

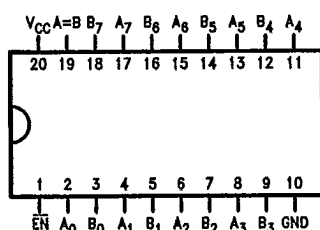
T-45-17-00


**National
Semiconductor**
DM54/74ALS518/519/520/521/522
8-Bit Comparator
General Description

These comparators perform an "equal to" comparison of two eight-bit words with provision for expansion or external enabling. The matching of the two 8-bit input plus a logic LOW on the EN input produces the output $A = B$ on the ALS518 and 519 and the output $\overline{A = B}$ on the ALS520, 521 and 522. The ALS520 and 521 have totem pole outputs, while the ALS518, 519 and 522 have open collector outputs for wire AND cascading. Additionally, the ALS518, 520 and 522 are provided with B input pull up termination resistors for analog or switch data.

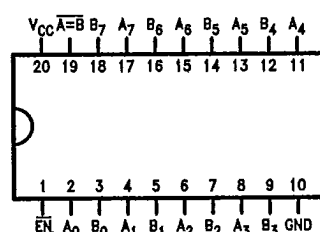
Features

- Switching specifications at 50 pF
- Switching specifications guaranteed over full temperature and V_{CC} range
- Advanced oxide-isolated, ion-implanted Schottky TTL process
- Functionally and pin for pin compatible with LS family counterpart
- Improved output transient handling capability

Connection Diagrams
Dual-In-Line Package


TL/F/6114-1

Order Number DM74ALS518WM, DM74ALS519WM,
DM74ALS518N or DM74ALS519N
See NS Package Number M20B or N20A

Dual-In-Line Package


TL/F/6114-2

Order Number DM74ALS520WM, DM74ALS521WM,
DM74ALS522WM, DM74ALS520N, DM54ALS521J,
DM74ALS521N or DM74ALS522N
See NS Package Number J20A, M20B or N20A

Function Tables
ALS518, 519

Inputs		Output
EN	Data	$A = B$
L	$A = B$	H
L	$A \neq B$	L
H	X	L

H = High Logic Level; L = Low Logic Level; X = Don't Care

ALS520, 521, 522

Inputs		Output
EN	Data	$\overline{A = B}$
L	$A = B$	L
L	$A \neq B$	H
H	X	H

H = High Logic Level; L = Low Logic Level; X = Don't Care

Absolute Maximum Ratings**T-45-17**

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Note: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Supply Voltage 7V
 Input Voltage 7V
 Operating Free Air Temperature Range
 DM54ALS -55°C to +125°C
 DM74ALS 0°C to +70°C
 Storage Temperature Range -65°C to +150°C
 Typical θ_{JA}
 N Package 62.0°C/W
 M Package 82.0°C/W

Recommended Operating Conditions

Symbol	Parameter	DM54ALS 521			DM74ALS 518, 519, 520, 521, 522			Units
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.7			0.8	V
V_{OH}	High Level Output Voltage (ALS518, 519, 522)			5.5			5.5	V
I_{OH}	High Level Output Current (ALS520, 521)			-1			-2.6	mA
I_{OL}	Low Level Output Current			12			24	mA
T_A	Free Air Operating Temperature	-55		125	0		70	°C

Electrical Characteristics

over recommended operating free air temperature range. All typical values are measured at $V_{CC} = 5V$, $T_A = 25^\circ C$.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IK}	Input Clamp Voltage	$V_{CC} = 4.5V$, $I_I = -18 mA$			-1.5	V
V_{OH}	High Level Output Voltage	$V_{CC} = 4.5V$ to $5.5V$ $I_{OH} = -400 \mu A$	$V_{CC} - 2$			V
		$V_{CC} = 4.5V$ $I_{OH} = \text{Max}$		2.4	3.2	V
I_{OH}	High Level Output Current	$V_{CC} = 5.5V$ $V_{OH} = 5.5V$			0.1	mA
V_{OL}	Low Level Output Voltage	$V_{CC} = 4.5V$		0.25	0.4	V
				0.35	0.5	V
I_I	Max High Input Current	$V_{CC} = 5.5V$	$V_{IH} = 5.5V$ B Input ALS518, 520, 522		0.1	mA
			$V_{IH} = 7V$, All Others			
I_{IH}	High Level Input Current	$V_{CC} = 5.5V$, $V_{IH} = 2.7V$	All Others		20	μA
			B Input ALS518, 520, 522		-200	
I_{IL}	Low Level Input Current	$V_{CC} = 5.5V$, $V_{IL} = 0.4V$	B Input ALS518, 520, 522		-0.6	mA
			All Others		-0.1	mA
I_O	Output Drive Current	$V_{CC} = 5.5V$	$V_O = 2.25V$ ALS520, 521	-30	-112	mA
I_{CC}	Supply Current	$V_{CC} = 5.5V$ (Note 1)	ALS518, 519, 522	11	17	mA
			ALS520, 521	12	19	mA

Note 1: I_{CC} is measured with EN grounded, A and B inputs at 4.5V and outputs open.

