1. General description

The XD74LS154 is a 4-to-16 line deco der/demultiplexer. It decodes four binary weighted address inputs (A0 to A3) to sixteen mutually exclusive outputs ($\overline{Y0}$ to $\overline{Y15}$). The device features two input enable ($\overline{E0}$ and $\overline{E1}$) inputs. A HIGH on either of the input enables forces the outputs HIGH. The device can be used as a 1-to-16 demultiplexer by using one of the enable inputs as the multiplexed data input. When the other enable input is LOW the addressed output will follow the state of the applied data. Inputs include clamp diodes. This enables the use of current limiting resistors to interface inputs to voltages in excess of V_{CC}.

2. Features and benefits

- 16-line demultiplexing capability
- Decodes 4 binary-coded inputs into 16 mutually-exclusive outputs
- Complies with JEDEC standard no. 7A
- Input levels:
  - For XD74LS154: CMOS level
- ESD protection:
  - HBM JESD22-A114F exceeds 2000 V
  - MM JESD22-A115-A exceeds 200 V
- Multiple package options
- Specified from −40 °C to +85 °C

3. Functional diagram

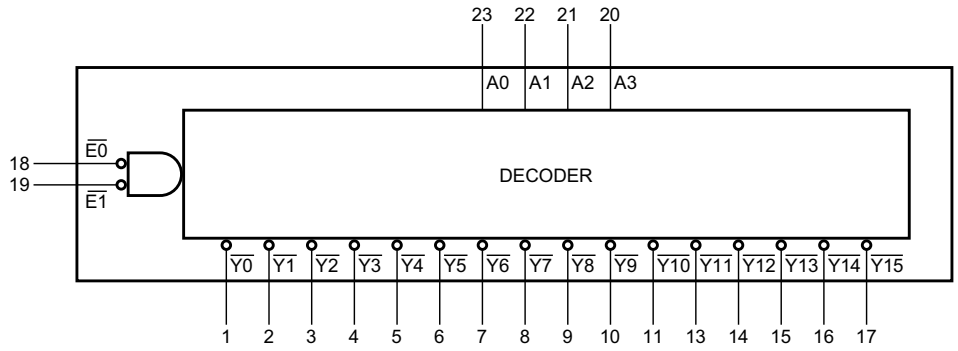


Fig 1. Functional diagram

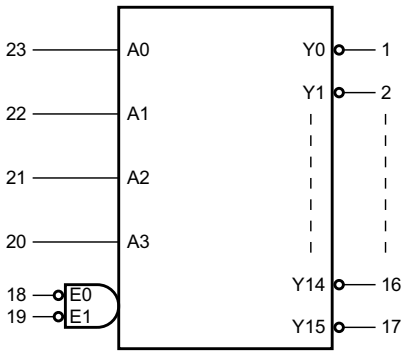


Fig 2. Logic symbol

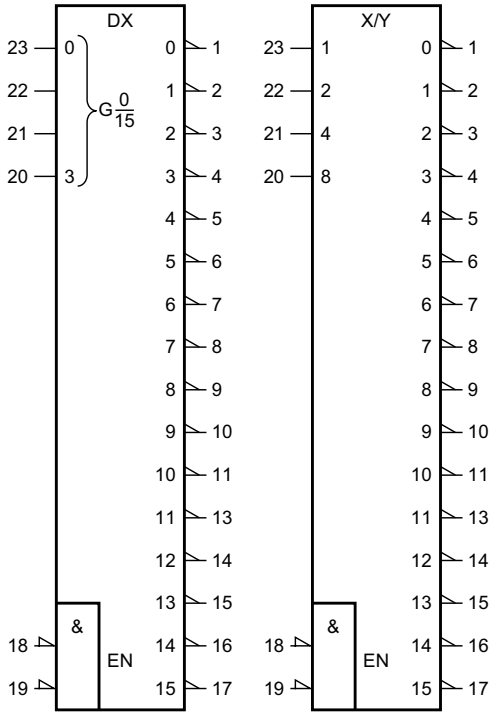


Fig 3. IEC logic symbol

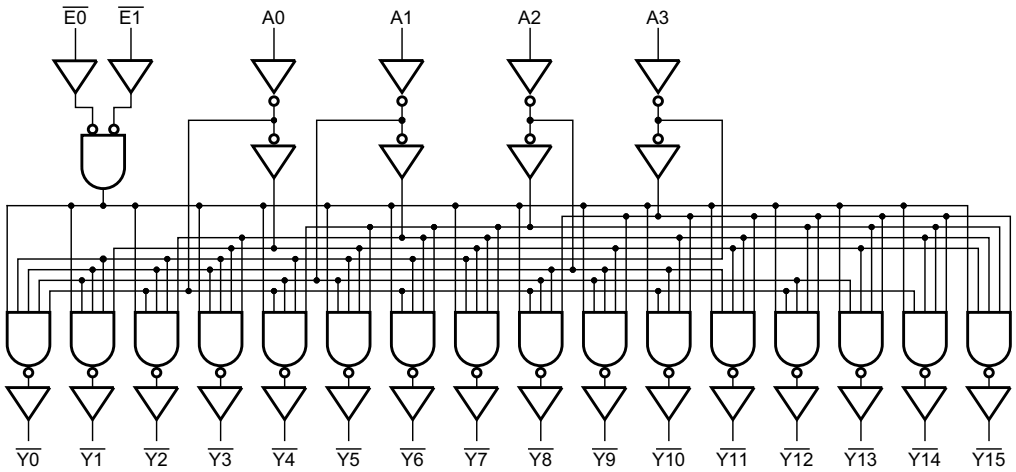


Fig 4. Logic diagram

4. Pinning information

4.1 Pinning

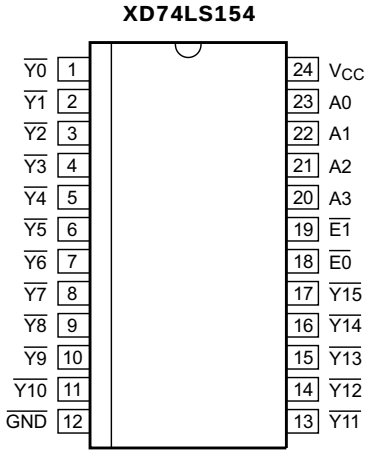


Fig 5. DIP24

4.2 Pin description

Table 1. Pin description

Symbol	Pin	Description
$\overline{Y0}$, $\overline{Y1}$, $\overline{Y2}$, $\overline{Y3}$, $\overline{Y4}$, $\overline{Y5}$, $\overline{Y6}$, $\overline{Y7}$, $\overline{Y8}$, $\overline{Y9}$, $\overline{Y10}$, $\overline{Y11}$, $\overline{Y12}$, $\overline{Y13}$, $\overline{Y14}$, $\overline{Y15}$	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17	data output (active LOW)
