

## A 1.55V to 5.25V, 1.9µA, 9kHz to 300kHz Silicon Timer

### FEATURES

- 5V Supply Voltage
- FOUT Output Period: 40µs(25kHz)
  - RSET = 4.32MΩ
- Fully Assembled and Tested
- 2in x 2in 2-layer circuit board

### COMPONENT LIST

DESIGNATION	QTY	DESCRIPTION
C2	1	4.7µF ±10% capacitor (0805)
R1	1	4.32MΩ ± 1% (0805)
U1	1	TS3006
VDD,F_OUT	2	Test points

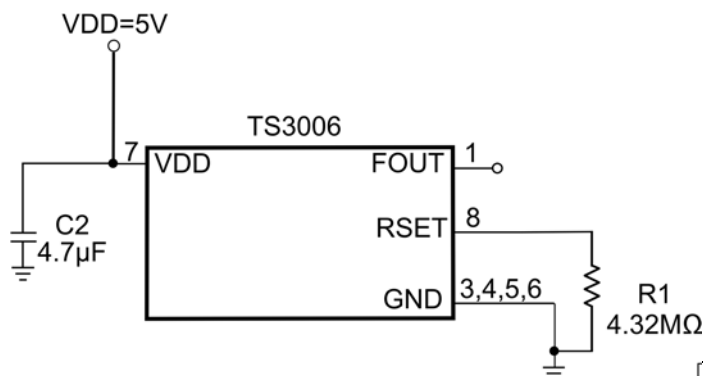


Figure 1. TS3006 Demo Board Circuit

### DESCRIPTION

The TS3006 is a single-supply, second-generation oscillator/timer that is fully specified to operate at a supply voltage range of 1.55V to 5.25V while consuming less than 2.4µA(max) supply current. Requiring only a resistor to set the base output frequency (or output period) at 25kHz (or 40µs) with a 50% duty cycle, the TS3006 timer/oscillator is compact, easy-to-use, and versatile.

Optimized for ultra-long life, low-frequency, battery-powered/portable applications, TS3006 joins the TS3001, TS3002, TS3004, and TS3005 in the CMOS timer family of the “NanoWatt Analog™” series of high-performance analog integrated circuits.

The TS3006 requires only an RSET = 4.32MΩ resistor to set the FOUT output period to 40µs(25kHz). The complete circuit is designed at a supply voltage of 5V. The TS3006 is fully specified over the -40°C to +85°C temperature range and is available in a low-profile, 8-pin 3x3mm TDFN package with an exposed back-side paddle.

Product data sheet and additional documentation can be found at [www.silabs.com](http://www.silabs.com).

### ORDERING INFORMATION

Order Number	Description
TS3006DB	TS3006 Demo Board



Figure 2. TS3006 Demo Board (Top View)



Figure 3. TS3006 Demo Board (Bottom View)

## DESCRIPTION

The TS3006 requires only an  $R_{SET} = 4.32M\Omega$  resistor to set the FOUT/PWMOUT output period to  $40\mu s$  (25kHz). The complete circuit is designed at a supply voltage of 5V and it is shown in Figure 1.

The TS3006 is a user-programmable oscillator where the period of the square wave at its FOUT terminal is generated by an external resistor connected to the RSET pin. The output period is given by:

$$FOUT \text{ (Hz)} = \frac{1.08E11}{R_{SET}}$$

### Equation 1. FOUT Frequency Calculation

With  $R_{SET} = 4.32M\Omega$ , the FOUT period is approximately  $40\mu s$  (25kHz) with a 50% duty cycle. As design aids, Table 1 lists TS3006's typical FOUT frequency for various standard values for  $R_{SET}$ .

$R_{SET}$ (M $\Omega$ )	FOUT (kHz)
0.360	300
1	108
2.49	43.37
4.32	25
6.81	15.86
9.76	11.07
12	9

Table 1: FOUT vs  $R_{SET}$

- 2) Connect the DC power supply positive terminal to the test point labeled VDD. Connect the negative labeled GND.
- 3) To monitor the FOUT output signal, connect the signal terminal of an oscilloscope probe to the test point labeled FOUT and the ground terminal to the test point labeled GND.
- 4) Select a channel on the oscilloscope and set the vertical voltage scale and the vertical position to 2V/DIV and 0V, respectively. Set the horizontal time scale to  $5\mu s$ /DIV. The coupling should be DC coupling. Turn on the power supply.

The supply current will vary depending on the load on the output. Given the default set-up on the board, the FOUT output period is approximately  $40\mu s$ . With an output load of 15pF on FOUT due to the oscilloscope probe, the supply current should be less than  $4\mu A$ .

