

PRELIMINARY

HAMAMATSU
PHOTON IS OUR BUSINESS

TSV MPPC array

S12642-0404PA-50: 3x3mm², 4x4ch, p50μm

S12642-0808PA-50: 3x3mm², 8x8ch, p50μm

S12642-1616PA-50: 3x3mm², 16x16ch, p50μm

■ Overview

TSV MPPC array is a COB (Chip on board) type MPPC array with a 3x3mm² effective photosensitive, using the TSV (Through Silicon Via) technology. There is no wire bonding, so the package outline is very close to the MPPC array. The outer gap from active area edge to package edge is only 0.2mm. The pitch between ch is 3.2mm. This package realizes the 4-side buttable arrangement.

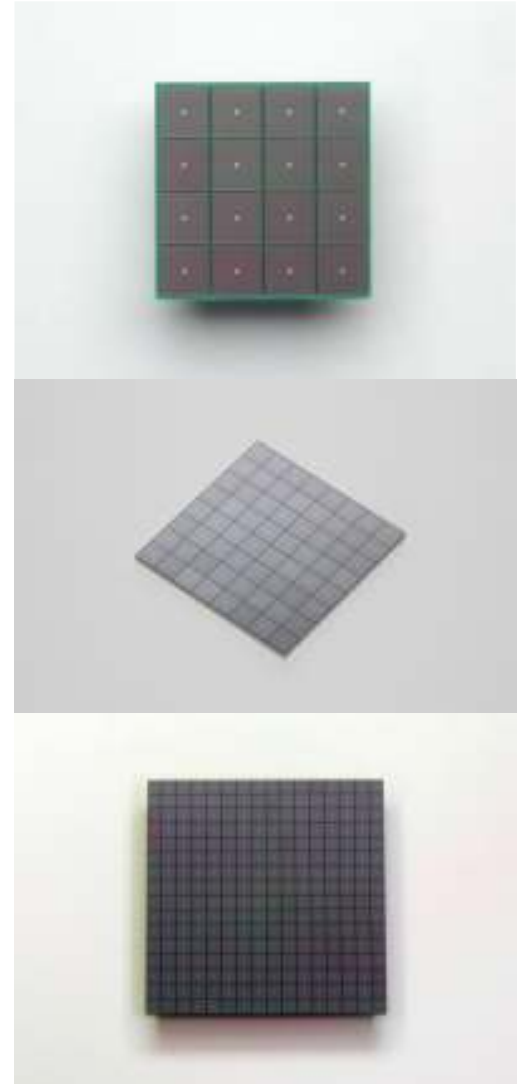
This MPPC is designed for the applications in the photon counting region, including medical, non-destructive inspection, high energy physics experiments, and many other fields.

■ Features

- Significantly reduced after pulse
- Very compact package with small dead space
- Superior photon counting capability
- Low voltage (Vop=65V Typ.) operation
- High gain: 10⁵ to 10⁶

■ Application

- PET
- Nuclear medicine
- High energy physics experiment
- Celestial observation
- Environmental analysis



■ Structure

Parameters	Symbol	S12642-0404PA-50	S12642-0808PA-50	S12642-1616PA-50	Unit
Number of channel	-	16 (4x4)	64 (8x8)	256 (16x16)	-
Effective photosensitive area / channel	-	3x3			mm ²
Pixel pitch	-	50			μm
Number of pixels / channel	-	3584			-
Geometrical fill factor	-	62			%
Package	-	Chip on board (Surface mount type)			-
Window	-	Epoxy resin			-
Window refractive index	-	1.55			-

■ **Absolute maximum ratings**

Parameters	Symbol	S12642 -0404PA-50	S12642 -0808PA-50	S12642 -1616PA-50	Unit
Operating temperature	Topr	0 to +40			°C
Storage temperature	Tstg	-20 to +60			°C

■ **Electrical and optical characteristics**

(Typ. Ta=25 deg C, per 1 ch., Vover=2.4V *1 Unless otherwise noted)

Parameters	Symbol	S12642 -0404PA-50	S12642 -0808PA-50	S12642 -1616PA-50	Unit
Spectral response range	λ	320 to 900			nm
Peak sensitivity wavelength	λ_p	450			nm
Photon detection efficiency at λ_p *1	PDE	35			%
Dark count *2	Typ.	2			Mcps
	Max	3			
Terminal capacitance	Ct	320			pF
Gain *3	M	1.25×10^6			-
Breakdown voltage	VBR	65±10			V
Recommended operating voltage range *4	Vop	VBR +2.4			V
Vop variation between channels (+/-)	Typ.	0.05			V
	Max.	0.15			
Temperature coefficient of reverse voltage	$\Delta T V_{op}$	60			mV/°C

