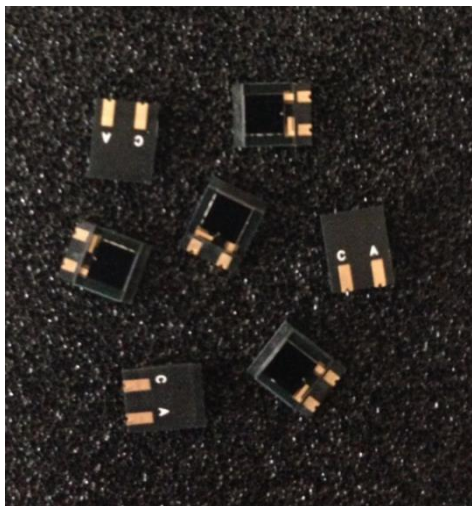


## Silicon Photomultiplier Detector

### SiPM3-VM



## Description

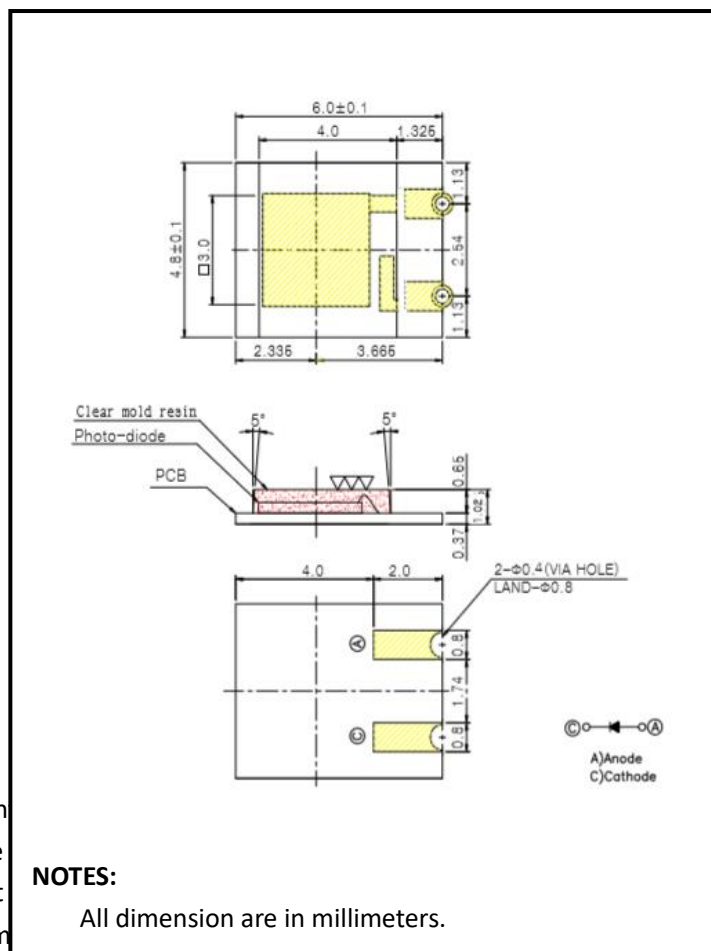
The SiPM3-VM is a photon counting solid state replacement for photomultiplier tubes. The low dark count rates made available by epoxy resin package, combined with extremely fast rise time and short recovery time, facilitate high performance detectors in which the output signal is proportional to the number of input photons, as well as in digital mode, as high speed photon counters with a wide dynamic range.

## Features

- \* Very low dark current
- \* High speed (1ns rise time typical)
- \* Wide single photon counting dynamic range (>20MHz)
- \* Operating temperature is from -25 to +60°C
- \* Storage temperature is from -45 to +70°C

## Applications

- |                                      |                        |
|--------------------------------------|------------------------|
| * High Energy Physics(HEP)           | * PET scanning         |
| * Fluorescence lifetime measurements | * Dynamic spectrometry |
| * DNA sequencing                     | * Nuclear medicine     |



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OTRON ELECTRONIC TECHNOLOGY CO., LTD

