

**Our job is to support the stage on which advanced equipment performs.**

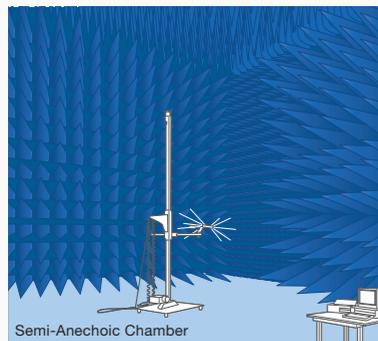
The scale of integration of semiconductor devices continues to rise, made possible by ever more advanced fabrication technology.

We take pride in helping to support the stage on which such equipment performs.

If you are a user of precision equipment, do you ever face problems of inaccuracy, malfunctions, or faulty products?

Such equipment is surrounded by electromagnetic noise and fluctuations that can degrade performance. GroundNite Inc. can help to create an ideal environment for your equipment by performing measurements in the installation location and implementing appropriate noise countermeasures.

Please contact us for assistance with your noise problems.



**GROUND LINE**  
NOISE FILTER



OPEN THE NEXT TECHNOLOGY  
**GROUNDNITE, INC.**  
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●This catalog is current as of October 2017. Specifications are subject to change due to product improvements.  
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# New standard for the 21st century: It is possible to eliminate ground line noise.

In environments where equipment and power supplies are in close proximity, and where power lines affect each other in complex ways, line noise becomes an issue. It can adversely affect the accuracy of precision equipment, and even cause malfunctions and damage. For this reason, many of our customers make use of noise filters.

Nevertheless, the danger of adverse effects on other equipment from electromagnetic noise entering through ground lines is overlooked surprisingly often. Even if they are aware of the issue, customers tend not to take any effective countermeasures because they think disconnecting ground lines could be dangerous.

Now GroundNite's ingenuity overturns this common assumption. We have developed a series of noise filters designed specifically for ground lines — something previously thought impractical. GroundNite technology provides solid support for environments employing advanced equipment.

U.S. Patent Granted (October 2004)

Taiwan Patent Granted (June 2006)

EU Patent Granted (May 2005)

Japan Patent Granted (May 2007)

Korea Patent Granted (May 2006)

Innovative Technology  
for Eliminating  
Ground Line Noise



Onboard Type

NEW

GROUNDNITE® III



During  
Sample  
Shipment

Onboard Type

GROUNDNITE® II



UL Approved  
Conforming to  
RoHS Directives

Small-Capacity, General Purpose Type

NEW

GROUNDNITE® PC



With a  
Power Supply  
Cable

PSE Approved  
Conforming to  
RoHS Directives

Small-Capacity, General Purpose Type

GROUNDNITE®



UL Approved  
Conforming to  
RoHS Directives

Medium- and Large-Capacity Type

Earth Line Cleaner®



UL Approved  
Conforming to  
RoHS Directives

The photograph is specifications in Japan.

**Noise current on the ground line is attenuated by converting the energy into a dissipative form. Consequently, environmental noise energy level is reduced.**

**GroundNite filter technology helps ensure stable operation of equipment.**

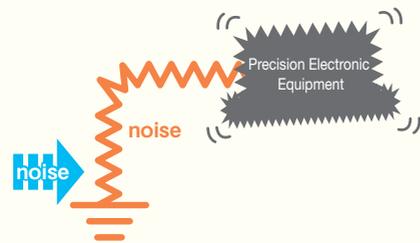
**Ground Line Noise Filter** from GroundNite converts leakage current in the ground line into heat energy, thereby effectively attenuating electromagnetic noise. These noise filters are designed specifically for ground lines. They employ innovative technology to clean up and eliminate the ground line noise that can harm electronic equipment. In addition, should a short circuit or electrical leakage occur in the equipment, the resulting high current is permitted to leak out immediately via the ground line.

