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OPTOELECTRONICS

Emitters, Detectors, Sensors

Infrared Emitters, Photo Detectors, and Optical Sensors



Infrared Emitters

PIN Photodiodes

Phototransistors

Reflective Sensors – Analog

Transmissive Sensors – Analog

Ambient Light Sensors

Fully Integrated Proximity and Ambient Light Sensors

RESOURCES

- Optical sensors product portfolio: www.vishay.com/optical-sensors/
- Infrared emitters product portfolio: www.vishay.com/ir-emitting-diodes/
- Photo detectors product portfolio: www.vishay.com/photo-detectors/
- Optoelectronics complete product portfolio: www.vishay.com/optoelectronics/
- Technical support:
 - emittertechsupport@vishay.com
 - sensorstechsupport@vishay.com
 - detectortechsupport@vishay.com
- Sales contacts: www.vishay.com/doc?99914



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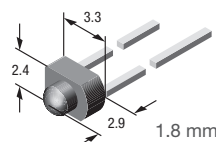
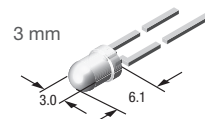
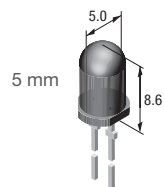
Emitters, Detectors, Sensors

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Infrared Emitters

Vishay offers a range of infrared emitters, including those with wavelengths of 850 nm and 940 nm. Along with having fast rise and fall response times, Vishay also provides an extensive selection of double-hetero infrared emitters, designed for high current applications with low forward voltages. Our portfolio also includes the latest surface emitter technology, which delivers high radiant intensities, further expanding the robust IR emitter offerings.

Package	Part Number	Peak Wavelength (nm)	Angle of Half Intensity ($\pm^\circ$)	Radiant Intensity, I_e (mW/sr) ⁽¹⁾	Rise and Fall Time, t_r / t_f (ns)	Remark
Through-Hole Packages						
5 mm	TSAL6100	940	10	170	15	No stand-off
	TSAL6200	940	17	72	15	No stand-off
	TSAL6400	940	25	50	15	No stand-off
	TSHF5210	890	8	327	10	Stand-off
	TSHF5410	890	27	62	10	Stand-off
	TSHF6210	890	8	327	10	No stand-off
	TSHF6410	890	27	61	10	No stand-off
	TSHG5210	850	10	215	10	Stand-off
	TSHG5410	850	15	100	10	Stand-off
	TSHG6200	850	10	230	10	No stand-off
	TSHG6400	850	27	105	10	No stand-off
	TSHG6410	850	15	135	10	No stand-off
	VSLY5850	850	3	600	10	Stand-off
	VSLY5940	940	3	600	10	Stand-off
3 mm	TSAL4400	940	25	36	15	No stand-off
	VSLB3940	940	22	65	15	No stand-off
	VSLB3948	940	22	65	15	No stand-off
	VSLB4940	940	22	65	15	—
	VSLY3850	850	18	70	10	—
	VSLY3943	940	17	70	5	—
1.8 mm	CQY36N	950	55	1.50	800	No stand-off
	CQY37N	950	12	5	800	No stand-off





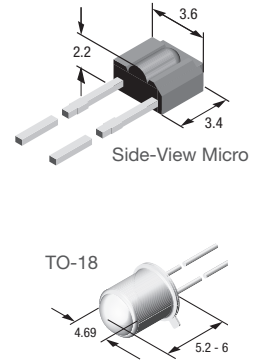
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Infrared Emitters (continued)

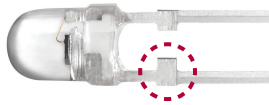
Package	Part Number	Peak Wavelength (nm)	Angle of Half Intensity ($\pm$ °)	Radiant Intensity, I_e (mW/sr) ⁽¹⁾	Rise and Fall Time, t_r / t_f (ns)	Remark
Through-Hole Packages						
Side-View Micro	TSSS2600	950	25 H, 65 V	2.6	800	No stand-off
TO-18	TSTA7100	890	5	400	10	No stand-off
	TSTA7300	890	12	260	10	No stand-off
	TSTA7500	890	44	18	10	No stand-off
	TSTS7100	950	4	105	15	No stand-off
	TSTS7300	950	8	95	15	No stand-off
	TSTS7500	950	50	5	15	No stand-off



Note

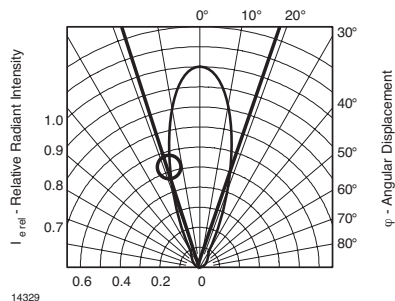
⁽¹⁾ $I_F = 100$ mA

Stand-Off



To control the height of the emitter when inserted into the PCB for soldering, some leaded emitters and photo detectors feature a stand-off option (shown at left). The stand-off is the tab on the leads. It is sometimes called a stopper.

