

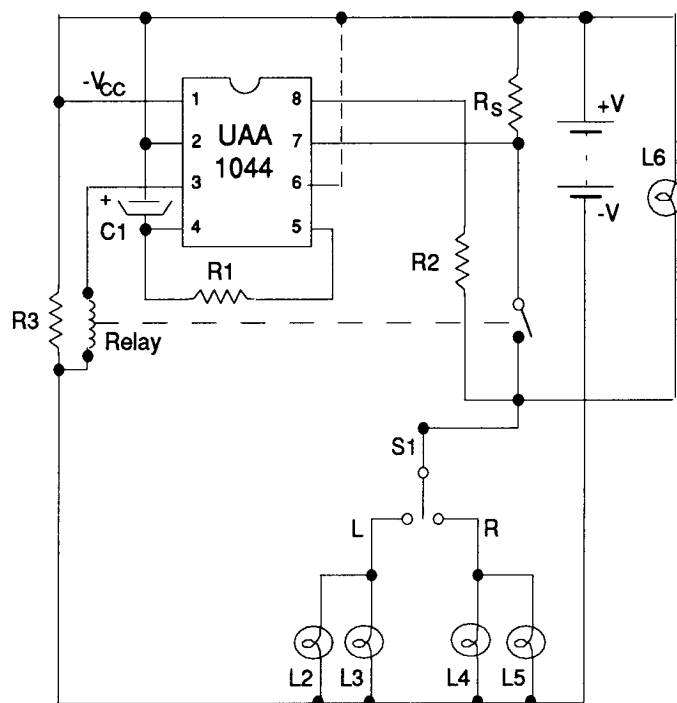
*Designer's Data Sheet*

**Automotive direction indicator**

... designed for use in conjunction with a relay in automotive applications.

- Defective Lamp Detection
- Overvoltage Protection
- Reverse Battery Connection Protection
- Integrated Suppression Clamp Diode

**FIGURE 1 - TYPICAL AUTOMOTIVE SYSTEM**



L6: dashboard light (3W typical) L2, L3, L4, L5: 21W, turn signals

R1 = 75 k $\Omega$   
Rs = 30 m $\Omega$

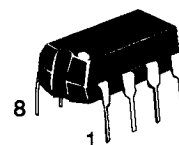
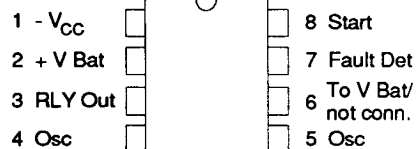
R2 = 3.3 k $\Omega$   
C1 = 5.6  $\mu$ F

R3 = 220  $\Omega$

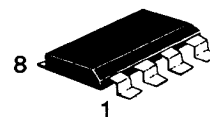
**UAA1044**

**AUTOMOTIVE  
DIRECTION INDICATOR**

**SILICON MONOLITHIC  
INTEGRATED CIRCUIT**



PLASTIC PACKAGE  
CASE 626-04



D SUFFIX  
PLASTIC PACKAGE  
CASE 751-01  
SO-8

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## MAXIMUM RATINGS

| Rating                      | Pin                  | Value                                                                    | Unit |
|-----------------------------|----------------------|--------------------------------------------------------------------------|------|
| Current: Continuous/Pulse*  | 1<br><br>2<br>3<br>8 | + 150/ + 500<br>- 35/ - 500<br>+/- 350/1900<br>+/- 300/1400<br>+/- 25/50 | mA   |
| Junction Temperature        |                      | 150                                                                      | °C   |
| Operating Temperature Range |                      | - 40 to + 100                                                            | °C   |
| Storage Temperature Range   |                      | - 65 to + 150                                                            | °C   |

\* One pulse with an exponential decay and with a time constant of 500 ms.

