PIN CONFIGURATION

$\overline{EA}$ 1   16 V_{CC}
S1   2   15 $\overline{EB}$
I3A   3   14 S0
I2A   4   13 I3B
I1A   5   12 I2B
I0A   6   11 I1B
YA   7   10 I0B
GND   8   9 YB

QSOP/ TSSOP
TOP VIEW

ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Description	Max	Unit
V_{TERM}[2]	SupplyVoltage to Ground	–0.5 to +4.6	V
V_{TERM}[3]	DC Switch Voltage V_S	–0.5 to +5.5	V
V_{TERM}[3]	DC Input Voltage V_{IN}	–0.5 to +5.5	V
V_{AC}	AC Input Voltage (pulse width ≤20ns)	–3	V
I_{OUT}	DC Output Current (max. sink current/pin)	120	mA
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. V_{CC} terminals.
3. All terminals except V_{CC} .

CAPACITANCE (T_A = +25°C, F = 1MHz, V_{IN} = 0V, V_{OUT} = 0V)

Symbol	Parameter[1]		Typ.	Max.	Unit
C_{IN}	Control Inputs		3	5	pF
$C_{I/O}$	Quickswitch Channels (Switch OFF)	Demux	4	6	pF
		Mux	11	15	
$C_{I/O}$	Quickswitch Channels (Switch ON)	Demux	12	16	pF
		Mux	12	16	

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

FUNCTION TABLE[1]

Enable		Select		Outputs		
$\overline{EA}$	$\overline{EB}$	S1	S0	Y_A	Y_B	Function
H	X	X	X	Z	X	Disable A
X	H	X	X	X	Z	Disable B
L	L	L	L	I0A	I0B	S1 - 0 = 0
L	L	L	H	I1A	I1B	S1 - 0 = 1
L	L	H	L	I2A	I2B	S1 - 0 = 2
L	L	H	H	I3A	I3B	S1 - 0 = 3

NOTE:
1. H = HIGH Voltage Level
   L = LOW Voltage Level
   X = Don't Care
   Z = High-Impedence

PIN DESCRIPTION

Pin Names	I/O	Description
Ixx	I	Data Inputs
S0, S1	I	Select Input
$\overline{EA}$, $\overline{EB}$	I	Enable Input
YA, YB	O	Data Outputs

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:
Industrial: T_A = –40°C to +85°C, V_{CC} = 3.3V ±0.3V

Symbol	Parameter	Test Conditions			Min.	Typ.[1]	Max.	Unit
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH for Control Inputs	V_{CC} = 2.3V to 2.7V		1.7	—	—	V
			V_{CC} = 2.7V to 3.6V		2	—	—	
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW for Control Inputs	V_{CC} = 2.3V to 2.7V		—	—	0.7	V
			V_{CC} = 2.7V to 3.6V		—	—	0.8	
I_{IN}	Input Leakage Current (Control Inputs)	0V ≤ V_{IN} ≤ V_{CC}			—	—	±1	µA
I_{OZ}	Off-State Current (Hi-Z)	0V ≤ V_{OUT} ≤ 5V, Switches OFF			—	—	±1	µA
I_{OFF}	Data Input/Output Power Off Leakage	V_{IN} or V_{OUT} 0V to 5V, V_{CC} = 0V			—	—	±1	µA
R_{ON}	Switch ON Resistance	V_{CC} = 2.3V Typical at V_{CC} = 2.5V	V_{IN} = 0V	I_{ON} = 30mA	—	6	8	Ω
			V_{IN} = 1.7V	I_{ON} = 15mA	—	7	9	
		V_{CC} = 3V	V_{IN} = 0V	I_{ON} = 30mA	—	4	6	
			V_{IN} = 2.4V	I_{ON} = 15mA	—	5	8	

NOTE:
1. Typical values are at V_{CC} = 3.3V and T_A = 25°C.

