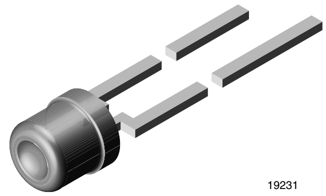
# Backlighting LED in ∅ 3 mm Tinted Non-Diffused Package




## DESCRIPTION

The TLV.4200 series was developed for backlighting. Due to its special shape the spatial distribution of the radiation is qualified for backlighting.

To optimize the brightness of backlighting a custom-built reflector (with scattering) is required. Uniform illumination can be enhanced by covering the front of the reflector with diffusor material.

This is a flexible solution for backlighting different areas.

## PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 3 mm backlighting
- Product series: standard
- Angle of half intensity: ± 85°

## FEATURES

- High light output
- Wide viewing angle
- Categorized for luminous flux
- Tinted clear package
- Low power dissipation
- Low self heating
- Rugged design
- High reliability
- Lead (Pb)-free device
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

Pb-free

e1

## APPLICATIONS

- Backlighting of display panels, LCD displays, symbols on switches, keyboards, graphic boards and measuring scales
- Illumination of large areas e.g. dot matrix displays

| PARTS TABLE | | |
|---|---|---|
| **PART** | **COLOR, LUMINOUS FLUX** | **TECHNOLOGY** |
| TLVH4200 | Red, $\phi_V$ > 10 mlm | GaAsP on GaP |
| TLVH4201 | Red, $\phi_V$ = (40 to 125) mlm | GaAsP on GaP |
| TLVS4200 | Soft orange, $\phi_V$ > 10 mlm | GaAsP on GaP |
| TLVY4200 | Yellow, $\phi_V$ > 10 mlm | GaAsP on GaP |
| TLVG4200 | Green, $\phi_V$ > 10 mlm | GaP on GaP |
| TLVP4200 | Pure green, $\phi_V$ > 4 mlm | GaP on GaP |

| ABSOLUTE MAXIMUM RATINGS [1] TLVH4200, TLVS4200, TLVY4200, TLVG4200, TLVP4200 | | | | |
|---|---|---|---|---|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Reverse voltage [2] | | $V_R$ | 6 | V |
| DC Forward current | $T_{amb} \leq 60$ °C | $I_F$ | 30 | mA |
| Surge forward current | $t_p \leq 10$ µs | $I_{FSM}$ | 1 | A |
| Power dissipation | | $P_V$ | 90 | 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, 2 mm from body | $T_{sd}$ | 260 | °C |
| Thermal resistance junction/ ambient | | $R_{thJA}$ | 400 | K/W |

Note:
[1] $T_{amb}$ = 25 °C, unless otherwise specified
[2] Driving the LED in reverse direction is suitable for a short term application

| OPTICAL AND ELECTRICAL CHARACTERISTICS [1] TLVH4200, RED | | | | | | | |
|---|---|---|---|---|---|---|---|
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Luminous flux | $I_F$ = 15 mA | TLVH4200 | $\phi_V$ | 10 | 25 | | mlm |
| | | TLVH4201 | $\phi_V$ | 40 | | 125 | mlm |
| Dominant wavelength | $I_F$ = 10 mA | | $\lambda_d$ | 612 | | 625 | nm |
| Peak wavelength | $I_F$ = 10 mA | | $\lambda_p$ | | 635 | | nm |
| Angle of half intensity | $I_F$ = 10 mA | | $\varphi$ | | ± 85 | | deg |
| Forward voltage | $I_F$ = 20 mA | | $V_F$ | | 2.4 | 3 | V |
| Reverse voltage | $I_R$ = 10 µA | | $V_R$ | 6 | 15 | | V |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | | $C_j$ | | 50 | | pF |

