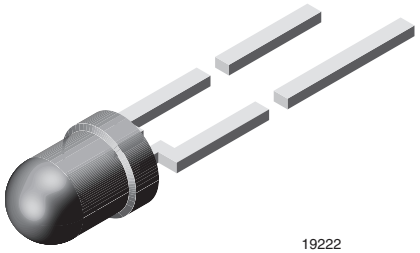
# High Efficiency LED in Ø 3 mm Clear Package



19222

## FEATURES

- Choice of four bright colors
- Standard Ø 3 mm (T-1) package
- Small mechanical tolerances
- Suitable for DC and high peak current
- Very small viewing angle
- Luminous intensity categorized
- Yellow and green color categorized
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e8

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

## DESCRIPTION

The TLH.4900 series was developed for applications where high light output is required.

It is housed in a 3 mm clear plastic package. The small viewing angle of these devices provides a high brightness.

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.

## APPLICATIONS

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

## PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 3 mm
- Product series: standard
- Angle of half intensity: ± 16°

## 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. | | |
| TLHR4900 | Red | 6.3 | 25 | - | 10 | 612 | - | 625 | 10 | - | 2 | 3 | 20 | GaAsP on GaP |
| TLHY4900 | Yellow | 10 | 26 | - | 10 | 581 | - | 594 | 10 | - | 2.4 | 3 | 20 | GaAsP on GaP |
| TLHY4900-AS12Z | Yellow | 10 | 26 | - | 10 | 581 | - | 594 | 10 | - | 2.4 | 3 | 20 | GaAsP on GaP |
| TLHG4900 | Green | 16 | 37 | - | 10 | 562 | - | 575 | 10 | - | 2.4 | 3 | 20 | GaP on GaP |
| TLHG4900-AS12Z | Green | 16 | 37 | - | 10 | 562 | - | 575 | 10 | - | 2.4 | 3 | 20 | GaP on GaP |

## ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °C, unless otherwise specified)
## TLHG4900, TLHR4900, TLHY4900

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|---|---|---|---|---|
| Reverse voltage | | $V_R$ | 6 | V |
| DC forward current | $T_{amb} \leq 60$ °C | $I_F$ | 30 | mA |
| Surge forward current | $t_p \leq 10$ µs | $I_{FSM}$ | 1 | A |
| Power dissipation | $T_{amb} \leq 60$ °C | $P_V$ | 100 | mW |
| Junction temperature | | $T_j$ | 100 | °C |
| Operating temperature range | | $T_{amb}$ | - 40 to + 100 | °C |
| Storage temperature range | | $T_{stg}$ | - 55 to + 100 | °C |
| Soldering temperature | t ≤ 5 s, 2 mm from body | $T_{sd}$ | 260 | °C |
| Thermal resistance junction/ambient | | $R_{thJA}$ | 400 | K/W |

## OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)
## TLHR4900, RED

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 10 mA | $I_V$ | 6.3 | 25 | - | 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 | $\varphi$ | - | ± 16 | - | deg |
| Forward voltage | $I_F$ = 20 mA | $V_F$ | - | 2 | 3 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 6 | 15 | - | V |
| Junction capacitance | $V_R$ = 0 V, f = 1 MHz | $C_j$ | - | 50 | - | pF |

**Note**
(1) In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$

## OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)
## TLHY4900, YELLOW

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 10 mA | $I_V$ | 10 | 26 | - | 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 | $\varphi$ | - | ± 16 | - | deg |
| Forward voltage | $I_F$ = 20 mA | $V_F$ | - | 2.4 | 3 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 6 | 15 | - | V |
| Junction capacitance | $V_R$ = 0 V, f = 1 MHz | $C_j$ | - | 50 | - | pF |

**Note**
(1) In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$

## OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)
## TLHG4900, GREEN

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 10 mA | $I_V$ | 16 | 37 | - | mcd |
| Dominant wavelength | $I_F$ = 10 mA | $\lambda_d$ | 562 | - | 575 | nm |
| Peak wavelength | $I_F$ = 10 mA | $\lambda_p$ | - | 565 | - | nm |
| Angle of half intensity | $I_F$ = 10 mA | $\varphi$ | - | ± 16 | - | deg |
| Forward voltage | $I_F$ = 20 mA | $V_F$ | - | 2.4 | 3 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 6 | 15 | - | V |
| Junction capacitance | $V_R$ = 0 V, f = 1 MHz | $C_j$ | - | 50 | - | pF |

