# Interval- and Wipe/ Wash Wiper Control IC

## Description

As a convenience feature of the windshield wiper intermittent and wipe/wash operation are implemented in most of the automobiles. The U642B is the low-cost solution for an accurate timing function control. Wipe/wash mode has priority over interval mode. Interval pause and afterwiping time can be set to fixed values by using resistors in a broad time range. Added value can be provided with an individual, continuous adjustment of the interval pause by a potentiometer which may be built into the stalk. For proper operation it is mandatory to feed the signal of the wiper motor's park switch into U642B.

## Features

- Interval pause: 4 to 20 s
- Afterwiping time: 2 to 20 s
- Wiper motor's park switch
- Wipe/wash mode priority
- One external capacitor, determines all time sequences
- Relay driver with Z-diode
- Interference protection according to VDE 0839 or ISO/TR 7637/1
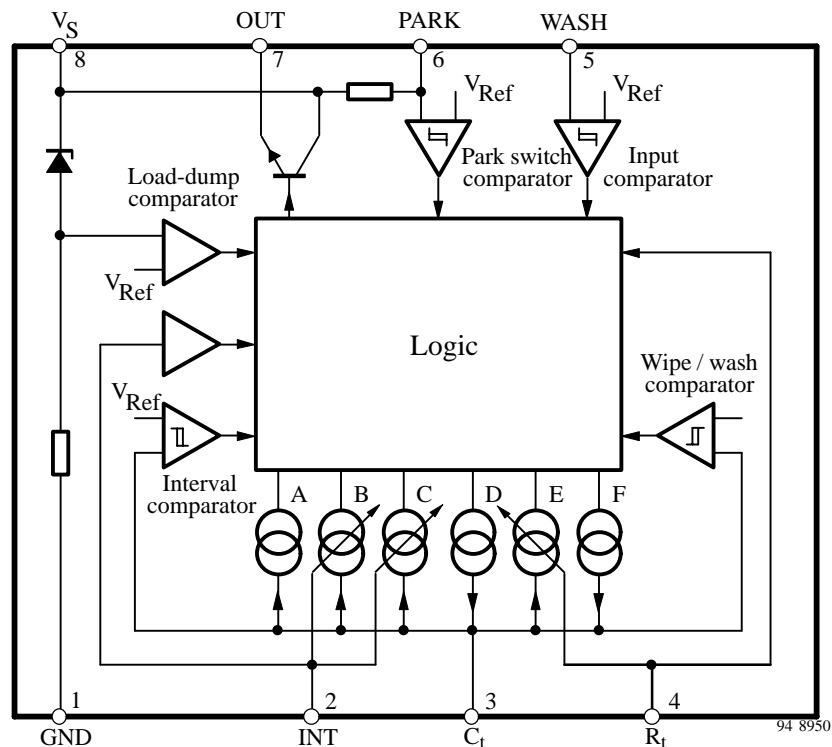- Load-dump protected

## Block Diagram



Figure 1. Block diagram

# U642B

## Ordering Information

| Extended Type Number | Package | Remarks |
|---|---|---|
| U642B | DIP8 | |
| U642B–FP | SO8 | |

## Pin Description

| Pin | Symbol | Function |
|---|---|---|
| 1 | GND | Ground |
| 2 | INT | Interval switch |
| 3 | $C_t$ | Timing capacitor $C_2$ |
| 4 | $R_t$ | Afterwiping time resistance |
| 5 | WASH | Wipe/Wash switch |
| 6 | PARK | Park switch for wiper motor |
| 7 | OUT | Relay control output |
| 8 | $V_S$ | Supply voltage KI. 15 |

GND [1]    [8] $V_S$
INT [2]    [7] OUT
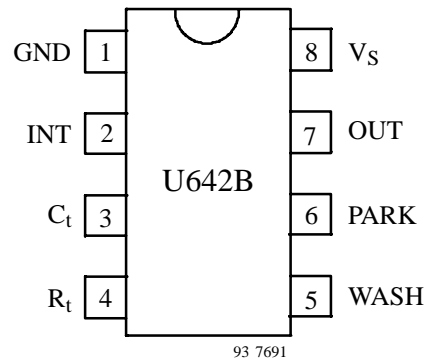$C_t$ [3]   U642B   [6] PARK
$R_t$ [4]    [5] WASH

