

Am54S/74S257 • Am54S/74S258

Quadruple 2-Line To 1-Line Data

Distinctive Characteristics

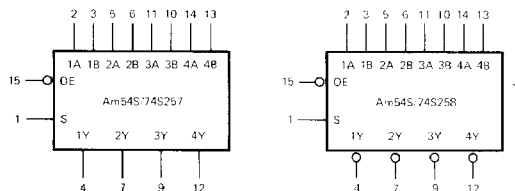
- Three-state outputs interface directly with bus organized systems
- Schottky clamp provides improved AC performance
- Pin assignments identical with Am54S/74S157 and Am54S/74S158
- 100% reliability assurance testing in compliance with MIL-STD-883

FUNCTIONAL DESCRIPTION

The 2-line to 1-line data selector multiplexer can be used to transfer data to a common data bus directly by using the three-state capability of the device. With the output control (OE) HIGH, the four outputs of the data selector are in the high impedance state. With the output control LOW, the selected four bits (A or B inputs) are bussed onto the four data lines.

The typical propagation delay times from data input to output average 4.8ns for the Am54S/74S257 and 4ns for the Am54S/74S258. Also, to minimize the possibility that two outputs will attempt to drive the common bus to opposite logic levels, the output enable circuitry is designed such that the output disable times are shorter than the output enable times.

LOGIC SYMBOL

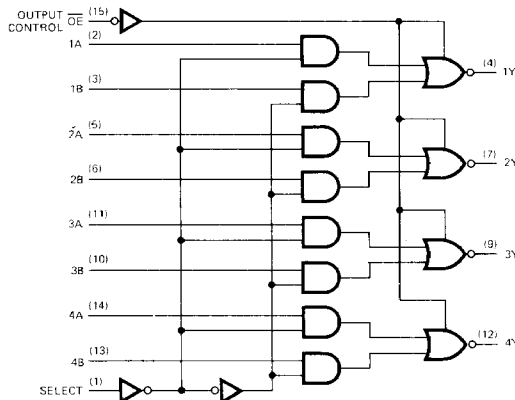
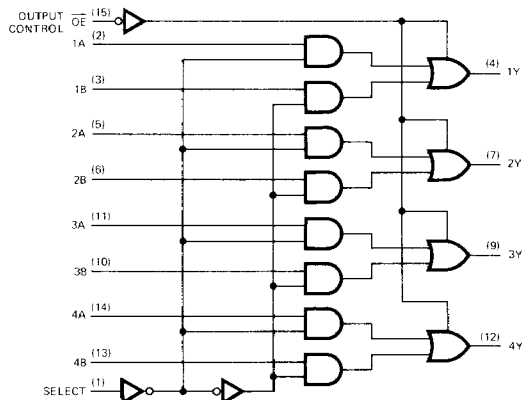


VCC = Pin 16
GND = Pin 8

Am54S257, Am74S257

LOGIC DIAGRAMS

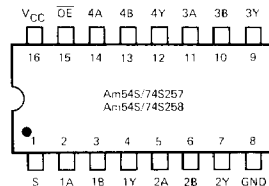
Am54S258, Am74S258



ORDERING INFORMATION

Package Type	Temperature Range	Am54S/74S257 Order Number	Am54S/74S258 Order Number
Molded DIP	0°C to +70°C	SN74S257N	SN74S258N
Hermetic DIP	0°C to +70°C	SN74S257J	SN74S258J
Dice	0°C to +70°C	SN74S257X	SN74S258X
Hermetic DIP	-55°C to +125°C	SN54S257J	SN54S258J
Hermetic Flat Pack	-55°C to +125°C	SN54S257W	SN54S258W
Dice	-55°C to +125°C	SN54S257X	SN54S258X

CONNECTION DIAGRAM Top View



Note: Pin 1 is marked for orientation on flat package only.

Am54S/74S257/258

MAXIMUM RATINGS (Above which the useful life may be impaired)

Storage Temperature	-65°C to +150°C
Temperature (Ambient) Under Bias	-55°C to +125°C
Supply Voltage to Ground Potential Continuous	-0.5 V to +7 V
DC Voltage Applied to Outputs for High Output State	-0.5 V to +V _{CC} max
DC Input Voltage	-0.5 V to +5.5 V
DC Output Current, Into Outputs	30 mA
DC Input Current	-30 mA to +5.0 mA

ELECTRICAL CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (Unless Otherwise Noted)

Am74S257/S258	T _A = 0°C to +70°C	V _{CC} = 5.0 V ±5% (Com'l)	Min = 4.75 V	Max = 5.25 V
Am54S257/S258	T _A = -55°C to +125°C	V _{CC} = 5.0 V ±10% (Mil)	Min = 4.5 V	Max = 5.5 V

