

PL2303GT USB to RS232 Serial Bridge Controller With Built-in RS232 Transceiver

USB Interface

- Single-chip USB to RS232 asynchronous serial data transfer interface.
- Fully Compliant with USB 2.0 specification (Full-Speed Mode).
- UHCI/OHCI (USB 1.1), EHCI (USB 2.0), xHCI (USB 3.1) Host Controller Compatible.
- Royalty-free USB to Virtual Com Port (VCP) drivers for Windows, Mac, Linux, and Android.
- Highly integrated USB 1.1 FS Transceiver. Integrated termination resistors and pull-up resistor to reduce PCB external components.
- Supports OTPROM (One-Time Programmable ROM) for USB device descriptors configuration. OTPROM can be programmed directly through USB port.
- Each IC has unique ID (for Serial Number).
- Supports bus-powered, self-powered and high-power USB device configuration.
- Supports Windows USB Selective Suspend (Remote Wakeup enabled).
- Supports 3.3V VBUS voltage operation.

GPIO Interface

- Total 4 General Purpose I/O (GPIO) pins:
 - 2 GPIO pins can be configured as UART Transmit (TX) and Receive (RX) access LED pins.
 - 2 GPIO pins can be configured as external I2C EEPROM interface pins (EE_SCL and EE_SDA) as OTPROM replacement for storing custom USB descriptors and configuration.
 - Provides free Software Development Kit (SDK) for custom GPIO control; or by driver request customization.

UART Interface (RS232)

- Built-in RS232 Transceiver:
 - Meets EIA/TIA-232F standards with 5.0V power supply
 - Guaranteed 1M bps transmission rate under loading
 - Three RS232 Drivers design
 - Five RS232 Receivers (always active)
 - Latch-up free
- RS232 Serial Port Output Interface:
 - Full UART RS232 interface pins (TXD, RXD, RTS, CTS, DTR, DSR, DCD, and RI)
 - Flexible baud rate support from 5 bps to 1Mbps
 - 5, 6, 7 or 8 data bits
 - Odd, Even, Mark, Space, None parity mode
 - One, one and a half, or two stop bits
 - Hardware and Software Flow Control
 - Provides RS232 shutdown indicator pin
- 1024-byte bi-directional data FIFO buffers (768-byte receive/256-byte transmit) for faster data throughput.
- Configurable Transmit (TX) and Receive (RX) LED pins using configurable GPIO pins.

Miscellaneous

- Integrated self-generated precise clock generator (no external crystal required).
- Integrated Power-on-Reset (POR) circuit.
- Integrated 5V to 3.3V LDO that can support 80mA for external components.
- Low operating power and USB suspend current.
- -40°C to 85°C Operating Temperature.
- 28-pin SSOP IC package (RoHS compliant and Pb-free Green Compound).
- Pin-compatible with PL2303RA chip.

REVISION HISTOR

Revision	Description	Date
1.0.2	➤ To change flexible baud rate support as from 5 bps to 12M bps in page ➤ To change the file title of the data sheet as PL2303GT Datasheet	2024/7/31
1.0.1	➤ Added Win11 as supported OS ➤ Removed supported OS: Win Vista, XP, Server 2003, 2008 ➤ Removed "Windows Update Driver installation available in Windows 7 and above (32/64-bit)" in Royalty-Free Driver Support ➤ Removed BCD information ➤ Modified PID from 23C3 to 23A3	2021/11/19
1.0.0	➤ Formal release	2020/7/22

1. Product Applications

- Single-chip upgrade solution for Legacy RS232 devices to USB interface
- USB to RS232 interface converters/cables/dongles/adapters
- PC I/O Docking Station/Port Replicators
- Point-of-Sale (POS) Terminals/Printers/Pole Displays
- Serial-over-IP Wireless Solution

2. Royalty-Free Driver Support

- Windows 11, 10, 8, 7 (Microsoft Certified WHQL Drivers)
- Windows Server 2008 R2, 2012, 2016, 2019, 2022
- Windows Embedded Industry, Point-of-Service (WEPOS), and POSReady
- Windows Embedded Compact, Windows Embedded CE, Windows CE
- Mac OS X
- Linux OS 3.18 and above (Support Linux 5.5 in-box driver and above)
- Android 3.2 and above

3. Ordering Information

Chip Product Name	Package Type	Ordering Part Number	MPQ
PL2303GT	28-pin SSOP	PL2303G4ZJG7P3	48pcs / tube
		PL2303G4ZJG8P3	2000pcs / reel

