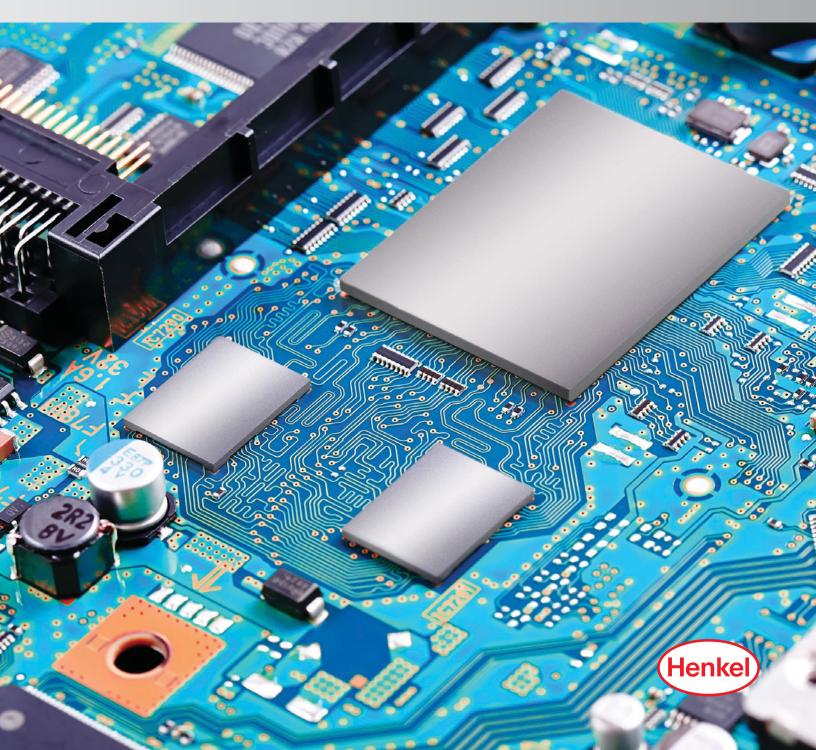


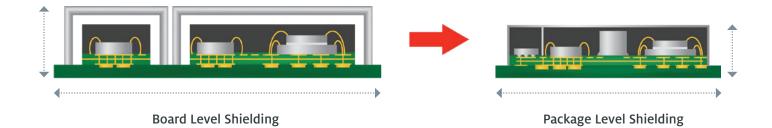
PACKAGE LEVEL EMI SHIELDING SOLUTIONS

CONFORMAL AND COMPARTMENTAL SHIELDING TECHNOLOGIES

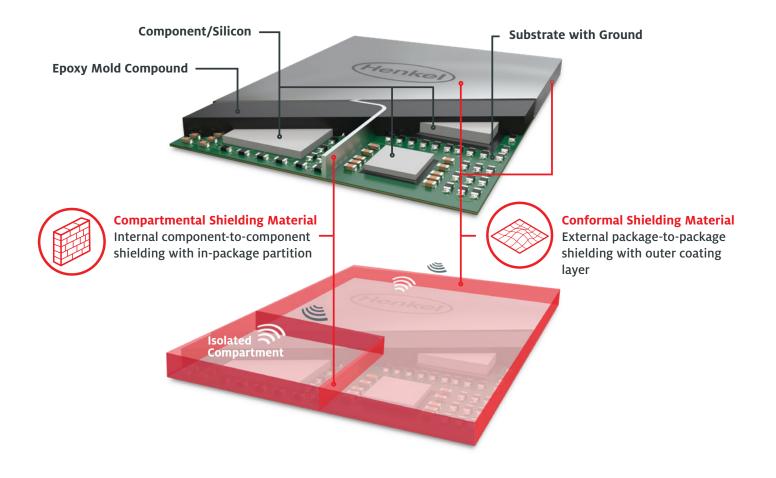


PACKAGE LEVEL EMI SHIELDING SOLUTIONS

With the increasing proliferation of wireless devices, designers are challenged with various electromagnetic waves from multiple sources radiating at the same spectrum of frequencies, resulting in electromagnetic interference (EMI). Radio-frequency (RF) emitting devices require effective isolation to limit the propagation of their interference to neighboring components to protect the end device from performance degradation. As electronics move toward miniaturization, lighter weight and higher speeds, these challenges become more significant as conventional shielding methods present functional and operational limitations. Henkel's specialized materials have optimal properties and characteristics that provide reliable shielding and adhesion performance in stressful electronic conditions and environments.



TYPICAL PACKAGING STRUCTURE AND SOLUTIONS



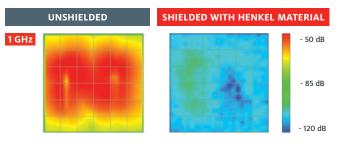
CONFORMAL SHIELDING

The thinly spray-coated material provides uniform coverage on top and sidewalls, clean edges without backside contamination, and excellent adhesion to mold compound with outstanding Shielding Effectiveness (SE). This technology is simple, allowing easy production scalability and design flexibility with minimal cost of ownership using spray-coating, compared to other costly methods such as PVD/sputtering.

