

# SN54LS597, SN54LS598, SN74LS597, SN74LS598 8-BIT SHIFT REGISTERS WITH INPUT LATCHES

SDLS007

D2635, JANUARY 1981—REVISED MARCH 1988

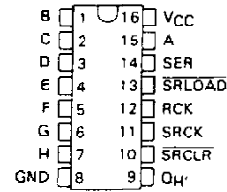
- 8-Bit Parallel Storage Register Inputs ('LS597)
- Parallel 3-State I/O, Storage Register Inputs, Shift Register Outputs ('LS598)
- Shift Register has Direct Overriding Load and Clear
- Accurate Shift-Frequency . . . DC to 20 MHz

## description

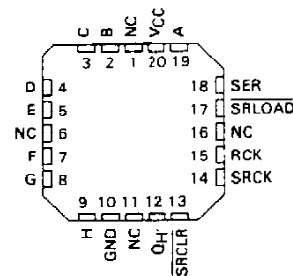
The 'LS597 comes in a 16-pin package and consists of an 8-bit storage latch feeding a parallel-in, serial-out 8-bit shift register. Both the storage register and shift register have positive-edge triggered clocks. The shift register also has direct load (from storage) and clear inputs.

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.

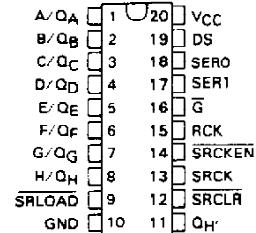
SN54LS597 . . . J OR W PACKAGE  
SN74LS597 . . . N PACKAGE  
(TOP VIEW)



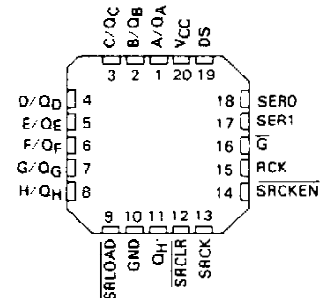
SN54LS597 . . . FK PACKAGE  
(TOP VIEW)



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



SN54LS598 . . . FK PACKAGE  
(TOP VIEW)



