

QUICKSWITCH[®] PRODUCTS HIGH-SPEED CMOS 24-BIT BUS-EXCHANGE SWITCH

IDTQS316212

FEATURES:

- Enhanced N channel FET with no inherent diode to Vcc
- Low propagation delay
- TTL-compatible input and output levels
- · Undershoot clamp diodes on all switch and control inputs
- Available in TSSOP package

APPLICATIONS:

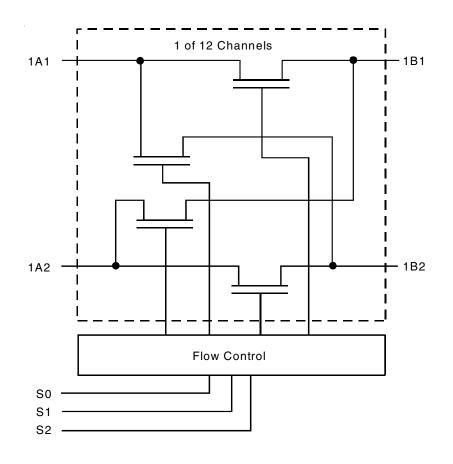
- Resource sharing
- Crossbar switching
- Hot-docking
- Voltage translation (5V to 3.3V)

DESCRIPTION:

The QS316212 provides a set of 24 high-speed CMOS TTL-compatible bus-exchange switches. The low ON resistance of the QS316212 allows inputs to be connected to outputs without adding propagation delay and without generating additional ground bounce noise. The device operates as a 24-bit bus switch or a 12-bit bus exchanger, which provides data exchanging between the four signal ports through the data-select (S0-S2) terminals.

The QS316212 is characterized for operation at -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM



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INDUSTRIAL TEMPERATURE RANGE

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PINCONFIGURATION

	1	\		1
S0	Γ	1	56] S1
1A1	Г	2	55] S2
1A2	Г	3	54	1 1B1
2A1	Г	4	53] 1B2
2A2	Г	5	52	2B1
3A1		6	51	2B2
3A2	Г	7	50] 3B1
GND	Г	8	49	GND
4A1	Г	9	48	3B2
4A2		10	47	4B1
5A1	Г	11	46	4B2
5A2		12	45	5B1
6A1	Γ	13	44	5B2
6A2	Γ	14	43] 6B1
7A1		15	42	6B2
7A2	Г	16	41] 7B1
V_{CC}		17	40] 7B2
8A1	Γ	18	39	8B1
GND	Г	19	38	GND
8A2	Г	20	37	8B2
9A1	Г	21	36	9B1
9A2	Г	22	35	9B2
10A1	Г	23	34	10B1
10A2	Г	24	33	10B2
11A1	С	25	32	11B1
11A2	Г	26	31	11B2
12A1	Γ	27	30] 12B1
12A2	Γ	28	29	12B2

TSSOP TOP VIEW

INDUSTRIAL TEMPERATURE RANGE

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Description	Max	Unit	
VTERM ⁽²⁾	Supply Voltage to Ground	–0.5 to +7	V	
VTERM ⁽³⁾	DC Switch Voltage Vs	–0.5 to +7	V	
VTERM ⁽³⁾	DC Input Voltage VIN	–0.5 to +7	V	
VAC	AC Input Voltage (pulse w	-3	V	
Ιουτ	DC Output Current	120	mA	
Рмах	Maximum Power SSOP		0.93	W
	Dissipation (TA = 85°C) TSSOP		0.77	
Tstg	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 $V\mbox{cc}$.

CAPACITANCE (TA = $+25^{\circ}$ C, f = 1MHz, VIN = 0V, VOUT = 0V)

Pins	Тур.	Max. ⁽¹⁾	Unit
Control Inputs	4	5	pF
Quickswitch Channels (Switch OFF)	7.5	9	pF

NOTE:

1. This parameter is guaranteed but not production tested.

PIN DESCRIPTION

Pin Names	I/O	Description
1Ax - 12Ax	I/O	Bus A
1Bx - 12Bx	I/O	Bus B
S0 - S2	I	Data Select

FUNCTION TABLE⁽¹⁾

S 2	S 1	S0	xA1	xA2	Function
L	L	L	Z	Z	Disconnect
L	L	Н	xB1	Z	xA1 to xB1
L	Н	L	xB2	Z	xA1 to xB2
L	Н	Н	Z	xB1	xA2 to xB1
Н	L	L	Z	xB2	xA2 to xB2
Н	L	Н	Z	Z	Disconnect
Н	Н	L	xB1	xB2	xA1 to xB1, xA2 to xB2
Н	Η	Н	xB2	xB1	xA1 to xB2, xA2 to xB1