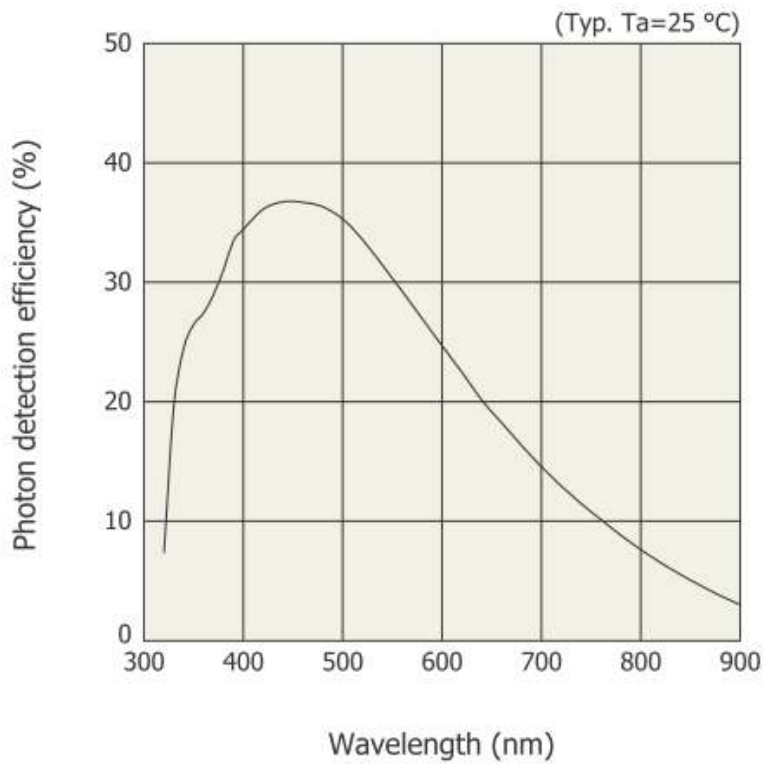
*1: Photon detection efficiency does not include crosstalk and afterpulses.

*2: The data will be measured by current.

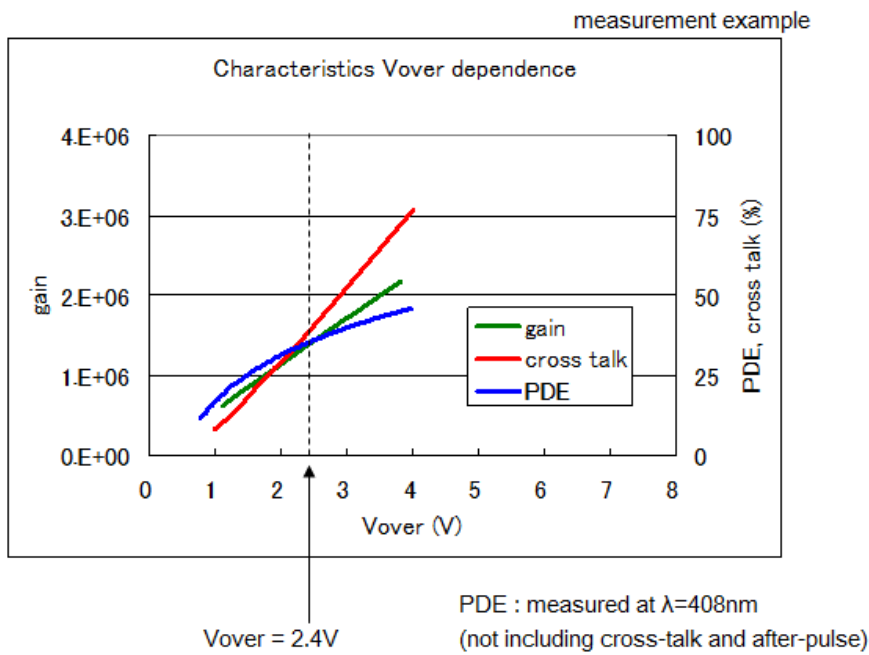
*3: Characteristics change with applied over voltage. Please refer to next section in detail.

*4: Refer to the data attached for each product.

