

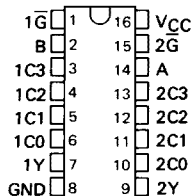
TYPES SN54153, SN54L153, SN54LS153, SN54S153, SN74153, SN74LS153, SN74S153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

DECEMBER 1972—REVISED DECEMBER 1983

- Permits Multiplexing from N lines to 1 line
- Performs Parallel-to-Serial Conversion
- Strobe (Enable) Line Provided for Cascading (N lines to n lines)
- High-Fan-Out, Low-Impedance, Totem-Pole Outputs
- Fully Compatible with most TTL Circuits

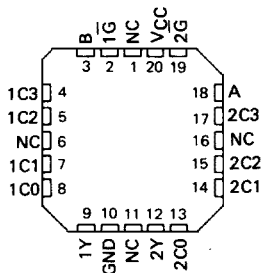
SN54153, SN54LS153, SN54S153 ... J OR W PACKAGE
SN54L153 ... J PACKAGE
SN74153 ... J OR N PACKAGE
SN74LS153, SN74S153 ... D, J OR N PACKAGE

(TOP VIEW)



SN54LS153, SN54S153 ... FK PACKAGE
SN74LS153, SN74S153 ... FN PACKAGE

(TOP VIEW)



NC - No internal connection

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TTL DEVICES

TYPE	TYPICAL AVERAGE PROPAGATION DELAY TIMES			TYPICAL POWER DISSIPATION
	FROM DATA	FROM STROBE	FROM SELECT	
'153	14 ns	17 ns	22 ns	180 mW
'L153	27 ns	34 ns	44 ns	90 mW
'LS153	14 ns	19 ns	22 ns	31 mW
'S153	6 ns	9.5 ns	12 ns	225 mW

description

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

FUNCTION TABLE

SELECT INPUTS		DATA INPUTS				STROBE	OUTPUT
B	A	C0	C1	C2	C3	\bar{G}	Y
X	X	X	X	X	X	H	L
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	H	X	L	X	X	L	L
L	H	X	H	X	X	L	H
H	L	X	X	L	X	L	L
H	L	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

Select inputs A and B are common to both sections.
H = high level, L = low level, X = irrelevant

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

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage: '153, 'L153, 'S153	5.5 V
'LS153	7 V
Operating free-air temperature range: SN54'	-55°C to 125°C
SN74'	0°C to 70°C
Storage temperature range	-65°C to 150°C

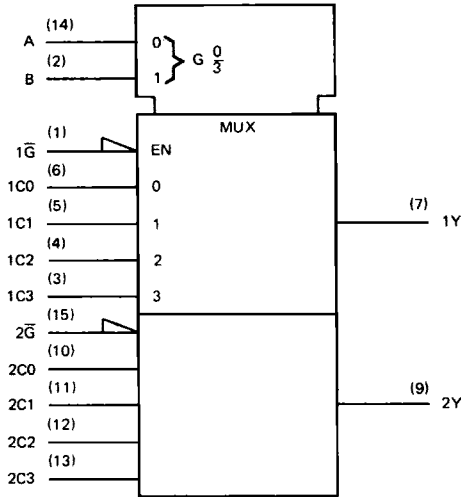
NOTE 1: Voltage values are with respect to network ground terminal.

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

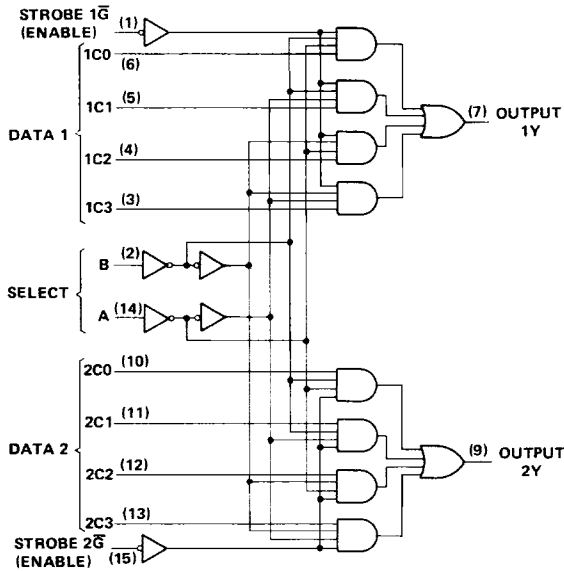


**TYPES SN54153, SN54L153, SN54LS153, SN54S153
 SN74153, SN74LS153, SN74S153
 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS**