TYPICAL ON RESISTANCE vs V_{IN} AT V_{CC} = 3.3V
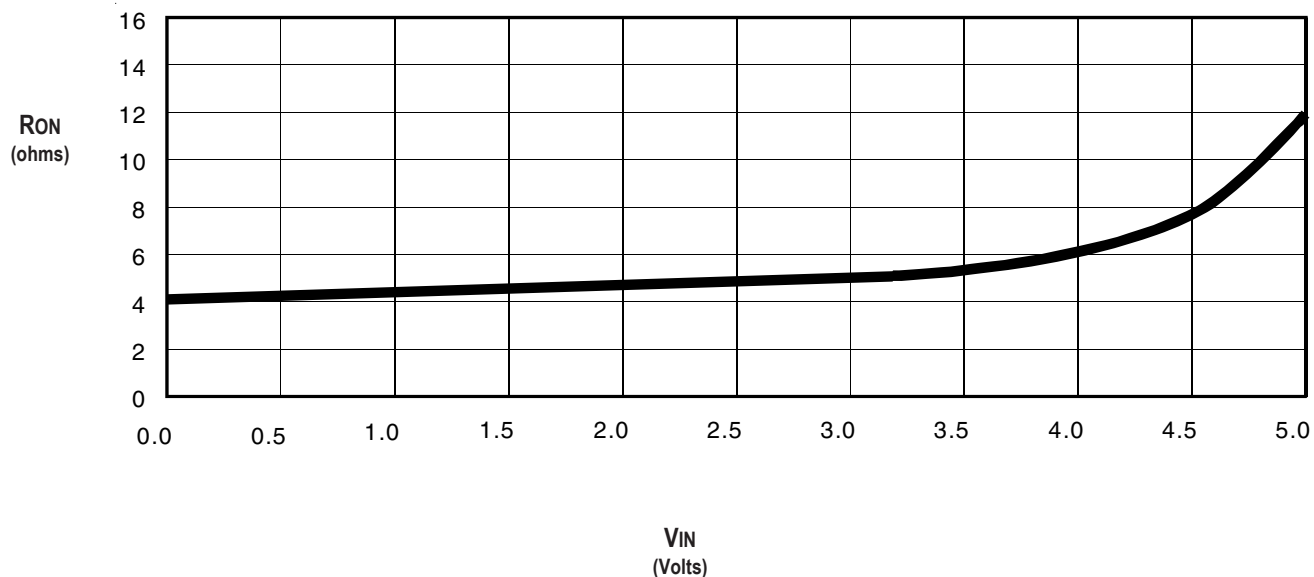
POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions[1]	Min.	Typ.	Max.	Unit
I_{CCQ}	Quiescent Power Supply Current	V_{CC} = Max., V_{IN} = GND or V_{CC}, f = 0	—	2	4	mA
ΔI_{CC}	Power Supply Current [2,3] per Input HIGH	V_{CC} = Max., V_{IN} = 3V, f = 0 per Control Input	—	—	30	µA
I_{CCD}	Dynamic Power Supply Current[4]	V_{CC} = 3.3V, A and B Pins Open, Control Inputs Toggling @ 50% Duty Cycle	See Typical I_{CCD} vs Enable 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. Mux/demux pins do not contribute to ΔI_{CC}.
3. This parameter is guaranteed but not tested.
4. This parameter represents the current required to switch internal capacitance at the specified frequency. The mux/demux inputs do not contribute to the Dynamic Power Supply Current. This parameter is guaranteed but not production tested.