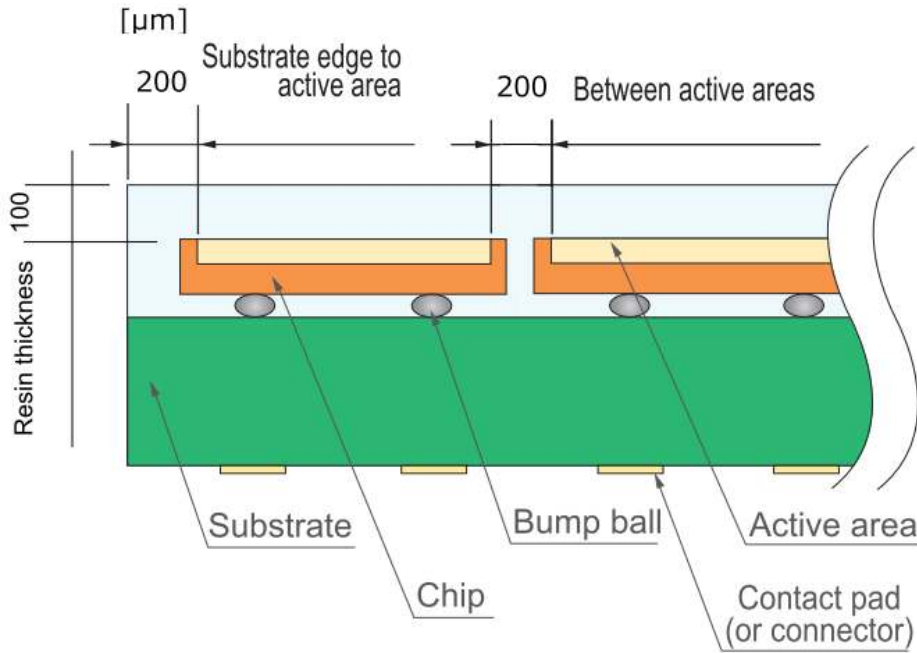
■ Photon detection efficiency vs. wavelength



