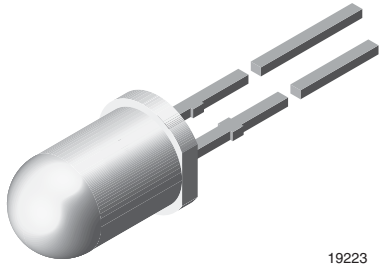




Ultrabright LED, Ø 5 mm Untinted Non-Diffused Package



19223

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: $\pm 9^\circ$

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



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

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 | AllnGaP on GaAs |
| TCR5100 | Red | 4300 | 11 000 | - | 50 | 611 | 616 | 622 | 50 | - | 2.1 | 2.7 | 50 | AllnGaP on GaAs |
| TCO5100 | Soft orange | 4300 | 12 000 | - | 50 | 600 | 605 | 611 | 50 | - | 2.1 | 2.7 | 50 | AllnGaP on GaAs |
| TLY5100 | Yellow | 3200 | 7500 | - | 50 | 585 | 590 | 597 | 50 | - | 2.1 | 2.7 | 50 | AllnGaP on GaAs |
| TLY5100-ASZ | Yellow | 3200 | 7500 | - | 50 | 585 | 590 | 597 | 50 | - | 2.1 | 2.7 | 50 | AllnGaP on GaAs |
| TLY5101-AS12Z | Yellow | 5750 | - | 20 000 | 50 | 585 | 590 | 597 | 50 | - | 2.1 | 2.7 | 50 | AllnGaP on GaAs |
| TLYG5100 | Yellow green | 1350 | 3500 | - | 50 | 565 | 572 | 576 | 50 | - | 2.2 | 2.7 | 50 | AllnGaP on GaAs |
| TLCPG5100 | Pure green | 430 | 1250 | - | 50 | 555 | 562 | 567 | 50 | - | 2.1 | 2.7 | 50 | AllnGaP on GaAs |

| ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25^\circ\text{C}$, unless otherwise specified) TLCS510., TCR510., TCO510., TLY510., TLYG510., TLCPG510. | | | | |
|---|---------------------------------------|------------|-------------|------------------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Reverse voltage ⁽¹⁾ | | V_R | 5 | V |
| DC forward current | $T_{amb} \leq 85^\circ\text{C}$ | I_F | 50 | mA |
| Surge forward current | $t_p \leq 10 \mu\text{s}$ | I_{FSM} | 1 | A |
| Power dissipation | | P_V | 135 | mW |
| Junction temperature | | T_j | 125 | $^\circ\text{C}$ |
| Operating temperature range | | T_{amb} | -40 to +100 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | -40 to +100 | $^\circ\text{C}$ |
| Soldering temperature | $t \leq 5 \text{ s}$, 2 mm from body | T_{sd} | 260 | $^\circ\text{C}$ |
| Thermal resistance junction/ambient | | R_{thJA} | 300 | K/W |

Note

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



| OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | |
|--|-------------------------------|----------|------------------|------|---------|------|------|
| TLCS5100, SUPER RED | | | | | | | |
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Luminous intensity ⁽¹⁾ | $I_F = 50\text{ mA}$ | TLCS5100 | I_V | 2400 | 7500 | - | mcd |
| Dominant wavelength | $I_F = 50\text{ mA}$ | | λ_d | 626 | 630 | 638 | nm |
| Peak wavelength | $I_F = 50\text{ mA}$ | | λ_p | - | 641 | - | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F = 50\text{ mA}$ | | $\Delta\lambda$ | - | 20 | - | nm |
| Angle of half intensity | $I_F = 50\text{ mA}$ | | ϕ | - | ± 9 | - | deg |
| Forward voltage | $I_F = 50\text{ mA}$ | | V_F | - | 2.1 | 2.7 | V |
| Reverse voltage | $I_R = 10\text{ }\mu\text{A}$ | | V_R | 5 | - | - | V |
| Temperature coefficient of V_F | $I_F = 50\text{ mA}$ | | TC_{V_F} | - | -2 | - | mV/K |
| Temperature coefficient of λ_d | $I_F = 50\text{ mA}$ | | TC_{λ_d} | - | 0.04 | - | nm/K |

Note

⁽¹⁾ In one packing unit $I_{V_{max.}}/I_{V_{min.}} \leq 2.0$

| OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | |
|--|-------------------------------|----------|------------------|------|---------|------|------|
| TLCR5100, RED | | | | | | | |
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Luminous intensity ⁽¹⁾ | $I_F = 50\text{ mA}$ | TLCR5100 | I_V | 4300 | 11 000 | - | mcd |
| Dominant wavelength | $I_F = 50\text{ mA}$ | | λ_d | 611 | 616 | 622 | nm |
| Peak wavelength | $I_F = 50\text{ mA}$ | | λ_p | - | 622 | - | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F = 50\text{ mA}$ | | $\Delta\lambda$ | - | 18 | - | nm |
| Angle of half intensity | $I_F = 50\text{ mA}$ | | ϕ | - | ± 9 | - | deg |
| Forward voltage | $I_F = 50\text{ mA}$ | | V_F | - | 2.1 | 2.7 | V |
| Reverse voltage | $I_R = 10\text{ }\mu\text{A}$ | | V_R | 5 | - | - | V |
| Temperature coefficient of V_F | $I_F = 50\text{ mA}$ | | TC_{V_F} | - | -3.5 | - | mV/K |
| Temperature coefficient of λ_d | $I_F = 50\text{ mA}$ | | TC_{λ_d} | - | 0.05 | - | nm/K |

