National Semiconductor

May 1986

DS8884A High Voltage Cathode Decoder/Driver

General Description

The DS8884A is designed to decode four lines of BCD input and drive seven-segment digits of gas-filled readout displays.

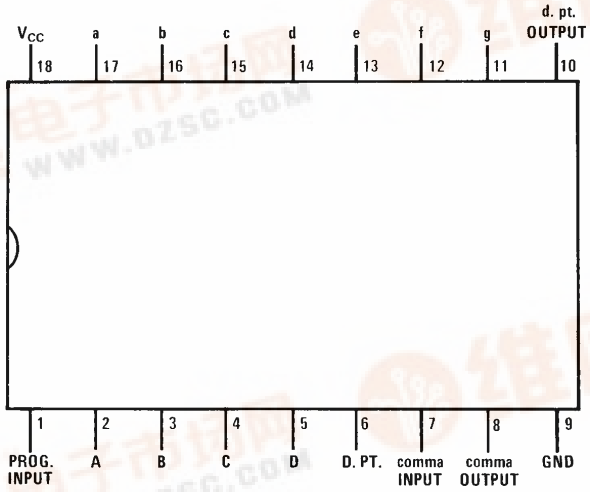
All outputs consist of switchable and programmable current sinks which provide constant current to the tube cathodes, even with high tube anode supply tolerance. Output currents may be varied over the 0.2 mA to 1.2 mA range for multiplex operation. The output current is adjusted by connecting an external program resistor (R_P) from V_{CC} to the program input in accordance with the programming curve. Unused outputs must be tied to V_{CC}.

Features

- Usable with AC or DC input coupling
- Current sink outputs
- High output breakdown voltage
- Low input load current
- Intended for multiplex operation
- Input pullups increase noise immunity
- Comma/d.pt. drive

Connection Diagram

Dual-In-Line Package



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Top View

Order Number DS8884AN
See NS Package Number N18A

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.

V_{CC}	7V
Input Voltage (Note 4)	V_{CC}
Segment Output Voltage	80V
Power Dissipation	600 mW
Transient Segment Output Current (Note 5)	50 mA
Storage Temperature Range	−65°C to +150°C
Maximum Power Dissipation* at 25°C Molded Package	1714 mW

*Derate molded package 13.71 mW/°C above 25°C.

Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})	4.75	5.25	V
Temperature (T_A)	0	+70	°C

Electrical Characteristics (Notes 2 and 3)

Symbol	Parameter	Conditions		Min	Max	Units
V_{IH}	Logical "1" Input Voltage	V_{CC} = 4.75V		2.0		V
V_{IL}	Logical "0" Input Voltage	V_{CC} = 4.75V			1.0	V
I_{IH}	Logical "1" Input Current	V_{CC} = 5.25V, V_{IN} = 2.4V			15	μA
I_{IL}	Logical "0" Input Current	V_{CC} = 5.25V, V_{IN} = 0.4V			−250	μA
I_{CC}	Power Supply Current	V_{CC} = 5.25V, R_P = 2.8k, All Inputs = 5V			40	mA
V_{I+}	Positive Input Clamp Voltage	V_{CC} = 4.75V, I_{IN} = 1 mA		5.0		V
V_{I-}	Negative Input Clamp Voltage	V_{CC} = 5V, I_{IN} = −12 mA, T_A = 25°C			−1.5	V
ΔI_O	SEGMENT OUTPUTS "ON" Current Ratio	All Outputs = 50V, I_{OUT} b = Ref., All Outputs		0.9	1.1	
$I_{b\ ON}$	Output b "ON" Current	V_{CC} = 5V, V_{OUT} b = 50V, T_A = 25°C	R_P = 18.1k	0.15	0.25	mA
			R_P = 7.03k	0.45	0.55	mA
			R_P = 3.40k	0.90	1.10	mA
			R_P = 2.80k	1.08	1.32	mA
I_{CEX}	Output Leakage Current	V_{OUT} = 75V			5	μA
V_{BR}	Output Breakdown Voltage	I_{OUT} = 250 μA		80		V
t_{pd}	Propagation Delay of Any Input to Segment Output	V_{CC} = 5V, T_A = 25°C			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.

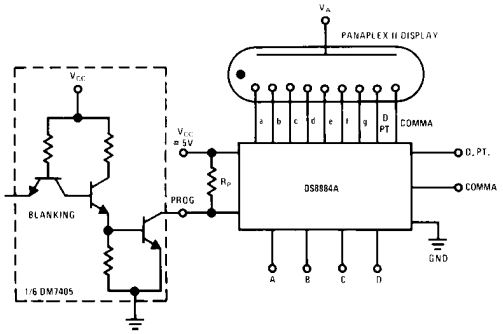
Note 2: Unless otherwise specified min/max limits apply across the 0°C to +70°C temperature range for the DS8884A. All typical values are for T_A = 25°C and V_{CC} = 5V.

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: This limit can be higher for a current limiting voltage source.

Note 5: In all applications transient segment output current must be limited to 50 mA. This may be accomplished in DC applications by connecting a 2.2k resistor from the anode-supply filter capacitor to the display anode, or by current limiting the anode driver in multiplex applications.

