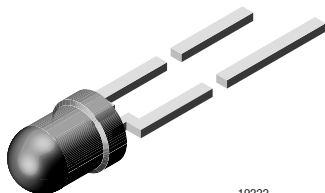


## High Intensity LED in Ø 3 mm Tinted Diffused Package



### DESCRIPTION

These devices have been designed to meet the increasing demand for AlInGaP technology general indicating and lighting purposes.

They are housed in a 3 mm diffused plastic package. The wide viewing angle of these devices provides a high brightness.

All packing units are categorized in luminous intensity groups. That allows users to assemble LEDs with uniform appearance.

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 3 mm
- Product series: low current
- Angle of half intensity:  $\pm 30^\circ$

### FEATURES

- AlInGaP technology
- Standard Ø 3 mm (T-1) package
- Small mechanical tolerances
- Wide viewing angle
- Very high intensity
- Low power consumption
- Specified at  $I_F = 2$  mA
- Luminous intensity categorized
- ESD-withstand voltage: up to 2 kV HBM according to JESD22-A114-B
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Status lights
- Off / on indicator
- Background illumination
- Readout lights
- Maintenance lights
- Legend light
- Low power DC circuits

### 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. |               |                 |
| TLLK4401      | Super red | 6.3                      | 17   | 32   | 2             | 626             | 630  | 639  | 2             | 1.6                 | 1.8  | 2.2  | 2             | AlInGaP on GaAs |
| TLLK4401-AS21 | Super red | 6.3                      | 17   | 32   | 2             | 626             | 630  | 639  | 2             | 1.6                 | 1.8  | 2.2  | 2             | AlInGaP on GaAs |
| TLLE4401      | Yellow    | 6.3                      | 17   | 32   | 2             | 581             | 589  | 594  | 2             | 1.6                 | 1.8  | 2.2  | 2             | AlInGaP on GaAs |

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified)

#### TLLK4401, TLLE4401

| PARAMETER                           | TEST CONDITION                  | SYMBOL     | VALUE       | UNIT             |
|-------------------------------------|---------------------------------|------------|-------------|------------------|
| Reverse voltage <sup>(1)</sup>      |                                 | $V_R$      | 5           | V                |
| DC forward current                  | $T_{amb} \leq 60^\circ\text{C}$ | $I_F$      | 30          | mA               |
| Surge forward current               | $t_p \leq 10 \mu\text{s}$       | $I_{FSM}$  | 0.1         | A                |
| Power dissipation                   | $T_{amb} \leq 60^\circ\text{C}$ | $P_V$      | 80          | mW               |
| Junction temperature                |                                 | $T_j$      | 100         | $^\circ\text{C}$ |
| Operating temperature range         |                                 | $T_{amb}$  | -40 to +100 | $^\circ\text{C}$ |
| Storage temperature range           |                                 | $T_{stg}$  | -55 to +100 | $^\circ\text{C}$ |
| Soldering temperature               | $t \leq 5$ s, 2 mm from body    | $T_{sd}$   | 260         | $^\circ\text{C}$ |
| Thermal resistance junction/ambient |                                 | $R_{thJA}$ | 400         | K/W              |

#### Note

<sup>(1)</sup> 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)  
**TLLK4401, SUPER RED**

| PARAMETER                         | TEST CONDITION                          | SYMBOL      | MIN. | TYP.     | MAX. | UNIT       |
|-----------------------------------|-----------------------------------------|-------------|------|----------|------|------------|
| Luminous intensity <sup>(1)</sup> | $I_F = 2\text{ mA}$                     | $I_V$       | 6.3  | 17       | 32   | mcd        |
| Dominant wavelength               | $I_F = 2\text{ mA}$                     | $\lambda_d$ | 626  | 630      | 639  | nm         |
| Peak wavelength                   | $I_F = 2\text{ mA}$                     | $\lambda_p$ | -    | 643      | -    | nm         |
| Angle of half intensity           | $I_F = 2\text{ mA}$                     | $\phi$      | -    | $\pm 30$ | -    | $^{\circ}$ |
| Forward voltage                   | $I_F = 2\text{ mA}$                     | $V_F$       | 1.6  | 1.8      | 2.2  | V          |
| Reverse voltage                   | $I_R = 10\text{ }\mu\text{A}$           | $V_R$       | 5    | -        | -    | V          |
| Junction capacitance              | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ | $C_j$       | -    | 15       | -    | pF         |

**Note**

<sup>(1)</sup> In one packing unit  $I_{Vmin}/I_{Vmax} \leq 0.5$ .

