OSRAM SFH 7074

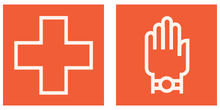
Datasheet

Published by ams-OSRAM AG
Tobelbader Strasse 30, 8141 Premstaetten, Austria
Phone +43 3136 500-0
ams-osram.com

BIOFY®

SFH 7074

Biomonitoring Sensor



Applications

- Digital Diagnostic Devices
- Vital Sign Monitoring

Features

- ESD: 1.5 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM)
- Light Barrier to block optical crosstalk
- optimized for strong PPG signal

Ordering Information

Type	Ordering Code
SFH 7074	Q65113A3202

Maximum Ratings

T_A = 25 °C

Parameter	Symbol		Values
Operating temperature range	T_{op}	min. max.	-40 °C 85 °C
Storage temperature range	T_{stg}	min. max.	-40 °C 85 °C
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 - HBM	V_{ESD}	max.	1.5 kV
Green Emitter			
Reverse voltage [5)]	V_R	max.	5 V
Forward current	$I_{F\ (DC)}$	min. max.	10 mA 30 mA
Forward current pulsed t_p = 2.7 ms; D = 0.005	$I_{F\ pulse}$	max.	300 mA
Red Emitter			
Reverse voltage [5)]	V_R	max.	12 V
Forward current	$I_{F\ (DC)}$	min. max.	10 mA 40 mA
Forward current pulsed t_p = 440 µs; D = 0.005	$I_{F\ pulse}$	max.	300 mA
Infrared Emitter			
Reverse voltage [5)]	V_R	max.	5 V
Forward current	$I_{F\ (DC)}$	min. max.	1 mA 60 mA
Forward current pulsed t_p = 15 µs; D = 0.005	$I_{F\ pulse}$	max.	1 A
Photodiode (PD1/ PD2/ PD3)			
Reverse voltage	V_R	max.	16 V

Characteristics

T_A = 25 °C

Parameter	Symbol		Values
Green Emitter			
Peak wavelength I_F = 20 mA; t_p = 20 ms	λ_{peak}	typ.	526 nm
Centroid Wavelength [6)] I_F = 20 mA; t_p = 20 ms	$\lambda_{centroid}$	min. typ. max.	520 nm 530 nm 540 nm
Spectral bandwidth at 50% Irel,max (FWHM) I_F = 20 mA; t_p = 20 ms	$\Delta\lambda$	typ.	27 nm
Half angle	φ	typ.	± 60 °
Rise time (10%/ 90%) I_F = 100 mA; R_L = 5 Ω	t_r	typ.	130 ns
Fall time (10%/ 90%) I_F = 100 mA; R_L = 5 Ω	t_f	typ.	250 ns
Forward voltage [7)] I_F = 20 mA; t_p = 20 ms	V_F	typ. max.	2.35 V 2.8 V
Reverse current V_R = 5 V	I_R		not designed for reverse operation
Radiant intensity [8)] I_F = 20 mA; t_p = 20 ms	I_e	min. typ. max.	2.2 mW / sr 4.0 mW / sr 5.4 mW / sr
Total radiant flux I_F = 20 mA; t_p = 20 ms	Φ_e	typ.	11 mW
Temperature coefficient of brightness I_F = 20 mA; t_p = 20 ms	TC_I	typ.	-0.2 % / K
Temperature coefficient of wavelength I_F = 20 mA; t_p = 20 ms	TC_λ	typ.	0.043 nm / K
Temperature coefficient of voltage I_F = 20 mA; t_p = 20 ms	TC_V	typ.	-3.4 mV / K
Thermal resistance junction solder point real	Rth_{JS}	max.	180 K / W

Characteristics

T_A = 25 °C

Parameter	Symbol		Values
Red Emitter			
Peak wavelength I_F = 20 mA; t_p = 20 ms	λ_{peak}	typ.	660 nm
Centroid Wavelength [6] I_F = 20 mA; t_p = 20 ms	$\lambda_{centroid}$	min. typ. max.	652 nm 655 nm 658 nm
Spectral bandwidth at 50% Irel,max (FWHM) I_F = 20 mA; t_p = 20 ms	$\Delta\lambda$	typ.	17 nm
Half angle	φ	typ.	± 60 °
Rise time (10%/ 90%) I_F = 100 mA; R_L = 50 Ω	t_r	typ.	24 ns
Fall time (10%/ 90%) I_F = 100 mA; R_L = 50 Ω	t_f	typ.	24 ns
Forward voltage [7] I_F = 20 mA; t_p = 20 ms	V_F	min. typ. max.	1.7 V 1.9 V 2.2 V
Reverse current V_R = 12V	I_R		not designed for reverse operation
Radiant intensity [8] I_F = 20 mA; t_p = 20 ms	I_e	min. typ. max.	3.6 mW / sr 4.6 mW / sr 6.9 mW / sr
Total radiant flux I_F = 20 mA; t_p = 20 ms	Φ_e	typ.	13.5 mW
Temperature coefficient of brightness I_F = 20 mA; t_p = 20 ms	TC_I	typ.	-0.7 % / K
Temperature coefficient of wavelength I_F = 20 mA; t_p = 20 ms	TC_λ	typ.	0.18 nm / K
Temperature coefficient of voltage I_F = 20 mA; t_p = 20 ms	TC_V	typ.	-1.7 mV / K
Thermal resistance junction solder point real	R_{thJS}	max.	265 K / W

Characteristics

T_A = 25 °C

Parameter	Symbol		Values
Infrared Emitter			
Peak wavelength I_F = 20 mA; t_p = 20 ms	λ_{peak}	typ.	950 nm
Centroid Wavelength [6)] I_F = 20 mA; t_p = 20 ms	$\lambda_{centroid}$	min. typ. max.	930 nm 940 nm 950 nm
Spectral bandwidth at 50% Irel,max (FWHM) I_F = 20 mA; t_p = 20 ms	$\Delta\lambda$	typ.	42 nm
Half angle	φ	typ.	± 60 °
Rise time (10%/ 90%) I_F = 100 mA; R_L = 50 Ω	t_r	typ.	16 ns
Fall time (10%/ 90%) I_F = 100 mA; R_L = 50 Ω	t_f	typ.	16 ns
Forward voltage [7)] I_F = 20 mA; t_p = 20 ms	V_F	typ. max.	1.3 V 1.7 V
Reverse current V_R = 5 V	I_R		Not designed for reverse operation
Radiant intensity [8)] I_F = 20 mA; t_p = 20 ms	I_e	min. typ. max.	2.2 mW / sr 3.0 mW / sr 5.4 mw / sr
Total radiant flux I_F = 20 mA; t_p = 20 ms	Φ_e	typ.	9.0 mW
Temperature coefficient of brightness I_F = 20 mA; t_p = 20 ms	TC_I	typ.	-0.3 % / K
Temperature coefficient of wavelength I_F = 20 mA; t_p = 20 ms	TC_λ	typ.	0.25 nm / K
Temperature coefficient of voltage I_F = 20 mA; t_p = 20 ms	TC_V	typ.	-0.8 mV / K
Thermal resistance junction solder point real	R_{thJS}	max.	180 K / W

Characteristics

T_A = 25 °C

Parameter	Symbol		Values
Broadband Photodiode			
Wavelength of max. sensitivity	$\lambda_{S\ max}$	typ.	940 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	400 … 1100 nm
Photocurrent [9)] E_e = 0.1 mW/cm²; λ = 530 nm; V_R = 5 V	I_P	min. typ. max.	0.88 µA 1.1 µA 1.45 µA
Photocurrent E_e = 0.1 mW/cm²; λ = 655 nm; V_R = 5 V	I_P	typ.	1.6 µA
Photocurrent E_e = 0.1 mW/cm²; λ = 940 nm; V_R = 5 V	I_P	typ.	2.3 µA
Radiant sensitive area	A	typ.	3.27 mm²
Half angle	φ	typ.	± 60 °
Dark current V_R = 5 V; E = 0	I_R	typ. max.	0.1 nA 5 nA
Open-circuit voltage E_e = 0.1 mW/cm²; λ = 530nm	V_O	typ.	280 mV
Open-circuit voltage E_e = 0.1 mW/cm²; λ = 655nm	V_O	typ.	270 mV
Open-circuit voltage E_e = 0.1 mW/cm²; λ = 940nm	V_O	typ.	280 mV
Short-circuit current E_e = 0.1 mW/cm²; λ = 530nm	I_{SC}	typ.	1.2 µA
Short-circuit current E_e = 0.1 mW/cm²; λ = 655nm	I_{SC}	typ.	1.6 µA
Short-circuit current E_e = 0.1 mW/cm²; λ = 940nm	I_{SC}	typ.	2.2 µA