Angle of Half Intensity, $\phi_{0.5}$ or θ



In a radiation diagram, the angle of half intensity is the angle within which the radiant intensity is greater than or equal to half of the maximum intensity. In Vishay datasheets, the symbol $\phi_{0.5}$ is most commonly used for the angle of half intensity. For visible LEDs, this is sometimes called the viewing angle. There is still light, be it infrared or visible, outside of this angle.



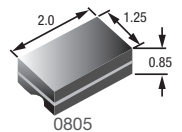
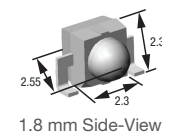
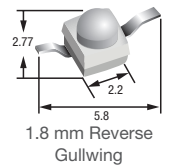
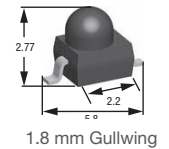
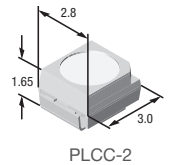
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Infrared Emitters (continued)

Package	Part Number ⁽²⁾	Peak Wavelength (nm)	Angle of Half Intensity (± °)	Radiant Intensity, I _e (mW/sr) ⁽¹⁾	Rise and Fall Time, t _r / t _f (ns)	Remark
Surface-Mount Packages						
PLCC-2	VSMB3940X01	940	60	13	15	–
	VSMY3940X01	940	60	15	10	–
	VSML3710	940	60	9.5	15	–
	VSMY3850	850	60	17	10	–
	VSMY385010	850	60	9	10	I _F = 70 mA
	VSMY385010X01	850	60	12	7	I _F = 70 mA
	VSMY385011X02	850	60	20	12	–
	VSMY3850X01	850	60	17	10	–
	VSMY3890X01	890	60	18	15	–
1.8 mm	VSMY2850RG, -G	850	10	125	10	–
	VSMY2853RG, -G	850	28	50	10	–
	VSMY2940RG, -G	940	10	125	10	–
	VSMB2000X01, -2020X01	940	12	40	15	–
	VSMB2943RGX01, -GX01	940	25	20	15	–
	VSMB2948RG, -G	940	25	20	15	–
	VSMY2943RG, -G	940	28	50	10	–
	VSMY294310RG, -G	940	25	25	10	I _F = 70 mA
1.8 mm Side-View	VSMY2853SL	850	28	50	10	–
	VSMB2943SLX01	940	25	20	15	–
	VSMB2948SL	940	25	20	15	–
	VSMY294310SL	940	25	25	10	I _F = 70 mA
	VSMY2943SL	940	28	50	10	–
0805	VSMY1940X01	940	60	10	10	–
	VSMB1940X01	940	60	6	15	–
	VSMY1850	850	60	10	10	–
	VSMY1850X01	850	60	10	10	–
	VSMY1850ITX01	850	60	10	10	–
	VSMY1940ITX01	940	60	10	10	–
	VSMY1943X01	940	60	6	5	I _F = 70 mA
	VSMY4850X01	850	60	8	7	–
	VSMY5850	850	60	13	7	–
	VSMY5850X01	850	60	13	7	–
	VSMY5890	890	60	13	7	–
	VSMY5890X01	890	60	13	7	–
	VSMY5940	940	60	13	7	–
	VSMY5940X01	940	60	13	7	–



Notes

⁽¹⁾ I_F = 100 mA unless otherwise stated

⁽²⁾ Products ending in "X01" are AEC-Q101 qualified and products ending in "X02" are AEC-Q102 qualified



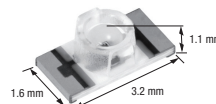
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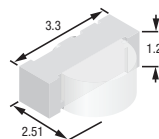
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Inner Lens PCB

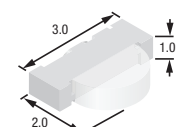
Package	Part Number ⁽²⁾	Peak Wavelength (nm)	Angle of Half Intensity (± °)	Radiant Intensity, I _e (mW/sr) ⁽¹⁾	Rise and Fall Time, t _r / t _f (ns)	Remark
Surface-Mount Packages						
Inner Lens PCB	VSMY12850	850	40	16	10	I _F = 70 mA
	VSMY12940	940	40	16	10	I _F = 70 mA
SMD SV Ultra Wide View	VSMB10940	940	75	1	15	I _F = 65 mA
	VSMB10941X01	940	75	1	15	I _F = 100 mA
SMD SV	VSMB14940	940	9	35	15	I _F = 70 mA
	VSMY14940	940	9	35	15	I _F = 70 mA



Inner Lens PCB



SMD SV Ultra Wide View



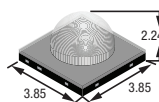
SMD SV

Notes

⁽¹⁾ I_F = 100 mA unless otherwise stated⁽²⁾ Products ending in "X01" are AEC-Q101 qualified and products ending in "X02" are AEC-Q102 qualified

