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 \geq 1 W
- Low Susceptibility to EMI
- Extremely Low Standby Current of 10 μA
- Protection According to ISO/TR 7637/1 Level 4 with External Capacitor (C2)

Description

The U6432B is an advanced automotive flasher IC which provides low standby current. Its basic function is equal to Atmel's flasher IC U6043B but low current consumption and frequency doubling disabling make outstanding differences.



Low-power Flasher IC with 18-mΩ Shunt

U6432B

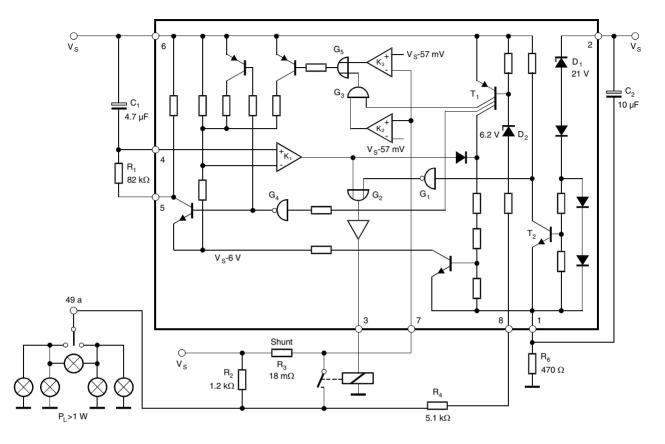
4725A-AUTO-06/03





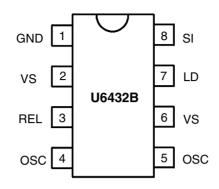
Block Diagram





Pin Configuration

Figure 2. Pinning



Pin Description

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





Functional Description

Pin 1, GND	The U6432B is protected against damage in case of battery reversal via resistor R_4 to ground (-31). 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. It is capable of driving a typical automotive relay with a minimum coil resistance of 60 Ω .
Pin 4 and 5, Oscillator	The flashing frequency, f_1 , is determined by the R_1C_1 components as given by the formula below (see Figure 1):
	$f_1 \approx \frac{1}{R_1 \times C_1 \times 1.5} Hz$
	where $C_1 \leq 47~\mu F,~R_1$ = 6.8 k Ω to 510 k Ω
	In case of a lamp outage (see Pin 7) the oscillator frequency is switched to the lamp outage frequency f_2 with $f_2\approx 2.2\times f_1.$
	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 $V_{\rm S}$ /shunt to Pin 6 is recommended.
Pin 7	
Control Signal Threshold (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 $R_3 = 18$ m Ω , the frequency change-over 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 $\rm R_3$ 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 $P_L \ge 1$ W.

Pin 8, Start Input

Start condition for flashing:

- Voltage at Pin 8 (see Figure 1)
- $\bullet \qquad V_8 \leq V_S \text{ } (V_{\text{BE}(\text{T1})} + V_{\text{Z(D2)}})$

Condition for standby:

The resistor R_2 betwen V_S and Pin 8 provides an extremly low standby current ($I_S \leq 10~\mu A$). The leakage current depends on the pull-up resistor R_2 according to the following formula:

 $I_{\text{Leak}} \approx (V_{\text{BE}(\text{T1})} + V_{Z(\text{D2})})/R_2$

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 $C_2 = 10 \ \mu\text{F} (25 \text{ V})$ 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	Pin 2 and 6	Vs	18	V
Surge Forward Curren	nt			
$t_{P} = 0.1 \text{ ms}$ $t_{P} = 300 \text{ ms}$ $t_{P} = 300 \text{ ms}$	Pin 2 and 6 Pin 2 and 6 Pin 8	I _{FSM} I _{FSM} I _{FSM}	1.5 1.0 30	A A mA
Output current	Pin 3	Ι _Ο	0.3	A
Power Dissipation				
$T_{amb} = 95^{\circ}C$ $T_{amb} = 60^{\circ}C$	DIP 8 SO8 DIP 8 SO8	P _{tot} P _{tot} P _{tot} P _{tot}	420 340 690 560	mW mW mW mW
Junction temperature		TJ	150	°C
Ambient temperature ra	ange	T _{amb}	-40 to +105	°C
Storage temperature ra	ange	T _{stg}	-55 to +150	°C





Electrical Characteristics

 $T_{amb} = 25^{\circ}C$; 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	Symbol	Min.	Тур.	Max.	Unit
Supply voltage range	Pin 2 and 6	Vs	9		16.5	V
Supply current, dark phase	Pins 2 and 6	۱ _s		4.5	8	mA
Supply current, stand-by	Pins 2 and 6	۱ _s			10	mA
Supply current, bright phase	Pins 2 and 6	۱ _s		7.0	11	mA
Relay output, saturation voltage	I _O = 150 mA V _S = 9 V, Pin 3	Vo			1.0	V
Relay output reverse current	Pin 3	Ι _ο			0.1	mA
Relay coil resistance		RL	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 to 15 V	Δf_1	47		53	%
Bright period	Control frequency f_2 V _S = 9 to 15 V	Δf_2	37		45	%
Frequency increase	Lamp failure, V _S = 9 to 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		PL	1			W