NC - No internal connection

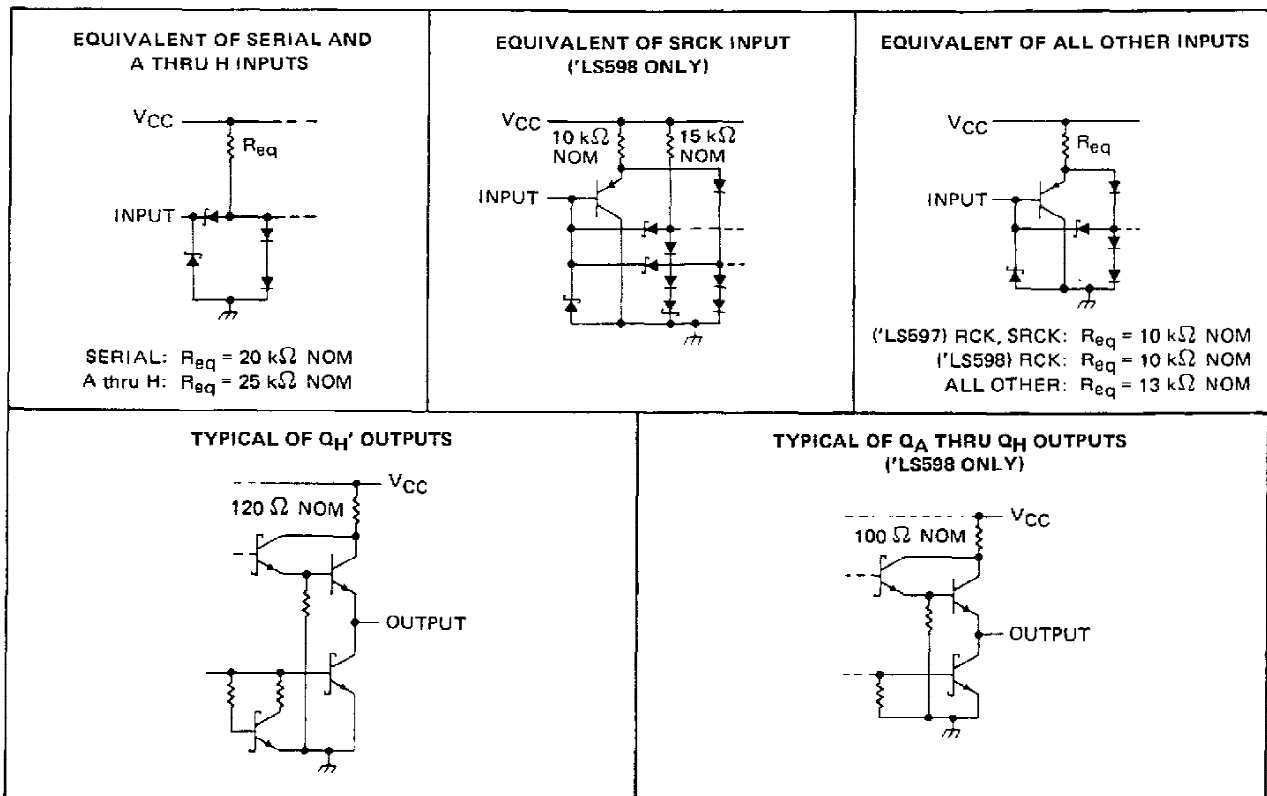
PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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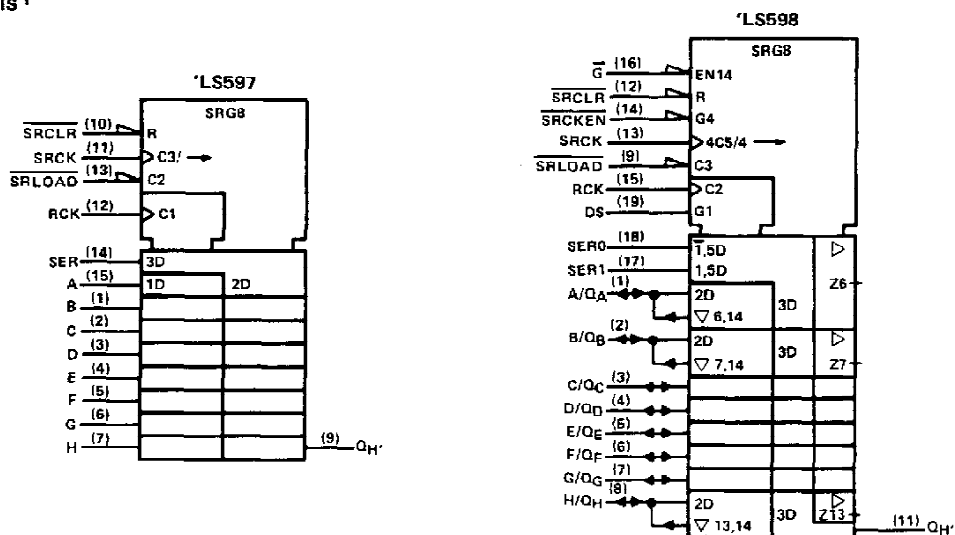
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# SN54LS597, SN54LS598, SN74LS597, SN74LS598 8-BIT SHIFT REGISTERS WITH INPUT LATCHES

