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**Product Data Sheet****PL2732**

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**1. Features**

- Single-chip SuperSpeed USB 3.0 Storage Controller Solution
- Compliant with USB 3.0 and USB 2.0 specification
- Integrated SuperSpeed (5Gbps), Hi-Speed, and Full-speed USB transceiver
- Supports high-performance 8-bit eMMC of BGA package (up to eMMC 5.0 HS200 speed grade)
- JBOD capability combines dual storage media capacity into one high-capacity USB drive
- Embedded high-performance microcontroller
- Supports USB Mass Storage Class (MSC) and Bulk-Only Transport Specification. No device driver installation needed for major Operating Systems (Windows, Mac, Linux, and Android).
- Firmware can be upgraded via USB interface using either external SPI flash or storage media (to further reduce PCB footprint and BOM cost)
- Built-in eMMC power regulator
- Built-in 5V to 3.3V regulator
- Built-in 5V to core voltage regulator
- LQFP48 package

**2. General Description**

The PL2732 is a single-chip SuperSpeed USB 3.0 eMMC storage controller with protocol engine that provides USB 3.0 to 8-bit eMMC interface for PCs/tablets/smartphones. When connected to the SuperSpeed USB port of PC, the PL2732 activates its USB BOT Mass Storage Class protocol engine and transfers files at USB 3.0 SuperSpeed (5Gbps that enables the eMMC media up to HS200 performance grade. The PL2732 uses OS built-in USB mass storage drivers so no driver installation is needed for major operating systems like Windows, Mac, Linux, and Android. The PL2732 can be configured as a single LUN USB drive using either one or two storage media. The PL2732 incorporates JBOD capability that provides the flexibility to use two storage media and combine their capacity into one logical drive.

To save BOM cost, the PL2732 integrates both SuperSpeed transceiver and Hi-Speed/Full-speed transceiver. It also integrates power management components including eMMC power regulator and other regulators. It also integrates chip power stability monitors to make sure the controller does not enter unknown state when system power is unstable. To maximize system compatibility and to integrate more value-added features, the firmware of PL2732 can also be upgraded via USB interface and stored in the external SPI flash.

