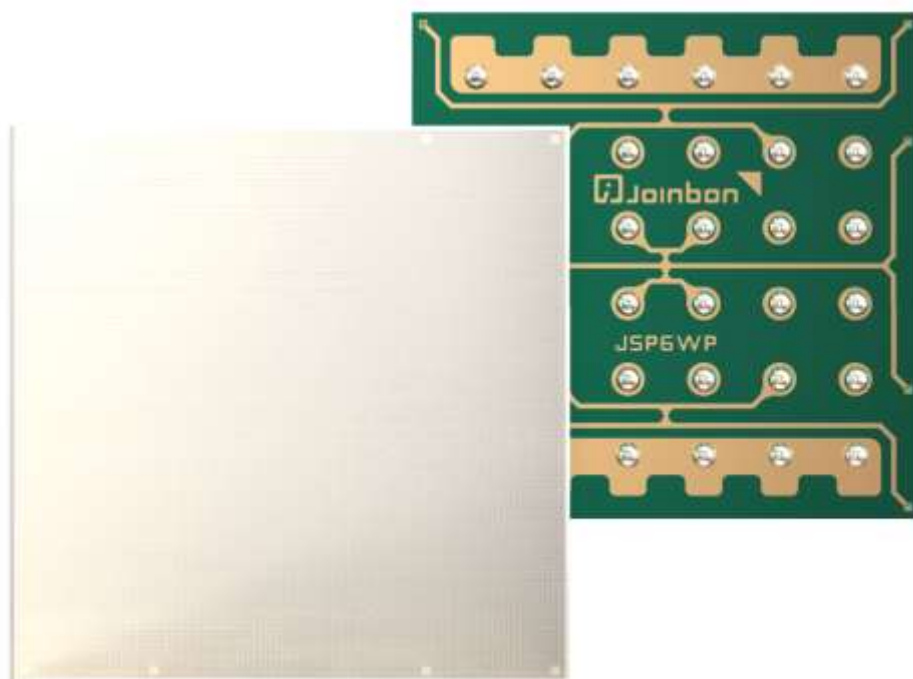


TP6050 SiPM

Large active area, compact WLCSP package



HIGHLIGHT FEATURES

- Large detection area
- WLCSP package based on TSV technology
- Compact size with small dead zone
- High dynamic range
- High PDE up to 35%
- Beneficial for large array splicing

APPLICATIONS

- Radiation detection
- Personal dose monitoring
- Environmental radiation monitoring
- Visible light communication
- Large vehicle/container scanning system
- Calorimeter in high energy physics
- Neutrino detection

Geometry Parameter

Product	Active Area	Pixel Pitch	No. of Pixels	Fill Factor	Package Dimension
JSP-TP6050-SMT	6mm×6mm	50 μm	13852	70.6%	6.03mm×6.03mm×0.61mm

Performance Parameter

Parameter		Value	Condition	Unit
		JSP-TP6050-SMT		
Spectral Response Range		250-950	--	nm
Peak Sensitivity Wavelength		420	--	nm
Breakdown Voltage		24.6±0.2	@ 25℃	V
Overvoltage ¹		1 - 5	--	V
PDE @420nm ²		35%	Vov=2V	--
Gain		2.1 × 10 ⁶	Vov=2V	--
Rise Time		1	Vov=2V	ns
Recovery Time τ ³		40	Vov=2V	ns
Dark Count Rate ⁴	Typ.	140	Vov=2V	kHz/mm ²
	Max.	280	Vov=2V	
Dark Current	Typ.	3800	Vov=2V	nA
	Max.	5900	Vov=2V	
Temperature Dependency of V _{br}		34.4	--	mV/℃
Crosstalk Probability		3%	Vov=2V	--
Afterpulse Probability		1.5%	Vov=2V	--
Pixel Capacitance		170	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-TP6050-SMT
Storage Temperature Range	-45℃~+100℃
Operating Temperature Range	-45℃~+85℃
Reflow Solder Compatibility	YES
Peak Temperature and Condition	260℃
Cover Material	glass
Cover Refractive Index	1.52@589nm
Moisture Sensitivity Level	MSL3 ¹

