

SFH 7070

BIOFY®

Biomonitoring Sensor



Applications

- Health Monitoring (Heart Rate Monitoring, Pulse Oximetry)

Features:

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

Ordering Information

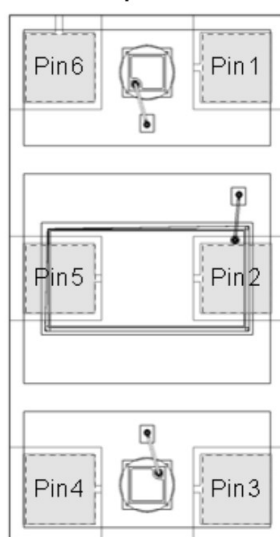
Type
SFH 7070

Ordering Code
Q65111A9887

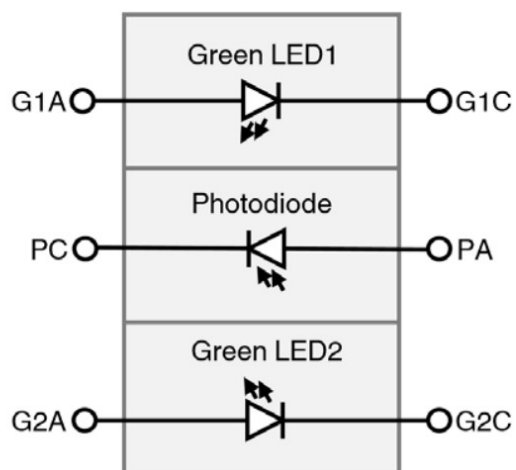
Pin configuration

Pin	Name	Function
1	Green 1	Green LED 1 Cathode
2	PD	Photodiode Anode
3	Green 2	Green LED 2 Cathode
4	Green 2	Green LED 2 Anode
5	PD	Photodiode Cathode
6	Green 1	Green LED 1 Anode

Top view



Block diagramm



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	V_R	max.	5 V
Forward current	$I_{F(DC)}$	max.	25 mA
Surge current $t_p = 10\text{ }\mu\text{s}$, $D = 0$	I_{FSM}	max.	300 mA

Photodiode

Reverse voltage	V_R	max.	16 V
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Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Green Emitter (single emitter)			
Peak wavelength $I_F = 20\text{ mA}$	λ_{peak}	typ.	526 nm
Centroid Wavelength $I_F = 20\text{ mA}$	$\lambda_{\text{centroid}}$	min.	520 nm
		typ.	530 nm
		max.	540 nm
Spectral bandwidth at 50% of I_{max} $I_F = 20\text{ mA}$	$\Delta\lambda$	typ.	32 nm
Half angle	φ	typ.	$\pm 60\text{ °}$
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.	56 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.	56 ns
Forward voltage $I_F = 20\text{ mA}$	V_F	typ.	3.0 V
		max.	3.4 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.	3.8 mW / sr
Total radiant flux $I_F = 20\text{ mA}, t_p = 20\text{ ms}$	Φ_e	typ.	11.7 mW
Temperature coefficient of brightness $I_F = 20\text{ mA}, t_p = 20\text{ ms}$	TC_I	typ.	-0.35 % / K
Temperature coefficient of wavelength $I_F = 20\text{ mA}, t_p = 20\text{ ms}$	TC_λ	typ.	0.03 nm / K
Temperature coefficient of voltage $I_F = 20\text{ mA}, t_p = 20\text{ ms}$	TC_V	typ.	-3.6 mV / K