OSRAM

Characteristics

T_A = 25 °C

Parameter	Symbol		Values
Broadband Photodiode (continued)			
Rise time (10%/ 90%) V_R = 5 V; R_L = 50 Ω; λ = 940 nm	t_r	typ.	3.6 µs
Fall time (10%/ 90%) V_R = 5 V; R_L = 50 Ω; λ = 940 nm	t_f	typ.	3.5 µs
Forward voltage I_F = 10 mA; E = 0	V_F	typ..	0.95 V
Capacitance V_R = 5 V; f = 1 MHz; E = 0	C_0	typ.	8 pF

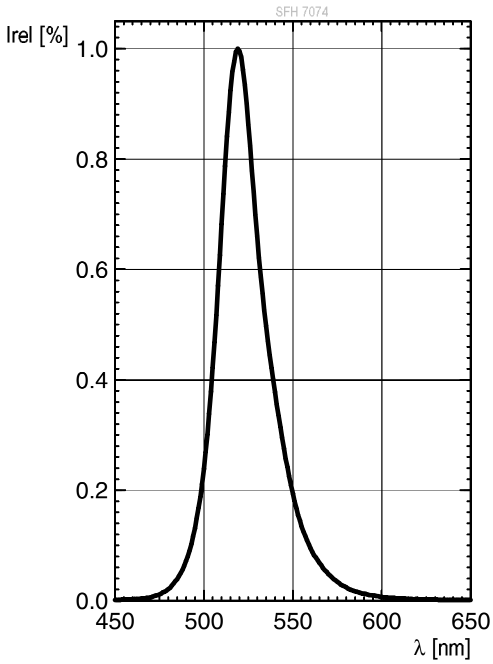
Characteristics

T_A = 25 °C

Parameter	Symbol		Values
IR-Cut Photodiode (PD1 and PD2)			
Wavelength of max. sensitivity	$\lambda_{S\,max}$	typ.	635 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	400 … 660 nm
Photocurrent [9] E_e = 0.1 mW/cm^2; λ = 530 nm; V_R = 5 V	I_P	min. typ. max.	0.6 µA 0.95 µA 1.22 µA
Radiant sensitive area	A	typ.	3.27 mm^2
Half angle	φ	typ.	± 55 °
Dark current V_R = 5 V; E = 0	I_R	typ. max.	0.1 nA 5 nA
Open-circuit voltage E_e = 0.1 mW/cm^2; λ = 530nm	V_O	typ.	370 mV
Short-circuit current E_e = 0.1 mW/cm^2; λ = 530nm	I_{SC}	typ.	0.9 µA
Rise time (10%/ 90%) V_R = 5 V; R_L = 50 Ω; λ = 530 nm	t_r	typ.	38 ns
Fall time (10%/ 90%) V_R = 5 V; R_L = 50 Ω; λ = 530 nm	t_f	typ.	38 ns
Forward voltage I_F = 10 mA; E = 0	V_F	typ..	0.9 V
Capacitance V_R = 5 V; f = 1 MHz; E = 0	C_0	typ.	50 pF

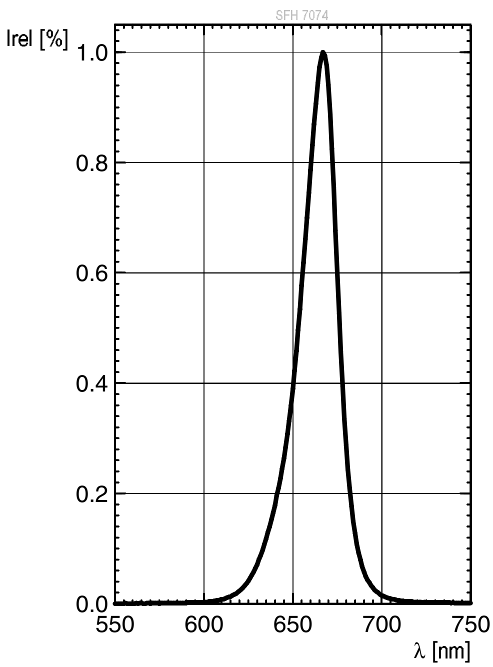
Relative Spectral Emission [1), 2)]

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



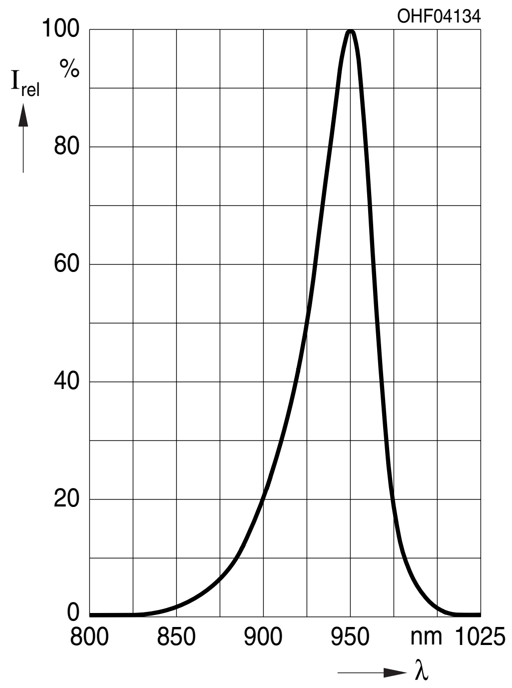
Relative Spectral Emission [1), 2)]

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



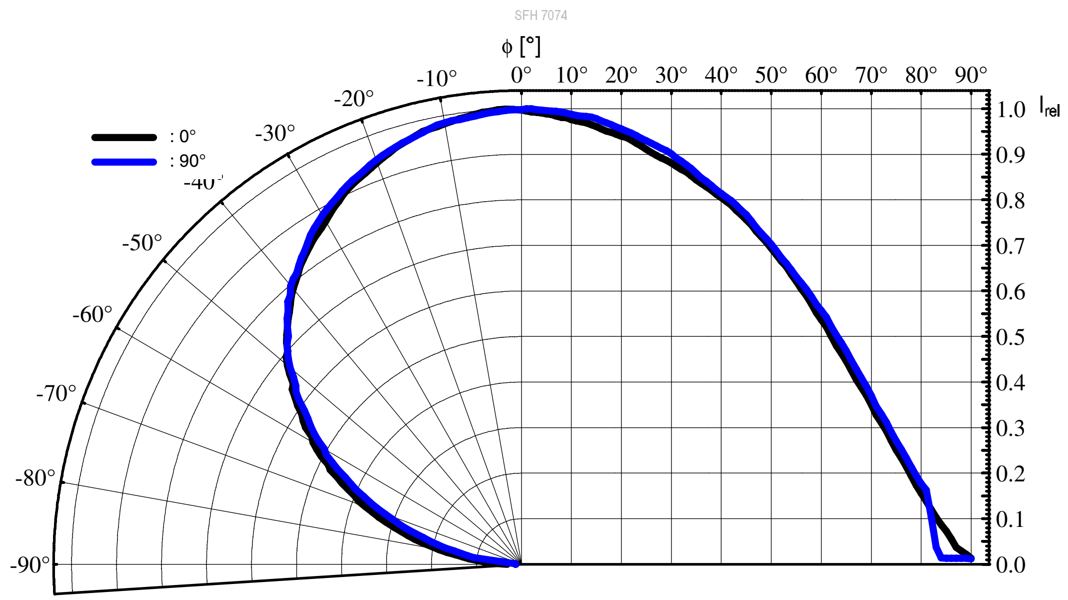
Relative Spectral Emission [1), 2)]

