QUICKSWITCH® PRODUCTS 3.3V QUAD ACTIVE LOW SWITCH FOR HOT SWAP APPLICATIONS (HOTSWITCH™)

IDTQS3VH125

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
- Low R_{ON} - 4Ω typical
- Flat R_{ON} characteristics from 0 - 5V
- Rail-to-rail switching 0 - 5V
- Bidirectional dataflow with near-zero delay: no added ground bounce
- Excellent R_{ON} matching between channels
- Vcc operation: 2.3V to 3.6V
- High bandwidth - up to 500MHz
- LVTTL-compatible control Inputs
- Undershoot Clamp Diodes on all switch and control Inputs
- Low I/O capacitance, 4pF typical
- 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

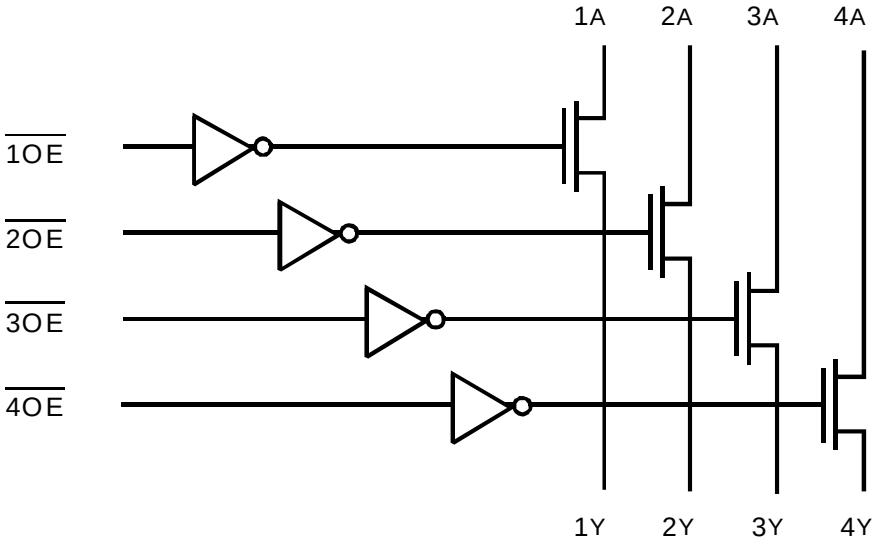
DESCRIPTION:

The QS3VH125 HotSwitch Quad bus switch is specially designed for a hot-swapping environment. The QS3VH125 has very low ON resistance, resulting in under 250ps propagation delay through the switch. The switches can be turned ON under the control of individual LVTTL-compatible active low Output Enable signals 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.

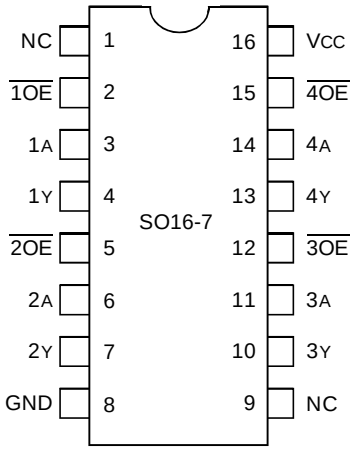
The combination of near-zero propagation delay, high OFF impedance, and over-voltage tolerance makes the QS3VH125 ideal for hot-swapping applications.

The QS3VH125 is characterized for operation from -40°C to +85°C.

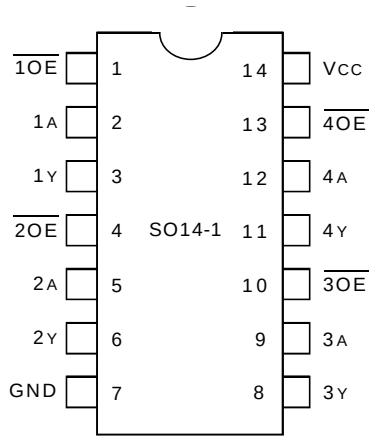
FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



QSOP
TOP VIEW



SOIC
TOP VIEW

ABSOLUTE MAXIMUM RATING(1)

Symbol	Description	Max.	Unit
V_{TERM}(2)	Supply Voltage 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
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	I/O	Description
$1A$ - $4A$	I/O	Bus A
$1Y$ - $4Y$	I/O	Bus Y
$\overline{1OE}$ - $\overline{4OE}$	I	Output Enable

FUNCTION TABLE (1)

