# PL2303SA (SOP8 Package)
# 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 Reference Schematic<br>➢ Remove USB Descriptors Information<br>➢ Added Chip Marking Information | March 30, 2012 |
| 1.0.0 | ➢ Formal Release – PL2303SA Product Datasheet | October 3, 2011 |

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# 1.0 Features

- Fully Compliant with USB Specification v2.0 (Full-Speed)
- UHCI/OHCI (USB1.1), EHCI (USB 2.0), xHCI (USB 3.0) Host Controller Compatible
- On Chip USB 1.1 transceiver, 5V→3.3V regulator
- On-chip 96MHz clock generator
- Full-duplex transmitter and receiver (TXD and RXD)
  - 5, 6, 7, or 8 data bits
  - Odd, Even, Mark, Space, or None parity mode
  - 1, 1.5, or 2 stop bits
  - Parity error, frame error, and serial break detection
  - Programmable baud rate from 75 bps to 115 kbps
  - Independent power source for serial interface
  - Works with existing PC COM Port software applications (TXD and RXD)
- 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
- Provides royalty-free Virtual COM Port (VCP) driver support for:
  - Windows 2000, XP, Vista, and 7 (Microsoft Certified WHQL Logo Drivers)
  - Windows Server 2003, 2008, 2008 R2
  - Windows 8
  - Windows CE 4.2, 5.0, 6.0, and Windows Embedded Compact 7
  - Windows XP Embedded (XPe), Point-of-Service (WEPOS), and POSReady
  - Mac OS 8/9, OS X
  - Linux/Android kernel 2.4.31 and above includes built-in PL2303 drivers
- Small footprint 8-pin SOP IC package

