SDLS147 - SEPTEMBER 1972 - REVISED MARCH 1988

- Three-State Version of SN54/74LS153, SN54/74S153
- Schottky-Diode-Clamped Transistors
- Permits Multiplexing from N Lines to 1 Line
- Performs Parallel-to Serial Conversion
- Fully Compatible with Most TTL Circuits
- Low Power Dissipation
 1 S253
 35 mW Typic

'LS253 . . . 35 mW Typical 'S253 . . . 225 mW Typical

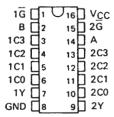
description

Each of these Schottky-clamped data selectors/multiplexers contains inverters and drivers to supply fully complementary, on-chip, binary decoding data selection to the AND-OR gates. Separate output control inputs are provided for each of the two four-line sections.

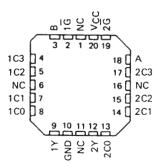
The three-state outputs can interface with and drive data lines of bus-organized systems. With all but one of the common outputs disabled (at a high-impedance state) the low-impedance of the single enabled output will drive the bus line to a high or low logic level.

SN54LS253, SN54S253 . . . J OR W PACKAGE SN74LS253, SN74S253 . . . D OR N PACKAGE

(TOP VIEW)



SN54LS253, SN54S253...FK PACKAGE (TOP VIEW)



NC-No internal connection

FUNCTION TABLE

1	ECT UTS		DATA	INPUTS		OUTPUT CONTROL	ОUТРUТ
В	Α	CO	C1	C2	C3	Ğ	Υ
X	X	X	X	X	X	Н	Z
Ł	L	L	X	X	X	L	L
L	L	Н	X	X	X	L	н
L	Н	×	L	X	Х	L	L
L	Н	×	Н	X	X	L	н
Н	L	×	×	L	×	L	L
н	L	×	X	Н	X	L	Н
H	Н	×	X	X	L	L	L
Н	H	X	X	X	Н	L	Н

Address inputs A and B are common to both sections.

H = high level, L = low level, X = irrelevant, Z = high impedance (off)

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

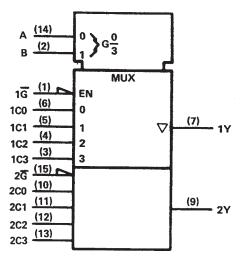
Supply voltage, VCC (see Note 1)	7 V
Input voltage: 'LS253	7 V
'\$253	5.5 V
Off-state output voltage	
Operating free-air temperature range: SN54LS253, SN54S253	125°C
SN74LS253, SN74S253 0°C t	
Storage temperature range – 65°C to	150°C

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

TEXAS INSTRUMENTS

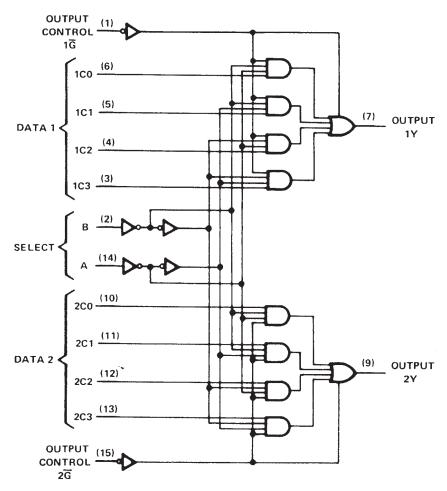
SDLS147 - SEPTEMBER 1972 - REVISED MARCH 1988

logic symbol†



[†] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

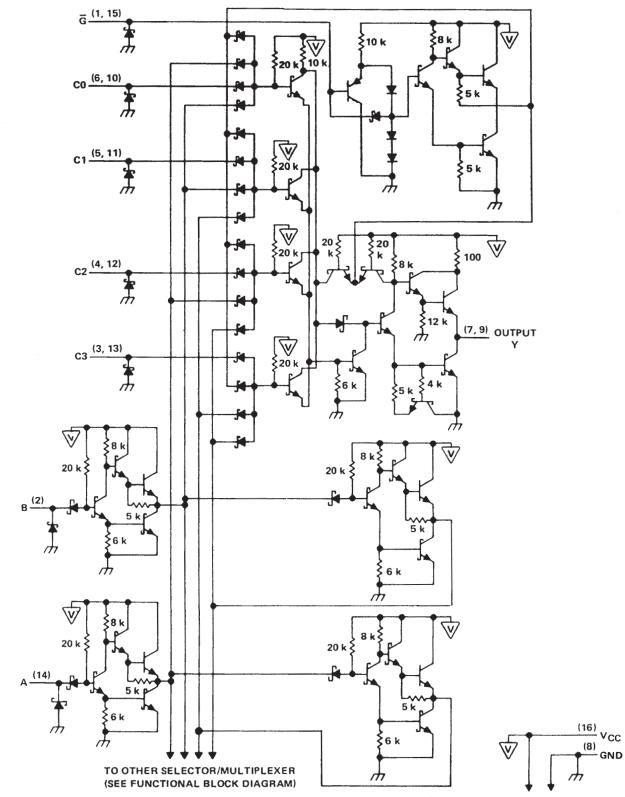
logic diagram (positive logic)



