

# TPS65982 USB Type-C & USB PD Controller, Power Switch, and High Speed Multiplexer

## 1 Features

- USB Power Delivery (PD) Controller
  - Mode Configuration for Provider (Host), Consumer (Device), or Consumer-Provider
  - Bi-Phase Marked Encoding/Decoding (BMC)
  - Physical Layer (PHY) Protocol
  - Policy Manager
  - Configurable at Boot and Host-Controlled
- USB Type-C Specification 1.1 Compliance
  - Attach of USB Cable at Port
  - Cable Orientation and Role Detection
  - Assign CC and VCONN Pins
  - Advertise 1.5 A or 3 A for Type-C Power
- Port Power Switch
  - 5-V, 3-A Switch to VBUS for Type-C Power
  - 5- to 20-V, 3-A Bidirectional Switch to or from VBUS for USB PD Power
  - 5-V, 600-mA Switches for VCONN
  - Over-Current Limiter, Overvoltage Protector
  - Slew Rate Control
  - Hard Reset Support
- Port Data Multiplexer
  - USB 2.0 HS Data, UART Data, and Low Speed Endpoint
  - Auxiliary and Alternate Modes (DisplayPort and Vendor-Defined Modes)
- Power Management
  - Gate Control and Current Sense for External 5- to 20-V, 5-A NMOS FET Bidirectional Switch
  - Power Supply from 3.3-V, 5-V, or VBUS Source
  - 3.3-V LDO Output for Dead Battery Support
- BGA MicroStar Junior Package
  - 0.5-mm Pitch
  - Through-Hole Via Compatible for All Pins

## 2 Applications

- Notebook Computers
- Tablets and Ultrabooks
- Docking Systems
- DisplayPort and HDMI Dongles & Cables
- Charger Adapters
- USB PD Hosts, Devices, and Dual-Role Ports
- USB PD-Enabled Bus-Powered Devices

## 3 Description

The TPS65982 is a stand-alone USB Type-C & PD controller providing cable plug and orientation detection at the USB Type-C connector. Upon cable detection, the TPS65982 communicates on the CC wire using the USB Power Delivery (PD) protocol. When cable detection and USB PD negotiation are complete, the TPS65982 enables the appropriate power path and configures alternate mode settings for internal and (optional) external multiplexers.

The mixed-signal front end on the CC pins advertises 1.5 A or 3 A for Type-C power providers, detects a plug event and determines the USB Type-C cable orientation, and autonomously negotiates USB PD contracts by adhering to the specified bi-phase marked coding (BMC) and physical layer (PHY) protocol.

The port power switch can pass up to 3 A downstream at 5 V for legacy and Type-C USB power. An additional bidirectional switch path can provide USB PD power up to 3 A at a maximum of 20 V as either a provider (host), consumer (device), or provider-consumer.

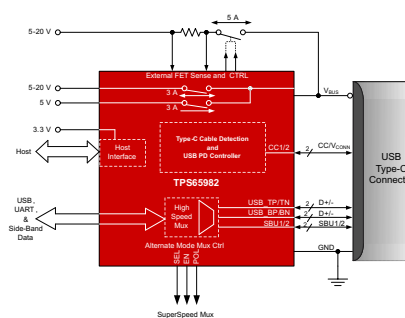
The TPS65982 can also be a Downstream-Facing Port (DFP), Upstream-Facing Port (UFP), or Dual-Role Port (DRP) for data. The port data multiplexer can pass data to or from the top or bottom D+/D- signal pair at the port for USB 2.0 HS or UART and has a USB 2.0 Low Speed Endpoint. Additionally, the Sideband Use (SBU) signal pair is used for auxiliary or alternate modes of communication (DisplayPort or vendor-defined modes, for example).

The power management circuitry can utilize a 3.3-V or 5-V power supply inside the system, and also use VBUS to start up and negotiate power for a dead battery or no battery condition.

### Device Information<sup>(1)</sup>

PART NUMBER	PACKAGE	BODY SIZE (NOM)
TPS65982	BGA MICROSTAR JUNIOR (96)	6.00 x 6.00 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.



## 4 Device and Documentation Support

### 4.1 Trademarks

All trademarks are the property of their respective owners.

### 4.2 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

### 4.3 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

## 5 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

**PRODUCT PREVIEW**

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
TPS65982AAZQZR	PREVIEW	BGA MICROSTAR JUNIOR	ZQZ	96	2500	Green (RoHS & no Sb/Br)	SNAGCU	Level-3-260C-168 HR	-40 to 85	TPS65982 AA	

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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