Note:
[1] $T_{amb}$ = 25 °C, unless otherwise specified

| OPTICAL AND ELECTRICAL CHARACTERISTICS [1] TLVS4200, SOFT ORANGE | | | | | | |
|---|---|---|---|---|---|---|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Luminous flux | $I_F$ = 15 mA | $\phi_V$ | 10 | 25 | | mlm |
| Dominant wavelength | $I_F$ = 10 mA | $\lambda_d$ | 598 | | 611 | nm |
| Peak wavelength | $I_F$ = 10 mA | $\lambda_p$ | | 605 | | nm |
| Angle of half intensity | $I_F$ = 10 mA | $\varphi$ | | ± 85 | | deg |
| Forward voltage | $I_F$ = 20 mA | $V_F$ | | 2.4 | 3 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 6 | 15 | | V |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | $C_j$ | | 50 | | pF |

Note:
[1] $T_{amb}$ = 25 °C, unless otherwise specified

| OPTICAL AND ELECTRICAL CHARACTERISTICS [1] TLVY4200, YELLOW | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Luminous flux | $I_F$ = 15 mA | $\phi_V$ | 10 | 20 | | mlm |
| Dominant wavelength | $I_F$ = 10 mA | $\lambda_d$ | 581 | | 594 | nm |
| Peak wavelength | $I_F$ = 10 mA | $\lambda_p$ | | 585 | | nm |
| Angle of half intensity | $I_F$ = 10 mA | $\varphi$ | | ± 85 | | deg |
| Forward voltage | $I_F$ = 20 mA | $V_F$ | | 2.4 | 3 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 6 | 15 | | V |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | $C_j$ | | 50 | | pF |

Note:
[1] $T_{amb}$ = 25 °C, unless otherwise specified

| OPTICAL AND ELECTRICAL CHARACTERISTICS [1] TLVG4200, GREEN | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Luminous flux | $I_F$ = 15 mA | $\phi_V$ | 10 | 30 | | mlm |
| Dominant wavelength | $I_F$ = 10 mA | $\lambda_d$ | 562 | | 575 | nm |
| Peak wavelength | $I_F$ = 10 mA | $\lambda_p$ | | 565 | | nm |
| Angle of half intensity | $I_F$ = 10 mA | $\varphi$ | | ± 85 | | deg |
| Forward voltage | $I_F$ = 20 mA | $V_F$ | | 2.4 | 3 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 6 | 15 | | V |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | $C_j$ | | 50 | | pF |

Note:
[1] $T_{amb}$ = 25 °C, unless otherwise specified

| OPTICAL AND ELECTRICAL CHARACTERISTICS [1] TLVP4200, PURE GREEN | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Luminous flux | $I_F$ = 15 mA | $\phi_V$ | 4 | 10 | | mlm |
| Dominant wavelength | $I_F$ = 10 mA | $\lambda_d$ | 555 | | 565 | nm |
| Peak wavelength | $I_F$ = 10 mA | $\lambda_p$ | | 555 | | nm |
| Angle of half intensity | $I_F$ = 10 mA | $\varphi$ | | ± 85 | | deg |
| Forward voltage | $I_F$ = 20 mA | $V_F$ | | 2.4 | 3 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 6 | 15 | | V |
| Junction capacitance | $V_R$ = 0, f = 1 MHz | $C_j$ | | 50 | | pF |

Note:
[1] $T_{amb}$ = 25 °C, unless otherwise specified

| LUMINOUS FLUX CLASSIFICATION | | |
|---|---|---|
| GROUP | LUMINOUS FLUX (MLM) | |
| STANDARD | MIN. | MAX. |
| P | 4.0 | 8.0 |
| Q | 6.3 | 12.5 |
| R | 10 | 20 |
| S | 16 | 32 |
| T | 25 | 50 |
| U | 40 | 80 |
| V | 63 | 125 |
| W | 100 | 200 |
| X | 130 | 260 |
| Y | 180 | 360 |
| Z | 240 | 480 |

Note:
Luminous flux is tested at a current pulse duration of 25 ms and an accuracy of ± 11 %.
The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped on each bag (there will be no mixing of two groups in each bag).
In order to ensure availability, single brightness groups will not be orderable.
In a similar manner for colors where wavelength groups are measured and binned, single wavelength groups will be shipped on any one bag.
In order to ensure availability, single wavelength groups will not be orderable.

