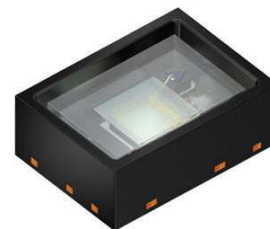


## V102Q123A-940



### Features:

- Package: QFN Package
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- IR laser wavelength 940nm
- VCSEL power array
- 1 Watt up to 2.5 Watts of power
- Die size 0.870 x 0.870 nm
- Package size: (WxDxH) 2.4 mm x 3.3 mm x 1.2 mm
- IR Laser with photodiode

### Applications

- 3D Capturing
- Access Control (IRIS/Vein Scan, Face Recognition)
- Augmented Reality, Mixed Reality
- Gesture Recognition
- Virtual Reality

### Note

Depending on the mode of operation, these devices emit highly concentrated non visible infrared light which can be hazardous to the human eye. Products which incorporate these devices have to follow the safety precautions given in IEC 60825-1 "Safety of laser products".

### Ordering Information

$T_A = 25\text{ °C}$  ,  $I_F = 2.7\text{ A}$ ,  $t_p = 300\text{ }\mu\text{s}$ ;  $D = 0.05$

Type	Peak output power $P_{opt}$ [W]	Ordering Code
V102Q123A-940	typ. 2	Q65112A9854

**Maximum Ratings**

Parameter	Symbol	Values	Unit
Operating temperature range (85°C with reduced efficiency)	$T_{op}$	-20 ... 85	°C
Storage temperature range	$T_{stg}$	-40 ... 85	°C
Soldering temperature ( $t_{max} = 10$ s)	$T_S$	260	°C
ESD withstand voltage (acc. to ANSI/ ESDA/ JEDEC JS-001 - HBM)	$V_{ESD}$	2	kV

**IR Laser**

Forward Current (CW mode)	$I_F$	2.5	A
Surge current ( $t_p \leq 600$ $\mu$ s, $D = 0.01$ )	$I_{FSM}$	4	A
Reverse voltage <sup>2) page 14</sup>	$V_R$	5	V

**Photodiode**

Reverse voltage	$V_R$	5	V
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**Note:** Stresses beyond those listed under Maximum Ratings may cause permanent damage to the device.

**Characteristics** ( $T_A = 25$  °C ,  $t_p = 300$   $\mu$ s;  $D = 0.05$ )

Parameter	Symbol	Values	Unit
Peak emission wavelength <sup>5) page 14</sup>	(min) (typ) (max)	$\lambda_{peak}$	930 945 nm nm
Peak output power <sup>1) page 14</sup> ( $I_F = 2.7$ A)	(min) (typ)	$P_{opt}$	2.0 2.15 W W
Threshold current	(typ) (max)	$I_{th}$	0.25 0.40 A A
Slope efficiency ( $I_F = 0.1$ W... 0.5 W)	(min) (typ)	$\eta$	0.7 0.85 W/A W/A
Power conversion efficiency ( $I_F = 2.7$ A)	(typ)	$\eta_{tot}$	38 %
Field of View incl. OE (HFOV)	(min)	$\Theta_{  }$	50 °
Field of View incl. OE (VFOV)	(min)	$\Theta_{\perp}$	63 °
Chip dimensions	(typ)	L x W	0.87 x 0.87 mm x mm

Parameter		Symbol	Values	Unit
Rise and fall times of $I_e$ ( 20% and 80% of $I_{e\max}$ )	(typ)	$t_r / t_f$	1	ns
Forward voltage <sup>4) page 14</sup> ( $I_F = 2.7$ A)	(min) (typ) (max)	$V_F$	1.75 2.2 2.25	V V V
Temperature coefficient of Wavelength	(typ)	$TC_\lambda$	0.07	nm/K
Thermal resistance junction solder point real	(max)	$R_{thJS}$	11	K / W

