

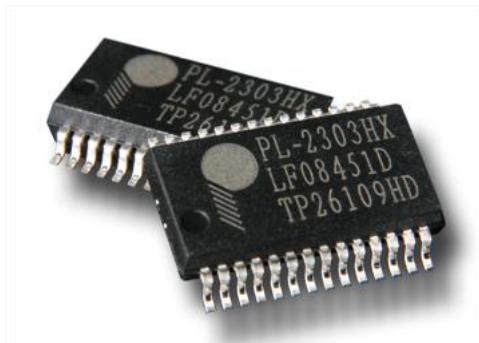


# PL-2303HX Edition (Chip Rev D) USB to Serial Bridge Controller Product Datasheet

---

Document Revision: 1.4.4

Document Release: March 20, 2013



## **Prolific Technology Inc.**

7F, No. 48, Sec. 3, Nan Kang Rd.

Nan Kang, Taipei 115, Taiwan, R.O.C.

Telephone: +886-2-2654-6363

Fax: +886-2-2654-6161

E-mail: [sales@prolific.com.tw](mailto:sales@prolific.com.tw)

Website: <http://www.prolific.com.tw>

## **Disclaimer**

All the information in this document is subject to change without prior notice. Prolific Technology Inc. does not make any representations or any warranties (implied or otherwise) regarding the accuracy and completeness of this document and shall in no event be liable for any loss of profit or any other commercial damage, including but not limited to special, incidental, consequential, or other damages.

## **Trademarks**

The Prolific logo is a registered trademark of Prolific Technology Inc. All brand names and product names used in this document are trademarks or registered trademarks of their respective holders.

## **Copyrights**

**Copyright © 2005-2013 Prolific Technology Inc., All rights reserved.**

No part of this document may be reproduced or transmitted in any form by any means without the express written permission of Prolific Technology Inc.

## Revision History

Revision	Description	Date
1.4.4	➤ Added Android USB Host API Support	March 20, 2013
1.4.3	➤ Modify Features and OS Driver Support List ➤ Added QFN32 Reel Tape Information	September 11, 2012
1.4.2	➤ Modify Section 12.0 Ordering Information Part Number	June 25, 2012
1.4.1	➤ Modify Reel Tape Packing (MOQ) Information	May 25, 2012
1.4	➤ Added Windows 8 Driver Support ➤ Added OTPROM Configuration Section ➤ Modified BaudRate Support Table ➤ Added Reference Schematic Diagram ➤ Added Chip Marking Information ➤ Added Tube Packing Information ➤ Added Worldwide Distributors Information	March 16, 2012
1.3	➤ Added Windows 7 Logo Driver Information ➤ Modified Operating Temperature Characteristics ➤ Modified Baud Rate Settings Table	September 9, 2010
1.2	➤ Sec. 9.0: Modified DC & Temperature Characteristics	June 27, 2008
1.1	➤ Added Windows Vista and XP Logo Driver information ➤ Added USB-IF Logo TID information	April 16, 2007
1.0B	➤ Sec. 4.2: Modified QFN diagram to add IC bottom PAD information	June 30, 2006
1.0A	➤ PL-2303HX (Chip Rev D) Datasheet – Formal Release	November 23, 2005

## Table of Contents

<b>1.0</b>	<b>FEATURES.....</b>	<b>7</b>
1.1	Royalty-Free Driver Support.....	8
1.2	Product Applications.....	8
<b>2.0</b>	<b>FUNCTIONAL BLOCK DIAGRAM.....</b>	<b>9</b>
<b>3.0</b>	<b>INTRODUCTION .....</b>	<b>10</b>
<b>4.0</b>	<b>PIN ASSIGNMENT OUTLINE .....</b>	<b>11</b>
4.1	SSOP28 Package .....	11
4.2	QFN32 Package.....	12
<b>5.0</b>	<b>PIN ASSIGNMENT &amp; DESCRIPTION.....</b>	<b>13</b>
5.1	SSOP28 Package .....	13
5.2	QFN32 Package.....	14
<b>6.0</b>	<b>OTPROM CONFIGURATION .....</b>	<b>15</b>
<b>7.0</b>	<b>DATA FORMATS &amp; PROGRAMMABLE BAUD RATE GENERATOR.....</b>	<b>17</b>
<b>8.0</b>	<b>PL2303HXD REFERENCE SCHEMATIC DIAGRAM .....</b>	<b>18</b>
<b>9.0</b>	<b>DC &amp; TEMPERATURE CHARACTERISTICS.....</b>	<b>19</b>
9.1	Absolute Maximum Ratings.....	19
9.2	DC Characteristics .....	19
9.3	Clock Characteristics .....	20
9.4	Temperature Characteristics .....	21
9.5	Leakage Current and Capacitance .....	21
9.6	Power-On Reset .....	21
<b>10.0</b>	<b>OUTLINE DIAGRAM.....</b>	<b>22</b>
10.1	SSOP28 Package .....	22
10.2	QFN32 Package .....	23
<b>11.0</b>	<b>PACKING INFORMATION .....</b>	<b>24</b>
11.1	Carrier Tape (SSOP-28).....	24
11.2	Carrier Tape (QFN32).....	25
11.3	Reel Dimension.....	26
11.4	Tube Packing .....	27

---

<b>12.0 ORDERING AND CHIP MARKING INFORMATION .....</b>	<b>28</b>
<b>13.0 CONTACT INFORMATION .....</b>	<b>29</b>

## List of Figures

Figure 2-1 Block Diagram of PL-2303HX (Rev D).....	9
Figure 4-1 Pin Assignment Outline of PL-2303HX (Rev D) SSOP28 .....	11
Figure 4-2 Pin Assignment Outline of PL-2303HX (Rev D) QFN32.....	12
Figure 6-1 PL2303 EEPROM Writer Program.....	15
Figure 8-1 PL2303HX (Chip Rev D) Reference Schematic Diagram .....	18
Figure 9-1 Power-On Reset Diagram.....	21
Figure 10-1 Outline Diagram of PL-2303HX (Rev D) SSOP28 .....	22
Figure 10-2 Outline Diagram of PL-2303HX (Rev D) QFN32.....	23
Figure 11-1 SSOP28 Carrier Tape .....	24
Figure 11-2 IC Reel Placements .....	24
Figure 11-3 QFN32 Carrier Tape .....	25
Figure 11-4 Reel Dimension .....	26
Figure 11-5 Tube Packing Dimension .....	27
Figure 12-1 Chip Part Number Information (SSOP).....	28

## List of Tables

Table 5-1 Pin Assignment & Description (SSOP28) .....	13
Table 5-2 Pin Assignment & Description (QFN32) .....	14
Table 6-1 EEPROM Writer Configuration .....	15
Table 7-1 Supported Data Formats .....	17
Table 7-2 Baud Rate Settings (Supported by Driver) .....	17
Table 9-1 Absolute Maximum Ratings.....	19
Table 9-2a Operating Voltage and Suspend Current.....	19
Table 9-2b 3.3V I/O Pins.....	19
Table 9-2c VDD_325@3.3V Serial I/O Pins .....	20
Table 9-2d VDD_325@2.5V Serial I/O Pins.....	20
Table 9-2e VDD_325@1.8V Serial I/O Pins.....	20
Table 9-3 Clock Characteristics .....	20
Table 9-4 Temperature Characteristics .....	21
Table 9-5 Leakage Current and Capacitance.....	21
Table 9-6 Power-On Reset .....	21
Table 10-1 Package Dimension .....	22
Table 11-1 Reel Part Number Information.....	26
Table 12-1 Ordering Information .....	28
Table 12-2 Chip Marking Information .....	28

## 1.0 Features

- Single-chip USB to Serial (RS232/RS422/RS485) asynchronous serial data transfer interface
- Fully Compliant with USB Specification v2.0 (Full-Speed)
- [USB-IF Logo Compliant with TID 40000100](#)
- UHCI/OHCI (USB1.1), EHCI (USB 2.0), xHCI (USB 3.0) Host Controller Compatible
- Integrated USB 1.1 Transceiver and 5V to 3.3V Regulator
- Integrated 96MHz clock generator (No external crystal required)
- Integrated OTPROM (One-Time Programming ROM) – no external EEPROM required.
  - For writing and storing customer USB VID/PID, Serial Number, Product String, and other device startup configurations. (uses default settings if OTPROM is empty)
- Supports USB to RS232 Serial UART Interface
  - Full-duplex transmitter and receiver (TXD and RXD)
  - Six MODEM control pins (RTS, CTS, DTR, DSR, DCD, and RI)
  - 5, 6, 7 or 8 data bits
  - Odd, Even, Mark, Space, or None parity mode
  - One, one and a half, or two stop bits
  - Parity error, frame error, and serial break detection
  - Programmable baud rate from 75 bps to 12M bps
  - External RS232 driver power down control
  - Independent power source for serial interface
- Supports RS-422/RS-485 like serial interface (TXD, DTR\_N, and RTS\_N pins should be externally pulled-up to 5V)
- Extensive Flow Control Mechanism
  - Adjustable high/low watermark level
  - Automatic hardware flow control with CTS/RTS or DSR/DTR
  - Automatic software flow control with XON/XOFF
  - Inbound data buffer overflow detection
- Configurable 512-byte bi-directional data buffer
  - 256-byte outbound buffer and 256-byte inbound buffer; or
  - 128-byte outbound buffer and 384-byte inbound buffer
- Supports Remote Wake-up from RS232 input pin signals (RI, RXD, DSR, DCD, CTS)
- Four (4) General Purpose I/O (GP0, GP1, GP2, & GP3) pins and Four (4) Auxiliary General Purpose I/O (RI\_N, DSR\_N, DCD\_N, & CTS\_N) pins.
- Supports Windows Selective Suspend by OTPROM configuration (Enable Remote Wakeup)
  - Suspends power of chip when idle (COM port is closed)
- Provides royalty-free USB to Virtual COM Port drivers for Windows, Mac, Linux, Android
- -40°C to 85°C Operating Temperature
- Small footprint 28-pin SSOP or 32-pin QFN IC packages (RoHS compliant and Pb-free Green Compound)

