National Semiconductor

December 1989

DM74ALS137 3 to 8 Line Decoder/Demultiplexer with Address Latches

General Description

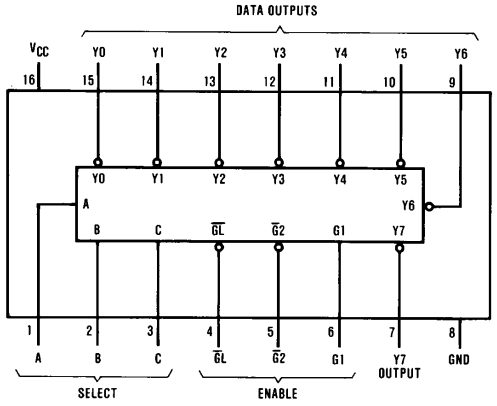
The ALS137 is a three line to eight line decoder/demultiplexer with latches on the three address inputs. When the latch-enable input ($\overline{GL}$) is low, the ALS137 acts as a decoder/demultiplexer. When $\overline{GL}$ goes from low to high, the address present at the select inputs (A, B, and C) is stored in the latches. Further address changes are ignored as long as $\overline{GL}$ remains high. The output enable controls, G1 and $\overline{G2}$, control the state of the outputs independently of the select or latch-enable inputs. All of the outputs are high unless G1 is high and $\overline{G2}$ is low. The ALS137 is ideally suited for implementing glitch-free decoders in strobed (stored-address) applications in bus-oriented systems.

Features

- Combines decoder and 3-bit address latch
- Incorporates 3 enable inputs to simplify cascading
- Low power dissipation .....28 mW typ
- Switching specifications guaranteed over full temperature and V_{CC} range
- Advanced oxide-isolated, ion-implanted Schottky TTL process

Connection Diagram

Dual-In-Line Package



TL/F/6202–1

Order Number DM74ALS137M or DM74ALS137N
See NS Package Number M16A or N16A

Function Table

Inputs						Outputs							
Enable			Select										
$\overline{GL}$	G1	$\overline{G2}$	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	X	H	X	X	X	H	H	H	H	H	H	H	H
X	L	X	X	X	X	H	H	H	H	H	H	H	H
L	H	L	L	L	L	L	H	H	H	H	H	H	H
L	H	L	L	L	H	H	L	H	H	H	H	H	H
L	H	L	L	H	L	H	H	L	H	H	H	H	H
L	H	L	L	H	H	H	H	H	L	H	H	H	H
L	H	L	H	L	L	H	H	H	H	L	H	H	H
L	H	L	H	L	H	H	H	H	H	H	L	H	H
L	H	L	H	H	L	H	H	H	H	H	H	L	H
L	H	L	H	H	H	H	H	H	H	H	H	H	L
H	H	L	X	X	X	Output corresponding to stored address, L; all others, H							

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

RRD-B30M105/Printed in U. S. A.

Absolute Maximum Ratings

Supply Voltage	7V
Input Voltage	7V
Operating Free Air Temperature Range	
DM74ALS	0°C to +70°C
Storage Temperature Range	−65°C to +150°C
Typical θ_{JA}	
N Package	75.5°C/W
M Package	104.0°C/W

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		Min	Nom	Max	Units
V_{CC}	Supply Voltage		4.5	5	5.5	V
V_{IH}	High Level Input Voltage		2			V
V_{IL}	Low Level Input Voltage				0.8	V
I_{OH}	High Level Output Current				−0.4	mA
I_{OL}	Low Level Output Current				8	mA
t_W	Width of Enabling Pulse	$\overline{GL}$ Low	10			ns
t_{SU}	Setup Time	A, B, C	10 ↑			ns
t_H	Hold Time	A, B, C	5 ↑			ns
T_A	Free Air Operating Temperature		0		70	°C

The arrow (↑) indicates the positive edge of the $\overline{GL}$ input pulse is used for reference.

Electrical Characteristics

over recommended operating free air temperature range. All typical values are measured at V_{CC} = 5V, T_A = 25°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	I_{OH} = −0.4 mA V_{CC} = 4.5V to 5.5V		V_{CC} − 2			V
V_{OL}	Low Level Output Voltage	V_{CC} = 4.5V	I_{OL} = 4 mA		0.25	0.4	V
			I_{OL} = 8 mA		0.35	0.5	V
I_I	Input Current @ Max. Input Voltage	V_{CC} = 5.5V V_{IH} = 7V	Enable			0.1	mA
			A, B, C			0.1	
I_{IH}	High Level Input Current	V_{CC} = 5.5V V_{IH} = 2.7V	Enable			20	μA
			A, B, C			20	
I_{IL}	Low Level Input Current	V_{CC} = 5.5V V_{IL} = 0.4V	Enable			−0.1	mA
			A, B, C			−0.1	
I_O	Output Drive Current	V_{CC} = 5.5V, V_O = 2.25V		−30		−112	mA
I_{CC}	Supply Current	V_{CC} = 5.5V			5	11	mA