4. Block Diagram

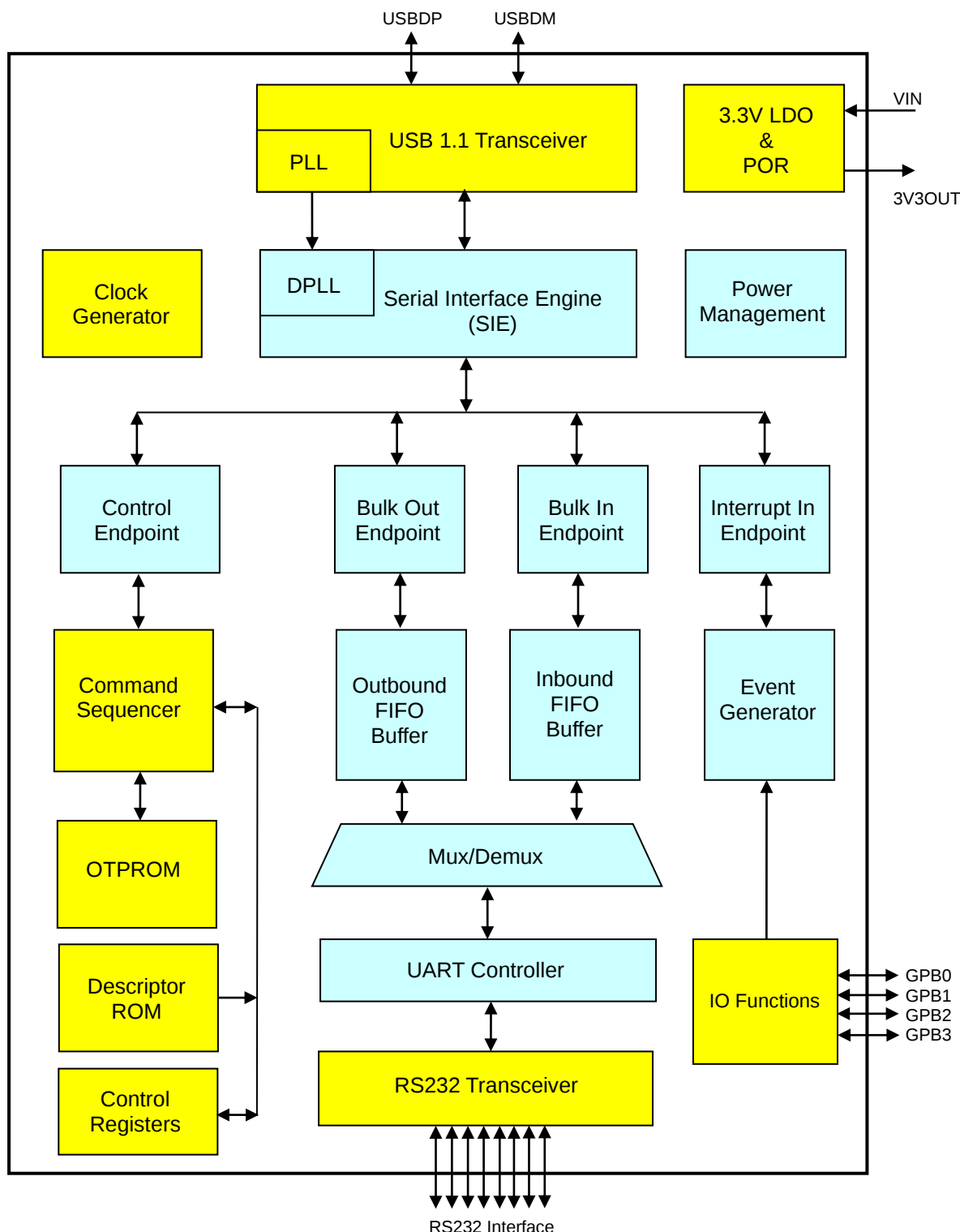


Figure 4-1 PL2303GT Block Diagram

5. USB Logo Certification

(TBA)

Table of Contents

1. Product Applications	3
2. Royalty-Free Driver Support	3
3. Ordering Information	3
4. Block Diagram.....	4
5. USB Logo Certification.....	5
6. Overview.....	10
6.1 PL2303 G-Series USB to Serial Family Product Table.....	11
7. Pin Diagram and Description.....	12
7.1 SSOP28 Pin Diagram	12
7.2 Pin Out Description.....	13
7.3 GPIO Multi-Function Options	14
8. Functional Description	15
8.1 USB 1.1 FS Transceiver	15
8.2 LDO Regulator.....	15
8.3 Clock Generator	15
8.4 USB FS SIE.....	15
8.5 Power Management.....	15
8.6 Control Endpoint.....	15
8.7 Bulk Out Endpoint.....	16
8.8 Bulk In Endpoint	16
8.9 Interrupt In Endpoint	16
8.10 Command Sequencer.....	16
8.11 Outbound FIFO.....	16
8.12 Inbound FIFO	16
8.13 Event Generator	16
8.14 Internal OTPROM.....	17
8.15 Mux/Demux	17
8.16 Descriptor ROM.....	17
8.17 UART Control	17
8.18 Control Registers.....	17
8.19 IO Functions	17

8.20 Integrated RS232 Transceiver18

9. Chip Function Configuration19

9.1 USB Data Configuration19

9.2 GPIO Configuration21

10. Design Application Examples22

10.1 USB Bus Powered Design22

10.2 External I2C EEPROM Support23

11. DC & Temperature Characteristics24

11.1 Absolute Maximum Ratings24

11.2 DC Characteristics24

11.2.1 Operating Voltage and Suspend Current24

11.2.2 I/O Pins25

11.2.3 RS232 Transceiver Pins25

11.3 Temperature Characteristics26

12. Outline Diagram27

12.1 Chip Marking information27

12.2 SSOP28 Package27

13. Packing Information29

13.1 Carrier Tape (SSOP-28)29

13.2 Reel Dimension30

13.3 Tube Packing31

List of Figures

Figure 4-1 PL2303GT Block Diagram4

Figure 7-1 PL2303GT Pin Diagram (SSOP28).....12

Figure 10-1 USB to RS232 Design Example.....22

Figure 10-2 External I2C EEPROM Design Example23

Figure 12-1 PL2303GT Outline Diagram (SSOP28).....28

Figure 13-1a SSOP28 Carrier Tape29

Figure 13-1b IC Reel Placements29

Figure 13-2 Reel Dimension30

Figure 13-3 Tube Packing Dimension31

List of Tables

Table 7-1: USB Data Interface Pins13

Table 7-2: Serial Port (RS232 Transceiver-Level) Interface Pins13

Table 7-3: Configurable GPIO Pins13

Table 7-4: Power and Ground Pins13

Table 7-5: Configurable GPIO Multi-Function Pins.....14

Table 7-6: GPIO Multi-Function Option Descriptions14

Table 9-1 USB Descriptor Configuration19

Table 9-2 GPIO (GPB Group) Configuration21

Table 11-1 Absolute Maximum Ratings.....24

Table 11-2a Operating Voltage and Suspend Current.....24

Table 11-2b 3.3V I/O Pins25

Table 11-2c RS232 Transceiver Pins.....25

Table 11-3 Temperature Characteristics26

Table 12-1 Package Dimension27

Table 13-2 Reel Part Number Information.....30

6. Overview

The new PL2303GT chip is one of the latest G-Series IC product added to the popular PL2303 USB to Serial (UART) Bridge Controller family, replacing the PL2303RA USB to RS232 serial chip. It provides an advanced full-featured single-chip bridge solution for connecting a full-duplex UART asynchronous serial interface device to any Universal Serial Bus (USB) capable host. The PL2303GT provides highly compatible USB drivers to simulate the traditional COM port (via virtual COM Port) on most operating systems allowing existing serial UART applications based on legacy COM port to easily migrate and be made USB ready.

PL2303GT integrates a high baud rate RS-232 transceiver that meets the EIA/TIA-232F and CCITT V.28 communications interface specifications. The RS-232 transceiver is a 3-transmitters and 5-receivers device with a high-efficient charge pump circuit embedded. This high-efficient charge pump circuit with 1uF external capacitors provides the bipolar output to the transmitters, and makes the transmitters to deliver the RS-232 output voltage levels. Under normal operation, PL2303GT operates at very low power consumption with guaranteed data rate up to 1000kbps. PL2303GT also has an active-low shutdown indicating pin that can serve as a shutdown indicator for special application purposes.

The new PL2303GT is pin-to-pin compatible with the PL2303RA chip. It also integrates an RS-232 transceiver, an internal precise clock generator (no external crystal required), USB 1.1 transceiver, Serial Interface Engine (SIE), LDO voltage regulator, power-on- reset (POR), FIFO data buffers, and OTPROM.

The PL2303GT added several new features and enhancements:

- Integrated termination resistors and pull-up resistor to reduce PCB external components.
- New USB drivers for different OS platforms with faster performance and advanced features.
- Precise baud rate generator (up to 1Mbps).
- OTPROM can be programmed directly through USB (no high voltage generator required).
- Larger TX/RX FIFO data buffers (1024-byte).
- Supports 3.3V VBUS voltage operation.
- Unique USB Serial Number for each IC.
- 4 GPIO pins (all input mode at power-up) with easy to use SDK. Can also be configured as TX/RX access LEDs, and I2C EEPROM (EE_SCL, EE_SDA) interface in OTPROM.

The PL2303GT is designed to support a wide-range of serial RS232 application including mobile, embedded, industrial, consumer, healthcare, navigation, and wearable solutions in mind. It provides 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, the PL2303GT is perfect for bus powered operation with plenty of power left for the attached devices.

6.1 PL2303 G-Series USB to Serial Family Product Table

Prolific's new PL2303 G-series USB to Serial family product line offers a variety of new advanced features for USB serial interface product design. The PL2303 G-series are redesigned to provide accurate and flexible baud rate support as well as plenty of I/O functions that can be easily configured in OTPROM memory.