---

## 1.1 Royalty-Free Driver Support

- Windows 8, 7, Vista, XP, 2000 (Microsoft Certified WHQL Drivers)
  - Windows Update Driver installation available in Windows Vista, 7, and 8 (32/64-bit)
  - Download: [http://www.prolific.com.tw/US/ShowProduct.aspx?p\\_id=225&pcid=41](http://www.prolific.com.tw/US/ShowProduct.aspx?p_id=225&pcid=41)
- Windows Server 2003, 2008, 2008 R2, 2012
- Windows XP Embedded (XPe), Point-of-Service (WEPOS), and POSReady
- Windows CE 4.2, 5.0, 6.0, and Windows Embedded Compact 7
  - Requires customer SDK image file for customizing WinCE 6.0 and 7.0 drivers.
- Mac OS 8/9, OS X (supports latest Mac OS X 10.8 Mountain Lion)
  - Download: [http://www.prolific.com.tw/US/ShowProduct.aspx?p\\_id=229&pcid=41](http://www.prolific.com.tw/US/ShowProduct.aspx?p_id=229&pcid=41)
- Linux/Android kernel 2.4.31 and above includes built-in drivers (pl2303.c)
  - Android requires root permission for accessing virtual serial port (ttyusb)
- Android Java Driver Library (requires Android 3.2 and above with USB Host or OTG)
  - No root permission needed
  - Download: [http://www.prolific.com.tw/US/ShowProduct.aspx?p\\_id=230&pcid=41](http://www.prolific.com.tw/US/ShowProduct.aspx?p_id=230&pcid=41)
  - Android device must support USB Host API:
    - <http://developer.android.com/guide/topics/connectivity/usb/host.html>
- Provides Driver Customization for Customer USB VID/PID and special baud rates

## 1.2 Product Applications

- Single-chip upgrade solution for Legacy RS232 devices to USB interface
- USB to RS232/RS422/RS485 converters/cables/dongles/adapters
- Healthcare/Medical USB Interface Data Transfer Cable
- Personal Infotainment/Media Player Docking USB Interface
- Cellular/PDA USB Interface Data Transfer Cable
- Serial-over-IP Wireless Solution
- USB Barcode/Smart Card Readers
- GPS/Navigation USB Interface
- Point-of-Sale (POS) Terminals/Printers
- PC Docking Station/Port Replicators
- Industrial/Instrumentation/Automation Control USB Interface
- USB Modem/Wireless/Zigbee USB Interface
- Set-Top Box (STB) / Home Gateway USB Interface
- MCU-based devices to USB interface



## 2.0 Functional Block Diagram

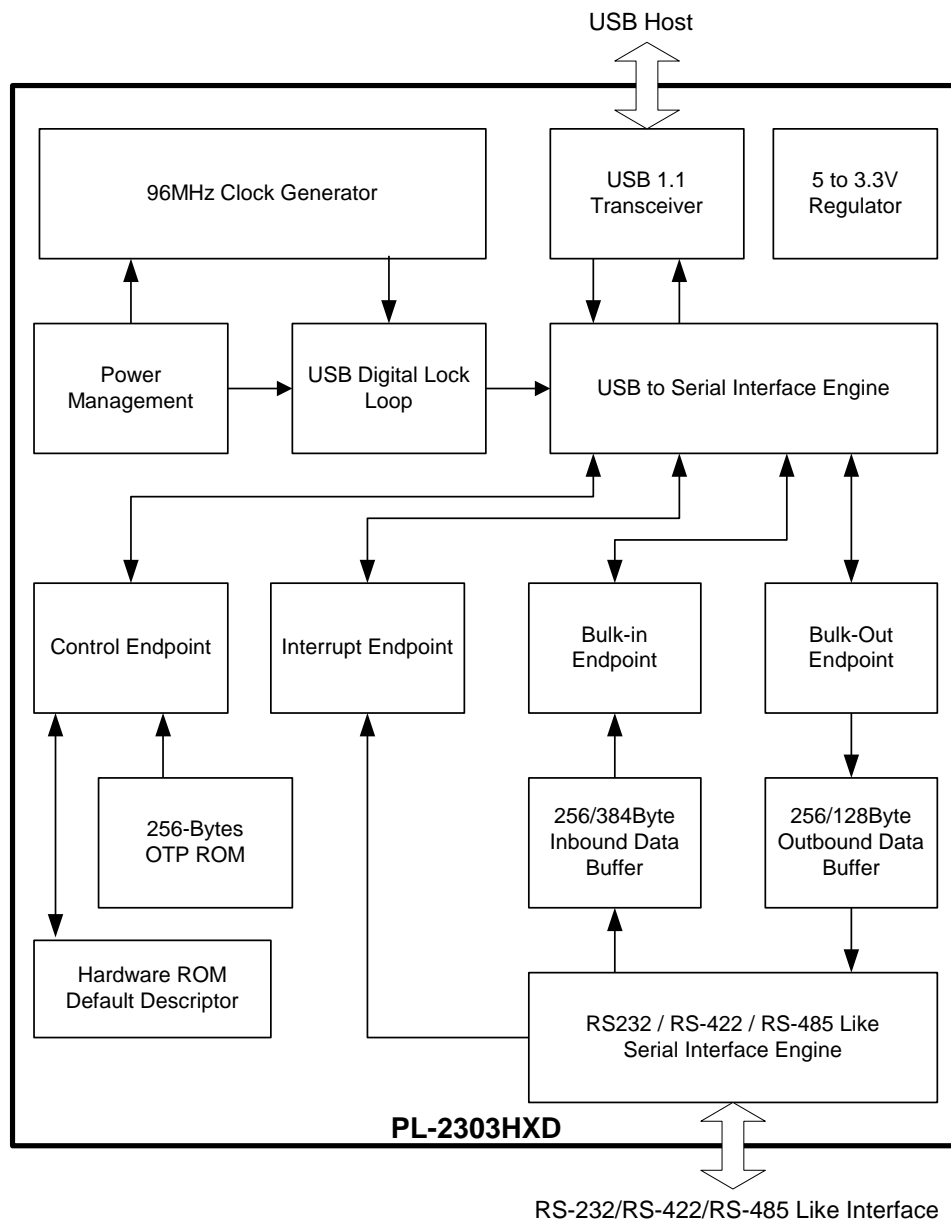


Figure 2-1 Block Diagram of PL-2303HX (Rev D)

---

## 3.0 Introduction

PL-2303HX (Chip Rev D) or PL-2303HXD provides a convenient solution for connecting an RS232-like full-duplex asynchronous serial device to any Universal Serial Bus (USB) capable host. PL-2303HXD 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.

By taking advantage of USB bulk transfer mode, large data buffers, and automatic flow control, PL-2303HXD is capable of achieving higher throughput compared to traditional UART (Universal Asynchronous Receiver Transmitter) ports. When real RS232 signaling is not required, baud rate higher than 115200 bps could be used for even higher performance. The flexible baud rate generator of PL-2303HXD could be programmed to generate any rate between 75 bps to 12M bps.

PL-2303HXD 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. With very small power consumption in either operating or suspend mode, PL-2303HXD is perfect for bus powered operation with plenty of power left for the attached devices. Flexible signal level requirement on the RS232-like serial port side also allows PL-2303HXD to connect directly to any 3.3V~1.8V range devices.