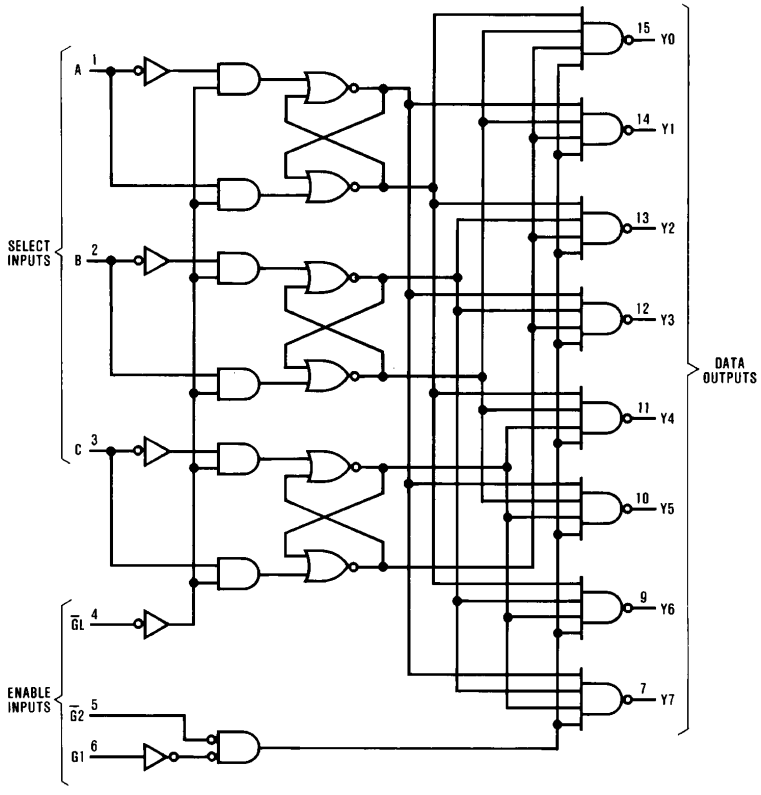
Switching Characteristics

over recommended operating free air temperature range (Note 1).

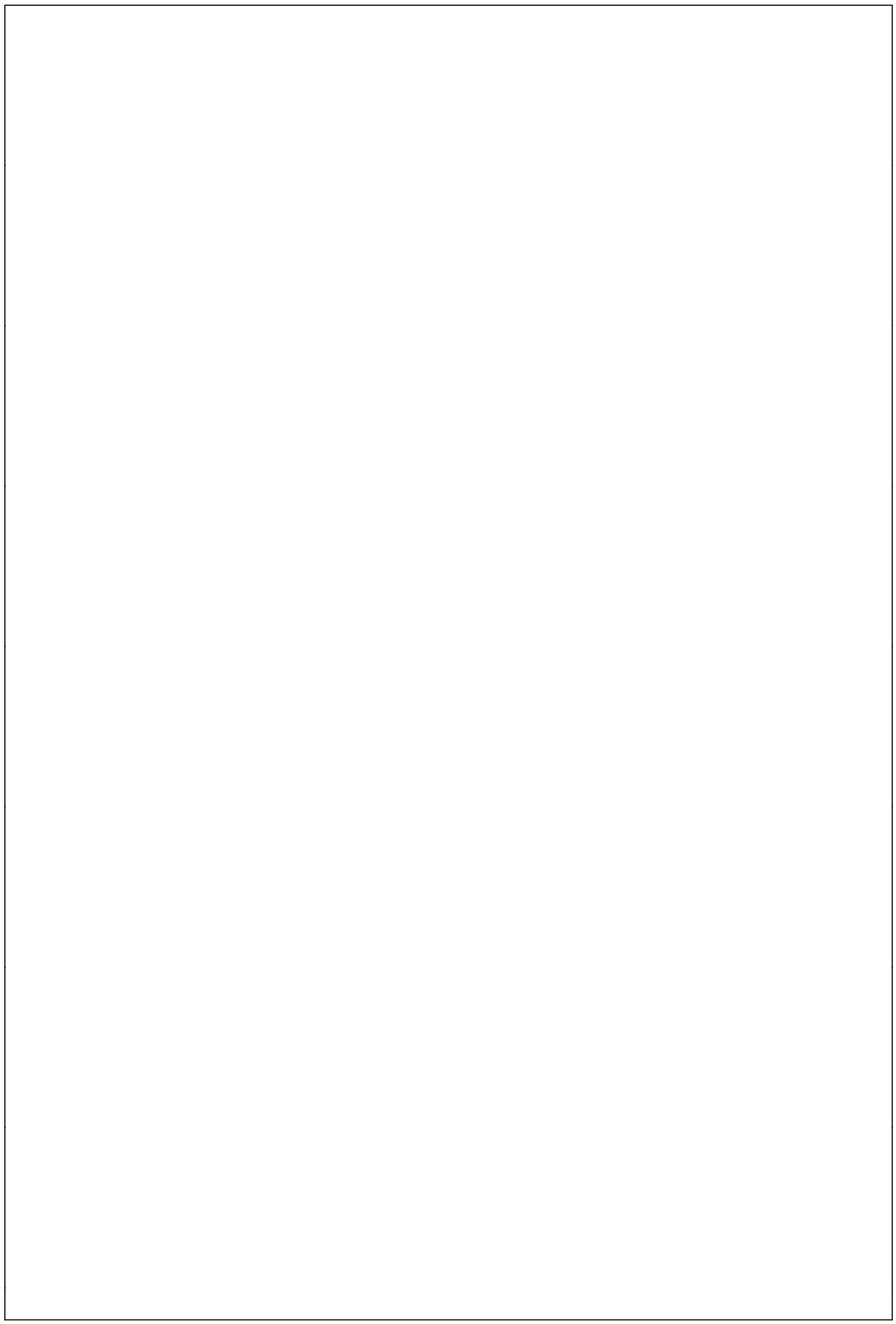
Symbol	Parameter	Conditions	From (Input) To (Output)	Min	Max	Units
t_{PLH}	Propagation Delay Time Low to High Level Output	V_{CC} = 4.5V to 5.5V R_L = 500Ω C_L = 50 pF	A, B, C to Y	5	20	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		A, B, C to Y	6	20	ns
t_{PLH}	Propagation Delay Time Low to High Level Output		$\overline{G2}$ to Y	4	12	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		$\overline{G2}$ to Y	5	15	ns
t_{PLH}	Propagation Delay Time Low to High Level Output		G1 to Y	5	17	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		G1 to Y	5	15	ns
t_{PLH}	Propagation Delay Time Low to High Level Output		$\overline{GL}$ to Y	7	22	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		$\overline{GL}$ to Y	7	20	ns

