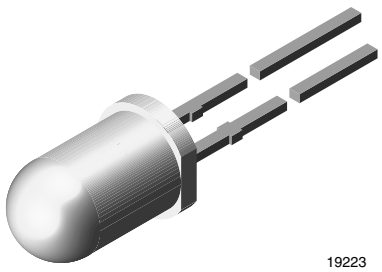
# Ultrabright LED, Ø 5 mm Untinted Non-Diffused Package



19223

## FEATURES

- Untinted non-diffused lens
- Utilizing ultrabright AlInGaP (AS)
- High luminous intensity
- High operating temperature: $T_j$ (chip junction temperature) up to 125 °C for AlInGaP devices
- Luminous intensity and color categorized for each packing unit
- ESD-withstand voltage: up to 2 kV according to JESD22-A114-B
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

## DESCRIPTION

The TLC.51.. series is a clear, non-diffused 5 mm LED for high end applications where supreme luminous intensity required.

These lamps with clear untinted plastic case utilize the highly developed ultrabright AlInGaP (AS).

The lens and the viewing angle is optimized to achieve best performance of light output and visibility.

## PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 5 mm
- Product series: power
- Angle of half intensity: ± 9°

## APPLICATIONS

- Interior and exterior lighting
- Outdoor LED panels
- Instrumentation and front panel indicators
- Central high mounted stop lights (CHMSL) for motor vehicles
- Replaces incandescent lamps
- Traffic signals
- Light guide design

## PARTS TABLE

| PART | COLOR | LUMINOUS INTENSITY (mcd) | | | at $I_F$ (mA) | WAVELENGTH (nm) | | | at $I_F$ (mA) | FORWARD VOLTAGE (V) | | | at $I_F$ (mA) | TECHNOLOGY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | MIN. | TYP. | MAX. | | MIN. | TYP. | MAX. | | MIN. | TYP. | MAX. | | |
| TLCS5100 | Super red | 2400 | 7500 | - | 50 | 626 | 630 | 638 | 50 | - | 2.1 | 2.7 | 50 | AlInGaP on GaAs |
| TLCR5100 | Red | 4300 | 11 000 | - | 50 | 611 | 616 | 622 | 50 | - | 2.1 | 2.7 | 50 | AlInGaP on GaAs |
| TLCYG5100 | Yellow green | 1350 | 3500 | - | 50 | 565 | 572 | 576 | 50 | - | 2.2 | 2.7 | 50 | AlInGaP on GaAs |
| TLCPG5100 | Pure green | 430 | 1250 | - | 50 | 555 | 562 | 567 | 50 | - | 2.1 | 2.7 | 50 | AlInGaP on GaAs |

## ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °C, unless otherwise specified)

**TLCS5100, TLCR5100, TLCYG5100, TLCPG5100**

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| Reverse voltage (1) | | $V_R$ | 5 | V |
| DC forward current | $T_{amb} \leq 85$ °C | $I_F$ | 50 | mA |
| Surge forward current | $t_p \leq 10$ µs | $I_{FSM}$ | 1 | A |
| Power dissipation | | $P_V$ | 135 | 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 ≤ 5 s, 2 mm from body | $T_{sd}$ | 260 | °C |
| Thermal resistance junction to ambient | | $R_{thJA}$ | 300 | K/W |

**Note**

(1) Driving the LED in reverse direction is suitable for a short term application



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**OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)
**TLCS5100, SUPER RED**

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 50 mA | TLCS5100 | $I_V$ | 2400 | 7500 | - | 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 | | $\Delta\lambda$ | - | 20 | - | nm |
| Angle of half intensity | $I_F$ = 50 mA | | $\varphi$ | - | ± 9 | - | ° |
| Forward voltage | $I_F$ = 50 mA | | $V_F$ | - | 2.1 | 2.7 | V |
| Reverse voltage | $I_R$ = 10 µA | | $V_R$ | 5 | - | - | V |
| Temperature coefficient of $V_F$ | $I_F$ = 50 mA | | $TC_{VF}$ | - | -2 | - | mV/K |
| Temperature coefficient of $\lambda_d$ | $I_F$ = 50 mA | | $TC\lambda_d$ | - | 0.04 | - | nm/K |