schematics of inputs and outputs



logic symbols†



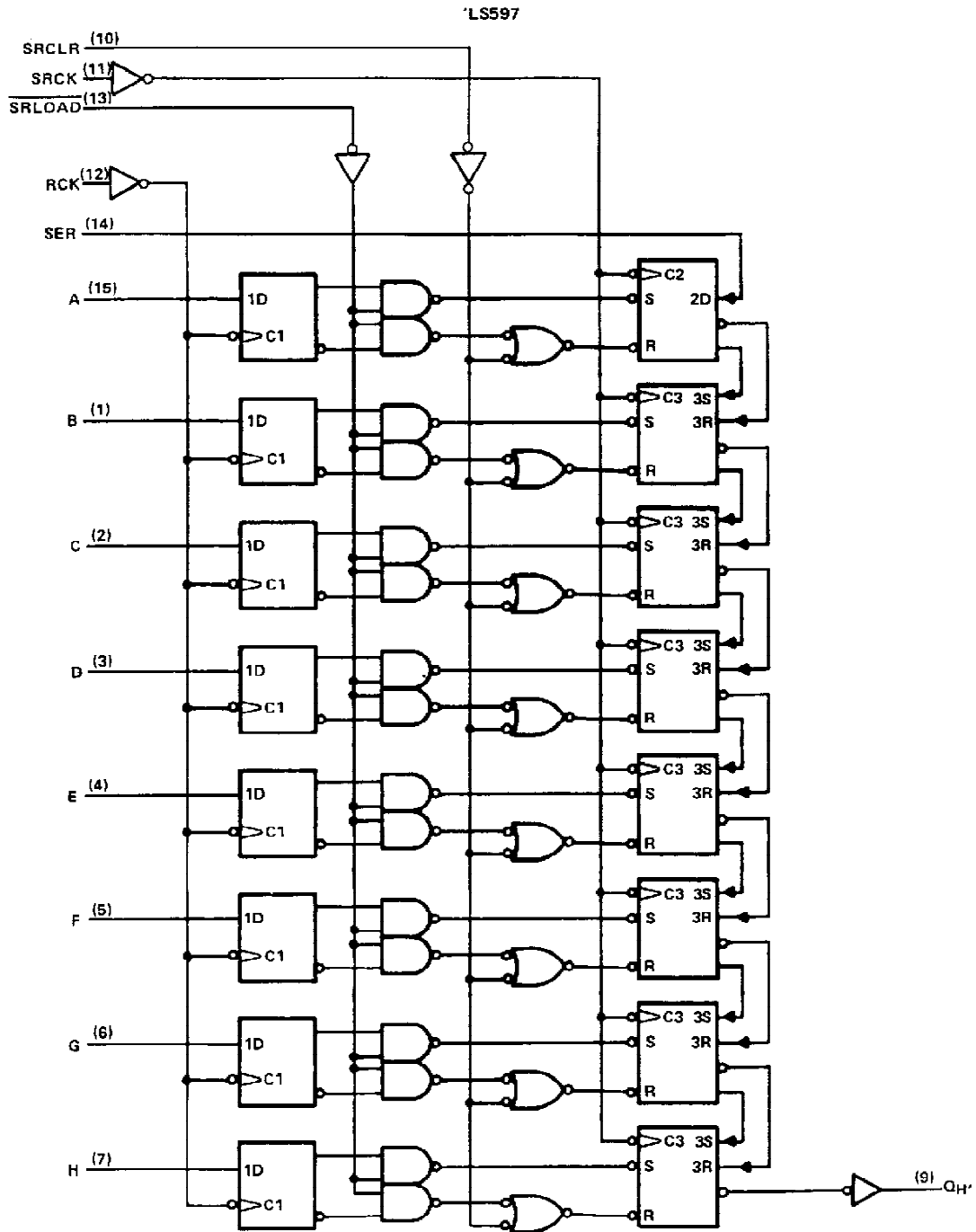
†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12. Pin numbers shown are for DW, J, N, and W packages.

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**SN54LS597, SN74LS597**  
**8-BIT SHIFT REGISTERS WITH INPUT LATCHES**

logic diagram (positive logic)



