SDFS052A - D2932, MARCH 1987 - REVISED OCTOBER 1993

- Permits Multiplexing From N Lines to One Line
- Performs Parallel-to-Serial Conversion
- Strobe (Enable) Line Provided for Cascading (N Lines to N Lines)
- Package Options Include Plastic Small-Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs

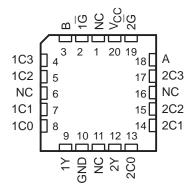
### description

These data selectors/multiplexers contain inverters and drivers to supply full binary decoding data selection to the AND-OR gates. Separate strobe  $(\overline{G})$  inputs are provided for each of the two 4-line sections.

The SN54F153 is characterized for operation over the full military temperature range of  $-55^{\circ}$ C to 125°C. The SN74F153 is characterized for operation from 0°C to 70°C.

SN54F153 J PACKAGE SN74F153 D OR N PACKAGE (TOP VIEW)								
1G В 1C3 1C2 1C1 1C1 1C0 1Y GND	1 2 3 4 5 6 7 8	16 15 14 13 12 11 10 9	V <sub>CC</sub> 2G A 2C3 2C2 2C1 2C0 2Y					

SN54F153 . . . FK PACKAGE (TOP VIEW)



NC - No internal connection

		INP		OUTDUT			
SEL	ECT		DA	TA		STROBE G	OUTPUT
В	Α	C0	C1	C2	C3	Ŭ	1
Х	Х	Х	Х	Х	Х	Н	L
L	L	L	Х	Х	Х	L	L
L	L	н	Х	Х	Х	L	Н
L	Н	Х	L	Х	Х	L	L
L	Н	Х	Н	Х	Х	L	Н
н	L	Х	Х	L	Х	L	L
н	L	Х	Х	Н	Х	L	Н
н	Н	Х	Х	Х	L	L	L
Н	Н	Х	Х	Х	Н	L	Н

**FUNCTION TABLE** 

Select inputs A and B are common to both sections.

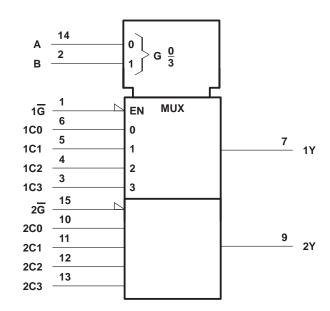
PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



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### logic symbol<sup>†</sup>

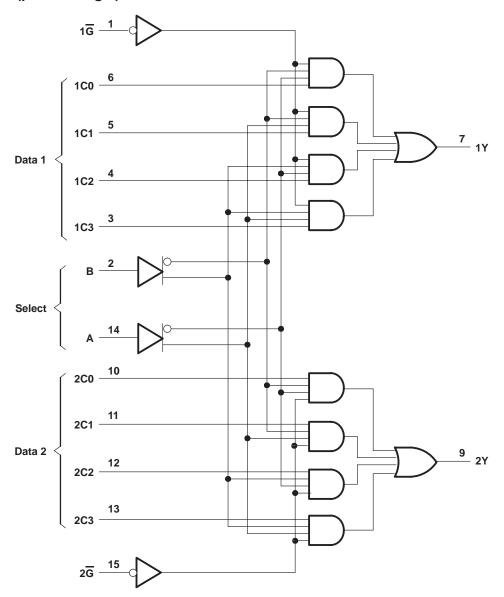


<sup>†</sup> This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for the D, J, and N packages.



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logic diagram (positive logic)



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



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### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

Supply voltage range, V <sub>CC</sub> Input voltage range (see Note 1)	
Input current range	
Voltage range applied to any output in the high state	$\dots$ –0.5 V to V <sub>CC</sub>
Current into any output in the low state	40 mA
Operating free-air temperature range: SN54F153	
SN74F153	0°C to 70°C
Storage temperature range	65°C to 150°C

<sup>†</sup> Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The input voltage rating may be exceeded provided that the input current rating is observed.

### recommended operating conditions

		S	N54F15	3	S	N74F153	3	
		MIN	NOM	MAX	MIN	NOM	MAX	UNIT
VCC	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
VIH	High-level input voltage	2			2			V
$V_{IL}$	Low-level input voltage			0.8			0.8	V
IIК	Input clamp current			-18			-18	mA
ЮН	High-level output current			– 1			– 1	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	TE		S	N54F15	3	S	UNIT		
PARAMETER	TEST CONDITIONS			TYP‡	MAX	MIN	TYP‡	MAX	UNIT
VIK	V <sub>CC</sub> = 4.5 V,	lj = – 18 mA			-1.2			-1.2	V
	V <sub>CC</sub> = 4.5 V,	I <sub>OH</sub> = – 1 mA	2.5	3.4		2.5	3.4		
VOH	V <sub>CC</sub> = 4.75 V,	I <sub>OH</sub> = – 1 mA				2.7			V
VOL	V <sub>CC</sub> = 4.5 V,	I <sub>OL</sub> = 20 mA		0.3	0.5		0.3	0.5	V
lį	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 7 V			0.1			0.1	mA
IIН	$V_{CC} = 5.5 V,$	V <sub>I</sub> = 2.7 V			20			20	μA
١ <sub>IL</sub>	$V_{CC} = 5.5 V,$	V <sub>I</sub> = 0.5 V			- 0.6			- 0.6	mA
IOS§	V <sub>CC</sub> = 5.5 V,	$V_{O} = 0$	-60		-150	-60		-150	mA
Icc	V <sub>CC</sub> = 5.5 V,	$V_{I} = 0$		12	20		12	20	mA

<sup>‡</sup> 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 the duration of the short circuit should not exceed one second.



