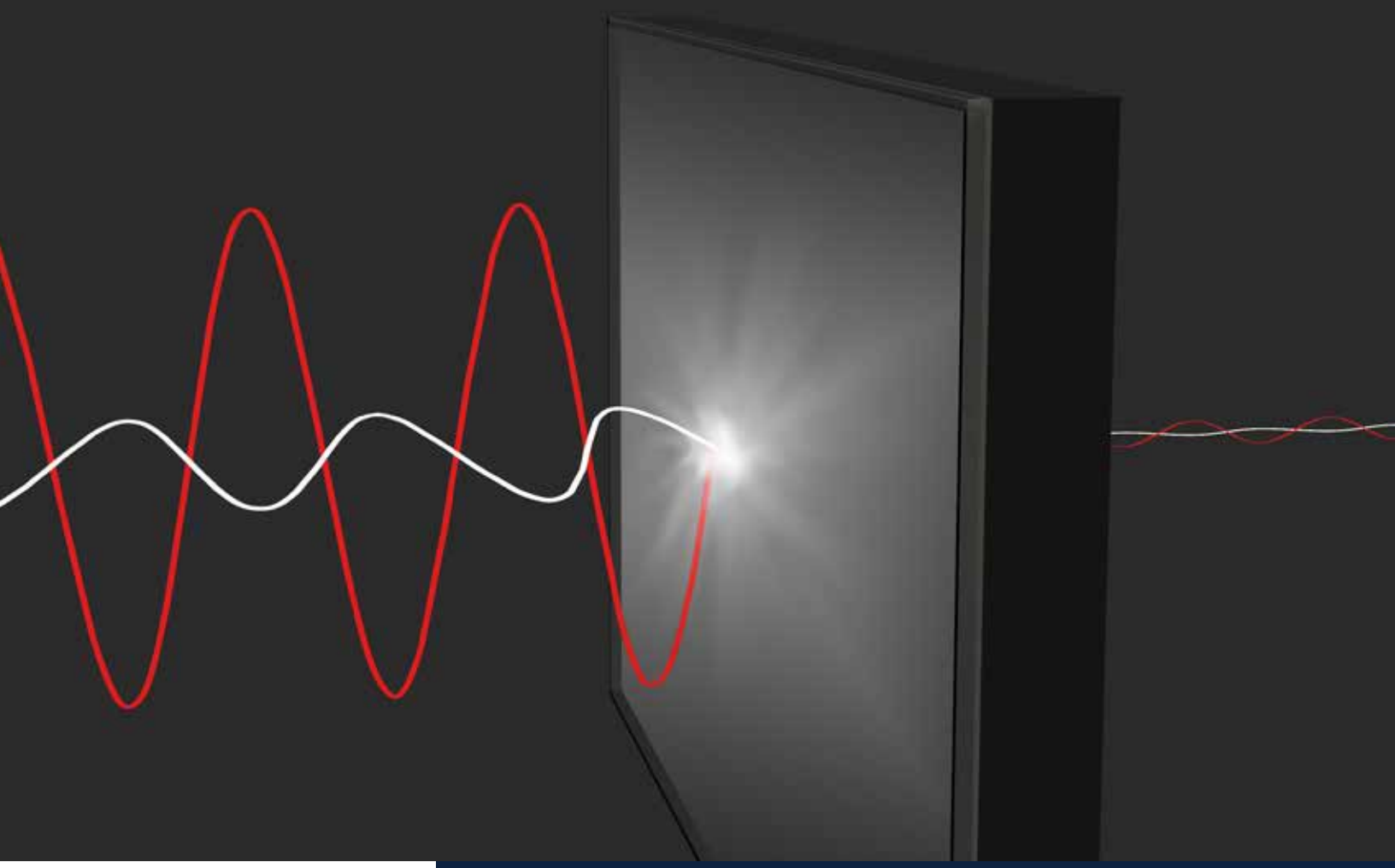
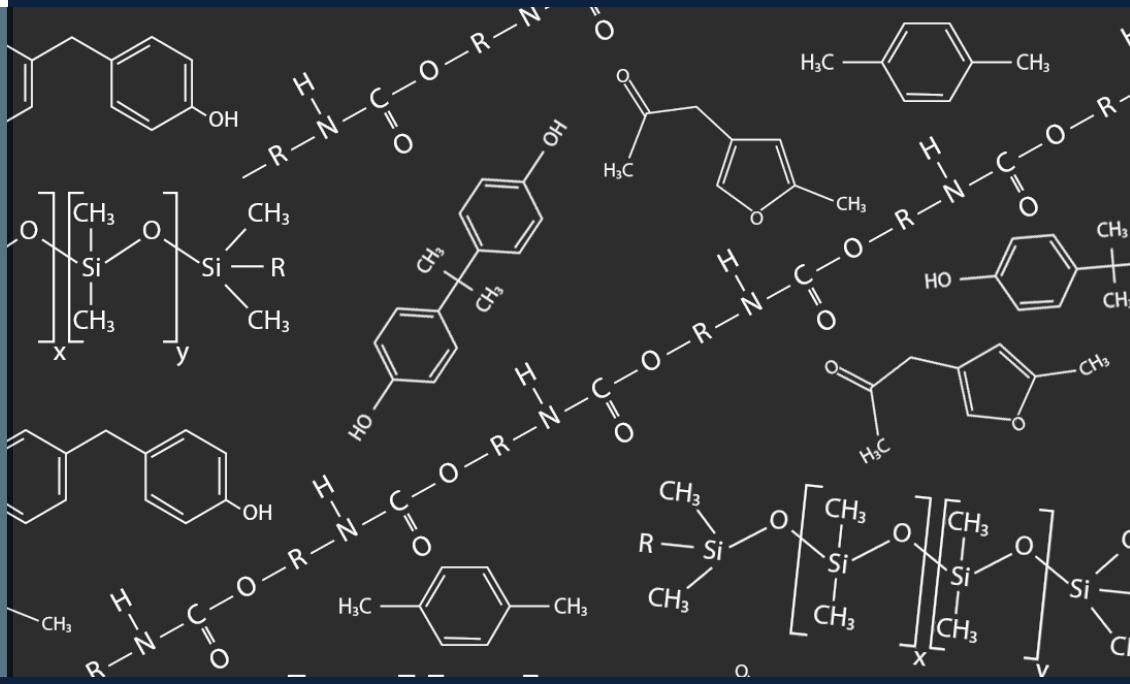


MG Chemicals®

ONE COMPANY... MANY SOLUTIONS

EMI/RFI SHIELDING

- AUTOMOTIVE
- AEROSPACE
- TRANSPORT
- MARINE
- MEDICAL
- TELECOMMUNICATIONS
- CONSUMER ELECTRONICS
- UTILITIES



WHO IS MG CHEMICALS

MG Chemicals is a manufacturer and wholesaler of chemical products for the electronics industry. Our chemical products include dusters and circuit coolers, electronic cleaners, flux removers, contact cleaners, protective coatings, epoxies, adhesives, RTV silicones, lubricants, EMI/RFI shielding coatings, thermal management products, prototyping supplies, solders, and more. We also distribute related non-chemical products such as wipes, swabs, brushes, desoldering braids, copper clad boards and 3D Printing filaments.

MG SERVICE

MG Chemicals recognizes that setting up production comes with various challenges. Our service team offers a wide variety of experience in material production, equipment, and technical issues you may encounter during planning, pilot studies, and production runs. To overcome these challenges, we offer professional services.

As a service, MG Chemicals can

- Provide advice on equipment and materials
- Assist with setup and troubleshooting
- Review your proposed application processes
- Suggest ways of optimizing and customizing processes to best meet your needs
- Offer training on the proper use of our products.

Quality Assurance

Since 1955, MG Chemicals has provided the North American electronics industry with a full line of high performance chemicals and accessories. The MG Chemicals manufacturing facility operates under the ISO 9001 Quality System Standard. All products undergo MG Chemicals' design process including the testing and analysis of each product to maximize performance, user safety, environmental safeguards and market desirability.

