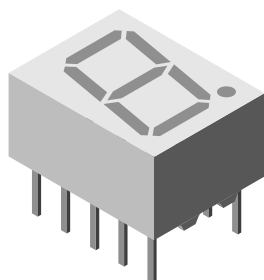


## Low Current 10 mm 7-Segment Display



19236

### DESCRIPTION

The TDSL31.0 series are 10 mm character seven segment low current LED displays in a very compact package.

The displays are designed for a viewing distance up to 6 m and available in high efficiency red. The grey package surface and the evenly lighted untinted segments provide an optimum on-off contrast.

All displays are categorized in luminous intensity groups. That allows users to assemble displays with uniform appearance.

Typical applications include instruments, panel meters, point-of-sale terminals and household equipment.

Due to the design of 10 mm displays, a certain amount of cross-talk between segments is unavoidable. This light leakage becomes more noticeable as the brightness of the operated segments increases. However, higher environmental illumination, or a partially transparent cover, may reduce this effect. Therefore, it's important to consider this phenomenon during design-in and to validate suitability for the particular application and all its operation modes.

### FEATURES

- Low power consumption
- Suitable for DC and multiplex operation
- Evenly lighted segments
- Grey package surface
- Untinted segments
- Luminous intensity categorized
- Wide viewing angle
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### APPLICATIONS

- Panel meters
- Test- and measure-equipment
- Point-of-sale terminals

### PRODUCT GROUP AND PACKAGE DATA

- Product group: display
- Package: 10 mm
- Product series: low current
- Angle of half intensity:  $\pm 50^\circ$

### PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY ( $\mu\text{cd}$ )			at $I_F$ (mA)	WAVELENGTH (nm)			at $I_F$ (mA)	FORWARD VOLTAGE (V)			at $I_F$ (mA)	CIRCUITRY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
TDSL3150	Red	180	260	-	2	612	-	625	2	-	1.8	2.4	2	Common anode
TDSL3160	Red	180	260	-	2	612	-	625	2	-	1.8	2.4	2	Common cathode

### ABSOLUTE MAXIMUM RATINGS ( $T_{\text{amb}} = 25^\circ\text{C}$ , unless otherwise specified)

#### TDSL3150, TDSL3160

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage per segment		$V_R$	6	V
DC forward current per segment		$I_F$	15	mA
Peak forward current per segment		$I_{FM}$	45	mA
Surge forward current per segment	$t_p \leq 10 \mu\text{s}$ (non repetitive)	$I_{FSM}$	100	mA
Power dissipation	$T_{\text{amb}} \leq 45^\circ\text{C}$	$P_V$	320	mW
Junction temperature		$T_j$	100	$^\circ\text{C}$
Operating temperature range		$T_{\text{amb}}$	-40 to +85	$^\circ\text{C}$
Storage temperature range		$T_{\text{stg}}$	-40 to +85	$^\circ\text{C}$
Soldering temperature	$t \leq 3 \text{ s}$ , 2 mm below seating plane	$T_{\text{sd}}$	260	$^\circ\text{C}$
Thermal resistance LED junction to ambient		$R_{\text{thJA}}$	180	K/W

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)  
**TDSL3150, TDSL3160, RED**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment <sup>(1)</sup> (digit average)	$I_F = 2\text{ mA}$	TDSL3150	$I_V$	180	260	-	$\mu\text{cd}$
		TDSL3160		180	260	-	
Dominant wavelength	$I_F = 2\text{ mA}$	TDSL3150, TDSL3160	$\lambda_d$	612	-	625	nm
Peak wavelength	$I_F = 2\text{ mA}$		$\lambda_p$	-	635	-	nm
Angle of half intensity	$I_F = 2\text{ mA}$		$\phi$	-	$\pm 50$	-	$^{\circ}$
Forward voltage per segment	$I_F = 2\text{ mA}$		$V_F$	-	1.8	2.4	V
	$I_F = 20\text{ mA}$		$V_F$	-	2.7	3	V
Reverse voltage per segment	$I_F = 10\text{ }\mu\text{A}$		$V_R$	6	20	-	V
Junction capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$		$C_j$	-	30	-	pF

**Note**

<sup>(1)</sup>  $I_{Vmin.}$  and  $I_V$  groups are mean values of all segments (a to g, D1 to D4), matching factor within segments is  $\geq 0.5$ , excluding decimal points and colon

**LUMINOUS INTENSITY CLASSIFICATION**

GROUP STANDARD	LIGHT INTENSITY ( $\mu\text{cd}$ )	
	MIN.	MAX.
E	180	360
F	280	560
G	450	900
H	700	1400
I	1100	2200
K	1800	3600

