MOTOROLA

Semiconductor Products Sector

Order Number: AN2167/D
Rev. 0, 08/2001

AN2167

Application Note

Changing Romeo2 Configuration Registers While RF Data Is Being Received

Explanation of the problem

In some applications, it is required to change the Romeo2 configuration registers while RF data is being received. Some care has to be taken so that dummy data is not downloaded into Romeo2 configuration registers. The problem occurs when DME =1 and when clock pulses are shifted out on SCLK. For example, this can happen after a wake-up has been detected (if DME = 1 and HE = 0) or after a header has been detected (DME = 1 and HE = 1).

To change Romeo2 configuration registers, RSTb must be pulled down. A problem occurs if RSTb is forced low when SCLK is high. There is a time when the SCLK line is in a high impedance state (after Romeo2 is set as slave and before the MCU SPI is switched as master). Then, a first unwanted falling edge is generated on SCLK, either because the MCU forces SCLK low when it is set as master or because the SCLK voltage is discharged through device input capacitances (if the time is too long before the MCU is set as master). See Figure 1. This unwanted falling edge is understood by Romeo2 as a clock pulse. Then, Romeo2 starts to read (if MOSI is high at this unwanted edge) or write its configuration registers (if MOSI is low at this unwanted edge).The result is that the Romeo2 configuration registers may be corrupted, that a write is executed instead of a read, that a read is executed instead of a write, or that a read command is not correctly executed because one bit is shifted.

MOTOROLA
digital dna™
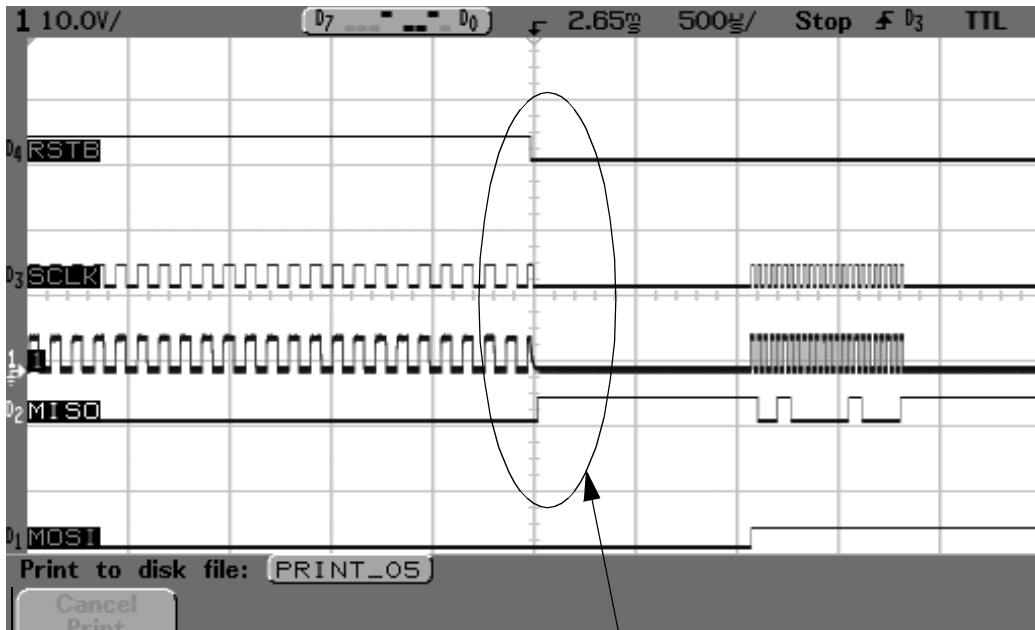
Trace 1 is the analog trace of SCLK.
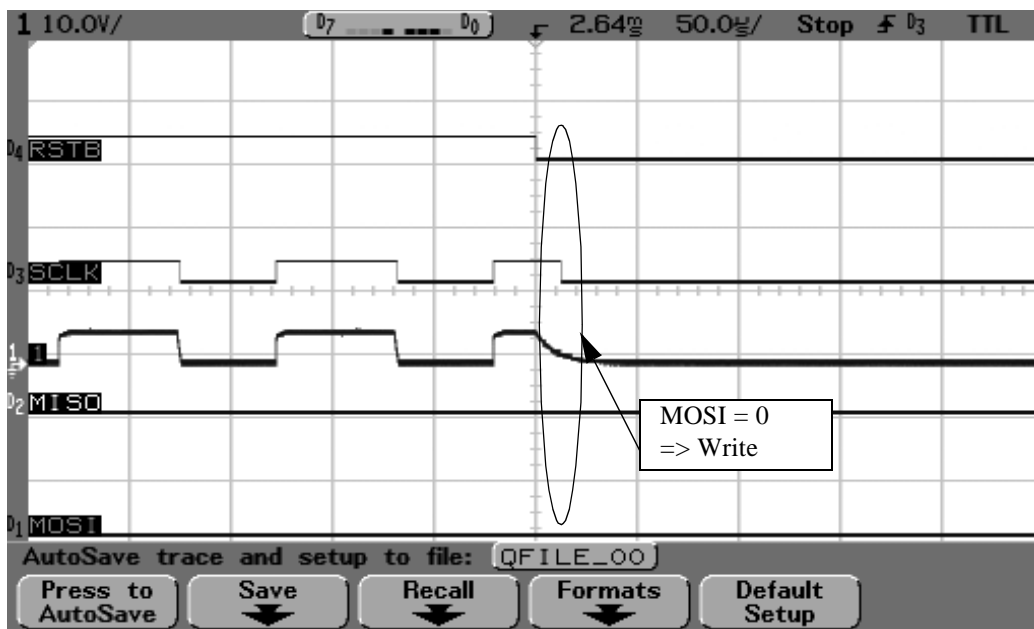
ZOOM