## 2.0 Functional Block Diagram

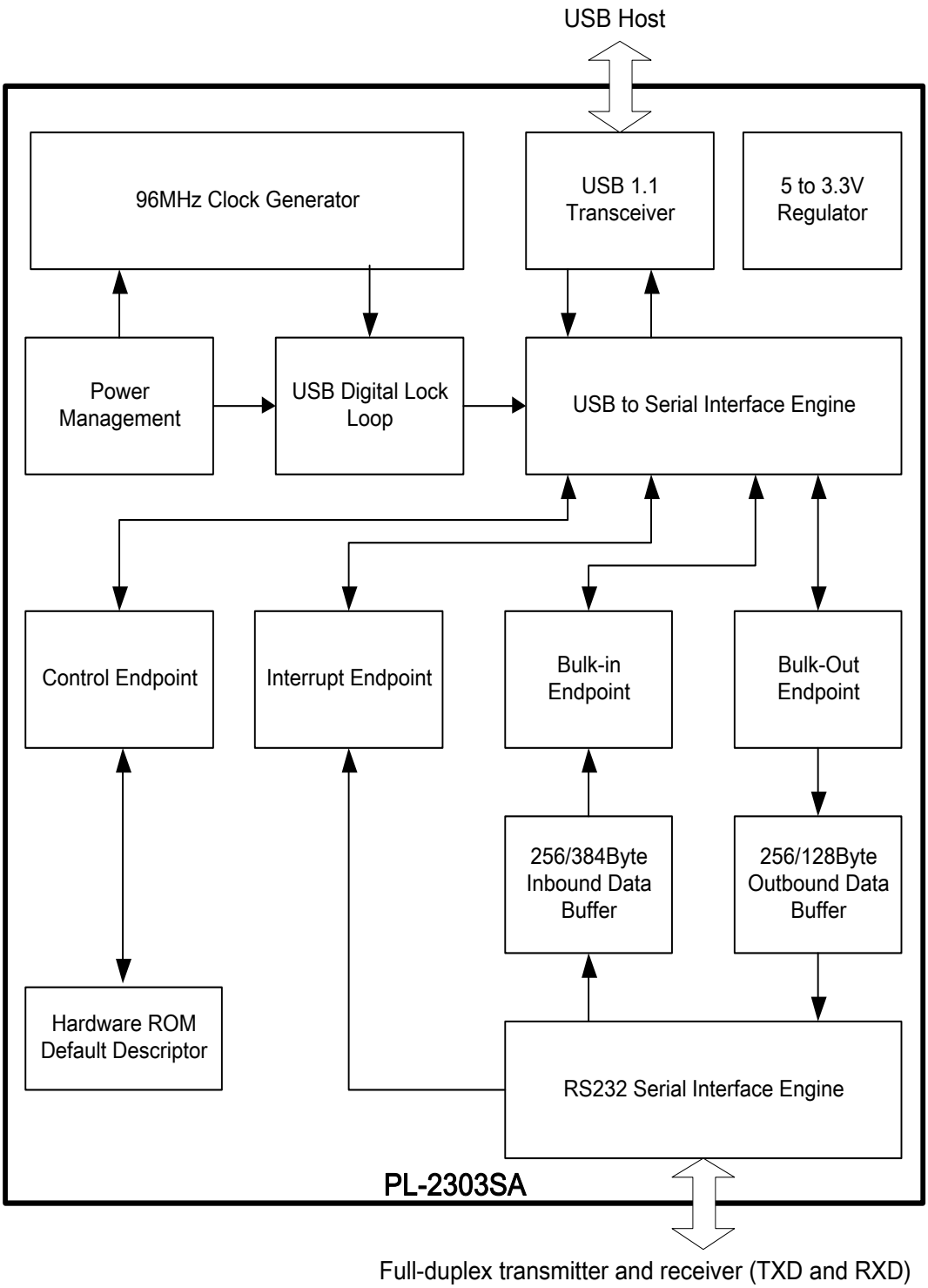



**Figure 2-1 Block Diagram of PL2303SA**

# 3.0 Introduction

PL2303SA is a convenient small-factor solution for connecting an RS232-like full-duplex asynchronous serial device (TX-RX only) to any Universal Serial Bus (USB) capable host. Prolific provides highly compatible drivers that could simulate the traditional COM port on most operating systems allowing the existing applications based on COM port (using TX-RX only) to easily migrate and be made USB ready.

By taking advantage of USB bulk transfer mode and large data buffers, PL2303SA is capable of achieving higher throughput compared to traditional UART (Universal Asynchronous Receiver Transmitter) ports. The flexible baud rate generator of PL2303SA also could be programmed to generate any rate between 75 bps to 115 kbps by driver customization.

PL2303SA is exclusively designed for mobile and embedded solutions in mind, providing a very small footprint that could easily fit in to any connectors and handheld devices. With very small power consumption in either operating or suspend mode, PL2303SA 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 PL2303SA to connect directly to any 3.3V~1.8V range devices.

# 4.0 Pin Assignment Diagram

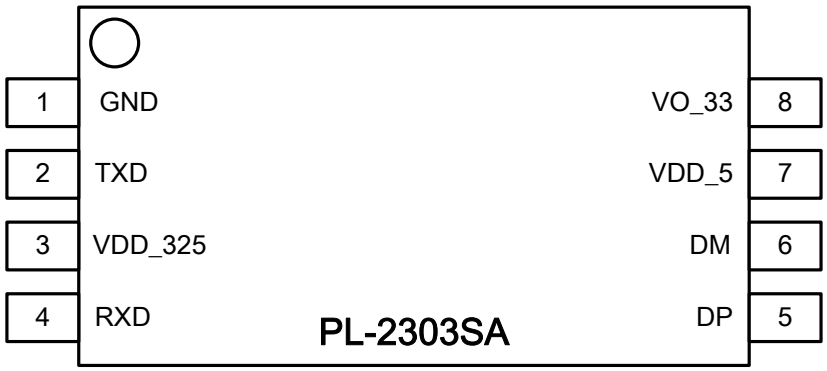



**Figure 4-1 Pin Assignment Diagram of PL2303SA SOP8 Package**

# 5.0 Pin Assignment Description

**Pin Type Abbreviation:**

| I: Input | O: Output | B: Bidirectional I/O | P: Power/Ground |
|---|---|---|---|

**Table 5-1 Pin Assignment Description (SOP8 Package)**

| Pin # | Name | Type | Description |
|---|---|---|---|
| 1 | GND | P | Ground |
| 2 | TXD | O (1) | Serial Port (Transmitted Data) |
| 3 | 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. |
| 4 | RXD | I (2) | Serial Port (Received Data) |
| 5 | DP | B | USB Port D+ signal |
| 6 | DM | B | USB Port D- signal |
| 7 | VDD_5 | P | USB Port $V_{BUS}$, 5V Power |
| 8 | VO_33 | P | 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.

