

1-of-10 decoder (3-State)

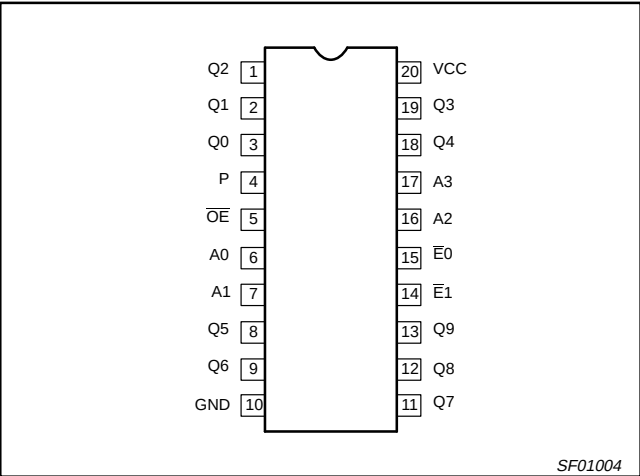
74F537

DESCRIPTION

The 74F537 is a one-of-ten decoder/demultiplexer with four active High BCD inputs and ten mutually exclusive outputs. A Polarity control (P) input determines whether the outputs are active Low or active High. The 74F537 has 3-State outputs and a High signal on the Output Enables (OE) input forces all outputs to the high impedance state. Two input Enables, active High (E1) and active Low (E0), are available for demultiplexing data to the selected output in either non-inverted or inverted form. Input codes greater than BCD nine causes all outputs to go to the inactive state (i.e., same polarity as the P input).

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F537	9ns	44mA

PIN CONFIGURATION



ORDERING INFORMATION

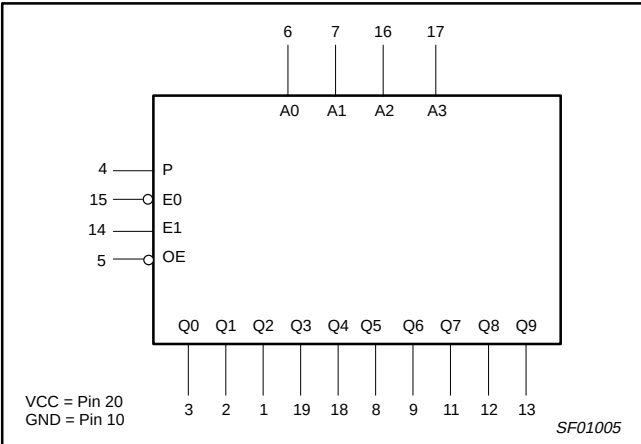
DESCRIPTION	COMMERCIAL RANGE V _{CC} = 5V ±10%, T _{amb} = 0°C to +70°C
20-Pin Plastic DIP	N74F537N
20-Pin Plastic SOL	N74F537D

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

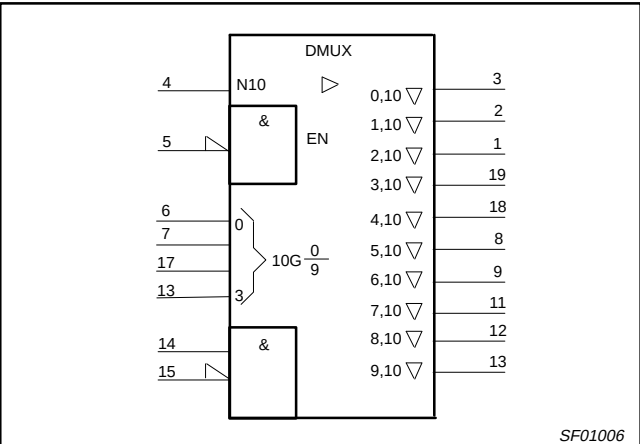
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
A0 - A3	Data inputs	1.0/1.0	20µA/0.6mA
E0	Enable input (active Low)	1.0/1.0	20µA/0.6mA
E1	Enable input (active High)	1.0/1.0	20µA/0.6mA
P	Polarity control input	1.0/1.0	20µA/0.6mA
OE	Output Enable input	1.0/1.0	20µA/0.6mA
Q0 - Q9	Data outputs	150/40	3.0mA/24mA

NOTE: One (1.0) FAST Unit Load is defined as: 20µA in the High state and 0.6mA in the Low state.

