Warning or Car Direction Indicator

Technology: Bipolar

Features

- Can be protected against damage or interference with a minimum of external circuitry
- Temperature and voltage compensated frequency
- Warning indication of lamp failure by means of frequency doubling
- Voltage dependence of the car indicator lamps also compensated for lamp failure
- Relay output with high current carrying capacity and low saturation voltage
- Overvoltage protected relay output
- Load–dump protection
- Lamp load ≥ 1 W
- HF protected
- Control input

Case

8 pin dual inline plastic (U 644 B)

8 pin SO plastic (U 644 B–FP)

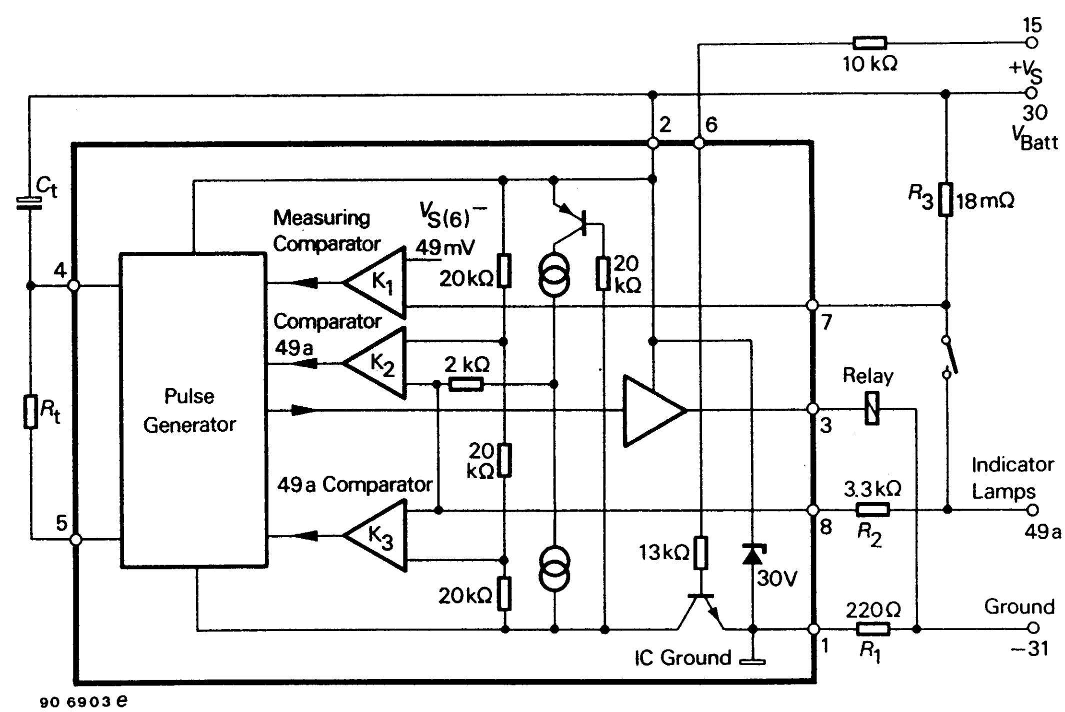


Figure 1 Application circuit as a car flasher with control input
Resistor R_1, R_2 and R_t: 1/4 Watt
R_1 for protection against continuous reversed polarity: 1 Watt

