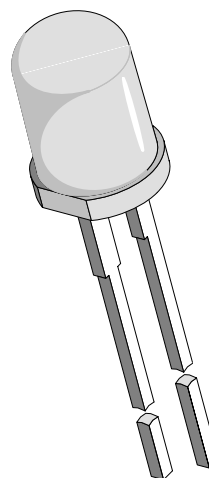


Silicon NPN Phototransistor

Description

BPW96 is a high speed and high sensitive silicon NPN epitaxial planar phototransistor in a standard T-1 $\frac{3}{4}$ (\varnothing 5 mm) package. Due to its waterclear epoxy the device is sensitive to visible and near infrared radiation. The viewing angle of $\pm 20^\circ$ makes it insensitive to ambient straylight.



94 8391

Features

- Fast response times
- High photo sensitivity
- Standard T-1 $\frac{3}{4}$ (\varnothing 5 mm) clear plastic package
- Angle of half sensitivity $\varphi = \pm 20^\circ$
- Suitable for visible and near infrared radiation
- Selected into sensitivity groups

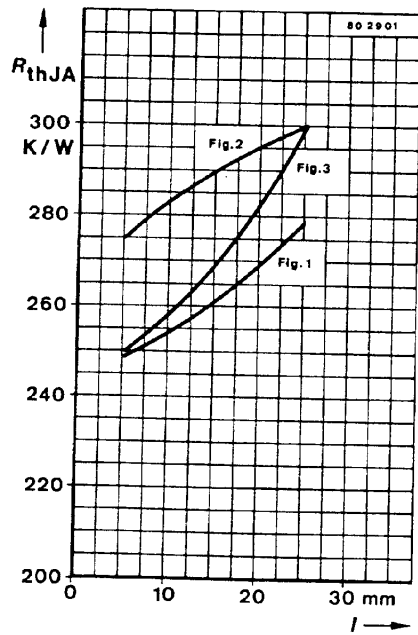
Applications

Detector in electronic control and drive circuits

Absolute Maximum Ratings

$T_{amb} = 25^\circ\text{C}$

Parameter	Test Conditions	Symbol	Value	Unit
Collector Emitter Voltage		V_{CEO}	70	V
Emitter Collector Voltage		V_{ECO}	5	V
Collector Current		I_C	50	mA
Peak Collector Current	$t_p/T = 0.5, t_p \leq 10 \text{ ms}$	I_{CM}	100	mA
Total Power Dissipation	$T_{amb} \leq 47^\circ\text{C}$	P_{tot}	150	mW
Junction Temperature		T_j	100	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55...+100	$^\circ\text{C}$
Soldering Temperature	$t \leq 3 \text{ s}$	T_{sd}	260	$^\circ\text{C}$
Thermal Resistance Junction/Ambient		R_{thJA}	350	K/W



Wärmewiderstand

Sperrschicht-Umgebung

Optische und elektrische Kenngrößen

$$T_{\text{amb}} = 25^{\circ}\text{C}$$

Kollektor-Dunkelstrom

$$U_{CE} = 20 \text{ V}, E = 0$$

Kollektor-Hellstrom

$$U_{CE} = 5 \text{ V}, E_A = 1 \text{ k}\Omega$$
$$U_{CE} = 5 \text{ V}, E_e = 1 \text{ mW/cm}^2, \lambda_p = 950 \text{ nm}$$

Wellenlänge der maximalen Empfindlichkeit

Bereich der spektralen Empfindlichkeit (50%)

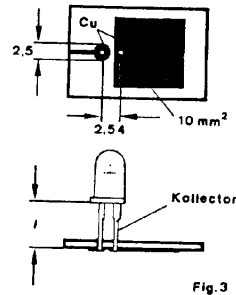
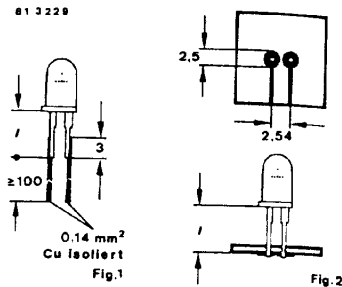
Kollektor-Emitter-Durchbruchspannung

$$I_C = 1 \text{ mA}$$

Kollektor-Emitter-Sättigungsspannung

 $I_C = 1 \text{ mA}, E_e = 1 \text{ mW/cm}^2, \lambda_p = 950 \text{ nm}$

Grenzfrequenz

$$U_S = 5 \text{ V}, I_C = 5 \text{ mA}, R_L = 100 \, \Omega$$


	Min.	Typ.	Max.
R_{thJA}			350 K/W

$I_{\text{CEO}}^*)$	10	200	nA
I_{ca}	6		mA
$I_{\text{ca}}^*)$	1	2	mA
λ_{p}	780		nm
$\lambda_{0,5}$	520...950		nm
$U_{\text{(BR)CEO}}^*)$	32		V
$U_{\text{CEsat}}^*)$		0,3	V
f_{g}	170		kHz

