# 3M™ EM Aware TNG ESD Event Monitors

## Models 3M034-3-TNG, 3M034-030-TNG and 3M034-031-TNG, Including Starter Kits

## User's Guide


3M

Read, understand and follow all safety information contained in these user guide instructions prior to installation of the 3M™ EM Aware TNG ESD Event Monitor. Retain these instructions for future reference.

## Intended Use

The 3M EM Aware TNG ESD Event Monitor monitors up to four key parameters that keep you aware of critical symptoms of ESD problems: 1) ESD events; 2) static voltages; 3) ionization balance; and 4) charge decay. The thresholds for these parameters are fully adjustable to suit your needs. The improved design features a metal case module with built-in LCD display, a control joystick, remote antenna, power supply and a data output.

The monitor system must be installed as specified in this user's guide. It is intended for use in the following environmental conditions only:

1. Indoor use
2. Altitudes up to 2,000 meters above sea level
3. Temperature range of 10ºC to 40ºC
4. Maximum relative humidity of 80% for temperatures up to 31ºC, decreasing linearly to 50% relative humidity at 40ºC
5. Pollution degree two (office, laboratory, test station)

The monitor system has not been evaluated for other uses or locations. If the monitor is used in a manner not specified by 3M, the protection provided by the equipment may be impaired.

# 3M™ EM Aware TNG ESD Event Monitor Starter Kit

## Safety Statements

| EXPLANATION OF SIGNAL WORD CONSEQUENCES | |
|---|---|
| ⚠ WARNING: | Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury and/or property damage. |
| ⚠ CAUTION: | Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury and/or property damage. |
| NOTICE: | Indicates a potentially hazardous situation, which, if not avoided, may result in property damage. |

| EXPLANATION OF PRODUCT SAFETY LABEL SYMBOLS | |
|---|---|
|  | **Indicates DC (Direct Current)** |
|  | **Earth Ground** |
|  | **Important safety information, refer to the user manual.** |

### ⚠ WARNING:

To reduce the risks associated with hazardous voltage, which if not avoided, could result in death or serious injury:

- Do not modify or disassemble this product;
- Never allow children or other non-qualified persons to come into contact with power adapter;
- Never use power adapter outdoors or other wet locations;
- Always use extreme caution to avoid coming into contact with any exposed electrical conductors of the equipment being monitored with the EM Aware TNG ESD Event Monitor

To reduce the risks associated with hazardous voltage or possible explosion, which if not avoided, could result in death or serious injury,

- Use only the power adapter provided with the product;
- If power adapter is missing or damaged, only replace with one supplied by 3M

## ⚠ CAUTION:

**To reduce the risks associated with ground water contamination:**

- Never incinerate or dispose of product in a manner which is inconsistent with local, state, or federal regulations

## ⚠ NOTICE:

**To reduce the risks associated with Electrostatic Discharge (ESD) voltage, which if not avoided, could result in damage to the meter:**

- To install or change antennas, turn off the meter, install or change antennas, turn meter back on;
- Avoid touching antenna when meter is turned on.

**FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IRREVERSIBLE DAMAGE TO EM AWARE TNG AND HARM TO PERSONNEL AND EQUIPMENT:**

- If the EM Aware TNG ESD Event Monitor is connected to a facility monitoring system (FMS), always verify that there is zero voltage and low resistance between FMS ground and ground at the location where EM Aware TNG monitor is installed and is being grounded. If ground conditions are unacceptable, correct them first prior to installing the EM Aware TNG monitor. Otherwise, damage to the EM Aware TNG monitor and/or to the FMS may occur.

# FCC

*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

# Industry Canada

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la NMB-003 du Canada.

## Box Contents

Check that the following items are included with the 3M™ EM Aware TNG ESD Event Monitor Starter Kit shipping box:

A. EM Aware TNG module
B. Remote antenna with cable
C. Power adapter
D. Data Acquisition System (Data box, installation CD, and USB cable)
E. Multi-port cable
F. Grounding terminal with screw and washer
G. Container with metal screws (for testing functionality of the monitor)

## Installation and Mounting Instructions (Optional)

The 3M EM Aware TNG ESD Event Monitor Model 3M034 can be mounted horizontally or vertically. For semi-permanent positioning, two #4-40 screws or an equivalent may be used. For such an installation, mark the surface where the holes should be drilled and drill pilot holes using a #44 tap drill size.

