

OSRAM SFH 7072

Datasheet

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BIOFY®

SFH 7072

Biomonitoring Sensor



Applications

- Digital Diagnostic Devices
- Vital Sign Monitoring

Features

- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- Multi chip package featuring two green, one red, one infrared emitter and two photodetectors
- Light Barrier to block optical crosstalk
- optimized for strong PPG signal
- Package size: (WxDxH) 7.5 mm x 3.9 mm x 0.9 mm

Ordering Information

Type
SFH 7072

Ordering Code
Q65112A1516

Maximum Ratings

 $T_A = 25\text{ °C}$

Parameter	Symbol	Values	
Operating temperature range	T_{op}	min.	-40 °C
		max.	85 °C
Storage temperature range	T_{stg}	min.	-40 °C
		max.	85 °C
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 - HBM	V_{ESD}	max.	2 kV
Green Emitters			
Reverse voltage ⁵⁾	V_R	max.	5 V
Forward current	$I_F (DC)$	max.	25 mA
Forward current pulsed $t_p = 5\text{ ms}$, $D = 0.005$	$I_F \text{ pulse}$	max.	300 mA
Red Emitter			
Reverse voltage ⁵⁾	V_R	max.	12 V
Forward current	$I_F (DC)$	max.	40 mA
Forward current pulsed $t_p = 300\text{ }\mu\text{s}$, $D = 0.005$	$I_F \text{ pulse}$	max.	300 mA
Infrared Emitters			
Reverse voltage ⁵⁾	V_R	max.	5 V
Forward current	$I_F (DC)$	max.	60 mA
Forward current pulsed $t_p = 200\text{ }\mu\text{s}$, $D = 0.005$	$I_F \text{ pulse}$	max.	1 A
Photodiode			
Reverse voltage	V_R	max.	16 V

Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Green Emitter (single emitter)			
Peak wavelength I _F = 20 mA	λ _{peak}	typ.	526 nm
Centroid Wavelength ⁶⁾ I _F = 20 mA	λ _{centroid}	min. typ. max.	520 nm 530 nm 540 nm
Spectral bandwidth at 50% of I _{max} I _F = 20 mA	Δ λ	typ.	32 nm
Half angle	φ	typ.	± 60 °
Rise time I _F = 100 mA, t _p = 16μs, R _L = 50 Ω	t _r	typ.	60 ns
Fall time I _F = 100 mA, t _p = 16μs, R _L = 50 Ω	t _f	typ.	60 ns
Forward voltage ⁷⁾ I _F = 20 mA	V _F	typ. max.	2.4 V 2.8 V
Reverse current V _R = 5 V	I _R		not designed for reverse operation
Radiant intensity I _F = 20 mA, t _p = 20 ms	I _e	typ.	4.7 mW / sr
Total radiant flux I _F = 20 mA, t _p = 20 ms	Φ _e	typ.	14 mW
Temperature coefficient of brightness I _F = 20 mA, t _p = 20 ms	TC _I	typ.	-0.35 % / K
Temperature coefficient of wavelength I _F = 20 mA, -10°C ≤ T ≤ 100°C	TC _λ	typ.	0.03 nm / K
Temperature coefficient of voltage I _F = 20 mA -10°C ≤ T ≤ 100°C	TC _V	typ.	-3.6 mV / K

Characteristics

 $T_A = 25\text{ °C}$

Parameter	Symbol		Values
Red Emitter			
Peak wavelength $I_F = 20\text{ mA}$	λ_{peak}	typ.	660 nm
Centroid Wavelength ⁶⁾ $I_F = 20\text{ mA}$	$\lambda_{\text{centroid}}$	min. typ. max.	652 nm 655 nm 658 nm
Spectral bandwidth at 50% of I_{max} $I_F = 20\text{ mA}$	$\Delta \lambda$	typ.	17 nm
Half angle	ϕ	typ.	$\pm 60^\circ$
Rise time $I_F = 100\text{ mA}$, $t_p = 16\mu\text{s}$, $R_L = 50\ \Omega$	t_r	typ.	17 ns
Fall time $I_F = 100\text{ mA}$, $t_p = 16\mu\text{s}$, $R_L = 50\ \Omega$	t_f	typ.	17 ns
Forward voltage ⁷⁾ $I_F = 20\text{ mA}$	V_F	typ. max.	1.9 V 2.2 V
Reverse current $V_R = 12\text{V}$	I_R		not designed for reverse operation
Radiant intensity $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	I_e	typ.	5.1 mW / sr
Total radiant flux $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	Φ_e	typ.	16 mW
Temperature coefficient of wavelength $I_F = 20\text{ mA}$, $-10^\circ\text{C} \leq T \leq 100^\circ\text{C}$	TC_λ	typ.	0.18 nm / K

Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Infrared Emitter			
Peak wavelength $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	λ_{peak}	typ.	950 nm
Centroid Wavelength ⁶⁾ $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	$\lambda_{\text{centroid}}$	min. typ. max.	930 nm 940 nm 950 nm
Spectral bandwidth at 50% of I_{max} $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	$\Delta \lambda$	typ.	42 nm
Half angle	ϕ	typ.	$\pm 60^\circ$
Rise time (10% and 90%) $I_F = 100\text{ mA}$, $t_p = 16\text{ }\mu\text{s}$, $R_L = 50\text{ }\Omega$	t_r	typ.	16 ns
Fall time (10% and 90%) $I_F = 100\text{ mA}$, $t_p = 16\text{ }\mu\text{s}$, $R_L = 50\text{ }\Omega$	t_f	typ.	16 ns
Forward voltage ⁷⁾ $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	V_F	typ. max.	1.3 V 1.8 V
Reverse current $V_R = 5\text{ V}$	I_R	.	Not designed for reverse operation
Radiant intensity $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	I_e	typ..	3.9 mW / sr
Total radiant flux $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	Φ_e	typ.	11 mW
Temperature coefficient brightness $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	TC_I	typ.	-0.3 % / K
Temperature coefficient of wavelength $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	TC_λ	typ.	0.25 nm / K
Temperature coefficient of voltage $I_F = 20\text{ mA}$, $t_p = 20\text{ ms}$	TC_V	typ.	-0.8 mV / K

Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Broadband Detector			
Wavelength of max. sensitivity	$\lambda_{S\text{ max}}$	typ.	960 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	410 ... 1100 nm
Photocurrent $E_e = 0.1\text{ mW/cm}^2, \lambda = 530\text{ nm}, V_R = 5\text{ V}$	I_P	typ.	0.4 μA
Photocurrent $E_e = 0.1\text{ mW/cm}^2, \lambda = 655\text{ nm}, V_R = 5\text{ V}$	I_P	typ.	0.6 μA
Photocurrent $E_e = 0.1\text{ mW/cm}^2, \lambda = 940\text{ nm}, V_R = 5\text{ V}$	I_P	typ.	1.1 μA
Radiation sensitive area	A	typ.	0.88 mm ²
Dimensions of radiant sensitive area	L x W	typ.	0.89 x 0.89 mm x mm
Half angle	ϕ	typ.	$\pm 60^\circ$
Dark current $V_R = 5\text{ V}, E = 0$	I_R	typ. max.	0.05 nA 10 nA
Open-circuit voltage $E_e = 0.1\text{ mW/cm}^2, \lambda = 530\text{ nm}$	V_O	typ.	211 mV
Open-circuit voltage $E_e = 0.1\text{ mW/cm}^2, \lambda = 655\text{ nm}$	V_O	typ.	249 mV
Open-circuit voltage $E_e = 0.1\text{ mW/cm}^2, \lambda = 940\text{ nm}$	V_O	typ.	266 mV
Short-circuit current $E_e = 0.1\text{ mW/cm}^2, \lambda = 530\text{ nm}$	I_{sc}	typ.	0.4 μA
Short-circuit current $E_e = 0.1\text{ mW/cm}^2, \lambda = 655\text{ nm}$	I_{sc}	typ.	0.6 μA
Short-circuit current $E_e = 0.1\text{ mW/cm}^2, \lambda = 940\text{ nm}$	I_{sc}	typ.	1.1 μA
Rise time $V_R = 5\text{ V}, R_L = 50\ \Omega, \lambda = 940\text{ nm}$	t_r	typ.	0.75 μs
Fall time $V_R = 5\text{ V}, R_L = 50\ \Omega, \lambda = 940\text{ nm}$	t_f	typ.	0.75 μs
Forward voltage $I_F = 100\text{ mA}, E = 0$	V_F	typ..	1.16 V
Capacitance $V_R = 5\text{ V}, f = 1\text{ MHz}, E = 0$	C_0	typ.	4.2 pF

