PL2303TA
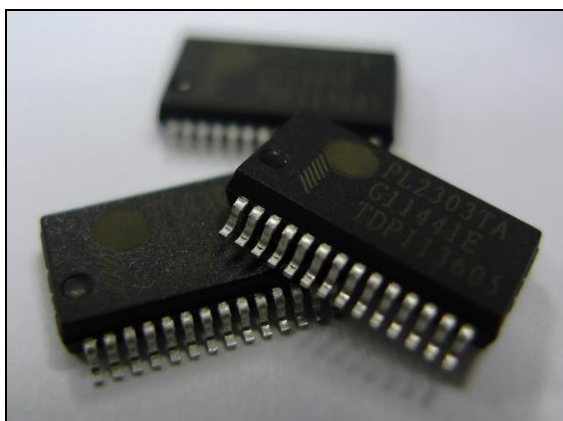# USB to Serial Bridge Controller
Product Datasheet

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Revision History

Revision	Description	Date
1.2.0	➤ Remove Distributors Contact Information (refer to Prolific website instead).	March 27, 2018
1.1.1	➤ Modify Ordering Information	May 4, 2012
1.1.0	➤ Added USB-IF Logo Product Listing URL Link ➤ Added Reel and Tube Packing Information	February 21, 2012
1.0.0	➤ PL2303TA Product Datasheet – Formal Release	November 30, 2011

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1.0 Features

➢ Full Compliant with USB Specification v2.0 (Full-Speed)

➢ USB-IF Logo Compliant with TID 40001305

➢ On Chip USB 1.1 Transceiver, 5V→3.3V regulator, and 12 MHz crystal oscillator

➢ Supports RS232-like Serial UART Interface
   o Full-duplex transmitter and receiver (TXD and RXD)
   o Six MODEM control pins (RTS, CTS, DTR, DSR, DCD, and RI)
   o 5, 6, 7 or 8 data bits
   o Odd, Even, Mark, Space, or None parity mode
   o One, one and a half, or two stop bits
   o Parity error, frame error, and serial break detection
   o Programmable baud rate from 75 bps to 6 Mbps
   o External RS232 driver power down control
   o Independent power source for serial interface
   o Works with existing PC COM Port software applications

➢ Extensive Flow Control Mechanism
   o Adjustable high/low watermark level
   o Automatic hardware flow control with CTS/RTS
   o Automatic software flow control with XON/XOFF
   o Inbound data buffer overflow detection

➢ Configurable 512-byte bi-directional data buffer
   o 256-byte outbound buffer and 256-byte inbound buffer; or
   o 128-byte outbound buffer and 384-byte inbound buffer

➢ Supports Remote Wake-up from RS232 input pin signals (RI, RXD, DSR, DCD, CTS)

➢ Supports Chip Suspend on Powered State (USB-IF Compliance Logo Test Requirement) with external EEPROM

➢ Supports USB Selective Suspend (Run-Time Power Management)

➢ Two General Purpose I/O (GPIO) pins

➢ Optional external serial EEPROM for startup device configurations

➢ Provides royalty-free Virtual COM Port (VCP) drivers for:
   o Windows 2000, XP, Vista, and 7 (Microsoft Certified Logo Drivers)
   o Windows Server 2003, 2008, 2008 R2
   o Windows 8
   o Windows CE 4.2, 5.0, 6.0, and Windows Embedded Compact 7
   o Windows XP Embedded (XPe), Point-of-Service (WEPOS), and POSReady
   o Mac OS 8/9, OS X
   o Linux/Android kernel 2.4.31 and above includes built-in drivers
   o Provides Driver Customization for Customer VID/PID and special baud rates

➢ UHCI/OHCI (USB1.1), EHCI (USB 2.0), xHCI (USB 3.0) Host Controller Compatible

➢ Low Operating Power Consumption and Suspend Current

➢ Pin-to-Pin Compatible with PL-2303HXA (see Migration Guide Application Note)

➢ -40°C to 85°C Operating Temperature

➢ Small footprint 28-pin SSOP IC package (RoHS compliant and Pb-free Green Compound)

1.1 Product Applications

➢ Applications include:

