QUICKSWITCH® PRODUCTS HIGH-SPEED CMOS QUICKSWITCH 32:16 MUX/DEMUX

IDTQS316233

FEATURES:

- **Enhanced N channel FET with no inherent diode to Vcc**
- **5Ω bidirectional switches connect inputs to outputs**
- **Zero propagation delay, zero ground bounce**
- **TTL-compatible input and output levels**
- **Undershoot clamp diodes on all switch and control inputs**
- **Available in SSOP and TSSOP packages**

APPLICATIONS:

- **Video, audio, graphics switching, muxing**
- **Hot-swapping, hot-docking**
- **Voltage translation (5V to 3.3V)**
- **Bus funneling**

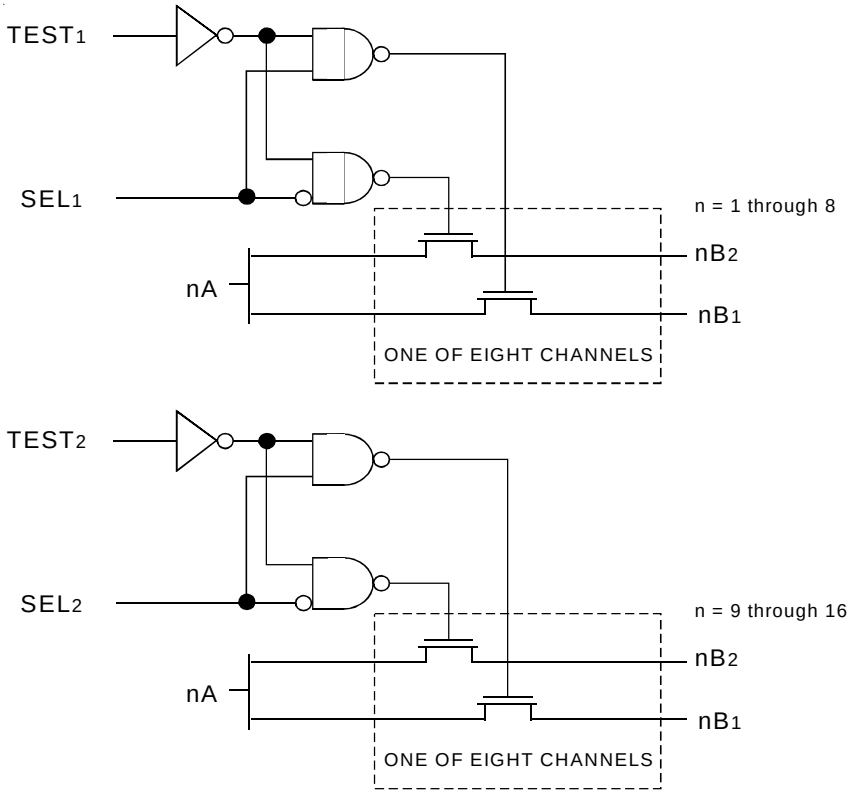
DESCRIPTION:

The QS316233 is a 32-bit to 16-bit high-speed CMOS, TTL-compatible switch which can multiplex or demultiplex data. It can be used for memory interleaving where two memory banks need to be addressed simultaneously. It can also be used as two 16-bit to 8-bit multiplexers or as one 32-bit to 16-bit multiplexer. SELn inputs control the data flow. TESTn inputs control either one or two ports connection.