■ Operation voltage dependence

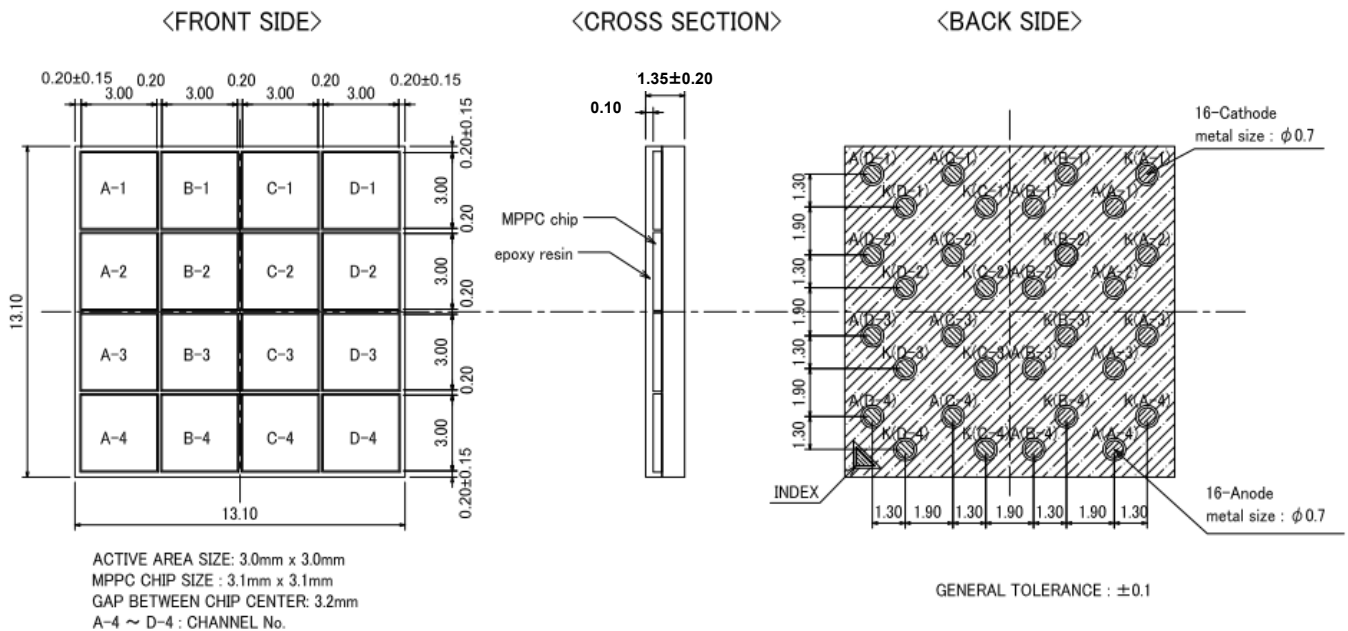


■ **Edge detail**

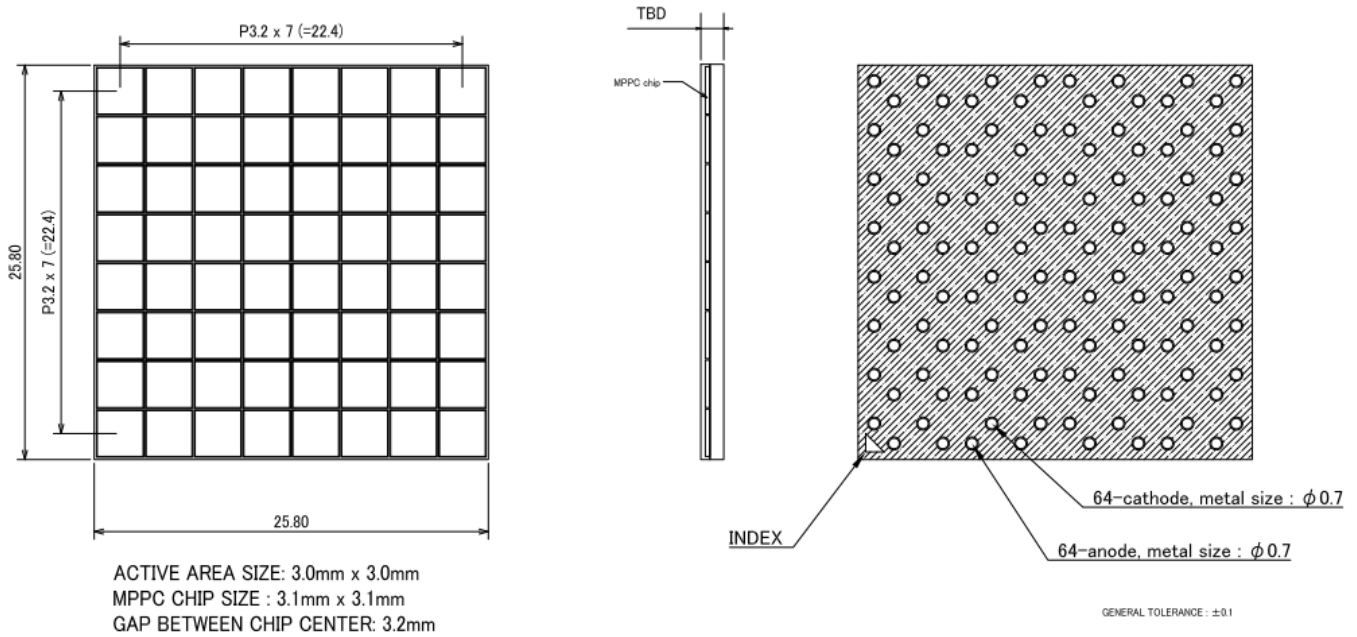


■ **Dimensional outline** (unit: mm, Tolerance: ±0.1 mm unless otherwise noted)

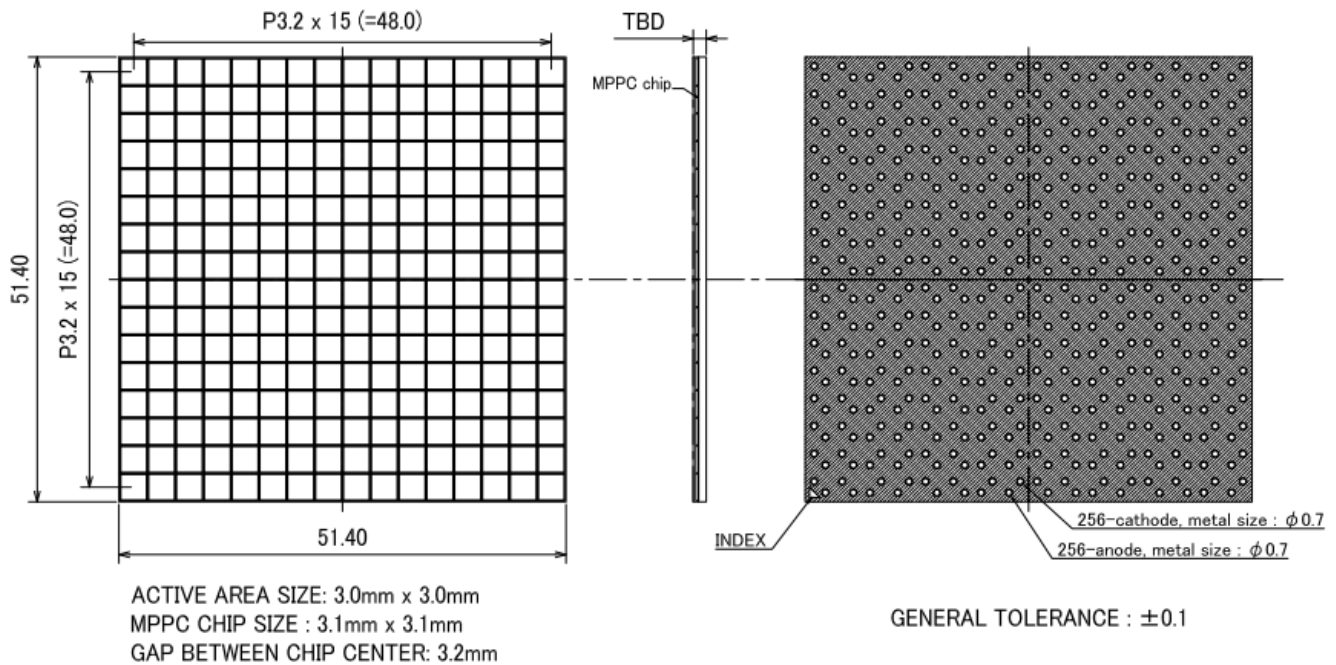
S12642-0404PA-50 (3x3mm², 4x4ch, 16ch, p50μm)