# 6.0 Data Formats & Programmable Baud Rate Generator

The PL2303SA controller supports versatile data formats and has a programmable baud rate generator. The supported data formats are shown on Table 6-1. The programmable baud rate generator supports baud rates from 75 bps up to 115 kbps as shown in Table 6-2.

**Table 6-1 Supported Data Formats**

| | Description |
|---|---|
| Stop bits | 1<br>1.5<br>2 |
| Parity type | None<br>Odd<br>Even<br>Mark<br>Space |
| Data bits | 5, 6, 7, 8 |

**Table 6-2 Driver Supported Baud Rates**

| Baud Rates (bps) | Baud Rates (bps) | Baud Rates (bps) | Baud Rates (bps) |
|---|---|---|---|
| 75 | 1200 | 7200 | 38400 |
| 110 | 1800 | 9600 | 56000 |
| 150 | 2400 | 14400 | 57600 |
| 300 | 3600 | 19200 | 115200 |
| 600 | 4800 | 28800 | |

NOTE: Additional baud rate support within the chip specification range can be added by driver customization request. Contact Prolific for more information.

# 7.0 Application Reference Circuit Diagram

Following is an example of using the PL2303SA as a simple USB to TXD/RXD serial converter. Note that Pin 3 (RS232 VDD) is the power pin for the serial port signals. If Pin 3 is 3.3V, the serial port is 3.3V. If Pin 3 is 2.5V, the serial port is 2.5V. The range can be from 1.8V~3.3V. Contact Prolific FAE for more PCB design support.

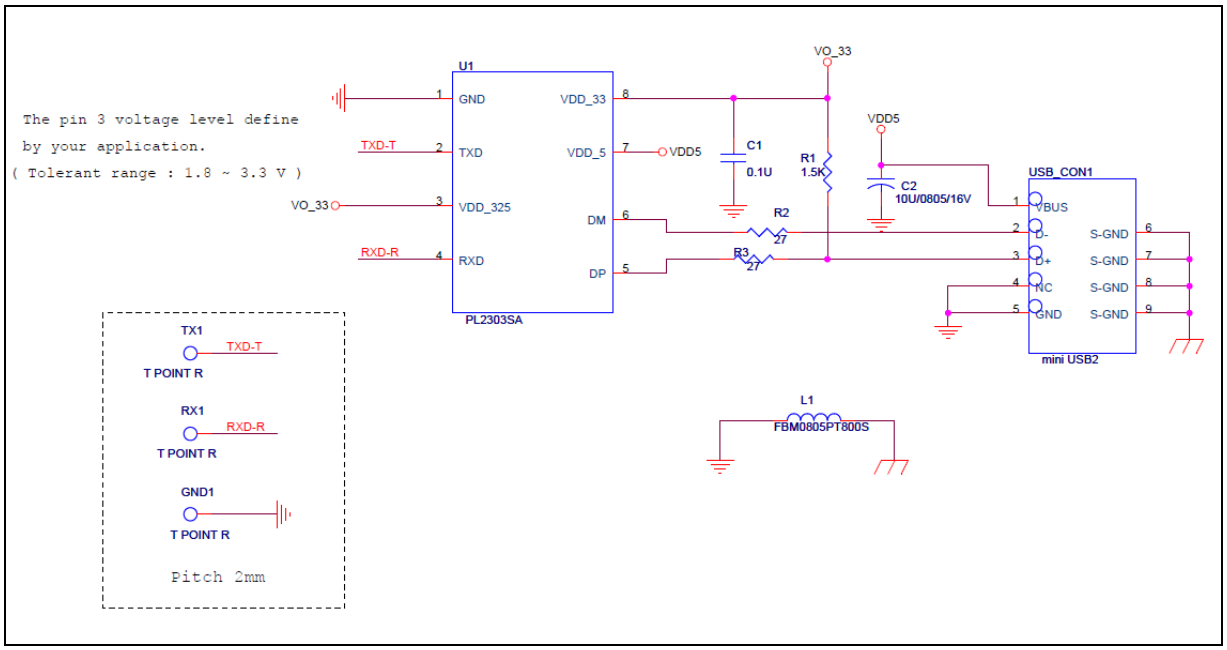



**Figure 7-1 PL2303SA Reference Schematic Diagram**

# 8.0 DC & Temperature Characteristics

## 8.1 Absolute Maximum Ratings

**Table 8-1 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 $^{o}$C |

## 8.2 DC Characteristics

### 8.2.1 Operating Voltage and Suspend Current

**Table 8-2a 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(1) (Power Consumption) | $I_{DD}$ | - | 20 | 25 | mA |
| Suspend Current | $I_{SUS}$ | - | 260 | 450 | μA |

(1) – No device connected.