**Ground Line Noise Filter** maintains the essential safety and protection functions of the ground line while preventing the equipment problems that can result in inaccuracies or malfunctions.

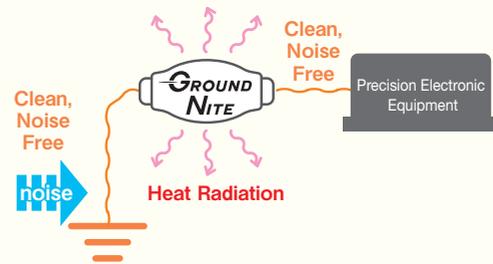
### Ground Line Noise Filter from GroundNite Features

- Unlike conventional power line filters, Ground Line Noise Filter from GroundNite converts noise into heat rather than reflecting it. (Electromagnetic noise is “cleaned up.”)

#### Without Filter

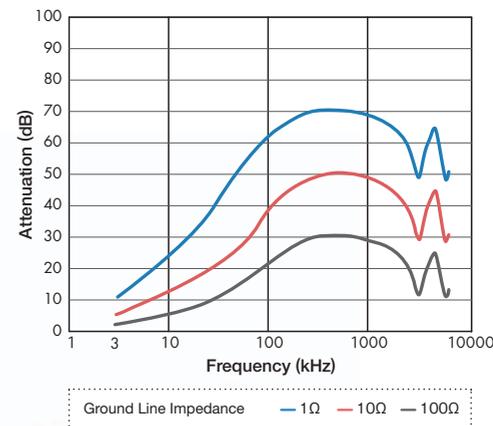


#### With Filter



- GroundNite Ground Line Noise Filters are effective in substantially attenuating noise from 3kHz through frequencies in 5MHz.

Ground Line Noise Filter Attenuation Performance



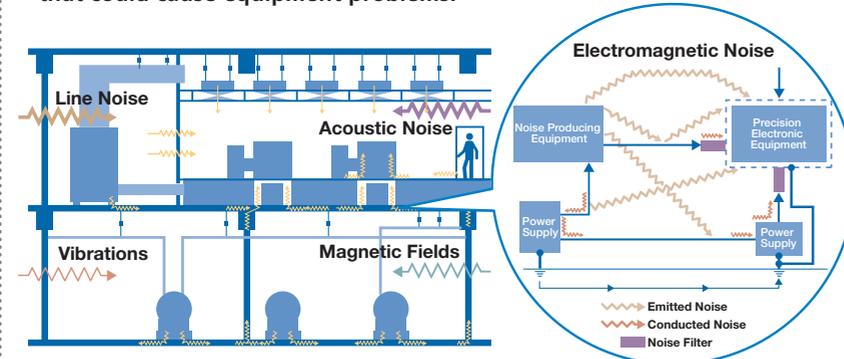
### Are you aware that dangerous electromagnetic noise can be conveyed to your equipment via ground lines?

Grounding is essential to ensuring the safety and reliability of electronic equipment. To ensure low impedance, ground lines are usually thick cables securely connected to a ground. However, the specifications for ground lines cover DC resistance only; a DC resistance of 10 Ω or less for a type-A ground and a DC resistance of 100 Ω or less for a type-D ground. The specifications do not address high-frequency impedance at all. Nevertheless, in a typical semiconductor plant, ground lines are generally located in cable racks together with the

power lines, and power and ground lines run side-by-side over long distances. If we assume, for example, a ground line 100 meters in length in a cable rack 2 meters above the floor, its impedance will be 14.4 Ω at 10 kHz, 106.4 Ω at 100 kHz, and 862 Ω at 500 kHz. Put simply, the impedance becomes high at the higher frequencies. This is another reason why ground lines (both those attached to grounds and those attached to cables) are susceptible to electromagnetically induced currents, a common source of noise.

