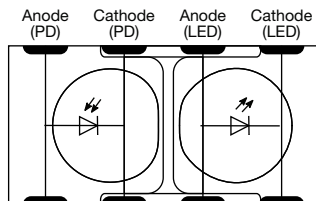


Optical Sensor With Photodiode Output for Optical Communication



LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The VCND2040X02, VCND2040SLX02 is 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 855 nm. The detector consists of a silicon photodiode. The sensor's analog output signal (photo current) is triggered by light from the other device for bidirectional, 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: 855 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⁾
VCND2040X02	35	± 13	855	18
VCND2040SLX02	35	± 13	855	18

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
VCND2040X02	7.8	± 29	820	No
VCND2040SLX02	7.8	± 29	820	No

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME ⁽¹⁾	REMARKS
VCND2040X02	Tape and reel	MOQ: 1000 pcs	Top looker variant
VCND2040SLX02	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		P_{tot}	73	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

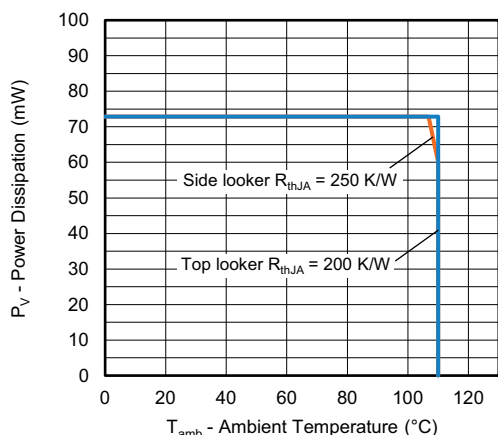


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

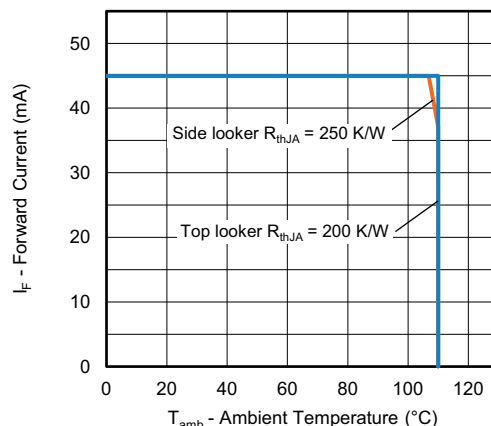


Fig. 2 - Forward Current Limit vs. Ambient Temperature

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	-	1.5	1.7	V
Temperature coefficient of V_F	$I_F = 24\text{ mA}$	TKV_F	-	-1.5	-	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	-	28.1	-	pF
Radiant intensity	$I_F = 24\text{ mA}$, $t_p = 20\text{ ms}$	I_e	19	35	65	mW/sr
Radiant power	$I_F = 24\text{ mA}$, $t_p = 20\text{ ms}$	ϕ_e	-	8	-	mW
Angle of half intensity		ϕ	-	± 13	-	$^{\circ}$
Peak wavelength	$I_F = 24\text{ mA}$	λ_p	-	855	-	nm
Spectral bandwidth	$I_F = 24\text{ mA}$	$\Delta\lambda_{P, 0.5}$	-	28	-	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}	-	96	-	μA
	$V_R = 2\text{ V}$, $I_F = 24\text{ mA}$, $d = 4\text{ mm}$, KODAK Gray Card, gray side, reflective setup ⁽¹⁾		-	6	-	
	$V_R = 2\text{ V}$, $I_F = 24\text{ mA}$, $d = 4\text{ mm}$, KODAK Gray Card, white side, reflective setup ⁽¹⁾		-	32	-	
	$V_R = 2\text{ V}$, $I_F = 24\text{ mA}$, $d = 10\text{ mm}$, communication setup ⁽²⁾		-	145	-	
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	-	18	-	ns
Output fall time (80 % to 20 %)		t_f	-	18	-	ns

Notes

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

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

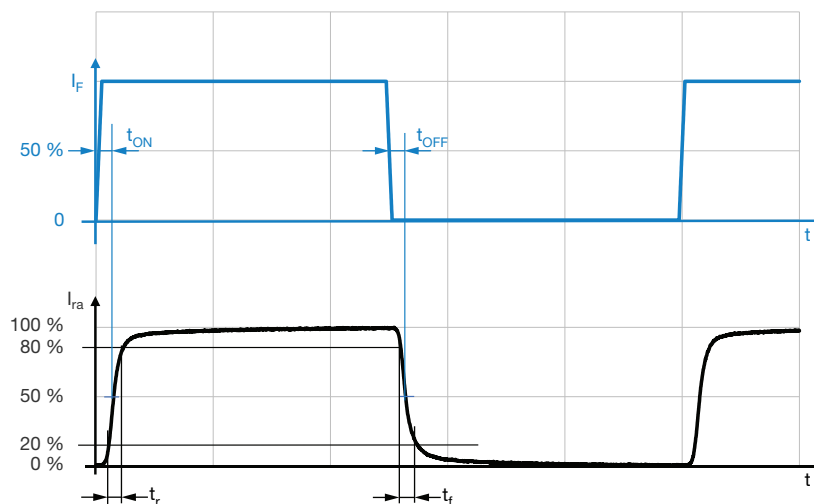


Fig. 3 - Switching Times

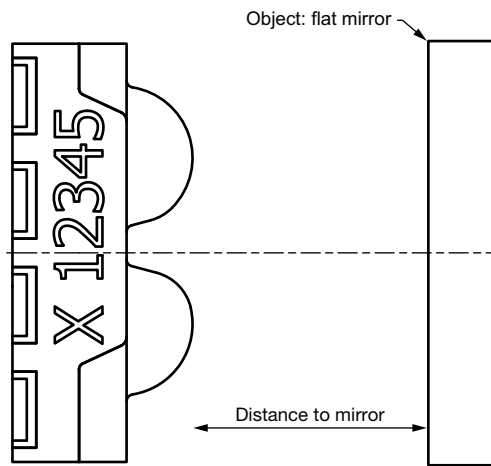


Fig. 4 - Test Setup - Reflective

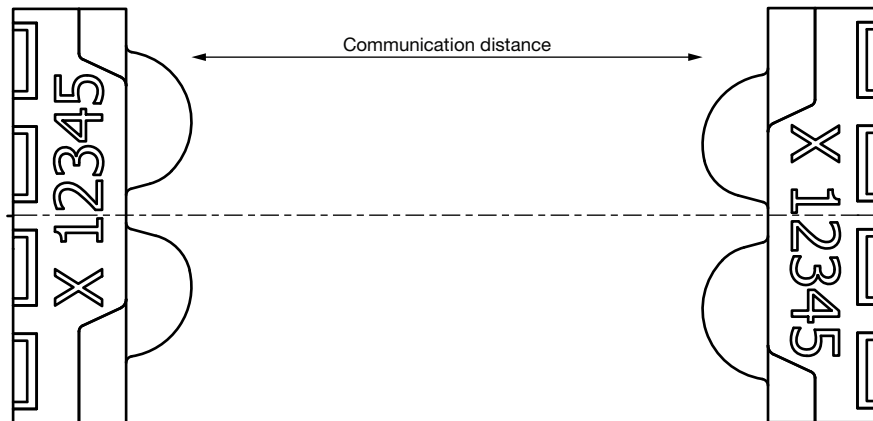


Fig. 5 - Test Setup - Communication

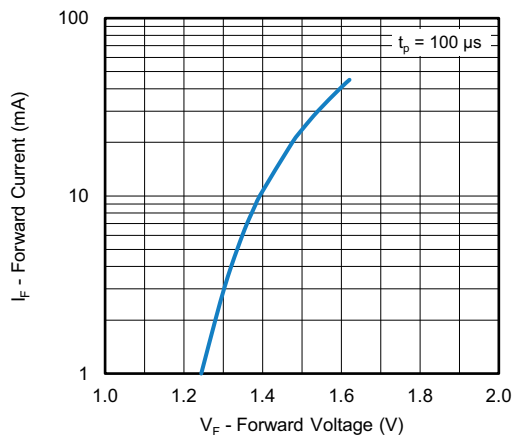
BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 6 - Forward Current vs. Forward Voltage

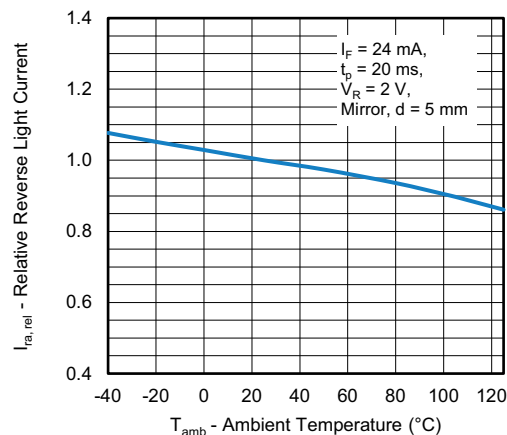


Fig. 9 - Relative Reverse Light Current vs. Ambient Temperature

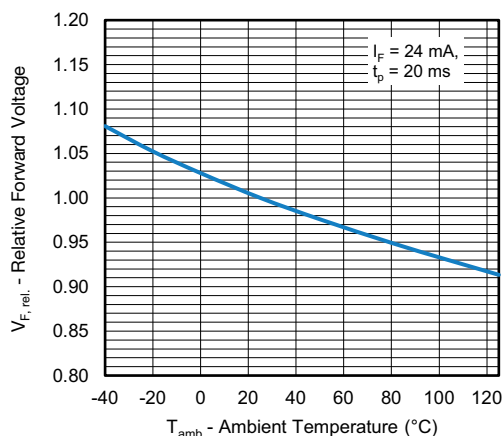


Fig. 7 - Relative Forward Voltage vs. Ambient Temperature

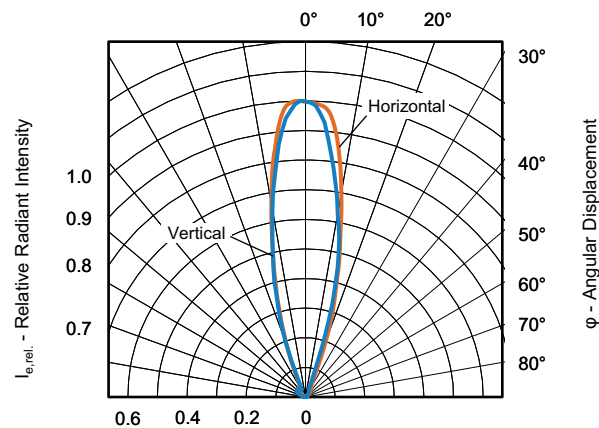


Fig. 10 - Relative Radiant Intensity vs. Angular Displacement

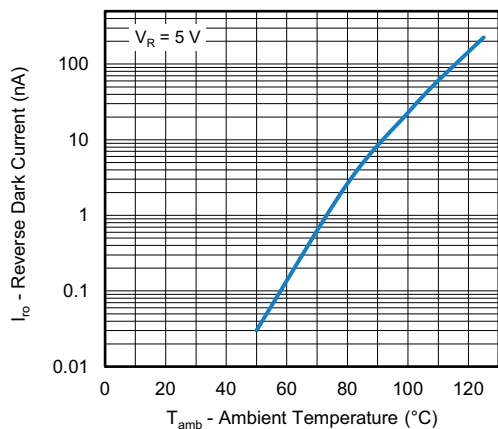


Fig. 8 - Reverse Dark Current vs. Ambient Temperature

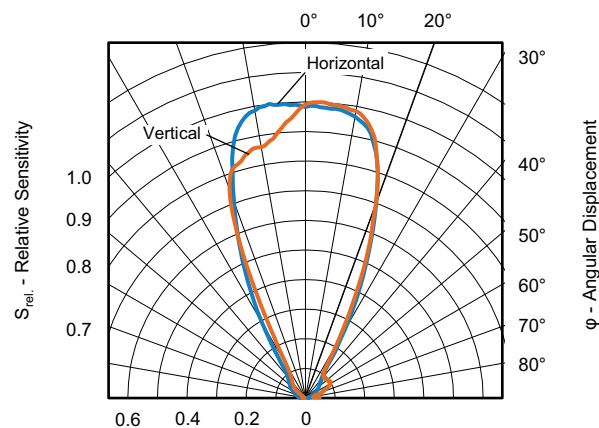


Fig. 11 - Relative Sensitivity vs. Angular Displacement

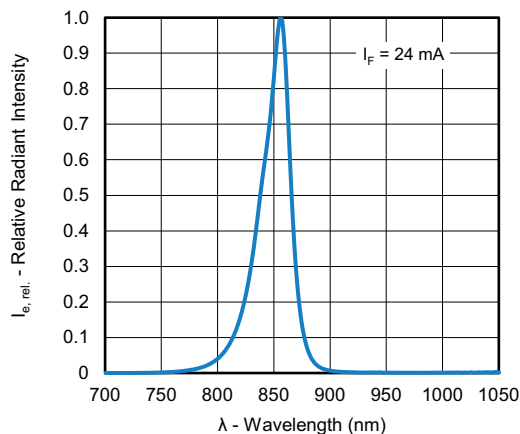


Fig. 12 - Relative Radiant Intensity vs. Wavelength

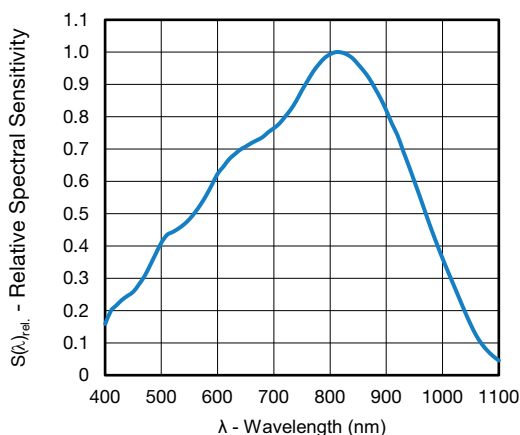


Fig. 13 - Relative Spectral Sensitivity vs. Wavelength

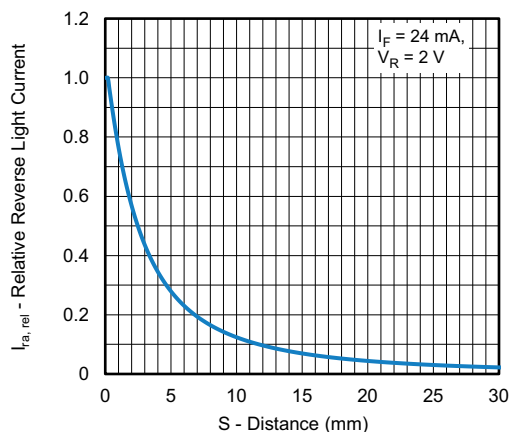


Fig. 14 - Relative Reverse Light Current vs. Distance (communication setup)

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: $T_{amb} < 30\text{ }^{\circ}\text{C}$, $RH < 60\%$

DRYING

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

192 h at $40\text{ }^{\circ}\text{C}$ (+ $5\text{ }^{\circ}\text{C}$), $RH < 5\%$

