PTN5100D

USB Type-C power delivery PHY and protocol IC

Rev. 1 — 18 June 2015 Objective short data sheet

1. General description

PTN5100D is a single port USB Type-C Power Delivery (PD) PHY and Protocol IC that provides Type-C Configuration channel interface and USB PD Physical and Protocol layer functions to a System PD Port Policy Controller (Policy Engine and Device Policy Manager, Alternate mode controller). It complies with USB PD and Type-C specifications. PTN5100D is architected to deliver robust performance, compliant behavior, configurability and system implementation flexibility that are essential to tide over interoperability and compliance hurdles in the platform applications.

PTN5100D can support system realization of the following PD roles: (i) Consumer only (ii) Consumer/Provider. Further, it is register programmed to operate in Type-C specific Upstream Facing Port (UFP). It can work along with the PD policy controller to operate in other modes (DFP, DRP).

PTN5100D operates from platform power supply VDD, or it can also be powered from USB power VBUS directly. The host interface operates on VIO supply to facilitate interfacing to systems that use IO supply rail different from VDD supply rail.

It provides SPI/I2C interface for system host control/status update. The interface choice is pre- configured in NXP factory.

PTN5100D is available in a small footprint package option: HVQFN20 4 mm x 4 mm, 0.5 mm pitch.

2. Features and benefits

2.1 USB PD and Type-C Features

Complies with USB PD and USB Type-C specifications.

- Supports implementation of various system PD roles: Consumer, Consumer/Provider
- Supports Type-C role configurability
  - Type-C role (UFP, DFP)
  - Implements UFP role pull down behavior to handle dead battery condition on battery powered platforms
  - Implements 'Rd' indication on CC pin
- Cooperatively works under the control of Policy controller MCU for power delivery negotiation and contract(s), Alternate mode and VDM exchanges
  - Implements BMC (de)coding, 4B5B symbol (de)coding, CRC generation/checking, PD packet assembling/disassembling including Preamble, SOP, EOP, Good CRC response, Retries, Hard and Cable resets
  - PD PHY and Protocol layer interface control and status update handled via SPI/I2C interface

- *DRP and DFP roles can be supported

2.2 System protection features

- Back current protection on all pins when PTN5100D is unpowered
- CC1 and CC2 pins are 5.5 V tolerant
- VBUS pin and VBUS power path MOSFET enable pins are 28 V tolerant

2.3 General

- Delivers (active LOW enable) gate control signals for PMOS Power MOSFETs on VBUS source and sink power paths
- Provides dedicated IO pin (CC_ORIENT) for indicating Cable/plug orientation
- Delivers up to 30 mA (max) for powering Policy controller MCU
- Supports SPI slave interface (SPI modes 0 and 3 supported) up to 30 MHz
- Supports I2C slave interface standard mode (100 kHz), Fast mode (400 kHz) and Fast mode plus (1 MHz)
- I2C Device slave address programmable up to 3 values
- Supports 3.3 V or 1.8 V capable I^2C-bus or SPI interface
  - Supports register access - device configuration, control and status/interrupt interfacing through Slave I^2C-bus interface
- Power supplies - VDD (3.3 V ±10 %) or VBUS
  - Tolerant up to 28 V on VBUS and operational up to maximum of 25 V on VBUS
- Operating temperature −20 °C to 105 °C
- ESD 8 kV HBM, 1 kV CDM
- Package: HVQFN20 4 mm × 4 mm, 0.5 mm pitch.

3. Applications

- PC accessories/peripherals: Docking, Mobile Monitors, Multi-Function Monitors, Portable/External hard drives, Dongles and accessories, etc.