**Note**
(1) In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$

## LUMINOUS INTENSITY CLASSIFICATION

| GROUP | LUMINOUS INTENSITY (mcd) | |
|---|---|---|
| | MIN. | MAX. |
| Q | 6.3 | 12.5 |
| R | 10 | 20 |
| S | 16 | 32 |
| T | 25 | 50 |
| U | 40 | 80 |
| V | 63 | 125 |

**Note**

- The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped on each reel or bulk (there will be no mixing of two groups on one reel/bulk). 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 reel/bulk. In order to ensure availability, single wavelength groups will not be orderable.

## COLOR CLASSIFICATION

| GROUP | DOM. WAVELENGTH (nm) | | | |
|---|---|---|---|---|
| | YELLOW | | GREEN | |
| | MIN. | MAX. | MIN. | MAX. |
| 0 | | | | |
| 1 | 581 | 584 | | |
| 2 | 583 | 586 | | |
| 3 | 585 | 588 | 562 | 565 |
| 4 | 587 | 590 | 564 | 567 |
| 5 | 589 | 592 | 566 | 569 |
| 6 | 591 | 594 | 568 | 571 |
| 7 | | | 570 | 573 |
| 8 | | | 572 | 575 |

**Note**

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

**TYPICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)

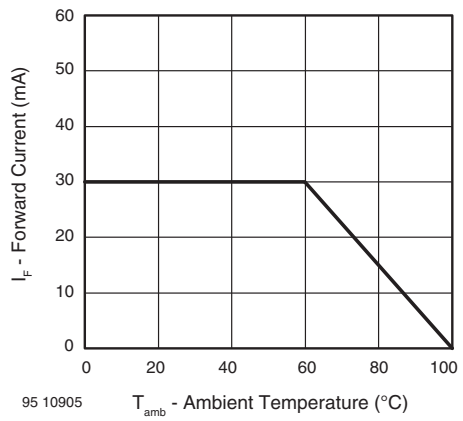



Fig. 1 - Forward Current vs. Ambient Temperature for InGaN

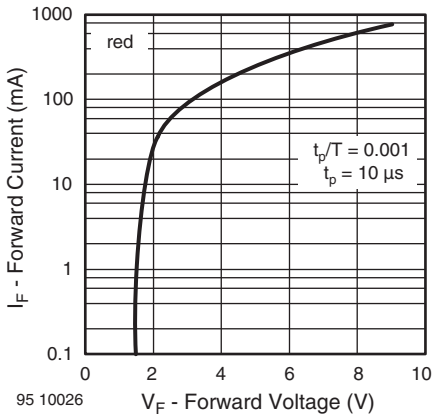



Fig. 4 - Forward Current vs. Forward Voltage

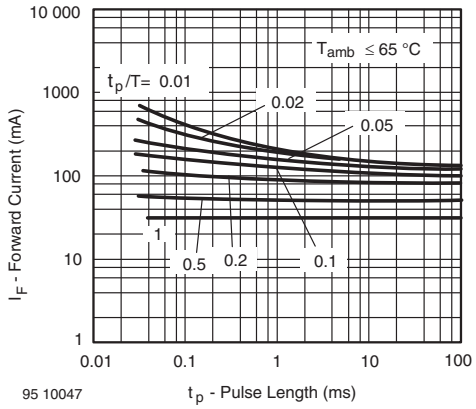



Fig. 2 - Forward Current vs. Pulse Length

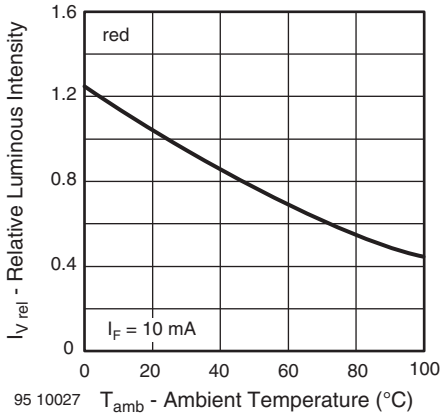