S12642-0808PA-50 (3x3mm², 8x8ch, 64ch, p50μm)



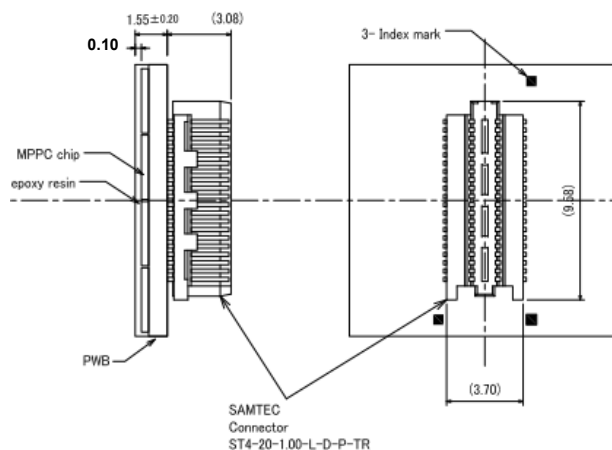
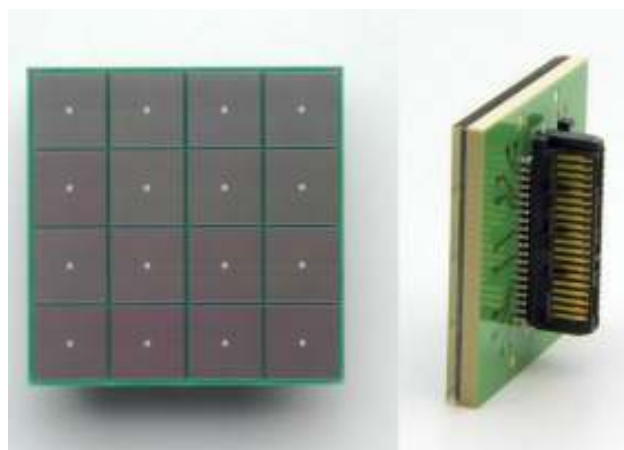
S12642-1616PA-50 (3x3mm², 16x16ch, 256ch, p50μm)



■ **Options**

Connector (Header)

MPPC array that implements the connector is also available. SAMTEC Header ST4-20-1.00-L-D-P-TR is installed back side of the package. This connector mates with: SAMTEC SS4-20-3.00-L-D-K-TR. See detail at <http://www.samtec.com/ftppub/pdf/ss4.pdf>



Type No. S12642-0404PB-50

Thin film coating

For better optical coupling, removed the epoxy resin window and cover the MPPC surface by a thin film coating. This MPPC don't have any surface protection, so require especially strict care during handling.

Other arrangement

We can offer the different arrangement of arrays with different pitch, row and column.

Other size MPPC

The MPPC array of 2x2mm² and 6x6mm² types are under development.

Example.

S12893-0404PA-50: 2x2mm², 4x4ch, 16ch, p50μm

S12895-0404PA-50: 6x6mm², 4x4ch, 16ch, p50μm

■ This document introduces new products or products under development. Please contact our sales office for detailed information.
 ■ Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared