OPTICAL SEMICONDUCTOR

SELECTION GUIDE

From Medical to Industrial Sensing

Medical Sensing

Industial Automation

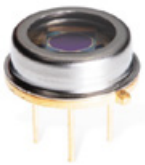
Building Automation

LiDAR Technology

- LEDs (UV to IR)
- Photodiodes (InGaAs, Si, GaAs)
- Avalanche Photodiodes
- Phototransistors
- PD-TIA Receivers
- APD-TIA Modules
- VCSEL
- Reflective Sensors

Contents

LED



Photodiodes

PD-TIA

Avalanche Photodiodes

APD-TIA

Phototransistors

VCSEL

Reflective Sensor

LED - Light Emitting Diodes

Application Examples

INDUSTRIAL AUTOMATION

Photoelectric Sensors

IR LED emitters paired with photodiode receivers detect objects on production lines using through-beam, reflective, and diffuse configurations.

BUILDING AUTOMATION

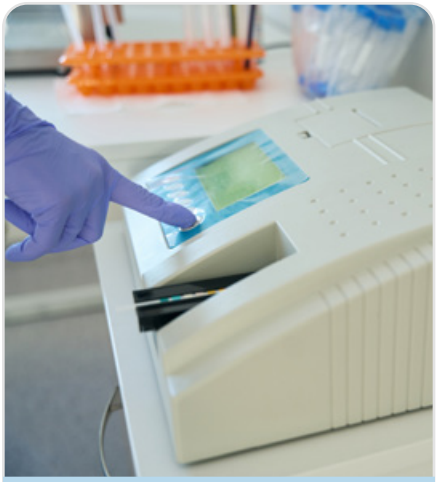
Automatic Door Opening

IR LED and photodiode presence detection sensors trigger automatic door opening when detecting approaching persons.

MEDICAL DEVICES

Pulse Oximetry

Multi-wavelength LEDs (660nm red + 940nm IR) measure blood oxygen saturation by detecting differential light absorption through tissue.



CLINICAL & RESEARCH LABS

Spectrophotometers - Medical

UV and visible LEDs enable absorbance measurements for DNA/protein quantification, clinical chemistry, and diagnostic assays.

QUALITY CONTROL

Spectrophotometers - Color

Visible spectrum LEDs enable precise color measurement for paint matching, textile quality control, and product inspection.

SAFETY & SECURITY

Smoke & CO2 Detectors

IR LEDs detect smoke particles and CO2 gas via light scattering in the sensing chamber, triggering alarms when levels exceed thresholds.

Need application support?

Contact CEL's engineering team at sales@cel.com for device selection assistance, optical pairing recommendations, and custom solutions.

LED

The color (wavelength) of an LED (light emitting diode) that emits light is determined by the material that is made up of semiconductor elements that apply a mechanism which converts electric current into light. We deal in LEDs in a wide range of colors (wavelengths) such as ultraviolet rays, visible light, and infrared rays. LEDs are characterized by their long service life and low power consumption, and are used in applications such as sensing and lighting in combination with light receiving elements.

Point Source LEDs

Model No	Product name	Wavelength		Optical Output Power		Half angle Typ.[2θdeg]	Package
		Typ.[nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KED160RAXH	Point Source LEDs	650	20	0.8	20	115	TO-CAN
KED080RAXH	Point Source LEDs	650	20	0.6	20	115	TO-CAN
KED050CXK	Point Source LEDs	855	50	5	50	125	STEM
KED050CXH	Point Source LEDs	855	50	2.4	50	115	TO-CAN

Multi Wavelength LEDs

Model No	Product name	Wavelength		Optical Output Power		Half angle (Typ.[2θdeg])	Package
		Typ. [nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KED691DS3	Multi Wavelength LEDs	660 (Red) 940 (IR)	20	5.5 (Red) 4.5 (IR)	20	115 (Red) 115 (IR)	SMD
KED694M31D	Multi Wavelength LEDs	660 (Red) 940 (IR)	20	4 (Red) 2 (IR)	20	38 (Red) 21 (IR)	MOLD
KED541H	Multi Wavelength LEDs	660 (Red) 880 (IR)	50	3 (Red) 5 (IR)	50	10 (Red) 10 (IR)	TO-CAN
KED530HDB	Multi Wavelength LEDs	660 (Red) 940 (IR)	50	4 (Red) 5 (IR)	50	60 (Red) 60 (IR)	TO-CAN

Parallel Beam LEDs

Model No	Product name	Wavelength		Optical Output Power		Half angle (Typ.[2θdeg])	Package
		Typ. [nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KED358-H23	Parallel Beam LEDs	855	50	10	50	7	TO-CAN
KED050-H23	Parallel Beam LEDs	850	50	2	50	2	TO-CAN
KED050HV	Parallel Beam LEDs	850	50	2	50	6	TO-CAN
KED050HQ	Parallel Beam LEDs	850	50	2.4	50	7.5	TO-CAN
KED308HV	Parallel Beam LEDs	870	50	7	50	8	TO-CAN
KED308HQ	Parallel Beam LEDs	870	50	12	50	12	TO-CAN
KED109Z-N	Parallel Beam LEDs	890	20	3	20	18	TO-CAN
KED358HQ-N	Parallel Beam LEDs	890	20	3	20	11	TO-CAN
KED358RHDQ	Parallel Beam LEDs	660	20	2	20	11	TO-CAN

Ultra Violet LEDs

Model No	Product name	Wavelength		Optical Output Power		Half angle(Typ. [2θdeg])	Package
		Typ. [nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KED373UMS1	Ultra Violet LEDs	373	20	3	20	130	SMD
KED373UH	Ultra Violet LEDs	373	20	1.5	20	100	TO-CAN
KED378UH	Ultra Violet LEDs	373	20	1	20	10	TO-CAN
KED372UHB	Ultra Violet LEDs	378	20	7.2	20	12	TO-CAN
KED372UH	Ultra Violet LEDs	373	20	1.5	20	12	TO-CAN
KED365UH	Ultra Violet LEDs	367	20	0.7	20	16	TO-CAN

Red LEDs

Model No	Product name	Wavelength		Optical Output Power		Half angle Typ.[2θdeg]	Package
		Typ.[nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KED351RKD	Red LEDs	660	20	3.6	20	32	STEM
KED354RHD	Red LEDs	660	20	3.0	20	45	TO-CAN
KED351RHD	Red LEDs	660	20	1.8	20	10	TO-CAN