**Note**
(1) In one packing unit $I_{Vmax.}/I_{Vmin.} \leq 2.0$

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)
**TLCR5100, RED**

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 50 mA | TLCR5100 | $I_V$ | 4300 | 11 000 | - | mcd |
| Dominant wavelength | $I_F$ = 50 mA | | $\lambda_d$ | 611 | 616 | 622 | nm |
| Peak wavelength | $I_F$ = 50 mA | | $\lambda_p$ | - | 622 | - | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F$ = 50 mA | | $\Delta\lambda$ | - | 18 | - | nm |
| Angle of half intensity | $I_F$ = 50 mA | | $\varphi$ | - | ± 9 | - | ° |
| Forward voltage | $I_F$ = 50 mA | | $V_F$ | - | 2.1 | 2.7 | V |
| Reverse voltage | $I_R$ = 10 µA | | $V_R$ | 5 | - | - | V |
| Temperature coefficient of $V_F$ | $I_F$ = 50 mA | | $TC_{VF}$ | - | -3.5 | - | mV/K |
| Temperature coefficient of $\lambda_d$ | $I_F$ = 50 mA | | $TC\lambda_d$ | - | 0.05 | - | nm/K |

**Note**
(1) In one packing unit $I_{Vmax.}/I_{Vmin.} \leq 2.0$

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)
**TLCYG5100, YELLOW GREEN**

| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 50 mA | TLCYG5100 | $I_V$ | 1350 | 3500 | - | mcd |
| Dominant wavelength | $I_F$ = 50 mA | | $\lambda_d$ | 565 | 572 | 576 | nm |
| Peak wavelength | $I_F$ = 50 mA | | $\lambda_p$ | - | 574 | - | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F$ = 50 mA | | $\Delta\lambda$ | - | 15 | - | nm |
| Angle of half intensity | $I_F$ = 50 mA | | $\varphi$ | - | ± 9 | - | ° |
| Forward voltage | $I_F$ = 50 mA | | $V_F$ | - | 2.2 | 2.7 | V |
| Reverse voltage | $I_R$ = 10 µA | | $V_R$ | 5 | - | - | V |
| Temperature coefficient of $V_F$ | $I_F$ = 50 mA | | $TC_{VF}$ | - | -4.5 | - | mV/K |
| Temperature coefficient of $\lambda_d$ | $I_F$ = 50 mA | | $TC\lambda_d$ | - | 0.1 | - | nm/K |

**Note**
(1) In one packing unit $I_{Vmax.}/I_{Vmin.} \leq 2.0$


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| **OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) **TLCPG5100, PURE GREEN** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Luminous intensity (1) | $I_F$ = 50 mA | TLCPG5100 | $I_V$ | 430 | 1250 | - | mcd |
| Dominant wavelength | $I_F$ = 50 mA | | $\lambda_d$ | 555 | 562 | 567 | nm |
| Peak wavelength | $I_F$ = 50 mA | | $\lambda_p$ | - | 563 | - | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F$ = 50 mA | | $\Delta\lambda$ | - | 20 | - | nm |
| Angle of half intensity | $I_F$ = 50 mA | | $\varphi$ | - | ± 9 | - | ° |
| Forward voltage | $I_F$ = 50 mA | | $V_F$ | - | 2.1 | 2.7 | V |
| Reverse voltage | $I_R$ = 10 µA | | $V_R$ | 5 | - | - | V |
| Temperature coefficient of $V_F$ | $I_F$ = 50 mA | | $TC_{VF}$ | - | -3.5 | - | mV/K |
| Temperature coefficient of $\lambda_d$ | $I_F$ = 50 mA | | $TC\lambda_d$ | - | 0.1 | - | nm/K |

**Note**

(1) In one packing unit $I_{Vmax.}/I_{Vmin.} \leq 2.0$

| **LUMINOUS INTENSITY CLASSIFICATION** | | |
|---|---|---|
| **GROUP** | **LUMINOUS INTENSITY (mcd)** | |
| **STANDARD** | **MIN.** | **MAX.** |
| BB | 430 | 860 |
| CC | 575 | 1150 |
| DD | 750 | 1500 |
| EE | 1000 | 2000 |
| FF | 1350 | 2700 |
| GG | 1800 | 3600 |
| HH | 2400 | 4800 |
| II | 3200 | 6400 |
| KK | 4300 | 8600 |
| LL | 5750 | 11 500 |
| MM | 7500 | 15 000 |
| NN | 10 000 | 20 000 |
| PP | 13 500 | 27 000 |
| QQ | 18 000 | 36 000 |
| RR | 24 000 | 48 000 |
| SS | 32 000 | 64 000 |
| TT | 43 000 | 86 000 |
| UU | 57 500 | 115 000 |

