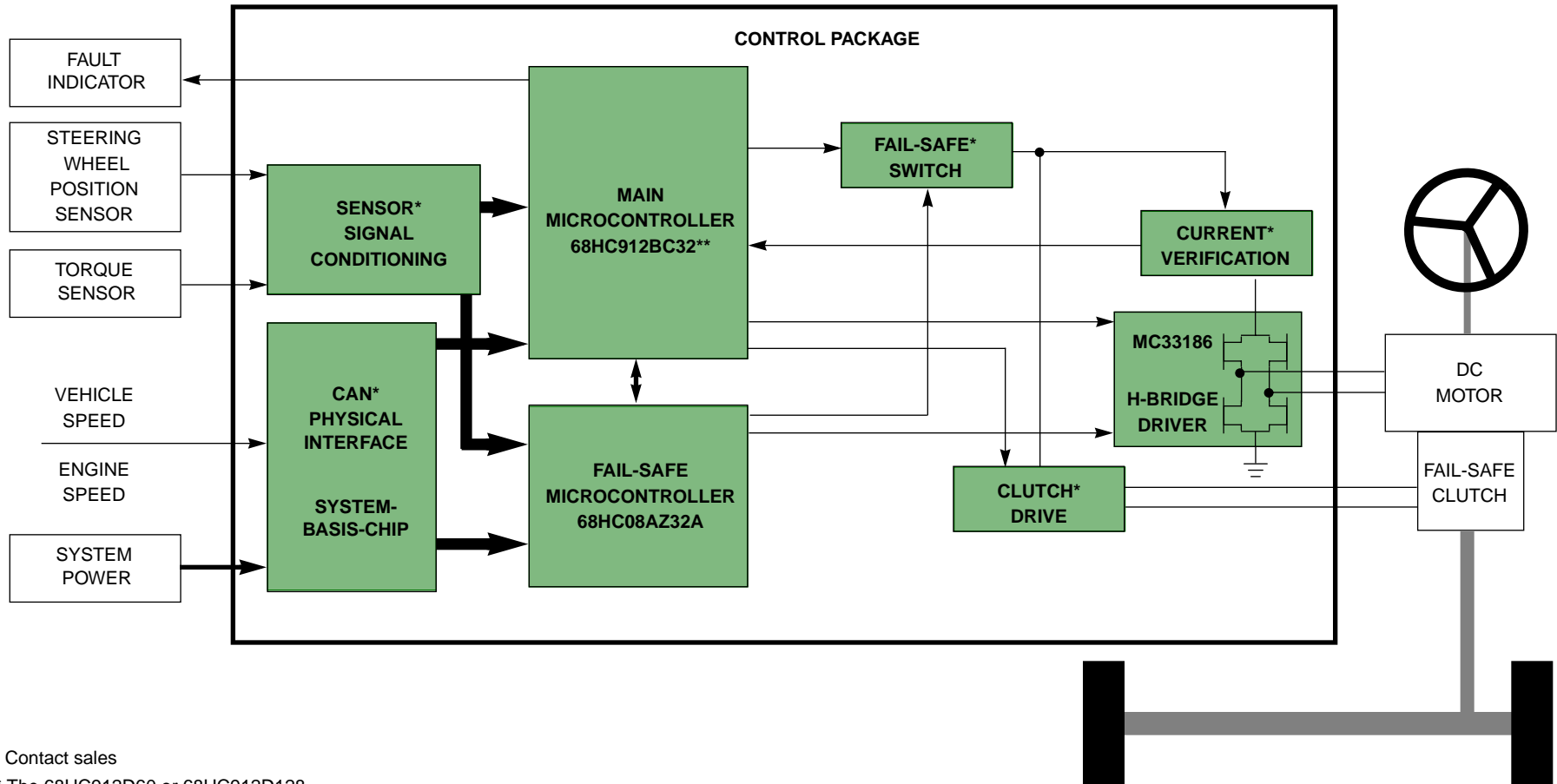


* Contact sales

Device Application	Suggested Device	Device Highlights
Main MCU	68HC912D60A	2K RAM, 60K FLASH, 8-CH/16-bit ECT, 2 SCI, SPI, CAN 2.0a/b
H-bridge driver	MC33186	150-mΩ H-bridge driver
Low-side driver	MC33293AT	Dual low-side driver
Fail-safe MCU	68HC08AZ32A	32K ROM, 1K RAM, 512 bytes EEPROM, CAN 2.0a/b, 64 QFP packaging option

