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ShockWatch® RFID Technical Data

The ShockWatch® RFID impact indicator is an intuitive solution for detecting mishandling of sensitive products.Simply mount the indicator on the outside of your package and begin monitoring. A distinctive green to red color change informs you if your product may have been compromised due to mishandling.

ShockWatch RFID

- Acts as a visual deterrent to mishandling
- Expands the utility of RFID with damage monitoring
- Reduces receiving times and isolates items that need inspection
- Reduces mishandling through awareness
- Helps identify trouble spots in the supply chain—from production to transportation to storage

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Key Specifications

Indication Type	RFID, visual green to red color change
Activation Method	Armable
Security	Tamperproof, Serialized
Operating Temperature Range	-25°C to 60°C /-13°F to 140°F
RFID Type	ISO 18000-6 / EPC Gen 2 / Passive
Impact Sensitivities	5G, 10G, 15G, 25G, 37G, 50G, 75G
Impact Duration	0.5 to 50 msec
Accuracy	+15% at 20°C / 68°F, 1 ATM
Product Life	2 years from date of manufacture when stored at 20°C / 68°F, 1 ATM
Storage Recommendations	20°C / 68°F, 1 ATM, 0-99% RH Non-condensing
Dimensions	1.69 in x 1.69 in x 0.25 in I 42.93 mm x 42.93 mm x 6.35 mm

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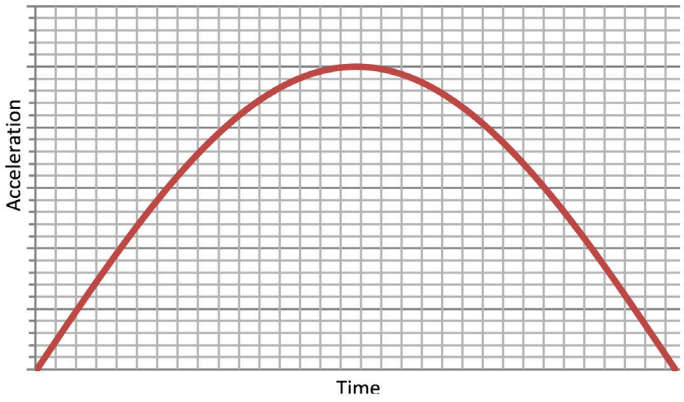
ShockWatch Activation

Two components comprise an impact – amplitude of acceleration (G) and duration of impact (msec). These components are illustrated in the graph below. The area under the curve represents the change in velocity (Δv).

ShockWatch impact indicator shock response curves are based on a half-sine shock pulse (shown below). A time, acceleration point on the half-sine curve can be correlated to the same point on the ShockWatch activation graph response curves.



Activation Graphs - Response Curves

The vertical axis of each ShockWatch impact indicator activation curve shows a linear scale and is titled "Acceleration" or G. A "G" is a multiple of the acceleration due to gravity (32.2ft/s2 or 9.8m/s2).

The horizontal axis of the graph shows a linear scale for time and represents the time duration. The unit of measure for this scale is milliseconds.

The most critical thing to observe from the curve is that as duration decreases, acceleration increases. Each ShockWatch impact indicator has a minimum G-threshold that must be exceeded before it will activate. The minimum G-level for each ShockWatch impact indicator is the leftmost G-value on the curve (the G-value where the shock curve intersects the left acceleration scale). If this minimum G-value is not exceeded, regardless of the duration (or the Δv), the device will not activate.

Response curves are measured with a drop system filtering at 3 kHz. Use of a different frequency filter will change the response curve.

If you have any questions or are unsure of how to interpret ShockWatch products, please contact SpotSee or your local distributor for assistance.