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



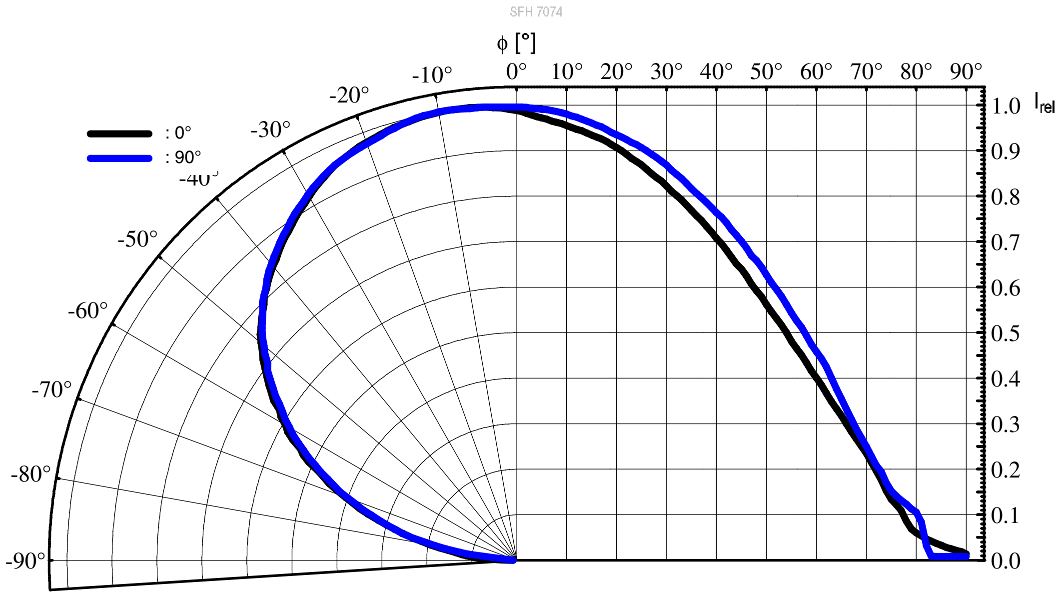
Radiation Characteristics [1), 2)]

- true green: $I_{e,rel} = f(\varphi)$; long axis (0°); short axis (90°)



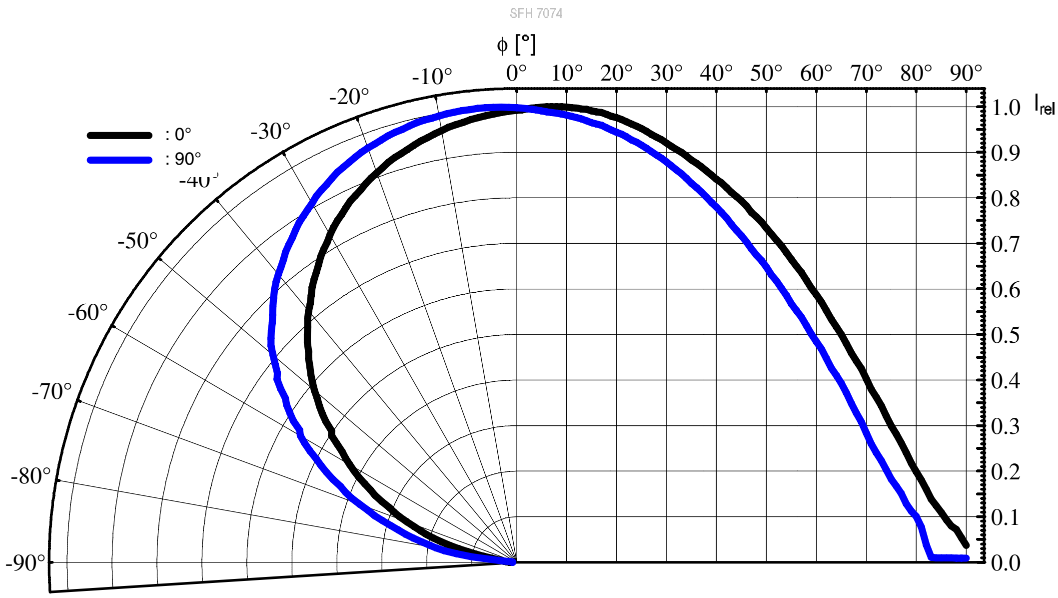
Radiation Characteristics [1), 2)]

- hyper red: $I_{e,rel}$ = f (φ); long axis (0°); short axis (90°)



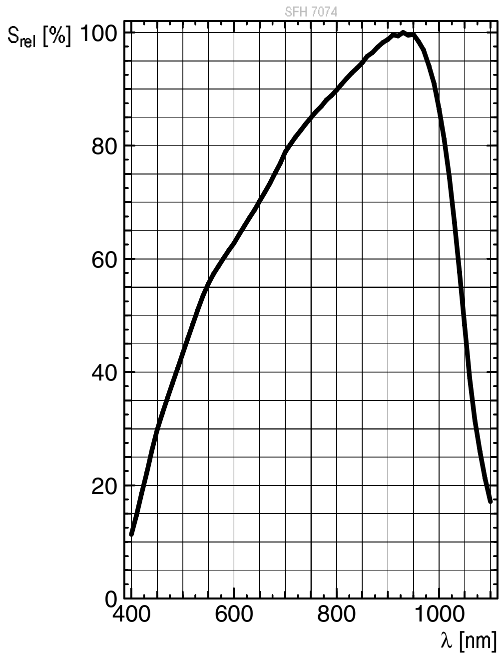
Radiation Characteristics [1), 2)]

- infrared (940 nm): $I_{e,rel}$ = f (φ); long axis (0°); short axis (90°)



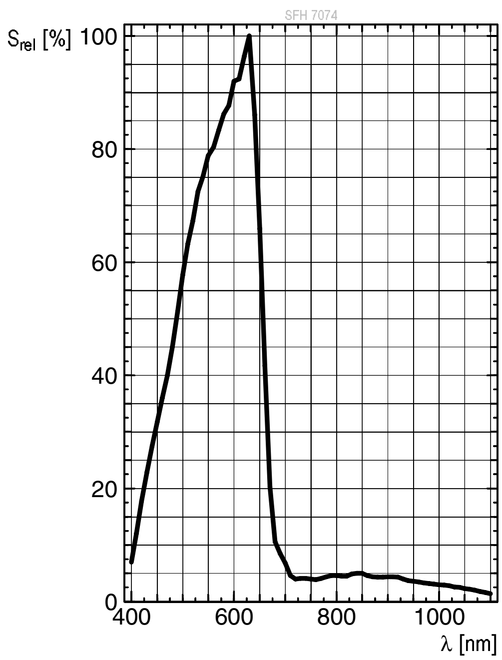
Relative Spectral Sensitivity [1), 2)]

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



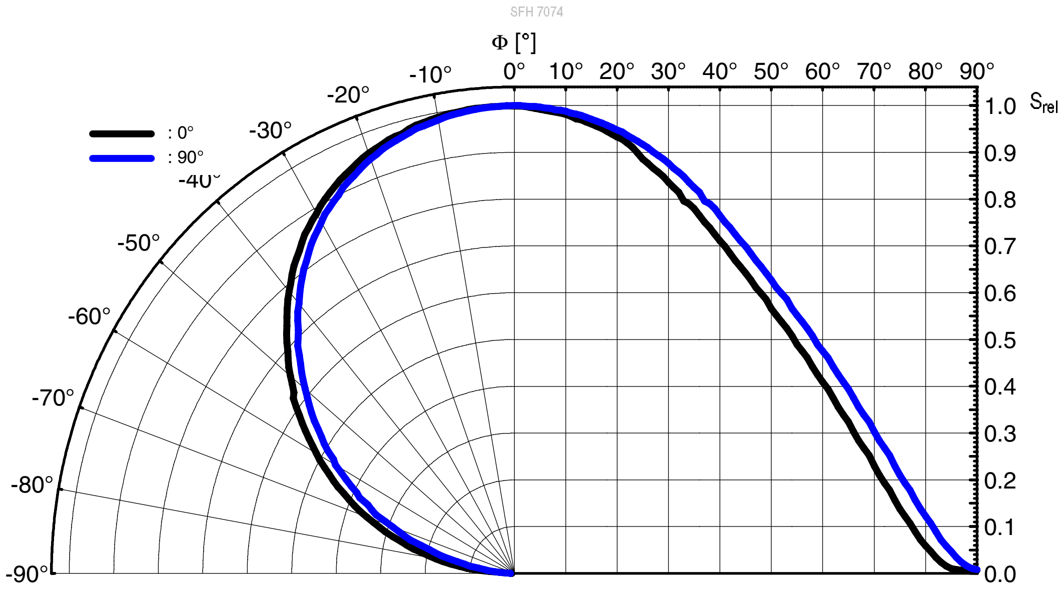
Relative Spectral Sensitivity [1), 2)]