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**TLLE4401, YELLOW**

| PARAMETER                         | TEST CONDITION                          | SYMBOL      | MIN. | TYP.     | MAX. | UNIT       |
|-----------------------------------|-----------------------------------------|-------------|------|----------|------|------------|
| Luminous intensity <sup>(1)</sup> | $I_F = 2\text{ mA}$                     | $I_V$       | 6.3  | 17       | 32   | mcd        |
| Dominant wavelength               | $I_F = 2\text{ mA}$                     | $\lambda_d$ | 581  | 589      | 594  | nm         |
| Peak wavelength                   | $I_F = 2\text{ mA}$                     | $\lambda_p$ | -    | 591      | -    | nm         |
| Angle of half intensity           | $I_F = 2\text{ mA}$                     | $\phi$      | -    | $\pm 30$ | -    | $^{\circ}$ |
| Forward voltage                   | $I_F = 2\text{ mA}$                     | $V_F$       | 1.6  | 1.8      | 2.2  | V          |
| Reverse voltage                   | $I_R = 10\text{ }\mu\text{A}$           | $V_R$       | 5    | -        | -    | V          |
| Junction capacitance              | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ | $C_j$       | -    | 15       | -    | pF         |

**Note**

<sup>(1)</sup> In one packing unit  $I_{Vmin}/I_{Vmax} \leq 0.5$ .

**LUMINOUS INTENSITY CLASSIFICATION**

| GROUP | LIGHT INTENSITY (mcd) |      |
|-------|-----------------------|------|
|       | MIN.                  | MAX. |
| Q     | 6.3                   | 12.5 |
| R     | 10                    | 20   |
| S     | 16                    | 32   |

**Note**

- Luminous intensity is tested at a current pulse duration of 25 ms. 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 on any one bag.  
In order to ensure availability, single wavelength groups will not be orderable.

**COLOR CLASSIFICATION**

| GROUP | YELLOW               |      |
|-------|----------------------|------|
|       | DOM. WAVELENGTH (nm) |      |
|       | MIN.                 | MAX. |
| 1     | 581                  | 584  |
| 2     | 583                  | 586  |
| 3     | 585                  | 588  |
| 4     | 587                  | 590  |
| 5     | 589                  | 592  |
| 6     | 591                  | 594  |

**Note**

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

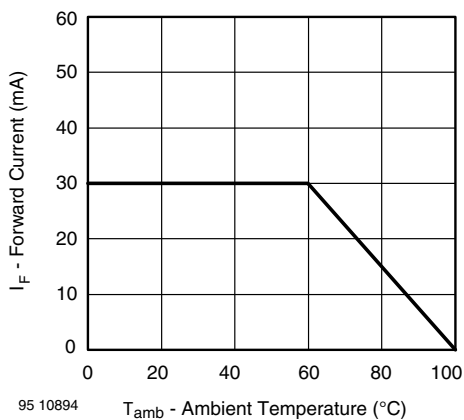
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

