# TLWB / BG / O / R / TG / W / Y7900

Vishay Semiconductors

# TELUX™ LED

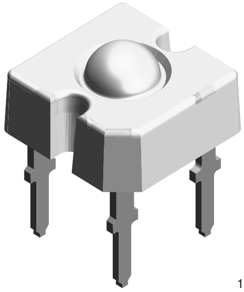
## Description

The TELUX™ series is a clear, non diffused LED for high end applications where supreme luminous flux is required.

It is designed in an industry standard 7.62 mm square package utilizing highly developed (AS) AlInGaP and InGaN technologies.

The supreme heat dissipation of TELUX™ allows applications at high ambient temperatures.

All packing units are binned for luminous flux and color to achieve best homogenous light appearance in application.



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## Features

- Utilizing (AS) AlInGaP and InGaN technologies
- High luminous flux
- Supreme heat dissipation: $R_{thJP}$ is 90 K/W
- High operating temperature: $T_{amb}$ = - 40 to + 110 °C
- Type TLWR meets SAE and ECE color requirements
- Packed in tubes for automatic insertion
- Luminous flux and color categorized for each tube
- Small mechanical tolerances allow precise usage of external reflectors or lightguides
- TLWR and TLWY types additionally forward voltage categorized
- ESD-withstand voltage: > 2 kV acc. to MIL STD 883 D, Method 3015.7 for AlInGaP, > 1 kV for InGaN

## Applications

Exterior lighting

Dashboard illumination

Tail-, Stop - and Turn Signals of motor vehicles

Replaces incandescent lamps

Traffic signals and signs

## Parts Table

| Part | Color, Luminous Intensity | Angle of Half Intensity (±φ) | Technology |
|---|---|---|---|
| TLWR7900 | Red, $\phi_V$ = 2100 mlm (typ.) | 45 ° | AlInGaP on GaAs |
| TLWO7900 | Softorange,<br>$\phi_V$ = 2100 mlm (typ.) | 45 ° | AlInGaP on GaAs |
| TLWY7900 | Yellow, $\phi_V$ = 1400 mlm (typ.) | 45 ° | AlInGaP on GaAs |
| TLWTG7900 | True green, $\phi_V$ = 900 mlm (typ.) | 45 ° | InGaN on SiC |
| TLWBG7900 | Blue green, $\phi_V$ = 700 mlm (typ.) | 45 ° | InGaN on SiC |
| TLWB7900 | Blue, $\phi_V$ = 330 mlm (typ.) | 45 ° | InGaN on SiC |
| TLWW7900 | White, $\phi_V$ = 650 mlm (typ.) | 45 ° | InGaN / YAG on SiC |

## Absolute Maximum Ratings

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

**TLWR7900 , TLWO7900 , TLWY7900**

| Parameter | Test condition | Symbol | Value | Unit |
|---|---|---|---|---|
| Reverse voltage | $I_R = 10\ \mu A$ | $V_R$ | 10 | V |
| DC Forward current | $T_{amb} \leq 85\ °C$ | $I_F$ | 70 | mA |
| Surge forward current | $t_p \leq 10\ \mu s$ | $I_{FSM}$ | 1 | A |
| Power dissipation | $T_{amb} \leq 85\ °C$ | $P_V$ | 187 | mW |
| Junction temperature | | $T_j$ | 125 | °C |
| Operating temperature range | | $T_{amb}$ | - 40 to + 110 | °C |
| Storage temperature range | | $T_{stg}$ | - 55 to + 110 | °C |
| Soldering temperature | t ≤ 5 s, 1.5 mm from body preheat temperature 100 °C/ 30 sec. | $T_{sd}$ | 260 | °C |
| Thermal resistance junction/ ambient | with cathode heatsink of 70 $mm^2$ | $R_{thJA}$ | 200 | K/W |
| Thermal resistance junction/pin | | $R_{thJP}$ | 90 | K/W |

**TLWTG7900 , TLWBG7900 , TLWB7900 , TLWW7900**

| Parameter | Test condition | Symbol | Value | Unit |
|---|---|---|---|---|
| Reverse voltage | $I_R = 10\ \mu A$ | $V_R$ | 5 | V |
| DC Forward current | $T_{amb} \leq 50\ °C$ | $I_F$ | 50 | mA |
| Surge forward current | $t_p \leq 10\ \mu s$ | $I_{FSM}$ | 0.1 | A |
| Power dissipation | $T_{amb} \leq 50\ °C$ | $P_V$ | 230 | mW |
| | | $P_V$ | 230 | mW |
| | | $P_V$ | 230 | mW |
| | | $P_V$ | 255 | mW |
| Junction temperature | | $T_j$ | 100 | °C |
| Operating temperature range | | $T_{amb}$ | - 40 to + 100 | °C |
| Storage temperature range | | $T_{stg}$ | - 55 to + 100 | °C |
| Soldering temperature | t ≤ 5 s, 1.5 mm from body preheat temperature 100 °C/ 30 sec. | $T_{sd}$ | 260 | °C |
| Thermal resistance junction/ ambient | with cathode heatsink of 70 $mm^2$ | $R_{thJA}$ | 200 | K/W |
| Thermal resistance junction/pin | | $R_{thJP}$ | 90 | K/W |