## 3. Block Diagram

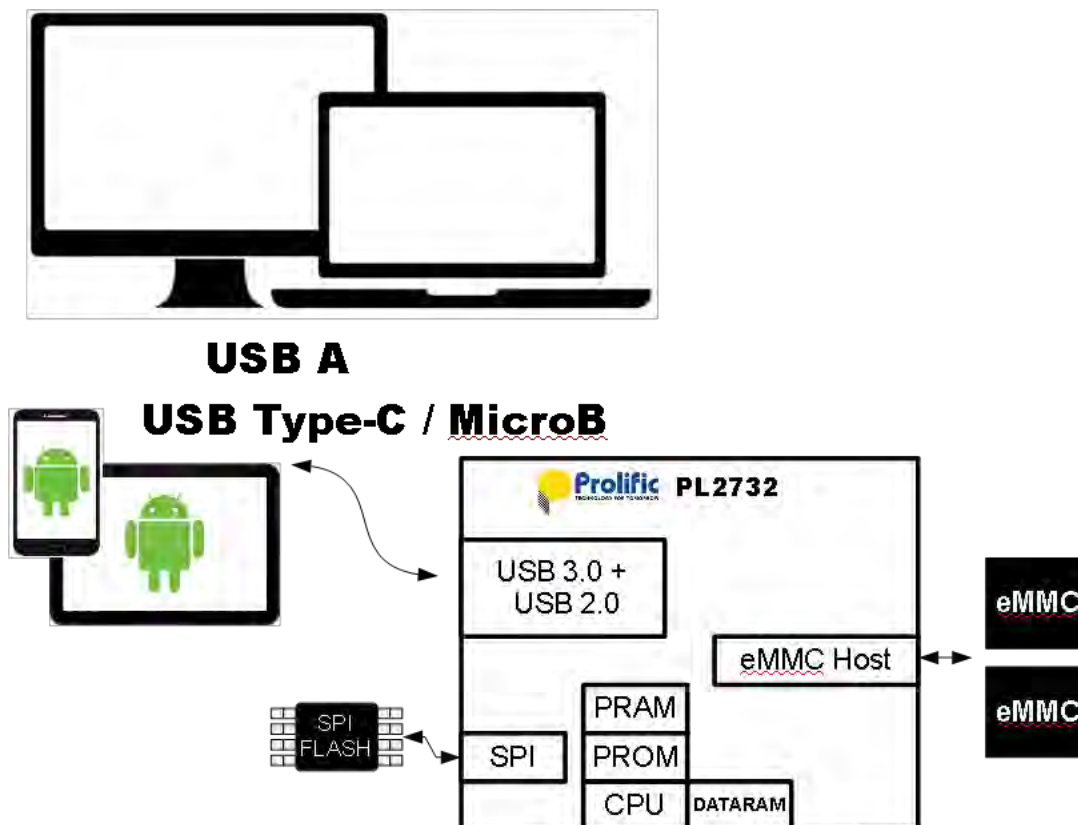


Figure 3-1: PL2732 Block Diagram & Application

## 4. Ordering Information

Table 4-1: Ordering Information

| Product Name | Package Type       | Ordering Number |
|--------------|--------------------|-----------------|
| PL2732       | 48pin LQFP (7x7mm) | PL2732B4LMG7P1  |

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5. Pin Assignment & Description

