USB83340

SMSC ® SUCCESS BY DESIGN

Automotive USB Transceiver with Variable Voltage ULPI and Selectable Reference Frequency

PRODUCT FEATURES

Highlights

- SMSC TrueAuto™ automotive quality process
- USB-IF Battery Charging 1.1 specification compliant
- Link Power Management (LPM) compliant
- Integrated ESD protection circuits
- Over-Voltage Protection circuit (OVP) protects the VBUS pin from continuous DC voltages up to 30 V
- 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® Technology
  — Extremely low current design ideal for battery powered applications
  — "Sleep" mode tri-states all ULPI pins and places the part in a low current state
  — 1.8 V to 3.3 V IO voltage
- Single power supply operation
  — Integrated 1.8 V regulator
  — Integrated battery to 3.3 V regulator
    – 100 mV dropout voltage
- PHYBoost
  — Programmable USB transceiver drive strength for recovering signal integrity
- VariSense™
  — Programmable USB receiver sensitivity
- "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 an ULPI bridge
- External reference clock operation available
  — ULPI Clock In Mode (60 MHz sourced by Link)
  — 0 to 3.6 V input drive tolerant
  — Able to accept "noisy" clock sources as reference to internal, low-jitter PLL
  — Support of multiple frequencies
  — Crystal / resonator support

- Smart detection circuits allow identification of USB charger, headset, or data cable insertion
- Full support for the optional On-The-Go (OTG) protocol detailed in the On-The-Go Supplement Revision 2.0 specification
  — Support of the OTG Host Negotiation Protocol (HNP) and Session Request Protocol (SRP)
- UART mode for non-USB serial data transfers
- Internal 5 V cable short-circuit protection of ID, DP and DM lines to VBUS or ground
- Environmental
  — Automotive grade A temp. support (-40 to +105 °C)
- Packaging
  — 32-pin, QFN lead-free, RoHS-compliant package

Target Applications

The USB83340 is the solution of choice for any application where an automotive Hi-Speed USB connection is desired and when board space, power, and interface pins must be minimized.

The USB83340 is well suited for:

- In-vehicle USB host implementation
- Infotainment test interface
- Automotive head unit
- Portable device charging via USB
- Rear seat infotainment access
- Internal connectivity bus
- Isolate high value SoCs from the outside world

PRODUCT PREVIEW

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Order Number(s):

USB83340AM for 32-pin, QFN lead-free, RoHS compliant package

USB83340AMR for 32-pin, QFN lead-free, RoHS compliant package, Tape and Reel

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TrueAuto™

TrueAuto is SMSC's automotive quality process. It has proven its capability to deliver leading edge quality and services to fulfill the needs of even the most demanding automotive customers. It is SMSC's proven total approach to true automotive-grade quality. SMSC's TrueAuto robustness begins with the design for reliability techniques within the silicon IC itself. Automotive-grade excellence and testability are designed into the IC. The IC is fully characterized over many operating parameters to prove the quality of the design under various conditions. It meets or exceeds automotive reliability standards (like AEC-Q100) and customer specific requirements.

In addition, extensive technologies and processes, such as enhanced monitors are used in fabrication of TrueAuto products in order to continuously drive improvements in accordance with SMSC's zero Defects per Million (DPM) goals.

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General Description

SMSC's USB83340 is a Hi-Speed USB 2.0 transceiver that provides a configurable physical layer (PHY) solution well suited for automotive applications.

The frequency of the reference clock is user selectable. The USB83340 includes an internal oscillator that may be used with either a quartz crystal or a ceramic resonator. Alternatively, the crystal input can be driven by an external clock oscillator. Another option is the use of a 60 MHz external clock when using the ULPI Clock In mode.

Several advanced features make the USB83340 the transceiver of choice by reducing both eBOM part count and printed circuit board (PCB) area. Outstanding ESD robustness eliminates the need for external ESD protection devices in typical applications. The internal Over-Voltage Protection circuit (OVP) protects the USB83340 from voltages up to 30 V on the **VBUS** pin. By using a reference clock from the Link, the USB83340 removes the cost of a dedicated crystal reference from the design, and the integrated USB switch enables unique product features with a single USB port of connection. The USB83340 includes integrated 3.3 V and 1.8 V regulators, making it possible to operate the device from a single power supply.

The USB83340 is optimized for use in applications where a low operating current and standby currents are essential. The USB83340 operates from a single supply and includes integrated regulators for its supplies. The USB83340 also supports the Link Power Management protocol (LPM) to further reduce USB operating currents.