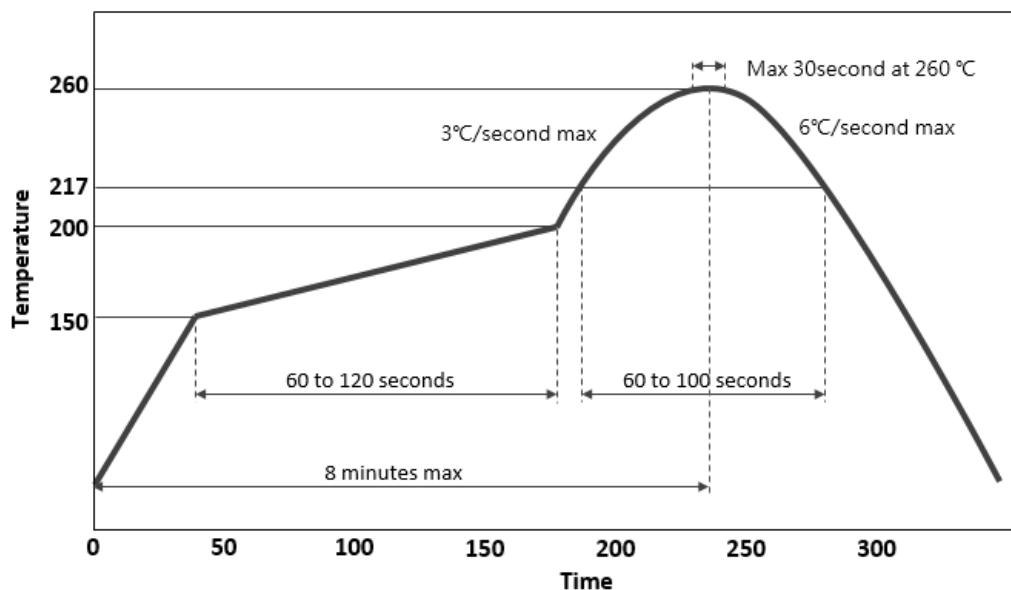
¹ Refer to JEDEC J-STD-020 standard, a MSL3 device is exposed at the condition of <30 °C, <60% RH, the device should be soldered within 168 hours. If the exposure time exceeds 168 hours, the device needs to be baked to remove the moisture inside the chips.

Soldering Condition

TP6050 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.

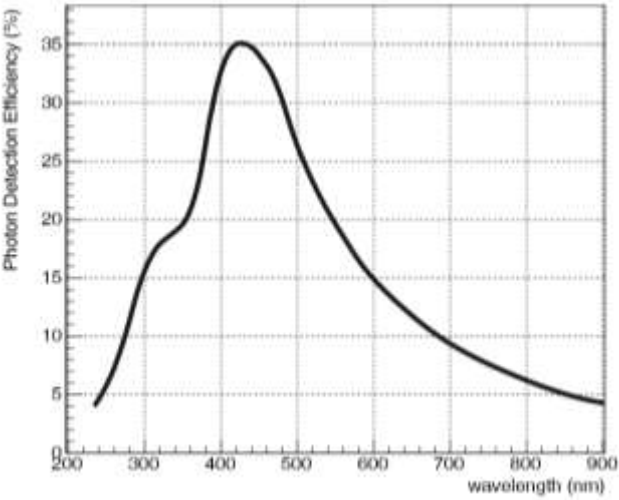
To execute the reflow solder for surface mount type SiPM, the recommended temperature curve shown as below.



