SDLS007 D2635, JANUARY 1981 – REVISED MARCH 1988

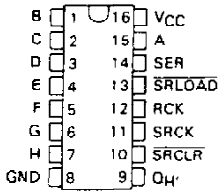
- **8-Bit Parallel Storage Register Inputs ('LS597)**
- **Parallel 3-State I/O, Storage Register Inputs, Shift Register Outputs ('LS598)**
- **Shift Register has Direct Overriding Load and Clear**
- **Accurate Shift-Frequency . . . DC to 20 MHz**

description

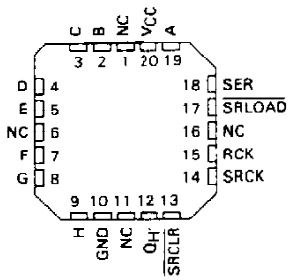
The 'LS597 comes in a 16-pin package and consists of an 8-bit storage latch feeding a parallel-in, serial-out 8-bit shift register. Both the storage register and shift register have positive-edge triggered clocks. The shift register also has direct load (from storage) and clear inputs.

The 'LS598 comes in a 20-pin package and has all the features of the 'LS597 plus 3-state I/O ports that provide parallel shift register outputs and also has multiplexed serial data inputs.

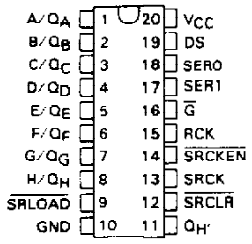
SN54LS597 . . . J OR W PACKAGE
SN74LS597 . . . N PACKAGE
(TOP VIEW)



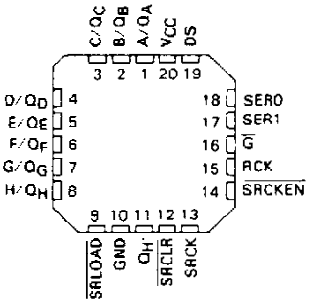
SN54LS597 . . . FK PACKAGE
(TOP VIEW)



SN54LS598 . . . J OR W PACKAGE
LS598 . . . DW OR N PACKAGE
(TOP VIEW)



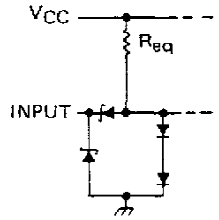
SN54LS598 . . . FK PACKAGE
(TOP VIEW)



NC - No internal connection

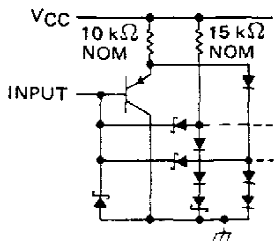
schematics of inputs and outputs

EQUIVALENT OF SERIAL AND A THRU H INPUTS

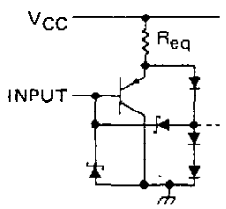


SERIAL: R_{eq} = 20 kΩ NOM
A thru H: R_{eq} = 25 kΩ NOM

EQUIVALENT OF SRCK INPUT ('LS598 ONLY)

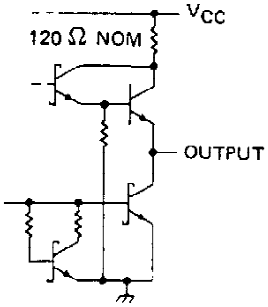


EQUIVALENT OF ALL OTHER INPUTS

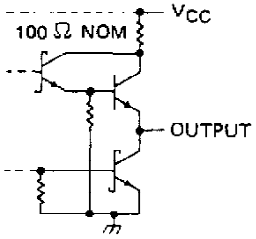


('LS597) RCK, SRCK: R_{eq} = 10 kΩ NOM
('LS598) RCK: R_{eq} = 10 kΩ NOM
ALL OTHER: R_{eq} = 13 kΩ NOM

TYPICAL OF $Q_{H'}$ OUTPUTS

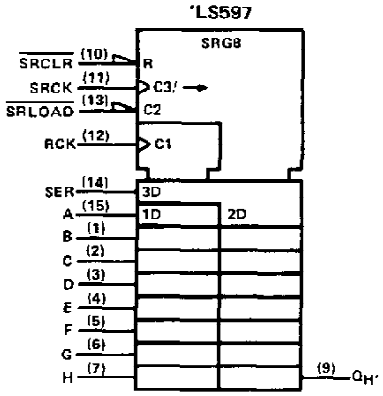


TYPICAL OF Q_A THRU Q_H OUTPUTS ('LS598 ONLY)