Such ground line noise can cause serious problems for electronic equipment. However, since the safety and protection function of grounding is the first priority, conventional noise filters (such as inductors) are not suitable for preventing noise. As a result, some users try to make do with measures aimed at reducing noise around the power lines or changing the routing of cables, while others take the extreme step of disconnecting the ground line altogether.

- Locations such as semiconductor plants or assembly plants for precision electronic equipment are full of potential noise sources that could cause equipment problems.



- Problems caused by ground line noise often have characteristics such as the following.

1. Problems are not constant but occur suddenly and unexpectedly.
2. Problems are not very reproducible and do not occur with consistent frequency. (Depending on conditions, they may occur once every few days or even months.)
3. Problems are not limited to the area in physical proximity to the equipment generating the noise. The cause of a particular problem may actually be located far from the equipment it affects, though somewhere within the same building and along the path of the ground line.
4. Due to differences in the noise environment, in many cases problems do not occur at the manufacturer's site, becoming apparent only after the equipment has been delivered to the customer.

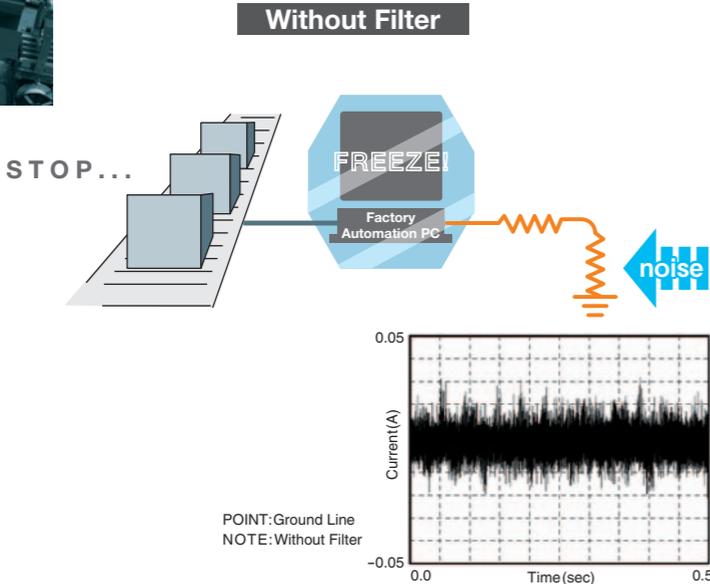
# Prevents line stoppage resulting from unknown causes. Contributes to the stable output of products.

Workers have difficulty in finding the cause of manufacturing line problems if the equipment in the line is apparently in good condition. The workers may try disconnecting the ground wire as the last resort and find that the line returns to normal. A large number of operators of high-precision equipment in semi-conductor manufacturing factories or engineers in charge of starting up or servicing equipment in device manufacturing companies may experience this type of phenomenon. Ground line noise often malfunctions equipment, the troubleshooting of which is time-consuming. Our ground line noise filter effectively suppresses line noise that adversely affects equipment, thus ensuring the stable operation of the equipment without losing the safety function of the ground line.

