

Dryers

Overview

Home appliance controls are changing from purely mechanical to fully electronic as microcontrollers are incorporated into the designs. While providing intelligence, microcontrollers boost reliability, drive down costs, and improve energy efficiency.

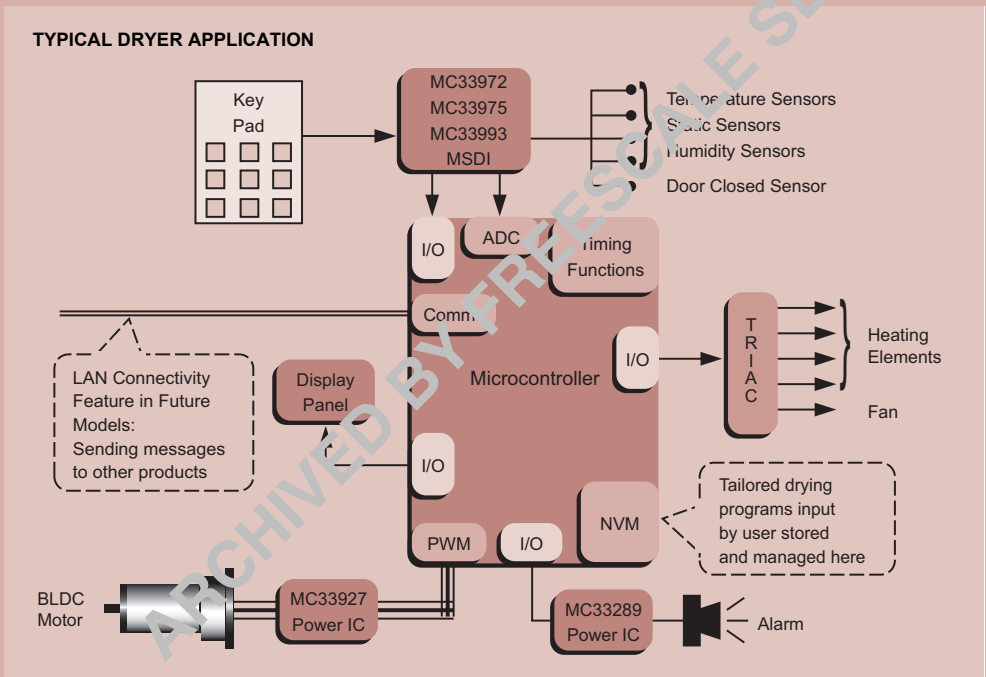
New dryer features make this appliance more energy efficient and better able to meet consumer demands for improved control.

Freescal's *SMARTMOS™* analog portfolio provides power actuation (MC33927) and

multiple switch detect (Flexible I/O) family ICs. The power actuation devices will support BLDC motors and static load controls. The Flexible I/O family provides a simple system power conservation solution providing a WAKE output with which the MCU power supply can be enabled when MCU activation is required. It allows optimized switch OPEN/CLOSE status verification of multiple switches with changes immediately reported to the MCU.

Key Benefits

- > Conserves energy by efficiently controlling the heating element
- > Provides a quieter, power-efficient operation with less vibration
- > Enhances informational display functions
- > Provides an event control alarm
- > Offers an in-home connection that sends dryer progress messages to other in-home devices