Note

⁽¹⁾ In one packing unit $I_{V_{max.}}/I_{V_{min.}} \leq 2.0$

| OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | |
|--|-------------------------------|----------|------------------|------|---------|------|------|
| TLCO5100, SOFT ORANGE | | | | | | | |
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Luminous intensity ⁽¹⁾ | $I_F = 50\text{ mA}$ | TLCO5100 | I_V | 4300 | 12 000 | - | mcd |
| Dominant wavelength | $I_F = 50\text{ mA}$ | | λ_d | 600 | 605 | 611 | nm |
| Peak wavelength | $I_F = 50\text{ mA}$ | | λ_p | - | 611 | - | nm |
| Spectral bandwidth at 50 % $I_{rel\ max.}$ | $I_F = 50\text{ mA}$ | | $\Delta\lambda$ | - | 17 | - | nm |
| Angle of half intensity | $I_F = 50\text{ mA}$ | | ϕ | - | ± 9 | - | deg |
| Forward voltage | $I_F = 50\text{ mA}$ | | V_F | - | 2.1 | 2.7 | V |
| Reverse voltage | $I_R = 10\text{ }\mu\text{A}$ | | V_R | 5 | - | - | V |
| Temperature coefficient of V_F | $I_F = 50\text{ mA}$ | | TC_{V_F} | - | -2.5 | - | mV/K |
| Temperature coefficient of λ_d | $I_F = 50\text{ mA}$ | | TC_{λ_d} | - | 0.1 | - | nm/K |

Note

⁽¹⁾ In one packing unit $I_{V_{max.}}/I_{V_{min.}} \leq 2.0$



| OPTICAL AND ELECTRICAL CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified) | | | | | | | |
|---|------------------------|----------|-----------------------------|------|------|--------|------|
| TLCY5100, TLCY5101, YELLOW | | | | | | | |
| PARAMETER | TEST CONDITION | PART | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Luminous intensity ⁽¹⁾ | I _F = 50 mA | TLCY5100 | I _V | 3200 | 7500 | - | mcd |
| | | TLCY5101 | I _V | 5750 | - | 20 000 | mcd |
| Dominant wavelength | I _F = 50 mA | | λ _d | 585 | 590 | 597 | nm |
| Peak wavelength | I _F = 50 mA | | λ _p | - | 593 | - | nm |
| Spectral bandwidth at 50 % I _{rel max.} | I _F = 50 mA | | Δλ | - | 17 | - | nm |
| Angle of half intensity | I _F = 50 mA | | φ | - | ± 9 | - | deg |
| 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 _{V_F} | - | -3.5 | - | mV/K |
| Temperature coefficient of λ _d | I _F = 50 mA | | TC _{λ_d} | - | 0.1 | - | nm/K |

Note

⁽¹⁾ In one packing unit I_{Vmax.}/I_{Vmin.} ≤ 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 | | λ _d | 565 | 572 | 576 | nm |
| Peak wavelength | I _F = 50 mA | | λ _p | - | 574 | - | nm |
| Spectral bandwidth at 50 % I _{rel max.} | I _F = 50 mA | | Δλ | - | 15 | - | nm |
| Angle of half intensity | I _F = 50 mA | | φ | - | ± 9 | - | deg |
| 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 _{V_F} | - | -4.5 | - | mV/K |
| Temperature coefficient of λ _d | I _F = 50 mA | | TC _{λ_d} | - | 0.1 | - | nm/K |

Note

⁽¹⁾ In one packing unit I_{Vmax.}/I_{Vmin.} ≤ 2.0

| 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 | | λ _d | 555 | 562 | 567 | nm |
| Peak wavelength | I _F = 50 mA | | λ _p | - | 563 | - | nm |
| Spectral bandwidth at 50 % I _{rel max.} | I _F = 50 mA | | Δλ | - | 20 | - | nm |
| Angle of half intensity | I _F = 50 mA | | φ | - | ± 9 | - | deg |
| 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 _{V_F} | - | -3.5 | - | mV/K |
| Temperature coefficient of λ _d | I _F = 50 mA | | TC _{λ_d} | - | 0.1 | - | nm/K |

Note

⁽¹⁾ In one packing unit I_{Vmax.}/I_{Vmin.} ≤ 2.0



| LUMINOUS INTENSITY CLASSIFICATION | | |
|--|---------------------------------|-------------|
| GROUP | LUMINOUS INTENSITY (mcd) | |
| | 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 $\pm 11\%$.
 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.

| COLOR CLASSIFICATION | | | | | | | | | | |
|-----------------------------|-----------------------------|-------------|--------------------|-------------|---------------|-------------|---------------------|-------------|-------------------|-------------|
| GROUP | DOM. WAVELENGTH (nm) | | | | | | | | | |
| | RED | | SOFT ORANGE | | YELLOW | | YELLOW GREEN | | PURE GREEN | |
| | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. |
| 0 | - | - | - | - | 585 | 588 | - | - | 555 | 559 |
| 1 | 611 | 618 | - | - | 587 | 591 | - | - | 558 | 561 |
| 2 | 614 | 622 | 600 | 603 | 589 | 594 | - | - | 560 | 563 |
| 3 | - | - | 602 | 605 | 592 | 597 | - | - | 562 | 565 |
| 4 | - | - | 604 | 607 | - | - | - | - | 564 | 567 |
| 5 | - | - | 606 | 609 | - | - | 565 | 570 | - | - |
| 6 | - | - | 608 | 611 | - | - | 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 ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

