

# 74F539

## Dual 1-of-4 Decoder with 3-STATE Outputs

### General Description

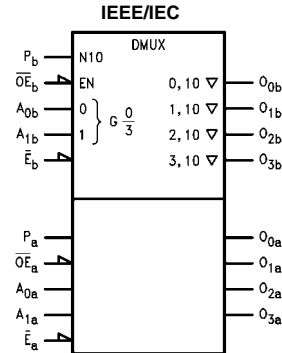
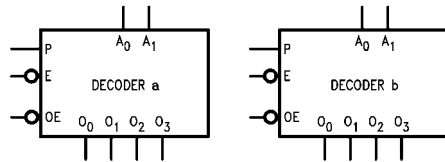
The 74F539 contains two independent decoders. Each accepts two Address ( $A_0, A_1$ ) input signals and decodes them to select one of four mutually exclusive outputs. A polarity control input ( $P$ ) determines whether the outputs are active HIGH ( $P = L$ ) or active LOW ( $P = H$ ). An active LOW input Enable ( $E$ ) is available for data demultiplexing; data is routed to the selected output in non-inverted form in the active LOW mode or in inverted form in the active HIGH mode. A HIGH signal on the active LOW Output Enable ( $\overline{OE}$ ) input forces the 3-STATE outputs to the high impedance state.

### Ordering Code:

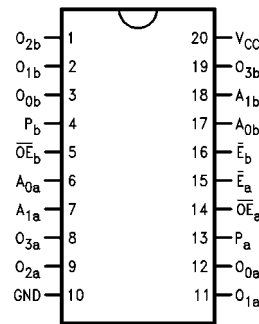
Order Number	Package Number	Package Description
74F539SC	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
74F539PC	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

### Logic Symbols



### Connection Diagram



74F539 Dual 1-of-4 Decoder with 3-STATE Outputs

### Unit Loading/Fan Out

Pin Names	Description	U.L.	
		HIGH/LOW	Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$
$A_{0a}-A_{1a}$	Side A Address Inputs	1.0/1.0	20 $\mu$ A/-0.6 mA
$A_{0b}-A_{1b}$	Side B Address Inputs	1.0/1.0	20 $\mu$ A/-0.6 mA
$\bar{E}_a, \bar{E}_b$	Enable Inputs (Active LOW)	1.0/1.0	20 $\mu$ A/-0.6 mA
$\overline{OE}_a, \overline{OE}_b$	Output Enable Inputs (Active LOW)	1.0/1.0	20 $\mu$ A/-0.6 mA
$P_a, P_b$	Polarity Control Inputs	1.0/1.0	20 $\mu$ A/-0.6 mA
$O_{0a}-O_{3a}$	Side A 3-STATE Outputs	150/40 (33.3)	-3 mA/24 mA (20 mA)
$O_{0b}-O_{3b}$	Side B 3-STATE Outputs	150/40 (33.3)	-3 mA/24 mA (20 mA)

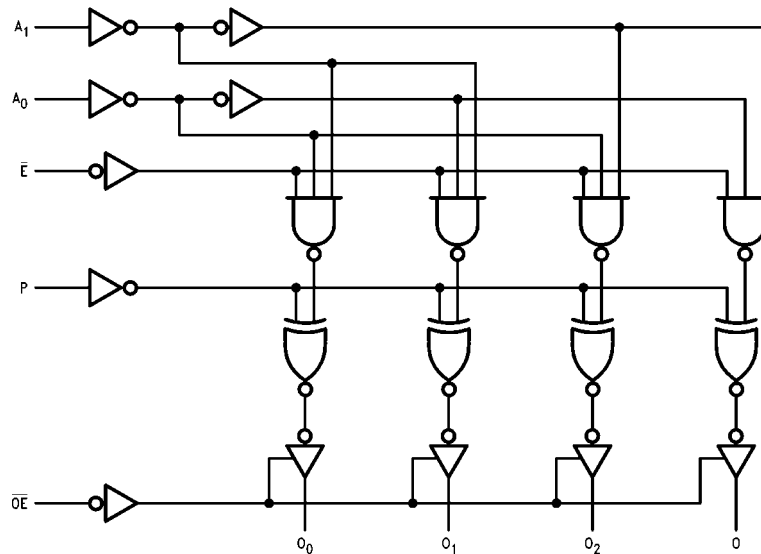
### Truth Table

(each half)

Function	Inputs				Outputs			
	$\overline{OE}$	$\bar{E}$	$A_1$	$A_0$	$O_0$	$O_1$	$O_2$	$O_3$
High Impedance	H	X	X	X	Z	Z	Z	Z
Disable	L	H	X	X	$O_n = P$			
Active HIGH	L	L	L	L	H	L	L	L
Output	L	L	L	H	L	H	L	L
(P = L)	L	L	H	L	L	L	H	L
	L	L	H	H	L	L	L	H
Active LOW	L	L	L	L	L	H	H	H
Output	L	L	L	H	H	L	H	H
(P = H)	L	L	H	L	H	H	L	H
	L	L	H	H	H	H	H	L