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



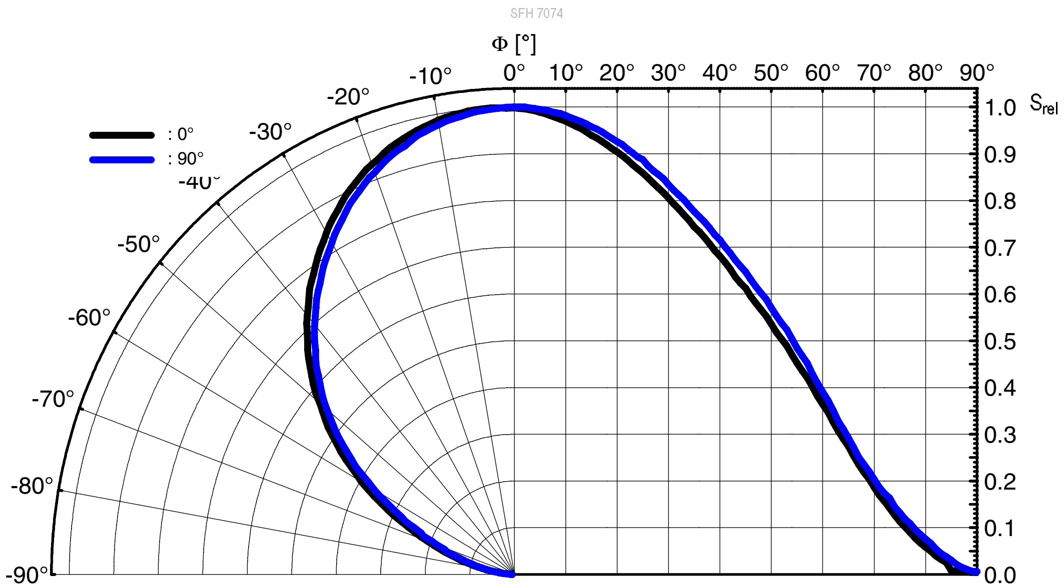
Directional Characteristics [1), 2)]

■ photodiode BB: S_{rel} = f (φ); long axis (0°); short axis (90°)



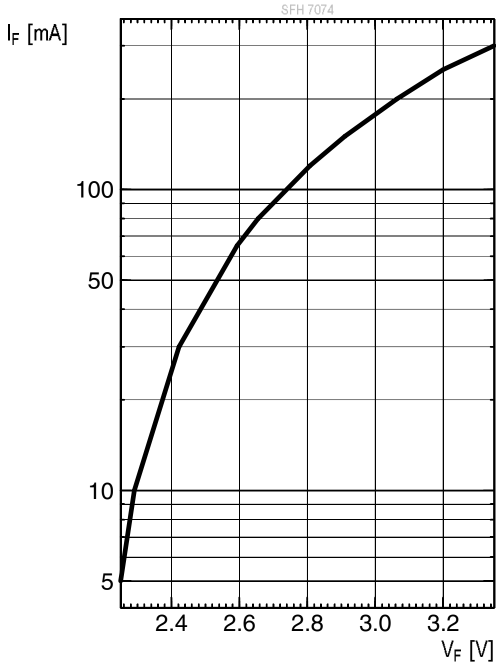
Directional Characteristics [1), 2)]

■ photodiode IR-Cut: S_{rel} = f (φ); long axis (0°); short axis (90°)



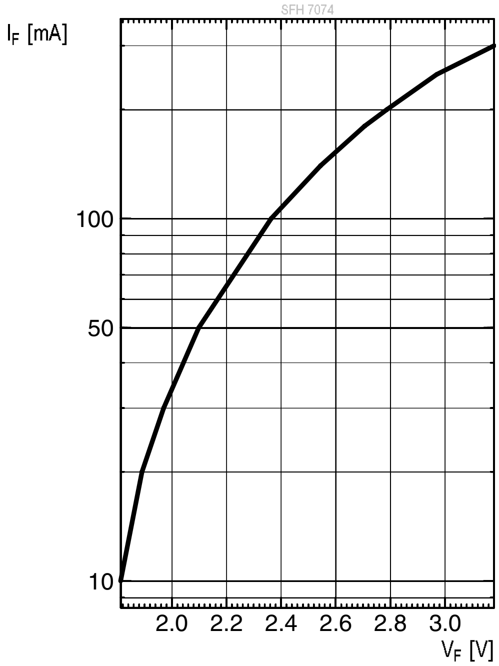
Forward current [1), 2)]

● true green: $I_F = f(V_F)$; single p.; t_p = 100 µs



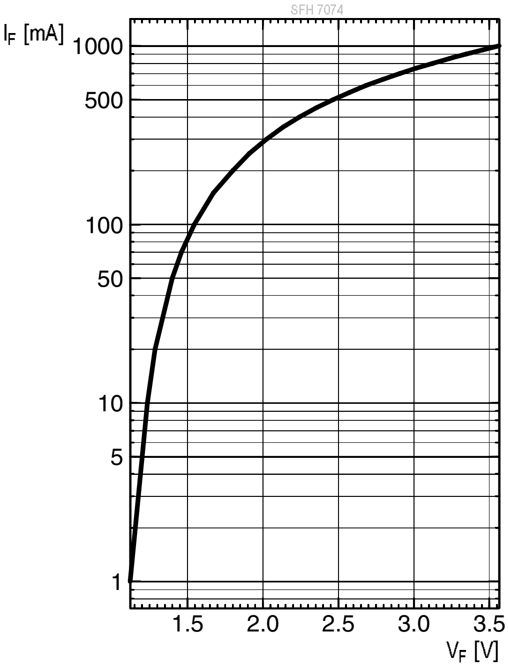
Forward current [1), 2)]

● hyper red: $I_F = f(V_F)$; single pulse; t_p = 100 µs



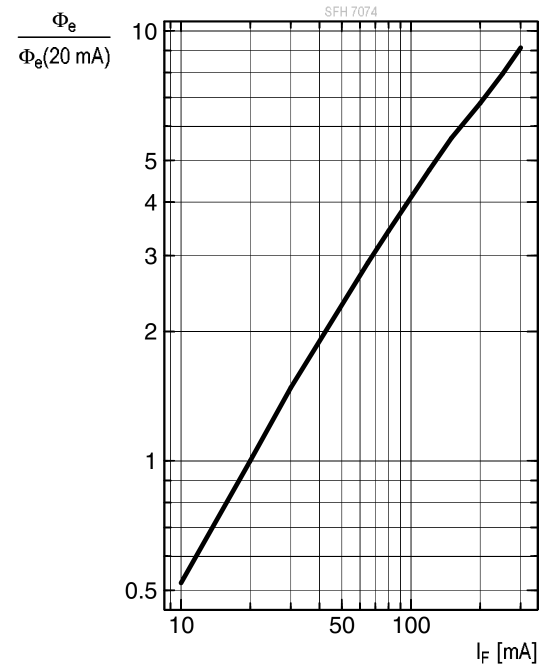
Forward current [1), 2)]

● infrared (940 nm): $I_F = f(V_F)$; single pulse; t_p = 100 µs



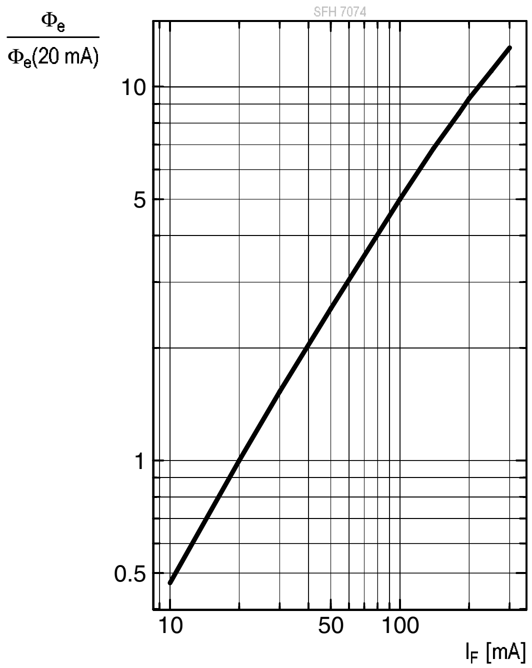
Relative Total Radiant Flux [1), 2)]

● true green: $\Phi_e/\Phi_e(20mA) = f(I_F)$; single p.; t_p = 100 µs



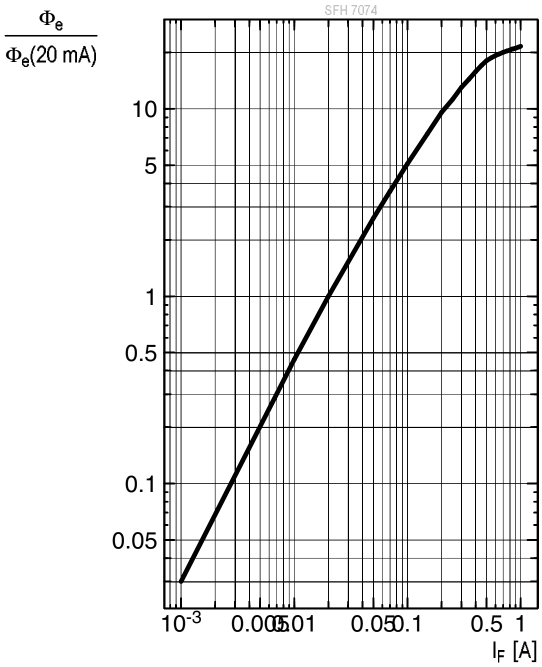
Relative Total Radiant Flux [1), 2)]

