

## DM74S257, DM74S258 3-STATE Quad 1 of 2 Data Selectors/Multiplexers

### General Description

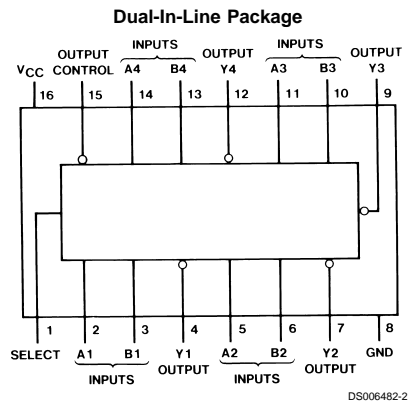
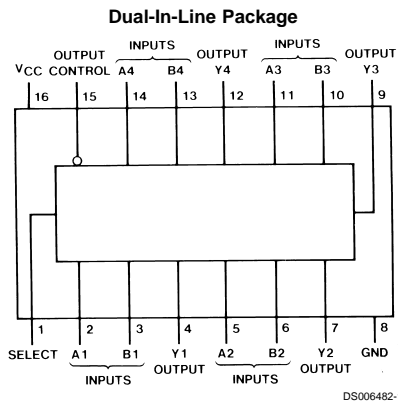
These Schottky-clamped high-performance multiplexers feature 3-STATE outputs that can interface directly with data lines of bus-organized systems. With all but one of the common outputs disabled (at a high impedance state), the low impedance of the single enabled output will drive the bus line to a high or low logic level. To minimize the possibility that two outputs will attempt to take a common bus to opposite logic levels, the output enable circuitry is designed such that the output disable times are shorter than the output enable times.

This 3-STATE output feature means that n-bit (paralleled) data selectors with up to 258 sources can be implemented for data buses. It also permits the use of standard TTL registers for data retention throughout the system.

### Features

- 3-STATE versions S157, S158, with same pin-outs
- Schottky-clamped for significant improvement in A-C performance
- Provides bus interface from multiple sources in high-performance systems
- Average propagation delay from data input
  - S257 4.8 ns
  - S258 4 ns
- Typical power dissipation
  - S257 320 mW
  - S258 280 mW

### Connection Diagrams



Order Number DM54S257J, DM54S258J, DM54S257W, DM74S257N or DM74S258N  
See Package Number J16A, N16E or W16A

DM74S257, DM74S258 3-STATE Quad 1 of 2 Data Selectors/Multiplexers

## Function Table

Output Control	Inputs			Output Y	
	Select	A	B	S257	S258
H	X	X	X	Z	Z
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

H = High Level, L = Low Level, X = Don't Care  
Z = High Impedance (off)

## Absolute Maximum Ratings (Note 1)

Supply Voltage	7V	DM54S	-55°C to +125°C
Input Voltage	5.5V	DM74S	0°C to +70°C
Operating Free Air Temperature Range		Storage Temperature Range	-65°C to +150°C

## Recommended Operating Conditions

Symbol	Parameter	DM54S257			DM74S257			Units
		Min	Nom	Max	Min	Nom	Max	
V <sub>CC</sub>	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub>	High Level Input Voltage	2			2			V
V <sub>IL</sub>	Low Level Input Voltage			0.8			0.8	V
I <sub>OH</sub>	High Level Output Current			-2			-6.5	mA
I <sub>OL</sub>	Low Level Output Current			20			20	mA
T <sub>A</sub>	Free Air Operating Temperature	-55		125	0		70	°C

**Note 1:** The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

## 'S257 Electrical Characteristics

over recommended operating free air temperature (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 2)	Max	Units
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = -18 mA			-1.2	V
V <sub>OH</sub>	High Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OH</sub> = Max	DM54	2.4	3.4	V
		V <sub>IL</sub> = Max, V <sub>IH</sub> = Min	DM74	2.4	3.2	
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = Min, I <sub>OL</sub> = Max V <sub>IH</sub> = Min, V <sub>IL</sub> = Max			0.5	V
I <sub>I</sub>	Input Current @ Max Input Voltage	V <sub>CC</sub> = Max, V <sub>I</sub> = 5.5V			1	mA
I <sub>IH</sub>	High Level Input Current	V <sub>CC</sub> = Max	Select		100	μA
		V <sub>I</sub> = 2.7V	Other		50	
I <sub>IL</sub>	Low Level Input Current	V <sub>CC</sub> = Max,	Select		-4	mA
		V <sub>I</sub> = 0.5V	Other		-2	
I <sub>OZH</sub>	Off-State Output Current with High Level Output Voltage Applied	V <sub>CC</sub> = Max, V <sub>O</sub> = 2.4V V <sub>IH</sub> = Min, V <sub>IL</sub> = Max			50	μA
I <sub>OZL</sub>	Off-State Output Current with Low Level Output Voltage Applied	V <sub>CC</sub> = Max, V <sub>O</sub> = 0.5V V <sub>IH</sub> = Min, V <sub>IL</sub> = Max			-50	μA
I <sub>OS</sub>	Short Circuit Output Current	V <sub>CC</sub> = Max	DM54	-40	-100	mA
		(Note 3)	DM74	-40	-100	
I <sub>CCH</sub>	Supply Current with Outputs High	V <sub>CC</sub> = Max (Note 4)		44	68	mA
I <sub>CCL</sub>	Supply Current with Outputs Low	V <sub>CC</sub> = Max (Note 4)		60	93	mA
I <sub>CCZ</sub>	Supply Current with Outputs Disabled	V <sub>CC</sub> = Max (Note 4)		64	99	mA