5.1 PL2732 Pin Assignment

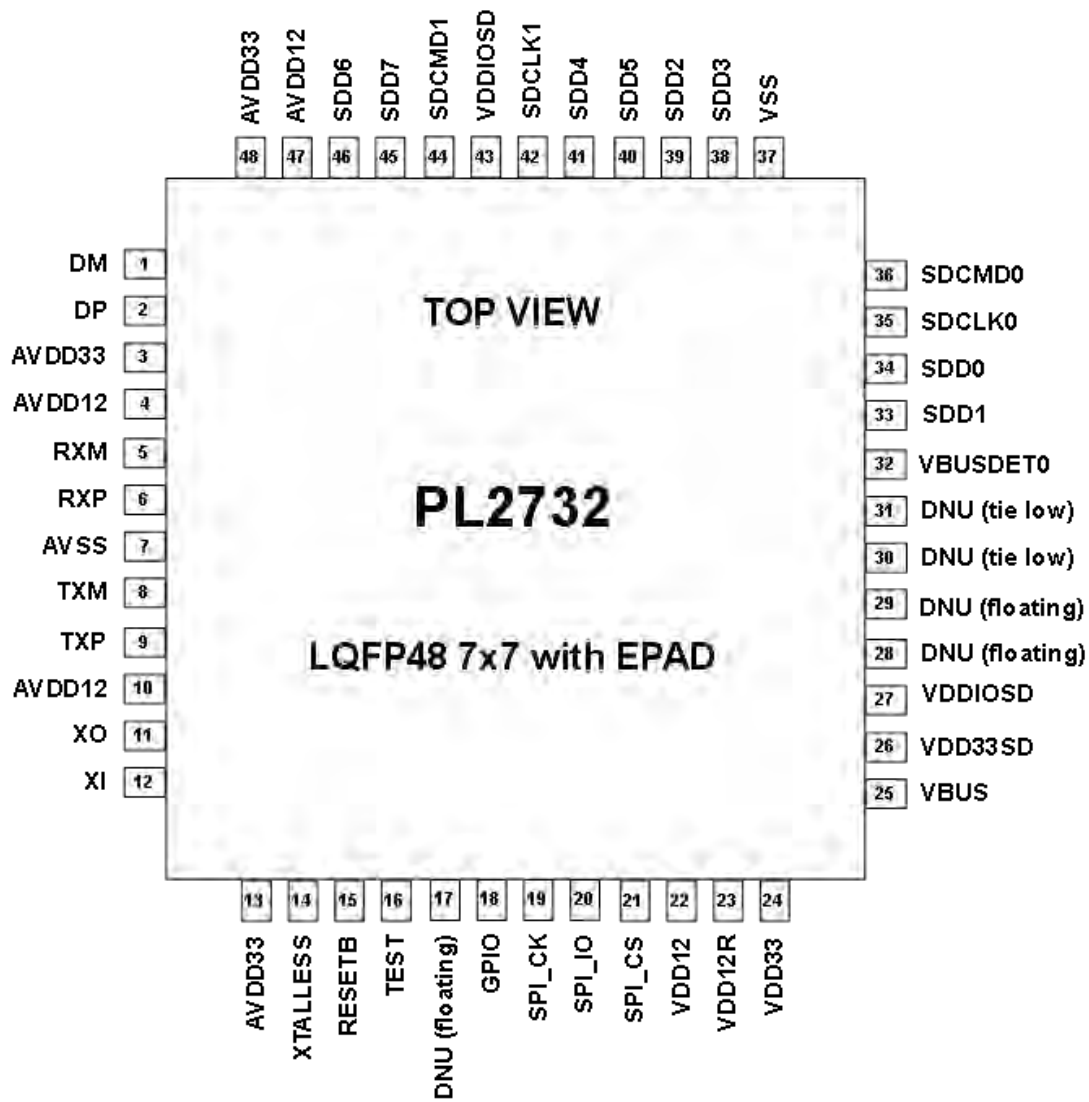


Figure 5-1: PL2732 Pin Diagram

## 5.2 PL2732 Pin Description Table

Table 5-1: PL2732 Pin Assignment

| Pin # | Pin Name      | Pin Type | Pin Description                                                                              |
|-------|---------------|----------|----------------------------------------------------------------------------------------------|
| 1     | DM            | AIO      | USB DM                                                                                       |
| 2     | DP            | AIO      | USB DP                                                                                       |
| 3     | AVDD33        | P        | 3.3V Analog Power                                                                            |
| 4     | AVDD12        | P        | 1.2V Analog Power                                                                            |
| 5     | RXM           | AIO      | USB SuperSpeed RXM                                                                           |
| 6     | RXP           | AIO      | USB SuperSpeed RXP                                                                           |
| 7     | AVSS          | P        | Analog Ground                                                                                |
| 8     | TXM           | AIO      | USB SuperSpeed TXM                                                                           |
| 9     | TXP           | AIO      | USB SuperSpeed TXP                                                                           |
| 10    | AVDD12        | P        | 1.2V Analog Power                                                                            |
| 11    | XO            | DO       | 30MHz Crystal Oscillator Output                                                              |
| 12    | XI            | DI       | 30MHz Crystal Oscillator Input                                                               |
| 13    | AVDD3         | P        | 3.3V Analog Power                                                                            |
| 14    | XTALLESS      | DI       | High: clock from internal oscillator<br>Low: clock from external crystal                     |
| 15    | RESETB        | DI       | Active low reset                                                                             |
| 16    | TEST          | DI       | Active high test mode. Tie this pin to ground.                                               |
| 17    | DNU           | -        | Do not use. Leave this pin floating.                                                         |
| 18    | GPIO          | DIO      | Do not use. Leave this pin floating.                                                         |
| 19    | SPI_CK        | DO       | SPI Clock                                                                                    |
| 20    | SPI_IO        | DIO      | SPI Data                                                                                     |
| 21    | SPI_CS        | DO       | SPI Chip Select                                                                              |
| 22    | VDD12         | P        | 1.2V Power                                                                                   |
| 23    | VDD12R        | P        | 1.2V output power (internal regulator)                                                       |
| 24    | VDD33         | P        | 3.3V output power (internal regulator)                                                       |
| 25    | VBUS          | P        | USB VBUS                                                                                     |
| 26    | VDD33SD       | P        | 3.3V output power for eMMC<br>Max output current: 250mA<br>Output Voltage range: 3.3V +/- 5% |
| 27    | VDDIOSD       | P        | Power for eMMC IO Interface                                                                  |
| 28    | DNU           | DIO      | Do not use. Leave this pin floating.                                                         |
| 29    | DNU           | -        | Do not use. Leave this pin floating.                                                         |
| 30    | DNU (tie low) | DIO      | Do not use. Tie this pin to GND.                                                             |
| 31    | DNU (tie low) | DI       | Do not use. Tie this pin to GND.                                                             |

