

## High Efficiency LED in Ø 5 mm Tinted Diffused Package



19224

### DESCRIPTION

The TLH.640. series was developed for standard applications like general indicating and lighting purposes.

It is housed in a 5 mm tinted diffused plastic package. The wide viewing angle of these devices provides a high on-off contrast.

Several selection types with different luminous intensities are offered. All LEDs are categorized in luminous intensity groups. The green and yellow LEDs are categorized additionally in wavelength groups.

That allows users to assemble LEDs with uniform appearance.

### FEATURES

- Choice of three bright colors
- Standard T-1 $\frac{3}{4}$  package
- Small mechanical tolerances
- Suitable for DC and high peak current
- Wide viewing angle
- Luminous intensity categorized
- Yellow and green color categorized
- TLH.640. without stand-offs
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### APPLICATIONS

- Status lights
- Off/on indicator
- Background illumination
- Readout lights
- Maintenance lights
- Legend light

### PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 5 mm
- Product series: standard
- Angle of half intensity:  $\pm 30^\circ$

| PARTS TABLE    |                               |              |
|----------------|-------------------------------|--------------|
| PART           | COLOR, LUMINOUS INTENSITY     | TECHNOLOGY   |
| TLHR6400       | Red, $I_V = 10$ mcd (typ.)    | GaAsP on GaP |
| TLHR6400-CS12Z | Red, $I_V = 10$ mcd (typ.)    | GaAsP on GaP |
| TLHR6401       | Red, $I_V = 12$ mcd (typ.)    | GaAsP on GaP |
| TLHR6405       | Red, $I_V = 14$ mcd (typ.)    | GaAsP on GaP |
| TLHR6405-ASZ   | Red, $I_V = 14$ mcd (typ.)    | GaAsP on GaP |
| TLHR6405-BT12Z | Red, $I_V = 14$ mcd (typ.)    | GaAsP on GaP |
| TLHY6400       | Yellow, $I_V = 10$ mcd (typ.) | GaAsP on GaP |
| TLHY6400-CS12Z | Yellow, $I_V = 10$ mcd (typ.) | GaAsP on GaP |
| TLHY6400-MS12Z | Yellow, $I_V = 10$ mcd (typ.) | GaAsP on GaP |
| TLHY6401       | Yellow, $I_V = 12$ mcd (typ.) | GaAsP on GaP |
| TLHY6405       | Yellow, $I_V = 14$ mcd (typ.) | GaAsP on GaP |
| TLHY6405-ASZ   | Yellow, $I_V = 14$ mcd (typ.) | GaAsP on GaP |
| TLHY6405-BTZ   | Yellow, $I_V = 14$ mcd (typ.) | GaAsP on GaP |
| TLHG6400       | Green, $I_V = 10$ mcd (typ.)  | GaP on GaP   |
| TLHG6400-AS12Z | Green, $I_V = 10$ mcd (typ.)  | GaP on GaP   |
| TLHG6400-CS12Z | Green, $I_V = 10$ mcd (typ.)  | GaP on GaP   |
| TLHG6401       | Green, $I_V = 12$ mcd (typ.)  | GaP on GaP   |

| PARTS TABLE    |                              |            |
|----------------|------------------------------|------------|
| PART           | COLOR, LUMINOUS INTENSITY    | TECHNOLOGY |
| TLHG6401-AS12Z | Green, $I_V = 12$ mcd (typ.) | GaP on GaP |
| TLHG6405       | Green, $I_V > 15$ mcd (typ.) | GaP on GaP |
| TLHG6405-ASZ   | Green, $I_V > 15$ mcd (typ.) | GaP on GaP |
| TLHG6405-BTZ   | Green, $I_V > 15$ mcd (typ.) | GaP on GaP |

| ABSOLUTE MAXIMUM RATINGS <sup>1)</sup> TLHR640. , TLHY640. , TLHG640. |                              |            |               |      |
|---|------------------------------|------------|---------------|------|
| PARAMETER   | TEST CONDITION               | SYMBOL     | VALUE         | UNIT |
| Reverse voltage   |                              | $V_R$      | 6             | V    |
| DC Forward current  | $T_{amb} \leq 65$ °C         | $I_F$      | 30            | mA   |
| Surge forward current   | $t_p \leq 10$ $\mu$ s        | $I_{FSM}$  | 1             | A    |
| Power dissipation   | $T_{amb} \leq 65$ °C         | $P_V$      | 100           | mW   |
| Junction temperature  |                              | $T_j$      | 100           | °C   |
| Operating temperature range   |                              | $T_{amb}$  | - 20 to + 100 | °C   |
| Storage temperature range   |                              | $T_{stg}$  | - 55 to + 100 | °C   |
| Soldering temperature   | $t \leq 5$ s, 2 mm from body | $T_{sd}$   | 260           | °C   |
| Thermal resistance junction/ambient                                   |                              | $R_{thJA}$ | 350           | K/W  |