| COLOR CLASSIFICATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| GROUP | DOM. WAVELENGTH (NM) | | | | | | | |
| | SOFT ORANGE | | YELLOW | | GREEN | | PURE GREEN | |
| | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. |
| 0 | | | | | | | 555 | 559 |
| 1 | 598 | 601 | 581 | 584 | | | 558 | 561 |
| 2 | 600 | 603 | 583 | 586 | | | 560 | 563 |
| 3 | 602 | 605 | 585 | 588 | 562 | 565 | 562 | 565 |
| 4 | 604 | 607 | 587 | 590 | 564 | 567 | | |
| 5 | 606 | 609 | 589 | 592 | 566 | 569 | | |
| 6 | 608 | 611 | 591 | 594 | 568 | 571 | | |
| 7 | | | | | 570 | 573 | | |
| 8 | | | | | 572 | 575 | | |

Note:
Wavelengths are tested at a current pulse duration of 25 ms.

## TYPICAL CHARACTERISTICS

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

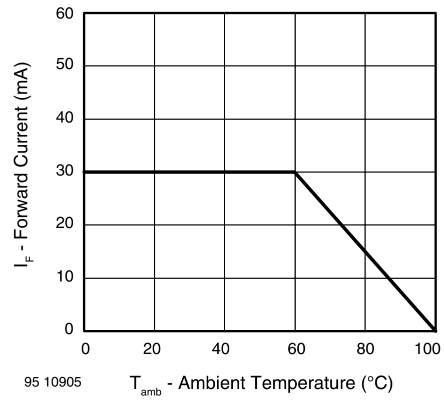



Figure 1. Forward Current vs. Ambient Temperature

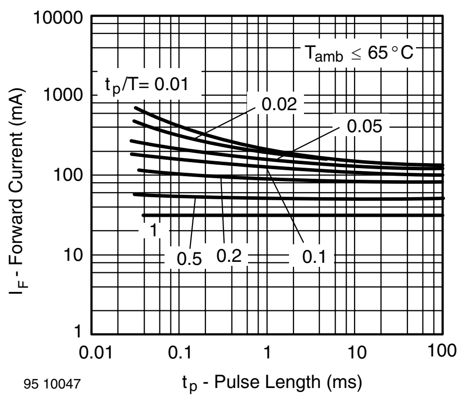



Figure 2. Forward Current vs. Pulse Length

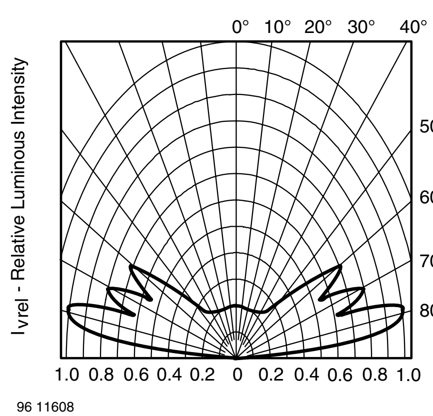



Figure 3. Rel. Luminous Intensity vs.
Angular Displacement for 90 ° Emission Angle