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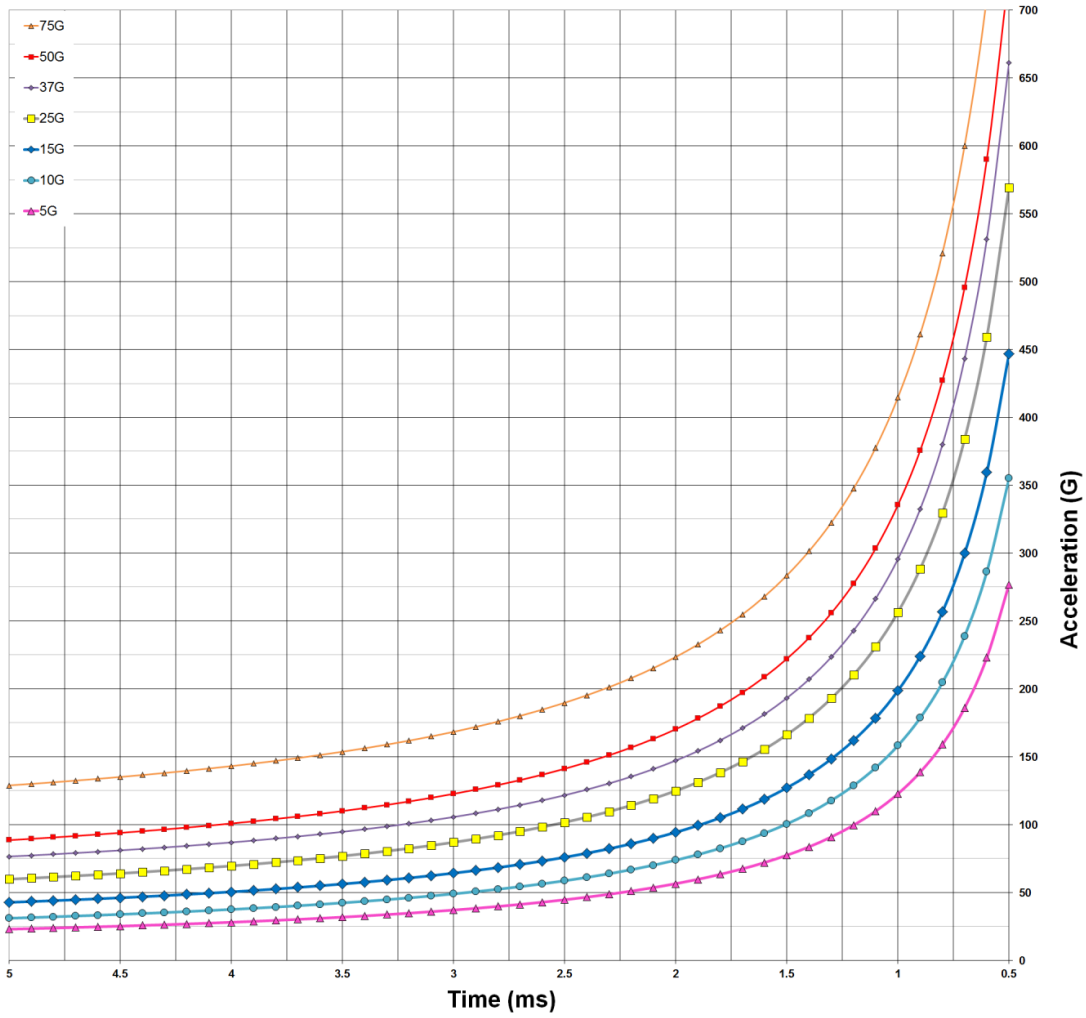
ShockWatch RFID G-Level vs. Duration (ms) - 0.5 to 5ms



