



The high frequency MMIC substrates and resonator in the range of 20~30GHz for the LMDS service and upcoming 3G wireless telecommunication(the 3rd generation) service is normally being designed on BST thin film and YBCO thin film. For the these thin films, the choice of substrate is very important because they were low loss is very important. Sapphire is usually used but anisotropy permittivity and high temperature coefficient of permittivity

MgO has a similar magnitude of dielectric constant ~9.5 but has isotropic permittivity and lower thermal coefficient. In addition, electronics and optical devices can be made of thin crystalline film deposited on and supported by durable substrates. A substrates is an underlying template that lines up the crystals of a thin film grown on it so that it conducts electrons or light. The substrates should not react with the film and, to avoid film breakage, it should expand at the same rate as the film when both are heated. Few crystals can meet these criteria, and MgO single crystal is an excellent substrates among them.

But the MgO grown by some companies as of today has previously been too small for some devices. MgO should be grown up to 2" at least to meet commercial purpose. We AMS Korea, Inc is ready to ship 2" substrate for your right size today.

Typical Physical Specification

Crystal Structure	Cubic
Lattice Constant	0.4213nm
Growth Method	Arc Melting Technology
Density	3.58 g/cm ³
Melt Point	2800 °C
Thermal expansion	12.80 x 10 ⁻⁶ /°C
Dielectric Constant	9.8
Color and Appearance	Yellow & transparent

Chemical Properties

Purity	MgO > 99.9%
Ca	221 ~ 248
Si	10 ~ 19
Al	86 ~ 101
Fe	70 ~ 91
Cr	5 ~ 9
P	< 1

Optical Properties

Transmission Range	0.3 ~ 6 microns
Refractive Index	1.7085 at 2microns
Reflection Loss	12.8% at 2microns
Absorption Coefficient	0.05cm ⁻¹ at 5.5 microns
Reststrahlen Peak	
dN/dT	+19x10 ⁻⁶ at 298K

Standard Size	10mm x 10mm, 20mm x 20mm, 30mm x 30mm, 38mm x 38mm Ø1inch, Ø2inches, Ø3inches
Tolerance	+0/-0.05mm
Max. size	3inches x 3inches
Standard thickness	0.5mm respectively 1mm
Surface quality	One-or both sides epi-polished
Certificate by AFM	Ra < 0.5nm (typical < 0.25nm) P-V < 3.5nm (typical < 3.0nm)

All substrates edge oriented, flatness is better than $1\mu\text{m}/\text{cm}$. The epitaxial surface is free from scratches, wipers, holes, and similar defects. The average of roughness R_a is better than the lattice constant (atomic smooth) and the peak valley is smaller than 3nm.

At your request we deliver special orientations including off orientations, other sizes, thickness of $> 100\mu\text{m}$, as well as improved qualities with respect to flatness and taper.

Surface Quality by AFM

Standard Specification

R_a < 0.5nm (typical <0.25nm)
 RMS < 0.8nm (typical <3.0nm)
 P-V < 3.5nm (typical <3nm)

Certificate Specification

R_a < 0.050nm
 RMS < 0.083nm
 P-V < 1.330nm