MOSI = 0
=> Write

Figure 1

With this example, the command is a read command. However, it is interpreted as a write command because MOSI = 1 at the unwanted falling edge. Since a read command was initially expected, MOSI is held as 1 for the whole command by the MCU. When MOSI = 1 during a write command, Romeo2 configuration registers are written as $FF instead of being interpreted as a read command.

Recommended solutions

Solution 1

Inserting a pull-down on SCLK is a risky solution; as a matter of fact, SCLK is quickly discharged by the pull-down resistor during the time when both Romeo2 and the MCU are slaves. But an unwanted edge occurs and is delayed versus the time when RSTb is pulled down. The Romeo2 state machine resynchronises the RSTb command with its internal 615 kHz sampling clock. If it is set as slave before the time when SCLK is pulled down, it is then considered as a falling edge; the problem still exists. See Figure 2.

ZOOM

Figure 2

Recommended solutions
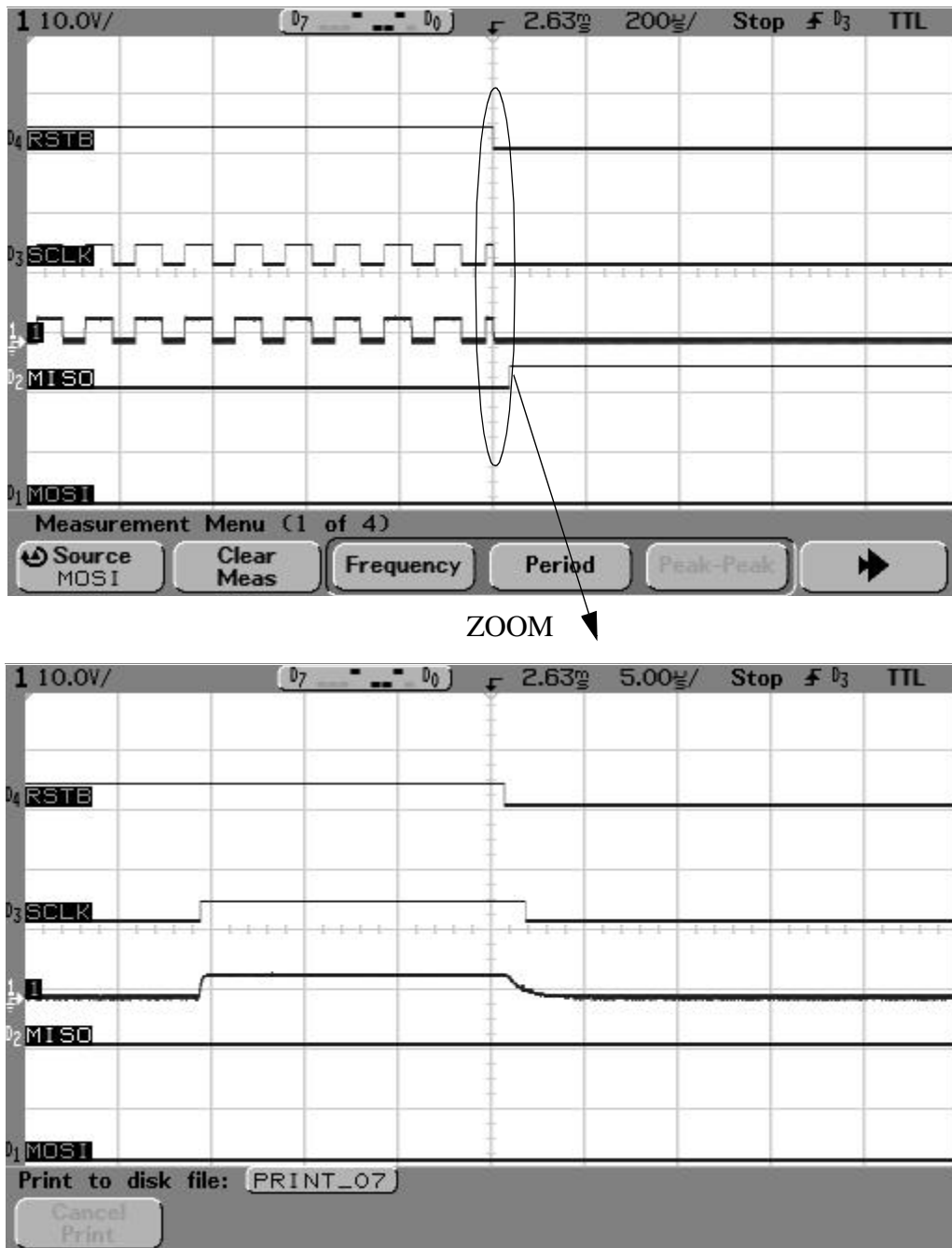
An unwanted SCLK edge occurs 1 μs after RSTb is pulled down. If it is understood as a clock pulse, the Romeo2 state machine is in trouble.

