OPTOELECTRONICS

Guide to Industrial Applications

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For the most recent list of Optoelectronics devices visit
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A WORLD OF SOLUTIONS

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OPTOELECTRONICS

Guide to Industrial Applications

Introduction

As one of the world´s leading suppliers of infrared emitters, photo detectors, optocouplers, and optical sensors, Vishay Intertechnology 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, the intensity of a surface emitter, the optical isolation of an optocoupler, or object detection with 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. This guide provides product recommendations for key applications.

Applications

There are literally thousands of applications that use an infrared emitter, photo detector, or optical sensor. Twelve key applications will be covered in the following pages.

- Illumination
- Smoke and Flame Detectors
- Long-Range Presence and Proximity
- Short-Range Presence and Proximity
- Ambient Light Sensors
- Touch Control
- Safety Barriers / Light Curtains
- Motor Control AC Variable-Speed Industrial Drives
- Remote Control
- Data Transmission
- Isolated Industrial Communications

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Illumination

Security cameras are nearly everywhere, and where they are not, they soon will be. Most crimes are committed after dark. Security cameras need infrared illumination to be effective at night. To illuminate the field of view of the cameras, infrared emitters may be on for up to 16 hours per day. The two critical performance factors used in choosing an infrared emitter are radiant intensity and degradation. High radiant intensity yields longer illumination distance and greater resolution. Low degradation minimizes resolution loss over time. If the emitters degrade, resolution and range are reduced, which makes the cameras less effective.

Industry's Best Performing 5 mm Emitters

Vishay's TSHG5210 and TSHG5410 infrared emitters outperform the competition in radiant intensity and minimum degradation. Adding to their competitive edge, the TSHG5210 and TSHG5410 can be driven at 100 mA DC, while the competition recommends only 50 mA. The peak wavelength of these emitters is 850 nm, matched to security camera sensors.

	Competitors			Vishay	
	A	B	C	TSHG5210	TSHG5410
Intensity (mW/sr)	171	107	130	230	90
4000 h Degradation (100 mA)	up to 60 %			< 5 %	< 5 %

Closed Circuit TV in HD

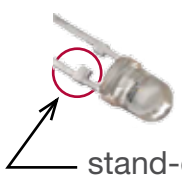
One Surflight VSMY7850X01 can replace anywhere from 10 to 20 standard 5 mm emitters currently used in today's cameras. Instead of 40 emitters, security cameras will have only 4. The field of view can remain the same or can be tailored using external lenses to achieve HD resolution.

Additional Applications

- Automotive
  - Drowsy driver
  - Illumination for heads-up display
- Machine vision

Emitters

Mounting	Package	Part Number	Angle of Half Intensity (±°)	Radiant Intensity (mW/sr)	Rise and Fall Time (ns)	Peak Wavelength (nm)
Through-hole	5 mm	TSHG5210	10	230	20	850
		TSHG5410	18	90	20	850
		TSHG6210	10	230	20	850
		TSHG6410	18	90	20	850
SMD	Dome lens	VSMY2850	10	90	10	850
	PLCC-2	VSMY3850	60	150	15	850
	Little Star®	VSMY7850X01	60	170	20	850
		VSMY7852X01	60	42	15	850



Stand-offs limit how far the lead can be inserted in the through- hole of the PCB. The TSHG5xxx emitters feature a stand-off.

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Smoke and Flame Detection

Depending on the combustible material, a fire emits light in multiple spectrums: ultraviolet (UV), visible, near infrared, and far infrared. Standard smoke detectors used in homes operate on a reflective technology where the smoke particles reflect infrared light that is then received by a photo detector. Consumer smoke detectors use 5 mm emitters with a peak wavelength of 940 nm. Recent studies indicate that the shorter wavelength of 870 nm can be more effective at detecting particles. In industrial applications where the combustible material varies widely, multiple sensing technologies are used.

TEMD5080X01 Product Focus

For sensing UV, visible, and infrared light, the TEMD5080X01's overall spectral sensitivity range of 350 nm to 1100 nm includes UV radiation, visible light, and near-infrared radiation. The TEMD5080X01 is a PIN photodiode with 300 % higher UV sensitivity at 400 nm compared to standard PIN photodiode chip technology.

Photo Detectors

New Products

VSLY5850 – 5 mm emitter

- 850 nm peak wavelength
- ± 3° angle of half intensity
- 600 mW/sr at 100 mA
- I_e = 6.0 mW/sr at 1 A
- I_V = 55 mW at 100 mA

VBPW34FAS, -SR

- Direct replacement for Osram parts
- Lower forward voltage of 1.0 V
- Wider angle of half sensitivity of ± 65°

Mounting	Package	Part Number	Angle of Half Sensitivity (±°)	Photo Current	Spectral Sensitivity (nm)	Peak Wavelength (nm)
Through-hole	5 mm	BPV10NF	20	60 mA	790 to 1050	940
		BPV22NF	60	85 (µA)	790 to 1050	940
SMD	SMD	VBPW34FAS	65	55 (µA)	780 to 1050	950
		VBP104FAS		35 (µA)	780 to 1050	950
		TEMD5080X01		60 (µA)	350 to 1100	940
	Dome lens	VEMD2020X01	12	12 (µA)	750 to 1050	950
		VEMD2000X01	12	12 (µA)	750 to 1050	950

Emitters

Mounting	Package	Orientation	Part Number	Angle of Half Intensity (±°)	Radiant Intensity (mW/sr)	Rise and Fall Time (µs)	Peak Wavelength (nm)
Through-hole	5 mm	Top view	VSLY5850	3	600	20	850
		Top view	TSFF5210	10	180	15	870
		Top view	TSAL6100	10	130	800	940
SMD	Dome lens	Reverse gullwing	VSMB2000X01	12	40	15	940
		Gullwing	VSMB2020X01	12	40	15	940
		Gullwing	VSMY2850G	10	100	10	850
		Reverse gullwing	VSMY2850RG	10	100	10	850

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Data Transmission

Transferring large amounts of data via infrared over long ranges requires an array of high-intensity emitters with extremely fast switching times to enable data communication at speeds up to 16 Mbit/s. Whether the application is infrared payment at toll collect stations like those found in Germany, Singapore, and Malaysia, or sending signals to infrared headphones for the hearing impaired in museums, concert halls, and other public venues, fast switching times are the key product parameter.

VSMF4720 and TSFF5510 Product Focus

For toll collect systems, Vishay introduced the VSMF4720, an 870 nm SMD infrared emitter with the industry's lowest forward voltage and highest radiant intensity of any such device in the PLCC2 package. In a leaded device, Vishay offers the TSFF5510, which has a viewing angle of ± 38°, enabling significantly better performance than standard 5 mm emitters. The combination of a wide viewing angle, high drive currents up to 1 A, and high switching speeds makes the VSMF4720 and TSFF5510 infrared emitters ideal for infrared data, audio, and video transmission.

