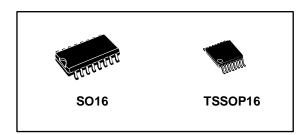
M74HC151



8-channel multiplexer

Datasheet - production data



Features

- High speed: t_{PD} = 17 ns (typ.) at V_{CC} = 6 V
- Low power dissipation: $I_{CC} = 4 \mu A \text{ (max.)}$ at $T_A = 25 \text{ °C}$
- High noise immunity:
 V_{NIH} = V_{NIL} = 28 % V_{CC} (min.)
- Symmetrical output impedance:
 |I_{OH}| = I_{OL} = 4 mA (min)
- Balanced propagation delays: t_{PLH} ~= t_{PHL}
- Wide operating voltage range:
 V_{CC} (OPR) = 2 V to 6 V
- Pin and function compatible with 74 series 151
- ESD performanceCDM: 1 kV

HBM: 2 kVMM: 200 V

Description

The M74HC151 is a high-speed CMOS 8-channel multiplexer manufactured using silicon gate C²MOS technology.

It provides, in one device, the ability to select one bit of data from up to eight sources. The M74HC151 can be used as a universal function generator to generate any logic function of four variables. Outputs Y and W are complementary; the selection depends on the address inputs A, B, and C. The strobe input must be taken low to enable this device. When the strobe is high, the W output is forced high and consequently the Y output goes low. All inputs are equipped with protection circuits to guard against static discharge and transient excess voltage.

Table 1: Device summary

Order code	Temperature range	Package	Packaging	Marking
M74HC151YRM13TR ⁽¹⁾	-40 °C to +125 °C	SO16 (automotive grade) ¹	Tape and reel	74HC151Y
M74HC151RM13TR	-55 °C to +125 °C	SO16	Tape and reel	74HC151
M74HC151TTR	-55 °C to +125 °C	TSSOP16	Tape and reel	HC151
M74HC151YTTR ¹	-40 °C to +125 °C	TSSOP16 (automotive grade) ¹	Tape and reel	HC151Y

Notes:

⁽¹⁾ Qualification and characterization according to AEC Q100 and Q003 or equivalent, advanced screening according to AEC Q001 and Q002 or equivalent.

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M74HC151 Pin information

1 Pin information

Figure 1: Pin connections and IEC logic symbols

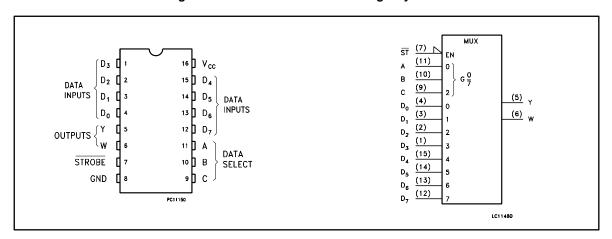


Table 2: Pin description

Pin number	Symbol	Name and function			
4, 3, 2, 1, 15, 14, 13, 12	D ₀ to D ₇	Multiplexer inputs			
5	Υ	Multiplexer output			
6	W	Complementary multiplexer output			
7	STROBE	Strobe input			
11, 10, 9	A, B, C	Select inputs			
8	GND	Ground (0 V)			
16	Vcc	Positive supply voltage			

2 Functional description

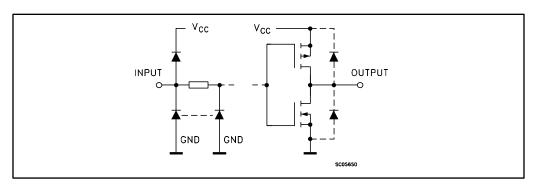
Table 3: Truth table

		C	Outputs		
	Select		STROBE	Y	w
С	В	Α	S		
X ⁽¹⁾	X ¹	X ¹	Н	L	Н
L	L	L	L	D_0	D 0
L	L	Н	L	D_1	
L	Н	L	L	D_2	
L	Н	Н	L	D ₃	D 3
Н	L	L	L	D_4	
Н	L	Н	L	D ₅	D 5
Н	Н	L	L	D ₆	D 6
Н	Н	Н	L	D ₇	D 7

Notes:

(1)X: don't care

Figure 2: Input and output equivalent circuit



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STROBE D5 **D6 D7** 5-73,46

Figure 3: Logic diagram

This logic diagram has not been used to estimate propagation delays.