  o Single-chip upgrade solution for Legacy RS232 devices to USB interface

  o USB to RS232 converters/cables/dongles

  o Healthcare/Medical USB Interface Data Transfer Cable

  o Personal Infotainment/Media Player Docking USB Interface

  o Cellular/PDA USB Interface Data Transfer Cable

  o Serial-over-IP Wireless Solution

  o USB Barcode/Smart Card Readers

  o GPS/Navigation USB Interface

  o Point-of-Sale (POS) Terminals/Printers

  o PC Docking Station/Port Replicators

  o Industrial/Instrumentation/Automation Control USB Interface

  o USB Modem/Wireless/Zigbee USB Interface

  o Set-Top Box (STB) / Home Gateway USB Interface

  o Battery Charger Application

  o MCU-based devices to USB interface
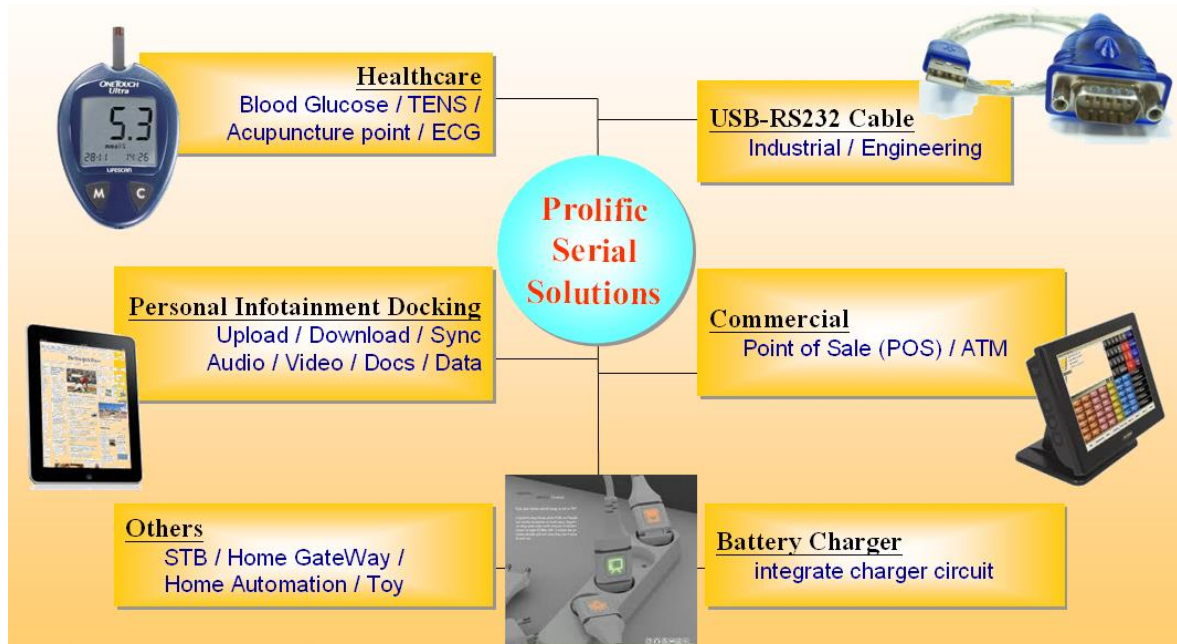
Figure 1-1 PL2303TA Product Application Areas

2.0 Functional Block Diagram
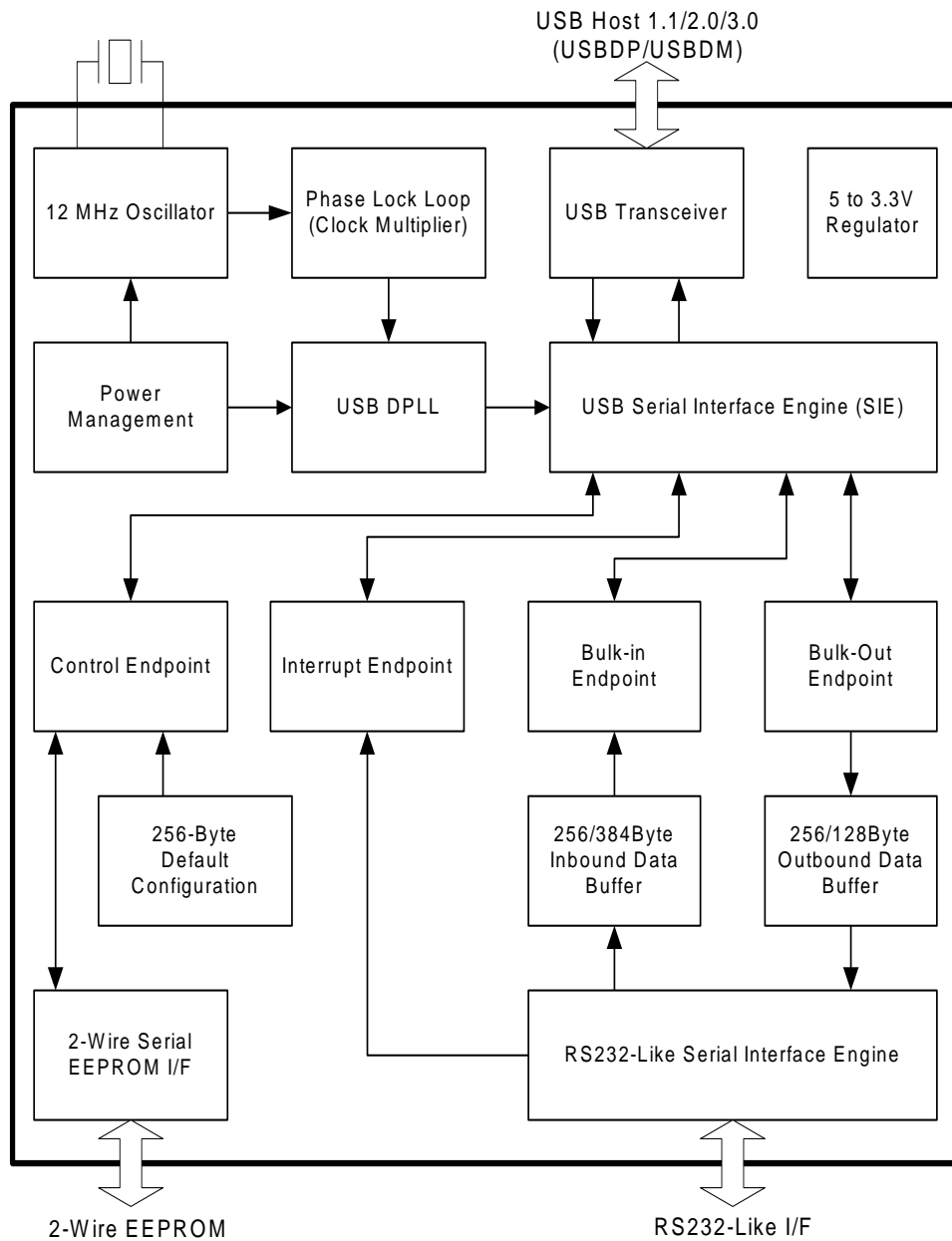
Figure 2-1 Block Diagram of PL2303TA

3.0 Introduction

PL2303TA provides a convenient solution for connecting an RS232-like full-duplex asynchronous serial device to any Universal Serial Bus (USB) capable host. PL2303TA 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 without having to rewrite the COM port software application.