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



schematic (each selector/multiplexer, and the common select section)



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



SDLS147 - SEPTEMBER 1972 - REVISED MARCH 1988

recommended operating conditions

		s	N54LS2	53	SN74LS253			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	UNII
Vcc	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
VIH	High-level input voltage	2			2			V
VIL	Low-level input voltage			0.7			0.8	V
Іон	High-level output current			- 1			- 2.6	mA
IOL	Low-level output current			4			8	mA
TA	Operating free-air temperature	- 55		125	0		70	°C

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

PARAMETER		TEST CONDITI	S	N54LS2	53	S					
FANAMETEN		1521 CONDITI	ONS		MIN	TYP \$	MAX	MIN	TYP‡	MAX	UNIT
VIK	V _{CC} = MIN,	$I_1 = -18 \text{ mA}$					- 1.5			1.5	V
VOH	V _{CC} = MIN,	V _{IH} = 2 V,	VIL = MAX,	1 _{OH} = MAX	2.4	3.4		2.4	3.1		V
VOL	V _{CC} = MIN,	V _{IH} = 2 V,	1/ - 14AV	IOL = 4 mA		0.25	0.4		0.25	0.4	V
VOL	ACC - MIIA	VIH - 2 V,	VIL = MAX	IOL = 8 mA		****			0.25	0.5	
loz	VCC = MAX,	V _{IH} = 2 V		V _O = 2.7 V			20			20	
102	VCC - WAX,	VIH - Z V		V _O = 0.4 V			- 20			20	μΑ
11	V _{CC} = MAX,	V ₁ = 7 V					0.1			0.1	mΑ
liH.	V _{CC} = MAX,	V _I = 2.7 V					20			20	μΑ
1	V _{CC} = MAX,	V ₁ = 0.4 V		Ğ			- 0.2			- 0.2	
115	VCC - MIAA,	V - 0.4 V		All other			- 0.4			- 0.4	, mA
Ios§	V _{CC} = MAX				- 30		- 130	- 30		- 130	mA
loo	V _{CC} = MAX,	See Note 2		Condition A		7	12		7	12	
¹cc	VCC - WAX,	See Note 2		Condition B		8.5	14		8.5	14	mA

[†] For conditions shown as MIN or MAX, use the appropriate value spcified under recommended operating conditions.

NOTE 2: I_{CC} is measured with the outputs open under the following conditions:

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
tPLH .	Data	Y			17	25	
tPHL.	Data	'			13	20	ns
^t PLH	Select		$C_L = 15 pF$, $R_L = 2 k\Omega$,		30	45	
tPHL.	Select	'	See Note 3		21	32	ns
^t PZH	Output	_			15	28	
^t PZL	Control	'			15	23	ns
^t PHZ	Output		$C_L = 5 pF$, $R_L = 2 k\Omega$,		27	41	
^t PLZ	Control	'	See Note 3		18	27	ns

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



[‡] All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ} \text{C}$.

[§] Not more than one output should be shorted at a time, and duration for the short-circuit should exceed one second.

A. All inputs grounded.

B. Output control at 4.5 V, all inputs grounded.

SDLS147 - SEPTEMBER 1972 - REVISED MARCH 1988

recommended operating conditions

			SN54S253			SN74S253			
		MIN	NOM	MAX	MIN	NOM	MAX	UNIT	
Vcc	Supply voltage	4.5	5	5.5	4.75	5	5.25	V	
VIH	High-level input voltage	2			2			V	
VIL	Low-level input voltage			0.8			0.8	V	
ЮН	High-level output current			-2			- 6.5	mA	
IOL	Low-level output current			20			20	mA	
TA	Operating free-air temperature	- 55		125	0		70	°c	

