USB72x6/USB7252

USB72x6/USB7252 Silicon Errata and Data Sheet Clarification

This document describes known silicon errata for the following USB72x6/USB7252 devices:

• USB7206
• USB7216
• USB7252

The silicon errata discussed in this document are for silicon revisions as listed in Table 1. The silicon revision can be determined by the device's top marking as indicated in Figure 1. A summary of USB72x6/USB7252 silicon errata is provided in Table 2.

TABLE 1:   AFFECTED SILICON REVISIONS

Part Numbers	Silicon Revision
USB7206, USB7216, USB7252	B1, C1

FIGURE 1:   TOP MARKING SILICON REVISION INDICATION
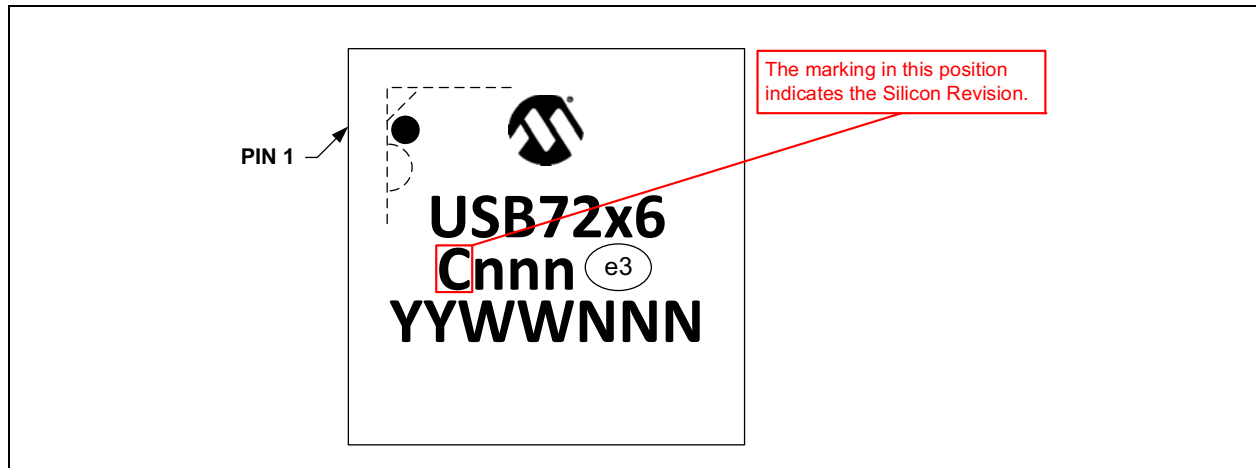
> **Note:**   Figure 1 details the top markings of an example part and highlights the location of the silicon revision. Other top marking values may differ (lot codes, location of manufacture, and so on).

USB72x6/USB7252

TABLE 2:   SILICON ISSUE SUMMARY

Item Number	Silicon Issue Summary	Affected Silicon Revisions
1.	FlexConnect USB 3.0 operation requires special conditions	B1
2.	Type-C Bridging	B1
3.	Type-C VBUS discharge in Port Power On/Off test	B1, C1
4.	I^{2}C Bridge sends an extra byte under certain conditions	B1
5.	PF29 cannot be initialized by configuration OTP	B1
6.	Clock Data Recovery Block Power-On Failures for Small Subset of Devices at USB3.x Gen 1 speeds	B1
7.	Incorrect default billboard device descriptor values	C1
8.	PID and Product String hub descriptors cannot be modified on USB7216C devices	C1

Silicon Errata Issues

Module 1:   FlexConnect USB 3.0 operation requires special conditions

DESCRIPTION

FlexConnect: For USB 3.0 connections only, the following conditions exist:

• The Flexed port may not re-enumerate if disconnected and reconnected.
• After flexing and unflexing, the UFP may not re-enumerate.

These conditions are avoided if both of the following steps are taken:

1.   Run the hub using SPI Flash memory.
2.   Disable the host (PC) power management.

> **Note:**   USB 2.0 connections enumerate normally in all FlexConnect states.