By taking advantage of USB bulk transfer mode, large data buffers, and automatic flow control, PL2303TA 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 PL2303TA could be programmed to generate any rate between 75 bps and 6M bps.

PL2303TA 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, PL2303TA 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 PL2303TA to connect directly to any 3.3V~1.8V range devices.

4.0 Pin Assignment Outline

Figure 4-1 Pin Assignment Outline of PL2303TA

5.0 Pin Assignment & Description

Pin Type Abbreviation:

I: Input	O: Output	I/O: Bidirectional	P: Power/Ground

Table 5-1 Pin Assignment & Description

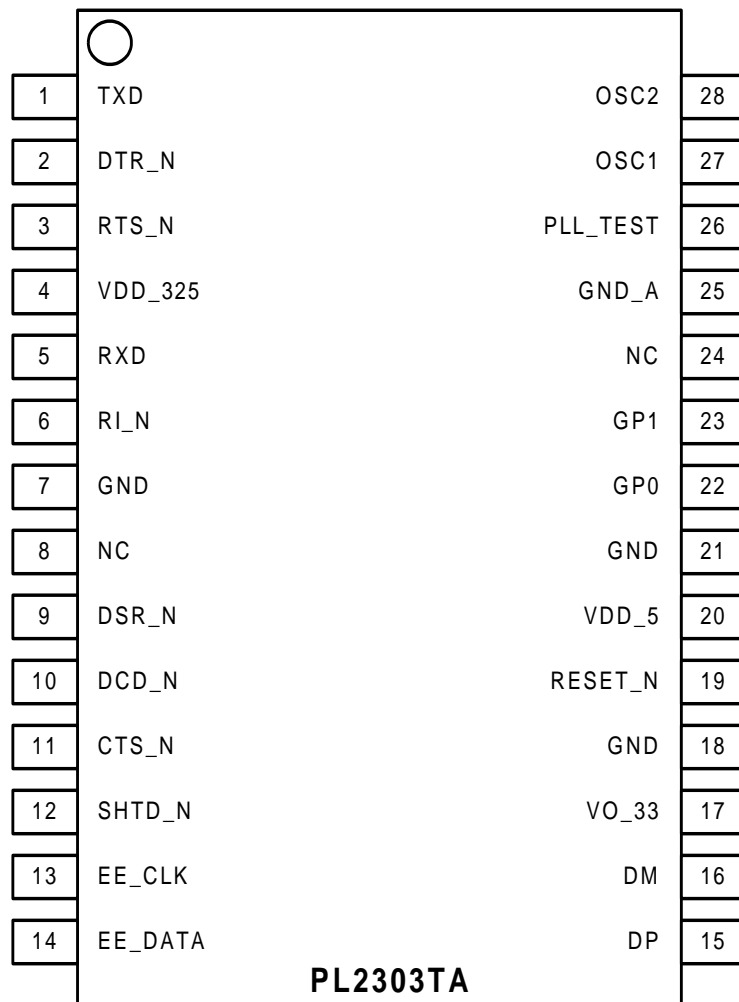| Pin #	Name	Type	Description
1	TXD	O [(1)]	Serial port (Transmitted Data)
2	DTR_N	O [(1)]	Serial port (Data Terminal Ready)
3	RTS_N	O [(1)]	Serial port (Request To Send)
4	VDD_325	P	RS232 VDD. The power pins for the serial port signals. When the serial port is 3.3V, this should be 3.3V. When the serial port is 2.5V, this should be 2.5V.
5	RXD	I [(2)]	Serial port (Received Data)
6	RI_N	I/O [(3)]	Serial port (Ring Indicator)
7	GND	P	Ground
8	NC		No Connection
9	DSR_N	I/O [(3)]	Serial port (Data Set Ready)
10	DCD_N	I/O [(3)]	Serial port (Data Carrier Detect)
11	CTS_N	I/O [(3)]	Serial port (Clear To Send)
12	SHTD_N	O [(4)]	RS232 Transceiver Shut Down Control
13	EE_CLK	I/O [(5)]	2-Wire Serial EEPROM Clock
14	EE_DATA	I/O [(5)]	2-Wire Serial EEPROM Data
15	DP	I/O	USB port D+ signal
16	DM	I/O	USB port D- signal
17	VO_33	P	Regulator Power Output, 3.3V
18	GND	P	Ground
19	RESET_N	I [(6)]	External System Reset (Active Low)
20	VDD_5	P	USB port V_{BUS}, 5V Power.
21	GND	P	Ground
22	GP0	I/O [(7)]	General Purpose I/O Pin 0
23	GP1	I/O [(7)]	General Purpose I/O Pin 1
24	NC		No Connection
25	GND_A	P	Analog Ground for PLL
26	PLL_TEST	I [(6)]	PLL test mode control
27	OSC1	I	Crystal oscillator input
28	OSC2	O	Crystal oscillator output

Notes:

(1) – CMOS Out, Output Pad. Level and Driving Capability decided by VDD_325.

(2) – SCHMITT In, 5V Tolerant, Input Pad. Level and Driving Capability decided by VDD_325.

