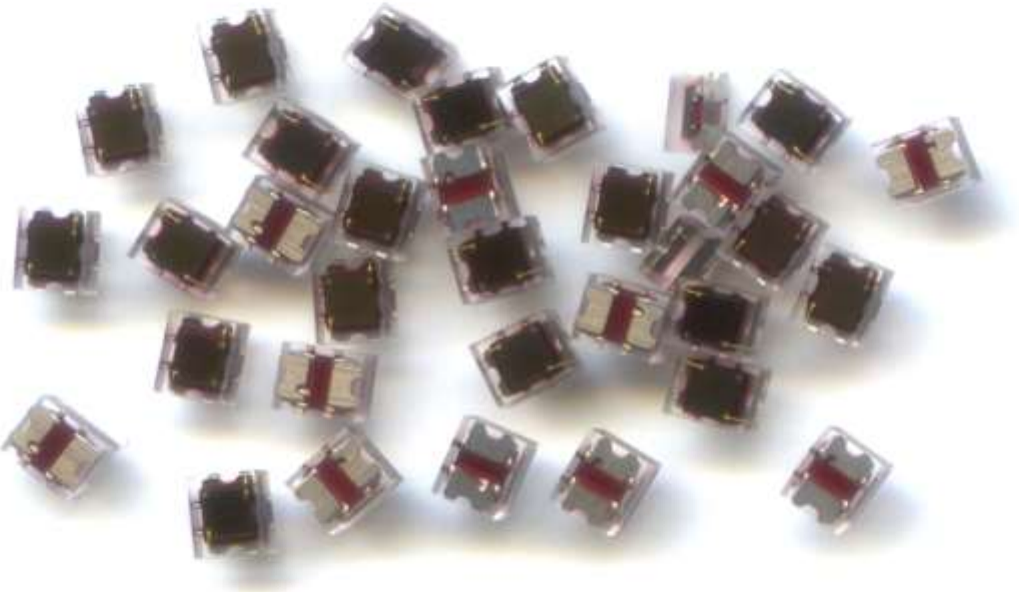
Joinbon
PASSION FOR LIGHT DETECTION

TN1000 Series SiPM

Performance and reliability



HIGHLIGHST FEATURES

- Excellent timing resolution
- Low dark count rate
- High PDE up to 35%
- Single photon sensitivity
- Excellent magnetic immunity
- Compact quad flat package

APPLICATIONS

- Gamma camera
- Spectral analyzer
- Light detection and range
- Fluorescence analysis
- Security inspection
- Low light imaging

Geometry Parameter

Product	Active Area	Pixel Pitch	No. of Pixels	Fill Factor	Package Dimension
JSP-TN1037-SMT	1mm×1mm	37 μm	576	60.2%	1.4mm×1.7mm×0.68mm
JSP-TN1050-SMT		50 μm	324	70.6%	

Performance Parameter

Parameter		Value		Condition	Unit
		JSP-TN1037-SMT	JSP-TN1050-SMT		
Spectral Response Range		250-950		--	nm
Peak Sensitivity Wavelength		420		--	nm
Breakdown Voltage		25±0.2		@ 25℃	V
Overvoltage [1]		1 - 5		--	V
PDE @420nm [2]		32%	35%	Vov=2V	--
Gain		2.1×10^6	3.8×10^6	Vov=2V	--
Rise Time		880	900	Vov=2V	ps
Recovery Time τ [3]		20	34	Vov=2V	ns
Dark Count Rate [4]	Typ.	110	120	Vov=2V	kHz/mm^2
	Max.	203	287	Vov=2V	
Dark Current	Typ.	47	90	Vov=2V	nA
	Max.	86	200	Vov=2V	
Temperature Dependency of V_{br}		35.3	34.4	--	mV/℃
Crosstalk Probability		2.5%	3.5%	Vov=2V	--
Afterpulse Probability		1.8%	2.0%	Vov=2V	--
Pixel Capacitance		98	165	Vov=2V	fF

