

# SFH 313 FA

## Radial T1 3/4

Silicon NPN Phototransistor



### Applications

- Electronic Equipment
- Highbay Industrial
- Industrial Automation (Machine Controls, Light Barriers, Vision Controls)
- White Goods

### Features:

- Package: black epoxy
- ESD: 2 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)
- 5 mm plastic package
- High photosensitivity
- Especially suitable for applications from 740 nm to 1080 nm
- Spectral range of sensitivity: (typ) 740 ... 1080 nm

### Ordering Information

Type	Photocurrent $V_{CE} = 5 \text{ V}; \lambda = 950 \text{ nm}; E_e = 0.5 \text{ mW/cm}^2$ $I_{PCE}$	Ordering Code
SFH 313 FA	2500 ... 20000 $\mu\text{A}$	Q62702P1674
SFH 313 FA-2/3	4000 ... 12500 $\mu\text{A}$	Q62702P3597
SFH 313 FA-3/4	6300 ... 20000 $\mu\text{A}$	Q62702P5196

## Maximum Ratings

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Operating temperature	$T_{op}$	min. max.	-40 °C 100 °C
Storage temperature	$T_{stg}$	min. max.	-40 °C 100 °C
Collector-emitter voltage	$V_{CE}$	max.	70 V
Collector current	$I_C$	max.	50 mA
Collector surge current $\tau \leq 10\ \mu\text{s}$	$I_{CS}$	max.	100 mA
Emitter-collector voltage	$V_{EC}$	max.	7 V
Total power dissipation	$P_{tot}$	max.	200 mW
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 2)	$V_{ESD}$	max.	2 kV

## Characteristics

$T_A = 25\text{ °C}$

Parameter	Symbol		Values
Wavelength of max sensitivity	$\lambda_{S\text{ max}}$	typ.	870 nm
Spectral range of sensitivity	$\lambda_{10\%}$	typ.	740 ... 1080 nm
Chip dimensions	L x W	typ.	1 x 1 mm x mm
Radiant sensitive area	A	typ.	0.55 mm <sup>2</sup>
Half angle	$\varphi$	typ.	10 °
Dark current	$I_{CE0}$	typ.	3 nA
$V_{CE} = 20\text{ V}; E = 0$		max.	200 nA
Rise time	$t_r$	typ.	13 $\mu\text{s}$
$I_C = 1\text{ mA}; V_{CC} = 5\text{ V}; R_L = 1\text{ k}\Omega$			
Fall time	$t_f$	typ.	13 $\mu\text{s}$
$I_C = 1\text{ mA}; V_{CC} = 5\text{ V}; R_L = 1\text{ k}\Omega$			
Collector-emitter saturation voltage <sup>1)</sup>	$V_{CEsat}$	typ.	150 mV
$I_C = I_{PCE,min} \times 0.3; E_e = 0.5\text{ mW/cm}^2$			
Capacitance	$C_{CE}$	typ.	10 pF
$V_{CE} = 5\text{ V}; f = 1\text{ MHz}; E = 0$			
Thermal resistance junction ambient real	$R_{thJA}$	max.	380 K / W

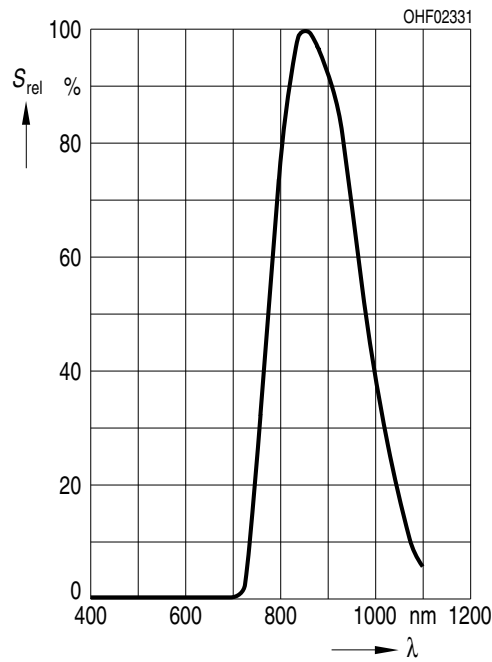
## Grouping

$T_A = 25\text{ °C}$

Group	Photocurrent	Photocurrent
	$V_{CE} = 5\text{ V}; \lambda = 950\text{ nm}; E_e = 0.5\text{ mW/cm}^2$ min. $I_{PCE}$	$V_{CE} = 5\text{ V}; \lambda = 950\text{ nm}; E_e = 0.5\text{ mW/cm}^2$ max. $I_{PCE}$
1	2500 $\mu\text{A}$	5000 $\mu\text{A}$
2	4000 $\mu\text{A}$	8000 $\mu\text{A}$
3	6300 $\mu\text{A}$	12500 $\mu\text{A}$
4	10000 $\mu\text{A}$	20000 $\mu\text{A}$

