

# 74F537

## 1-of-10 Decoder with TRI-STATE® Outputs

### General Description

The 74F537 is one-of-ten decoder/demultiplexer with four active HIGH BCD inputs and ten mutually exclusive outputs. A polarity control input determines whether the outputs are active LOW or active HIGH. The 74F537 has TRI-STATE outputs, and a HIGH signal on the Output Enable (OE) input forces all outputs to the high impedance state. Two input

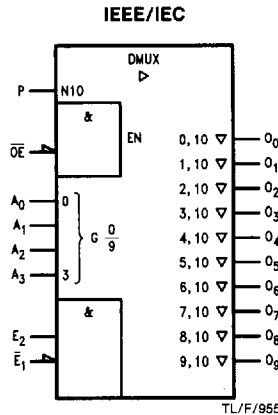
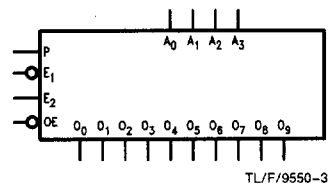
enables, active HIGH  $E_2$  and active LOW  $\bar{E}_1$ , are available for demultiplexing data to the selected output in either non-inverted or inverted form. Input codes greater than BCD nine cause all outputs to go to the inactive state (i.e., same polarity as the P input).

### Ordering Code: See Section 11

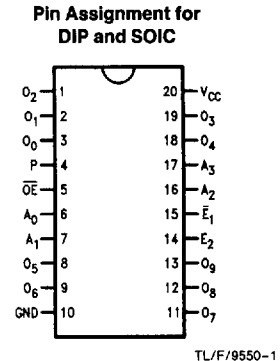
Commercial	Package Number	Package Description
74F537PC	N20A	20-Lead (0.300" Wide) Molded Dual-In-Line
74F537SC (Note 1)	M20B	20-Lead (0.300" Wide) Molded Small Outline, JEDEC
74F537SJ (Note 1)	M20D	20-Lead (0.300" Wide) Molded Small Outline, EIAJ

Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

### Logic Symbols



### Connection Diagram



### Unit Loading/Fan Out: See Section 2 for U.L. Definitions

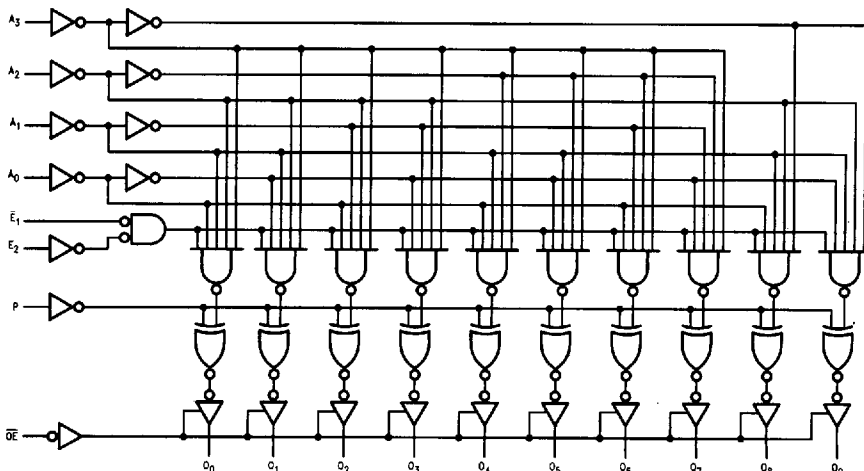
Pin Names	Description	74F	
		U.L. HIGH/LOW	Input $I_{IH}/I_{IL}$ Output $I_{OH}/I_{OL}$
$A_0$ - $A_3$	Address Inputs	1.0/1.0	20 $\mu$ A/ -0.6 mA
$\bar{E}_1$	Enable Input (Active LOW)	1.0/1.0	20 $\mu$ A/ -0.6 mA
$E_2$	Enable Input (Active HIGH)	1.0/1.0	20 $\mu$ A/ -0.6 mA
$\bar{O}E$	Output Enable Input (Active LOW)	1.0/1.0	20 $\mu$ A/ -0.6 mA
P	Polarity Control Input	1.0/1.0	20 $\mu$ A/ -0.6 mA
$O_0$ - $O_9$	TRI-STATE Outputs	150/40 (33.3)	-3 mA/24 mA (20 mA)