The USB83340 also includes integrated battery charger detection circuitry. These circuits are used to detect the attachment of a USB charger. By sensing the attachment to a USB charger, a product using the USB83340 can draw more than 500 mA from the USB connector.

The USB83340 meets all of the electrical requirements for a Hi-Speed USB host, device, or an On-the-Go (OTG) transceiver. In addition to the supporting USB signaling, the USB83340 also provides USB UART mode and USB audio mode.

USB83340 uses the industry standard UTMI+ Low Pin Interface (ULPI) to connect the USB PHY to the Link. ULPI uses a method of in-band signaling and status byte transfers between the Link and PHY to facilitate a USB session with only twelve pins.

The USB83340 uses SMSC's "wrapper-less" technology to implement the ULPI interface. This "wrapper-less" technology allows the PHY to achieve a low latency transmit and receive time. SMSC's low latency transceiver allows an existing UTMI Link to be reused by adding a UTMI to ULPI bridge. By adding a bridge to the ASIC the existing and proven UTMI Link IP can be reused.

The USB83340 includes an integrated 3.3 V LDO regulator that may optionally be used to generate 3.3 V from power applied to the **VBAT** pin. The voltage on the **VBAT** pin can range from 4.5 to 5.5 V. The **VBAT** and **VDD33** pins should *never* be connected together.

In USB UART mode, the USB83340 **DP** and **DM** pins are redefined to enable pass-through of asynchronous serial data. The USB83340 will enter UART mode when programmed.

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 USB83340 can be configured to enter USB audio mode. In addition, these switches are on when the **RESETB** pin of the USB83340 is asserted. The USB audio mode enables audio signaling from a single USB port of connection, and the switches may also be used to connect Full-Speed USB from another transceiver to the USB connector.
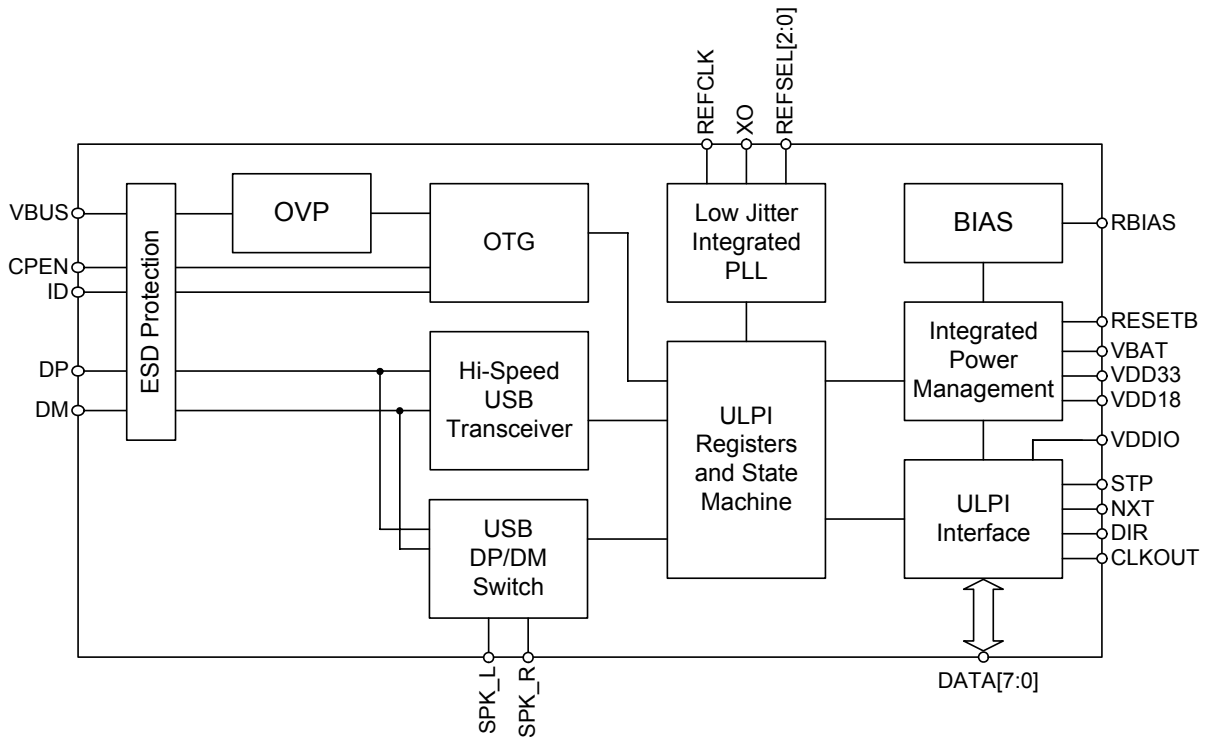
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Block Diagram

Figure 1 Internal Block Diagram

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Package Outline

The USB83340 is offered in a compact 32-pin lead-free QFN package.