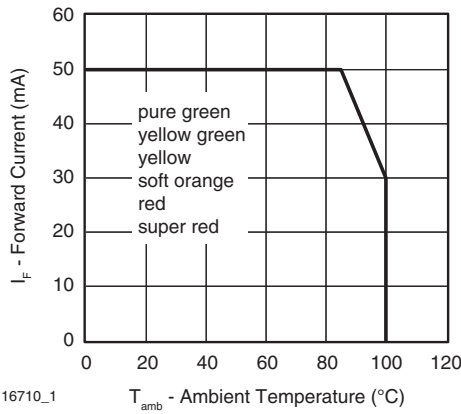


Fig. 1 - Forward Current vs. Ambient Temperature

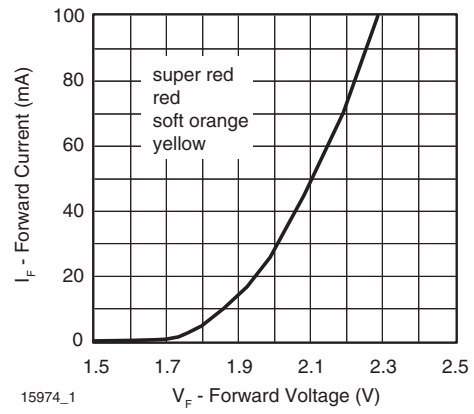


Fig. 4 - Forward Current vs. Forward Voltage

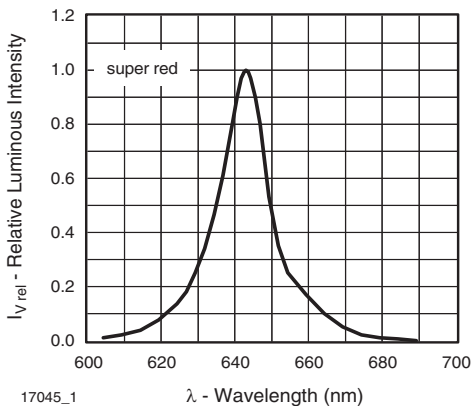


Fig. 2 - Relative Intensity vs. Wavelength

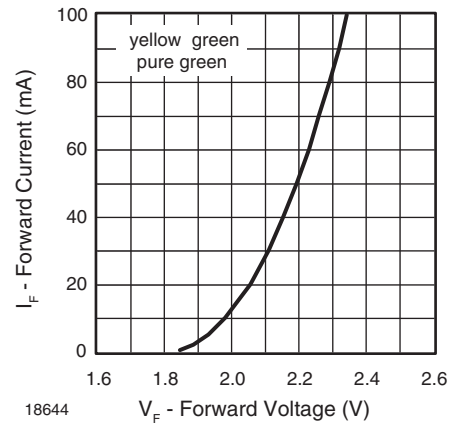


Fig. 5 - Forward Current vs. Forward Voltage

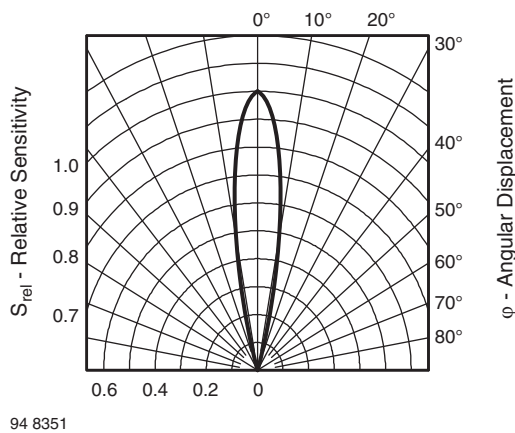


Fig. 3 - Relative Radiant Sensitivity vs. Angular Displacement

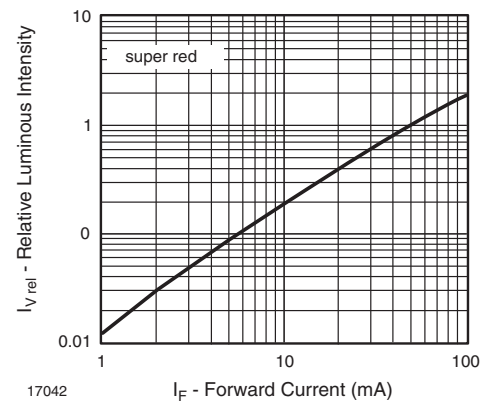


Fig. 6 - Relative Luminous Flux vs. Forward Current

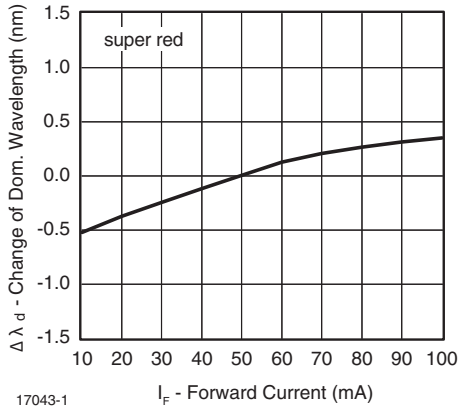


Fig. 7 - Change of Dominant Wavelength vs. Ambient Temperature

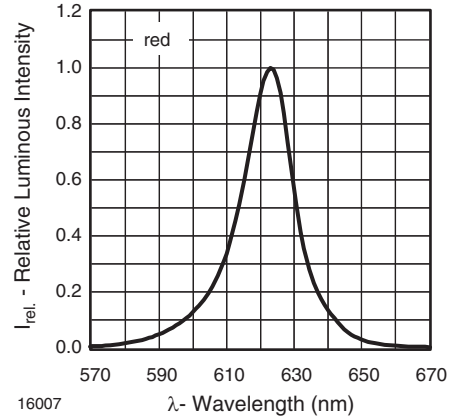


Fig. 10 - Relative Intensity vs. Wavelength

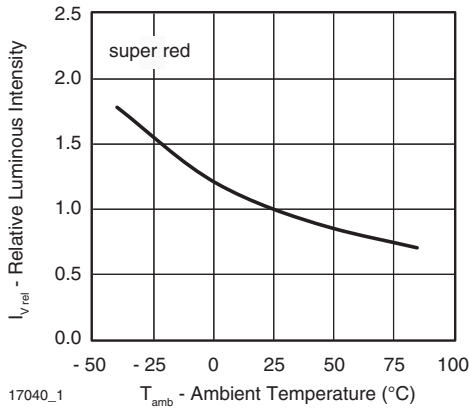


