National *Semiconductor*

54F/74F280
9-Bit Parity Generator/Checker

General Description

The 'F280 is a high-speed parity generator/checker that accepts nine bits of input data and detects whether an even or an odd number of these inputs is HIGH. If an even number of inputs is HIGH, the Sum Even output is HIGH. If an odd number is HIGH, the Sum Even output is LOW. The Sum Odd output is the complement of the Sum Even output.

Features

■ Guaranteed 4000V minimum ESD protection

| Commercial	Military	Package Number	Package Description
74F280PC		N14A	14-Lead (0.300″ Wide) Molded Dual-In-Line
	54F280DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line
74F280SC (Note 1)		M14A	14-Lead (0.150″ Wide) Molded Small Outline, JEDEC
74F280SJ (Note 1)		M14D	14-Lead (0.300″ Wide) Molded Small Outline, EIAJ
	54F280FM (Note 2)	W14B	14-Lead Cerpack
	54F280LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

Note 1: Devices also available in 13″ reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMQB, FMQB and LMQB.

Logic Symbols

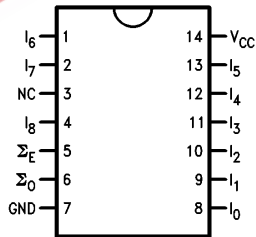

TL/F/9512–3

IEEE/IEC
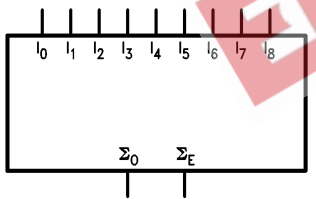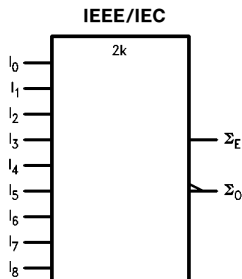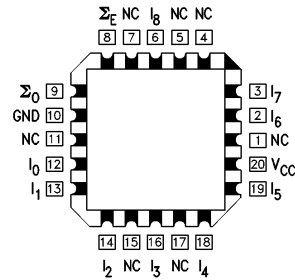

TL/F/9512–5

Connection Diagrams

Pin Assignment for DIP, SOIC and Flatpak

TL/F/9512–1

Pin Assignment for LCC

TL/F/9512–2

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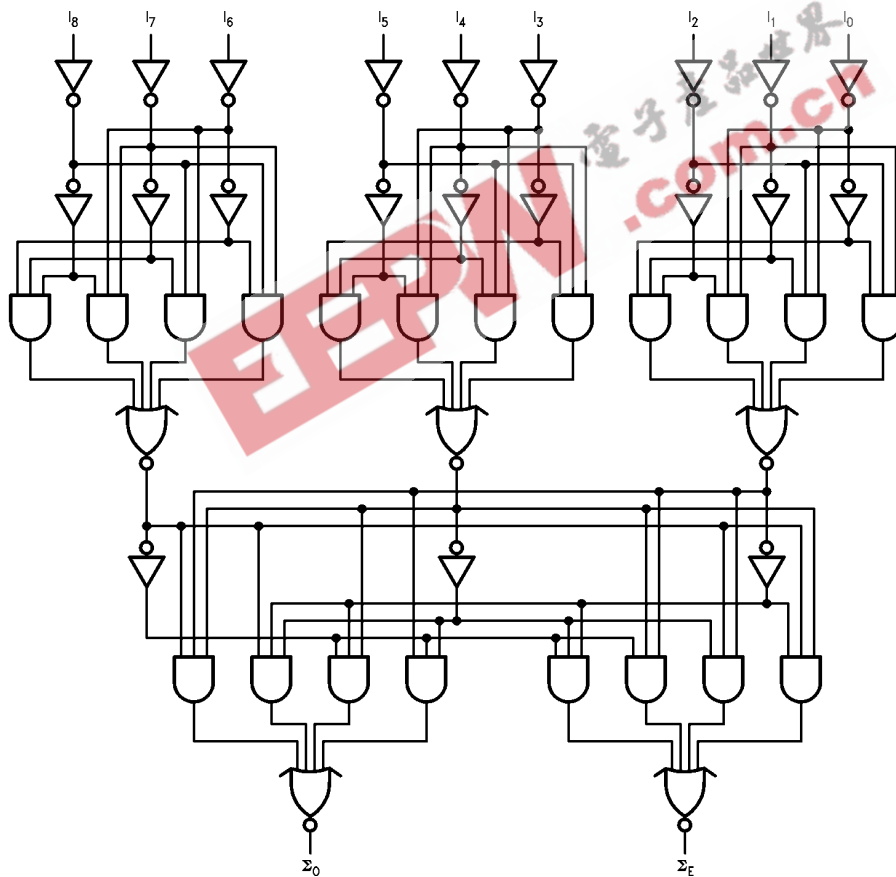
Unit Loading/Fan Out