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518•519•520•521•522

Switching Characteristics over recommended operating free air temperature range (Note 1)

Symbol	Parameter	Conditions	From Input	To Output	DM74ALS 518, 519		Units
					Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	$V_{CC} = 4.5V$ to $5.5V$ $C_L = 50$ pF $R_L = 680\Omega$	A or B Data	$A = B$	15	33	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		A or B Data	$A = B$	3	15	ns
t_{PLH}	Propagation Delay Time Low to High Level Output		$\overline{EN}$	$A = B$	15	33	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		$\overline{EN}$	$A = B$	3	15	ns

Switching Characteristics over recommended operating free air temperature range (Note 1)

Symbol	Parameter	Conditions	From Input	To Output	DM54ALS 521		DM74ALS 520, 521		Units
					Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	$V_{CC} = 4.5V$ to $5.5V$ $C_L = 50$ pF $R_L = 500\Omega$	A or B Data	$\overline{A} = \overline{B}$	3	18	3	12	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		A or B Data	$\overline{A} = \overline{B}$	5	25	5	20	ns
t_{PLH}	Propagation Delay Time Low to High Level Output		$\overline{EN}$	$\overline{A} = \overline{B}$	3	15	2	12	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		$\overline{EN}$	$\overline{A} = \overline{B}$	5	25	5	22	ns

Switching Characteristics over recommended operating free air temperature range (Note 1)

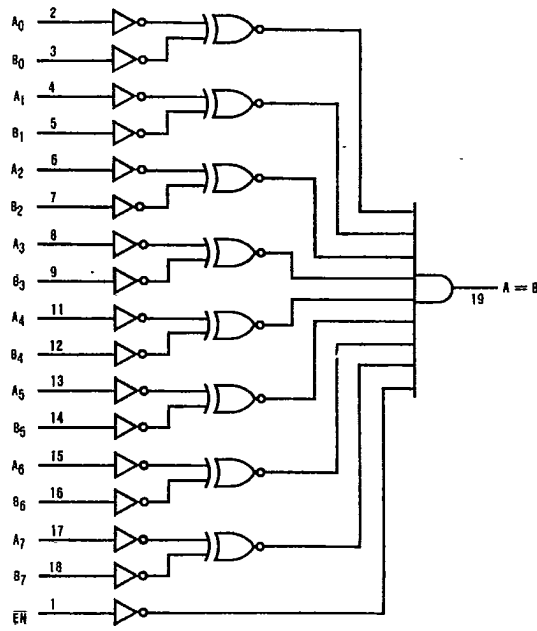
Symbol	Parameter	Conditions	From Input	To Output	DM74ALS 522		Units
					Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	$V_{CC} = 4.5V$ to $5.5V$ $C_L = 50$ pF $R_L = 680\Omega$	A or B Data	$\overline{A} = \overline{B}$	10	25	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		A or B Data	$\overline{A} = \overline{B}$	5	23	ns
t_{PLH}	Propagation Delay Time Low to High Level Output		$\overline{EN}$	$\overline{A} = \overline{B}$	8	25	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		$\overline{EN}$	$\overline{A} = \overline{B}$	8	23	ns

Note 1: See Section 1 for test waveforms and output load.

Logic Diagrams

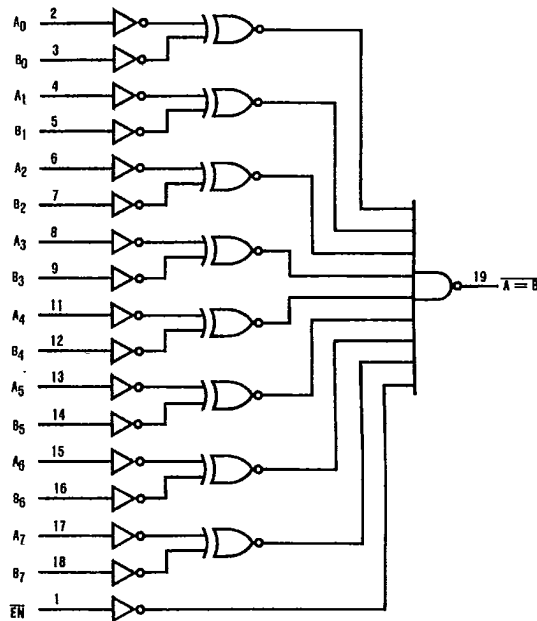
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ALS518/519



TL/F/6114-3

ALS520/521/522



TL/F/6114-4

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