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### switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5 V,$ $C_{L} = 50 pF,$ $R_{L} = 500 \Omega,$ $T_{A} = 25^{\circ}C$		$V_{CC} = 4.5 V \text{ to } 5.5 V,$ $C_{L} = 50 \text{ pF},$ $R_{L} = 500 \Omega,$ $T_{A} = \text{MIN to MAX}^{\dagger}$				UNIT	
			MIN	<sup>′</sup> F153 TYP	MAX	SN54 MIN	F153 MAX	SN74	F153 MAX	
tPLH			3.7	7.7	10.5	3.7	14	3.7	12	
tPHL	A or B	Y	2.7	6.6	9	2.7	11	2.7	10.5	ns
tPLH	G		3.7	6.7	9	3.7	11.5	3.7	10.5	
<sup>t</sup> PHL	G	Y	2.2	5.3	7	1.7	9	1.7	8	ns
<sup>t</sup> PLH	С	Y	2.2	4.9	7	1.7	9	2.2	8	ns
<sup>t</sup> PHL	C	Ŷ	2.2	4.7	6.5	1.7	8	1.7	7.5	115

<sup>†</sup> For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.





### PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Top-Side Markings	Samples
5962-9758301Q2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Call TI	-55 to 125	5962- 9758301Q2A SNJ54F 153FK	Samples
5962-9758301QEA	ACTIVE	CDIP	J	16	1	TBD	Call TI	Call TI	-55 to 125	5962-9758301QE A SNJ54F153J	Samples
5962-9758301QFA	ACTIVE	CFP	W	16	1	TBD	Call TI	Call TI	-55 to 125	5962-9758301QF A SNJ54F153W	Samples
JM38510/33902B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	JM38510/ 33902B2A	Samples
JM38510/33902BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 33902BEA	Samples
JM38510/33902BFA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 33902BFA	Samples
M38510/33902B2A	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	JM38510/ 33902B2A	Samples
M38510/33902BEA	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 33902BEA	Samples
M38510/33902BFA	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	JM38510/ 33902BFA	Samples
SN54F153J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	SN54F153J	Samples
SN74F153D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F153	Samples
SN74F153DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F153	Samples
SN74F153DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F153	Samples
SN74F153DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F153	Samples
SN74F153DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F153	Samples



24-Jan-2013

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Top-Side Markings	Samples
SN74F153DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	F153	Samples
SN74F153N	ACTIVE	PDIP	Ν	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74F153N	Samples
SN74F153NE4	ACTIVE	PDIP	Ν	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	0 to 70	SN74F153N	Samples
SN74F153NSR	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74F153	Samples
SN74F153NSRE4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74F153	Samples
SN74F153NSRG4	ACTIVE	SO	NS	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	0 to 70	74F153	Samples
SNJ54F153FK	ACTIVE	LCCC	FK	20	1	TBD	POST-PLATE	N / A for Pkg Type	-55 to 125	5962- 9758301Q2A SNJ54F 153FK	Samples
SNJ54F153J	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9758301QE A SNJ54F153J	Samples
SNJ54F153W	ACTIVE	CFP	W	16	1	TBD	A42	N / A for Pkg Type	-55 to 125	5962-9758301QF A SNJ54F153W	Samples

<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.

(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)



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

<sup>(4)</sup> Only one of markings shown within the brackets will appear on the physical device.

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#### OTHER QUALIFIED VERSIONS OF SN54F153, SN74F153 :

Catalog: SN74F153

• Military: SN54F153

NOTE: Qualified Version Definitions:

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

## PACKAGE MATERIALS INFORMATION

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### TAPE AND REEL INFORMATION





## QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*Al	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
	SN74F153DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
	SN74F153NSR	SO	NS	16	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1

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## PACKAGE MATERIALS INFORMATION

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\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74F153DR	SOIC	D	16	2500	333.2	345.9	28.6
SN74F153NSR	SO	NS	16	2000	367.0	367.0	38.0

J (R-GDIP-T\*\*) 14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



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



- 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



LEADLESS CERAMIC CHIP CARRIER

FK (S-CQCC-N\*\*) 28 TERMINAL SHOWN



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



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).
- $\triangle$  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.
- 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

### PLASTIC SMALL-OUTLINE PACKAGE

#### 0,51 0,35 ⊕0,25⊛ 1,27 8 14 0,15 NOM 5,60 8,20 5,00 7,40 $\bigcirc$ Gage Plane ₽ 0,25 7 1 1,05 0,55 0°-10° Δ 0,15 0,05 Seating Plane — 2,00 MAX 0,10PINS \*\* 14 16 20 24 DIM 10,50 10,50 12,90 15,30 A MAX A MIN 9,90 9,90 12,30 14,70 4040062/C 03/03

NOTES: A. All linear dimensions are in millimeters.

NS (R-PDSO-G\*\*)

**14-PINS SHOWN** 

- 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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