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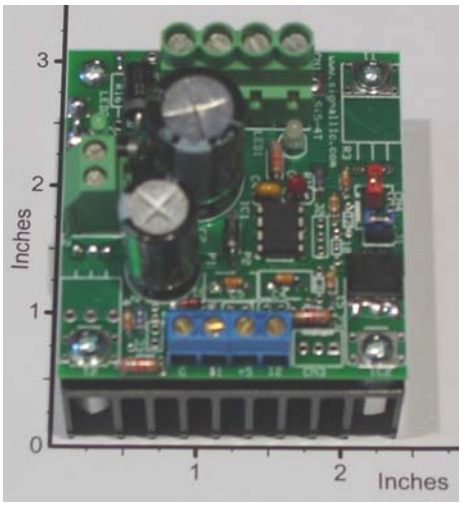
Si5HyUdPTC2-CC-30V-2x16A; Dual, 30V 2x16A, Hybrid, Unidirectional, Proportional Temperature Controller with Integrated Heat Sink and with 9-Bit Digital Sensor Port



The **Si5HyUdPTC2-CC-30V-2x16A** is a Dual 30V 2x16A, microprocessor based, Hybrid, Unidirectional, Proportional, Temperature Controller board with an integrated heat sink that uses pulse-width modulation (**PWM**) to efficiently control the average current flow in two TE (Thermo-Electric) cooling banks. The two banks are connected in parallel, and jointly controlled (turned on and off at the same time). The power flow in each bank is controlled from 0 to 480W power range with 4W steps. Two high-power (55V, 60A max.) MOSFETs are used (one for each cooling bank) to control the temperature of an enclosed environment. 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 (|Td|). The duty-cycle is 0% when |Td|<=0^0C; 25% when 0^0C< |Td|<0.5^0C; 50% when 0.5^0C< |Td|<$1C^0$; 75% when 1^0C< |Td|<1.5^0C; 100% when |Td|>1.5^0C. This method allows a uniform temperature control in the **-25^0C to +102^0C Range, with 1/2^0C accuracy**. As the name hybrid (**Hy**) implies, the desired temperature value is derived from a variable analog-voltage, while all other control-signals are digital. The desired temperature (Set-Temperature) value is adjusted by an on-board 25 turn trim-pot (**P1**). An onboard Red LED is used to monitor the Cooler Port #1 voltage, while a Yellow Green is used for the Cooler Port #2. This board requires a single 9V to 30V DC power source (unregulated and unfiltered) at a 0A to 32A current range to operate normally. 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 2x16A or 960W power level. Higher power-levels (30V, 2x20A or 1200W) 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 Heat Controller, Thermo-Electric Cooler Controller, etc. This board can be configured and programmed to perform efficiently in many customized applications.

Set-Temperature Adjustment with Trim-Pot P1:

The minimum voltage that trim-pot P1 can be adjusted to is 0.00V DC at **pin A5** test point. This minimum voltage corresponds to -25 Degree C Set-Temperature. The operating temperature of +21 Degree C (or +70F) corresponds to 1.730V DC at **pin A5** test point. Accordingly, adjust the P1 trim-pot to 1.730V DC on A5 for a proper operating Temperature of +21 Degree C (or +70F).The maximum voltage that the trim-pot can be adjusted to is 3.25V or +61.5 Degree C. **The slope of this temperature function is: 0.03761V/C**

Specification and Application for Si5HyUdPTC2-CC-30V-2x16A

- **Typical Operating Temperature at 2x16A:** 45^0C with the Metal Heat-Ring bolted to a small aluminum (2.4"x2.3"x0.95") finned Heat-Sink, while the plate is exposed to air at 25^0C (as shown on photograph).

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- **Source-Voltage Requirement (V_P, from pin +P to -P):** Any DC voltage from 9V to 30V at 40 A max., unregulated and unfiltered DC.
- **Max. Continuous Average Load-Current, I_{L1}, or I_{L2}:** 20A max. at 100% Duty-Cycle.
- **Load Isolation:** The Loads or TE cells must be isolated from the source voltage (V_P) and from each other.
- **Power-Conversion Efficiency:** Approximately 97.5% at full-load (30V and 16A for each load).
- **Load-Power Indicators and Board Protection:** An onboard Red LED is used to monitor the cooler #1 output voltage, and a Yellow LED is used to monitor the cooler #2 output voltage. The power-circuit is protected by an optional 20A fast acting Mini-Fuse.
- **Closed-Loop Temperature Control in 1/2^{0}C Steps, -25^{0}C to +102^{0}C Range**
- **Factory Calibrated 9-Bit Digital Temperature Sensor is Immune to Additive Noise**
- **9-Bit Digital Temperature Sensor: Si18DTsens**

About the Voltage Requirement: The Si5 will work with any load in the 9V to 30V 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 Si5HyUdPTC2-CC-30V-2x16A

In this cooling application, the temperature of the enclosed environment is proportionally controlled by two TE banks (each in the 0 to 480W power range) and by the Si5 board. The desired temperature is linearly adjusted with the on-board trim-pot (**P1**) from **-25^{0}C to +61.5^{0}C Temperature Range, in 1/2^{0}C Steps**. The 9-bit digital temperature sensor can be purchased from us (see Parts Department Si18DTsens). The TE Cells can be purchased from Melcor Corp. Trenton, NJ 08648 USA, www.melcor.com .