QUALITY SEMICONDUCTOR, INC.

QuickSwitch® Products
High-Speed CMOS 20-Bit High Enable Bus Switch With Active High and Low Enables

QS32X862
QS32X2862

ADVANCE INFORMATION

FEATURES/BENEFITS

- Enhanced N channel FET with no inherent diode to V_{CC}
- 5Ω bidirectional switches connect inputs to outputs
- Zero propagation delay
- QS32X2862 is 25Ω version for low noise
- Undershoot clamp diodes on all switch and control pins
- Active Low and High enable controls
- Zero ground bounce in flow-through mode
- Available in 48-pin QVSOP (Q1)

APPLICATIONS

- Hot-swapping, hot-docking (Application Note AN-13)
- Voltage translation (5V to 3.3V; Application Note AN-11)
- Power conservation
- Capacitance reduction and isolation
- Applications requiring Active High enabling
- Bus isolation
- Clock gating

DESCRIPTION

The QS32X862 and QS32X2862 provide two sets of ten high-speed CMOS, TTL Compatible bus switches. The low ON resistance (5Ω) of the QS32X862 allows inputs to be connected to outputs without adding propagation delay and without generating additional ground bounce noise. The QS32X2862 adds an internal 25Ω series termination resistor to each switch to reduce reflection noise in high-speed applications. The switches are controlled by independent active Low Enable ($\overline{BE}$) and active High Enable (BE) controls for each set.

The '862 family of bus switches is ideal for switching digital buses, as well as for hot plug buffering and 5V to 3.3V conversion.

Figure 1. Functional Block Diagram

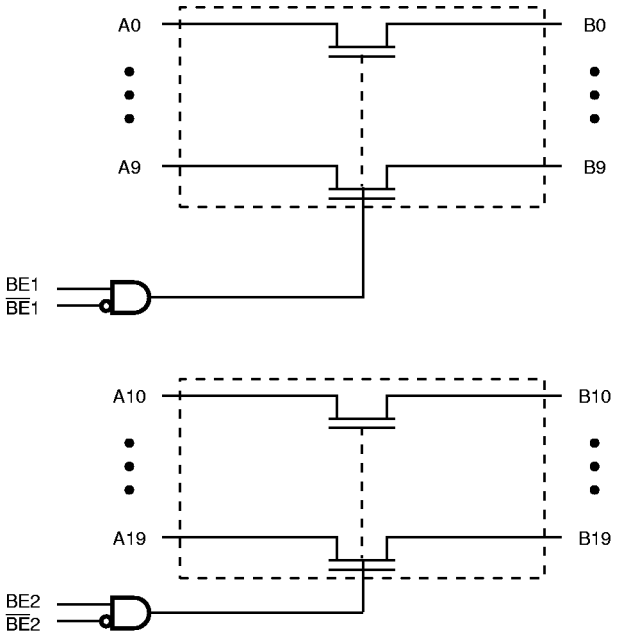


Table 1. Pin Description

Name	I/O	Function
A0-A19	I/O	Bus A
B0-B19	I/O	Bus B
$\overline{BE}$	I	Active Low Bus Enable
BE	I	Active High Bus Enable

Figure 2. Pin Confiruration (All Pins Top View)

QVSOP (Q1)

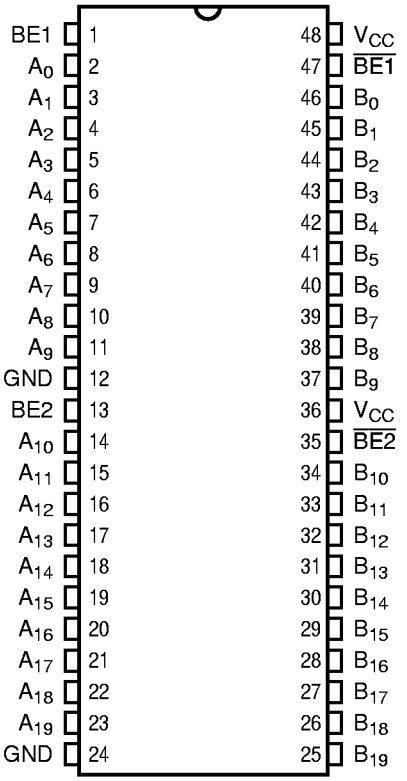


Table 2. Function Table

BE1	$\overline{BE1}$	A0-A9	Function
L	L	Hi-Z	Disconnect
L	H	Hi-Z	Disconnect
H	L	B0-B9	Connect
H	H	Hi-Z	Disconnect