or

96 h at $60\text{ }^{\circ}\text{C}$ (+ $5\text{ }^{\circ}\text{C}$), $RH < 5\%$

REFLOW SOLDER PROFILE

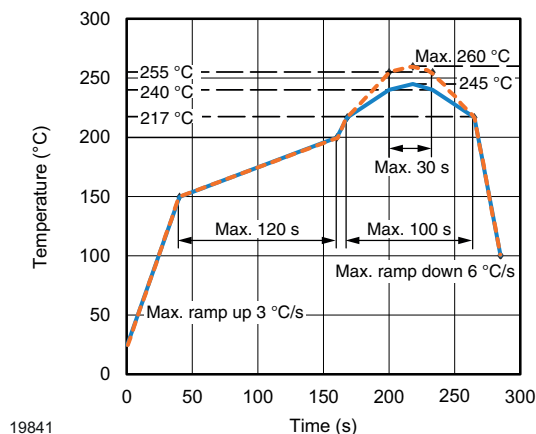
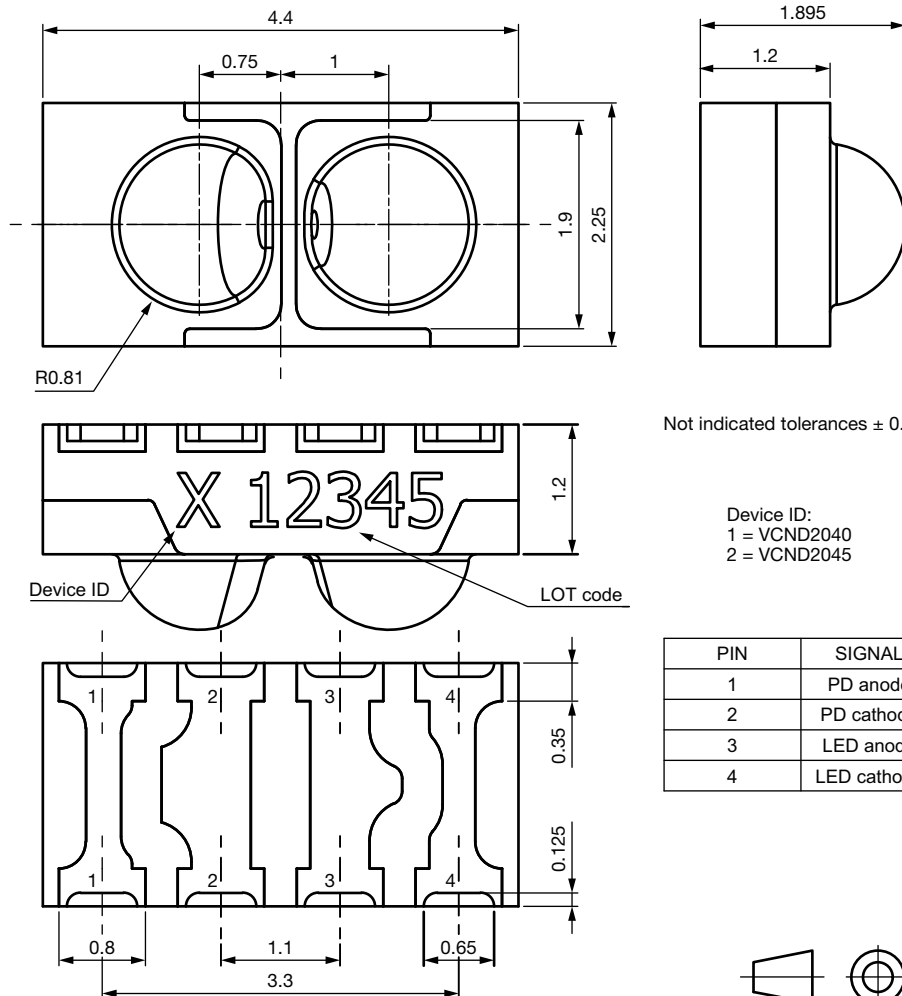


