



# QUICKSWITCH® PRODUCTS HIGH-SPEED CMOS 32-BIT LOW RESISTANCE QUICKSWITCH WITH PRECHARGED OUTPUTS

IDTQS34XR800

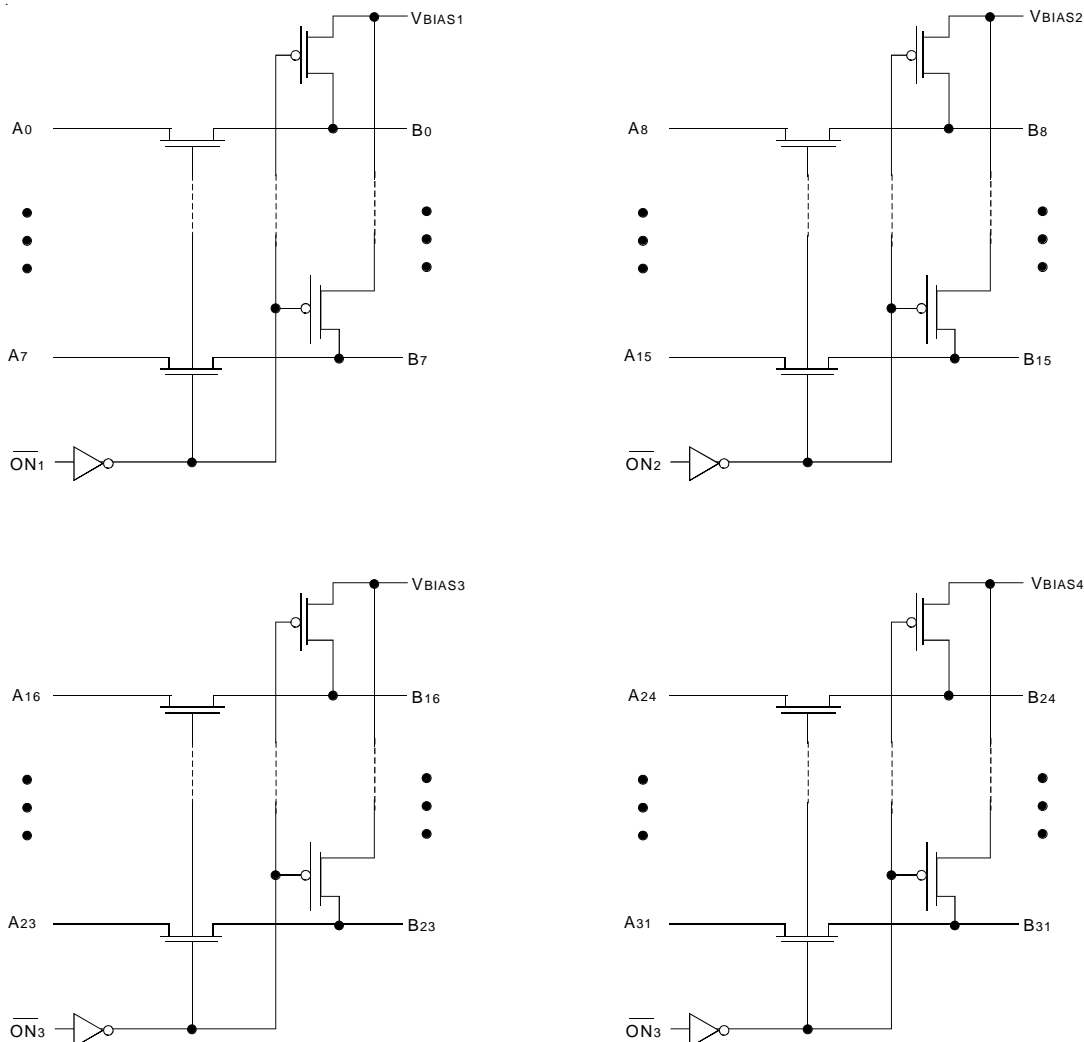
## FEATURES:

- 2.5Ω bidirectional switches connect inputs to outputs
- Zero propagation delay, zero ground bounce
- Undershoot clamp diodes on all switch and control inputs
- Outputs precharge voltage to minimize signal distortion during live insertion
- Flow-through pinout for easy layout
- TTL-compatible input and output levels
- Available in 80-pin Millipaq package

## DESCRIPTION:

The QS34XR800 is a 32-bit high-speed CMOS bus switch controlled by a four enable ( $\overline{ONx}$ ) input in a flow-through pinout. When  $\overline{ONx}$  is low, the switch is on and port A is connected to port B. When  $\overline{ONx}$  is high, the switch between port A and port B is open and port B is precharged to the bias voltage. The low ON resistance (2.5Ω) of the QS34XR800 allows inputs to be connected to outputs without adding propagation delay and without generating additional noise. The QS34XR800 also precharges the B port to a user-selectable bias voltage to minimize live-insertion noise, which is useful in VME bus applications.

