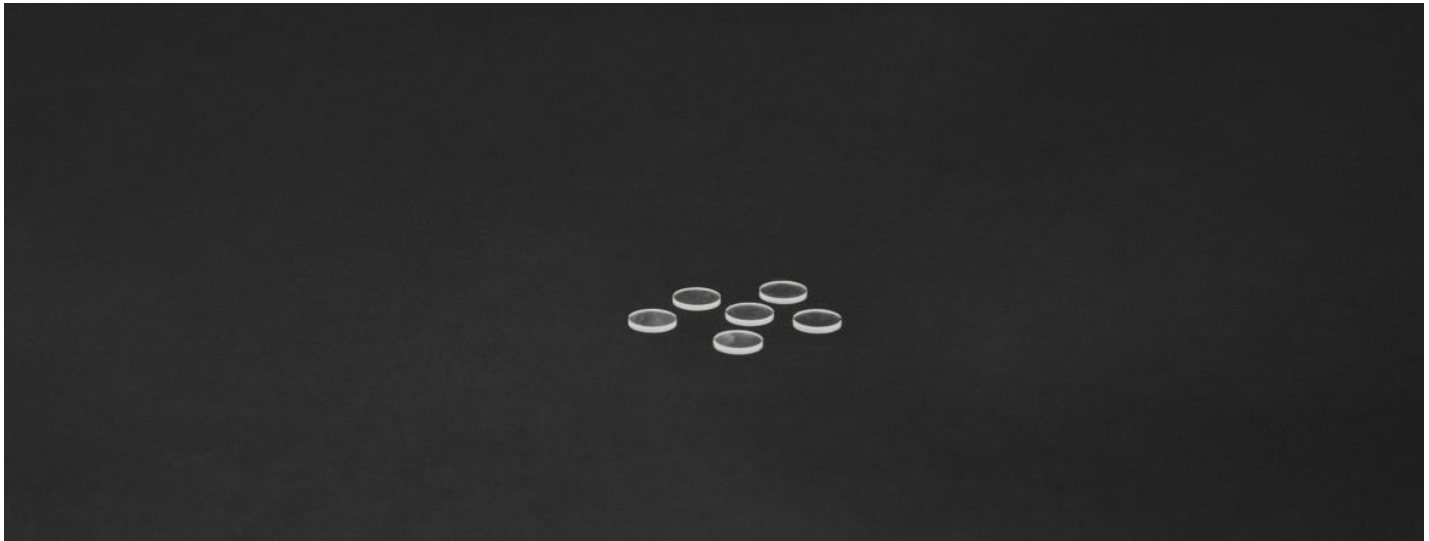


# GaAs

## Gallium Arsenide (GaAs) Crystal Substrate



### DESCRIPTION

GaAs is a semi-conductor material with excellent performance characteristics including direct band gap, high electron mobility, high-frequency low noise, and high conversion efficiency.

GaAs applications cover a large variety of transistors for industry spanning optical fiber communication, wireless networks (WLAN), mobile handsets, blue tooth communications, satellite communications, monolithic microwave integrated circuits (MMIC) for 5G, as well as radio frequency integrated circuits (RFIC). With the development of mini-LED and micro-LED, red light LEDs produced with GaAs substrates are increasingly used for display screens and in AR/VR. The conversion efficiency of a high-efficiency solar-cell panel based on GaAs is up to 40%. At present, such solar-cell panels are widely used in unmanned aerial vehicle and solar auto applications.

### FEATURE

- High electron mobility
- High frequency
- High conversion efficiency
- Low power consumption
- Direct band gap

### APPLICATION

- Light emitting diodes
- Laser diodes
- Photovoltaic devices
- High Electron Mobility Transistor
- Heterojunction Bipolar Transistor



## PARAMETER

### Physical Properties

Crystal structure	Zinc blende
Lattice constant (300K)	5.654Å
Atomic density (300K)	$4.43 \times 10^{22} \text{cm}^{-3}$
Melting point	1238°C
Density (300K)	5.315g/cm <sup>3</sup>
Linear thermal expansion coefficient (300K)	$6.03 \times 10^{-6} \text{K}^{-1}$
Thermal lattice conductivity (300K)	$0.48 \text{Wcm}^{-1} \text{K}^{-1}$
Specific heat (300K)	$0.325 \text{Jg}^{-1} \text{K}^{-1}$
Energy gap (300K)	1.42eV
Electron mobility (300K)	$8800 \text{cm}^2 \text{V}^{-1} \text{s}^{-1}$
Hole mobility (300K)	$450 \text{cm}^2 \text{V}^{-1} \text{s}^{-1}$
Effective electron mass	0.068 $m_0$
Intrinsic electron concentration	$1.8 \times 10^6 \text{cm}^{-3}$
Intrinsic resistivity (300K)	$3.8 \times 10^8 \Omega \text{cm}$
Static electric constant (300K)	12.85
Optic electric constant (300K)	10.88
Elastic constants	
C11	$11.88 * 10^{10} \text{Pa}$
C44	$5.49 * 10^{10} \text{Pa}$
C12	$5.38 * 10^{10} \text{Pa}$
Mohs hardness	4.5
Vickers hardness for (0.05 .. 1) N	$6.52 * 10^9 \text{Pa}$
Surface energy	
{ 100 }	$220 \times 10^{-6} \text{Jcm}^{-2}$
{ 110 }	$150 \times 10^{-6} \text{Jcm}^{-2}$
{ 111 }	$130 \times 10^{-6} \text{Jcm}^{-2}$

### Main Specification

Growth	LEC/ VGF
Diameter	Ø 2" / Ø 3" / Ø 4"
Thickness	350µm ~ 625µm
Orientation	<100> / <111> / <110> or others
Conductivity	P - type / N - type / Semi-insulating
Dopant	Zn / Si / undoped
Surface	One side polished or two sides polished
TTV	≦ 10µm
Bow / Warp	≦ 20µm
Grade	Epi polished grade / mechanical grade

