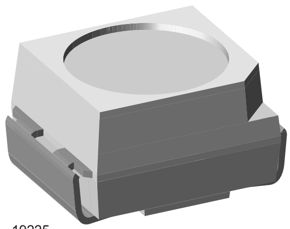
# Power SMD LED in PLCC-2 Package

## Description

The TLM.33.. series is an advanced modification of the Vishay TLM.31.. series. It is designed to incorporate larger chips, therefore, capable of withstanding a 50 mA drive current.

The package of the TLM.33.. is the PLCC-2 (equivalent to a size B tantalum capacitor).

It consists of a lead frame which is embedded in a white thermoplast. The reflector inside this package is filled up with clear epoxy.




e3 Pb Pb-free

## Features

- Utilizing (AS) AlInGaP technology
- Available in 8 mm tape
- Luninous intensity, color and forward voltage categorized per packing unit
- Luminous intensity ratio per packing unit $I_{Vmax}/I_{Vmin} \leq 1.6$
- Thermal resistance R = 400 K/W
- ESD class 2
- Suitable for all soldering methods according to CECC
- Lead-free device

## Applications

Traffic Signals and Signs

Interior and exterior lighting

Dashboard illumination

Indicator and backlighting purposes for audio, video, LCD's switches, symbols, illuminated advertising etc.

## Parts Table

| Part | Color, Luminous Intensity | Angle of Half Intensity ($\pm\varphi$) | Technology |
|---|---|---|---|
| TLMK3300 | Red, $I_V$ > 200 mcd | 60 ° | AlInGaP on GaAs |
| TLMK3301 | Red, $I_V$ = (250 to 800) mcd | 60 ° | AlInGaP on GaAs |
| TLMK3302 | Red, $I_V$ = (400 to 800) mcd | 60 ° | AlInGaP on GaAs |
| TLMK3303 | Red, $I_V$ = (400 to 1250) mcd | 60 ° | AlInGaP on GaAs |
| TLMS3300 | Red, $I_V$ > 160 mcd | 60 ° | AlInGaP on GaAs |
| TLMS3301 | Red, $I_V$ = (160 to 400) mcd | 60 ° | AlInGaP on GaAs |
| TLMS3302 | Red, $I_V$ = (250 to 800) mcd | 60 ° | AlInGaP on GaAs |
| TLMO3300 | Soft orange, $I_V$ > 200 mcd | 60 ° | AlInGaP on GaAs |
| TLMO3301 | Soft orange, $I_V$ = (250 to 640) mcd | 60 ° | AlInGaP on GaAs |
| TLMO3302 | Soft orange, $I_V$ = (320 to 800) mcd | 60 ° | AlInGaP on GaAs |

| Part | Color, Luminous Intensity | Angle of Half Intensity ($\pm\varphi$) | Technology |
|---|---|---|---|
| TLMO3303 | Soft orange, $I_V$ = (400 to 1250) mcd | 60 ° | AlInGaP on GaAs |
| TLMY3300 | Yellow, $I_V$ > 200 mcd | 60 ° | AlInGaP on GaAs |
| TLMY3301 | Yellow, $I_V$ = (250 to 640) mcd | 60 ° | AlInGaP on GaAs |
| TLMY3302 | Yellow, $I_V$ = (320 to 800) mcd | 60 ° | AlInGaP on GaAs |
| TLMY3303 | Yellow, $I_V$ = (400 to 1250) mcd | 60 ° | AlInGaP on GaAs |

## Absolute Maximum Ratings

$T_{amb}$ = 25 °C, unless otherwise specified

**TLMY33.., TLMO33.., TLMK33.., TLMS33..**

| Parameter | Test condition | Symbol | Value | Unit |
|---|---|---|---|---|
| Reverse voltage | | $V_R$ | 5 | V |
| DC Forward current | $T_{amb} \leq 73$ °C (400 K/W) | $I_F$ | 50 | mA |
| Power dissipation | $T_{amb} \leq 73$ °C (400 K/W) | $P_V$ | 130 | mW |
| Junction temperature | | $T_j$ | 125 | °C |
| Operating temperature range | | $T_{amb}$ | - 40 to + 100 | °C |
| Storage temperature range | | $T_{stg}$ | - 40 to + 100 | °C |
| Soldering temperature | $t \leq 5$ s | $T_{sd}$ | 260 | °C |
| Thermal resistance junction/ ambient | mounted on PC board (pad size > 16 $mm^2$) | $R_{thJA}$ | 400 | K/W |

