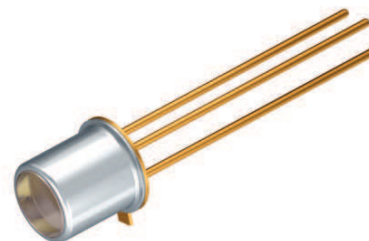


# Silicon NPN Phototransistor

## Version 1.3

### BPX 38



#### Features:

- **Spectral range of sensitivity:** (typ) 450 ... 1120 nm
- **Package:** Metal Can (TO-18), hermetically sealed
- **Special:** Base connection
- Suitable up to 125 °C
- High linearity
- Available in groups

#### Applications

- Photointerrupters
- Industrial electronics
- For control and drive circuits

#### Ordering Information

Type:	Photocurrent $I_{PCE}$ [ $\mu$ A] $\lambda = 950 \text{ nm}$ , $E_e = 0.5 \text{ mW/cm}^2$ , $V_{CE} = 5 \text{ V}$	Ordering Code
BPX 38	$\geq 200$	Q62702P0015
BPX 38-2/3	200 ... 630	Q62702P3578
BPX 38-3	320 ... 630	Q62702P0015S003
BPX 38-4	500 ... 1000	Q62702P0015S004

*Note:* Only one bin within one packing unit (variation less than 2:1)

**Maximum Ratings** ( $T_A = 25\text{ °C}$ )

Parameter	Symbol	Values	Unit
Operating and storage temperature range	$T_{op}; T_{stg}$	-40 ... 125	°C
Collector-emitter voltage	$V_{CE}$	50	V
Collector current	$I_C$	50	mA
Collector surge current ( $\tau < 10\ \mu\text{s}$ )	$I_{CS}$	200	mA
Emitter-base voltage	$V_{EB}$	7	V
Total Power dissipation	$P_{tot}$	220	mW
Thermal resistance	$R_{thJA}$	450	K / W

**Characteristics** ( $T_A = 25\text{ °C}$ )

Parameter		Symbol	Values	Unit
Wavelength of max. sensitivity	(typ)	$\lambda_{S\max}$	880	nm
Spectral range of sensitivity	(typ)	$\lambda_{10\%}$	(typ) 450 ... 1120	nm
Radiant sensitive area	(typ)	A	0.675	mm <sup>2</sup>
Dimensions of chip area	(typ)	L x W	(typ) 1.02 x 1.02	mm x mm
Half angle	(typ)	$\varphi$	$\pm 40$	°
Photocurrent of collector-base photodiode ( $\lambda = 950\text{ nm}$ , $E_e = 0.5\text{ mW/cm}^2$ , $V_{CB} = 5\text{ V}$ )	(typ)	$I_{PCB}$	1.8	$\mu\text{A}$
Photocurrent of collector-base photodiode ( $E_v = 1000\text{ lx}$ , Std. Light A, $V_{CB} = 5\text{ V}$ )	(typ)	$I_{PCB}$	5.5	$\mu\text{A}$
Capacitance ( $V_{CE} = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ )	(typ)	$C_{CE}$	23	pF
Capacitance ( $V_{CB} = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ )	(typ)	$C_{CB}$	39	pF
Capacitance ( $V_{EB} = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$ )	(typ)	$C_{EB}$	47	pF
Dark current ( $V_{CE} = 25\text{ V}$ , $E = 0$ )	(typ (max))	$I_{CE0}$	20 ( $\leq 100$ )	nA

Grouping ( $T_A = 25\text{ °C}$ ,  $\lambda = 950\text{ nm}$ )