Fig. 5 - Relative Luminous Intensity vs. Ambient Temperature

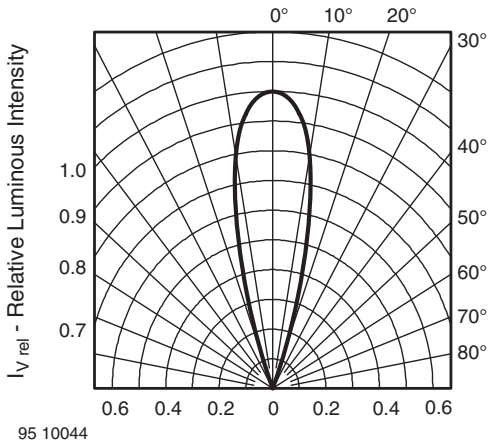



Fig. 3 - Relative Luminous Intensity vs. Angular Displacement

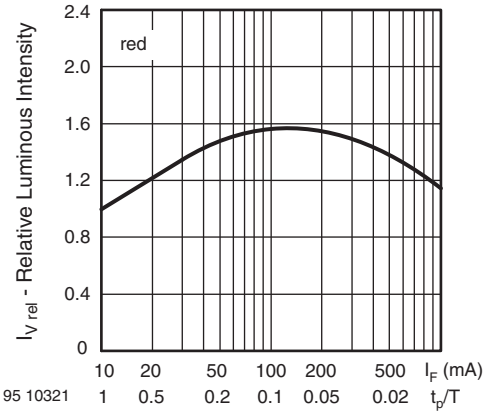



Fig. 6 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

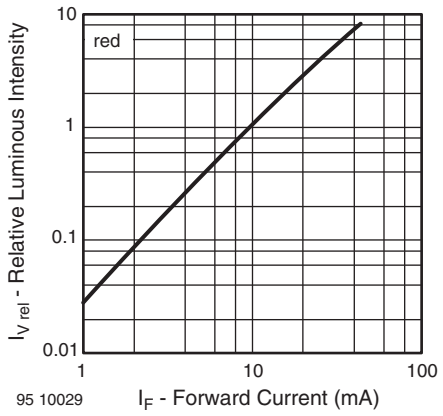



Fig. 7 - Relative Luminous Intensity vs. Forward Current

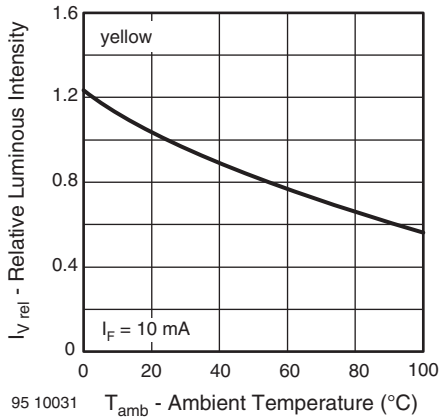



Fig. 10 - Relative Luminous Intensity vs. Ambient Temperature

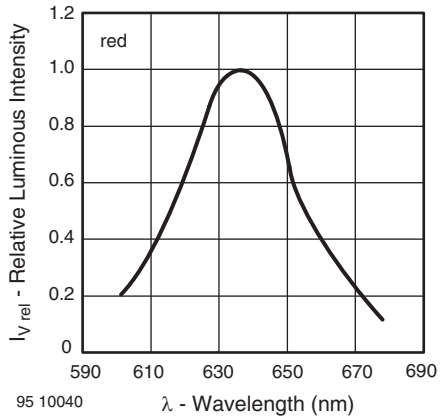



Fig. 8 - Relative Intensity vs. Wavelength

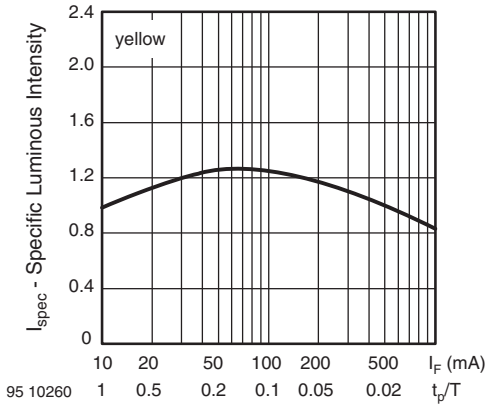



Fig. 11 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

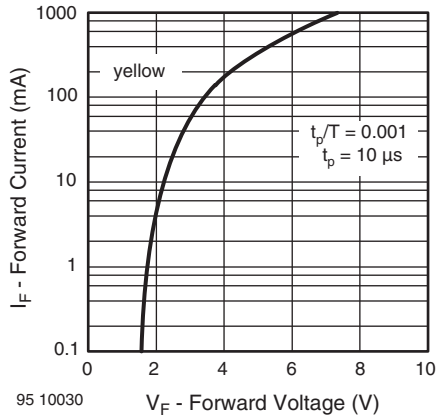