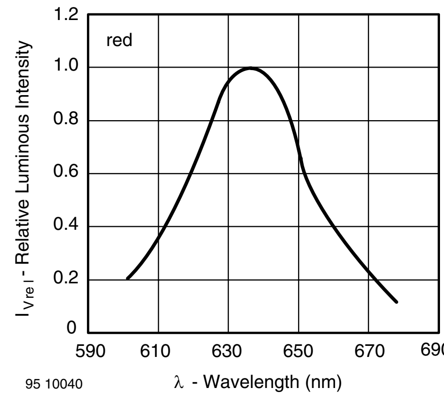



Figure 4. Relative Intensity vs. Wavelength

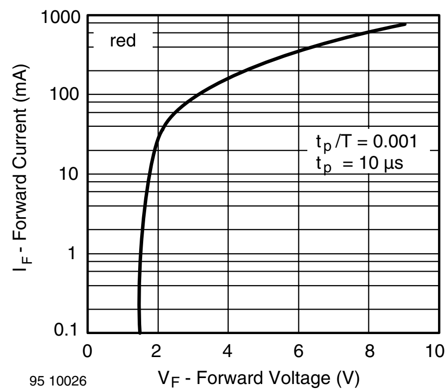



Figure 5. Forward Current vs. Forward Voltage

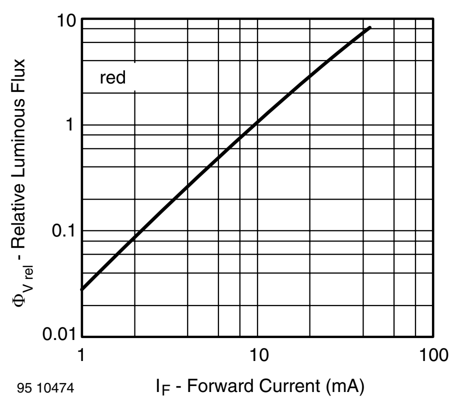



Figure 6. Relative Luminous Flux vs. Forward Current

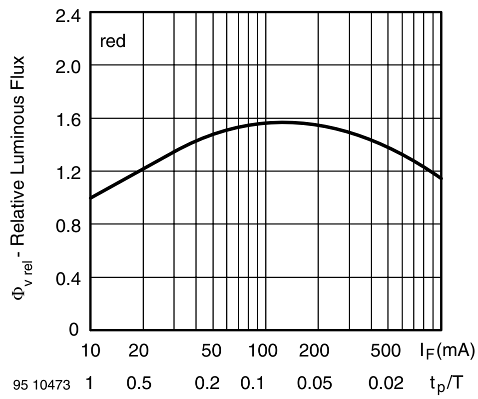



Figure 7. Rel. Luminous Flux vs. Forw. Current/Duty Cycle

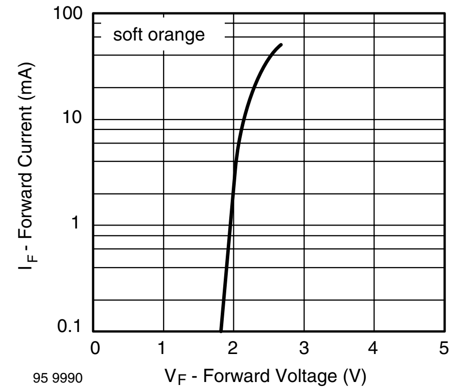



Figure 10. Forward Current vs. Forward Voltage

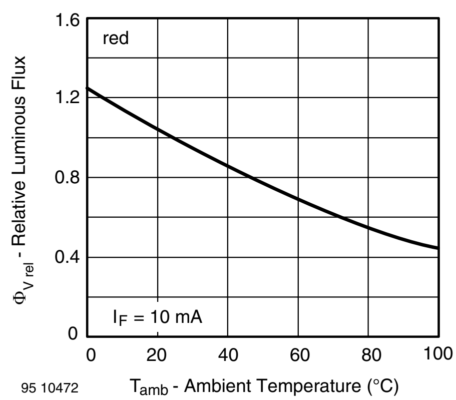