## Optical and Electrical Characteristics

$T_{amb}$ = 25 °C, unless otherwise specified

## Red

**TLMK33..**

| Parameter | Test condition | Part | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Luminous intensity | $I_F$ = 50 mA | TLMK3300 | $I_V$ | 200 | 500 | | mcd |
| | | TLMK3301 | $I_V$ | 250 | | 800 | mcd |
| | | TLMK3302 | $I_V$ | 400 | | 800 | mcd |
| | | TLMK3303 | $I_V$ | 400 | | 1250 | mcd |
| Luminous flux/Luminous intensity | | | $\phi_V/I_V$ | | 3 | | mlm/ mcd |
| Dominant wavelength | $I_F$ = 50 mA | | $\lambda_d$ | 611 | 617 | 622 | nm |
| Peak wavelength | $I_F$ = 50 mA | | $\lambda_p$ | | 624 | | nm |
| Spectral bandwidth at 50 % $I_{rel\ max}$ | $I_F$ = 50 mA | | $\Delta\lambda$ | | 18 | | nm |
| Angle of half intensity | $I_F$ = 50 mA | | $\varphi$ | | ± 60 | | deg |
| Forward voltage | $I_F$ = 50 mA | | $V_F$ | 1.85 | 2.1 | 2.55 | V |
| Reverse current | $V_R$ = 5 V | | $V_R$ | | 0.01 | 10 | µA |

## Red

**TLMS33..**

| Parameter | Test condition | Part | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Luminous intensity | $I_F$ = 50 mA | TLMS3300 | $I_V$ | 160 | 300 | | mcd |
| | | TLMS3301 | $I_V$ | 160 | | 400 | mcd |
| | | TLMS3302 | $I_V$ | 250 | | 800 | mcd |
| Luminous flux/Luminous intensity | | | $\phi_V/I_V$ | | 3 | | mlm/mcd |
| Dominant wavelength | $I_F$ = 50 mA | | $\lambda_d$ | 626 | 630 | 638 | nm |
| Peak wavelength | $I_F$ = 50 mA | | $\lambda_p$ | | 641 | | nm |
| Spectral bandwidth at 50 % $I_{rel\ max}$ | $I_F$ = 50 mA | | $\Delta\lambda$ | | 17 | | nm |
| Angle of half intensity | $I_F$ = 50 mA | | $\varphi$ | | ± 60 | | deg |
| Forward voltage | $I_F$ = 50 mA | | $V_F$ | 1.85 | 2.1 | 2.55 | V |
| Reverse current | $V_R$ = 5 V | | $V_R$ | | 0.01 | 10 | μA |

## Soft Orange

**TLMO33..**

| Parameter | Test condition | Part | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Luminous intensity | $I_F$ = 50 mA | TLMO3300 | $I_V$ | 200 | 500 | | mcd |
| | | TLMO3301 | $I_V$ | 250 | | 640 | mcd |
| | | TLMO3302 | $I_V$ | 320 | | 800 | mcd |
| | | TLMO3303 | $I_V$ | 400 | | 1250 | mcd |
| Luminous flux/Luminous intensity | | | $\phi_V/I_V$ | | 3 | | mlm/mcd |
| Dominant wavelength | $I_F$ = 50 mA | | $\lambda_d$ | 600 | 605 | 611 | nm |
| Peak wavelength | $I_F$ = 50 mA | | $\lambda_p$ | | 611 | | nm |
| Spectral bandwidth at 50 % $I_{rel\ max}$ | $I_F$ = 50 mA | | $\Delta\lambda$ | | 17 | | nm |
| Angle of half intensity | $I_F$ = 50 mA | | $\varphi$ | | ± 60 | | deg |
| Forward voltage | $I_F$ = 50 mA | | $V_F$ | 1.85 | 2.1 | 2.55 | V |
| Reverse current | $V_R$ = 5 V | | $V_R$ | | 0.01 | 10 | μA |

