



UU6046B

Preliminary

LINEAR INTEGRATED CIRCUIT

**REAR WINDOW HEATING
TIMER**

■ **DESCRIPTION**

The bipolar integrated circuit UTC **UU6046B** is designed as a window heating timer. Due to time controlled functions, they reduce the current consumptions of high loads i.e., heating resistors.

An ON-relay can be switched off after a preset delay time. The relay time can be interrupted manually, whereas a retrigger function is not provided.

■ **FEATURES**

- * Delay time range: 3.7s to 20h
- * Relay driver with Z-diode
- * RC oscillator determines switching characteristics
- * Debounced input for toggle switch
- * Two debounced inputs: ON and OFF
- * Load-dump protection
- * RF interference protected
- * Inputs switched to V_{Batt}

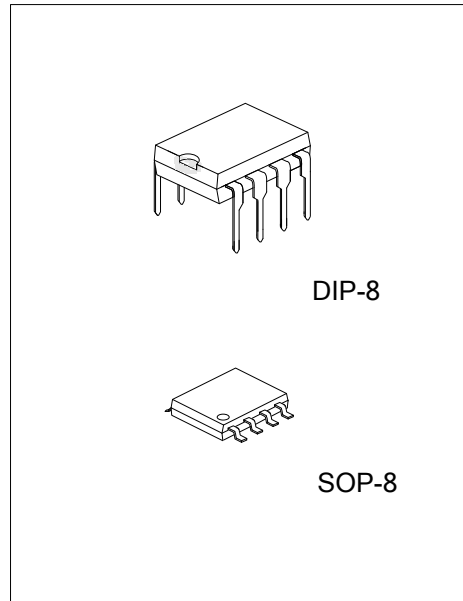
■ **ORDERING INFORMATION**

| Ordering Number | | Package | Packing |
|-----------------|----------------|---------|-----------|
| Lead Free | Halogen Free | | |
| UU6046BG-D08-T | UU6046BG-D08-T | DIP-8 | Tube |
| - | UU6046BG-S08-R | SOP-8 | Tape Reel |

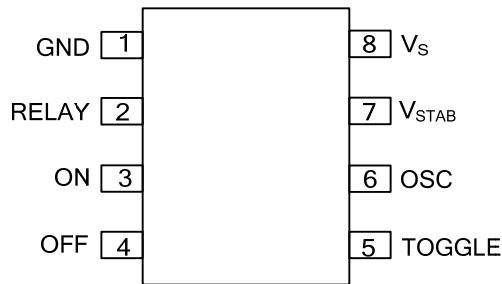
| | |
|--|---|
| <p>UU6046BL-D08-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p> | <p>(1) T: Tube, R: Tape Reel (2) D08: DIP-8, S08: SOP-8 (3) L: Lead Free, G: Halogen Free and Lead Free</p> |
|--|---|

■ **MARKING**

| DIP-8 | SOP-8 |
|---|---|
| <p>UTC UU6046B</p> <p>Date Code L: Lead Free G: Halogen Free Lot Code</p> | <p>UTC UU6046BG</p> <p>Date Code Lot Code</p> |