**Note**

- Luminous intensity 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 on 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 in any one bag.
  In order to ensure availability, single wavelength groups will not be orderable


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## COLOR CLASSIFICATION

| GROUP | DOM. WAVELENGTH (nm) | | | | | |
|---|---|---|---|---|---|---|
| | RED | | YELLOW GREEN | | PURE GREEN | |
| | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. |
| 0 | - | - | - | - | 555 | 559 |
| 1 | 611 | 618 | - | - | 558 | 561 |
| 2 | 614 | 622 | - | - | 560 | 563 |
| 3 | - | - | - | - | 562 | 565 |
| 4 | - | - | - | - | 564 | 567 |
| 5 | - | - | 565 | 570 | - | - |
| 6 | - | - | 567 | 572 | - | - |
| 7 | - | - | 569 | 574 | - | - |
| 8 | - | - | 571 | 576 | - | - |

**Note**

- Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of ± 1 nm

## TYPICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)

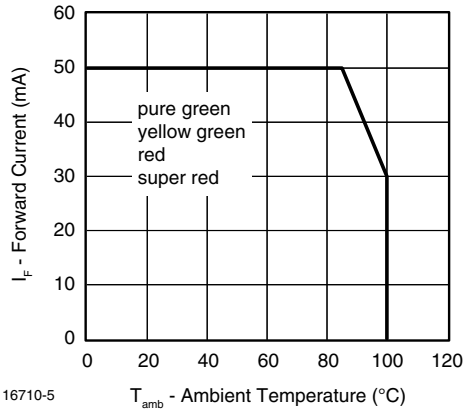



Fig. 1 - Forward Current vs. Ambient Temperature

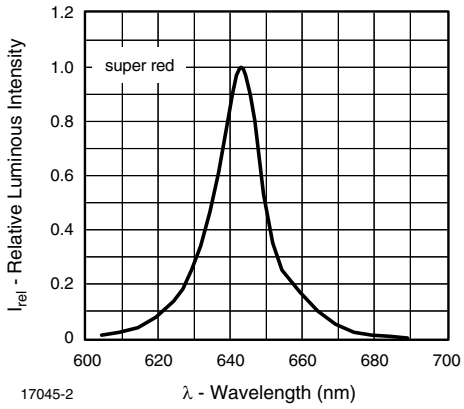



Fig. 3 - Relative Intensity vs. Wavelength

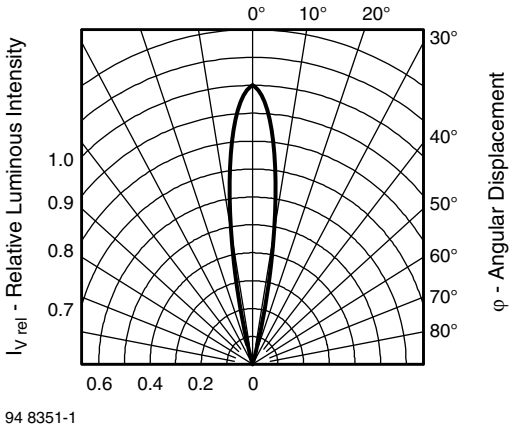



Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

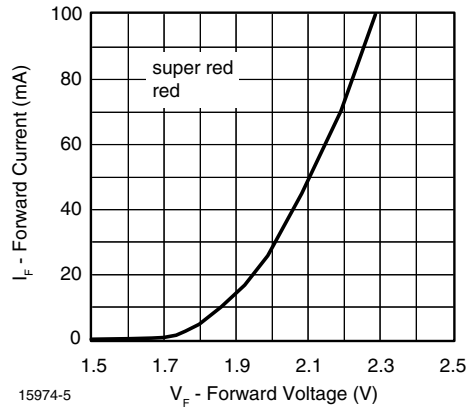



Fig. 4 - Forward Current vs. Forward Voltage


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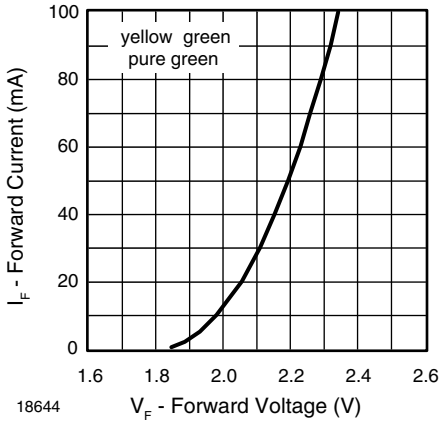