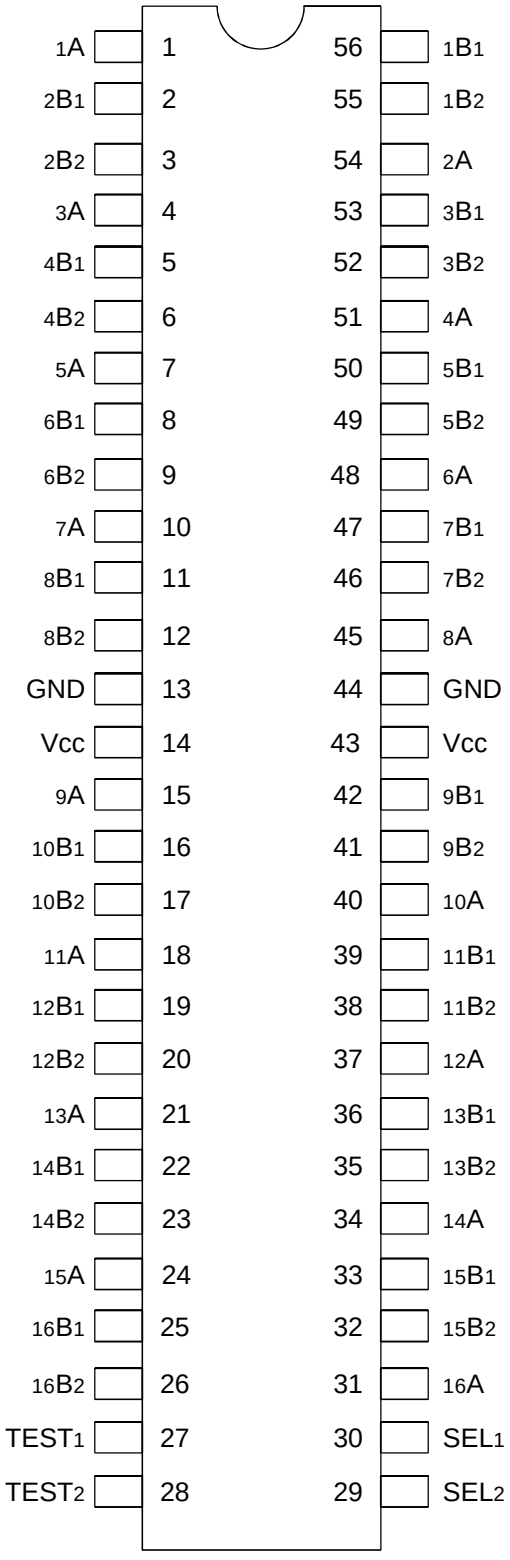
Mux/Demux devices provide an order of magnitude faster speed than equivalent logic devices.

The QS316233 is characterized for operation at -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



SSOP/ TSSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Description		Max	Unit
V_{TERM}(2)	Supply Voltage to Ground		–0.5 to +7	V
V_{TERM}(3)	DC Switch Voltage V_S		–0.5 to +7	V
V_{TERM}(3)	DC Input Voltage V_{IN}		–0.5 to +7	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)	SSOP	0.93	W
		TSSOP	0.77	
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)

Pins		Typ.	Max.(1)	Unit
Control Inputs		5	5.5	pF
Quickswitch Channels (Switch OFF)	Mux	8.5	10	pF
	Demux	6	7	

NOTE:
1. This parameter is guaranteed but not production tested.

PIN DESCRIPTION

Pin Names	I/O	Description
xA	I/O	Bus A
xB_1, xB_2	I/O	Bus B
SEL_1, SEL_2	I	Data Select
$TEST_1$, $TEST_2$	I	Port Select

FUNCTION TABLES(1)

n = 1 through 8

SEL_1	$TEST_1$	xA	Function
L	L	xB_1	xA to xB_1
H	L	xB_2	xA to xB_2
X	H	xB_1, xB_2	xA to xB_1 and xB_2

n = 9 through 16

SEL_2	$TEST_2$	xA	Function
L	L	xB_1	xA to xB_1
H	L	xB_2	xA to xB_2
X	H	xB_1, xB_2	xA to xB_1 and xB_2

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

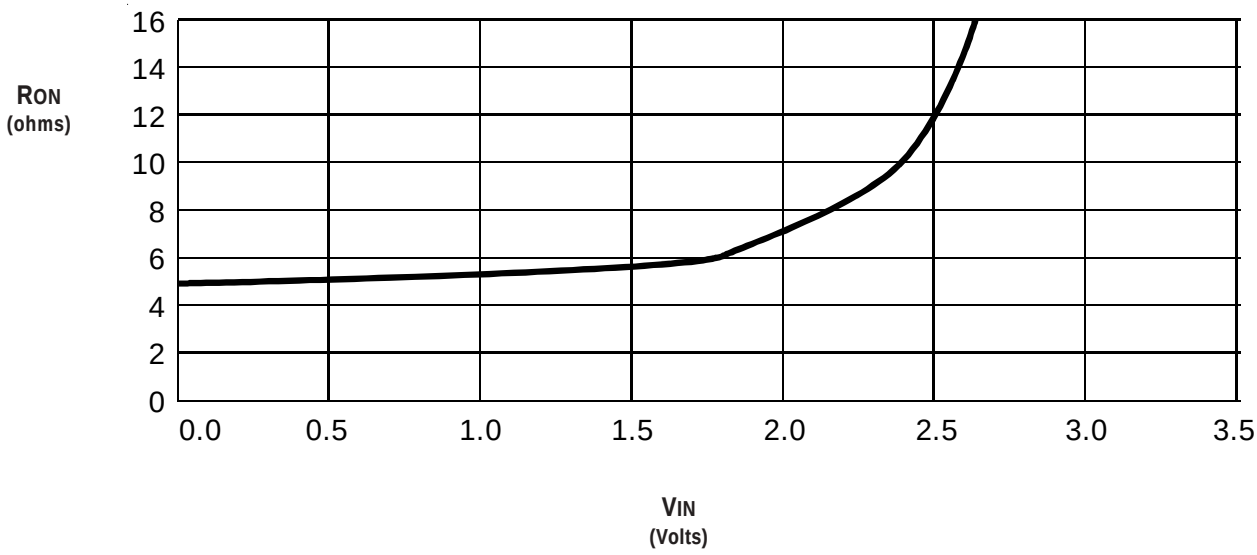
DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Industrial: T_A = –40°C to +85°C, V_{CC} = 5V ± 10%

