

DM54ALS251/DM74ALS251 TRI-STATE® 1 of 8 Line Data Selector/Multiplexer

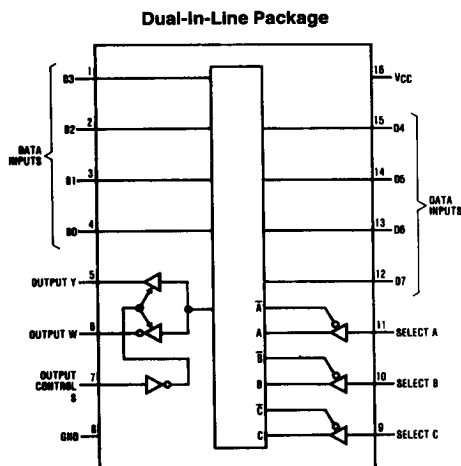
General Description

This Data Selector/Multiplexer contains full on-chip decoding to select one-of-eight data sources as a result of a unique three-bit binary code at the Select inputs. Two complementary outputs provide both inverting and non-inverting buffer operation. An Output Control input is provided which, when at the high level, places both outputs in the high impedance Off state. In order to prevent bus access conflicts, output disable times are shorter than output enable times. The Select input buffers incorporate internal overlap features to ensure that select input changes do not cause invalid output transients.

Features

- Advanced oxide-isolated, ion-implanted Schottky TTL process
- Switching performance is guaranteed over full temperature and V_{CC} supply range
- Pin and functional compatible with LS family counterpart
- Improved output transient handling capability
- Output control circuitry incorporates power-up TRI-STATE feature

Connection Diagram



TL/F/6214-1

Order Number DM54ALS251J or DM74ALS251M, N
See NS Package Number J16A, M16A or N16A

Function Table

Inputs				Outputs	
Select			Strobe S	Y	W
C	B	A			
X	X	X	H	Z	Z
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

H = High Level, L = Low Level, X = Don't Care

Z = High Impedance (Off)

D0 thru D7 = The Level of the Respective D Input

Absolute Maximum Ratings

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

Supply Voltage, V_{CC}	7V
Input Voltage	7V
Voltage Applied to Disabled Output	5.5V
Operating Free Air Temperature Range	
DM54ALS251	–55°C to +125°C
DM74ALS251	0°C to +70°C
Storage Temperature Range	–65°C to +150°C

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.

Recommended Operating Conditions

Symbol	Parameter	DM54ALS251			DM74ALS251			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
I_{OH}	High Level Output Current			–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 $V_{CC} = 5V$, $T_A = 25^\circ C$.

