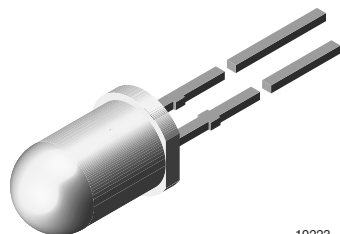


**Ultrabright LED, Ø 5 mm Untinted Non-Diffused**

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
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC

**RoHS**  
COMPLIANT**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                      | TECHNOLOGY      |
|----------------|------------------------------------------------|-----------------|
| TLCR5100       | Red, $I_V \geq 4300$ mcd                       | AlInGaP on GaAs |
| TLCY5100       | Yellow, $I_V \geq 3200$ mcd                    | AlInGaP on GaAs |
| TLCY5100-ASZ   | Yellow, $I_V \geq 3200$ mcd                    | AlInGaP on GaAs |
| TLCY5101       | Yellow, $I_V = (5750 \text{ to } 20\,000)$ mcd | AlInGaP on GaAs |
| TLCY5101-AS12Z | Yellow, $I_V = (5750 \text{ to } 20\,000)$ mcd | AlInGaP on GaAs |
| TLCS5100       | Super red, $I_V \geq 2400$ mcd                 | AlInGaP on GaAs |
| TLCO5100       | Soft orange, $I_V \geq 4300$ mcd               | AlInGaP on GaAs |
| TLCYG5100      | Yellow green, $I_V \geq 1350$ mcd              | AlInGaP on GaAs |
| TLCPG5100      | Pure green, $I_V \geq 430$ mcd                 | AlInGaP on GaAs |

# ABSOLUTE MAXIMUM RATINGS <sup>1)</sup> TLCS/R/O/Y/YG/PG510.

| PARAMETER                           | TEST CONDITION                        | SYMBOL     | VALUE         | UNIT             |
|-------------------------------------|---------------------------------------|------------|---------------|------------------|
| Reverse voltage <sup>2)</sup>       |                                       | $V_R$      | 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:

<sup>1)</sup>  $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified

<sup>2)</sup> Driving the LED in reverse direction is suitable for a short term application

# OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> TLCS5100, SUPER RED

| PARAMETER                                         | TEST CONDITION         | PART     | SYMBOL           | MIN. | TYP.    | MAX. | UNIT |
|---------------------------------------------------|------------------------|----------|------------------|------|---------|------|------|
| Luminous intensity <sup>2)</sup>                  | $I_F = 50 \text{ mA}$  | TLCS5100 | $I_V$            | 2400 | 7500    |      | mcd  |
| Dominant wavelength                               | $I_F = 50 \text{ mA}$  |          | $\lambda_d$      | 626  | 630     | 638  | nm   |
| Peak wavelength                                   | $I_F = 50 \text{ mA}$  |          | $\lambda_p$      |      | 641     |      | nm   |
| Spectral bandwidth at 50 % $I_{rel \text{ max.}}$ | $I_F = 50 \text{ mA}$  |          | $\Delta\lambda$  |      | 20      |      | nm   |
| Angle of half intensity                           | $I_F = 50 \text{ mA}$  |          | $\phi$           |      | $\pm 9$ |      | deg  |
| Forward voltage                                   | $I_F = 50 \text{ mA}$  |          | $V_F$            |      | 2.1     | 2.7  | V    |
| Reverse voltage                                   | $I_R = 10 \mu\text{A}$ |          | $V_R$            | 5    |         |      | V    |
| Temperature coefficient of $V_F$                  | $I_F = 50 \text{ mA}$  |          | $TC_{VF}$        |      | - 2     |      | mV/K |
| Temperature coefficient of $\lambda_d$            | $I_F = 50 \text{ mA}$  |          | $TC_{\lambda_d}$ |      | 0.04    |      | nm/K |

Note:

<sup>1)</sup>  $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified

<sup>2)</sup> In one packing unit  $I_{Vmax.}/I_{Vmin.} \leq 2.0$

# OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> TLCR5100, RED

| PARAMETER                                         | TEST CONDITION         | PART     | SYMBOL           | MIN. | TYP.    | MAX. | UNIT |
|---------------------------------------------------|------------------------|----------|------------------|------|---------|------|------|
| Luminous intensity <sup>2)</sup>                  | $I_F = 50 \text{ mA}$  | TLCR5100 | $I_V$            | 4300 | 11 000  |      | mcd  |
| Dominant wavelength                               | $I_F = 50 \text{ mA}$  |          | $\lambda_d$      | 611  | 616     | 622  | nm   |
| Peak wavelength                                   | $I_F = 50 \text{ mA}$  |          | $\lambda_p$      |      | 622     |      | nm   |
| Spectral bandwidth at 50 % $I_{rel \text{ max.}}$ | $I_F = 50 \text{ mA}$  |          | $\Delta\lambda$  |      | 18      |      | nm   |
| Angle of half intensity                           | $I_F = 50 \text{ mA}$  |          | $\phi$           |      | $\pm 9$ |      | deg  |
| Forward voltage                                   | $I_F = 50 \text{ mA}$  |          | $V_F$            |      | 2.1     | 2.7  | V    |
| Reverse voltage                                   | $I_R = 10 \mu\text{A}$ |          | $V_R$            | 5    |         |      | V    |
| Temperature coefficient of $V_F$                  | $I_F = 50 \text{ mA}$  |          | $TC_{VF}$        |      | - 3.5   |      | mV/K |
| Temperature coefficient of $\lambda_d$            | $I_F = 50 \text{ mA}$  |          | $TC_{\lambda_d}$ |      | 0.05    |      | nm/K |