|    |          |       |                      |
|----|----------|-------|----------------------|
| 32 | VBUSDET0 | DI5VT | VBUS detection 0     |
| 33 | SDD1     | DIO   | Data bit 1 of eMMC   |
| 34 | SDD0     | DIO   | Data bit 0 of eMMC   |
| 35 | SDCLK0   | DO    | Clock pin of eMMC #0 |
| 36 | SDCMD0   | DIO   | CMD pin of eMMC #0   |
| 37 | VSS      | P     | VSS                  |
| 38 | SDD3     | DIO   | Data bit 3 of eMMC   |
| 39 | SDD2     | DIO   | Data bit 2 of eMMC   |
| 40 | SDD5     | DIO   | Data bit 5 of eMMC   |
| 41 | SDD4     | DIO   | Data bit 4 of eMMC   |
| 42 | SDCLK1   | DO    | Clock pin of eMMC #1 |
| 43 | VDDIOSD  | P     | Power for IO of eMMC |
| 44 | SDCMD1   | DIO   | CMD pin of eMMC #1   |
| 45 | SDD7     | DIO   | Data bit 7 of eMMC   |
| 46 | SDD6     | DIO   | Data bit 6 of eMMC   |
| 47 | AVDD12   | P     | 1.2V Analog Power    |
| 48 | AVDD33   | P     | 3.3V Analog Power    |
| 49 | EPAD     | EPAD  | VSS                  |

**Pin Type:**

- AIO – Analog Bi-directional
- P – Power / Ground
- DI – Digital Input
- DO – Digital Output
- DIO – Digital Bi-directional
- DI5VT – Digital Input, 5V Tolerant

## 6. AC & DC Characteristics

### 6.1 Absolute Maximum Ratings

Table 6-1: Absolute Maximum Ratings

| Symbol        | Parameter                            | Rating       | Units |
|---------------|--------------------------------------|--------------|-------|
| $V_{BUS}$     | Power supply of VBUS                 | -0.3 to 5.5  | V     |
| $V_{DD12}$    | Power supply of 1.2V (VDD12, AVDD12) | -0.3 to 1.31 | V     |
| $V_{DD33}$    | Power supply of 3.3V (VDD33, AVDD33) | -0.3 to 3.6  | V     |
| $V_{IN33}$    | Input signal voltage of 3.3V IO      | -0.3 to 3.6  | V     |
| $V_{ESD-MM}$  | Machine Mode                         | $\pm 300$    | V     |
| $V_{ESD-HBM}$ | Human Body Mode                      | $\pm 4$      | KV    |
| $T_{op}$      | Operating temperature                | -40 to 85    | °C    |
| $T_J$         | Junction Operation Temperature       | -40 to 125   | °C    |
| $T_{STG}$     | Storage temperature                  | -40 to 150   | °C    |

### 6.2 Recommended Operating Conditions

Table 6-2: Recommended Operating Conditions

| Symbol      | Parameter                            | Min  | Typ  | Max  | Units |
|-------------|--------------------------------------|------|------|------|-------|
| $V_{BUS}$   | Power supply of VBUS                 | 2.7  |      | 5.5  | V     |
| $V_{DD12}$  | Power supply of 1.2V (VDD12, AVDD12) | 1.25 | 1.28 | 1.31 | V     |
| $V_{DD33}$  | Power supply of 3.3V (VDD33, AVDD33) | 2.7  | 3.3  | 3.6  | V     |
| $V_{DI5VT}$ | Voltage of 5V tolerance pin          | 2.7  |      | 5.5  | V     |