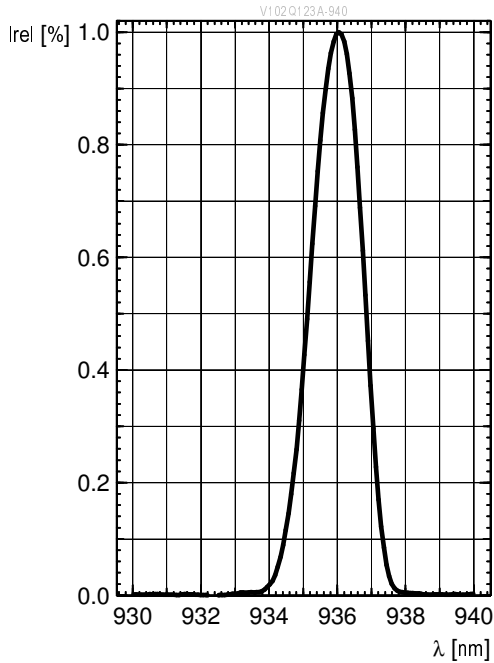
### Photodiode

Wavelength of max sensitivity	(typ)	$\lambda_{S\max}$	910	nm
Spectral range of sensitivity	(typ)	$\lambda_{10\%}$	400 ... 1100	nm
Photocurrent ( $\lambda = 940$ nm, $E_e = 0.5$ mW/cm <sup>2</sup> , $V_R = 3.3$ V)	(typ)	$I_P$	310	nA
Photocurrent (Std. light A, $E_v = 1000$ lx; $V_R = 3.3$ V)	(typ)	$I_P$	890	nA
Photocurrent <sup>3) page 14</sup> (with VCSEL @ $I_F = 2.7$ A, $V_R = 3.3$ V)	(min) (typ) (max)	$I_P$	420 600 680	$\mu$ A $\mu$ A $\mu$ A
Dark current ( $V_R = 3.3$ V)	(typ) (max)	$I_R$	0.1 30	nA nA
Chip dimensions	(typ)	L x W	0.36 x 0.36	mm x mm
Rise and fall time ( 10% and 90%) ( $\lambda = 940$ nm, $V_R = 3.3$ V, $R_L = 50$ $\Omega$ )	(typ)	$t_r, t_f$	320/ 200	ns
Forward voltage <sup>4) page 14</sup> ( $I_F = 10$ mA, $E = 0$ )	(typ) (max)	$V_F$	0.9 1.25	V V
Open-circuit voltage ( $\lambda = 940$ nm, $E_e = 0.5$ mW/cm <sup>2</sup> )	(typ)	$V_O$	260	mV
Short-circuit current ( $\lambda = 940$ nm, $E_e = 0.5$ mW/cm <sup>2</sup> , $V_R = 0$ V)	(typ)	$I_{SC}$	270	nA
Short-circuit current (Std. light A, $E_v = 1000$ lx, $V_R = 0$ V)	(typ)	$I_{SC}$	810	nA
Capacitance ( $E_e = 0$ mW/cm <sup>2</sup> , $f = 1$ MHz, $V_R = 0$ V)	(typ)	$C_0$	2.1	pF
Temperature coefficient of Sensitivity ( $\lambda = 940$ nm, $E_e = 0.5$ mW/cm <sup>2</sup> , $V_R = 3.3$ V)	(typ)	$TC_I$	0.23	%/K
Temperature coefficient of Voltage ( $I_F = 10$ mA, $E = 0$ )	(typ)	$TC_V$	-1.2	mV/K

**Diagrams**  
**IR Laser**

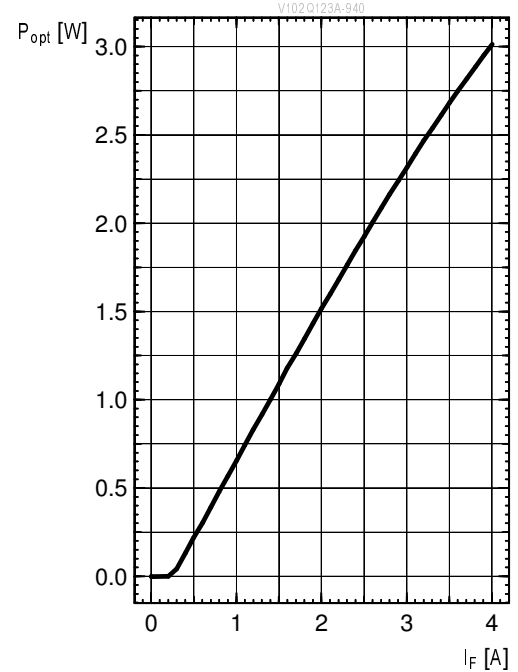
**Relative Spectral Emission** <sup>6) page 14</sup>

$I_{rel} = f(\lambda)$ ,  $t_p = 300 \mu s$ ;  $D = 0.05$ ,  $T_A = 25^\circ C$



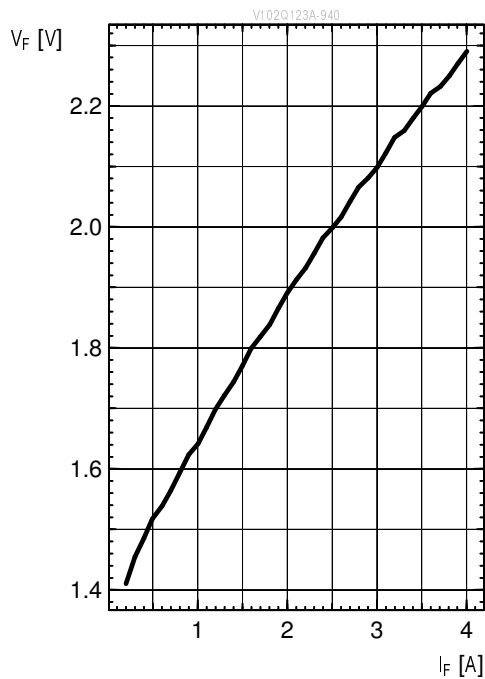
**Optical output power** <sup>6) page 14</sup>

