



# PL2586

## USB 2.0 High Speed 4-Port Hub Controller

### Product Datasheet

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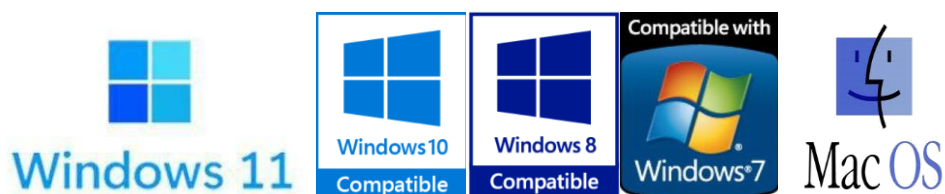
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## REVISION HISTORY

| Revision | Description                                                                                                                                                                                                                                  | Date       |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1.7      | ➤ Modified Package type QFN24 dimension information.                                                                                                                                                                                         | 2024/6/25  |
| 1.6      | ➤ Modified Ordering Part Number version from A3 to A2.                                                                                                                                                                                       | 2024/3/12  |
| 1.5      | <ul style="list-style-type: none"> <li>➤ Added T4 minimum value of Reset Timing</li> <li>➤ Added Chip marking information</li> <li>➤ Added Pin1 location map of carrier tape</li> <li>➤ Added QFN24 packing is applicable to MSL3</li> </ul> | 2024/2/1   |
| 1.4      | ➤ To remove USB Battery Charger (BC1.2) function.                                                                                                                                                                                            | 2023/11/24 |
| 1.3      | <ul style="list-style-type: none"> <li>➤ Modified Ordering Information</li> <li>➤ Modified pin28 pin description.</li> </ul>                                                                                                                 | 2023/2/8   |
| 1.2      | <ul style="list-style-type: none"> <li>➤ Modified Package type QFN24 MPQ information</li> <li>➤ Modified Storage Temperature range from -55 ~ 150 to -40 to 150 °C</li> </ul>                                                                | 2022/5/27  |
| 1.1      | <ul style="list-style-type: none"> <li>➤ Added QFN24 package IC Bottom PAD information of pin assignment</li> <li>➤ Modified pin description</li> </ul>                                                                                      | 2022/3/9   |
| 1.0      | <ul style="list-style-type: none"> <li>➤ Modified chip version of ordering information from A1 to A2</li> <li>➤ Added TID of USB Compliance test</li> </ul>                                                                                  | 2022/2/9   |
| 0.1      | ➤ Initial Version                                                                                                                                                                                                                            | 2021/5/18  |

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## **1. Description**

The PL2586 is a high performance solution for USB 2.0 High Speed 4-port hub controller with fully compliant with Universal Serial Bus Specification 2.0. The controller inherits advanced serial interface technology to consume the least power when 4 DS (downstream) ports function simultaneously.

PL2586 adapt Single Transaction Translator (STT) and Ganged power management to achieve cost effective purpose. Users can also implement multiple Hub configuration options through external EEPROM.

PL2586 supports QFN24 and SSOP28 packages targeting mainstream stand-alone 4 ports Hub market.

## **2. Features**

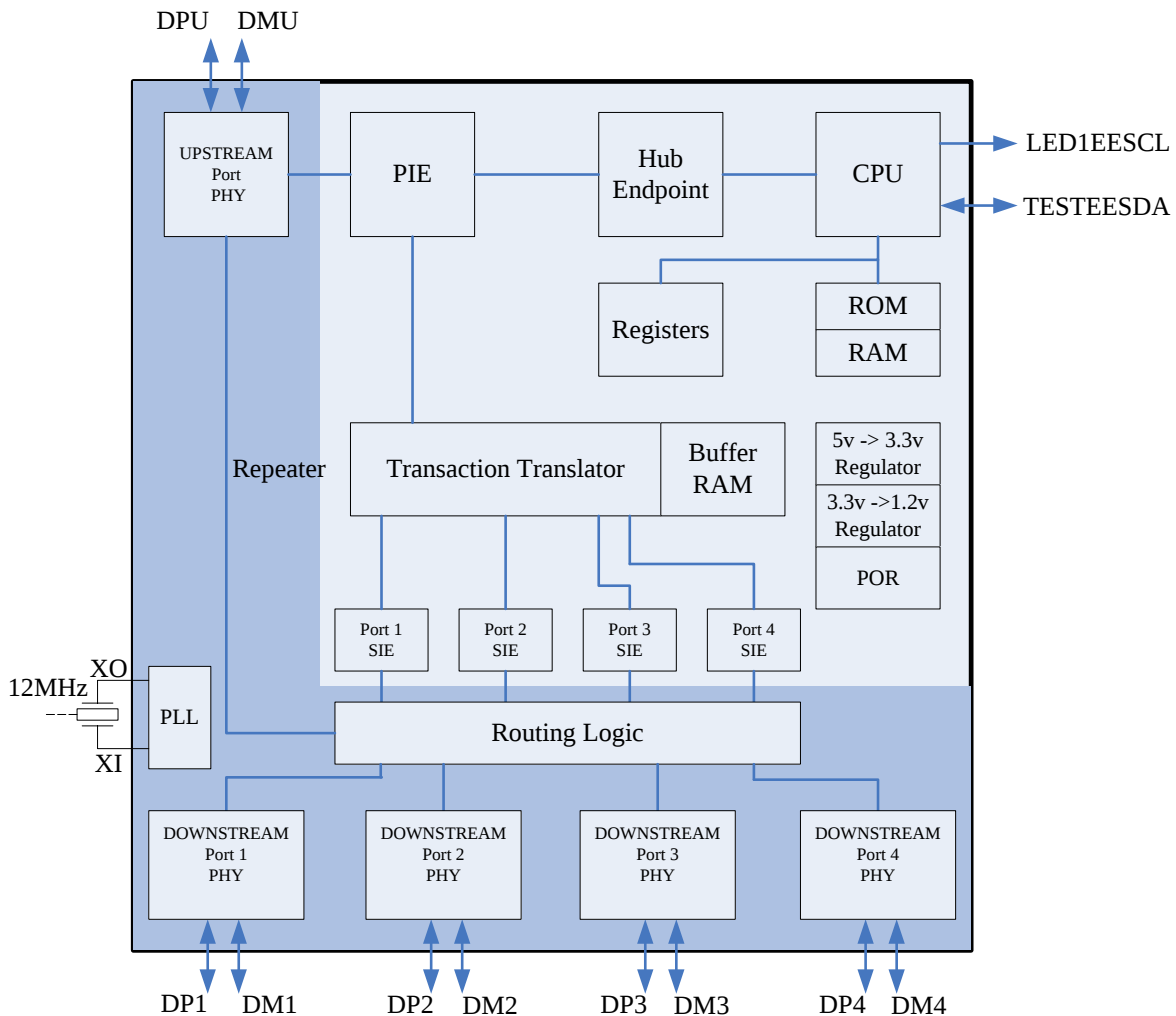
- Compliant with USB Specification Revision 2.0
  - Upstream Port supports high-speed (480MHz) and full-speed (12MHz) traffic
  - Configurable 4/3/2 downstream ports support high-speed, full-speed, and low-speed
  - Backward compatible to USB Specification Revision 1.1
- Integrated Fast 8051 microprocessor
- 12MHz Oscillator clock input
- Integrated upstream 1.5K $\Omega$  pull-up downstream 15K $\Omega$  pull-down resistors
- Single Transaction Translator (Single TT)
- Ganged Power Control and Global Over Current detection for downstream ports
- Leading small power consumption USB2.0 Hub
- On chip 5V to 3.3V and 3.3V to 1.2V regulator
- Automatic re-enumeration for switching between self-powered and bus-powered modes
- External EEPROM interface for customized information storage
  - Customized VID, PID
  - Number of downstream port
  - Product ID
  - Serial number
- Two LED port indicator mode
  - 4 Downstream port LED (enable green) and one Active/Suspend LED (Red)
  - One joint Downstream port LED for 4 ports (enable green) and one Active/Suspend LED(Red)
- Type of packages
  - QFN24
  - SSOP28