Customer Care

Customer care is what separates MG Chemicals from the rest. Our commitment to all of these principles focuses on getting you the quality product and support you deserve.

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About EMI/RFI

What is EMI/RFI?

Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) are two sides of the phenomena where electronic devices create and are affected by electromagnetic radiation. Often, the terms RFI and EMI are used interchangeably because radio waves are simply a subset of the electromagnetic spectrum. However, in practice, EMI generally refers to short range interference caused by high frequency emissions within the device itself, while RFI refers to longer wavelength interference from sources external to the device. EMI and RFI affect devices differently, but they are a related phenomenon and a common issue for today's electronics.

EMI/RFI are a growing problem in the modern world. Today's environment is filled with RFI. Radio, cell phone, and WIFI transmitters permeate space with signals. Solar activity and other sources from outer space also create significant radio wave noise. Additionally, as devices become smaller, they are increasingly vulnerable to EMI, especially when the distance between circuits are less than one wavelength. This creates a challenging environment for electrical engineers.

What is EMC?

Electro-Magnetic Compliance (EMC) is a critical part of electronic design. EMC is achieved when a device is designed to be protected from external EMI/RFI, and does not significantly generate its own. Government bodies and industry organizations such as the Federal Communications Commission and Society of Automotive Engineers have written comprehensive laws and guidelines for EMC that electronic devices must meet before being sold. Achieving EMC is no small task.

How is EMC achieved?

Most EMC is achieved through good circuit design. Opposing magnetic fields cancel each other out, therefore circuits are designed so that the field from one part nullifies the field of another part. However, this does not eliminate all EMI/RFI. EMI/RFI shielding is commonly necessary to capture the residuals.

A basic example is shielded twisted pair wiring, where two wires are run in opposite directions and twisted together so that their electromagnetic fields cancel each other out. The twisted pair is then put into a metal tube that eliminates residual emissions.

What is EMI/RFI Shielding?

The energy of an electromagnetic wave is reduced or "attenuated" when it passes through a conductive material. EMI/RFI shielding is a layer of conductive material. It may be designed to protect a device from its environment or components of a device from each other. In both cases, conductive paints provide effective solutions.

Metal enclosures inherently provide excellent EMI/RFI shielding, but most modern enclosures are plastic, offering no intrinsic protection. To achieve EMC, the inner surfaces of plastic enclosures are commonly coated with a conductive paint.

Board components are often shielded with metal caps, but with miniaturization there is not always room for one. However, a thin film of conductive paint can fit in tight places, and sometimes come to the rescue.

How is EMI/RFI Shielding Measured?

Attenuation is measured in decibels (dB) on a logarithmic scale. 10 dB of EMI/RFI Shielding will reduce the energy of the incident wave by a factor of 10. 20 dB will reduce it by a factor of 100; 30 dB by 1000, and so on.

It is important to note that the shielding effectiveness of all materials will differ depending on the wavelength of the radiation being shielded. A measurement of shielding effectiveness is only useful if the range of wavelengths for which that measurement is known.

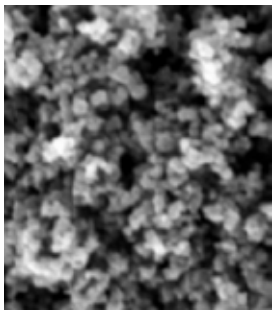
What does MG Chemicals offer?

MG Chemicals offers a range of conductive paints for EMI/RFI shielding and related applications.

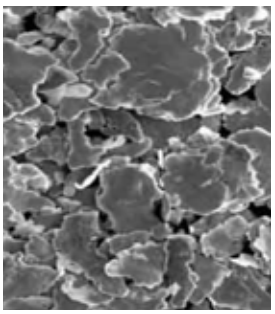
Customers can choose between three chemistries:

- **Acrylic** is the most common. It is widely used on electronic enclosures, satellite dishes, and board level applications. It is easy to apply, durable, and adheres well to many surfaces.
- **Water Based Urethane** is the only choice in architectural applications because of its low VOC content. It is non-flammable, has no noxious vapors, and is not a dangerous good by air.
- **Epoxy** is used when extreme durability is needed. It offers mar and scratch resistance, very strong adhesion, extreme abrasion resistance, impact resistance, and strong chemical resistance.

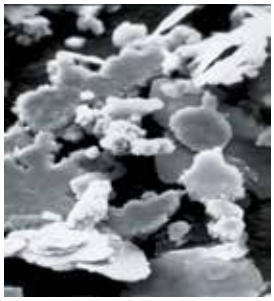
And four pigments:



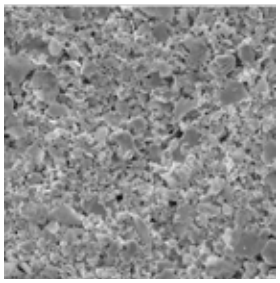
- **Carbon** is best for low frequency shielding, musical instruments, and grounding.



- **Silver coated copper** provides superior shielding at higher frequencies.



- **Nickel** is suitable for most device level shielding applications. It provides good shielding and excellent corrosion resistance



- **Silver** offers the best shielding and corrosion resistance. It is also the best choice for board level shielding and mission critical applications. It can be applied very thin.

PIGMENT / RESIN SYSTEMS COMBINATION PRODUCT SELECTION CHART

	RESIN SYSTEM		
PIGMENT SYSTEM	ACRYLIC	WATER BASED URETHANE	EPOXY
CARBON	838AR	N/A	N/A
NICKEL	841AR	841WB	841ER
SILVER COATED COPPER	843AR	843WB	843ER
SILVER	842AR	842WB	N/A

PERFORMANCE COMPARISON OF COATING BASES

Each coating base comes with its own tradeoffs depending on the application.

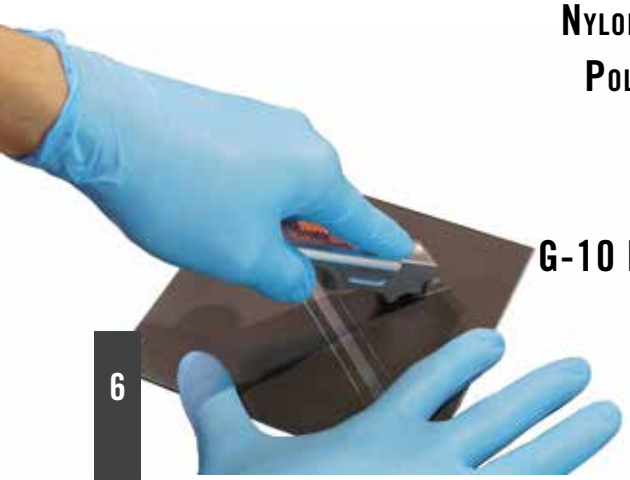
GENERAL CHARACTERISTICS

Dry time	Adhesion and Durability	Shielding Attenuation	Coating Thickness	Ease of Use
FASTEST	STRONGEST	HIGHEST	THINNEST	EASIEST
Acrylic	Epoxy	Acrylic	Acrylic	Acrylic
Epoxy	Acrylic	Water Based	Water Based	Water Based
Water Based	Water Based	Epoxy	Epoxy	Epoxy
SLOWEST	WEAKEST	LOWEST	THICKEST	HARDEST

SUBSTRATE ADHESION

Each polymer system comes with its own adhesion strength depending on the substrate it is applied to.