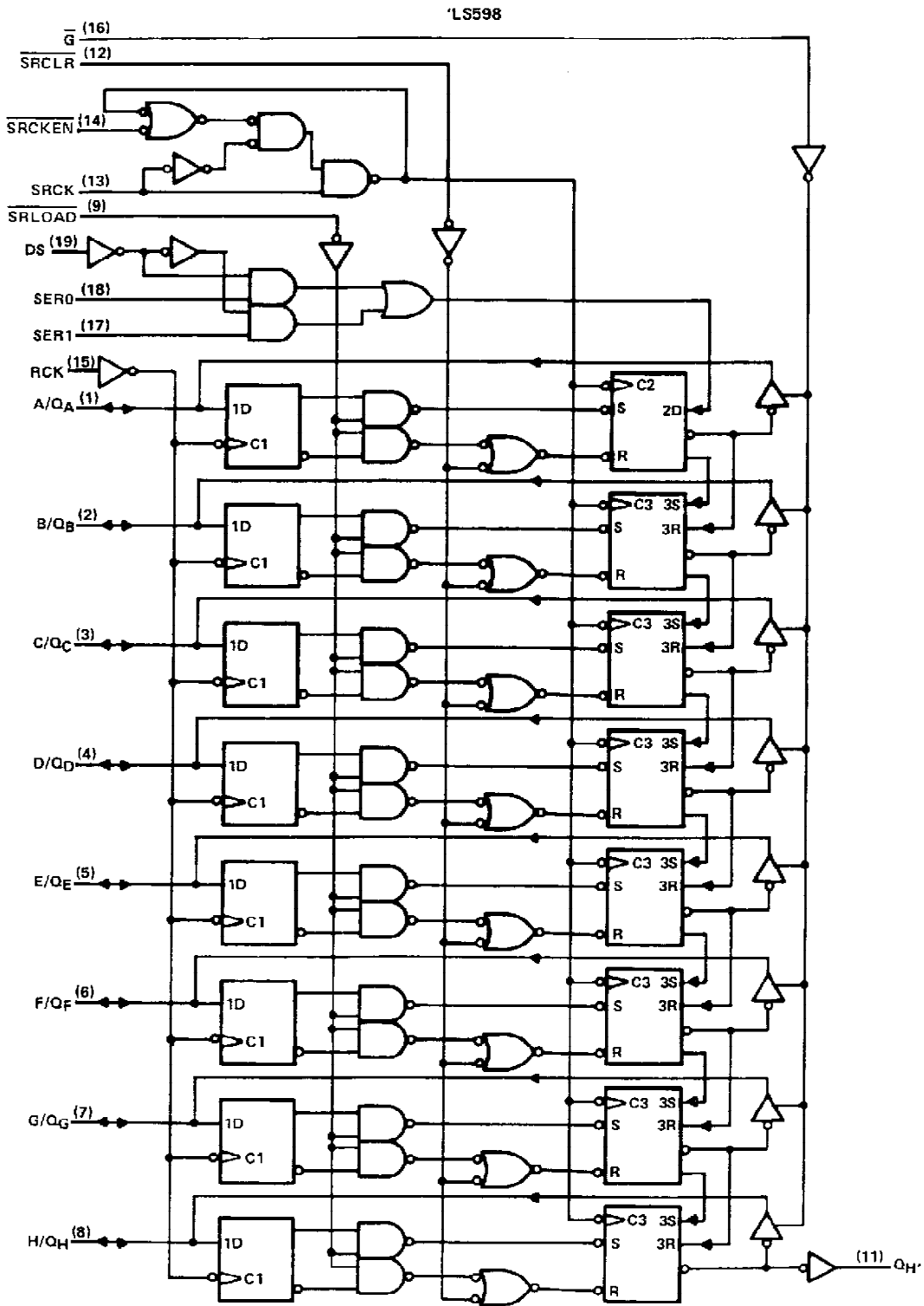
Pin numbers shown are for DW, J, N, and W packages.

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# SN54LS598, SN74LS598 8-BIT SHIFT REGISTERS WITH INPUT LATCHES

logic diagram (positive logic)



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

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# SN54LS597, SN54LS598, SN74LS597, SN74LS598 8-BIT SHIFT REGISTERS WITH INPUT LATCHES

## 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			
		SRCLR		20	20			
		SRLOAD		40	40			
$t_{su}$	Setup time	Data before RCK ↑		20	20		ns	
		DS before SRCK ↑ ('LS598 only)		30	30			
		SRCKEN low before SRCK ↑ ('LS598 only)		20	20			
		SRCLR inactive before SRCK ↑		25	25			
		SRLOAD inactive before SRCK ↑		30	30			
		RCK ↑ before SRLOAD ↑ (see Note 2)		40	40			
		SER before SRCK ↑		20	20			
$t_h$	Hold time	0		0	0		ns	
$T_A$	Operating free-air temperature	- 55		125	0		70	°C

NOTE 2: The RCK ↑ before SRLOAD ↑ setup time ensures the data saved by RCK ↑ will also be loaded into the shift register.



