A Large Volume, Portable, Real-Time PCR Reactor

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SUPPLEMENTAL INFORMATION

S1. Schematic Depiction of the Real-Time PCR System

Fig. S1 depicts schematically the building blocks of our PCR analyzer system used for real-time detection of the PCR amplification process. The analyzer communicates with a computer through an RS232 interface. Custom software with a user-friendly graphical interface (GUI) was developed to allow the user to specify various operating variables such as set points and dwell times for each temperature control step as well as to report cycle number and thermal cycler's temperatures as functions of time.

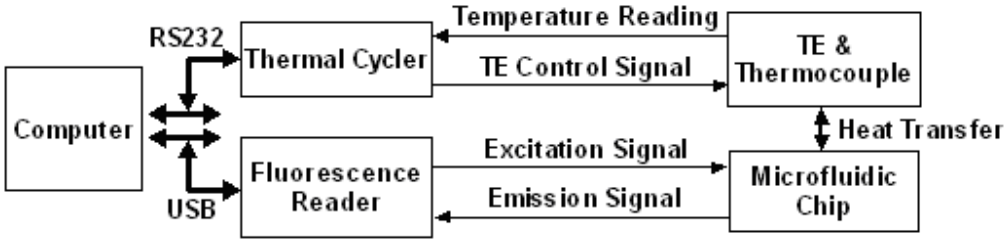

Fig. S1: A block diagram of the real-time PCR analyzer system

S2. Schematic Design of the Portable Thermal Cycler

Fig. S2 depicts schematically the various building blocks of the portable thermal cycler. In addition to the two K-type thermocouples which are embedded in the master thermoelectric module and the thermal waveguide module, a third thermocouple is used to monitor the ambient temperature. All three thermocouples are connected to the thermocouple signal conditioner (AD595, Analog Devices, Norwood, MA) via a multiplexer. Another AD595 was used to provide the thermocouple's cold junction temperature. The temperature readings were calibrated

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by exposing the thermocouples to an ambient of known temperature and determined to be accurate within ± 0.2 °C. Subsequent to conditioning, the thermocouple signals were transmitted to the microcontroller (ADμC 845, Analog Devices, Norwood, MA). During the thermal cycling process, the temperatures were sampled at a rate of 100 per second.

Two identical thermoelectric units provided heating and cooling. The control powers to the TE units were provided by the microcontroller and amplified with a dual, full-bridge driver (L298, STMicroelectronics, Geneva, Switzerland). To alternate between heating and cooling, the TE elements' current direction was switched with the L298, eliminating the need for a separate relay switch array.

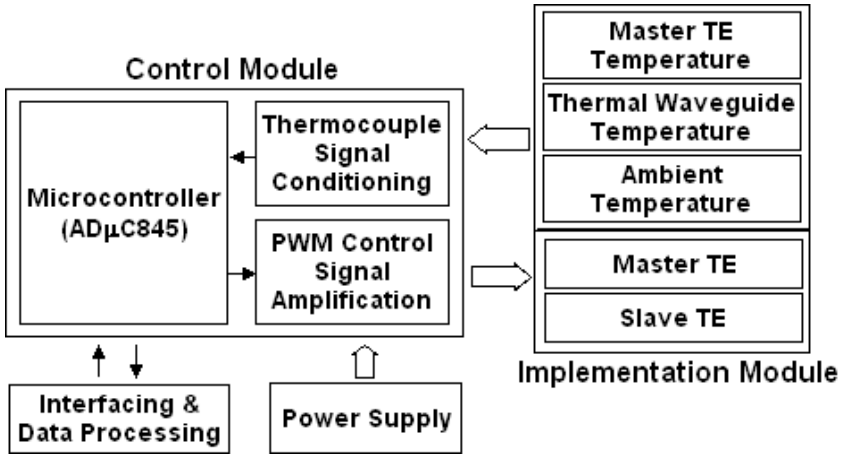

Fig. S2: The schematic structure of the portable thermal cycler.