$P_{opt} = f(I_F)$ ,  $t_p = 300 \mu s$ ;  $D = 0.05$ ,  $T_A = 25^\circ C$



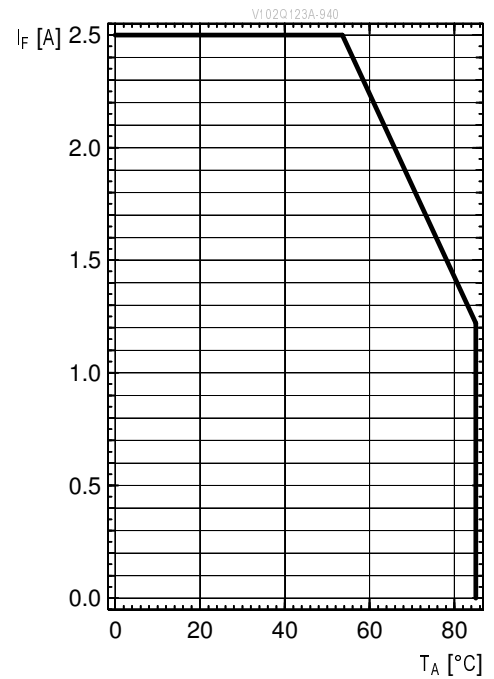
**Forward Current** <sup>6) page 14</sup>

$I_F = f(V_F)$ ,  $t_p = 300 \mu s$ ;  $D = 0.05$ ,  $T_A = 25^\circ C$



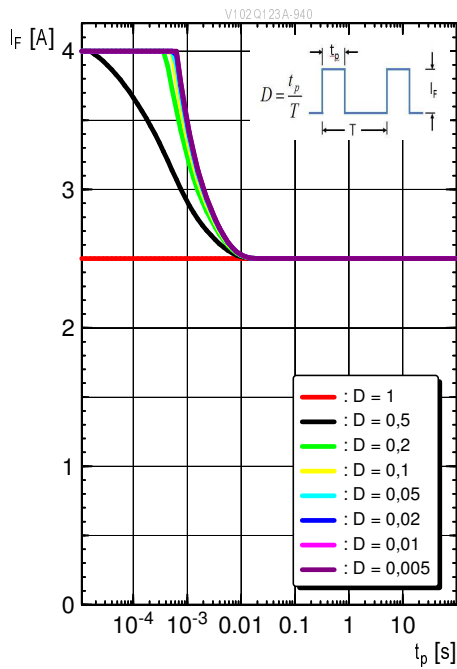
**Max. Permissible Forward Current**

$I_{F, max} = f(T_A)$ ,  $R_{thJS} = 11 K / W$



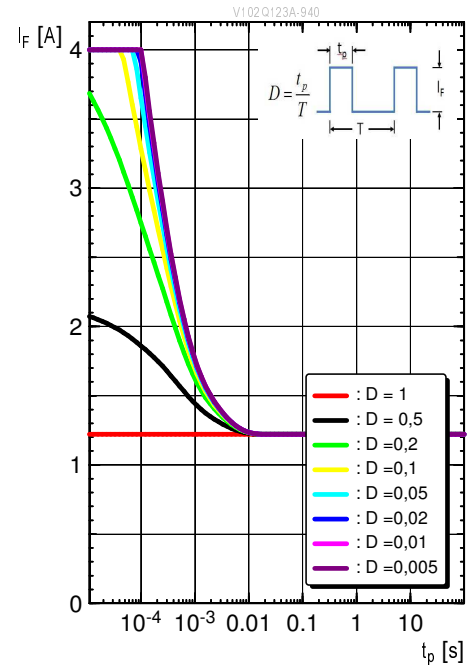
**Permissible Pulse Handling Capability**

$I_F = f(t_p)$ ,  $T_A = 25\text{ °C}$ , duty cycle  $D = \text{parameter}$



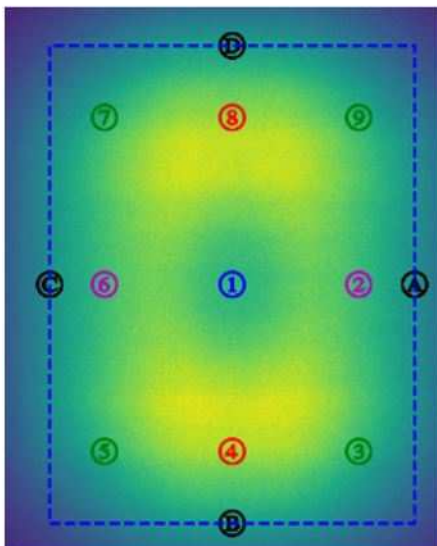
**Permissible Pulse Handling Capability**

$I_F = f(t_p)$ ,  $T_A = 85\text{ °C}$ , duty cycle  $D = \text{parameter}$



**Far-Field Illumination Pattern** <sup>6) page 14</sup>

$I_{rel} = f(\phi)$ ,  $t_p = 300\ \mu\text{s}$ ;  $D = 0.05$ ,  $T_A = 25\text{ °C}$



