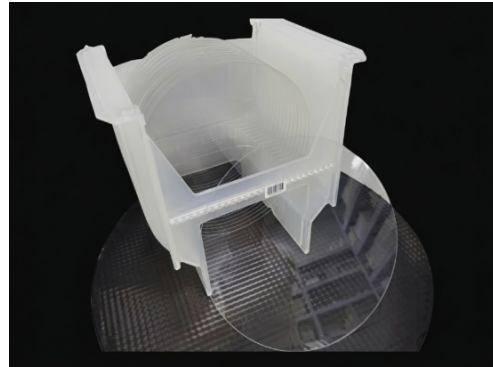


CRYSTAL WAFERS & SUBSTRATES

Quartz Crystal Wafers

Product Brochure & Technical Reference

Synthetic single-crystal quartz wafers and blanks for optical and piezoelectric applications. Cut angle, handedness, wafer geometry and surface evaluation depend on the intended device.



Reference product image. Shown geometry is illustrative.

Material reference properties / options

Property	Typical Value
Density	2.65 g/cm ³
Melting point	Approx. 1467 C
Thermal conductivity at 25 C	10.7 W/(m K) parallel to Z-axis; 6.2 W/(m K) perpendicular to Z-axis
Thermal expansion coefficient, 0-25 C	7.1 x 10 ⁻⁶ /C parallel to Z-axis; 13.2 x 10 ⁻⁶ /C perpendicular to Z-axis
Mohs hardness	7
Specific heat capacity at 25 C	710 J/(kg K)
Dielectric constant at 30 MHz	4.34 parallel to Z-axis; 4.27 perpendicular to Z-axis
Chemical stability	Insoluble in water

Reference values and options for selection. Confirm the material grade, geometry, test conditions and acceptance criteria for the quoted configuration.

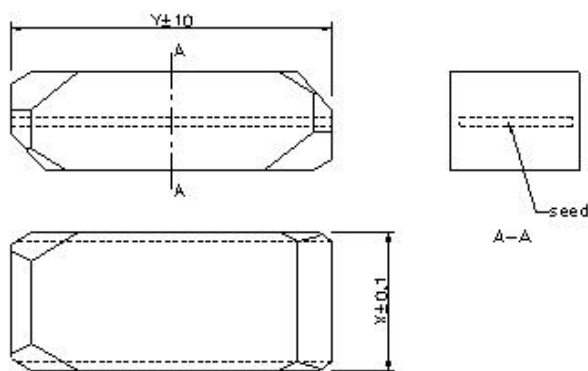
CRYSTAL WAFERS & SUBSTRATES

Configuration & quotation

Define the component around your application

Application examples: SAW filters, RF components, and acoustic wave substrates; Frequency-control devices, resonators, and piezoelectric elements; Optical low-pass filters and precision optical plates

Crystal blank schematic



Reference quartz growth-blank schematic. Specify the finished wafer cut, handedness, diameter, thickness and surface requirements separately.

Available Quartz Wafer and Blank Options

Item	Available Option	Design Notes
Orientation	X-cut, Y-cut, Z-cut, AT-cut, ST-cut, 42.75 degree Y-X cut, and custom cuts	SAW and frequency-control devices require exact cut angle and orientation tolerance.
Diameter	1 inch, 2 inch, 3 inch, 4 inch	Availability depends on cut, thickness, grade, and quantity.
Thickness	0.05 mm and above; common values include 0.2 mm, 0.5 mm, and 1.0 mm	Thickness tolerance and TTV should be confirmed with wafer diameter.
Surface type	SSP or DSP	Single-side polished or double-side polished processing.
Material grade	SAW grade, optical grade, laser grade, left-handed quartz, custom blanks	Grade should be selected according to piezoelectric, optical, or laser requirements.
Product form	Wafers, blanks, custom optics, and drawing-defined substrates	Custom processing can be reviewed case by case.

Quality Evaluation of Synthetic Quartz Crystal

Quality Item	Evaluation Note
Twinning	No electrical or optical twinning should be present in the usable region.
Strain	No harmful strain should be present in the seed crystal or grown quartz crystal according to agreed inspection criteria.
Cracks and fractures	No cracks, fractures, or unacceptable chipping should be present in the usable region.
Inclusion density	Inclusion grading can be specified according to IEC 60758 or agreed customer standard.
SAW wafer criteria	Wafer edge, roughness, warp, TV5/LTV, and TTV can be specified with reference to IEC 62276 or customer drawing.

Product Parameters of Quartz Single Crystal Wafers

Parameter	Typical Value / Option
Material	Synthetic quartz single crystal / SiO ₂
Cutting angle	X-cut, Y-cut, Z-cut, AT-cut, ST-cut, 42.75 degree Y-X cut, and custom cuts
Diameter	1 inch / 25.4 mm to 4 inch / 100 mm
Diameter tolerance	<= +/-0.20 mm
Thickness	0.05 mm or more; custom thickness available
LTV / TV5	<1 um within 5 mm x 5 mm area, if specified and feasible for wafer size/grade
TTV	Typically <3 um for selected grades; other limits can be reviewed by wafer size and thickness
Bow	Typically within +/-30 um, depending on wafer size and thickness
Warp	<40 um, depending on wafer size and grade
Surface type	Single-side polished, SSP; double-side polished, DSP
Polished side Ra	<0.5 nm for selected optical or SAW-grade surfaces
Backside criteria	Typically 0.2-0.5 um Ra, or customized
Scratch / dig	Better than 40/20, or custom specification
Edge criteria	Compliant with SEMI M1.2 or IEC 62276 reference, depending on order requirement
Etch channel density / ECD	Better than grade 4, if specified by material grade system
Inclusion	Better than grade I, or according to IEC 60758 / customer standard
Q value	Better than grade C, or according to agreed frequency-control grade
Particles	Particles larger than 0.3 um: <= 30, if specified in the order
Scratch and chipping	None by agreed visual inspection criteria
Defects	No edge cracks, scratches, saw marks, or stains by agreed inspection criteria
Packaging	Typically 25 pcs per wafer box, or custom packing on request

Prepare your quotation

RFQ Item	Information to Provide
Application	SAW filter, resonator, frequency-control device, optical plate, waveplate, sensor, or custom substrate.
Crystal requirement	Optical grade, SAW grade, left-handed or right-handed quartz, seeded or seedless requirement, inclusion grade, ECD grade, and Q value.
Orientation	X-cut, Y-cut, Z-cut, AT-cut, ST-cut, 42.75 degree Y-X cut, orientation tolerance, primary flat direction, and flat length.
Wafer geometry	Diameter, thickness, thickness tolerance, LTV/TV5, TTV, bow, warp, bevel, and edge criteria.
Surface requirement	SSP or DSP, polished-side Ra, backside roughness, scratch-dig, particle limit, and visual defect criteria.
Order information	Quantity, wafer box requirement, inspection report requirement, packaging, delivery schedule, and drawing.

Reference values and options for selection. Confirm the material grade, geometry, test conditions and acceptance criteria for the quoted configuration.

Send drawings for engineering review

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