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 V_{CC}**
  - *No DC path to V_{CC} or GND*
  - *5V tolerant in OFF and ON state*
- **5V tolerant I/Os**
- **Bidirectional dataflow with near-zero delay: no added ground bounce**
- **Flat R_{ON} characteristics from 0 - 5V**
- **Rail-to-rail switching 0 - 5V**
- **Excellent R_{ON} matching between channels**
- **V_{CC} operation: 2.3V to 3.6V**
- **Maximum operating frequency for data - 150MHz**
- **LVTTL-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**

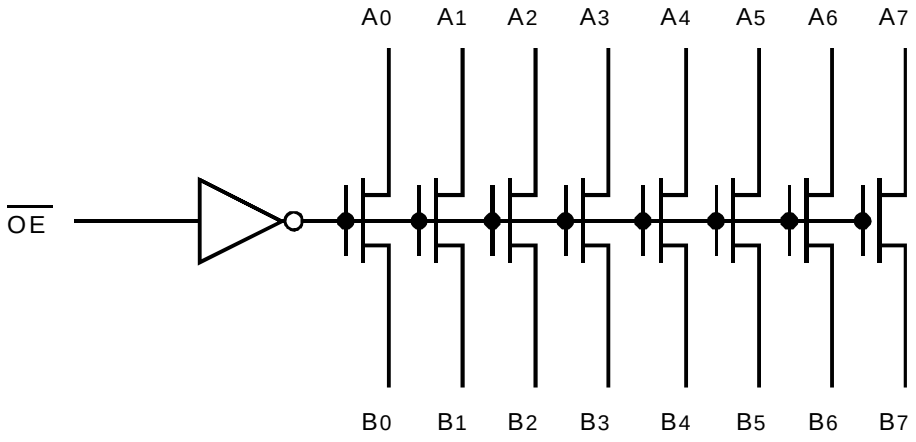
DESCRIPTION:

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 LVTTL-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 impedence at the terminals.

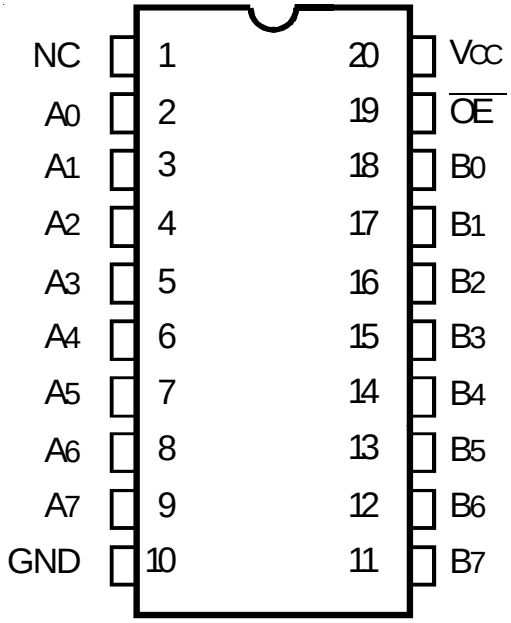
The combination of small propagation delay, high OFF impedance, and over-voltage tolerance makes the QS3VH2245 ideal for high performance communication applications.

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
V_{TERM}(2)	SupplyVoltage to Ground	–0.5 to +4.6	V
V_{TERM}(3)	DC Switch Voltage V_S	–0.5 to +5.5	V
V_{TERM}(3)	DC Input Voltage V_{IN}	–0.5 to +5.5	V
V_{AC}	AC Input Voltage (pulse width ≤20ns)	–3	V
V_{OUT}	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
An	Data I/Os
Bn	Data I/Os

FUNCTION TABLE(1)