END USER IMPLICATIONS

If FlexConnect operation is required for USB 3.0 connections, both of the following must be met:

• The hub must operate using SPI Flash memory.
• Host power management must be disabled.

Work Around

None.

PLAN

This erratum is fixed in revision C1 silicon.

Module 2:   Type-C Bridging

DESCRIPTION

The internal Type-C Bridge device is not implemented for USB7216 and USB7252 devices with only basic Type-C ports.

END USER IMPLICATIONS

There is no end user impact as long as USB 3 Hub Command Verifier (HUB3CV) Ver. 2.1.12.1 or later is used; with this version, a missing Type-C Bridge device will not result in a compliance test failure.

Work Around

None.

PLAN

This erratum is fixed in revision C1 silicon.

Module 3:   Type-C VBUS discharge in Port Power On/Off test

DESCRIPTION

One requirement for USB-IF compliance certification of a system with an exposed Type-C port is the *Port Power On/Off* test. This test is part of the HUBCV suite of *Command Verification* tests for USB 2 devices. As part of this test, the hub must discharge VBUS, and then energize VBUS in response to CLEAR_FEATURE and SET_FEATURE commands from the test host.

Frequently, these ports will be implemented with electrolytic VBUS load capacitors, which retain a small residual charge that is released slowly compared to the timing of the discharge. In such cases, as energy is released from the capacitor the voltage can drift upward slightly after the discharge, which can cross the VBUS_DET threshold for detecting VBUS high. In the sequence of the Port Power On/Off test, this can inhibit subsequent turning on of VBUS in response to commands from the test host and the test fails.

This issue does not impact normal operation of the port. Only the Port Power On/Off test is affected.

END USER IMPLICATIONS

Type C ports that have a large electrolytic capacitor may require this workaround to pass the HUBCV Port Power On/Off test.

Applications that do not perform HUBCV testing are not affected.

Work Around

In reference designs for USB7216 and USB7252 devices, an N-channel MOSFET with a V_{GS} less than 1.0V is connected between VBUS and VBUS_MON, with gate control from the DISCHARGE signal. This additional component creates an additional current path as the discharge is monitored by VBUS_MON, which biases VBUS_MON higher. This results in discharge to a lower voltage than what is otherwise achieved, and compensates for any residual energy that the capacitor releases after the discharge. At times other than the discharge, the MOSFET is turned off and does not influence VBUS.

No components of the reference design need to be removed; only the MOSFET is added.

