QUICKSWITCH® PRODUCTS 3.3V HIGH SPEED DOUBLE-WIDTH BUS SWITCH

IDTQS32XV245

FEATURES:

- **5Ω bidirectional 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 40-pin QVSOP package**

APPLICATIONS:

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

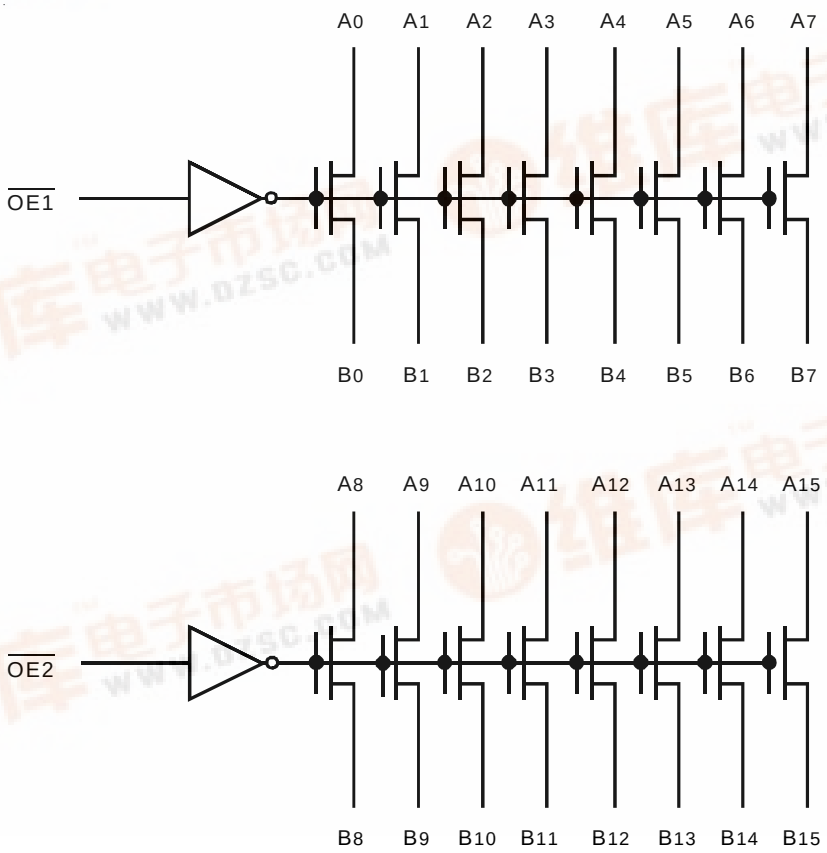
DESCRIPTION:

The QS32XV245 is a 16-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.

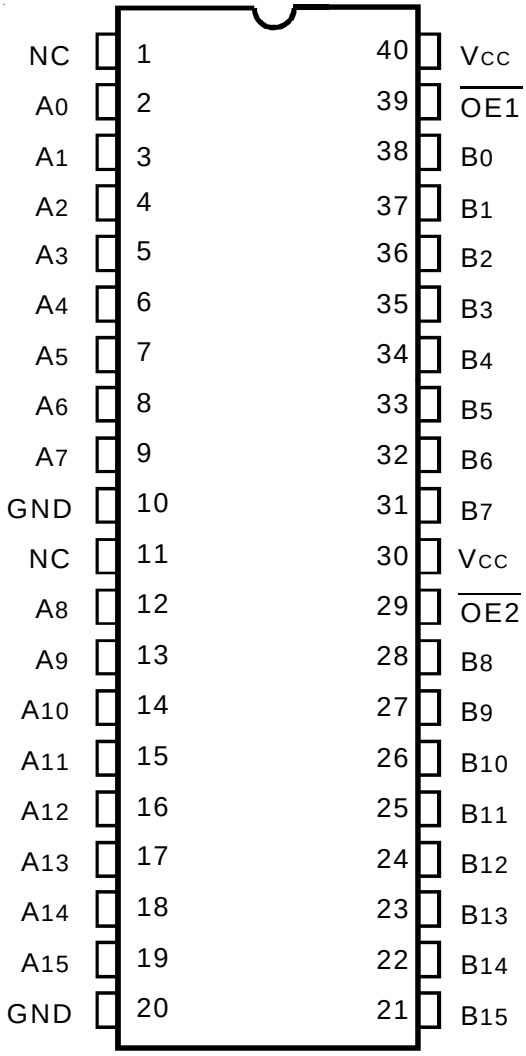
The QS32XV245 is specially designed for direct interface between 3.3V and 2.5V devices without any external components. When operating from a 3.3V supply, the logic high level at the switch output is clamped to 2.5V when the switch input signal exceeds 2.5V. This device can be used for switching 2.5V buses without signal attenuation. The ON resistance at 3.3V Vcc is less than 5Ω typical, providing near zero propagation delay through the switch. Absence of DC path from switch I/O pins to Vcc or ground makes QS32XV245 an ideal device for hot swapping applications.

