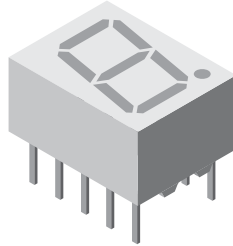




# Standard 7-Segment Display 10 mm



19236

## DESCRIPTION

The TDS.31.. series are 10 mm character seven segment LED displays in a very compact package.

The displays are designed for a viewing distance up to 6 m and available in four bright colors. 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.

## FEATURES

- Evenly lighted segments
- Grey package surface
- Untinted segments
- Luminous intensity categorized
- Yellow and green categorized for color
- Wide viewing angle
- Suitable for DC and high peak current
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC



RoHS COMPLIANT

## APPLICATIONS

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

## PRODUCT GROUP AND PACKAGE DATA

- Product group: display
- Package: 10 mm
- Product series: standard
- Angle of half intensity: ± 50°

PARTS TABLE			
PART	COLOR	LUMINOUS INTENSITY AT 10 mA	CIRCUITRY
TDSO3150	Orange red	$I_V = 4500 \mu\text{cd}$ (typ.)	Common anode
TDSO3150-KL	Orange red	$I_V = (1800 \text{ to } 5600) \mu\text{cd}$	Common anode
TDSO3150-L	Orange red	$I_V = (2800 \text{ to } 5600) \mu\text{cd}$	Common anode
TDSO3160	Orange red	$I_V = 4500 \mu\text{cd}$ (typ.)	Common cathode
TDSO3160-KL	Orange red	$I_V = (1800 \text{ to } 5600) \mu\text{cd}$	Common cathode
TDSO3160-L	Orange red	$I_V = (2800 \text{ to } 5600) \mu\text{cd}$	Common cathode
TDSY3150	Yellow	$I_V = 3000 \mu\text{cd}$ (typ.)	Common anode
TDSY3150-K	Yellow	$I_V = (1800 \text{ to } 3600) \mu\text{cd}$	Common anode
TDSY3160	Yellow	$I_V = 3000 \mu\text{cd}$ (typ.)	Common cathode
TDSG3150	Green	$I_V = 6500 \mu\text{cd}$ (typ.)	Common anode
TDSG3150-M	Green	$I_V = (4500 \text{ to } 9000) \mu\text{cd}$	Common anode
TDSG3150-MN	Green	$I_V = (4500 \text{ to } 14\ 000) \mu\text{cd}$	Common anode
TDSG3160	Green	$I_V = 6500 \mu\text{cd}$ (typ.)	Common cathode
TDSG3160-M	Green	$I_V = (4500 \text{ to } 9000) \mu\text{cd}$	Common cathode



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>TDSO3150, TDSO3160, TDSY3150, TDSY3160, TDSG3150, TDSG3160</b>					
PARAMETER	TEST CONDITION	PART	SYMBOL	VALUE	UNIT
Reverse voltage per segment or DP			$V_R$	6	V
DC forward current per segment or DP		TDSO3150	$I_F$	20	mA
		TDSO3160		20	
		TDSY3150		20	
		TDSY3160		20	
		TDSG3150		20	
		TDSG3160		20	
DC forward current per segment or DP	$t_p \leq 10\text{ }\mu\text{s}$ (non repetitive)	TDSO3150	$I_{FSM}$	0.15	A
		TDSO3160		0.15	
		TDSY3150		0.15	
		TDSY3160		0.15	
		TDSG3150		0.15	
		TDSG3160		0.15	
Power dissipation	$T_{amb} \leq 45\text{ }^{\circ}\text{C}$	TDSO3150, TDSO3160, TDSY3150, TDSY3160, TDSG3150, TDSG3160	$P_V$	480	mW
Junction temperature			$T_j$	100	$^{\circ}\text{C}$
Operating temperature range			$T_{amb}$	- 40 to + 85	$^{\circ}\text{C}$
Storage temperature range			$T_{stg}$	- 40 to + 85	$^{\circ}\text{C}$
Soldering temperature	$t \leq 3\text{ s}$ , 2 mm below seating plane		$T_{sd}$	260	$^{\circ}\text{C}$
Thermal resistance LED junction/ambient			$R_{thJA}$	120	K/W