	Acrylic	Epoxy	Water Based
Acrylonitrile Butadiene Styrene (ABS)	EXCELLENT	EXCELLENT	EXCELLENT
Polycarbonate (PC)	EXCELLENT	EXCELLENT	EXCELLENT
PolyVinyl Chloride (PVC)	EXCELLENT	EXCELLENT	EXCELLENT
Nylon 66 (Polyamide)	EXCELLENT	EXCELLENT	EXCELLENT
Polypropylene (PP)	POOR	POOR	POOR
Glass	POOR	EXCELLENT	POOR
Metal	POOR	EXCELLENT	POOR
G-10 Fiberglass Epoxy	EXCELLENT	EXCELLENT	EXCELLENT
Dry Wall	GOOD	GOOD	EXCELLENT



PERFORMANCE COMPARISON OF COATING PIGMENTS

Each conductive filler comes with its own tradeoffs depending on the application.

High frequency shielding/electrical conductivity	Price	Corrosion resistance	Suitability for electroplating	Minimum coating thickness
HIGH	HIGHEST	HIGHEST	MOST	THIN
Silver	Silver	Carbon	Silver	Silver
Silver Coated Copper	Silver Coated Copper	Silver	Silver Coated Copper	Carbon
Nickel	Nickel	Nickel	Nickel	Nickel
Carbon	Carbon	Silver Coated Copper	Carbon	Silver Coated Copper
LOW	LOWEST	LOWEST	LEAST	THICK

Acrylic Conductive Coatings

Our AR series Acrylic Conductive Coatings are durable acrylic lacquers pigmented with highly conductive fillers. They provide effective EMI/RFI shielding over a broad frequency range and are an easy to use solvent based system with no heat cure necessary. The cured coatings are smooth, hard, abrasion resistant, and adhere strongly to plastics.

They are available in four pigments, carbon, nickel, silver coated copper, or silver, so customers can choose the most cost effective solution for their application.

Benefits and Features

- Smooth, durable, and abrasion resistant conductive coating
- Choice of four conductive pigments: carbon, nickel, silver coated copper, or silver
- Easily applied
- Available in aerosol format
- Quick dry time, no heat cure required
- Service temperature range -40 to 120 °C
- Mild solvent system
- Strong adhesion to acrylic, ABS, polycarbonate, and other injection molded plastics
- HAP Free; Does not contain toluene or xylene

Usage Parameters

Properties	Value
DRYING TIME @ 25 °C [77 °F]	24 hours
DRYING TIME @ 65 °C [149 °F]	30 minutes

Applications & Usages

Our Acrylic Conductive Coatings are commonly used to suppress EMI/RFI devices such as these:

- Electronic enclosures
- Sensors
- Controllers
- Receivers
- Test equipment
- Scientific equipment
- Medical equipment
- Communication devices
- Satellite dishes and radar systems
- Antennas
- Aerospace applications
- Electric vehicles
- Networking gear, firewalls
- Military equipment
- Cellphones, laptops, PDAs
- GPSs, navigation systems
- TVs, monitors, and displays
- Consumer electronics
- Electronic sporting equipment
- Audio equipment
- Electric guitars and other amplified instruments
- Drones and other RC vehicles
- Cable boxes

Other applications for our Acrylic Conductive Coatings include:

- Board level shielding to prevent cross talk between circuits or components
- Repairing damage to existing shielding
- Conductive undercoat for electroplating
- Prototyping and repairing circuits
- Providing electrical continuity to a surface
- Protecting metal surfaces from oxidation
- Grounding

ENVIRONMENT
RoHS Compliant
Low-VOC

Acrylic Conductive Coatings

Total Ground™ Carbon Conductive Coating - 838AR

The 838AR Total Ground™ Carbon Conductive Coating is as an economical solution for grounding or low frequency RFI shielding applications, especially electric guitars and other electronic instruments. It is ideal for RFI shielding in metal detectors and other devices affected by the presence of metal. It can also be used as the conductive inner coating in picture tubes, or as a resistor in circuitry. It functions as a conductive undercoat in some electroplating applications.

- **Provides >52 dB of EMI/RFI shielding at frequencies <1 MHz.**
- **Volume resistivity of 0.33 Ω•cm for liquid; 0.34 Ω•cm for aerosol**
- **Can be applied by spray, aerosol, brush, or pen**
- **Strong corrosion resistance, suitable for marine environments**

Cat. Number	Packaging	Net Volume		Net Weight	
838AR-340G	Aerosol	Not Established		340 g	12 oz
838AR-900ML	Can	850 mL	1.79 pt	725 g	1.59 lb
838AR-3.78L	Can	3.6 L	3.8 qt	3.07 kg	6.77 lb

Super Shield™ Nickel Conductive Coating - 841AR

The 841AR Super Shield™ Nickel Conductive Coating is the standard choice for shielding plastic electronic enclosures or for use on satellite dishes. It functions as a conductive undercoat in many electroplating applications.

- **Provides effective EMI/RFI shielding over a broad frequency range**
- **Volume resistivity of 0.0040 Ω•cm for liquid; 0.0076 Ω•cm for aerosol**
- **Can be applied by spray, aerosol, brush, or pen**
- **Corrosion resistant, suitable for marine environments**

Cat. Number	Packaging	Net Volume		Net Weight	
841AR-340G	Aerosol	Not Established		340 g	12 oz
841AR-150ML	Can	150 mL	5.0 fl oz	253 g	8.93 oz
841AR-900ML	Can	850 mL	1.79 pt	1.43 kg	3.16 lb
841AR-3.78L	Can	3.60 L	3.8 qt	6.07 kg	13.3 lb

Super Shield™ Silver Coated Copper Conductive Coating - 843AR

The 843AR Super Shield™ Silver Coated Copper Conductive Coating provides superior EMI/RFI shielding to plastic electronic enclosures. It is suitable for some board level applications. It functions well as a conductive undercoat in many electroplating applications.

- **Provides strong EMI/RFI shielding over a broad frequency range**
- **Volume resistivity of 0.0003 Ω•cm for liquid; 0.0014 Ω•cm for aerosol**
- **Can be applied by spray or aerosol**
- **Comes in ready-to-spray liquid format, no let down necessary**
- **Low VOC content, MEK free**

Cat. Number	Packaging	Net Volume		Net Weight	
843AR-340G	Aerosol	Not Established		340 g	12 oz
843AR-900ML	Can	850 mL	1.8 pt	927 g	2.05 lb
843AR-3.78L	Can	3.60 L	3.8 qt	3.93 kg	8.66 lb

Super Shield™ Silver Conductive Coating - 842AR

The 842AR Super Shield™ Silver Conductive Coating provides the highest level EMI/RFI shielding for electronic enclosures. It is suitable for board level applications. It functions very well as a conductive undercoat in most electroplating applications.

- **Provides extreme EMI/RFI shielding over a broad frequency range**
- **Volume resistivity of 0.0001 Ω•cm for liquid; 0.000076 Ω•cm for aerosol**
- **Can be applied by spray, aerosol, brush, or pen**
- **Extremely corrosion resistant, suitable for harsh marine environments**
- **Low VOC content, MEK free**

Cat. Number	Packaging	Net Volume		Net Weight	
842AR-340G	Aerosol	Not Established		340 g	12 oz
842AR-150ML	Can	150 mL	5.07 fl oz	260 g	9.19 oz
842AR-900ML	Can	850 mL	1.79 pt	1.47 kg	3.25 lb
842AR-3.78L	Can	3.60 L	3.8 qt	6.26 kg	13.7 lb