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Figure 2.  Pinning

## Circuit Description

### Interval Function, Pin 2

By closing the interval switch, $S_2$, to supply voltage, $V_{Batt}$, the relay is activated. The internal current source (Pin 3) which holds the capacitor $C_2$ in charged state is switched-off. As soon as there is a positive potential at the park switch ($S_1$), the current source F (see figure 1) charges the capacitor $C_2$ very fast. After the wiper operation is finished, $S_1$ is again at ground potential, the relay is in "off" position – interval pause begins – the capacitor $C_2$ is discharged through the current source C, till the voltage at Pin 3 is below the threshold of 2 V. Interval pause can be adjusted between 4 s to 20 s with the help of potentiometer $R_3$. Now the relay switches on and the next interval cycle begins. Opening of switch $S_2$ causes the current source A to discharge $C_2$ immediately and current sources C and F are switched-off.

### Wipe/Wash (WIWA) Operation, Pin 5

By closing the WIWA-switch, $S_3$, to supply voltage, $V_{Batt}$, the water pump starts spraying water on the windscreen, the current source A is switched-off which keeps the capacitor $C_2$ in discharged state. Now the capacitor is charged through the current sources D and F, and when after a time interval of approximately 100 ms, the voltage at the capacitor is greater than 6.5 V, the relay is turned on as long as the switch "WIWA" is closed.

The after-wipe-time begins after the switch is open whereas the sources D and F are switched off and the source E is activated. Source E discharges the capacitor till the voltage is less than 2.2 V. The relay is off and the wiper-motor is supplied via the park switch until the park position will be reached. The after-wipe-time is determined by the current source E which can be regulated with the external resistor $R_{Time}$. Afterwards the source A discharges the capacitor. The relay switch off is independent of the park switch $S_1$.

### Interval and WIWA Functions

The interval function is interrupted immediately when the wipe/ wash mode is activated. The current source A discharges the capacitor to a value of 2 V, afterwards the normal wash function starts.

Interval wiping starts immediately when the after-wipe-time is over. The switching delays are slightly shorter, because the capacitor is already charged to a value of 2 V.

The wipe/ wash function is not interrupted when interval switch $S_2$ is activated. Interval function begins after the WIWA function is over.
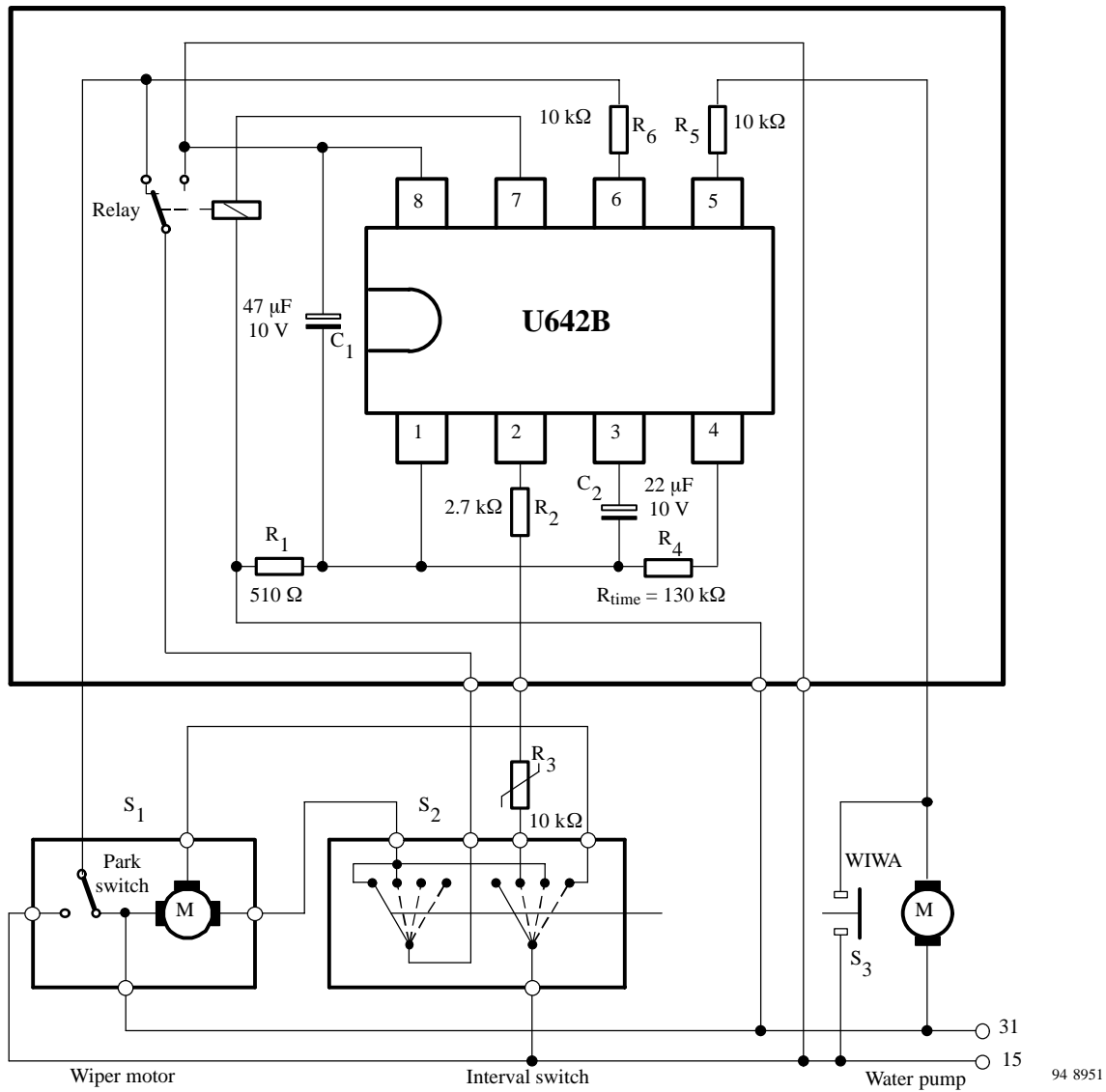
Figure 3. Application circuit with interval and wipe/wash operation