TYPICAL I_{CCD} vs ENABLE FREQUENCY CURVE AT V_{CC} = 3.3V

ENABLE FREQUENCY (MHz)
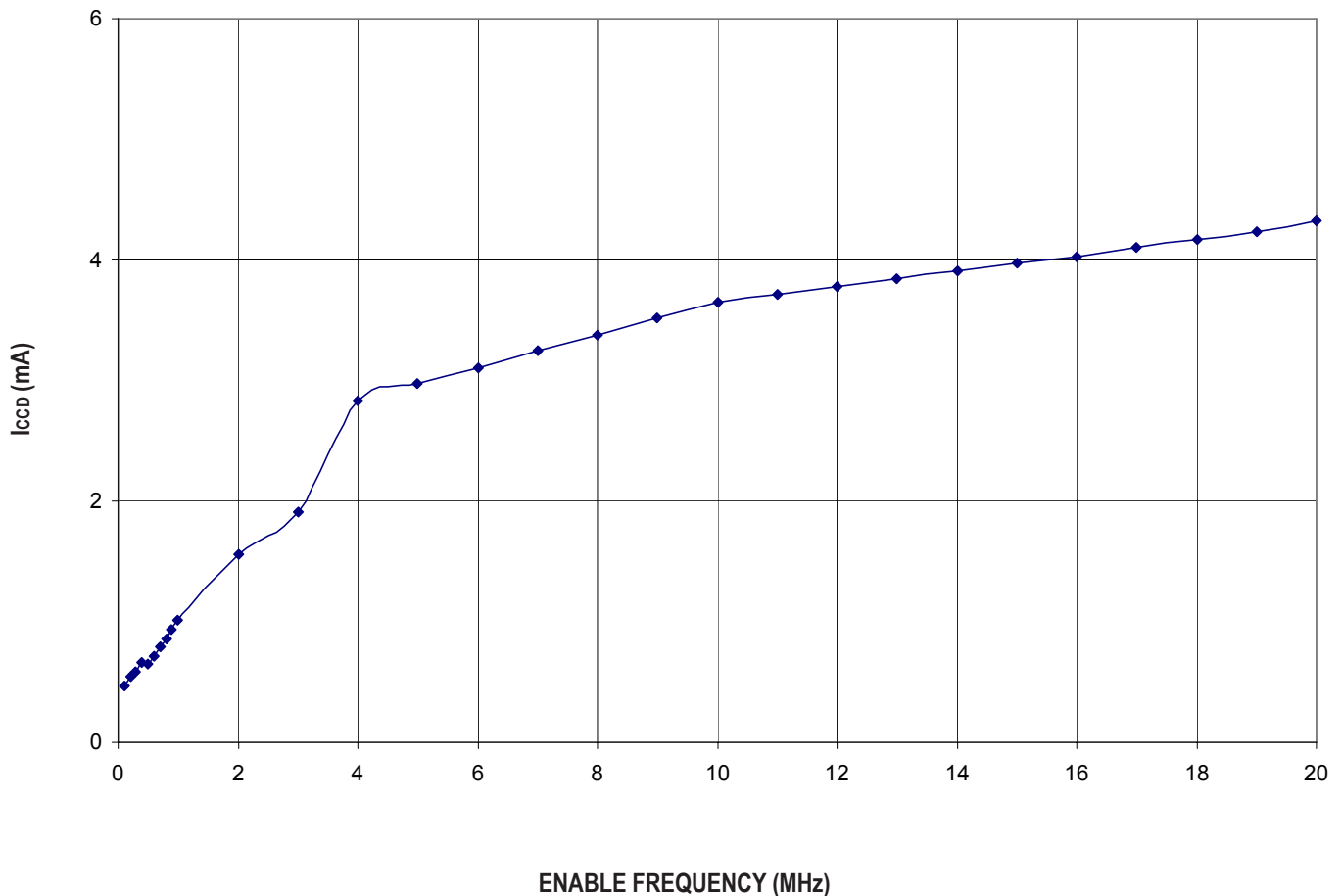
SWITCHING CHARACTERISTICS OVER OPERATING RANGE

T_A = -40°C to +85°C

| Symbol	Parameter	V_{CC} = 2.5 ± 0.2V [1]		V_{CC} = 3.3 ± 0.3V [1]		Unit
		Min. [4]	Max.	Min. [4]	Max.	
t_{PLH} t_{PHL}	Data Propagation Delay[2,3] Yx to Ixx or Ixx to Yx	——	0.2	—	0.2	ns
t_{SEL}	Select Time S to Yx	1.5	9	1.5	8	ns
t_{PZH} t_{PZL}	Enable Time Sx to Ixx	1.5	9	1.5	9	ns
t_{PHZ} t_{PLZ}	Disable Time Sx to Ixx	1.5	8	1.5	8	ns