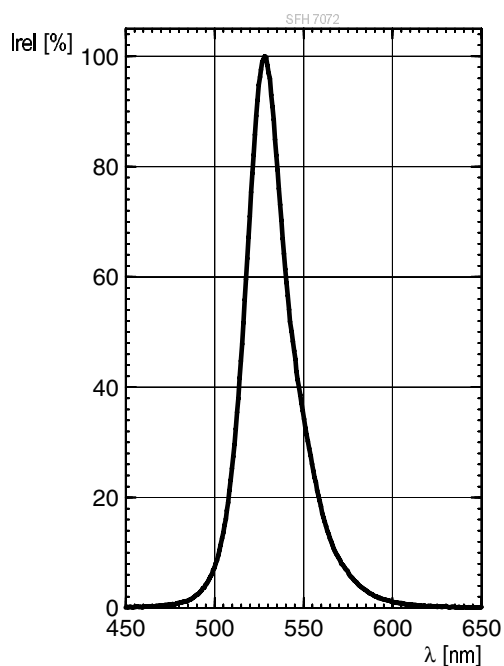
Characteristics

 $T_A = 25\text{ °C}$

Parameter	Symbol		Values
IR-Cut Detector			
Wavelength of max. sensitivity	$\lambda_{S\ max}$	typ.	635 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	402 ... 694 nm
Photocurrent $E_e = 0.1\ \text{mW/cm}^2$, $\lambda = 530\ \text{nm}$, $V_R = 5\ \text{V}$	I_P	typ.	1.1 μA
Radiation sensitive area	A	typ.	3.46 mm ²
Dimensions of radiant sensitive area	$L \times W$	typ.	1.29 x 2.69 mm x mm
Half angle	ϕ	typ.	$\pm\ 57^\circ$
Dark current $V_R = 5\ \text{V}$, $E_e = 0$	I_R	typ. max.	0.4 nA 2 nA
Open-circuit voltage $E_e = 0.1\ \text{mW/cm}^2$, $\lambda = 530\text{nm}$	V_O	typ.	390 mV
Short-circuit current $E_e = 0.1\ \text{mW/cm}^2$, $\lambda = 530\text{nm}$	I_{SC}	typ.	1.1 μA
Rise time $V_R = 5\ \text{V}$, $R_L = 50\ \Omega$, $\lambda = 530\ \text{nm}$	t_r	typ.	40 ns
Fall time $V_R = 5\ \text{V}$, $R_L = 50\ \Omega$, $\lambda = 530\ \text{nm}$	t_f	typ.	40 ns
Forward voltage $I_F = 10\ \text{mA}$, $E = 0$	V_F	typ..	0.84 V
Capacitance $V_R = 5\ \text{V}$, $f = 1\ \text{MHz}$, $E = 0$	C_0	typ.	55 pF

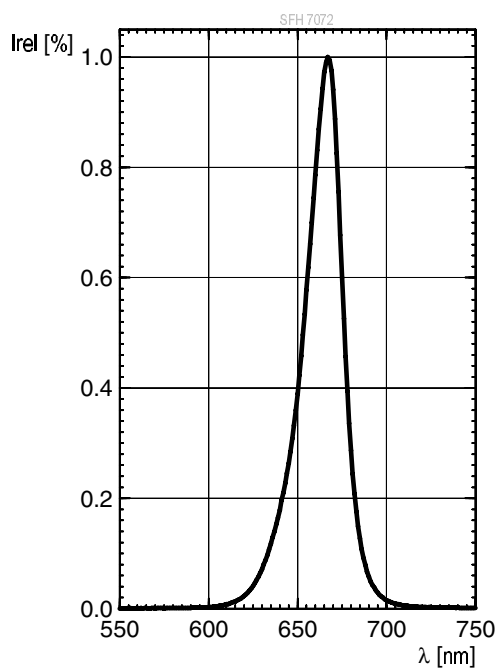
Relative Spectral Emission ^{1), 2)}

- true green: $I_{e,rel} = f(\lambda)$; $I_F = 20 \text{ mA}$; $t_p = 20 \text{ ms}$



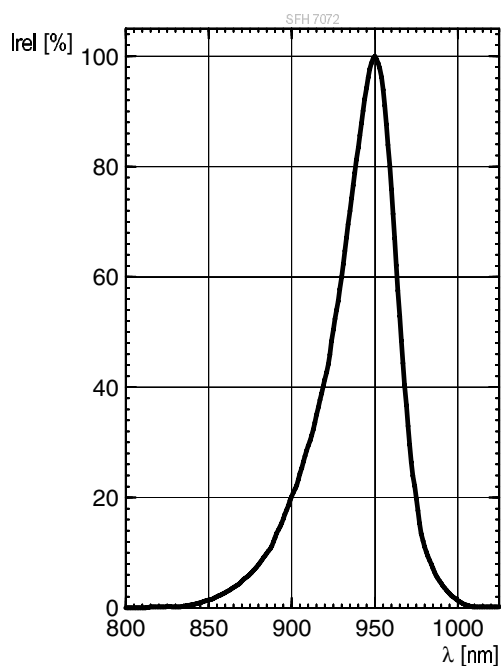
Relative Spectral Emission ^{1), 2)}

- hyper red: $I_{e,rel} = f(\lambda)$; $I_F = 20 \text{ mA}$; $t_p = 20 \text{ ms}$



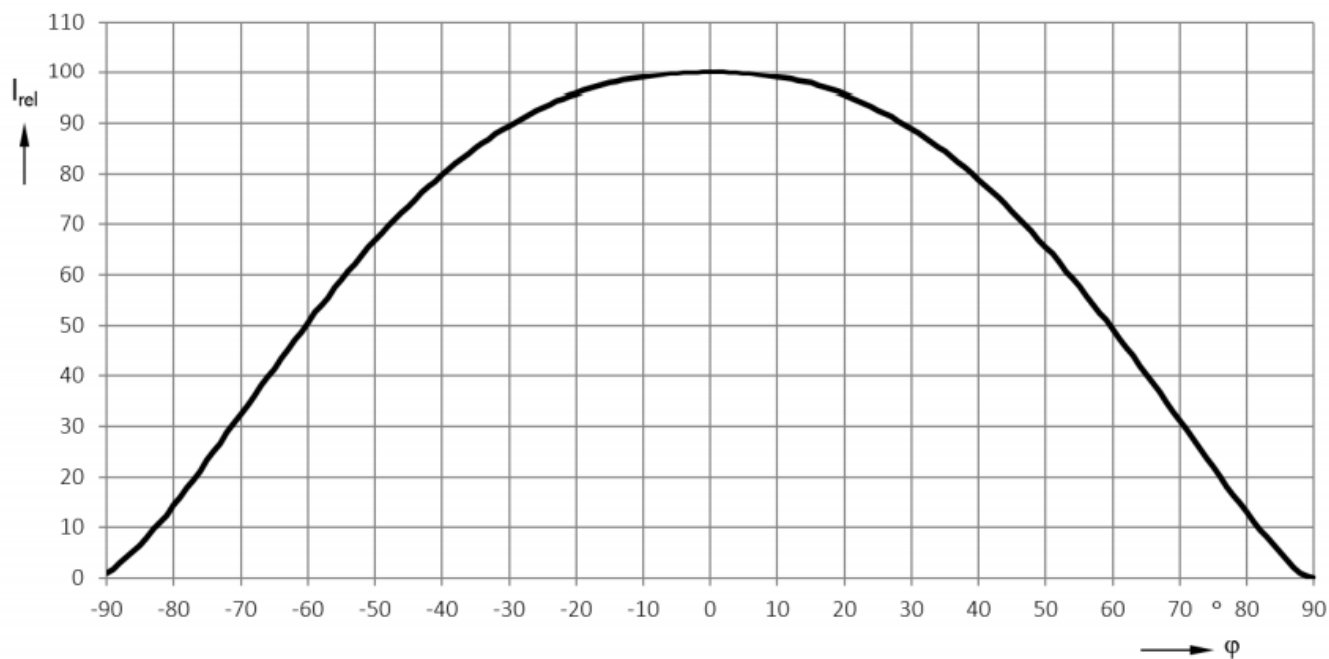
Relative Spectral Emission ^{1), 2)}

- infrared (940 nm): $I_{e,rel} = f(\lambda)$; $I_F = 20 \text{ mA}$; $t_p = 20 \text{ ms}$