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

PARAMETER			MIN	түр‡	MAX	UNIT				
VIK	VCC = MIN,	I ₁ = - 18 mA						- 1.2	V	
Vон	VCC = MIN,	V _{1H} = 2 V,	V _{1L} = 0.8 V,	IOH = MAX	Series 54S	2,5	3.4		1 ,,	
* OH	VCC - WITH,	VIH - 2 V,	VIL - 0.8 V,	IOH = MAX	Series 74S	2.7	2.7 3.4		V	
VOL	VCC = MIN,	VIH = 2 V,	VIL = 0.8 V,	IOL = 20 mA				0.5	V	
loz	Vcc = MAX,	VIH = 2 V			V _O = 2.4 V			50		
	VCC - WAX,	VIH - Z V			V _O = 0.5 V			- 50	μА	
1 ₁	V _{CC} = MAX,	V1 = 5.5 V						1	mA	
IН	V _{CC} = MAX,	V _I = 2.7 V						50	μΑ	
111	V00 - 110 V	V: - 0.5 V			G = 0.8 V			- 2		
•11.	VCC = MAX,	$V_I = 0.5 V$			G = 2 V			- 0.25	mA	
los§	V _{CC} = MAX				1	- 40		- 100	mA	
¹cc	V _{CC} = MAX,	See Note 2			Condition A		45	70		
	V _{CC} = MAX, See Note 2				Condition B		65	85	mA	

[†] For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

Not more than one output should be shorted at a time and duration of short-circuit should not exceed one second.

NOTE 2: I_{CC} is measured with the outputs open under the following conditions:

- A. All inputs grounded.
- B. Output control at 4.5 V, all inputs grounded.

switching characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ} \text{C}$

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CON	MIN TYP	MAX	UNIT	
^t PLH	Data	~			6	9	
^t PHL	Data	1			6	9	ns
^t PLH	Select	· ·	R _L = 280 Ω,	C _L = 15 pF	11.5	18	
^t PHL] 00.001	'	See Note 3	o_ ,o p.	12	18	ns
^t PZH	Output	· ·	***************************************		11	16.5	
^t PZL	Control				12	18	ns
^t PHZ	Output	· ·	R _L = 280 Ω,	C _L = 5 pF	6.5	9.5	
^t PLZ	Control	1	See Note 3		10	15	ns

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



[‡] All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ} \text{C}$.





9-May-2014

PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish (6)	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Sample
76017012A	ACTIVE	LCCC	FK	20		TBD	Call TI	Call TI	-55 to 125	76017012A SNJ54LS 253FK	Sample
7601701EA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	7601701EA SNJ54LS253J	Sample
7601701EA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	7601701EA SNJ54LS253J	Sample
7601701FA	NRND	CFP	W	16		TBD	Call TI	Call TI	-55 to 125	7601701FA SNJ54LS253W	
7601701FA	NRND	CFP	W	16		TBD	Call TI	Call TI	-55 to 125	7601701FA SNJ54LS253W	
JM38510/30908B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	JM38510/ 30908B2A	Sample
JM38510/30908B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	JM38510/ 30908B2A	Sampl
JM38510/30908BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 30908BEA	Sampl
JM38510/30908BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 30908BEA	Sampl
JM38510/30908BFA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 30908BFA	Sampl
JM38510/30908BFA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 30908BFA	Sampl
M38510/30908B2A	ACTIVE	LCCC	FK	20		TBD	Call TI	Call TI	-55 to 125	JM38510/ 30908B2A	Sampl
M38510/30908B2A	ACTIVE	LCCC	FK	20		TBD	Call TI	Call TI	-55 to 125	JM38510/ 30908B2A	Sampl
M38510/30908BEA	ACTIVE	CDIP	J	16		TBD	Call TI	Call TI	-55 to 125	JM38510/ 30908BEA	Sampl
M38510/30908BEA	ACTIVE	CDIP	J	16		TBD	Call TI	Call TI	-55 to 125	JM38510/ 30908BEA	Sampl
M38510/30908BFA	ACTIVE	CFP	W	16		TBD	Call TI	Call TI	-55 to 125	JM38510/ 30908BFA	Samp
M38510/30908BFA	ACTIVE	CFP	W	16		TBD	Call TI	Call TI	-55 to 125	JM38510/	Samp