VSMF4720 – PLCC2

- ± 60° angle of half intensity
- I_e = 16 mW/sr at 100 mA
- Switching at 15 ns

TSFF5510 – 5 mm

- ± 38° angle of half intensity
- I_e = 32 mW/sr at 100 mA
- Switching at 15 ns

New Products

- TSFF5410 φ = ± 22°
- TSFF5210 φ = ± 10°
- VSMF4710 (870 nm)

Photo Detectors

Mounting	Package	Part Number	Angle of Half Sensitivity (±°)	Data Rate		Transmit Range		Peak Wavelength (nm)	Spectral Bandwidth (nm)	Photo Current
				Low	High	Short	Long			
SMD	0805	TEMD7100X01		X	X	X				
	Dome lens	VEMD20..X01			X	X				
	SMD	TEMD5110X01	65		X		X	940	790 to 1050	55 µA
		TEMD5120X01			X		X	940	790 to 1050	35 µA
		VBPW34FAS..			X		X	950	780 to 1050	55 µA
		VBP104FAS..			X		X	950	780 to 1050	35 µA
	PLCC-2	VEMT3700F	60	X		X		940	850 to 1050	0.5 mA

Emitters

Mounting	Package	Part Number	Angle of Half Sensitivity (±°)	Data Rate		Transmit Range		Peak Wavelength (nm)	Radiant Intensity (mW/sr)	Rise and Fall Time (ns)
				Low	High	Short	Long			
SMD	0805	VSMB1940X01	60	X		X		940	6	15
		VSMY1850		X		X		850	15	10
	PLCC-2	VSML3710	60	X		X		940	8	500
		VSMB3940X01		X	X	X		940	13	15
		VSMF4710		X	X	X	X	870	10	15
		VSMF4720		X	X	X	X	870	16	15
	Dome lens	VSMB20..X01	12	X	X	X	X	850	40	15
		VSMG20...X01	12	X	X	X	X	850	35	20
		VSMY2850G, -RG	10	X	X	X	X	850	100	15
Through-hole	5 mm	TSFF5210	10	X	X	X	X	870	180	15
		TSFF5410	22	X	X	X	X	870	70	15
		TSFF5510	38	X	X	X	X	870	32	15

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Infrared Remote Control

Vishay is the world's leading supplier of remote control receivers used in the consumer electronics and light industrial markets. No other supplier offers a similar breadth of products, holders, application and technical support, and overall knowledge of infrared communication. Our customers have confidence that our IR receivers will receive the remote control signals while filtering out noise in the most demanding ambient environments. Vishay's IR receivers are used for remote control, 3D active glasses synchronization, and for transmisive and reflective sensors.

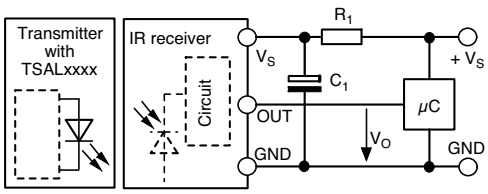
VSLB3940 and VSLB3948

Every remote control receiver needs an infrared emitter. Vishay has recently introduced a series of 3 mm diameter emitters with performance characteristics comparable to leading 5 mm emitters. The new VSLB3940 and VSLB3948 infrared emitters features an on-axis radiant intensity of 65 mW/sr and optical power of 40 mW at 100 mA — which represents about an 8 % performance improvement over the larger, 5 mm TSAL6200 in a 40 % smaller form factor.

Emitters

Part Number	Peak Wavelength (nm)	Package	Intensity (mW/sr)	Angle of Half Intensity (±°)	Rise / Fall Time (ns)
TSAL6100	940	5 mm (T1¾)	170	10	15
TSAL6200	940	5 mm (T1¾)	60	17	800
TSAL4400	940	5 mm (T1¾)	15	18	800
VSLB3940	940	3 mm (T1)	70	19	30
VSMB2948SL	940	Side View	20	25	15

A - Forward voltage at 100 mA



R_1 and C_1 are recommended for protection against EOS. Components should be in the range of 33 W < R_1 < 1 kW, C_1 > 0.1 μF.

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Infrared Remote Control

IR Receivers for Remote Control

Code, Applications	Carrier Freq. (kHz)	Best AGC	VSOP 2.0W x 2.0H x .76D (mm)	Belobog 3.95W x 3.95H x .8D (mm)	Belobog Shield 4.3W x 4.3H x 1.0D (mm)	Heimdall No-lens 6.8W x 3.0H x 2.3D (mm)	Heimdall 6.8W x 3.0H x 3.2D (mm)	Panhead 7.5W x 5.3H x 4.0D (mm)	Mold 6.0W x 6.95H x 5.6D (mm)	Minicast 5.0W x 6.95H x 4.8D (mm)	Cast 10W x 12.5H x 5.8D (mm)
Sony SIRCS 15 and 20 bit	40	2				TSOP75S40FW	TSOP75S40F				
Sony 12 bit		4				TSOP75S40FW	TSOP75S40F				
RC-5	36	4	VSOP58436	TSOP37436 TSOP57436	TSOP37436H TSOP57436H	TSOP75436W	TSOP75436	TSOP36436	TSOP34436	TSOP38436	TSOP31436
RC-6	36					TSOP77436W	TSOP77436	TSOP6436	TSOP4436	TSOP58436	
Panasonic	36.7										
NEC	38	4	VSOP58438	TSOP37438 TSOP57438	TSOP37438H TSOP57438H	TSOP75438W	TSOP75438	TSOP36436	TSOP34438	TSOP38438	TSOP31438
Sharp						TSOP77438W	TSOP77438	TSOP6438	TSOP4438	TSOP58438	
r-step											
r-step	56	4		TSOP57456	TSOP37456H TSOP57456H	TSOP75456W	TSOP75456	TSOP36456	TSOP34456	TSOP38456	TSOP31456
Thomson RCA						TSOP77456W	TSOP77456	TSOP6456	TSOP4456	TSOP58456	
MCIR	36	3 or 5	VSOP38336	TSOP37336 TSOP57336	TSOP37336H TSOP57336H	TSOP75536W TSOP77336W	TSOP75536 TSOP77336	TSOP36536 TSOP6336	TSOP34536 TSOP4336	TSOP38536 TSOP58336	TSOP31536 TSOP31336
Mitsubishi	38	3 or 5	VSOP38338	TSOP37338 TSOP57338	TSOP37338H TSOP57338H	TSOP75538W	TSOP75538	TSOP36538	TSOP34538	TSOP38538	TSOP31538
RECS-80 Code		3 or 5				TSOP77338W	TSOP77338	TSOP6338	TSOP4338	TSOP58338	TSOP31338
r-map		3 or 5									
XMP-1, XMP-2	38	3	VSOP38338	TSOP57338	TSOP57338H	TSOP75338W	TSOP75338	TSOP36338	TSOP34338	TSOP38338	TSOP31338
Presence sensor (Fixed gain)	38	---		TSSP57038	TSSP57038H			TSSP6038	TSSP4038	TSSP58038	
Proximity sensor	38	---		TSSP57P38	TSSP57P38H			TSSP6P38	TSSP4P38	TSSP58P38	
Code Learning/ Repeater	carrier out	---					TSMP77000	TSMP6000		TSMP58000	
		---							TSMP4138	TSMP58138	
		---							TSMP4138		TSMP1138

Note: Part dimensions shown in millimeter (mm)

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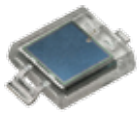
Meters

Electric, gas, and water meters use optoelectronic components to measure usage by monitoring an encoding wheel to detect tampering through the use of tilt sensors, and to read the meter and perform maintenance diagnostics. Smart meters are replacing the traditional electric meter in many countries. A smart meter is an advanced meter that identifies consumption in more detail than a conventional meter and often communicates that information via some network back to the local utility for monitoring and billing purposes. Smart meters measure not only total consumption but also when the energy was consumed. Many smart meters still include encoding wheels. They also provide for real-time diagnostics using infrared communication.

VBPW34FAS, -SR

- Direct replacement for Osram parts
- Low forward voltage of 1.0 V
- Wide angle of half-sensitivity of ± 65°
- Also available in reverse gullwing



Dome Lens Portfolio

- Low off-axis deviation of radiation
- Current portfolio includes angle of ± 15°
- Qualified for automotive applications
- Improved power performance

Emitters

Mounting	Orientation	Package	Part Number	Angle of Half Sensitivity (±°)	Radiant Intensity (mW/sr)	Peak Wavelength (nm)	Rise and Fall Time (ns)
SMD	Top view	Dome lens	VSMB20..X01	12	40	940	15
			VSMG20..X01	12	35	850	20
			VSMY2850	10	100	850	10
		0805	VSMB1940X01	60	6	940	15
		PLCC-2	VSMB3940X01	60	13	940	15
			VSML3710	60	8	940	500