## Optical and Electrical Characteristics

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

## Red

**TLWR7900**

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Total flux | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\phi_V$ | 1500 | 2100 | 3000 | mlm |
| Luminous intensity/Total flux | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $I_V/\phi_V$ | | 0.7 | | mcd/mlm |
| Dominant wavelength | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\lambda_d$ | 611 | 618 | 634 | nm |
| Peak wavelength | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\lambda_p$ | | 624 | | nm |
| Angle of half intensity | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\varphi$ | | ± 45 | | deg |
| Total included angle | 90 % of Total Flux Captured | $\varphi$ | | 100 | | deg |
| Forward voltage | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $V_F$ | 1.83 | 2.2 | 2.67 | V |

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Reverse voltage | $I_R = 10\ \mu A$ | $V_R$ | 10 | 20 |  | V |
| Junction capacitance | $V_R = 0$, f = 1 MHz | $C_j$ |  | 17 |  | pF |
| Temperature coefficient of $\lambda_{dom}$ | $I_F = 50$ mA | $TC_{\lambda dom}$ |  | 0.05 |  | nm/K |

## Soft Orange

**TLWO7900**

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Total flux | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\phi_V$ | 1500 | 2100 | 3000 | mlm |
| Luminous intensity/Total flux | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $I_V/\phi_V$ |  | 0.7 |  | mcd/mlm |
| Dominant wavelength | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\lambda_d$ | 598 | 605 | 611 | nm |
| Peak wavelength | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\lambda_p$ |  | 610 |  | nm |
| Angle of half intensity | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\varphi$ |  | ± 45 |  | deg |
| Total included angle | 90 % of Total Flux Captured | $\varphi$ |  | 100 |  | deg |
| Forward voltage | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $V_F$ | 1.83 | 2.2 | 2.67 | V |
| Reverse voltage | $I_R = 10\ \mu A$ | $V_R$ | 10 | 20 |  | V |
| Junction capacitance | $V_R = 0$, f = 1 MHz | $C_j$ |  | 17 |  | pF |
| Temperature coefficient of $\lambda_{dom}$ | $I_F = 50$ mA | $TC_{\lambda dom}$ |  | 0.06 |  | nm/K |

## Yellow

**TLWY7900**

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Total flux | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\phi_V$ | 1000 | 1400 | 2400 | mlm |
| Luminous intensity/Total flux | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $I_V/\phi_V$ |  | 0.7 |  | mcd/mlm |
| Dominant wavelength | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\lambda_d$ | 585 | 592 | 597 | nm |
| Peak wavelength | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\lambda_p$ |  | 594 |  | nm |
| Angle of half intensity | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $\varphi$ |  | ± 45 |  | deg |
| Total included angle | 90 % of Total Flux Captured | $\varphi$ |  | 100 |  | deg |
| Forward voltage | $I_F = 70$ mA, $R_{thJA} = 200$ °K/W | $V_F$ | 1.83 | 2.1 | 2.67 | V |
| Reverse voltage | $I_R = 10\ \mu A$ | $V_R$ | 10 | 15 |  | V |
| Junction capacitance | $V_R = 0$, f = 1 MHz | $C_j$ |  | 32 |  | pF |
| Temperature coefficient of $\lambda_{dom}$ | $I_F = 50$ mA | $TC_{\lambda dom}$ |  | 0.1 |  | nm/K |

## True green

**TLWTG7900**

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Total flux | $I_F = 50$ mA, $R_{thJA} = 200$ °K/W | $\phi_V$ | 630 | 900 | 1800 | mlm |
| Luminous intensity/Total flux | $I_F = 50$ mA, $R_{thJA} = 200$ °K/W | $I_V/\phi_V$ |  | 0.7 |  | mcd/mlm |
| Dominant wavelength | $I_F = 50$ mA, $R_{thJA} = 200$ °K/W | $\lambda_d$ | 509 | 523 | 529 | nm |
| Peak wavelength | $I_F = 50$ mA, $R_{thJA} = 200$ °K/W | $\lambda_p$ |  | 518 |  | nm |
| Angle of half intensity | $I_F = 50$ mA, $R_{thJA} = 200$ °K/W | $\varphi$ |  | ± 45 |  | deg |
| Total included angle | 90 % of Total Flux Captured | $\varphi$ |  | 100 |  | deg |
| Forward voltage | $I_F = 50$ mA, $R_{thJA} = 200$ °K/W | $V_F$ |  | 4.2 | 4.7 | V |
| Reverse voltage | $I_R = 10\ \mu A$ | $V_R$ | 5 | 10 |  | V |
| Junction capacitance | $V_R = 0$, f = 1 MHz | $C_j$ |  | 50 |  | pF |
| Temperature coefficient of $\lambda_{dom}$ | $I_F = 30$ mA | $TC_{\lambda dom}$ |  | 0.02 |  | nm/K |

## Blue green

**TLWBG7900**

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Total flux | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\phi_V$ | 400 | 700 | 1250 | mlm |
| Luminous intensity/Total flux | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $I_V/\phi_V$ |  | 0.7 |  | mcd/mlm |
| Dominant wavelength | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\lambda_d$ | 492 | 505 | 510 | nm |
| Peak wavelength | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\lambda_p$ |  | 503 |  | nm |
| Angle of half intensity | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\varphi$ |  | ± 45 |  | deg |
| Total included angle | 90 % of Total Flux Captured | $\varphi$ |  | 100 |  | deg |
| Forward voltage | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $V_F$ |  | 4.2 | 4.7 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 5 | 10 |  | V |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | $C_j$ |  | 50 |  | pF |
| Temperature coefficient of $\lambda_{dom}$ | $I_F$ = 30 mA | $TC_{\lambda dom}$ |  | 0.02 |  | nm/K |

