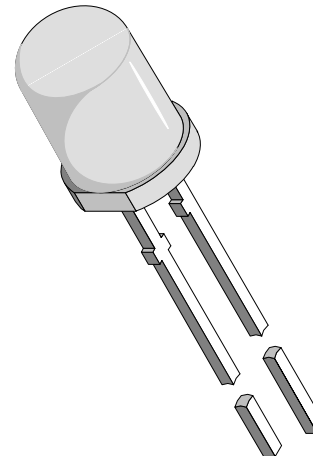


GaAs Infrared Emitting Diodes in \varnothing 5 mm (T-1 $\frac{3}{4}$) Package

Description

TSUS540. series are infrared emitting diodes in standard GaAs on GaAs technology, molded in a clear, blue-grey tinted plastic package. The devices are spectrally matched to silicon photodiodes and phototransistors.



94 8390

Features

- Low cost emitter
- Low forward voltage
- High radiant power and radiant intensity
- Suitable for DC and high pulse current operation
- Standard T-1 $\frac{3}{4}$ (\varnothing 5 mm) package
- Comfortable angle of half intensity $\varphi = \pm 22^\circ$
- Peak wavelength $\lambda_p = 950$ nm
- High reliability
- Good spectral matching to Si photodetectors

Applications

- Infrared remote control and free air transmission systems with low forward voltage and comfortable radiation angle requirements in combination with PIN photodiodes or phototransistors.

Absolute Maximum Ratings

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

Parameter	Test Conditions	Symbol	Value	Unit
Reverse Voltage		V_R	5	V
Forward Current		I_F	150	mA
Peak Forward Current	$t_p/T = 0.5, t_p = 100 \mu\text{s}$	I_{FM}	300	mA
Surge Forward Current	$t_p = 100 \mu\text{s}$	I_{FSM}	2.5	A
Power Dissipation		P_V	210	mW
Junction Temperature		T_j	100	$^\circ\text{C}$
Operating Temperature Range		T_{amb}	-55...+100	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55...+100	$^\circ\text{C}$
Soldering Temperature	$t \leq 5\text{sec}, 2 \text{ mm from case}$	T_{sd}	260	$^\circ\text{C}$
Thermal Resistance Junction/Ambient		R_{thJA}	375	K/W

Basic Characteristics

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

Parameter	Test Conditions	Type	Symbol	Min.	Typ.	Max.	Unit
Forward Voltage	$I_F = 100 \text{ mA}$, $t_p = 20 \text{ ms}$		V_F		1.3	1.7	V
	$I_F = 1.5 \text{ A}$, $t_p = 100 \mu\text{s}$		V_F		2.2	3.4	V
Temp. Coefficient of V_F	$I_F = 100\text{mA}$		TK_{V_F}		-1.3		mV/K
Reverse Current	$V_R = 5 \text{ V}$		I_R			100	μA
Junction Capacitance	$V_R = 0 \text{ V}$, $f = 1 \text{ MHz}$, $E = 0$		C_j		30		pF
Radiant Intensity	$I_F = 100 \text{ mA}$, $t_p = 20 \text{ ms}$	TSUS5400	I_e	7	14		mW/sr
		TSUS5401	I_e	10	17		mW/sr
		TSUS5402	I_e	15	20		mW/sr
	$I_F = 1.5 \text{ A}$, $t_p = 100 \mu\text{s}$	TSUS5400	I_e	60	140		mW/sr
		TSUS5401	I_e	85	160		mW/sr
		TSUS5402	I_e	120	190		mW/sr
Radiant Power	$I_F = 100 \text{ mA}$, $t_p = 20 \text{ ms}$	TSUS5400	ϕ_e		13		mW
		TSUS5401	ϕ_e		14		mW
		TSUS5402	ϕ_e		15		mW
Temp. Coefficient of ϕ_e	$I_F = 20 \text{ mA}$		TK_{ϕ_e}		-0.8		%/K
Angle of Half Intensity			φ		± 22		deg
Peak Wavelength	$I_F = 100 \text{ mA}$		λ_p		950		nm
Spectral Bandwidth	$I_F = 100 \text{ mA}$		$\Delta\lambda$		50		nm
Temp. Coefficient of λ_p	$I_F = 100 \text{ mA}$		TK_{λ_p}		0.2		nm/K
Rise Time	$I_F = 100 \text{ mA}$		t_r		800		ns
	$I_F = 1.5 \text{ A}$		t_r		400		ns
Fall Time	$I_F = 100 \text{ mA}$		t_f		800		ns
	$I_F = 1.5 \text{ A}$		t_f		400		ns

