



QUICKSWITCH® PRODUCTS 3.3V 8-BIT BUS SWITCH FOR HOT SWAP APPLICATIONS (HOT SWITCH™)

IDTQS3VH2245

FEATURES:

- N channel FET switches with no parasitic diode to Vcc
 - No DC path to Vcc or GND
 - 5V tolerant in OFF and ON state
- 5V tolerant I/Os
- Bidirectional dataflow with near-zero delay: no added ground bounce
- Flat RON characteristics from 0 - 5V
- Rail-to-rail switching 0 - 5V
- Excellent RON matching between channels
- Vcc operation: 2.3V to 3.6V
- Maximum operating frequency for data - 150MHz
- LVTTTL-compatible control Inputs
- Undershoot Clamp Diodes on all switch and control Inputs
- Low I/O capacitance, 4pF typical
- 25Ω resistors for low noise and line matching
- Available in QSOP and SOIC packages

APPLICATIONS:

- PCI/Compact PCI hot-swapping
- 10/100 Base-T, ethernet LAN switch
- Low distortion analog switch
- Replaces mechanical relay
- ATM 25/155 switching

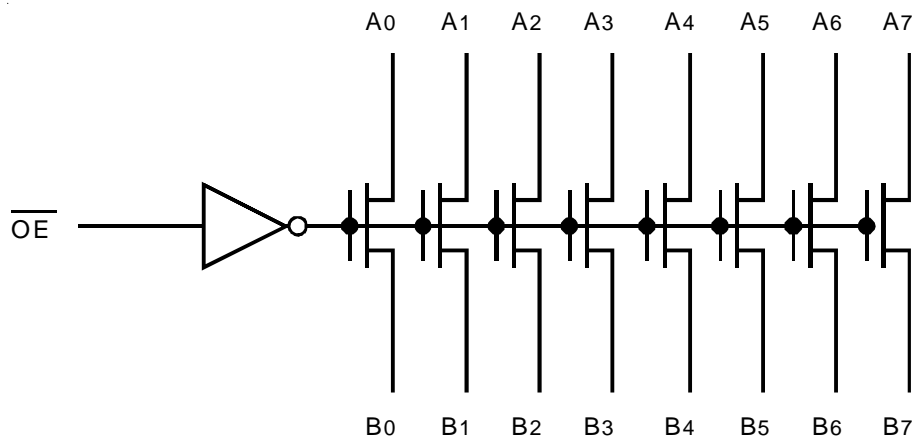
DESCRIPTION:

The QS3VH2245 Hotswitch 8-bit bus switch is specially designed for a hot-swapping environment. The QS3VH2245, with 25Ω ON resistance and 1.25ns propagation delay, is ideal for line matching and low noise environments. The switches can be turned ON under the control of the LVTTTL-compatible Output Enable signal for bidirectional data flow with no added delay or ground bounce. In the OFF and ON states, the switches are 5V-tolerant. In the OFF state, the switches offer very high impedance at the terminals.

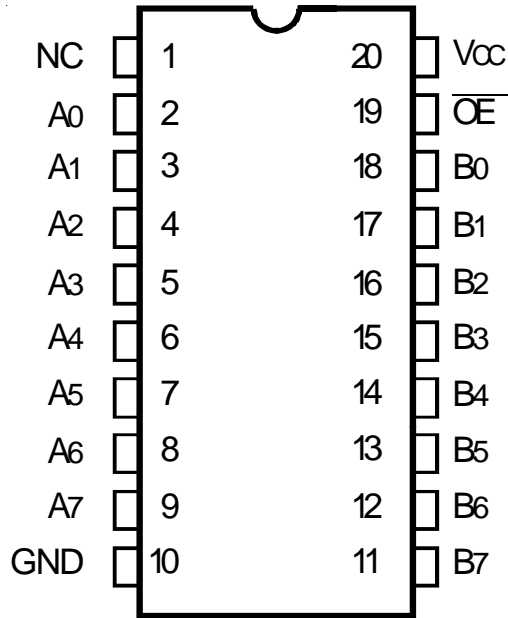
The combination of small propagation delay, high OFF impedance, and over-voltage tolerance makes the QS3VH2245 ideal for high performance communication applications.