### 3. Ordering Information

| Chip Product Name | Package Type | Ordering Part Number | MPQ             |
|-------------------|--------------|----------------------|-----------------|
| PL2586            | 28-pin SSOP  | PL2586A2ZJG7P1       | 50 pcs / tube   |
|                   |              | PL2586A2ZJG8P1       | 2500pcs / reel  |
|                   | 24-pin QFN   | PL2586A2FIG8P1(*1)   | 3000 pcs / reel |

(\*1) This packing is applicable to MSL3 (Based on IPC/JEDEC J-STD-020), Please refer to user's guide including Storage and Baking Condition.

### 4. Block Diagram



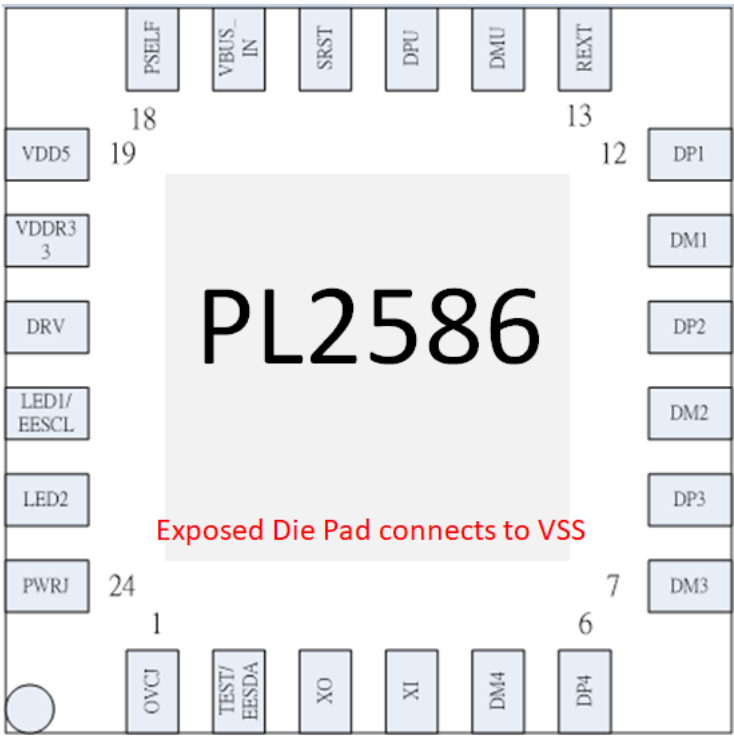
## 5. USB Logo Certification

The PL2586 IC has been certified by the USB-IF organization with TID 6701 to be fully compliant with the USB 2.0 specification.