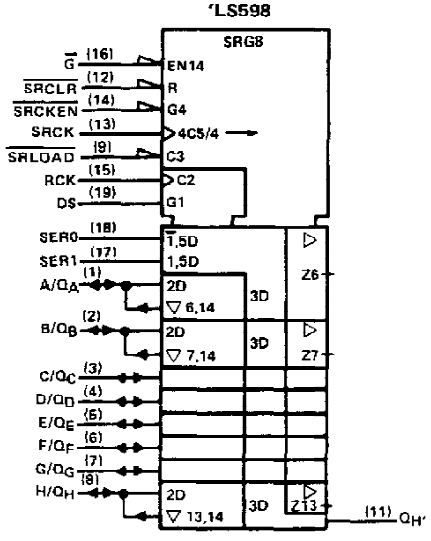


logic symbols†

'LS597

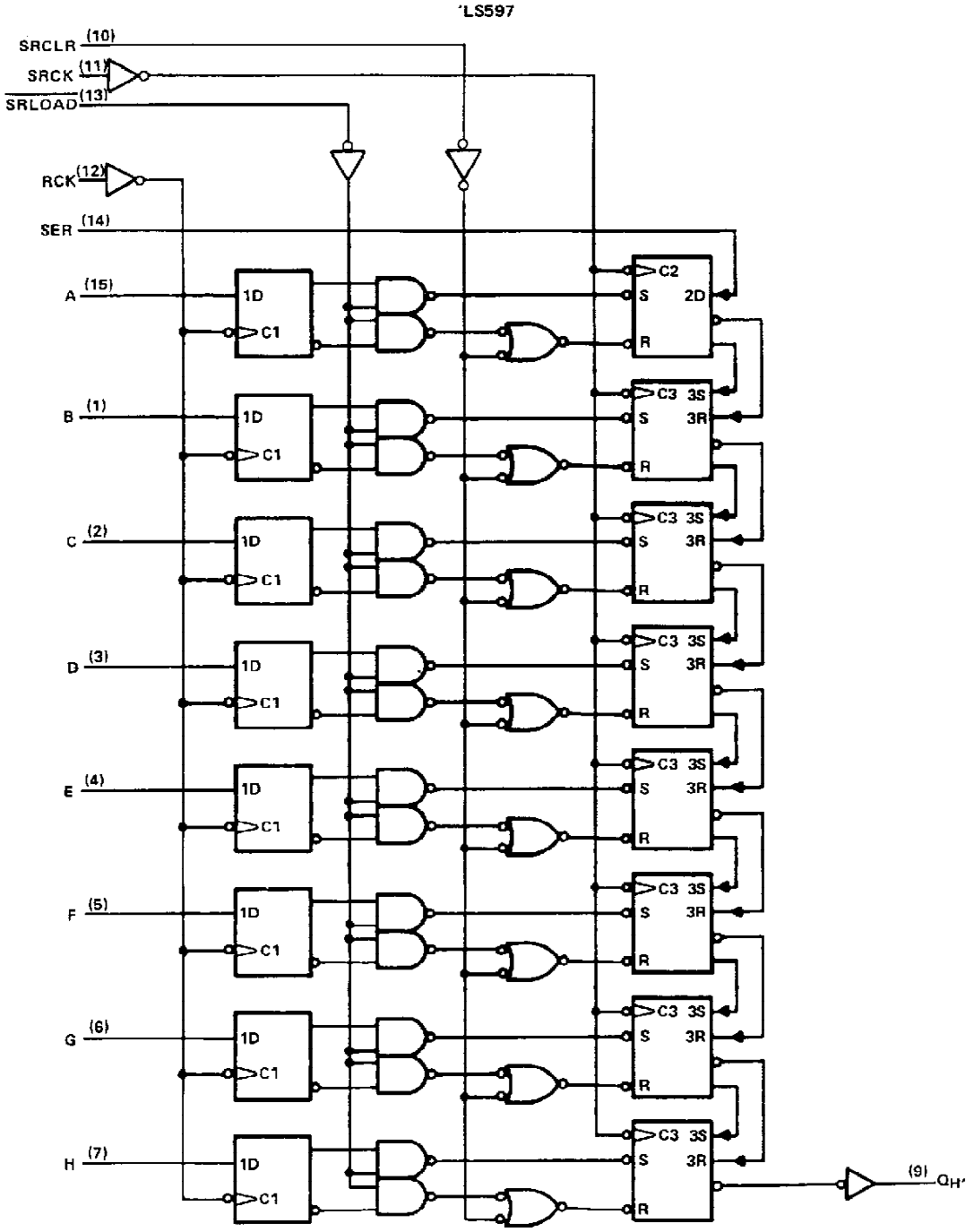


'LS598



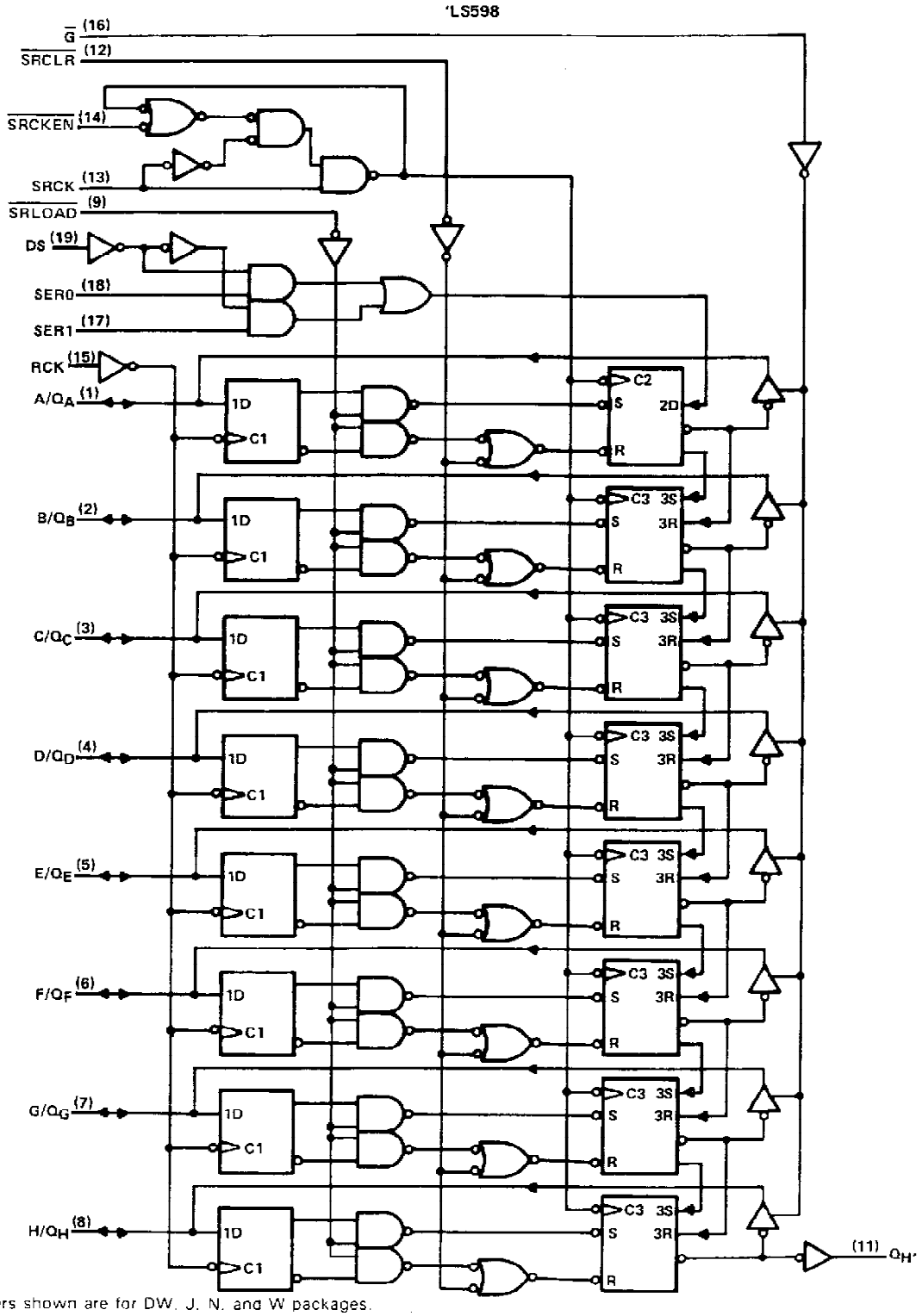
†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DW, J, N, and W packages.

logic diagram (positive logic)



Pin numbers shown are for DW, J, N, and W packages.

logic diagram (positive logic)



Pin numbers shown are for DW, J, N, and W packages.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage (excluding I/O ports) . . . . . 7 V
Off-state output voltage (including I/O ports) . . . . . 5.5 V
Operating free-air temperature range: SN54LS597, SN54LS598 . . . . . −55°C to 125°C
SN74LS597, SN74LS598 . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

NOTE 1: Voltage values are with respect to the network ground terminal.

recommended operating conditions

				SN54LS'			SN74LS'			UNIT
				MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage			4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage			2			2			V
V_{IL}	Low-level input voltage					0.7			0.8	V
I_{OH}	High-level output current	Q_H'				−1			−1	mA
		Q_A thru Q_H, 'LS598 only				−1			−2.6	
I_{OL}	Low-level output current	Q_H'				8			16	mA
		Q_A thru Q_H, 'LS598 only				12			24	
f_{SCK}	Shift clock frequency			0		20	0		20	MHz
t_w	Pulse duration	SRCK	high	15			15			ns
			low	35			35			
		RCK		20			20			
		$\overline{\text{SRCLR}}$		20			20			
		$\overline{\text{SRLOAD}}$		40			40			
t_{su}	Setup time	Data before RCK ↑		20			20			ns
		DS before SRCK ↑ ('LS598 only)		30			30			
		$\overline{\text{SRCKEN}}$ low before SRCK ↑ ('LS598 only)		20			20			
		$\overline{\text{SRCLR}}$ inactive before SRCK ↑		25			25			
		$\overline{\text{SRLOAD}}$ inactive before SRCK ↑		30			30			
		RCK ↑ before $\overline{\text{SRLOAD}}$ ↑ (see Note 2)		40			40			
		SER before SRCK ↑		20			20			
t_h	Hold time			0			0			ns
T_A	Operating free-air temperature			−55		125	0		70	°C

NOTE 2: The RCK ↑ before $\overline{\text{SRLOAD}}$ ↑ setup time ensures the data saved by RCK ↑ will also be loaded into the shift register.

