Product Brief

10Gb/s Avalanche Photodiode (APD) Chip

PA006700

The Oclaro APD chip is an Indium Phosphide (InP) based device designed for high performance telecoms receiver applications up to 11.3Gb/s. The optical signal is received via top illumination of the central active region through a ring shaped contact which provides a 30µm aperture.

A reverse electrical bias is applied across the active region by the P (anode) and N (cathode) contacts. The circular P bond pad has a diameter of 70 microns suitable for wirebonding.

The APD is suitable for operation at up to 11.3Gb/s at a multiplication gain factor between M3 and M10.

Performance is checked by on wafer testing comprising DC, CV and AC test measurements.

Proven reliability of <1FIT derived from over 40 billion field hours.

Telcordia ESD rating: minimum 500V human body model.

Features:

- 400 x 400 x 80 µm size
- Top illumination 30µm aperture
- High bandwidth
- Excellent responsivity
- 0.2pF capacitance
- Top side wirebond pads
- Optimised for epoxy attach
- -5 to +85°C operation

Benefits :

- Excellent performance to 11.3Gb/s
- Very high reliability
- Large volume production
- Robust ESD performance
- Full 6/6 RoHS compliance
- Fully Telcordia qualified

Applications:

- Long-haul networks
- Single mode datacom and telecom
- 10G PON

Optical Characteristics

The following parametric limits detailed are for a case temperature range of 25 ±1°C

Parameter	Conditions	Symbol	Min	Typical	Max	Units
Breakdown voltage	In dark, at Id=10µA	V_{br}	-26	-28	-32	V
Dark Current	In dark at V_{br} * 0.9	I_{d9}	-	-	25	nA
3dB Bandwidth at M=10 [1,2]	10µW incident 1550nm, I=100µA	BW_{M10}	6.5	7	-	GHz
3dB Bandwidth at M=3 [1,2]	10µW incident 1550nm, I=30µA	BW_{M3}	6.5	8.5	-	GHz
Responsivity [1]	10µW, 1550nm	R		1.0		A/W
Responsivity ratio at 1610nm compared with 1550nm	At fixed voltage (both at V_{M3} and $V_{M10,}$ P_{opt} = 10µW, λ=1545nm) ratio of currents when 1610nm	R_{1610}/R_{1550}	0.75			-
Responsivity ratio at 1300nm compared with 1550nm	At fixed voltage (both at V_{M3} and $V_{M10,}$ P_{opt} = 10µW, λ=1550nm) ratio of currents when 1300nm	R_{1300}/R_{1550}	0.70			-
Temperature coefficient of V_{br}	-40 to +85°C	dV_{br}/dT	0.040	0.050	0.061	$Vdeg^{-1}$
Total capacitance	At V_{br} * 0.9	C		0.22	0.25	pF
Optical overload	M3	Povld	-2			dBm

Notes:

[1]: Gain M is DEFINED for assumed DC responsivity 1.0A/W at 1550nm: i.e. M = Current (A) / Optical power (W)

[2]: s21 measurement made on wafer with GS probe and plane-ended SMF optical coupling at normal incidence into the optical aperture. 50Ω load

Absolute Maximum Ratings

Parameter	Conditions	Rating	Unit
Storage temperature	Non operating, in dry nitrogen (dew point -60°C at 1 ATM).	-50 to +100	°C
Maximum continuous forward current	All	3	mA
Maximum forward voltage	All	1	V
Maximum reverse voltage	All	V_{br}	V
Maximum power dissipation (including instantaneous)	All [1]	160	mW
Maximum reverse current	Biased at Vm3 or lower [2,3]	6	mA
Maximum continuous input power	Photocurrent and bias voltage cannot exceed maximum power dissipation spec. Biased at Vm3 or lower [2,3]	+4	dBm

Notes:

[1] Power dissipation is the product of the APD photocurrent and reverse-bias voltage and gives rise to self-heating of the device junction. Dissipated power in excess of 200mW can give rise to damage to the device.
[2] In the case of high optical power the device should be operated at low gain to limit the dissipated power. It is recommended that a fast response current limiting diode is used in the protection circuit.
[3] The maximum power dissipation must not be exceeded. Vm3 is the bias voltage which gives gain M=3 at low optical power: -20dBm.

Ordering Information

PA006700 - APD chips are shipped on UV film, 6 inch diameter rings

PA013593 - Sample APD chips are shipped in 2” x 2” antistatic gel packs containing up to 400 units.

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