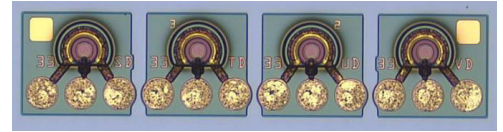


AFCD-P84HS

100-Gb/s InGaAs, 1×4 Array PIN Photodiode with 250- μm GSG Channel Spacing

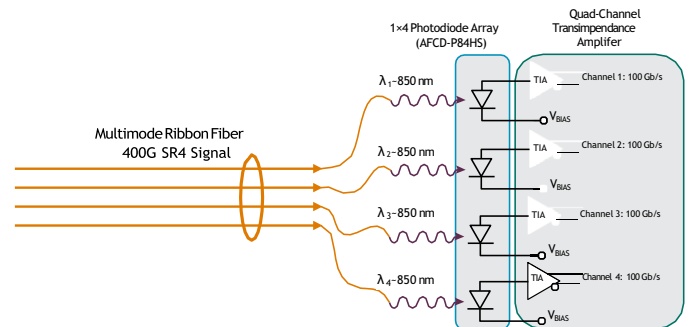


Overview

The Broadcom® AFCD-P84HS is an InGaAs-based 1x4 PIN photodiode array offering high responsivity, low dark current, and low capacitance for high-bandwidth, high-performance optical receiver designs. The photodiodes have wide-band anti-reflective coating on the detection window, and low parasitics make them ideal for high-speed, multimode 4×100-Gb/s applications when used with Broadcom high-performance 4×100-Gb/s quad-channel transimpedance amplifiers (TIAs).

The three-pad GSG design provides the user flexibility in wirebonding to TIAs and can help reduce crosstalk to adjacent channels. The high 3-dB bandwidth enables the AFCD-P84HS to handle multilevel PAM-4 signals with a fidelity high enough to be used by Broadcom 50-Gbaud linear transimpedance amplifiers. The AFCD-P84HS is designed with extra bandwidth when compared with typical photodiodes used in 50-Gb/s NRZ signaling. This extra bandwidth enables the AFCD-P84HS to provide superior performance with 50-Gbaud PAM-4-type signals, and also helps to ensure that the linear fidelity of the PAM-4 signaling is better preserved and cleanly launched into a linear TIA channel.

Figure 1: 400G SR4 into Four Discrete Photodiodes



Features

- Large aperture
- Wide-band anti-reflective coating
- 36-GHz bandwidth (15-ohm load)
- Low capacitance
- GSG three-pad configuration
- PAM-4 ready

Applications

- 4×50-Gbaud PAM-4 links
- 400-Gigabit Ethernet (400-GbE) SR4
- Multimode datacom
- Active optical cables
- Fiber-optic transceivers, receivers, and transponders

Ordering Information

Description	Product Code
InGaAs PIN Photodiode 1×4 Array: Blue tape, 6" hoop frames, max. 1000 die/frame	AFCD-P84HS

Absolute Maximum Ratings

The following table provides the absolute maximum ratings. Absolute maximum limits mean that no catastrophic damage will occur if the product is subjected to these ratings for short periods, provided that each limiting parameter is in isolation, and all other parameters have values within the performance specification. It should not be assumed that limiting values of more than one parameter can be applied to the product at the same time. Stresses greater than those listed might cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions higher than those indicated in [Mechanical and Electrical Characteristics](#) for extended periods of time can affect the device.

Parameter	Symbol	Min.	Typ.	Max.	Units	Notes
Operating Temperature	T_{opr}	0	—	85	$^{\circ}$ C	Non condensing
Storage Temperature	T_{stg}	-40	—	100	$^{\circ}$ C	Non condensing
Maximum Assembly Temperature	—	—	—	180	$^{\circ}$ C	Up to 10 seconds
Input Optical Power	P_{in}	—	—	10	mW	Per photodiode
ESD Threshold	—	—	120	—	V	Human Body Model