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
I_0-I_8	Data Inputs	1.0/1.0	20 μA/$-$0.6 mA
Σ_O	Odd Parity Output	50/33.3	$-$1 mA/20 mA
Σ_E	Even Parity Output	50/33.3	$-$1 mA/20 mA

Truth Table

Number of HIGH Inputs I_0-I_8	Outputs	
	Σ Even	Σ Odd
0, 2, 4, 6, 8	H	L
1, 3, 5, 7, 9	L	H

H = HIGH Voltage Level
L = LOW Voltage Level

Logic Diagram

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Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

2

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Storage Temperature	$-65°C$ to $+150°C$
Ambient Temperature under Bias	$-55°C$ to $+125°C$
Junction Temperature under Bias	$-55°C$ to $+175°C$
Plastic	$-55°C$ to $+150°C$
V_{CC} Pin Potential to Ground Pin	$-0.5V$ to $+7.0V$
Input Voltage (Note 2)	$-0.5V$ to $+7.0V$
Input Current (Note 2)	-30 mA to $+5.0$ mA
Voltage Applied to Output in HIGH State (with $V_{CC} = 0V$)	
Standard Output	$-0.5V$ to V_{CC}
TRI-STATE® Output	$-0.5V$ to $+5.5V$
Current Applied to Output in LOW State (Max)	twice the rated I_{OL} (mA)
ESD Last Passing Voltage (Min)	4000V

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Recommended Operating Conditions

Free Air Ambient Temperature	
Military	$-55°C$ to $+125°C$
Commercial	$0°C$ to $+70°C$
Supply Voltage	
Military	$+4.5V$ to $+5.5V$
Commercial	$+4.5V$ to $+5.5V$

DC Electrical Characteristics

Symbol	Parameter		54F/74F			Units	V_{CC}	Conditions
			Min	Typ	Max			
V_{IH}	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signal
V_{IL}	Input LOW Voltage				0.8	V		Recognized as a LOW Signal
V_{CD}	Input Clamp Diode Voltage				-1.2	V	Min	$I_{IN} = -18$ mA
V_{OH}	Output HIGH Voltage	54F 10% V_{CC}	2.5			V	Min	$I_{OH} = -1$ mA
		74F 10% V_{CC}	2.5					$I_{OH} = -1$ mA
		74F 5% V_{CC}	2.7					$I_{OH} = -1$ mA
V_{OL}	Output LOW Voltage	54F 10% V_{CC}			0.5	V	Min	$I_{OL} = 20$ mA
		74F 10% V_{CC}			0.5			$I_{OL} = 20$ mA
I_{IH}	Input HIGH Current	54F			20.0	μA	Max	$V_{IN} = 2.7V$
		74F			5.0			
I_{BVI}	Input HIGH Current Breakdown Test	54F			100	μA	Max	$V_{IN} = 7.0V$
		74F			7.0			
I_{CEX}	Output HIGH Leakage Current	54F			250	μA	Max	$V_{OUT} = V_{CC}$
		74F			50			
V_{ID}	Input Leakage Test	74F	4.75			V	0.0	$I_{ID} = 1.9$ μA All Other Pins Grounded
I_{OD}	Output Leakage Circuit Current	74F			3.75	μA	0.0	$V_{IOD} = 150$ mV All Other Pins Grounded
I_{IL}	Input LOW Current				-0.6	mA	Max	$V_{IN} = 0.5V$
I_{OS}	Output Short-Circuit Current		-60		-150	mA	Max	$V_{OUT} = 0V$
I_{CCH}	Power Supply Current			25	38	mA	Max	$V_O = $ HIGH

AC Electrical Characteristics

Symbol	Parameter	74F $T_A = +25°C$ $V_{CC} = +5.0V$ $C_L = 50\ pF$			54F $T_A, V_{CC} = Mil$ $C_L = 50\ pF$		74F $T_A, V_{CC} = Com$ $C_L = 50\ pF$		Units
		Min	Typ	Max	Min	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation Delay I_n to Σ_E	6.5 6.5	10.0 11.0	15.0 16.0	6.5 6.5	20.0 21.0	6.5 6.5	16.0 17.0	ns
t_{PLH} t_{PHL}	Propagation Delay I_n to Σ_O	6.0 6.5	10.0 11.0	15.0 16.0	5.0 6.5	20.0 21.0	6.0 6.5	16.0 17.0	ns

Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:

74F 280 S C X

Temperature Range Family
74F = Commercial
54F = Military

Device Type

Package Code
P = Plastic DIP
D = Ceramic DIP
F = Flatpak
L = Leadless Chip Carrier (LCC)
S = Small Outline SOIC JEDEC
SJ = Small Outline SOIC EIAJ

Special Variations
QB = Military grade device with environmental and burn-in processing
X = Devices shipped in 13″ reel

Temperature Range
C = Commercial (0°C to +70°C)
M = Military (−55°C to +125°C)

Physical Dimensions inches (millimeters)

Top View

Side View

DETAIL A

0.350 ± 0.008
(8.890 ± 0.203)

0.063 − 0.075
(1.600 − 1.905)

0.200 ± 0.005
(5.080 ± 0.127)
TYP

45° × 0.015 ± 0.010
(0.381 ± 0.254)

0.007 − 0.011
(0.178 − 0.279)
R TYP

0.015
(0.381)
MIN TYP

0.077 − 0.093
(1.959 − 2.362)

0.022 − 0.028
(0.559 − 0.711)
TYP

PIN #1
INDEX

0.045 − 0.055
(1.143 − 1.397)
TYP

0.067 − 0.083
(1.702 − 2.108)
TYP

0.045 − 0.055
(1.143 − 1.397)
TYP

45° × 0.040 ± 0.010
(1.016 ± 0.254)
3 PLCS

Bottom View

0.003
(0.076)
MIN TYP

0.022
(0.559)
MAX TYP

0.015
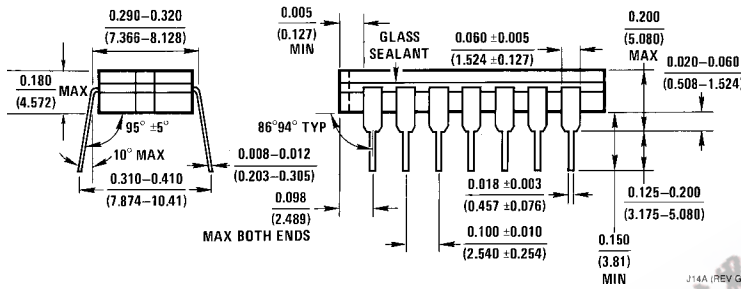(0.381)
MAX TYP

0.006
(0.152)
MIN TYP

Detail A

E20A (REV D)

20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A

5

0.785
(19.939)
MAX

0.025
(0.635)
RAD

0.220–0.310
(5.588–7.874)

0.290–0.320
(7.366–8.128)

0.180
(4.572)
MAX

0.005
(0.127)
MIN

GLASS
SEALANT

0.060 ±0.005
(1.524 ±0.127)

0.200
(5.080)
MAX

0.020–0.060
(0.508–1.524)

95° ±5°

86°94° TYP

0.008–0.012
(0.203–0.305)

0.018 ±0.003
(0.457 ±0.076)

0.125–0.200
(3.175–5.080)

10° MAX

0.310–0.410
(7.874–10.41)

0.098
(2.489)
MAX BOTH ENDS

0.100 ±0.010
(2.540 ±0.254)

0.150
(3.81)
MIN

J14A (REV G)
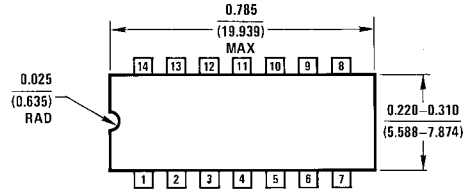
14-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A

0.335–0.344
(8.509–8.738)

0.228–0.244
(5.791–6.198)

LEAD NO. 1
IDENT

30°
TYP

0.010
(0.254) MAX

0.150–0.157
(3.810–3.988)

0.010–0.020
(0.254–0.508) ×45°

8° MAX TYP
ALL LEADS

0.008–0.010
(0.203–0.254)
TYP ALL LEADS

0.004
(0.102)
ALL LEAD TIPS

0.016–0.050
(0.406–1.270)
TYP ALL LEADS

0.053–0.069
(1.346–1.753)

0.004–0.010
(0.102–0.254)

SEATING
PLANE

0.014
(0.356)