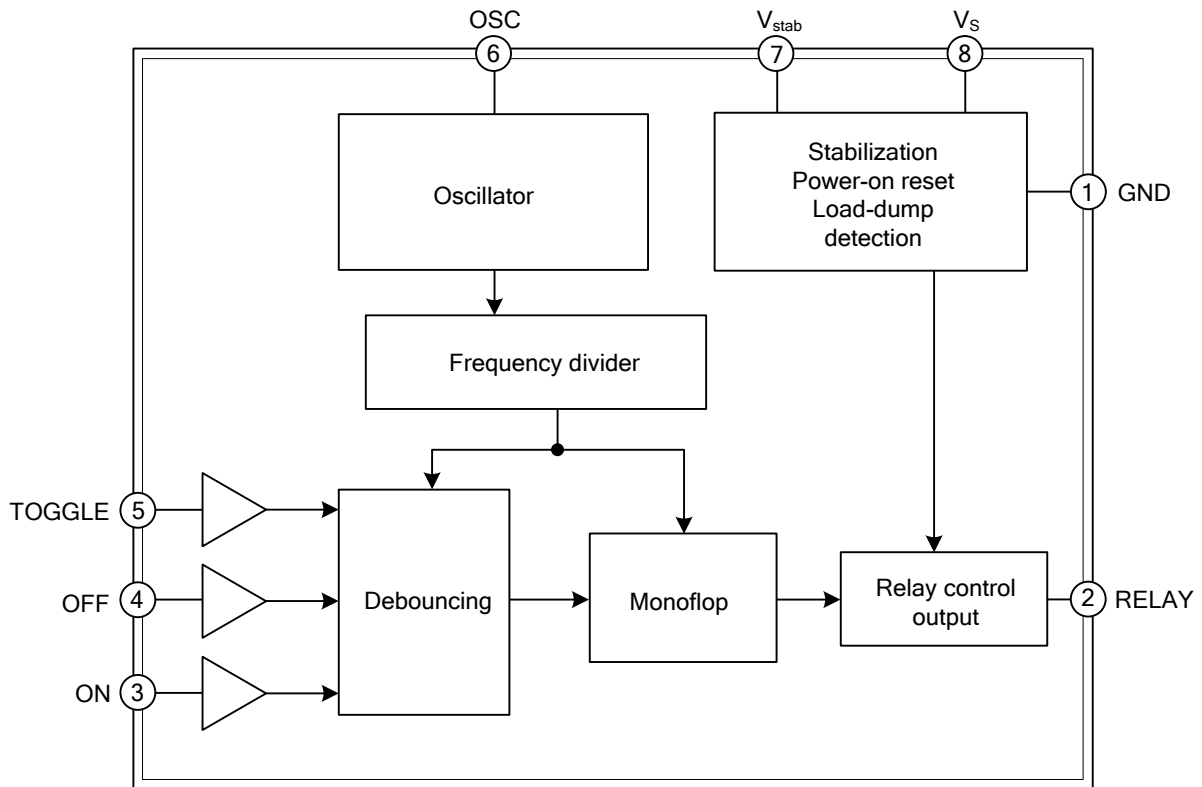
■ PIN CONFIGURATION



■ PIN DESCRIPTION

| PIN NO. | PIN NAME | DESCRIPTION |
|---------|-------------------|-------------------------|
| 1 | GND | Reference point, ground |
| 2 | RELAY | Relay control output |
| 3 | ON | Switch-on input |
| 4 | OFF | Switch-off input |
| 5 | TOGGLE | Toggle input |
| 6 | OSC | RC oscillator input |
| 7 | V _{STAB} | Stabilized voltage |
| 8 | V _S | Supply voltage |

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

| PARAMETER | SYMBOL | RATINGS | UNIT |
|----------------------------------|------------|----------|------|
| Operating Voltage, Static, 5 min | V_{Batt} | 24 | V |
| Ambient Temperature Range | T_A | -40~+125 | °C |
| Junction Temperature | T_J | 150 | °C |
| Storage Temperature Range | T_{STG} | -55~+125 | °C |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL RESISTANCE

| PARAMETER | SYMBOL | RATINGS | UNIT |
|------------------|--------|---------|------|
| Junction Ambient | DIP-8 | 110 | K/W |
| | SOP-8 | 160 | K/W |

