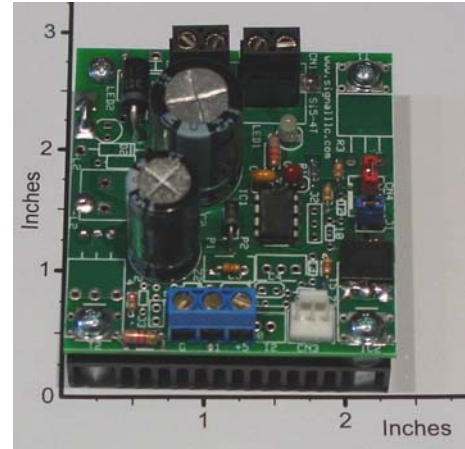




Si5HyUdPTC1-50V-20A, Hybrid, Unidirectional Proportional Temperature Controller with 9-Bit Digital Sensor Port

The **Si5HyUdPTC1-50V-20A** is a 50V 20A, microprocessor based, Hybrid, Unidirectional, Proportional Temperature Controller board with an integrated heat sink that uses pulse-width modulation (**PWM**) to efficiently control average current to a resistive heater or Thermo-Electric (TE) cooler cell in 0 to 1000W power range. An onboard microprocessor allocates the load-power and controls the temperature. The sample temperature is measured by a small, 9-bit digital thermometer [Si18DTsens](#). This sensor uses a unique “1-wire interface” (with parasite power mode) that requires only 2-conductors for reliable remote (long as 20 meters) temperature sensing. The term proportional controller implies that the value of the average load current used is proportional to the difference between the actual and desired temperature. Five PWM duty-cycle values are used depending on the absolute-value of the difference between the set and measured temperature values ($|T_d|$). The duty-cycle is 0% when $|T_d|=0^{\circ}\text{C}$; 25% when $0^{\circ}\text{C} < |T_d| < 0.5^{\circ}\text{C}$; 50% when $0.5^{\circ}\text{C} < |T_d| < 1^{\circ}\text{C}$; 75% when $1^{\circ}\text{C} < |T_d| < 1.5^{\circ}\text{C}$; 100% when $|T_d| > 1.5^{\circ}\text{C}$. This method allows a uniform temperature control in the **-25°C to $+102^{\circ}\text{C}$ Range, with $1/2^{\circ}\text{C}$ accuracy**. As the name hybrid (**Hy**) implies, the required temperature value (or load current) is derived from a variable analog-voltage, while the all other control-signals are digital. The desired temperature value (or load current) is set by an (0 to 5V range) external analog voltage ($V_{H,G}$), or by an external potentiometer. This analog (**I1**) input is zener-diode protected. This board requires a single 9V to 50V DC power source (unregulated) at a 0A to 20A current range to operate normally. An onboard LED (red) is used to monitor the load-voltage. A small (2.3"x2.4"x0.45") finned integrated heat sink is included with mounting hardware (as shown on the photograph) to operate at 20A or 1000W power levels. Higher power-levels (50V, 30A or 1500W) can be achieved with more efficient heat-sinks. Please click on this link and read the [Board Mounting Instructions and Heat Sink Selection Guide](#). Typical applications are: DC Resistive Heater Controller, Thermo-Electric Cooler Controller, etc. This board can be configured and programmed to perform efficiently in many customized applications.



Specification and Application for **Si5HyUdPTC1-50V-20A**

- **Typical Operating Temperature at full-load:** 45°C with the Metal Heat-Ring Bolted to a small (2.3"x2.4"x0.45") finned Aluminum Heat-Sink, while exposed to air at 25°C (as shown on photograph).
- **Source-Voltage Requirement (V_p , from pin +P to pin -P):** Any DC voltage from 9V to 50V, unregulated and unfiltered DC.
- **Average Load-Voltage of $v_L(t)$ from pin L+ to pin L-:** 0V at 0% Duty-Cycle, V_p at 100% Duty-Cycle.
- **Max. Continuous Average Load-Current:** 20A at 100% duty-cycle, with heat-sink (as shown).



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- **Max. Load-Current for 5sec:** 40A at 100% duty-cycle, with heat-sink (as shown).
- **Load Isolation:** The Load or TE cell must be isolated from the source voltage (V_P).
- **Power-Conversion Efficiency:** Approximately 98.5% at full-load (50V and 20A).
- **Closed-Loop Temperature Control in 1/2°C Steps, -25°C to +102°C Range**
- **Factory Calibrated 9-Bit Digital Temperature Sensor is Immune to Additive Noise**
- **9-Bit Digital Temperature Sensor:** [Si18DTsens](#)

- **Load-Indicator:** An onboard LED (red) is used to monitor the TE cell (or load) voltage.

About the Voltage Requirement: The Si5 will work with any DC motor or load in the 9 V to 50V voltage range. In addition, the power filters are included on this board, consequently, only unfiltered (full-wave rectified) DC input power is required in most applications.

A Typical Application of the [Si5HyUdPTC1-50V-20A](#)

In this heating or cooling application (but not both at the same time), the temperature (load-current) is proportionally controlled (in the 0 to 1000W power range) by the Si5 board and the desired temperature (or load current) is linearly adjusted with the [Si5Pot1-5k](#) accessory (an external 1-turn 5kΩ pot); **-25°C to +102°C Temperature Range, in 1/2°C Steps**. The 9-bit digital temperature sensor can be purchased from us (see Parts Department [Si18DTsens](#)) or you can wire up your own using the Dallas Semi. Digital Thermometer chip DS18S20, in TO-92 casing (order from www.digikey.com as part number **DS18S20-ND**). The TE Cells can be purchased from Melcor Corp. Trenton, NJ 08648 USA, www.melcor.com.