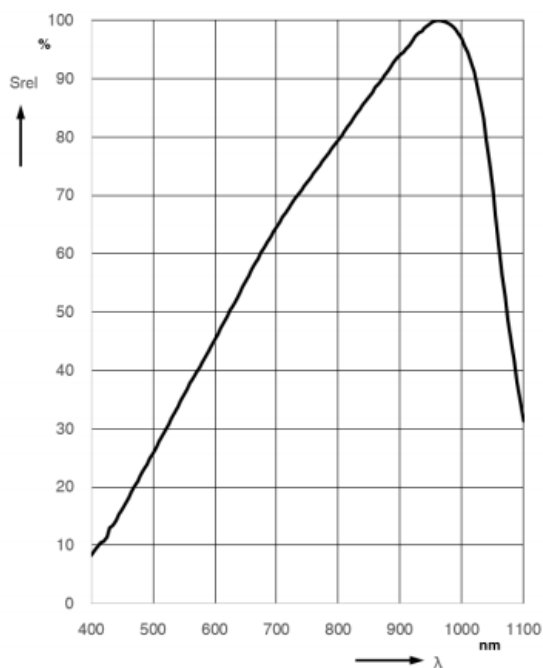
Radiation Characteristics ^{1), 2)}

true green/ hyper red/ infrared: $I_{e,rel} = f(\varphi)$



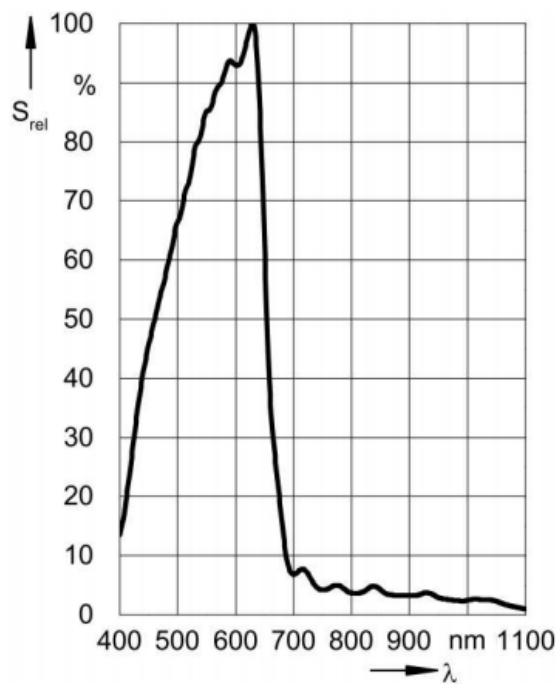
Relative Spectral Sensitivity ^{1), 2)}

■ photodiode BB: $S_{rel} = f(\lambda)$



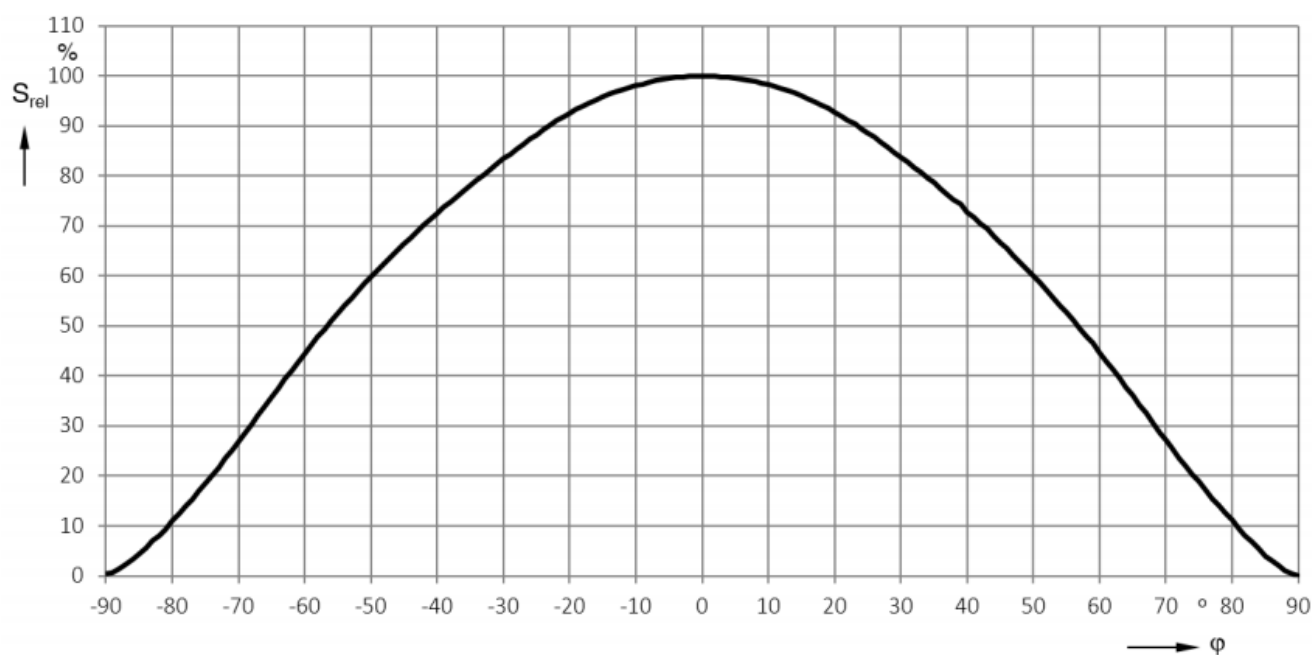
Relative Spectral Sensitivity ^{1), 2)}

■ photodiode IR-Cut: $S_{rel} = f(\lambda)$



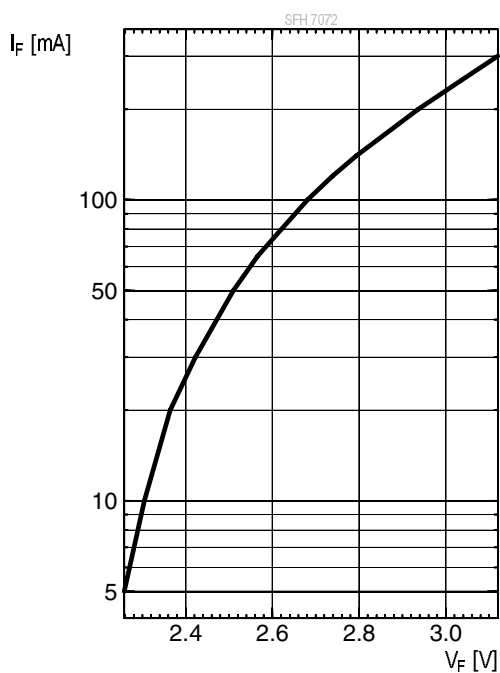
Directional Characteristics ^{1), 2)}

photodiode broadband/ IR-cut: $S_{\text{rel}} = f(\varphi)$; $\lambda = 530 \text{ nm}$