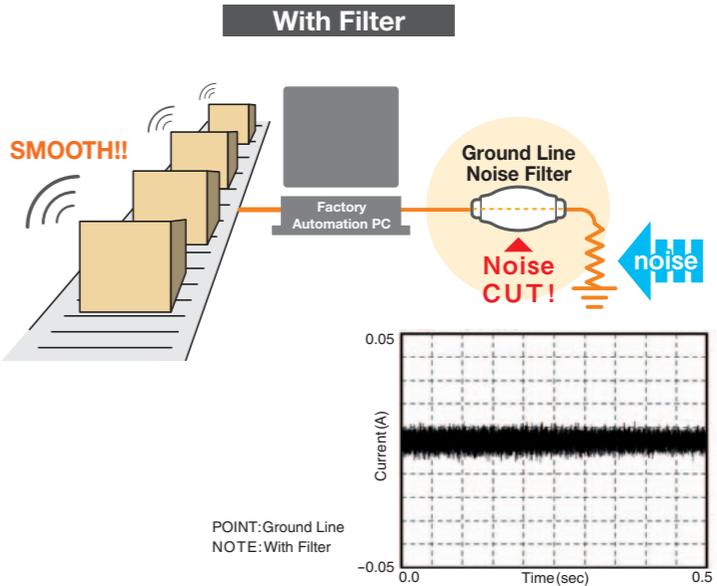


## Material Handling System of a Chemical Products Manufacture

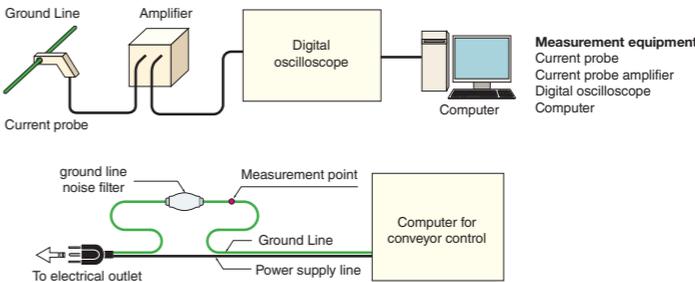
Problem of intermittent production line stoppages completely solved!



Problems causing the line to halt during operations (intermittent stoppages) were occurring about **10 times per day**. The manufacturer of the equipment used was asked to investigate and correct the problem several times, but the stoppages continued. Each time the problem occurred the technician at the site would reset the system. These intermittent stoppages resulted in a **reduction in the operating efficiency of the production line of over 20%**.



After a ground line noise filter from EMC was installed on the ground line of the PC controlling the factory automation system, the **intermittent stoppages were reduced to zero**. The customer was extremely pleased.



**Measurement Method (Ground Line Noise)**  
A current clamp was connected to the ground line to measure the current in the ground line. A digital oscilloscope was used for data analysis. The spectrum data obtained from the measurement was transferred to a computer. The conditions of the ground line, with and without a ground line noise filter, were measured to check the noise suppression effect of the filter.

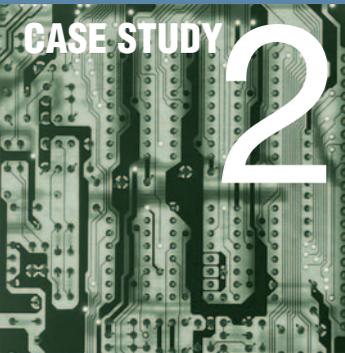
### Furthermore...

Ground line noise filters are also effective in improving the operating environment for conveyor robots.

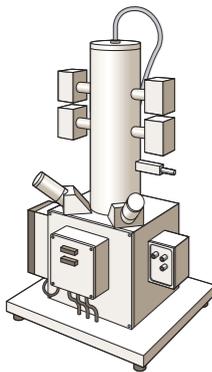


# Stabilizes technical quality and ensures clearer inspection images. Increases system performance.

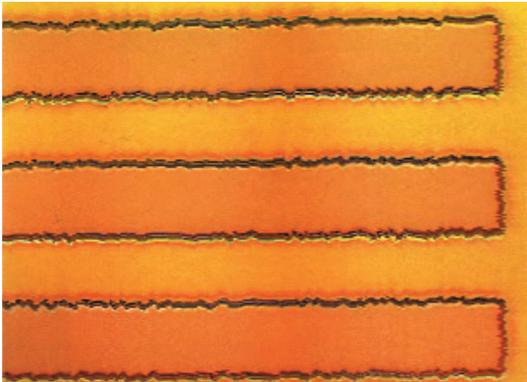
Ground line noise has a detrimental effect on the accuracy of equipment and the clearness of monitoring images. The ground line noise filter reduces the risk of equipment problems caused by noise, thus providing an ideal environment where you can make full use of the performance of the equipment.



