

# Am93S48

## Twelve-Input Parity Checker/Generator

### Distinctive Characteristics

- Generates or checks parity over 12 bits
- Advanced Schottky technology

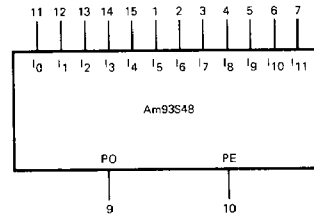
- Same delay to EVEN and ODD parity outputs
- 100% reliability assurance testing in compliance with MIL-STD-883.

### FUNCTIONAL DESCRIPTION

The Am93S48 is a high-speed, 12-input parity checker or parity generator. The device is built using advanced Schottky technology and also incorporates PNP input transistors to reduce the input loading to only 0.4 STTL Unit Loads.

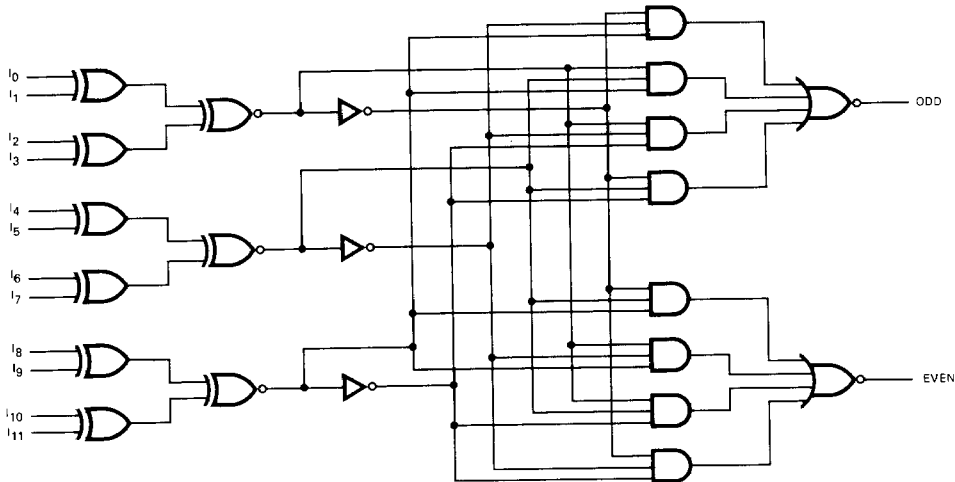
Both an ODD parity output and an EVEN parity output are obtained with the same propagation delay. This is accomplished by using an output structure that looks at the input as three 4-bit parity trees.

### LOGIC SYMBOL



V<sub>CC</sub> = Pin 16  
GND = Pin 8

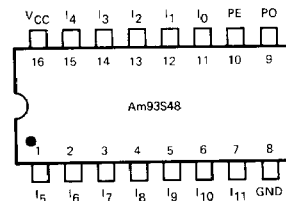
### LOGIC DIAGRAM



### ORDERING INFORMATION

Package Type	Temperature Range	Order Number
Molded DIP	0°C to +70°C	93S48PC
Hermetic DIP	0°C to +70°C	93S48DC
Dice	0°C to +70°C	93S48XC
Hermetic DIP	-55°C to +125°C	93S48DM
Hermetic Flat Pak	-55°C to +125°C	93S48FM
Dice	-55°C to +125°C	93S48XM

### CONNECTION DIAGRAM Top View



Note: Pin 1 is marked for orientation.

