

## ◆ F-TEM (Flexible-thermoelectric module)

Part Number: DK-TEM es-02

### Advantages

- A "soft" Peltier device that combines existing Peltier element with rubber.
- Possible to be bent (minimum diameter  $\phi 50\text{mm}$ ).
- Weight reduction is achieved by using rubber (40% less than general ceramic products)
- Drop proof (1.5m free fall)
- Excellent resistance against vibration with rubber
- Completely sealed structure that keeps water out

### Overview

F-TEM(Flexible-thermoelectric module) is a flexible thermoelectric device consists of the Peltier device and rubber. It can be basically used in the same way as a conventional ceramic Peltier device. This thermoelectric conversion device operates as a heat pump by applying direct current, and can control temperature by electronic control.



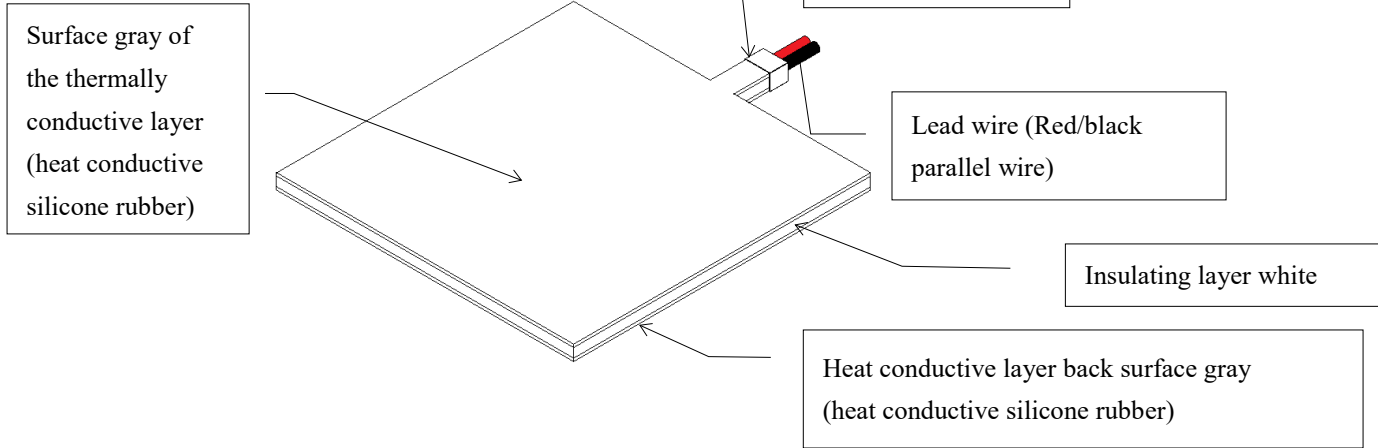
### Function

- ◇ Temperature control
  - Heating and cooling are possible only by electrical control.
  - Possible to be bent (minimum diameter  $\phi 50\text{mm}$ ).

