lamaPLC: TEC / Peltier Elements

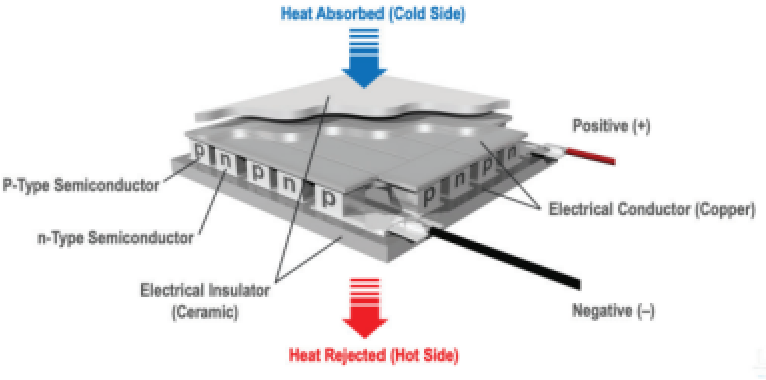
A TEC (*thermoelectric cooler*) or Peltier cooler is a solid-state electronic device that uses the Peltier effect to transfer heat, providing both heating and cooling without moving parts such as compressors. Applying a direct electrical current moves heat from one side of the module to the other. This creates a *"cold side"* and a *"hot side,"* making them useful for applications that require precise temperature control of individual components.

How it works

- **Structure:** The device consists of multiple pairs of P-type and N-type semiconductor "legs" sandwiched between two ceramic plates.
- **Peltier effect:** When a DC electrical current passes through these legs, it forces heat to flow from one side to the other.
- **Hot and cold sides:** One side cools while the other heats up, depending on the direction of the current.
- **Heat dissipation:** The "hot side" must be coupled with a heat sink and fan to dissipate the heat effectively. Without proper heat sinking, the device can be damaged.

Key characteristics

- **Solid-state:** It has no moving parts, making it reliable and quiet.
- **Versatile:** It can be used for both cooling and heating, and can also generate DC power (though less efficiently).
- **Compact:** Its small size is ideal for cooling temperature-sensitive components like CPUs, laser diodes, or voltage references.



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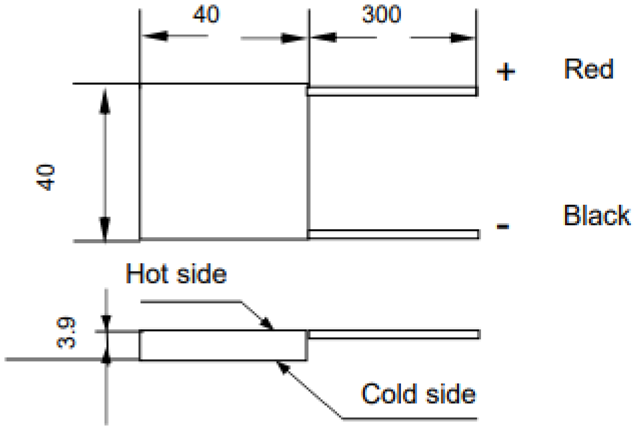
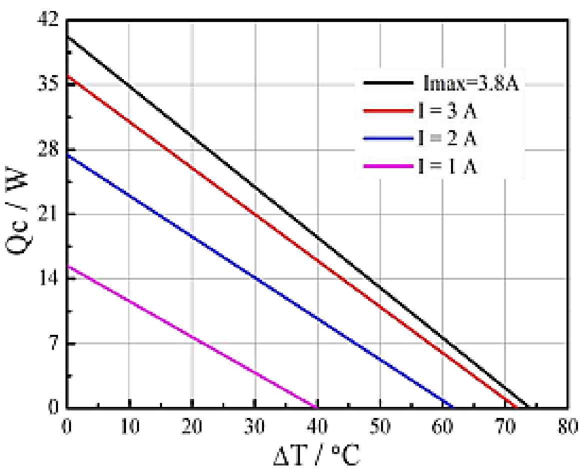
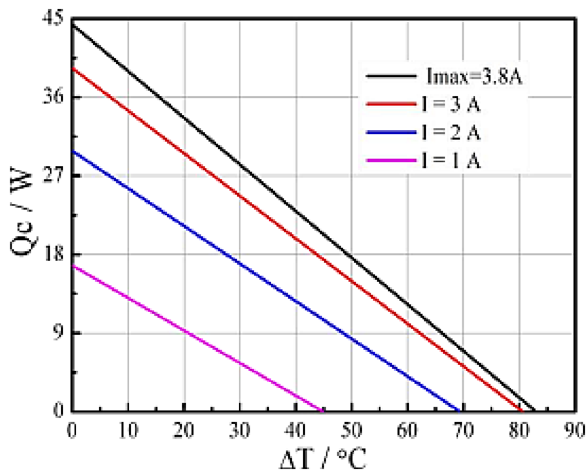
Typical sizes



