

# SN54HC180, SN74HC180 9-BIT ODD/EVEN PARITY GENERATORS/CHECKERS

D2484, MARCH 1984—REVISED SEPTEMBER 1987

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

## description

These universal, monolithic, 9-bit (8 data bits plus 1 parity bit) parity generators/checkers, feature odd/even outputs and control inputs to facilitate operation in either odd- or even-parity applications. Depending on whether even or odd parity is being generated or checked, the even or odd inputs can be utilized as the parity or 9th-bit input. The word-length capability is easily expanded by cascading.

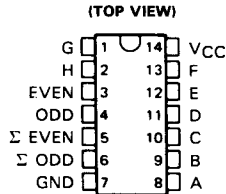
The SN54HC180 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74HC180 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

FUNCTION TABLE

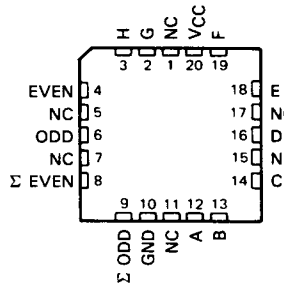
$\Sigma$ OF H's AT A THRU H	INPUTS		OUTPUTS	
	EVEN	ODD	$\Sigma$ EVEN	$\Sigma$ ODD
EVEN	H	L	H	L
ODD	H	L	L	H
EVEN	L	H	L	H
ODD	L	H	H	L
X	H	H	L	L
X	L	L	H	H

H = high level, L = low level, X = irrelevant

SN54HC180 . . . J PACKAGE  
SN74HC180 . . . D OR N PACKAGE

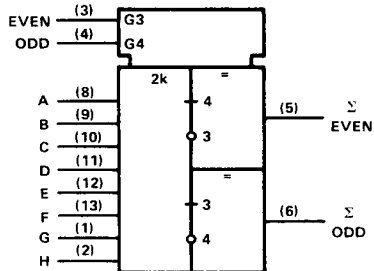


SN54HC180 . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

## logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, J, and N packages.

2

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PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

TEXAS  
INSTRUMENTS

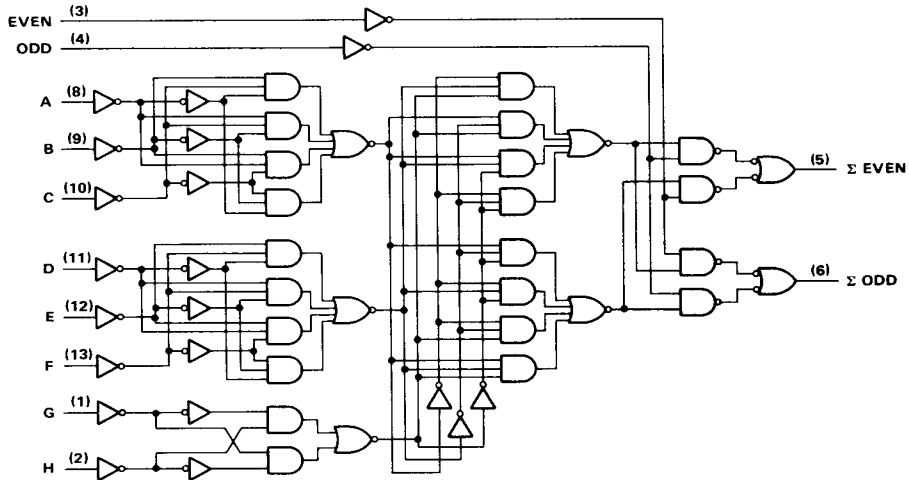
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2-259

**SN54HC180, SN74HC180**  
**9-BIT ODD/EVEN PARITY GENERATORS/CHECKERS**

logic diagram (positive logic)



Pin numbers shown are for D, J, and N packages.