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial  
Z = High Impedance

### Logic Diagram (one half shown)



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

**Absolute Maximum Ratings**(Note 1)

Storage Temperature	-65°C to +150°C
Ambient Temperature under Bias	-55°C to +125°C
Junction Temperature under Bias	-55°C to +150°C
V <sub>CC</sub> Pin Potential to Ground Pin	-0.5V to +7.0V
Input Voltage (Note 2)	-0.5V to +7.0V
Input Current (Note 2)	-30 mA to +5.0 mA
Voltage Applied to Output in HIGH State (with V <sub>CC</sub> = 0V)	
Standard Output	-0.5V to V <sub>CC</sub>
3-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I <sub>OL</sub> (mA)

**Recommended Operating Conditions**

Free Air Ambient Temperature	0°C to +70°C
Supply Voltage	+4.5V to +5.5V

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

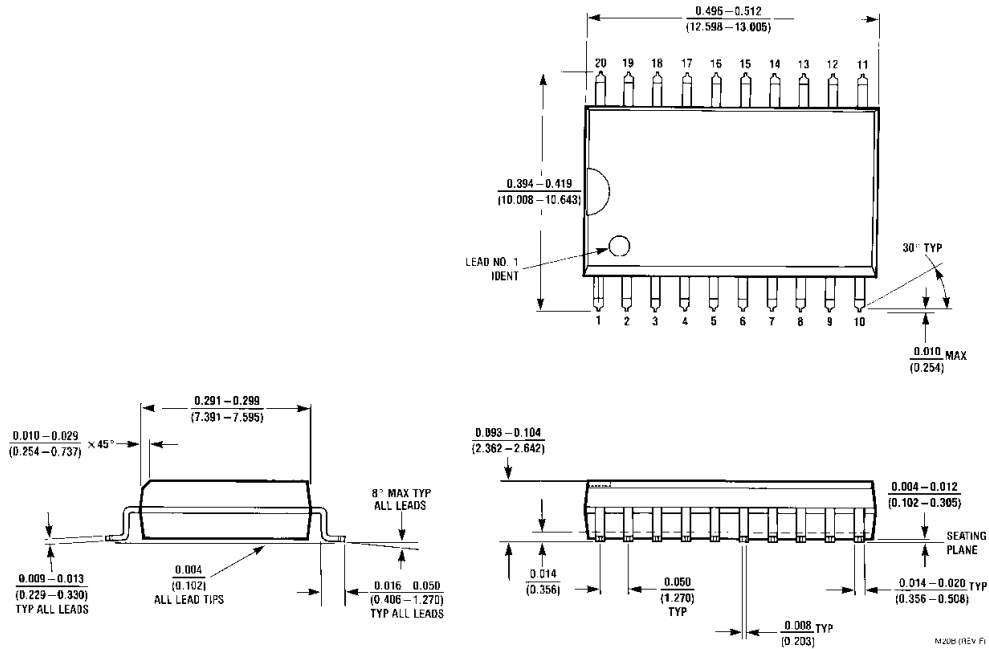
**Note 2:** Either voltage limit or current limit is sufficient to protect inputs.

