Science. Applied to Life.™

Sales guide for distributors and converters

3M™ EMI Absorbers

Help suppress EMI as you strive to achieve optimal system performance.

Electromagnetic Interference (EMI) and Radio-Frequency Interference (RFI) solutions from 3M help electronic devices reduce electromagnetic interference, which can help them meet Electromagnetic Compatibility (EMC) standards, improve performance, and improve their signal integrity in critical applications.

3M™ EMI Absorbers are flexible composite sheets incorporating specialized magnetic particles and can be ordered with or without non-conductive pressure sensitive adhesive (PSA). They help suppress EMI noise by absorbing electromagnetic energy inside and around electronics devices and assemblies. These materials are sold in sheet or large roll format and need to be converted and/or laminated. Some 3M absorbers also have dual functionality as an EMI absorber and magnetic shielding material at certain frequencies.

Selection process:

1. Ask the engineer questions to learn more about the application and narrow down the solutions
2. Connect with a 3M EMI Sales Specialist to help select a material - there are often unknowns in EMI applications that require a specialist
3. Start with the Go-To 3M™ EMI Absorbers
   a. Show graph with all absorbers and go-to products
4. Select alternative 3M absorbers for specific performance attributes
   a. Specific thickness or max thickness allowed, temperature requirements, thermal conductivity, no adhesive
5. For applications that require stacking thicknesses, laminating adhesives, or die-cutting, connect the customer with a 3M Preferred Converter for prototyping

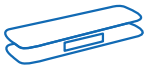
Target market segments

- Aerospace and Defense
- Consumer Electronics
- Automotive
- Test and scientific equipment
- Medical equipment
- General electronics

Applications

Attach directly to and/or opposite side of noise source (traces, cameras, digital IC's, chip, microprocessor)

Attach to enclosure surface



Insert between module components to help reduce coupling

Cable wrapping/ attachment – round or flex cable

Product usage examples

- Board-level noise suppression
- Electronic enclosures
- Radar modules
- Avionic modules
- Display module enclosures
- Camera modules
- Communication & navigation modules
- Test & measurement equipment

Target job titles

- RF Engineer
- EMI Design Engineer
- EMI/EMC Engineer
- Electrical Engineer
- Materials Engineer
- Survivability Engineer (defense)
- Low Observable Engineer (defense)

Target customer types

» Aerospace & defense contractors (tier 1 & 2) – aeronautics, mission systems, electronic warfare

» OEMs/ODMs: display, network and server, test and scientific instruments, automotive, etc.

» 3rd Party Manufacturers: automotive, medical equipment, robotics, contract electronics equipment, satellites, telecom, IoT devices

» Electronic engineering design firms, EMI testing houses, EMI labs

» Questions to identify needs

Ask these questions to help understand the application requirements:

- What is the application?
  - Where will the EMI absorber be located? (e.g., enclosure, shield can, component, antenna module, etc.)
- What is the frequency range of interest?
- What is your preferred thickness?
- Do you require the absorber to come with an adhesive?
  - What is the substrate?
- What are the environmental operating requirements? (e.g., temperature, humidity, chemical resistance)
- What is the expected lifetime of your product?
- Are there any other requirements? (e.g., UL flammability rating, outgassing)

» Questions to help drive the selection process

Ask these questions to help select a 3M absorber for testing:

- Are you trying to suppress EMI within a device to pass regulatory emissions testing or to meet a specific performance target?
  - What stage in product development are you in right now?
- What specifications do you have for electromagnetic properties? (e.g., permeability, permittivity, resistivity, sheet resistance, etc.)
- How many dB reduction do you require to meet your spec?

» Objections to overcome

Objection: *"Your portfolio is too narrow. I need a xx (e.g., higher frequency absorber, different electromagnetic property values, UL flame rating, etc.)"*

Answer: 3M has robust manufacturing and technical capabilities to tailor products to meet customer requirements. Please contact your 3M sales representative to discuss your specific needs.