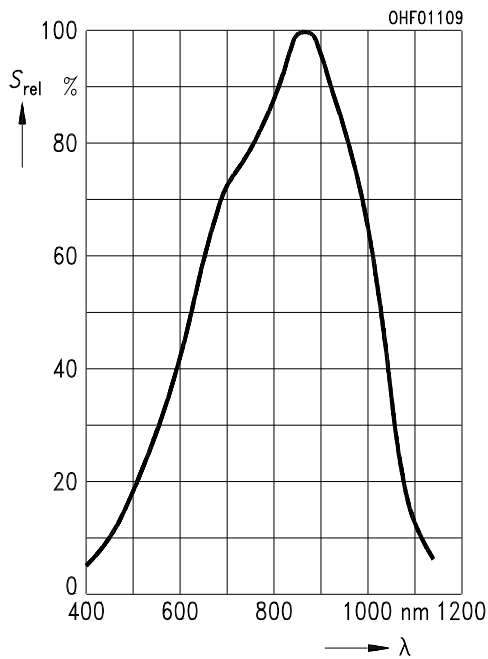
Group	Min Photocurrent $E_e = 0.5\text{ mW/cm}^2$ , $V_{CE} = 5\text{ V}$ $I_{PCE, min}\text{ [}\mu\text{A]}$	Max Photocurrent $E_e = 0.5\text{ mW/cm}^2$ , $V_{CE} = 5\text{ V}$ $I_{PCE, max}\text{ [}\mu\text{A]}$	Typ Photocurrent $E_V = 1000\text{ lx, Std. Light A, } V_{CE} = 5\text{ V}$ $I_{PCE}\text{ [}\mu\text{A]}$	Rise and fall time $I_C = 1\text{ mA, } V_{CC} = 5\text{ V, } R_L = 1\text{ k}\Omega$ $t_r, t_f\text{ [}\mu\text{s]}$
BPX 38-2	200	400	950	9
BPX 38-3	320	630	1500	12
BPX 38-4	500	1000	2300	15
BPX 38-5	800		3600	18

Group	Collector-emitter saturation voltage $I_C = I_{PCEmin} \times 0.3$ , $E_e = 0.5\text{ mW/cm}^2$ $V_{CEsat}\text{ [mV]}$	Current gain $E_e = 0.5\text{ mW/cm}^2, V_{CE} = 5\text{ V}$ $I_{PCE} / I_{PCB}$
BPX 38-2	200	170
BPX 38-3	200	280
BPX 38-4	200	420
BPX 38-5	200	650

Note.:  $I_{PCEmin}$  is the min. photocurrent of the specified group.

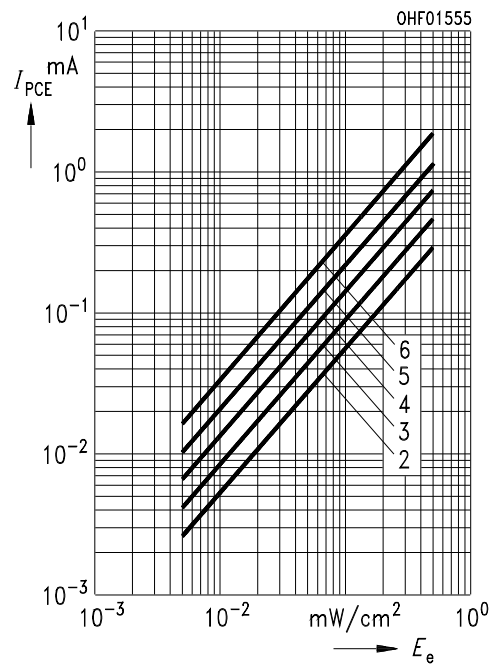
**Relative Spectral Sensitivity** <sup>1) page 9</sup>