Note:

<sup>1)</sup>  $T_{amb} = 25$  °C, unless otherwise specified

| OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> TLHR640., RED |                         |          |             |      |          |      |      |
|--|-------------------------|----------|-------------|------|----------|------|------|
| PARAMETER  | TEST CONDITION          | PART     | SYMBOL      | MIN. | TYP.     | MAX. | UNIT |
| Luminous intensity <sup>2)</sup>                                   | $I_F = 10$ mA           | TLHR6400 | $I_V$       | 1.6  | 10       |      | mcd  |
|  |                         | TLHR6401 | $I_V$       | 4    | 12       |      | mcd  |
|  |                         | TLHR6405 | $I_V$       | 6.3  | 14       |      | mcd  |
| 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           |          | $\varphi$   |      | $\pm 30$ |      | deg  |
| Forward voltage  | $I_F = 20$ mA           |          | $V_F$       |      | 2        | 3    | V    |
| Reverse voltage  | $I_R = 10$ $\mu$ A      |          | $V_R$       | 6    | 15       |      | V    |
| Junction capacitance   | $V_R = 0$ , $f = 1$ MHz |          | $C_j$       |      | 50       |      | pF   |

Note:

<sup>1)</sup>  $T_{amb} = 25$  °C, unless otherwise specified

<sup>2)</sup> In one packing unit  $I_{Vmin.}/I_{Vmax.} \leq 0.5$

| OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> TLHY640., YELLOW |                         |          |             |      |          |      |      |
|---|-------------------------|----------|-------------|------|----------|------|------|
| PARAMETER   | TEST CONDITION          | PART     | SYMBOL      | MIN. | TYP.     | MAX. | UNIT |
| Luminous intensity <sup>2)</sup>                                      | $I_F = 10$ mA           | TLHY6400 | $I_V$       | 1.6  | 10       |      | mcd  |
|   |                         | TLHY6401 | $I_V$       | 4    | 12       |      | mcd  |
|   |                         | TLHY6405 | $I_V$       | 6.3  | 14       |      | mcd  |
| 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           |          | $\varphi$   |      | $\pm 30$ |      | deg  |
| Forward voltage   | $I_F = 20$ mA           |          | $V_F$       |      | 2.4      | 3    | V    |
| Reverse voltage   | $I_R = 10$ $\mu$ A      |          | $V_R$       | 6    | 15       |      | V    |
| Junction capacitance  | $V_R = 0$ , $f = 1$ MHz |          | $C_j$       |      | 50       |      | pF   |

Note:

<sup>1)</sup>  $T_{amb} = 25$  °C, unless otherwise specified

<sup>2)</sup> In one packing unit  $I_{Vmin.}/I_{Vmax.} \leq 0.5$

| OPTICAL AND ELECTRICAL CHARACTERISTICS <sup>1)</sup> TLHG640., GREEN |                              |          |             |      |          |      |      |
|--|------------------------------|----------|-------------|------|----------|------|------|
| PARAMETER  | TEST CONDITION               | PART     | SYMBOL      | MIN. | TYP.     | MAX. | UNIT |
| Luminous intensity <sup>2)</sup>                                     | $I_F = 10 \text{ mA}$        | TLHG6400 | $I_V$       | 1.6  | 10       |      | mcd  |
|  |                              | TLHG6401 | $I_V$       | 4    | 12       |      | mcd  |
|  |                              | TLHG6405 | $I_V$       | 6.3  | 15       |      | mcd  |
| Dominant wavelength  | $I_F = 10 \text{ mA}$        |          | $\lambda_d$ | 562  |          | 575  | nm   |
| Peak wavelength  | $I_F = 10 \text{ mA}$        |          | $\lambda_p$ |      | 565      |      | nm   |
| Angle of half intensity  | $I_F = 10 \text{ mA}$        |          | $\phi$      |      | $\pm 30$ |      | deg  |
| Forward voltage  | $I_F = 20 \text{ mA}$        |          | $V_F$       |      | 2.4      | 3    | V    |
| Reverse voltage  | $I_R = 10 \mu\text{A}$       |          | $V_R$       | 6    | 15       |      | V    |
| Junction capacitance   | $V_R = 0, f = 1 \text{ MHz}$ |          | $C_j$       |      | 50       |      | pF   |

