QUICKSWITCH® PRODUCTS HIGH-SPEED CMOS QUICKSWITCH 24:12 MUX/DEMUX

IDTQS33X257

FEATURES:

- Enhanced N channel FET with no inherent diode to Vcc
- Bidirectional signal flow
- 24:12 Mux/Demux switches connect inputs to outputs
- Individual controls for each bank
- Zero propagation delay, zero ground bounce
- Undershoot clamp diodes on all switch and control pins
- TTL-compatible control inputs
- Available in 48-pin QVSOP Package

APPLICATIONS

- Logic replacment
- Video, audio, graphics switching, muxing
- Hot-swapping, hot-docking
- Voltage translation (5V to 3.3V)
- Bus funneling

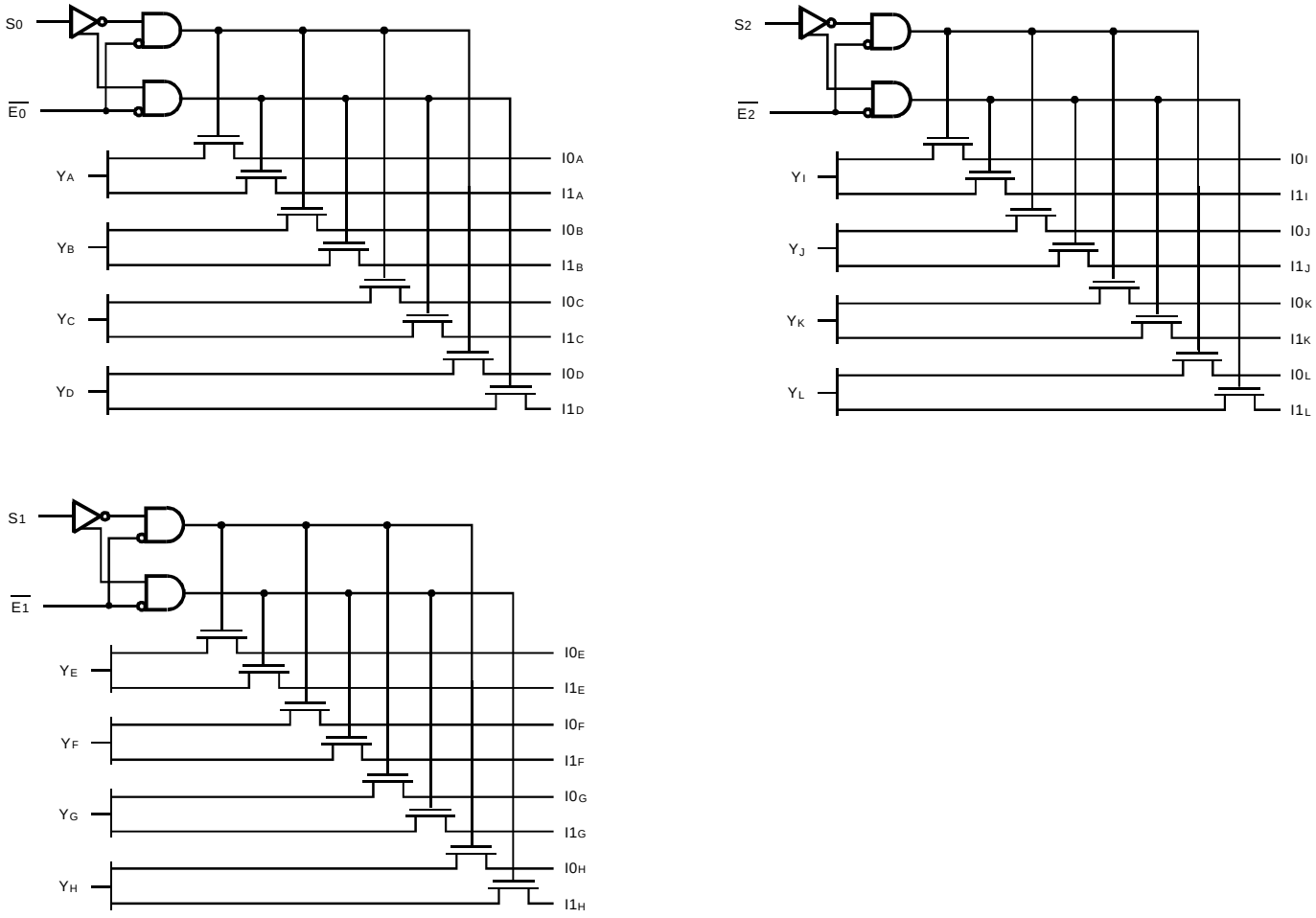
DESCRIPTION

The QS33X257 is a high-speed CMOS TTL-compatible 24:12 multiplexer/demultiplexer. The QS33X257 is functionally compatible to three of the QuickSwitch version of the 74F257, 74FCT257, and the 74ALS/AS/LS257 Quad 2:1 multiplexers. The low ON resistance of the QS33X257 allows inputs to be connected to outputs without adding propagation delay and without generating additional ground bounce noise. This part will be used in wide bus multiplexing where board space is at a premium.