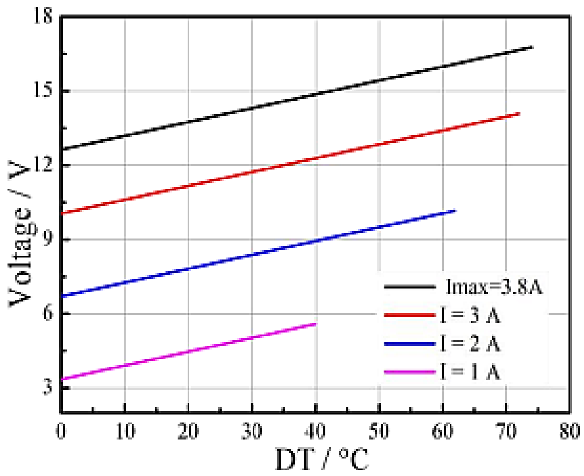
Typical TEC / Peltier Elements characteristic

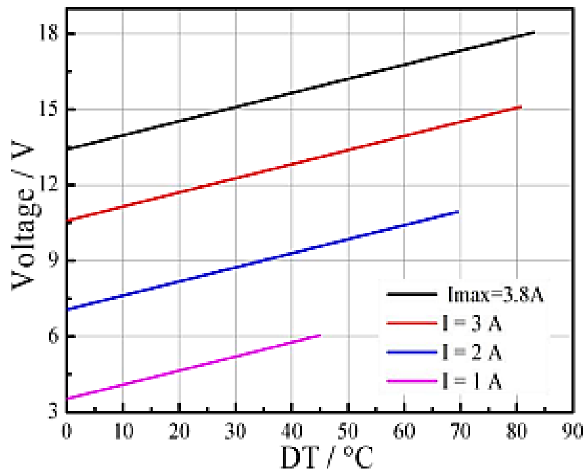
Performance curve (TEC1-12703) when hot surface temperature Th = 27°C or 50°C