**Note 2:** All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

**Note 3:** Not more than one output should be shorted at a time, and the duration should not exceed one second.

**Note 4:** I<sub>CC</sub> is measured with all outputs open and all possible inputs grounded, while achieving the stated output conditions.

## 'S257 Switching Characteristics

at  $V_{CC} = 5V$  and  $T_A = 25^\circ C$

Symbol	Parameter	From (Input) To (Output)	$R_L = 280\Omega$				Units
			$C_L = 15\text{ pF}$		$C_L = 50\text{ pF}$		
			Min	Max	Min	Max	
$t_{PLH}$	Propagation Delay Time Low to High Level Output	Data to Output		7.5		11	ns
$t_{PHL}$	Propagation Delay Time High to Low Level Output	Data to Output		6.5		10	ns
$t_{PLH}$	Propagation Delay Time Low to High Level Output	Select to Output		15		16	ns
$t_{PHL}$	Propagation Delay Time High to Low Level Output	Select to Output		15		16	ns
$t_{PZH}$	Output Enable Time to High Level Output	Output Control to Y		19.5		23	ns
$t_{PZL}$	Output Enable Time to Low Level Output	Output Control to Y		21		24	ns
$t_{PHZ}$	Output Disable Time to High Level Output (Note 5)	Output Control to Y		8.5			ns
$t_{PLZ}$	Output Disable Time to Low Level Output (Note 5)	Output Control to Y		14			ns

Note 5:  $C_L = 5\text{ pF}$ .

## Recommended Operating Conditions

Symbol	Parameter	DM54S258			DM74S258			Units
		Min	Nom	Max	Min	Nom	Max	
$V_{CC}$	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
$V_{IH}$	High Level Input Voltage	2			2			V
$V_{IL}$	Low Level Input Voltage			0.8			0.8	V
$I_{OH}$	High Level Output Current			-2			-6.5	mA
$I_{OL}$	Low Level Output Current			20			20	mA
$T_A$	Free Air Operating Temperature	-55		125	0		70	$^\circ C$

## 'S258 Electrical Characteristics

over recommended operating free air temperature (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 6)	Max	Units
$V_I$	Input Clamp Voltage	$V_{CC} = \text{Min}, I_I = -18\text{ mA}$			-1.2	V
$V_{OH}$	High Level Output Voltage	$V_{CC} = \text{Min}, I_{OH} = \text{Max}$ $V_{IL} = \text{Max}, V_{IH} = \text{Min}$	DM54	2.4	3.4	
			DM74	2.4	3.2	
$V_{OL}$	Low Level Output Voltage	$V_{CC} = \text{Min}, I_{OL} = \text{Max}$ $V_{IH} = \text{Min}, V_{IL} = \text{Max}$			0.5	V
$I_I$	Input Current @ Max Input Voltage	$V_{CC} = \text{Max}, V_I = 5.5V$			1	mA
$I_{IH}$	High Level Input Current	$V_{CC} = \text{Max},$ $V_I = 2.7V$	Select		100	$\mu A$
			Other		50	
$I_{IL}$	Low Level Input Current	$V_{CC} = \text{Max},$ $V_I = 0.5V$	Select		-4	mA
			Other		-2	

## 'S258 Electrical Characteristics (Continued)

over recommended operating free air temperature (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 6)	Max	Units	
$I_{OZH}$	Off-State Output Current with High Level Output Voltage Applied	$V_{CC} = \text{Max}$ , $V_O = 2.4V$ $V_{IH} = \text{Min}$ , $V_{IL} = \text{Max}$			50	$\mu A$	
$I_{OZL}$	Off-State Output Current with Low Level Output Voltage Applied	$V_{CC} = \text{Max}$ , $V_O = 0.5V$ $V_{IH} = \text{Min}$ , $V_{IL} = \text{Max}$			-50	$\mu A$	
$I_{OS}$	Short Circuit Output Current	$V_{CC} = \text{Max}$ (Note 7)	DM54	-40		-100	mA
			DM74	-40		-100	
$I_{CCH}$	Supply Current with Outputs High	$V_{CC} = \text{Max}$ (Note 8)		36	56	mA	
$I_{CCL}$	Supply Current with Outputs Low	$V_{CC} = \text{Max}$ (Note 8)		52	81	mA	
$I_{CCZ}$	Supply Current with Outputs Disabled	$V_{CC} = \text{Max}$ (Note 8)		56	87	mA	

**Note 6:** All typicals are at  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$ .

**Note 7:** Not more than one output should be shorted at a time, and the duration should not exceed one second.

**Note 8:**  $I_{CC}$  is measured with all outputs open and all possible inputs grounded, while achieving the stated output conditions.