**SN54LS597, SN54LS598, SN74LS597, SN74LS598**  
**8-BIT SHIFT REGISTERS WITH INPUT LATCHES**

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

PARAMETER	TEST CONDITIONS†	SN54LS*		SN74LS*		UNIT		
		MIN	TYP‡	MAX	MIN		TYP‡	MAX
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA			-1.5		-1.5	V	
V <sub>OH</sub>	'LS598 Q Q <sub>H</sub> '	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX	I <sub>OH</sub> = -1 mA	2.4	3.2			
			I <sub>OH</sub> = -2.6 mA			2.4	3.1	
V <sub>OL</sub>	'LS598 Q Q <sub>H</sub> '	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX	I <sub>OL</sub> = 12 mA		0.25	0.4	0.25	0.4
			I <sub>OL</sub> = 24 mA				0.35	0.5
			I <sub>OL</sub> = 8 mA		0.25	0.4	0.25	0.4
			I <sub>OL</sub> = 16 mA				0.35	0.5
I <sub>OZH</sub>	'LS598 Q	V <sub>CC</sub> = MAX, V <sub>O</sub> = 2.7 V	V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX,			20	20	μA
I <sub>OZL</sub>	'LS598 Q	V <sub>CC</sub> = MAX, V <sub>O</sub> = 0.4 V	V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX,			-0.4	-0.4	mA
I <sub>I</sub>	'LS598 Q	V <sub>CC</sub> = MAX	V <sub>I</sub> = 5.5 V			0.1	0.1	mA
	Others		V <sub>I</sub> = 7 V			0.1	0.1	
I <sub>IH</sub>		V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V				20	20	μA
I <sub>IL</sub>	'LS598 SRCK	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V				-0.8	-0.8	mA
	SER, A Thru H					-0.4	-0.4	
	Others					-0.2	-0.2	
I <sub>OS</sub> §	'LS598 Q	V <sub>CC</sub> = MAX, V <sub>O</sub> = 0 V				-30	-130	mA
	Q <sub>H</sub> '					-20	-100	
I <sub>CC</sub>	'LS597	V <sub>CC</sub> = MAX, All possible inputs grounded, All outputs open	I <sub>CC</sub> H	35	53	35	53	mA
			I <sub>CC</sub> L	35	53	35	53	
	'LS598		I <sub>CC</sub> H	45	68	45	68	
			I <sub>CC</sub> L	54	80	54	80	
			I <sub>CC</sub> Z	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<sub>CC</sub> = 5 V, T<sub>A</sub> = 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.

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**8-BIT SHIFT REGISTERS WITH INPUT LATCHES**

switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ . (see note 3)

