3M

3M Electronic Solutions Division
Static Control Products and Services Catalog

Static Control

Protection You Can Trust.

Static Control Products 2008

3M

3M™ Static Control Solutions

A Reputation of Trust. Over the past 100 years, 3M has become widely recognized as a world leader in product innovation. Our ability to combine core technologies has allowed more than 55,000 3M products to become an important part of every day in many markets, including electronics, industrial, automotive, medical and consumer.

The Experts in Static Control.

The need for static protection to drain electrostatic charges from personnel and materials is well-accepted in many industries. It is of particular importance with the handling and protection of precision high-tech products such as disk drives, semiconductors, flat panel displays and other electronics. From air ionization to monitoring, flooring and packaging, 3M provides complete solutions to meet the challenge of electrostatic discharge (ESD) and adverse environmental conditions during handling and transportation.

It's a Matter of Control.

A full range of products. Full-service solutions.

The Need for Complete Static Control Solutions

In an increasingly technological age, electrostatic discharge (ESD) is more than just an annoyance; it can be costly or even dangerous. In static-sensitive environments, ESD can damage sensitive electronic components, attract contaminants in clean environments or cause problems when handling films or small parts.

The cost of ESD-damaged electronic devices alone adds up, but the additional loss of production time is significant as well. Clearly, opportunities exist for significant improvements in reducing losses to ESD and static electricity.

Global Support from the Industry Leader

3M has built a global network of resources with the ability to address your needs on local, regional and international levels. With each facility in your operation, our experienced team works with you one-on-one to evaluate each step in the process and accurately provide a static control solution uniquely suited to meet your needs. 3M is your single source for fast, customized solutions anywhere in the world.

Value-Added Services that Set Us Apart

Our products are designed to be reliable and dependable, but it is our customer services that truly demonstrate our extended value to you. To help you reduce your total cost of ownership, 3M offers a long list of value-added services, including local warehousing, custom make-to-order, just-in-time manufacturing (JIT), electronic funds transfer, Web PO, EDI, extranet services for key customers, on-site training and more.

For more product information, please visit www.3M.com/static

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Static Control Workstation Products

1

3M™ Electrostatic Discharge (ESD) Workstation Products are designed to provide a safe environment for the handling and assembly of sensitive components. These products drain static charge from personnel, limit the buildup of static charges on non-conductive materials on the benchtop, and monitor the system to ensure that it is operating properly. These various components can be configured to work together providing optimal protection for your application.

Note: All specifications are subject to change without notice.

3M™ Wrist Strap Product Selection Guide

Wrist Strap Type	Features	Model Number
Premium		
Fabric	Adjustable knitted burgundy band, available with 5 ft. (1.5 m) and 10 ft. (3.0 m) cords, 1,000,000+ flexes	2214 and 2224
	Adjustable fabric blue band with machined stud, available with 6 ft. (1.8 m) and 12 ft. (3.6 m) cord, 1,000,000+ flexes	WBB-AFWS61M and WBB-AFWS121M
	Dual conductor adjustable turquoise fabric band, available with 5 ft. (1.5 m), 10 ft. (3.0 m), and 20 ft. (6.0 m) dual conductor cord, use with dual conductor monitors	2368 with 2360, 2370, or 2371
Metal	Fixed size metal band, S,M,L	2205, 2206, 2207
	Adjustable metal band available with 6 ft. (1.8 m) and 12 ft. (3.6 m) cord	AMWS61-M and AMWS121M
	Dual conductor fixed size metal bands with 5 ft. (1.5 m), 10 ft. (3.0 m), 20 ft. (6.0 m) dual conductor cord	2380 Series Metal Bands
Standard		
Fabric	Lay-in stretch blue or maroon band available with 6 ft. (1.8 m) and 12 ft. (3.6 m) ground cord	BLUEWS61M , BLUEWS121M and MWS61M, MWS121M
	Adjustable dual conductor fabric band available with right angle 6 ft. (1.8 m) and 12 ft. (3.6 m) cord, use with dual conductor monitors	DWAFWS61M and DWAFWS121M
Economy		
Fabric	Adjustable stretch weave fabric band available with 5 ft. (1.5 m) lightweight ground cord, 200,000 flexes, low cost	2272
	Adjustable fabric wrist band with 6 ft. (1.8 m) cord, low cost	ECWS61M-1
Plastic	Adjustable thermoplastic blue wrist band available with 5 ft. (1.5 m) and 10 ft. (3.0 m) lightweight cord, 200,000+ flexes	4620 and 4610 or 4611
	Dual conductor adjustable thermoplastic blue wrist band, low cost	4720
Disposable	One time use	2209

⚠ Warning on all wrist strap products:

A 1 megohm resistor is molded into 3M™ Wrist Strap Ground Cords. DO NOT REMOVE. If it becomes damaged, replace ground cord immediately. These products are not to be used in areas where the individual may come in contact with exposed electrical circuitry exceeding 250 volts AC.

These products are for static control. They will not reduce or increase your risk of receiving electrical shock when using or working on electrical equipment. Follow the same precautions you would use without wrist straps, including:

- Make certain that equipment having a grounding type plug is properly grounded.
- Make certain that you are not in contact with grounded objects other than through the 3M Wrist Strap.

3M™ Wrist Strap — Adjustable Elastic Fabric (Premium Performance)

3M™ Adjustable Wrist Strap for Single Conductor Cords

3M Adjustable Wrist Straps provide a comfortable, custom fit. One size adjusts to most any size wrist to provide reliable, 360-degree protection. These wrist straps feature a band made of a silver-plated, monofilament, continuous thread woven together with elastic nylon to allow full conductivity, comfort and reliability, while providing rapid and continuous drain of static charge.

Adjustability also simplifies ordering procedures and inventory control by virtually eliminating the need to order and stock several band sizes. A 1 megohm resistor is built into the ground cord. Available with 1/8 in. (4 mm) snap end. Adjustable bands fit wrist circumference up to 9.0 in. (228.6 mm).

Meets or exceeds the requirements of ANSI/ESD S1.1, ANSI/ESD S20.20, EIA 625, MIL-STD-1686, and MIL-HDBK-263.

Features

- 1/8 in. (4 mm) snap.
- Silver-plated, monofilament elastic band.
- 1 megohm resistor built into ground cord.
- 1 million+ flexes.
- Adjustable, locking clasp.

Product No.	Description
2204	Adjustable Fabric Wrist Band made of knitted fabric, in burgundy color.
2214	Adjustable Fabric Wrist Band, in burgundy color, with coiled cord 5 ft. (1.5 m) practical extended length. Includes alligator clip.
2224	Adjustable Fabric Wrist Band, in burgundy color, with coiled cord 10 ft. (3.0 m) practical extended length. Includes alligator clip.

UL LISTED

3M Products are ESD 20.20 Program Compliant

3M™ Wrist Strap — Adjustable Elastic Fabric (Premium Performance)

This wrist strap set features a fully adjustable, stretch elastic wrist band and a 6 ft. or 12 ft. (1.8 m or 3.6 m) coiled cord. The hypoallergenic, silver-plated band provides 360-degree conductivity around the wrist for maximum skin contact. The band fabric is extra-soft and avoids the scratchy feel of other bands. A machined snap provides a consistent 1 pound removal force. The polyurethane polymer strain relief survives 1 million flexes. Made in the USA. Meets these standards: ANSI/ESD S20.20, EIA 625, MIL-STD-1686, and MIL-HDBK-263.

3M™ Adjustable Elastic Fabric Wrist Band

3M™ Coiled Cord CC61M

Band Features

- Machined snap (4 mm) for a reliable connection.
- Soft, hypoallergenic silver-plated band.
- Stainless steel (302 Series) backplate.
- Adjustable, locking clasp.
- UL Listed. Date coded for traceability.
- Made in the USA.

Cord Features

- Polyurethane, high tensile strength coiled cord.
- High quality coiled cord: 1,000,000 bending cycles.
- UL Listed. Date coded for traceability.
- Made in the USA.

Product No.	Description
WBB-AFWS61M	Fabric Wrist Band, 6 ft. (1.8 m) coiled cord
WBB-AFWS121M	Fabric Wrist Band, 12 ft. (3.6 m) coiled cord
WBB-AFWS	Fabric Wrist Band, Blue/White
CC61M	6 ft. (1.8 m) coiled cord
CC121M	12 ft. (3.6 m) coiled cord
RACC61M	6 ft. (1.8 m) coiled cord, right angle plug (not UL listed)
RACC121M	12 ft. (3.6 m) coiled cord, right angle plug (not UL listed)

UL LISTED

3M™ Wrist Strap — Adjustable Elastic Fabric (Standard Performance)

This wrist strap set features a fully adjustable stretch fabric wrist band and 6 ft. (1.8 m) coiled cord. The band provides 360-degree conductivity around the wrist for maximum skin contact. Band curling is reduced by the woven band fabric. The retractable coiled cord connects to the wrist band via a 1/8 in. (4 mm) post snap and contains a 1 megohm resistor. A “spinning style” banana jack reduces cord tangles and improves the cord’s life span. Meets the requirements of ANSI/ESD S20.20, EIA 625, MIL-STD-1686, and MIL-HDBK-263. Includes alligator clip. Band available in blue or maroon.

3M™ Wrist Strap BLUEWS61M

Features

- 360-degree wrist contact.
- 6 ft. (1.8 m) coiled cord.
- 1/8 in. (4 mm) snap.

Product No.	Description
BLUEWS61M	Fabric Wrist Band, blue, 6 ft. (1.8 m) coiled cord
BLUEWS121M	Fabric Wrist Band, blue, 12 ft. (3.6 m) coiled cord
BLUEWS	Fabric Wrist Band, blue
BLCC61M	6 ft. (1.8 m) coiled cord
BLCC121M	12 ft. (3.6 m) coiled cord

Product No.	Description
MWS61M	Fabric Wrist Band, maroon, 6 ft. (1.8 m) coiled cord
MWS121M	Fabric Wrist Band, maroon, 12 ft. (3.6 m) coiled cord
MWS	Fabric Wrist Band, maroon
MCC61M	6 ft. (1.8 m) coiled cord
MCC121M	12 ft. (3.6 m) coiled cord

3M Products are ESD 20.20 Program Compliant

3M™ Wrist Strap — Adjustable Elastic Fabric (Economy Performance)

This wrist strap set provides a cost-effective method of grounding personnel. Features a comfortable, adjustable band, a 5 ft. (1.5 m) coiled cord and 1/8 in. (4 mm) snap.

3M™ Wrist Strap 2272

Product No.	Description
2271	Economy Adjustable Fabric Wrist Band is made of stretch weave fabric, blue color with white trim.
2272	Economy Adjustable Wrist Band with coiled cord. 5 ft. (1.5 m) practical extended length, blue color with white trim. Includes alligator clip.

3M™ Wrist Strap — Adjustable Elastic Fabric (Economy Performance)

This wrist strap set provides a cost effective means of grounding production staff. Featuring an adjustable fabric wrist band, a 6 ft. (1.8 m) retractable coiled cord and a 1/8 in. (4 mm) snap.

3M™ Wrist Strap ECWS61M-1

Product No.	Description
ECWS61M-1	Band, 6 ft. (1.8 m) cord

Features

- Meets the requirements of ANSI/ESD S20.20, MIL-STD-1686, and EIA 625.
- Cost-effective design.
- 6 ft. coiled cord.
- 1/8 in. (4 mm) snap.
- Alligator clip included.

3M™ Adjustable Thermo Plastic Wrist Strap (Economy Performance)

The 3M Adjustable Wrist Straps 4600 Series feature a thermoplastic band with an integrally molded conductive interior. The wrist strap utilizes an easy on/easy off adjustable “zipper” style latching mechanism and is available with 1/8 in. (4 mm) snaps and 5 ft. (1.5 m) and 10 ft. (3.0 m) ground cords.

3M™ Wrist Strap 4600 Series shown with ground cord and alligator clip

Product No.	Description
4620	Blue Wrist Band with 1/8 in. (4 mm) stud
4650	Blue Wrist Band with 5 ft. (1.5 m) coiled cord

3M™ Metal Wrist Band — Fixed Size (Premium Performance)

3M Metal Wrist Bands 2200 Series feature quality Speidel™ metal expansion bands for durability and comfort. Each link is covered with an insulative plastic cap. Compatible with the 3M™ Wrist Strap Ground Cords 2210, 2220 and 4610/4611.

Three sizes are available: small for user's wrists from 4.5 in. to 6 in. (114 mm to 152 mm) in circumference; medium for user's wrists from 5.5 in. to 7.25 in. (140 mm to 184 mm); and large for user's wrists larger than 6.5 in. (165 mm). Available with 1/8 in. (4 mm) snap end. This product meets the requirements of ESD Standard 1.1, ANSI/ESD S20.20, MIL-STD-1686, MIL-HDBK-263, and EIA 625.

3M™ Wrist Band 2205

Product No.	Description
2205	Bulk pack of 25 metal wrist bands (Small)
2206	Bulk pack of 25 metal wrist bands (Medium)
2207	Bulk pack of 25 metal wrist bands (Large)

3M™ Wrist Strap — Adjustable Metal (Premium Performance)

Made from jewelry-quality stainless steel, our durable metal wrist band creates a superior electrical contact to the user's wrist. The flex-metal style band uses adjustable links to assure a secure and comfortable fit. This product meets the requirements of ESD Standard 1.1, ANSI/ESD S20.20, MIL-STD-1686, MIL-HDBK-263, and EIA 625.

3M™ Wrist Band AMWS

Product No.	Description
AMWS61M	Adjustable Metal Wrist Band, 6 ft. (1.8 m) coiled cord
AMWS121M	Adjustable Metal Wrist Band, 12 ft. (3.6 m) coiled cord
AMWS	Adjustable Metal Wrist Band

Features

- Metal band for durability and easy cleaning.
- Tough outer band coating to protect wearer from electrical hazards.
- Lot coded for traceability.

3M Products are ESD 20.20 Program Compliant

3M™ Wrist Strap Ground Cords

3M Wrist Strap Ground Cords 2210, 2220 and 4610 Series are highly durable with segmented strain relief, and a single bundle of tinsel conductors laced for great strength and reinforced with strong synthetic fibers. These features provide long cord life and easy movement. Each cord has a 1 megohm resistor molded into the snap end. UL Listed.

3M™ Ground Cord 2210

3M™ Ground Cord 4610 (includes alligator clip not shown)

Product No.	Description
2210	Ground Cord, coiled 5 ft. (1.5 m) practical extended length. Includes alligator clip.
2220	Ground Cord, coiled 10 ft. (3.0 m) practical extended length. Includes alligator clip.

UL LISTED

Product No.	Description
4610	Ground Cord, coiled, 5 ft. (1.5 m), 4 mm snap end. Includes alligator clip.
4611	Ground Cord, coiled, 10 ft. (3 m), 4 mm snap end. Includes alligator clip.

3M™ Dual Conductor Fabric Wrist Band for Monitors (Premium Performance)

The 3M Dual Conductor Fabric Wrist Band 2368 is used exclusively with all 3M™ Workstation Monitors.

One size adjusts to most any size wrist to provide reliable protection. The wrist strap features a band made of a silver-plated, monofilament, continuous thread woven together with elastic nylon to maintain full conductivity, comfort and reliability, while providing rapid and continuous drain of static charge. Two 1 megohm resistors are built into the ground cord. Adjustability also simplifies ordering procedures and inventory control by virtually eliminating the need to order and stock several band sizes.

3M™ Fabric Wrist Band 2368

Note: The 3M™ Bands and Cords 2300 Series, 2300VM Series and 2200 Series are not interchangeable. See page 8 for additional information on wrist band and cord combinations.

Product No.	Description
2368	Dual Conductor Adjustable Fabric Wrist Band, Turquoise
2368VM	Dual Conductor Adjustable Fabric Wrist Band (790 only), Turquoise

⚠ Warning:

These products are not to be used in areas where the individual may come in contact with exposed circuitry exceeding 250 volts AC.

These products are for static control. It will not reduce or increase your risk of receiving electrical shock when using or working on electrical equipment. Follow the same precautions you would use without wrist straps, including:

- Make certain that equipment having a grounding type plug is properly grounded.
- Make certain that you are not in contact with grounded objects other than through the 3M™ Wrist Strap.
- A current limiting resistor(s) is located in these 3M™ Ground Cords. DO NOT REMOVE. If the resistor(s) becomes damaged, replace ground cord immediately.

3M™ Dual Conductor Metal Wrist Straps for Monitors (Premium Performance)

The 3M Dual Conductor Metal Wrist Straps 2380 Series are for use exclusively with 3M Workstation Monitors. These long-lasting metal expansion bands are for use in clean rooms and applications requiring extended band life.

Three sizes are available: small for wrists from 4.5 in. to 6 in. (114 mm to 152 mm) in circumference; medium for wrists from 5.5 in. to 7.25 in. (140 mm to 184 mm); and large for wrists larger than 6.5 in. (165 mm).

3M™ Metal Wrist Strap 2381

Product No.	Description
2381	Dual Conductor Metal Wrist Strap Includes band and 5 ft. (1.5 m) cord (Small)
2381VM	Dual Conductor Metal Wrist Strap Includes band and 5 ft. (1.5 m) cord (Small) (790 only)
2382	Dual Conductor Metal Wrist Strap Includes band and 5 ft. (1.5 m) cord (Medium)
2382VM	Dual Conductor Metal Wrist Strap Includes band and 5 ft. (1.5 m) cord (Medium) (790 only)
2383	Dual Conductor Metal Wrist Strap Includes band and 5 ft. (1.5 m) cord (Large)
2383VM	Dual Conductor Metal Wrist Strap Includes band and 5 ft. (1.5 m) cord (Large) (790 only)
2384	Dual Conductor Metal Wrist Band (Small)
2384VM	Dual Conductor Metal Wrist Band (Small) (790 only)
2385	Dual Conductor Metal Wrist Band (Medium)
2385VM	Dual Conductor Metal Wrist Band (Medium) (790 only)
2386	Dual Conductor Metal Wrist Band (Large)
2386VM	Dual Conductor Metal Wrist Band (Large) (790 only)

3M™ Dual Conductor Ground Cords (Premium Performance)

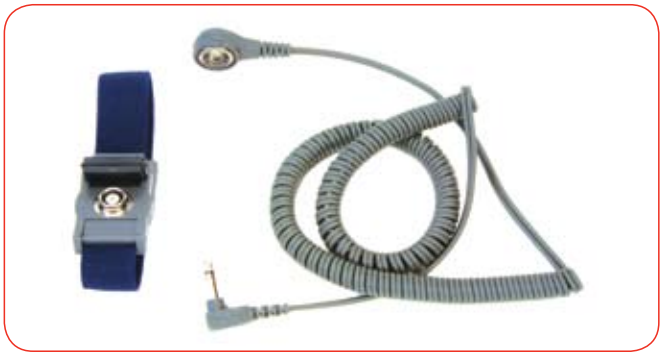
The 3M Dual Conductor Wrist Strap Ground Cord is for use exclusively with dual conductor wrist straps. Used in conjunction with 3M's ESD workstation monitors, the 3M Dual Conductor Cord 2300 Series features an improved grip that is wider in diameter and easier to grasp when inserting and removing the cord from the remote unit. The terminations at both ends of the cord have been redesigned for a secure fit when plugged into the dual remote.

3M™ Dual Conductor Ground Cords

Product No.	Description
2360	Dual Conductor Coiled Cord, 5 ft. (1.5 m) practical length.
2370	Dual Conductor Coiled Cord, 10 ft. (3.0 m) practical length.
2371	Dual Conductor Coiled Cord, 20 ft. (6.0 m) practical length.
2360R	Dual Conductor Coiled Cord, 5 ft. (1.5 m) practical length, with right angle mono plug connection. (To be used only with 3M monitors)
2370R	Dual Conductor Coiled Cord, 10 ft. (3.0 m) practical length, with right angle mono plug connection. (To be used only with 3M monitors)
2371R	Dual Conductor Coiled Cord, 20 ft. (6.0 m) practical length, with right angle mono plug connection. (To be used only with 3M monitors)
2391	Dual Conductor Coiled Cord, 5 ft. (1.5 m) practical length, with right angle mono plug connection. (To be used only with monitors other than 3M)
2392	Dual Conductor Coiled Cord, 10 ft. (3.0 m) practical length, with right angle mono plug connection. (To be used only with monitors other than 3M)
2393	Dual Conductor Coiled Cord, 20 ft. (6.0 m) practical length, with right angle mono plug connection. (To be used only with monitors other than 3M)

3M™ Dual Conductor Wrist Strap (Standard Performance)

3M's Dual Conductor Wrist Straps are designed to work with dual conductor, resistance style, constant monitors. The wrist band is fully adjustable and made from soft fabric that stays flat on the wrist for good contact. Dual conductor coiled cords offer a right angle (90-degree) mono plug, 40 lb. tensile, multi-conductor wire, and are available in 6 ft. or 12 ft. (1.8 m or 3.6 m) lengths. These wrist straps are generally compatible with dual conductor monitors that accept a mono plug.



3M™ Dual Conductor Wrist Strap

Product No.	Description
DWAFWS61M	Band, 6 ft. (1.8 m) cord
DWAFWS121M	Band, 12 ft. (3.6 m) cord
DWAFWS	Adjustable fabric band
DWCC61M	6 ft. (1.8 m) cord
DWCC121M	12 ft. (3.6 m) cord

Features

- Compatible with most dual conductor, resistance style monitors.
- Dual conductor design allows functionality if one wire fails.
- Single snap to band for improved reliability.
- Right angle (90-degree) mono plug prevents damage to cord.

Product Referral Generator

WS Aware Dual Workstation Monitor . . . . . pg. 16

3M™ Dual Conductor Thermoplastic Wrist Straps for Monitors 4720 (Economy Performance)

Made to be used in conjunction with all 3M™ Workstation Monitors. The 4720 offers several unique features to provide high-tech businesses with cutting-edge equipment at a low cost.

The dual conductor wrist band is connected to the 3M Workstation or Wrist Strap Monitor via a 3M™ Dual Wire Ground Cord 2300 Series. The cords (2360, 2370, and 2371) are sold separately to allow customers the option of purchasing a cord in 5 ft., 10 ft. and 20 ft. (1.5 m, 3.0 m, 6.0 m) lengths respectively.

3M's exclusive "comfort bumps" design on the conductive interior insert provides not only increased contact with the skin, but also air flow between the band and skin, resulting in more comfort for the wearer.

Made of thermoplastic material, the 3M Dual Wire Wrist Bands 4720 are lightweight and low profile, making reliable contact to the skin, improving employee acceptance while providing an effective grounding device. The pliable thermoplastic material of the 4720 conforms to the arm, increasing the amount of contact area.

The "zipper" style latching mechanism easily adjusts to most any size wrist, effecting a "one size fits all," allowing for a secure and comfortable fit. After adjusting for proper fit, any excess band material is cut off. The wrist band is highly visible, making it easy for supervisors to see that the wrist straps are properly used.

Product No.	Description
4720	Dual Conductor Wrist Band, Blue (ground cord not included)

3M™ Wrist Band 4720 with 3M™ Dual Conductor Wrist Strap Ground Cord 2360

3M™ Disposable Wrist Straps (Economy Performance)

The 3M Disposable Wrist Strap 2209 is ideally suited for shipment along with components and devices, such as memory upgrades, sound cards, etc., to provide protection at the receiving end. It may also be used for short-term use in the plant for visitors and others who don't need the durability of a reusable strap.

At the end that wraps around the wrist, a hypoallergenic adhesive provides 360-degree contact with the skin to minimize skin-to-band resistance. At the other end, the conductive adhesive on the copper foil tape adheres to any convenient electrical ground. A current-limiting resistance is fabricated into the plastic ribbon below the wrist band.

Each 3M Disposable Wrist Strap 2209 is individually packaged in a clear poly envelope. Custom printing is available by special order (minimum quantities apply).

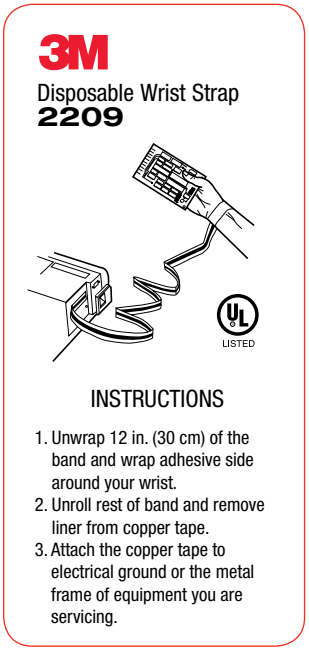
3M™ Disposable Wrist Strap 2209

Product No.	Description
2209	Disposable Wrist Strap. (Custom envelope imprinting is available.) UL Listed.

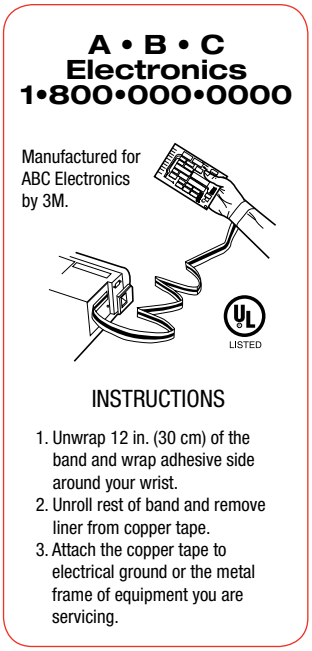
UL LISTED

2209 Properties

Item	Typical Properties
Ground/Bonding End	Copper foil with conductive adhesive on both attached to conductive ribbon.
Conductive Ribbon	Flexible conductive film, with fabricated current limiting resistance near wrist band end. Conductive ribbon enclosed in non-woven adhesive tape.
Wrist Band End	Conductive ribbon with exposed hypoallergenic adhesive along each side of conductive ribbon.
Practical Working Length	4 ft. (1.2 m)
Electrical Resistance End to End	1.0 to 5.0 megohm



Standard envelope



Custom envelope example

3M™ Wrist Strap/Continuous Workstation Monitor Compatibility Chart

Wrist Band		Monitors					
Description	*Model No.*	*3M™ Static Monitor 790*	*3M™ Workstation Monitor 724*	*3M™ Wrist Strap Monitor 725*	*3M™ WS Aware*	*3M™ Iron Man Plus*	*3M™ Ground Man Plus*
Fabric Wrist Band, Adjustable, Dual Conductor	2368		•	•	•	•	•
Fabric Wrist Band, Adjustable, Dual Conductor	2368VM	•					
Metal Wrist Strap with 5 ft. Dual Conductor Cord, Small	2381		•	•	•	•	•
Metal Wrist Strap with 5 ft. Dual Conductor Cord, Small	2381VM	•					
Metal Wrist Strap with 5 ft. Dual Conductor Cord, Medium	2382		•	•	•	•	•
Metal Wrist Strap with 5 ft. Dual Conductor Cord, Medium	2382VM	•					
Metal Wrist Strap with 5 ft. Dual Conductor Cord, Large	2383		•	•	•	•	•
Metal Wrist Strap with 5 ft. Dual Conductor Cord, Large	2383VM	•					
Metal Wrist Band, Small	2384		•	•	•	•	•
Metal Wrist Band, Small	2384VM	•					
Metal Wrist Band, Medium	2385		•	•	•	•	•
Metal Wrist Band, Medium	2385VM	•					
Metal Wrist Band, Large	2386		•	•	•	•	•
Metal Wrist Band, Large	2386VM	•					
Dual Conductor Wrist Band, Blue	4720		•	•	•	•	•

Size Key:

Small for wrists 4.5 in. – 6 in. (11.4 cm – 15.2 cm)
Medium for wrists 5.5 in. – 7.25 in. (13.97 cm – 18.4 cm)
Large for wrists >6.5 in. (16.5 cm)

Monitor and Cord Compatibility Chart

Wrist Band		Monitors					
Description	*Model No.*	*3M™ Static Monitor 790*	*3M™ Workstation Monitor 724*	*3M™ Wrist Strap Monitor 725*	*3M™ WS Aware*	*3M™ Iron Man Plus*	*3M™ Ground Man Plus*
Dual Conductor Coiled Cord, 5 ft.	2360	•	•	•	•	•	•
Dual Conductor Coiled Cord, 10 ft.	2370	•	•	•	•	•	•
Dual Conductor Cord, 20 ft.	2371	•	•	•	•	•	•
Dual Conductor Coiled Cord, Right Angle, 5 ft.	2360R	•	•	•	•	•	•
Dual Conductor Coiled Cord, Right Angle, 10 ft.	2370R	•	•	•	•	•	•
Dual Conductor Coiled Cord, Right Angle, 20 ft.	2371R	•	•	•	•	•	•
Dual Conductor Coiled Cord, 5 ft.	2391	Only use with non-3M monitors.					
Dual Conductor Coiled Cord, 10 ft.	2392	Only use with non-3M monitors.					
Dual Conductor Coiled Cord, 20 ft.	2393	Only use with non-3M monitors.					

3M™ Workstation Monitor Selection Guide

Application	WS Aware CTC061	WS Aware CTC062	Iron Man CTC330	Iron Man Plus CTC331	Ground Man Plus CTC334	724	725	790	WSMONITOR1	WSMONITOR2	WSMONITOR3
Critical Environment											
Hard Disk Drive Manufacturing	x	x	x	-	-	-	-	-			
Sub-50 V Sensitive Components	x	x	x	x	x	-	-	-			
Back End Semiconductors											
>50 V CDM	x	x	x	x	x	x	x	x			
Electronics Assembly											
	x	x		x	x	x	x	x	x	x	x
Wrist Strap Type											
Dual Conductor	x	x	-	x	x	x	x	x			
Single Wire			-						x	x	x
Number of Operators	2	2	1	1	1	2	1	2	1	1	2
Operator Control Voltage											
25 mV	x	x	-	-	-	-	-	-			
400 mV	-	-	-	x	x	-	-	-			
Up to 9 V	-	-	-	-	-	x	x	x	x	x	x
Body Voltage Alarm											
Yes	x	x	x	x	x	-	-	-			
Operator Presence Detector Option											
Big Brother Infrared Sensor	x	x	-	-	-	-	-	-			
Metal Grounds	2	4	-	-	3	-	-	-			
EMI on Metal Grounds	x	x	-	-	-	-	-	-			
Dissipative Grounds (mat/bench monitor)	2	-	-	1	-	1	-	-		1	1
Board ESD/EOS Alarm	-	-	x	x	-	-	-	-			
Output Signal											
Analog	x	x	-	-	-	-	-	-			
Logic	x	x	-	-	x	-	-	-			
Digital	x	x	-	-	-	-	-	-			

Photos are not to scale.

Notes

3M™ EM Aware Monitor

3M™ EM Aware ESD Monitors

3M EM Aware ESD monitors detect and measure ESD events (electrostatic discharges), as well as static voltage and ionization parameters (depending on the model). EM Aware is a comprehensive diagnostics and troubleshooting tool for your ESD environment, a continuous monitor for critical ESD process and an instrument to qualify your tools for handling ESD-sensitive devices. EM Aware ESD Monitors are essential in establishing and maintaining a safe ESD environment.

EM Aware Starter Kits include a number of selected EM Aware Monitors with antennae, data acquisition system, Windows-based software, worldwide power adapter, and all cables and interconnects.

Features

- One antenna for monitoring all parameters.
- Data is correlated to standard discharge models: CDM, HBM and MM.
- Real time measurements with adjustable range settings.
- Highly sensitive measurements of ionization balance and decay.
- Outputs for every parameter to all major facility monitoring systems (FMS).
- Optional extended temperature antennae.

ESD Events

Item	Typical Properties
Sensitivity	1 – 1000 V
Characterization	HBM, MM and CDM
Threshold	Adjustable locally and remotely
Discharge Polarity	Both
Event Count	Available
Event Magnitude	Output to FMS, DAQ; LED bar
ESD Event Indication	LED, buzzer
ESD Event Hold	LED w/reset
Static Voltage	
Types of Measurements	Induced voltage 1 in. from the surface
Measurement Range	±100 V – ±5,000 V adjustable
Indication	Output to FMS, DAQ; LED bar
Alarm	Buzzer, adjustable threshold

Ionization Balance

Item	Typical Properties
Type of Ionizer	DC, AC blowers
Measurement Range	±12.5 V Full Scale
Indication	Output to FMS, DAQ; LED bar
Alarm	Buzzer, adjustable threshold
Ionization Decay	
Type of Ionizer	DC, AC blowers
Measurement Range	0–10 seconds correlated to standard CPM
Indication	Output to FMS, DAQ
Alarm	Buzzer, adjustable threshold
Interface	
Output to FMS, DAQ	4–20 mA each channel; other interfaces available
Connector	RJ45
Power	12–24 Vdc, <200 mA
Mechanical	
Dimensions (approx.) Without Antenna	1.30 H x 2.25 W x 3.2 in. L (33 x 57 x 81 mm)

3M™ EM Aware Starter Kits

The EM Aware Starter Kits include everything you need for comprehensive electrostatic discharge (ESD) events, EMI, electrostatic field, and ionization monitoring in your environment. Quickly connect several EM Aware monitors to a computer and immediately start collecting ESD/EMI data. Each kit contains a number of selected EM Aware monitors, remote antenna, a USB data acquisition system, Windows-based software, a worldwide power adapter and all necessary cables and interconnects.

3M™ EM Aware Starter Kits

Optional Antennae

- CTC115 Remote (High Temp) omni-directional ESD events/static voltage antenna
- CTC118 Remote (High Temp) omni-directional ESD events/static voltage/ ionization antenna
- CTC117 Current/EOS clamp antenna

Product No.	Description
CTK3A5-C CTK3AM5-C	This full-featured kit provides the broadest range of monitoring capabilities including electrostatic discharge (ESD) events, static voltage, ionization balance and ionization decay. Recommended for those applications, inside or outside the cleanroom, where ionizations, balance and decay are included critical parameters.
CTK2A6-C CTK2AM6-C	The best value and most popular for troubleshooting and diagnostics. This kit offers EM Aware's patented ESD event monitoring, as well as static voltage monitoring and ionization balance. Recommended for tool and workstation monitoring/ diagnostics, in and out of cleanroom. Applications where the monitoring of electrostatic discharge (ESD) events and static-field voltage are key.
CTK1A4-C CTK1AM4-C	This kit lets you identify, measure and manage the most critical parameters that typically signify harmful ESD events in manufacturing environments, inside and outside the cleanroom. Recommended for tool and workstation monitoring where electrostatic discharge (ESD) events are a major concern.

3M™ Octopus ESD Monitoring System

3M Octopus ESD Monitoring System is designed for complete integration into such tools as IC handlers, pick-and-place machines, wafer and reticle handlers and others. Full communication with the tool enables automatic separation of exposed components and reporting of ESD statistics. It offers unparalleled patented technology to detect and measure strength of electrostatic discharges (ESD events). Integrated into the tool, Octopus can in real time identify the exposure of each individual component to ESD and facilitate automatic separation of exposed components so that they are not shipped to the customer.

Features

- Comprehensive — reports ESD exposure to the component at every step.
- Versatile — registers ESD occurrences in real time.
- Certainty of Measurements — uses a patented algorithm to reject most extraneous ESD events.

Extended temperature range sensors are available for certain configurations. Please contact 3M for details and specific recommendations.

Product No.	Description
CTK075	Octopus ESD Monitoring System

3M™ Octopus ESD Monitoring System

3M™ WS Aware Dual Workstation Monitors

The 3M WS Aware Workstation Monitor provides continuous monitoring of all grounding parameters on a workbench or in a tool in full compliance with ANSI 6.1 and ANSI/ESDA - S20.20 requirements, as well as high-frequency noise (EMI) on ground. For operators, WS Aware Monitors utilize dual wrist straps for a continuous resistivity check of human body connection and patented advanced DSP technology for reliable monitoring utilizing ultra-low control voltage. Each operator's body voltage is also continuously monitored. Patented optional Big Brother terminals allow the monitor to alarm when an operator approaches static-sensitive components, but does not plug in his or her wrist strap properly.