Parameters	Description	Test Conditions (Note 1)	Min.	Typ. (Note 2)	Max.	Units	
V _{OH}	Output HIGH Voltage	V _{CC} = MIN., V _{IN} = V _{IH} or V _{IL} 54S, I _{OH} = -2mA 74S, I _{OH} = -6.5mA	2.4	3.4		Volts	
V _{OL}	Output LOW Voltage	V _{CC} = MIN., V _{IH} = 2V V _{IL} = 0.8V, I _{OL} = 20mA			0.5	Volts	
V _{IH}	Input HIGH Level	Guaranteed input logical HIGH voltage for all inputs	2			Volts	
V _{IL}	Input LOW Level	Guaranteed input logical LOW voltage for all inputs			0.8	Volts	
V _I	Input Clamp Voltage	V _{CC} = MIN., I _{IIN} = -18mA			-1.2	Volts	
I _{IL}	Unit Load Input LOW Current	S Input			-4	mA	
		Any Other			-2		
I _{IH} (Note 3)	Unit Load Input HIGH Current	S Input			100	μA	
		Any Other			50		
I _I	Input HIGH Current	V _{CC} = MAX., V _{IN} = 5.5V			1	mA	
I _O	Off-State (HIGH Impedance) Output Current	V _{CC} = MAX., V _O = 2.4V			50	μA	
		V _{CC} = MAX., V _O = 0.5V			-50		
I _{SC}	Output Short Circuit Current (Note 4)	V _{CC} = MAX., V _{OUT} = 0.0 V	-40		-100	mA	
I _{CC}	Power Supply Current	V _{CC} = MAX. (Note 5)	All Outputs HIGH	Am54S/74S257	44	68	mA
			Am54S/74S258	36	56		
			All Outputs LOW	Am54S/74S257	60	93	mA
			Am54S/74S258	52	81		
			All Outputs OFF	Am54S/74S257	64	99	mA
Am54S/74S258	56	87					

- Notes: 1. For conditions shown as MIN. or MAX. use the appropriate value specified under Electrical Characteristics for the applicable device type.
 2. Typical limits are at V_{CC} = 5.0V, 25°C ambient and maximum loading.
 3. Actual Input Currents = Unit Load Current x Input Load Factor (See Loading Rules).
 4. Not more than one output should be shorted at a time and duration of the short circuit test should not exceed one second.
 5. I_{CC} is measured with all outputs open and all possible inputs grounded while achieving the stated output conditions.

Switching Characteristics (T_A = 25°C)

Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
t _{PLH}	Data to Output	V _{CC} = 5 V, R _L = 280 Ω, C _L = 15 pF	S257	5	7.5	ns
			S258	4	6	
t _{PHL}	Data to Output		S257	4.5	6.5	ns
			S258	4	6	
t _{PLH}	Select to Output		S257	8.5	15	ns
			S258	8	12	
t _{PHL}	Select to Output		S257	8.5	15	ns
			S258	7.5	12	
t _{ZH}	Control to Output			13	19.5	ns
t _{ZL}				14	21	
t _{HZ}	Control to Output	V _{CC} = 5 V, R _L = 280 Ω, C _L = 5 pF		5.5	8.5	ns
t _{LZ}				9	14	

FUNCTION TABLE

INPUTS				OUTPUTS	
Output Control	Select	A	B	Am54S/ 74S257	Am54S/ 74S258
H	X	X	X	Z	Z
L	L	L	X	L	H
L	L	H	X	H	L
L	H	X	L	L	H
L	H	X	H	H	L

H = HIGH
L = LOW

X = Don't Care
Z = High Impedance

LOADING RULES (In Unit Loads)

Input/Output	Pin No.'s	Input Unit Load	Fan-out	
			Output HIGH	Output LOW
			54S	74S
S	1	2	—	—
1A	2	1	—	—
1B	3	1	—	—
1Y	4	—	40	130
2A	5	1	—	—
2B	6	1	—	—
2Y	7	—	40	130
GND	8	—	—	—
3Y	9	—	40	130
3B	10	1	—	—
3A	11	1	—	—
4Y	12	—	40	130
4B	13	1	—	—
4A	14	1	—	—
\overline{OE}	15	1	—	—
V _{CC}	16	—	—	—

A Schottky TTL Unit Load is defined as 50 μ A measured at 2.7 V HIGH and -2.0mA measured at 0.5V LOW.

FUNCTIONAL TERMS

1A, 2A, 3A, 4A The data inputs for the 4-bits of the A word.

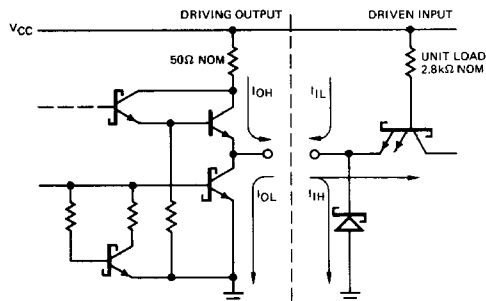
1B, 2B, 3B, 4B The data inputs for the 4-bits of the B word.