# U642B

## Absolute Maximum Ratings

| Parameters | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Supply voltage | t = 60 s | Terminal 15, Pin 8 | $V_{Batt}$ | 28 | V |
| Supply current | t = 2 ms | Pin 8 | $I_8$ | 1.5 | A |
| | t = 200 ms | | $I_8$ | 150 | mA |
| Relay control output current (DC) | | Pin 7 | $I_7$ | 200 | mA |
| | t = 200 ms | | $I_7$ | 1.2 | A |
| Pulse current (control inputs) | t = 200 ms | | | | |
| | Park switch, $S_1$ | Pin 6 | $I_6$ | 50 | mA |
| | Wipe/Wash switch, $S_3$ | Pin 5 | $I_5$ | 50 | |
| | Interval switch, $S_2$ | Pin 2 | $I_2$ | 50 | |
| Power dissipation | $T_{amb}$ = 90°C | | $P_{tot}$ | 500 | mW |
| Storage temperature range | | | $T_{stg}$ | −55 to +125 | °C |
| Ambient temperature range | | | $T_{amb}$ | −40 to +85 | °C |

## Thermal Resistance

| Parameters | | Symbol | Value | Unit |
|---|---|---|---|---|
| Junction ambient | DIP8 | $R_{thJA}$ | 120 | K/W |
| | SO8 | $R_{thJA}$ | 160 | K/W |

## Electrical Characteristics

$V_{Batt}$ = 12 V, $T_{amb}$ = 25°C, reference point is Pin 8 (see figure 3) unless otherwise specified.

| Parameters | Test Conditions / Pins | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Supply voltage | Pin 8 | $V_{Batt}$ | 9 | | 16.5 | V |
| Supply current | | $I_8$ | | 10 | | mA |
| Z-diode limitation | | $V_1$ | | 7.6 | | V |
| **Overvoltage** | | | | | | |
| Threshold current | | I1 | | −50 | | mA |
| Threshold voltage | | $V_{Batt}$ | | 35 | | V |
| **Relay control output** | Pin 7 | | | | | |
| Saturation voltage | $I_7$ = 100 mA | $V_7$ | | | −1.0 | V |
| | $I_7$ = 200 mA | | | | −1.5 | |
| Leakage current | | $I_7$ | | 100 | | µA |
| **Park switch** | Pin 6 | | | | | |
| Internal pull-up resistance | $R_6$ = 10 kΩ | $R_6$ | | 50 | | kΩ |
| Switching threshold voltage | | $V_6$ | | −3.3 | | V |
| Protection diode | $I_6$ = −10 mA | $V_6$ | | −0.8 | | V |
| | $I_6$ = 10 mA | $V_6$ | | 7.6 | | V |
| **Input $C_t$** | Pin 3 | | | | | |
| Internal resistance | | $R_3$ | | 100 | | Ω |
| **Interval input**, $R_2$ = 2.7 to 30 kΩ | Pin 2 | | | | | |
| Protection diode | $I_2$ = −10 mA | $V_2$ | | −0.8 | | V |
| | $I_2$ = 30 mA/10 ms | | | 7.6 | | |

