

# Automotive Lamp-Outage Monitor, $V_T = 8 \text{ mV}$ , $V_{Z(3,5)} = 22\text{V}$

## Description

The bipolar IC U4790B is designed as a monitor for lamp failure in automobiles. The comparator threshold is matched to the PTC characteristic of incandescent lamps. The threshold is tied to a typical value of  $V_{4,6} = V_S - V_T$  where  $V_T = 8 \text{ mV}$ .

If the voltage drop across shunt resistor,  $R_{sh}$ , exceeds  $8 \text{ mV}$ , the output is turned off, otherwise the output is turned on. Without supply voltage or open input Pin 8, the output is turned off. An unused comparator input must be connected to Pin 7.

## Features

- 10 kV–ESD protection
- Two comparators with common reference
- Tight threshold tolerance
- Threshold matched to PTC characteristic of incandescent lamps
- Temperature compensated
- NPN output
- Interference and damage–protection according to VDE 0839
- EMI protection
- Reversal polarity protection
- Load-dump protection

## Block Diagram

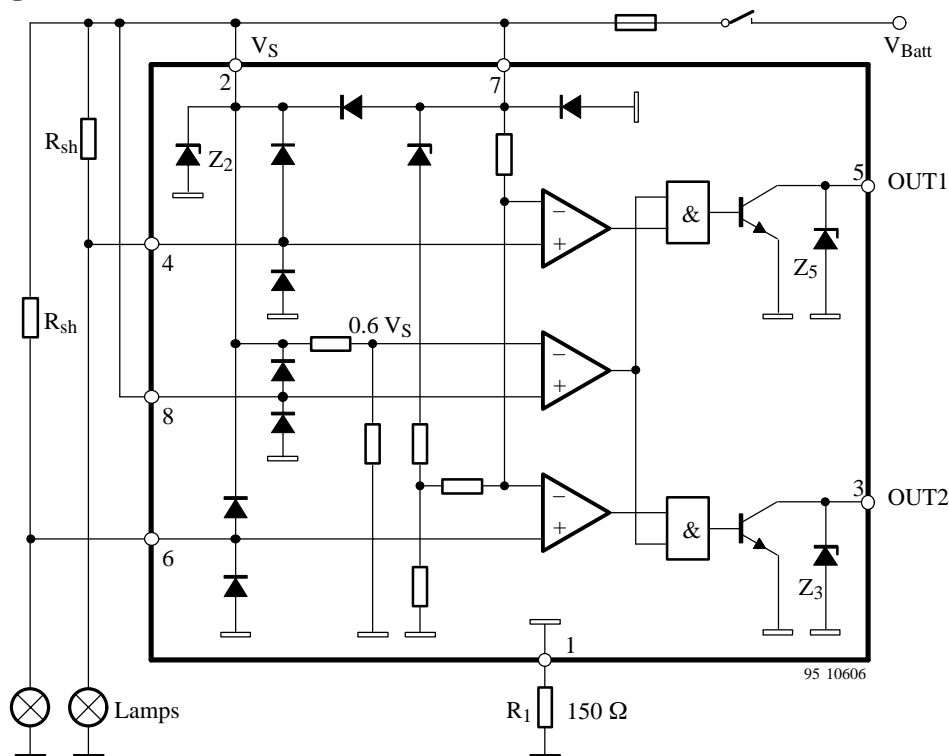


Figure 1. Schematic and application circuit

## Ordering Information

| Extended Type Number | Package | Remarks |
|----------------------|---------|---------|
| U4790B               | DIP8    |         |

## Pin Description

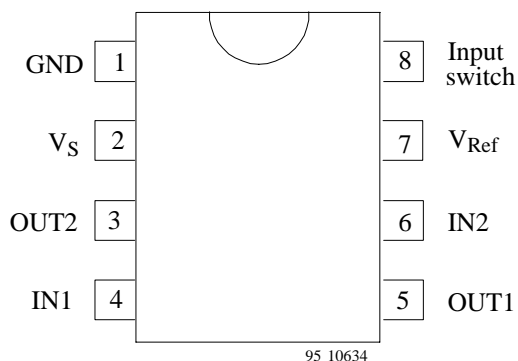


Figure 2. Pinning

| Pin | Symbol    | Function                |
|-----|-----------|-------------------------|
| 1   | GND       | Reference point, ground |
| 2   | $V_S$     | Supply voltage          |
| 3   | OUT2      | Output 2                |
| 4   | IN1       | Input 1                 |
| 5   | OUT1      | Output 1                |
| 6   | IN2       | Input 2                 |
| 7   | $V_{Ref}$ | Reference voltage       |
| 8   | Input     | Input switch            |

## Absolute Maximum Ratings

| Parameters  |          | Symbol     | Value       | Unit |
|---|----------|------------|-------------|------|
| Supply voltage  | Pin 2, 7 | $V_S$      | 16.5        | V    |
| Current consumption<br>$t = 2$ ms, measured at Pin 1 (GND)                        | Pin 1    | $I_1$      | 1.5         | A    |
| Output current  | Pin 3, 5 | $I_{3,5}$  | 20          | mA   |
| Input voltage<br>reference point Pin 7  | Pin 4, 6 | $-V_{4,6}$ | 6           | V    |
| Power dissipation<br>$T_{amb} = 95$ °C      DIP 8<br>$T_{amb} = 60$ °C      DIP 8 |          | $P_{tot}$  | 420         | mW   |
|   |          | $P_{tot}$  | 690         | mW   |
| Ambient temperature range   |          | $T_{amb}$  | -40 to +95  | °C   |
| Storage temperature range   |          | $T_{stg}$  | -55 to +125 | °C   |
| Junction temperature  |          | $T_j$      | 150         | °C   |