FIGURE 2:   TYPE-C DISCHARGE WORKAROUND FOR MODULE 3
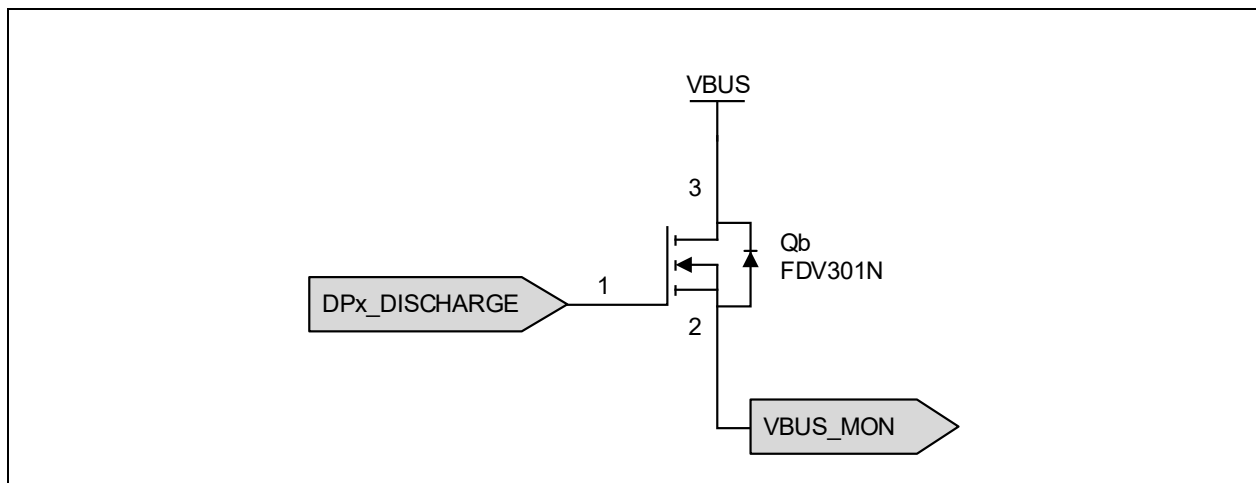
PLAN

There is no plan to correct this erratum.

USB72x6/USB7252

Module 4:   I^{2}C Bridge sends an extra byte under certain conditions

DESCRIPTION

USB7252 is an I^{2}C master that is connected to an I^{2}C slave. In the case where a single byte is to be read, the I^{2}C Bridge responds by reading two bytes. The first of these bytes has an ACK bit, and the second byte has a NACK bit. Only the first byte contains correct data, and the value of the second byte is unpredictable. Only the valid byte is returned to the application or the I^{2}C Read Buffer.

This phenomenon is also seen in cases where the number of bytes to be read is equal to a multiple of 128 plus 1 (for example, 129 bytes, 257 bytes, and so on).

> **Note:**   This module applies to all USB7206, USB7216, and USB7252 devices Revision B1.

END USER IMPLICATIONS

I^{2}C slaves may not expect the second byte. The I^{2}C slave software may interpret the incorrect byte as valid, and may malfunction.

Work Around

The I^{2}C master software should avoid reading a single byte. When only one byte is desired, the I^{2}C master software should read two bytes and discard the second byte.

PLAN

1. An OTP patch is available that corrects the error in the case of reading one byte. It does not correct the other cases (129 bytes, 257 bytes, and so on).
2. This erratum is fixed in revision C1 silicon.

Module 5:   PF29 cannot be initialized by configuration OTP

DESCRIPTION

After reset, PF29 is initialized to these conditions:

*   Output is enabled
*   Input is enabled
*   Output value is High (1)
*   Pull-up is enabled
*   Open-drain is enabled

These initial conditions cannot be altered by means of writing to the GPIO control registers from configuration OTP.

After initialization is complete (that is, in runtime), the value of the GPIO registers can be altered in the normal manner: through USB host control or through SMBus control.

END USER IMPLICATIONS

If the initial state of PF29 is unacceptable, then a different GPIO pin must be used.

If the initial state of PF29 is not a concern, then PF29 can be used.

Work Around

None.

PLAN

This erratum is fixed in revision C1 silicon.

Module 6: **Clock Data Recovery Block Power-On Failures for Small Subset of Devices at USB3.x Gen 1 speeds**

DESCRIPTION

On a small subset of devices, the clock data recovery block within one or more USB3.2 PHYs may not properly power on when operating at USB3.x Gen 1 (5GHz) speeds.

This failure does not occur when operating at USB3.x Gen 2 (10GHz) or USB2.0-only speeds.

END USER IMPLICATIONS

Devices affected with this errata may fail to connect at USB3.x Gen 1 speeds on the affected port, which may be the upstream port or any of the downstream ports.

<u>**Work Around**</u>

This workaround may be applied universally to all commercial-grade devices to guard against this failure. The following register settings elevate the internal voltage supply to the clock data recovery block. The registers may be modified via 1 of 3 options:

OTP Memory: Programmed permanently at the time of production or in the field through USB or SMBus.

SMBus interface: Set after every power-on/reset.

External SPI Memory: "Pseudo-OTP" memory space when executing firmware and configuration from external SPI memory.

