

## 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

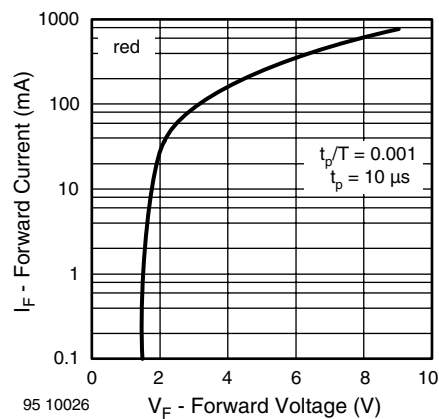


Figure 4. Forward Current vs. Forward Voltage



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



6.544-5259.02-4  
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95 10917

**REEL**

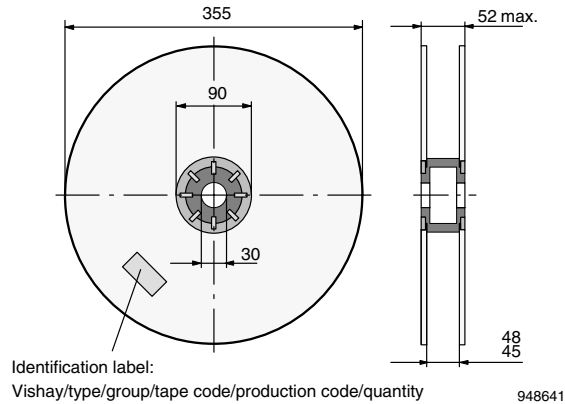


Figure 19. Reel Dimensions

**AMMOPACK**

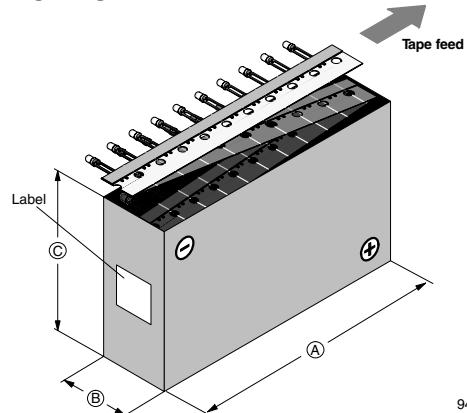


Figure 21. Tape Direction

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

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

**TAPE**

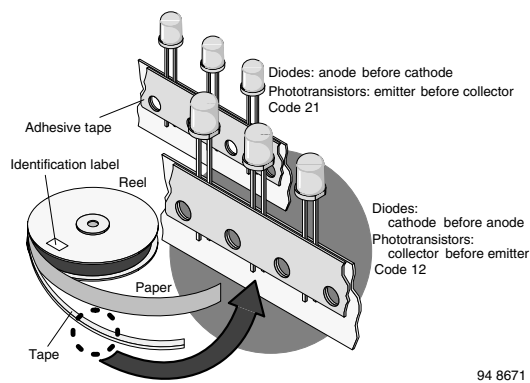
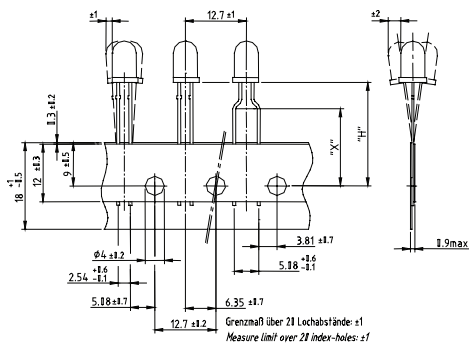


Figure 20. LED in Tape

**TAPE DIMENSIONS** in millimeters



Quantity per:	Ammopack/reel (Mat.-No. 1764) 1000
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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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