Fig. 9 - Forward Current vs. Forward Voltage

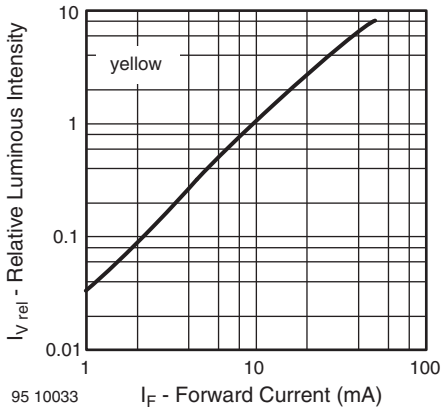



Fig. 12 - Relative Luminous Intensity vs. Forward Current

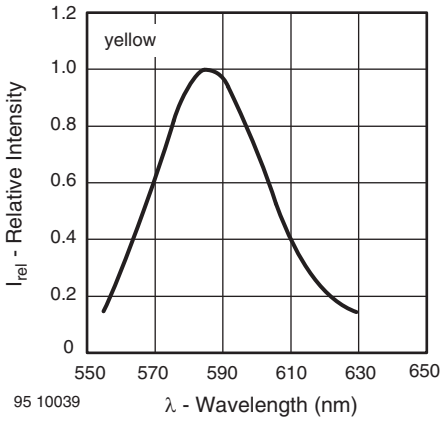



Fig. 13 - Relative Intensity vs. Wavelength

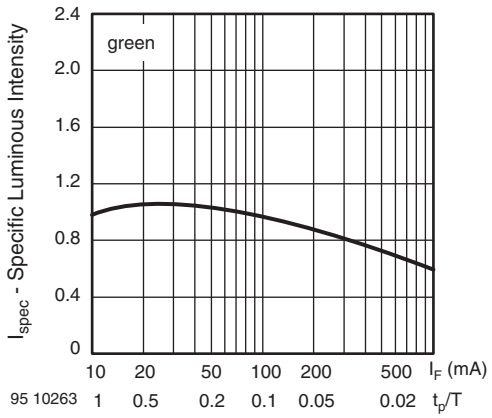



Fig. 16 - Specific Luminous Intensity vs. Forward Current

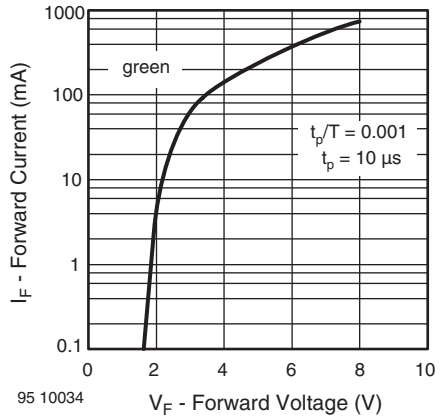



Fig. 14 - Forward Current vs. Forward Voltage

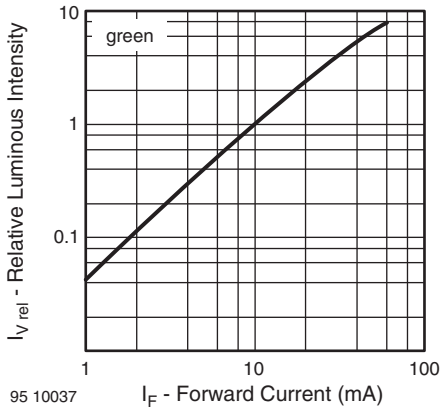



Fig. 17 - Relative Luminous Intensity vs. Forward Current

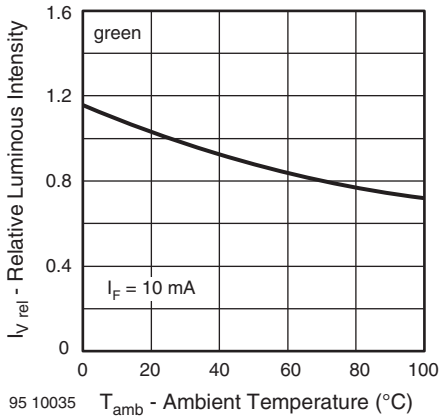



Fig. 15 - Rel. Luminous Intensity vs. Ambient Temperature

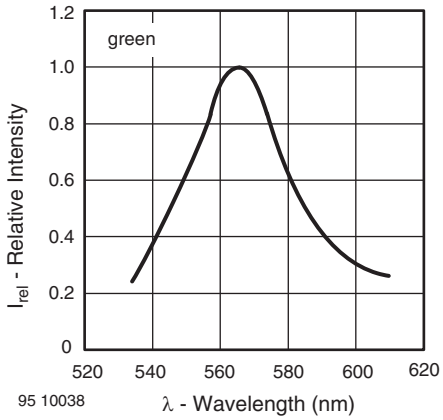
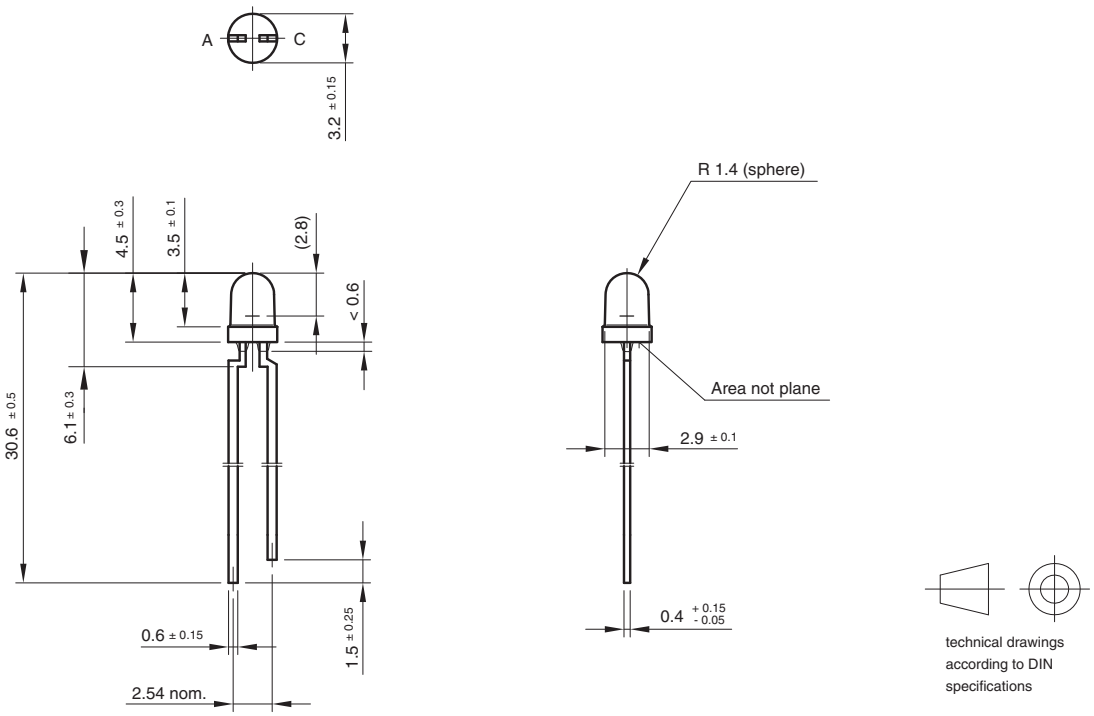