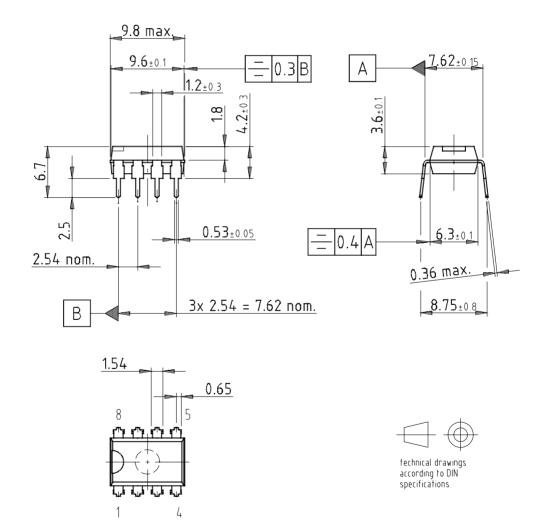
Ordering Information

Extended Type Number	Package	Remarks
U6432B	DIP8	-
U6432B-FP	SO8	-

Package Information

DIP8

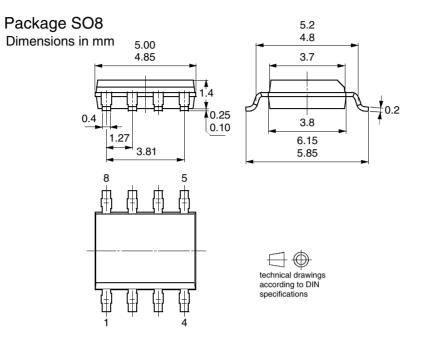
Package: DIP 8 Dimensions in mm



Drawing-No.: 6.543-5040.01-4 Issue: 1; 16.01.02









Atmel Corporation

2325 Orchard Parkway San Jose, CA 95131 Tel: 1(408) 441-0311 Fax: 1(408) 487-2600

Regional Headquarters

Europe

Atmel Sarl Route des Arsenaux 41 Case Postale 80 CH-1705 Fribourg Switzerland Tel: (41) 26-426-5555 Fax: (41) 26-426-5500

Asia

Room 1219 Chinachem Golden Plaza 77 Mody Road Tsimshatsui East Kowloon Hong Kong Tel: (852) 2721-9778 Fax: (852) 2722-1369

Japan

9F, Tonetsu Shinkawa Bldg. 1-24-8 Shinkawa Chuo-ku, Tokyo 104-0033 Japan Tel: (81) 3-3523-3551 Fax: (81) 3-3523-7581

Atmel Operations

Memory

2325 Orchard Parkway San Jose, CA 95131 Tel: 1(408) 441-0311 Fax: 1(408) 436-4314

Microcontrollers

2325 Orchard Parkway San Jose, CA 95131 Tel: 1(408) 441-0311 Fax: 1(408) 436-4314

La Chantrerie BP 70602 44306 Nantes Cedex 3, France Tel: (33) 2-40-18-18-18 Fax: (33) 2-40-18-19-60

ASIC/ASSP/Smart Cards

Zone Industrielle 13106 Rousset Cedex, France Tel: (33) 4-42-53-60-00 Fax: (33) 4-42-53-60-01

1150 East Cheyenne Mtn. Blvd. Colorado Springs, CO 80906 Tel: 1(719) 576-3300 Fax: 1(719) 540-1759

Scottish Enterprise Technology Park Maxwell Building East Kilbride G75 0QR, Scotland Tel: (44) 1355-803-000 Fax: (44) 1355-242-743

RF/Automotive

Theresienstrasse 2 Postfach 3535 74025 Heilbronn, Germany Tel: (49) 71-31-67-0 Fax: (49) 71-31-67-2340

1150 East Cheyenne Mtn. Blvd. Colorado Springs, CO 80906 Tel: 1(719) 576-3300 Fax: 1(719) 540-1759

Biometrics/Imaging/Hi-Rel MPU/

High Speed Converters/RF Datacom Avenue de Rochepleine BP 123 38521 Saint-Egreve Cedex, France Tel: (33) 4-76-58-30-00 Fax: (33) 4-76-58-34-80

e-mail literature@atmel.com

Web Site http://www.atmel.com

Disclaimer: Atmel Corporation makes no warranty for the use of its products, other than those expressly contained in the Company's standard warranty which is detailed in Atmel's Terms and Conditions located on the Company's web site. The Company assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Atmel are granted by the Company in connection with the sale of Atmel products, expressly or by implication. Atmel's products are not authorized for use as critical components in life support devices or systems.

© Atmel Corporation 2003. All rights reserved.

Atmel® and combinations thereof are the registered trademarks of Atmel Corporation or its subsidiaries.

Other terms and product names may be the trademarks of others.