t_{PZH} t_{PZL}	Enable Time $\overline{E}x$ to Yx or Ixx	1.5	9	1.5	8	ns
t_{PHZ} t_{PLZ}	Disable Time $\overline{E}x$ to Yx or Ixx	1.5	8	1.5	8	ns
$f_{\overline{E}xorSx}$	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 Sx or $\overline{E}x$ control input (pass voltage > V_{CC}, V_{IN} = 5V, $R_{LOAD} \geq 1M\Omega$, no C_{LOAD}).
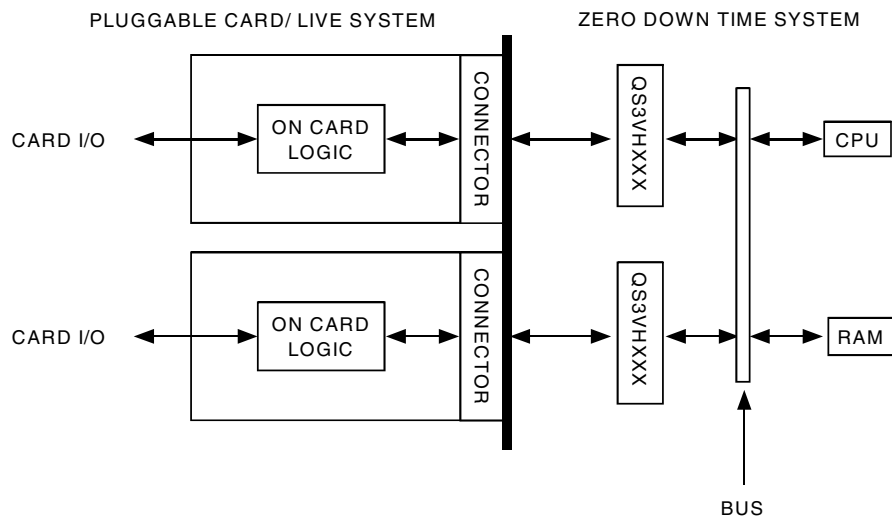
SOME APPLICATIONS FOR HOTSWITCH PRODUCTS
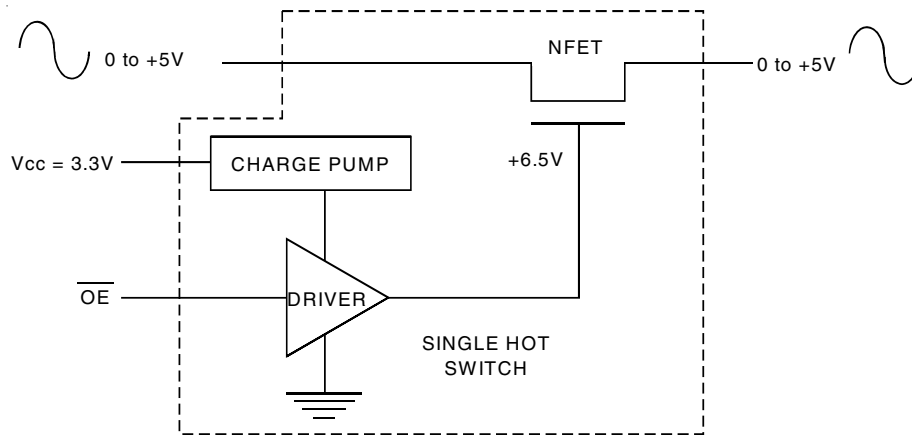
Rail-to-Rail Switching
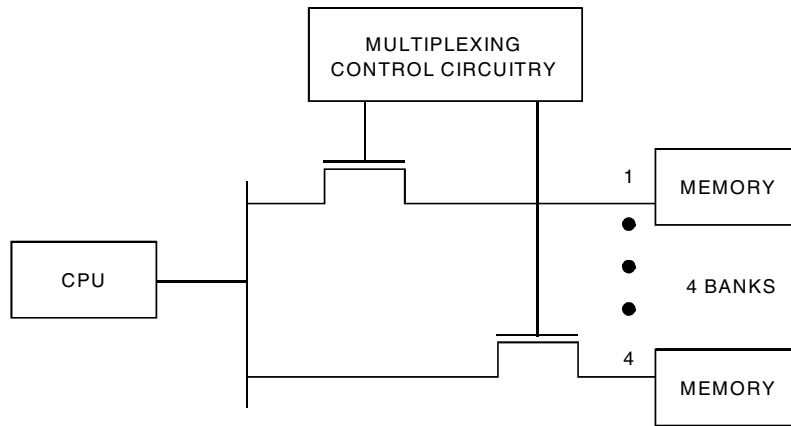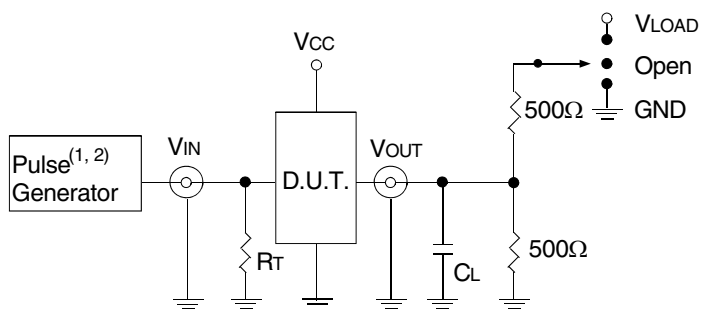
Multiplexing/Demultiplexing

