SN54157, SN54LS157, SN54LS158, SN54S157, SN54S158, SN74157, SN74LS157, SN74LS158, SN74S157, SN74S158 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS

MARCH 1974 - REVISED MARCH 198

- Buffered Inputs and Outputs
- Three Speed/Power Ranges Available

	TYPICAL	TVNCAL
TYPES	AVERAGE	TYPICAL
TTPES	PROPAGATION	POWER
	TIME	DISSIPATION
157	9 ns	150 mW
'LS157	9 ns	49 mW
' \$157	5 ns	250 mW
'LS158	7 ns	24 mW
'S158	4 ns	195 mW

applications

- Expand Any Data Input Point
- Multiplex Dual Data Buses
- Generate Four Functions of Two Variables (One Variable Is Common)
- Source Programmable Counters

description

These monolithic data selectors/multiplexers contain inverters and drivers to supply full on-chip data selection to the four output gates. A separate strobe input is provided. A 4-bit word is selected from one of two sources and is routed to the four outputs. The '157, 'LS157, and 'S157 present true data whereas the 'LS158 and 'S158 present inverted data to minimize propagation delay time.

FUNCTION TABLE

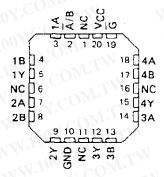
	INPL	JTS	M	OUTP	UT Y
STROEE	SELECT A/B	А	ម	157, LS157, S157	'LS158 'S158
Н	X	×	X	E	WHILE
L	L	L	×	LIV.M	н
L	L	н	x <	н	001
L	н	×	L	UN	H
_	н	Х	н	Н	105

H = high level, L = low level, X = irrelevant

SN54157, SN54LS157, SN54S157, SN54LS158, SN54S158...J OR Ŵ PACKAGE SN74157...N PACKAGE SN74LS157, SN74S157, SN74LS158. SN74S158...D OR N PACKAGE (TOP VIEW)

Ā/B∐	1	O_{16}	VCC
√\1A[]	2	15	G
18 🔲	3	14	4A
] Yt	4	13	4B
	5	12	4Y
28 🔲	6	11	3A
2Y 🗌	7	10	3B
GND	8	9	3Y

SN54LS157, SN54S157, SN54LS158, SN54S158...FK PACKAGE (TOP VIEW)



NC - No internal connection

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

Supply voltage, VCC (See Note 1)		7 V
'LS157, 'LS158		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 documents contain information current as of rublication date. Products conform to specifications per the terms of Teams instruments standard was renty. Production processing does not not usually include testing of all parameters.



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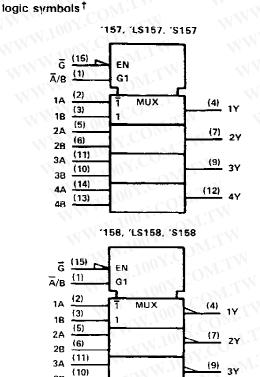
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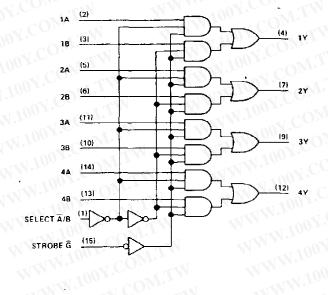
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logic diagram (positive logic) 157





These symbols are in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

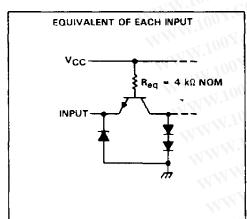
Pin numbers shown are for D, J, N, and W packages.

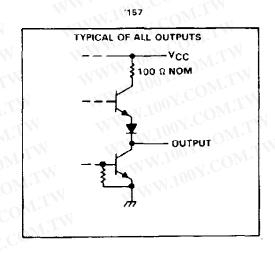
schematics of inputs and outputs

3B (14)4A (13)

4B

157

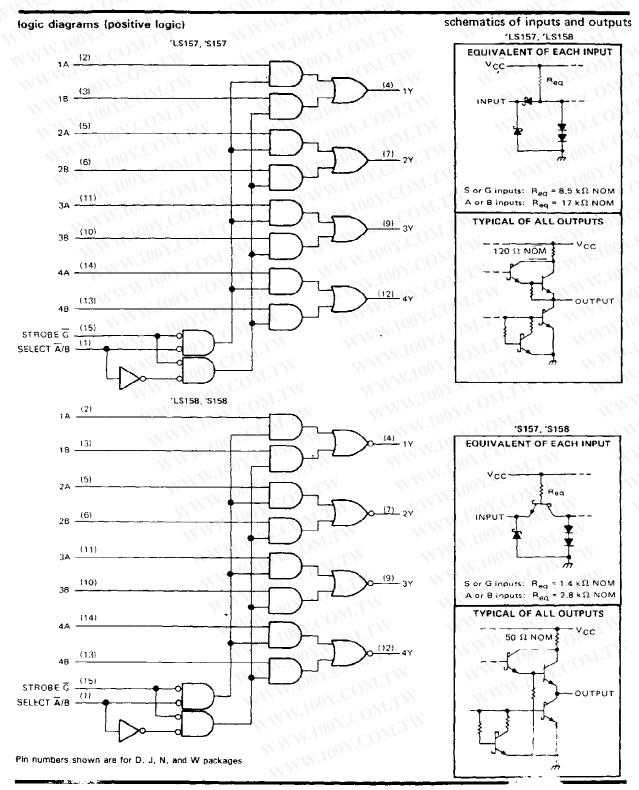






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SN54LS157, SN54LS158, SN54S157, SN54S158, SN74LS157, SN74LS158, SN74S157, SN74S158 QUADRUPLE 2-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS





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recommended operating conditions

MM.In. COM.	CO IT	SN5415	7		SN7415	i 7	UNIT
11, 100 to 11 th 11, 11	MIN	NOM	MAX	MIN	NOM	MAX	Olai
Supply voltage, V _{CC}	4.5	5	5.5	4,75	5	5.25	v
High-level output current, IOH	COM		-800	MW	0.5	-800	μΑ
Low-level output current, IOL	100 r. COM 1.		16	-311	1.10	16	mA
Operating free-air temperature, TA	-55	N	125	0	1	70	°C

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

	WW TANAGE OF THE			- 1 1	SN5415	7	AA :	SN7415	7 (1)	
	PARAMETER	TEST C	ONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	UNIT
V_{IH}	High-level input voltage			2			2			V
VIL.	Low-level input voltage	V V	MAN ON!	A.	- TV	0.8		MAN.	8.0	V
VIK	Input clamp voltage	VCC = MIN,	1 ₁ = - 12 mA	(0)	17.	- 1.5		_TXX	- 1.5	٧
۷он	High-level output voltage	V _{CC} = MIN, V _{IL} = 0.8 V.	V _{IH} = 2 V, I _{OH} = -800 µA	2.4	3.4	VV -	2.4	3.4	VVV.	٧
VOL.	Low-level output voltage	V _{CC} = MIN, V _{IL} = 0.8 V,	~1111	V.C	0.2	0.4		0.2	0.1	٧
1	Input current at maximum input voltage	VCC = MAX.	V _I = 5.5 V	(~ON!	1			1	mA
Н	High-level input current	VCC = MAX.	V ₁ = 2.4 V	401.		40			40	μА
L	Low level input current	VCC = MAX,	V _I = 0.4 V		CO	-1.6	N		- 1.6	πΑ
os	Short-circuit output current §	V _{CC} = MAX		-20	aC	-55	-18		- 55	mA
CC	Supply current	VCC = MAX.	See Note 2	. 00	30	48		30	48	mΑ

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

switching characteristics, VCC = 5 V, TA = 25°C

RAMETER	FROM (INPUT)	TEST CONDITIONS	MIN	TYP		UNIT
^t PLH	Data	NI TO THE PARTY OF	J CON	9	14	ns -
tPHL .	1/1/1	C _L = 35 pF,	7.	9	14	
¹ PLH	Strobe G	R₁ = 400 Ω,	VICO	13	20	ns
tpHL .		See Note 3	U ×	14	21	
^t PLH	Select A/B	See Note 3	ON V.C	15	23	ns
†PHL	Select A/B	W. 1. W. 1	00	18	27] ""

Itp_H = propagation delay time, low-to-high-level output



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 $^{^{\}ddagger}$ 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_{CC} is measured with 4.5 V applied to all inputs and all outputs open,

tpHL = propagation delay time, high-to-low-level output

PHL = propagation delay time, high-to-low-level output
NOTE 3: Load circuits and voltage waveforms are shown in Section 1. WWW.100Y.COM.TW

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recommended operating conditions

	N. Jac.	CON TO	SN54L	5'	MA->	SN74LS	$\mathbb{C}\Omega_{n}$	UNIT
	, 100 in the last of the last	MIN	NOM	MAX	MIN	NOM	MAX	UNIT
Vcc	Supply voltage	4.5	5	5.5	4.75	5	5.25	٧
ГОН	High-level output current			-400	TIN.	Too	-400	μА
IOL	Low-level output current	WY TOWN		4	44	- 100	8	mA
TA	Operating free-air temperature	-55	cī.	125	0	1.1	70	°C

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

	W 1	Mo			100	Mr.	SN54LS	ĭ		SN74LS		. aC
	PARAME	IEH.	TE:	ST CONDITION	ISI	MIN	TYP#	MAX	MIN	ТҮР‡	MAX	UNIT
ViH	High-level inpu	t voltage	1.2	· VIV	.100	2		_	2	WW		V
VIL	Low-level input	t voltage	TW	Mari	1100 Y.		CLA	0.7	V	-18	0.8	٧
VIK	Input clamp vo	Itage	V _{CC} - MIN,	I _I = -18 mA	VI.	M.	TV	-1.5	1	NV	1.5	V
νон	High-level outp	ut voltage	V _{CC} = MIN, V _{IL} = MAX,	V _{IH} = 2 V, I _{OH} = -400	μA	2.5	3.4	W	2.7	3.4	1.1	٧
Vai	Low-level outp		VCC = MIN,	V _{IH} = 2 V.	IOL = 4 mA	C	0.25	0.4	-	0.25	0.4	. v 0
VOL	Low-level datp	ut vultage	VIL = MAX		IOL = 8 mA		M.	1		0.35	0.5	100
l _l	Input current at maximum	Ā/B ar G	V _{CC} = MAX.	V ₁ = 7 V	10	N.C	Ma	0.2		V	0.2	mΑ
''	input voltage	A or B	T VCC - WIAA.	M - 1 - 1		NOV.	Co.	0.1		1	0.1	L
1	High-level	Ā/B or G	V MAY		-11/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1			40	Ń		40	VV
11H	input current	A or B	VCC = MAX,	V = 2.7 V		100	- 40	20			20	ДА
1	Low-tevel	A/B or G	VCC = MAX.	W. any	WW	. 00	1.0	-0.8	W		-0.8	mΑ
ηL	input current	A or B	OCC - MAX,	V - 0.4 V		To.	-7 (-0.4	- 41		-0.4	ma.
los	Short-circuit or	utput current§	V _{CC} = MAX	WTI	1/1/1/	-20	101	-100	-20		-100	mA
			OV		'LS157	M	9.7	16		9.7	16	
			V _{CC} = MAX,	See Note 2	'LS158	. XV 1	4.8	8	1. 1	4.8	8	
^I CC	Supply current	MM	V _{CC} = MAX, All A inputs at All other inputs		'L\$158	NW	6.5	Y.Cu	M. ^T	6.5	11	mΑ

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

switching characteristics, VCC = 5 V, TA = 25°C

hing characteristic	cs, V _{CC} = 5 V, T _A = 2	5°C			N.100	Y.CO	OM;	IN	I
PARAMETER	FROM	TEST COMPLYIONS		'LS157	4xi 11	10 -	'LS158		UNIT
PANAMIC I EN 1	(INPUT)	TEST CONDITIONS	MIN	TYP	MAX	MIN	TYP	MAX	ONT
TPLH	S	in course		9	14	00	7	12	- «sile
†PHL	Data	15.5		9	14	400	10	15	ns
tPLH .		C _L = 15 pF,	ı	13	20	1 0	-71E	17	ns
^t PHL	Strobe G	R _L = 2 kΩ,		14	21	100	18	24	113
tPLH .	6.1.	See Note 3	(A)	15	23	T o	13	20	
^T PHL	Select A/B	V 100 - OM. 1		18	27	VI.IV	16	24	ns

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

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



 $[\]ddagger$ AR typical values are at V_{CC} = 5 V, T_A = 25°C.

⁸ Not more than one output should be shorted at a time and duration of short circuit should not exceed one second.

NOTE 2: ICC is measured with 4.5 V applied to all inputs and all outputs open.

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recommended operating conditions

MAN TOO Y COM! TAN MAN TOO Y COM!		SN54S1 SN54S1		4.	N74S15		UNIT
COM.	MIN	NOM	MAX	MIN	NOM	MAX	74-
Supply voltage, V _{CC}	4.5	5	5.5	4.75	5	5.25	V
High-level autput current, IOH	TW		-1	4	N 10	1 -1	mA
Low-level output current, IOL	TTY	Ň	20	NW	44.	20	mA
Operating free-air temperature, TA	- 55	- 1	125	0	1.1	70	°C

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

	PARAMETER	.COM.T	TES	T CONDITIONS	st) Y.CO		N54\$1 N74\$1		1	N54S1		UNIT
			×XI			MIN	TYP‡	MAX	MIN.	TYP	MAX	M
VIH	High-level input voltage	T. Mar.		TXN.	100 r	2	Y. F.		2	7.		V
VIL	Low-level input voltage	V.Co.	TW	MW	Anny.			8.0		WV	0.8	V
Vik	Input clamp voltage	COM	VCC = MIN,	I ₁ = -18 mA	1.100	C(0)	Mr.	-1.2		_ ≼ 1	-1.2	V
V		OUX.	VCC = MIN.	V _{IH} = 2 V.	Series 545	2.5	3.4	MA	2.5	3.4	-	1.00
νон	High-level output voltage	ON CON	VIL = 0.8 V.	I _{OH} = -1 mA	Series 74S	2.7	3.4	TW	2.7	3.4	W	ľ
VOL	Low-level output voltage	100 x. CO	V _{CC} = MIN, V _{IL} = 0.8 V,	V _{IH} = 2 V, t _{OL} = 20 mA	M.100	y.C	OM	0.5			0.5	1 V
tj	Input current at maximu	m input voltage	VCC = MAX.	V ₁ = 5.5 V	WW.Io	=1	CO_{I}	1	11		-31	mΑ
lore	High-level input current	A/B or G	V MAX	V 2 7 V	-x11	M 7.		100	1		100	μА
ΙΗ	ringit-level imput current	A or B	V _{CC} = MAX,	V1 - 2.7 V		_03	1.CU	50			50	""
le.	Low-level input current	A/B or G],(=== MAY	V. ~ 0.5 V		100		-4			4	mA
HE.	Low-level input cuttent	A or B	V _{CC} = MAX,	VI = 0.5 V		400	M.C	-2	TW		- 2	N.A.
los	Short-circuit ouput curre	ent §	V _{CC} = MAX		- TANN	-40	41 (-100	-40	1	-100	mA
laa	Supply gueros	WW.100	V _{CC} = MAX, See Note 2	All inputs at 4	.5 V,	N.10	50	78	V.J.	39	61	30
Icc	Supply current			A inputs at 4.5 at 0 V, See N		W.	100.	Y.CC	M.	TW	81	mA

^{*} For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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

PARAMETER ¶	FROM (INPUT)	TEST CONDITIONS	SN54S157 SN74S157			SN54S158 SN74S158			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	% 1
^t PLH	Data	C _L - 15 pF, R _L = 280 Ω, See Note 3	1//	5	7.5	27.	4	6	ns
†PHŁ				4.5	6.5	Vo.	4	6	
tPLH	Strobe G			8.5	12,5	no.	6.5	11.5	ns
tPHL				7.5	12	100	7	12	
tPLH .	Select A/B			9.5	15	70	8	12	ns
tPHL				9.5	15	101	8	12	

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



 $^{^{\}ddagger}AII$ 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.

Note 2: ICC is measured with all outputs open.

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