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FAIRCHILD SEMICONDUCTOR™

September 1986
Revised April 2000

DM74LS157 • DM74LS158
Quad 2-Line to 1-Line Data Selectors/Multiplexers

General Description

These data selectors/multiplexers contain inverters and drivers to supply full on-chip data selection to the four output gates. A separate strobe input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The DM74LS157 presents true data whereas the DM74LS158 presents inverted data to minimize propagation delay time.

Applications

- Expand any data input point
- Multiplex dual data buses
- Generate four functions of two variables (one variable is common)
- Source programmable counters

Features

- Buffered inputs and outputs
- Typical Propagation Time
  - DM74LS157 9 ns
  - DM74LS158 7 ns
- Typical Power Dissipation
  - DM74LS157 49 mW
  - DM74LS158 24 mW

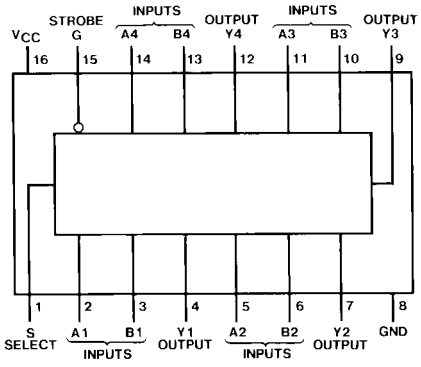
Ordering Code:

Order Number	Package Number	Package Description
DM74LS157M	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
DM74LS157SJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
DM74LS157N	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide
DM74LS158M	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
DM74LS158N	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

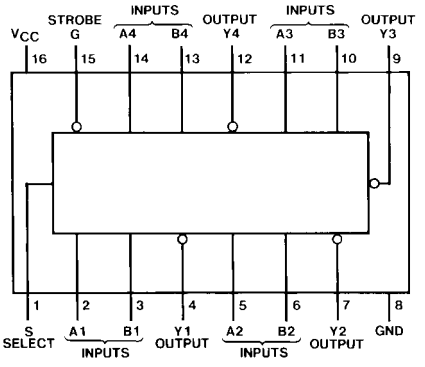
Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Connection Diagrams

DM74LS157



DM74LS158



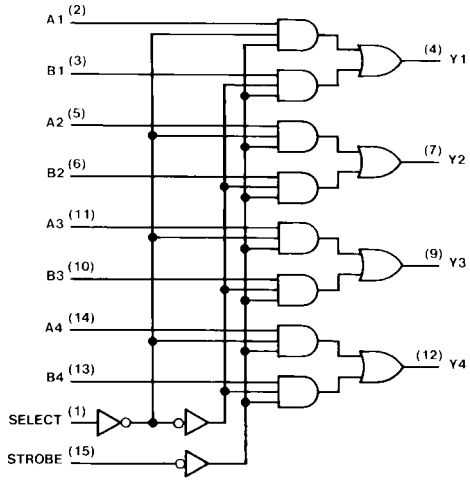
Function Table

Inputs				Output Y	
Strobe	Select	A	B	DM74LS157	DM74LS158
H	X	X	X	L	H
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

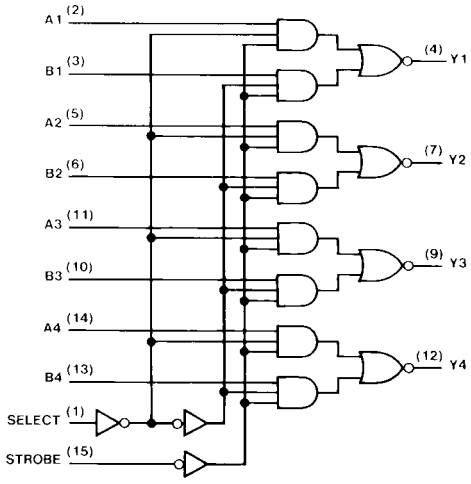
H = HIGH Level
L = LOW Level
X = Don't Care

Logic Diagrams

DM74LS157



DM74LS158



Absolute Maximum Ratings(Note 1)