0.050
(1.270)
TYP

0.008
(0.203) TYP

0.014–0.020
(0.356–0.508) TYP

M14A (REV H)
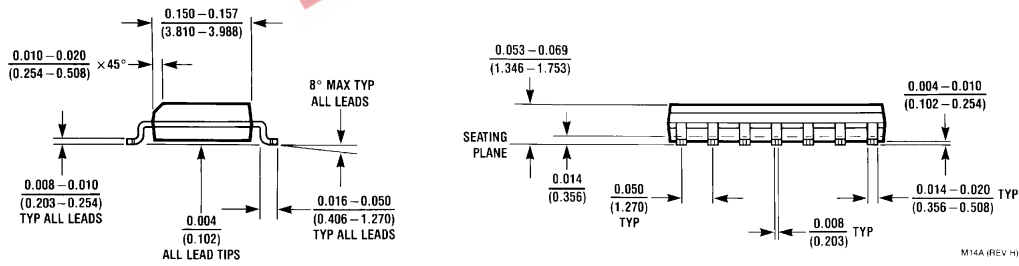
14-Lead (0.150″ Wide) Molded Small Outline Package, JEDEC (S)
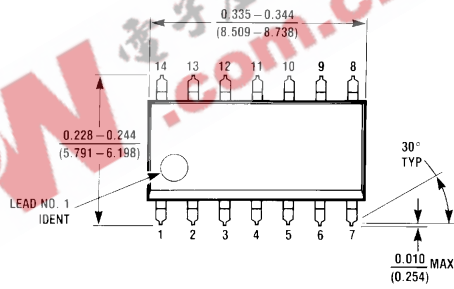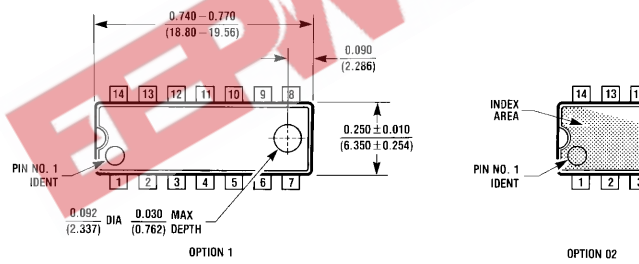**NS Package Number M14A**
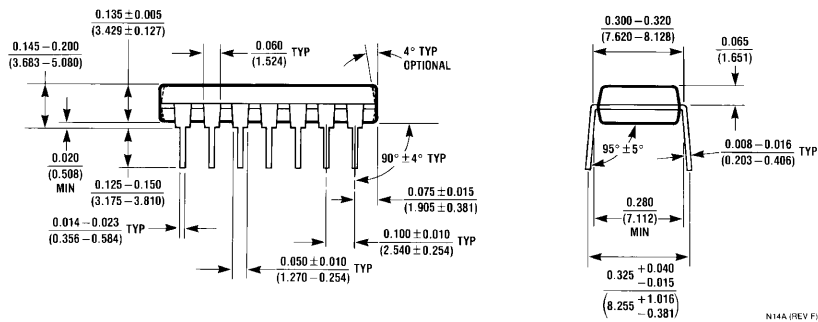
Physical Dimensions inches (millimeters) (Continued)

DETAIL F

0°–8°

0.016 – 0.031
(0.406 – 0.787)

0.394 – 0.402
(10.01 – 10.21)

14 13 12 11 10 9 8

0.295 – 0.319
(7.493 – 8.103)

0.205 – 0.213
(5.207 – 5.410)

1 2 3 4 5 6 7

0.006 – 0.010
(0.152 – 0.254)

0.049
(1.245) REF

SEE DETAIL F

0.071
(1.803) REF

0.067 – 0.083
(1.702 – 2.108)

SEATING PLANE

0.050
(1.270)

0.000 – 0.010
(0.000 – 0.254)