Note:

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

<sup>2)</sup> In one packing unit  $I_{V\text{min.}}/I_{V\text{max.}} \leq 0.5$ 
**TYPICAL CHARACTERISTICS**
 $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified


Figure 1. Forward Current vs. Ambient Temperature



Figure 3. Rel. Luminous Intensity vs. Angular Displacement



Figure 2. Forward Current vs. Pulse Length



Figure 4. Forward Current vs. Forward Voltage



Figure 5. Rel. Luminous Intensity vs. Ambient Temperature



Figure 8. Relative Intensity vs. Wavelength



Figure 6. Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle



Figure 9. Forward Current vs. Forward Voltage



Figure 7. Relative Luminous Intensity vs. Forward Current



Figure 10. Rel. Luminous Intensity vs. Ambient Temperature



Figure 11. Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle



Figure 14. Forward Current vs. Forward Voltage



Figure 12. Relative Luminous Intensity vs. Forward Current

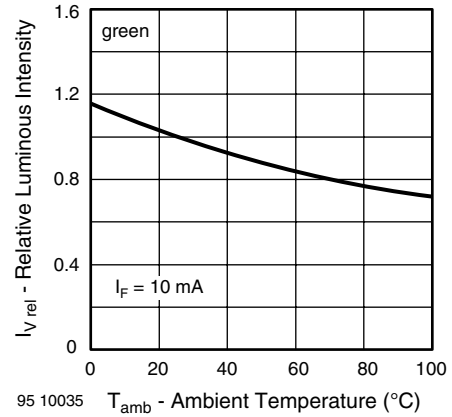


Figure 15. Rel. Luminous Intensity vs. Ambient Temperature



Figure 13. Relative Intensity vs. Wavelength



Figure 16. Specific Luminous Intensity vs. Forward Current



Figure 17. Relative Luminous Intensity vs. Forward Current



Figure 18. Relative Intensity vs. Wavelength

## PACKAGE DIMENSIONS in millimeters



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## REEL



Figure 19. Reel Dimensions

AS12 = cathode leaves tape first  
AS21 = anode leaves tape first

## AMMOPACK

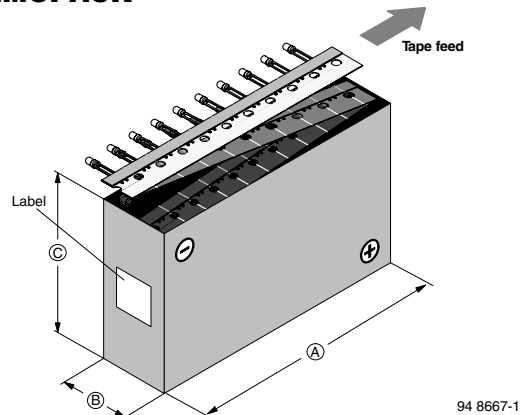


Figure 21. Tape Direction

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

## TAPE

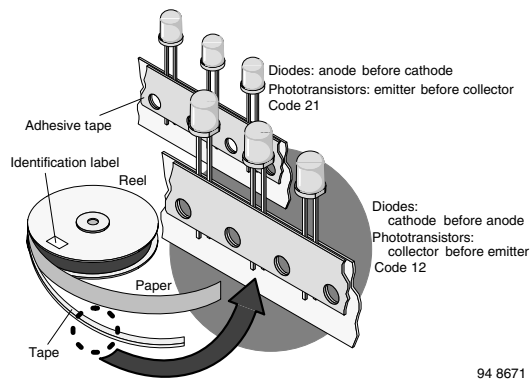
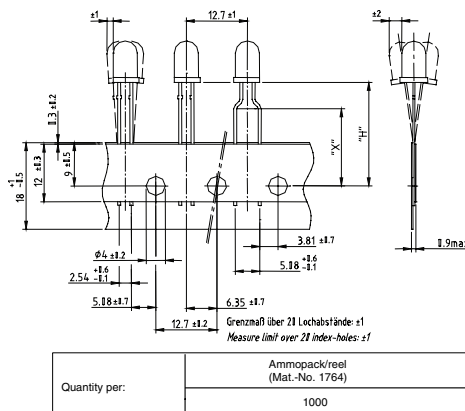


Figure 20. LED in Tape

## TAPE DIMENSIONS in millimeters



| Option | Dim. "H" ± 0.5 mm | Dim. "X" ± 0.5 mm |
|--------|-------------------|-------------------|
| AS     | 17.3              |                   |
| BT     | 20.0              | 16.0              |
| CS     | 22.0              |                   |
| MS     | 25.5              |                   |



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