Photo Detectors

Mounting	Type	Orientation	Package	Part Number	Angle of Half Sensitivity (±°)	Peak Wavelength (nm)	Spectral Bandwidth (nm)	Rise and Fall Time (ns)
SMD	PIN Photodiode	Top view	Dome lens	VEMD20..X01	15	940	750 to 1050	12
			0805	TEMD7100X01	60	950	750 to 1050	3
			SMD	VBPW34FAS..	65	950	780 to 1050	55
				VBP104FAS..	65	950	780 to 1050	35
			Dome lens	VEMD25..X01	15	940	750 to 1050	12
	Photo-transistor	Top view	Dome lens	VEMT20..X01	15	860	790 to 970	6000
			PLCC-2	VEMT3700F	60	950	850 to 1050	500

Ordering Information

Widebody High Isolation and High Speed Optocouplers			
Part Number	Data Rate	Package	Key Features
VOW137 VOW2611	10 MBd	Widebody, DIP-8, SMD-8	• Creepage > 10 mm • V_{IORM} = 1414 V • V_{IORM} = 8000 V
VOW135 VOW136	1 MBd	Widebody, DIP-8, SMD-8	• Creepage > 10 mm • V_{IORM} = 1414 V • V_{IORM} = 8000 V

VOWXX Widebody, High Isolation and High Creepage Couplers

- Widebody package with > 10 mm clearance and creepage distance
- High working voltage up to 1414 V
- High transient voltage 8000 V
- Data rate of 1 MBd and 10 MBd
- High operating temperature up to 100 °C
- Extreme high common mode transient immunity up to 40 kV/ µs typ
- Fulfills IEC/EN 61010-1 overvoltage protection category requirement

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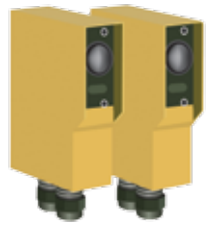
Safety Guards, Industrial Automation



Light curtains include an array of infrared transmitters that emit modulated and pulsed light, and a corresponding array of photo detectors to receive the light. When an object interrupts or breaks one or more beams, the control logic of the light curtain sends a stop signal to the guarded machine. A similar transmissive or interrrupter arrangement is used for automatic gates and garage doors or in industrial automation where product position, fill levels, and conveyor operation are monitored.

Light Curtain

The new AEC-Q101-qualified VEMD20x0X01 PIN photodiodes and VEMT20x0X01 phototransistors feature an operating temperature range of -40 °C to +100 °C, are available in 1.8 mm gullwing and reverse gullwing surface-mount packages, and have a matching emitter in the recently introduced high-intensity, high-speed VSMB20x0X01.

VEMx20x0X01

- 4-week floor life without baking
- 1 nA dark current
- Matched emitter pairing

Photo Detectors

Mounting	Type	Orientation	Package	Part Number	Angle of Half Sensitivity (±°)	Peak Wavelength (nm)	Spectral Bandwidth (nm)	Photo Current
SMD	PIN Photodiode	Top view	Dome lens	VEMD20..X01	15	940	750 to 1050	12 µA
			0805	TEMD7100X01	60	950	750 to 1050	3 µA
			SMD	VBPW34FAS..	65	950	780 to 1050	55 µA
				VBP104FAS..	65	950	780 to 1050	35 µA
			Dome lens	VEMD25..SLX01	15	940	750 to 1050	12 µA
	Photo-transistor	Top view	Dome lens	VEMT20..X01	15	860	790 to 970	6 mA
			PLCC-2	VEMT3700F	60	950	850 to 1050	35 µA
			Dome lens	VEMT25..SLX01	15	860	790 to 970	6 mA

Emitters

Mounting	Orientation	Package	Part Number	Angle of Half Intensity (±°)	Radiant Intensity (mW/sr)	Peak Wavelength (nm)	Rise and Fall Time (ns)
SMD	Top view	Dome lens	VSMB20..X01	12	40	940	15
			VSMG20..X01	12	35	850	20
			VSMY2850	10	100	850	10
		0805	VSMB1940X01	60	6	940	15
		PLCC-2	VSMB3940X01	60	13	940	15
			VSML3710	60	8	940	500
	Side view	Dome lens	VSMB2943SLX01	25	20	940	15
			VSMY2853SL	28	35	850	10

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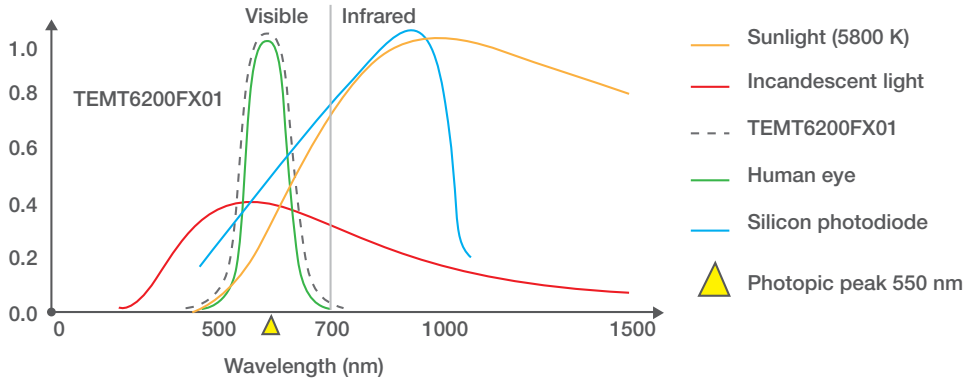
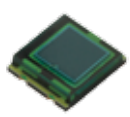
Ambient Light Sensors

Optimizing the backlight intensity of a display based on the ambient light ensures that operators get a clear view of a machine's status. Meter reading equipment and ruggedized hand-held sensors are used in direct sunlight conditions as well as in dark utility tunnels. An ambient light sensor helps optimize the visibility of the display while extending the battery life by controlling LCD intensity. As cities and municipalities around the world begin to implement solid-state lighting, these lights will also feature ambient light sensors. Not only will the sensors be used to turn on and turn off the lights, they will also be used to ramp up the intensity and slowly dim the lights during dusk and dawn.

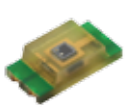


Phototransistors and Photodiodes

Output	Part Number	Mounting	Size (mm)	Peak Wavelength (nm)	Bandwidth (nm)	Angle of Half Sensitivity (±°)	Light Current Standard A (µA)
Phototransistor	TEMT6200FX01	SMD	1.2 x 2.0 x 0.85	550	450 to 610	60	12
	TEMT6000X01	SMD	2.0 x 4.0 x 1.0	570	430 to 800	60	50
	TEPT5700	Leaded	5 mm, flat top	570	430 to 800	50	75
	TEPT5600	Leaded	5 mm	570	430 to 800	20	350
	TEPT4400	Leaded	3 mm	570	430 to 800	30	200
Photodidode	TEMD6010FX01	SMD	2.0 x 4.0 x 1.0	540	430 to 610	60	0.04
	TEMD5510FX01	SMD	4.2 x 5.0 x 1.1	540	430 to 610	65	1
	TEMD6200FX01	SMD	1.2 x 2.0 x 0.85	540	430 to 610	60	0.04
	BPW21R	Leaded	TO5 - 8 mm	565	420 to 675	50	0.9


TEMD5510FX01

TEMT6200FX01
TEMD6200X01


TEMD6010FX01
TEMT6000X01

TEPT5600

TEPT4400

TEPT5700

BPW21R

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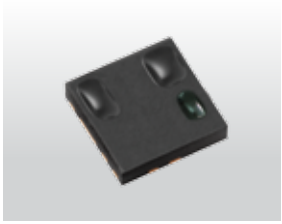
Integrated Proximity and Ambient Light Sensors

VCNL3020, VCNL4020

VCNL4020X01



VCNL4010

The VCNL4010, VCNL4020, and VCNL4020X01 are fully integrated proximity and ambient light sensors. Fully integrated means they contain the infrared emitter and photo detector for proximity, an ambient light sensor, a signal processing IC, and I^2C communication interface. VCNL4020X01 is qualified for automotive applications. It has a maximum operating temperature of 105 °C. The VCNL3020 supports only proximity sensing; it does not contain an ambient light sensor. With full 16-bit resolution for both the proximity and ambient features, user-defined interrupt levels, and multiple packaging options, the VCNL portfolio will fulfill your requirements.