The QS3VH2245 is characterized for operation from -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



QSOP/ SOIC
TOP VIEW

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

| Symbol | Description | Max | Unit |
|----------------------|--------------------------------------|--------------|------|
| VTERM ⁽²⁾ | Supply Voltage to Ground | -0.5 to +4.6 | V |
| VTERM ⁽³⁾ | DC Switch Voltage V _S | -0.5 to +5.5 | V |
| VTERM ⁽³⁾ | DC Input Voltage V _{IN} | -0.5 to +5.5 | V |
| VAC | AC Input Voltage (pulse width ≤20ns) | -3 | V |
| VOUT | DC Output Current | 120 | mA |
| P _{MAX} | Maximum Power Dissipation | 0.5 | W |
| T _{STG} | Storage Temperature | -65 to +150 | °C |

NOTES:

1. 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.
2. V_{cc} terminals.
3. All terminals except V_{cc}.

CAPACITANCE (T_A = +25°C, F = 1MHz, V_{IN} = 0V, V_{OUT} = 0V)

| Symbol | Parameter ⁽¹⁾ | Typ. | Max. | Unit |
|------------------|-----------------------------------|------|------|------|
| C _{IN} | Control Inputs | 3 | 5 | pF |
| C _{I/O} | Quickswitch Channels (Switch OFF) | 4 | 6 | pF |

NOTE:

1. This parameter is guaranteed but not production tested.

PIN DESCRIPTION

| Pin Names | Description |
|-----------------|---------------|
| \overline{OE} | Output Enable |
| A _n | Data I/Os |
| B _n | Data I/Os |

FUNCTION TABLE⁽¹⁾

| \overline{OE} | Function |
|-----------------|---------------------------------|
| H | Disconnected |
| L | A _n = B _n |

NOTE:

1. H = HIGH Voltage Level
L = LOW Voltage Level

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

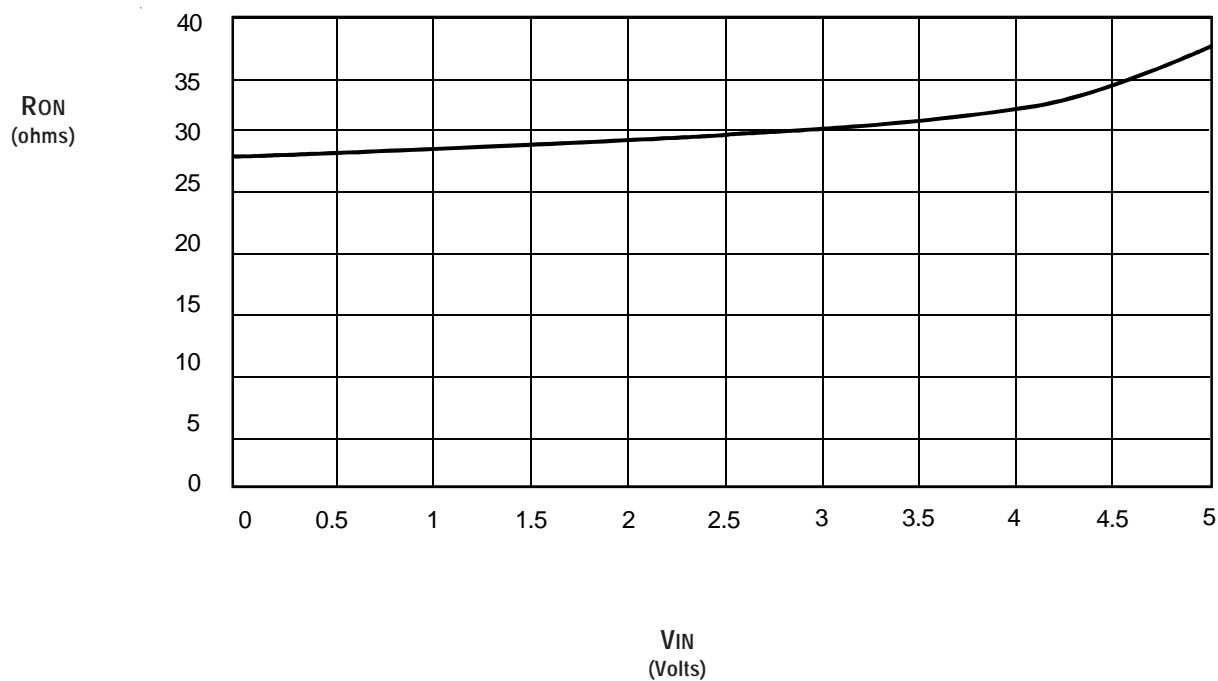
Industrial: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = 3.3\text{V} \pm 0.3\text{V}$