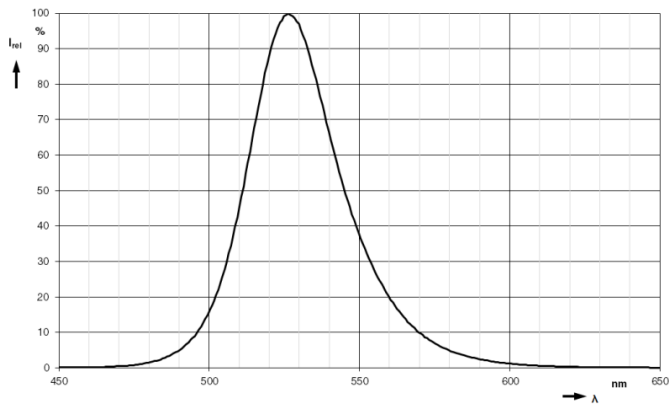
Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Photodiode			
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.	0.985 μA
Radiation sensitive area	A	typ.	3.46 mm ²
Dimensions of radiant sensitive area	L x W	typ.	1.29 x 2.69 mm x mm
Half angle	Φ	typ.	$\pm 57\text{ °}$
Dark current $V_R = 5\text{ V}$, $E_e = 0\text{ mW/cm}^2$	I_R	typ. max.	0.4 nA 5 nA
Spectral sensitivity of the chip $\lambda = 530\text{ nm}$	S_λ	typ.	0.31 A / W
Spectral sensitivity of the chip $\lambda \geq 690\text{ nm}$	S_{IR}	typ.	0.02 A / W
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.	0.984 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 $I_F = 10\text{ mA}$, $E = 0\text{ mW/cm}^2$	V_F	typ.	0.84 V
Capacitance $V_R = 5\text{ V}$, $f = 1\text{ MHz}$, $E = 0\text{ mW/cm}^2$	C_0	typ.	55 pF