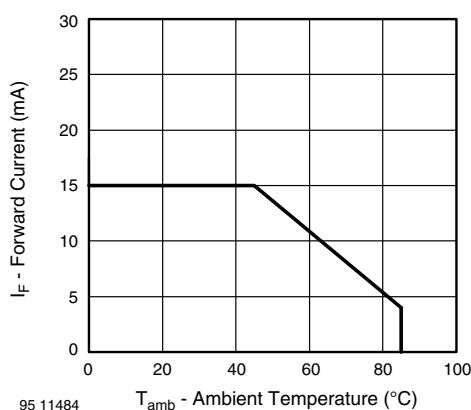
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Current vs. Ambient Temperature

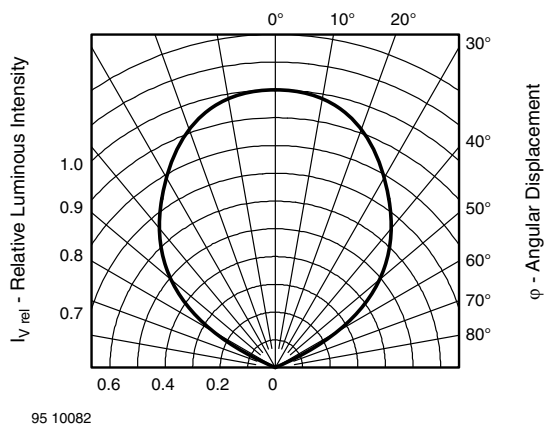


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

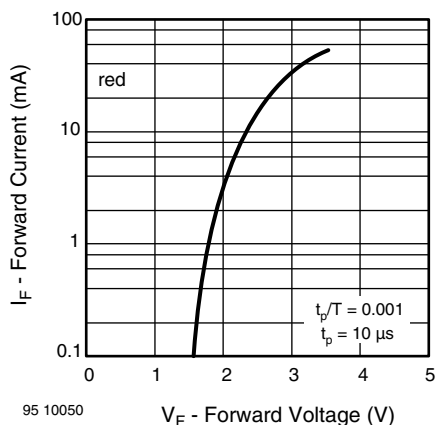


Fig. 3 - Forward Current vs. Forward Voltage

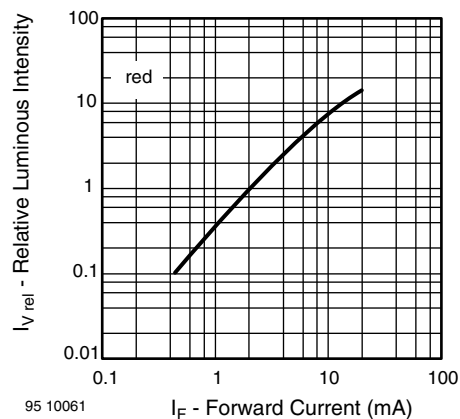


Fig. 6 - Relative Luminous Intensity vs. Forward Current

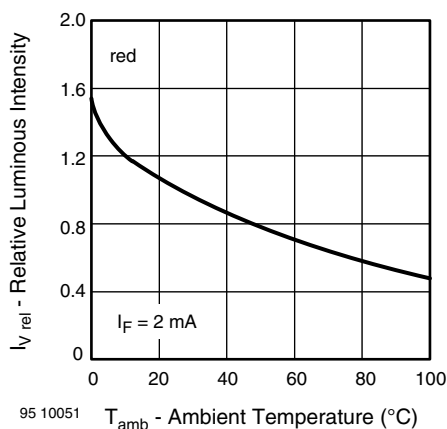


Fig. 4 - Relative Luminous Intensity vs. Ambient Temperature

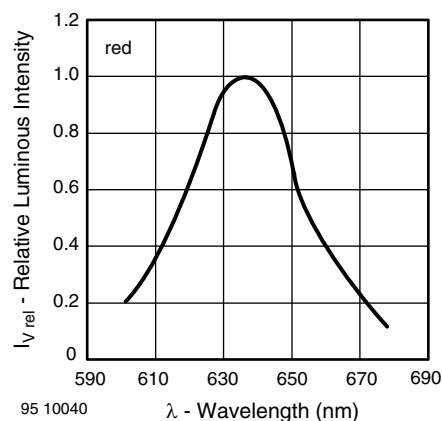


Fig. 7 - Relative Intensity vs. Wavelength

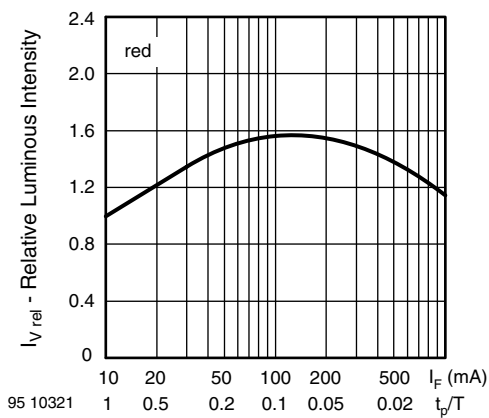


Fig. 5 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

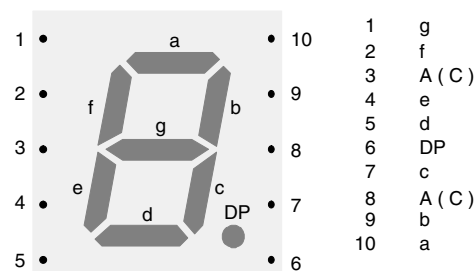