Note:

<sup>1)</sup>  $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified

<sup>2)</sup> In one packing unit  $I_{Vmax.}/I_{Vmin.} \leq 2.0$



**OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> TLCO5100, SOFT ORANGE**

| PARAMETER                                         | TEST CONDITION                 | PART     | SYMBOL           | MIN. | TYP.    | MAX. | UNIT |
|---------------------------------------------------|--------------------------------|----------|------------------|------|---------|------|------|
| Luminous intensity <sup>2)</sup>                  | $I_F = 50 \text{ mA}$          | TLCO5100 | $I_V$            | 4300 | 12 000  |      | mcd  |
| Dominant wavelength                               | $I_F = 50 \text{ mA}$          |          | $\lambda_d$      | 600  | 605     | 611  | nm   |
| Peak wavelength                                   | $I_F = 50 \text{ mA}$          |          | $\lambda_p$      |      | 611     |      | nm   |
| Spectral bandwidth at 50 % $I_{rel \text{ max.}}$ | $I_F = 50 \text{ mA}$          |          | $\Delta\lambda$  |      | 17      |      | nm   |
| Angle of half intensity                           | $I_F = 50 \text{ mA}$          |          | $\phi$           |      | $\pm 9$ |      | 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 $V_F$                  | $I_F = 50 \text{ mA}$          |          | $TC_{VF}$        |      | - 2.5   |      | mV/K |
| Temperature coefficient of $\lambda_d$            | $I_F = 50 \text{ mA}$          |          | $TC_{\lambda_d}$ |      | 0.08    |      | nm/K |

Note:

<sup>1)</sup>  $T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified

<sup>2)</sup> In one packing unit  $I_{Vmax.}/I_{Vmin.} \leq 2.0$

**OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> TLCY5100, TLCY5101, YELLOW**

| PARAMETER                                         | TEST CONDITION                 | PART     | SYMBOL           | MIN. | TYP.    | MAX.   | UNIT |
|---------------------------------------------------|--------------------------------|----------|------------------|------|---------|--------|------|
| Luminous intensity <sup>2)</sup>                  | $I_F = 50 \text{ mA}$          | TLCY5100 | $I_V$            | 3200 | 7500    |        | mcd  |
|                                                   |                                | TLCY5101 | $I_V$            | 5750 |         | 20 000 | mcd  |
| Dominant wavelength                               | $I_F = 50 \text{ mA}$          |          | $\lambda_d$      | 585  | 590     | 597    | nm   |
| Peak wavelength                                   | $I_F = 50 \text{ mA}$          |          | $\lambda_p$      |      | 593     |        | nm   |
| Spectral bandwidth at 50 % $I_{rel \text{ max.}}$ | $I_F = 50 \text{ mA}$          |          | $\Delta\lambda$  |      | 17      |        | nm   |
| Angle of half intensity                           | $I_F = 50 \text{ mA}$          |          | $\phi$           |      | $\pm 9$ |        | 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 $V_F$                  | $I_F = 50 \text{ mA}$          |          | $TC_{VF}$        |      | - 3.5   |        | mV/K |
| Temperature coefficient of $\lambda_d$            | $I_F = 50 \text{ mA}$          |          | $TC_{\lambda_d}$ |      | 0.1     |        | nm/K |

Note:

<sup>1)</sup>  $T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified

<sup>2)</sup> In one packing unit  $I_{Vmax.}/I_{Vmin.} \leq 2.0$

**OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> TLCYG5100, YELLOW GREEN**

| PARAMETER                                         | TEST CONDITION                 | PART      | SYMBOL           | MIN. | TYP.    | MAX. | UNIT |
|---------------------------------------------------|--------------------------------|-----------|------------------|------|---------|------|------|
| Luminous intensity <sup>2)</sup>                  | $I_F = 50 \text{ mA}$          | TLCYG5100 | $I_V$            | 1350 | 3500    |      | mcd  |
| Dominant wavelength                               | $I_F = 50 \text{ mA}$          |           | $\lambda_d$      | 565  | 572     | 576  | nm   |
| Peak wavelength                                   | $I_F = 50 \text{ mA}$          |           | $\lambda_p$      |      | 574     |      | nm   |
| Spectral bandwidth at 50 % $I_{rel \text{ max.}}$ | $I_F = 50 \text{ mA}$          |           | $\Delta\lambda$  |      | 15      |      | nm   |
| Angle of half intensity                           | $I_F = 50 \text{ mA}$          |           | $\phi$           |      | $\pm 9$ |      | deg  |
| Forward voltage                                   | $I_F = 50 \text{ mA}$          |           | $V_F$            |      | 2.2     | 2.7  | V    |
| Reverse voltage                                   | $I_R = 10 \text{ }\mu\text{A}$ |           | $V_R$            | 5    |         |      | V    |
| Temperature coefficient of $V_F$                  | $I_F = 50 \text{ mA}$          |           | $TC_{VF}$        |      | - 4.5   |      | mV/K |
| Temperature coefficient of $\lambda_d$            | $I_F = 50 \text{ mA}$          |           | $TC_{\lambda_d}$ |      | 0.1     |      | nm/K |

Note:

<sup>1)</sup>  $T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified

<sup>2)</sup> In one packing unit  $I_{Vmax.}/I_{Vmin.} \leq 2.0$

| OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> TLCPG5100, PURE GREEN |                                |           |                  |      |         |      |      |
|----------------------------------------------------------------------------|--------------------------------|-----------|------------------|------|---------|------|------|
| PARAMETER                                                                  | TEST CONDITION                 | PART      | SYMBOL           | MIN. | TYP.    | MAX. | UNIT |
| Luminous intensity <sup>2)</sup>                                           | $I_F = 50 \text{ mA}$          | TLCPG5100 | $I_V$            | 430  | 1250    |      | mcd  |
| Dominant wavelength                                                        | $I_F = 50 \text{ mA}$          |           | $\lambda_d$      | 555  | 562     | 567  | nm   |
| Peak wavelength                                                            | $I_F = 50 \text{ mA}$          |           | $\lambda_p$      |      | 563     |      | nm   |
| Spectral bandwidth at 50 % $I_{rel \text{ max.}}$                          | $I_F = 50 \text{ mA}$          |           | $\Delta\lambda$  |      | 20      |      | nm   |
| Angle of half intensity                                                    | $I_F = 50 \text{ mA}$          |           | $\varphi$        |      | $\pm 9$ |      | deg  |
| Forward voltage                                                            | $I_F = 50 \text{ mA}$          |           | $V_F$            |      | 2.2     | 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 $\lambda_d$                                     | $I_F = 50 \text{ mA}$          |           | $TC_{\lambda_d}$ |      | 0.1     |      | nm/K |

Note:

<sup>1)</sup>  $T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified

<sup>2)</sup> 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  $\pm 11 \%$ .

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  $\pm 1$  nm.

