Silicon PIN Photodiode

BPW21R

Features

Hermetically sealed TO–5 case

Flat glass window with built–in color correction fil-ter for visible radiation

Cathode connected to case

Wide viewing angle φ = ± 50

Large radiant sensitive area (A=7.5 mm2)

Suitable for visible radiation

High sensitivity

Low dark current

High shunt resistance

Excellent linearity

For photodiode and photovoltaic cell operation

Application

Exposure meter for daylight

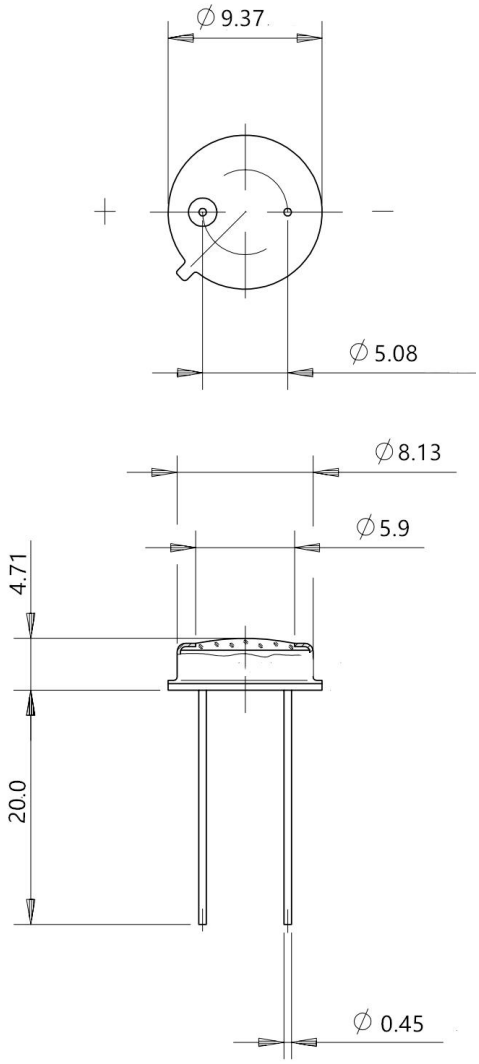
For artificial light of high color temperature in photographic fields and color analysis

Sensor in exposure and color measuring purposes

Description

BPW21R is a planar Silicon PIN photodiode in ahermetically sealed short TO–5 case, especially de-signed for high precision linear applications. Due to its extremely high dark resistance, the short circuit photocurrent is linear over seven decades of il-lumination level. On the other hand, there is a strictly logarithmic correlation between open circuit voltage and illumina tion over the same range. The device is equipped with a flat glass window with built in color correction filter, giving an approximation to the spectral response of the human eye.

PACKAGE DIMENSIONS



NOTES:

1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.25mm(.010") unless otherwise noted.
3. Lead spacing is measured where the leads emerge from the package.

ABSOLUTE MAXIMUM RATINGS AT TA =25℃

Parameter	Test Conditions	Symbol	Value	Unit
Reverse Voltage		V_R	10	V
Power Dissipation	$T_{amb} \leqq 50$ ˚C	P_V	300	mW
Junction Temperature		T_j	125	˚C
Operating Temperature Range		T_{amb}	–55...+125	˚C
Storage Temperature Range		T_{stg}	–55...+125	˚C
Soldering Temperature	t ≦ 5 s	T_{sd}	260	˚C
Thermal Resistance Junction/Ambient		R_{thJA}	250	K/W

BASIC CHARACTERISTICS AT TA=25℃

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Forward Voltage	I_F = 50 mA	V_F		1.0	1.3	V
Breakdown Voltage	I_R = 20 µA, E = 0	$V_{(BR)}$	10			V
Reverse Dark Current	V_R = 5 V, E = 0	I_{ro}		2	30	nA
Diode Capacitance	V_R = 0 V, f = 1 MHz, E = 0	C_D		1.2		nF
	V_R = 5 V, f = 1 MHz, E = 0	C_D		400		pF
Dark Resistance	V_R = 10 mV	R_D		38		GΩ
Open Circuit Voltage	E_A = 1 klx	V_o	280	450		mV
Temp. Coefficient of V_o	E_A = 1 klx	TK_{Vo}		–2		mV/K
Short Circuit Current	E_A = 1 klx	I_k	4.5	9		µA
Temp. Coefficient of I_k	E_A = 1 klx	TK_{Ik}		–0.05		%/K
Reverse Light Current	E_A = 1 klx, V_R = 5 V	I_{ra}	4.5	9		µA
Sensitivity	V_R = 5 V, $E_A = 10^{-2}...10^5$ lx	S		9		nA/lx
Angle of Half Sensitivity		φ		±50		deg
Wavelength of Peak Sensitivity		λ_p		565		nm
Range of Spectral Bandwidth		$\lambda_{0.5}$		420...675		nm
Rise Time	V_R = 0 V, R_L = 1k Ω, λ = 660 nm	t_r		3.1		µs
Fall Time	V_R = 0 V, R_L = 1k Ω, λ = 660 nm	t_f		3.0		µs

