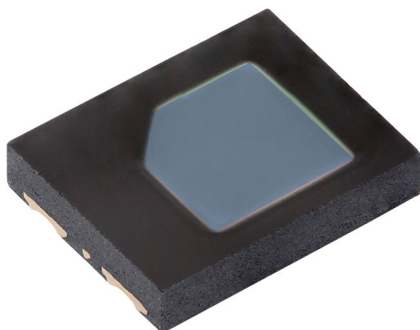




Ambient Light Sensor



DESCRIPTION

VEMD5510CF is a high speed and high sensitive PIN photodiode. It is a low profile surface-mount device (SMD) including the chip with a 7.5 mm² sensitive area detecting visible light much like the human eye. The diode has its peak sensitivity at 540 nm and a low capacitance.

FEATURES

- Package type: surface-mount
- Package form: top view
- Dimensions (L x W x H in mm): 5 x 4 x 0.9
- Radiant sensitive area (in mm²): 7.5
- Supression filter for infrared radiation
- Fast response times
- Angle of half sensitivity: $\varphi = \pm 65^\circ$
- Floor life: 72 h, MSL 4, according to J-STD-020
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

- Wearables
- Optical heart rate monitoring
- Ambient light sensors

PRODUCT SUMMARY

| COMPONENT | I_{ra} (μA) | φ (°) | $\lambda_{0.5}$ (nm) |
|------------|---------------|---------------|----------------------|
| VEMD5510CF | 0.25 | ± 65 | 440 to 620 |

Note

- Test conditions see table "Basic Characteristics"

ORDERING INFORMATION

| ORDERING CODE | PACKAGING | REMARKS | PACKAGE FORM |
|-----------------|---------------|------------------------------|--------------|
| VEMD5510CF | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Top view |
| VEMD5510CF-GS15 | Tape and reel | MOQ: 5000 pcs, 5000 pcs/reel | Top view |

Note

- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25^\circ\text{C}$, unless otherwise specified)

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|--|---|-------------|-------------|------------------|
| Reverse voltage | | V_R | 20 | V |
| Power dissipation | $T_{amb} \leq 25^\circ\text{C}$ | P_V | 215 | mW |
| Junction temperature | | T_j | 110 | $^\circ\text{C}$ |
| Operating temperature range | | T_{amb} | -40 to +100 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | -40 to +100 | $^\circ\text{C}$ |
| Soldering temperature | According to reflow solder profile Fig. 8 | T_{sd} | 260 | $^\circ\text{C}$ |
| Thermal resistance junction to ambient | | R_{thJA} | 350 | K/W |
| ESD safety HBM | ± 2000 V, 1.5 kΩ, 100 pF, 3 pulses | ESD_{HBM} | ≥ 2 | kV |



| BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|--|---|-----------------|------|------------|------|---------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Forward voltage | $I_F = 50\text{ mA}$ | V_F | - | 0.9 | 1.3 | V |
| Breakdown voltage | $I_R = 100\text{ }\mu\text{A}$, $E = 0$ | $V_{(BR)}$ | 20 | - | - | V |
| Reverse dark current | $V_R = 10\text{ V}$, $E = 0$ | I_{ro} | - | 0.2 | 10 | nA |
| Diode capacitance | $V_R = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0$ | C_D | - | 80 | - | pF |
| | $V_R = 3\text{ V}$, $f = 1\text{ MHz}$, $E = 0$ | C_D | - | 30 | 40 | pF |
| Open circuit voltage | $E_V = 100\text{ lx}$, CIE illuminant A | V_o | - | 210 | - | mV |
| Temperature coefficient of V_o | $E_V = 100\text{ lx}$, CIE illuminant A | TK_{V_o} | - | -2.3 | - | mV/K |
| Short circuit current | $E_V = 100\text{ lx}$, CIE illuminant A | I_k | - | 0.25 | - | μA |
| Reverse light current | $E_e = 0.2\text{ mW/cm}^2$, $\lambda = 525\text{ nm}$, $V_R = 5\text{ V}$ | I_{ra} | 1.35 | 2.1 | 3.05 | μA |
| | $E_V = 100\text{ lx}$, CIE illuminant A, $V_R = 5\text{ V}$ | I_{ra} | 0.16 | 0.25 | 0.39 | μA |
| Angle of half sensitivity | | ϕ | - | ± 65 | - | $^{\circ}$ |
| Wavelength of peak sensitivity | | λ_p | - | 540 | - | nm |
| Range of spectral bandwidth | | $\lambda_{0.5}$ | - | 440 to 620 | - | nm |
| Rise time | $V_R = 5\text{ V}$, $R_L = 50\text{ }\Omega$, $\lambda = 525\text{ nm}$ | t_r | - | 40 | - | ns |
| Fall time | $V_R = 5\text{ V}$, $R_L = 50\text{ }\Omega$, $\lambda = 525\text{ nm}$ | t_f | - | 30 | - | ns |