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# Am93S48

## 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 +5.0V
DC Voltage Applied to Outputs for HIGH Output State	-0.5V to +V <sub>CC</sub> max
DC Input Voltage	-0.5V to +5.0V
DC Output Current, Into Outputs	30mA
DC Input Current	-30mA to +5.0mA

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

Am93S48XC	T <sub>A</sub> = 0°C to +70°C	V <sub>CC</sub> = 5.0V ±5% (COM'L)	MIN. = 4.75V	MAX. = 5.25V
Am93S48XM	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., I <sub>OH</sub> = -1mA	XC	2.7		Volts
		V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	XM	2.5		
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> (Note 3)	Input LOW Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 0.5V			-0.8	mA
I <sub>IH</sub> (Note 3)	Input HIGH Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 2.7V			20	μA
I <sub>I</sub>	Input HIGH Current	V <sub>CC</sub> = MAX., V <sub>IN</sub> = 5.5V			1.0	mA
I <sub>SC</sub>	Output Short Circuit Current (Note 4)	V <sub>CC</sub> = MAX., V <sub>OUT</sub> = 0.0V	-40		-100	mA
I <sub>CC</sub>	Power Supply Current	V <sub>CC</sub> = MAX. (Note 5)		57	80	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. 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. Duration of the short circuit test should not exceed one second.  
 5. Both outputs open; all inputs at 4.5V.

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

Parameters	Description	Test Conditions	Min.	Typ.	Max.	Units
t <sub>PLH</sub>	I <sub>O</sub> through I <sub>11</sub> to Even Output	V <sub>CC</sub> = 5.0V, C <sub>L</sub> = 15 pF, R <sub>L</sub> = 280Ω		19	28	ns
t <sub>PHL</sub>	I <sub>O</sub> through I <sub>11</sub> to Odd Output			19	28	ns
t <sub>PLH</sub>	I <sub>O</sub> through I <sub>11</sub> to Even Output			19	28	ns
t <sub>PHL</sub>	I <sub>O</sub> through I <sub>11</sub> to Odd Output			19	28	ns

## TRUTH TABLE

NUMBER OF I INPUTS		OUTPUT	
LOW	HIGH	ODD	EVEN
0	12	L	H
1	11	H	L
2	10	L	H
3	9	H	L
4	8	L	H
5	7	H	L
6	6	L	H
7	5	H	L
8	4	L	H
9	3	H	L
10	2	L	H
11	1	H	L
12	0	L	H

H = HIGH  
L = LOW  
X = Don't Care

## LOADING RULES (In Unit Loads)

Input/Output	Pin No.'s	Input Unit Load	Fan-out Output	
			HIGH	LOW
I <sub>5</sub>	1	0.4	—	—
I <sub>6</sub>	2	0.4	—	—
I <sub>7</sub>	3	0.4	—	—
I <sub>8</sub>	4	0.4	—	—
I <sub>9</sub>	5	0.4	—	—
I <sub>10</sub>	6	0.4	—	—
I <sub>11</sub>	7	0.4	—	—
GND	8	—	—	—
PO	9	—	20	10
PE	10	—	20	10
I <sub>0</sub>	11	0.4	—	—
I <sub>1</sub>	12	0.4	—	—
I <sub>2</sub>	13	0.4	—	—
I <sub>3</sub>	14	0.4	—	—
I <sub>4</sub>	15	0.4	—	—
V <sub>CC</sub>	16	—	—	—

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

## DEFINITION OF FUNCTIONAL TERMS

**I<sub>0</sub> through I<sub>11</sub>** The twelve inputs to the parity tree.

**ODD** The ODD parity output of the device. When an ODD number of I inputs are at a HIGH level, the ODD output will be HIGH.

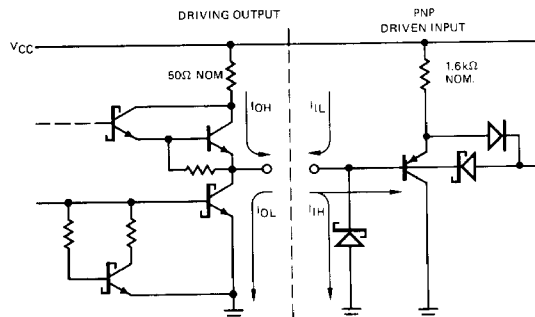
**EVEN** The EVEN parity output of the device. When an EVEN number of I inputs are at a HIGH level, the EVEN output will be HIGH.