Fig. 8 - Relative Luminous Intensity vs. Ambient Temperature

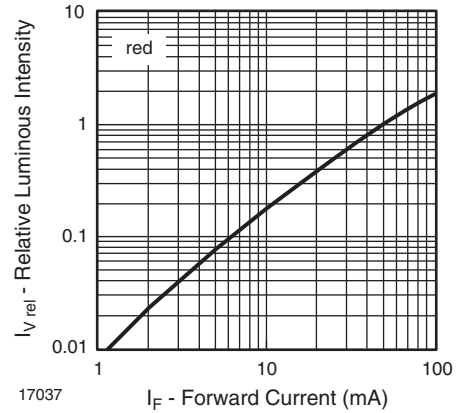


Fig. 11 - Relative Luminous Flux vs. Forward Current

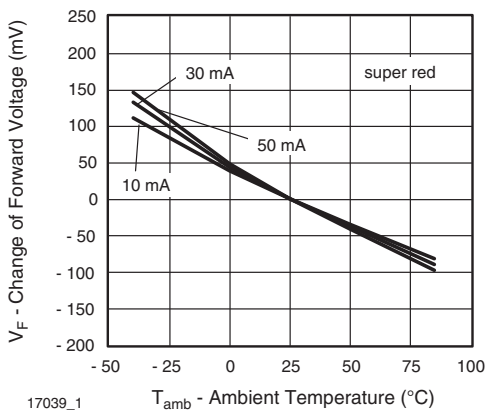


Fig. 9 - Change of Forward Voltage vs. Ambient Temperature

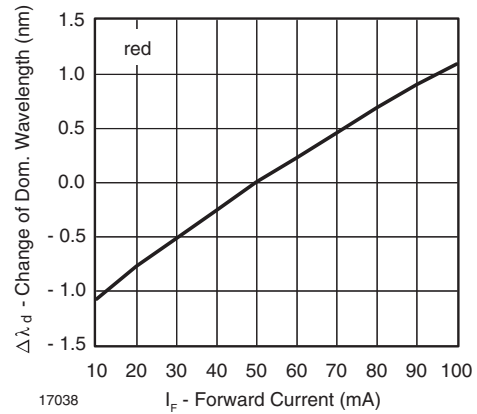


Fig. 12 - Changes of Dominant Wavelength vs. Forward Current

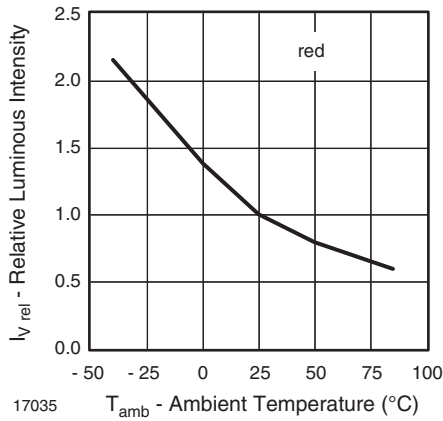


Fig. 13 - Relative Luminous Intensity vs. Ambient Temperature

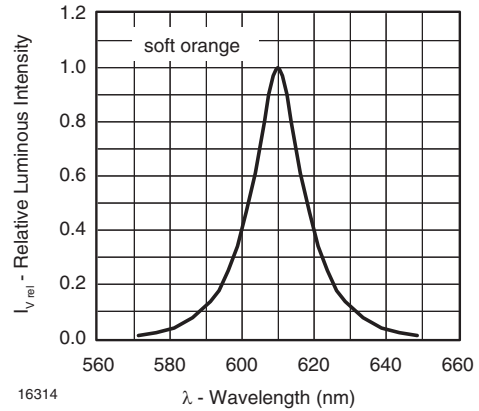


Fig. 16 - Relative Intensity vs. Wavelength

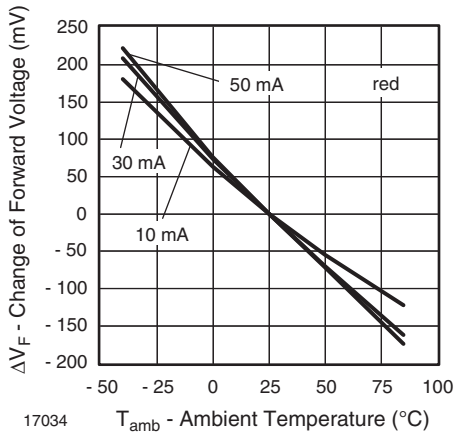


Fig. 14 - Change of Forward Voltage vs. Ambient Temperature

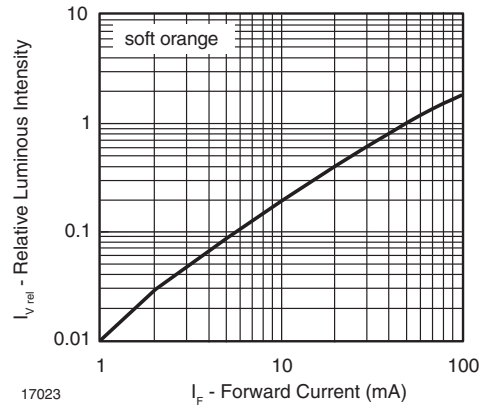


Fig. 17 - Relative Luminous Flux vs. Forward Current

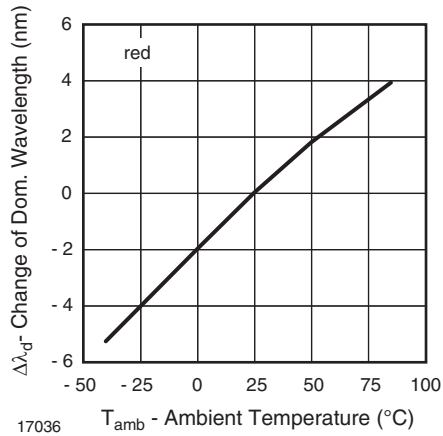


