

SN54LS595, SN54LS596, SN74LS595, SN74LS596 8-BIT SHIFT REGISTERS WITH OUTPUT LATCHES

SDLS006

D2634, JANUARY 1981 (REVISED MARCH 1988)

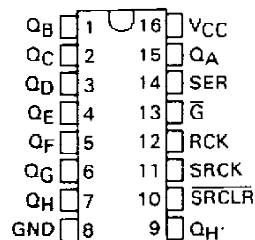
- 8-Bit Serial-In, Parallel-Out Shift Registers with Storage
- Choice of 3-State ('LS595) or Open-Collector ('LS596) Parallel Outputs
- Shift Register Has Direct Clear
- Accurate Shift Frequency: DC to 20 MHz

description

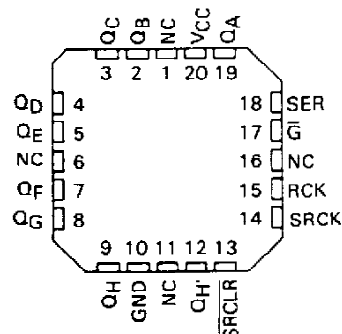
These devices each contain an 8-bit serial-in, parallel-out shift register that feeds an 8-bit D-type storage register. The storage register has parallel 3-state ('LS595) or open-collector ('LS596) outputs. Separate clocks are provided for both the shift register and the storage register. The shift register has a direct-overriding clear, serial input, and serial output pins for cascading.

Both the shift register and storage register clocks are positive-edge triggered. If the user wishes to connect both clocks together, the shift register state will always be one clock pulse ahead of the storage register.

SN54LS595, SN54LS596 . . . J OR W PACKAGE
SN74LS595, SN74LS596 . . . N PACKAGE
(TOP VIEW)

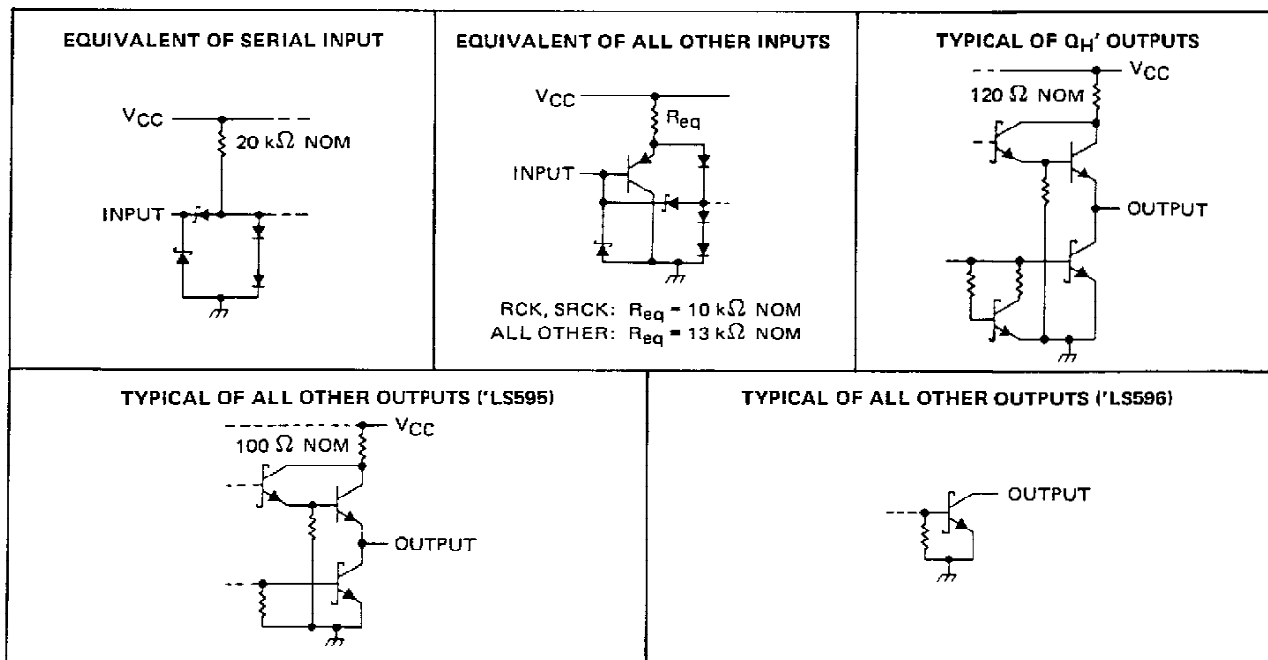


SN54LS595, SN54LS596 . . . FK PACKAGE
(TOP VIEW)



