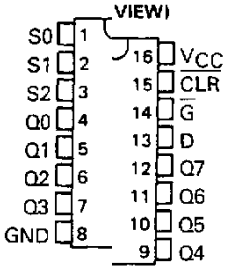
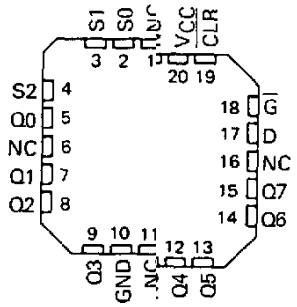
SDLS086 DECEMI
BER 1983 – REVISED MARCH 1988

- 8-Bit Parallel-Out Storage Register Performs Serial-to-Parallel Conversion with Storage
- Asynchronous Parallel Clear
- Active High Decoder
- Enable/Disable Input Simplified Expansion
- Expandable for N-Bit Applications
- Four District Functional Modes
- Package Options Include Ceramic Chip Carriers and Flat Packages in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

SN54259, SN54LS259
SN74259 . . B . . . J OR W PACKAGE
SN74LS259B . . . . N PACKAGE
(TOP D OR N PACKAGE
VIEW)



SN54LS259B .
(TOP . . . FK PACKAGE
VIEW)



NC - No internal co nnection

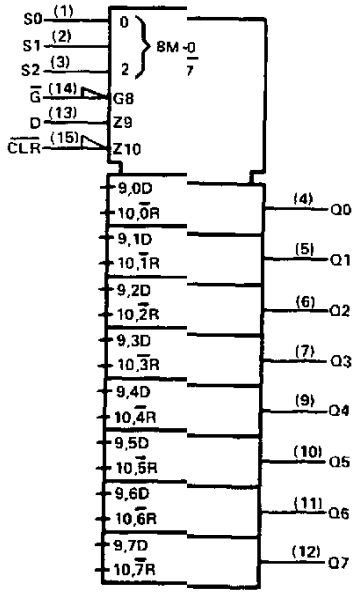
description

These 8-bit addressable latches are designed for general purpose storage applications in digital systems. Specific uses include working registers, serial-holding registers, and active-high decoders or demultiplexers. They are multifunctional devices capable of storing single-line data in eight addressable latches, and being a 1-of-8 decoder or demultiplexer with active-high outputs.

Four distinct modes of operation are selectable by controlling the clear ($\overline{CLR}$) and enable ($\overline{G}$) inputs as enumerated in the function table. In the addressable-latch mode, data at the data-in terminal is written into the addressed latch. The addressed latch will follow the data input with all unaddressed latches remaining in their previous states. In the memory mode, all latches remain in their previous states and are unaffected by the data or address inputs. To eliminate the possiblity of entering erroneous data in the latches, enable $\overline{G}$ should be held high (inactive) while the address lines are changing. In the 1-of-8 decoding or demultiplexing mode, the addressed output will follow the level of the D input with all other outputs low. In the clear mode, all outputs are low and unaffected by the address and data inputs.

The SN54259 and SN54LS259B are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74259 and SN74LS259B are characterized for operation from 0°C to 70°C.

logic symbol†



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

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

FUNCTION TABLE

INPUTS		OUTPUT OF ADDRESSED LATCH	EACH OTHER OUTPUT	FUNCTION
$\overline{CLR}$	$\overline{G}$			
H	L	D	Q_{i0}	Addressable Latch
H	H	Q_{i0}	Q_{i0}	Memory
L	L	D	L	8-Line Demultiplexer
L	H	L	L	Clear

H = high level, L = low level
D = the level at the data input
Q_{i0} = the level of Q_i (i = 0, 1, . . . 7, as appropriate) before the indicated steady-state input conditions were established.