## Yellow

**TLMY33..**

| Parameter | Test condition | Part | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Luminous intensity | $I_F$ = 50 mA | TLMY3300 | $I_V$ | 200 | 450 | | mcd |
| | | TLMY3301 | $I_V$ | 250 | | 640 | mcd |
| | | TLMY3302 | $I_V$ | 320 | | 800 | mcd |
| | | TLMY3303 | $I_V$ | 400 | | 1250 | mcd |
| Luminous flux/Luminous intensity | | | $\phi_V/I_V$ | | 3 | | mlm/mcd |
| Dominant wavelength | $I_F$ = 50 mA | | $\lambda_d$ | 583 | 588 | 594 | nm |
| Peak wavelength | $I_F$ = 50 mA | | $\lambda_p$ | | 590 | | nm |
| Spectral bandwidth at 50 % $I_{rel\ max}$ | $I_F$ = 50 mA | | $\Delta\lambda$ | | 18 | | nm |
| Angle of half intensity | $I_F$ = 50 mA | | $\varphi$ | | ± 60 | | deg |
| Forward voltage | $I_F$ = 50 mA | | $V_F$ | 1.85 | 2.1 | 2.55 | V |
| Reverse current | $V_R$ = 5 V | | $V_R$ | | 0.01 | 10 | µA |

## Forward Voltage Classification

| Group | Forward Voltage (V) | |
|---|---|---|
| | min | max |
| 1 | 1.85 | 2.25 |
| 2 | 2.15 | 2.55 |

## Color Classification

| Group | Dominant Wavelength (nm) | | | | | |
|---|---|---|---|---|---|---|
| | Red | | Soft Orange | | Yellow | |
| | min | max | min | max | min | max |
| 1 | 611 | 618 | 598 | 601 | 581 | 584 |
| 2 | 614 | 622 | 600 | 603 | 583 | 586 |
| 3 | | | 602 | 605 | 585 | 588 |
| 4 | | | 604 | 607 | 587 | 590 |
| 5 | | | 606 | 609 | 589 | 592 |
| 6 | | | 608 | 611 | 591 | 594 |

## Luminous Intensity Classification

| Group | Luminous Intensity (mcd) | |
|---|---|---|
| | min | max |
| Xa | 160 | 250 |
| Xb | 200 | 320 |
| Ya | 250 | 400 |
| Yb | 320 | 500 |
| Za | 400 | 630 |
| Zb | 500 | 800 |
| 0a | 630 | 1000 |
| 0b | 800 | 1250 |

## Group Name on Label

| Luminous Intensity Group | Halfgroup | Wavelength | Forward Voltage |
|---|---|---|---|
| Z | b | 2 | 1 |

One packing unit/tape contains only one classification group of luminous intensity, color and forward voltage

Only one single classification groups is not available

The given groups are not order codes, customer specific group combinations require marketing agreement

