National Semiconductor

DM54S65/DM74S65 4-Wide AND-OR-INVERT Gates with Open-Collector Outputs

General Description

This device contains a combination of gates which performs the logic AND-OR-INVERT function. The open-collector output requires an external pull-up resistor 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

Absolute Maximum Ratings (Note 1)

Supply Voltage	7V
Input Voltage	5.5V
Output Voltage	7V
Storage Temperature Range	−65°C to 150°C

Note 1: The "Absolute Maximum Ratings" are those values beyond which the safety of the device can not 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.

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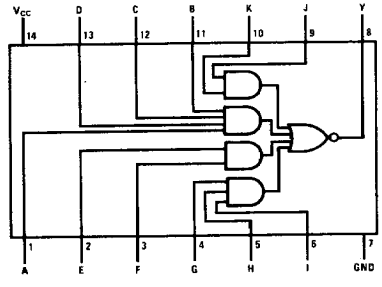
Connection Diagram

Dual-In-Line Package



TL/F/6456-1

DM54S65 (J) DM74S65 (N)

Function Table

$$Y = \overline{ABCD + EF + GHI + JK}$$

Inputs											Output
A	B	C	D	E	F	G	H	I	J	K	Y
H	H	H	H	X	X	X	X	X	X	X	L
X	X	X	X	H	H	X	X	X	X	X	L
X	X	X	X	X	X	H	H	H	X	X	L
X	X	X	X	X	X	X	X	X	H	H	L
All other combinations											H

H = High Logic Level

L = Low Logic Level

X = Either Low or High Logic Level

Recommended Operating Conditions

Sym	Parameter	DM54S65			DM74S65			Units
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.8			0.8	V
V_{OH}	High Level Output Voltage			5.5			5.5	V
I_{OL}	Low Level Output Current			20			20	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C

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

Sym	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA			−1.2	V
I_{CEX}	High Level Output Current	V_{CC} = Min, V_O = 5.5V V_{IL} = Max			250	μA
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max V_{IH} = Min			0.5	V
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 5.5V			1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.7V			50	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.5V			−2	mA
I_{CCH}	Supply Current With Outputs High	V_{CC} = Max		6	11	mA
I_{CCL}	Supply Current With Outputs Low	V_{CC} = Max		8.5	16	mA

Switching Characteristics at V_{CC} = 5V and T_A = 25°C (See Section 1 for Test Waveforms and Output Load)

Parameter	R_L = 280Ω						Units
	C_L = 15 pF			C_L = 50 pF			
	Min	Typ	Max	Min	Typ	Max	
t_{PLH} Propagation Delay Time Low to High Level Output	2	5	7.5	3	8	12	ns
t_{PHL} Propagation Delay Time High to Low Level Output	2	5.5	8.5	3	6.5	10	ns

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