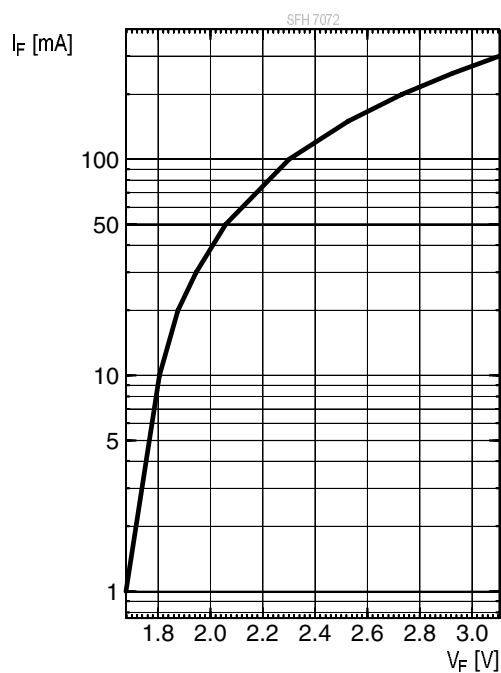
Forward current ^{1), 2)}

• true green: $I_F = f(V_F)$; single pulse; $t_p = 100 \mu\text{s}$



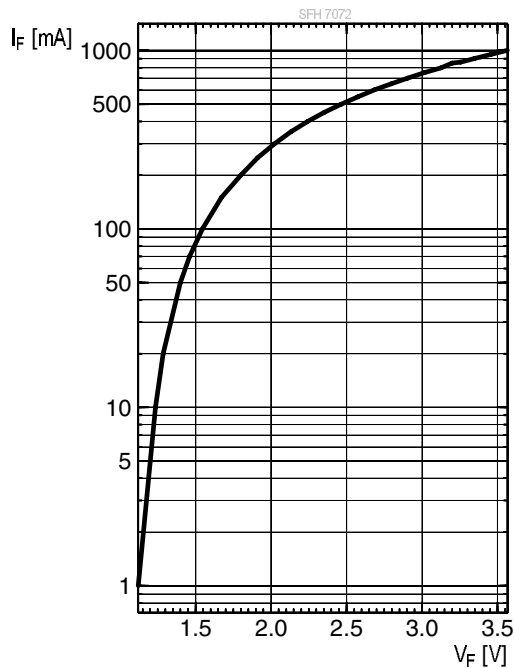
Forward current ^{1), 2)}

• hyper red: $I_F = f(V_F)$; single pulse; $t_p = 100 \mu\text{s}$



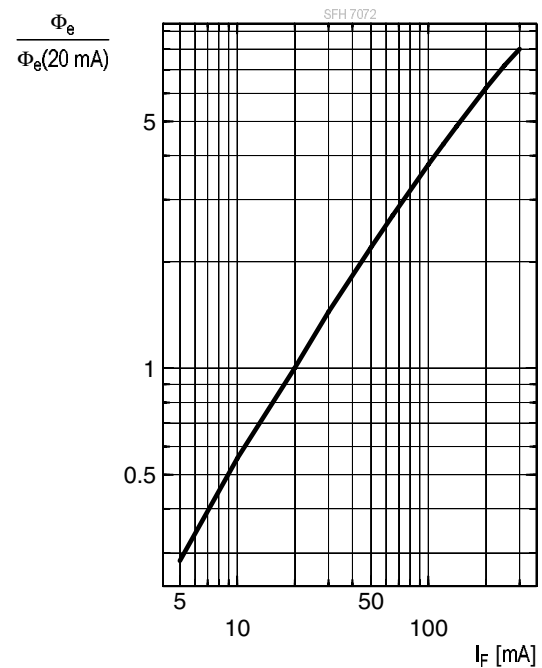
Forward current ^{1), 2)}

- infrared (940 nm): $I_F = f(V_F)$; s.p.; $t_p = 100 \mu s$



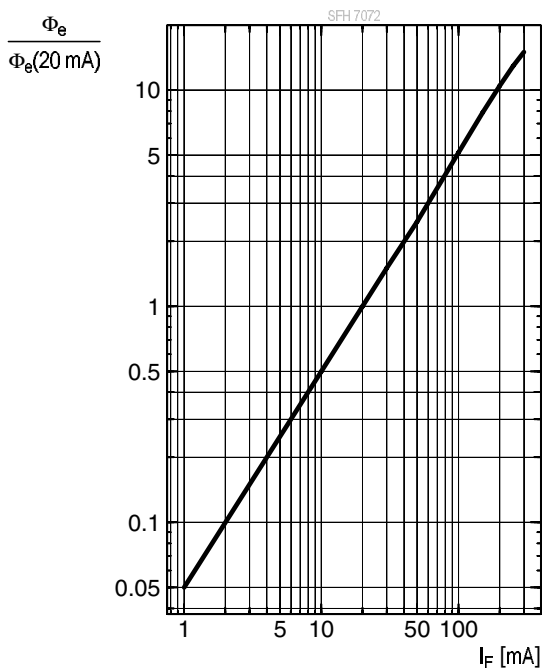
Relative Total Radiant Flux ^{1), 2)}

- true green: $\Phi_e / \Phi_e(20mA) = f(I_F)$; single pulse; $t_p = 100 \mu s$

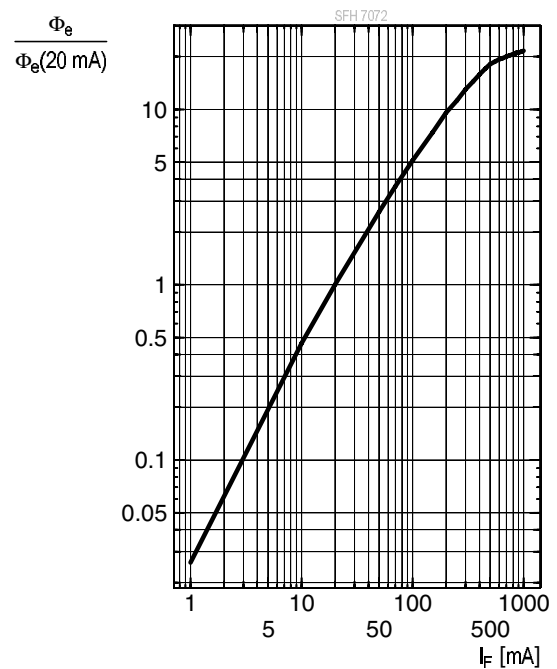


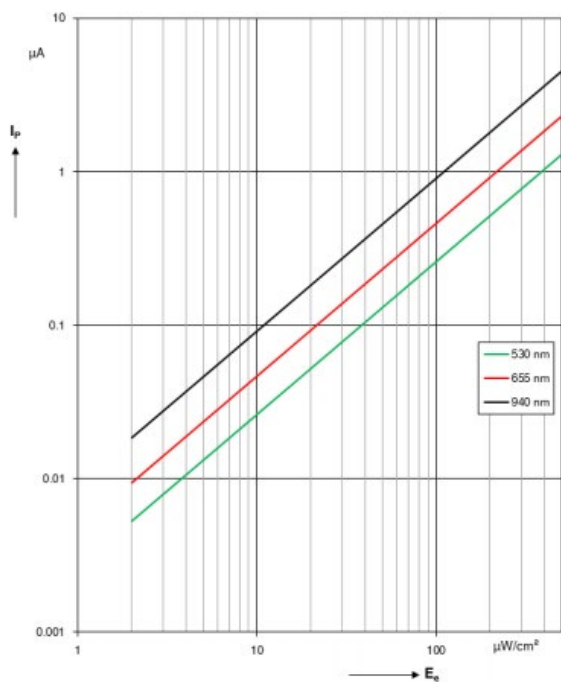
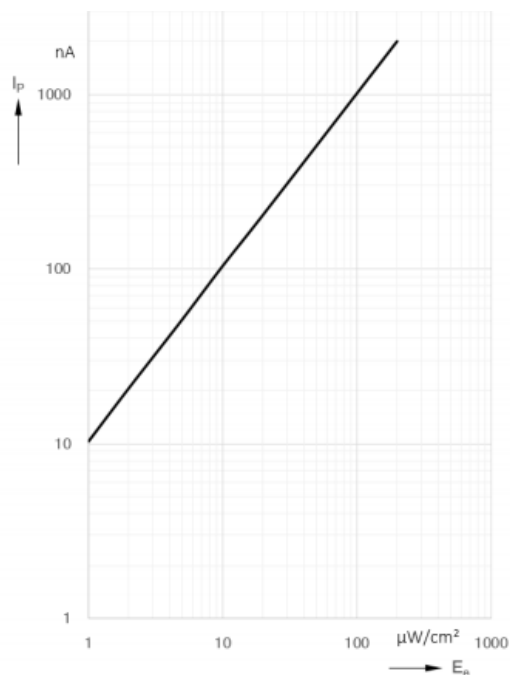
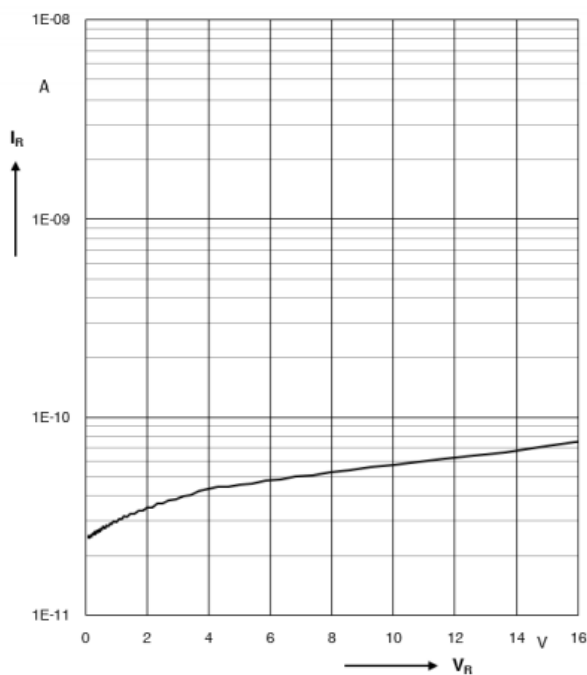
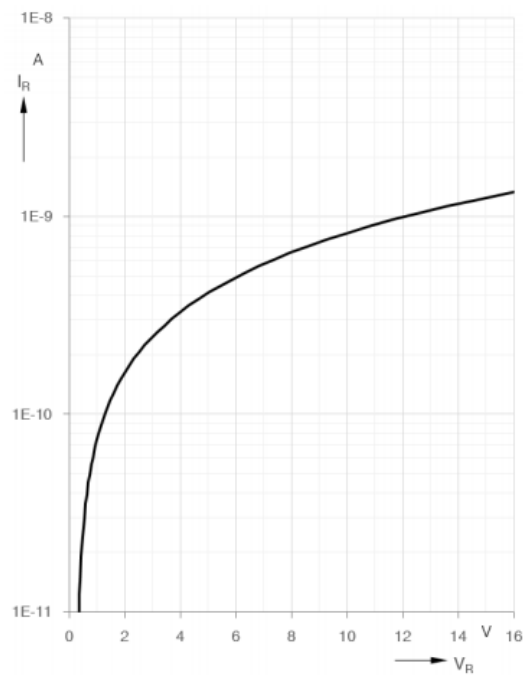