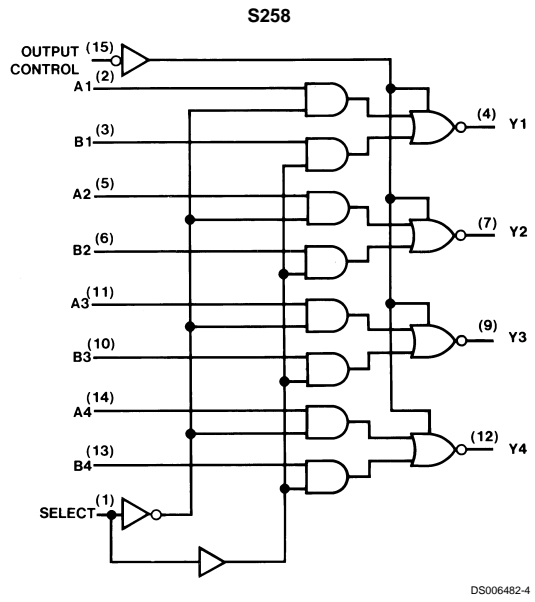
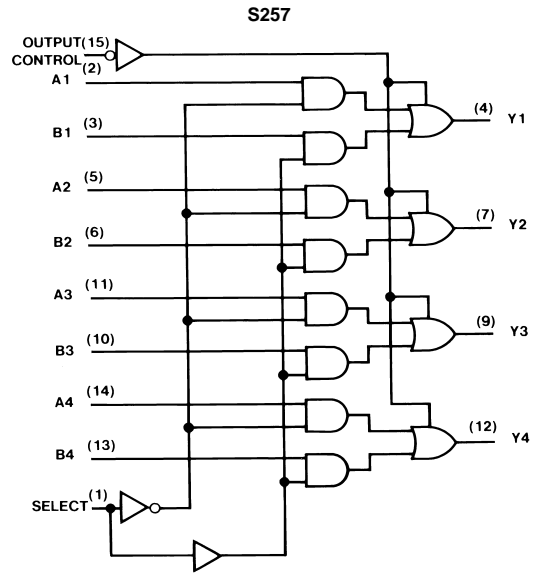
## 'S258 Switching Characteristics

at  $V_{CC} = 5V$  and  $T_A = 25^\circ C$

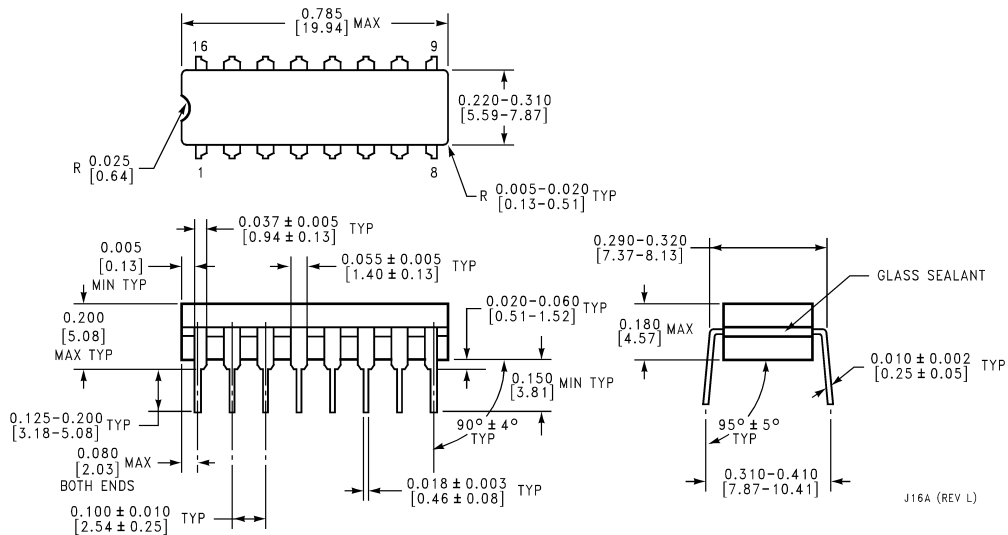
Symbol	Parameter	From (Input) To (Output)	$R_L = 280\Omega$				Units
			$C_L = 15 \text{ pF}$		$C_L = 50 \text{ pF}$		
			Min	Max	Min	Max	
$t_{PLH}$	Propagation Delay Time Low to High Level Output	Data to Output		6		9	ns
$t_{PHL}$	Propagation Delay Time High to Low Level Output	Data to Output		6		9	ns
$t_{PLH}$	Propagation Delay Time Low to High Level Output	Select to Output		12		15	ns
$t_{PHL}$	Propagation Delay Time High to Low Level Output	Select to Output		12		15	ns
$t_{PZH}$	Output Enable Time to High Level Output	Output Control to Y		19.5		23	ns
$t_{PZL}$	Output Enable Time to Low Level Output	Output Control to Y		21		24	ns
$t_{PHZ}$	Output Disable Time to High Level Output (Note 9)	Output Control to Y		8.5			ns
$t_{PLZ}$	Output Disable Time to Low Level Output (Note 9)	Output Control to Y		14			ns