NC - No internal connection

schematics of inputs and outputs



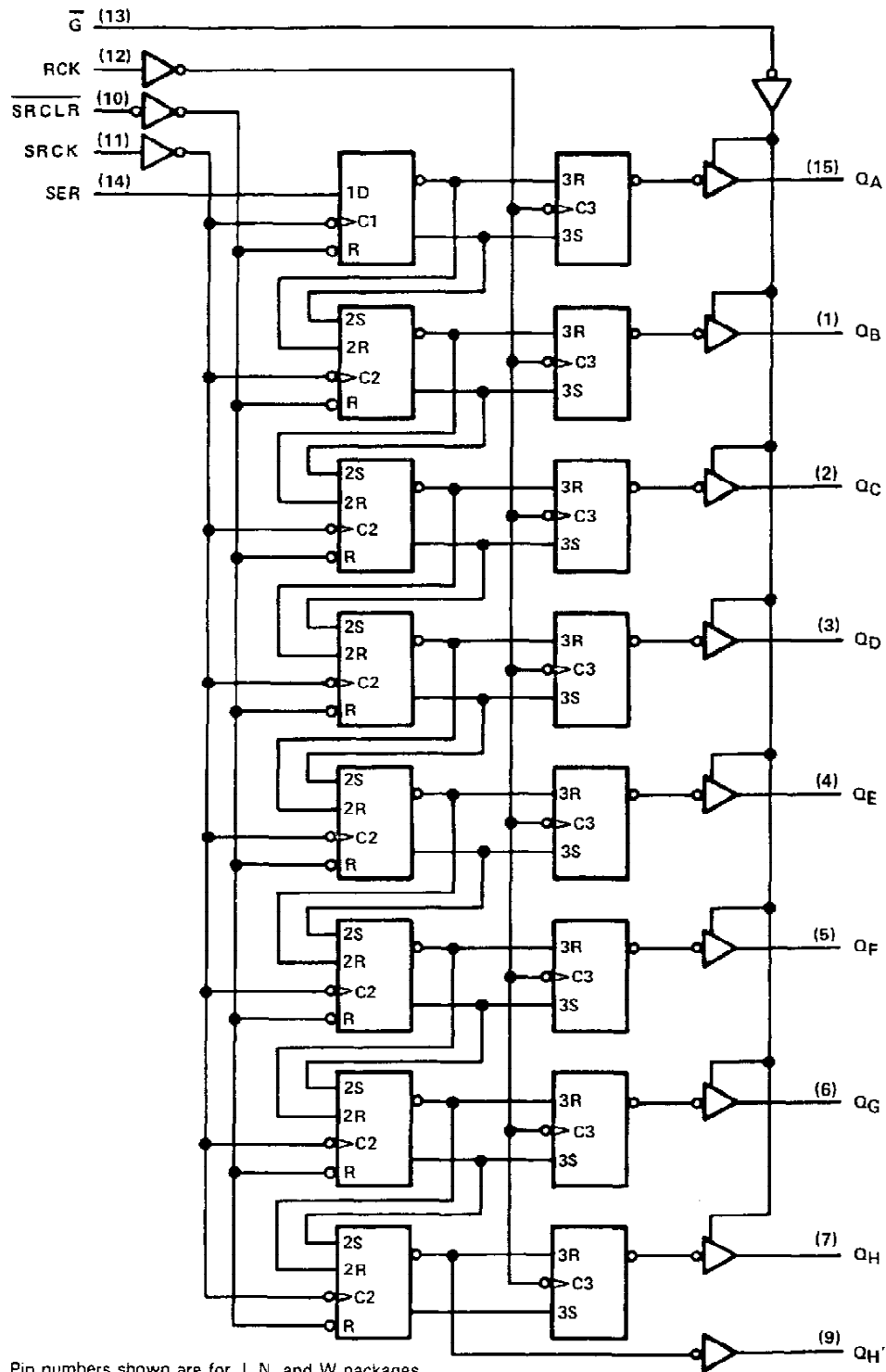
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SN54LS595, SN54LS596, SN74LS595, SN74LS596 **8-BIT SHIFT REGISTERS WITH OUTPUT LATCHES**

logic diagram (positive logic)



