### AT A GLANCE

**high quantum efficiency**  
**surface illuminated InGaAs photodiodes for sensing applications**

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#### Features

- low noise, high responsivity photodiodes  
- single diode, segmented diodes or array configuration  
- backside or front side illumination  
- lens integration for back side illuminated photodiode (optional)  
- flip-chip or wire bonding  
- zero bias operation possible

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#### Technical Background

Surface-illuminated photodiodes with low noise and high quantum efficiency are key components for short wavelength infrared (SWIR) sensing applications. The standard InGaAs photodiodes operate at a wavelength of 820 nm up to 1650 nm. For the extended InGaAs devices, the upper absorption wavelength can be shifted up to 2500 nm.

The photodiode chips are based on mature InP technology and are fabricated at the wafer process line of HHI, having Telcordia and space-qualified processes. Due to the ability of customising the photodiode chips, customers obtain the optimal performance for their application.

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#### Applications

- SWIR sensing and imaging
Customization

- optical aperture up to a few mm-diameter
- quantum efficiency up to 99%
- planar or mesa type photodiodes
- single photodiode, segmented photodiode or array configuration
- segmented photodiodes and arrays with common or isolated cathode
- backside or front side illumination
- lens integration for backside illuminated photodiode
- flip-chip or wire bonding
- customized pitches and pad configurations
- APD and SPAD photodiode types also available
AT A GLANCE
high-speed balanced photodetector module for > 1 T/bs coherent telecom applications

Features
- up to 100 GHz 3 dB-bandwidth
- detection of 128 Gbaud x-QAM signals with optical 90° hybrid
- integrated bias network
- low bias operation
- 1 mm RF connector

Technical Background
High-speed balanced photodetector modules are of interest for the development of next-generation telecom coherent optical communication links. Since these R&D links are always a step ahead in terms of symbol rates, photodetector modules with a RF bandwidth beyond state-of-the-art are needed at the receiver side. In combination with a 90° optical hybrid, the balanced photodetectors provide the functionality of a coherent receiver for detecting dual-polarization higher order QAM signals.

The photodetector chips inside the modules are based on mature InP technology and are fabricated at the wafer process line of HHI, offering Telcordia and space-qualified processes. The chips are packaged at HHI facilities.
Technical Specifications

- 3 dB-bandwidth: up to 100 GHz
- wavelength: 1480 nm - 1620 nm
- low dark current: < 100 nA @ 3 V
- bias voltage: +2 V and -2 V
- 1 mm female RF connector
- RF output matched to 50 Ω
- optical input: FC/APC PM SMF fibre
  or
  SC/APC PM SMF fibre
AT A GLANCE
high-speed photodetector module for > 1T/bs PAM datacom, telecom and microwave photonics applications

Features
- up to 100 GHz 3 dB-bandwidth
- detection of 128 Gbaud amplitude modulated signals
- operation in O-band and C+L-band
- integrated bias network
- low bias operation
- 1 mm RF connector

Technical Background
High-speed photodetector modules are of interest for the development of next-generation optical communication links in datacom and telecom. Since these R&D links are always a step ahead in terms of symbol rates, photodetector modules with a RF bandwidth beyond state-of-the-art are needed at the receiver side. Furthermore, the high-speed performance of the photodetector modules makes them applicable to microwave photonics.

The photodetector chips inside the modules are based on mature InP technology and are fabricated at the wafer process line of HHI, offering Telcordia and space-qualified processes. The chips are packaged at HHI facilities.
Technical Specifications

- 3 dB-bandwidth: up to 100 GHz
- C+L-band option
  - wavelength: 1480 nm - 1620 nm
  - responsivity: 0.5 A/W @ 1550 nm
- O-band & C+L-band option
  - wavelength: 1270 nm - 1620 nm
  - responsivity: 0.45 A/W @ 1550 nm
  - 0.5 A/W @ 1310 nm
- PDL: < 0.5 dB
- optical input power: up to +15 dBm
- dark current: < 100 nA @ 3 V
- bias voltage: +2 V
- 1 mm female RF connector
- RF output matched to 50 Ω
- optical input: FC/APC SMF fibre
High-speed photodetector modules are of interest for the development of next-generation optical communication links in datacom and telecom. Since these R&D links are always a step ahead in terms of symbol rates, photodetector modules with a RF bandwidth beyond state-of-the-art are needed at the receiver side. Furthermore, the high-speed performance of the photodetector modules makes them applicable in microwave photonics.

The photodetector chips inside the modules are based on mature InP technology and are fabricated at the wafer process line of HHI, having Telcordia and space-qualified processes. The modules are also packaged at Fraunhofer HHI facilities.
Technical Specifications

- wavelength: 1480nm - 1620nm
- 3 dB-bandwidth: up to 145 GHz
- low dark current: < 100 nA @ 3 V
- bias voltage: +2 V
- 0.8mm female RF connector
- RF output matched to 50 Ω
- optical input: FC/APC PM SMF fibre
HIGH-POWER PHOTODETECTOR MODULE

Technical Background
High-power photodetector modules are of interest for down-converting optically generated signals in the field of microwave photonics. The photodetector chips inside the modules are based on mature InP technology and are fabricated at the wafer process line of HHI, having Telcordia and space-qualified processes. The modules are also packaged at HHI facilities.

AT A GLANCE
High-speed photodetector module for microwave photonics applications

Features
- up to 65 GHz 3 dB-bandwidth
- single or balanced configuration
- operation in C- and L-band
- integrated bias network
- 1.85 mm RF connector

Applications
- radio-over-fibre
- phased array antennas
- precision frequency generation
- photonic channelizer
Technical Specifications

- wavelength: 1480 nm - 1620 nm
- 3 dB-bandwidth: up to 65 GHz
- low dark current: < 100 nA @ 3 V
- 1.85 mm female RF connector
- optical input: FC/APC SMF fibre
56 GBaud, 32 GBaud AND 28 GBaud SURFACE ILLUMINATED PHOTODIODES

AT A GLANCE

high-speed surface illuminated InGaAs photodiodes for datacom, telecom and sensing applications

Features

- up to 60 GHz 3 dB-bandwidth
- back side or top side illumination
- single diode or array configuration
- lens integration for back side illuminated photodiode (optional)
- integrated bias-T (optional)
- flip chip or wire bonding
- IEEE P802.3 bs compliant

Technical Background

High-speed surface-illuminated photodiodes are key components for hybrid-integrated photodetectors in datacom and telecom transceivers. The photodiodes operate at a wavelength of 1310 nm for intra-datacenter links or 1550 nm for inter-datacenter and long-haul optical communication links.

The photodiode chips are based on mature InP technology and are fabricated at the wafer process line of HHI, offering Telcordia and space-qualified processes. Due to the ability of customising the photodiode chips, customers get the optimal performance for their application.

Applications

- datacommunication
- telecommunication
- sensing
Customisation

- 3 dB-bandwidth up to 60 GHz
- customised responsivity-bandwidth trade-off
- back side or top side illumination
- single diode or array configuration
- integrated bias-T
- lens integration for back side illuminated photodiode
- flip chip or wire bonding
- customised pitches and pad configurations

Technical Specifications

- wavelength: 1060nm - 1700nm
- responsivity:
  - 28 GBAud: 0.95 A/W @ 1310 nm
  - 32 GBAud: 0.75 A/W @ 1550 nm
  - 56 GBAud: 0.7 A/W @ 1310 nm, 0.55 A/W @ 1550 nm
- low dark current: < 10 nA @ 5 V
- IEEE P802.3bs compliant