**Note 9:**  $C_L = 5 \text{ pF}$ .

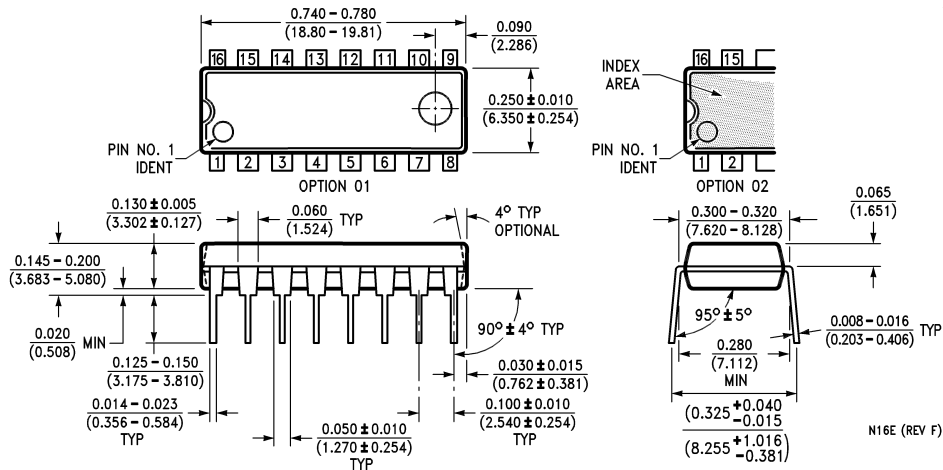
# Logic Diagrams



**Physical Dimensions** inches (millimeters) unless otherwise noted

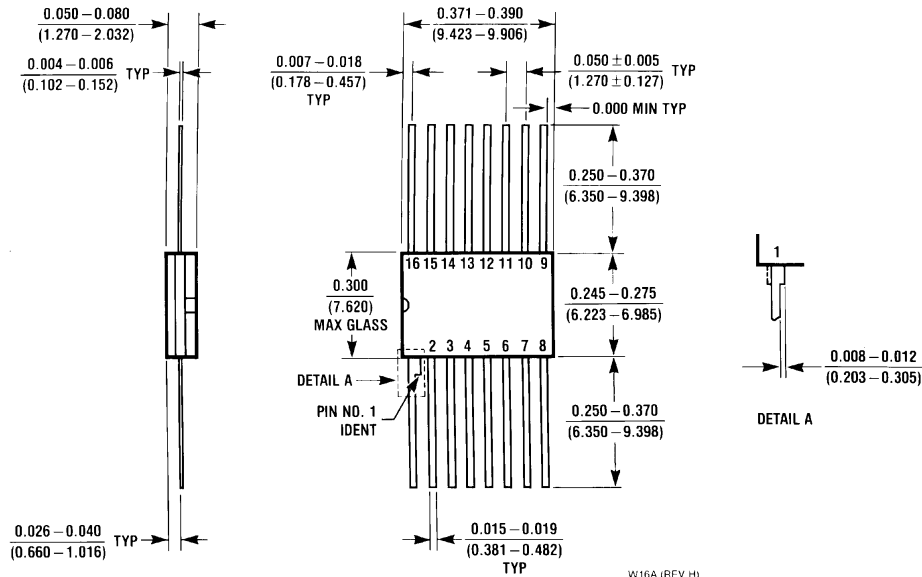


**16-Lead Ceramic Dual-In-Line Package (J)**  
**Order Numbers DM54S257J or DM54S258J**  
**Package Number J16A**



**16-Lead Molded Dual-In-Line Package (N)**  
**Order Numbers DM74S257N or DM74S258N**  
**Package Number N16E**

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



**16-Lead Ceramic Flat Package (W)**  
**Order Number DM54S257W**  
**Package Number W16A**

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