Infrared LEDs

Model No	Product name	Wavelength		Optical Output Power		Half angle Typ.[2θdeg]	Package
		Typ.[nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KEDE1652H	Infrared LEDs	1650	50	2	50	20	TO-CAN
KEDE1552H	Infrared LEDs	1550	50	1.8	50	20	TO-CAN
KEDE1458K	Infrared LEDs	1450	50	3	50	110	STEM
KEDE1454H	Infrared LEDs	1450	50	2.5	50	80	TO-CAN
KEDE1452H	Infrared LEDs	1450	50	2.8	50	20	TO-CAN
KEDE1304H	Infrared LEDs	1300	50	2.5	50	80	TO-CAN
KED085-P02	Infrared LEDs	855	1000	580	1000	127	SMD
KED602K	Infrared LEDs	890	50	15	50	45	STEM
KED604H	Infrared LEDs	890	100	11	100	60	TO-CAN
KED601H	Infrared LEDs	890	100	9	100	14	TO-CAN
KED353KDL	Infrared LEDs	870	20	6	20	32	STEM
KED351HDL	Infrared LEDs	870	20	4	20	12	TO-CAN
KED050CX-T	Infrared LEDs	850	50	0.025 (-16dBm)	50	-	PIGTAIL

Platics Mold Visible LEDs

Model No	Product name	Wavelength		Optical Output Power		Half angle Typ.[2θdeg]	Package
		Typ.[nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KED661M51	Plastic Mold Visible LEDs	660	20	4	20	20	MOLD
KED671M34	Plastic Mold Visible LEDs	670	20	3.3	20	90	MOLD
KED661M34	Plastic Mold Visible LEDs	660	20	3.7	20	96	MOLD
KED661M32B	Plastic Mold Visible LEDs	660	20	-	-	90	MOLD
KED661M32A	Plastic Mold Visible LEDs	660	20	-	-	90	MOLD
KED661M32	Plastic Mold Visible LEDs	660	20	3.5	20	50	MOLD
KED664M31A	Plastic Mold Visible LEDs	660	20	-	-	24	MOLD
KED661M31A	Plastic Mold Visible LEDs	660	20	-	-	40	MOLD
KED661M31	Plastic Mold Visible LEDs	660	20	3.5	20	30	MOLD
KED641M34	Plastic Mold Visible LEDs	635	20	6	20	116	MOLD
KED641M51	Plastic Mold Visible LEDs	635	20	9	20	34	MOLD
KED641M32	Plastic Mold Visible LEDs	635	20	9.4	20	66	MOLD
KED641M31	Plastic Mold Visible LEDs	635	20	8.5	20	44	MOLD
KED621M51A	Plastic Mold Visible LEDs	625	20	9.5	20	34	MOLD
KED621M32A	Plastic Mold Visible LEDs	625	20	9.3	20	60	MOLD
KED621M31A	Plastic Mold Visible LEDs	625	20	8.5	20	44	MOLD
KED611M51A	Plastic Mold Visible LEDs	610	20	7	20	36	MOLD
KED611M32A	Plastic Mold Visible LEDs	610	20	7.2	20	60	MOLD
KED611M31A	Plastic Mold Visible LEDs	610	20	6.5	20	44	MOLD
KED591M51A	Plastic Mold Visible LEDs	590	20	3.4	20	36	MOLD
KED591M32A	Plastic Mold Visible LEDs	590	20	3.4	20	60	MOLD

Platics Mold Visible LEDs *...continued*

Model No	Product name	Wavelength		Optical Output Power		Half angle Typ.[2θdeg]	Package
		Typ.[nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KED591M31A	Plastic Mold Visible LEDs	590	20	3.2	20	44	MOLD
KED521M51B	Plastic Mold Visible LEDs	525	20	-	-	25	MOLD
KED471M53A	Plastic Mold Visible LEDs	465	20	18	20	115	MOLD

Plastic Mold Infrared LEDs

Model No	Product name	Wavelength		Optical Output Power		Half angle Typ.[2θdeg]	Package
		Typ.[nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KEDE1551M51	Plastic Mold Infrared LEDs	1550	50	1.6	50	50	MOLD
KEDE1451M52	Plastic Mold Infrared LEDs	1450	50	2.2	50	10	MOLD
KEDE1301M51	Plastic Mold Infrared LEDs	1300	50	2.2	50	40	MOLD
KED941M53VC	Plastic Mold Infrared LEDs	940	50	11	50	90	MOLD
KED941M51C	Plastic Mold Infrared LEDs	940	50	21	50	20	MOLD
KED941M51B	Plastic Mold Infrared LEDs	940	50	10	50	28	MOLD
KED941M31B	Plastic Mold Infrared LEDs	940	50	10	50	32	MOLD
KED941M31A	Plastic Mold Infrared LEDs	940	50	11	50	50	MOLD
KED871M31B	Plastic Mold Infrared LEDs	870	50	21	50	29	MOLD
KED861M52	Plastic Mold Infrared LEDs	865	50	22	50	10	MOLD
KED863M51	Plastic Mold Infrared LEDs	865	50	22	50	50	MOLD
KED862M51	Plastic Mold Infrared LEDs	865	50	22	50	40	MOLD
KED861M51	Plastic Mold Infrared LEDs	865	50	22	50	30	MOLD
KED864M32	Plastic Mold Infrared LEDs	865	50	25	50	70	MOLD

Plastic Mold Infrared LEDs *...continued*

Model No	Product name	Wavelength		Optical Output Power		Half angle Typ.[2θdeg]	Package
		Typ.[nm]	Conditions [IF=mA]	Typ.[mW]	Conditions [IF=mA]		
KED861M32	Plastic Mold Infrared LEDs	865	50	22	50	50	MOLD
KED861M31	Plastic Mold Infrared LEDs	865	50	22	50	30	MOLD
KED853M51	Plastic Mold Infrared LEDs	850	50	22	50	50	MOLD
KED852M51	Plastic Mold Infrared LEDs	850	50	22	50	40	MOLD
KED851M51	Plastic Mold Infrared LEDs	850	50	22	50	30	MOLD
KED851M32	Plastic Mold Infrared LEDs	850	50	22	50	50	MOLD
KED851M31	Plastic Mold Infrared LEDs	850	50	22	50	30	MOLD

Photodiodes

Application Examples

RENEWABLE ENERGY

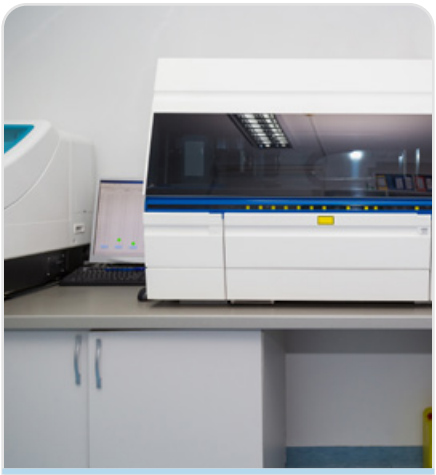
Solar Energy Harvesting

Silicon photodiodes convert sunlight into electrical current for solar calculators, outdoor sensors, and low-power IoT devices requiring energy-autonomous operation.

INDUSTRIAL AUTOMATION

Optical Encoder

Photodiodes paired with parallel beam LEDs read patterned disks for precise position sensing in motors, robotics, and automation systems.



CLINICAL & RESEARCH LABS

Fluorescence Spectroscopy

Photodiodes detect fluorescent emissions from biological samples, enabling DNA sequencing, protein analysis, and cellular imaging in research labs.

RETAIL & LOGISTICS

Barcode Scanners

Photodiodes detect reflected laser light from 1D/2D barcodes, enabling point-of-sale systems, warehouse inventory management, and package tracking automation.

MEDICAL IMAGING

X-Ray & Radiography Detection

Specialized photodiodes paired with scintillator materials convert X-ray photons into electrical signals for digital radiography, CT scanners, and dental imaging systems.

CONSUMER ELECTRONICS

Ambient Light Sensors

Compact photodiodes measure environmental light levels to automatically adjust display brightness in smartphones, tablets, laptops, and automotive dashboards.

Need application support?

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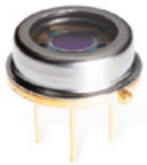


Photodiodes

A photodiode is a light receiving element that converts the intensity of light into an electric current when it is irradiated with light. The wavelength width and sensitivity to be detected differ depending on the materials that make up the semiconductor element. When the material is silicon (Si), it is sensitive to the wavelength range of ultraviolet rays, visible light, and infrared rays (up to 1,100 nm), and when the material is a compound semiconductor such as InGaAs, it is sensitive to the wavelength range of infrared rays of longer wavelengths. It can be used for various sensing applications by combining it with a light source.

InGaAs Photodiodes

Model No	Product name	Sensitive size [mm]	Sensitive wavelength		Bandwidth		Responsivity		Package
			Min[nm]	Max[nm]	Typ.	Conditions	Typ.[A/W]	Conditions	
KPDEH16LC	KP-H InGaAs Photodiode	φ0.04	900	1700	32GHz	VVR=2V,λ=1310nm, RL=50Ω, Pin=0dBm, Small signal modulation,	0.7	VR=2V, λ=1310nm, Pin=0dBm	CHIP
KPDEH16L-CC1D	KP-H InGaAs Photodiode	φ0.04	900	1700	35GHz	RL=50W λ=1550nm Pin=0dBm Small signal modulation	0.7 0.6	λ=1310nm VR=2V λ=1550nm VR=2V	CoC
KPDE008LS-A-RA-HQ	KP-M InGaAs Photodiodes for Monitoring	φ0.08	900	1700	2.0GHz	RL=50Ω Pi=-10dBm VR=5V	0.8 0.9	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE030S-A	KP-M InGaAs Photodiodes for Monitoring	φ0.3	900	1700	0.6GHz	RL=50Ω Pi=-10dBm VR=5V	0.8 0.9	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE020S-A	KP-M InGaAs Photodiodes for Monitoring	φ0.2	900	1700	1.0GHz	RL=50Ω Pi=-10dBm VR=5V	0.8 0.9	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE008S-D	KP-M InGaAs Photodiodes for Monitoring	φ0.08	900	1700	2.0GHz	RL=50Ω Pi=-10dBm VR=5V	0.8 0.9	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE008S-A	KP-M InGaAs Photodiodes for Monitoring	φ0.08	900	1700	2.0GHz	RL=50Ω Pi=-10dBm VR=5V	0.8 0.9	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN

InGaAs Photodiodes *...continued*

Model No	Product name	Sensitive size [mm]	Sensitive wavelength		Bandwidth		Responsivity		Package
			Min[nm]	Max[nm]	Typ.	Conditions	Typ.[A/W]	Conditions	
KPDB086S-H8	InGaAs Photodiodes	0.86x0.86	800	1700	50MHz	RL=50Ω VR=2V	0.45 1.1	λ=850nm VR=0V λ=1550nm VR=5V TO-CAN	TO-CAN
KPDE300-H53	InGaAs Photodiodes	φ3	900	1700	-	-	0.9 1.0	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE150-H45	InGaAs Photodiodes	φ1.5	900	1700	-	-	0.9 1.0	λ=1310nm VR=1V λ=1550nm VR=1V	TO-CAN
KPDE086S-H8	InGaAs Photodiodes	0.86x0.86	900	1700	30MHz	Pi=-10dBm VR=5V Small signal modulation	0.9 1.0	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE0301M51	InGaAs Photodiodes	φ0.3	900	1700	-	-	0.9	λ=1550nm	MOLD
KPEIMC-UDCOM	KP-E Edge Illuminated InGaAs Photodiodes	0.1x0.12	900	1700	1.5GHz	Pi=-10dBm VR=5V Small signal modulation	0.55 0.75	λ=1310nm Pi=-10dBm VR=5V λ=1550nm Pi=-10dBm VR=5V	CHIP
KPEIMC-100	KP-E Edge Illuminated InGaAs Photodiodes	0.1x0.08	900	1700	1.5GHz	Pi=-10dBm VR=5V	0.7 0.8	λ=1310nm Pi=-10dBm VR=5V λ=1550nm Pi=-10dBm VR=5V	CHIP
KPDE030SL-H8	KP-M InGaAs Photodiodes for Monitoring	φ0.3	900	1700	600MHz	Pi=-10dBm VR=5V Small signal modulation	0.9 1.0	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE030SA-TU	KP-M InGaAs Photodiodes for Monitoring	φ0.3	900	1700	600MHz	Pi=-10dBm VR=5V Small signal modulation	0.9 1.0	λ=1310nm VR=5V λ=1550nm VR=5V	PIGTAIL
KPDE030-S	KP-M InGaAs Photodiodes for Monitoring	φ0.3	900	1700	0.6GHz	RL=50Ω Pi=-10dBm VR=5V	0.8 0.9	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE030-H8	KP-M InGaAs Photodiodes for Monitoring	φ0.3	900	1700	600MHz	Pi=-10dBm VR=5V Small signal modulation	0.9 1.0	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN

InGaAs Photodiodes *...continued*

Model No	Product name	Sensitive size [mm]	Sensitive wavelength		Bandwidth		Responsivity		Package
			Min[nm]	Max[nm]	Typ.	Conditions	Typ.[A/W]	Conditions	
KPDE020-S	KP-M InGaAs Photodiodes for Monitoring	Φ0.2	900	1700	1.0GHz	RL=50Ω Pi=-10dBm VR=5V	0.8 0.9	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE020-H8	KP-M InGaAs Photodiodes for Monitoring	Φ0.2	900	1700	1.0GHz	Pi=-10dBm VR=5V Small signal modulation	0.9 1.0	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE008S-TU	KP-M InGaAs Photodiodes for Monitoring	φ0.08	900	1700	2.0GHz	Pi=-10dBm VR=5V Small signal modulation	0.85 0.98	λ=1310nm VR=5V λ=1550nm VR=5V	PIGTAIL
KPDE008-S	KP-M InGaAs Photodiodes for Monitoring	φ0.08	900	1700	2.0GHz	RL=50Ω Pi=-10dBm VR=5V	0.8 0.9	λ=1310nm VR=5V λ=1550nm VR=5V	TO-CAN
KPDE10GC-V2	KP-R InGaAs Photodiodes for Receivers	φ0.028	900	1700	14GHz	Pi=-10dBm VR=5V Small signal modulation	0.80 0.85	λ=1310nm VR=5V λ=1550nm VR=5V	CHIP

InGaAs NIR Photodiodes

Model No	Product name	Sensitive size [mm]	Sensitive wavelength		Bandwidth		Responsivity		Package
			Min[nm]	Max[nm]	Typ.	Conditions	Typ.[A/W]	Conditions	
KPDF030F26-H8	InGaAs NIR Photodiodes	φ0.3	1200	2700	-	-	1.2	λ=1950nm VR=0V	TO-CAN
KPDF030F22-H8	InGaAs NIR Photodiodes	Φ0.2	1200	2300	-	-	1.2	λ=1950nm VR=0V	TO-CAN

Photovoltaic Power Converter

Model No	Product name	Sensitive size [mm]	Sensitive wavelength		Bandwidth		Short Circuit Current		Package
			Min[nm]	Max[nm]	Typ.	Conditions	Typ.[μA]	Conditions	
KPC8H-FC	Photovoltaic Power Converter	-	1300	1600	-	-	32000	λ=1480nm Pin=300mW	MODULE
KPC8-T	Photovoltaic Power Converter	-	1300	1600	-	-	12000	λp=1480nm Pin=100mW	MODULE

Thermoelectrically Cooled InGaAs Photodiodes

Model No	Product name	Sensitive size [mm]	Sensitive wavelength		Bandwidth		Responsivity		Package
			Min [nm]	Max [nm]	Typ.	Conditions	Typ.[A/W]	Conditions	
KPDE086S-H85P	Thermoelectrically Cooled InGaAs Photodiodes	0.86x0.86	900	1700	-	-	0.9 1.0	λ=1310nm λ=1550nm	TO-CAN

Si Photodiodes

Model No	Product name	Sensitive size [mm]	Sensitive wavelength		Bandwidth		Short circuit current		Responsivity		Package
			Min [nm]	Max [nm]	Typ.	Conditions	Typ.[μA)	Conditions	Typ.[A/W]	Conditions	
KPID020DS-S	Si Photodiodes	φ0.2	400	1000	2.0GHz	RL=50Ω VR=2V	-	-	0.3	λ=850nm VR=10V	TO-CAN
KPID050M-H8	Si Photodiodes	φ0.5	400	1000	-	-	-	-	0.35	λ=850nm VR=0V	TO-CAN
KPID020D-H8	Si Photodiodes	Φ0.2	400	1000	-	-	-	-	0.35	λ=850nm VR=0V	TO-CAN
KPD151M53	Si Photodiodes	1.25x1.25	400	1100	-	-	16	1000lx @2856k	-	-	MOLD
KPD104M51	Si Photodiodes	0.81x0.81	400	1100	-	-	55	1000lx @2856k	-	-	MOLD
KPD101M51	Si Photodiodes	0.81x0.81	400	1100	-	-	19	1000lx @2856k	-	-	MOLD
KPD104M32	Si Photodiodes	0.81x0.81	400	1100	-	-	10	1000lx @2856k	-	-	MOLD
KPD101M32	Si Photodiodes	0.81x0.81	400	1100	-	-	16	1000lx @2856k	-	-	MOLD
KPD101M31	Si Photodiodes	0.81x0.81	400	1100	-	-	30	1000lx @2856k	-	-	MOLD
KPD31S	Si Photodiodes	2.80x0.80	400	1100	-	-	22	1000lx @2856k	-	-	SMD
KPD30S	Si Photodiodes	2.59x2.59	400	1100	-	-	68	1000lx @2856k	-	-	SMD
KPD1803K	Si Photodiodes	1.30x1.60	400	1100	-	-	24	1000lx @2856k	-	-	STEM
KPD1803H	Si Photodiodes	1.30x1.60	400	1100	-	-	17	1000lx @2856k	-	-	TO-CAN
KPD1801H	Si Photodiodes	1.30x1.60	400	1100	-	-	70	1000lx @2856k	-	-	TO-CAN
KPID1301H	Si Photodiodes	1.10x1.10	400	1100	-	-	60	1000lx @2856k	-	-	TO-CAN
KPD1203K	Si Photodiodes	0.92x0.92	400	1100	-	-	11	1000lx @2856k	-	-	STEM

Si Photodiodes *...continued*

Model No	Product name	Sensitive size[mm]	Sensitive wavelength		Bandwidth		Short circuit current		Responsivity		Package
			Min [nm]	Max [nm]	Typ.	Conditions	Typ.[μA)	Conditions	Typ.[A/W]	Conditions	
KPD1203H	Si Photodiodes	0.92x0.92	400	1100	-	-	8	1000lx @2856k	-	-	TO-CAN
KPD1201H	Si Photodiodes	0.92x0.92	400	1100	-	-	60	1000lx @2856k	-	-	TO-CAN

Si Photodiode Arrays

Model No	Product name	Sensitive size[mm]	Sensitive wavelength		Bandwidth		Short circuit current		Responsivity		Package
			Min [nm]	Max [nm]	Typ.	Conditions	Typ.[μA)	Conditions	Typ.[A/W]	Conditions	
KPD3212	Si Photodiode Arrays	1.5x1.0	400	1100	-	-	13	1000lx @2856k	-	-	SMD

GaAs Photodiodes

Model No	Product name	Sensitive size[mm]	Sensitive wavelength		Bandwidth		Short circuit current		Responsivity		Package
			Min [nm]	Max [nm]	Typ.	Conditions	Typ.[μA)	Conditions	Typ.[A/W]	Conditions	
KPDG020C	GaAs Photodiodes	φ0.2	650	880	1.0GHz	RL=50Ω VR=2V	-	-	0.6	λ=850nm VR=2V	CHIP
KPDG008-H8	GaAs Photodiodes	φ0.08	650	880	4.0GHz	Pi=-10dBm VR=5V Small signal modulation	-	-	0.55	λ=850nm VR=5V	TO-CAN

Two-tone Photodiode

Model No	Product name	Sensitive size[mm]	Sensitive wavelength		Bandwidth		Responsivity		Package
			Min [nm]	Max [nm]	Typ.	Conditions	Typ.[A/W]	Conditions	
KPMC24B	Two-tone Photodiodes	Si 2.2 x 2.2 InGaAs 0.86 x 0.86	400 900	1000 1700	-	-	0.6 0.9	λ=850nm VR=0V λ=1550nm VR=0V	TO-CAN
KPMC29	Two-tone Photodiodes	Si 2.2 x 2.2 InGaAs 0.86 x 0.86	400 900	1000 1700	-	-	0.6 0.9	λ=850nm VR=0V λ=1550nm VR=0V	SMD

GaN UV Sensors

Model No	Product name	Sensitive size[mm]	Sensitive wavelength		Bandwidth		Responsivity		Package
			Min [nm]	Max [nm]	Typ.	Conditions	Typ.[A/W]	Conditions	
KPDU086SU27-H11Q	GaN UV Sensors	0.86x0.86	200	290	-	-	0.095	λ=254nm VR=0V	TO-CAN
KPDU086SU31-H11Q	GaN UV Sensors	0.86x0.86	200	320	-	-	0.075	λ=300nm VR=0V	TO-CAN

PD-TIA

Application Examples

INDUSTRIAL AUTOMATION

High-Speed Optical Encoders

PD-TIA receivers enable ultra-fast position feedback in CNC machines, semiconductor manufacturing, and precision robotics requiring megahertz response rates.

INDUSTRIAL MEASUREMENT

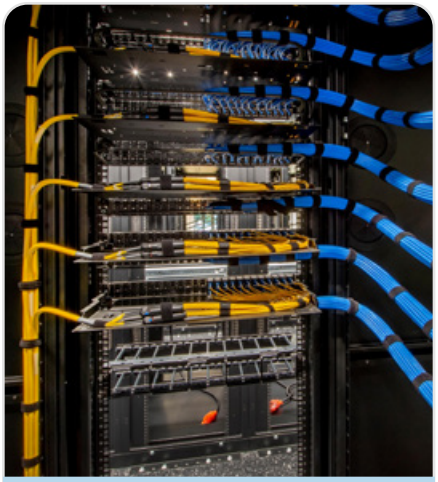
Laser Distance Measurement

PD-TIA receivers convert reflected laser pulses into precise distance measurements for manufacturing, logistics, and quality control applications.

DATA & AUTOMATION

High-Speed Laser Scanners & Readers

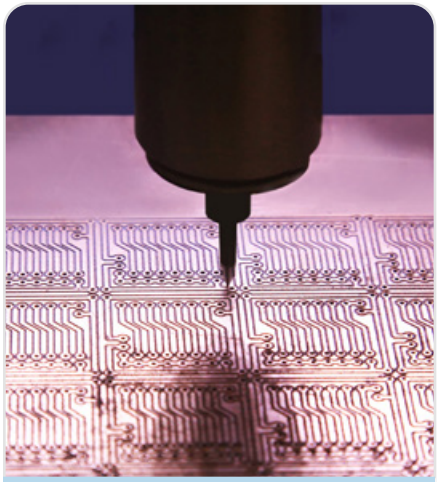
High-speed PD-TIA modules detect reflected laser patterns for industrial tracking, sorting, and scanning applications.



FIBER OPTIC SYSTEMS

Optical Data Links

InGaAs PD-TIA receivers enable high-speed fiber optic communication for data centers, telecom networks, and industrial control systems.



MANUFACTURING

Optical Inspection Systems

Fast PD-TIA receivers detect microscopic defects in semiconductor wafers, printed circuit boards, and precision-manufactured components.

SCIENTIFIC RESEARCH

Time-Resolved Spectroscopy

GaAs PD-TIA receivers capture fast fluorescence decay for material science, biochemistry, and photodynamics research applications.

Need application support?

Contact CEL's engineering team at sales@cel.com for device selection assistance, optical pairing recommendations, and custom solutions.

PD-TIA

An optical receiver module with a transimpedance amplifier (TIA) that maximizes the performance of the photodiode. It is suitable for high-speed optical communication products and is equipped with a photodiode of a compound semiconductor such as InGaAs and GaAs. We ask that you select the product according to the wavelength and frequency bandwidth of the light source.

InGaAs PD-TIA Receivers

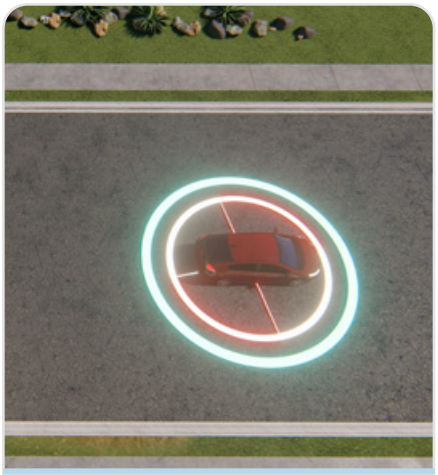
Model No	Product name	Sensitive wave-length(MIN[nm])	Sensitive wave-length(MAX[nm])	Bit rate(Typ.[bps])	Optical sensitivity(T-yp.[dbm])	Package
KPDX10G-T	InGaAs PD-TIA Receivers	900	1700	10.3G	-19	PIGTAIL
KPDX10G-H34S	InGaAs PD-TIA Receivers	900	1700	10.3G	-19	TO-CAN
KPDX4G-T	InGaAs PD-TIA Receivers	900	1700	4.25G	-22	PIGTAIL
KPDX4G-H33	InGaAs PD-TIA Receivers	900	1700	4.25G	-22	TO-CAN
KPDX2GK-T	InGaAs PD-TIA Receivers	900	1700	2.5G	-29	PIGTAIL
KPDX2GK-H33	InGaAs PD-TIA Receivers	900	1700	2.5G	-29	TO-CAN
KPDX1GK-T	InGaAs PD-TIA Receivers	900	1700	1.25G	-32	PIGTAIL
KPDX1GK-H33	InGaAs PD-TIA Receivers	900	1700	1.25G	-32	TO-CAN
KPDX150MB-T	InGaAs PD-TIA Receivers	900	1700	156M	-39	PIGTAIL
KPDX150MB-H33	InGaAs PD-TIA Receivers	900	1700	156M	-39	TO-CAN