Fig. 5 - Forward Current vs. Forward Voltage

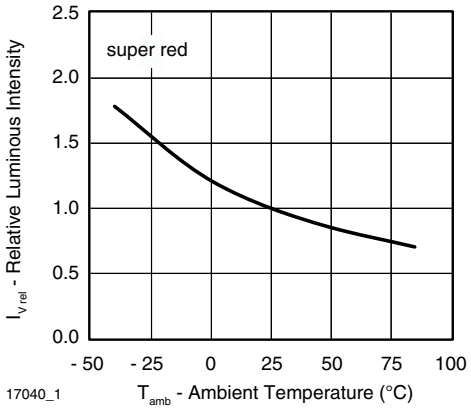



Fig. 8 - Relative Luminous Intensity vs. Ambient Temperature

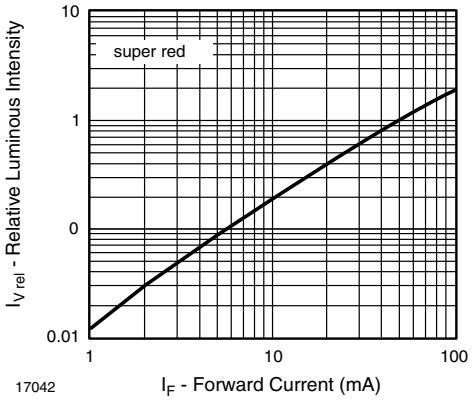



Fig. 6 - Relative Luminous Intensity vs. Forward Current

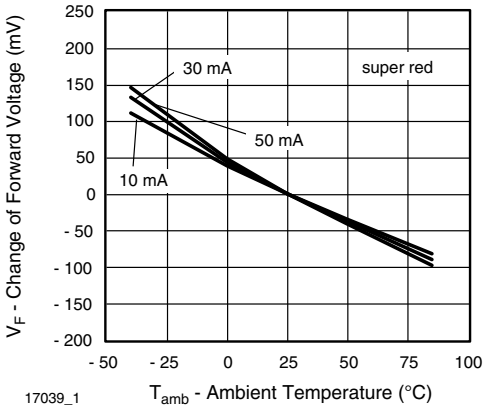



Fig. 9 - Change of Forward Voltage vs. Ambient Temperature

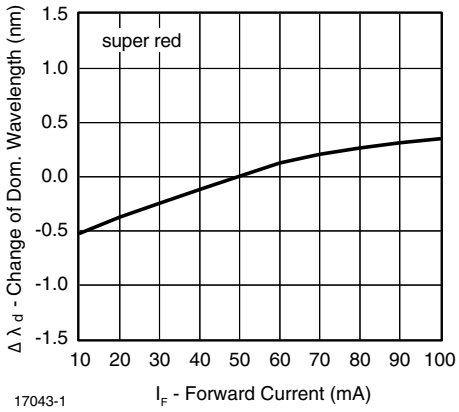



Fig. 7 - Change of Dominant Wavelength vs. Ambient Temperature

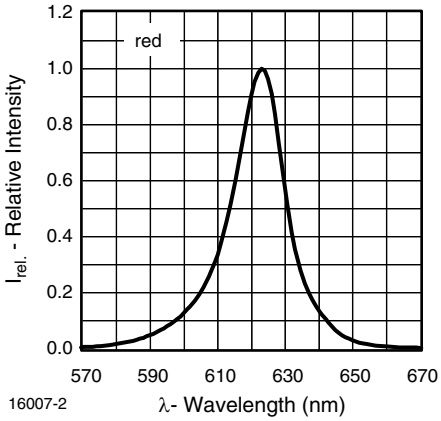



Fig. 10 - Relative Intensity vs. Wavelength


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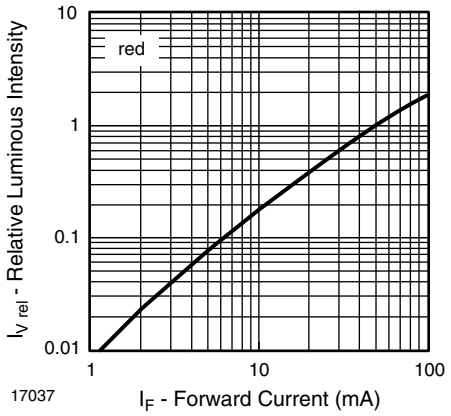