$\overline{OE}$	A	Y	Function
L	H	H	Connect
L	L	L	Connect
H	X	X	Disconnect

NOTE:
1. H = HIGH Voltage Level
   L = LOW Voltage Level
   X = Don't Care

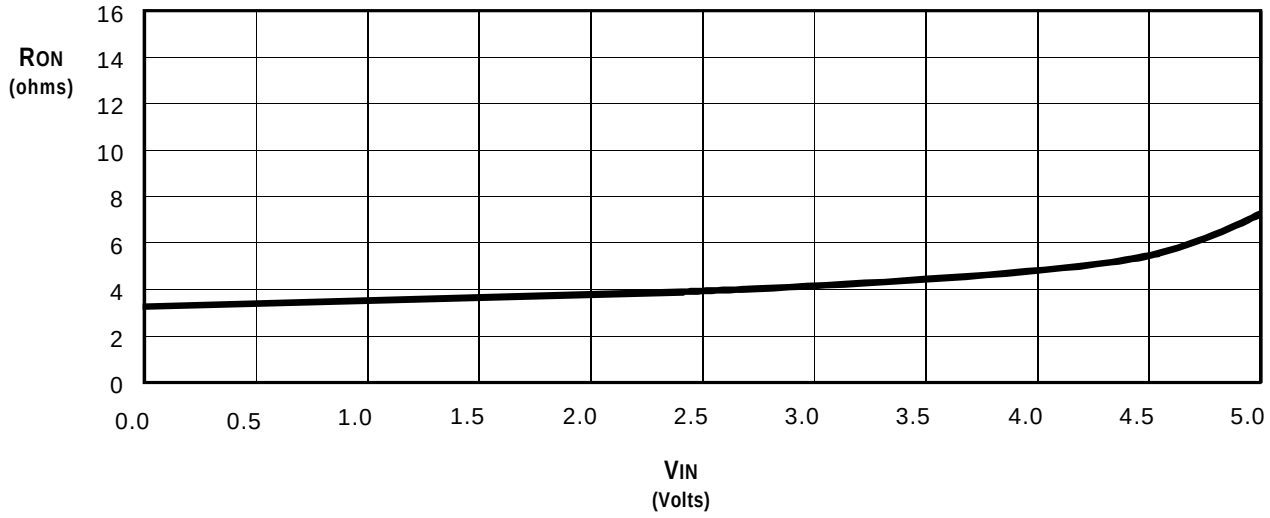
DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

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 (Control Inputs)	$0V \le V_{IN} \le V_{CC}$	—	—	±1	µA
I_{OZ}	Off-State Current (Hi-Z)	$0V \le V_{OUT} \le V_{CC}$, Switches OFF	—	—	±1	µA
R_{ON}	Switch ON Resistance (2)	V_{CC} = Min., V_{IN} = 0V, I_{ON} = 30mA	—	4	6	Ω
		V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15mA	—	5	8	

NOTES:
1. Typical values are at V_{CC} = 3.3V and T_A = 25°C.
2. R_{ON} guaranteed but not production tested.

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	3	mA
ΔI_{CC}	Power Supply Current[2, 3] per Input HIGH	V_{CC} = Max., V_{IN} = 3V, f = 0 per Control Input	30	µA
I_{CCD}	Dynamic Power Supply Current per MHz [4]	V_{CC} = Max., A and Y Pins Open, Control Inputs 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 LVTLL driven input. A and Y 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 Y inputs do not contribute to the Dynamic Power Supply Current. This parameter is guaranteed but not production tested.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

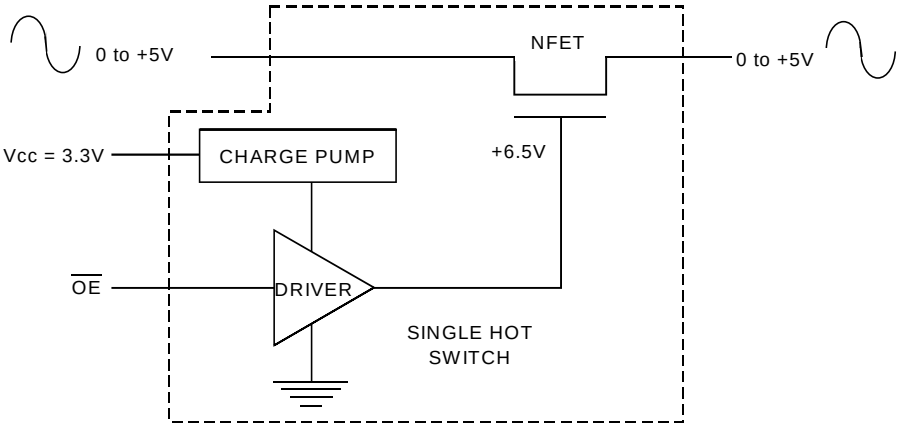
T_A = -40°C to +85°C

Symbol	Parameter	Min. [3]	Typ.	Max.	Unit
t_{PLH} t_{PHL}	Data Propagation Delay[1,2] A to Y	—	—	0.25	ns
t_{PZH} t_{PZL}	Switch Turn-On Delay $\overline{OE}$ to nA/nY	1.5	—	9	ns
t_{PHZ} t_{PLZ}	Switch Turn-Off Delay[1] $\overline{OE}$ to nA/nY	1.5	—	8	ns
$f_{\overline{OE}}$	Operating Frequency - Enable [1,4]	—	—	1	MHz