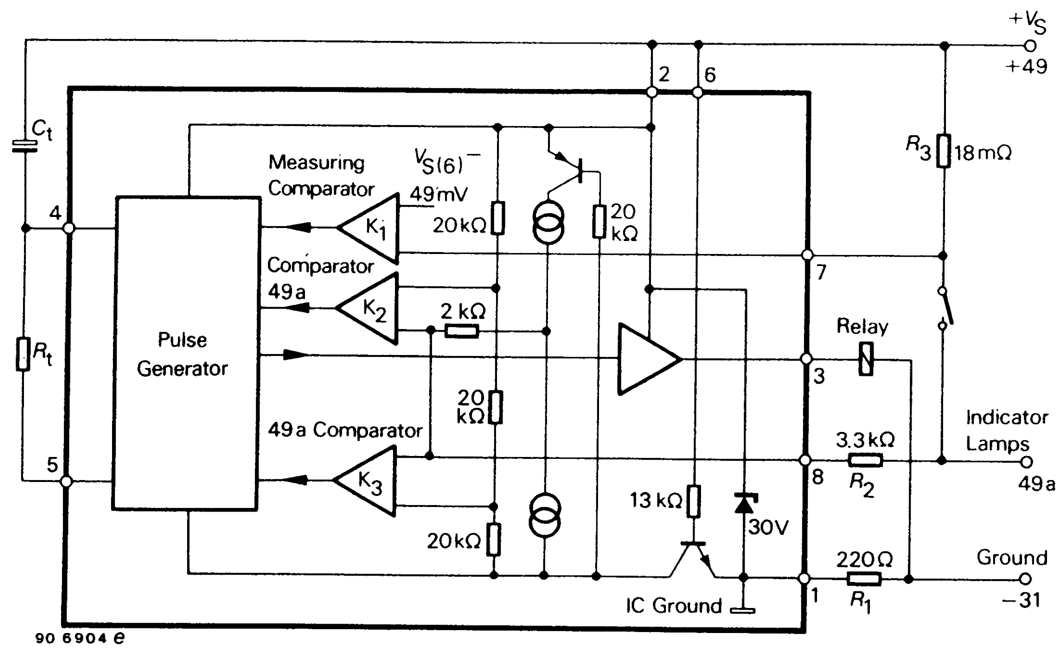


Figure 2 Application circuit as a car flasher without control input
Resistor R_1, R_2 and R_t: 1/4 Watt
R_1 for protection against continuous reversed polarity: 1 Watt

Application Note

In Figure 1, the control input (Pin 6) is used to enable or disable U 644 B.

If ignition is off, the current consumption is less than 50 μA.

In Figure 2, Pin 6 is bridged to Pin 2, so U 644 B works like U 6043 B. Note that the resistor values of R_1 and R_2 are different from the U 6043 B – application circuit!

Pin Configuration

Pin	Function
1	IC ground
2	Supply voltage V_S
3	Relay driver
4	C_t oscillator
5	R_t oscillator
6	Control input
7	Lamp failure detection
8	Start input (49a)

Circuit Description

The application circuit shows the operation of this IC as a car direction indicator signal generator. The flashing frequency is determined by the components R_t and C_t, and the frequency can be calculated from

$$f_1 \sim \frac{1}{R_t \cdot C_t \cdot 1.5} \quad \text{(Hz)}$$

where f_1 is the frequency in normal flashing operation (basic frequency). The control frequency f_2 is typically 2.2 times the value of f_1 and is the frequency in the case of lamp failure. The bright periods for f_1 and f_2 are internally set in the IC and are 50 % for f_1 and 40 % for f_2.

The resistor R_1 and R_2 are needed to protect the circuit against possible damage. An integrated protection circuit together with these external resistors, limits the impulse current in the integrated circuit. Connecting the circuit with the wrong polarity leads to current limitation by R_1, R_2 and the resistance of the coil of the relay. A current of about 60 mA would then flow over R_1 so that for unlimited protection against continuous reversal of the polarity of the supply, a 1.0 W resistor would be necessary. A short circuit between indicator lamp (49a) and ground (31) can give rise to a voltage drop of about 4 V across the measuring resistance R_3, the circuit would not be damaged by such a short circuit.

The use of this application circuit ensures damage and interference protection consistent with VDE 0839 and load dump. The recognition point for lamp failure can be calculated from the control signal threshold, typically 49 mV with V_S = 12 V. With a measuring resistance of R_3 = 18 mΩ the frequency changeover is reached at a lamp load of 21 W + 11.4 W. The variation of the control signal threshold with supply voltage takes into account the PTC–characteristic of filament lamps.

A resistance R_p = 5.6 kΩ between lamp indicator (49a) and ground (31) ensures that if the direction indicator switch is open, then the flashing generator is in the stand–by mode. Then the voltage at pin 8 is between the threshold of the comparators K2 and K3. During the bright phase the voltage at pin 8 must be above the K2–threshold, during dark phase below the K3–threshold. Defined operation is ensured with a lamp load of $P_L \geq 1$ Watt.

Absolute Maximum Ratings

Reference point Pin 1

Parameters		Symbol	Value	Unit
Supply voltage	Pin 2	V_S	18	V
Surge forward current				
t_P = 0.1 ms	Pin 2	I_{FSM}	1.5	A
t_P = 300 ms	Pin 2	I_{FSM}	1.0	A
t_P = 300 ms	Pin 8	I_{FSM}	50	mA
Output current	Pin 3	I_O	0.3	A
Power dissipation				
T_{amb} = 120 °C	DIP 8	P_{tot}	230	mW
T_{amb} = 105 °C	SO 8	P_{tot}	300	mW
T_{amb} = 60 °C	DIP 8	P_{tot}	690	mW
	SO 8	P_{tot}	560	mW
Junction temperature		T_j	150	°C
Ambient temperature range	DIP 8	T_{amb}	–40 ... +120	°C
	SO 8	T_{amb}	–40 ... +105	°C
Storage temperature range		T_{stg}	–65 ... +150	°C

