Enabling High-speed Serial Connectivity

For all your Timing, Switching, Connectivity & Signal Integrity Needs

PC Segment
January 2016
Complete Product Offerings to meet the PC/NB I/O needs

**Primary Product Categories**

**Signal Integrity**
- ReDrivers/Repeaters
- All major protocols (up to 12Gb)

**Timing**
- Clocks/Buffers
- Real Time Clock
- Xtal Oscillators XO, VCXO, TCXO
- Crystals

**Switching**
- Analog Switch
- Digital Switch
- Power Switch
- Interface Logic
- Power Mgmt

**Connectivity**
- PCIe Bridges
- PCIe Switch
- Video Decoder
- UART

**10GbE**
**PCI Express**
**USB SuperSpeed**
**FibreChannel**
Pericom Solutions for AIO PC

All-in-one PC
ReDriver and Repeater Products
SATA/SAS ReDriver Portfolio

SATA3 - 6.0Gbps

- PI3EQX6741ST
  - Low Power
  - 3.3V, 1Port, 20QFN

SAS2/SATA3/RXAUI - 6.5Gbps

- PI2EQX6812
  - 2 Port, 42QFN, 1.2V
  - Pin Strap/I2C control

- PI2EQX6814
  - 4-port, 100-LBGA, 1.2V
  - Pin Strap/I2C control

SAS3 - 12.5Gbps

- PI3EQX1204-B
  - Limiting Redriver
  - 4 Channel
  - 42 QFN 3.3V

- PI3EQX1204-C
  - Linear Redriver
  - 4 Channel
  - 42 QFN 3.3V
PI3EQX6741ST

1 Port, 3.3V 6.0Gb/s SATA Redriver with Auto-Slumber and HDD unplug detect power saving modes

Features
- 6.0Gbps operation – Auto Data rate detection
- 1-port SATA / SAS
  - 2-differential channels
- Pin adjustable receiver equalization
  - 3, 6, 9 dB at 6G and 2.5, 5, 7.5dB at 3G
- Pin adjustable transmit pre-emphasis
  - 0 to 3dB at 3G and 0 to 1.5dB at 6G
- HDD Cable plug/unplug detection w/outputs
- Automatic rate detection & optimization
- Full OOB support
- Low power –
  - Power down: 0.07mW typical
  - HDD unplugged: 3.6mW
  - Automatic slumber: 36mW typical
  - Active:254 mW typical
- Pin-compatible to MAX4951, TI601
PCle3 8Gb ReDriver - Application

REDRIVER APPLICATION FEATURES:

- Excellent cost effective choice for **closed channel** applications
  - Closed Channel = fixed length PCB trace or PCIe cable
- Can provide up to 32dB (42”) compensation for FR4 PCB trace
- Works with all PCle3 chipsets / link training (Intel and PCISIG validated)
- Pericom offers flow thru pinout for lowest crosstalk.

Example: Typical Server PCB – the channel is too long

- Graphics Card
- Ethernet Controller
- SATA/SAS Controller
PI2/PI3EQX862 Combo PCIe3 / SATA3 ReDrivers

Key Features

- PCIe 3.0 and SATA 3.0 compatible
- Two 8.0Gbps differential signal pairs
- Adjustable Receiver EQ and Tx DE
- 100Ω Differential CML I/O’s
- Single Supply Voltage: PI2EQX862 = 1.2V, PI3EQX862 = 3.3V
- Packaging: 18-Pin TQFN 2x2mm
- PCIe3 and SATA3 signal compliant
- Low Power – Pd Active - 85mA (data transfer – SATA mode)
- Low Power – Pd Inactive - 14mA (no data transfer, active – SATA mode)
- Low Power – Pd Pwrdown - 0.10mA (100μA) (connector empty)
- Auto select when mode signals tied to M.2, mSATA or SATAe connector
- Excellent for internal NB/TAB HDD / SSD ‘M’ connector, docking
Applications:
# Pericom HDMI1.4 Redriver Snapshot