USB3.2 PHY0 (UFP) Register Settings:

0xBF80_6082 = 0x02

0xBF80_6083 = 0x5F

0xBF80_6086 = 0x04

USB3.2 PHY1 Register Settings:

0xBF80_6482 = 0x02

0xBF80_6483 = 0x5F

0xBF80_6486 = 0x04

USB3.2 PHY2 Register Settings:

0xBF80_6882 = 0x02

0xBF80_6883 = 0x5F

0xBF80_6886 = 0x04

USB3.2 PHY3 Register Settings:

0xBF80_6C82 = 0x02

0xBF80_6C83 = 0x5F

0xBF80_6C86 = 0x04

USB3.2 PHY4 Register Settings:

0xBF80_7082 = 0x02

0xBF80_7083 = 0x5F

0xBF80_7086 = 0x04

USB3.2 PHY5 Register Settings:

0xBF80_7482 = 0x02

0xBF80_7483 = 0x5F

0xBF80_7486 = 0x04

Global Settings (must be applied after the USB Attach Command with SMBus Active [0xAA 0x56] is issued if configuring via SMBus):

0xBF80_6019 = 0x1F

PLAN

Commercial-grade B1 Revision Silicon: The register-based workaround will be included in all B1 silicon devices moving forward. The fix can be verified by checking the bcdDevice descriptor of the hub:

• USB7206 devices with bcdDevice = 0x0612 or higher

• USB7216 devices with bcdDevice = 0x0613 or higher

• USB7252 devices with bcdDevice = 0x0614 or higher

Industrial-grade B1 Revision Silicon: The is no plan to address this erratum for Industrial-grade B1 devices. Use Revision C1 or newer devices.

All C1 or Newer Revision Silicon: This erratum is fixed in revision C1 silicon (consumer or industrial-grade).

Module 7:   Incorrect default billboard device descriptor values

DESCRIPTION

The default billboard device descriptors of USB7206C and USB7216C devices are not correct by default.

END USER IMPLICATIONS

Billboard device enumeration will not generate a pop-up billboard device message to the user as expected.

Work Around

The following register settings can correct this issue via any of the 3 configuration mechanisms:

OTP Memory: Programmed permanently at the time of production or in the field through USB or SMBus.

SMBus interface: Set after every power-on/reset.

External SPI Memory: "Pseudo-OTP" memory space when executing firmware and configuration from external SPI memory.

Corrected Billboard Device Descriptor Settings:

0xBFD2_4604 = 0x08 0x10 0x0F 0x01 0x02 0x00 0x00 0x00 0x08 0x10 0x0F 0x02 0xC5 0x00 0xC0 0x00

0xBFD2_45C8 = 0x03

PLAN

This erratum will not be corrected in a future revision.

Module 8:   PID and Product String hub descriptors cannot be modified on USB7216C devices

DESCRIPTION

On all USB7216C devices, the LSB of the USB2 and USB3 hub PID cannot be changed from the default value of 16h. The hub firmware is overwriting this value at boot and any attempt to modify it via OTP programming will be unsuccessful.

Similarly, USB3 hub Product String descriptors cannot be properly changed. Any attempt to modify the product string via OTP programming will be unsuccessful as the value of '16' within the string descriptor will always be overwritten by the hub firmware at boot.

END USER IMPLICATIONS

The USB Hub Product ID (PID) and Product Strings of both the USB2 hub and USB3 hub cannot be modified properly from the default settings.

Work Around

This issue can be addressed by applying an additional OTP-based firmware patch which modifies the register location by which the PID and string descriptors are stored. Contact Microchip support for instructions and assistance.

PLAN

This erratum will not be corrected in a future revision.

