

# Am54S/74S350

## Four-Bit Shifter With Three-State Outputs

### Distinctive Characteristics

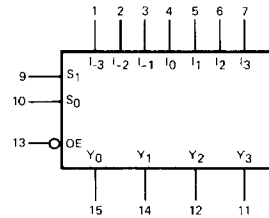
- Shifts 4-bits of data to 0, 1, 2 or 3 places under control of two select lines.
- Three-state outputs for bus organized systems.
- 6.5 ns typical data propagation delay.
- 100% reliability assurance testing in compliance with MIL-STD-883.

### FUNCTIONAL DESCRIPTION

The Am54S/74S350 is a combinatorial logic circuit that accepts a four-bit data word and shifts the word 0, 1, 2 or 3 places. The number of places to be shifted is determined by a two-bit select field  $S_0$  and  $S_1$ . An active-LOW enable controls the three-state outputs. This feature allows expansion of shifting over a larger number of places with one delay.

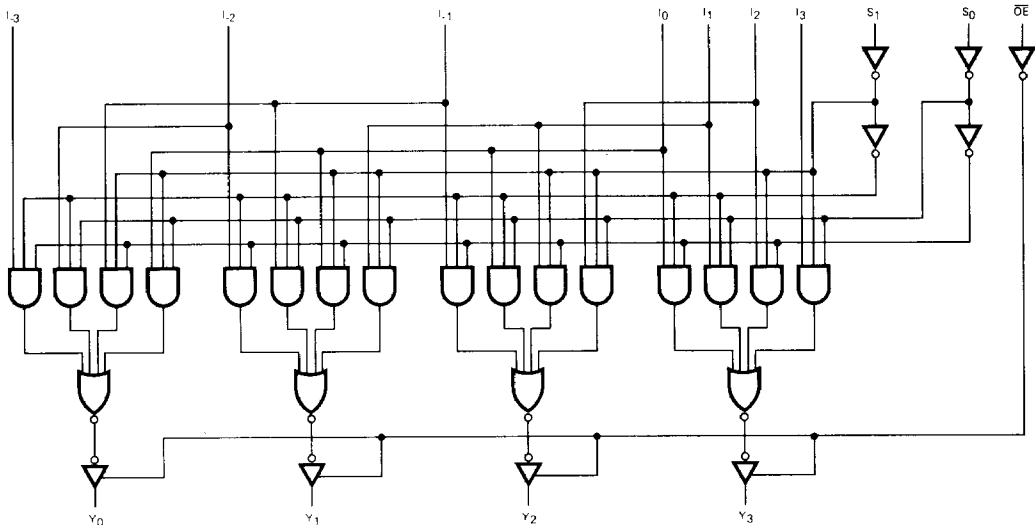
By suitable interconnection, the Am54S/74S350 can be used to shift any number of bits any number of places up or down. Shifting can be logical, with logic zeroes pulled in at either or both ends of the shifting field; arithmetic, where the sign bit is repeated during a shift down; or end around, where the data word forms a continuous loop.

### LOGIC SYMBOL

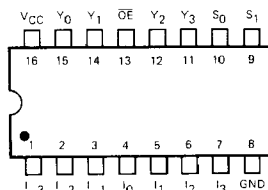


$V_{CC}$  = Pin 16  
GND = Pin 8

### 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	-0.5 V to +7 V
DC Voltage Applied to Outputs for High Output State	-0.5 V to +V <sub>CC</sub> 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)

SN74S350	T <sub>A</sub> = 0°C to +70°C	V <sub>CC</sub> = 5.0 V ± 5% (COM'L)	MIN. = 4.75 V	MAX. = 5.25 V
SN54S350	T <sub>A</sub> = -55°C to +125°C	V <sub>CC</sub> = 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 <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> = MIN., V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> MIL, I <sub>OH</sub> = -2mA COM'L, I <sub>OH</sub> = -6.5mA	2.4 2.4	3.4 3.2		Volts
V <sub>OL</sub>	Output LOW Voltage	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>	Unit Load Input LOW Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 0.5 V			-2.0	mA
I <sub>IH</sub>	Unit Load Input HIGH Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 2.7 V			50	μA
I <sub>O</sub>	Off State (High Impedance) Output Current	V <sub>CC</sub> = MAX., V <sub>O</sub> = 2.4 V V <sub>O</sub> = 0.5 V			50 -50	μA
I <sub>I</sub>	Input HIGH Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 5.5 V			1.0	mA
I <sub>SC</sub>	Output Short Circuit Current (Note 3)	V <sub>CC</sub> = MAX., V <sub>OUT</sub> = 0.0 V	-40		-100	mA
I <sub>CC</sub>	Power Supply Current	V <sub>CC</sub> = MAX., All outputs open, All inputs = GND		60	85	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, 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.

**Switching Characteristics** (T<sub>A</sub> = +25°C)

Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
t <sub>PLH</sub>	Data Input to Output	V <sub>CC</sub> = 5.0 V, C <sub>L</sub> = 15pF, R <sub>L</sub> = 280 Ω		5	7.5	ns
t <sub>PHL</sub>				8	12	
t <sub>PLH</sub>	Select to Output			11	17	ns
t <sub>PHL</sub>				13	20	
t <sub>ZH</sub>	Output Control $\overline{OE}$ to Output				19.5	ns
t <sub>ZL</sub>					21	
t <sub>HZ</sub>	Output Control $\overline{OE}$ to Output	V <sub>CC</sub> = 5V, C <sub>L</sub> = 5pF, R <sub>L</sub> = 280 Ω		5	8	ns
t <sub>LZ</sub>				10	15	