LOGIC SYMBOL



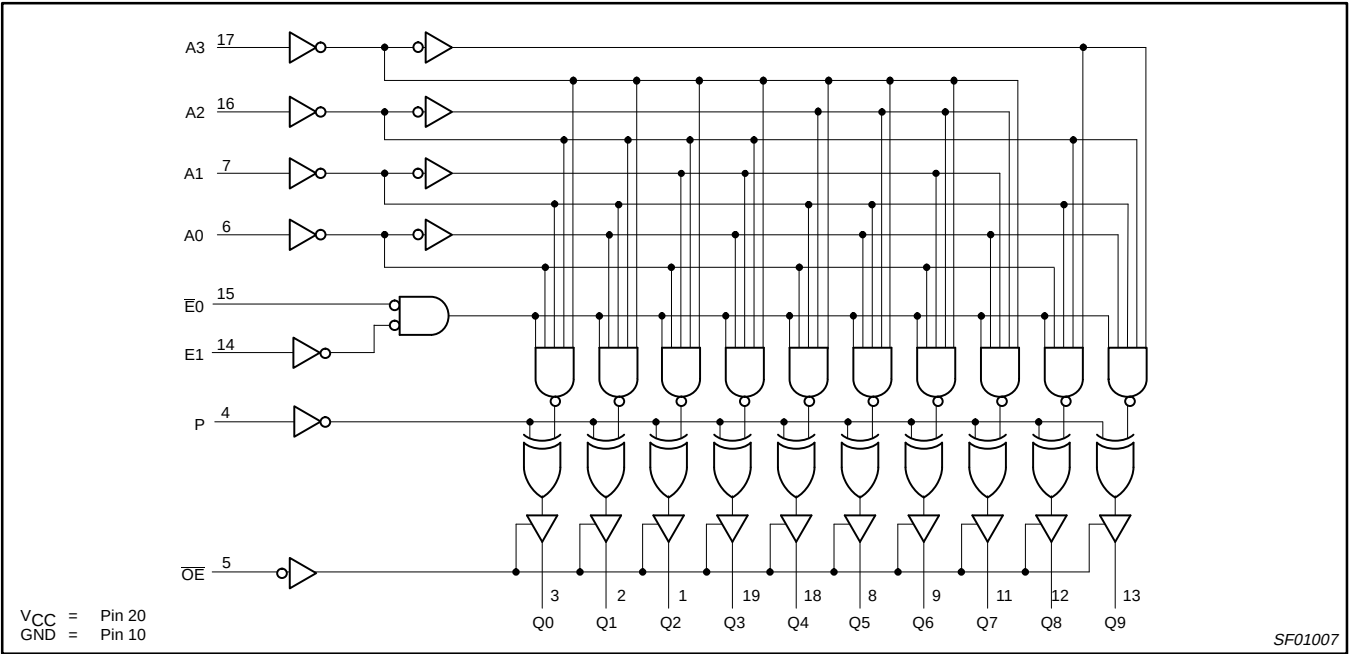
LOGIC SYMBOL (IEEE/IEC)



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74F537

LOGIC DIAGRAM



FUNCTION TABLE

INPUTS							OUTPUTS										OPERATING MODE
OE	E0	E1	A3	A2	A1	A0	Q0	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	
H	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	High Impedance
L	H	X	X	X	X	X	Outputs equal P input										Disable
L	L	H	L	L	L	L	H	L	L	L	L	L	L	L	L	L	Active High output (P = L)
L	L	H	L	L	L	H	L	H	L	L	L	L	L	L	L	L	
L	L	H	L	L	H	L	L	L	H	L	L	L	L	L	L	L	
L	L	H	L	L	H	H	L	L	L	H	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	H	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	H	L	L	L	L	L	L	H	L	L	L	L	
L	L	H	L	H	H	H	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	H	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
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L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
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L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
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L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	
L	L	H	L	H	L	L	L	L	L	L	L	L	L				

H = High voltage level
L = Low voltage level
X = Don't care
Z = High impedance "off" state

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74F537

ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limits set forth in this table may impair the useful life of the device.