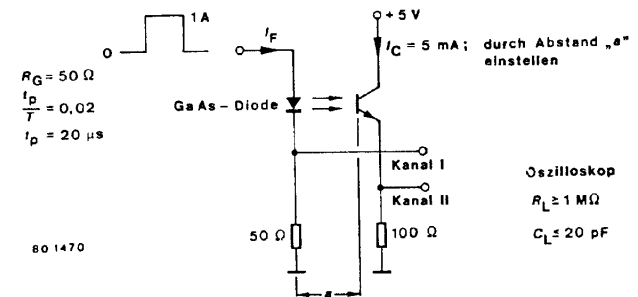
*) AQL = 0,65%

¹⁾ Normlichtart A (DIN 5033/IEC 306-1)

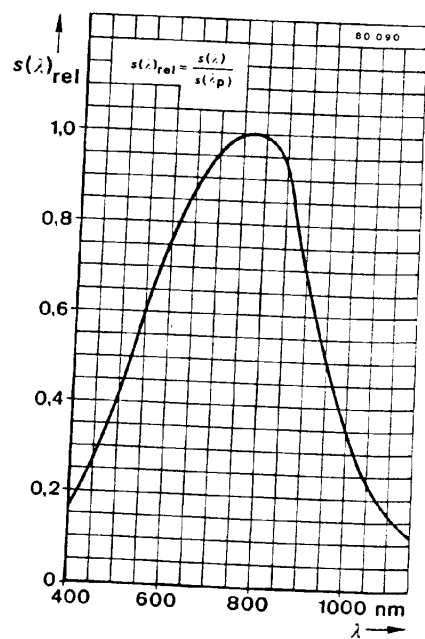
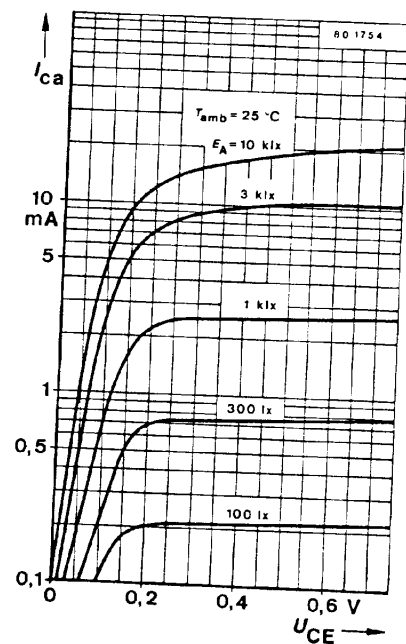
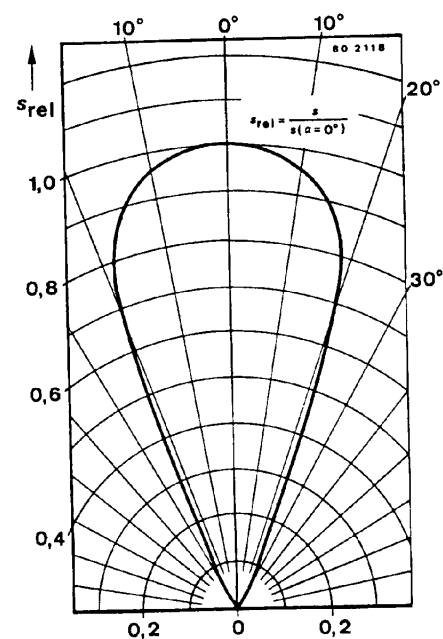
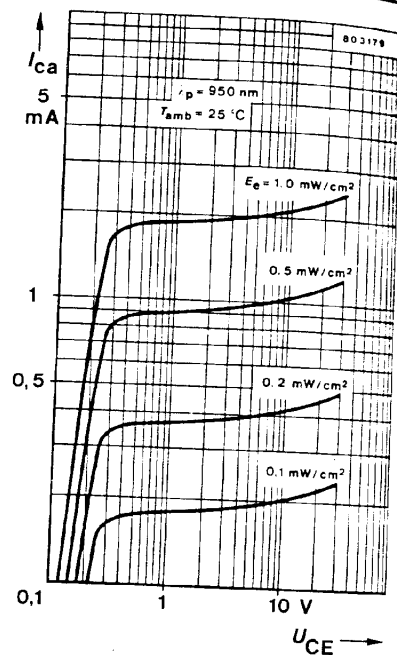
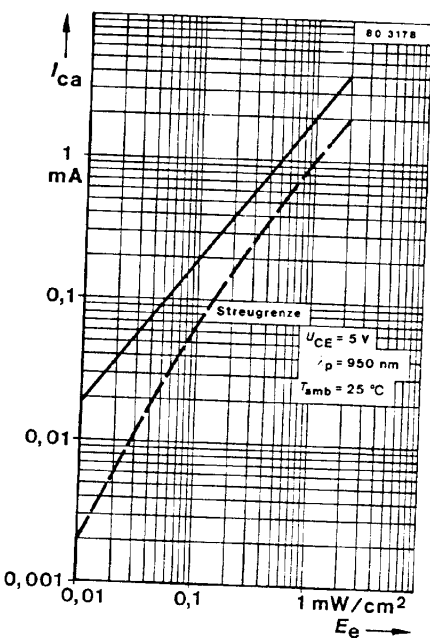
Schaltzeiten