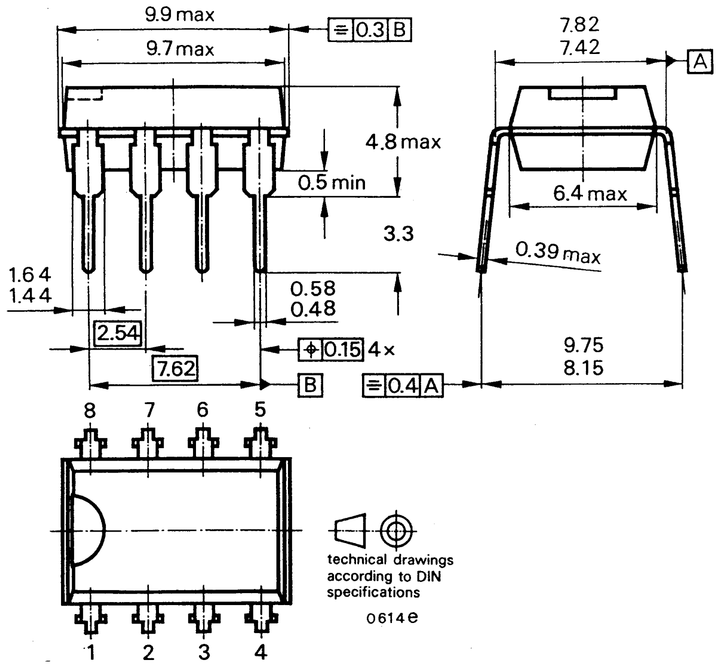
Electrical Characteristics

Typical values under normal operation in application circuit Figure 1, V_S (+49, Pin 2) = 12 V.

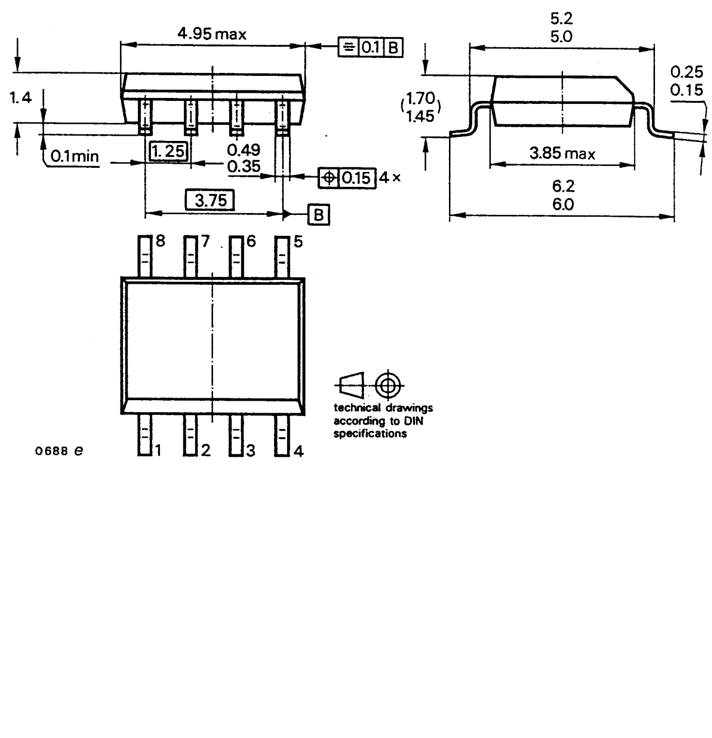
Reference point ground (–31), T_{amb} = 25 °C unless otherwise specified

Parameters	Test Conditions / Pin	Symbol	Min	Typ	Max	Unit
Supply voltage range	Pin 2	V_S (+49)		8 ... 18		V
Supply current, dark phase or stand–by	Pin 2	I_S		5	7	mA
Supply current, bright phase	Pin 2	I_S		6	10	mA
Relay output, saturation voltage	I_O = 300 mA Pin 3	V_O			1.3	V
Relay output reverse current	Pin 3	I_O			0.1	mA
Relay coil resistance		R_L	60			Ω
Relay output overvoltage detection (Relay disabled)			19.0	20.2	22.5	V
Start delay (first bright phase)		t_{on}			10	ms
Frequency determining resistor		R_t	6.8		510	kΩ
Frequency determining capacitor		C_t			47	μF
Frequency tolerance (normal flashing, basic frequency f_1 not including the tolerance of the external components R_t and C_t)		Δf_1	–6.5		+ 6.5	%
Bright period (basic frequency f_1)		Δf_1	45		55	%
Bright period (control frequency f_2)		Δf_2	35		45	%
Frequency increase (lamp failure)		f_2	$2.1 \cdot f_1$		$2.4 \cdot f_1$	
Control signal threshold	V_s = 18 V Pin 7 V_s = 8 V Pin 7 V_s = 13.5 V Pin 7	V_{R3} V_{R3} V_{R3}	53 40.5 47.5	57 43.6 51	61 46.6 54.5	mV mV mV
Resistance between 49a to ground for stand–by		R_P		2	5.6	kΩ
Lamp load		P_L	1			W

Dimensions in mm



Case
DIP 8



Case
SO 8
(SOT 96 A)

OZONE DEPLETING SUBSTANCES POLICY STATEMENT

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements and

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.

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

The Montreal Protocol (1987) and its London Amendments (1990) will soon 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.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division has been able to use its policy of continuous improvements to eliminate the use of any 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 and

3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

TEMIC can certify that our semiconductors are not manufactured with and do not contain ozone depleting substances.

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