



APPLICATION USE CASE

Small Cells Accelerate Mobile Broadband Access with Reliable Performance Enhanced by Thermal Control

01 Application Challenges and Objectives



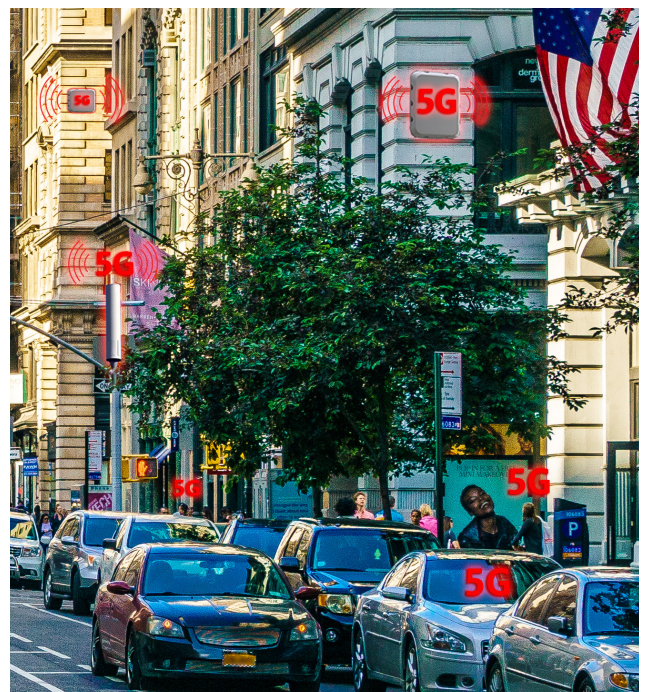
Small cells, which extend cellular signals, are widely deployed for 4G LTE and 5G connectivity. As 5G infrastructure expands, a significantly greater quantity of these devices will be required to manage the shorter signal lengths inherent with the new network standard.



As the name implies, the small cellular radio access points are extremely compact, resulting in high power densities that require thorough heat dissipation for dependable operation.



Because the cells are expected to last as long as 8 years in service, reliable performance is critical and thermal management materials are a key piece of ensuring long-lasting, optimal functionality.



02 Process and Performance Requirements

This application's small cell design employs a relatively large printed circuit board (PCB) (50 mm x 100 mm) with a variety of components of different dimensions. A one-material solution for heat dissipation was preferred for simplicity.

Fast and automated application of the thermal interface material (TIM) was also a significant factor to allow for high volume production.

The TIM solution needed to be able to accommodate for the variety of component heights, provide very low assembly stress, conform to different topographies to fill voids and allow for low thermal impedance for maximum heat dissipation. Cost-efficiency and material delivery expediency were important considerations.



03 Henkel Solution and Results

Understanding the breadth of requirements, Henkel recommended its BERGQUIST® GAP FILLER TGF 3600 liquid gap filler for this high power density small cell application. A high thermal conductivity of 3.6 W/m-K in combination with the conforming liquid medium help ensure low thermal impedance and adaptability to the various gap dimensions between components and the cell's metal housing.

The liquid material is engineered for efficient automatic dispensing, enabling mass production and facilitating the more than 1.5 million small cells per year manufacturing target.

Supply chain resilience, short lead and delivery times and consistency of supply were also deciding factors, with Henkel's local manufacturing site able to respond to order requests quickly and provide much faster delivery than competitors.

Next-generation small cell access points that leverage BERGQUIST® GAP FILLER TGF 3600 liquid gap filler for thermal management are currently deployed across many telecom infrastructure networks and, to date, have shown excellent reliability and performance.

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