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## USB2422

### Silicon Errata and Data Sheet Clarification

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This document describes known anomalies in the USB2422 device.

**TABLE 1: SILICON ISSUE SUMMARY**

Item Number	Silicon Issue Summary
1	Low-speed keep-alive traffic is not resumed in 3ms
2	Disconnect Event Occurs when Hub is Operating at Full-Speed
3	High-Speed Split Transaction to Full-Speed
4	Glitch on DP (and SDA/SCL) During Power-up
5	Port Disconnect Timer in Full-Speed Mode Violates USB Specifications
6	SE0 Generated on Downstream Port During Remote Wake-up Signaling
7	Suspended USB 2.0 Hub Does Not Wake upon Downstream Device Disconnect after Disabling the Downstream Port
8	USB Device Reconnection Error in Windows 8 and Windows Server 2013
9	Detach detection failure

#### Module 1: Low-speed keep-alive traffic is not resumed in 3ms

##### DESCRIPTION

While in Full-Speed (FS) mode, the USB2422 does not produce a keep-alive strobe within 3ms of a SOF to prevent a Low-Speed (LS) device from entering suspend.

All USB 2.0 hubs must generate a Low-Speed keep-alive strobe to prevent a low speed device on its downstream port from entering suspend mode and to keep it alive. This strobe must be generated at least once per frame after a SOF (Start of Frame) is received by the device (within 3ms) to prevent the LS device from going into suspend.

##### END USER IMPLICATIONS

Because the strobe does not occur within 3ms, it is possible that the low speed device may go into suspend and stay there even after the end of RESUME, which would then require another wakeup event for the LS device to become active again.

Currently SMSC has not found any LS devices that are sensitive to this timing. However, this anomaly could potentially occur in unknown future LS products.

##### Work around

There is no work around at this time since there are no known real-world implications to the end user.

##### PLAN

This will not be addressed in a future revision of the device.

# USB2422

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## Module 2: Disconnect Event Occurs when Hub is Operating at Full-Speed

### DESCRIPTION

This issue is only seen when the USB2422 is configured as a Full-Speed hub or as a device attached to a downstream port from a Full-Speed host.

When an adjacent downstream port is disconnected, a data packet may become corrupted on the other port while a data transfer is occurring simultaneously. Infrequently, this corruption could lead to a full hub disconnect.

### END USER IMPLICATIONS

On very rare occasions, the end user may observe a total hub disconnect when removing a downstream device while performing a data transfer on the other port, disrupting the data transfer and forcing the end user to restart the data transfer. The user will observe the hub and all downstream devices disconnect and re-enumerate thereafter.

#### **Work around**

Loading the downstream port DP/DM signals with 100pF caps can help reduce the packet corruption.

### PLAN

This will not be addressed in a future revision of the device.

## Module 3: High-Speed Split Transaction to Full-Speed

### DESCRIPTION

If a High-Speed (HS) split transaction exceeds 288 bytes per microframe to a single downstream port, the Transaction Translator of the USB2422 could be corrupted if another HS data packet is sent before the Full-Speed packets downstream have completed.

### END USER IMPLICATIONS

The corrupted data would be caught by the USB error checks in most applications, causing the host to resend the data to the device with no visibility to the end user. However, if the data is not checked by the device and streamed to a speaker for example, the corrupted data can negatively impact the performance of the device.

#### **Work around**

There is no known work around at this time.

### PLAN

This will not be addressed in a future revision of the device.

## Module 4: Glitch on DP (and SDA/SCL) During Power-up

### DESCRIPTION

This anomaly is only seen when the USB2422 is under BUS power and can cause some minor signal glitches on the digital pins (SDA/SCL) during an attach/docking event.

About 2ms to 5ms after the attach event (DP goes HIGH) the DP wire will momentary (for ~0.5us) transitions to LOW.

### END USER IMPLICATIONS

When under BUS power, if the SOC is monitoring the digital pins (SDA/SCL) during Power-On Reset (POR), the glitch could be detected. This anomaly should not affect the performance of the USB2422.

#### **Work around**

There are two possible solutions:

1. If using an SOC and this glitch occurs, the SOC could ignore the SMBUS traffic for the initial 5ms after POR. Adding a 5ms delay during POR will alleviate this issue and prevent it from occurring.
2. Glitch occurrence and width is related to ramp rate of internal core voltage. If the resistor and capacitor on the RESETn are 100k ohms and 100nF, respectively, the glitch occurs. However, doubling the capacitor to 200nF will prevent the glitch from occurring.

### PLAN

This will not be addressed in a future revision of the device.

## Module 5: Port Disconnect Timer in Full-Speed Mode Violates USB Specifications

### DESCRIPTION

Configured in Full-Speed mode, the USB2422 will not disconnect the downstream port when D+ is deasserted <100us. D+ held low longer than 100us will cause port disconnect and port re-enumeration after D+ is tri-stated. The Spec specifies that a D+ deassert >2.5us should end the SOF. SOF are seen on downstream traffic until D+ is held for 100us or longer.

### END USER IMPLICATIONS

While the end user impact will not be wide spread, this issue might be seen by some FS hosts.

