# PL-2303HX Edition USB-to-Serial Bridge Controller Migration Guide Application Note

## Introduction

This application note provides the latest important migration guidelines for PL-2303HX Edition USB-to-Serial Bridge Controller. Refer to this application note if you are migrating from PL-2303H to PL-2303HX or from an old version PL-2303HX to a newer HX chip revision. If you are a new customer, please refer to PL-2303X Edition product brochure and datasheet.

## PL-2303H and HX Chip Comparison Table

Following are the comparisons for PL-2303H and the current available PL-2303HX controllers:

| | PL-2303H | PL-2303HXA | PL-2303HXD |
|---|---|---|---|
| **Core Voltage** | 5V | 3.3V | 3.3V |
| **Load mode** | Set by pin | Set by EEPROM | Set by EEPROM |
| **Tri-state** | Set by pin | Set by EEPROM | Set by EEPROM |
| **RS-232 VDD** | 5V ~ 3.3V | 3.3V ~ 1.8V | 3.3V ~ 1.8V |
| **GPIO** | No | 2 pins | 4 pins |
| **Baud Rate setting** | 75 ~ 1.2M bps | 75 ~ 6M bps | 75 ~ 12M bps |
| **Buffer Size** | Non-configurable Upstream 256 bytes Downstream 256 bytes | Configurable Upstream 256/384 bytes Downstream 256/128 bytes | Configurable Upstream 256/384 bytes Downstream 256/128 bytes |
| **Upstream buffer overflow detect** | No | Yes | Yes |
| **Flow Control (XON/XOFF)** | By Software | By Hardware / Software | By Hardware / Software |
| **Flow Control (RTS/CTS)** | By Hardware | By Hardware | By Hardware |
| **Serial number in EEPROM** | No | Yes | Yes |
| **Adjustable threshold for flow control** | No | Yes | Yes |
| **Serial interface (Data Bits)** | 5,6,7,8 or 16 | 5,6,7 or 8 | 5,6,7 or 8 |
| **NC Pins** | No | Pin 8/19/24 | Pin 8/24 |
| **Circuit** | H Version | Compatible with H Version | Compatible with H Version |
| **PKG** | SSOP28 | SSOP28 | SSOP28 / QFN32 |
| **Product Cycle** | **Discontinued (EOL)** | **Available** | **Available** |

*Upstream: From RS-232 to USB*
*Downstream: From USB to RS-232*

## PL-2303HX Chip Version Comparison Table

The table below shows the comparison for all released PL-2303HX chip revisions:

| | PL-2303HX (Rev A) | PL-2303HX (Rev B) | PL-2303HX (Rev C) | PL-2303HX (Rev D) |
|---|---|---|---|---|
| **Clock Source** | External 12MHz crystal & Internal 4X PLL | External 12MHz crystal & Internal 4X PLL | Internal 48MHz clock generator | Internal 96MHz clock generator |
| **Initial Startup Device Configuration** | External EEPROM | Internal OTPROM | Internal OTPROM | Internal OTPROM |
| **Hardware Flow Control** | RTS/CTS | RTS/CTS | RTS/CTS or DTR/DSR[1] | RTS/CTS or DTR/DSR[1] |
| **General Purpose IO** | 2 (GP0/1) | 4 (GP0/1/2/3) | 2 (GP0/1) | 4 (GP0/1/2/3) |
| **Pin Differences** | Pin 13 → EE_CLK<br>Pin 14 → EE_DATA<br>Pin 19 → NC<br>Pin 21 → GND<br>Pin 25 → GND_A<br>Pin 27 → OSC1<br>Pin 28 → OSC2 | Pin 13 → GP3<br>Pin 14 → GP2<br>Pin 19 → NC<br>Pin 21 → GND<br>Pin 25 → GND_A<br>Pin 27 → OSC1<br>Pin 28 → OSC2 | Pin 13 → NC<br>Pin 14 → NC<br>Pin 19 → RESET_N[2]<br>Pin 21 → GND<br>Pin 25 → NC<br>Pin 27 → NC<br>Pin 28 → NC | Pin 13 → GP3<br>Pin 14 → GP2<br>Pin 19 → RESET_N[2]<br>Pin 21 → NC<br>Pin 25 → GND<br>Pin 27 → NC<br>Pin 28 → RESERVED |
| **Product Cycle** | **Available** | **Discontinued (EOL)** | **Discontinued (EOL)** | **Available** |

[1] – To apply DTR/DSR hardware flow control, please contact Prolific FAE for support and information.