### 8.2.2 3.3V I/O Pins

**Table 8-2b 3.3V I/O Pins**

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Output Driving Capability | $I_{DD}$ | | 4 | | mA |
| Power Supply for 3.3V I/O Pins | VO_33 | 2.97 | 3.3 | 3.63 | 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 |
| Output Voltage, 3.3V | | | | | |
| Low | $V_{OL}$ | -- | -- | 0.4 | V |
| High | $V_{OH}$ | 2.4 | -- | -- | V |

### 8.2.3 Serial I/O Pins

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

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

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

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Output Driving Capability | $I_{DD}$ | | 5.2 | | 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 |
| Output Voltage | | | | | |
| Low | $V_{OL}$ | -- | -- | 0.4 | V |
| High | $V_{OH}$ | 1.85 | -- | -- | V |

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

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Output Driving Capability | $I_{DD}$ | | 4.4 | | 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 |
| Output Voltage | | | | | |
| Low | $V_{OL}$ | -- | -- | 0.4 | V |
| High | $V_{OH}$ | 1.25 | -- | -- | V |

## 8.3 Temperature Characteristics

**Table 8-3 Temperature Characteristics**

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | -- | 0 | -- | 70 | $^{o}C$ |
| Junction Operation Temperature | $T_J$ | -40 | 25 | 80 | $^{o}C$ |