## Electrical Characteristics (continued)

$V_{Batt}$ = 12 V, $T_{amb}$ = 25°C, reference point is Pin 8 (see figure 3) unless otherwise specified.

| Parameters | Test Conditions / Pins | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **WASH Input**, $R_5$ = 10 kΩ | Pin 5 | | | | | |
| Switching threshold/Hysteresis | | $V_5$ | | –1.4/–5.4 | | V |
| Protection diode | $I_5$ = –10 mA<br>$I_5$ = 10 mA | V | | –0.8<br>7.6 | | V |
| **Switching Characteristics,** $R_4$ = 47 kΩ to 300 kΩ, $I_4$ = –150 µA | | | | | | |
| Interval time | $R_3$ = 0 kΩ<br>$R_3$ = 10 kΩ | $t_2$ | 3.6<br>10.8 | 4<br>12 | 4.4<br>13.2 | s |
| Prewash delay | | $t_{del}$ | | 100 | | ms |
| After-wipe-time | $R_4$ = 130 kΩ          Pin 5 | $t_5$ | 4.75 | 5.25 | 5.75 | s |
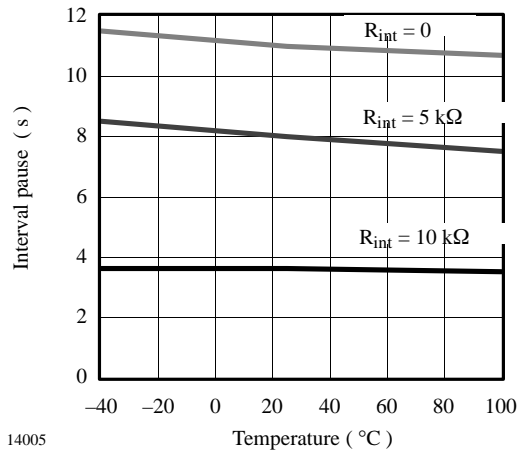


Figure 4.  Interval pause = f ( T); Ct = 22 µF
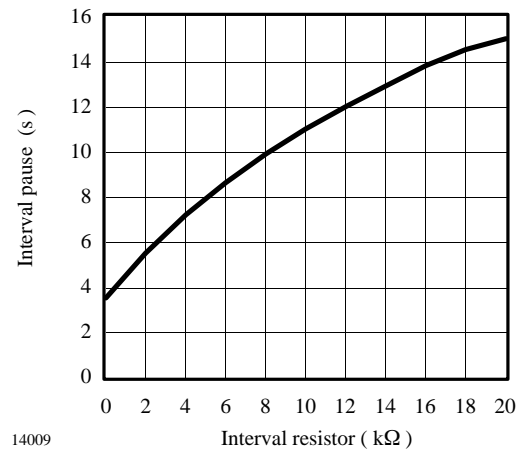


Figure 6.  Interval pause = f ( $R_{INT}$); Ct = 22 µF
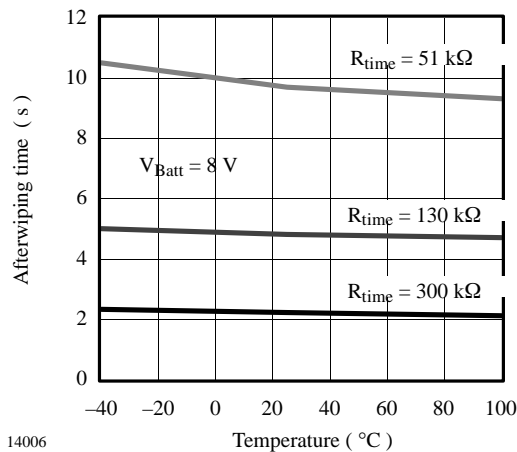


