TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC74HC280AP, TC74HC280AF

9-Bit Parity Generator/Checker

The TC74HC280A is a high speed CMOS 9-BIT PARITY GENERATOR fabricated with silicon gate C^2MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

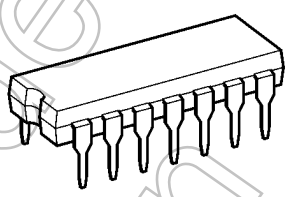
The TC74HC280A is composed of nine data inputs A thru I and odd/even parity outputs Σ ODD and Σ EVEN.

The odd parity output is high when an odd number of data inputs are high. The even parity output is high when an even number of data inputs are high.

The word-length capability is easily expanded by cascading.

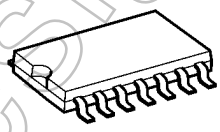
All inputs are equipped with protection circuits against static discharge or transient excess voltage.

TC74HC280AP



DIP14-P-300-2.54

TC74HC280AF



SOP14-P-300-1.27A

Weight

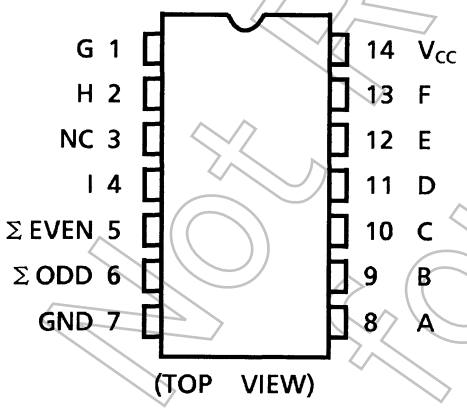
DIP14-P-300-2.54 : 0.96 g (typ.)

SOP14-P-300-1.27A : 0.18 g (typ.)

Features

- High speed: t_{pd} = 22 ns (typ.) at V_{CC} = 5 V
- Low power dissipation: I_{CC} = 4 μA (max) at Ta = 25°C
- High noise immunity: $V_{NIH} = V_{NIL}$ = 28% V_{CC} (min)
- Output drive capability: 10 LSTTL loads
- Symmetrical output impedance: $|I_{OH}| = I_{OL}$ = 4 mA (min)
- Balanced propagation delays: $t_{pLH} \simeq t_{pHL}$
- Wide operating voltage range: V_{CC} (opr) = 2 to 6 V
- Pin and function compatible with 74LS280