1 Overvoltage (V_{ov}) =Operating Voltage (V_{op})-Breakdown Voltage (V_{br})

2 Photon detection efficiency does not include crosstalk and afterpulse

3 RC charging time of the pixel

4 Threshold=0.5 p.e at 25℃

General Parameters

	JSP-TN1xxx-SMT
Storage Temperature Range	-20℃～+45℃
Operating Temperature Range	-45℃～+85℃
Reflow Solder Compatibility	YES
Peak Temperature and Condition	250℃，5second×twice
Cover Material	Epoxy Resin
Cover Refractive Index	1.54@589nm
Moisture Sensitivity Level	MSL3 [1]

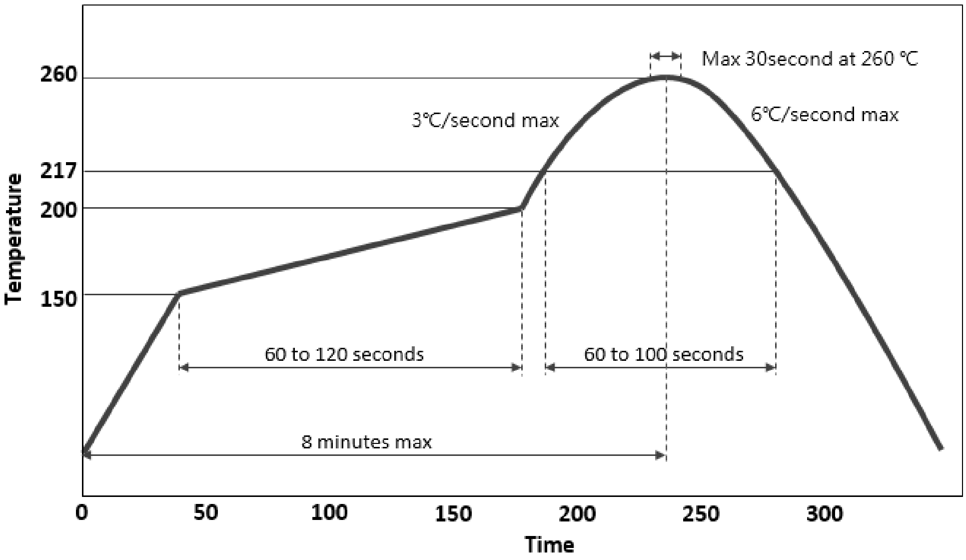
[1] Refer to JEDEC J-STD-020 standard, a MSL3 device is exposed at the condition of <30 ℃, <60% RH, the device should be soldered within 168 hours. If the exposure time exceeds 168 hours, the device needs to be baked to remove the moisture inside the chips.

Soldering Condition

TN series SiPM are packed in tape & reel in MBB (Moisture Barrier Bag), Please follow the introductions below before reflow solder or other high temperature process:

1. Please don't open the MBB before the reflow solder process;
2. If the MBB is opened before reflow solder or other high temperature process, please follow the operating standard procedure of moisture sensitive device (JEDEC J-STD-033), the devices should be mounted within 168 hours. If the exposure time exceeds 168 hours, it needs to be baked to remove the moisture inside the chips before apply it to reflow solder.

To execute the reflow solder for surface mount type SiPM, the recommended temperature curve shown as below.