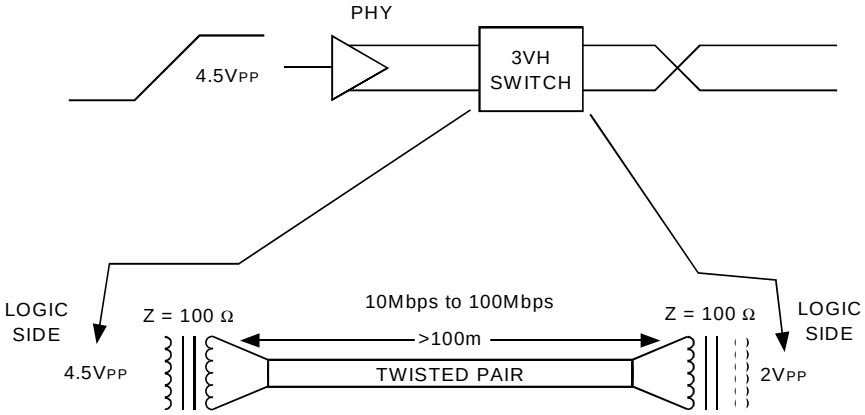
NOTES:
1. This parameter is guaranteed but not production tested.
2. The bus switch contributes no propagation delay other than the RC delay of the ON resistance of the switch and the load capacitance. The time constant for the switch alone is of the order of 0.25ns at C_L = 50pF. Since this time constant 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 toggle frequency for $\overline{OE}$ control input.

SOME APPLICATIONS FOR HOTSWITCH PRODUCTS

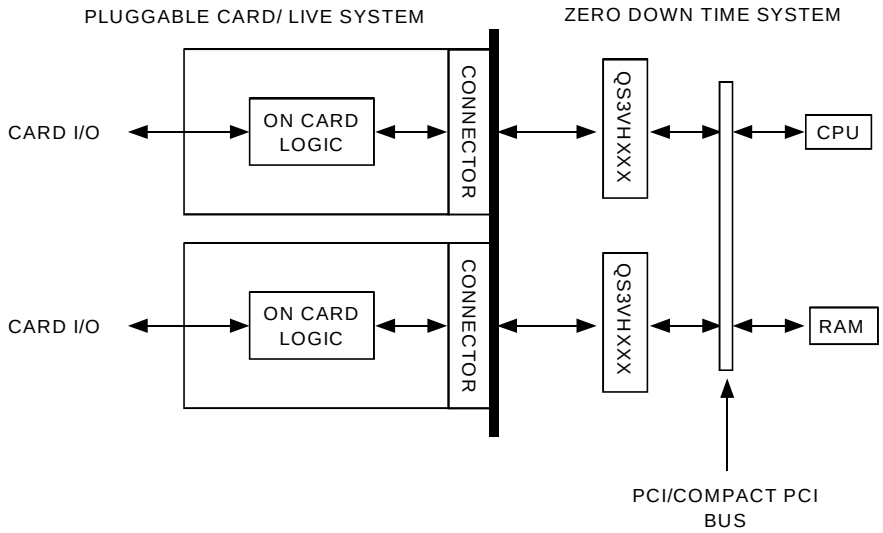
RAIL-TO-RAIL SWITCHING



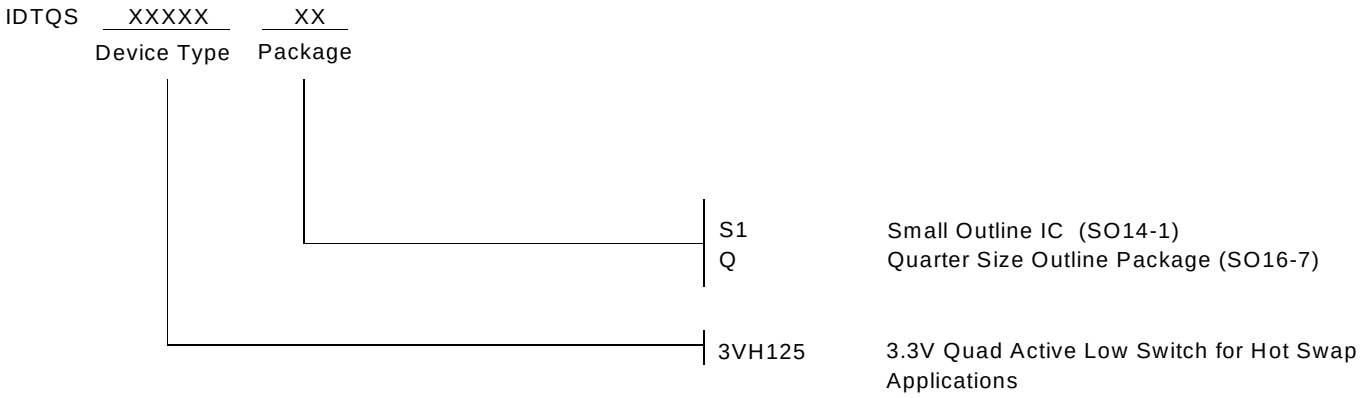
FAST ETHERNET DATA SWITCHING (LAN SWITCH)



HOT SWAPPING: PCI/COMPACT PCI



ORDERING INFORMATION



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