High Speed CMOS 9-Bit Parity Generator/Checker

QS54/74FCT280T

QS54/74FCT1280T

FEATURES/BENEFITS

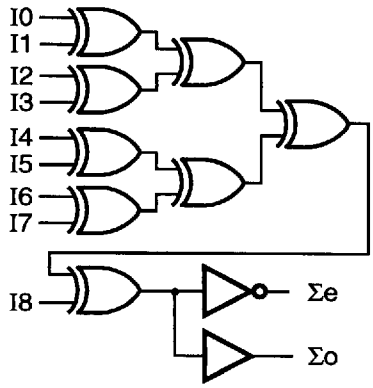
- QSFCT280BT faster than FAST™
- QSFCT1280T has I8 enable, registered outputs
- I_{OL} = 48 mA COM, 32 mA MIL
- TTL-compatible input and output levels
- Military product compliant with MIL-STD 883
- 6.3 ns delay, Ix to Σe for QSFCT280BT
- 2 ns setup, Ix to reg clock for QSFCT1280BT
- CMOS power levels <7.5 mW static
- Available in DIP, SOIC, QSOP, ZIP, HQSOP
- JEDEC standard pinouts

DESCRIPTION

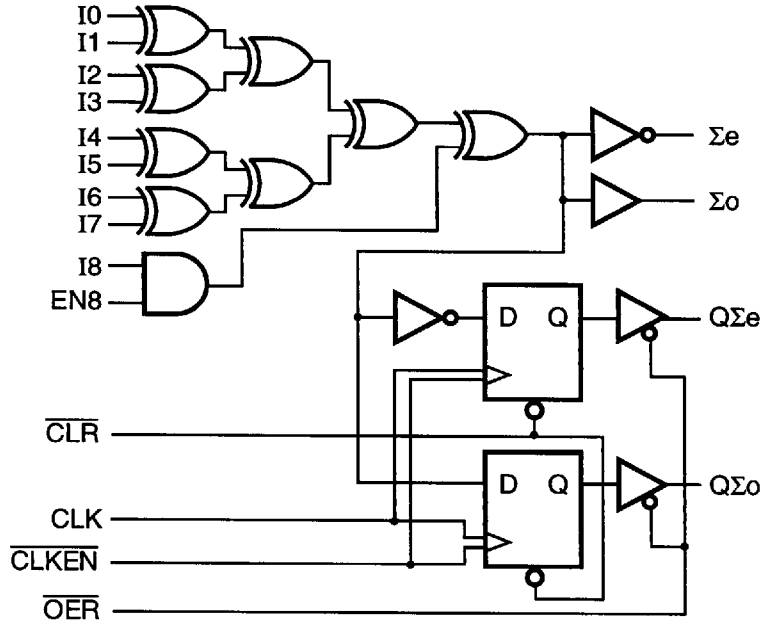
The QSFCT280/AT/BT and QSFCT1280/AT/BT are high-speed CMOS TTL-compatible 9-bit parity generator-checkers. Both odd and even parity outputs are available for generating or checking odd or even parity. The 1280 has I8 enable for parity bit generation and registered odd and even outputs for parity check on the following cycle. All inputs have clamp diodes for undershoot noise suppression. All outputs have ground bounce suppression (see QSI Application Note AN-001).

FUNCTIONAL BLOCK DIAGRAM

FCT280

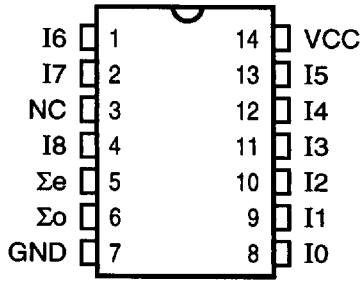


FCT1280

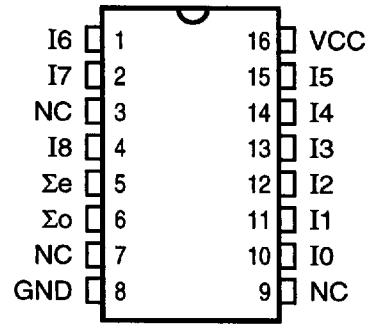


FCT280 PIN CONFIGURATIONS (All Pins Top View)