logic symbol



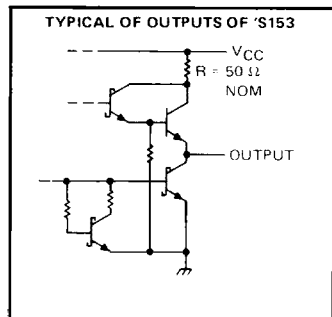
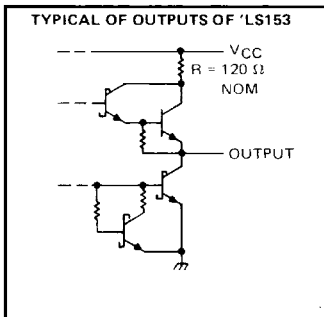
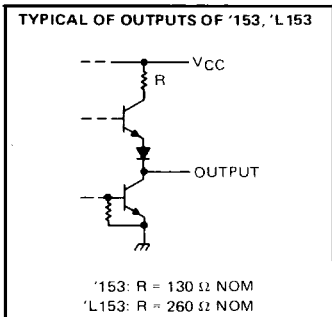
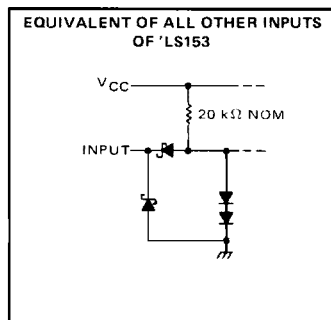
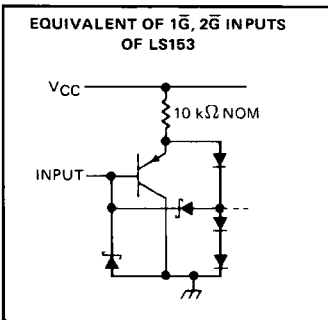
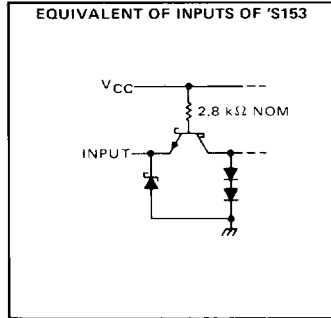
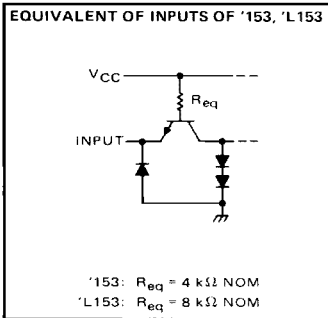
logic diagram



Pin numbers shown on logic notation are for D, J or N packages.

**TYPES SN54153, SN54L153, SN54LS153, SN54S153
SN74153, SN74LS153, SN74S153
DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS**

schematics of inputs and outputs



TTL DEVICES

TYPES SN54153, SN74153

DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	SN54153			SN74153			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-800			-800	μ A
Low-level output current, I_{OL}			16			16	mA
Operating free-air temperature, T_A	-55		125	0		70	$^{\circ}$ C

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

PARAMETER	TEST CONDITIONS [†]	SN54153			SN74153			UNIT
		MIN	TYP [‡]	MAX	MIN	TYP [‡]	MAX	
V_{IH} High-level input voltage		2			2			V
V_{IL} Low-level input voltage				0.8			0.8	V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}, I_I = -12 \text{ mA}$			-1.5			-1.5	V
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OH} = -800 \mu\text{A}$	2.4	3.4		2.4	3.4		V
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.8 \text{ V}, I_{OL} = 16 \text{ mA}$		0.2	0.4		0.2	0.4	V
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$			1			1	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$			40			40	μ A
I_{IL} Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$			-1.6			-1.6	mA
I_{OS} Short-circuit output current [§]	$V_{CC} = \text{MAX}$	-20		-55	-18		-57	mA
I_{CCL} Supply current, output low	$V_{CC} = \text{MAX}$, See Note 2		36	52		36	60	mA

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

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

[§]Not more than one output should be shorted at a time.

NOTE 2: I_{CCL} is measured with the outputs open and all inputs grounded.

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

PARAMETER [¶]	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Data	Y	$C_L = 30 \text{ pF}, R_L = 400 \Omega$, See Note 3		12	18	ns
t_{PHL}	Data	Y			15	23	ns
t_{PLH}	Select	Y			22	34	ns
t_{PHL}	Select	Y			22	34	ns
t_{PLH}	Strobe \bar{G}	Y			19	30	ns
t_{PHL}	Strobe \bar{G}	Y			15	23	ns

[¶] t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

NOTE 3: See General Information Section for load circuits and voltage waveforms.

TYPE SN54L153

DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	MIN	NOM	MAX	UNIT
V _{CC} Supply voltage	4.5	5	5.5	V
V _{IH} High-level input voltage	2			V
V _{IL} Low-level input voltage			0.8	V
I _{OH} High-level output current			-0.4	mA
I _{OL} Low-level output current			8	mA
T _A Operating free-air temperature	-55		125	°C

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

PARAMETER	TEST CONDITIONS †	MIN	TYP ‡	MAX	UNIT
V _{IK}	V _{CC} = MIN, I _I = -12 mA			-1.5	V
V _{OH}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OH} = -0.4 mA	2.4	3.4		V
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = 0.8 V, I _{OL} = 8 mA		0.2	0.4	V
I _I	V _{CC} = MAX, V _I = 5.5 V			1	mA
I _{IH}	V _{CC} = MAX, V _I = 2.4 V			20	μA
I _{IL}	V _{CC} = MAX, V _I = 0.4 V			-0.8	mA
I _{OS} §	V _{CC} = MAX	-10		-28	mA
I _{CCL}	V _{CC} = MAX, See Note 2		18	26	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 short-circuit should not exceed one second.