<table>
<thead>
<tr>
<th></th>
<th>PI3HDX511F</th>
<th>PI3HDX511D</th>
<th>PI3VDP1431A</th>
<th>PI3HDX511E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standby Current</strong></td>
<td>Ultra-low 2uA stand-by current</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Data rate</strong></td>
<td>HDMI1.4, 3.4Gb/s Data Rate, 340MHz Clock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Package (body size)</strong></td>
<td>ZL40(3x6)</td>
<td>ZL30(2.5x4.5)</td>
<td>ZL32(3x6)</td>
<td></td>
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<tr>
<td><strong>Input Port</strong></td>
<td>TMDS Redriver</td>
<td>DP++ Level Shift</td>
<td>DP++ Level Shift</td>
<td>TMDS Redriver</td>
</tr>
<tr>
<td></td>
<td>DP++ Level Shift</td>
<td></td>
<td>DP++ Level Shift</td>
<td></td>
</tr>
<tr>
<td><strong>Pin-map</strong></td>
<td>Sink &amp; Source</td>
<td>Source s0de</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>1.5/3.3VDD</td>
<td>3.3V Single Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EQ setting</strong></td>
<td>Max 15dB. 6 steps</td>
<td>Max 7.5dB. 3 steps</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Summary</strong></td>
<td>Full options</td>
<td>Smallest package</td>
<td>DP++ Level Shifter</td>
<td>HDMI511 compatible</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td>Monitor, Active Cable</td>
<td>Tablet/Mobile Phone</td>
<td>PC</td>
<td>&lt;--</td>
</tr>
</tbody>
</table>
## Pericom DP1.2 and 1.3 ReDriver Snapshot

<table>
<thead>
<tr>
<th></th>
<th>PI3EQXDP1201</th>
<th>PI3DPX1202</th>
<th>PI3DPX1203</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DP Version</strong></td>
<td>DP1.2, 5.4Gb/s</td>
<td>DP1.2, 5.4Gb/s</td>
<td>DP1.3 8Gb/s Linear Redriver</td>
</tr>
<tr>
<td><strong>Link Training</strong></td>
<td>Not Support</td>
<td>&lt;-- Support (No Aux need)</td>
<td></td>
</tr>
<tr>
<td><strong>Aux Listener</strong></td>
<td>Yes</td>
<td>&lt;--</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Power Supply</strong></td>
<td>3.3V, 1.5/3.3V</td>
<td>3.3V, 1.2/3.3V</td>
<td>3.3V</td>
</tr>
<tr>
<td><strong>Power mA(mW)</strong></td>
<td>360mA (600mW)</td>
<td>300mA (400mW)</td>
<td>230mA (800mW)</td>
</tr>
<tr>
<td><strong>Standby mA</strong></td>
<td>1mA</td>
<td>50uA (est)</td>
<td>1mA</td>
</tr>
<tr>
<td><strong>Package</strong></td>
<td>48-QFN(7x7) 40-QFN(5x5)</td>
<td>48-QFN(7x7) 40-QFN(5x5)</td>
<td>42-pin QFN (9x3.5)</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td>Pin-to-Pin package</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pericom Type C Solution in PC
USB Type-C™ Host

- **Cross Bar Switch** PI3USB30532
- **DisplayPort ReDriver** PI3DPX1203
- **CC Sense & Control** PI5USB30216A
- **Charge Controller** PI5USB2546A
- **USB 3.0/3.1 ReDriver**:
  - PI2EQX502T (1.2V)
  - PI3EQX7741AI (3.3V)
  - PI1EQX512 (1V)

**Key Components**:
- Tx1, Rx1 (D0-D1)
- Tx2, Rx2 (D2-D3)
- SBU1, SBU2
- CC1
- CC2
- D+, D- (Top & Bottom)
- Vbus
- USB 3.0/3.1 ReDriver
- USB Sleep & Charge

**Notebook**

USB Type-C™ and USB-C™ are trademarks of USB Implementers Forum.
# USB Type-C™ Products at a Glance