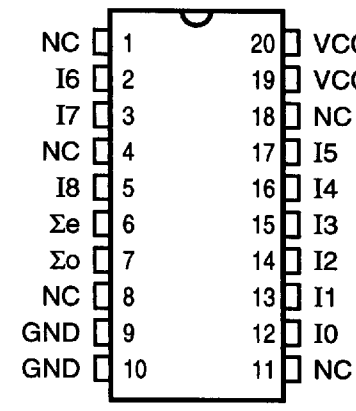
DIP, SOIC



QSOP

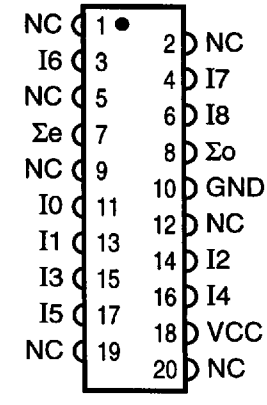


HQSOP



Note:
14-Pin SOIC is 150 mil wide (package code S1).

ZIP



PIN DESCRIPTION

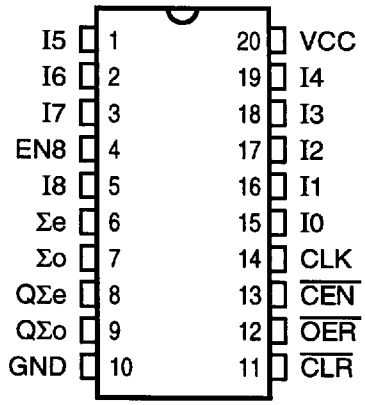
Name	I/O	Description
I8-I0	I	Data Inputs
Σe	O	Even Parity Out
Σo	O	Odd Parity Out

FUNCTION TABLE

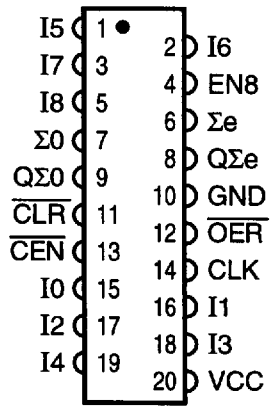
Inputs I8-I0	Outputs Σ even	Outputs Σ odd	Function
Number of Bits at TTL High = 0,2,4,6,8	H	L	Parity is Even
Number of Bits at TTL High = 1,3,5,7,9	L	H	Parity is Odd

FCT1280 PIN CONFIGURATIONS (All Pins Top View)

PDIP, SOIC, QSOP, HQSOP



ZIP



PIN DESCRIPTION

Name	I/O	Description
I8-I0	I	Data Inputs
EN8	I	Enable I8
CLK	I	Clock
$\overline{CEN}$	I	Clock Enable
$\overline{CLR}$	I	Clear
$\overline{OER}$	I	Reg. Out Enable
Σe	O	Even Parity Out
Σo	O	Odd Parity Out
QΣe	O	Reg. Even Parity
QΣo	O	Reg. Odd Parity

FUNCTION TABLE

Inputs			Outputs	
I7-I0	I8	EN8	Σe	Σo
Number of Bits at TTL High = 0,2,4,6,8	X	L	H	L
	L	H	H	L
	H	H	L	H
Number of Bits at TTL High = 1,3,5,7,9	X	L	L	H
	L	H	L	H
	H	H	H	L

Inputs				Outputs		
$\overline{OER}$	$\overline{CEN}$	$\overline{CLR}$	CLK	QΣe	QΣo	Function
H	X	X	X	Hi-Z	Hi-Z	Disable
L	X	L	X	L	L	Clear
L	H	H	↑	QΣen-1	QΣon-1	No Change
L	L	H	↑	Σen-1	Σon-1	Load Σe,Σo

ABSOLUTE MAXIMUM RATINGS

Supply Voltage to Ground	–0.5V to +7.0V
DC Output Voltage V_{OUT}	–0.5V to +7.0V
DC Input Voltage V_{IN}	–0.5V to +7.0V
AC Input Voltage (for a pulse width ≤ 20 ns)	–3.0V
DC Input Diode Current with V_{IN} < 0	–20 mA
DC Output Diode Current with V_{OUT} < 0	–50 mA
DC Output Current Max. Sink Current/Pin	120 mA
Maximum Power Dissipation	0.5 watts
T_{STG} Storage Temperature	–65° to +150°C

Note: Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to QSI devices that result in functional or reliability type failures.