GND	12	ground (0 V)
$\overline{E0}$, $\overline{E1}$	18, 19	enable input (active LOW)
A0, A1, A2, A3	23, 22, 21, 20	address input
V_{CC}	24	supply voltage

5. Functional description

Table 2. Function table[1]

Input						Output															
$\overline{E0}$	$\overline{E1}$	A0	A1	A2	A3	$\overline{Y0}$	$\overline{Y1}$	$\overline{Y2}$	$\overline{Y3}$	$\overline{Y4}$	$\overline{Y5}$	$\overline{Y6}$	$\overline{Y7}$	$\overline{Y8}$	$\overline{Y9}$	$\overline{Y10}$	$\overline{Y11}$	$\overline{Y12}$	$\overline{Y13}$	$\overline{Y14}$	$\overline{Y15}$
H	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
H	L	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	H	X	X	X	X	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
		H	L	L	L	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H
		L	H	L	L	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	H
		H	H	L	L	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H	H
		L	L	H	L	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H	H
		H	L	H	L	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H	H
		L	H	H	L	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H	H
		H	H	H	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	H
		L	L	L	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H
		H	L	L	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H	H
		L	H	L	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H	H
		H	H	L	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H	H
		L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H	H
		H	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H	H
		L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	H
		H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L

[1] H = HIGH voltage level
L = LOW voltage level
X = don’t care.