Typical Characteristics (T_{amb} = 25°C unless otherwise specified)

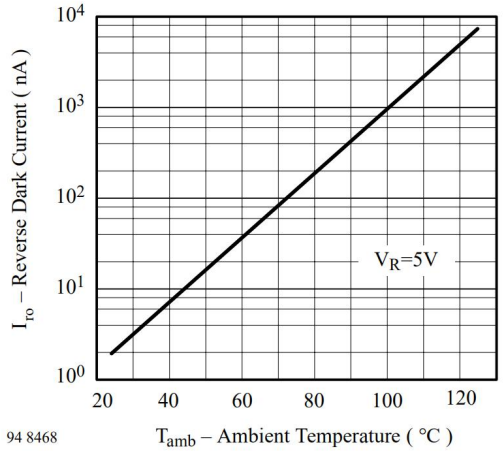


Figure 1. Reverse Dark Current vs. Ambient Temperature

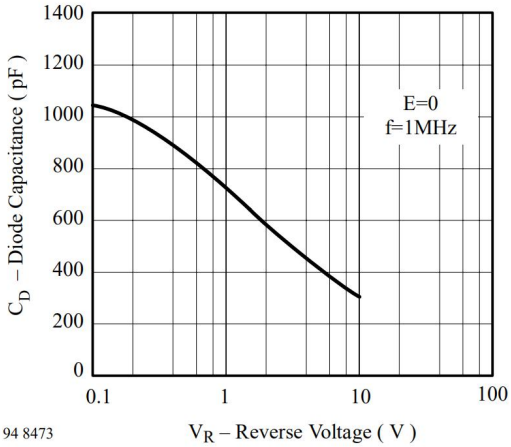


Figure 4. Diode Capacitance vs. Reverse Voltage

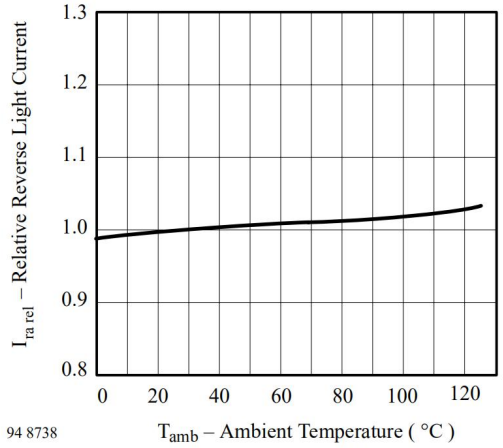


Figure 2. Relative Reverse Light Current vs. Ambient Temperature

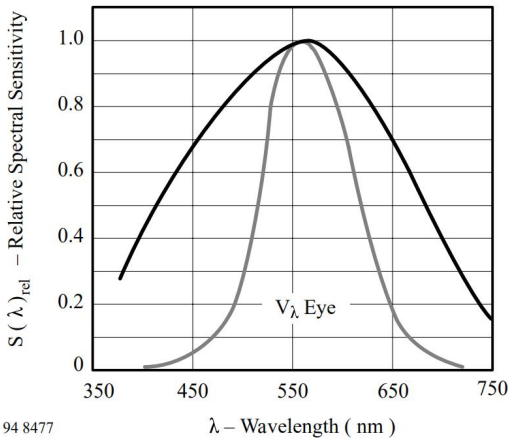


Figure 5. Relative Spectral Sensitivity vs. Wavelength

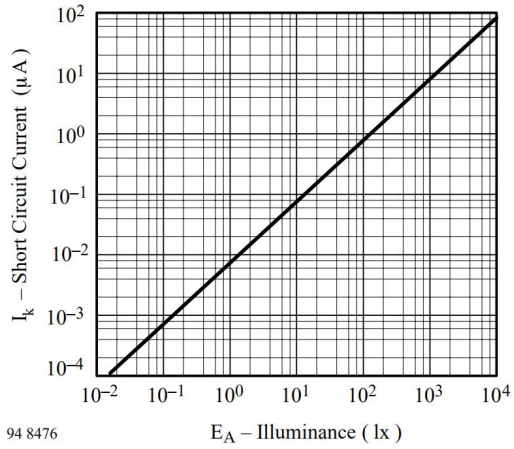


Figure 3. Short Circuit Current vs. Illuminance

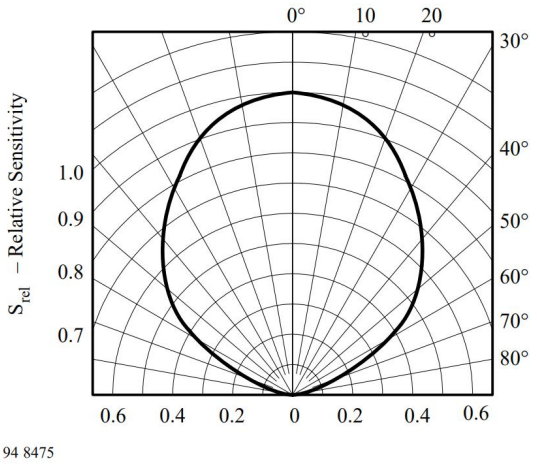


Figure 6. Relative Radiant Sensitivity vs. Angular Displacement

Packing Quantity Specification

1. 200Pcs/1Bag,10 Bag/1Box

2. 4Boxes/1Carton

Label Form Specification

- PRODUCT: Part Number
- CODE NO.: Product Serial Number
- QTY: Packing Quantity
- LOT No: Lot Number
- REMARKS:Remarks

Notes

Lead Forming

1.During lead frame bending, the lead frame should be bent at a distance more than 3mm from bottom of the epoxy.

Note: Must fix lead frame and do not touch epoxy before bending to avoid Photodilde broken.

2.Lead forming should be done before soldering.

3.Avoid stressing the Photodode package during leads forming. The stress to the base may damage the Photodiode's characteristics or it may break the Photodiode.

4.Cut the Photodiode lead frame at room temperature. Cutting the lead frame at high temperatures may cause failure of the Photodiode.

5.When mounting the Photodiode onto a PCB, the PCB holes must be aligned exactly with the lead position of the Photodiode. If the Photodiode are mounted with stress at the leads, it causes deterioration of the epoxy resin and this will degrade the Photodiode.

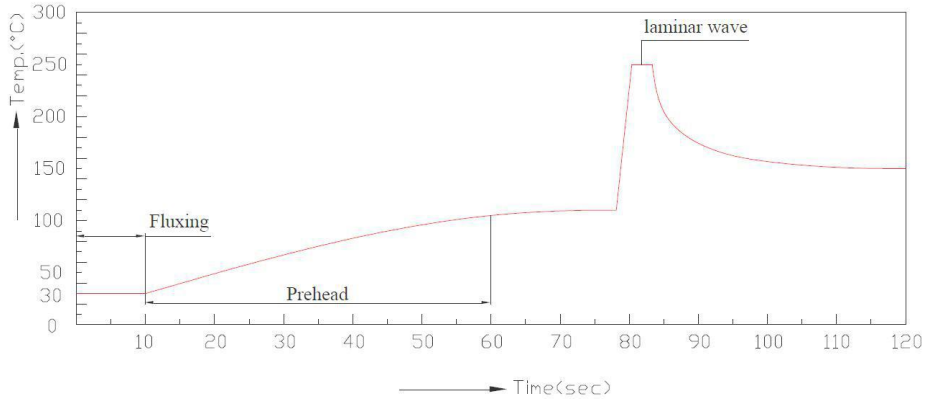
Soldering

1. Careful attention should be paid during soldering. When soldering, leave more than 3mm from solder joint to epoxy bulb, and soldering beyond the base of the tie bar is recommended.

2. Recommended soldering conditions:

Hand Soldering		DIP Soldering	
Temp. at tip of iron	300°C Max. (30W Max.)	Preheat temp.	100°C Max. (60 sec Max.)
Soldering time	3 sec Max.	Bath temp. & time	260 Max., 5 sec Max
Distance	3mm Min.(From solder joint to epoxy bulb)	Distance	3mm Min. (From solder joint to epoxy bulb)

3. Recommended soldering profile



4.Avoiding applying any stress to the lead frame while the Photodiode are at high temperature particularly when soldering.

5.Dip and hand soldering should not be done more than one time

6.After soldering the Photodiode, the epoxy bulb should be protected from mechanical shock or vibration until the Photodiode return to room temperature.

7.A rapid-rate process is not recommended for cooling the Photodiode down from the peak temperature.

8.Although the recommended soldering conditions are specified in the above table, dip or hand soldering at the lowest possible temperature is desirable for the Photodiode.

9.Wave soldering parameter must be set and maintain according to recommended temperature and dwell time in the solder wave.

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