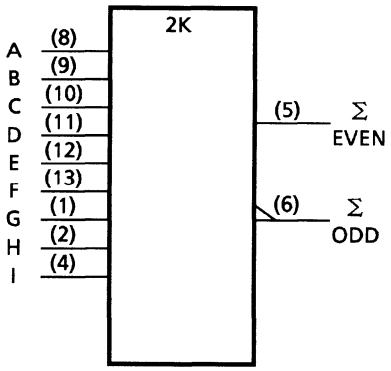
Pin Assignment



NC: No connection

Start of commercial production
1987-11

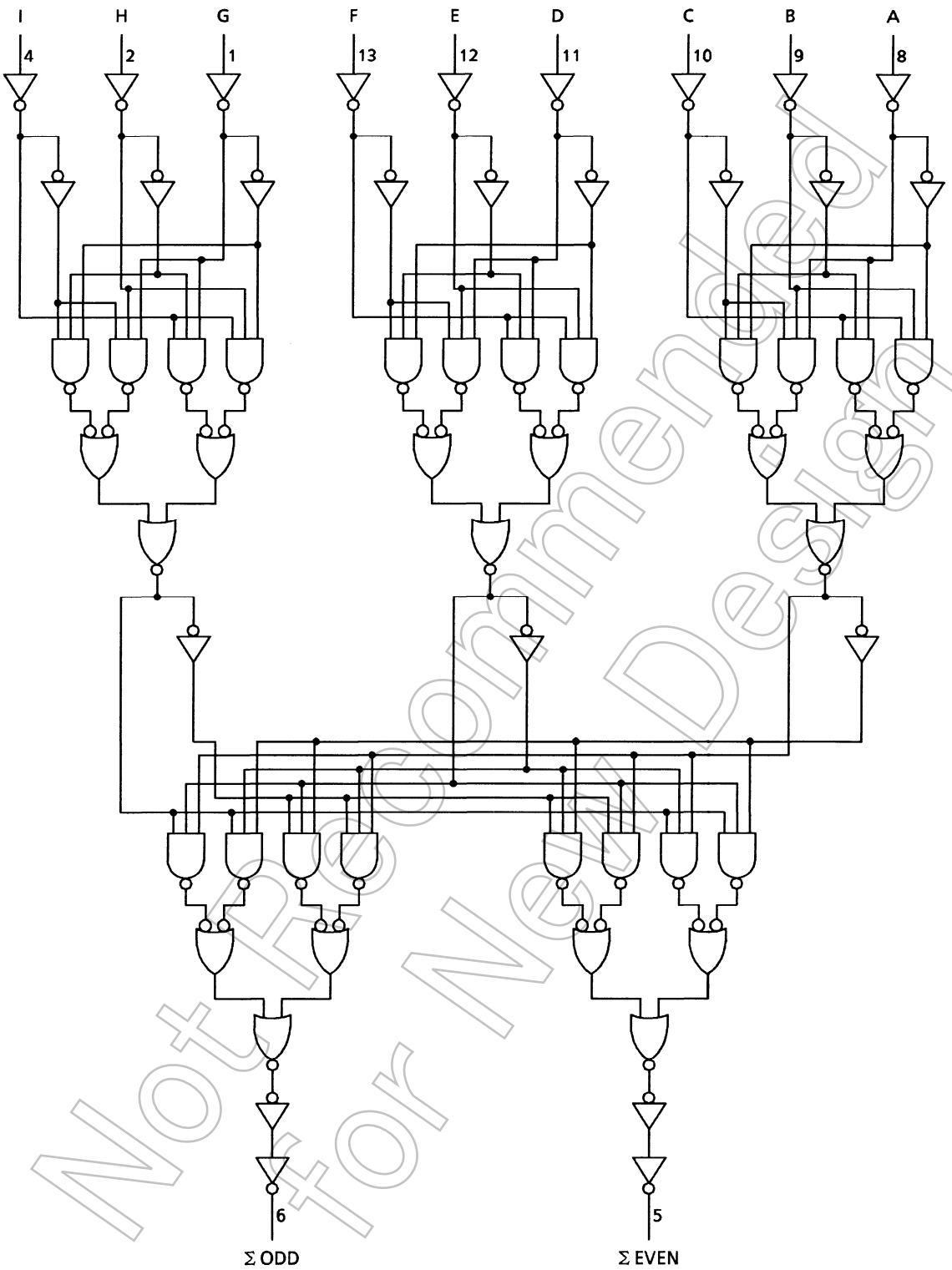
IEC Logic Symbol



Truth Table

Number of Inputs A Through I That are High	Outputs	
	Σ EVEN	Σ ODD
0, 2, 4, 6, 8	H	L
1, 3, 5, 7, 9	L	H

System Diagram



Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	−0.5 to 7	V
DC input voltage	V_{IN}	−0.5 to V_{CC} + 0.5	V
DC output voltage	V_{OUT}	−0.5 to V_{CC} + 0.5	V
Input diode current	I_{IK}	±20	mA
Output diode current	I_{OK}	±20	mA
DC output current	I_{OUT}	±25	mA
DC V_{CC}/ground current	I_{CC}	±50	mA
Power dissipation	P_D	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	T_{stg}	−65 to 150	°C

Note 1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 2: 500 mW in the range of Ta = −40 to 65°C. From Ta = 65 to 85°C a derating factor of −10 mW/°C shall be applied until 300 mW.

Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2 to 6	V
Input voltage	V_{IN}	0 to V_{CC}	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{opr}	−40 to 85	°C
Input rise and fall time	t_r, t_f	0 to 1000 (V_{CC} = 2.0 V) 0 to 500 (V_{CC} = 4.5 V) 0 to 400 (V_{CC} = 6.0 V)	ns

Note: The operating ranges must be maintained to ensure the normal operation of the device.
Unused inputs must be tied to either V_{CC} or GND.

