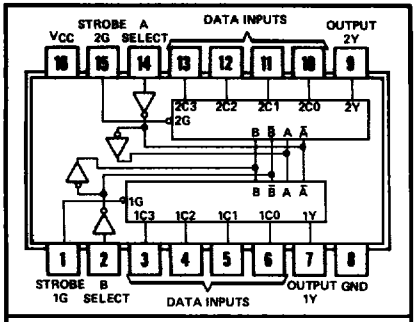
TYPES SN54153, SN54L153, SN54LS153, SN54S153, SN74153, SN74L153, SN74LS153, SN74S153
DUAL 4-LINE-TO-1-LINE DATA SELECTORS/MULTIPLEXERS

BULLETIN NO. DL-S 7611852, DECEMBER 1972 – REVISED OCTOBER 1976

- 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 and DTL Circuits

TYPE	TYPICAL AVERAGE PROPAGATION DELAY TIMES FROM DATA	FROM STROBE	FROM SELECT	TYPICAL POWER DISSIPATION
'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

SN54153, SN54LS153, SN54S153 . . . J OR W PACKAGE
SN54L153 . . . J PACKAGE
SN74153, SN74L153, SN74LS153, SN74S153 . . . J OR N PACKAGE
(TOP VIEW)



positive logic: see function table

FUNCTION TABLE

SELECT INPUTS		DATA INPUTS				STROBE	OUTPUT
B	A	C0	C1	C2	C3	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

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-invert gates. Separate strobe inputs are provided for each of the two four-line sections.

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

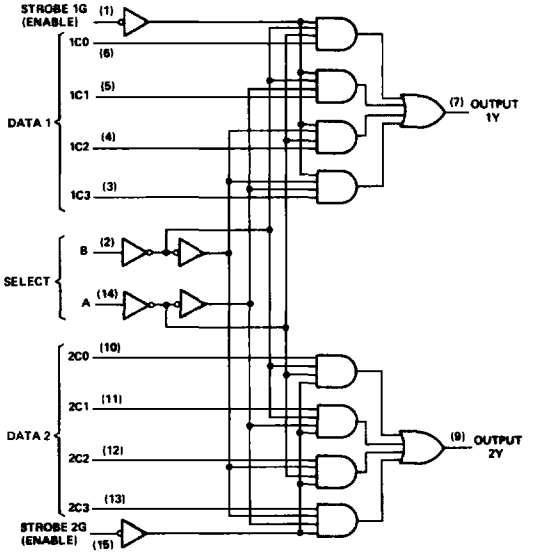
Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage: '153, 'L153, 'S153 . . . . . 5.5 V
'LS153 . . . . . 7 V
Operating free-air temperature range: SN54', SN54L', SN54LS', SN54S' Circuits . . . . . −55°C to 125°C
SN74', SN74L', SN74LS', SN74S' Circuits . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

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

TYPES SN54153, SN54L153, SN54LS153, SN54S153, SN74153, SN74L153, SN74LS153, SN74S153
DUAL 4-LINE-TO-1-LINE DATA SELECTORS/MULTIPLEXERS

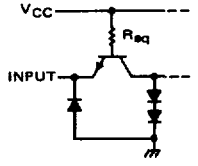
REVISED OCTOBER 1976

functional block diagram



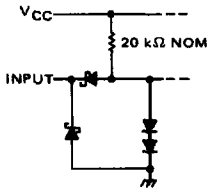
schematics of inputs and outputs

EQUIVALENT OF INPUTS OF '153, 'L153

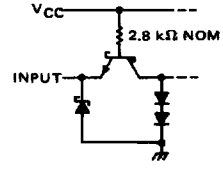


'153: R_{eq} = 4 kΩ NOM
'L153: R_{eq} = 8 kΩ NOM

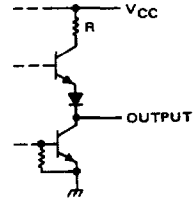
EQUIVALENT OF INPUTS OF 'LS153



EQUIVALENT OF INPUTS OF 'S153

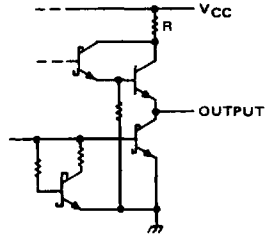


TYPICAL OF OUTPUTS OF '153, 'L153



'153: R = 130 Ω NOM
'L153: R = 260 Ω NOM

TYPICAL OF OUTPUTS OF 'LS153, 'S153



'LS153: R = 120 Ω NOM
'S153: R = 50 Ω NOM

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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	μA
Low-level output current, I_{OL}			16			16	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†	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} = MIN, I_I = −12 mA			−1.5			−1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = −800 μA	2.4	3.4		2.4	3.4		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OL} = 16 mA		0.2	0.4		0.2	0.4	V
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 5.5 V			1			1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.4 V			40			40	μA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.4 V			−1.6			−1.6	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX	−20		−55	−18		−57	mA
I_{CCL}	Supply current, output low	V_{CC} = 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 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 = 30 pF, R_L = 400 Ω, 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	Y			19	30	ns
t_{PHL}	Strobe	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: Load circuit and voltage waveforms are shown on page 3-10.

recommended operating conditions

	SN54L153			SN74L153			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}			−400			−400	μA
Low-level output current, I_{OL}			8			8	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†	SN54L153			SN74L153			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} = MIN, I_I = −12 mA			−1.5			−1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = −400 μA	2.4	3.4		2.4	3.4		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OL} = 8 mA		0.2	0.4		0.2	0.4	V
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 5.5 V			1			1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.4 V			20			20	μA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.4 V			−0.8			−0.8	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX	−10		−28	−9		−30	mA
I_{CCL}	Supply current, output low	V_{CC} = MAX, See Note 2		18	26		18	30	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 = 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	Y			38	60	ns
t_{PHL}	Strobe	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: Load circuit and voltage waveforms are shown on page 3-10.

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recommended operating conditions

	SN54LS153			SN74LS153			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}			−400			−400	μA
Low-level output current, I_{OL}			4			8	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†		SN54LS153			SN74LS153			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH}	High-level input voltage			2			2			V
V_{IL}	Low-level input voltage					0.7			0.8	V
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = −18 mA				−1.5			−1.5	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = V_{IL} max, I_{OH} = −400 μA		2.5	3.4		2.7	3.4		V
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = V_{IL} max	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
			I_{OL} = 8 mA					0.35	0.5	
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 7 V				0.1			0.1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.7 V				20			20	μA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.4 V				−0.4			−0.4	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX		−20		−100	−20		−100	mA
I_{CCL}	Supply current, output low	V_{CC} = MAX, See Note 2			6.2	10		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 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 = 15 pF, R_L = 2 kΩ, See Note 4		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	Y			16	24	ns
t_{PHL}	Strobe	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 4: Load circuits and voltage waveforms are shown on page 3-11.

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} = MIN, I_I = −18 mA				−1.2	V
V_{OH}	High-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OH} = −1 mA	Series 54S	2.5	3.4		V
			Series 74S	2.7	3.4		
V_{OL}	Low-level output voltage	V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.8 V, I_{OL} = 20 mA				0.5	V
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 5.5 V				1	mA
I_{IH}	High-level input current	V_{CC} = MAX, V_I = 2.7 V				50	μA
I_{IL}	Low-level input current	V_{CC} = MAX, V_I = 0.5 V				−2	mA
I_{OS}	Short-circuit output current§	V_{CC} = MAX		−40		−100	mA
I_{CCL}	Supply current, low-level output	V_{CC} = 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 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 = 15 pF, R_L = 280 Ω, 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	Y			10	15	ns
t_{PHL}	Strobe	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: Load circuit and voltage waveforms are shown on page 3-10.

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