**DC Electrical Characteristics**

Symbol	Parameter	Min	Typ	Max	Units	V <sub>CC</sub>	Conditions
V <sub>IH</sub>	Input HIGH Voltage	2.0			V		Recognized as a HIGH Signal
V <sub>IL</sub>	Input LOW Voltage			0.8	V		Recognized as a LOW Signal
V <sub>CD</sub>	Input Clamp Diode Voltage			-1.2	V	Min	I <sub>IN</sub> = -18 mA
V <sub>OH</sub>	Output HIGH Voltage	10% V <sub>CC</sub> 10% V <sub>CC</sub> 5% V <sub>CC</sub> 5% V <sub>CC</sub>	2.5 2.4 2.7 2.7		V	Min	I <sub>OH</sub> = -1 mA I <sub>OH</sub> = -3 mA I <sub>OH</sub> = -1 mA I <sub>OH</sub> = -3 mA
V <sub>OL</sub>	Output LOW Voltage	10% V <sub>CC</sub>		0.5	V	Min	I <sub>OL</sub> = 24 mA
I <sub>IH</sub>	Input HIGH Current			5.0	μA	Max	V <sub>IN</sub> = 2.7V
I <sub>BVI</sub>	Input HIGH Current Breakdown Test			7.0	μA	Max	V <sub>IN</sub> = 7.0V
I <sub>CEX</sub>	Output HIGH Leakage Current			50	μA	Max	V <sub>OUT</sub> = V <sub>CC</sub>
V <sub>ID</sub>	Input Leakage Test	4.75			V	0.0	I <sub>ID</sub> = 1.9 μA All Other Pins Grounded
I <sub>OD</sub>	Output Leakage Circuit Current			3.75	μA	0.0	V <sub>IDP</sub> = 150 mV All Other Pins Grounded
I <sub>IL</sub>	Input LOW Current			-0.6	mA	Max	V <sub>IN</sub> = 0.5V
I <sub>OZH</sub>	Output Leakage Current			50	μA	Max	V <sub>OUT</sub> = 2.7V
I <sub>OZL</sub>	Output Leakage Current			-50	μA	Max	V <sub>OUT</sub> = 0.5V
I <sub>OS</sub>	Output Short-Circuit Current	-60		-150	mA	Max	V <sub>OUT</sub> = 0V
I <sub>ZZ</sub>	Bus Drainage Test			500	μA	0.0V	V <sub>OUT</sub> = 5.25V
I <sub>CCH</sub>	Power Supply Current		28	45	mA	Max	V <sub>O</sub> = HIGH
I <sub>CCL</sub>	Power Supply Current		40	60	mA	Max	V <sub>O</sub> = LOW
I <sub>CCZ</sub>	Power Supply Current		40	60	mA	Max	V <sub>O</sub> = HIGH Z

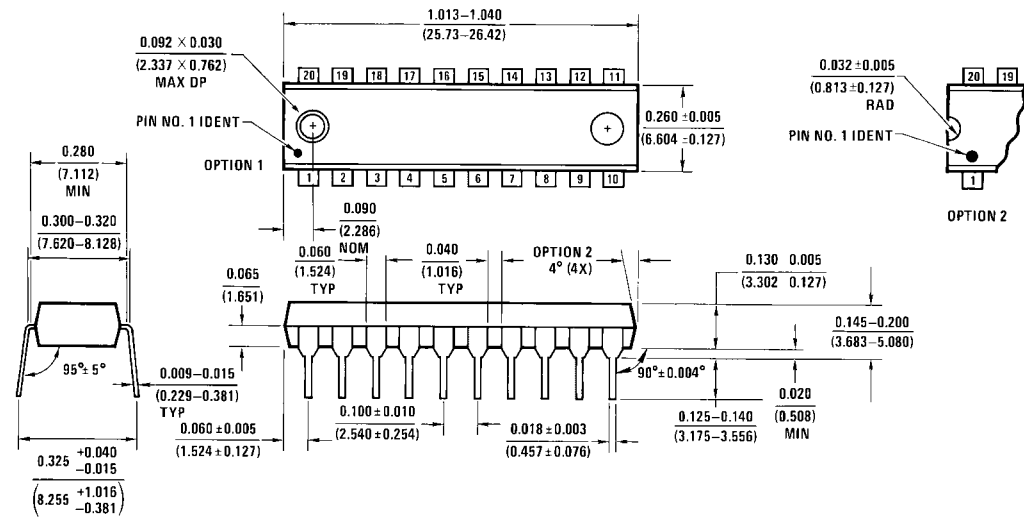
AC Electrical Characteristics							
Symbol	Parameter	T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50 pF			T <sub>A</sub> = 0°C to +70°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50 pF		Units
		Min	Typ	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	4.0	14.5	18.5	3.5	19.5	ns
t <sub>PHL</sub>	A <sub>n</sub> to O <sub>n</sub>	4.0	9.5	12.0	4.0	13.0	
t <sub>PLH</sub>	Propagation Delay	5.0	12.0	16.0	5.5	17.0	ns
t <sub>PHL</sub>	$\overline{E}$ to O <sub>n</sub>	4.0	7.5	9.5	4.0	10.5	
t <sub>PLH</sub>	Propagation Delay	7.5	14.5	21.5	4.5	22.5	ns
t <sub>PHL</sub>	P to O <sub>n</sub>	5.0	11.0	16.5	4.5	17.5	
t <sub>PZH</sub>	Output Enable Time	4.5	8.0	10.5	4.0	11.5	ns
t <sub>PZL</sub>	$\overline{OE}$ to O <sub>n</sub>	5.5	10.0	13.0	5.0	14.0	
t <sub>PHZ</sub>	Output Disable Time	2.0	4.5	6.5	2.0	7.0	
t <sub>PLZ</sub>	$\overline{OE}$ to O <sub>n</sub>	3.0	6.5	8.5	3.0	9.5	

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



**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide  
Package Number M20B**

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



**20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide  
Package Number N20A**

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