High Power Infrared Emitters

Package	Part Number ⁽²⁾	Peak Wavelength (nm)	Angle of Half Intensity (± °)	Radiant Intensity, I _e (mW/sr) ⁽¹⁾	Rise and Fall Time, t _r / t _f (ns)	Remark
Surface-Mount Packages						
High Power QFN	VSMA1085250	850	28	1350	13	–
	VSMA1085250X02	850	28	1350	13	–
	VSMA1085400	850	40	1025	13	–
	VSMA1085400X02	850	40	1025	13	–
	VSMA1085600	850	60	510	13	–
	VSMA1085600X02	850	60	510	13	–
	VSMA1085750	850	75	360	13	–
	VSMA1085750X02	850	75	360	13	–
	VSMA1094250	945	28	1350	10	–
	VSMA1094250X02	945	28	1350	10	–
	VSMA1094400	945	40	1025	10	–
	VSMA1094400X02	945	40	1025	10	–
	VSMA1094600	945	60	510	10	–
	VSMA1094600X02	945	6	510	10	–
	VSMA1094750	945	75	360	10	–
	VSMA1094750X02	945	75	360	10	–
	VSMY98145DS	810	45	500	30	–
	VSMY98525DS	850	25	1000	14	–
	VSMY98545	850	45	350	15	–
	VSMY9854535	850	45	370	15	–
	VSMY98545ADS	850	45	630	14	–
	VSMY9857535	850	75	180	30	–
	VSMY98575ADS	850	75	320	14	–



High Power QFN

Notes

⁽¹⁾ I_F = 100 mA unless otherwise stated⁽²⁾ Products ending in "X02" are AEC-Q102 qualified



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PIN Photodiodes

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.

Package	Part Number	Peak Wavelength (nm)	Bandwidth $\lambda_{0.5}$ (nm)	Sensitivity I_{ra} (μA) ⁽¹⁾	Angle of Half Sensitivity ($\pm^\circ$)	Photo Area (mm)	Remark
Through-Hole Packages							
3 mm	TEFD4300	950	350 to 1120	17	20	0.23	–
	TEFD4300F	950	770 to 1070	17	20	0.23	–
5 mm	BPV10	920	380 to 1140 ⁽³⁾	70	20	0.78	Stand-off
	BPV10NF	940	790 to 1050	60	20	0.78	Stand-off
Side-View	BPW41N	950	870 to 1050	45	65	7.5	5 mm × 4 mm × 6.8 mm
	BPW82	950	790 to 1050	45	65	7.5	5 mm × 4 mm × 6.8 mm
	BPW83	950	790 to 1050	45	65	7.5	5 mm × 3 mm × 6.4 mm
Side-View, High Performance	BPV22F	950	870 to 1050	80	60	7.5	–
	BPV22NF	940	790 to 1050	85	60	7.5	–
	BPV23F	950	870 to 1050	63	60	4.4	–
	BPV23NF	940	790 to 1050	65	60	4.4	–
TO-5	BPW20RF	920	400 to 1100 ⁽³⁾	60	50	7.5	–
TO-18	BPW24R	900	400 to 1100 ⁽³⁾	60	12	0.78	–
Top-View, Leaded	BP104	950	870 to 1050	45	65	7.5	–
	BPW34	900	430 to 1100 ⁽³⁾	50	65	7.5	–

Notes

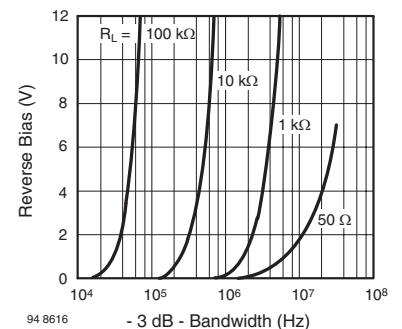
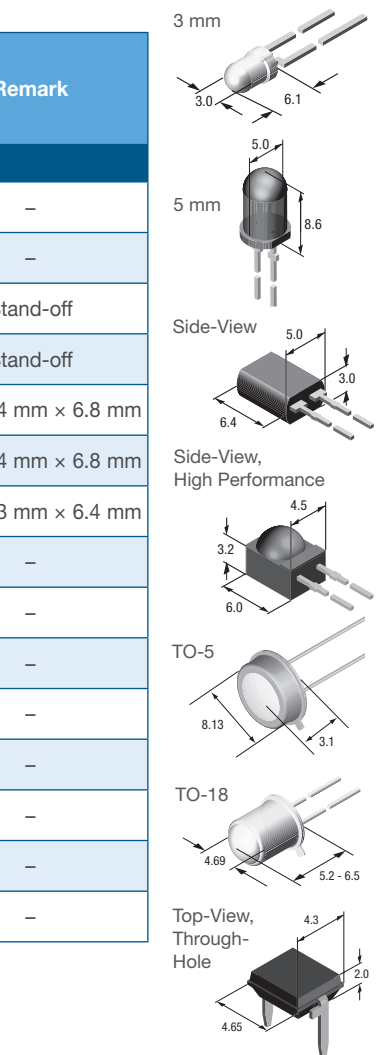
⁽¹⁾ Sensitivity: $V_R = 5\text{ V}$, $E_e = 1\text{ mW/cm}^2$, $\lambda = 950\text{ nm}$;

⁽²⁾ Speed: $R_L = 1\text{ k}\Omega$, $\lambda = 820\text{ nm}$, $V_R = 10\text{ V}$

⁽³⁾ Bandwidth $\lambda_{0.1}$ (nm)

Rise and Fall Time

Switching times for photo detectors are strongly dependent on the measurement conditions. Shown in the diagrams are two major conditions: the reverse bias and the value of the load resistor used in the circuit. The switching time of a photodiode varies by two orders of magnitude when the load resistor value changes from $50\text{ }\Omega$ to $10\text{ k}\Omega$. The lower the value of the load resistor, the faster the diode becomes. Also, the higher the reverse bias, the faster the switching times.



BPW34, TEMD5010X01

Bandwidth vs. Reverse Bias Voltage

Parameter: Load Resistance, $\lambda = 820\text{ nm}$

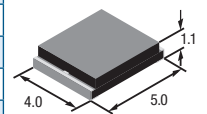


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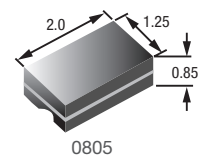
PIN Photodiodes (continued)

Package	Part Number ⁽⁴⁾	Peak Wavelength (nm)	Bandwidth $\lambda_{0.5}$ (nm)	Sensitivity I_{ra} (μA) ⁽¹⁾	Angle of Half Sensitivity ($\pm^\circ$)	Photo Area (mm)	Rise / Fall Time, t_r / t_f (ns)	Remark
Surface-Mount Packages								
4-Quadrant Photodiode	K857PE	840	690 to 1050	8.5	60	4 × 1.6	30	AEC-Q101
Top-View	TEMD5080X01	940	350 to 1100 ⁽³⁾	60	65	7.5	40 ⁽²⁾	AEC-Q101
	TEMD5020X01	900	430 to 1100 ⁽³⁾	35	65	4.4	100	AEC-Q101
	TEMD5120X01	940	790 to 1050	35	65	4.4	100	AEC-Q101
	TEMD5010X01	940	430 to 1100 ⁽³⁾	55	65	7.5	100	AEC-Q101
	TEMD5110X01	940	790 to 1050	55	65	7.5	100	AEC-Q101
	VBP104S	940	430 to 1100 ⁽³⁾	35	65	4.4	100	Gullwing
	VBP104SR	940	430 to 1100 ⁽³⁾	35	65	4.4	100	Reverse gullwing
	VBP104FAS	950	780 to 1050	35	65	4.4	100	Gullwing
	VBP104FASR	950	780 to 1050	35	65	4.4	100	Reverse gullwing
	VBPW34S	940	430 to 1100 ⁽³⁾	55	65	7.5	100	Gullwing
	VBPW34SR	940	430 to 1100 ⁽³⁾	55	65	7.5	100	Reverse gullwing
	VBPW34FAS	950	780 to 1050	55	65	7.5	100	Gullwing
	VBPW34FASR	950	780 to 1050	55	65	7.5	100	Reverse gullwing
1206	VEMD6010X01	900	430 to 1100	9.5	60	0.85	100	—
	VEMD6110X01	950	750 to 1050	9.5	60	0.85	100	—
QFN	VEMD5010X01	940	430 to 1100	48	65	7.5	100	—
	VEMD5110X01	940	790 to 1050	48	65	7.5	100	—
0805	TEMD7000X01	900	350 to 1120 ⁽³⁾	3	60	0.23	100	—
	TEMD7100X01	950	750 to 1050	3	60	0.23	100	—
	VEMD4010X01	910	550 to 1040	2.4	55	0.42	100	AEC-Q101
	VEMD4010X02	910	550 to 1040	2.4	24	0.42	100	AEC-Q102
	VEMD4060X02	820	540 to 960	1.5	58	0.375	100	AEC-Q102
	VEMD4080X02	870	480 to 1030	2.3	57	0.375	100	AEC-Q102
	VEMD4110X01	910	740 to 1040	2.4	55	0.42	100	AEC-Q101
	VEMD4110X02	910	740 to 1040	2.4	24	0.42	100	AEC-Q102
	VEMD4160X02	910	740 to 1040	2.4	24	0.42	100	AEC-Q102
1.8 mm	VEMD2000X01	940	750 to 1050	12	15	0.23	100	Reverse gullwing
	VEMD2020X01	940	750 to 1050	12	15	0.23	100	Gullwing
	VEMD2500X01	900	350 to 1120 ⁽³⁾	12	15	0.23	100	Reverse gullwing
	VEMD2520X01	900	350 to 1120 ⁽³⁾	12	15	0.23	100	Gullwing
	VEMD2503X01	900	350 to 1120 ⁽³⁾	10	35	0.23	100	Reverse gullwing
	VEMD2523X01	900	350 to 1120 ⁽³⁾	10	35	0.23	100	Gullwing
	VEMD2003X01	940	750 to 1050	10	35	0.23	100	Reverse gullwing
	VEMD2023X01	940	750 to 1050	10	35	0.23	100	Gullwing
	VEMD2523SLX01	900	350 to 1120 ⁽³⁾	10	35	0.23	100	—
1.8 mm Side-View	VEMD2023SLX01	940	750 to 1050	10	35	0.23	100	—
SMD SV Ultra Wide View	VEMD10940F	920	780 to 1050	3	75	0.23	100	Side-view

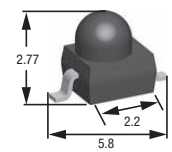
Notes

⁽¹⁾ Sensitivity: $V_R = 5\text{ V}$, $E_o = 1\text{ mW/cm}^2$, $\lambda = 950\text{ nm}$ ⁽²⁾ $R_L = 50\ \Omega$ ⁽³⁾ Bandwidth $\lambda_{0.1}\text{ (nm)}$ ⁽⁴⁾ Products ending in "X01" are AEC-Q101 qualified and products ending in "X02" are AEC-Q102 qualified

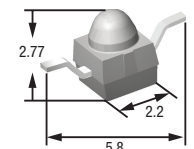
Top-View, Surface-Mount



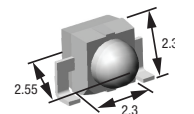
0805



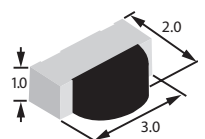
1.8 mm Gullwing



1.8 mm Reverse Gullwing



1.8 mm Side-View



SMD SV Ultra Wide View



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Phototransistors

Vishay provides the industry's widest selection of phototransistors. Offered in over 10 different packages, Vishay's phototransistors are exceptionally sensitive and simplify circuit design by eliminating the need for a separate amplifier.

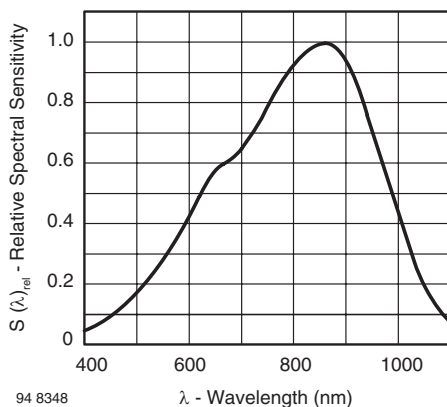
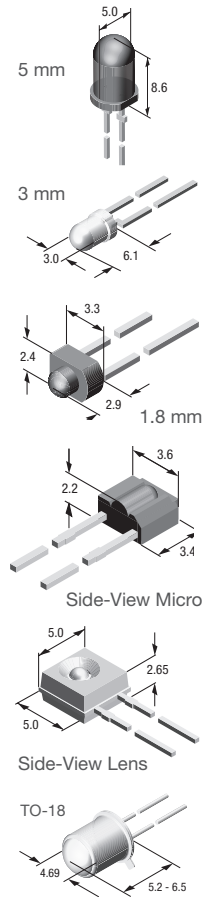
Package	Part Number	Peak Wavelength (nm)	Bandwidth $\lambda_{0.5}$ (nm)	Collector Light Current, I_{ca} (mA) ⁽¹⁾	Angle of Half Sensitivity ($\pm^\circ$)	Rise / Fall Time, t_r / t_f (ns) ⁽²⁾	Remark
Through-Hole Packages							
5 mm	BPV11	850	450 to 1080 ⁽³⁾	10	15	6	With base pin
	BPV11F	930	900 to 980	9	15	6	With base pin
	BPW96C	850	450 to 1080 ⁽³⁾	8	25	2	Stand-off
3 mm	BPW85C	850	450 to 1080 ⁽³⁾	5	25	2	Stand-off
	TEFT4300	925	875 to 1000	3.2	30	2	No stand-off
1.8 mm	BPW16N	825	450 to 1040 ⁽³⁾	0.14	40	4.8	–
	BPW17N	825	450 to 1040 ⁽³⁾	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	450 to 1080 ⁽³⁾	> 0.6	40	6	–
	BPW77NB	850	450 to 1080 ⁽³⁾	> 10	10	6	–

Notes

⁽¹⁾ Collector light current: $V_{CE} = 5\text{ V}$, $E_e = 1\text{ mW/cm}^2$, $\lambda = 950\text{ nm}$, typical

⁽²⁾ Speed: $V_S = 5\text{ V}$, $I_C = 5\text{ mA}$, $R_L = 100\ \Omega$

⁽³⁾ Bandwidth $\lambda_{0.1}$ (nm)



Bandwidth: $\lambda_{0.5}$ and $\lambda_{0.1}$

The diagram to the left shows the relative spectral sensitivity of the BPV11 phototransistor. The peak sensitivity is found at 850 nm. The bandwidth of the detector can be defined by using a relative spectral sensitivity value of 0.5 or 0.1. Vishay datasheets will show one of these values. In the case of the BPV11, the bandwidth in the datasheet is 450 nm to 1080 nm, $\lambda_{0.1}$.



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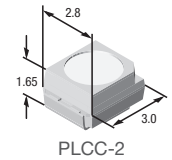
OPTOELECTRONICS

Emitters, Detectors, Sensors

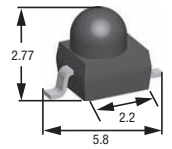
Phototransistors (continued)

Package	Part Number	Peak Wavelength (nm)	Bandwidth $\lambda_{0.5}$ (nm)	Collector Light Current, I_{ca} (mA) ⁽¹⁾	Angle of Half Sensitivity ($\pm$ °)	Rise / Fall Time, t_r / t_f (ns) ⁽²⁾	Remark
Through-Hole Packages							
PLCC-2	VEMT3700	850	450 to 1080 ⁽³⁾	0.5	60	2	–
	VEMT3700F	940	850 to 1050	0.5	60	2	–
	VEMT4700	850	450 to 1080 ⁽³⁾	0.5	60	2	With base pin
1.8 mm	VEMT2000X01	860	790 to 970	6	15	2	Reverse gullwing
	VEMT2020X01	860	790 to 970	6	15	2	Gullwing
	VEMT2500X01	850	470 to 1090 ⁽³⁾	6	15	2	Reverse gullwing
	VEMT2520X01	850	470 to 1090 ⁽³⁾	6	15	2	Gullwing
	VEMT2503X01	860	470 to 1090 ⁽³⁾	2.7	30	10	Reverse gullwing
	VEMT2523X01	860	470 to 1090 ⁽³⁾	2.7	35	10	Gullwing
	VEMT2003X01	860	790 to 970	2.7	35	10	Reverse gullwing
	VEMT2023X01	860	790 to 970	2.7	35	10	Gullwing
1.8 mm Side-View	VEMT2523SLX01	850	470 to 1090 ⁽³⁾	2.7	35	10	–
	VEMT2023SLX01	860	790 to 970	2.7	35	10	–
0805	TMT7000X01	850	470 to 1090 ⁽³⁾	0.45	60	2	–
	TMT7100X01	870	750 to 1010	0.45	60	2	–

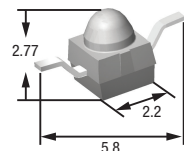
Notes

⁽¹⁾ Collector light current: $V_{CE} = 5$ V, $E_e = 1$ mW/cm², $\lambda = 950$ nm, typical⁽²⁾ Speed: $V_S = 5$ V, $I_C = 5$ mA, $R_L = 100$ Ω ⁽³⁾ Bandwidth $\lambda_{0.1}$ (nm)⁽⁴⁾ Products ending in "X01" are AEC-Q101 qualified

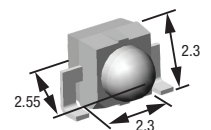
PLCC-2



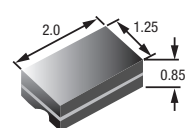
1.8 mm Gullwing



1.8 mm Reverse Gullwing



1.8 mm Side-View



0805

Reflective Sensors, Analog Output

Part Number ⁽¹⁾⁽³⁾	Package		Peak Operating Range (mm) ⁽²⁾	Peak Operating Distance (mm)	Typical Output Current (mA)
	L × W (mm)	H (mm)			
TCND5000 ⁽³⁾	6.0 × 4.3	3.75	2 to 25	6.0	0.0015
TCRT1000 , TCRT1010	7.0 × 4.0	2.5	0.2 to 4.0	1.0	0.7
TCRT5000(L)	10.2 × 5.8	7.0	0.2 to 15	2.5	1
CNY70	7.0 × 7.0	6.0	0 to 5.0	0	1
VCNT2020	2.5 × 2	0.6	0 to 7	0.5	0.12
VCNT2025X01	2.5 × 2	0.6	0 to 15	0.7	0.39
VCNT2030	1.85 × 1.2	0.6	0 to 38	0.9	3.14

Notes

⁽¹⁾ All optical sensors have phototransistor output except where noted⁽²⁾ Relative collector current > 20 %⁽³⁾ TCND5000 has a PIN photodiode output

TCND5000



TCRT1000



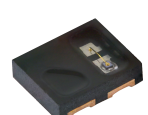
TCRT1010



TCRT5000(L)



CNY70



VCNT2025X01



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Transmissive Sensors, Analog Output

Part Number ⁽¹⁾⁽³⁾	Package		Gap (mm)	Aperture (mm)	Typical Output Current (mA)	On / Off Time t _{on} / t _{off} (μs)	Max. Operating Temperature
	L × W (mm)	H (mm)					
TCPT1300X01	5.5 × 4.0	4.0	3.0	0.3	0.6	20 / 30	+105 °C
TCUT1300X01 ⁽²⁾	5.5 × 4.0	4.0	3.0	0.3	0.6	20 / 30	+105 °C
TCPT1350X01	5.5 × 4.0	4.0	3.0	0.3	1.6	9 / 16	+125 °C
TCUT1350X01 ⁽²⁾	5.5 × 4.0	4.0	3.0	0.3	1.6	9 / 16	+125 °C
TCPT1600X01	5.5 × 4.0	5.7	3.0	0.3	1.6	9 / 16	+105 °C
TCUT1600X01 ⁽²⁾	5.5 × 4.0	5.7	3.0	0.3	1.6	9 / 16	+105 °C
TCUT1630X01 ⁽⁴⁾	5.5 × 5.85	7.0	3.0	0.3	1.3	9 / 16	+105 °C
TCUT1800X01 ⁽⁵⁾	5.5 × 5.85	7.0	3.0	0.3	1.3	9 / 16	+105 °C
TCST1030	8.3 × 4.7	8.15	3.1	none	2.4	15 / 10	+85 °C
TCST1103	11.9 × 6.3	10.8	3.1	1.0	4.0	10 / 8	+85 °C
TCST1202	11.9 × 6.3	10.8	3.1	0.5	2.0	10 / 8	+85 °C
TCST1230	9.2 × 4.8	5.4	2.8	0.5	2.0	15 / 10	+85 °C
TCST1300	11.9 × 6.3	10.8	3.1	0.25	0.5	10 / 8	+85 °C
TCST2103	24.5 × 6.3	10.8	3.1	1.0	4.0	10 / 8	+85 °C
TCST2202	24.5 × 6.3	10.8	3.1	0.5	2.0	10 / 8	+85 °C
TCST2300	24.5 × 6.3	10.8	3.1	0.25	0.5	10 / 8	+85 °C
TCST5250	14.3 × 6.0	9.5	2.7	0.5	1.5	15 / 10	+85 °C
VT141P	5.5 × 4	4.0	3.0	0.3	1.5	14 / 21	+85 °C
VT142U	5.5 × 4	4.0	3.0	0.3	1.5	14 / 21	+85 °C