## Connect the EM Aware TNG Monitor

Connect the EM Aware TNG monitor shown in Figure 1 below.

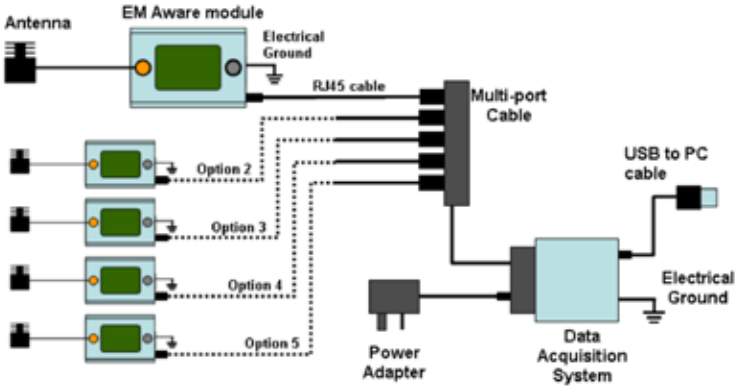



Figure 1

Alternatively, the EM Aware monitor can be connected as a stand-alone system. Follow the connection shown in Figure 2 at right.

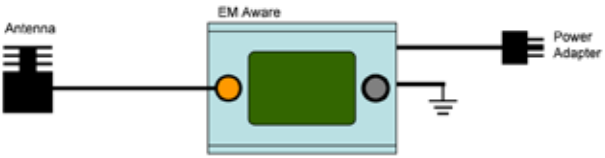


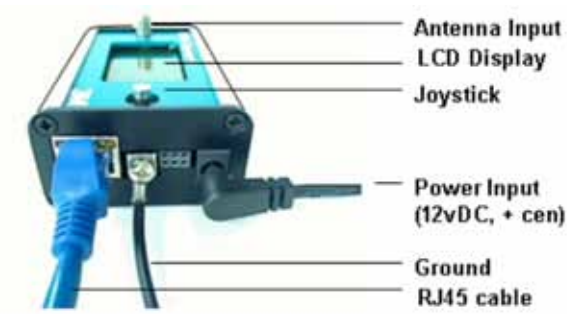

Figure 2

Without connecting the USB plug into the PC, test the 3M™ EM Aware TNG ESD Event Monitor by plugging the power adaptor into the main power supply. The power adapter is a +12V DC supply with a 2.1 mm barrel connector, center positive. You can plug it into DAQ or into the EM Aware monitor directly. The EM Aware monitor will light up with the display. Shake the container above the antenna and the EM Aware monitor should respond with beeps.

## Setting up the the Data Acquisition System

(See procedures in the Data Acquisition System section)

## Controlling the EM Aware TNG ESD Event Monitor




The EM Aware TNG monitor is controlled using a 5-way joystick on the right side of the screen; 1) Left, 2) Right 3) Up, 4) Down, and 5) Push. They will be referred as L, R, U, D and P in this guide.

The first level control takes place upon power up, in which case all L, R, U, D, controls do the same function. All of the directions scroll through the parameter displays as shown in Figure 3.

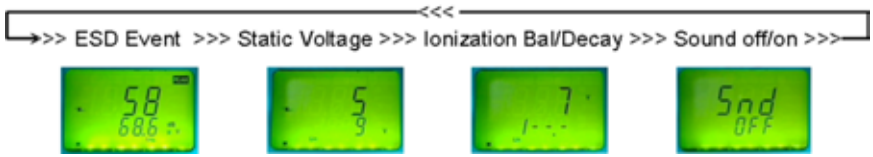



Figure 3

At any of the parameters displayed, the push of the joystick brings the next level control, which allows you to change the parameter settings, i.e. thresholds.

## Changing the ESD Event Parameters


ESD Event main screen

1. To reset the ESD counter to zero, press the joystick momentarily.
2. To change the ESD threshold, press the joystick longer until “ESD” is displayed. Move the joystick left or right to decrease or increase the threshold value. On this screen, a “REF” symbol appears on the top left corner.
3. To disable or enable CDM, move the joystick up or down to “on” or “off” CDM filter. A PEAK symbol appears on screen when the ESD filter is active.
4. To finalize the settings, push the joystick longer until the main ESD Event screen appears. A “MEM” symbol appears momentarily in this process.