## Blue

**TLWB7900**

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Total flux | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\phi_V$ | 200 | 330 | 630 | mlm |
| Luminous intensity/Total flux | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $I_V/\phi_V$ |  | 0.7 |  | mcd/mlm |
| Dominant wavelength | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\lambda_d$ | 462 | 470 | 476 | nm |
| Peak wavelength | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\lambda_p$ |  | 460 |  | nm |
| Angle of half intensity | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\varphi$ |  | ± 45 |  | deg |
| Total included angle | 90 % of Total Flux Captured | $\varphi$ |  | 100 |  | deg |
| Forward voltage | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $V_F$ |  | 4.3 | 4.7 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 5 | 10 |  | V |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | $C_j$ |  | 50 |  | pF |
| Temperature coefficient of $\lambda_{dom}$ | $I_F$ = 30 mA | $TC_{\lambda dom}$ |  | 0.03 |  | nm/K |

## White

**TLWW7900**

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Total flux | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\phi_V$ | 400 | 650 | 1250 | mlm |
| Luminous intensity/Total flux | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $I_V/\phi_V$ |  | 0.7 |  | mcd/mlm |
| Color temperature | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $T_K$ |  | 5500 |  | K |
| Angle of half intensity | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $\varphi$ |  | ± 45 |  | deg |
| Total included angle | 90 % of Total Flux Captured | $\varphi$ |  | 100 |  | deg |
| Forward voltage | $I_F$ = 50 mA, $R_{thJA}$ = 200 °K/W | $V_F$ |  | 4.3 | 5.1 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 5 | 10 |  | V |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | $C_j$ |  | 50 |  | pF |

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

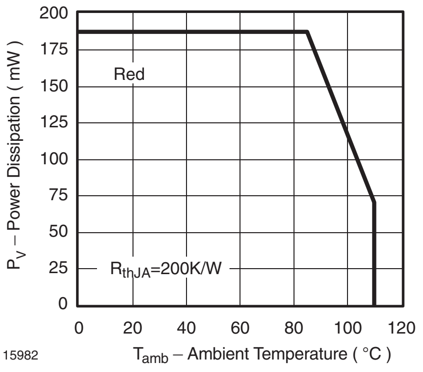


Figure 1. Power Dissipation vs. Ambient Temperature

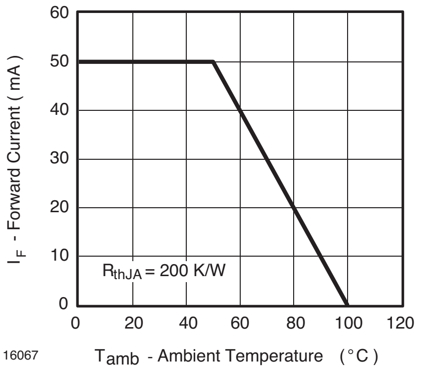


Figure 4. Forward Current vs. Ambient Temperature for InGaN

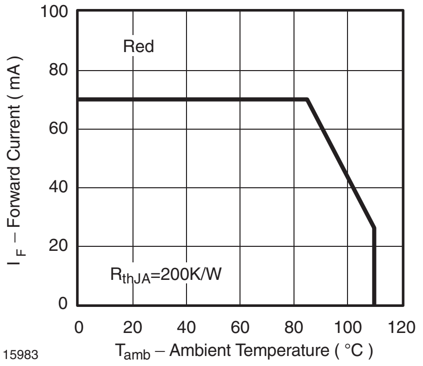


Figure 2. Forward Current vs. Ambient Temperature

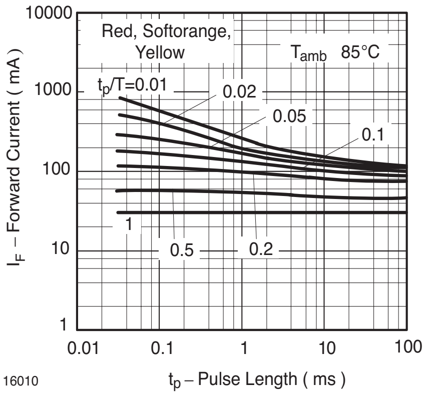


Figure 5. Forward Current vs. Pulse Length

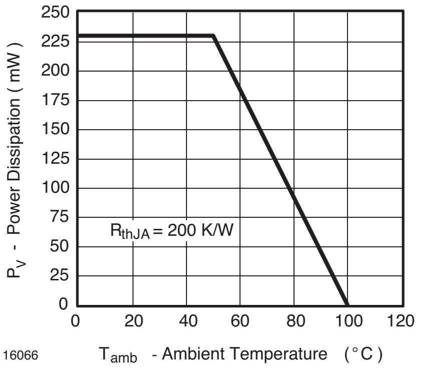


Figure 3. Power Dissipation vs. Ambient Temperature for InGaN

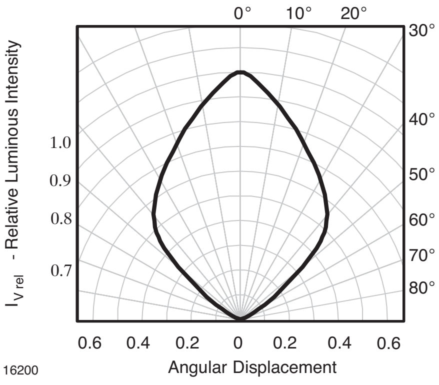


Figure 6. Rel. Luminous Intensity vs. Angular Displacement

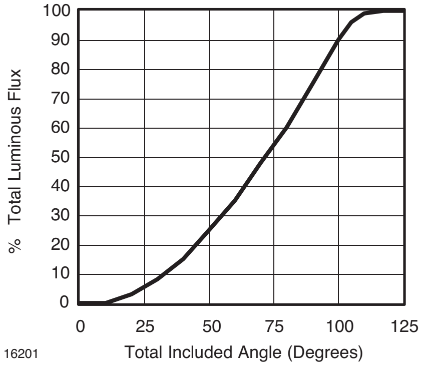


Figure 7. Percentage Total Luminous Flux vs. Total Included Angle for 90 ° emission angle

