



### Resistor LED for 12 V Supply Voltage

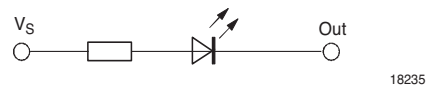
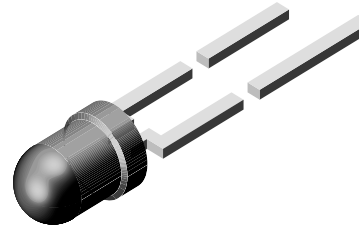
#### Description

These devices are developed for the automotive industry in motor vehicles with 12 V supply voltage.

The TLRE4406 series contains an integrated resistor for current limiting in series with the LED chip. This allows the lamp to be driven from a 12 V source without an external current limiter.

These tinted non-diffused lamps provide a high luminous intensity.

These LEDs are intended for space critical applications such as automobile instrument panels, switches and others which are driven from a 12 V source.



#### Features

- With current limiting resistor for 12 V
- Cost effective: save space and resistor cost
- Standard  $\varnothing$  3 mm (T-1) package
- High luminous intensity
- Luminous intensity categorized
- Yellow color categorized

#### Applications

Status light in cars  
 OFF / ON indicator in cars  
 Background illumination for switches  
 Off / On indicator in switches

#### Parts Table

Part	Color, Luminous Intensity	Angle of Half Intensity ( $\pm\phi$ )	Technology
TLRE4406	Yellow, $I_V > 63$ mcd	30 °	AlInGaAs on GaAs

#### Absolute Maximum Ratings

$T_{amb} = 25\text{ °C}$ , unless otherwise specified

##### TLRE4406

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		$V_R$	13.5	V
Forward voltage	$T_{amb} \leq 65\text{ °C}$	$V_F$	16	V
Power dissipation	$T_{amb} \leq 65\text{ °C}$	$P_V$	240	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	$t \leq 5$ s, 2 mm from body	$T_{sd}$	260	°C
Thermal resistance junction/ambient		$R_{thJA}$	150	K/W

## Optical and Electrical Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

### Yellow

#### TLRE4406

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Luminous intensity <sup>1)</sup>	$V_S = 12\text{ V}$	$I_V$	63		260	mcd
Dominant wavelength	$V_S = 12\text{ V}$	$\lambda_d$	581	588	594	nm
Peak wavelength	$V_S = 12\text{ V}$	$\lambda_p$		590		nm
Angle of half intensity	$V_S = 12\text{ V}$	$\phi$		$\pm 30$		deg
Forward current	$V_S = 12\text{ V}$	$I_F$		10	12	mA
Breakdown voltage	$I_R = 10\text{ }\mu\text{A}$	$V_{BR}$	13.5	50		V
Junction capacitance	$V_R = 0, f = 1\text{ MHz}$	$C_j$		50		pF