### Application note: Measuring ESD Events

Test the system by shaking the screw container just above the antenna. Observe the number display showing magnitudes of ESD events. It is now ready for ESD event detection. The factory default for static events is 80dBuV/m.

### Application note: Measuring EMI Noise

EMI are spurious signals that are similar in nature to ESD signals. Like ESD, they are also unwanted. EMI can be monitored by switching the ESD filter to “OFF”. EMI sources could come from RF generating equipments like phone, motors, etc. The main display should not show the “PEAK” symbol.

## Changing the Static Voltage Parameters

Static Voltages main screen

1. At the main screen display (no “REF” symbol), move the joystick until the display is as shown above.
2. To reset the over-threshold counter to zero, press the joystick momentarily.
3. To change the voltage range and thresholds, push the joystick longer until a new screen appears. The new screen shows a “REF” symbol at the right top corner.
4. Move the joystick up or down to scroll on the voltage range options.
5. Move the joystick left or right to decrease or increase the static voltage threshold.
6. To finalize the settings, push the joystick longer until the screen shows the main static voltage screen.

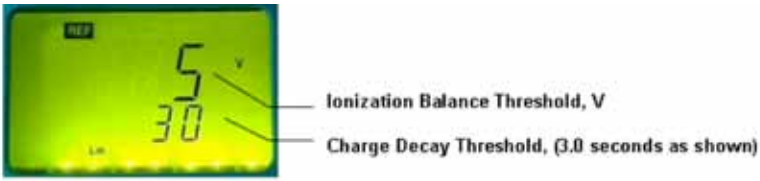
### Application note: Measuring/Detecting Static Voltage

Rub an insulative material against your garment and bring it just above the antenna. Observe the numbers displayed on the 3M™ EM Aware TNG ESD Event Monitor screen. The voltage peaks will coincide with alarms on the EM Aware TNG monitor. The EM Aware TNG monitor sounds an alarm when it detects a peak voltage exceeding the preset threshold voltage. It is now ready to detect static voltages around the antenna. On electronic manufacturing lines, locate the antenna closest to where the suspect static voltage is being generated. Once the EM Aware TNG monitor sounds the alarm, take precautions (i.e. removing insulative materials at the vicinity).

# Changing the Ionization Balance and Decay Parameters


Ionization Balance/Decay main screen

1. At the main screen display (no "REF" symbol), move the joystick until the display is as shown similar above.
2. To manually test the decay time, press the joystick momentarily.
3. The decay time is also automatically measured every two minutes.
4. To change the voltage range and thresholds, push the joystick longer until a new screen appears. The new screen is as shown below.
5. Move the joystick up or down to increase or decrease the decay time threshold.




Ionization Balance/Decay Threshold Status

6. Move the joystick left or right to decrease or increase the ionization balance threshold.
7. To finalize the settings, push the joystick longer until the screen shows the main static voltage screen.

## Application note: Measuring Ionization Balance

Observe the waveform in the third row. Notice that the line is close to the zero level. This would indicate a balanced condition. A line that is above or below the zero level is called the offset voltage. An alarm indication on the 3M™ EM Aware TNG ESD Event Monitor means that the offset threshold was exceeded.

## Application note: Measuring Charge Decay

Charge decay is measured at intervals of two minutes. The waveform is shown on the third row of the screen. If the decay exceeds the threshold time, an alarm is heard on the EM Aware TNG monitor.

# Data Acquisition System

## Installing the Data Logging Software

A. Start the PC.

B. Insert the USB cable into the PC.

C. Wait for the PC  to detect the presence of new hardware.

D. Insert the installation CD when prompted.

E. Follow the succeeding prompts until it indicates that the hardware is ready for use.

F. Launch the program:

   a. Select the hardware detected in the list.

   b. Press "start Windaq". A screen appears shortly showing a vertical marker scanning horizontally.

   c. The software installation is successful.