$U_S = 5 \text{ V}$, $I_C = 5 \text{ mA}$, $R_L = 100 \text{ }\Omega$, siehe Meßschaltung

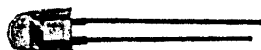
Schaltzeiten		Min.	Typ.	Max.
$U_S = 5 \text{ V}$, $I_C = 5 \text{ mA}$, $R_L = 100 \text{ }\Omega$, siehe Meßschaltung				
Verzögerungszeit	t_d		1,8	μs
Anstiegszeit	t_r		1,6	μs
Einschaltzeit	t_{on}		3,4	μs
Speicherzeit	t_s		0,3	μs
Abfallzeit	t_f		1,7	μs
Ausschaltzeit	t_{off}		2,0	μs



Meßschaltung



Silizium-NPN-Epitaxial-Planar-Fototransistor



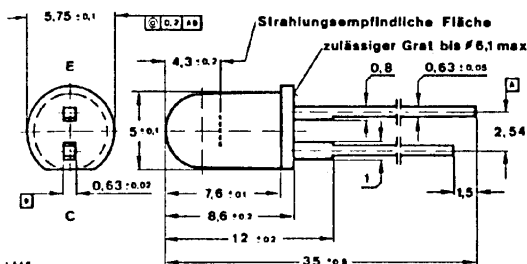
Anwendung: Empfänger in elektronischen Steuer- und Regeleinrichtungen

Besondere Merkmale:

- Kunststoffgehäuse Ø 5 mm
- Hohe Fotoempfindlichkeit
- Für die Bereiche der sichtbaren und nahen infraroten Strahlung geeignet
- Großer Öffnungswinkel
- Axiale Anschlüsse

Abmessungen in mm

Vorläufige technische Daten



Öffnungswinkel $\alpha = 40^\circ$

Spezialgehäuse
Kunststoff klar
Gewicht max. 0,4 g

Zubehör

Montagehülse Best. Nr. 562 136

Haltering Best. Nr. 562 135

Absolute Grenzdaten

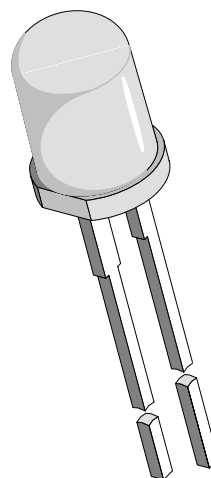
Kollektor-Emitter-Sperrspannung	U_{CEO}	32	V
Emitter-Kollektor-Sperrspannung	U_{ECO}	5	V
Kollektorstrom	I_C	100	mA
Kollektorspitzenstrom	I_{CM}	200	mA
$\frac{t_p}{T} = 0,5, t_p \leq 10 \text{ ms}$			
Gesamtverlustleistung	P_{tot}	100	mW
$T_{amb} \leq 45^\circ \text{C}$			
Sperrschichttemperatur	T_j	100	$^\circ \text{C}$
Lagerungstemperaturbereich	T_{stg}	-25...+100	$^\circ \text{C}$
Maximal zulässige Löttemperatur	$T_{sd}^{1)}$	245	$^\circ \text{C}$
$t \leq 3 \text{ s}$			

¹⁾ Abstand von der Aufsetzkante $\geq 1,5 \text{ mm}$ mit zwischengelegter Leiterplatte

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94 8391

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Collector Current		I_C	50	mA
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Junction Temperature		T_j	100	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55...+100	$^\circ\text{C}$
Soldering Temperature	$t \leq 3 \text{ s}$	T_{sd}	260	$^\circ\text{C}$
Thermal Resistance Junction/Ambient		R_{thJA}	350	K/W

Basic Characteristics

 $T_{amb} = 25^{\circ}\text{C}$

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Collector Emitter Breakdown Voltage	$I_C = 1\text{ mA}$	$V_{(BR)CE\ O}$	70			V
Collector Dark Current	$V_{CE} = 20\text{ V}, E = 0$	I_{CEO}		1	200	nA
Collector Emitter Capacitance	$V_{CE} = 5\text{ V}, f = 1\text{ MHz}, E = 0$	C_{CEO}		3		pF
Angle of Half Sensitivity		ϕ		± 20		deg
Wavelength of Peak Sensitivity		λ_p		850		nm
Range of Spectral Bandwidth		$\lambda_{0.5}$		620...980		nm
Collector Emitter Saturation Voltage	$E_e = 1\text{ mW/cm}^2$, $\lambda = 950\text{ nm}, I_C = 0.1\text{ mA}$	V_{CEsat}			0.3	V
Turn-On Time	$V_S = 5\text{ V}, I_C = 5\text{ mA}$, $R_L = 100\ \Omega$	t_{on}		2.0		μs
Turn-Off Time	$V_S = 5\text{ V}, I_C = 5\text{ mA}$, $R_L = 100\ \Omega$	t_{off}		2.3		μs
Cut-Off Frequency	$V_S = 5\text{ V}, I_C = 5\text{ mA}$, $R_L = 100\ \Omega$	f_c		180		kHz