6. Limiting values

Table 3. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{CC}	supply voltage			−0.5	+7.0	V
I_{IK}	input clamping current	$V_I < -0.5$ V or $V_I > V_{CC} + 0.5$ V	[1]	-	±20	mA
I_{OK}	output clamping current	$V_O < -0.5$ V or $V_O > V_{CC} + 0.5$ V	[1]	-	±20	mA
I_O	output current	-0.5 V $< V_O < V_{CC} + 0.5$ V	[1]	-	±25	mA
I_{CC}	supply current		[1]	-	50	mA
I_{GND}	ground current		[1]	-	−50	mA
T_{stg}	storage temperature			−65	+150	°C
P_{tot}	total power dissipation	T_{amb} = −40 °C to +125 °C	[2]	-	300	mW

The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

7. Recommended operating conditions

Table 4. Recommended operating conditions

Voltages are referenced to GND (ground = 0 V)

Symbol	Parameter	Conditions	XD74LS154			Unit
			Min	Typ	Max	
V_{CC}	supply voltage		2.0	5.0	6.0	V
V_I	input voltage		0	-	V_{CC}	V
V_O	output voltage		0	-	V_{CC}	V
T_{amb}	ambient temperature		−40	+25	+125	°C
$\Delta t/\Delta V$	input transition rise and fall rate	V_{CC} = 2.0 V	-	-	625	ns/V
		V_{CC} = 4.5 V	-	1.67	139	ns/V
		V_{CC} = 6.0 V	-	-	83	ns/V

8. Static characteristics

Table 5. Static characteristics XD74LS154

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
T_{amb} = 25 °C							
V_{IH}	HIGH-level input voltage	V_{CC} = 2.0 V		1.5	1.2	-	V
		V_{CC} = 4.5 V		3.15	2.4	-	V
		V_{CC} = 6.0 V		4.2	3.2	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 2.0 V		-	0.8	0.5	V
		V_{CC} = 4.5 V		-	2.1	1.35	V
		V_{CC} = 6.0 V		-	2.8	1.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}					
		V_{CC} = 2.0 V; I_O = −20 μA		1.9	2.0	-	V
		V_{CC} = 4.5 V; I_O = −20 μA		4.4	4.5	-	V
		V_{CC} = 6.0 V; I_O = −20 μA		5.9	6.0	-	V
		V_{CC} = 4.5 V; I_O = −4.0 mA		3.98	4.32	-	V
		V_{CC} = 6.0 V; I_O = −5.2 mA		5.48	5.81	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}					
		V_{CC} = 2.0 V; I_O = 20 μA		-	0	0.1	V
		V_{CC} = 4.5 V; I_O = 20 μA		-	0	0.1	V
		V_{CC} = 6.0 V; I_O = 20 μA		-	0	0.1	V
		V_{CC} = 4.5 V; I_O = 4.0 mA		-	0.15	0.26	V
		V_{CC} = 6.0 V; I_O = 5.2 mA		-	0.16	0.26	V
I_I	input leakage current	V_{CC} = 6.0 V; $V_I = V_{CC}$ or GND		-	-	±0.1	μA
I_{CC}	supply current	V_{CC} = 6.0 V; $V_I = V_{CC}$ or GND; I_O = 0 A		-	-	8.0	μA
C_I	input capacitance			-	3.5	-	pF
T_{amb} = −40 °C to +85 °C							
V_{IH}	HIGH-level input voltage	V_{CC} = 2.0 V		1.5	-	-	V
		V_{CC} = 4.5 V		3.15	-	-	V
		V_{CC} = 6.0 V		4.2	-	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 2.0 V		-	-	0.5	V
		V_{CC} = 4.5 V		-	-	1.35	V
		V_{CC} = 6.0 V		-	-	1.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}					
		V_{CC} = 2.0 V; I_O = −20 μA		1.9	-	-	V
		V_{CC} = 4.5 V; I_O = −20 μA		4.4	-	-	V
		V_{CC} = 6.0 V; I_O = −20 μA		5.9	-	-	V
		V_{CC} = 4.5 V; I_O = −4.0 mA		3.84	-	-	V
		V_{CC} = 6.0 V; I_O = −5.2 mA		5.34	-	-	V

Table 6. Static characteristics XD74LS154 *…continued*

At recommended operating conditions; voltages are referenced to GND (ground = 0 V).