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

PARAMETER			TEST CONDITIONS†			SN54LS' MIN	SN54LS' TYP‡	SN54LS' MAX	SN74LS' MIN	SN74LS' TYP‡	SN74LS' MAX	UNIT
V_{IK}			V_{CC} = MIN, I_I = −18 mA					−1.5			−1.5	V
V_{OH}	'LS598 Q		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX	I_{OH} = −1 mA		2.4	3.2					V
				I_{OH} = −2.6 mA					2.4	3.1		
	Q_H'			I_{OH} = −1 mA		2.4	3.2		2.4	3.2		
V_{OL}	'LS598 Q		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX	I_{OL} = 12 mA			0.25	0.4		0.25	0.4	V
				I_{OL} = 24 mA						0.35	0.5	
	Q_H'			I_{OL} = 8 mA			0.25	0.4		0.25	0.4	
				I_{OL} = 16 mA						0.35	0.5	
I_{OZH}	'LS598 Q		V_{CC} = MAX, V_{IH} = 2 V, V_{IL} = MAX, V_O = 2.7 V					20			20	μA
I_{OZL}	'LS598 Q		V_{CC} = MAX, V_{IH} = 2 V, V_{IL} = MAX, V_O = 0.4 V					−0.4			−0.4	mA
I_I	'LS598 Q		V_{CC} = MAX	V_I = 5.5 V				0.1			0.1	mA
	Others			V_I = 7 V				0.1			0.1	
I_{IH}			V_{CC} = MAX, V_I = 2.7 V					20			20	μA
I_{IL}	'LS598 SRCK		V_{CC} = MAX, V_I = 0.4 V					−0.8			−0.8	mA
	SER, A Thru H							−0.4			−0.4	
	Others							−0.2			−0.2	
I_{OS}§	'LS598 Q		V_{CC} = MAX, V_O = 0 V			−30		−130	−30		−130	mA
	Q_H'					−20		−100	−20		−100	
I_{CC}	'LS597	I_{CCH}	V_{CC} = MAX, All possible inputs grounded, All outputs open				35	53		35	53	mA
		I_{CCL}					35	53		35	53	
	'LS598	I_{CCH}					45	68		45	68	
		I_{CCL}					54	80		54	80	
		I_{CCZ}					56	85		56	85	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C
§ Not more than one output should be shorted at a time and the duration of the short-circuit should not exceed one second.

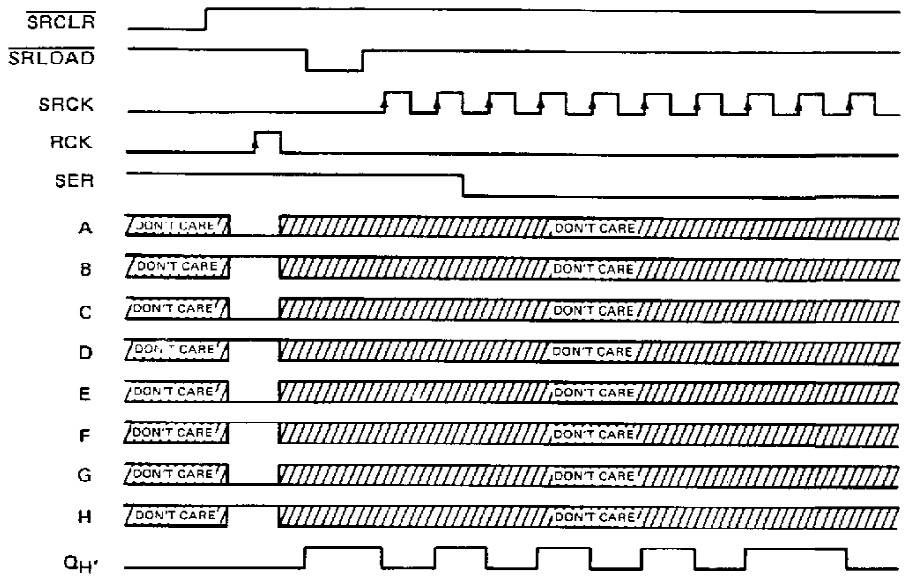
switching characteristics, V_{CC} = 5 V, T_A = 25°C, (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS597			'LS598			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
f_{max}	SRCK	Q	R_L = 667 Ω, C_L = 45 pF	20	35		20	35		MHz
f_{max}	SRCK	Q_H'	R_L = 1 kΩ, C_L = 30 pF	20	35					MHz
t_{PLH}	SRCK↑	Q_H'	R_L = 1 kΩ, C_L = 30 pF		15	23		11	17	ns
t_{PHL}	SPCK↑	Q_H'			20	30		15	23	ns
t_{PLH}	$\overline{\text{SRLOAD}}$↓	Q_H'			38	57		28	42	ns
t_{PHL}	$\overline{\text{SRLOAD}}$↓	Q_H'			29	44		20	30	ns
t_{PHL}	$\overline{\text{SRCLR}}$↓	Q_H'			24	36		18	27	ns
t_{PLH}	RCK↑	Q_H'	R_L = 1 kΩ, C_L = 30 pF		41	60		32	48	ns
t_{PHL}	RCK↑	Q_H'	SRLOAD = L		32	48		24	36	ns
t_{PLH}	SRCK↑	Q	R_L = 667 Ω, C_L = 45 pF					12	18	ns
t_{PHL}	SRCK↑	Q						19	28	ns
t_{PLH}	$\overline{\text{SRLOAD}}$↓	Q						32	48	ns
t_{PHL}	$\overline{\text{SRLOAD}}$↓	Q						27	40	ns
t_{PHL}	$\overline{\text{SRCLR}}$↓	Q						25	38	ns
t_{PZH}	G↓	Q						26	31	ns
t_{PZL}	G↓	Q						29	43	ns
t_{PHZ}	G↑	Q	R_L = 667 Ω, C_L = 5 pF					25	38	ns
t_{PLZ}	G↑	Q						20	30	ns

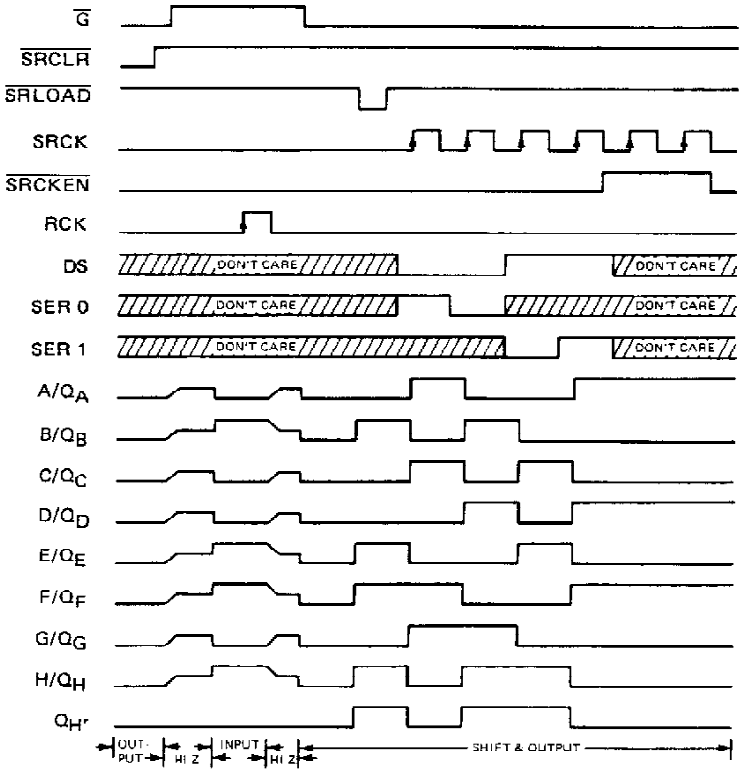
NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