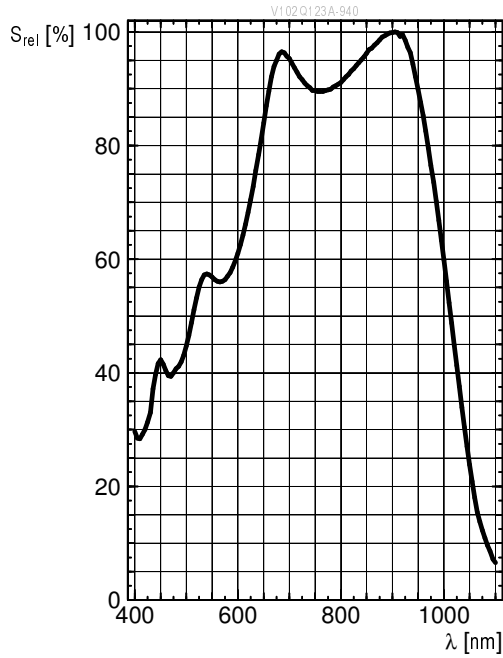
	Min	Typ	Max
1	100%	100%	100%
2	90%	105%	135%
3	75%	90%	130%
4	105%	135%	160%
5	75%	90%	130%
6	90%	105%	135%
7	75%	90%	130%
8	105%	135%	160%
9	75%	90%	130%
A	65%	80%	110%
B	65%	80%	110%
C	65%	80%	110%
D	65%	80%	110%

----- FOI = 50°(h) x 63°(v)

**Diagrams**  
**Photodiode**

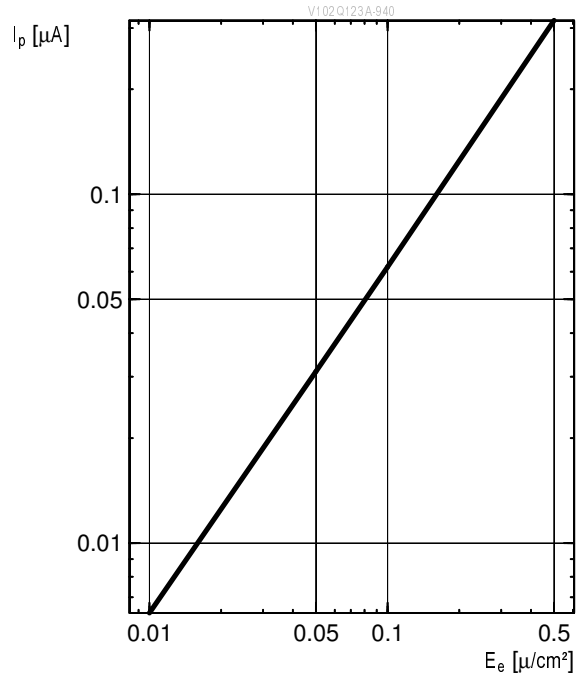
**Relative Spectral Sensitivity** <sup>6) page 14</sup>

$S_{rel} = f(\lambda), V_R = 3.3 \text{ V}, T_A = 25^\circ\text{C}$



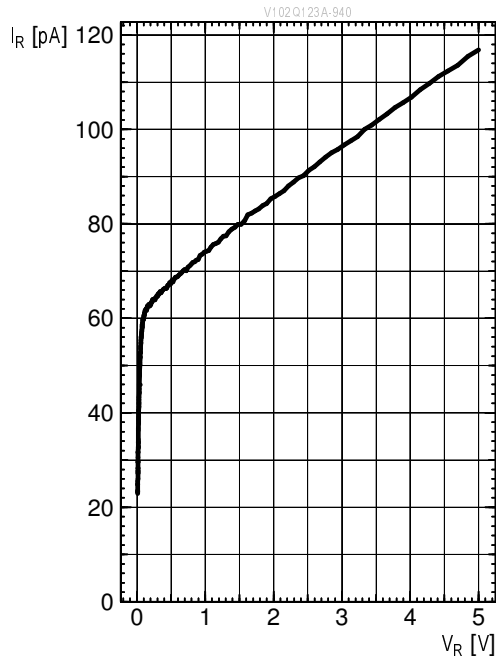
**Photocurrent** <sup>6) page 14</sup>

$I_p = f(E_e), V_R = 3.3 \text{ V}, T_A = 25^\circ\text{C}$



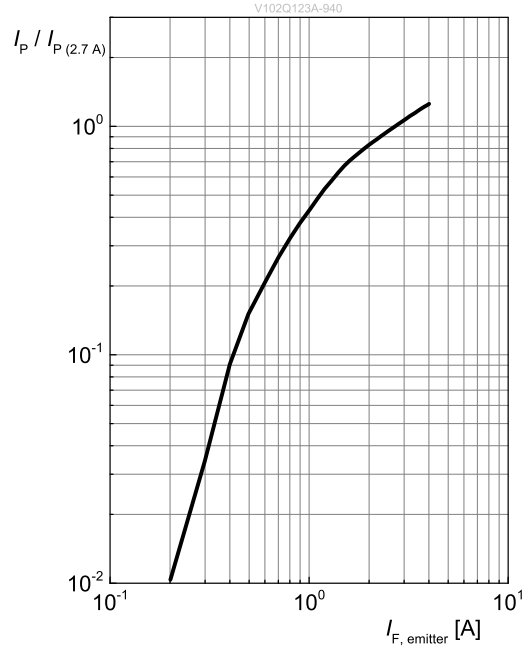
**Dark Current** <sup>6) page 14</sup>

$I_R = f(V_R)$



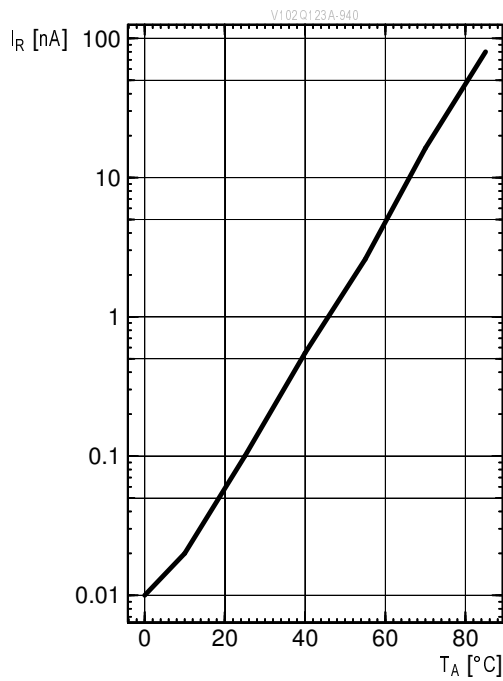
**Photocurrent** <sup>6) page 14</sup>

$I_{P,rel} = f(I_{F,emitter}), V_R = 3.3 V, T_A = 25^\circ C$



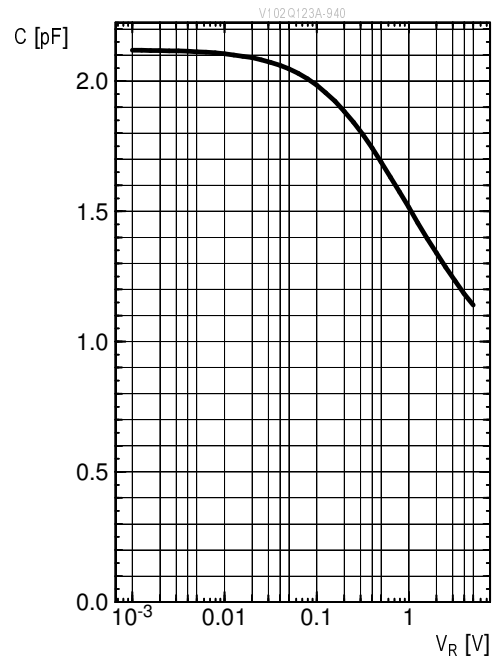
**Dark Current** <sup>6) page 14</sup>

$I_R = f(T_A), V_R = 3.3 V$

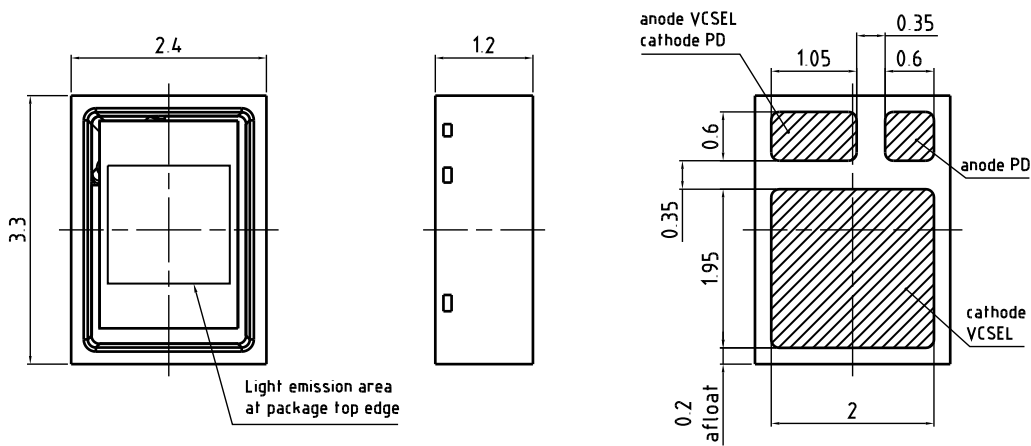


**Capacitance** <sup>6) page 14</sup>

$C = f(V_R), f = 1 MHz, T_A = 25^\circ C$



**Dimensional Drawing** <sup>7) page 14</sup>



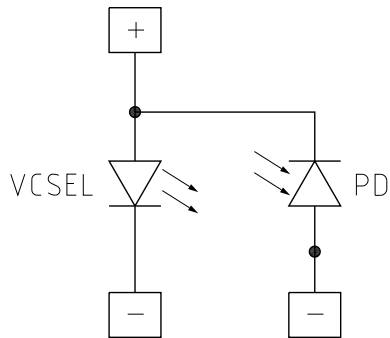
general tolerance  $\pm 0.1$   
 lead finish Au

C67062-A0307-A2..-05

Dimensions in mm.

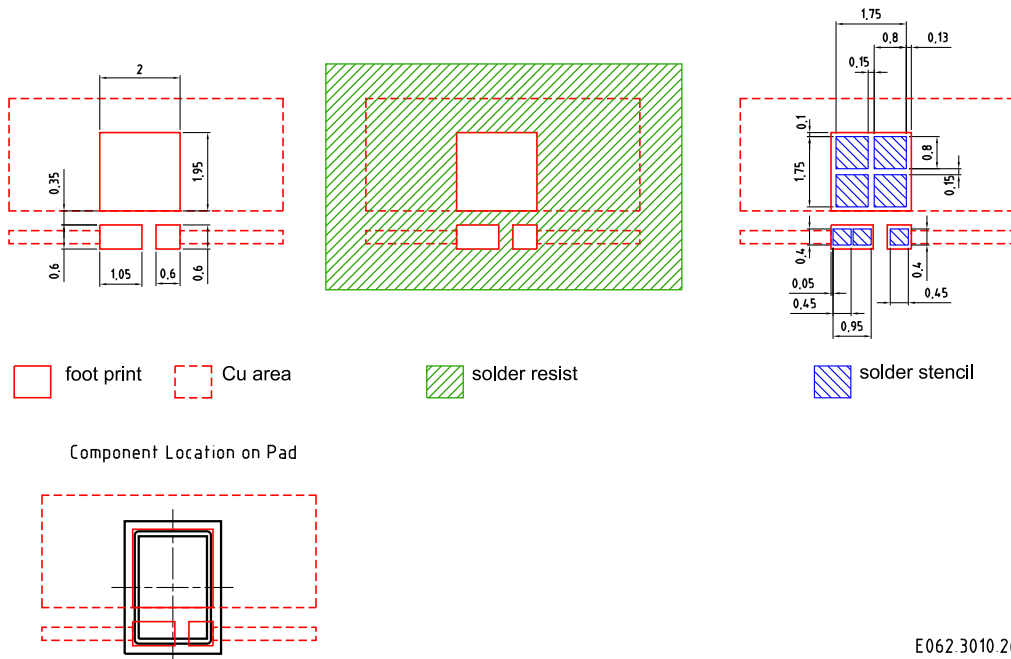
**Approximate Weight:**  
 20 mg

**Electrical internal circuit**





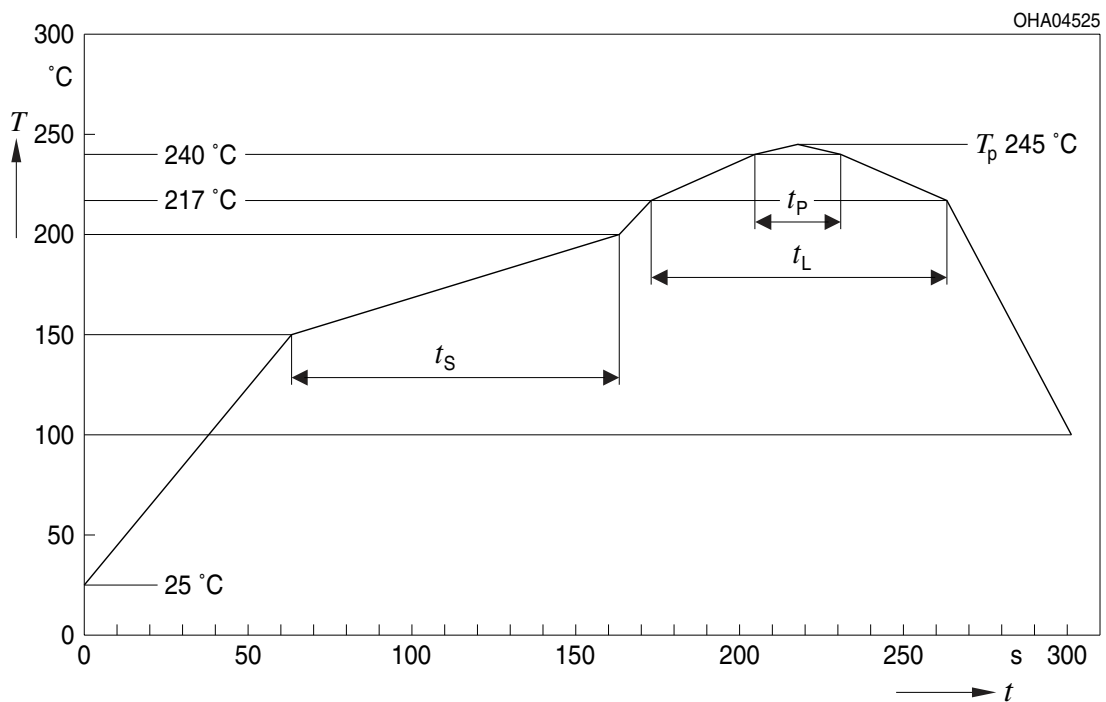
**Recommended Solder Pad**



Dimensions in mm.

**Reflow Soldering Profile**

Product complies to MSL Level 3 acc. to JEDEC J-STD-020E

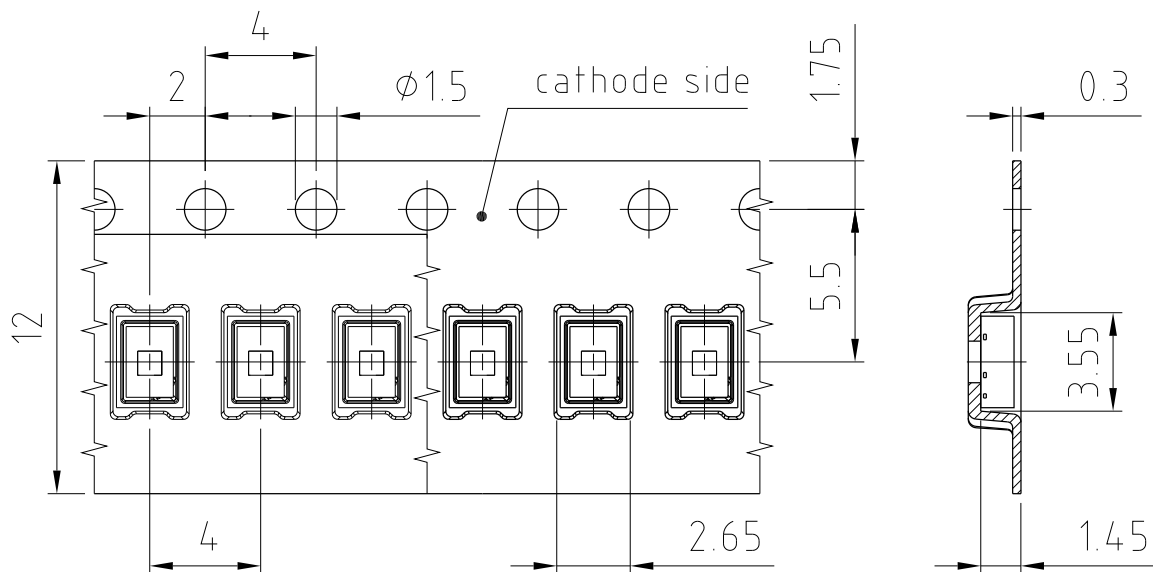


OHA04612

Profil-Charakteristik Profile Feature	Symbol Symbol	Pb-Free (SnAgCu) Assembly			Einheit Unit
		Minimum	Recommendation	Maximum	
Ramp-up Rate to Preheat*) 25 °C to 150 °C			2	3	K/s
Time $t_S$ $T_{Smin}$ to $T_{Smax}$	$t_S$	60	100	120	s
Ramp-up Rate to Peak*) $T_{Smax}$ to $T_P$			2	3	K/s
Liquidus Temperature	$T_L$	217			°C
Time above Liquidus temperature	$t_L$		80	100	s
Peak Temperature	$T_P$		245	260	°C
Time within 5 °C of the specified peak temperature $T_P - 5$ K	$t_P$	10	20	30	s
Ramp-down Rate* $T_P$ to 100 °C			3	6	K/s
Time 25 °C to $T_P$				480	s

All temperatures refer to the center of the package, measured on the top of the component  
\* slope calculation  $DT/Dt$ :  $Dt$  max. 5 s; fulfillment for the whole T-range