No color subgrouping for Super Red

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

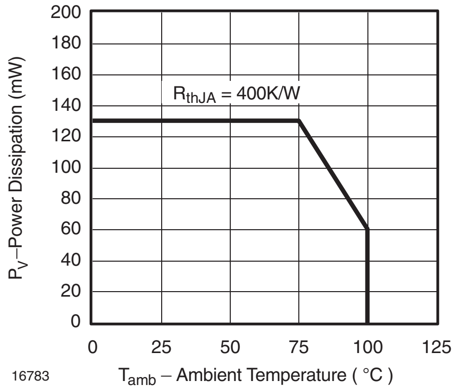



Figure 1. Power Dissipation vs. Ambient Temperature

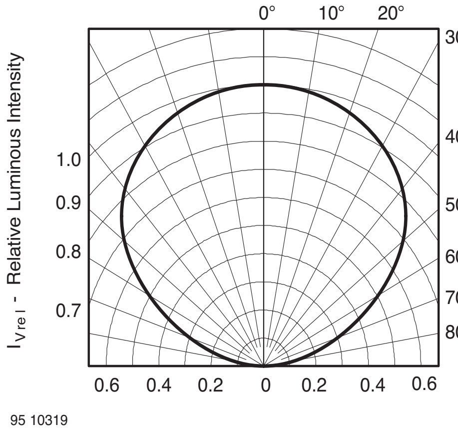



Figure 3. Rel. Luminous Intensity vs. Angular Displacement

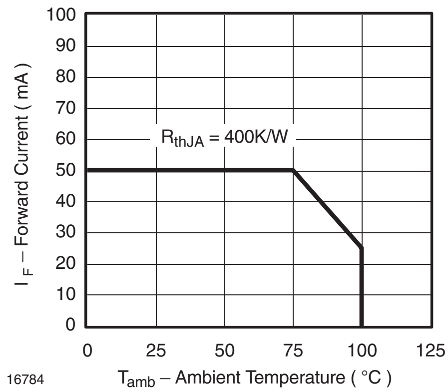



Figure 2. Forward Current vs. Ambient Temperature

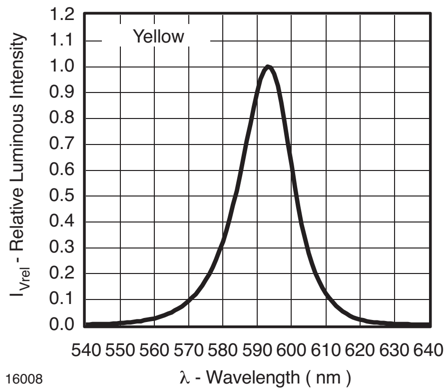



Figure 4. Relative Intensity vs. Wavelength

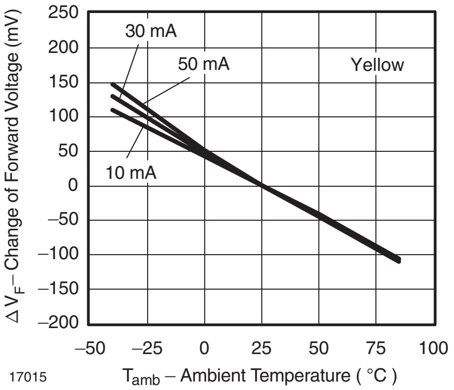



Figure 5. Change of Forward Voltage vs. Ambient Temperature

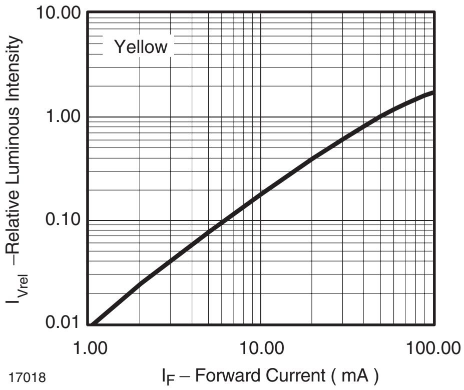



Figure 8. Relative Luminous Intensity vs. Forward Current

