Flasher, 18-mΩ Shunt, Extremely Low Power Consumption

Description

The U6432B is an advanced automotive flasher IC which provides lowest stand-by current. Its basic function is equal to the Atmel Wireless & Microcontrollers flasher IC U6043B but current consumption and frequency doubling disabling make the outstanding differences.

Features

- Temperature and voltage compensated frequency
- Warning indication of lamp failure by means of frequency doubling only in direction mode
- Voltage dependence of the car indicator lamps also compensated for lamp failure
- Relay output with high current-carrying capacity and low saturation voltage
- Load-dump protection
- Minimum lamp load for flasher operation ≧ 1 W
- Low susceptibility to EMI
- Extremely low stand by current of 10 µA
- Protection according to ISO/TR 7637/1 level 4 with external capacitor (C_2)

Block Diagram

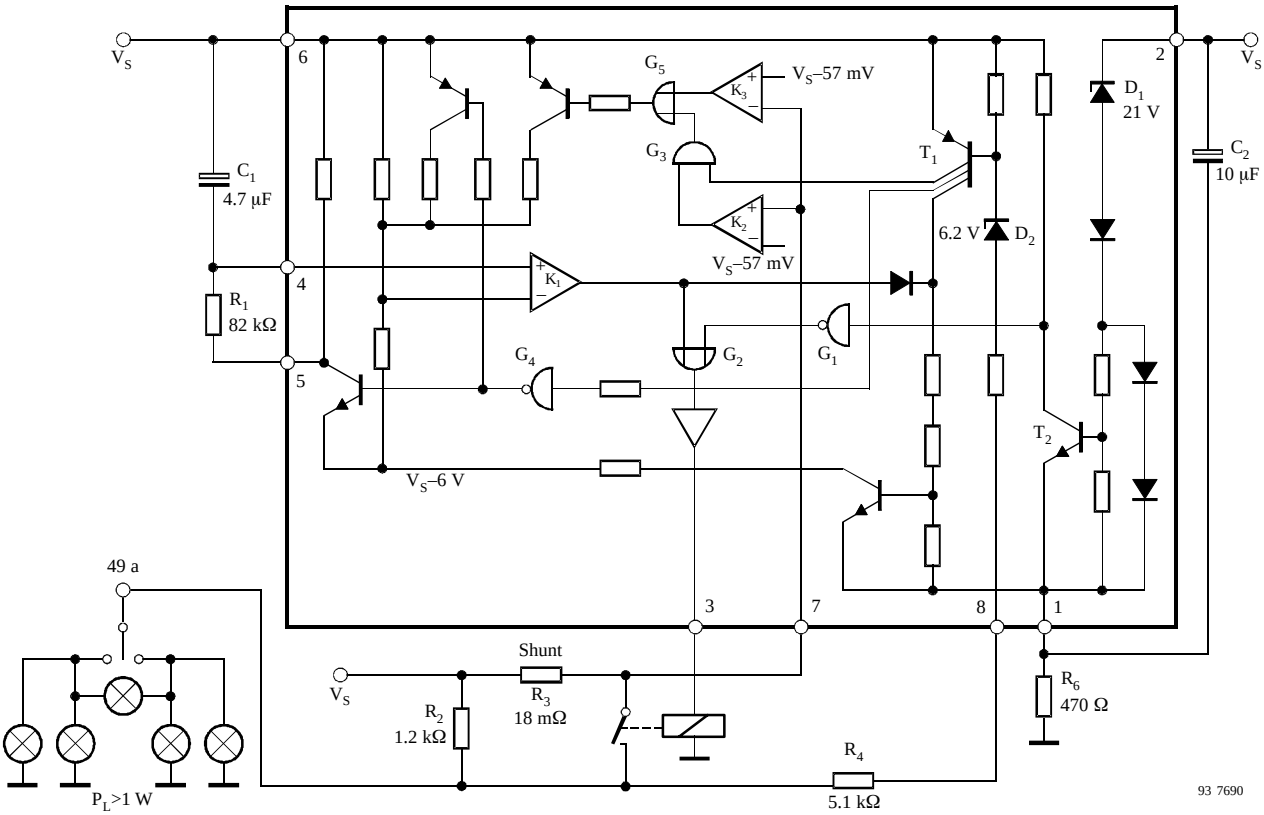


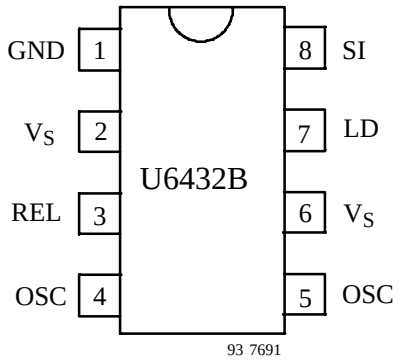
Figure 1. Application as a car flasher

Ordering Information

Extended Type Number	Package	Remarks
U6432B	DIP8	
U6432B-FP	SO8	

Pin Description

Pin	Symbol	Function
1	GND	IC ground
2	V_S	Supply voltage
3	REL	Relay driver
4	OSC	Oscillator
5	OSC	Oscillator
6	V_S	Supply voltage
7	LD	Lamp failure detection
8	SI	Start input (49a)



Functional Description

Pin 1, GND
The integrated circuit is protected against damage via resistor R_4 to ground (–31) in the case of battery reversal. An integrated protection circuit together with external resistances R_2 and R_4 limits the current pulses in the IC.

Pin 2, Supply voltage, V_S - Power
The arrangement of the supply connections to Pin 2 (and 6) must be so as to ensure that, on the connection printed circuit board (PCB), the resistance of V_S to Pin 6 is lower than that to Pin 2.

Pin 3, Relay control output (driver)
The relay control output is a high-side driver with a low saturation voltage and capable to drive a typical automotive relay with a minimum coil resistance of 60 Ω.

Pin 4 and 5 Oscillator
Flashing frequency, f_1, is determined by the R_1C_1 components as follows (see figure 1):

$$f_1 \approx \frac{1}{R_1 \times C_1 \times 1.5}\ \text{Hz}$$

where $C_1 \leq 47\ \mu F$
$R_1 = 6.8\ k\Omega$ to $510\ k\Omega$