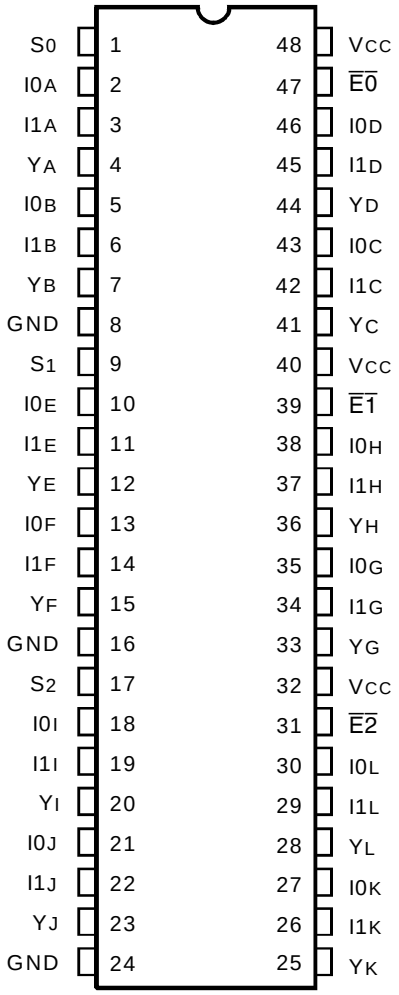
Mux/Demux devices provide an order of magnitude faster speed than equivalent logic devices.

The QS33X257 is characterized for operation at -40°C to +85°C.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



QVSOP
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 Vs	– 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 Max. SInk Current/Pin	120	mA
P_{MAX}	Maximum Power Dissipation	.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		4	5	pF
Quickswitch Channels	Demux	5	7	pF
(Switch OFF)	Mux	9	10	pF

NOTE:
1. This parameter is guaranteed at characterization but not tested.

PIN DESCRIPTION

Pin Names	I/O	Description
Ixx	I/O	Data Inputs
Sx	I	Select Input
$\overline{Ex}$	I/O	Enable Input
Y_A - Y_L	I/O	Data Outputs

FUNCTION TABLE(1)

Inputs		Outputs				
$\overline{Ex}$	Sx	Y_A	Y_B	Y_C	Yx	Function
H	X	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Disable
L	L	I0A	I0B	I0C	I0x	Select 0
L	H	I1A	I1B	I1C	I1x	Select 1

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

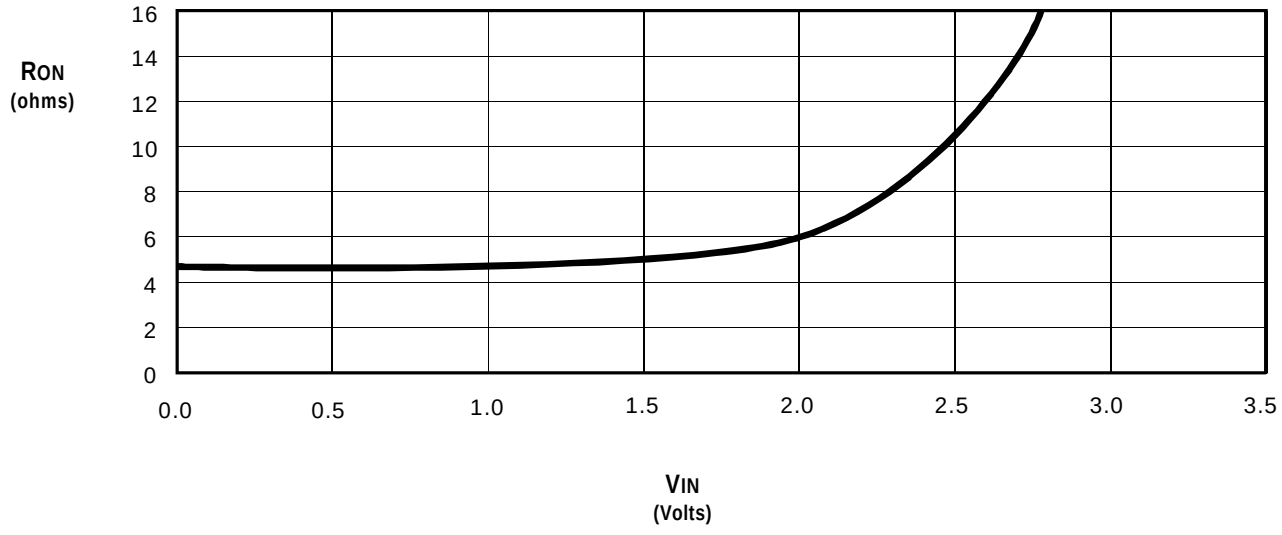
DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

