High-Speed CMOS QuickSwitch® Quad 2:1 Mux / Demux

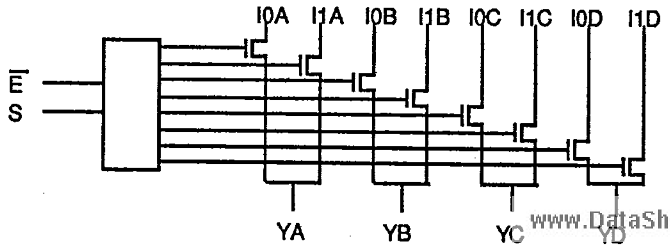
QS3257

FEATURES/BENEFITS

- 5Ω switches connect inputs to outputs
- Pin compatible to the 74F257, 74FCT257, and 74FCT257T
- Undershoot clamp diodes on all I/Os
- Low power CMOS proprietary technology
- Zero propagation delay
- TTL-compatible control inputs
- Zero ground bounce in flow-through mode
- TTL compatible control inputs
- Available in 16-pin DIP, SOIC, & QSOP

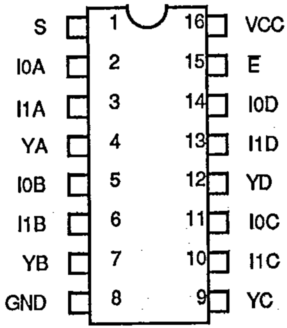
DESCRIPTION

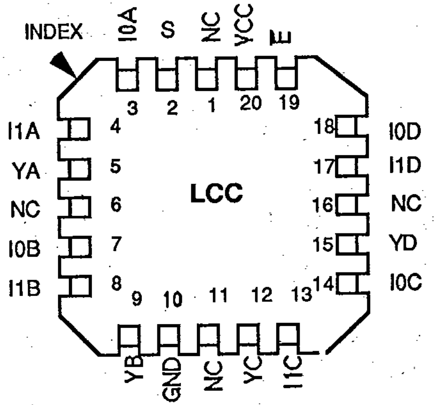
The QS3257 is a high speed CMOS TTL-compatible Quad 2:1 multiplexer/demultiplexer. The QS3257 has 3-state outputs. The QS3257 is function and pinout compatible QuickSwitch version of the 74F257, 74FCT257 and the 74ALS/AS/LS257 Quad 2:1 multiplexers. The low on resistance (5 ohms) of the 3257 allows inputs to be connected outputs without adding propagation delay and without generating additional ground bounce noise.



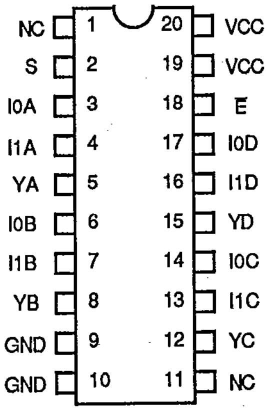
QS3257 PINOUT

PDIP, SOIC, QSOP





HQSOP



ALL PINS TOP VIEW

Note: Available in both 150 mil wide SOIC (package code S1) and 300 mil SOIC (package code SO).

PIN DESCRIPTION

Name	I/O	Description
Ixx	I	Data Inputs
S	I	Select Input
E	I	Enable Input
YA-YD	O	Data Outputs

FUNCTION TABLES

E	S	257				Function
		YA	YB	YC	YD	
H	X	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Disable
L	L	I0A	I0B	I0C	I0D	Select 0
L	H	I1A	I1B	I1C	I1D	Select 1

ABSOLUTE MAXIMUM RATINGS

Supply Voltage to Ground.................................. -0.5V to +7.0V
DC Switch Voltage V_S .... -0.5V to V_{CC} + 0.5V
DC Input Voltage V_I .... -0.5V to V_{CC} + 0.5V
AC Input Voltage (for a pulse width ≤20 ns).................... -3.0V
DC Input Diode Current with V_I<0.................................. -20 mA
DC Channel Current Max. current/pin....................... 120 mA
Maximum Power Dissipation... 0.5 watts
T_{STG} Storage Temperature.............................. -65° to +165°C

CAPACITANCE

TA = 25 °C, f = 1 MHz, Vin = 0V, Vout = 0 V

Pins	SOIC		QSOP		PDIP		Unit
	Typ	Max	Typ	Max	Typ	Max	
Controls	3		3		4		pF
QuickSwitch Channels	7		7		8		pF