Type Dedicated Characteristics

 $T_{amb} = 25^{\circ}\text{C}$

Parameter	Test Conditions	Type	Symbol	Min	Typ	Max	Unit
Collector Light Current	$E_e = 1\text{ mW/cm}^2$, $\lambda = 950\text{ nm}, V_{CE} = 5\text{ V}$	BPW96A	I_{ca}	1.5	2.5	4.5	mA
		BPW96B	I_{ca}	2.5	4.5	7.5	mA
		BPW96C	I_{ca}	4.5	8	15	mA

Typical Characteristics ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)

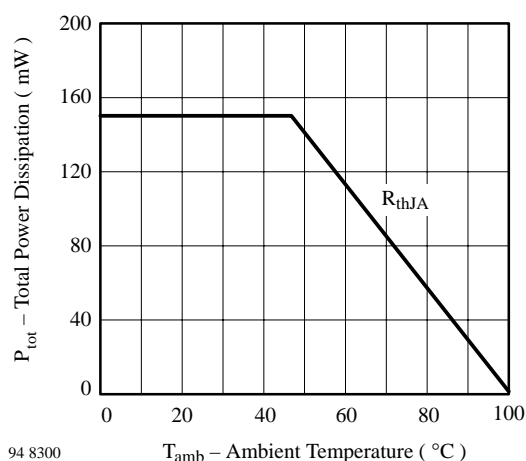


Figure 1. Total Power Dissipation vs. Ambient Temperature

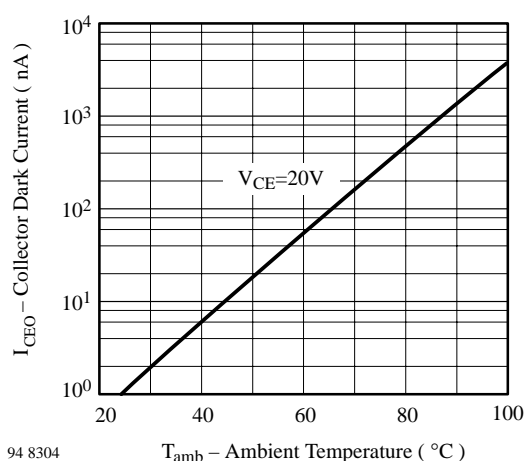


Figure 2. Collector Dark Current vs. Ambient Temperature