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

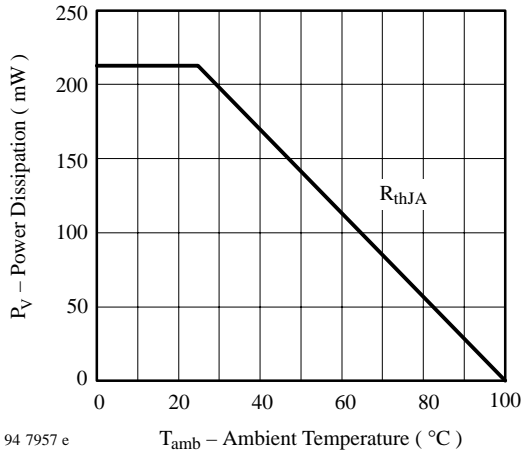


Figure 1. Power Dissipation vs. Ambient Temperature

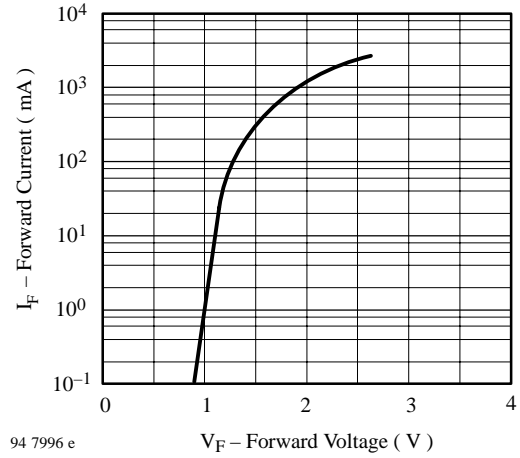


Figure 4. Forward Current vs. Forward Voltage

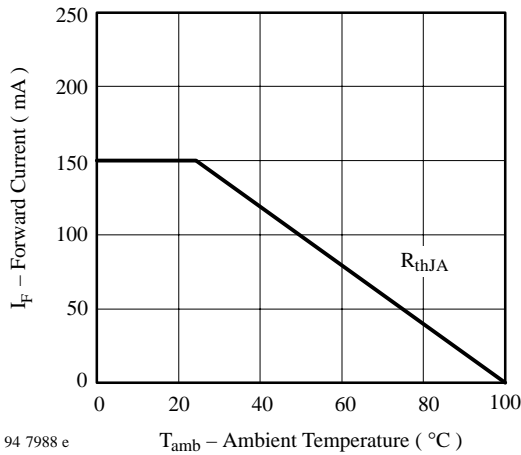


Figure 2. Forward Current vs. Ambient Temperature

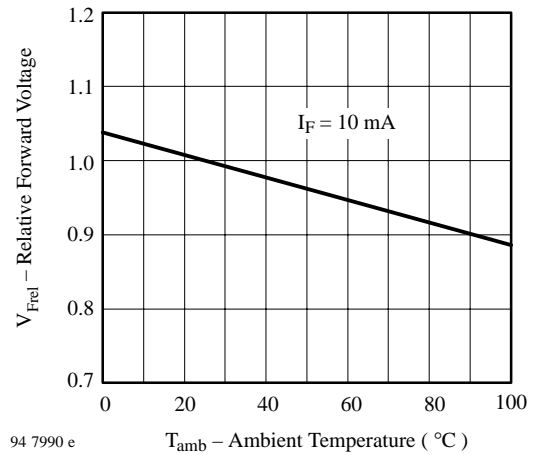


