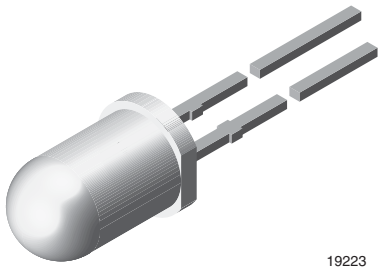
# High Intensity LED, Ø 5 mm Untinted Non-Diffused Package



19223

## FEATURES

- Untinted non-diffused lens
- Choice of three colors
- TLH.5100 for cost effective design
- Medium viewing angle
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

## DESCRIPTION

The TLH.51.. series is a clear, non diffused 5 mm LED for outdoor application.

These clear lamps utilize the highly developed technologies like AlInGaP and GaP.

The lens and the viewing angle is optimized to achieve best performance of light output and visibility.

## APPLICATIONS

- Outdoor LED panels
- Central high mounted stop lights (CHMSL) for motor vehicles
- Instrumentation and front panel indicators
- Light guide design
- Traffic signals

## PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 5 mm
- Product series: standard
- Angle of half intensity: ± 9°

## 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. | | |
| TLHK5100 | Red | 320 | 1400 | - | 20 | 626 | 630 | 639 | 10 | - | 2 | 2.6 | 20 | AlInGaP on GaAs |
| TLHK5100-AS12Z | Red | 320 | 1400 | - | 20 | 626 | 630 | 639 | 10 | - | 2 | 2.6 | 20 | AlInGaP on GaAs |
| TLHE5100 | Yellow | 750 | 1800 | - | 20 | 581 | 588 | 594 | 10 | - | 2 | 2.6 | 20 | AlInGaP on GaAs |
| TLHG5100 | Green | 240 | 450 | - | 20 | 562 | - | 575 | 10 | - | 2.4 | 3 | 20 | GaP on GaP |

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

### TLHK510., TLHE510., TLHG510.

| 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 | $t_p \leq 10$ µs | $I_{FSM}$ | 1 | A |
| Power dissipation | $T_{amb} \leq 65$ °C | $P_V$ | 100 | mW |
| Junction temperature | | $T_j$ | 100 | °C |
| Operating temperature range | | $T_{amb}$ | -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 | | $R_{thJA}$ | 350 | K/W |

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)
**TLHK510., RED**

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 20 mA | $I_V$ | 320 | 1400 | - | mcd |
| Dominant wavelength | $I_F$ = 10 mA | $\lambda_d$ | 626 | 630 | 639 | nm |
| Peak wavelength | $I_F$ = 10 mA | $\lambda_p$ | - | 643 | - | nm |
| Angle of half intensity | $I_F$ = 10 mA | φ | - | ± 9 | - | deg |
| Forward voltage | $I_F$ = 20 mA | $V_F$ | - | 2 | 2.6 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 5 | - | - | V |
| Junction capacitance | $V_R$ = 0 V, f = 1 MHz | $C_j$ | - | 15 | - | 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)
**TLHE510., YELLOW**

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 20 mA | $I_V$ | 750 | 1800 | - | mcd |
| Dominant wavelength | $I_F$ = 10 mA | $\lambda_d$ | 581 | 588 | 594 | nm |
| Peak wavelength | $I_F$ = 10 mA | $\lambda_p$ | - | 590 | - | nm |
| Angle of half intensity | $I_F$ = 10 mA | φ | - | ± 9 | - | deg |
| Forward voltage | $I_F$ = 20 mA | $V_F$ | - | 2 | 2.6 | V |
| Reverse voltage | $I_R$ = 10 µA | $V_R$ | 5 | - | - | V |
| Junction capacitance | $V_R$ = 0 V, f = 1 MHz | $C_j$ | - | 15 | - | 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)
**TLHG510., GREEN**

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Luminous intensity (1) | $I_F$ = 20 mA | $I_V$ | 240 | 450 | - | 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 | φ | - | ± 9 | - | 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 | LIGHT INTENSITY (mcd) | |
| STANDARD | MIN. | MAX. |
| Z | 240 | 480 |
| AA | 320 | 640 |
| 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 |

**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 in any one bag.
  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)