Freescale Ordering Information^{Note}

Part Number	Product Highlights	Additional Information
DSP56F801	80 MHz, 40 MIPS, SCI, SPI, ADC, PWM, Quad Timer, and 8 K Program Flash; 1 K Program RAM, 2 K Data Flash, and 1 K Data RAM; MCU-Friendly Instruction Set; OnCE for Debug; On-Chip Relaxation Oscillator, 2 K BootFLASH; Up to 11 GPIO Available in a 48-Pin LQFP	www.freescale.com
DSP56F802	80 MHz, 40 MIPS, SCI, SPI, ADC, PWM, Quad Timer, and 8 K Program Flash; 1 K Program RAM, 2 K Data Flash, and 1 K Data RAM; MCU-Friendly Instruction Set; OnCE for Debug; On-Chip Relaxation Oscillator, 2 K BootFLASH; Up to 4 GPIO Available in a 32-Pin LQFP	
DSP56F803	80 MHz, 40 MIPS, CAN, SCI, SPI, ADC, PWM, Quad Timer, and 8 K Program Flash; 1 K Program RAM, 2 K Data Flash, and 1 K Data RAM; MCU-Friendly Instruction Set; OnCE for Debug; On-Chip Relaxation Oscillator, 2 K BootFLASH; Up to 16 GPIO Available in a 100-Pin LQFP	
MC33289	Dual High-Side Switch for Inductive Loads, 2 x 40 mΩ	www.freescale.com/analog
MC33927	Three-Phase FET Pre-Driver	
MC33972	22 Input Multiple Switch Detection Interface with Suppressed Wake-Up	
MC33975	22 Input Multiple Switch Detection Interface with Higher Wetting Current	
MC33993	22 Input Multiple Switch Detection Interface	
MC56F801x Family	Up to 32 MHz, 32 MIPS, and Up to 16 KB Flash; 4 KB Unified Data/Program RAM; EEPROM Emulation Capability; SCI with LIN, SPI, I ² C, ADC, PWM, GPIO, COP/Watchdog; MCU-Style Software Stack Support; JTAG/OnCE for Debug	www.freescale.com
MC56F8122	40 MHz, 40 MIPS, 40 KB Flash, and 8 KB RAM with 2 SPI, 2 SCI, ADC, COP, PLL, 2 Quad Timers; MCU-Friendly Instruction Set; Enhanced OnCE for Debug; Industrial (-40°C to 105°C) with Up to 21 GPIOs in a 48-Pin LQFP	
MC56F8123	40 MHz, 40 MIPS, 48 KB Flash, and 8 KB RAM with 2 SPI, 2 SCI, ADC, COP, PLL, 2 Quad Timers; MCU-Friendly Instruction Set; Enhanced OnCE for Debug; Industrial (-40°C to 105°C) with Up to 27 GPIOs in a 64-Pin LQFP	
MC56F8322	60 MHz, 60 MIPS, 48 KB Flash, and 12 KB RAM with 2 SPI, 2 SCI, 2 ADC, PWM, COP, PLL, Decoder, 2 Quad Timers, FlexCAN™; MCU-friendly Instruction Set; Enhanced OnCE for Debug; On-Chip Relaxation Oscillator; Temperature sensor; Industrial (-40°C to 105°C) and Extended (-40°C to 125°C) Temperature Ranges with Up to 21 GPIOs in a 48-Pin LQFP	
MC56F8323	60 MHz, 60 MIPS, 48 KB Flash, and 12 KB RAM with 2 SPI, 2 SCI, 2 ADC, PWM, COP, PLL, Decoder, 2 Quad Timers, FlexCAN™; MCU-friendly Instruction Set; Enhanced OnCE for Debug; On-Chip Relaxation Oscillator; Temperature Sensor; Industrial (-40°C to 105°C) and Extended (-40°C to 125°C) Temperature Ranges with Up to 27 GPIOs in a 64-Pin LQFP	
MC68HC(9)08AZxx	ADC, SCI, SPI, CAN, EEPROM	
MC68HC908MRxx	ADC, PWM, SCI, SPI	
MC68HC(9)08ABxx	ADC, SCI, SPI, EEPROM	
MC68HC(9)08GPxx	ADC, SCI, SPI	
MC68HC908GTxx	ADC, SCI, SPI, ICG	
MC68HC908GRxx	ADC, SCI, SPI	
MC68HC(9)08JLxx	ADC	
MC68HC(9)08JKxx	ADC	
MC68HC908KXxx	ADC, SCI	
MC68HC908Qxx	Low Pin Count, Low Cost	

Note: Search on the listed part number.

Design Challenges

Today's appliance designers face multiple challenges beyond the appliance's base functionality of:

Cost

The highly competitive, high-volume, and cost-sensitive appliance market can save thousands of dollars by eliminating just a few cents from the solution's cost.

Flexibility

New models are introduced every year, as products have a relatively short life

Freescale Semiconductor Solution

Freescale Semiconductor is the Flash microcontroller industry leader. Flash memory is a nonvolatile memory (NVM) technology that provides:

- > Reduced time to market with application re-programmability
- > Improved write/erase and data retention performance for Flash, which allows the user to define preferred settings
- > Faster Flash memory programming and erase times
- > Flexible block protection and security

cycle. Software problems must be quickly eliminated, which requires professional development tools and faster, more efficient development cycles.

Noise

Minimum levels of noise and vibration are desirable. As consumers become busier, multiple appliances are simultaneously in use, especially at night when electricity rates are lower.

