A Product Line of
Diodes Incorporated

PI2DPT1021Q

10Gbps USB Type-C DP1.4 Alt Bi-directional ReTimer with Adaptive Equalizer

Description

The PI2DPT1021Q is a bit level ReTimer with receiver adaptive CTLE and transmitter 3-tap equalization which can compensate channel loss up to -23dB for 5GHz signal transmission. It supports DP1.4 and USB3.2 standards for USB Type-C® DP ALT mode operation. The operation configurations are programmable via I2C interface to select 4-lane DP, 2-lane DP/1 lane USB3.2 Gen1x1/ Gen2x1, 1/2 lane USB3.2 Gen1x1/Gen2x1 or USB3.2 Gen2x2.

To achieve good power saving management, this device uses the common 1.8V Vdd power supply. It complies with USB link power management states for active mode (U0) and power saving mode (U1, U2, U3). USB Rx detection monitors the plug condition of the TX terminals continuously. The LFPS signal detector detects the LBPM (LFPS Based PWM Message) of USB mode.

Under DisplayPort operation, the AUX Listener will monitor the AUX communication for data rate, lane count, swing & pre-emphasis setting and power saving D3 mode setting. The SINK side HPD connection signal is set via I2C register by the system PD controller. The integrated AUX/SBU switch maps the DisplayPort AUX+/- pins and to the Type-C SBU1/SBU2 pins automatically.

The bi-directional design provides the flexibility if DFP and UFP signal flow is swapped which is a convenient setting on the fly for active cable application or it can give more layout option for signal flow selection.

With the merit of the bit level ReTimer design, PI2DPT1021Q has very low latency from signal input to output (< 1ns) that serves good interoperability among various USB and DP devices.

Application(s)

- Automotive Infotainment & Clusters
- Automotive Rear Seat Entertainment
- Automotive Smart Cockpits
- Automotive Active Cables

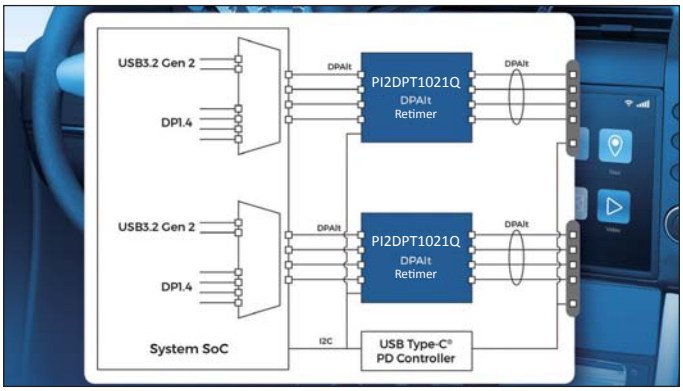

Figure 1-1 DP Alt Type-C Connectors Inside PC

Features

- Supports 10Gbps USB Type-C DP1.4 Alt ReTimer
- Configurable for USB 3.2 Gen 2 x1 or x2, USB 3.2 Gen 2 x1/2-Lane DP1.4 (Source Side Only), 4-Lane DP1.4 (Source Side Only) Operations
- Supports Jitter Cleaning and 4-Lane Bi-Directional
- -23dB at 5GHz Channel Loss Compensation
- Low Latency < 1ns.
- Adaptive Continuous Time Linear Equalizer (CTLE)
- Default USB Type-C Safe State (Hi-Z) After Power-On
- Rx Termination Detection for Power Saving Control
- Integrated AUX Channel Crossbar Switch for Side Band Signal
- Integrated AUX Listener for Power Management
- Type-C Connector Flip and Non-Flip Plug Support
- I2C Slave Support with Speed Up to 1MHz
- Single Power Supply: 1.8V +/-5%
- Supports AEC-Q100 Grade 2, –40°C to 105°C
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. “Green” Device (Note 3)
- The PI2DPT1021Q is suitable for automotive applications requiring specific change control; this part is AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.
  https://www.diodes.com/quality/product-definitions/

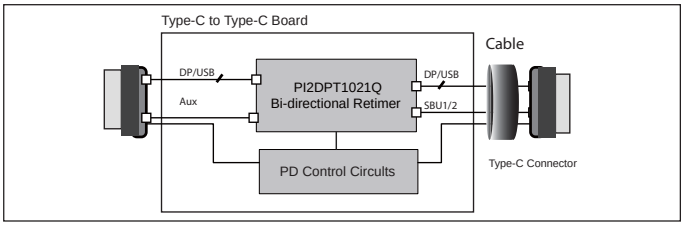

Figure 1-2 DP Alt Bi-directional Active Cable

Ordering Information

Orderable Part Number	Package Code	Package Description
PI2DPT1021Q2XEAEX	XEA	32-pin, X1-QFN2845-32 (2.85x4.5mm), 0.4mm pitch, 0.45mm height

Notes:
- Q2 = Automotive Grade Level
- E = Pb-free and Green
- X suffix = Tape/Reel

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated’s definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. Automotive products are AEC-Q100 qualified and are PPAP capable. Refer to https://www.diodes.com/quality/.