DATA SHEET

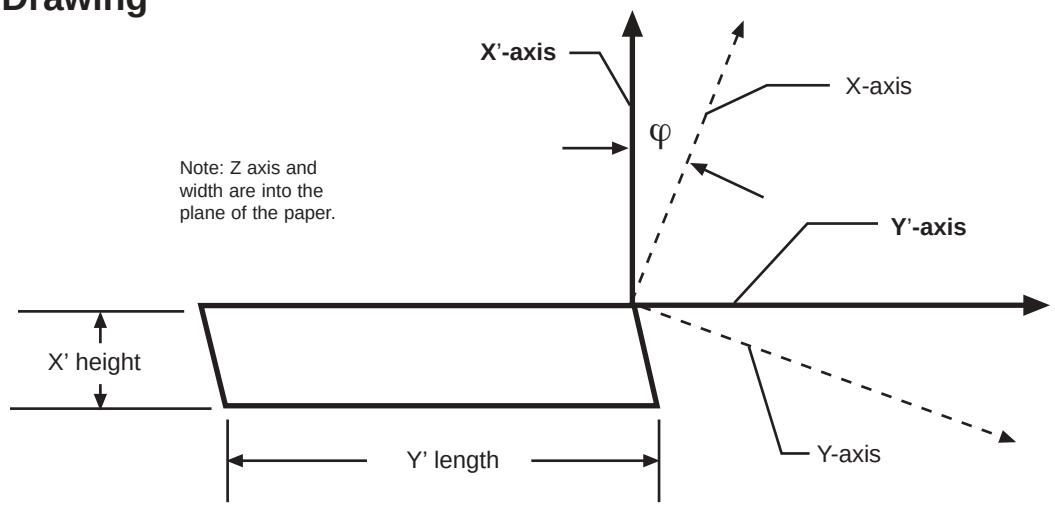
LUMBERED D-BAR
CUTTING STOCK FOR DOUBLY ROTATED BLANKS

General

This document provides typical specifications for single crystal cultured quartz material grown on a Z-plate seed and lumbered so as to simplify the cutting of wafers for the family of doubly rotated crystals operating in the thickness shear mode. The additional rotation is about the Z-axis and is designed to reduce the effects of stress on resonant frequency.

Sawyer Research “D-Bars” are lumbered such that doubly rotated blanks are easily obtained when the D-Bar is wafered using procedures similar to those used to fabricate AT-cut blanks. The φ-rotation (i.e. the first, or X→X’, rotation), nominal values of which are typically around 22° for bars used to make SC-cut blanks and 19° for IT-cuts, is provided by Sawyer Research, as shown. The θ-rotation (i.e. the second, or Z→Z’, rotation) is delivered when the bar is wafered, the primary difference between AT wafering and this θ-rotation being a slight reduction in the cutting angle.

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	13.3 x 12.7	± 0.13
		16.5 x 15.2	
		17.8 x 16.5	
Y'-length	mm	63.5	+ 2.5, -0
Orientation of X'-surface @ Z-axis	degrees	0	± 15 minutes
Orientation of Z-surface @ X'-axis	degrees	0	± 15 minutes
@ Y'-axis		0	
Flatness of -X' lumbered surface	mm	Flat	± 0.1
Surface finish of -X' lumbered surface, R_a	μm	4.0	maximum

Material Characteristics

Handedness		Right		
Infrared α (3500 cm^{-1})	α-units	Grade B: 0.045		maximum
Inclusions (diameter)		Grade II	Grade I	
25-75 μm	cm^{-3}	5	4	
75-100 μm	cm^{-3}	4	2	maximum
> 100 μm	cm^{-3}	3	2	
Etch channels	cm^{-2}	Grade 4: 300		maximum
		Grade 3: 100		
Twins and cracks in useful volume	count	None		

Seed Characteristics

Pure-Z, seed free material

Marking and Packaging

- Supplier logo, grind lot number, part number and "Minus X" are marked on the minus-X' surface of each bar. Reference Z-surface is marked "Z reference".
- Bars are shrink-wrapped to cardboard backing and stacked within double walled cardboard boxes.
- Total piece count, net weight, gross weight and part number are marked on the exterior of the carton.

Lumbered D-Bar

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