### ELECTRICAL CHARACTERISTICS ( $T_j = 25^\circ\text{C}$ )

| Characteristics                                                                                                                       | Symbol                                | Min         | Typ                      | Max         | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------|--------------------------|-------------|------|
| Battery Voltage Range (normal operation)                                                                                              | V <sub>B</sub>                        | 8           | —                        | 18          | V    |
| Overvoltage Detector Threshold                                                                                                        | V <sub>Pin2</sub> - V <sub>Pin1</sub> | 19          | 20.2                     | 21.5        | V    |
| Clamping Voltage                                                                                                                      | V <sub>Pin2</sub> - V <sub>Pin1</sub> | 29          | 31.5                     | 34          | V    |
| Starting Threshold Voltage                                                                                                            | V <sub>Pin2</sub> - V <sub>Pin7</sub> | 25          | —                        | —           | mV   |
| Output Voltage (I <sub>relay</sub> = - 250 mA)                                                                                        | V <sub>Pin2</sub> - V <sub>Pin3</sub> | —           | —                        | 1.5         | V    |
| Oscillator Constant (normal operation)                                                                                                | K <sub>n</sub>                        | 1.4         | 1.5                      | 1.6         | —    |
| Temperature Coefficient of K <sub>n</sub>                                                                                             | kn                                    | —           | - 1.5 x 10 <sup>-3</sup> | —           | 1/°C |
| Duty Cycle (normal operation)                                                                                                         | —                                     | 45          | 50                       | 55          | %    |
| Oscillator Constant — (1 lamp defect of 21 W)                                                                                         | K <sub>F</sub>                        | 0.63        | 0.68                     | 0.73        | —    |
| Duty Cycle (1 lamp defect of 21 W)                                                                                                    | —                                     | 35          | 40                       | 45          | %    |
| Oscillator Constant                                                                                                                   | K <sub>1</sub>                        | —           | 0.180                    | —           | —    |
|                                                                                                                                       | K <sub>2</sub>                        | —           | 0.270                    | —           | —    |
|                                                                                                                                       | K <sub>3</sub>                        | —           | 0.130                    | —           | —    |
| Current Consumption (relay off)<br>Pin 1; at V <sub>Pin2</sub> - V <sub>Pin1</sub> = 8.0 V<br>= 13.5V<br>= 18V                        | I <sub>CC</sub>                       | —<br>—<br>— | - 0.9<br>- 1.6<br>- 2.2  | —<br>—<br>— | mA   |
| Current Consumption (relay on)<br>Pin 1; at V <sub>Pin2</sub> - V <sub>Pin1</sub> = 8.0 V<br>= 13.5 V<br>= 18 V                       | —                                     | —<br>—<br>— | - 3.8<br>- 5.6<br>- 6.9  | —<br>—<br>— |      |
|                                                                                                                                       | —                                     | —<br>—<br>— | —<br>—<br>—              | —<br>—<br>— |      |
| Defect Lamp Detector Threshold<br>(with R <sub>3</sub> = 220Ω) at V <sub>Pin2</sub> to - V <sub>B</sub> = 8.0 V<br>= 13.5 V<br>= 18 V | V <sub>Pin2</sub> - V <sub>Pin7</sub> | —           | 67                       | —           | mV   |
|                                                                                                                                       | V <sub>Pin2</sub> - V <sub>Pin7</sub> | —           | 85.3                     | —           |      |
|                                                                                                                                       | V <sub>Pin2</sub> - V <sub>Pin7</sub> | —           | 100                      | —           |      |

## CIRCUIT DESCRIPTION

The circuit is designed to drive the direction indicator flasher relay. Figure 2 shows the typical system configuration with the external components. It consists of a network (R1, C1) to determine the oscillator frequency, shunt resistor ( $R_s$ ) to detect defective bulbs in the system, and two current limiting resistors ( $R_2/R_3$ ) to protect the IC against load dump transients.

Light bulbs L2, L3, L4, L5 are the turn signal indicators with the dashboard-light L6. When switch S1 is closed, after a time delay of  $t_1$  (in our example  $t_1 = 75$  ms), the relay will be actuated. The corresponding light bulbs L2, L3, (or L4, L5) will flash at the oscillator frequency, independent of the battery voltage of 8.0 V to 18 V. The flashing cycle stops and the circuit is reset to the initial position when the switch S1 is open.

The circuit features overvoltage and defective lamp detection.

### Overvoltage detection:

Senses the battery voltage. When this voltage exceeds 20.2 V (this is the case when two batteries are connected in series), the relay will be turned off to protect the light bulbs.

### Light bulb defect detector:

Senses the current through the shunt resistor  $R_s$ . When one of the light bulbs is defective, the failure is indicated by doubling the flashing frequency.