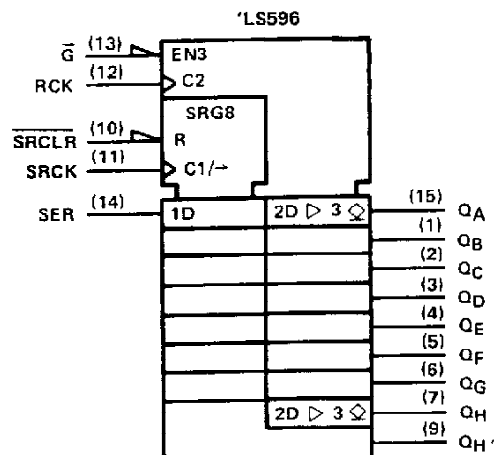
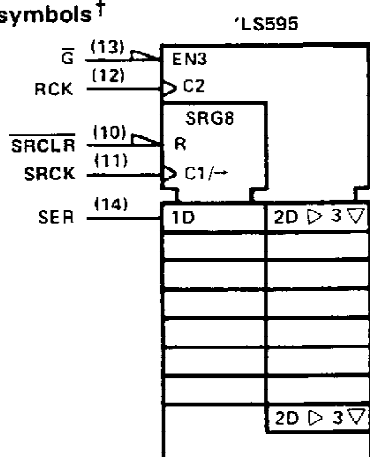
Pin numbers shown are for J, N, and W packages.

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SN54LS595, SN54LS596, SN74LS595, SN74LS596 8-BIT SHIFT REGISTERS WITH OUTPUT LATCHES

logic symbols†



†These symbols are in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.
Pin numbers shown are for 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	7 V
Off-state output voltage	5.5 V
Operating free-air temperature range: SN54LS595, SN54LS596	–55°C to 125°C
SN74LS595, SN74LS596	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
V_{OH}	High-level output voltage	Q_A thru Q_H , 'LS596 only		5.5			5.5	V
I_{OH}	High-level output current	Q_H'		–1			–1	mA
		Q_A thru Q_H , 'LS595 only		–1			–2.6	
I_{OL}	Low-level output current	Q_H'		8			16	mA
		Q		12			24	
f_{SRCK}	Shift clock frequency	0		20	0		20	MHz
$t_w(SRCK)$	Duration of shift clock pulse	25			25			ns
$t_w(RCK)$	Duration of register clock pulse	20			20			ns
$t_w(SRCLR)$	Duration of shift clear pulse, low level	20			20			ns
t_{su}	Setup time	SRCLR inactive before SRCK ↑		20				ns
		SER before SRCK ↑		20				
		SRCK ↑ before RCK ↑ (see Note 2)		40				
		SRCLR low before RCK ↑		40				
t_h	Hold time	SER after SRCK ↑		0			0	ns
T_A	Operating free-air temperature	–55		125	0		70	°C

NOTE 2: This setup time ensures the register will see stable data from the shift-register outputs. The clocks may be connected together, in which case the storage register state will be one clock pulse behind the shift register.

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SN54LS595, SN54LS596, SN74LS595, SN74LS596
8-BIT SHIFT REGISTERS WITH OUTPUT 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 _{IK}		V _{CC} = MIN, I _I = - 18 mA			- 1.5		- 1.5	V	
V _{OH}	'LS595 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
I _{OH}	'LS596 Q	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX, V _{OH} = 5.5 V			0.1		0.1	mA	
V _{OL}	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	
			I _{OL} = 8 mA		0.25	0.4	0.25	0.4	
	Q _H '		I _{OL} = 16 mA				0.35	0.5	
I _{OZH}	'LS595 Q	V _{CC} = MAX, V _{IH} = 2 V, V _{IL} = MAX, V _{OH} = 2.7 V			20		20	μA	
I _{OZL}	'LS595 Q	V _{CC} = MAX, V _{IH} = 2 V, V _{IL} = MAX, V _{OH} = 0.4 V			- 20		- 20	μA	
I _I		V _{CC} = MAX, V _I = 7 V			0.1		0.1	mA	
I _{IH}		V _{CC} = MAX, V _I = 2.7 V			20		20	μA	
I _{IL}	SER	V _{CC} = MAX, V _I = 0.4 V			- 0.4		- 0.4	mA	
	All others				- 0.2		- 0.2		
I _{OS} §	'LS595 Q	V _{CC} = MAX, V _O = 0 V	- 30		- 130	- 30		- 130	mA
	Q _H '		- 20		- 100	- 20		- 100	
I _{CCH}	'LS595	V _{CC} = MAX, All possible inputs grounded, All outputs open	33		50	33		50	mA
	'LS596		30		45	30		45	
I _{CCL}	'LS595		42		65	42		65	mA
	'LS596		36		55	36		55	
I _{CCZ}	'LS595		44		65	44		65	mA

† 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 duration of the short-circuit should not exceed one second.

