UPD1002

Programmable USB Power Delivery Controller

Highlights

- Integrated USB Power Delivery (PD) PHY
- Support for Power Delivery Message Protocol
- Integrated Voltage and Current ADC Inputs
- Configuration Profile Selection
- On-chip Microcontroller
- SPI Interface
- Commercial, Industrial, and Automotive Grade Temperature Support
- Available in 32-SQFN Package

Target Applications

- Notebooks
- Ultrabooks
- Desktop PCs
- Docking Stations
- Monitors
- Printers
- Automotive

Key Benefits

- Integrated USB Power Delivery (PD) PHY
  - Integrated receive termination
  - Requires minimal external components
- Support for Power Delivery Message Protocol
  - Message Generation/Consumption
  - Retry Generation
  - Error Handling
  - State Behavior
- Cable Detect Logic
  - Cable attachment type
- CFG_SEL pins allow selection of multiple profiles
  - Provider
  - Provider/Consumer
  - Consumer
  - Consumer/Provider
- Integrated Voltage (VMON) and Current (IMON) ADC Inputs
- Dead Battery Support
- On-chip Microcontroller
  - Manages I/Os and other signals
  - Implements power delivery policy engine and device policy manager
- Configuration Programming via OTP, or Vendor Defined Messaging
- Supports Low Power Modes
- Serial Peripheral Interface (SPI) Bus
- Internal 3.3 V and 1.8 V Voltage Regulators
- Integrated Oscillator Reduces BOM Costs
- Package
  - 32-pin SQFN (5 x 5 mm)
- Environmental
  - Commercial temperature range (0°C to +70°C)
  - Industrial temperature range (-40°C to +85°C)
  - Automotive temperature range (-40°C to +105°C)

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1.0 INTRODUCTION

1.1 General Description

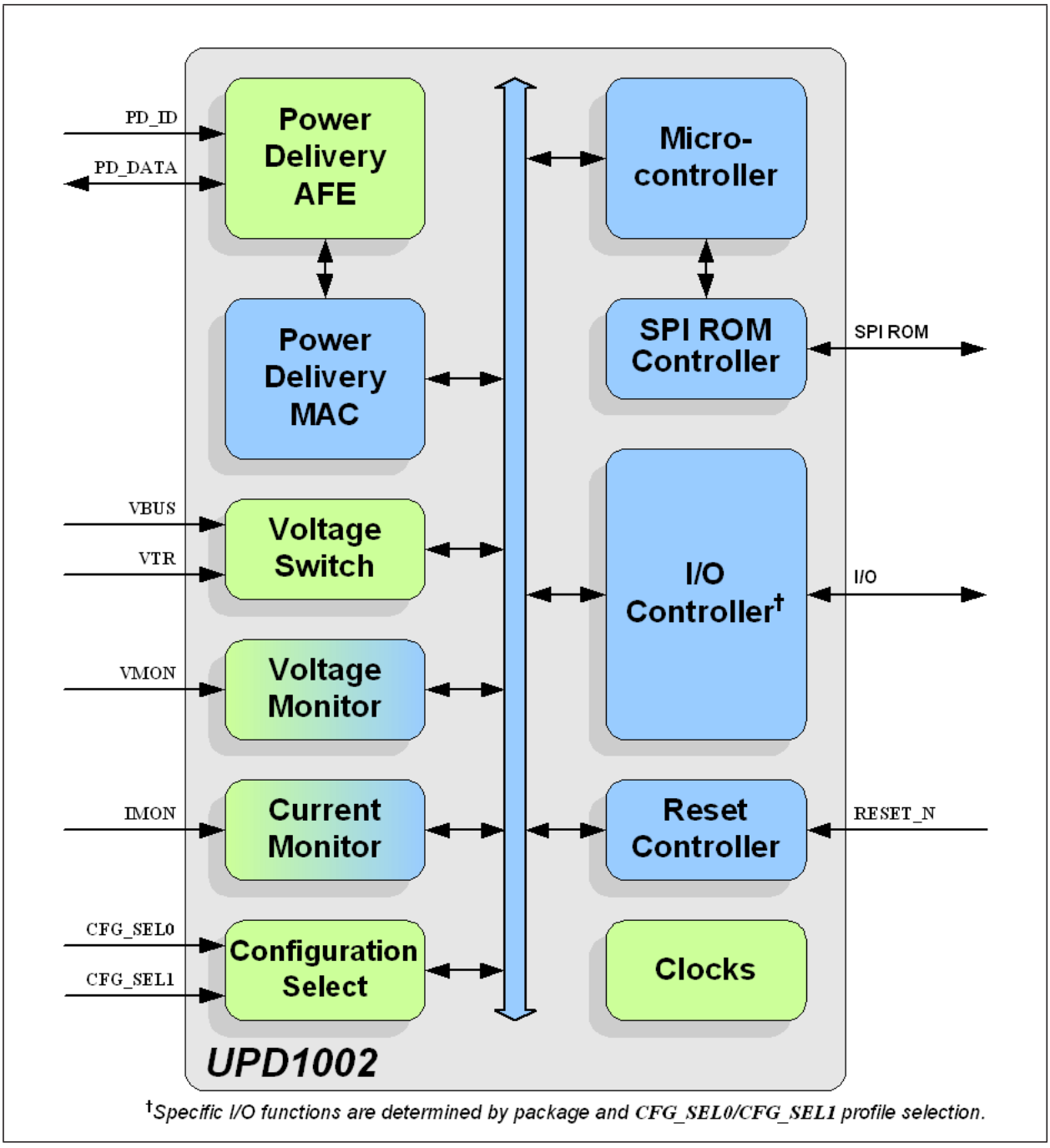
The UPD1002 is a programmable USB Power Delivery (PD) controller designed to adhere to the *USB Power Delivery Specification*. USB Power Delivery allows a host (or device) to provide or consume up to 5 Amps and/or up to 20 Volts of power from a USB PD capable partner device on the other end of the USB cable. USB PD capable standard and custom cables/connectors are supported, which in most cases are backward compatible with standard USB connections.