## 4.0 Pin Assignment Outline

### 4.1 SSOP28 Package

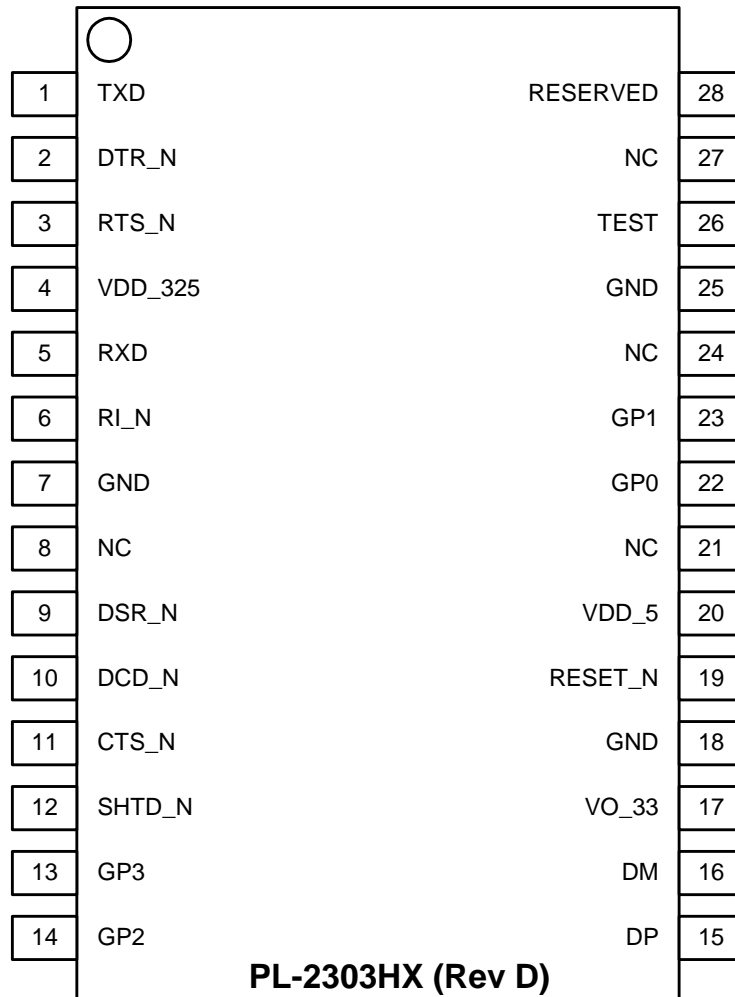


Figure 4-1 Pin Assignment Outline of PL-2303HX (Rev D) SSOP28

## 4.2 QFN32 Package

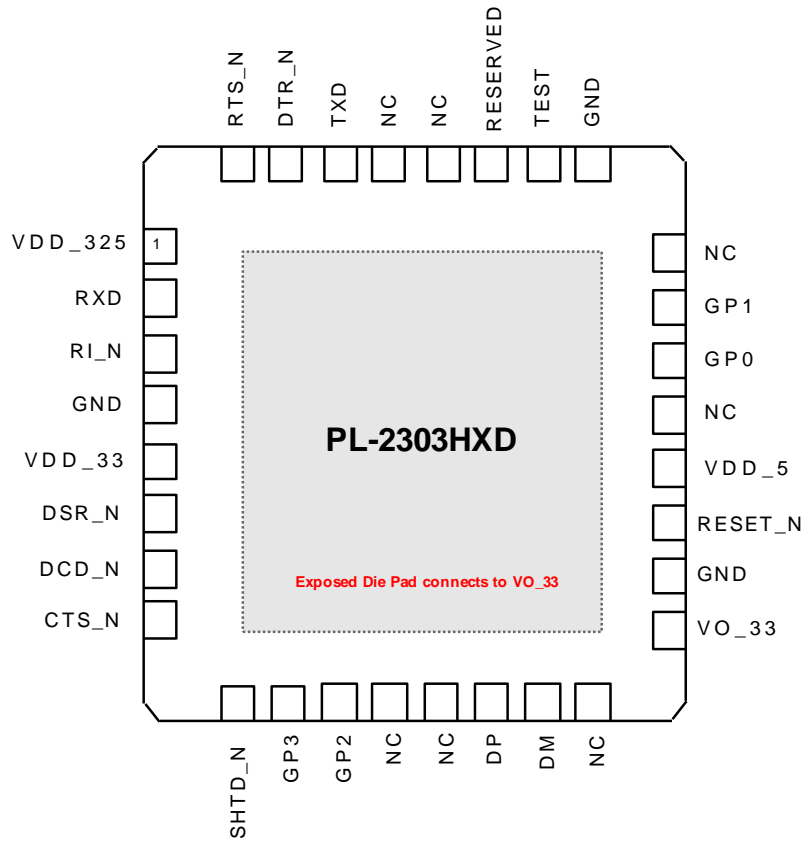
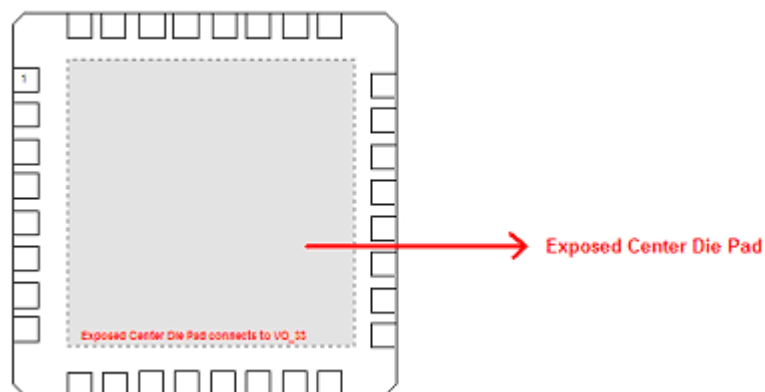


Figure 4-2 Pin Assignment Outline of PL-2303HX (Rev D) QFN32

**Warning:** The exposed center die pad of the PL-2303HX QFN package is connected (bonded) to the pin VO\_33 so it is very important to design the PCB layout wherein this exposed die pad won't get grounded on the PCB when mounted.



## 5.0 Pin Assignment & Description

Pin Type Abbreviation:

I: Input

O: Output

B: Bidirectional I/O

P: Power/Ground

### 5.1 SSOP28 Package

Table 5-1 Pin Assignment & Description (SSOP28)

Pin #	Name	Type	Description
1	TXD	O <sup>(1)</sup>	Serial Port (Transmitted Data)
2	DTR_N	O <sup>(1)</sup>	Serial Port (Data Terminal Ready)
3	RTS_N	O <sup>(1)</sup>	Serial Port (Request To Send)
4	VDD_325	P	RS232 VDD. The power pin for the serial port signals. When the serial port is 3.3V, this should be 3.3V. When the serial port is 2.5V, this should be 2.5V. The range can be from 1.8V~3.3V.
5	RXD	I <sup>(2)</sup>	Serial Port (Received Data)
6	RI_N	B <sup>(2)</sup>	Serial Port (Ring Indicator); or Auxiliary General Purpose I/O Port when enabled <sup>(7)</sup> .
7	GND	P	Ground
8	NC	-	No Connection
9	DSR_N	B <sup>(2)</sup>	Serial Port (Data Set Ready); or Auxiliary General Purpose I/O Port when enabled <sup>(7)</sup> .
10	DCD_N	B <sup>(2)</sup>	Serial Port (Data Carrier Detect); or Auxiliary General Purpose I/O Port when enabled <sup>(7)</sup> .
11	CTS_N	B <sup>(2)</sup>	Serial Port (Clear to Send); or Auxiliary General Purpose I/O Port when enabled <sup>(7)</sup> .
12	SHTD_N	O <sup>(3)</sup>	RS232 Transceiver Shut Down Control
13	GP3	I/O	Auxiliary GPIO Pin 3 (Default output high mode) <sup>(6)</sup>
14	GP2	I/O	Auxiliary GPIO Pin 2 (Default output high mode) <sup>(6)</sup>
15	DP	B	USB Port D+ signal
16	DM	B	USB Port D- signal
17	VO_33	P	Regulator Power Output, 3.3V
18	GND	P	Ground
19	RESET_N	I <sup>(4)</sup>	External System Reset (Active Low)
20	VDD_5	P	USB Port V <sub>BUS</sub> , 5V Power. (6.5V for OTPROM writing voltage).
21	NC	-	No Connection
22	GP0	B <sup>(5)</sup>	General Purpose I/O Pin 0
23	GP1	B <sup>(5)</sup>	General Purpose I/O Pin 1
24	NC	-	No Connection
25	GND	-	Ground
26	TEST	I	Test mode control
27	NC	-	No Connection
28	Reserved	-	Reserved pin (Must be floating)

**Notes:**

- (1) – Tri-State, Output Pad. Level and Driving Capability decided by VDD\_325.
- (2) – Tri-State, CMOS Input/Output Pad with level shifter. Level and Driving Capability decided by VDD\_325.
- (3) – CMOS Output Pad.
- (4) – CMOS Input Pad, 5V tolerant.
- (5) – Tri-State, CMOS Input/Output Pad. (Default mode: Input)
- (6) – Default output high mode; do not connect to ground.
- (7) – Enabling Auxiliary GPIO requires special customized driver.