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

Basic characteristics graphs to be extended to $110\text{ }^{\circ}\text{C}$ ambient temperatures where applicable.

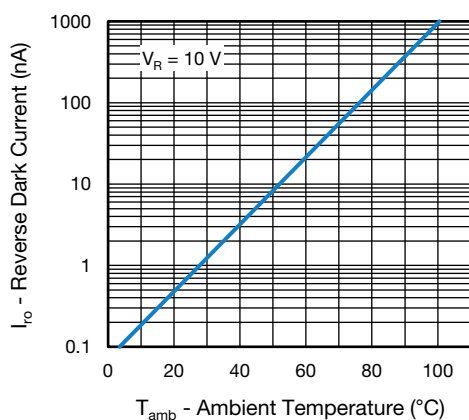


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

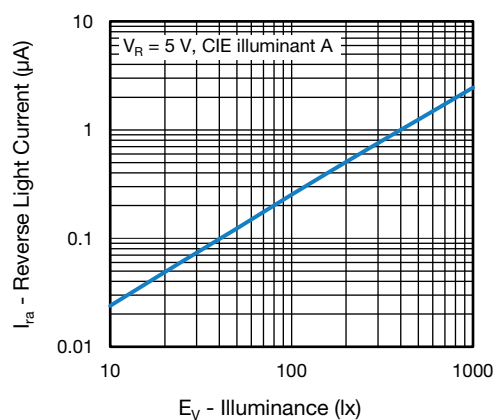


Fig. 2 - Reverse Light Current vs. Irradiance

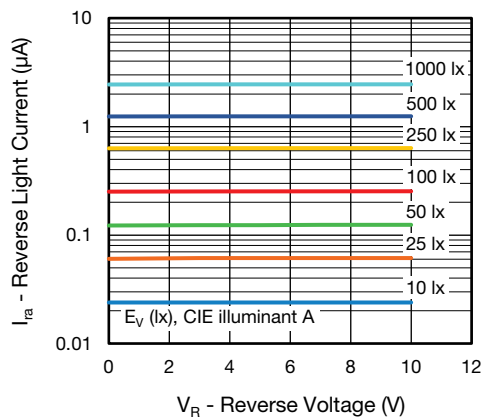


Fig. 3 - Reverse Light Current vs. Reverse Voltage

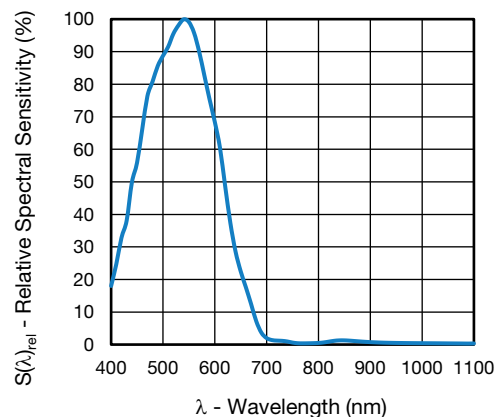


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

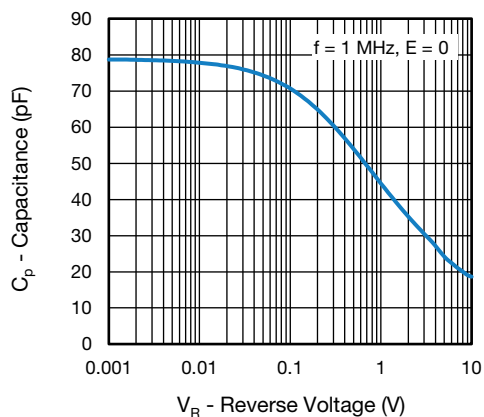


Fig. 4 - Diode Capacitance vs. Reverse Voltage

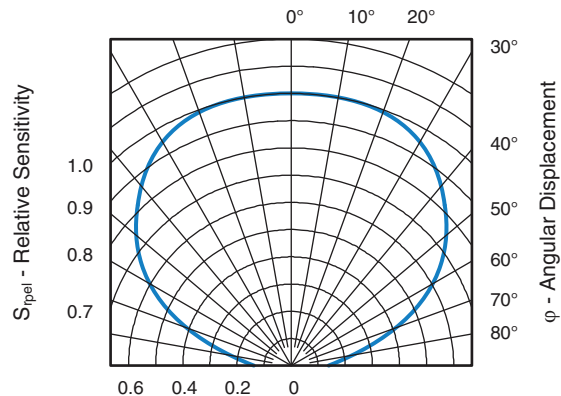



Fig. 6 - Relative Sensitivity vs. Angular Displacement

Figure 1 shows the dimensions of the device. The front view includes dimensions: 4, 1.8, 5, 3, 1.8, 2.1, and 3. The bottom view and top view are also shown. The top view includes the label 'Optical window'. A detail X (20:1) is shown, which is a tie bar, electrically connected to the cathode. The recommended footprint is shown with dimensions: 4.1, 5.2, 1, 0.65, 1.2, 0.8, 0.9, 1.2, 2.5, 3.1, 0.4 (4 x), 0.6 (4 x), 2, and 0.8. The footprint also includes labels for 'Cathode', 'Exposed pad (cathode)', 'Anode', and 'NC'.