BE2	$\overline{BE2}$	A10-A19	Function
L	L	Hi-Z	Disconnect
L	H	Hi-Z	Disconnect
H	L	B10-B19	Connect
H	H	Hi-Z	Disconnect

Table 3. Absolute Maximum Ratings

Supply Voltage to Ground	–0.5V to +7.0V
DC Switch Voltage V_S	–0.5V to +7.0V
DC Input Voltage V_{IN}	–0.5Vto+7.0V
AC Input Voltage (for a pulse width ≤ 20ns)	–3.0V
DC Output Current Max. Sink Current/Pin	120mA
Maximum Power Dissipation	0.5 watts
T_{STG} Storage Temperature	–65° to +150°C

Note: ABSOULUTE MAXIMUM CONTINUOUS RATINGS are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute-maximum conditions is not implied.

Table 4. Capacitance

T_A = 25°C, f = 1MHz, V_{IN} = 0V, V_{OUT} = 0V

Pins	QVSOP Typ	QVSOP Max	Unit
Control Inputs	3	5	pF
QuickSwitch Channels (Switch OFF)	5	7	pF

Note: Capacitance is characterized but not production tested. For total capacitance while the switch is ON, please see Section 1 under "Input and Switch Capacitance."

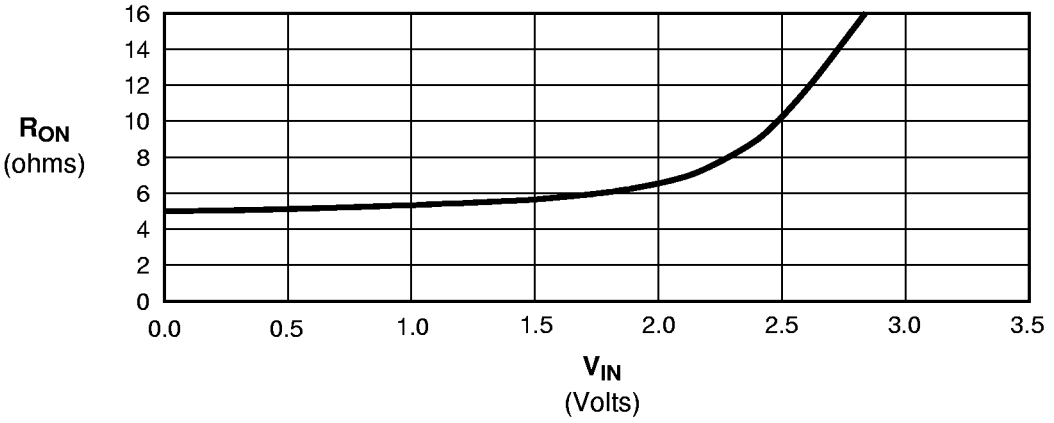
Table 5. DC Electrical Characteristics Over Operating Range

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 Inputs	2.0	—	—	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW for Control Inputs	—	—	0.8	V
$\|I_{IN}\|$	Input Leakage Current (Control Inputs)	$0 \le V_{IN} \le V_{CC}$	—	0.01	1	µA
$\|I_{OZ}\|$	Off-State Current (Hi-Z)	$0 \le V_{OUT} \le V_{CC}$, Switches off	—	0.01	1	µA
R_{ON}	Switch ON Resistance(2)	V_{CC} = Min., V_{IN} = 0.0V 32X862 I_{ON} = 30mA 32X2862	— —	5 28	7 40	Ω
R_{ON}	Switch ON Resistance(2)	V_{CC} = Min., V_{IN} = 2.4V 32X862 I_{ON} = 15mA 32X2862	— —	10 35	15 48	Ω
V_P	Pass Voltage(3)	$V_{IN} = V_{CC}$ = 5V, I_{OUT} = –5µA	3.7	4	4.2	V

Notes:
1. Typical values indicate V_{CC} = 5.0V and T_A = 25°C.
2. For a diagram explaining the procedure for R_{ON} measurement, please see Section 1 under "DC Electrical Characteristics." Max. value of R_{ON} guaranteed, but not production tested.
3. Pass Voltage is guaranteed, but not production tested.

Figure 3. Typical ON Resistance vs. V_{IN} at V_{CC} = 5.0V (QS32X862)



Note: For QS32X2862, add 23Ω to R_{ON} shown.