[2] – Starting from Chip Rev C, Pin 19 will be assigned as RESET pin. If PCB layout has NC for Pin 19, you can short Pin 19 to Pin 20.

## PL-2303H to HX Hardware Design Migration

Following are the hardware design guidelines for migrating PL-2303H to current HX chips:

➢ Pin 4 of PL-2303HX cannot support 5V (Only 1.8 to 3.3V). Hardware migration is only possible if your design is 3.3V. Otherwise, you need to modify your PCB.

➢ Power mode is configured in EEPROM. The default mode for PL-2303HX is low power. If your PL-2303H design is high power mode, you need to add EEPROM to change the mode.

  o Note: PL-2303HXD chip has an integrated EEPROM for OTP (One-Time-Programming) to configure the correct power mode.

➢ Refer also to PL-2303HX Schematic Diagram and Datasheet.

## PL-2303HXD Hardware Design Migration

The latest PL-2303HXD is pin-to-pin compatible with the PCB layout of PL-2303H (3.3V) and previous PL-2303HX chip versions. However, note some differences:

> If the PCB layout was designed with Pin 19 as NC, you can short Pin 19 (RESET_N) to Pin 20 (VDD_5). Pin 19 is 5V tolerant. Otherwise, the PCB needs to be re-layout. See Figure-1 below.
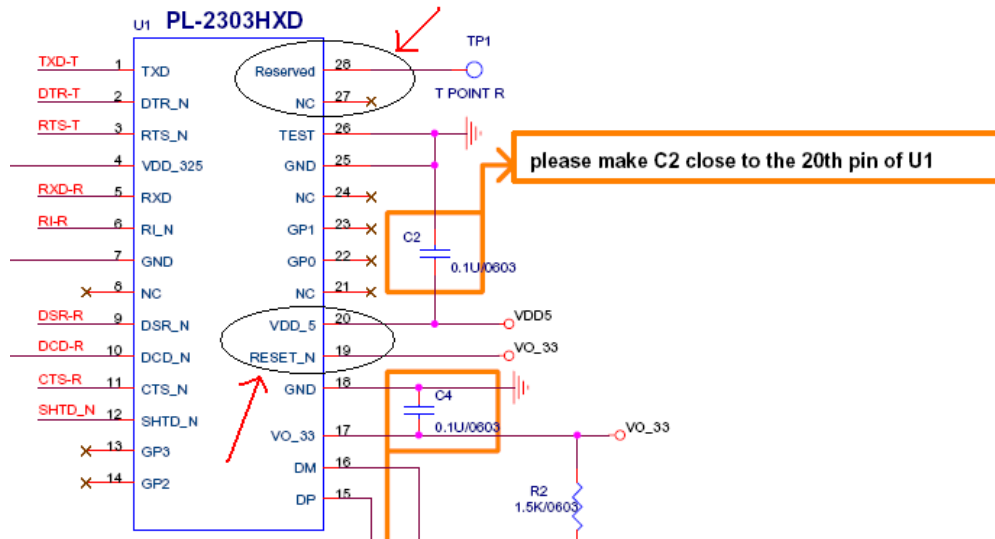


**Figure-1: PL-2303HXD Schematic Diagram Reference**

> PL-2303HXD already has an integrated clock generator so pin 27 is NC while pin 28 should be floating.

