

## DS8859A, DS8869A Open Collector Hex Latch LED Drivers

### General Description

The DS8859A, DS8869A are TTL compatible open collector hex latch LED drivers with programmable current sink outputs. The current sinks are nominally set at 14 mA but may be adjusted by external resistors for any value between 0–32 mA. Each device contains six latches which may be set by input data terminals. An active low strobe common to all six latches enables the data input terminals. The DS8859A current sink outputs are switched on by entering a high level into the latches and the DS8869A current sink outputs are switched on by entering a low level into the latches.

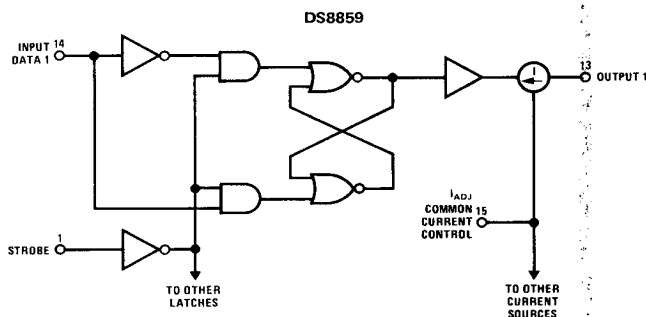
The devices are available in either a molded or cavity package. In order not to damage the devices there is a

limit placed on the power dissipation allowable for each package type. This information is shown in the graph included in this data sheet.

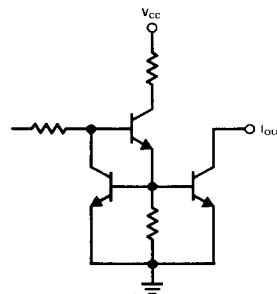
### Features

- Built-in latch
- Programmable output current
- TTL compatible inputs
- 32 mA output sink

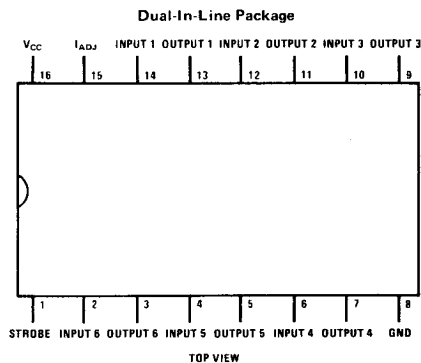
### Logic Diagram



### Output Circuit



### Connection Diagram



### Truth Table

COMMON STROBE	INPUT DATA	DS8859 OUTPUT (t + 1)	DS8869 OUTPUT (t + 1)
0	0	OFF	ON
0	1	ON	OFF
1	X	OUTPUT (t)	OUTPUT (t)

Order Number DS8859AJ, DS8869AJ,  
DS8859AN or DS8869AN  
See NS Package J16A or N16A

**Absolute Maximum Ratings** (Note 1)

Supply Voltage	7V
Input Voltage	5.5V
Output Voltage	5.5V
Storage Temperature Range	-65°C to +150°C
Maximum Power Dissipation* at 25°C	
Cavity Package	1433 mW
Molded Package	1362 mW
Lead Temperature (Soldering, 10 seconds)	300°C

\*Derate cavity package 9.55 mW/°C above 25°C; derate molded package 10.9 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)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$V_{IH}$ Logical "1" Input Voltage	$V_{CC} = \text{Min}$	2.0			V
$I_{IH}$ Logical "1" Input Current	$V_{CC} = \text{Max}$ , $V_{IN} = 2.4\text{V}$			40	$\mu\text{A}$
$V_{IL}$ Logical "0" Input Voltage	$V_{CC} = \text{Min}$			0.8	V
$I_{IL}$ Logical "0" Input Current	$V_{CC} = \text{Max}$ , $V_{IN} = 0.4\text{V}$		-1.0	-1.6	mA
$V_{CD}$ Input Clamp Voltage	$V_{CC} = \text{Min}$ , $I_{IN} = -12\text{mA}$		-1.1	-1.5	V
$I_{OH}$ Logical "1" Output Current	$V_{CC} = \text{Min}$ , $V_{IL} = 0.8\text{V}$ , $V_{OH} = 5.5\text{V}$ , $V_{IH} = 2.0\text{V}$			250	$\mu\text{A}$
$V_{OL}$ Logical "0" Output Voltage	$V_{CC} = \text{Min}$ , $V_{IL} = 0.8\text{V}$ , $I_{OL} = 16\text{mA}$ , $V_{IH} = 2\text{V}$ , $V_{IADJ} = V_{CC\text{MIN}}$			0.4	V
$I_{CC}$ Supply Current	$V_{CC} = \text{Max}$ , Current Sources "OFF," (See Truth Table), (Note 4)			50	mA
$I_{SINK}$ Output Current	$V_{CC} = 5.0\text{V}$ , $V_{OUT} = 2.0\text{V}$ , $T_A = 25^\circ\text{C}$ , (Note 4)				
	$V_{IADJ} = 5\text{V}$ $I_{ADJ} = \text{Open}$	32 9			mA mA

**Switching Characteristics**  $T_A = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ 

PARAMETER		CONDITIONS		MIN	TYP	MAX	UNITS
$t_{pd0}$	Propagation Delay to a Logical "0"	$C_{OUT} = 15\text{ pF}, R_L = 390\Omega$ , (Note 5)	Data to Output			36	ns
			Strobe to Output			50	ns
$t_{pd1}$	Propagation Delay to a Logical "1"		Data to Output			150	ns
			Strobe to Output			150	ns

**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. All typicals are given for  $V_{CC} = 5.0\text{V}$  and  $T_A = 25^\circ\text{C}$ .

**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.

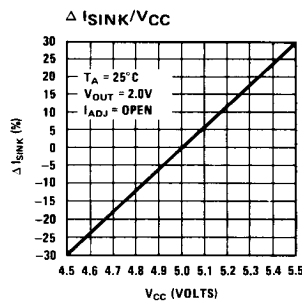
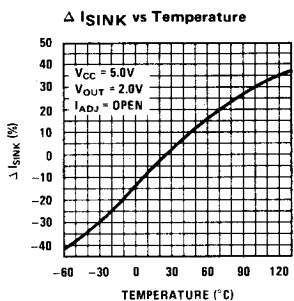
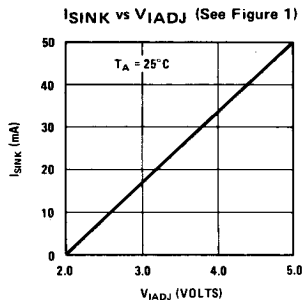
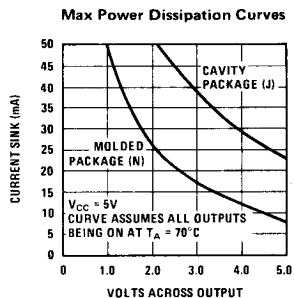
**Note 4:** See graphs for changes in  $I_{SINK}$  versus changes in temperature and  $V_{CC}$ .

**Note 5:**  $C_{OUT}$  includes device output capacitance of approximately 8.5 pF and wiring capacitance.

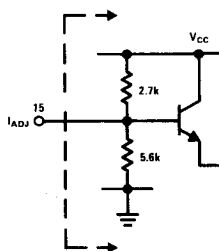
# Typical Performance Characteristics

DS8859A, DS8869A

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## $I_{SINK}$ Adjustment Circuit



$I_{ADJ}$  may be programmed by a voltage source or by resistors.

FIGURE 1.