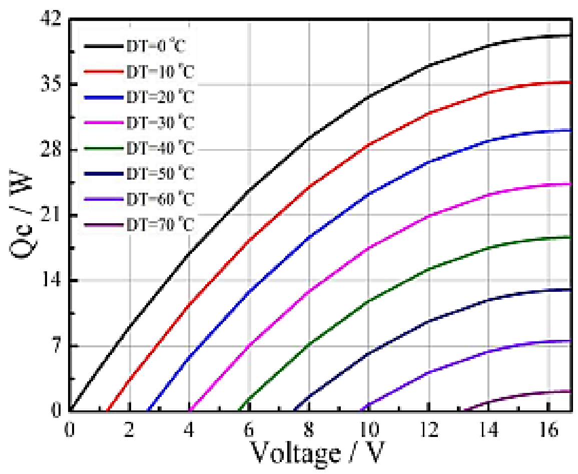


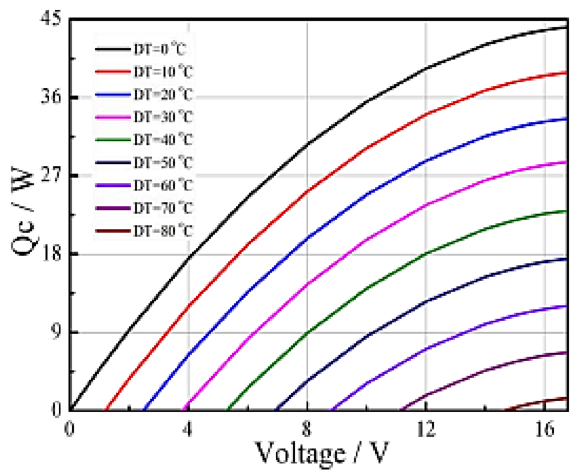
Performance diagram (TEC1-12703) of cooling power changes with temperature difference under different currents Qc=f(DT)



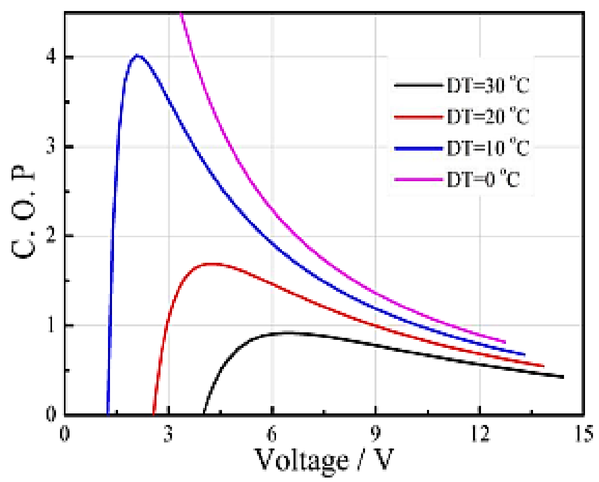


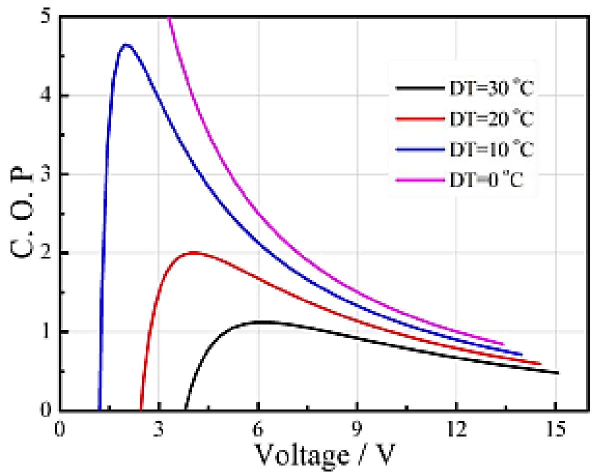
Performance diagram (TEC1-12703) of voltage changing with temperature difference under different currents V=f(DT)