The UPD1002 provides a complete USB Power Delivery solution for notebooks/ultrabooks, desktop PCs, monitors, docking stations, and automotive applications. The functionality of the UPD1002 is selected via two configuration selection pins, **CFG_SEL0** and **CFG_SEL1**, which can be used to select unique PD and system configurations. Designing the UPD1002 into a system can be as simple as selecting a configuration, with no external EEPROM required. Advanced programmability options exist with an external EEPROM installed.

The integrated USB Power Delivery MAC and PHY support provider and consumer operation via the PD communication protocol, as specified in Revision 1.0 (Version 1.2) of the *USB Power Delivery Specification*. Monitoring of VBUS and battery charging is accomplished via the integrated voltage and current ADC inputs. The PHY supports cable ID detection/identification and loopback modes. The PHY includes a 24MHz FSK modulator/demodulator and provides integrated terminations. The USB PD MAC supports both USB PD insertion detection (cold socket) and dead battery cases. The device provides an integrated voltage switch which is used to detect whether the VBUS or VTR (battery) power supply is active, enabling selection of the appropriate power supply at any given time.

The on-chip microcontroller manages the IOs and implements the power delivery local policy engine and device manager. The SPI ROM controller is used by the microcontroller for optional external code execution from ROM. A One Time Programmable (OTP) ROM is integrated in the UPD1002. Integrated 3.3 V and 1.8 V regulators allow device operation from a single power supply. The UPD1002 is available in commercial (0°C to +70°C), industrial (-40°C to +85°C), and automotive (-40°C to +105°C) temperature ranges. An internal block diagram of the UPD1002 is shown in Figure 1-1.