| Symbol | Parameter | Test Conditions | Min. | Typ. ⁽¹⁾ | Max. | Unit |
|----------|--------------------------|---|------|---------------------|---------|---------------|
| V_{IH} | Input HIGH Voltage | Guaranteed Logic HIGH for Control Inputs | 2 | — | — | V |
| V_{IL} | Input LOW Voltage | Guaranteed Logic LOW for Control Inputs | — | — | 0.8 | V |
| I_{IN} | Input Leakage Current | $0\text{V} \leq \overline{OE} \leq V_{CC}$ | — | — | ± 1 | μA |
| I_{OZ} | Off-State Current (Hi-Z) | $0\text{V} \leq A, B \leq V_{CC}$, Switches OFF | — | — | ± 1 | μA |
| RON | Switch ON Resistance | $V_{CC} = \text{Min}$, $V_{IN} = 0\text{V}$, $I_{ON} = 30\text{mA}$ | 20 | 27 | 40 | Ω |
| | | $V_{CC} = \text{Min}$, $V_{IN} = 2.4\text{V}$, $I_{ON} = 15\text{mA}$ | 20 | 28 | 42 | |

NOTE:

1. Typical values are at $V_{CC} = 3.3\text{V}$ and $T_A = 25^{\circ}\text{C}$.

TYPICAL ON RESISTANCE vs V_{IN} AT $V_{CC} = 3.3\text{V}$



POWER SUPPLY CHARACTERISTICS

| Symbol | Parameter | Test Conditions ⁽¹⁾ | Max. | Unit |
|------------------|--|--|------|--------|
| I _{CCQ} | Quiescent Power Supply Current | V _{CC} = Max., V _{IN} = GND or V _{CC} , f = 0 | 4 | mA |
| ΔI _{CC} | Power Supply Current ^(2,3) per Input HIGH | V _{CC} = 3.6V, V _{IN} = 3V, f = 0 per Control Input | 30 | μA |
| I _{CCD} | Dynamic Power Supply Current per MHz ⁽⁴⁾ | V _{CC} = 3.6V, A and B Pins Open, per Control Input Toggling @ 50% Duty Cycle | 0.25 | mA/MHz |

NOTES:

- For conditions shown as Min. or Max., use the appropriate values specified under DC Electrical Characteristics.
- Per LVTTTL-driven-control-input. A and B pins do not contribute to ΔI_{CC}.
- This parameter is guaranteed but not tested.
- This parameter represents the current required to switch internal capacitance at the specified frequency. The A and B inputs do not contribute to the Dynamic Power Supply Current. This parameter is guaranteed but not production tested.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