The QS32XV245 is characterized for operation from -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



QVSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Description	Max	Unit
V_{TERM}(2)	Supply Voltage to Ground	–0.5 to +4.6	V
V_{TERM}(3)	DC Switch Voltage Vs	–0.5 to +4.6	V
V_{TERM}(3)	DC Input Voltage V_{IN}	–0.5 to +4.6	V
V_{AC}	AC Input Voltage (pulse width ≤ 20ns)	–3	V
I_{OUT}	DC Output Current	120	mA
P_{MAX}	Maximum Power Dissipation (T_A = 85°C)	0.6	W
T_{STG}	Storage Temperature	–65 to +150	°C

NOTE:
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. Vcc terminals.
3. All terminals except Vcc.

CAPACITANCE

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

Pins	Typ.	Max.(1)	Unit
Control Pins	4	6	pF
Quickswitch Channels (Switch OFF)	5	7	pF

NOTE:
1. This parameter is measured at characterization but not tested.

PIN DESCRIPTION

Pin Names	Description
$\overline{OE}$	Output Enable
An, Bn	Data I/Os

FUNCTION TABLE(1)

$\overline{OE1}$	$\overline{OE2}$	A_0 - A_7	A_8 - A_{15}	Function
H	H	Z	Z	Disconnect
L	H	B_0 - B_7	Z	Connect
H	L	Z	B_8 - B_{15}	Connect
L	L	B_0 - B_7	B_8 - B_{15}	Connect

NOTE:
1. H = HIGH Voltage Level
   L = LOW Voltage Level
   Z = High-Impedance

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 Level	Guaranteed Logic HIGH for Control Pins	2	—	—	V
V_{IL}	Input LOW Level	Guaranteed Logic LOW for Control Pins	—	—	0.8	V
I_{IN}	Input LeakageCurrent (Control Inputs)	0V ≤ V_{IN} ≤ V_{CC}	—	—	1	µA
I_{OZ}	Off-State Output 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	2.5	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, T_A = 25°C.
2. Pass Voltage is guaranteed but not production tested.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions(1)	Max.	Unit
I_{CCQ}	Quiescent Power Supply Current	V_{CC} = Max., V_{IN} = GND or Vcc, f = 0	6	µA
ΔI_{CC}	Power Supply Current per Control Input HIGH (2)	V_{CC} = Max., V_{IN} = 3.4V, f = 0	50	µA
I_{CCD}	Dynamic Power Supply Current per MHz(3)	V_{CC} = Max., A and B pins open Control Inputs Toggling at 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 TLL driven input (V_{IN} = 3.4V, control inputs only). A and B pins do not contribute to ΔI_{CC}.
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

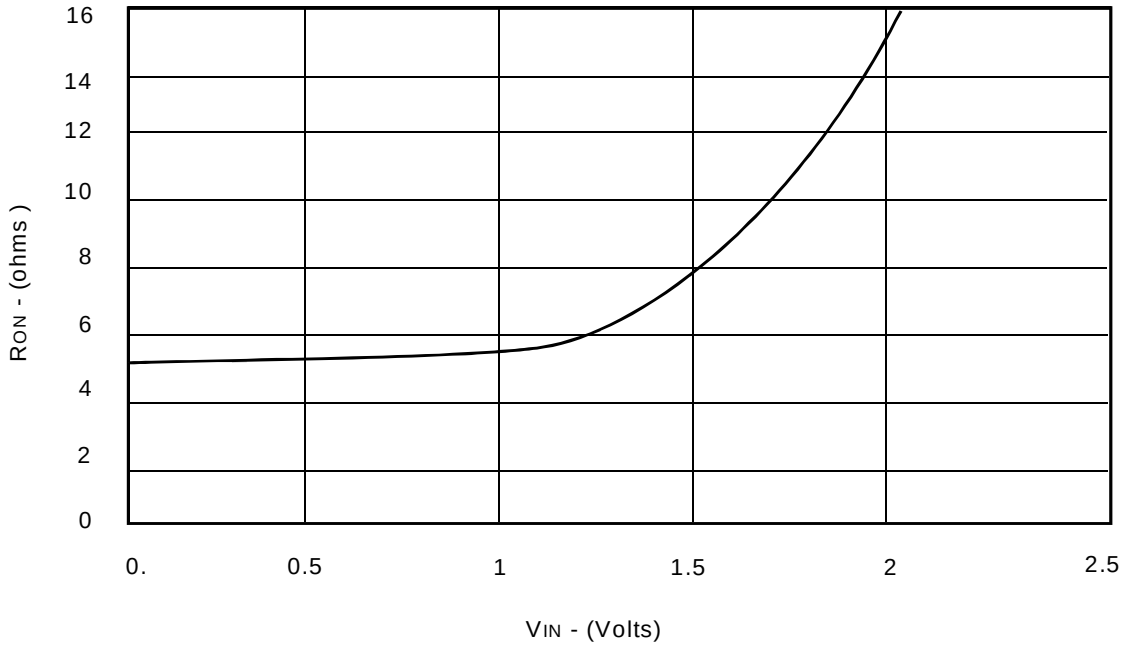
T_A = -40°C to +85°C, V_{CC} = 3.3V ±0.3V