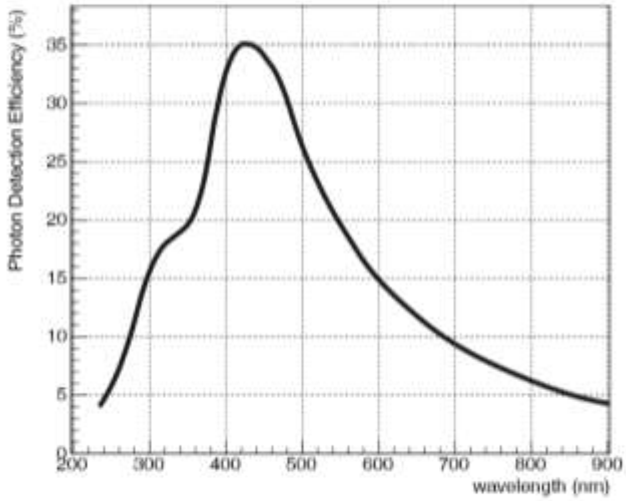


Recommended Temperature Curve

Performance Plots

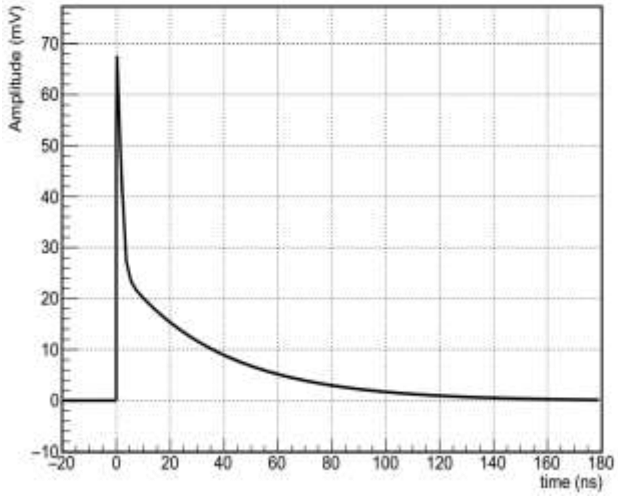
PDE versus Wavelength

JSP-TN1050-SMT



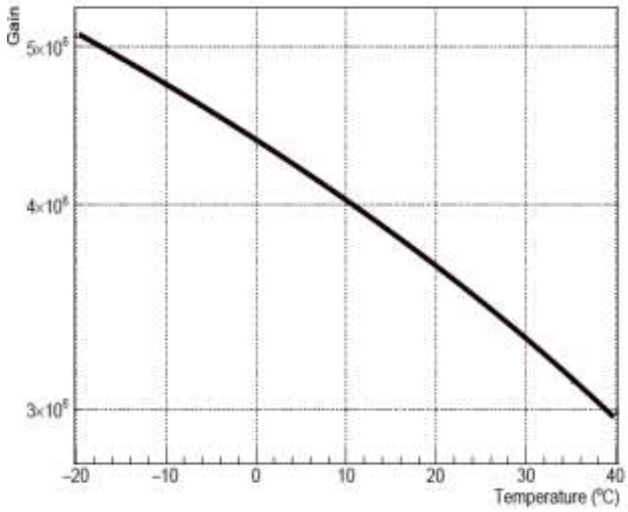
Typical Impulse Response

JSP-TN1050-SMT



Gain versus Temperature*

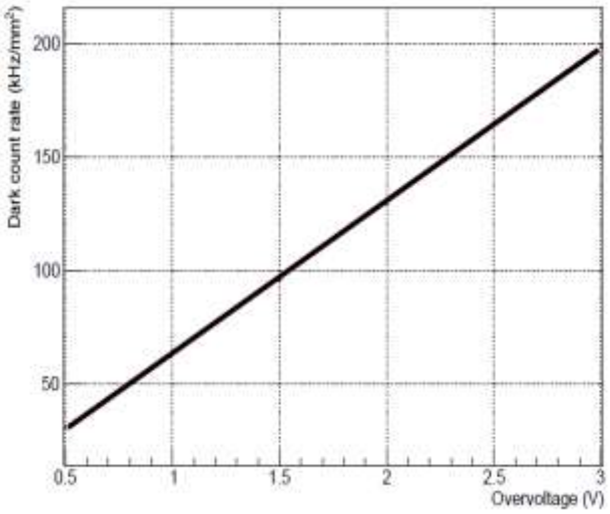
JSP-TN1050-SMT



*This data is tested at a fixed voltage of 26.9V (Vov=2V at room temperature, the breakdown voltage is typically 24.9V)

