Automatic Pressure Canning System
Hardware Description

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Introduction:
The Automatic pressure canning system was designed to automate the process for preserving food by monitoring, and controlling the pressure of the canner. A 16 bit microcontroller is connected with a pressure sensor, a buzzer, and solid state relay for the heater control. The user interface consists of a keypad and a 24x2 LCD display.

Power Supply:
The system uses 120/240 V, 60 Hz, single phase for the hotplate and the power supply. The PS1 provides 5 volts VCC to the components, and is rated for a maximum of 1 Amp.

Microcontroller:
The 9S12C32 microprocessor U1 is a 48 pin package device. The 16 Bit MCU has 32 kB flash, and 2 kB RAM. It provides 32 GPIO and can communicate via SPI, SCI, or CAN. There is an 8 channel A/D, PWM, and Timer. The power supply provides 5V to VDD1, VDDR, VDDA, VRH, and VDDX. An 8MHz external crystal is connected to U1 pins 21 and 22. The frequency is then multiplied up to 24MHz for the MCU timing.

BDM:
The BDM connector J1 is used to program and communicate with U1. The 5v is available on pin 6. The RESET_L on pin 4 is used to pull pin 17 on U1 to ground to reset the processor. Pin1 is connected U1 pin 11 and is used as a data line.

Keypad:
A membrane switch pack is used for the keypad so the user can enter the pressure and timer parameters. The switches are connected to PAD (0-4). The switch inputs have 10K pull up resistors, and .001uf capacitors to filter any noise. Each switch shares a common ground that is connected to pin 5, and when pressed the port is pulled low to indicate a key entry.

LCD:
The 24x2 LCD is configured for 4 bit mode by sending commands twice on the upper data lines D4-D7. The lower data lines D0-D3 are tied low. The R/W is also tied low to configure the LCD to write only.

Pressure Sensor:
The MPX4250 series piezoresistive transducer has a range from 0 to 36.3 psi. The output correlates with the pressure from .2 to 4.9V. The transducer is connected to the ATD channel on PAD07. The ATD is configured for 8 bit mode. The resolution is .15 which sets the dynamic range to 242.
**Solid State Relay:**
K1 switches the AC line voltage to the hotplate when 5 volts is applied on pin 3 from PT6. The SSR provides circuit isolation by using a phototriac, and has a zero cross function with an input impedance of 250 ohms. It has a built in varistor that can effectively absorb external surges. The SSR is rated for a maximum of 10 Amps. The pull down resistor R10 keeps PT6 low when there is no signal applied.

**Buzzer:**
LS1 is connected to PB4, and is used as audible indication during the systems process. Applying a high will activate the buzzer with a 2400 Hz tone. The sound output at 10cm is greater than 83 dB.