

1-of-10 decoder (3-State)

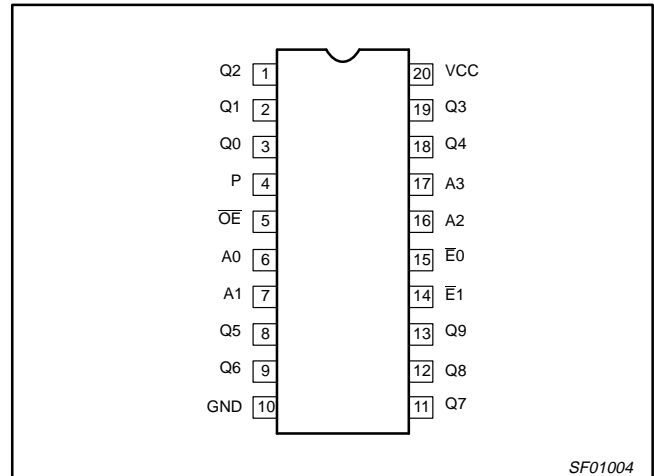
74F537

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

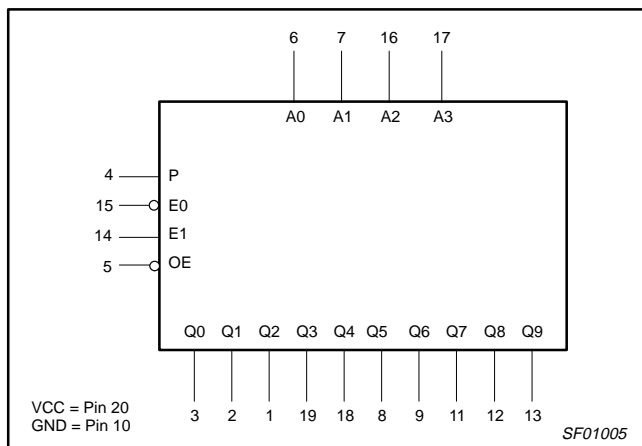
DESCRIPTION	COMMERCIAL RANGE V _{CC} = 5V ±10%, T _{amb} = 0°C to +70°C
20-Pin Plastic DIP	N74F537N
20-Pin Plastic SOL	N74F537D

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

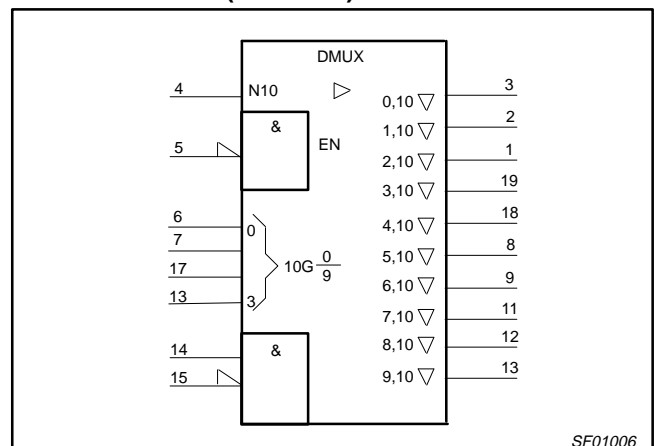
PINS	DESCRIPTION	74F(U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
A0 - A3	Data inputs	1.0/1.0	20µA/0.6mA
$\bar{E}0$	Enable input (active Low)	1.0/1.0	20µA/0.6mA
E1	Enable input (active High)	1.0/1.0	20µA/0.6mA
P	Polarity control input	1.0/1.0	20µA/0.6mA
\bar{OE}	Output Enable input	1.0/1.0	20µA/0.6mA
Q0 - Q9	Data 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



