QUICKSWITCH® PRODUCTS
HIGH-SPEED CMOS
10-BIT BUS SWITCH

IDTQS32384

FEATURES:

– Enhanced N channel FET with no inherent diode to Vcc
– 5Ω bidirectional switches connect inputs to outputs
– Zero ground bounce
– 25Ω resistors for low noise
– Undershoot clamp diodes on all switch and control pins
– Two enables control five bits each
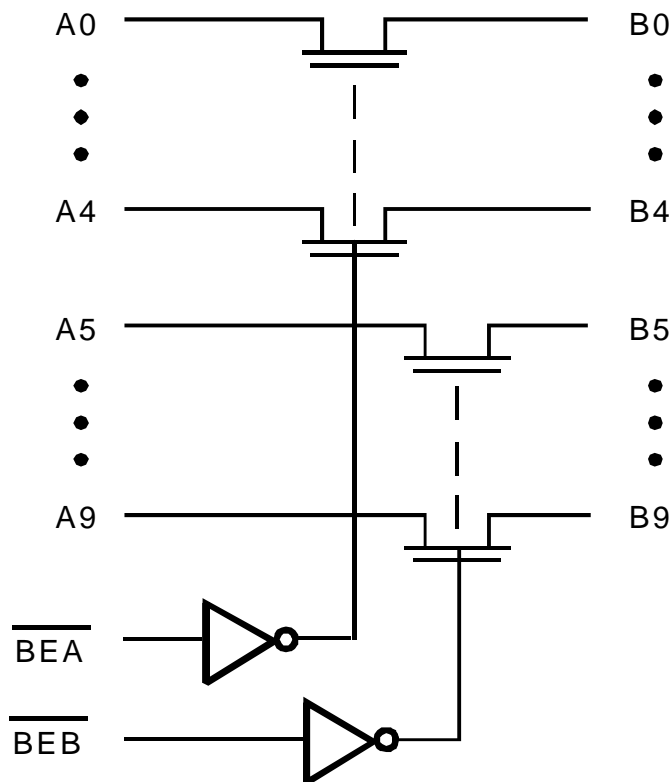– Available in SOIC and QSOP Packages

APPLICATIONS

– Hot-swapping, hot-docking
– Voltage translation (5V to 3.3V)
– Power conservation
– Capacitance reduction and isolation
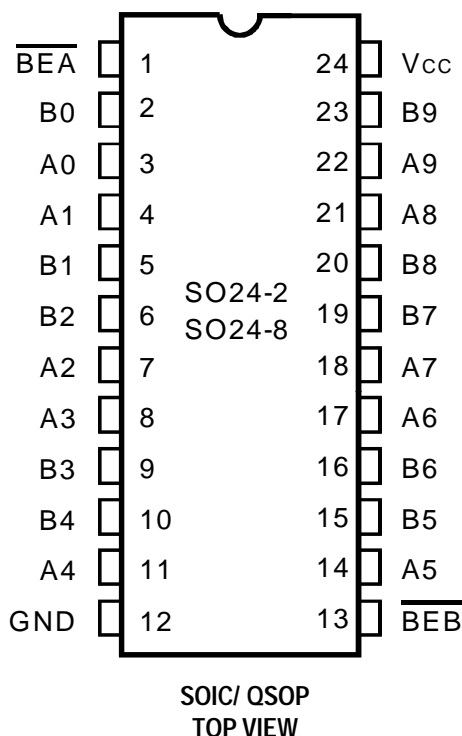– Bus isolation
– Clock gating

DESCRIPTION:

The QS32384 provides a set of ten high-speed CMOS, TTL-compatible bus switches. Two banks of five switches are controlled by independent Bus Enable ($\overline{BE}$) signals. The QS32384 adds an internal series resistor with each switch to reduce reflection noise in high speed applications. When closed, the switch acts as the source (series) termination for the driver connected to it.

The QS32384 is characterized for operation at -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM

INDUSTRIAL TEMPERATURE RANGE

APRIL 2000

DSC-5751/-

PIN CONFIGURATION


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       _____               
 BEA [ 1            24 ] Vcc
  B0 [ 2            23 ] B9
  A0 [ 3            22 ] A9
  A1 [ 4            21 ] A8
  B1 [ 5            20 ] B8
  B2 [ 6  SO24-2    19 ] B7
  A2 [ 7  SO24-8    18 ] A7
  A3 [ 8            17 ] A6
  B3 [ 9            16 ] B6
  B4 [ 10           15 ] B5
  A4 [ 11           14 ] A5
 GND [ 12           13 ] BEB
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SOIC/ QSOP
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)	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. 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 Inputs	3	5	pF
Quickswitch Channels (Switch OFF)	5	7	pF

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

PIN DESCRIPTION

Pin Names	I/O	Description
A0 - A9	I/O	Bus A
B0 - B9	I/O	Bus B
BEA, BEB	I	Bus Switch Enable

FUNCTION TABLE[1]

