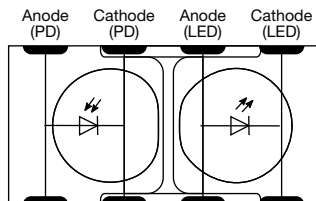


Optical Sensor With Photodiode Output for Optical Communication



LINKS TO ADDITIONAL RESOURCES



3D Models



Application Notes



Infographics

DESCRIPTION

The VCND2045X02, VCND2045SLX02 are an optical sensor in a miniature SMD package used for optical data communication and reflective encoding. It has a compact construction where the emitting light source and the detector are arranged in the same plane. The operating infrared wavelength is 860 nm. The detector consists of a silicon photodiode. The sensor analog output signal (photo current) is triggered by light from other device for optical data transmission.

FEATURES

- Package type: SMD
- Package form: top view, side view
- Detector type: photodiode
- Dimensions (L x W x H in mm): 4.4 x 2.25 x 1.9
- Emitter wavelength: 860 nm
- Moisture sensitivity level (MSL): 3
- AEC-Q102 qualified
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

- Wireless optical communication
- Position sensor
- Optical switch
- Optical encoder

PRODUCT SUMMARY - EMITTER

PART NUMBER	I_e (mW/sr) at $I_F = 24$ mA	ϕ (°)	λ_p (nm)	t_r (ns) ⁽¹⁾
VCND2045X02	65	± 10	860	9
VCND2045SLX02	65	± 10	860	9

Note

⁽¹⁾ Conditions as in "Basic Characteristics"

PRODUCT SUMMARY - PHOTODIODE

PART NUMBER	I_{Fa} (μA) at $E_e = 1$ mW/cm ² , $\lambda = 850$ nm, $V_R = 2$ V	ϕ (°)	λ_p (nm)	DAYLIGHT BLOCKING FILTER INTEGRATED
VCND2045X02	7.8	± 29	820	No
VCND2045SLX02	7.8	± 29	820	No

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME ⁽¹⁾	REMARKS
VCND2045X02	Tape and reel	MOQ: 1000 pcs	Top looker variant
VCND2045SLX02	Tape and reel	MOQ: 1500 pcs	Side looker variant

Note

⁽¹⁾ MOQ: minimum order quantity



ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT (EMITTER)				
Reverse voltage		V_R	5	V
Forward current		I_F	45	mA
Junction temperature		T_J	125	$^{\circ}\text{C}$
Thermal resistance junction to ambient	Top looker, JESD 51	R_{thJA}	200	K/W
	Side looker, JESD 51	R_{thJA}	250	K/W
OUTPUT (DETECTOR)				
Reverse voltage		V_R	5	V
SENSOR				
Total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	P_{tot}	120	mW
Ambient temperature range		T_{amb}	-40 to +110	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	-40 to +110	$^{\circ}\text{C}$
Soldering temperature	In accordance with Fig. 15	T_{sd}	260	$^{\circ}\text{C}$