WS Aware CTC061 provides continuous monitoring for two metal grounds (such as tools) and for two "soft" grounds (such as dissipative mats, surfaces and parts made of dissipative plastics), or four metal grounds (CTC062). It provides monitoring of EMI on metal grounds with programmable alarm thresholds. As electromagnetic interference (EMI) is rapidly becoming a significant factor in equipment failures, this patented feature helps to provide proper operation of your equipment.

Features

- Highly integrated credit card-size unit offers combination of features.
- Proper operator grounding — Big Brother operator presence detector alerts if an operator is within reach of sensitive components but is not plugged in.
- Ultra-low voltage — only 25 millivolts of signal to any part of wrist strap at any time.
- ANSI 6.1 and ESDA S20.20 compliant ground monitoring.
- EMI monitoring on grounds.
- Safety — built-in safety 1 megohm resistors for each half of the wrist strap.
- Output to facility monitoring system.

3M™ WS Aware Dual Workstation Monitor CTC061 (Stand not included.)

Connectivity

Item	Typical Properties
Interface	
Current Loop	4 – 20 mA
Logic Level	0/20 mA
MODBUS	MODBUS std. compliant
Data Connector	RJ45 jack

Wrist Strap Monitor

Item	Typical Properties
Wrist Strap Type	Dual, 3.5 mm plug
Connection to Ground	1 megohm for each side
Wrist Straps Monitored	2
Imposed Voltage on Body	0.025 V (25 mV) max.
Remote Terminals	2, one for each operator
Remote Terminal Cables	Mini-DIN 6-pin
Visitor Jack on Remote	Available
Body Resistance Alarm Level	10 megohm default
Body Voltage Alarm Level	±2.5 V default (adjustable)
Local Indication	LED, buzzer
Indicated Parameters	Availability Continuity Body Voltage
Output Parameters for Each Operator	Availability Continuity Body Voltage

Ground Monitor

Parameters Monitored	Typical Properties
CTC061 Metal Ground (Tools) Dissipative Surfaces	 2 connections 2 connections
CTC062 Metal Ground (Tools)	 4 connections
Monitored Ground Connector	No-screw terminal
Connection Activation Metal Ground Alarm	Dip-switch (no jumpers) 1 – 20 ohm (10 ohm default)
Dissipative Ground Alarm	10 – 1,000 megohm (1,000 megohm default)
Imposed Voltage Metal Ground Dissipative Surfaces	 < 0.075 V open circuit < 0.4 V open circuit
EMI on Metal Ground Sensitivity	 0 dBm (226 mV) default
Local Indication	Good/alarm/off, LED, buzzer
Indicated Parameters	Resistance to ground EMI on metal ground
Output Parameters	Availability (pass/fail)
Output Parameters for Each Connection	Resistance to ground EMI (metal ground) (MODBUS)

General

Item	Typical Properties
Power (local or network) Voltage	12..24 Vdc
Current Consumption	<150 mA
Dimension (approx.)	1.30 H x 2.25 W x 3.2 in. L (33 x 57 x 81 mm)
Weight (approx.)	4.25 oz (120 g)

Order Universal Power Adapter CTA212 for WS Aware.

3M Products are ESD 20.20 Program Compliant

3M™ Iron Man Workstation Monitors

3M Iron Man Workstation Monitors measure voltage directly on circuit boards during assembly. If there is any electrical overstress (EOS) on a board, the operator is alerted with both visual and audio alarms. The monitors are small enough to fit on every workbench where assembly or service occurs.

Simply connect the overvoltage input to any ground plane connection of the board or to a mat on which the board is placed, with the supplied alligator connector. When there is a dangerous EOS exposure, the operator will be instantly alerted. Additionally, the board itself will be reliably grounded via a 1 megohm resistor inside the monitor.

The 3M Iron Man Plus Workstation Monitor CTC331 adds complete monitoring of the entire workbench, including wrist strap and dissipative mat monitoring. The operator is monitored for proper connectivity and for excessive body voltage. The dissipative or conductive mat is monitored for its proper connectivity. A unique replacement wrist strap jack does not require soldering, which helps improve reliability and helps reduce the cost of ownership.

Features

- Electric overstress monitoring of every board.
- Alarms allow operators to immediately respond to electric overstress.
- Isolation of exposed assemblies.
- Complete workbench coverage.

CTC330 and CTC331 Properties

Item	Iron Man CTC330 Typical Properties	Iron Man Plus CTC331 Typical Properties
Alarm Threshold Ranges	0 – ±5 V; 0 – ±50 V	0 – ±5 V; 0 – ±50 V
Threshold Adjustment	Potentiometer	Potentiometer
Threshold Range	Range selected by jumper	Range selected by jumper
Wrist Strap		Dual, 3.5 mm plug
Operator's Resistance Alarm		Yes
Operator Body Voltage Alarm		Yes
Resistance to Ground		Yes
Visual	LED	LED
Audio	Buzzer	Buzzer
Dimensions	0.85 H x 2.4 W x 1.63 in. L (22 x 61 x 42 mm)	0.85 H x 2.4 W x 2.56 in. L (22 x 61 x 63 mm)
Power	External adapter included	External adapter included

3M™ Iron Man Workstation Monitor CTC330

3M™ Iron Man Plus Workstation Monitor CTC331

Product No.	Description
CTC330	3M™ Iron Man Workstation Monitor
CTC331	3M™ Iron Man Plus Workstation Monitor

3M Products are ESD 20.20 Program Compliant

3M™ Workstation Monitor Checker

An easy-to-use, self-contained and portable system to verify the operation of your workstation monitors.

The Workstation Monitor Checker was designed specifically to verify the proper operation of your dual wrist strap, workstation and ground monitors. The Checker simulates the proper resistances and signals to check for the correct response and verify that the monitors are in compliance with your facilities specifications.

Although the Checker was designed to work with 3M monitors such as 3M™ WS Aware, Iron Man Plus, 3M™ Ground Master and 3M™ Ground Man, it can also be used to verify the operation of most other monitors on the market today.

3M™ Monitor Verification Tool CTE701A

Product No.	Description
CTE701A	Workstation Monitor Checker with 3.5 mm Jack

Features

- 3.5 mm jack for wrist strap monitor test.
- EMI button and LED for metal grounds.
- Banana jack for ground test.
- Banana jack for reference grounds.
- High (fail limit) switches for metal and soft grounds.
- Low (pass limit) switches for metal and soft grounds.
- Power switch and LED.
- Threshold setting switches.
- Body voltage set potentiometer.
- Body voltage test button.
- Pass (low limit) switch for wrist straps.

Product Referral Generator

WS Aware Dual Workstation Monitor . . . . . pg. 16
Ground Master Equipment Ground Monitor. . . . . pg. 24
Iron Man and Iron Man Plus Workstation Monitor. . . . . pg. 17
Ground Man and Ground Man Plus Ground Monitors for Tools. . . . . pg. 25

3M™ Workstation Monitor

The 3M Workstation Monitor 724 continuously monitors the resistance of the operator and worksurface ground connections. The monitor uses a reliable resistance method that actually includes the operator's skin resistance to determine if the system is operating properly. If the operator's resistance exceeds pre-set levels of 10 megohm or 35 megohm, or the wiring connections exceed 3.7 megohm, audible and visible alarms are triggered. The unit will also warn of potentially dangerous low-resistance situations. A switch allows the user to select either a 9 V or 16 V test voltage, and 10 megohm or 35 megohm resistance setting.

The monitor uses the light, compact dual conductor wrist strap (purchased separately; see page 11). Dual conductors provide the resistance circuit that is monitored, as well as grounding redundancy. If one conductor fails, the other will still function to prevent sensitive components from being exposed to static.

The Workstation Monitor 724 monitors a visitor to the workstation or a second operator. In addition, the loudness of the alarm is adjustable. A quick connect/disconnect 3M™ Remote Input Jack 732 comes with the Workstation Monitor.

3M™ Workstation Monitor 724 pictured with 3M™ Remote Input Jack 732, 3M™ Dual Conductor Wrist Band 4700 and the 3M™ Dual Conductor Cord 2360 (ground cord and band not included).

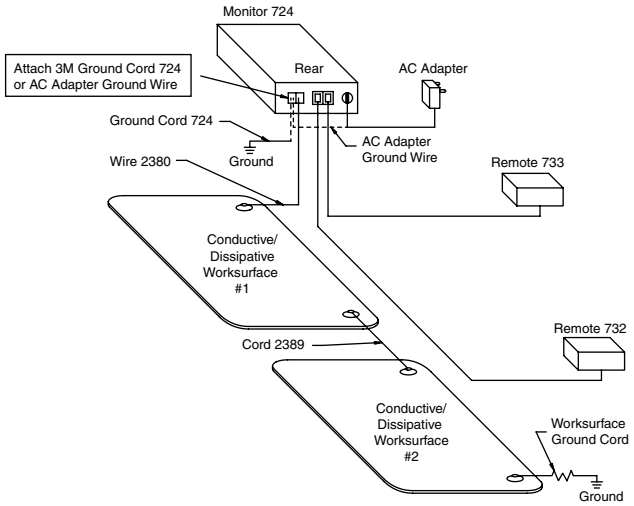
Product No.	Description
724	Workstation Monitor complete with a quick connect/ disconnect 732 Remote Jack and mounting hardware.

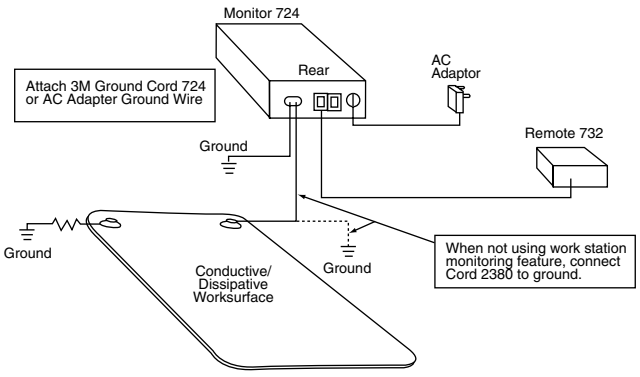
724 Properties

Item	Typical Properties
Dimensions	6.5 H x 3.125 W x 1.375 in. L (16.5 x 7.9 x 3.5 cm)
Power Supply	25 Vdc @ 50 mA minimum
Test Voltage	9 Vdc or 16 Vdc (Switch selectable)
Test Current	Less than 3 microamps
Upper Resistance Limits	Wrist Strap: 10 or 35 megohm Switch selectable Worksurface: 3.7 megohm
Lower Resistance	Wrist Strap: 1.5 megohm Worksurface: none
Accuracy	± 15%
Environmental Operating Conditions	
Temperature	Max. 110°F (43°C) Min. 50°F (10°C)
Humidity	Max. 75% R.H.
Accessories	Remote Splitter Kit 733 Stand-By Jack 3057

The worksurface ground resistance circuit of the 3M workstation monitor indicates a malfunction when the ground loop resistance exceeds 3.7 megohm. To determine if your mat is within this limit, perform the following procedure using an ohmmeter.

Measure the resistance between the snap on the mat, where you intend to connect the 3M™ Monitor/Table Mat Replacement Cord 2380, and the ground point for the mat. Be sure the mat is connected to ground.





3M™ Monitor Verification Kits

The 3M Verification Kits 724VK and 725VK were designed to check the wrist strap input resistance ranges of the 3M™ Workstation and 3M™ Wrist Strap Monitors 700 Series. The 3M Verification Kit 790VK contains hardware items for connecting to the 3M™ Static Monitor 790, that are recommended when performing the verification procedure. Use of this kit allows for reliable connections to the Monitor 790. In addition to this kit, a DC power supply and resistance substitution box are required (supplied by user). See instruction manual for complete details.

3M™ Verification Kit 724VK

3M™ Verification Kit 725VK

3M™ Verification Kit 790VK

Product No.	Description
724VK	Verification Kit Six 1% Resistor Plugs and Case
725VK	Verification Kit Four 1% Resistor Plugs and Case
790VK	Verification Kit One 5 ft. (1.5 m) Dual Conductor Cord 2360, one test wrist band socket assembly, and one two-wire male connector with 24 in. (60.9 cm) lead wire.

724VK Contents

Item	Value
Test Plug #1	Resistor, Metal Film, 1.33 megohm ± 1%, 1/4 Watt
Test Plug #2	Resistor, Metal Film, 1.69 megohm ± 1%, 1/4 Watt
Test Plug #3	Resistor, Metal Film, 8.45 megohm ± 1%, 1/4 Watt
Test Plug #4	Resistor, Metal Film, 11.5 megohm ± 1%, 1/4 Watt
Test Plug #5	Resistor, Metal Film, 29.4 megohm ± 1%, 1/4 Watt
Test Plug #6	Resistor, Metal Film, 40.2 megohm ± 1%, 1/4 Watt

725VK Contents

Item	Value
Test Plug #1	Resistor, Metal Film, 29.4 megohm ± 1%, 1/4 Watt
Test Plug #2	Resistor, Metal Film, 40.2 megohm ± 1%, 1/4 Watt
Test Plug #3	Resistor, Metal Film, 4.99 megohm ± 1%, 1/4 Watt
Test Plug #4	Resistor, Metal Film, 11.5 megohm ± 1%, 1/4 Watt

790VK Contents

Item
Dual Conductor Cord 2360, 5 ft. (1.5 m)
Test Wrist Band Socket Assembly
Two-Wire Male Connector with 24 in. (60.9 cm) lead wire

3M™ Dual Conductor Remote Input Jacks

The 3M Remote Input Jack 732 may be purchased as a replacement part for the 3M™ Workstation Monitor 724. It provides two phone jacks — one for the primary worker and one for use by visitors to the work area. The 3M™ Remote Splitter Kit 733 may be purchased for use in conjunction with the Workstation Monitor 724. It offers the versatility of grounding and monitoring two workers at independent workstations that are in close proximity. The units feature a quick “connect/disconnect” system.

3M™ Remote Input Jack 732

3M™ Remote Splitter Kit 733

Product No.	Description
732	Replacement Remote Input Jack for the 724 Workstation Monitor, 6 ft. (1.8 cm) long cord **Size, in. (cm)** 3.188 H x 1 W x 1.5 in. D (8.1 x 2.5 x 3.8 cm)
733	Remote Splitter Kit, 6 ft. (1.8 cm) long cord **Size, in. (cm)** 3.188 H x 1 W x 1.5 in. D (8.1 x 2.5 x 3.8 cm)

3M™ Dual Conductor Portable Wrist Strap Monitor

The 3M™ Wrist Strap Monitor 725 is a small, compact, battery-powered unit that continuously monitors both the worker and the worker's wrist strap. The monitor uses a reliable resistance method that includes the worker's skin resistance to determine if the system is operating properly.

The monitor uses the same dual conductor wrist strap as used with the 3M™ Workstation Monitor 724. In addition, the Monitor 725 also monitors the ground wire connection and battery level.

The Wrist Strap Monitor 725 immediately alerts the individual when a wrist strap is operating improperly. The Monitor 725 continuously supplies a current that is returned through a wrist band and cord that contain two separate independent conductors.

The monitor is a compact, portable, battery-powered unit with a visual and an audible alarm. A "parking plate" mounted on the Monitor 725 allows an individual to disconnect the ground cord and clip it to the parking plate to silence the alarm when moving from one work area to another. The 3M™ Belt Clip 723 is available as an accessory item and may be purchased separately.

The competitively priced Wrist Strap Monitor 725 can be used in manufacturing and field service environments. By contributing to the protection of static sensitive devices and printed circuit boards from static damage, the monitor helps save money and time as a result of improved yield rates and lower field service costs.

3M™ Wrist Strap Monitor 725

Product No.	Description
725	Personal and Portable Wrist Strap Monitor for use in manufacturing and field service environments. The Monitor 725 features wrist strap monitoring and grounding for ESD mats/work surfaces. Accessory Belt Clip 723 converts the monitor into a portable/personal monitor.
723	Accessories: Belt Clip 723 2.5 H x 2.625 W x 1.125 in. D (6.4 x 6.7 x 2.9 cm)

725 Properties

Item	Typical Properties
Dimensions	2.5 H x 2.6 W x 1.1 in. D (6.4 x 6.6 x 2.8 cm)
Power Supply	9 V alkaline battery (not supplied)
Test Voltage	9 Vdc maximum
Test Current	Less than 1 microamp
Upper Resistance Limits	Wrist Strap: 35 megohm Ground Clip: 10 megohm
Lower Resistance	Wrist Strap: 1.5 megohm Worksurface: none
Accuracy	± 15%
Environmental Operating Conditions	
Temperature	Max. 110°F (43°C), Min. 50°F (10°C)
Humidity	Max. 75% R.H.
Accessories	Belt Clip 723

3M™ Belt Clip 723

Product Referral Generator

Verification Kits . . . . . .pg. 20

Note: Only use 3M™ Dual Conductor Bands and Cords with the Monitor 725. See page 8 for additional information on wrist band and cord combinations.

3M™ Wrist Strap Monitor

The 3M Static Monitor 790 is a cost-efficient unit that is small, compact and versatile in its usage, and may be mounted directly onto device handling equipment, testers and auto insertion equipment.

Housed in static dissipative plastic, the Static Monitor 790 works by measuring the voltage potential on a person referenced to earth ground. The monitor uses a slide switch allowing the user to select the voltage level necessary for the specific job function being performed.

The Static Monitor 790 has two wrist strap input jacks located on its front, allowing two operators to use one monitor unit at a workstation simultaneously. Power is supplied to the unit through an AC adapter.

Three distinct alarms make it easy to identify operators and the type of fault condition. The audible alarm can be adjusted to a low or high level to overcome background noise from other equipment that may be in use in the area. Ring terminals on the end of the unit's ground and chassis cords provide a permanent connection.

Features

- Audible and visual alarms.
- Compact system.
- Select voltage alarm levels of 1 V, 3 V, 6 V and 9 V.
- Static dissipative plastic housing.
- Mounts easily to ESD worksurface.
- Regulatory Compliance: UL and CE.
- VM fabric and metal bands are to be used specifically with the Static Monitor 790.

3M™ Static Monitor 790

Product No.	Description
790	Monitor includes: • 790 Wrist Strap Monitor • 790AC Adapter (available without AC Adapter) • 3M™ Dual Lock™ Mounting Fasteners • 2-Wire Connector

Product No.	Description
790MP	Mounting Plate for 790 (10 per package)
790VK	Verification Kit
3057	Stand-By Jack Dual Conductor Bands and Cords (See page 8 for additional information on wrist band and cord combinations.)

790 Properties

Item	Typical Properties
Monitor Size	3.5 H x 4.0 W x 1.25 in. D (8.9 x 10.2 x 3.2 cm), approximate H x W x D
Power Supply Requirements Input	
	120 Vac ±10% (North America)
Outside North America	(As required)
Output	25 Vdc @ 50 mA rated load
Output Plug Polarization	Center negative
Output Plug Dimensions	5.5 x 2.1 x 9.5 mm (OD x ID x l)
Accuracy	(The following parameters are valid for altitudes up to 2000 m. Pollution degree 2, Class 3, Equipment)
Voltage Detection Levels	(1 V ±15%) (3 V, 6 V, & 9 V ±10%)
Ground Disconnect	10 ohm ±20%
Environmental Operating Conditions	
Temperature	Max. 104°F (40°C); Min. 50°F (10°C)
Humidity	Max. 75% relative humidity

Single Wire Continuous Monitors

Single wire continuous monitors offer the most cost-effective means for continuously testing the connection integrity of the entire ground loop including the person, the wrist band and the coil cord. By using new impedance sensing technology, adjustments and false alarms are virtually eliminated. This system is fully automatic and activates when a wrist strap is plugged into the unit. It provides a green light for safe condition and a red light and tone for unsafe condition. Units are powered and grounded by an AC adapter. Compatible with most standard wrist straps.

Product No.	Description
WSMONITOR1	Monitors one wrist strap
WSMONITOR2	Monitors one wrist strap and bench
WSMONITOR3	Monitors two wrist straps and bench

3M™ Continuous Monitor, Single Wire 1

WSMONITOR1 Features

- Monitors one wrist strap/person.
- Compatible with any standard wrist strap.
- Easy to use: Simply plug in the wrist strap.
- Easy to install: Attach the monitor to the bench with included hardware and plug it in.
- Size: 0.88 H x 1.75 W x 1.25 in. D (2.24 x 4.45 x 3.18 cm)

3M™ Continuous Monitor, Single Wire 2

WSMONITOR2 Features

- Monitors one wrist strap/person and the mat.
- Compatible with any standard wrist strap.
- Easy to use: Simply plug in the wrist strap.
- Easy to install: Attach the monitor to the bench with included hardware, connect the mat and plug it in.
- Size: 1 H x 2.4 W x 2.3 in. D (2.54 x 6.10 x 5.84 cm)

3M™ Continuous Monitor, Single Wire 3

WSMONITOR3 Features

- Monitors two wrist straps/persons (for supervisor or second operator).
- Monitors connections to the bench mat.
- Compatible with any standard wrist strap.
- Easy to use: Simply plug in the wrist strap.
- Easy to install: Attach the monitor boxes to the bench with included hardware, connect the mat and plug it in.
- Size: 1 H x 4 W x 2.4 in D (2.54 x 10.16 x 6.10 cm)

Continuous monitors reduce production costs by virtually eliminating the time spent testing wrist straps. Further savings may be realized by reduced ESD damage from broken wrist straps. Continuous monitors indicate a failed wrist strap when the wrist strap breaks. A broken wrist strap that goes undetected may expose products to ESD over an entire shift.

3M™ Ground Monitors Product Selection Guide

	Ground Master CTC065	Ground Man CTC333	Ground Man Plus CTC334
Metal Grounds	8	3	3
Measurement Method			
AC Impedance	x	x	x
EMI on Metal Grounds	x	-	-
Wrist Strap Monitoring			x
Output Signal			
Analog 4 – 20mA	x		
Logic	x	x	x
Digital	MODBUS		

3M™ Ground Master Equipment Ground Monitors

3M Ground Master Equipment Ground Monitors are designed to provide continuous monitoring of proper ground connections of up to eight tools and up to 16 tools in tandem with another Ground Master monitor. The monitor shows which individual ground connection is being monitored and its status. Ground Master also monitors EMI on each ground, to assist in diagnostics of lockups and malfunctions.

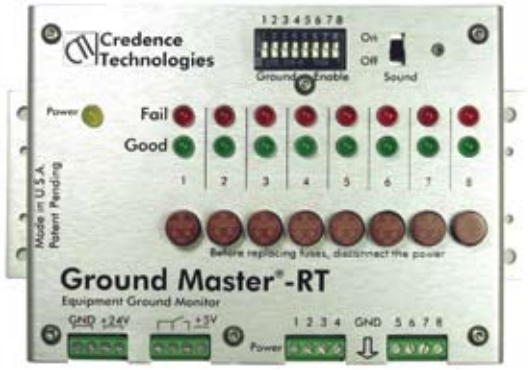
Each ground connection has its own easily replaceable fuse to prevent dangerous voltages from incorrect wiring propagating to other equipment.

Ground Master provides intelligent information to a facility monitoring system with detailed status on each ground connection. 3M Ground Master RT provides relay closure and a logic signal to the tool so that it can be shut down in case of ground failure. Contact 3M for the best model for your applications.

Features

- ANSI/ESDA S20.20 compliant.
- Alarm threshold adjustable from 1–20 ohm.
- Each ground connection is protected by individual fuse in case of incorrect wiring.
- EMI monitored on each ground.
- Output to data acquisition or facility monitoring system (depending on model).
- Logic signal output to the tool shuts tool down if ground fails (depending on model).

Product No.	Description
CTC065	Ground Monitor



3M™ Ground Master Equipment Ground Monitor

3M Products are ESD 20.20 Program Compliant

3M™ Ground Man and Ground Man Plus Ground Monitors for Tools

3M Ground Man Monitors allow users to continuously monitor up to three connection points on tools. The monitors indicate whether each individual ground connection being monitored is within specification or has failed. Ideal applications include SMT pick-and-place tools, IC handlers, wire bonders, die attach and other tools.

Ground impedance alarm levels can be set by the user to satisfy a broad range of requirements and compliance with standards such as ANSI 6.1 and ANSI/ESDA S20.20. Adding additional reliability, the host tool is provided a logic level signal to shut the tool down in case of ground failure. Miniature and unobtrusive, the Ground Man Monitors are easy to install and easy to connect.

Use 3M Ground Man Plus Monitor CTC334 to monitor all important ground connections in the tool and an operator. This monitor adds wrist strap monitoring to allow only properly grounded operators to work with the sensitive devices.

Features

- ANSI/ESDA S20.20 compliant.
- Adjustable threshold alarm from 1–20 ohm.
- Logic signal out to the host tool.
- Complete tool coverage.

Product No.	Description
CTC333	Ground Man Monitor
CTC334	Ground Man Plus Monitor

Product Referral Generator

Workstation Monitor Checker . . . . . pg. 18

3M™ Ground Man Monitor

3M™ Ground Man Plus Monitor

3M Products are ESD 20.20 Program Compliant

3M™ Heel Grounder Product Selection Guide

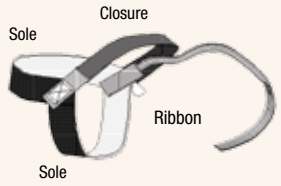
Heel Grounder Type	Closure Style	Features	Model Number
Premium			
Cup Style	Beige non-marking sole, burgundy hook and elastic loop	Non-marking	2056
	Blue non-marking sole, black elastic loop	Non-marking	NS-HGC1M
Front Sole Grounder	Front sole grounder, D-ring, black hook and loop	High contact area	FSG1M-S, M, L
Sole Grounder — Full Coverage	Full coverage sole grounder, D-ring, black hook and loop	Highest contact area	SG1M-S, L, XL
Toe Grounder	Adjustable buckle	Fits high heels	2053
Standard			
Cup Style	Black sole, burgundy hook and loop	Moderate heel contact area	2051
	D-ring, blue hook and loop	Moderate heel contact area, high visibility	BLUE-HGC1MD
	Black hook and elastic loop	Moderate heel contact area	HGC1M
	Black hook and elastic loop, quick clasp	Easy adjustment	HGC1M-C
	Blue hook and elastic loop	High visibility, tennis sole	HGC1M-N72-BLU
	Orange hook and loop	High visibility, tennis sole	HGC1M-ORG
Standard Style	Red, D-ring, black hook and loop	Red elastic back	HGS1MD-RED
	Black elastic back	Moderate cost	HGS1M
Economy			
Cup Style	Black sole, yellow-green hook and loop	High visibility, low cost	2044
	Green hook and loop	High visibility, low cost	HGC1M-ECG
	Black hook and loop	Low cost	HGC1M-EC
Toe Grounder	Adjustable buckle, no D-ring at the toe	Fits high heels, low cost	TG1M
Disposable	Adheres to shoe sole	One time use	2045
	Adheres to shoe sole	One time use	5402

For the Best Heel Grounders, Choose 3M

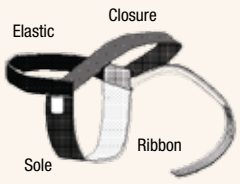
3M Heel Grounders are designed and manufactured for comfort, durability, and cost-effectiveness. We make all of these grounders in the USA. Our grounders are tested for electrical performance, and many are UL Listed. A lot code on most grounders provides quality traceability.

Grounder Styles

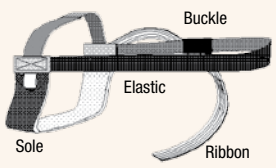
Cup Style Grounder
Two soles for double life span.



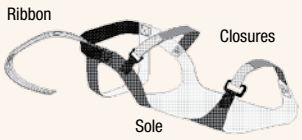
Standard Grounder
One sole and an elastic back strap.



Toe Grounder
For high heel shoes.



Sole Grounder
The most floor contact area.



3M Heel Grounders comply with ESD SP9.2

Foot Grounder Classification	
Type	**Resistance Range**
A	1 megohm (+20%)
B	35 to 100 megohm
C	< 800 kilohm

Note: A two megohm option is available.

3M™ Full Coverage Sole Grounder (Premium Performance)

This grounder is designed to provide maximum floor contact by covering both the ball of the foot and the heel. Three-point straps allow this grounder to stay in place without uncomfortable over-tightening. This quality grounder is tested for electrical performance and is lot numbered for QC traceability. ESD SP9.2 Type A.

3M™ Full Coverage Sole Grounder

3M™ Full Coverage Sole Grounder

Product No.	Description
SG1M-S	Full Coverage Sole Grounder Assembly, Small
SG1M-L	Full Coverage Sole Grounder Assembly, Large
SG1M-XL	Full Coverage Sole Grounder Assembly, Extra large

Features

- Highest contact area.
- D-ring closure.
- Lot coded.
- Black hook and loop.

3M™ Front Sole Grounder (Premium Performance)

This grounder puts the floor contact right where people stand and walk: on the ball of the foot. Three-point straps allow this grounder to stay in place without uncomfortable over-tightening. This quality grounder is tested for electrical performance and is lot numbered for QC traceability. ESD SP9.2 Type A.

3M™ Front Sole Grounder

3M™ Front Sole Grounder

Product No.	Description
FSG1M-S	Front Sole Grounder Assembly, Small
FSG1M-M	Front Sole Grounder Assembly, Medium
FSG1M-L	Front Sole Grounder Assembly, Large

Features

- D-ring closure.
- Black hook and loop.
- Lot coded.
- 3-point straps.

3M™ Heel Grounder Assembly (Premium Performance)

The 3M Non-Marking Shoe Grounder Assembly 2056 is designed to reliably ground mobile personnel when they are in contact with conductive and dissipative flooring. The non-marking conductive, carbon-free, non-slip outer layer provides a dependable static ground while the inner layer provides a non-marking surface for the shoe. After being trimmed to a desired length, an extra-long contact ribbon is inserted between the shoe and sock. The function of the heel grounding assembly depends upon the foot perspiration in the shoe to sustain electrical contact between the conductive ribbon and the body. The Shoe Grounder Assembly 2056 is designed with a 1 megohm resistor. ESD SP9.2 Type A.

3M™ Non-Marking Shoe Grounder Assembly 2056

Product No.	Description
2056	Non-Marking Shoe Grounder Assembly with a 1 megohm resistor

To be effective, shoe grounders must be worn on both feet.

Features

- Non-marking beige sole.
- 1 megohm resistor.
- Carbon-free non-slip outer layer.

⚠ Warning:

The 3M Heel Grounding Assemblies are not to be used in areas where the individual may come in contact with exposed electrical circuitry exceeding 250 Volts AC.

3M Products are ESD 20.20 Program Compliant

3M™ Heel Grounder — Non-Marking (Premium Performance)

The blue sole virtually eliminates scuff marks on ESD floors and shoes. The reversible, double-life sole is static dissipative. Elastic hook and loop fastener provides a secure, comfortable fit. ESD SP9.2 Type A.

3M™ Heel Grounder – Non-Marking

Product No.	Description
NS-HGC1M	Heel Grounder — Non-marking with a 1 megohm resistor

Features

- Virtually no marks on floor.
- Blue sole for visibility.
- 1 megohm resistor.
- Lot coded.
- UL Listed.

3M™ Grounder Assembly 2051 (Standard Performance)

The 3M™ Shoe Grounder Assembly 2051 is designed to effectively ground mobile personnel when they are in contact with conductive and dissipative flooring. The conductive, no-slip outer sole provides a reliable static ground. After being trimmed to a desired length, an extra-long contact ribbon is inserted between the shoe and sock. The function of the shoe grounding assembly depends upon foot perspiration in the shoe to sustain electrical contact between the conductive ribbon and the body. The Shoe Grounder Assembly 2051 comes with a 1 megohm resistor. ESD SP9.2 Type A.

3M™ Shoe Grounder Assembly 2051

Product No.	Description
2051	Shoe Grounder Assembly with a 1 megohm resistor

To be effective, shoe grounders must be worn on both feet.

Features

- Black sole.
- Burgundy hook and loop.
- 1 megohm resistor.
- Moderate heel contact area.

3M™ Heel Grounder — Cup Style (Standard Performance)

A full size, double life span sole combines with comfortable elastic hook and loop to make our cup style an industry favorite. This quality grounder features a durable three layer sole, lot number and multi-strand ribbon. ESD SP9.2 Type A.

3M™ Heel Grounder – Cup Style

3M™ Heel Grounder – Cup Style

Product No.	Description
HGC1M	Heel Grounder — Cup Style, 1 megohm resistor
HGC2M	Heel Grounder — Cup Style, 2 megohm resistor (not UL listed)

Features

- 24 in. (60.9 cm) ribbon.
- Double life span, 3-layer sole.
- 1 megohm resistor.
- Lot coded for QC traceability.
- UL Listed. (HGC1M only)

3M™ Heel Grounder — Cup Style, Quick Clasp (Standard Performance)

Added to the features of the HGC1M, this grounder uses a push button clasp to make attaching and removing the grounder fast and easy. Adjust the fit the first time and then simply attach the grounder the next time. The soft, elastic nylon strap is designed for comfort. Fits boots and cross trainers. ESD SP9.2 Type A.

3M™ Heel Grounder – Cup Style, Quick Clasp

3M™ Heel Grounder – Cup Style, Quick Clasp

Product No.	Description
HGC1M-C	Heel Grounder — Cup Style, Quick Clasp

Features

- Fast to attach and remove.
- Remembers last adjustment.
- Elastic strap fits boots.
- Lot coded for QC traceability.
- UL Listed.
- 1 megohm resistor.

3M™ Heel Grounder — Cup Style, High Visibility (Standard Performance)

Blue elastic hook and loop provides a comfortable, secure fit with good visibility for compliance verification. The durable, double life span tennis sole is made from 3-layer rubber and is designed to not mark shoes. Made in the USA, this quality grounder features UL Listing, a lot number, and a 24 in. (60.9 cm) multi-strand ribbon. ESD SP9.2 Type A.

3M™ Heel Grounder – Cup Style, High Visibility

3M™ Heel Grounder – Cup Style, High Visibility

Product No.	Description
HGC1M-N72-BLU	Heel Grounder — Cup Style, 1 megohm resistor

Features

- Blue elastic hook and loop for visibility.
- Double life span, 3-layer sole.
- 1 megohm resistor.
- Lot coded for QC traceability.
- UL Listed.

3M™ Heel Grounder — Cup Style, D-Ring, High Visibility (Standard Performance)

Features a D-ring for quick, comfortable adjustment, blue hook and loop fastener for improved visibility, and a reversible sole for double life span. Made in the USA, this quality grounder features a durable three-layer sole, lot number, and a 24 in. (60.9 cm) multi-strand ribbon. Fits boots and cross trainers. ESD SP9.2 Type A.

3M™ Heel Grounder – Cup Style, D-Ring, High Visibility

3M™ Heel Grounder – Cup Style, D-Ring, High Visibility

Product No.	Description
BLUE-HGC1MD	Heel Grounder — Cup Style, 1 megohm resistor

Features

- D-ring for quick no-slip adjustment.
- 1 megohm resistor.
- 24 in. (60.9 cm) ribbon.
- Lot coded for QC traceability.
- UL Listed.

3M Products are ESD 20.20 Program Compliant

3M™ Heel Grounder — Cup Style, High Visibility (Standard Performance)

Bright elastic orange hook and loop fastener lets you see at a glance who is wearing their heel grounders. Makes heel grounder compliance easy to verify. Made in the USA, this quality grounder features a durable three-layer sole, lot number, and a 24 in. (60.9 cm) multi-strand ribbon. ESD SP9.2 Type A.

