

# 2454 AND 2455

27460.10A

## AUTOMOTIVE LAMP MONITORS

**ULN2455A**

Dwg. No. PS-013

**ABSOLUTE MAXIMUM RATINGS**  
at +25°C Free-Air Temperature

Supply Voltage,  $V_{CC}$  ..... 30 V  
 Peak Supply Voltage,  $V_{CC}(100\text{ ms})$  .. 80 V  
 Peak Reverse Voltage,  $V_R$  ..... 30 V  
 Output Current,  $I_{OUT}$  ..... 35 mA  
 Package Power Dissipation,  $P_D$  See Graph  
 Operating Temperature Range,  
 $T_A$  ..... -40°C to +85°C  
 Storage Temperature Range,  
 $T_S$  ..... -65°C to +150°C

Capable of monitoring all types of automotive lamps, the ULN2454L, ULQ2454M, and ULN2455A lamp monitors provide multiple LED outputs to pinpoint the area in which a lamp has failed. The ULN2455A is a quad comparator capable of monitoring eight individual lamps or groups of lamps. The ULN/UL2454L/M are dual comparators featuring an additional output to trigger an alarm if either of the comparators detects a lamp failure. This output can be used to drive an audible signaling device or centrally located warning indicator. All devices can be used to monitor lamps, multiple low-voltage power supplies, or, with appropriate sensors, industrial processes.

Installation and operation of these lamp monitors has no effect on normal lamp operation. Comparators sense the normal voltage drop in the lamp wiring (approximately 20 mV) for each of the monitored lamp circuits. Little additional wiring is necessary for installation because the system can be completely integral to the wiring assembly. No standby power is required...the operating voltage is obtained from the sense leads; the system is energized only when the lamps are turned ON.

All devices are designed for use in the severe automotive environment. Lateral PNP transistors provide high-frequency noise immunity and differential transient-voltage protection. Reverse voltage protection, internal regulators, and temperature compensation are all embodied in the circuit designs. A failure within a device will not affect lamp operation.

These versatile lamp monitors are packaged in 14-pin plastic DIPs (suffix A), 8-lead surface-mountable SOICs (suffix L), or 8-pin mini-DIPs (suffix M) and are rated for operation over the temperature range of -40°C to +85°C.

### FEATURES

- No Standby Power
- Integral to Wiring Assembly
- Internal Transient Protection
- Fail-Safe
- Reverse Voltage Protected
- DIP or SOIC Plastic Packages

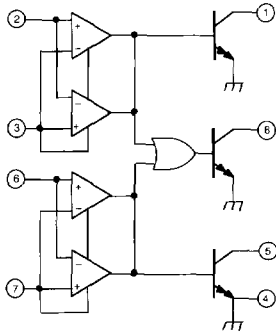
Always order by complete part number:

Part Number	Function	Style
ULN2454L	Dual Comparator with OR Output	8-Lead SOIC
UL2454M	Dual Comparator with OR Output	8-Pin Mini-DIP
ULN2455A	Quad Comparator	14-Pin DIP

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## PIN OUT & FUNCTIONAL BLOCK DIAGRAMS

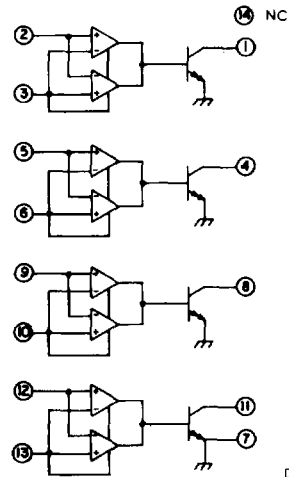
**ULN2454L  
and ULQ2454M**



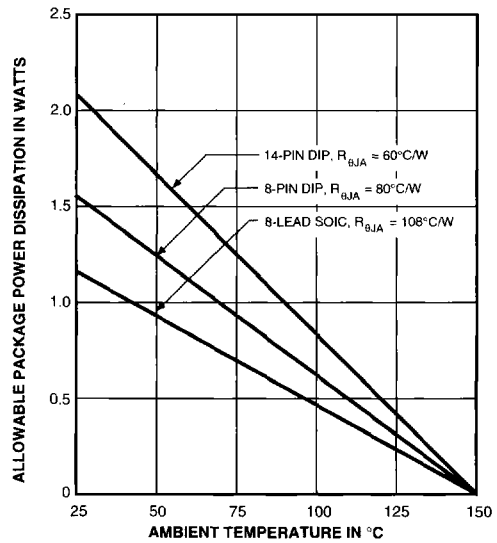
Dwg. No. FS-010A

Note that the dual in-line package and the small-outline IC package are electrically identical and share a common pin number assignment.