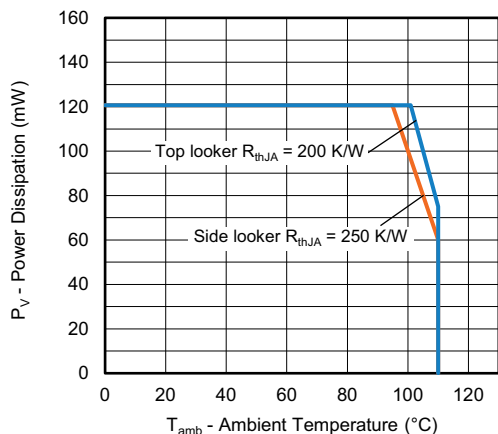
ABSOLUTE MAXIMUM RATINGS

Fig. 1 - Power Dissipation vs. Ambient Temperature

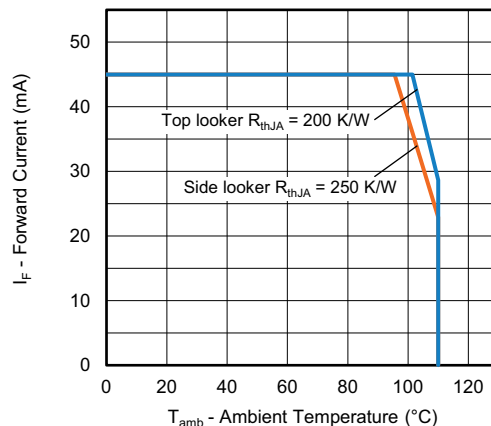


Fig. 2 - Forward Current vs. Ambient Temperature

BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT (EMITTER)						
Forward voltage	$I_F = 24\text{ mA}$	V_F	-	2.5	3.3	V
Temperature coefficient of V_F	$I_F = 24\text{ mA}$	TKV_F	-	-1.8	-	mV/K
Reverse current		I_R	Not designed for reverse operation			μA
Junction capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0$	C_j	-	19.5	-	pF
Radiant intensity	$I_F = 24\text{ mA}$, $t_p = 20\text{ ms}$	I_e	35	65	100	mW/sr
Radiant power	$I_F = 24\text{ mA}$, $t_p = 20\text{ ms}$	ϕ_e	-	12	-	mW
Angle of half intensity		ϕ	-	± 10	-	$^{\circ}$
Peak wavelength	$I_F = 24\text{ mA}$	λ_p	-	860	-	nm
Spectral bandwidth	$I_F = 24\text{ mA}$	$\Delta\lambda_{P, 0.5}$	-	37	-	nm



BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
OUTPUT (DETECTOR)						
Forward voltage	$I_F = 50\text{ mA}$	V_F	-	0.9	1.1	V
Reverse dark current	$V_R = 10\text{ V}$, $E = 0$	I_{ro}	-	0.01	10	nA
Diode capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0$	C_D	-	5.8	-	pF
Open circuit voltage	$E_e = 1\text{ mW/cm}^2$, $\lambda = 850\text{ nm}$	V_O	-	429	-	mV
Temperature coefficient of V_O	$E_e = 1\text{ mW/cm}^2$, $\lambda = 850\text{ nm}$	TKV_O	-	-2.6	-	mV/K
Short circuit current	$E_e = 1\text{ mW/cm}^2$, $\lambda = 850\text{ nm}$	I_k	-	7.8	-	μA
Temperature coefficient of I_k	$E_e = 1\text{ mW/cm}^2$, $\lambda = 850\text{ nm}$	TKI_K	-	0.1	-	%/K
Reverse light current	$E_e = 1\text{ mW/cm}^2$, $\lambda = 850\text{ nm}$, $V_R = 2\text{ V}$	I_{ra}	4	7.8	10	μA
Wavelength of peak sensitivity		λ_p	-	820	-	nm
Angle of half sensitivity		ϕ	-	± 29	-	$^{\circ}$
SENSOR						
Reverse light current	$V_R = 2\text{ V}$, $I_F = 24\text{ mA}$, $d = 4\text{ mm}$, mirror, reflective setup ⁽¹⁾	I_{ra}	-	166	-	μA
	$V_R = 2\text{ V}$, $I_F = 24\text{ mA}$, $d = 4\text{ mm}$, KODAK Gray Card, gray side, reflective setup ⁽¹⁾		-	8	-	
	$V_R = 2\text{ V}$, $I_F = 24\text{ mA}$, $d = 4\text{ mm}$, KODAK Gray Card, white side, reflective setup ⁽¹⁾		-	42	-	
	$V_R = 2\text{ V}$, $I_F = 24\text{ mA}$, $d = 10\text{ mm}$, communication setup ⁽²⁾		-	274	-	
Output rise time (20 % to 80 %)	Push-pull driver with $I_F = 24\text{ mA}$, $I_{ra} = 5\text{ }\mu\text{A}$, $V_R = 2\text{ V}$, communication setup ⁽²⁾	t_r	-	9	-	ns
Output fall time (80 % to 20 %)		t_f	-	9	-	ns

