



# 5G mmWave Performance Material Solutions

EMI Shielding and Thermal Management Solutions  
for 5G Applications



ENGINEERING YOUR SUCCESS.

# Why Parker Chomerics?

One partner, multiple solutions

Don't let the complexity of shielding for electromagnetic interference (EMI) get in your way of designing for the future of mmWave 5G connectivity.

We're experts in creating EMI and thermal solutions, giving you a wealth of integrated, multi technology systems and components that meet or exceed your specifications and expectations.

mmWaves pose new, complex heat and EMI challenges and we have a world-renowned portfolio of products and engineers who can help you solve your issues from concept through production,

Our selectable levels of lower development cost, and speed time to market. Learn more about how we can solve your challenges.



## Our innovative solutions matter

The widespread adoption of smartphones has seen a dramatic increase in mobile communications traffic in the last few years. In 2016, global mobile data traffic amounted to 7 exabytes per month. In 2021, mobile data traffic worldwide is expected to reach 49 exabytes per month at a compound annual growth rate of 47 percent. To put that into perspective, one exabyte is equal to 1,000,000 terabytes of data.

There is little doubt that the pace of this growth will accelerate even more in years to come, and research into the fifth-generation (5G) mobile communications has been proceeding as the world looks for ways to cater to this demand. The expectation is that 5G communications will be ready to use from 2020 onwards, and advances in a range of technologies are essential for that to happen.

A waiting threat behind the promise of 5G delivering up to 1,000 times as much data as today's networks is that 5G could also consume up to 1,000 times as much energy. And with that, concerns over radiated emissions, electromagnetic interference (EMI) and thermal issues will affect your electronic designs, a problem that's hardly limited to 5G. But what 5G networks require, however, could increase EMI-related and thermal management challenges. While there's still time to prepare, electronic designers need to understand the 5G network fundamentals when it comes to EMI shielding and thermal management solutions.



## PARKER CHOMERICS GLOBAL FOOTPRINT

- Your language
- Your time zone
- Your currency

# Adapting to the Challenges of 5G

## More Small Cells, More EMI

5G networks require their own frequency bands because current fourth-generation (4G) networks don't have enough bandwidth to accommodate the immense amounts of data that 5G will transfer. 5G networks will also be the first to use extremely high frequencies (EHF) also known as millimeter waves (mmWave), ranging from 30 to 300 GHz. The problem with these waves is that

they don't travel as far as low-frequency waves and won't readily pass through structures. Telecommunications companies plan to address this challenge by installing large numbers of small cells, which are low power, short range wireless transmission systems covering a small geographic area. Since many of these cells will have a limited

coverage range, they'll need to be installed at higher densities than with current 4G networks. Due to the increase in small cells in and around your home or workplace, both indoor and exposed to the elements, a combination weather seal and EMI shielding gasket must be designed into the housing to protect both moisture and extraneous EMI.

## 5G Massive MIMO Antennas

MIMO (multiple input, multiple output) deployment uses multiple antennas that are located at both the source (transmitter) and destination (receiver). Those antennas are linked to minimize error and increase efficiency of a network. This method's ability to multiply the capacity of the antenna links has made it an essential element of wireless standards.

When it comes to massive MIMO, the technology involves the use of arrays with many more antennas

at each base station. Thus, there are many more hardware components per base station. Thermal heat dissipation is a known issue with massive MIMO arrays, as each element must have its own electronics including power amplifiers and analog to digital (or digital to analog) converters.

These all must be contained in a relatively small area, as a typical array at 28 GHz will have an 8x8 array of antennas and may be as small as 8cm on a side. Typical

MIMO arrays at mmWave use 64 elements (8x8 array) or 128 elements (16x8 array). With that many arrays, the heat builds up and must be dissipated effectively. Common thermal solutions include transferring the heat generated by the array to a heat sink. A thermal interface material (TIM) is used to span the gap between the heat and heatsink. Massive MIMO antenna arrays will simply result in more antennas at each base station.