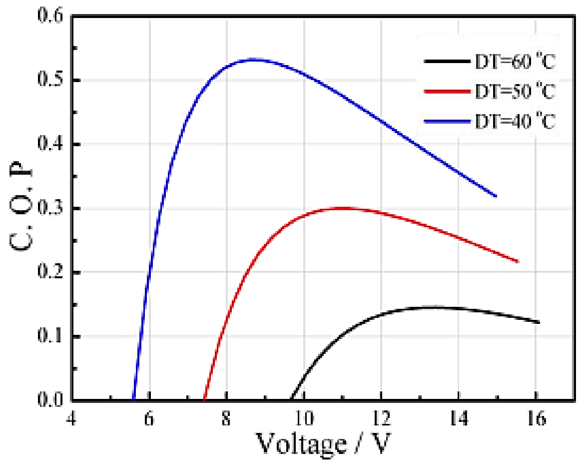


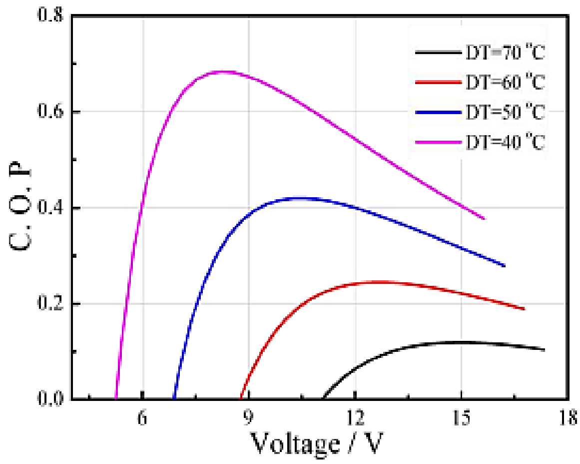
Performance curve (TEC1-12703) when hot surface temperature Th=27°C or 50°C
Performance diagram of temperature difference range 0-30°C. Cooling coefficient changes with voltage COP=f(V)





Performance curve (TEC1-12703) when hot surface temperature Th=27°C or 50°C
Performance diagram of temperature difference range 40~60/70°C. Cooling coefficient changes with voltage COP=f(V)





TEC series

Name	Couples	Size	Weight	Imax	Umax	Resistance	ΔT max	Qmax (ΔT =0)	max COP
TEC1-12703	127	40x40x4.7 mm	31 g	3 A	15.4 V	3.2-3.7 Ω	66 °C	38.0 W	0.63
TEC1-12704	127	40x40x4.7 mm	31 g	4 A	15.4 V	2.85 Ω	66 °C	33.4 W	-
TEC1-12705	127	40x40x4.0 mm	29 g	5.3 A	15.4 V	2.20 Ω	75 °C	57.0 W	-
TEC1-12706	127	40x40x3.9 mm	27 g	6.4 A	15.4 V	2.3 Ω	75 °C	57.0 W	0.61
TEC1-12707	127	40x40x3.5 mm	25 g	7.4 A	15.4 V	1.80 Ω	68 °C	75.0 W	-
TEC1-12708	127	40x40x3.5 mm	23 g	8.5 A	15.4 V	1.55 Ω	68 °C	85.0 W	-
TEC1-12710	127	40x40x3.3 mm	26 g	10.5 A	15.4 V	1.08 Ω	68 °C	100.0 W	-
TEC1-12715	127	40x40x3.9 mm	50 g	15.6 A	15.4 V	0.80 Ω	68 °C	150 W	0.73
TEC1-26316	263	50x50x3.1 mm	65 g	16 A	31.5 V	1.60 Ω	66 °C	300 W	-
TEC1-12730	263	62x62x3.9 mm	90 g	30.7 A	15.4 V	0.35 Ω	68 °C	350 W	-
TEC1-06306	63	40x20x3.9 mm	17 g	6 A	7.6 V	1.05 Ω	63 °C	42 W	-
TEC1-06308	63	40x20x3.9 mm	17 g	8.5 A	7.6 V	0.75 Ω	63 °C	32 W	-
TEC1-06310	63	40x20x3.3 mm	17 g	7.5 A	7.5 V	0.65 Ω	63 °C	45 W	-
TEC1-06312	63	40x20x3.1 mm	17 g	9.5 A	7.5 V	0.55 Ω	63 °C	55 W	-
TEC1-04901	-	20x20x4.9 mm	-	1 A	5 V	5 Ω	50 °C	5 W	-
TEC1-04902	-	20x20x4.5 mm	-	2 A	5 V	2.5 Ω	55 °C	10 W	-
TEC1-04903	-	20x20x3.7 mm	-	3 A	5 V	1.7 Ω	60 °C	15 W	-
TEC1-04904	-	20x20x3.5 mm	-	4 A	5 V	1.3 Ω	60 °C	20 W	-
TEC1-04905	-	20x20x3.1 mm	-	5 A	5 V	1 Ω	60 °C	25 W	-
TEC1-04906	-	20x20x3.1 mm	-	6 A	5 V	0.83 Ω	60 °C	30 W	-

Thermo topics on lamaPLC

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