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Quantum Cascade Photodetector (QCD)

P16309-01

Ultrafast mid-infrared quantum cascade photodetector

This is an ultrafast mid-infrared photodetector with a response bandwidth of 20 GHz. It operates bias free with no cooling required, so no external power supplies are needed. It explores the application such the high frequency and high time resolved measurement like a Heterodyne detection in mid-infrared region.

Features

- **High-speed response: DC to 20 GHz**
- **Peak sensitivity wavelength: 4.65 µm typ.**
- **Photosensitivity: 1 mA/W typ.**
- **Non-cooled, non-bias operation**

Applications

- **Heterodyne detection**
- **High frequency / high time resolved measurement**

Structure

Parameter	Specification	Unit
Connector type	SMA	-
Cooling	Non-cooled	-
Lens	Focusing lens*1	-
Aperture	ϕ4.5	mm
Polarizing direction	Marked in the body*2	-

*1: Incident light have to be colimated.
*2: Refer to P4 Dimensional outline.

Absolute maximum ratings

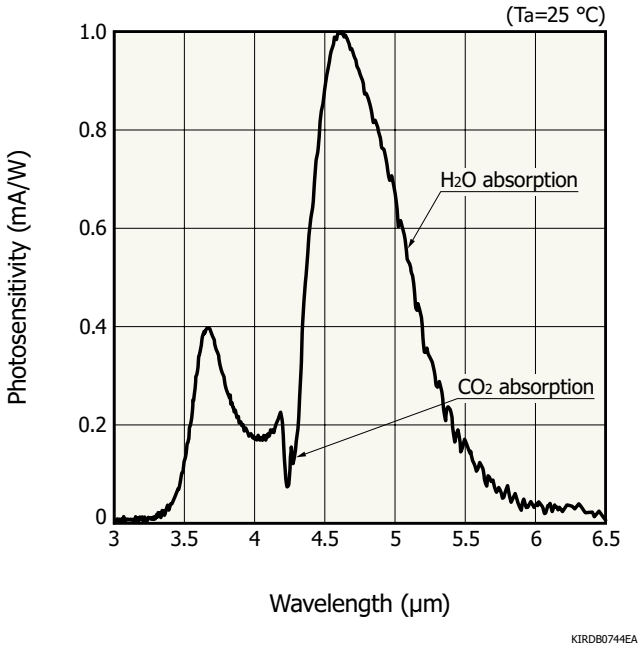
Parameter	Symbol	Value	Unit
Incident light level*3	Pmax	1	W/cm^2
Opearting temperature*4	Topr	-10 to +50	°C
Storage tempera*4	Tstg	-10 to +50	°C

*3: Ta=25 °C
*4: No dew condensation
When there is a temperatuer difference between a product and the surrounding area in high humidity environments, dew condensation may occur on the peoduct sureface. Dew condensatoin on the product may cause deteroration in characteristics an reliability.
Note: Exceeding the absolure maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the abslute maximum ratings.
Non-bias operation is required.

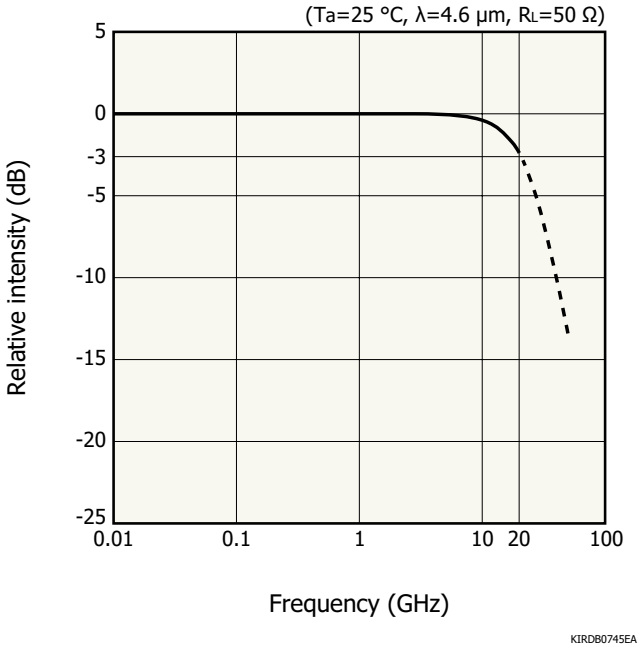
Electrical and optical characteristics (Ta=25 °C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Peak sensitivity wavelength	λp		4.6	4.65	4.7	μm
Photosensitivity	S	λ=λp, f0=800 Hz, Δf=1 Hz	0.5	1	-	mA/W
Detectivity	D*	λ=λp, f0=800 Hz, Δf=1 Hz	8.0×10^{8}	1.5×10^{9}	-	$cm \cdot Hz^{1/2}/W$
Noise equivalent power	NEP	λ=λp, f0=800 Hz	-	3.0×10^{-10}	1.0×10^{-9}	$W/Hz^{1/2}$
Cutoff frequency	fc	-3 dB, R_L=50 Ω	18	20	-	GHz
Terminal capacitance	Ct	f=1 MHz	-	1.1	1.5	pF
Shunt resistance	Rsh	V_R=10 mV	70	90	110	kΩ

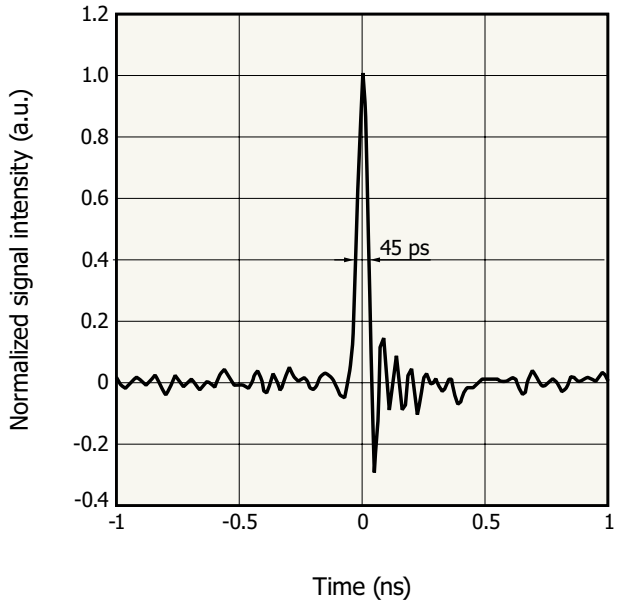
Spectral response (typical example)



Frequency characteristics (typical example)



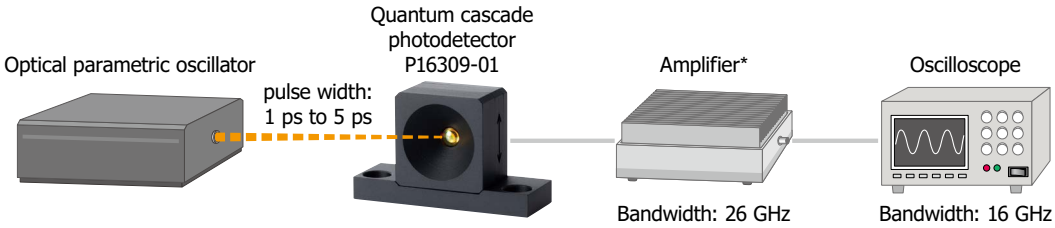
Ultrashort pulse waveform measurement (measurement example)