TEL:+86-21-54971821

FAX:+86-21-54971823

EMAL:frank.shuai@e-otron.com

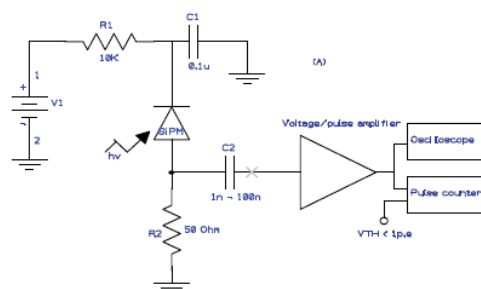
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## Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Chip size	A			9		mm <sup>2</sup>
Light sensitive/Active area				196		um <sup>2</sup>
Interconnect elements	Pix	120*120 circular		14400		pixels
	pitch	Pixel ptich		25		um
	Fill factor	Per pixel	31			%
Breakdown Voltage	Vbr	-20°C, I=1nA		36		V
Vbr Temperature Coefficient	TC Vbr			50		mV/°C
Over voltage range		20°C	1		5	V
Pixel gain	Gain	Depending on overvoltage (Ubr+5V)	10 <sup>5</sup>		10 <sup>6</sup>	
Pixel capacitance	C			300		pF
Dark current	I <sub>d</sub>	room temperature, before breakdown			0.5	nA
Dark count rate		+20°C and Ubr+5V	400		1200	Kcps
Spectral Response Range	λ <sub>range</sub>		350		1100	nm
Photon detection efficiency*	E	λ=500nm	25%			
Pulse width		FWHM	2.2	3.2	6	ns
Rise time	Tr	U <sub>p</sub> =Ubr+5V, λ=500nm	Leading edge	1		ns
Fall time	Tf		Trailing edge	1.5		ns
Single photon counting dynamic range		Comparator threshold<1 p.e.	40			MHz
Saturation power	Pmin				10	uW

\* PDE includes crosstalk and afterpulsing

## Typical application circuit



Inform

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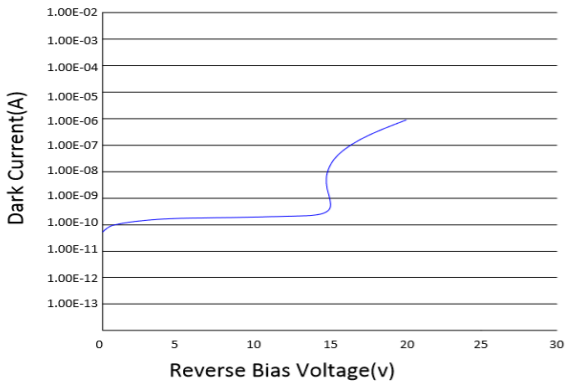
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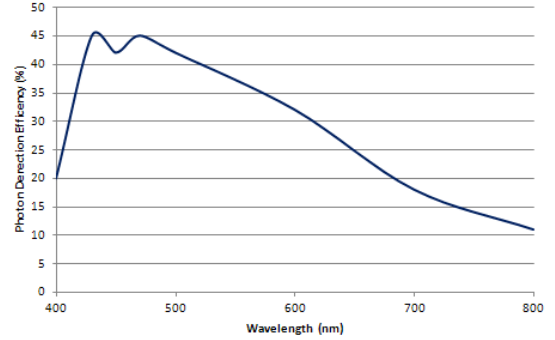
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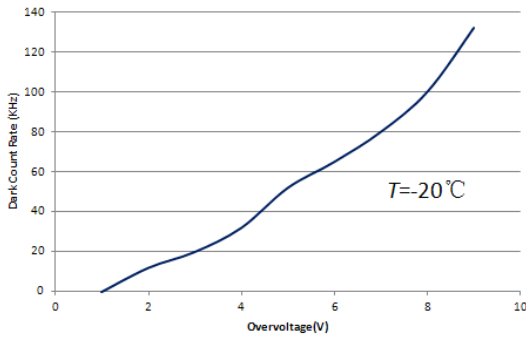
## ■ Dark current vs. reverse voltage



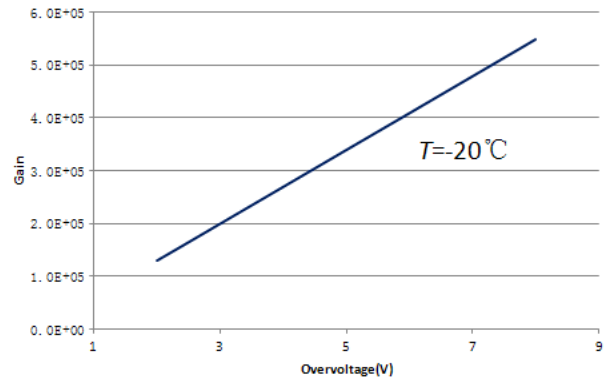
## ■ Photon detect efficiency vs. wavelength



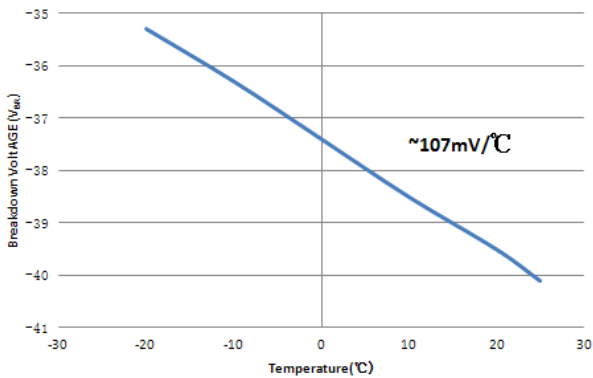
## ■ Dark count Vs. Overbias



## ■ Gain Vs. Overbias



## ■ Breakdown voltage VS. Temperature



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