FCT280 CAPACITANCE

T_A = 25°C, f = 1 MHz, V_{IN} = 0V, V_{OUT} = 0V

Pins (14-Pin Package)	**SOIC**	**QSOP**	**PDIP**	**ZIP**	**Unit**
1, 2, 4, 8-13	4	4	5	7	pF
5, 6	6	6	7	9	pF
—	8	8	9	10	pF

FCT1280 CAPACITANCE

T_A = 25°C, f = 1 MHz, V_{IN} = 0V, V_{OUT} = 0V

Pins	**SOIC**	**QSOP**	**PDIP**	**ZIP**	**Unit**
1-5, 11-19	4	4	5	7	pF
6-9	6	6	7	9	pF
—	8	8	9	10	pF

Note: Capacitance is characterized but not tested.

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Commercial T_A = 0°C to 70°C, V_{CC} = 5.0V ± 5% Military T_A = –55°C to 125°C, V_{CC} = 5.0V ± 10%

Symbol	Parameter	Test Conditions	Min	Typ(1)	Max	Unit
V_{IH}	Input HIGH Voltage	Logic HIGH for All Inputs	2.0	—	—	V
V_{IL}	Input LOW Voltage	Logic LOW for All Inputs	—	—	0.8	V
ΔV_T	Input Hysteresis	$V_{TLH} - V_{THL}$ for All Inputs	—	0.2	—	V
$\lvert I_{IH} \rvert$ $\lvert I_{IL} \rvert$	Input Current Input HIGH or LOW	Vcc = Max., 0 ≤ V_{IN} < Vcc	—	—	5	µA
$\lvert I_{OZ} \rvert$	Off-State Output Current (Hi-Z)	Vcc = Max., 0 ≤ V_{IN} ≤ Vcc	—	—	5	µA
Ios	Short Circuit Current	Vcc = Max., V_{OUT} = GND(2,3)	–60	—	—	mA
V_{IC}	Input Clamp Voltage	Vcc = Min., I_{IN} = –18 mA, T_A = 25°C(3)	—	–0.7	–1.2	V
V_{OH}	Output HIGH Voltage	Vcc = Min. I_{OH} = –12 mA (MIL) I_{OH} = –15 mA (COM)	2.4 2.4	— —	— —	V
V_{OL}	Output LOW Voltage	Vcc = Min. I_{OL} = 32 mA (MIL) I_{OL} = 48 mA (COM)	— —	— —	0.50 0.50	V

Notes:
1. Typical values indicate Vcc = 5.0V and T_A = 25°C.
2. Not more than one output should be shorted and the duration is ≤1 second.
3. These parameters are guaranteed by design but not tested.

POWER SUPPLY CHARACTERISTICS

Symbol	Parameter	Test Conditions(1)	Min	Max	Unit
Icc	Quiescent Power Supply Current	Vcc = Max., freq = 0 0V ≤ V_{IN} ≤ 0.2V or Vcc-0.2V ≤ V_{IN} ≤ Vcc	—	1.5	mA
ΔIcc	Supply Current per Input @ TTL HIGH	Vcc = Max., V_{IN} = 3.4V, freq = 0(2)	—	2.0	mA
Qccd	Supply Current per Input per MHz	Vcc = Max., Outputs Open and Enabled One BitToggling @ 50% Duty Cycle Other Inputs at GND or Vcc(3,4)	—	0.25	mA/ MHz

Notes:
1. For conditions shown as Min. or Max., use the appropriate values specified under DC specifications.
2. Per TTL driven input (V_{IN} = 3.4V).
3. For flip-flops, Qccd is measured by switching one of the data input pins so that the output changes every clock cycle. This is a measurement of device power consumption only and does not include power to drive load capacitance or tester capacitance. This parameter is guaranteed by design but not tested.
4. Ic can be computed using the above parameters as explained in the Technical Overview section.

FCT280 SWITCHING CHARACTERISTICS OVER OPERATING RANGE

Commercial T_A = 0°C to 70°C, Vcc = 5.0V ± 5% Military T_A = –55°C to 125°C, Vcc = 5.0V ± 10%
C_{LOAD} = 50 pF, R_{LOAD} = 500Ω unless otherwise noted.