Acrylic Conductive Coating Comparison Chart

Uncured Working Properties	838AR	841AR	843AR	842AR
Conductive Filler	C (carbon)	Ni (nickel)	Ag/Cu (silver coated copper)	Ag (silver)
Format	Liquid	Liquid	Liquid	Liquid
Color	Black	Dark grey	Light metallic brown	Metallic silver
Solids Percentage	15%	57%	31%	61%
Density @25 °C [77 °F]	0.85 g/mL	1.7 g/mL	1.1 g/mL	1.7 g/mL
Viscosity @25 °C [77 °F]	154 cP	1 460 cP	<30 cP	873 cP
VOC Content	47%	14%	17%	12%
Shelf Life	2 y	2 y	2 y	2 y
Coverage & Application Properties				
Ready to Spray	No	No	Yes	No
Theoretical HVLP Spray Coverage	≤25 300 cm^2/L	≤29 600 cm^2/L	≤15 000 cm^2/L	≤59 600 cm^2/L
Recoat Time	3 min	3 min	3 min	3 min
Drying Time @25 °C [77 °F]	24 h	24 h	24 h	24 h
Drying Time @65 °C [149 °F]	30 min	30 min	30 min	30 min
Cured Properties	**838AR**	**841AR**	**843AR**	**842AR**
Electrical Properties				
Volume Resistivity	0.33 Ω·cm	0.0040 Ω·cm	0.00030 Ω·cm	0.0001 Ω·cm
Volume Conductivity	3.1 S/cm	250 S/cm	3 300 S/cm	9 337 S/cm
Surface Resistance @1 coat	170 Ω/sq	0.52 Ω/sq	0.071 Ω/sq	<0.01 Ω/sq [a)]
@2 coats	60 Ω/sq	0.38 Ω/sq	0.018 Ω/sq	<0.01 Ω/sq [a)]
Attenuation from 0.01 to 18 000 MHz	23 dB ± 25 dB	59 dB ± 12 dB	65 dB ± 11 dB	73 dB ± 11 dB
Salt Fog Test @35 °C [95 °F], 96 h [b)]	Before: 70 Ω/sq After: 70 Ω/sq	Before: 0.38 Ω/sq After: 0.51 Ω/sq	Before: 0.08 Ω/sq After: 3.3 Ω/sq	Before: <0.01 Ω/sq After: 0.05 Ω/sq
Thermal Properties				
Constant Service Temperature	-40 to 120 °C [-40 to 248 °F]	-40 to 120 °C [-40 to 248 °F]	-40 to 120 °C [-40 to 248 °F]	-40 to 120 °C [-40 to 248 °F]
Intermittent Temperature Limits	-50 to 125 °C [-58 to 257 °F]	-50 to 125 °C [-58 to 257 °F]	-50 to 125 °C [-58 to 257 °F]	-50 to 125 °C [-58 to 257 °F]
Mechanical Properties				
Adhesion [b)]	5B	5B	5B	5B
Pencil Hardness [b)]	H, hard	3H, hard	F, medium	3H, hard
Magnetic Properties				
Magnetic Class	Diamagnetic (non-magnetic)	Ferromagnetic (magnetic)	Diamagnetic (non-magnetic)	Diamagnetic (non-magnetic)
Relative Permeability	<1.0	≥100	<1.0	<1.0

Values for conductive coatings in aerosol format will vary slightly. Please see product's TDS for exact values.

a) Readings less than 0.01 Ω/sq are below the detection limit of the test apparatus

b) Tested on acrylonitrile butadiene styrene (ABS)

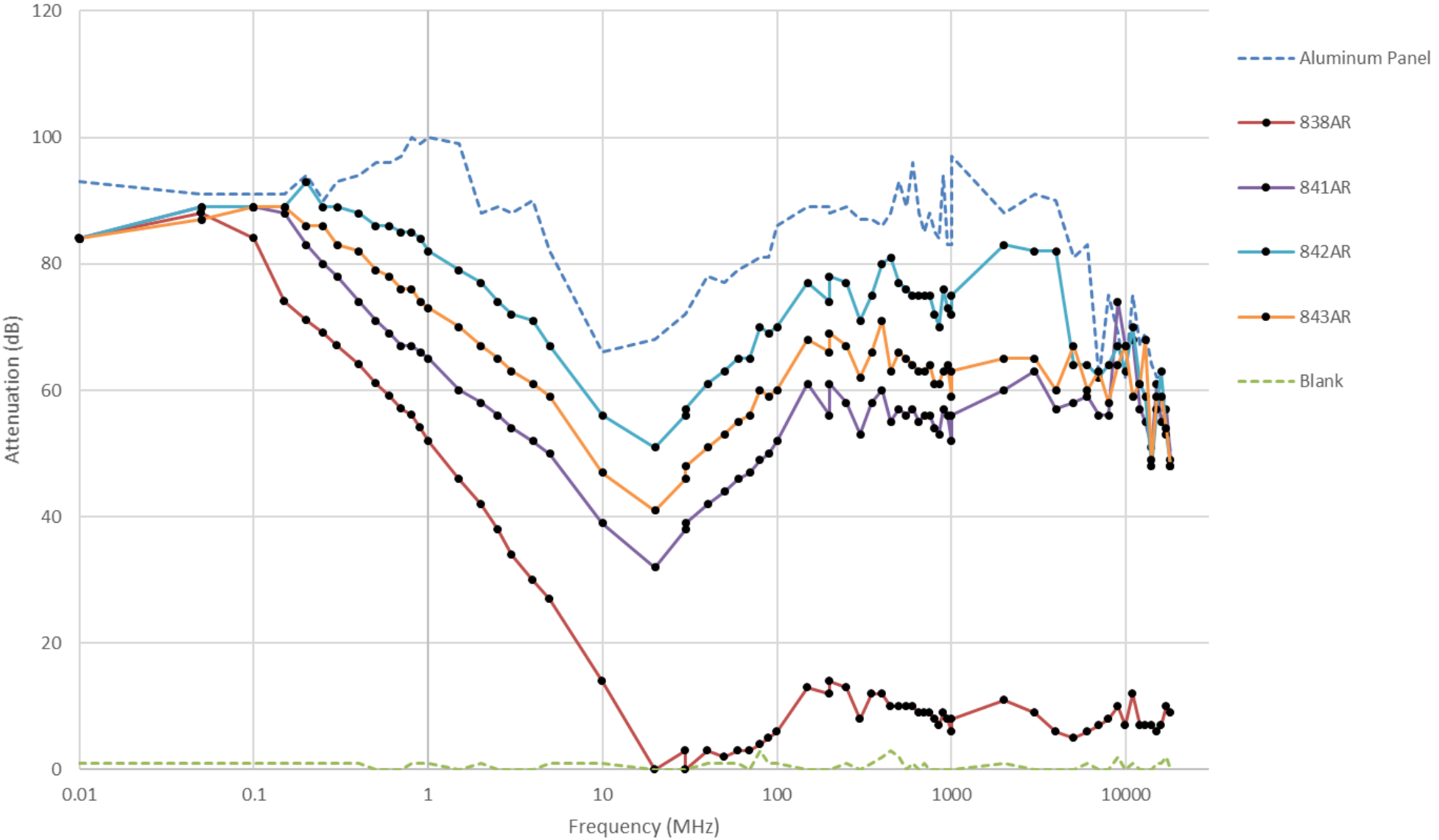

340 g

150 mL

900 mL

3.78 L

Acrylic Conductive Coating Attenuation vs Frequency Graph



Water Based Conductive Coatings

Our WB series Water Based Conductive Coatings are urethane systems pigmented with highly conductive fillers. They are easy to use with no heat cure necessary. The cured coatings are smooth, durable, and adhere well to plastics, wood, metal, and ceramics. They bond well to drywall and can be painted over with common architectural paints.

They are available in three pigments, nickel, silver coated copper, or silver, so customers can choose the most effective solution for their application.

Benefits and Features

- Provides effective EMI/RFI shielding over a broad range of frequencies
- Can be applied by spray gun, roll, or brush
- One-part ready-to-use system—no dilution required
- Excellent adhesion to drywall
- Can be painted over with common architectural paints
- Cures at room temperature
- Safe on delicate plastics
- Good adhesion to acrylic, ABS, polycarbonate, and other injection molded plastics
- Good adhesion to wood, ceramics, copper, and aluminum
- Good environmental resistance
- Non-flammable
- No noxious odors
- Ships as a non-dangerous good by Air
- Low regulated VOC content allows for use in architectural applications

Applications & Usages

The WB series Super Shield™ Water Based Conductive Coatings are designed to reduce EMI/RFI in architectural and electronic applications.

