Greetings,

Thank you for your interest in RTP Company. We’d like to take this opportunity to tell you a little more about our organization:

**Whether your application is simple or complex, we can help you find a thermoplastic material to fit your needs.** Our engineers develop customized thermoplastic compounds in over 60 different resin systems for applications requiring color, conductive, elastomeric, flame retardant, high temperature, structural, and wear resistant properties.

Our conductive product line offers compounds for electrostatic discharge (ESD) protection, EMI shielding, or PermaStat® permanent anti-static protection. Available in particulate and all polymeric-based materials, these compounds can be colored, as well.

**We provide you with honest recommendations.** Private ownership allows us to be completely objective in our selection of resins and additives. Unlike larger companies, we are not obligated to use specific materials; rather, we’ll suggest the thermoplastic that will work best for your application, even if it is not one of our own.

**We’re here to support you.** With over 20 manufacturing plants located in the United States, Mexico, Europe, Singapore and China, our global team of sales representatives are available to serve you efficiently – no matter where you do business.

**Looking for samples?** Please contact us and tell us about your application! We typically offer five-to-ten day lead times for engineered samples, color matches, and production orders of standard materials.

**For more information**, please telephone (507) 454-6900, or visit our website at [www.rtpcompany.com](http://www.rtpcompany.com). We look forward to working with you!

Sincerely,

RTP Company
www.rtpcompany.com
Visit our website to view product
data sheets for EMI shielding compounds
along with technical information on
RTP Company’s complete portfolio of
thermoplastic compounds.

Color • Conductive • Elastomer
Flame Retardant • Structural
Wear Resistant

To begin the process of developing a custom thermoplastic compound to meet your application’s requirements, contact your local RTP Company representative.
Imagineering Plastics
RTP Company is a privately-owned global compounder of engineered thermoplastics. We offer customer-driven material solutions for multiple processes, including injection molding and extrusion. We work with more than 60 engineering resins to create a unique compound with your precise combination of conductive, flame retardant, color, structural, and wear resistant properties. RTP Company has ten full-service manufacturing locations, plus sales representatives throughout the world that will meet your needs with short lead times for samples, color matches, and standard production orders.

From the Start, Partner with RTP Company
• Innovative, value-added solutions not off-the-shelf materials.
• Engineered thermoplastics that optimize your design and reduce manufacturing costs.
• Short lead times that expedite prototyping and streamline production.
• Consistent quality you can rely on globally.
• Responsive, personalized service from experienced materials experts.

EMI Shielding
Custom Compounds from RTP Company
Reliable and Flexible
Electromagnetic interference (EMI) shielding compounds from RTP Company offer reliability and value in a wide range of applications where electromagnetic compatibility is required. Providing designers and processors with tremendous flexibility and significant benefits over metals, metallized coatings, and other EMI technologies.

Custom Formulations
Begin your search for a unique EMI shielding compound with RTP Company. Our engineers apply their knowledge of electromagnetic interference principles and material capabilities to create a plastic compound that’s ideal for your application. Instead of offering just a few standard products, we routinely develop custom compounds offering multi-property solutions such as conductivity, flame retardance, structural reinforcement, color, and wear resistance.

Flexibility Combined with Shielding
An RTP 2700 Series styrenic thermoplastic elastomer compound provides EMI shielding and is pliable enough to serve as a gasket or seal. Developed to shield two halves of a cellular telephone housing, these materials have potential uses throughout the business equipment and electronics industry. The compound features surface resistivity of \(10^{12}\) ohm/sq.

Case Study
EMI shielding compounds are colorable for part identification.
Imagineering Plastics

RTP Company is a privately-owned global compouder of engineered thermoplastics. We offer customer-driven material solutions for multiple processes, including injection molding and extrusion. We work with more than 60 engineering resins to create a unique compound with your precise combination of conductive, flame retardant, color, structural, and wear resistant properties. RTP Company has ten full-service manufacturing locations, plus sales representatives throughout the world that will meet your needs with short lead times for samples, color matches, and standard production orders.