(3) – SCHMITT In/CMOS Out, 5V Tolerant, Bi-directional Pad. Level and Driving Capability decided by VDD_325.

(4) – CMOS Out, 3.3V, Output Pad, 4mA Output Driving Capability.

(5) – SCHMITT In/CMOS Out, 5V Tolerant, Bi-directional Pad with internal resistor pulling-up to 3.3V, 4mA Output Driving Capability.

(6) – LVTTL In, 3.3V, Input Pad.

(7) – SCHMITT In/CMOS Out, 5V Tolerant, Bi-directional Pad, 4mA Output Driving Capability.

6.0 EEPROM Configuration

The default configuration descriptors are stored in the chip internally which will be loaded during power-on reset or USB bus reset when there is no external EEPROM detected or external EEPROM is empty. The PL2303TA has four string descriptors: Language ID, Manufacturer, Product, and Serial Number. Except for Serial Number, the first three string descriptors are stored in the chip with a fixed string value and cannot be modified.

Table 6-1 Fixed String Descriptors (Chip Internal)

String Descriptor	Default	Notes
Language ID	0409h	English (United States)
Manufacturer Name	Prolific Technology Inc.	
Product Description	USB-Serial Controller	This string will also be shown in Device Manager when driver is not installed. If driver is installed, the product string in driver INF file will be shown instead.

However, other device descriptors could be modified and stored to an external 2-wire serial EEPROM like USB Vendor ID (VID), Product ID (PID), serial number, and other configuration descriptors. The external EEPROM can be programmed using the Prolific EEPROM Writer utility software called EEWriter, which can be requested from Prolific or authorized distributors.
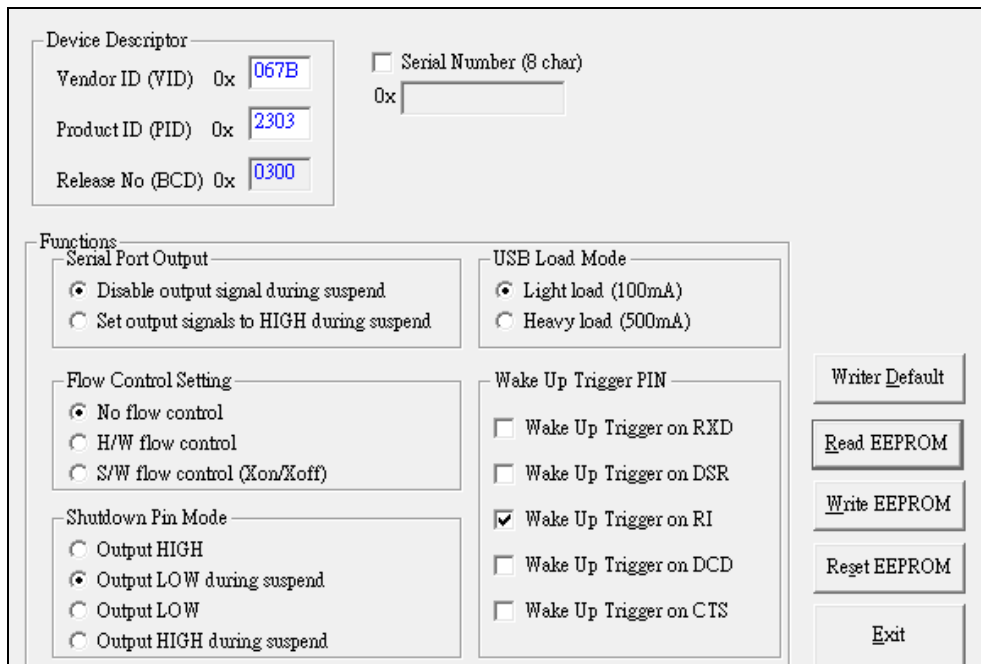

Figure 6-1 PL2303TA EEPROM Writer Program

Table 6-2 External EEPROM Configuration

Device Descriptor	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: http://www.usb.org/developers/vendor/
Product ID (PID)	2303 (hex)	USB Product ID assigned by Company or Manufacturer.
Rel. No. (BCD)	0300	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.
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.
Shutdown Pin Mode	Output LOW during suspend	This option allows setting the Shutdown pin (Pin 12) mode to Output HIGH or LOW on normal mode or Suspend mode.

7.0 Data Formats & Programmable Baud Rate Generator

The PL2303TA 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 6Mbps and standard driver already supports several baud rate settings 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 Standard Driver)

Baud Rates (bps)	Baud Rates (bps)	Baud Rates (bps)	Baud Rates (bps)	Baud Rates (bps)
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 other special baud rate requirements, please contact Prolific FAE for driver customization support. The baud rates listed on the above table are already supported by the standard driver and only needs to be set by the COM port configuration of the application software on the PC.

8.0 DC & Temperature Characteristics

8.1 Absolute Maximum Ratings

Table 8-1 Absolute Maximum Ratings

Items	Ratings
Power Supply Voltage	-0.3 to 5.5 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 VO_33 + 0.3 V
Storage Temperature	-40 to 150 ^{o}C

8.2 DC Characteristics

Table 8-2 Operating Voltage and Suspend Current

Parameter	Symbol	Min	Typ	Max	Unit
Operating Voltage Range	VDD_5	3.6	5	5.5	V
Regulator Output Driving Current (VDD_5 = 5V)	I_{LOAD}	-	-	150	mA
Operating Current[1] (Power Consumption)	I_{DD}	-	8	10	mA
Suspend Current	I_{SUS}	-	370	400	μA

Note: (1) – No device connected.