Water based conductive paints are the only choice for architectural RFI shielding applications because VOC regulations prohibit the use of solvent based systems. Such applications include containing RFI within a room such as an engine room to prevent interference across other rooms. Also, it can be used to protect a room containing sensitive electronic equipment from general sources of interference, such as server rooms, recording studios, laboratories, and surgical rooms, especially those near cell phone or radio towers.

The WB series is also great for providing EMI/RFI shielding to electronic enclosures, sensors, test equipment, portable controllers, communication devices, and most applications where one would normally use solvent based shielding. They are also good for repairing conductive traces and electronic prototyping.

Usage Parameters

Properties	Value
RECOAT TIME (liquid)	30 minutes
DRYING TIME @ 25 °C [77 °F]	24 hours
DRYING TIME @ 65 °C [149 °F]	2.5 - 3 h

Super Shield™ Water Based Nickel Conductive Coating - 841WB

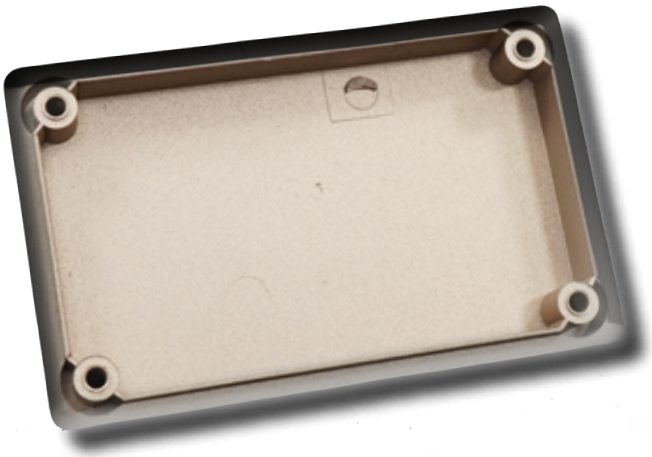
The 841WB Super Shield™ Water basedSilver Conductive Coating provides effective shielding for electronic enclosures and most common architectural applications.

- **Provides effective EMI/RFI shielding over a broad frequency range**
- **Volume resistivity of 0.027 Ω•cm**
- **Corrosion resistant**

Cat. Number	Packaging	Net Volume		Net Weight	
841WB-150ML	Can	150 mL	5.0 fl oz	271 g	9.58 oz
841WB-850ML	Bottle	850 mL	1.79 pt	1.83 kg	4.03 lb
841WB-3.78L	Can	3.60 L	7.6 qt	6.51 kg	16.6 lb

Super Shield™ Water Based Silver Coated Copper Conductive Coating - 843WB

The 843WB Super Shield™ Water Based Silver Coated Copper Conductive Coating provides superior shielding to electronic enclosures and architectural applications. It is also suitable for server rooms.



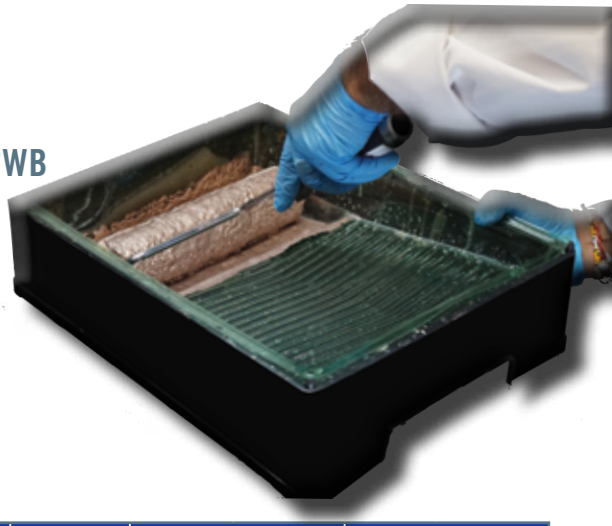
- **Provides superior EMI/RFI shielding over a broad frequency range**
- **Volume resistivity of 0.00068 Ω•cm**

Cat. Number	Packaging	Net Volume		Net Weight	
843WB-150ML	Bottle	150 mL	5.07 fl oz	195 g	6.88 oz
843WB-900ML	Can	850 mL	1.79 pt	1.1 kg	2.43 lb
843WB-3.78L	Can	3.78 L	3.8 qt	4.68 kg	10.3 lb

Super Shield™ Water Based Silver Conductive Coating - 842WB

The 842WB Super Shield™ Water Based Silver Conductive Coating provides excellent shielding to electronic enclosures and architectural applications.

- **Provides excellent EMI/RFI shielding over a broad frequency range**
- **Volume resistivity of 0.000075 Ω•cm**
- **Corrosion resistant**



Cat. Number	Packaging	Net Volume		Net Weight	
842WB-150ML	Bottle	150 mL	5.0 fl oz	224 g	7.93 oz
842WB-850ML	Can	850 mL	1.79 pt	1.27 kg	2.8 lb
842WB-3.78L	Pail	3.78 L	1 gal	5.66 kg	12.4 lb

Water-based Conductive Coating Comparison Chart

Uncured Working Properties	***841WB***	***843WB***	***842WB***
Conductive Filler	Ni (nickel)	Ag/Cu (silver coated copper)	Ag (silver)
Format	Liquid	Liquid	Liquid
Color	Grey	Light metallic brown	Silver
Solids Percentage	54%	42%	60%
Density @25 °C [77 °F]	1.8 g/mL	1.3 g/mL	1.5 g/mL
Viscosity @25 °C [77 °F]	143 cP	234 cP	195 cP
VOC Content	145 g/L	51 g/L	53 g/L
Shelf Life	1 y	1 y	1 y
Coverage & Application Properties			
Ready to Spray	Yes	Yes	Yes
Theoretical HVLP Spray Coverage	≤15 200 cm^2/L	≤42 200 cm^2/L	≤69 000 cm^2/L
Recoat Time [a)]	30 min	20 min	20 min
Drying Time @25 °C [77 °F]	24 h	24 h	24 h
Drying Time @65 °C [149 °F]	3 h	2.5 h	3 h
Cured Properties	***841WB***	***843WB***	***842WB***
Electrical Properties			
Volume Resistivity	0.027 Ω·cm	0.00068 Ω·cm	0.000075 Ω·cm
Volume Conductivity	37 S/cm	1 470 S/cm	13 300 S/cm
Surface Resistance @1 coat	1.4 Ω/sq	0.21 Ω/sq	0.04 Ω/sq
@2 coats	0.68 Ω/sq	0.11 Ω/sq	0.02 Ω/sq
Attenuation from 0.01 to 18 000 MHz	46 dB ± 16 dB	61 ± 12 dB	65 ± 11 dB
Salt Fog Test @35 °C [95 °F], 96 h [b)]	Before 0.4 Ω/sq After 3 Ω/sq	TBD "	Before 0.012 Ω/sq After 0.081 Ω/sq
Thermal Properties			
Constant Service Temperature	-40 to 120 °C [-40 to 248 °F]	-40 to 120 °C [-40 to 248 °F]	-40 to 120 °C [-40 to 248 °F]
Intermittent Temperature Limits	-50 to 125 °C [-58 to 257 °F]	-50 to 125 °C [-58 to 257 °F]	-50 to 125 °C [-58 to 257 °F]
Mechanical Properties			
Adhesion on ABS	5B	5B	5B
Pencil Hardness on ABS	HB, hard	HB, hard	HB, hard
Magnetic Properties			
Magnetic Class	Ferromagnetic (magnetic)	Diamagnetic (non-magnetic)	Diamagnetic (non-magnetic)
Relative Permeability	≥100	<1.0	<1.0