Figure 8. Rel. Luminous Flux vs. Ambient Temperature

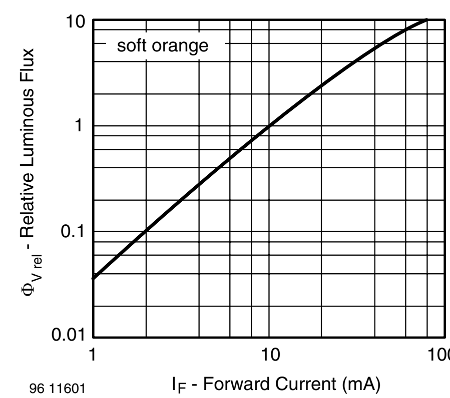



Figure 11. Relative Luminous Flux vs. Forward Current

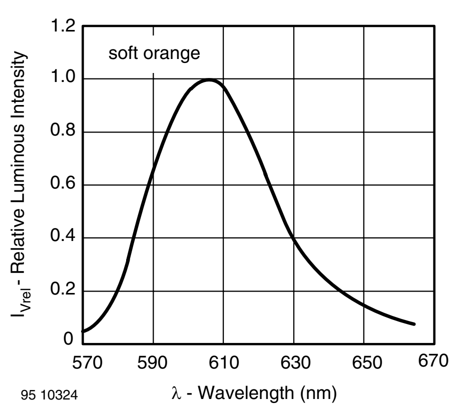



Figure 9. Relative Intensity vs. Wavelength

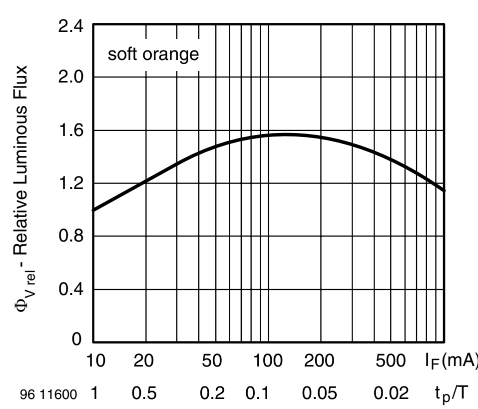



Figure 12. Rel. Luminous Flux vs. Forw. Current/Duty Cycle

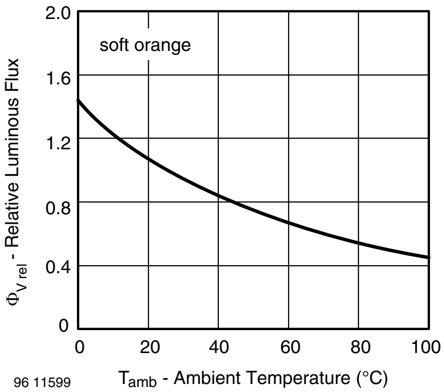



Figure 13. Rel. Luminous Flux vs. Ambient Temperature

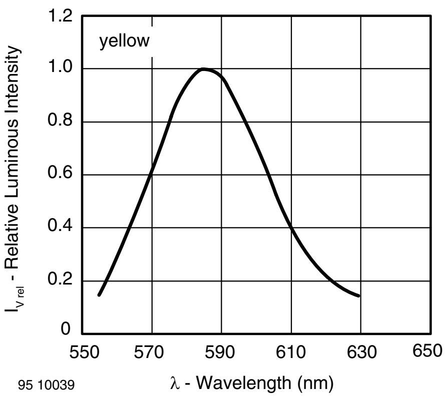



Figure 14. Relative Intensity vs. Wavelength