Figure 5. Relative Forward Voltage vs. Ambient Temperature

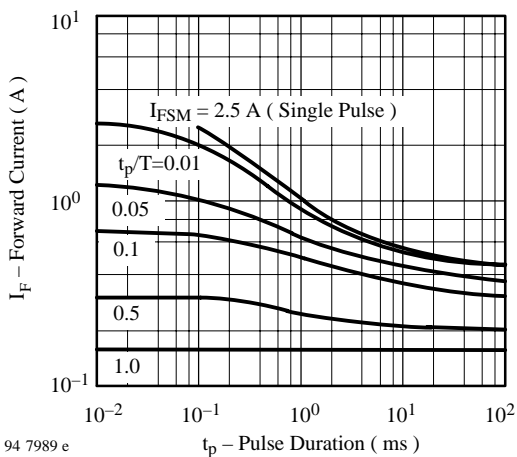


Figure 3. bPulse Forward Current vs. Pulse Duration

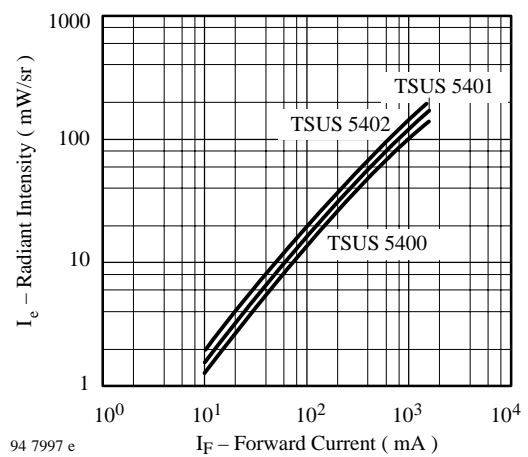


Figure 6. Radiant Intensity vs. Forward Current

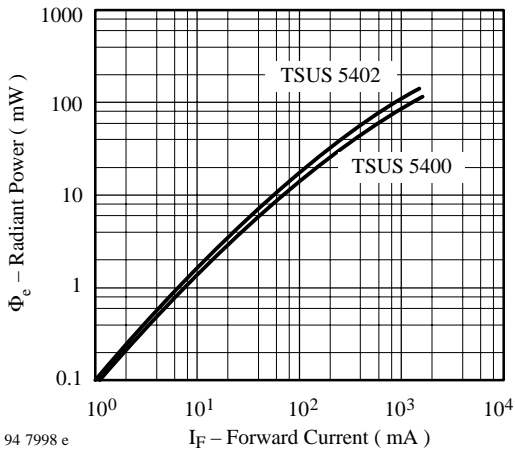


Figure 7. Radiant Power vs. Forward Current

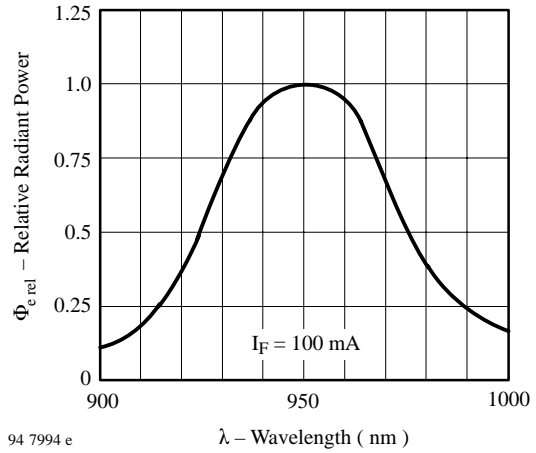


Figure 9. Relative Radiant Power vs. Wavelength