PL2303 G-Series USB to Serial (UART) Family Product Line						
Product	PL2303GC	PL2303GS	PL2303GE	PL2303GT	PL2303GL	PL2303GR
Description	USB to Full UART (Integrated Clock)	USB to Full UART (Integrated Clock)	USB to Full UART (High ESD Protection)	USB to RS232 (Internal RS232 Transceiver)	USB to Basic UART (Low-Pin Count)	USB to RS485 (Internal RS485 Transceiver)
Packages	SSOP28 QFN24	SSOP16 QFN16	SSOP28	SSOP28	SOP8	SSOP28
UART Interface	RS232 RS422/RS485	RS232 RS422/RS485	RS232 RS422/RS485	RS232 Only	RS232 (TX-RX Only)	RS485 Only
Max. Data Rates	12Mbps	12Mbps	12Mbps	1Mbps	115200bps	10Mbps
Dedicated GPIO Pins	6	0	6	4	0	4
Shared GPIO (with UART pins)	9	9	9	0	2	0
Clocking	Internal ¹	Internal	Internal ¹	Internal	Internal	Internal
OTPROM ²	USB Data + Configurable GPIO Function	USB Data + Configurable GPIO Function	USB Data + Configurable GPIO Function	USB Data + Configurable GPIO Function	USB Data	USB Data
External EEPROM Option	YES ³	YES ³	YES ³	YES ³	NO	NO
Android OS Support	YES	YES	YES	YES	YES	YES
Configurable Data Buffer ⁴	768-byte (RX) 256-byte (TX)	768-byte (RX) 256-byte (TX)	768-byte (RX) 256-byte (TX)	768-byte (RX) 256-byte (TX)	768-byte (RX) 256-byte (TX)	768-byte (RX) 256-byte (TX)
Battery Charger Detection Option	YES	YES	YES	No	No	No
I/O Voltage Range	I/O levels from 1.8V to 5V	I/O levels from 1.8V to 5V	I/O levels from 1.8V to 5V	3.3V	I/O levels from 1.8V to 5V	I/O levels from 1.8V to 5V
Pin Compatible	PL2303HxD (SSOP28 only)	New design	PL2303EA	PL2303RA	PL2303SA (SOP8 only)	New design

¹ – Also supports external crystal clock source to bypass internal clock.

² – OTPROM allows setting the USB data descriptors. Also allows setting of multi-function GPIO options.

³ – External EEPROM (when enabled in OTPROM) will override OTPROM settings.

⁴ – TX/RX data buffers are configurable in OTPROM (PL2303GC, PL2303GS, and PL2303GE); or by driver customization.

7. Pin Diagram and Description

7.1 SSOP28 Pin Diagram

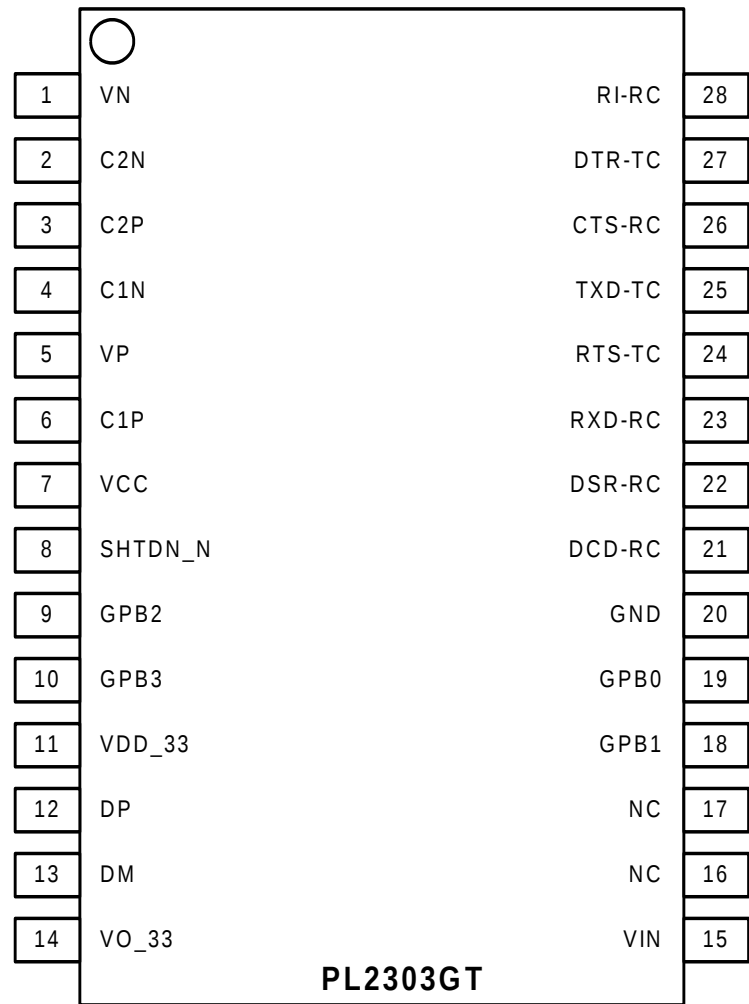


Figure 7-1 PL2303GT Pin Diagram (SSOP28)

7.2 Pin Out Description

Table 7-1: USB Data Interface Pins

Pin Name	Pin No.	Type	Description
DP	12	I/O	USB Port Data Plus (D+) Signal
DM	13	I/O	USB Port Data Minus (D-) Signal

Table 7-2: Serial Port (RS232 Transceiver-Level) Interface Pins

Pin Name	Pin No.	Type	Description
TXD-TC	25	Output	RS232 Transmitter Output: Transmitted Data
DTR-TC	27	Output	RS232 Transmitter Output: Data Terminal Ready
RTS-TC	24	Output	RS232 Transmitter Output: Request To Send
RXD-RC	23	Input	RS232 Receiver Input: Received Data
RI-RC	28	Input	RS232 Receiver Input, Ring Indicator (Remote Wakeup)
DSR-RC	22	Input	RS232 Receiver Input: Data Set Ready
DCD-RC	21	Input	RS232 Receiver Input: Data Carrier Detect
CTS-RC	26	Input	RS232 Receiver Input: Clear to Send
SHTDN_N	8	Output	Active-low shutdown indicator pin. It is activated by USB suspend and indicates this chip is in suspend state.

Table 7-3: Configurable GPIO Pins

Pin Name	Pin No.	Type	Description
GPB0	19	I/O	Configurable GPIO Pin. (see Section 7.3)
GPB1	18	I/O	Configurable GPIO Pin. (see Section 7.3)
GPB2	9	I/O	Configurable GPIO Pin. (see Section 7.3)
GPB3	10	I/O	Configurable GPIO Pin. (see Section 7.3)

Table 7-4: Power and Ground Pins

Pin Name	Pin No.	Type	Description
VIN	15	Power	USB port VBUS input power supply.
VO_33	14	Power	+3.3V output power from integrated LDO regulator.
VDD_33	11	Power	Power supply input +3.3V.
VCC	7	Power	Power supply input +5V for RS232 transceiver.
GND	20	Power	Ground
VP	5	Power	Internal generated positive supply.
VN	1	Power	Internal generated negative supply.
C1P	6	Power	External C1 capacitor (+ terminal) is connected to this pin.
C1N	4	Power	External C1 capacitor (- terminal) is connected to this pin.
C2P	3	Power	External C2 capacitor (+ terminal) is connector to this pin.
C2N	2	Power	External C2 capacitor (- terminal) is connected to this pin.
NC	16, 17	NC	No internal connection. Leave floating.