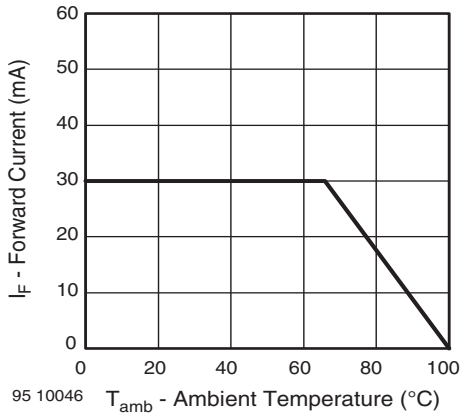



Fig. 1 - Forward Current vs. Ambient Temperature

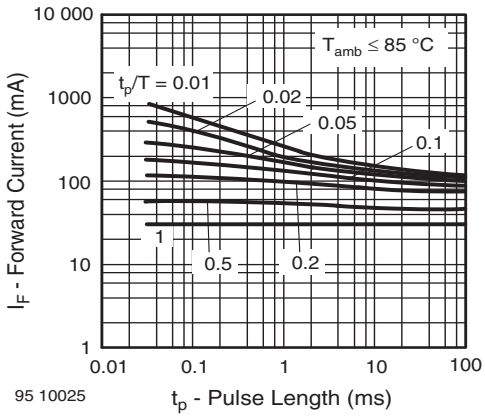



Fig. 2 - Forward Current vs. Pulse Length

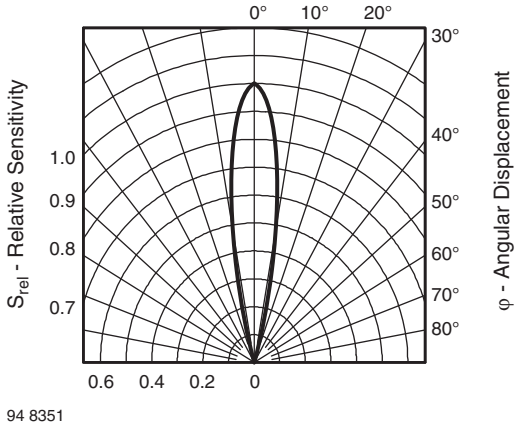



Fig. 3 - Relative Radiant Sensitivity vs. Angular Displacement

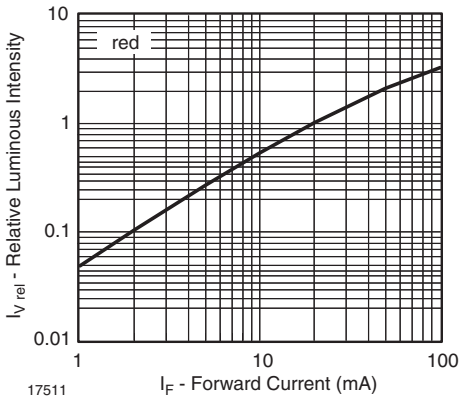



Fig. 6 - Relative Luminous Intensity vs. Forward Current

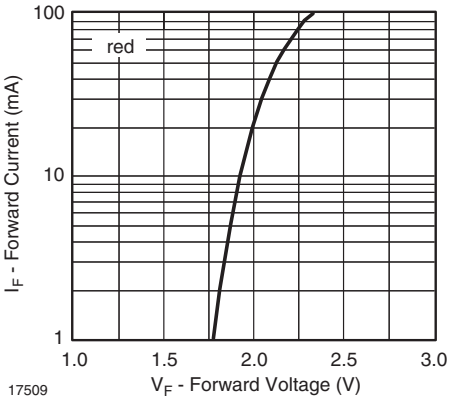



Fig. 4 - Forward Current vs. Forward Voltage