Typical Application



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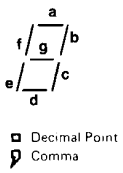
Truth Table

FUNCTION	D.PT.	COMMA	D	C	B	A	a	b	c	d	e	f	g	DISPLAY
0	1	1	0	0	0	0	0	0	0	0	0	0	1	
1	1	1	0	0	0	1	1	0	0	1	1	1	1	
2	1	1	0	0	1	0	0	0	1	0	0	1	0	
3	1	1	0	0	1	1	0	0	0	0	1	1	0	
4	1	1	0	1	0	0	1	0	0	1	1	0	0	
5	1	1	0	1	0	1	0	1	0	0	1	0	0	
6	1	1	0	1	1	0	0	1	0	0	0	0	0	
7	1	1	0	1	1	1	0	0	0	1	1	1	1	
8	1	1	1	0	0	0	0	0	0	0	0	0	0	
9	1	1	1	0	0	1	0	0	0	0	1	0	0	
10	1	1	1	0	1	0	1	1	0	0	0	1	1	
11	1	1	1	0	1	1	1	1	0	0	0	1	0	
12	1	1	1	1	0	0	0	0	1	1	1	0	0	
13	1	1	1	1	0	1	0	1	1	0	0	0	0	
14	1	1	1	1	1	0	1	1	1	1	1	1	0	
15	1	1	1	1	1	1	1	1	1	1	1	1	1	
*D.PT.	0	1	X	X	X	X	X	X	X	X	X	X	X	
*Comma	0	0	X	X	X	X	X	X	X	X	X	X	X	



Decimal Point

Comma

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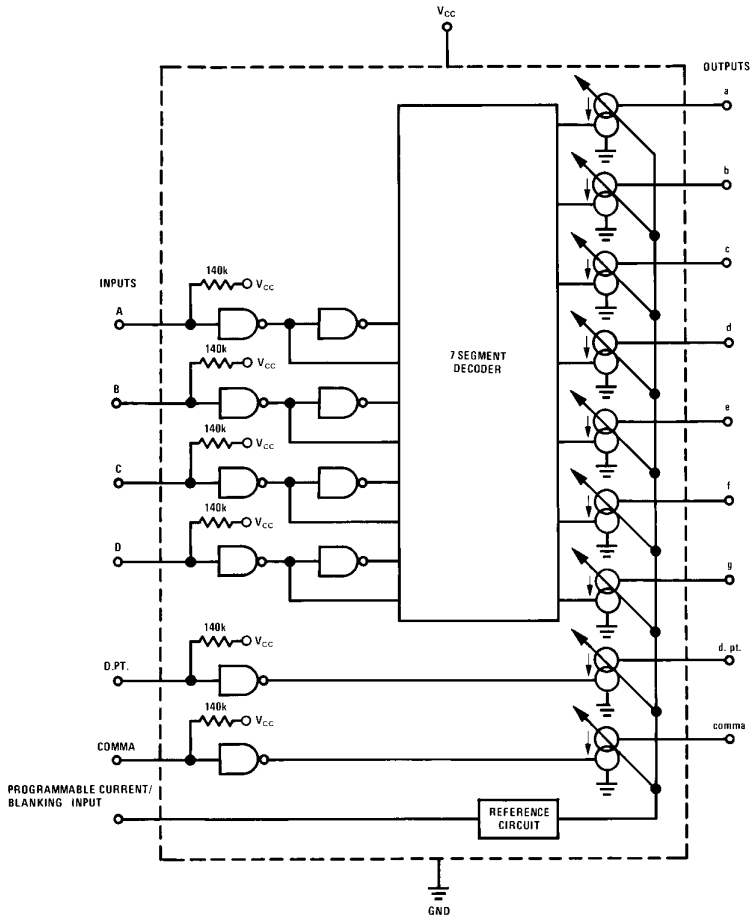
*Decimal point and comma can be displayed with or without any numeral.

Logic Diagram



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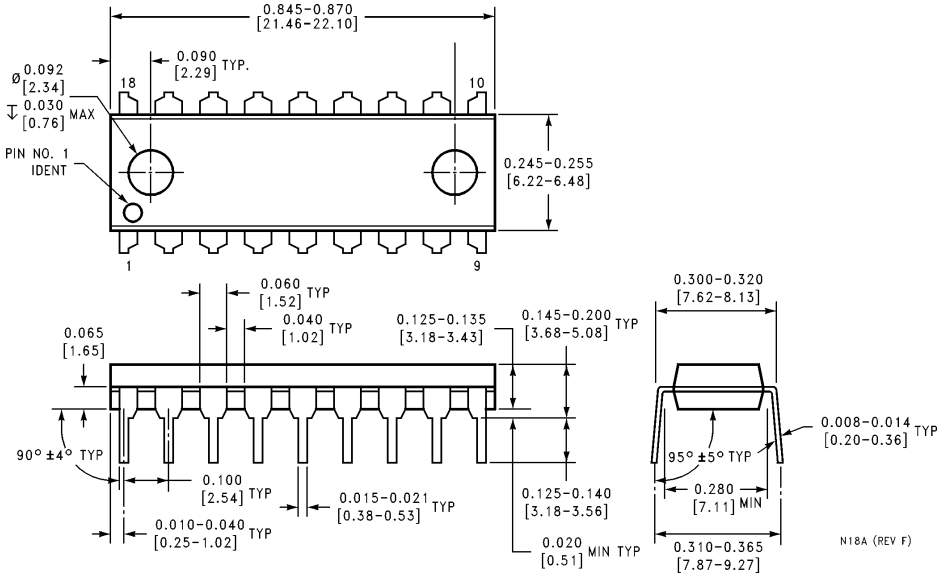
Physical Dimensions inches (millimeters)



Molded Dual-In-Line Package (N)
Order Number DS8884AN
NS Package Number N18A

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