**ULN2455A**



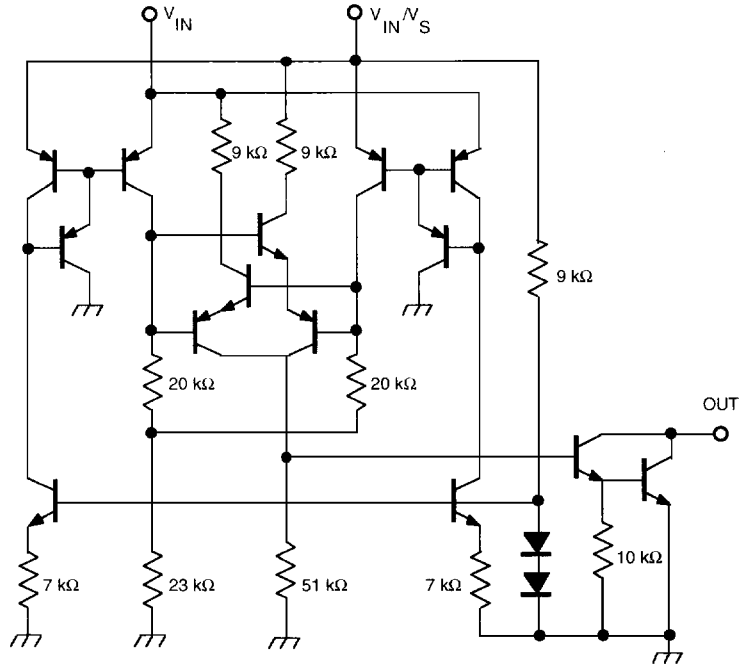
Dwg. No. A-12,033A



Dwg. No. GS-008-1A

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**SIMPLIFIED SCHEMATIC  
(SINGLE DIFFERENTIAL SENSE AMPLIFIER)**



Dwg. No. ES-011

**ELECTRICAL CHARACTERISTICS at  $T_A = +25^\circ\text{C}$ ,  $V_{CC} = V_{IN} = 10$  to  $16$  V  
(unless otherwise noted).**

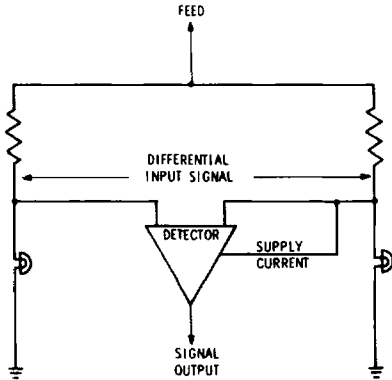
Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Output Leakage Current	$I_{CEX}$	$V_{OUT} = 80$ V, $\Delta V_{IN} < 7$ mV	—	—	100	$\mu\text{A}$
Output Saturation Voltage	$V_{CE(SAT)}$	$I_{OUT} = 5$ mA, $\Delta V_{IN} > 20$ mV	—	0.8	1.0	V
		$I_{OUT} = 30$ mA, $\Delta V_{IN} > 20$ mV	—	1.4	2.0	V
Differential Switch Voltage	$\Delta V_{IN}$	$V_{IN} - V_{IN}/V_S$	7.0	13	20	mV
Input Current	$I_{IN}$	$\Delta V_{IN} = V_{IN} - V_{IN}/V_S = +30$ mV	150	300	800	$\mu\text{A}$
	$I_{IN}/I_S$	$\Delta V_{IN} = V_{IN} - V_{IN}/V_S = -30$ mV	0.5	1.7	3.5	mA

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## PRINCIPLE OF OPERATION

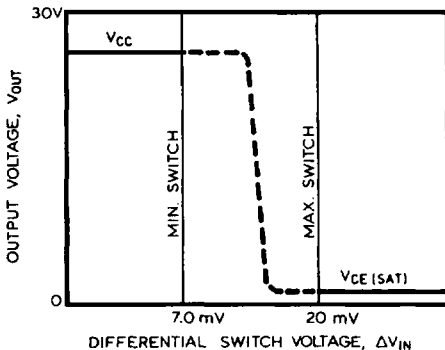
Operation of these lamp monitors is similar to that of a simple bridge circuit in which the top two legs of the bridge are formed by the wiring assembly resistance or discrete low-value resistors. The bottom legs of the bridge are the monitored lamps. These differential amplifier circuits sense the voltage drops in the wiring assemblies (approximately 20 mV) for each of the lamp circuits. When the system detects a difference in voltage due to an open filament, the appropriate output driver is turned ON.

## BASIC BRIDGE MONITORING SYSTEM



Dwg. No. A-11,473A

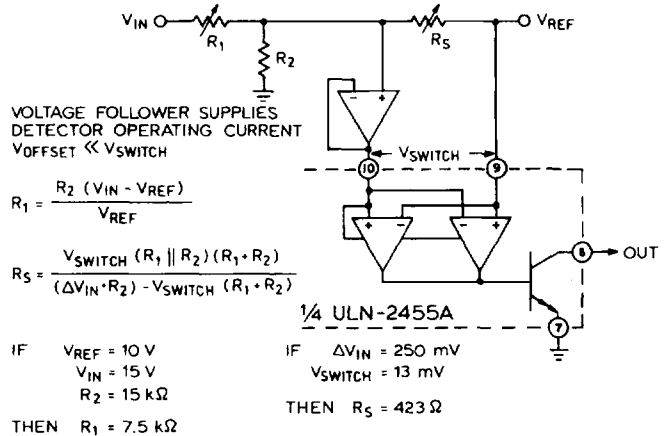
## TYPICAL SWITCH CHARACTERISTICS



Dwg. No. A-12,187

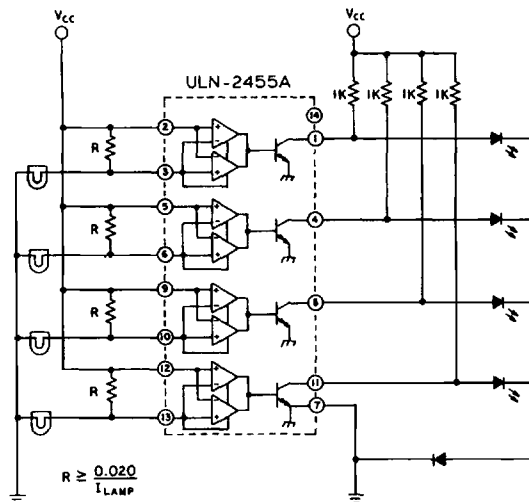
## TYPICAL APPLICATIONS

### POWER SUPPLY SUPERVISORY CIRCUIT



Dwg. No. B-1524

### QUAD LAMP MONITOR



Dwg. No. A-12,035A