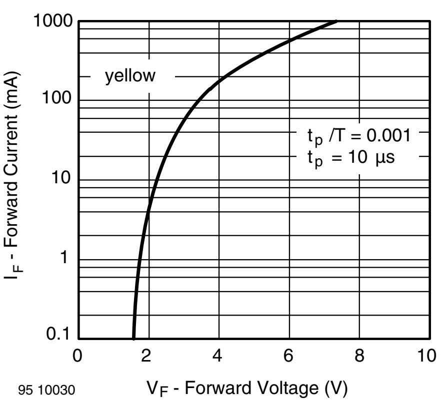



Figure 15. Forward Current vs. Forward Voltage

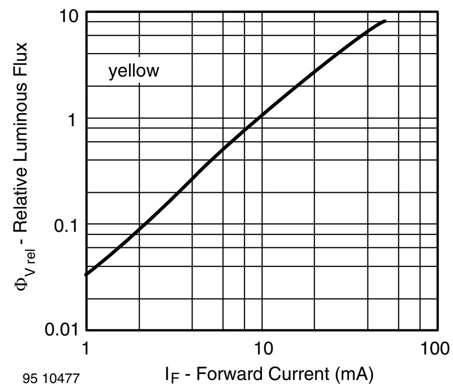



Figure 16. Relative Luminous Flux vs. Forward Current

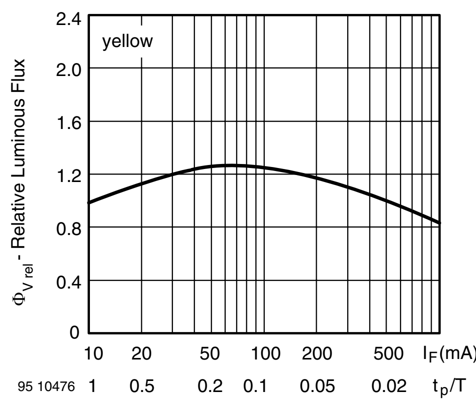



Figure 17. Rel. Luminous Flux vs. Forw. Current/Duty Cycle

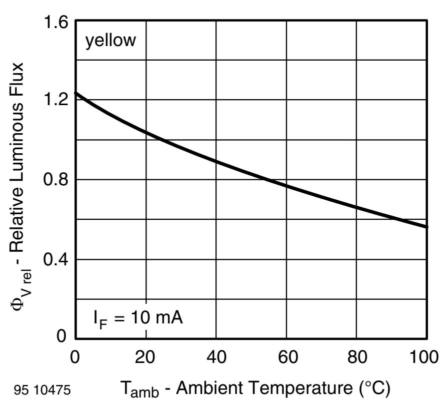



Figure 18. Rel. Luminous Flux vs. Ambient Temperature

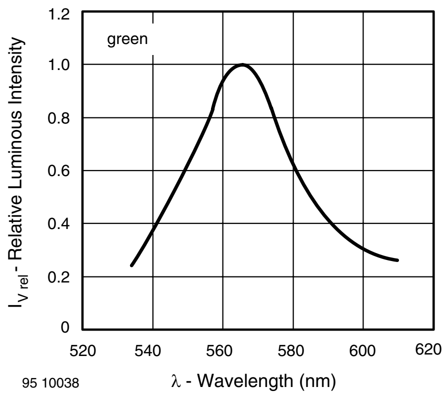



Figure 19. Relative Intensity vs. Wavelength

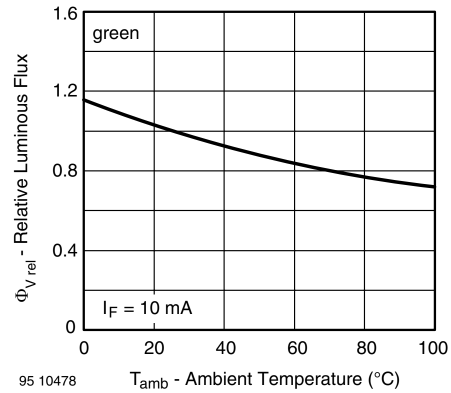