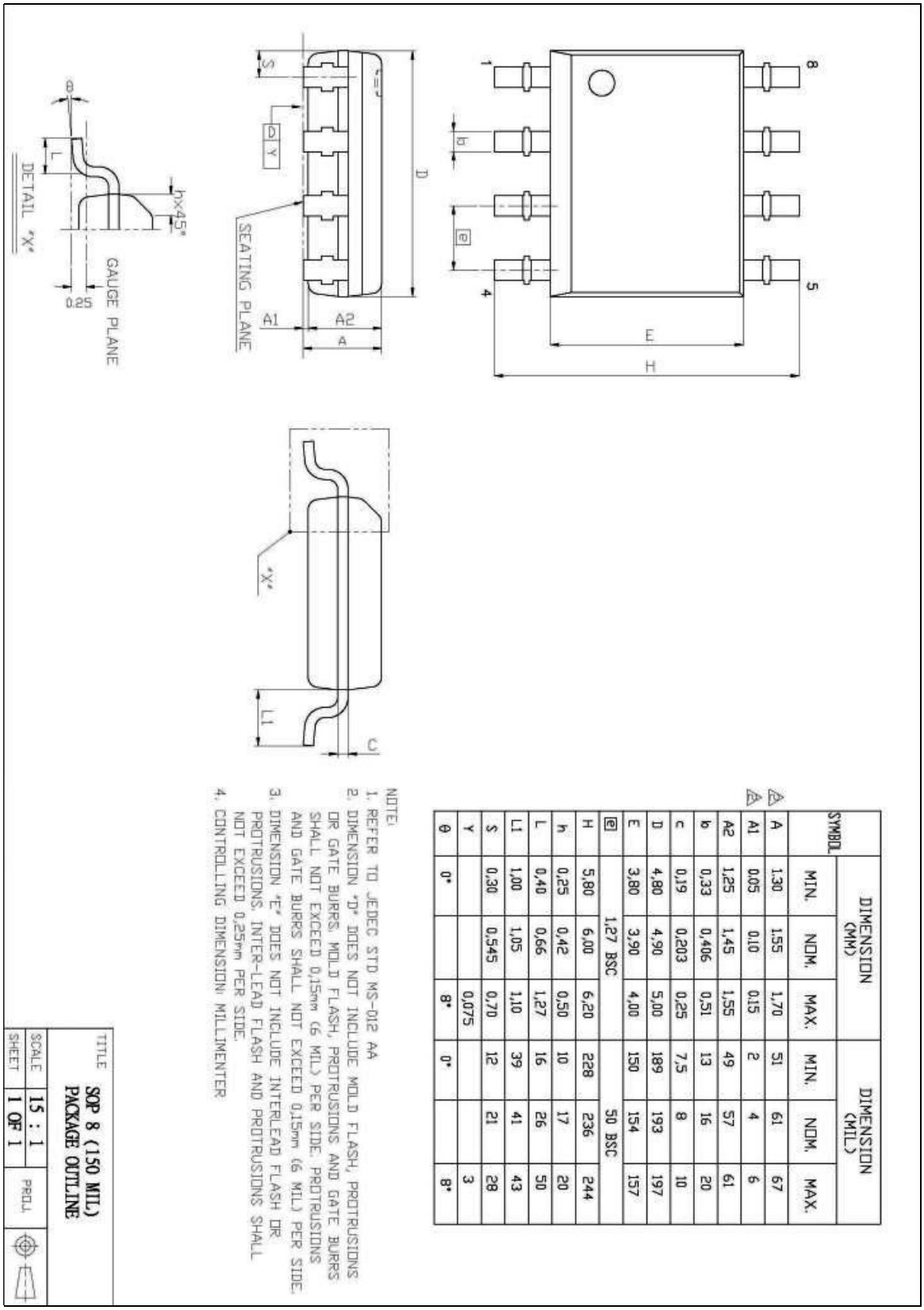
## 8.4 Leakage Current and Capacitance

**Table 8-4 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 |

(1) – No pull-up or pull-down resistor.

# 9.0 SOP8 Outline Diagram




| SYMBOL | DIMENSION (MM) | | | DIMENSION (MIL) | | |
|---|---|---|---|---|---|---|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 1.30 | 1.55 | 1.70 | 51 | 61 | 67 |
| A1 | 0.05 | 0.10 | 0.15 | 2 | 4 | 6 |
| A2 | 1.25 | 1.45 | 1.55 | 49 | 57 | 61 |
| b | 0.33 | 0.406 | 0.51 | 13 | 16 | 20 |
| c | 0.19 | 0.203 | 0.25 | 7.5 | 8 | 10 |
| D | 4.80 | 4.90 | 5.00 | 189 | 193 | 197 |
| E | 3.80 | 3.90 | 4.00 | 150 | 154 | 157 |
| e | | 1.27 BSC | | | 50 BSC | |
| H | 5.80 | 6.00 | 6.20 | 228 | 236 | 244 |
| h | 0.25 | 0.42 | 0.50 | 10 | 17 | 20 |
| L | 0.40 | 0.66 | 1.27 | 16 | 26 | 50 |
| L1 | 1.00 | 1.05 | 1.10 | 39 | 41 | 43 |
| S | 0.30 | 0.545 | 0.70 | 12 | 21 | 28 |
| Y | | | 0.075 | | | 3 |
| θ | 0° | | 8° | 0° | | 8° |

**Figure 9-1 SOP8 Package Outline Diagram**

# 10.0 Ordering Information

**Table 10-1 Ordering Information**

| Part Number | Package Type |
|---|---|
| PL-2303SA LF | 8-pin SOP Lead Free |

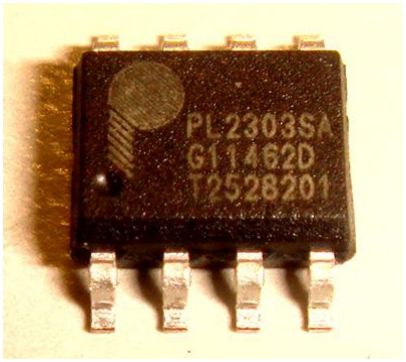



**Figure 10-1 Chip Part Number Information**

**Table 10-2 Chip Marking Information**

| Line | Marking | Description |
|---|---|---|
| First Line | PL2303SA | Chip Product Name |
| Second Line (GYYWWXXX) | G | Green compound packing material (Pb-free) |
| | YY | Last two digits of the manufacturing year |
| | WW | Week number of the manufacturing year |
| | XXX | Chip Version (2D) |
| Third Line | TXXXXXXXX | Manufacturing LOT code |

Example: "*G11462D*" – means Green packing + Year 2011 + Week no. 46 + 2D chip version.