

Germanium Sputtering Targets

Physical Properties

Data Sheet

Physical Properties ^[1]	Melting Point	938.25 °C
	Density	5.323 g/cm ³
	Thermal Expansion Coefficient	5.7 x 10 ⁻⁶ /K
	Young's Modulus (<111>)	155.6 GPa
	Modulus of Rupture	72.4 MPa

Analytical assay of our standard Target product ^[2]

GDMS Measurements:

Li	< 0.4 ppm	Mn	< 0.5 ppm	Cd	< 1 ppm
B	< 0.5 ppm	Fe	< 2 ppm	In	< 1 ppm
Na	< 1 ppm	Co	< 1 ppm	Sn	< 1 ppm
Mg	< 1 ppm	Ni	< 0.5 ppm	Sb	Dopant
Al	< 1 ppm	Cu	< 0.1 ppm	Cs	< 0.1 ppm
Si	< 3 ppm	Zn	< 0.2 ppm	La	< 0.1 ppm
P	< 1 ppm	Ga	< 0.5 ppm	Ce	< 0.2 ppm
S	< 1 ppm	Ge	Matrix	Nd	< 0.1 ppm
Cl	< 2 ppm	As	< 0.1 ppm	W	< 0.5 ppm
K	< 1 ppm	Se	< 0.2 ppm	Au	< 0.5 ppm
Ca	< 1 ppm	Y	< 0.1 ppm	Bi	< 1 ppm
Ti	< 1 ppm	Zr	< 1 ppm	Th	< 0.001 ppm
V	< 0.3 ppm	Mo	< 0.5 ppm	U	< 0.001 ppm
Cr	< 0.5 ppm	Ag	< 1 ppm		

H,C,N,O measurement data upon request

Material Specifications	Purity	> 99.999 %
	Crystal Structure	Monocrystalline & Polycrystalline
	Type / Dopant	N/Antimony; P/Boron
	Orientation	<111>, others available
	Resistivity	0.05 - 40 Ωcm

Products	Rods and Discs	10 - 450 mm
	Rectangular and other shapes	350 x 350 mm; max. 450 mm diagonal



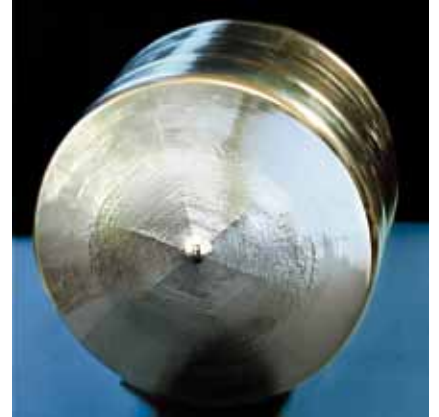
^[1] Taken from NIST Database ^[2] Measured by an independent certified analytical laboratory

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Tolerances & Quality

Data Sheet

Tolerances	Tolerances are diameter dependent, and they are based on a 10 mm minimum to 500 mm maximum. Fabrication is according to DIN 286-2 (1990-11) and ASME Y14.5M 1994. Tighter tolerances are available upon request.	
	Diameter	± 0.2 mm to ± 1.5 mm
	Thickness	± 0.1 mm to ± 0.8 mm
	Flatness	± 30'
	Parallelism	≤ 25 μm
	Perpendicularity	≤ 30 μm
	Chamfer	0.1 to 1.6 mm
	ETV	≤ 30 μm
	Roundness	≤ 30 μm
	Length and Width	± 0.05 mm
Surface Quality	As cut	
	Standard D46	Rq = 2 μm max.
	Fine D15	Rq = 0.8 μm max.
	Superfine D7	Rq = 0.2 μm max.
	Rq is defined as RMS deviation of all peaks/valleys to surface. Polishing provided for filters and witness samples only.	
Quality Assurance	Full traceability according to MIL 130 Standard back to Melt / Lot	



Germanium granules for evaporation

Material Specification	Purity	99,99 % (4N)
		99,999 % (5N)
Product	Grain sizes	3-7 mm
		1-3 mm
		Other sizes on request.

EUROPE/ ASIA
 Photonic Sense GmbH
 Am Goldberg 3
 99817 Eisenach | Germany

Phone: +49 3691 7318-21
 Fax: +49 3691 7318-79
 E-mail: azickler@photonic-sense.com

Photonic Sense is a member of Jenoptik Group

USA
 Photonic Sense, Inc.
 16490 Innovation Drive, Suite B
 Jupiter, FL 33478-6428 | USA

Phone: +1 201 569 8695
 Fax: +1 201 568 8179
 E-mail: eric.brambani@photonic-sense.us

www.photonic-sense.com