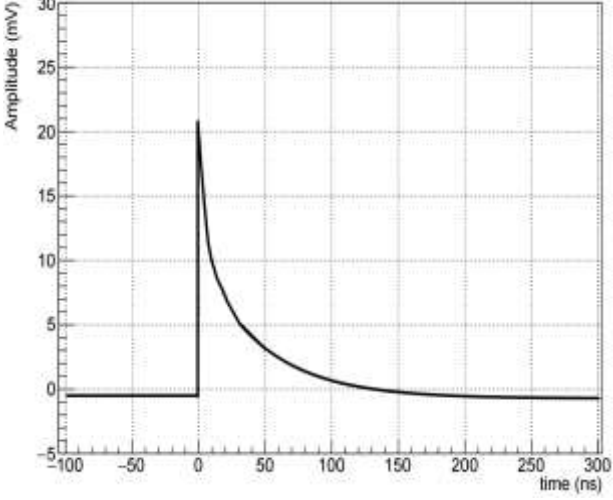
Recommended Temperature Curve

Performance Plots -----

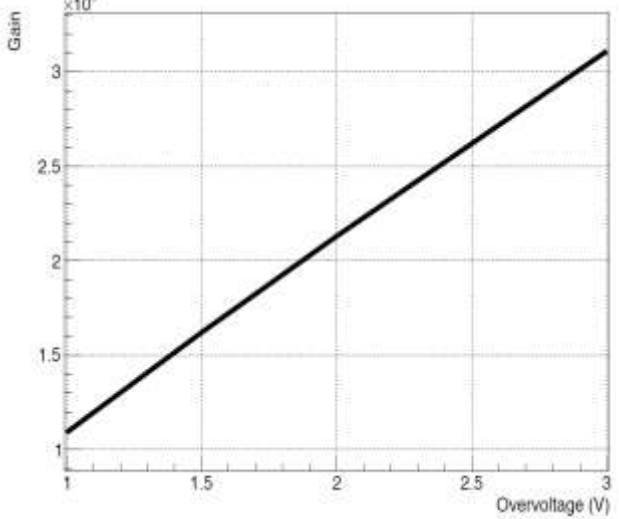
PDE versus Wavelength
JSP-TP6050-SMT



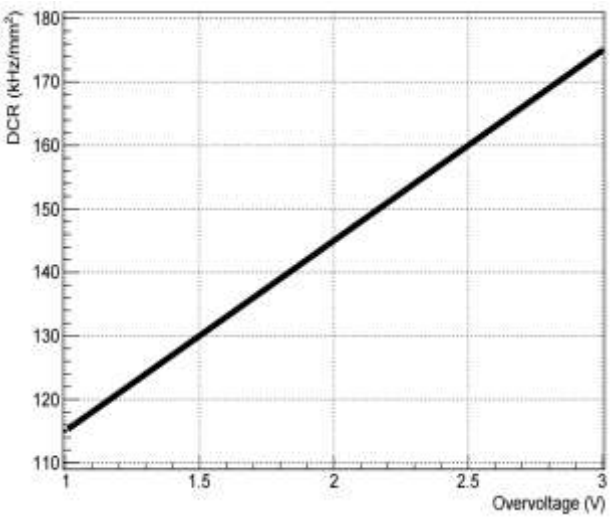
Typical Impulse Response
JSP-TP6050-SMT



Gain versus Temperature*
JSP-TP6050-SMT



Dark Count Rate versus Overvoltage
JSP-TP6050-SMT

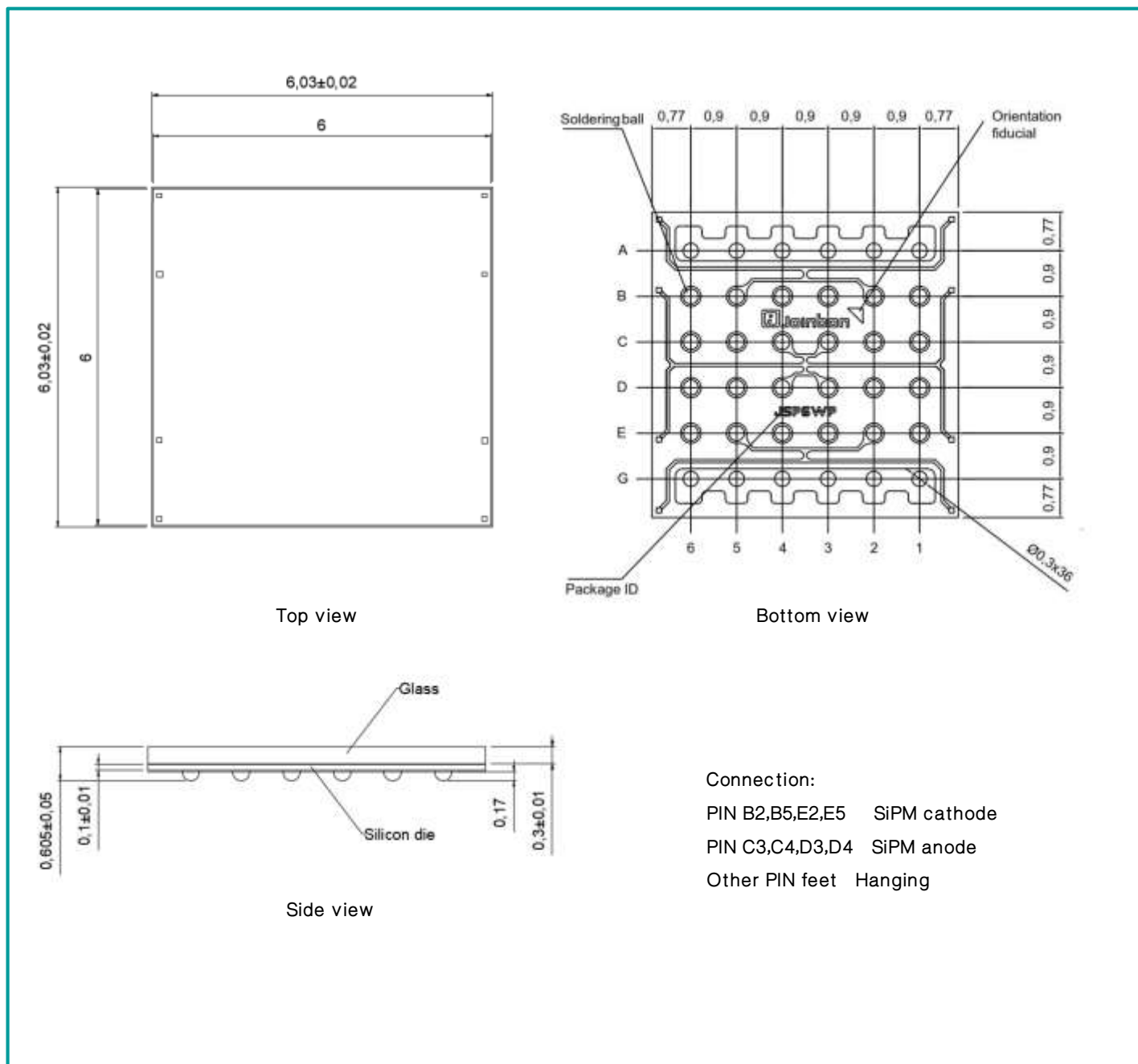


1 To use the product exceed the maximum rating condition may cause performance reduction or permanent damage
2 All the measurement are made at voltage of $V_{ov}=2V$ unless otherwise noted

Package Drawing

unit: mm

TP6050 SiPM Package Outline



More information about the handling, storage, soldering and the basic of readout of TP series products is available to download.

[Handling, Storage and Soldering for SMT Products](#)

■ All specifications are subject to change without notice

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