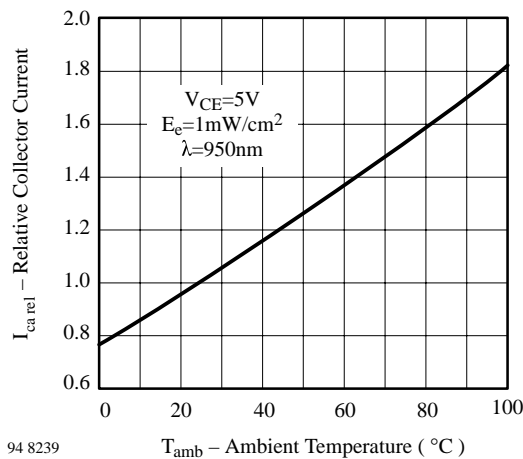


Figure 3. Relative Collector Current vs. Ambient Temperature

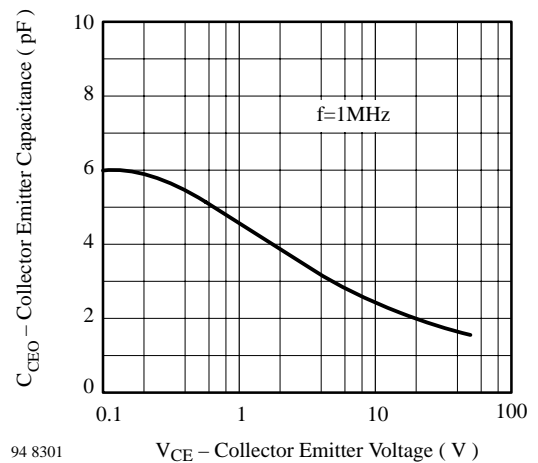


Figure 6. Collector Emitter Capacitance vs. Collector Emitter Voltage

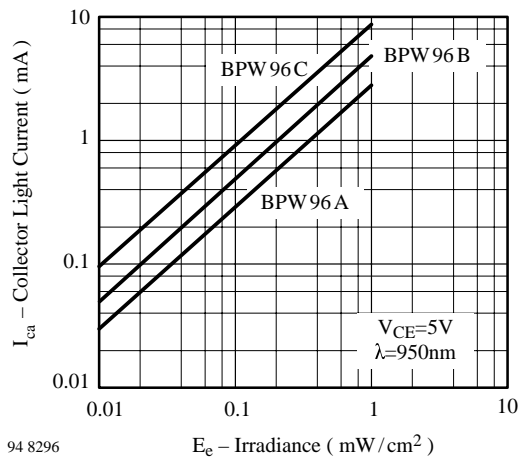


Figure 4. Collector Light Current vs. Irradiance

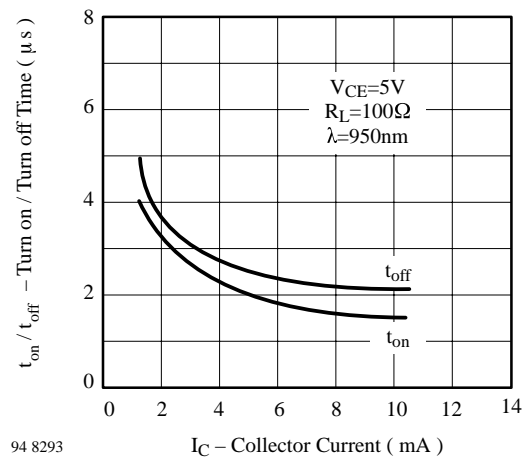


Figure 7. Turn On/Turn Off Time vs. Collector Current

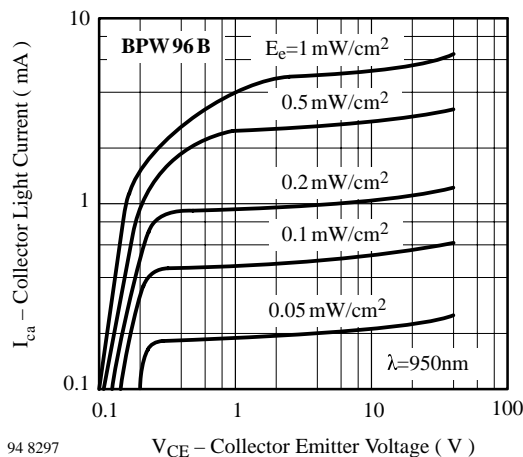


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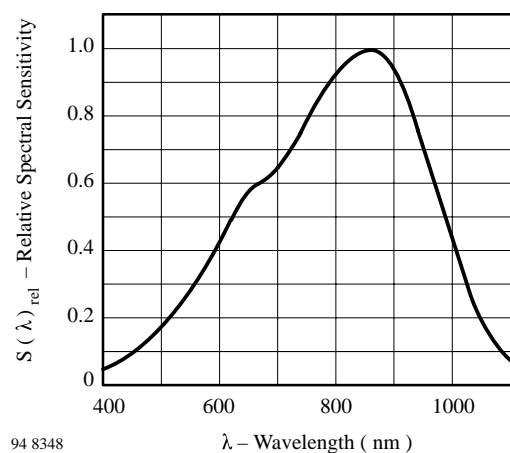
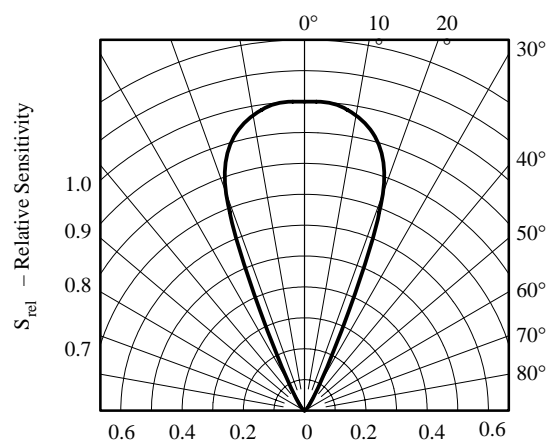
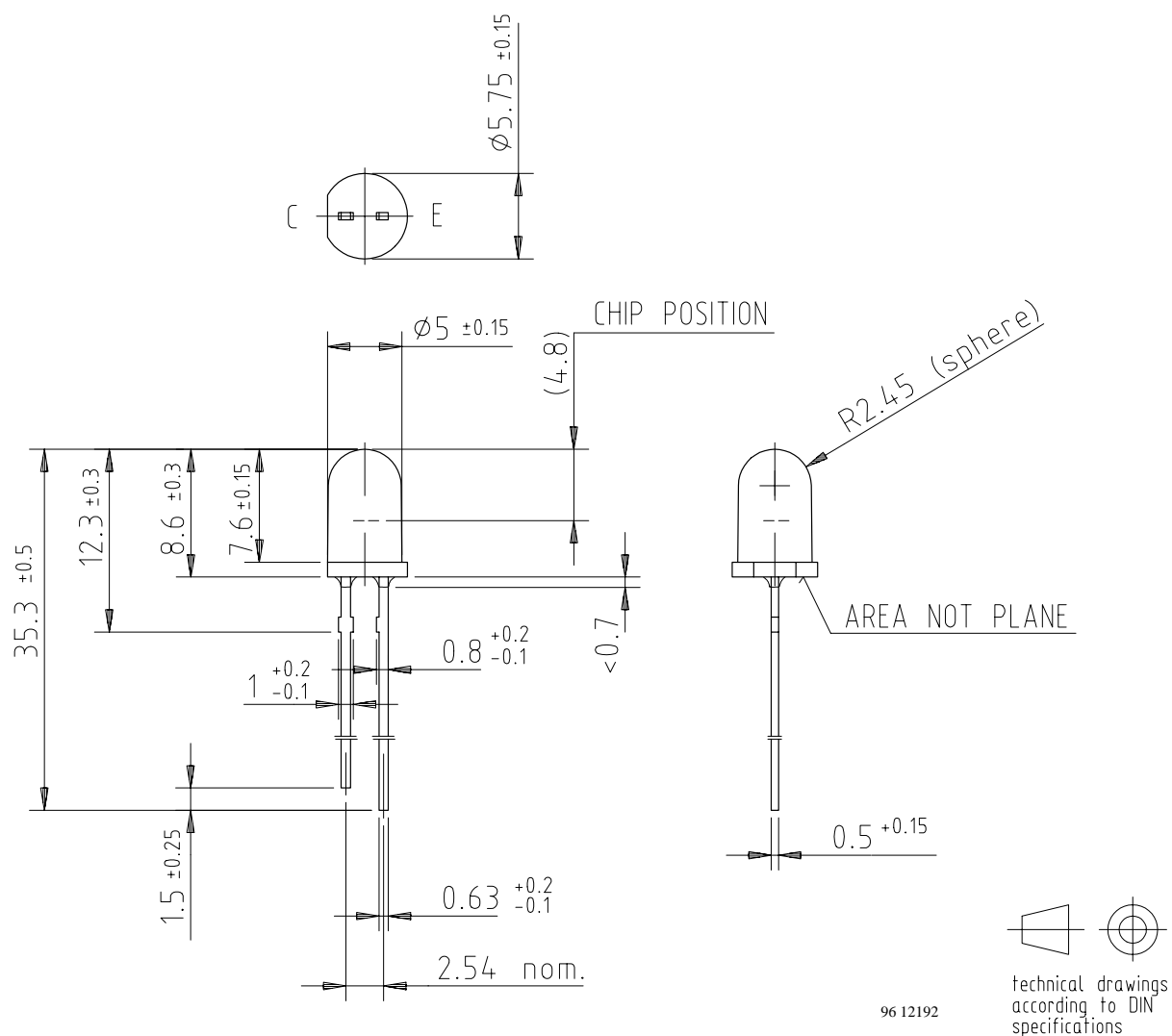


