QUICKSWITCH® PRODUCTS
HIGH-SPEED CMOS
QUICKSWITCH 32-BIT
MULTIWIDTH™ BUS SWITCHES

IDTQS34X245

FEATURES:

• Enhanced N channel FET with no inherent diode to Vcc
• Bidirectional switches connect inputs to outputs
• Zero propagation delay, zero ground bounce
• QS34X245 is 32-bit version of QS3245
• Flow-through pinout for easy layout
• Undershoot clamp diodes on all switch and control inputs
• TTL-compatible control inputs
• Available in 80-pin MilliPaQ™ package

APPLICATIONS:

• Hot-swapping, hot-docking
• Voltage translation (5V to 3.3V)
• Bus switching and isolation
• Power conservation
• Logic replacement (data processing)
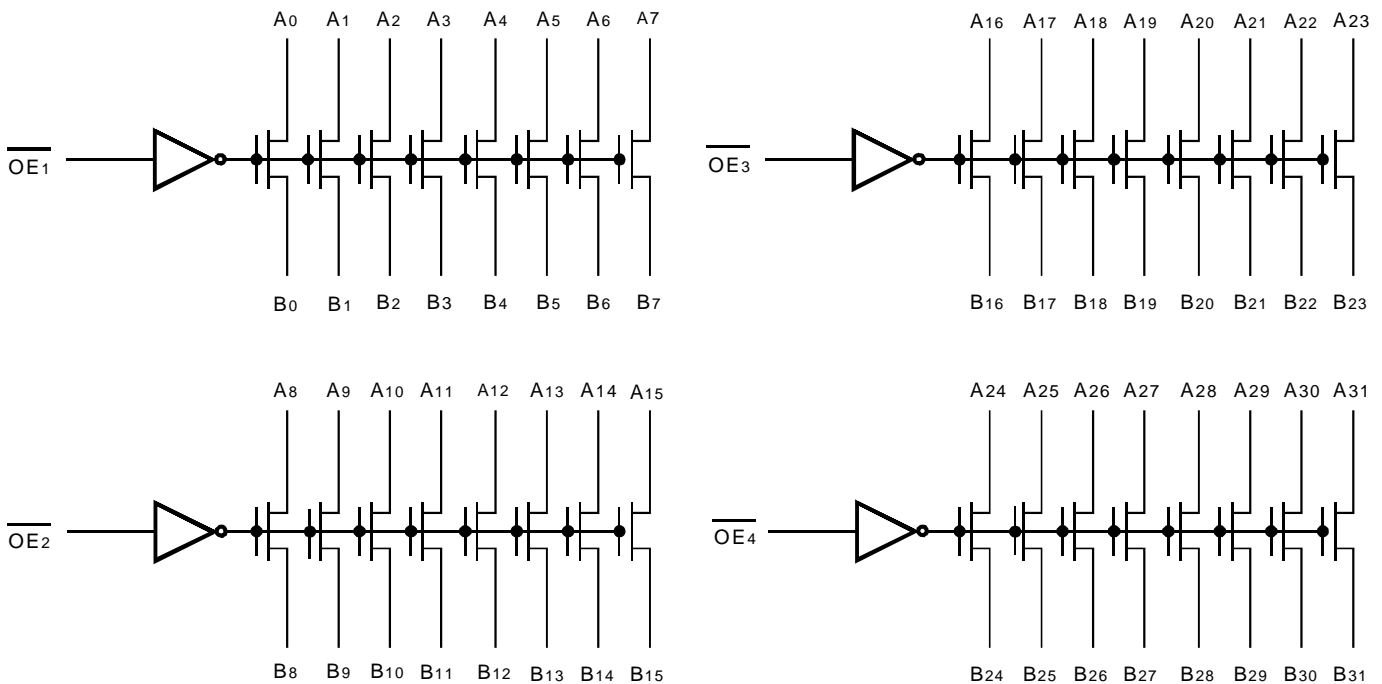• Capacitance isolation
• Clock gating

DESCRIPTION:

The QS34X245 is a member of the MultiWidth™ family of QuickSwitch devices and provides a set of 32 high-speed CMOS compatible bus switches in a flow-through pinout. This device is available in the MilliPaQ package, the world's first small outline 32-bit solution. The low ON-resistance of the QS34X245 allows inputs to be connected to outputs without adding propagation delay and without generating additional ground bounce noise. When Output Enable ($\overline{OEn}$) is low, the switches are turned on, connecting bus A to bus B. When $\overline{OEn}$ is high, the switches are turned off. This device is ideally suited for 32/64 bit applications where board space is at a premium.

QuickSwitch devices provide speeds an order of magnitude faster than conventional logic devices.