#### **Work around**

There is no work around at this time since there are no known implications to the end user.

### PLAN

This will not be addressed in a future revision of the device.

## **Module 6: SE0 Generated on Downstream Port During Remote Wake-up Signaling**

### DESCRIPTION

When the USB2422 device is placed in global suspend mode (J state) and a remote wakeup event (K state) is generated from a downstream device, the device will attempt to change state as if trying to wake up. The port enters an undefined state for 140 ns before it transitioning back to the original state (K state). This event is only seen on the same port on which the wake up event was generated.

### END USER IMPLICATIONS

This anomaly does not appear to effect the performance of the USB2422 and may not be of concern by end user. However, the end user implications have not fully been investigated at this time.

#### **Work around**

There is no work around at this time since there are no known implications to the end user.

### PLAN

This will not be addressed in a future revision of the device.

## **Module 7: Suspended USB 2.0 Hub Does Not Wake upon Downstream Device Disconnect after Disabling the Downstream Port**

### DESCRIPTION

The USB 2.0 specification states that a hub “must not perform disconnect detection” in the first 4ms after entering “Disabled” state. This implies that after 4ms the hub must perform the normal disconnect detection on its downstream ports. The USB2422 does not execute normal disconnect detection when a downstream port is in the “Disabled” state. In the <safe removal> case, while a USB2 device is attached to the HUT and the user ejects that device, the hub does not report port change status during any subsequent detach/attach events on that port. In Windows 7 the Intel driver sends the SET\_FEATURE PORT\_SUSPEND, to which the USB2422 hub would correctly detect the detach event and generate the correct port status change behavior. Windows 8 sends a CLEAR\_FEATURE PORT\_ENABLE which disables the hub port – thus creating the condition for this anomalous behavior.

### END USER IMPLICATIONS

The End User would only see this issue when using Windows 8. There are no issues with previous Microsoft operating systems.

#### **Work around**

The problem will be fixed in some future Windows 8 update.

### PLAN

This will not be addressed in a future revision of the device.

## Module 8: USB Device Reconnection Error in Windows 8 and Windows Server 2013

### DESCRIPTION

There is an issue that affects the USB2422 when used with Windows 8 or Windows Server 2013. This issue occurs when a USB device is connected to a USB downstream port on the hub, the USB device is safely removed from the USB port, and a device (the same device or difference device) is then reconnected to the same downstream port of the hub. In this scenario, Windows does not detect the USB device. This issue occurs because the USB port is disabled after the device was safely removed from the port.

### END USER IMPLICATIONS

A Windows 8 or Windows Server 2013 user may not be able to reconnect devices on USB downstream ports without rebooting Windows.

#### Work around

To resolve this issue, install the Windows RT, Windows 8, and Windows Server 2012 update rollup 2845533, or install a hotfix that is described at <http://support.microsoft.com/kb/2830154>.

### PLAN

This is a Windows software issue and will not be addressed in a future version of the device.

## Module 9: Detach detection failure

### DESCRIPTION

When a Full-Speed/Low-Speed device detaches and quickly re-attaches, such as when issued a reset command over USB or other sideband control signal, there is a chance that the USB hub will not recognize the device detach and communicate the device detach event to the USB host. This may result in a failure to establish a connection with the device after the device is re-attached.

The hub requires 100us of uninterrupted SE0 line state (both D+ and D- lines below  $V_{IL(min)}$ ) before a device detach is detected.

### END USER IMPLICATIONS

This issue does not typically apply to a physical detach, as a physical device detach and re-attach typically involves much longer time scales.

This issue may be encountered when a device performs a self detach and re-attach as a result of some special command over USB or a reset due to some stimulus within the device's system (such as a button reset).

#### Work around

There are two possible work arounds:

1. Ensure that the hub port detects an SE0 line state for > 100us before re-attaching the device.
  - a) The device must remove its D+ or D- pull-up resistor to ensure SE0 line state is achieved.
  - b) There must be at least one 100µs gap in between packets while the device is in the detached state.
2. If the device is being commanded to detach and re-attach from USB host command (such as when instructing a device to re-enumerate in a different mode of operation), issue a Port Reset command to the hub for the respective port immediately after the detach command is issued to ensure that the device can be properly detected when it re-attaches.

### PLAN

This erratum will not be corrected in a future revision.

## APPENDIX A: DOCUMENT REVISION HISTORY

TABLE A-1: REVISION HISTORY

Revision Level & Date	Section/Figure/Entry	Correction
Rev. B (05-06-19)	Module <a href="#">9</a>	Added new errata module " <a href="#">Detach detection failure</a> "
	All	Updated layout to standard Microchip format.
Rev. A	All	Replaces the previous SMSC version 1.4.
Revision 1.4 (07-24-13)	Module <a href="#">8</a>	Added anomaly 8, fixed misc. typos and grammatical errors
Revision 1.3 (05-31-13)	All	Document co-branded
Revision 1.2 (05-28-13)	All	Updated anomalies with the latest corrections and feedback
Revision 1.1 (05-23-13)	All	Updated anomalies.
Revision 1.0 (05-03-10)	All	Initial release

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