

InAsSb photovoltaic detectors

P13243 series



High-speed response and high sensitivity in the spectral band up to 5 μm, infrared detectors

The P13243 series are photovoltaic type detectors that have achieved high sensitivity in the spectral band up to 5 μm using Hamamatsu unique crystal growth technology and process technology. These products are environmentally friendly infrared detectors and do not use lead, mercury or cadmium, which are substances restricted by the RoHS Directive. They are replacements for previous products that contain these substances. The non-cooled types offering easy handling include the surface mount ceramic type which supports lead free reflow soldering. This type enables support for automation of mounting and a reduced mounting area achieved through miniaturization. The lineup also includes the TE-cooled type with a large photosensitive area, which delivers stable high S/N measurement.

Features

- High sensitivity
- High-speed response
- High shunt resistance
- Compact, surface mount type ceramic package (P13243-013CA)
- Compatible with lead-free solder reflow (P13243-013CA)
- TE-cooled type (P13243-122MS/-222MS)

Applications

- Gas detection (CH₄, CO₂, CO, etc.)
- Radiation thermometers
- Flame detection

Options (sold separately)

- Heatsink for one-stage TE-cooled type **A3179**
- Heatsink for two-stage TE-cooled type **A3179-01**
- Temperature controller for TE-cooled type **C1103-04**
- Amplifier for infrared detector **C4159-01**

Structure

Type no.	Photosensitive area (mm)	Package	Window material	Cooling	Field of view FOV (degrees)
P13243-011MA	0.7 × 0.7	TO-46	Si with AR coating	Non-cooled	90
P13243-013CA		Ceramic			102
NEW P13243-022MS	2 × 2	TO-5	Sapphire	Non-cooled	97
P13243-122MS		TO-8		One-stage TE-cooled	134
P13243-222MS				Two-stage TE-cooled	113

Absolute maximum ratings

Type no.	Allowable TE-cooler current (A)	Thermistor power dissipation (mW)	Reverse voltage V _R (V)	Operating temperature T _{opr} *1 (°C)	Storage temperature T _{stg} *1 (°C)	Maximum incident light level (W/cm ²)	Soldering temperature T _{sol} (°C)
P13243-011MA	-	-	1	-40 to +85	-40 to +85	1	-
P13243-013CA	-	-					240 (once)*2
NEW P13243-022MS	-	-		-40 to +60	-40 to +60		-
P13243-122MS	1.5	0.2					
P13243-222MS	1.0						

*1: No dew condensation

When there is a temperature difference between a product and the surrounding area in high humidity environments, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

*2: Reflow soldering, JEDEC J-STD-020 MSL2, see P.8

Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

Electrical and optical characteristics (Typ. Ta=25 °C unless otherwise noted)

Type no.	Chip temperature Tchip (°C)	Peak sensitivity wavelength λp (μm)	Cutoff wavelength λc (μm)	Photosensitivity S*3 λ=λp (mA/W)	Shunt resistance Rsh VR=10mV (kΩ)	Detectivity D* (λp, 1200, 1)		Noise equivalent power NEP λ=λp		Rise time tr*4 (ns)	Terminal capacitance Ct*5 (pF)
						Min. (cm·Hz ^{1/2} /W)	Typ. (cm·Hz ^{1/2} /W)	Typ. (W/Hz ^{1/2})	Max. (W/Hz ^{1/2})		
P13243-011MA	25	4.1	5.3	4.5	300	8.0 × 10 ⁸	1.0 × 10 ⁹	7.0 × 10 ⁻¹¹	8.8 × 10 ⁻¹¹	15	0.7
P13243-013CA											
NEW P13243-022MS	25			8.0	7	8.0 × 10 ⁸	1.0 × 10 ⁹	2.0 × 10 ⁻¹⁰	2.5 × 10 ⁻¹⁰	100	20
P13243-122MS	-10			8.6	19	1.0 × 10 ⁹	1.9 × 10 ⁹	1.0 × 10 ⁻¹⁰	2.0 × 10 ⁻¹⁰	100	
P13243-222MS	-30			8.8	33	1.6 × 10 ⁹	2.8 × 10 ⁹	0.7 × 10 ⁻¹⁰	1.3 × 10 ⁻¹⁰		