4. Ordering information

Table 1. Ordering information

Type number	Topside marking	Package		
		Name	Description	Version
PTN5100D	51D0	HVQFN20	plastic thermal enhanced very thin quad flat package; no leads; 20 terminals; body 4 × 4 × 0.85 mm[2]	SOT917-4
PTN5100DA	51DA	HVQFN20	plastic thermal enhanced very thin quad flat package; no leads; 20 terminals; body 4 × 4 × 0.85 mm[3]	SOT917-4

[1] Total height after printed-circuit board mounting <=1 mm (maximum)

[2] Supported system interface - SPI

[3] Supported system interface - I^2C

4.1 Ordering options

Table 2. Ordering options

Type number	Orderable part number	Package	Packing method	Minimum order quantity	Temperature
PTN5100DBS	PTN5100DBSHP	HVQFN20	Reel 13" Q2/T3 *standard mark SMD dry pack	6000	T_{amb} = −20 °C to +105 °C
PTN5100DBS	PTN5100DBSAZ	HVQFN20	Reel 7" Q2/T3 *standard mark SMD dry pack	500	T_{amb} = −20 °C to +105 °C
PTN5100DABS	PTN5100DABSHP	HVQFN20	Reel 13" Q2/T3 *standard mark SMD dry pack	6000	T_{amb} = −20 °C to +105 °C
PTN5100DABS	PTN5100DABSAZ	HVQFN20	Reel 7" Q2/T3 *standard mark SMD dry pack	500	T_{amb} = −20 °C to +105 °C

5. Block diagram

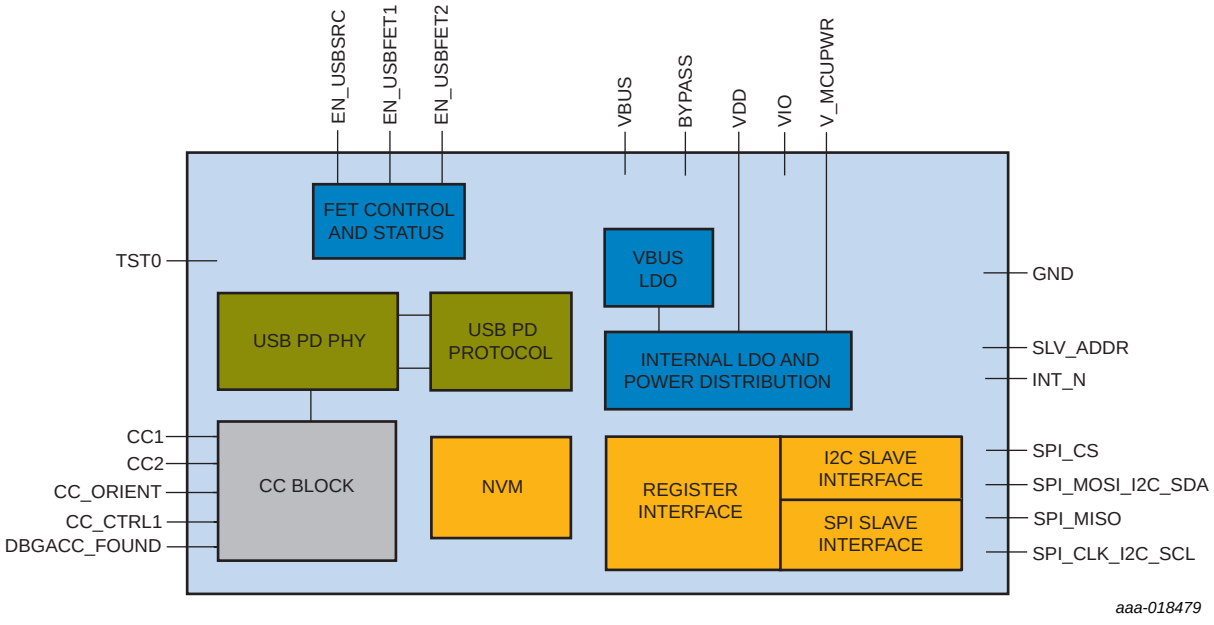

Fig 1. Block diagram

6. Revision history

Table 3. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PTN5100D_SDS v.1	20150618	Objective short data sheet	-	-

7. Legal information

7.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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9. Contents

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