7. Package Outline Diagram

7.1 Outline Diagram

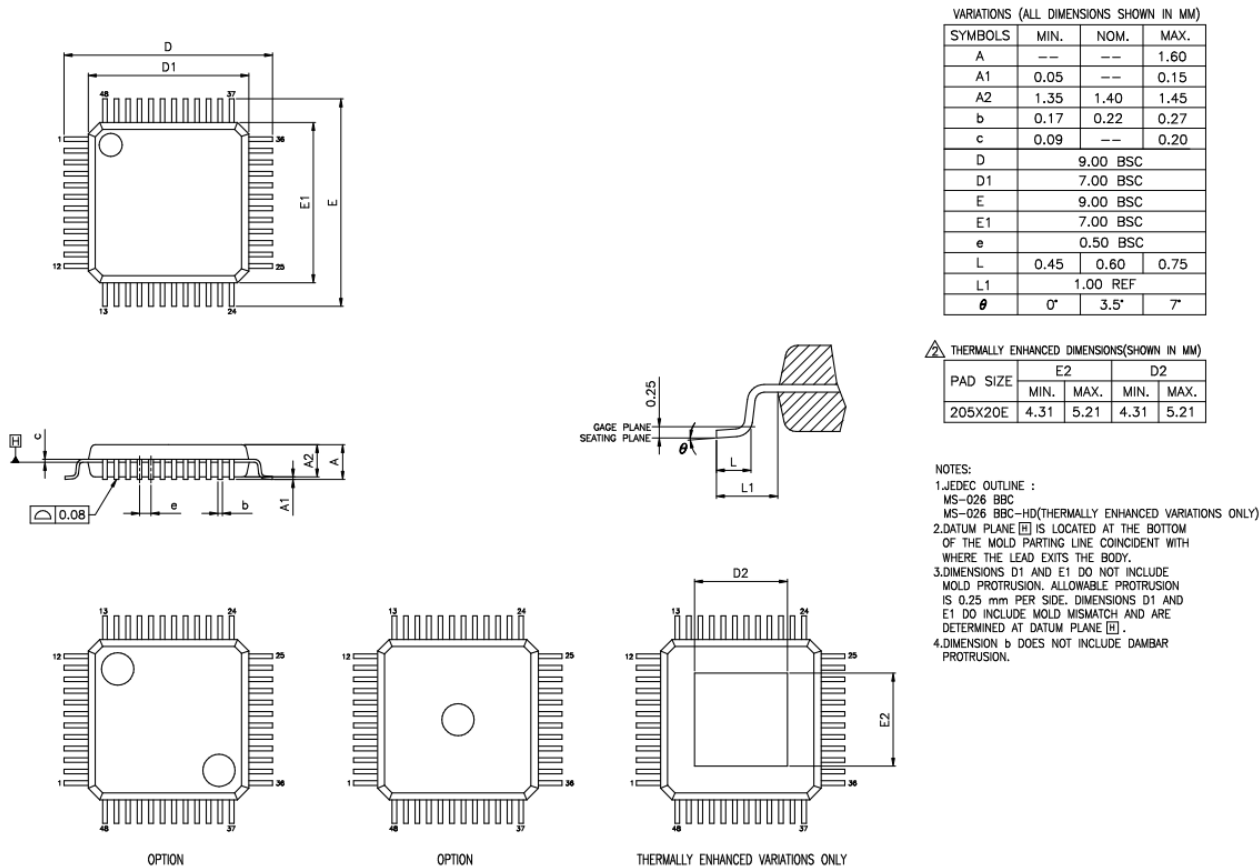


Figure 7-1: PL2732 Outline Diagram (LQFP48 7x7mm)

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