QUICKSWITCH® PRODUCTS
3.3V HIGH SPEED BUS SWITCH

IDTQS3V245

FEATURES:

- **5 Ω bi-directional switches connect inputs to outputs**
- **Pin compatibility with QS3245**
- **250ps propagation delay**
- **Undershoot Clamp Diodes on all switch and control Inputs**
- **LVTTL-compatible control Inputs**
- **Available in SOIC and QSOP packages**

APPLICATIONS:

- **3.3V to 2.5V voltage translation**
- **2.5V to 1.8V voltage translation**
- **PCI bus isolation hot swap**

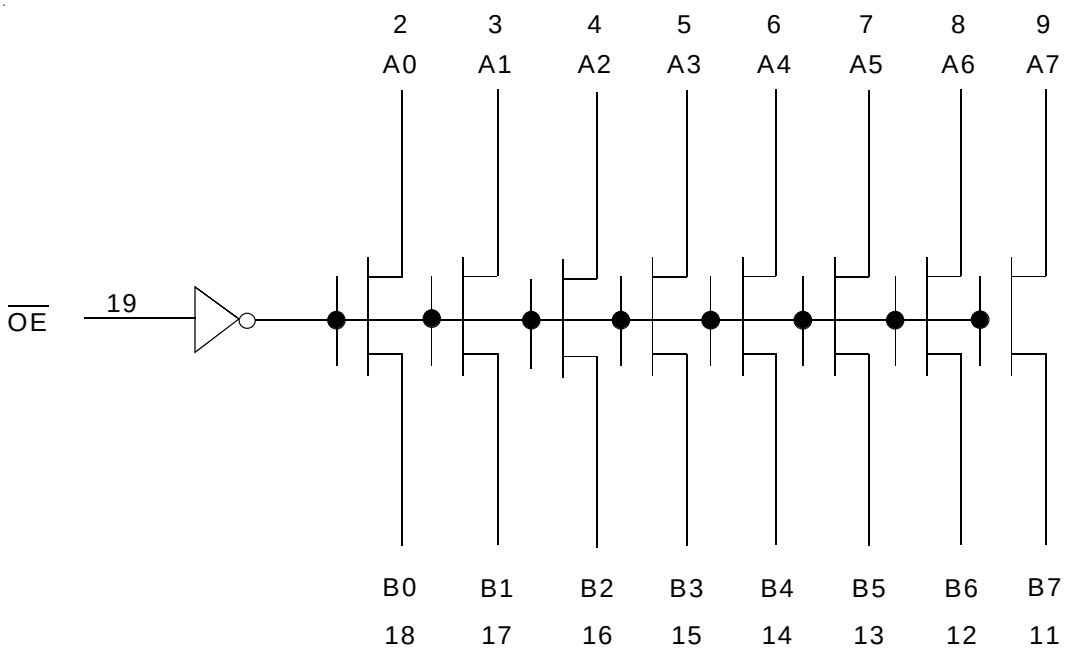
DESCRIPTION:

The QS3V245 is an 8-bit high speed bus switch controlled by LVTTL-compatible active low enable signal. When closed, the switches exhibit near zero propagation delay without generating additional ground bounce or switching noise.