■ ELECTRICAL CHARACTERISTICS

($V_{Batt}=13.5V$, $T_{AMB}=25^{\circ}C$, reference point ground, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|-------------|------------------------------------|-------|-----|-------|------------|
| Operating Voltage | V_{Batt} | $R_1 \geq 510\Omega$ | 6 | | 16 | V |
| | | $t < 5min$ | | | 24 | V |
| | | $t < 60min$ | | | 18 | V |
| 5V Supply | V_8, V_7 | Without R_1, C_1 Pins 7 and 8 | 4.3 | | 6.0 | V |
| Stabilized Voltage | V_7 | $V_{Batt}=12V$, Pin 7 | | 5.5 | | V |
| Undervoltage Threshold | V_S | Power on Reset | 3.0 | | 4.2 | V |
| Supply Current | I_S | All Push Buttons Open, Pin8 | | 1.3 | 2.0 | mA |
| Internal Z-Diode | V_Z | $I_8=10mA$, Pin 8 | 13.5 | 14 | 16 | V |
| Relay control output (Pin 2) | | | | | | |
| Saturation Voltage | V_2 | $I_2=200mA$ | | 1.2 | | V |
| | | $I_2=300mA$ | | 1.3 | | V |
| Leakage Current | I_{lkq} | $V_2=14V$ | | 2 | 100 | μA |
| Output Current | I_2 | | | | 300 | mA |
| Output pulse current | | | | | | |
| Load Dump Pulse | I_2 | $t \leq 300ms$ | | | 1.5 | A |
| Internal Z-Diode | V_Z | $I_2=10mA$ | 20 | 22 | 24 | V |
| Oscillator input (f = 0.001~40 kHz, see table 1) (Pin 6) | | | | | | |
| Internal Discharge Resistance | R_6 | $V_6=5V$ | | 2.0 | | k Ω |
| Switching Voltage | V_{6L} | Lower | 0.9 | 1.1 | 1.4 | V |
| | V_{6H} | Upper | | 3.1 | | V |
| Input Current | $-I_6$ | $V_6=0V$ | | | 1 | μA |
| Switching times | | | | | | |
| Debounce Time | t_3 | | | 6 | | cycles |
| Delay Time | t_d | | 72704 | | 74752 | cycles |
| Inputs ON, OFF, TOGGLE (Pins 3, 4 and 5) | | | | | | |
| Switching Threshold Voltage | $V_{3,4,5}$ | | | 2.0 | | V |
| Internal Z-Diode | V_Z | $I_{3,4,5}=10mA$ | 6.5 | 7.1 | 8.0 | V |
| Pull-Down Resistance | $R_{3,4,5}$ | $V_{3,4,5}=5V$ | 13 | 20 | 50 | k Ω |