Figure 8. Relative Spectral Sensitivity vs. Wavelength



94 8299

Figure 9. Relative Radiant Sensitivity vs. Angular Displacement

Dimensions in mm


Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

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Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay-Telefunken products for any unintended or unauthorized application, the buyer shall indemnify Vishay-Telefunken against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany
Telephone: 49 (0) 7131 67 2831, Fax number: 49 (0) 7131 67 2423

Basic Characteristics

 $T_{amb} = 25^{\circ}\text{C}$

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Collector Emitter Breakdown Voltage	$I_C = 1\text{ mA}$	$V_{(BR)CE\ O}$	70			V
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Turn-On Time	$V_S = 5\text{ V}, I_C = 5\text{ mA}$, $R_L = 100\ \Omega$	t_{on}		2.0		μs
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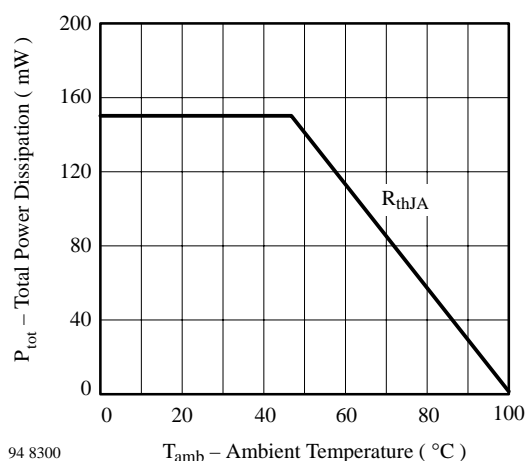


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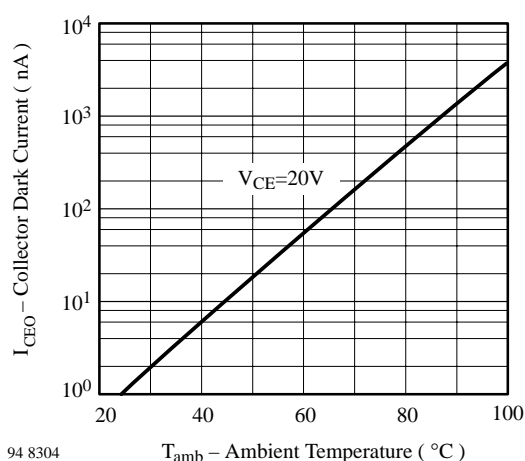