<table>
<thead>
<tr>
<th>Product Family</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>USB 3.1 Gen1/2 Mux/Crossbar</strong></td>
<td>PI3USB30532</td>
<td>3.3V USB 3.1 Gen 1/DP1.2 3:2 Matrix switch</td>
</tr>
<tr>
<td></td>
<td>PI3PCIE3242</td>
<td>4-Channel 2x2 Crossbar Type C Connector USB 3.0, DP 1.2 Switch</td>
</tr>
<tr>
<td></td>
<td>PI3DBS3224</td>
<td>4-Channel 2x4 Crossbar Type C Connector AUX Bandwidth Switch</td>
</tr>
<tr>
<td></td>
<td>PI3DBS12212A</td>
<td>12 Gbps, 1-lane (2-Channel), Differential 2:1 Mux/DeMux, 3.3V</td>
</tr>
<tr>
<td></td>
<td>PI3DBS12412A</td>
<td>12Gbps, 2-Lane (4-Channel), Differential 2:1 Mux/DeMux, 3.3V</td>
</tr>
<tr>
<td></td>
<td>PI3USB3102</td>
<td>USB 3.0 and USB 2.0 Combo Switch</td>
</tr>
<tr>
<td></td>
<td>PI3USB302-A</td>
<td>3.3V USB 3.0 2:1 MUX/DeMux Switch</td>
</tr>
<tr>
<td><strong>USB 3.1 Gen1 Re-Driver</strong></td>
<td>PI1EQX512A</td>
<td>1.0V, 5.0Gbps, 1-port, USB 3.0 Re-driver</td>
</tr>
<tr>
<td></td>
<td>PI2EQX502T</td>
<td>1.2V, 5.0Gbps 1-port USB 3.0 Re-driver with Equalization &amp; Emphasis</td>
</tr>
<tr>
<td></td>
<td>PI2EQX502E</td>
<td>1.8V, 5.0Gbps 1-port USB 3.0 Re-driver with Equalization &amp; Emphasis</td>
</tr>
<tr>
<td><strong>DP 1.3 Re-Driver</strong></td>
<td>PI3DPX1203</td>
<td>DisplayPort 1.3 4-lane Linear Redriver, Ultra-low add-in jitter, link training transparent</td>
</tr>
<tr>
<td><strong>USB Charging Controllers</strong></td>
<td>PI3USB9281A</td>
<td>USB Port Detection/Protection IC (device side)</td>
</tr>
<tr>
<td></td>
<td>PI5USB2546A</td>
<td>USB Port Charger/Controller IC (host side)</td>
</tr>
<tr>
<td><strong>CC Sense &amp; Control</strong></td>
<td>PI5USB30216A/B/C/D</td>
<td>USB plug orientation (CC pins) detector</td>
</tr>
<tr>
<td></td>
<td>PI5USB30217</td>
<td>USB Plug Orientation (CC pins) Detector with Vconn</td>
</tr>
<tr>
<td><strong>USB3.1 Gen 1/2 Mux/CC Sense &amp; Control</strong></td>
<td>PI5USB30213, P15USB31213</td>
<td>USB 3.1 Gen 1 &amp; Gen 2 SuperSpeed Mux/Demux Switch w/I2C Control and VCONN for USB Type-C™ Connector</td>
</tr>
</tbody>
</table>
PI3USB30532 USB3.0/DP1.2/AUX Crossbar Switch for Type-C

Features

- Supports operation of DP over USB Type-C Connector
- Supports USB 3.0 and DP 1.2 data rates
- Multiplexes one of the following to Type-C Connector
  - USB SS signals only
  - USB SS signals + 2 lanes of DP signals
  - 4 lanes of DP signals only
- With DP operating, AUX+/- are muxed to SBU pins
- Less than 1.5dB insertion loss at 5.4Gb/s
- I2C or pin-strap control modes
- 3.0-4.3V Power Supply
- 40L TQFN (3 x 6mm) 0.4mm lead pitch
PI3USB30213 USB 3.0 Type-C Switch

Features

- Dual Differential Channel, 2:1 USB 3.9 MUX//Demux
- Switches USB controller and Type-C connector
- Supports Host mode/Device Mode/Dual-role mode
- Auto-configures port orientation through CC detection
- Supports VCONN to power active cables and other accessories
- Supports both pin control and I2C interface for control and communication
- Integrated power switches high-precision resistors and current sources for CC pins
- Provides support for default current, 1.5A, 3A modes with I2C Control
- Power saving mode
- Output indicator for plug-in detection
- Wide Power Supply Range: 2.7V -5.5V
- Industrial Temp Range: -40C to +85C
- Pb-Free & Green Packaging
- 24 Contact STQFN (2mmx4mm)
# USB Type-C™ Switch Selection Guide

<table>
<thead>
<tr>
<th>Features</th>
<th>PI5USB30213 PI5USB31213</th>
<th>PI5USB30216 C/D</th>
<th>PI5USB30217</th>
<th>PI3USB30532</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type-C Specs</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
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<tr>
<td>USB 3.1 Gen 1, Gen 2</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓ Gen 1</td>
</tr>
<tr>
<td>DP 1.2, DP 1.3</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>AUX</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>CC Detect</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>VCONN</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>VBUSDET</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Low-power mode</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Integrated R, Current Source</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Device/Host/Dual-role</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Type-C orientation pin O/P</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pin &amp; I2C Control Status</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Signal Switch Products
2-12 Gbps Differential Signal Switch Portfolio