3M™ Heel Grounder, Cup Style, High Visibility

3M™ Heel Grounder, Cup Style, High Visibility

Product No.	Description
HGC1M-ORG	Heel Grounder, Wide Sole

Features

- Orange hook and loop for visibility.
- Double life span, 3-layer sole.
- 1 megohm resistor.
- Lot coded.
- UL Listed.
- Wide sole for better floor contact.

3M™ Heel Grounder — Standard Style (Standard Performance)

This standard style grounder provides a conductive sole under the heel, and a stretch-nylon strap around the back of the shoe. Made in the USA, this quality grounder features a durable three-layer sole, lot number, and 24 in. (60.9 cm) multi-strand ribbon. ESD SP9.2 Type A.

3M™ Heel Grounder, Standard Style

Product No.	Description
HGS1M	Heel Grounder — Standard Style

Features

- Black elastic back.
- 24 in. (60.9 cm) multi-strand ribbon.
- Lot coded.
- 1 megohm resistor.

3M™ Heel Grounder — Standard Style, High Visibility (Standard Performance)

This grounder features a D-ring and elastic hook and loop for full adjustability. Compliance verification is simplified by the bright red elastic strap. ESD SP9.2 Type A.

3M™ Heel Grounder, Standard Style, High Visibility

3M™ Heel Grounder, Standard Style, High Visibility

Product No.	Description
HGS1MD-RED	Heel Grounder — Standard Style, High Visibility

Features

- D-ring closure.
- Black hook and loop, red elastic back.
- 1 megohm resistor.
- Lot coded.

3M™ Heel Grounder Assembly (Economy Performance)

The 3M Economy Heel Grounder 2044 — a cup style heel grounder with a high visibility "yellow glow" strap that helps facility supervisors effectively manage their static control program. With the Economy Heel Grounder 2044, supervisors may now see at a single glance whether employees are properly wearing their heel grounding assemblies, and know that their company is protected against static damage. Designed for dependability and cost-efficiency, the Heel Grounder 2044 grounds mobile personnel when they are in contact with conductive and dissipative flooring, and should be an integral part of any static control system in the workplace. ESD SP9.2 Type A.

3M™ Shoe Grounder Assembly 2044

Product No.	Description
2044	Economy Shoe Grounder Assembly with a 1 megohm resistor

To be effective, shoe grounders must be worn on both feet.

Features

- Yellow-green glow strap for visibility.
- 1 megohm resistor.
- Low cost.

3M™ Heel Grounder — Cup Style, High Visibility (Economy Performance)

Designed to be cost-effective and durable. A double life span, three-layer sole, and 24 in. (60.9 cm) multi-strand ribbon make this grounder a good choice for high volume grounder use. Green hook and loop provides visual verification that heel grounders are being used. The elastic strap offers comfortable adjustability. ESD SP9.2 Type A.

3M™ Heel Grounder, Cup Style, High Visibility

3M™ Heel Grounder, Cup Style, High Visibility

Product No.	Description
HGC1M-ECG	Heel Grounder — Cup Style, Economy High Visibility

Features

- Green hook and loop for visibility.
- 3-layer rubber sole.
- Elastic strap for comfort.
- 1 megohm resistor.
- Lot coded for QC traceability.
- Low cost.

3M™ Heel Grounder — Cup Style (Economy Performance)

Designed to be cost-effective and durable. A double life span, three-layer sole, 18 in. (45.7 cm) multi-strand ribbon, and a low price make this grounder a good choice when high volume grounder use and turnover is costing too much. ESD SP9.2 Type A.

3M™ Heel Grounder, Cup Style

3M™ Heel Grounder, Cup Style

Product No.	Description
HGC1M-EC	Heel Grounder — Cup Style, Economy

Features

- Low cost.
- 18 in. (45.7 cm) ribbon.
- Double life span, 3-layer sole.
- 1 megohm resistor.

3M Products are ESD 20.20 Program Compliant

3M™ Toe Grounder Assembly (Premium Performance)

Designed for use with high-heeled shoes, the 3M Toe Grounder Assembly 2053 grounds personnel when they are in contact with conductive/dissipative flooring. A comfortable elastic toe strap and 12 in. (30.5 cm) long conductive ribbon for insertion into the shoe complete the ground path to the operator. To be effective, the shoe grounders must be worn on both feet. Available with a 1 megohm resistor. ESD SP9.2 Type A.

3M™ Toe Grounder Assembly 2053

Product No.	Description
2053	Toe Grounder Assembly with a 1 megohm resistor

Features

- Use with high-heeled shoes.
- 12 in. (30.5 cm) conductive ribbon.
- 1 megohm resistor.
- Date coded for traceability.

3M™ Toe Grounder (Economy Performance)

Fits high heels and other shoes that traditional heel grounders won't. Made in the USA, this quality grounder features a durable three layer sole, lot number, and 12 in. (30.5 cm) multi-strand ribbon. ESD SP9.2 Type A.

3M™ Toe Grounder

Product No.	Description
TG1M	Toe Grounder

Features

- Buckle for easy adjustment.
- Elastic strap for comfort.
- 1 megohm resistor.
- Lot coded.
- UL Listed.

3M™ Disposable Shoe Grounder Assembly (Economy Performance)

3M Disposable Shoe Grounding Straps 2045 provide a reliable path for static charge to drain to ground when personnel are wearing shoes with insulative soles.

The shoe grounding straps are especially desirable in work situations where personnel must move around — wave soldering, automatic insertion or operation of sensitive computerized equipment. To be effective, the shoe grounders must be worn on both feet. ESD SP9.2 Type C.

3M™ Disposable Shoe Grounding Straps 2045

Product No.	Description
2045	Disposable Shoe Grounding Straps (100 per box). One size fits all low cut shoes.

Features

- One-time use.
- Adheres to shoe sole.
- Packaged 100 per box.
- Date coded for traceability.

⚠ Warning:

The 3M Disposable Shoe Grounding Strap 2045 is not to be used in areas where the individual may come in contact with exposed electrical circuitry exceeding 120 Volts AC.

3M™ Disposable Heel Grounder (Economy Performance)

The Disposable Foot Grounder 5402 is a low cost personnel grounder that is ideal for one-time or limited use applications. Adhesive at one end of the foot grounder secures it to the bottom of your shoe. The other end tucks inside the heel of the shoe without the need for adhesives or metal clips that might mar the upper part of your shoe. The bright yellow and black stripes makes visual verification simple. Packaged 100 per bag. ESD SP9.2 Type C.

3M™ Disposable Heel Grounder

3M™ Disposable Heel Grounder

Product No.	Description
5402	Disposable Heel Grounder (100 per bag.)

Features

- Ideal for one-time or limited use.
- Low cost personnel grounder.
- Bright yellow for visibility.
- Packaged 100 per bag.

3M Products are ESD 20.20 Program Compliant

Notes

3M™ Combination Wrist Strap and Footwear Tester

This basic combination wrist strap and footwear tester allows associates to test their own wrist straps, heel grounders or shoes. Results are immediate and easy to understand. A red light indicates high resistance and a yellow light indicates a resistance that is too low. A green “Pass” light and tone indicator indicate a resistance in the acceptable range. Acceptable range is 750k to 100 megohm for footwear. Battery or AC powered. Some assembly required.

3M™ Combination Tester

Product No.	Description
COMBOTESTER	Combination wrist strap and footwear tester

3M™ Mat Product Selection Guide

Construction	Primary Usage	Features	Color	Model	Rtt	Rtg	Roll (Runner) Widths
Premium							
2-Layer Rubber	Table	Resistant to heat and most common solvents, excellent electrical properties, superior lay flat characteristics, thickness 0.065 in. (1.7 mm)	Gray, Blue, Green	8800 Series	1×10^6	5×10^6	2 ft., 2.5 ft., 3 ft., 4 ft. (0.6 m, 0.76 m, 0.9 m, 1.2 m)
3-Layer Vinyl	Table	Excellent electrical properties, thickness 0.138 in. (3.5 mm)	Gray, Blue, Brown	8200 Series	4×10^7	1×10^7	2 ft., 2.5 ft., 3 ft., 4 ft. (0.6 m, 0.76 m, 0.9 m, 1.2 m)
Conductive Plastic/Rubber	Floor	Conductive, resistant to heat and most common solvents, thickness 0.125 in. (3.2 mm)	Black	1864	6×10^2	9×10^2	2 ft. (0.6 m)
Anti-Fatigue	Floor	Durable rubber "cells" construction, static control and minimize fatigue, thickness 0.625 in. (1.6 mm)	Black	9900 Series	$<1 \times 10^6$	$<2 \times 10^6$	3 ft. (0.9 m)
Standard							
Ultra R-2 Layer Rubber	Table	Resistant to heat and chemicals, excellent electrical properties, thickness 0.060 in. (1.5 mm)	Gray, Blue, Green	RM (W in. x L in.) L2RGR RM (W in. x L in.) L2RBL RM (W in. x L in.) L2RGN	1×10^6	1×10^7	2 ft., 2.5 ft., 3 ft., 4 ft. (0.6 m, 0.76 m, 0.9 m, 1.2 m)
3-Layer Vinyl	Table	Excellent electrical properties, thickness 0.125 in. (3.2 mm)	Gray, Blue	TM (W in. x L in.) L3GR TM (W in. x L in.) L3BL	1×10^7	1×10^7	2 ft., 2.5 ft., 3 ft., 4 ft. (0.6 m, 0.76 m, 0.9 m, 1.2 m)
Economy							
1-Layer Vinyl	Table and Floor	Good lay flat characteristics, low cost, thickness 0.093 in. (2.4 mm) Not compatible with monitors	Gray, Blue	TM (W in. x L in.) L1GR TM (W in. x L in.) L1BL	$1 \times 10^{9\text{-}10}$	$1 \times 10^{9\text{-}10}$	2 ft., 2.5 ft., 3 ft., 4 ft. (0.6 m, 0.76 m, 0.9 m, 1.2 m)
Conductive Rubber	Floor	Conductive, resistant to heat and solvents, thickness 0.060 in. (1.5 mm), low cost	Black	COND (W in. x L in.) FM	$1 \times 10^{5\text{-}6}$	$1 \times 10^{5\text{-}6}$	2 ft., 3 ft., 4 ft. (0.6 m, 0.9 m, 1.2 m)
Anti-Fatigue	Floor	Foamed vinyl, static control and minimize fatigue, thickness 0.375 in. (9.5 mm)	Brown, Gray	AFM (W in. x L in.) L1VBR AFM (W in. x L in.) L1VGR	$1 \times 10^{9\text{-}10}$	$1 \times 10^{9\text{-}10}$	3 ft. (0.9 m)

Cut Mats or Rolls, 3M Provides the Best Worksurfaces

Whether you need a worksurface that can handle solder and solvents, or an anti-fatigue mat for comfort, 3M Table and Floor Mats provide the static control and mechanical performance to fit your application. All 3M matting is available in rolls. Most materials are available in 2 ft., 2.5 ft., 3 ft. or 4 ft. (0.6 m, 0.76 m, 0.9 m, 1.2 m) widths. 3M also supplies the accessories you need to install the mats you cut, including snaps, snap tool, ground cords, mat cleaner and test meter. 3M can custom-cut mats to the sizes you need.

Get Worksurface Support Items from 3M

3M™ Snap Tool

3M™ Test Kit 701

3M™ Ground Cords 3040/3048

3M™ Surface Mark Remover 8001

3M™ Ground Cord Product Selection Guide

Features	Model
Premium	
Ground Cord, 15 ft. (4.5 m) with 10 mm snap, connects mats to building ground, integral 1 megohm resistor	3040
Ground Kit for 3M Static Dissipative Laminate, 10 ft. (3.0 m) cord, integral 1 megohm resistor	3041
Common Point Grounding System for 2 wrist straps, 10 ft. (3.0 m) cord	3042
Interconnect Mat Cord, 5 ft. (1.5 m) with 10 mm snap at each end, connects mats to each other	3043
Common Point Grounding System for workstation components, single-row, six terminal strip, 10 ft. (3.0 m) ground cord, integral 1 megohm resistor	3047
Common Point Grounding System for 2 wrist straps and table mat, 15 ft. (4.5 m) cord, 10 mm snap, integral 1 megohm resistor	3048
Economy	
Ground Cord, 15 ft. (4.5 m) with 10 mm snap, connects mats to building ground, integral 1 megohm resistor, low cost	FGC151M
Common Point Grounding System for 2 wrist straps and table mat, 15 ft. (4.5 m) cord, 10 mm snap, integral 1 megohm resistor, low profile, low cost	LPCGC151M
Metal Grounding Block Common Point Grounding System for 2 wrist straps, 10 ft. (3.0 m) cord, low cost	WSGR2

3M™ Dissipative Rubber Mats and Rolls (Premium Performance)

3M Static Dissipative Rubber Mats and Rolls 8800 Series consist of a top layer of static dissipative rubber laminated to a bottom layer of conductive rubber. Both layers are made from vulcanized synthetic rubber, which offers excellent resistance to oil, grease and most common solvents. They offer superior resistance to heat and hot solder as compared to vinyl or olefinic materials. Non-standard sizes are available on a custom order basis. Compatible with constant monitors.

3M™ Floor Mats 8870 Series

Dissipative floor mats include one 15 ft. (4.6 m) 3M™ Ground Cord 3040 and two 3M™ Snap Fasteners 3034 (installed).

3M™ Floor Rolls 8880/8890 Series

Dissipative floor rolls include two 15 ft. (4.6 m) 3M Ground Cords 3040 and five 3M Snap Fasteners 3034 to be installed by user.
Note: 8890 Series – no hardware included.

3M™ Table Mats 8810/8830/88A/88B Series

Dissipative table mats include two 3M™ Snap Fasteners 3034 (installed) and one 3M™ Wrist Strap Grounding System 3048.

3M™ Table Rolls 8800/8820/8840/8850/8860 Series

Dissipative table rolls include two 15 ft. (4.6 m) 3M Ground Cords 3040 and five 3M Snap Fasteners 3034 to be installed by the user.
Note: 8800, 8820 and 8850 – no hardware included.

3M™ Static Dissipative Rubber Mat

Meets the requirement of ESD Standard 4.1, ESD Standard 20.20, EIA 625, MIL-HDBK-263, and MIL-STD-1686. RTG: 10^7 ohm; RTT: 10^7; Thickness: .065 in. Compatible with constant monitors.

Properties

Property	Typical Value
Material	Top and Bottom Layers — Nitrile™ Rubber
Thickness	0.065 in. (1.7 mm)
Hardness	60 Shore A
*Resistance	
(Surface to Ground)	5 x 10^6 ohm
(Surface to Surface)	1 x 10^6 ohm

Product No.	Description	Size, ft.	(m)
8800	Table Roll, No Hardware, Gray	2 x 40	(0.6 x 12.2)
8801	Table Roll, No Hardware, Blue	2 x 40	(0.6 x 12.2)
8802	Table Roll, No Hardware, Green	2 x 40	(0.6 x 12.2)
8810	Table Mat, Gray	2 x 4	(0.6 x 1.2)
8811	Table Mat, Blue	2 x 4	(0.6 x 1.2)
8812**	Table Mat, Green	2 x 4	(0.6 x 1.2)
8820	Table Roll, No Hardware, Gray	2.5 x 40	(0.75 x 12.2)
8821	Table Roll, No Hardware, Blue	2.5 x 40	(0.75 x 12.2)
8822	Table Roll, No Hardware, Green	2.5 x 40	(0.75 x 12.2)
8830	Table Mat, Gray	3 x 4	(0.9 x 1.2)
8831	Table Mat, Blue	3 x 4	(0.9 x 1.2)
8832	Table Mat, Green	3 x 4	(0.9 x 1.2)
8840	Table Roll, Gray	2 x 24	(0.6 x 7.2)
8841	Table Roll, Blue	2 x 24	(0.6 x 7.2)
8842**	Table Roll, Green	2 x 24	(0.6 x 7.2)
8850	Table Roll, No Hardware, Gray	3 x 40	(0.9 x 12.2)
8851	Table Roll, No Hardware, Blue	3 x 40	(0.9 x 12.2)

* Tested per ESD Association Standard S4.1 at 72°F, 50% RH using 3M™ Test Kit 701 for Static Control Surfaces (Megohmmeter).
** Note: Green mat table/runner identifies work surface as a lead-free area.

3M Products are ESD 20.20 Program Compliant

Product No.	Description	Size, ft.	(m)
8852	Table Roll, No Hardware, Green	3 x 40	(0.9 x 12.2)
8860	Table Roll, Gray	3 x 24	(0.9 x 7.2)
8861	Table Roll, Blue	3 x 24	(0.9 x 7.2)
8862	Table Roll, Green	3 x 24	(0.9 x 7.2)
8870	Floor Mat, Gray	4 x 6	(1.2 x 1.8)
8871	Floor Mat, Blue	4 x 6	(1.2 x 1.8)
8872	Floor Mat, Green	4 x 6	(1.2 x 1.8)
8880	Floor Roll, Gray	4 x 24	(1.2 x 7.2)
8881	Floor Roll, Blue	4 x 24	(1.2 x 7.2)
8882	Floor Roll, Green	4 x 24	(1.2 x 7.2)
8890	Floor Roll, No Hardware, Gray	4 x 40	(1.2 x 12.2)
8891	Floor Roll, No Hardware, Blue	4 x 40	(1.2 x 12.2)
8892	Floor Roll, No Hardware, Green	4 x 40	(1.2 x 12.2)
88A0	Table Mat, Gray	2 x 3	(0.6 x 0.9)
88A1	Table Mat, Blue	2 x 3	(0.6 x 0.9)
88A2	Table Mat, Green	2 x 3	(0.6 x 0.9)
88B0	Table Mat, Gray	2 x 2	(0.6 x 0.6)
88B1	Table Mat, Blue	2 x 2	(0.6 x 0.6)
88B2	Table Mat, Green	2 x 2	(0.6 x 0.6)

Non-standard sizes available on custom order basis up to 50 ft. (15.2 m) maximum length.

Product Referral Generator

Wrist Straps . . . . . pg. 2
Heel Grounders . . . . . pg. 26
Static Control Surface Mark Remover . . . . . pg. 44

3M™ Dissipative Vinyl Three-Layer Mats and Rolls (Premium Performance)

3M Mats and Rolls 8200 Series are soft table and floor mats with a unique three-layer construction. The top layer is durable static dissipative vinyl, which has sufficiently low resistance to discharge static-laden conductors, yet will prevent the shorting of pins on the backs of printed circuit boards laid on the mat. The middle layer is a highly conductive scrim that provides the main discharge path to ground, and the bottom layer is static dissipative foam, providing a durable nonskid cushion. Non-standard sizes are available on a custom order basis. Compatible with constant monitors.

3M™ Floor Mats 8200 Series

Includes one 15 ft. (4.6 m) 3M™ Ground Cord 3040 and two 3M™ Snap Fasteners 3050 (installed).

3M™ Floor Rolls 8250, 8290, 82A Series

Includes two 15 ft. (4.6 m) 3M Ground Cords 3040 and two 3M Snap Fasteners 3050 to be installed by customer.
Note: 8290 and 82A – no hardware included.

3M™ Table Mats 8210 + 8220 Series

Includes two 3M Snap Fasteners 3050 (installed) and one 3M™ Wrist Strap Grounding System 3048. Wrist Straps must be ordered separately.

3M™ Table Rolls 8230, 8240, 8260, 8270, 8280 Series

Includes two 15 ft. (4.6 m) 3M Ground Cords 3040 and two 3M Snap Fasteners 3050 to be installed by user.
Note: 8230, 8240, 8270 and 8280 – no hardware included.

3M™ Mats and Rolls 8200 Series

Properties

Property	Typical Value
Material	Top and Bottom Layers — Vinyl
Thickness	0.138 in. (3.5 mm)
Hardness	40 – 50 Shore A
*Resistance	
(Surface to Ground)	1 x 10^7 ohm
(Surface to Surface)	4 x 10^7 ohm

* Tested per ESD Association Standard S4.1 at 72°F, 50% RH using 3M™ Test Kit 701 for Static Control Surfaces (Megohmmeter).

Note: Non-standard sizes available on custom order basis up to 50 ft. (15.2 m) maximum length.

3M Products are ESD 20.20 Program Compliant

Product No.	Description	Size, ft.	(m)
8201	Floor Mat, Brown	4 x 6	(1.2 x 1.8)
8203	Floor Mat, Gray	4 x 6	(1.2 x 1.8)
8204	Floor Mat, Blue	4 x 6	(1.2 x 1.8)
8211	Table Mat, Brown	2 x 4	(0.6 x 1.2)
8213	Table Mat, Gray	2 x 4	(0.6 x 1.2)
8214	Table Mat, Blue	2 x 4	(0.6 x 1.2)
8221	Table Mat, Brown	2 x 3	(0.6 x 0.9)
8223	Table Mat, Gray	2 x 3	(0.6 x 0.9)
8224	Table Mat, Blue	2 x 3	(0.6 x 0.9)
8231	Table Roll, No Hardware, Brown	2 x 50	(0.6 x 15.0)
8233	Table Roll, No Hardware, Gray	2 x 50	(0.6 x 15.0)
8234	Table Roll, No Hardware, Blue	2 x 50	(0.6 x 15.0)
8241	Table Roll, No Hardware, Brown	2.5 x 50	(0.75 x 15.0)
8243	Table Roll, No Hardware, Gray	2.5 x 50	(0.75 x 15.0)
8244	Table Roll, No Hardware, Blue	2.5 x 50	(0.75 x 15.0)
8251	Floor Roll, Brown	4 x 24	(1.2 x 7.2)
8253	Floor Roll, Gray	4 x 24	(1.2 x 7.2)
8254	Floor Roll, Blue	4 x 24	(1.2 x 7.2)
8261	Table Roll, Brown	2 x 24	(0.6 x 7.2)
8263	Table Roll, Gray	2 x 24	(0.6 x 7.2)
8264	Table Roll, Blue	2 x 24	(0.6 x 7.2)
8271	Table Roll, No Hardware, Brown	3 x 50	(0.9 x 15.0)
8273	Table Roll, No Hardware, Gray	3 x 50	(0.9 x 15.0)
8274	Table Roll, No Hardware, Blue	3 x 50	(0.9 x 15.0)
82A1	Floor Roll, No Hardware, Brown	4 x 50	(1.2 x 15.0)
82A3	Floor Roll, No Hardware, Gray	4 x 50	(1.2 x 15.0)
82A4	Floor Roll, No Hardware, Blue	4 x 50	(1.2 x 15.0)
8281	Table Roll, No Hardware, Brown	2 x 40	(0.6 x 12.2)
8283	Table Roll, No Hardware, Gray	2 x 40	(0.6 x 12.2)
8284	Table Roll, No Hardware, Blue	2 x 40	(0.6 x 12.2)
8291	Floor Roll, No Hardware, Brown	4 x 40	(1.2 x 12.2)
8293	Floor Roll, No Hardware, Gray	4 x 40	(1.2 x 12.2)
8294	Floor Roll, No Hardware, Blue	4 x 40	(1.2 x 12.2)

The requirements of ESD Standard 4.1, ESD Standard 20.20, EIA 625, MIL-HDBK-263, and MIL-STD-1686. RTG: 10^7 ohm; RTT: 10^7; Thickness: .0125 in. Compatible with Constant Monitors.

3M™ Ultra-R2 Rubber — Two Layer (Standard Performance)

Excellent resistance to solvents, hot solder and soldering irons makes the Ultra-R2 mats an excellent static safe work surface. Excellent electrical performance is provided by using a two-layer combination of static dissipative and conductive rubber materials. Ultra-R2 mats combine the low contact resistance and convenience of soft mats, and the conductivity and durability of hard laminates. Meets the requirements of ESD Standard 4.1, ESD Standard 20.20, EIA 625, MIL-HDBK-263, and MIL-STD-1686. Rtg: 10^6 ohm; Rtt: 10^7 ohm; Thickness: 0.060 in. (1.5 mm). Compatible with constant monitors.

3M™ Mat Kits

Includes mat, two snaps, installed, and a 15 ft. (4.5 cm) ground cord

Size	Blue P/N	Gray P/N	Green P/N
24 in. x 36 in. (60.1 cm x 91.4 cm)	RM2436L2RBL-L	RM2436L2RGR-L	RM2436L2RGN-L
24 in. x 48 in. (60.1 cm x 121.9 cm)	RM2448L2RBL-L	RM2448L2RGR-L	RM2448L2RGN-L

Rolls/Runners

2 ft. x 50 ft. (0.61 m x 15.0 m)	RM24600L2RBL	RM24600L2RGR	RM24600L2RGN
3 ft. x 50 ft. (0.9 m x 15.0 m)	RM36600L2RBL	RM36600L2RGR	RM36600L2RGN
2.5 ft. x 50 ft. (0.76 m x 15.0 m)	RM30600L2RBL	RM30600L2RGR	NA
4 ft. x 50 ft. (1.2 m x 15.0 m)	RM48600L2RBL	RM48600L2RGR	RM48600L2RGN

Call for custom sizes.

Use green mats to indicate lead-free work areas.

3M™ Dissipative Vinyl — Three-Layer (Standard Performance)

This three-layer vinyl mat provides excellent electrical properties. The top layer is tough, easy to clean, dissipative vinyl. The center layer, a highly conductive metal scrim, moves the charge from the surface to ground quickly. The bottom layer is a durable, non-skid cushion of dissipative foam. While not as durable as the two-layer rubber material, this three-layer vinyl is designed to be cost effective. Meets the requirements of ESD Standard 4.1, ESD Standard 20.20, EIA 625, MIL-HDBK-263, and MIL-STD-1686. Rtg: 10^7 ohm; Rtt: 10^7 ohm; Thickness: 0.125 in. (3.2 mm). Compatible with constant monitors.

3M™ Dissipative Vinyl Mat

3M™ Mat Kits

Includes mat, two snaps, installed, and a 15 foot ground cord

Size	Blue P/N	Gray P/N
24 in. x 36 in. (60.1 cm x 91.4 cm)	TM2436L3RBL-L	TM2436L3RGR-L
24 in. x 48 in. (60.1 cm x 121.9 cm)	TM2448L3RBL-L	TM2448L3RGR-L

Rolls

2 ft. x 50 ft. (0.61 m x 15.0 m)	TM24600L3RBL	TM24600L3RGR
3 ft. x 50 ft. (0.9 m x 15.0 m)	TM36600L3RBL	TM36600L3RGR
2.5 ft. x 50 ft. (0.76 m x 15.0 m)	TM30600L3RBL	TM30600L3RGR
4 ft. x 50 ft. (1.2 m x 15.0 m)	TM48600L3RBL	TM48600L3RGR

Call for custom sizes.

3M™ Vinyl — Homogeneous (Economy Performance)

One-layer static dissipative vinyl for good electrical properties and long wear. Meets the requirements of MIL-HDBK-263 and MIL-STD-1686. Rtg: 10^9-10^{10} ohm; Rtt: 10^9-10^{10} of ohm; Thickness: 0.093 in. (0.23 cm). Not compatible with workstation monitors.

3M™ Mat Kits

Includes mat, two snaps, installed, and a 15 foot ground cord

Size	Blue P/N	Gray P/N
24 in. x 36 in. (60.1 cm x 91.4 cm)	TM2436L1BL-L	TM2436L1GR-L
24 in. x 48 in. (60.1 cm x 121.9 cm)	TM2448L1BL-L	TM2448L1GR-L

Rolls

2 ft. x 50 ft. (0.61 m x 15.0 m)	TM24600L1BL	TM24600L1GR
3 ft. x 50 ft. (0.9 m x 15.0 m)	TM36600L1BL	TM36600L1GR
2.5 ft. x 50 ft. (0.76 m x 15.0 m)	TM30600L1BL	TM30600L1GR
4 ft. x 50 ft. (1.2 m x 15.0 m)	TM48600L1BL	TM48600L1GR

Call for custom sizes. All mat kits are also available without the kit accessories.

3M™ Conductive Floor Mats for Hard Floors (Premium Performance)

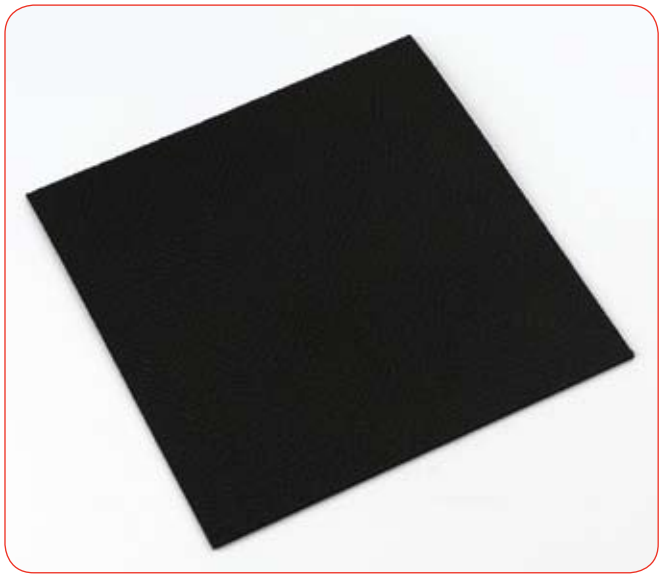
The main purpose of a conductive floor mat or roll is to remove static charge from personnel as they approach work areas. Floor mats provide significant passive protection in well-traveled assembly areas. Continuous runners extend static protection throughout and between entire areas.

3M™ Floor Mat 1864

This semi-flexible conductive floor mat contains a rubber filler for resilience. It also has a textured surface for better traction. It includes two 3M™ Snap Fasteners 3034 (installed) and one 15 ft. (4.6 m) 3M™ Ground Cord 3040 with a 1 megohm resistor.

3M™ Floor Rolls 1864R

The 3M™ Floor Roll 1864R is a 50 ft. long roll of the mat material 1864. It includes two 15 ft. (4.6 m) 3M Ground Cords 3040 with 1 megohm resistor, five 3M Snap Fasteners 3034 and one 3M™ Snap Fastener Installation Tool.



3M™ Floor Mat 1864

Product No.	Description	Size, ft.	(m)
1864	Floor Mat 0.125 in. (3.2 mm) thick	4 x 6 4 x 8	(1.2 x 1.8) (1.2 x 2.4)
1864R	Floor Roll 0.125 in. (3.2 mm) thick	2 x 50	(0.6 x 15.0)

Conductive Floor Mats 1864 are black. Non-standard sizes are available on a custom order basis.

Properties

Property	Typical Value
Material	EVA Copolymer/Rubber
Thickness	0.125 in. (3.2 mm)
Hardness	80-85 Shore A
*Resistance	
(Surface to Ground)	9 x 10^2 ohm
(Surface to Surface)	6 x 10^2 ohm
**Resistivity	10^2 ohm-cm

* Tested per ESD Association Standard S4.1 at 72°F, 50% RH using 3M Test Kit 701 for Static Control Surfaces (Megohmmeter).
**Tested per ASTM D 257

3M Products are ESD 20.20 Program Compliant

3M™ Conductive Rubber Floor Mats — Homogeneous (Economy Performance)

Homogenous conductive rubber construction provides resistance to wear, hot solder, oil grease, and solvents. This mat's conductive resistance value provides rapid discharge from personnel wearing heel grounders. The low profile reduces trip hazard and is preferred for use with rolling carts or chairs. Mat can be reversed for double usage. ESD Standard 20.20, EIA 625, MIL-HDBK-263, and MIL-STD-1686. Rtg: 10^5 ohm; Rtt: 10^5 ohm; Thickness: 0.060 in. (1.5 mm)

3M™ Conductive Rubber Floor Mats

Mat Kits

Includes mat, two snaps, installed, and a 15 ft. (4.5 cm) ground cord

Size	Black P/N
48 in. x 72 in. (1.2 m x 1.8 m)	COND4872FM-F

Rolls

2 ft. x 50 ft. (0.6 m x 15.0 m)	COND24600FM
3 ft. x 50 ft. (0.9 m x 15.0 m)	COND36600FM
4 ft. x 50 ft. (1.2 m x 15.0 m)	COND48600FM
Call for custom sizes.	

3M™ Anti-Fatigue Mats (Premium Performance)

3M Static Control Anti-Fatigue Mats allow workers to stand comfortably for long periods while minimizing the fatigue associated with standing work. Manufactured from durable rubber, 3M Anti-Fatigue Mats consist of a matrix of hollow cylinders that function like a spring when compressed. These mats are designed to provide a durable cushion that offers secure, stable footing and a unique energizing responsiveness.

Their structure provides a stable surface supported by rubber cells that soften in response to surface activity. These cells provide an effective cushioning solution because the 3M Static Control Anti-Fatigue Mats get softer as compressed, not harder like products made of foam.

3M™ Anti-Fatigue Mat 9910

3M™ Anti-Fatigue Mat 9920

Product No.	Description
9900	Static Control Anti-Fatigue Mat 3 ft. W x 5 ft. L (0.9 m x 1.5 m). Includes one installed ground snap and one 15 ft. (4.6 m) ground cord.
9910	Static Control Anti-Fatigue Roll. 3 ft. (0.9 m) x custom length. Includes appropriate number of ground cords.
9920	Static Control Anti-Fatigue Mat. 22 in. (55.9 cm) octagonal shape. Includes one installed ground snap and one 15 ft. (55.9 cm) ground cord.
CTK9900-331	Static Control Anti-Fatigue Mat 3 ft. W x 5 ft. L (0.9 m x 1.5 m). Mat and operator monitoring system. Includes: two installed ground snaps, two 15 ft. ground cords, CTC331-WW Iron Man Plus Monitor.

Properties

Property	Typical Value
Size	Standard: 3 ft. W x 5 ft. L (0.9 m and 1.5 m) and octagonal 22 in. (55.9 cm) diameter. Rolls: 3 ft. (0.9 m) width x custom length.
Thickness	0.625 in. (1.55 cm) with beveled edge
Durometer	42 Shore A
Weight	2 lbs. per square ft.
Composition	SBR rubber polymers
Flammability	NFPA Rating (Scale 1–4) Fire: 1
Cleaning	Sweep, vacuum or damp mop
Color	Black
Edges	Solid molded rubber
*Resistance Surface to Surface Surface to Ground	 <1 x 10^6 ohm <2 x 10^6 ohm (When connected through 3M™ Ground Cord 3040)
Coefficient of Friction	Greater than 1.0 C.O.F.
Temperature Use Range	-40°F to 180°F (-40°C to 82°C)
Chemical Resistance	Water — Excellent Acids — Fair-Good Alkali — Fair Alcohols — Good Oils & Gasoline — Poor Aliphatic Hydrocarbons — Poor Aromatic Hydrocarbons — Poor

* Tested per ESD STMS7.1 at 72°F, 12% RH on 3 ft. x 5 ft. (0.9 m x 1.5 m) mat

3M™ Vinyl Anti-Fatigue Mat (Economy Performance)

This 3/8 inch thick foamed vinyl mat provides relief and comfort for personnel that must stand or walk for long periods. Embossing improves traction. Meets the requirements of MIL-HDBK-263 and MIL-STD-1686. Rtg: 10^9-10^{10} ohm; Rtt: 10^9-10^{10} ohm

Mat Kits

Includes mat, two snaps, installed, and a 15 foot ground cord

Size	Gray P/N	Brown P/N
24 in. x 36 in. (60.1 cm x 91.4 cm)	AFM2436GR-F	AFM2436BR-F
36 in. x 60 in. (91.4 cm x 152.4 cm)	AFM3660GR-F	AFM3660BR-F
Rolls		
3 ft. x 60 ft. (0.9 m x 18.3 m)	AFM36720GR	AFM36720BR
Call for custom sizes.		