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3 Electrical characteristics

Stressing the device above the ratings listed in the "Absolute maximum ratings" table may cause permanent damage to the device. These are stress ratings only, and operation of the device at these or any other conditions above those indicated in the operating sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Table 4: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{CC}	Supply voltage	-0.5 to +7	V
Vı	DC input voltage	-0.5 to V _{CC} to +0.5	V
Vo	DC output voltage	-0.5 to V _{CC} to +0.5	V
I _{IK}	DC input diode current	±20	mA
I _{OK}	DC output diode current	±20	mA
Io	DC output current	±25	mA
I _{CC} or I _{GND}	DC V _{CC} or ground current	±50	mA
P _D	Power dissipation	500 ⁽¹⁾	mW
T _{stg}	Storage temperature	-65 to +150	°C
TL	Lead temperature (10 sec.)	300	°C

Notes:

Table 5: Recommended operating conditions

Symbol	Parameter		Value	Unit
V _{CC}	Supply voltage		2 to 6	V
VI	Input voltage		0 to V _{CC}	V
Vo	Output voltage	0 to V _{CC}	V	
T _{op}	Operating temperature		-55 to 125	°C
		V _{CC} = 2.0 V	0 to 1000	ns
t_r, t_f	Input rise and fall time	V _{CC} = 4.5 V	0 to 500	ns
		0 to 400	ns	

 $^{^{(1)}500}$ mW at 65 °C; derate to 300 mW by 10 mW/°C from 65 °C to 85 °C

Table 6: DC specifications

		Test condition		Value							
Symbol	Parameter	V 00		Т	T _A = 25°C		-40 to 85°C		-55 to 125°C		Unit
		V _{CC} (V)		Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
		2.0		1.5			1.5		1.5		
V _{IH}	High-level input voltage	4.5		3.15			3.15		3.15		V
	i chage	6.0		4.2			4.2		4.2		
		2.0				0.5		0.5		0.5	
V _{IL}	Low-level input voltage	4.5				1.35		1.35		1.35	V
vollago	6.0				1.8		1.8		1.8		
	2.0	Ι _O = -20 μΑ	1.9	2.0		1.9		1.9			
	4.5	Ι _O = -20 μΑ	4.4	4.5		4.4		4.4			
V _{OH}	High-level output voltage	6.0	Ι _O = -20 μΑ	5.9	6.0		5.9		5.9		V
	i chage	4.5	I _O = -4.0 mA	4.18	4.31		4.13		4.10		
		6.0	I _O = -5.2 mA	5.68	5.8		5.63		5.60		
		2.0	Ι _O = 20 μΑ		0.0	0.1		0.1		0.1	
		4.5	Ι _O = 20 μΑ		0.0	0.1		0.1		0.1	
V _{OL}	Low-level output voltage	6.0	Ι _O = 20 μΑ		0.0	0.1		0.1		0.1	V
		4.5	I _O = 4.0 mA		0.17	0.26		0.33		0.40	
		6.0	I _O = 5.2 mA		0.18	0.26		0.33		0.40	
I	Input leakage current	6.0	V _I = V _{CC} or GND			±0.1		±1		±1	μΑ
I _{CC}	Quiescent supply current	6.0	V _I = V _{CC} or GND			4		40		80	μΑ

Electrical characteristics M74HC151

Table 7: AC electrical characteristics ($C_L = 50 \text{ pF}$, input $t_r = t_f = 6 \text{ ns}$)

		Took condition				Value				
Symbol	Parameter	Test condition		T _A = 25°	С	-40 to	85°C	-55 to	125°C	Unit
		V _{CC} (V)	Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
		2.0		30	75		95		110	
$t_{TLH} t_{THL}$	Output transition time	4.5		8	15		19		22	ns
		6.0		7	13		16		19	
		2.0		56	130		165		190	
$t_{\text{PLH}} t_{\text{PHL}}$	Propagation delay time (D – W)	4.5		16	26		33		38	ns
		6.0		14	22		28		32	
		2.0		56	130		165		190	
t _{PLH} t _{PHL} Propagation delay time (D – Y)	4.5		16	26		33		38	ns	
		6.0		14	22		28		32	
	Propagation delay time	2.0		30	85		105		125	
t _{PLH} t _{PHL}	(STROBE - W)	4.5		10	17		21		25	ns
		6.0		9	14		18		21	
	Dronagation delay time	2.0		30	85		105		125	
t _{PLH} t _{PHL}	Propagation delay time (STROBE - Y)	4.5		10	17		21		25	ns
	(0111052 1)	6.0		9	14		18		21	
		2.0		72	160		200		235	
t _{PLH} t _{PHL}	Propagation delay time (A, B, C – W)	4.5		20	32		40		47	ns
	(A, B, C – W)	6.0		17	27		34		40	
		2.0		72	160		200		235	
t _{PLH} t _{PHL}	Propagation delay time	4.5		20	32		40		47	ns
	(A, B, C – Y)	6.0		17	27		34		40	