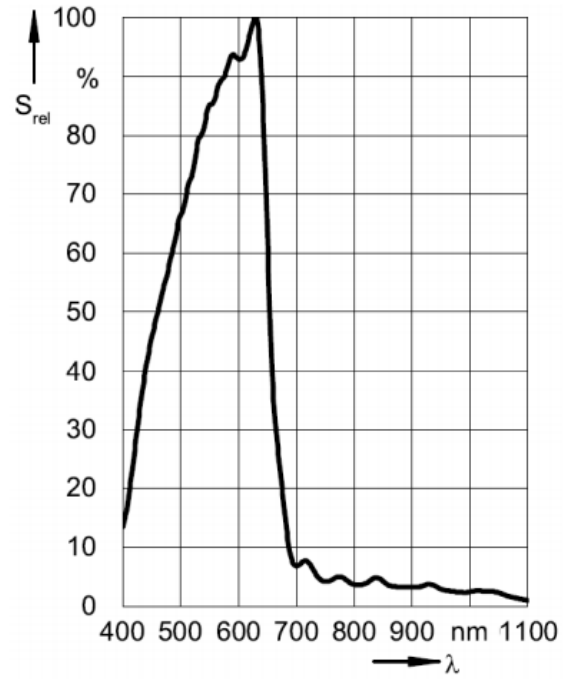
Relative Spectral Emission ^{1), 2)}

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



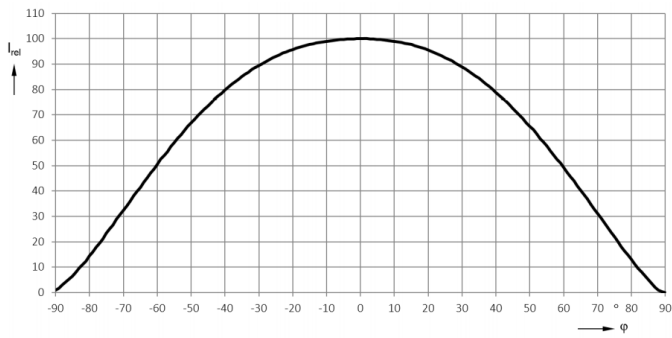
Relative Spectral Sensitivity ^{1), 2)}

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



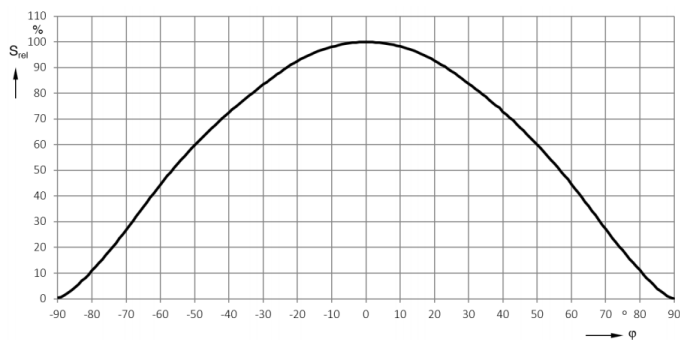
Radiation Characteristics ^{1), 2)}

- true green: $I_{e,rel} = f(\varphi)$



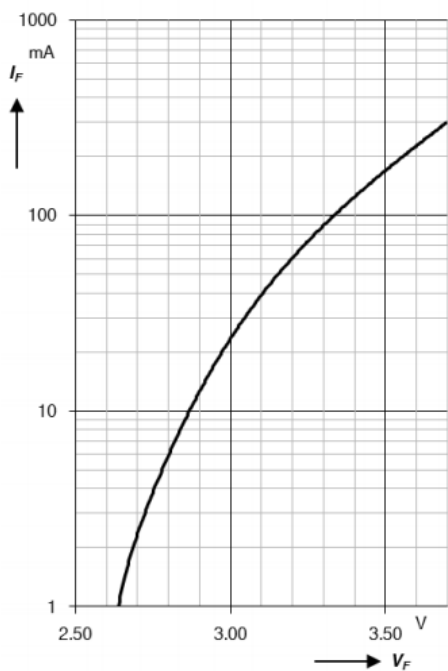
Directional Characteristics ^{1), 2)}

■ photodiode: $S_{rel} = f(\lambda)$; $\lambda = 530\text{nm}$



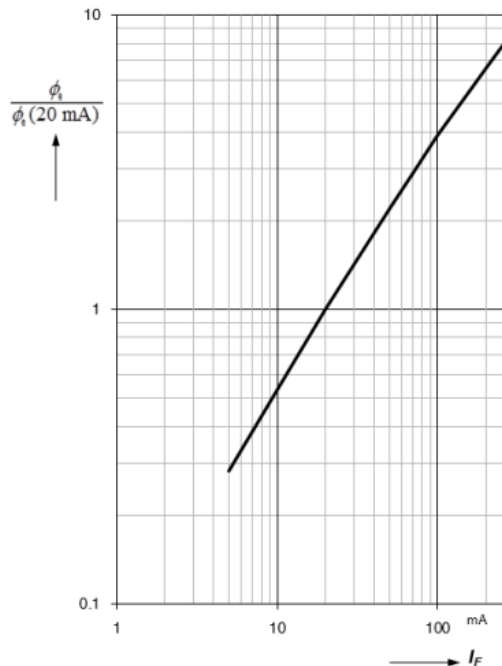
Forward current ^{1), 2)}

● true green: $I_F = f(V_F)$



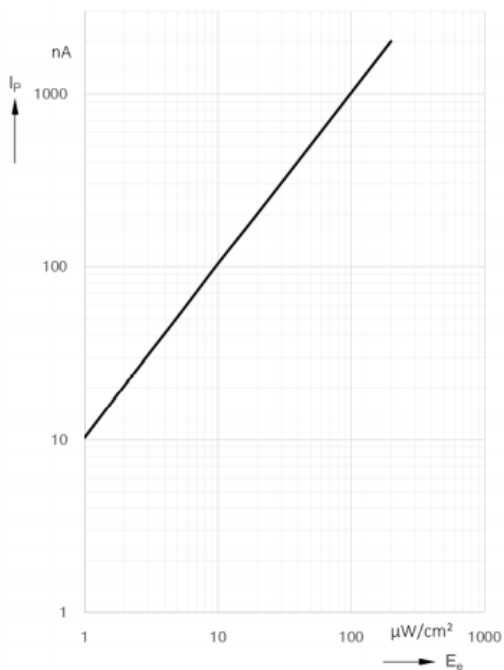
Relative Total Radiant Flux ^{1), 2)}

● true green: $\Phi_e/\Phi_e(20\text{mA}) = f(I_F)$, single pulse, $t_p = 25\mu\text{s}$



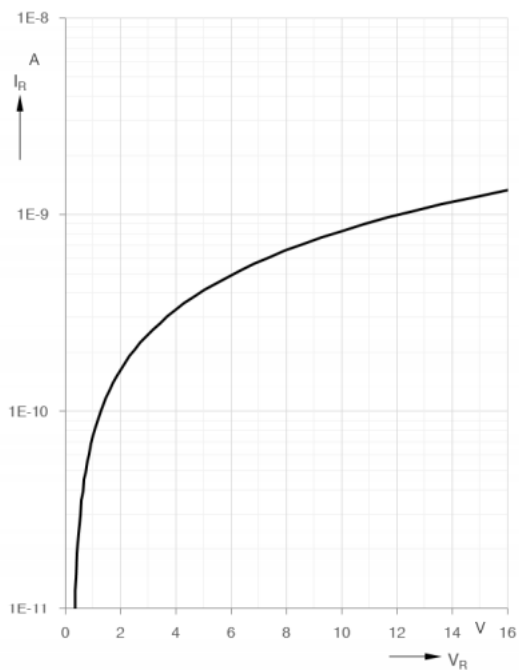
Photocurrent 1), 2)