3M™ Dissipative Hard Laminate Sheets

Dissipative Hard Laminate Sheets are used where a hard, durable, electrically safe surface is needed, providing a low coefficient of friction to permit heavy objects to slide easily. Controlled conductivity (surface-to-ground) virtually eliminates shock hazard when working on a powered component.

This material is post-formable with normal high pressure laminate process techniques used by furniture makers. Using this technique, a tight 0.5 in. (12.7 mm) radius is possible, which allows installation without seams in corners and over rounded edges when forming parallel to sanding lines. The laminate provides a comfortable rounded front on which personnel can rest their arms. It is resistant to common solvents and to hot solder droppings.

3M™ Dissipative Hard Laminate Sheets

Note: For consistent static charge dissipation from rigid, conductive flat-bottomed totes and trays, use of a pad or mat of 3M Dissipative Vinyl Material 8200 in conjunction with this static-protective hard laminate is suggested, especially in areas where relative humidity often drops below 30%.

Product No.	Color	Size, ft.	(m)
8360	Beige	4 x 8 3 x 12 5 x 12	(1.2 x 2.4) (0.9 x 3.7) (1.5 x 3.7)
8365	Gray	4 x 8 3 x 12 5 x 12	(1.2 x 2.4) (0.9 x 3.7) (1.5 x 3.7)
8375	White	5 x 12	(1.5 x 3.7)

Non-standard sizes and colors are also available, subject to minimum order quantity.

Properties

Property	Typical Value
Thickness	0.037 in. (0.94 mm)
Hardness Abrasion resistance:	> 1500 cycles Tabor Wheel 32
*Resistance	
(Surface to Ground)	7 x 10^6 ohm
(Surface to Surface)	6 x 10^7 ohm

* Tested per ESD Association Standard 4.1 at 72oF, 50% RH using 3M Test Kit 701 for Static Control Surfaces (Megohmmeter)

Product Referral Generator

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Monitors . . . . . pg. 12
Static Control Surface Mark Remover . . . . . pg. 44

3M™ Dissipative Rigid Worksurfaces

Static Dissipative Rigid Worksurface 8300 Series have the high abrasion resistance of a laminate, yet are as easy to install as table mats. The nonglare surface also resists staining, scorching and common solvents. All edges and corners are rounded, and the laminate comes ready to use with two factory-installed snap fasteners, and one 3M™ Grounding System 3048 for wrist strap/table mat.

3M™ Rigid Worksurface 8300 Surface

Product No.	Color	Size, in.	(cm)
8343	Beige	0.125 x 24 x 36	(0.32 x 61.0 x 91.0)
8344	Gray	0.125 x 24 x 36	(0.32 x 61.0 x 91.0)
8353	Beige	0.125 x 24 x 36	(0.32 x 61.0 x 91.0)
8354	Gray	0.125 x 24 x 36	(0.32 x 61.0 x 91.0)

Product Referral Generator

Dissipative Rubber Mats/Rolls . . . . . pg. 37
Static Control Surface Mark Remover . . . . . pg. 44
Static Control Floor Tile . . . . . pg. 112

3M™ Clean Walk Mats

3M Clean Walk Mats 5830 are designed to remove dirt and contaminants from shoe soles, wheels and other passing objects on contact. When the top sheet becomes soiled, it can be peeled back to reveal a clean adhesive sheet underneath.

3M™ Clean Walk Mats 5830

Product No.	Description
5380	Clean Walk Mats, 30 mats per pad **Size, in. (cm)** 18 x 36 (45.7 x 85.7) 18 x 45 (45.7 x 114.3) 25 x 45 (63.5 x 114.3)

3M™ Worksurface Cleaning Products

The 3M Static Control Surface Mark Remover 8001 is an extra-strength fluid that is designed to remove ordinary dirt and grime as well as difficult spots and stains from all types of static control surfaces, such as table mats, floor mats, hard-laminate benchtops, portable field-service kit work surface, etc. Unlike many cleaning products, the 3M Static Control Surface Mark Remover 8001 is not corrosive, per FTMS 101C, Method 3005, and leaves no tacky residue that attracts dirt, attacks delicate parts, or increases the contact resistance of the surface. It is a clear, colorless, homogeneous, water-based liquid that contains detergents, conditioners and other cleaning additives and has a fresh, clean scent.

3M laboratory tests have proven the cleaner to be an excellent topical antistat, maintaining a consistent surface resistivity ($1x10^{11}$ ohm/square) over extended periods in both normal (55% RH) and dry (13% RH) environments. Simply spray on any washable surface and wipe off with a clean cloth or sponge — no rinsing required. The cleaner is designed to be used full-strength and supplied in handy quart spray bottles.

Product No.	Description
8001	Surface Mark Remover Size: 1 quart spray (32 oz.) Shelf-life: two years

3M™ Static Control Surface Mark Remover 8001

3M™ Topical Antistatic Spray

Staticide is a safe, easy-to-use, topical antistatic solution that can be applied to walls, ceilings, floors, carpets, fixtures, worksurfaces, tools, equipment, conveyor belts, clothing, and other materials to render them non-static generating. Meets the requirements for topical antistats as required in MIL-HDBK-263. Available in 1 quart spray bottle or 1 gallon jug.

Product No.	Description
ANTISTAT1QT or ANTISTAT1GAL	Topical Antistat Spray Size: 1 quart spray (32 oz.) 1 gallon jug

3M™ Static Safe Hand Lotion

This static dissipative, non-contaminating lotion keeps skin moist for better contact between the wrist strap and the skin, as recommended by MIL-HDBK-263. Available in 8 oz. or 1 gallon plastic bottles.

Product No.	Description
LOTION8OZ or LOTION1GAL	Static Safe Hand Lotion Size: 8 oz. 1 gallon

3M™ Ionizer Selection Guide

Model	960	963	980	991
Type				
Single DC Blower	x	x		
Overhead Triple Fan DC Blower				x
Tool DC Blower	x	x		
Ionizer Gun			x	
Applications				
Workbenches	x	x		x
Tools	x	x		
Material Handling		x	x	x
Industries				
Electronics Assembly	x	x	x	x
Back End Semiconductors	x	x	x	x
Military	x	x	x	x
Medical Equipment	x	x	x	x
Aerospace	x	x	x	x

3M™ Overhead Air Ionizer 991

Using steady-state DC ion emission, the 3M Overhead Air Ionizer 991 provides consistent static control coverage. With its overhead mounting system, the ionizer doesn't compromise valuable space on the workbench, allowing for neutralization of static charges. The steady-state DC ion emission allows fast discharge with low airflow, providing a more comfortable work environment for operators. Emitter points are placed behind the fan to virtually eliminate field-induced charge and to provide a homogenous mixture of ionized air. Also featured are open-cell foam filters on the fan intakes, protecting the internal components from environmental contamination.

3M™ Overhead Air Ionizer 991

Product No.	Description
991	Overhead Air Ionizer 991 with North America Power Cord (98-0798-5683-1) Overhead Air Ionizer 991 with UK Power Cord (98-0798-5684-9) Overhead Air Ionizer 991 with Germany Power Cord (98-0798-5694-8) Overhead Air Ionizer 991 with China Power Cord (98-0798-5695-5)

Product No.	Description
991F	Replacement Filters, three filters/pkg

Specifications

Property	Typical Values
Ion Emission	Steady-state (DC)
Emitter Points	0.12 in. (3.048 mm) tungsten wire, internally shielded, 2 year life estimated
Air Flow	114 CFM (per fan, high speed, free-air)
Audible Noise	63 dB, high fan speed ohm 57 dB, low fan speed ohm
Power Inlet	IEC60320 (with removable line cord)
Input Voltage	100-230 Vac, 50/60 Hz, 27 watts max.
Input Current	0.4A max.
Power	27W max.
Discharge Time	≤ 8 seconds directly under each fan at 18 in. (46 cm) distance; high fan speed
Offset Voltage Balance	≤ ±20 volts directly under each fan at 18 in. (46 cm) distance; high fan speed
Power Outlet	IEC60320 female, unfused, 5A maximum load
Alarm Relay Course	Modular handset jack, rated 1A maximum, 30 volts
Coverage Area	2 ft. W x 4 ft. L (61 cm x 122 cm) directly under ionizer
Controls	Power/fan speed slide switch: High/Off/Low settings
Indicators	Bi-color LED: green power ON; red power supply failure
Daisy-Chain Capacity	10 units maximum
Chassis	Aluminum with epoxy-polyester powder coated
Mounting	Four eyebolts and 1-1/8 in. S-hooks provided
Dimensions	4 H x 6 W x 44 in. L (10.1 x 15.2 x 111.7 cm)
Operating Environment	
Temperature	50°F–95°F (10°C–35°C)
Humidity	20–55% RH (non-condensing)
Ozone Level	< 0.010 ppm
RoHS Compliant	Yes
Weight	10 lbs. (4.5 kg)
Certifications	cULus, TUV-GS, CE, C-Tick

3M™ Ionized Air Gun

The 3M Ionized Air Gun 980/980E is an excellent tool for blowing particulate contamination off of any surface. It releases a balanced stream of compressed ionized air that neutralizes the static charge that can hold particulates to a surface. The loose particles can then be easily blown away. Patented technology ensures balanced ionization for consistent control of surface charges. The air gun does not need adjustment and requires very little maintenance.

3M™ Ionized Air Gun 980

The 3M Air Gun 980 is a multi-component device that consists of a hand unit, an air hose and a mounting console. Compact and lightweight, the console for the unit can be mounted anywhere on the workstation for easy access. It connects to any supply of clean, dry air or nitrogen, and an internal disposable filter collects particles from the air supply. The low-voltage electrical feed from the console to the hand unit is incorporated into the 7 ft. (2.1 m) light, flexible air hose. The gun itself is very lightweight and ergonomically designed for long-term user comfort and efficient operation. The console, gun and air hose are all made of static-dissipative, ESD-safe materials.

The Air Gun 980 operates from 100/120 AC power; the 3M Air Gun 980E is a 230 V version for European use.

Product No.	Description
980F	Replacement Air Filters (4 packs of 3)
980T	Replacement Nozzle Tip
980X/980X	Replacement Wall Transformer, 120 V

Product No.	Description	
980	**Ionized Air Gun** AC 100/120V 50/60 Hz	
	Hand Unit 8.0 H x 3.0 W x 1.0 in. L (20.3 x 7.6 x 2.5 cm)	
	Construction	Dissipative rigid polycarbonate
	Weight	12.0 oz (341 g) with 7 ft. (2 m) air hose
	Emitter Points	Tungsten alloy
	Air Hose Construction	Dissipative flexible polyurethane
	Size	7 in. long, 0.38 in. OD 17 cm x 0.97 cm
	Filter Efficiency	99.9% for 0.1 micron particle size
	Operating Environment	
	Temperature	59°F–95°F (15°C-35°C)
	Humidity	15%–55% RH, non-condensing
	Other Conditions	Product should be used in relatively clean indoor environments
	Console 8.5 H x 3.0 W x 1.6 in. L (21.6 x 7.6 x 4.1 cm)	
	RoHS compliant	Yes
980E	**Ionized Air Gun — European version** AC 230V ~ 50/60 Hz	
	Hand Unit 8.0 H x 3.0 W x 1.0 in. L (20.3 x 7.6 x 2.5 cm)	
	Console 8.5 H x 3.0 W x 1.6 in. L (21.6 x 7.6 x 4.1 cm)	

Product No.	Description
980E-X	Replacement Wall Transformer, 230 V

3M™ Benchtop Air Ionizers

The use of ionized air in electronics work environments will remove the build-up of potentially damaging static charges. Air ionizers are primarily used to control static charge on nonconductive materials. The 3M™ Benchtop Air Ionizer 963 Series blanket the benchtop with ionized air to help prevent static from damaging sensitive electronics.

Features

- Two versions available: The Benchtop Air Ionizer 963 operates using AC 120 V power, and the 3M™ Benchtop Air Ionizer 963E from DC 24 V power supplied by an included universal power transformer (power line cord not included).
- Fast neutralization of static charges on nonconductive objects. < 2 seconds at 1 ft. (30 cm) distance using ANSI/ESD S3.1 test procedure.
- Maintains equal balance of positive-negative ions.
- Two-speed fans.
- Static dissipative housing prevents static charge buildup on the surface of the housing, a common problem with ionizers. "ESD-safe" design allows the ionizer to be part of your overall static-safeguarded electronic workstation.
- UL, C-UL, NOM certification. CE-marked.

Product Referral Generator

Floor Mats/Runners . . . . . pg. 36
Dissipative Rubber Mats/Rolls . . . . . pg. 37

Product No.	Description
963	Benchtop Air Ionizer, including ionizer, Operator's Manual, and power cord; 120 VAC

NOM c UL us LISTED RoHS Compliant 2002/95/EC

Product No.	Description
963E	Benchtop Air Ionizer, including ionizer, Operator's Manual, and power transformer; 100 VAC–240 VAC

NOM CE c UL us LISTED RoHS Compliant 2002/95/EC

3M™ Benchtop Air Ionizer 963

Physical Characteristics

Property	Typical Value	
	963	963E
Power Ratings	AC 120 V 60 Hz 0.20 A 20 W	DC 24 V 0.5A 10W
Power Inlet	IEC 320 socket	Mini DIN socket
Power Transformer	-	Input: AC 100 V–240 V, 0.4A, 50/60 Hz Into IEC320 Socket. Output: DC24 V, 0.5A 3.0 ft. (0.9 m) cord with Mini DIN plug
Power Outlet Cord	6 ft. (1.8 m) cord with IEC 320 and NEMA 5–15 plugs	Not included
Dimensions (w/Mounting Base)	9 H x 7.0 W x 4 in. D (23 x 18 x 10 cm)	9 H x 7.0 W x 4 in. D (23 x 18 x 10 cm)
Weight	2.5 lb. (1.1 kg)	2.5 lb. (1.1 kg)
Air Flow Low Speed: Feet per Minute High Speed: Feet per Minute	 350 fpm (1.0 m/s) 350 fpm (1.0 m/s)	 190 fpm (0.5 m/s) 290 fpm (1.5 m/s)
Operating Environment Temperature Humidity Other Conditions	 59°F–95°F (15°C–35°C) 15%–55% RH, non-condensing. Product should be used in relatively clean indoor environments.	 59°F–95°F (15°C–35°C) 15%–55% RH, non-condensing. Product should be used in relatively clean indoor environments.
Static Discharge Time* @ 1 ft. (30 cm)	< 2 second	< 2 second
Offset Voltage	±15 V	±15 V
Certifications and Approvals	UL, C-UL, NOM	UL, C-UL, NOM, CE
Warranty	1 year	1 year

* When tested according to ANSI/ESD S3.1-1991 at high fan speed.

3M™ Mini Air Ionizer

The 3M Mini Air Ionizer 960 is a small and versatile blower available for equipment or local area ionization. Its small size makes it ideal for use in those situations where space is at a minimum. Possible applications include in or around electronic product equipment, inside OEM equipment, or on ESD workstations.

The Mini Air Ionizer 960 is designed to generate a well-balanced flow of ionized air particles, which helps neutralize stray electrostatic buildup on a surface. Charges are dissipated in seconds and the possibility of a damaging electrostatic discharge (ESD) event is minimized. The ionizer also maintains a reasonably balanced flow (± 20 V) of ionized air.

The unit runs off of low-voltage 24 VAC power, which can be supplied by the 3M™ Wall Transformer 960X (sold separately). Included with the ionizer are a mounting bracket and a 3 ft. (0.9 m) telephone cable (with modular plugs) to connect the ionizer to the Wall Transformer 960X.

Features

- Steady-state DC ion emission for efficient ion delivery.
- Intrinsically balanced — no adjustment necessary.
- Small/compact design utilizes very little work bench space.
- UL/C-UL/CE for global acceptance.

3M™ Mini Air Ionizer 960

Product No.	Description
960	Mini Air Ionizer

Product No.	Description
960X/980X	Wall Transformer

Mini Air Ionizer 960

Item	Typical Properties
Input Voltage	AC 24 V
Power	5.5 watts
Power Input Connection	RJ-11 socket
Size	4.5 H x 3.3 W x 2 in. D (including bracket) (11.5 x 8.4 x 5.1 cm)
Weight	0.75 lb.
Air Flow Velocity	(@1 ft. in front of grille): 300 ft./min.
Air Flow Volume	22 scfm
Operating Environment	
Temperature	59°F–95°F (15°C–35°C)
Humidity	15%–55% RH, non-condensing
Other Conditions	Product should be used in relatively clean indoor environments
Certifications	UL, C-UL, CE
*Offset Balance @ 1 ft.	± 20 V
*On Center Discharge Times	@ 1 ft.<4 seconds @ 2 ft.<10 seconds @ 3 ft.<18 seconds @ 4 ft.<28 seconds

*Testing was performed with a charged plate monitor in accordance with ionization standard ANSI/ESD 3.1 - 1991.

Wall Transformer 960X/980X (sold separately)

Item	Typical Properties
Input	AC 120 V, 50/60 Hz, 270 mA
Output	AC 24 V, 1.0 A through RJ-11 socket connector
Dimensions	3.2 H x 2.6 W x 1.9 in.D (8.1 x 6.6 x 4.8 cm)
Weight	16 oz.
Certifications	UL, CSA

Note: One transformer will supply four Mini Air Ionizers 960.

3M™ Equilibrion Ionizer Monitors

	Equilibrion		
	CTC037	CTC038	CTC039
Type of Ionizer			
DC Blower	x	x	x
AC Blower		x	x
Pulsed Bar			x
Steady-State Bar		x	x
AC Bar			x
Alpha	x		
Monitor Type			
Controller	x		
Monitor Only		x	x
Output			
To Ionizer	x		
Digital		x	x
Relay		x	x
Parameters			
Balance	x	x	x
Decay	x	x	x
± Peaks		x	x
External Display Unit	x	Optional	Optional

3M™ Equilibrion Ionization Controllers and Monitors

3M offers the Equilibrion family of ionization controllers and monitors. Equilibrion CTC037 is a breakthrough patented ionizer controller that is designed to be completely immune to influence of nearby static charges in ionizer balance. Equilibrion brings the balance of controllable ionizers to zero and keeps it at zero, even as ionizer tips wear out or build up dirt — dramatically increasing the time between required ionizer maintenance and thus lowering the cost of ionizer ownership. Other Equilibrion models provide monitoring of ionizer bars and ionizer blowers that cannot be controlled.

Equilibrion provides monitoring of ionization decay — the most fundamental property of an ionized environment. Charge decay at places where sensitive components are handled can exceed acceptable levels due to dirty ionizer points, air flow blockage, or a poorly positioned ionizer. With Equilibrion, automatic continuous decay monitoring provides an alarm when decay becomes unacceptable, improving ESD safety in your environment.

3M™ Equilibrion Ionizer Controller

Features

- Brings to zero, keeps at zero from the widest of imbalances.
- Immune to static voltage.
- Reports balance and decay.
- Miniature size.

CTC037-7FT Properties

Item	Typical Properties
Indication	
Balance	LED bar
Decay	3-LED bar
Construction	
Enclosure	Non-tribocharging static-dissipative
Antenna	Integrated
Dimension (max.)	1 H x 2.75 W x 1.85 in. L (25 x 70 x 47 mm)
Weight	2.5 oz (70 g)
Interface	
Type of Ionizer	DC, with control input
Control Input	
RJ11	RJ11 4-conductor cable
BNC Adapter Avaliable — See Ordering Information	
Power	
RJ11 Interface	Ionizer provides power
Power Jack	12 – 24 Vdc <100 mA

3M™ Signs

Protect your products by notifying staff and visitors that static control precautions are required. Signs and Aisle Marking Tape allow you to clearly identify the areas requiring static protective measures. Apply them to doors, floors, walls, tote boxes, or to any area containing static sensitive parts. As part of ISO9000, many companies have implemented ESD control programs that reference the standards ESD 20.20, EIA 625, or MIL-HDBK-263. These standards require that work areas for static sensitive items be designated.

Product No.	Description
ESDSIGN4X10	4 in. x 10 in. (10.2 cm x 25.4 cm) Sign
ESDSIGN8.5X11	8.5 in. x 11 in. (21.6 cm x 27.9 cm) Sign
SIGN17X22E	17 in. x 22 in. (43.2 cm x 55.9 cm) Sign, English
SIGN17X22S	17 in. x 22 in. (43.2 cm x 55.9 cm) Sign, Spanish
AISLETAPE54	3 in. x 54 ft. (7.6 cm x 16.5 cm) Caution Tape

3M™ ESD Warning Signs

These signs provide the warning message and symbol as required by EIA 625 and MIL-HDBK-263. Black lettering on a yellow background gives clear warning that static-safety precautions are necessary. Signs come complete with adhesive strips for easy mounting.

3M™ ESD Warning Sign,
4 in. x 10 in. (10.2 cm x 25.4 cm)

3M™ ESD Warning Sign,
8.5 in. x 11 in. (21.6 cm x 27.9 cm)

3M™ ESD Warning Posters

These poster-sized 17 x 22 in. (43.2 x 55.9 cm) signs are great for building and section entry areas. Available in English or Spanish. Packaged five posters per box.

3M™ ESD Warning Poster,
17 in. x 22 in., English (43.2 cm x 55.9 cm)

3M™ ESD Warning Poster,
17 in. x 22 in., Spanish (43.2 cm x 55.9 cm)

3M™ Aisle Marking Tape

Protect your products by notifying staff and visitors that static control precautions are needed. ESD Aisle Marking Tape allows you to clearly identify the areas requiring static protective measures. This 6 mil, scuff-resistant tape features a repeating ESD Warning Symbol and message. Bright yellow background makes the black text easy to read. Rolls are 3 in. (7.6 cm) wide and 54 ft. (16.5 m) long on a 3 in. (7.6 cm) core.

3M™ Aisle Marking Tape, 3 in. x 54 ft. (7.6 cm x 16.5 m)

3M™ Field Service Kit Product Selection Guide

Features	Model
Premium	
Portable, 22 in. x 24 in. (55.9 cm x 61 cm), static dissipative, red worksurface, includes Wrist Strap Monitor 725 and dual conductor wrist strap	8507
Portable, 15 in. x 20 in. (38.1 cm x 50.8 cm), static dissipative, red, lightweight worksurface, includes adjustable fabric wrist strap and grounding accessories	8505
Standard	
Portable, 22 in. x 24 in. (55.9 cm x 61 cm), static dissipative, red worksurface, includes adjustable fabric wrist strap and grounding accessories	8501
8.75 in. x 24 in. (22.2 cm x 61 cm) static dissipative, red worksurface, includes adjustable fabric wrist strap and grounding accessories, installed in remote, unattended telephone switching enclosures	8502
Economy	
Portable, 24 in. x 24 in. (61 cm x 61 cm), static dissipative, red worksurface, includes adjustable fabric wrist strap and grounding accessories, low cost	FSKL3RD

Field Service Kits

Sensitive microelectronic components can be damaged, even destroyed, by one ever-present enemy — static electricity. Electronic equipment is especially susceptible to static electricity during servicing.

Static dissipative products manufactured by 3M are designed to provide protection at a variety of field service sites, from typical office environments to remote telephone terminals. The standard field service kit quickly and reliably removes any static charge on the technician and provides a durable, static-free surface upon which to lay parts. The lightweight version offers the same protection in a flexible, compact package. The telephone terminal service kit is especially designed to be installed at remote telephone switches or CEVs to provide convenient static protection on-site.

Practicing proper static control in the field can save time, money and aggravation for both your customers and your company. Enable your technicians to do the job right the first time with a static dissipative portable field service kit from 3M.

3M™ Portable Field Service Kit (Premium Performance)

The 3M Portable Field Service Kit 8505 is a small, lightweight kit that offers the same level of static control as the full-sized 3M™ Field Service Kit 8501, yet is small enough to fit in a shirt pocket.

3M™ Portable Field Service Kit 8505

Product No.	Description
8505	Lightweight Portable Field Service Kit Kit contains: • Static Dissipative Worksurface with Pocket 0.015 H x 15 W x 20 in. L (0.38 mm x 38 cm x 51 cm) • 3M™ Adjustable Wrist Band 2204 • Lightweight Heavy-Duty Coiled Ground Cords: 3M™ Wrist Strap Ground Cord 2240, 5 ft. (1.5 m) 3M™ Extension Ground Cord 2243, 5 ft. (1.5 m) 3M™ Worksurface Ground Cord 3063, 5 ft. (1.5 m) • 3M™ Alligator Clip 3038

Custom logo imprinting on the worksurface is available.

8505 Properties

Typical Property	Value
Resistance: (Surface-to-ground)	1×10^6 ohm to 1×10^9 ohm

Tested per ESD Association Standard 4.1 at 72OF, 50% RH using 3M™ Test Kit 701 for Static Control Surfaces (Megohmmeter).

3M™ Portable Field Service Kit (Premium Performance)

The 3M Portable Field Service Kit 8507 with a 3M™ Wrist Strap Monitor 725 bundles together two static control products to give a field technician the same continuously monitored, static protected working environment as that enjoyed by workers in a manufacturing facility.

3M™ Portable Field Service Kit 8507

Product No.	Description
8507	Portable Field Service Kit includes Wrist Strap Monitor 725 and Dual Conductor Wrist Strap Kit contains: • Static Dissipative Worksurface, foldable, 0.021 H x 22 W x 24 in. L (0.53 mm x 56 cm x 61 cm) red with gray cotton edging. Two pockets, each 8 in. x 11 in. (20.3 cm x 28.0 cm), ground snap. • 3M™ Wrist Strap Monitor 725, 2.5 H x 2.6 W x 1.1 in. L (6.4 x 6.6 x 2.8 cm), black. Battery-powered, 9 V (not included). Ground cord, 6 ft. (1.8 m), with ground clip. Ground snap on unit to connect to the worksurface. • 3M™ Dual Conductor Adjustable Fabric Wrist Band 2368 • 3M™ Dual Conductor Coiled Cord 2370, 10 ft. (3.0 m)

3M™ Portable Field Service Kit (Standard Performance)

The 3M Portable Field Service Kit 8501 is designed to provide effective static protection in a compact package for the electronics field technician. The entire kit folds to a size that fits easily into most tool cases. Two pockets sewn into the worksurface provide storage for the cords.

3M™ Portable Field Service Kit 8501

Product No.	Description
8501	Static Dissipative Portable Field Service Kit Kit includes: • Static-Dissipative Worksurface 0.021 H x 22 W x 24 in. L (0.53 x 56 x 61 cm) • 3M™ Ground Cord Assembly 3051 • 3M™ Alligator Clip 3038 • 3M™ Adjustable Wrist Band 2204

Custom logo imprinting on the worksurface is available.

8501 Properties

Typical Property	Value
Resistance: (Surface-to-ground)	1 x 10^6 ohm to 1 x 10^9 ohm

Tested per ESD Association Standard 4.1 at 72OF, 50% RH using 3M™ Test Kit 701 for Static Control Surfaces (Megohmmeter).

3M™ Telecommunications Field Service Kit (Standard Performance)

The 3M Static Dissipative Field Service Kit 8502 is a specially designed static dissipative kit for installation in remote, unattended telephone switching enclosures.

The worksurface has a strip of 3M Hook and Loop Fastener Tape stitched to the back so it can be left suspended from the permanently mounted instruction sign.

3M™ Static Dissipative Field Service Kit 8502

Product No.	Description
8502	Static Dissipative Portable Field Service Kit for remote, unmanned telephone switching sites Kit includes: • Static-Dissipative Worksurface 0.021 H x 22 W x 24 in. L (0.53 mm x 56 cm x 61 cm) (0.53 mm x 56 cm x 61 cm) with two pockets • Two 5 ft. (1.5 m) coiled ground cords; one for mat, one for wrist band • 3M™ Adjustable Wrist Band 2204 • Static Caution Sign • Plastic Instruction Sign

8502 Properties

Typical Property	Value
Resistance: (Surface-to-ground)	1 x 10^6 ohm to 1 x 10^9 ohm

Tested per ESD Association Standard 4.1 at 72OF, 50% RH using 3M™ Test Kit 701 for Static Control Surfaces (Megohmmeter).

3M™ Field Service Kit

This Field Service Kit provides a complete, portable, static safe workstation for personnel working with electronics in the field. To stop static electricity from damaging electronic cards, a static safe work area is essential for field service technicians performing in-field repair or installation of cards. The Field Service Kit is used by technicians in telecommunications, computer, industrial controls and business equipment service applications. The entire kit folds to fit into most tool cases. Custom mat printing is available. Includes 24 in. x 24 in. (61 cm x 61 cm) mat with two pockets, wrist strap, ground cord and instructions.

3M™ Field Service Kit FSKL3RD

Product No.	Description
FSKL3RD	Field Service Kit Kit includes: 1 - 24 in. x 24 in. (61 cm x 61 cm) Mat with two pockets 1- Adjustable Fabric Wrist Band 1- 6 ft. Coiled Cord 1- Common Ground Cord, 15 ft. (4.6 m) with clip instructions

Properties

Product	Typical Value
Mat	3-layer, vinyl, red, 10^{7-8}
Common Ground Cord	15 ft. (4.6 m), 1 meg resistor, bulldog clip
Coiled Cord	6 ft. (1.83 m), 1 meg resistor
Wrist Band	Fabric, adjustable

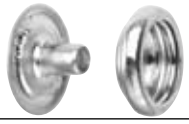
3M™ Workstation Products Selection Guide

Image	Product No.	Description
	3047	Common Point Grounding System, 10 ft. (3 m) to ground workstation components. Single-row, six-terminal strip, protective cover, three cable clips. Ground cord has a 1 megohm resistor.
	3048	Grounding System for 3M™ Wrist Strap/Table Mat. Easily snaps onto mats and runners, (10 mm snap); grounds two single conductor wrist straps. Comes complete with ring connector and 15 ft. (4.6 m) ground cord. Ground cord has a 1 megohm resistor for mat connection only.
	LPCGC151M LPCGC150M	This low profile common point ground cord is less obtrusive in the work area. The system connects two wrist straps and a work surface to ground. Holes are provided for permanent mounting to a bench. Available with either a 3/8 in. (10 mm) stud or socket that securely snaps the cord to the mat. A ring terminal connects the opposite end of the 15 ft. (4.6 m) cord to ground.
	3050	Snap Fastener, female, 10 mm diameter. For 3M™ Table and Floor Mats and Runners 8200 Series.
	3051	Ground Cord with center snap for standard field service kits. Wrist strap cord section 10 ft. (3.0 m) and ground cord section 5 ft. (1.5 m). Each contains a 1 megohm resistor.
	3057	Monitor Stand-By Jack. Allows operator to disconnect a ground cord from the wrist band and leave the workstation without deactivating the 3M™ Wrist Strap Workstation Monitor 724 or 3M™ Static Monitor 790.
	SP3010	Soldering Tool. 3M's SP3010 Soldering Tool will help you form component leads, probe circuit cards, and chase wire and leads. Tough glass-filled nylon plastic makes this tool durable and long lasting.
	SNAPTOOL	This simple-to-use tool attaches snaps to static mats. Three easy steps give you a secure snap with good electrical connection. Rugged and rust resistant, the snap tool allows you to put a grounding snap right where you need it.
	SNAPSOCKET3/8	Socket snaps are held in place by crimping the tip of an eyelet through the center of the socket with a snap tool. This traps the mat between the socket on the top of the mat and the eyelet on the back of the mat. 10 sockets and eyelets are included in each pack. Use with SNAPTOOL.
	SNAPSTUD3/8	Stud snaps are held in place by crimping the tip of an eyelet through the center of the stud with a snap tool. This traps the mat between the stud on the top of the mat and the eyelet on the back of the mat. 10 studs and eyelets are included in each pack. Use with SNAPTOOL.
	FPSNAP	Prong clinch snaps are held in place by putting the prongs through the mat and crimping them on the bottom of the mat. No special tools are needed.

3M™ Accessories Selection Guide

Image	Product No.	Description
	723	Accessory Belt Clip to be used with the 3M™ Wrist Strap Monitor 725
	724P	Power Supply for 3M™ Wrist Strap Workstation Monitor 724 and 3M™ Static Monitor 790
	724VK	Monitor Verification Kit. Verifies the resistance range of the Workstation Monitor 724
	725VK	Monitor Verification Kit. Verifies the resistance range of the Wrist Strap Monitor 725
	732	Replacement Remote Input Jack. 6 ft. (1.8 m) long cord. To be used with Workstation Monitor 724.
	733	Remote Splitter Kit. 6 ft. (1.8 m) long cord. To be used with Workstation Monitor 724.
	740P	Power Supply for 3M™ Wrist Strap and Footwear Tester 740
	746P	Power Supply for 3M™ Wrist Strap Tester 746
	790VK	Verification Kit. One 5 ft. (1.5 m) Dual Conductor Cord 2360, one test wrist band socket assembly, and one two-wire male connector with 24 in. (0.61 m) lead wire.
	2380	Monitor/Table Mat Replacement Cord, 6 ft. (1.8 m), with 10 mm snap. Extends from the 3M™ Wrist Strap Workstation Monitor 724 to the static control worksurface to be monitored. This cord does not have a resistor molded into the snap fastener cap.
	2389	Monitor/Table Mat Interconnect Cord, 10 ft. (3 m), with 10 mm snap. A straight cord with male snap fasteners at each end and no resistors. Used to interconnect two monitored worksurfaces.

3M™ Accessories Selection Guide

Image	Product No.	Description
	3033	Snap Fastener, male, 0.125 in. (3.2 mm) hole, 10 mm diameter. For mats and runners. 1800/8800 Series.
	3034	Snap Fastener, female, 0.125 in. (3.2 mm) hole, 10 mm diameter. For 3M™ Mats and Runners 1800/8800 series.
	3037	Insulated Bulldog Clip. Fits standard banana plug.
	3038	Uninsulated Alligator Clip. Fits standard banana plug.
	3040	Ground Cord, 15 ft. (4.6 m), with 10 mm snap. Molded-in male snap fastener with integral 1 megohm resistor on one end, solderless terminal on other. Connects all 3M™ Static Control Mats and Runners to building ground.
	3041	Grounding Kit for 3M™ Static Protective Hard Laminate includes #10 screw, lock washer, #10 nut, lock washer wing nut, #10 self-tapping screw and one 10 ft. (3.0 m) ground cord. Ground cord has a 1 megohm resistor.
	3042	Wrist Strap Grounding System. Grounds two single conductor wrist straps and conveniently mounts beneath the edge of most work benches. Comes complete with 10 ft. (3.0 m) ground cord.
	3043	Interconnect Cord 5 ft. (3.5 m), with 10 mm snap. Molded-in male snap fastener at each end. Connects all static control mats and runners to each other. Ground cord has a 1 megohm resistor.
	CTA242	This remote terminal connects to WS Aware workstation monitors and provides connection for dual wire wrist straps for an operator and a visitor. Patented plug-in replaceable board with the jacks reduces cost of ownership of the monitor since only one inexpensive board needs to be replaced when the jacks are worn out, instead of the entire terminal.
	CTA243	Before sensitive devices are handled, Big Brother alarms alert the operator to plug-in. Once Big Brother senses that the operator is properly grounded the alarm is silenced. The Big Brother wrist strap terminal makes the WS Aware one of the most intelligent and cost-effective systems on the market today.
No Photo Available	CTA245	Replacement board with jacks for WS Aware remote monitors CTA242 and CTA243.
	FGC150M FGC151M	The low profile beveled cap prevents the cord from being accidentally removed from the mat. A 3/8 in. (10 mm) stud securely snaps to the mat, and at the other end of the 15 ft. (4.5 m) cord is a ring terminal.
	WSGR2	This metal grounding block accommodates two wrist straps and comes complete with mounting hardware. Designed to be mounted under the bench and keep the wrist strap connections safe. The integral 15 ft. (4.5 m) cord ends with a ring terminal. Two 4 mm parking studs hold coiled cords to reduce damage to cords left at the bench. No resistor.