■ OSCILLATOR FREQUENCY, DEBOUNCE TIME, DELAY TIME. DIMENSIONING

Table 1. Oscillator frequency, debounce time, delay time. dimensioning

| Frequency f | Debounce time t_3 | Delay time t_d | | C_2 | R_2 |
|-------------|---------------------|------------------|-----|-------|-------|
| | | min | s | | |
| 1 | 6000 | 1229 | | 4700 | 280 |
| 2 | 3000 | 614 | | 1000 | 650 |
| 3 | 2000 | 410 | | 1000 | 440 |
| 4 | 1500 | 307 | | 1000 | 330 |
| 5 | 1200 | 246 | | 1000 | 260 |
| 6 | 1000 | 205 | | 1000 | 220 |
| 7 | 857 | 176 | | 1000 | 190 |
| 8 | 750 | 154 | | 1000 | 160 |
| 9 | 667 | 137 | | 1000 | 140 |
| 10 | 600 | 123 | | 1000 | 130 |
| 20 | 300 | 61 | | 100 | 650 |
| 30 | 200 | 41 | | 100 | 440 |
| 40 | 150 | 31 | | 100 | 330 |
| 50 | 120 | 25 | | 100 | 260 |
| 60 | 100 | 20 | | 100 | 220 |
| 70 | 86 | 18 | | 100 | 190 |
| 80 | 75 | 15 | | 100 | 160 |
| 90 | 67 | 14 | | 100 | 140 |
| 100 | 60 | 12 | | 100 | 130 |
| 200 | 30 | | 369 | 10 | 600 |
| 300 | 20 | | 246 | 10 | 400 |
| 400 | 15 | | 184 | 10 | 300 |
| 500 | 12 | | 147 | 10 | 240 |
| 600 | 10 | | 123 | 10 | 200 |
| 700 | 9.00 | | 105 | 10 | 170 |
| 800 | 8.00 | | 92 | 10 | 150 |
| 900 | 7.00 | | 82 | 10 | 130 |
| 1000 | 6.00 | | 74 | 10 | 120 |
| 2000 | 3.00 | | 37 | 1 | 600 |
| 3000 | 2.00 | | 25 | 1 | 400 |
| 4000 | 1.50 | | 18 | 1 | 300 |
| 5000 | 1.20 | | 15 | 1 | 240 |
| 6000 | 1.00 | | 12 | 1 | 200 |
| 7000 | 0.86 | | 11 | 1 | 170 |
| 8000 | 0.75 | | 9 | 1 | 150 |
| 9000 | 0.67 | | 8 | 1 | 130 |
| 10000 | 0.60 | | 7 | 1 | 120 |
| 11000 | 0.55 | | 6.7 | 1 | 110 |
| 12000 | 0.50 | | 6.1 | 1 | 99 |
| 13000 | 0.46 | | 5.7 | 1 | 91 |
| 14000 | 0.43 | | 5.3 | 1 | 85 |
| 15000 | 0.40 | | 4.9 | 1 | 79 |
| 16000 | 0.38 | | 4.6 | 1 | 74 |
| 17000 | 0.35 | | 4.3 | 1 | 70 |
| 18000 | 0.33 | | 4.1 | 1 | 66 |
| 19000 | 0.32 | | 3.9 | 1 | 62 |
| 20000 | 0.30 | | 3.7 | 1 | 59 |

■ TYPICAL APPLICATION CIRCUIT

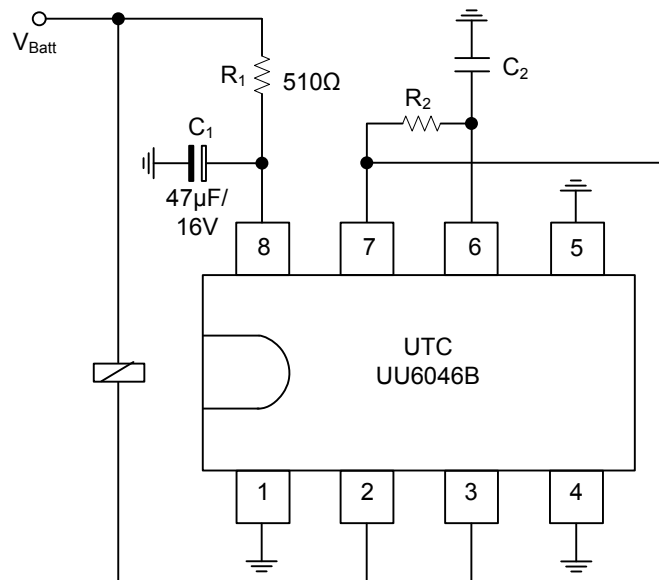


Figure 1. Generation of a monostable delay time, t_d , caused by applying the operating voltage V_{Batt} , not externally deactivatable.