T_A = -40°C to +85°C, V_{CC} = 3.3V ± 0.3V

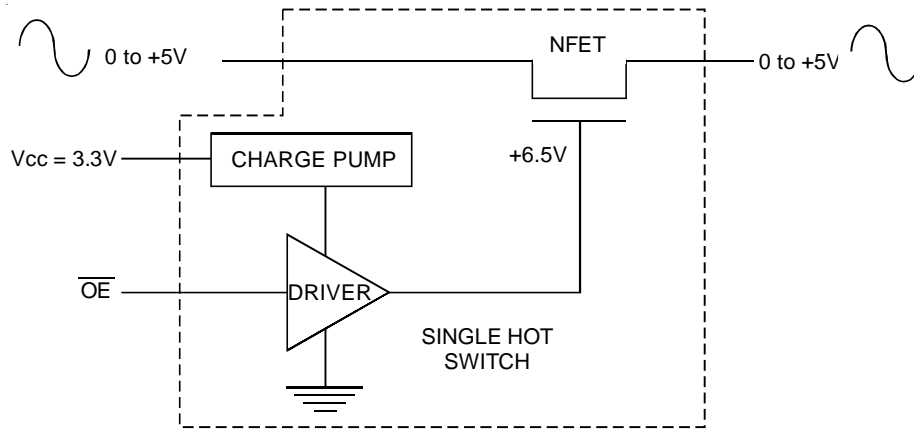
C_{LOAD} = 50pF, R_{LOAD} = 500Ω, unless otherwise noted

| Symbol | Parameter | Min. ⁽³⁾ | Typ. | Max. | Unit |
|--------------------------------------|--|---------------------|------|--------------------|------|
| t _{PLH} t _{PHL} | Data Propagation Delay ^(1,2) An to/from Bn | — | — | 1.25 | ns |
| t _{PZL} t _{PZH} | Switch Turn-On Delay \overline{OE} to An/Bn | 0.5 | — | 10 | ns |
| t _{PLZ} t _{PHZ} | Switch Turn-Off Delay ⁽¹⁾ \overline{OE} to An/Bn | 0.5 | — | 9 | ns |
| f _s | Operating Frequency - Data ^(1,4) \overline{OE} = LOW | — | — | 150 ⁽⁶⁾ | MHz |
| f _{OE} | Operating Frequency - Enable, Select ^(1,5) | — | — | 1 | MHz |

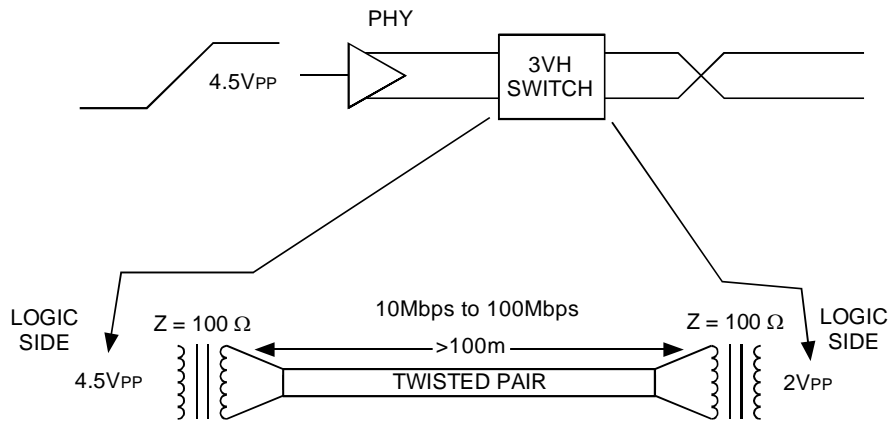
NOTES:

- 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 1.25ns at 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.
- Minimums are guaranteed but not production tested.
- Maximum frequency for bidirectional data flow.
- Maximum toggle frequency for \overline{OE} control input.
- Measured at C_{LOAD} = 30pF.