## TYPICAL CHARACTERISTICS

$T_{amb} = 25^\circ\text{C}$ , unless otherwise specified

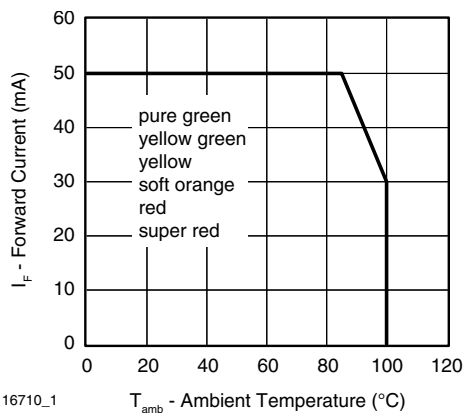


Figure 1. Forward Current vs. Ambient Temperature

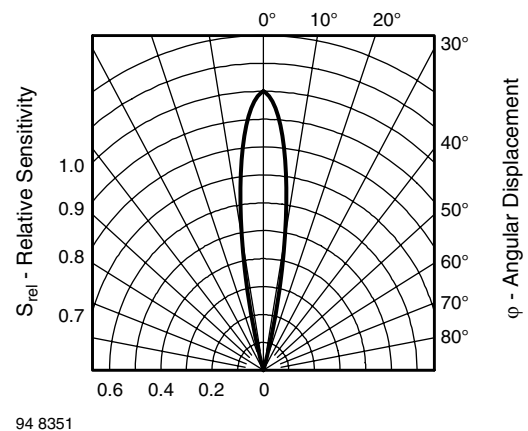


Figure 3. Relative Radiant Sensitivity vs. Angular Displacement

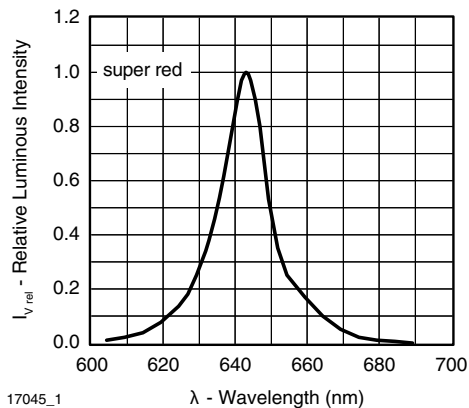


Figure 2. Relative Intensity vs. Wavelength

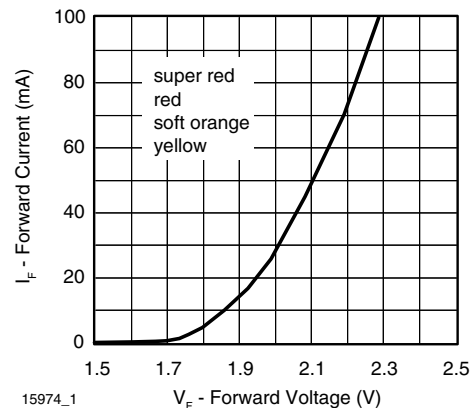


Figure 4. Forward Current vs. Forward Voltage

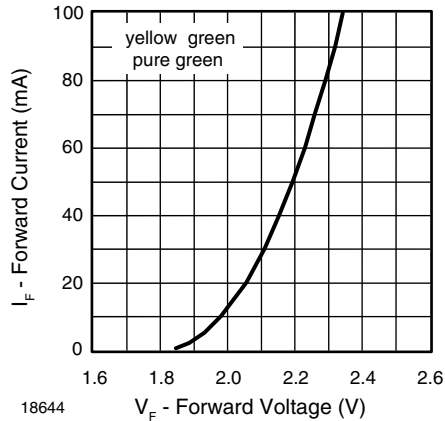


Figure 5. Forward Current vs. Forward Voltage

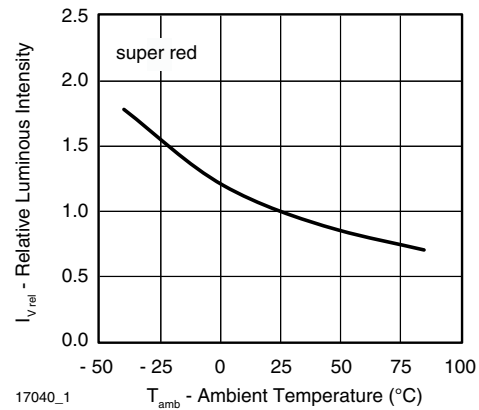


Figure 8. Relative Luminous Intensity vs. Ambient Temperature

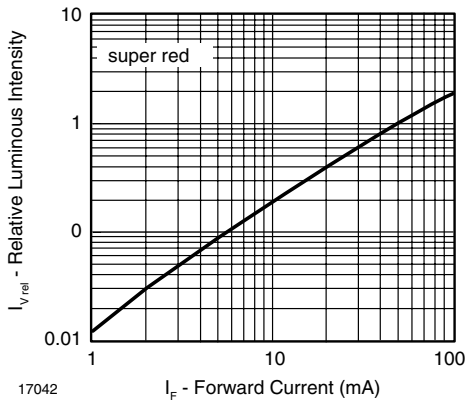


Figure 6. Relative Luminous Flux vs. Forward Current

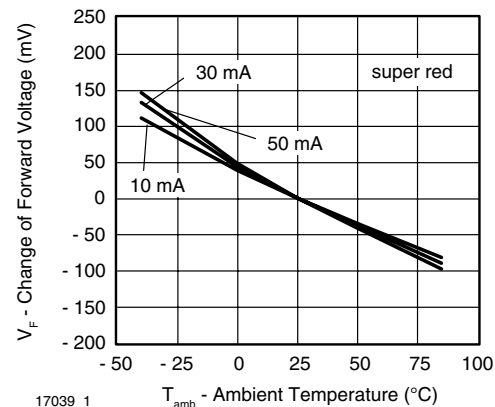


Figure 9. Change of Forward Voltage vs. Ambient Temperature

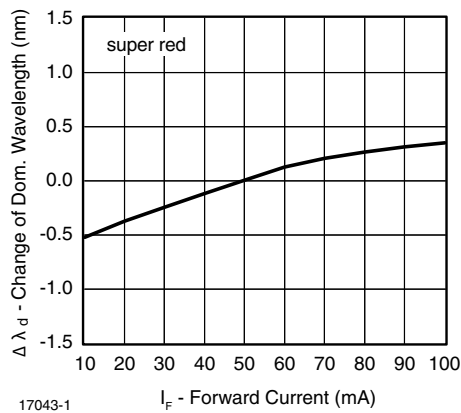