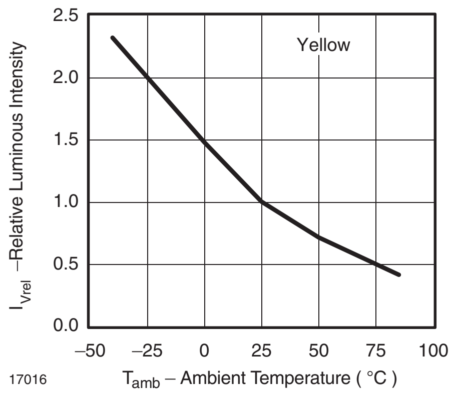



Figure 6. Relative Luminous Intensity vs. Amb. Temperature

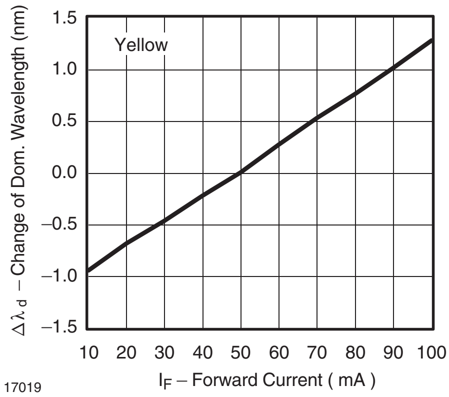



Figure 9. Change of Dominant Wavelength vs. Forward Current

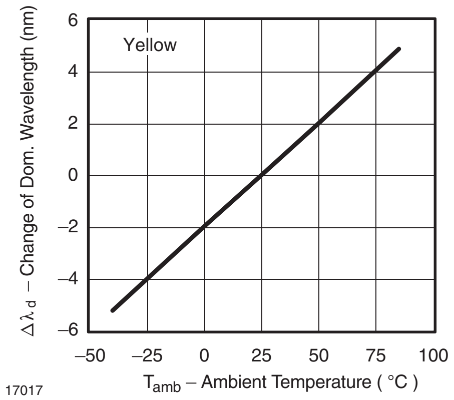



Figure 7. Change of Dominant Wavelength vs. Ambient Temperature

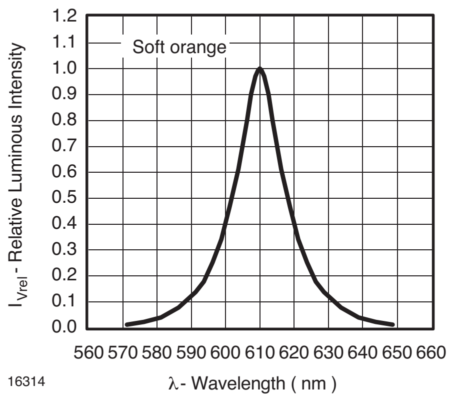



Figure 10. Relative Intensity vs. Wavelength

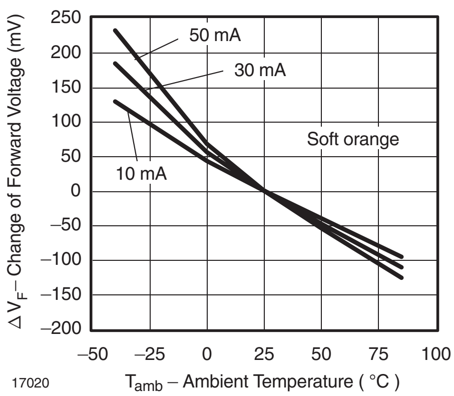



Figure 11. Change of Forward Voltage vs. Ambient Temperature

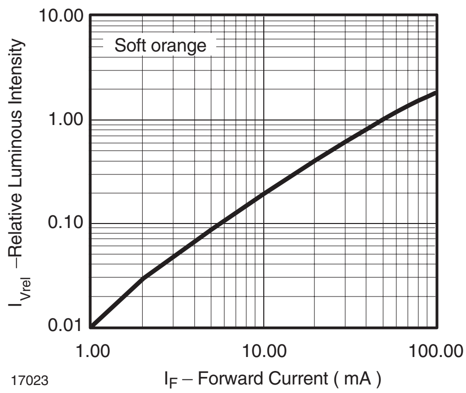



Figure 14. Relative Luminous Intensity vs. Forward Current

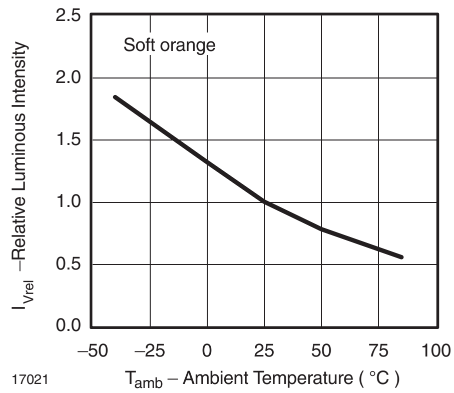