## FUNCTIONAL BLOCK DIAGRAM

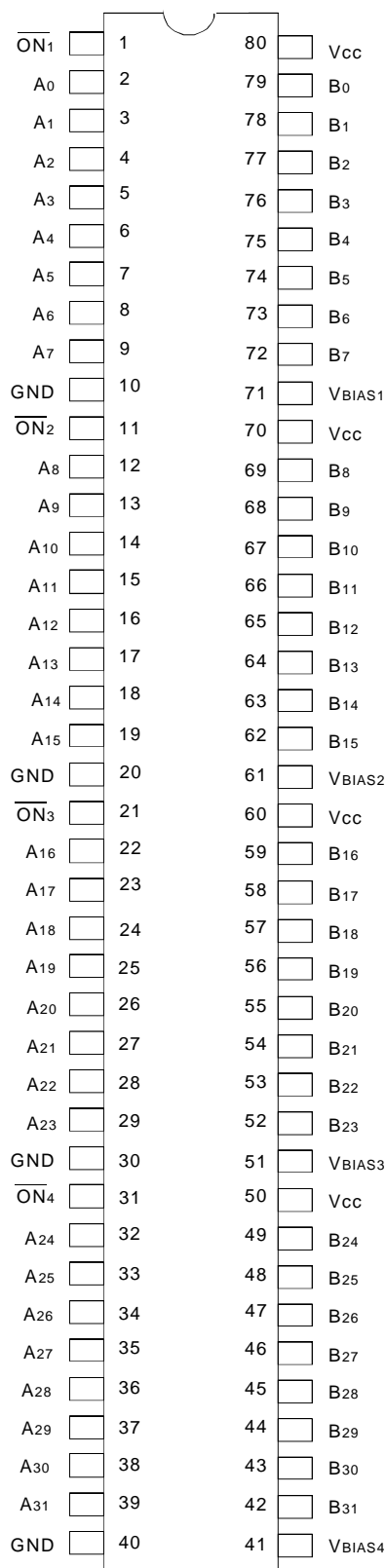


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INDUSTRIAL TEMPERATURE RANGE

NOVEMBER 1999

## PIN CONFIGURATION



MILLIPAQ (Q3)  
TOP VIEW

## ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>

Symbol	Description	Max	Unit
VTERM <sup>(2)</sup>	Supply Voltage to Ground	-0.5 to +7	V
VTERM <sup>(3)</sup>	DC Switch Voltage V <sub>s</sub>	-0.5 to +7	V
VTERM <sup>(3)</sup>	DC Input Voltage V <sub>IN</sub>	-0.5 to +7	V
VAC	AC Input Voltage (pulse width ≤ 20ns)	-3	V
IOUT	DC Output Current	120	mA
P <sub>MAX</sub>	Maximum Power Dissipation (T <sub>A</sub> = 85°C)	0.5	W
TSTG	Storage Temperature	-65 to +150	°C

### NOTE:

- 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.
- V<sub>CC</sub> terminals.
- All terminals except V<sub>CC</sub>.

## CAPACITANCE

(T<sub>A</sub> = +25°C, f = 1.0MHz, V<sub>IN</sub> = 0V, V<sub>OUT</sub> = 0V)

Pins	Typ.	Max. <sup>(1)</sup>	Unit
Control Pins	3	4	pF
Quickswitch Channels (Switch OFF)	5	8	pF

### NOTE:

- This parameter is measured at characterization but not tested.