$\overline{OE}$	Function
H	Disconnected
L	An = Bn

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

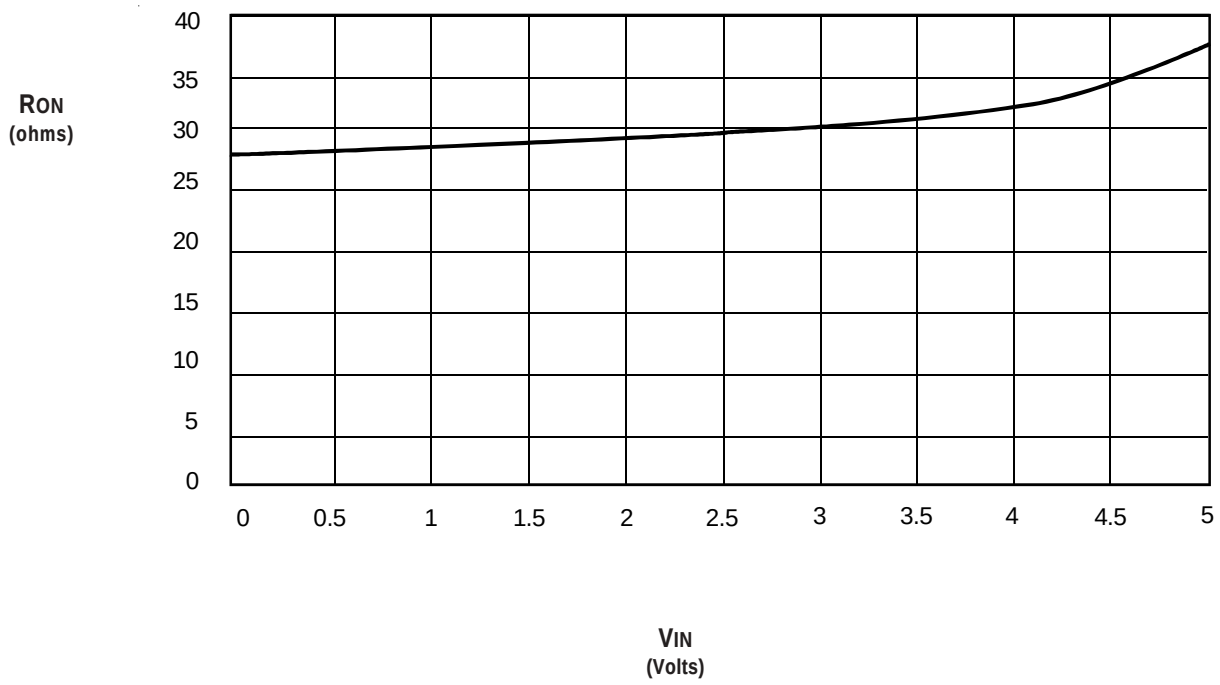
DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Industrial: T_A = –40°C to +85°C, V_{CC} = 3.3V ±0.3V

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	$0V \le \overline{OE} \le V_{CC}$	—	—	±1	µA
I_{OZ}	Off-State Current (Hi-Z)	$0V \le A, B \le V_{CC}$, Switches OFF	—	—	±1	µA
R_{ON}	Switch ON Resistance	V_{CC} = Min, V_{IN} = 0V, I_{ON} = 30mA	20	27	40	Ω
		V_{CC} = Min, V_{IN} = 2.4V, I_{ON} = 15mA	20	28	42	

NOTE:
1. Typical values are at V_{CC} = 3.3V and T_A = 25°C.

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



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:
1. For conditions shown as Min. or Max., use the appropriate values specified under DC Electrical Characteristics.
2. Per LVTTL-driven-control-input. A and B pins do not contribute to ΔIcc.
3. This parameter is guaranteed but not tested.
4. 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

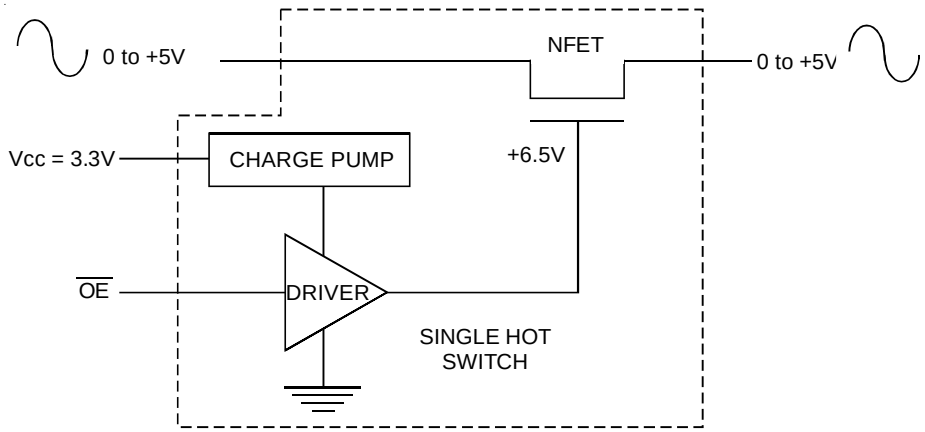
T_A = -40°C to +85°C, V_{CC} = 3.3V ± 0.3V

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

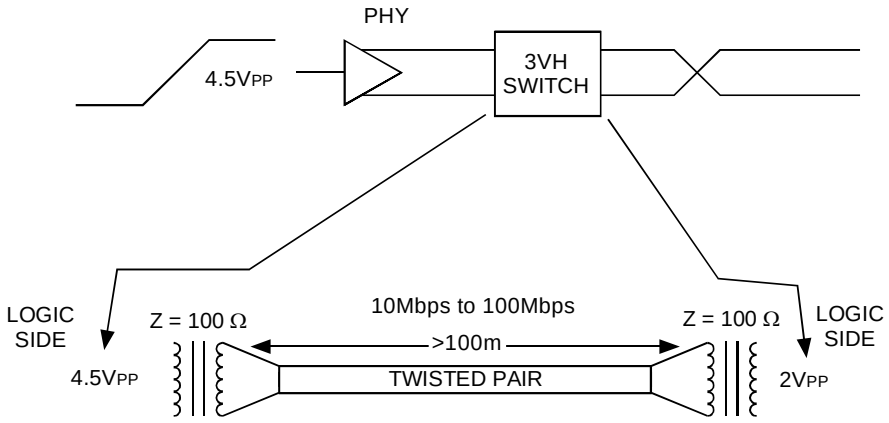
Symbol	Parameter	Min.[3]	Typ.	Max.	Unit
t_{PLH} t_{PHL}	Data Propagation Delay[1,2] An to/from Bn	—	—	1.25	ns
t_{PZL} t_{PZH}	Switch Turn-On Delay $\overline{OE}$ to An/Bn	0.5	—	10	ns
t_{PLZ} t_{PHZ}	Switch Turn-Off Delay[1] $\overline{OE}$ to An/Bn	0.5	—	9	ns
f_S	Operating Frequency - Data[1,4] $\overline{OE}$ = LOW	—	—	150[6]	MHz
$f_{\overline{OE}}$	Operating Frequency - Enable, Select[1,5]	—	—	1	MHz