Symbol	Description		280T Min	280T Max	280AT Min	280AT Max	280BT Min	280BT Max	Unit
t_{PHLE}	Propagation Delay	Com	—	10	—	7.5	—	6.3	ns
t_{PLHE}	I8-I0 to Σeven	Mil	—	11	—	9	—	7.5	
t_{PHLO}	Propagation Delay	Com	—	10	—	7.5	—	6.3	ns
t_{PLHO}	I8-I0 to Σodd	Mil	—	11	—	9	—	7.5	

FCT1280 SWITCHING CHARACTERISTICS OVER OPERATING RANGE

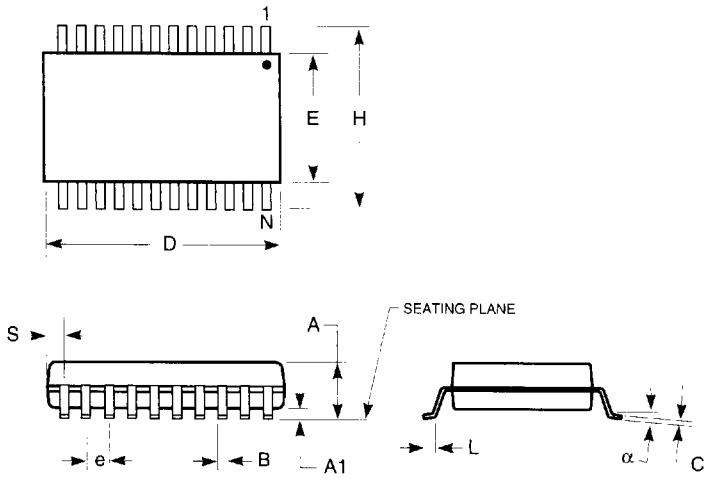
Commercial T_A = 0°C to 70°C, Vcc = 5.0V ± 5% Military T_A = –55°C to 125°C, Vcc = 5.0V ± 10%
C_{LOAD} = 50 pF, R_{LOAD} = 500Ω unless otherwise noted.

Symbol	Description		1280T Min	1280T Max	1280AT Min	1280AT Max	1280BT Min	1280BT Max	Unit
t_{PHLE}	Propagation Delay	Com	—	10	—	7.5	—	6.3	ns
t_{PLHE}	I8-I0 to Σeven	Mil	—	11	—	9	—	7.5	
t_{PHLO}	Propagation Delay	Com	—	10	—	7.5	—	6.3	ns
t_{PLHO}	I8-I0 to Σodd	Mil	—	11	—	9	—	7.5	
t_{OE}	Output Enable Time	Com[1]	1.5	12.5	1.5	10	1.5	7.5	ns
	$\overline{OER}$ to QΣe, QΣo	Mil[1]	1.5	14	1.5	12	1.5	8.5	
t_{OZ}	Output Disable Time	Com[2]	1.5	8	1.5	7	1.5	6.5	ns
	$\overline{OER}$ to QΣe, QΣo	Mil[2]	1.5	8	1.5	7	1.5	6.5	
t_{CPQ}	Clock to Output	Com	—	10	—	9	—	7.5	ns
	QΣe, QΣo	Mil	—	11	—	10	—	8.5	
t_{CLR}	$\overline{CLR}$ to Output	Com	—	13	—	11	—	8	ns
	QΣe, QΣo	Mil	—	15	—	13	—	10	
t_{CS}	$\overline{CEN}$ Setup Time	Com	2.5	—	2	—	2	—	ns
	$\overline{CEN}$ to CLK	Mil	2.5	—	2	—	2	—	
t_{CH}	$\overline{CEN}$ Hold Time	Com	3	—	2.5	—	2	—	ns
	$\overline{CEN}$ to CLK	Mil	3	—	2.5	—	2.5	—	
t_S	Data Setup Time	Com	2.5	—	2	—	2	—	ns
	Ix to CLK	Mil	2.5	—	2	—	2	—	
t_H	Data Hold Time	Com	3	—	2.5	—	2	—	ns
	Ix to CLK	Mil	3	—	2.5	—	2.5	—	
t_W	Clock Pulse Width	Com[2]	7	—	7	—	5	—	ns
	HIGH or LOW	Mil[2]	7	—	7	—	6	—	

Notes:
1. Minimums guaranteed but not tested.
2. This parameter is guaranteed by design but not tested.
3. See Test Circuit and Waveforms.