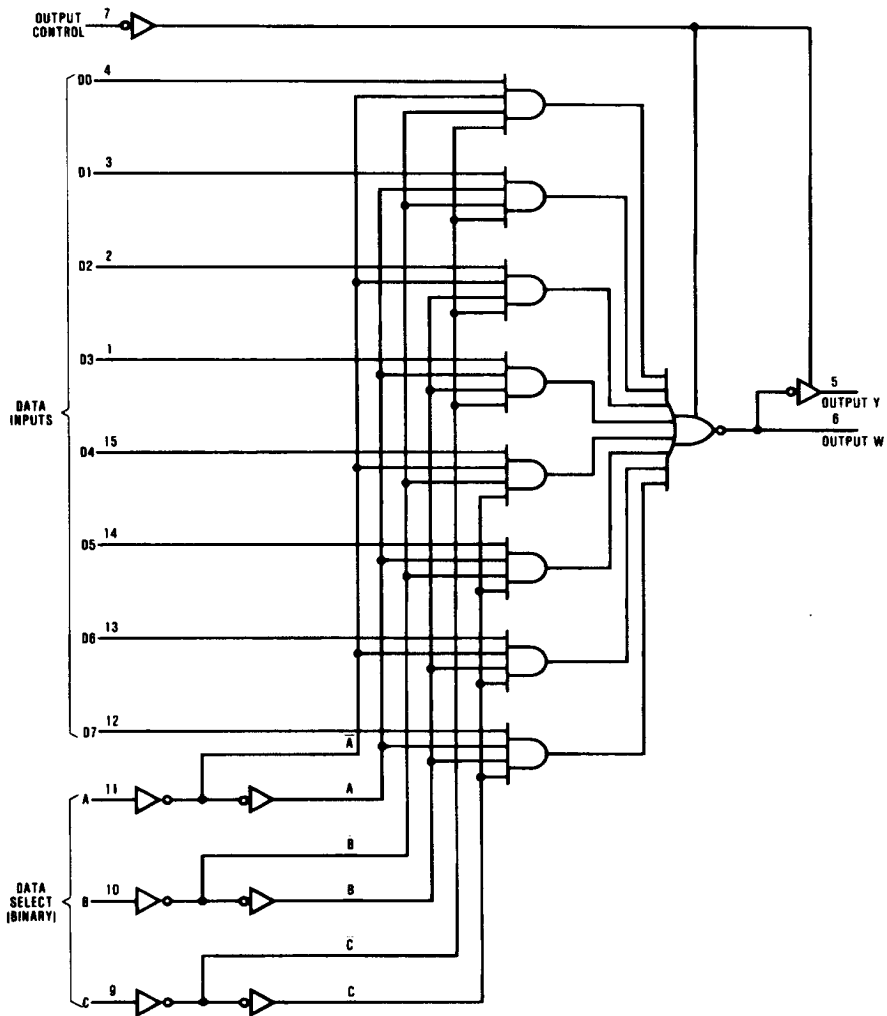
Symbol	Parameter	Conditions		Min	Typ	Max	Units
V_{IK}	Input Clamp Voltage	$V_{CC} = 4.5V$, $I_{IN} = -18\text{ mA}$				–1.5	V
V_{OH}	High Level Output Voltage	$V_{CC} = 4.5V$, $I_{OH} = \text{Max}$		2.4	3.2		V
		$I_{OH} = 400\text{ }\mu A$, $V_{CC} = 4.5V$ to $5.5V$		$V_{CC} - 2$			V
V_{OL}	Low Level Output Voltage	$V_{CC} = 4.5V$	54/74ALS $I_{OL} = 12\text{ mA}$		0.25	0.4	V
			74ALS $I_{OL} = 24\text{ mA}$		0.35	0.5	V
I_I	Input Current at Max Input Voltage	$V_{CC} = 5.5V$, $V_{IH} = 7V$				0.1	mA
I_{IH}	High Level Input Current	$V_{CC} = 5.5V$, $V_{IH} = 2.7V$				20	μA
I_{IL}	Low Level Input Current	$V_{CC} = 5.5V$, $V_{IL} = 0.4V$				–0.1	mA
I_O	Output Drive Current	$V_{CC} = 5.5V$, $V_{OUT} = 2.25V$		–30		–112	mA
I_{OZH}	Off-State Output Current, High Bias	$V_{CC} = 5.5V$, $V_{OUT} = 2.7V$				20	μA
I_{OZL}	Off-State Output Current, Low Bias	$V_{CC} = 5.5V$, $V_{OUT} = 0.4V$				–20	μA
I_{CC}	Supply Current	$V_{CC} = 5.5V$, Inputs = GND	Enabled		7	10	mA
		Inputs = 4.5V, $V_{CC} = 5.5V$	Disabled		9.4	14	

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

Symbol	Parameter	From	To	Conditions	DM54ALS251		DM74ALS251		Units
					Min	Max	Min	Max	
t _{PLH}	Propagation Delay Time Low to High Level Output	Select	Y	V _{CC} = 4.5V to 5.5V C _L = 50 pF R _L = 500Ω	1	21	5	18	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	Select			8	34	8	24	ns
t _{PLH}	Propagation Delay Time Low to High Level Output	Select	W		5	38	8	24	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	Select			7	26	7	23	ns
t _{PLH}	Propagation Delay Time Low to High Level Output	Data	Y		2	15	2	10	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	Data			3	23	3	15	ns
t _{PLH}	Propagation Delay Time Low to High Level Output	Data	W		3	25	3	15	ns
t _{PHL}	Propagation Delay Time High to Low Level Output	Data			3	20	3	15	ns
t _{pZH}	Output Enable Time to High Level	Output Control	Y		3	21	3	15	ns
t _{pZL}	Output Enable Time to Low Level	Output Control			3	19	3	15	ns
t _{pZH}	Output Enable Time to High Level	Output Control	W		3	21	3	15	ns
t _{pZL}	Output Enable Time to Low Level	Output Control			3	19	3	15	ns
t _{PHZ}	Output Disable Time from High Level	Output Control	Y		2	12	2	10	ns
t _{PLZ}	Output Disable Time from Low Level	Output Control			1	18	1	10	ns
t _{PHZ}	Output Disable Time from High Level	Output Control	W		2	12	2	10	ns
t _{PLZ}	Output Disable Time from Low Level	Output Control			1	18	1	10	ns

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

Logic Diagram



TL/F/6214-2