Note 1: See Section 5 for test waveforms and output load.

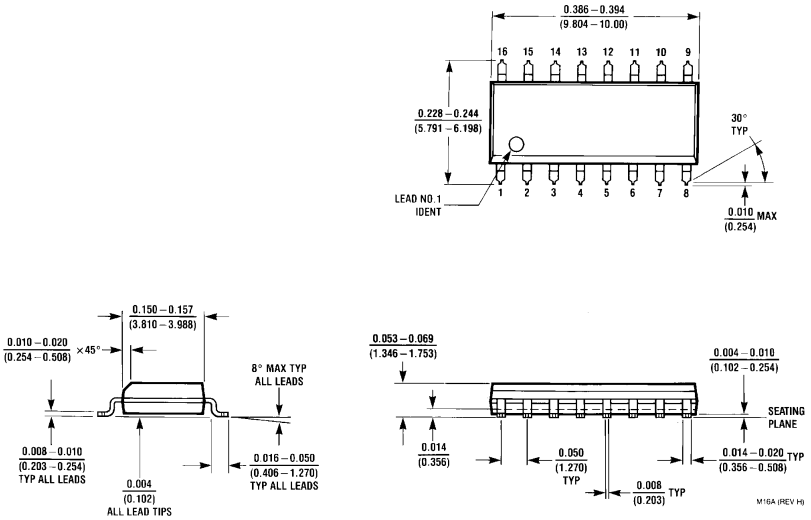
Logic Diagram



TL/F/6202–2

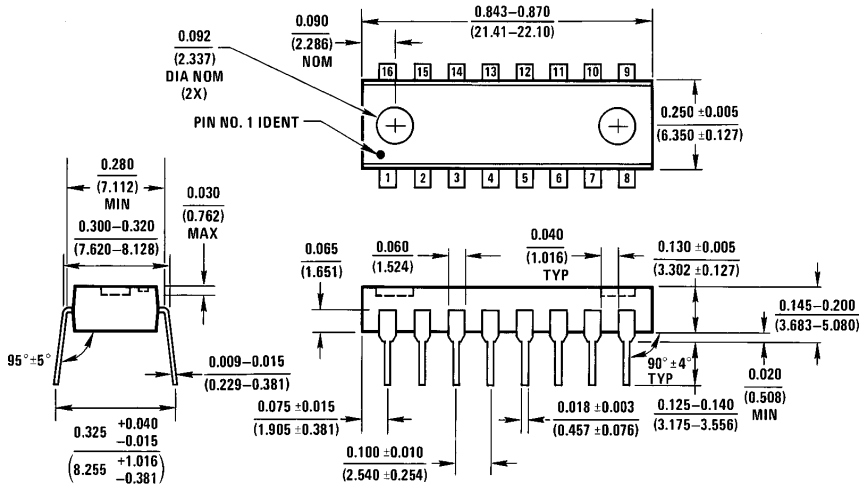


Physical Dimensions inches (millimeters)



S.O. Package (M)
Order Number DM74ALS137M
NS Package Number M16A

Physical Dimensions inches (millimeters) (Continued)



N16A (REV E)

Molded Dual-In-Line Package (N)
Order Number DM74ALS137N
NS Package Number N16A

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National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

National Semiconductor Europe
Fax: (+49) 0-180-530 85 86
Email: cnjwge@tevm2.nsc.com
Deutsch Tel: (+49) 0-180-530 85 85
English Tel: (+49) 0-180-532 78 32
Français Tel: (+49) 0-180-532 93 58
Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
Tel: 81-043-299-2309
Fax: 81-043-299-2408