## APPLICATION INFORMATION

1. The flashing cycle is started by closing S1. The switch position is sensed across resistor  $R_2$  and  $R_3$ .

The maximum starting load is 40Ω

2.  $f_n$  : Flashing frequency:  $f_n = \frac{1}{R_1 C_1 K_n}$

3.  $f_F$  : Flashing frequency in the case of one defective light bulb of 21 W.

$$f_F = \frac{1}{R_1 C_1 K_1} \quad K_n = 2.2 K_F$$

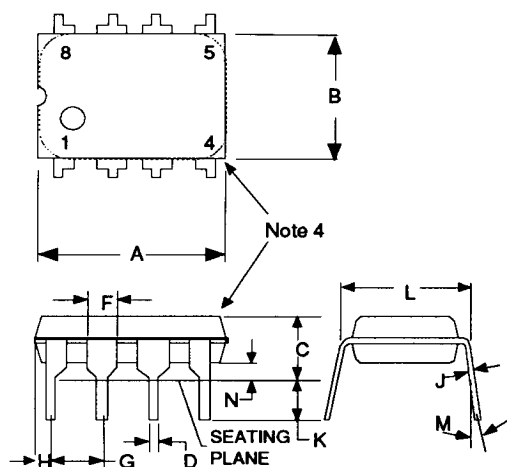
4.  $t_1$  : delay at the moment when S1 is closed and first flash  $t_1 = K_1 R_1 C_1$

5.  $t_2$  : defective light bulb detection delay  $t_2 = K_2 R_1 C_1$

6. When overvoltage is sensed ( $V_{Pin2} - V_{Pin1}$ ) the relay is turned off to protect the relay and the light bulbs against excessive currents.

PLASTIC PACKAGE  
CASE 626-04

$$R_{\theta JA} = 100^{\circ}\text{C/W (Typ)}$$



| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 9.40        | 10.16 | 0.370     | 0.400 |
| B   | 6.10        | 6.60  | 0.240     | 0.260 |
| C   | 3.94        | 4.45  | 0.155     | 0.175 |
| D   | 0.38        | 0.51  | 0.015     | 0.020 |
| F   | 1.02        | 1.52  | 0.040     | 0.060 |
| G   | 2.54 BSC    |       | 2.54 BSC  |       |
| H   | 0.76        | 1.27  | 0.030     | 0.050 |
| J   | 0.20        | 0.30  | 0.008     | 0.012 |
| K   | 2.92        | 3.43  | 0.115     | 0.135 |
| L   | 7.62 BSC    |       | 0.300 BSC |       |
| M   | —           |       | 10°       |       |
| N   | 0.51        | 0.76  | 0.020     | 0.030 |

NOTES:

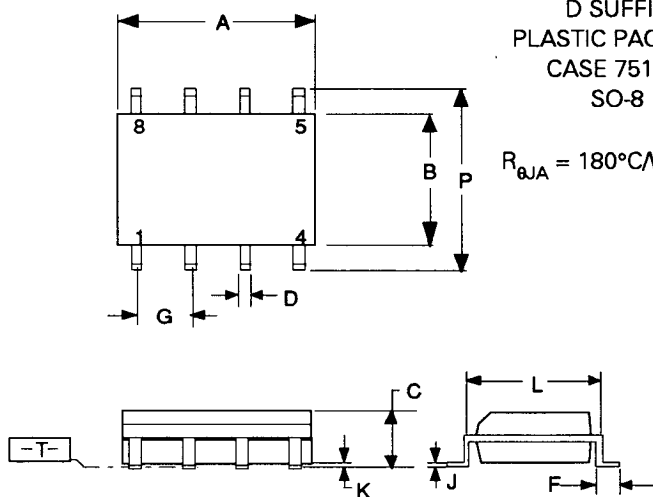
1. LEAD POSITIONAL TOLERANCE

$$\oplus \phi 0.13 (0.005) \text{ (M) } T \text{ (A) (M) } B \text{ (M)}$$

2. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
3. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
4. DIMENSIONS A AND B ARE DATUMS.
5. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

D SUFFIX  
PLASTIC PACKAGE  
CASE 751-01  
SO-8

$$R_{\theta JA} = 180^{\circ}\text{C/W (Typ)}$$



| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX   |
| A   | 4.78        | 5.00 | 0.188     | 0.197 |
| B   | 3.81        | 4.01 | 0.150     | 0.158 |
| C   | 1.35        | 1.75 | 0.053     | 0.069 |
| D   | 0.35        | 0.46 | 0.014     | 0.018 |
| F   | 0.67        | 0.77 | 0.026     | 0.030 |
| G   | 1.27 BSC    |      | 0.050 BSC |       |
| J   | 0.19        | 0.22 | 0.007     | 0.009 |
| K   | 0.10        | 0.20 | 0.004     | 0.008 |
| L   | 4.82        | 5.21 | 0.189     | 0.205 |
| P   | 5.79        | 6.20 | 0.228     | 0.244 |

NOTES:

1. -T- IS SEATING PLANE.
2. DIMENSION A IS DATUM.
3. POSITIONAL TOLERANCE FOR LEADS:

$$\oplus 0.25 (0.010) \text{ (M) } A \text{ (S)}$$

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