Fig. 11 - Relative Luminous Intensity vs. Forward Current

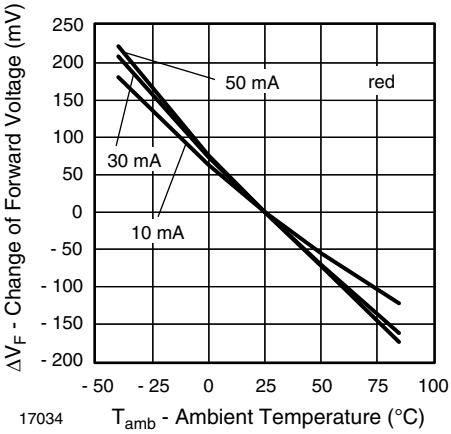



Fig. 14 - Change of Forward Voltage vs. Ambient Temperature

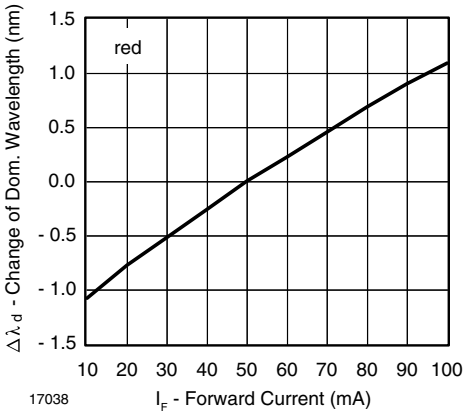



Fig. 12 - Changes of Dominant Wavelength vs. Forward Current

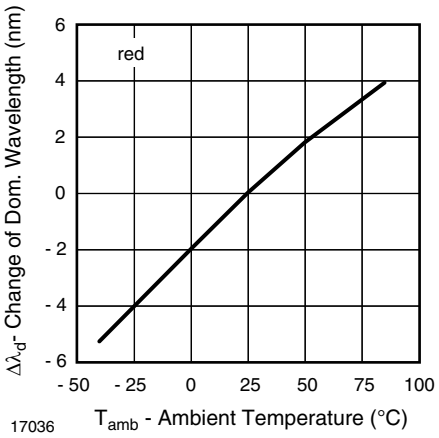



Fig. 15 - Change of Dominant Wavelength vs. Ambient Temperature

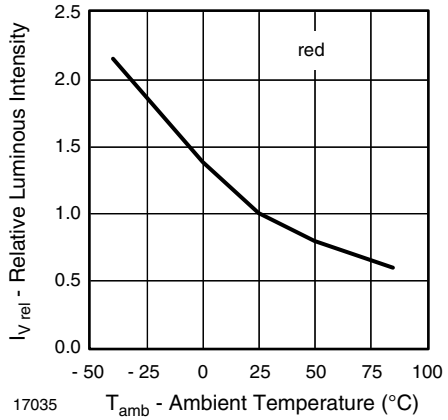



Fig. 13 - Relative Luminous Intensity vs. Ambient Temperature

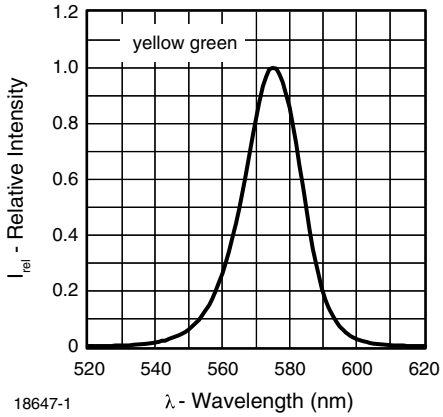



Fig. 16 - Relative Intensity vs. Wavelength


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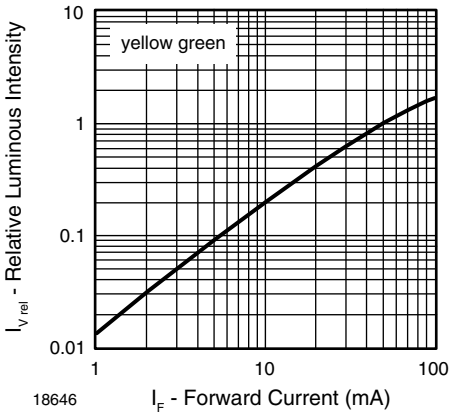