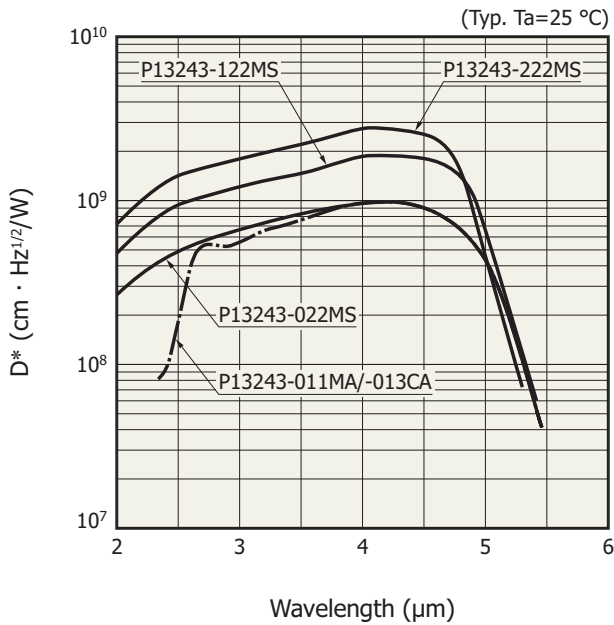
*3: Uniform irradiation on the entire photosensitive area

*4: VR=0 V, RL=50 Ω, 10 to 90%, λ=1.55 μm

*5: VR=0 V, f=1 MHz

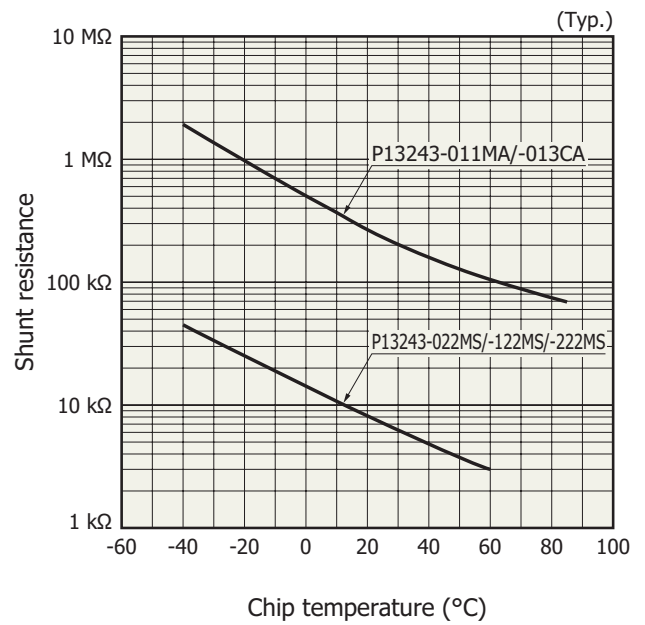
Note: Uniform irradiation must be applied to the entire photosensitive area during use.

Spectral response (D*)



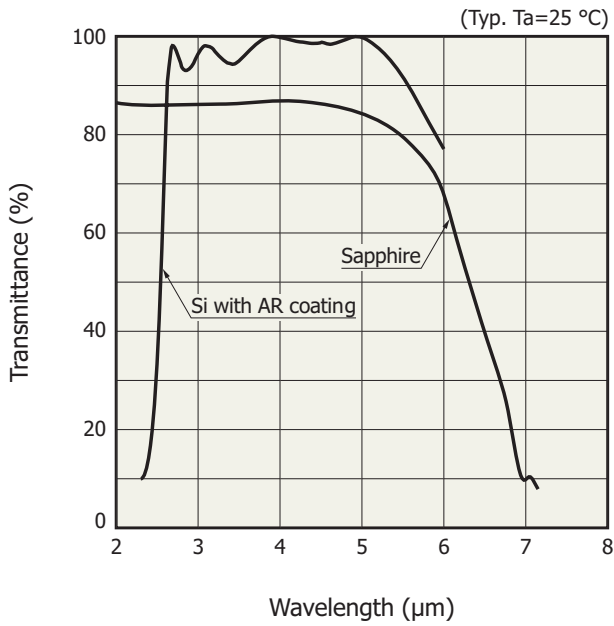
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Shunt resistance vs. chip temperature