## 5.2 QFN32 Package

**Table 5-2 Pin Assignment & Description (QFN32)**

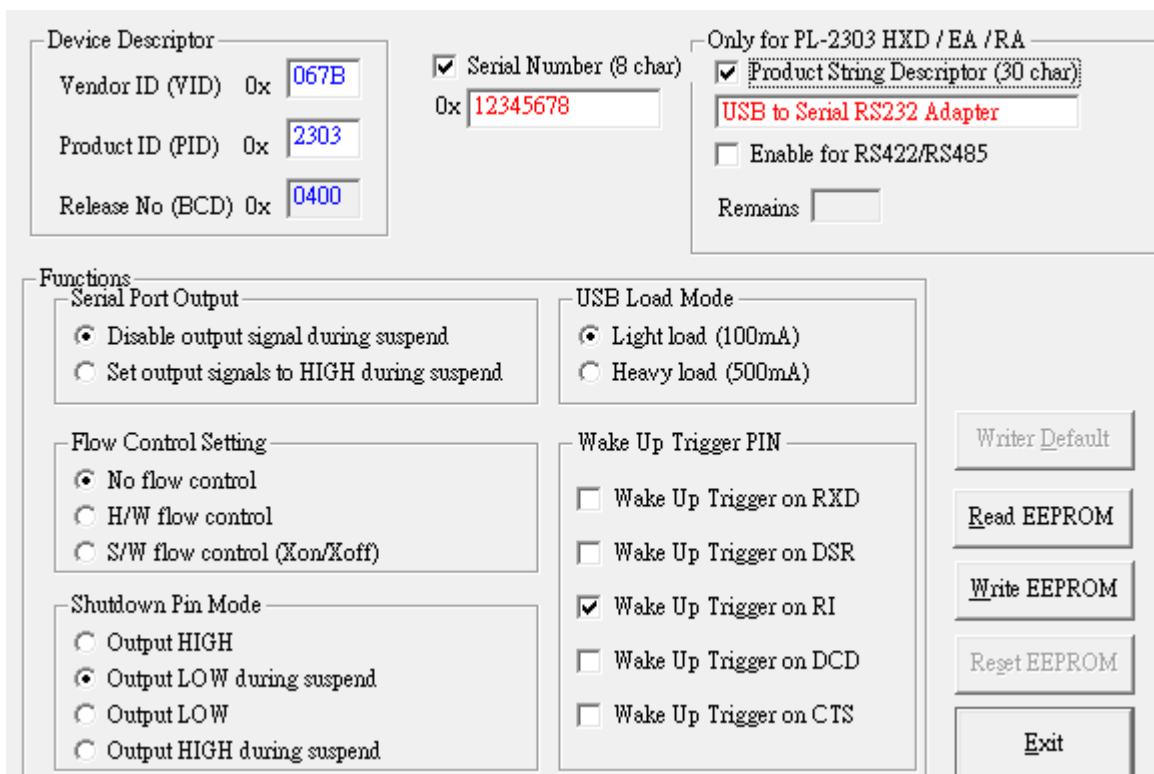
Pin #	Name	Type	Description
1	VDD_325	P	RS232 VDD. The power pin for the serial port signals. When the serial port is 3.3V, this should be 3.3V. When the serial port is 2.5V, this should be 2.5V. The range can be from 1.8V~3.3V.
2	RXD	I <sup>(2)</sup>	Serial Port (Received Data)
3	RI_N	B <sup>(2)</sup>	Serial Port (Ring Indicator); or Auxiliary General Purpose I/O Port when enabled <sup>(6)</sup> .
4	GND	P	Ground
5	VDD_33	P	Primary Power (3.3V)
6	DSR_N	B <sup>(2)</sup>	Serial Port (Data Set Ready); or Auxiliary General Purpose I/O Port when enabled <sup>(6)</sup> .
7	DCD_N	B <sup>(2)</sup>	Serial Port (Data Carrier Detect); or Auxiliary General Purpose I/O Port when enabled <sup>(6)</sup> .
8	CTS_N	B <sup>(2)</sup>	Serial Port (Clear to Send); or Auxiliary General Purpose I/O Port when enabled <sup>(6)</sup> .
9	SHTD_N	O <sup>(3)</sup>	RS232 Transceiver Shut Down Control
10	GP3	I/O	Auxiliary GPIO Pin 3 (Default output high mode) <sup>(5)</sup>
11	GP2	I/O	Auxiliary GPIO Pin 2 (Default output high mode) <sup>(5)</sup>
12	NC	-	No Connection
13	NC	-	No Connection
14	DP	B	USB Port D+ signal
15	DM	B	USB Port D- signal
16	NC	-	No Connection
17	VO_33	P	Regulator Power Output, 3.3V
18	GND	P	Ground
19	RESET_N	I	External System Reset (Active Low)
20	VDD_5	P	USB Port V <sub>BUS</sub> , 5V Power.
21	NC	-	No Connection
22	GP0	B <sup>(4)</sup>	General Purpose I/O Pin 0
23	GP1	B <sup>(4)</sup>	General Purpose I/O Pin 1
24	NC	-	No Connection
25	GND	P	Ground
26	TEST	I	Test mode control
27	Reserved	-	Reserved pin (Must be floating)
28	NC	-	No Connection
29	NC	-	No Connection
30	TXD	O <sup>(1)</sup>	Serial Port (Transmitted Data)
31	DTR_N	O <sup>(1)</sup>	Serial Port (Data Terminal Ready)
32	RTS_N	O <sup>(1)</sup>	Serial Port (Request To Send)
IC Bottom PAD		P	Connects to VO_33 (Regulator Power Output, 3.3V)

**Notes:**

- (1) – Tri-State, Output Pad. Level and Driving Capability decided by VDD\_325.  
 (2) – Tri-State, CMOS Input/Output Pad with level shifter. Level and Driving Capability decided by VDD\_325.  
 (3) – CMOS Output Pad.  
 (4) – Tri-State, CMOS Input/Output Pad. (Default mode: Input)  
 (5) – Default output high mode; do not connect to ground.  
 (6) – Enabling Auxiliary GPIO requires special customized driver.

## 6.0 OTPROM Configuration

The default configuration descriptors are stored in the chip internally which will be loaded during power-on reset or USB bus reset whenever OTPROM (One-Time Programmable ROM) is empty. Several of the USB descriptors could be modified and stored to the PL2303HXD OTPROM during device startup like Vendor ID (VID), Product ID (PID), Serial Number, Product String, and other configuration descriptors. The OTPROM can be programmed twice using the Prolific PL2303 EEPROM Writer utility software which can be requested from Prolific or authorized distributors.



The screenshot shows the PL2303 EEPROM Writer Program interface. It is divided into several sections:

- Device Descriptor:**
  - Vendor ID (VID) 0x: 067B
  - Product ID (PID) 0x: 2303
  - Release No (BCD) 0x: 0400
  - Serial Number (8 char): 0x 12345678
  - Product String Descriptor (30 char): USB to Serial RS232 Adapter
  - Enable for RS422/RS485
  - Remains: [ ]
- Functions:**
  - Serial Port Output:**
    - Disable output signal during suspend
    - Set output signals to HIGH during suspend
  - Flow Control Setting:**
    - No flow control
    - H/W flow control
    - S/W flow control (Xon/Xoff)
  - Shutdown Pin Mode:**
    - Output HIGH
    - Output LOW during suspend
    - Output LOW
    - Output HIGH during suspend
  - USB Load Mode:**
    - Light load (100mA)
    - Heavy load (500mA)
  - Wake Up Trigger PIN:**
    - Wake Up Trigger on RXD
    - Wake Up Trigger on DSR
    - Wake Up Trigger on RI
    - Wake Up Trigger on DCD
    - Wake Up Trigger on CTS
- Buttons:**
  - Writer Default
  - Read EEPROM
  - Write EEPROM
  - Reset EEPROM
  - Exit

Figure 6-1 PL2303 EEPROM Writer Program

Table 6-1 EEPROM Writer Configuration

Descriptors	Default Value	Description
Vendor ID (VID)	067B (hex)	USB unique Vendor ID of Company or Manufacturer. This ID is applied and registered from USB-IF.  Refer to this website for applying VID: <a href="http://www.usb.org/developers/vendor/">http://www.usb.org/developers/vendor/</a>
Product ID (PID)	2303 (hex)	USB Product ID assigned by Company or Manufacturer.
Rel. No. (BCD)	0400	This field reports the release number of USB the device. This item is fixed and cannot be modified.

Serial No. (8 hex characters)	Disabled	This field sets the product USB serial number. Entering a unique serial number allows the device to be assigned the same COM Port number even when plug to other USB ports of the same PC.
Product String Descriptor	None	This field when entered will be the string displayed by Windows and other OS when device is first detected and before driver is loaded or driver not installed.
Enable for RS422/RS485	Disabled	Enable this for RS422 or RS485 support.
Remains	2	PL2303HXD has an integrated OTPROM which allows to write EEPROM settings without the use of an external one. However, the OTPROM can only be written twice and cannot be erased. PL2303HXD does not support external EEPROM.

Functions	Default Value	Description
Serial Port Output	Disable	This option allows setting the serial port output pin signals (TXD, RTS, DTR) to HIGH during suspend mode.
USB Load Mode	Light Load (100mA)	This option sets the USB device maximum power if 100mA (low-power) or 500mA (high power).
Flow Control Setting	No Flow Control	This option allows to set the flow control initial setting to none, H/W, or S/W control. Note: H/W and S/W flow control can also be set and configured on customer/user serial communication software.
Wakeup Trigger Pin	Wakeup trigger on RI	This option allows setting the trigger pin for remote wakeup function. When in suspend mode, changes on the enabled serial port input signals could trigger a wakeup event. <b>NOTE:</b> To support Selective Suspend function, you need to write and enable this option in OTPROM.
Shutdown Pin Mode	Output LOW during suspend	This option allows setting the Shutdown pin mode to Output HIGH or LOW on normal mode or Suspend mode.