Solution 2

This solution involves monitoring the SCLK line. When the MCU detects a falling edge on SCLK, it pulls down RSTb. This solution is safe and secure. In fact, SCLK is noise free while the received signal is above the sensitivity level. The CPU must detect the falling edge on SCLK and force a low level on RSTb within a 50 μs time slot (when the data rate is 9600 bauds). This time slot is long enough for the CPU. This software solution has been implemented and extensively tested with success.

Solution 3

Solution 3 involves resetting the Romeo2 state machine with a short pulse on the RSTb pin. Then, the configuration is changed as shown below (see Figure 3).
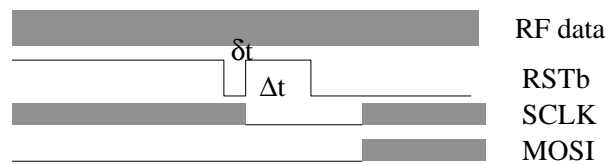

RF data
RSTb
SCLK
MOSI

δt
Δt

Figure 3

The first RSTb pulse is about 2 μs. This pulse width is long enough to be certain that the RSTb command is detected by the Romeo2 state machine. The pulse width is also short enough to be certain only one SCLK falling edge (in the worst case) is detected by the Romeo2 state machine. In slave mode, the first detected bit does not change Romeo2 configuration registers; it only sets the state machine either in write or read. Thus, this small RSTb pulse will reset the state machine into state 1 (see MC33591/2/3 data sheet). Then, since the strobe pin is high, the state machine will move to state 3 or state 7 (depending on the SOE bit). At this point, Romeo2 is waiting to receive a new ID byte. However, in these 2 states, SCLK is clean and low. Δt is shorter than the ID length so that the state machine does not move into state 5 or state 10 before the RSTb pin is pulled down; no SCLK pulse is shifted out. Also note that Δt must be longer than 4 μs. As a matter of fact, it has to be long enough so that the state machine moves to state 2 after the small RSTb pulse. A new Romeo2 configuration can then be downloaded safely.

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

JAPAN: Motorola Japan Ltd.; SPS, Technical Information Center, 3-20-1, Minami-Azabu. Minato-ku, Tokyo 106-8573 Japan. 81-3-3440-3569

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

Technical Information Center: 1-800-521-6274

HOME PAGE: http://www.motorola.com/semiconductors/

MOTOROLA

AN2167/D

SUNSTAR 商斯达实业集团是集研发、生产、工程、销售、代理经销 、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有 10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一,是一家专业代理和分銷世界各大品牌 IC 芯片和電子元器件的连锁经营綜合性国际公司,专业经营进口、国产名厂名牌电子元件，型号、种类齐全。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商,已在全国范围内建成强大统一的供货和代理分销网络。 我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM 电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA软件硬件、二极管、三极管、模块等,是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。商斯达实业公司拥有庞大的资料库,有数位毕业于著名高校——有中国电子工业摇篮之称的西安电子科技大学（西军电）并长期从事国防尖端科技研究的高级工程师为您精挑细选、量身订做各种高科技电子元器件,并解决各种技术问题。

更多产品请看本公司产品专用销售网站：

商斯达中国传感器科技信息网：http://www.sensor-ic.com/

商斯达工控安防网：http://www.pc-ps.net/

商斯达电子元器件网：http://www.sunstare.com/

商斯达微波光电产品网:HTTP://www.rfoe.net/

商斯达消费电子产品网://www.icasic.com/

商斯达实业科技产品网://www.sunstars.cn/

传感器销售热线：

    地址：深圳市福田区福华路福庆街鸿图大厦 1602 室

    电话：0755-83370250 83376489 83376549 83607652 83370251 82500323

    传真：0755-83376182 （0）13902971329 MSN: SUNS8888@hotmail.com

    邮编：518033 E-mail:szss20@163.com QQ: 195847376

    深圳赛格展销部：深圳华强北路赛格电子市场 2583 号 电话：0755-83665529 25059422

    技术支持：0755-83394033 13501568376

欢迎索取免费详细资料、设计指南和光盘 ；产品凡多，未能尽录，欢迎来电查询。

    北京分公司：北京海淀区知春路 132 号中发电子大厦 3097 号

      TEL：010-81159046 82615020 13501189838 FAX：010-62543996

    上海分公司：上海市北京东路 668 号上海赛格电子市场 2B35 号

      TEL：021-28311762 56703037 13701955389 FAX：021-56703037

    西安分公司：西安高新开发区 20 所(中国电子科技集团导航技术研究所)

        西安劳动南路 88 号电子商城二楼 D23 号

      TEL：029-81022619 13072977981 FAX:029-88789382