7.3 GPIO Multi-Function Options

The PL2303GT chip provides a total of 4 configurable GPIO (General Purpose I/O) pins. The table below shows the possible functions that can be configured for each GPIO pin. These special functions can be easily configured in the OTPROM or to an external I2C EEPROM using the PL2303GT OTPROM/EEPROM software tool. When these pins are configured as standard GPIO pins, customers can refer to the Prolific GPIO SDK (software development kit) to develop software to control the GPIO pins for customer application desired functions.

Table 7-5: Configurable GPIO Multi-Function Pins

GPIO	SSOP28 Pin No.	Factory Default	Configurable Options (using OTPROM Tool)	
GPB0	19	GPIO Input Pin	TX_LED	
GPB1	18	GPIO Input Pin	RX_LED	TRX_LED
GPB2	9	GPIO Input Pin	EE_SDA	
GPB3	10	GPIO Input Pin	EE_SCL	

Table 7-6: GPIO Multi-Function Option Descriptions

GPIO Function	SSOP28 GPIO Pins	Type	Description
TX_LED	GPB0 (Pin 19)	Output	Serial Port: TXD Access LED signal.
RX_LED	GPB1 (Pin 18)	Output	Serial Port: RXD Access LED signal.
TRX_LED	GPB1 (Pin 18)	Output	Serial Port: TXD and RXD Access LED signal.
EE_SDA	GPB2 (Pin 9)	Input/Output	External I2C EEPROM interface serial data signal.
EE_SCL	GPB3 (Pin 10)	Input/Output	External I2C EEPROM interface serial clock signal.

8. Functional Description

This section details the functional block diagram description of the PL2303GT.

8.1 USB 1.1 FS Transceiver

The USB Transceiver provides the USB full-speed electrical signal requirements and USB physical interface (DP/DM). This block also includes one precise internal oscillator for PLL. The PLL provides the clock to other logic functions. This block also includes the internal USB series termination resistors on the USB data lines and pull-up resistor for the DP signal.

8.2 LDO Regulator

This block is the 5V to 3.3V LDO regulator to power and drive the USB transceiver. It also includes 3.3V brownout detection output signals that will be used by digital circuit to reset the chip. The LDO 5V to 3.3V can supply 100mA for chip internal and external components.

8.3 Clock Generator

The clock generator module generates the 48MHz and 12MHz reference clock signals for internal chip logic. The internal clocks will be stopped while in suspend state.

8.4 USB FS SIE

The USB Full-Speed Serial Interface Engine (SIE) block performs the processing of USB DP/DM signals. It translates the internal parallel data to serial data and outputs to USB FS transceiver to generate external USB DP/DM signals timing. It also translates external USB DP/DM signals pass through USB FS transceiver to parallel data for internal circuit. This block supports USB packet decoding and encoding. It also generates and check packet CRC, bit stuffing, SYNC and EOP frame signal. The DPLL module will use the internal 48MHz clock to synchronize external DP/DM transitions to generate 12MHz clock for USB interface related circuit.

8.5 Power Management

This module will monitor the USB attachment and DP/DM signals state to create reset state, running state, suspend state, wakeup state, etc.

8.6 Control Endpoint

The Control Endpoint module handles control endpoint packet transfer protocols such as SETUP packet, DATA packet and return status packet.

8.7 Bulk Out Endpoint

The Bulk Out Endpoint module handles bulk-out endpoint packet transfer protocols such as DATA packet and return status packet. It also transfers USB host bulk-out data to chip outbound FIFO.

8.8 Bulk In Endpoint

The Bulk In Endpoint module handles bulk-in endpoint packet transfer protocols such as DATA packet and return status packet. It also transfers data inside the chip inbound FIFO to USB host through bulk-in DATA packet.

8.9 Interrupt In Endpoint

The Interrupt In Endpoint module handles interrupt-in endpoint packet transfer protocols such as DATA packet and return status packet. It transfers interrupt data generated inside the chip to USB host through interrupt-in DATA packet.

8.10 Command Sequencer

This module handles the USB standard requests and vendor requests. It dispatches control signals to relative peripheral modules and gather information from peripheral modules. When it received USB standard request commands, it may check ROM data or data latched from OTP and return them to USB host. When vendor requests are received, it dispatches to peripherals to set or get something.

8.11 Outbound FIFO

This buffer receives data from Bulk Out Endpoint and provides data to peripheral modules. It handles read and write pointers and calculate full and empty conditions. There are also near empty threshold check to notify peripheral module that FIFO is going to empty.

8.12 Inbound FIFO

This buffer receives data from peripheral modules and provides data to Bulk In Endpoint. It handles read and write pointers and calculate full and empty conditions. There are also near full threshold check to notify peripheral module that FIFO is going to full.

8.13 Event Generator

This module provides interrupt data to Interrupt In Endpoint. This module senses interrupt event toggle from UART peripheral and GPIO module.

8.14 Internal OTPROM

The OTPROM (One-Time Programming Read-Only Memory) is used to store USB descriptor related data. A one-time programming user area of the memory is available to allow customization of settings. The user area of the PL2303GT OTPROM can now be easily programmed using the Prolific OTPROM software through USB port without any additional voltage converter requirement. Refer to Section 9.0 for more information on the OTPROM configuration settings.

8.15 Mux/Demux

This module is designed to pass data between FIFO and UART peripheral module.

8.16 Descriptor ROM

This block contains the USB descriptor data for returning to USB host.

8.17 UART Control

The UART Control module handles the data transfer according to RS232 format and interface. Full set flow control is implemented including RTS/CTS, DTR/DSR and software flow control. Flow control circuit will check FIFO near full or near empty status to activate flow control signals. This module includes a precise baud rate generator that can generate baud rates up to 1Mbps. The baud rate is set from USB command.

8.18 Control Registers

The Control Registers module contains the chip control registers read and set, and initially loads from OTPROM. USB host will use USB vendor command to read and write control registers to set chip function.

8.19 IO Functions

The GPIO Functions block provides four General Purpose Input/Output (GPIO) pins for customer I/O control special requirements. These GPIO pins can be controlled by software developed using Prolific SDK. GPIO control sample programs and source code are available by request. These GPIO pins can also be configured in the OTPROM as TX/RX access LED and I2C EEPROM interface pins (see Section 7.3).

8.20 Integrated RS232 Transceiver

The PL2303GT integrates a high baud rate RS-232 transceiver that meets the EIA/TIA-232F and CCITT V.28 communications interface specifications. The RS-232 transceiver is a 3-transmitters and 5-receivers device with a high-efficient charge pump circuit embedded. This high-efficient charge pump circuit with 2.2uF external capacitors provides the bipolar output to the transmitters, and makes the transmitters to deliver the RS-232 output voltage levels. Under normal operation, PL2303GT operates at very low power consumption with guaranteed data rate up to 1000kbps or 1Mbps. PL2303GT also has an active-low shutdown indicating pin that can serve as a shutdown indicator for special application purposes.