Figure 12. Relative Luminous Intensity vs. Amb. Temperature

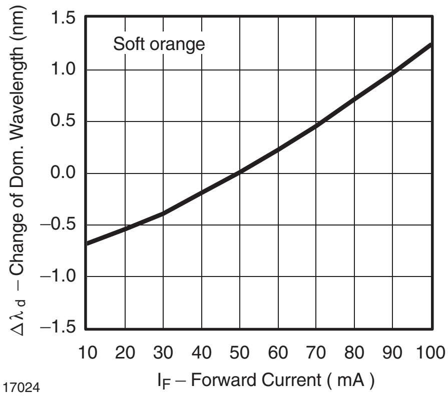



Figure 15. Change of Dominant Wavelength vs. Forward Current

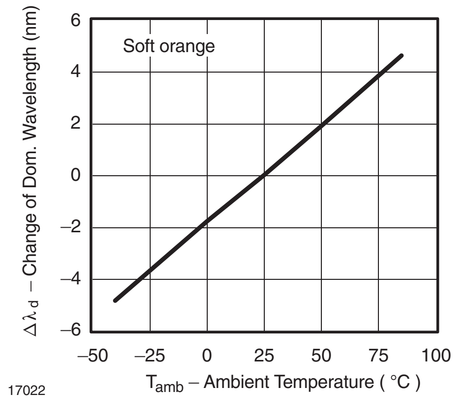



Figure 13. Change of Dominant Wavelength vs. Ambient Temperature

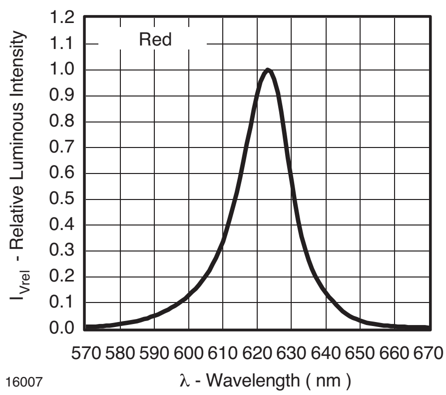



Figure 16. Relative Intensity vs. Wavelength

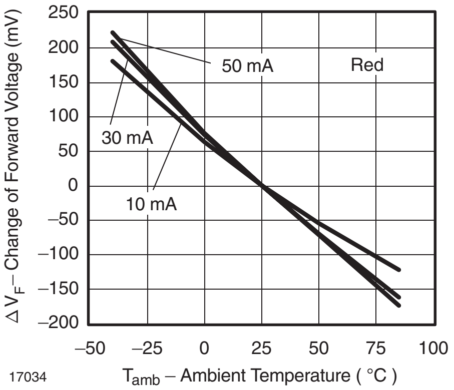



Figure 17. Change of Forward Voltage vs. Ambient Temperature

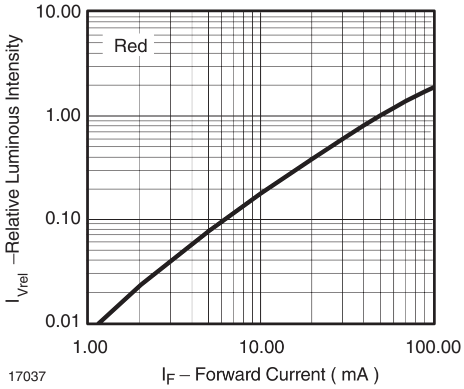



Figure 20. Relative Luminous Intensity vs. Forward Current

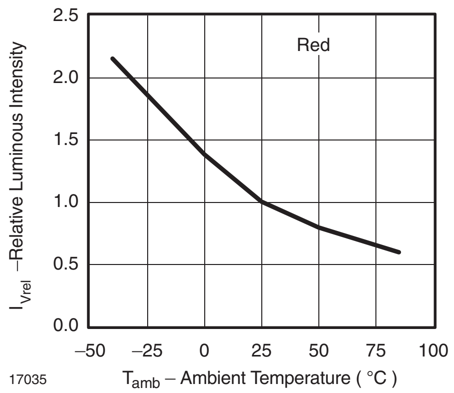



Figure 18. Relative Luminous Intensity vs. Amb. Temperature