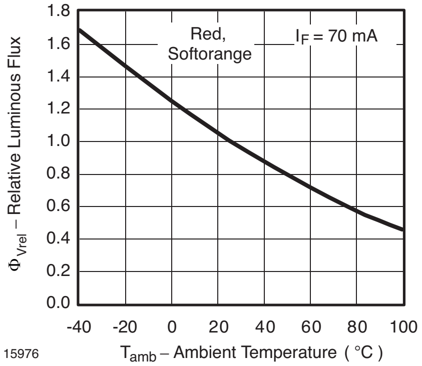


Figure 10. Rel. Luminous Flux vs. Ambient Temperature

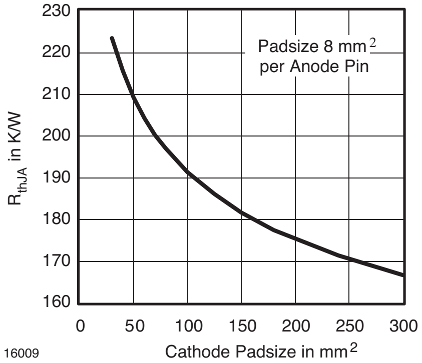


Figure 8. Thermal Resistance Junction Ambient vs. Cathode Padsize

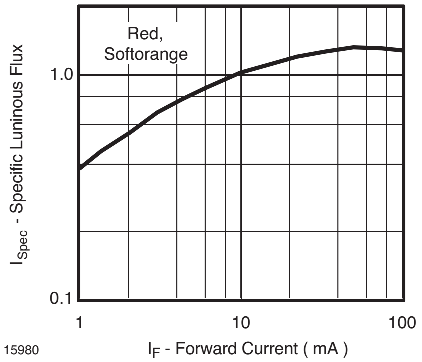


Figure 11. Specific Luminous Flux vs. Forward Current

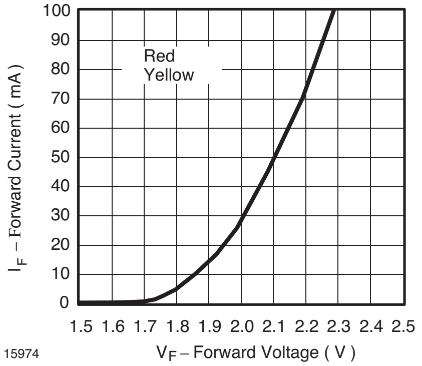


Figure 9. Forward Current vs. Forward Voltage

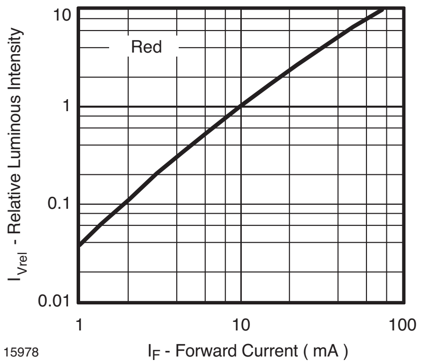


Figure 12. Relative Luminous Flux vs. Forward Current

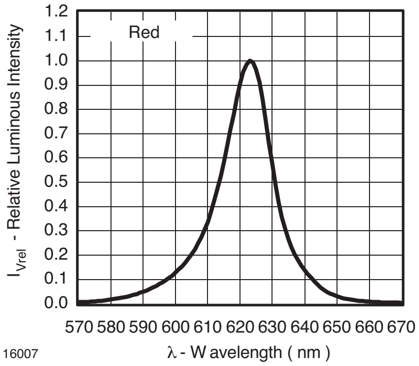


Figure 13. Relative Intensity vs. Wavelength

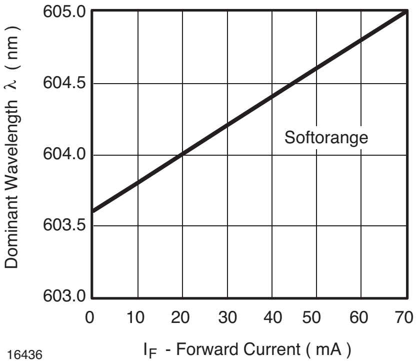


Figure 16. Dominant Wavelength vs. Forward Current

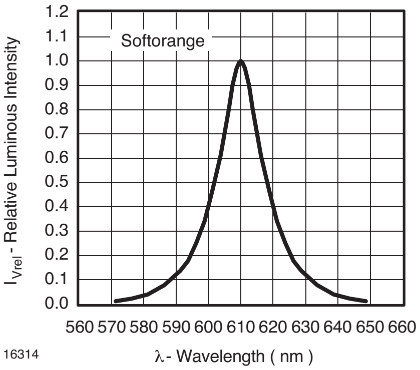


Figure 14. Relative Intensity vs. Wavelength