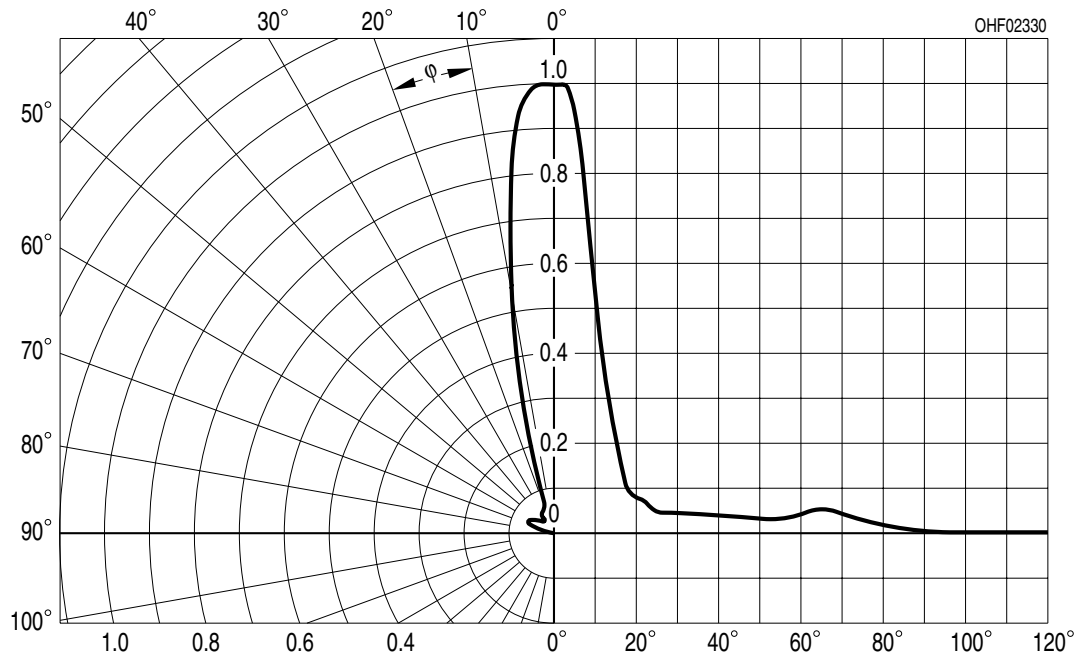
## Relative Spectral Sensitivity <sup>2), 3)</sup>

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



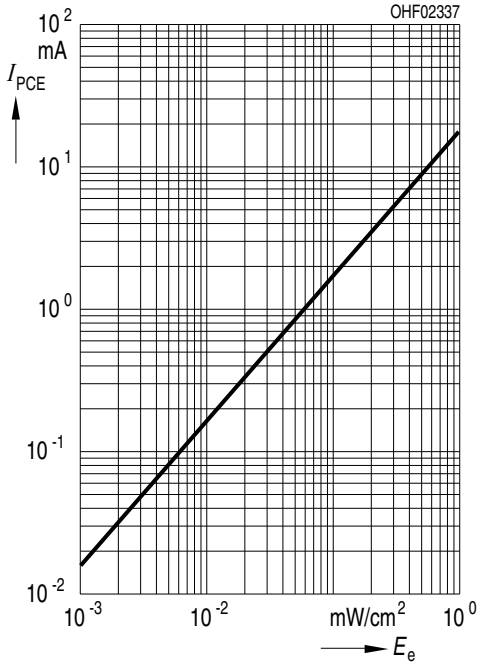
## Directional Characteristics <sup>2), 3)</sup>