Note: Capacitance is characterized but not tested

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

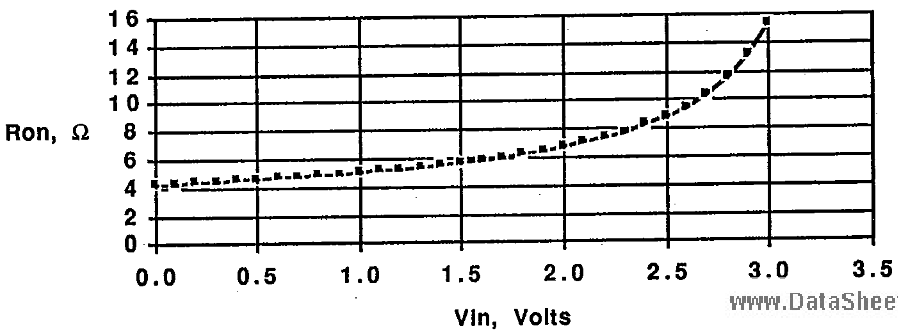
Commercial T_A = 0° C to 70°C, Vcc = 5.0V±5% Military T_A = -55°C to 125° C, Vcc = 5.0V±10%

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Vih	Input HIGH Voltage	Guaranteed Logic HIGH for Control Inputs	2.0	-	-	Volts
Vil	Input LOW Voltage	Guaranteed Logic LOW for Control Inputs	-	-	0.8	Volts
|Iin|	Input Leakage Current	0 ≤ Vin ≤ Vcc	-	-	5	µA
|Ioz|	Off State Current (Hi-Z)	0 ≤ I, Y ≤ Vcc	-	-	5	µA
|Ios|	Short Circuit Current (2)	I (Y) = 0V, Y (I) = Vcc		300		mA
Vic	Clamp Diode Voltage	Vcc = Min, Iin = -18 mA	-	-0.7	-1.2	Volts
Ron	Switch On Resistance (Note 3)	Vcc = Min, Vin = 0.0 Volts Ion = 30 mA	-	5	7	Ω
		Vcc = Min, Vin = 2.4 Volts Ion = 15 mA	-	10	15	Ω

Notes:

1. Typical values indicate V_{CC}=5.0V and T_A=25°C.
2. Not more than one output should be used to test this high power condition, and the duration is 1 second.
3. Measured by voltage drop between I and Y pin at indicated current through the switch. On resistance is determined by the lower of the voltages on the two pins.
4. During input/output leakage testing all pins are at a High or Low state, and the $\overline{OE}$ control is High.

On Resistance vs Vin @ 4.75 Vcc



POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions (1)	Min	Typ	Max	Unit
Icc	Quiescent Power Supply Current	Vcc = MAX, Vi = GND or Vcc, f = 0	-	-	2.5	mA
ΔIcc	Pwr Supply Current, per Input High (2)	Vcc = MAX, Input = 3.4 V, f = 0 Per control input	-	-	3.5	mA
Qccd	Dynamic Pwr Supply Current per mHz (3)	Vcc = MAX, I & Y pins open, Control input 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. Per TTL driven input (Vi=3.4V, control inputs only). I and Y pins do not contribute to Icc.
3. Guaranteed by design. 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.

SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Commercial T_A = 0° C to 70°C, Vcc = 5.0V±5% Military T_A= -55°C to 125° C, Vcc = 5.0V±10%
Cload = 50 pF, Rload = 500Ω unless otherwise noted.

Symbol	Description	Note	Com		Mil		Unit
			Min	Max	Min	Max	
t IY	Data Propagation Delay In to Y	2,3		0.25		0.25	ns
t SY	Switch Turn On Delay Sn to Y, 3257	1	0.5	5.2	0.5	6.2	ns
t EY	Switch Turn On Delay En to Y, 3257	1,2	0.5	4.8	0.5	5.8	ns
t PHZ t PLZ	Switch Turn Off Delay En to Y, 3257	1	0.5	5.0	0.5	6.0	ns

Notes:

1. See Test Circuit and Waveforms. Minimums guaranteed but not tested.
2. This parameter is guaranteed by design 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 0.25 ns for 50 pF 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.