



QUICKSWITCH® PRODUCTS HIGH-SPEED CMOS 20-BIT LOW RESISTANCE, ACTIVE HIGH BUS SWITCH WITH FLOW-THROUGH PINOUT

IDTQS32XR862

FEATURES:

- Enhanced N channel FET with no inherent diode to Vcc
- 2.5Ω bidirectional switches connect inputs to outputs
- Zero propagation delay, zero ground bounce
- Undershoot clamp diodes on all switch and control pins
- Active Low and High enable controls
- Available in 48-pin QVSOP Package

APPLICATIONS

- Hot-swapping and hot-docking (low Ron resistance for PCI and Compact PCI applications)
- Voltage translation (5V to 3.3V)
- Power conservation
- Capacitance reduction and isolation
- Applications requiring Low resistance and active High enabling
- Bus isolation
- Clock gating

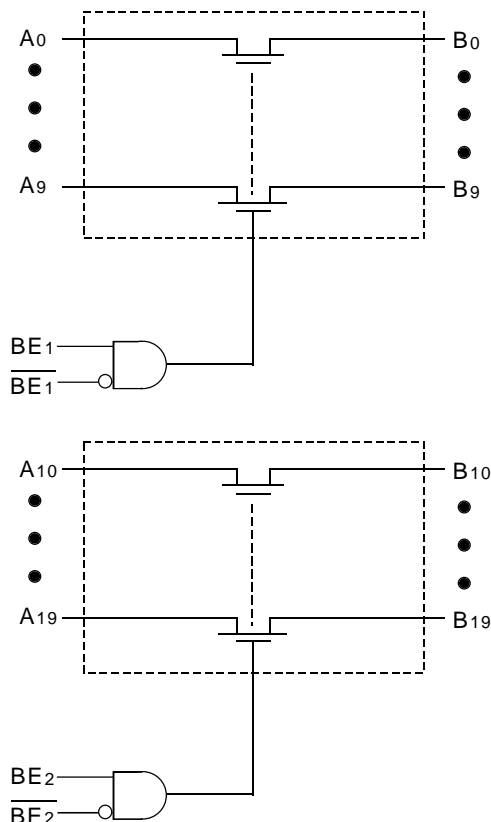
DESCRIPTION:

The QS32XR862 provides two sets of ten high-speed CMOS, TTL-compatible, active high, low resistance bus switches. The very low ON resistance (2.5Ω) of the QS32XR862 allows inputs to be connected to outputs without adding propagation delay and without generating additional ground bounce noise. The switches are controlled by independent active Low Enable (\overline{BE}) and active High Enable (BE) controls for each set.

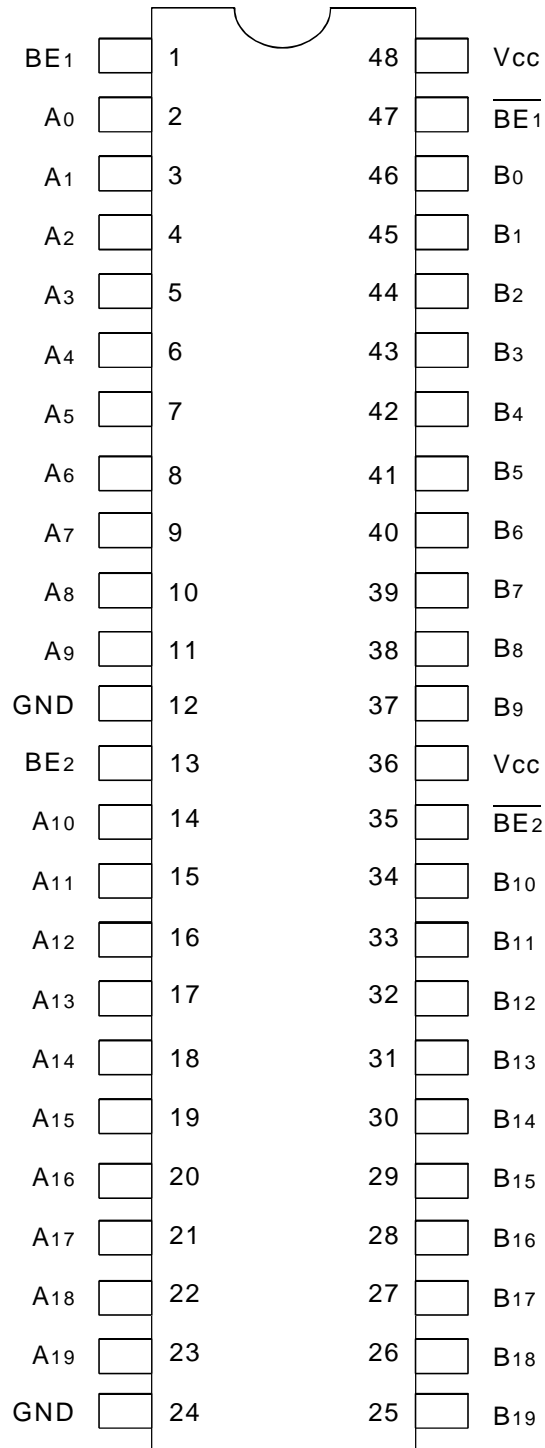
The QS32XR862 is ideal for switching digital buses as well as for hot plug buffering and 5V to 3.3V conversion. The low ON resistance of the QS32XR862 makes it ideal for PCI hot-docking applications.