Objection: *"I need a thicker absorber."*

Response: Absorbers can be stacked to meet your desired dB reduction and/or thickness requirements. 3M can connect you with a Preferred Converter to laminate the absorbers together to meet your desired thickness.

» Customer example

3Mer: Hi there! I understand you're looking for an EMI absorber to suppress EMI noise in your analyzer equipment. Can you tell me the frequency range you want to absorb?

Customer: Sure, it's 2 GHz.

3Mer: Great, and what is the specific application?

Customer: It's for the digital processing section of the PCB in the analyzer. The absorber would be attached to the top of the ADC chip.

3Mer: Ok, sounds like you need a near-field EMI absorber since you're putting the absorber directly on the noise source. Do you have a preferred thickness for the absorber?

Customer: We don't have a specific thickness in mind. We need the thinnest and lowest-cost absorber that is effective. The maximum thickness allowed is 1mm.

3Mer: Understood. Do you require the absorber to come with an adhesive? If so, what is the substrate?

Customer: Yes, we need it to attach to the chip. The chip case is an epoxy-resin encapsulant.

3Mer: Okay, our absorbers come with a standard pressure-sensitive adhesive (PSA) to keep the absorber in place. That should be sufficient for adhering to the chip case. What is the expected lifetime of your product?

Customer: 5-10 years.

3Mer: Okay, what are the environmental operating requirements? For example, temperature, humidity, or chemical resistance?

Customer: The enclosure isn't sealed, but it's kept indoors. Operating temperatures can go up to +85°C.

3Mer: Okay, our standard composite absorber and PSA could be a good fit then. Are there any other requirements, such as UL flammability rating or outgassing?

Customer: No, nothing else.

3Mer: Great, last few questions here for the electromagnetic properties and targets. Are you trying to suppress EMI within the device to pass regulatory emissions testing or to meet a specific performance target?

Customer: We need a 5db reduction to meet our target to improve upon the previous generation's capability.

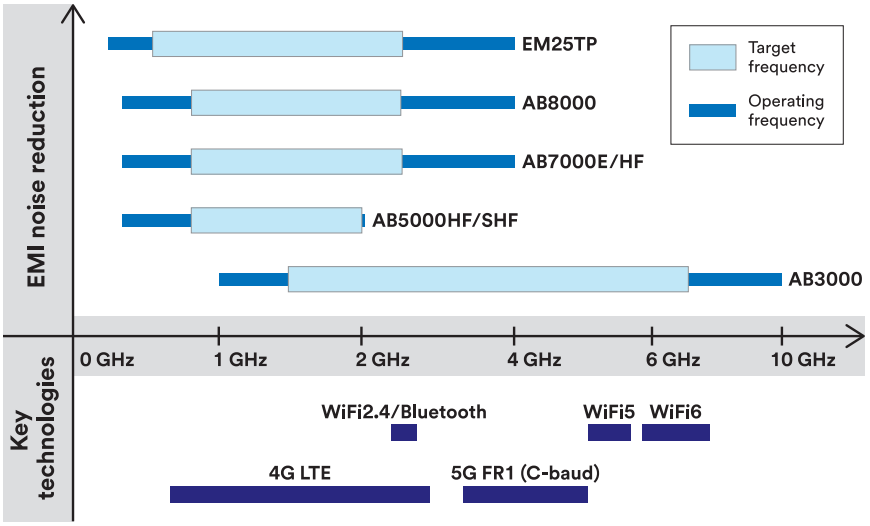
3Mer: Okay, a 5 db reduction at 2 GHz. Did you have any material specifications for permeability, permittivity, resistivity, or sheet resistance?

Customer: We don't have specific values, we just need a 5 dB improvement at 2 GHz to meet our target.