■ photodiode: $I_p = f(E_e)$; $\lambda = 530 \text{ nm}$; $V_R = 5 \text{ V}$



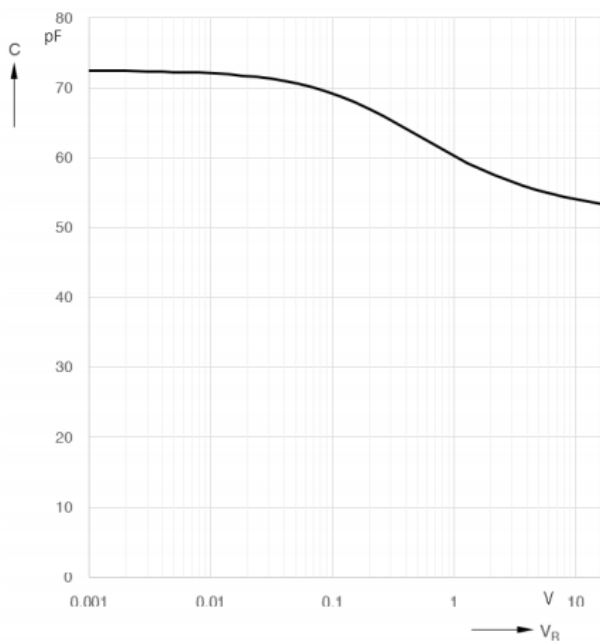
Dark Current 1), 2)

■ photodiode: $I_R = f(V_R)$



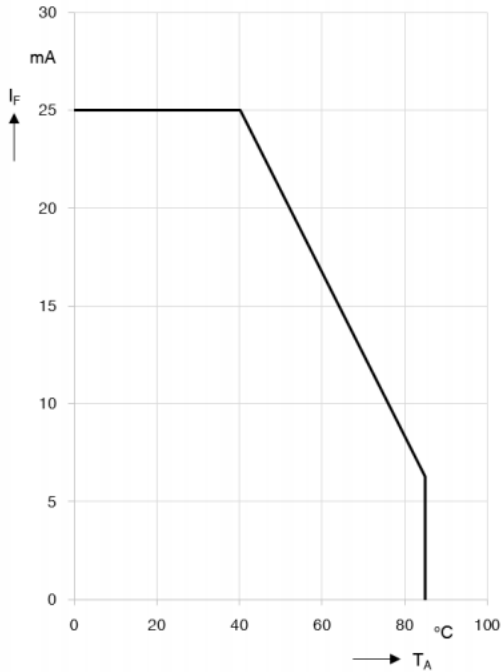
Capacitance 1), 2)

■ photodiode: $C = f(V_R)$; $f = 1 \text{ MHz}$



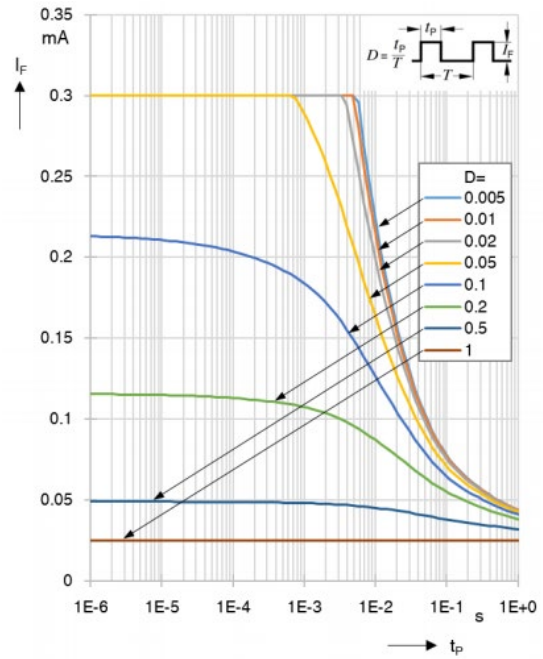
Max. Permissible Forward Current

- true green: $I_{F,max} = f(T_A)$, $R_{thJA} = 800 \text{ K/W}$



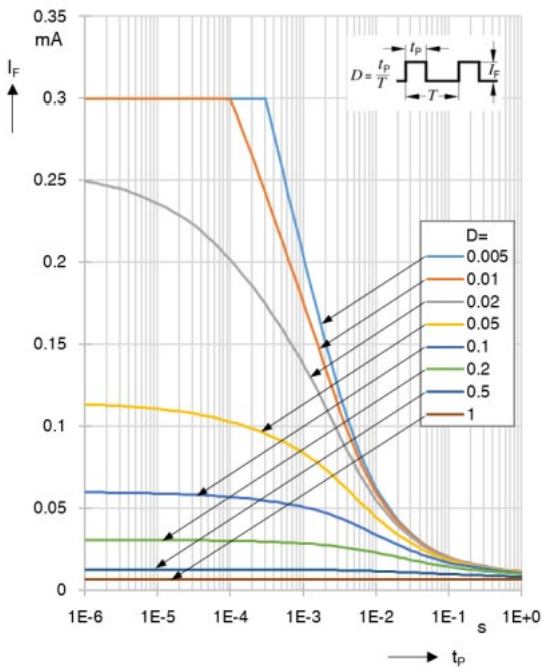
Permissible Pulse Handling Capability

- true green: $I_F = f(t_p)$; duty cycle D ; $T_A = 40^\circ\text{C}$

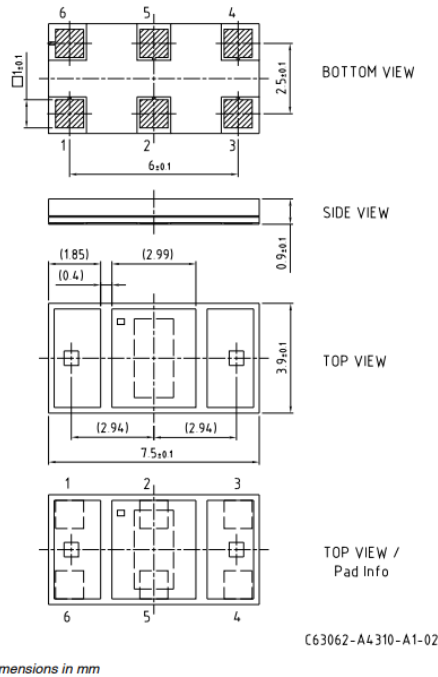


Permissible Pulse Handling Capability

- true green: $I_F = f(t_p)$; duty cycle D ; $T_A = 85^\circ\text{C}$



Dimensional Drawing ³⁾

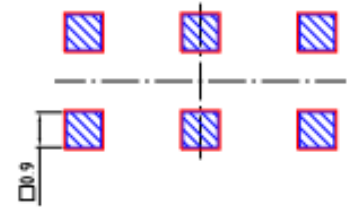
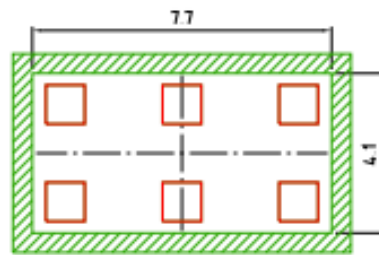
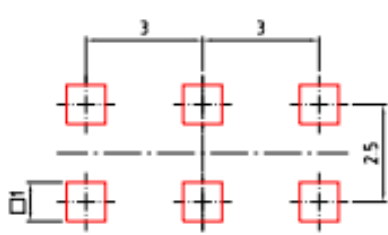


Further Information:

Approximate Weight: 44.0 mg

Pin	Description
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Recommended Solder Pad ³⁾

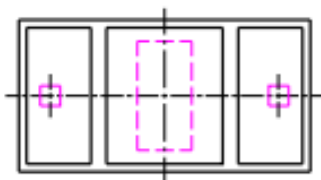


 Cu Solder pad

 solder resist

 solder stencil

Component Location on Pad

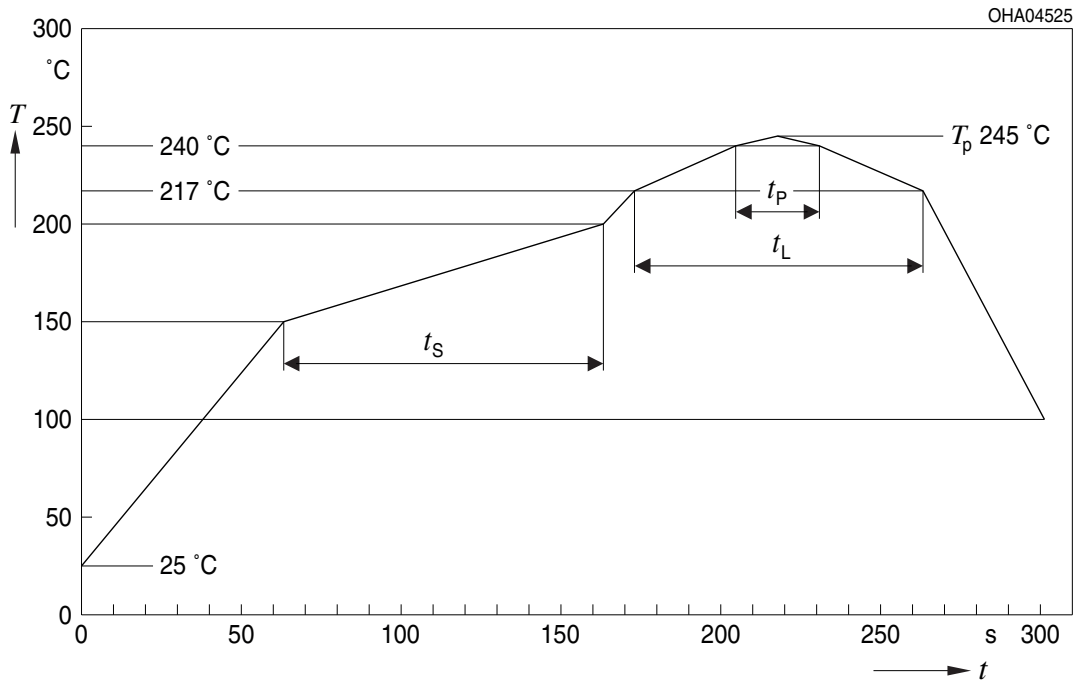


Dimensions in mm (inch).

E062.3010.204-02

Reflow Soldering Profile

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

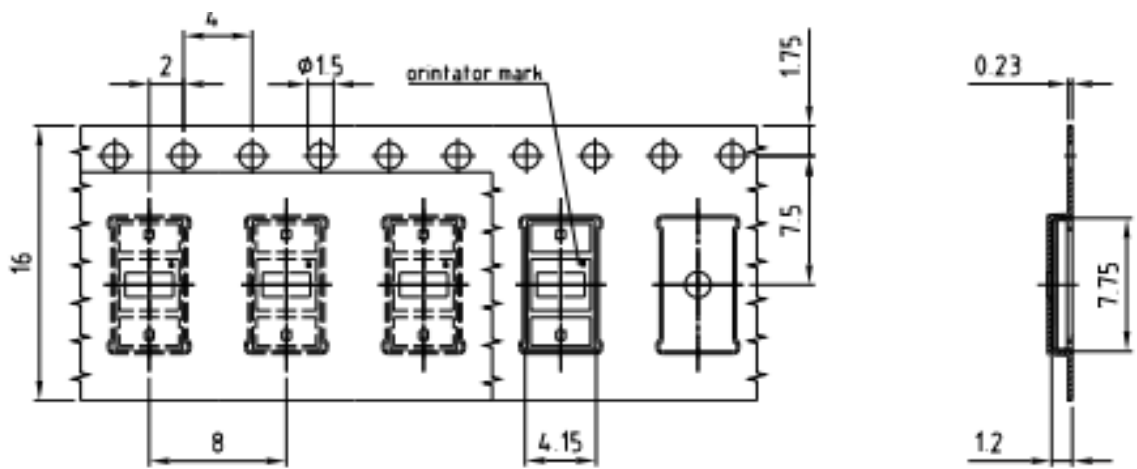


Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat ^{*)} 25 °C to 150 °C			2	3	K/s
Time t_s T_{Smin} to T_{Smax}	t_s	60	100	120	s
Ramp-up rate to peak ^{*)} T_{Smax} to T_p			2	3	K/s
Liquidus temperature	T_L		217		°C
Time above liquidus temperature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