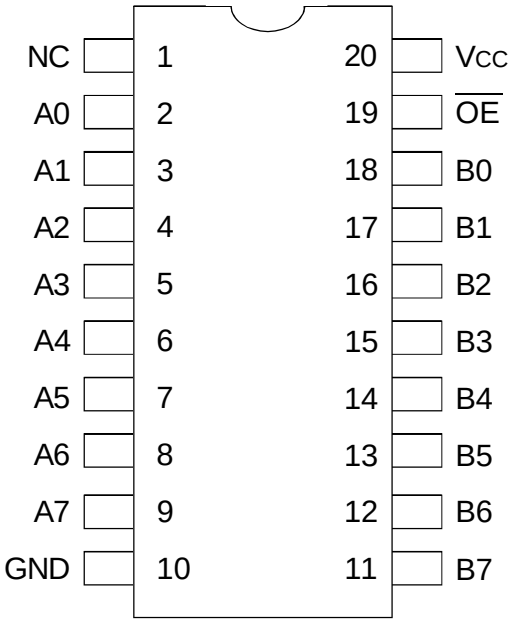
The QS3V245 is specially designed for direct interface between 3.3V and 2.5V devices without any external components. When operating from a 3.3V supply, the logic high level at the switch output is clamped to 2.5V when the switch input signal exceeds 2.5V. This device can be used for switching 2.5V buses without signal attenuation. The ON resistance at 3.3V V_{CC} is less than 5Ω typical, providing near zero propagation delay through the switch. Absence of DC path from switch I/O pins to V_{CC} or ground makes QS3V245 an ideal device for hot swapping applications.

The QS3V245 is characterized for operation from -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



SOIC/ QSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Description	Max	Unit
V_{TERM}(2)	Supply Voltage to Ground	–0.5 to +4.6	V
V_S	DC Switch Voltage	–0.5 to +4.6	V
V_{IN}	DC Input Voltage	–0.5 to +4.6	V
V_{AC}	AC Input Voltage (pulse width ≤20ns)	–3	V
I_{OUT}	DC Output Current (max. sink current/pin)	120	mA
	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.

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

Symbol	Parameter(1)	Typ.	Max.	Unit
C_{IN}	Control Inputs	4	6	pF
$C_{I/O}$	Quickswitch Channels (Switch OFF)	5	7	pF

NOTE:
1. As applicable to the device type.

PIN DESCRIPTION

Pin Names	Description
$\overline{OE}$	Output Enable
Ax	Data I/Os
Bx	Data I/Os

FUNCTION TABLE(1)

$\overline{OE}$	Outputs
H	Disconnected
L	Ax = Bx

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

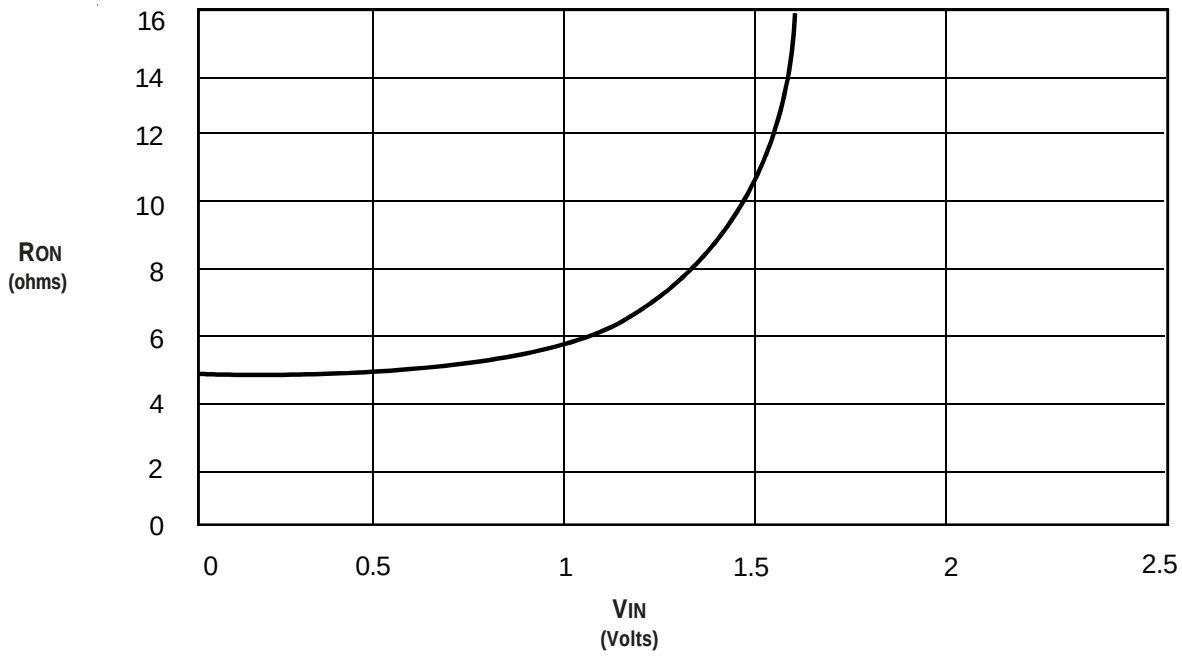
DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