PCleG2 @ 5.0Gbps 1.5 to 1.8V
- P2PCIE2214
  2-Lane, 4 Channel 2:1 Mux
- P2PCIE2212
  1-Lane, 2 Channel 2:1 Mux
- P2PCIE2442
  2-Lane, 4 Channel 2:1 Mux

PCleG2 @ 5.0Gbps 3.3V
- P3PCIE215
  2-Lane, 4 Channel 2:1 Mux
- P3PCIE2215
  1-Lane, 2 Channel 2:1 Mux

PCleG3/10GE @8-10Gbps 3.3V
- P3PCIE3215
  1-Lane, 2 Channel 2:1 Mux
- P3PCIE3212
  2-Lane, 4 Channel 2:1 Mux
- P3PCIE3415
  2-Lane, 4 Channel 2:1 Mux
- P3PCIE3242
  1-Lane, 2 Channel 2:1 Mux

10-12Gbps 3.3V
- P2DDBS12412-A
  2-Lane 2:1 Mux 10-12Gbps
- P2DDBS12212-A
  1-Lane 2:1 Mux 10-12Gbps

DDR3/DDR4 1.5V-3.3V 4.266 GT/s
- P2DDR3212
  14 bit 2:1 DDR3/4 Switch 1.5V/1.8V
- P3DDR4212
  12 bit 2:1 DDR3/4 Switch 1.8V/3.3V

Differential Broadband SAS2/SATA2/XAUI/TB/10GE 1.5 to 1.8V, 3.3V
- P2DBS212
  3.2Gbps, 1.5-1.8V SAS, SATA2, XAUI 1-Lane, 2 Channel 2:1 Mux
- P2DBS6212
  6.5Gbps, 1.5-1.8V SAS2, SATA3, XAUI 1-Lane, 2 Channel 2:1 Mux/Demux

Legend
- Production
- Sampling
USB Switch Portfolio  Best in Signal Integrity and Performance

**USB 2.0**
- **PI3USB102G**
  - 2:1 Mux, 10TQFN (1.6x1.3x0.75mm)
  - With 5V Protection
- **PI3USB42**
  - 2:1 Mux, 10UQFN (1.4x1.8x0.55mm)
  - Vdd: 1.8V to 4.3V
- **PI3USB14-A**
  - 4:1 Mux, 16QSOP/TSSOP 20TQFN
- **PI3USB221**
  - 2:1 Mux, 10TLLGA (2x1.4x0.55mm)
  - 10TDFN (3x3x0.85mm)

**USB 2.0 with Audio**
- **PI3USB223**
  - 2:1 Switch, 10UQFN (1.4x1.8x0.55mm)

**USB 3.0**
- **PI3USB302-A**
  - Dual 2:1 Mux, 20TQFN
- **PI3USB3102**
  - Dual USB 3.0 2:1 Mux, USB2.0 2:1 Mux 32TQFN
- **PI2USB4122**
  - 4:1 Mux, 42TQFN
Video Switch Portfolio

**HDMI**
- **PI3WVR31310A**
  - 3:1 Switch, 5.4Gbps, 4-lane, DP 1.2

- **PI3WVR12412**
  - 2:1 Switch, 42Pin TQFN, 6Gbps with DDC, 4K2K/30Frame

- **PI3HDMI2410**
  - 4:1 Switch, 80Pin LQFP, 5Gbps, 4K2K/30Hz

**DisplayPort**
- **PI3WVR31310A**
  - 3:1 Switch, 5.4Gbps, 4-lane, DP 1.2

- **PI3WVR12412**
  - 2:1 Switch, 42Pin TQFN, 6Gbps with DDC, 4K2K/30Frame

- **PI3VDP3212**
  - 2:1 Switch, 32Pin TQFN, 2-lane 4.7Gbps

**HDMI/DisplayPort Wide Voltage Range Thunderbolt**
- **PI3TB212**
  - DP1.2, 10Gbs, 24Pin-TQFN

- **PI3WVR31313A**
  - 1:3 2DP, 1HDMI active Switch, Supporting cable ID, 60Pin-TQFN

- **PI3WVR31212A**
  - 1:2 1 DP+1 HDMI active Switch, 60Pin-TQFN

- **PI3WVR12412**
  - 2:1 Switch, 42Pin TQFN, 6Gbps with DDC, 4K2K/30Frame
USB Charger and ULS
Charging Controller Supports

- Full feature B.C. 1.2
- Majority of all popular portable devices and update

Load Switch: Power Sequencing

- Low Ron & continuous slew rate
- Lower quiescent current
- 2nd source to TI
Features