typical operating sequences

'LS597



'LS598



PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/ Ball Finish	MSL Peak Temp (3)	Samples (Requires Login)
5962-89444012A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Call TI	
5962-8944401EA	ACTIVE	CDIP	J	16	1	TBD	Call TI	Call TI	
5962-8944401EA	ACTIVE	CDIP	J	16	1	TBD	Call TI	Call TI	
5962-8944401FA	ACTIVE	CFP	W	16	1	TBD	Call TI	Call TI	
5962-8944401FA	ACTIVE	CFP	W	16	1	TBD	Call TI	Call TI	
5962-89756012A	OBSOLETE	LCCC	FK	20		TBD	Call TI	Call TI	
5962-89756012A	OBSOLETE	LCCC	FK	20		TBD	Call TI	Call TI	
5962-8975601SA	OBSOLETE	CFP	W	20		TBD	Call TI	Call TI	
5962-8975601SA	OBSOLETE	CFP	W	20		TBD	Call TI	Call TI	
SN54LS597J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
SN54LS597J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
SN54LS598J	OBSOLETE	CDIP	J	20		TBD	Call TI	Call TI	
SN54LS598J	OBSOLETE	CDIP	J	20		TBD	Call TI	Call TI	
SN74LS597D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS597N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS597NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS597NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS597NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/ Ball Finish	MSL Peak Temp (3)	Samples (Requires Login)
SN74LS597NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597NSRG4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS597NSRG4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN74LS598N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS598N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS598NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN74LS598NE4	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SNJ54LS597FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54LS597FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	
SNJ54LS597J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
SNJ54LS597J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	
SNJ54LS597W	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	
SNJ54LS597W	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	
SNJ54LS598FK	OBSOLETE	LCCC	FK	20		TBD	Call TI	Call TI	
SNJ54LS598FK	OBSOLETE	LCCC	FK	20		TBD	Call TI	Call TI	
SNJ54LS598J	OBSOLETE	CDIP	J	20		TBD	Call TI	Call TI	
SNJ54LS598J	OBSOLETE	CDIP	J	20		TBD	Call TI	Call TI	
SNJ54LS598W	OBSOLETE			20		TBD	Call TI	Call TI	
SNJ54LS598W	OBSOLETE			20		TBD	Call TI	Call TI	

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

OTHER QUALIFIED VERSIONS OF SN54LS597, SN54LS598, SN74LS597, SN74LS598 :

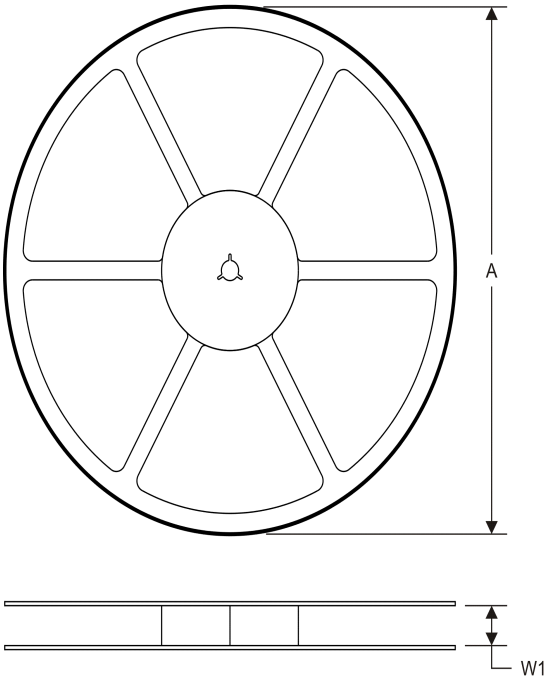
- Catalog: SN74LS597, SN74LS598
- Military: SN54LS597, SN54LS598

NOTE: Qualified Version Definitions:

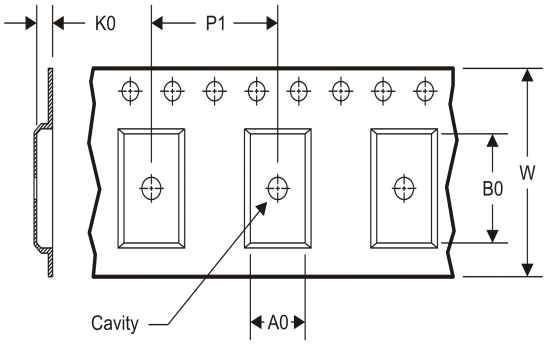
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



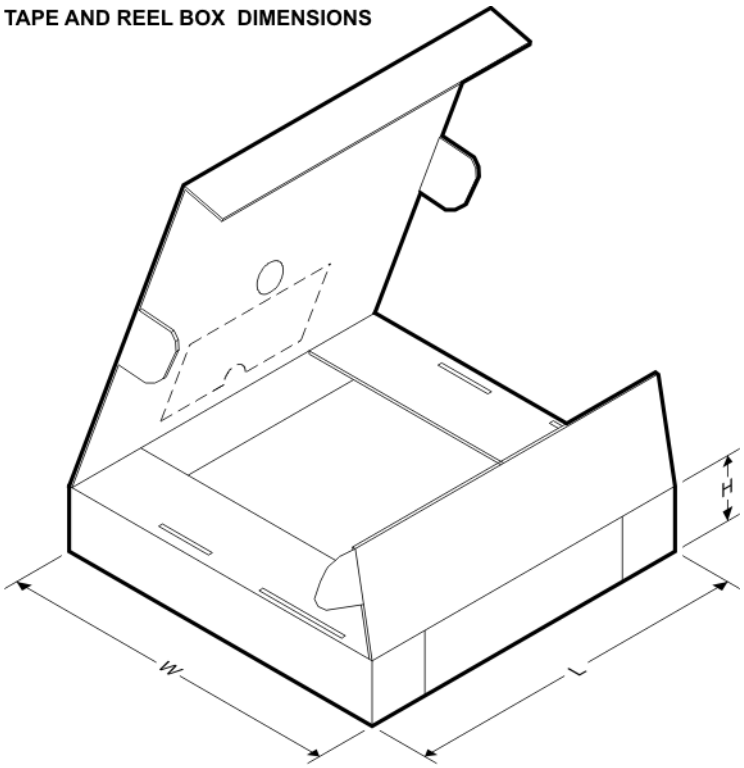
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

TAPE AND REEL INFORMATION

*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LS597NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS



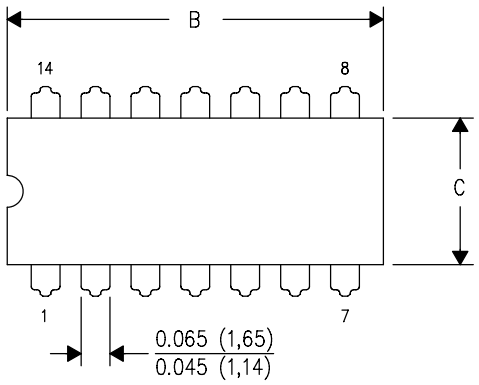
*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LS597NSR	SO	NS	16	2000	367.0	367.0	38.0