Figure 22. Rel. Luminous Flux vs. Ambient Temperature

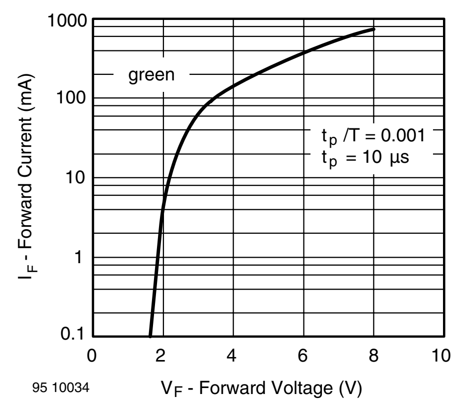



Figure 20. Forward Current vs. Forward Voltage

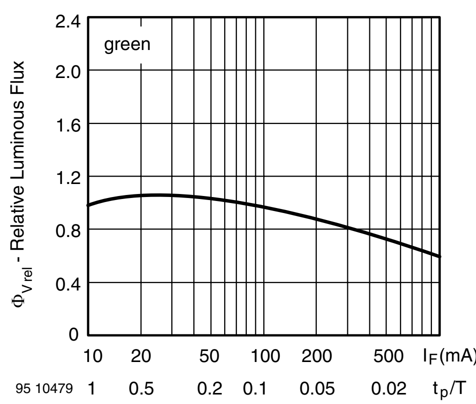



Figure 23. Rel. Luminous Flux vs. Forw. Current/Duty Cycle

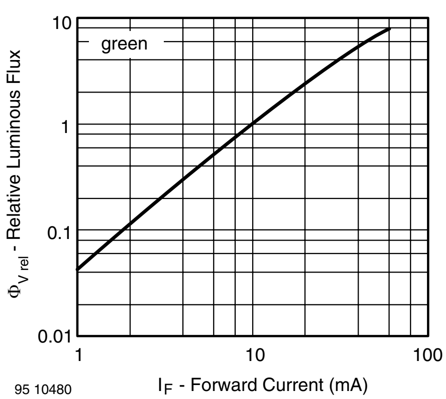



Figure 21. Relative Luminous Flux vs. Forward Current

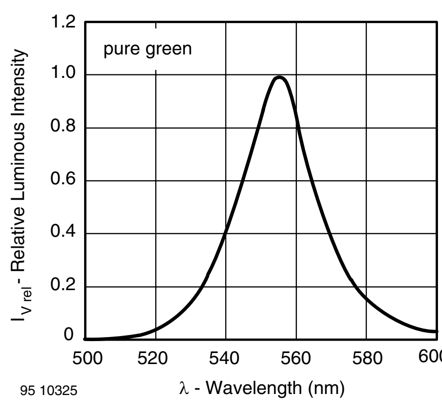



Figure 24. Relative Intensity vs. Wavelength

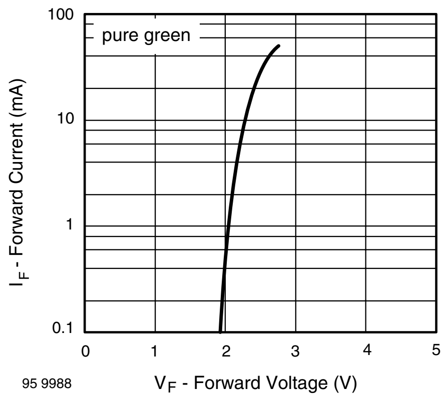



Figure 25. Forward Current vs. Forward Voltage