APPENDIX A: DOCUMENT REVISION HISTORY

Revision Level & Date	Section/Figure/Entry	Correction
DS80000847E (02-10-22)	All	Updated document for C1 silicon.
	Table 1	Added C1 silicon revision to list.
	Figure 1	Updated figure to indicate where the silicon revision can be determined in the package top marking.
	Table 2	Added affected silicon revisions column.
	Modules 1., 2., 4., 5., 6.	Updated Plan section to indicate the erratum is fixed in revision C1 silicon.
	Module 7.	Added new module.
	Module 8.	Added new module.
DS80000847D (03-12-21)	Clock Data Recovery Block Power-On Failures for Small Subset of Devices at USB3.x Gen 1 speeds	Added this section.
DS80000847C (08-14-20)	PF29 cannot be initialized by configuration OTP	Added this section.
DS80000847B (05-14-20)	Table 1	Added part number USB7252 in the list of affected silicon revisions.
	Type-C Bridging	Updated to show impact to USB7252.
	Type-C VBUS discharge in Port Power On/Off test	Added this section describing Type-C VBUS discharge in Port Power On/Off test.
	I^2C Bridge sends an extra byte under certain conditions	Added this section describing the scenario where the I^2C Bridge sends two bytes of data
DS80000847A (09-19-19)	Initial release	

THE MICROCHIP WEB SITE

Microchip provides online support via our WWW site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at www.microchip.com. Under "Support", click on "Customer Change Notification" and follow the registration instructions.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://microchip.com/support

USB72x6/USB7252

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
http://www.microchip.com/
support
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453
Tel: 317-536-2380

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608
Tel: 951-273-7800

Raleigh, NC
Tel: 919-844-7510

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110
Tel: 408-436-4270

Canada - Toronto
Tel: 905-695-1980
Fax: 905-695-2078

ASIA/PACIFIC

Australia - Sydney
Tel: 61-2-9868-6733

China - Beijing
Tel: 86-10-8569-7000

China - Chengdu
Tel: 86-28-8665-5511

China - Chongqing
Tel: 86-23-8980-9588

China - Dongguan
Tel: 86-769-8702-9880

China - Guangzhou
Tel: 86-20-8755-8029

China - Hangzhou
Tel: 86-571-8792-8115

China - Hong Kong SAR
Tel: 852-2943-5100

China - Nanjing
Tel: 86-25-8473-2460

China - Qingdao
Tel: 86-532-8502-7355

China - Shanghai
Tel: 86-21-3326-8000

China - Shenyang
Tel: 86-24-2334-2829

China - Shenzhen
Tel: 86-755-8864-2200

China - Suzhou
Tel: 86-186-6233-1526

China - Wuhan
Tel: 86-27-5980-5300

China - Xian
Tel: 86-29-8833-7252

China - Xiamen
Tel: 86-592-2388138

China - Zhuhai
Tel: 86-756-3210040

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444

India - New Delhi
Tel: 91-11-4160-8631

India - Pune
Tel: 91-20-4121-0141

Japan - Osaka
Tel: 81-6-6152-7160

Japan - Tokyo
Tel: 81-3-6880- 3770

Korea - Daegu
Tel: 82-53-744-4301

Korea - Seoul
Tel: 82-2-554-7200

Malaysia - Kuala Lumpur
Tel: 60-3-7651-7906

Malaysia - Penang
Tel: 60-4-227-8870

Philippines - Manila
Tel: 63-2-634-9065

Singapore
Tel: 65-6334-8870

Taiwan - Hsin Chu
Tel: 886-3-577-8366

Taiwan - Kaohsiung
Tel: 886-7-213-7830

Taiwan - Taipei
Tel: 886-2-2508-8600

Thailand - Bangkok
Tel: 66-2-694-1351

Vietnam - Ho Chi Minh
Tel: 84-28-5448-2100

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4485-5910
Fax: 45-4485-2829

Finland - Espoo
Tel: 358-9-4520-820

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Garching
Tel: 49-8931-9700

Germany - Haan
Tel: 49-2129-3766400

Germany - Heilbronn
Tel: 49-7131-72400

Germany - Karlsruhe
Tel: 49-721-625370

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Rosenheim
Tel: 49-8031-354-560

Israel - Ra'anana
Tel: 972-9-744-7705

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Padova
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Norway - Trondheim
Tel: 47-7288-4388

Poland - Warsaw
Tel: 48-22-3325737

Romania - Bucharest
Tel: 40-21-407-87-50

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Gothenberg
Tel: 46-31-704-60-40

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820