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



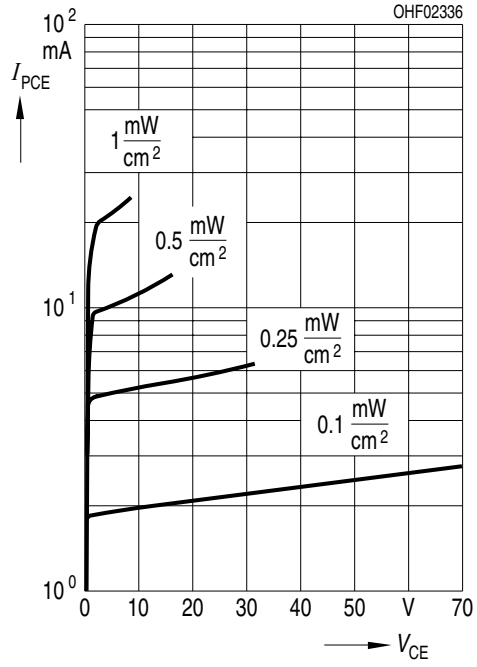
**Photocurrent** 2), 3)

$I_{PCE} = f(E_e); V_{CE} = 5\text{ V}$



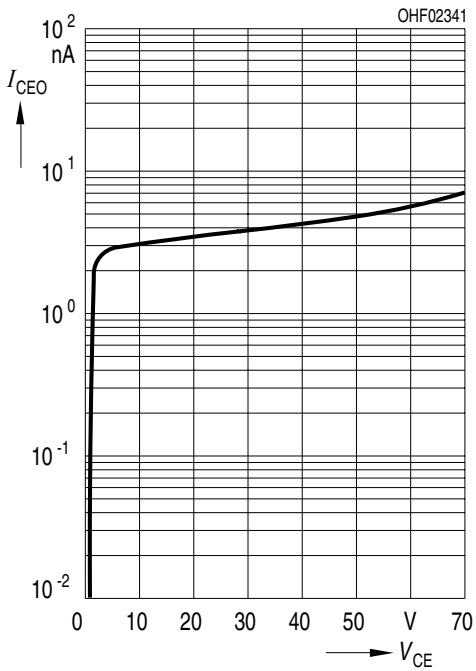
**Photocurrent** 2), 3)

$I_{PCE} = f(V_{CE}), E_e = \text{Parameter}$



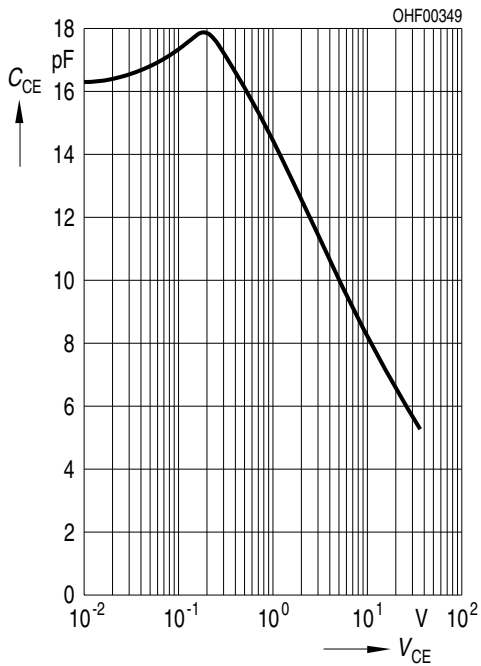
**Dark Current** 2), 3)

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



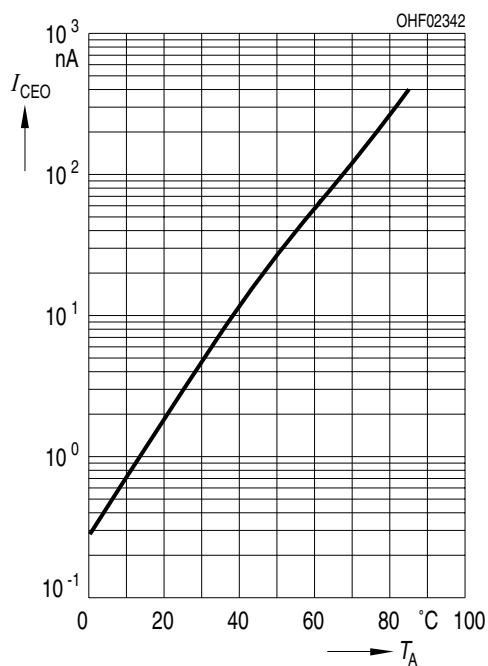
### Collector-Emitter Capacitance <sup>2), 3)</sup>