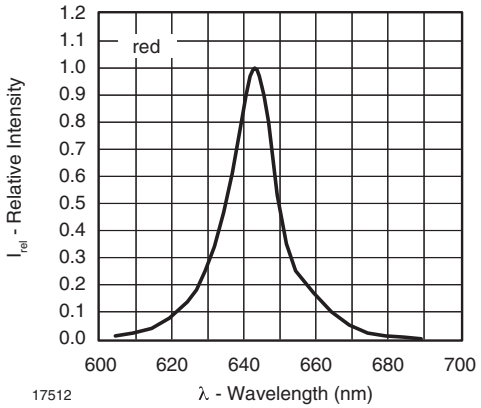



Fig. 7 - Relative Intensity vs. Wavelength

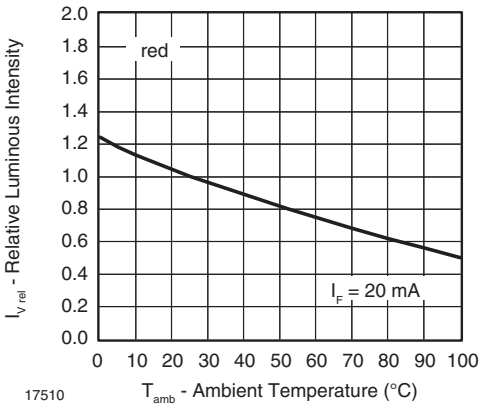



Fig. 5 - Relative Luminous Intensity vs. Ambient Temperature

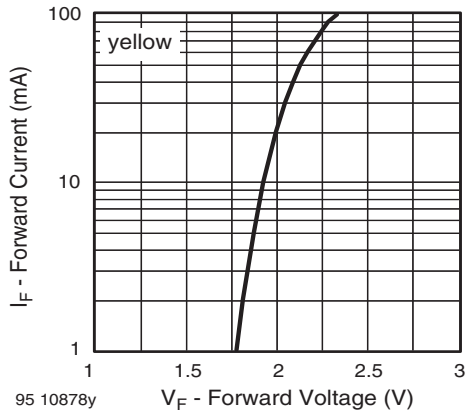



Fig. 8 - Forward Current vs. Forward Voltage

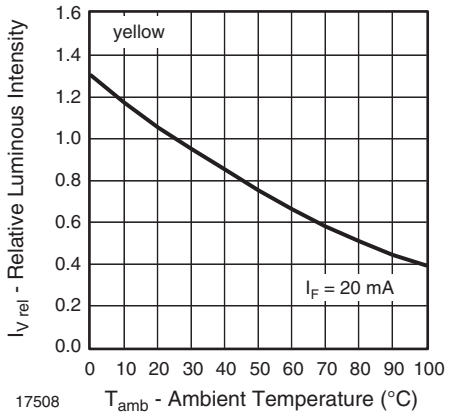



Fig. 9 - Relative Luminous Intensity vs. Ambient Temperature

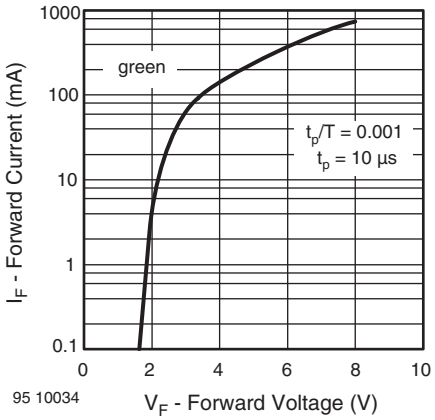



Fig. 12 - Forward Current vs. Forward Voltage

