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National Semiconductor

June 1989

DM5417/DM7417 Hex Buffers with High Voltage Open-Collector Outputs

General Description

This device contains six independent gates each of which performs a buffer function. The open-collector outputs require external pull-up resistors for proper logical operation.

Pull-Up Resistor Equations

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

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

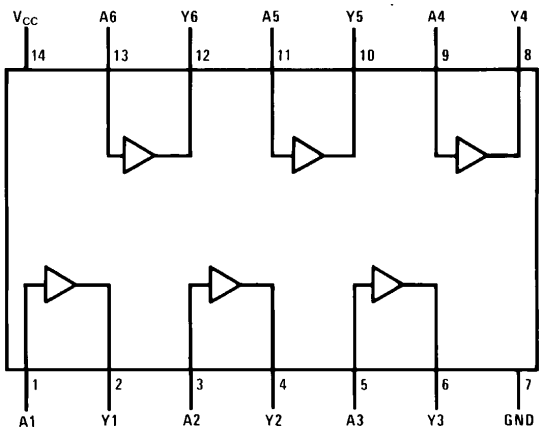
Where: $N_1\,(I_{OH})$ = total maximum output high current for all outputs tied to pull-up resistor

$N_2\,(I_{IH})$ = 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

Connection Diagram

Dual-In-Line Package



TL/F/6505–1

Order Number DM5417J, DM5417W or DM7417N
See NS Package Number J14A, N14A or W14B

Function Table

Y = A

Input	Output
A	Y
L	L
H	H

H = High Logic Level

L = Low Logic Level

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Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7V
Input Voltage	5.5V
Output Voltage	15V
Operating Free Air Temperature Range	
DM54	−55°C to +125°C
DM74	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

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	DM5417			DM7417			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			15			15	V
I_{OL}	Low Level Output Current			30			40	mA
T_A	Free Air Operating Temperature	−55		125	0		70	°C

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

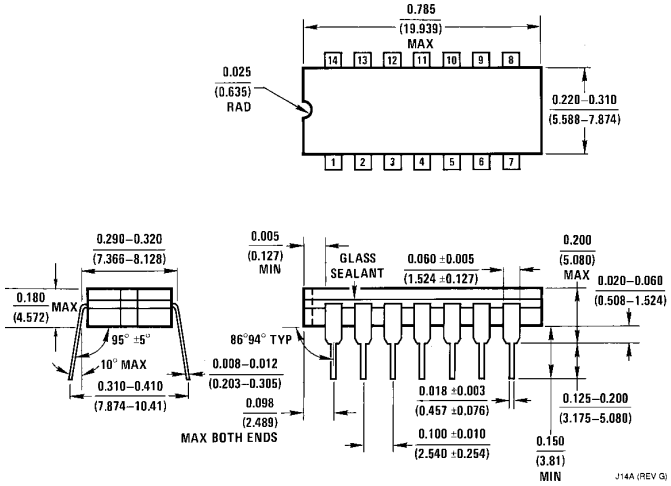
Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −12 mA			−1.5	V
I_{CEX}	High Level Output Current	V_{CC} = Min, V_O = 15V V_{IH} = Min			250	μA
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max V_{IL} = Max			0.7	V
		I_{OL} = 16 mA, V_{CC} = Min			0.4	
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 = 2.4V			40	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.4V			−1.6	mA
I_{CCH}	Supply Current with Outputs High	V_{CC} = Max		29	41	mA
I_{CCL}	Supply Current with Outputs Low	V_{CC} = Max		21	30	mA

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

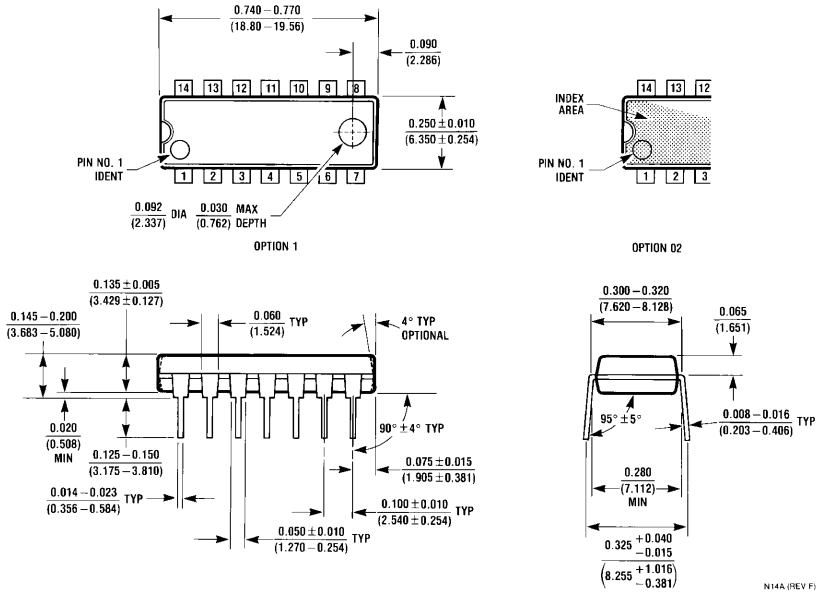
Symbol	Parameter	Conditions	Min	Max	Units
t_{PLH}	Propagation Delay Time Low to High Level Output	C_L = 15 pF R_L = 110Ω		10	ns
t_{PHL}	Propagation Delay Time High to Low Level Output			30	ns

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

Physical Dimensions inches (millimeters)

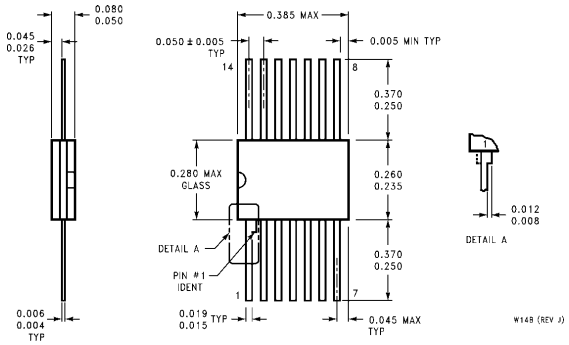


14-Lead Ceramic Dual-In-Line Package (J)
Order Number DM5417J
NS Package Number J14A



14-Lead Molded Dual-In-Line Package (N)
Order Number DM7417N
NS Package Number N14A

Physical Dimensions inches (millimeters) (Continued)



14-Lead Ceramic Flat Package (W)
Order Number DM5417W
NS Package Number W14B

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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

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