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>TDSO3150, TDSO3160, ORANGE RED</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment (digit average) <sup>(1)</sup>	$I_F = 10\text{ mA}$	TDSO3150	$I_V$	450	4500	-	$\mu\text{cd}$
		TDSO3150-KL		1800	-	5600	
		TDSO3150-L		2800	-	5600	
		TDSO3160		450	4500	-	
		TDSO3160-KL		1800	-	5600	
		TDSO3160-L		2800	-	5600	
Dominant wavelength	$I_F = 10\text{ mA}$	TDSO3150, TDSO3160	$\lambda_d$	612	-	625	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$	-	630	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		$\phi$	-	$\pm 50$	-	deg
Forward voltage per segment or DP	$I_F = 20\text{ mA}$		$V_F$	-	2	3	V
Reverse voltage per segment or DP	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6	15	-	V

**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.



# TDSG3150, TDSG3160, TDSO3150, TDSO3160, TDSY3150, TDSY3160

Standard 7-Segment Display 10 mm Vishay Semiconductors

OPTICAL AND ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
TDSY3150, TDSY3160, YELLOW							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment (digit average) <sup>(1)</sup>	$I_F = 10\text{ mA}$	TDSY3150	$I_V$	450	3000	-	$\mu\text{cd}$
		TDSY3150-K		1800	-	3600	
		TDSY3160		450	3000	-	
Dominant wavelength	$I_F = 10\text{ mA}$	TDSY3150, TDSY3160	$\lambda_d$	581	-	594	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$	-	585	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		$\phi$	-	$\pm 50$	-	deg
Forward voltage per segment or DP	$I_F = 20\text{ mA}$		$V_F$	-	2.4	3	V
Reverse voltage per segment or DP	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6	15	-	V

**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.

OPTICAL AND ELECTRICAL CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
TDSG3150, TDSG3160, GREEN							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment (digit average) <sup>(1)</sup>	$I_F = 10\text{ mA}$	TDSG3150	$I_V$	450	6800	-	$\mu\text{cd}$
		TDSG3150-M		4500	-	9000	
		TDSG3150-MN		4500	-	14 000	
		TDSG3160		450	6800	-	
		TDSG3160-M		4500	-	9000	
Dominant wavelength	$I_F = 10\text{ mA}$	TDSG3150, TDSG3160	$\lambda_d$	562	-	575	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$	-	565	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		$\phi$	-	$\pm 50$	-	deg
Forward voltage per segment or DP	$I_F = 20\text{ mA}$		$V_F$	-	2.4	3	V
Reverse voltage per segment or DP	$I_R = 10\text{ }\mu\text{A}$		$V_R$	6	15	-	V

**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	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
L	2800	5600
M	4500	9000
N	7000	14 000

**Note**

The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped in one tube (there will be no mixing of two groups in one tube). In order to ensure availability, single brightness groups will not be orderable.

COLOR CLASSIFICATION						
GROUP	ORANGE RED		YELLOW		GREEN	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
1	598	601	581	584		
2	600	603	583	586	562	565
3	602	605	585	588	564	567
4	604	607	587	590	566	569
5	606	609	589	592	568	571
6	608	611	591	594	570	573
7					570	575

**Note**

Wavelengths are tested at a current pulse duration of 25 ms and an accuracy of  $\pm 1\text{ nm}$ .

