National Semiconductor

August 1986

DS8669 2-Digit BCD to 7-Segment Decoder/Driver

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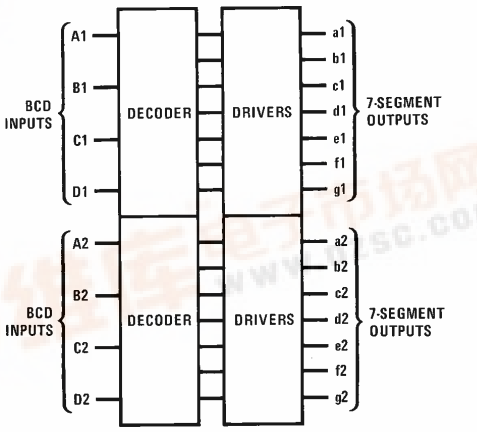
General Description

The DS8669 is a 2-digit BCD to 7-segment decoder/driver for use with common anode LED displays. The DS8669 drives 2 7-segment LED displays without multiplexing. Outputs are open-collector, and capable of sinking 25 mA/segment. Applications include TV and CB channel displays.

Features

- Direct 7-segment drive
- 25 mA/segment current sink capability
- Low power requirement—16 mA typ
- Very low input currents—2 μA typ
- Input clamp diodes to both V_{CC} and ground
- No multiplexing oscillator noise

Logic and Connection Diagrams



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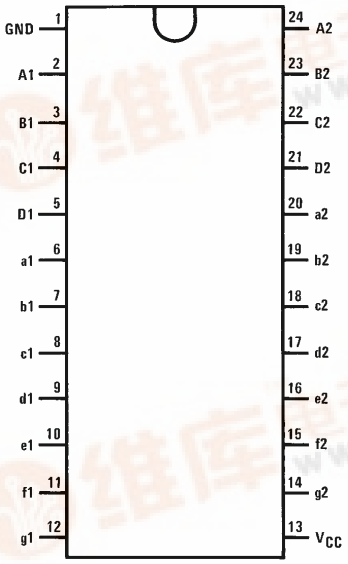
Dual-In-Line Package



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Top View

Order Number DS8669N
See NS Package Number N24A

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

Absolute Maximum Ratings (Note 1)

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

Supply Voltage	7V
Input Current	20 mA
Output Voltage	12V
Storage Temperature Range	−65°C to +150°C
Maximum Power Dissipation* at 25°C	
Molded Package	2005 mW
Lead Temperature (Soldering, 10 seconds)	300°C

*Derate molded package 16.04 mW/°C above 25°C.

Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})	4.5	6.0	V
Temperature (T_A)	0	+70	°C

Electrical Characteristics V_{CC} = 5.25V, (Note 2)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IH}	Logical "1" Input Voltage	V_{CC} = Min	2.0		V_{CC} + 0.6	V
V_{IL}	Logical "0" Input Voltage	V_{CC} = Min	−0.3		0.8	V
I_O	Logical "1" Output Leakage Current	V_{CC} = Max, V_{OUT} = 10V			50	μA
V_{OL}	Logical "0" Output Voltage	I_{OL} = 25 mA, V_{CC} = Min		0.4	0.8	V
I_{IH}	Logical "1" Input Current	V_{IN} = V_{CC} = Max		2.0	10	μA
I_{IL}	Logical "0" Input Current	V_{IN} = 0V, V_{CC} = Max		−0.1	−10	μA
I_{CC}	Supply Current	All Outputs Low, V_{CC} = Max		16	25	mA
V_{IC}	Input Clamp Voltage	I_{IN} = 10 mA			V_{CC} + 1.5V	V
		I_{IN} = −10 mA			−1.5V	V
t_{pd0}	Propagation Delay to a Logical "0" from Any Input to Any Output	R_L = 400Ω, C_L = 50 pF, T_A = 25°C			10	μs
t_{pd1}	Propagation Delay to a Logical "1" from Any Input to Any Output				10	μs

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: Unless otherwise specified min/max limits apply across the 0°C to +70°C range for the DS8669. All typicals are given for V_{CC} = 5.25V and T_A = 25°C.

