MC54F538, MC74F538

1-of-8 Decoder with 3-State Outputs

The MC54/74F538 decoder/demultiplexer accepts three Address (A_0-A_2) input signals and decodes them to select one of eight mutually exclusive outputs. A polarity control input (P) determines whether the outputs are active LOW or active HIGH. A HIGH Signal on either of the active LOW Output Enable ($\overline{OE}$) inputs forces all outputs to the high impedance state. Two active HIGH and two active LOW input enables are available for easy expansion to 1-of-32 decoding with four packages, or for data demultiplexing to 1-of-8 or 1-of-16 destinations.

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
    - Class Q Military
    - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
    - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

MOTOROLA

MC54/74F538

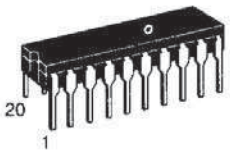
1-OF-8 DECODER WITH 3-STATE OUTPUTS

1-OF-8 DECODER WITH 3-STATE OUTPUTS

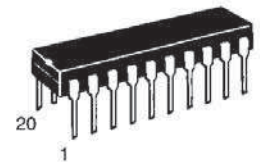
FAST™ SCHOTTKY TTL

The MC54/74F538 decoder/demultiplexer accepts three Address ($A_0 - A_2$) input signals and decodes them to select one of eight mutually exclusive outputs. A polarity control input (P) determines whether the outputs are active LOW or active HIGH. A HIGH Signal on either of the active LOW Output Enable ($\overline{OE}$) inputs forces all outputs to the high impedance state. Two active HIGH and two active LOW input enables are available for easy expansion to 1-of-32 decoding with four packages, or for data demultiplexing to 1-of-8 or 1-of-16 destinations.

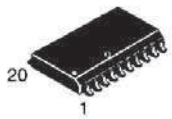
- Output Polarity Control
- Data Demultiplexing Capability
- Multiple Enables for Expansion
- 3-State Outputs
- ESD Protection > 4000 Volts



J SUFFIX
CERAMIC
CASE 732-03



N SUFFIX
PLASTIC
CASE 738-03

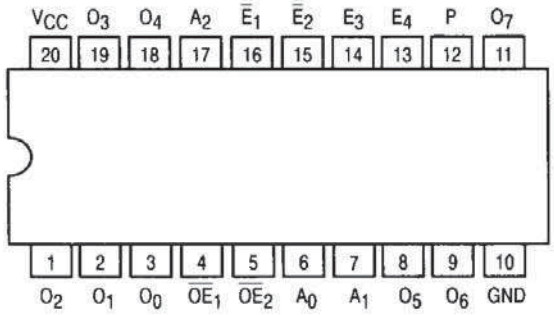


DW SUFFIX
SOIC
CASE 751D-03

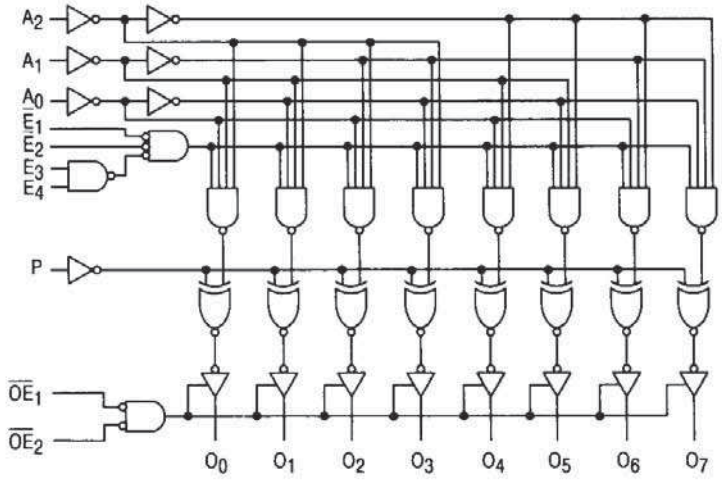
ORDERING INFORMATION

MC54FXXXJ	Ceramic
MC74FXXXN	Plastic
MC74FXXXDW	SOIC

CONNECTION DIAGRAM DIP (TOP VIEW)

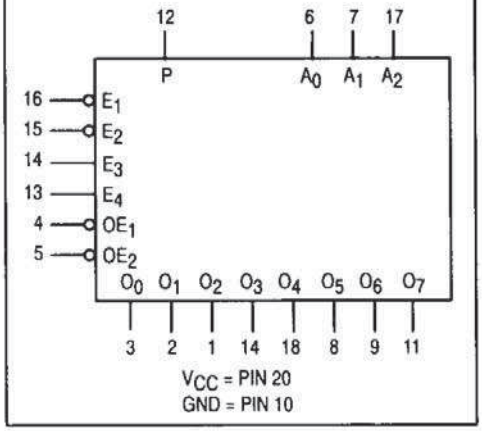


LOGIC DIAGRAM



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

LOGIC SYMBOL



4

GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	Supply Voltage	54, 74	4.5	5.0	5.5	V
T_A	Operating Ambient Temperature Range	54	−55	25	125	°C
		74	0	25	70	
I_{OH}	Output Current — High	54, 74			−3.0	mA
I_{OL}	Output Current — Low	54, 74			24	mA