9. Chip Function Configuration

The default configuration descriptors are stored in the chip internal memory which will be loaded during power-on reset or USB bus reset whenever OTPROM is empty. Several of the USB and configuration descriptors could be modified and programmed one-time into the chip's OTPROM using the PL2303GT OTPROM Writer utility program. These descriptors include USB Vendor ID, Product ID, Serial Number, Product String, and other USB configuration descriptors.

9.1 USB Data Configuration

The screenshot displays the 'USB' tab of the PL2303GT OTPROM Writer utility. The interface is divided into several sections:

- OTPROM / External EEPROM:** Includes a radio button for 'Use OTPROM(Space):' with a value of '1', and an option to 'Enable Ext. EEPROM, GPB3:SCL, GPB2:SDA'.
- Fixed COM Port Number:** A checkbox for 'Enable' and a 'COM' dropdown menu set to '3'.
- Compare Write Data:** Checkboxes for 'Default data' (checked) and 'MS+PS+SN'.
- Device Descriptor:** Fields for 'Vendor ID (VID) 0x' (067B) and 'Product ID (PID) 0x' (23C3).
- Configuration descriptor:** Includes 'Device Power mode' (radio buttons for Self-powered, Bus-powered(100mA) selected, Bus-powered(500mA)), 'Max Power: 100 ma', and 'USB Selective Suspend : Remote Wakeup' (radio buttons for Enable selected, Disable).
- String Information:** Shows 'String Length: 45 / 90 (Max) : MS: 24, PS: 21, SN: 0'. Fields for 'Manufacturer String' (Prolific Technology Inc.) and 'Product String' (USB-Serial Controller) are present, along with an 'Enable PSDM' checkbox.
- Serial Number Options:** Radio buttons for 'Disable Serial Number', 'Enable Unique Serial Number ID' (selected), and 'Custom Serial Number'. The 'Enable Unique Serial Number ID' section includes a 'UNIQ_ID 0x' field and a 'Prefix : Number (8 char):' section with 'Auto SN(+1)' and 'Fixed SN' options.
- Help Description:** A large text area for additional information.
- Device Selection:** A dropdown menu set to 'PL2303GT'.
- Actions:** Buttons for 'Load', 'Save', 'Read', 'Write', 'Reset EEPROM', and 'Exit'.
- Clear msg:** A button at the bottom right.

Table 9-1 USB Descriptor Configuration

Descriptors	Default Value	Description
OTPROM Space	1	This field indicates the space left for the OTPROM that can be written (1 or 0). The OTPROM can only be written once and cannot be erased. If value is 0, it means OTPROM has already been written once.
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)	23A3 (hex)	USB Product ID assigned by Manufacturer.
Device Power Mode	Bus Powered (100mA)	This field sets the USB device if bus-powered or self-powered device.

Max Power	100mA	This field sets the USB device maximum power that can be drawn by the device from the USB host. Enter the value here if it is not 100mA or 500mA. Expressed in 2 mA units (i.e., 50 = 100 mA).
USB Selective Suspend	Enable	This field enables/disables the USB Selective Suspend function. When enabled, Windows OS will suspend the device when idle for few seconds (COM port not open).
Manufacturer String	Prolific Technology Inc.	This field contains the product manufacturer string.
Product String	USB-Serial Controller	This field when entered will be the device string displayed by Windows and other OS when device is first detected and before driver is loaded or driver not installed. After driver is loaded, Windows will show the product string written inside the driver INF file.
Serial Number	Enable Unique Serial Number ID	• Disable Serial Number – this option will disable the Serial Number. Operating System will assign a random serial number for the device. • Enable Unique Serial Number ID – this default option enables the unique serial number pre-programmed inside the chip. • Custom Serial Number – this option allows the customer to set own product serial numbering: ○ Auto SN: allows to add prefix while the numbers auto increment after each write. ○ Fixed SN: this will write the same number. Device with serial number enabled allows the device to be assigned with the same COM port number even when plug to other USB ports of the same PC.

NOTE: The total string length for the manufacturer + product + serial number string is up to 90 characters.

9.2 GPIO Configuration

Also refer to Section 7.3 for the complete GPIO Multi-Function options description.

	IO Function	enable open-drain	enable pull-up	Inverse Polarity	Output driving select
GPB0	GPIO	☐	☐	☐	4mA
GPB1	GPIO	☐	☐	☐	4mA
GPB2	GPIO	☐	☐	☐	4mA
GPB3	GPIO	☐	☐	☐	4mA

Table 9-2 GPIO (GPB Group) Configuration

GPIO Function	Default Value	Default I/O	Description
GPB0	GPIO	Input	This field allows setting the pin as a standard GPIO or any of the following function: - GPIO (General Purpose I/O) - TX_LED
GPB1	GPIO	Input	This field allows setting the pin as a standard GPIO or any of the following function: - GPIO (General Purpose I/O) - RX_LED - TRX_LED
GPB2	GPIO	Input	This field allows setting the pin as a standard GPIO or any of the following function: - GPIO (General Purpose I/O) - EE_SDA
GPB3	GPIO	Input	This field allows setting the pin as a standard GPIO or any of the following function: - GPIO (General Purpose I/O) - EE_SCL
Enable Open-Drain	Disabled		This field sets the selected I/O pin to open-drain output mode.
Enable-Pull Up	Disabled		This field enables the selected I/O pin weak pull-up. NOTE: The weak pull-up resistor is pull-up to VDD_IO. When enabling pull-up for input pins, the input signal voltage should not be higher than the VDD_IO voltage.
Inverse Polarity	Disabled		This field inverts the selected I/O pin input and output signal polarity.
Output Driving Strength	4mA		This field sets the output driving strength of the selected pin. (4mA up to 8mA) @VDDIO3.3V

10. Design Application Examples

This section illustrates conceptual design application examples using the PL2303GT.

10.1 USB Bus Powered Design

Following is an example of using the PL2303GT as a USB to RS232 converter. The PL2303GT, which is pin-to-pin compatible with PL2303RA, already includes an integrated RS232 transceiver to convert the TTL levels USB serial interface to RS232 levels as well as converting the +5V nominal VCC to the $\pm 9V$ required by RS232. The PL2303GT built-in transceiver supports up to 1Mbps baud rate transmission which is very ideal for many designs requiring high speed performance. Contact Prolific FAE for more PCB design support.