Fig. 17 - Relative Luminous Intensity vs. Forward Current

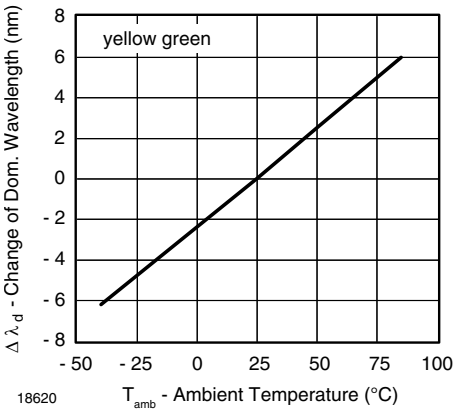



Fig. 20 - Change of Dominant Wavelength vs. Ambient Temperature

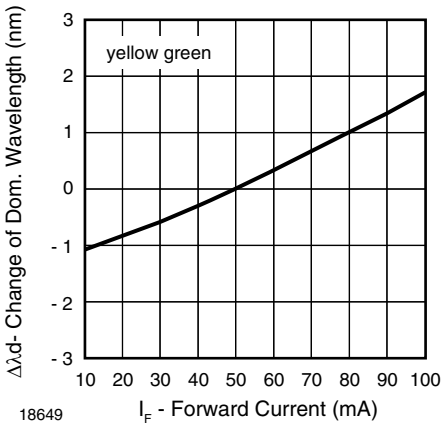



Fig. 18 - Change of Dominant Wavelength vs. Forward Current

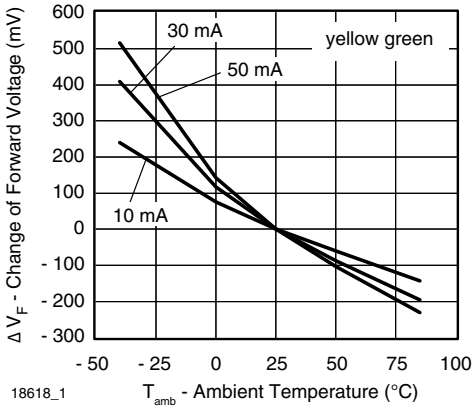



Fig. 21 - Change of Forward Voltage vs. Ambient Temperature

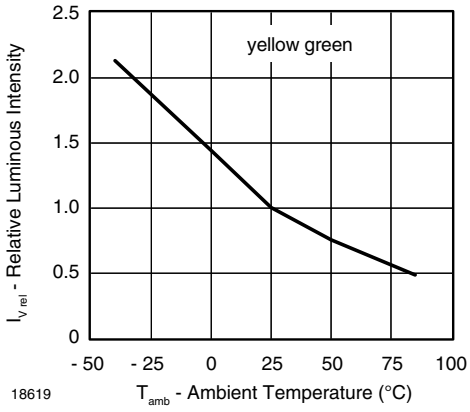



Fig. 19 - Relative Luminous Intensity vs. Ambient Temperature

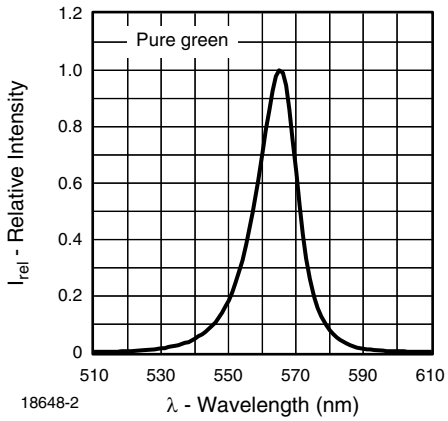



Fig. 22 - Relative Intensity vs. Wavelength


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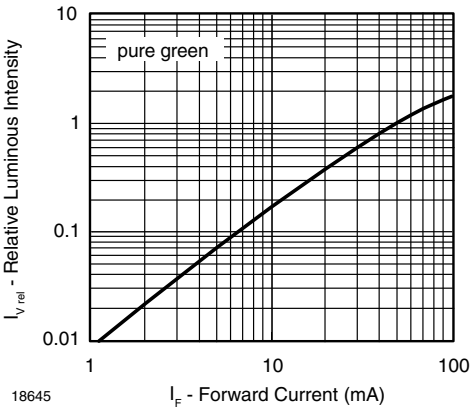