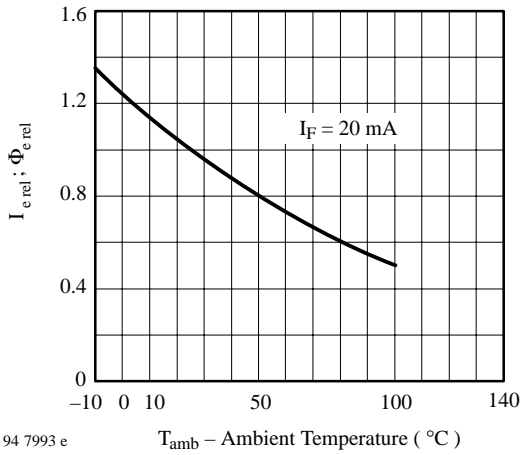


Figure 8. Rel. Radiant Intensity/Power vs. Ambient Temperature

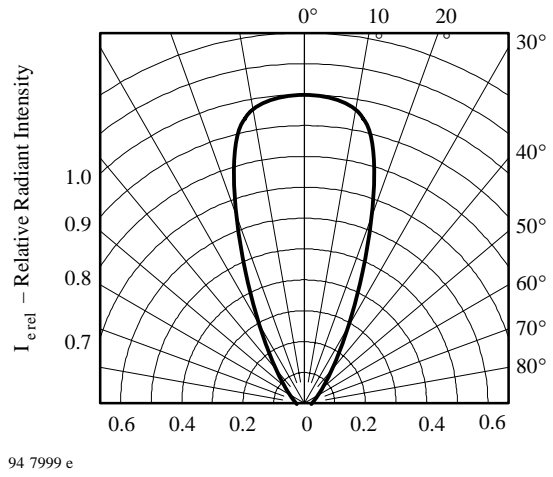
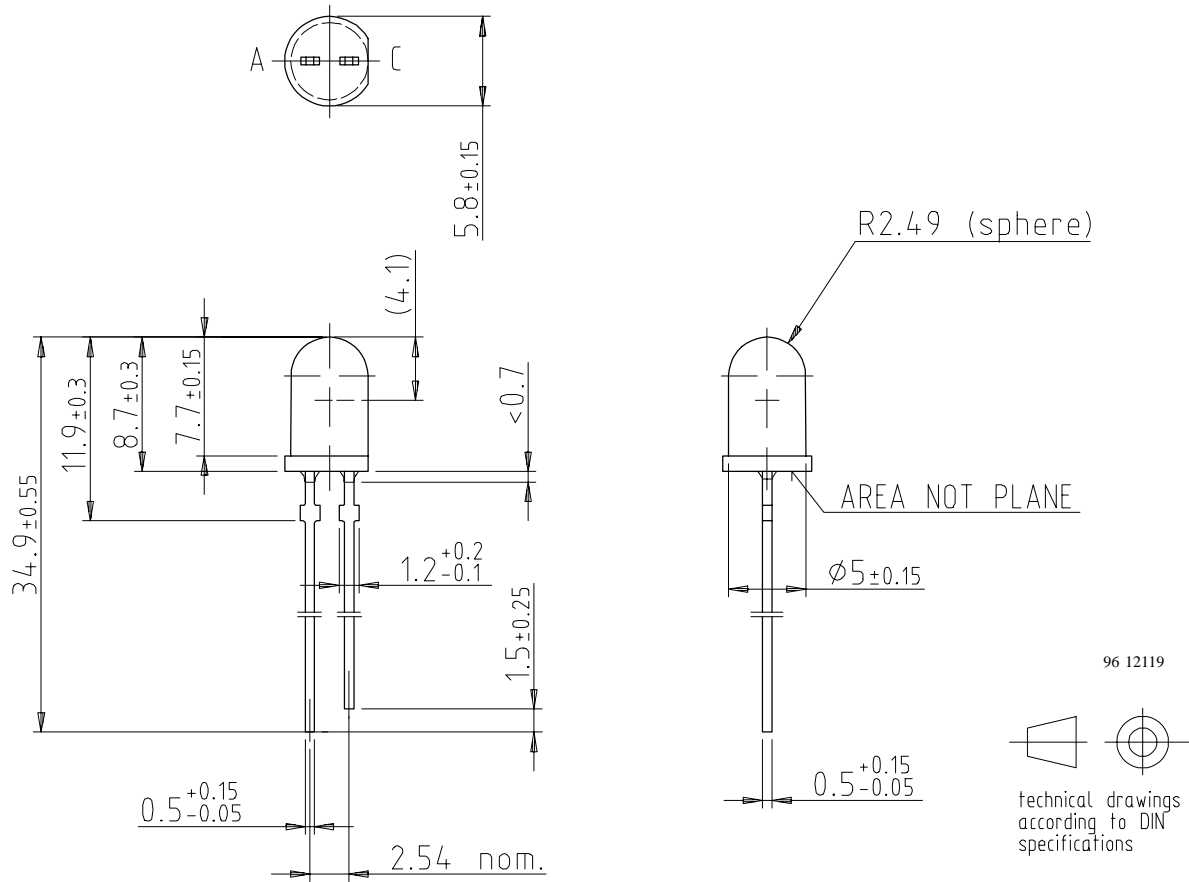


Figure 10. Relative Radiant Intensity vs. Angular Displacement

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).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design and may do so without further notice.

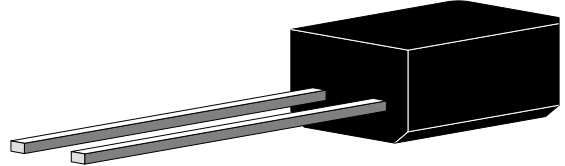
Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, 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

Silicon PIN Photodiode

Description

BPW41N is a high speed and high sensitive PIN photodiode in a flat side view plastic package. The epoxy package itself is an IR filter, spectrally matched to GaAs or GaAs on GaAlAs IR emitters ($\lambda_p = 950 \text{ nm}$). The large active area combined with a flat case gives a high sensitivity at a wide viewing angle.



Features

- Large radiant sensitive area ($A=7.5 \text{ mm}^2$)
- Wide angle of half sensitivity $\phi = \pm 65^\circ$
- High radiant sensitivity
- Fast response times
- Small junction capacitance
- Plastic case with IR filter ($\lambda=950 \text{ nm}$)
- Suitable for near infrared radiation

94 8480

Applications

High speed photo detector

Absolute Maximum Ratings

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

Parameter	Test Conditions	Symbol	Value	Unit
Reverse Voltage		V_R	60	V
Power Dissipation	$T_{\text{amb}} \leq 25^\circ\text{C}$	P_V	215	mW
Junction Temperature		T_j	100	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55...+100	$^\circ\text{C}$
Soldering Temperature	$t \leq 5 \text{ s}$	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
Breakdown Voltage	$I_R = 100 \mu\text{A}, E = 0$	$V_{(BR)}$	60			V
Reverse Dark Current	$V_R = 10 \text{ V}, E = 0$	I_{ro}		2	30	nA
Diode Capacitance	$V_R = 0 \text{ V}, f = 1 \text{ MHz}, E = 0$	C_D		70		pF
	$V_R = 3 \text{ V}, f = 1 \text{ MHz}, E = 0$	C_D		25	40	pF
Open Circuit Voltage	$E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$	V_o		350		mV
Temp. Coefficient of V_o	$E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$	TK_{V_o}		-2.6		mV/K
Short Circuit Current	$E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$	I_k		38		μA
Temp. Coefficient of I_k	$E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$	TK_{I_k}		0.1		%/K
Reverse Light Current	$E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}, V_R = 5 \text{ V}$	I_{ra}	43	45		μA
Angle of Half Sensitivity		ϕ		± 65		deg
Wavelength of Peak Sensitivity		λ_p		950		nm
Range of Spectral Bandwidth		$\lambda_{0.5}$		870...1050		nm
Noise Equivalent Power	$V_R = 10 \text{ V}, \lambda = 950 \text{ nm}$	NEP		4×10^{-14}		$\text{W}/\sqrt{\text{Hz}}$
Rise Time	$V_R = 10 \text{ V}, R_L = 1 \text{ k}\Omega, \lambda = 820 \text{ nm}$	t_r		100		ns
Fall Time	$V_R = 10 \text{ V}, R_L = 1 \text{ k}\Omega, \lambda = 820 \text{ nm}$	t_f		100		ns