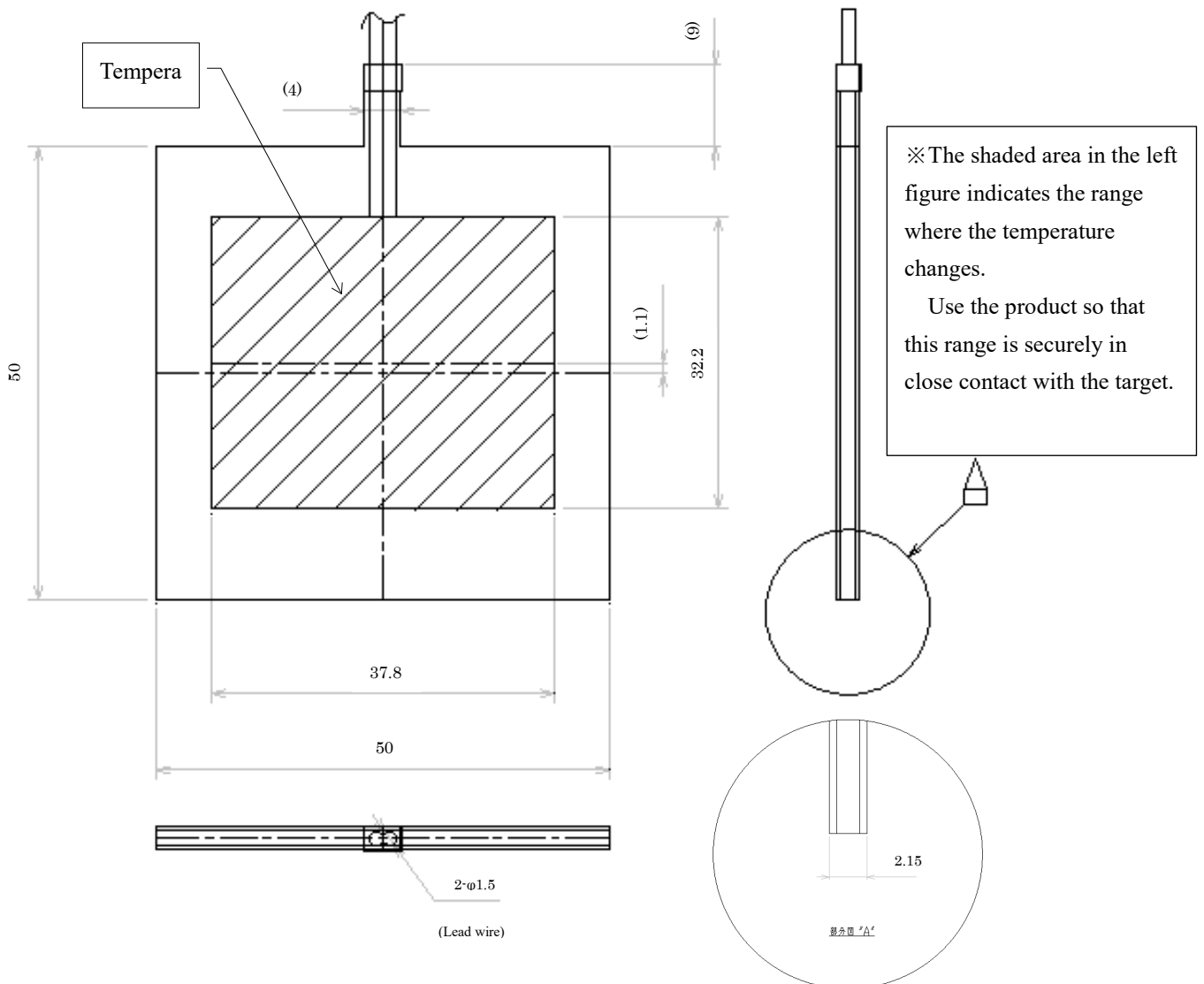
※ When using the product, be sure to read " (◆) F-TEM (Flexible-thermoelectric module) Part Number: DK-TEM es-02 Instruction Manual", keep the handling precautions.

# 1. Specifications

## 1-1. Product appearance



## 1-2. Outline and dimensions



### 1-3. Characteristics

#### (1) Rating

Section	Item		Unit
1	Load rating	1.5	Mpa
2	Bending diameter	φ50	mm
3	Weight	9.5	g
4	Operating temperature	~100	°C
5	Maximum current $I_{max}(A)$ ※1	3.99	A
6	Maximum voltage $V_{max}(V)$ ※1	11.2	V
7	Maximum temperature difference $\Delta T_{max}(°C)$ ※1	52.1	°C
8	Maximum heat absorption $Q_{cmax}(W)$ *1	19.5	W

※Insulation: Silicone rubber

※Items 5 to 8:  $T_h = 50°C$  (the radiating surface temperature is constant at  $50°C$ ).

※It is recommended to store this product at a temperature of 0 to  $30°C$  and humidity of 60%RH or less.

**(2) Reliability Evaluation (\* Test Results)**

 ※Judgment Criteria: Resistance change after testing is less than  $\pm 5\%$  of the design value of  $2.0 \Omega$ 

Section	Test Item	Characteristics	Resistance change
1	Heat cycle	-40°C: 15 min, 85°C: 15 min $\times$ 10 cycles	-0.10%
2	Thermal shock	15s dipping in $0\pm 1^\circ\text{C}$ water and 15s dipping in $100\pm 1^\circ\text{C}$ water $\times$ 10 times	-0.06%
3	Vibration	Between 20 and 2,000Hz for 4min. (sine wave)	0.03%
4	Temperature-humidity tolerance	$+25^\circ\text{C}\sim 65^\circ\text{C}\sim -10^\circ\text{C}$ 、Humidity 80 to 96%, 10 cycles	0.26%
6	Polarity reversal	Apply 3.5A until one side reaches $0^\circ\text{C}$ or for 80 seconds, and apply until the same side reaches $80^\circ\text{C}$ or 3.5A for 20 seconds. 20,000 cycles	0.17%