GaAs PD-TIA Receivers

Model No	Product name	Sensitive wave-length(MIN[nm])	Sensitive wave-length(MAX[nm])	Bit rate(Typ.[bps])	Optical sensitivity(-Typ.[dbm])	Package
KPGX4G-LR33S	GaAs PD-TIA Receivers	650	880	4.25G	-17	LC-ROSA
KPGX2GK-LR33S	GaAs PD-TIA Receivers	650	880	2.5G	-25	LC-ROSA
KPGX4G-T	GaAs PD-TIA Receivers	650	880	4.25G	-17	PIGTAIL
KPGX4G-H33	GaAs PD-TIA Receivers	650	880	4.25G	-17	TO-CAN
KPGX2GK-T	GaAs PD-TIA Receivers	650	880	2.5G	-25	PIGTAIL
KPGX2GK-H33	GaAs PD-TIA Receivers	650	880	2.5G	-25	TO-CAN
KPGX1GK-T	GaAs PD-TIA Receivers	650	880	1.25G	-24	PIGTAIL
KPGX1GK-H33	GaAs PD-TIA Receivers	650	880	1.25G	-24	TO-CAN

Avalanche Photodiodes

Application Examples



LIDAR SYSTEMS

Autonomous Vehicles & Robotics

Si APDs detect weak laser reflections for 3D mapping and obstacle detection in self-driving cars, drones, and mobile robots.

SAFETY & SECURITY

Flame Detection

APDs detect UV and IR radiation from flames at long distances, triggering alarms in industrial facilities, refineries, and offshore platforms.

SAFETY & SECURITY

Gas Detection

APDs enable sensitive NDIR (non-dispersive infrared) gas analyzers detecting methane, CO2, and hazardous gases in industrial and environmental monitoring.

SCIENTIFIC IMAGING

SWIR Imaging

InGaAs APDs capture low-light short-wave infrared images for semiconductor inspection, biological imaging, and astronomy applications.

RESEARCH & DIAGNOSTICS

Single-Photon Detection

APDs operated in Geiger mode detect individual photons for quantum communication, LIDAR, and ultra-sensitive fluorescence microscopy.

INDUSTRIAL MEASUREMENT

Long-Range Distance Sensors

APDs amplify weak reflected signals enabling laser rangefinders for surveying, golf/gun rangefinders, and industrial positioning systems.

Need application support?

Contact CEL's engineering team at sales@cel.com for device selection assistance, optical pairing recommendations, and custom solutions.

Avalanche Photodiodes

An avalanche photodiode is a semiconductor device that multiplies photoelectrons by applying a reverse bias voltage. Multiplying photoelectrons allows you to obtain a larger photocurrent than the photodiode. It is perfect for detecting low level light. We also deal in APD modules that can apply a high reverse bias voltage.

KP-A InGaAs Avalanche Photodiodes

Model No	Product name	Sensitive size[mm]	Sensitive wavelength		Cutoff Frequency		Responsivity		Package
			Min [nm]	Max [nm]	Typ. [GHz]	Conditions	Typ.[A/W]	Conditions	
KPDEA007-56F	KP-A InGaAs Avalanche Photodiodes	φ75	900	1700	2	M=10	0.90 1.05	M=1 λ=1310nm M=1 λ=1550nm	TO-CAN
KPDEA005-56F	KP-A InGaAs Avalanche Photodiodes	φ55	900	1700	3	M=10	0.95 1.05	M=1 λ=1310nm M=1 λ=1550nm	TO-CAN

KP-A Si Avalanche Photodiodes

Model No	Product name	Sensitive size[mm]	Sensitive wavelength		Cutoff Frequency		Responsivity		Package
			Min [nm]	Max [nm]	Typ. [GHz]	Conditions	Typ.[A/W]	Conditions	
KPDA100P-H8	KP-A Si Avalanche Photodiodes	φ1000	400	1000	0.6	M=100 RL=50Ω λ=850nm	0.45	M=1 λ=850nm	TO-CAN
KPDA050P-H8	KP-A Si Avalanche Photodiodes	φ500	400	1000	1.2	M=100 RL=50Ω λ=850nm	0.45	M=1 λ=850nm	TO-CAN
KPDA020P-H8	KP-A Si Avalanche Photodiodes	φ200	400	1000	1.3	M=100 RL=50Ω λ=850nm	0.45	M=1 λ=850nm	TO-CAN

APD-TIA

Application Examples

TELECOMMUNICATIONS

Long-Haul Fiber Networks

APD-TIA modules provide ultra-sensitive reception for optical signals over hundreds of kilometers in submarine and terrestrial fiber links.

UNDERWATER SYSTEMS

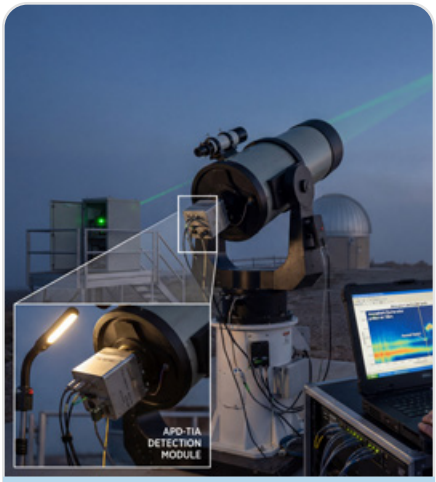
Underwater Optical Comms

APD-TIA modules enable high-speed data transmission between submarines, autonomous underwater vehicles (AUVs), and subsea sensor networks where RF signals cannot penetrate.

SCIENTIFIC RESEARCH

Low-Light Spectroscopy

APD-TIA modules enable Raman spectroscopy, photon correlation, and time-correlated single-photon counting in research laboratories.



LIDAR & RANGING

Long-Distance LIDAR

APD-TIA receivers detect weak laser returns for atmospheric monitoring, topographic mapping, and autonomous vehicle navigation.