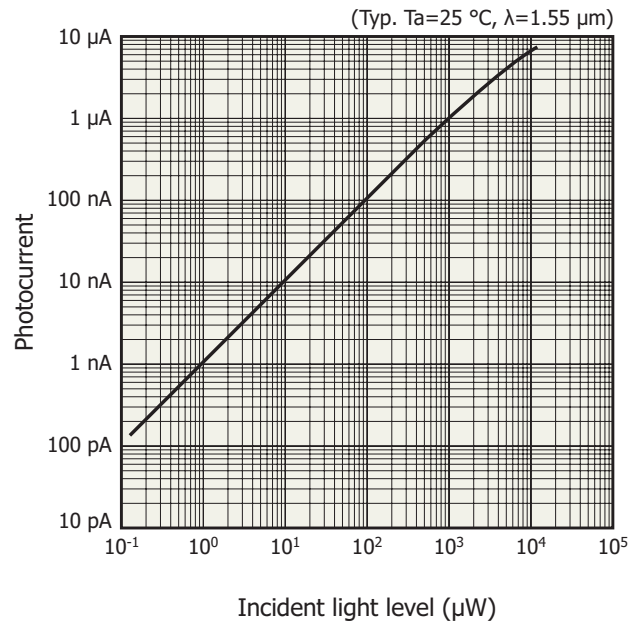
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Spectral transmittance of window material



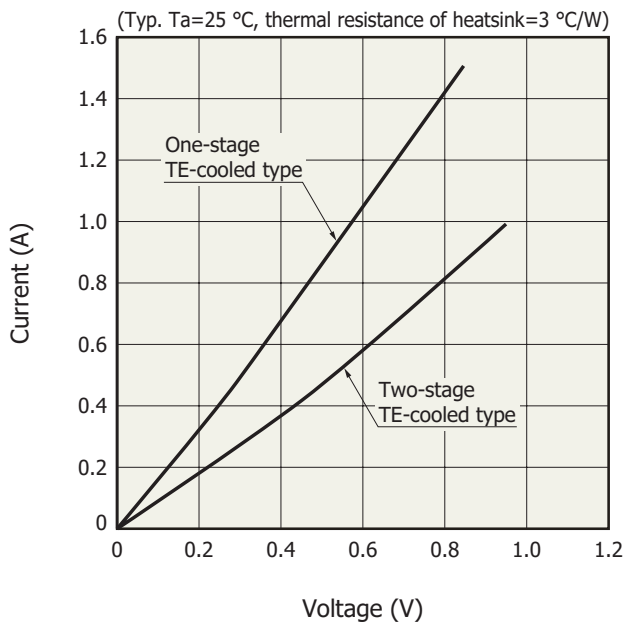
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Linearity



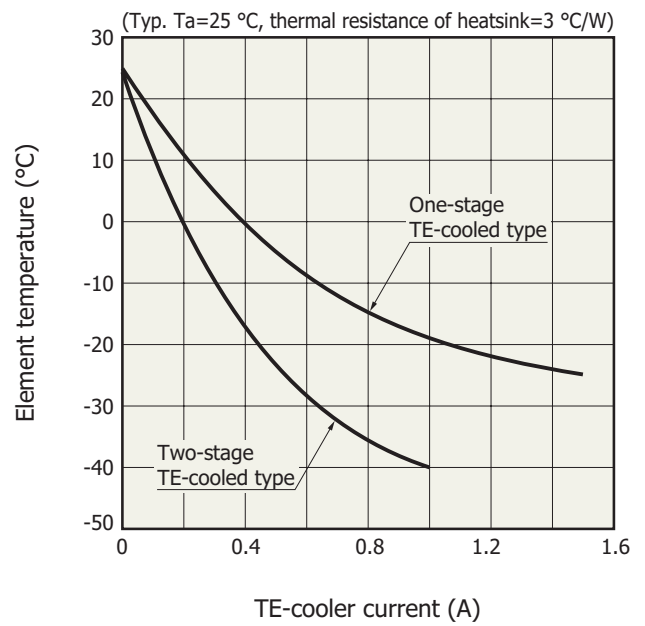
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Current vs. voltage characteristics of TE-cooler