Features

- Proximity function
  - 16-bit resolution
  - Excellent crosstalk immunity
  - Programmable LED drive current from 10 mA to 200 mA in 10 mA steps
  - Programmable measurement rate from 1 Hz to 250 Hz
  - Proximity distance up to 20 cm (8 in.)
  - Includes driver for an external emitter for increased range
- Ambient light function
  - Built-in ambient light PIN photodiode with close to human eye sensitivity characteristic
  - 16-bit dynamic range for ambient light detection from 0.25 lx to 16 klx
  - 100 Hz and 120 Hz flicker noise rejection

Applications

- Smart phone display control
- Digital camera display control
- Monitor sleep / wake function for displays on ATMs and Vending machines
- Touchless light switch
- Refrigerator water / ice dispenser
- Paper towel dispenser
- Soap dispenser
- Automatic toilet flushing
- Automatic water faucet
- Industrial door or latch switch
- Proximity guide for pick and place equipments

GESTURE CONTROL

SMARTPHONES

REARVIEW MIRROR

LCD DISPLAY

SOAP DISPENSER

TOWEL DISPENSER

TOUCHLESS LIGHT SWITCH

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VCNL Product Family

PART NUMBER	PACKAGE		INTEGRATED COMPONENTS			OPERATING TEMP RANGE (°C)	AEC-Q101
	L X W (mm)	HEIGHT (mm)	INFRARED EMITTER	PROXIMITY DETECTOR	AMBIENT LIGHT SENSOR		
VCNL4020X01	4.90 x 2.40	0.83	•	•	•	-40 to 105	•
VCNL3020	4.90 x 2.40	0.83	•	•	x	-25 to 85	x
VCNL4010	3.95 x 3.95	0.75	•	•	•	-25 to 85	x
VCNL4020	4.90 x 2.40	0.83	•	•	•	-25 to 85	x

Gesture Recognition

In applications in which safety might be compromised, such as when a user must find a knob or push a specific button, a user can operate a machine through gestures in a wide active field where gross movements can replace fine movements for a simple and more intuitive interface with the machine.

A streamlined method of adding touch-less swipe right, swipe left, proximity and tap control to any device by using a VCNL4020 and two discrete infrared emitters. The VCNL4020 Gesture Control Sensor Board is the ideal tool to quickly prove a design concept and to start initial hardware and software gesture control development.

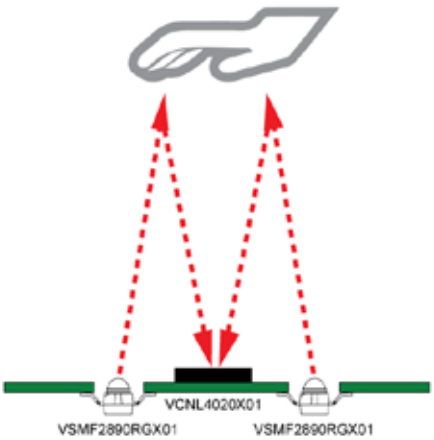

Fig.1: Vishay's gesture-control system consists of just two IR LEDs and a single proximity sensor

The detection of gestures using the gesture control sensor board is accomplished by comparing the signal of infrared light coming from each of the VSMF2890RGX01 emitters. The emitted infrared light is reflected from an object, for example a hand, and then detected by the VCNL4020 proximity sensor. In order to differentiate between the signals coming from either emitter, the emitters are multiplexed, meaning they are pulsed one after the other in quick succession. The proximity signal is then read out between each pulse via the I2C bus interface. When a hand is in the proximity of the board, it will reflect more signal from the emitter it is directly located over. If the hand is then moved across the board, the signal from one emitter will increase before the other. It is this time difference of signal strength that is analyzed to determine if a swipe gesture was made and in which direction.

Evaluation Kits

An evaluation kit is available, along with an add-on demo board for each of the sensors. Contact any catalog distributor or a local Vishay sales representative to purchase the Sensor Starter Kit. Please contact sensorstechsupport@vishay.com in order to recieve the VCNL4010, VCNL4020X01, VCNL3020, or VCNL4020 gesture control add-on boards.

VCNL4010

VCNL4020

VCNL3020

VCNL4020X01

VCNL4020 Gesture Control Board

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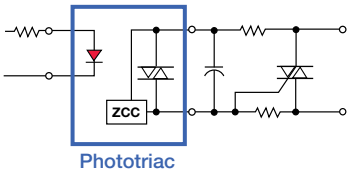
Phototriacs for Motor Control

The photo detector in a phototriac is a photo sensitive TRIAC, sometimes called an optotriac. Phototriacs are used to switch on and off AC loads. Turning on the infrared emitting diode allows current to flow to the AC load. Phototriacs are primarily used as a silicon-controlled rectifier (SCR) or as a pre-driver to a TRIAC. They are commonly found in industrial applications such as in motor control. As optocouplers, they isolate the low-voltage control circuitry and people from the high-voltage mains.

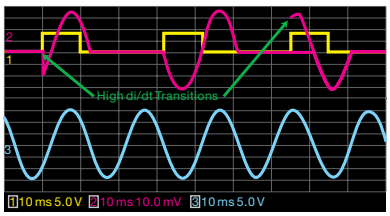
Phototriacs

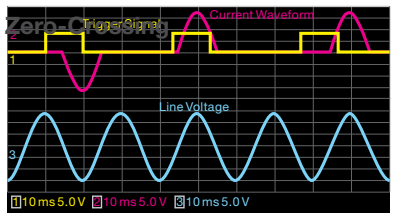
Phototriacs can be zero-crossing and non-zero-crossing. This simply describes when the output current turns on. In a non-zero-crossing phototriac, the output current turns on when the infrared emitting diode turns on, regardless of the AC voltage phase. In the diagrams below, the yellow line is the input current and the fuscia line is the output current. Note that when the input current goes high (on), the output current turns on immediately. For a zero-crossing phototriac, the output turns on when the infrared diode turns on and when the AC voltage crosses zero. In the diagram, when the yellow input current goes high, the output does not immediately turn on. Only when the AC voltage crosses zero does the output go high. Both turn off when the infrared emitter turns off and the AC line crosses zero.



Phototriac

Non-Zero-Crossing





	Part Number	Package	V_{ISO} (V_{RMS})	I_{FT} (mA)	V_{DRM} (V)	dV/dt min. (V/µs)	Operating Temperature (°C)
Zero-Crossing	IL410/IL4108	DIP-6 SMD-6	5300	2	600	10 000	- 40 to 100
	VO4154 Series			1.6, 2, 3		5000	
	VO3062			10		1500	
	VO3063			5			
Non-Zero-Crossing (Random Phase)	IL420/IL4208			2		10 000	
	VO4254 Series			1.6, 2, 3		5000	
	VO3052			10		1500	
	VO3053			5			
	K3101			15	250	10	- 40 to 85
	K3020			30	500		
	VOM3052	SOP-4	3750	10	600	1500	- 40 to 100
	VOM3053			5			
	VOM160R/P/T			5, 7, 10		500	

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Long-Range Presence and Proximity Sensors

Long-range sensors from many suppliers adjust their detection threshold depending on the amount of ambient light and optical noise present in the environment. When noise is present, the gain of the amplifier is reduced to avoid false detections. When exposed to lower light levels, the adjustable gain makes the receiver too sensitive. It will detect reflected or stray light.

Digital Output

Vishay's TSSP4038, TSSP6038, and TSSP58038 eliminate these problems by featuring a *fixed gain*. With a fixed gain, the detection threshold and resulting detection distance is fixed. Once the design of the optical parameters, such as the intensity of the emitter, the aperture in front of the receiver, and the alignment of emitter and detector are determined, the sensor will have stable, repeatable performance under all lighting conditions. *The output is a simple digital state indicating a detection.*

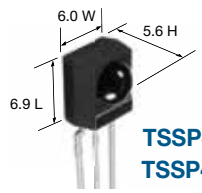
Analog Output: Proximity

Many applications require a reflective sensor that detects not only presence but also the strength or weakness of the reflected signal. Instead of a fixed detection threshold, analog information from the sensor is needed. This is possible with Vishay's infrared sensors with variable gain, also called the "P" or proximity sensors: TSSP4**P**38, TSSP6**P**38, and TSSP58**P**38.

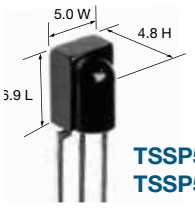
Fast Response Time

People's lives depend on light curtains and perimeter guards having fast reaction times. Unfortunately, some sensors require the infrared beam to be interrupted for up to 5 ms before detection. The 300 µs response time of Vishay's sensors is much faster. For the fastest response time, a continuous 38 kHz signal should be used. For the longest distance, we recommend driving the TSAL6100 infrared emitter using a 38 kHz burst.

Part Numbers*		Supply Current (mA)	Supply Voltage (V)	Response Time (µs)	Light curtain Range (m)	Reflective Range (m)
Presence (Digital Out)	Proximity (PWM Out)					
TSSP4038 TSSP58038 TSSP6038 TSSP77038 TSSP57038	TSSP4P38 TSSP58P38 TSSP6P38 TSSP77P38 TSSP57P38	0.7	2.5 to 5.5	300	30	0.2 to 2



TSSP4038
TSSP4P38



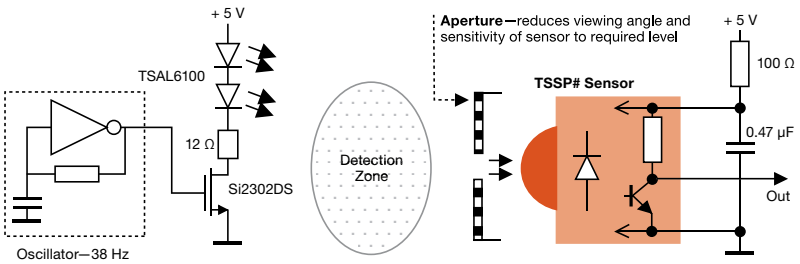
TSSP58038
TSSP58P38

TSSP77038
TSSP77P38

TSSP6038
TSSP6P38

TSSP57038
TSSP57P38

* 38 kHz sensors; other modulation frequencies available by request



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0603 ChipLED Indicator LEDs

Just as they are used in the unlimited power supply panel to the right, 0603 ChipLED LEDs are commonly used as indicators in backlighting applications.

VLMx1300

- Small size – 1.6 mm x 0.8 mm x .55 mm
- Wide viewing angle - 135°
- Exceptional brightness

B	G^P	G	Y	O	R^S	W
Blue	Green	Green	Yellow	Orange	Red	White

0603 Part Number	Color	Dominant Wavelength (nm)			Luminous Intensity (mcd)			at I_F (ma)
		Min (x)	Typ	Max (y)	Min	Typ	Max	
VLMS1300	Super red	–	631	–	18	54	–	20
VLMO1300	Soft orange	–	605	–	45	90	–	20
VLMY1300	Yellow	584	–	597	28	–	180	20
VLMG1300	Yellow green	567	–	576	18	35	–	20
VLMTG1300	True green	520	–	535	71	–	450	20
VLMB1300	Blue	465	–	475	28	–	180	20
VLMB1310*	Blue	465	–	475	28	–	180	20
VLMW1300	White	.274 to .334	6 bins	.226 to .343	45	–	180	5

* With ESD protection diode

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Motion Control
Reflective and Interrupter Sensors

In manufacturing environments, applications for optoelectronics products are virtually endless. Here we list a few examples where Vishay's reflective and transmissive sensors are used.

Application Examples

- Control the speed of a spinning shaft
- Limit the slack in a drive belt
- Enable controlled shutdown of an auto loom machine when a thread breaks
- Monitor the revolutions in a gas or water meter
- Monitor fluid levels in an overfill tank
- Check the direction and speed of a spinning wheel
- Sense stack height
- Guide a movable stage
- Check contents of a package
- Check packaging seats
- Monitor adhesive dispensing
- Industrial optical switch
- Interface to encoding wheels and strips
- Detect the status of a door or panel, inserted coin, or credit or ATM card
- Printers, copier, scanners, computer servers, networking equipment, vending machines, ATM machines

Benefits

- Fully AEC-Q101 qualified
- Released for high operating temperatures up to 125 °C
- Moisture sensitivity level (MSL): 1 (Unlimited floor life)
- Available in different dome heights for additional mechanical tolerance.

Reflective Sensors, Analog Output

Part Number[1][3]	Package		Peak Operating Range[2] (mm)	Peak Operating Distance (mm)	Typical Output Current (mA)
	L x W (mm)	H (mm)			
TCND5000[3]	6.0 x 4.3	3.75	2 to 25	6.0	0.0015
TCRT1000/1010	7.0 x 4.0	2.5	0.2 to 4.0	1.0	0.5
TCRT5000(L)	10.2 x 5.8	7.0	0.2 to 15	2.5	1
CNY70	7.0 x 7.0	6.0	0 to 5.0	0	1

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

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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)	Operating Temp. Max.
	L x W (mm)	H (mm)					
TCPT1300X01	5.5 x 4.0	4.0	3.0	0.3	0.6	20 / 30	+105 °C
TCUT1300X01[2]	5.5 x 4.0	4.0	3.0	0.3	0.6	20 / 30	+105 °C
TCPT1350X01	5.5 x 4.0	4.0	3.0	0.3	1.6	9 / 16	+125 °C
TCUT1350X01[2]	5.5 x 4.0	4.0	3.0	0.3	1.6	9 / 16	+125 °C
TCPT1600X01[4]	5.5 x 4.0	5.7	3.0	0.3	1.6	9 / 16	+105 °C
TCUT1600X01[2][4]	5.5 x 4.0	5.7	3.0	0.3	1.6	9 / 16	+105 °C
TCST1030	8.3 x 4.7	8.15	3.1	none	2.4	15 / 10	+85 °C
TCST1103	11.9 x 6.3	10.8	3.1	1.0	4.0	10 / 8	+85 °C
TCST1202	11.9 x 6.3	10.8	3.1	0.5	2.0	10 / 8	+85 °C
TCST1230	9.2 x 4.8	5.4	2.8	0.5	2.0	15 / 10	+85 °C
TCST1300	11.9 x 6.3	10.8	3.1	0.25	0.5	10 / 8	+85 °C
TCST2103	24.5 x 6.3	10.8	3.1	1.0	4.0	10 / 8	+85 °C
TCST2202	24.5 x 6.3	10.8	3.1	0.5	2.0	10 / 8	+85 °C
TCST2300	24.5 x 6.3	10.8	3.1	0.25	0.5	10 / 8	+85 °C
TCST5250	14.3 x 6.0	9.5	2.7	0.5	1.5	15 / 10	+85 °C

Notes: [1] All optical sensors have phototransistor output
[2] Dual channel
[3] Products ending in "X01" are AEC-Q101 qualified
[4] Pending release

TCPT13x0X01

TCUT13x0X01

TCST1030

TCST1230

TCST1x0x

TCST2x0x

TCPT1600X01

TCUT1600X01

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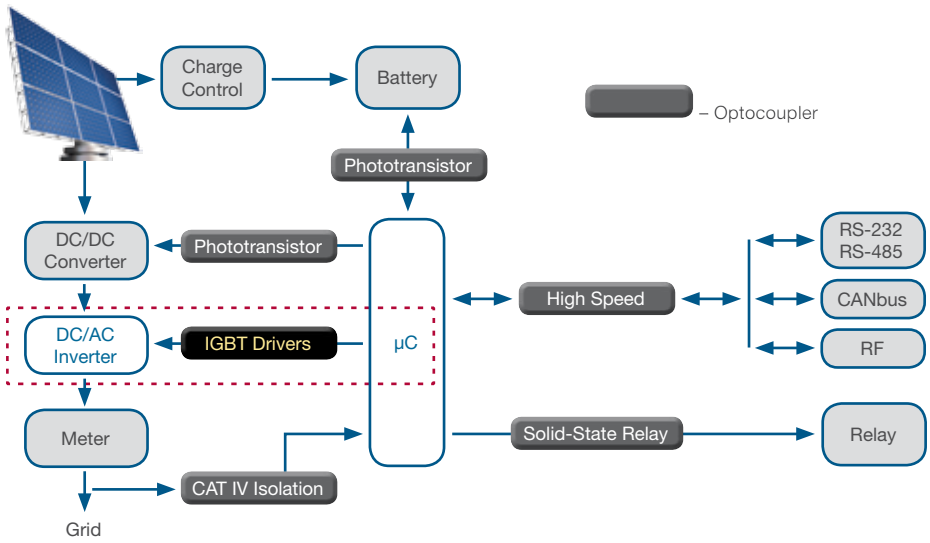
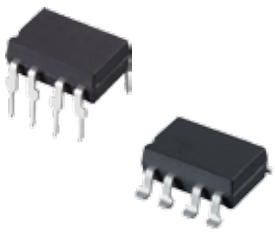
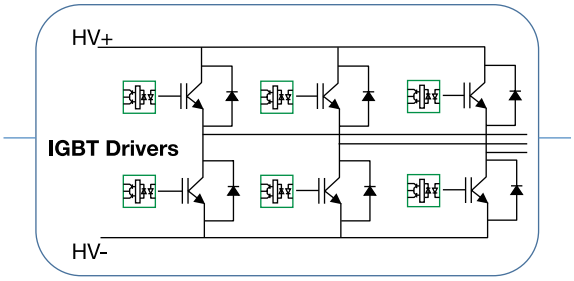
Solar and Wind IGBT Drivers

Optically isolated IGBT drivers are used to isolate the high-voltage stage of an DC/AC inverter from the low-voltage control circuitry. Isolation is required for safety purposes because string inverters are inverting a high-voltage DC output from the solar panels to a high-voltage output that will be fed to the utility grid. This high voltage must be isolated from the user accessible low-voltage circuitry. Optically isolated IGBT drivers also allow the designers to separate low-noise control circuitry from noisy high-voltage and high-current circuitry, which improves performance, shrinks product size, and simplifies the design process.







Optically Isolated IGBT Drivers

Part Number	Output Current, I_o (A)	Operating Voltage Range, V_{CC} (V)	Pulse Width Distortion, PWD max (µs)	Supply Current, I_{CC} (mA)	Common Mode Rejection, CMR min. (kV/µs)	V_{IORM} (V_{RMS})	External Creepage Distance (mm)
VO3120	2.5	15 to 32	0.2	2.5	25	890	8
VO3150A	0.5						
VOL3120	2.5				48	1050	8
VOW3120	2.5				25	1414	10

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Optical Isolation - Low Input Current (I_F) Optocouplers

Optocouplers are designed to protect sensitive control circuitry and people from high-voltage transients or spikes. They isolate the low- and high-voltage sides by using an infrared emitter to transmit the control signal to a photo detector. There is no way for the voltage spike to get from one side to the other; they are galvanically isolated. The 4-pin couplers are the most commonly used optocouplers. Low input current, high isolation voltage, long creepage and long distance through the insulation, and competitive pricing are features of Vishay's 4-pin optocoupler portfolio.

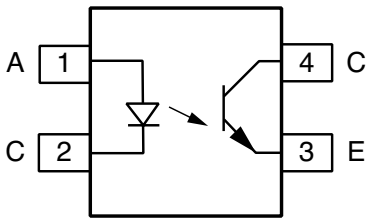
Application Examples

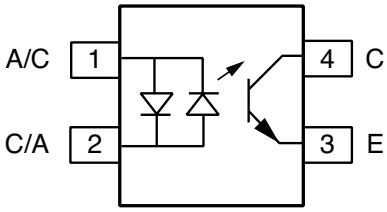
Power Supplies
- Isolated DC converters
- SMPS
- AC adapters
- DC/DC bricks

Industrial I/O
- Isolated 4 mA to 20 mA control loops
- Isolated serial communications

Smart Grids
- Grid voltage detection
- ZC detection
- Communication isolation

Industrial Automation
- Switching supply
- I/O isolation
- Feedback control loops





AC Input

Input Current of 5 mA

I_F = 5 mA		Part Number	CTR Range (%)	Isolation Voltage	Creepage Distance	Temperature Range
DIP-4, SMD-4		VO617A	50 to 600	5300 V_{RMS}	≥ 7 mm	-55 °C to +110 °C
SOP-4 miniflat		VOM617A	50 to 600	3750 V_{RMS}	≥ 5 mm	-55 °C to +110 °C
LSOP-4 long creepage		VOL617A	50 to 600	5000 V_{RMS}	≥ 8 mm	-55 °C to +110 °C
SSOP-4 half-pitch, miniflat		VOS617A	50 to 600	3750 V_{RMS}	≥ 5 mm	-55 °C to +110 °C

[1]See datasheets for binning and part ordering information

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Input Current of 1 mA

I_F = 1 mA		Part Number	CTR Range (%)	Isolation Voltage	Creepage Distance	Temperature Range
DIP-4, SMD-4		VO618A	50 to 600	5300 V_{RMS}	≥ 7 mm	-55 °C to +110 °C
SOP-4 miniflat		VOM618A	50 to 600	3750 V_{RMS}	≥ 5 mm	-55 °C to +110 °C
LSOP-4 long creepage		VOL618A	50 to 600	5000 V_{RMS}	≥ 8 mm	-55 °C to +110 °C
SSOP-4 half-pitch, miniflat		VOS618A	50 to 600	3750 V_{RMS}	≥ 5 mm	-55 °C to +110 °C

[1]See datasheets for binning and part ordering information

AC Input

Forward Current	Package		Part Number	CTR Range (%)	Isolation Voltage	Creepage Distance	Temperature Range
I_F = 5 mA AC input	SSOP-4 half-pitch miniflat		VOS627A	50 to 600	3750 V_{RMS}	≥ 5 mm	-55 °C to +110 °C
I_F = 1 mA AC input	LSOP-4 long creepage		VOL628A	50 to 600	5000 V_{RMS}	≥ 8 mm	-55 °C to +110 °C
	SSOP-4 half-pitch, miniflat		VOS628A	50 to 600	3750 V_{RMS}	≥ 5 mm	-55 °C to +110 °C

[1]See datasheets for binning and part ordering information

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Industrial Solid-State Relay, Single-Component Solutions
Off-the-Shelf Integrated SSR Solutions

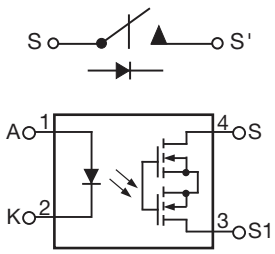
Vishay has a wide range of integrated solid state relay solutions. These are available in DIP, SDIP (DIP with SMD lead forms), and SMD packages. They range in output voltage from 60 V to 400 V, and in current from 100 mA to 2 A.

Application Examples

- Programmable logic controller I/O relays
- High-voltage mechanical relay replacement
- Industrial testers
- Integrated industrial sensor modules
- Welding equipment
- Heater controllers

Features

- Low output leakage current (> 1 µA)
- Load voltage = load DC voltage
- No moving parts
- Small form factor
- No contact arcing
- High isolation voltage (up to 5300 V)
- Available in through-hole and SMD packages



	LH1546AT	**LH1546AD**	**LH1525AT**	**VO14642AT**	**LH1526XX**
Load current	120 mA	120 mA	250 mA	2000 mA	125 mA
Load voltage	350 V	350 V	400 V	60 V	400 V
V_{ISO}	3750 V	5300 V	5300 V	5300 V	5300 V
R_{ON}	35 Ω	35 Ω	36 Ω	0.25 Ω	36 Ω

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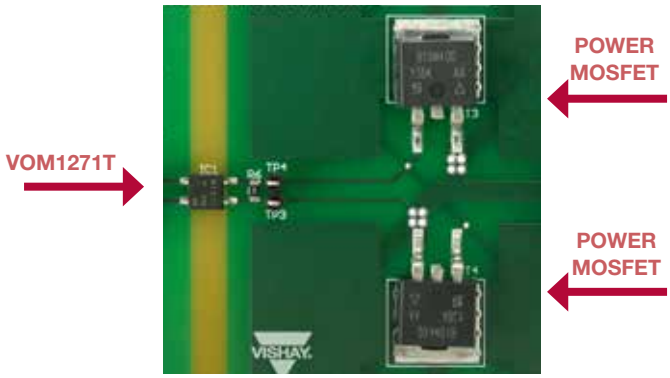
MOSFET High-Power Solid-State Relay Solutions
PV MOSFET Driver-Based High-Power Solid-State Relay Solutions

Vishay's portfolio of standalone PV MOSFET drivers allow customers to economically implement board-level solid-state replacements to high-power mechanical SSRs, with the greatest degree of simplicity and minimum number of parts. This makes the replacement of high-power mechanical parts possible for applications that would otherwise require costly high-power industrial relay modules.

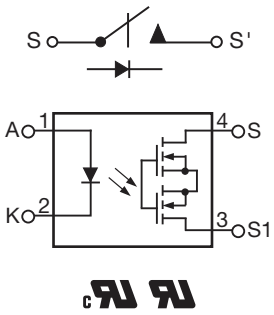
Application Examples

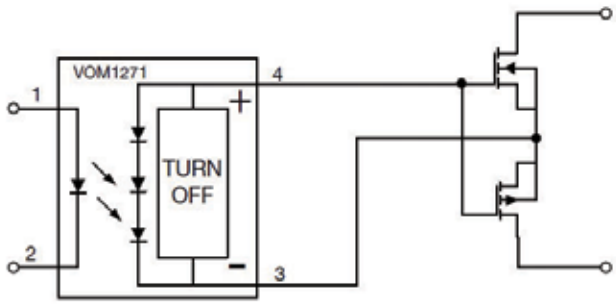
- Industrial motor controls
- "Hockey puck" SSR replacements
- Heater controllers
- Fan controllers
- Pump controllers
- Solenoid drivers



Features

- No need for secondary side driver supply
- Small form factor
- Single-component power MOSFET driver solution





Bidirectional MOSFET Driver Application

	VOM1271T	**VO1263**
I_{SC} (I_F = 20 mA)	30 µA	21.0 µA
V_{OC} (I_F = 20 mA)	8.7 V	14.7 V
V_{ISO}	4500 V	5300 V

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AC Variable-Speed Industrial Drives

Vishay's portfolio allows customers to cost-effectively isolate the power stages of high-power switching stages. The isolation provided by these parts can be used to design circuits that are both safe and robust to electrical noise interference.

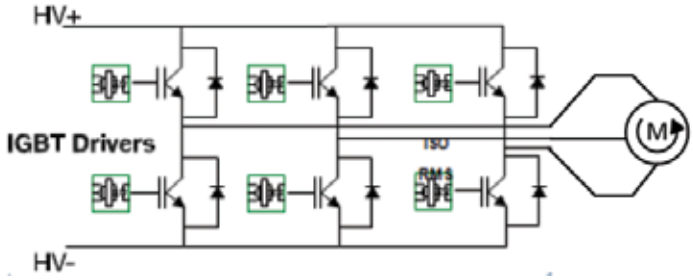
Application Examples

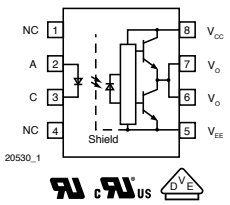
- PWM industrial AC variable speed drives
- PWM heater controllers
- PWM fan controllers
- PWM solenoid drivers

Optically Isolated IGBT / MOSFET

Features

- Low propagation delay
- High V_{CC} operation
- Low quiescent current
- High output current drive
- High noise isolation
- High working and transient voltage isolation

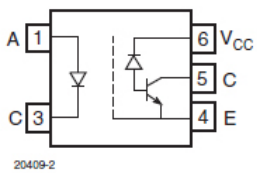


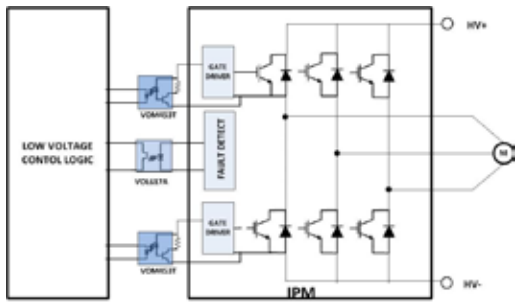
		VO3120	VO3150A	VOL3120	VOW3120
	I_{OUT}	2.5 A	0.5 A	2.5 A	2.5 A
	I_{CC}	2.5 mA	2.5 mA	2.5 mA	2.5 mA
	V_{IORM}	890 V	890 V	1050 V	1414 V
	Package				

IPM Drivers

Features

- High noise isolation
- High voltage Isolation
- Flexible output configuration
- Low propagation delay

		VOM452T / VOM453T
	Data Rate	1 MBd
	V_{ISO}	3750 V
	CMTI	15000 V/µs
	Package	



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Isolated Industrial Communications High-Speed Optocouplers

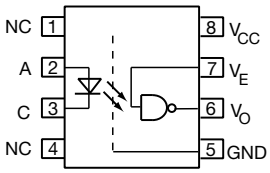
Vishay's portfolio of high-speed opto-isolators allows designers to isolate industrial communications busses such as RS485, Profibus, SPI buses, etc... It not only provides bullet-proof safety isolation but also provides extremely effective noise isolation, which is common in industrial environments.

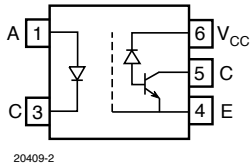
Application Examples

- Isolated RS485
- Isolated Profibus
- Isolated CAN
- Isolated SPI
- Isolated 4 mA to 20 mA com loops
- Smart metering

Features

- Up to 10 Mbps data speed
- High noise isolation
- High working and transient voltage isolation
- Wide variety of packages
- Open collector and totem pole outputs





Part Number	Data Rate	V_{IORM}	CMR	Creepage	DIP-8 Widebody	SMD-8 Widebody	DIP-8 400 mil	DIP-8	SMD-8	SOP-5	SOIC-8
6N1135	1 MBd	890 V	1 kV/µs	8 mm			√	√	√		
6N1136	1 MBd	890 V	1 kV/µs	8 mm			√	√	√		
6N135	1 MBd	890 V	1 kV/µs	8 mm			√	√	√		
6N136	1 MBd	890 V	1 kV/µs	8 mm			√	√	√		
SFH6135	1 MBd	890 V	1 kV/µs	8 mm			√	√	√		
SFH6136	1 MBd	890 V	1 kV/µs	8 mm			√	√	√		
SFH6325	1 MBd	890 V	1 kV/µs	8 mm			√	√	√		
SFH6326	1 MBd	890 V	1 kV/µs	8 mm			√	√	√		
SFH6345	1 MBd	890 V	15 kV/µs	8 mm			√	√	√		
VOM452T	1 MBd	707 V	15 kV/µs	5 mm						√	
VOM453T	1 MBd	707 V	15 kV/µs	5 mm						√	
VOW135	1 MBd	1414 V	1 kV/µs	10 mm	√	√					
VOW136	1 MBd	1414 V	1 kV/µs	10 mm	√	√					
SFH6701	5 MBd	890 V	1 kV/µs	8 mm			√	√	√		
SFH6702	5 MBd	890 V	1 kV/µs	8 mm			√	√	√		
SFH6705	5 MBd	890 V	1 kV/µs	8 mm			√	√	√		
SFH6711	5 MBd	890 V	2.5 kV/µs	8 mm			√	√	√		
SFH6712	5 MBd	890 V	2.5 kV/µs	8 mm			√	√	√		
SFH6720T	5 MBd	560 V	1 kV/µs	4 mm							√
SFH6721T	5 MBd	560 V	10 kV/µs	4 mm							√
SFH6731	5 MBd	890 V	1 kV/µs	8 mm			√	√	√		
SFH6732	5 MBd	890 V	10 kV/µs	8 mm			√	√	√		
6N137	10 MBd	890 V	25 kV/µs	8 mm			√	√	√		
VO2601	10 MBd	890 V	25 kV/µs	8 mm			√	√	√		
VO2611	10 MBd	890 V	25 kV/µs	8 mm			√	√	√		
VO2630	10 MBd	890 V	25 kV/µs	8 mm			√	√	√		
VO2631	10 MBd	890 V	25 kV/µs	8 mm			√	√	√		
VO4661	10 MBd	890 V	25 kV/µs	8 mm			√	√	√		
6N137A	10 MBd	630 V	1 kV/µs	8 mm			√	√	√		
VO0600T	10 MBd	560 V	1 kV/µs	4 mm							√
VO0601T	10 MBd	560 V	5 kV/µs	4 mm							√
VO0611T	10 MBd	560 V	1 5kV/µs	4 mm							√
VO0630T	10 MBd	560 V	1 kV/µs	4 mm							√
VO0631T	10 MBd	560 V	5 kV/µs	4 mm							√
VO0661T	10 MBd	560 V	15 kV/µs	4 mm							√
VOW137	10 MBd	1414 V	10 kV/µs	10 mm	√	√					
VOW2611	10 MBd	1414 V	25 kV/µs	10 mm	√	√					

