

KW DPLS33.KD

SYNIOS® E4014

The low-profile rectangular shape of SYNIOS E4014 enables the light from this LED to be injected into light guides so that a wide range of design ideas can be realized. These mid-power light emitting diodes also have an impressively robust plastic package, a particularly uniform distribution of light and an excellent price performance ratio. The LEDs are intended primarily for lighting systems in vehicles and displays.



Applications

- Displays (Backlighting)

Features:

- Package: colored silicone resin, SMD epoxy package
- Chip technology: InGaN on Sapphire
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.28, Cy = 0.25 acc. to CIE 1931 (● white)
- Corrosion Robustness Class: 3B
- Qualifications: AEC-Q102 Qualified
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)

Ordering Information

Type	Luminous Flux ¹⁾ $I_F = 120 \text{ mA}$ Φ_V	Ordering Code
KW DPLS33.KD-HIJG-D30D144-HN-22C2	37.3 ... 56.5 lm	Q65112A8138

Maximum Ratings

Parameter	Symbol		Values
Reverse voltage			
Operating Temperature	T _{op}	min. max.	-40 °C 110 °C
Storage Temperature	T _{stg}	min. max.	-40 °C 110 °C
Junction Temperature	T _j	max.	125 °C
Forward Current T _S = 25 °C	I _F	min. max.	10 mA 200 mA
Forward Current pulsed t ≤ 10 ms; D = 10 %; T _S = 25 °C	I _{F pulse}	max.	250 mA
Reverse voltage ²⁾ T _S = 25 °C	V _R	max.	1.2 V
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)	V _{ESD}		8 kV

Characteristics

$I_F = 120 \text{ mA}$; $T_s = 25 \text{ °C}$

Parameter	Symbol		Values
Reverse current			
Chromaticity Coordinate ³⁾	C _x	typ.	0.28
	C _y	typ.	0.25
Peak Wavelength I _F = 120 mA	λ _{peak}	min.	446 nm
		max.	458 nm
Viewing angle at 50% I _V	2φ	typ.	120 °
Forward Voltage ⁴⁾ I _F = 120 mA	V _F	min.	2.80 V
		typ.	2.95 V
		max.	3.40 V
Reverse voltage (ESD device)	V _{R ESD}	min.	45 V
Reverse current ²⁾ V _R = 1.2 V	I _R	max.	200 mA
Real thermal resistance junction/solderpoint ⁵⁾	R _{thJS real}	typ.	21 K / W
		max.	28 K / W
Electrical thermal resistance junction/solderpoint ⁵⁾ with efficiency η _e = 50 %	R _{thJS elec.}	typ.	11 K / W
		max.	14 K / W

Brightness Groups

Group	Luminous Flux ¹⁾ $I_F = 120 \text{ mA}$ min. Φ_V	Luminous Flux ¹⁾ $I_F = 120 \text{ mA}$ max. Φ_V	Luminous Intensity ⁶⁾ $I_F = 120 \text{ mA}$ typ. I_V
HI	37.3 lm	39.1 lm	12.9 cd
HJ	39.1 lm	41.0 lm	13.5 cd
HK	41.0 lm	43.0 lm	14.2 cd
HL	43.0 lm	45.0 lm	14.9 cd
JC	45.0 lm	47.1 lm	15.5 cd
JD	47.1 lm	49.3 lm	16.3 cd
JE	49.3 lm	51.6 lm	17.0 cd
JF	51.6 lm	54.0 lm	17.8 cd
JG	54.0 lm	56.5 lm	18.7 cd

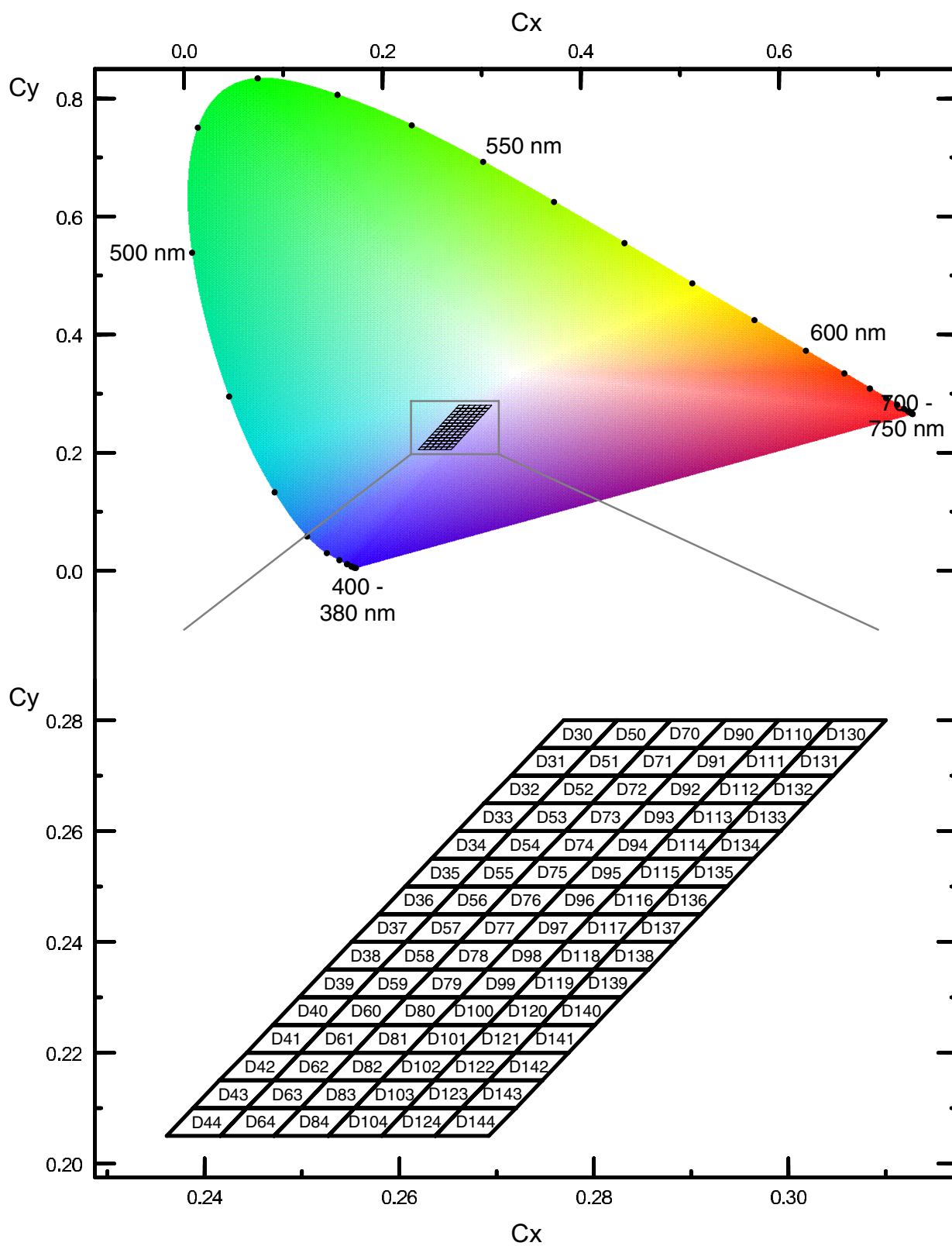
Forward Voltage Groups

Group	Forward Voltage ⁴⁾ $I_F = 120 \text{ mA}$ min. V_F	Forward Voltage ⁴⁾ $I_F = 120 \text{ mA}$ max. V_F
22	2.80 V	2.90 V
42	2.90 V	3.00 V
62	3.00 V	3.10 V
82	3.10 V	3.20 V
A2	3.20 V	3.30 V
C2	3.30 V	3.40 V