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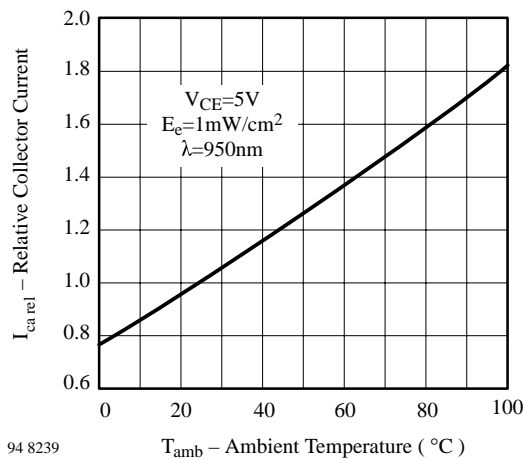


Figure 3. Relative Collector Current vs. Ambient Temperature

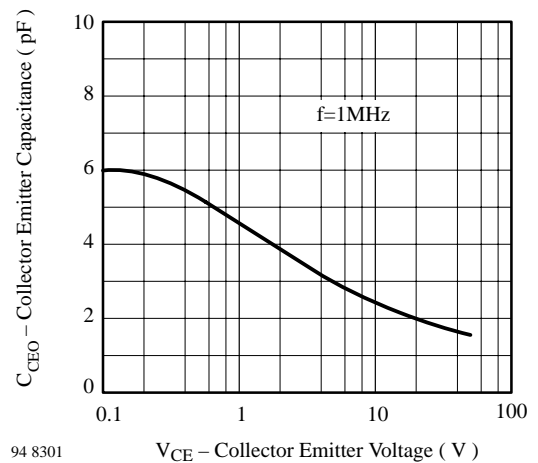


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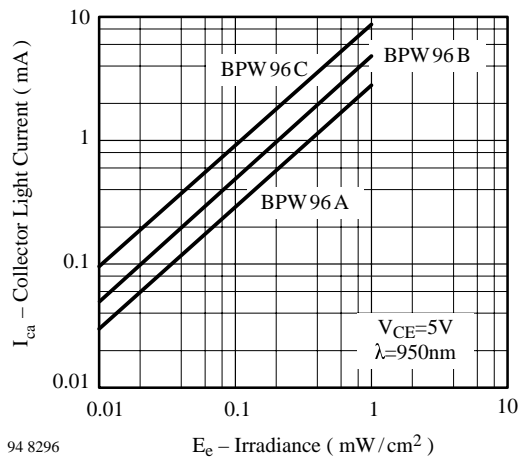


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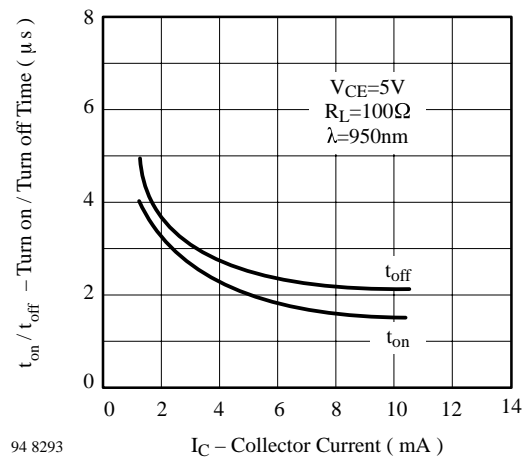


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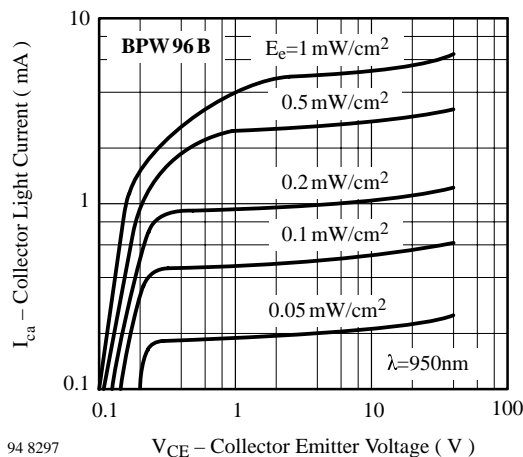


