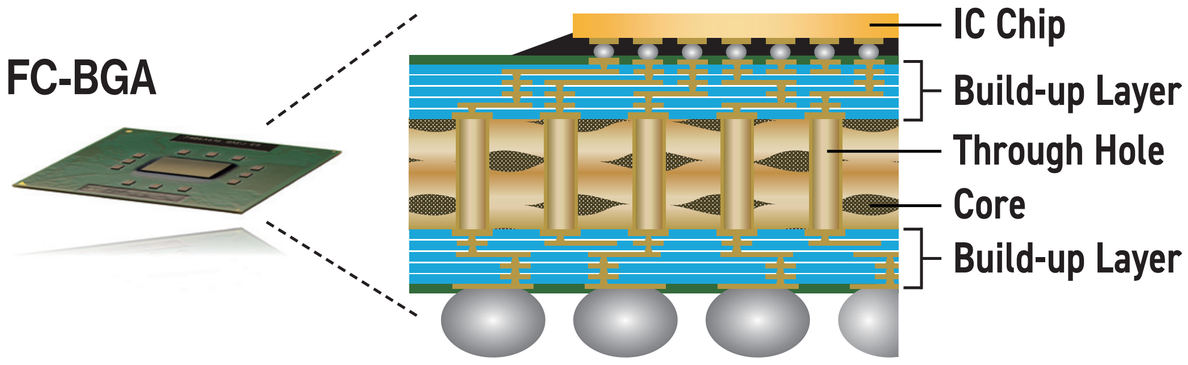
State-of-the-Art Material Enabling Next Generation IC Packages
Build-up Dielectric Material

Features

Where Build-up Dielectric Material is Used

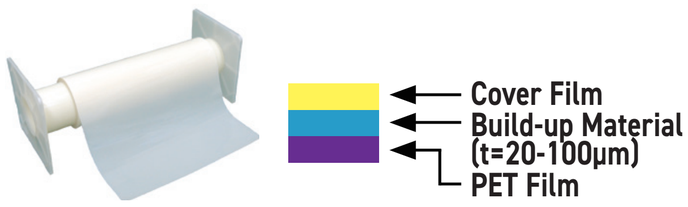
Build-up Dielectric Materials are primarily utilized as interlayer dielectric film in the fabrication of FC-BGA IC package substrates forming the build-up layers



Schematic X-Sectional View of IC Package Substrate

Advantages of SEKISUI Materials

- Have been key in driving high-end IC products for data centers and cloud providers, powering cutting-edge AI applications since 2014
- One of the few alternative providers of mass-produced dielectric build-up materials



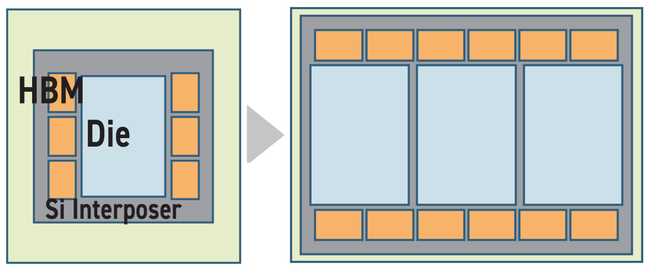
Product Form of Build-up Dielectric Material

Lineup

		NX04H	NQ07V	QX04	EL
		HVM		Sampling	Sampling
Df	@10GHz (Split Cylinder)	0.0079	0.0038	0.0024	≤ 0.0025
Dk	@10GHz (Split Cylinder)	3.4	3.5	3.3	≤ 2.5
CTE (25-150°C)	ppm/°C	24.5	27	15	17-23
Tg (DMA)	°C	205	183	177	n.d.
Young's Modulus	GPa	8.0	10.4	14.0	n.d.
Elongation	%	2.4	2.6	2.9	n.d.
Tensile Strength	MPa	100	105	110	n.d.
Thermal Conductivity	W/m·K	0.46	0.46	0.62	n.d.

SEKISUI's Material Solutions for Substrate Challenges and Trends

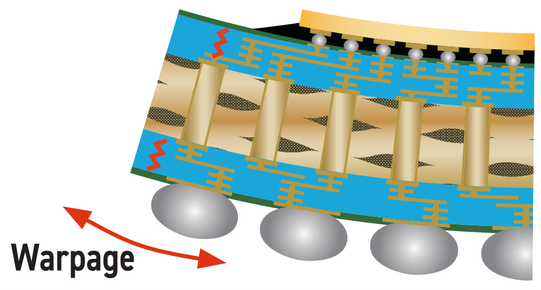
Trend 1 Size Increase of PKG / Die / Interposer



Longer trace length
→ Greater insertion loss

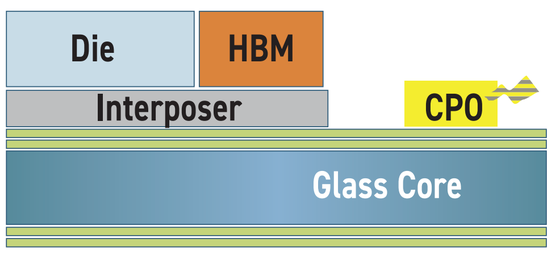
C4 Area Increase
→ Worse embedding capabilities

Trend 2 High Reliability Requirement



Larger substrate / multiple dies
→ Larger warpage / higher substrate cracking risks
→ Higher CTE mismatch
→ Higher reliability risk

Trend 3 Glass Core

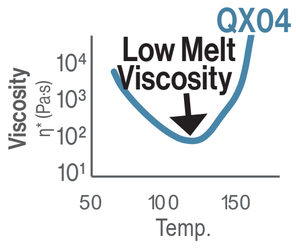


Glass Core = Higher Rigidity
→ Stress accumulates
→ Se-Wa-Re risk increases

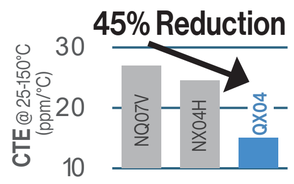
Smoother Surface
→ Lower adhesion

SEKISUI Solutions

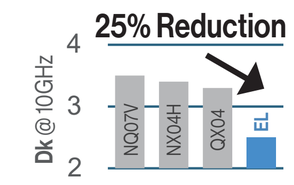
+ Low Df + Low Viscosity — QX04



+ Low CTE — QX04



+ Low Dk — EL



+Low Stress + High Adhesion — EL



SEKISUI

SEKISUI Chemical Co., Ltd.