$S_{rel} = f(\lambda)$



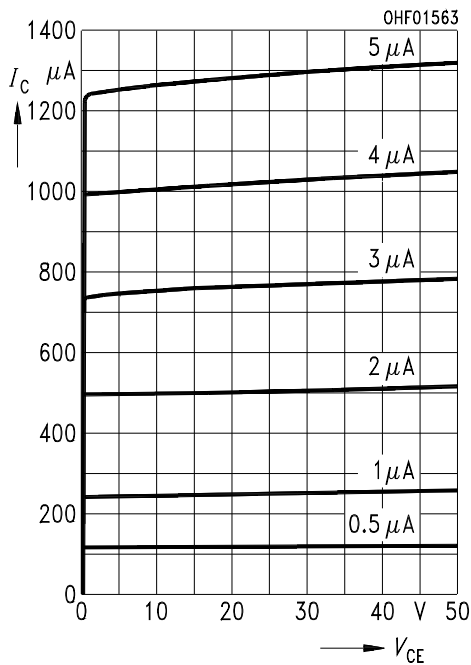
**Photocurrent** <sup>1) page 9</sup>

$I_{PCE} = f(E_e), V_{CE} = 5 V$



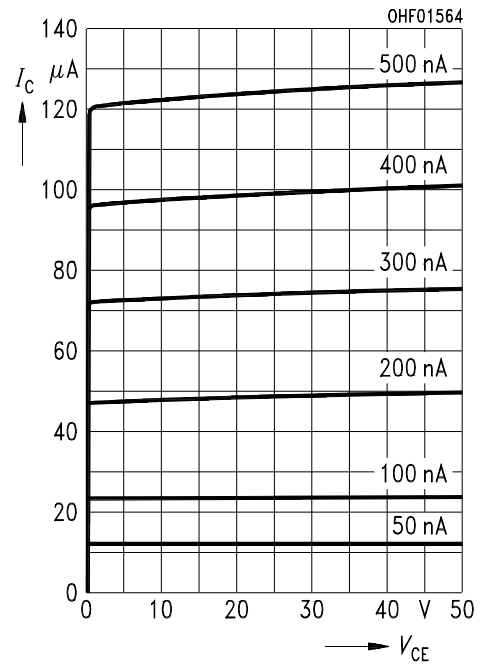
**Collector Current** <sup>1) page 9</sup>

$I_C = f(V_{CE}), I_B = \text{Parameter}$



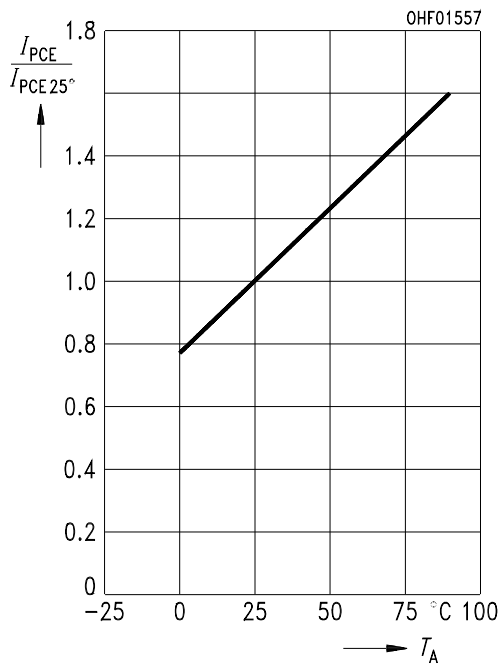
**Collector Current** <sup>1) page 9</sup>