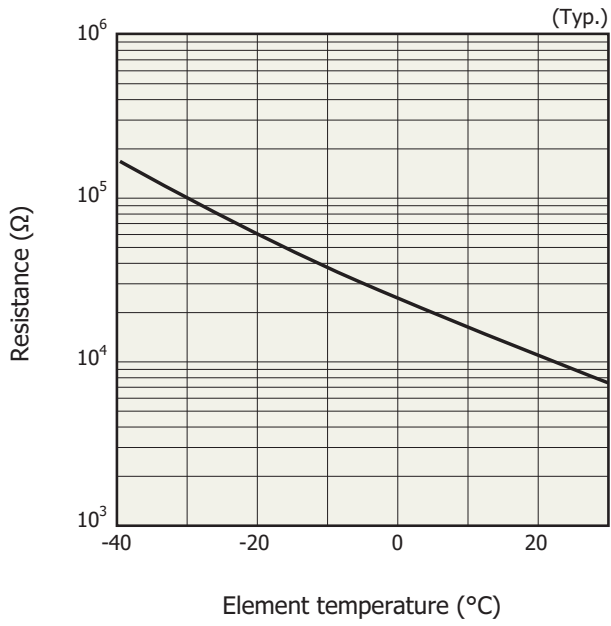
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Cooling characteristics of TE-cooler



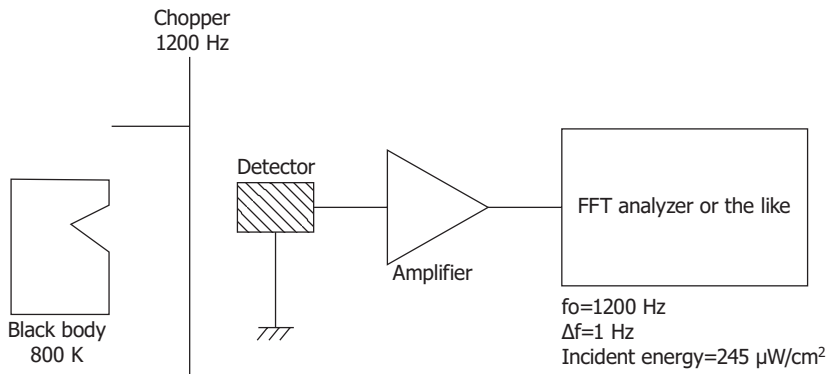
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Thermistor temperature characteristics