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = −40 to 85°C		Unit
			V_{CC} (V)	Min	Typ.	Max	Min	Max	
High-level input voltage	V_{IH}	—	2.0	1.50	—	—	1.50	—	V
			4.5	3.15	—	—	3.15	—	
			6.0	4.20	—	—	4.20	—	
Low-level input voltage	V_{IL}	—	2.0	—	—	0.50	—	0.50	V
			4.5	—	—	1.35	—	1.35	
			6.0	—	—	1.80	—	1.80	
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	2.0	1.9	2.0	—	1.9	—	V
		I_{OH} = −20 μA	4.5	4.4	4.5	—	4.4	—	
			6.0	5.9	6.0	—	5.9	—	
		I_{OH} = −4 mA	4.5	4.18	4.31	—	4.13	—	
		I_{OH} = −5.2 mA	6.0	5.68	5.80	—	5.63	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	2.0	—	0.0	0.1	—	0.1	V
		I_{OL} = 20 μA	4.5	—	0.0	0.1	—	0.1	
			6.0	—	0.0	0.1	—	0.1	
		I_{OL} = 4 mA	4.5	—	0.17	0.26	—	0.33	
		I_{OL} = 5.2 mA	6.0	—	0.18	0.26	—	0.33	
Input leakage current	I_{IN}	V_{IN} = V_{CC} or GND	6.0	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND	6.0	—	—	4.0	—	40.0	μA

AC Characteristics (C_L = 15 pF, V_{CC} = 5 V, Ta = 25°C, input: t_r = t_f = 6 ns)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Output transition time	t_{TLH} t_{THL}	—	—	4	8	ns
Propagation delay time	t_{pLH} t_{pHL}	—	—	22	35	ns

AC Characteristics (C_L = 50 pF, input: $t_r = t_f$ = 6 ns)

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = −40 to 85°C		Unit
			V_{CC} (V)	Min	Typ.	Max	Min	Max	
Output transition time	t_{TLH} t_{THL}	—	2.0	—	30	75	—	95	ns
			4.5	—	8	15	—	19	
			6.0	—	7	13	—	16	
Propagation delay time	t_{pLH} t_{pHL}	—	2.0	—	80	200	—	250	ns
			4.5	—	26	40	—	50	
			6.0	—	22	34	—	43	
Input capacitance	C_{IN}	—		—	5	10	—	10	pF
Power dissipation capacitance	C_{PD} (Note)	—		—	61	—	—	—	pF

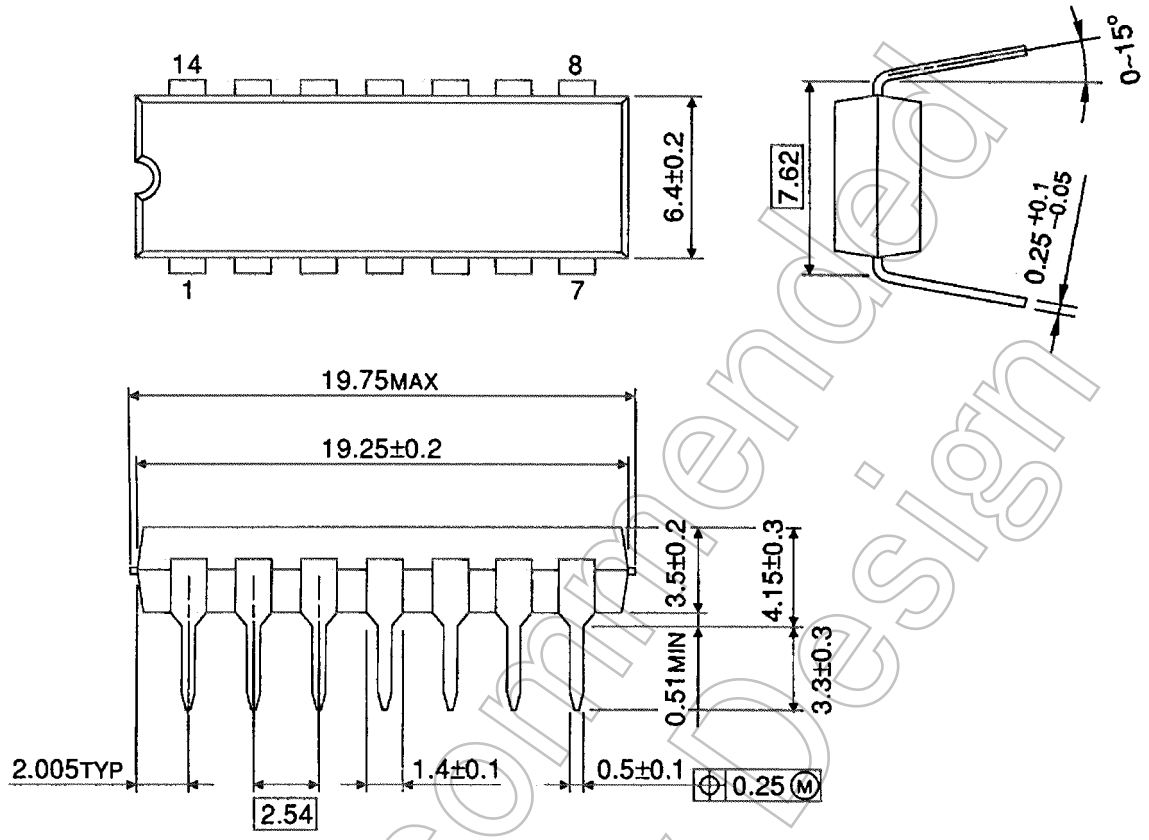
Note: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

