Mask Set Errata for Mask 2M00S

Introduction

This report applies to mask 2M00S for these products:

- MCF51EM256
- MCF51EM128

The mask set is identified by a 5-character code consisting of a version number, a letter, two numerical digits, and a letter, for example 0J27F. All standard devices are marked with a mask set number and a date code.

Device markings indicate the week of manufacture and the mask set used. The date is coded as four numerical digits where the first two digits indicate the year and the last two digits indicate the work week. For instance, the date code "0301" indicates the first week of the year 2003.

Some MCU samples and devices are marked with an SC, PC, or XC prefix. An SC prefix denotes special/custom device. A PC prefix indicates a prototype device which has undergone basic testing only. An XC prefix denotes that the device is tested but is not fully characterized or qualified over the full range of normal manufacturing process variations. After full characterization and qualification, devices will be marked with the MC or SC prefix.

SECF206-iRTC: iRTC repeatedly loops within the hour after Daylight Saving Time (DST) falls back

Errata type: Silicon
Affects: iRTC
Description: iRTC repeatedly loops within the hour after Daylight Saving Time (DST) falls back. This erratum only impacts iRTC when daylight saving falls back. Other features including DST forward are not impacted.

Following is an example where the erratum occurs:

If the iRTC is configured to have DST forward on day A at 14:00:00 and to have DST falls back on day B at 16:00:00 then the following behavior will be observed.

Forward on date A:
13:59:59 ->15:00:00

Fallback on date B:
The erratum behavior occurs in ***bold italics***: 15:59:59 -> 15:00:00 -> 15:59:59 **-> *15:00:00***
The correct behavior occurs in **bold**: 15:59:59 ->15:00:00 -> 15:59:59 **-> 16:00:00**

In the example above, the iRTC correctly rolls from 15:59:59 to 15:00:00 when fallback occurs. After the fallback occurs, the next hour roll over should be from 15:59:59 to 16:00:00 but it is incorrectly roll back to 15:00:00. iRTC then falsely loops between 15:59:59 and 15:00:00 repeatedly.

Workaround: This issue can be resolved by software where the iRTC Alarm feature disables the DST after the fallback event occurs. Then re-enables the DST after the iRTC passes the next hour (e.g after 16:00:00). Make sure the DST is re-enabled before the next DST event occurs.

Note that this workaround requires MCU to wake up when DST fallback event occurs once a year. Therefore, in additional to have power present at VBAT pin, it is also required to have power present at MCU VDD pins when DST fallback occurs.

Following is an example of the workaround:

15:59:59 -> 1st alarm (counter ==0)

- 15:59:59 falls back to 15:00:00
- In Alarm interrupt service routine :
  - Update software counter = 1 ;
  - Re-configure next alarm to a time before the next 15:59:59 roll over. In this example we keep the alarm time same as the first one at 15:59:59.

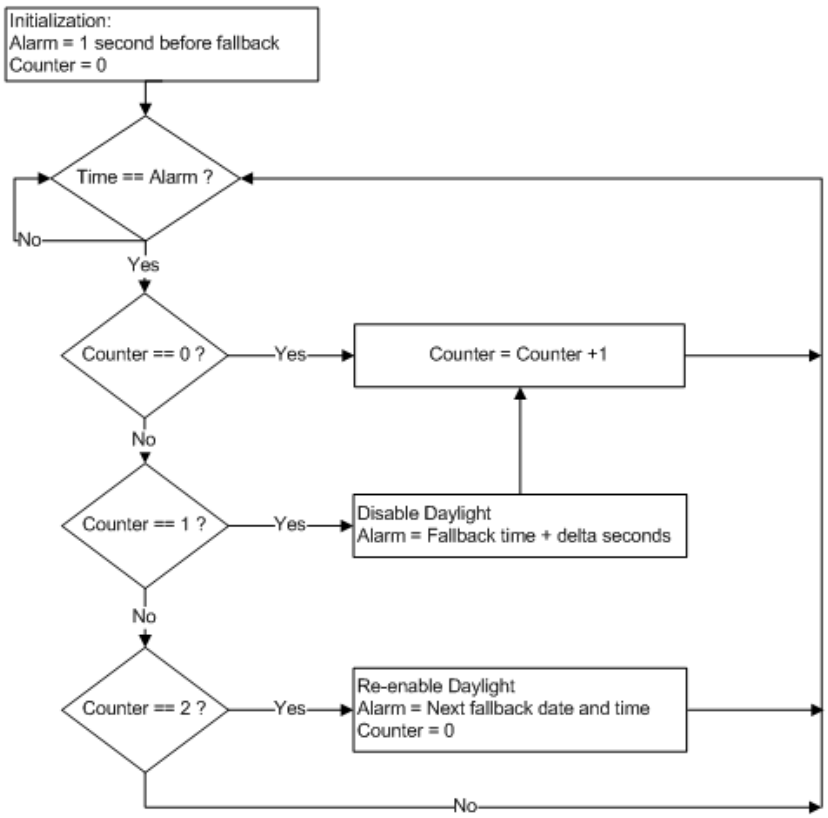
15:59:59 -> 2nd alarm (counter ==1)

- In Alarm interrupt service routine:
  - Disable DST feature. This allows 15:59:59 to correctly roll to 16:00:00
  - Re-configure next alarm to a time after 16:00:00. We recommend choosing a time long enough to account for alarm interrupt service routine execution time. Testing showed that with 15 seconds after roll over time is a safe delay. In this example the next alarm is set to 16:00:15
  - Set software counter = 2;

16:00:15 -> 3rd alarm (counter ==2)

- Re-enable DST feature so that the next DST event can occur.
- Re-configure alarm to the next DST fallback date and time
- Reset counter (counter = 0)

See following flow chart for the workaround example described above:


Initialization:
Alarm = 1 second before fallback
Counter = 0
Time == Alarm ?
No
Yes
Counter == 0 ?
Yes
Counter = Counter +1
No
Counter == 1 ?
Yes
Disable Daylight
Alarm = Fallback time + delta seconds
No
Counter == 2 ?
Yes
Re-enable Daylight
Alarm = Next fallback date and time
Counter = 0
No

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