Fig. 15 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

PACKAGE DIMENSIONS in millimeters

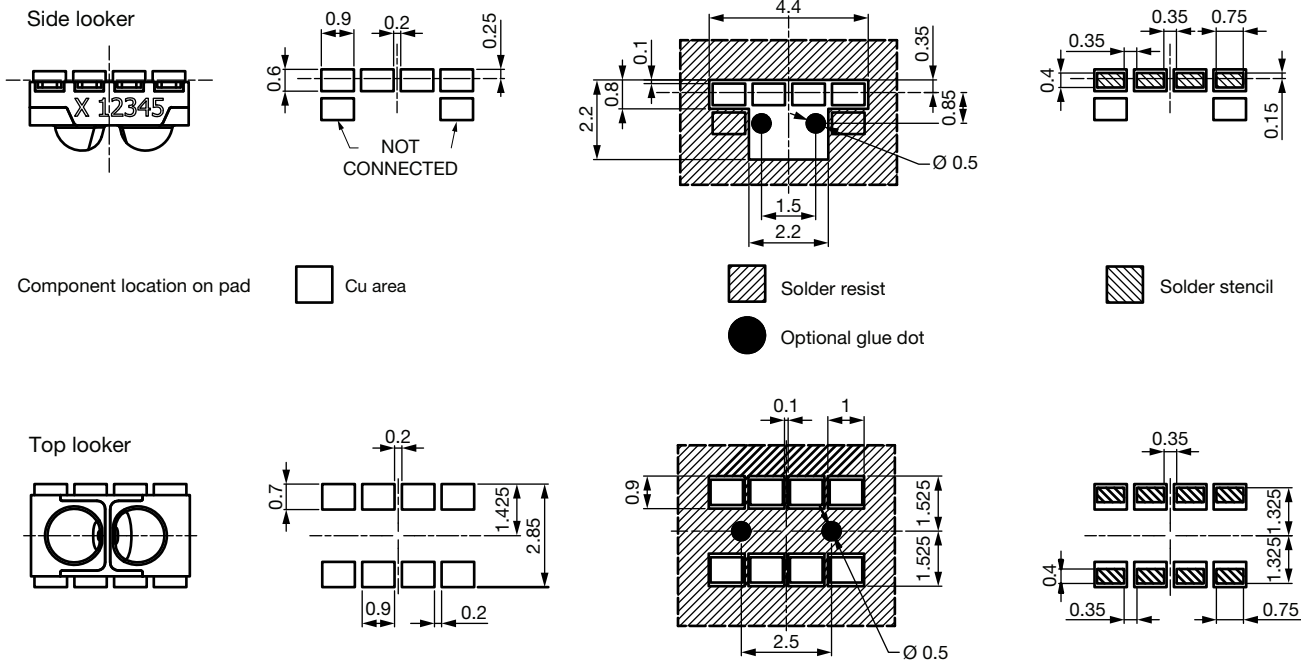


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Issue: 1_A; 27.08.2025

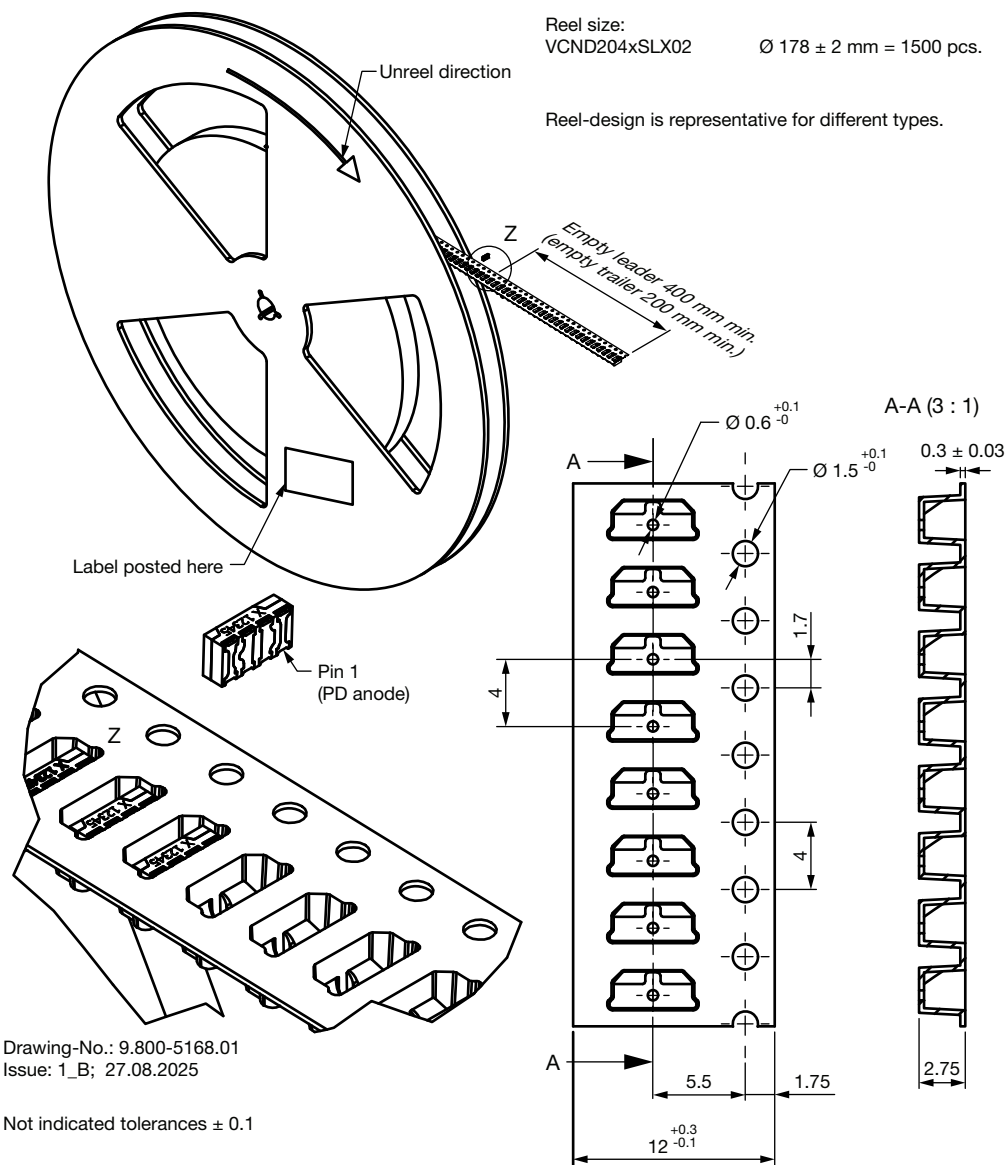
Technical drawings
according to DIN
specification