Hot-Swapping

TEST CIRCUITS AND WAVEFORMS

TEST CONDITIONS

Symbol	$V_{CC}^{(1)}$= 3.3V ± 0.3V	$V_{CC}^{(2)}$= 2.5V ± 0.2V	Unit
V_{LOAD}	6	2 x V_{CC}	V
V_{IH}	3	V_{CC}	V
V_T	1.5	$V_{CC}/2$	V
V_{LZ}	300	150	mV
V_{HZ}	300	150	mV
C_L	50	30	pF

Propagation Delay

Test Circuits for All Outputs

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

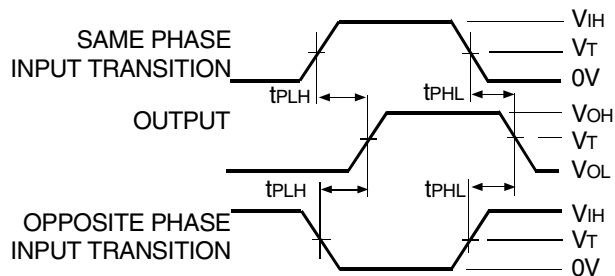*Enable and Disable Times*

DEFINITIONS:
C_L = Load capacitance: includes jig and probe capacitance.
R_T = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.
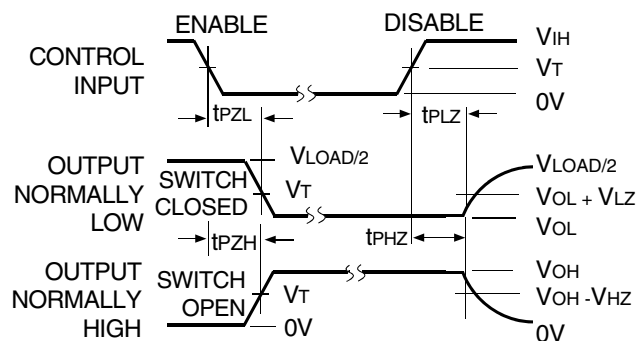
NOTES:
1. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_F ≤ 2.5ns; t_R ≤ 2.5ns.
2. Pulse Generator for All Pulses: Rate ≤ 10MHz; t_F ≤ 2ns; t_R ≤ 2ns.

SWITCH POSITION

Test	Switch
t_{PLZ}/t_{PZL}	V_{LOAD}
t_{PHZ}/t_{PZH}	GND
t_{PD}	Open

ORDERING INFORMATION

QS   XXXXX   XX   X
    Device Type   Package

Blank	Tube or Tray
8	Tape and Reel

QG	QSOP - Green
PAG	TSSOP - Green

3VH253	2.5V / 3.3V Dual 4:1 Mux/Demux High Bandwidth Bus Switch

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