In the case of a lamp outage (see Pin 7) the oscillator frequency is switched to the lamp outage frequency f_2 with $f_2 \approx 2.2\ f_1$.

Duty cycle in normal flashing mode: 50%
Duty cycle in lamp outage mode: 40% (bright phase)

Pin 6, Supply voltage, Sense
For accurate monitoring via the shunt resistor, a minimized layer resistance from point V_S / shunt to Pin 6 is recommended.

Pin 7, Control signal threshold 1 (49-mV comparator)

The detection 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 supply voltage takes into account the PTC characteristic of filament lamps.

Control Signal Threshold 2 (15-mV Comparator)

A voltage drop at the shunt resistor R_3 between 49 mV and 15 mV lets the flasher work in frequency doubling mode.

If the voltage drop decreases to a value below V_{R3MAX} = 15 mV, frequency doubling is disabled.

This can be achieved either with a switch which by-passes the shunt resistor (e.g., a special hazard warning switch) or with a small lamp load.

Flasher operation starts with a lamp load of $P_L \geqq 1$ W.

Pin 8, Start input

Start condition for flashing:

Voltage at Pin 8 (see block diagram)

$V_8 \leq V_S - (V_{BE(T1)} + V_{Z(D2)})$

Condition for stand-by:

The resistor R_2 betwen Vs and Pin 8 provides an extremly low stand-by current ($I_S \leq 10$ µA). The leakage current depends on the pull-up resistor R2 according the following formula:

$I_{Leak} \approx (V_{BE(T1)} + V_{Z(D2)})/R2$

Application Hint

In order to achieve a high level immunity against “electrical interference by conduction and coupling” according to ISO/TR 7637/1 test level 4, an electrolythic capacitor C_2 = 10 µF (25 V) between Pin 1 and 2 – mounted close to the IC – is highly recommended.

Absolute Maximum Ratings

Reference point Pin 1

Parameters			Symbol	Value	Unit
Supply voltage	Pins 2 and 6		V_S	18	V
Surge forward current	t_p = 0.1 ms	Pins 2 and 6	I_{FSM}	1.5	A
	t_p = 300 ms	Pins 2 and 6		1.0	A
	t_p = 300 ms	Pin 8		30.0	mA
Output current	Pin 3		I_O	0.3	A
Power dissipation	T_{amb} = 95°C	DIP8	P_{tot}	420	mW
		SO8		340	
	T_{amb} = 60°C	DIP8		690	
		SO8		560	
Junction temperature			T_j	150	°C
Ambient temperature range			T_{amb}	–40 to +105	°C
Storage temperature range			T_{stg}	–55 to +150	°C

