



# Highly Integrated Full Featured Hi-Speed USB 2.0 ULPI Transceiver

## PRODUCT FEATURES

Data Brief

- Integrated ESD protection circuits
  - Up to  $\pm 15\text{kV}$  IEC Air Discharge without external devices
- Over-Voltage Protection circuit (OVP) protects the VBUS pin from continuous DC voltages up to 30V
- Integrated USB Switch
  - No degradation of Hi-Speed electrical characteristics
  - Allows single USB port of connection by providing switching function for:
    - Battery charging
    - Stereo and mono/mic audio
    - USB Full-Speed/Low-Speed data
- flexPWR<sup>®</sup> Technology
  - Low current design ideal for battery powered applications
  - “Sleep” mode tri-states all ULPI pins and places the part in a low current state
  - 1.8V to 3.3V IO Voltage ( $\pm 10\%$ )
- Integrated battery to 3.3V regulator
  - 2.2 $\mu\text{F}$  bypass capacitor
  - 100mV dropout voltage
- “Wrapper-less” design for optimal timing performance and design ease
  - Low Latency Hi-Speed Receiver (43 Hi-Speed clocks Max) allows use of legacy UTMI Links with a ULPI bridge
- Selectable Reference Clock Frequency
  - Frequencies: 12, 13, 19.2, 24, 26, 27, 38.4, 52 or 60MHz - pin selectable
- External Reference Clock operation available
  - ULPI Input Clock Mode (60MHz sourced by Link)
  - 0 to 3.6V input drive tolerant
  - Able to accept “noisy” clock sources as reference to internal, low-jitter PLL
- Internal Oscillator operation available
  - This mode requires external Quartz Crystal or Ceramic Resonator
- Smart detection circuits allow identification of USB charger, headset, or data cable insertion

- Includes full support for the optional On-The-Go (OTG) protocol detailed in the On-The-Go Supplement Revision 2.0 specification
- Supports Headset Audio Mode
- Supports the OTG Host Negotiation Protocol (HNP) and Session Request Protocol (SRP)
- UART mode for non-USB serial data transfers
- Internal 5V cable short-circuit protection of ID, DP and DM lines to VBUS or ground
- Industrial Operating Temperature  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- 32 pin, QFN Lead-free RoHS Compliant Package (5 x 5 x 0.90 mm height)

## Applications

The USB3320 is targeted for any application where a Hi-Speed USB connection is desired and when board space, power, and interface pins must be minimized.

The USB3320 is well suited for:

- Networking
- Audio Video
- Medical
- Industrial Computers
- Printers
- Repeaters
- Communication

**ORDER NUMBER(S):****USB3320C-EZK for 32 pin, QFN Lead-Free RoHS Compliant Package****USB3320C-EZK-TR for 32 pin, QFN Lead-Free RoHS Compliant Package (tape and reel)**

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The USB3320 includes an integrated 3.3V Low Drop Out (LDO) regulator that may optionally be used to generate 3.3V from power applied at the **VBAT** pin. The voltage on the **VBAT** pin can range from 3.1 to 5.5V. The regulator dropout voltage is less than 100mV which allows the transceiver to continue USB signaling when the voltage on **VBAT** drops to 3.1V. The USB transceiver will continue to operate at lower voltages, although some parameters may be outside the limits of the USB specifications. If the user would like to provide a 3.3V supply to the USB3320, the **VBAT** and **VDD33** pins should be connected together.

The USB3320 also includes integrated pull-up resistors that can be used for detecting the attachment of a USB Charger. By sensing the attachment to a USB Charger, a product using the USB3320 can charge its battery at more than the 500mA allowed when charging from a USB Host. Please see SMSC Application Note AN 19.7 - Battery Charging Using SMSC USB Transceivers for more information on battery charging.

In USB UART mode, the USB3320 **DP** and **DM** pins are redefined to enable pass-through of asynchronous serial data. The USB3320 can only enter UART mode when the user programs the part into this mode.

In USB audio mode, a switch connects the **DP** pin to the **SPK\_R** pin, and another switch connects the **DM** pin to the **SPK\_L** pin. The USB3320 can be configured to enter USB audio mode. In addition, these switches are on when the **RESETB** pin of the USB3320 is asserted. The USB audio mode enables audio signalling from a single USB port of connection, and the switches may also be used to connect Full Speed USB from another transceiver onto the USB cable.

