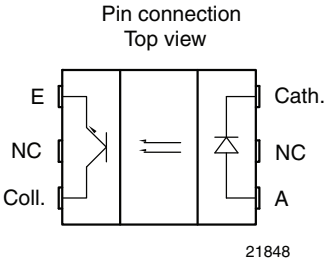
Single Channel Transmissive Sensor



FEATURES

- Package type: surface-mount
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 5.5 x 4 x 5.7
- Gap (in mm): 3
- Aperture (in mm): 0.3
- Typical output current under test: I_C = 1.5 mA
- Emitter wavelength: 950 nm
- Moisture sensitivity level (MSL): 1
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e4

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

3D Models

Application Notes

APPLICATIONS

- Accurate position sensor for encoder
- Detection of motion speed

DESCRIPTION

The VT171P is a compact transmissive sensor that includes an infrared emitter and a phototransistor detector, located face-to-face in a surface mount package. VT171P is especially designed to meet high operating temperature requirements and is released for operating temperature ranges from -25 °C to +85 °C.

PRODUCT SUMMARY

PART NUMBER	GAP WIDTH (mm)	APERTURE WIDTH (mm)	TYPICAL OUTPUT CURRENT UNDER TEST (1) (mA)	DAYLIGHT BLOCKING FILTER INTEGRATED
VT171P	3	0.3	1.5	No

Note

- Conditions like in table basic characteristics / coupler

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME (1)	REMARKS
VT171P	Tape and reel	MOQ: 1300 pcs, 1300 pcs/reel	-

Note

- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
COUPLER				
Total power dissipation	$T_{amb} \leq 85$ °C	P_{tot}	37.5	mW
Junction temperature		T_j	105	°C
Ambient temperature range		T_{amb}	-25 to +85	°C
Storage temperature range		T_{stg}	-25 to +105	°C
Soldering temperature	In accordance with Fig. 16	T_{sd}	260	°C
INPUT (EMITTER)				
Reverse voltage		V_R	5	V
Forward current	$T_{amb} \leq 85$ °C	I_F	25	mA
Forward surge current	$t_p \leq 10$ µs	I_{FSM}	200	mA
Power dissipation	$T_{amb} \leq 85$ °C	P_V	37.5	mW
OUTPUT (DETECTOR)				
Collector emitter voltage		V_{CEO}	20	V
Emitter collector voltage		V_{ECO}	7	V
Collector current		I_C	20	mA
Collector dark current	T_{amb} = 85 °C, V_{CE} = 5 V	I_{CEO}	3.3	µA

ABSOLUTE MAXIMUM RATINGS

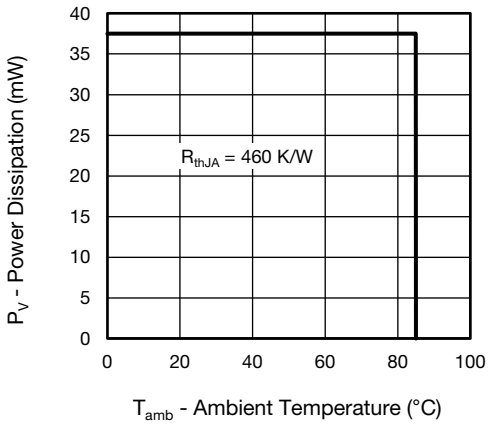


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

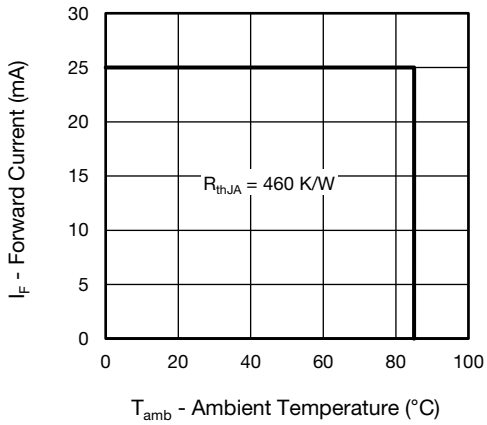


Fig. 2 - Forward Current Limit vs. Ambient Temperature

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
COUPLER						
Collector current	V_{CE} = 5 V, I_F = 15 mA	I_C	0.7	1.5	-	mA
Collector emitter saturation voltage	I_F = 15 mA, I_C = 0.2 mA	V_{CEsat}	-	-	0.4	V
INPUT (EMITTER)						
Forward voltage	I_F = 15 mA	V_F	1	1.2	1.4	V
Reverse current	V_R = 5 V	I_R	-	-	10	µA
Junction capacitance	V_R = 0 V, f = 1 MHz	C_j	-	25	-	pF
OUTPUT (DETECTOR)						
Collector emitter voltage I_C	I_C = 1 mA	V_{CEO}	20	-	-	V
Emitter collector voltage	I_E = 100 µA	V_{ECO}	7	-	-	V
Collector dark current	V_{CE} = 25 V, I_F = 0 A, E = 0 lx	I_{CEO}	-	1	100	nA
SWITCHING CHARACTERISTICS						
Rise time	I_C = 0.7 mA, V_{CE} = 5 V, R_L = 100 Ω (see Fig. 3)	t_r	-	14	150	µs
Fall time	I_C = 0.7 mA, V_{CE} = 5 V, R_L = 100 Ω (see Fig. 3)	t_f	-	21	150	µs

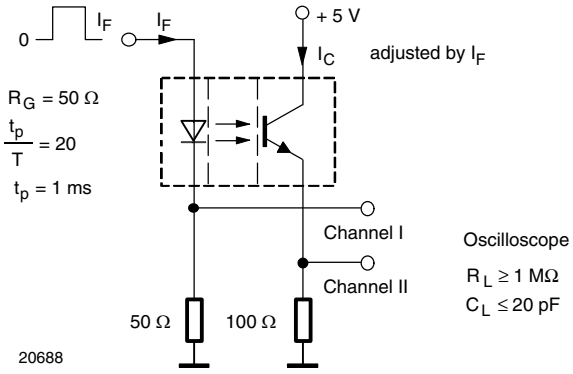


Fig. 3 - Test Circuit for t_r and t_f

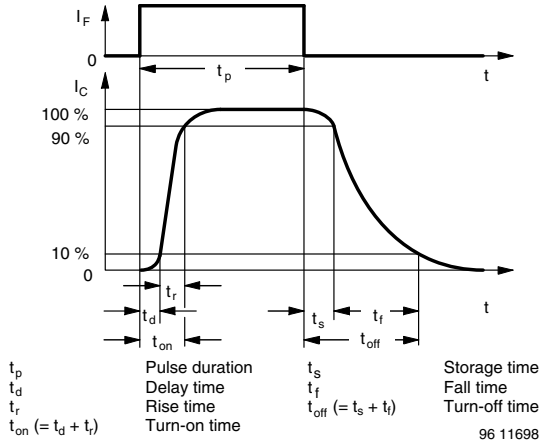


Fig. 4 - Switching Times

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

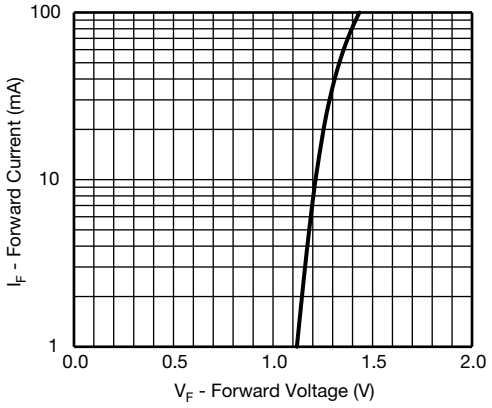


Fig. 5 - Forward Current vs. Forward Voltage

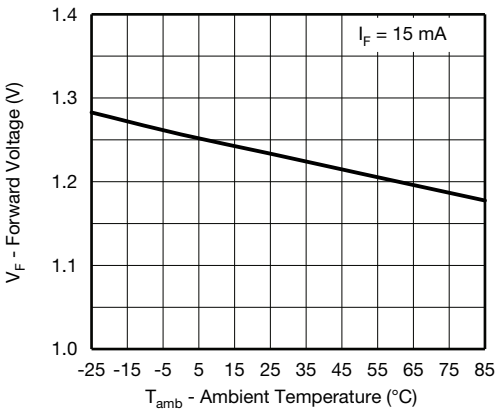


Fig. 6 - Forward Voltage vs. Ambient Temperature

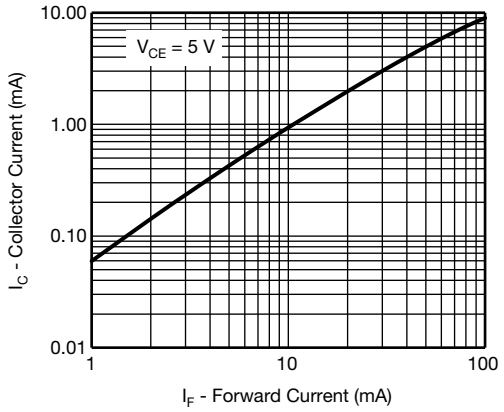


Fig. 7 - Collector Current vs. Forward Current

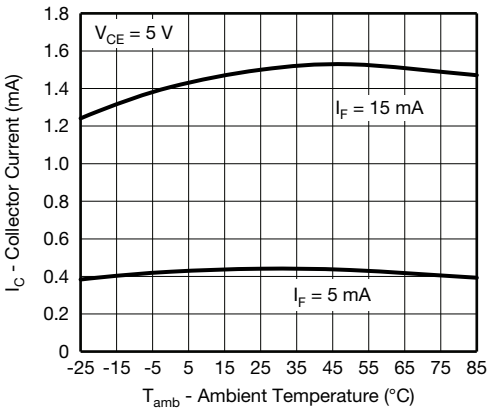


Fig. 10 - Collector Current vs. Ambient Temperature

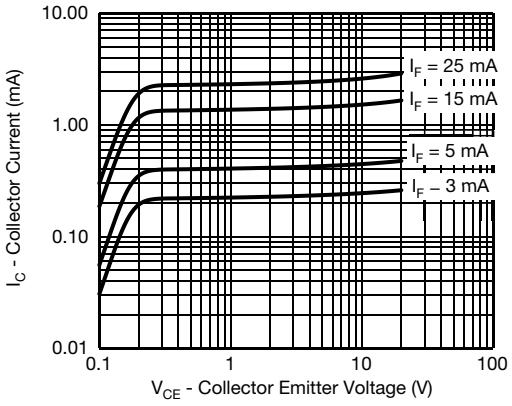


Fig. 8 - Collector Current vs. Collector Emitter Voltage

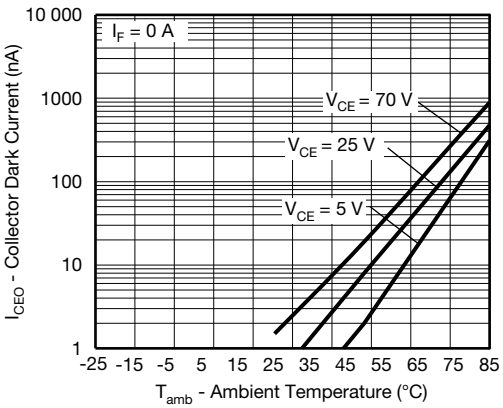


Fig. 11 - Collector Dark Current vs. Ambient Temperature

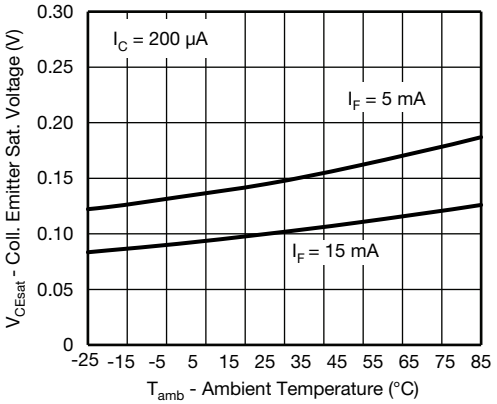


Fig. 9 - Collector Emitter Saturation Voltage vs. Ambient Temperature

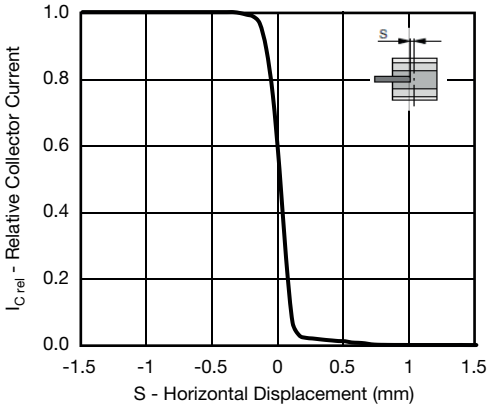


Fig. 12 - Relative Collector Current vs. Horizontal Displacement

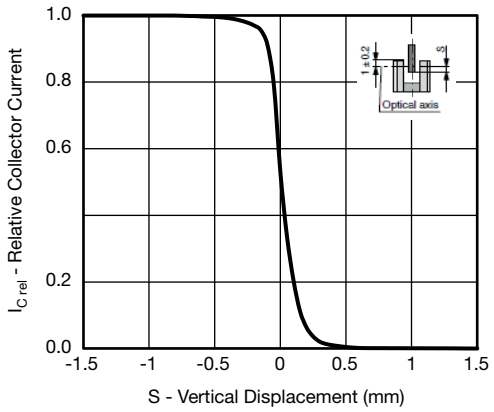


Fig. 13 - Relative Collector Current vs. Vertical Displacement

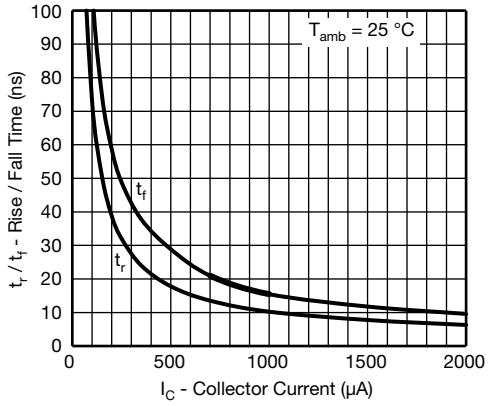


Fig. 14 - Rise / Fall Time vs. Collector Current

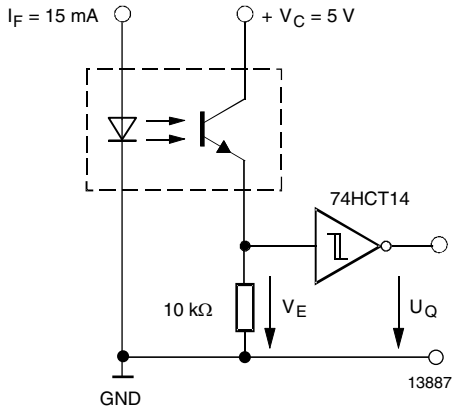


Fig. 15 - Application example

REFLOW SOLDER PROFILE

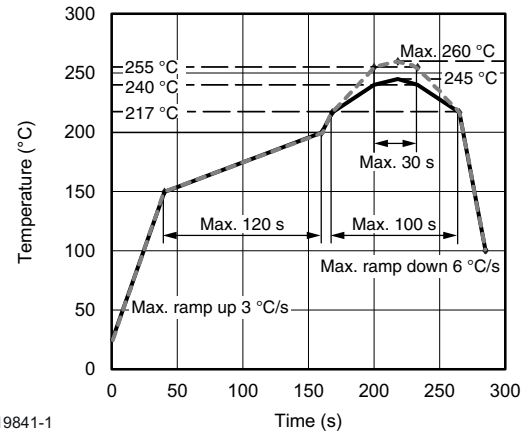


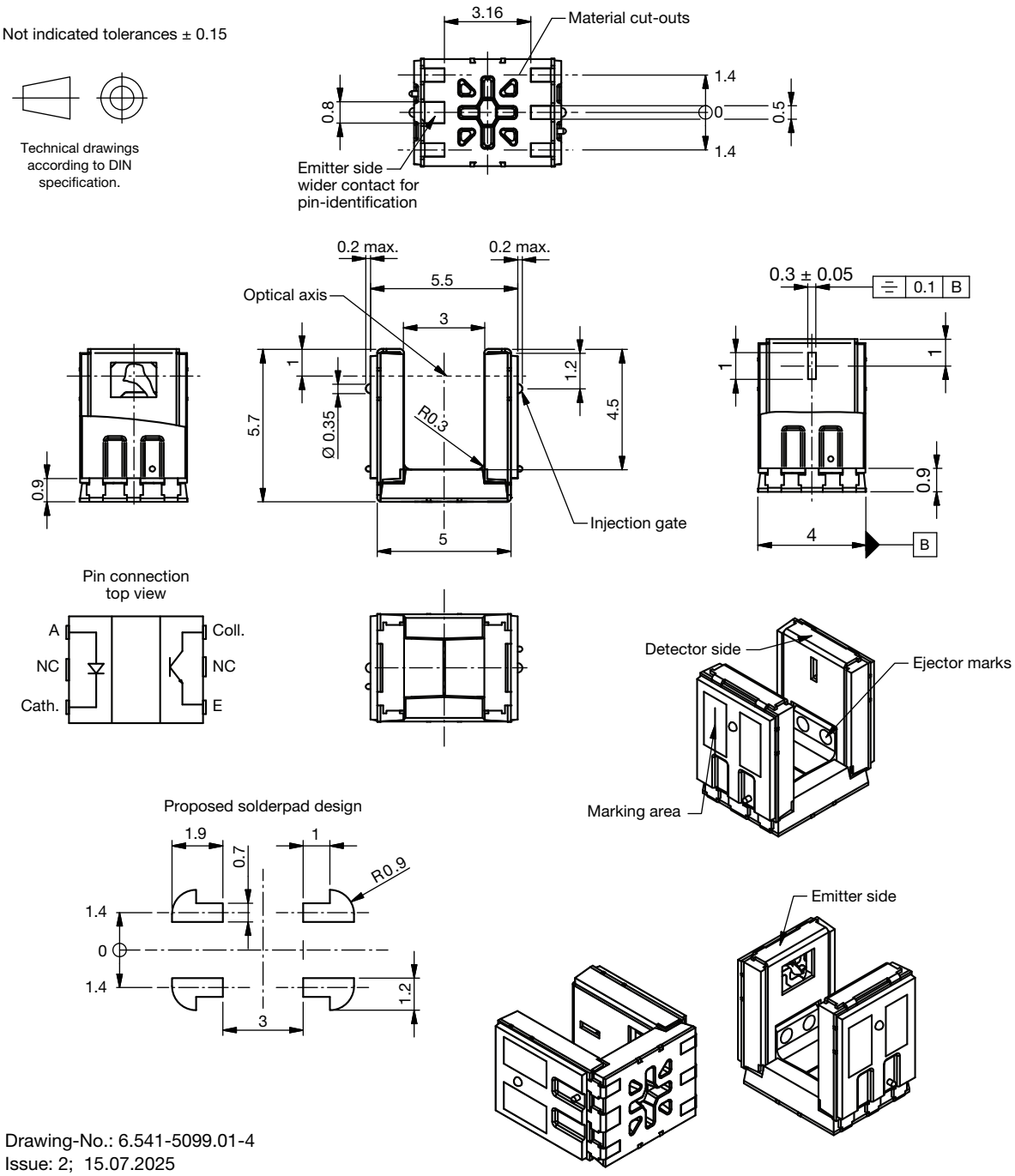
Fig. 16 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020

FLOOR LIFE

No time limit.

Moisture sensitivity level (MSL) 1, according to JEDEC®, J-STD-020.

PACKAGE DIMENSIONS in millimeters



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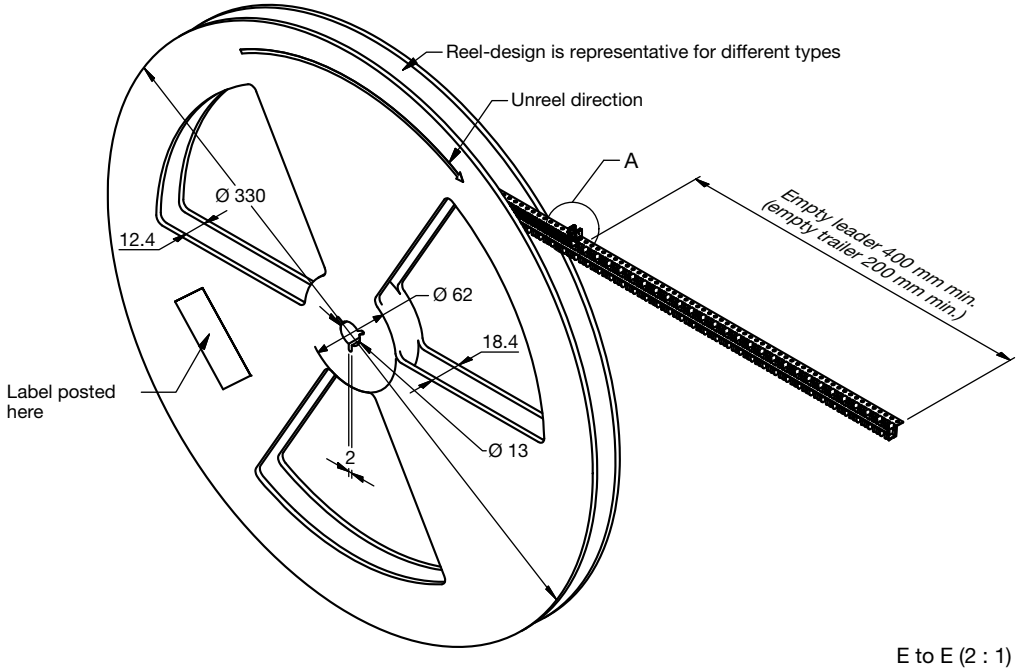
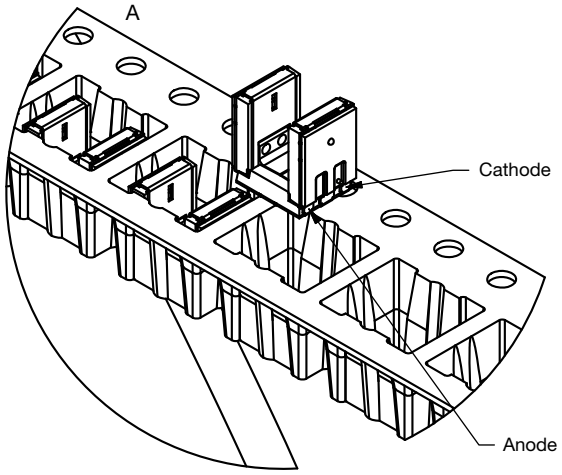
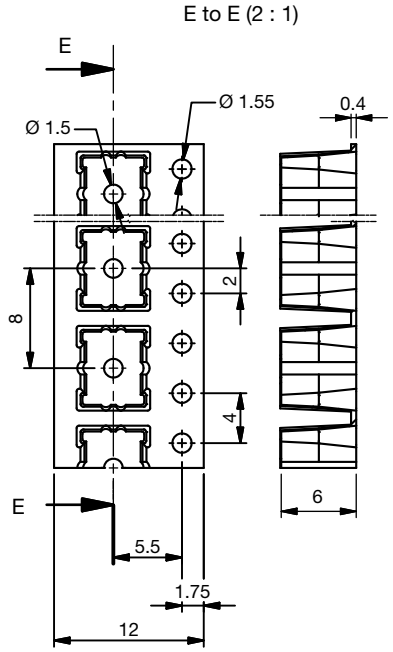
Issue: 2; 15.07.2025

PACKAGE DIMENSIONS in millimeters







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Issue: 2; 15.07.2025

REVISION HISTORY		
DATASHEET VERSION	**REVISION DATE**	**CHANGE**
1.0	28-Aug-2025	Initial release
1.1	02-Oct-2025	Part drawing and tape-and-reel drawing updated
1.2	09-Dec-2025	The link to the external 3D model resource has been updated to the latest version

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