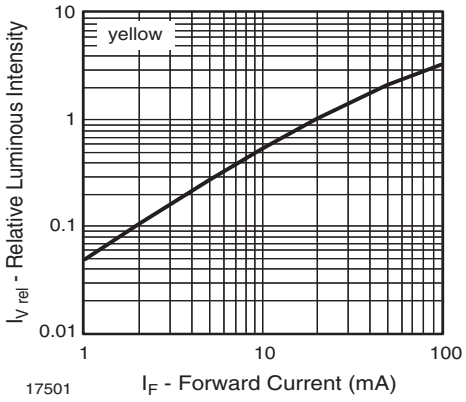



Fig. 10 - Relative Luminous Intensity vs. Forward Current

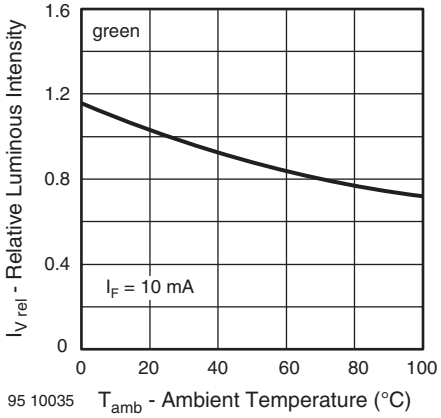



Fig. 13 - Relative Luminous Intensity vs. Ambient Temperature

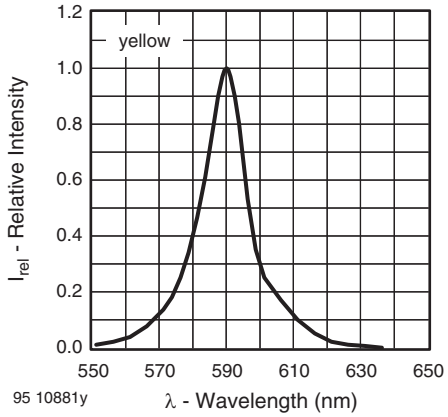



Fig. 11 - Relative Intensity vs. Wavelength

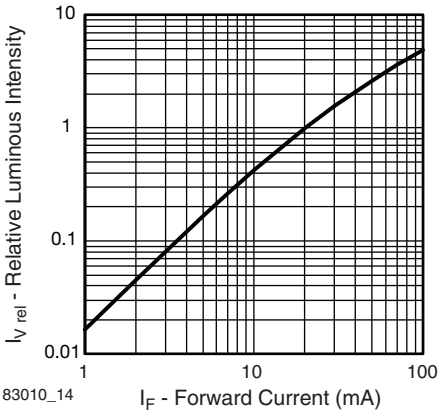



Fig. 14 - Relative Luminous Intensity vs. Forward Current

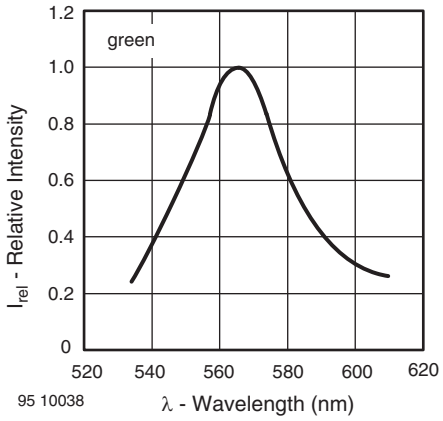
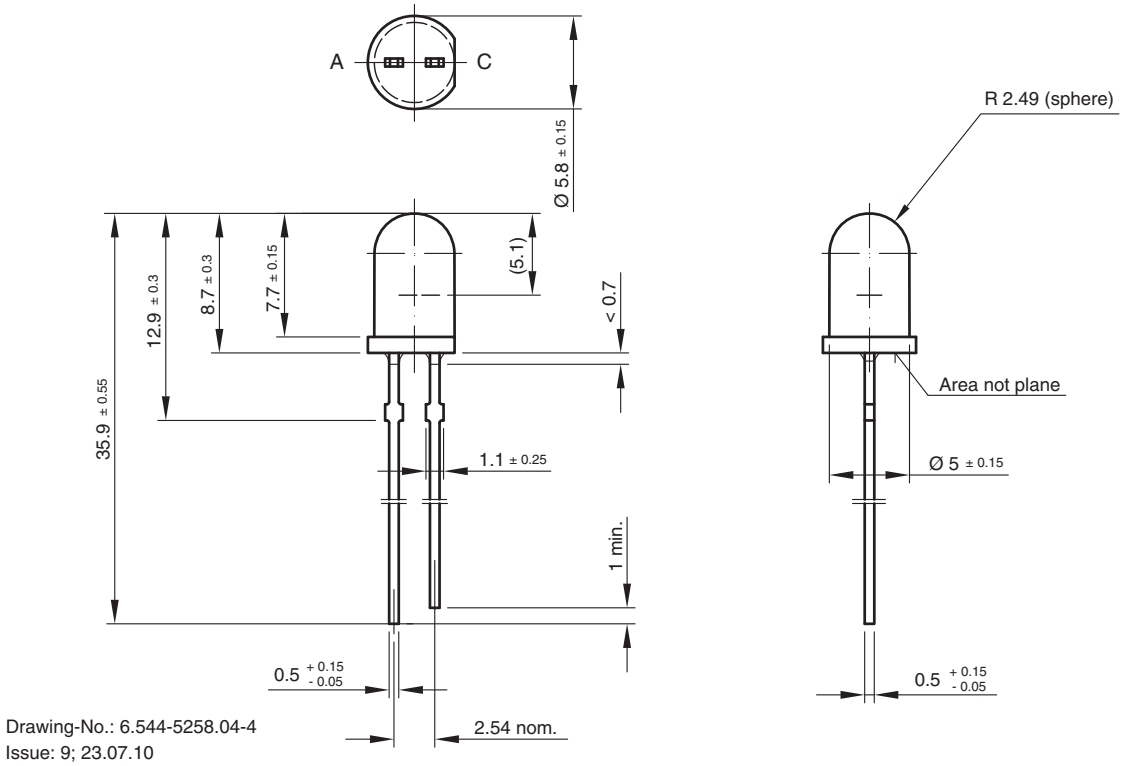



Fig. 15 - Relative Intensity vs. Wavelength

## **PACKAGE DIMENSIONS** in millimeters




technical drawings
according to DIN
specifications

Drawing-No.: 6.544-5258.04-4
Issue: 9; 23.07.10
96 12121

**AMMOPACK**

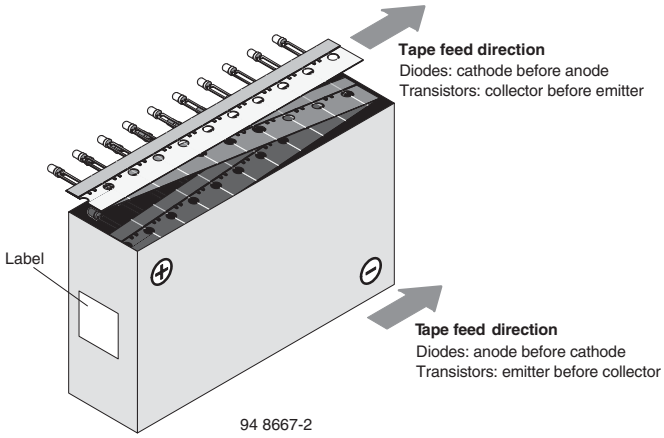
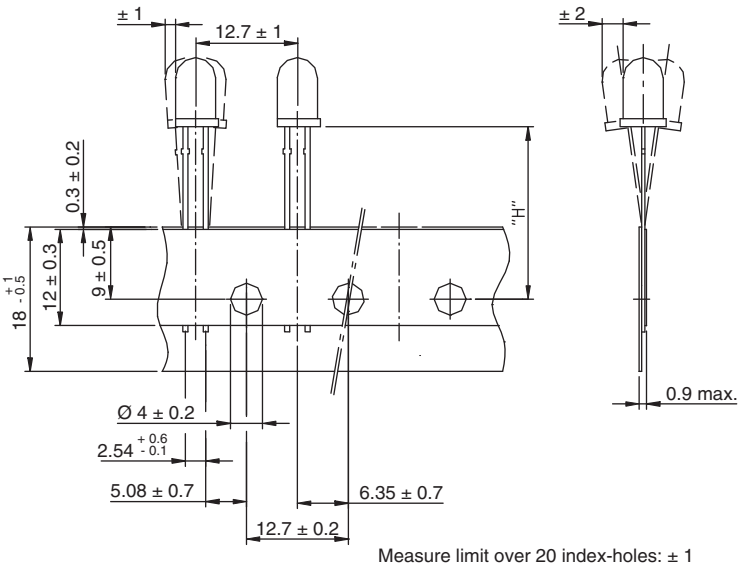



Fig. 16 - Tape Direction

**Note**

- The new nomenclature for ammopack is e.g. 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) |
|---|---|
| | 1000 |

94 8172

| OPTION | DIMENSION “H” ± 0.5 mm | DIMENSION “X” ± 0.5 mm |
|---|---|---|
| AS | 17.3 | - |

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