● hyper red: $\Phi_e/\Phi_e(20mA) = f(I_F)$; single pulse; t_p = 100 µs



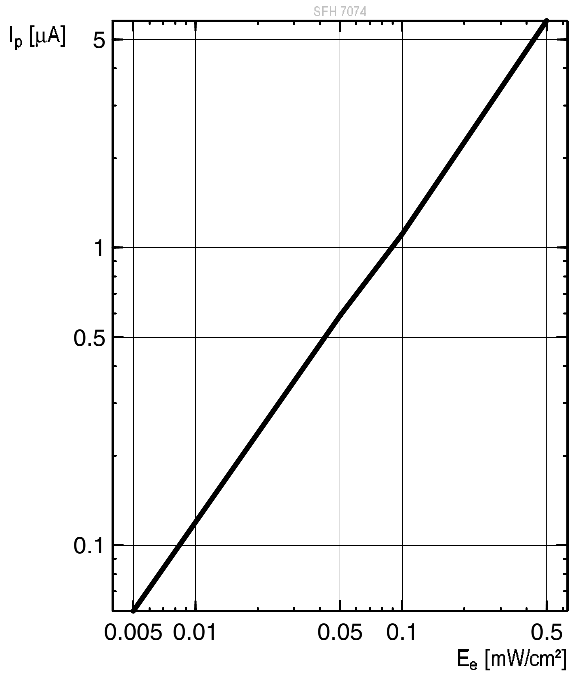
Relative Total Radiant Flux [1), 2)]

● infrared (940 nm): $\Phi_e/\Phi_e(20mA) = f(I_F)$; s. p.; t_p = 25 µs



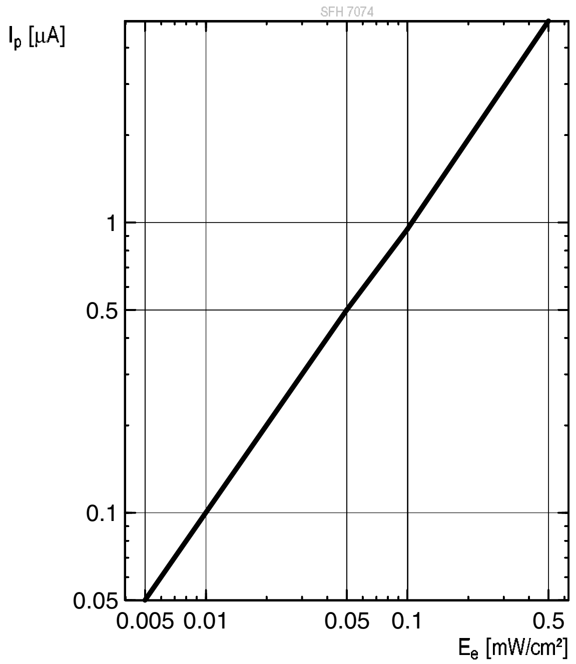
Photocurrent [1), 2)]

■ photodiode BB: $I_P = f(E_e)$; λ = 530 nm; V_R = 5 V



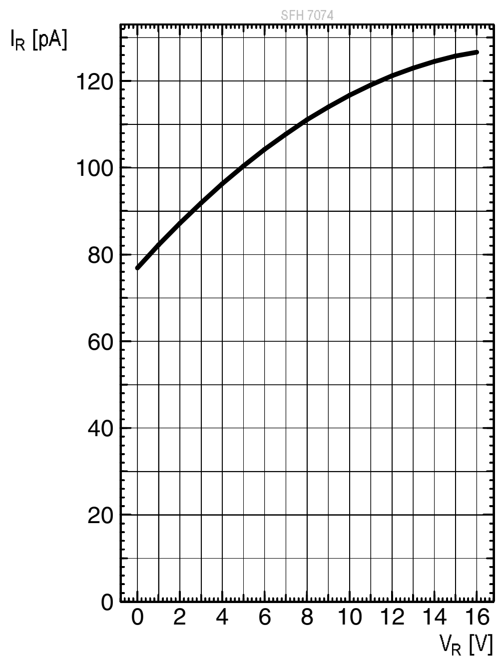
Photocurrent [1), 2)]

■ photodiode IR-Cut: $I_P = f(E_e)$; λ = 530 nm; VR = 5 V



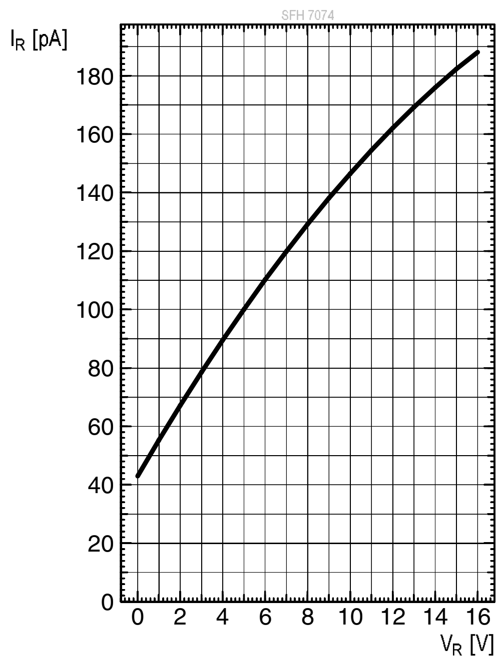
Dark Current [1), 2)]

■ photodiode BB: $I_R = f(V_R)$; E = 0



Dark Current [1), 2)]

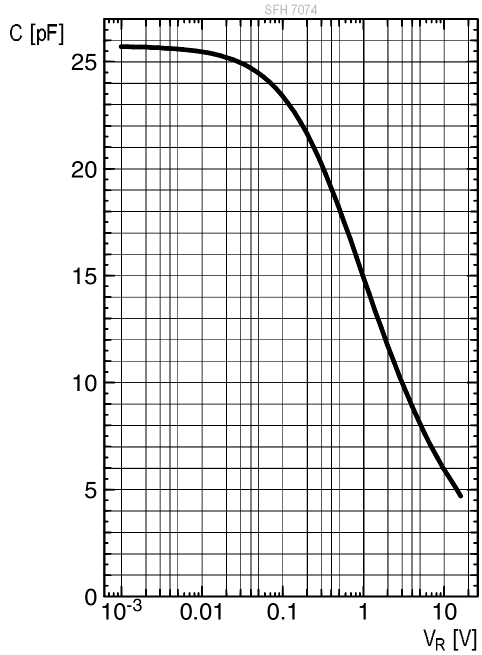
■ photodiode IR-Cut: $I_R = f(V_R)$; E = 0



OSRAM

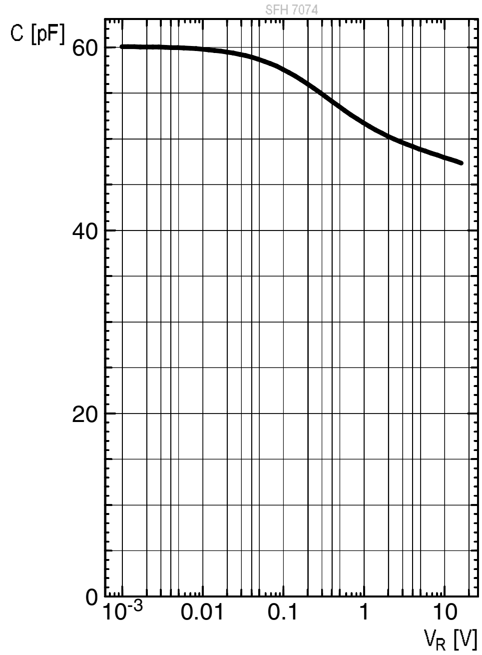
Capacitance [1), 2)]

