

4-Quadrant Silicon PIN Photodiode



FEATURES

- Package type: surface-mount
- Technology: epitaxial
- Package form: top view
- Dimensions (L x W x H in mm): 4.72 x 4.72 x 0.75
- AEC-Q101 qualified
- High photo sensitivity
- Floor life: 168 h, MSL 3, according to J-STD-020
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

DESCRIPTION

K857PE is a 4-quadrant photo detector in surface-mount package. Each quadrant PD has an active area of 1.6 mm².

LINKS TO ADDITIONAL RESOURCES



PRODUCT SUMMARY			
COMPONENT	I_{ra} (μA) ($E_e = 1.0 \text{ mW/cm}^2$, $\lambda = 850 \text{ nm}$, $V_R = 5 \text{ V}$)	ϕ (°)	$\lambda_{0.1}$ (nm)
K857PE	8.5	± 60	690 to 1050

Note

- Test conditions see table “Basic Characteristics”

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
K857PE	Tape and reel	MOQ: 1000 pcs, 1000 pcs/reel	Top view
K857PE-GS15	Tape and reel	MOQ: 5000 pcs, 5000 pcs/reel	Top view

Note

- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25 \text{ }^\circ\text{C}$, unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V_R	20	V
Operating temperature range		T_{amb}	-40 to +110	$^\circ\text{C}$
Storage temperature range		T_{stg}	-40 to +110	$^\circ\text{C}$
Soldering temperature	According to reflow solder profile Fig. 8	T_{sd}	260	$^\circ\text{C}$
ESD safety HBM	$\pm 2000 \text{ V}$, 1.5 k Ω , 100 pF, 3 pulses	ESD_{HBM}	2.0	kV

BASIC CHARACTERISTICS, SINGLE QUADRANT ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	$I_F = 50\text{ mA}$	V_F	-	0.9	1.3	V
Reverse dark current	$V_R = 10\text{ V}, E = 0$	I_{ro}	-	1	10	nA
Diode capacitance	$V_R = 0\text{ V}, f = 1\text{ MHz}, E = 0$	C_D	-	11	-	pF
	$V_R = 3\text{ V}, f = 1\text{ MHz}, E = 0$	C_D	-	7	-	pF
Short circuit current	$E_e = 1\text{ mW/cm}^2, \lambda = 850\text{ nm}$	I_k	-	8.5	-	μA
Temperature coefficient of I_{ra}	$E_e = 1\text{ mW/cm}^2, V_R = 5\text{ V}$	TK_{Ira}	-	0.15	-	%/K
Reverse light current	$E_e = 1\text{ mW/cm}^2, \lambda = 850\text{ nm}, V_R = 5\text{ V}$	I_{ra}	7	8.5	11	μA
	$E_e = 1\text{ mW/cm}^2, \lambda = 940\text{ nm}, V_R = 5\text{ V}$	I_{ra}	-	5.7	-	μA
Angle of half sensitivity		ϕ	-	± 60	-	$^{\circ}$
Wavelength of peak sensitivity		λ_p	-	840	-	nm
Range of spectral bandwidth		$\lambda_{0.1}$	-	690 to 1050	-	nm
Rise time	$V_R = 10\text{ V}, R_L = 50\text{ }\Omega, \lambda = 830\text{ nm}$	t_r	-	30	-	ns
Fall time	$V_R = 10\text{ V}, R_L = 50\text{ }\Omega, \lambda = 830\text{ nm}$	t_f	-	30	-	ns

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

 Values per quadrant q ($q = 1, 2, 3, 4$)

CROSS-TALK SPECIFICATION			
Laser illumination (850 nm, 65 μm spot diameter, radiant power 0.7 mW) of center of PD quadrant 1 ($q = 1$), $V_{R,q} = 5\text{ V}$ applied to all quadrants ($q = 1, 2, 3, 4$)			
ILLUMINATED	MEASURED PARAMETER	TYP. VALUE	UNIT
Yes	$I_{ra_850_1}$	100	%
No	$I_{ra_850_2}$	0.1	%
No	$I_{ra_850_3}$	0.1	%
No	$I_{ra_850_4}$	0.05	%

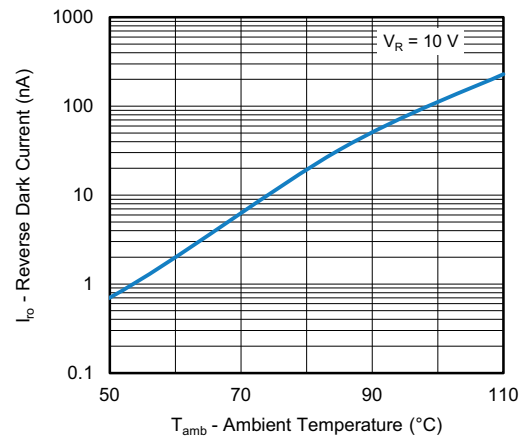
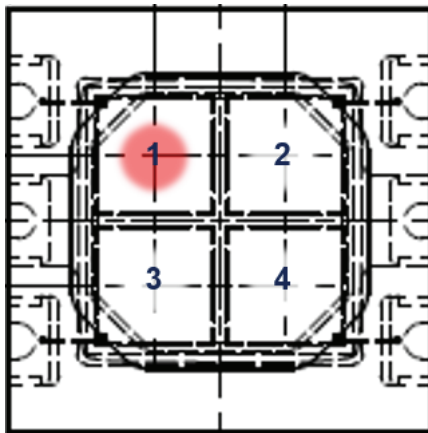


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

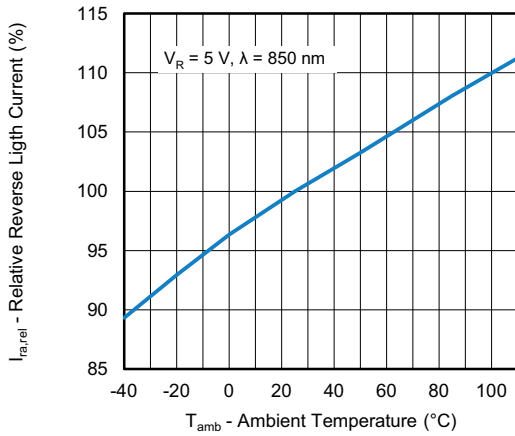


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

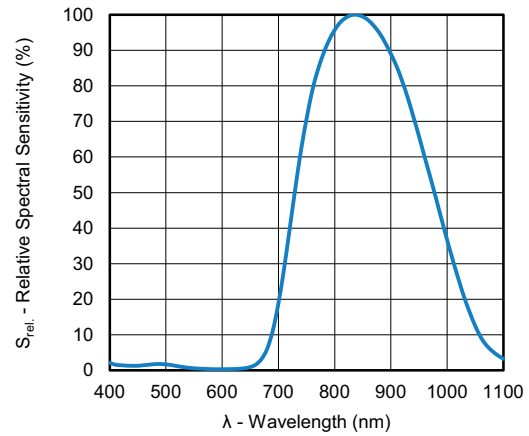


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

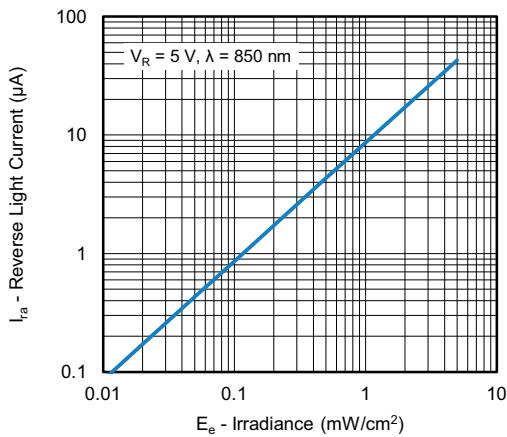


Fig. 3 - Reverse Light Current vs. Irradiance

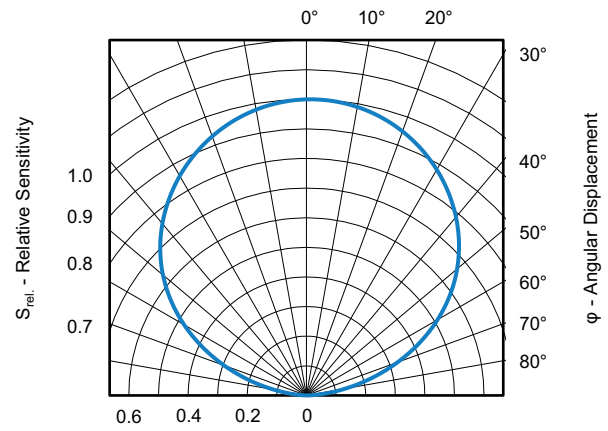


Fig. 6 - Relative Sensitivity vs. Angular Displacement

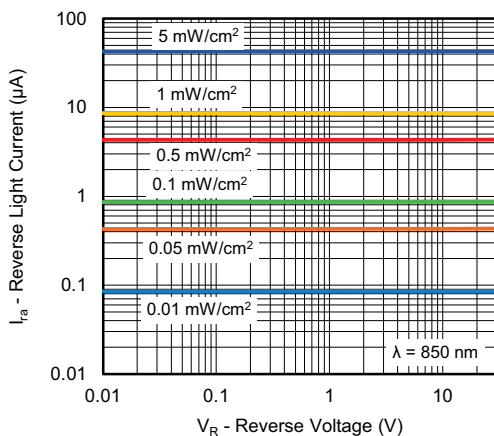
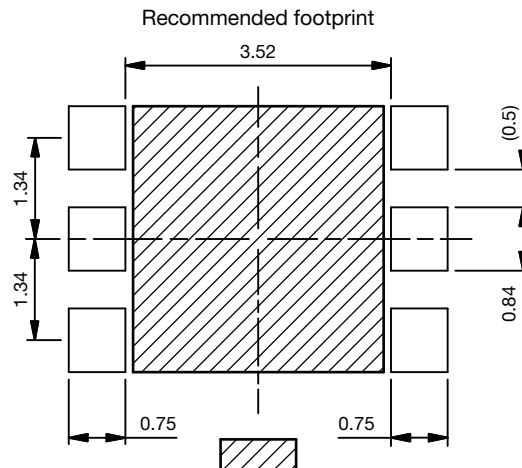
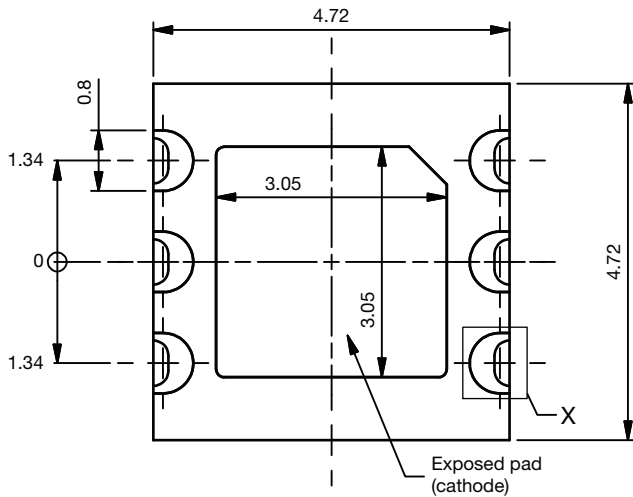
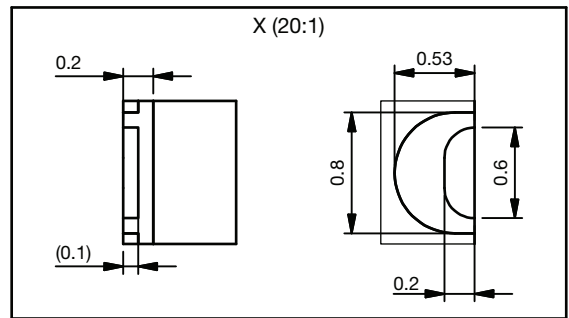
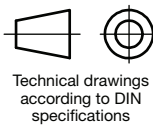
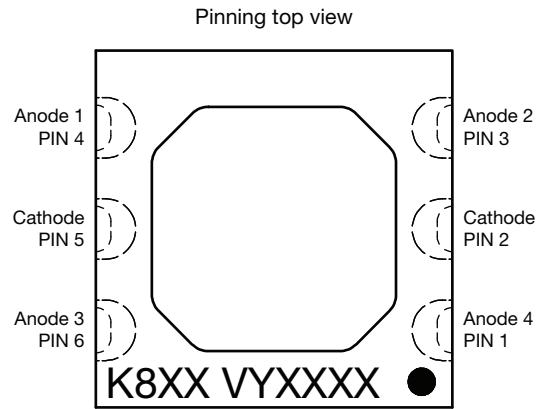
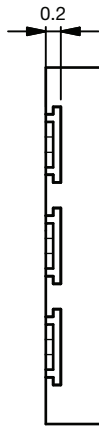
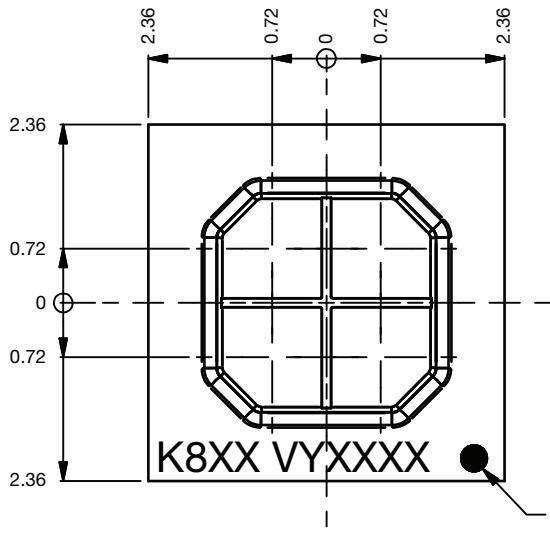