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

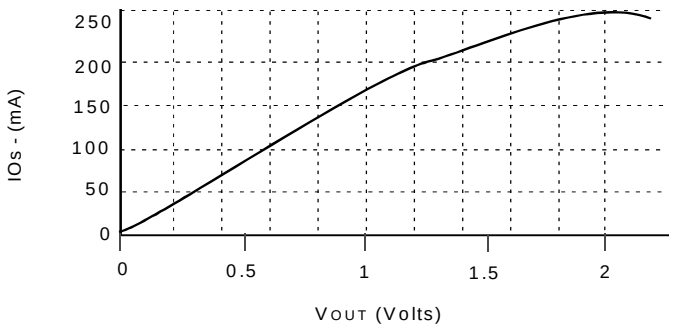
Symbol	Parameter	Min.[1]	Typ.	Max.	Unit
t_{PLH} t_{PHL}	Data Propagation Delay[2,3] An to/from Bn	—	—	0.25	ns
t_{PZL} t_{PZH}	Switch Turn-on Delay $\overline{OE}$n to An/Bn	0.5	—	6.5	ns
t_{PLZ} t_{PHZ}	Switch Turn-off Delay[2] $\overline{OE}$n to An/Bn	0.5	—	4	ns

NOTES:
1. Minimums are 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 capacitance. 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.

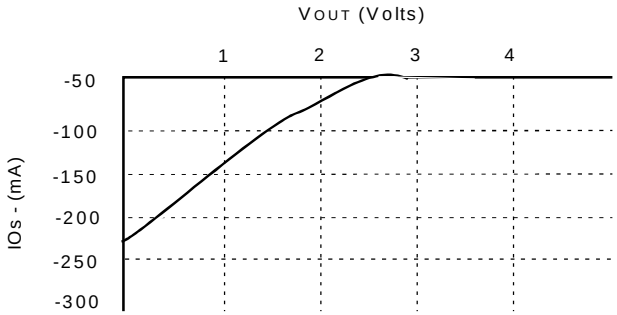
TYPICAL ON RESISTANCE vs V_{IN} AT V_{CC} = 3.3V



