

COEFFICIENT OF THERMAL EXPANSION (CTE)

Definition: The coefficient of thermal expansion is defined as the fractional increase in the length per unit rise in temperature.

The coefficient of thermal expansion for a material is usually specified over a temperature range because it varies depending on the temperature. The following values are given for a temperature around 20 °C. CTE is usually given in units of um/m/°C or ppm/°C.

Material	CTE (ppm/°C)	Material	CTE (ppm/°C)
AlAs	4.9	InAs	4.52
AlP	4.5	InP	4.75
Alumina	7-Jun	InSb	5.37
AsSb	4	Invar	1.3
Copper	16.7	Kovar	5.9
Cu/I/Cu	8.4	Molybdenum	7.0-7.1
Cu/Mo/Cu	6	Polymers	50-200
Cu/Mo-Cu/Cu	10-Jun	S-glass	16
E-glass	54	Silicon	2.6
Epoxy	55	Silicon Nitride (Si ₃ N ₄)	3.2
Fused Silica	0.55	Silicone resins	30-300
Gallium Arsenide (GaAs)	6.86	Tin-Lead Solder	27
GaP	4.5	Titanium	9.5
GaSb	7.75	Tungsten	5.7-8.3
Germanium (Ge)	5.8		

Sources:www.owlnet.rice.edu/~msci301/ThermalExpansion.pdf
www.matweb.com

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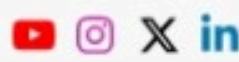
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