## Drawing Accuracy Improvement in Electron Beam Lithography Equipment



Without Filter



The fluctuation of drawing accuracy easily occurs under the influence of ground line noise.

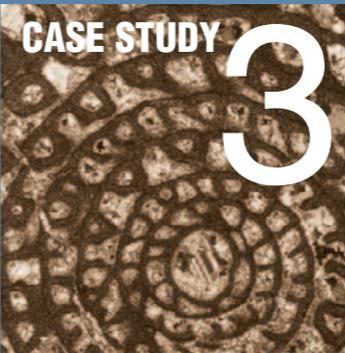


With Filter

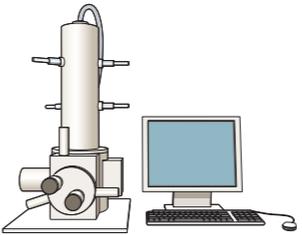


An increase in drawing accuracy is ensured by effective noise suppression.

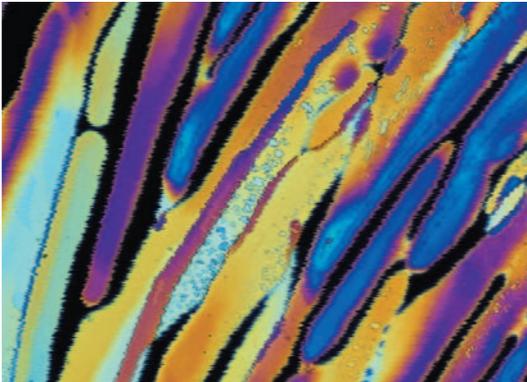
\* The picture provides an easy-to-understand image that explains the effect.



## Resolution Improvement on Scanning Electron Microscope (SEM) Images



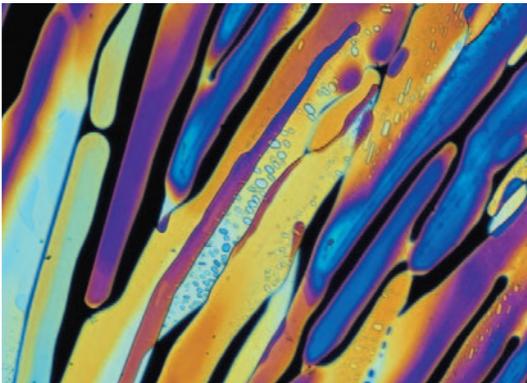
Without Filter



Ground line noise appears in SEM images, thus adversely affecting the resolution of the images.



With Filter



The noise in SEM images is suppressed and SEM's performance will be closer to its original performance.

\* The picture provides an easy-to-understand image that explains the effect.