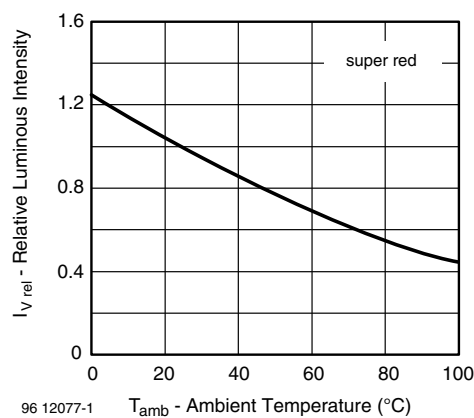


Fig. 4 - Relative Luminous Intensity vs. Ambient Temperature

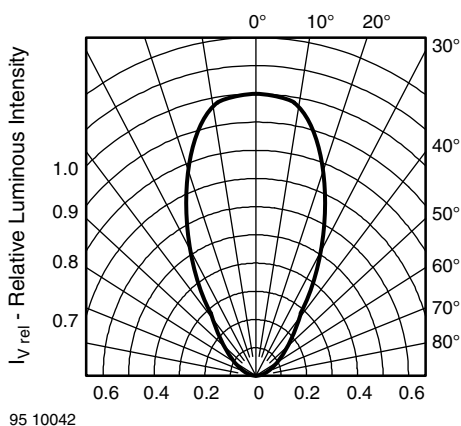


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

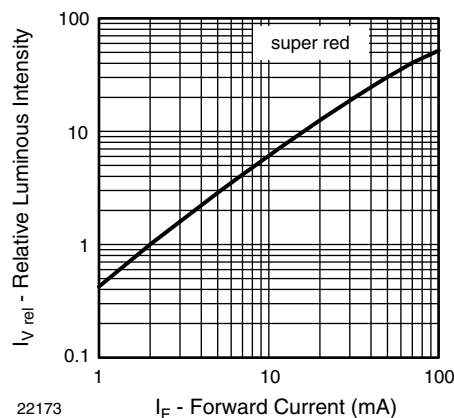


Fig. 5 - Relative Luminous Intensity vs. Forward Current

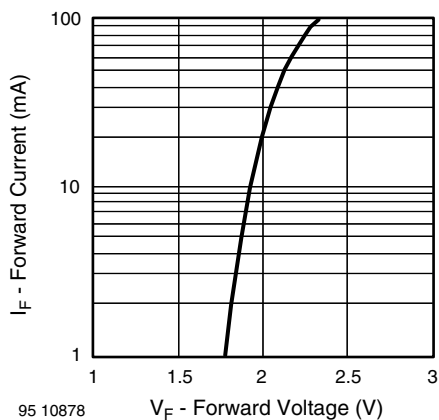


Fig. 3 - Forward Current vs. Forward Voltage