## Configuring the Software

This 3M™ EM Aware TNG ESD Event Monitor Starter Kit is for monitoring ESD events and ionization parameters, balance and decay. The first channel for each RJ45 jack is for ESD events; the second is for static voltage; and the third is for ionization balance and decay. Please refer to the table below:

| RJ45 Jack Identification | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| ESD Events channels | 1 | 4 | 7 | 10 | 13 |
| Static Voltages | 2 | 5 | 8 | 11 | 14 |
| Balance/ Ionizer Decay channel | 3 | 6 | 9 | 12 | 15 |

# Channel Settings

## Setting Limits

The 3M™ EM Aware TNG ESD Event Monitors in these starter kits have 4-20mA output. With an interface of the DI700 data acquisition system, the physical output range on the screen is 1-5V.

First, set for all channels for proper physical limits.

Go to SCALING>LIMITS and set the TOP LIMIT to 5V and the BOTTOM LIMIT to 0V for ESD events and

Go to SCALING>LIMITS and set the TOP LIMIT to 5V and the BOTTOM LIMIT to 1V for all other parameters.

## ESD Event Monitoring

No additional settings are necessary.

## Electrostatic Field/Ionization Balance

EM Aware TNG monitor sensitivity to ionization balance is 10 times higher than sensitivity to induced electrostatic voltage. For example, the EM Aware TNG monitor may be set to monitor +/-250V induced electrostatic voltage or +/-25V ionization balance. Therefore, you may want to set the display limits based on what you intend to measure. If in doubt, set the monitor to the limits of electrostatic voltage and keep in mind that readings for ionization balance would be 10 times less, i.e. for 250V electrostatic voltage range the balance would read +/-25V full scale. The EM Aware TNG monitor range is specified in its calibration certificate.

To set the proper scale on the screen, go to the desired channel, and go to EDIT>LOW CALIBRATION and enter the following:

**Input Level = 1 V**
**Low Cal Value = Negative Voltage Limit, i.e. -250V**
**Engr. Units = V**
**Press OK.**

Then go to EDIT>HIGH CALIBRATION and enter the following:

**Input Level = 5 V**
**High Cal Value =Positive Voltage Limit, i.e. 250V**
**Engr. Units = V**
**Press OK.**

Make sure that the limits being set correspond to the limits set in the 3M™ EM Aware TNG ESD Event Monitor. If there is a high level of electrical noise in the environment, the readings on the screen may be higher than zero even in the absence of any apparent static voltage.

## Ionizer Decay

Ionization balance is measured on a linear scale. +5V corresponds to decay of 10 seconds or more and 0V corresponds to an ideal zero decay. Go to EDIT>LOW CALIBRATION and set the following:

**Input Level = 1 V**
**Low Cal Value = 0**
**Engr. Units = Sec.**
**Press OK.**

Then go to EDIT>HIGH CALIBRATION and enter the following:

**Input Level = 2 V**
**High Cal Value = 10**
**Engr. Units = 10 Sec.**
**Press OK.**

# 3M™ EM Aware TNG ESD Event Monitor

## Regulatory Information

China RoHS information applies only to the EM Aware TNG ESD Event Monitor, power supply and antenna assembly. China RoHS information for other kit components will accompany those kit components, if applicable.

## China RoHS


**Electronic Industry Standard of the People's Republic of China, SJ/T11363-2006, Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products.**

**This symbol, per Marking for the Control of Pollution Caused by Electronic Information Products, SJ/T11364-2006, means that the** product or part **does** contain a substance, as detailed in the chart below, in excess of the following maximum concentration values in any homogeneous material: (a) 0.1% (by weight) for lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers; or (b) 0.01% (by weight) for cadmium. Unless otherwise stated by 3M in writing, this information represents 3M's best knowledge and belief based upon information provided by third party suppliers to 3M.

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产品中有毒有害物质或元素的名称及含量
**Name and Content of Hazardous Substances or Elements**

| 部件名称 (Part or Component Name) | 有毒有害物质或元素 (Hazardous Substances or Elements) | | | | | |
|---|---|---|---|---|---|---|
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 Cr(VI) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 装置的焊接部 (Solder in instrument) | × | ○ | ○ | ○ | ○ | ○ |

○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下。(Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.)

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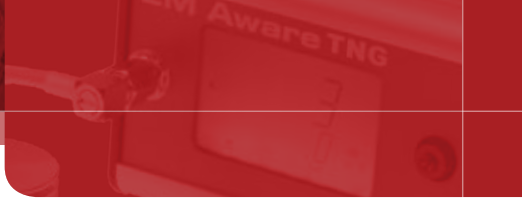
Aware TNG

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