

QUICKSWITCH® PRODUCTS 2.5V / 3.3V 8-BIT HIGH BANDWIDTH BUS SWITCH

IDTQS3VH245

FEATURES:

- N channel FET switches with no parasitic diode to Vcc
 - Isolation under power-off conditions
 - No DC path to Vcc or GND
 - 5V tolerant in OFF and ON state
- 5V tolerant I/Os
- Low Ron 4Ω typical
- · Flat Ron characteristics over operating range
- Rail-to-rail switching 0 5V
- Bidirectional dataflow with near-zero delay: no added ground bounce
- Excellent Ron matching between channels
- Vcc operation: 2.3V to 3.6V
- High bandwidth up to 500MHz
- · LVTTL-compatible control Inputs
- · Undershoot Clamp Diodes on all switch and control Inputs
- · Low I/O capacitance, 4pF typical
- · Available in QSOP, SOIC, and TSSOP packages

APPLICATIONS:

- · Hot-swapping
- 10/100 Base-T, Ethernet LAN switch
- · Low distortion analog switch
- · Replaces mechanical relay
- ATM 25/155 switching
- · Bus switching and isolation

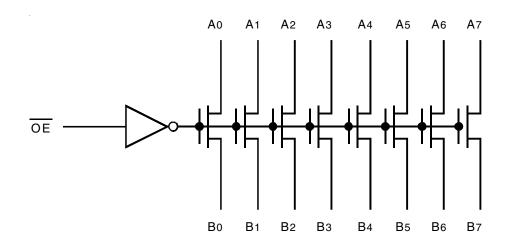
DESCRIPTION:

The QS3VH245 HotSwitch 8-bit bus switch is a high bandwidth bus switch. The QS3VH245 has very low ON resistance, resulting in under 250ps propagation delay through the switch. The switches can be turned ON under the control of the LVTTL-compatible Output Enable signal for bidirectional data flow with no added delay or ground bounce. In the ON state, the switches can pass signals up to 5V. In the OFF state, the switches offer very high impedence at the terminals.

The combination of near-zero propagation delay, high OFF impedance, and over-voltage tolerance makes the QS3VH245 ideal forhigh performance communications applications.

The QS3VH245 is characterized for operation from -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM



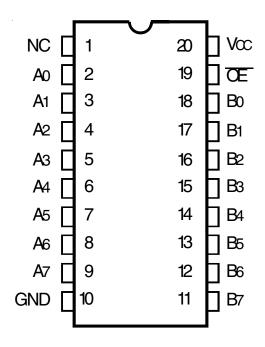
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INDUSTRIAL TEMPERATURE RANGE

FEBRUARY 2014

DSC-5775/10

PIN CONFIGURATION



QSOP/ SOIC/ TSSOP TOP VIEW

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Description	Max	Unit
VTERM ⁽²⁾	SupplyVoltage to Ground	-0.5 to +4.6	٧
VTERM ⁽³⁾	DC Switch Voltage Vs	-0.5 to +5.5	V
VTERM ⁽³⁾	DC Input Voltage Vเท	-0.5 to +5.5	V
VAC	AC Input Voltage (pulse width ≤20ns)	-3	V
lout	DC Output Current (max. sink current/pin)	120	mA
Tstg	Storage Temperature	-65 to +150	°C

NOTES:

- 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 (TA = +25°C, F = 1MHz, Vin = 0V, Vout =

0 % ymbol	Parameter ⁽¹⁾	Тур.	Max.	Unit
CIN	Control Inputs	3	5	pF
CI/O	Quickswitch Channels (Switch OFF)	4	6	pF
CI/O	Quickswitch Channels (Switch ON)	8	12	pF

NOTE:

1. This parameter is guaranteed but not production tested.

PIN DESCRIPTION

Pin Names	Description
ŌĒ	Output Enable
Ax	Data I/Os
Bx	Data I/Os

FUNCTION TABLE(1)

ŌĒ	Outputs
Н	Disconnected
L	Ax = Bx

NOTE:

H = HIGH Voltage Level
 L = LOW Voltage Level

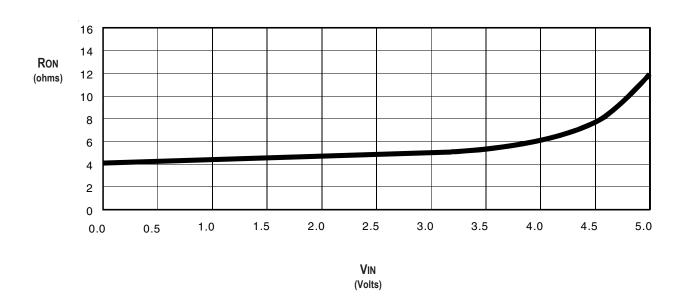
DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified: Industrial: TA = -40° C to $+85^{\circ}$ C, VCC = $3.3V \pm 0.3V$