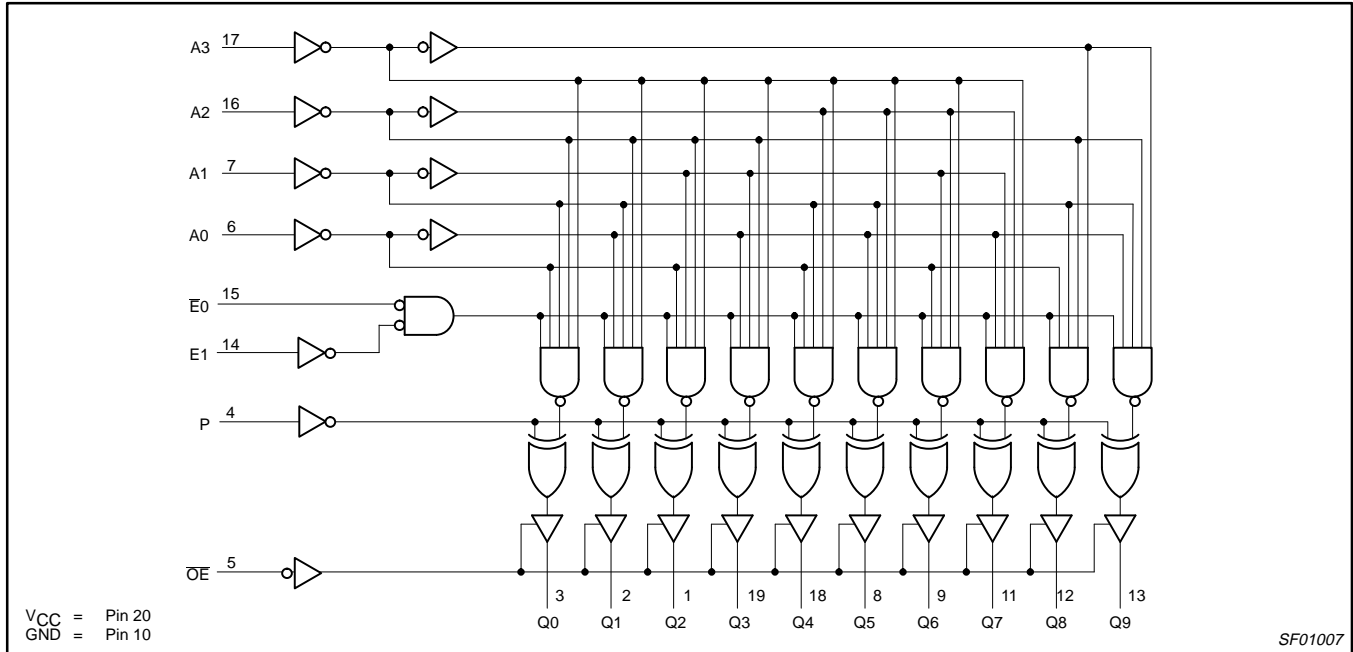
LOGIC SYMBOL (IEEE/IEC)



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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	L	L	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	L	L	L	L	L	L	Active Low output (P = H)
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	L	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	L	L	L	H	H	H	H	L	H	H	H	H	H	Active Low output (P = H)
L	L	H	L	L	L	H	H	H	H	H	L	H	H	H	H	H	
L	L	H	L	L	H	L	H	H	H	H	L	H	H	H	H	H	
L	L	H	L	L	H	H	H	H	H	H	L	H	H	H	H	H	
L	L	H	H	L	L	L	H	H	H	H	H	H	H	H	L	H	Active Low output (P = H)
L	L	H	H	L	L	H	H	H	H	H	H	H	H	H	L	H	
L	L	H	H	X	H	X	H	H	H	H	H	H	H	H	H	H	
L	L	H	H	H	X	X	H	H	H	H	H	H	H	H	H	H	

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

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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	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, V_{IH} = \text{MIN}, I_{OH} = \text{MAX}$	$\pm 10\%V_{CC}$	2.4		V	
			$\pm 5\%V_{CC}$	2.7	3.3	V	
V_{OL}	Low-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$	$\pm 10\%V_{CC}$		0.35	0.50	V
			$\pm 5\%V_{CC}$		0.35	0.50	V
V_{IK}	Input clamp voltage	$V_{CC} = \text{MIN}, I_I = I_{IK}$		-0.73	-1.2	V	
I_I	Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 7.0\text{V}$			100	μA	
I_{IH}	High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7\text{V}$			20	μA	
I_{IL}	Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.5\text{V}$			-0.6	mA	
I_{OZH}	Off-state current High-level voltage applied	$V_{CC} = \text{MAX}, V_O = 2.7\text{V}$			50	μA	
I_{OZL}	Off-state current Low-level voltage applied	$V_{CC} = \text{MAX}, V_O = 0.5\text{V}$			-50	μA	
I_{OS}	Short-circuit output current ³	$V_{CC} = \text{MAX}$	-60		-150	mA	
I_{CC}	Supply current (total)	$V_{CC} = \text{MAX}$		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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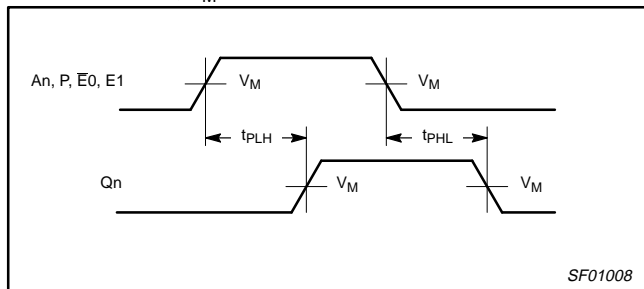
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AC ELECTRICAL CHARACTERISTICS