8.2.1 3.3V I/O Pins

Table 8-2-1 3.3V I/O Pins

Parameter	Symbol	Min	Typ	Max	Unit
Output Driving Capability	I_{DD}	--	4	--	mA
Output Voltage of Regulator	VO_33	3.0	3.3	3.6	V
Input Voltage (CMOS)					
Low	V_{IL}	--	--	0.3* VO_33	V
High	V_{IH}	0.7* VO_33	--	--	V
Input Voltage (LVTTL)					
Low	V_{IL}	--	--	0.8	V
High	V_{IH}	2.0	--	--	V
Schmitt Trigger Threshold Voltage					
Negative going	V_{t-}	0.9	1.2	--	V
Positive going	V_{t+}	--	2.1	2.5	V
Output Voltage, 3.3V					
Low	V_{OL}	--	--	0.4	V
High	V_{OH}	2.4	--	--	V

8.2.2 Serial I/O Pins

Table 8-2-2a VDD_325@3.3V Serial I/O Pins

Parameter	Symbol	Min	Typ	Max	Unit
Output Driving Capability	I_{DD}	--	4	--	mA
Power Supply for Serial I/O Pins	VDD_325	3.0	3.3	3.6	V
Input Voltage					
Low	V_{IL}	--	--	0.8	V
High	V_{IH}	2.0	--	--	V
Schmitt Trigger Threshold Voltage					
Negative going	V_{t-}	0.8	1.1	--	V
Positive going	V_{t+}	--	1.6	2.0	V
Output Voltage					
Low	V_{OL}	--	--	0.4	V
High	V_{OH}	2.4	--	--	V

Table 8-2-2b VDD_325@2.5V Serial I/O Pins

Parameter	Symbol	Min	Typ	Max	Unit
Output Driving Capability	I_{DD}	--	2.6	--	mA
Power Supply for Serial I/O Pins	VDD_325	2.25	2.5	2.75	V
Input Voltage					
Low	V_{IL}	--	--	0.25* VDD_325	V
High	V_{IH}	0.7* VDD_325	--	--	V
Schmitt Trigger Threshold Voltage					
Negative going	V_{t-}	0.25* VDD_325	0.84	--	V
Positive going	V_{t+}	--	1.31	0.7* VDD_325	V
Output Voltage					
Low	V_{OL}	--	--	0.4	V
High	V_{OH}	1.85	--	--	V

Table 8-2-2c VDD_325@1.8V Serial I/O Pins

Parameter	Symbol	Min	Typ	Max	Unit
Output Driving Capability	I_{DD}	--	1.4	--	mA
Power Supply for Serial I/O Pins	VDD_325	1.65	1.8	1.95	V
Input Voltage					
Low	V_{IL}	--	--	0.25* VDD_325	V
High	V_{IH}	0.7* VDD_325	--	--	V
Schmitt Trigger Threshold Voltage					
Negative going	V_{t-}	0.25* VDD_325	0.6	--	V
Positive going	V_{t+}	--	1.04	0.7* VDD_325	V
Output Voltage					
Low	V_{OL}	--	--	0.4	V
High	V_{OH}	1.25	--	--	V

8.3 Clock Characteristics

Table 8-3 Clock Characteristics

Parameter	Min	Typ	Max	Units
Frequency of Operation	11.976	12.000	12.024	MHz
Clock Period	83.1	83.3	83.5	ns
Duty Cycle	45	50	55	%

8.4 Temperature Characteristics

Table 8-4 Temperature Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature	--	-40	--	85	^{o}C
Junction Operation Temperature	T_J	-40	25	125	^{o}C

8.5 Leakage Current and Capacitance

Table 8-5 Leakage Current and Capacitance

Parameter	Symbol	Min	Typ	Max	Unit
Input Leakage Current[1]	I_L	-10	±1	10	μA
Tri-state Leakage Current	I_{oz}	-10	±1	10	μA
Input Capacitance	C_{IN}	--	2.8	--	pF
Output Capacitance	C_{OUT}	2.7	--	4.9	pF
Bi-directional Buffer Capacitance	C_{BID}	2.7	--	4.9	pF

Note: *1. No pull-up or pull-down resistor.

8.6 Power-On Reset
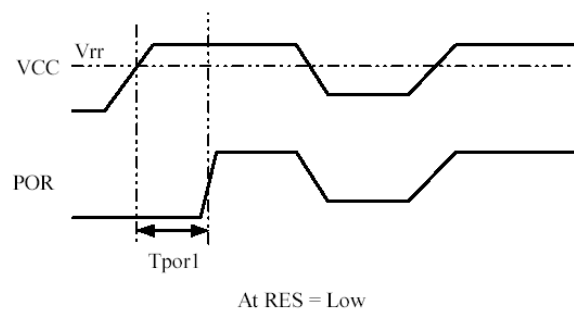
Figure 8-1 Power-On Reset Diagram

Table 8-6 Power-On Reset

Description and Condition	Symbol	Min	Typ	Max	Unit
Power supply voltage	VCC	2.8	3.3	4.0	V
VCC rise relax voltage	V_{rr}	1.8	2.3	2.8	V
Power output low duration VCC |$_{rise}$ @ V_{rr} to POR |$_{rise}$ @ 1/2*VCC (VCC slew rate = 1V/1us)	T_{por1}	1.3	5	264	μS