■ photodiode BB: $C = f(V_R)$; f = 1MHz; E = 0



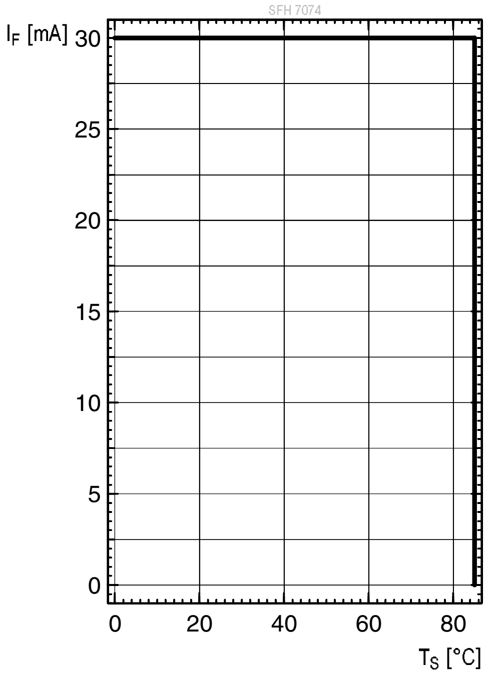
Capacitance [1), 2)]

■ photodiode IR-Cut: $C = f(V_R)$; f = 1MHz; E = 0



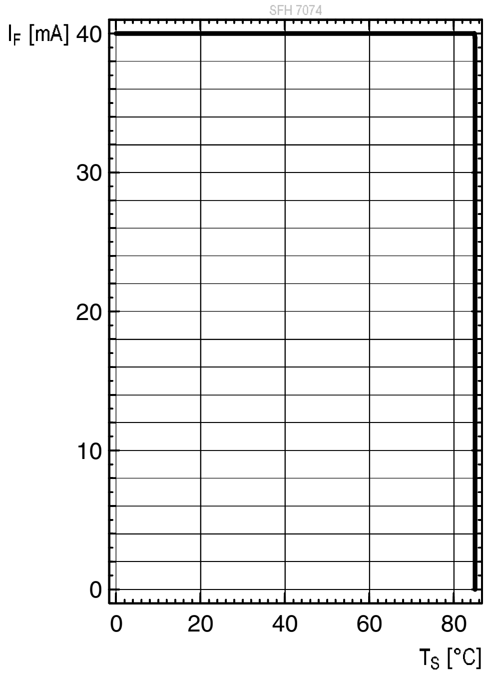
Max. Permissible Forward Current

● true green: $I_F = f(T_S)$; Rth_{js} = 180 K / W



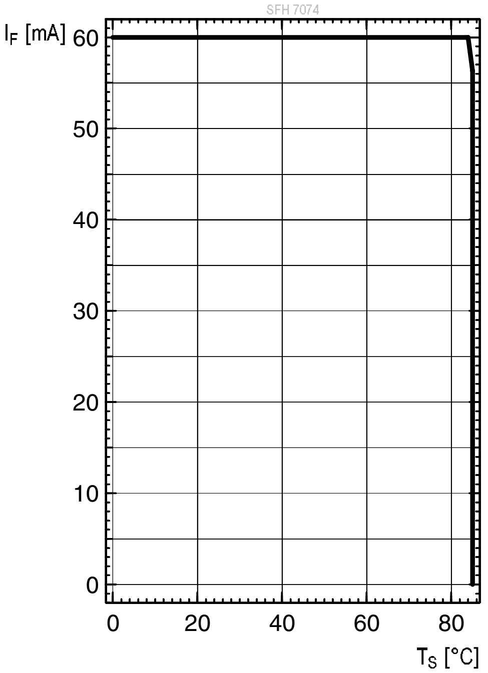
Max. Permissible Forward Current

● hyper red: $I_F = f(T_S)$; Rth_{js} = 265 K / W



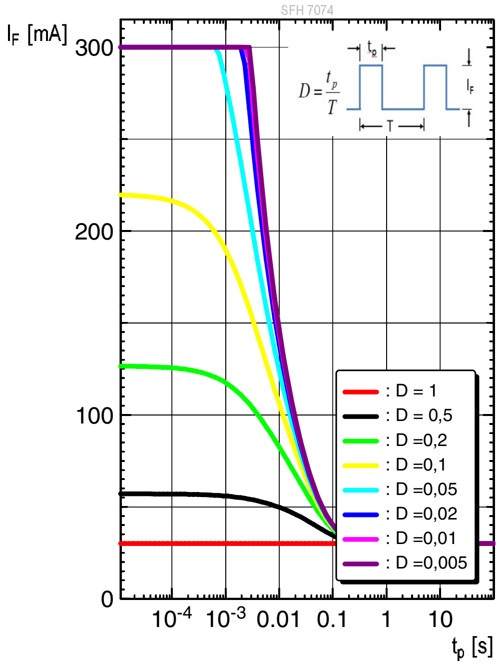
Max. Permissible Forward Current

- infrared (940 nm): $I_F = f(T_S)$; Rth_{js} = 180 K / W



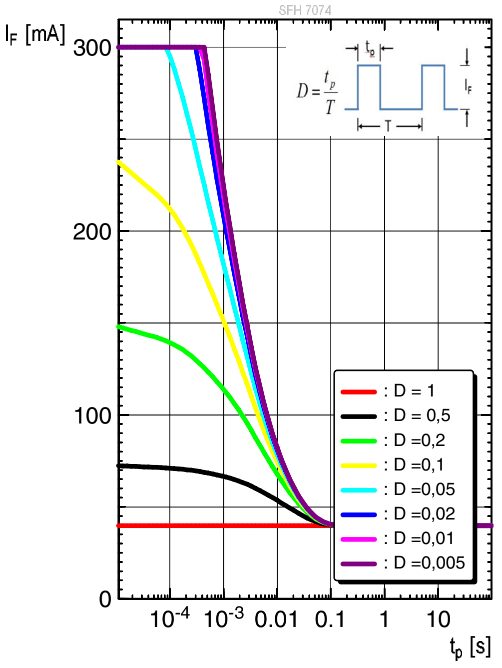
Permissible Pulse Handling Capability

- true green: $I_F = f(t_p)$; D = parameter; T_S = 85 °C



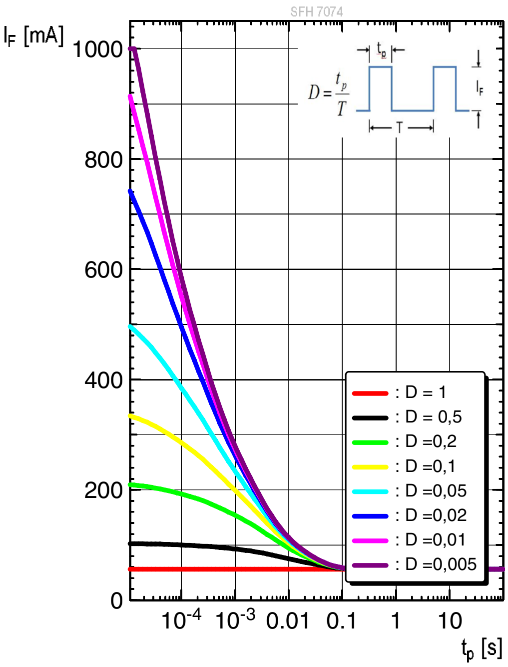
Permissible Pulse Handling Capability

- hyper red: $I_F = f(t_p)$; D = parameter; T_S = 85 °C

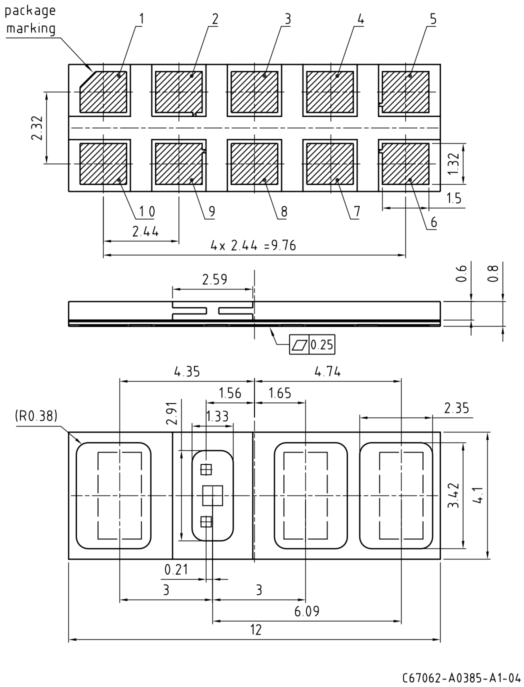


Permissible Pulse Handling Capability

- infrared (940 nm): $I_F = f(t_p)$; D = parameter; T_S = 85 °C



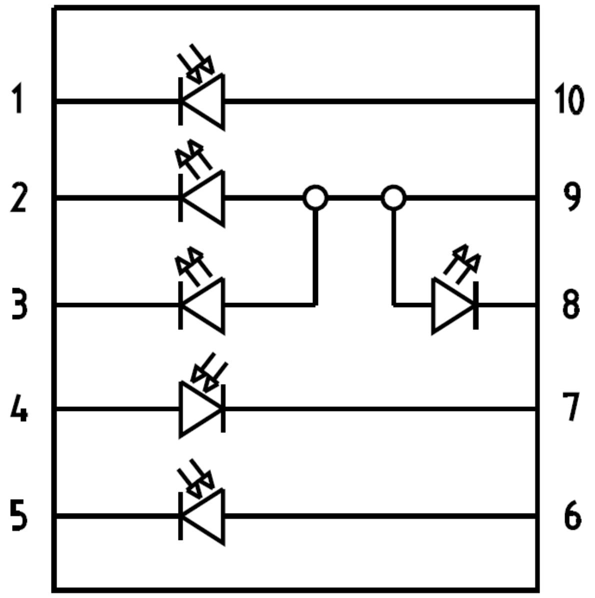
Dimensional Drawing [3]