Notes

- ⁽¹⁾ All optical sensors have phototransistor output
⁽²⁾ Dual channel
⁽³⁾ Products ending in "X01" are AEC-Q101 qualified
⁽⁴⁾ Triple channel
⁽⁵⁾ Quad channel





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Emitters, Detectors, Sensors

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Ambient Light Sensors

Ambient light sensors are used to detect light or brightness in a manner similar to the human eye. They are most commonly found in industrial lighting, consumer electronics, and automotive systems, where they allow settings to be adjusted automatically in response to changing ambient light conditions. By turning on, turning off, or adjusting features, ambient light sensors can conserve battery power or provide extra safety, while eliminating the need for manual adjustments.

Package	Part Number ⁽²⁾	Peak Wavelength (nm)	Bandwidth $\lambda_{0.5}$ (nm)	Angle of Half Sensitivity ($\pm$ °)	Light Current Incandescent (μ A) ⁽¹⁾	Remark
Photodiodes						
0805, SMD	TEMD6200FX01	540	430 to 610	60	0.04	Stand-off
1206, SMD	TEMD6010FX01	540	430 to 610	60	0.04	–
Top-View SMD	TEMD5510FX01	540	430 to 610	65	1	–
	VEMD5501FX01	540	420 to 620	65	0.7	–
TO-5, Leaded	BPW21R	565	420 to 675	50	9	–
Phototransistors						
0805, SMD	TEMT6200FX01	550	450 to 610	60	23	–
1206, SMD	TEMT6000X01	570	440 to 800	60	50	–
5 mm, Flat Top	TEPT5700	570	440 to 800	50	75	Leaded
5 mm	TEPT5600	570	440 to 800	20	630	Leaded
3 mm	TEPT4400	570	440 to 800	30	200	Leaded

Notes

⁽¹⁾ $E_V = 100$ lux, $V_{CE} = 5$ V, CIE illuminant A, typical

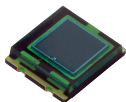
⁽²⁾ Products ending in "X01" are AEC-Q101 qualified

F

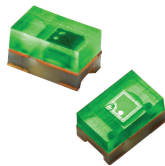
Part numbers with an F contain an infrared filtering epoxy to further improve the ambient light sensing performance

X01

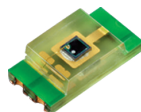
Part numbers with an X01 are qualified to the AEC-Q101 standard and support operating temperatures from -40 °C to $+100$ °C



TEMD5510FX01



TEMT6200FX01,
TEMD6200FX01



TEMD6010FX01,
TEMT6000X01



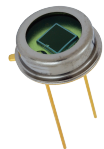
TEPT5600



TEPT4400



TEPT5700



BPW21R



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High Accuracy Digital Light Sensors

Based on patented Filtron™ technology implementation, digital light sensors introduced by Vishay provide red, green, blue, IR, and UVAB light sensing for precise color measurement. All digital light sensors have 16-bit resolution and feature miniature transparent OPLGA packages. These are fully integrated sensors – including a high sensitivity photodiode, a low noise amplifier, and a 16-bit A/D converter – with support for easy to use I²C bus communication.

Features and Benefits

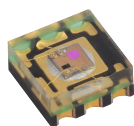
- On-chip coating provides best spectral sensitivity to cover visible and UV spectrum (Filtron™ technology)
- Shutdown mode with < 1 μ A power consumption
- 16-bit range for ambient light detection, RGB, and UV
- I²C interface

Applications

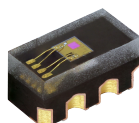
- Health monitoring
- AWB correction
- Control display brightness
- Home lightning control

Ambient Light Sensors

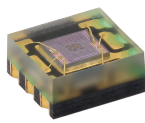
Part Number	Package Dimensions L x W x H (mm)	Ambient Light Resolution (lx)	Operating Voltage (V)	Operating Temperature Range (°C)	Output Code	AEC- Qualified
VEML3235	2 x 2 x 0.87	0.0042	2.6 to 3.6	–25 to +85	16 bit, I ² C	–
VEML3235SL	2.95 x 1.5 x 1.5	0.0021	2.6 to 3.6	–40 to +85	16 bit, I ² C	–
VEML6030	2 x 2 x 0.87	0.0042	2.5 to 3.6	–25 to +85	16 bit, I ² C	–
VEML6031X00	2.67 x 2.45 x 0.6	0.0034	2.5 to 3.6	–40 to +110	16 bit, I ² C	Yes
VEML6031X01	2.67 x 2.45 x 0.6	0.0034	2.5 to 3.6	–40 to +110	16 bit, I ² C	Yes
VEML6035	2.0 x 2.0 x 0.4	0.0004	1.7 to 3.6	–25 to +85	16 bit, I ² C	–
VEML7700	6.8 x 2.35 x 3.0	0.0042	2.5 to 3.6	–25 to +85	16 bit, I ² C	–