Supply Voltage	7V
Input Voltage	7V
Operating Free Air Temperature Range	0°C to +70°C
Storage Temperature Range	−65°C to +150°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 tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

DM74LS157 Recommended Operating Conditions

Symbol	Parameter	Min	Nom	Max	Units
V_{CC}	Supply Voltage	4.75	5	5.25	V
V_{IH}	HIGH Level Input Voltage	2			V
V_{IL}	LOW Level Input Voltage			0.8	V
I_{OH}	HIGH Level Output Current			−0.4	mA
I_{OL}	LOW Level Output Current			8	mA
T_A	Free Air Operating Temperature	0		70	°C

DM74LS157 Electrical Characteristics

over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ (Note 2)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA				−1.5	V
V_{OH}	HIGH Level Output Voltage	V_{CC} = Min, I_{OH} = Max, V_{IL} = Max, V_{IH} = Min		2.7	3.4		V
V_{OL}	LOW Level Output Voltage	V_{CC} = Min, I_{OL} = Max, V_{IL} = Max, V_{IH} = Min			0.35	0.5	V
		I_{OL} = 4 mA, V_{CC} = Min			0.25	0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max	S or G			0.2	mA
		V_I = 7V	A or B			0.1	
I_{IH}	HIGH Level Input Current	V_{CC} = Max	S or G			40	µA
		V_I = 2.7V	A or B			20	
I_{IL}	LOW Level Input Current	V_{CC} = Max	S or G			−0.8	mA
		V_I = 0.4V	A or B			−0.4	
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 3)		−20		−100	mA
I_{CC}	Supply Current	V_{CC} = Max (Note 4)			9.7	16	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 4.5V applied to all inputs and all outputs OPEN.

DM74LS157 Switching Characteristics

at V_{CC} = 5V and T_A = 25°C

Symbol	Parameter	From (Input) To (Output)	R_L = 2 kΩ				Units
			C_L = 15 pF		C_L = 50 pF		
			Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time LOW-to-HIGH Level Output	Data to Y		14		18	ns
t_{PHL}	Propagation Delay Time HIGH-to-LOW Level Output	Data to Y		14		23	ns
t_{PLH}	Propagation Delay Time LOW-to-HIGH Level Output	Strobe to Y		20		24	ns
t_{PHL}	Propagation Delay Time HIGH-to-LOW Level Output	Strobe to Y		21		30	ns
t_{PLH}	Propagation Delay Time LOW-to-HIGH Level Output	Select to Y		23		28	ns
t_{PHL}	Propagation Delay Time HIGH-to-LOW Level Output	Select to Y		27		32	ns

DM74LS158 Recommended Operating Conditions

Symbol	Parameter	Min	Nom	Max	Units
V_{CC}	Supply Voltage	4.75	5	5.25	V
V_{IH}	HIGH Level Input Voltage	2			V
V_{IL}	LOW Level Input Voltage			0.8	V
I_{OH}	HIGH Level Output Current			−0.4	mA
I_{OL}	LOW Level Output Current			8	mA
T_A	Free Air Operating Temperature	0		70	°C

DM74LS158 Electrical Characteristics

over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ (Note 5)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA				−1.5	V
V_{OH}	HIGH Level Output Voltage	V_{CC} = Min, I_{OH} = Max V_{IL} = Max, V_{IH} = Min		2.7	3.4		V
V_{OL}	LOW Level Output Voltage	V_{CC} = Min, I_{OL} = Max V_{IL} = Max, V_{IH} = Min			0.35	0.5	V
		I_{OL} = 4 mA, V_{CC} = Min			0.25	0.4	
I_I	Input Current @ Max Input Voltage	V_{CC} = Max V_I = 7V	S or G			0.2	mA
			A or B			0.1	
I_{IH}	HIGH Level Input Current	V_{CC} = Max V_I = 2.7V	S or G			40	µA
			A or B			20	
I_{IL}	LOW Level Input Current	V_{CC} = Max V_I = 0.4V	S or G			−0.8	mA
			A or B			−0.4	
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 6)		−20		−100	mA
I_{CC}	Supply Current	V_{CC} = Max (Note 7)			4.8	8	mA

Note 5: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 6: Not more than one output should be shorted at a time, and the duration should not exceed one second.