# Truth Table

Function	Inputs							Outputs										
	$\overline{OE}$	$\overline{E}_1$	$E_2$	$A_3$	$A_2$	$A_1$	$A_0$	$O_0$	$O_1$	$O_2$	$O_3$	$O_4$	$O_5$	$O_6$	$O_7$	$O_8$	$O_9$	
High Impedance	H	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
Disable	L	H	X	X	X	X	X			Outputs Equal P Input								
Active HIGH Output (P = L)	L	L	H	L	L	L	L	L	H	L	L	L	L	L	L	L	L	
	L	L	H	L	L	L	L	H	L	H	L	L	L	L	L	L	L	
	L	L	H	L	L	H	L	L	L	L	H	L	L	L	L	L	L	
	L	L	H	L	L	H	H	L	L	L	L	L	L	L	L	L	L	
	L	L	H	L	H	L	L	L	L	L	L	H	L	L	L	L	L	
	L	L	H	L	H	L	L	H	L	L	L	L	H	L	L	L	L	
	L	L	H	L	H	H	L	L	L	L	L	L	L	H	L	L	L	
	L	L	H	L	H	H	L	L	L	L	L	L	L	L	H	L	L	
	L	L	H	L	H	H	H	L	L	L	L	L	L	L	L	L	L	
	L	L	H	L	H	H	H	H	L	L	L	L	L	L	L	L	L	
	L	L	H	H	L	L	L	L	L	L	L	L	L	L	L	H	L	
	L	L	H	H	L	L	L	H	L	L	L	L	L	L	L	L	H	
	L	L	H	H	X	H	X	X	L	L	L	L	L	L	L	L	L	
	L	L	H	H	H	X	X	X	L	L	L	L	L	L	L	L	L	
	Active LOW Output (P = H)	L	L	H	L	L	L	L	L	H	H	H	H	H	H	H	H	H
		L	L	H	L	L	L	L	H	L	H	H	H	H	H	H	H	H
L		L	H	L	L	H	L	L	H	H	L	H	H	H	H	H	H	
L		L	H	L	L	H	H	L	H	H	L	H	H	H	H	H	H	
L		L	H	L	H	L	L	L	H	H	H	L	H	H	H	H	H	
L		L	H	L	H	L	L	H	L	H	H	L	H	H	H	H	H	
L		L	H	L	H	H	L	L	H	H	H	L	H	H	L	H	H	
L		L	H	L	H	H	L	L	H	H	H	L	H	H	L	H	H	
L		L	H	L	H	H	H	L	H	H	H	L	H	H	L	H	H	
L		L	H	H	L	L	L	L	H	H	H	H	H	H	H	L	H	
L		L	H	H	L	L	L	H	L	H	H	H	H	H	H	L	H	
L		L	H	H	X	H	X	X	H	H	H	H	H	H	H	H	H	
L		L	H	H	H	X	X	X	H	H	H	H	H	H	H	H	H	

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

## Logic Diagram



TL/F/9550-4

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 +175°C
Plastic	-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>
TRI-STATE Output	-0.5V to +5.5V
Current Applied to Output in LOW State (Max)	twice the rated I <sub>OL</sub> (mA)

**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.

**Recommended Operating Conditions**

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

**DC Electrical Characteristics**

Symbol	Parameter	74F			Units	V <sub>CC</sub>	Conditions
		Min	Typ	Max			
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	74F 10% V <sub>CC</sub> 74F 10% V <sub>CC</sub> 74F 5% V <sub>CC</sub> 74F 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	74F 10% V <sub>CC</sub>		0.5	V	Min	I <sub>OL</sub> = 24 mA
I <sub>IH</sub>	Input HIGH Current	74F		5.0	μA	Max	V <sub>IN</sub> = 2.7V
I <sub>BVI</sub>	Input HIGH Current Breakdown Test	74F		7.0	μA	Max	V <sub>IN</sub> = 7.0V
I <sub>CEX</sub>	Output HIGH Leakage Current	74F		50	μA	Max	V <sub>OUT</sub> = V <sub>CC</sub>
V <sub>ID</sub>	Input Leakage Test	74F	4.75		V	0.0	I <sub>ID</sub> = 1.9 μA All Other Pins Grounded
I <sub>OD</sub>	Output Leakage Circuit Current	74F		3.75	μA	0.0	V <sub>IOD</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			56	mA	Max	V <sub>O</sub> = HIGH
I <sub>CCZ</sub>	Power Supply Current		44	66	mA	Max	V <sub>O</sub> = HIGH Z

**AC Electrical Characteristics:** See Section 2 for Waveforms and Load Configurations

Symbol	Parameter	74F			74F		Units	Fig. No.
		T <sub>A</sub> = +25°C V <sub>CC</sub> = +5.0V C <sub>L</sub> = 50 pF			T <sub>A</sub> , V <sub>CC</sub> = Com C <sub>L</sub> = 50 pF			
		Min	Typ	Max	Min	Max		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay A <sub>n</sub> to O <sub>n</sub>	6.0 4.0	11.0 7.5	16.0 11.0	6.0 4.0	17.0 12.0	ns	2-3
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay E <sub>1</sub> to O <sub>n</sub>	5.0 4.0	8.5 6.5	14.5 9.0	5.0 4.0	15.5 10.0		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay E <sub>2</sub> to O <sub>n</sub>	6.0 5.0	11.0 10.0	16.0 14.0	6.0 5.0	17.0 15.0	ns	2-3
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay P to O <sub>n</sub>	6.0 6.0	11.5 11.0	18.0 16.0	6.0 6.0	20.0 17.0		
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time OE to O <sub>n</sub>	3.0 5.0	5.5 9.0	10.5 13.0	3.0 5.0	11.5 14.0	ns	2-5
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time OE to O <sub>n</sub>	2.0 3.0	4.0 5.0	6.0 7.0	2.0 3.0	7.0 8.0		