3Mer: Okay, the 3M™ Absorber AB7000 Series could work. This is our go-to standard absorber. It meets your mechanical and environmental requirements, comes with an adhesive, and our RTP graph on the TDS predicts a 5+ dB reduction at 2 GHz for the thinnest options. Typically, the thicker the absorber, the better the performance. I suggest you test 3M absorber AB7010E (0.1mm) and 3M absorber AB7020E (0.2mm) in your application to determine the suitability for your application.

Customer: That sounds perfect. We'll start with those options. Thank you!

EMI absorbing performance



3M product number	Thickness mil (mm)	Adhesive	Initial permeability @1MHz or 3MHz [μ']	Operating frequency MHz-GHz	Operating temp range (°C)	Unique features and benefits
EM25TP-005-A10 EM25TP-0100-A10 EM25TP-0200-A20	2 (0.05), 4 (0.1), 8 (0.2)	Non-conductive acrylic (optional)	250	200MHz – 4GHz	-25 ~ 90°C	» Broad frequency absorber » High permeability magnetic film » Absorbing performance 200GHz – 4GHz » Targeted permeability for magnetic shielding <100 kHz – 3 MHz
AB7010HF AB7020HF AB7030HF AB7050HF	5.2 (0.13), 9.8 (0.25), 14 (0.35), 22 (0.55)	Non-conductive acrylic PSA	110	300MHz – 4GHz	-25 ~ 85°C	» Good workability » High resistivity » High permeability » Improved lower frequency absorber vs the 3M Absorber AB5000 series (@ <1GHz)
AB5010HF/SHF AB5020HF/SHF AB5030HF/SHF AB5050HF/SHF AB5100HF/SHF	4 (0.1), 8 (0.2), 12 (0.3), 19.5 (0.5) 39 (1.0)		55 HF, 30 SHF	300MHz – 2GHz	-25 ~ 85°C	» AB5000HF: Standard absorber » AB5000SHF: Advanced EMI absorber, lower peak absorber frequency than 3M EMI Absorber AB5000HF, thermal conductivity 0.7 W/m-K
AB6005SHF AB60005HF	4 (0.1)		30 – 250	10MHz – 18GHz	-30 ~ +105°C	» Excellent for EMI shielding & insulation » Aluminum layer provides excellent shielding effectiveness up to 18 GHz » Available in sheets or rolls » PET absorber reduces EMI and ESD in enclosed cavities
AB7010E/AB7010E-WO AB7020E/AB7020E-WO AB7030E/AB7030E-WO AB7050E/AB7050E-WO	4 (0.1), 8 (0.2), 12 (0.3), 19.5 (0.5)	Non-conductive acrylic (optional)	100u' @ 3 MHz	300MHz – 4GHz	-25°C – 105°C	» High permeability » Available with and without (-WO) adhesive » Long shelf life (18 months) » Broader temperature performance than 3M absorber AB7000HF series
AB8010-WO AB8020-WO AB8030-WO AB8050-WO	4 (0.1), 8 (0.2), 12 (0.3), 19.5 (0.5)	No adhesive	110u'~130 @ 3 MHz	300MHz – 4GHz	-40°C – 150°C	» High permeability » High performance resin system for solder reflow stable performance » High temperature resistance (150°C) » Available without adhesive (-WO) » Long shelf life (2 years)
AB3010/AB3010-WO AB3030/AB3030-WO AB3050/AB3050-WO	4 (0.1), 12 (0.3), 19.5 (0.5)	Non-conductive acrylic (optional)	30	1GHz – 10GHz	-25°C – 90°C	» Broad absorbing performance 1-10 GHz » Availability with and without (-WO) adhesive » Large sheet format for improved yield (340mm x 340mm)

The above technical information and data should be considered representative or typical only and should not be used for specification purposes. Contact your 3M Technical Representative for details.

Contact your 3M sales representative or visit 3m.com/electronicsassembly to learn more.

Regulatory: For regulatory information about this product, contact your 3M representative.

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