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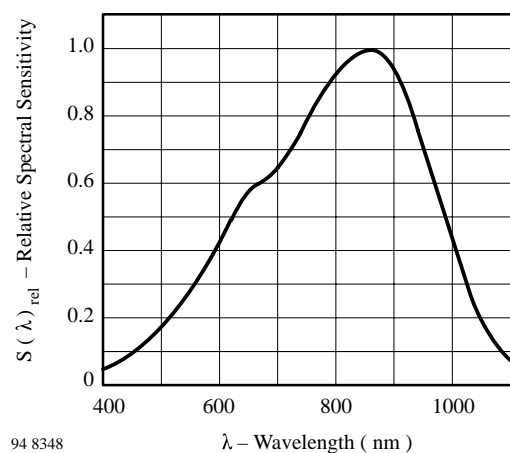
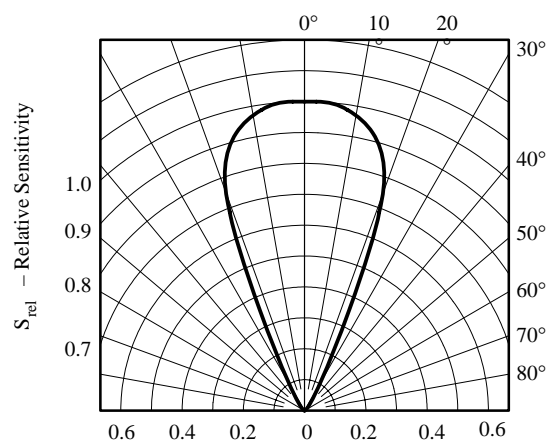
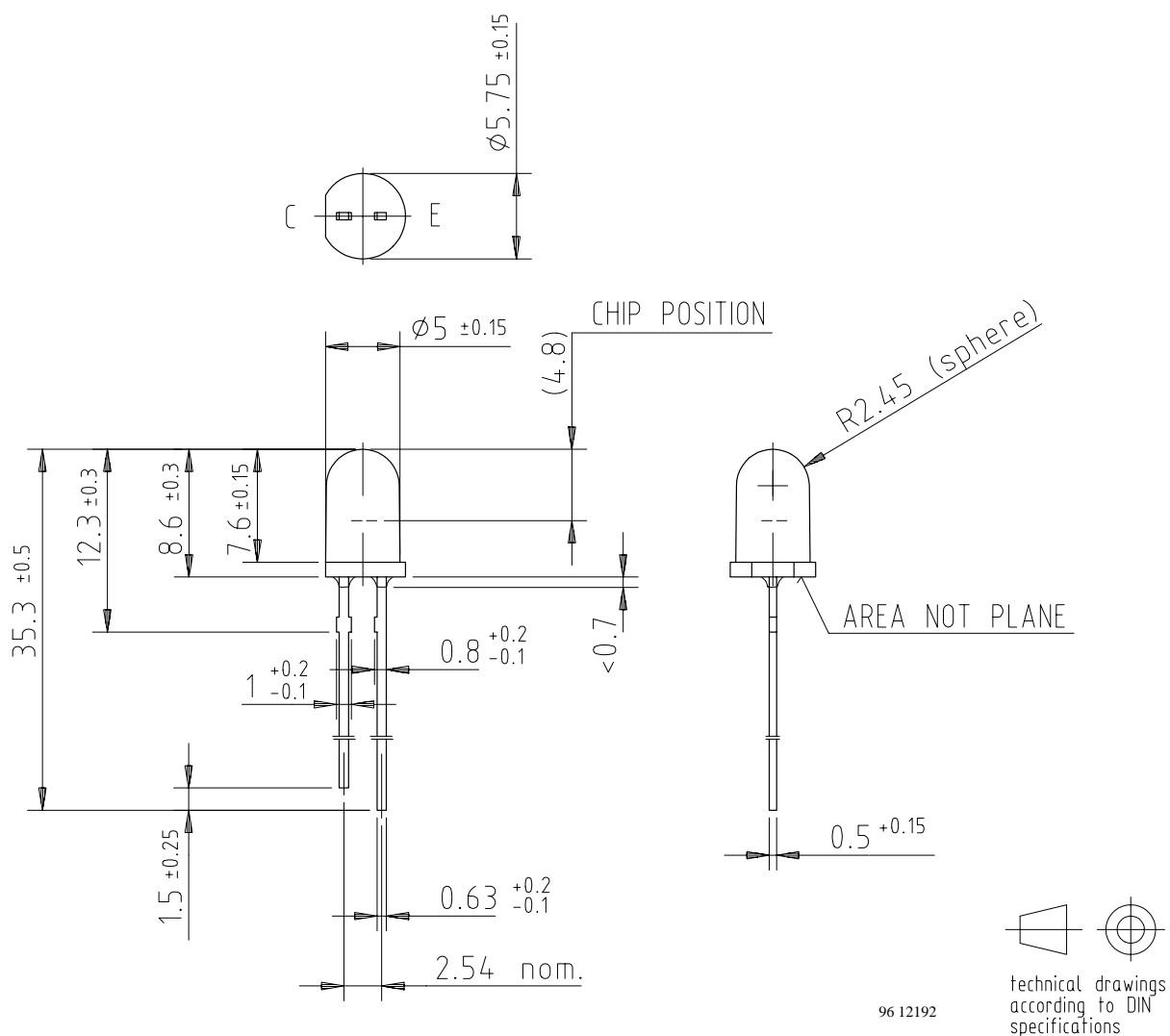


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94 8299

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