

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

General Description

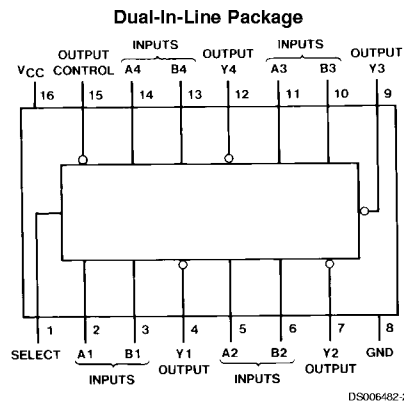
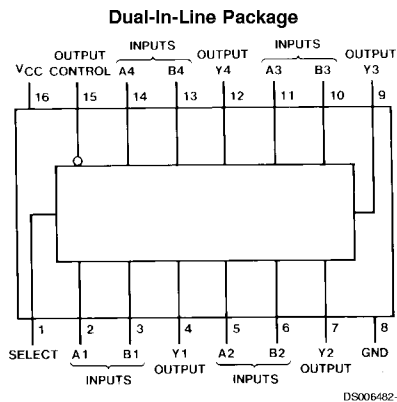
These Schottky-clamped high-performance multiplexers feature 3-STATE outputs that can interface directly with data lines of bus-organized systems. With all but one of the common outputs disabled (at a high impedance state), the low impedance of the single enabled output will drive the bus line to a high 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 _{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	°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 _I	Input Clamp Voltage	V _{CC} = Min, I _I = -18 mA			-1.2	V
V _{OH}	High Level Output Voltage	V _{CC} = Min, I _{OH} = Max	DM54	2.4	3.4	V
		V _{IL} = Max, V _{IH} = Min	DM74	2.4	3.2	
V _{OL}	Low Level Output Voltage	V _{CC} = Min, I _{OL} = Max V _{IH} = Min, V _{IL} = Max			0.5	V
I _I	Input Current @ Max Input Voltage	V _{CC} = Max, V _I = 5.5V			1	mA
I _{IH}	High Level Input Current	V _{CC} = Max	Select		100	μA
		V _I = 2.7V	Other		50	
I _{IL}	Low Level Input Current	V _{CC} = Max,	Select		-4	mA
		V _I = 0.5V	Other		-2	
I _{OZH}	Off-State Output Current with High Level Output Voltage Applied	V _{CC} = Max, V _O = 2.4V V _{IH} = Min, V _{IL} = Max			50	μA
I _{OZL}	Off-State Output Current with Low Level Output Voltage Applied	V _{CC} = Max, V _O = 0.5V V _{IH} = Min, V _{IL} = Max			-50	μA
I _{OS}	Short Circuit Output Current	V _{CC} = Max	DM54	-40	-100	mA
		(Note 3)	DM74	-40	-100	
I _{COH}	Supply Current with Outputs High	V _{CC} = Max (Note 4)		44	68	mA
I _{COL}	Supply Current with Outputs Low	V _{CC} = Max (Note 4)		60	93	mA
I _{CCZ}	Supply Current with Outputs Disabled	V _{CC} = Max (Note 4)		64	99	mA

Note 2: All typicals are at V_{CC} = 5V, T_A = 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_{CC} 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	V
			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	μA
			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	μA
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	μA
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.