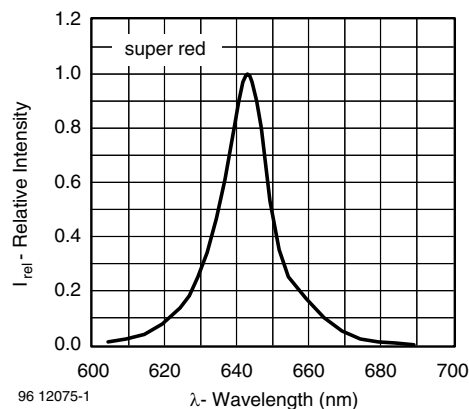


Fig. 6 - Relative Intensity vs. Wavelength

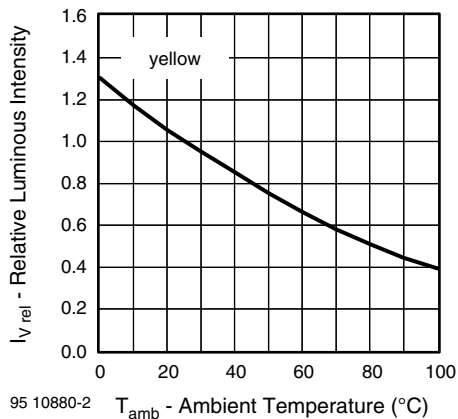


Fig. 7 - Relative Luminous Intensity vs. Ambient Temperature

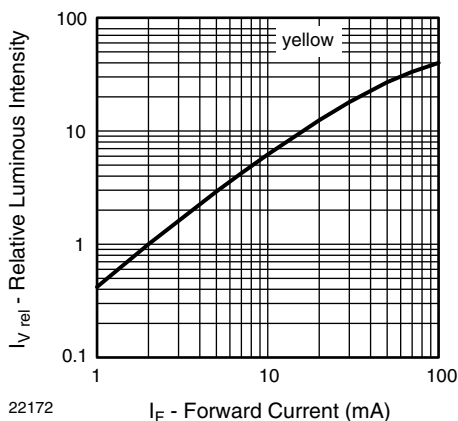


Fig. 8 - Relative Luminous Intensity vs. Forward Current

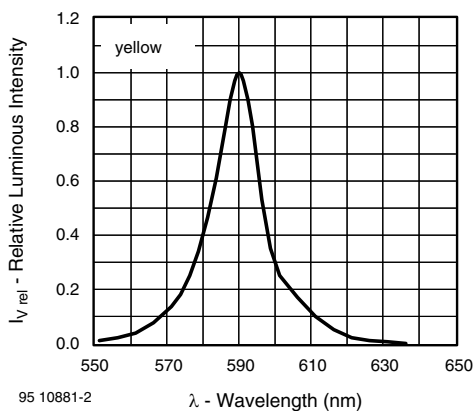
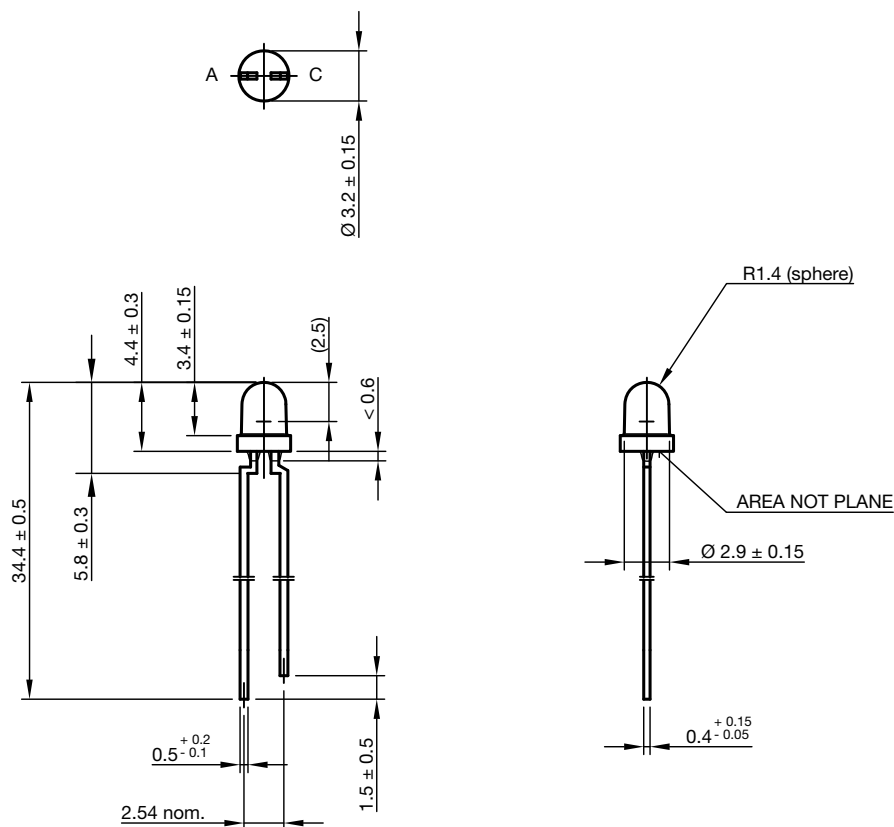