KIRDB0116EA

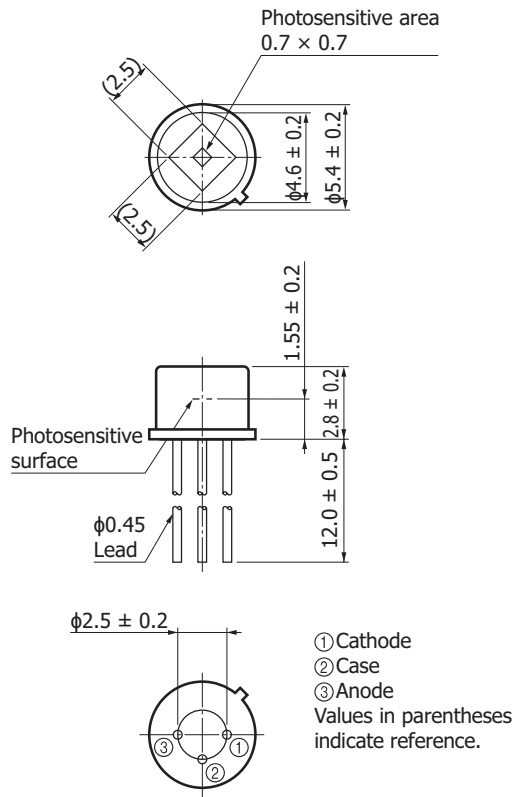
Measurement circuit example



KIRDC0125EA

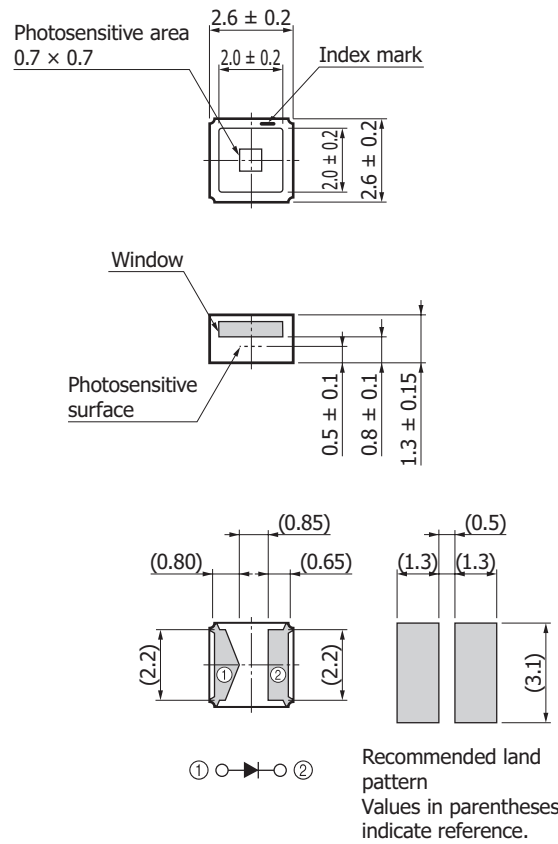
Dimensional outlines (unit: mm)

P13243-011MA



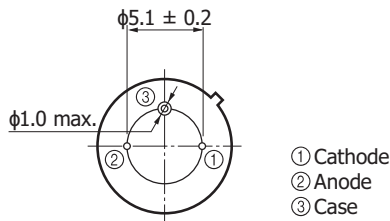
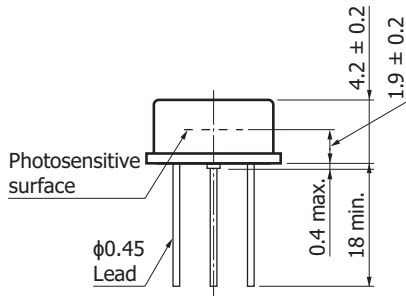
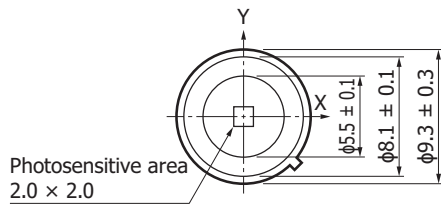
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P13243-013CA



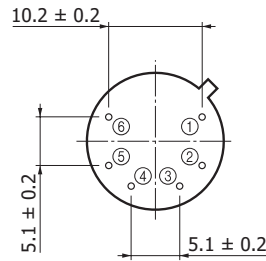
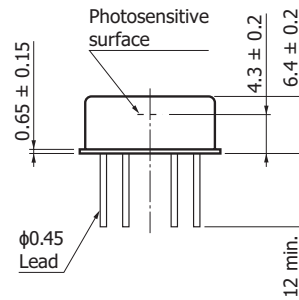
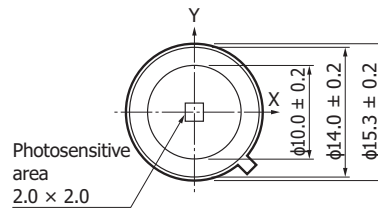
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P13243-022MS



