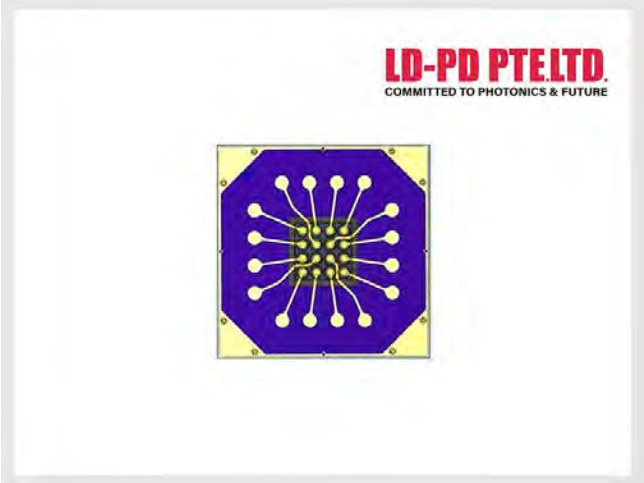
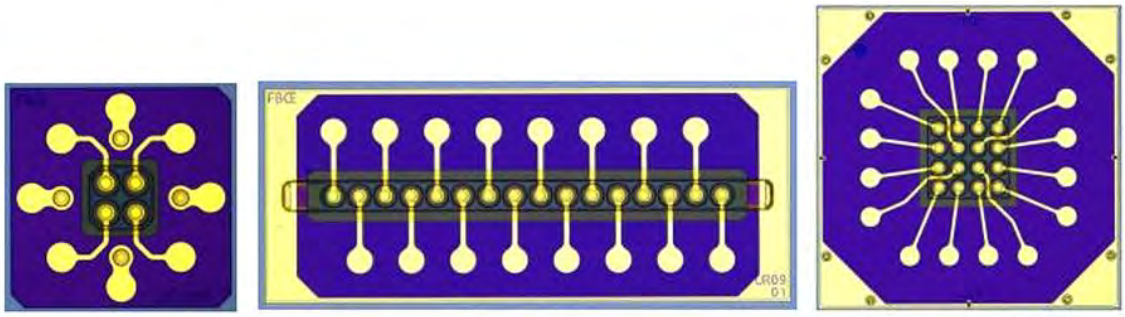
4×4 Back-incidence InGaAs Single-Photon Avalanche Diode Array Chip Series



Description

Back-incidence InGaAs Single-Photon Avalanche Diode(SPAD) Small Array Chip Series include multiple models such as 2x2, 1x16 and 4x4. The pixel pitch of all models is 50 microns. It adopts a back-incidence structure and integrate micro-lenses on the back to enhance the effective duty cycle, meeting the application requirements of spatial light single photon detection, etc.



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DC Characteristics Specifications *

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Active Diameter	Φ	†	45	48	50	μm
Spectral Range	Δλ	-	950	-	1650	nm
Breakdown Voltage	VBR	IR =10μA, PIN =0	50	70	90	V
DC Dark Current	ID	VR =VBR-2V, PIN =0	-	1	10	nA
1550nm-Responsivity	R1550	VR =VBR-2V, PIN =10μW (1550nm)	8.0	8.5	-	A/W
Capacitance	C	VR =VBR-2V, f=1MHz	-	0.2	0.5	pF
Vbr temperature coefficient	η	IR =10μA, PIN =0, -40~25℃	-	0.10	0.15	V/℃

* All tests are taken at room temperature if not indicated.

† This is the backside micro-lens dimension.

Single Photon Detection Characteristics **

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Photon Detection Efficiency	PDE	TOP = -30℃, λ = 1550nm, 0.1 ph/pulse	20%	-	-	-
Dark Count Rate	DCR	TOP = -30℃, 1ns & 100MHz gated mode	-	-	20	kHz
After-pulsing Probability	APP	The same of PDE test with 100ns hold-off time	-	-	4%	-
Timing Jitter	TJ	TOP = -30℃, 1ns & 100MHz gated mode, PDE = 20%	-	2	-	ps
Neighboring Pixel Cross-talk Probability	PXT	TOP = -30℃, dark count statistics at Vex corresponding to PDE = 20%	-	-	20%	-

**Single-photon detection characteristics are closely related to the quenching circuitry and test conditions. Please contact our specialists for more details.

Absolute Maximum Ratings

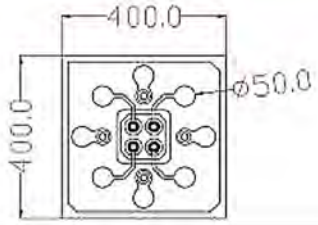
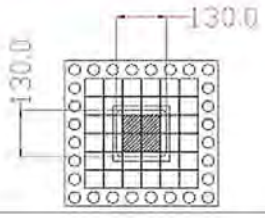
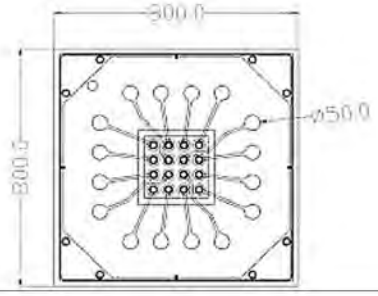
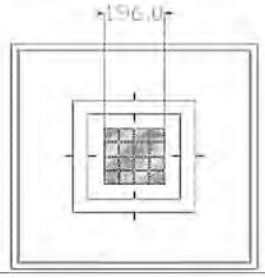
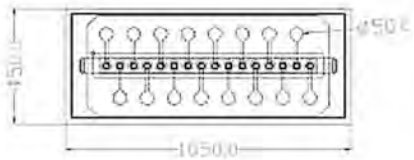
TOP Operating Temperature	TSTG Storage Temperature	IF Average Forward Current	IR Average Reverse Current	TOP Operating Temperature
-40 ~ +85 ℃	-50 ~ +100 ℃	10 mA	2 mA	-40 ~ +85 ℃

Bare die Dimensions ***

Part Num.	Pixel Num.	Chip Dimensions	Chip Thickness	Back-side Micro-lens Features
GM2P50B	2 ×2	400 μ m×400 μ m	200 μ m	48 μ m × 48 μ m, R137 μ m
GM4P50B	4 ×4	800 μ m×800 μ m	200 μ m	48 μ m × 48 μ m, R137 μ m
GM16×1P50B	1 × 16	450 μ m×1050 μ m	200 μ m	48 μ m × 48 μ m, R137 μ m

*** The chip dimension error is ± 10 μ m, thickness ± 5 μ m, micro-lens size ± 2 μ m, radius of curvature ±12μm

Bare die Layout****

Part Num.	Pixel Num.	Front-side view	Back-side view
GM2P50B	2×2		
GM4P50B	4×4		
GM16× 1P50B	1×16		

****The active areas are covered by metallic reflectors on the front-side. The shadowed areas on the back-side view are the photo-sensitive window. It is suggested to use a ceramic interposer with appropriate aperture to flip the chip for further packaging.

The electrodes connected to pixels are anodes, while the other metal- covered areas are the common cathode.

Reliability:

Qualified to Telcordia-GR-468-CORE.