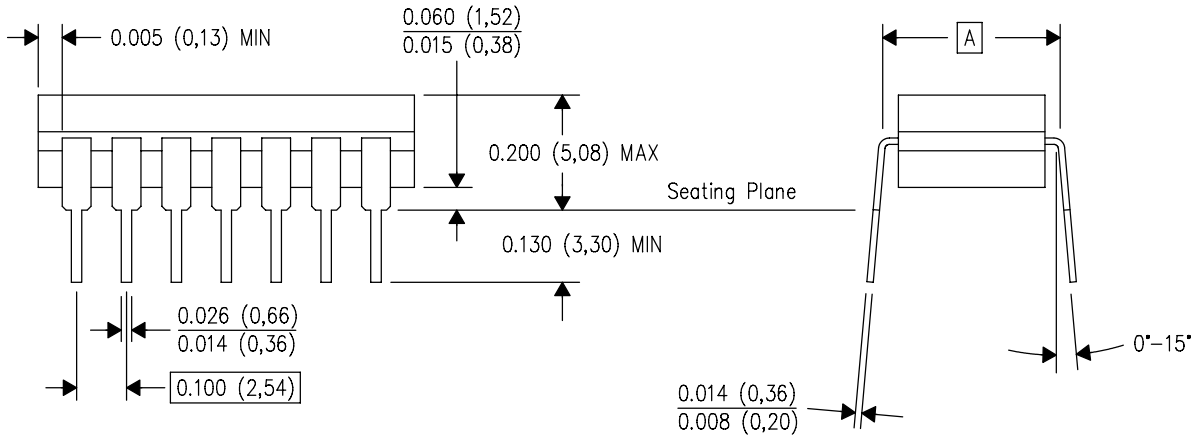
J (R–GDIP–T**)

14 LEADS SHOWN

CERAMIC DUAL IN–LINE PACKAGE



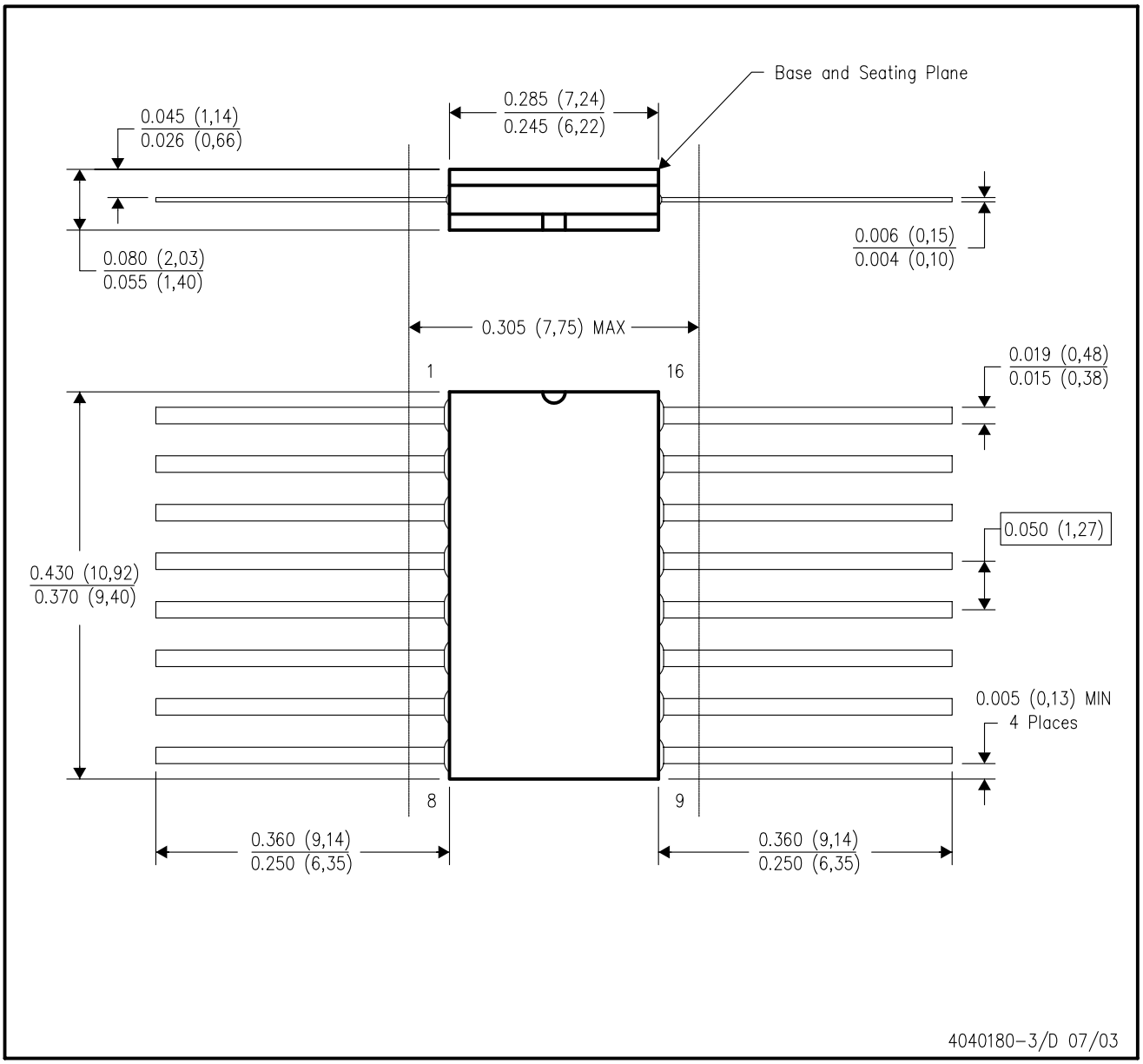
DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