3M™ Scotch-Brite™ High Performance Cloth 2011

The 3M Scotch-Brite High Performance Cloth 2011 is an efficient cleaning tool consisting of microfibers in a unique knit pattern. The Scotch-Brite High Performance Cloth is specifically designed with a unique combination of bi-component microfibers and knit construction. This combination provides excellent dust, oil and water pickup with minimal linting. The bi-component aspect of the microfibers allows for both oil and water absorption while the microfiber's ribbon-like shape provides the maximum surface area for the collection of dust, oil and water. The unique knit pattern of tufts and valleys allows both small and large particulates to be trapped within the Scotch-Brite High Performance Cloth. The combination of microfiber and knit construction provides a versatile non-scratching tool allowing the Scotch-Brite Cloth to be used on a wide variety of substrates including delicate surfaces.

The Scotch-Brite High Performance Cloth may be used dry or damp, with or without cleaning chemicals.

3M™ Scotch-Brite™ High Performance Cloths 2011

Product No.	Description
2011	Scotch-Brite™ High Performance Cloths, 50 per case **Examples of Intended Use** • Fingerprint removal from glass • Removing glaze and polish from painted metals • Polishing furniture • Cleaning and polishing brass • Dust removal **Standard Size** 12.6 in. x 14.2 in (32 cm x 36 cm) **Colors** Blue Green Red Yellow White

Note: The 3M Scotch-Brite High Performance Cloth 2011 does not have static dissipative properties.

Physical Characteristics

Property	Typical Value	Test Method
Size	12.6 in. x 14.2 in. (32 cm x 36 cm)	HCC-TM-69
Thickness	0.062 in. (1.57 mm)	HCC-TM-69
Weight	1.09 oz. (30.8 g)	HCC-TM-69
Fiber Type	Polyester and nylon	
Tuft Density	37 per square cm	HCC-TM-86
Water Absorption	7.2 g water per g wipe	HCC-TM-73
Oil Absorption	7.1 g oil per g wipe	HCC-TM-73
Artificial Sebum Removal (artificial skin oil)	98% gloss recovery	HCC-TM-90
Drag (dry, kinetic coefficient) Glass Cross Direction	 0.85 0.41	 HCC-TM-75 (modified)
Tear Resistance (6400 g pendulum) Machine Direction Cross Direction	 5570 gram force 4290 gram force	 HCC-TM-75
Resistant to	Household Ammonia Household Bleach Household Cleaner/Degreaser Vinegar Mineral Oil Vegetable Oil	
Linting	Minimal	
Laundering	Launderable to 95ºC (200ºF)	

Static Control Packaging and Transportation Products

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3M provides a wide range of static shielding and barrier packaging products to protect sensitive electronic components from static charges during transit and while in storage. To meet your specific needs, 3M provides shielding bags, cushioned bags and wrap, moisture barrier bags and more in a variety of sizes and material composition.

3M™ Conductive Resin Products are easily grounded to prevent holding a static charge. Available as film, tubing, bags and drum liners, this material is made of opaque, volume-conductive, carbon-impregnated polyolefin.

The electrical characteristics are not affected by humidity, and are suited for material handling, shipping and storage.

Note: All specifications are subject to change without notice.

Packaging Protection You Can Trust

3M provides the static control packaging to protect electronic items from electrostatic, physical and environmental damage during manufacture, transportation, and storage. 3M packaging can help you to build a compliant ANSI/ESD S20.20 static control program. S20.20 now refers to ANSI/ESD S541 to set the performance goals for packaging:

S541 Requirements for Protective Packaging

1. Low charge generation
2. Dissipative or conductive materials for intimate contact
3. A structure that provides electrostatic discharge shielding

Following the Road Map to More Packaging Protection

The 2005 ESD Association Technology Road Map shows that, due to the continued reduction in device size, chips will become more sensitive to static though 2010, reaching sensitivity levels not observed since 1980. Also, the Industry Council on ESD has proposed that on-chip protection levels be lowered by half to save space on devices and increase speed. As sensitivity climbs, and on-chip protection falls, robust ESD protective packaging will be even more critical.

Choose the Protection that You Need

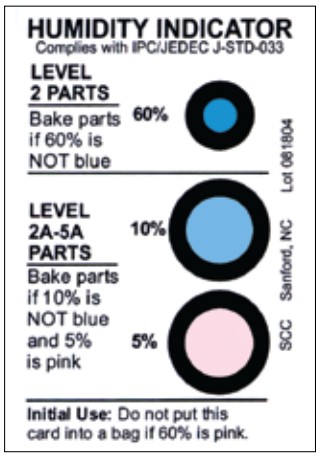
From the following pages, choose the packaging that fits your application, or contact 3M for application guidance.

3M™ Static Shielding and Moisture Barrier Bags are tested to comply with ESDA, industry and customer standards. Cost effective metal-in bags and high protection metal-out bags allow you to meet protection requirements for a wide range of device sensitivities.

3M™ Dri-Shield System for Dry Packaging

Use the 3M Dri-Shield System 033 to protect SMDs from moisture damage and meet the IPC/JEDEC J-STD-033 standard.

3M™ Moisture Barrier Bag
Exceeds the MVTR requirements of <.002.
Page 74



3M™ Humidity Indicator Card (HIC)
5%, 10%, 60% sensitivity.
Page 80

3M™ Desiccant
Complies with MIL-D-3464.
Page 81

3M™ Moisture-Sensitive Caution Label
Blue print on white label as required by STD-033.
Page 81

3M™ Vacuum Sealer
Removes air to reduce bulk, and heat seals the bag closed.
Page 81

Notes

3M™ Static Shielding Bags

3M is one of the leading manufacturers of static shielding bags, offering fast shipment from large inventories of standard sized bags, and custom bag sizes to fit your application. Bags are marked with ESD caution information, RoHS compliant symbols, and are lot coded for traceability. Custom printing is available.

Static Shielding bags protect electronic items from electrostatic, physical and environmental damage during manufacture, transportation, and storage. As required in ANSI/ESD S541, and as part of the ANSI/ESD S20.20 ESD control program, shielding bags provide protection from static discharge and are low charging. These bags are one of the most cost effective and widely used types of static control packaging, with over 500 million bags made each year.

See page 70 for labels and sealers to close static shielding bags.
See the product data sheets online, or call 3M for information about custom bags.

3M™ Static Shielding Bags Product Selection Guide

Product	Technology	Benefit	Application	Page
Metal-In Shielding Bag				
SCC 1000	Metal-In Static Shielding Bag	Four-layer construction. Polyester dielectric and metal layer provide Faraday effect shielding of ESD and fields. Tribocharging is minimized by the specially processed polyethylene. Lot coded for QC traceability.	Transparent, metallized static shielding bag provides a static safe environment for sensitive electronic devices.	64
Metal-Out Shielding Bag				
SCC 1500	Metal-Out Static Shielding Bag	Provides low charge retention and rapid static decay. These bags are approved by major computer, electronics, and disk drive manufacturers for use worldwide. Lot coded for QC traceability.	Best protection from ESD through low charge retention and rapid static decay.	66
ZipTop Reclosable Bags				
SCC 1000 **SCC 1300** **SCC 1500** **3M 2110R**	Reclosable ZipTop Static Shielding Bag	ZipTop feature makes the bag easy to open and close. Lot coded for QC traceability.	Easy to open and close. Transparent, metallized static shielding bags provide a static safe environment for sensitive electronic devices.	72 72 72 72
Puncture Resistant Shielding Bags				
SCC 1300	Puncture Resistant Metal-In Static Shielding Bag	High puncture resistance provides a long life and reduces tears. Four-layer construction. Polyester dielectric and metal layer provide Faraday effect shielding of ESD and fields. Lot coded for QC traceability.	For tubes and heavy items. Transparent, metallized static shielding bag provides a static safe environment for sensitive electronic devices.	68
3M 2100R	Puncture Resistant Metal-Out Static Shielding Bag	High puncture resistance provides long life and reduces tears. Metallized bag structure provides a static safe environment for sensitive electronic devices. Provides low charge retention and rapid static decay. Lot coded for QC traceability.	For tubes and heavy items. Best protection from ESD through low charge retention and rapid static decay.	69

3M™ Static Shielding Bag with RoHS label

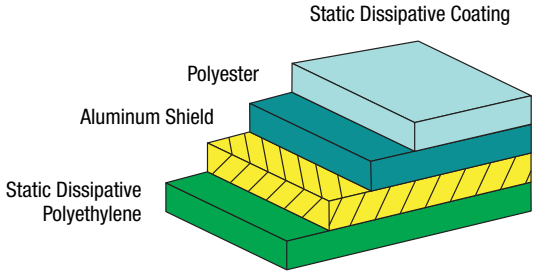
3M™ SCC 1000 Static Shielding Bag

3M™ SCC 1000 Static Shielding Bags

This transparent, metal-in static shielding bag is designed to provide a static safe environment for sensitive electronic devices. With over 100 stock sizes ready for same-day shipping, the 3M SCC 1000 remains the bag of choice for IC and PCB protection. These bags are tested to meet or exceed the electrical and physical requirements of MIL-PRF-81705 Type III, ANSI/ESD S541, EIA 625, MIL-HDBK-263, MIL-STD-1686, and ANSI/ESD S20.20. Bags are RoHS Compliant* and lead-free**.

Features

- Faraday effect shielding by the metallized layer protects electronic devices from ESD and electrostatic fields.
- Durability is enhanced by positioning the metal layer between polyester and polyethylene.
- Four-layer construction offers excellent protection from punctures and tears.
- Bags are printed with ESD Warning symbol and lot coded for QC traceability.
- Testable to industry standards.



See the full product data sheet, or Technical Bulletin "Choosing the Right Static Bag" online.

Close bags with 3M™ ESD Warning labels. See page 70.

See 3M™ ZipTop Reclosable Static Shielding Bags on page 72.

3M Products are ESD 20.20 Program Compliant

RoHS Compliant 2002/95/EC

3M Standard Size (Inside Dimensions)

3M™ SCC 1000 Open Top					
W x L (in.)	*Part No.*	*W x L (in.)*	*Part No.*	*W x L (in.)*	*Part No.*
2 x 3	10023	6 x 30	100630	12 x 12	1001212
2 x 4	10024	6.5 x 10	1006.510	12 x 14	1001214
2 x 6	10026	6.5 x 16	1006.516	12 x 16	1001216
3 x 3	10033	7 x 10	100710	12 x 18	1001218
3 x 5	10035	7 x 11	100711	12 x 24	1001224
4 x 4	10044	7 x 15	100715	12 x 25	1001225
4 x 6	10046	7 x 16	100716	12 x 30	1001230
4 x 8	10048	8 x 8	10088	14 x 18	1001418
4 x 24	100424	8 x 10	100810	14 x 20	1001420
4 x 26	100426	8 x 12	100812	14 x 30	1001430
4 x 30	100430	8 x 16	100816	15 x 18	1001518
5 x 6	10056	8 x 18	100818	16 x 18	1001618
5 x 7	10057	8 x 24	100824	16 x 20	1001620
5 x 8	10058	8 x 30	100830	16 x 24	1001624
5 x 10	100510	9 x 12	100912	18 x 18	1001818
6 x 8	10068	10 x 12	1001012	18 x 20	1001820
6 x 9	10069	10 x 14	1001014	18 x 24	1001824
6 x 10	100610	10 x 16	1001016	18 x 30	1001830
6 x 12	100612	10 x 18	1001018	20 x 20	1002020
6 x 14	100614	10 x 24	1001024	20 x 24	1002024
6 x 16	100616	10 x 26	1001026	22 x 24	1002224
6 x 18	100618	10 x 30	1001030	24 x 24	1002424
6 x 24	100624	11 x 14	1001114	24 x 30	1002430
6 x 26	100626	11 x 15	1001115	30 x 24	1003024
3M™ SCC 1000 ZipTop					
2 x 3	30023	6 x 10	300610	10 x 30	3001030
3 x 3	30033	6 x 24	300624	11 x 15	3001115
3 x 4	30034	6 x 30	300630	12 x 12	3001212
3 x 5	30035	7 x 15	300715	12 x 16	3001216
4 x 4	30044	8 x 8	30088	12 x 18	3001218
4 x 6	30046	8 x 10	300810	14 x 18	3001418
4 x 8	30048	8 x 12	300812	15 x 18	3001518
4 x 24	300424	9 x 12	300912	16 x 24	3001624
4 x 30	300430	10 x 10	3001010	18 x 18	3001818
5 x 8	30058	10 x 12	3001012	18 x 24	3001824
5 x 10	300510	10 x 14	3001014	20 x 24	3002024
6 x 8	30068	10 x 24	3001024	24 x 24	3002424

- All standard sizes in-stock/same day shipment.
- Width is measured from inside seam to inside seam.
- Length is measured from the top edge to the bottom fold.
- Opening is in the "width" dimension.
- Custom bag sizes, custom printing, and custom hot stamping are available.
- Most sizes are packed 100 per case.
- Small sizes are packed 500 or 1,000 per case.

SCC 1000 Properties

Electrical Properties		
Surface Resistivity/Resistance		
	ASTM D257	ANSI/ESD STM11.11
Interior	$<10^{12}$ ohm/square	or $<10^{11}$ ohm
Exterior	$<10^{12}$ ohm/square	or $<10^{11}$ ohm
Metal	<100 ohm	
Static Shielding	<30 volts	MIL-PRF-81705, EIA 541
Static Shielding	<10 nJ	ANSI/ESD STM11.31, ANSI/ESD S541
Static Decay	<0.05 seconds	MIL-STD-3010
Charge Generation		
Teflon	0.09 nC/sq.in.	Modified Inclined Plane
Quartz	0.01 nC/sq.in.	
Physical Properties		
Tensile Strength	4700 PSI, 330 kg/cm^2	ASTM D882
Seam Strength	>10 lbs	ASTM D882
Light Transmission	40%	Tobias
Heat Sealing Conditions		
Temperature:	250°F – 375°F	
Time:	0.5 – 3.5 seconds	
Pressure:	30 – 70 PSI	
Thickness:	3.1 mils	±10%
Cleanliness Properties		
Outgassing	Pass	ASTM E595
Non-corrosive	Pass	MIL-STD-3010
Silicone or Amine Content	Not detected	FTIR

RoHS Compliant 2002/95/EC

3M Products are ESD 20.20 Program Compliant

3M™ SCC 1500 Static Shielding Bags

The 3M SCC 1500 bag is engineered to provide low charge retention and rapid static decay. The proprietary top coating improves durability, making the bag superior to other metal-out bags. The technology has gained the bag approval by the most critical electronics and disk drive manufacturers. This transparent, metal-out, static shielding bag provides a static safe environment for sensitive electronic devices.

3M SCC 1500 bags are tested to meet or exceed the electrical and physical requirements of MIL-PRF-81705D Type III, ESD S541, EIA 625, MIL-HDBK-263, MIL-STD-1686, ANSI/ESD S20.20, and charge retention standards. Bags are RoHS Compliant* and lead-free**.

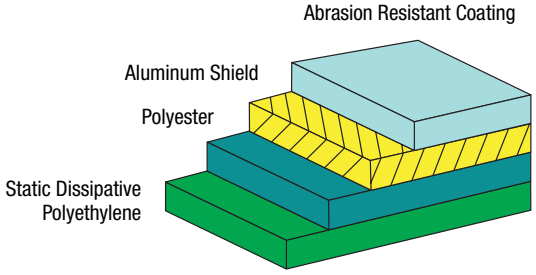
Features

- Faraday Cage effect shielding of the metallized layer protects electronic devices from ESD and electrostatic fields.
- Metal layer is positioned near the outer surface for fast charge decay and low charge retention.
- Four layer construction offers excellent protection from punctures and tears.
- Bags are printed with ESD Warning symbol and lot coded for QC traceability.
- Testable to industry standards.
- Specially processed polyethylene minimizes tribocharging.

3M™ SCC 1500 Static Shielding Bag

SCC 1500 Properties

Electrical Properties		
Surface Resistivity/Resistance		
	ASTM D257	ANSI/ESD STM11.11
Interior	$<10^{12}$ ohm/square	or $<10^{11}$ ohm
Exterior	$<10^{5}$ ohm/square	or $<10^{9}$ ohm
Metal	<100 ohm	
Static Shielding	<30 volts	MIL-PRF-81705, EIA 541
Static Shielding	<10 nJ	ANSI/ESD STM11.31, ANSI/ESD S541
Charge Retention	< 100 volts	
Physical Properties		
Tensile Strength	4700 PSI, 330 kg/cm^2	ASTM D882
Seam Strength	>10 lbs	ASTM D882
Light Transmission	40%	Tobias
Heat Sealing Conditions		
Temperature:	250°F – 375°F	
Time:	0.5 – 3.5 seconds	
Pressure:	30 – 70 PSI	
Thickness:	3.0 mils	±10%
Cleanliness Properties		
Outgassing	Pass	ASTM E595
Non-corrosive	Pass	MIL-STD-3010
Silicone or Amine Content	Not detected	FTIR



Standard Size (Inside Dimensions)

SCC 1500 Open-Top						SCC 1500 ZipTop	
W x L (in.)	*Part No.*	*W x L (in.)*	*Part No.*	*W x L (in.)*	*Part No.*	*W x L (in.)*	*Part No.*
3 x 5	15035	8 x 10	150810	12 x 16	1501216	3 x 5	150Z35
4 x 6	15046	8 x 12	150812	12 x 18	1501218	4 x 6	150Z46
5 x 8	15058	9 x 12	150912	14 x 18	1501418	5 x 8	150Z58
6 x 8	15068	10 x 12	1501012	15 x 18	1501518	6 x 8	150Z68
6 x 10	150610	10 x 14	1501014	16 x 24	1501624	6 x 10	150Z610
6 x 30	150630	10 x 24	1501024	18 x 18	1501818	8 x 10	150Z810
7 x 15	150715	11 x 15	1501115	18 x 24	1501824	10 x 12	150Z1012
						12 x 18	150Z1218

- All standard sizes in-stock/same day shipment.
- Width is measured from inside seam to inside seam.
- Length is measured from the top edge to the bottom fold.
- Opening is in the “width” dimension.
- Custom bag sizes, custom printing, and custom hot stamping are available.
- Most sizes are packed 100 per case.
- Small sizes are packed 500 or 1,000 per case.

See 3M™ ZipTop Reclosable Static Shielding Bags on page 72.

3M™ Puncture Resistant Bags

Puncture resistant shielding bags offer more strength for packaging items with sharp edges, like PCBs and shipping tubes. These puncture resistant bags use double the amount of polyester plastic as compared to standard shielding bags. Please call for bag sizes.

3M™ SCC 1300 Puncture Resistant Metal-In Static Shielding Bag

Features

- Extra thick polyester plastic to resist punctures and tears.
- Faraday effect shielding of the metallized layer protects electronic devices from ESD and electrostatic fields.
- Bags are printed with ESD Warning symbol and lot coded for QC traceability.
- Tested to meet or exceed the electrical and physical requirements of MIL-PRF-81705D Type III, ESD S541, EIA 625, MIL-HDBK-263, MIL-STD-1686, ANSI/ESD S20.20.
- Bags are RoHS Compliant* and lead-free**.

3M™ SCC 1300 Puncture Resistant Metal-In Static Shielding Bag

SCC 1300 Properties

Physical Properties		
Puncture Resistance	>16 lbs.	FTMS 101 MTH 2065
Seam Strength	Pass	MIL-PRF-81705
Light Transmission	40%	Tobias
Thickness	3.5 mils	±10%
Electrical Properties		
	ASTM D257	ANSI ESDSTM11.11
Surface Resistivity/Resistance		
Interior	$<10^{12}$ ohm/square	or $<10^{11}$ ohm
Exterior	$<10^{12}$ ohm/square	or $<10^{11}$ ohm
Metal	100 ohm	
Static Shielding	<30 volts	MIL-PRF-81705, EIA 541
Static Shielding	<10 nJ	EOS/ESD S11.31
Static Decay	<0.05 seconds	MIL-PRF-81705, FTMS 101 MTH 4046

RoHS Compliant 2002/95/EC

3M Products are ESD 20.20 Program Compliant

3M™ Puncture Resistant Metal-Out Static Shielding Bags 2100R

Features

- Extra thick polyester plastic to resist punctures and tears.
- Metal layer is positioned near the outer surface for fast charge decay and low charge retention.
- Bags are printed with ESD Warning symbol and lot coded for QC traceability.
- Tested to meet or exceed the electrical and physical requirements of MIL-PRF-81705D Type III, ESD S541, EIA 625, MIL-HDBK-263, MIL-STD-1686, ANSI/ESD S20.20., and charge retention standards.
- Bags are RoHS Compliant* and lead-free**.

3M™ Static Shielding Bag 2100R

Product No.	Description
2100R	Metal-Out Static Shielding Bags. 100 bags per pack.

Standard Sizes, in.	(cm)
3 x 5	(7.6 x 12.5)
4 x 4	(10.2 x 10.2)
4 x 6	(10.2 x 15.2)
4 x 26	(10.2 x 66.0)
4 x 30	(10.2 x 76.2)
5 x 8	(12.7 x 20.3)
6 x 8	(15.2 x 20.3)
6 x 10	(15.2 x 25.4)
7 x 15	(17.8 x 38.1)
8 x 8	(20.3 x 20.3)
8 x 10	(20.3 x 25.4)
8 x 12	(20.3 x 30.5)
10 x 14	(25.4 x 35.6)
10 x 24	(25.4 x 61)
11 x 15	(27.9 x 38.1)
12 x 16	(30.5 x 40.6)
14 x 18	(35.6 x 45.7)
15 x 18	(38.1 x 45.7)
16 x 24	(40.6 x 61)
18 x 18	(45.7 x 45.7)
18 x 24	(45.7 x 61)

Custom Sizes, in.	(cm)
2 x 3 to 35 x 36	(5.1 x 7.6 to 88.9 x 91.4)

RoHS Compliant 2002/95/EC

2100R/2110R Properties

Property	Typical Value	Test Method
Thickness	3.2 mil (81 microns)	ASTM D2103
Strength	>20 lbs. (>6250 PSI, 4.3 x 107 N/m^2)	
Tensile	9000 PSI (6.2 x 107 N/m^2)	ASTM D882
Puncture	24 lbs. (10.9 kg)	FTMS 101
Seam	Pass	MIL PRF 81705
Optical Density	.35–.45	ASTM D1003
Surface Resistance/ Resistivity		
Interior	<10^{11} ohm	ANSI/ESD S11.11
Exterior	<10^9 ohm	ANSI/ESD S11.11
Metallized Layer	<10^2 ohm/sq	Monroe #267
Electrostatic Shielding	<30V	EIA-541 (V-Zap)
	<25 nJ	ANSI/ESD S11.31
Decay Time	<2 sec.	EIA-541
Contact Corrosivity	Pass	FTMS 101C Method 3005
Outgassing		
TML	<1.0%	ASTM E595
CVCM	<0.1%	ASTM E595
Heat Seal Properties		
Temperature	180°F – 250°F (82°C – 121°C)	
Time	0.5 – 5.0 sec.	
Pressure	20 – 60 PSI	
Shelf Life (from date of manufacture)	1 Year	

Product No.	Description
2110R	2100R with Zipper Closure. 100 bags per pack.

Standard Sizes, in.	(cm)
3 x 5	(7.6 x 12.5)
4 x 4	(10.2 x 10.2)
4 x 6	(10.2 x 15.2)
5 x 8	(12.7 x 20.3)
6 x 8	(15.2 x 20.3)
6 x 10	(15.2 x 25.4)
8 x 10	(20.3 x 25.4)
8 x 12	(20.3 x 30.5)
10 x 12	(25.4 x 30.5)
10 x 14	(25.4 x 35.6)
11 x 15	(27.9 x 38.1)

Custom Size, in.	(cm)
3 x 5 to 20 x 30	(7.6 x 12.7 to 50.8 x 76.2)

RoHS Compliant 2002/95/EC

3M Products are ESD 20.20 Program Compliant

3M™ Destructible Labels

Labels alert personnel handling bags, boxes or other carriers that the contents are static-sensitive. 3M labels are easy to use and provide the ESD symbol and warning message needed to complete your protective package. These destructible type labels are “tamper evident,” letting you easily monitor whether or not a bag has been opened.

3M™ Attention Labels

Destructible, black printing on yellow background. This 3M JEDEC-14 label displays the reaching hand symbol and provides writing space.

3M™ Attention Labels

3M™ Attention Labels

Product No.	Description	Labels per Roll
7102	Destructible Yellow w/ Black Type. Room to write. JEDEC-14 Symbol Size: 1.875 in. x 2.5 in. (4.6 cm x 6.4 cm)	500
ALABEL	Destructible Yellow w/ Black Type. Room to write. JEDEC-14 Symbol Size: 1.875 in. x 2.5 in. (4.6 cm x 6.4 cm)	500
ALABEL5/8X2	Destructible Yellow w/ Black Type. JEDEC-14 Symbol Size: 1.6 in. x 2.0 in. (4.1 cm X 5.08 cm)	1000

3M™ Caution Labels

Destructible, black printing on yellow background. This label shows the military force-arrows symbol and a warning message.

3M™ Caution Labels

Product No.	Description	Labels per Roll
CLABEL2X2	Destructible Yellow w/ Black Type. Displays military force-arrows and warning. Size: 2 in. x 2 in. (5.08 cm x 5.08 cm)	500
CLABEL4X4	Destructible Yellow w/ Black Type. Displays military force-arrows and warning. Size: 4 in. x 4 in. (10.2 cm x 10.2 cm)	100

3M™ Military Labels

Destructible, black printing on yellow background. Displays warning symbol and message in accordance with MIL-STD-129.

3M™ Military Label 129LABEL

Product No.	Description	Labels per Roll
7202	Destructible Yellow w/ Black Type. MIL-STD-129 Symbol Size: 2 in. x 2 in. (5.08 cm x 5.08 cm)	500
129LABEL	Destructible Yellow w/ Black Type. MIL-STD-129 Symbol Size: 2 in. x 2 in. (5.08 cm x 5.08 cm)	500
7204	Destructible Yellow w/ Black Type. MIL-STD-129 Symbol Size: 4 in. x 4 in. (10.2 cm x 10.2 cm)	500

3M™ RoHS Label

This destructible label shows Pb free and RoHS compliance. White printing in green background.

3M™ RoHS Label

Product No.	Description	Labels per Roll
RoHSLABEL	Destructible Green/White Type. Size: 2 in. x 2 in. (5.08 cm x 5.08 cm)	500

3M™ Reusable Labels

Labels alert personnel handling bags, boxes or other carriers that the contents are static-sensitive. 3M labels are easy to use and provide the ESD symbol and warning message needed to complete your protective package. These reusable type labels allow you to reopen the bag without tearing the label.

3M™ Attention Label

Reusable, black printing on orange background. This 3M JEDEC-14 label displays the reaching hand symbol and provides writing space.

3M™ Attention Labels

Product No.	Description	Labels per Roll
7101	Reusable Orange w/Black Type. JEDEC-14 Symbol Size: 1.875 in. x 2.5 in. (4.6 cm x 6.4 cm)	500

3M™ Military Labels

Reusable, black printing on yellow background. These 3M labels display warning symbol and message in accordance with MIL-STD-129.

3M™ Attention Labels 7201, 7203

Product No.	Description	Labels per Roll
7201	Reusable Yellow w/Black Type. MIL-STD-129 Symbol Size: 2 in. x 2 in. (5.1 cm x 5.1 cm)	500
7203	Reusable Yellow w/Black Type. MIL-STD-129 Symbol Size: 4 in. x 4 in (10.2 cm x 10.2 cm)	500

3M™ Label Dispenser

Convenient bench-top dispenser holds two 2 in. wide rolls or one 4 in. wide roll.

3M™ Label Dispenser

Product No.	Description
LABELDISPNSR	Convenient benchtop dispenser holds two 2 in. (5.1 cm) wide rolls or one 4 in. (10.2 cm) wide roll.

3M™ Heat Sealer

Securely seals plastic bags closed. 3M static shielding bags are heat sealable. Dependable, impulse design features a time/temperature control and Teflon™-covered sealing elements. Lightweight, portable table model. No warm-up needed. Hot only while sealing. 12 or 16 in. wide sealers.

3M™ Heat Sealer

Product No.	Description
500210	12 in. (30.5 cm) wide
600210	16 in. (40.6 cm) wide

Product Referral Generator

Static Shielding Bags . . . . . pg. 63
Dri-Shield Moisture Barrier Bags . . . . . pg. 76

3M™ ZipTop Reclosable Static Shielding Bags

As an alternative to folding your bags and securing them with a warning label, try our ZipTop reclosable bags. We use quality-tested zipper material and our own custom built machines to make zipper bags that have a reputation for outstanding reliability. Bags are RoHS Compliant* and lead-free**.

Features

- Same Faraday shielding, durability, and structure as open top bags.
- ZipTop zipper is welded to the bag interior for reliability.
- Bags are printed with ESD Warning symbol and lot coded for QC traceability.
- Testable to industry standards.

Product No.	Description
SCC 1000	Metal-In Static Shielding Bag
SCC 1500	Metal-Out Static Shielding Bag
SCC 1300	Puncture Resistant Metal-In Static Shielding Bag
2110	Puncture Resistant Metal-In Static Shielding Bag

RoHS Compliant 2002/95/EC

3M™ ZipTop Reclosable Static Shielding Bags

3M™ SCC 1000 ZipTop Reclosable Static Shielding Bag

Transparent, metallized static shield bag provides a static safe environment for sensitive electronic devices. See sizes on page 65.

3M™ SCC 1500 ZipTop Reclosable Static Shielding Bag

Best protection from ESD through low charge retention and rapid static decay. See sizes on page 67.

3M™ SCC 1300 ZipTop Reclosable Static Shielding Bag

High puncture resistance provides a long life and reduces tears. For tubes and heavy items.

3M™ ZipTop Reclosable Static Shielding Bag 2110

High puncture resistance provides a long life and reduces tears. For tubes and heavy items. Best protection from ESD through low charge retention and rapid static decay.

3M™ TapeTop Adhesive Closure Bags

3M TapeTop bags offer a self-sealing tape closure that is re-sealable for multiple uses. The bags are easy to open and do not require a heat sealer to close. To close the bag, simply peel off the cover strip and fold the flap closed. Open the bag by lifting the flap. TapeTop closure is available on all 3M static shielding bags.

Peel

Stick

Closed

Notes

3M™ Moisture Barrier Bags

3M is one of the leading manufacturers of moisture bags, offering short lead times for custom bag sizes to fit your application. Bags are marked with Moisture and ESD caution information, RoHS compliant symbols, and are lot coded for traceability. Custom printing is available. Moisture barrier bags are designed to protect electronic items from moisture, electrostatic, physical and environmental damage during manufacture, transportation, and storage. As required in ANSI/ESD S541, and as part of the ANSI/ESD S20.20 ESD control program, barrier bags provide protection from static discharge and are low charging.

Types of Barrier Bags

IPC/JEDEC J-STD-033 for Devices

Surface mount devices (SMD) are attached to circuit boards by reheating solder on the pads. This technique, called reflow soldering, heats the circuit board, device leads and the device case. Moisture trapped inside the device case can expand at a rate faster than the case, causing the case to rupture. To prevent this damage, the IPC/JEDEC J-STD-033 standard sets requirements for foil barrier bags, desiccant, humidity indicator cards, labeling and bag sealing. 3M supplies all of the items needed for compliance.

MIL-PRF-81705 for Assemblies

Disk drives, bare cards, and other components are subject to corrosion during storage and shipment. Metallized moisture barrier bags that meet the barrier limit established in MIL-PRF-81075 can help to prevent this damage.

Get all the parts to meet IPC/JEDEC J-STD-033: See page 76 for bags, page 80 for HICs and page 81 for desiccants, labels and sealers.

3M™ Moisture Barrier Bags Product Selection Guide

Product	Technology	Benefit	Application	Page
Bags for IPC/JEDEC J STD-033 MVTR				
Dri-Shield 3000	Moisture Barrier Bag, Foil, 6 mil	Designed to meet the requirements of IPC/JEDEC J-STD-033 for the dry packaging of electronic devices. Dri-Shield 3000 bags are made from dissipative nylon, foil, and dissipative polyethylene. These bags protect SMDs from moisture and static damage. Flexible structure is easy to vacuum seal. Lot coded for QC traceability.	Dry packaging of devices in compliance with IPC/JEDEC J-STD-033.	76
Dri-Shield 3400	Moisture Barrier Bag, Foil, 4 mil	For dry packaging of electronic devices. Dri-Shield 3400 bags are made from a high barrier foil structure. Bags protect SMDs from moisture and static damage. Flexible structure is easy to vacuum seal. Lot coded for QC traceability.	Value packaging: Higher puncture resistance with less thickness. Dry packaging of devices in compliance with IPC/JEDEC J-STD-033.	76
Puncture Resistant				
Dri-Shield 3700	Puncture Resistant Moisture Barrier Bag, Foil	Bags provide superior puncture resistance and drop test performance. This reduces vacuum loss due to punctures from sharp trays and rough handling. Also meets the requirements of IPC/JEDEC J-STD-033 easy to vacuum seal. Lot coded for QC traceability.	Highest puncture resistance to reduce vacuum loss. Dry packaging of devices in compliance with IPC/JEDEC J-STD-033.	77
Low Voltage Retention (Metal-Out)				
Dri-Shield 3200	Metal-out Moisture Barrier Bag, Foil, 3.6 mil	Metal-out structure meets the dry packaging requirements of IPC/JEDEC J-STD-033, and provides charge retention of less than 50 volts. This combination of technology helps prevent static damage to transient-sensitive devices.	Low voltage retention for sensitive devices. Dry packaging of devices in compliance with IPC/JEDEC J-STD-033.	77

Product Referral Generator

Humidity Indicator Cards . . . . . pg. 80
Desiccants . . . . . pg. 81
Labels . . . . . pg. 81
Vacuum Sealers . . . . . pg. 81

3M™ Moisture Barrier Bag with 3M™ Humidity Indicator Card and 3M™ Desiccant

3M™ Moisture Barrier Bags Product Selection Guide

Product	Technology	Benefit	Application	Page
Bags for MIL-PRF-81705 MVTR				
Dri-Shield 2000	Moisture Barrier Bag, Aluminized, 3.6 mil	Bags are made from multiple layers of metallized polyester and dissipative polyethylene. Bags protect SMDs from moisture and static damage. Flexible structure is easy to vacuum seal. Lot coded for QC traceability.	Dry packaging of devices in compliance with MIL-PRF-81705 MVTR.	78
3370	Moisture Barrier Bag, Aluminized, 3.6 mil	Bags are made from multiple layers of metallized polyester and dissipative polyethylene. Bags protect SMDs from moisture and static damage. Contains no amines, amides or N-Octanoic Acid. Outgassing levels are extremely low.	Outgassing levels are extremely low. Dry packaging of devices in compliance with MIL-PRF-81705 MVTR.	78
Puncture Resistant				
Dri-Shield 2700	Puncture Resistant Moisture Barrier Bag, Aluminized, 7 mil	Dri-Shield 2700 bags provide superior puncture resistance and drop test performance. This reduces vacuum loss due to punctures from sharp trays and rough handling. Bags protect from moisture and static damage. Lot coded for QC traceability.	Highest puncture resistance to reduce vacuum loss. Dry packaging of devices in compliance with MIL-PRF-81705 MVTR.	79
Low Voltage Retention (Metal-Out)				
Dri-Shield 2500	Metal-Out Moisture Barrier Bag, Aluminized, 3.6 mil	Combines the moisture barrier technology and low charge retention for charge retention of less than 50 volts and shielding as low as 1 nJ. Stops static damage to transient-sensitive GMR devices.	Dry packaging of devices in compliance with MIL-PRF-81705 MVTR.	79
ZipTop Reclosable Barrier Bags				
Dri-Shield 3400 ZipTop	Reclosable ZipTop Moisture Barrier Bag, Foil, 4 mil	ZipTop feature makes the bag easy to open and close. Dri-Shield 3400 bags are made from a high barrier foil structure. Bags should be heat sealed to fully protect SMDs from moisture.	Reclosable to allow for access to parts. Dry packaging of devices in compliance with IPC/JEDEC J-STD-033.	76
Dri-Shield 2000 ZipTop	Reclosable ZipTop Moisture Barrier Bag, Aluminized, 3.6 mil	ZipTop feature makes the bag easy to open and close. Bags should be heat sealed to fully protect from moisture.	Reclosable to allow for access to parts. Dry packaging in compliance with MIL-PRF-81705.	78

3M™ Dri-Shield 3000 Moisture Barrier Bag

Made from static dissipative nylon, aluminum foil, and static dissipative polyethylene, the bag offers extremely low MVTR and is designed to provide maximum moisture protection for surface mount devices (SMD). Please inquire for sizes. Bags are RoHS Compliant* and lead-free**.