$$I_{CC}\ (opr) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

Package Dimensions

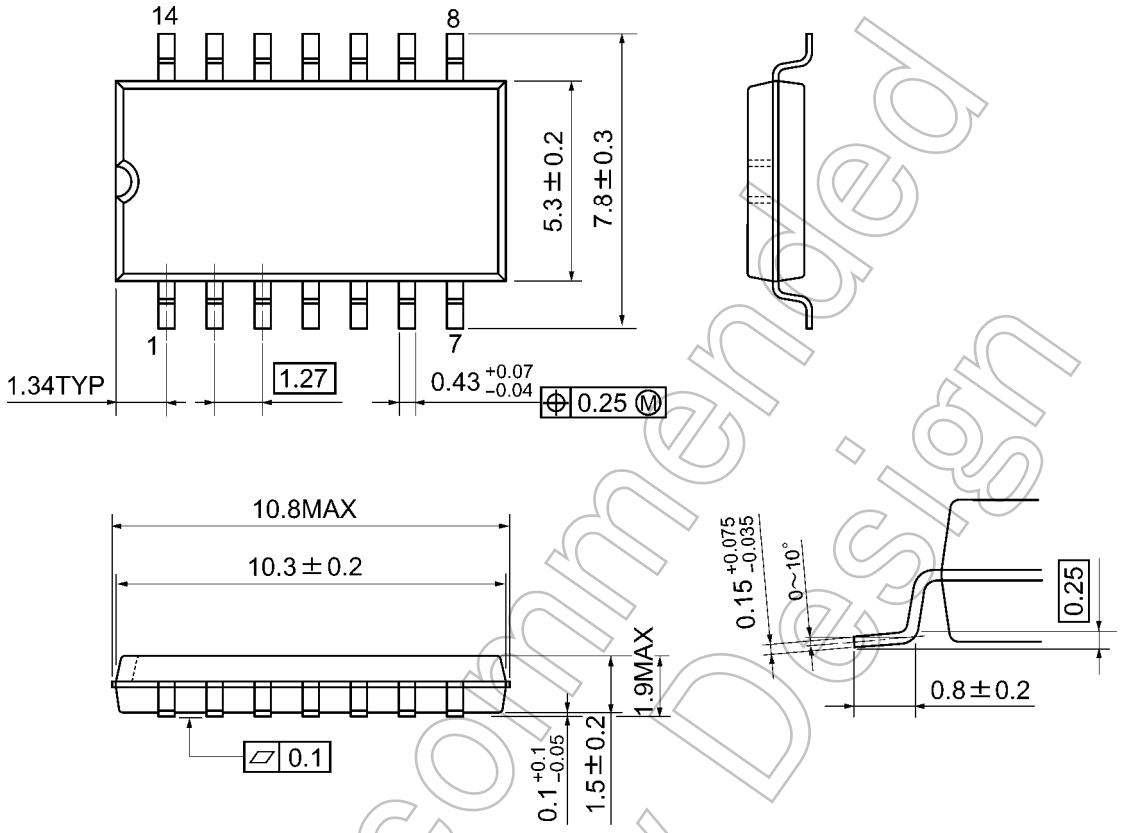
DIP14-P-300-2.54 Unit : mm



Weight: 0.96 g (typ.)

Package Dimensions

SOP14-P-300-1.27A Unit: mm



Weight: 0.18 g (typ.)

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