NOTES:
1. This parameter is guaranteed but not production tested.
2. 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.
3. Minimums are guaranteed but not production tested.
4. Maximum frequency for bidirectional data flow.
5. Maximum toggle frequency for $\overline{OE}$ control input.
6. Measured at C_{LOAD} = 30pF.

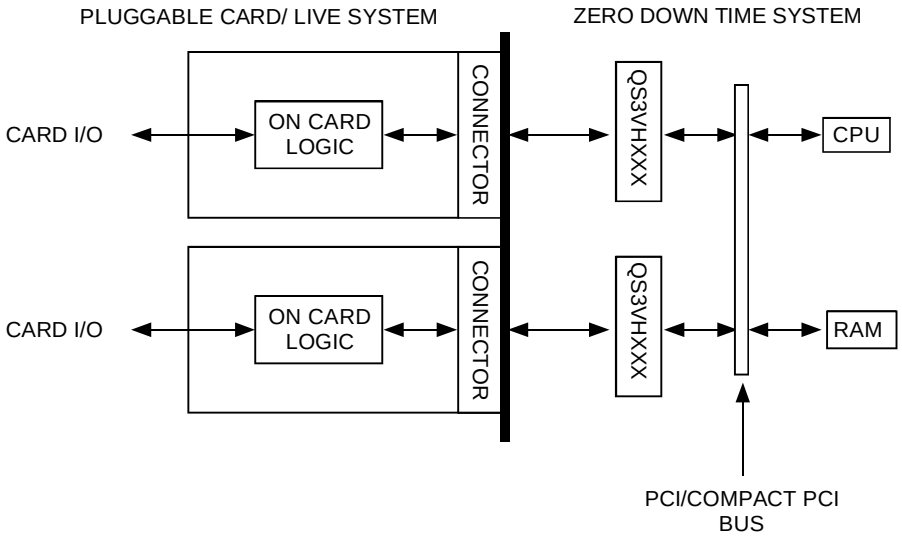
SOME APPLICATIONS FOR HOTSWITCH PRODUCTS



Rail-to-Rail Switching

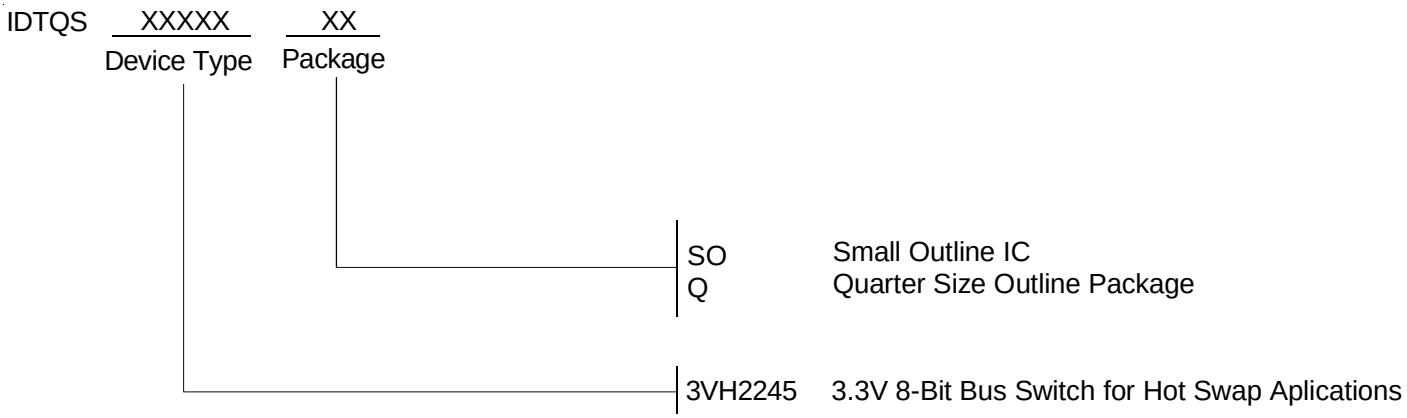


Fast Ethernet Data Switching (LAN Switch)



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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