Fig. 15 - Change of Dominant Wavelength vs. Ambient Temperature

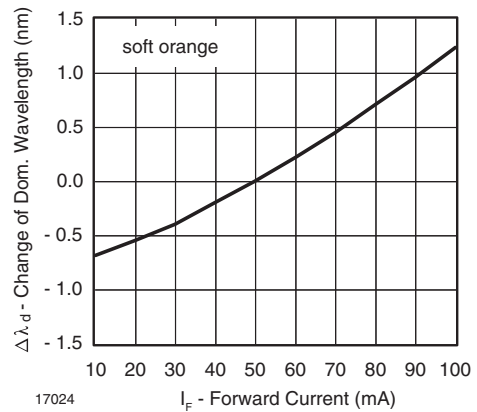


Fig. 18 - Change of Dominant Wavelength vs. Forward Current

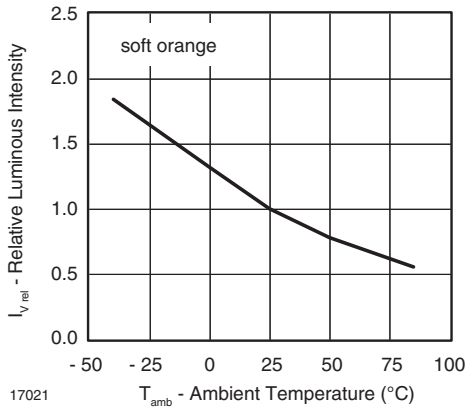


Fig. 19 - Relative Luminous Intensity vs. Ambient Temperature

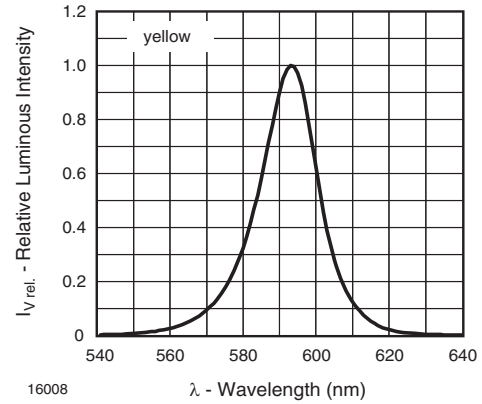


Fig. 22 - Relative Intensity vs. Wavelength

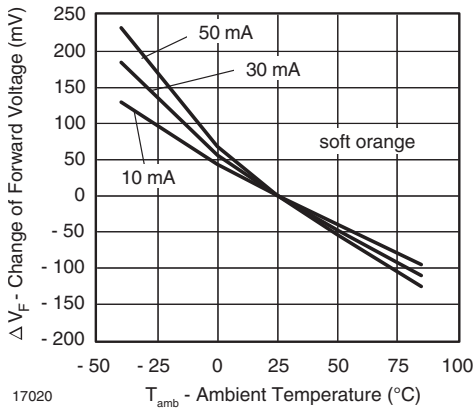


Fig. 20 - Change of Forward Voltage vs. Ambient Temperature

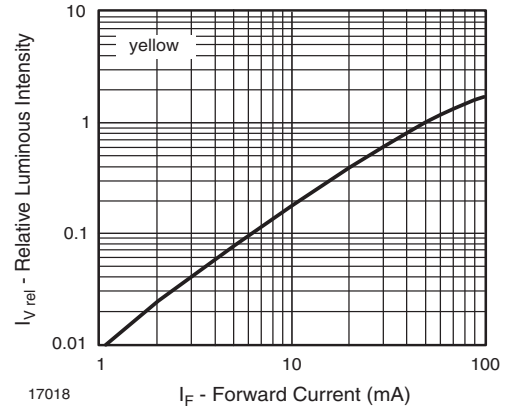


Fig. 23 - Relative Luminous Flux vs. Forward Current

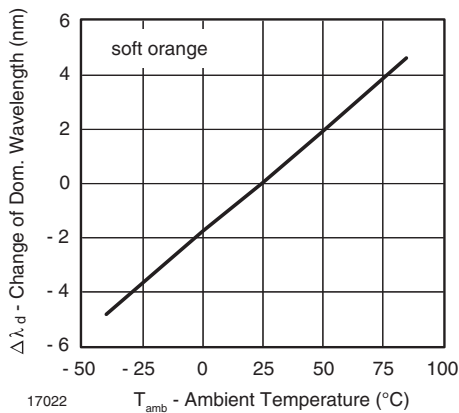


Fig. 21 - Change of Dominant Wavelength vs. Ambient Temperature

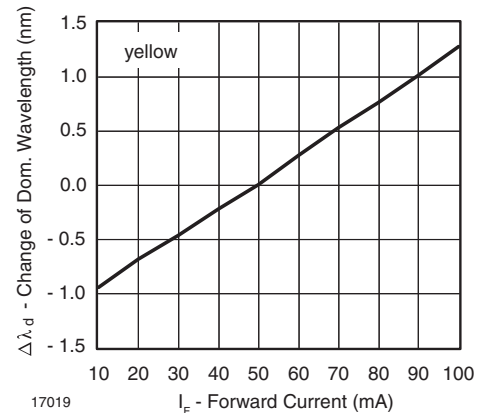


Fig. 24 - Change of Dominant Wavelength vs. Forward Current

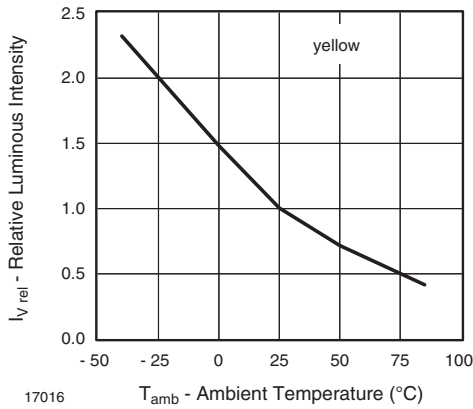