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Through-Hole Emitters and Detectors

Emitters

Wavelength λ (nm)	Radiant Power Φ_E (mW)	Radiant Intensity I_e (mW/sr)		On/Off t_f t_r (ns)	3 mm	5 mm			
	100 mA	100 mA	1 A		φ = ± 22°	φ = ± 4°	φ = ± 10°	φ = ± 18 - 22°	φ = ± 38°
830	50	70	700	15				TSHG8400	
		160	1600	15			TSHG8200		
	55	32	320	15					TSHG5510
850	55	90	900	20				TSHG5410	
								TSHG6410	
		230	2300	20			TSHG5210		
							TSHG6210		
		450	4.5	20		VSLY5850			
870	55	32		15					TSFF5510
	50	70	700	15				TSFF5410	
	50	180	1800	15			TSFF5210		
890	40	10	100	30					
	48	65	650	30				TSHF5410	
	48	140	1400	30			TSHF5210		
940	40	32	320	15	TSAL4400				
	40	65		15	VSLB3940				

Photo Detectors

Output Type	Filter	Wavelength λ (nm)	Side View	5 mm Flattop	5 mm	3 mm	Flat, Top View
			ϕ = ± 60°	ϕ = ± 50°	ϕ = ± 20°	ϕ = ± 25°	ϕ = ± 65°
PIN Photo diode	None	900	BPW46		BPV10		BPW34
	Daylight blocking	950	BPV20F BPV21F		BPV10NF		BP104
Photo-transistor	None	850			BPW96C	BPW85B	
	Daylight blocking	920				TEFT4300	
		940	BPV22NF BPV23NF				
		950	BPV22F BPV23F				
	Infrared blocking	570		TEPT5700	TEPT5600	TEPT4400	

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Small-Angle, Surface-Mount Emitters and Detectors

Gullwing

Reverse Gullwing

Emitters with ± 10° Angle of Intensity

Part Number	Package Form	Peak Wavelength (nm)	Radiant Intensity (mΩ/sr)	Angle of Half Intensity (±°)	Rise Time (ns)
VSMY2850RG	Reverse gullwing	850	100	10	10
VSMY2850G	Gullwing	850	100	10	10
VSMG2020X01	Gullwing	850	40	12	20
VSMG2000X01	Reverse gullwing	850	40	12	20
VSMF2890RGX01	Reverse gullwing	890	40	12	30
VSMF2890GX01	Gullwing	890	40	12	30
VSMB2020X01	Gullwing	940	40	12	15
VSMB2000X01	Reverse gullwing	940	40	12	15

Gullwing

Reverse Gullwing

Photo Detectors With ± 15° Angle of Sensitivity

Part Number	Output Type	Package Form	Peak Wavelength (nm)	Spectral Bandwidth (nm)	Output Current	Angle of Sensitivity (±°)
VEMD2500X01	PIN Photodiode	Reverse gullwing	900	350 to 1120	12 µA	15
VEMD2520X01	PIN Photodiode	Gullwing	900	350 to 1120	12 µA	15
VEMD2000X01	PIN Photodiode	Reverse gullwing	940	750 to 1050	12 µA	15
VEMD2020X01	PIN Photodiode	Gullwing	940	750 to 1050	12 µA	15
VEMT2000X01	Phototransistor	Reverse gullwing	860	790 to 970	6 mA	15
VEMT2020X01	Phototransistor	Gullwing	860	790 to 970	6 mA	15
VEMT2500X01	Phototransistor	Reverse gullwing	850	470 to 1090	6 mA	15
VEMT2520X01	Phototransistor	Gullwing	850	470 to 1090	6 mA	15

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Large-Angle, Surface-Mount Emitters and Detectors

Emitters With ± 60° Angle of Intensity

Part Number	Package Form	Peak Wavelength (nm)	Radiant Intensity (mW/sr)	Angle of Half Intensity (±°)	Rise Time (ns)
VSMG2720	PLCC-2	830	14	60	15
VSMG2700	PLCC-2	830	10	60	20
VSMY3850	PLCC-2	850	17	60	10
VSMG3700	PLCC-2	850	10	60	20
VSMY7852X01	Little Star	850	42	60	8
VSMY7850X01	Little Star	850	170	60	15
VSMY1850X01	0805	850	10	60	10
VSMF4720	PLCC-2	870	16	60	15
VSMF4710	PLCC-2	870	10	60	15
VSMF9700	PLCC-2	890	8	60	50
VSMF3710	PLCC-2	890	10	60	30
VSML3710	PLCC-2	940	8	60	800
VSMB3940X01	PLCC-2	940	13	60	15
VSMB1940X01	0805	940	6	60	15
VSMS3700	PLCC-2	950	4.5	60	800

PLCC

0805

Little Star™

Emitters With ± 65° Angle of Sensitivity

Part Number	Output Type	Package Form	Peak Wavelength (nm)	Spectral Bandwidth (nm)	Output Current (µA)	Angle of Sensitivity (±°)
VBP104FAS	PIN Photodiode	Gullwing	950	780 to 1050	35	65
VBP104FASR	PIN Photodiode	Reverse gullwing				
VBP104S	PIN Photodiode	Gullwing	940	430 to 1100	35	65
VBP104SR	PIN Photodiode	Reverse gullwing				
VBPW34FAS	PIN Photodiode	Gullwing	950	780 to 1050	55	65
VBPW34FASR	PIN Photodiode	Reverse gullwing				
VBPW34S	PIN Photodiode	Gullwing	940	430 to 1100	55	65
VBPW34SR	PIN Photodiode	Reverse gullwing				

Gullwing Visible Filter

Reverst Gullwing with Visible Filter

Reverse Gullwing

Gullwing

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Medium-Angle, Surface-Mount Emitters and Detectors

Reverse Gullwing

Gullwing

Side View

Emitters With ± 25° and ± 28° Angle of Intensity

Part Number	Package Form	Peak Wavelength (nm)	Radiant Intensity (mW/sr)	Angle of Half Intensity (±°)	Rise Time (ns)
VSMY2853RG	Reverse gullwing	850	35	28	10
VSMY2853G	Gullwing	850	35	28	10
VSMY2853SL	Side view lens	850	35	28	10
VSMF2893RGX01	Reverse gullwing	890	20	25	30
VSMF2893GX01	Gullwing	890	20	25	30
VSMF2893SLX01	Side view lens	890	20	25	30
VSMB2943RGX01	Reverse gullwing	940	20	25	15
VSMB2943GX01	Gullwing	940	20	25	15
VSMB2948SL	Side view lens	940	20	25	15
VSMB2943SLX01	Side view lens	940	20	25	15

Photo Detectors With ± 35° Angle of Sensitivity

COMING SOON!

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