The QS34X245 is characterized for operation at -40°C to +85°C.
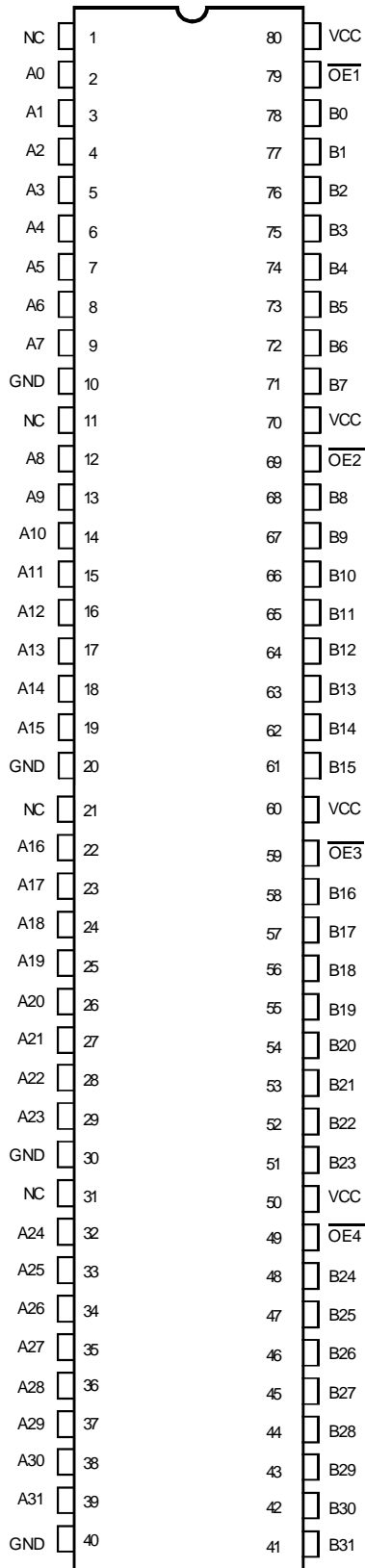
FUNCTIONAL BLOCK DIAGRAM

INDUSTRIAL TEMPERATURE RANGE

APRIL 2000

DSC-5481/3

PIN CONFIGURATION

NC	1	80	VCC
A0	2	79	$\overline{OE1}$
A1	3	78	B0
A2	4	77	B1
A3	5	76	B2
A4	6	75	B3
A5	7	74	B4
A6	8	73	B5
A7	9	72	B6
GND	10	71	B7
NC	11	70	VCC
A8	12	69	$\overline{OE2}$
A9	13	68	B8
A10	14	67	B9
A11	15	66	B10
A12	16	65	B11
A13	17	64	B12
A14	18	63	B13
A15	19	62	B14
GND	20	61	B15
NC	21	60	VCC
A16	22	59	$\overline{OE3}$
A17	23	58	B16
A18	24	57	B17
A19	25	56	B18
A20	26	55	B19
A21	27	54	B20
A22	28	53	B21
A23	29	52	B22
GND	30	51	B23
NC	31	50	VCC
A24	32	49	$\overline{OE4}$
A25	33	48	B24
A26	34	47	B25
A27	35	46	B26
A28	36	45	B27
A29	37	44	B28
A30	38	43	B29
A31	39	42	B30
GND	40	41	B31

MILLIPAQ
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 Vs	–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 $\leq$ 20ns)	–3	V
I_{OUT}	DC Output Current	120	mA
P_{MAX}	Maximum Power Dissipation (T_A =70°C)	1.4	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. V_{CC} terminals.
3. All terminals except V_{CC}.

CAPACITANCE

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

Pins	Typ.	Max.[1]	Unit
Control Pins	3	4	pF
Quickswitch Channels (Switch OFF)	7	8	pF

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

PIN DESCRIPTION

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

FUNCTION TABLE[1]

$\overline{OEn}$	Function
H	Disconnected
L	An = Bn

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} = 5.0V ±5%

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 Leakage Current (Control Inputs)	$0V \leq V_{IN} \leq V_{CC}$	—	—	±1	µA
I_{OZ}	Off-State Current (Hi-Z)	$0V \leq V_{OUT} \leq V_{CC}$, Switches OFF	—	—	±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	15	
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} = 5.0V, T_A = 25°C.

2. Pass Voltage is guaranteed but not production tested.

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

R_{ON}
(ohms)

