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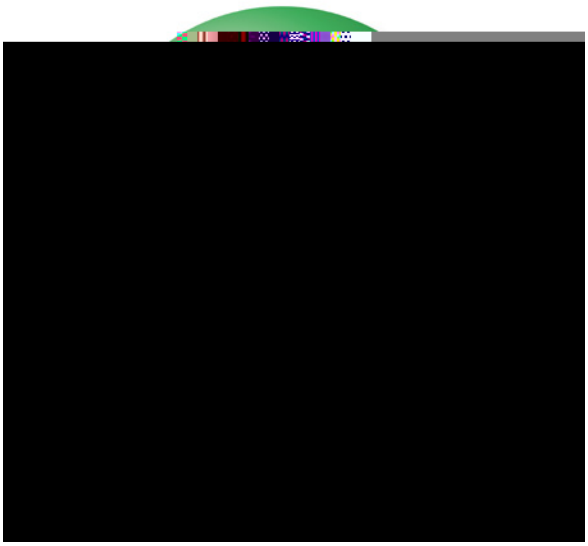

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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD SEMICONDUCTOR™

November 1992
Revised April 1999

74VHC138
3-to-8 Decoder/Demultiplexer

General Description

The VHC138 is an advanced high speed CMOS 3-to-8 decoder/demultiplexer fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent Bipolar Schottky TTL while maintaining the CMOS low power dissipation.

When the device is enabled, 3 binary select inputs (A_0, A_1 and A_2) determine which one of the outputs ($\overline{O}_0$–$\overline{O}_7$) will go LOW. When enable input E_3 is held LOW or either $\overline{E}_1$ or $\overline{E}_2$ is held HIGH, decoding function is inhibited and all outputs go HIGH.r eil16(r)261

Truth Table

Inputs						Outputs							
$\overline{E}_1$	$\overline{E}_2$	E_3	A_0	A_1	A_2	$\overline{O}_0$	$\overline{O}_1$	$\overline{O}_2$	$\overline{O}_3$	$\overline{O}_4$	$\overline{O}_5$	$\overline{O}_6$	$\overline{O}_7$
H	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	L	L	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	L	H	H	H	H	H
L	L	H	H	H	L	H	H	H	L	H	H	H	H
L	L	H	L	L	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	L	H	H
L	L	H	L	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	L

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Absolute Maximum Ratings (Note 1)

Supply Voltage (V_{CC})	−0.5V to +7.0V
DC Input Voltage (V_{IN})	−0.5V to +7.0V
DC Output Voltage (V_{OUT})	−0.5V to V_{CC} + 0.5V
Input Diode Co 1 TP-17d	

Recommended Operating Conditions (Note 2)

Note 1: Absolute Maximum Ratings are values beyond which the device may be damaged or have its useful life impaired. The databook specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation outside databook specifications.

Note 2: Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = 25°C$			$T_A = -40°C$ to $+85°C$		Units	Conditions
			Min	Typ	Max	Min	Max		
t_{PLH}	Propagation Delay	3.3 ± 0.3		8.2	11.4	1.0	13.5	ns	$C_L = 15$ pF
t_{PHL}	A_n to $\overline{O}_n$			10.0	15.8	1.0	18.0		$C_L = 50$ pF
		5.0 ± 0.5		5.7	8.1	1.0	9.5	ns	$C_L = 15$ pF
				7.2	10.1	1.0	11.5		$C_L = 50$ pF
t_{PLH}	Propagation Delay	3.3 ± 0.3		8.1	12.8	1.0	15.0	ns	$C_L = 15$ pF
t_{PHL}	E_3 to $\overline{O}_n$			10.6	16.3	1.0	18.5		$C_L = 50$ pF
		5.0 ± 0.5		5.6	8.1	1.0	9.5	ns	$C_L = 15$ pF
				7.1	10.1	1.0	11.5		$C_L = 50$ pF
t_{PLH}	Propagation Delay	3.3 ± 0.3		8.2	11.4	1.0	13.5	ns	$C_L = 15$ pF
t_{PHL}	$\overline{E}_1$ or $\overline{E}_2$ to $\overline{O}_n$			10.7	14.9	1.0	17.0		$C_L = 50$ pF
		5.0 ± 0.5		5.8	8.1	1.0	9.5	ns	$C_L = 15$ pF
				7.3	10.1	1.0	11.5		$C_L = 50$ pF
C_{IN}	Input Capacitance			4	10		10	pF	V_{CC} = Open
C_{PD}	Power Dissipation Capacitance			34				pF	(Note 3)

Note 3: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I_{CC} (opr.) = $C_{PD} * V_{CC} * f_{IN} + I_{CC}$.

Physical Dimensions inches (millimeters) unless otherwise noted

16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M16A

Physical Dimensions