150-MIL HQSOP - Package Code H

Hermetic Quarter-Size Outline Package
Ceramic Small Outline Gull-Wing



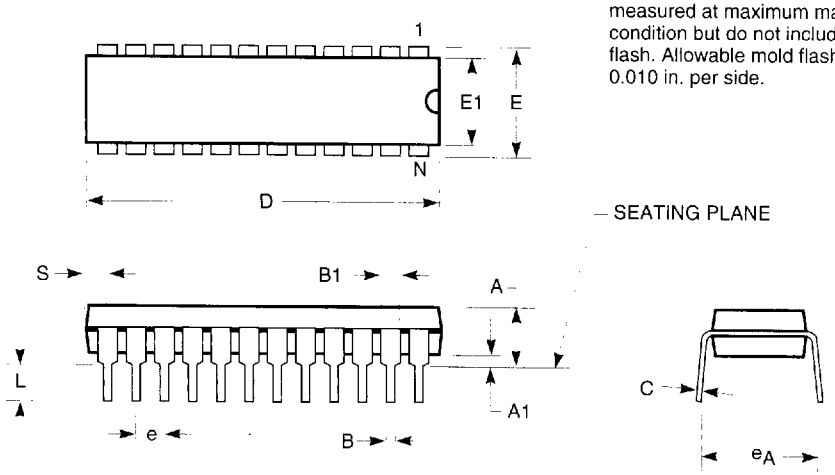
JEDEC#	TBD			TBD		
DWG#	HSS-20A			HSS-24A		
Symbol	Min	Nom	Max	Min	Nom	Max
A	0.070	0.074	0.078	0.070	0.074	0.078
A1	0.008	0.012	0.016	0.008	0.012	0.016
B	0.009	0.010	0.012	0.009	0.010	0.012
C	0.007	0.008	0.010	0.007	0.008	0.010
D	0.337	0.342	0.350	0.337	0.342	0.350
E	0.150	0.155	0.158	0.150	0.155	0.158
e	0.025 BSC			0.025 BSC		
H	0.230	0.236	0.244	0.230	0.236	0.244
L	0.016	0.025	0.035	0.016	0.025	0.035
N	20			24		
α	0°	5°	8°	0°	5°	8°
S	0.056	0.058	0.062	0.031	0.033	0.037

Notes:
1. Refer to applicable symbol list.
2. All dimensions are in inches.
3. N is the number of lead positions.
4. Dimensions D and E are to be measured at maximum material condition.
5. Lead coplanarity is 0.004 in. maximum.

300-MIL PDIP - Package Code P

Plastic Dual In-line Package

Notes:
1. Refer to applicable symbol list.
2. All dimensions are in inches.
3. N is the number of lead positions.
4. Dimensions D and E1 are to be measured at maximum material condition but do not include mold flash. Allowable mold flash is 0.010 in. per side.