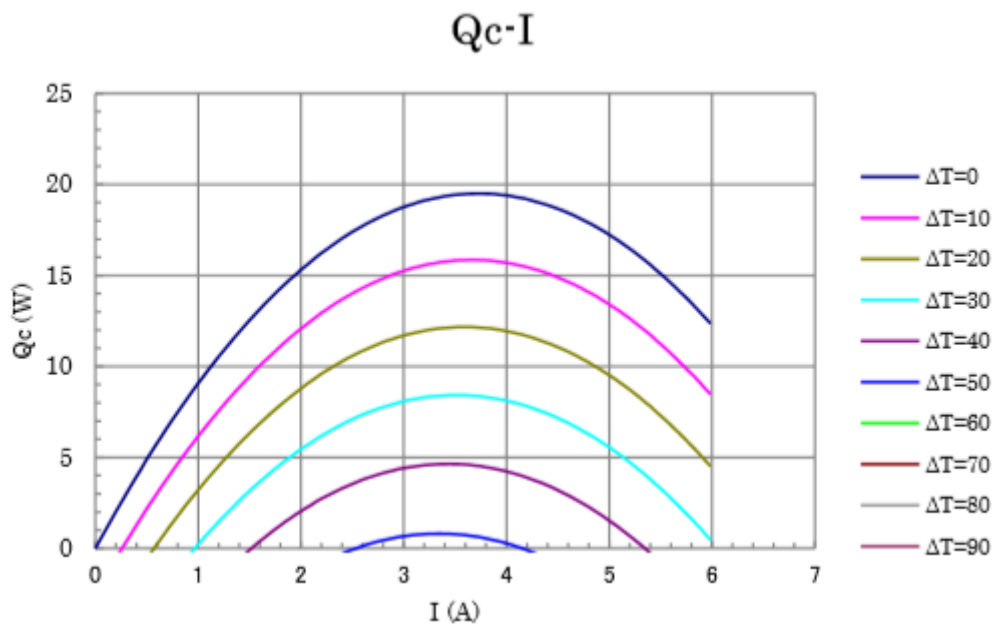
**(3) Mechanical Characteristics (\* Test Results)**

Section	Item	Characteristics	
1	Bending	X direction $\phi 50\text{mm}$ 20 times/min	1500 times
2	Bending	Y direction $\phi 50\text{mm}$ 20 times/min	4000 times
3	Drop impact	1.5m free fall	20 times or more
4	Bending life	Stored with bending to $\phi 50\text{mm}$ *Not energized at room temperature	Over 2000 hours

## 2. Detailed properties

Characteristic diagram (Th=50°C)

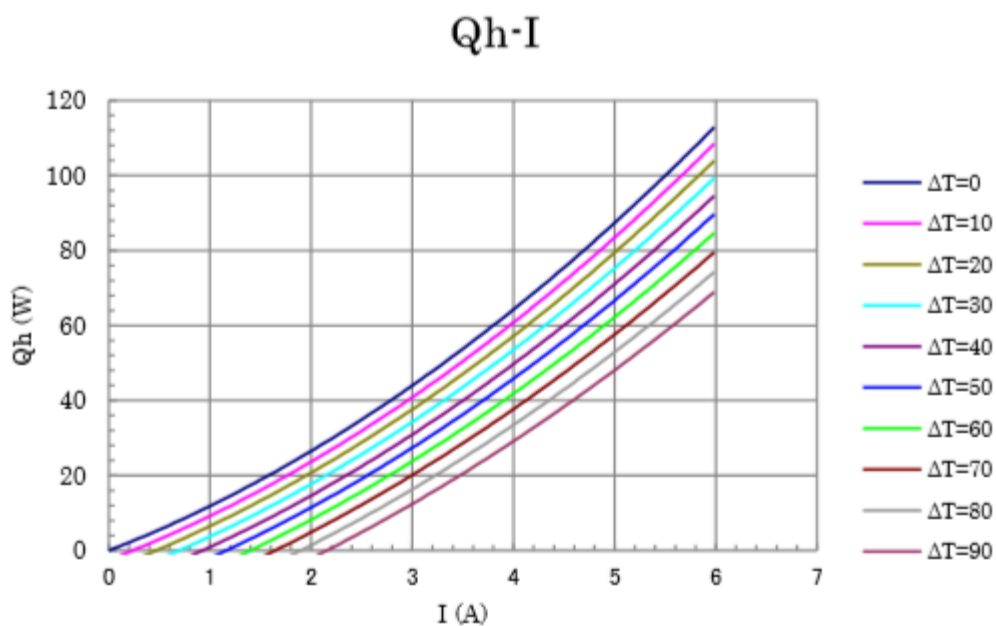
※Th : Temperature – Heat dissipation side