# Package Outline

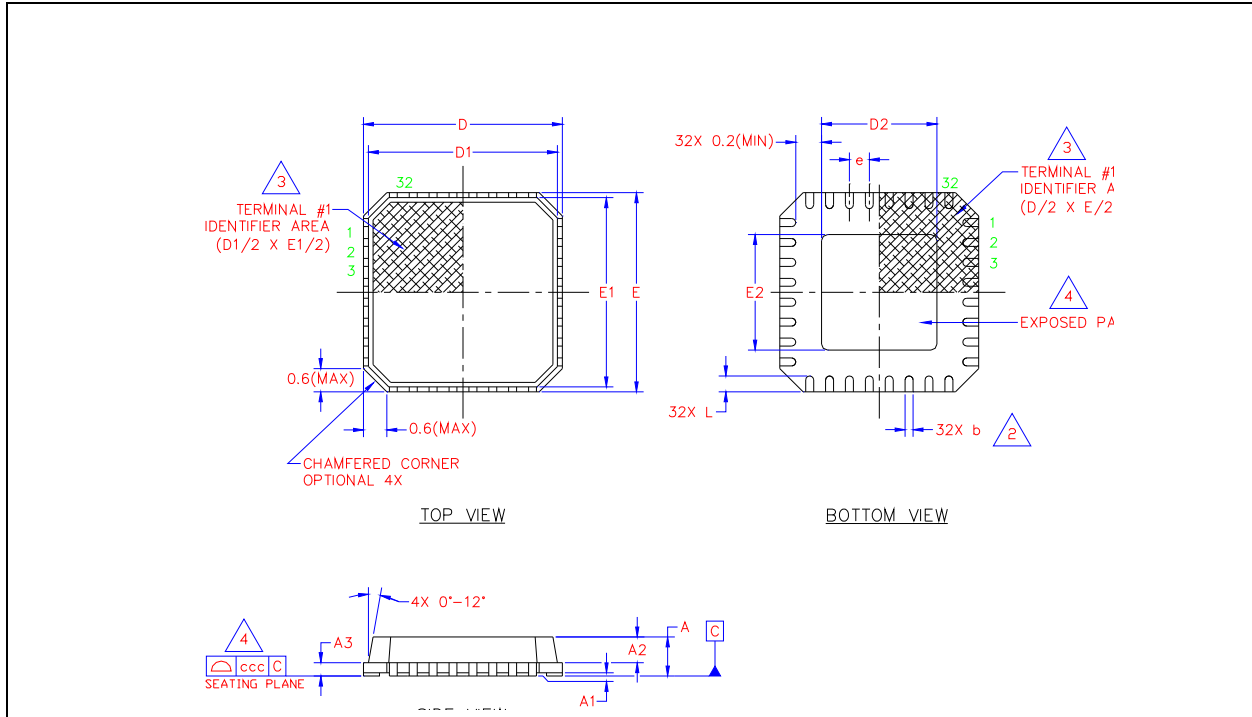


Figure 2 USB3320 32 Pin QFN Package Outline, 5 x 5 x 0.9 mm Body (Lead-Free)

Table 1 32 Terminal QFN Package Parameters

	MIN	NOMINAL	MAX	REMARKS
A	0.70	~	1.00	Overall Package Height
A1	0	0.02	0.05	Standoff
A2	~	~	0.90	Mold Thickness
A3	0.20 REF			Copper Lead-frame Substrate
D	4.85	5.0	5.15	X Overall Size
D1	4.55	~	4.95	X Mold Cap Size
D2	3.15	3.3	3.45	X exposed Pad Size
E	4.85	5.0	5.15	Y Overall Size
E1	4.55	~	4.95	Y Mold Cap Size
E2	3.15	3.3	3.45	Y exposed Pad Size
L	0.30	~	0.50	Terminal Length
e	0.50 BSC			Terminal Pitch
b	0.18	0.25	0.30	Terminal Width
ccc	~	~	0.08	Coplanarity

**Notes:**

1. Controlling Unit: millimeter.
2. Dimension b applies to plated terminals and is measured between 0.15mm and 0.30mm from the terminal tip. Tolerance on the true position of the leads is  $\pm 0.05$  mm at maximum material conditions (MMC).
3. Details of terminal #1 identifier are optional but must be located within the zone indicated.
4. Coplanarity zone applies to exposed pad and terminals.