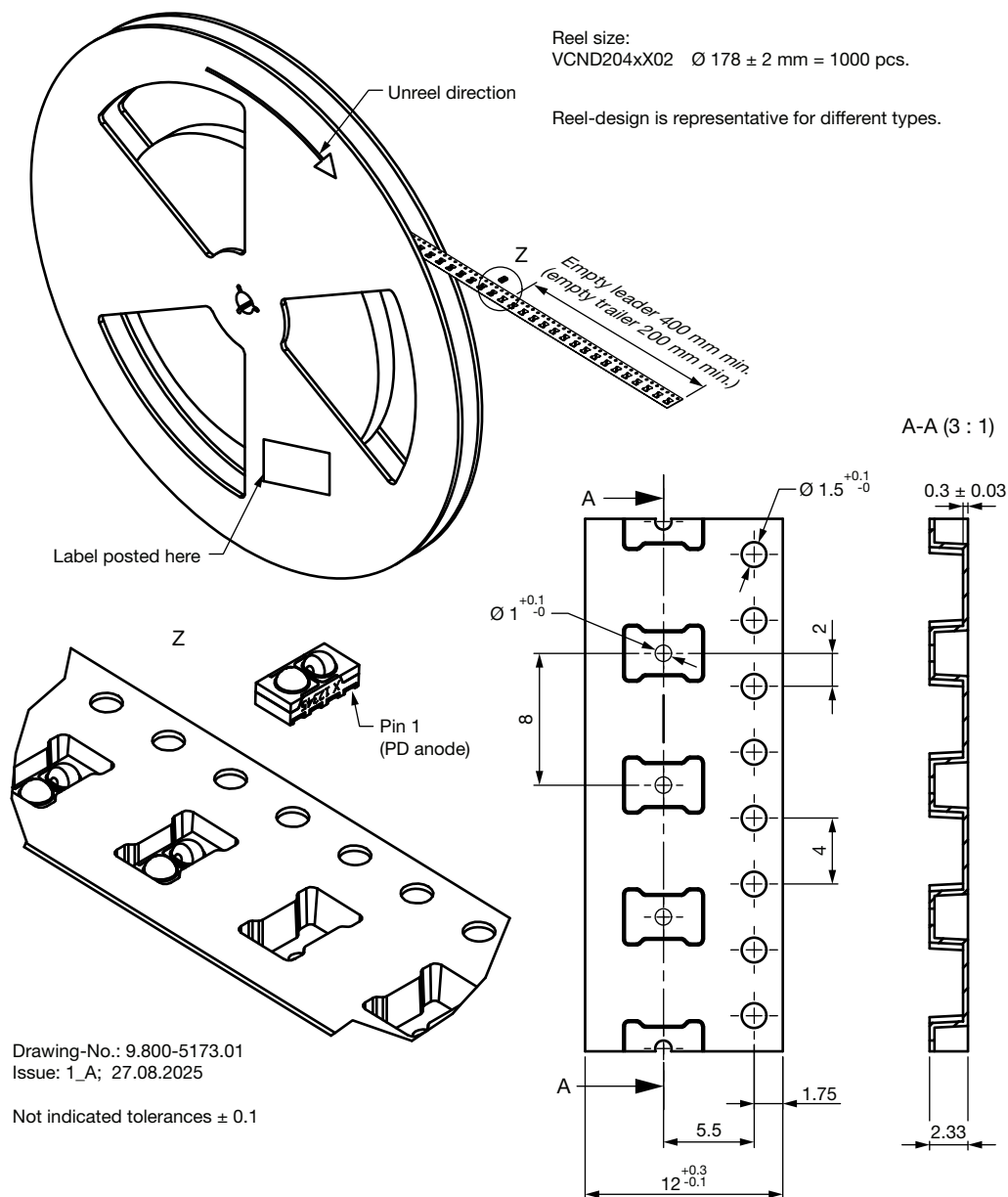
RECOMMENDED SOLDER PAD in millimeters



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



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