<Data provided>
Ideguchi group, The University of Tokyo

KIRDB0746EA

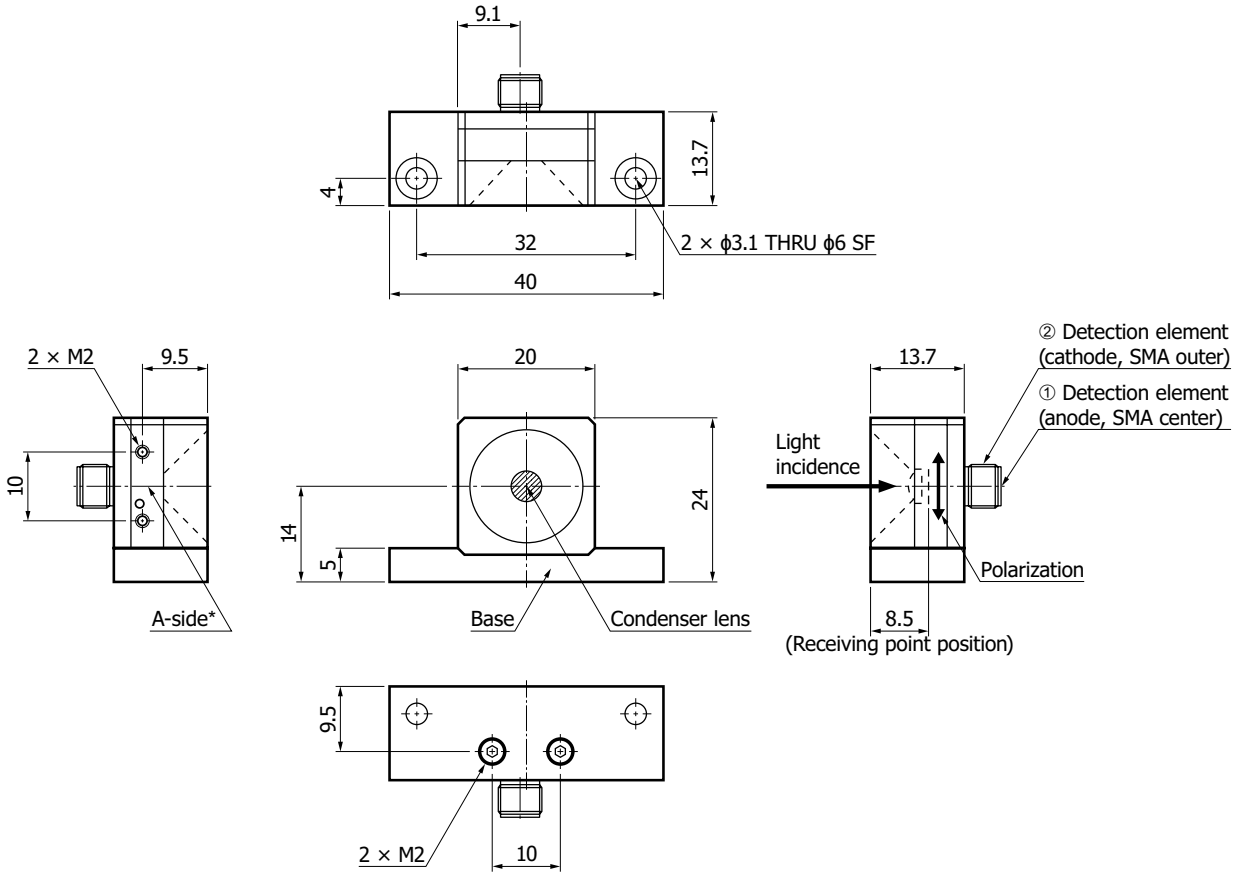
Measurement configuration



* Example of equipment: Keysight technologies, 83006A

KIRDC0150EA

Dimensional outline (unit: mm)



* A-side can be fixed on the base as the bottom aspect.
Tolerance unless otherwise noted: ±0.3
Both ① and ② are electrically insulated from the package.

KIRDA0296EA

Related information

www.hamamatsu.com/sp/ssd/doc_en.html

■ Precautions
· Disclaimer
· Safety consideration / Opto-semiconductor products
· Precautions / Compound opto-semiconductors (photosensors, light emitters)

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