TBD=To be determined

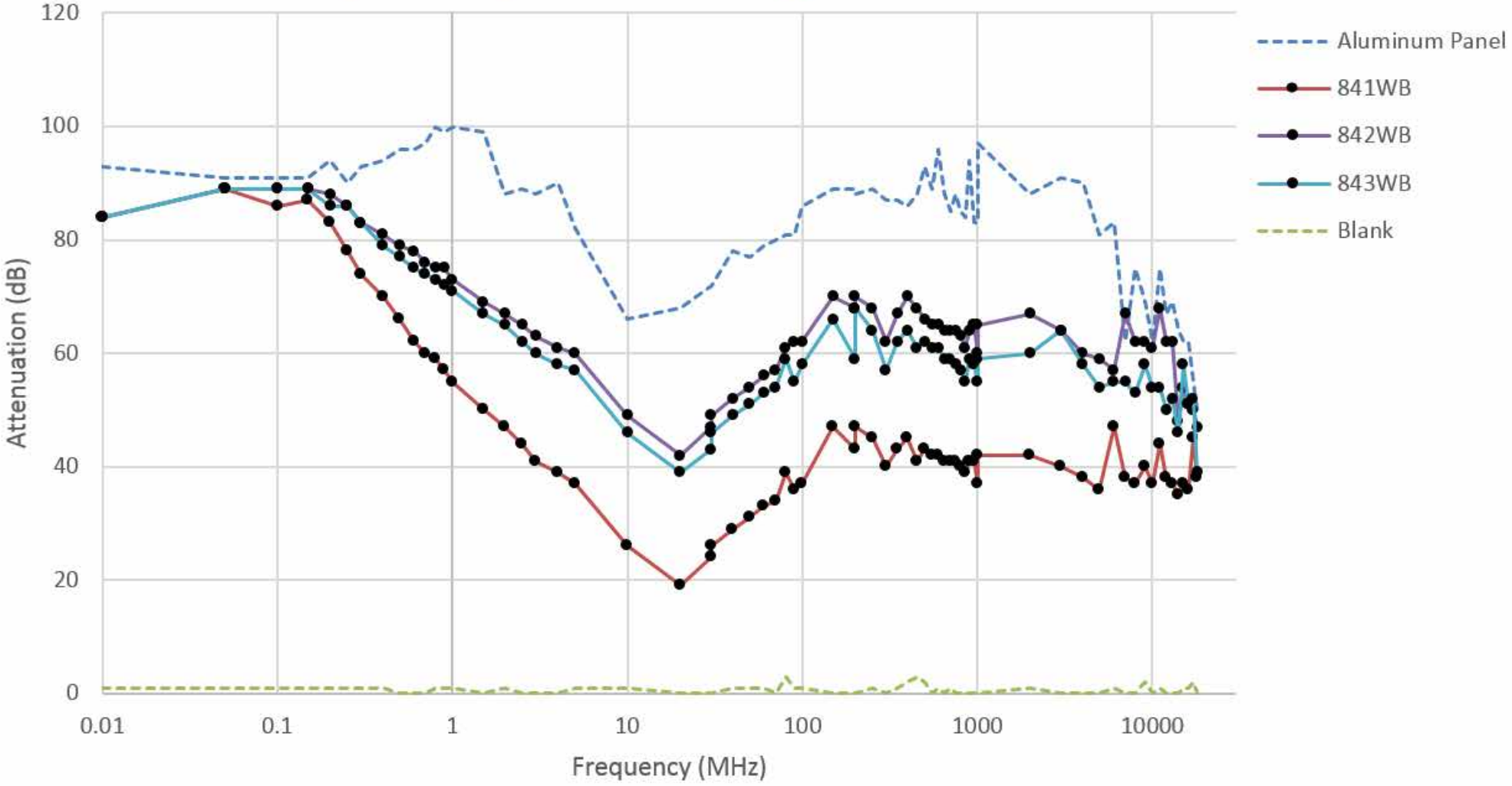
a) Recoat time for plastic. Dry wall recoat times can be found on the TDS's.

150 mL

850 mL

3.78 L

Water Based Conductive Coating Attenuation vs Frequency Graph



Epoxy Conductive Coatings

Our ER series Epoxy Conductive Coatings are two-part systems pigmented with highly conductive fillers. They cure in 24 hours at room temperature or two hours at 80 °C. The cured coatings are smooth and extremely hard. It is abrasion, scratch, and mar resistant. It also provides good chemical resistance and adheres strongly to plastics, including chemically resistant and low energy plastics.

They are available in two pigments, nickel or silver coated copper.

Benefits and Features

- Provides excellent EMI/RFI shielding across a broad range of frequencies
- Extremely durable; vibration, abrasion, and impact resistant
- Will not mar, scratch, or flake
- Very strong adhesion to chemically resistant plastics and other difficult to bond to materials
- Chemically resistant

Applications & Usages

They provide a conductive coating that is extremely durable, physically and chemically.

They are suitable for applications in military, automotive, aerospace, oil and gas, and on aluminum flanges.

It is an effective adhesive for electrostatic flocking and may also act as a conductive base for electroplating, grounding, or for any process where it is necessary to create a durable conductive surface.

Super Shield™ Nickel Epoxy Conductive Coating - 841ER

The 841ER Super Shield™ Nickel Conductive Coating provides effective shielding and grounding for shielding applications in extreme environments.

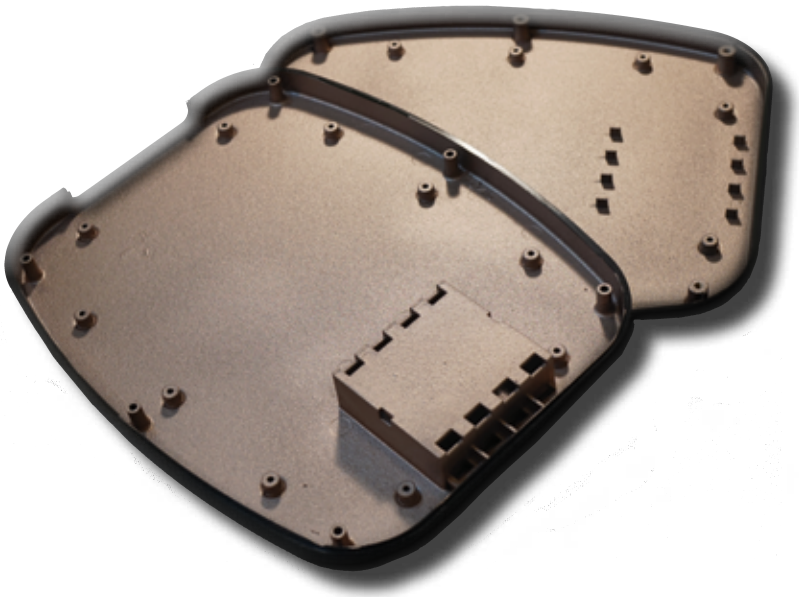
- **Volume resistivity of 0.1 Ω•cm**
- **Corrosion resistant**

Cat. Number	Packaging	Net Volume		Net Weight	
841ER-1.17 L	Can	1.17 L	2.47 pt	1.82 kg	4.24 lb
841ER-3.25L	Can	3.25 L	6.87 pt	5.34 kg	11.7 lb

Super Shield™ Silver Coated Copper Epoxy Conductive Coating - 843ER

The 843ER Super Shield™Silver Coated Copper Conductive Coating provides the highest level EMI/RFI shielding for electronic enclosures. It is suitable for board level applications. It functions very well as a conductive undercoat in most electroplating applications

- **Volume resistivity of 0.002 Ω•cm**



Cat. Number	Packaging	Net Volume		Net Weight	
843ER-800ML	Can	810 mL	1.71 pt	895 g	1.97 lb
843ER-3.25L	Can	3.25 L	6.87 pt	3.59 kg	7.92lb