From the Start, Partner with RTP Company

- Innovative, value-added solutions not off-the-shelf materials.
- Engineered thermoplastics that optimize your design and reduce manufacturing costs.
- Short lead times that expedite prototyping and streamline production.
- Consistent quality you can rely on globally.
- Responsive, personalized service from experienced materials experts.

www.rtpcompany.com

EMI Shielding

Custom Compounds from RTP Company

Reliable and Flexible

Electromagnetic interference (EMI) shielding compounds from RTP Company offer reliability and value in a wide range of applications where electromagnetic compatibility is required. Providing designers and processors with tremendous flexibility and significant benefits over metals, metallized coatings, and other EMI technologies.

Custom Formulations

Begin your search for a unique EMI shielding compound with RTP Company. Our engineers apply their knowledge of electromagnetic interference principles and material capabilities to create a plastic compound that’s ideal for your application. Instead of offering just a few standard products, we routinely develop custom compounds offering multi-property solutions such as conductivity, flame retardance, structural reinforcement, color, and wear resistance.

Flexibility Combined with Shielding

An RTP 2700 Series styrenic thermoplastic elastomer compound provides EMI shielding and is pliable enough to serve as a gasket or seal. Developed to shield two halves of a cellular telephone housing, these materials have potential uses throughout the business equipment and electronics industry. The compound features surface resistivity of 10^1 ohm/sq.

Case Study

EMI shielding compounds are colorable for part identification.

www.rtpcompany.com
Shielding provides protection for sensitive components from incoming EMI and/or prevents excessive emissions of EMI to other susceptible equipment.

**Basic Concepts of EMI and EMC...**

**Device Design Key to EMI Control**
Common methods for preventing emission or reception of EMI are proper circuit design, grounding, and selection/placement of components (including specially designed filters) within devices.

When such methods are not sufficient to meet agency standards, achieve proper operation of the device, or are not economical – utilizing shielding by incorporating an RTP Company thermoplastic compound can provide the additional protection necessary for success.

Typically, EMI shielding compounds utilize stainless steel fiber or nickel-coated carbon fiber in a thermoplastic matrix to provide the necessary shielding. These compounds can also incorporate flame retardant additives, wear additives, reinforcements, and colorants in a single custom material solution to meet the requirements of your application.

**Electromagnetic Interference**
The most common type of EMI occurs in the radio frequency range of the electromagnetic (EM) spectrum, from 10 kHz to 10^12 Hz. This energy can be radiated by computer circuits, radio transmitters, fluorescent lamps, electric motors, overhead power lines, lightning, and many other sources.

Device failures caused by interference – or "noise" – from electromagnetic energy are increasing due to the growing number of products that contain sensitive electronic components. The smaller size and faster operating speeds of these components often make it more challenging to manage EM pollution. Increased device frequencies, applications over 10 GHz are now common, result in proportionally decreased wavelengths that can penetrate very small openings in housings or enclosures.

Increasingly strict regulations address device emissions. At the same time, a product's immunity to external EMI determines its commercial success or failure. To comply with regulations on both emissions and susceptibility, designers and manufacturers integrate shielding into their product designs through a working knowledge of EMI behavior and shielding techniques.

**Electromagnetic Compatibility**
Standards governing electromagnetic compatibility (EMC) also refer to the topic as shielding against EMI. While EMI shielding can be partially controlled through the use of suppression components and good circuit design, it is the device enclosure that is often called upon to provide functional EMC compliance.

EMC is a property of overall system design, including the enclosure, the connectors, and the internal electronic components. Weakness in any one of these will reduce EMC. Conversely, strength in any one alone cannot ensure EMC. A well-designed electronic device will incorporate good EMC practices in all these areas.

**Case Study**

**Emission and Reception Control**
When point-of-sale printers sit side-by-side with other electronic equipment, EMI can interrupt their operation. Shielding in this printer base protects the printer's components from incoming EMI and prevents emissions of EMI to other susceptible equipment.

The *RTP 300 Series polycarbonate specialty compound* contains stainless steel fibers that provide critical shielding properties. The precolored compound has a UL94 flammability rating of V-0 at 1/16" (1.5 mm).