Mechanical and Electrical Characteristics

The following table provides optoelectronic specifications and typical high-speed performance characteristics.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Operating temperature	T	Non condensing	0	—	85	$^{\circ}$ C
Input Optical Wavelength	λ	—	840	—	870	nm
Active Area	—	Effective optical aperture	—	32	—	μ m
Responsivity	R_p	$\lambda = 850$ nm	0.50	0.60	0.68	A/W
3-dB Bandwidth (15 Ω TIA)	BW	$\lambda = 850$ nm	—	36	—	GHz
Recommended Bias Voltage ^a	V_r	—	—	-3	—	V
Dark Current	I_d	$V_r = 3V$ at 25 $^{\circ}$ C	—	—	10	nA
Capacitance	C	$V_r = 3V$	—	110	120	fF
Series Resistance	R_s	-3V	—	7	15	Ω
Overload ^b	OL	$V_r = -3V$	—	—	4	dBm
Optical Return Loss	ORL	$\lambda = 865$ nm	—	-22	—	dB

a. a.The optimal bias point might depend on the particular application.

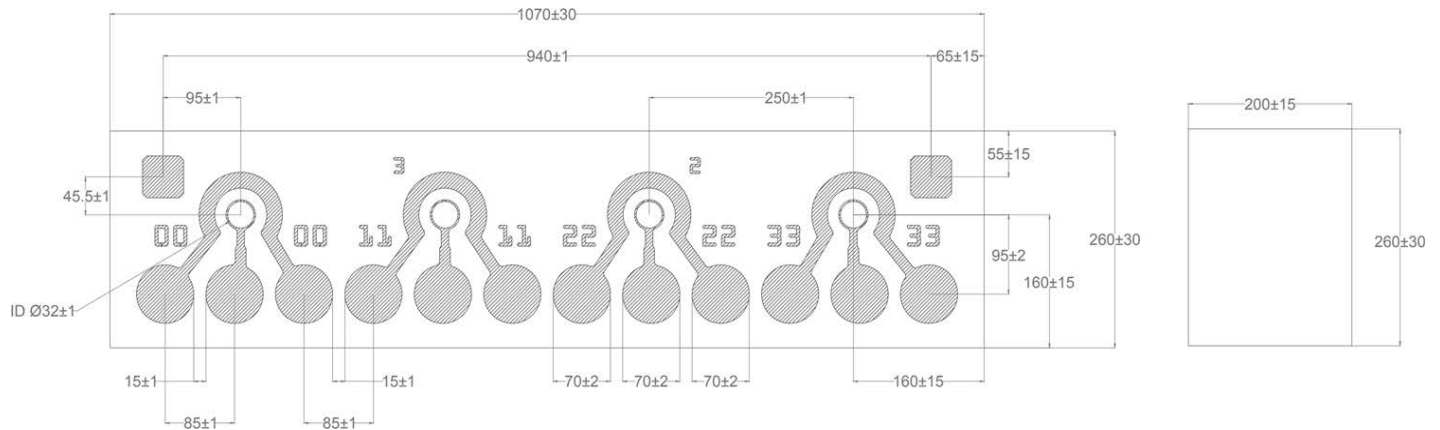
b. b.Overload is the average optical power above which PIN 3 dB bandwidth degrades below that required for 50 GBaud operation.

CAUTION! Performance figures, data, and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by Broadcom before they become applicable to any particular order or contract. In accordance with the Broadcom policy of continuous improvement, specifications can change without notice.

Device Dimensions

Parameter	Units	Min.	Typ.	Max.
Height	μm	230	260	290
Width	μm	1040	1070	1100
Thickness	μm	185	200	215
Detection diameter	μm	—	32	—
Bond pad gold metallization thickness	μm	2	—	—

Figure 2: Device Dimensions in microns



ESD Protection

The physics and design of this PIN photodiode cause it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, use standard ESD precautions and protection procedures when handling this product.

RoHS Compliance

Broadcom is fully committed to environmental protection and sustainable development and has set in place a comprehensive program to ensure that all its products are free from all polluting and hazardous substances as defined by the RoHS standard. The relevant evidence of RoHS compliance is held as part of our controlled documentation for each of our products.

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