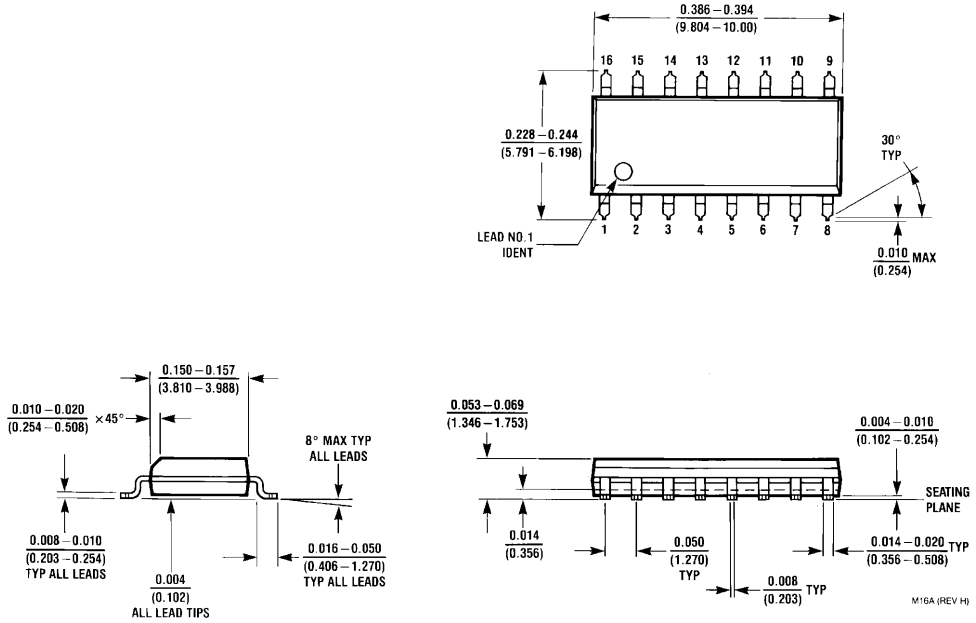
Note 7: I_{CC} is measured with 4.5V applied to all inputs and all outputs OPEN.