Fig. 25 - Relative Luminous Intensity vs. Ambient Temperature

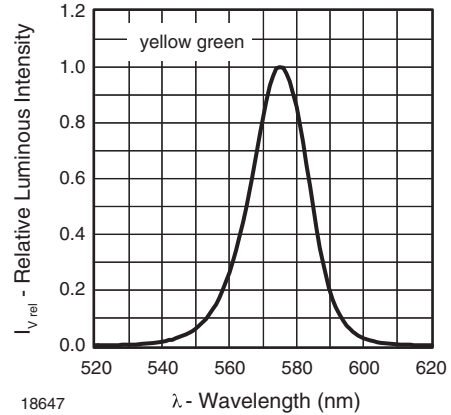


Fig. 28 - Relative Intensity vs. Wavelength

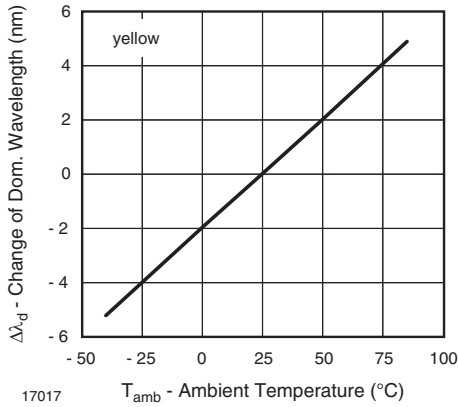


Fig. 26 - Change of Dominant Wavelength vs. Ambient Temperature

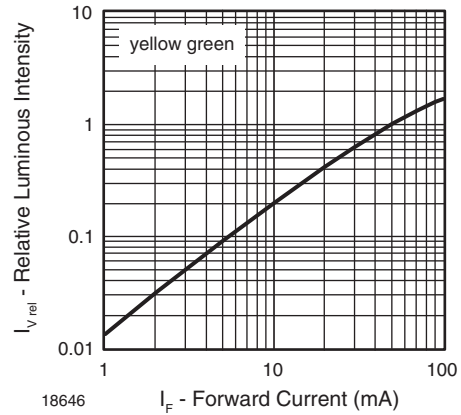


Fig. 29 - Relative Luminous Flux vs. Forward Current

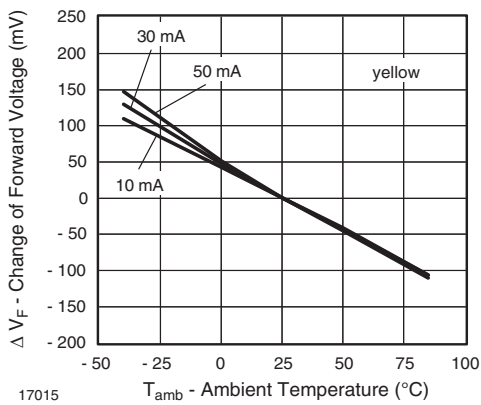


Fig. 27 - Change of Forward Voltage vs. Ambient Temperature

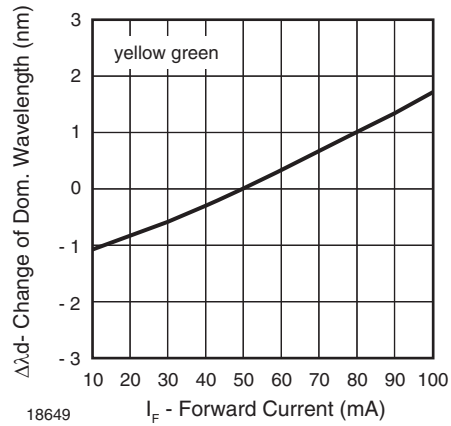


Fig. 30 - Change of Dominant Wavelength vs. Forward Current

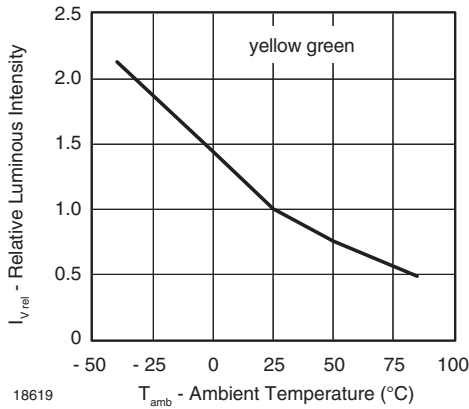


Fig. 31 - Relative Luminous Intensity vs. Ambient Temperature

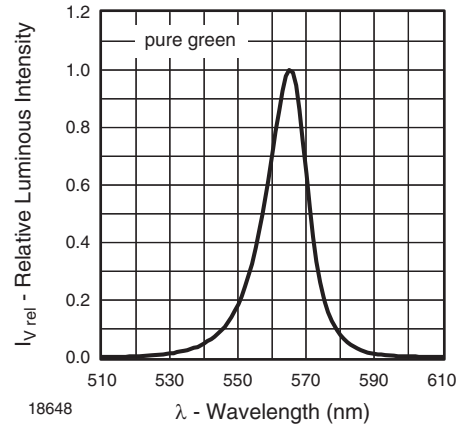


Fig. 34 - Relative Intensity vs. Wavelength

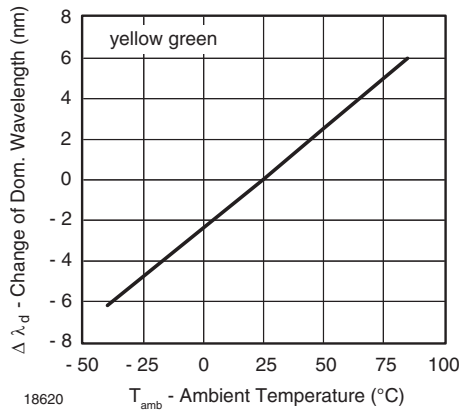


