Definition of terms for Thermoelectric cooler modules

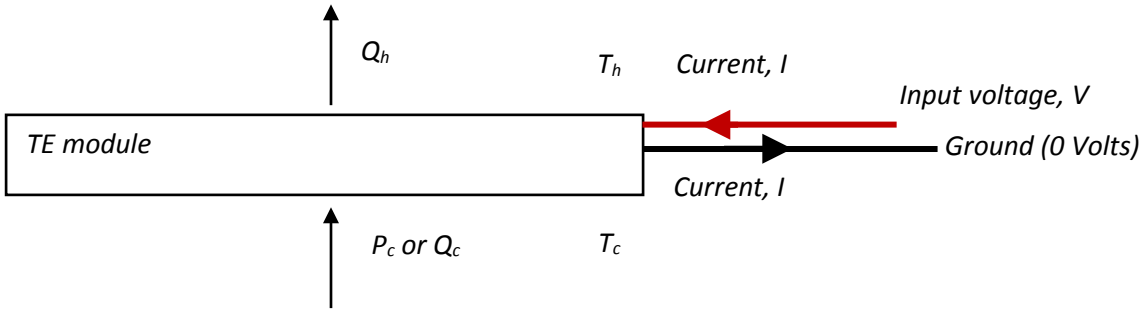

Figure 1: *TEC diagram*

A diagram of a thermoelectric cooler (TEC) is shown in Figure 1. The following terms are used:

T_h : module (not system) hot side temperature

T_c : module (not system) cold side temperature

$\Delta T = T_h - T_c$: temperature difference across the module

P_c or Q_c : Heat flow pumped into the module at the cold side, also described as heat removed in some datasheets.

Q_h : Heat flow pumped out of the module at the hot side, also described as waste heat on some datasheets.

V : Voltage applied to the module

I : Current applied to the module

COP : Coefficient of performance. This is defined for cooling applications as the cooling power divided by the electrical power, P_c/IV.

Using these terms, several special cases of these terms can be defined. These are also illustrated graphically in Figure 2 for an example module.

ΔT_{max} : The maximum temperature difference that the module can generate across itself. This occurs with zero heat flow into the cold side ($P_c = 0$) and at a current $I = I_{max}$.

I_{max} : The current at which the maximum temperature difference occurs.

$P_{c\,max}$: The maximum heat flow that the module can pump into the cold side (maximum value of P_c or Q_c) at a current of I_{max}, which occurs at zero temperature difference across the module ($\Delta T = 0$).

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Heat flow

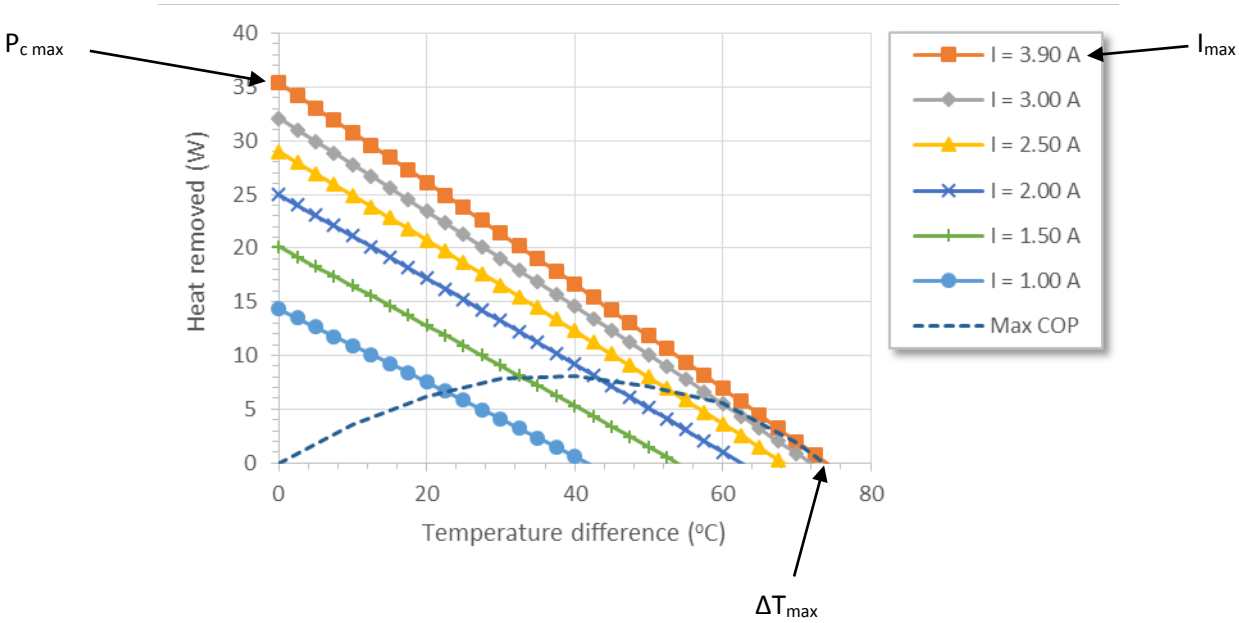

Figure 2: *Heat removed (Pc) vs Temperature difference for an example module.*