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

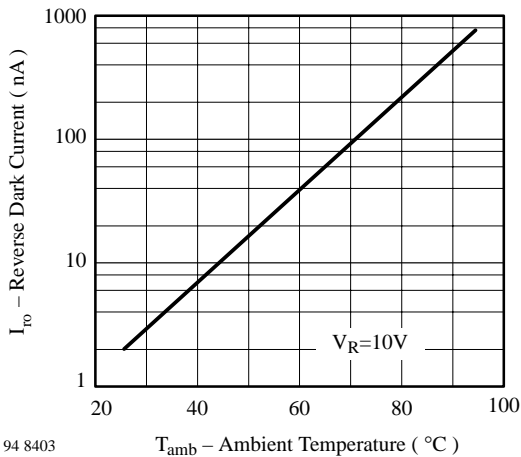


Figure 1. Reverse Dark Current vs. Ambient Temperature

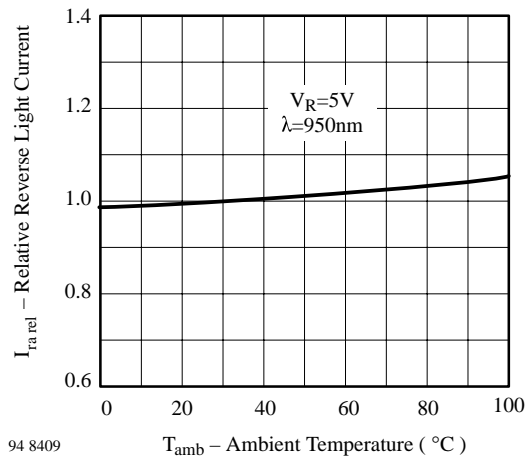
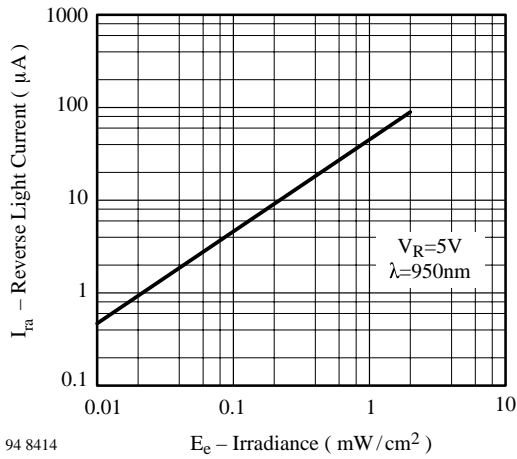
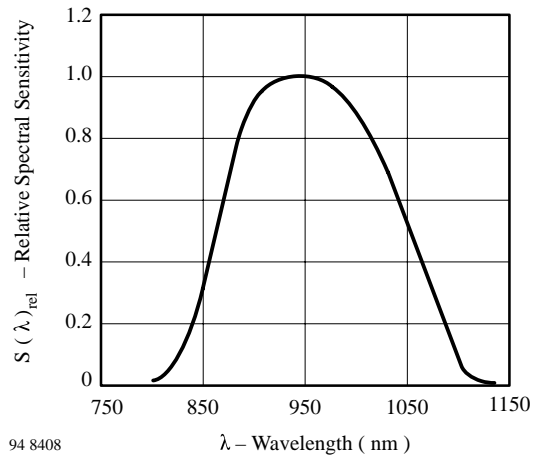