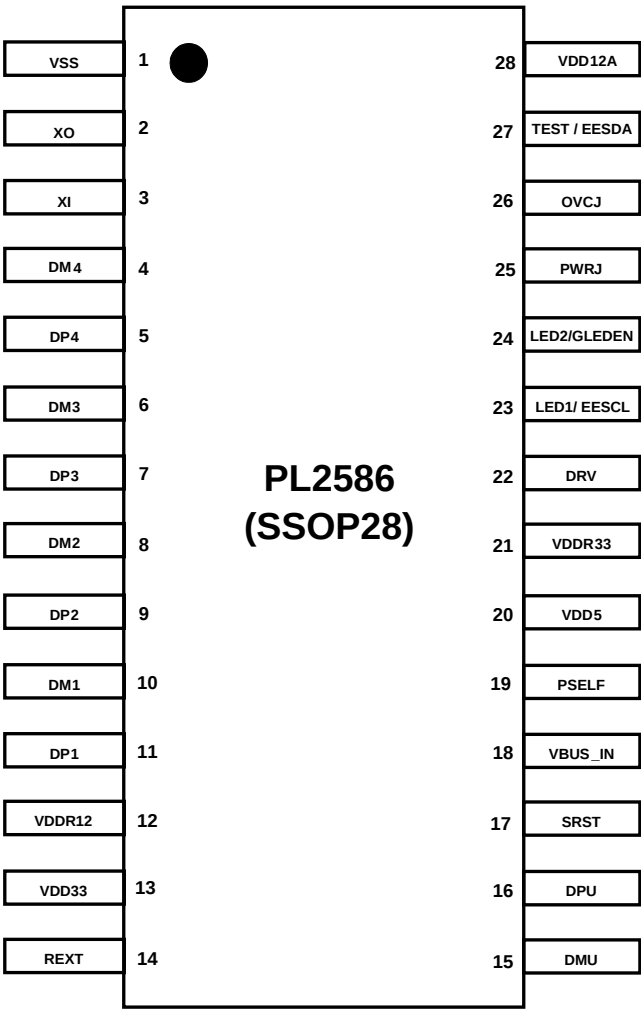


6. Pin Assignment

6.1 QFN24 Pin Diagram



6.2 SSOP28 Pin Diagram



### 6.3 Pin Description (QFN24 & SSOP28)

| QFN24<br>Pin # | SSOP28<br>Pin # | Pin Name     | I/O | Description                                                                                                                                                                         |
|----------------|-----------------|--------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1              | 26              | OVCJ         | B   | Global over current detection indicator for 4 DSP, active low. <b>(Default: pull up)</b>                                                                                            |
| 2              | 27              | TEST / EESDA | B   | Test mode enable / EEPROM data pin, <b>(Default: pull up)</b> .<br>For normal usage this EESDA pin should left as No-Connection or connect to EEPROM SDA pin. Active low.           |
| 3              | 2               | XO           | P   | 12MHz Crystal Oscillator output                                                                                                                                                     |
| 4              | 3               | XI           | P   | 12MHz Crystal Oscillator input                                                                                                                                                      |
| 5              | 4               | DM4          | B   | USB D- pin for the 4 <sup>th</sup> Downstream Port                                                                                                                                  |
| 6              | 5               | DP4          | B   | USB D+ pin for the 4 <sup>th</sup> Downstream Port                                                                                                                                  |
| 7              | 6               | DM3          | B   | USB D- pin for the 3 <sup>rd</sup> Downstream Port                                                                                                                                  |
| 8              | 7               | DP3          | B   | USB D+ pin for the 3 <sup>rd</sup> Downstream Port                                                                                                                                  |
| 9              | 8               | DM2          | B   | USB D- pin for the 2 <sup>nd</sup> Downstream Port                                                                                                                                  |
| 10             | 9               | DP2          | B   | USB D+ pin for the 2 <sup>nd</sup> Downstream Port                                                                                                                                  |
| 11             | 10              | DM1          | B   | USB D- pin for the 1 <sup>st</sup> Downstream Port                                                                                                                                  |
| 12             | 11              | DP1          | B   | USB D+ pin for the 1 <sup>st</sup> Downstream Port                                                                                                                                  |
| 13             | 14              | REXT         | I   | USB PHY bias reference                                                                                                                                                              |
| 14             | 15              | DMU          | B   | USB D- pin for the Upstream Port                                                                                                                                                    |
| 15             | 16              | DPU          | B   | USB D- pin for the Upstream Port                                                                                                                                                    |
| 16             | 17              | SRST         | I   | System reset pin <b>(Default: pull up)</b>                                                                                                                                          |
| 17             | 18              | VBUS_IN      | I   | USB Vbus facing port. Used to monitor the power state of Vbus. When Vbus_in = 1, the chip starts function.                                                                          |
| 18             | 19              | PSELF        | B   | a. Bus power monitor. Distinguish the power source is Self-powered or Bus-powered. (High level indicates Self-Powered; Low level indicates Bus-Powered; <b>(Default pull- up)</b> ) |
| 19             | 20              | VDD5         | P   | 5V input for LDO                                                                                                                                                                    |
| 20             | 21              | VDDR33       | P   | 3.3V output from 5V LDO                                                                                                                                                             |
| 21             | 22              | DRV          | B   | LED control <b>(Default: pull down)</b><br>a. When chip normal function (without enabling the charging mode), this DRV                                                              |

# Product Data Sheet

## PL2586 (USB 2.0 High Speed 4-Port Hub Controller)



|               |    |              |   |                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------|----|--------------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|               |    |              |   | pin is responsible for indicating the Hub active/suspends status, tie to GND.<br>(refer to schematic)                                                                                                                                                                                                                                                                                |
| 22            | 23 | LED1/ EESCL  | B | DSP 1 and DSP 3 LED control / EEPROM clock. <b>(Default: pull down)</b><br>a. When using 4LED for each downstream port, this LED1 pin is responsible for port1 and port3 control. (refer to schematic)<br>b. When LED2 is pull high during initiate, LED1 act as the LED indicator for all 4ports.<br>c. Clock of EEPROM (SCL)                                                       |
| 23            | 24 | LED2/ GLEDEN | B | DSP 2 and DSP 4 LED control/Group LED Indicator Enable. <b>(Default: pull down)</b><br>a. When using 4LED for each downstream port, this LED2 pin is responsible for port2 and port4 control. (refer to schematic)<br>b. When using 1LED for 4 downstream port, this LED2 pin is responsible for enable Group LED indicator (GLEDEN), with it pull high to 3.3V (refer to schematic) |
| 24            | 25 | PWRJ         | B | Power switch enable power for 4 DSP devices in Ganged powered mode, active low. <b>(Default: pull up)</b>                                                                                                                                                                                                                                                                            |
| -             | 1  | VSS          | P | Ground                                                                                                                                                                                                                                                                                                                                                                               |
| -             | 12 | VDDR12       | P | 1.2V output from 3.3V to 1.2VLDO                                                                                                                                                                                                                                                                                                                                                     |
| -             | 13 | VDD33        | P | 3.3V input for 3.3V to 1.2VLDO                                                                                                                                                                                                                                                                                                                                                       |
| -             | 28 | VDD12A       | P | 1.2V power output                                                                                                                                                                                                                                                                                                                                                                    |
| IC Bottom PAD |    | VSS          | P | Must be connected to VSS(Ground)                                                                                                                                                                                                                                                                                                                                                     |

### I/O Type Definition

O : Output

B : Bi-directional

I : Input

P : Power

## 7. Data Format Defined in EEPROM

This controller supports in-system customization to fulfill wide range of applications without controller re-spin. This is achieved via non-volatile memory of low density two-wire serial EEPROM. This type of memory is widely-used industrial standard hence make it the cost-efficient solution for customization and vastly ease time-to-market curve.

Table 7-1 of EEPROM array.

| Offset<br>(Hex) | Size<br>(Dec) | Description                                                                                                                                                                                                                                                                                                                                               |
|-----------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x00            | 1             | Validation byte 0.<br><br>There are 7 validation bytes across EEPROM array to check possibly corruption of valid data. These validation bytes are generated dynamically according to content of EEPROM array. Any value other than generated will invalidate the EEPROM content and the controller will not load value from EEPROM during initialization. |
| 0x01            | 1             | Validation byte 1.                                                                                                                                                                                                                                                                                                                                        |
| 0x02            | 1             | idVendor of USB Standard Device Descriptor.<br>Big-endian.                                                                                                                                                                                                                                                                                                |
| 0x03            | 1             | idVendor of USB Standard Device Descriptor.<br>Big-endian.                                                                                                                                                                                                                                                                                                |
| 0x04            | 1             | idProduct of USB Standard Device Descriptor.<br>Big-endian.                                                                                                                                                                                                                                                                                               |
| 0x05            | 1             | idProduct of USB Standard Device Descriptor.<br>Big-endian.                                                                                                                                                                                                                                                                                               |
| 0x06            | 1             | bcdDevice of USB Standard Device Descriptor.<br>Big-endian.                                                                                                                                                                                                                                                                                               |
| 0x07            | 1             | bcdDevice of USB Standard Device Descriptor.<br>Big-endian.                                                                                                                                                                                                                                                                                               |
| 0x08 ~<br>0x19  | 18            | Reserved. Fill 0x00                                                                                                                                                                                                                                                                                                                                       |
| 0x1A            | 1             | Number of downstream facing ports in Hub Descriptor.<br>0x1: 1 downstream facing port is supported by this hub.<br>0x2: 2 downstream facing ports are supported by this hub.<br>0x3: 3 downstream facing ports are supported by this hub.<br>0x4: 4 downstream facing ports are supported by this hub.<br>Other value: invalid                            |
| 0x1B ~          | 14            | Reserved. Fill 0x00                                                                                                                                                                                                                                                                                                                                       |

