VISHAY INTERTECHNOLOGY, INC.

INFRARED EMITTERS, PHOTO DETECTORS AND OPTICAL SENSORS

OPTOELECTRONICS

SELECTOR GUIDE

www.vishay.com

IR Emitters, Photo Detectors, and Optical Sensors

Introduction

As one of the world's leading suppliers of infrared emitters, photo detectors, and optical sensors, Vishay offers an extraordinarily broad portfolio of optoelectronic products. Whether you require the high speed of a PIN photodiode, the sensitivity of an ambient light sensor, or the object detection provided by a reflective or transmissive sensor, Vishay has a solution.

Behind these products stands a vertically integrated, optoelectronics company with over 30 years of experience in emitter and detector die fabrication and packaging know-how. Regional applications engineering and sales support is available wherever you are, be it in China, Korea, Singapore, Japan, Taiwan, North and South America, Europe, India or on-line via our web site.

Photo Detectors

Vishay has the broadest portfolio of PIN photodiodes on the market. With lower capacitance, they provide high-speed response, low noise and low dark current along with excellent sensitivity. They are ideal for high-speed data transfer, light barriers, alarm systems, and linear light measurement. In addition to PIN photodiodes, Vishay provides the industry's widest selection of phototransistors. Offered in over 12 different packages, Vishay's phototransistors are exceptionally sensitive and simplify circuit design by eliminating the need for a separate amplifier.

Infrared Emitters

Vishay offers emitters in more wavelengths than any other supplier: 830 nm, 850 nm, 870 nm, 885 nm, 940 nm, and 950 nm. Providing fast rise and fall response times, Vishay also has the broadest selection of double hetero infrared emitters. They are the highest-power infrared emitters with the lowest forward voltages on the market and ideal for high-current applications.

Optical Sensors

Whether your application involves detecting the edge of a sheet of paper, a spinning wheel, or an object's proximity, Vishay offers a solution with reflective and interrupter sensors. Offering thru-hole and surface mount packages, Vishay's portfolio meets the requirements of even the most demanding applications.

Ambient Light Sensor

Vishay enables electronic products like LCD displays and streetlights to sense and respond to light in ways similar to the human eye. The TEMT6000X01, TEMT6200FX01, TEPT4400, TEPT5600 and TEPT5700 are small phototransistors with peak sensitivity of 570 nm. With a unique, patent-pending filtering material, interference from infrared and ultraviolet light is virtually eliminated. The TEMD5510FX01 and TEMD6010FX01 photodiodes are qualified to the automotive's most rigorous standard, AEC Q101.

Lead (Pb)-Free and RoHS

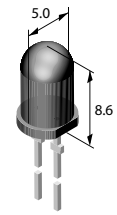
All products listed are lead (Pb)-free and comply with RoHS 2002/95/EC and WEEE 2002/96/EC. Each datasheet provides a recommended solder profile for processing and the JEDEC level for moisture sensitivity.

Samples

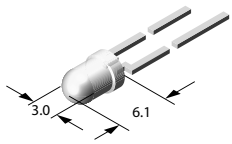
If you need samples, they will be shipped at no charge to you within 24 hours of order entry. To order, visit our web site for the nearest sales representative or distributor in your area.

Infrared Emitters

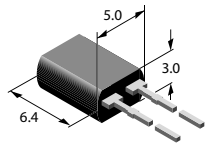
Package	Part Number	Peak Wavelength (nm)	Angle of Half Intensity (+/-°)	Radiant Intensity, I_e (mW/sr)(1)	Rise and Fall Time, t_r/t_f (ns)(1)
Infrared Emitters					
5.0 mm	TSAL5100	940	10	130	800
	TSAL5300	940	22	45	800
	TSAL6100	940	10	130	800
	TSAL6200	940	17	60	800
	TSAL6400	940	25	40	800
	TSAL7200	940	17	60	800
	TSAL7300	940	22	45	800
	TSAL7400	940	25	40	800
	TSAL7600	940	30	25	800
	TSFF5210	870	10	180	15
	TSFF5410	870	22	70	15
	TSHF5210	870	10	160	30
	TSHF5410	870	22	70	30
	TSHA5203	875	12	65	600
	TSHA5503	875	24	35	600
	TSHA6203	875	12	65	600
	TSHA6503	875	24	35	600
	TSHG6200	850	10	160	20
	TSHG6400	850	22	70	20
	TSHG8200	830	10	160	20
	TSHG8400	830	20	79	20
	TSUS5202	950	15	30	800
	TSUS5402	950	22	20	800
1.9 mm, Surface Mount	TSML1000/1020	950	12	7(2)	800
	TSMF1000/1020	870	17	5(2)	30
3.0 mm	TSUS4300	950	16	18	800
	TSUS4400	950	18	15	800
	TSAL4400	940	25	30	800
	TSHA4400	875	20	20	600
1.8 mm	CQY37N	950	12	5	800
	CQY36N	950	55	1.5	800
Side View Micro	TSSS2600	950	25H, 65V(3)	2.6	800
Side View Lens	TSKS5400S	950	30	9	800
TO-18	TSTS7100	950	5	18	800
	TSTS7300	950	12	6	800
	TSTS7500	950	30	1.6	800
	TSTA7100	875	5	50	600
	TSTA7300	875	12	20	600
	TSTA7500	875	30	6	600
PLCC-2, Surface Mount	VSMF3710	870	60	10	30
	VSMF4710	870	60	10	15
	VSMG2700	830	60	10	15
	VSMG3700	850	60	10	20
	VSML3710	950	60	8	800
	VSMS3700	950	60	4.5	800



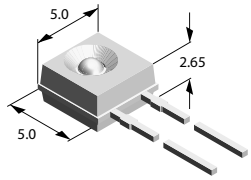
5.0 mm



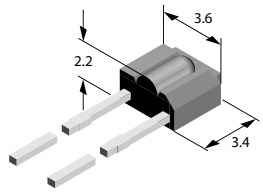
3.0 mm



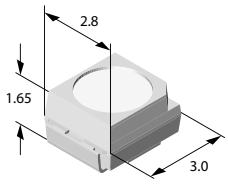
Side View



Side View Lens



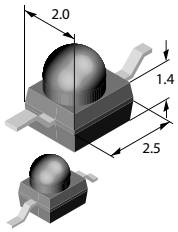
Side View Micro



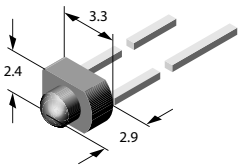
PLCC-2

Notes: 1) I_f = 100 mA 2) I_f = 20 mA 3) Horizontal and vertical

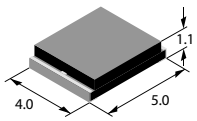
Photo Detectors



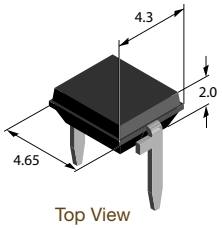
1.9 mm
Surface Mount



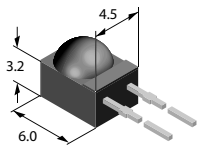
1.8 mm



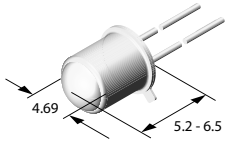
Top View Surface
Mount



Top View
Leaded



High Performacne



TO-18

Package	Part Number	Peak Wavelength (nm)	Bandwidth, $\lambda_{0.5}$ (nm)	Sensitivity, Ira (μA)(1)	Angle of Half Sensitvity (+/-°)	Photo Area (mm^2)	Rise and Fall Time, t_r/t_f (ns)(2)
PIN Photodiodes							
5.0 mm	BPV10	920	570 to 1040	70	20	0.78	2.5(3)
	BPV10NF	940	790 to 1050	60	20	0.78	2.5(3)
1.9 mm, SMD	TEMD1000/1020	900	840 to 1050	10	15	0.25	4(4)
Side View	BPV20F	950	870 to 1050	60	65	7.5	100
	BPV21F(L)	950	870 to 1050	38	65	5.7	70
	BPW41N	950	870 to 1050	45	65	7.5	100
	BPW46, L	900	600 to 1050	50	65	7.5	100
	BPW82, 83	950	790 to 1050	45	65	7.5	100
	S186P	950	870 to 1050	45	65	7.5	100
High Performance	BPV22F	950	870 to 1050	80	60	7.5	100
	BPV22NF	940	790 to 1050	85	60	7.5	100
	BPV23F	950	870 to 1050	63	60	5.7	70
	BPV23NF	940	790 to 1050	65	60	5.7	70
	TESP5700	870	790 to 980	25	60	2	10
TO-18	BPW24R	900	600 to 1050	60	12	0.78	7(4)(5)
Top View, Leaded	BPW34	900	600 to 1050	50	65	7.5	100
	BP104	950	870 to 1050	45	65	7.5	100
Top View, SMD	TEMD5010X01	900	400 to 1100	55	65	7.5	100
	TEMD5020X01	900	400 to 1100	35	65	4.4	100
	TEMD5110X01	940	790 to 950	55	65	7.5	100
	TEMD5120X01	940	790 to 950	35	65	4.4	100

Notes: (1) Sensitivity: V_R = 5 V, Ee = 1 mW/cm^2, λ = 950 nm (2) Speed: R_L = 1 kΩ, λ = 820 nm, V_R = 10 V
(3) V_R = 50 V, R_L = 50 Ω, λ = 820 nm (4) R_L = 50 Ω (5) V_R = 20 V

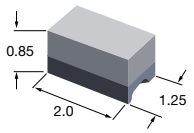
Package	Part Number	Peak Wavelength (nm)	Bandwidth, $\lambda_{0.5}$ (nm)	Collector Light Current, Ica (mA)(1)	Angle of Half Sensitvity (+/-°)	Rise and Fall Time, t_r/t_f (μs)(2)
Phototransistors						
5.0 mm	BPV11	850	620 to 980	10	15	6
	BPV11F	930	900 to 980	9	15	6
	BPW96C	850	620 to 980	8	20	2
3.0 mm	BPW85C	850	620 to 980	5	25	2
	TEFT4300	925	875 to 1000	3.2	30	2
1.8 mm	BPW16N	825	620 to 960	0.14	40	4.8
	BPW17N	825	620 to 960	1	12	4.8
Side View Micro	TEST2600	920	850 to 980	2.5	30 H 60 V	6
Side View Lens	TEKT5400S	920	850 to 980	4	37	6
TO-18	BPW76B	850	620 to 980	1.2	40	6
	BPW77NB	850	620 to 980	20	10	6
1.9 mm, SMD	TEMT1000/1020	950	750 to 980	7	15	2
PLCC-2, SMD	VEMT3700	830	620 to 980	0.5	60	2
	VEMT3700F	940	860 to 1050	0.5	60	2
	VEMT4700	830	620 to 980	0.5	60	2

Notes: (1) Collector light current: V_{CE} = 5 V, Ee = 1 mW/cm^2, λ = 950 nm, typical (2) Speed: R_L = 0.1 kΩ, λ = 950 nm, V = 5, V_IC = 5 mA

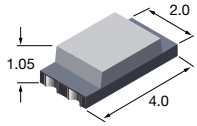
Package	Part Number	Peak Wave-length (nm)	Bandwidth, $\lambda_{0.5}$ (nm)	Supply Current (mA)	Angle of Half Sensitvity (+/-°)	Hyster-isis	On / Off Time t_{on}/t_{off} (μs)
Photo Schmitt Trigger							
Side View Lens	TEKS5400	920	825 to 950	2	30	80 %	1.5 / 3.0
	TEKS6400	920	825 to 950	0.045	30	80 %	1.5 / 3.0

Optical Sensors

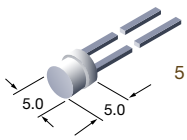
Package	Part Number	Peak Wavelength (nm)	Bandwidth (nm)	Angle of Half Sensitivity (+/-°)	Light Current[1] Incandescent Light (µA)	Light Current[2] Fluorescent Light (µA)
Ambient Light Sensor - Photodiodes						
1206 SMD	TEMD6010FX01	540	430 - 610	60	0.04	0.03
Top View, SMD	TEMD5510FX01	540	430 - 610	65	1.00	0.70
Ambient Light Sensor - Phototransistors						
0805 SMD	TEMT6200FX01	550	450 - 610	60	23	14
1206 SMD	TEMT6000X01	570	430 - 800	60	50	21
5 mm, flat top	TEPT5700	570	430 - 800	50	75	31
5 mm	TEPT5600	570	430 - 800	20	350	145
3 mm	TEPT4400	570	430 - 800	30	200	83



0805



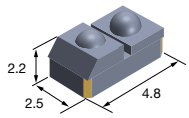
1206



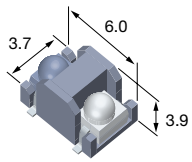
5 mm, flat top

Notes: (1) E_v=100 lux, V_{CE} = 5 V, CIE illuminant A, typical
(2) E_v=100 lux, V_{CE} = 5 V, e.g. Sylvania color abbrev. D830, typical

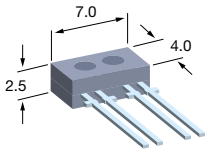
Part Number	Operating Range[2] (mm)	Peak Operating Distance (mm)
Reflective Sensors[1]		
TCND3000[3]	1 to 20	0 and 10
TCND5000[4]	2 to 25	7
TCRT1000/1010	1 to 2	1
TCRT5000(L)	1 to 14	2.5
CNY70	1 to 3	0



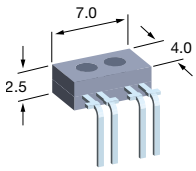
TCND3000



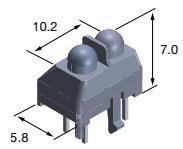
TCND5000



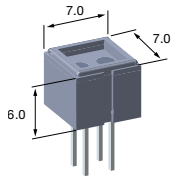
TCRT1000



TCRT1010



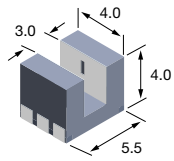
TCRT5000(L)



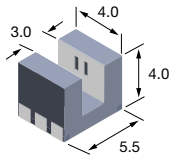
CNY70

Notes: (1) All optical sensors have phototransistor output except where noted
(2) Relative collector current > 20%
(3) TCND3000 operates only with E909.01 ELMOS ASIC
(4) TCND5000 has a PIN photodiode output

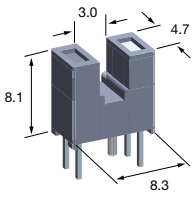
Part Number	Gap (mm)	Aperature (mm)	On / Off Time t_{on}/t_{off} (µs)
Transmissive or Interrupter Sensors[1]			
TCPT1300X01	3.0	0.3	20 / 30
TCUT1300X01[2]	3.0	0.3	20 / 30
TCST1030, L	3.0	none	15 / 10
TCST1103	3.2	1	10 / 8
TCST1202	3.2	0.5	10 / 8
TCST1230	3.0	0.5	15 / 10
TCST1300	3.2	0.25	10 / 8
TCST2103	3.2	1	10 / 8
TCST2202	3.2	0.5	10 / 8
TCST2300	3.2	0.25	10 / 8
TCST5250	2.7	0.5	15 / 10



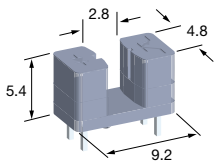
TCPT1300X01



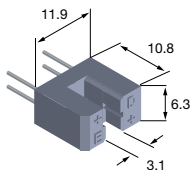
TCUT1300X01



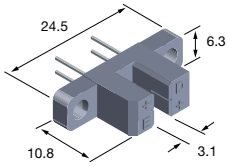
TCST1030, L



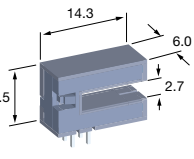
TCST1230



TCST1x0x



TCST2x0x



TCST5250

Notes: (1) All optical sensors have phototransistor output
(2) Dual channel

SEMICONDUCTORS:
Rectifiers • High-Power Diodes and Thyristors • Small-Signal Diodes • Zener and Suppressor Diodes • FETs • RF Transistors • Optoelectronics • ICs • Modules and Assemblies

PASSIVE COMPONENTS:
Resistive Products • Magnetics • Capacitors • Strain Gage Transducers and Stress Analysis Systems

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