The QS32XR862 is characterized for operation at -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



QVSOPTOP VIEW

ABSOLUTE MAXIMUM RATINGS ⁽¹⁾

| Symbol | Description | Max. | Unit |
|----------------------------------|--------------------------------------|--------------|------|
| V _{TERM} ⁽²⁾ | Supply Voltage to Ground | - 0.5 to +7 | V |
| V _{TERM} ⁽³⁾ | DC Switch Voltage V _s | - 0.5 to +7 | V |
| V _{TERM} ⁽³⁾ | DC Input Voltage V _{IN} | - 0.5 to +7 | V |
| V _{AC} | AC Input Voltage (pulse width ≤20ns) | -3 | V |
| I _{OUT} | DC Output Current | 120 | mA |
| P _{MAX} | Maximum Power Dissipation | .5 | W |
| T _{STG} | Storage Temperature | - 65 to +150 | °C |

NOTES:

- Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
- V_{cc} Terminals.
- All terminals except V_{cc}.

CAPACITANCE

(T_A = +25°C, f = 1.0MHz, V_{IN} = 0V, V_{OUT} = 0V)

| Pins | Typ. | Max. ⁽¹⁾ | Unit |
|-----------------------------------|------|---------------------|------|
| Control Inputs | 3 | 4 | pF |
| Quickswitch Channels (Switch OFF) | 5 | 6 | pF |

NOTE:

- This parameter is guaranteed but not production tested.

PIN DESCRIPTION

| Pin Names | I/O | Description |
|----------------------------------|-----|------------------------|
| \overline{BE} | I | Active LOW Bus Enable |
| BE | I | Active HIGH Bus Enable |
| A ₀ - A ₁₉ | I/O | Bus A |
| B ₀ - B ₁₉ | I/O | Bus B |

FUNCTION TABLE⁽¹⁾

| BE ₁ | \overline{BE}_1 | A ₀ - A ₉ | Function |
|-----------------|-------------------|---------------------------------|------------|
| L | L | Hi-Z | Disconnect |
| L | H | Hi-Z | Disconnect |
| H | L | B ₀ - B ₉ | Connect |
| H | H | Hi-Z | Disconnect |

| BE ₂ | \overline{BE}_2 | A ₁₀ - A ₁₉ | Function |
|-----------------|-------------------|-----------------------------------|------------|
| L | L | Hi-Z | Disconnect |
| L | H | Hi-Z | Disconnect |
| H | L | B ₁₀ - B ₁₉ | Connect |
| H | H | Hi-Z | Disconnect |

NOTE:

- H = HIGH Voltage Level
L = LOW Voltage Level
Z = High-Impedence

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

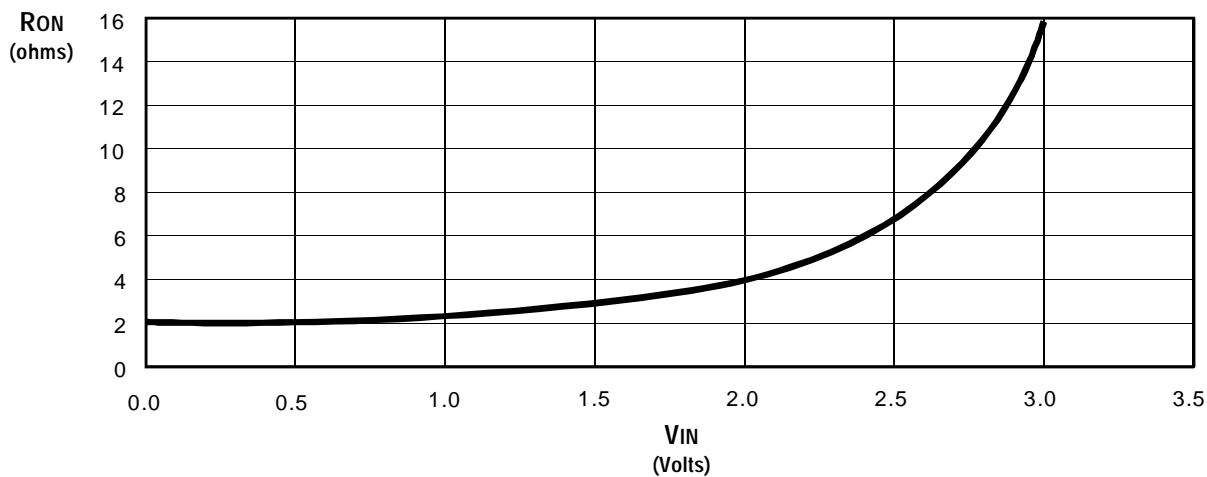
Industrial: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = 5.0\text{V} \pm 10\%$

| Symbol | Parameter | Test Conditions | Min. | Typ. ⁽¹⁾ | Max. | Unit |
|----------|--|--|------|---------------------|---------|---------------|
| V_{IH} | Input HIGH Voltage | Guaranteed Logic HIGH for Control Pins | 2 | — | — | V |
| V_{IL} | Input LOW Voltage | Guaranteed Logic LOW for Control Pins | — | — | 0.8 | V |
| I_{IN} | Input Leakage Current (Control Inputs) | $0\text{V} \leq B_{EN}, \overline{B}_{EN} \leq V_{CC}$ | — | ± 0.01 | ± 1 | μA |
| I_{OZ} | Off-State Current (Hi-Z) | $0\text{V} \leq V_{OUT} \leq V_{CC}$, Switches OFF | — | ± 0.01 | ± 1 | μA |
| R_{ON} | Switch ON Resistance | $V_{CC} = \text{Min.}$, $V_{IN} = 0\text{V}$, $I_{ON} = 30\text{mA}$ | — | 2.5 | 5 | Ω |
| R_{ON} | Switch ON Resistance | $V_{CC} = \text{Min.}$, $V_{IN} = 2.4\text{V}$, $I_{ON} = 15\text{mA}$ | — | 4 | 8.5 | Ω |
| V_P | Pass Voltage ⁽²⁾ | $V_{IN} = V_{CC} = 5\text{V}$, $I_{OUT} = -5\mu\text{A}$ | 3.7 | 4 | 4.3 | V |

NOTES:

- Typical values are at $V_{CC} = 5.0\text{V}$, $T_A = 25^{\circ}\text{C}$.
- Pass voltage is guaranteed but not production tested.

TYPICAL ON RESISTANCE vs V_{IN} AT $V_{CC} = 5\text{V}$



POWER SUPPLY CHARACTERISTICS

| Symbol | Parameter | Test Conditions ⁽¹⁾ | Typ. ⁽²⁾ | Max. | Unit |
|------------------|--|--|---------------------|------|--------|
| I _{CCQ} | Quiescent Power Supply Current | V _{CC} = Max., BEn = GND or V _{CC} , f = 0 | 0.2 | 6 | μA |
| ΔI _{CC} | Power Supply Current per Control Input HIGH ⁽³⁾ | V _{CC} = Max., V _{IN} = 3.4V, f = 0 | — | 2.5 | mA |
| I _{CCD} | Dynamic Power Supply Current per MHz ⁽⁴⁾ | V _{CC} = Max., A and B pins open Control Inputs Toggling at 50% Duty Cycle | — | 0.25 | mA/MHz |

NOTES:

- For conditions shown as Min. or Max., use the appropriate values specified under DC Electrical Characteristics.
- Typical values are at V_{CC} = 5.0V, T_A = 25°C.
- Per TLL driven input (V_{IN} = 3.4V, control inputs only). A and B pins do not contribute to ΔI_{CC}.
- This current applies to the control inputs only and represents the current required to switch internal capacitance at the specified frequency. The A and B inputs generate no significant AC or DC currents as they transition. This parameter is guaranteed but not production tested.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

T_A = -40°C to +85°C, V_{CC} = 5.0V ± 10%

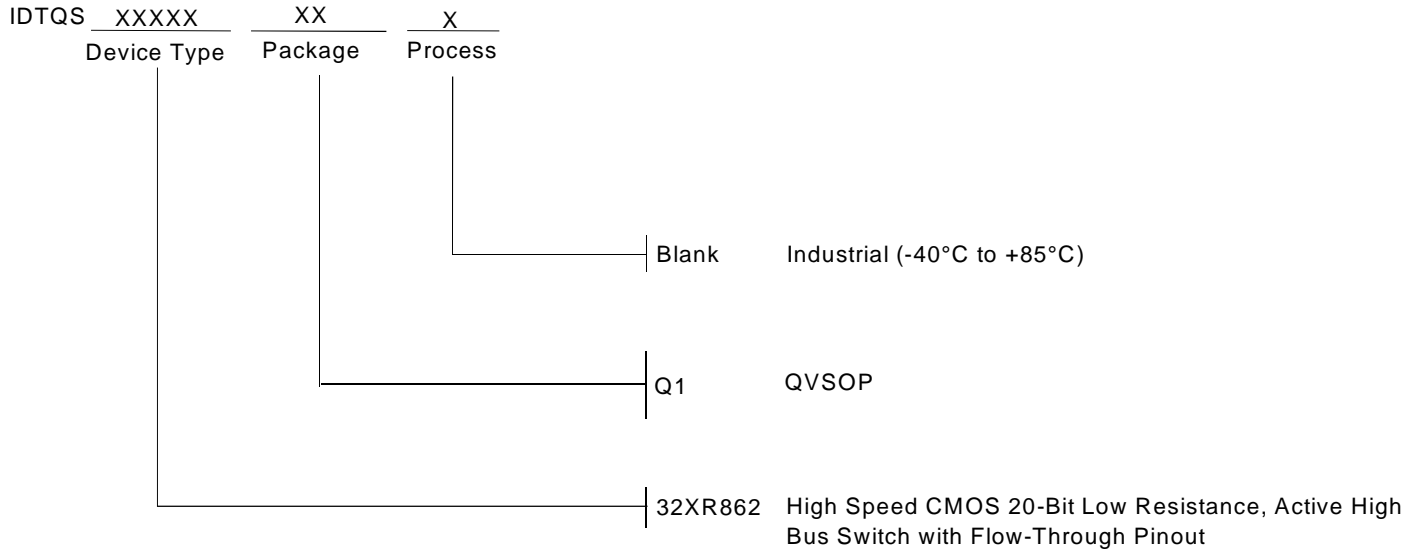
C_{LOAD} = 50pF, R_{LOAD} = 500Ω unless otherwise noted.

| Symbol | Parameter | Min. ⁽¹⁾ | Typ. | Max. | Unit |
|--------------------------------------|--|---------------------|------|------|------|
| t _{PLH} t _{PHL} | Data Propagation Delay ^(2,3) An to/from Bn | — | — | 0.12 | ns |
| t _{PZL} t _{PZH} | Switch Turn-on Delay BEn or BEn to An/Bn | 1.5 | — | 5.6 | ns |
| t _{PLZ} t _{PHZ} | Switch Turn-off Delay ⁽²⁾ BEn to An/Bn | 1.5 | — | 4.5 | ns |

NOTES:

- Minimums are guaranteed but not production tested.
- This parameter is guaranteed but not production tested.
- The bus switch contributes no propagation delay other than the RC delay of the ON resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.12ns for C_L = 50pF. Since this time constant is much smaller than the rise and fall times of typical driving signals, it adds very little propagation delay to the system. Propagation delay of the bus switch, when used in a system, is determined by the driving circuit on the driving side of the switch and its interaction with the load on the driven side.

ORDERING INFORMATION



CORPORATE HEADQUARTERS
2975 Stender Way
Santa Clara, CA 95054

for SALES:
800-345-7015 or 408-727-6116
fax: 408-492-8674
www.idt.com*

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