Figure 5.  Afterwiping time = f ( T); Ct = 22 µF
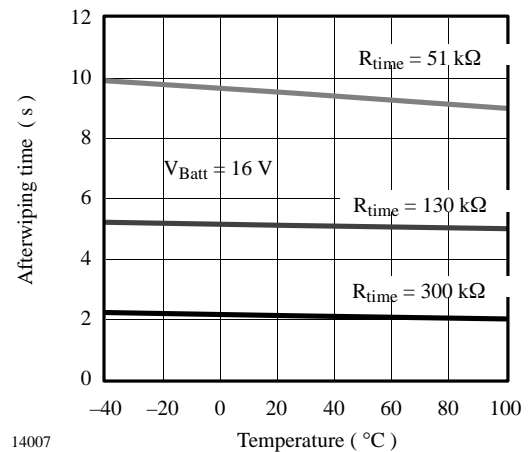


Figure 7.  Afterwiping time = f ( T); Ct = 22 µF

## Package Information

### Package DIP8
Dimensions in mm



9.8
9.5
1.64
1.44
4.8 max
0.5 min
3.3
0.58
0.48
2.54
7.62

7.77
7.47
6.4 max
0.36 max
9.8
8.2

8    5

1    4

technical drawings
according to DIN
specifications

13021
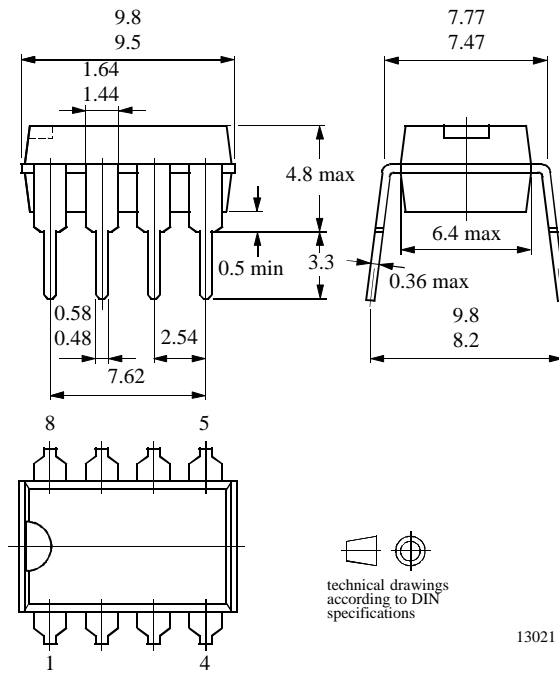
### Package SO8
Dimensions in mm



5.00
4.85
1.4
0.4
0.25
0.10
1.27
3.81

5.2
4.8
3.7
3.8
6.15
5.85
0.2

8    5

1    4

technical drawings
according to DIN
specifications

13034
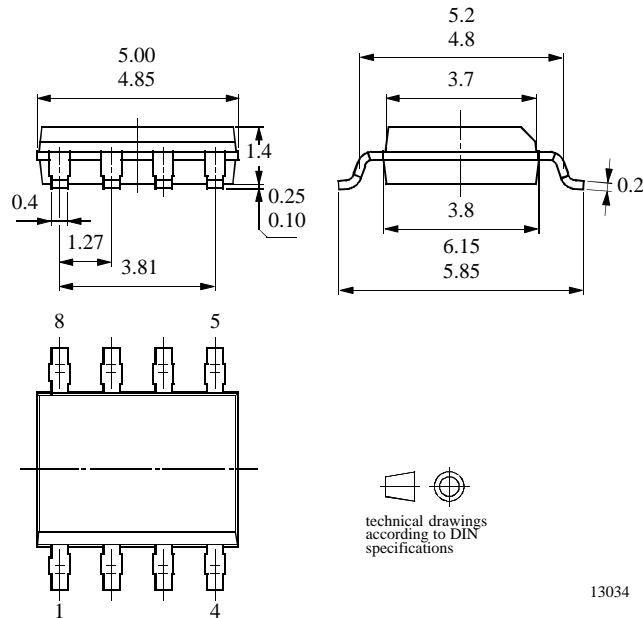
## Ozone Depleting Substances Policy Statement

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**

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