Note 3: All currents into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

Truth Table

INPUT LEVELS				SEGMENT OUTPUTS															
D_N	C_N	B_N	A_N	a1	b1	c1	d1	e1	f1	g1	a2	b2	c2	d2	e2	f2	g2	DISPLAY 1	DISPLAY 2
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
0	0	0	1	1	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1
0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	2	2
0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	1	1	0	3	3
0	1	0	0	1	0	0	1	1	0	0	1	0	0	1	1	0	0	4	4
0	1	0	1	0	1	0	0	1	0	0	0	1	0	0	1	0	0	5	5
0	1	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	6	6
0	1	1	1	0	0	0	1	1	1	1	0	0	0	1	1	1	1	7	7
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8
1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	9	9
1	0	1	0	0	1	1	0	0	0	1	1	0	0	1	0	0	0	C	H
1	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0	1	1	A	J
1	1	0	0	0	0	1	1	0	0	0	1	1	1	0	0	0	1	P	L
1	1	0	1	0	1	1	0	0	0	0	0	1	1	1	0	0	0	E	F
1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	1	0	-	-
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	(Blank)	(Blank)

"0" = Segment ON

"1" = Segment OFF

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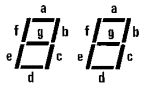
Display Segment Notation



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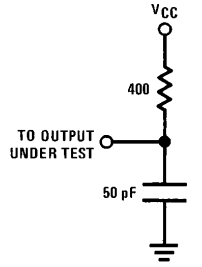
AC Test Circuit



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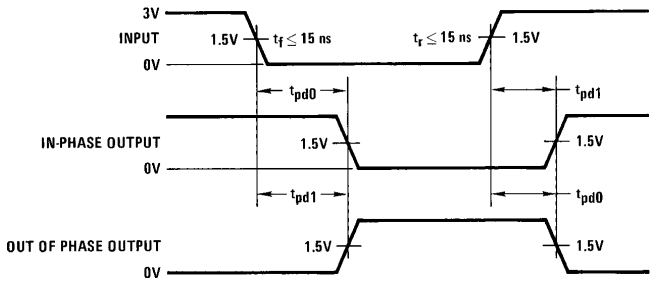
Switching Time Waveforms



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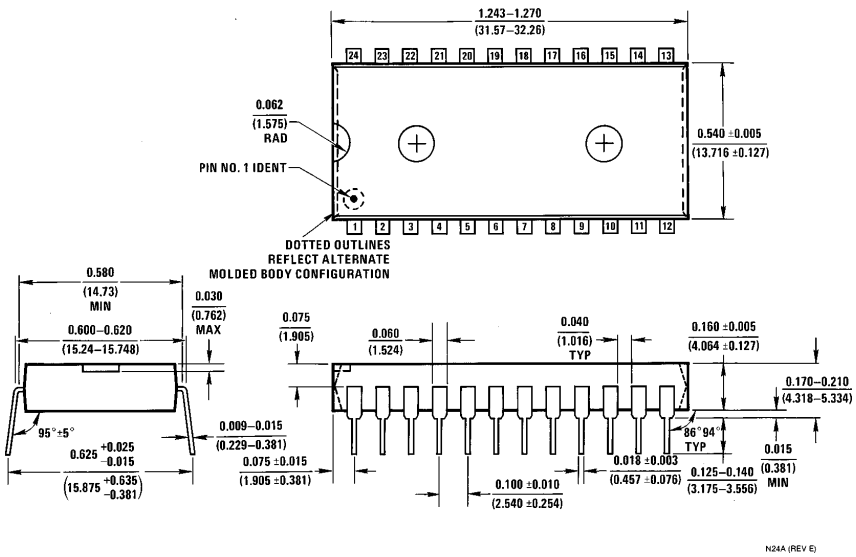
Physical Dimensions inches (millimeters)



Molded Dual-In-Line Package (N)
Order Number DS8669N
NS Package Number N24A

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