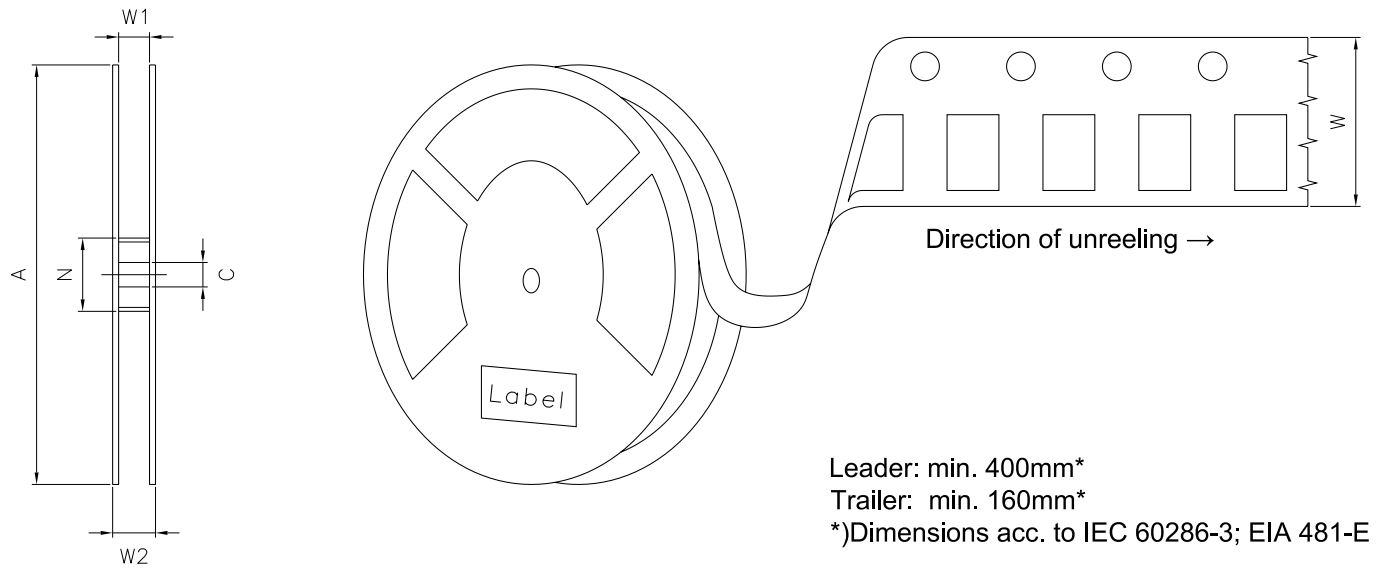
Taping ³⁾



C63062-A4 310-B2 -02

Dimensions in mm [inch].

Tape and Reel ⁴⁾



Reel Dimensions

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

Barcode-Product-Label (BPL)