Qc: Endothermic amount

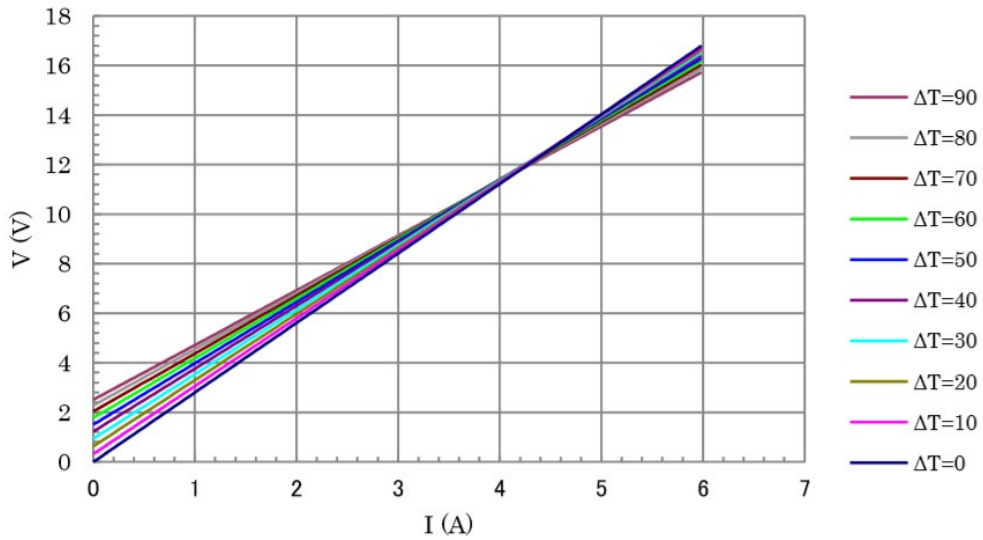
ΔT : Temperature gap (Heat dissipation/Endothermic )

I : Input current



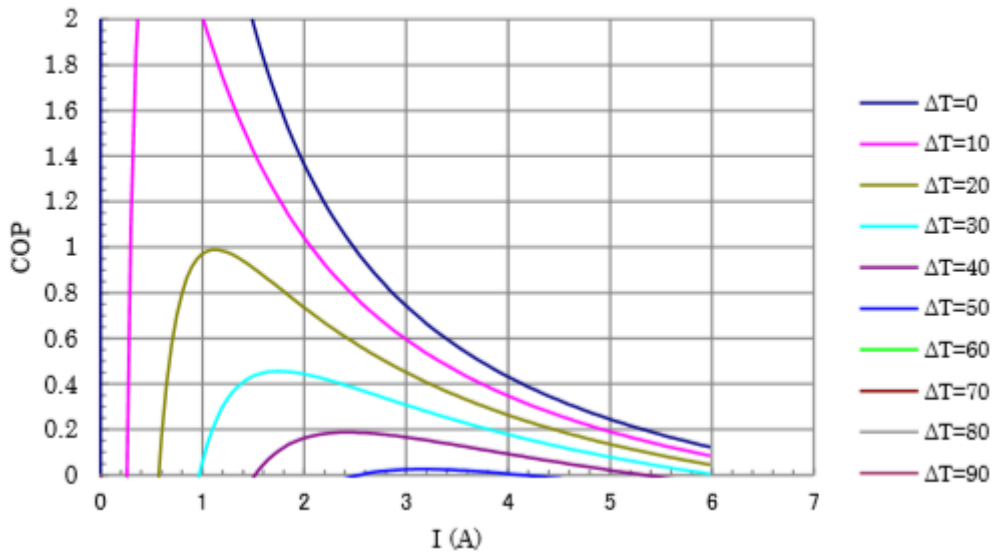
Qh : Quantity of heat

V-I



V: Input Voltage

COP-I



COP : Coefficient of performance

## **Precautions**

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