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 (Control Inputs)	0V ≤ V_{IN} ≤ V_{CC}	——		1	µA
I_{OZ}	Off-State Current (Hi-Z)	0V ≤ V_{OUT} ≤ V_{CC}, Switches OFF	—	0.001	1	µA
R_{ON}	Switch ON Resistance	V_{CC} = Min., V_{IN} = 0V, I_{ON} = 8mA	—	5	7	Ω
		V_{CC} = Min., V_{IN} = 1.7V, I_{ON} = 8mA	—	15	20	
		V_{CC} = 2.3V, V_{IN} = 0V, I_{ON} = 8mA	—	7	—	
		V_{CC} = 2.3V, V_{IN} = 1.3V, I_{ON} = 8mA	—	25	—	
V_P	Pass Voltage[2]	V_{IN} = V_{CC} = 3.3V, I_{OUT} = -5µA	2.3	2.7	2.9	V
		V_{IN} = V_{CC} = 2.5V, I_{OUT} = -5µA	—	1.8	—	

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

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



POWER SUPPLY CHARACTERISTICS

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

Symbol	Parameter	Test Conditions[1]	Min.	Max.	Unit
I_{CCQ}	Quiescent Power Supply Current	V_{CC} = Max., V_{IN} = GND or V_{CC}, f = 0	—	3	µA
ΔI_{CC}	Power Supply Current [2] per Input HIGH	V_{CC} = Max., V_{IN} = 3V or V_{CC}, f = 0 per Control Input	—	30	µA
I_{CCD}	Dynamic Power Supply Current per MHz [3]	V_{CC} = 3.3V, A and B Pins Open, Control Input Toggling @ 50% Duty Cycle	—	0.15	mA/MHz

NOTES:
1. For conditions shown as Min. or Max., use the appropriate values specified under DC Electrical Characteristics.
2. Per TTL driven input (V_{IN} = 3V, control inputs only). A and B pins do not contribute to Icc.
3. 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.

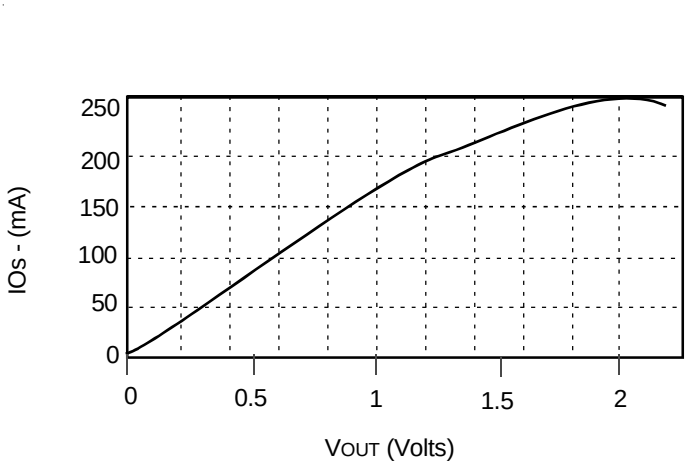
SWITCHING CHARACTERISTICS OVER OPERATING RANGE[1]