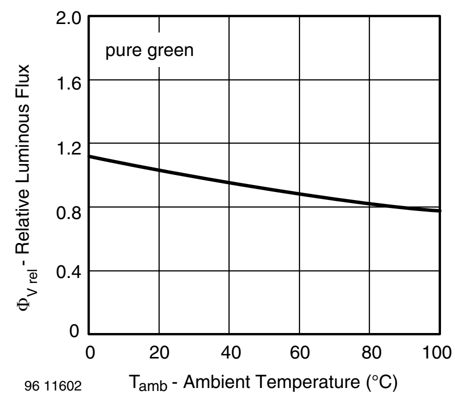



Figure 28. Rel. Luminous Flux vs. Ambient Temperature

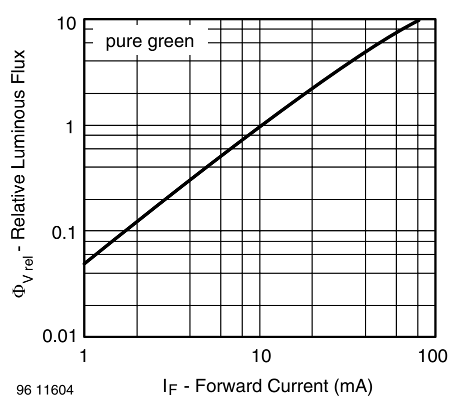



Figure 26. Relative Luminous Flux vs. Forward Current

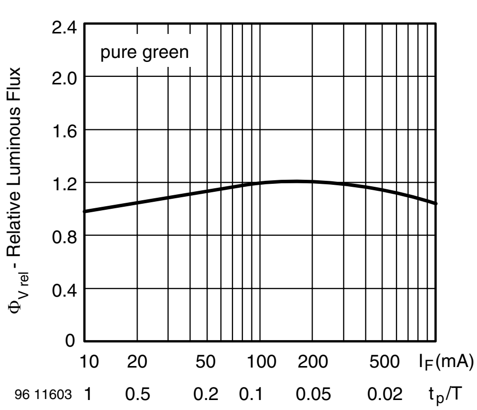
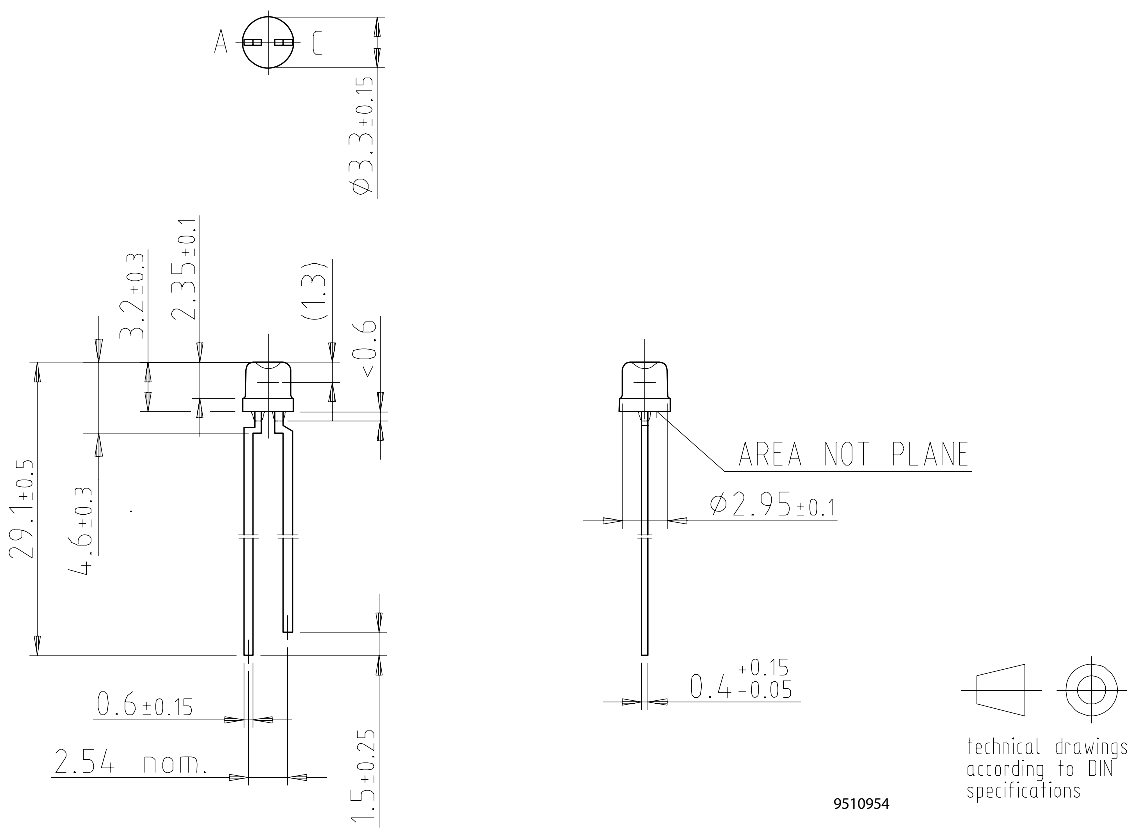



Figure 27. Rel. Luminous Flux vs. Forw. Current/Duty Cycle

**PACKAGE DIMENSIONS** in millimeters



## 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.



Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

# Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.