

# Am54S/74S388

Quad D Register With Standard And Three-State Outputs

## Distinctive Characteristics

- Advanced Schottky technology
- Four D-type flip-flops
- Four standard totem-pole outputs

- Four three-state outputs
- 75 MHz clock frequency
- 100% reliability assurance testing in compliance with MIL-STD-883

### FUNCTIONAL DESCRIPTION

The Am54S/74S388 consists of four D-type flip-flops with a buffered common clock. Information meeting the set-up and hold requirements on the D inputs is transferred to the Q outputs on the LOW-to-HIGH transition of the clock.

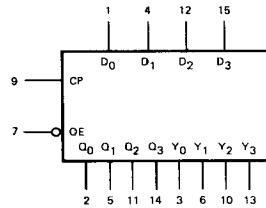
The same data as on the Q outputs is enabled at the three-state Y outputs when the "output control" (OE) input is LOW. When the OE input is HIGH, the Y outputs are in the high-impedance state.

The Am54S/74S388 is a 4-bit, high-speed Schottky register intended for use in real-time signal processing systems where the standard outputs are used in a recursive algorithm and the three state outputs provide access to a data bus to dump the results after a number of iterations.

The device can also be used as an address register or status register in computers or computer peripherals.

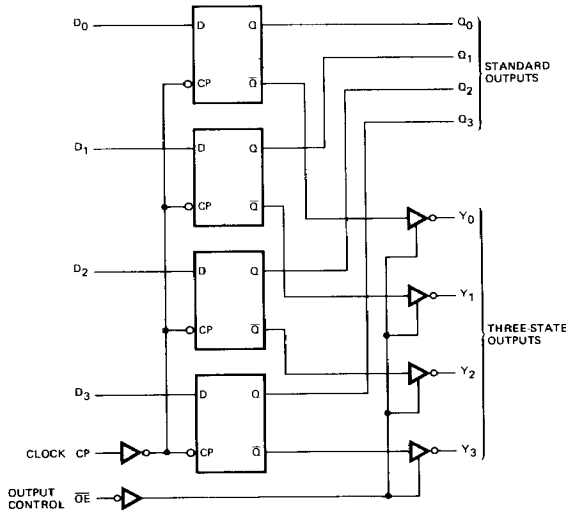
Likewise, the Am54S/74S388 is also useful in certain display applications where the standard outputs can be decoded to drive LED's (or equivalent) and the three state outputs are bus organized for occasional interrogation of the data as displayed.

### LOGIC SYMBOL

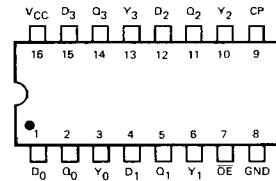


VCC = Pin 16  
GND = Pin 8

### LOGIC DIAGRAM



### CONNECTION DIAGRAM Top View



Note: Pin 1 is marked for orientation.

**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 (Pin 16 to Pin 8) Continuous	-0.5V to +7V
DC Voltage Applied to Outputs for HIGH Output State	-0.5V to +V <sub>CC</sub> max
DC Input Voltage	-0.5V to +5.5V
DC Output Current, Into Outputs	30mA
DC Input Current	-30mA to +5.0mA

**ELECTRICAL CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE** (Unless Otherwise Noted)

SN74S388	T <sub>A</sub> = 0°C to +70°C	V <sub>CC</sub> = 5.0V ± 5% (COM'L)	MIN. = 4.75V	MAX. = 5.25V
SN54S388	T <sub>A</sub> = -55°C to +125°C	V <sub>CC</sub> = 5.0V ± 10% (MIL)	MIN. = 4.5V	MAX. = 5.5V

Parameters	Description	Test Conditions (Note 1)	Min.	Typ. (Note 2)	Max.	Units
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = MIN., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	Q I <sub>OH</sub> = -1mA	MIL 2.5	3.4	Volts
			COM'L	2.7	3.4	
		Y	MIL, I <sub>OH</sub> = -2mA	2.4	3.4	
		COM'L, I <sub>OH</sub> = -6.5mA	2.4	3.2		
V <sub>OL</sub>	Output LOW Voltage (Note 6)	V <sub>CC</sub> = MIN., I <sub>OL</sub> = 20mA V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>			0.5	Volts
V <sub>IH</sub>	Input HIGH Level	Guaranteed input logical HIGH voltage for all inputs	2.0			Volts
V <sub>IL</sub>	Input LOW Level	Guaranteed input logical LOW voltage for all inputs			0.8	Volts
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = MIN., I <sub>IN</sub> = -18mA			-1.2	Volts
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 0.5V			-2.0	mA
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 2.7V			50	μA
I <sub>I</sub>	Input HIGH Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 5.5V			1.0	mA
I <sub>O</sub>	Y Output Off-State Leakage Current	V <sub>CC</sub> = MAX.	V <sub>O</sub> = 2.4V		50	μA
			V <sub>O</sub> = 0.4V		-50	
I <sub>SC</sub>	Output Short Circuit Current (Note 3)	V <sub>CC</sub> = MAX.	-40		-100	mA
I <sub>CC</sub>	Power Supply Current	V <sub>CC</sub> = MAX. (Note 4)		80	130	mA

- 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<sub>CC</sub> = 5.0V, T<sub>A</sub> = 25°C ambient and maximum loading.  
 3. Not more than one output should be shorted at a time. Duration of the short circuit test should not exceed one second.  
 4. I<sub>CC</sub> is measured with all inputs at 4.5V and all outputs open.  
 5. Measured on Q outputs with Y outputs open. Measured on Y outputs with Q outputs open.

**Switching Characteristics** (T<sub>A</sub> = +25°C, V<sub>CC</sub> = 5.0V, R<sub>L</sub> = 280Ω)

Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units	
t <sub>PLH</sub>	Clock to Q Output	C <sub>L</sub> = 15pF		6.0	9.0	ns	
t <sub>PHL</sub>				8.5	13		
t <sub>pw</sub>	Clock Pulse Width		HIGH	7.0		ns	
			LOW	9.0			
t <sub>s</sub>	Data		5.0		ns		
t <sub>h</sub>	Data		3.0		ns		
t <sub>PLH</sub>	Clock to Y Output (OE LOW)			6.0	9.0	ns	
t <sub>PHL</sub>				8.5	13		
t <sub>ZH</sub>	Output Control to Output		C <sub>L</sub> = 15pF		12.5	19	ns
t <sub>ZL</sub>					12	18	
t <sub>HZ</sub>		C <sub>L</sub> = 5.0pF		4.0	6.0		
t <sub>LZ</sub>				7.0	10.5		
f <sub>max</sub>	Maximum Clock Frequency	C <sub>L</sub> = 15pF	75	100		MHz	