Symbol	Parameter	Test C	Test Conditions			Typ. ⁽¹⁾	Max.	Unit
VIH	Input HIGH Voltage	Guaranteed Logic HIGH	Vcc = 2.3V to 2.7	V	1.7	_		V
		for Control Inputs	Vcc = 2.7V to 3.6	V	2	_	_	
VIL	Input LOW Voltage	Guaranteed Logic LOW	Vcc = 2.3V to 2.7	V	_	_	0.7	V
		for Control Inputs	Vcc = 2.7V to 3.6	SV	_	_	0.8	
lin	Input Leakage Current (Control Inputs)	0V ≤ VIN ≤ VCC		_	_	±1	μΑ	
loz	Off-State Current (Hi-Z)	0V ≤ Vouт ≤ 5V, Switches OFF		_	_	±1	μΑ	
loff	Data Input/Output Power Off Leakage	VIN or VOUT 0V to 5V, VCC = 0V			_	_	±1	μΑ
		Vcc = 2.3V	VIN = 0V	Ion = 30mA	_	6	8	
Ron	Switch ON Resistance	Typical at Vcc = 2.5V	VIN = 1.7V	Ion = 15mA	_	7	9	Ω
		Vcc = 3V	VIN = 0V	Ion = 30mA	_	4	6	
			VIN = 2.4V	Ion = 15mA	_	5	8	

NOTE:

TYPICAL ON RESISTANCE vs Vin AT Vcc = 3.3V



^{1.} Typical values are at Vcc = 3.3V and Ta = 25°C.

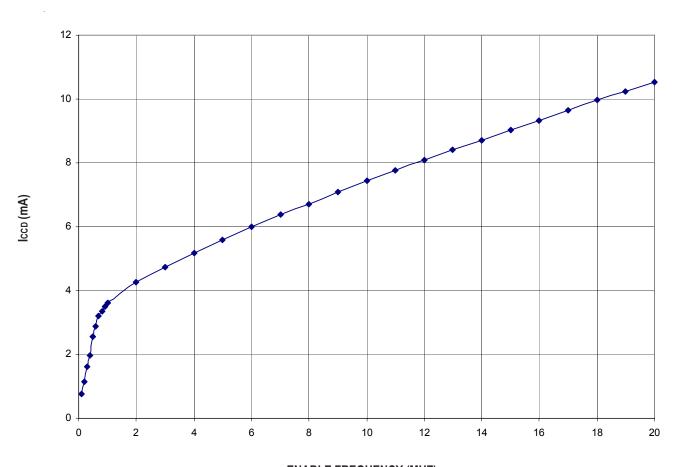
POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾	Min.	Тур.	Max.	Unit
Iccq	Quiescent Power Supply Current	Vcc = Max., Vin = GND or Vcc, f = 0	_	2	4	mA
Δlcc	Power Supply Current (2,3) per Input HIGH	Vcc = Max., Vin = 3V, f = 0 per Control Input	_	_	30	μA
ICCD	Dynamic Power Supply Current (4)	Vcc = 3.3V, A and B Pins Open, Control Inputs Toggling @ 50% Duty Cycle			e Frequency	graph below

NOTES:

- 1. For conditions shown as Min. or Max., use the appropriate values specified under DC Electrical Characteristics.
- 2. Per input driven at the specified level. A and B pins do not contribute to Δlcc .
- 3. This parameter is guaranteed but not tested.
- 4. This parameter represents the current required to switch internal capacitance at the specified frequency. The A and B inputs do not contribute to the Dynamic Power Supply Current. This parameter is guaranteed but not production tested.