DM74LS158 Switching Characteristics

at V_{CC} = 5V and T_A = 25°C

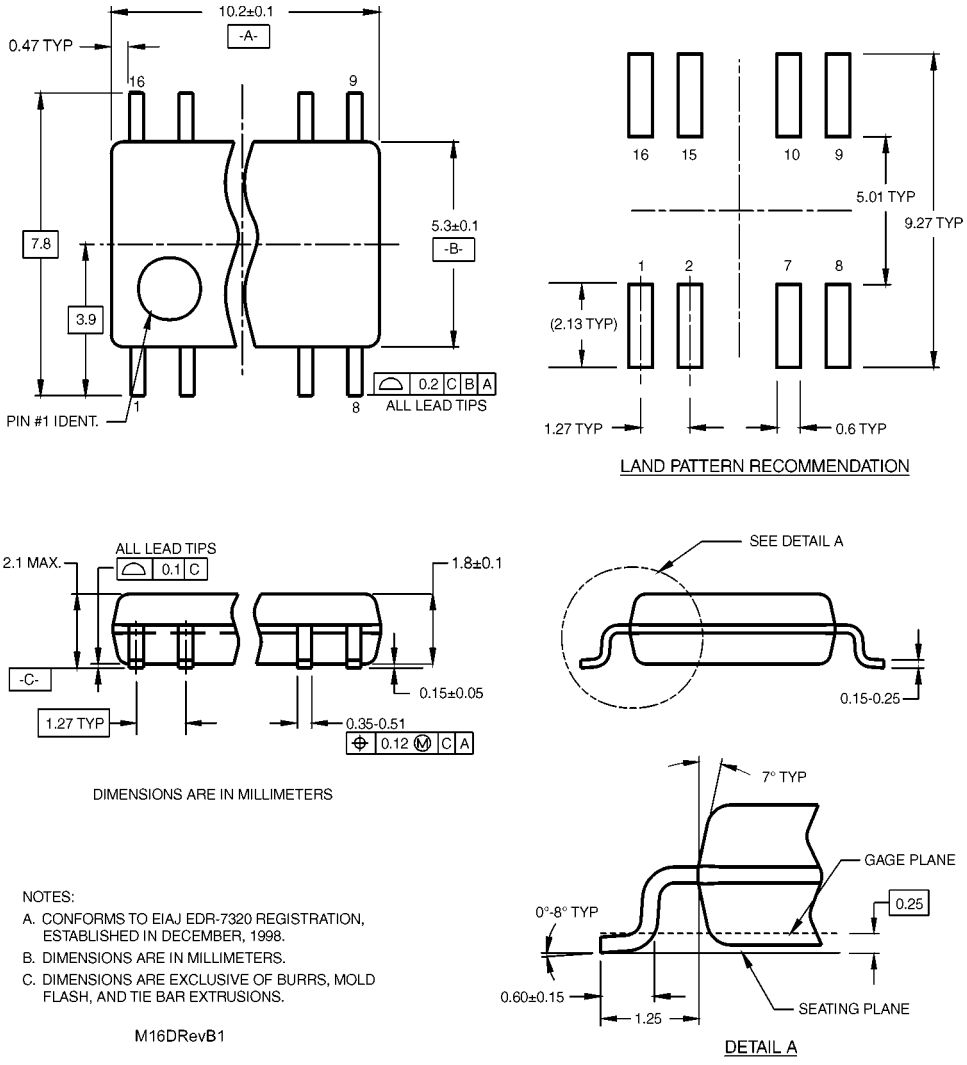
Symbol	Parameter	From (Input) To (Output)	R_L = 2 kΩ				Units
			C_L = 15 pF		C_L = 50 pF		
			Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time LOW-to-HIGH Level Output	Data to Y		12		18	ns
t_{PHL}	Propagation Delay Time HIGH-to-LOW Level Output	Data to Y		12		21	ns
t_{PLH}	Propagation Delay Time LOW-to-HIGH Level Output	Strobe to Y		17		23	ns
t_{PHL}	Propagation Delay Time HIGH-to-LOW Level Output	Strobe to Y		18		28	ns
t_{PLH}	Propagation Delay Time LOW-to-HIGH Level Output	Select to Y		20		24	ns
t_{PHL}	Propagation Delay Time HIGH-to-LOW Level Output	Select to Y		24		36	ns

Physical Dimensions inches (millimeters) unless otherwise noted



16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
Package Number M16A

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



NOTES:

A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.

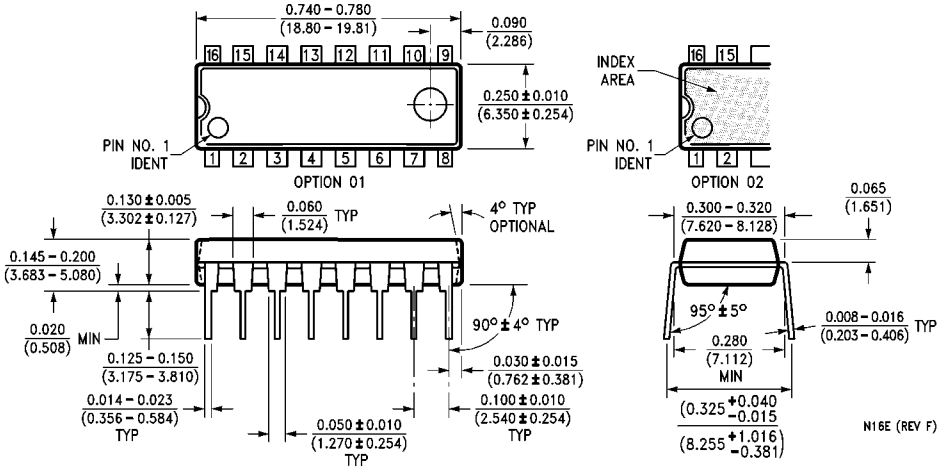
B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M16DRevB1

16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M16D

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



16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide
Package Number N16E