TOP VIEW

BOTTOM VIEW

SIDE VIEW

3-D VIEWS
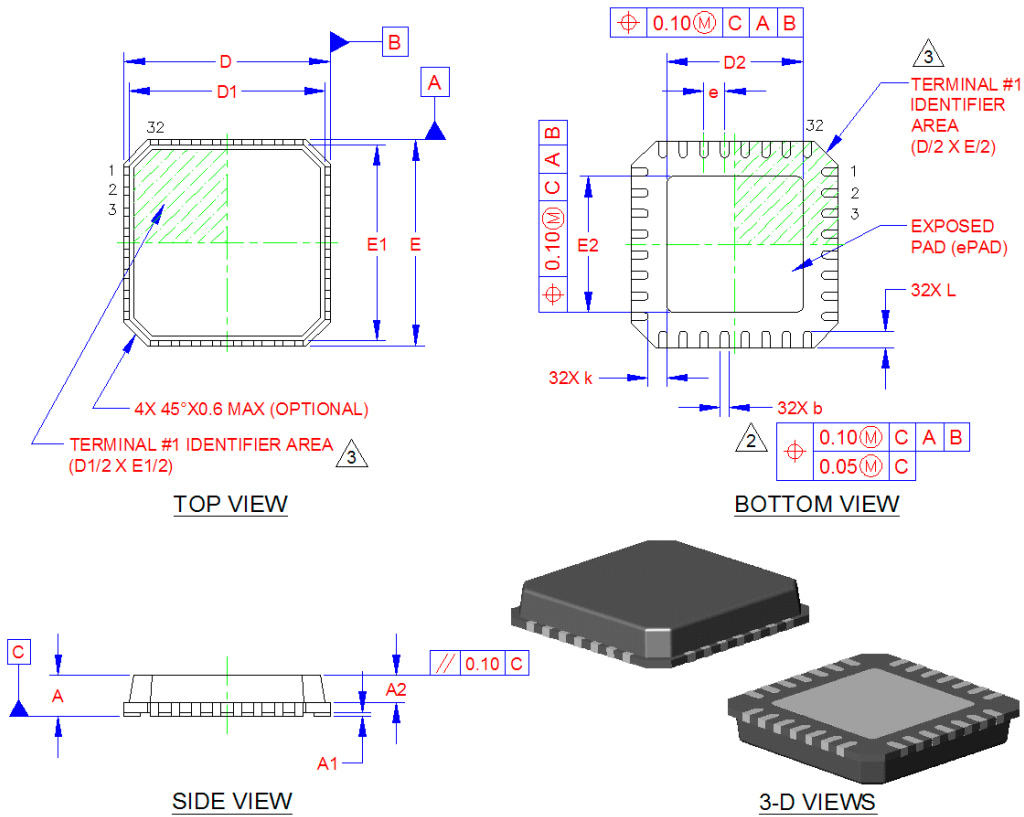
Table 1 32 Terminal QFN Package Parameters

	MIN	NOMINAL	MAX	REMARKS
A	0.80	0.85	0.90	Overall Package Height
A1	0.00	0.01	0.05	Standoff
A2	0.60	0.65	0.70	Mold Thickness
D/E	4.90	5.00	5.10	X/Y Overall Size
D1/E1	4.65	4.75	4.85	X/Y Mold Cap Size
D2/E2	3.20	3.3	3.40	X/Y Exposed Pad Size
L	0.30	0.40	0.50	Terminal Length
e		0.50 BSC		Terminal Pitch
b	0.18	0.23	0.30	Terminal Width
k	0.25	-	-	Terminal to Exposed Pad Clearance

Notes:

1. All dimensions are in millimeters unless otherwise noted.
2. Dimension "b" applies to plated terminals and is measured between 0.15 and 0.30 mm from the terminal tip.
3. The pin 1 identifier may vary, but is always located within the zone indicated.

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Further Information

For more information on SMSC automotive products, including integrated circuits, software, and MOST® development tools and modules, visit our web site: http://www.smsc-ais.com. Direct contact information is available at: http://www.smsc-ais.com/offices.

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