TYPICAL ICCD vs ENABLE FREQUENCY CURVE AT VCC = 3.3V



SWITCHING CHARACTERISTICS OVER OPERATING RANGE

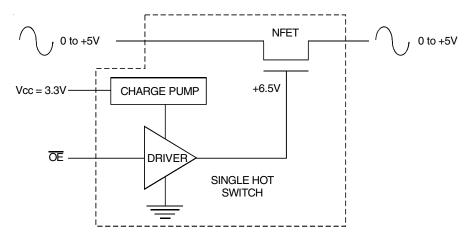
 $T_A = -40$ °C to +85°C

		$Vcc = 2.5 \pm 0.2V^{(1)}$		$Vcc = 3.3 \pm 0.3 V^{(1)}$		
Symbol	Parameter	Min. ⁽⁴⁾	Max.	Min. ⁽⁴⁾	Max.	Unit
tPLH	Data Propagation Delay ^(2,3)		0.2	_	0.2	ns
t PHL	Ax to/from Bx					
tpzl	Switch Turn-On Delay	1.5	8	1.5	7	ns
t PZH	OE to Ax/Bx					
tPLZ	Switch Turn-Off Delay	1.5	7	1.5	6.5	ns
t PHZ	OE to Ax/Bx					
fOE	Operating Frequency - Enable ^(2,5)	_	10	_	20	MHz

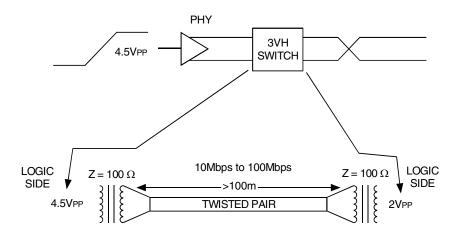
NOTES:

- 1. See Test Conditions under TEST CIRCUITS AND WAVEFORMS.
- 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 0.2ns 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.
- 4. Minimums are guaranteed but not production tested.
- 5. Maximum toggle frequency for \overline{OE} control input (pass voltage > Vcc, Vin = 5V, RLOAD \geq 1M Ω , no CLOAD).

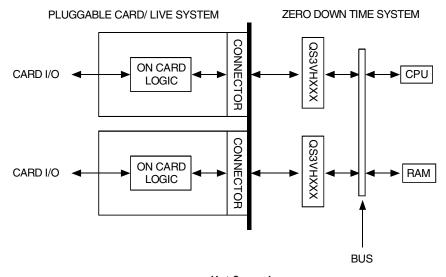
SOME APPLICATIONS FOR HOTSWITCH PRODUCTS



Rail-to-Rail Switching



Fast Ethernet Data Switching (LAN Switch)

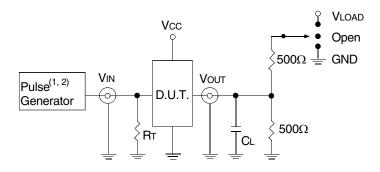


Hot-Swapping

TEST CIRCUITS AND WAVEFORMS

TEST CONDITIONS

Symbol	Vcc ⁽¹⁾ = 3.3V ± 0.3V	Vcc ⁽²⁾ = 2.5V ± 0.2V	Unit
VLOAD	6	2 x Vcc	V
VIH	3	Vcc	V
VT	1.5	Vcc/2	V
VLZ	300	150	mV
VHZ	300	150	mV
CL	50	30	pF



Test Circuits for All Outputs

DEFINITIONS:

CL = Load capacitance: includes jig and probe capacitance.

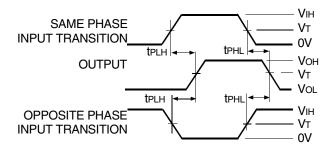
RT = Termination resistance: should be equal to ZouT of the Pulse Generator.

NOTES:

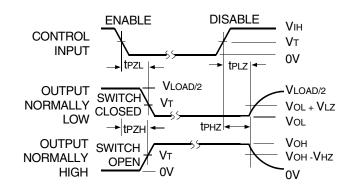
- 1. Pulse Generator for All Pulses: Rate \leq 10MHz; tF \leq 2.5ns; tR \leq 2.5ns.
- 2. Pulse Generator for All Pulses: Rate \leq 10MHz; tF \leq 2ns; tR \leq 2ns.

SWITCH POSITION

Test	Switch
tplz/tpzl	Vload
tpHz/tpzH	GND
tPD	Open



Propagation Delay

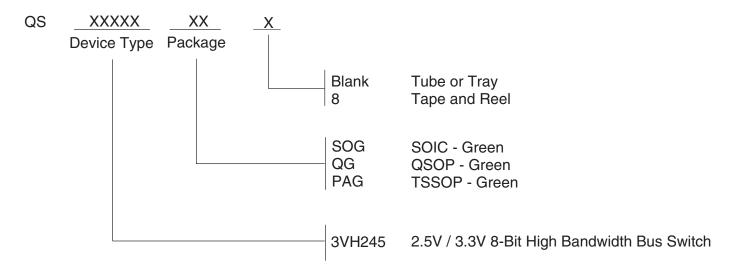


NOTE:

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.

Enable and Disable Times

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan www.renesas.com

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