BEA	BEB	B0 - B4	B5 - B9	Function
H	H	Hi-Z	Hi-Z	Disconnect
L	H	A0 - A4	Hi-Z	Connect
H	L	Hi-Z	A5 - A9	Connect
L	L	A0 - A4	A5 - A9	Connect

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

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 Voltage	Guaranteed Logic HIGH for Control Pins	2	—	—	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW for Control Pins	—	—	0.8	V
I_{IN}	Input Leakage Current (Control Inputs)	$0V \leq V_{IN} \leq V_{CC}$	—	±0.01	±1	µA
I_{OZ}	Off-State Current (Hi-Z)	$0V \leq V_{OUT} \leq V_{CC}$, Switches OFF	—	±0.01	±1	µA
R_{ON}	Switch ON Resistance	V_{CC} = Min., V_{IN} = 0V, I_{ON} = 30mA	20	28	40	Ω
R_{ON}	Switch ON Resistance	V_{CC} = Min., V_{IN} = 2.4V, I_{ON} = 15mA	20	35	48	Ω
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
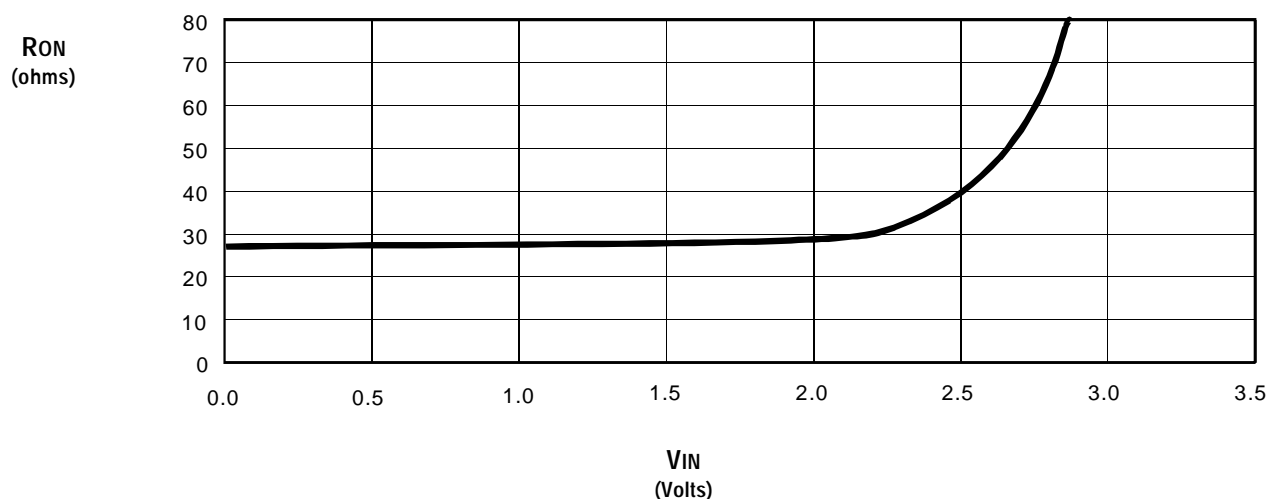
POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]	Max.	Unit
I_{CCQ}	Quiescent Power Supply Current	V_{CC} = Max., V_{IN} = GND or V_{CC}, f = 0	1.5	mA
ΔI_{CC}	Power Supply Current per Control Input HIGH [2]	V_{CC} = Max., V_{IN} = 3.4V, f = 0	2.5	mA
I_{CCD}	Dynamic Power Supply Current per MHz[3]	V_{CC} = Max., A and B pins open Control Input 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, B, C, and D 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

Following Conditions Apply Unless Otherwise Specified:

Industrial: T_A = -40°C to +85°C, V_{CC} = 5.0V ± 5%

C_{LOAD} = 50pF, R_{LOAD} = 500Ω

Symbol	Parameter	Min. [1]	Typ.	Max.	Unit
t_{PLH} t_{PHL}	Data Propagation Delay [2,4] Ax to Bx, Bx to Ax	—	—	1.25 [3]	ns
t_{PZL} t_{PZH}	Switch Turn-on Delay $\overline{BEA}$, $\overline{BEB}$ to Ax, Bx	1.5	—	7.5	ns
t_{PLZ} t_{PHZ}	Switch Turn-off Delay [2] $\overline{BEA}$, $\overline{BEB}$ to Ax, Bx	1.5	—	5.5	ns

NOTES:

1. Minimums are guaranteed but not production tested.
2. This parameter is guaranteed but not production tested.
3. The time constant for the switch alone is of the order of 1.25ns for C_L = 50pF.
4. The bus switch contributes no propagation delay other than the RC delay of the ON resistance of the switch and the load capacitance. 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 XXXXX   XX   X
       Device Type   Package   Process

Blank   Industrial (-40°C to +85°C)

SO   Small Outline IC (SO24-2)
Q   Quarter Size Outline Package (SO24-8)

32384   High Speed CMOS 10-Bit Bus Switch

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