PL-2303 Series (USB-to-Serial) Product Selection Guide

Introduction

This application note guides you through the process of determining the most suitable Prolific USB-to-Serial Bridge Controller chip for your product. Prolific's PL-2303 range of controller chips provides a convenient solution for connecting an RS232-like full-duplex asynchronous serial device to any Universal Serial Bus (USB) capable host. The PL-2303 highly compatible drivers could simulate the traditional COM port on most operating systems allowing the existing applications based on COM port to easily migrate and be made USB ready. The PL-2303 is exclusively designed for mobile and embedded solutions in mind, providing a small footprint that could easily fit in to any connectors and handheld devices.

Product Comparison Table

Table 1 – Prolific Full-Speed USB-to-Serial Bridge Controller Chip Selection Guide

	PL-2303H	PL-2303X	PL-2303HX
Core Voltage	5V	3.3V	3.3V
Load mode	Set by pin 23	Set by EEPROM	Set by EEPROM
Tri-state	Set by pin 22	Set by EEPROM	Set by EEPROM
RS-232 VDD	5V ~ 3.3V	3.3V ~ 1.8V	3.3V ~ 1.8V
GPIO	No	2 pins	2 pins
Baud Rate setting	75 ~ 1.2M bps	75 ~ 6M bps	75 ~ 6M 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
Software Flow Control (XON/XOFF)	By Software	By Hardware	By Hardware
Hardware 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	No	Pin 8/19/24
Circuit	H Version	X Version	Pin-to-Pin Compatible with H Version
PKG	SSOP28	SSOP28	SSOP28
Software Drivers	Prolific provides the same compatible drivers for all PL-2303 Product Series		
Availability	**Discontinued**	**Available Now**	**Available Now**
Customer Type	-	For new customers	For existing PL-2303H customers only

Note: Upstream – From RS-232 to USB / Downstream – From USB to RS-232

Q: Which controller chip should we be using for our USB application?

If you are designing a new USB-to-Serial application, Prolific recommends the PL-2303X because of its features, performance and flexibility. If you are already using an existing PL-2303H application design and would like to continue using it, you can upgrade to the PL-2303HX that is pin-to-pin hardware compatible with PL-2303H but provides the features, performance and flexibility of the PL-2303X. Prolific has discontinued the PL-2303H and is now only providing the PL-2303H controller to existing customers that cannot migrate to the PL-2303HX.

Q: What is the difference between PL-2303X and PL-2303H?

The PL-2303X is a new generation USB-to-Serial controller chip derived from the original PL-2303H released by Prolific at the beginning. The comparison table shown earlier on this application note already provided the detailed differences between the controller chips.

The advantages of the PL-2303X from the PL-2303X:

- Lower Power Voltage Support
  - PL-2303X supports UART interface voltages of 1.8V to 3.3V range.
- Higher Performance
  - PL-2303X supports up to 6 Mbps baud rate with programmable buffer size.
  - XON/XOFF flow control of PL-2303X is implemented in the hardware circuit.
- More Integration
  - PL-2303X provides more functional, flexibility and performance improvements like GPIO, external EEPROM, upstream buffer, and adjustable threshold.
- COM Port Emulator
  - PL-2303X provides a unique serial number in external EEPROM.

Q: Is PL-2303X pin-to-pin compatible with PL-2303H?

No, the PL-2303X is not pin-to-pin compatible with PL-2303H. If you already have implemented a PL-2303H design and want to upgrade to the features of PL-2303X, Prolific provides the PL-2303HX that is pin-to-pin compatible. You can refer to the datasheet of the controllers for the differences in the pin assignment.

Q: What is the difference between PL-2303HX and PL-2303X?

The PL-2303HX is a pin-to-pin compatible solution for existing PL-2303H customers in order to upgrade to the PL-2303X features, flexibility and performance.

The PL-2303HX also provides the same advantages of PL-2303X:

- Lower Power Voltage Support
  - PL-2303HX supports UART interface voltages of 1.8V to 3.3V range.
- Higher Performance
  - PL-2303HX supports up to 6 Mbps baud rate with programmable buffer size.
  - XON/XOFF flow control of PL-2303HX is implemented in the hardware circuit.
- More Integration
  - PL-2303HX provides more functional, flexibility and performance improvements like GPIO, external EEPROM, upstream buffer, and adjustable threshold.
- COM Port Emulator
  - PL-2303HX provides a unique serial number in external EEPROM.

The differences of PL-2303HX from PL-2303X:

- PL-2303HX is Pin-to-Pin Compatible with PL-2303H
  - No need to change PCB layout for existing PL-2303H customers.
  - Pins 8, 19, 24 are changed to NC. These pin voltages are supplied through Pin 17.

Q: Is there any restrictions when migrating from PL-2303H to PL-2303HX?

Yes, although the PL-2303HX is pin-to-pin compatible with PL-2303H, there are some restrictions when migrating from PL-2303H design to PL-2303HX:

- Pin 4 (RS-232 VDD) 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.
  Note: PL-2303HX chip does not have an integrated OTP (One Time Programming) ROM.
- Pins 22 and 23 will not have any effect on PL-2303HX whether it is pull-high or pull-low. However if you need to set the Tri-state and Load mode, you need to add an EEPROM to make these settings.
- Refer also to the PL-2303HX Schematic Diagram and Datasheet for comparison.

Q: Are the drivers, tools and utilities different for each controller?

The drivers and test programs provided for the PL-2303 controller chips are all compatible and the same. Only the EEPROM writer program is different and not compatible. Contact Prolific for the latest versions.

Below is a comparison table for the drivers, tools, and utilities used for each controller:

Table 2 – Prolific PL-2303 Drivers and Programs Comparison Table

	PL-2303H	PL-2303HX / PL-2303X
Windows Driver Support		
Note: All driver versions starting from v2.0.0.18 (2K/XP) and V2.0.0.11 (for ME/98) are the same and compatible for PL-2303H, PL-2303HX, and PL-2303X controllers. Contact Prolific for the latest Windows driver version available.		
EEPROM Writer Program	V1.5.0.x	V1.0.0.1
Note: EEPROM Writer program are not compatible for H and HX controller.		
Cable Test Program	V2.2.1.1	V2.2.1.1
Note: Cable Test program are the same and compatible for PL-2303H, PL-2303HX, and PL-2303X controllers.		
Function Test Program	V3.1.4.5	V3.1.4.5
Note: Function Test program are the same and compatible for PL-2303H, PL-2303HX, and PL-2303X controllers.		

Q: How do we make use of the GPIO?

Prolific provides GPIO application sample codes for customers to evaluate.