Electric Power Assist

Electric Power Assist Steering System Example



* Contact sales

** The 68HC912D60 or 68HC912D128 may also be used in this application.

Device Application	Suggested Device	Device Highlights
Main MCU	68HC912BC32	32K ROM, 1K RAM, 768 bytes EEPROM, CAN 2.0a/b, 80 QFP packaging option
Fail-safe MCU	68HC08AZ32A	32K ROM, 1K RAM, 512 bytes EEPROM, CAN 2.0a/b, 64 QFP packaging option
H-bridge driver	MC33186	150-mΩ H-bridge driver, HSOP20 packaging

— Definitions —

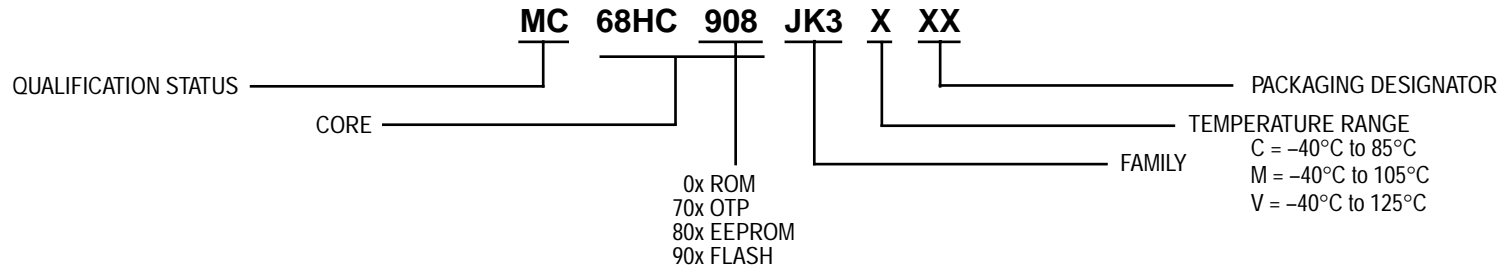
ADC — Analog-to-Digital Converter
BDM — Background Debug Mode
CAN — Controller Area Network
CDIP — Ceramic Dual In-Line Package
CLCC — Ceramic Leaded Chip Carrier
COP — Computer Operating Properly (Watchdog Timer)
CPU16 — 16-Bit Central Processor Unit (HC11 Compatible)
CPU32 — 32-Bit Central Processor Unit (68000 Compatible)
CTM — Configurable Timer Module (Various Hardware Options)
DIP — Dual In-line Package
DTMF — Dual-Tone Multi-Frequency
EBI — External Bus Interface
GPT — General-Purpose Timer Module (4 IC, 5 OC, 2 PWM)
IC — Input Capture
I²C — 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