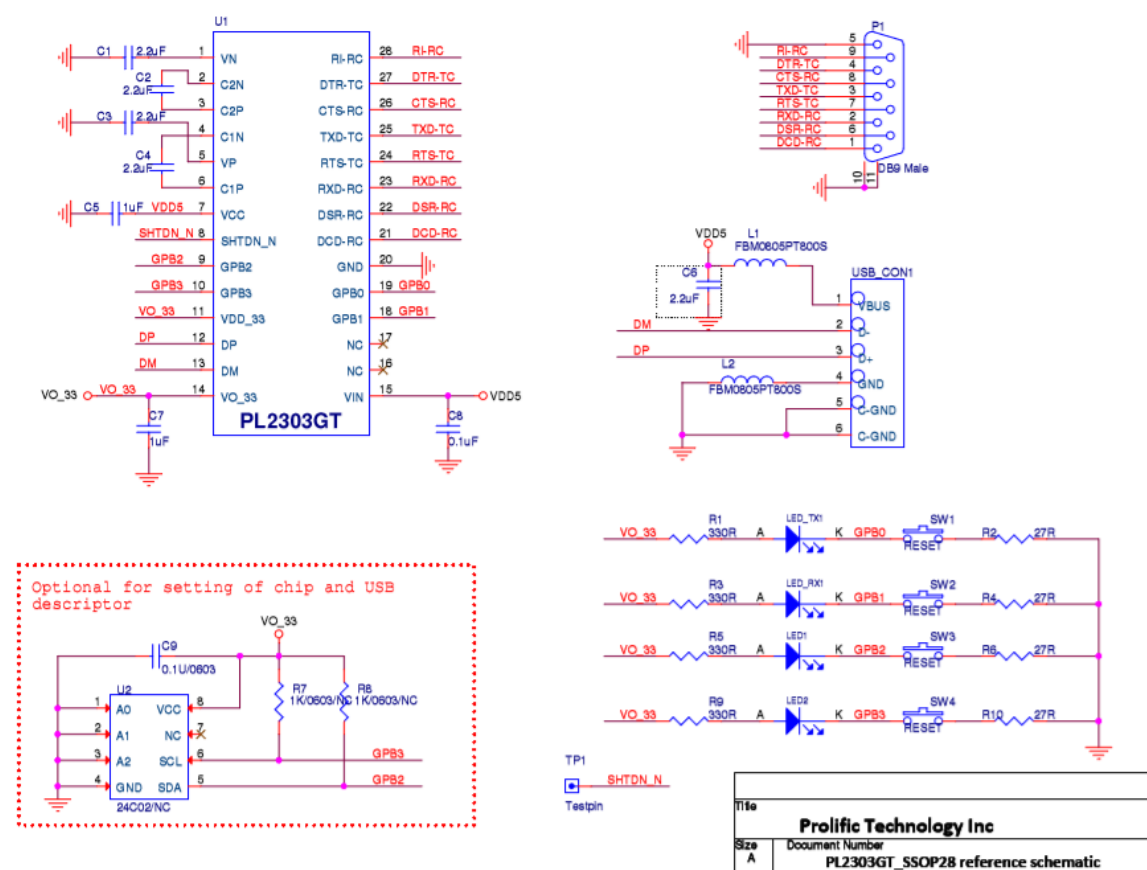


Figure 10-1 USB to RS232 Design Example

10.2 External I2C EEPROM Support

The PL2303GT can also support an external I2C EEPROM to override the OTPROM settings. To use an external EEPROM, it needs to program the OTPROM to enable the external I2C EEPROM support (using GPB2 pin as I2C SDA and GPB3 pin as I2C SCL).

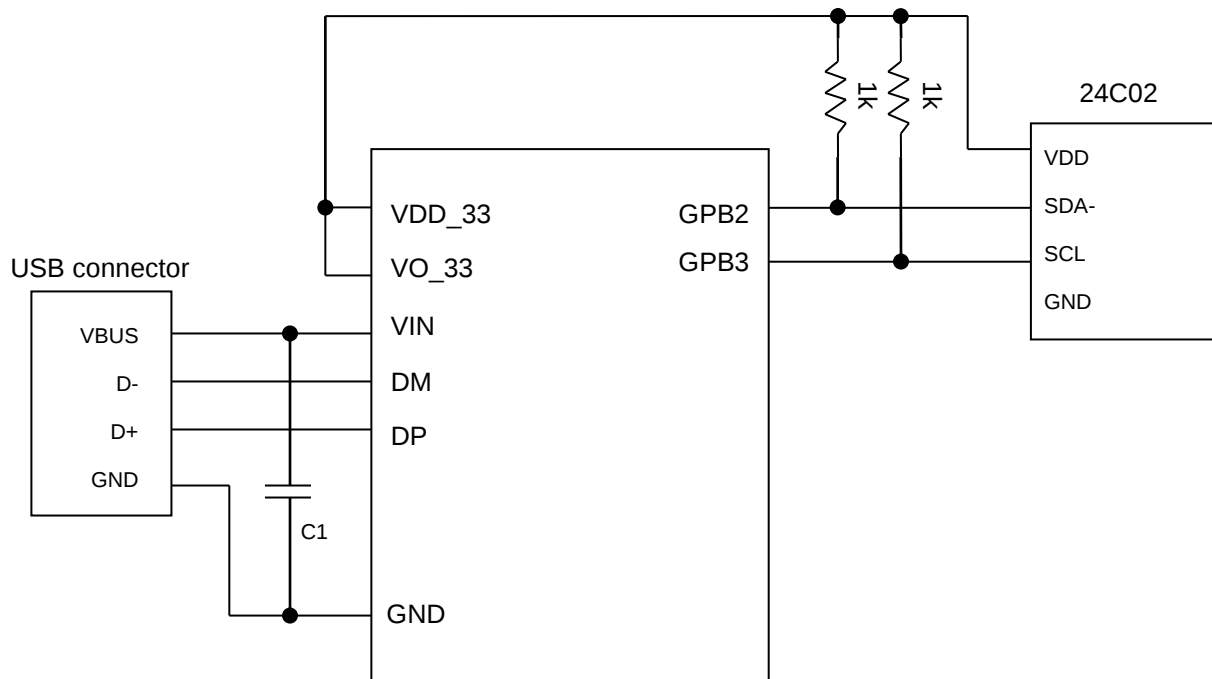


Figure 10-2 External I2C EEPROM Design Example

There is signature field in external EEPROM space. When this field content is valid, the PL2303GT will load the external EEPROM contents and override the settings defined in the OTPROM. Detailed information can be checked with OTPROM and EEPROM software programming tool. The supported external I2C EEPROM size is 256 bytes.

11. DC & Temperature Characteristics

11.1 Absolute Maximum Ratings

Table 11-1 Absolute Maximum Ratings

Items	Ratings
Power Supply Voltage - VIN	-0.3 to 6.5 V
Power Supply Voltage - VCC	-0.3 to 6.5V
Charge Pump Positive Output (V+)	(Vcc-0.3) to 13.2V
Charge Pump Negative Output (V-)	+0.3 to -13.2V
RS232 Receiver Input (RXD, CTS, DSR, RI, DCD)	20V
RS232 Transmitter Output (TXD, RTS, DTR)	(V+,+ 0.3V) to (V,- 0.3V)
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
Storage Temperature	-40 to 150 °C
ESD Machine Model (MM)	±200 V
ESD Human Body Model (HBM)	±4 kV
IEC1000-4-2, Contact Discharge	±8 kV
IEC1000-4-2, Air-Gap Discharge	±15 kV

Note: Permanent device damage may occur if the absolute maximum ratings are exceeded. These are stress rating only, and functional operation should be restricted to within the conditions. Exposure to absolute maximum rating conditions for extended periods may affect the device's reliability.

11.2 DC Characteristics

11.2.1 Operating Voltage and Suspend Current

Table 11-2a Operating Voltage and Suspend Current

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage Range	VIN	4.5	5	5.5	V
Power Supply for VDD_33	VDD_33	2.97	3.3	3.63	V
Output Voltage of Regulator	VO_33	2.97	3.3	3.63	V
Operating Current ⁽¹⁾ (Power Consumption)	IDD	-	20.5	25	mA
Suspend Current	Isus	-	440	500	μA

Note: (1) – No device connected.