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: TA = -40° C to $+85^{\circ}$ C. Vcc = 5V ± 10%

Symbol	Parameter	Test Conditions	Min.	Тур. ⁽¹⁾	Max.	Unit
Vih	Input HIGH Voltage	Guaranteed Logic HIGH for Control Inputs	2	-	_	V
Vil	Input LOW Voltage	Guaranteed Logic LOW for Control Inputs	_	-	0.8	V
lin	Input Leakage Current (Control Inputs)	$0V \le VIN \le VCC$	_	-	±1	μA
loz	Off-State Current (Hi-Z)	$0V \le VOUT \le VCC$, Switches OFF	-	-	±1	μA
Ron	Switch ON Resistance ⁽²⁾	VCC = Min., VIN = 0V, ION = 30mA	-	5	7	Ω
		Vcc = Min., VIN = 2.4V, ION = 15mA	-	10	12]
Vp	Pass Voltage ⁽³⁾	$V_{IN} = V_{CC} = 5V$, $I_{OUT} = -5\mu A$	3.7	4	4.2	V

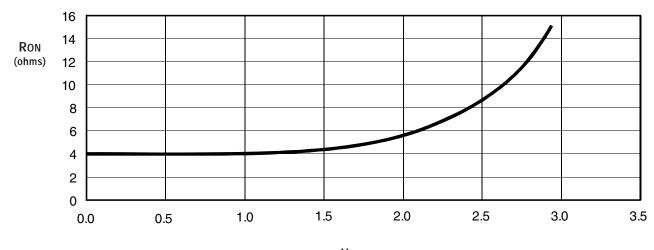
NOTES:

1. Typical values are at Vcc = 5V and Ta = 25° C.

2. Ron is guaranteed but not production tested.

3. Pass voltage is guaranteed but not production tested.

TYPICAL ON RESISTANCE vs VIN AT VCC = 5V



VIN (Volts)

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾	Max.	Unit
Icco	Quiescent Power Supply Current	Vcc = Max., VIN = GND or Vcc, f = 0	3	μA
Δ ICC	Power Supply Current per Control Input HIGH ⁽²⁾	Vcc = Max., VIN = 3.4V, f = 0	2.5	mA
ICCD	Dynamic Power Supply Current per MHz $^{\scriptscriptstyle (3)}$	Vcc = 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 (VIN = 3.4V). A and B pins do not contribute to Δ Icc.

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

 $T_A = -40^{\circ}C \text{ to } +85^{\circ}C, V_{CC} = 5V \pm 10\%$

CLOAD = 50pF, RLOAD = 500Ω unless otherwise noted.

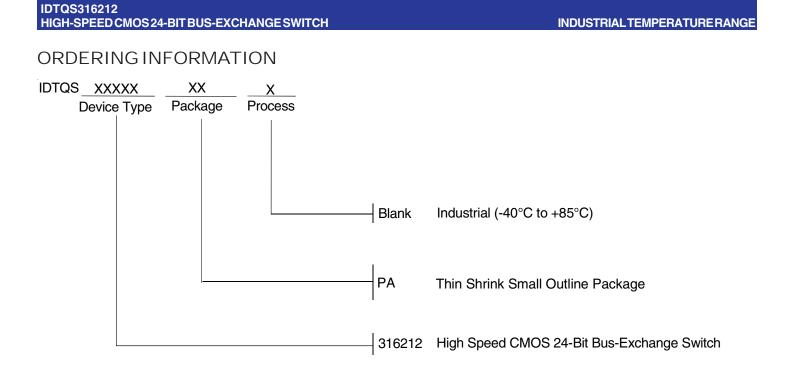
Symbol	Parameter	Min. ⁽¹⁾	Тур.	Max.	Unit
t PLH	Data Propagation Delay ⁽²⁾	_	_	0.25 ⁽³⁾	ns
t PHL	xAx to xBx, xBx to xAx				
tPZL	Switch Turn-On Delay	1.5	_	6.5	ns
tРZH	Sx to xAx, xBx				
tPLZ	Switch Turn-Off Delay ⁽²⁾	1.5	_	6.2	ns
tphz	Sx to xAx, xBx				

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 CL = 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.





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