## 7.0 Data Formats & Programmable Baud Rate Generator

The PL-2303HXD controller supports versatile data formats and has a programmable baud rate generator. The supported data formats are shown on Table 7-1. The programmable baud rate generator supports baud rates up to 12M bps and standard driver already supports several baud rate settings as shown in Table 7-2.

**Table 7-1 Supported Data Formats**

	Description
Stop bits	1 1.5 2
Parity type	None Odd Even Mark Space
Data bits	5, 6, 7, 8

**Table 7-2 Baud Rate Settings (Supported by Driver)**

Baud Rates (bps)	Baud Rates (bps)	Baud Rates (bps)	Baud Rates (bps)	Baud Rates (bps)
12000000				
6000000	460800	134400	19200	1800
3000000	403200	128000	14400	1200
2457600	268800	115200	9600	600
1228800	256000	57600	7200	300
921600	230400	56000	4800	150
806400	201600	38400	3600	110
614400	161280	28800	2400	75

**Note:** For special baud rate requirements, please contact Prolific FAE for driver customization support.

## 8.0 PL2303HXD Reference Schematic Diagram

Below is an example of using the PL-2303HX (Chip Rev D) as a USB to RS232 converter (with RS485 option) where a RS232 transceiver (Sipex SP213EHCA) is used to convert the TTL levels serial interface of the PL2303TA to RS232 levels as well as converting the +5V nominal VCC to the  $\pm 9V$  required by RS232. The SP213EHCA transceiver provides up to 500Kbps data rate transmission which is ideal for many designs requiring high speed performance. Contact Prolific FAE for more PCB design support.

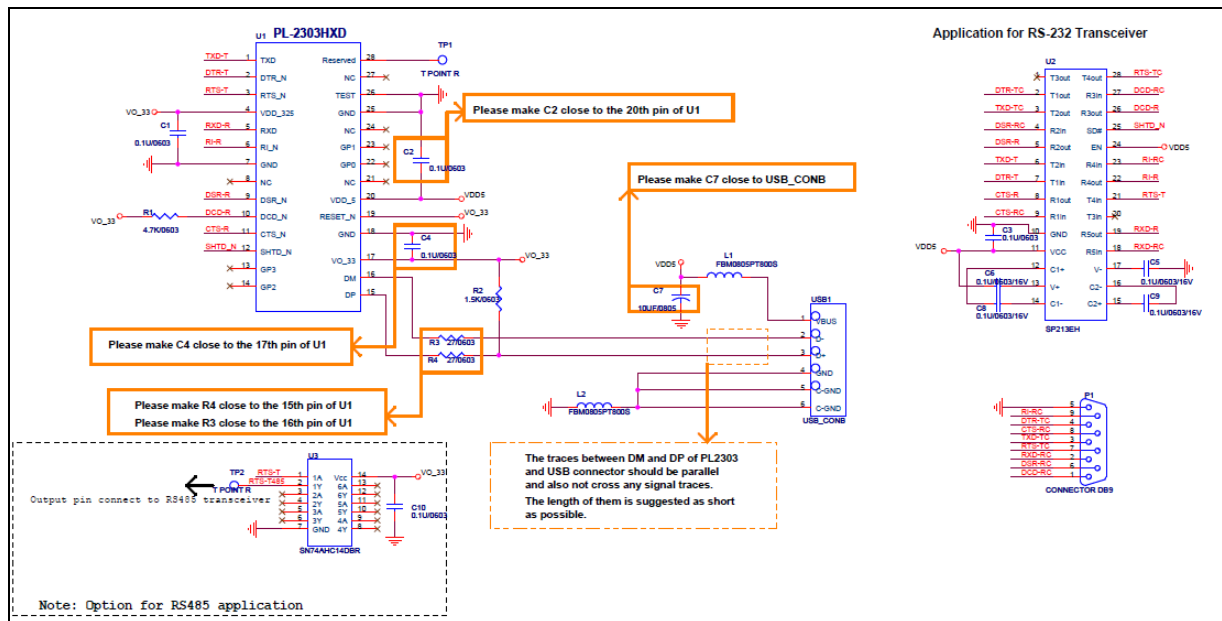


Figure 8-1 PL2303HX (Chip Rev D) Reference Schematic Diagram

## 9.0 DC & Temperature Characteristics

### 9.1 Absolute Maximum Ratings

Table 9-1 Absolute Maximum Ratings

Items	Ratings
Power Supply Voltage - VDD_5	-0.3 to 6.5 V
Input Voltage of 3.3V I/O	-0.3 to VO_33+0.3 V
Input Voltage of 3.3V I/O with 5V Tolerance I/O	-0.3 to VDD_5+0.3V
Output Voltage of 3.3V I/O	-0.3 to VDD_5 +0.3 V
Storage Temperature	-40 to 150 °C

### 9.2 DC Characteristics

#### 9.2.1 Operating Voltage and Suspend Current

Table 9-2a Operating Voltage and Suspend Current

Parameter	Symbol	Min	Typ	Max	Unit
Operating Voltage Range	VDD_5	4.5	5	6.5	V
Output Voltage of Regulator	VO_33	2.97	3.3	3.63	V
Operating Current <sup>(1)</sup> (Power Consumption)	I <sub>DD</sub>	-	20	25	mA
Suspend Current	I <sub>SUS</sub>	-	260	450	μA

Note: (1) – No device connected.

#### 9.2.2 3.3V I/O Pins

Table 9-2b 3.3V I/O Pins

Parameter	Symbol	Min	Typ	Max	Unit
Output Driving Capability	I <sub>DD</sub>		4		mA
Power Supply for 3.3V I/O Pins	VO_33	2.97	3.3	3.63	V
Input Voltage (CMOS)					
Low	V <sub>IL</sub>	--	--	0.3* VO_33	V
High	V <sub>IH</sub>	0.7* VO_33	--	--	V
Input Voltage (LVTTL)					
Low	V <sub>IL</sub>	--	--	0.8	V
High	V <sub>IH</sub>	2.0	--	--	V
Output Voltage, 3.3V					
Low	V <sub>OL</sub>	--	--	0.4	V
High	V <sub>OH</sub>	2.4	--	--	V

### 9.2.3 Serial I/O Pins

**Table 9-2c VDD\_325@3.3V Serial I/O Pins**

Parameter	Symbol	Min	Typ	Max	Unit
Output Driving Capability	I <sub>DD</sub>		8		mA
Power Supply for Serial I/O Pins	VDD_325	2.97	3.3	3.63	V
Input Voltage					
Low	V <sub>IL</sub>	--	--	0.25* VDD_325	V
High	V <sub>IH</sub>	0.7* VDD_325	--	--	V
Output Voltage					
Low	V <sub>OL</sub>	--	--	0.4	V
High	V <sub>OH</sub>	2.4	--	--	V

**Table 9-2d VDD\_325@2.5V Serial I/O Pins**

Parameter	Symbol	Min	Typ	Max	Unit
Output Driving Capability	I <sub>DD</sub>		5.2		mA
Power Supply for Serial I/O Pins	VDD_325	2.25	2.5	2.75	V
Input Voltage					
Low	V <sub>IL</sub>	--	--	0.25* VDD_325	V
High	V <sub>IH</sub>	0.7* VDD_325	--	--	V
Output Voltage					
Low	V <sub>OL</sub>	--	--	0.4	V
High	V <sub>OH</sub>	1.85	--	--	V

**Table 9-2e VDD\_325@1.8V Serial I/O Pins**

Parameter	Symbol	Min	Typ	Max	Unit
Output Driving Capability	I <sub>DD</sub>		4.4		mA
Power Supply for Serial I/O Pins	VDD_325	1.65	1.8	1.95	V
Input Voltage					
Low	V <sub>IL</sub>	--	--	0.25* VDD_325	V
High	V <sub>IH</sub>	0.7* VDD_325	--	--	V
Output Voltage					
Low	V <sub>OL</sub>	--	--	0.4	V
High	V <sub>OH</sub>	1.25	--	--	V

### 9.3 Clock Characteristics

**Table 9-3 Clock Characteristics**

Parameter	Min	Typ	Max	Units
Frequency of Operation	11.97	12.0	12.03	MHz
Clock Period	83.1	83.3	83.5	ns
Duty Cycle	45	50	55	%

## 9.4 Temperature Characteristics

Table 9-4 Temperature Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature	--	-40	--	85	°C
Junction Operation Temperature	T <sub>J</sub>	-40	25	105	°C

## 9.5 Leakage Current and Capacitance

Table 9-5 Leakage Current and Capacitance

Parameter	Symbol	Min	Typ	Max	Unit
Input Leakage Current*1	I <sub>L</sub>	-10	±1	10	μA
Tri-state Leakage Current	I <sub>oz</sub>	-10	±1	10	μA
Input Capacitance	C <sub>IN</sub>	--	2.8	--	pF
Output Capacitance	C <sub>OUT</sub>	2.7	--	4.9	pF
Bi-directional Buffer Capacitance	C <sub>BID</sub>	2.7	--	4.9	pF

\*1. No pull-up or pull-down resistor.