Fig. 23 - Relative Luminous Intensity vs. Forward Current

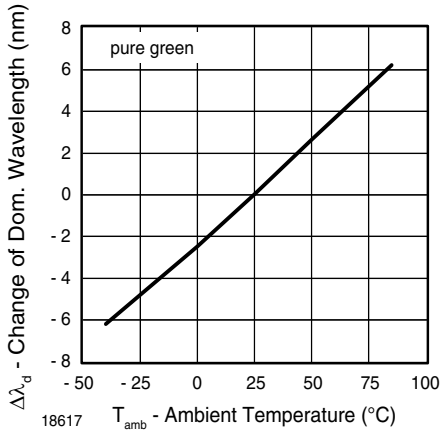



Fig. 26 - Change of Dominant Wavelength vs. Ambient Temperature

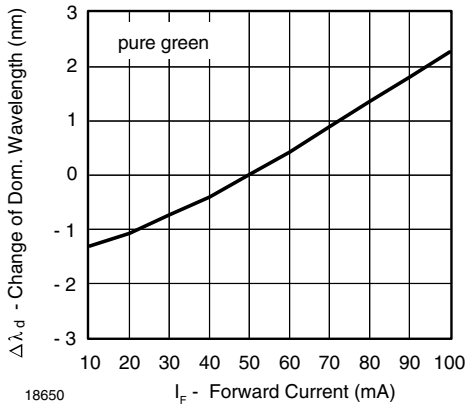



Fig. 24 - Change of Dominant Wavelength vs. Forward Current

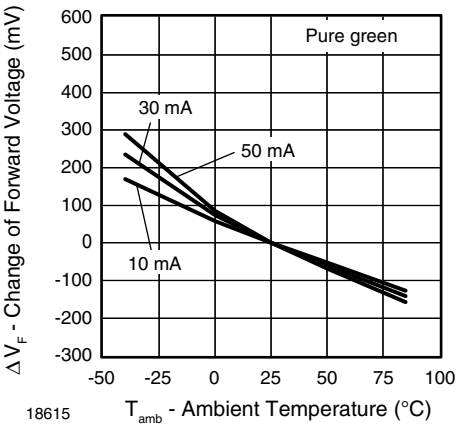



Fig. 27 - Change of Forward Voltage vs. Ambient Temperature

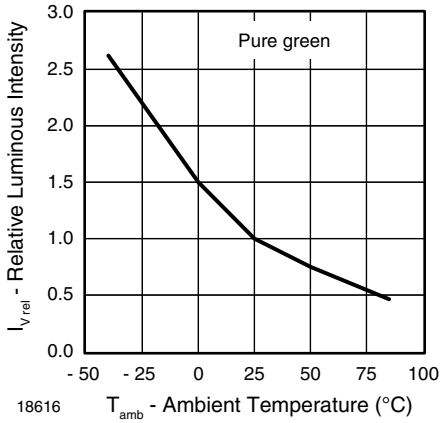
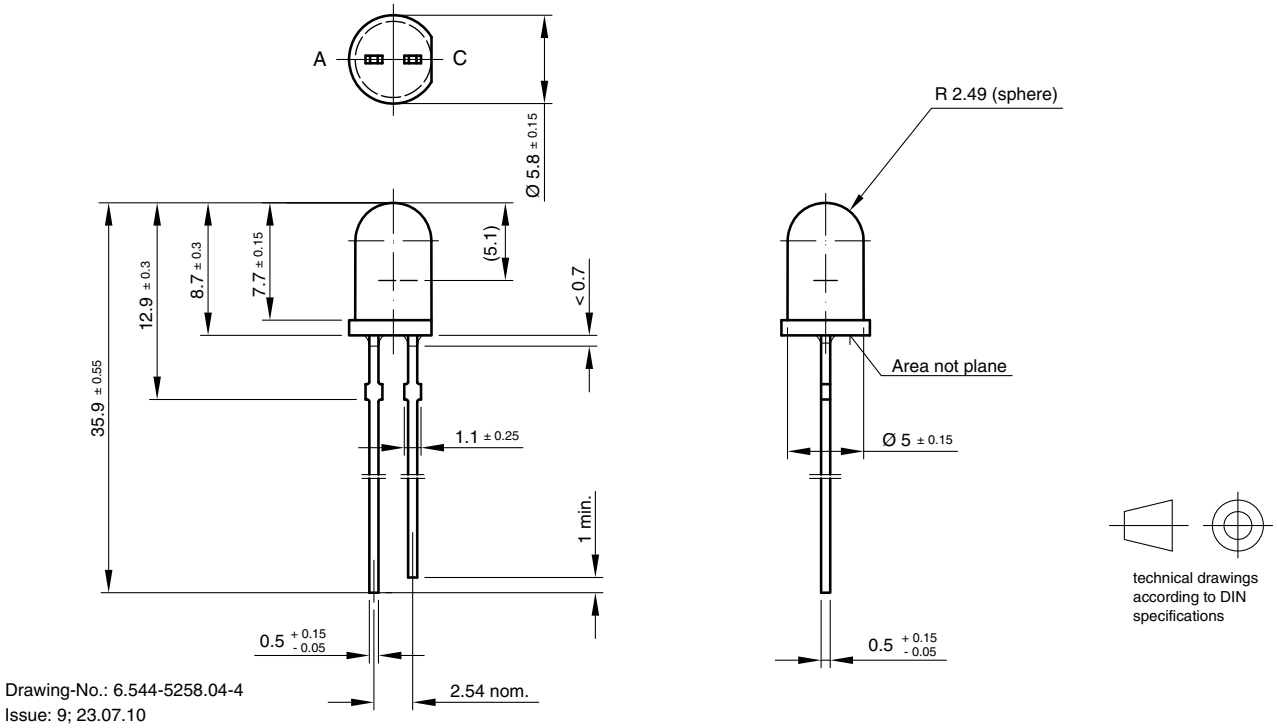



Fig. 25 - Relative Luminous Intensity vs. Ambient Temperature


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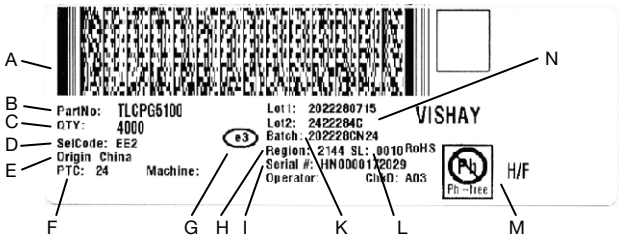
## PACKAGE DIMENSIONS in millimeters




Drawing-No.: 6.544-5258.04-4
Issue: 9; 23.07.10
96 12121

| PACKING | | |
|---|---|---|
| **MATERIAL** | **PACKING** | **QUANTITY** |
| TLCx5100 | Bulk | 4000 |

## BAR CODE PRODUCT LABEL (example)




A. 2D barcode
B. Part No: Vishay part number
C. QTY: quantity
D. SelCode: selection bin code
E. Country of origin
F. PTC: production plant code
G. Termination finish
H. Region code
I. Serial#: serial number
K. Batch number: year, week, country code, plant code
L. SL: storage location
M. Environmental symbols: RoHS, lead (Pb)-free, halogen-free
N. Lot numbers


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