Fig. 32 - Change of Dominant Wavelength vs. Ambient Temperature

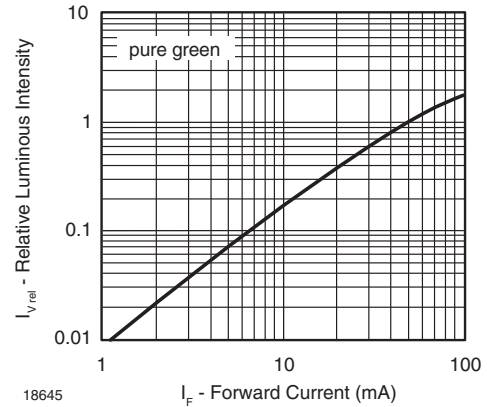


Fig. 35 - Relative Luminous Flux vs. Forward Current

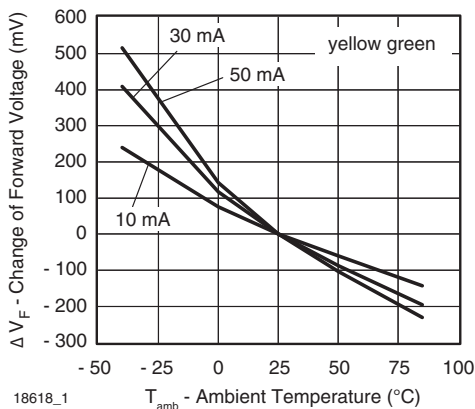


Fig. 33 - Change of Forward Voltage vs. Ambient Temperature

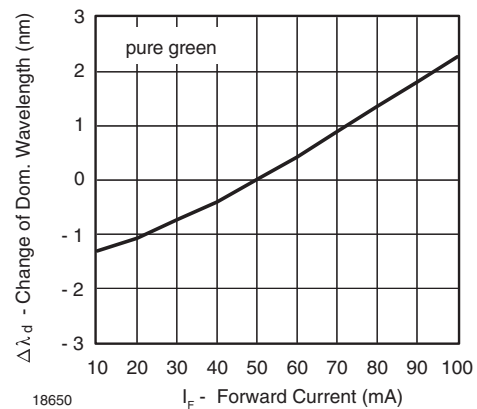


Fig. 36 - Change of Dominant Wavelength vs. Forward Current

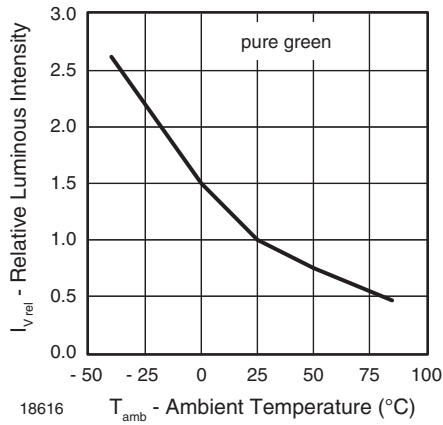


Fig. 37 - Relative Luminous Intensity vs. Ambient Temperature

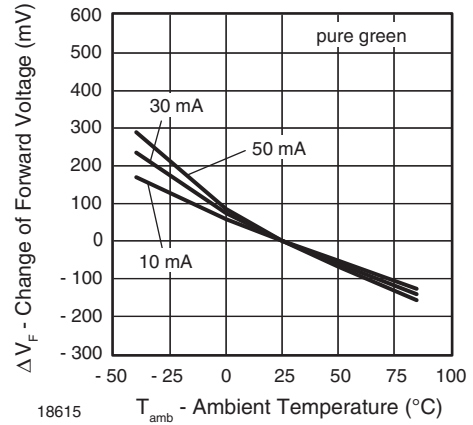


Fig. 39 - Change of Forward Voltage vs. Ambient Temperature

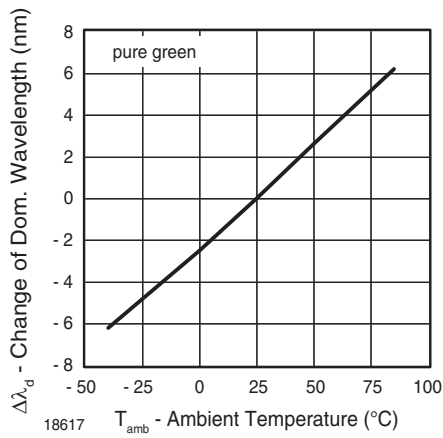
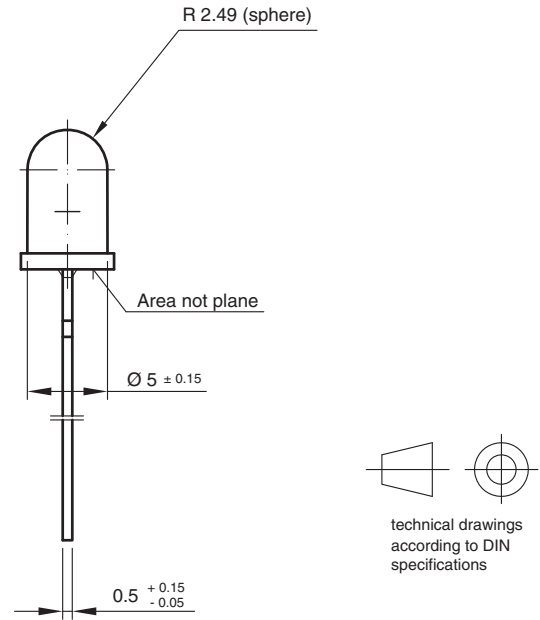
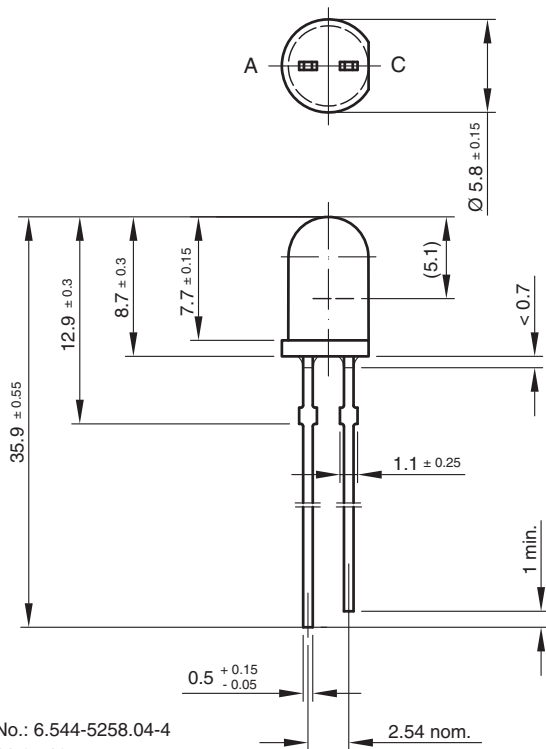


Fig. 38 - Change of Dominant Wavelength vs. Ambient Temperature



PACKAGE DIMENSIONS in millimeters



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