Unless otherwise noted these limits are over the operating free-air temperature range.)

SYMBOL	PARAMETER	RATING	UNIT
V_{CC}	Supply voltage	−0.5 to +7.0	V
V_{IN}	Input voltage	−0.5 to +7.0	V
I_{IN}	Input current	−30 to +5.0	mA
V_{OUT}	Voltage applied to output in High output state	−0.5 to + V_{CC}	V
I_{OUT}	Current applied to output in Low output state	48	mA
T_{amb}	Operating free-air temperature range	0 to +70	°C
T_{stg}	Storage temperature	−65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5.0	5.5	V
V_{IH}	High-level input voltage	2.0			V
V_{IL}	Low-level input voltage			0.8	V
I_{IK}	Input clamp current			−18	mA
I_{OH}	High-level output current			−3.0	mA
I_{OL}	Low-level output current			24	mA
T_{amb}	Operating free-air temperature range	0		70	°C

DC ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER	TEST CONDITIONS ¹		LIMITS			UNIT
				MIN	TYP ²	MAX	
V _{OH}	High-level output voltage	V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN, I _{OH} = MAX	±10%V _{CC}	2.4			V
			±5%V _{CC}	2.7	3.3		V
V _{OL}	Low-level output voltage	V _{CC} = MIN, V _{IL} = MAX, V _{IH} = MIN, I _{OL} = MAX	±10%V _{CC}		0.35	0.50	V
			±5%V _{CC}		0.35	0.50	V
V _{IK}	Input clamp voltage	V _{CC} = MIN, I _I = I _{IK}			−0.73	−1.2	V
I _I	Input current at maximum input voltage	V _{CC} = MAX, V _I = 7.0V				100	μA
I _{IH}	High-level input current	V _{CC} = MAX, V _I = 2.7V				20	μA
I _{IL}	Low-level input current	V _{CC} = MAX, V _I = 0.5V				−0.6	mA
I _{OZH}	Off-state current High-level voltage applied	V _{CC} = MAX, V _O = 2.7V				50	μA
I _{OZL}	Off-state current Low-level voltage applied	V _{CC} = MAX, V _O = 0.5V				−50	μA
I _{OS}	Short-circuit output current ³	V _{CC} = MAX	−60			−150	mA
I _{CC}	Supply current (total)	V _{CC} = MAX			44	66	mA

NOTES:

- For conditions shown as MIN or MAX, use the appropriate value under the recommended operating conditions for the applicable type.
- All typical values are at $V_{CC} = 5\text{V}$, $T_{amb} = 25^\circ\text{C}$.
- Not more than one output should be shorted at a time. For testing I_{OS} , the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I_{OS} should be performed last.

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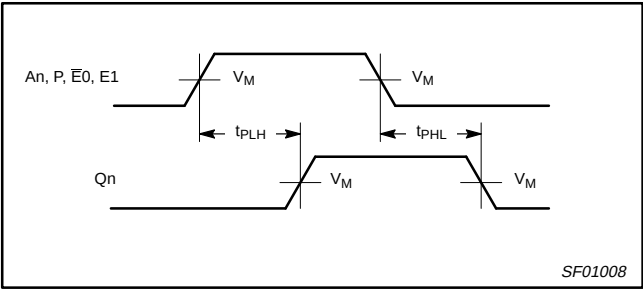
74F537