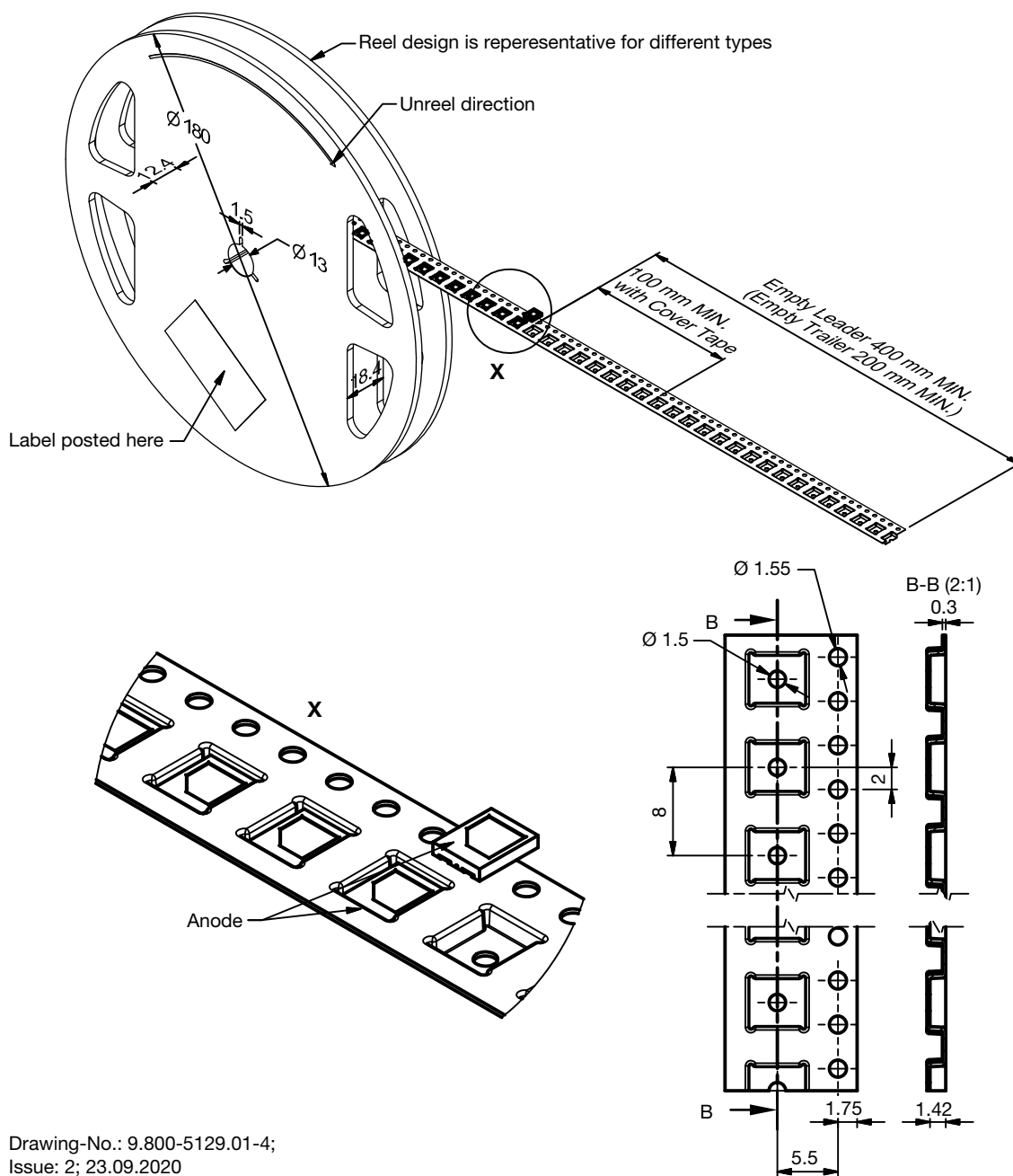
Not indicated tolerances ± 0.1



Technical drawings
according to DIN
specification



TAPE AND REEL DIMENSIONS in millimeters



Drawing-No.: 9.800-5129.01-4;
Issue: 2; 23.09.2020

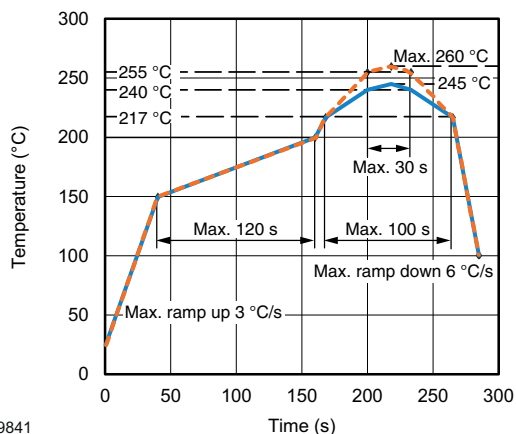
**SOLDER PROFILE**

Fig. 7 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020D

DRYPACK

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

FLOOR LIFE

Time between soldering and removing from MBB must not exceed the time indicated in J-STD-020:

Moisture sensitivity: level 4

Floor life: 72 h

Conditions: $T_{amb} < 30\text{ °C}$, $RH < 60\%$

DRYING

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or recommended conditions:

192 h at $40\text{ °C} (+ 5\text{ °C})$, $RH < 5\%$

or

96 h at $60\text{ °C} (+ 5\text{ °C})$, $RH < 5\%$.



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