## 9.6 Power-On Reset

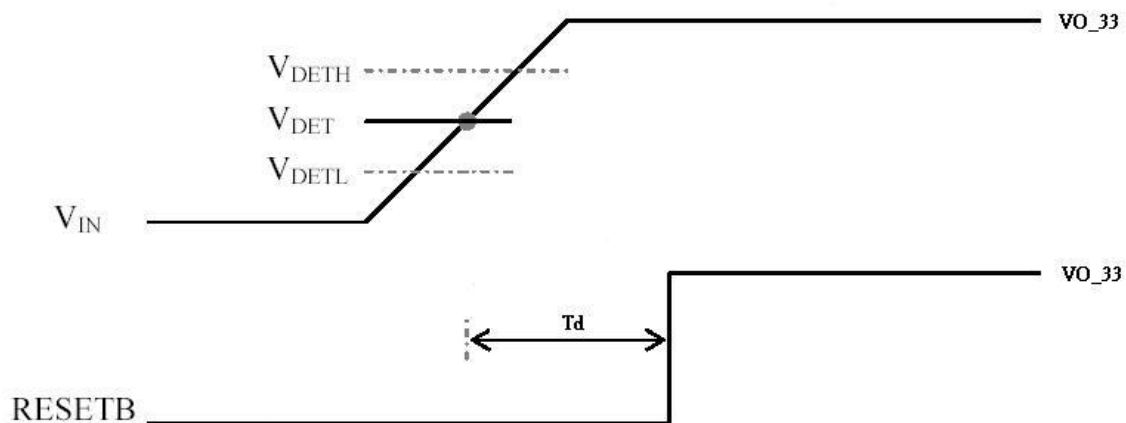


Figure 9-1 Power-On Reset Diagram

Table 9-6 Power-On Reset

Parameter	Symbol	FF@70°C VO_33=3.63V	TT@25°C VO_33=3.3V	SS@0°C VO_33=2.97V	Unit
Output Delay Time	Td	1.18	2.68	182.5	μsec

**Note:** The delay time is simulated with VIN ramp of 1V/μsec.

## 10.0 Outline Diagram

### 10.1 SSOP28 Package

Table 10-1 Package Dimension

Symbol	Millimeter			Inch		
	Min	Nom	Max	Min	Nom	Max
b	0.22		0.38	0.009		0.015
E	7.40	7.80	8.20	0.291	0.307	0.323
E1	5.00	5.30	5.60	0.197	0.209	0.220
L	0.55	0.75	0.95	0.021	0.030	0.037
R1	0.09			0.004		
D	9.9	10.2	10.5	0.390	0.402	0.413
A			2.0			0.079
e		0.65			0.0256	
L1		1.25			0.050	
A1	0.05			0.020		
A2	1.65	1.75	1.85	0.065	0.069	0.073