NOTE 2: I_{CCL} is measured with the outputs open and all inputs grounded.

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

PARAMETER ¶	FROM INPUT	TO OUTPUT	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{PLH}	Data	Y	C _L = 30 pF, R _L = 400 Ω, See Note 3		24	36	ns
t _{PHL}	Data	Y			30	46	ns
t _{PLH}	Select	Y			44	68	ns
t _{PHL}	Select	Y			44	68	ns
t _{PLH}	Strobe \bar{G}	Y			38	60	ns
t _{PHL}	Strobe \bar{G}	Y			30	46	ns

¶ t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

NOTE 3: See General Information Section for load circuits and voltage waveforms.

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TTL DEVICES

TYPES SN54LS153, SN74LS153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	SN54LS153			SN74LS153			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			V
I _{OH} High-level output current				-0.4			mA
I _{OL} Low-level output current				4			mA
T _A Operating free-air temperature	-55			125			°C

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

PARAMETER	TEST CONDITIONS †	SN54LS153			SN74LS153			UNIT
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	
V _{IK}	V _{CC} = MIN, I _I = -18 mA	-1.5			-1.5			V
V _{OH}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX I _{OH} = -0.4 mA	2.5	3.4		2.7	3.4		V
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX, I _{OL} = 4 mA	0.25	0.4		0.25	0.4		V
					0.35	0.5		
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}	T _G , $\bar{2}\bar{G}$	-0.2			-0.2			mA
	All other	-0.4			-0.4			
I _{OS} §	V _{CC} = MAX	-20	-100		-20	-100		mA
I _{CCL}	V _{CC} = MAX, See Note 2	6.2			6.2			10 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.

NOTE 2: I_{CCL} is measured with the outputs open and all inputs grounded.

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

PARAMETER ¶	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{PLH}	Data	Y	C _L = 15 pF, R _L = 2 kΩ, See Note 3		10	15	ns
t _{PHL}	Data	Y			17	26	ns
t _{PLH}	Select	Y			19	29	ns
t _{PHL}	Select	Y			25	38	ns
t _{PLH}	Strobe \bar{G}	Y			16	24	ns
t _{PHL}	Strobe \bar{G}	Y			21	32	ns

¶ t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

NOTE 3: See General Information Section for load circuits and voltage waveforms.

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TTL DEVICES

TYPES SN54S153, SN74S153 DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

recommended operating conditions

	SN54S153			SN74S153			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
Supply voltage, V_{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level output current, I_{OH}			-1			-1	mA
Low-level output current, I_{OL}			20			20	mA
Operating free-air temperature, T_A	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†	MIN	TYP‡	MAX	UNIT
V_{IH} High-level input voltage			2		V
V_{IL} Low-level input voltage				0.8	V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$			-1.2	V
V_{OH} High-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V},$ $V_{IL} = 0.8 \text{ V}, I_{OH} = -1 \text{ mA}$	Series 54S 2.5	3.4		V
V_{OL} Low-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V},$ $V_{IL} = 0.8 \text{ V}, I_{OL} = 20 \text{ mA}$	Series 74S 2.7	3.4		V
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$			1	mA
I_{IH} High-level input current	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$			50	µA
I_{IL} Low-level input current	$V_{CC} = \text{MAX}, V_I = 0.5 \text{ V}$			-2	mA
I_{OS} Short-circuit output current§	$V_{CC} = \text{MAX}$	-40		-100	mA
I_{CCL} Supply current, low-level output	$V_{CC} = \text{MAX},$ See Note 2		45	70	mA

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

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

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

NOTE 2: I_{CCL} is measured with the outputs open and all inputs grounded.

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

PARAMETER¶	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}	Data	Y	$C_L = 15 \text{ pF}; R_L = 280 \Omega,$ See Note 3		6	9	ns
t_{PHL}	Data	Y			6	9	ns
t_{PLH}	Select	Y			11.5	18	ns
t_{PHL}	Select	Y			12	18	ns
t_{PLH}	Strobe \bar{G}	Y			10	15	ns
t_{PHL}	Strobe \bar{G}	Y			9	13.5	ns

¶ t_{PLH} = propagation delay time, low-to-high-level output

t_{PHL} = propagation delay time, high-to-low-level output

NOTE 3: See General Information Section for load circuits and voltage waveforms.

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TTL DEVICES