AEROSPACE & DEFENSE

Satellite Optical Communications

APD-TIA receivers enable ultra-long-distance free-space optical links between satellites, ground stations, and aircraft, providing secure, high-bandwidth communication channels.

DATA CENTERS

High-Speed Optical Links

APD-TIA receivers enable error-free 10G/25G/40G data transmission in enterprise networks and cloud computing infrastructure.

Need application support?

Contact CEL's engineering team at sales@cel.com for device selection assistance, optical pairing recommendations, and custom solutions.

APD-TIA

An optical receiver module with a transimpedance amplifier (TIA) that maximizes the performance of the avalanche photodiode. The APD-TIA is perfect for long-distance optical communication products for which the output of PD-TIA is insufficient.

APD-TIA Product Lineup

Model No	Product name	Sensitive wavelength		Bit rate(Typ.[bps])	Optical sensitivity(-Typ.[dbm])	Package
		Min [nm]	Max [nm]			
KPDXA10G-XMD	InGaAs APD-TIA Receivers	900	1700	10G	-28	LC-ROSA
KPDXA10G-T	InGaAs APD-TIA Receivers	900	1700	10G	-28	PIGTAIL
KPDXA10G-H34S	InGaAs APD-TIA Receivers	900	1700	10G	-28	TO-CAN
KPDXA2GK-T	InGaAs APD-TIA Receivers	900	1700	2.5G	-35	PIGTAIL
KPDXA2GK-H33	InGaAs APD-TIA Receivers	900	1700	2.5G	-35	TO-CAN
KPDXA1GK-T	InGaAs APD-TIA Receivers	900	1700	1.25G	-38	PIGTAIL
KPDXA1GK-H33	InGaAs APD-TIA Receivers	900	1700	1.25G	-38	TO-CAN

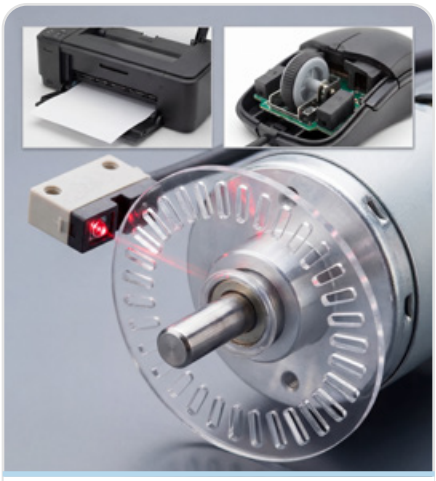
Phototransistors

Application Examples

INDUSTRIAL AUTOMATION

Photoelectric Sensors

Phototransistors amplify photocurrent for object detection in conveyor systems, packaging machinery, and material handling equipment.



CONSUMER ELECTRONICS

Optical Switches & Encoders

Phototransistors detect slot patterns in rotary encoders for computer mice, printer wheels, and motor control feedback systems.

AUTOMATION & ROBOTICS

Label & Contrast Detection

Phototransistors paired with IR LEDs detect contrast marks, labels, and registration marks in printing, packaging, and sorting machines.

BUILDING AUTOMATION

Automatic Door Sensors

Phototransistors provide cost-effective presence detection for automatic doors, elevators, and access control systems.

SAFETY SYSTEMS

Light Curtains & Beam Breaks

Arrays of phototransistors create safety barriers around dangerous machinery, stopping operation when beams are interrupted.

CONSUMER PRODUCTS

Remote Control Receivers

Phototransistors decode infrared signals from TV remotes, air conditioners, and home automation devices.

Need application support?

Contact CEL's engineering team at sales@cel.com for device selection assistance, optical pairing recommendations, and custom solutions.

Phototransistors

Phototransistors are made up of a structure in which a photodiode and a transistor are integrated. It is a light receiving element that, with a transistor, outputs the current after amplifying the photocurrent generated by the photodiode.

Si Phototransistors

Model No	Product name	Sensitive wavelength		Bit rate(Typ. [bps])	Optical sensitivity(Typ. [dbm])	Package
		Min [nm]	Max [nm]			
KPDXA10G-XMD	InGaAs APD-TIA Receivers	900	1700	10G	-28	LC-ROSA
KPDXA10G-T	InGaAs APD-TIA Receivers	900	1700	10G	-28	PIGTAIL
KPDXA10G-H34S	InGaAs APD-TIA Receivers	900	1700	10G	-28	TO-CAN
KPDXA2GK-T	InGaAs APD-TIA Receivers	900	1700	2.5G	-35	PIGTAIL
KPDXA2GK-H33	InGaAs APD-TIA Receivers	900	1700	2.5G	-35	TO-CAN
KPDXA1GK-T	InGaAs APD-TIA Receivers	900	1700	1.25G	-38	PIGTAIL
KPDXA1GK-H33	InGaAs APD-TIA Receivers	900	1700	1.25G	-38	TO-CAN

VCSEL

Application Examples

LIDAR & 3D SENSING

Autonomous Vehicles

VCSEL arrays emit structured light patterns for real-time 3D mapping, enabling self-driving cars and advanced driver assistance systems.

CONSUMER ELECTRONICS

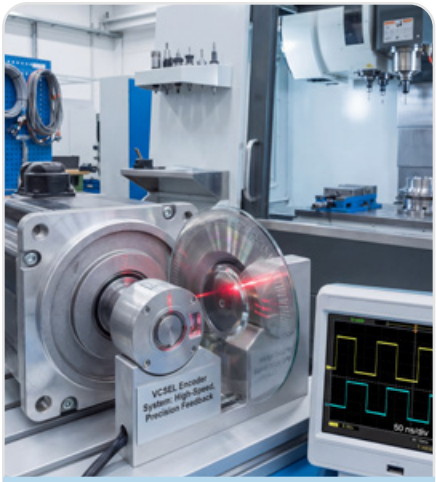
Facial Recognition & Biometrics

VCSELs project infrared dot patterns for Face ID, smartphone authentication, and secure access control systems.

INDUSTRIAL MEASUREMENT

Laser Distance Sensors

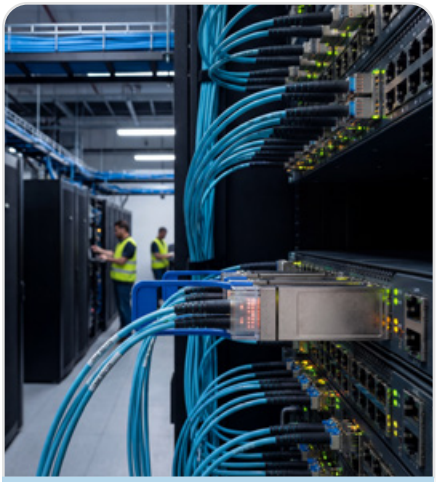
VCSELs provide compact, low-cost emitters for time-of-flight distance measurement in robotics, drones, and warehouse automation.