$I_C = f(V_{CE}), I_B = \text{Parameter}$



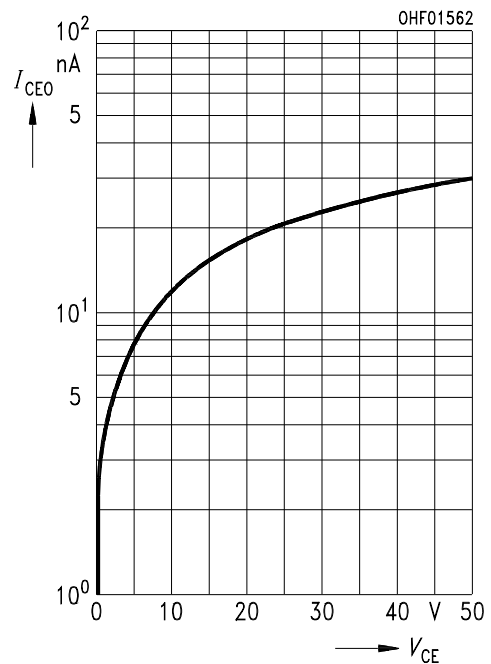
**Photocurrent** <sup>1) page 9</sup>

$I_{PCE} / I_{PCE}(25^{\circ}C) = f(T_A), V_{CE} = 5 V$



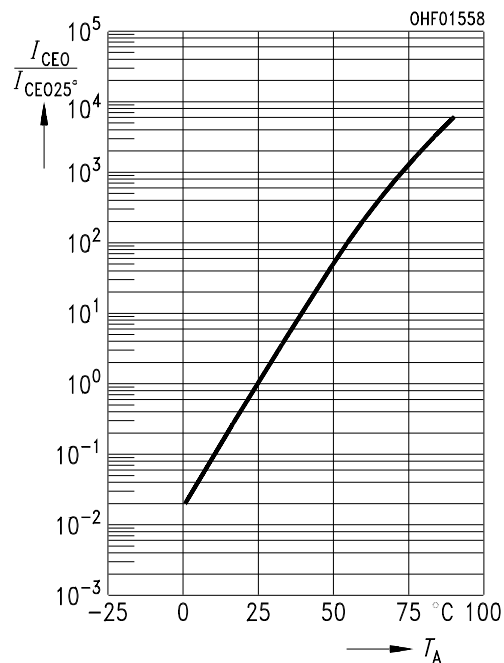
**Dark Current** <sup>1) page 9</sup>

$I_{CEO} = f(V_{CE}), E = 0$



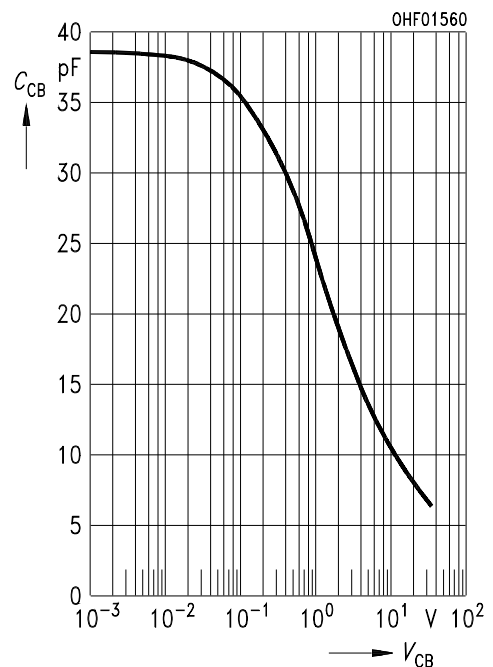
**Dark Current** <sup>1) page 9</sup>

$I_{CEO} / I_{CEO}(25^{\circ}C) = f(T_A), V_{CE} = 25 V, E = 0$



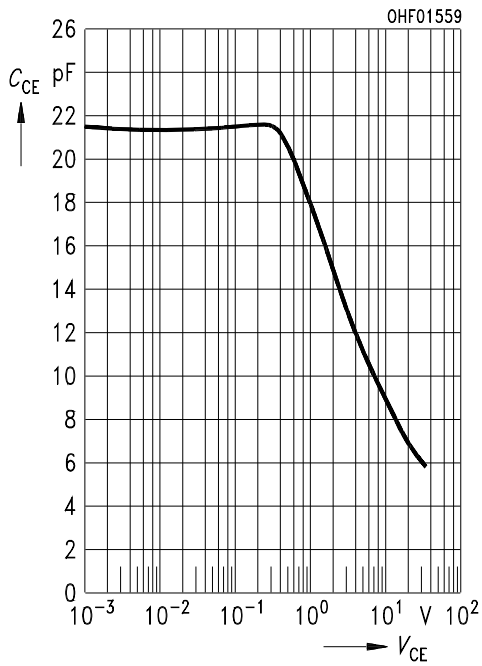
**Collector-Base Capacitance** <sup>1) page 9</sup>

$C_{CB} = f(V_{CB}), f = 1 MHz, E = 0$



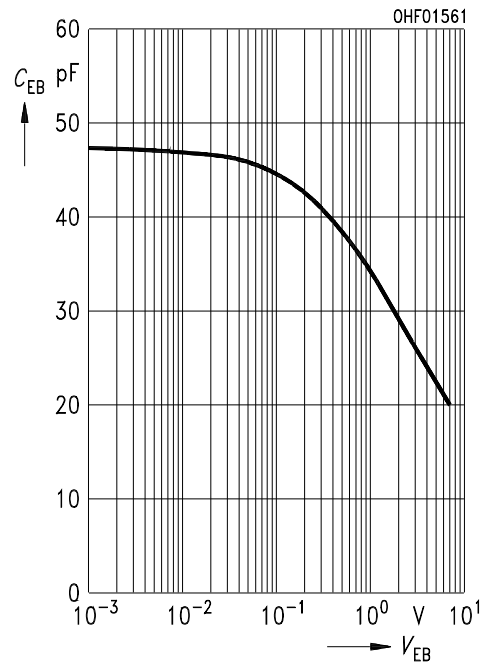
**Collector-Emitter Capacitance** <sup>1) page 9</sup>