Relative Total Radiant Flux ^{1), 2)}

- hyper red: $\Phi_e / \Phi_e(20mA) = f(I_F)$; single pulse; $t_p = 25 \mu s$
- infrared (940 nm): $\Phi_e / \Phi_e(20mA) = f(I_F)$; s. p.; $t_p = 25 \mu s$



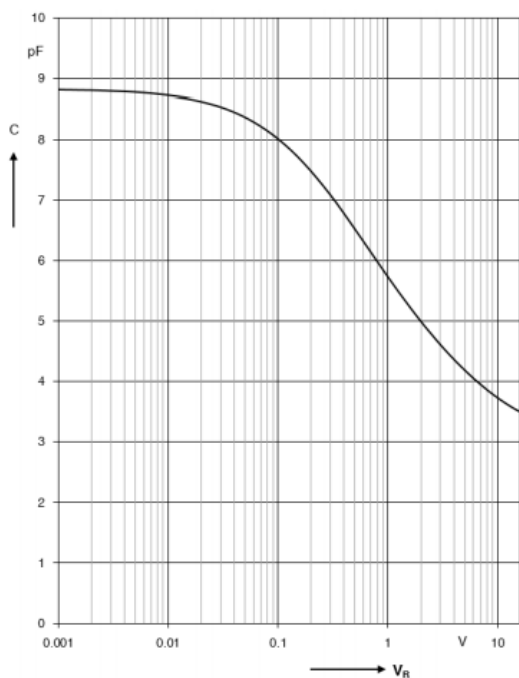
Relative Total Radiant Flux ^{1), 2)}



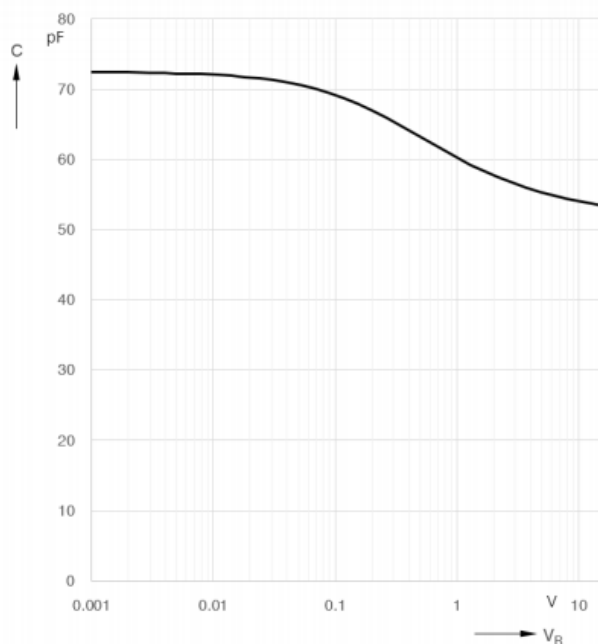
Photocurrent 1), 2)■ photodiode BB: $I_p = f(E_e)$; $\lambda = \text{parameter}$; $V_R = 5 \text{ V}$ **Photocurrent** 1), 2)■ photodiode IR-Cut: $I_p = f(E_e)$; $\lambda = 530 \text{ nm}$; $V_R = 5 \text{ V}$ **Dark Current** 1), 2)■ photodiode BB: $I_R = f(V_R)$; $E = 0$ **Dark Current** 1), 2)■ photodiode IR-Cut: $I_R = f(V_R)$; $E = 0$ 

Capacitance ^{1), 2)}

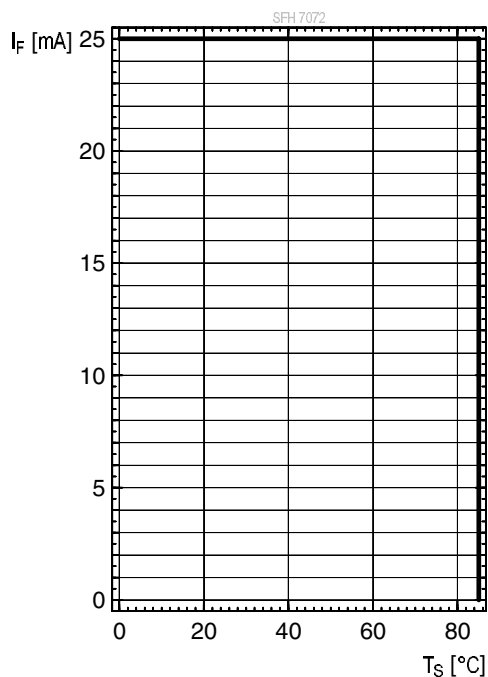
- photodiode BB: $C = f(V_R)$; $f = 1\text{MHz}$; $E = 0$