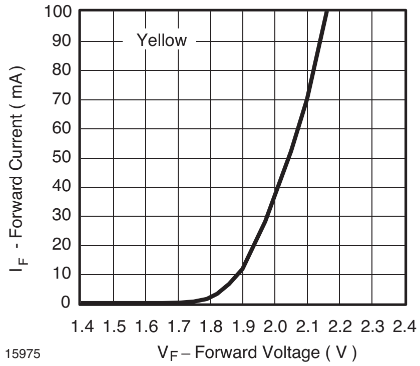


Figure 17. Forward Current vs. Forward Voltage

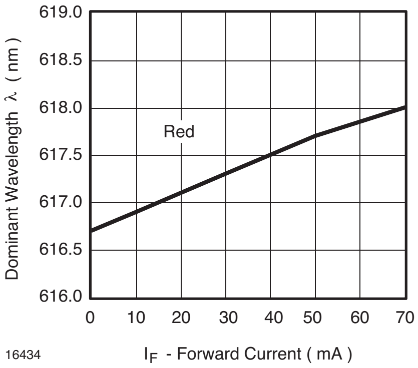


Figure 15. Dominant Wavelength vs. Forward Current

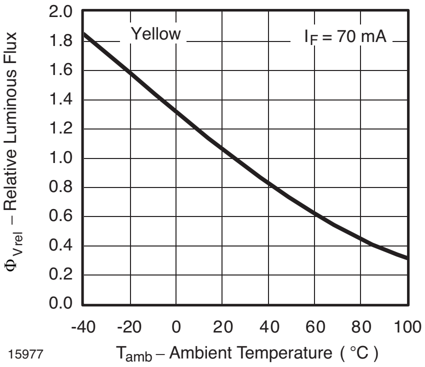


Figure 18. Rel. Luminous Flux vs. Ambient Temperature

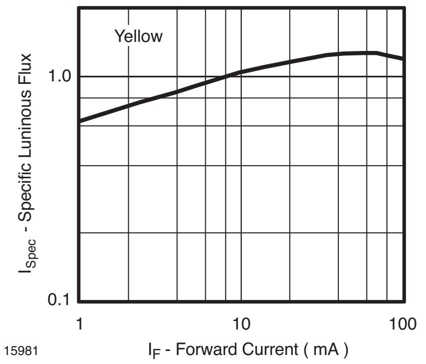


Figure 19. Specific Luminous Flux vs. Forward Current

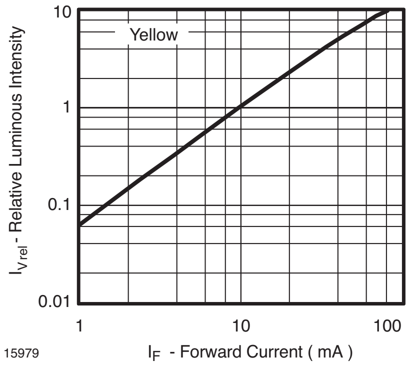


Figure 20. Relative Luminous Flux vs. Forward Current

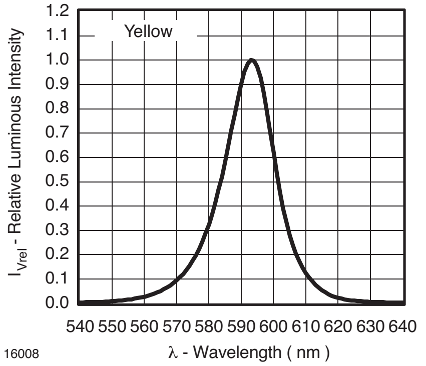


Figure 21. Relative Intensity vs. Wavelength

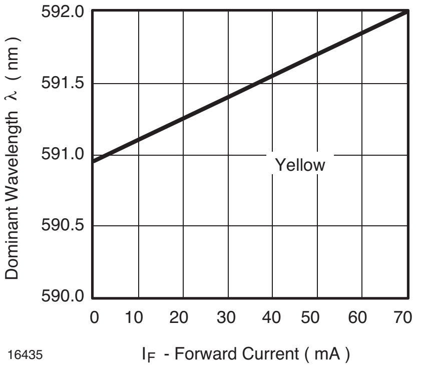


Figure 22. Dominant Wavelength vs. Forward Current

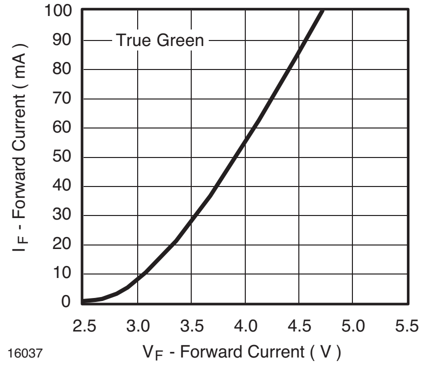


Figure 23. Forward Current vs. Forward Voltage

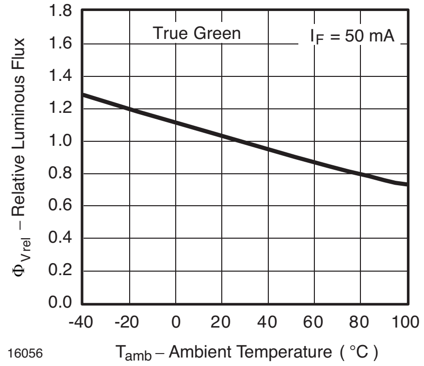


Figure 24. Rel. Luminous Flux vs. Ambient Temperature

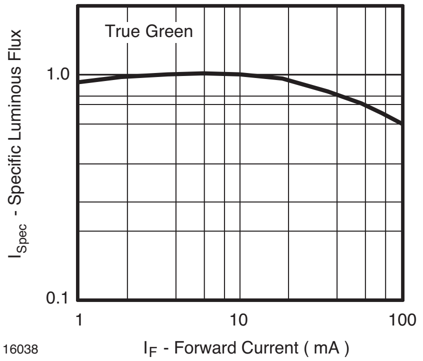


Figure 25. Specific Luminous Flux vs. Forward Current

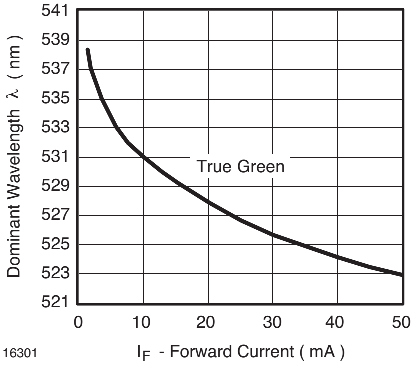


Figure 28. Dominant Wavelength vs. Forward Current

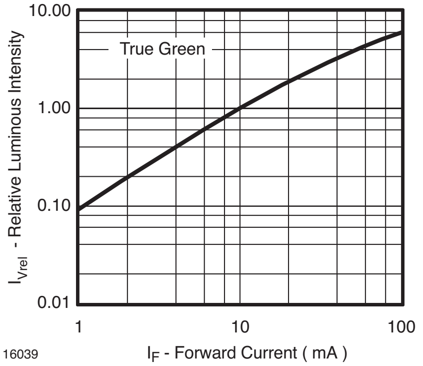


Figure 26. Relative Luminous Flux vs. Forward Current

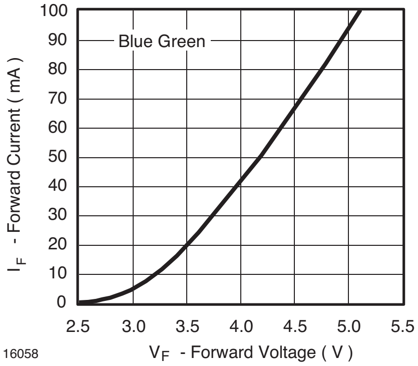


Figure 29. Forward Current vs. Forward Voltage

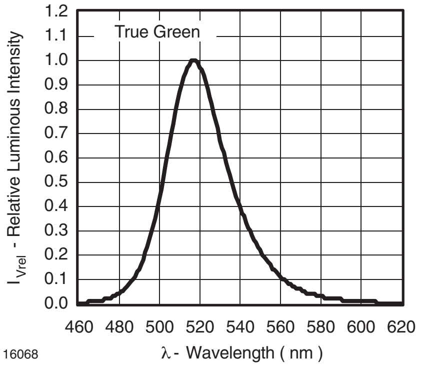


Figure 27. Relative Intensity vs. Wavelength

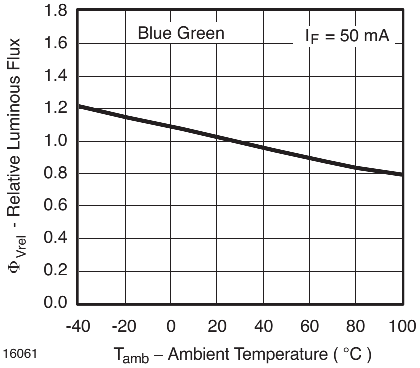


Figure 30. Rel. Luminous Flux vs. Ambient Temperature

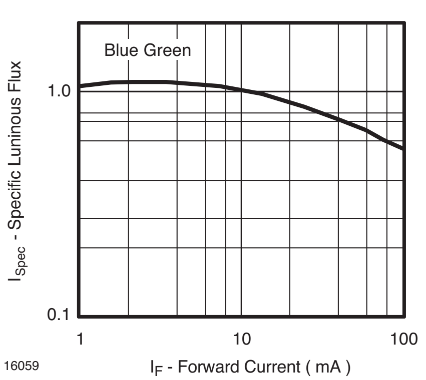


Figure 31. Specific Luminous Flux vs. Forward Current

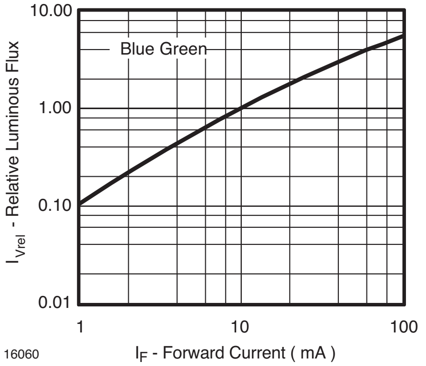