Wavelength Groups

Group	Peak Wavelength $I_F = 120 \text{ mA}$ min. λ_{peak}	Peak Wavelength $I_F = 120 \text{ mA}$ max. λ_{peak}
H	446 nm	448 nm
J	448 nm	450 nm
K	450 nm	452 nm
L	452 nm	454 nm
M	454 nm	456 nm
N	456 nm	458 nm

Chromaticity Coordinate Groups



Chromaticity Coordinate Groups

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
D100	0.2635	0.2250	D113	0.2881	0.2600	D121	0.2663	0.2200
	0.2691	0.2250		0.2936	0.2600		0.2719	0.2200
	0.2718	0.2300		0.2963	0.2650		0.2746	0.2250
	0.2663	0.2300		0.2908	0.2650		0.2691	0.2250
D101	0.2608	0.2200	D114	0.2854	0.2550	D122	0.2636	0.2150
	0.2663	0.2200		0.2909	0.2550		0.2692	0.2150
	0.2691	0.2250		0.2936	0.2600		0.2719	0.2200
	0.2635	0.2250		0.2881	0.2600		0.2663	0.2200
D102	0.2581	0.2150	D115	0.2827	0.2500	D123	0.2609	0.2100
	0.2636	0.2150		0.2882	0.2500		0.2664	0.2100
	0.2663	0.2200		0.2909	0.2550		0.2692	0.2150
	0.2608	0.2200		0.2854	0.2550		0.2636	0.2150
D103	0.2554	0.2100	D116	0.2799	0.2450	D124	0.2582	0.2050
	0.2609	0.2100		0.2855	0.2450		0.2637	0.2050
	0.2636	0.2150		0.2882	0.2500		0.2664	0.2100
	0.2581	0.2150		0.2827	0.2500		0.2609	0.2100
D104	0.2527	0.2050	D117	0.2772	0.2400	D130	0.3018	0.2750
	0.2582	0.2050		0.2827	0.2400		0.3073	0.2750
	0.2609	0.2100		0.2855	0.2450		0.3100	0.2800
	0.2554	0.2100		0.2799	0.2450		0.3045	0.2800
D110	0.2963	0.2750	D118	0.2745	0.2350	D131	0.2991	0.2700
	0.3018	0.2750		0.2800	0.2350		0.3046	0.2700
	0.3045	0.2800		0.2827	0.2400		0.3073	0.2750
	0.2990	0.2800		0.2772	0.2400		0.3018	0.2750
D111	0.2935	0.2700	D119	0.2718	0.2300	D132	0.2963	0.2650
	0.2991	0.2700		0.2773	0.2300		0.3019	0.2650
	0.3018	0.2750		0.2800	0.2350		0.3046	0.2700
	0.2963	0.2750		0.2745	0.2350		0.2991	0.2700
D112	0.2908	0.2650	D120	0.2691	0.2250	D133	0.2936	0.2600
	0.2963	0.2650		0.2746	0.2250		0.2992	0.2600
	0.2991	0.2700		0.2773	0.2300		0.3019	0.2650
	0.2935	0.2700		0.2718	0.2300		0.2963	0.2650

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
D134	0.2909	0.2550	D142	0.2692	0.2150	D35	0.2606	0.2500
	0.2964	0.2550		0.2747	0.2150		0.2661	0.2500
	0.2992	0.2600		0.2774	0.2200		0.2688	0.2550
	0.2936	0.2600		0.2719	0.2200		0.2633	0.2550
D135	0.2882	0.2500	D143	0.2664	0.2100	D36	0.2579	0.2450
	0.2937	0.2500		0.2720	0.2100		0.2634	0.2450
	0.2964	0.2550		0.2747	0.2150		0.2661	0.2500
	0.2909	0.2550		0.2692	0.2150		0.2606	0.2500
D136	0.2855	0.2450	D144	0.2637	0.2050	D37	0.2551	0.2400
	0.2910	0.2450		0.2692	0.2050		0.2607	0.2400
	0.2937	0.2500		0.2720	0.2100		0.2634	0.2450
	0.2882	0.2500		0.2664	0.2100		0.2579	0.2450
D137	0.2827	0.2400	D30	0.2742	0.2750	D38	0.2524	0.2350
	0.2883	0.2400		0.2797	0.2750		0.2579	0.2350
	0.2910	0.2450		0.2824	0.2800		0.2607	0.2400
	0.2855	0.2450		0.2769	0.2800		0.2551	0.2400
D138	0.2800	0.2350	D31	0.2715	0.2700	D39	0.2497	0.2300
	0.2856	0.2350		0.2770	0.2700		0.2552	0.2300
	0.2883	0.2400		0.2797	0.2750		0.2579	0.2350
	0.2827	0.2400		0.2742	0.2750		0.2524	0.2350
D139	0.2773	0.2300	D32	0.2687	0.2650	D40	0.2470	0.2250
	0.2828	0.2300		0.2743	0.2650		0.2525	0.2250
	0.2856	0.2350		0.2770	0.2700		0.2552	0.2300
	0.2800	0.2350		0.2715	0.2700		0.2497	0.2300
D140	0.2746	0.2250	D33	0.2660	0.2600	D41	0.2443	0.2200
	0.2801	0.2250		0.2715	0.2600		0.2498	0.2200
	0.2828	0.2300		0.2743	0.2650		0.2525	0.2250
	0.2773	0.2300		0.2687	0.2650		0.2470	0.2250
D141	0.2719	0.2200	D34	0.2633	0.2550	D42	0.2415	0.2150
	0.2774	0.2200		0.2688	0.2550		0.2471	0.2150
	0.2801	0.2250		0.2715	0.2600		0.2498	0.2200
	0.2746	0.2250		0.2660	0.2600		0.2443	0.2200

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
D43	0.2388	0.2100	D56	0.2634	0.2450	D64	0.2416	0.2050
	0.2443	0.2100		0.2689	0.2450		0.2471	0.2050
	0.2471	0.2150		0.2716	0.2500		0.2499	0.2100
	0.2415	0.2150		0.2661	0.2500		0.2443	0.2100
D44	0.2361	0.2050	D57	0.2607	0.2400	D70	0.2852	0.2750
	0.2416	0.2050		0.2662	0.2400		0.2907	0.2750
	0.2443	0.2100		0.2689	0.2450		0.2935	0.2800
	0.2388	0.2100		0.2634	0.2450		0.2879	0.2800
D50	0.2797	0.2750	D58	0.2579	0.2350	D71	0.2825	0.2700
	0.2852	0.2750		0.2635	0.2350		0.2880	0.2700
	0.2879	0.2800		0.2662	0.2400		0.2907	0.2750
	0.2824	0.2800		0.2607	0.2400		0.2852	0.2750
D51	0.2770	0.2700	D59	0.2552	0.2300	D72	0.2798	0.2650
	0.2825	0.2700		0.2607	0.2300		0.2853	0.2650
	0.2852	0.2750		0.2635	0.2350		0.2880	0.2700
	0.2797	0.2750		0.2579	0.2350		0.2825	0.2700
D52	0.2743	0.2650	D60	0.2525	0.2250	D73	0.2771	0.2600
	0.2798	0.2650		0.2580	0.2250		0.2826	0.2600
	0.2825	0.2700		0.2607	0.2300		0.2853	0.2650
	0.2770	0.2700		0.2552	0.2300		0.2798	0.2650
D53	0.2715	0.2600	D61	0.2498	0.2200	D74	0.2743	0.2550
	0.2771	0.2600		0.2553	0.2200		0.2799	0.2550
	0.2798	0.2650		0.2580	0.2250		0.2826	0.2600
	0.2743	0.2650		0.2525	0.2250		0.2771	0.2600
D54	0.2688	0.2550	D62	0.2471	0.2150	D75	0.2716	0.2500
	0.2743	0.2550		0.2526	0.2150		0.2771	0.2500
	0.2771	0.2600		0.2553	0.2200		0.2799	0.2550
	0.2715	0.2600		0.2498	0.2200		0.2743	0.2550
D55	0.2661	0.2500	D63	0.2443	0.2100	D76	0.2689	0.2450
	0.2716	0.2500		0.2499	0.2100		0.2744	0.2450
	0.2743	0.2550		0.2526	0.2150		0.2771	0.2500
	0.2688	0.2550		0.2471	0.2150		0.2716	0.2500

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
D77	0.2662	0.2400	D83	0.2499	0.2100	D94	0.2799	0.2550
	0.2717	0.2400		0.2554	0.2100		0.2854	0.2550
	0.2744	0.2450		0.2581	0.2150		0.2881	0.2600
	0.2689	0.2450		0.2526	0.2150		0.2826	0.2600
D78	0.2635	0.2350	D84	0.2471	0.2050	D95	0.2771	0.2500
	0.2690	0.2350		0.2527	0.2050		0.2827	0.2500
	0.2717	0.2400		0.2554	0.2100		0.2854	0.2550
	0.2662	0.2400		0.2499	0.2100		0.2799	0.2550
D79	0.2607	0.2300	D90	0.2907	0.2750	D96	0.2744	0.2450
	0.2663	0.2300		0.2963	0.2750		0.2799	0.2450
	0.2690	0.2350		0.2990	0.2800		0.2827	0.2500
	0.2635	0.2350		0.2935	0.2800		0.2771	0.2500
D80	0.2580	0.2250	D91	0.2880	0.2700	D97	0.2717	0.2400
	0.2635	0.2250		0.2935	0.2700		0.2772	0.2400
	0.2663	0.2300		0.2963	0.2750		0.2799	0.2450
	0.2607	0.2300		0.2907	0.2750		0.2744	0.2450
D81	0.2553	0.2200	D92	0.2853	0.2650	D98	0.2690	0.2350
	0.2608	0.2200		0.2908	0.2650		0.2745	0.2350
	0.2635	0.2250		0.2935	0.2700		0.2772	0.2400
	0.2580	0.2250		0.2880	0.2700		0.2717	0.2400
D82	0.2526	0.2150	D93	0.2826	0.2600	D99	0.2663	0.2300
	0.2581	0.2150		0.2881	0.2600		0.2718	0.2300
	0.2608	0.2200		0.2908	0.2650		0.2745	0.2350
	0.2553	0.2200		0.2853	0.2650		0.2690	0.2350

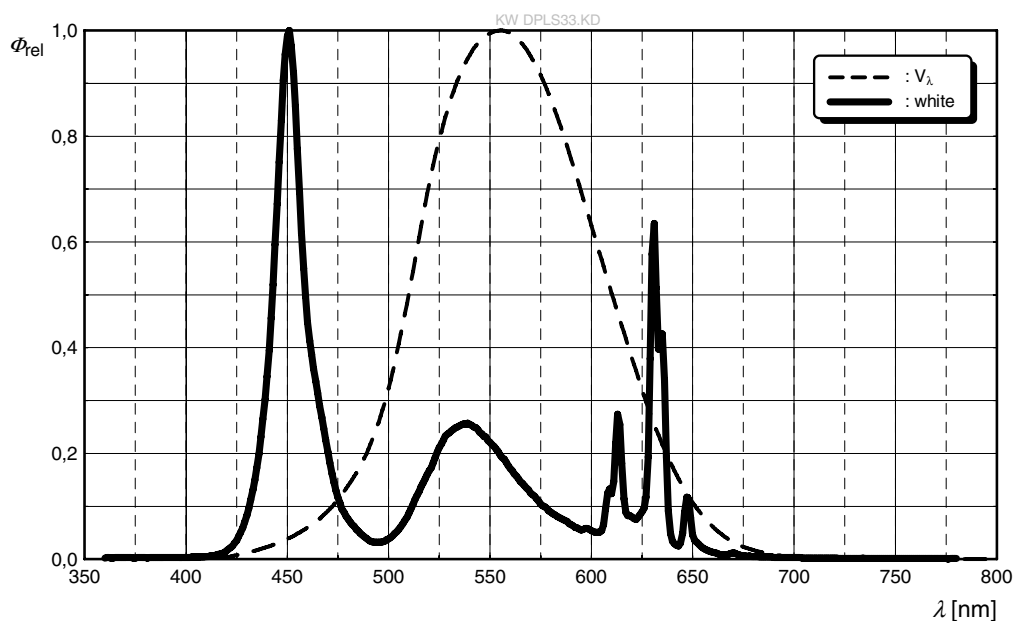
Group Name on Label

Example: HI-D100-H-22

Brightness	Color Chromaticity	Wavelength Groups	Forward Voltage
HI	D100	H	22

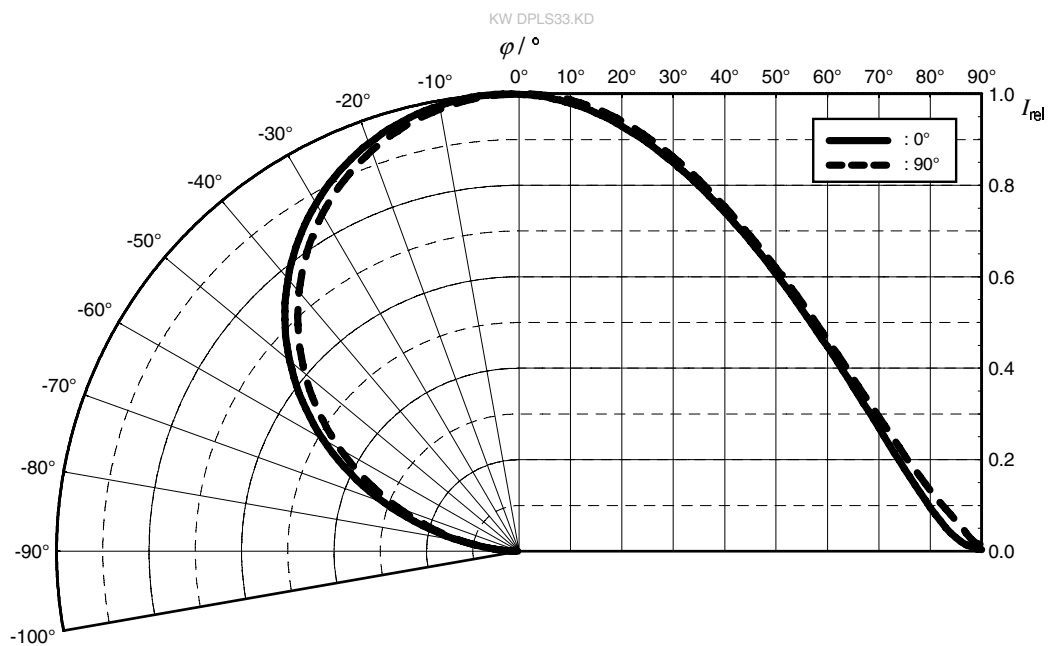
Relative Spectral Emission ⁶⁾

$$\Phi_{\text{rel}} = f(\lambda); I_F = 120 \text{ mA}; T_S = 25^\circ \text{C}$$