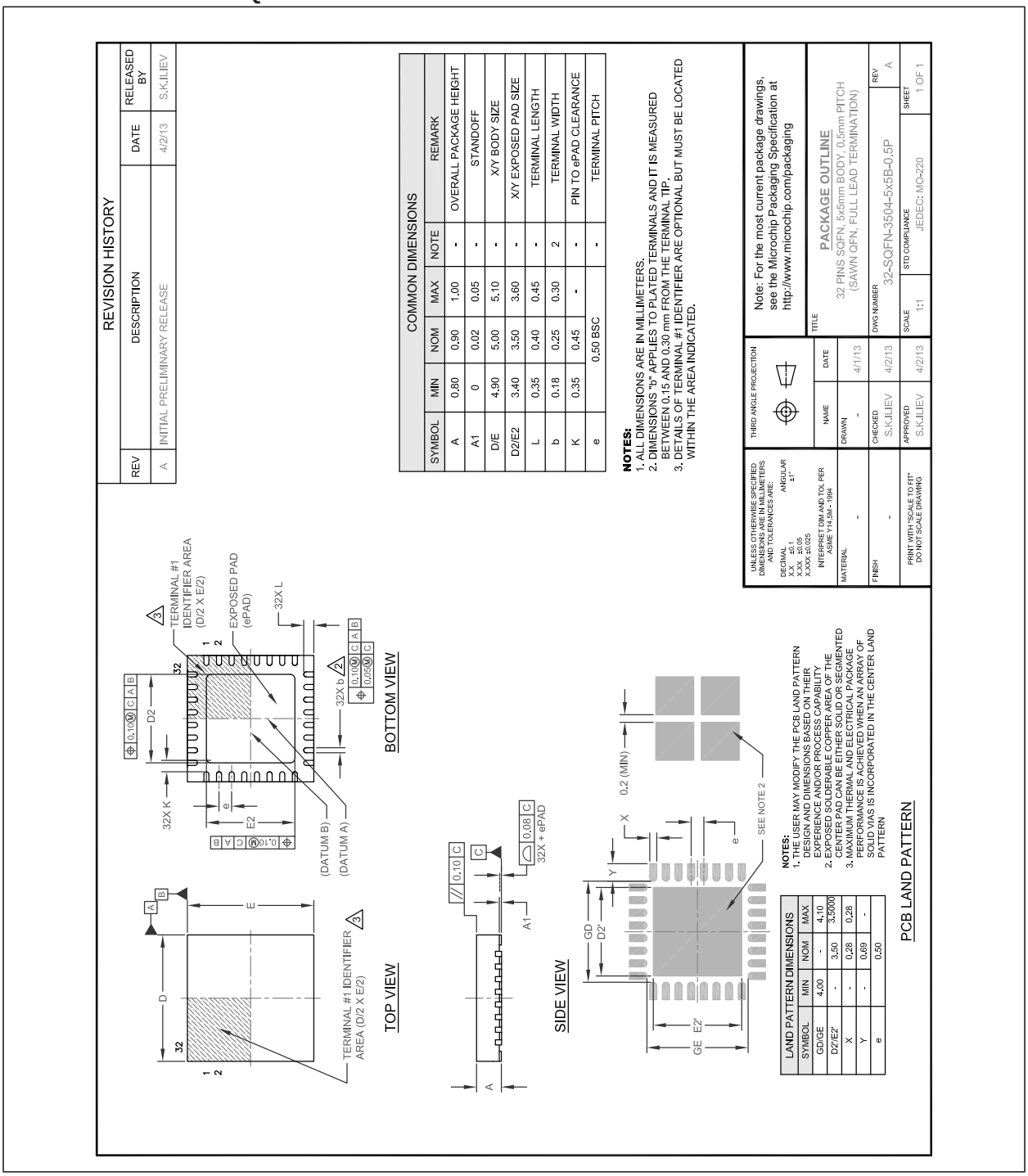
FIGURE 1-1: INTERNAL BLOCK DIAGRAM



2.0 PACKAGE OUTLINES

2.1 32-SQFN

FIGURE 2-1: 32-SQFN PACKAGE



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PART NO.	[X]	-	XX	/	XX
Device	Tape and Reel Option		Temperature Range		Package

Device:	UPD1002	
Tape and Reel Option:	Blank T	= Standard packaging (tray) = Tape and Reel (Note 1)
Temperature Range:	A AI AV	= 0°C to +70°C (Commercial) = -40°C to +85°C (Industrial) = -40°C to +105°C (Automotive)
Package:	MQ	= 32-pin SQFN

Examples:

a) UPD1002-A/MQ
Tray, Commercial temp., 32-pin SQFN

b) UPD1002T-AI/MQ
Tape & reel, Industrial temp., 32-pin SQFN

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

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