



T-43-15-00

DM74ALS136 Quad 2-Input Exclusive-OR Gate with Open-Collector Outputs

General Description

This device contains four independent gates, each of which performs the logic exclusive-OR function. The open-collector outputs require external pull-up resistors for proper logical operation.

Pull-Up Resistor Equations

$$R_{MAX} = \frac{V_{CC} (Min) - V_{OH}}{N_1 (I_{OH}) + N_2 (I_{IH})}$$

$$R_{MIN} = \frac{V_{CC} (Max) - V_{OL}}{I_{OL} - N_3 (I_{IL})}$$

Where: $N_1 (I_{OH})$ = total maximum output high current for all outputs tied to pull-up resistor

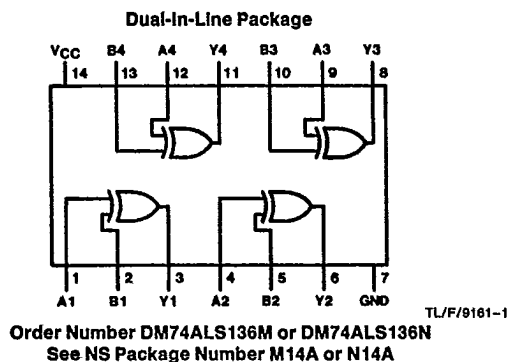
$N_2 (I_{IH})$ = total maximum input high current for all inputs tied to pull-up resistor

$N_3 (I_{IL})$ = total maximum input low current for all inputs tied to pull-up resistor

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 TTL counterpart
- Improved AC performance over Schottky and low power Schottky counterparts

Connection Diagram



Function Table

$$Y = A \oplus B$$

Inputs		Output
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	L

H = High Logic Level

L = Low Logic Level

Absolute Maximum Ratings

Supply Voltage	7V
Input Voltage	7V
High Level Output Voltage	7V
Operating Free Air Temperature Range	0°C to +70°C
DM74ALS	
Storage Temperature Range	-65°C to +150°C
Typical θ_{JA}	87.0°C/W
N Package	
M Package	117.2°C/W

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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	DM74ALS136			Units
		Min	Nom	Max	
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
V _{OH}	High Level Output Voltage			5.5	V
I _{OL}	Low Level Output Current			8	mA
T _A	Free Air Operating Temperature	0		70	°C

Electrical Characteristics over recommended operating free air temperature (unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V _I	Input Clamp Voltage	V _{CC} = Min, I _I = -18 mA			-1.5	V
I _{CEX}	High Level Output Current	V _{CC} = Min, V _O = 5.5V V _{IL} = Max, V _{IH} = Min			100	μA
V _{OL}	Low Level Output Voltage	V _{CC} = Min, V _{OL} = Max, V _{IL} = Max, V _{IH} = Min	I _{OL} = 4 mA	0.25	0.4	V
			I _{OL} = 8 mA	0.35	0.5	V
I _I	Input Current at Max Input Voltage	V _{CC} = Max, V _I = 7V			0.1	mA
I _{IH}	High Level Input Current	V _{CC} = Max, V _I = 2.7V			20	μA
I _{IL}	Low Level Input Current	V _{CC} = Max, V _I = 0.4V			-0.1	mA
I _{CCL}	Supply Current with Outputs Low	V _{CC} = Max, (Note 2)		3.9	5.9	mA
I _{CCH}	Supply Current with Outputs High	V _{CC} = Max, (Note 3)		3.8	4.7	mA

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: I_{CCL} is measured with all inputs at 4.5V and the outputs open.

Note 3: I_{CCH} is measured with A inputs at ground and B inputs at 4.5V and all outputs open.

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Switching Characteristics over recommended operating free air temperature range

Symbol	Parameter	Conditions	DM74ALS136		Units
			Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	$V_{CC} = 4.5V$ to $5.5V$ $R_L = 2\text{ k}\Omega$ $C_L = 50\text{ pF}$ Other Input Low	20	50	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		3	15	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	$V_{CC} = 4.5V$ to $5.5V$ $R_L = 2\text{ k}\Omega$ $C_L = 50\text{ pF}$ Other Input High	20	50	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		3	12	ns