T_A = -40°C to +85°C

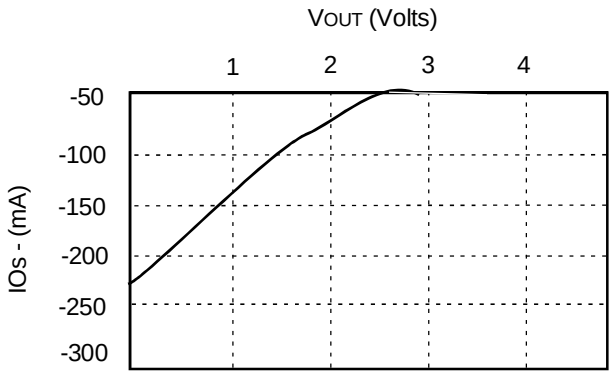
Symbol	Parameter	Min.	Typ.	Max.	Unit
t_{PLH} t_{PHL}	Data Propagation Delay[2,3] Ax to/from Bx	——	—	0.25	ns
t_{PZL} t_{PZH}	Switch Turn-On Delay $\overline{OE}$ to Ax/Bx	0.5	—	6.5	ns
t_{PLZ} t_{PHZ}	Switch Turn-Off Delay[2] $\overline{OE}$ to Ax/Bx	0.5	—	4	ns

NOTES:
1. See TEST CIRCUITS AND WAVEFORMS. Minimums guaranteed but not production tested
2. This parameter is guaranteed but not production tested.
3. The bus switch contributes no propagation delay other than the RC delay of the ON resistance of the switch and the load capac itance. The time constant for the switch alone is of the order of 0.25ns for C_L = 30pF. 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.

