T-43-15-00

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National Semiconductor

DM74ALS811 Quad 2-Input Exclusive-NOR Gate with Open-Collector Outputs

General Description

This device contains four independent gates, each of which performs the logic exclusive-NOR 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

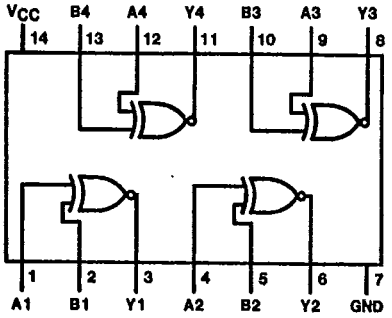
$N_3\,(I_{IL})$ = total maximum input low current for all inputs tied to pull-up resistor

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

Connection Diagram

Dual-In-Line Package



TL/F/6715–1

Order Number DM74ALS811M or DM74ALS811N
See NS Package Number M14A or N14A

Function Table

$$\overline{Y} = A \oplus B$$

Inputs		Output
A	B	$\overline{Y}$
L	L	H
L	H	L
H	L	L
H	H	H

H = High Logic Level

L = Low Logic Level

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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	87.2°C/W
M Package	117.2°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	DM74ALS811			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_{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_{IH} = 7V				0.1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_{IH} = 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)			5	7.5	mA
I_{CCH}	Supply Current with Outputs High	V_{CC} = Max (Note 3)			4.6	5.6	mA

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

Note 2: I_{CCL} is measured with all outputs open, one input of each gate at 4.5V, and the other inputs grounded.

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

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Switching Characteristics over recommended operating free air temperature range

Symbol	Parameter	Conditions	DM74ALS811		Units
			Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	Other Input Low V_{CC} = 4.5V to 5.5V R_L = 500Ω C_L = 50 pF	25	55	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		5	28	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Other Input High V_{CC} = 4.5V to 5.5V R_L = 500Ω C_L = 50 pF	20	50	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		5	23	ns

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