www.ti.com

9-May-2014

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
	(1)				٦.,	(2)	(0)	(3)		30908BFA	
SN54LS253J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54LS253J	Sample
SN54LS253J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54LS253J	Samples
SN74LS253DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	LS253	Samples
SN74LS253DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	LS253	Samples
SN74LS253DRE4	ACTIVE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	LS253	Samples
SN74LS253DRE4	ACTIVE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	LS253	Samples
SN74LS253DRG4	ACTIVE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	LS253	Samples
SN74LS253DRG4	ACTIVE	SOIC	D	16		TBD	Call TI	Call TI	0 to 70	LS253	Samples
SN74LS253J	OBSOLETE	CDIP	J	16		TBD	Call TI	Call TI	0 to 70		
SN74LS253J	OBSOLETE	CDIP	J	16		TBD	Call TI	Call TI	0 to 70		
SN74LS253N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74LS253N	Samples
SN74LS253N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74LS253N	Samples
SN74LS253N3	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI	0 to 70		
SN74LS253N3	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI	0 to 70		
SN74LS253NE4	ACTIVE	PDIP	N	16		TBD	Call TI	Call TI	0 to 70	SN74LS253N	Samples
SN74LS253NE4	ACTIVE	PDIP	N	16		TBD	Call TI	Call TI	0 to 70	SN74LS253N	Samples
SN74LS253NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS253	Samples
SN74LS253NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74LS253	Samples
SN74LS253NSRE4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI	0 to 70	74LS253	Samples
SN74LS253NSRE4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI	0 to 70	74LS253	Samples
SN74LS253NSRG4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI	0 to 70	74LS253	Samples



PACKAGE OPTION ADDENDUM

9-May-2014

Orderable Device	Status	Package Type	Package	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
SN74LS253NSRG4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI	0 to 70	74LS253	Samples
SN74S253N	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI	0 to 70		
SN74S253N	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI	0 to 70		
SNJ54LS253FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	76017012A SNJ54LS 253FK	Samples
SNJ54LS253FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	76017012A SNJ54LS 253FK	Samples
SNJ54LS253J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	7601701EA SNJ54LS253J	Samples
SNJ54LS253J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	7601701EA SNJ54LS253J	Samples
SNJ54LS253W	NRND	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	7601701FA SNJ54LS253W	
SNJ54LS253W	NRND	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	7601701FA SNJ54LS253W	

(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.



PACKAGE OPTION ADDENDUM

9-May-2014

- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead/Ball Finish Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF SN54LS253, SN74LS253:

Catalog: SN74LS253

Military: SN54LS253

NOTE: Qualified Version Definitions:

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

PACKAGE MATERIALS INFORMATION

www.ti.com 14-Jul-2012

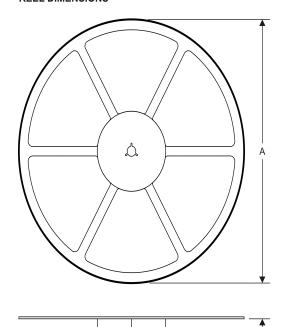
TAPE DIMENSIONS

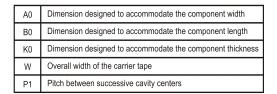
- K0

Cavity

TAPE AND REEL INFORMATION

REEL DIMENSIONS





◆ A0 **→**

TAPE AND REEL INFORMATION

*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LS253DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74LS253NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

PACKAGE MATERIALS INFORMATION

www.ti.com 14-Jul-2012



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LS253DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74LS253NSR	SO	NS	16	2000	367.0	367.0	38.0

14 LEADS SHOWN



- 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



- 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-F16



FK (S-CQCC-N**)

LEADLESS CERAMIC CHIP CARRIER

28 TERMINAL SHOWN



- 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



- 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-PDS0-G16)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- 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.
- 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.



MECHANICAL DATA

NS (R-PDSO-G**)

14-PINS SHOWN

PLASTIC SMALL-OUTLINE PACKAGE



- 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.



IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have *not* been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products Applications

Audio www.ti.com/audio Automotive and Transportation www.ti.com/automotive Communications and Telecom Amplifiers amplifier.ti.com www.ti.com/communications **Data Converters** dataconverter.ti.com Computers and Peripherals www.ti.com/computers **DLP® Products** www.dlp.com Consumer Electronics www.ti.com/consumer-apps

DSP **Energy and Lighting** dsp.ti.com www.ti.com/energy Clocks and Timers www.ti.com/clocks Industrial www.ti.com/industrial Interface interface.ti.com Medical www.ti.com/medical logic.ti.com Logic Security www.ti.com/security

Power Mgmt power.ti.com Space, Avionics and Defense www.ti.com/space-avionics-defense

Microcontrollers microcontroller.ti.com Video and Imaging www.ti.com/video

RFID www.ti-rfid.com

OMAP Applications Processors www.ti.com/omap TI E2E Community e2e.ti.com/omap

Wireless Connectivity <u>www.ti.com/wirelessconnectivity</u>