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# Product Data Sheet

## PL2586 (USB 2.0 High Speed 4-Port Hub Controller)

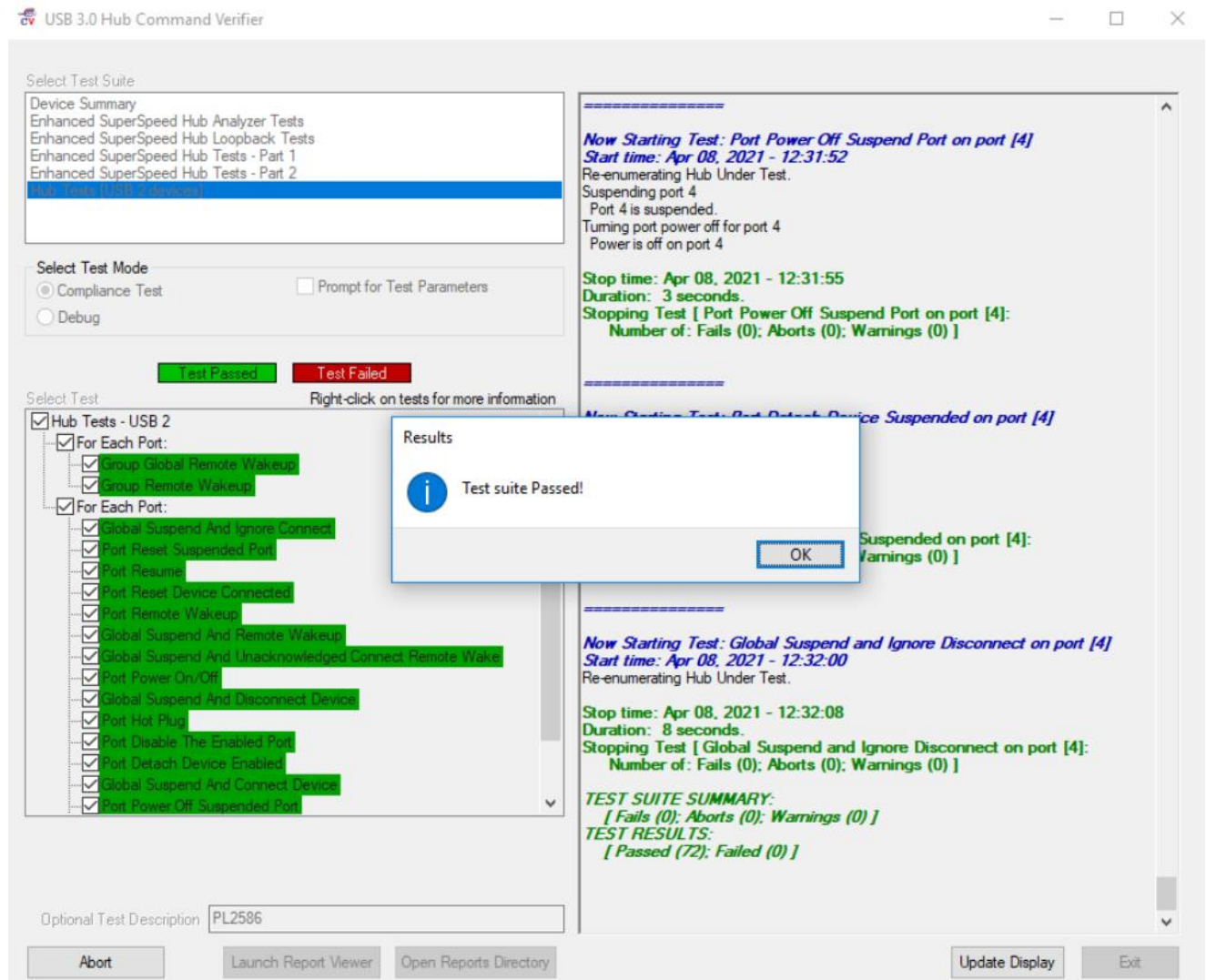


|              |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |    | ''', '''                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 0x48         | 1  | <p>Length of string descriptor describing serial number (offset 0x49~0x54).<br/>This field represents length of characters and will be automatically converted to bLength format of String Descriptor.<br/>Maximum value of this field is 12.</p> <p>If this byte is 0x00 or 0xFF then no serial number string will be reported.</p>                                                                                                                                                                                                                                                                                                                  |
| 0x49 ~ 0x54  | 12 | <p>ASCII coded data of string descriptor describing serial number, indicated by iSerialNumber of USB Standard Device Descriptor.<br/>The array here is ASCII coded and will be automatically converted to Unicode coded in forming String Descriptor.</p> <p>Example: '0', '1', '2', '3', '4', '5', '6', '7', '8', '9', 'A', 'B'</p>                                                                                                                                                                                                                                                                                                                  |
| 0x55         | 1  | <p>Bit[7:4]: reserved, do not use</p> <p>bit[3] : DeviceRemovable indicator of downstream facing port 4 of Hub Descriptor<br/>0b: device is removable<br/>1b: device is non-removable</p> <p>bit[2] : DeviceRemovable indicator of downstream facing port 3 of Hub Descriptor<br/>0b: device is removable<br/>1b: device is non-removable</p> <p>bit[1] : DeviceRemovable indicator of downstream facing port 2 of Hub Descriptor<br/>0b: device is removable<br/>1b: device is non-removable</p> <p>bit[0] : DeviceRemovable indicator of downstream facing port 1 of Hub Descriptor<br/>0b: device is removable<br/>1b: device is non-removable</p> |
| 0x56         | 1  | Validation byte 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 0x57         | 1  | Validation byte 6.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Other offset | -  | Reserved for future use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**Note:** Contact Prolific representative for EEPROM tooling.

## 8. USB3 & USB2 HUB Command Verifier

### 8.1 USB3 HUB Command Verifier



# Product Data Sheet

## PL2586 (USB 2.0 High Speed 4-Port Hub Controller)



USB 3 Gen X Command Verifier

Select Test Suite

- Billboard Tests
- Chapter 9 Tests [USB 2 devices]**
- Chapter 9 Tests [USB 3 Gen X devices]
- Connector Type Tests
- Current Measurement Test [USB 2 devices]
- Current Measurement Test [USB 3 Gen X devices]
- Device Summary
- HID Tests
- Link Layer Test for Gen1

Select Test Mode

☒ Compliance Test ☐ Prompt for Test Parameters

☐ Debug

Select Test

Right-click on tests for more information

- ☒ Chapter 9 Tests - USB 2
  - ☒ Chapter 9 Tests
    - ☒ For Each Configuration:
      - ☒ Default State
        - ☒ TD 9.1: Device Descriptor Test
        - ☒ TD 9.2: Configuration Descriptor Test
        - ☒ TD 9.3: Interface Association Descriptor Test
        - ☒ TD 9.4: Interface Descriptor Test
        - ☒ TD 9.5: Endpoint Descriptor Test
        - ☒ TD 9.7: BOS Descriptor Test
        - ☒ TD 9.38 Configuration Summary Descriptor Test
      - ☒ Addressed State
        - ☒ TD 9.1: Device Descriptor Test
        - ☒ TD 9.2: Configuration Descriptor Test
        - ☒ TD 9.3: Interface Association Descriptor Test
        - ☒ TD 9.4: Interface Descriptor Test
        - ☒ TD 9.5: Endpoint Descriptor Test
        - ☒ TD 9.7: BOS Descriptor Test

Optional Test Description: PL2586

Test Passed Test Failed

Endpoint descriptor length : 0x7  
Endpoint descriptor type : 0x5  
Endpoint Type : Interrupt, Number : 0x1, Direction : IN  
Endpoint descriptor bmAttributes : 0x3  
Endpoint descriptor raw MaxPacketSize : 0x1  
Endpoint descriptor interval : 0xFF

Stop time: Apr 08, 2021 - 12:14:00  
Duration: 1 second.  
Stopping Test [ TD 9.5 - Endpoint Descriptor Test (Configuration Index 0  
OtherSpeedConfiguration Index 0) - configured:  
Number of: Fails (0); Aborts (0); Warnings (0) ]

Now Starting Test: TD 9.16 - Enumeration Test(repeat 150 times)  
Start time: Apr 08, 2021 - 12:14:00  
Device speed is High.  
Beginning enumeration test with 150 enumerations. This may take several minutes to complete.

|       |                  |
|-------|------------------|
| ..... | 25 enumerations  |
| ..... | 50 enumerations  |
| ..... | 75 enumerations  |
| ..... | 100 enumerations |
| ..... | 125 enumerations |
| ..... | 150 enumerations |

Results

Test suite Passed!