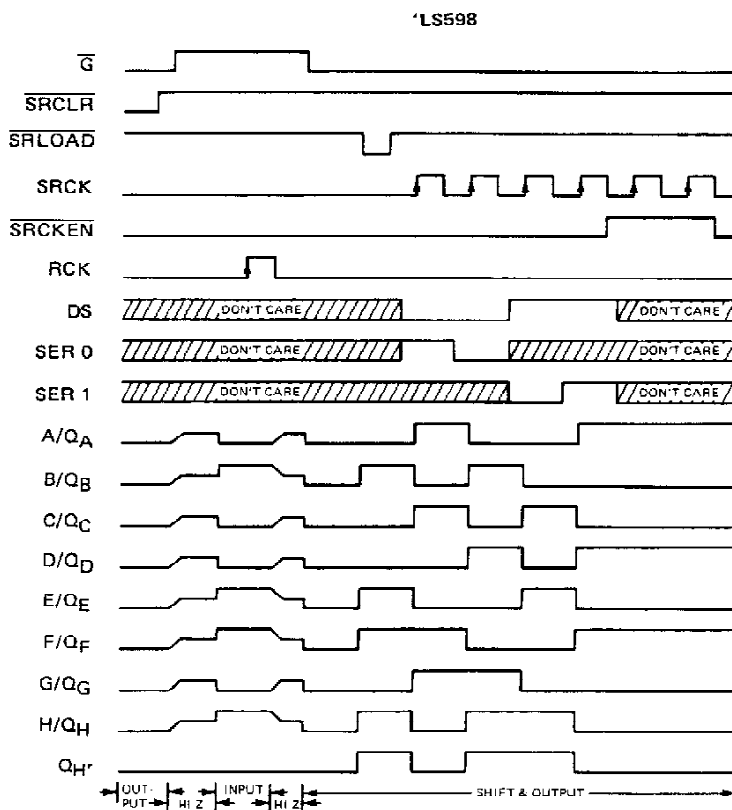
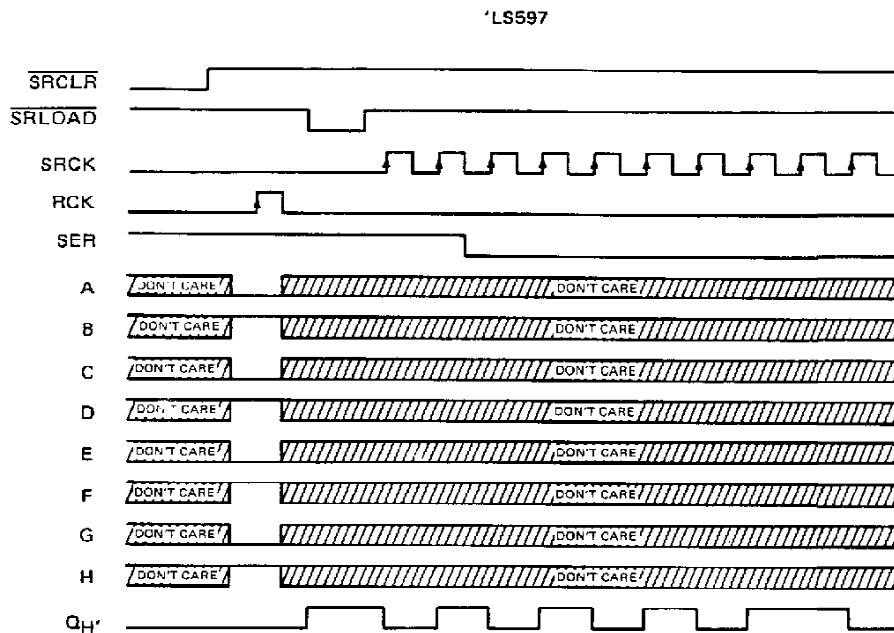
PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	LS597			LS598			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
$f_{max}$	SRCK	Q	$R_L = 667\ \Omega$ , $C_L = 45\ \mu\text{F}$	20	35		20	35		MHz
$f_{max}$	SRCK	$Q_H'$	$R_L = 1\ \text{k}\Omega$ , $C_L = 30\ \text{pF}$	20	35					MHz
$t_{PLH}$	SRCK $\uparrow$	$Q_H'$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

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



# SN54LS597, SN54LS598, SN74LS597, SN74LS598 8-BIT SHIFT REGISTERS WITH INPUT LATCHES

typical operating sequences



  
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**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	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 <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	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	

<sup>(1)</sup> 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.

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<sup>(2)</sup> 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)

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

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

● Catalog: [SN74LS597](#), [SN74LS598](#)

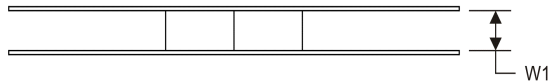
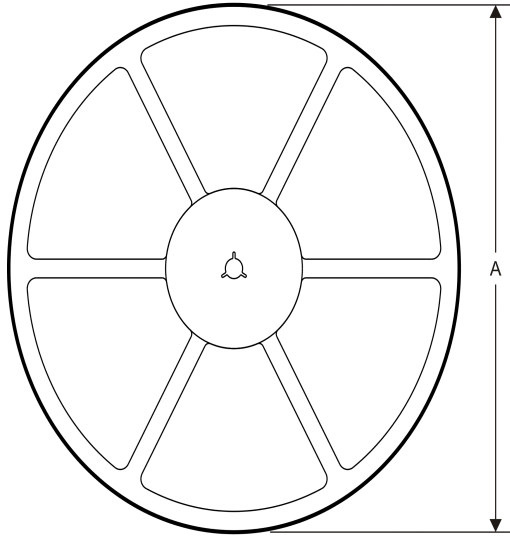
● Military: [SN54LS597](#), [SN54LS598](#)

NOTE: Qualified Version Definitions:

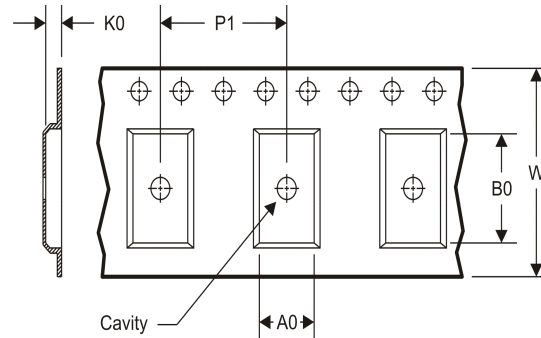
- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