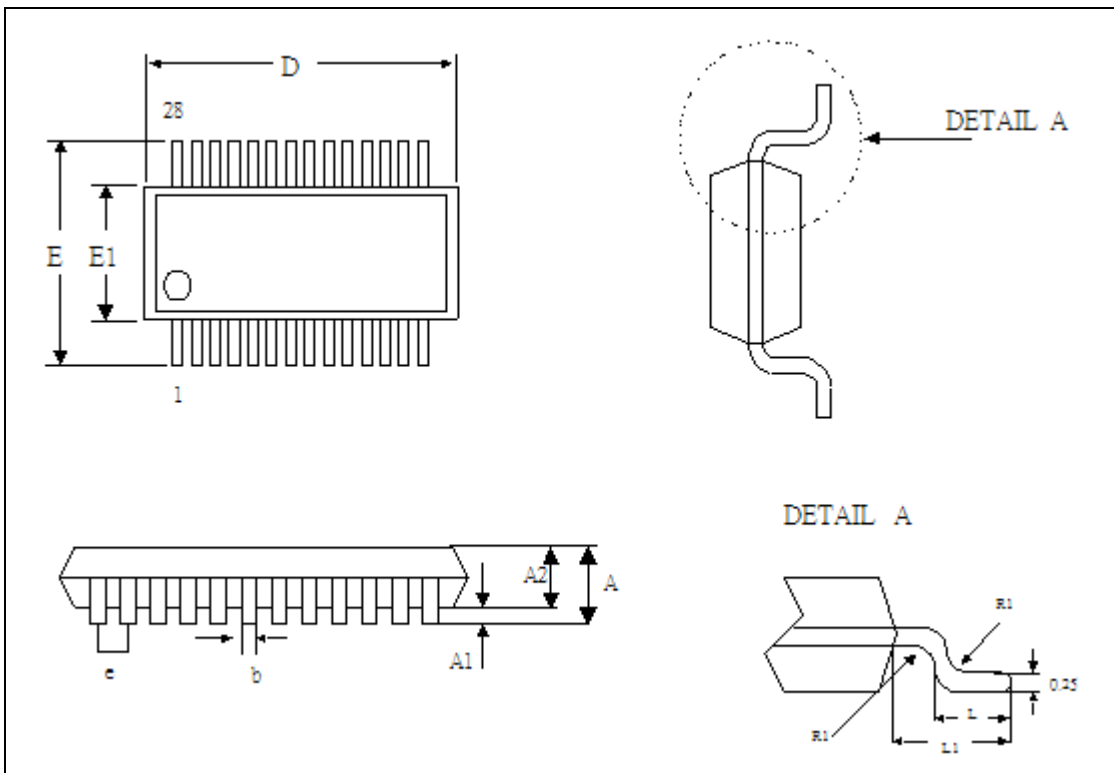


Figure 10-1 Outline Diagram of PL-2303HX (Rev D) SSOP28

## 10.2 QFN32 Package

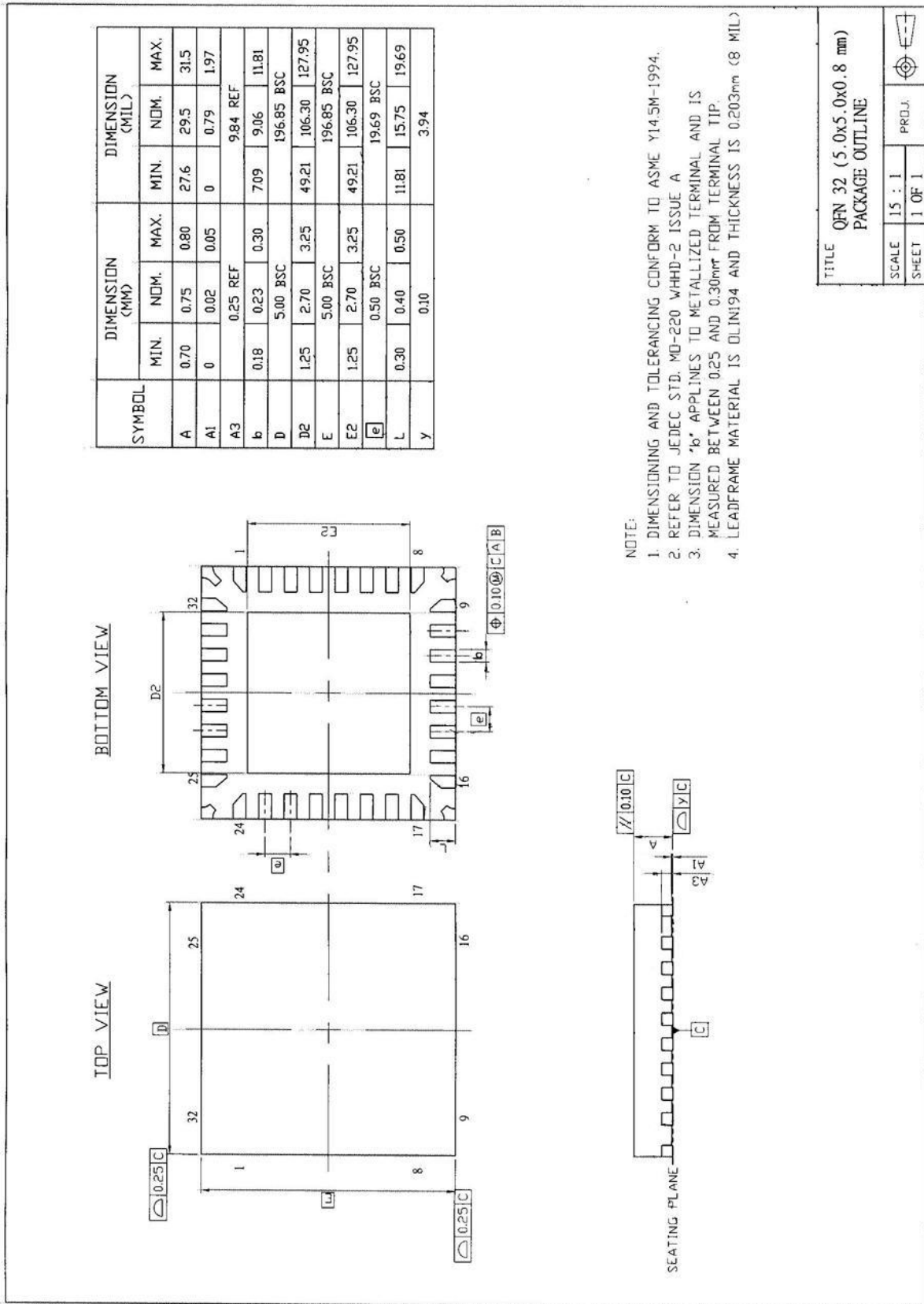


Figure 10-2 Outline Diagram of PL-2303HX (Rev D) QFN32

## 11.0 Packing Information

### 11.1 Carrier Tape (SSOP-28)

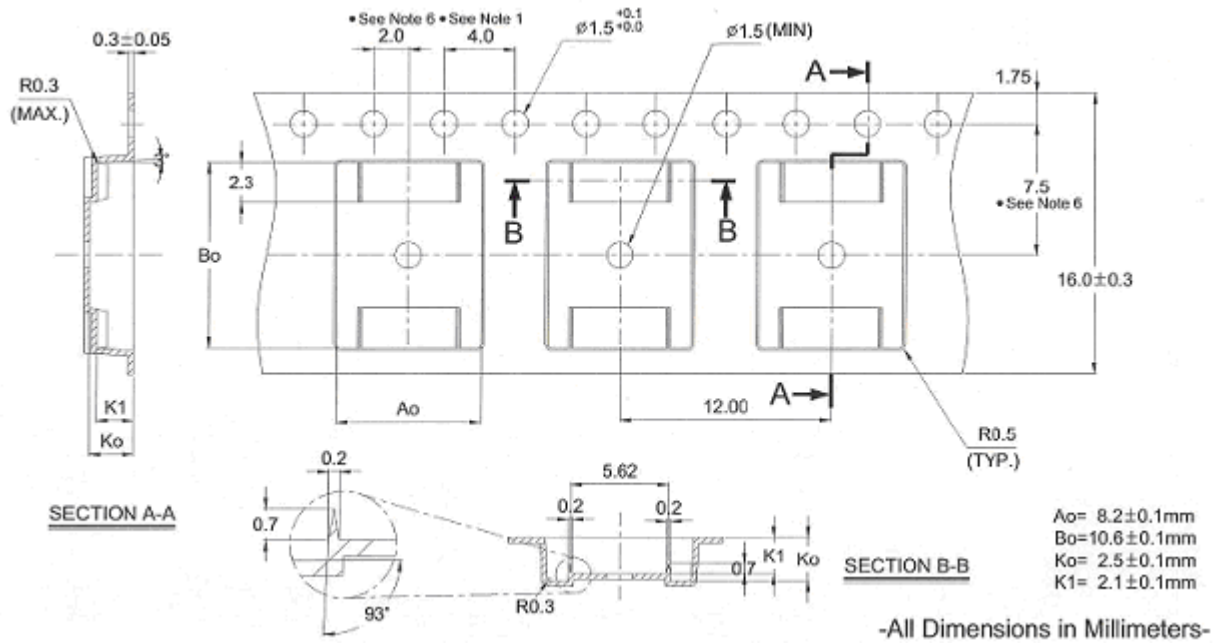


Figure 11-1 SSOP28 Carrier Tape

#### Notes:

- 10 sprocket hole pitch cumulative tolerance  $\pm 0.2$
- Camber not to exceed 1mm in 100mm.
- Material: Black Polystyrene.
- $A_0$  and  $B_0$  measured on a plane 0.3mm above the bottom of the pocket.
- $K_0$  measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
- Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.
- IC quantity per one reel: 2,000 pieces (MOQ)

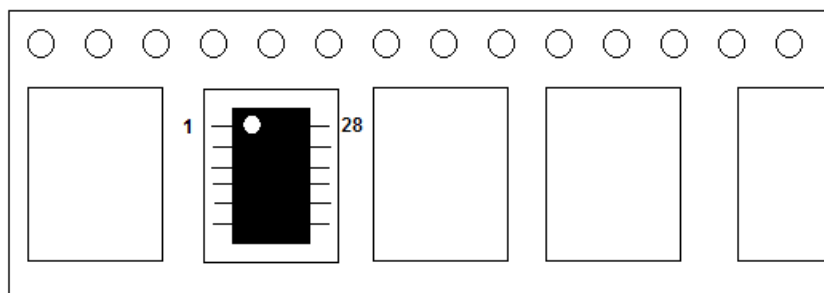


Figure 11-2 IC Reel Placements



## 11.2 Carrier Tape (QFN32)

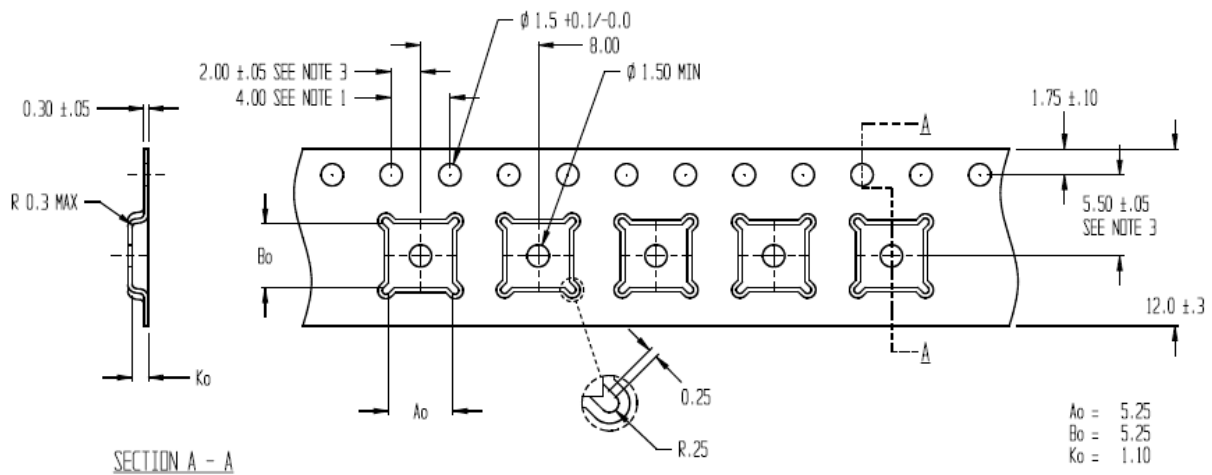


Figure 11-3 QFN32 Carrier Tape

### Notes:

- 10 sprocket hole pitch cumulative tolerance  $\pm 0.2$
- Camber in compliance with EIA 481.
- Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.
- IC quantity per one reel: 2,000 pieces (MOQ)

### 11.3 Reel Dimension

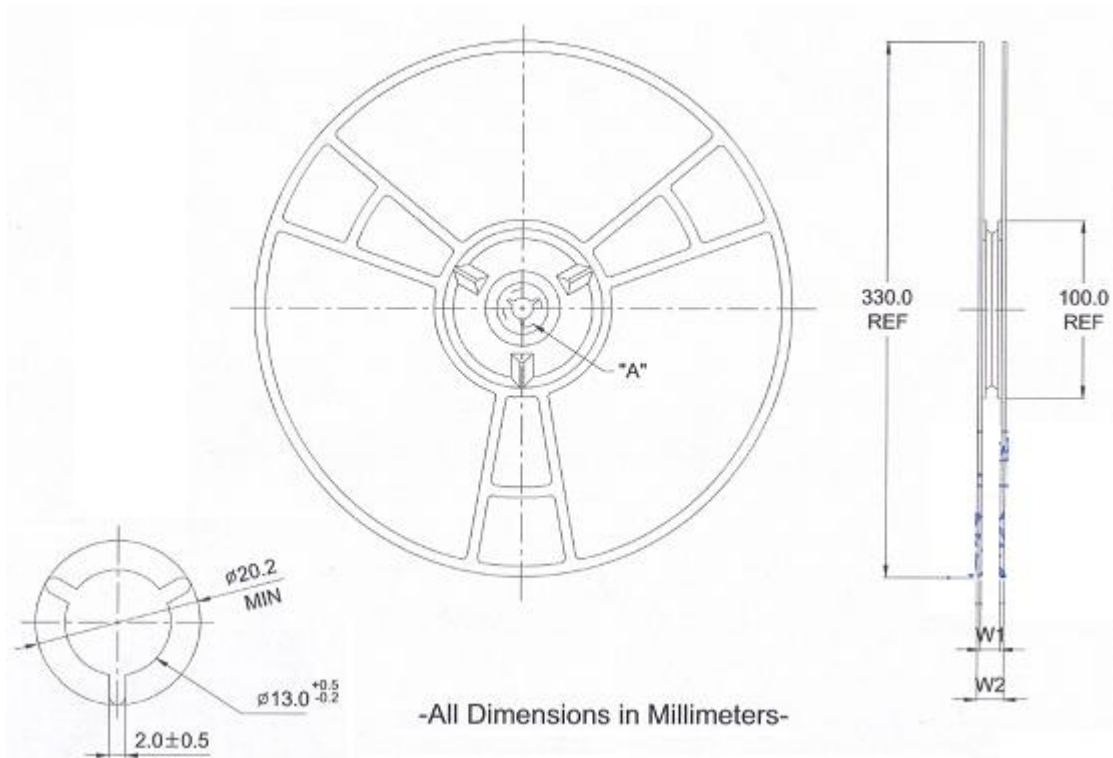
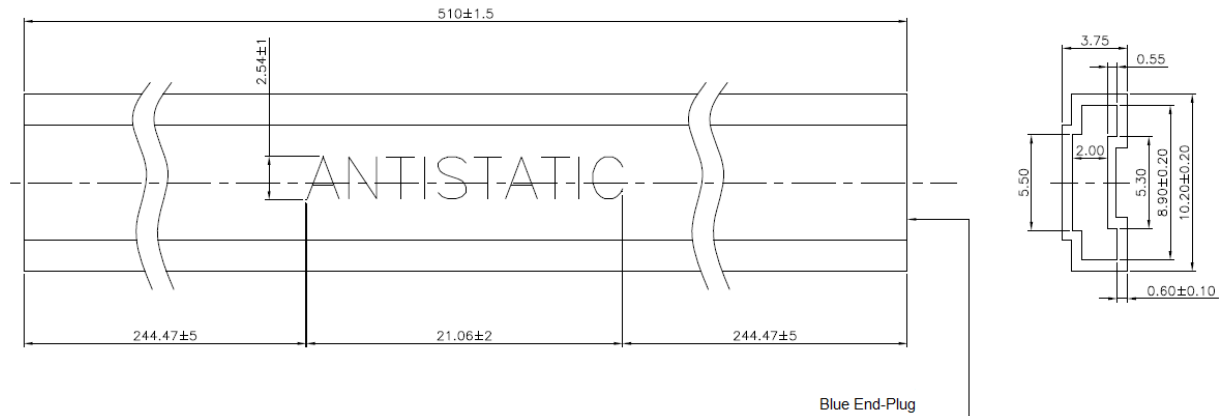