OK

Number of: Fails (0); Aborts (0); Warnings (0) ]

150 times):

Informed user: run Connector Type Tests on this device.  
Informed user: run Hub Tests on this device.

TEST SUITE SUMMARY:  
[ Fails (0); Aborts (0); Warnings (0) ]  
TEST RESULTS:  
[ Passed (36); Failed (0) ]

Abort Launch Report Viewer Open Reports Directory Update Display Exit

# Product Data Sheet

## PL2586 (USB 2.0 High Speed 4-Port Hub Controller)



### 8.2 USB2 HUB Command Verifier

USB 2 Command Verifier

Select Test Suite

- Chapter 9 Tests
- Current Measurement Test
- Device Summary
- HID Tests
- Hub Tests**
- MSC Tests
- OTG Tests
- PHDC Tests

Select Test Mode

☒ Compliance Test ☐ Prompt for Test Parameters

☐ Debug

Test Passed Test Failed

Select Test Right-click on tests for more information

☒ Hub Tests

☒ For each Port:

- ☒ Global Suspend And Ignore Connect
- ☒ Port Reset - Suspended Port
- ☒ Port Resume
- ☒ Port Reset - Device Connected
- ☒ Port Remote Wakeup
- ☒ Global Suspend And Remote Wakeup
- ☒ Port Suspend
- ☒ Port Power On/Off
- ☒ Global Suspend And Disconnect Device
- ☒ Port Hot Plug
- ☒ Port Disable The Enabled Port
- ☒ Port Detach Device Enabled
- ☒ Global Suspend And Connect Device
- ☒ Port Power Off Suspended Port
- ☒ Port Detach Suspended Device
- ☒ Global Suspend and Ignore Disconnect

☒ For each Port:

Optional Test Description PL2586

Abort Launch Report Viewer Open Reports Directory Update Display Exit

Start time: Apr 08, 2021 - 12:51:04  
Current Host: PCI bus 8, device 0, function 2  
Number of ports: 5  
Received a port change notification

Stop time: Apr 08, 2021 - 12:51:12  
Duration: 8 seconds.  
Stopping Test [ Hub Port Remote Wakeup on port [3]:  
Number of: Fails (0); Aborts (0); Warnings (0) ]

Now Starting Test: Hub Global Suspend and Remote Wakeup on port [4]  
Start time: Apr 08, 2021 - 12:51:12  
Current Host: PCI bus 8, device 0, function 2  
Number of ports: 5  
Suspended the parent port  
Parent port saw remote wakeup  
Received a remote wake event

Stop time: Apr 08, 2021 - 12:51:21

Remote Wakeup on port [4]:  
Number of: Fails (0); Aborts (0); Warnings (0) ]

Number of ports: 5  
Received a port change notification

Stop time: Apr 08, 2021 - 12:51:29  
Duration: 8 seconds.  
Stopping Test [ Hub Port Remote Wakeup on port [4]:  
Number of: Fails (0); Aborts (0); Warnings (0) ]

TEST SUITE SUMMARY:  
[ Fails (0); Aborts (0); Warnings (0) ]  
TEST RESULTS:  
[ Passed (72); Failed (0) ]

Results

Test suite Passed!

OK

# Product Data Sheet

## PL2586 (USB 2.0 High Speed 4-Port Hub Controller)



USB 2 Command Verifier

Select Test Suite

- Enumeration Tests
- Current Measurement Test
- Device Summary
- HID Tests
- Hub Tests
- MSC Tests
- OTG Tests
- PHDC Tests

Select Test Mode

☒ Compliance Test ☐ Prompt for Test Parameters

☐ Debug

Test Passed Test Failed

Select Test Right-click on tests for more information

☒ Chapter 9 Tests

- ☒ For each configuration:
  - ☒ Device Descriptor Test - Configured State
  - ☒ Device Descriptor Test - Addressed State
  - ☒ Interface Association Descriptor Test
  - ☒ BOS Descriptor Test - Addressed state
  - ☒ Config Descriptor Test - Configured State
  - ☒ Config Descriptor Test - Addressed State
  - ☒ Interface Descriptor Test
  - ☒ Endpoint Descriptor Test - Configured State
  - ☒ Endpoint Descriptor Test - Addressed State
  - ☒ Halt Endpoint Test
  - ☒ Set Configuration Test
  - ☒ Suspend/Resume Test
  - ☒ Remote Wakeup Test - Enabled
  - ☒ Remote Wakeup Test - Disabled
- ☒ For each other speed configuration:
  - ☒ Other Speed Config Descriptor Test - Addressed State
  - ☒ Other Speed Interface Descriptor Test - Addressed State

Optional Test Description PL2586

Abort Launch Report Viewer Open Reports Directory Update Display Exit

Start time: Apr 08, 2021 - 12:35:43

Testing Interface number : 0 Alternate setting : 0

Endpoint descriptor length : 7

Endpoint descriptor type : 5

Endpoint Type : Interrupt, Number : 1, Direction : IN

Endpoint descriptor bmAttributes : 3

Endpoint descriptor raw MaxPacketSize : 1

Endpoint descriptor interval : ff

Stop time: Apr 08, 2021 - 12:35:44

Duration: 1 second

Stopping Test [ Endpoint Descriptor Test (Configuration Index 0)

OtherSpeedConfiguration Index 0):

Number of: Fails (0); Aborts (0); Warnings (0) ]

Now Starting Test: Enumeration Test (repeat 150 times)

Start time: Apr 08, 2021 - 12:35:44

Device speed is High

Beginning enumeration test with 150 enumerations. This may take several minutes to complete.

- ..... 25 enumerations
- ..... 50 enumerations
- ..... 75 enumerations
- ..... 100 enumerations
- ..... 125 enumerations
- ..... 150 enumerations

Results

Test suite Passed!