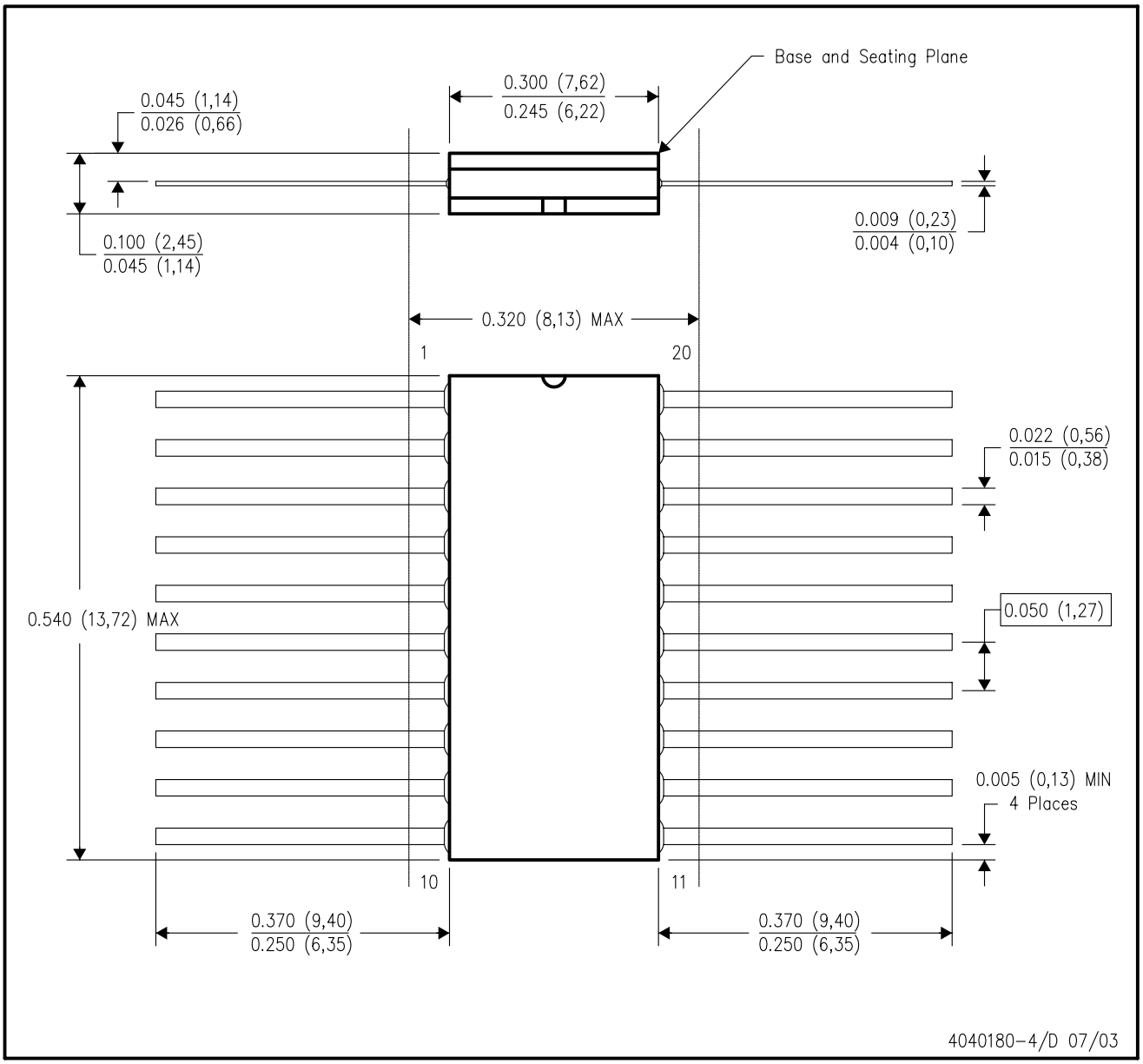
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package is hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
E. Falls within MIL STD 1835 GDIP1–T14, GDIP1–T16, GDIP1–T18 and GDIP1–T20.

W (R–GDFP–F16) CERAMIC DUAL FLATPACK



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only.
E. Falls within MIL STD 1835 GDFP1–F16 and JEDEC MO–092AC

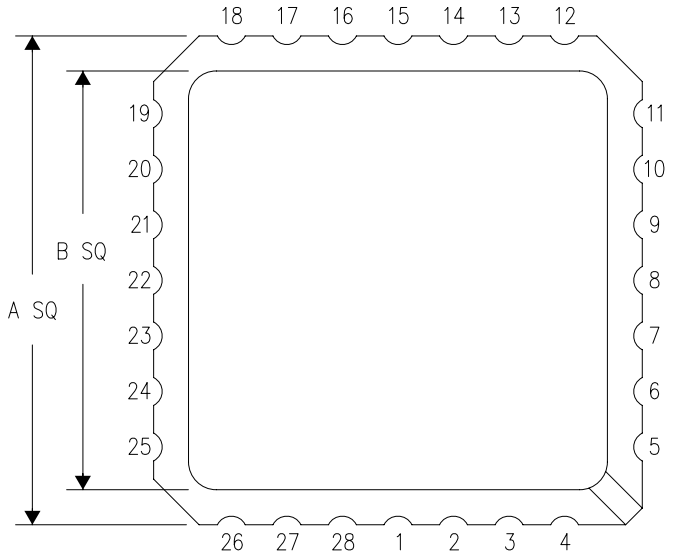
W (R–GDFP–F20) CERAMIC DUAL FLATPACK



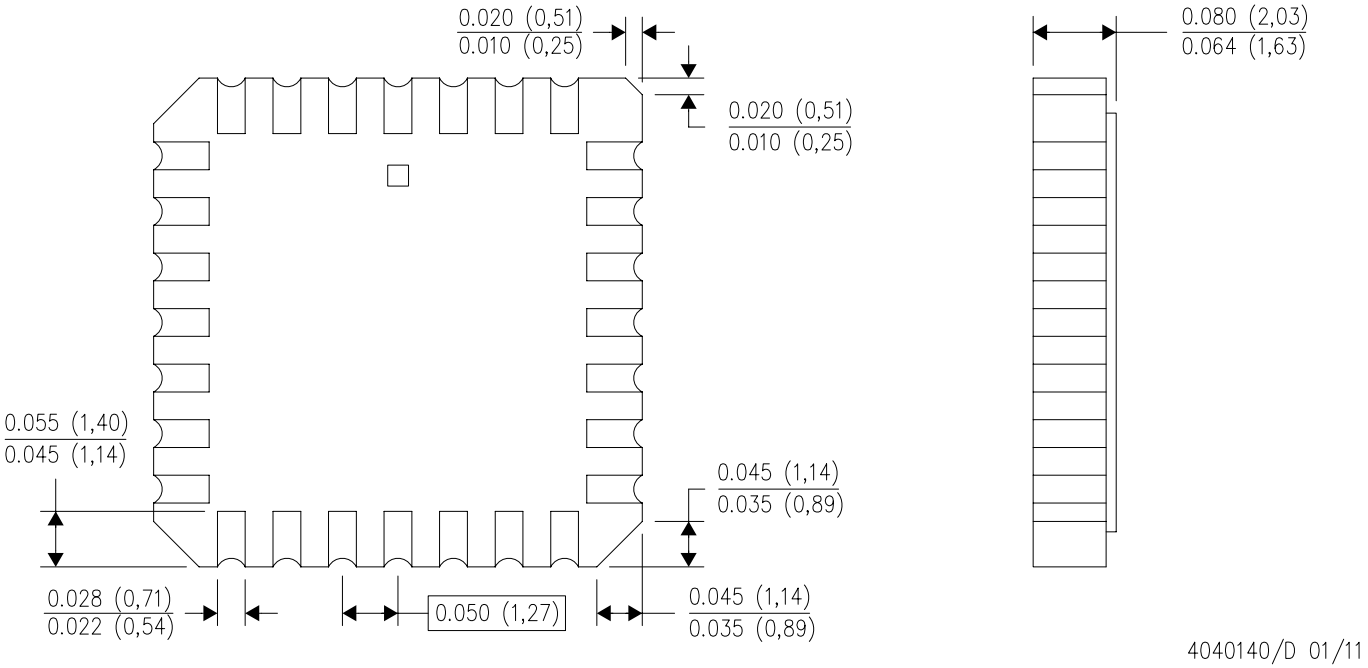
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a ceramic lid using glass frit.
D. Index point is provided on cap for terminal identification only.
E. Falls within Mil–Std 1835 GDFP2–F20