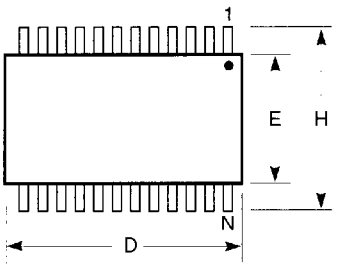


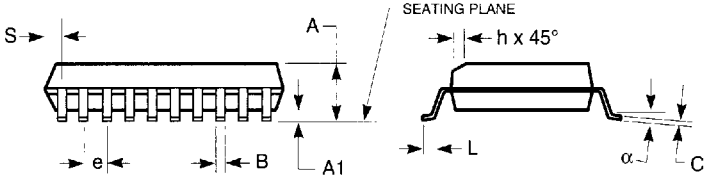
JEDEC#	MS-001AC		MS001AA		MS-001AE		N/A		MS-001AF		MO-095AH	
DWG#	PD14A		PD16A		PD20A		PT22B		PT24A		PT28A	
Symbol	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
A	0.130	0.170	0.130	0.170	0.130	0.170	0.130	0.170	0.130	0.170	0.130	0.180
A1	0.015	0.040	0.015	0.040	0.015	0.040	0.015	0.040	0.015	0.040	0.015	0.040
B	0.016	0.020	0.016	0.020	0.016	0.020	0.016	0.020	0.016	0.020	0.016	0.020
B1	0.045	0.070	0.045	0.070	0.045	0.070	0.045	0.070	0.045	0.070	0.045	0.060
C	0.009	0.012	0.009	0.012	0.009	0.012	0.009	0.012	0.009	0.012	0.009	0.012
D	0.745	0.765	0.745	0.765	1.020	1.040	1.020	1.040	1.150	1.260	1.345	1.385
E	0.300	0.325	0.300	0.325	0.300	0.325	0.300	0.325	0.300	0.325	0.300	0.325
E1	0.240	0.270	0.240	0.270	0.240	0.270	0.240	0.270	0.250	0.280	0.275	0.295
e	0.090	0.110	0.090	0.110	0.090	0.110	0.090	0.110	0.090	0.110	0.090	0.110
e_A	0.310	0.380	0.310	0.380	0.310	0.380	0.310	0.380	0.310	0.380	0.310	0.380
L	0.120	0.140	0.120	0.140	0.120	0.140	0.120	0.140	0.120	0.140	0.120	0.140
S	0.070	0.080	0.020	0.035	0.060	0.070	0.010	0.020	0.025	0.080	0.020	0.040
N	14		16		20		22		24		28	

150-MIL QSOP - Package Code Q

Quarter-Size Outline Package
Plastic Small Outline Gull-Wing

Notes:
1. Refer to applicable symbol list.
2. All dimensions are in inches.
3. N is the number of lead positions.
4. Dimensions D and E are to be measured at maximum material condition but do not include mold flash. Allowable mold flash is 0.006 in. per side.
5. Lead coplanarity is 0.004 in. maximum.

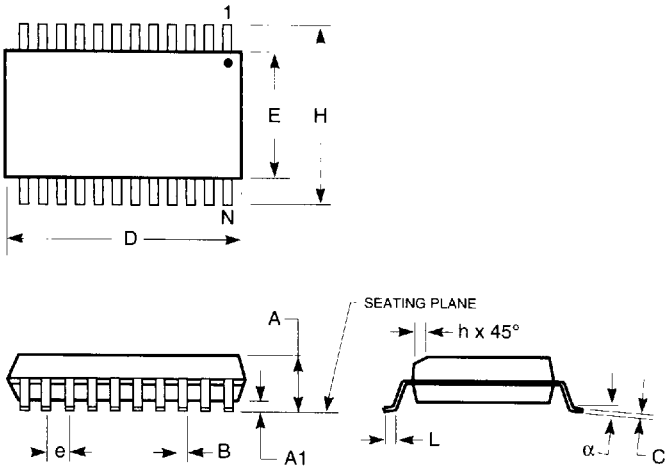




JEDEC#	MO-137AB			MO-137AD			MO-137AE			MO-137AF		
DWG#	PSS-16A			PSS-20A			PSS-24A			PSS-28A		
Symbol	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
A	0.060	0.064	0.068	0.060	0.064	0.068	0.060	0.064	0.068	0.060	0.064	0.068
A1	0.004	0.006	0.008	0.004	0.006	0.008	0.004	0.006	0.008	0.004	0.006	0.008
B	0.009	0.010	0.012	0.009	0.010	0.012	0.009	0.010	0.012	0.009	0.010	0.012
C	0.007	0.008	0.010	0.007	0.008	0.010	0.007	0.008	0.010	0.007	0.008	0.010
D	0.189	0.193	0.197	0.337	0.341	0.344	0.337	0.341	0.344	0.386	0.390	0.394
E	0.150	0.154	0.157	0.150	0.154	0.157	0.150	0.154	0.157	0.150	0.154	0.157
e	0.025 BSC			0.025 BSC			0.025 BSC			0.025 BSC		
H	0.230	0.236	0.244	0.230	0.236	0.244	0.230	0.236	0.244	0.230	0.236	0.244
h	0.010	0.013	0.016	0.010	0.013	0.016	0.010	0.013	0.016	0.010	0.013	0.016
L	0.016	0.025	0.035	0.016	0.025	0.035	0.016	0.025	0.035	0.016	0.025	0.035
N	16			20			24			28		
α	0°	5°	8°	0°	5°	8°	0°	5°	8°	0°	5°	8°
S	0.006	0.009	0.010	0.056	0.058	0.060	0.031	0.033	0.035	0.031	0.033	0.035