## PIN DESCRIPTION

Pin Names	I/O	Description
A <sub>0</sub> - A <sub>31</sub>	I/O	Bus A
B <sub>0</sub> - B <sub>31</sub>	I/O	Bus B
$\overline{\text{ON}}_x$	I	Bus Switch Enable
VBIAS <sub>X</sub>	I	Bias Voltage

## FUNCTION TABLE<sup>(1)</sup>

$\overline{\text{ON}}_x$ <sup>(2)</sup>	B <sub>m</sub> -B <sub>n</sub>	Function
L	A <sub>m</sub> - A <sub>n</sub>	Connect
H	VBIAS <sub>X</sub>	Precharge

### NOTES:

- H= HIGH Voltage Level  
L= LOW Voltage Level
- For X = 1    m = 0    n = 7  
X = 2    m = 8    n = 15  
X = 3    m = 16    n = 23  
X = 4    m = 24    n = 31

## DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

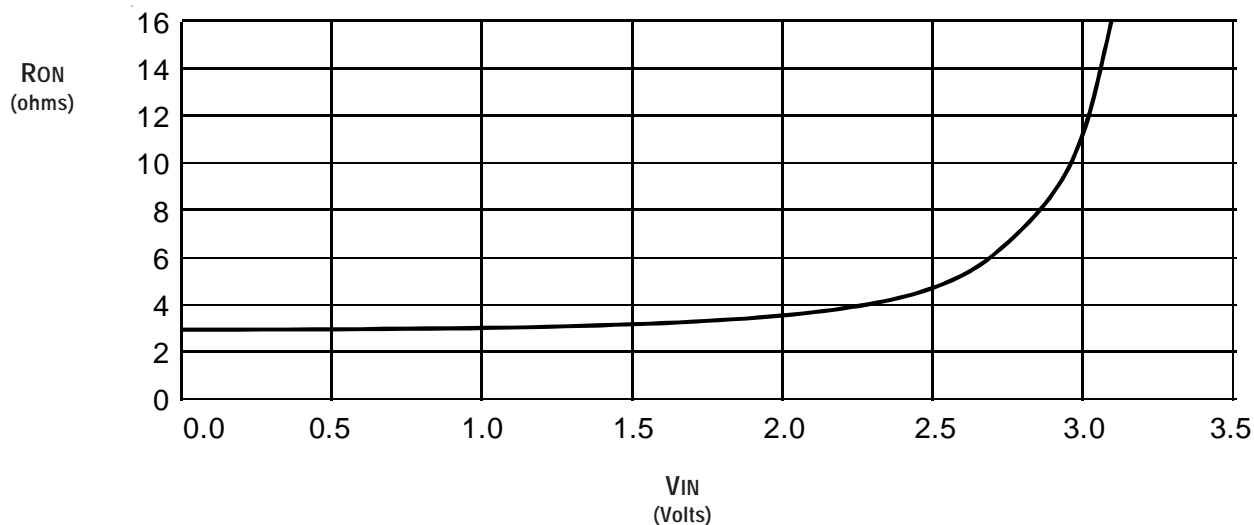
Industrial:  $T_A = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{CC} = 5.0\text{V} \pm 10\%$

Symbol	Parameter	Test Conditions	Min.	Typ. <sup>(1)</sup>	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
$V_{BIAS}$	Bias Voltage	$V_{CC} = 5\text{V}$ , $\overline{ON}x = \text{HIGH}$	1.3	—	$V_{CC}$	V
$I_O$	Bias Current	$V_{CC} = 4.5\text{V}$ , $V_{BIAS} = 2.4\text{V}$ , $V_{OUT} = 0$ , $\overline{ON}x = \text{HIGH}$	0.25	—	—	mA
$I_{IN}$	Input Leakage Current (Control Inputs)	$0\text{V} \leq V_{IN} \leq V_{CC}$	—	—	$\pm 1$	$\mu\text{A}$
$I_{OZ}$	Off-State Output Current (Hi-Z)	$0\text{V} \leq V_{OUT} \leq V_{CC}$	—	—	$\pm 1$	$\mu\text{A}$
$R_{ON}$	Switch ON Resistance <sup>(2,3)</sup>	$V_{CC} = \text{Min.}$ , $V_{IN} = 0\text{V}$ , $I_{ON} = 30\text{mA}$	—	2.5	5	$\Omega$
		$V_{CC} = \text{Min.}$ , $V_{IN} = 2.4\text{V}$ , $I_{ON} = 15\text{mA}$	—	4	8.5	

**NOTES:**

1. Typical values are at  $V_{CC} = 5.0\text{V}$ ,  $T_A = 25^{\circ}\text{C}$ .
2. Max value of  $R_{ON}$  is guaranteed but not production tested.
3. During input/output leakage, testing all pins are at HIGH or LOW state.