OUTPUT VI CHARACTERISTICS

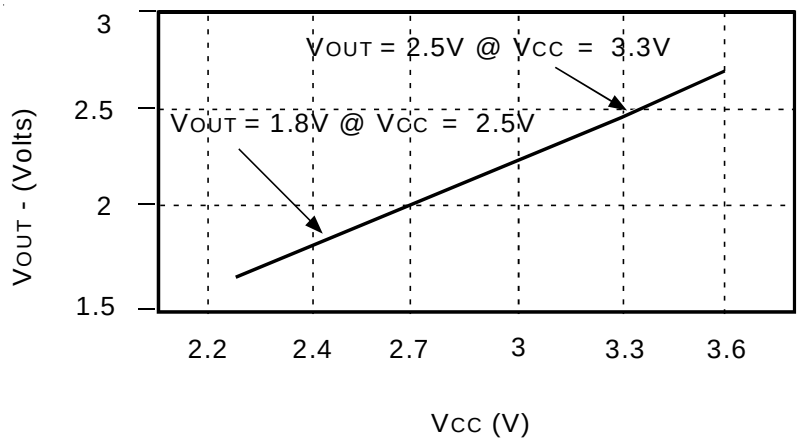


Outputs Low Characteristic

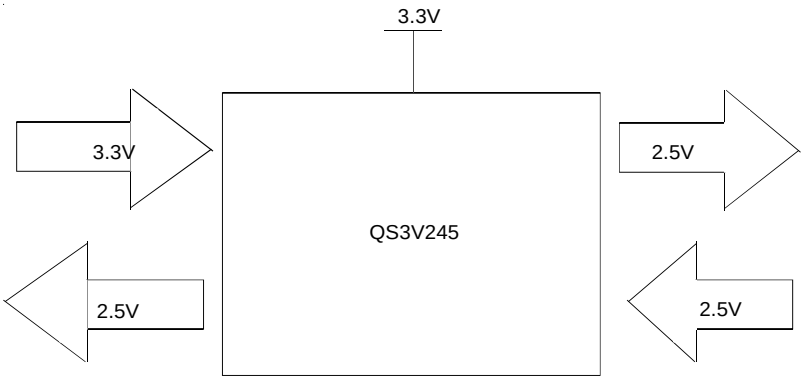


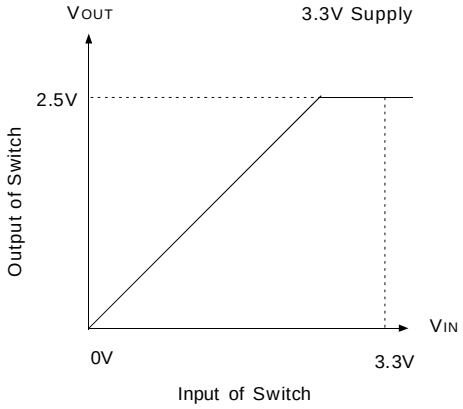
Outputs High Characteristic

PASS VOLTAGE vs VCC

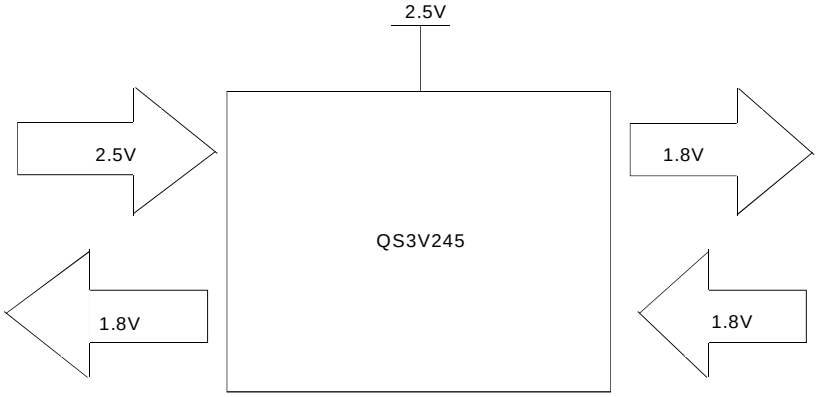


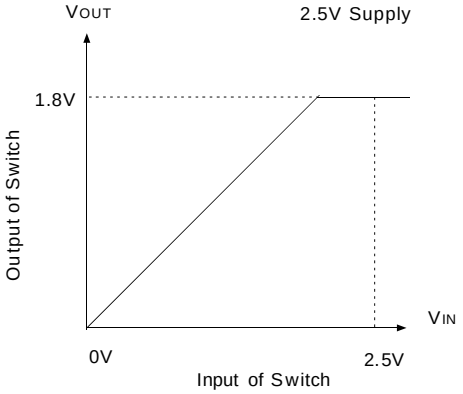
3.3V TO 2.5V VOLTAGE TRANSLATION



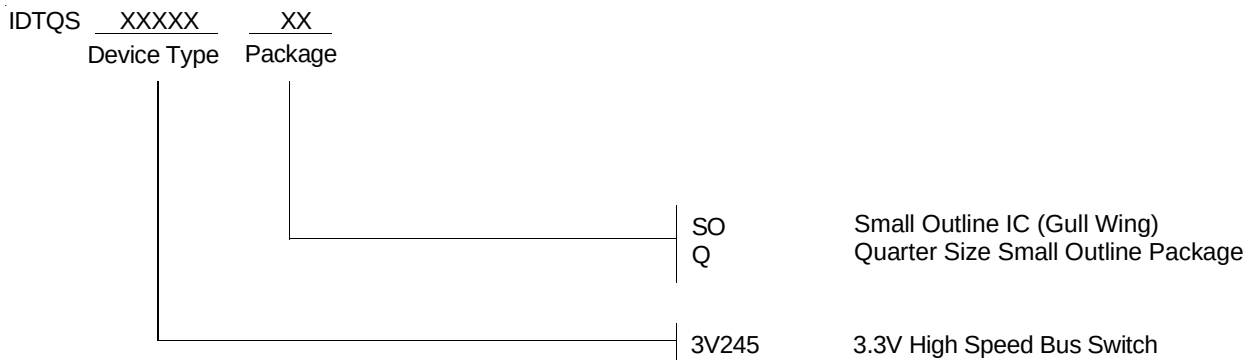


2.5V TO 1.8V VOLTAGE TRANSLATION





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

for Tech Support:
logichelp@idt.com
(408) 654-6459