National Semiconductor

May 1986

DS8870 Hex LED Digit Driver

General Description

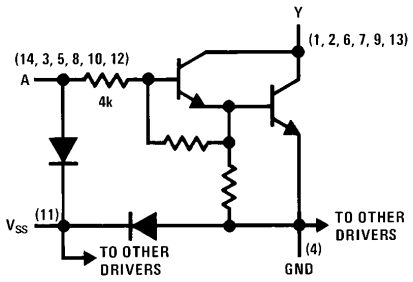
The DS8870 is an interface circuit designed to be used in conjunction with MOS integrated circuits and common-cathode LED's in serially addressed multi-digit displays. The number of drivers required for this time-multiplexed system is minimized as a result of the segment-address-and-digit-scan method of LED drive.

Features

- Sink capability per driver—350 mA
- MOS compatibility (low input current)
- Low standby power
- High-gain Darlington circuits

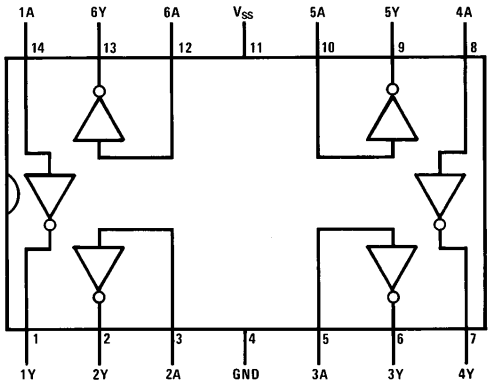
Schematic and Connection Diagrams

DS8870 (Each Driver)



TL/F/5841–1

Dual-In-Line Package



TL/F/5841–2

Order Number DS8870J or DS8870N
See NS Package Number J14A or N14A

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.

Input Voltage Range (Note 4)	−5V to V_{SS}
Collector Output Voltage	10V
Collector Output to Input Voltage	10V
Voltage at V_{SS} Terminal with Respect to Any Other Device Terminal	10V
Collector Output Current	
Each Collector Output	350 mA
All Collector Outputs	600 mA
Continuous Total Dissipation	800 mW
Operating Temperature Range	0° to +70°C
Storage Temperature	−65°C to +150°C
Maximum Power Dissipation* at 25°C	
Cavity Package	1308 mW
Molded Package	1207 mW
Lead Temperature (Soldering, 4 seconds)	260°C

*Derate cavity package 8.72 mW/°C above 25°C; derate molded package 9.66 mW/°C above 25°C.

Electrical Characteristics V_{SS} = 10V (Notes 2 and 3)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{OL}	Low Level Output Voltage	Input = 6.5V through kΩ, I_{OUT} = 350 mA, T_A = 25°C		1.2	1.4	V
V_{OL}	Low Level Output Voltage	Input = 6.5V through 1 kΩ, I_{OUT} = 350 mA			1.6	V
I_{OH}	High Level Output Current	V_{OH} = 10V, I_{IN} = 40 μA			200	μA
I_{OH}	High Level Output Current	V_{OH} = 10V, V_{IN} = 0.5V			200	μA
I_I	Input Current at Maximum Input Voltage	V_{IN} = 10V, I_{OL} = 20 μA		2.2	3.3	mA
I_{SS}	Current into V_{SS} Terminal				1	mA

Switching Characteristics V_{SS} = 7.5V, T_A = 25°C

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PLH}	Propagation Delay Time, Low-to-High Level Output	V_{IH} = 7.5V, R_L = 39Ω, C_L = 15 pF		300		ns
t_{PHL}	Propagation Delay Time, High-to-Low Level Output	V_{IH} = 7.5V, R_L = 39Ω, C_L = 15 pF		30		ns

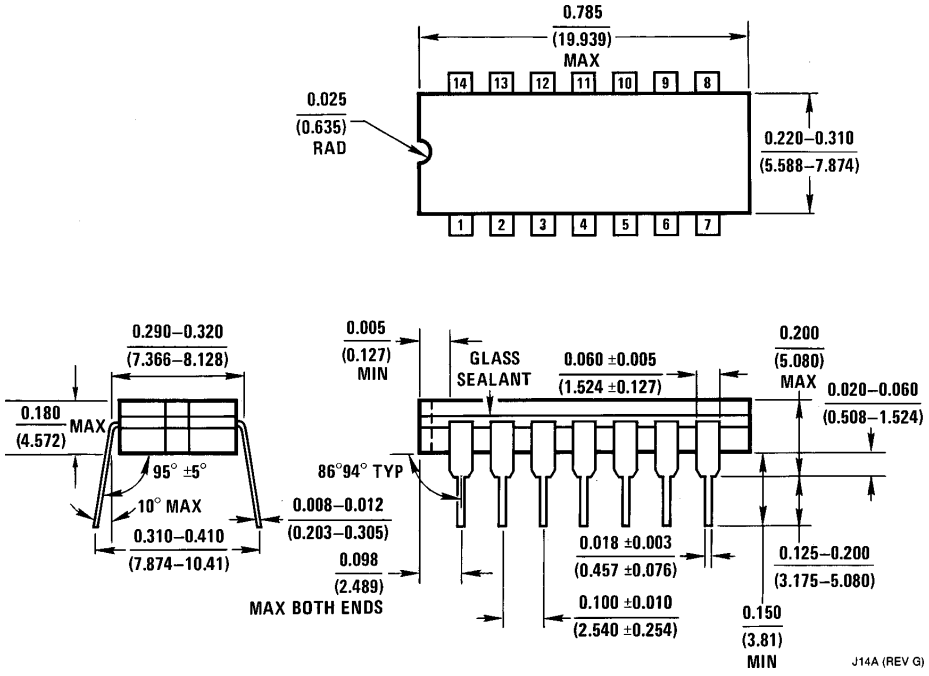
Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual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

Note 2: Unless otherwise specified min/max limits apply across the 0°C to +70°C temperature range.

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.

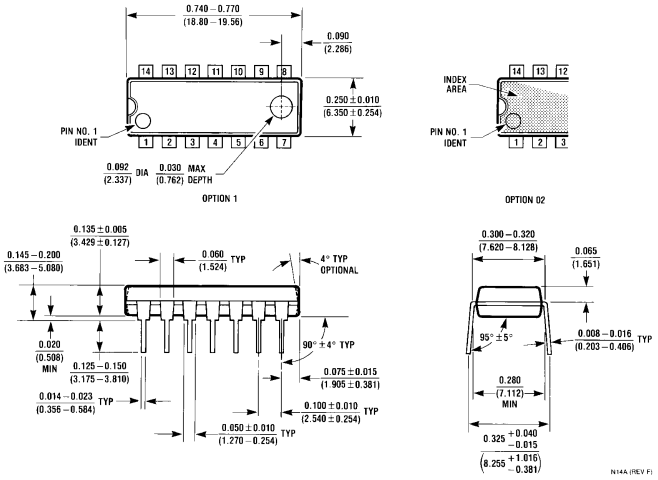
Note 4: The input is the only device terminal which may be negative with respect to ground.

Physical Dimensions inches (millimeters)



Ceramic Dual-In-Line Package (J)
Order Number DS8870J
NS Package Number J14A

Physical Dimensions inches (millimeters) (Continued)



Molded Dual-In-Line Package (N)
Order Number DS8870N
NS Package Number N14A

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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