$C_{CE} = f(V_{CE}), f = 1 \text{ MHz}, E = 0$



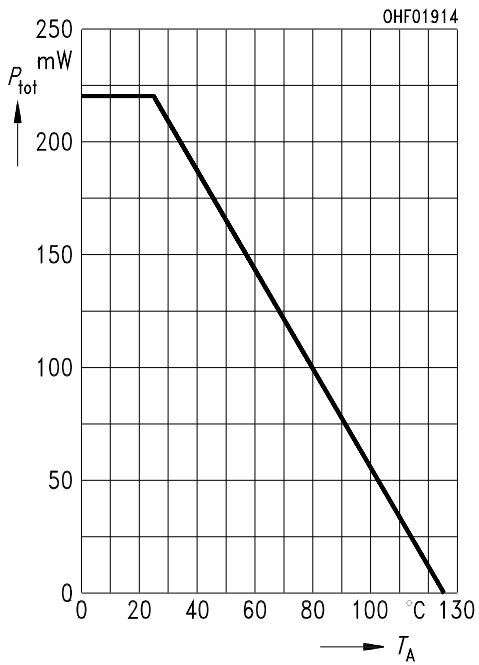
**Emitter-Base Capacitance** <sup>1) page 9</sup>

$C_{EB} = f(V_{EB}), f = 1 \text{ MHz}, E = 0$



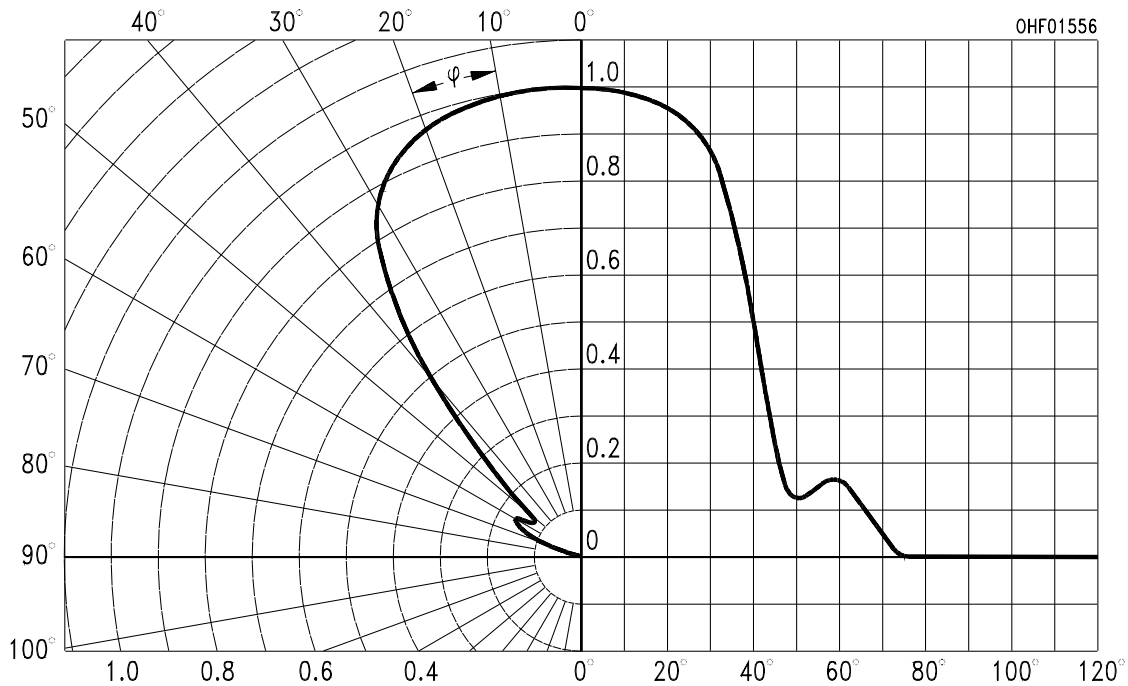
**Power Consumption**

$P_{tot} = f(T_A)$

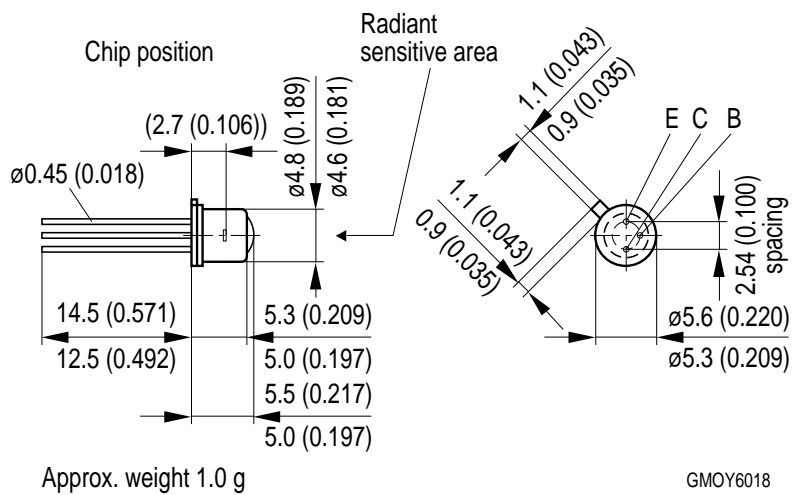


**Directional Characteristics** <sup>1) page 9</sup>

$S_{rel} = f(\phi)$



**Package Outline**



*Dimensions in mm (inch).*

**Package**

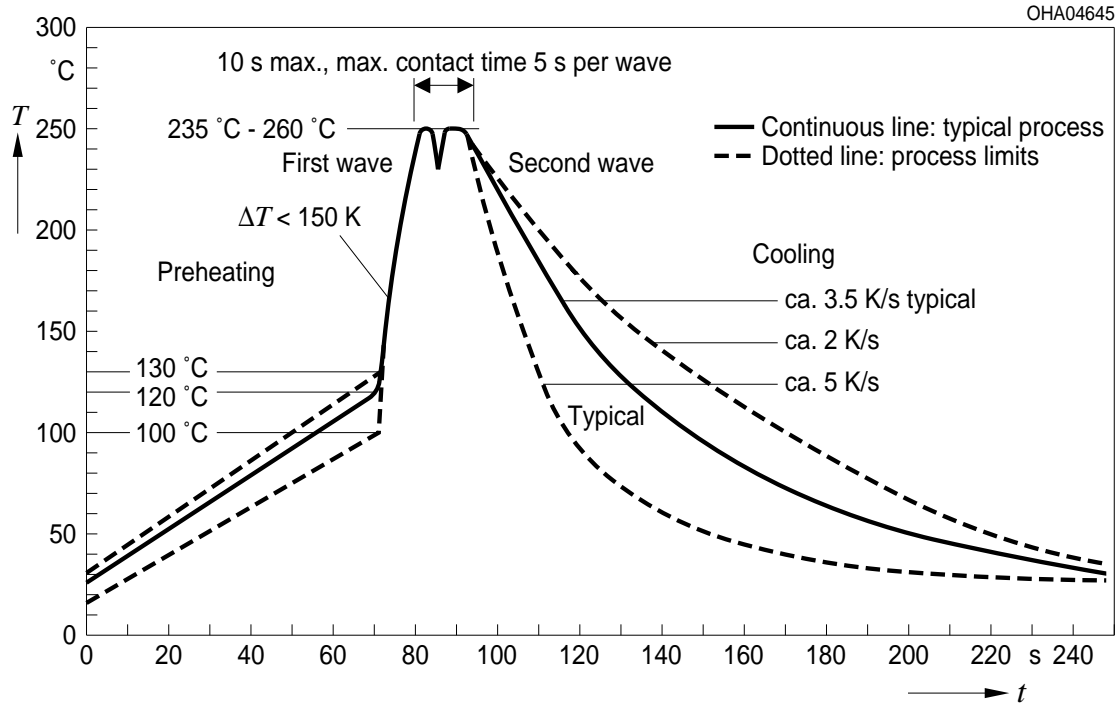
Metal Can (TO-18), hermetically sealed

**Approximate Weight:**

0.28 g

**TTW Soldering**

IEC-61760-1 TTW

**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.

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\*\*) Life support devices or systems are intended (a) to be implanted in the human body, or (b) to support and/or maintain and sustain human life. If they fail, it is reasonable to assume that the health and the life of the user may be endangered.



**Glossary**

- <sup>1)</sup> **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.

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