题　　目：智能频率检测仪

摘　要

本文主要是讲述一种利用单片机 AT89C52 实现比较宽的频带上的频率检测以及对比较小的信号进行检测。频率是对周期信号来说非常重要的物理量，在传统的频率测量采用的频率计大多是由组合电路和时序电路等大量的硬件电路组成，有体积大，速度慢等缺点，由于单片机有体积小，精度高，性能好而且价格便宜等特点，所以我们采用单片机进行频率测量。

主要是采用单片机进行控制，智能的切换量程，从而提高测量的精度和扩大测量的范围。在本设计中为了提高精度，频率的测量方法也采用了两种方式，第一种是在一秒的时间内计数下降沿的次数，另一种则是计时两个下降沿之间（一个周期）的时间。

整个设计主要由输入信号处理部分，频率倍率选择部分，控制及处理部分，显示部分组成。

输入信号处理部分主要是对信号进行了放大、限幅以及反相（施密特触发器）处理，使输入信号变为一个有较好的上升、下降沿的电压信号。

智能量程切换部分是由分频器以及几个由单片机引脚控制的允许电路（与门）组成。

控制以及处理部分采用 AT89C52 单片机的最小系统。

显示部分采用 1602 液晶进行显示。

该设计误差较小，理论上可以准确测量 0.1Hz~15MHz 的频率信号，电压范围可以从 0.05V~20V 之间，主要采用正弦信号，三角信号，矩形信号等周期信号进行测试。

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关键词：单片机；分频器；智能切换；频率计；液晶显示

ABSTRACT

This paper is mainly about the use of a single chip microcomputer AT89C52 to achieve a relatively wide frequency band of frequency detection and a relatively small signal detection. Frequency is a very important physical quantities for periodic signal, in the traditional frequency measurement using frequency meter are mostly by combinational circuits and sequential circuits of a large number of hardware circuit, a large volume, slow velocity and so on shortcomings, due to the SCM has small volume, high precision, good performance and cheap in price, so we adopt single chip microcomputer frequency measurement.

This design mainly uses the single chip microcomputer to carry on the control, the intelligent switch range, thus enhances the measurement precision and the extension measurement scope.

The whole design is mainly composed of input signal processing part, frequency multiplier selection part, control and processing part, display part.

The input signal processing part mainly amplifies, limits and inverts the signal (schmidt trigger) to make the input signal become a voltage signal with a good rising and falling edge.

The intelligent range switching part is composed of a frequency divider and several allowable circuits (and gates) controlled by a single chip microcomputer pin.

The control and processing part adopts the minimum system of AT89C52 single chip microcomputer.

The display part uses 1602 liquid crystal to carry on the display.

The design error is small, theoretically can accurately measure the frequency signal of 0.1hz ~15MHz, voltage range can be from 0.05v to 20V, mainly using sinusoidal signal, triangular signal, rectangular signal and other periodic signals for testing.

Keywords:Single chip microcomputer;frequency divider;Intelligent switch;Frequency meter; Liquid crystal display (LCD)