Features

- Meets the requirements of IPC/JEDEC J-STD-033.
- Strong, heat sealable, suitable for vacuum packaging.
- Meets electrical and physical requirements of EIA 583, ESD S541, EIA625, and MIL-PRF-81705, and ANSI/ESD S20.20.
- Static safe: dissipative inner and outer surfaces.
- Amine free, passes outgassing and corrosion tests.
- Used for packaging SMDs in trays, shipping tubes, and tape and reel.
- Printed with ESD and moisture symbols; lot coded for traceability.
- Testable to industry standards.

RoHS Compliant 2002/95/EC

3M™ Dri-Shield 3000 Moisture Barrier Bag

Dri-Shield 3000 Properties

Physical Properties		
MVTR	<0.0003 g/100 sq.in./24 hrs	ASTM F 1249
Puncture Resistance	17 lbs	MIL-STD-3010
Tear Strength (Elmendorf)	980 grams	ASTM D1922
Thickness	6.1 mils	±10%
Tensile Strength	5400 PSI, 380kg/cm^2	ASTM D882
Seal Strength	>15 lbs	ASTM D882
Electrical Properties		
Surface Resistivity/Resistance		
	ASTM D257	ANSI/ESD STM11.11
Interior	<10^{12} ohm/square	or <10^{11} ohm
Exterior	<10^{12} ohm/square	or <10^{11} ohm
Metal	<100 ohm	
Static Shielding	<15 volts	MIL-PRF-81705, EIA 541
Static Shielding	<10 nJ	ANSI/ESD S11.31
EMI Attenuation	45 dB	MIL-PRF-81705
Static Decay	<0.03 seconds	MIL-STD-3010
Silicone or Amine Content	Not detected	FTIR

3M™ Dri-Shield 3400 Moisture Barrier Bag

Specially designed for high volume applications, this bag offers the barrier properties required by JEDEC specs at a lower cost. Please inquire for sizes. Bags are RoHS Compliant* and lead-free**.

Features

- Meets the requirements of IPC/JEDEC J-STD-033.
- Strong, lightweight, heat sealable, suitable for vacuum packaging.
- Meets electrical and physical requirements of EIA 583, ESD S541, EIA625, and MIL-PRF-81705, and ANSI/ESD S20.20.
- Static safe: dissipative inner and outer surfaces.
- Amine free, passes outgassing and corrosion tests.
- Used for packaging SMDs in trays, shipping tubes, and tape and reel.
- Printed with ESD and moisture symbols; lot coded for traceability.
- Testable to industry standards.

RoHS Compliant 2002/95/EC

3M™ Dri-Shield 3400 Moisture Barrier Bag

Dri-Shield 3400 Properties

Physical Properties		
MVTR	<0.0003 g/100 sq.in./24 hrs	ASTM F 1249
Puncture Resistance	20 lbs	MIL-STD-3010
Tear Strength (Elmendorf)	110 grams	ASTM D1922
Thickness	4.0 mils	SCC 008
Tensile Strength	8500 PSI, 598kg/cm^2	ASTM D882
Seal Strength	>15 lbs	ASTM D882
Electrical Properties		
Surface Resistivity/Resistance		
	ASTM D257	ANSI/ESD STM11.11
Interior	<10^{12} ohm/square	or <10^{11} ohm
Exterior	<10^{12} ohm/square	or <10^{11} ohm
Metal	<100 ohm	
Static Shielding	<20 volts	MIL-PRF-81705, EIA 541
Static Shielding	<10 nJ	ANSI/ESD S11.31
EMI Attenuation	45 dB	MIL-PRF-81705
Static Decay	<0.01 seconds	MIL-STD-3010
Silicone or Amine Content	Not detected	FTIR

3M Products are ESD 20.20 Program Compliant

3M™ Dri-Shield 3200 Metal-Out Moisture Barrier Bag

This bag is engineered to provide low charge retention and rapid static decay. Low MVTR provides maximum moisture protection for surface mount devices. Please inquire for sizes. Bags are RoHS Compliant* and lead-free**.

Features

- Metal layer is positioned near the outer surface for fast charge decay and low charge retention.
- Meets the requirements of IPC/JEDEC J-STD-033.
- Strong, lightweight, heat sealable, suitable for vacuum packaging.
- Meets electrical and physical requirements of EIA 583, ESD S541, EIA625, and MIL-PRF-81705, and ANSI/ESD S20.20.
- Static safe: dissipative inner and outer surfaces.
- Amine free, passes outgassing and corrosion tests.
- Used for packaging SMDs in trays, shipping tubes, and tape and reel.
- Printed with ESD and moisture symbols; lot coded for traceability.
- Testable to industry standards.

RoHS Compliant 2002/95/EC

3M™ Dri-Shield 3200 Metal-Out Moisture Barrier Bag

Dri-Shield 3200 Properties

Physical Properties		
MVTR	<0.0003 g/100 sq.in./24 hrs	ASTM F1249
Puncture Resistance	>20 lbs	MIL-STD-3010
Tear Strength (Elmendorf)	110 grams	ASTM D1922
Thickness	4.0 mils	SCC 008
Tensile Strength	8500 PSI, 598kg/cm^2	ASTM D882
Seal Strength	>15 lbs	ASTM D882
Electrical Properties		
Surface Resistivity/Resistance		
	ASTM D257	ANSI/ESD STM11.11
Interior	<10^{12} ohm/square	or <10^{11} ohm
Exterior	<10^{5} ohm/square	or <10^{9} ohm
Metal	<100 ohm	
Static Shielding	<20 volts	MIL-PRF-81705, EIA 541
Static Shielding	<10 nJ	ANSI/ESD S11.31
EMI Attenuation	45 dB	MIL-PRF-81705
Static Decay	<0.01 seconds	MIL-STD-3010
Charge Retention	<100 volts	CPM
Silicone or Amine Content	Not detected	FTIR

3M™ Dri-Shield 3700 Moisture Barrier Bag

This puncture resistant bag offers more strength for packaging items with sharp edges. Low MVTR provides maximum moisture protection for surface mount devices. Please inquire for sizes. Bags are RoHS Compliant* and lead-free**.

Features

- Meets the requirements of IPC/JEDEC J-STD-033.
- Puncture resistant.
- Strong, lightweight, heat sealable, suitable for vacuum packaging.
- Meets electrical and physical requirements of EIA 583, ESD S541, EIA625, and MIL-PRF-81705, and ANSI/ESD S20.20.
- Static safe: dissipative inner and outer surfaces.
- Amine free, passes outgassing and corrosion tests.
- Used for packaging SMDs in trays, shipping tubes, and tape and reel.
- Printed with ESD and moisture symbols; lot coded for traceability.
- Testable to industry standards.

RoHS Compliant 2002/95/EC

3M™ Dri-Shield 3700 Moisture Barrier Bag (label optional)

Dri-Shield 3700 Properties

Physical Properties		
MVTR	<0.0003 g/100 sq.in./24 hrs	ASTM F1249
Puncture Resistance	>25 lbs	MIL-STD-3010
Tear Strength (Elmendorf)	185 grams	ASTM D1922
Thickness	4.0 mils	SCC 008
Tensile Strength	13000 PSI, 914kg/cm^2	ASTM D882
Seal Strength	>15 lbs	ASTM D882
Electrical Properties		
Surface Resistivity/Resistance		
	ASTM D257	ANSI/ESD STM11.11
Interior	<10^{12} ohm/square	or <10^{11} ohm
Exterior	<10^{12} ohm/square	or <10^{11} ohm
Metal	<100 ohm	
Static Shielding	<20 volts	MIL-PRF-81705, EIA 541
Static Shielding	<10 nJ	ANSI/ESD S11.31
EMI Attenuation	45 dB	MIL-PRF-81705
Static Decay	<0.01 seconds	MIL-STD-3010
Silicone or Amine Content	Not detected	FTIR

3M™ Dri-Shield 2000 Moisture Barrier Bag

Multiple layers of metallized polyester provide puncture resistance and moisture barrier for this economical dry bag. Please inquire for sizes. Bags are RoHS Compliant* and lead-free**.

Features

- Strong, lightweight, heat sealable, suitable for vacuum packaging.
- Meets electrical and physical requirements of EIA 583, ESD S541, EIA625, MIL-PRF-81705, and ANSI/ESD S20.20.
- Static safe: dissipative inner and outer surfaces.
- Amine free, passes outgassing and corrosion tests.
- Used for packaging SMDs in trays, shipping tubes, and tape and reel.
- Printed with ESD and moisture symbols; lot coded for traceability.
- Testable to industry standards.

RoHS Compliant 2002/95/EC

3M™ Dri-Shield 2000 Moisture Barrier Bag

3M™ Moisture Barrier Bag 3370

The 3M™ Moisture Barrier Bag 3370 has been designed to meet the demanding moisture protection needs of the electronics market. Bags are RoHS Compliant* and lead-free**.

Features

- Clean barrier film contains no amines, N-Octanoic Acid.
- Outgassing levels are extremely low.
- Strong, lightweight, heat sealable, suitable for vacuum packaging.
- Meets electrical and physical requirements of EIA 583, ESD S541, EIA625, MIL-PRF-81705, and ANSI/ESD S20.20.
- Static safe: dissipative inner and outer surfaces.
- Used for packaging SMDs in trays, shipping tubes, and tape and reel.
- Printed with ESD and moisture symbols; lot coded for traceability.
- Testable to industry standards.

Product No.	Description
3370	Moisture Vapor Barrier Bag. 100 bags per pack. Metal Out. Standard Sizes, in. (cm) 4 x 6 (10.2 x 15.2) 5 x 8 (12.5 x 20.3) 6 x 10 (15.2 x 25.4) 8 x 10 (20.3 x 25.4) 10 x 12 (24.4 x 30.5) 12 x 16 (30.5 x 40.6) 16 x 18 (40.6 x 45.7) 18 x 24 (45.7 x 61) Custom Sizes Limits, in. (cm) 3 x 3 to 35 x 36 (7.6 x 7.6 to 88.9 x 91.4)

RoHS Compliant 2002/95/EC

3M Products are ESD 20.20 Program Compliant

3M™ Moisture Barrier Bag 3370

Dri-Shield 2000 Properties

Physical Properties		
MVTR	<0.02 g/100 sq.in./24 hrs	ASTM F1249
Puncture Resistance	>20 lbs	MIL-STD-3010
Tear Strength (Elmendorf)	48 grams	ASTM D1922
Thickness	3.6 mils	±10%
Tensile Strength	8700 PSI, 612kg/cm^2	ASTM D882
Seal Strength	>12 lbs	ASTM D882
Electrical Properties		
Surface Resistivity/Resistance		
	ASTM D257	ANSI/ESD STM11.11
Interior	<10^{12} ohm/square	or <10^{11} ohm
Exterior	<10^{12} ohm/square	or <10^{11} ohm
Metal	<100 ohm	
Static Shielding	<20 volts	MIL-PRF-81705, EIA 541
Static Shielding	<10 nJ	ANSI/ESD S11.31
EMI Attenuation	45 dB	MIL-PRF-81705
Static Decay	<0.03 seconds	MIL-STD-3010
Silicone or Amine Content	Not detected	FTIR

Moisture Barrier Bag 3370 Properties

Property	Typical Value	Test Method
Thickness	3.6 mil. (92 microns)±10%	Measure
Moisture Vapor Transmission Rate	< 0.015 grams/100 inches^2 /24 hours (645.2 cm^2) (film and seams)	ASTM F 1249
Tensile Strength	> 8200 PSI (5.7 x 107 N/m^2)	ASTM D 882
Puncture Resistance	> 20 lbs. (9.07 kg)	FTMS 101C Method 2065
Seam Strength	Pass (3.5 lb./1.6 kg hanging weight)	Mil PRF 81705(D)
Surface Resistance (Interior and Exterior)	<1 x 10^{11} ohm @12% R.H.	ANSI/ESD S11.11
Metal Layer	< 100 ohm	Monroe 267 Buried Layer
Static Discharge Shielding	< 7 nJ	ANSI/ESD S11.31
Outgassing	<10µg/g Total outgassing, < 1µg/g Hydrocarbons	Static Headspace
Ionic Contamination	<20 ng/cm^2: Na, F, PO_4, SO_4, Cl, NH_4 <100 ng/cm^2: NO_3	Extraction/IC
Non Volatile Residue	<1 µg/cm^2	ASTM E1235 (reference)
Polycarbonate Compatibility	Pass - 185°F (85°C), 3400 PSI	EIA 564
Amines, Amides, Silicone	None Added	FTIR/NMR

3M™ Dri-Shield 2500 Metal-Out Moisture Barrier Bag

This bag is engineered to provide low charge retention and rapid static decay. Provides moisture protection for sensitive assemblies. Please inquire for sizes. Bags are RoHS Compliant* and lead-free**.

Features

- Metal layer is positioned near the outer surface for fast charge decay and low charge retention.
- Strong, lightweight, heat sealable, suitable for vacuum packaging.
- Meets electrical and physical requirements of EIA 583, ESD S541, EIA625, MIL-PRF-81705, and ANSI/ESD S20.20.
- Static safe: dissipative inner and outer surfaces.
- Used for packaging SMDs in trays, shipping tubes, and tape and reel.
- Printed with ESD and moisture symbols; lot coded for traceability.
- Testable to industry standards.

RoHS Compliant 2002/95/EC

3M™ Dri-Shield 2500 Metal-Out Moisture Barrier Bag

Dri-Shield 2500 Properties

Physical Properties		
MVTR	<0.02 g/100 sq.in./24 hrs	ASTM F 1249
Puncture Resistance	>20 lbs	MIL-STD-3010
Tear Strength (Elmendorf)	48 grams	ASTM D 1922
Thickness	3.6 mils	±10%
Tensile Strength	8700 PSI, 612kg/cm^2	ASTM D882
Seal Strength	>12 lbs	ASTM D882
Electrical Properties		
Surface Resistivity/Resistance		
	ASTM D257	ANSI/ESD STM11.11
Interior	<10^{12} ohm/square	or <10^{11} ohm
Exterior	<10^{5} ohm/square	or <10^{9} ohm
Metal	<100 ohm	
Static Shielding	<20 volts	MIL-PRF-81705, EIA 541
Static Shielding	<5 nJ	ANIS/ESD S11.31
EMI Attenuation	45 dB	MIL-PRF-81705
Static Decay	<0.03 seconds	MIL-STD-3010
Charge Retention	<100 volts	CPM
Silicone or Amine Content	Not detected	FTIR

3M™ Dri-Shield 2700 Moisture Barrier Bag

This puncture resistant bag offers more strength for packaging items with sharp edges. Provides moisture protection for sensitive assemblies. Please inquire for sizes. Bags are RoHS Compliant* and lead-free**.

Features

- Puncture resistant.
- Strong, lightweight, heat sealable, suitable for vacuum packaging.
- Meets electrical and physical requirements of EIA 583, ESD S541, EIA625, MIL-PRF-81705, and ANSI/ESD S20.20.
- Static safe: dissipative inner and outer surfaces.
- Amine free, passes outgassing and corrosion tests.
- Used for packaging SMDs in trays, shipping tubes, and tape and reel.
- Printed with ESD and moisture symbols; lot coded for traceability.
- Testable to industry standards.

RoHS Compliant 2002/95/EC

3M™ Dri-Shield 2700 Moisture Barrier Bag

Dri-Shield 2700 Properties

Physical Properties		
MVTR	<0.005 g/100 sq.in./24 hrs	ASTM F 1249
Puncture Resistance	30 lbs	MIL-STD-3010
Tear Strength (Elmendorf)	215 grams	ASTM D 1922
Thickness	7.0 mils	SCC 008
Tensile Strength	6800 PSI, 478kg/cm^2	ASTM D882
Seal Strength	>15 lbs	ASTM D882
Electrical Properties		
Surface Resistivity/Resistance		
	ASTM D257	ANSI/ESD STM11.11
Interior	<10^{12} ohm/square	or <10^{11} ohm
Exterior	<10^{12} ohm/square	or <10^{11} ohm
Metal	<100 ohm	
Static Shielding	<20 volts	MIL-PRF-81705, EIA 541
Static Shielding	<10 nJ	ANIS/ESD S11.31
EMI Attenuation	45 dB	MIL-PRF-81705
Static Decay	<0.01 seconds	MIL-STD-3010
Silicone or Amine Content	Not detected	FTIR

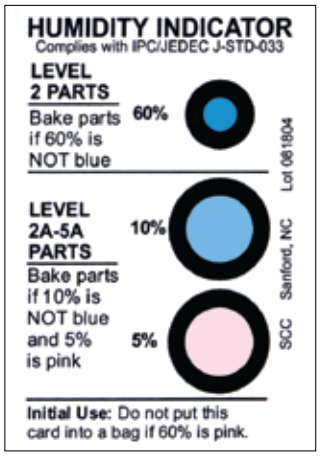
3M Products are ESD 20.20 Program Compliant

3M™ Humidity Indicator Cards (HICs)

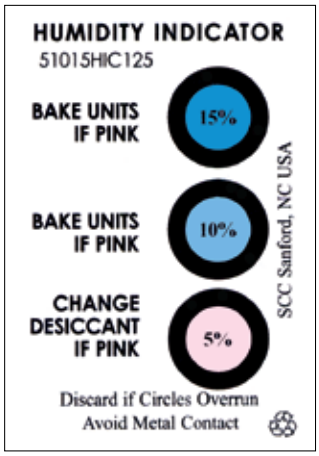
HICs are printed with moisture sensitive spots which respond to various levels of humidity with a visible color change from blue to pink. HICs are used inside vacuum sealed (dry packed) moisture barrier bags to monitor the interior humidity conditions of the package. When the bag is opened, the card can be examined to verify proper dryness inside the bag. This indicates that the moisture barrier bag and desiccant functioned correctly. Performance tested. Lot traceable. Bags are RoHS Compliant* and lead-free**.

RoHS Compliant 2002/95/EC

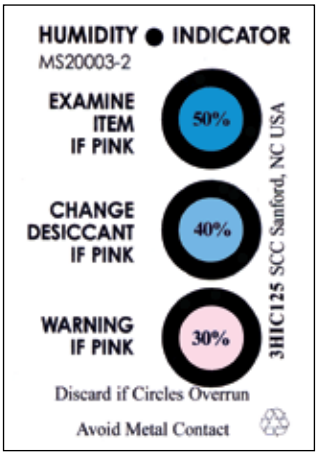
Product No.	Description	Cards Per Can
51060HIC125	JEDEC Compliant Meets IPC/JEDEC J-STD-033 revision B. Indicates 5, 10, 60% RH. Size: 2 in. x 3 in. (5.1 cm x 7.6 cm)	125
51015HIC125	JEDEC Compliant Meets IPC/JEDEC J-STD-033 revision A. Indicates 5, 10, 15% RH. Size: 2 in. x 3 in. (5.1 cm x 7.6 cm)	125
4HIC100	EIA583 Compliant Indicates 10, 20, 30, 40% RH. Size: 2 in. x 3 in. (5.1 cm x 7.6 cm)	100
6HIC200	MIL-I-8835 Compliant Indicates 10, 20, 30, 40, 50, 60% RH. Size: 1.56 in. x 4.75 in. (4.0 cm x 12.1 cm)	200
3HIC125	MS20003-2 Compliant Indicates, 30, 40, 50% RH. Size: 2 in. x 3 in. (5.1 cm x 7.6 cm)	125



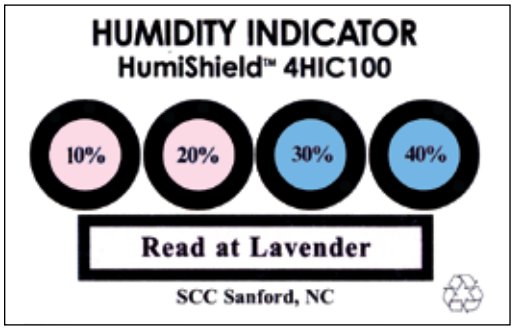
3M™ Humidity Indicator Card 5, 10, 60% RH



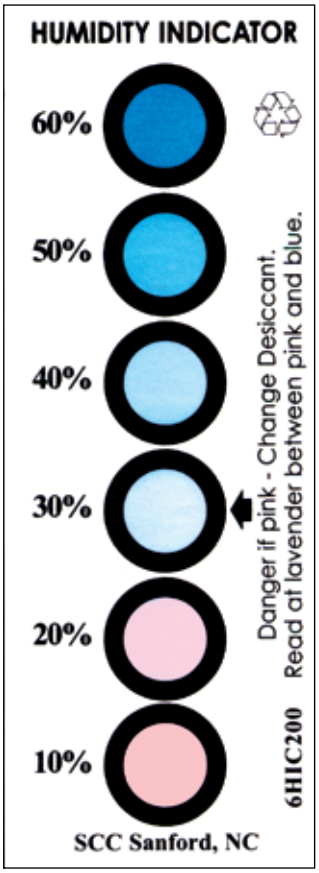
3M™ Humidity Indicator Card 5, 10, 15% RH



3M™ Humidity Indicator Card
MS 20003-2 Compliant



3M™ Humidity Indicator Card 10, 20, 30, 40% RH



3M™ Humidity Indicator Card
MIL-I-8835 Compliant

3M™ Desiccant

Desiccant works by efficiently absorbing airborne moisture left inside the bag after vacuum sealing, and captures moisture that manages to pass through the bag material. Secure in a strong envelope of either cleanroom compatible, sulphur-free Tyvek™ or economical Kraft paper, these desiccants are designed to keep your devices dry. Meets the requirements of IPC/JEDEC J-STD-033 and MIL-D-3464, Types I & II.

3M™ Desiccant, Tyvek™ Pouch

3M™ Desiccant, Kraft Pouch

3M™ Dessicant

Pouch Size	Part Number	Part Number	Pouches per Container
1/6 Unit	1/6TYDES1200	1/6KDES1200	1200
1/3 Unit	1/3TYDES700	1/3KDES700	700
1/2 Unit	1/2TYDES550	1/2KDES550	550
1 Unit	1TYDES300	1KDES300	300
1 Unit	1TYDES1300	1KDES1300	1300
2 Unit	2TYDES150	2KDES150	150
2 Unit	2TYDES800	2KDES800	800
4 Unit	4TYDES500	4KDES500	500
8 Unit	8TYDES300	8KDES300	300
16 Unit	16TYDES150	16KDES150	150

3M™ Dry Packaging Labels

3M™ Label 113

3M™ Dri-Label

3M™ Dry Packaging Labels

Product No.	Description	Labels per Roll
113LABEL	For use with dry packaging applications. Displays the warning symbol and message in accordance with IPC/JEDEC J-STD-033 and JEDEC113. 3M can pre-apply this label to bags.	100
DRILABEL	For use with dry packaging applications. Displays static awareness symbol and EIA 583 moisture symbol. Provides writing space.	100

3M™ Vacuum Sealers

A vacuum sealer evacuates moisture laden air from moisture barrier bags, and then heat seals the bags closed. This is part of the dry packaging process that protects surface mount devices from moisture. A vacuum sealer, a moisture barrier bag, desiccant, and humidity indicator card (HIC) make up the complete system for dry packaging.

3M™ Vacuum Sealers

Product No.	Description
635VACUSEAL	Premium Vacuum Sealer
35VACUSEAL	Standard Vacuum Sealer
235VACUSEAL	Economy Vacuum Sealer

3M™ Vacuum Sealer 635 (Premium Performance)

- Electronic control center
- Retracting vacuum nozzle
- Automatic operation

Part No. 635VACUSEAL

3M™ Vacuum Sealer 35 (Standard Performance)

- Vacuum, heat, cool timers
- Fixed vacuum nozzle
- Semi-automatic operation

Part No. 35VACUSEAL

3M™ Vacuum Sealer 235 (Economy Performance)

- Heat and cool timers
- Retracting vacuum nozzle
- Manual operation

Part No. 235VACUSEAL

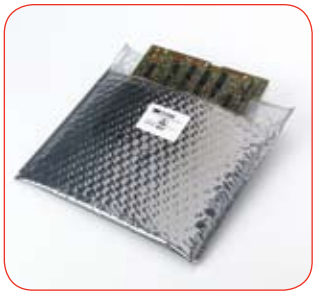
3M™ Vacuum Sealer 635

3M™ Vacuum Sealer 35

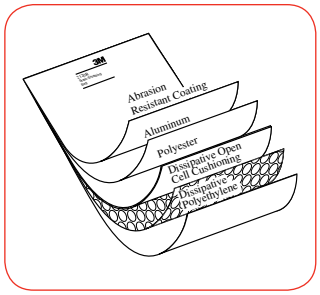
3M™ Vacuum Sealer 235

3M™ Cushioned Shielding Bags

3M Metal-Out Cushioned Static Shielding Bags 2120R protect devices from physical damage as well as provide proper static shielding.



3M™ Static Shielding Bag 2120R



Cross Section

Product No.	Description
2120R	Cushioned Static Shielding Bags. 100 bags per pack Standard Sizes, in. (cm) 6 x 7 (15.2 x 17.8) 8 x 7 (20.3 x 17.8) 8 x 11 (20.3 x 27.9) 10 x 7 (25.4 x 17.8) 12 x 11 (25.4 x 27.9) 14 x 11 (35.6 x 27.9) 14 x 15 (35.6 x 38.1) 16 x 11 (40.6 x 27.9) 16 x 15 (40.6 x 38.1) 18 x 11 (45.7 x 27.9) 18 x 15 (45.7 x 38.1) 18 x 23 (45.7 x 58.4) Custom Sizes Limits, in. (cm) 5 x 5 to 24 x 23 (12.7 x 12.7 to 61 x 58.4)

Dimensions are inside measurements (W x L). Custom printing on bags available by special order. (Please contact 3M Customer Service for quotations.)

RoHS Compliant 2002/95/EC

3M™ Cushioned Shielding Wrap

3M Cushioned Wrap 2126R provides static shielding and physical protection for large or irregularly shaped circuit boards. Heat sealable inner surface.

Product No.	Description
2126R	Cushioned Static Shielding Wrap. Supplied in rolls. Standard Sizes, in. (cm) 24 x 125 (61 x 38.1) 48 x 125 (122 x 38.1)

RoHS Compliant 2002/95/EC

Cushioned Wrap 2126R Properties

Property	Test Method	Typical Value
Thickness	PPP-C-1842	125 mil (3.175 mm)
Strength		
Tensile	ASTM D882	34 lbs./in.
Puncture	FTMS 101	22 lbs. (10 kg)
Surface Resistance/ Resistivity		
Interior	EIA-541, ASTM D257	$<10^{12}$ ohm/sq.
Exterior	ANSI/ESD S11.11	$<10^{11}$ ohm
Metallized Layer	Monroe #267	$<10^{2}$ ohm/sq.
Shielding	EIA-541 (V-Zap)	<30 V
Electrostatic Decay		
Interior	ANSI/ESD S11.11	<2 sec.
Contact Corrosivity	FTMS 101C, Method 3005	Pass
Shelf Life (from date of manufacture)		1 Year

Static Shielding Bag 2120R Properties

Property	Test Method	Typical Value
Thickness	PPP-C-1842	125 mil (3.175 mm)
Strength		
Tensile	ASTM D882	34 lbs./in.
Puncture	FTMS 101	22 lbs. (10 kg)
Seam	MIL PRF 81705	Pass
Surface Resistance/ Resistivity		
Interior	EIA-541, ASTM D257	$<10^{12}$ ohm/sq.
Exterior	ANSI/ESD S11.11	$<10^{11}$ ohm
Metallized Layer	Monroe #267	$<10^{2}$ ohm/sq.
Shielding	EIA-541 (V-Zap)	<30V
Electrostatic Decay		
Interior	EIA-541	<2 sec.
Contact Corrosivity	FTMS 101C, Method 3005	Pass
Shelf Life (from date of manufacture)		1 Year

3M™ MIL Spec Bags

3M™ SCC 2000MQPL/Military Moisture Barrier Bag

Bags are made from MIL-PRF-81705 Type I material that appears on the Navy Qualified Products List (QPL) and are converted per MIL-DTL-117.

3M™ SCC 2000MQPL/Military Moisture Barrier Bag

3M™ MILpac 131 Barrier Bag

MIL-PRF-131 bags provide protection for critical items susceptible to damage by moisture or corrosion. This material appears on the Qualified Products List (QPL). Bag converted per MIL-DTL-117.

3M™ MILpac 131 Barrier Bag

Product No.	Description
2000MQPL	Military Moisture Barrier Bag
MILpac 131	MIL-PRF-131 Barrier Bag

3M™ Conductive Bags

3M Conductive Bags 2004 are made of opaque, volume-conductive carbon impregnated polyolefin. They are easily grounded and the electrical characteristics are not affected by age or humidity. The standard bags are readily heat-sealable and 4 mils thick. 100 bags per pack.

3M™ Conductive Bags 2004

Product No.	Description
2004	Conductive Bags. Wall thickness: 4.0 mil. (102 microns) 100 bags per pack Standard Sizes, in. (cm) 5 x 8 (12.7 x 20.3) 6 x 10 (15.2 x 25.4) 8 x 12 (20.3 x 30.5) 10 x 12 (25.4 x 30.5) 12 x 16 (30.5 x 40.6) 15 x 18 (38.1 x 45.7) Custom Size, in. (cm) 4 x 4 to 42 x 72 (10.2 x 10.2 to 106.7 x 182.9)

RoHS Compliant 2002/95/EC

3M™ Conductive Drum Liners

3M Drum Liners 2014 do not hold static charge when grounded. Commonly used as waste container liners, for holding chemicals that could be ignited by a static caused spark, or dry chemicals that tend to cling to ordinary nonconductive static-laden plastics. 100 bags per box.

3M™ Conductive Drum Liner 2014

Product No.	Description
2014	Drum Liners. Wall thickness: 4.0 mil. (102 microns) 100 per box Standard Sizes, in. (cm) 5 gallon: 18 x 24 (45 x 60) 20 gallon: 24 x 36 (61 x 91) 30 gallon: 30 x 36 (76 x 91) *55 gallon: 38 x 58 (96 x 147) * Available 50 per box

RoHS Compliant 2002/95/EC

Conductive Packaging Properties*

Property	Test Method	Typical Value
Thickness	ASTM D2103	4 mil (102 microns)
Strength		
Breaking Factor	ASTM D882	10 lbs./in.
Puncture	Fed Std 101	8 lbs.
Heat Seal Parameters		
Temperature		180°F – 250°F
Time		0.5 – 5.0 sec.
Pressure		20 – 60 PSI (1.4 x 105 – 4.1 x 105 N/m2)
Vicat Softening Temp.		-50°F – 150°F (-46°C – 66°C)
Vicat Softening Temp.	ASTM D1525	83°C
Electrical Properties		
Volume Resistivity	ASTM D991	<500 ohm-cm
Static Decay	EIA-541	<2 sec.
Water Vapor Transmission	ASTM F372	3 g/sq. m/day
Chemical Susceptibility	ASTM D543	
Dilute Acids and Alkalies		Resistant
Concentrated Acids & Alkalies		Slight Attack
Alcohols (Isopropanol)		Resistant
Hydrocarbons (Heptane)		Moderate Attack
Ketones (Acetone)		Slight Attack
Oil and Gasoline		Moderate Attack
Aromatic Hydrocarbons (Toluene) Shelf Life		Severe Attack Indefinite

*** Typical values for 4.0 mil film.**
Physical characteristics will change with other thicknesses.

3M™ Conductive Film

This film is opaque, volume-conductive, carbon-impregnated polyolefin, and is commonly used for material handling, shipping and storage in the electronic or chemical industries.

3M™ Conductive Film 1700, 1760 Series

3M™ Conductive Tubing

3M Conductive Tubing 1724 is made of opaque, volume conductive carbon-impregnated polyolefin, and is used to make bags and sleeves for specialized packaging or storage requirements. The tubing is heat-sealable and can be used on automated packaging lines.

3M™ Conductive Tubing 1724

Product No.	Description
Short Rolls	
1704	Film. Thickness: 4.0 mil. (102 microns) Widths, in. (m) Approx. Length/Roll, ft. (m) 36 (0.9) 150 (45.7) 54 (1.4) 150 (45.7) 72 (1.8) 150 (45.7)
1706	Film. Thickness: 6.0 mil. (152,4 microns) Widths, in. (m) Approx. Length/Roll, ft. (m) 36 (0.9) 150 (45.7) 54 (1.4) 150 (45.7) 72 (1.8) 150 (45.7)
1708	Film. Thickness: 8.0 mil. (203,2 microns) Widths, in. (m) Approx. Length/Roll, ft. (m) 36 (0.9) 150 (45.7) 54 (1.4) 150 (45.7) 72 (1.8) 150 (45.7)
Long Rolls	
1764	Film. Thickness: 4.0 mil. (102 microns) Widths, in. (m) Approx. Length/Roll, ft. (m) 36 (0.9) 150 (45.7)

RoHS Compliant 2002/95/EC

Product No.	Description
Short Rolls	
1724	Lay Flat Conductive Tubing. Thickness: 4.0 mil. (102 microns) Widths, in. (m) Approx. Length/Roll, ft. (m) 5 (12.7) 500 (152) 12 (30.5) 500 (152)

Note: Shelf life of products made with conductive resin is five years. Variations in storage conditions such as temperature fluctuation, exposure to sunlight or high humidity may reduce the shelf life.

RoHS Compliant 2002/95/EC

3M™ Conductive Containers

Conductive containers are ideal for static-safe storage, kitting, and in-process handling and transporting of static-sensitive assemblies and devices. Made from injection-molded plastic, these containers are noncorrosive and lightweight. Static-sensitive devices can be transported in these containers which provide protection from static discharge and from static fields.

Product No.	Length in. (cm)	Width in. (cm)	Depth in. (cm)
8520	10 (25.4)	8 (20.3)	1.25 (3.2)
8521	12 (30.5)	9 (22.9)	1.25 (3.2)
8522	18 (45.7)	17 (43.2)	2 (5.1)
8523	10 (25.4)	8 (20.3)	2 (5.1)

All dimensions are referenced from the inside bottom of the container and are nominal dimensions.

3M™ Single Card Carriers

3M Static Shielding Single Card Carriers protect individual printed circuit boards from static and physical damage during storage and transport. Interiors are lined with dissipative cushioning foam.