Figure 7. Change of Dominant Wavelength vs. Ambient Temperature

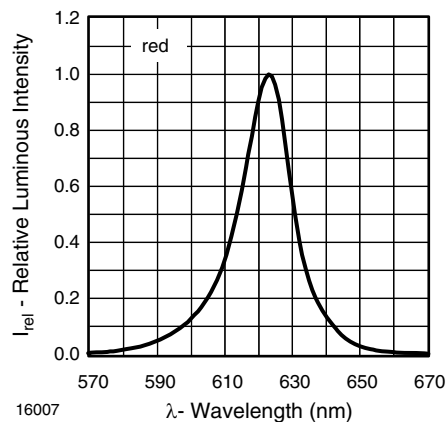


Figure 10. Relative Intensity vs. Wavelength

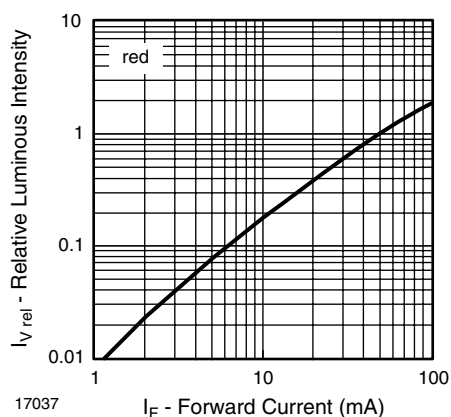


Figure 11. Relative Luminous Flux vs. Forward Current

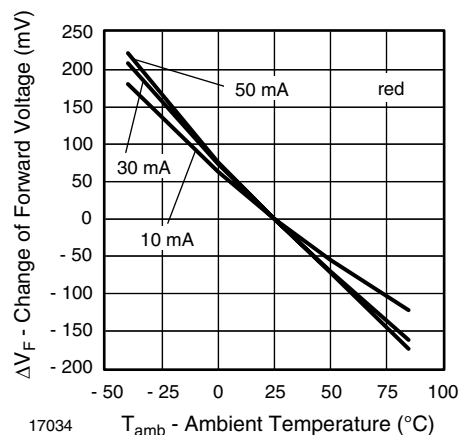


Figure 14. Change of Forward Voltage vs. Ambient Temperature

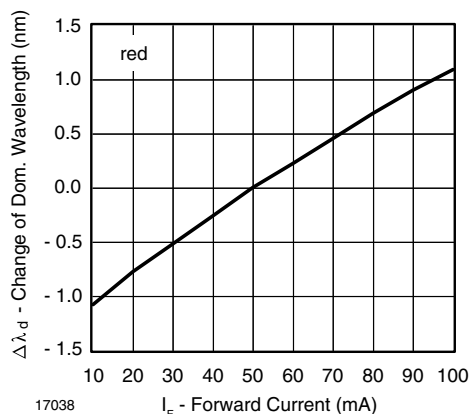


Figure 12. Changes of Dominant Wavelength vs. Forward Current

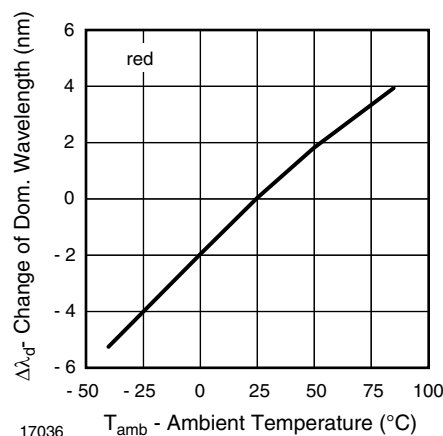


Figure 15. Change of Dominant Wavelength vs. Ambient Temperature

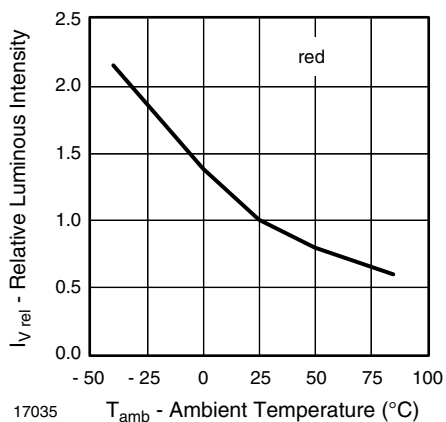


Figure 13. Relative Luminous Intensity vs. Ambient Temperature

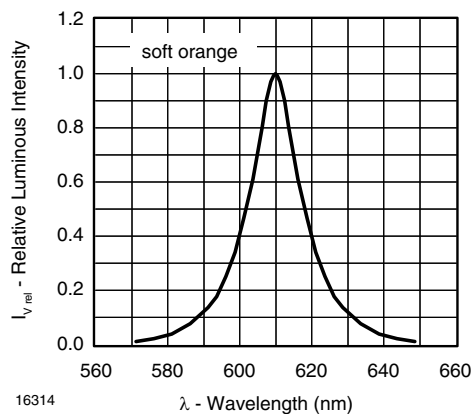


Figure 16. Relative Intensity vs. Wavelength

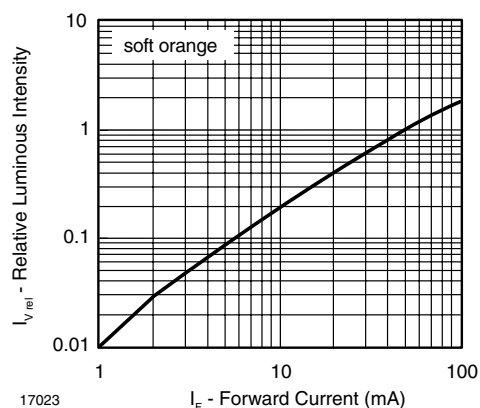


Figure 17. Relative Luminous Flux vs. Forward Current

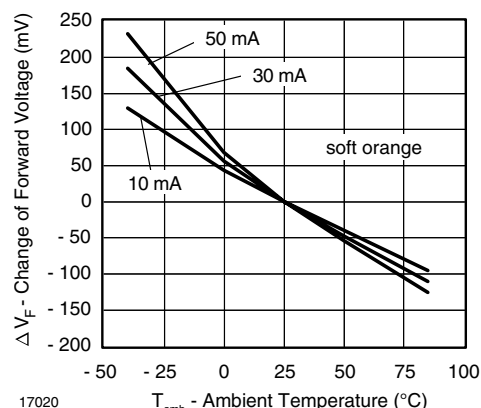


Figure 20. Change of Forward Voltage vs. Ambient Temperature

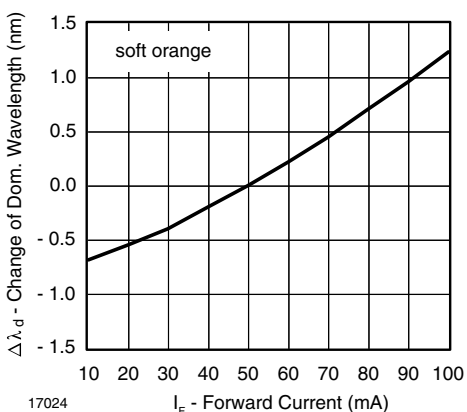


Figure 18. Change of Dominant Wavelength vs. Forward Current

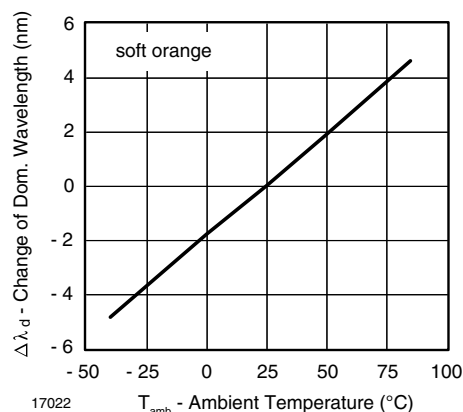


Figure 21. Change of Dominant Wavelength vs. Ambient Temperature

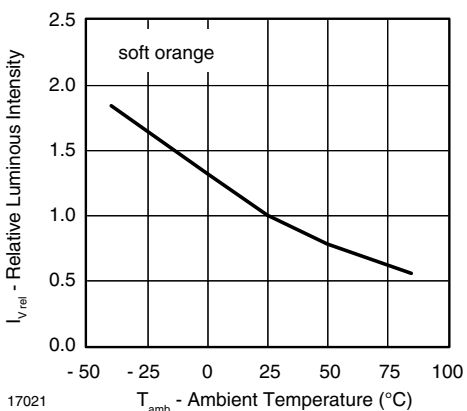


Figure 19. Relative Luminous Intensity vs. Ambient Temperature

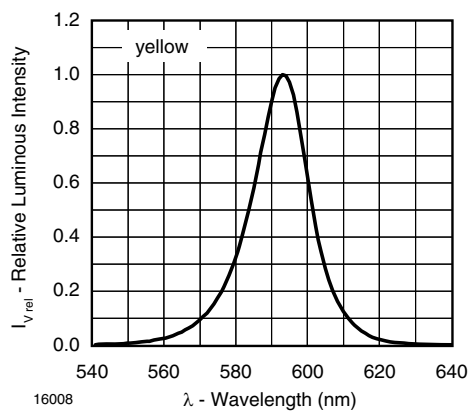


Figure 22. Relative Intensity vs. Wavelength

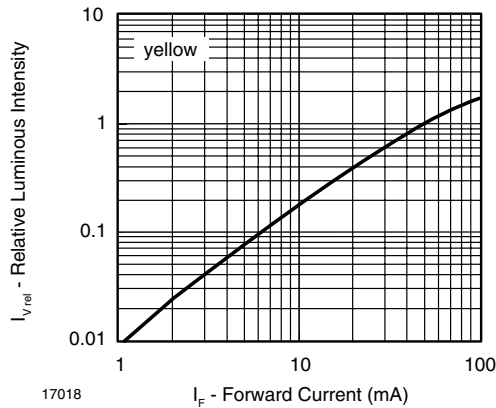


Figure 23. Relative Luminous Flux vs. Forward Current

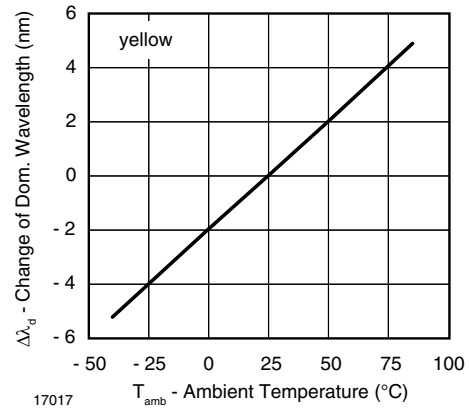


Figure 26. Change of Dominant Wavelength vs. Ambient Temperature

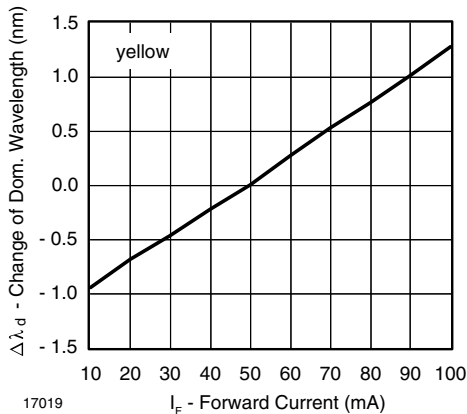


Figure 24. Change of Dominant Wavelength vs. Forward Current

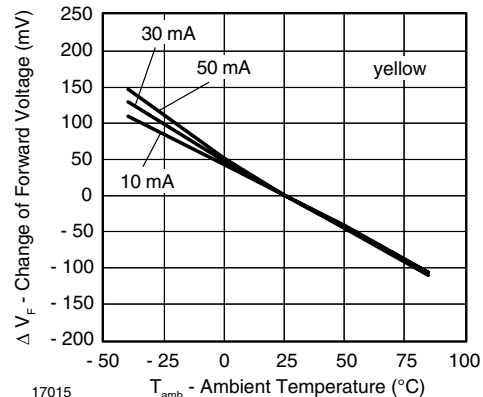


Figure 27. Change of Forward Voltage vs. Ambient Temperature

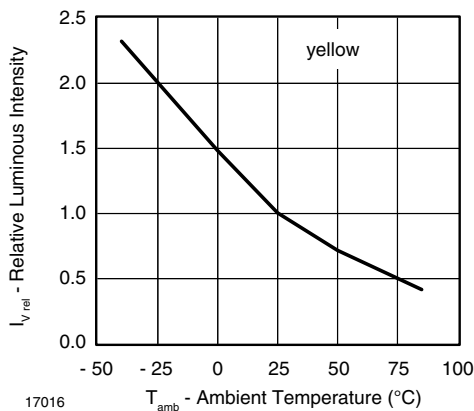


Figure 25. Relative Luminous Intensity vs. Ambient Temperature

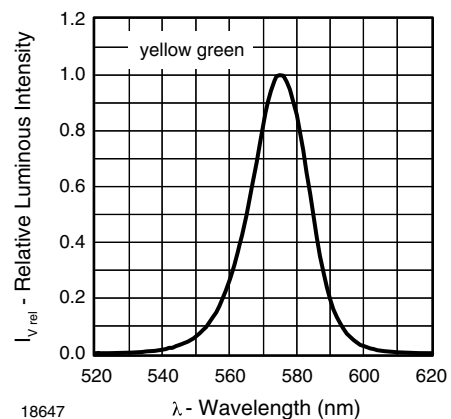


Figure 28. Relative Intensity vs. Wavelength

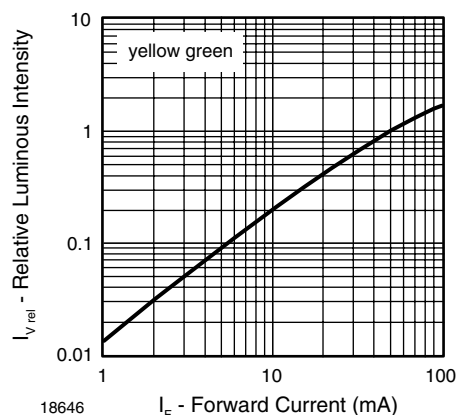


Figure 29. Relative Luminous Flux vs. Forward Current

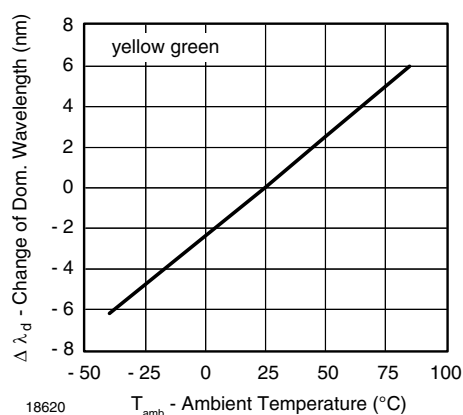


Figure 32. Change of Dominant Wavelength vs. Ambient Temperature

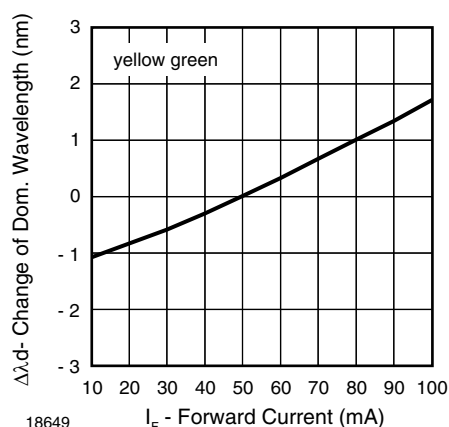


Figure 30. Change of Dominant Wavelength vs. Forward Current

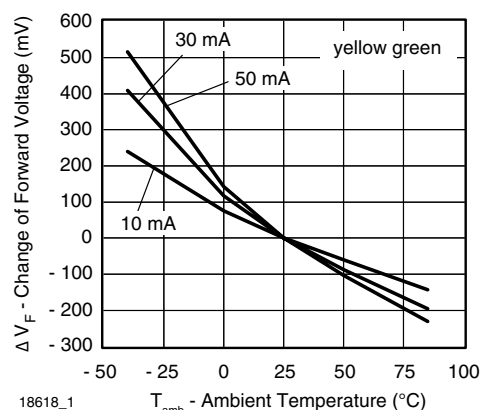


Figure 33. Change of Forward Voltage vs. Ambient Temperature

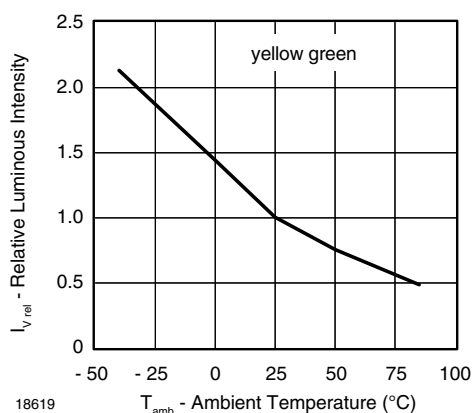


Figure 31. Relative Luminous Intensity vs. Ambient Temperature

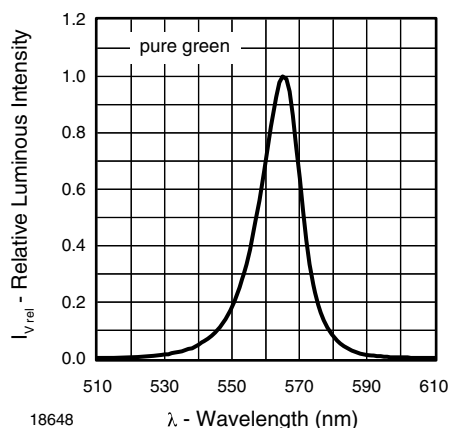


Figure 34. Relative Intensity vs. Wavelength

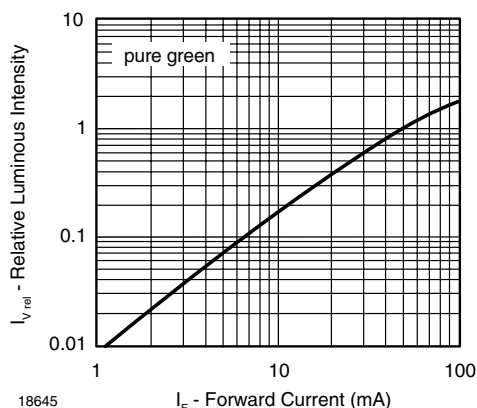


Figure 35. Relative Luminous Flux vs. Forward Current

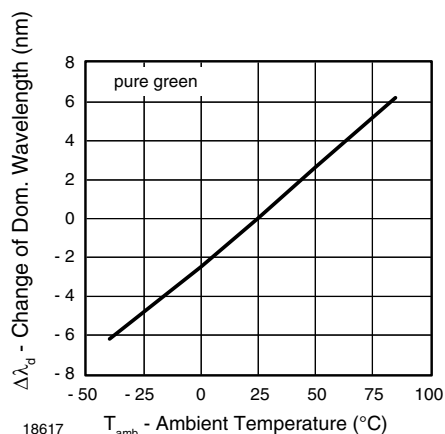


Figure 38. Change of Dominant Wavelength vs. Ambient Temperature

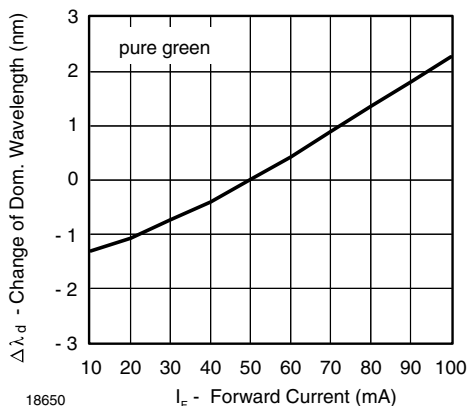


