

3M™ Glass Bubbles

Enabling the future of 5G

3M is evolving our design & process, to provide unique solutions to meet the needs of the electronics market.

3M™ Glass Bubbles designed for use in electronics:

3M Glass Bubbles have been used in many industries as a hollow, strong, and lightweight additive and now 3M is designing bubbles specifically for electronics.

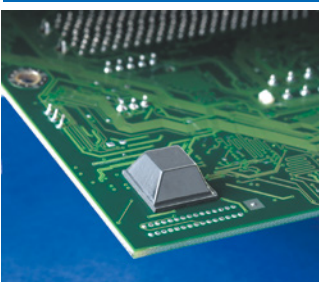
- Attractive dielectric properties
- Consistent and controlled design and quality needed in the electronics space
- Use in network infrastructure & devices, as a low loss material additive
- Small bubble size
- Ability to displace higher cost resins in applications

5G applications for 3M™ Glass Bubbles

3M Glass Bubbles are a low loss additive used in resin material that allows engineers to tailor their 5G design to a target Dk & Df value while ensuring the material has consistently low moisture, reduced impurities, and the quality assurance required in the electronics space. Designs incorporating glass bubbles helps enable a 5G signal by improving the data transfer velocity and reducing the signal transmission power loss.

Applicable for network infrastructure as well as devices:

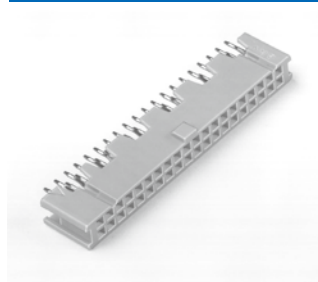
PCB CCL



Rodome Covers



Electrical Connectors



Plastics/Composites Parts



3M™ Glass Bubbles for 5G Electronics

Typical Physical Properties

Property	3M™ Glass Bubbles S4630	3M™ Glass Bubbles S3240-VS
True Density ¹	0.46g/cm ³	0.32g/cm ³
Crush Strength ²	> 16,000PSI (> 110.4MPa)	> 6,000PSI (> 41.4MPa)
D50 (typical values)	18µm	22µm
D95 (typical values)	<40µm	<47µm
Top Size Controlled, % Retained ³	<0.05%	<0.05%
Moisture	<0.35%	<0.35%
Dielectric Constant @ 10GHz(Dk)	1.5	1.4
Dissipation Factor @ 10GHz (Df)	0.005	0.004
Resin Compatibilization Treatment	None	Vinyl Silane
Target Applications	Electrical Connectors, CCL, & Radomes	CCL

¹ Helium Gas Pycnometer

² 3M internal QCM

³ 3M internal QCM; no more than 0.05% by weight when passing through a 53 micron sieve

Working Together in 5G Innovation

[3M.com/5Gglassbubbles](https://www.3m.com/5Gglassbubbles)

At 3M, we are designing products specifically with 5G in mind. Let us know about your pain points today and those expected in the future to enable innovation together.

Our material innovation and experienced application engineers can help you solve even the toughest design challenges in 5G.

For more information, talk to your sales representative or visit [3M.com/5Gglassbubbles](https://www.3m.com/5Gglassbubbles).

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