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 2.0 V; I_O = 20 μA	-	-	0.1	V
		V_{CC} = 4.5 V; I_O = 20 μA	-	-	0.1	V
		V_{CC} = 6.0 V; I_O = 20 μA	-	-	0.1	V
		V_{CC} = 4.5 V; I_O = 4.0 mA	-	-	0.33	V
		V_{CC} = 6.0 V; I_O = 5.2 mA	-	-	0.33	V
I_I	input leakage current	V_{CC} = 6.0 V; $V_I = V_{CC}$ or GND	-	-	±1.0	μA
I_{CC}	supply current	V_{CC} = 6.0 V; $V_I = V_{CC}$ or GND; I_O = 0 A	-	-	80	μA
T_{amb} = −40 °C to +125 °C						
V_{IH}	HIGH-level input voltage	V_{CC} = 2.0 V	1.5	-	-	V
		V_{CC} = 4.5 V	3.15	-	-	V
		V_{CC} = 6.0 V	4.2	-	-	V
V_{IL}	LOW-level input voltage	V_{CC} = 2.0 V	-	-	0.5	V
		V_{CC} = 4.5 V	-	-	1.35	V
		V_{CC} = 6.0 V	-	-	1.8	V
V_{OH}	HIGH-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 2.0 V; I_O = −20 μA	1.9	-	-	V
		V_{CC} = 4.5 V; I_O = −20 μA	4.4	-	-	V
		V_{CC} = 6.0 V; I_O = −20 μA	5.9	-	-	V
		V_{CC} = 4.5 V; I_O = −4.0 mA	3.7	-	-	V
		V_{CC} = 6.0 V; I_O = −5.2 mA	5.2	-	-	V
V_{OL}	LOW-level output voltage	$V_I = V_{IH}$ or V_{IL}				
		V_{CC} = 2.0 V; I_O = 20 μA	-	-	0.1	V
		V_{CC} = 4.5 V; I_O = 20 μA	-	-	0.1	V
		V_{CC} = 6.0 V; I_O = 20 μA	-	-	0.1	V
		V_{CC} = 4.5 V; I_O = 4.0 mA	-	-	0.4	V
		V_{CC} = 6.0 V; I_O = 5.2 mA	-	-	0.4	V
I_I	input leakage current	V_{CC} = 6.0 V; $V_I = V_{CC}$ or GND	-	-	±0.1	μA
I_{CC}	supply current	V_{CC} = 6.0 V; $V_I = V_{CC}$ or GND; I_O = 0 A	-	-	160	μA

9. Dynamic characteristics

Table 7. Dynamic characteristics

GND (ground = 0 V); C_L = 50 pF unless otherwise specified; for test circuit, see Figure8 .

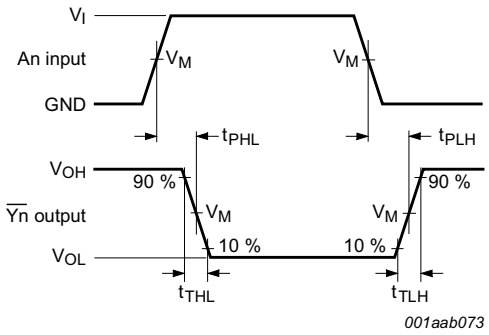
Symbol	Parameter	Conditions	25 °C			–40°C to + 8 5°C		Unit
			Min	Typ	Max	Min	Max (85 °C)	
XD74LS154								
t_{pd}	propagation delay	An to $\overline{Yn}$; see Figure6 [1]						
		V_{CC} = 2.0 V	-	36	150	-	190	ns
		V_{CC} = 4.5 V	-	13	30	-	38	ns
		V_{CC} = 5 V; C_L = 15 pF	-	11	-	-	-	ns
		V_{CC} = 6.0 V	-	10	26	-	33	ns
		$\overline{En}$ to $\overline{Yn}$; see Figure7						
		V_{CC} = 2.0 V	-	39	150	-	190	ns
		V_{CC} = 4.5 V	-	14	30	-	38	ns
		V_{CC} = 5 V; C_L = 15 pF	-	11	-	-	-	ns
		V_{CC} = 6.0 V	-	11	26	-	33	ns
t_t	transition time	see Figure6 and 7 [2]						
		V_{CC} = 2.0 V	-	19	75	-	95	ns
		V_{CC} = 4.5 V	-	7	15	-	19	ns
		V_{CC} = 6.0 V	-	6	13	-	16	ns
C_{PD}	power dissipation capacitance	per gate; V_I = GND to V_{CC} [3]	-	60	-	-	-	pF