Fig. 9 - Relative Luminous Intensity vs. Wavelength

**PACKAGE DIMENSIONS** in millimeters


Drawing-No.: 6.544-5255.01-4

Issue: 9; 28.07.14

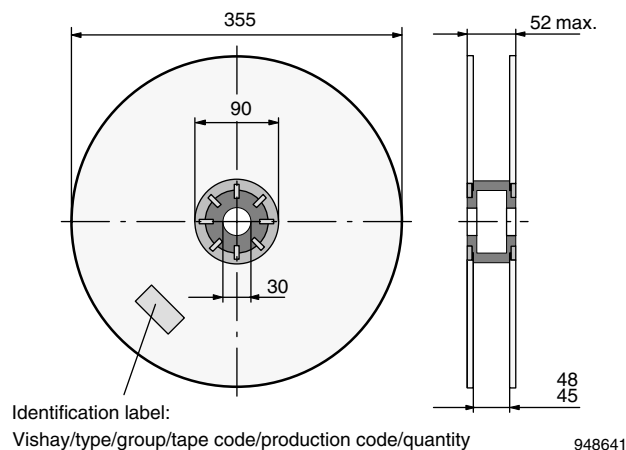
**REEL DIMENSIONS** in millimeters


Fig. 10 - Reel

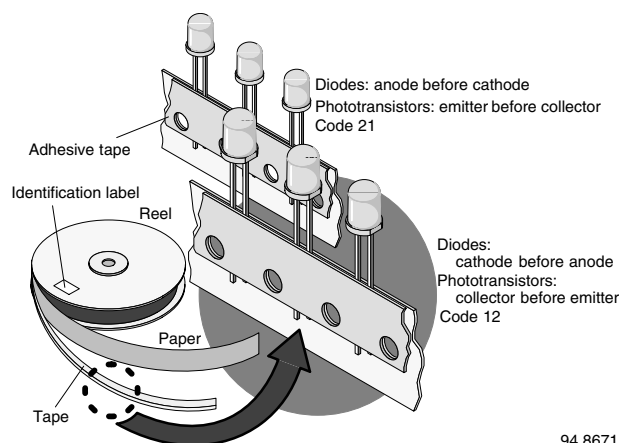
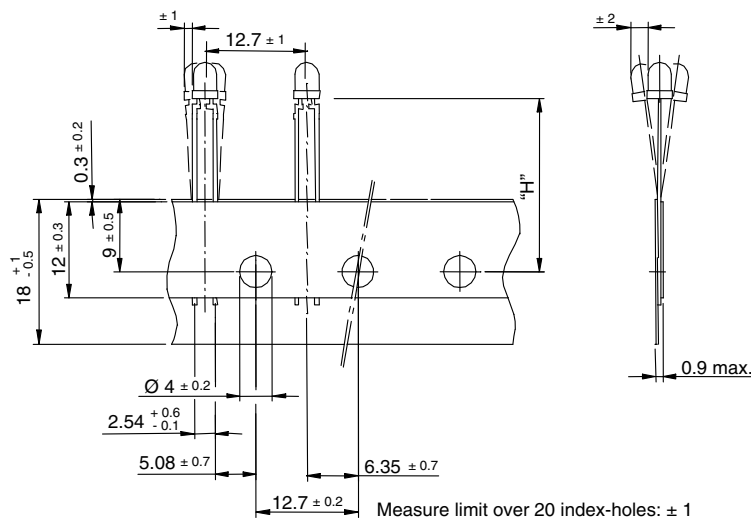
**TAPE**


Fig. 11 - LED in Tape

**TAPE DIMENSIONS** in millimeters


|               |                   |
|---------------|-------------------|
| Quantity per: | Reel              |
|               | (Mat. - No. 1764) |
|               | 2000              |

94 8171

| OPTION | DIMENSION "H" ± 0.5 mm | DIMENSION "X" ± 0.5 mm |
|--------|------------------------|------------------------|
| AS     | 17.3                   | -                      |

| PACKING INFORMATION |               |                        |                      |
|---------------------|---------------|------------------------|----------------------|
| PART                | PACKING       | MINIMUM ORDER QUANTITY | REMARK               |
| TLLE4401            | Bulk          | 5000                   | -                    |
| TLLK4401            | Bulk          | 5000                   | -                    |
| TLLK4401-AS21       | Tape and reel | 10 000 (5 x 2000)      | Anode before cathode |



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