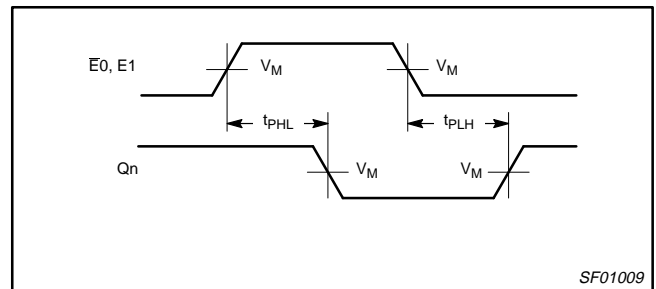
SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS					UNIT
			T _{amb} = +25°C V _{CC} = +5.0V C _L = 50pF, R _L = 500Ω			T _{amb} = 0°C to +70°C V _{CC} = +5.0V ± 10% C _L = 50pF, R _L = 500Ω		
			MIN	TYP	MAX	MIN	MAX	
t _{PLH} t _{PHL}	Propagation delay An to Qn	Waveform 1	4.5 3.0	9.0 7.5	14.0 11.0	4.5 3.0	16.0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

AC WAVEFORMS

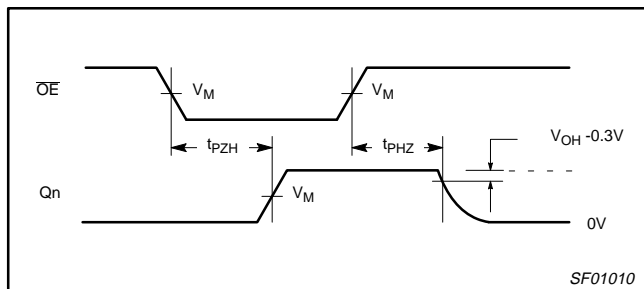
For all waveforms, V_M = 1.5V.



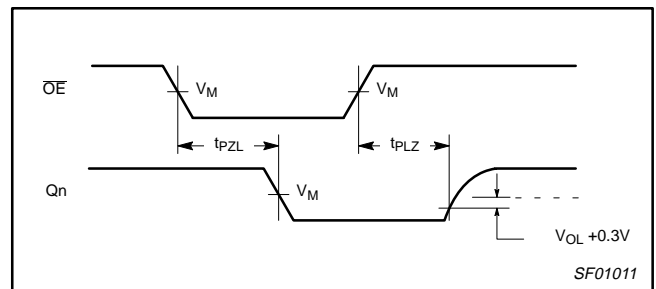
Waveform 1. Propagation Delay for Non-Inverting Outputs



Waveform 2. Propagation Delay for Inverting Outputs



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

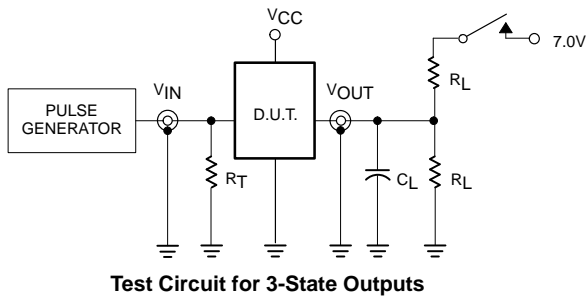


Waveform 4. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

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TEST CIRCUIT AND WAVEFORM



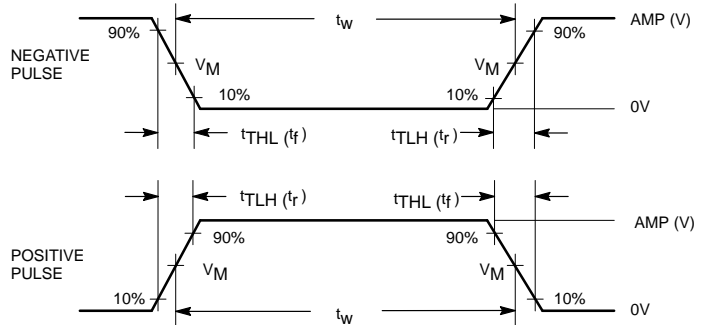
Test Circuit for 3-State Outputs

SWITCH POSITION

TEST	SWITCH
t_{PLZ}	closed
t_{PZL}	closed
All other	open

DEFINITIONS:

- R_L = Load resistor; see AC electrical characteristics for value.
- C_L = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.
- R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.



Input Pulse Definition

family	INPUT PULSE REQUIREMENTS					
	amplitude	V_M	rep. rate	t_w	t_{TLH}	t_{THL}
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns

SF00777