KIRDA0272EB

P13243-122MS

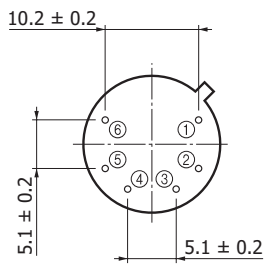
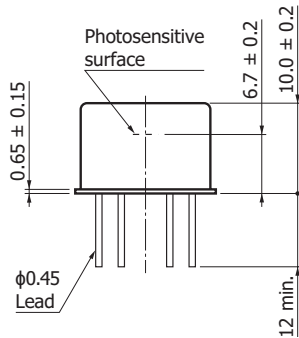
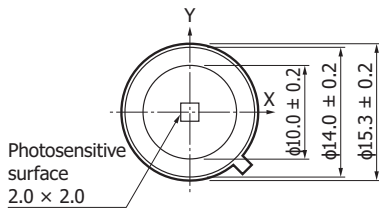


Distance from photosensitive area center to cap center
 $-0.3 \leq X \leq +0.3$
 $-0.3 \leq Y \leq +0.3$

- ① Detector (anode)
- ② Detector (cathode)
- ③ TE-cooler (-)
- ④ TE-cooler (+)
- ⑤ ⑥ Thermistor

KIRDA0260ED

P13243-222MS



Distance from photosensitive area center to cap center
 $-0.3 \leq X \leq +0.3$
 $-0.3 \leq Y \leq +0.3$

- ① Detector (anode)
- ② Detector (cathode)
- ③ TE-cooler (-)
- ④ TE-cooler (+)
- ⑤⑥ Thermistor

KIRDA0261EE

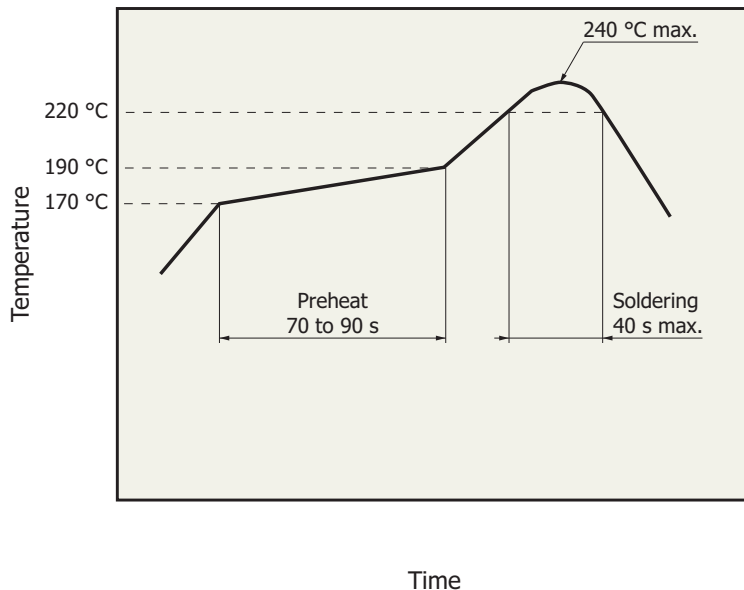
Recommended soldering conditions

P13243-011MA/-022MS/-122MS/-222MS

Type no.	Solder temperature (°C)
P13243-011MA	240 (5 s or less, once)
NEW P13243-022MS	260 (10 s or less, once)
P13243-122MS	
P13243-222MS	

Note: When you set soldering conditions, check that problems do not occur in the product by testing out the conditions in advance.

P13243-013CA



- After unpacking, store the device in an environment at a temperature range of 5 to 30 °C and a humidity of 60% or less, and perform reflow soldering within 1 year.
- The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. When you set reflow soldering conditions, check that problems do not occur in the product by testing out the conditions in advance.

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Related information

www.hamamatsu.com/sp/ssd/doc_en.html

Precautions

- Disclaimer
- Compound opto-semiconductors

Information described in this material is current as of September 2020.

Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use. Copying or reprinting the contents described in this material in whole or in part is prohibited without our prior permission.

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