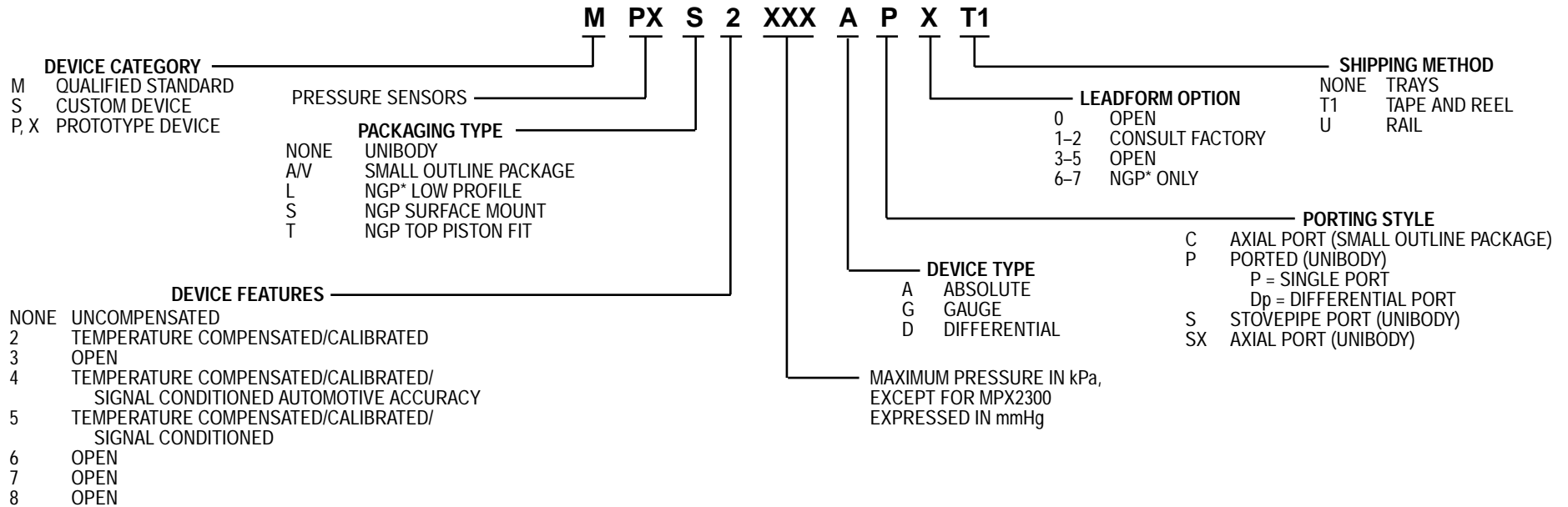
— Package Designators —

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 Sidebrazed
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

Device Numbering System for Microcontrollers



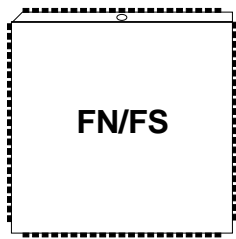
Device Numbering System for Pressure Sensors



*NGP = NEXT GENERATION PACKAGING

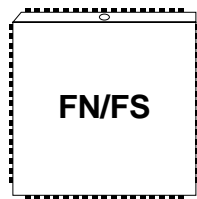
Package Options (Actual Size)

84-Lead PLCC/CLCC



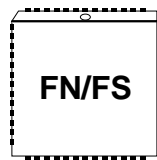
50 mil/1.27 mm Pitch
1.15 in x 1.15 in Body

68-Lead PLCC/CLCC



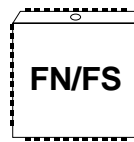
50 mil/1.27 mm Pitch
0.950 in x 0.950 in Body

52-Lead PLCC/CLCC



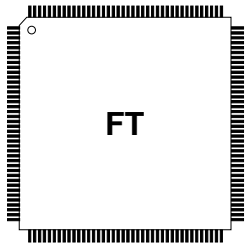
50 mil/1.27 mm Pitch
0.750 in x 0.750 in Body

44-Lead PLCC/CLCC



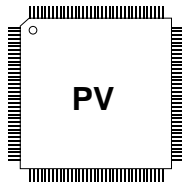
50 mil/1.27 mm Pitch
0.650 in x 0.650 in Body

160-Lead QFP



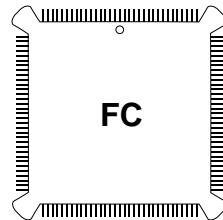
.65 mm Pitch
28 mm x 28 mm Body

144-Lead LQFP



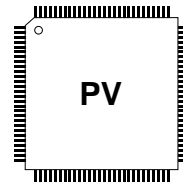
.5 mm Pitch
20 mm x 20 mm Body

132-Lead PQFP



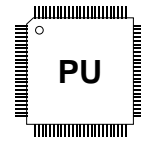
25 mil/06.35 mm Pitch
0.950 in x 0.950 in Body
(Nominal, w.o. Bumpers)

112-Lead LQFP



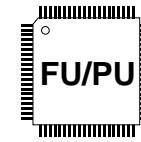
.65 mm Pitch
20 mm x 20 mm Body

100-Lead LQFP



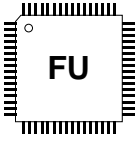
.5 mm Pitch
14 mm x 14 mm Body

80-Lead QFP/LQFP



.65 mm Pitch
14 mm x 14 mm Body

64-Lead QFP



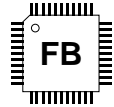
.8 mm Pitch
14 mm x 14 mm Body

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

28-Lead SOIC



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

20-Lead SOIC



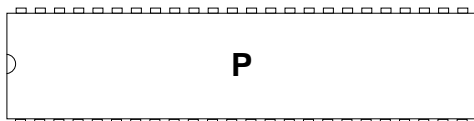
50 mil/1.27 mm Pitch
12.8 mm x 7.5 mm Body

