

LW TTSD specified at 5mA binning FK0PN0

TOPLED®

TOPLED, SMT LED with integrated reflector. With our great experience in SMT LED we are able to offer a high quality product for all kind of applications.



Applications

- Cluster, Button Backlighting
- Electronic Equipment
- Interior Illumination (e.g. Ambient Map)
- White Goods

Features:

- Package: white PLCC-2 package, colored diffused silicone resin
- Chip technology: ThinGaN
- Typ. Radiation: 120° (Lambertian emitter)
- Color: Cx = 0.33, Cy = 0.33 acc. to CIE 1931 (● white)
- Corrosion Robustness Class: 3B
- Qualifications: AEC-Q102 Qualified
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)

Ordering Information

Type	Luminous Intensity ¹⁾ $I_F = 5 \text{ mA}$ I_v	Ordering Code
LW TTSD-R2T1-FK0PN0-W266	140 ... 355 mcd	Q65113A1043

Maximum Ratings

Parameter	Symbol		Values
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 $T_s = 25\text{ °C}$	I_F	min. max.	1 mA 30 mA
Surge Current $t \leq 10\text{ }\mu\text{s}$; $D = 0.005$; $T_s = 25\text{ °C}$	I_{FS}	max.	200 mA
Reverse voltage ²⁾ $T_s = 25\text{ °C}$	V_R	max.	5 V
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM)	V_{ESD}		2 kV

Characteristics

$I_F = 5 \text{ mA}$; $T_S = 25 \text{ °C}$

Parameter	Symbol		Values
Chromaticity Coordinate ³⁾	C _x	typ.	0.33
	C _y	typ.	0.33
Viewing angle at 50% I_V	2 ϕ	typ.	120 °
Forward Voltage ⁴⁾	V _F	min.	2.60 V
$I_F = 5 \text{ mA}$		typ.	2.80 V
		max.	3.30 V
Reverse current ²⁾	I _R	typ.	0.01 μA
V _R = 5 V		max.	10 μA
Real thermal resistance junction/ambient ⁵⁾⁶⁾	R _{thJA real}	max.	340 K / W
Real thermal resistance junction/solderpoint ⁵⁾	R _{thJS real}	max.	180 K / W

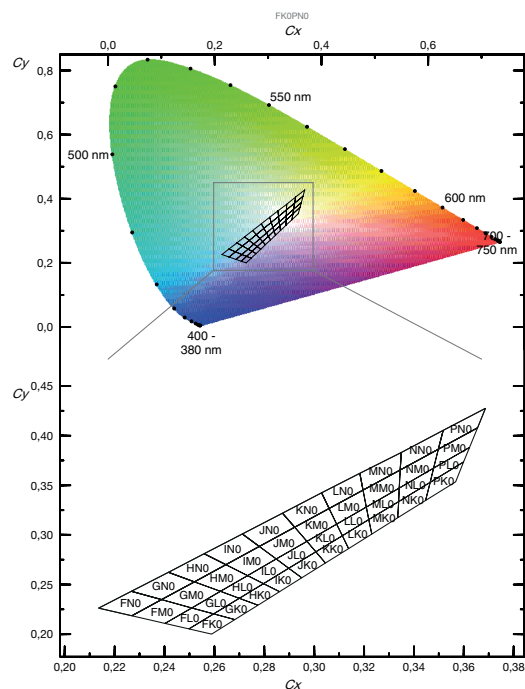
Brightness Groups

Group	Luminous Intensity ¹⁾ $I_F = 5 \text{ mA}$ min. I_v	Luminous Intensity ¹⁾ $I_F = 5 \text{ mA}$ max. I_v	Luminous Flux ⁷⁾ $I_F = 5 \text{ mA}$ typ. Φ_v
R2	140 mcd	180 mcd	480 mlm
S1	180 mcd	224 mcd	606 mlm
S2	224 mcd	280 mcd	756 mlm
T1	280 mcd	355 mcd	953 mlm

Forward Voltage Groups

Group	Forward Voltage ⁴⁾ $I_F = 5 \text{ mA}$ min. V_F	Forward Voltage ⁴⁾ $I_F = 5 \text{ mA}$ max. V_F
W2	2.60 V	2.70 V
Z6	2.70 V	3.00 V
66	3.00 V	3.30 V

Chromaticity Coordinate Groups



Chromaticity Coordinate Groups ³⁾

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
FK0	0.2498	0.2053	GK0	0.2597	0.2204	HK0	0.2700	0.2361
	0.2597	0.2204		0.2700	0.2361		0.2797	0.2509
	0.2682	0.2146		0.2775	0.2292		0.2861	0.2427
	0.2589	0.2000		0.2682	0.2146		0.2775	0.2292
FL0	0.2402	0.2108	GL0	0.2509	0.2264	HL0	0.2624	0.2431
	0.2509	0.2264		0.2624	0.2431		0.2733	0.2590
	0.2597	0.2204		0.2700	0.2361		0.2797	0.2509
	0.2498	0.2053		0.2597	0.2204		0.2700	0.2361
FM0	0.2269	0.2185	GM0	0.2388	0.2348	HM0	0.2520	0.2527
	0.2388	0.2348		0.2520	0.2527		0.2646	0.2700
	0.2509	0.2264		0.2624	0.2431		0.2733	0.2590
	0.2402	0.2108		0.2509	0.2264		0.2624	0.2431
FN0	0.2136	0.2262	GN0	0.2267	0.2432	HN0	0.2416	0.2623
	0.2267	0.2432		0.2416	0.2623		0.2559	0.2810
	0.2388	0.2348		0.2520	0.2527		0.2646	0.2700
	0.2269	0.2185		0.2388	0.2348		0.2520	0.2527