1Y, 2Y, 3Y, 4Y The four outputs of the multiplexer.

\overline{OE} Output Control When the output control is HIGH, the four outputs are in the high impedance state. When the output control is LOW, the selected A or B input is present at the output.

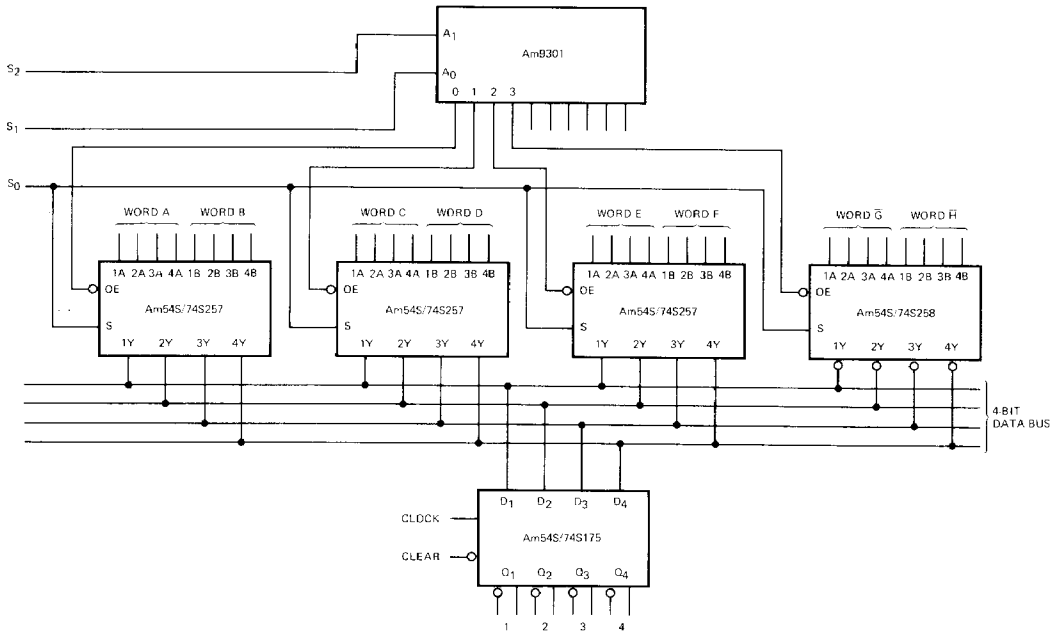
S Select When the select input is LOW, the A word is present at the output. When the select input is HIGH, the B word is present at the output.

SCHOTTKY INPUT/OUTPUT CURRENT INTERFACE CONDITIONS



Note: Actual current flow direction shown

APPLICATIONS



8-Word, 4-Bit Multiplexer

APPLICATION BRIEF – THREE STATE OUTPUTS

When a three-state Schottky output is in the high-impedance state, the maximum off-state leakage current is specified as $50\mu\text{A}$ at 2.4V and $-50\mu\text{A}$ at 0.5V. This leakage loading must be added to the input loading of the devices connected to the data bus for worst-case design. For this reason, the output HIGH source current of the three-state devices are specified with $I_{OH} = -2\text{mA}$ for the Am54S series and $I_{OH} = -6.5\text{mA}$ for the Am74S series. The output LOW sink current for all Am54S/74S devices is specified as $I_{OL} = 20\text{mA}$ at 0.5V.

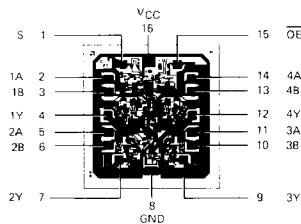
The high current sinking and sourcing capability allows many three-state outputs to be bus-organized and drive several TTL inputs reliably. An example of the I_{OH} and I_{OL} loading calculations is shown in Table I. The important factor for bus-organized three-state outputs is not to exceed either the HIGH-state or the LOW-state maximum loading.

TABLE I

NO. OF LOADING DEVICES ON BUS	TYPE LOAD	DATA BUS HIGH LOAD	DATA BUS LOW LOAD
		$50\mu\text{A} \times 36 = 1.8\text{mA}$	$-50\mu\text{A} \times 36 = -1.8\text{mA}$
4	54S/74S outputs Hi-Z	$50\mu\text{A} \times 4 = .2\text{mA}$	$-2\text{mA} \times 4 = -8.0\text{mA}$
	54S/74S inputs	2.0mA	-9.8mA
OUTPUT LOADING USED		Am54S	~ 50%
		Am74S	~ 31%

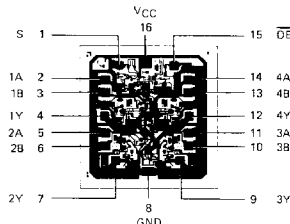
Metallization and Pad Layouts

Am54S/74S257



DIE SIZE 0.065" X 0.069"

Am54S/74S258



DIE SIZE 0.065" X 0.069"