16-Lead SOIC



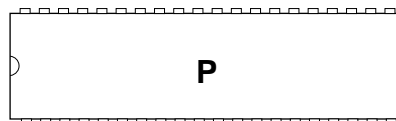
50 mil/1.27 mm Pitch
10.35 mm x 7.5 mm Body

48-Pin Plastic DIP



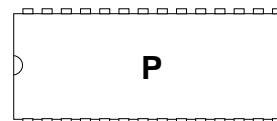
100 mil/2.54 mm Pitch
2.45 in x .55 in Body
(100 mil x 600 mil pin centers)

40-Pin Plastic DIP



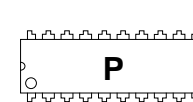
100 mil/2.54 mm Pitch
2.05 in x .55 in Body
(100 mil x 600 mil pin centers)

28-Pin DIP



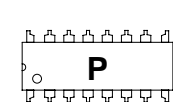
100 mil/2.54 mm Pitch
1.45 in x .55 in Body
(100 mil x 600 mil pin centers)

20-Pin Plastic DIP



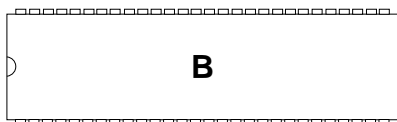
100 mil/2.54 mm Pitch
.97 in x .29 in Body
(100 mil x 600 mil pin centers)

16-Pin Plastic DIP



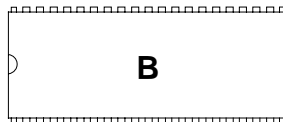
100 mil/2.54 mm Pitch
.75 in x .25 in Body
(100 mil x 600 mil pin centers)

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

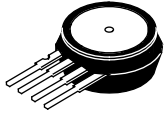


70 mil/1.778 mm Pitch
1.45 in x .55 in Body
(70 mil x 600 mil pin centers)

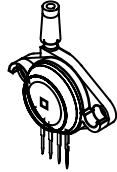
Package Options

Package Options (Actual Size)

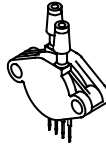
4-Pin



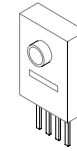
BASIC ELEMENT*
CASE 344-15
SUFFIX A/D



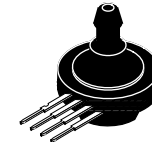
GAUGE PORT*
CASE 344B-01
SUFFIX AP/GP



DUAL PORT*
CASE 344C-01
SUFFIX DP

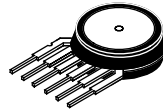


MEDICAL CHIP PAK*
CASE 423A-03

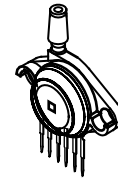


STOVEPIPE PORT
CASE 344E-01
SUFFIX AS/GS

6-Pin

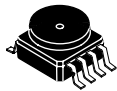


BASIC ELEMENT*
CASE 867-08
SUFFIX A/D

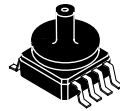


GAUGE PORT*
CASE 867B-04
SUFFIX AP/GP

8-Pin



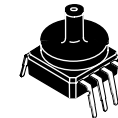
SMALL OUTLINE
(SURFACE MOUNT)*
CASE 482-01



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




SMALL OUTLINE
(DIP)
CASE 482B-03



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

*Indicates preferred packing options



Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution, P.O. Box 5405, Denver, Colorado 80217. 1-303-675-2140 or 1-800-441-2447. Customer Focus Center, 1-800-521-6274

JAPAN: Motorola Japan Ltd.; SPS, Technical Information Center, 3-20-1, Minami-Azabu, Minato-ku, Tokyo 106-8573 Japan. 81-3-3440-8573

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Centre, 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong. 852-26668334

HOME PAGE: <http://motorola.com/semiconductors/>



MOTOROLA

© Motorola, Inc., 2000

SG187/D