Further Information:

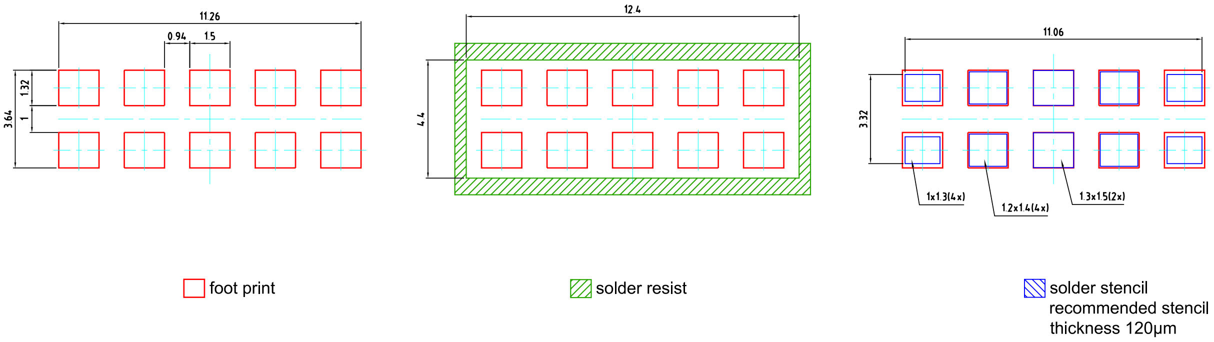
Approximate Weight: 68.0 mg

Electrical Internal Circuit

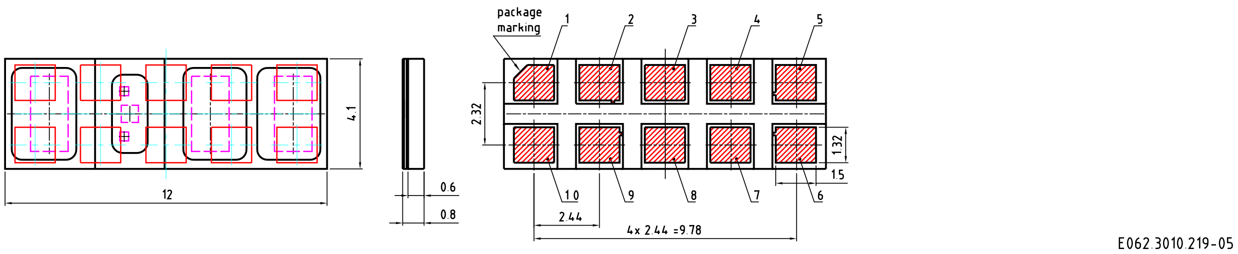


Pin	Description
1	PD1 Cathode
2	Green LED Cathode
3	Red LED Cathode
4	PD2 Anode
5	PD3 Cathode
6	PD3 Anode
7	PD2 Cathode
8	IR LED Cathode
9	Green/ Red/ IR Anode
10	PD1 Anode

Recommended Solder Pad [3)]

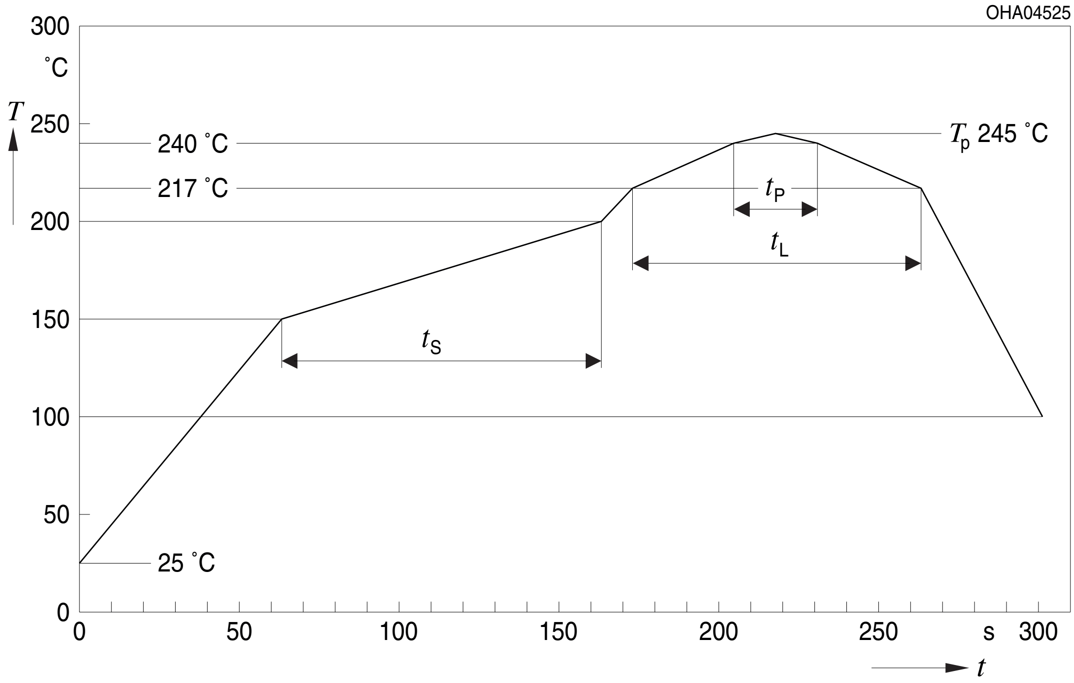


Component Location on Pad



Reflow Soldering Profile

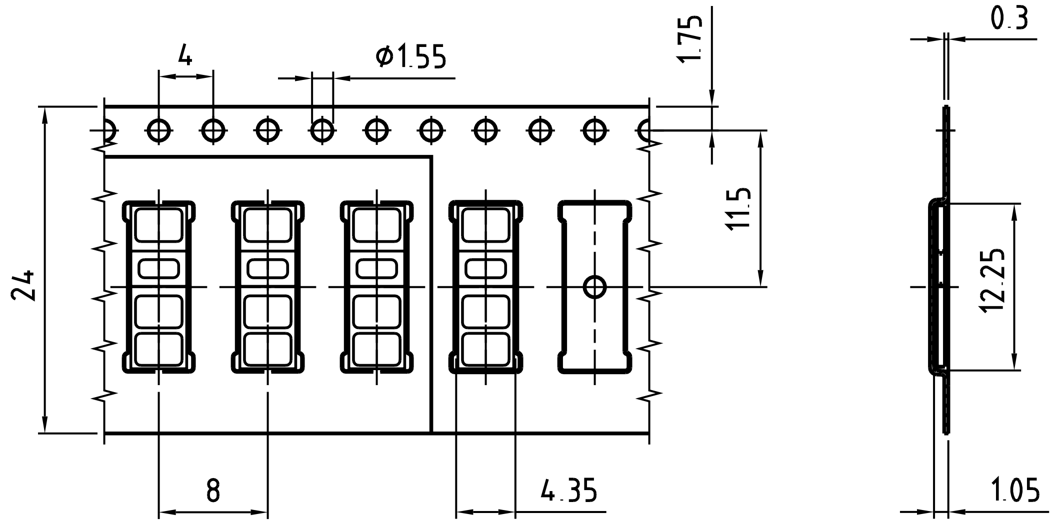
Product complies to MSL Level 4 acc. to JEDEC J-STD-020E



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		°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