# GroundNite ground line filters effectively reduce ground line noise that conventional filters cannot control.

## Measurement Screen Data of Noise HiLogger 3145 (HIOKI E.E.Cor.)

### Ground Current With and Without Filter

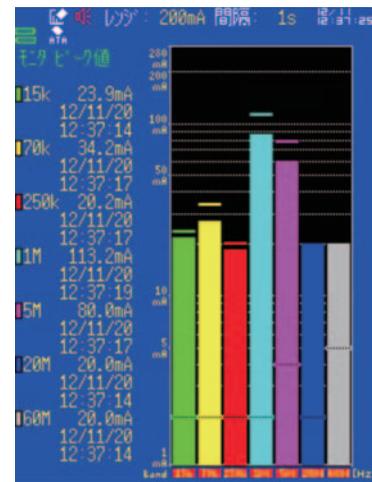
#### Ground Current without Ground Nite



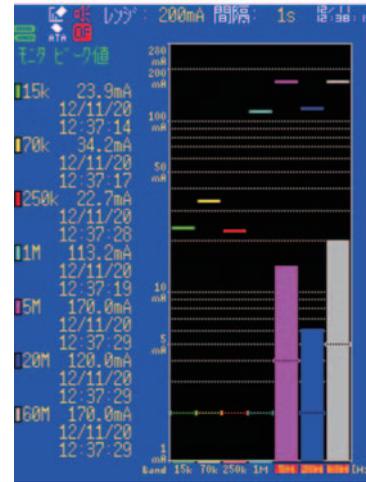
#### Ground Current with Ground Nite



#### Before



#### After



Noise HiLogger 3145 /  
Clamp on Noise Sensor 9754

**HIOKI**  
HIOKI E.E. Corporation

# Certified under an international safety standard (UL standard). Offers world-class specifications.

## International Standard



Appliance filter-ground filters,  
Cat.Nos.EF-NT-1027,EF-NT 1027RS.  
Cat.No.EF-NT 4710S,EF-NT1710S.

## Safety Testing

### 1. Insulation Performance Test

In testing by the Japan Electrical Safety & Environment Technology Laboratories (JET), the ground filter was rated "no malfunction" when tested under the following conditions: test voltage: 200 V, test current: 1,500 A, power application time: 20.5 ms.

### 2. In lightning impulse withstand current test (test current waveform: positive polarity 8x20 μs lightning impulse wave)

Using a test current of 2,000 A, rated "No malfunction."

## Basic Specifications

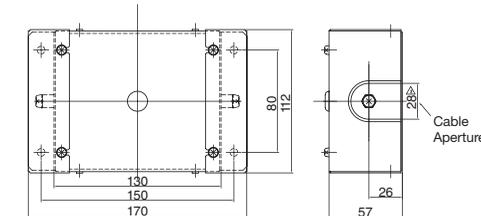
### Electrical Characteristics

Product	Earth Line Cleaner®	GROUNDNITE® PC
Model	EF-NT 1027RS	EF-NT 5710PC
Attenuation Performance	~60dB	~60dB
Frequency Band	3kHz~5MHz	3kHz~5MHz
Max. Resistance Value	0.06 Ω	0.1 Ω or less
Max. Rated Current	20A (AC 60Hz)	7A (AC 60Hz)

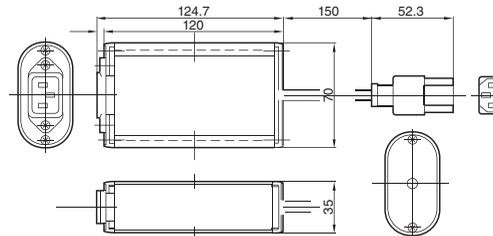
Product	GROUNDNITE®	GROUNDNITE® II	GROUNDNITE® III
Model	EF-NT 4710S	EF-NT 1710S	EF-NT 2710B
Attenuation Performance	~60dB	~60dB	~60dB
Frequency Band	3kHz~5MHz	3kHz~5MHz	3kHz~5MHz
Max. Resistance Value	0.06 Ω	0.1 Ω or less	0.1 Ω or less
Max. Rated Current	5A (AC 60Hz)	3A (AC 60Hz)	1A (AC 60Hz)

## External Dimensions (Unit: mm)

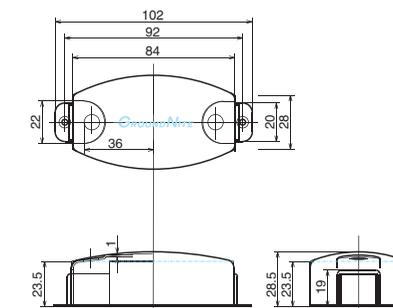
### ●Earth Line Cleaner



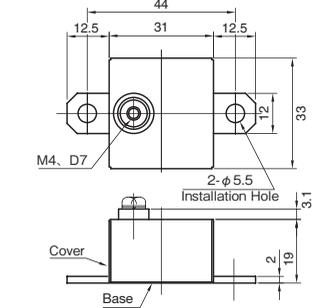
### ●Ground Nite PC



### ●Ground Nite



### ●Ground Nite II



Note: Specifications subject to change without notice.