**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



W (R-GDFP-F16)

CERAMIC DUAL FLATPACK



4040180-3/D 07/03

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

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



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

D (R-PDSO-G16)

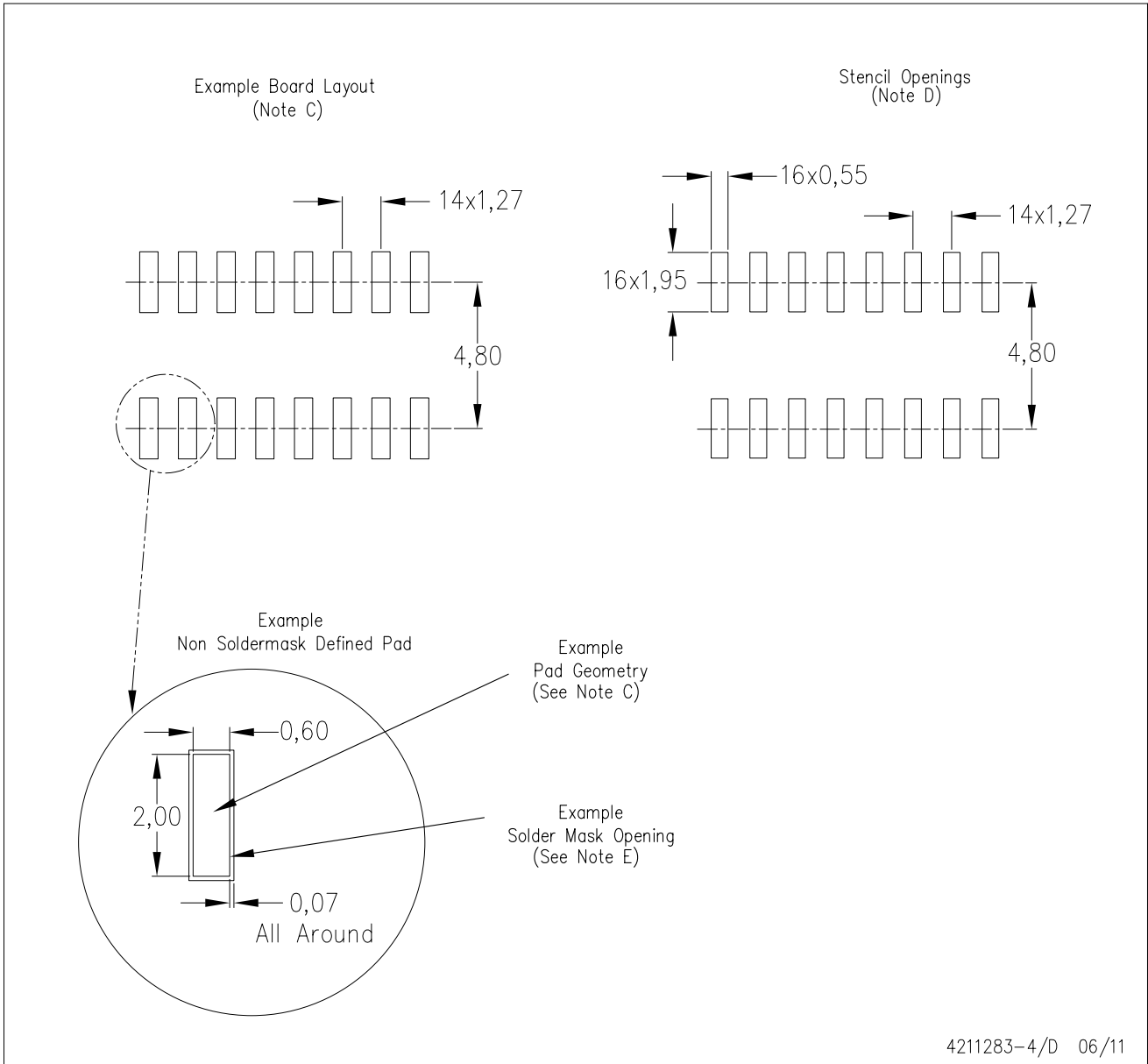
PLASTIC SMALL OUTLINE



- 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



- 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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