9.0 USB to RS-232 Application Example

Following is an example of using the PL2303TA as a USB to RS232 converter 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 ±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.
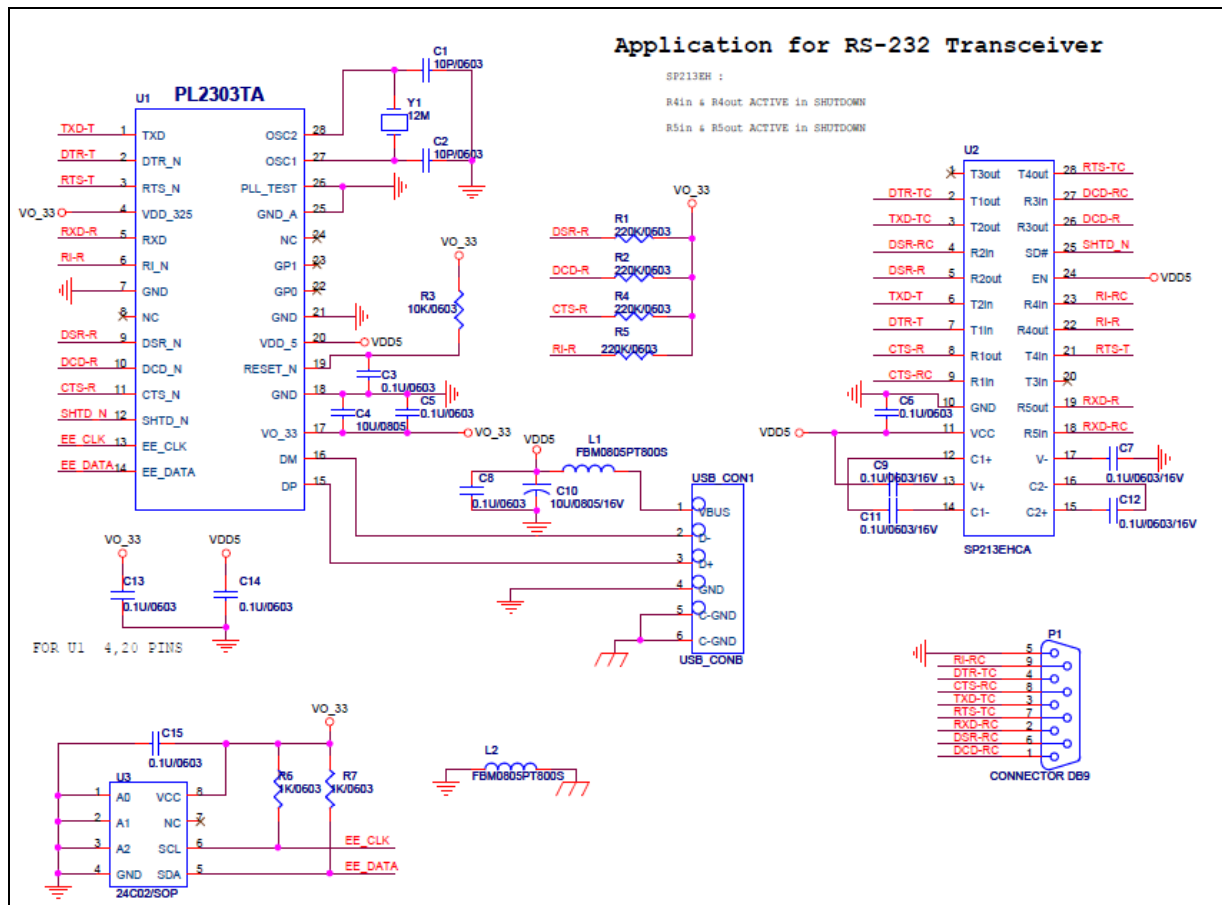

Figure 9-1 USB to RS232 Converter Example

10.0 Outline Diagram

10.1 SSOP28 Package

Table 10-1 Package Dimension

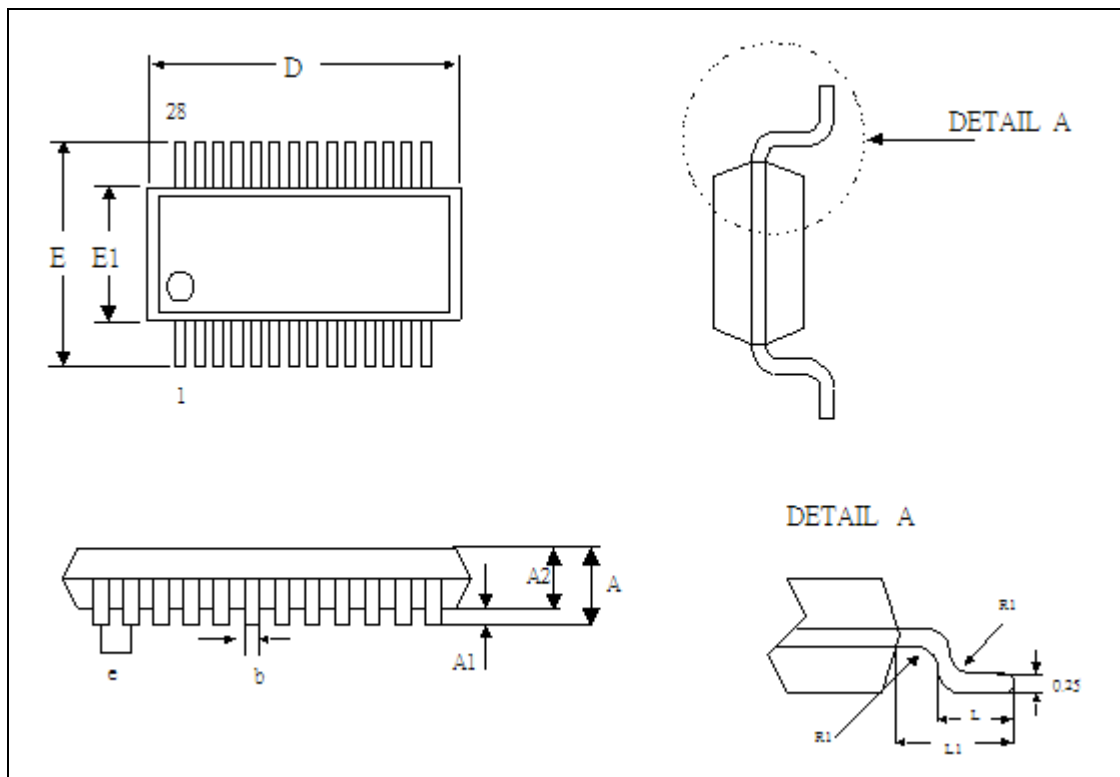| Symbol	Millimeter			Inch		
	Min	**Nom**	**Max**	**Min**	**Nom**	**Max**
b	0.22		0.38	0.009		0.015
E	7.40	7.80	8.20	0.291	0.307	0.323
E1	5.00	5.30	5.60	0.197	0.209	0.220
L	0.55	0.75	0.95	0.021	0.030	0.037
R1	0.09			0.004		
D	9.9	10.2	10.5	0.390	0.402	0.413
A			2.0			0.079
e		0.65			0.0256	
L1		1.25			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 PL2303TA SSOP28