- > EEPROM emulation

Embedded Flash brings new design flexibility:

- > Provides end-of-line customizing for regional variations in consumer demands
- > Provides software-enabled intelligence to satisfy changing legislation
- > Supports remote diagnostics and preventative maintenance
- > Minimizes programming costs
- > Increases code flexibility with production, line programming

Legislation

Energy regulations, combined with consumer demand for efficient appliances that consume less energy, water, and laundry products, are forcing manufacturers to design their products to meet these requirements.

Measurement Accuracy

The ability to measure temperature, humidity, and static in the dryer enables the appliance to operate at maximum efficiency.

- > Reduces code obsolescence, which saves on scrapped product costs
- > Shortens lead times, which improves time to market
- > Standardizes platforms, which reduces product variability
- > Eliminates sockets and rework with in-system programmable Flash
- > Provides for field upgrades and allows remote reprogramming of the microcontroller
- > Eliminates the need for external EEPROM by using EEPROM emulation

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Development Tools^{Note}

Tool Type	Product Name	Vendor	Description	Additional Information	
Software	CW568X	Freescale Semiconductor	CodeWarrior™ Development Studio for 56800/E Controllers with Processor Expert (Metrowerks)	www.freescale.com	
Software	CWHC08	Metrowerks	CodeWarrior Full Package for HC08	www.metrowerks.com	
Software	CWHC08ASM	Metrowerks	CodeWarrior ASM Tools for HC08		
Software	CWHC08CC	Metrowerks	Stand-Alone C/C++/c++/EC++ Compiler for HC08		
Software	CWHC08MIG	Metrowerks	CodeWarrior Full Package for HC08 Migration		
Hardware	56F800DEMO	Freescale Semiconductor	56F800 Demonstration Kit	www.freescale.com	
Hardware	68HC08 Emulators, Cables, and Adapters	Freescale Semiconductor	Emulation Modules, Flex Cables, and Target Head Adapters in Support of 68HC08 MCUs		
Hardware	68HC08 Programmers	Freescale Semiconductor	Programmer Boards in Support of 68HC08 MCUs		
Hardware	DEMO56F8013	Freescale Semiconductor	Demonstration Kit for the 56F8013		
Hardware	DEMO56F8014	Freescale Semiconductor	Demonstration Kit for the 56F8014		
Hardware	DSP56F801EVM	Freescale Semiconductor	Evaluation Module for 56F801 and 56F802		
Hardware	DSP56F803EVM	Freescale Semiconductor	Evaluation Module for 56F803		
Hardware	MC56F8300DSK	Freescale Semiconductor	56F8300 Developers Start Kit		
Hardware	MC56F8323EVM	Freescale Semiconductor	Evaluation Module for 56F8322 and 56F8323		
Evaluation Kit	KIT33289DWEVB	Metrowerks	Automotive Dual High-Side Switch		www.metrowerks.com
Evaluation Kit	KIT33993DWBEVB	Metrowerks	22 Input Multiple Switch Detection Interface		
Development	In-Circuit Simulator (ICS) Kits	Freescale Semiconductor	Low-Cost Tools for Development and Debugging Target Systems Incorporating 68HC08 MCUs	www.freescale.com	
Development	Modular Evaluation System (MMEVS) Kits	Freescale Semiconductor	Economical, Two-Chip Emulator for the 68HC(9)08 MCUs		
Development	Modular Development System (MMDS) Kits	Freescale Semiconductor	Full-Featured Simulator System for Developing Embedded Systems Using 68HC(9)08 MCUs		
Development	MON08 Cyclone	Freescale Semiconductor	Provides all the capabilities of the MON08 Multilink plus the ability to function as a stand-alone programmer with push buttons and LED user interface.		
Development	MON08 Multilink	Freescale Semiconductor	Low-Cost Development Tool for 68HC08 Flash MCUs		

Note: Search on the listed product name.

Related Documentation^{Note}

Document Number	Description	Additional Information
816PITCHPAK03	MCU and 16-Bit Sales Binder	www.freescale.com
APDPAK	Analog ICs Integrated Solutions Pitch Pack	
BR68HC08FAMAM	68HC08 Family: High Performance and Flexibility	
CWDEVSTUDFACTHC08	CodeWarrior Development Studio for 68HC08, Special Edition Brochure	
FLYREMBEDFLASH	Embedded Flash: Changing the Technology World for the Better	
SG1002	Analog Product Selector Guide	

Note: Search on the listed document number.

Learn More: Contact the Technical Information Center at +1-800-521-6274 or +1-480-768-2130. For more information about Freescale products, please visit www.freescale.com.