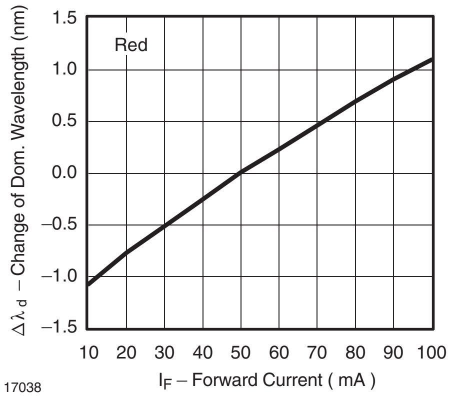



Figure 21. Change of Dominant Wavelength vs. Forward Current

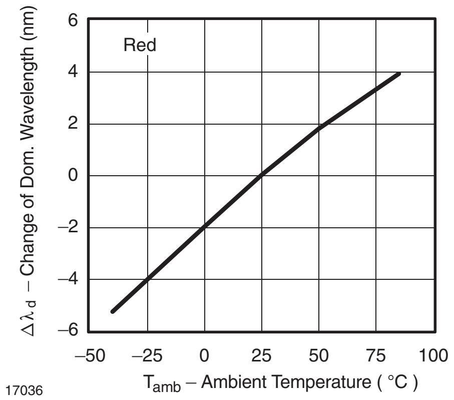



Figure 19. Change of Dominant Wavelength vs. Ambient Temperature

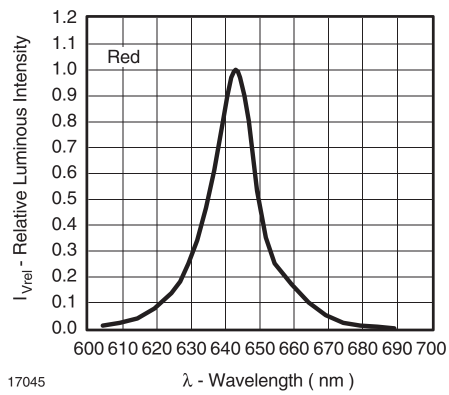



Figure 22. Relative Intensity vs. Wavelength

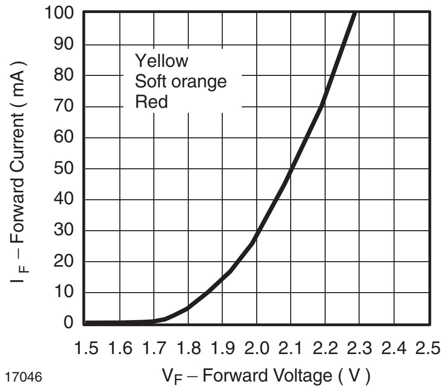



Figure 23. Forward Current vs. Forward Voltage

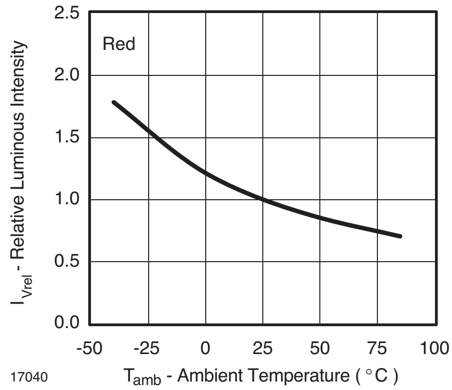



Figure 26. Relative Luminous Intensity vs. Amb. Temperature

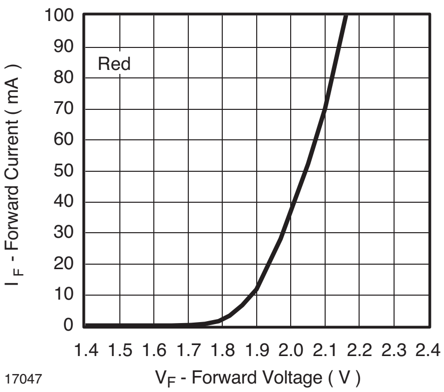



Figure 24. Forward Current vs. Forward Voltage

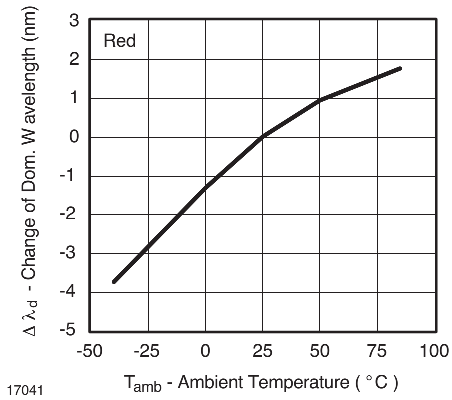