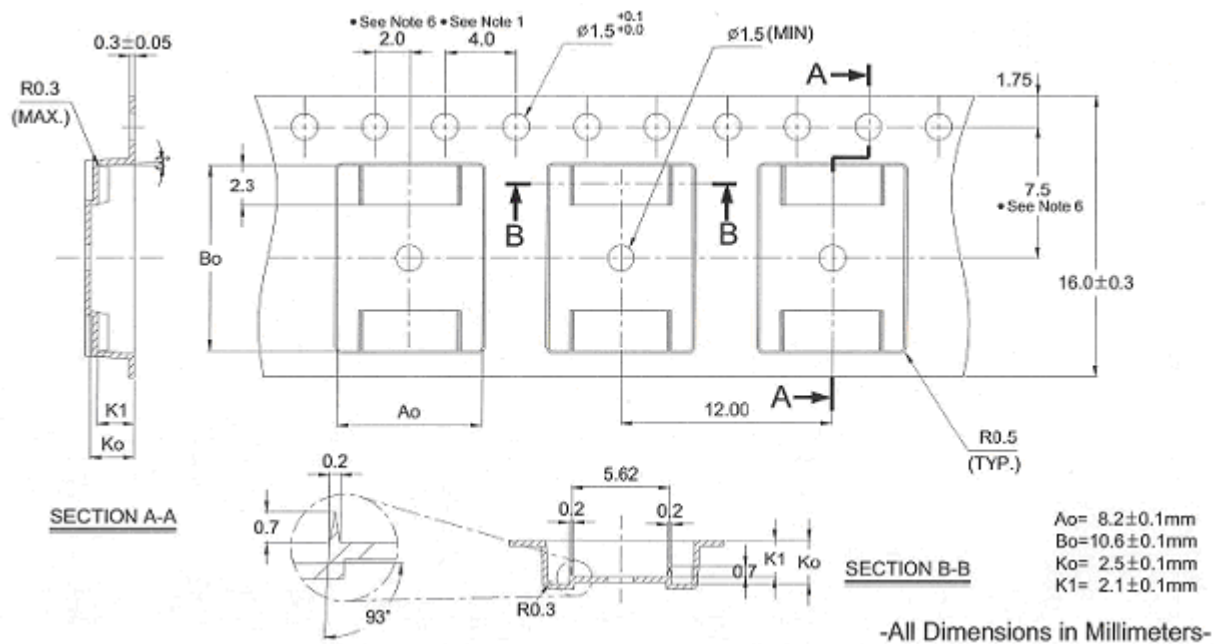# 11.0 Packing Information

11.1 Reel Packing

Figure 11-1 SSOP28 Carrier Tape

Notes:

- 10 sprocket hole pitch cumulative tolerance ±0.2
- Camber not to exceed 1mm in 100mm.
- Material: Black Polystyrene.
- A_o and B_o measured on a plane 0.3mm above the bottom of the pocket.
- K_o 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.
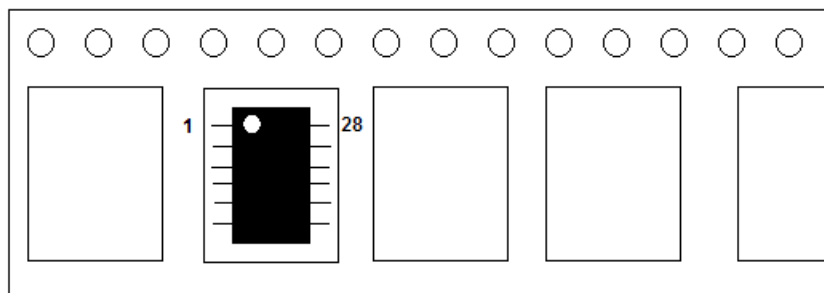- IC quantity per one reel: 2,000 pieces