Electrical Characteristics

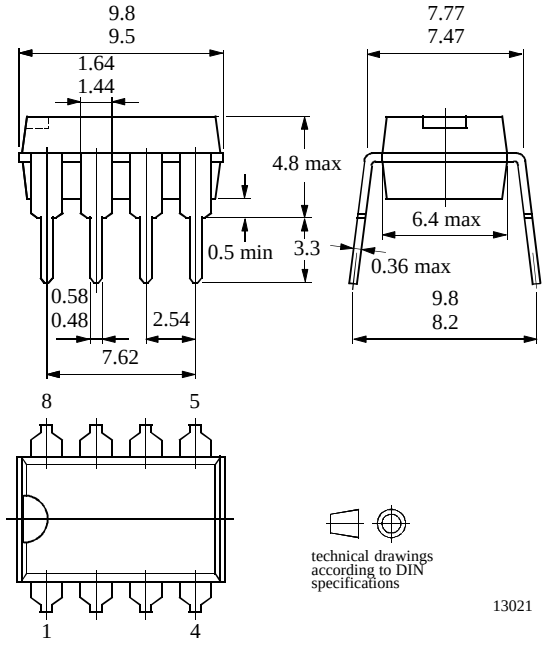
T_{amb} = 25°C; typical values under normal operation in application circuit figure 1, V_S = 12 V (Pins 2 and 6); reference point ground (–31), unless otherwise specified.

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage range	Pins 2 and 6	V_S	9		16.5	V
Supply current, dark phase	Pins 2 and 6	I_S		4.5	8	mA
Supply current, stand-by	Pins 2 and 6	I_S			10	µA
Supply current, bright phase	Pins 2 and 6	I_S		7.0	11	mA
Relay output, saturation voltage	I_O = 150 mA, V_S = 9 V Pin 3	V_O			1.0	V
Relay output reverse current	Pin 3	I_O			0.1	mA
Relay coil resistance		R_L	60			Ω
Start delay	First bright phase	t_{on}			10	ms
Frequency determining resistor		R_1	6.8		510	kΩ
Frequency determining capacitor		C_1			47	µF
Frequency tolerance	Normal flashing, basic frequency f_1 not including the tolerances of the external components R_1 and C_1	Δf_1	–5		+5	%
Bright period	Basic frequency f_1, V_S = 9-15 V	Δf_1	47		53	%
Bright period	Control frequency f_2, V_S = 9-15 V	Δf_2	37		45	%
Frequency increase	Lamp failure, V_S = 9-15 V	f_2	$2.15 \times f_1$		$2.3 \times f_1$	Hz
Control signal threshold 1	V_S = 15 V V_S = 9 V V_S = 12 V Pin 7	V_{R3}	50 43 47	53 45 49	57 47 51	mV
Control signal threshold 2		V_{R3}			15	mV
Lamp load		P_L	1			W

Package Information

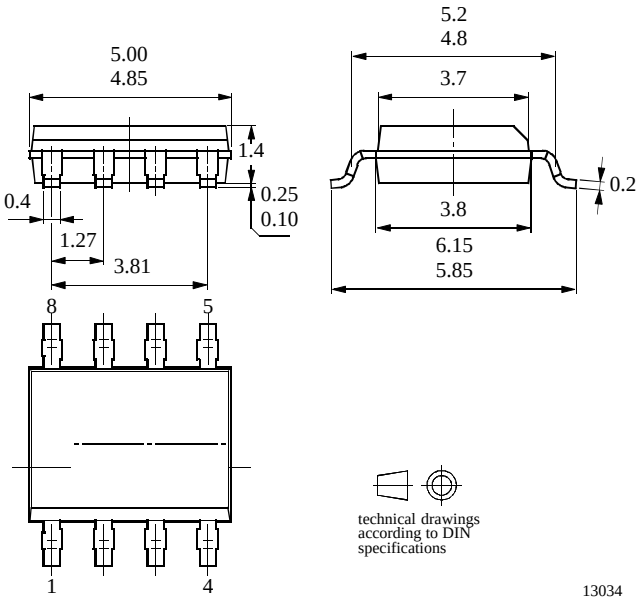
Package DIP8

Dimensions in mm



Package SO8

Dimensions in mm



Ozone Depleting Substances Policy Statement

It is the policy of **Atmel Germany GmbH** to

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.

Atmel Germany GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Data sheets can also be retrieved from the Internet: http://www.atmel–wm.com

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