<sup>1)</sup> in one Packing Unit  $I_{Vmin}/I_{Vmax} \leq 0.5$

## Typical Characteristics ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

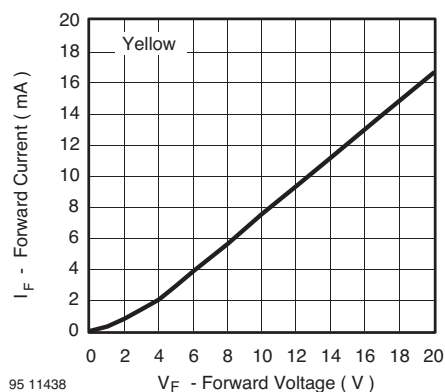


Figure 1. Forward Current vs. Forward Voltage

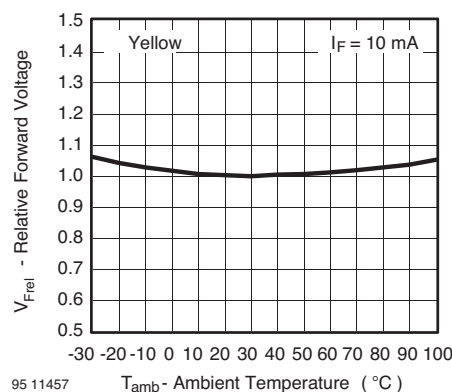


Figure 3. Relative Forward Voltage vs. Ambient Temperature

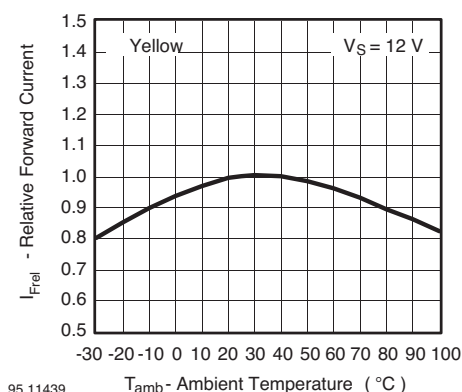


Figure 2. Relative Forward Current vs. Ambient Temperature

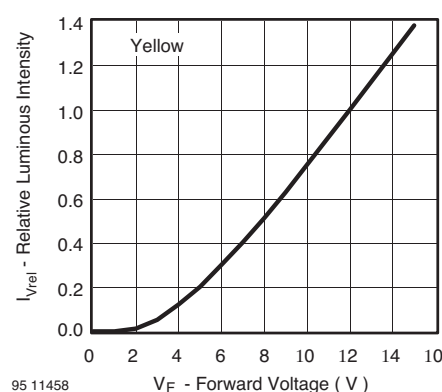


Figure 4. Relative Luminous Intensity vs. Forward Voltage

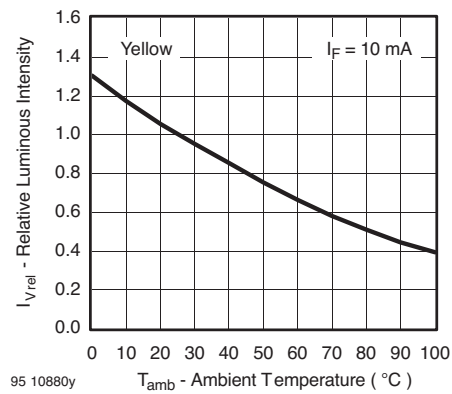


Figure 5. Rel. Luminous Intensity vs. Ambient Temperature

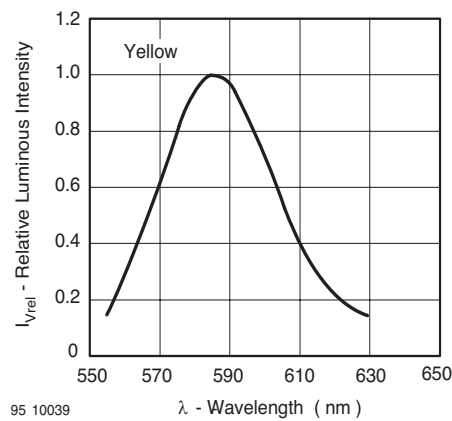


Figure 6. Relative Intensity vs. Wavelength

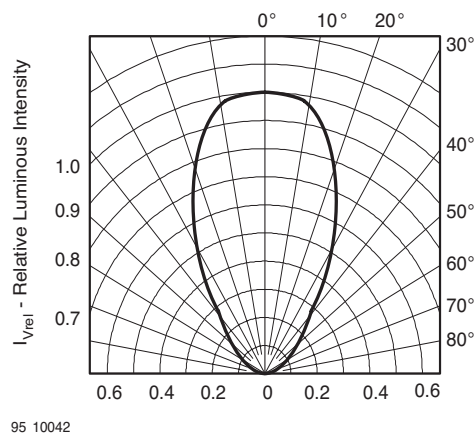
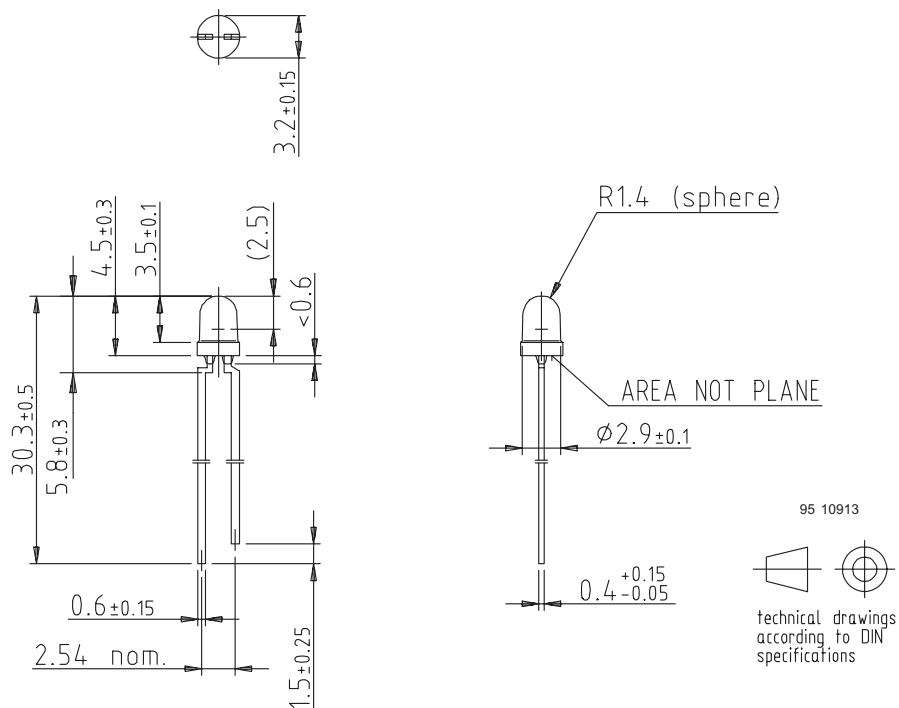


Figure 7. Rel. Luminous Intensity vs. Angular Displacement

## Package Dimensions in mm



## **Ozone Depleting Substances Policy Statement**

It is the policy of **Vishay Semiconductor GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

**Vishay Semiconductor GmbH** has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

**Vishay Semiconductor GmbH** can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

### **We reserve the right to make changes to improve technical design and may do so without further notice.**

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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