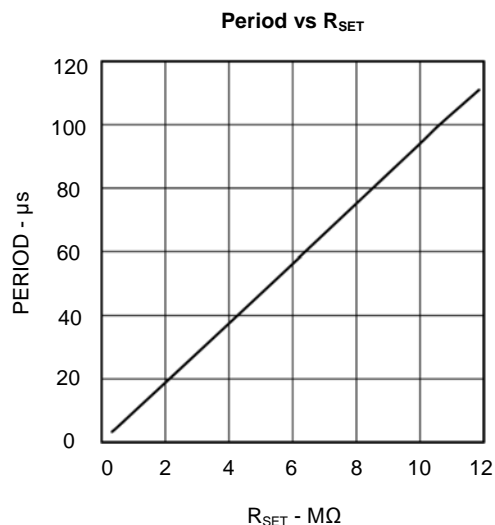
## QUICK START PROCEDURE

### Required Equipment

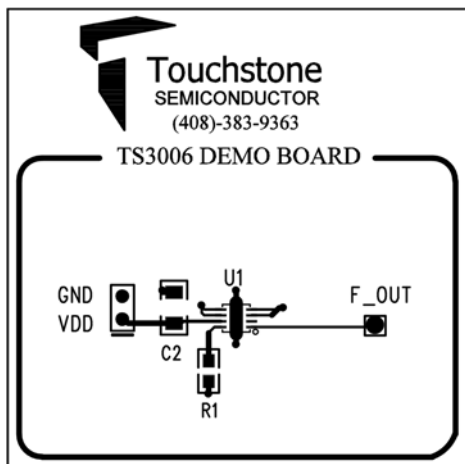
- TS3006 Demo Board
- DC Power Supply
- Oscilloscope Model Agilent DSO1014A or equivalent
- One 10X, 15pF//10M $\Omega$  oscilloscope probe

To evaluate the TS3006 silicon timer, the following steps are to be performed:

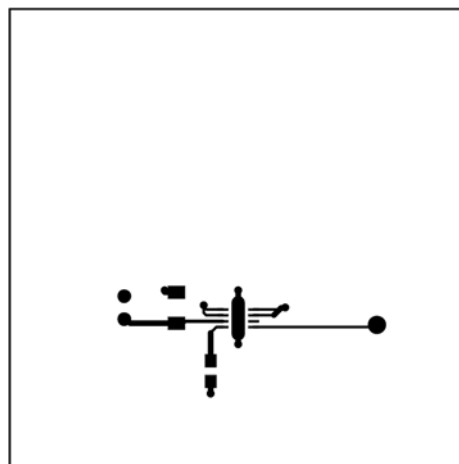
- 1) Before connecting the DC power supply to the demo board, turn on the power supply, set the DC voltage to 5V, and then turn it off.



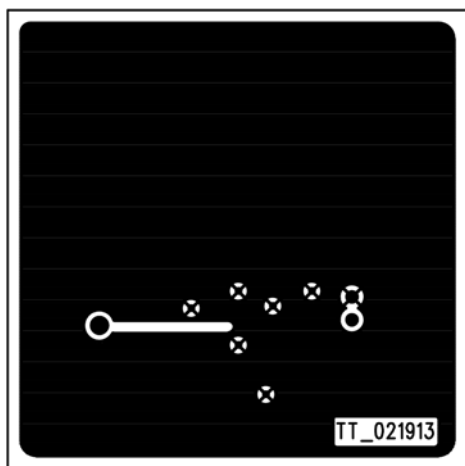
**Figure 4. FOUT Period vs R<sub>SET</sub>**



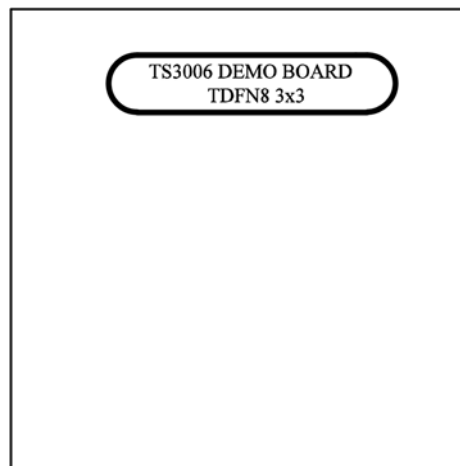
**Figure 5. Top Layer View #1**



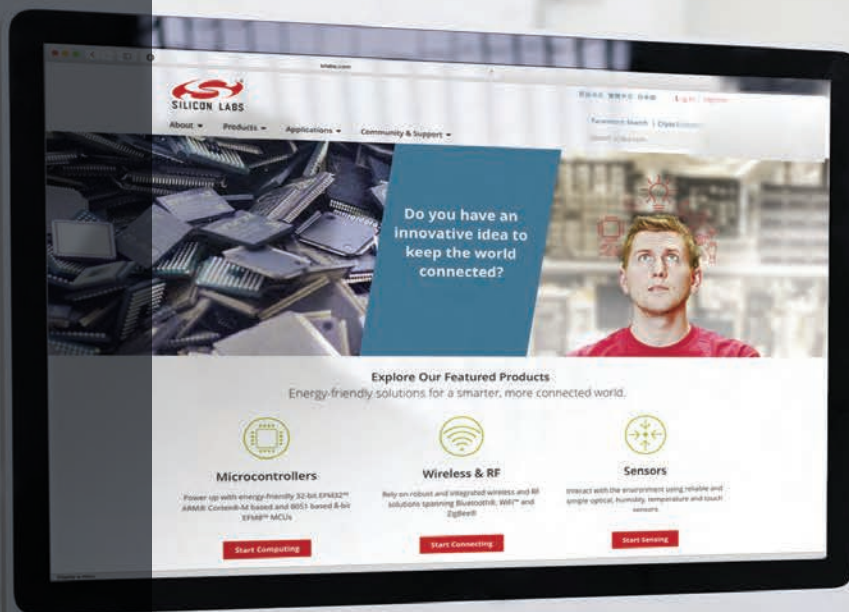
**Figure 6. Top Layer View #2**



**Figure 7. Bottom Layer (GND) #1**



**Figure 8. Bottom Layer (GND) #2**



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