Notes

(1) Reflective test setup as described in Fig. 4

(2) Communication test setup as described in Fig. 5

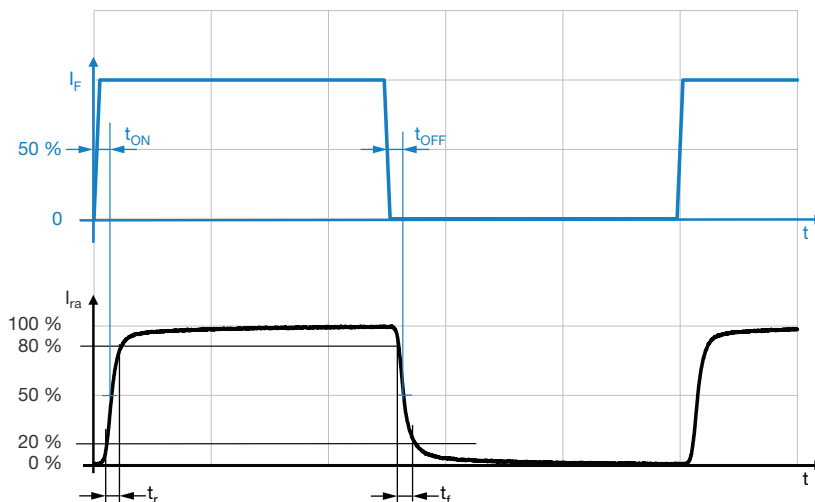


Fig. 3 - Switching Times

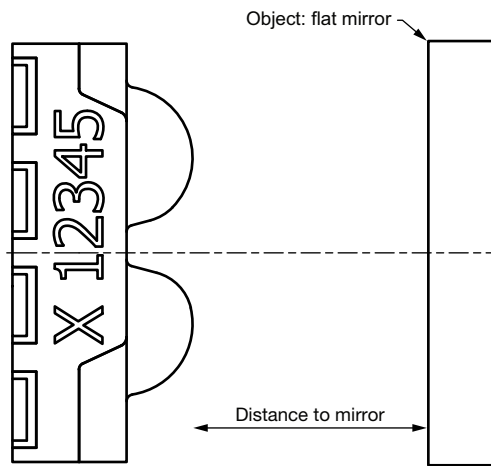


Fig. 4 - Test Setup - Reflective

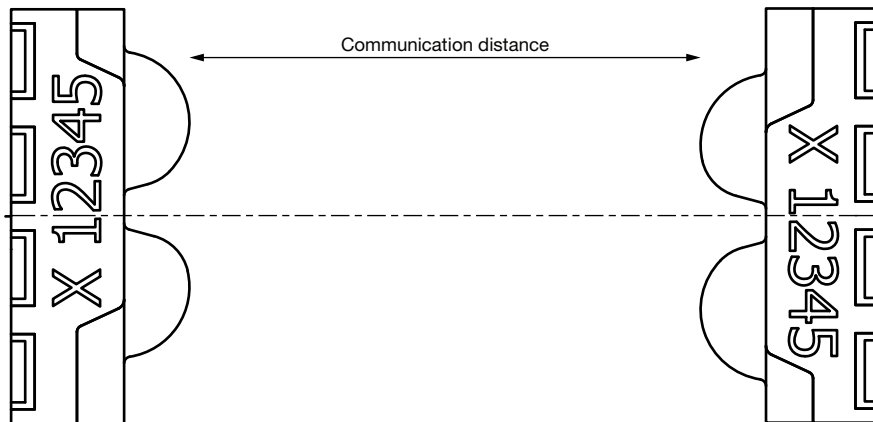


Fig. 5 - Test Setup - Communication

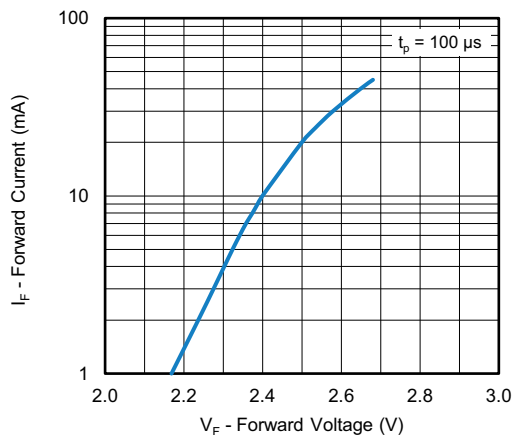
BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 6 - Forward Current vs. Forward Voltage