11.2.2 I/O Pins

Table 11-2b 3.3V I/O Pins

Parameter	Symbol	Min	Typ	Max	Unit
Output Driving Capability	I _{DD}		4		mA
Input Voltage					
Low	V _{IL}	--	--	0.4	V
High	V _{IH}	2.0	--	--	V
Output Voltage, 3.3V					
Low	V _{OL}	--	--	0.4	V
High	V _{OH}	2.4	--	--	V

11.2.3 RS232 Transceiver Pins

Table 11-2c RS232 Transceiver Pins

Parameter	Condition	Min	Typ	Max	Unit
DC Characteristic					
Supply Current	no load, T _{AMB} =+25 °C		11		mA
Shutdown Supply Current	SHTDN_N=GND, T _{AMB} = +25 °C,		0.6		uA
Transmitter Outputs					
Output Voltage Swing	3kΩ load to ground at all transmitter outputs, T _{AMB} = +25 °C		±9		V
Output Resistance	V _{CC} =V+=V-=0V, T _{OUT} = ±2V		0.05		uA
Output Short-Circuit Current	T _{OUT} = 0V		17		mA
Output Leakage Current	Transmitter disable, T _{OUT} = ±12V		0.12		uA
Receiver Inputs					
Input Voltage Range		-22		22	V
Input Threshold LOW	V _{CC} =5.0V		1.25		V
Input Threshold HIGH	V _{CC} =5.0V		1.5		V
Input Hysteresis			0.25		V
Input Resistance			4.6		kΩ
Timing Characteristics					
Maximum Data Rate	R _L =3KΩ, CL=1000pF, one transmitter switching			1000	kbps
Receiver Propagation Delay	t _{PHL} , RxIN to RxOUT, CL=150pF		0.5		μS
	t _{PLH} , RxIN to RxOUT, CL=150pF		1		μS
Transmitter Propagation Delay	t _{PHL} , RL = 3K, CL=1000pF		1.9		μS
	t _{PLH} , RL = 3K, CL=1000pF		1.3		μS

Note: Unless otherwise noted, the above specifications apply for V_{CC}=5V ±10% with T_{AMB}= T_{MIN} to T_{MAX}, C1 to C4= 1μF.

11.3 Temperature Characteristics

Table 11-3 Temperature Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	--	-40	--	85	°C
Junction Operation Temperature	T _J	-40	25	125	°C

12. Outline Diagram

12.1 Chip Marking information

Figure 12-1 Chip Part Number Information (SSOP)

Table 12-2 Chip Marking Information

Line	Marking	Description
First Line	PL2303GT	Chip Product Name
Second Line (GYYWWXX)	G	Green packing material
	YY	Last two digits of the manufacturing year
	WW	Week number of the manufacturing year
	XX	Chip Version
Third Line	XXXXXXXXXX	Manufacturing LOT code

Example: "G19361A" – means Green packing + Year 2019 + Week no. 36 + 1A chip version.

12.2 SSOP28 Package

Table 12-1 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

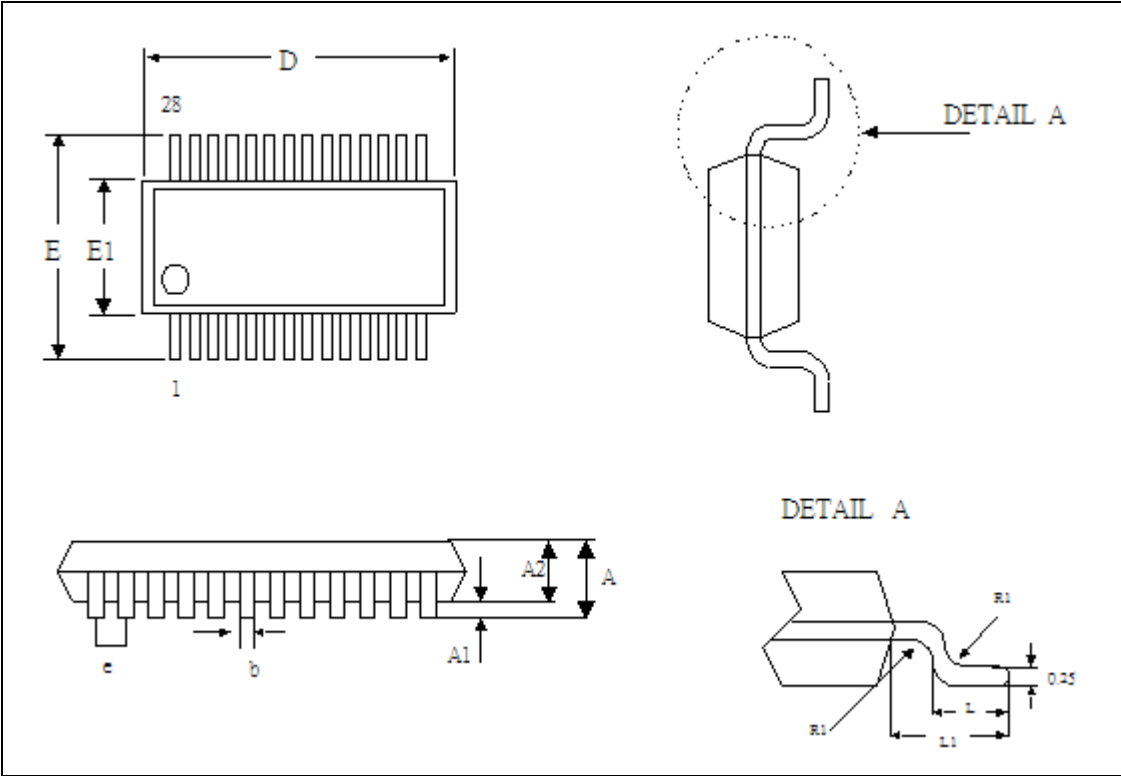


Figure 12-1 PL2303GT Outline Diagram (SSOP28)

