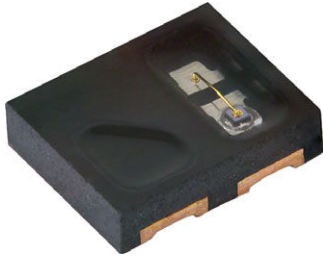


Reflective Optical Sensor With Transistor Output



LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The VCNT2025X01 is a reflective sensor in a miniature SMD package. It has a compact construction where the emitting light source and the detector are arranged in the same plane. The operating infrared wavelength is 940 nm. The detector consists of a silicon phototransistor. The sensor analog output signal (photo current) is triggered by detection of reflected infrared light from a close by object.

The sensor has a built in daylight blocking filter, which greatly suppresses disturbing ambient light and therefore increases signal to noise ratio.

FEATURES

- Package type: SMD
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 2.5 x 2 x 0.6
- Emitter wavelength: 940 nm
- Moisture sensitivity level (MSL): 3
- AEC-Q101 qualified
- Material categorization:
for definitions of compliance please see www.vishay.com/doc?99912

 AUTOMOTIVE
GRADE

RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

APPLICATIONS

- Position sensor
- Optical switch
- Optical encoder
- Object detection (e.g. paper presence in printer and copy machines)

PRODUCT SUMMARY				
PART NUMBER	DISTANCE FOR MAXIMUM CTR _{rel} ⁽¹⁾ (mm)	DISTANCE RANGE FOR I _C > 0.5 mA (mm)	TYPICAL OUTPUT CURRENT UNDER TEST ⁽²⁾ (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
VCNT2025X01	0.7	0.3 to 4.5	6.6	Yes

Notes

(1) CTR: current transfer ratio, I_{out}/I_{in}

(2) Conditions like in table basic characteristics / sensors

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	VOLUME ⁽¹⁾	REMARKS
VCNT2025X01	Tape and reel	MOQ: 3000 pcs	Drypack, MSL 3

Note

(1) MOQ: minimum order quantity



ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
INPUT (EMITTER)				
Reverse voltage		V _R	5	V
Forward current		I _F	65	mA
Forward surge current	t _p ≤ 100 μs	I _{FSM}	200	mA
OUTPUT (DETECTOR)				
Collector emitter breakdown voltage		V _{(BR)CEO}	20	V
Emitter collector voltage		V _{ECO}	7	V
Collector current		I _C	50	mA
SENSOR				
Total power dissipation	T _{amb} ≤ 25 °C	P _{tot}	170	mW
Ambient temperature range		T _{amb}	-40 to +110	°C
Storage temperature range		T _{stg}	-40 to +110	°C
Soldering temperature	In accordance with Fig. 16	T _{sd}	260	°C

ABSOLUTE MAXIMUM RATINGS

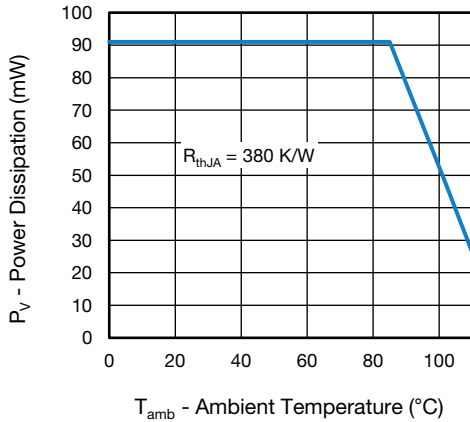


Fig. 1 - Power Dissipation vs. Ambient Temperature

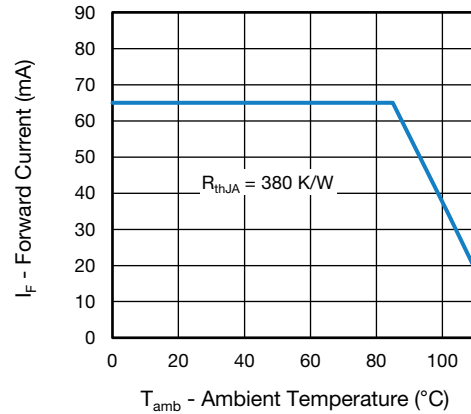


Fig. 2 - Forward Current vs. Ambient Temperature

BASIC CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT (EMITTER)						
Forward voltage	I _F = 20 mA	V _F	1.0	1.25	1.4	V
	I _F = 65 mA		-	1.47	-	
Temperature coefficient of V _F	I _F = 20 mA	TKV _F	-	-1.0	-	mV/K
Peak wavelength	I _F = 65 mA	λ _p	-	940	-	nm
Reverse current	V _R = 5 V	I _R	-	-	10	μA
OUTPUT (DETECTOR)						
Collector emitter breakdown voltage	I _C = 0.1 mA, E = 0	V _{(BR)CEO}	20	-	-	V
Emitter collector voltage	I _E = 100 μA, E = 0	V _{ECO}	7	-	-	V
Collector emitter dark current	V _{CE} = 5 V, E = 0	I _{CEO}	-	1	100	nA
SENSOR						
Collector current	V _{CE} = 5 V, I _F = 20 mA, d = 1 mm	I _C	3.5	6.6	10.5	mA
Current transfer ratio	I _C /I _F , d = 1 mm, V _{CE} = 5 V	CTR	-	33	-	%
Rise time	I _C = 0.8 mA, V _{CE} = 5 V, R _L = 100 Ω	t _r	-	10	-	μs
Fall time	I _C = 0.8 mA, V _{CE} = 5 V, R _L = 100 Ω	t _f	-	15	-	μs

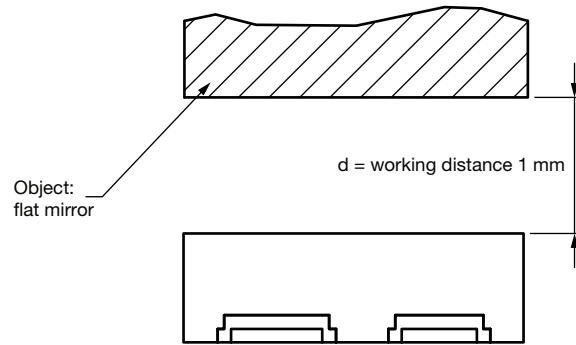


Fig. 3 - Test Setup

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

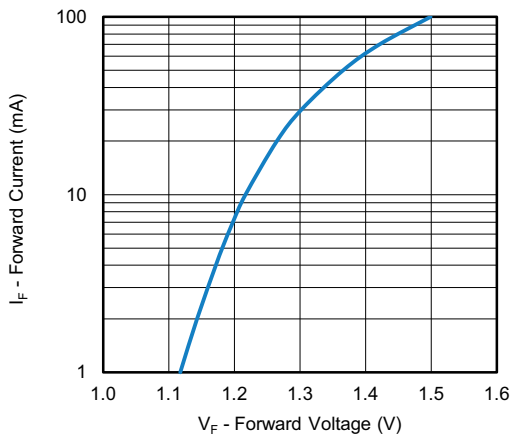


Fig. 4 - Forward Current vs. Forward Voltage

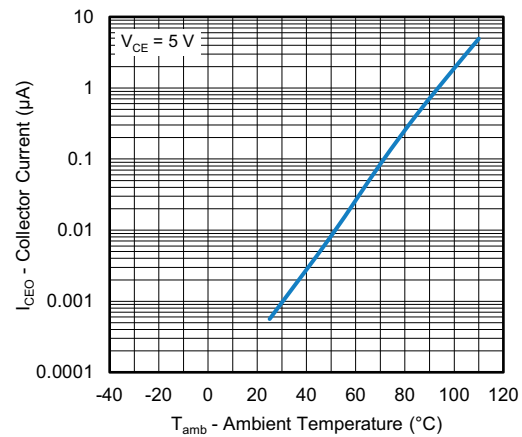


Fig. 6 - Collector Dark Current vs. Ambient Temperature

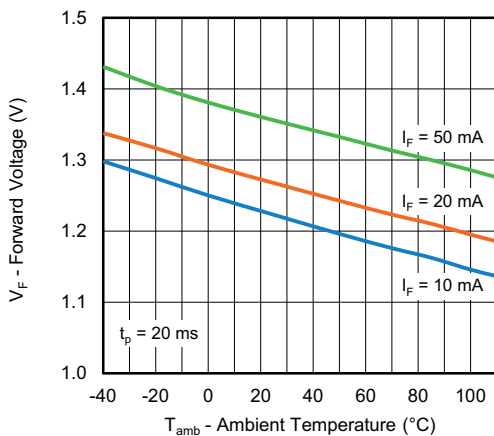


Fig. 5 - Forward Voltage vs. Ambient Temperature

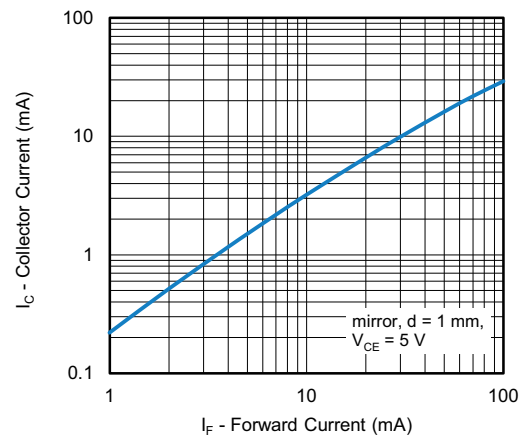


Fig. 7 - Collector Current vs. Forward Current

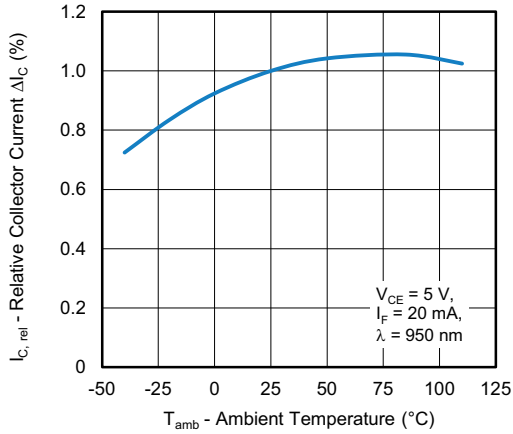


Fig. 8 - Relative Collector Current vs. Ambient Temperature

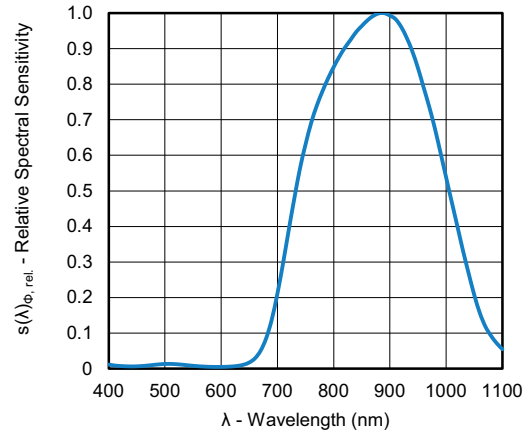


Fig. 11 - Relative Spectral Sensitivity vs. Wavelength

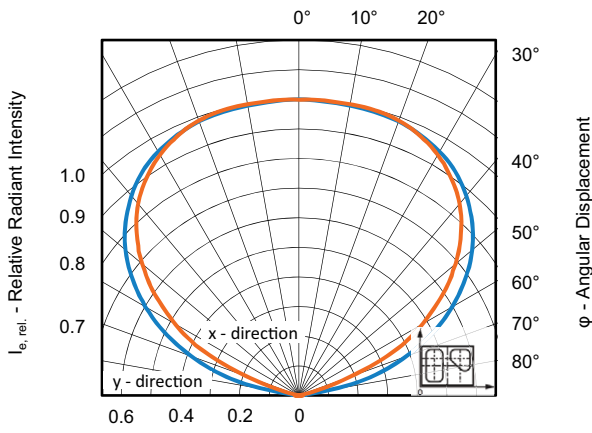


Fig. 9 - Relative Radiant Intensity vs. Angular Displacement

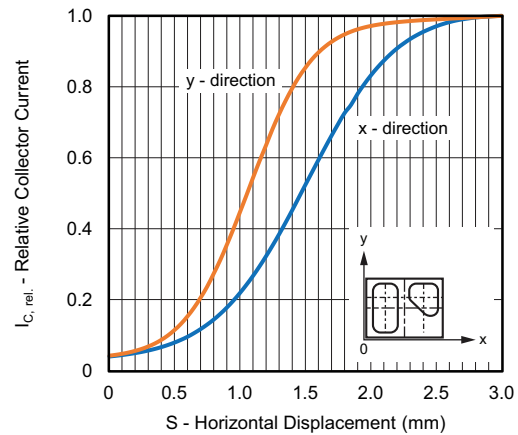


Fig. 12 - Relative Collector Current vs. Displacement

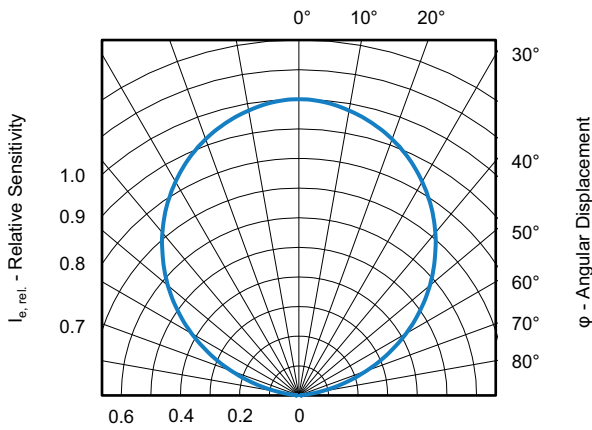


Fig. 10 - Relative Sensitivity vs. Angular Displacement

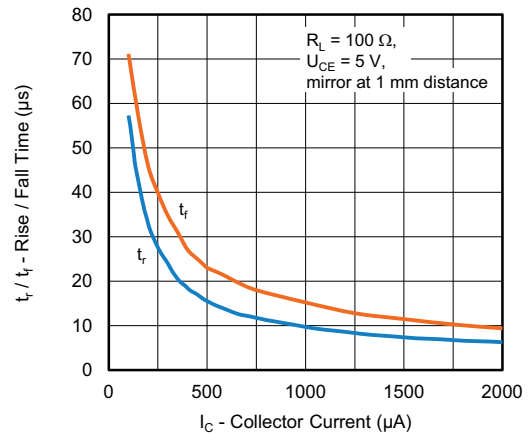


Fig. 13 - Rise / Fall Time vs. Collector Current

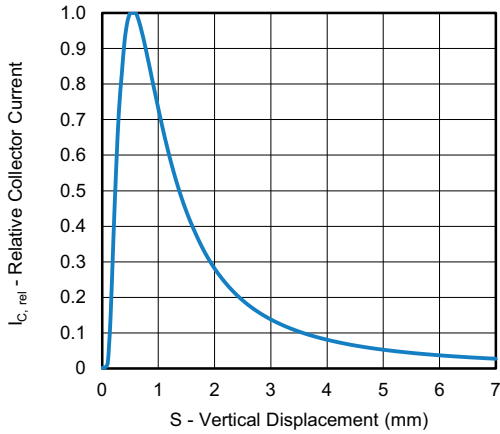


Fig. 14 - Relative Collector Current vs. Distance

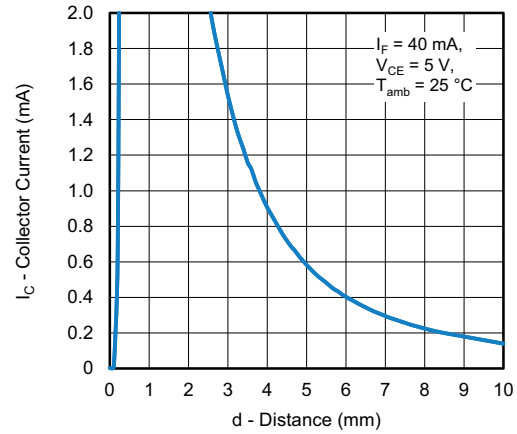


Fig. 15 - Collector Current vs. Distance, for $I_C \leq 2 \text{ mA}$

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

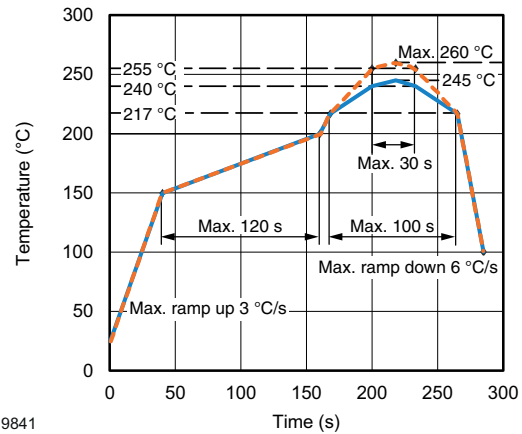
In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or recommended conditions:

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

or

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

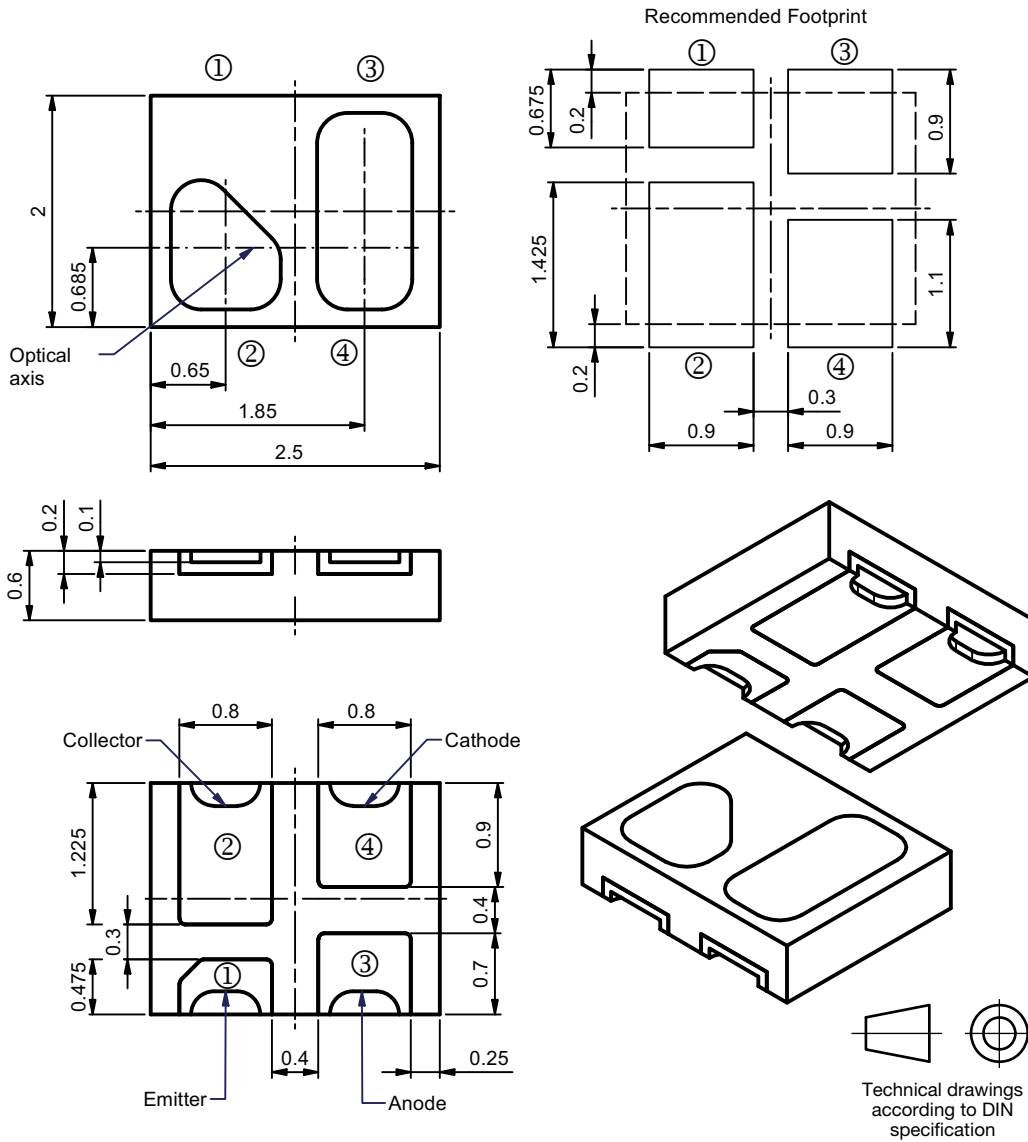
REFLOW SOLDER PROFILE



19841

Fig. 16 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

PACKAGE DIMENSIONS in millimeters



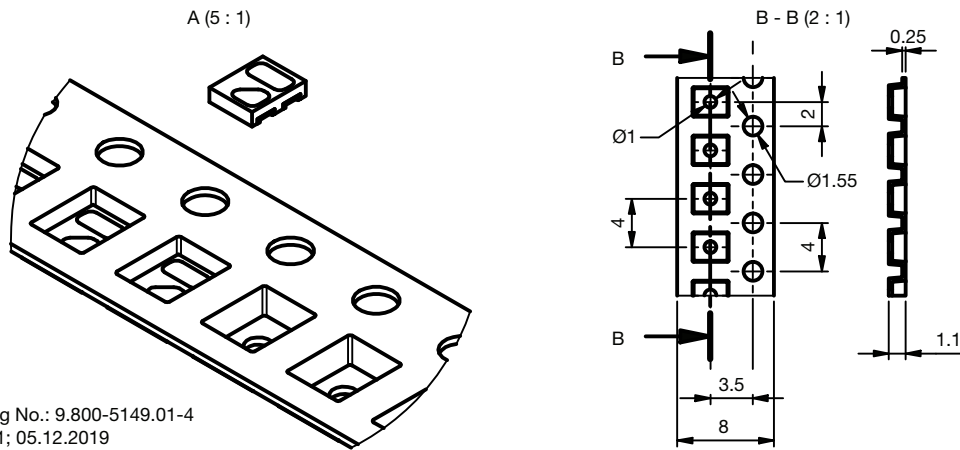