0.014 – 0.020
(0.356 – 0.508)
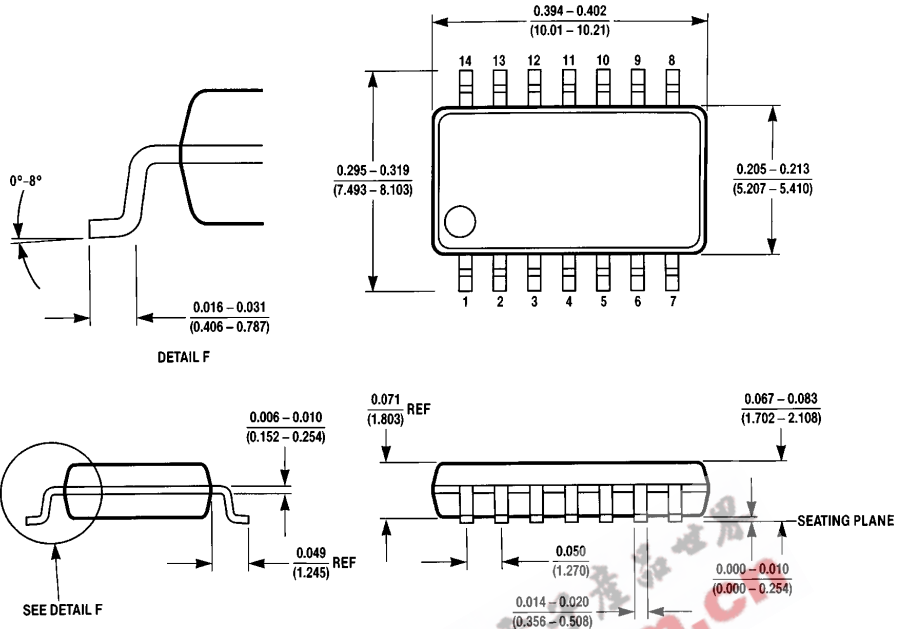
M14D (REV A)

14-Lead (0.300″ Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M14D

0.740 – 0.770
(18.80 – 19.56)

0.090
(2.286)

14 13 12 11 10 9 8

0.250 ± 0.010
(6.350 ± 0.254)

PIN NO. 1
IDENT

1 2 3 4 5 6 7

0.092
(2.337) DIA

0.030 MAX
(0.762) DEPTH

OPTION 1

INDEX
AREA

14 13 12

PIN NO. 1
IDENT

1 2 3

OPTION 02

0.135 ± 0.005
(3.429 ± 0.127)

0.145 – 0.200
(3.683 – 5.080)

0.060 TYP
(1.524)

4° TYP
OPTIONAL

0.020
(0.508)
MIN

0.125 – 0.150
(3.175 – 3.810)

90° ± 4° TYP

0.075 ± 0.015
(1.905 ± 0.381)

0.014 – 0.023 TYP
(0.356 – 0.584)

0.100 ± 0.010 TYP
(2.540 ± 0.254)

0.050 ± 0.010 TYP
(1.270 – 0.254)

0.300 – 0.320
(7.620 – 8.128)

0.065
(1.651)

95° ± 5°

0.008 – 0.016 TYP
(0.203 – 0.406)

0.280
(7.112)
MIN

0.325 +0.040 −0.015
(8.255 +1.016 −0.381)

N14A (REV F)

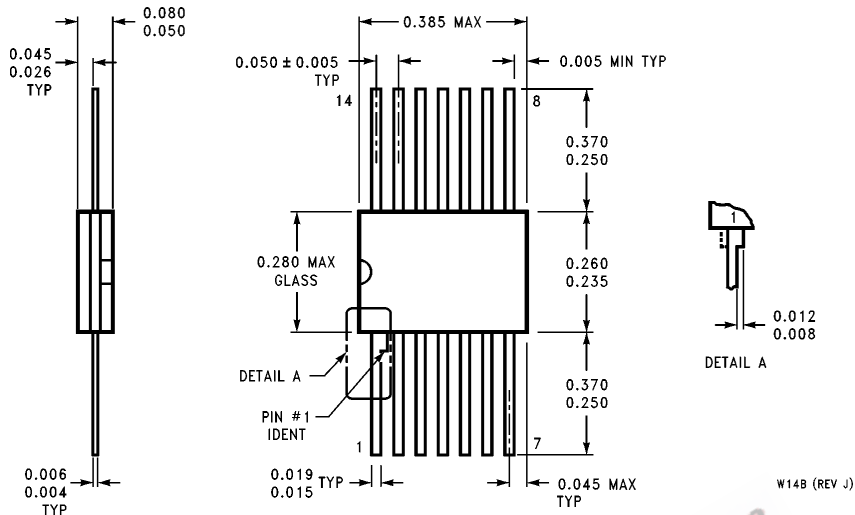**14-Lead (0.300″ Wide) Molded Dual-In-Line Package (P)**
NS Package Number N14A

Physical Dimensions inches (millimeters) (Continued)

0.080
0.050

0.045
0.026
TYP

0.385 MAX

0.050 ± 0.005
TYP

14

8

0.005 MIN TYP

0.370
0.250

0.280 MAX
GLASS

0.260
0.235

DETAIL A

PIN #1
IDENT

1

7

0.370
0.250

0.006
0.004
TYP

0.019
0.015 TYP

0.045 MAX
TYP

0.012
0.008

DETAIL A

W14B (REV J)

14-Lead Ceramic Flatpak (F)
NS Package Number W14B

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.