

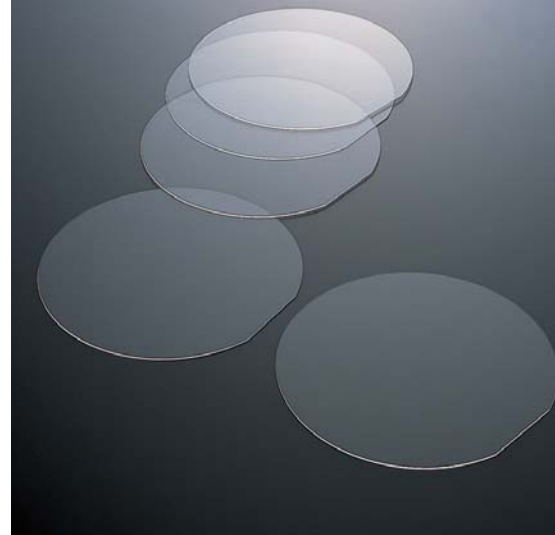
Synthetic Quartz AQ Wafers

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AQ, a synthetic fused quartz, is specially suited for high frequency wafer level packaging and stand alone substrates from RF to Millimeter wave applications (up to terahertz). The extremely low loss and low dielectric of AGC's AQ synthetic fused quartz – allows the RF designer – for the first time to design circuits with never-before-seen-performance. AGC's AQ synthetic fused quartz was developed with quality as the driver to enable hermetic packaging for Microwave Integrated Circuits (MIC's), hybrids, and microwave assemblies. These types of devices, when exposed to wide ranges of temperature and humidity, have stable dielectric constant and losses. Because AGC's AQ synthetic fused quartz – RF properties (tangent loss and dielectric constant) – are equal in all directions, unique designs and formats never before seen in the Microwave Industry can be manufactured and packaged.

AQ Product Features:

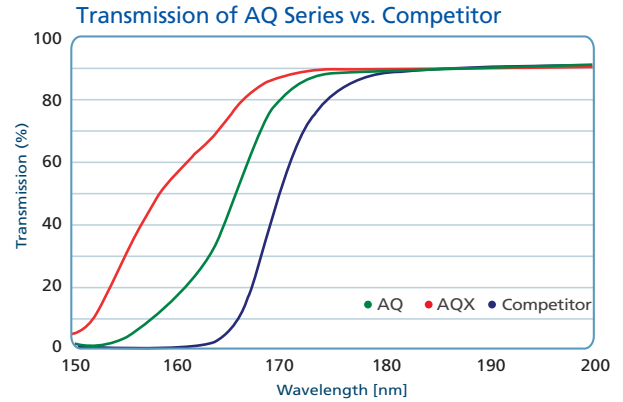
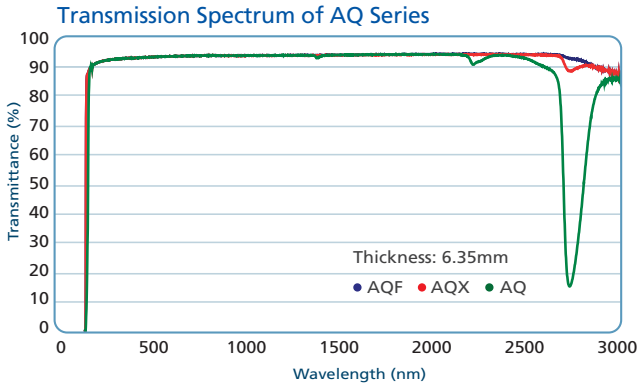
- Extreme low loss for “never before seen” high frequency performance
- Ultra polished surfaces that virtually eliminates skin effects experience at ultra high frequencies.
- ZERO moisture absorption, no outgassing and hermetic
- Thermally and mechanically stable up to 1000°C
- Wide range of thicknesses available to accommodate all design features
- > 99% optical transmissivity down to 200nm for Multi Mode Optical, Digital and RF applications in a single substrate
- Non-crystalline structure results in no resonance with applied voltages
- Impervious to fluxes or any chemical used in typical manufacturing process.



AQ Synthetic Quartz Properties

Chemical Composition	SiO ₂	wt (%)	100
	R2O3	wt (%)	
	RO	wt (%)	
	R2O	wt (%)	
Thermal Properties	CTE	[10 ⁻⁶](50~200°C)	0.6
	Softening Point	(°C)	1,600
	Transformation Point	(°C)	
	Strain Point	(°C)	1,000
Optical Properties	Refractive Index	nD	1.46
Chemical Properties	Water Resistance	JIS R-3502	
	Acid Resistance	(mg/cm ²)	0.000
	Alkali Resistance	(mg/cm ²)	0.032
Mechanical Properties	Density	(g/cm ³)	2.20
	Young's Modulus	(GPa)	74
	Knoop Microhardness	(GPa)	6
Electrical Properties	Bulk Resistivity	log(Ω·cm) at 200°C	12.5
	Dielectric Constant	2.0 - 77 Ghz	3.9
	Loss Tangent	2.0 - 77 Ghz	.0002

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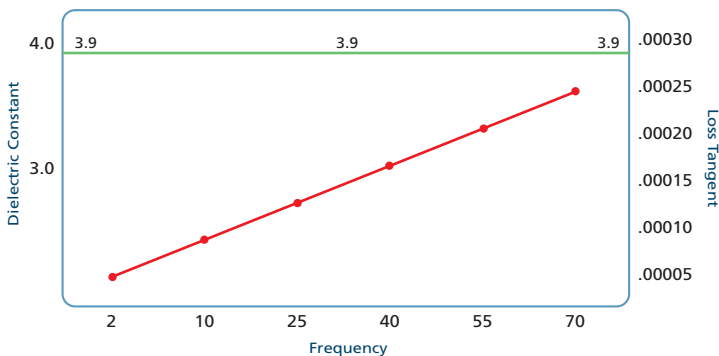


AQ Wafers Size Tolerances

Polish Grade

Diameter	Tolerance	Thickness	Tolerance	TTV	1P	2P	3P
12" Ø	± .1	.3 ~ 3.0mm	± 0.05	< 3 - 10µm	< 50Å	< 10Å	2Å
8" Ø							
6" Ø							
4" Ø							
8" □	± .1	.3 ~ 3.0mm	± 0.05	< 3 - 10µm	< 50Å	< 10Å	2Å
4" □							

RF Data



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