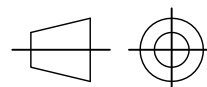
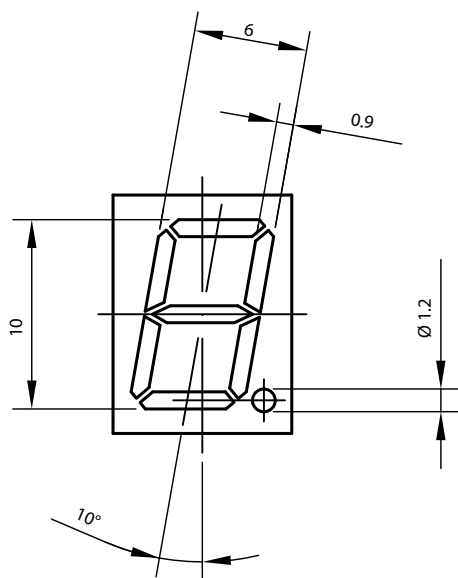
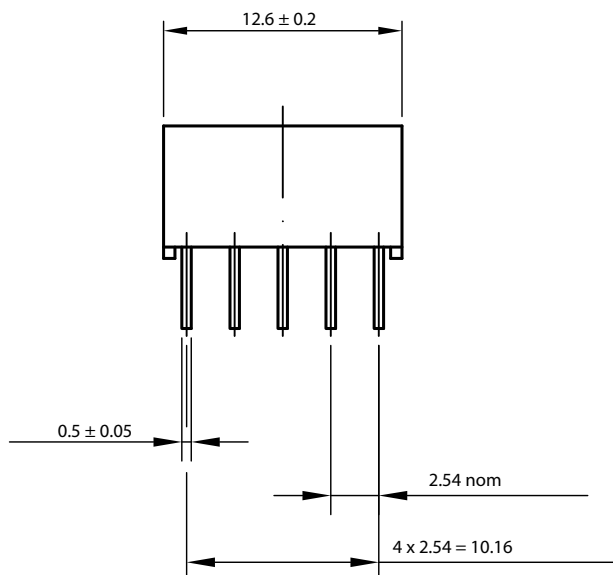
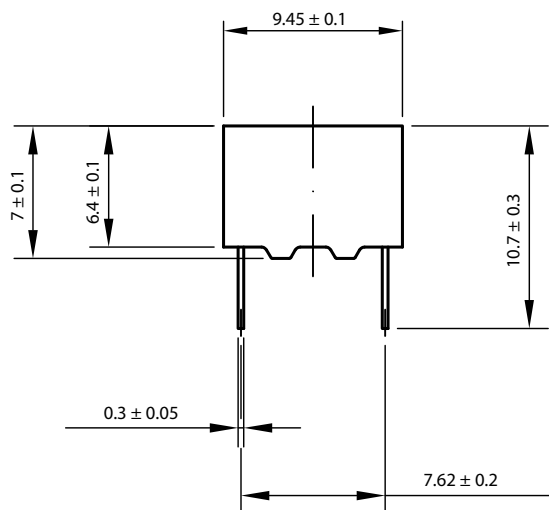


Fig. 8 - TDSL31..

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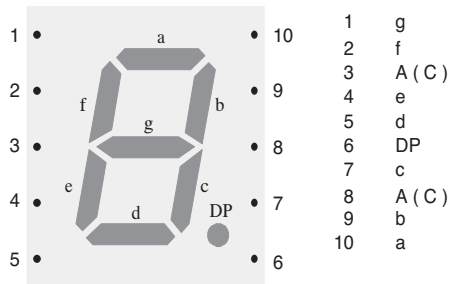
## PACKAGE DIMENSIONS in millimeters



technical drawings  
according to DIN  
specifications

Drawing-No.: 6.544-5093.01-4  
Issue: 2; 23.03.2012

## Pin Connections 10 mm



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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.

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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  
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