Table 6. Power Supply Characteristics Over Operating Range

T_A = –40°C to 85°C, V_{CC} = 5.0V ± 5%

Symbol	Parameter	Test Conditions[1]	Typ[2]	Max	Unit
I_{CCQ}	Quiescent Power Supply Current	V_{CC} = Max., V_{IN} = GND or V_{CC}, f = 0	0.2	6.0	µA
ΔI_{CC}	Power Supply Current per Input HIGH[3]	V_{CC} = Max., V_{IN} = 3.4V, f = 0 per Control Input	—	2.5	mA
Q_{CCD}	Dynamic Power Supply Current per MHz[4]	V_{CC} = Max., A and B Pins Open, $\overline{BEn}$ and BEn 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 specifications.
2. Typical values are at V_{CC} = 5.0V, +25°C ambient.
3. Per TTL driven input (V_{IN} = 3.4V, control inputs only). A and B pins do not contribute to ΔI_{CC}.
4. 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.

Table 7. Switching Characteristics Over Operating Range

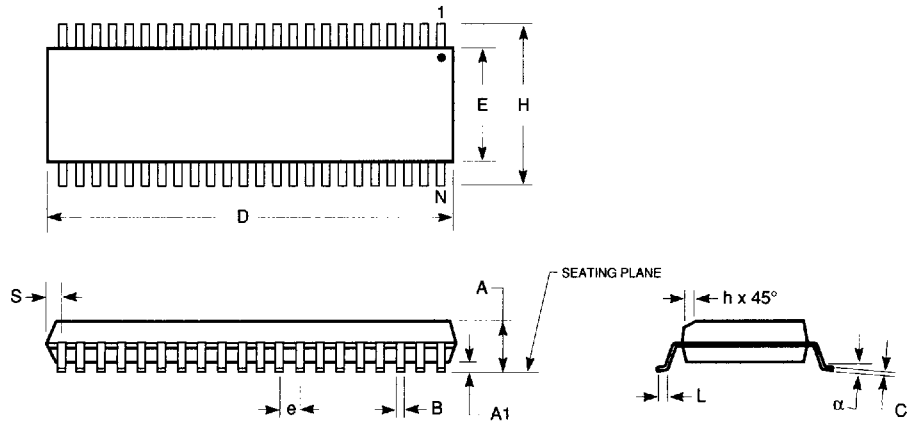
T_A = –40°C to 85°C, V_{CC} = 5.0V ± 5%
C_{LOAD} = 50pF, R_{LOAD} = 500Ω unless otherwise noted.

Symbol	Description[1]		Min	Typ	Max	Unit
t_{PLH}	Data Propagation Delay[2,4]	QS32X862	—	0.25	—	ns
t_{PHL}	An to/from Bn	QS32X2862	—	1.25	—	
t_{PZL}	Switch Turn-on Delay	QS32X862	1.5	—	6.5	ns
t_{PZH}	BEn or $\overline{BEn}$ to An/Bn	QS32X2862	1.5	—	7.5	
t_{PLZ}	Switch Turn-off Delay[2]	QS32X862	1.5	—	5.5	ns
t_{PHZ}	BEn or $\overline{BEn}$ to An/Bn	QS32X2862	1.5	—	6.5	

Notes:
1. See Test Circuit and Waveforms. Minimums 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 for QS32X862 and 1.25ns for QS32X2862 for 50pF load. Since this time constant is much smaller than the rise/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.

150-MIL QVSOP™ - Package Code Q1/Q2

150-Mil Wide Plastic Small Outline Gull-Wing



JEDEC#	MO-154BB			MO-154AB		
DWG#	PSS-40A (Q2)			PSS-48A (Q1)		
Symbol	Min	Nom	Max	Min	Nom	Max
A	0.059	0.065	0.069	0.059	0.065	0.069
A1	0.004	0.006	0.008	0.004	0.006	0.008
B	0.0067	0.008	0.009	0.0051	0.0063	0.008
C	0.0075	0.008	0.0098	0.0075	0.008	0.0098
D	0.386	0.390	0.394	0.386	0.390	0.394
E	0.150	0.154	0.157	0.150	0.154	0.157
e	0.0197 BSC, 0.5mm			0.0157 BSC, 0.4mm		
H	0.228	0.236	0.244	0.228	0.236	0.244
h	0.010	0.013	0.016	0.010	0.013	0.016
L	0.020	0.024	0.030	0.020	0.024	0.030
N	40			48		
α	0°	5°	8°	0°	5°	8°
S	0.006	0.008	0.010	0.012	0.014	0.016

Notes:
1. Refer to applicable symbol list.
2. All dimensions are in inches.
3. N is the number of lead positions.
4. Dimensions D and E are to be measured at maximum material condition but do not include mold flash. Allowable mold flash is 0.006in. per side.
5. Lead coplanarity is 0.003in. maximum.