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}	—	—	±1	µA
R_{ON}	Switch ON Resistance	V_{CC} = Min., V_{IN} = 0V, I_{ON} = 30mA	—	5	7	Ω
		V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15mA	—	10	12	
V_P	Pass Voltage[2]	V_{IN} = V_{CC} = 5V, I_{OUT} = -5µA	3.7	4	4.2	V

NOTES:
1. Typical values are at V_{CC} = 5V and T_A = 25°C.
2. Pass voltage is guaranteed but not production tested.

TYPICAL ON RESISTANCE vs V_{IN} AT V_{CC} = 5V



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	µA
ΔI_{CC}	Power Supply Current per Control Input HIGH[2]	V_{CC} = Max., V_{IN} = 3.4V, f = 0	3	mA
I_{CCD}	Dynamic Power Supply Current per MHz[3]	V_{CC} = Max., A and B 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 TTL-driven input (V_{IN} = 3.4V). 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

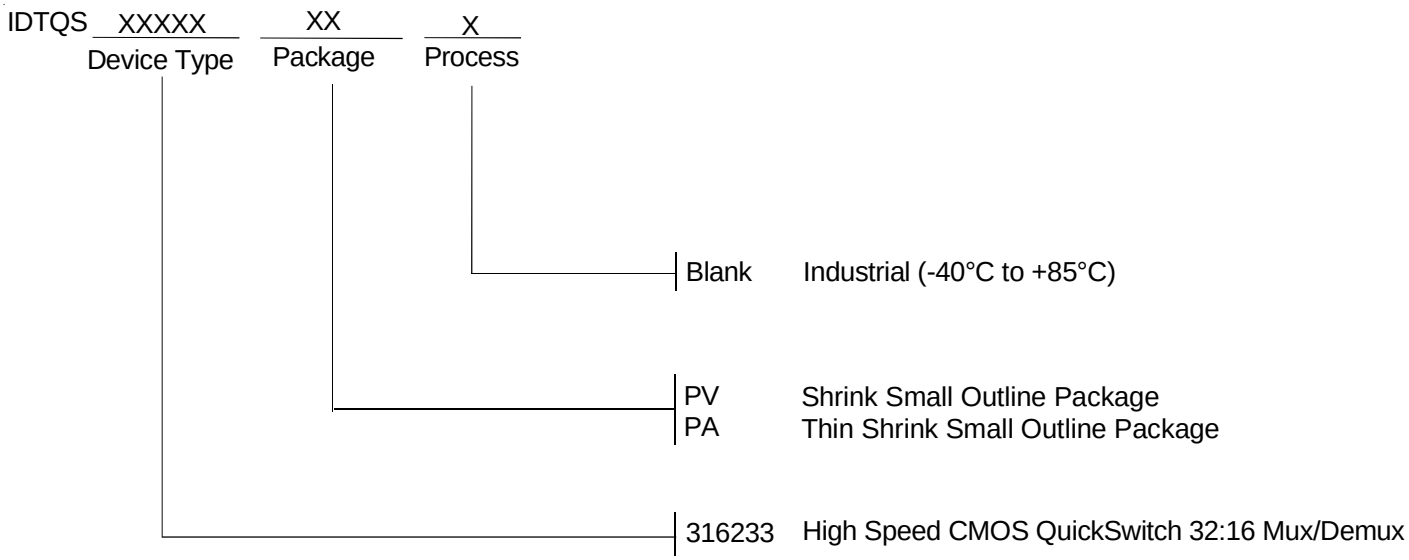
T_A = -40°C to +85°C, V_{CC} = 5V ± 10%

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

Symbol	Parameter	Min.[1]	Typ.	Max.	Unit
t_{PLH} t_{PHL}	Data Propagation Delay[2] xA to xBx, xBx to xA	—	—	0.25[3]	ns
t_{BX}	Switch Multiplex Delay SEL to xA	1.5	—	5.3	ns
t_{PZL} t_{PZH}	Switch Turn-On Delay SEL, TEST to xBx	1.5	—	5.2	ns
t_{PLZ} t_{PHZ}	Switch Turn-Off Delay[2] SEL, TEST to xBx	1.5	—	5.3	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 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.

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