OK

TEST SUITE SUMMARY:

[ Fails (0); Aborts (0); Warnings (0) ]

TEST RESULTS:

[ Passed (23); Failed (0) ]

## 9. Electrical Characteristics

### 9.1 Absolute Maximum Ratings

| Symbol | Parameter                 | Min  | Max | Unit |
|--------|---------------------------|------|-----|------|
| VBUS   | 5V Power Supply Voltage   | -0.3 | 5.5 | V    |
| VDD33  | 3.3V Power Supply Voltage | -0.3 | 3.8 | V    |
| VDD12  | 1.2V Power Supply Voltage | -0.3 | 1.6 | V    |
| Ts     | Storage Temperature       | -40  | 150 | °C   |

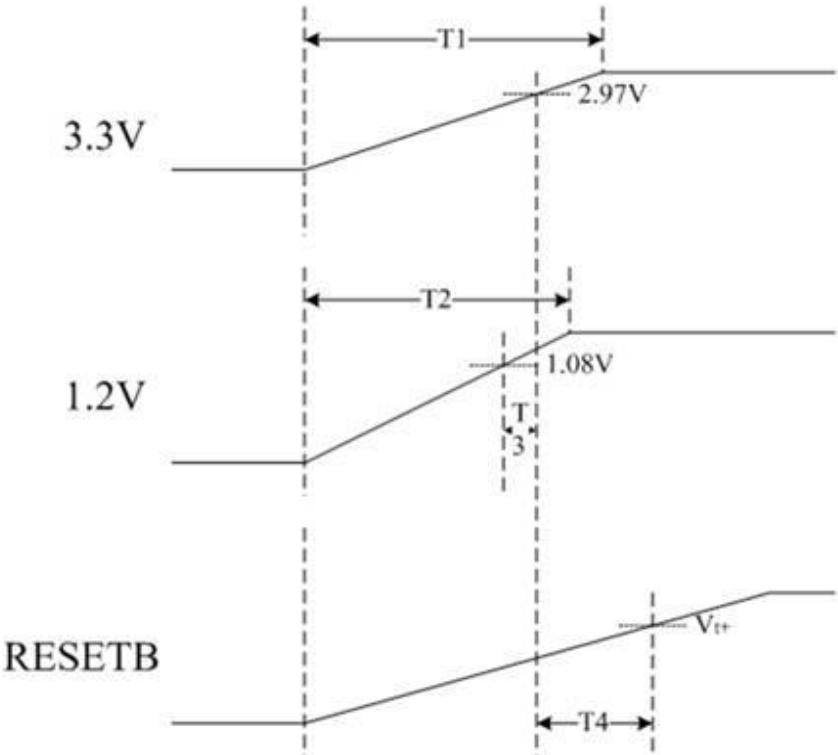
### 9.2 Operating Conditions

| Symbol.         | Parameter                      | Rating |      |      | Unit |
|-----------------|--------------------------------|--------|------|------|------|
|                 |                                | Min.   | Typ. | Max. |      |
| VBUS            | 5V Power Supply Voltage        | 3.0    | 5    | 5.5  | V    |
| VDD33           | 3.3V Power Supply Voltage      | 3.0    | 3.3  | 3.6  | V    |
| VDD12           | 1.2V Power Voltage             | 1.08   | 1.2  | 1.32 | V    |
| T <sub>A</sub>  | Operating Temperature          | -40    | -    | 85   | °C   |
| T <sub>J</sub>  | Junction Temperature           | -40    | -    | 125  | °C   |
| θ <sub>Jc</sub> | Thermal Characteristics SSOP28 |        | 22   |      | °C/W |
| θ <sub>Jc</sub> | Thermal Characteristics QFN24  |        | 20   |      | °C/W |

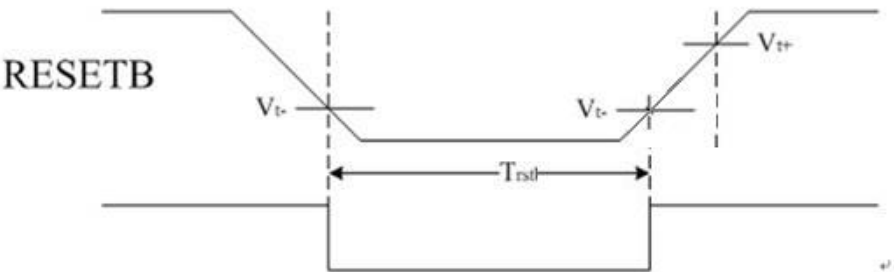
### 9.3 DC Characteristics

| Symbol.         | Parameter                                         | Rating |      |      | Unit |
|-----------------|---------------------------------------------------|--------|------|------|------|
|                 |                                                   | Min.   | Typ. | Max. |      |
| V <sub>IH</sub> | High level input voltage                          | 2.0    | -    | -    | V    |
| V <sub>IL</sub> | Low level input voltage                           | -      | -    | 0.8  | V    |
| V <sub>t-</sub> | Schmitt-trigger negative to threshold voltage     | -      | -    | 1.6  | V    |
| V <sub>t+</sub> | Schmitt-trigger positive to threshold voltage     | 1.8    | -    | -    | V    |
| V <sub>OH</sub> | High level output voltage                         | 2.5    | -    | -    | V    |
| V <sub>OL</sub> | Low level output voltage                          | -      | -    | 0.4  | V    |
| I <sub>OH</sub> | High level output current                         | -      | 6    | -    | mA   |
| I <sub>OL</sub> | Low level output current (V <sub>OL</sub> = 0.4V) | -      | 6    | -    | mA   |

9.4 Power on Sequence



Reset Timing



| SYMBOL            | MIN  | TYP | MAX | UNIT |
|-------------------|------|-----|-----|------|
| T1                | -    | 70  | -   | us   |
| T2                | -    | 60  | -   | us   |
| T3                | -    | 12  | -   | us   |
| T4                | 0    | 400 | -   | us   |
| T <sub>rstb</sub> | 2000 | -   | -   | us   |

Note: For V<sub>th</sub> and V<sub>tl</sub>, refer to 9.3

## 10. Power consumption

### 10.1 Measurement with the total device consumption

| PL2586 Power Consumption                                            |              |           |        |       |       |      |
|---------------------------------------------------------------------|--------------|-----------|--------|-------|-------|------|
| Symbol                                                              | Condition    |           |        | Idle  | R/W   | Unit |
|                                                                     | Active ports | Host      | Device |       |       |      |
| Icc                                                                 | 4            | H         | H      | 55.3  | 135.6 | mA   |
|                                                                     |              | H         | F      | 53.0  | 58.6  | mA   |
|                                                                     |              | H         | L      | 49.3  | 49.6  | mA   |
|                                                                     |              | F         | H      | 45.7  | 54.9  | mA   |
|                                                                     |              | F         | F      | 52.7  | 58.4  | mA   |
|                                                                     |              | F         | L      | 46.8  | 47.1  | mA   |
|                                                                     | 3            | H         | H      | 53.6  | 122.1 | mA   |
|                                                                     |              | H         | F      | 51.2  | 55.3  | mA   |
|                                                                     |              | H         | L      | 48.5  | 48.8  | mA   |
|                                                                     |              | F         | H      | 45.2  | 51.8  | mA   |
|                                                                     |              | F         | F      | 51.0  | 55.2  | mA   |
|                                                                     |              | F         | L      | 46    | 49    | mA   |
|                                                                     | 2            | H         | H      | 51.8  | 98.1  | mA   |
|                                                                     |              | H         | F      | 49.5  | 52.1  | mA   |
|                                                                     |              | H         | L      | 47.8  | 48.1  | mA   |
|                                                                     |              | F         | H      | 44.7  | 49.8  | mA   |
|                                                                     |              | F         | F      | 49.4  | 52.0  | mA   |
|                                                                     |              | F         | L      | 45.2  | 45.5  | mA   |
|                                                                     | 1            | H         | H      | 50.1  | 64.7  | mA   |
|                                                                     |              | H         | F      | 47.9  | 49.2  | mA   |
|                                                                     |              | H         | L      | 47.2  | 47.5  | mA   |
|                                                                     |              | F         | H      | 44.4  | 48.3  | mA   |
|                                                                     |              | F         | F      | 47.6  | 49.0  | mA   |
|                                                                     |              | F         | L      | 44.6  | 44.9  | mA   |
|                                                                     |              | No Active | H      | n/a   | 0.538 |      |
|                                                                     | No Active    | F         | n/a    | 0.631 |       | mA   |
| Isusp                                                               | Suspend      |           |        | 0.538 |       | mA   |
| F: Full-Speed, H: High-Speed                                        |              |           |        |       |       |      |
| H: USB Mass storage Device, Port1:SP 16G, Port2:Toshiba USB3.0 16G, |              |           |        |       |       |      |