> For PL-2303HXD, you can remove the $0.1\mu F$ capacitor (C14 in PL-2303H schematic) and just use 10uF as 5V capacitor (C7 in PL-2303HXD schematic). See Figure-2 below.
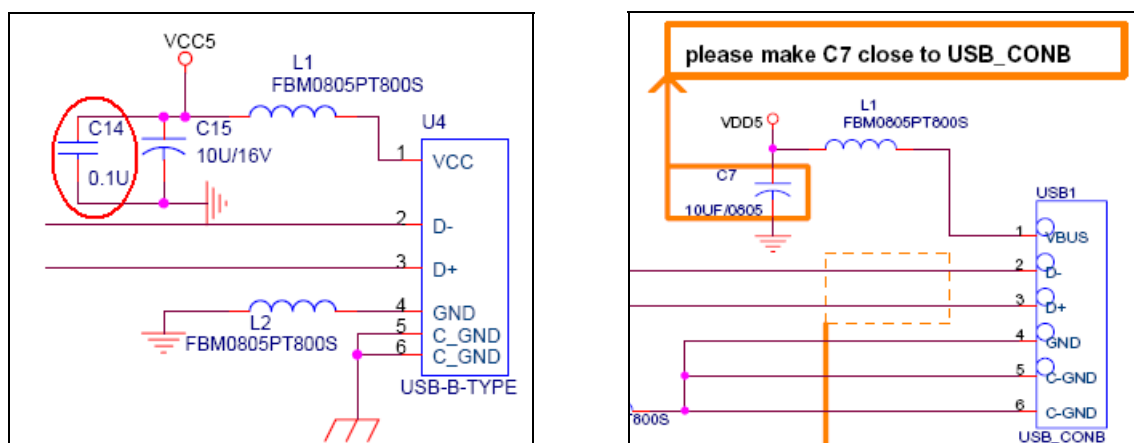


**Figure-2: PL-2303H and PL-2303HXD Schematic Diagram (5V Capacitor) Comparison**

Note: Refer to the latest PL-2303HXD Schematic Diagram and Datasheet from Prolific for more accurate information.

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## PL-2303 Software & Drivers Comparison Table

The table below shows the software comparison for all the PL-2303 chip edition series:

| Chip Version | Windows Driver Versions |
|---|---|
| **PL-2303H, PL-2303HX, PL-2303X** | 3.3.0.1 (for Windows Vista) |
| | 2.0.2.8 (for Windows 2K/XP) |
| | 2.0.0.19 (for Windows ME/98) |

**Note:** All drivers (for Windows 98, ME, 2000, XP, Vista, WinCE, Mac, Linux OS) are compatible with all PL-2303H, PL-2303HX, and PL-2303X chip versions.

**Note:** Please contact Prolific FAE or support website for the latest driver version.

| Chip Version | Cable Test Program Version |
|---|---|
| **PL-2303H, PL-2303HX, PL-2303X** | 2.2.1.1 |

**Note:** Cable Test program is one and the same for all PL-2303H, PL-2303HX, and PL-2303X controllers.

| Chip Version | EEPROM Writer Program Version |
|---|---|
| **PL-2303H** | 1.0.0.3 |
| **PL-2303HX (Chip Rev A, B, C)** | |
| **PL-2303X** | |
| **PL-2303HX (Chip Rev D)** | 1.0.0.5 |

**Note:** For PL-2303HX with OTPROM, it is required to attach the device to a 5V-to-6.5V USB port converter before writing data into OTPROM. Refer to the OTPROM Guidelines Section in the succeeding page.

**Note:** For PL-2303HXD, it is required to install the Windows 2K/XP driver **v2.0.2.5** or above; or Windows ME/98 driver v2.0.0.19 when using the EEPROM Writer program.

## PL-2303HXD OTPROM Guidelines

When writing data into the internal OTPROM (One-Time Programming ROM) of PL-2303HXD, it is required to supply 6.5V to the device while executing the program. Prolific can provide 5V-to-6.5V USB port converters (see Figure-3) to customers during the chip sample evaluation stage. Prolific also can provide the schematic diagram for the USB port converter upon request if customers want to produce the converters themselves. Contact Prolific for more information.