Figure 27. Change of Dominant Wavelength vs. Ambient Temperature

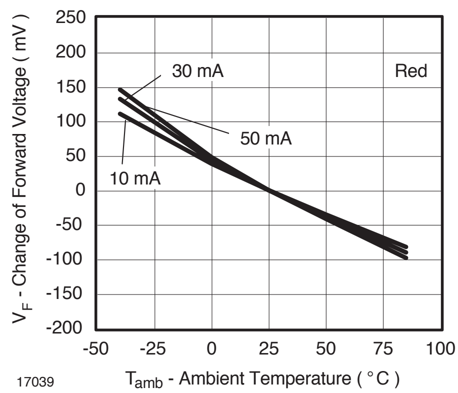



Figure 25. Change of Forward Voltage vs. Ambient Temperature

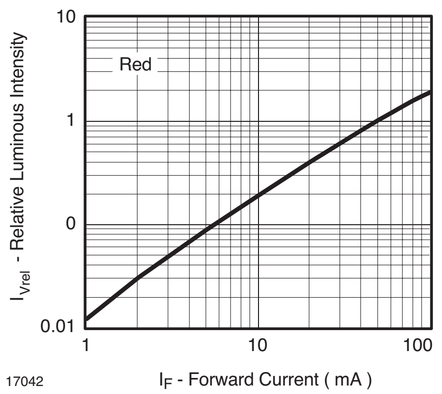



Figure 28. Relative Luminous Intensity vs. Forward Current

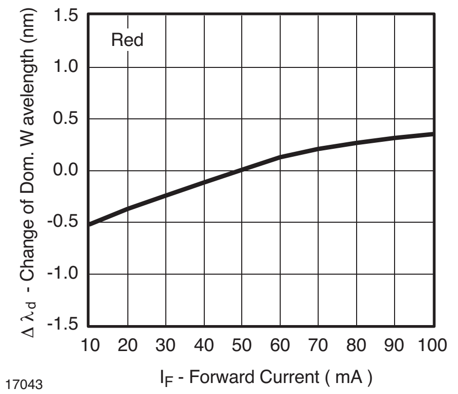



Figure 29. Change of Dominant Wavelength vs. Forward Current

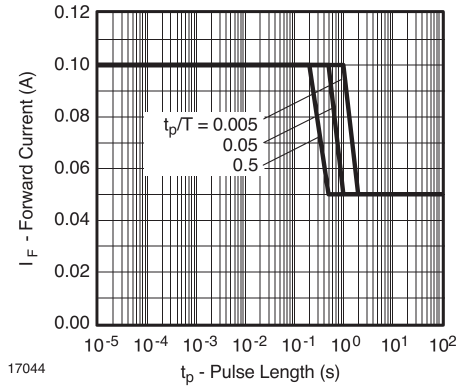
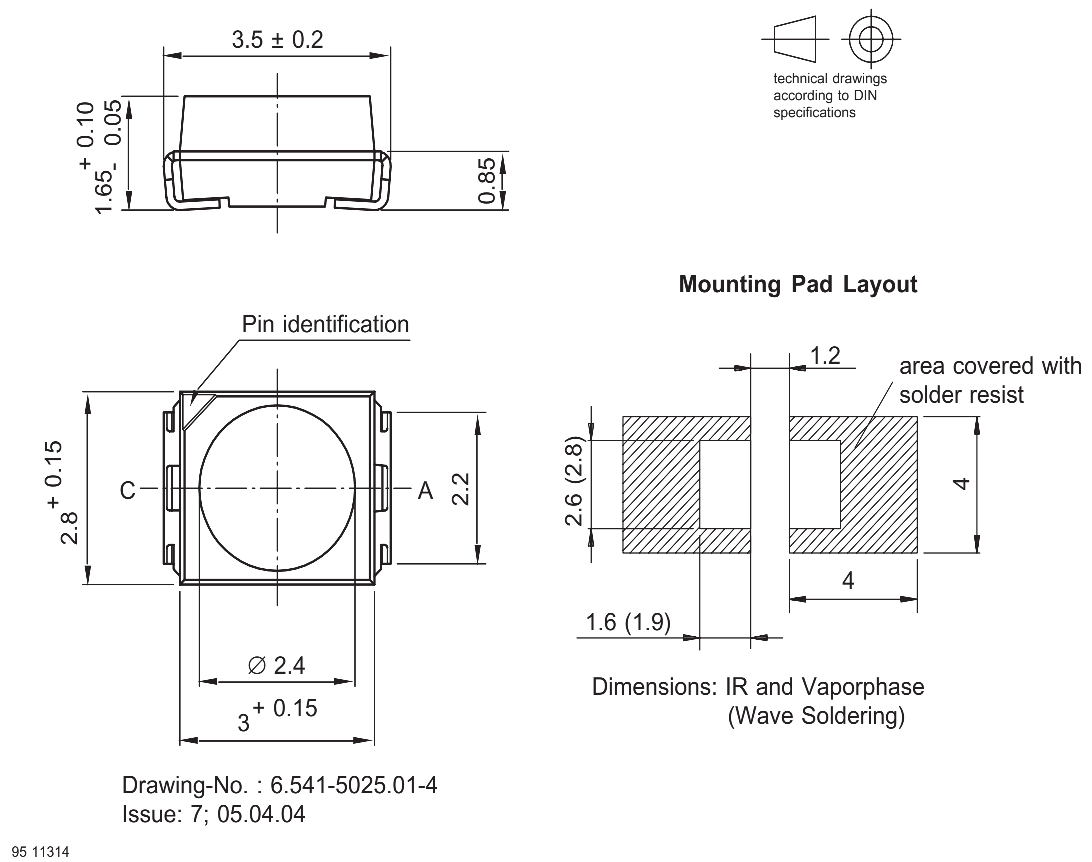



Figure 30. Forward Current vs. Pulse Length

## Package 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 operatingsystems 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.



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