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SN54LS595, SN54LS596, SN74LS595, SN74LS596 **8-BIT SHIFT REGISTERS WITH OUTPUT LATCHES**

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS595			'LS596			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
t_{PLH}	SRCK \uparrow	Q_H'	$R_L = 1\text{ k}\Omega$, $C_L = 30\text{ pF}$		12	18		14	21	ns
t_{PHL}					17	25		20	30	ns
t_{PLH}	RCK \uparrow	Q_A thru Q_H	$R_L = 667\ \Omega$, $C_L = 45\text{ pF}$		12	18		28	42	ns
t_{PHL}					24	35		24	35	ns
t_{PZH}	$\overline{G} \downarrow$	Q_A thru Q_H			20	30				ns
t_{PZL}					25	38				ns
t_{PHZ}	$\overline{G} \uparrow$	Q_A thru Q_H	$R_L = 667\ \Omega$, $C_L = 5\text{ pF}$		20	30				ns
t_{PLZ}					25	38				ns
t_{PLH}	$\overline{G} \uparrow$	Q_A thru Q_H	$R_L = 667\ \Omega$, $C_L = 45\text{ pF}$					40	60	ns
t_{PHL}	$\overline{G} \downarrow$	Q_A thru Q_H						25	38	ns
t_{PHL}	SRCLR \downarrow	Q_H'	$R_L = 1\text{ k}\Omega$, $C_L = 30\text{ pF}$		24	35		24	35	ns

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

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PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
5962-8671701EA	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701EA SNJ54LS595J
5962-8671701FA	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701FA SNJ54LS595W
5962-8671701FA	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701FA SNJ54LS595W
SN54LS595J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54LS595J
SN54LS595J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54LS595J
SN54LS595J.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54LS595J
SN54LS595J.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	SN54LS595J
SN74LS595D	Obsolete	Production	SOIC (D) 16	-	-	Call TI	Call TI	0 to 70	LS595
SN74LS595D	Obsolete	Production	SOIC (D) 16	-	-	Call TI	Call TI	0 to 70	LS595
SN74LS595DR	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS595
SN74LS595DR	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS595
SN74LS595DR.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS595
SN74LS595DR.A	Active	Production	SOIC (D) 16	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	LS595
SN74LS595N	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74LS595N
SN74LS595N	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74LS595N
SN74LS595N.A	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74LS595N
SN74LS595N.A	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74LS595N
SNJ54LS595J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701EA SNJ54LS595J
SNJ54LS595J	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701EA SNJ54LS595J
SNJ54LS595J.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701EA SNJ54LS595J
SNJ54LS595J.A	Active	Production	CDIP (J) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701EA SNJ54LS595J
SNJ54LS595W	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701FA SNJ54LS595W

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
SNJ54LS595W	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701FA SNJ54LS595W
SNJ54LS595W.A	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701FA SNJ54LS595W
SNJ54LS595W.A	Active	Production	CFP (W) 16	25 TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	5962-8671701FA SNJ54LS595W

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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OTHER QUALIFIED VERSIONS OF SN54LS595, SN74LS595 :

- Catalog : [SN74LS595](#)
- Military : [SN54LS595](#)

NOTE: Qualified Version Definitions:

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

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
SN74LS595DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	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)
SN74LS595DR	SOIC	D	16	2500	340.5	336.1	32.0

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
5962-8671701FA	W	CFP	16	25	506.98	26.16	6220	NA
SN74LS595N	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS595N	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS595N.A	N	PDIP	16	25	506	13.97	11230	4.32
SN74LS595N.A	N	PDIP	16	25	506	13.97	11230	4.32
SNJ54LS595W	W	CFP	16	25	506.98	26.16	6220	NA
SNJ54LS595W.A	W	CFP	16	25	506.98	26.16	6220	NA

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.
- $\triangle C$ 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.
- $\triangle D$ 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.

W (R-GDFP-F16)

CERAMIC DUAL FLATPACK



- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package can be hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only.
 - Falls within MIL STD 1835 GDFP2-F16

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



PINS ** DIM	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.

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	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	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.
-  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.

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