## LOGIC EQUATIONS

$$\text{Odd Output} = I_0 \oplus I_1 \oplus I_2 \oplus I_3 \oplus I_4 \oplus I_5 \oplus I_6 \oplus I_7 \oplus I_8 \oplus I_9 \oplus I_{10} \oplus I_{11}$$

$$\text{Even Output} = \overline{I_0 \oplus I_1 \oplus I_2 \oplus I_3 \oplus I_4 \oplus I_5 \oplus I_6 \oplus I_7 \oplus I_8 \oplus I_9 \oplus I_{10} \oplus I_{11}}$$

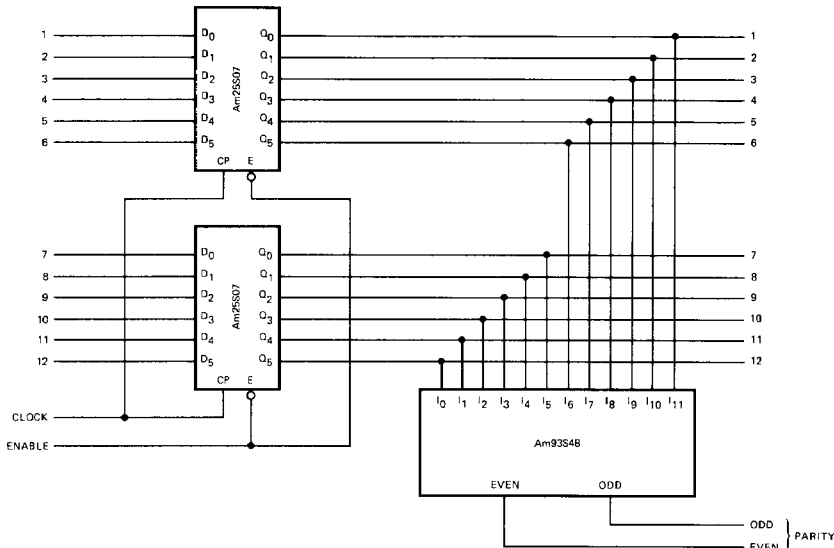
## SCHOTTKY INPUT/OUTPUT CURRENT INTERFACE CONDITIONS



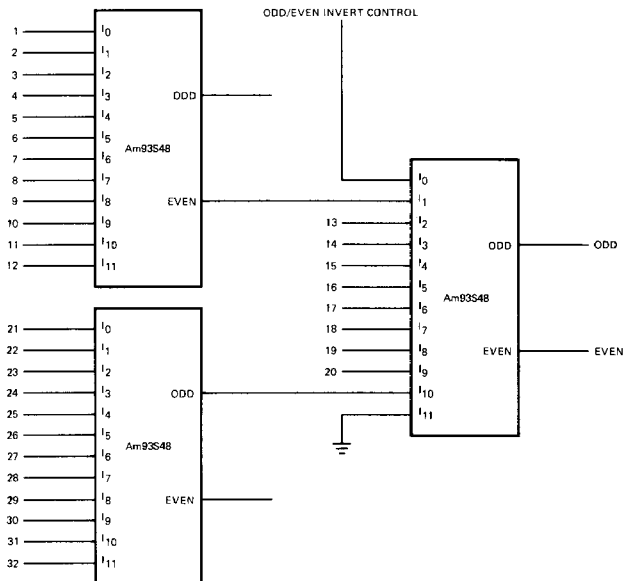
Note: Actual current flow direction shown.

### APPLICATIONS

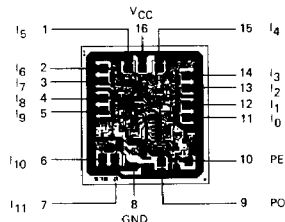
#### 12-BIT PARALLEL ODD/EVEN PARITY CHECKER/GENERATOR



#### 32-BIT PARITY CHECKER/GENERATOR



#### Metallization and Pad Layout



DIE SIZE 0.067" X 0.072"