## Taping

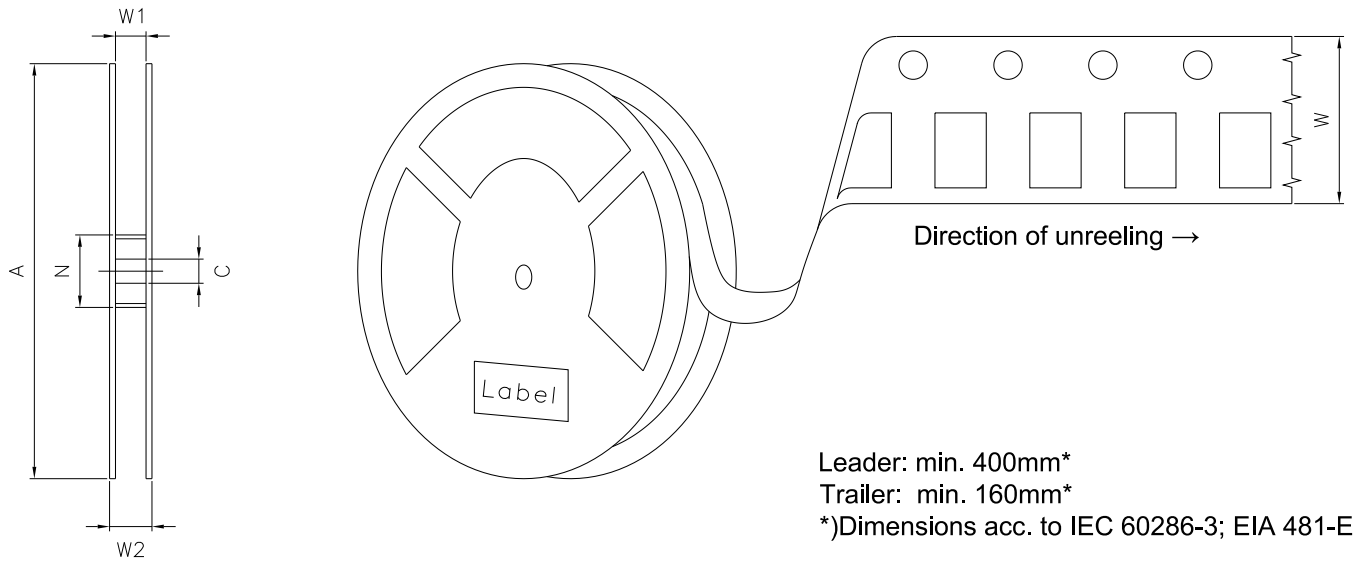


C67062-A0307-B6-01

Dimensions in mm.

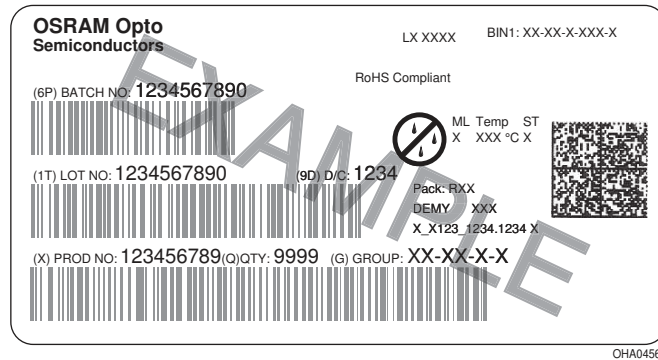
**Tape and Reel**

12 mm tape with 2000 pcs. on  $\varnothing$  180 mm or 8000 pcs. on  $\varnothing$  330 mm reel

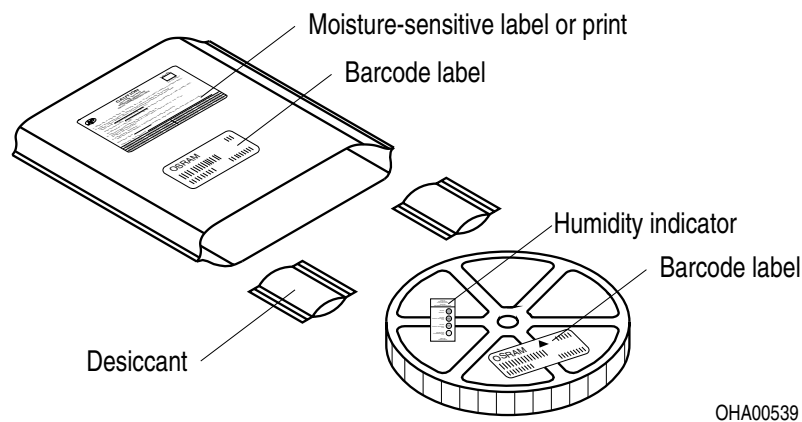
**Reel dimensions [mm]**

A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2max</sub>
180	12	60	12.4	18.4
330	12	60	12.4	18.4

**Barcode-Product-Label (BPL)**



**Dry Packing Process and Materials**



**Note:**

Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card. Regarding dry pack you will find further information in the internet. Here you will also find the normative references like JEDEC.

**Disclaimer**

Language english will prevail in case of any discrepancies or deviations between the two language wordings.

**Attention please!**

The information describes the type of component and shall not be considered as assured characteristics.

Terms of delivery and rights to change design reserved. Due to technical requirements components may contain dangerous substances.

For information on the types in question please contact our Sales Organization.

If printed or downloaded, please find the latest version on the OSRAM OS website.

**Packing**

Please use the recycling operators known to you. We can also help you – get in touch with your nearest sales office. By agreement we will take packing material back, if it is sorted. You must bear the costs of transport. For packing material that is returned to us unsorted or which we are not obliged to accept, we shall have to invoice you for any costs incurred.

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**Glossary**

- 1) **Brightness:** The brightness values are measured with a tolerance of  $\pm 11\%$ .
- 2) **Reverse Operation:** Reverse Operation of 10 hours is permissible in total. Continuous reverse operation is not allowed.
- 3) **Photocurrent:** The photocurrent values are measured (by irradiating the devices with a homogenous light source and applying a voltage to the device) with a tolerance of  $\pm 11\%$ .
- 4) **Forward voltage:** The forward voltages are measured with a tolerance of  $\pm 0.1$  V.
- 5) **Wavelength:** The wavelengths are measured with a tolerance of  $\pm 1$  nm.
- 6) **Typical Values:** Due to the special conditions of the manufacturing processes of LED, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.
- 7) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimensions are specified in mm.

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EU RoHS and China RoHS compliant product



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