Activation Occurs +/- 15% of the Nominal

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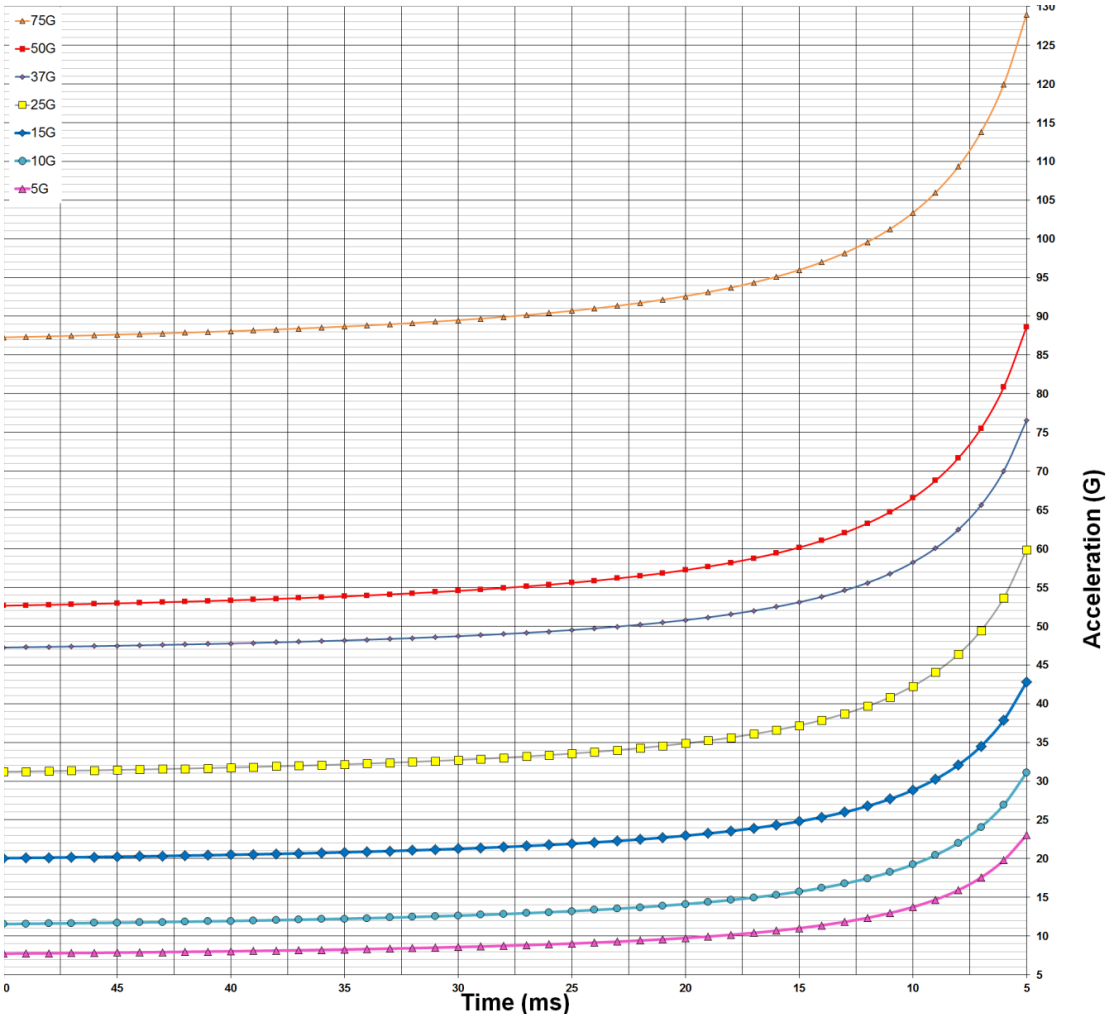
ShockWatch RFID G-Level vs. Duration (ms) - 5 to 50ms



Activation Occurs +/- 15% of the Nominal Activation Value

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Response Equations

The ShockWatch RFID's response generally follows the equations below:

Product	Equation
ShockWatch RFID – 5G	$G = 116 \times t^{-1.22} + 6.26$
ShockWatch RFID – 10G	$G = 145 \times t^{-1.25} + 9.37$
ShockWatch RFID – 15G	$G = 190 \times t^{-1.25} + 15.12$
ShockWatch RFID – 25G	$G = 245 \times t^{-1.25} + 23$
ShockWatch RFID – 37G	$G = 250 \times t^{-1.3} + 45.7$
ShockWatch RFID – 50G	$G = 285 \times t^{-1.25} + 50.5$
ShockWatch RFID – 75G	$G = 330 \times t^{-1.25} + 84.8$

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Product Selection

ShockWatch RFID should be used when monitoring products that are sensitive and must be handled with care. There are two things you need to know to select a ShockWatch RFID impact indicator sensitivity: shipment size and weight. The selection guide should always be used as a starting point only. The indicator that will be best suited to your application will also consider product fragility and packaging.

ShockWatch RFID	5 - 15 ft^3 .14 - .42 m^3	15 - 50 ft^3 .42 - 1.42 m^3	50 - 100 ft^3 1.42 - 2.83 m^3	100 - 250 ft^3 2.83 - 7.08 m^3	250 - 500 ft^3 7.08 - 14.16 m^3	500 - 1,000 ft^3 14.16 - 304.8 m^3	1,000+ ft^3 304.8+ m^3
0 - 10 lbs 0 - 5 kg	75G	75G	50G	37G	N/A	N/A	N/A
10 - 25 lbs 5 - 11 kg	75G	50G	50G	37G	25G	N/A	N/A
25 - 50 lbs 11 - 23 kg	50G	50G	37G	25G	25G	15G	N/A
50 - 100 lbs 23 - 45 kg	50G	37G	37G	25G	15G	15G	10G
100 - 250 lbs 45 - 113 kg	37G	37G	25G	25G	15G	15G	10G
250 - 1,000 lbs 113 - 454 kg	37G	25G	25G	15G	15G	10G	10G
1,000 - 2,000 lbs 454 - 907 kg	25G	25G	25G	15G	15G	10G	5G
2,000 - 5,000 lbs	25G	25G	15G	15G	10G	10G	5G
5,000 - 10,000 lbs 2,268 - 4,536 kg	25G	15G	15G	15G	10G	10G	5G
10,000 - 15,000 lbs 4,536 - 6,804 kg	N/A	15G	15G	10G	10G	5G	5G
15,000 - 20,000 lbs 6,804 - 9,072 kg	N/A	N/A	10G	10G	5G	5G	5G
20,000 - 30,000 lbs 9,702 - 13,608 kg	N/A	N/A	N/A	5G	5G	5G	5G
30,000+ lbs 13,608+ kg	N/A	N/A	N/A	N/A	5G	5G	5G