**Capacitance** ^{1), 2)}

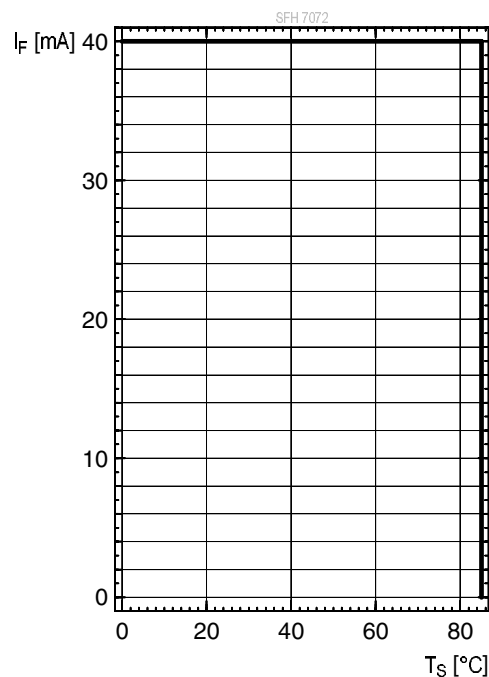
- photodiode IR-Cut: $C = f(V_R)$; $f = 1\text{MHz}$; $E = 0$

**Max. Permissible Forward Current**

- true green: $I_F = f(T_S)$; $R_{th_{js}} = 110\text{ K/W}$

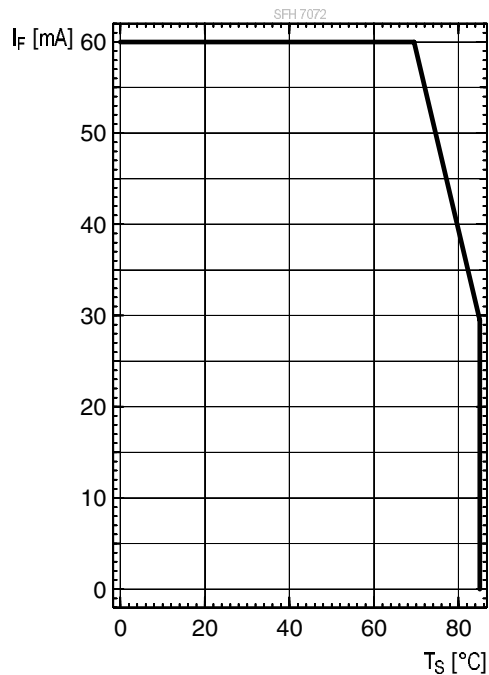
**Max. Permissible Forward Current**

- hyper red: $I_F = f(T_S)$; $R_{th_{js}} = 80\text{ K/W}$



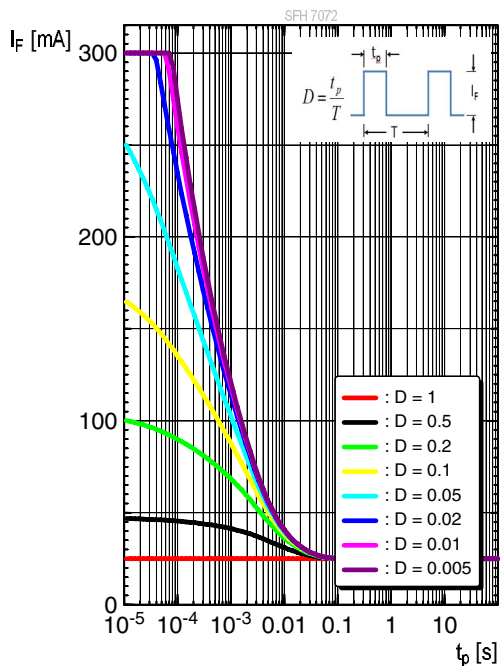
Max. Permissible Forward Current

- infrared (940 nm): $I_F = f(T_S)$; $R_{th_{js}} = 340 \text{ K/W}$



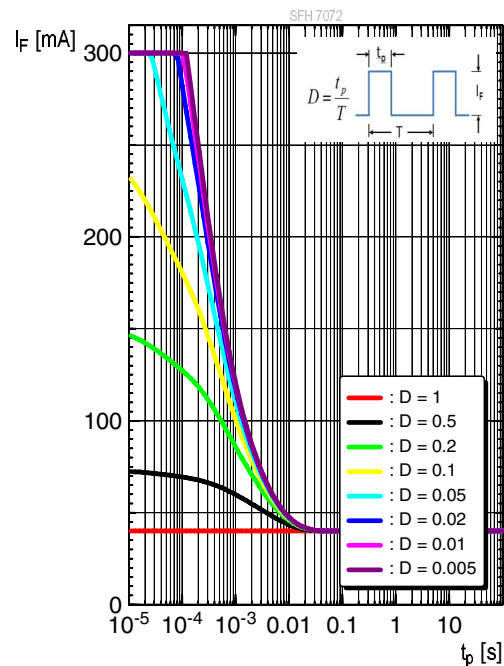
Permissible Pulse Handling Capability

- true green: $I_F = f(t_p)$; D = parameter; $T_A = 85 \text{ °C}$



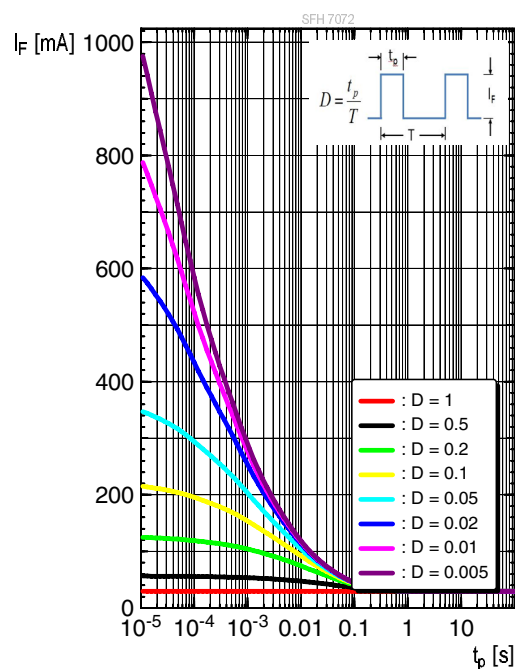
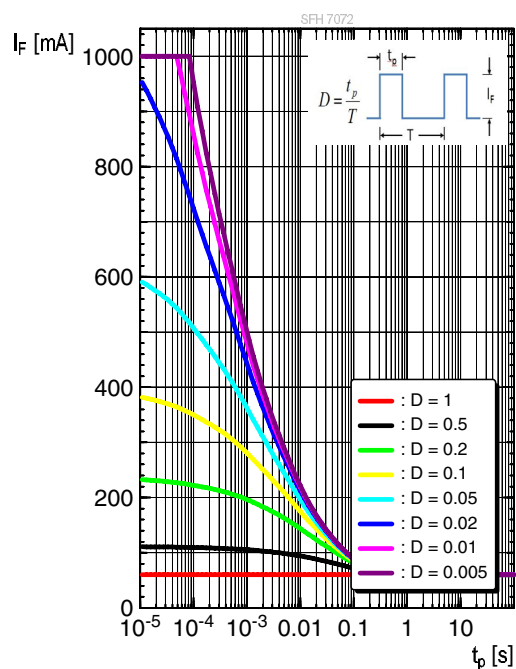
Permissible Pulse Handling Capability

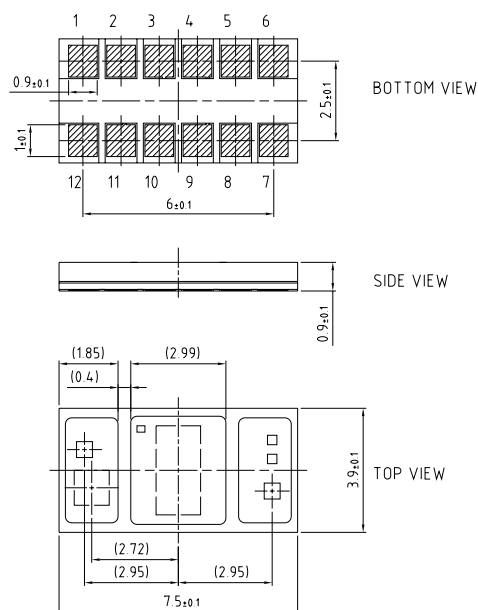
- hyper red: $I_F = f(t_p)$; D = parameter; $T_A = 85 \text{ °C}$