150-MIL SOIC - Package Code S1

Plastic Small Outline Gull-Wing

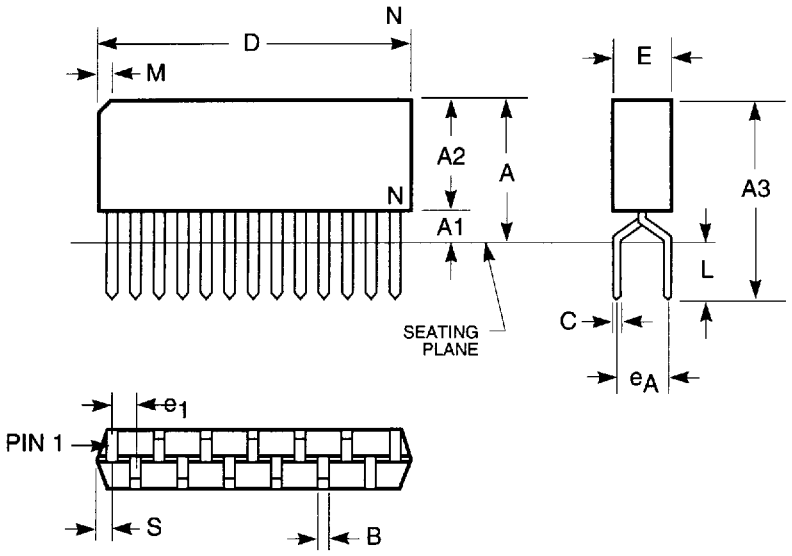


JEDEC#	MS-012AB			MS-012AC		
DWG#	PS-14B			PS-16B		
Symbol	Min	Nom	Max	Min	Nom	Max
A	0.060	0.064	0.068	0.060	0.064	0.068
A1	0.004	0.006	0.008	0.004	0.006	0.008
B	0.014	0.016	0.019	0.014	0.016	0.019
C	0.0075	0.008	0.0098	0.0075	0.008	0.0098
D	0.337	0.341	0.346	0.386	0.390	0.394
E	0.150	0.154	0.157	0.150	0.154	0.157
e	0.050 BSC			0.050 BSC		
H	0.230	0.236	0.244	0.230	0.236	0.244
h	0.010	0.013	0.016	0.010	0.013	0.016
L	0.016	0.025	0.035	0.016	0.025	0.035
N	14			16		
α	0°	5°	8°	0°	5°	8°

Notes:
1. Refer to applicable symbol list.
2. All dimensions are in inches.
3. N is the number of lead positions.
4. Dimensions D and E are to be measured at maximum material condition but do not include mold flash. Allowable mold flash is 0.006 in. per side.
5. Lead coplanarity is 0.004 in. maximum.

300-MIL ZIP - Package Code Z

Zig-zag In-line Packages



JEDEC#	MO-072AB		MO-072AC		MO-072AD	
DWG#	PZ20A		PZ24A		PZ28A	
Symbol	Min	Max	Min	Max	Min	Max
A	0.350	0.400	0.350	0.400	0.350	0.400
A1	0.030	0.070	0.030	0.070	0.032	0.055
A2	0.280	0.340	0.320	0.350	0.335	0.345
A3	0.450	0.550	0.450	0.550	0.460	0.550
B	0.015	0.024	0.015	0.024	0.015	0.024
C	0.008	0.012	0.008	0.012	0.008	0.012
D	1.008	1.030	1.200	1.250	1.409	1.424
E	0.100	0.120	0.100	0.120	0.110	0.120
e1	0.050 BSC		0.050 BSC		0.050 BSC	
eA	0.100 BSC		0.100 BSC		0.100 BSC	
L	0.100	0.150	0.100	0.150	0.110	0.150
M	0.035	0.085	0.035	0.085	0.035	0.085
N	20		24		28	
S	0.018	0.032	0.018	0.032	0.025	0.038

Notes:
1. Refer to applicable symbol list.
2. All dimensions are in inches.
3. N is the number of lead positions.
4. Dimensions D and E are to be measured at maximum material condition but do not include mold flash. Allowable mold flash is 0.010 in. per side.