### TYPICAL ON RESISTANCE vs $V_{IN}$ AT $V_{CC} = 5\text{V}$



## POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions <sup>(1)</sup>	Typ.	Max.	Unit
I <sub>CCQ</sub>	Quiescent Power Supply Current	V <sub>CC</sub> = Max., V <sub>IN</sub> = GND or V <sub>CC</sub> , f = 0	0.2	6	μA
ΔI <sub>CC</sub>	Power Supply Current per Control Input HIGH <sup>(2)</sup>	V <sub>CC</sub> = Max., V <sub>IN</sub> = 3.4V, f = 0	—	6.5	mA
I <sub>CCD</sub>	Dynamic Power Supply Current per MHz <sup>(3)</sup>	V <sub>CC</sub> = Max., A and B pins open Data inputs = GND Control Inputs Toggling at 50% Duty Cycle	—	0.25	mA/MHz

### NOTES:

- For conditions shown as Min. or Max., use the appropriate values specified under DC Electrical Characteristics.
- Per TLL driven input (V<sub>IN</sub> = 3.4V, control inputs only). A and B pins do not contribute to ΔI<sub>CC</sub>.
- 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<sub>A</sub> = -40°C to +85°C, V<sub>CC</sub> = 5.0V ± 10%;

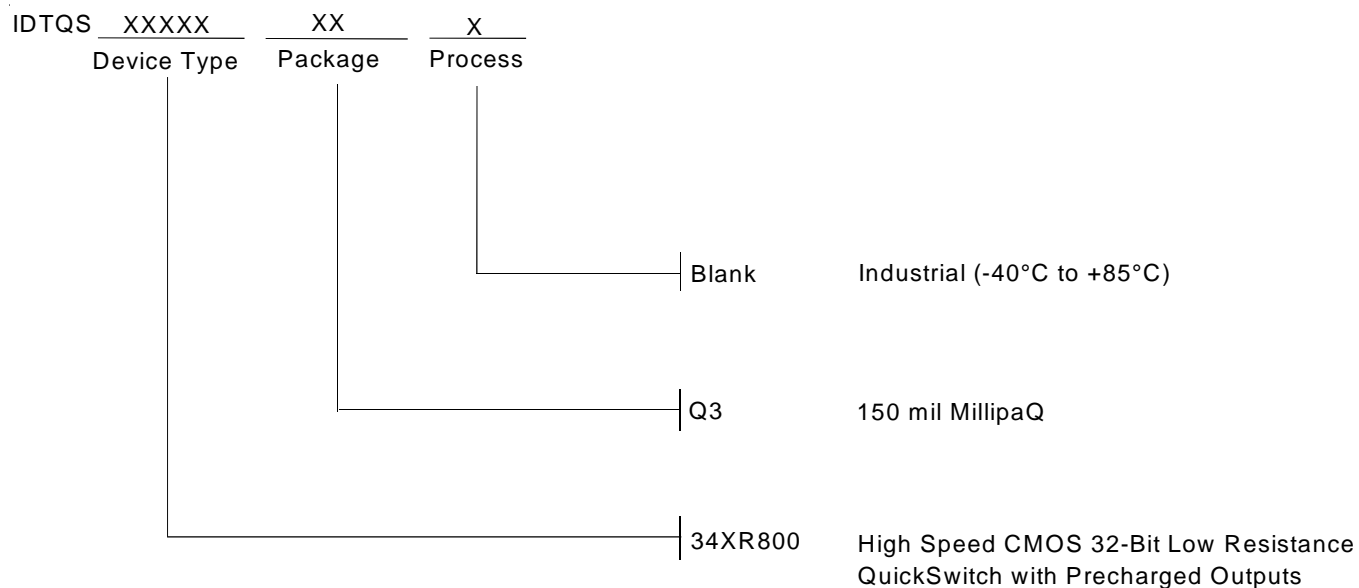
C<sub>LOAD</sub> = 50pF, R<sub>LOAD</sub> = 500Ω unless otherwise noted.

Symbol	Parameter	Min. <sup>(1)</sup>	Typ.	Max.	Unit
t <sub>PLH</sub>	Data Propagation Delay <sup>(2,3)</sup>	—	—	0.12	ns
t <sub>PHL</sub>	A to B or B to A	—	—	—	—
t <sub>PZL</sub>	Switch Turn-on Delay	1.5	—	7.5	ns
t <sub>PZH</sub>	$\overline{\text{ON}}x$ to A or B	—	—	—	—
t <sub>PLZ</sub>	Switch Turn-off Delay <sup>(2)</sup>	1.5	—	6.5	ns
t <sub>PHZ</sub>	$\overline{\text{ON}}x$ to A or B	—	—	—	—

### NOTES:

- Minimums are guaranteed but not production tested.
- This parameter is guaranteed but not production tested.
- 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 0.12ns for C<sub>L</sub> = 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



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