# How We Can Help

## More Small Cells, More EMI

In the rapidly expanding landscape of telecommunications, the proliferation of small cells presents both opportunities and challenges. At Parker Chomerics, we understand the critical importance of managing electromagnetic interference (EMI) in the deployment of small cells. Our expertise in EMI shielding solutions ensures that these compact wireless

transmission systems operate seamlessly within their designated environments, whether indoors or exposed to the elements. With our advanced materials and innovative designs, we provide comprehensive EMI shielding solutions tailored to the unique requirements of small cell installations. From weather seals to EMI shielding

gaskets, our solutions offer robust protection against moisture and extraneous EMI, safeguarding the integrity and performance of small cell networks. Partner with Parker Chomerics to navigate the complexities of small cell deployment with confidence, ensuring reliable connectivity in an increasingly interconnected world.



# Featured Parker Chomerics Products

EMI Shielding Elastomer and Form-In-Place Gaskets

Gaskets for shielding of enclosures of electronics such as displays, flanges, and components.

| Product         | Conductive Filler | Binder         | Shielding | Corrosion |
|-----------------|-------------------|----------------|-----------|-----------|
| CHO-SEAL® 6502  | Nickel-Aluminum   | Silicone       | Excellent | Excellent |
| CHO-SEAL® 6503  | Nickel-Aluminum   | Fluorosilicone | Excellent | Excellent |
| CHO-SEAL® 1298  | Silver-Aluminum   | Fluorosilicone | Good      | Very Good |
| CHO-SEAL® 1285  | Silver-Aluminum   | Silicone       | Very Good | Good      |
| CHO-SEAL® S6305 | Nickel-Graphite   | Silicone       | Good      | Fair      |
| CHO-SEAL® 6370  | Nickel-Graphite   | Silicone       | Fair      | Fair      |
| CHOFORM® 5513   | Silver-Copper     | Silicone       | Excellent | Fair      |
| CHOFORM® 5528   | Silver-Copper     | Silicone       | Excellent | Fair      |

## Fabric-Over-Foam EMI Shielding Gaskets

SOFT-SHIELD® fabric-over-foam gaskets provide excellent performance with very low closure force due to the soft urethane foam construction.

| Product           | Gasket Compression Set | Flammability Rating | Shielding | Operating Temperature |
|-------------------|------------------------|---------------------|-----------|-----------------------|
| SOFT-SHIELD® 3500 | < 15%                  | UL 94 V-0           | Excellent | -40º C - 70º C        |
| SOFT-SHIELD® 3700 | <10%                   | UL 94 V-0           | Excellent | -40º C - 125º C       |
| SOFT-SHIELD® 4850 | <15%                   | UL 94 V-0           | Very Good | -40º C - 70º C        |

## PREMIER™ EMI Shielding Plastics

Conductive plastics eliminate 35% of the housing weight (as compared to aluminum) and reduce costs by 65%, while providing excellent hydrolysis resistance.

| Product            | Filler Level | Flammability Rating | Surface Resistance (Ohm/sq) | Shielding Effectiveness (dB) |
|--------------------|--------------|---------------------|-----------------------------|------------------------------|
| PREMIER™ A220-HT   | Low          | N/A                 | 4.50                        | 60                           |
| PREMIER™ A240-ST   | High         | N/A                 | 0.20                        | 85                           |
| PREMIER™ A240-FRHF | High         | UL 94 V-0           | 0.25                        | 85                           |
| PREMIER™ PEI 140   | High         | UL 94 V-0           | 0.45                        | 85                           |
| PREMIER™ PBT-225   | Medium       | UL 94 H-B           | 10.0                        | 80                           |

## CHO-SHIELD® Conductive Paints and Coatings

Conductive paints designed to be applied to the inside of plastic electronic enclosures help shield critical medical equipment from damaging EMI.

| Product          | Conductive Filler    | Polymer Family | Temperature Range | Shielding Effectiveness (dB) |
|------------------|----------------------|----------------|-------------------|------------------------------|
| CHO-SHIELD® 2044 | Nickel               | Acrylic        | -40º C to 85º C   | >55                          |
| CHO-SHIELD® 2056 | Silver-Plated Copper | Acrylic        | -40º C to 85º C   | >75                          |
| CHO-SHIELD® 2040 | Silver               | Arylic         | -40º C to 85º C   | >80                          |



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# Featured Parker Chomerics Products

## Thermal Management and Cooling: Thermally Conductive Dispensable Gels

THERM-A-GAP™ thermally conductive dispensable gels are pre-cured, single-component compounds that can be robotically dispensed on the heat-generating component.

