

Reducing Current Consumption at 32kHz with ST62

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INTRODUCTION

In many cases a 32kHz crystal is chosen for the oscillator of the ST62 microcontroller in order to achieve the minimum current consumption in the application.

This note provides a technique for minimising the current consumption when using a crystal oscillator at this frequency.

The note should be read in conjunction with Application Note AN670 - Oscillator Selection for the ST62.

1 CIRCUIT MODIFICATION

A standard oscillator circuit is shown in Figure 1. This circuit is suitable for higher frequency oscillations up to the maximum oscillation frequency of the ST62.

The current consumption of the oscillator of the ST62 can be reduced effectively when a resistor is added in the circuit as shown in Figure 2.

Figure 1. Standard Circuit.

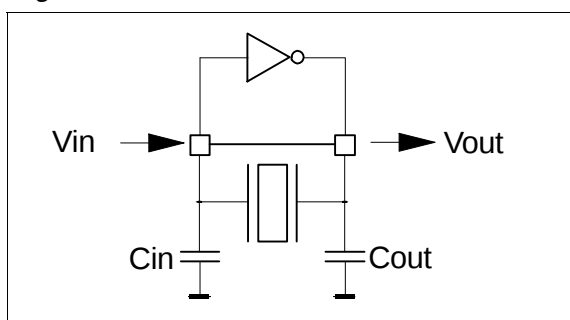
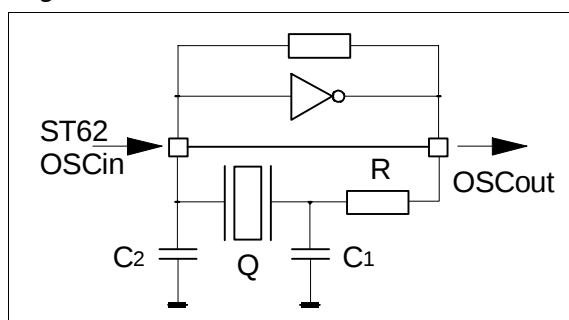


Figure 2. Modified Circuit.



The Resistor (R) limits the power dissipation through the crystal, resulting in a lower load for the inverter circuit and a minimum power consumption.

Note that the resistor adds a phase shift to the Capacitor and oscillator network. This shift must not be excessive such that it affects the loop functionality.

Recommended values are:

R = 330K

C1 = 33 pF

C2 = 33 pF

Q = 32.8kHz crystal

2 RESULTS

The current consumption in WAIT mode measures the oscillator consumption as long as there is no additional consumption in the I/O pins with their associated external circuits.

The following table indicates the typical potential current saving in the WAIT mode of the ST62E2x microcontroller at a temperature of 25 C.

Typical current saving (32kHz crystal)

	Standard oscillator	Modified oscillator
5V	900 μ A	450 μ A
3V	50 μ A	35 μ A

The oscillator start-up time is also increased and ranges from 300 to 500 ms. This is due to the R, C1 time constant and the normal start-up time of the 32kHz crystal (typically around 250ms).

The use of this additional resistor is made possible by the high gain of the inverter in the ST62 oscillator circuit when working at 32kHz and the characteristics of a standard 32kHz crystal.

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