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



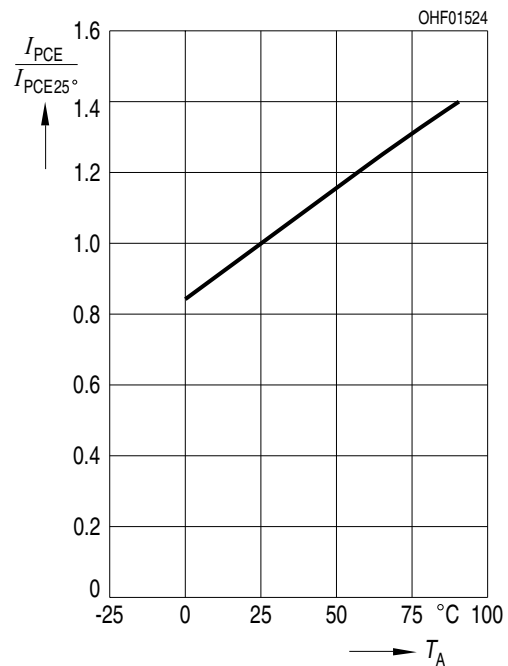
### Dark Current <sup>2)</sup>

$$I_{CEO} = f(T_A); E = 0$$



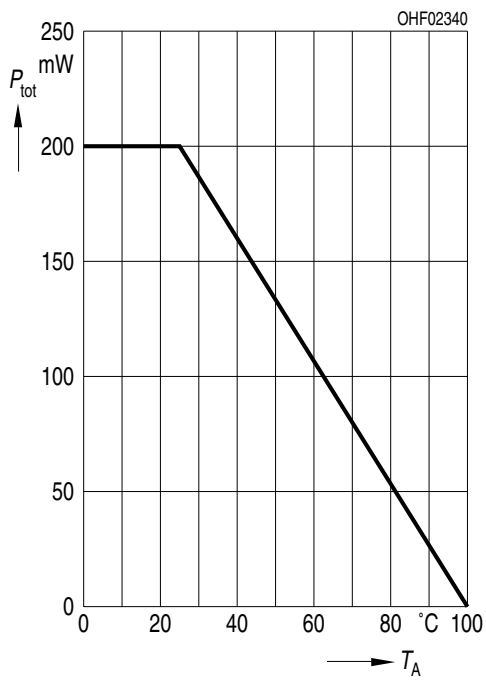
### Photocurrent <sup>2)</sup>

$$I_{PCE,rel} = f(T_A); V_{CE} = 5 \text{ V}$$

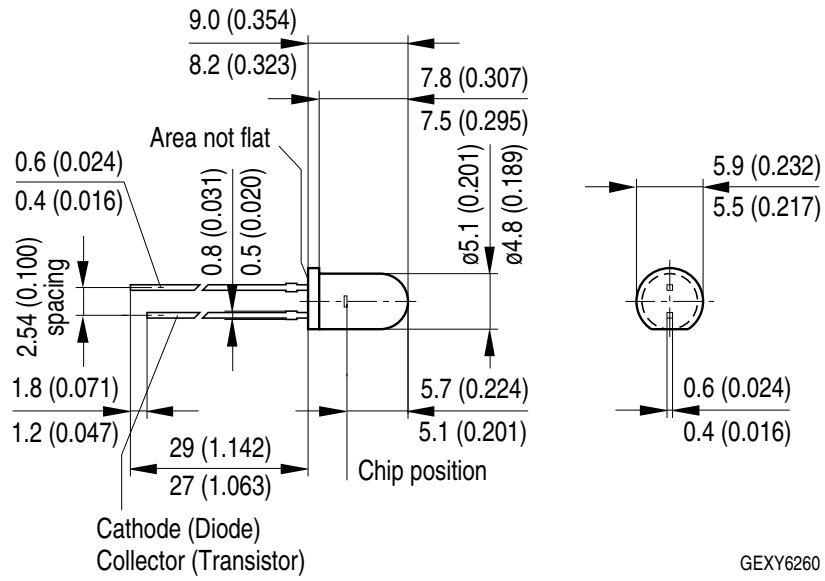


## Power Consumption

$$P_{\text{tot}} = f(T_A)$$



Dimensional Drawing <sup>4)</sup>

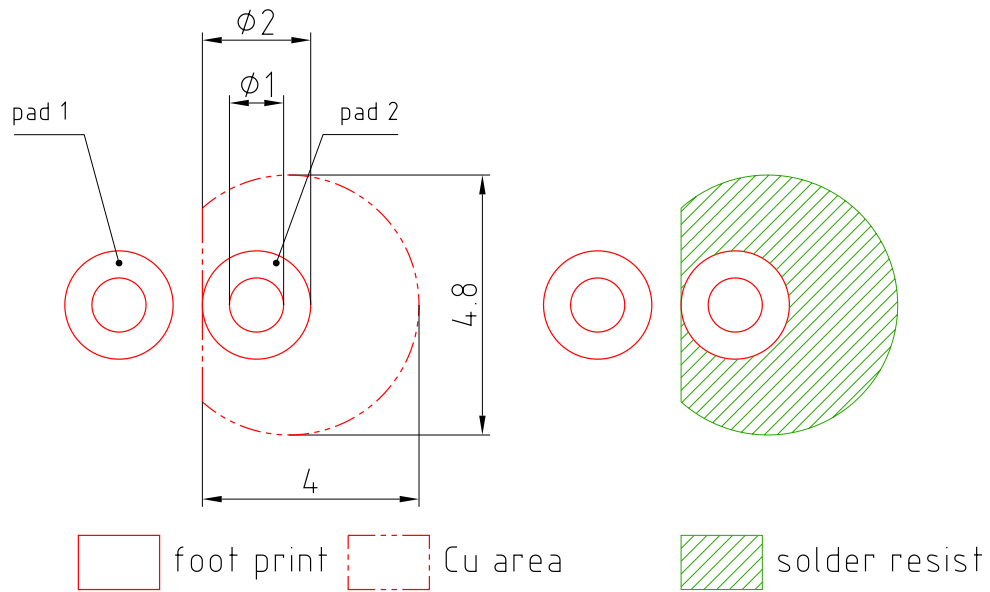


Approximate Weight: 353.0 mg

Package marking: Collector



## Recommended Solder Pad <sup>4)</sup>

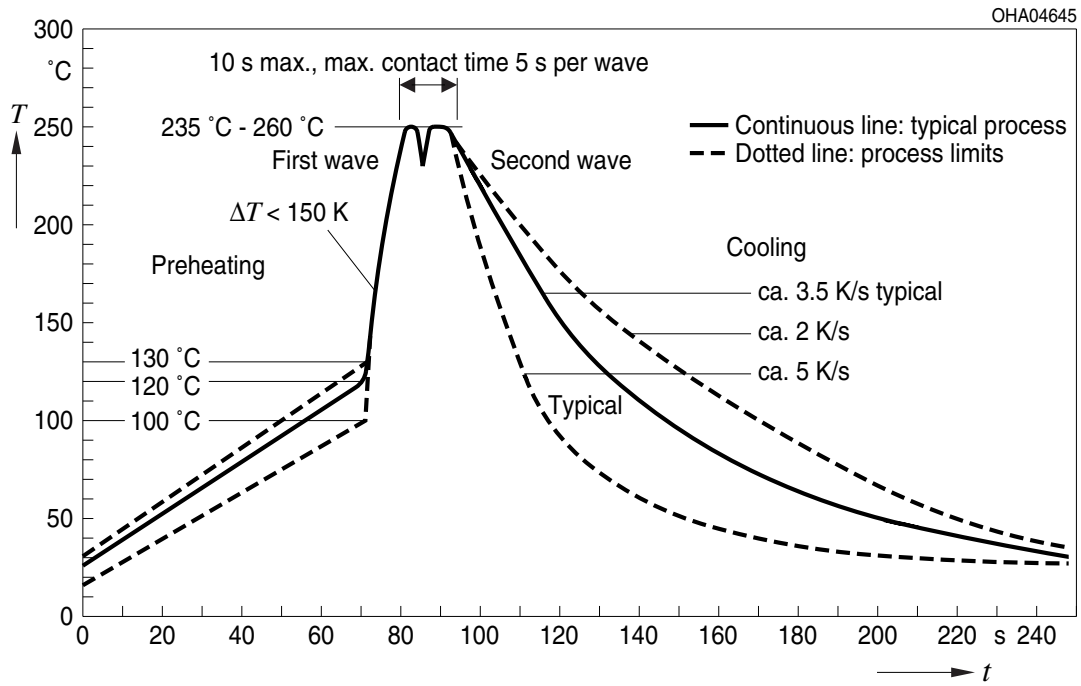


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Pad 1: emitter

## TTW Soldering

IEC-61760-1 TTW



## 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.

Packing information is available on the internet (online product catalog).

For further application related informations please visit [www.osram-os.com/appnotes](http://www.osram-os.com/appnotes)

## Disclaimer

### 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. 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 in 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 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.

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) **IPCEmin:**  $I_{PCEmin}$  is the min. photocurrent of the specified group.
- 2) **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.
- 3) **Testing temperature:**  $T_A = 25^\circ\text{C}$
- 4) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimensions are specified in mm.

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