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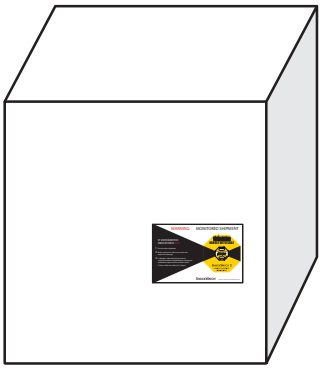
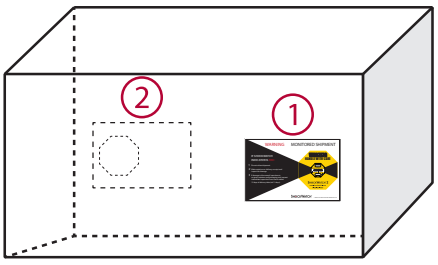
How To Use

The ShockWatch RFID visually alerts users when a mishandling event has occurred so that appropriate actions can be taken according to the company or industry guidelines. The ShockWatch RFID will change from white to red when an impact over the G-level amplitude / duration has occurred. See mounting details in the section “Best Practices for Mounting” for instructions detailing how to place the ShockWatch RFID on a package.

Mounting Best Practices

1. Mount the ShockWatch RFID Impact Indicator in the lower third of the package/pallet as close to the edge as possible. Avoid the center of the package because the mounting locations should be structurally sound.
2. If the package is twice as long as it is wide, use two ShockWatch RFID Impact Indicators. Place a second indicator in the same position on the opposite side of the package.
3. Place the Alert Sticker on your bill of lading as a reminder to receivers to check the ShockWatch RFID indicator immediately upon arrival.
4. While these instructions are considered best practices, each situation may be different. If you have any questions, please contact your **SpotSee Sales representative or call +1 (800) 466-0101 or email techsupport@spotsee.io**
5. **To reorder, call (800) 846-2468 or email orders@spotsee.io**





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Reading ShockWatch RFID:

To read the damage status of a ShockWatch RFID Indicator, simply configure the reader to read bit number 512 in the standard EPC memory bank (Bank 1).

If this bit is clear (equal to zero): the indicator has been triggered as the result of an impact event.
If the bit is set (equal to one): the indicator has not triggered.

Below is sample code for an Impinj Speedway reader:

```
x.MemoryBank = MemoryBank.Epc;          // 1. Select EPC memory bank (bank 1)
x.WordPointer = 512/16;                 // 2. Point to bit 512 in EPC memory bank
x.WordCount = 1;                        // 3. Say how many bits to read
settings.Report.OptimizedReadOps.Add(x); // 4. Do the actual read operation
```

If you have any questions regarding a reader setup, please contact SpotSee by visiting spotsee.io/support for the latest contact information.

Accessories & Related Products

The ShockWatch RFID, framing labels, companion labels, alert stickers, and alert tape can be incorporated into an overall program for reducing product mishandling. Contact your SpotSee Regional Manager or Local Distributor for more information.

Quality

The sampling specification used in the manufacturing process of the ShockWatch RFID is ANSI Z1.4, AQL 2.5%. This specification is a recognized means of statistically sampling manufactured goods for acceptable product quality.

ShockWatch is an ISO 9001-2015 company, and as the global leader in supply chain damage prevention programs, ShockWatch's testing and inspection equipment is calibrated by an ISO/IEC accredited organization, traceable to NIST standards.

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Ordering Information

Product	Part Number
ShockWatch RFID – 5G	SWRFID 5G
ShockWatch RFID – 10G	SWRFID 10G
ShockWatch RFID – 15G	SWRFID 15G
ShockWatch RFID – 25G	SWRFID 25G
ShockWatch RFID – 37G	SWRFID 37G
ShockWatch RFID – 50G	SWRFID 50G
ShockWatch RFID – 75G	SWRFID 75G
Companion Label - 200/roll	26106
Companion Label - 500/roll	26107
SWZ Companion Label - 200/roll	26126

Technical Support

If you are unsure of how to use or interpret the ShockWatch® RFID, please contact SpotSee Technical Support by visiting spotsee.io/contact for the latest contact information.