| Product               | Features                                            | Thermal Conductivity (W-m/K) | Product Type | Flow Rate (cc/min) |
|-----------------------|-----------------------------------------------------|------------------------------|--------------|--------------------|
| THERM-A-GAP™ GEL 8010 | Ideal for thin bondlines, UL 94 V-0                 | 3.0                          | One Part     | 60                 |
| THERM-A-GAP™ GEL 30   | Easily dispensable, high performance, UL 94 V-0     | 3.5                          | One Part     | 20                 |
| THERM-A-GAP™ GEL 45   | Easily dispensable, high end performance            | 4.5                          | One Part     | 55                 |
| THERM-A-GAP™ TC50     | Controlled dispensing, high end thermal performance | 5.5                          | One Part     | 10                 |

## Thermal Management and Cooling: Thermally Conductive Gap Filler Pads

THERM-A-GAP™ thermally conductive silicone and non-silicone gap filler pads are for applications where heat must be conducted over a large and variant gap.

| Product            | Features                                                           | Thermal Conductivity (W-m/K) | Hardness (Shore 00) | Flammability Rating |
|--------------------|--------------------------------------------------------------------|------------------------------|---------------------|---------------------|
| THERM-A-GAP™ HCS10 | Economical solution, highest conformability                        | 1.0                          | 4                   | UL 94 V-0           |
| THERM-A-GAP™ 569   | Great combination of thermal performance and conformability        | 1.5                          | 10                  | UL 94 V-0           |
| THERM-A-GAP™ 579   | Lowest outgassing, excellent thermal performance                   | 3.0                          | 30                  | UL 94 V-0           |
| THERM-A-GAP™ G974  | Fiberglass reinforced for improved tear strength                   | 5.0                          | 86                  | UL 94 V-0           |
| THERM-A-GAP™ 974   | Excellent thermal performance, PSA available                       | 6.0                          | 86                  | N/A                 |
| THERM-A-GAP™ 976   | Superior thermal performance, low compression force under pressure | 6.5                          | 55                  | UL 94 V-0           |

## Thermal Management and Cooling: Cure-in-Place Potting and Underfill Materials

THERM-A-FORM™ thermally conductive elastomer products are dispensable form-in-place compounds designed for heat transfer without excessive compressive force.

| Product            | Features                                                      | Thermal Conductivity (W-m/K) | Product Type | Hardness (Shore A) |
|--------------------|---------------------------------------------------------------|------------------------------|--------------|--------------------|
| THERM-A-FORM™ T647 | Superior thermal performance while maintaining low modulus    | 0.9                          | Two Part     | 25                 |
| THERM-A-FORM™ T646 | Provides combination of high thermal performance and low cost | 1.0                          | Two Part     | 50                 |
| THERM-A-FORM™ 1641 | One component, moisture cure, non-acetic acid generating      | 1.0                          | One Part     | 56                 |

## LCD Display Protection and Enhancement

Touchscreen, window and LCD solutions for human interface life science applications providing turnkey solutions with integrated assemblies aids in fast design cycles and fast to market product development cycles.

| Product              | Features                                                                                                              |
|----------------------|-----------------------------------------------------------------------------------------------------------------------|
| CHO-TOUCH™ Displays  | Integrated LCD/touch display solutions with optional custom cover glass and and EMI shielding                         |
| Integrated Solutions | Custom plastic or metal housing sub assemblies with specified displays, touchscreens, covers, supply chain components |
| WIN-SHIELD™ P        | Laminated plastic EMI shielded covers with optional embedded screen printed graphics                                  |
| WIN-SHIELD™ G        | Laminated or coated glass EMI shielded covers with optional embedded screen printed graphics                          |
| Duralan™ P           | Laminated plastic display/touchscreen covers with optional embedded graphics, display enhancements                    |

# Parker Chomerics Contact Locations

## Corporate Facilities

To place an order please visit [parker.com/chomerics](http://parker.com/chomerics) or contact a customer Service Representative at the following locations

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Product Disclosure

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## Manufacturing Facilities

Woburn, MA; Hudson, NH; Cranford, NJ; Millville, NJ; Fairport, NY; Monterrey, Mexico; Grantham, UK; High Wycombe, UK;  
Saint Ouen L'Aumone, France; Sadska, Czech Republic; Shanghai, PRC; Shenzhen, PRC; Penang, Malaysia;  
Kuala Lumpur, Malaysia; Chennai, India.

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