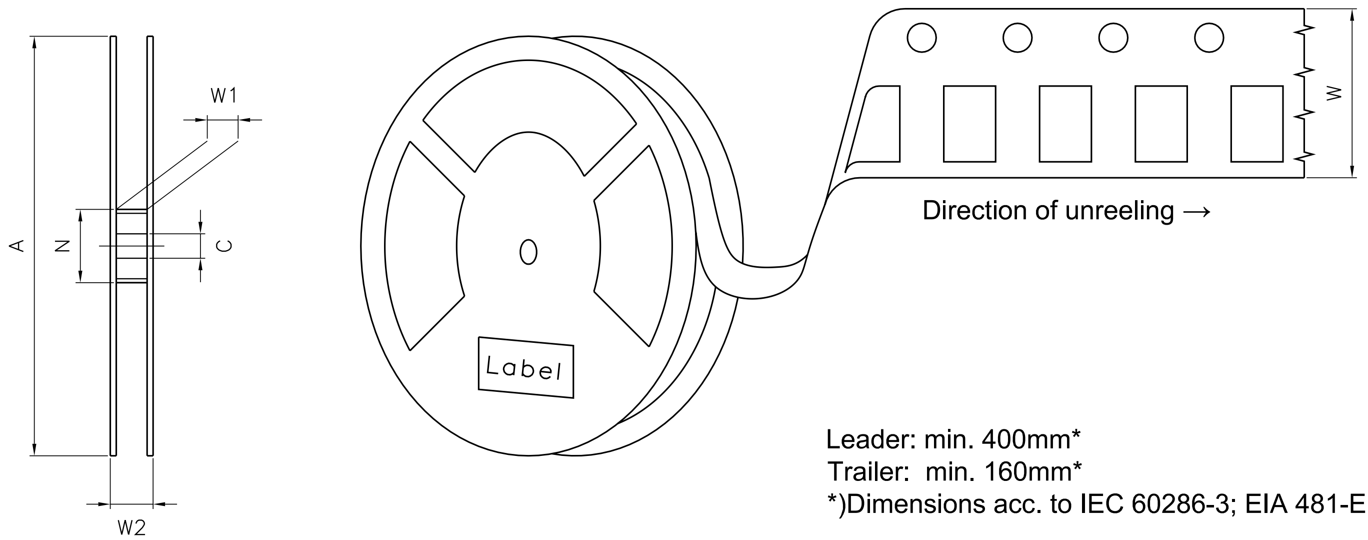
All temperatures refer to the center of the package, measured on the top of the component
* slope calculation DT/Dt: Dt max. 5 s; fulfillment for the whole T-range

Taping [3)]



C67062-A0385-B2-01

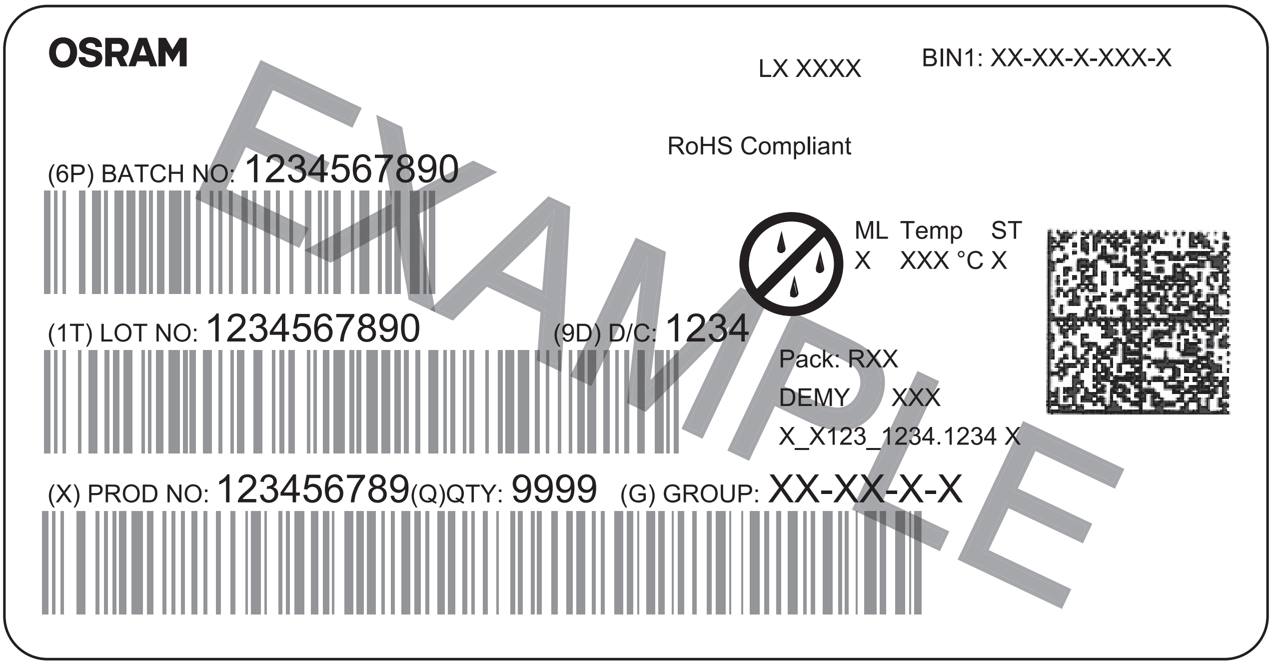
Tape and Reel [4)]



Reel Dimensions

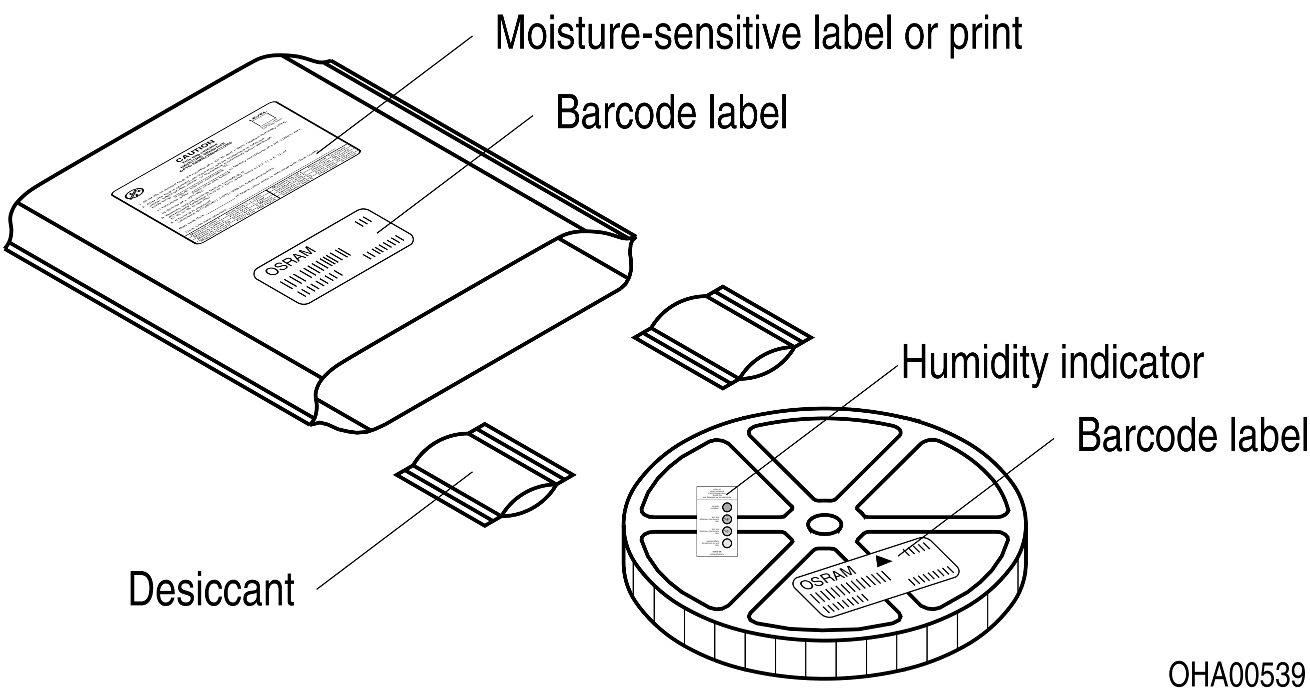
A	W	N_{min}	W_1	$W_{2\,max}$	Pieces per PU
180 mm	24 + 0.3 / - 0.1 mm	60/100 mm	24.4 + 2 mm	30.4 mm	1500

Barcode-Product-Label (BPL)



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°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 ±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 ±11 %.

Revision History

Version	Date	Change
1.1	2023-05-22	Product Image

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。

Published by ams-OSRAM AG
Tobelbader Strasse 30, 8141 Premstaetten, Austria
Phone +43 3136 500-0
ams-osram.com