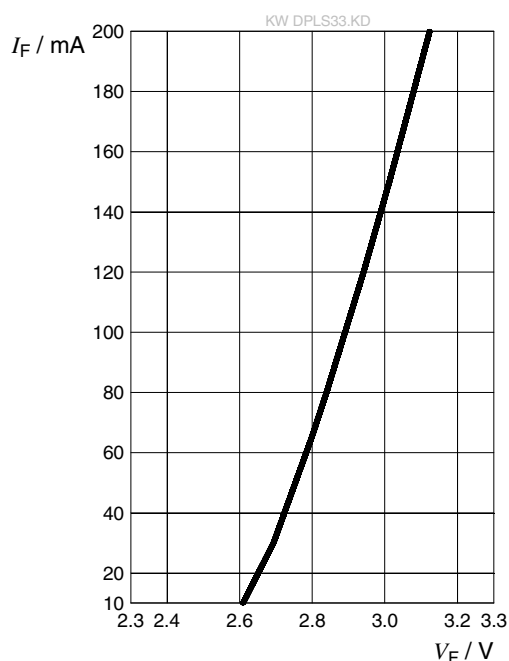
Radiation Characteristics ⁶⁾

$$I_{\text{rel}} = f(\phi); T_S = 25^\circ \text{C}$$

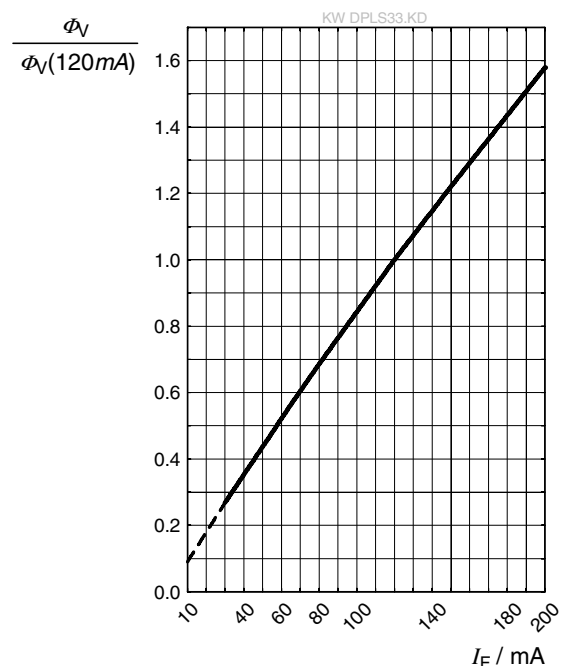


Forward current ⁶⁾

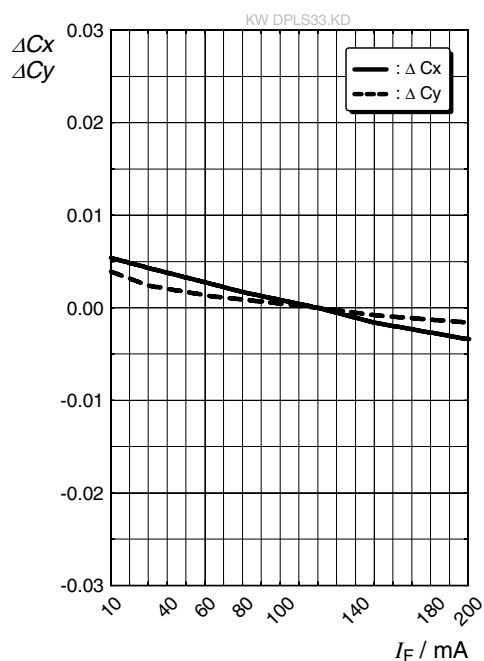
$$I_F = f(V_F); T_S = 25\text{ °C}$$

**Relative Luminous Flux** ^{6), 7)}

$$\Phi_V / \Phi_V(120\text{ mA}) = f(I_F); T_S = 25\text{ °C}$$

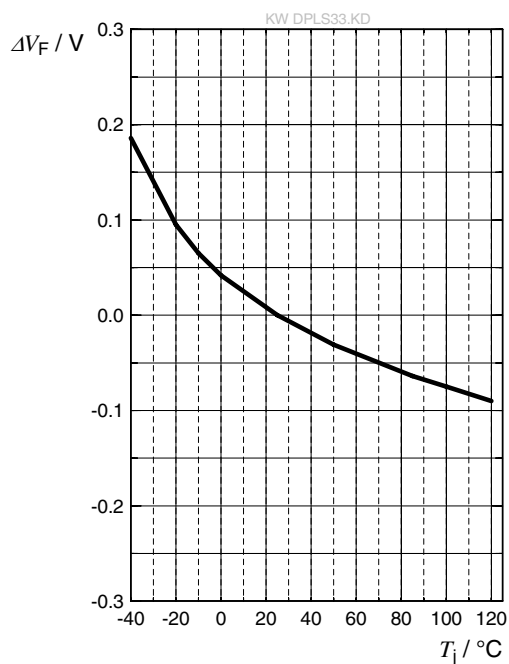
**Chromaticity Coordinate Shift** ⁶⁾

$$\Delta C_x, \Delta C_y = f(I_F); T_S = 25\text{ °C}$$

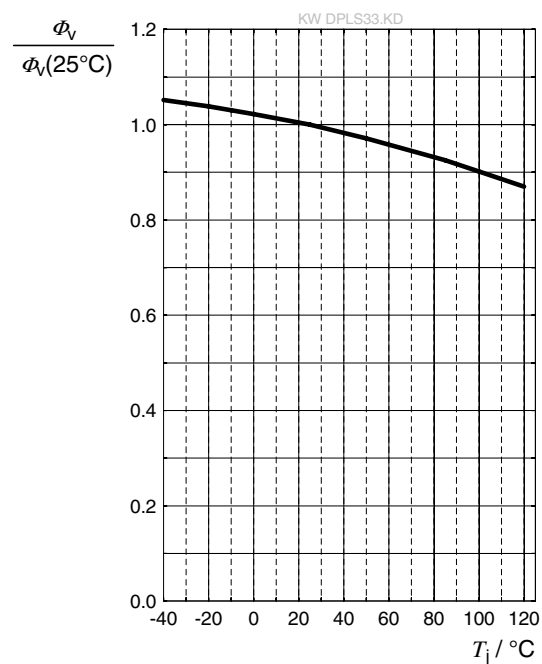


Forward Voltage ⁶⁾

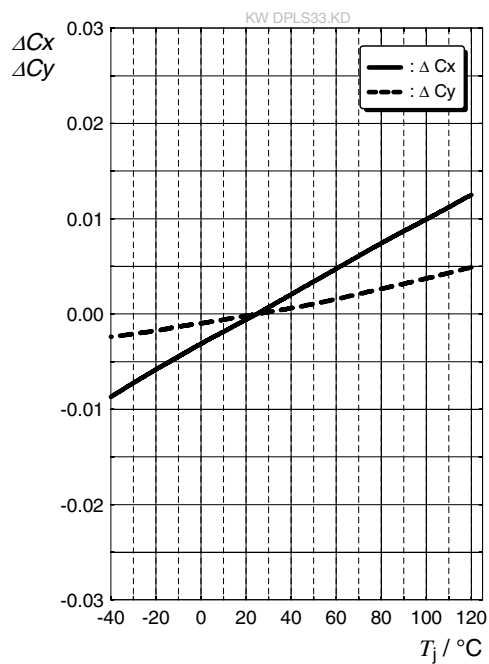
$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 120\text{ mA}$$

**Relative Luminous Flux** ⁶⁾

$$\Phi_V / \Phi_V(25^\circ\text{C}) = f(T_j); I_F = 120\text{ mA}$$

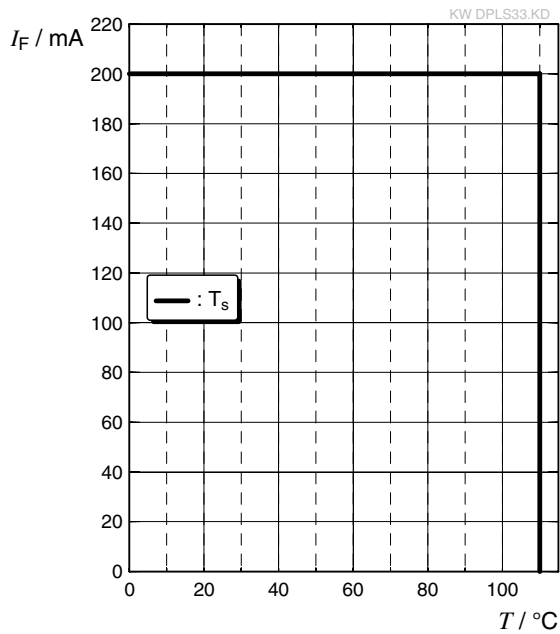
**Chromaticity Coordinate Shift** ⁶⁾

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 120\text{ mA}$$



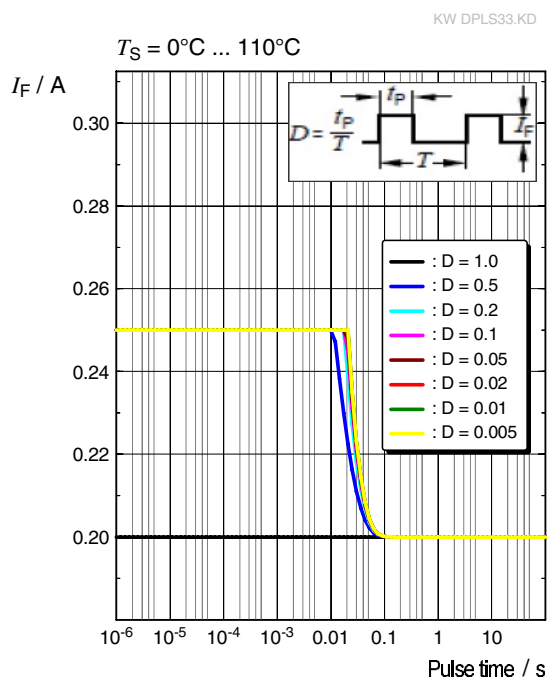
Max. Permissible Forward Current

$$I_F = f(T)$$

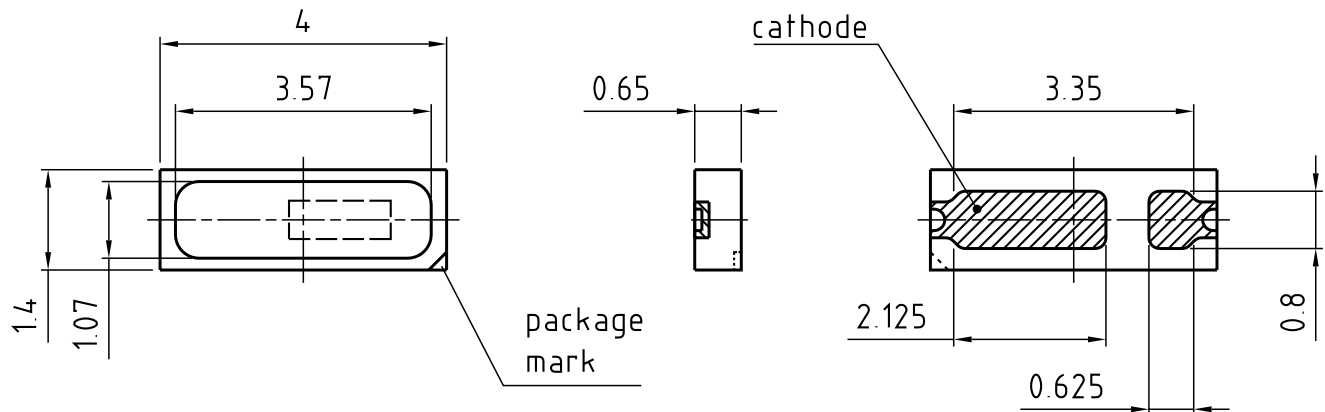


Permissible Pulse Handling Capability

$$I_F = f(t_p); D: \text{Duty cycle}$$



Dimensional Drawing ⁸⁾



general tolerance ± 0.1
lead finish Ag 

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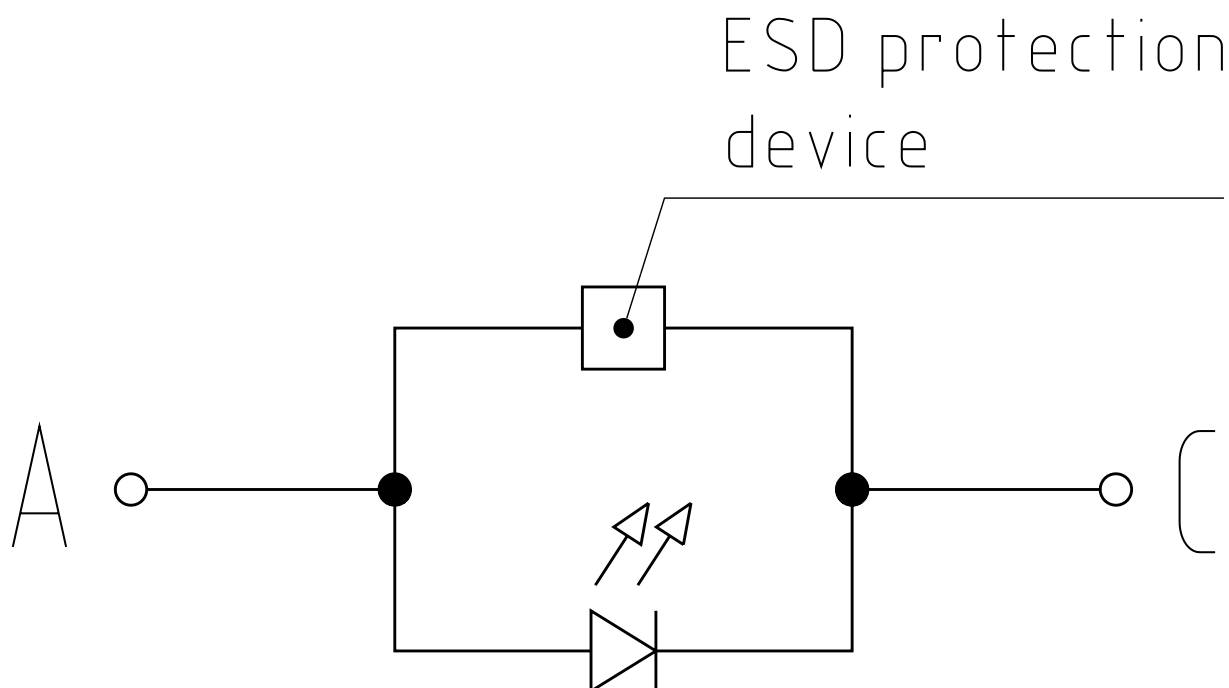
Further Information:

Approximate Weight: 10.0 mg

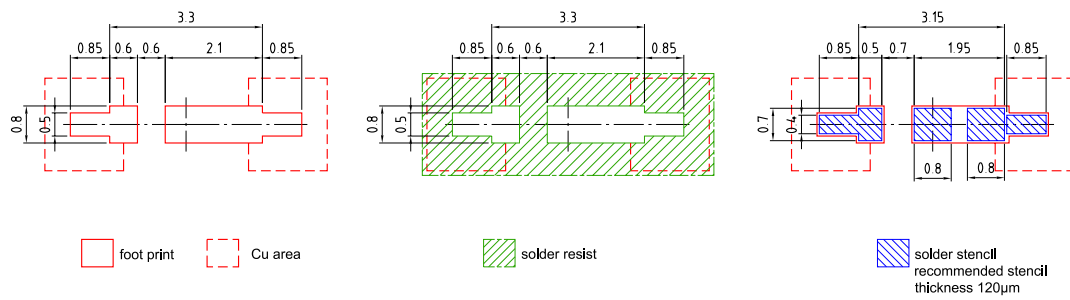
Package marking: Cathode

Corrosion test: Class: 3B
Test condition: 40°C / 90 % RH / 15 ppm H₂S / 14 days (stricter than IEC 60068-2-43)

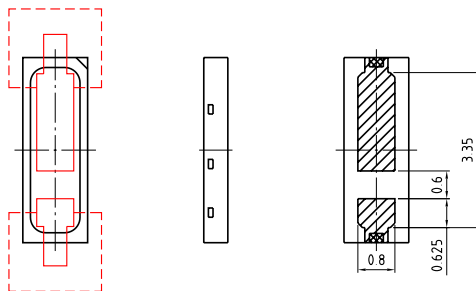
Electrical Internal Circuit



Recommended Solder Pad ⁸⁾



Component Location on Pad

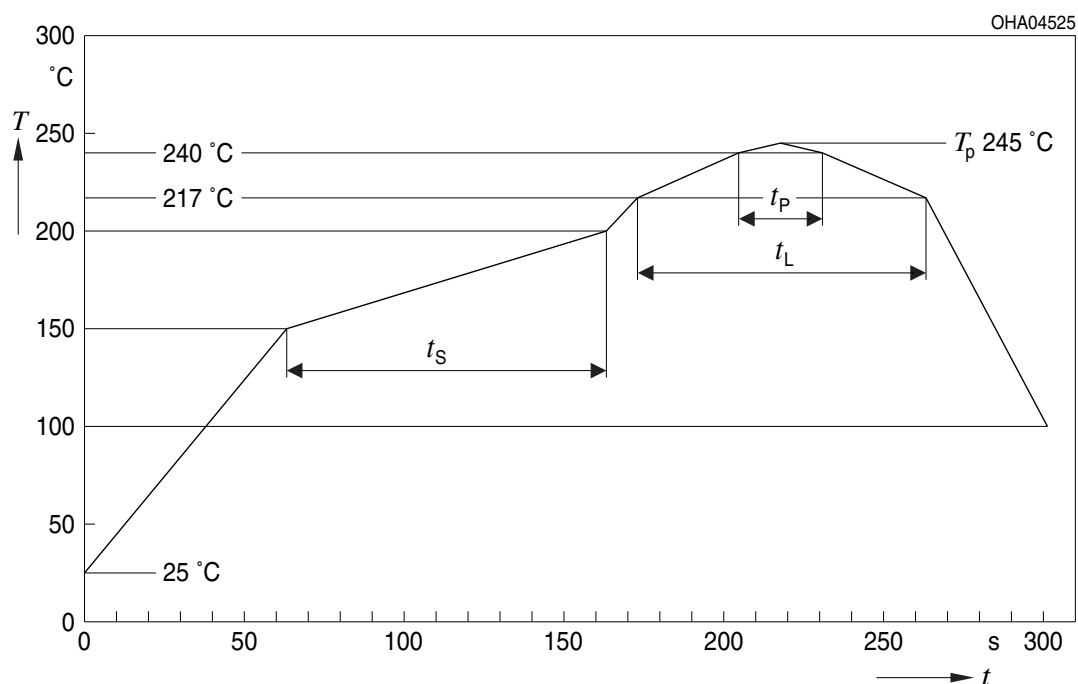


E062.3010.228-01

For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere. Package not suitable for ultra sonic cleaning.

Reflow Soldering Profile

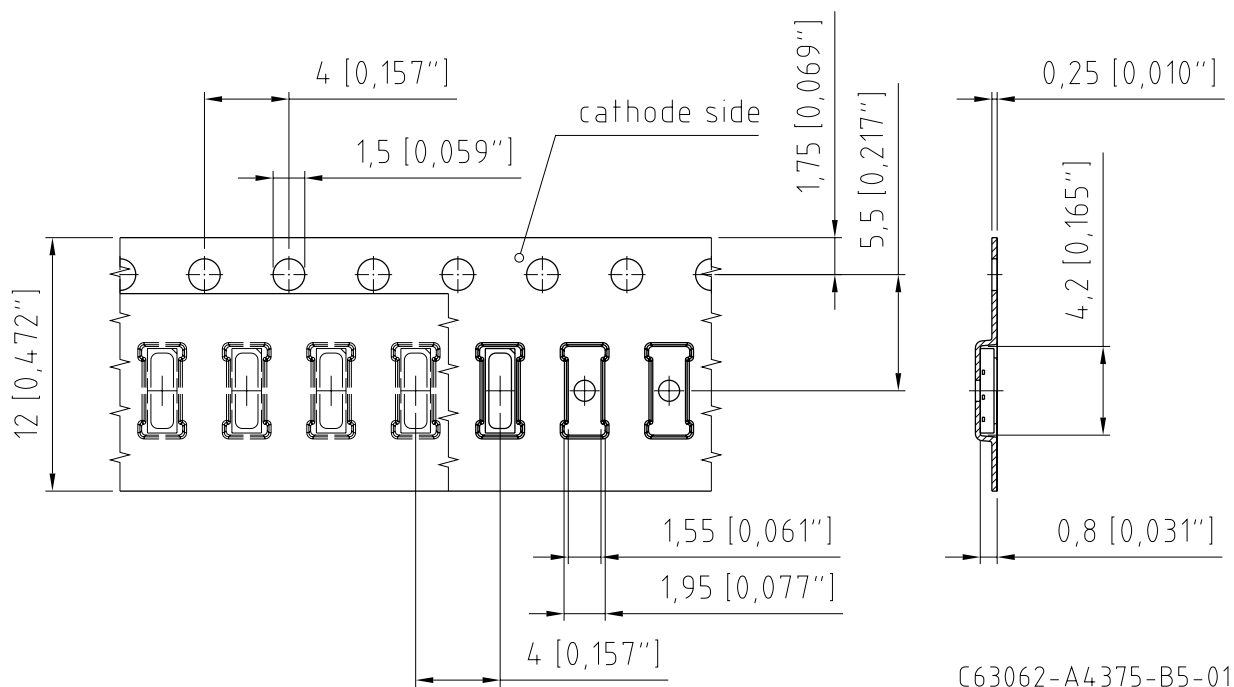
Product complies to MSL Level 3 acc. to JEDEC J-STD-020E



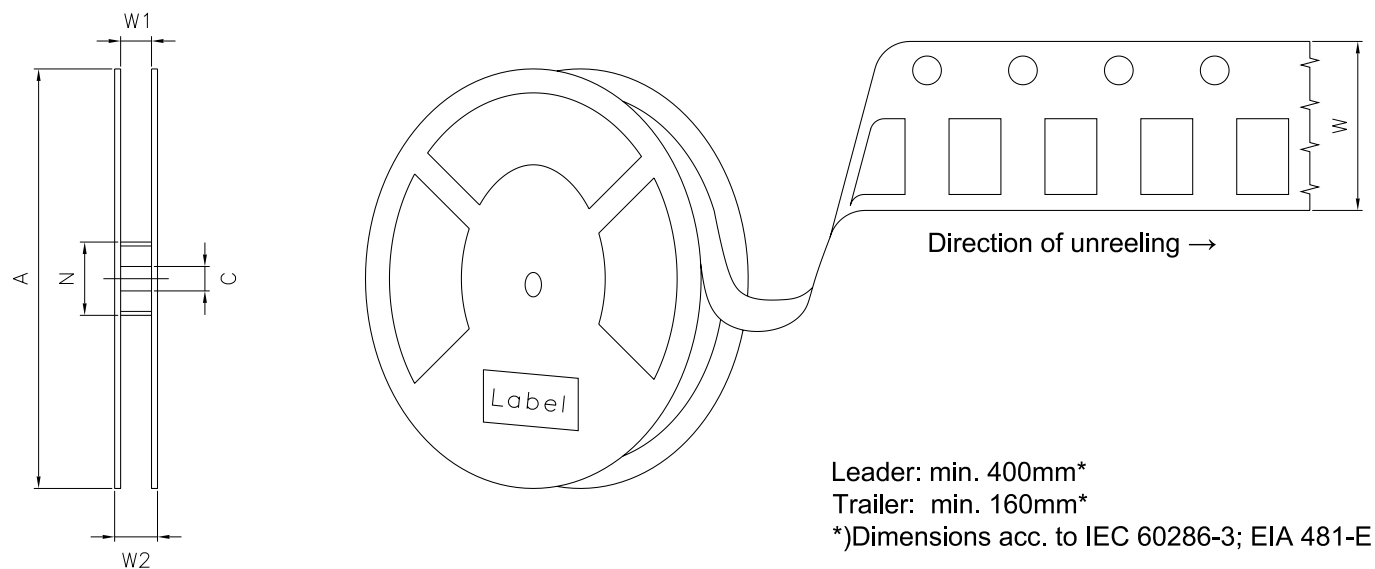
Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat ^{*)} 25 °C to 150 °C			2	3	K/s
Time t_s T_{Smin} to T_{Smax}	t_s	60	100	120	s
Ramp-up rate to peak ^{*)} T_{Smax} to T_p			2	3	K/s
Liquidus temperature	T_L		217		$^{\circ}\text{C}$
Time above liquidus temperature	t_L		80	100	s
Peak temperature	T_p		245	260	$^{\circ}\text{C}$
Time within 5 °C of the specified peak temperature $T_p - 5\text{ K}$	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 ⁸⁾

Tape and Reel ⁹⁾



Reel Dimensions

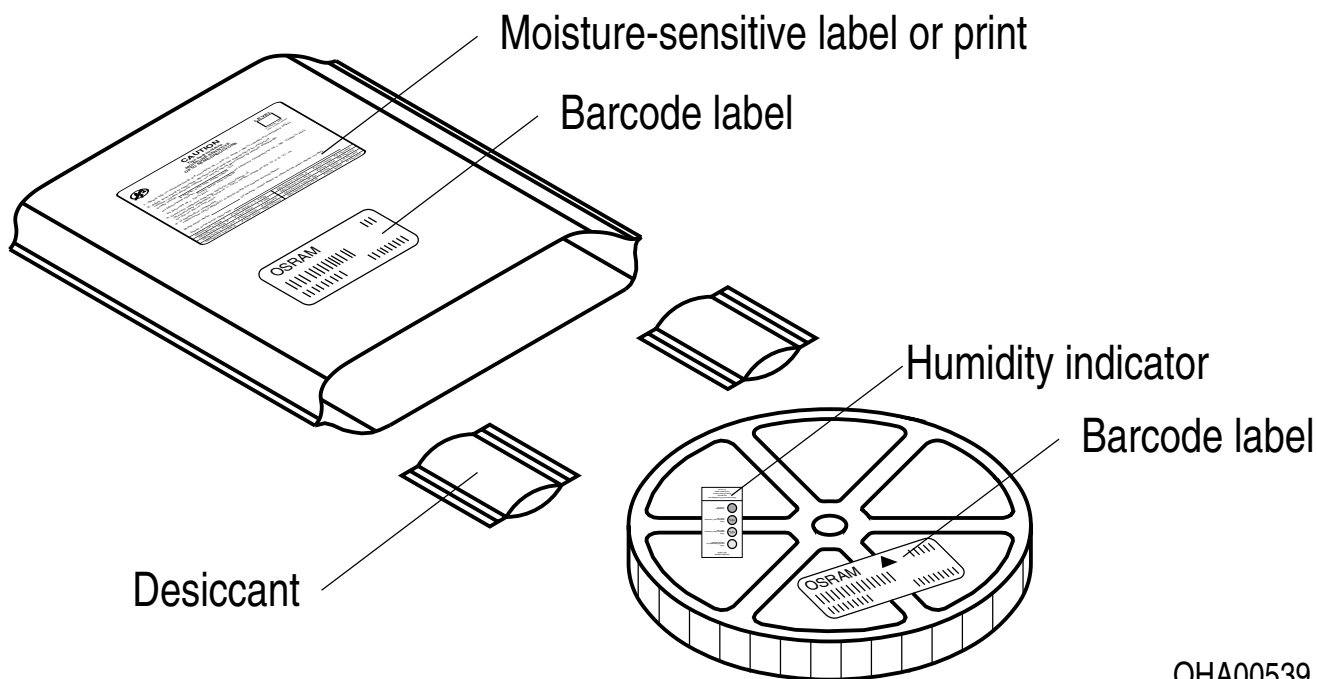
A	W	N _{min}	W ₁	W _{2 max}	Pieces per PU
180 mm	12 + 0.3 / - 0.1 mm	60 mm	12.4 + 2 mm	18.4 mm	1000

Barcode-Product-Label (BPL)

OSRAM Opto Semiconductors		LX XXXX	BIN1: XX-XX-X-XXX-X
(6P) BATCH NO: 1234567890		RoHS Compliant	
		 ML Temp ST X XXX °C X	
(1T) LOT NO: 1234567890	(9D) D/C: 1234		
		Pack: RXX DEMY XXX X_X123_1234.1234 X	
(X) PROD NO: 123456789(Q)QTY: 9999		(G) GROUP: XX-XX-X-X	
			

OHA04563

Dry Packing Process and Materials ⁸⁾



OHA00539

Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card according JEDEC-STD-033.

Notes

The evaluation of eye safety occurs according to the standard IEC 62471:2006 (photo biological safety of lamps and lamp systems). Within the risk grouping system of this IEC standard, the device specified in this data sheet falls into the class **moderate risk (exposure time 0.25 s)**. Under real circumstances (for exposure time, conditions of the eye pupils, observation distance), it is assumed that no endangerment to the eye exists from these devices. As a matter of principle, however, it should be mentioned that intense light sources have a high secondary exposure potential due to their blinding effect. When looking at bright light sources (e.g. headlights), temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation.

Subcomponents of this device contain, in addition to other substances, metal filled materials including silver. Metal filled materials can be affected by environments that contain traces of aggressive substances. Therefore, we recommend that customers minimize device exposure to aggressive substances during storage, production, and use. Devices that showed visible discoloration when tested using the described tests above did show no performance deviations within failure limits during the stated test duration. Respective failure limits are described in the IEC60810.

For further application related information please visit www.osram-os.com/appnotes

Disclaimer

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.

Product and functional safety devices/applications or medical devices/applications

OSRAM OS components are not developed, constructed or tested for the application as safety relevant component or for the application in medical devices.

OSRAM OS products are not qualified at module and system level for such application.

In case buyer – or customer supplied by buyer – considers using OSRAM OS components in product safety devices/applications or medical devices/applications, buyer and/or customer has to inform the local sales partner of OSRAM OS immediately and OSRAM OS and buyer and /or customer will analyze and coordinate the customer-specific request between OSRAM OS and buyer and/or customer.

Glossary

- 1) **Brightness:** Brightness values are measured during a current pulse of typically 60 ms, with an internal reproducibility of $\pm 8\%$ and an expanded uncertainty of $\pm 11\%$ (acc. to GUM with a coverage factor of $k = 3$).
- 2) **Reverse Operation:** This product is intended to be operated applying a forward current within the specified range. Applying any continuous reverse bias or forward bias below the voltage range of light emission shall be avoided because it may cause migration which can change the electro-optical characteristics or damage the LED.
- 3) **Chromaticity coordinate groups:** Chromaticity coordinates are measured during a current pulse of typically 60 ms, with an internal reproducibility of ± 0.005 and an expanded uncertainty of ± 0.01 (acc. to GUM with a coverage factor of $k = 3$).
- 4) **Forward Voltage:** The forward voltage is measured during a current pulse of typically 43 ms, with an internal reproducibility of $\pm 0.05\text{ V}$ and an expanded uncertainty of $\pm 0.1\text{ V}$ (acc. to GUM with a coverage factor of $k = 3$).
- 5) **Thermal Resistance:** $R_{th\text{ max}}$ is based on statistic values (6σ).
- 6) **Typical Values:** Due to the special conditions of the manufacturing processes of semiconductor devices, 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) **Characteristic curve:** In the range where the line of the graph is broken, you must expect higher differences between single devices within one packing unit.
- 8) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.
- 9) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

Revision History

Version	Date	Change
1.0	2019-02-20	Initial Version
1.1	2019-04-24	Brightness Groups
1.2	2020-09-16	Description Features Maximum Ratings Further Information Schematic Transportation Box Dimensions of Transportation Box

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