Permissible Pulse Handling Capability Permissible Pulse Handling Capability

- infrared (940 nm): $I_F = f(t_p)$; $D = \text{parameter}$; $T_A = 25\text{ }^{\circ}\text{C}$
- infrared (940 nm): $I_F = f(t_p)$; $D = \text{parameter}$; $T_A = 85\text{ }^{\circ}\text{C}$



Dimensional Drawing ³⁾

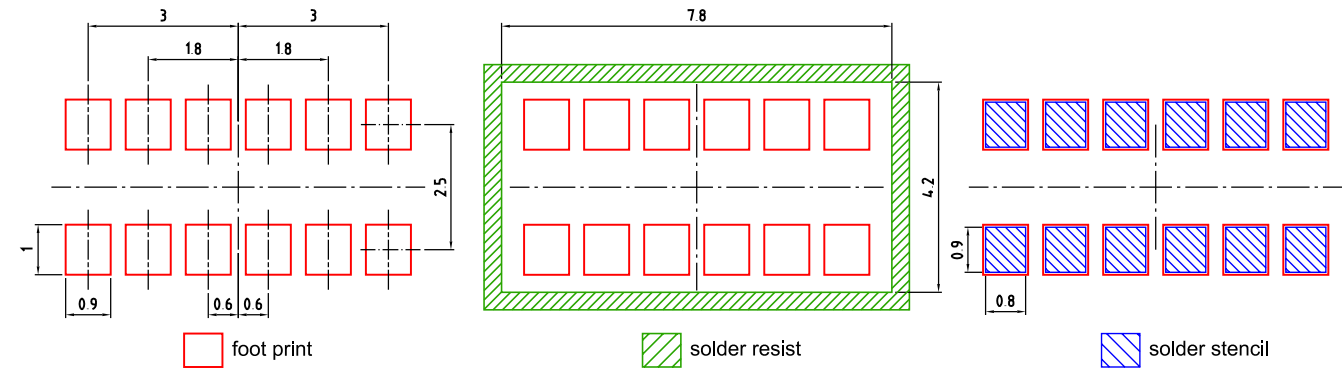
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Further Information:

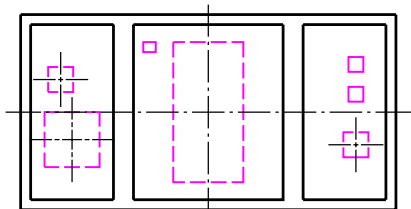
Approximate Weight: 44.0 mg

Pin	Description
1	PD1 (BB) Cathode
2	PD1 (BB) Anode
3	PD2 (IR-Cut) Cathode
4	IR LED Anode
5	Green 1 LED Anode
6	Green 1 LED Cathode
7	Red LED Anode
8	Red LED Cathode
9	IR LED Cathode
10	PD2 (IR-Cut) Anode
11	Green 2 LED Anode
12	Green 2 LED Cathode

Recommended Solder Pad ³⁾



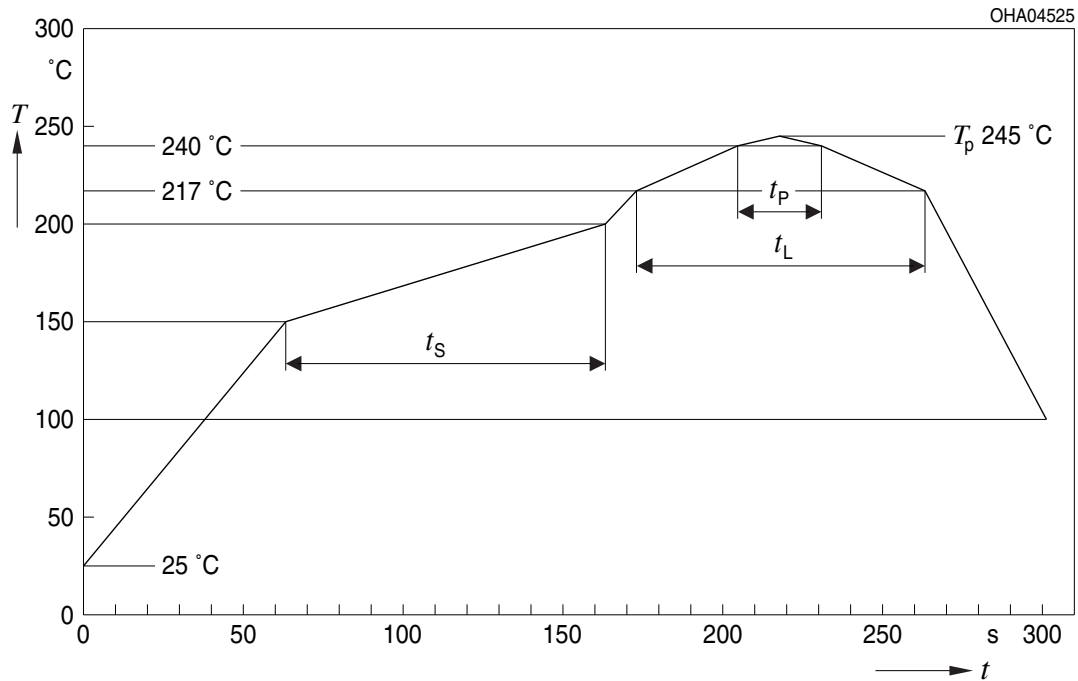
Component Location on Pad



E062.3010.217-01

Reflow Soldering Profile

Product complies to MSL Level 4 acc. to JEDEC J-STD-020E

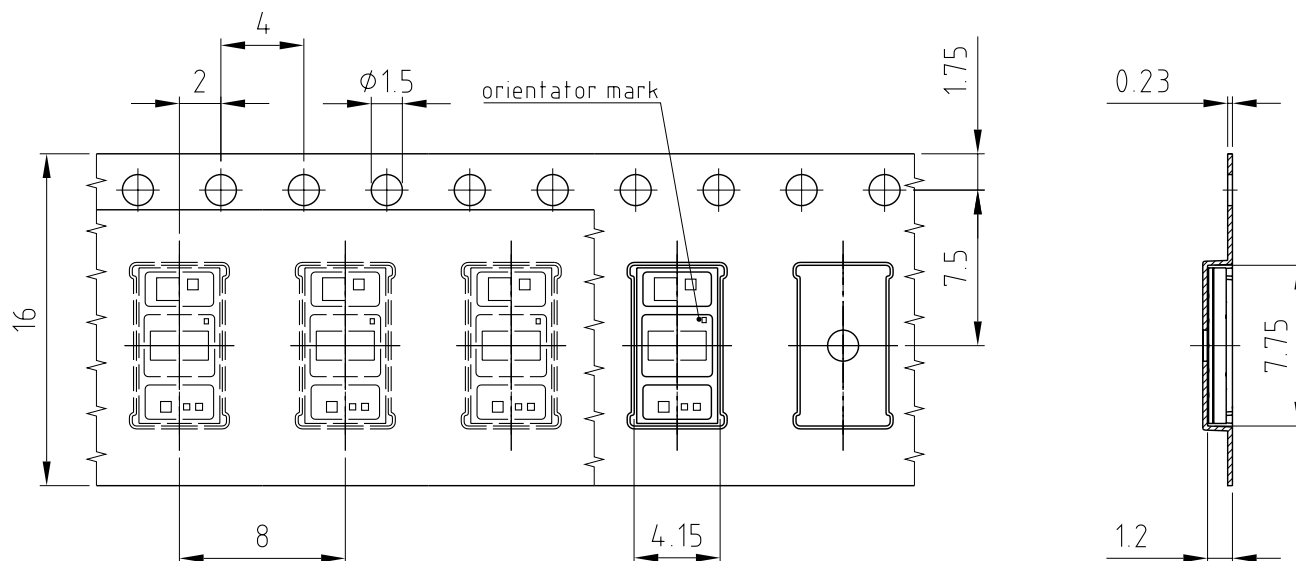


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat ^{*)} 25 °C to 150 °C			2	3	K/s
Time t_s T_{Smin} to T_{Smax}	t_s	60	100	120	s
Ramp-up rate to peak ^{*)} T_{Smax} to T_p			2	3	K/s
Liquidus temperature	T_L		217		$^{\circ}\text{C}$
Time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