Figure 32. Relative Luminous Flux vs. Forward Current

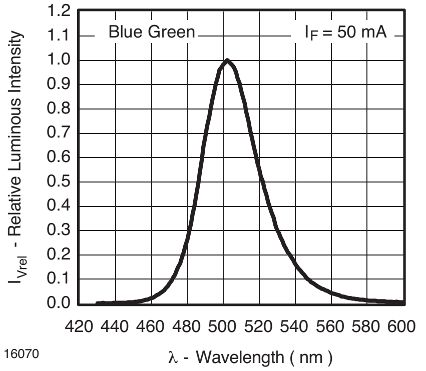


Figure 33. Relative Intensity vs. Wavelength

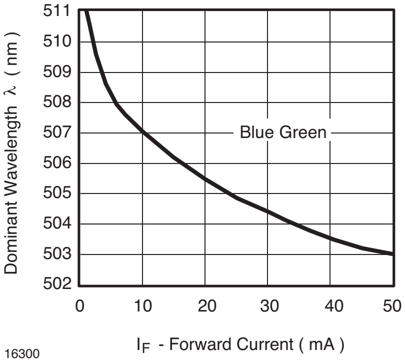


Figure 34. Dominant Wavelength vs. Forward Current

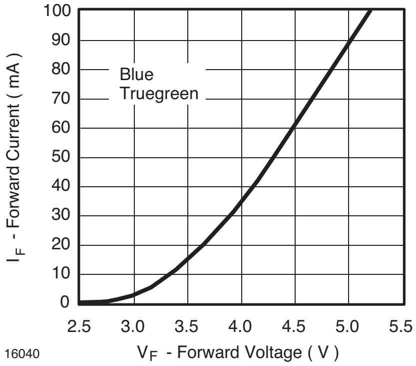


Figure 35. Forward Current vs. Forward Voltage

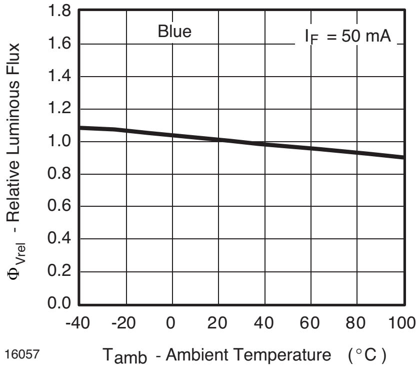


Figure 36. Rel. Luminous Flux vs. Ambient Temperature

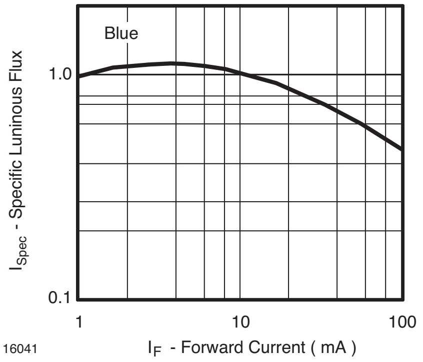


Figure 37. Specific Luminous Flux vs. Forward Current

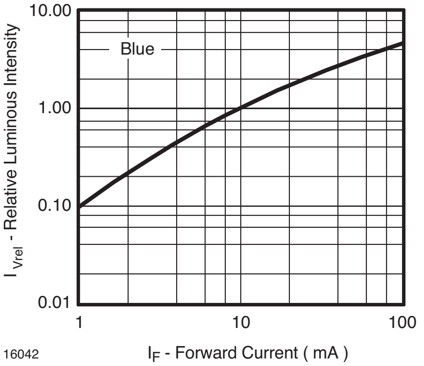


Figure 38. Relative Luminous Flux vs. Forward Current

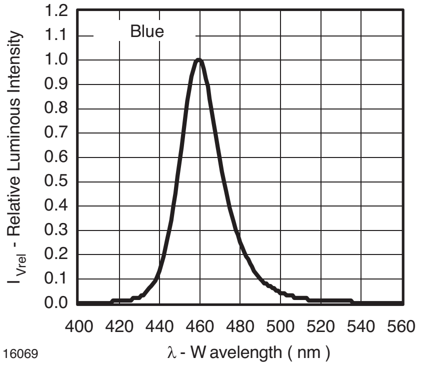


Figure 39. Relative Intensity vs. Wavelength

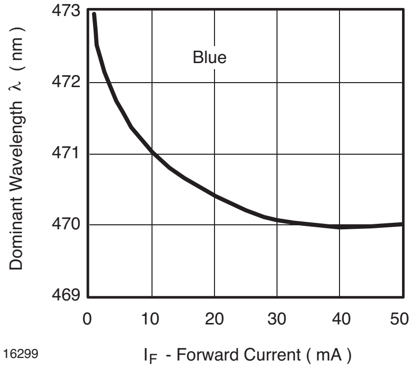


Figure 40. Dominant Wavelength vs. Forward Current