FK (S–CQCC–N**) LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



NO. OF TERMINALS **	A		B	
	MIN	MAX	MIN	MAX
20	0.342 (8,69)	0.358 (9,09)	0.307 (7,80)	0.358 (9,09)
28	0.442 (11,23)	0.458 (11,63)	0.406 (10,31)	0.458 (11,63)
44	0.640 (16,26)	0.660 (16,76)	0.495 (12,58)	0.560 (14,22)
52	0.740 (18,78)	0.761 (19,32)	0.495 (12,58)	0.560 (14,22)
68	0.938 (23,83)	0.962 (24,43)	0.850 (21,6)	0.858 (21,8)
84	1.141 (28,99)	1.165 (29,59)	1.047 (26,6)	1.063 (27,0)



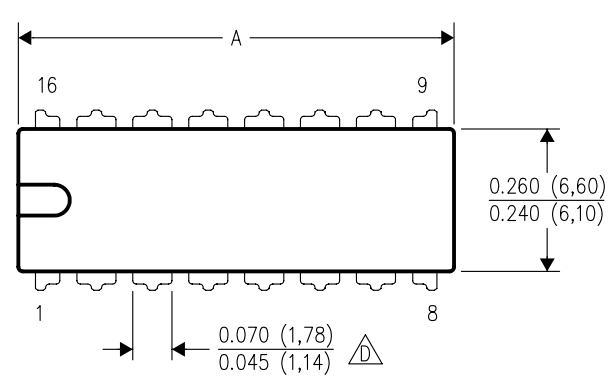
4040140/D 01/11

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. This package can be hermetically sealed with a metal lid.
D. Falls within JEDEC MS–004

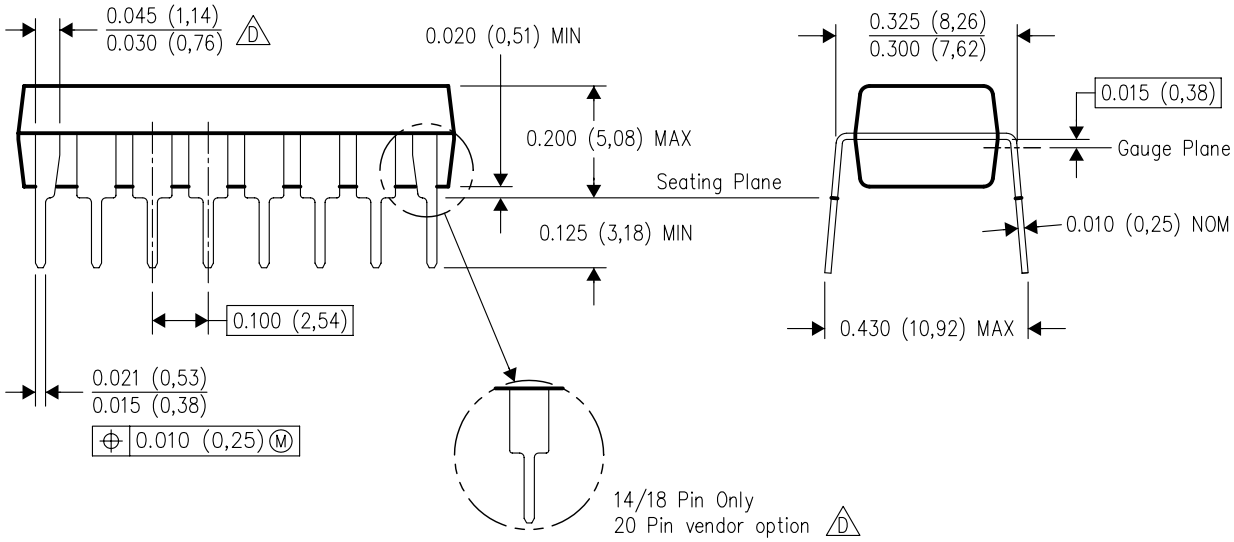
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



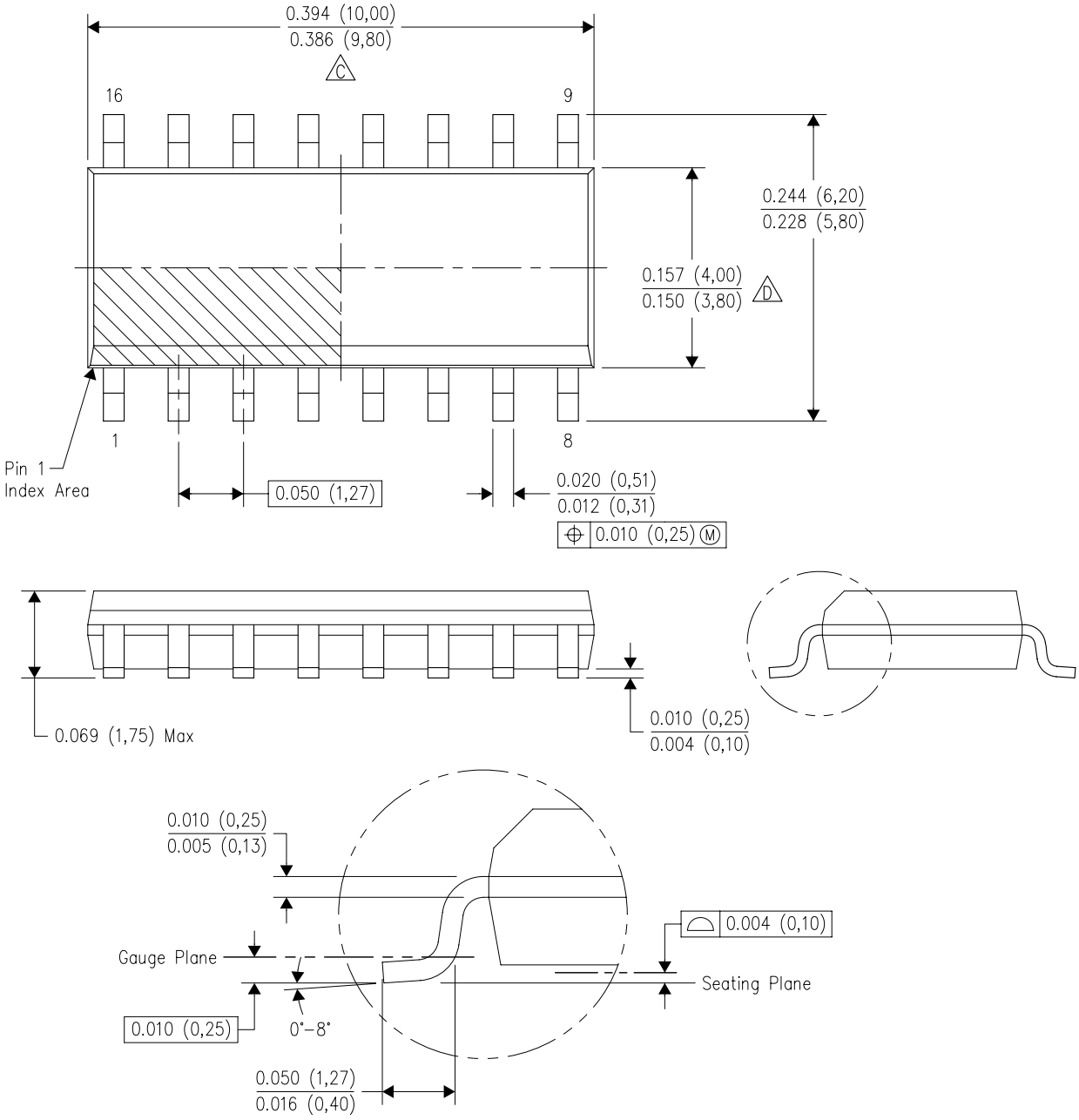
DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