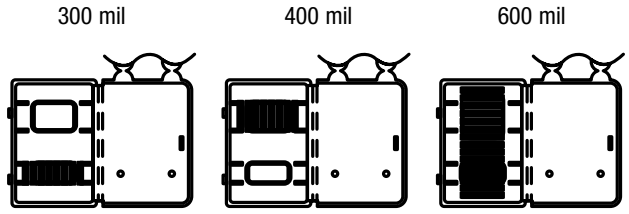
3M™ Single Card Carrier

Product No.	Length in. (cm)	Width in. (cm)	Depth in. (cm)
5701	1.55 (3.9)	1.01 (2.6)	0.46 (1.2)

All dimensions are referenced from the inside bottom of the container and are nominal dimensions.

3M™ Single Device Carriers

The rugged injection-molded 3M™ Single Device Carrier 5701 is designed to provide cost-effective physical and static protection for DIPs. The conductive units are volume resistive and will not lose their conductivity with age, nor do they depend on humidity to function. Single Device Carrier 5701 meets EIA-541 requirements for static shielding. A unique “saddle” design supports device leads and helps prevent accidental bending. Other design features include a smooth front surface on the container to adhere labels and a living hinge cover that snaps securely shut. Carrier accepts up to 18-pin 300 mil and 400 mil devices, and up to 28-pin 600 mil devices.



3M™ Single Device Carrier 5701

3M™ Hinged Containers

3M Hinged Containers are made from injection-molded plastic, and are noncorrosive and lightweight. The containers feature molded pin hinges that provide better security and reliability than traditional snap hinges.

Static-sensitive devices can be transported in these containers which provide protection from direct static discharges as well as from static fields from charged personnel and materials.

3M™ Hinged Containers

3M Containers are injection-molded in a variety of shapes and sizes. They are ideal for static-safe storage, kitting, and in-process handling and transporting of static-sensitive assemblies and devices.

Product No.	Length in. (cm)	Width in. (cm)	Depth in. (cm)
4021	2.88 (7.3)	1.19 (3.0)	0.5 (1.3)
4022	3.88 (9.8)	1.94 (4.9)	0.5 (1.3)
4023	2.56 (6.5)	3.5 (8.9)	1.75 (4.4)
4024	7 (17.8)	3.5 (8.9)	1 (2.5)
4025	7 (17.8)	5 (12.3)	0.5 (1.3)

All dimensions are referenced from the inside bottom of the container and are nominal dimensions.

Note: Shelf life of products made with conductive resin is five years. Variations in storage conditions such as temperature fluctuation, exposure to sunlight or high humidity may reduce the shelf life.

3M™ Round Containers

3M Round Containers feature separate containers and lids.

3M™ Round Containers

Product No.	Diameter in. (cm)	Height in. (cm)
4011	2.38 (6.0)	0.88 (2.2)
4012	3.38 (8.6)	0.88 (2.2)
4013	1.81 (4.6)	4 (10.2)
4014	4.06 (10.3)	2.34 (6.0)
4015	3.81 (9.7)	4.69 (11.9)

All dimensions are referenced from the inside bottom of the container and are nominal dimensions.

Container Properties

Typical Property	Test Method	4540 EVA Copolymer Compound / 1801 Sheet Stock Typical Value*	4520 Polypropylene Compound / 1840 Sheet Stock Typical Value**
Hardness	ASTM D2240	58 - 62 Shore D	67 - 71 Shore D
Heat Deflection Temp.	ASTM D648	38° - 43°C @ 264 PSI	100°C @ 66 PSI; 50°C @ 264 PSI
Water Absorption	ASTM 570	0.1 - 0.2%	0.1 - 0.2%
Vicat Softening	ASTM D1525	88° - 92°C	148°C
Flammability	ASTM D635	4.5 - 5.5 cm/min.	2 cm/min.
Impact Resistance	ASTM D256	2.9 - 3.7 ft.-lbs./in. @ 72°F	8 - 10 ft.-lbs./in. @ 72°F
Notched Izod		0.6 - 1.3 ft.-lbs./in. @ 25°F	7 - 9 ft.-lbs./in. @ 25°F
Maximum Temp. Exposure	3M	150°F	180°F
Tensile Strength	ASTM D638	1700 - 2000 PSI	2800 - 3000 PSI
Flex Modulus	ASTM D790	40,000 - 50,000 PSI	130,000 - 150,000 PSI
Mold Shrinkage	ASTM 955	15 - 20 mil/in.	10 - 20 mil/in.
Electrical Conductance			
Volume Conductive	ASTM D991	< 500 ohm-cm	< 500 ohm-cm
Chemical Resistance	ASTM D543		
Alcohol		Resistant	Resistant
Aromatic Hydrocarbons		Severe Attack	Severe Attack
Aliphatic Hydrocarbons		Moderate Attack	Moderate Attack
Concentrated Acids		Slight Attack	Slight Attack
Concentrated Alkalines		Slight Attack	Slight Attack
Dilute Acids		Resistant	Resistant
Dilute Alkalines		Resistant	Resistant
Kerosene		Severe Attack	Severe Attack
Ketones (Acetone)		Moderate Attack	Moderate Attack
Mineral Oil		Slight Attack	Slight Attack
Oil and Gasoline		Moderate Attack	Moderate Attack

*EVA copolymer technical data for 4540 Resin; 1801; 4251-4254A Snap on Covers.

**Polypropylene technical data for 4520 Resin; 1840; 4011-4016 Round Containers and Lids; 4021-4025 Hinged Containers; 5701 Single Device Carriers; and 8520-8523 Single Card Carriers.

3M™ Connector Covers

3M Connector Covers are made of an intrinsically conductive composite material with uniformly distributed fibers. This makes the covers free of carbon black particulate and better suited to clean situations. The covers do not leave black marks and are permanently conductive.

3M™ Circular Connector Covers 4270 Series

4270 Series were designed to meet the requirements and intentions of MS90376,and MIL PRF 5501/31A or 32A. Military contractors have qualified these materials to their own specifications and are encouraging their use.

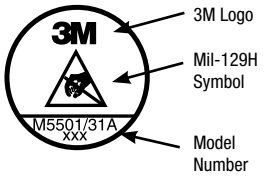
3M™ Circular Connector Covers 4270 Series

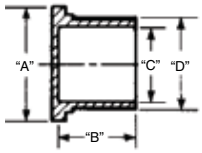
Product No.	Description
4270	Feature a unique conductive composite material. Noncorrosive and produce no visible corrosion. Connector Covers 4270 Series were designed to meet the requirements and intentions of MS90376 and MIL PRF 5501/31A or 32A.

Material Properties

Property	Test Method	Typical Value
Resistivity	ASTM D991	$<10^5$ ohm-cm
Contact Corrosivity (Kovar plate)	FTMS 101C Method 3005	Pass
Crayoning	3M	Not visible
Elongation	ASTM D638	25%
Tensile	ASTM D638	1500 PSI (1.0×10^7 N/m^2)
Vicat Softening	ASTM MD 1525	205°F (960C)
Outgassing	ASTM E595	Pass
Chemical		**Reactions**
Dilute Acids		Slight Attack
Dilute Alkalines		Slight Attack
Concentrated Acids		Severe Attack
Concentrated Alkalines		Severe Attack
Methanol, Ethanol, and Isopropanol		Resistant
Hydrocarbons		Slight Attack
Ketones		Dissolves
Oil and Gasoline		Severe Attack

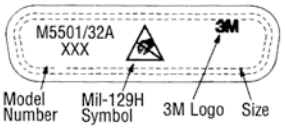
3M™ Circular Cover 4270

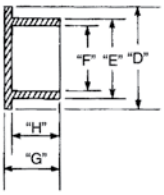


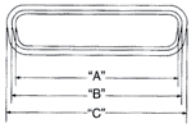


Product Description	Old Prod. Desc.	"A"	"B"	"C"	"D"
Packaged 100/bag; 10 bags/box					
4270 M5501-31A-250	4270-4R	.670	.500	.250	.336
4270 M5501/31A-313	4270-5R	.670	.500	.313	.399
4270 M5501/31A-375	4270-6R	.670	.500	.375	.461
4270 M5501/31A-413	4270-8Y	.670	.625	.413	.483
4270 M5501/31A-480	4270-8R	.740	.500	.480	.540
4270 M5501/31A-500	4270-9R	.750	.500	.500	.586
4270 M5501/31A-530	4270-10Y	.750	.625	.530	.595
4270 M5501/31A-605	4270-10R	.840	.500	.605	.665
4270 M5501/31A-655	4270-12Y	.860	.625	.655	.715
4270 M5501/31A-720	4270-12R	.970	.500	.720	.775
4270 M5501/31A-785	4270-14Y	1.031	.625	.785	.845
4270 M5501/31A-850	4270-14R	1.125	.500	.850	.905
4270 M5501/31A-893	4270-16Y	1.125	.625	.893	.963
4270 M5501/31A-973	4270-16R	1.220	.500	.973	1.035
4270 M5501/31A-1028	4270-18Y	1.250	.625	1.028	1.088
4270 M5501/31A-1093	4270-18R	1.330	.562	1.093	1.155
4270 M5501/31A-1125	4270-19R	1.400	.562	1.125	1.213
4270 M5501/31A-1150	4270-20Y	1.406	.625	1.150	1.215
4270 M5501/31A-1231	4270-20R	1.465	.562	1.231	1.301
4270 M5501/31A-1270	4270-22Y	1.500	.625	1.270	1.340
4270 M5501/31A-1340	4270-22R	1.590	.562	1.340	1.410
4270 M5501/31A-1390	4270-24Y	1.640	.625	1.390	1.460
4270 M5501/31A-1463	4270-24R	1.700	.562	1.463	1.533
4270 M5501/31A-1540	4270-25Y	1.810	.625	1.540	1.580
4270 M5501/31A-1645	4270-28Y	1.875	.625	1.645	1.718
4270 M5501/31A-1715	4270-28R	1.950	.562	1.715	1.790
Packaged 25/bag; 10 bags/box					
4270 M5501/31A-1890	4270-32Y	2.125	.625	1.890	1.970
4270 M5501/31A-1965	4270-32R	2.220	.562	1.965	2.040
4270 M5501/31A-2140	4270-36Y	2.340	.625	2.140	2.210
4270 M5501/31A-2215	4270-36R	2.435	.600	2.215	2.290
4270 M5501/31A-2380	4270-40Y	2.600	.625	2.380	2.450
4270 M5501/31A-2440	4270-40R	2.660	.600	2.440	2.530
4270 M5501/31A-2630	4270-44Y	2.875	.625	2.630	2.700
4270 M5501/31A-2720	4270-44R	2.960	.600	2.720	2.812
4270 M5501/31A-2880	4270-48Y	3.125	.625	2.880	2.950
4270 M5501/31A-2960	4270-48R	3.225	.600	2.960	3.050

"D" Type Cover 4272







Product Description	Old Prod. Desc.	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"
Packaged 100/bag; 10 bags/box									
4272 M5501-32A-50P	4272-50P	2.112	2.179	2.279	.636	.536	.469	.280	.240
4272 M5501-32A-50S	4272-50S	2.049	2.116	2.216	.574	.474	.407	.280	.240
4272 M5501-32A-37P	4272-37P	2.216	2.283	2.383	.530	.430	.363	.280	.240
4272 M5501-32A-37S	4272-37S	2.143	2.210	2.310	.462	.362	.295	.280	.240
4272 M5501-32A-25P	4272-25P	1.586	1.635	1.735	.530	.430	.363	.280	.240
4272 M5501-32A-25S	4272-25S	1.495	1.562	1.662	.462	.362	.295	.280	.240
4272 M5501-32A-15P	4272-15P	1.040	1.107	1.177	.512	.436	.369	.280	.240
4272 M5501-32A-15S	4272-15S	.955	1.022	1.122	.462	.362	.295	.280	.240
4272 M5501-32A-9P	4272-9P	.708	.775	.849	.512	.434	.367	.280	.240
4272 M5501-32A-9S	4272-9S	.627	.694	.794	.462	.362	.295	.280	.240

Notes

Test Equipment

3

3M offers a complete selection of test equipment to verify the correct functioning of static control systems. These test products measure static voltages on objects and surfaces, verify air ionizer performance and test static control wrist straps and footwear.

Instruction manuals for 3M Test Equipment are available online at www.3m.com/static.

Note: All specifications are subject to change without notice.

Test Equipment

	Product No.	3M™ Test Equipment	Measures	Application
ESD Events/EMI				
	CTC034 CTC034-030 CTC034-031	EM Aware ESD Monitors	ESD events Static field Ionizer balance Ionizer decay	Diagnostics of ESD environment; tool ESD qualification; ESD audit; problem troubleshooting
	CTK1A4-C CTK1AM4-C CTK2A6-C CTK2AM6-C CTK3A5-C CTK3AM5-C	EM Aware ESD Monitors Starter Kits	ESD events Static field Ionizer balance Ionizer decay	Diagnostics of ESD environment; tool ESD qualification; ESD audit; problem troubleshooting
	CTC082	ESD Pro ESD Event Handheld Indicator	ESD events	Diagnostics of ESD environment; ESD audit; problem troubleshooting
	CTK053	EMI/ESD Diagnostics Kit	ESD events, EMI	Diagnostics of ESD and EMI environment, problem troubleshooting
Static Field				
	718	Static Sensor	Static field	Charged objects and surfaces
	711	Charge Analyzer Also see EM Aware above	Static field, Ionization performance Charge retention/ drainage Charge generation/ drainage	Static field measurements Ionization balance and decay Static dissipative materials, mats, surfaces and surface treatments Wrist straps Floor tiles
Ionization				
	711	Charge Analyzer	Static field, Ionization performance Charge retention/ drainage Charge generation/ drainage	Ionization balance and decay Static field measurements Static dissipative materials, mats, surfaces and surface treatments Wrist straps Floor tiles
	718 + 718A	Air Ionizer Test Kit Also see EM Aware above	Ionization balance, Ionization decay	Air ionizers

	Product No.	3M™ Test Equipment	Measures	Application
Grounding — Metal Ground				
	Ground Pro CTM051	Ground Integrity Meter	Ground impedance, EMI (high frequency noise) on ground, AC and DC voltage on ground	Production equipment, tools Semiconductor, hard disk, flat panel display, electronic manufacturing
Grounding — Dissipative Grounds				
	701	Test Kit for Static Control Surfaces	Resistance surface-to-ground and surface-to-surface	Dissipative surfaces Mats Floors Tiles Materials
	SRMETER	Surface Resistance Meter	Resistivity in ohm/square (ASTM D257 units), resistance in ohm (ANSI/ESD S11.11 UNITS) and resistance to ground (RTG) for mats	Dissipative surfaces Mats Floors Tiles Materials
Shoe / Wrist Strap Testers				
	740	Wrist Strap and Footwear Tester	Resistance	Single conductor wrist straps, heel straps, shoes
	746	Wrist Strap Tester	Resistance	Single conductor wrist straps
	747	Wrist Strap and Footwear Tester	Resistance	Single conductor wrist straps, heel straps, shoes
Instrumentation Verification Instruments				
	CTE701A	Workstation Monitor Checker	Resistance, voltage, high-frequency signal	For WS Aware, Ground Master, Iron Man Plus and Ground Man Plus
	724VK	Verification Kit for 724 Workstation Monitors	Resistance	724 workstation monitors
	725VK	Verification Kit for 725 Workstation Monitors	Resistance	725 workstation monitors

3M™ ESD Pro

ESD Pro is a hand-held indicator of ESD events that shows the relative strength of each ESD event and counts the number of ESD events above the set threshold. ESD events, or electrostatic discharges, can damage sensitive electronic components. The ultimate goal of ESD protection such as grounding, wrist straps, ionizers and static dissipative mats is to prevent ESD events, or at least decrease their strength and frequency of occurrence. The only way to verify that your ESD protection works is by knowing whether you have ESD events in your environment, how strong they are and how many of them occur. Thus, ESD Pro serves as your ultimate measure of effectiveness of your ESD protection.

ESD Pro is capable of rejecting most non-ESD related EMI (electromagnetic interference) events. This methodology allows assessment of the ESD environment in places where EMI events resulting from stepper motors, solenoids, relays, etc. occur.

3M™ ESD Pro

Product No.	Description
CTC082	Hand-held ESD event indicator with event count, adjustable threshold and relative event strength indicator. Size, in. (cm) 6.25 H x 3.75 W x 1.25 L (15.8 x 9.5 x 3.3)

Notes

3M™ EMI/ESD Diagnostics Kit

EMI can cause serious problems for sensitive equipment and processes, such as equipment malfunction, latch-ups and software-related errors. Even very weak ESD events can create disaster for manufacturers of sensitive components such as disk drives, semiconductors, or flat panel displays. Identification of these EMI sources is possible with a series of instruments from 3M.

The 3M EMI/ESD Diagnostics Kit will help you perform waveform and spectral analysis of electro magnetic interference and of emission from electrostatic discharges. The kit includes a set of miniature active broadband antennae for radiated and conducted emission, an interface module and a set of RF cables. Simply connect the output of an active antenna to your high-speed oscilloscope and observe or measure ESD events as they occur. For complete EMI analysis, use the antenna with your spectrum analyzer to capture the spectral content of emission.

Active miniature antenna work in a broad frequency range, offer high sensitivity and are able to measure radiated and conducted emission in various environments.

Features

- Flat frequency response over a very broad range provides precise signals.
- Miniature antenna allows for use in tight spaces.
- Built-in preamp virtually eliminates the need for additional amplification.
- Antenna included in the EMI/ESD Diagnostics Kit provides measurements of both radiated (via air) and conducted (via cables) emission.

3M™ Interface Module

The interface module contains everything you need to connect your miniature active antennae to an oscilloscope or to a spectrum analyzer. 3M Interface Module CTA225 works with all our active antennae, providing them with power via the same RF coax cable used for signal by utilizing a special phantom supply circuit.

CTA225 has two channels and allows any two antennae to be used simultaneously. CTA225 contains a rechargeable battery that will provide hours of operation without the need for an external power supply and with full isolation from noisy power lines. A universal supply charger is included.

Field	Electric Antenna CTS001	Electric Antenna CTC112	Magnetic Antenna CTC116
Emission	Radiated	Radiated	Conducted
Sensitivity (typ.)	-18 dBm (28 mV)/(1 V/m)	-16 dBm (35 mV)/(1 V/m)	-22 dBm (15 mV)/(1 mA)
Frequency Range	1 MHz..2.7GHz	1 MHz..3GHz	150 kHz..200 MHz
Output Impedance	50 ohm	50 ohm	50 ohm
Type	Active	Active	Active
Sensor Element	Internal	Internal	Split-core magnetic
Connector	SMA	SMA	SMA
Power	5 V, phantom	5 V, phantom	5 V, phantom
Dimension	0.75 in. x 1.7 in. (19 mm x 43 mm)	1.06 H x 1.77 W x 0.78 in. L (27 x 45 x 20 mm)	1.3 H x 2.38 W x 0.8 in. L (33 x 61 x 20.5 mm)
Applications	Hand-held measurements	Hand-held, stationary and semi-stationary measurements	Hand-held, stationary and semi-stationary measurements

3M™ Interface Module CTA225

EMI/ESD Diagnostics Kit

Comes with:

- Miniature active radiated antenna CTS001
- Miniature active radiated omni-directional antenna CTC112
- Miniature active conducted antenna CTC116 for measuring emissions on wires and cables
- Portable 2-channel interface module with rechargeable batteries
- AC/DC Universal Power Supply/Charger
- Two 2 ft. (0.6 m) RF cables from interface to an oscilloscope
- Two 6 ft. (1.8 m) RF cables from antenna to interface module
- User's Guide

3M™ Air Ionizer Tester/Field Meter and Charger

Static Sensor

The 3M Static Sensor 718 is an easy-to-use, hand-held instrument designed to measure static voltages on objects and surfaces, arising from electrostatic charge buildups. This instrument can play a valuable role in an organization's ESD-control program by helping the user locate and quantify ESD trouble-spots.

Product No.	Description
718	Static Sensor, including meter, Operator's Manual, and Certificate of Performance verification. Available in certified.
718A	Air Ionizer Test Kit, including charge plate assembly, charger, Operator's Manual and Certificate of Performance verification.

NOM CE c UL us LISTED

Features

- Small-size, lightweight, conductive plastic housing.
- Membrane switches for Power, Range/Zero, and Hold functions.
- Digital, LCD (liquid-crystal) display is easy to read and updates quickly.
- Ranging systems assist user in making quick and easy measurements.
- Measurements accurate to 5%.
- Output jack available for continuous measurements.

3M™ Static Sensor 718

Static Sensor 718 Physical Characteristics

Item	Typical Properties
Dimensions	0.85 H x 2.4 W x 4.15 in. L (2.2 x 6.1 x 10.5 cm)
Weight	4.5 oz. (128 g) with battery
Power Requirements	One 9-volt alkaline battery (not included)
Measurement Ranges	0 – 2 kV Low Range 0 – 20 kV High Range
Voltage Display	3 1/2 digit liquid crystal display
Distance Indicator	LED targets. Aligned targets indicate 1 in. (2.54 cm) measurement distance.
Measurement Accuracy	Within 5% of actual voltage
Certifications	UL, C-UL, CE, CB-scheme, NOM

3M™ Air Ionizer Test Kit

The 3M Air Ionizer Test Kit 718A, when used in conjunction with the Static Sensor 718, can be used for periodic verification of air ionizer performance. The unit consists of a charge plate and a charger.

3M™ Air Ionizer Test Kit 718A

Air Ionizer Test Kit 718A Physical Characteristics

Item	Typical Properties
Charge Plate Assembly	Per ESD Association Standard Practice - 3.3
Charge Plate Assembly Weight	2.5 oz (70 g)
Charger Dimensions	0.85 H x 2.4 W x 5.0 in. L (2.2 x 6.1 x 12.7 cm)
Charger Weight	6 oz. (170 g) with battery
Charger Power Requirements	One 9 V alkaline battery
Charger Output	1100 V minimum for positive or negative voltage
Certifications	UL, C-UL, CE, CB-scheme, NOM

3M™ Charge Analyzer/Charge Plate Monitor

The 3M Charge Analyzer 711 was designed to test the performance of products used for the purpose of static control and elimination. The Charge Analyzer 711 can be used as a laboratory analytical tool, evaluating the performance of ionizing equipment, static-protective packaging, work surfaces, and personnel grounding systems. It is very effective for use as a demonstration tool in employee static awareness training sessions.

The lightweight and compact construction of the unit offers versatility in the workplace. The modular internal construction simplifies modifications and repair by exchange of the functional printed circuit boards. All parameter settings are controlled via a built-in EEPROM. Periodic calibrations can be performed without the need to open the chassis. When the analyzer is switched off, all last set parameters are stored in the EEPROM. These parameters are defaulted to when the unit is switched on again. The analyzer 711 is powered by built-in rechargeable NiMH-batteries or an AC wall plug-in adapter. All interfacing connections are made at the rear of the unit.

3M™ Charge Analyzer 711

Product No.	Description
711	The Charge Analyzer 711 is shipped in a durable black case with foam interior, containing the following accessories: (Certified only) • Cup Electrode • Plate Electrode • Cylinder Electrode • AC/DC Adapter, DC 12 V / 500 mA • Sensor Cover • Teflon™ Measuring Lead, 1 m • Grounding Cord with Alligator Clip • RS 232 Interface Cable • 2 in. (50 mm) High Conductive Container with Insulating Handle • Insulated Bulldog Clip • Metal Spacers (3) with Thread, 3 in. length (76 mm) • Software Disk for Data Acquisition • Operating Instructions • Transport Case • Certificate of Conformity • Sensor, 711 RS for Measuring Electrostatic Fields, with 6.5 ft. (2 m) Cord

RoHS Compliant 2002/95/EC

3M™ Charge Analyzer 711 Properties

Item	Typical Properties
Dimensions	Base unit: 6 H x 6 W x 6 in. L (15.2 x 15.2 x 15.2 cm)
Weight	3.53 lbs. (1.6 kg)
High Voltage Power Supply (internal)	> 1100 V positive or negative (current limiting resistor: 10M ohm)
Low Voltage Power Supplies	Built-in NiMH-rechargeable batteries, 1400 mAh AC/DC Adapter: secondary side, DC 12 V/500 mA
Operating Time (rechargeable batteries)	4 hours (approximately) with full charge
Storage Memory Capacity	128 k EEPROM (e.g. sufficient for approximately 100 CPM*-measurements)
Response Time	0 to 100%; 100 ms
Impedance	10^{15} ohm (Teflon™-separators cleaned)
Accuracy	± 2.5% of range end value (digitized) ± 5% for the analog output (for 1000 V range) ± 10% for the analog output (25, 100, 500 and 5000 V ranges)
Operating Functions	CPM* (positive/negative/automatic), voltmeter and fieldmeter
Interfaces	Analog output ± 2 V (± 1 V, in 500 V range for voltmeter), serial PC-COM, and external field sensor type 711 RS
Displays	Two, 11-segment positive and negative LED-bar charge indicators 16-digit alphanumeric dual row LCD
Settings — CPM* Operating Function	Starting voltage: 600 V – 1200 V in 1 V-steps Stop voltage: 1 V – 500 V in 1 V-steps (in decimal mode)
Static Decay Time	0.1 seconds – 99.9 seconds
Offset-Voltage Time	1 – 10 seconds in 1 second steps and 10 – 60 seconds in 10 second steps
Voltmeter Operating Function	Ranges: 25 V, 100 V, 500 V, 1.0 kV, 5.0 kV and auto range
Fieldmeter Operating Function	Ranges: Manual 1.25 kV/m, 5 kV/m, 25 kV/m, 50 kV/m, 250 kV/m, and automatic
Plate Electrode	SS-steel (152 x 152) mm/(6 x 6) inches, removable, capacitance (20 ± 2) pF
Cup Electrode	Gold-plated electrode with 4 mm-banana socket, for voltage measurements
Selection of Operating Function	Pre-setting is “FIELDMETER,” additional automatic settings by applying the plate or cup electrode
Operating Temperature	32°F to 113°F (0°C to 45°C)
Humidity	Maximum 60% Note: At high relative humidity, charge leakage may occur affecting the decay time measurement
Storage Temperature	-22°F to 140°F (-30°C to 60°C)

*Charge Plate Monitor

3M™ Ground Pro Ground Integrity Meter

3M Ground Pro Ground Integrity Meter is an essential tool for anyone concerned with obtaining proper grounding of equipment during installation, maintenance, and throughout regular use. This dedicated meter has multiple features to verify critical grounding parameters in any facility. It measures ground impedance in accordance with ANSI 6.1 and ANSI/ESDA S20.20 standards. Because data integrity is essential, this monitor provides accurate measurements of ground impedance even when ground noise is present — an area in which many instruments fail.

It also measures AC and DC voltage on the ground while separately measuring high-frequency voltage (EMI), to aid in performing diagnostics of equipment malfunctions and lockups.

3M™ Ground Pro Ground Integrity Meter

Product No.	Description
CTM051	Ground Integrity Meter

3M Products are ESD 20.20 Program Compliant

Features

- ANSI/ESDA S20.20 and ANSI 6.1 compliant.
- Accurate readings in noisy environments.
- Built-in alarm alerts personnel of potentially dangerous voltage.
- Measures high-frequency noise (EMI) on grounds in a broad frequency range.

Areas Not Touched by Multimeters

A typical multimeter measures resistance by applying DC voltage to the circuit and measuring voltage drop. Any current in the ground connection, which is a common occurrence in a working tool, can easily be factored in the calculations and cause a multimeter to produce an unrealistic result such as negative or extremely high resistance. Ground Pro uses proprietary DSP technology to measure ground impedance while completely ignoring noise and currents on the ground, providing reliable readings in difficult environments.

3M™ Test Kits for Static Control Surfaces

The 3M Test Kit 701 contains a lightweight, user-friendly megohmmeter plus all of the components needed to make testing mats and other surfaces simple and accurate. All of the items are packaged in a foam-lined carrying case.

The kit meets the intent of ANSI/ESD Standard 4.1, "Worksurfaces – Resistive Characterization," ANSI/ESD Standard 7.1, "Floor Materials – Resistive Characterization of Materials," and MIL-PRF-87893, "Workstation, Electrostatic Discharge (ESD) Control," for auditing purposes. The meter has separate scales and test settings for measuring surface-to-ground and surface-to-surface resistance at two prescribed test voltages (10 V and 100 V), and system continuity. The easy-to-read scales are both color-coded and numbered.

3M™ Test Kit 701

Product No.	Description
701	Test Kit for Static Control Surfaces (Certified and non-certified) Kit contains: • 1 Megohmmeter 12 oz. (340 g) 1.8 H x 3.3 W x 4.6 in. L (4.57 x 8.38 x 11.68 cm) • 2 Test Weights, 5 lbs. (2.27 kg) each • 2 Test Leads, 10 ft. (3 m) each • 1 Insulated Bulldog Clip • 1 Alligator Clip • 1 Continuity Test Plate • 2 Batteries (22.5 V and 1.5 V) • 1 Operator's Manual • 1 Molded Carrying Case
701-L	Test Leads
701-M	Megohmmeter only
701-W	5 lb. (2.27 kg) Test Weight

Test Kit Properties

Product	Item	Typical Properties
Kit	Weight:	14 lb. (6.35 kg)
	Case Dimensions:	5.125 H x 10 W x 13.5 in. L (13.02 x 25.4 x 34.29 cm)
	Case Material:	Blow-molded, high density polyethylene with foam inserts
	Case Color:	Gray
Meter	Weight:	12 oz. (0.34 kg)
	Dimensions:	1.8 H x 3.3 W x 4.6 in. L (4.57 x 8.38 x 11.68 cm)
	Resistance Ranges: Continuity Test Mode 10 V Surface Test Mode 100 V Surface Test Mode	 0 – 10M ohm (internal R=500 K ohm) 10^5 – 10^{11} ohm (internal R=2 M ohm) 10^5 – 10^{11} ohm (internal R=2 M ohm)
Weights	2 Test Weights:	5 lb. (2.27 kg) each
	Dimensions:	Diameter – 2.5 in. (6.35 cm) Height – 5.06 in. (12.85 cm); includes handle and pad
	Pad Material:	Conductive silicone rubber
	Pad Dimensions:	Diameter – 2.5 in. (6.35 cm) Thickness – 0.25 in. (0.64 cm)
Leads	Length:	10 ft. (3.05 m)
	Wire Size:	18 gauge
	Insulation:	Silicone rubber
	Diameter:	0.125 in. (0.32 cm)
Power Supply	Batteries (2):	22.5 volt (Eveready™ #505 or equivalent) and 1.5 volt (AA).

Product Referral Generator

Floor Mats/Rolls . . . . . pg. 36
Dissipative Rubber Mats/Rolls . . . . . pg. 36
Static Conductive Floor Tile . . . . . pg. 112

3M™ Surface Resistance Meter

The SCC-625 is a wide-range, multi-scale, auto-ranging meter. It measures resistivity per ASTM D257, resistance per EOS/ESD S11.11, and Resistance to Ground (RTG). Appropriate for auditing static control items. Measures conductive, dissipative and insulative items. The meter is battery powered and simple to use. High-speed electronics provide repeatable measurements.

Useful for audit testing required by ANSI/ESD S-20.20, EIA 625, MIL-STD-1686.

3M™ SCC-625 Surface Resistance/Resistivity RTG Meter

Product No.	Description
SRMETER	Surface Resistance/Resistivity RTG Meter

Properties

Electrical	
Measurement	10^3 to 10^{12} ohm/square ASTM D257 10^2 to 10^{11} ohm EOS/ESD 11.11
Resolution	one order of magnitude
Accuracy	± 1/2 decade
Power	9 volt battery
Electrodes	Parallel Bar
Mechanical	
Weight	6.2 oz
Size	4.5 H x 2.7 W x 1.0 in. L (115 H x 69 W x 26 mm L)

3M™ Wrist Strap and Footwear Tester

The 3M Wrist Strap and Footwear Tester 740 is an AC-powered unit designed to be wall-mounted in a production facility for daily testing of employees' static control wrist straps. Use of the optional 3M™ Shoe Electrode 741 attachment allows the tester to be used as a footwear tester as well. The optional Shoe Electrode 741 is a test plate that connects to the Wrist Strap and Footwear Tester 740. By standing on the shoe electrode, personnel can use the wrist strap and footwear tester to check the operation of static control footwear, heel straps and the like. This electrode, constructed of rugged stainless steel in a molded plastic base, must be ordered separately.

Simple to operate, the unit has several useful features and options. Red and green LEDs give a clear "go" or "no go" indication. The user can select any of four different resistance levels, making the tester a versatile instrument to meet varying industry, corporate and global standards. The unit tests the wrist band and cord while they are being worn, and can also test each component independently to isolate an indicated fault. There is also a digital output that can be used to interface with a computer, automatic door lock, alarm or other control device.

The wrist strap and footwear tester comes with the base unit, output connector, 3M Dual Lock™ Wall-Mounting System and template, cover for the wrist strap plug-in jack and the AC/DC transformer.

3M™ Wrist Strap and Footwear Tester 740

Wrist Strap Tester 740 Properties

Item	Typical Properties
Dimensions	5.43 H x 7.48 W x 2.09 in. D (13.8 x 19.0 x 5.3 cm)
Weight	15.75 oz. (450 gm)
Power Supply	27 Vdc transformer, 150 mA (AC/DC adapter supplied) 6 ft. (1.8 m) wire
Test Voltage	20 Vdc, ± 1 volt (open circuit)
Resistance Ranges	Lower limit: 750K ohm
Upper Limit Wrist Strap	2, 5, 10 and 35M ohm
Upper Limit Footwear	10, 35, 50 and 100M ohm
Accuracy	+ 20%, -0% for 750K ohm lower limit ± 10% for 2M, 5M, 10M, 35M and 50M ohm ± 20% for 100M ohm
Output	Open collector at pins 1, 2, 4 and 5 DC return at pin 6. + 5 volts at pin 3
Wall Mounting	3M™ Dual Lock™ System

Shoe Electrode 741 Properties

Item	Typical Properties
Dimensions	20 H x 16 in. W (50.8 x 40.6 cm)
Weight	5 lbs. (2.3 kg)
Construction	1 mm stainless steel plate and molded plastic base
Other	3M adhesive strip prevents unit from sliding while in use. Shoe electrode interconnect cord 6 ft. (1.8 m).

Note: The Shoe Electrode 741 is not included with the Wrist Strap and Footwear Tester 740 and must be ordered separately.

3M™ Wrist Strap Tester

The 3M Wrist Strap Tester 746 can be used to test wrist straps in a variety of situations, from daily testing in a production facility to periodic testing at remote sites or field service locations. This versatility allows the Wrist Strap Tester 746 to be the standard for all applications in your company.

The tester is supplied with an AC adapter, but it also contains a long-life lithium battery as back-up power for portable applications or during power failures. (A “battery” light notifies the user when the battery needs replacement.)

As with other 3M wrist strap testers, the unit is easy to use. It can test the entire wrist strap system while it is being worn, or it can test the individual components to isolate a fault condition.

Product No.	Description
746	Wrist Strap Tester supplied with an AC adapter, a lithium battery, and a wall mounting kit. Also available in certified. Size, in. (cm) 6.25 H x 3.75 W x 1.25 L (15.8 x 9.5 x 3.3)

3M™ Wrist Strap Tester 746

3M™ AC Adapter 746P

Wrist Strap Tester 746 Properties

Item	Typical Properties
Weight	7 oz. (200 g) without battery
Power	9 V regulated 75 mA AC/DC adapter (supplied with 746)
Battery	9 V lithium manganese (NEDA 1604LC) (supplied with 746) Does not contain mercury, cadmium or lead.
Test Voltage	19 V DC, ± 1 V (open circuit)
Resistance Ranges	Upper limit – 10 M ohm ± 10% Lower limit – 750 K ohm +20% -0%
Wall Mounting	3M™ Dual Lock™ System
AC Adapter Specifications	Input Voltage — AC 120 V Output Voltage — DC 9 V (Regulated) Output Current — 75 mA **Output Connector** Dimensions — 0.2 (0.D) x 0.1 (I.D) x 0.4 in (L) [5.5 (O.D.) x 2.1 (I.D.) x 11 mm (L)] **Output Connector** Polarity — Center negative

3M™ Workstation Monitor Checker

An easy-to-use, self-contained and portable system to verify the operation of your workstation monitors.