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 Inputs	2	—	—	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW for Control Inputs	—	—	0.8	V
I_{IN}	Input Leakage Current (Control Inputs)	$0V \le V_{IN} \le Vcc$	—	—	±1	µA
I_{OZ}	Off-State Current (Hi-Z)	$0V \le V_{OUT} \le Vcc$	—	—	±1	µA
R_{ON}	Switch ON Resistance	Vcc = Min., V_{IN} = 0V, I_{ON} = 30mA	—	5	7	Ω
R_{ON}	Switch ON Resistance	Vcc = Min., V_{IN} = 2.4V, I_{ON} = 15mA	—	10	15	Ω
V_P	Pass Voltage [2]	V_{IN} = Vcc = 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 Vcc, f = 0	9	µA
ΔI_{CC}	Power Supply Current per Control Input HIGH[2]	V_{CC} = Max., V_{IN} = 3.4V , f = 0	1.5	mA
I_{CCD}	Dynamic Power Supply Current per MHz[3]	V_{CC} = Max., I and Y 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 TTL driven input (V_{IN} = 3.4V, control inputs only). I and Y 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 I and Y inputs generate no significant AC or DC currents as they transition. This parameter is guaranteed but not production tested.

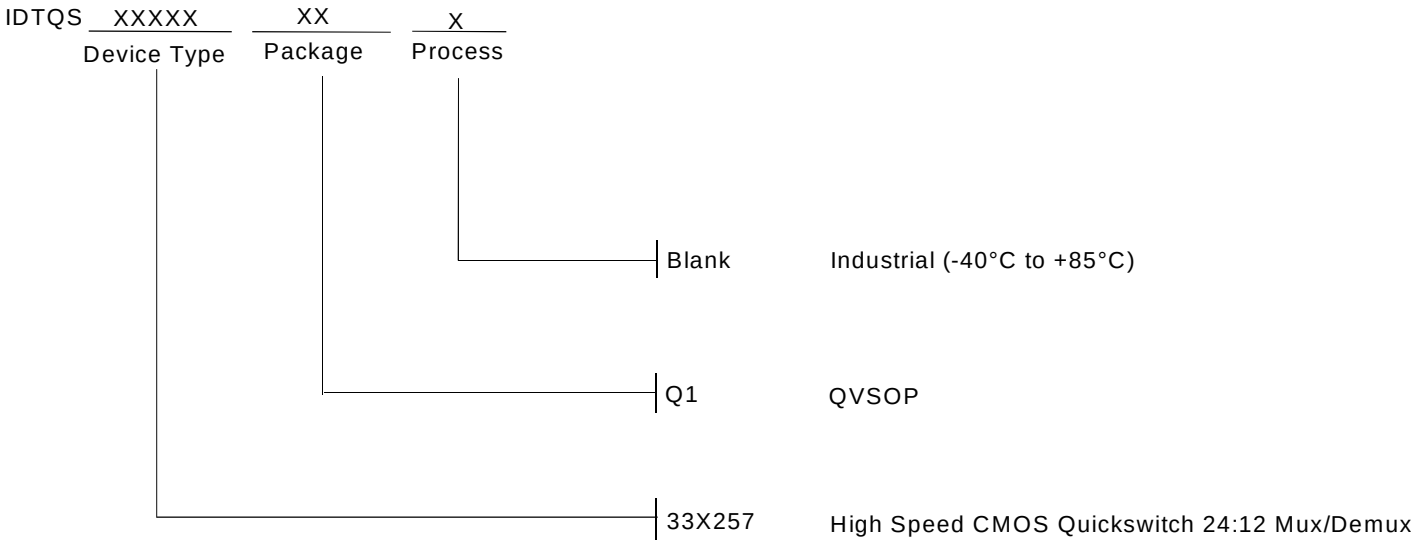
SWITCHING CHARACTERISTICS OVER OPERATING RANGE

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

Symbol	Parameter	Min. [1]	Typ.	Max.	Unit
t_{PLH} t_{PHL}	Data Propagation Delays [2, 3] In to Y	—	0.25 [3]	—	ns
t_{PZH} t_{PZL}	Switch Turn-On Delay Sn to Y	0.5	—	5.2	ns
t_{PZH} t_{PZL}	Switch Turn-On Delay $\overline{En}$ to Y	0.5	—	4.8	ns
t_{PHZ} t_{PLZ}	Switch Turn-Off Delay [2] $\overline{En}$ to Y, Sn to Y	0.5	—	5	ns

NOTES:
1. Minimums guaranteed but not tested.
2. This parameter is guaranteed but not 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 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.

ORDERING INFORMATION



CORPORATE HEADQUARTERS
2975 Stender Way
Santa Clara, CA 95054

for SALES:
800-345-7015 or 408-727-6116
fax: 408-492-8674
www.idt.com*

**To search for sales office near you, please click the sales button found on our home page or dial the 800# above and press 2.*