Figure 36. Change of Dominant Wavelength vs. Forward Current

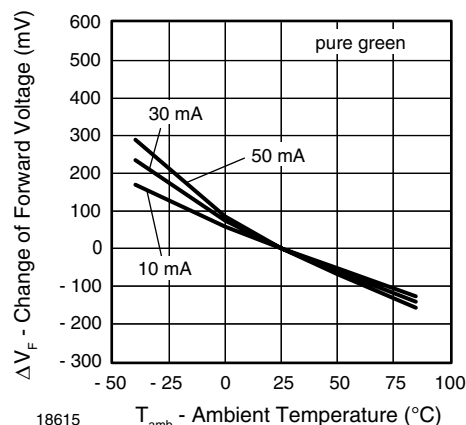


Figure 39. Change of Forward Voltage vs. Ambient Temperature

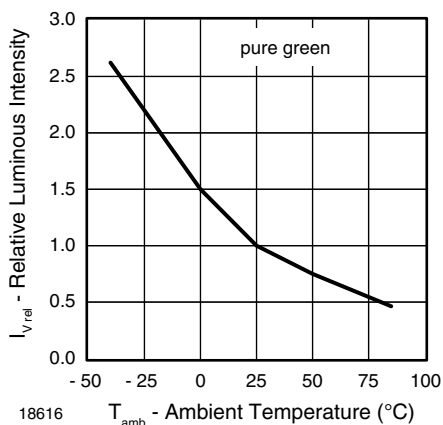
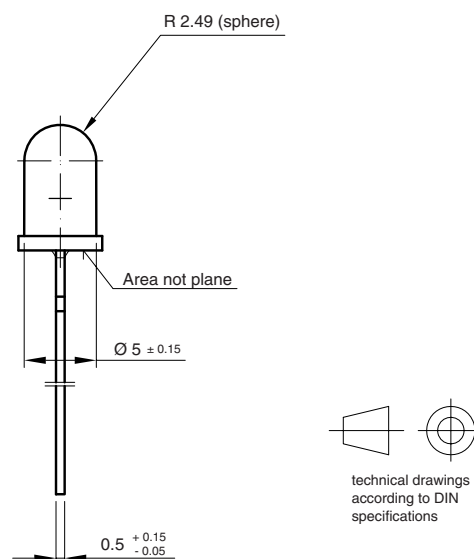
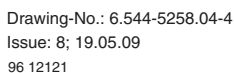
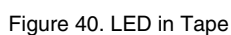


Figure 37. Relative Luminous Intensity vs. Ambient Temperature

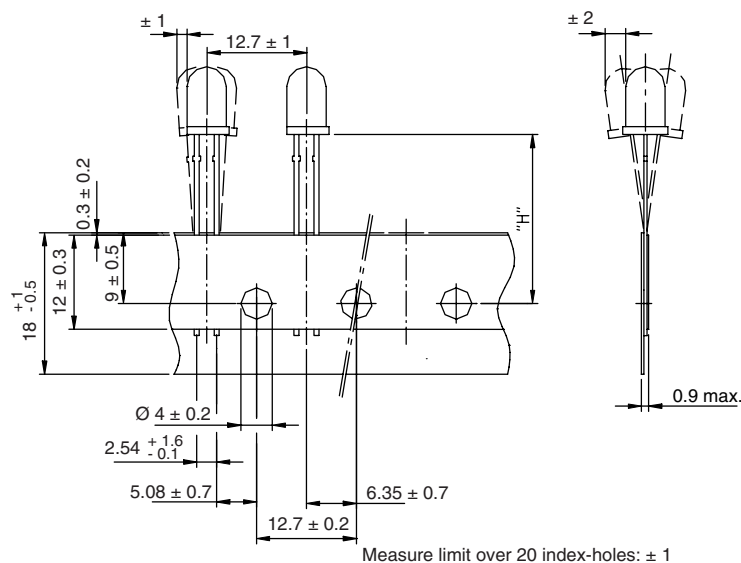
### PACKAGE DIMENSIONS in millimeters



## AMMOPACK



Note:  
AS12Z and AS21Z still valid for already existing types BUT NOT  
FOR NEW DESIGN

**TAPE DIMENSIONS** in millimeters

Measure limit over 20 index-holes:  $\pm 1$

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

94 8172

|        |                       |
|--------|-----------------------|
| Option | Dim. "H" $\pm$ 0.5 mm |
| AS     | 17.3                  |



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