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
IK0	0.2797	0.2509	KK0	0.3007	0.2830	MK0	0.3219	0.3154
	0.2898	0.2664		0.3113	0.2992		0.3339	0.3336
	0.2950	0.2568		0.3138	0.2862		0.3335	0.3172
	0.2861	0.2427		0.3045	0.2717		0.3231	0.3008
IL0	0.2733	0.2590	KL0	0.2971	0.2935	ML0	0.3209	0.3281
	0.2848	0.2757		0.3090	0.3108		0.3341	0.3472
	0.2898	0.2664		0.3113	0.2992		0.3339	0.3336
	0.2797	0.2509		0.3007	0.2830		0.3219	0.3154
IM0	0.2646	0.2700	KM0	0.2922	0.3077	MM0	0.3196	0.3451
	0.2780	0.2883		0.3060	0.3266		0.3345	0.3654
	0.2848	0.2757		0.3090	0.3108		0.3341	0.3472
	0.2733	0.2590		0.2971	0.2935		0.3209	0.3281
IN0	0.2559	0.2810	KN0	0.2873	0.3219	MN0	0.3183	0.3621
	0.2712	0.3009		0.3030	0.3424		0.3349	0.3830
	0.2780	0.2883		0.3060	0.3266		0.3345	0.3654
	0.2646	0.2700		0.2922	0.3077		0.3196	0.3451
JK0	0.2898	0.2664	LK0	0.3113	0.2992	NK0	0.3339	0.3336
	0.3007	0.2830		0.3219	0.3154		0.3465	0.3530
	0.3045	0.2717		0.3231	0.3008		0.3447	0.3347
	0.2950	0.2568		0.3138	0.2862		0.3335	0.3172
JL0	0.2848	0.2757	LL0	0.3090	0.3108	NL0	0.3341	0.3472
	0.2971	0.2935		0.3209	0.3281		0.3479	0.3673
	0.3007	0.2830		0.3219	0.3154		0.3465	0.3530
	0.2898	0.2664		0.3113	0.2992		0.3339	0.3336
JM0	0.2780	0.2883	LM0	0.3060	0.3266	NM0	0.3345	0.3654
	0.2922	0.3077		0.3196	0.3451		0.3498	0.3863
	0.2971	0.2935		0.3209	0.3281		0.3479	0.3673
	0.2848	0.2757		0.3090	0.3108		0.3341	0.3472
JN0	0.2712	0.3009	LN0	0.3030	0.3424	NN0	0.3349	0.3830
	0.2873	0.3219		0.3183	0.3621		0.3517	0.4053
	0.2922	0.3077		0.3196	0.3451		0.3498	0.3863
	0.2780	0.2883		0.3060	0.3266		0.3345	0.3654

Group	Cx	Cy	Group	Cx	Cy
PK0	0.3465	0.3530	PM0	0.3498	0.3863
	0.3599	0.3735		0.3655	0.4079
	0.3567	0.3535		0.3623	0.3882
	0.3447	0.3347		0.3479	0.3673
PL0	0.3479	0.3673	PN0	0.3517	0.4053
	0.3623	0.3882		0.3687	0.4276
	0.3599	0.3735		0.3655	0.4079
	0.3465	0.3530		0.3498	0.3863

Group Name on Label

Example: R2-FK0-66

Brightness

Color Chromaticity

Forward Voltage

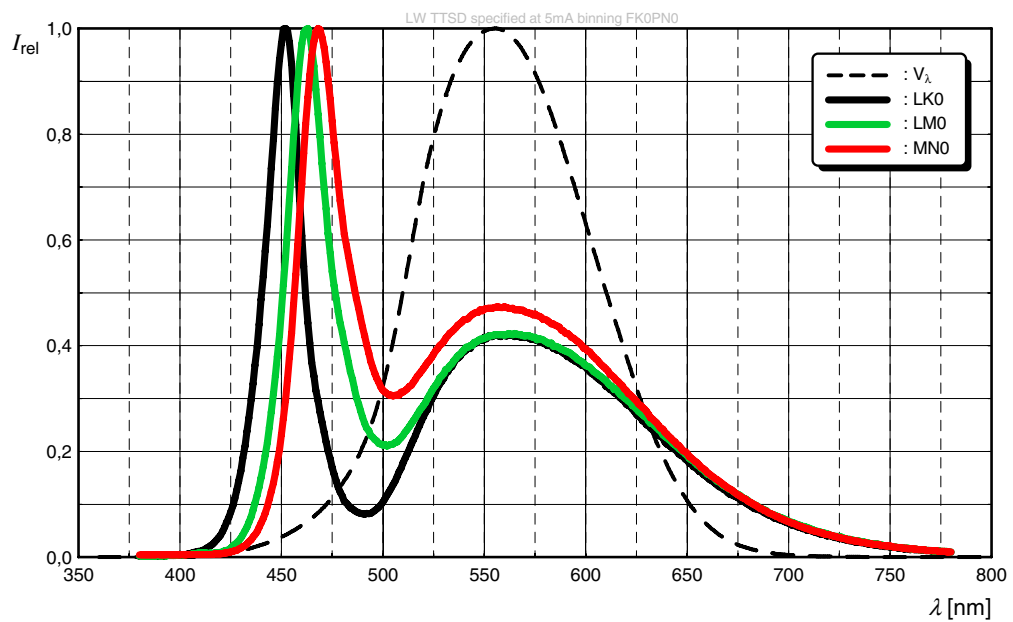
R2

FK0

66

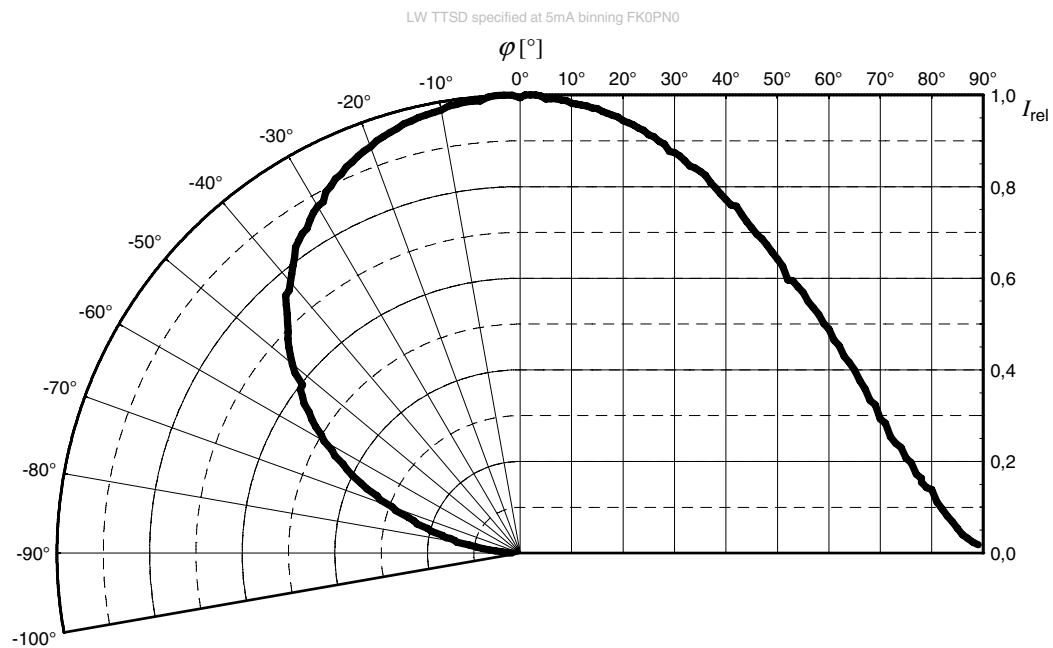
Relative Spectral Emission ⁷⁾

$$I_{\text{rel}} = f(\lambda); I_F = 5 \text{ mA}; T_S = 25^\circ \text{C}$$



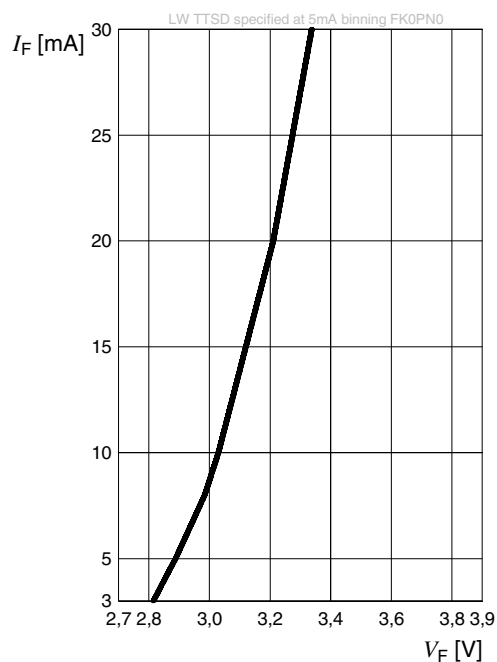
Radiation Characteristics ⁷⁾

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



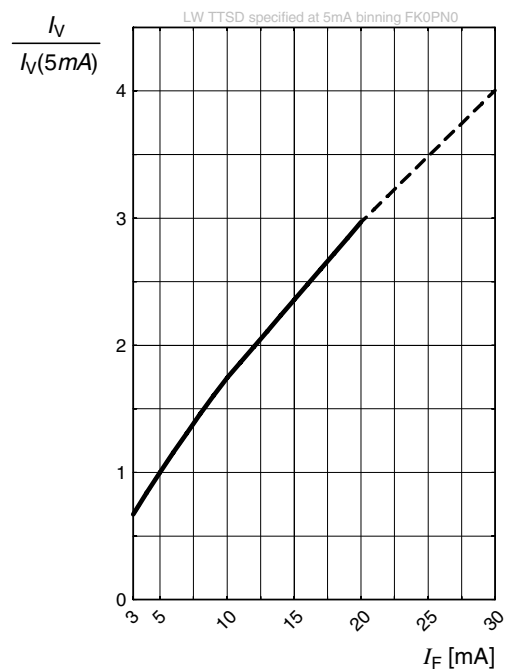
Forward current ⁷⁾

$$I_F = f(V_F); T_S = 25^\circ\text{C}$$



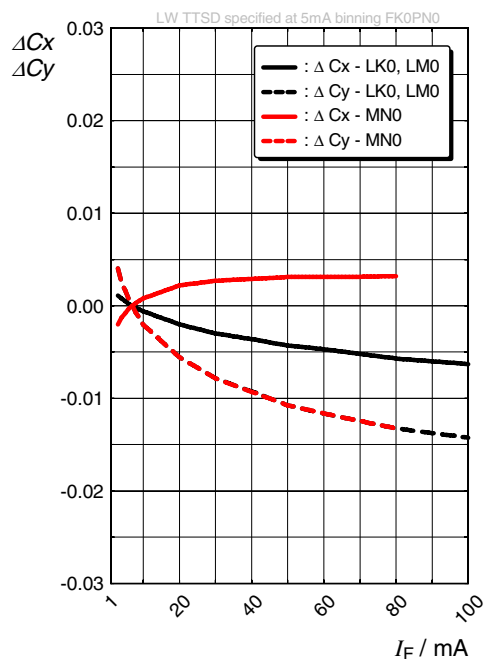
Relative Luminous Intensity ^{7), 8)}

$$I_V/I_V(5\text{ mA}) = f(I_F); T_S = 25^\circ\text{C}$$



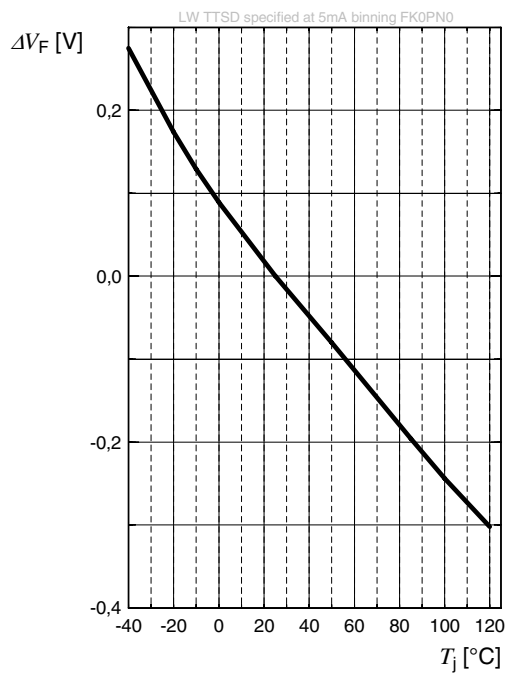
Chromaticity Coordinate Shift ⁷⁾

$$\Delta Cx, \Delta Cy = f(I_F); T_S = 25^\circ\text{C}$$



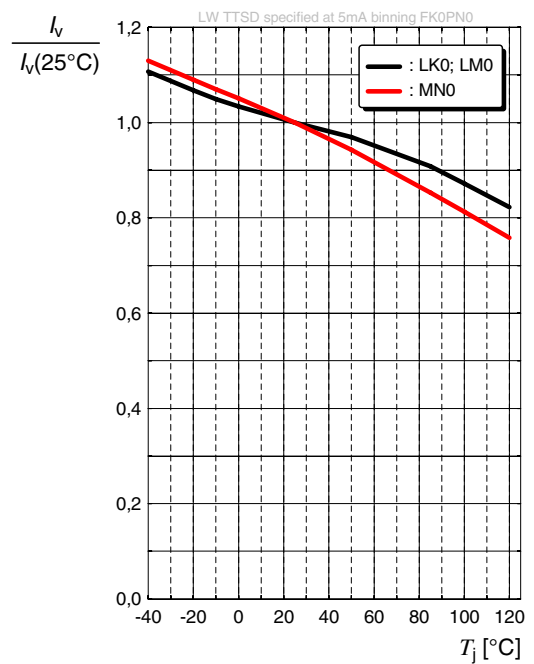
Forward Voltage ⁷⁾

$$\Delta V_F = V_F - V_F(25^\circ\text{C}) = f(T_j); I_F = 5\text{ mA}$$



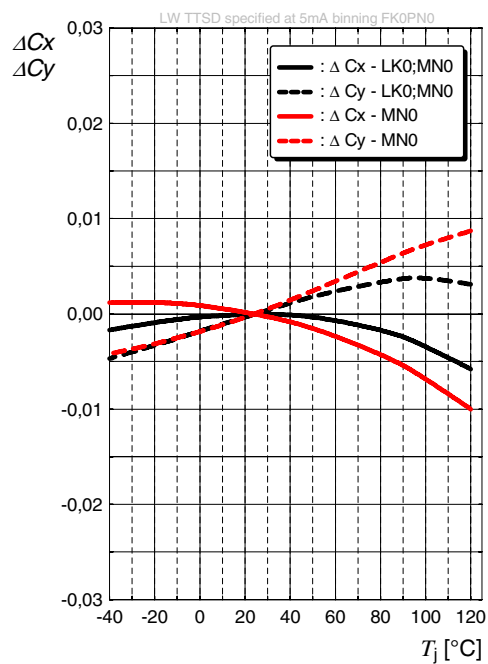
Relative Luminous Intensity ⁷⁾

$$I_V/I_V(25^\circ\text{C}) = f(T_j); I_F = 5\text{ mA}$$



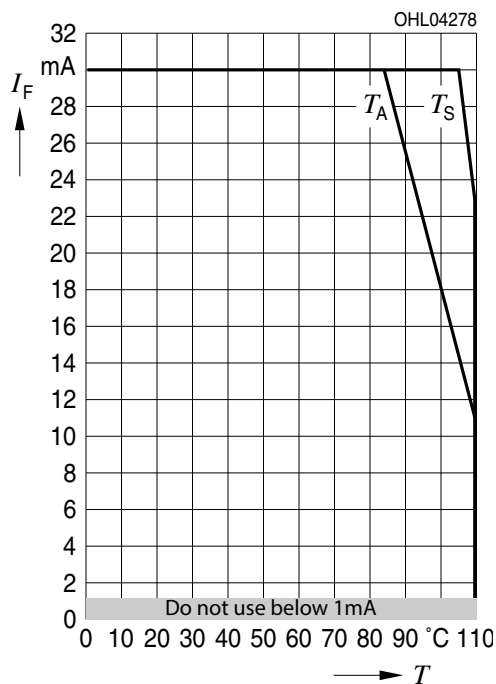
Chromaticity Coordinate Shift ⁷⁾

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 5\text{ mA}$$



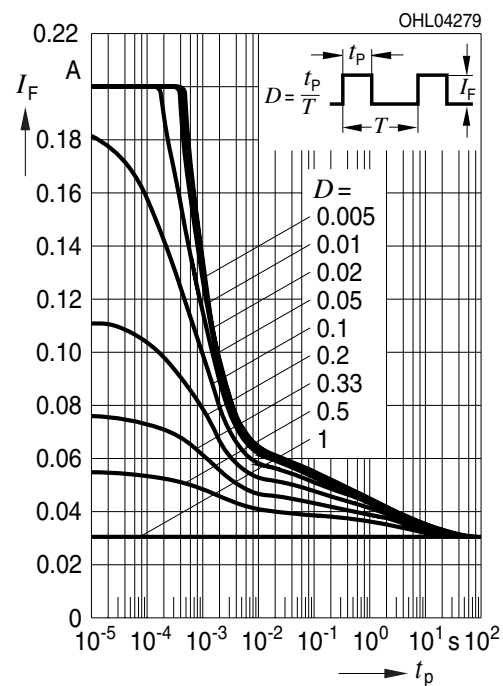
Max. Permissible Forward Current

$$I_F = f(T)$$



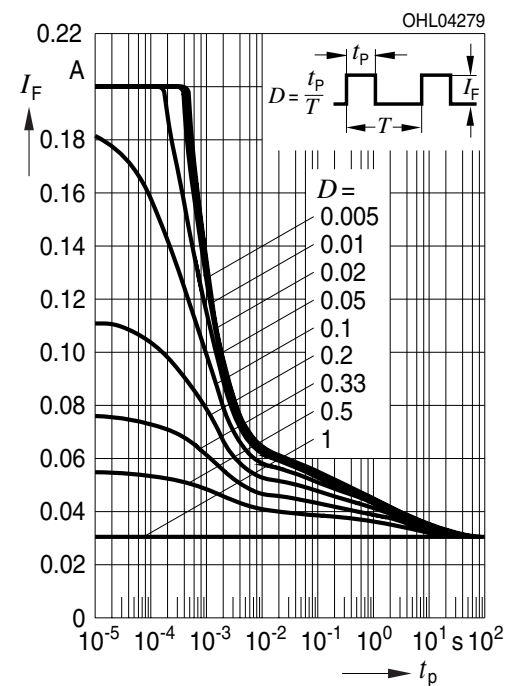
Permissible Pulse Handling Capability

$$I_F = f(t_p); D: \text{Duty cycle}; T_S = 25^\circ\text{C}$$

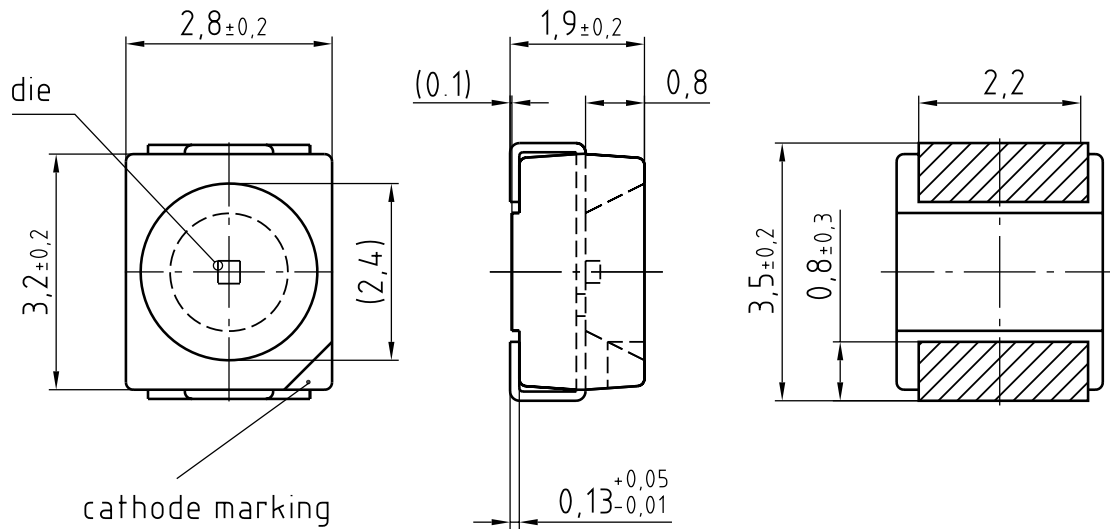


Permissible Pulse Handling Capability

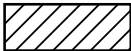
$$I_F = f(t_p); D: \text{Duty cycle}; T_S = 85^\circ\text{C}$$



Dimensional Drawing ⁹⁾



general tolerance $\pm 0,1$

lead finish Sn 

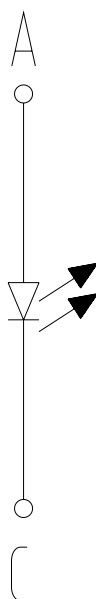
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Further Information:

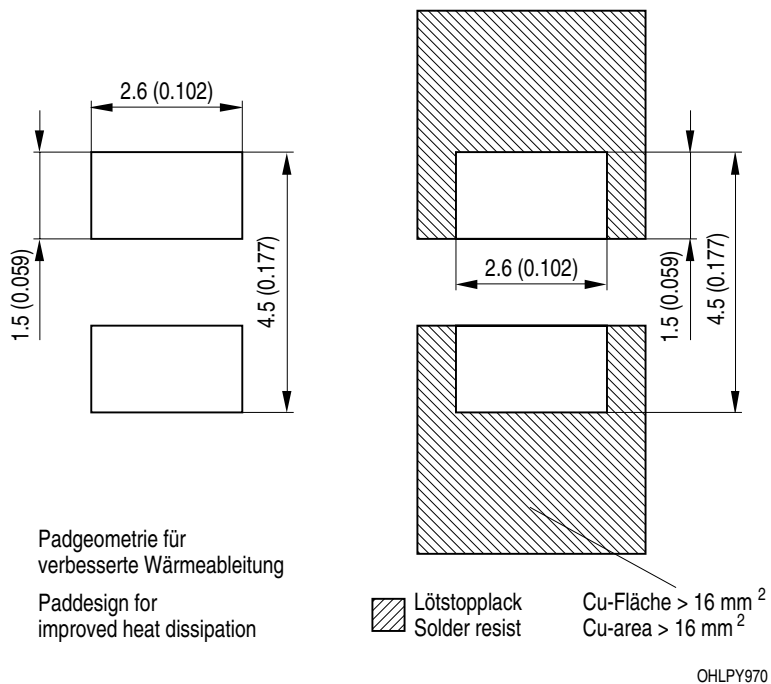
Approximate Weight: 32.0 mg

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

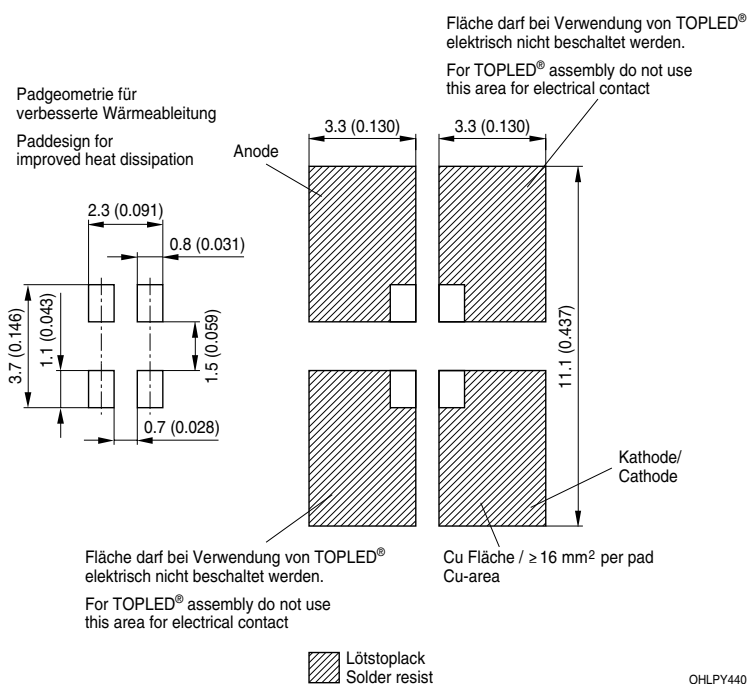
Electrical Internal Circuit



Recommended Solder Pad ⁹⁾



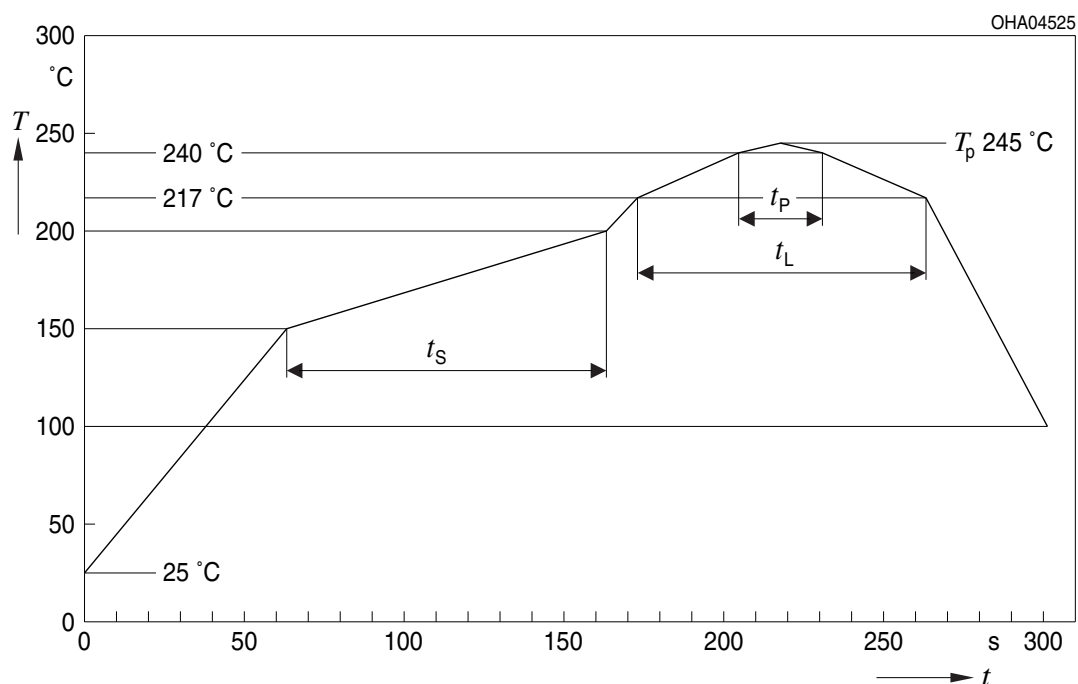
Recommended Solder Pad ⁹⁾



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 2 acc. to JEDEC J-STD-020E

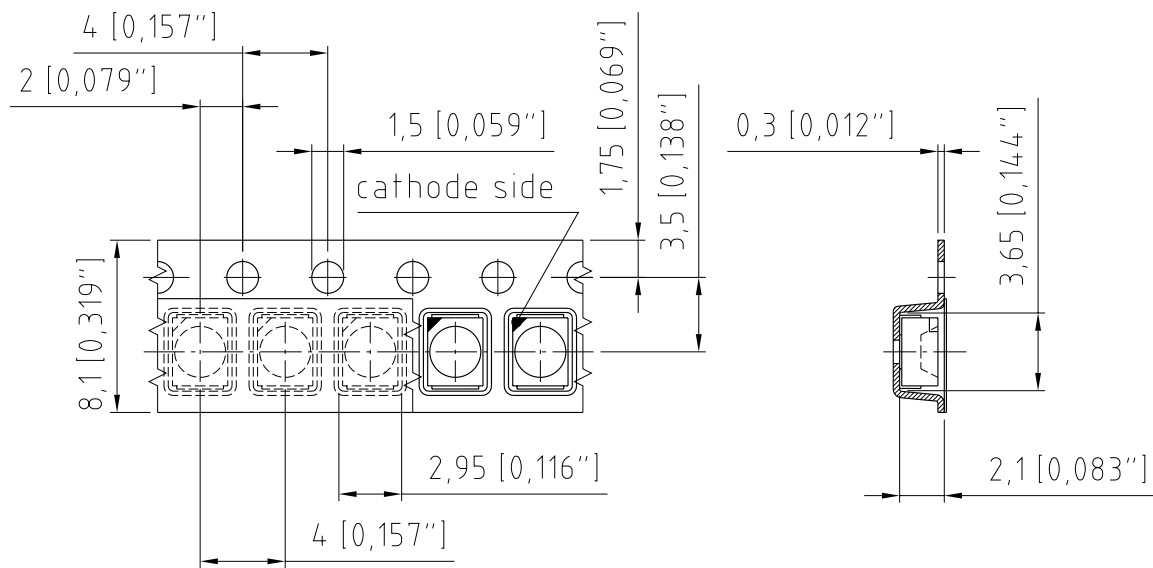


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat ^{*)} 25 °C to 150 °C			2	3	K/s
Time t_s T_{Smin} to T_{Smax}	t_s	60	100	120	s
Ramp-up rate to peak ^{*)} T_{Smax} to T_p			2	3	K/s
Liquidus temperature	T_L		217		°C
Time above liquidus temperature	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

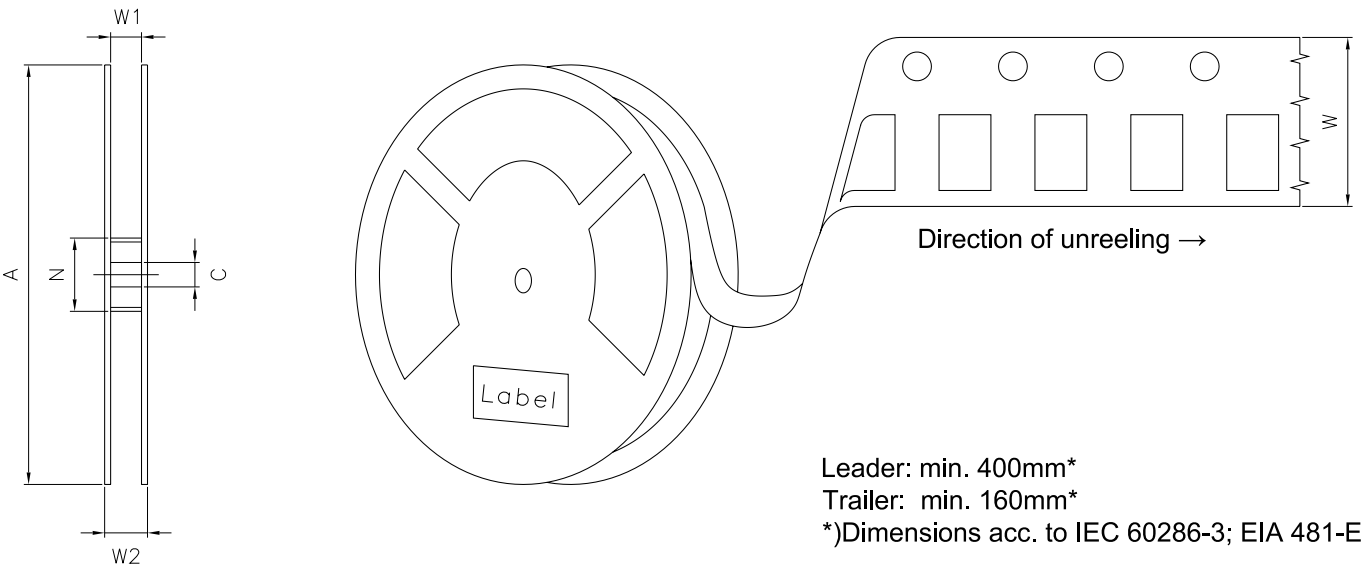
* slope calculation DT/Dt : Dt max. 5 s; fulfillment for the whole T-range

Taping ⁹⁾



C63062-A3863-B3 -02

Tape and Reel ¹⁰⁾



Reel Dimensions

A	W	N _{min}	W ₁	W _{2 max}	Pieces per PU
180 mm	8 + 0.3 / - 0.1 mm	60 mm	8.4 + 2 mm	14.4 mm	2000
330 mm	8 + 0.3 / - 0.1 mm	60 mm	8.4 + 2 mm	14.4 mm	8000

Barcode-Product-Label (BPL)

OSRAM Opto Semiconductors

LX XXXX BIN1: XX-XX-X-XXX-X

RoHS Compliant

(6P) BATCH NO: 1234567890

(1T) LOT NO: 1234567890 (9D) D/C: 1234

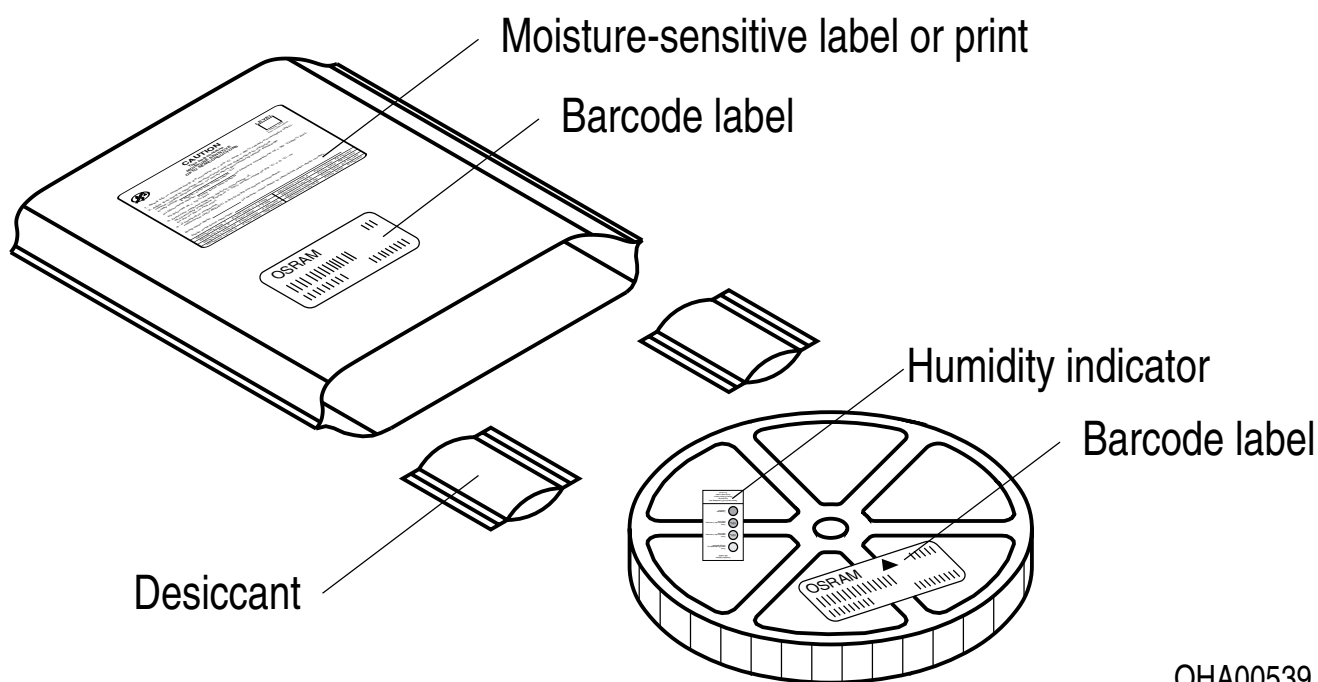
ML Temp ST
X XXX °C X

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 ⁹⁾



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

Type Designation System

Wavelength ($\lambda_{\text{dom typ.}}$)		Emission Color		Color coordinates according CIE 1931/Emission color:		
A:	617 nm	amber		W:	white	
S:	633 nm	super red		UW:	ultra white	
T:	528 nm	true green		CB:	color on demand blue	
Y:	587 nm	yellow		CG:	color on demand green	
O:	606 nm	orange		CL:	color on demand lagune	
G:	570 nm	green				
P:	560 nm	pure green				
R:	625 nm	red				
B:	470 nm	blue				
H:	645 nm	hyper-red				
V:	505 nm	verde green				
L: Light emitting diode				Package Type T: TOPLED		
L	A		T	6	7	6
Lead / Package Properties 6: folded leads 7: reverse gullwing leads T: folded leads, improved corrosion stability (Au-LF), w/o TiO2 jetting V: folded leads and UX:3 w/ improved corrosion stability (Au-LF), TiO2 jetting						
Encapsulant Type / Lens Properties 7: Colorless clear or white volume conversion (resin encapsulation) S: Silicone (with or without diffuser)						
Chip Technology: 1: TSN 3: standard InGaN 4: AlGaAs 5: HOP 2000 6: Standard InGaIP 9: TSN low current B: HOP 2000 C: ATON D: Small ThinGaN/ Thinfilm (e.g. 6mil) F: Thinfilm InGaAIP G: ThinGaN(Thinfilm InGaN) K: InGaAIP low current S: standard InGaN low current O: TSN						

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 **exempt group (exposure time 10000 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 25 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 25 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 8 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) **Thermal Resistance:** R_{thJA} results from mounting on PC board FR 4 (pad size 16 mm^2 per pad)
- 7) **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.
- 8) **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.
- 9) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.
- 10) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

Revision History

Version	Date	Change
1.1	2019-09-09	Dimensional Drawing
1.2	2020-05-26	Ordering Information Characteristics Electro - Optical Characteristics (Diagrams)
1.2	2020-06-03	Ordering Information Characteristics Electro - Optical Characteristics (Diagrams)

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EU RoHS and China RoHS compliant product



此产品符合欧盟 RoHS 指令的要求；
按照中国的相关法规和标准，不含有毒有害物质或元素。

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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