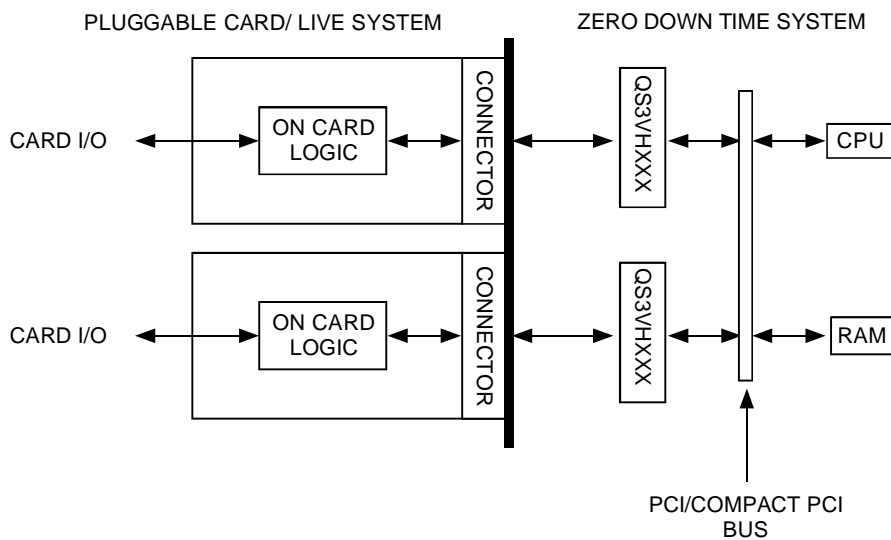
SOME APPLICATIONS FOR HOTSWITCH PRODUCTS



Rail-to-Rail Switching

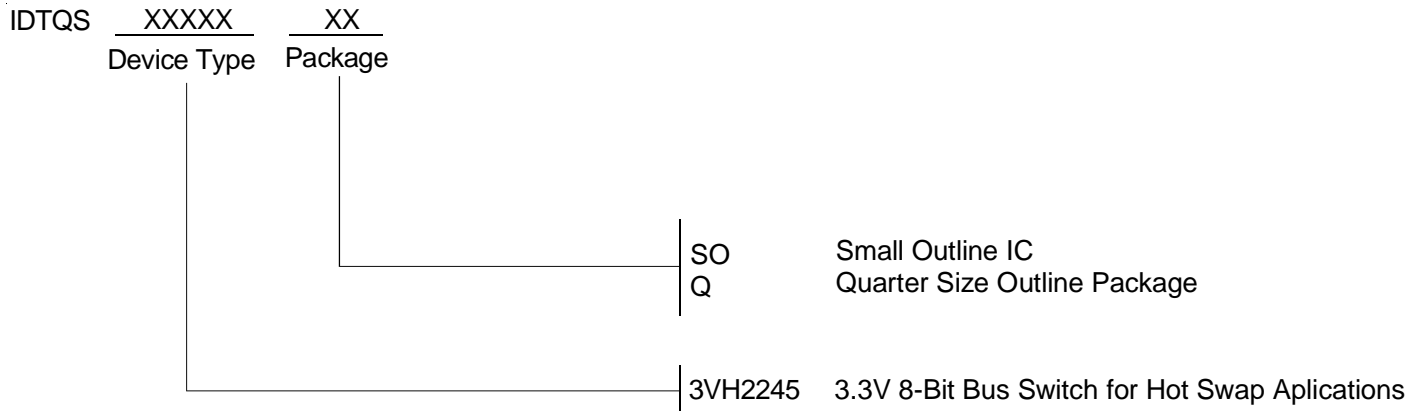


Fast Ethernet Data Switching (LAN Switch)



Hot-Swapping: PCI / Compact PCI

ORDERING INFORMATION



DATA SHEET DOCUMENT HISTORY

8/6/2002 Updated according to PCN Logic-0206-11



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