Fig. 4 - Reverse Light Current vs. Reverse Voltage

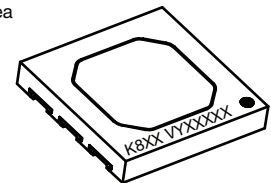
PACKAGE DIMENSIONS in millimeters



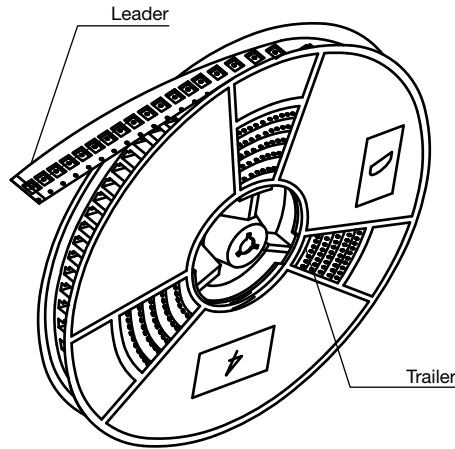
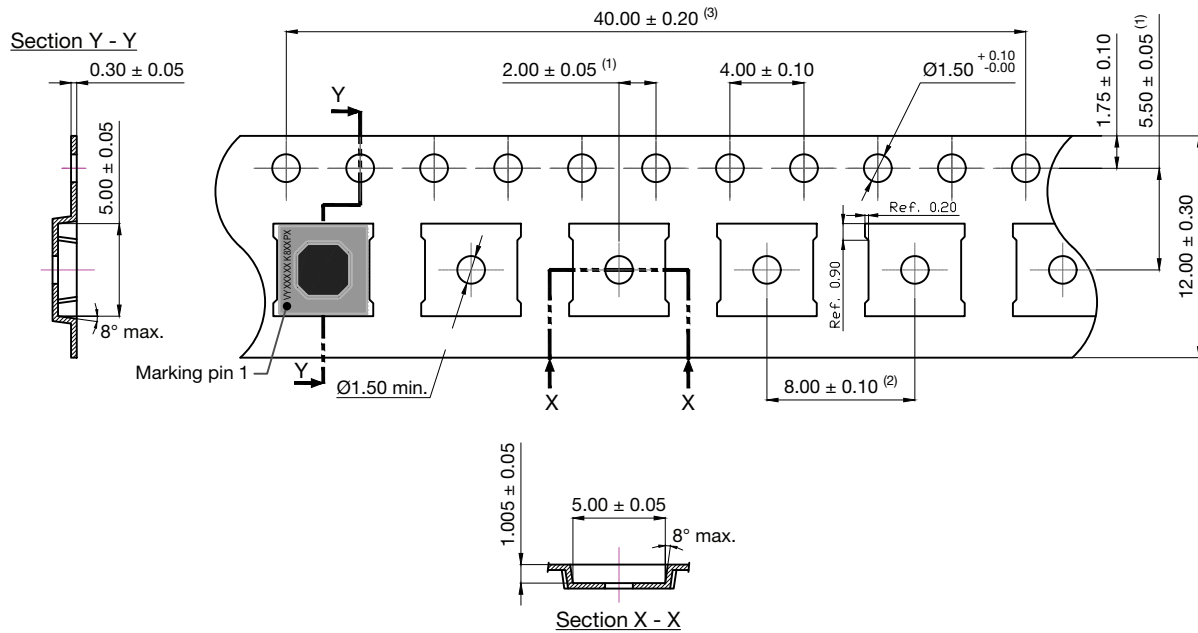
Not indicated tolerances ± 0.1 mm

Drawing No.: 6.550-5356.01-4
Issue: 2; 19.02.2021

Active area photodiodes:	
Single PD:	1.6 mm ²
All PDs:	6.4 mm ²
Total opening:	7.1 mm ²



TAPE AND REEL DIMENSIONS in millimeters



Notes

- Allowable camber to be 1 mm per 250 mm in length for single winding and 2 mm per 250 mm in length for cross winding
- (1) Measure from centerline of sprocket hole to centerline of pocket
- (2) Measure from centerline of pocket to centerline of pocket
- (3) Pitch tolerance for sprocket hole, 10 pitch cumulative tolerance is ± 0.2 mm

SOLDER PROFILE



19841

Fig. 7 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020D

DRYPACK

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

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-033D or recommended conditions:

192 h at 40 °C (+ 5 °C), $RH < 5\%$

or

96 h at 60 °C (+ 5 °C), $RH < 5\%$



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