13. Packing Information

13.1 Carrier Tape (SSOP-28)

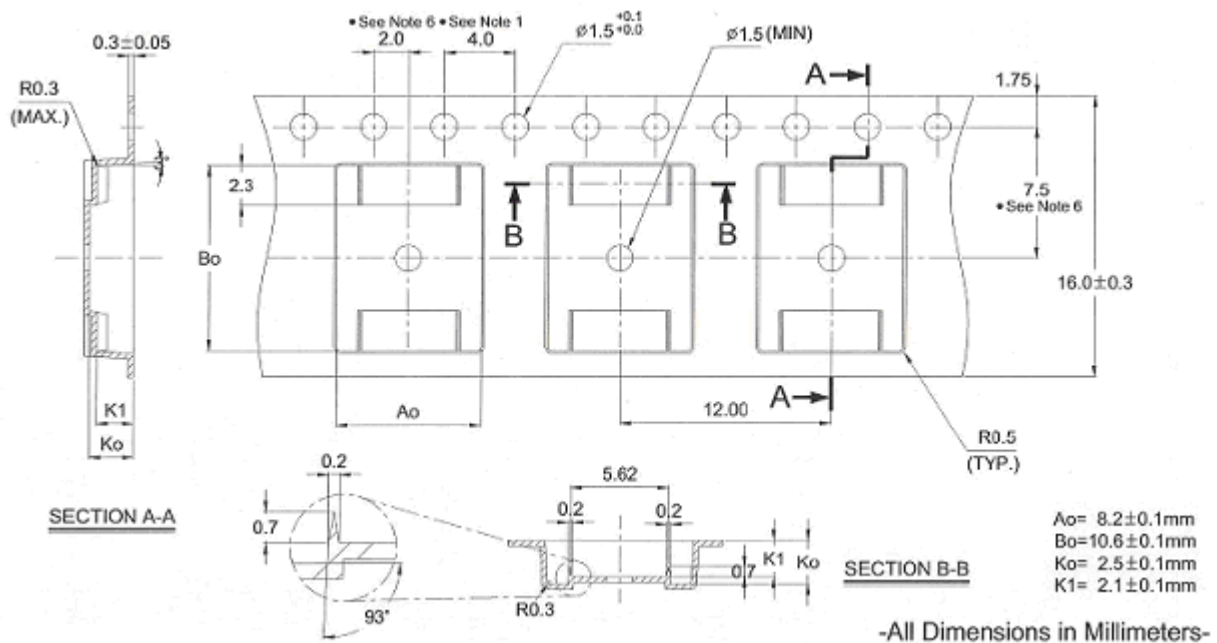


Figure 13-1a SSOP28 Carrier Tape

Notes:

- 10 sprocket hole pitch cumulative tolerance ± 0.2
- Camber not to exceed 1mm in 100mm.
- Material: Black Polystyrene.
- Ao and Bo measured on a plane 0.3mm above the bottom of the pocket.
- Ko 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)

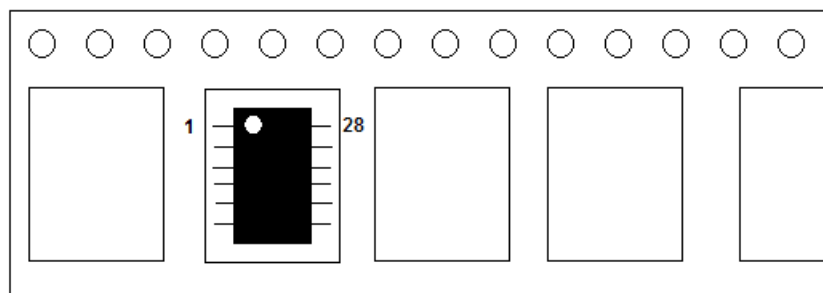


Figure 13-1b IC Reel Placements

13.2 Reel Dimension

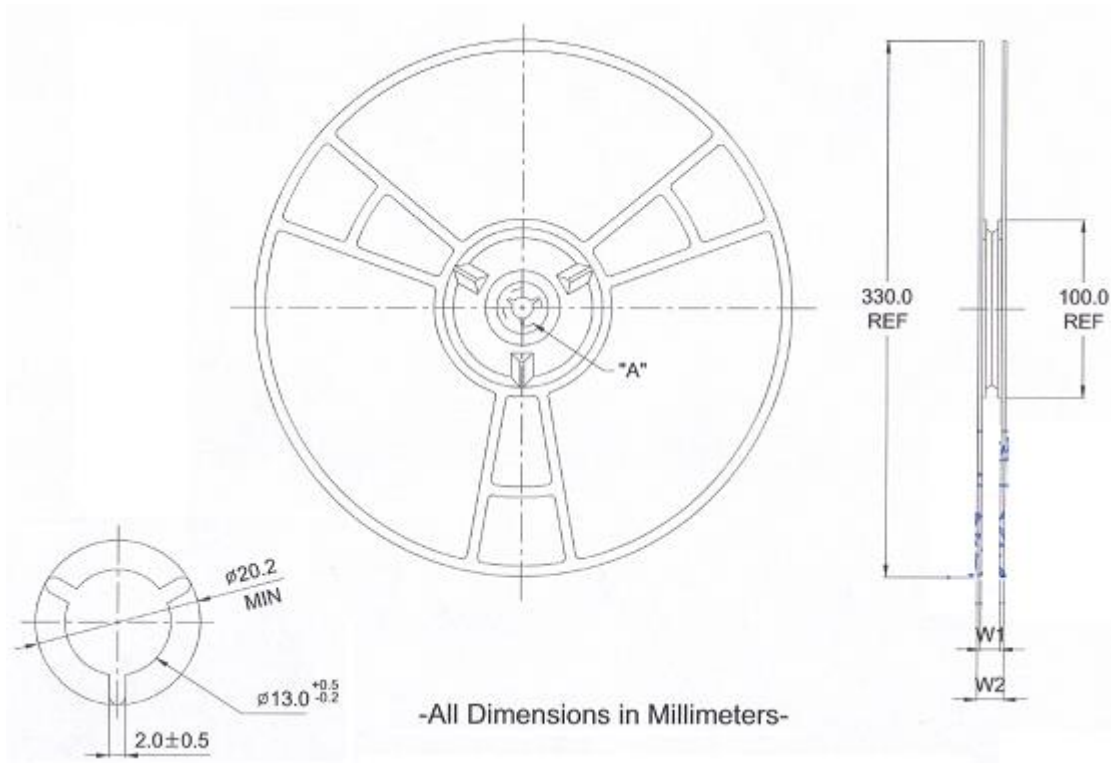


Figure 13-2 Reel Dimension

Table 13-2 Reel Part Number Information

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

13.3 Tube Packing

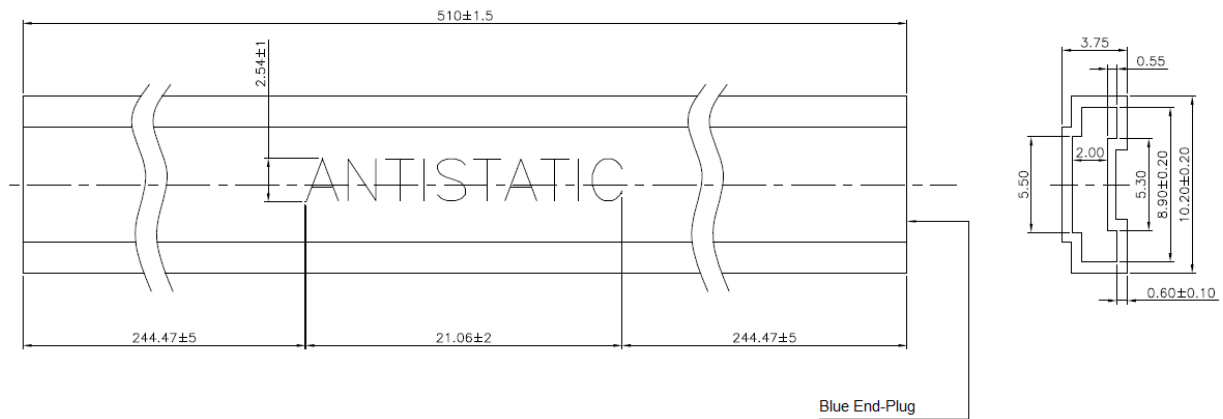


Figure 13-3 Tube Packing Dimension

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.

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