

Thin Film Design Guidelines

	Standard	Special	NPD
Dimensions of single circuit device on a substrate			
Singulation (Dicing) tolerance	±0.05 mm	± 0.025 mm	
Minimum ratio via diameter to substrate thickness	1 to 1	range from 1 to .5 to 1	N/a
Tolerance via dimension	± 0.05 mm	± 0.025 mm	N/a
Distance via edge to substrate edge or cut-out	≥ Substrate Thickness		N/a
Distance via edge to another via edge	≥ Substrate Thickness	≥ 0.8 x	N/a
Tolerance via center to center	± 0.05 mm	± 0.025 mm	N/a
Metallization annular ring around a via on front and backside	≥ 0.100 mm	≥ 0.070 mm	x(0-0.05 mm)
Distance conductor to substrate edge:			
Distance conductor parallel to substrate edge or cut-out edge	≥ 0.200 mm	≥ 0.150 mm	N/a
Conductor Line and Space:*			
Conductor width Line and Space	0.050 mm	0.030 mm	0.020 mm
Tolerance conductor width	± 0.005 mm/ 0.007 mm	± 0.003 mm/ 0.005 mm	N/a
Resistors	10%	trimmed to value	N/a
Alignment tolerance conductor to laser feature	± 0.050 mm	± 0.025 mm	N/a
Alignment tolerance front to back patterning	± 0.050 mm	± 0.025 mm	N/a
Alignment tolerance resistors to conductor	± 0.020 mm	± 0.010 mm	N/a
Cut-outs (parallel to substrate edge)			N/a
Distance cut-out edge to substrate edge or another cut-out edge	≥ Substrate Thickness	< Substrate thickness	N/a
Alignment tolerance cut-out edge to substrate edge cut or sawn	± 0.050 mm	± 0.025 mm	N/a

Material Properties:

Ceramic Material	Units	Aluminum oxide ceramic 99.6% (Al ₂ O ₃)	Aluminum oxide ceramic 99.6% (Al ₂ O ₃)	Aluminum nitride ceramic (AlN)	Sapphire	Quartz glass SiO ₂ *
Composition		as fired	polished	as fired	polished	polished
Available thicknesses	Inches	0.005-0.025	0.004-0.040	0.004-0.100	0.005-0.050	0.004-0.080
Chamber	inch/ inch	0.002	0.0003/0.0005	0.0003/0.0005	0.0003/0.0005	0.0003/0.0005
Surface finish typical Ra	μ-inch	2.0-3.0	<1.0	<2.0	<1.0 μ-inch CLA	60/40
Density	g/cm³	3.87	3.87	3.28	3.97	2.2
Dielectric Constant ε_r	@10 MHz	9.9	9.9	8.9	10	3.8
Loss Tangent	@1 MHz	0.0001	0.0001	0.001	0.0008	0.000015
Thermal Conductivity	W/m²K	26.9	26.9	170	N/a	N/a
Coefficient of Thermal Expansion CTE	ppm / °C	7.0-8.3 (25-1000°C)	7.0-8.3 (25-1000°C)	4.6 (25-300°C)	A plane at 25 °C 5.3	0.55 (20-320°C)