Fig. 18 - Relative Intensity vs. Wavelength

## PACKAGE DIMENSIONS in millimeters




Drawing-No.: 6.544-5255.02-4
Issue: 3; 23.04.98
95 10914

## TAPE

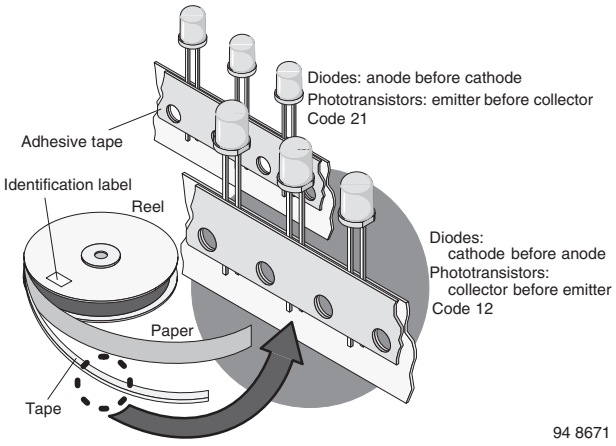



Fig. 19 - LED in Tape

## AMMOPACK

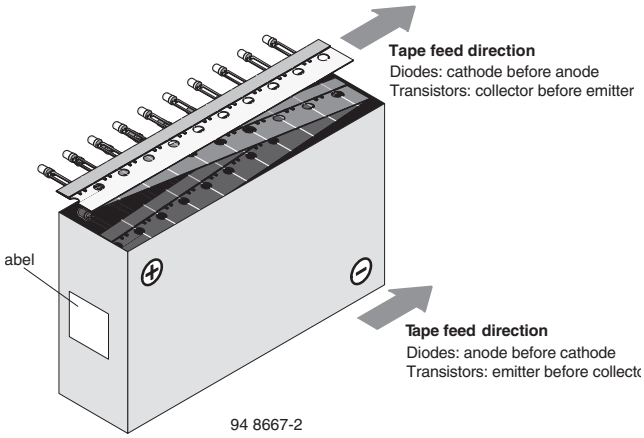
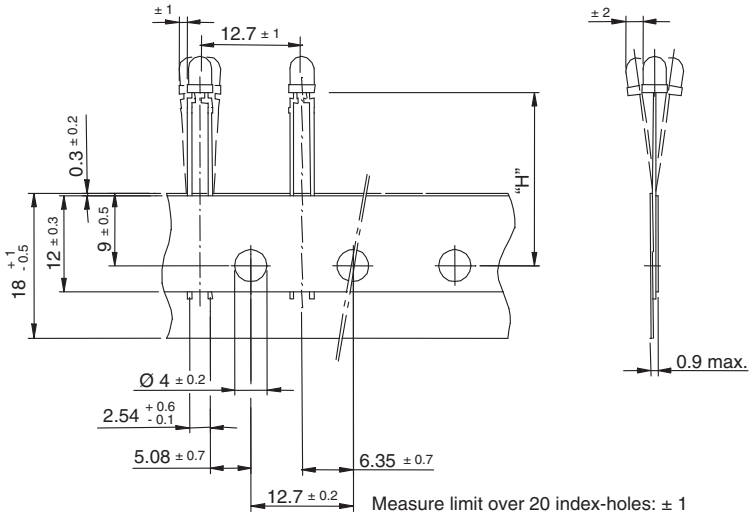



Fig. 20 - Tape Direction

**Note**

- The new nomenclature for ammopack is 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) |
|---|---|
| | 2000 |

94 8171

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

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