OUTPUT VI CHARACTERISTICS

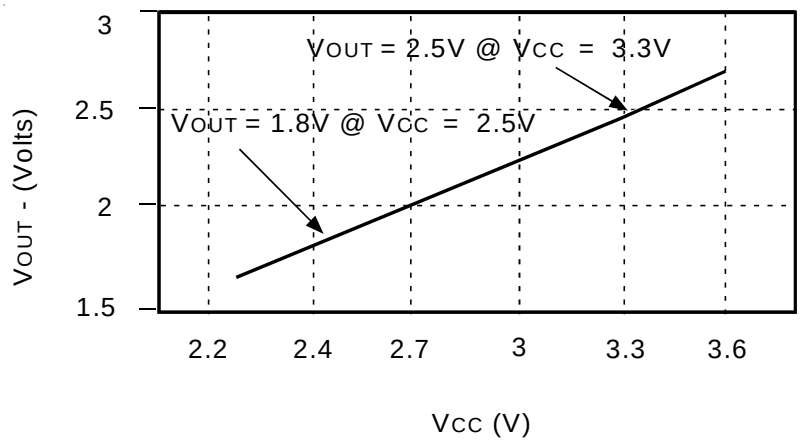


Outputs Low Characteristic

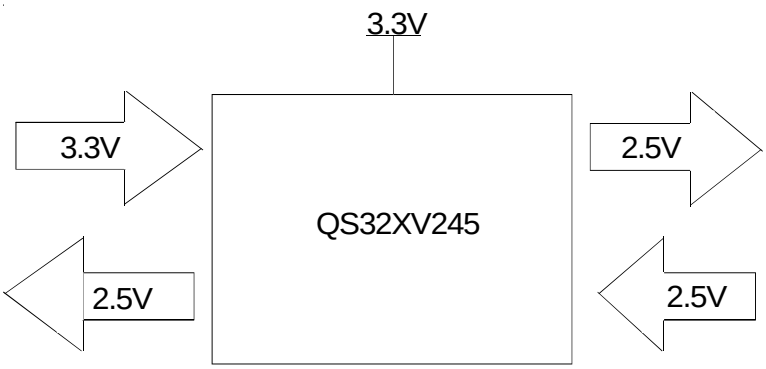


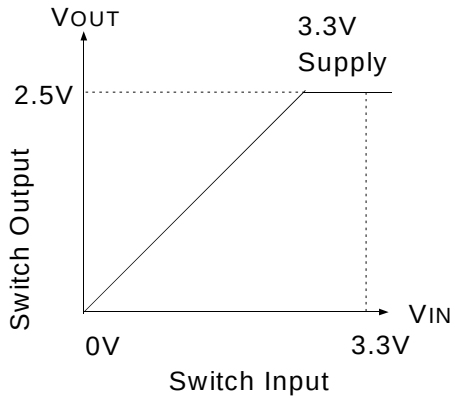
Outputs High Characteristic

PASS VOLTAGE vs VCC

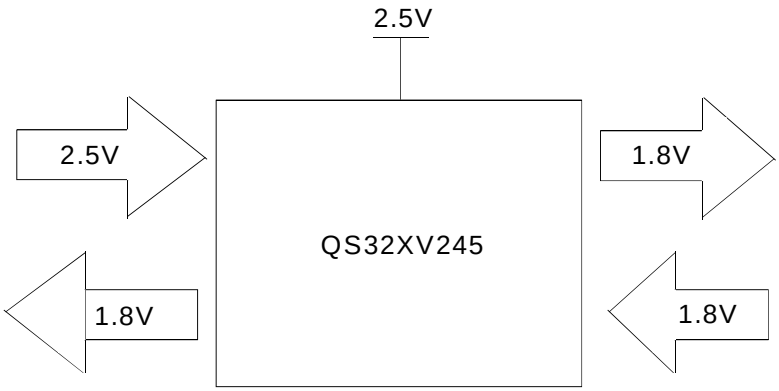


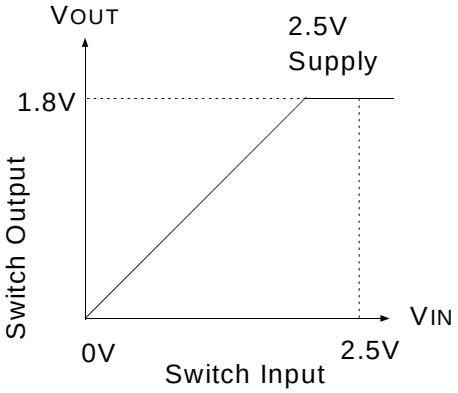
3.3V TO 2.5V VOLTAGE TRANSLATION



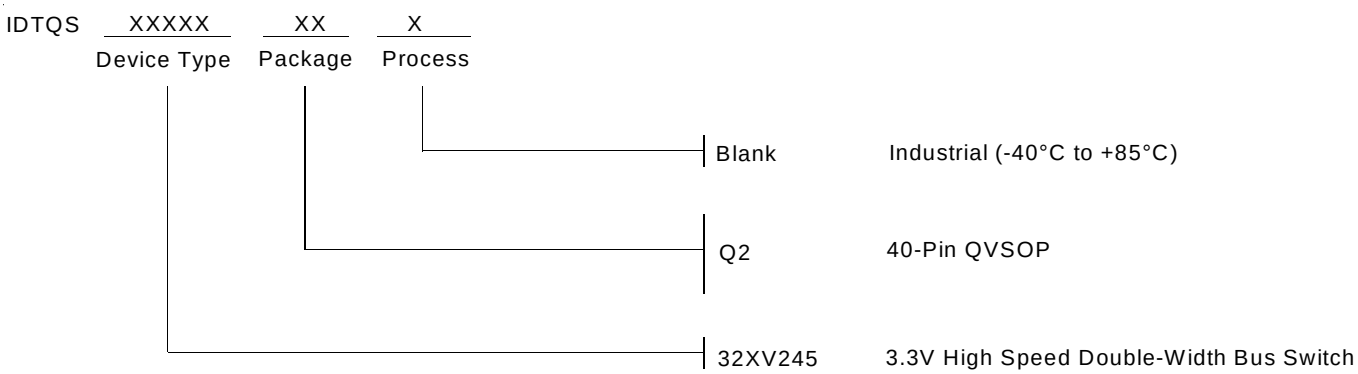


2.5V TO 1.8V VOLTAGE TRANSLATION





ORDERING INFORMATION



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