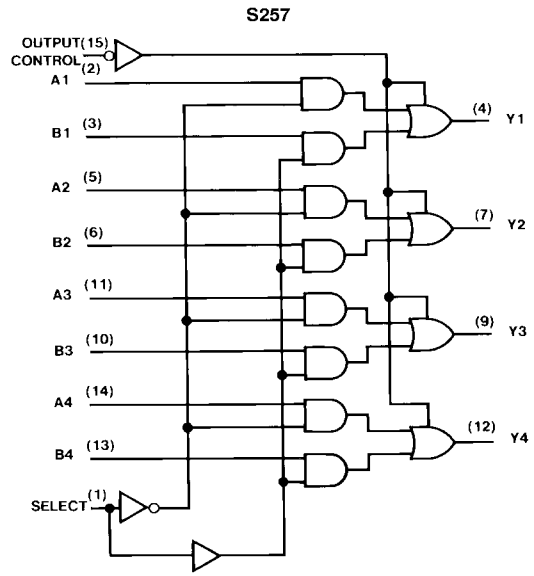
'S258 Switching Characteristics

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

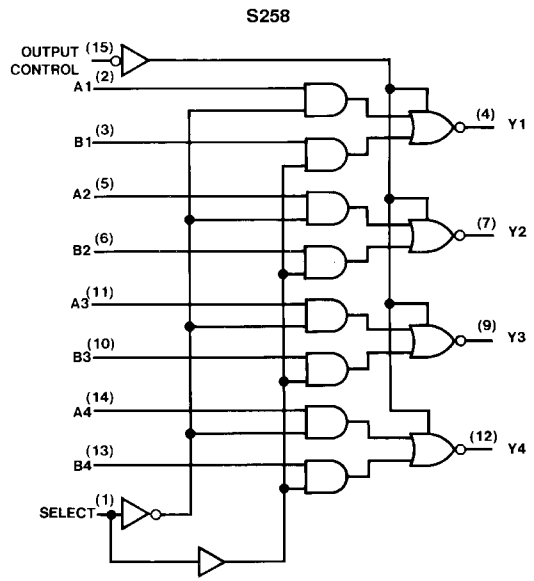
Symbol	Parameter	From (Input) To (Output)	$R_L = 280\Omega$				Units
			$C_L = 15\text{ pF}$		$C_L = 50\text{ pF}$		
			Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	Data to Output		6		9	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Data to Output		6		9	ns
t_{PLH}	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