INDUSTRIAL AUTOMATION

High-Speed Optical Encoders

VCSELs paired with photodiodes enable precise position feedback in servo motors, CNC machines, and semiconductor manufacturing equipment.



DATA COMMUNICATIONS

Short-Reach Optical Links

850nm VCSELs transmit multi-gigabit data over multimode fiber in data centers, enterprise networks, and active optical cables.

CONSUMER DEVICES

Proximity & Gesture Sensing

VCSELs enable touchless control in smartphones, smart watches, and automotive user interfaces through proximity detection.

Need application support?

Contact CEL's engineering team at sales@cel.com for device selection assistance, optical pairing recommendations, and custom solutions.

VCSEL

The vertical-cavity surface-emitting laser (VCSEL) is different from the conventional edge-emitting laser, with the light-emitting part located on the upper surface of the chip and emitting light in the vertical direction. We deal in VCSELs with an emission wavelength range of 850 nm.

850nm VCSEL

Model No	Product name	Sensitive wavelength		Optical output power		Bandwidth		Package
		Typ. [nm]	Conditions	Typ. [mW]	Conditions	Typ. [GHz]	Conditions	
KLD085VC-H32	850nm VCSEL	850	λp=Peak wavelength CW PO=2.5mW	2.5	CW IF=7mA	4	PO=2.5mW	TO-CAN
KLD085VC-LTH32	850nm VCSEL	850	λp=Peak wavelength CW IF=7mA	1	CW IF=7mA	4	PO=1.0mW	LC-TOSA

Reflective Sensor

Application Examples

AGRICULTURE

Moisture Detection (NIR)

SWIR reflective sensors measure water content in grains, seeds, and soil using near-infrared absorption spectroscopy for quality control.

INDUSTRIAL PROCESS

Gas Detection (NDIR-Style Sensing)

Dual-wavelength reflective sensing techniques can support compact NDIR-style gas detection by measuring differential infrared absorption for process control and emissions monitoring.

QUALITY CONTROL

Material Sorting & Identification

SWIR sensors distinguish plastics, minerals, and organic materials by their spectral signatures for recycling and mining operations.

FOOD & BEVERAGE

Composition Analysis

Reflective sensors measure fat, protein, sugar, and moisture content in food products for quality assurance and nutritional labeling.

PHARMACEUTICAL

Tablet Inspection & Coating

NIR reflective sensors verify active ingredient content, detect coating thickness, and identify counterfeit medications.

ENVIRONMENTAL

Water Quality Monitoring

SWIR sensors detect oil contamination, algae blooms, and dissolved organic matter in industrial wastewater and natural water bodies.

Need application support?

Contact CEL's engineering team at sales@cel.com for device selection assistance, optical pairing recommendations, and custom solutions.

Reflective Sensor

This is a sensor in which an LED chip, which is a light-emitting element, and a photodiode chip, which is a light-receiving element, are mounted side by side in one package. It can be used for detection and analysis of various components, sensing of various materials, general-purpose photoelectric sensors, proximity sensors, etc.

KPR SWIR type single-wavelength Reflective sensors

Model No	Product name	Sensitive size[mm]	Wavelength		Short circuit current		Package
			Typ.[nm]	Conditions [IF=mA]	Typ.[μA]	Conditions [IF=mA]	
KPR16S6	Single-wavelength Reflective sensor	0.3	1650	20	0.6	20 (L=1mm)	SMD
KPR15S6	Single-wavelength Reflective sensor	0.3	1550	20	0.7	20 (L=1mm)	SMD
KPR14S6	Single-wavelength Reflective sensor	0.3	1450	20	0.8	20 (L=1mm)	SMD
KPR13S6	Single-wavelength Reflective sensor	0.3	1300	20	0.8	20 (L=1mm)	SMD

KPR SWIR type dual-wavelength Reflective sensors

Model No	Product name	Sensitive size[mm]	Wavelength		Short circuit current		Package
			Typ.[nm]	Conditions [IF=mA]	Typ.[μA]	Conditions [IF=mA]	
KPR816DS6	Dual-wavelength Reflective sensor	0.3	810 1650	20	2.7 0.7	20 (L=1mm λ=810nm) 20 (L=1mm λ=1650nm)	SMD
KPR815DS6	Dual-wavelength Reflective sensor	0.3	810 1550	20			SMD
KPR813DS6	Dual-wavelength Reflective sensor	0.3	810 1300	20			SMD

KPR SWIR type dual-wavelength Reflective sensors *...continued*

Model No	Product name	Sensitive size[mm]	Wavelength		Short circuit current		Package
			Typ. [nm]	Conditions [IF=mA]	Typ. [µA]	Conditions [IF=mA]	
KPR814DS6	Dual-wavelength Reflective sensor	0.3	810 1450	20	2.7 0.8	20 (L=1mm λ=810nm) 20 (L=1mm λ=1450nm)	SMD
KPR1516DS6	Dual-wavelength Reflective sensor	0.3	1550 1650	20	0.7 0.6	20 (L=1mm λ=1550nm) 20 (L=1mm λ=1650nm)	SMD
KPR1416DS6	Dual-wavelength Reflective sensor	0.3	1450 1650	20	0.8 0.6	20 (L=1mm λ=1450nm) 20 (L=1mm λ=1650nm)	SMD
KPR1415DS6	Dual-wavelength Reflective sensor	0.3	1450 1550	20	0.8 0.7	20 (L=1mm λ=1450nm) 20 (L=1mm λ=1550nm)	SMD
KPR1316DS6	Dual-wavelength Reflective sensor	0.3	1300 1650	20	0.8 0.6	20 (L=1mm λ=1300nm) 20 (L=1mm λ=1650nm)	SMD
KPR1315DS6	Dual-wavelength Reflective sensor	0.3	1300 1550	20	0.8 0.7	20 (L=1mm λ=1300nm) 20 (L=1mm λ=1550nm)	SMD
KPR1314DS6	Dual-wavelength Reflective sensor	0.3	1300 1450	20	0.8 0.8	20 (L=1mm λ=1300nm) 20 (L=1mm λ=1450nm)	SMD