Design of automotive detector based on real-time waveform display of single-chip microcomputer LCD

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Abstract: Automobile testing provides an important basis for automobile performance parameter evaluation and fault diagnosis, and portable automobile detector is the main topic of current research and development. Based on the 2.4-inch TFT LCD display connected to the ILI9325 drive interface of MC9S12XET256, this paper uses C language to program the eight-channel real-time data waveform display car detector on the CodeWarrior platform. The problem that poor continuity exists in displaying real-time wave is able to be solved by a curve interpolation method. Relevant display functions for LCD dynamic waves are performed by programming. The software interface for the automobile tester is designed. Finally, the reliability of the tester is certified by the compared results by using the tester and INV 3062 type data acquisition instrument to test relevant sensors of the Passat automobile electrical training platform at the same time.

Keywords: Freescale MCU;Data acquisition;ILI9325 drive interface; LCD display;Car detector

I. Introduction

Automotive fault diagnosis and performance parameter evaluation are based on vehicle testing data. Handheld car detectors are gradually popularized due to their portability and versatility, and the prospects are promising . The handheld detector is realized by connecting the single-chip microcomputer main control chip to the liquid crystal display (LCD). LCD displays have the advantages of small size, convenient interface control and programmable drive, and are widely used in intelligent meters, display terminals .

How to realize multi-channel dynamic real-time waveform display of LCD has become a key technical problem to be solved. In recent years, the study of the waveform curve of the measured data measured by LCD display has been reported. For example, Qin Gang et al. established the coordinate conversion relationship between measurement parameters and display module pixels on the basis of discussing the principle of image conversion pixel matrix, and used the method of scrolling screen refresh to realize the dynamic display of real-time curves. Yu Hongying et al. first wrote the drawing point function to draw the point plot, then used the least squares method to fit the straight line, and finally drew it into a dynamic curve. Aiming at the problems of poor continuity and large data dispersion when drawing real-time curves, the author uses the method of curve interpolation when tracing and drawing, and sets it into 8-channel data sampling and real-time voltage curve display, which can better monitor the condition of automotive equipment.

2. Circuit diagram design of automotive detector

2.1 Circuit diagram design

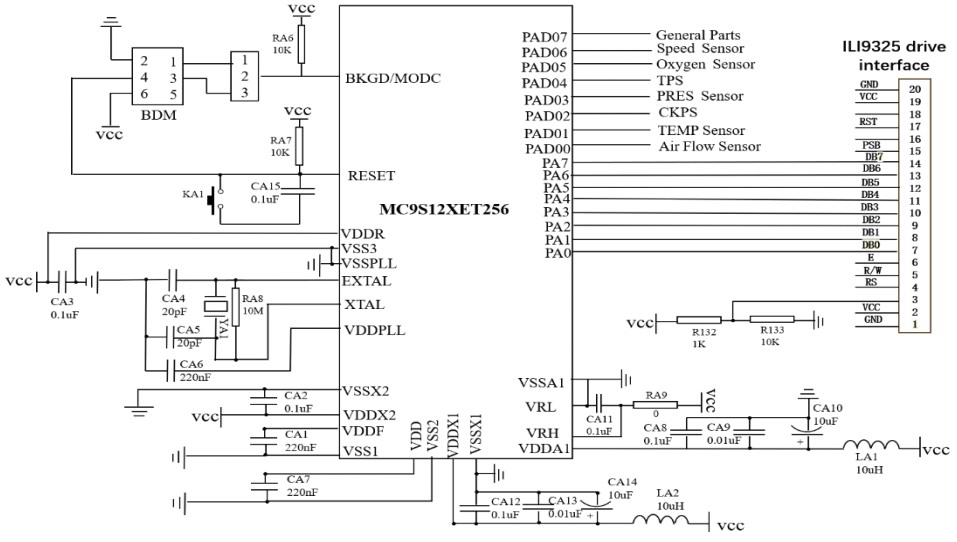

Fig.1 Detector Hardware Circuit Diagram

The detector is based on Freescale MC9S12XET256 microcontroller as the main control chip, which is mainly composed of three parts: the smallest system of the single-chip microcomputer, the A/D data acquisition module and the liquid crystal display module. The design detector can simultaneously test seven sensor signal channels (air flow sensor, temperature sensor, etc.) and one general parts channel.Fig.1 shows the hardware circuit diagram of the automobile detector. The detector is based on the minimum system of the single-chip microcomputer, and the minimum system is composed of MC9S12XET256 chip, reset circuit, crystal oscillator circuit, BDM circuit, PLL circuit and power supply . The eight-bit data line DB0~DB7 of the design ILI9325 drive interface is connected to PA0~PA7