Cross Section of Conformal Shielding



Unshielded and Shielded with Henkel Technology



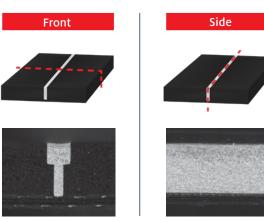
Conformal EMI Shielding Material Properties

GENERAL PROPERTIES	LOCTITE [®] ABLESTIK EMI 8660S	LOCTITE ABLESTIK EMI 8880S
Application Method	Spray	Spray
Viscosity, 5 rpm (cP)	250	550
Thixotropic Index (0.5 rpm/5 rpm)	1.2	1.4
Conductive Filler Type	Propietary Ag	Propietary Ag
Volume Resistivity (Ω•cm)	1.5 x 10 ⁻⁵	7.9 x 10 ⁻⁶
Curing Condition	175°C, 1 hour in air	175°C, 1 hour in air
Optimal Coating Thickness (µm)	3~5	3~5
Adhesion to EMC (ASTM Cross Hatch Test)	5B (0% peel)	5B (0% peel)
Shielding Effectiveness (dB)	90 (Excellent)	90 (Excellent)
Target Frequency Range	500 MHz ~ 10 GHz	10 MHz ~ 10 GHz

COMPARTMENTAL SHIELDING

The jet-dispensed, highly flowable, conductive material is capable of filling a narrow trench with high aspect ratios to create shielded partitioning within a package. This material technology offers high adhesion to the inner sidewalls and the bottom of the trench.

Cross Section of Compartmental Shielding



Typical Compartment EMI Shielding Material Properties

GENERAL PROPERTIES	TYPICAL HENKEL MATERIAL
Application Method	Jet-Dispense
Viscosity, 5 rpm (cP)	5000
Thixotropic Index (0.5 rpm/5 rpm)	< 1.5
Conductive Filler Type	Ag or Ag-coated Cu
Volume Resistivity (Ω • cm)	7.0 x 10 ⁻⁵
Adhesion Interfaces	EMC, Copper, Solder
Supported Trench Width (µm)	60 and above
Trench Aspect Ratio (Depth: Width)	Up to 10:1
Cure Shrinkage	Low
Stress Management	Good



AMERICAS

UNITED STATES

Henkel Corporation 14000 Jamboree Road Irvine, CA 92606 United States Tel: +1.888.943.6535 Fax: +1.714.368.2265

Henkel Corporation 20021 Susana Road Rancho Dominguez, CA 90221 United States Tel: +1.310.764.4600 Fax: +1.310.605.2274

Henkel Corporation 18930 W. 78th Street Chanhassen, MN 55317 United States Tel: +1.952.835.2322 Tel: +1.800.347.4572 Fax: +1.952.835.0430

BRAZIL

Henkel Brazil Av. Prof. Vernon Krieble, 91 06690-070 Itapevi, Sao Paulo Brazil Tel: +55.11.3205.7001 Fax: +55.11.3205.7100

ASIA-PACIFIC

CHINA

Henkel Management Center Building 7, No. 99 Jiang Wan Cheng Road Shanghai 200438, China Tel: +86.21.2891.8000 Fax: +86.21.2891.8952

ABLESTIK (Shanghai) LIMITED No. 332 Meigui South Road WaiGaoQiao Free Trade Zone, Pu Dong Shanghai 200131, China Tel: +86.21.2702.5888 Fax: +86.21.5048.4169

JAPAN

Henkel Japan Ltd. 27-7, Shin Isogo-cho Isogo-ku Yokohama, 235-0017 Japan Tel: +81.45.286.0161 Email: jp.ae-csdesk@henkel.com

KOREA

Henkel Korea Co Ltd. 18th Floor of tower B, BYC High City Bldg Gasan Digital 1-ro, Geumcheon-gu, Seoul, 08506 South Korea Tel: +82.2.6150.3000 Fax: +82.2.6947.5203

SINGAPORE

Henkel Singapore Pte Ltd. 401, Commonwealth Drive #03-01/02 Haw Par Technocentre, Singapore 149598 Tel: +65.6266.0100 Fax: +65.6472.8738 / +65.6266.1161

TAIWAN

Henkel Taiwan Ltd. 10F, No. 866, Zhongzheng Road, Zhonghe District, New Taipei City, 23586 Taiwan Tel: +866.2.2227.1988 Fax: +866.2.2226.8699

EUROPE

BELGIUM Henkel Belgium N.V. Nijverheidsstraat 7 B-2260 Westerlo Belgium Tel: +32.1457.5611 Fax: +32.1458.5530

UNITED KINGDOM

Henkel Ltd. Adhesives Limited Technologies House Wood Lane End Hemel Hempstead Hertfordshire HP2 4RQ United Kingdom Tel: +44.1442.278000 Fax: +44.1442.278071



henkel-adhesives.com/electronics

For more information, please visit henkel-adhesives.com/loctite-emi-shielding

All marks used are trademarks and/or registered trademarks of Henkel and its affiliates in the U.S., Germany and elsewhere © 2019 Henkel Corporation. All rights reserved. LT-8233 (09/19) US