# Product Data Sheet

## PL2586 (USB 2.0 High Speed 4-Port Hub Controller)

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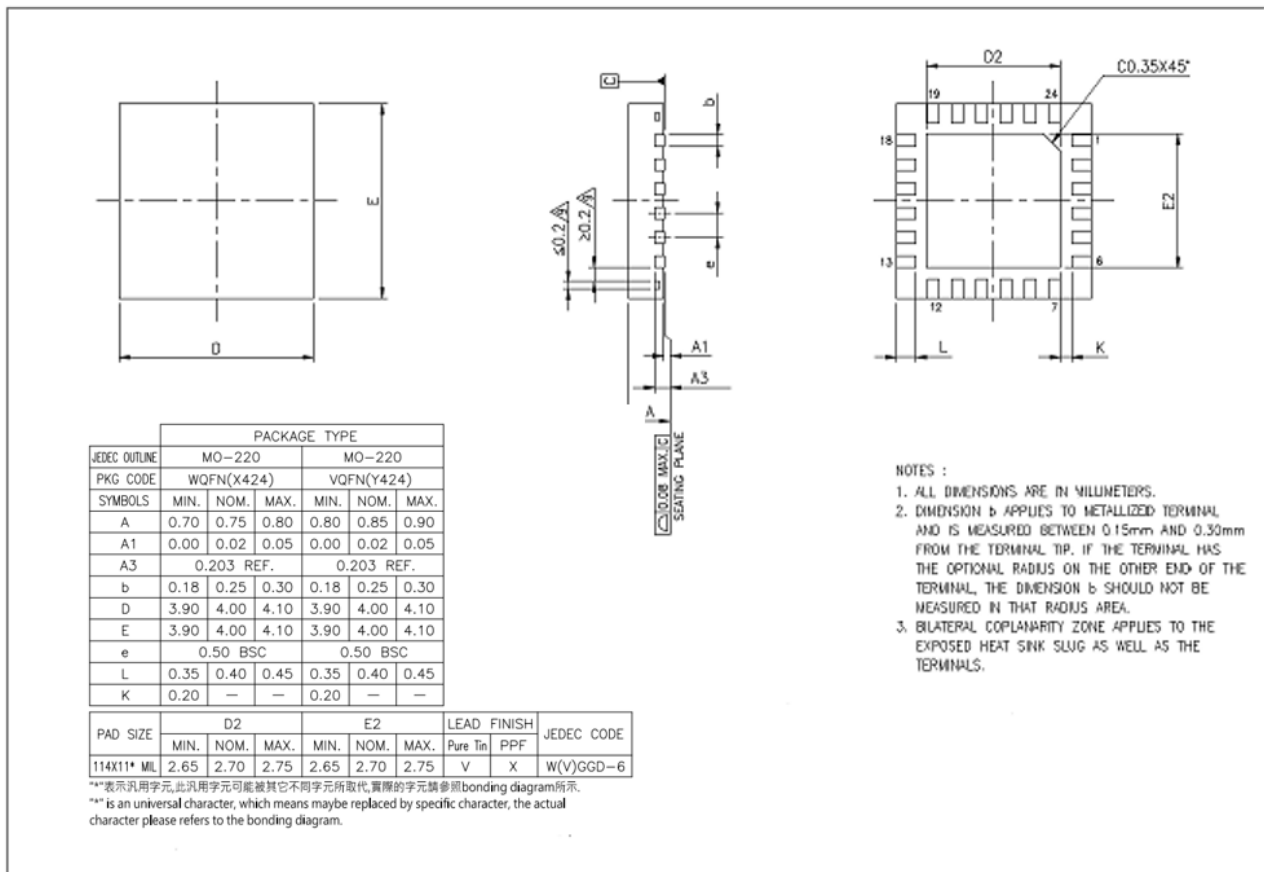


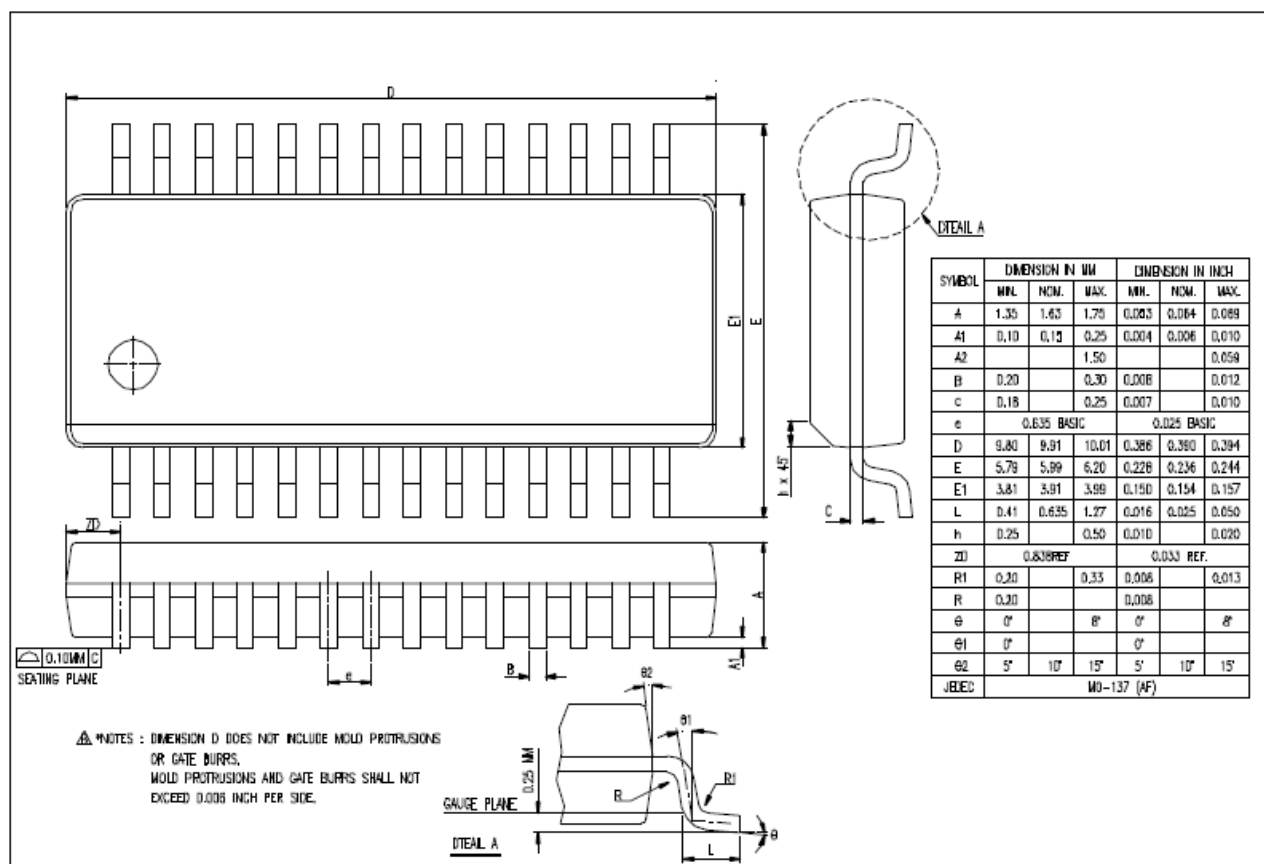
|                                                  |
|--------------------------------------------------|
| Port3:Supersonic 32G, Port4:Transcent USB3.1 32G |
| F : PL2303HXD, Baud Rate:115200bps               |
| L : Low Speed Mouse                              |