4040049/E 12/2002

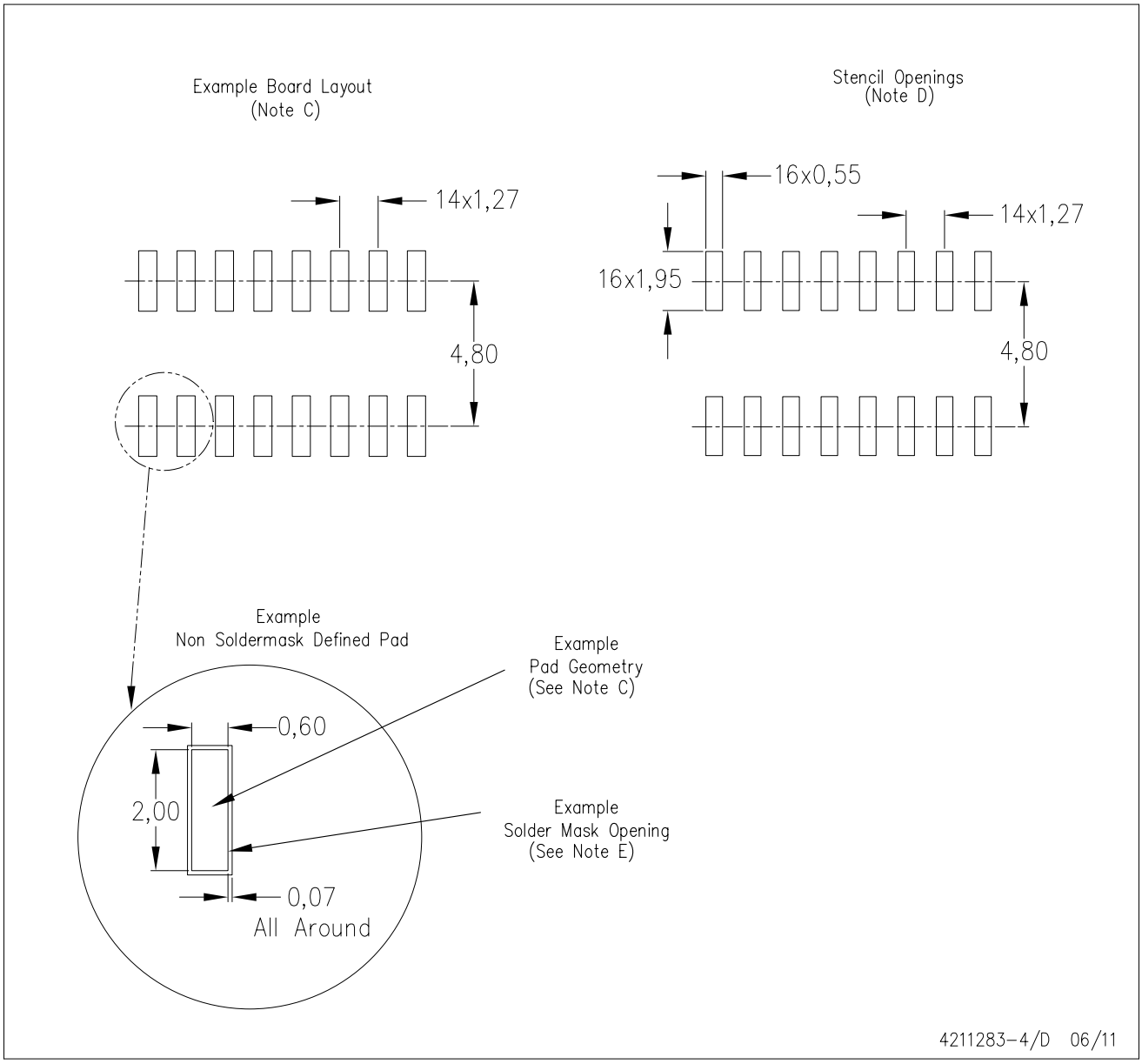
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

D (R–PDSO–G16) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
E. Reference JEDEC MS–012 variation AC.

D (R–PDSO–G16) PLASTIC SMALL OUTLINE

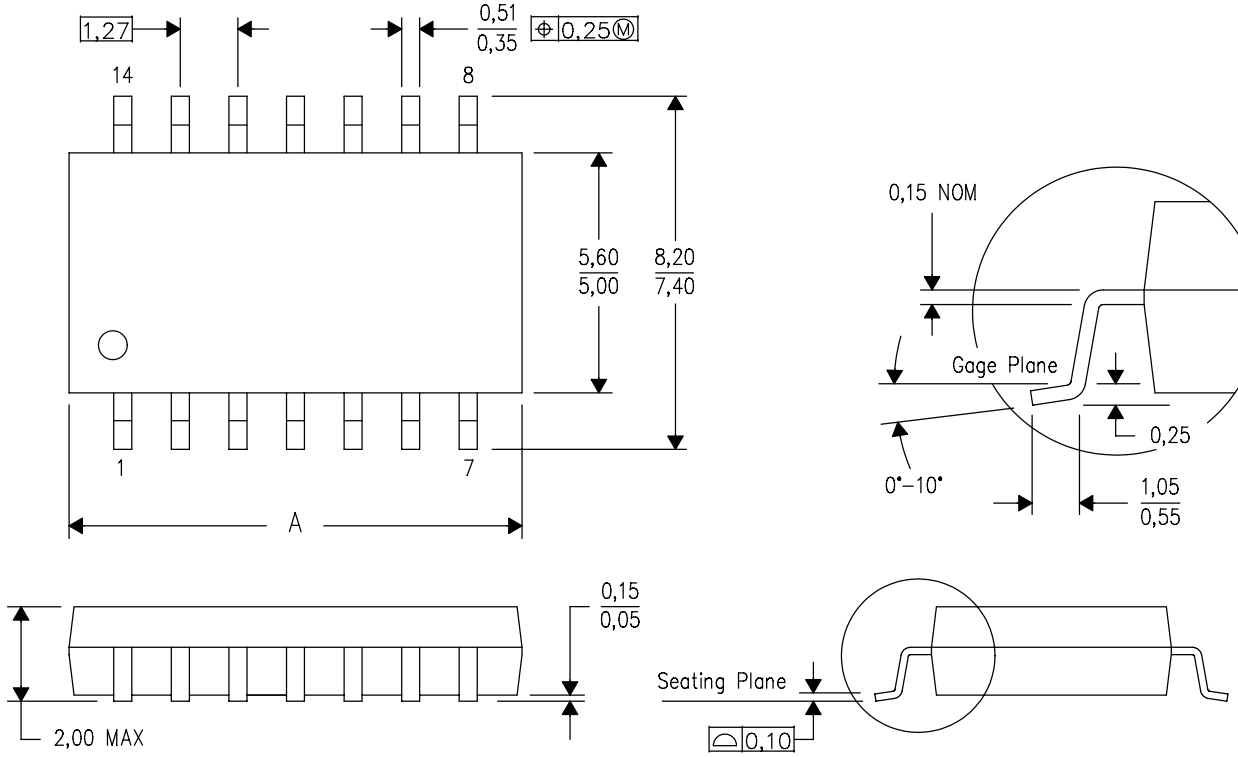


NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Publication IPC–7351 is recommended for alternate designs.
D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC–7525 for other stencil recommendations.
E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

MECHANICAL DATA

NS (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

14-PINS SHOWN



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

4040062/C 03/03

NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

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