**Plastic Compounds Instead of Metal**
High performance encoders that operate in industrial environments are susceptible to electrical interference. This interference can disturb signal transmission resulting in equipment failure.

Machined aluminum rod and bar stock was replaced by an *RTP 300 Series polycarbonate compound* with nickel-coated carbon fiber. This cost-saving material change reduced part weight, improved mechanical stability, and preserved critical EMI shielding properties.

**Save Money**
EMI shielding compounds are more economical than coated plastics in parts with complex geometric designs and intricate wall thicknesses. This shield in a hand-held digital multimeter is molded from an *RTP 300 Series polycarbonate compound* that offers a shielding effectiveness of 50 dB.

**www.rtpcompany.com**
Basic Concepts of EMI and EMC...

Shielding provides protection for sensitive components from incoming EMI and/or prevents excessive emissions of EMI to other susceptible equipment.

Device Design Key to EMI Control
Common methods for preventing emission or reception of EMI are proper circuit design (grounding and selection/placement of components (including specially designed filters) within devices.

When such methods are not sufficient to meet agency standards, achieve proper operation of the device, or are not economical – utilizing shielding by incorporating an RTP Company thermoplastic compound can provide the additional protection necessary for success.

Typically, EMI shielding compounds utilize stainless steel fiber or nickel-coated carbon fiber in a thermoplastic matrix to provide the necessary shielding. These compounds can also incorporate flame retardant additives, wear additives, reinforcements, and colorants in a single custom material solution to meet the requirements of your application.

Electromagnetic Interference
The most common type of EMI occurs in the radio frequency range of the electromagnetic (EM) spectrum, from 10^4 to 10^12 Hertz. This energy can be radiated by computer circuits, radio transmitters, fluorescent lamps, electric motors, overhead power lines, lightning, and many other sources.

Device failures caused by interference — or "noise" — from electromagnetic energy are increasing due to the growing number of products that contain sensitive electronic components. The smaller size and faster operating speeds of these components often make it more challenging to manage EM pollution. Increased device frequencies, applications over 10 GHz are now common, result in proportionally decreased wavelengths that can penetrate very small openings in housings or enclosures.

Increasingly strict regulations address device emissions. At the same time, a product’s immunity to external EMI determines its commercial success or failure. To comply with regulations on both emissions and susceptibility, designers and manufacturers integrate shielding into their product designs through a working knowledge of EMI behavior and shielding techniques.

Electromagnetic Compatibility
Standards governing electromagnetic compatibility (EMC) also refer to the topic as shielding against EMI. While EMI shielding can be partially controlled through the use of suppression components and good circuit design, it is the device enclosure that is often called upon to provide functional EMC compliance.

EMC is a property of overall system design, including the enclosure, the connectors, and the internal electronic components. Weakness in any one of these will reduce EMC. Conversely, strength in any one alone cannot ensure EMC. A well-designed electronic device will incorporate good EMC practices in all these areas.

Emission and Reception Control
When point-of-sale printers sit side-by-side with other electronic equipment, EMI can interrupt their operation. Shielding in this printer base protects the printer’s components from incoming EMI and prevents emissions of EMI to other susceptible equipment.

The RTP 300 Series polycarbonate specialty compound contains stainless steel fibers that provide critical shielding properties. The precolored compound has a UL94 flammability rating of V-0 at 1/16” (1.5 mm).

Case Study

Plastic Compounds Instead of Metal
High performance encoders that operate in industrial environments are susceptible to electrical interference. This interference can disturb signal transmission resulting in equipment failure.

Machined aluminum rod and bar stock was replaced by an RTP 300 Series polycarbonate compound with nickel-coated carbon fiber. This cost-saving material change reduced part weight, improved mechanical stability, and preserved critical EMI shielding properties.

Case Study

Save Money
EMI shielding compounds are more economical than coated plastics in parts with complex geometric designs and intricate wall thicknesses.