**Figure-3: USB 5V-to-6.5V Port Converter**

### How to run OTPROM for PL-2303HXD:

1. Run the PL-2303HXD Windows Driver Setup program to install the device driver to the computer. Please make sure to install the latest Windows XP/2K driver version to run OTPROM.

2. Plug the USB 5V-to-6.5V Port Converter into the USB port of the USB Hub or PC.

3. Plug the PL-2303HXD device to the Converter's A Type Receptacle Connector.

4. Windows will detect the PL-2303HXD device and loads the pre-installed driver.

5. Run the EEPROM Writer program to write configuration data into the OTPROM. Please note that the PL-2303HXD is using a newer version (1.0.0.5) for the EEPROM Writer program (see figures next page).
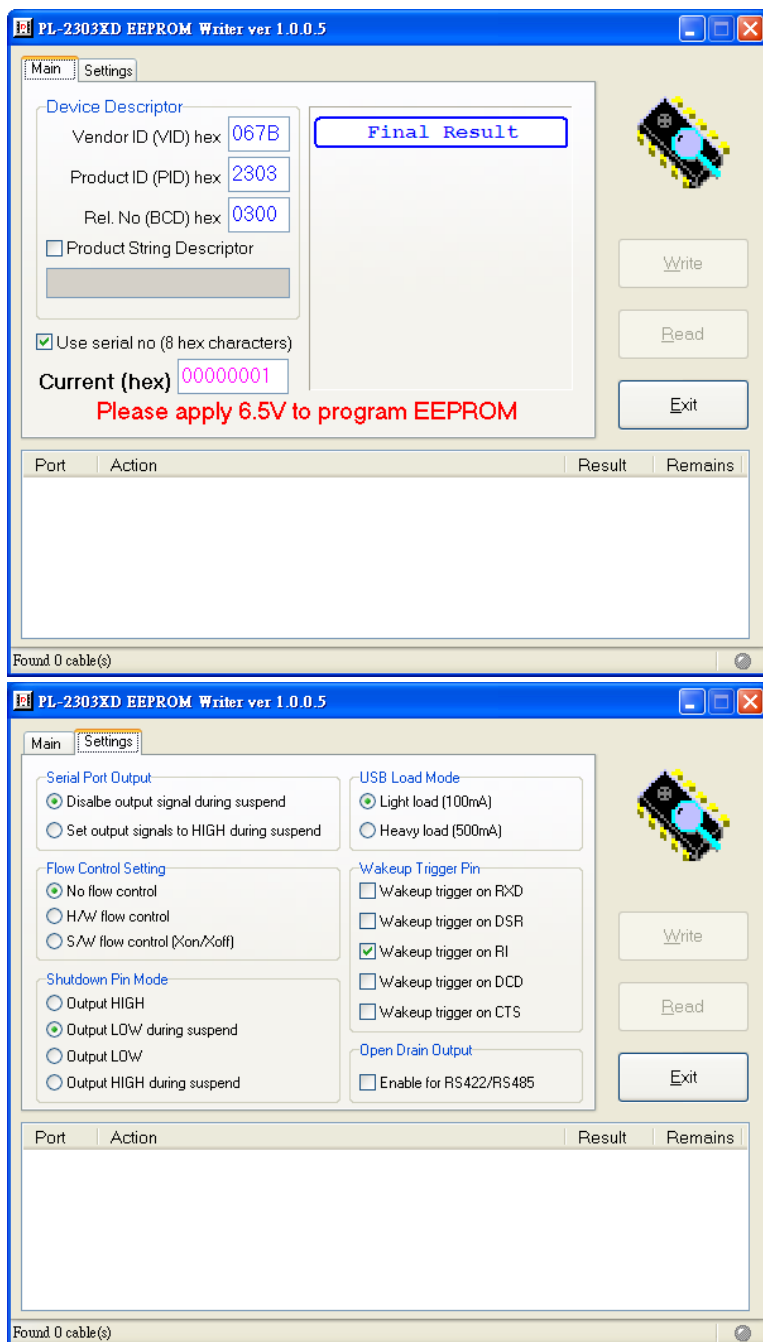
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