V_{IN}
(Volts)
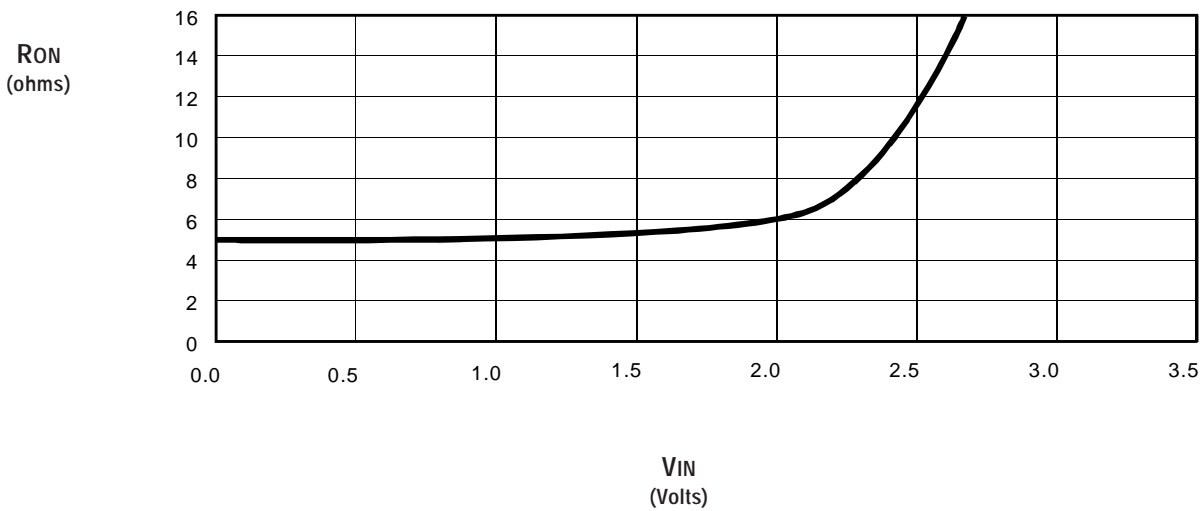
POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]	Max.	Unit
I_{CCQ}	Quiescent Power Supply Current	V_{CC} = Max., V_{IN} = GND or V_{CC}, f = 0	12	μA
ΔI_{CC}	Power Supply Current per Control Input HIGH [2]	V_{CC} = Max., V_{IN} = 3.4V, f = 0	1.5	mA
I_{CCD}	Dynamic Power Supply Current per MHz[3]	V_{CC} = Max., A and B pins open Control Inputs Toggling at 50% Duty Cycle	0.25	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
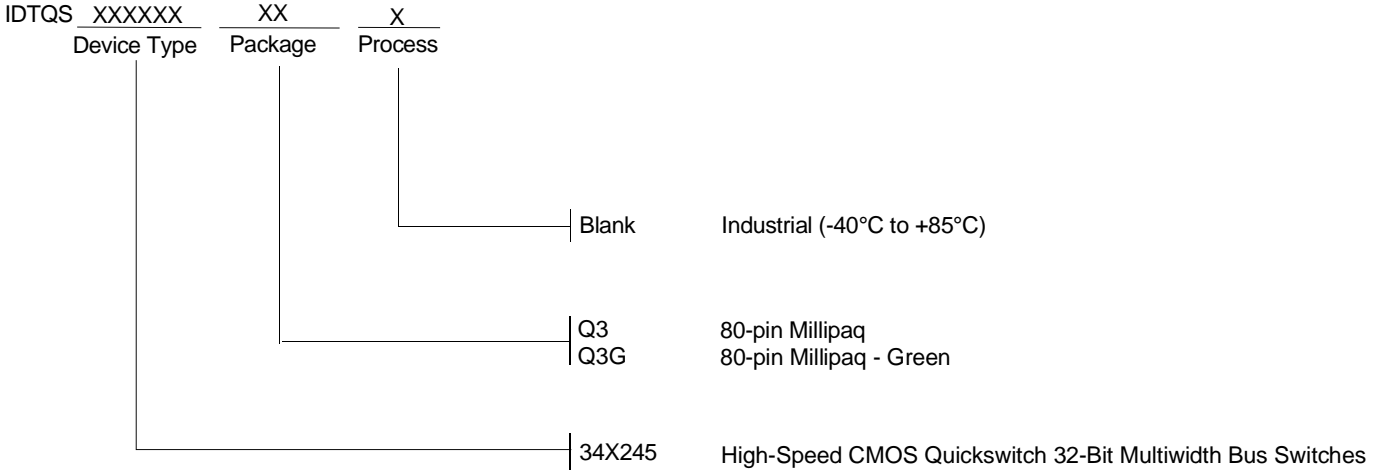
T_A = -40°C to +85°C, V_{CC} = 5.0V ± 5%;

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

Symbol	Parameter	Min. [1]	Typ.	Max.	Unit
t_{PLH}	Data Propagation Delay [1,2]	—	—	0.25	ns
t_{PHL}	An to/from Bn				
t_{PZL}	Switch Turn-on Delay	0.5	—	5.6	ns
t_{PZH}	$\overline{OE}$ to An/Bn				
t_{PLZ}	Switch Turn-off Delay [1]	0.5	—	5.2	ns
t_{PHZ}	$\overline{OE}$ to An/Bn				

NOTES:
1. Minimums are 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 for 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

IDTQS <u>XXXXXX</u>   <u>XX</u>   <u>X</u>
     Device Type   Package   Process

Blank	Industrial (-40°C to +85°C)
Q3	80-pin Millipaq
Q3G	80-pin Millipaq - Green
34X245	High-Speed CMOS Quickswitch 32-Bit Multiwidth Bus Switches

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