This shield in a hand-held digital multimeter is molded from an RTP 300 Series polycarbonate compound that offers a shielding effectiveness of 50 dB.
There are three scientific phenomena that occur as electromagnetic waves encounter material:

**ABSORPTION:** Energy loss as electromagnetic waves pass through a material. This energy loss is usually converted to thermal energy. Absorption is highly dependent on the thickness and magnetic properties of the material.

**REFLECTION:** Energy reflected when electromagnetic waves encounter a material. Reflection can occur from both the front and back surfaces and from additives within the material, independent of the material’s thickness.

**TRANSMISSION:** Energy passing through a material with minimal disturbance.

For comparative information on the effects different additives, loading levels, and material thicknesses have on providing shielding against EMI, view the results of ASTM D 4935 shielding effectiveness testing for a variety of RTP Company thermoplastic compounds.

www.rtpcompany.com/info/shielding

www.rtpcompany.com
There are three scientific phenomena that occur as electromagnetic waves encounter material:

**ABSORPTION:** Energy loss as electromagnetic waves pass through a material. This energy loss is usually converted to thermal energy. Absorption is highly dependent on the thickness and magnetic properties of the material.

**REFLECTION:** Energy reflected when electromagnetic waves encounter a material. Reflection can occur from both the front and back surfaces and from additives within the material, independent of the material’s thickness.

**TRANSMISSION:** Energy passing through a material with minimal disturbance.

**Shielding Effectiveness Data**

For comparative information on the effects of different additives, loading levels, and material thicknesses on providing shielding against EMI, view the results of ASTM D 4935 shielding effectiveness testing for a variety of RTP Company thermoplastic compounds.

For more information, visit [www.rtpcompany.com/info/shielding](http://www.rtpcompany.com/info/shielding).

---

**Cost Analysis**

**EMI Shielding Compounds Instead of Coatings**

RTP Company conducted a study that compared cost per piece for achieving an EMI shielding level of at least 40 dB on a plastic part. The study considered RTP Company’s EMI shielding compounds versus three coating methods (painting, metallic plating, and vacuum metallizing). The plastic part was a housing 2” x 2” x 1/2” (51 mm x 51 mm x 13 mm), with wall thickness of 0.120” (3.050 mm). Costs reflect volumes of 10,000 and 100,000 parts.

Two RTP Company compounds were selected for the study, both of which exceed the minimum requirement for EMI shielding:

- **EMI 661** – ABS with 10% stainless steel fiber
- **RTP 682 HEC** – ABS with 15% nickel-coated carbon fiber

A drawing of the plastic part was submitted to several coaters. Their prices included a unit cost to apply the coating, a tooling/fixturing/masking cost, and a scrap rate.

The part design and shielding specifications were appropriate for a conductive coating process. Yet, even under such favorable conditions, EMI shielding compounds are competitive or less costly than conductive coatings for both low and high volume applications.

---

**There are two primary ways to shield plastics**

1. **Conductive coatings such as:**
   - Metallic plating
   - Painting
   - Vacuum metallizing

2. **EMI shielding compounds**

---

Download our complete white paper “Dramatic Cost Reductions for Electronic Device Protection”.

[www.rtpcompany.com/info/papers](http://www.rtpcompany.com/info/papers)
To begin the process of developing a custom thermoplastic compound to meet your application’s requirements, contact your local RTP Company representative.

www.rtpcompany.com
Visit our website to view product data sheets for EMI shielding compounds along with technical information on RTP Company’s complete portfolio of thermoplastic compounds.

Color • Conductive • Elastomer
Flame Retardant • Structural
Wear Resistant

No information supplied by RTP Company constitutes a warranty regarding product performance or use. Any information regarding performance or use is only offered as suggestion for investigation for use, based upon RTP Company or other customer experience. RTP Company makes no warranties, expressed or implied, concerning the suitability or fitness of any of its products for any particular purpose. It is the responsibility of the customer to determine that the product is safe, lawful and technically suitable for the intended use. The disclosure of information herein is not a license to operate under, or a recommendation to infringe any patents.

Copyright © 2010 RTP Company, 8/10