KB8001 Product Brief

A USB Type-C® 40 Gbit/s Multiprotocol Switch and Bidirectional Bit-Level Retimer

General description

The KB8001 is part of the Matterhorn™ product family of USB Type-C® 40 Gbit/s multiprotocol switch and bidirectional bit-level retimers.

All four lanes of the KB8001 are bidirectional. This makes it a versatile signal retimer in host (source) applications.

A Two-Wire Interface (TWI) connects to the Power Delivery Controller (PDC) for initialization and configuration operations. The Sideband Use (SBU) interface carries sideband information used by the USB Type-C Alt Mode.
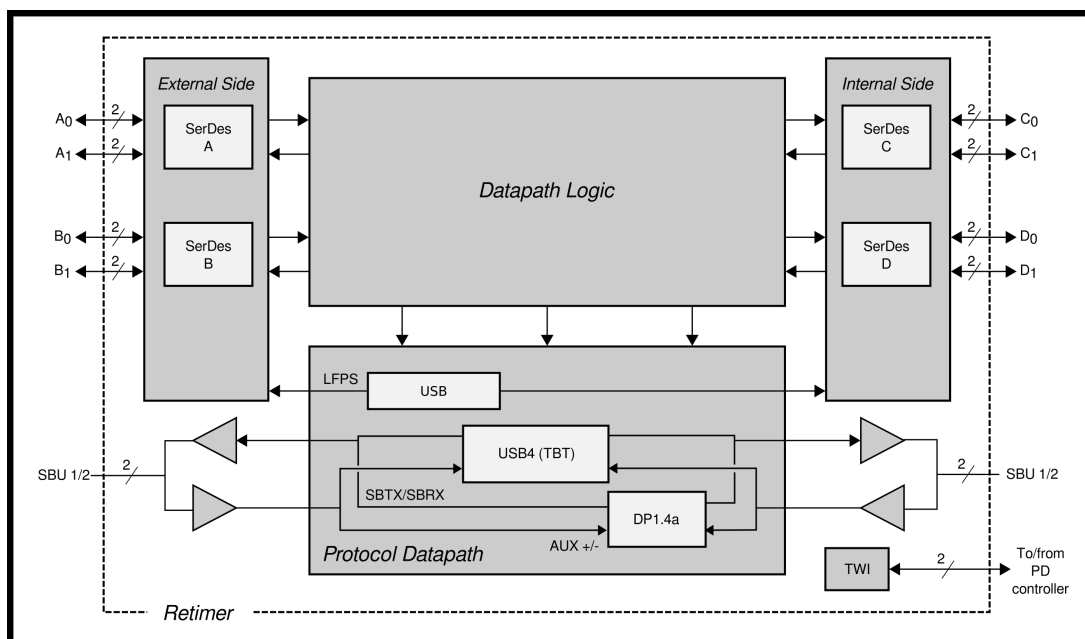

Fig. 1: Functional KB8001 block diagram

Features

- Multiprotocol reversible BLR and Separate Reference Clock with Independent SSC retimer supporting up to 40 Gbit/s:
  - USB Type-C with USB4 Gen 2/3 signaling for 10, 20, and 40 Gbit/s operation
  - USB Type-C with USB 3.2 Gen 1/2 signaling for 5 and 10 Gbit/s operation
  - USB Type-C with DP 1.4a x1, x2, x4 at HBR3, HBR2, HBR and RBR rates
  - USB Type-C Alternate Mode with USB 3.2 (Gen1x1 and Gen2x1) and DP 1.4a x1, x2 at HBR3, HBR2, HBR and RBR rates

- USB Type-C Thunderbolt 3 (10.3125 Gbit/s and 20.625 Gbit/s) support single lane, dual lane unbonded, and dual-lane bonded operations
- Integrated MUX to support combined USB 3.2, DP, and Thunderbolt (USB Type-C) applications
- Crossbar switch supporting a flexible datapath
- Support for six cascaded retimers
- TX de-emphasis for up to 8 dB at 10.315 GHz
- Autonomous RX Equalization with DFE tap weight adjustment for equalization up to 23 dB at 10.315 GHz

- On-chip diagnostics including EyeScope and Bit-Error Rate monitors
- PRBS7, PRBS15, PRBS31 pattern generation and verification
- External configuration through TWI or SBU interfaces
- Integrated DC blocking capacitors on the SBU lines
- Temperature range: 0°C to 65°C
- 4 mm x 4 mm 81p Flip-Chip Chip Scale Package (FCCSP)

Benefits

- **Low system cost:** No requirement for serial memory or other external components which enables reduced BOM cost.
- **Autonomous RX Equalization:** Superior channel performance >2X versus competitors by dynamically correcting for extreme channel characteristics with no tuning. This enables more flexible PCB routing (longer traces) and cost-effective PCB materials.
- **Flexible orientation:** SerDes architecture and crossbar logic supports source applications. No need to worry about orientation or swapping pin functionality to match existing designs.

- **Lower Active Power:** Low active power <50% in USB4 and DP-ALT modes versus competitors. Save power when connected to USB4 / DP devices.
- **Compliance Ready:** Fully compliant to standards for USB4, USB 3.2 and DisplayPort 1.4a. Enables a USB4 host solution with all the additional USB 3.2 and DisplayPort options required for TBT4 certification.
- **Extensive Interop:** Over 500 host / device/ cable combination tested in Kandou labs. Fully tested at USB-IF PIL, no issues against golden devices. Low risk and proven solution.

Applications

- Mobile PCs, desktop PCs and tablets
- Docking stations and adapters
- External hard disk and solid-state drives

Device and ordering information

Two delivery forms are available for the KB8001. They differ in delivery quantity and ordering codes:

- Tape and reel
- Tray (dry-pack)

Table 1: Ordering codes

Ordering code	Package	Delivery form	Delivery quantity
KB8001-AR	81p, 4x4 mm, FCCSP	Tape and reel	5500
KB8001-AD	81p, 4x4 mm, FCCSP	Tray (dry-pack)	490

For ordering information, contact sales@kandou.com.