## Thermal Resistance

| Parameters       |      | Symbol     | Value | Unit |
|------------------|------|------------|-------|------|
| Junction ambient | DIP8 | $R_{thJA}$ | 110   | K/W  |

## Electrical Characteristics

$V_S = 9$  to  $15$  V,  $T_{amb} = -40$  to  $+95$  °C, figure 1, unless otherwise specified

| Parameters  | Test Conditions / Pin  | Symbol       | Min        | Typ       | Max         | Unit    |
|---|--|--------------|------------|-----------|-------------|---------|
| Supply voltage  | Pin 2,7  | $V_S$        | 9          |           | 15          | V       |
| Internal Z diode $Z_2$  | Pin 2  | $V_Z$        | 20         |           |             | V       |
| Current consumption   | $V_S = 12$ V<br>Pin 1<br>measured at Pin 1 (GND)   | $I_1$        |            | 4.5       | 6           | mA      |
| Output saturation voltage   | $V_S = 9$ V, $I_{3,5} = 10$ mA<br>$T_{amb} = 25$ °C<br>Pin 3,5                                 | $V_{sat}$    |            |           | 0.5         | V       |
| Output Z diodes $Z_3, Z_5$  | Pin 3,5  | $V_Z$        | 21         |           |             | V       |
| Control signal threshold  | Reference point Pin 7 ( $V_7$ )<br>$I_{3,5} = 3$ mA<br>Pin 4,6<br>$V_S = 12$ V<br>$V_S = 15$ V | $-V_T$       | 6.5<br>7.8 | 8<br>9.3  | 9.5<br>10.8 | mV      |
| Voltage drift<br>$\Delta V = \frac{V_{T(15V)} - V_{T(12V)}}{15\text{ V} - 12\text{ V}}$ | Pin 4,6  | $\Delta V$   |            | 0.45      |             | mV/V    |
| Threshold voltage   | Switch identification Pin 8  | $V_8$        |            | $0.6 V_S$ |             | V       |
| Input currents  | Pin 4,6  | $I_I$        |            | 100       |             | nA      |
|   | Pin 8  |              |            | 5         |             | $\mu$ A |
| Delay time  | Switch-on<br>High to low<br>Pin 3,5  | $t_{d(on)}$  |            | 6         |             | $\mu$ s |
|   | Switch-off<br>Low to high  | $t_{d(off)}$ |            | 30        |             | $\mu$ s |

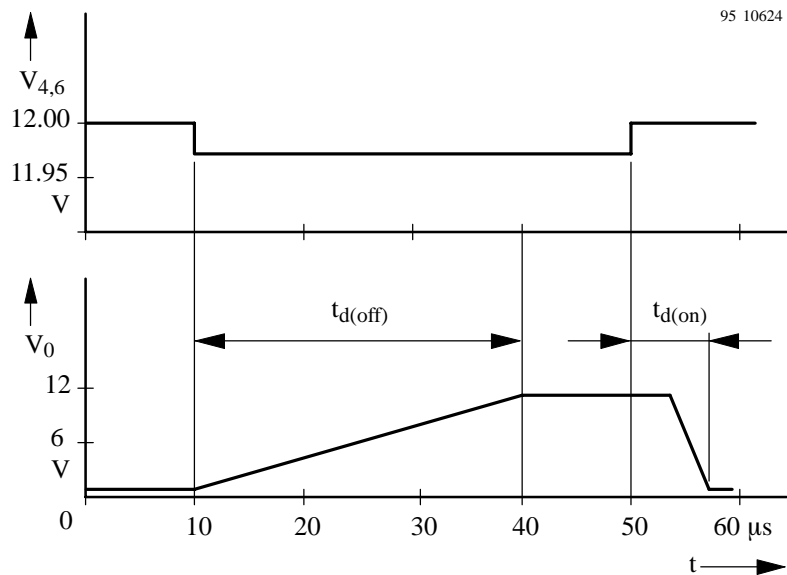
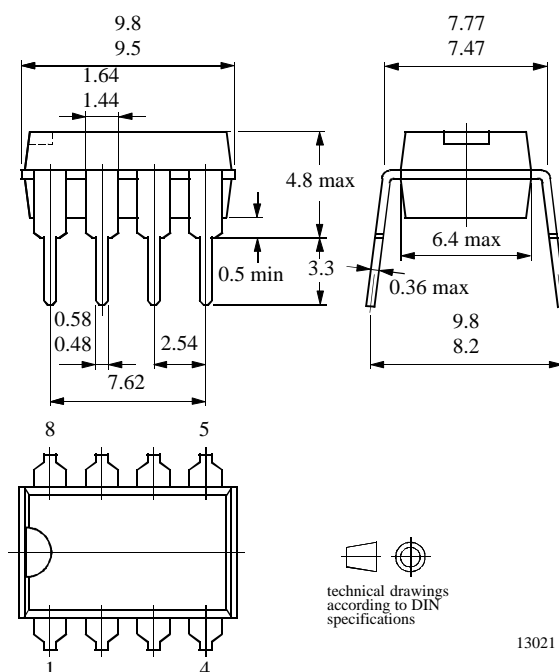


Figure 3.

## Package Information

Package DIP8

Dimensions in mm



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1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**Atmel Germany GmbH** has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

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Atmel Germany GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany  
Telephone: 49 (0)7131 67 2594, Fax number: 49 (0)7131 67 2423