Figure 11-2 IC Reel Placements

Table 11-1 Reel Packing Part Number Information

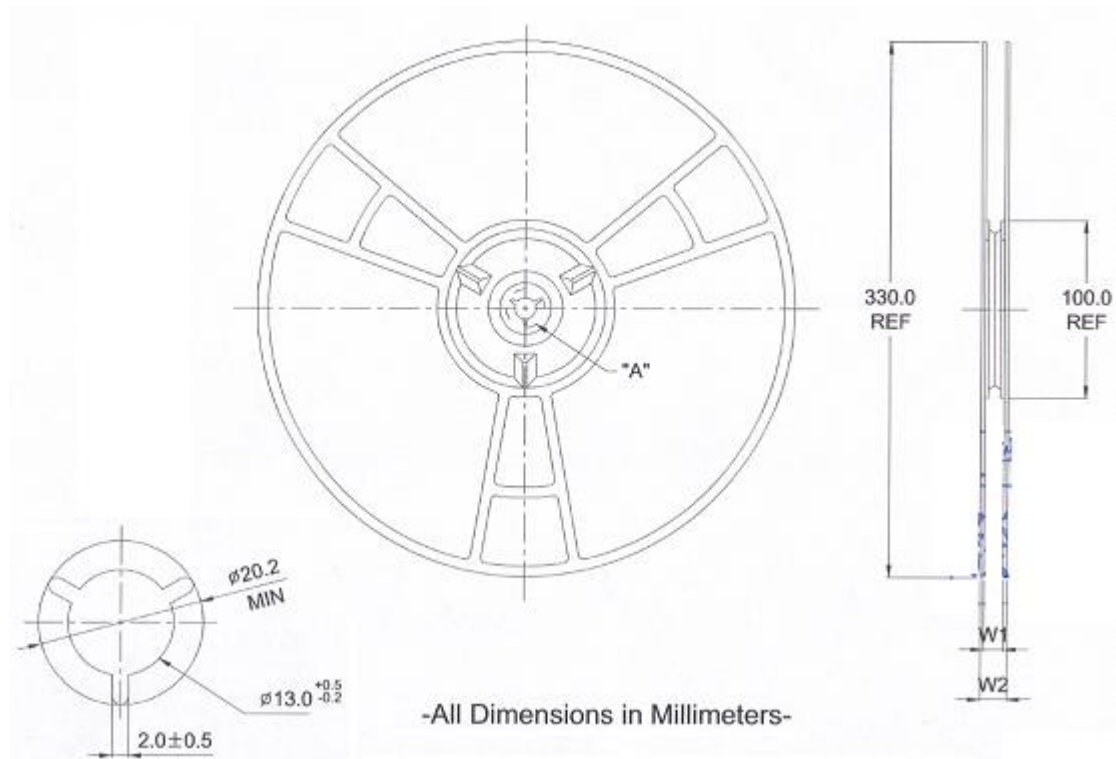| Part Number	Normal Hub Width	W1 +0.3mm -0.2mm	W2 Max
RD33008SW-T + RD33008SW-T	16mm	16.8mm	22.2mm

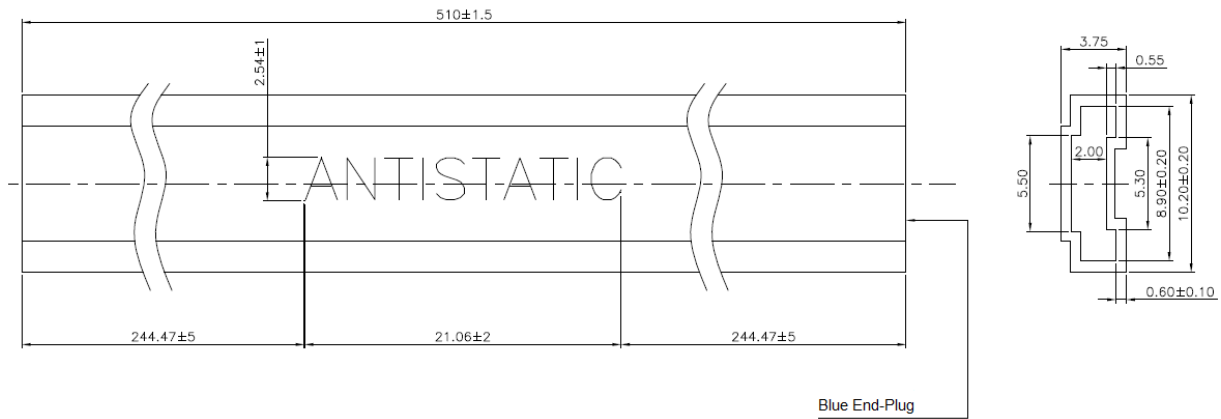**Figure 11-3 Reel Dimension**

11.2 Tube Packing

Figure 11-4 Tube Packing Dimension

REMARK :

1. TUBE MT'L : PVC,COATING WITH ANTISTATIE LIQUID.

2. COLOR : TUBE - TRANSPARENT ; MARK - BLUE

3. SURFACE RESISTANCE : $10^8 \sim 10^{11}$ • /□

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

This section provides the chip ordering part number information and the chip marking information.

Table 12-1 Ordering Information

Part Number	Package Type
PL-2303TA LF	28-pin SSOP Lead Free

Figure 12-1 Chip Part Number Information

Table 12-2 Chip Marking Information

Line	Marking	Description
First Line	PL2303TA	Chip Product Name
Second Line (GYYWWXX)	G	Green compound packing material (Pb-free)
	YY	Last two digits of the manufacturing year
	WW	Week number of the manufacturing year
	XX	Chip Version (1E)
Third Line	TXXXXXXXX	Manufacturing LOT code

Example: "*G11441E*" – means Green packing + Year 2011 + Week no. 44 + 1E chip version.