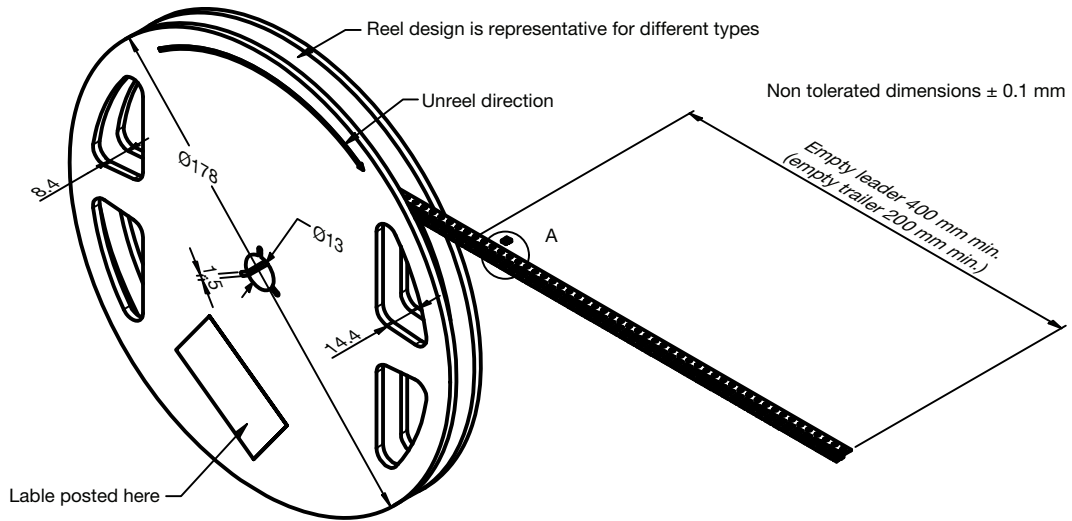
Drawing- No.: 6.550-5364.01-4
Issue: 2; 11.01.2022

Not indicated tolerances ± 0.1



TAPE AND REEL DIMENSIONS in millimeters

3000 pcs/reel



Drawing No.: 9.800-5149.01-4
Issue: 1; 05.12.2019



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