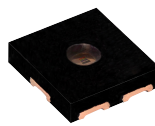
VEML3235



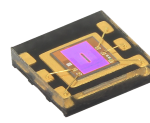
VEML3235SL



VEML6030



VEML6031



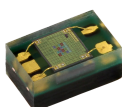
VEML6035



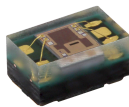
VEML7700

Color Sensors

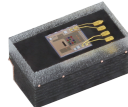
Part Number	Package Dimensions L x W x H (mm)	Peak Sensitivity (nm)	Operating Voltage (V)	Operating Temperature Range (°C)	Output Code	AEC- Qualified
VEML3328	2.0 x 1.25 x 1.0	590, 610, 560, 470, 825 (C, R, G, B, IR)	2.6 to 3.6	–40 to +85	16 bit, I ² C	–
VEML3328SL	2.95 x 1.50 x 1.50	590, 610, 560, 470, 825 (C, R, G, B, IR)	2.6 to 3.6	–40 to +85	16 bit, I ² C	–
VEML6040	2.0 x 1.25 x 1.0	650, 550, 450 (R, G, B)	2.5 to 3.6	–40 to +85	16 bit, I ² C	–
VEML6046X00	2.67 x 2.45 x 0.6	600, 550, 470, 820 (R, G, B, IR)	2.5 to 3.6	–40 to +110	16 bit, I ² C	Yes



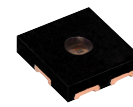
VEML6040



VEML3328



VEML3328SL



VEML6046X00



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Fully Integrated Proximity and Ambient Light Sensors

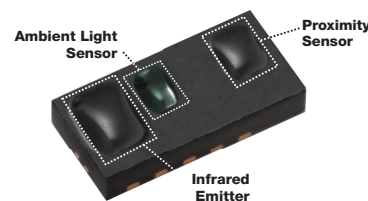
To simplify the design process, Vishay has integrated the infrared emitter, proximity photodiode, ambient light sensor, and signal processing IC in one package. Window design and sensor placement are no longer geometric puzzles and the need for mechanical crosstalk barriers is eliminated. Each sensor is a leadless surface-mount package with standard I²C communication and features an interrupt function. Interrupts reduce power consumption by eliminating polling traffic between the sensor and microcontroller.

Features and Benefits

- 16-bit dynamic range
- Detection range up to 1.5 m
- I²C interface

Applications

- Mobile devices (smart phones, tablets, gaming controllers)
- Consumer (white goods, cameras, game systems)
- Computing devices (notebooks, tablet PCs)
- Automotive and industrial devices (presence detection and displays)
- Health monitoring



VCNL4020X01



VCNL4200



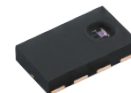
VCNL4020



VCNL3020



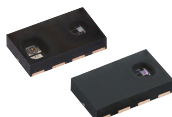
VCNL36687S



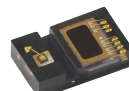
VCNL4035X01



VCNL4030X01

VCNL3030X01,
VCNL3036X01

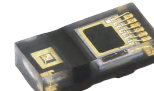
VCNL3040



VCNL36825T



VCNL36826S



VCNL36828P

Proximity Sensors

Part Number	Package Dimensions L x W x H (mm)	Integrated Components			Operating Temperature Range (°C)	AEC-Q101 Qualified
		Infrared Emitter	Proximity Detector	Ambient Light Sensor		
VCNL4020X01	4.90 × 2.40 × 0.83	x	x	x	-40 to +105	x
VCNL4035X01	4.0 × 2.36 × 0.75	—	x	x	-40 to +105	x
VCNL4030X01	4.0 × 2.36 × 0.75	x	x	x	-40 to +105	x
VCNL3020	4.90 × 2.40 × 0.83	x	x	—	-25 to +85	—
VCNL36687S	3.05 × 2 × 1.0	VCSEL	x	—	-40 to +85	—
VCNL4020	4.90 × 2.40 × 0.83	x	x	x	-25 to +85	—
VCNL4040	4.0 × 2.0 × 1.1	x	x	x	-25 to +85	—
VCNL4200	8.0 × 3.0 × 1.1	x	x	x	-40 to +85	—
VCNL3030X01	4.0 × 2.36 × 0.75	x	x	—	-40 to +105	x
VCNL3036X01	4.0 × 2.36 × 0.75	—	x	—	-40 to +105	x
VCNL3040	4.0 × 2.0 × 1.1	x	x	—	-40 to +85	—
VCNL36825T	2.0 × 1.25 × 0.5	VCSEL	x	—	-40 to +85	—
VCNL36826S	2.55 × 2.05 × 1.0	VCSEL	x	—	-40 to +85	—
VCNL36828P	2.0 × 1.0 × 0.5	VCSEL	—	—	-40 to +85	—