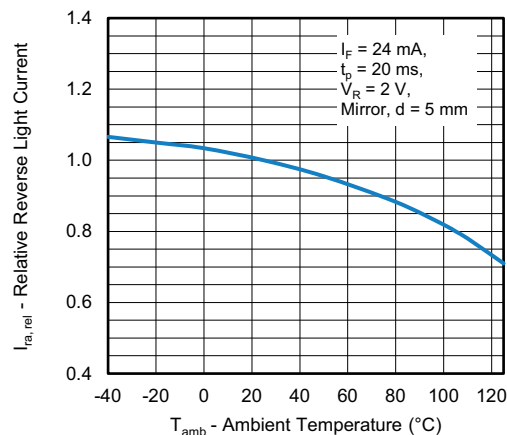


Fig. 9 - Relative Reverse Light Current vs. Ambient Temperature

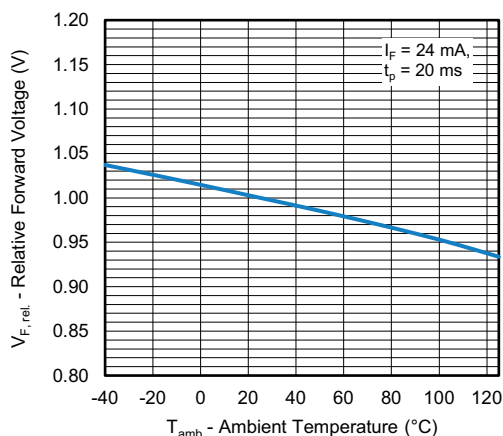


Fig. 7 - Relative Forward Voltage vs. Ambient Temperature

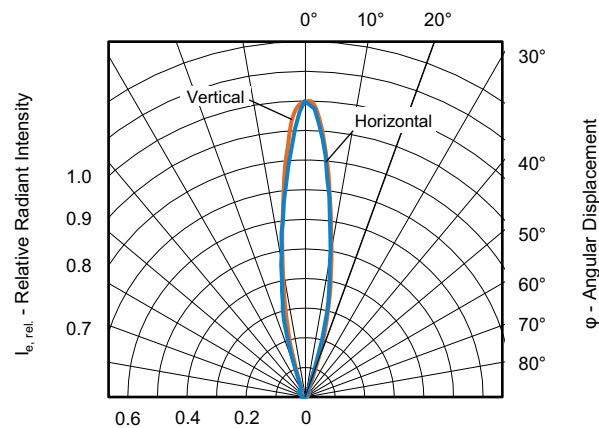


Fig. 10 - Relative Radiant Intensity vs. Angular Displacement

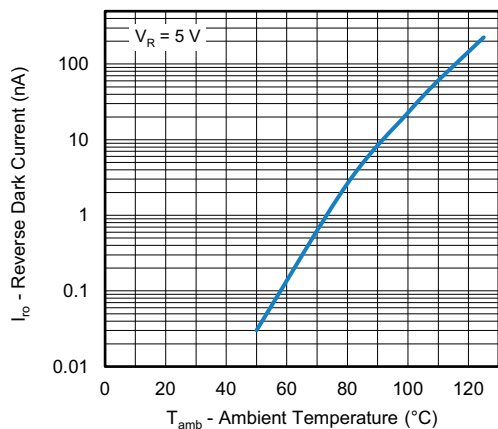


Fig. 8 - Reverse Dark Current vs. Ambient Temperature

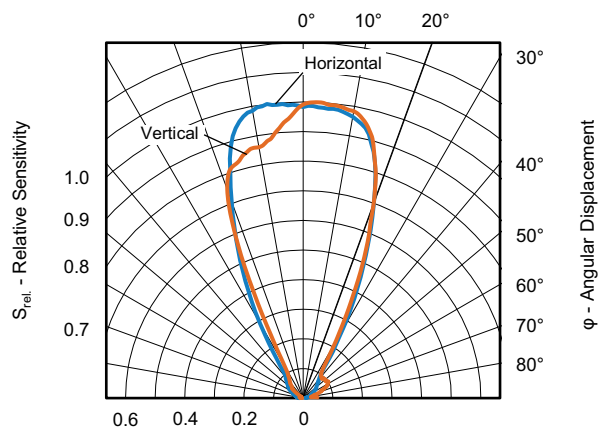


Fig. 11 - Relative Sensitivity vs. Angular Displacement

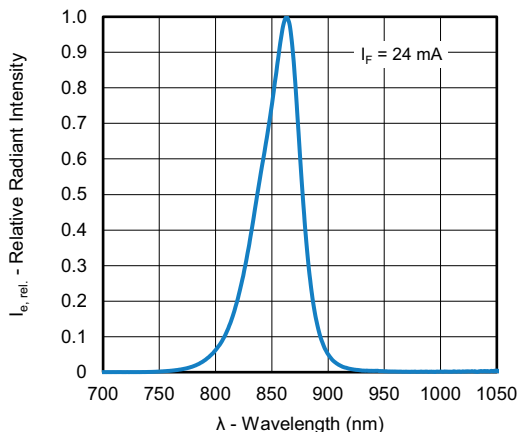


Fig. 12 - Relative Radiant Intensity vs. Wavelength

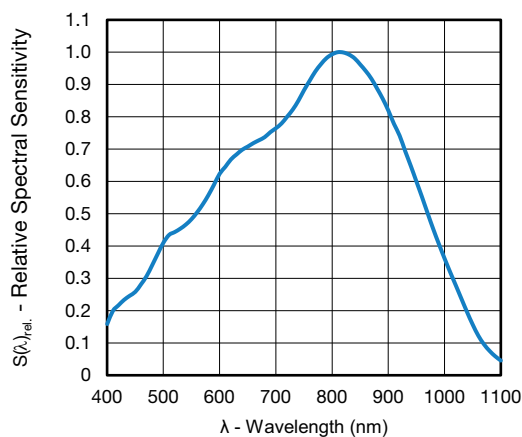


Fig. 13 - Relative Spectral Sensitivity vs. Wavelength

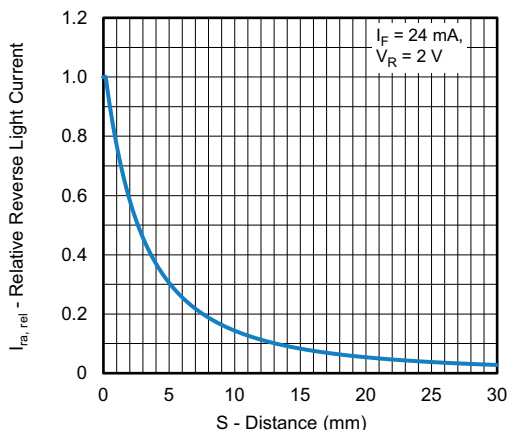


Fig. 14 - Relative Reverse Light Current vs. Distance (communication setup)

FLOOR LIFE

Time between soldering and removing from MBB must not exceed the time indicated in J-STD-020:

Moisture sensitivity: level 3

Floor life: 168 h

Conditions: $T_{amb} < 30\text{ °C}$, $RH < 60\%$

DRYING

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or recommended conditions:

192 h at 40 °C (+ 5 °C), $RH < 5\%$

or

96 h at 60 °C (+ 5 °C), $RH < 5\%$

REFLOW SOLDER PROFILE

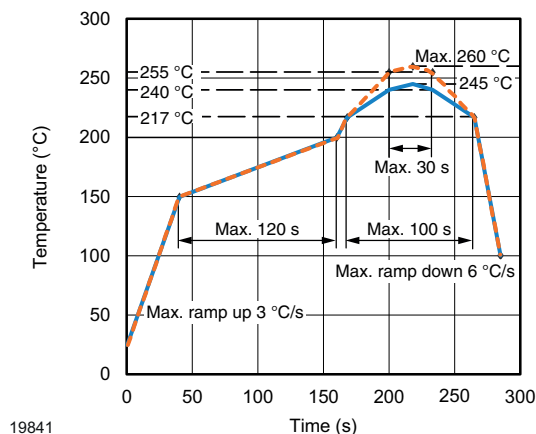
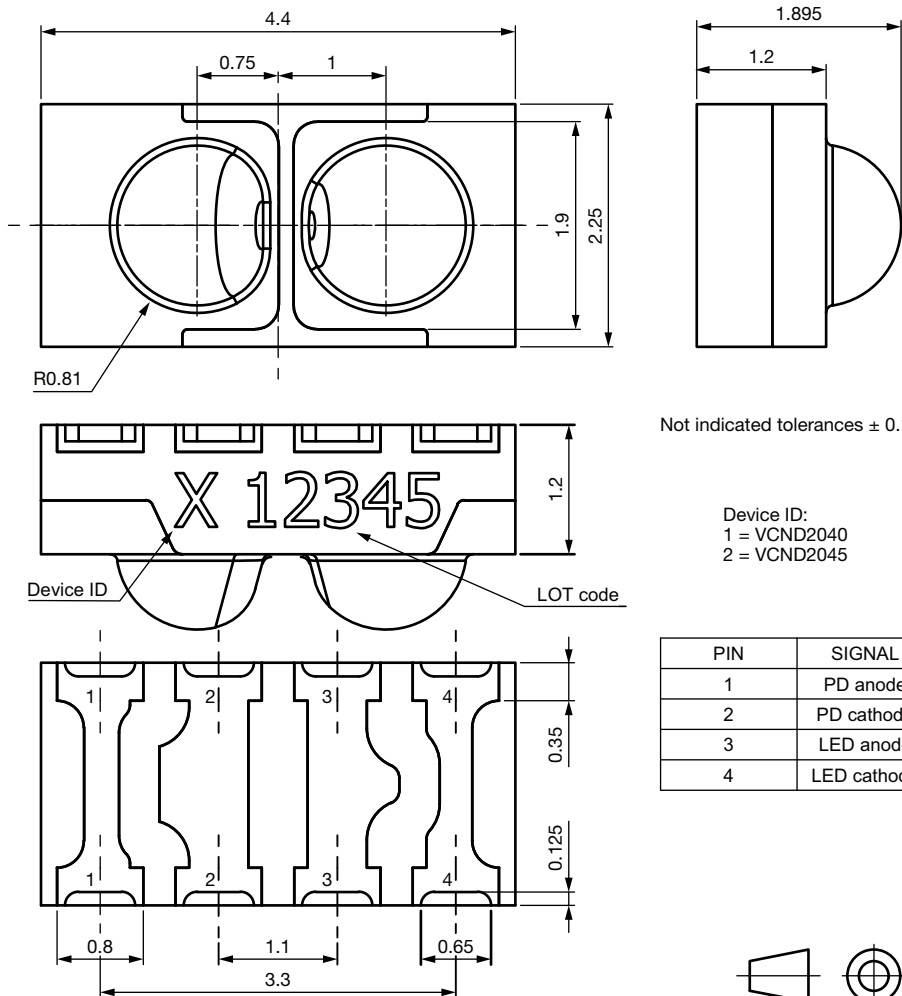


Fig. 15 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020



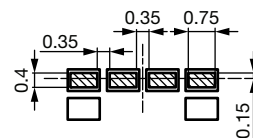
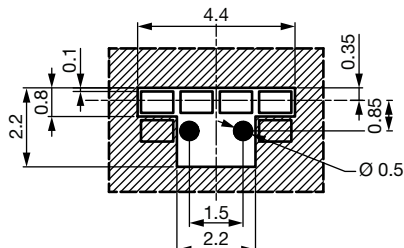
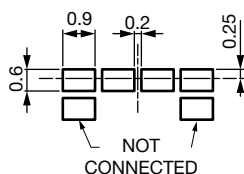
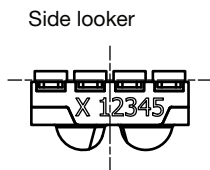
PACKAGE DIMENSIONS in millimeters



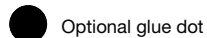
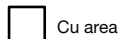
Drawing-No.: 6.550-5376.01-4
Issue: 1_A; 27.08.2025



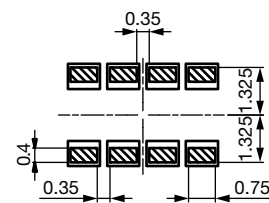
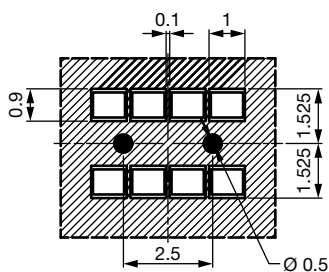
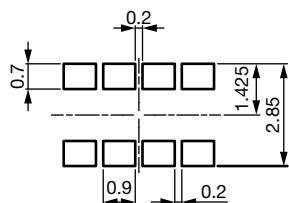
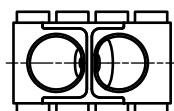
RECOMMENDED SOLDER PAD in millimeters