[1] t_{pd} is the same as t_{PLH} and t_{PHL}

[2] t_t is the same as t_{TLH} and t_{THL}

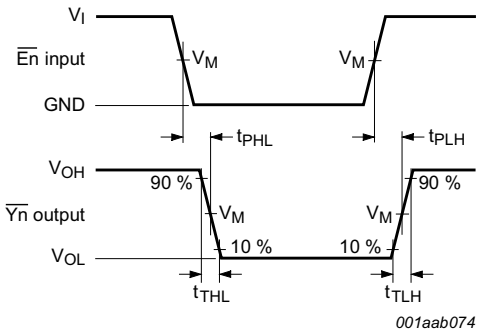
[3] C_{PD} is used to determine the dynamic power dissipation (P_D in μW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i \times N + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:
f_i = input frequency in MHz;
f_o = output frequency in MHz;
C_L = output load capacitance in pF;
V_{CC} = supply voltage in V;
N = number of load switching outputs;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

10. Waveforms



Measurement points are given in Table 9.

Fig 6. Propagation delay address input (An) to output (Yn) and transition time output (Yn)

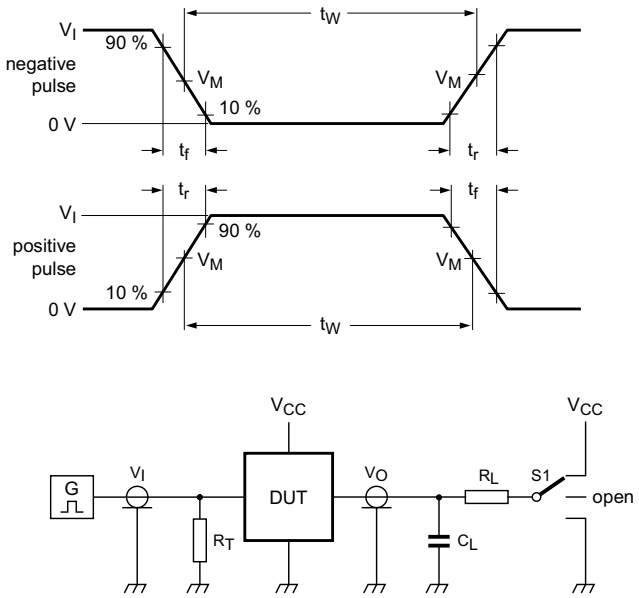


Measurement points are given in Table 9.

Fig 7. Propagation delay enable input ($\overline{En}$) to output (Yn) and transition time output (Yn)

Table 8. Measurement points

Type	Input	Output
	V_M	V_M
XD74LS154	$0.5V_{CC}$	$0.5V_{CC}$



Test data is given in Table 10.

Definitions for test circuit:

R_T = Termination resistance; should be equal to output impedance Z_o of the pulse generator.

C_L = Load capacitance including jig and probe capacitance.

R_L = Load resistor.

S1 = Test selection switch.