Dark Count Rate versus Overvoltage

JSP-TN1050-SMT



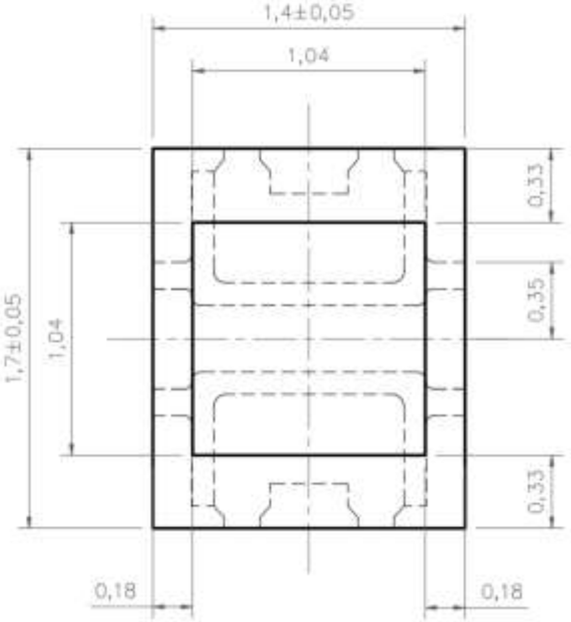
1 To use the product exceed the maximum rating condition may cause performance reduction or permanent damage

2 All the measurement are made at voltage of Vov=2V unless otherwise noted

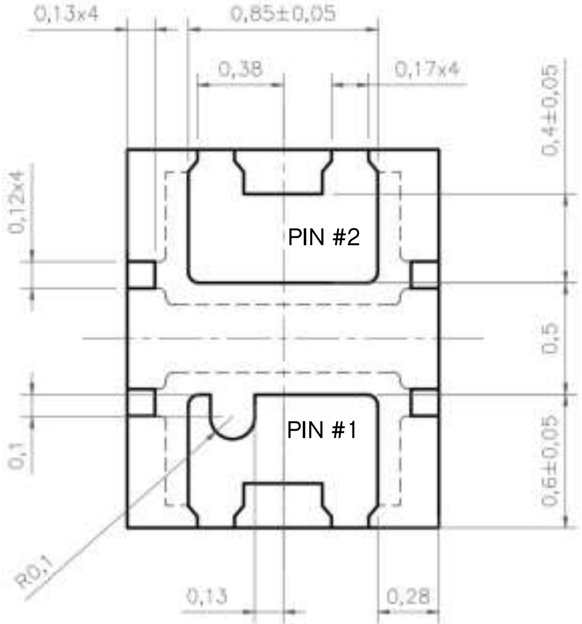
Package Drawing

unit: mm

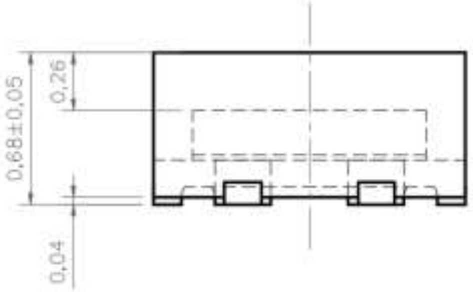
TN1-SMT Package Outline



Top View



Bottom View



Side View

Connection:

PIN #1 SiPM anode
PIN #2 SiPM cathode

The detailed drawing of TN1xxx-SMT is available to download here: JSP-TN1xxx-SMT-CAD

More information about the handling, storage, soldering and the basic of readout of TN series products is available to download.
Handling, Storage and Soldering for SMT Products

TN series SiPM has been certificated by Europe CE and RoHS certification, it is approved to be free of hazardous substances such as Pb, Hg, etc., which indicates TN series SiPM to be safe and environmentally friendly.

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