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

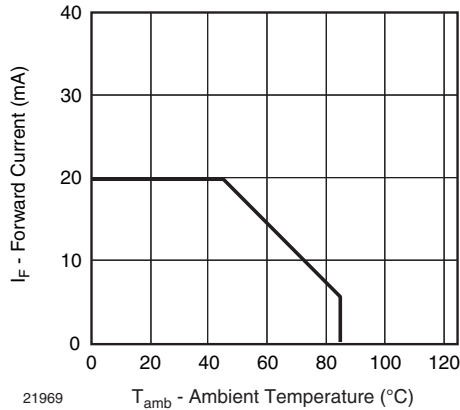


Fig. 1 - Forward Current vs. Ambient Temperature

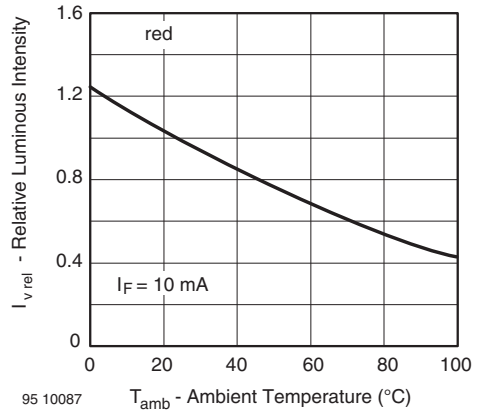


Fig. 4 - Rel. Luminous Intensity vs. Ambient Temperature

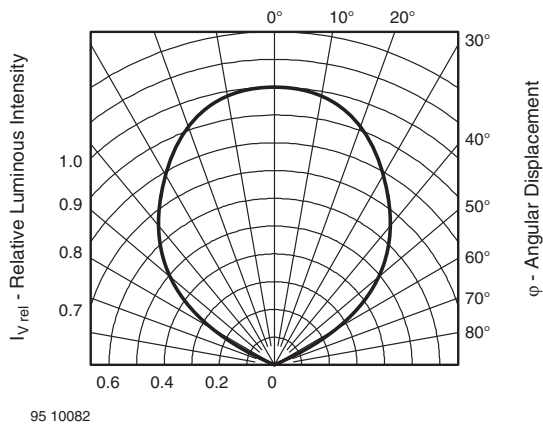


Fig. 2 - Rel. Luminous Intensity vs. Angular Displacement

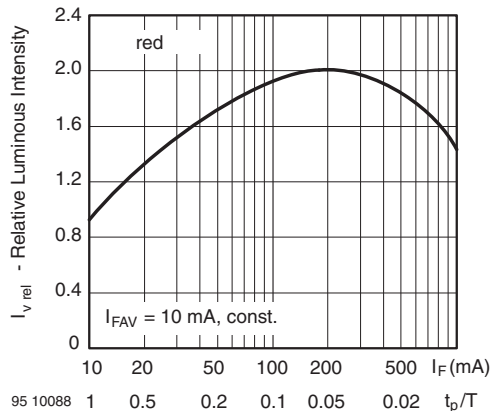


Fig. 5 - Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

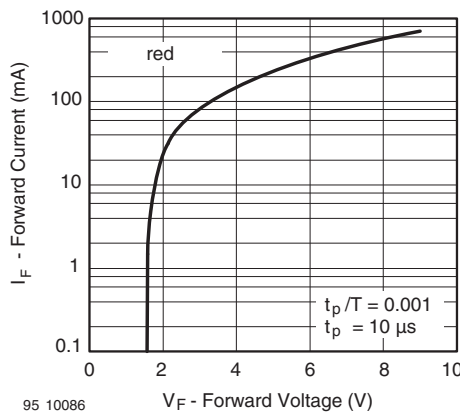


Fig. 3 - Forward Current vs. Forward Voltage

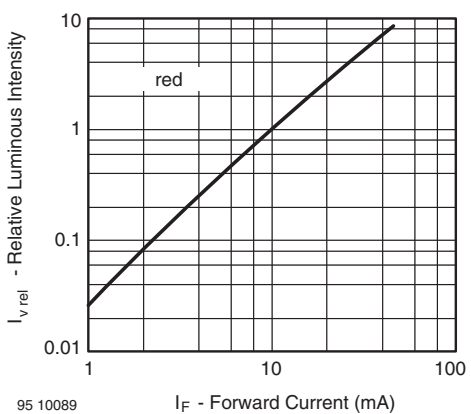