Epoxy Conductive Coating Comparison Chart

Uncured Working Properties	841ER	843ER
Conductive Filler	Ni (nickel)	Ag/Cu (silver coated copper)
Format	Liquid	Liquid
Color	Grey	Metallic brown
Mix ratio by weight	4:1	100:28
Mix ratio by volume	100:38	100:36
Solids Percentage	32%	30%
Density @25 °C [77 °F]	1.64 g/mL	1.0 g/mL
Viscosity @25 °C [77 °F]	200 cP (part A), 18 cP (part B)	35 cP (part A), 9 cP (part B)
VOC Content	49%	76%
Shelf Life	1 y	1 y
Coverage & Application Properties		
Ready to Spray	Yes	Yes
Theoretical HVLP Spray Coverage	≤40 900 cm^2/L	≤31 100 cm^2/L
Working Life @22 °C [72 °F]	4 h	8 h
Recoat Time @22 °C [72 °F]	5 min	3 min
Ambient Cure Time @22 °C [72 °F]	—	24 h
Elevated Cure Time	30 min @22 °C [72 °F] then 4 h @65 °C [149 °F] then 1 h @22 °C [72 °F]	2 h @80 °C [176 °F] — —
Cured Properties	**841ER**	**843ER**
Electrical Properties		
Volume Resistivity	0.1 Ω·cm	0.0018 Ω·cm
Volume Conductivity	11 S/cm	556 S/cm
Surface Resistance @1 coat	72 Ω/sq	0.3 Ω/sq
@2 coats	21 Ω/sq	0.2 Ω/sq
Attenuation from 0.01 to 18 000 MHz	TBD	60 dB ± 12 dB
Salt Fog Test @35 °C [95 °F], 96 h	" "	Before: 0.15 Ω/sq After: 0.73 Ω/sq
Thermal Properties		
Constant Service Temperature	-40 to 150 °C [-40 to 302 °F]	-40 to 120 °C [-40 to 248 °F]
Intermittent Temperature Limits	-50 to 165 °C [-58 to 329 °F]	-60 to 130 °C [-76 to 266 °F]
Mechanical Properties		
Adhesion	5B [a)]	5B [b)]
Pencil Hardness	4H, hard [b)]	6H, hard [b)]
Magnetic Properties		
Magnetic Class	Ferromagnetic (magnetic)	Diamagnetic (non-magnetic)
Relative Permeability	≥100	<1.0

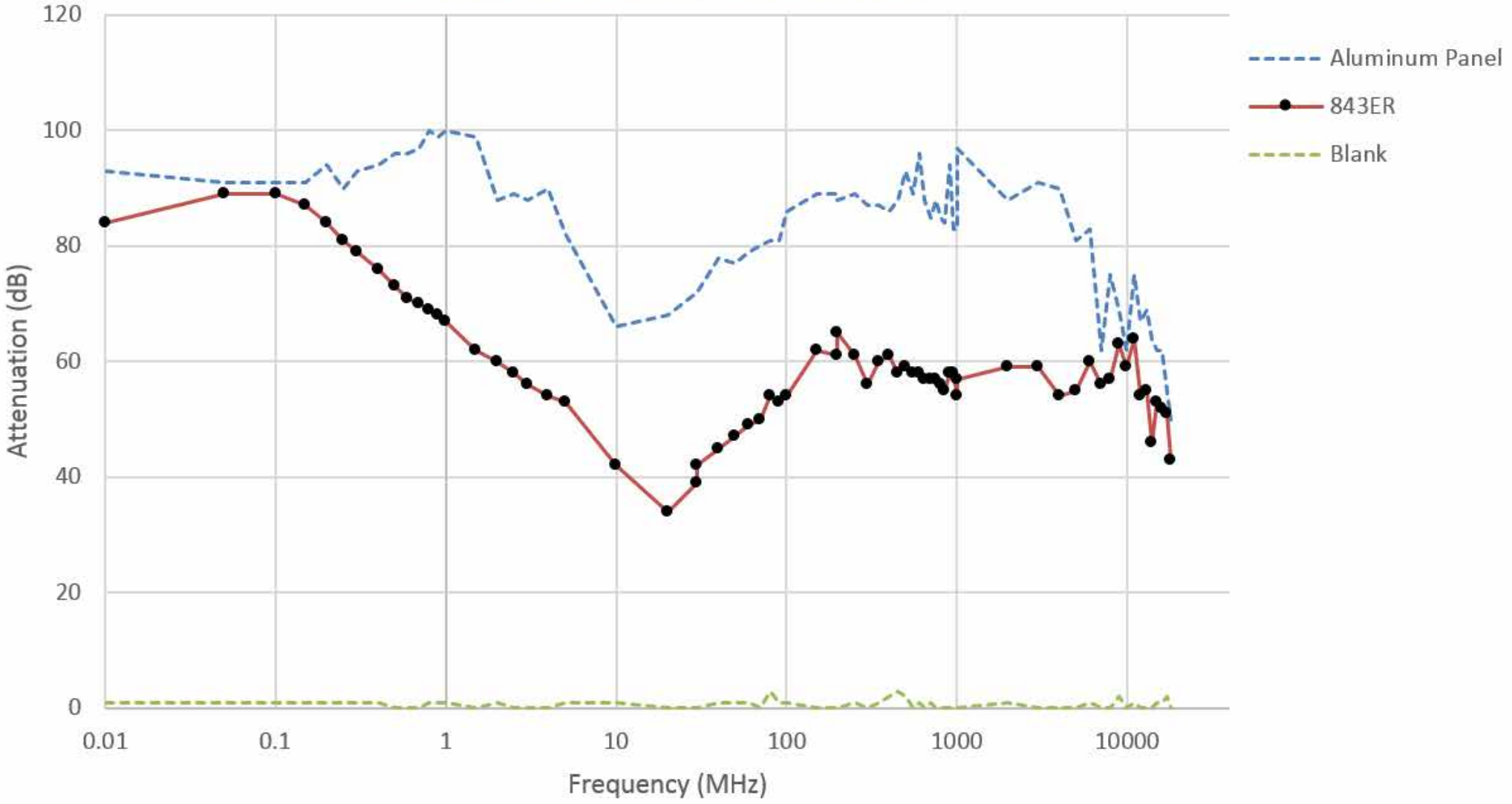
a) Tested on acrylonitrile butadiene styrene (ABS), polycarbonate (PC), polyvinyl chloride (PVC), glass, and aluminum.