Figure 2. Relative Reverse Light Current vs. Ambient Temperature



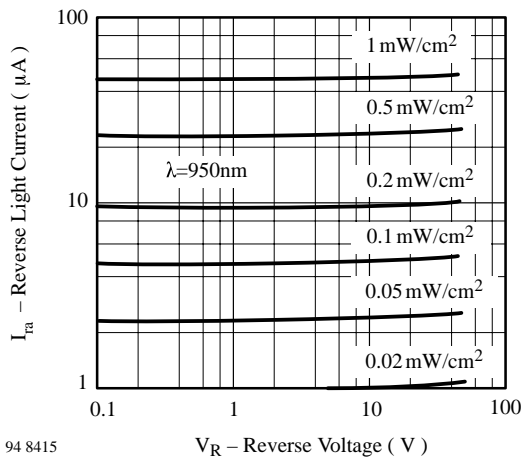
94 8414

Figure 3. Reverse Light Current vs. Irradiance



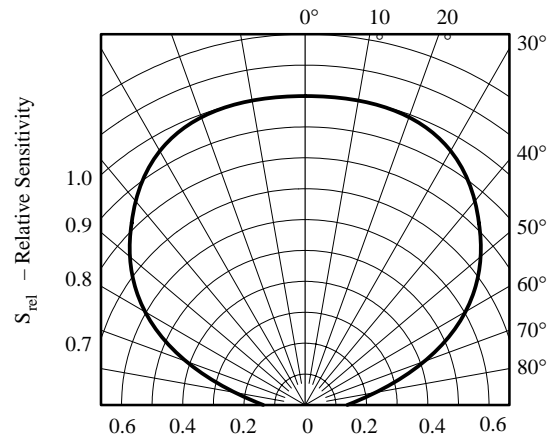
94 8408

Figure 6. Relative Spectral Sensitivity vs. Wavelength



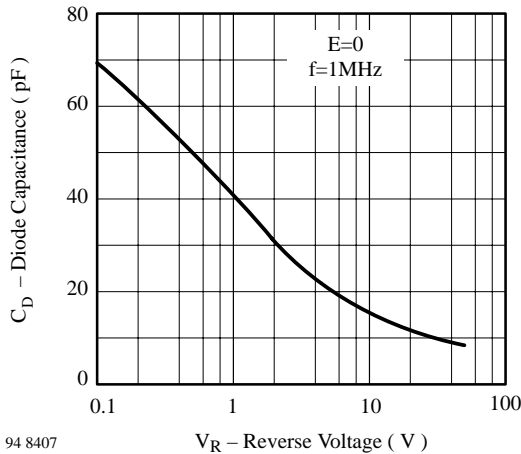
94 8415

Figure 4. Reverse Light Current vs. Reverse Voltage



94 8406

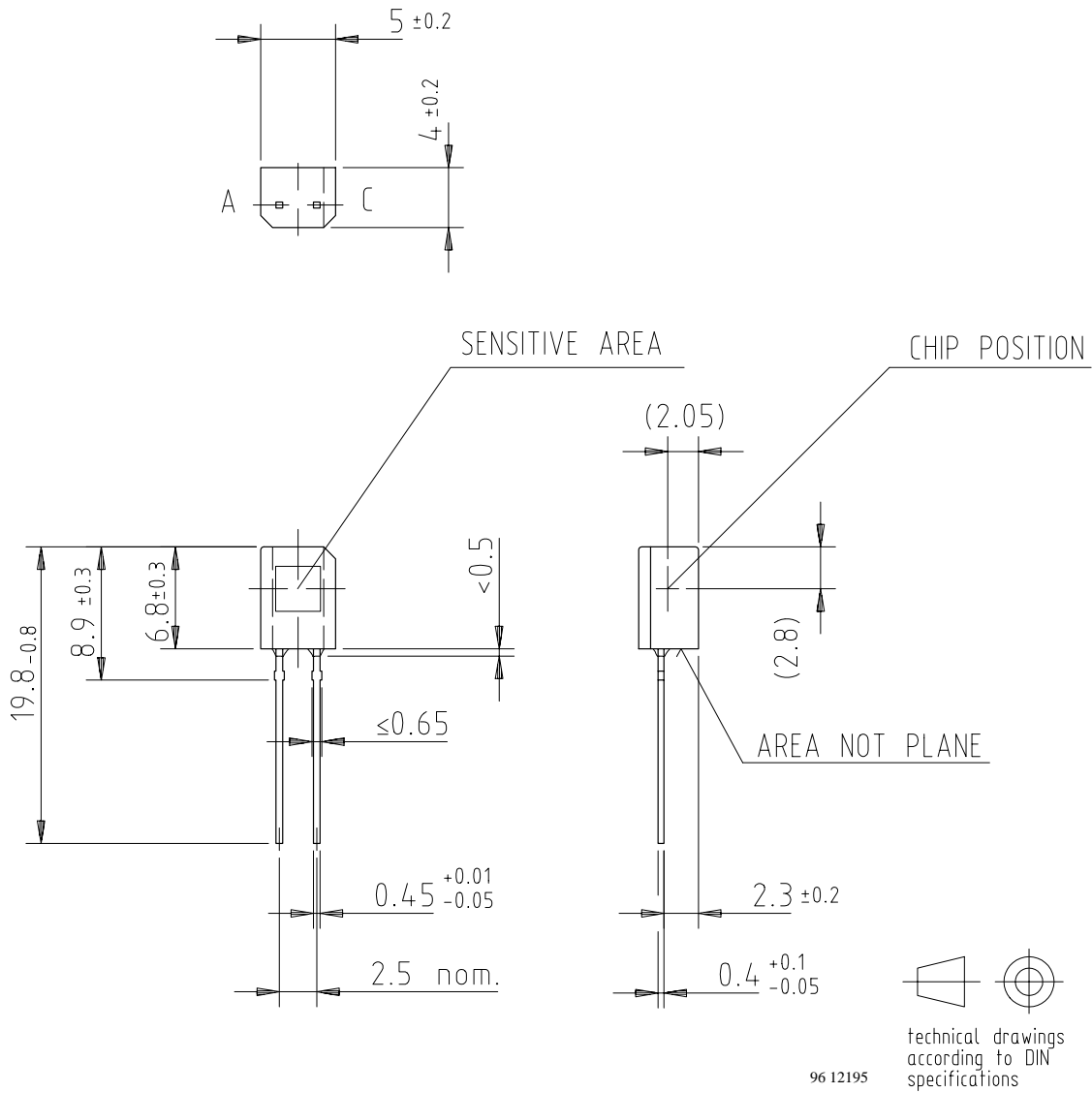
Figure 7. Relative Radiant Sensitivity vs. Angular Displacement



94 8407

Figure 5. Diode Capacitance vs. Reverse Voltage

Dimensions in mm





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