Figure 11-4 Reel Dimension

Table 11-1 Reel Part Number Information

Package	Part Number	Normal Hub Width	W1 +0.3mm -0.2mm	W2 Max
QFN32	RD33008SW-T + RD33004SW-T	12mm	12.8mm	18.2mm
SSOP28	RD33008SW-T + RD33008SW-T	16mm	16.8mm	22.2mm

## 11.4 Tube Packing



**Figure 11-5 Tube Packing Dimension**

REMARK :

- 1.TUBE MT'L : PVC,COATING WITH ANTISTATIE LIQUID.
- 2.COLOR : TUBE - TRANSPARENT ; MARK - BLUE
- 3.SURFACE RESISTANCE :  $10^8 \sim 10^{11} \cdot / \square$
- 4.NO BURR AT CUTTING AREA.
- 5.THE TUBE SHALL WITH BLUE END-PLUG(3088-060-01681) FROM VENDOR, TAIL DOWNWARD AND THE OTHER ONE ENCLOSE TOGETHER WITH SHIPMENT.

## 12.0 Ordering and Chip Marking Information

Table 12-1 Ordering Information

Part Number	Package Type
PL-2303HXD LF	28-pin SSOP (Lead Free or Pb-Free)
PL-2303HXD QFN32 LF	32-pin QFN (Lead Free or Pb-Free)

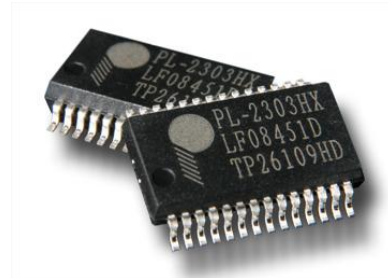
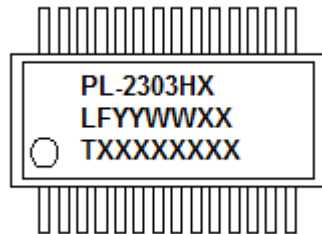


Figure 12-1 Chip Part Number Information (SSOP)

Table 12-2 Chip Marking Information

Line	Marking	Description
First Line	PL-2303HX	Chip Product Name
Second Line (LFYYWWXX)	LF	Lead-Free (Pb-free) packing material
	YY	Last two digits of the manufacturing year
	WW	Week number of the manufacturing year
	XX	HX Chip Version (Rev D)
Third Line	TXXXXXXXX	Manufacturing LOT code

Example: "LF08451D" – means Lead-Free packing + Year 2008 + Week no. 45 + 1D chip version.

---

## 13.0 Contact Information

### **Taiwan Headquarter**

7F, No.48, Sec. 3, Nan Kang Rd.,  
Nan Kang, Taipei, Taiwan 115, R.O.C.  
Tel: +886-2-2654-6363 Fax: +886-2-2654-6161  
Website: [www.prolific.com.tw](http://www.prolific.com.tw)  
E-mail: [sales@prolific.com.tw](mailto:sales@prolific.com.tw)

### **Shenzhen Office**

Room 1908, Building, No.A. jiahehuaqiang Building,  
Shennanzhong Rd. Futian District, Shenzhen, China  
Tel: +86-1350-285-4191  
E-mail: [alex yang@prolific.com.tw](mailto:alex yang@prolific.com.tw)

**Distributors Contact:** <http://www.prolific.com.tw/eng/contact-distributors.asp>

### **Taiwan Distributors**

#### **Maxtek Technology Co., Ltd.**

5F, No. 13-20, Sec. 6, Ming-Chuang E.RD., Nei-Hu, Taipei, Taiwan, R.O.C.  
Tel: +886-2-2794-6060 Ext.662  
Fax: +886-2-8792-8921  
Website: <http://www.maxtek-icrep.com.tw>  
E-mail: [sales@maxtek.icrep.com.tw](mailto:sales@maxtek.icrep.com.tw)

#### **Morrihan International Corp.**

4F, No. 3-2, YuanCyu Street, NanKang District , Taipei 115, Taiwan, R.O.C.  
Tel: +886-2-2788-5511  
Fax: +886-2-2788-9366  
Website: <http://www.morrihan.com>

#### **U-CHEER Company Co., Ltd.**

4F, No. 48, Chow-Tze ST., Nei-Hu, Taipei, Taiwan, R.O.C.  
Tel: +886-2-8797-6789  
Fax: +886-2-8797-3388  
E-mail: [arthur.lu36@ucheer.com.tw](mailto:arthur.lu36@ucheer.com.tw)

### **USA and Canada**

#### **ProlificUSA.com / Tectona Electronics Inc.**

250 Wyecroft Road, Unit 6, Oakville, Ontario, Canada L6K 3T7  
Tel: +905-827-2206  
Fax: +905-847-9412  
Corporate Website: <http://www.tectona.com>  
Product Website: <http://www.prolificUSA.com>

### **Japan**

#### **Hitachi High-Tech Trading Corporation**

1-24-14, Nishi-Shimbashi, Minato-ku, Tokyo, 105-8418 Japan  
Dept.: Electronic Devices 4th Dept., Electronic Devices Sales Div  
Tel: +81-3-3504-3859  
Fax: +81-3-3504-7903  
Website: <http://www.hitachi-hitec-trading.com>

---

## China

### **Lacewood International Corp.**

Hong Kong Office

Unit B1-B3, 21/F, Block B, Kong Nam Industrial Building, 603-609 Castle peak Road,

Tsuen Wan N.T, Hong Kong

Tel: +852-2690-9898

Fax: +852-2690-9300

Shenzhen Office

Room401-3,East, CEC Information Building, No.1 Xin Wen Road, Shenzhen, P.R.C.,  
518034

Tel:+86-755-8296-7018

Fax: +86-775-8330-7119

Shanghai Office

Rm 208, District B, Building 3, NO.7, Guiqin Rd, Xuhui Area, Shanghai

Tel : +86-21-5426-2182 ~6

Fax: +86-21-5426-2180

### **China Fremlink Asia Limited**

Room 307, 3F Block6, AnHua Industrial Zone, Tairan 8th Road,

CheGongMiao, Futian District, Shenzhen, China

Tel: +86-755-8302-0469

### **China Shenzhen Shiqixinji Science and Technology Co., Ltd.**

Room 1908, Building NO.A, Jiahehuaqiang Building,

Shennanzhong Rd., Futian District, Shenzhen, China

Tel: +86-755-8329-5310

## Korea

### **Nevora Technology**

Rm 502, Citylife, 441, Amsa-Dong, Kangdong-Gu, Seoul, 134-855, Korea

Tel: +82-2-3426-0050

Fax: +82-2-3426-0070

Website: <http://www.nevora.co.kr>

### **T&C Semitech Co.,LTD**

#703 J-dong, Gongku-sangga, 636-62, Kuro-dong, Kuro-ku, Seoul. Korea

Tel: +82-2-2672-9531

Fax: +82-2-2672-9532

Website: <http://www.tncsemi.co.kr>