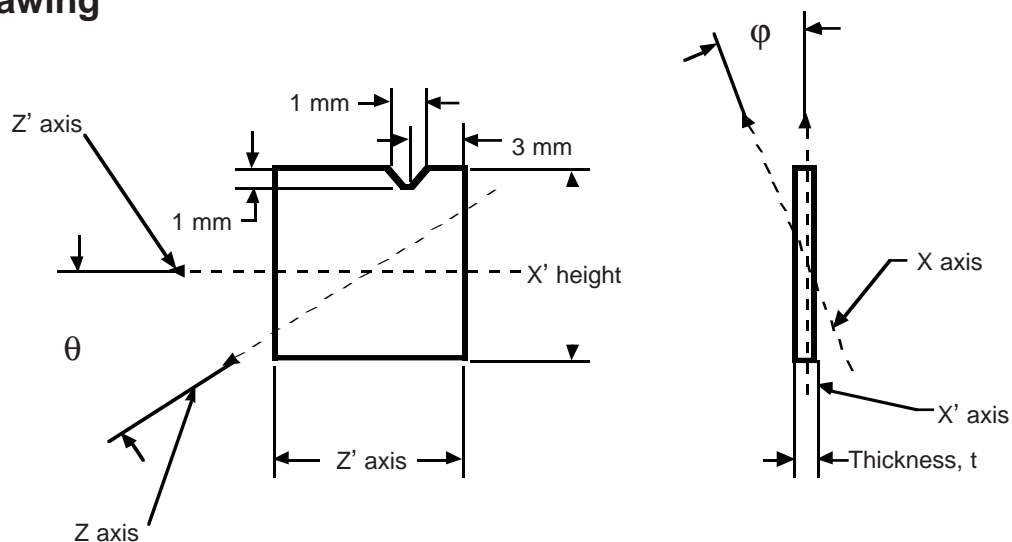


General

This document provides typical specifications for single crystal altered quartz blanks fabricated with a double angular rotation suitable for operation in the thickness shear mode. This family of blanks includes the SC-cut and IT-cut and is designed to reduce the effects of stress on resonant frequency.

Sawyer Research double rotated blanks can be fabricated to a range of specifications for either of the two angles of rotation as well as the overall blank dimensions. Typical specifications for the ϕ -rotation (i.e. the first or $X \rightarrow X'$, rotation) are around 22° for SC-cut blanks and 19° for IT-cuts, but can vary by as much as $\pm 1^\circ$. The θ -rotation (i.e. the second, or $Z \rightarrow Z'$, rotation) typically ranges from 33° to 35° . Verifications of specified orientation is assured by providing Sawyer Research with the appropriate X-ray diffraction reference standards. As the blanks are usually angle corrected after delivery, both surfaces are lapped to a rough finish using $15 \mu\text{m}$ abrasive, unless otherwise specified.

Outline Drawing



References

International Electrotechnical Commission Standard, CEI/IEC 758, Second edition, 1993-04.

Institute of Electrical and Electronic Engineers Standard on Piezoelectricity, ANSI/IEEE Std. 176-1987.

Mechanical Characteristics

	Units	Typical Values	Tolerance
Standard dimensions (other dimensions are available to meet customer-specific requirements)			
X'-height x Z'-width	mm	16.5 x 16.5	± 0.25
Thickness, t		As specified	± 0.013
Orientation -- ϕ	degrees	As specified(18°-24°)	± 10 minutes
Orientation -- θ	degrees	As specified (33°-35°)	± 5 minutes

Material Characteristics

Handedness		Right	
Infrared α (3500 cm^{-1})	α -units	Grade B: 0.045	maximum
Inclusions (diameter)		<u>Grade I</u>	
25-75 μm	cm^{-3}	4	
75-100 μm	cm^{-3}	2	maximum
> 100 μm	cm^{-3}	2	
Etch channels	cm^{-2}	Grade 4: 300	maximum
Twins in useful volume	count	None	

Surface Characteristics

Surface finish	Rough lapped using 15 μm abrasive		
Chips intruding onto surface	mm	1.0	maximum

Seed Characteristics

Pure-Z, seed free material

Doubly Rotated Blanks

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