Fig 8. Test circuit for measuring switching times

Table 9. Test data

Type	Input		Load		S1 position
	V_I	t_r, t_f	C_L	R_L	t_{PHL}, t_{PLH}
XD74LS154	V_{CC}	6 ns	15 pF, 50 pF	1 kΩ	open

11. Application information

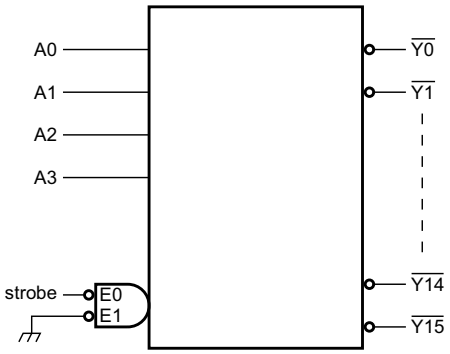


Fig 9. 1-of-16 decoder; LOW level output selected

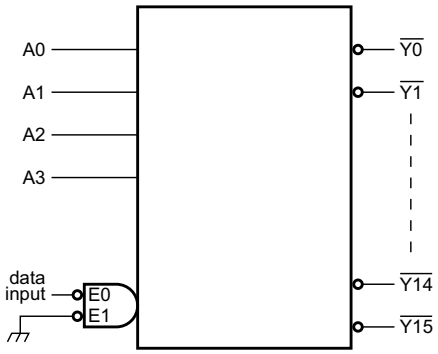
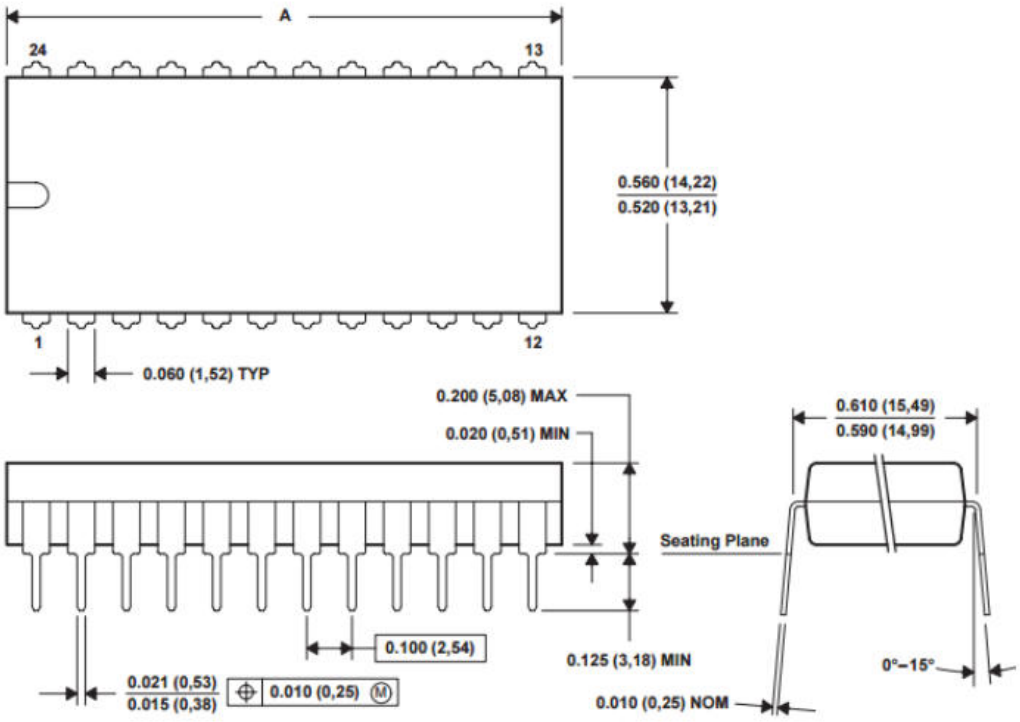


Fig 10. 1-of-16 demultiplexer; logic level on selected outputs follow the logic level on the data input



DIM \ PINS **	24	28	32	40	48	52
A MAX	1.270 (32,26)	1.450 (36,83)	1.650 (41,91)	2.090 (53,09)	2.450 (62,23)	2.650 (67,31)
A MIN	1.230 (31,24)	1.410 (35,81)	1.610 (40,89)	2.040 (51,82)	2.390 (60,71)	2.590 (65,79)

以上信息仅供参考.如需帮助联系客服人员。谢谢 XINLUDA

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