800 mL

1.17 L

3.25L

Epoxy Conductive Coating Attenuation vs Frequency Graph



MG Chemicals

Conductive Coating Comparison Chart

	Acrylic				Epoxy		Water Based		
Uncured Working Properties	**838AR**	**841AR**	**843AR**	**842AR**	**841ER**	**843ER**	**841WB**	**843WB**	**842WB**
Conductive Filler	C	Ni	Ag/Cu	Ag	Ni	Ag/Cu	Ni	Ag/Cu	Ag
Format	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid
Color	Black	Dark grey	Metallic brown	Metallic silver	Grey	Metallic brown	Grey	Metallic Brown	Silver
Number of Components	1	1	1	1	2	2	1	1	1
Solids Percentage	15%	57%	31%	61%	32%	30%	54%	42%	60%
Density @25 °C	0.85 g/mL	1.7 g/mL	1.1 g/mL	1.7 g/mL	1.64 g/mL	1.0 g/mL	1.8 g/mL	1.3 g/mL	1.5 g/mL
Viscosity @25 °C	154 cP	1 460 cP	<30 cP	873 cP	200 cP (A), 18 cP (B)	35 cP (A), 9 cP (B)	143 cP	234 cP	195 cP
VOC Content	47%	14%	17%	12%	49%	76%	145 g/L [d]	51 g/L [d]	53 g/L [d]
Shelf Life	2 y	2 y	2 y	2 y	1 y	1 y	1 y	1 y	1 y
Coverage/Application Properties									
Ready to Spray	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Theoretical HVLP Spray Coverage	≤25 300 cm^2/L	≤29 600 cm^2/L	≤15 000 cm^2/L	≤59 600 cm^2/L	≤40 900 cm^2/L	≤31 100 cm^2/L	≤15 200 cm^2/L	≤42 200 cm^2/L	≤69 000 cm^2/L
Recoat Time	3 min	3 min	3 min	3 min	5 min	3 min	30 min [c]	20 min [c]	20 min [c]
Cure/Drying Time @25 °C	24 h	24 h	24 h	24 h	—	24 h	24 h	24 h	24 h
Cured Properties	**838AR**	**841AR**	**843AR**	**842AR**	**841ER**	**843ER**	**841WB**	**843WB**	**842WB**
Electrical Properties									
Volume Resistivity	0.33 Ω·cm	0.0040 Ω·cm	0.00030 Ω·cm	0.0001 Ω·cm	0.1 Ω·cm	0.0018 Ω·cm	0.027 Ω·cm	0.00068 Ω·cm	0.000075 Ω·cm
Volume Conductivity	3.1 S/cm	250 S/cm	3 300 S/cm	9 337 S/cm	11 S/cm	556 S/cm	37 S/cm	1 470 S/cm	13 300 S/cm
Surface Resistance @1 coat	170 Ω/sq	0.52 Ω/sq	0.071 Ω/sq	<0.01 Ω/sq [a]	72 Ω/sq	0.3 Ω/sq	1.4 Ω/sq	0.21 Ω/sq	0.04 Ω/sq
@2 coats	60 Ω/sq	0.38 Ω/sq	0.018 Ω/sq	<0.01 Ω/sq [a]	21 Ω/sq	0.2 Ω/sq	0.68 Ω/sq	0.11 Ω/sq	0.02 Ω/sq
Attenuation (0.01 to 18 000 MHz)	23 dB ± 25 dB	59 dB ± 12 dB	65 dB ± 11 dB	73 dB ± 11 dB	TBD	60 dB ± 12 dB	46 dB ± 16 dB	61 ± 12 dB	65 ± 11 dB
Salt Fog Test @35 °C, 96 h [b]	Before: 70 Ω/sq After: 70 Ω/sq	Before: 0.38 Ω/sq After: 0.51 Ω/sq	Before: 0.08 Ω/sq After: 3.3 Ω/sq	Before: <0.01 Ω/sq After: 0.05 Ω/sq	" "	Before: 0.15 Ω/sq After: 0.73 Ω/sq	Before 0.4 Ω/sq After 3 Ω/sq	TBD "	Before 0.012 Ω/sq After 0.081 Ω/sq
Thermal Properties									
Constant Service Temperature	-40 to 120 °C	-40 to 120 °C	-40 to 120 °C	-40 to 120 °C	-40 to 150 °C	-40 to 120 °C	-40 to 120 °C	-40 to 120 °C	-40 to 120 °C
Intermittent Temperature Limits	-50 to 125 °C	-50 to 125 °C	-50 to 125 °C	-50 to 125 °C	-50 to 165 °C	-60 to 130 °C	-50 to 125 °C	-50 to 125 °C	-50 to 125 °C
Mechanical Properties									
Adhesion [b]	5B	5B	5B	5B	5B	5B	5B	5B	5B
Pencil Hardness [b]	H, hard	3H, hard	F, medium	3H, hard	4H, hard	6H, hard	HB, hard	HB, hard	HB, hard
Magnetic Properties									
Magnetic Class	Diamagnetic	Ferromagnetic	Diamagnetic	Diamagnetic	Ferromagnetic	Diamagnetic	Ferromagnetic	Diamagnetic	Diamagnetic
Relative Permeability	<1.0	≥100	<1.0	<1.0	≥100	<1.0	≥100	<1.0	<1.0

TBD=To be determined. Values for conductive coatings in aerosol format will vary slightly. Please see product's TDS for exact values.

a) Readings less than 0.01 Ω/sq are below the detection limit of the test apparatus.

b) Tested on acrylonitrile butadiene styrene (ABS).

c) Recoat time for plastic. Dry wall recoat times can be found on product's TDS.

d) Values for regulated VOC.

16 December 2016

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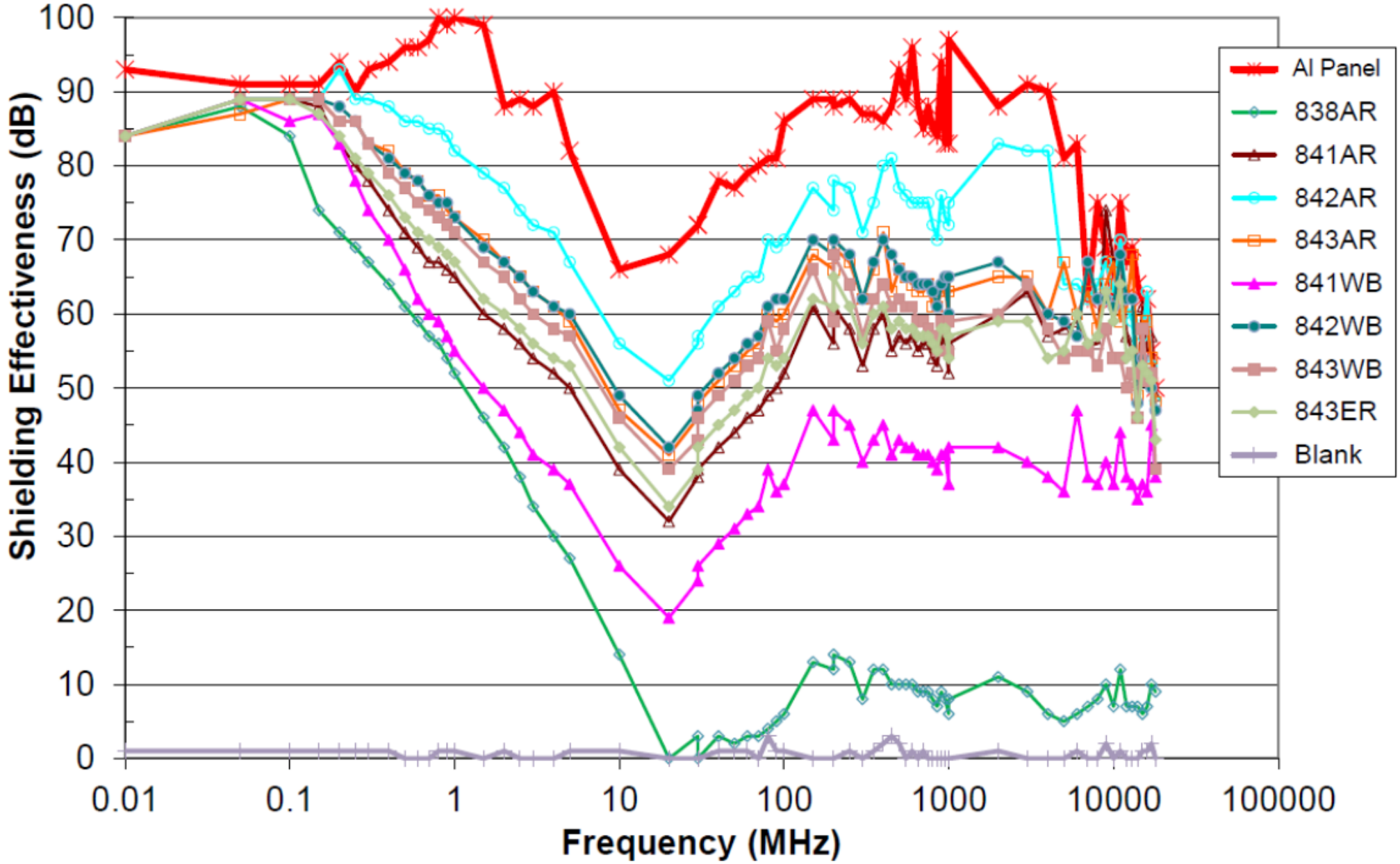

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