TAPE

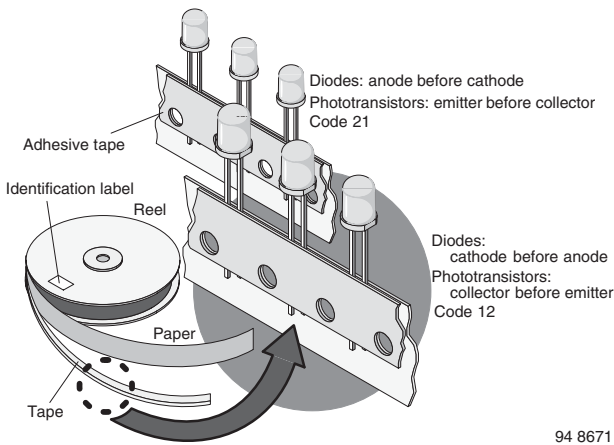


Fig. 40 - LED in Tape

94 8671

AMMOPACK

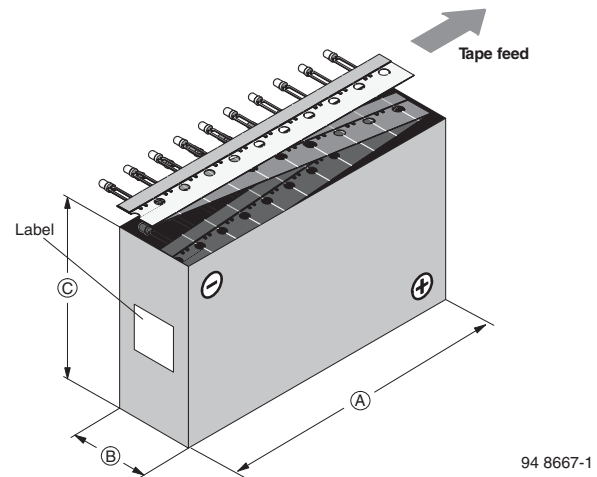


Fig. 41 - Tape Direction

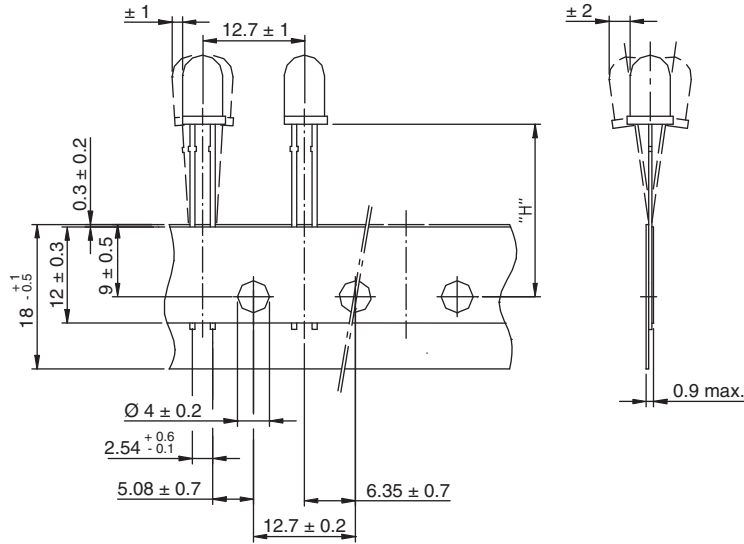
94 8667-1

Note

- The new nomenclature for ammpack is e.g. ASZ only, without suffix for the LED orientation. The carton box has to be turned to the desired position: "+" for anode first, or "-" for cathode first. AS12Z and AS21Z are still valid for already existing types, BUT NOT FOR NEW DESIGN.



TAPE DIMENSIONS in millimeters



| | |
|---------------|-------------------------|
| Quantity per: | Reel (Mat.-no. 1764) |
| | 1000 |

94 8172

| | |
|--------|-------------------|
| Option | Dim. "H" ± 0.5 mm |
| AS | 17.3 |



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