The Workstation Monitor Checker was designed specifically to verify the proper operation of your dual wrist strap, workstation and ground monitors. The Checker simulates the proper resistances and signals to check for the correct response and verify that the monitors are in compliance with your facilities specifications.

Although the Checker was designed to work with 3M monitors such as 3M™ WS Aware and 3M™ Ground Master, it can also be used to verify the operation of most other monitors on the market today.

3M™ Monitor Verification Tool CTE701A

Product No.	Description
CTE701A	Workstation Monitor Checker with 3.5 mm Jack

Features

- 3.5 mm jack for wrist strap monitor test.
- EMI button and LED for metal grounds.
- Banana jack for ground test.
- Banana jack for reference grounds.
- High (fail limit) switches for metal and soft grounds.
- Low (pass limit) switches for metal and soft grounds.
- Power switch and LED.
- Threshold setting switches.
- Body voltage set potentiometer.
- Body voltage test button.
- Pass (low limit) switch for wrist straps.

Product Referral Generator

WS Aware Dual Workstation Monitor. . . . . pg. 16
Iron Man Plus Workstation Monitor. . . . . .pg. 17
Ground Master Equipment Ground Monitor. . . . . pg. 24
Ground Man and Ground Man Plus Ground Monitors for Tools. . . . . .pg. 25

3M™ Data Logging Software 747DLS

Designed to work with the 3M™ Shoes/Wrist Strap Tester 747, the 3M Data Logging Software 747DLS offers you a complete system of testing and recording results of your wrist straps and footwear. Our complete system performs an accurate resistance measurement of either or both your wrist straps and footwear. Once completed, the results will then be automatically saved on a PC, which allows efficient data storage and faster data retrieval.

Features

- Electronic data logging virtually eliminates manual logging, providing highly reliable records.
- Can be used with barcode, magnetic stripe or proximity card readers/identification cards.
- Incorporates a pilot lamp in monitoring so it can identify which testing stations are currently being used.
- Printable records feature allows hard copies to be kept for documentation.

Product No.	Description
747DLS	Data Logging Software

3M™ Shoes/Wrist Strap Tester 747

Card Reader Technical Requirements

Serial Interface Specification	
Bit Rate	110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 (selectable)
Word Length	Data Format–4, 5, 6, 7, 8 (selectable); Parity Bit–Even, Odd, None, Mark, Space (selectable); Stop Bit–1, 1.5, 2 (selectable)
Handshaking (Flow Control)	None, Xon/Xoff, RTS/CTS, RTS/Xon/Xoff (selectable)
Magnetic Card Reader Data	
Message Indicator	Start of Text–Single ASCII character; End of Text–Single ASCII character
Track Framing Characters	Track 1 Start–Single ASCII character; Track 1 End–Single ASCII character Track 2 Start–Single ASCII character; Track 2 End–Single ASCII character Track 3 Start–Single ASCII character; Track 3 End–Single ASCII character
Barcode Reader Data	
Message Indicator	Start of Text–Single ASCII character; End of Text–Single ASCII character
Proximity Card Reader Data	
	Start of Text–Two ASCII characters; End of Text–CR, LF, CR/LF (selectable)

3M™ Shoes/Wrist Strap Tester 747

Daily inspection and recording of wrist straps and shoes testing are very important as fundamental countermeasures against static on personnel. A fully functional resistance tester, the 3M Shoes/Wrist Strap Tester 747 makes it possible to control both in a single unit. Use of the external data port allows automatic recording of test results, virtually eliminating manual recording and possible errors.

Features

- Checks personnel wearing wrist straps, ESD shoes and heel straps against preset resistance limits.
- Actual measurements are indicated on a 3.5 digit display and by LED lamps.
- Test results available on RS-232C serial port and output jack.
- Testing data automatically recorded when utilizing the 3M™ Data Logging Software 747DLS.

ESD Shoe and Heel Strap Testing

- Electrical resistance of ESD shoes and heel straps are measured and compared to preset limits.
- Set value for the upper and lower resistance limits can be varied.
  Upper limit: 10 megohm, 35 megohm, or 100 megohm.
  Lower limit: 100K ohm, 1.0 megohm.
- LCD display (3.5 digit) indicates actual resistance measurement value.*
- LEDs on the tester indicate Low, OK, and High test results.
- Measurement requires standing on the Shoe Testing Plate and pressing the touch panel.

*Includes body resistance

Wrist Strap Testing

- Electrical resistance of wrist straps is measured and compared to preset limits.
- Set value for an upper resistance limit can be varied.
  (5 megohm, 10 megohm and 35 megohm).
  Lower resistance limit 650K ohm preset internally.
- LCD display (3.5 digit) indicates actual resistance measurement value.*
- LEDs on the tester indicate (Low, OK and High) test results.
- Measurement requires inserting ground cord plugs into a test jack and pressing the touch panel.

*Includes arm to wrist band contact resistance

External Output Functions

- RS-232C Serial Data Port provides resistance value and pass/fail test result information for computer data logging. Used with 3M Data Logging Software 747DLS.
- Open collector output configuration provides High and Low signal levels for pass/fail test result indication. When used with an external relay door, entries can be controlled.

Product No.	Description
747	Shoes/Wrist Strap Tester (certified only)

Wrist Strap Tester 747 Properties

Item	Typical Properties
Dimensions	7.7 in. x 4.7 in. x 1.89 in. (H x W x D) (196 mm x 120 mm x 48 mm)
Weight	1.2 lb. (550 g) without batteries
Power Requirements	AA (LR6) alkaline battery (1.5 Vdc x 6) or AC adapter (9 Vdc, center positive)
Environmental Operating Conditions	Temperature range (0° to 40°C) 80% relative humidity

3M™ Shoes/Wrist Strap Tester 747

3M™ Monitor Verification Kits

The 3M Verification Kits 724VK and 725VK were designed to check the wrist strap input resistance ranges of the 3M™ Workstation and Wrist Strap Monitors 700 Series. The 3M Verification Kit 790VK contains hardware items for connecting to the 3M™ Static Monitor 790, that are recommended when performing the verification procedure. Use of this kit allows for reliable connections to the Monitor 790. In addition to this kit, a DC power supply and resistance substitution box are required (supplied by user). See instruction manual for complete details.

3M™ Verification Kit 724VK

3M™ Verification Kit 725VK

3M™ Verification Kit 790VK

Product No.	Description
724VK	Verification Kit Six 1% Resistor Plugs and Case
725VK	Verification Kit Four 1% Resistor Plugs and Case
790VK	Verification Kit One 5 ft. (1.5 m) Dual Conductor Cord 2360, one test wrist band socket assembly, and one two-wire male connector with 24 in. (60.9 cm) lead wire.

724VK Contents

Item	Value
Test Plug #1	Resistor, Metal Film, 1.33 megohm ± 1%, 1/4 Watt
Test Plug #2	Resistor, Metal Film, 1.69 megohm ± 1%, 1/4 Watt
Test Plug #3	Resistor, Metal Film, 8.45 megohm ± 1%, 1/4 Watt
Test Plug #4	Resistor, Metal Film, 11.5 megohm ± 1%, 1/4 Watt
Test Plug #5	Resistor, Metal Film, 29.4 megohm ± 1%, 1/4 Watt
Test Plug #6	Resistor, Metal Film, 40.2 megohm ± 1%, 1/4 Watt

725VK Contents

Item	Value
Test Plug #1	Resistor, Metal Film, 29.4 megohm ± 1%, 1/4 Watt
Test Plug #2	Resistor, Metal Film, 40.2 megohm ± 1%, 1/4 Watt
Test Plug #3	Resistor, Metal Film, 4.99 megohm ± 1%, 1/4 Watt
Test Plug #4	Resistor, Metal Film, 11.5 megohm ± 1%, 1/4 Watt

790VK Contents

Item
Dual Conductor Cord 2360, 5 ft. (1.5 m)
Test Wrist Band Socket Assembly
Two-Wire Male Connector with 24 in. (60.9 cm) lead wire

Training 4

To help create and maintain the highest standards of protection against ESD in the workplace, 3M offers several options for employee training and program development.

A two-day, intensive workshop is conducted four times a year in Austin, Texas, as a "train-the-trainer" or for the ESD program manager. Awareness, testing and measuring, standards development, and much more are covered in this course. 3M also regularly conducts local one-day static awareness seminars for electronics manufacturers, so contact your local 3M representative for more information.

When employee training is needed, 3M can provide solutions as well. As part of our product support, 3M can deliver various versions of training for your organization, from basic to advanced. Having the facts presented properly, in terms easily understood, can help facilitate your ESD control program.

3M Hosts ESD Training on Static Control in Austin, Texas

3M offers an in-depth training program on static control at the 3M Austin Center. The two-day course is designed for people responsible for implementing or managing a company's ESD program.

The course content, designed for the beginner to intermediate level, covers such topics as:

- What are the foundations of ESD? This includes terminology, basic electricity and its relationship to ESD, basic ESD controls and how parts fail.
- How can static electricity be controlled?
- How do I conduct a plant survey or audit?
- What are appropriate surfacing and grounding materials and techniques?
- How and why do I use static-protective packaging materials?
- What is ionization, how do I properly test ionizers, and how do I use ionization effectively?
- What about field service? Do my customers or I need it?
- What do I need to know about testing and measuring — frequency of tests, methods, equipment, interpretation of results and use of appropriate test techniques?
- How and when do I use continuous wrist strap and/or work station monitoring — installation, operation and attributes?
- How do I know if I have a static problem?

Please contact Customer Service at 1-866-722-3736 for registration information and class schedule. To view current agenda, or learn more about 3M training seminars, refer to www.3M.com/static.

S20.20 Standard Requires Training

The ANSI/ESD S20.20 truly breaks new ground in the standardization of static control for electronics, but are you aware that it contains a requirement for training?

Training is so fundamental to an effective program of static control that it has been made a requirement under the ANSI/ESD S20.20 standard. When your employees understand how electrostatic discharge occurs, the extent of its damage, and how to protect against it, they will be more likely to use static protection equipment properly and abide by static control procedures. They will better understand their role in producing high quality, profitable products.

If training has been nonexistent or scattered in your organization, you will need to make it a high priority in adopting S20.20. You must first decide on a schedule for training. Will it be once a year, twice a year, or more often? Ideally, the schedule will correspond to the needs of your organization. Perhaps you expect to hire large numbers of new employees. Or, maybe you must train employees in rapidly changing technologies and manufacturing methods. The schedule should reflect those needs.

Who is trained and on what? Some organizations require that all employees, from the general manager to the clean-up crew, take the same training. Other organizations develop a high level of training for assemblers, a medium level for inventory and shipping clerks, and a basic level of training for office staff and others who rarely enter the manufacturing area.

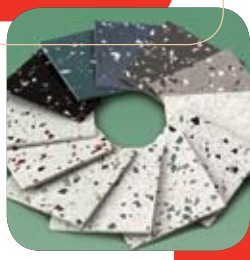
How will you provide the training? Will you use live instructors, video tapes, individualized computer-based training programs, or a combination of these methods? From experience, 3M has found that a live instructor is the most effective because the training is interactive. The instructor can answer questions and tailor the training to the trainees' education and experience. The video approach is the least effective because it requires no interaction, only passive watching and listening.

How will you verify trainees' understanding of static control? You can accomplish this through a written test, on-the-job observation, computer-based testing or a personal interview. 3M's preference would be for the class to verbally review all the critical points of training as the means to check their retention, and follow that with on-the-job observation to ensure they are practicing proper static control procedures.

Finally, S20.20 training should include a mechanism for updating your employees in response to changes in product sensitivity, introduction of new products, upgrades in manufacturing techniques, and other changes. Ideally, you will provide training with every change so employees can adjust accordingly.

Permanent Flooring Products

5



3M™ Tile Flooring Systems provide a first line of defense against the buildup of static charge on personnel and equipment. Static protective permanent flooring, in conjunction with conductive footwear or heel grounding straps, drains static charge away to ground through the floor. It is a solid foundation for a comprehensive static control system.

Note: All specifications are subject to change without notice.

3M™ Static Control Vinyl Floor Tile

3M Static Control Floor Tile 8400 Series is a long-term solution to controlling electrostatic discharge. This solid vinyl tile is durable and attractive and can be installed by competent flooring contractors. The flexible, resilient tiles are made with only 100% pure vinyl and contain a minimum amount of filler and none of the regrind that can make tile brittle. Both the conductive and static dissipative versions are available in a selection of bright, vivid colors. A proprietary manufacturing process seals in the conductive carbon medium, resulting in a unique tile that can be easily cleaned and shined to a gloss while maintaining its electrical properties—without the use of an ESD wax or polish.

3M™ Static Control Vinyl Floor Tile 8400 Series

Features

- Lifetime warranty on electrical performance.
- 10-year limited warranty on materials.
- Long-term ESD protection.
- Superior wear resistance and durability.
- Low outgassing.
- Easy, low-cost maintenance (no waxing — ever).
- Made with 100% pure homogeneous vinyl; no regrind.
- Micro-edged for precise squareness for ease of installation.
- Available in 24.25 in. size for raised access floors, plus 12 in., 24 in., and 36 in. sizes.
- Available in 12 standard colors; custom colors can be formulated.
- May be seam welded or self-coved.

Product No.	Description
Static Dissipative Floor Tile	
8411	Brown
8412	White
8413	Gray
8414	Blue
8415	Green
8416	Green
8417	Black
8421	Reverse Brown
8423	Reverse Gray
8424	Reverse Blue
8425	Reverse Green
8427	Reverse Black
Conductive Floor Tile	
8431	Brown
8432	White
8433	Gray
8434	Blue
8435	Green
8436	Maroon
8437	Black
8441	Reverse Brown
8443	Reverse Gray
8444	Reverse Blue
8445	Reverse Green
8447	Reverse Black
Accessories	
8403	Conductive Adhesive. Two-Part Epoxy. (1-gallon unit. covers approx. 135 sq. ft.)
8405	Calcium Chloride Moisture Test Kit.

3M™ Static Control Vinyl Floor Tile

"No Wax" ESD Tile

One of the key attributes of 3M ESD Vinyl Tile is its ability to be cleaned and maintained with a minimum of cost and effort.

See 3M ESD Floor Tile 8400 Series instructions for complete maintenance details.

Unique Cleanability

3M ESD Floor Tile 8400 Series can be repeatedly cleaned and then buffed to a high sheen without ever using wax.

With some other ESD tiles, normal cleaning procedures may dull the finish and can even degrade the electrical properties. Conductive wax or glaze must then be used to restore their shine and conductivity. 3M Tiles 8400 Series maintain their electrical properties and can be shined like new with simple buffing. The photos below demonstrate this feature.

1

2

3

The floor section shown is a test patch of 3M™ Static Dissipative Tile 8412 installed in a high-traffic area of a regional telephone company warehouse. To determine whether the tile could truly withstand serious abuse and then be returned to like-new condition with simple cleaning and without wax, the section was intentionally left unattended for 11 months as it was subjected to the wear and grime of continual forklift traffic. The result of this abuse is evident in Photo 1.

After being swept, the tile was scrubbed with neutral cleaner, left to dry, and then buffed according to the maintenance procedure established. As Photos 2 and 3 show, in spite of nearly a year of dramatic abuse, the high gloss of the restored floor finish is similar to that of the tile when it is newly installed—without the use of any kind of wax.

This trial is an impressive demonstration of the durability of the 3M ESD tile and its unique "no wax" feature.

Mechanical Properties

Static Dissipative Floor Tile (Model numbers 8411–8427) Conductive Floor Tile (Model numbers 8431–8447)	
Flammability Flame Spread Index (ASTM E162/ASTM E84) Smoke Development (ASTM E84)	 Meets Class 1 requirements Meets Class 1 requirements
Critical Radiant Flux (ASTM E648/NFPA 253)	>1.1 w/cm2
Physical Specifications	Meets ASTM F1066-99 Meets US Federal Specification SS-T-312B
Hardness (ASTM D 2240)	55 ± 5 Shore D
Flexibility (CSA 126.2) 100 mm mandrel @ 25˚ C	 Does not break
Abrasion Resistance (ASTM D 3389) Taber H22 wheel, 70 rpm	 0.445 grams (weight of tile removed per 1000 cycles)
Static Load (ASTM F970) 125 lbs, 0.25 in. diameter indentor foot, 24 hours Residual indentation 700 lbs., 1.125 in. diameter indentor foot, 2 hours Residual indentation	 2500 PSI point load 3% of tile thickness 700 PSI point load 1% of tile thickness

Electrical Properties (typical)

Static Dissipative	Conductive
Electrical Resistance (Surface-to-ground, ESD S7.1) 1 x 10^6 to 1 x 10^9 ohm	 2.5 x 10^4 to 1 x 10^6 ohm
Static Generation (With conductive footwear at 20% RH) <50 volts	 <25 volts
Static Decay (Federal TM 101C, Method 4046 @ 15% RH [5000 volts to 0 volts]) <0.10 sec.	 <0.03 sec.

Sizes

Static Dissipative and Conductive
0.125 H x 12 W x 12 in. L (3.2 x 305 x 305 mm) 0.125 H x 24.25 W x 24.25 in. L (3.2 x 622 x 622 mm) -for raised access floor panels
0.125 H x 24.25 W x 24.25 in. L (3.2 x 622 x 622 mm) 0.125 H x 36 W x 36 in. L (3.2 x 915 x 915 mm) -for seamwelded installations

3M™ ESD Floor Tile 8400 Series is available in the special 24.5 in. x 24.5 in. (622 mm x 622 mm) size used for raised access floor panels.

Notes

Tapes 6

To aid in the various processes typical of the electronics industry, 3M has assembled a wide selection of tapes, including antistatic utility tapes for use in static sensitive areas, tapes designed for wave soldering applications, foil shielding tapes and other related tapes and accessories.

Note: All specifications are subject to change without notice.

3M™ Antistatic Utility Tape

3M Antistatic Utility Tape 40 combines 3M's remarkable antistatic adhesive with a clear, one mil polyester film backing, and is perfect for use in static-sensitive areas. An optional special pattern of ESD symbols alerts users that this is the only tape that should be used in static-safe areas.

At the heart of all 3M antistatic tapes is a unique conductive polymer adhesive that suppresses static, both during unwind from the roll and during removal from a surface. They generate less than 50 volts on unwind from the roll or removal from a stainless steel surface, even in extremely dry conditions of 10% relative humidity.

Use Antistatic Utility Tape 40 as a third hand to hold work orders, notes, documentation, or instructions in place; to seal static shielding bags and boxes containing electronic components; or to bundle DIP tubes and JEDEC shipping trays. It can also be used to hold down obstructions such as wires or attachments during manufacturing.

3M™ Antistatic Utility Tape 40PR

Product No.	Description
40/40PR*	3 in. Antistatic Plastic Cores Antistatic Utility Tape.*

Widths, in.	(mm)	Length, yd.	(m)
0.25	(6.3)	72	(66)
0.375	(9.5)	72	(66)
0.50	(12.7)	72	(66)
0.625	(15.8)	72	(66)
0.75	(19.0)	72	(66)
0.875	(22.2)	72	(66)
1	(25.3)	72	(66)

1 in. Antistatic Plastic Cores

Widths, in.	(mm)	Length, yd.	(m)
.50	(12.6)	36	(33)
.75	(19.0)	36	(33)

Specify at time of order. Custom widths available upon request.
*PR designation means printed.

RoHS Compliant 2002/95/EC

Antistatic Utility Tape 40 and 40PR Properties

Property	Test Method	Typical Value
Static Charge Generation		
Removal from Roll, 10% RH, volts	3M	20
Removal from Roll, 50% RH, volts	3M	5
Removal from Stainless Steel, 10% RH, volts	3M	20
Removal from Stainless Steel, 50% RH, volts	3M	5
Surface Resistance		
Adhesive @ 50% RH	ESD S11.11	5×10^6 Ω
Adhesive @ 10% RH	ESD S11.11	5×10^8 Ω
Tape Properties		
Adhesion to Steel	ASTM D1000	19 oz/in.
Unwind Force from Roll	ASTM D1000	24 oz/in.
Thickness	ASTM D1000	2.2 mils
Break Strength	ASTM D1000	20 lb/in.
Slit Width	ASTM D1000	± 1/64 in.
Rolling Ball Tack	ASTM D1000	70 mm
Outgassing		
TML	ASTM E595	<1.0%
CVCM	ASTM E595	<0.1%
Shelf Life	2 years [when stored in original packaging at 50°F (10°C) to 80°F (27°C) at 50% RH maximum.]	

3M™ Antistatic Utility Tape Dispenser

The 3M Tape Dispenser 620 is designed for use in ESD protected areas. The dispenser is made of conductive and static-dissipative materials which will minimize or eliminate problems associated with conventional dispensers.

3M™ Antistatic Tape Dispenser 620

Tape Dispenser 620 Properties

Property	Typical Value
Body	Stainless steel frame Accepts tape roll up to 2 in. wide. Accepts tape on either 3 in. or 1 in. core. Unit is shipped with 3 in. dissipative drum.
Blade	Stainless Steel replacement blade
Base	Cast iron Dimensions 5 in. x 9 in. (13 cm x 23 cm) Weight 7.5 lbs. (3.4 kg)
Accessories	1 in. (2.5 cm) drum
Decay Time	From 1000 V to < 100 V less than 2 seconds (3 in. core)
Recommended Tapes	Antistatic Film Tape 40 Low Static Polyimide Film Tape 5419

Product No.	Description
620	Tape Dispenser Drum for Manual Dispenser, 1 in. Manual Dispenser with base Manual Dispenser without base Replacement Blade

3M™ Silicone Adhesive Tapes

The 3M™ Polyimide Film Tape 5413 consists of a Kapton® polyimide film and silicone adhesive. It is designed for high temperature applications. Temperature use range is –100° to 500°F (–73°C to 260°C).

3M™ Low Static Polyimide Film Tape 5419 is a translucent, polyimide film-backed silicone adhesive tape with unique and extremely low electrostatic discharge properties. Use 3M Tape 5419 to mask printed circuit boards during the wave solder or solder dip process.

Product No.	Description
5413	Polyimide Film Tape. Silicone Adhesive. Widths, in. (cm) Length, yd. (m) 0.50 (1.2) 36 (33) 0.75 (1.9) 36 (33) 1 (2.5) 36 (33) 2 (5.1) 36 (33)
5419	Low Static Polyimide Film Tape. Silicone Adhesive. Widths, in. (cm) Length, yd. (m) 0.25 (0.6) 36 (33) 0.375 (0.9) 36 (33) 0.50 (1.3) 36 (33) 0.75 (1.9) 36 (33) 0.875 (2.2) 36 (33) 1 (2.5) 36 (33)
Shelf Life	To obtain best performance, use this product within 12 months from date of manufacture and store under normal conditions of 60°F to 80°F (15° to 21°C) and 40 to 50% R.H. in the original carton.

RoHS Compliant 2002/95/EC

3M™ Water Soluble Tape

3M Water Soluble Wave Solder Tape 5414 has a poly-vinyl alcohol backing which is water soluble and a synthetic water soluble adhesive. This tape is designed to mask gold fingers on printed circuit boards during wave soldering.

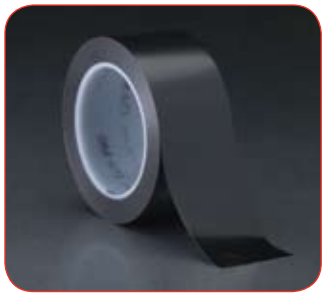
3M™ Water Soluble Tape 5414

Product No.	Description
5414	Water Soluble Wave Solder Tape. Widths, in. (mm) Length, yd. (m) 0.5 (1.3) 36 (33) 0.75 (1.9) 36 (33) 1 (2.5) 36 (33)
Shelf Life	To obtain best performance, use this product within 12 months from date of manufacture and store under normal conditions of 60°F to 80°F (15° to 21°C) and 40 to 50% R.H. in the original carton.

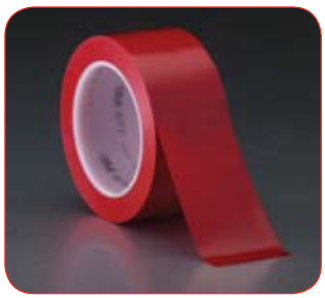
RoHS Compliant 2002/95/EC

3M™ Vinyl Tape

3M Vinyl Tape 471 is a conformable colored vinyl backing with a rubber adhesive ideal for many lane and safety markings, color coding, abrasion protection, masking, sealing, splicing and other general purpose applications. The tape's pigmented backings maintain their vivid colors even when exposed to heavy abrasion. Sharper colors for color coding or marking systems draw attention and help enhance plant safety. Dead stretch properties provide straighter lines when masking, marking and sealing.



3M™ Vinyl Tape 471



3M™ Vinyl Tape 471

3M™ Vinyl Tape 471

Product No.	Description
471	Plastic Film Tape, Black Widths, in. (cm) Length, yd. (m) 0.50 (1.2) 36 (33) 0.75 (1.9) 36 (33) 1 (2.5) 36 (33) 1.5 (3.8) 36 (33) 2 (5.0) 36 (33) 3 (7.6) 36 (33) 4 (10.1) 36 (33) Plastic Film Tape, Blue (not pictured) Widths, in. (cm) Length, yd. (m) 0.25 (6.3) 36 (33) 0.50 (1.2) 36 (33) 0.75 (1.9) 36 (33) 1 (2.5) 36 (33) 1.5 (3.8) 36 (33) 2 (5.0) 36 (33) 3 (7.6) 36 (33) Plastic Film Tape, Red Widths, in. (cm) Length, yd. (m) 0.25 (6.3) 36 (33) 0.375 (6.3) 36 (33) 0.50 (1.2) 36 (33) 0.75 (1.9) 36 (33) 1 (2.5) 36 (33) 1.5 (3.8) 36 (33) 2 (5.0) 36 (33) 3 (7.6) 36 (33) 4 (10.1) 36 (33) Plastic Film Tape, White Widths, in. (cm) Length, yd. (m) 0.25 (6.3) 36 (33) 0.375 (6.3) 36 (33) 0.50 (1.2) 36 (33) 0.75 (1.9) 36 (33) 1 (2.5) 36 (33) 1.5 (3.8) 36 (33) 2 (5.0) 36 (33) 3 (7.6) 36 (33) 4 (10.1) 36 (33)

RoHS Compliant 2002/95/EC

3M™ EMI Shielding Tapes

3M EMI Shielding Tapes are designed for applications requiring reliable point-to-point electrical contact, particularly EMI shielding, grounding and static charge draining. The tapes have a multitude of uses in electronic design and test laboratories for prototyping, design and troubleshooting.

The 3M™ Foil Shielding Tape Engineering Kit enables engineers who need only a few inches of a particular tape for specifying, prototyping, troubleshooting, testing and repairing to avoid the problems and expense associated with meeting minimum order quantities. The kit virtually eliminates the problem of rolls of tape lost between multiple users or kept loose in desk drawers.

The compact dispenser box also serves as a desktop reference for the tapes. The box panels provide basic technical information about each tape, including product number, backing and adhesive type and thickness, adhesion, resistance and shielding effectiveness.

3M™ Foil Shielding Tape Engineering Kit

Engineering Kit for Foil Shielding Tapes

Engineering Kit
Kit includes one roll of each foil tape, 3/4 in. x 4 yds. (1.9 cm x 8.3 m)
Dispenser box is 4 in. x 4 in. x 8.5 in. (10.0 cm x 10.0 cm x 21.3 cm)

Product No.	Description
1120	Smooth aluminum foil, conductive acrylic adhesive, 4.0 mil total, supplied on liner. Widths, in. (cm) Length, yd. (m) 1 (2.5) 36 (33) 0.875 (2.22) 36 (33) 0.75 (1.9) 36 (33) 0.625 (1.5) 36 (33) 0.50 (1.2) 36 (33) 0.375 (9.5) 36 (33) 0.25 (6.3) 36 (33)
1125	Smooth copper foil, acrylic adhesive, 3.5 mil total, supplied on liner. Widths, in. (cm) Length, yd. (m) 1 (2.5) 36 (33) 0.875 (2.22) 36 (33) 0.75 (1.9) 36 (33) 0.625 (1.5) 36 (33) 0.50 (1.2) 36 (33) 0.375 (0.9) 36 (33) 0.25 (0.6) 36 (33)
1126	Smooth copper foil, conductive acrylic adhesive, 3.5 mil total, supplied on liner. Widths, in. (cm) Length, yd. (m) 1 (2.5) 36 (33) 0.875 (2.22) 36 (33) 0.75 (1.9) 36 (33) 0.625 (1.5) 36 (33) 0.50 (1.2) 36 (33) 0.375 (0.9) 36 (33) 0.25 (0.6) 36 (33)

RoHS Compliant 2002/95/EC

3M™ EMI Shielding Tapes

Product No.	Description
1170	Smooth aluminum foil, conductive acrylic adhesive, 3.2 mil total, supplied on liner.

Widths, in.	(cm)	Length, yd.	(m)
1	(2.5)	18	(16.5)
0.875	(1.5)	18	(16.5)
0.75	(1.9)	18	(16.5)
0.625	(1.5)	18	(16.5)
0.50	(1.2)	18	(16.5)
0.375	(9.5)	18	(16.5)
0.25	(6.3)	18	(16.5)

Product No.	Description
1181	Smooth copper foil, conductive acrylic adhesive, 2.6 mil total, supplied on liner.

Widths, in.	(cm)	Length, yd.	(m)
1	(2.5)	18	(16.5)
0.875	(1.5)	18	(16.5)
0.75	(1.9)	18	(16.5)
0.625	(1.5)	18	(16.5)
0.50	(1.2)	18	(16.5)
0.375	(9.5)	18	(16.5)
0.25	(6.3)	18	(16.5)

Product No.	Description
1182	Smooth copper foil coated on both sides, conductive acrylic adhesive, 3.5 mil total, supplied with liner on each side.

Widths, in.	(cm)	Length, yd.	(m)
1	(2.5)	18	(16.5)
0.75	(1.9)	18	(16.5)
0.625	(1.5)	18	(16.5)
0.50	(1.2)	18	(16.5)
0.25	(6.3)	18	(16.5)

Product No.	Description
1183	Smooth tin-plated copper foil, conductive acrylic adhesive, 2.6 mil total, supplied on liner.

Widths, in.	(cm)	Length, yd.	(m)
1	(2.5)	18	(16.5)
0.75	(1.9)	18	(16.5)
0.625	(1.5)	18	(16.5)
0.50	(1.2)	18	(16.5)
0.375	(9.5)	18	(16.5)
0.25	(6.3)	18	(16.5)

Product No.	Description
1194	Smooth copper foil, nonconductive acrylic adhesive, 3.0 mil total, supplied on liner.

Widths, in.	(cm)	Length, yd.	(m)
1	(2.5)	36	(33)
0.75	(1.9)	36	(33)
0.50	(1.2)	36	(33)
0.375	(9.5)	36	(33)
0.25	(6.3)	36	(33)

Product No.	Description
1245	Embossed copper foil, nonconductive acrylic adhesive, 4.0 mil total, conductivity “through the adhesive,” supplied on liner.

Widths, in.	(cm)	Length, yd.	(m)
1	(2.5)	18	(16.5)
0.75	(1.9)	18	(16.5)
0.625	(1.5)	18	(16.5)
0.50	(1.2)	18	(16.5)
0.25	(6.3)	18	(16.5)

Product No.	Description
1267	Embossed aluminum foil, nonconductive acrylic adhesive, 5.0 mil. total, conductivity “through the adhesive,” supplied on liner.

Widths, in.	(cm)	Length, yd.	(m)
1	(2.5)	18	(16.5)
0.875	(1.5)	18	(16.5)
0.75	(1.9)	18	(16.5)
0.625	(1.5)	18	(16.5)
0.50	(1.2)	18	(16.5)
0.375	(9.5)	18	(16.5)
0.25	(6.3)	18	(16.5)

Product No.	Description
1345	Embossed tin-plated copper foil, nonconductive acrylic adhesive, 4.0 mil. total, conductivity “through the adhesive,” supplied on liner.

Widths, in.	(cm)	Length, yd.	(m)
1	(2.5)	18	(16.5)
0.75	(1.9)	18	(16.5)
0.625	(1.5)	18	(16.5)
0.50	(1.2)	18	(16.5)
0.375	(9.5)	18	(16.5)
0.25	(6.3)	18	(16.5)

All tapes are furnished on 3 in. (7.6 cm) I.D. cores.
Minimum width is 1/4 in. (0.6 cm). Maximum width is 23 in. (58 cm).

RoHS Compliant 2002/95/EC

Static Control Measures for Handling Electronic Parts

Why should I care about Electrostatic Discharge?

Electrostatic discharge (ESD) costs the electronics industry millions of dollars annually in damaged and degraded parts. A study in *Semiconductor Reliability News* estimated that approximately 60% of device failures are caused by EOS/ESD.

What Is ESD?

The contact and separation of materials creates a static charge. An example of a common electrostatic event occurs when a charged individual discharges to a doorknob.

The contact and separation of feet when walking across a floor creates a charge on the individual. The discharge to the doorknob is an example of an electrostatic discharge. The simple act of walking across a floor can generate 15,000 volts of static electricity.

Human Awareness Levels

- We feel the discharge if it is greater than 3,500 volts.
- We hear the discharge if it is greater than 5,000 volts.
- We see the discharge if it is greater than 8,000 volts.
- By comparison, integrated circuits that are used to make electronic circuit boards can be damaged by voltages as low as 100 to 1,000 volts.

What Is Device Sensitivity?

Once a charge is generated, a charge can be induced from one object onto another. This is called charge transfer. The damage is a result of energy shifting from one charged object to another object. Static sensitive devices are subject to damage or degradation from Electrostatic discharge (ESD). Damage occurs because small traces and materials cannot withstand the amount of energy surge introduced by an electrostatic field or discharge. Damage and degradation can also result from an electrostatic field.

Typical Electrostatic Voltages

Event	Voltages at Relative Humidity 10%	40%	55%
Walking Across Carpet	35,000	15,000	7,500
Walking Across Vinyl Floor	12,000	5,000	3,000
Motions of Individuals Not Grounded	6,000	800	400
Remove Bubble Pack from Package	26,000	20,000	7,000

Device Sensitivity Threshold Levels

Generally, device sensitivity threshold levels are well below a person's ability to detect.

Device Type	Threshold Susceptivity (Volts)
MOSFET	10–100
VMOS	30–1800
NMOS	60–100
GaAsFET	60–2000
EPROM	100+
CMOS	200–3000
JFET	140–7000
SAW	150–500
Op-AMP	190–2500
Schottky Diodes	300–2500
Film Resistors	300–3000
Bipolar Resistors	300–7000
ECL	500+
SCR	500–1000
Schottky TTL	500–2500

Where Do You Need Static Protection?

- Incoming inspection and test
- Stores and storage
- Transfer carts
- Kitting
- Manual and automated insertion
- Wave soldering
- Equipment assembly and test
- Packaging and shipping
- Repair stations

Ordering and International Information

Ordering Information

For your nearest distributor, call:
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Toll Free Fax: (866) 722-3735

International Phone: (919) 718-0000
International Fax: (919) 774-8174

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