AC ELECTRICAL CHARACTERISTICS

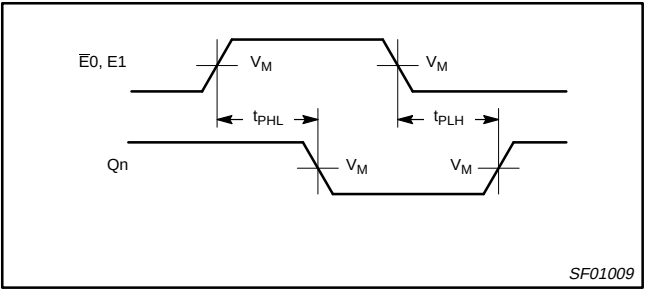
SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS					UNIT
			T _{amb} = +25°C V _{CC} = +5.0V C _L = 50pF, R _L = 500Ω			T _{amb} = 0°C to +70°C V _{CC} = +5.0V ± 10% C _L = 50pF, R _L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t _{PLH} t _{PHL}	Propagation delay An to Qn	Waveform 1	4.5 3.0	9.0 7.5	14.0 11.0	4.5 3.0	16.0 12.0	ns ns
t _{PLH} t _{PHL}	Propagation delay E0 to Qn	Waveform 2	4.0 3.0	8.0 8.0	11.0 11.0	4.0 3.0	12.0 12.0	ns ns
t _{PLH} t _{PHL}	Propagation delay E1 to Qn	Waveform 2	6.0 4.0	8.5 8.5	11.5 11.5	6.0 4.0	13.0 12.5	ns ns
t _{PLH} t _{PHL}	Propagation delay P to Qn	Waveform 1	5.0 3.5	12.5 6.5	16.0 10.0	5.0 3.5	17.0 11.0	ns ns
t _{PZH} t _{PZL}	Output Enable time OE to Qn	Waveform 3 Waveform 4	2.5 4.0	4.5 5.5	7.0 8.0	2.5 4.0	8.0 9.0	ns ns
t _{PHZ} t _{PLZ}	Output Disable time OE to Qn	Waveform 3 Waveform 4	1.5 2.0	3.0 4.0	6.0 6.5	1.0 2.0	7.0 7.0	ns ns

AC WAVEFORMS

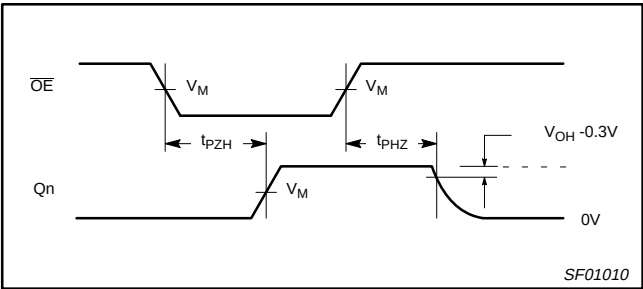
For all waveforms, V_M = 1.5V.



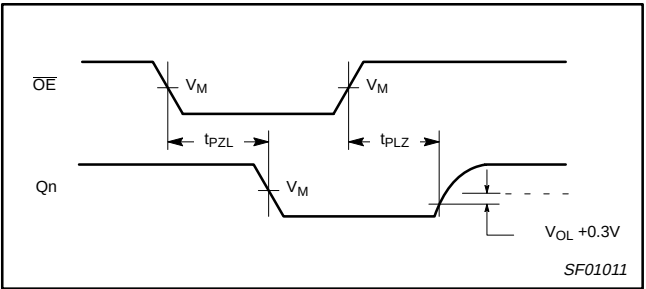
Waveform 1. Propagation Delay for Non-Inverting Outputs



Waveform 2. Propagation Delay for Inverting Outputs



Waveform 3. 3-State Output Enable Time to High Level and Output Disable Time from High Level



Waveform 4. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

1-of-10 decoder (3-State)

74F537

TEST CIRCUIT AND WAVEFORM