Fig. 6 - Relative Luminous Intensity vs. Forward Current

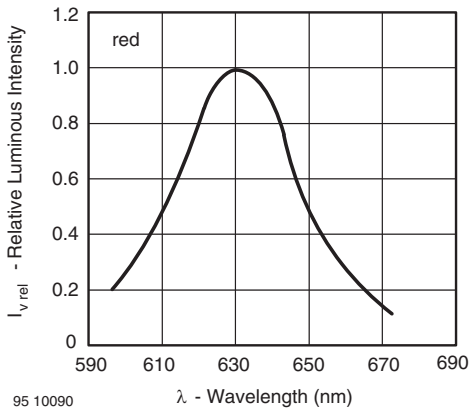


Fig. 7 - Relative Intensity vs. Wavelength

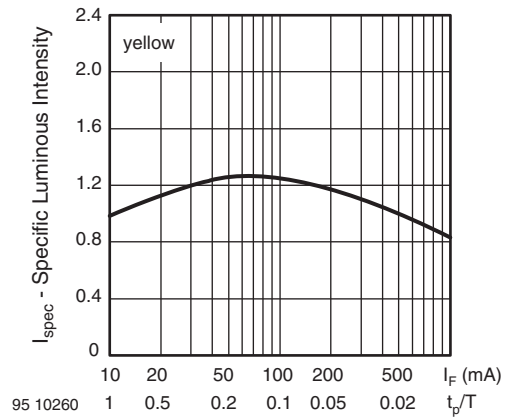


Fig. 10 - Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

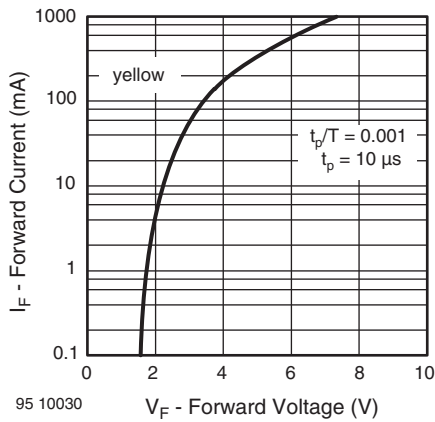


Fig. 8 - Forward Current vs. Forward Voltage

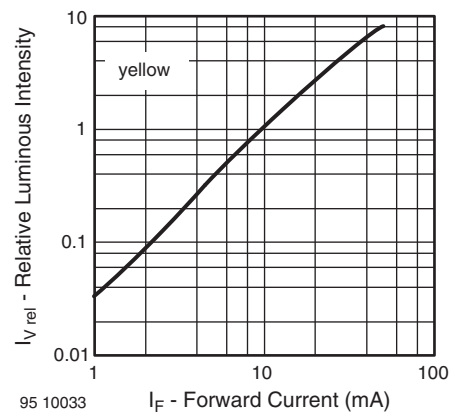


Fig. 11 - Relative Luminous Intensity vs. Forward Current

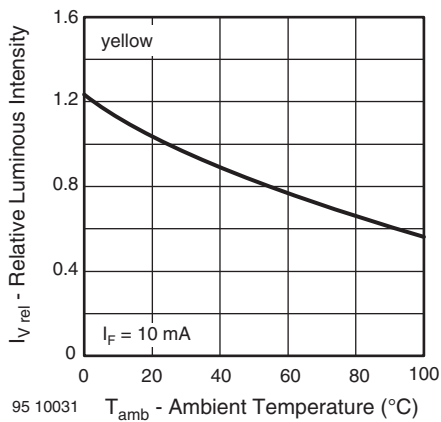


Fig. 9 - Rel. Luminous Intensity vs. Ambient Temperature

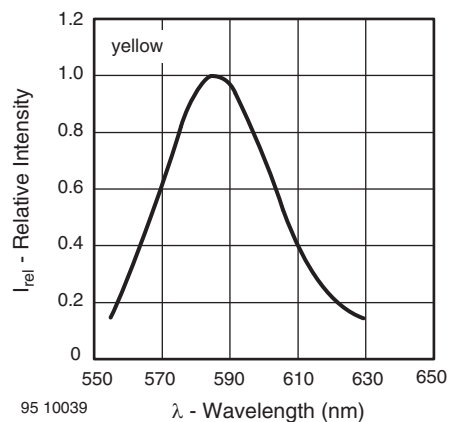