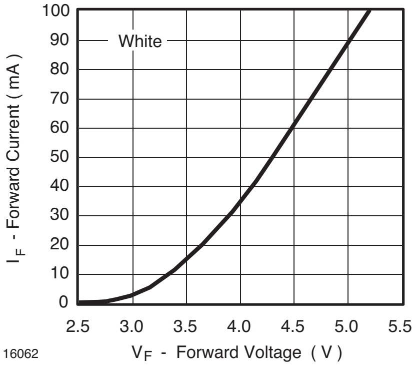


Figure 41. Forward Current vs. Forward Voltage

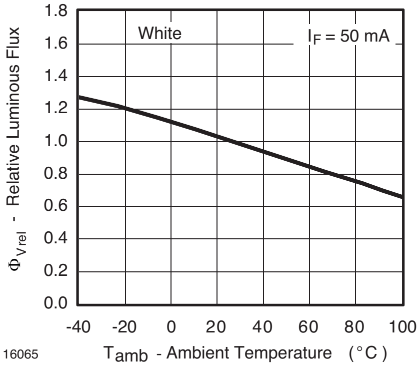


Figure 42. Rel. Luminous Flux vs. Ambient Temperature

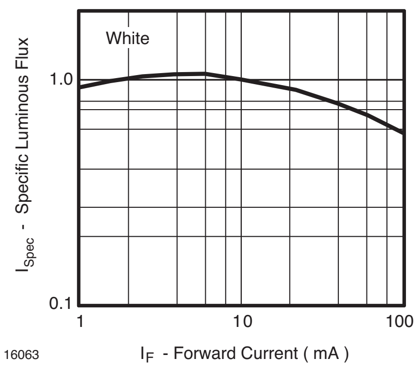


Figure 43. Specific Luminous Flux vs. Forward Current

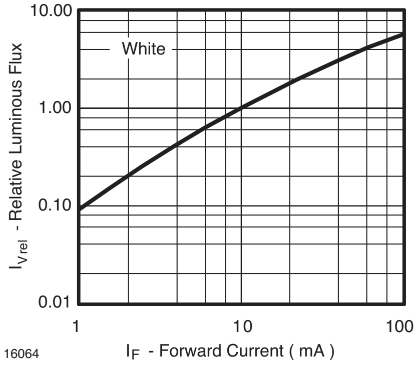


Figure 44. Relative Luminous Flux vs. Forward Current

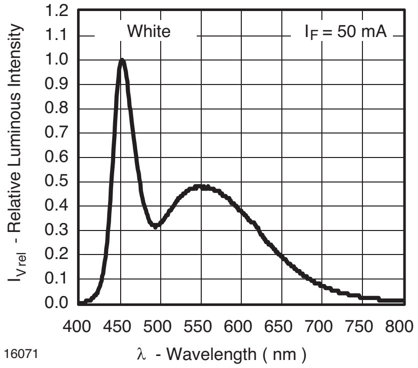


Figure 45. Relative Intensity vs. Wavelength

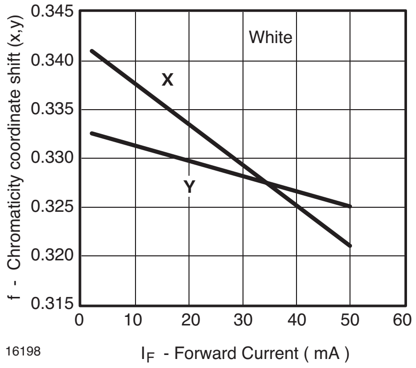
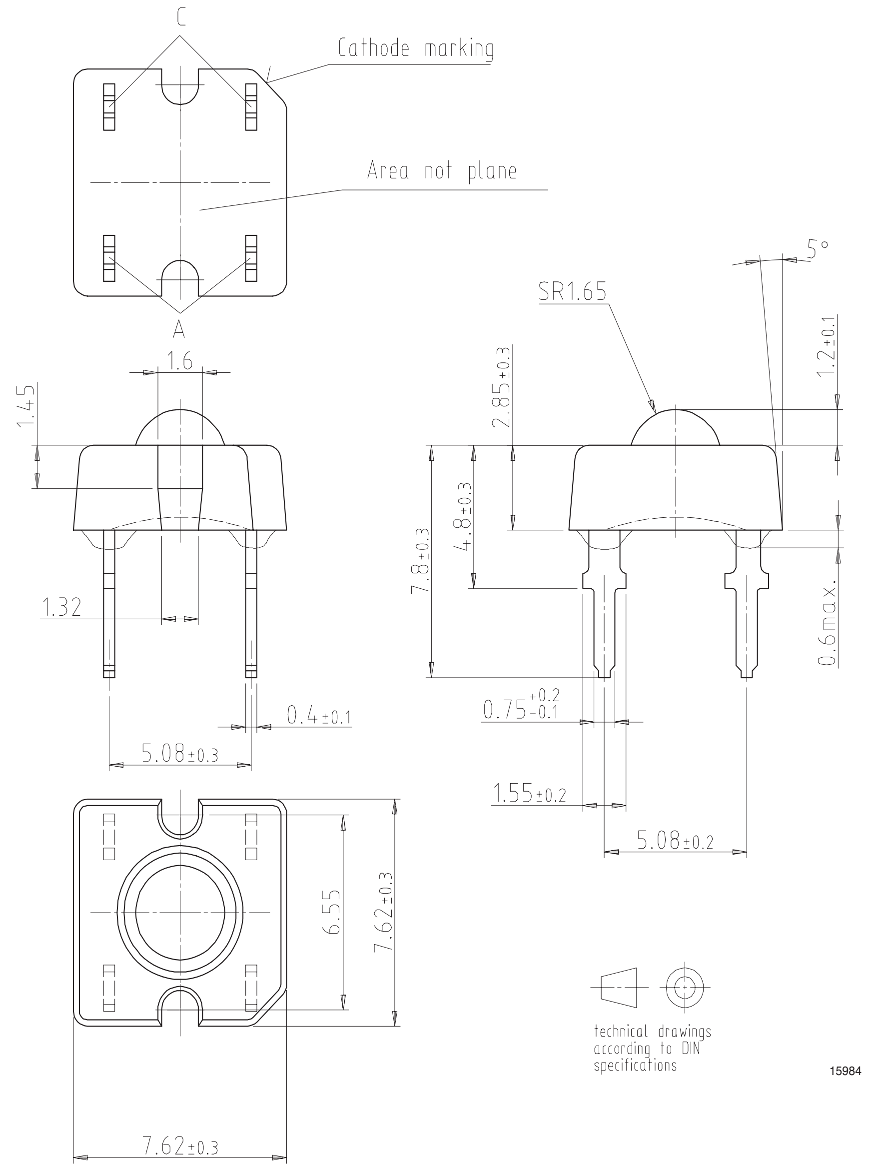


Figure 46. Chromaticity Coordinate Shift vs. Forward Current

## 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.

**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.

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