

# Motorola Semiconductor Engineering Bulletin

---

## EB258

## Sources of Reset on Modular Microcontrollers

By Sharon Darley  
Austin, Texas

### Introduction

---

Motorola modular microcontrollers have several sources of reset which are listed here. Resets can be both synchronous and asynchronous. Synchronous reset signals are asserted at the end of the current bus cycle, while asynchronous reset signals cause an immediate reset of the system.

To see which type of reset last occurred, read the reset status register to see which bit has been set.

### General Information

---

#### External Reset

An external reset affects the clock module and all internal circuits. An external reset is a synchronous reset caused by a logic 0 signal applied to the RESET pin. After the RESET is driven low, the CPU reset control logic asserts RESET internally until the release of RESET. Then, the reset control logic drives RESET low for an additional 512 clock cycles. Because a conflict will occur if the RESET line is held low at the same time that the CPU32 executes a RESET instruction, the RESET line



must be held for at least 520 cycles to guarantee that the external reset is recognized by the external bus interface.

### Power-On Reset

Power-on reset is an asynchronous reset generated by the external bus interface. A modular microcontroller goes into reset when  $V_{DD}$  drops below approximately 2.5 volts, and it stays in reset until  $V_{DD}$  rises above this threshold. The duration for which  $V_{DD}$  must remain below the threshold to trigger power-on reset has not been measured, but it is typically on the order of nanoseconds. The power-on reset should not be relied upon to monitor  $V_{DD}$  voltage since parts of the device logic can fail at a higher  $V_{DD}$  than the power-on reset threshold. To monitor  $V_{DD}$ , use an external low voltage inhibit circuit such as the MC34064.

### Software Reset

The software reset is an asynchronous reset caused by a timeout of the software watchdog timer. Although software reset is enabled at power-on, it can be disabled by setting the software watchdog enable bit (SWE[7]) in the system protection control register (SYPCR).

When the software reset is enabled, the bit pattern \$55 followed by \$AA must be written into the software service register (SWSR) within a specified amount of time to prevent a software reset. This feature is typically used to stop a runaway program that has branched to the wrong location.


### Double Bus Fault Reset

A double bus fault reset is an asynchronous reset caused by the double bus fault monitor (also called the halt monitor). A double bus fault is a special case of a bus error which can abort exception processing.

After two bus error signals (BERR) are asserted, the MCU halts, drives the HALT line low, and then can be restarted only by a reset. When the HALT line is driven low internally, the double bus fault monitor will immediately cause a reset if it is enabled.

If the double bus fault monitor has been disabled by writing a 0 to the halt monitor enable (HME) bit in SYPCR, then nothing happens and the MCU remains in the halted state indefinitely and must be reset externally.

- Loss of Clock Reset**      A loss of clock reset is a synchronous reset that occurs when the frequency reference to the clock submodule is lost. For this reset to be enabled, the RSTEN bit in the synthesizer control register (SYNCR) must be set and the voltage-controlled oscillator (VCO) must be enabled.
- System Reset**              A system reset drives the RESET pin low, but does not reset the CPU or system integration module (SIM). A system reset is an asynchronous reset caused when the CPU32 executes a RESET instruction.
- This is the only reset that does not allow the CPU to regain the ability to write once to write-once-only bits, such as the software watchdog enable bits.
- The CPU16 does not have a RESET instruction.
- Test Reset**                      A test reset drives the external RESET pin low and resets all internal circuits other than the clock module. A test reset is a synchronous reset caused by the SIM test submodule when the MCU exits from special test mode.
- The test submodule is used for factory production testing of the MCU and is not recommended for user applications.

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, 1-800-441-2447 or 1-303-675-2140. Customer Focus Center, 1-800-521-6274

**JAPAN:** Motorola Japan Ltd.: SPD, Strategic Planning Office, 141, 4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan, 03-5487-8488

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd., Silicon Harbour Centre, 2 Dai King Street, Tai Po Industrial Estate, Tai Po, New Territories, Hong Kong, 852-26629298

**Mfax™, Motorola Fax Back System:** RMFAX0@email.sps.mot.com; <http://sps.motorola.com/mfax/>;  
TOUCHTONE, 1-602-244-6609; US and Canada ONLY, 1-800-774-1848

**HOME PAGE:** <http://motorola.com/sps/>

Mfax is a trademark of Motorola, Inc.



**MOTOROLA**

© Motorola, Inc., 1999

EB258/D