**absolute maximum ratings over operating free-air temperature range†**

Supply voltage, $V_{CC}$ .....	-0.5 V to 7 V
Input clamp current, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ ) .....	$\pm 20$ mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....	$\pm 20$ mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	$\pm 25$ mA
Continuous current through $V_{CC}$ or GND pins .....	$\pm 50$ mA
Lead temperature 1,6 mm (1/16 in) from case for 60 s: FK or J package .....	300 °C
Lead temperature 1,6 mm (1/16 in) from case for 10 s: D or N package .....	260 °C
Storage temperature range .....	-65 °C to 150 °C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

**2**  
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# SN54HC180, SN74HC180 9-BIT ODD/EVEN PARITY GENERATORS/CHECKERS

## recommended operating conditions

		SN54HC180			SN74HC180			UNIT	
		MIN	NOM	MAX	MIN	NOM	MAX		
$V_{CC}$	Supply voltage	2	5	6	2	5	6	V	
$V_{IH}$	High-level input voltage	$V_{CC} = 2\text{ V}$ $V_{CC} = 4.5\text{ V}$ $V_{CC} = 6\text{ V}$		1.5 3.15 4.2	1.5 3.15 4.2			V	
$V_{IL}$	Low-level input voltage	$V_{CC} = 2\text{ V}$ $V_{CC} = 4.5\text{ V}$ $V_{CC} = 6\text{ V}$		0 0 0	0.3 0.9 1.2		0 0.3 1.2	V	
$V_I$	Input voltage			0	$V_{CC}$		0	$V_{CC}$	
$V_O$	Output voltage			0	$V_{CC}$		0	$V_{CC}$	
$t_t$	Input transition (rise and fall) times	$V_{CC} = 2\text{ V}$ $V_{CC} = 4.5\text{ V}$ $V_{CC} = 6\text{ V}$		0 0 0	1000 500 400		0 500 400	ns	
$T_A$	Operating free-air temperature			-55	125		-40	85	°C

## electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	$V_{CC}$	$T_A = 25^\circ\text{C}$			SN54HC180		SN74HC180		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$V_{OH}$	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OH} = -20\ \mu\text{A}$	2 V	1.9	1.998		1.9		1.9	V	
		4.5 V	4.4	4.499		4.4		4.4		
		6 V	5.9	5.999		5.9		5.9		
$V_{OL}$	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 20\ \mu\text{A}$	4.5 V	3.98	4.30		3.7		3.84	V	
		6 V	5.48	5.80		5.2		5.34		
		6 V	0.001	0.1		0.1		0.1		
$V_{OL}$	$V_I = V_{IH}$ or $V_{IL}$ , $I_{OL} = 4\text{ mA}$	4.5 V	0.17	0.26		0.4		0.33	V	
		6 V	0.15	0.26		0.4		0.33		
		6 V	±0.1	±100		±1000		±1000		
$I_I$	$V_I = V_{CC}$ or 0	6 V							nA	
$I_{CC}$	$V_I = V_{CC}$ or 0, $I_O = 0$	6 V			8		160		80	μA
$C_i$		2 to 6 V	3 10		10		10		10	pF

2

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**SN54HC180, SN74HC180**  
**9-BIT ODD/EVEN PARITY GENERATORS/CHECKERS**

switching characteristics over recommended operating free-air temperature range (unless otherwise noted),  $C_L = 50 \text{ pF}$  (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN54HC180		SN74HC180		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	Data (odd = 0)	Even	2 V	119	260		390		325	ns	
			4.5 V	36	52		78		65		
			6 V	32	44		66		55		
t <sub>pd</sub>	Data (odd = 0)	Odd	2 V	113	245		370		305	ns	
			4.5 V	33	49		74		61		
			6 V	13	42		63		52		
t <sub>pd</sub>	Data (even = 0)	Even	2 V	119	260		390		325	ns	
			4.5 V	36	52		78		65		
			6 V	32	44		66		55		
t <sub>pd</sub>	Data (even = 0)	Odd	2 V	113	245		370		305	ns	
			4.5 V	33	49		74		61		
			6 V	24	42		63		52		
t <sub>pd</sub>	Even or Odd	Even or Odd	2 V	49	110		165		140	ns	
			4.5 V	15	22		33		28		
			6 V	12	19		28		24		
t <sub>t</sub>		Any	2 V	38	75		110		95	ns	
			4.5 V	8	15		22		19		
			6 V	6	13		19		16		

C <sub>pd</sub>	Power dissipation capacitance	No load, T <sub>A</sub> = 25°C	60 pF typ
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NOTE 1: Load circuit and voltage waveforms are shown in Section 1.

2 HCMOS Devices