Component location on pad

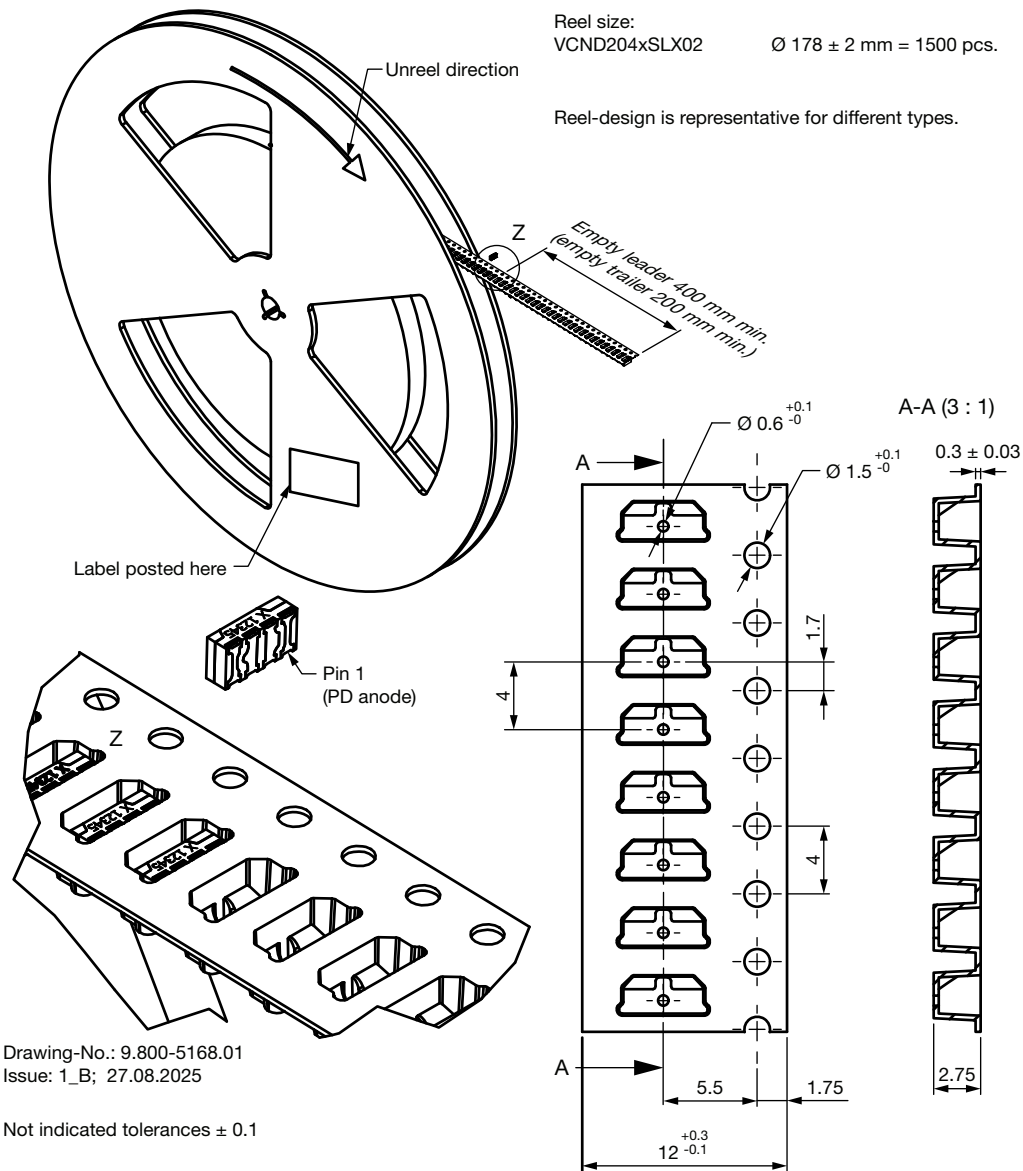


Top looker



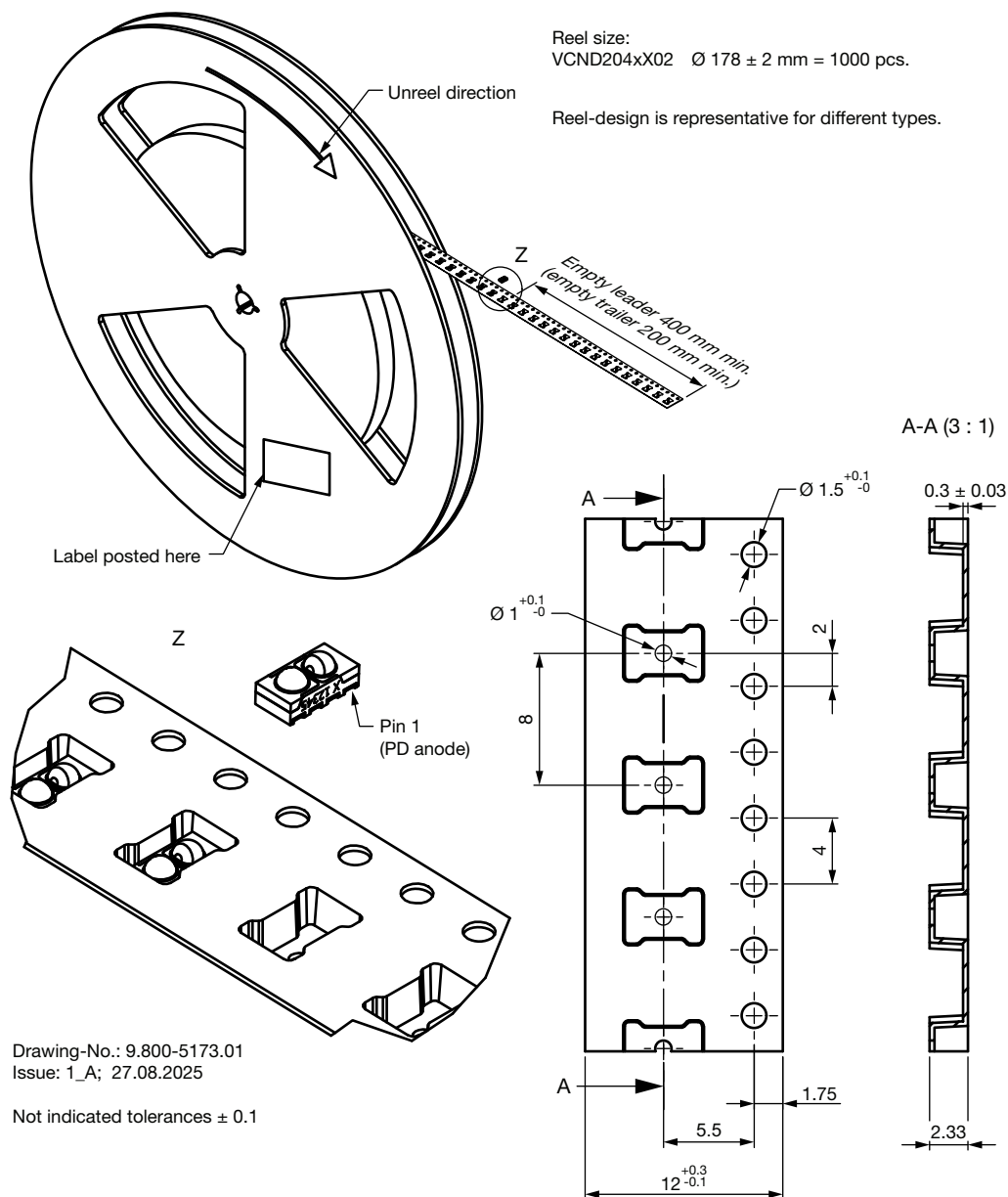


TAPE AND REEL DIMENSIONS (SIDE LOOK) in millimeters





TAPE AND REEL DIMENSIONS (TOP LOOK) in millimeters





REVISION HISTORY		
DOCUMENT VERSION	REVISION DATE	CHANGE
1.0	15-Apr-2026	Initial datasheet release
1.1	13-Aug-2026	Introduced "LINKS TO ADDITIONAL RESOURCES" section and block diagram



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.