- Two separate current limiting channels
- Supports D+/D- CDP/DCP Modes per USB Battery Charging Specification 1.2
- Supports D+/D- Shorted Mode per Chinese Telecommunication Industry Standard YD/T 1591-2009
- Supports non-BC1.2 Charging Modes by Automatic Selection
  - D+/D- Divider Modes 2.0/2.7V, 2.7/2.0V and 2.7/2.7V
  - D+/D- 1.2V Mode
- Supports Sleep Mode Charging and Mouse/Keyboard Wake up
- Automatic SDP/CDP Switching for Devices that do not Connect to CDP Ports
- Load Detection for Power Supply Control in S4/S5 Charging and Port Power Management in all Charge Modes
- Compatible with USB 2.0/3.0 Power Switch requirements
- Integrated 73-mΩ (Typ.) High-Side MOSFET
- Adjustable Current Limit up to 3A (Typ.)
- Operating Range: 4.5V to 5.5V
- Max Device Current
  - 2μA at Device Disabled
  - 270μA at Device Enabled
What is PI3USB9281A?

- A Comprehensive Co-Power Delivery Solution by:

  - Detecting the following types of charging source:
    - 12W Apple
    - 10W Apple
    - 5W Apple
    - Samsung FAST charge
    - USB_BC1.2 CDP (not only detect, but also communicates)
    - USB_BC1.2 SDP
    - USB_BC1.2 DCP

  - Additional micro-B connector interface for non-charging source:
    - USB OTG
    - MHL

- Can Tolerate USB3.0 PD with VBUS=20V
  - Support VBUS OCP, OVP
PI3USB9281A USB2 Port protection with charger detection

USB Controller

I2C Controller

Type-C Connector in UFP mode

VBUSIN

D+, D-

D-, D+

GND
## Comparison of I²C/SMBus Level Shifters & Repeater

The series is particularly designed for Open Drain topology, such as I²C, SMBus and MDIO.

<table>
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<tr>
<th>Features</th>
<th>PI6ULS5V 9627A</th>
<th>PI6ULS5V 9617A</th>
<th>PI6ULS5V 9517A</th>
<th>PI6ULS5V 9509</th>
<th>PI6ULS5V 9306</th>
<th>PI6ULS5V 9515A</th>
<th>PI4ULS5V 202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel #</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Level Shifter</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Repeater</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>VccA Supply Voltage</td>
<td>0.6V ~ 5.5V</td>
<td>0.6V ~ 5.5V</td>
<td>0.8V ~ 5.5V</td>
<td>1.0V ~ VccB-1V</td>
<td>1.0V ~ 3.3V</td>
<td>2.3V ~ 3.6V</td>
<td>1.2V ~ 5.5V</td>
</tr>
<tr>
<td>VccB Supply Voltage</td>
<td>2.2V ~ 5.5V</td>
<td>2.2V ~ 5.5V</td>
<td>2.2V ~ 5.5V</td>
<td>3V ~ 5V</td>
<td>1.8V ~ 5V</td>
<td>n/a</td>
<td>1.2V ~ 5.5V</td>
</tr>
<tr>
<td>Data Rate</td>
<td>1MHz (FM+)</td>
<td>1MHz (FM+)</td>
<td>400KHz</td>
<td>400KHz</td>
<td>400KHz</td>
<td>400KHz</td>
<td>2MHz</td>
</tr>
<tr>
<td>ESD HBM</td>
<td>8KV</td>
<td>8KV</td>
<td>8KV</td>
<td>8KV</td>
<td>4KV</td>
<td>4KV</td>
<td>8KV</td>
</tr>
<tr>
<td>Packages</td>
<td>TSSOP QFN</td>
<td>TDFN 2x3-8L MSOP8 SOP8</td>
<td>TDFN 2x3-8L MSOP8 SOP8</td>
<td>UQFN 1.6x1.6-8L MSOP8 SOP8</td>
<td>TDFN 2x3-8L USOP8</td>
<td>TDFN 2x3-8L MSOP8 SOP8</td>
<td>UDFN1.2x1.6-8L MSOP8</td>
</tr>
<tr>
<td>Features</td>
<td>w/ Repeater</td>
<td>w/ Repeater</td>
<td>w/Repeater</td>
<td>w/ Repeater</td>
<td>Less propagation delay</td>
<td>No Level shifter, repeater only</td>
<td>High Data Rate Support Push-Pull</td>
</tr>
</tbody>
</table>

The series is particularly designed for Open Drain topology, such as I²C, SMBus and MDIO.
The End

Thank You