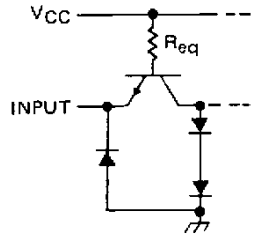
LATCH SELECTION TABLE

SELECT INPUTS			LATCH ADDRESSED
S2	S1	S0	
L	L	L	0
L	L	H	1
L	H	L	2
L	H	H	3
H	L	L	4
H	L	H	5
H	H	L	6
H	H	H	7

schematic of inputs and outputs

'259

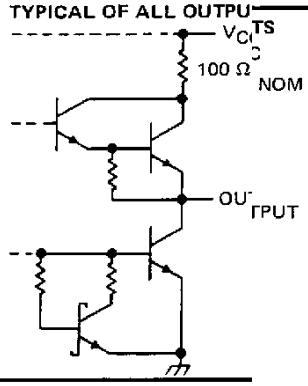
EQUIVALENT OF EACH INPUT



$\overline{G}$: R_{eq} = 2.2 kΩ NOM
All other inputs: R_{eq} = 4 kΩ NOM

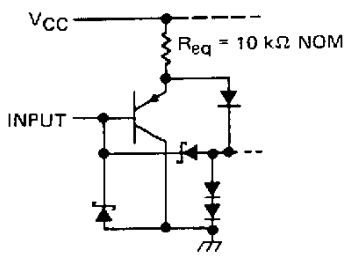
'259

TYPICAL OF ALL OUTPUTS



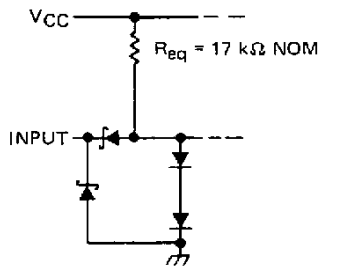
'LS259B

EQUIVALENT OF $\overline{G}$ INPUT



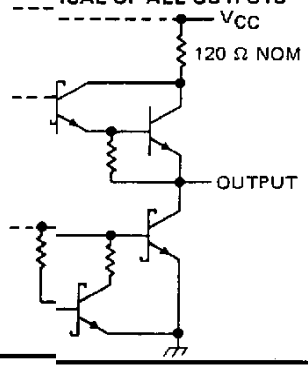
'LS259B

EQUIVALENT OF ALL OTHER INPUTS



'LS259B

TYPICAL OF ALL OUTPUTS



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

Supply voltage (see Note 1) . . . . . 7 V
Input voltage: SN54259, SN74259 . . . . . 5.5 V
SN54LS259B, SN74LS259B . . . . . 7 V
Operating free-air temperature range: SN54259, SN54LS259B . . . . . −55°C to 125°C
SN74259, SN74LS259B . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

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

recommended operating conditions

		SN54259			SN74259			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
Width of clear or enable pulse, t_w		15			15			ns
Setup time, t_{su}	Data	15↑			15↑			ns
	Address	5↑			5↑			
Hold time, t_h	Data	0↑			0↑			ns
	Address	20↑			20↑			
Operating free-air temperature, T_A		−55		125	0		70	°C

↑The arrow indicates that the rising edge of the enable pulse is used for reference.

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

PARAMETER			TEST CONDITIONS†		SN54259			SN74259			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_{IL} = 0.8 V,	V_{IH} = 2 V, I_{OH} = −800 μA	2.4	3.4		2.4	3.4		V
V_{OL}	Low-level output voltage		V_{CC} = MIN, V_{IL} = 0.8 V,	V_{IH} = 2 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	$\overline{G}$	V_{CC} = MAX,	V_I = 2.4 V			80			80	μA
		Other inputs					40			40	
I_{IL}	Low-level input current	$\overline{G}$	V_{CC} = MAX,	V_I = 0.4 V			−3.2			−3.2	mA
		Other inputs					−1.6			−1.6	
I_{OS}	Short-circuit output current§		V_{CC} = MAX		−18		−57	−18		−57	mA
I_{CC}	Supply current		V_{CC} = MAX,	See Note 2		60	90		60	90	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_{CC} is measured with the inputs grounded and the outputs open.

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	$\overline{CLR}$	Any Q	C_L = 15 pF, R_L = 400 Ω, See Note 3		16	25	ns
t_{PLH}	Data	Any Q			14	24	ns
t_{PHL}					11	20	
t_{PLH}	Address	Any Q			15	28	ns
t_{PHL}					17	28	
t_{PLH}	$\overline{G}$	Any Q			12	20	ns
t_{PHL}					11	20	

t_{PLH} = propagation delay time, low-to-high-level output
t_{PHL} = propagation delay time, high-to-low-level output
NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

recommended operating conditions

			SN54LS259B			SN74LS259B			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			0.8	V
I_{OH}	High-level output current				−0.4			−0.4	mA
I_{OL}	Low-level output current				4			8	mA
t_w	Pulse duration	$\overline{G}$ low	17			17			ns
		$\overline{CLR}$ low	10			10			
t_{su}	Set up time	Data before $\overline{G}\uparrow$	20			20			ns
		Address before $\overline{G}\uparrow$	17			17			
		Address before $\overline{G}\downarrow$	0			0			
t_h	Hold time	Data after $\overline{G}\uparrow$	0			0			ns
		Address after $\overline{G}\uparrow$	0			0			
T_A	Operating free-air temperature		−55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†		SN54LS259B			SN74LS259B			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
		I_{OL} = 8 mA					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}	V_{CC} = MAX, V_I = 0.4 V				−0.4			−0.4	mA
I_{OS}§	V_{CC} = MAX		−20		−100	−20		−100	mA
I_{CC}	V_{CC} = MAX, See Note 2			27	36		22	36	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 short-circuit should not exceed one second.
NOTE 2: I_{CC} is measured with the inputs grounded and the outputs open.

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PHL}	$\overline{CLR}$	Any Q	C_L = 15 pF, R_L = 2 kΩ, See Note 3		12	18	ns
t_{PLH}	Data	Any Q			19	30	ns
t_{PHL}					13	20	
t_{PLH}	Address	Any Q			17	27	ns
t_{PHL}					14	20	
t_{PLH}	$\overline{G}$	Any Q			15	24	ns
t_{PHL}					15	24	

t_{PLH} = propagation delay time, low-to-high-level output
t_{PHL} = propagation delay time, high-to-low-level output
NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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