OSRAM Opto Semiconductors LX XXXX BIN1: XX-XX-X-XXX-X

RoHS Compliant

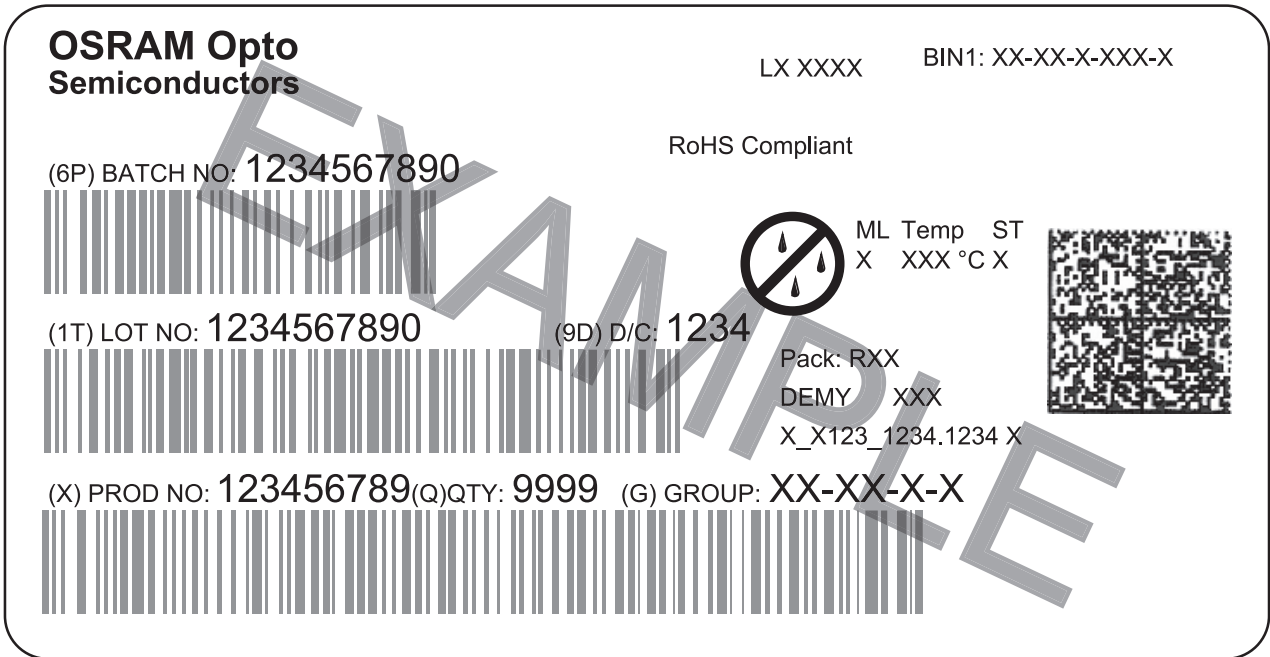
(6P) BATCH NO: 1234567890

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

(X) PROD NO: 123456789 (Q) QTY: 9999 (G) GROUP: XX-XX-X-X

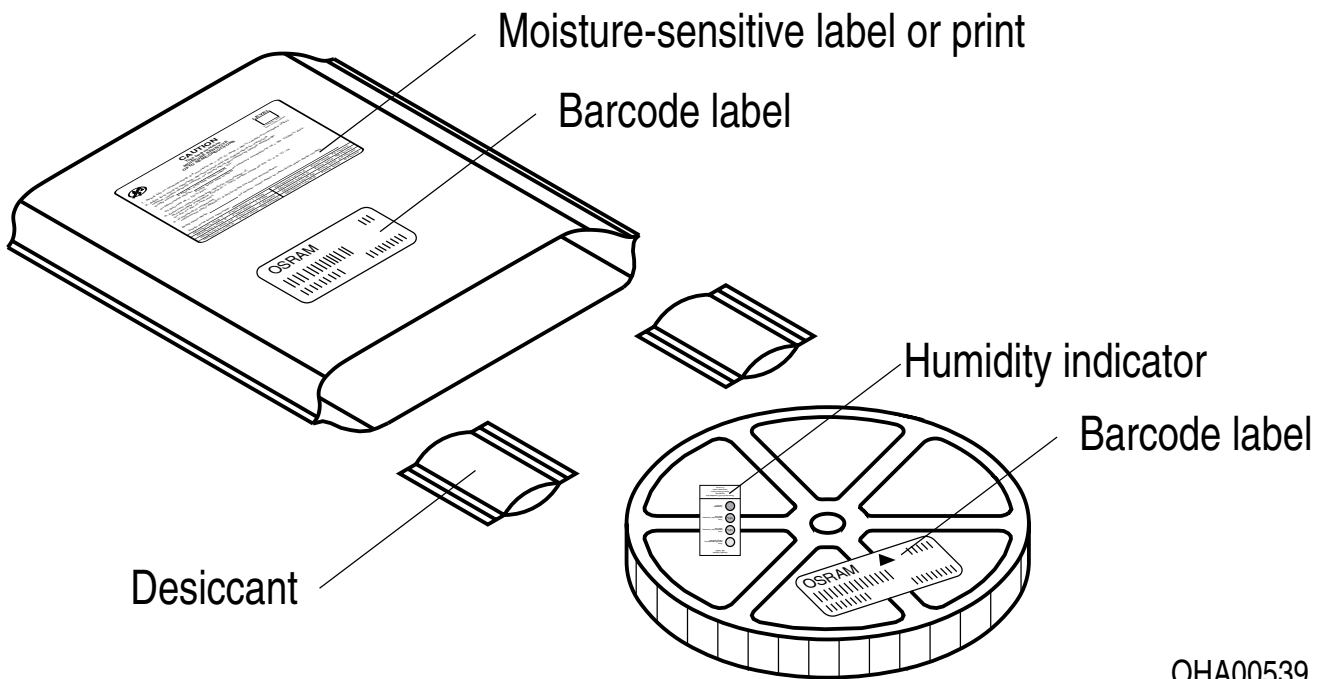
ML Temp ST
X XXX °C X

Pack: RXX
DEMY XXX
X_X123_1234.1234 X



OHA04563

Dry Packing Process and Materials ³⁾



OHA00539

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) **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:** TA = 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.

Revision History

Version	Date	Change
1.2	2021-04-27	New Layout

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