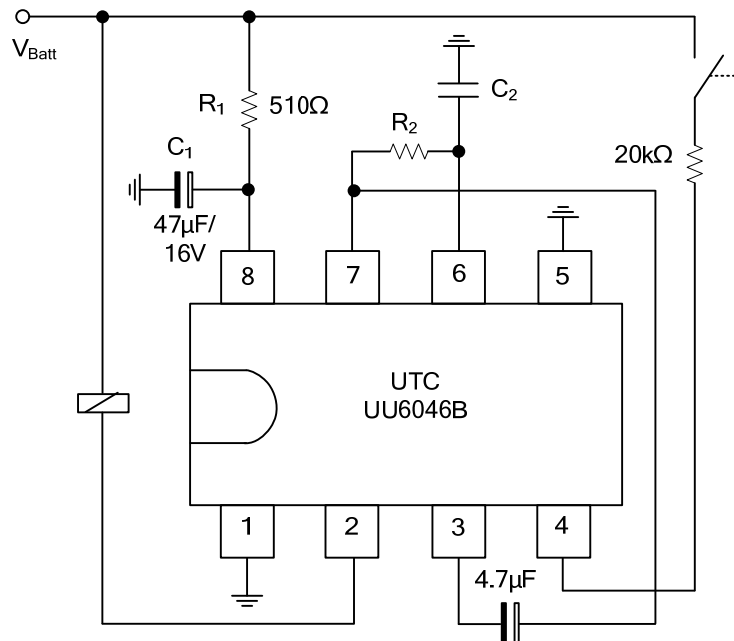


Figure 2. Generation of a monostable delay time, t_d , by applying the operating voltage V_{Batt} , deactivatable by the OFF push-button

■ TYPICAL APPLICATION CIRCUIT (Cont.)

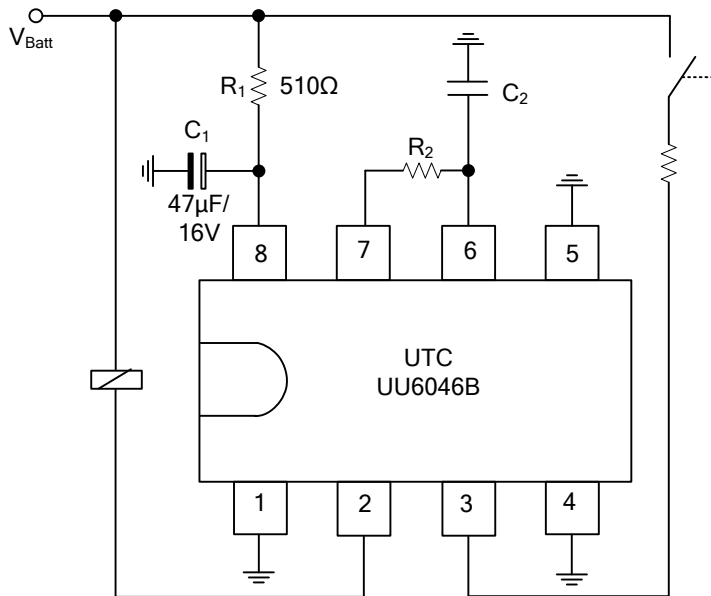


Figure 3. Monostable delay time, t_d , can be activated by the ON push-button, not externally deactivatable

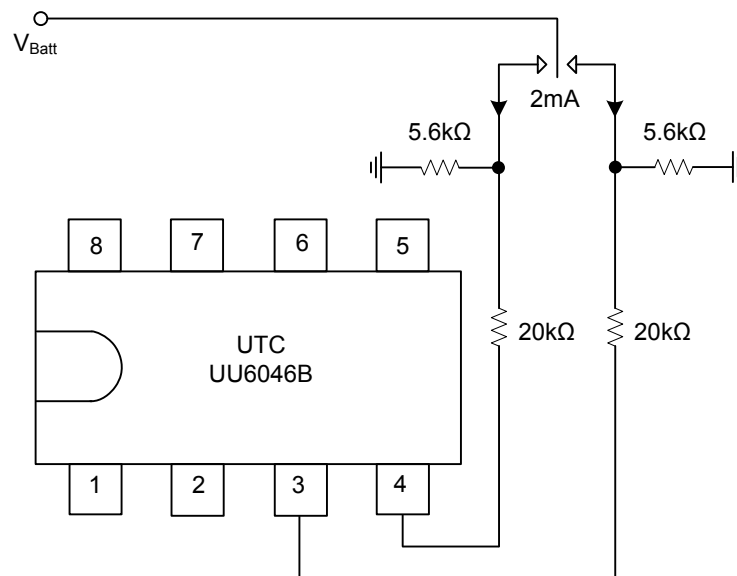


Figure 4. Increasing the contact current by parallel resistors

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