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Table 8: Capacitive characteristics

		Test				Value				
Symbol Parameter		condition	dition T _A = 25°C		-40 to 85°C		-55 to 125°C		Unit	
		V _{CC} (V)	Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
C _{IN}	Input capacitance	5.0		5	10		10		10	pF
C _{PD}	Power dissipation capacitance ⁽¹⁾	5.0		63						pF

Notes:

 $V_{\rm CC}$ **PULSE** D.U.T. **GENERATOR**

Figure 4: Test circuit

- R_T = Z_{OUT} of pulse generator (typically 50 ohm)
 C_L = 50 pF or equivalent (includes jig and probe capacitance)

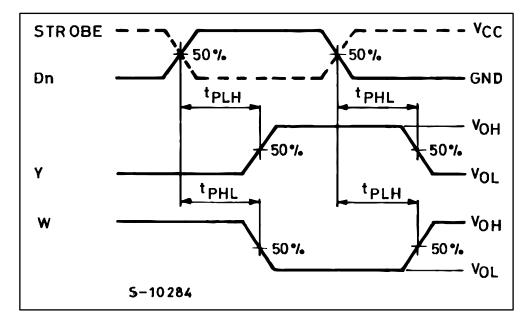
 $^{^{(1)}}C_{PD}$ is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load (refer to the test circuit). The average operating current can be obtained by the following equation: $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

Electrical characteristics M74HC151

Y or W

Figure 5: Waveform 1: propagation delay times (f = 1 MHz; 50% duty cycle)

Figure 6: Waveform 2: propagation delay times (f = 1 MHz; 50% duty cycle)



M74HC151 Package information

4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: **www.st.com**. ECOPACK® is an ST trademark.

4.1 SO16 package information

Figure 7: Plastic SO16 package mechanical outline

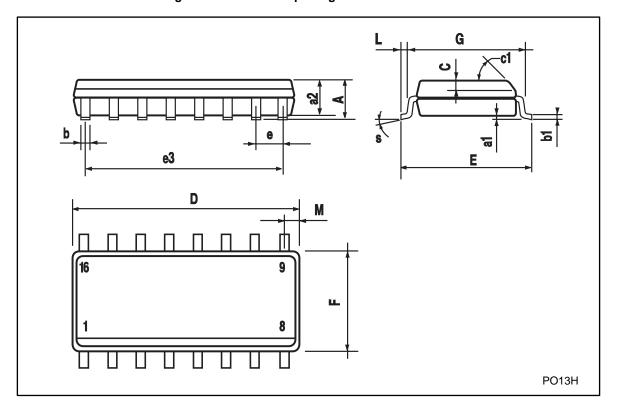


Table 9: Plastic SO16 package mechanical data

		mm. inches				
Dimensions	Min.	Тур.	Max.	Min.	Тур.	Max.
А			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
С		0.5			0.019	
c1			45	° (typ.)		
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
е		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S			8 °	(max.)		

M74HC151 Package information

4.2 TSSOP16 package information

Figure 8: TSSOP16 package mechanical outline

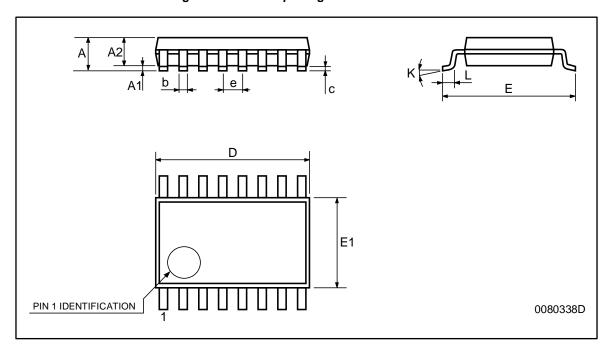


Table 10: TSSOP16 package mechanical data

	mm.			inches		
Dimensions	Min.	Тур.	Max.	Min.	Тур.	Max.
А			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
С	0.09		0.20	0.004		0.0089
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
е		0.65 BSC			0.0256 BSC	
К	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030

Revision history M74HC151

5 Revision history

Table 11: Document revision history

Date	Version	Change		
Jul-2001	1	Initial release		
01-Nov-2013	2	Added ESD performance to Section "Features"		
		Added automotive grade order codes, temperature ranges and marking information to <i>Table 1: "Device summary"</i>		
		Removed DIP16 package option		
		Revised document presentation, minor textual updates		

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