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter		Limits Min	Typ	Max	Unit	Test Conditions	
V_{IH}	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage	
V_{IL}	Input LOW Voltage				0.8	V	Guaranteed Input LOW Voltage	
V_{IK}	Input Clamp Diode Voltage				−1.2	V	V_{CC} = MIN, I_{IN} = −18 mA	
V_{OH}	Output HIGH Voltage	54, 74	2.4			V	I_{OH} = −3.0 mA	V_{CC} = 4.5 V
		74	2.7			V	I_{OH} = −3.0 mA	V_{CC} = 4.75 V
V_{OL}	Output LOW Voltage				0.5	V	I_{OL} = 24 mA	V_{CC} = MIN
I_{OZH}	Output OFF Current — HIGH				50	µA	V_{OUT} = 2.7 V	V_{CC} = MAX
I_{OZL}	Output OFF Current — LOW				−50	µA	V_{OUT} = 0.5 V	V_{CC} = MAX
I_{IH}	Input HIGH Current				20	µA	V_{CC} = MAX, V_{IN} = 2.7 V	
					0.1	mA	V_{CC} = MAX, V_{IN} = 7.0 V	
I_{IL}	Input LOW Current				−0.6	mA	V_{CC} = MAX, V_{IN} = 0.5 V	
I_{OS}	Output Short Circuit Current (Note 2)		−60		−150	mA	V_{CC} = MAX, V_{OUT} = 0 V	
I_{CCZ}	Power Supply Current			37	56	mA	V_{CC} = MAX: A_0–A_2, $\overline{E}_1$, $\overline{E}_2$ = GND $\overline{OE}_1$, $\overline{OE}_2$, E_3, E_4, P = HIGH	

AC CHARACTERISTICS

Symbol	Parameter	54/74F T_A = +25°C, V_{CC} = +5.0 V, C_L = 50 pF Min	Typ	Max	54F T_A = −55 to +125°C, V_{CC} = 5.0 V ± 10%, C_L = 50 pF Min	Max	74F T_A = 0 to 70°C, V_{CC} = 5.0 V ± 10%, C_L = 50 pF Min	Max	Unit
t_{PLH} t_{PHL}	Propagation Delay A_n to O_n	4.0 3.0	11 7.5	13 12.5	4.0 3.0	17 16.5	4.0 3.0	14 13.5	ns
t_{PLH} t_{PHL}	Propagation Delay $\overline{E}_1$ or $\overline{E}_2$ to O_n	4.0 3.0	8.5 6.5	12 12	3.5 3.0	15 14.5	3.5 3.0	13 12.5	ns
t_{PLH} t_{PHL}	Propagation Delay E_3 or E_4 to O_n	6.5 4.0	11 10	12.5 12.5	5.5 3.5	15.5 15	5.5 3.5	13.5 13	ns
t_{PLH} t_{PHL}	Propagation Delay P to O_n	4.5 3.5	11.5 11	15 11.5	4.0 3.5	18.5 12.5	4.0 3.5	16.5 12	ns
t_{PZH} t_{PZL}	Output Enable Time $\overline{OE}_1$ or $\overline{OE}_2$ to O_n	2.5 4.0	5.5 9.0	9.5 13.5	2.0 4.0	13 16	2.0 4.0	11 15	ns
t_{PHZ} t_{PLZ}	Output Disable Time $\overline{OE}_1$ or $\overline{OE}_2$ to O_n	1.0 1.0	4.0 5.0	6.0 8.5	1.0 1.0	8.0 10.5	1.0 1.0	7.0 9.5	ns

4

TRUTH TABLE

FUNCTION	INPUTS									OUTPUTS							
	$\overline{OE}_1$	$\overline{OE}_2$	$\overline{E}_1$	$\overline{E}_2$	E_3	E_4	A_2	A_1	A_0	O_0	O_1	O_2	O_3	O_4	O_5	O_6	O_7
High Impedance	H	X	X	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z
	X	H	X	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z
Disable	L	L	H	X	X	X	X	X	X	Outputs Equal P Input							
	L	L	X	H	X	X	X	X	X								
	L	L	X	X	L	X	X	X	X								
	L	L	X	X	X	L	X	X	X								
Active HIGH Output (P = L)	L	L	L	L	H	H	L	L	L	H	L	L	L	L	L	L	L
	L	L	L	L	H	H	L	L	H	L	H	L	L	L	L	L	L
	L	L	L	L	H	H	L	H	L	L	L	H	L	L	L	L	L
	L	L	L	L	H	H	L	H	H	L	L	L	H	L	L	L	L
	L	L	L	L	H	H	H	L	L	L	L	L	L	H	L	L	L
	L	L	L	L	H	H	H	L	H	L	L	L	L	L	H	L	L
	L	L	L	L	H	H	H	H	L	L	L	L	L	L	L	H	L
	L	L	L	L	H	H	H	H	H	L	L	L	L	L	L	L	H
Active LOW Output (P = H)	L	L	L	L	H	H	L	L	L	L	H	H	H	H	H	H	H
	L	L	L	L	H	H	L	L	H	H	L	H	H	H	H	H	H
	L	L	L	L	H	H	L	H	L	H	H	L	H	H	H	H	H
	L	L	L	L	H	H	L	H	H	H	H	H	L	H	H	H	H
	L	L	L	L	H	H	H	L	L	H	H	H	H	L	H	H	H
	L	L	L	L	H	H	H	L	H	H	H	H	H	H	L	H	H
	L	L	L	L	H	H	H	H	L	H	H	H	H	H	H	L	H
	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	L

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
Z = High Impedance

4