



Matterhorn - KB8001

USB Type-C™ 40 Gb/s Multiprotocol Switch and Bidirectional Bit-Level Retimer

Description

The KB8001 is a USB Type-C™ 40 Gb/s Multiprotocol Switch and Bidirectional Bit-Level Retimer that supports transmitter Feed-Forward Equalization and adaptive receiver equalization. This compensates for frequency-dependent cable and board trace loss up to 30 dB that can result in Inter-Symbol Interference. It requires adaptive RX equalization when the higher speed modes such as USB Super Speed, DP 1.4a, Thunderbolt 3, or other alternate modes need to travel across a PCB or cable.

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

For host or device applications, the KB8001 enables the system to pass both transceiver compliance and receiver jitter tolerance tests for USB4 Gen 2,3, USB3.2 Gen 1,2 (Gen1x1, Gen1x2, Gen2x1, and Gen2x2), DP version 1.4a [(RBR 1.62 Gb/s, HBR3 8.1 Gb/s, HBR2 5.4 Gb/s, HBR 2.7 Gb/s and RBR 1.62 GBd) x1, x2, x4], Thunderbolt 2, 3 [(10.3125 Gb/s, 20.625 Gb/s) single lane operation, dual lane unbonded and dual-lane bonded operation].

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

Applications

- Mobile PC, desktop PC and tablets
- Monitors, docking stations, and adapters
- External hard disk and solid-state drives
- Gaming consoles
- Active cables

Benefits

- First to market with re-timer solution that supports multiple protocols
- Low BOM cost with integrated passives and no requirement for external EEPROM
- Low power for host computing and active cables applications
- Easy to debug with on-chip diagnostics including EyeScope, SNR and BER monitors
- Flexible orientation enabling both source and sink applications
- Longer cables beyond two metres with support for RX equalization and TX de-emphasis
- Compact footprint for small form factor designs

Device Information

Part number: KB8001

Body size (nom): 4.00 mm x 4.00 mm

Features

- Multiprotocol USB-C 40 Gb/s multiprotocol switch and bidirectional bit-level retimer supporting:
 - USB4 Gen2, Gen3 signalling for 20 and 40 Gb/s operation
 - USB3.2 Super Speed+ signalling for 5 and 10 Gb/s operation
 - DP1.4a (8.1 / 5.4 / 2.7 / 1.62 Gb/s) and x1, x2, x4
 - Alternate Mode with USB3.2 and DP 1.4 (HBR3, HBR2, HBR and RBR) x1, x2
 - Thunderbolt (20.625 and 10.3125 Gb/s) support single / dual-lane operation
- Low power for host computing and active cables applications
- Crossbar switch supporting a flexible datapath
- Support for six cascaded retimers
- TX de-emphasis up to 8 dB at 10.315 GHz
- RX advanced equalization up to 30 dB at 10.315 GHz
- Dynamic per-wire de-skew
- On-chip diagnostics including EyeScope, SNR and BER monitors
- PRBS pattern generators and loopbacks modes
- External configuration through TWI or SBU interfaces
- Integrated SBU DC-blocking capacitors and pullup / down resistors
- Temperature range: 0°C to 65°C
- Compact footprint: 81p, 4 × 4 mm, FCCSP package

Simplified Schematic