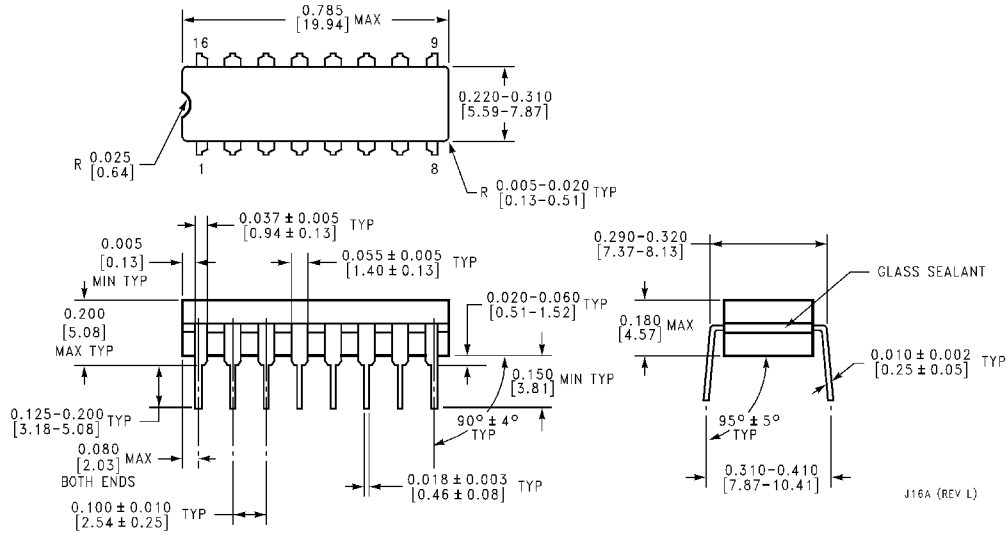


DS006482-3

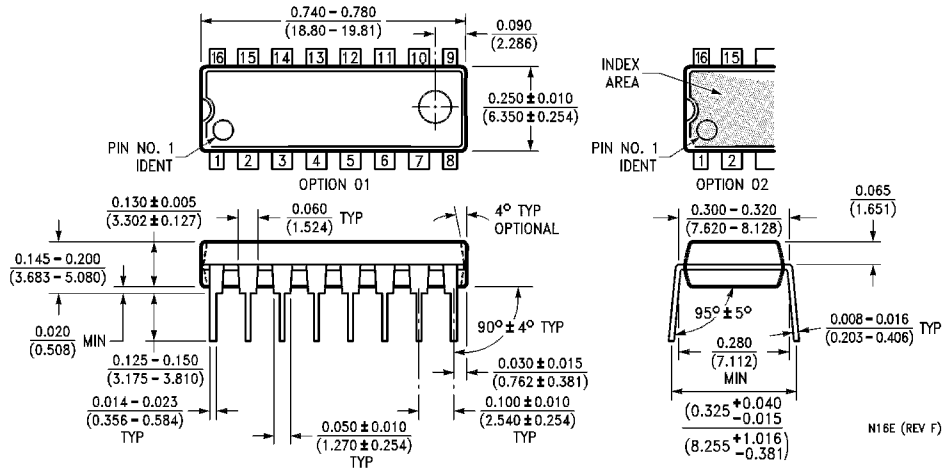


DS006482-4

Physical Dimensions inches (millimeters) unless otherwise noted

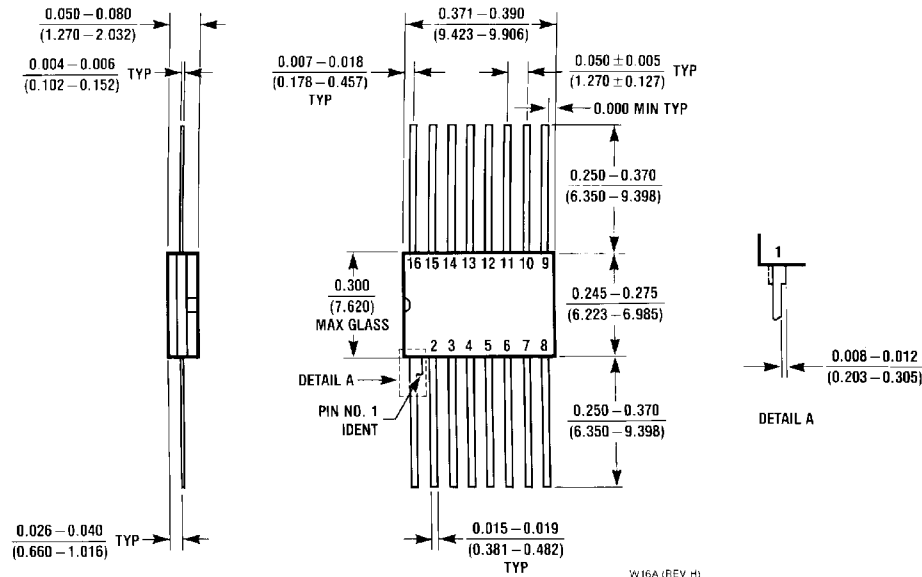


16-Lead Ceramic Dual-In-Line Package (J)
Order Numbers DM54S257J or DM54S258J
Package Number J16A



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

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Fairchild Semiconductor Corporation
 Americas
 Customer Response Center
 Tel: 1-888-522-5372

Fairchild Semiconductor Europe
 Fax: +49 (0) 1 80-530 85 86
 Email: europe.support@nsc.com
 Deutsch Tel: +49 (0) 8 141-35-0
 English Tel: +44 (0) 1 793-85-68-56
 Italy Tel: +39 (0) 2 57 5631

Fairchild Semiconductor Hong Kong Ltd.
 13th Floor, Straight Block,
 Ocean Centre, 5 Canton Rd.
 Tsimshatsui, Kowloon
 Hong Kong
 Tel: +852 2737-7200
 Fax: +852 2314-0061

National Semiconductor Japan Ltd.
 Tel: 81-3-5620-6175
 Fax: 81-3-5620-6179

www.fairchildsemi.com