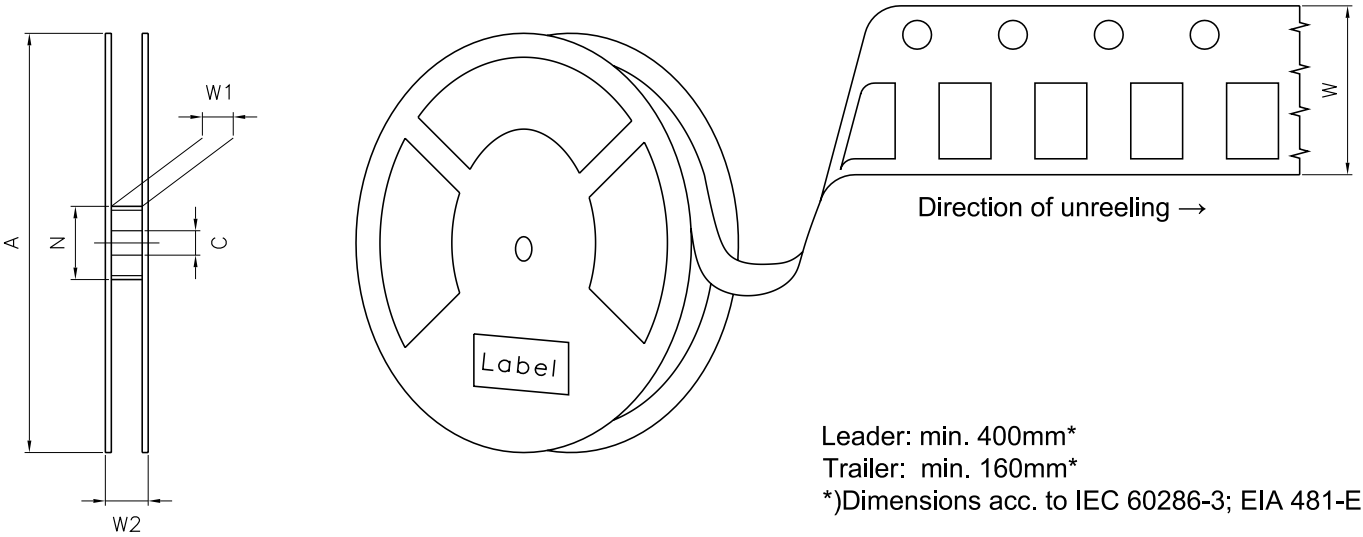
* slope calculation DT/Dt : Dt max. 5 s; fulfillment for the whole T-range

Taping ³⁾



C63062-A4325-B2 -02

Tape and Reel ⁴⁾



Reel Dimensions

A	W	N _{min}	W ₁	W _{2 max}	Pieces per PU
180 mm	16 + 0.3 / - 0.1 mm	60/100 mm	16.4 + 2 mm	22.4 mm	1500

Barcode-Product-Label (BPL)

OSRAM

LX XXXX

BIN1: XX-XX-X-XXX-X

RoHS Compliant

(6P) BATCH NO: 1234567890



(1T) LOT NO: 1234567890



(X) PROD NO: 123456789

(Q) QTY: 9999

(G) GROUP: XX-XX-X-X





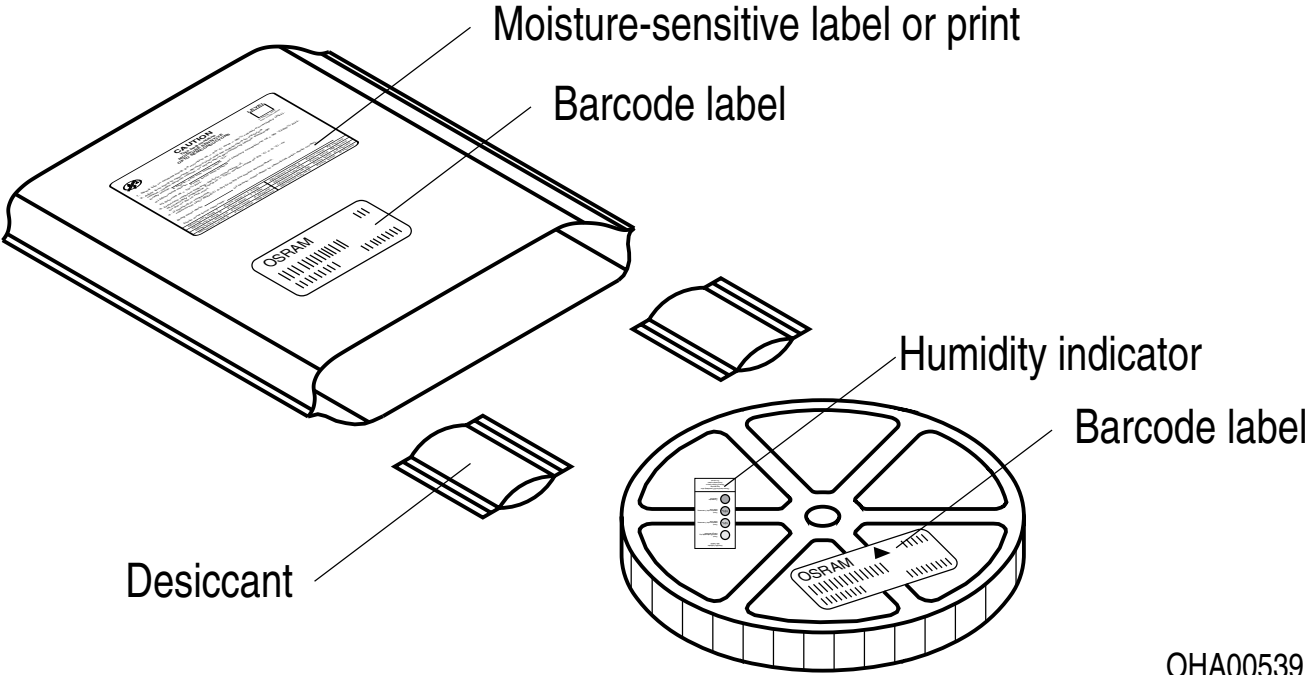
ML Temp ST
X XXX °C X

Pack: RXX
DEMY XXX
X_X123_1234.1234 X



OHA04563

Dry Packing Process and Materials ³⁾



OHA00539

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

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 our 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

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

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

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

Glossary

- 1) **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.
- 2) **Testing temperature:** $T_A = 25^{\circ}\text{C}$ (unless otherwise specified)
- 3) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with ± 0.1 and dimensions are specified in mm.
- 4) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.
- 5) **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.
- 6) **Wavelength:** The wavelengths are measured with a tolerance of ± 1 nm.
- 7) **Forward Voltage:** The forward voltages are measured with a tolerance of ± 0.1 V.
- 8) **Brightness:** The brightness values are measured with a tolerance of $\pm 11\%$.
- 9) **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 $\pm 11\%$.

Revision History

Version	Date	Change
1.1	2019-04-24	Characteristics
1.2	2020-07-10	Derating (Diagrams) Schematic Transportation Box Dimensions of Transportation Box
1.3	2021-04-27	Characteristics New Layout
1.4	2021-08-12	Features
1.5	2022-05-10	Characteristics Electro - Optical Characteristics (Diagrams) New Layout
1.6	2023-08-11	Characteristics Derating (Diagrams)



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。

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