**\* PL2586 provides the lowest IC power consumption on market.**

## 11. Package Outline

### 11.1 QFN24 Outline





## 12. Outline Diagram

### 12.1 Chip Marking information

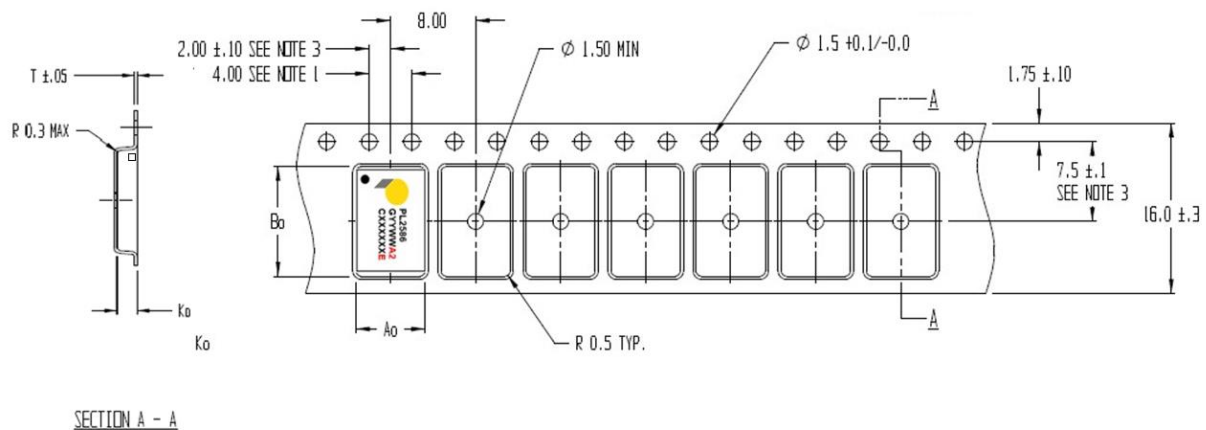


Table 12-1 Chip Marking Information

| Line                     | Marking    | Description                               |
|--------------------------|------------|-------------------------------------------|
| First Line               | PL2586     | Chip Product Name                         |
| Second Line<br>(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: "G2316A2" – means Green packing + Year 2023 + Week no. 16 + A2 chip version.

### 12.2 Carrier Tape (SSOP-28)



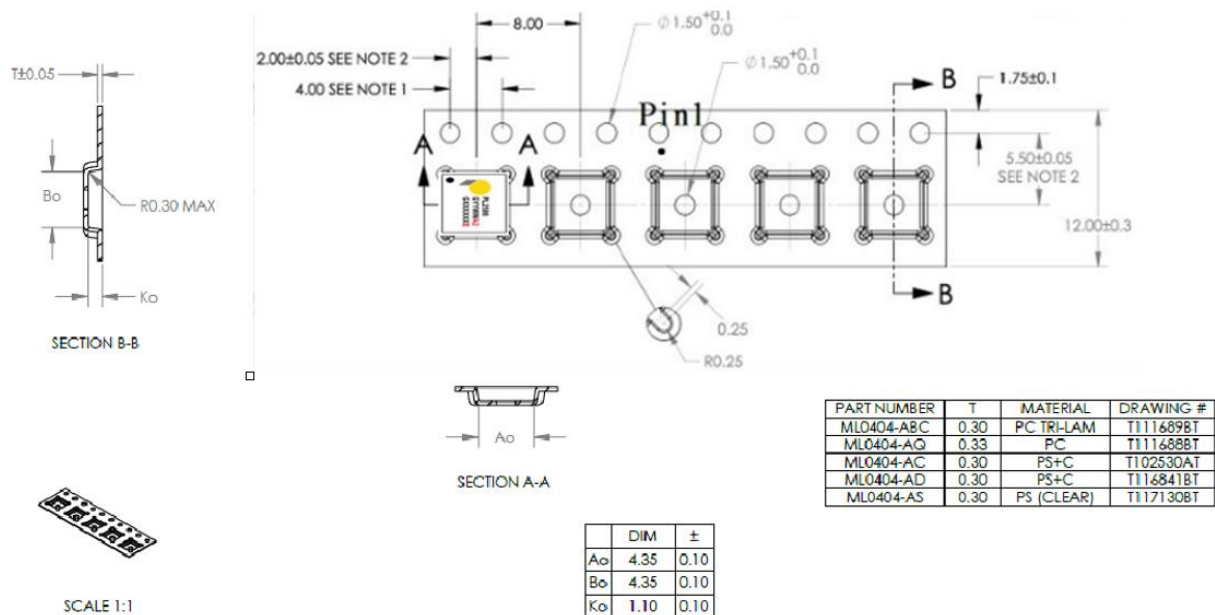
Ao = 6.50  
Bo = 10.30  
Ko = 2.10

NOTES:

1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
2. CAMBER IN COMPLIANCE WITH EIA 481
3. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE

| PART#     | T    | MATERIAL | DRAWING NO.    |
|-----------|------|----------|----------------|
| SOIC16-AC | 0.30 | PS+C     | A0103-B9-14(2) |
| SOIC16-AD | 0.30 | PS+C     | T108794BT      |

12.3 Carrier Tape (QFN24)



NOTES:  
1. TO SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2  
2. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE.  
3. Ao AND Bo ARE MEASURED ON A PLANE AT A DISTANCE "R" ABOVE THE BOTTOM OF THE POCKET.

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