Fig. 12 - Relative Intensity vs. Wavelength

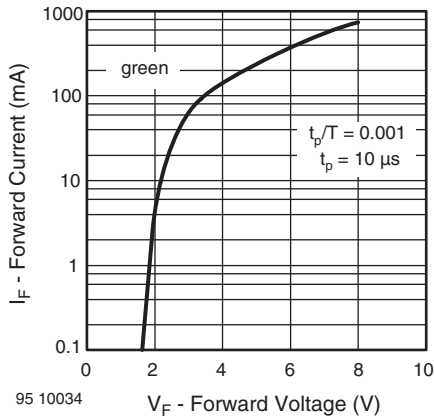


Fig. 13 - Forward Current vs. Forward Voltage

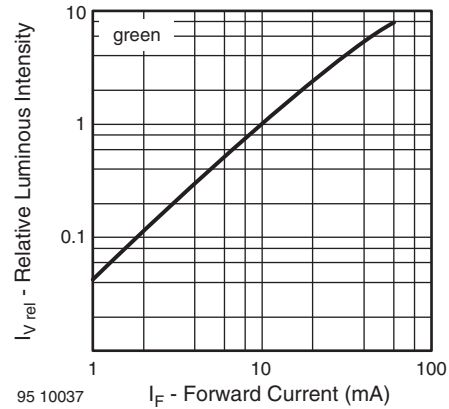


Fig. 16 - Relative Luminous Intensity vs. Forward Current

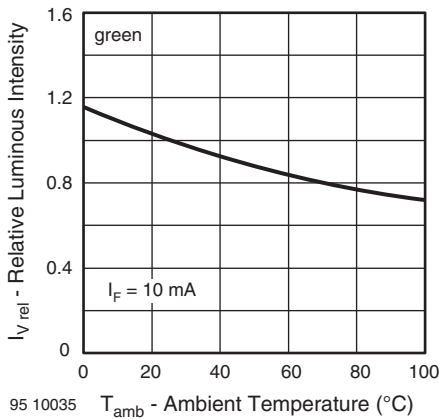


Fig. 14 - Rel. Luminous Intensity vs. Ambient Temperature

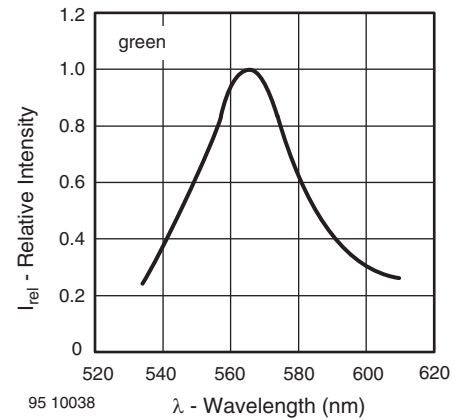


Fig. 17 - Relative Intensity vs. Wavelength

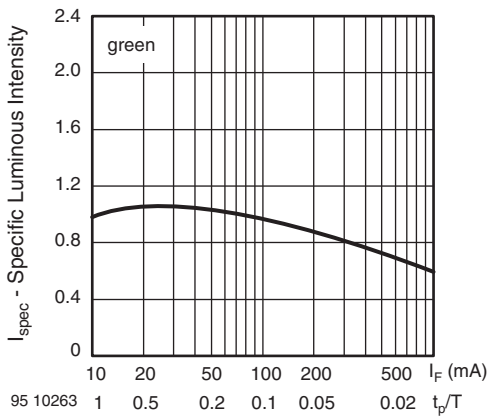


Fig. 15 - Specific Luminous Intensity vs. Forward Current

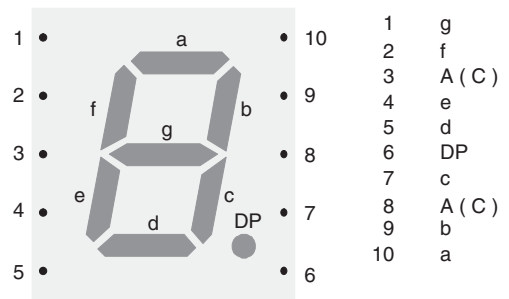


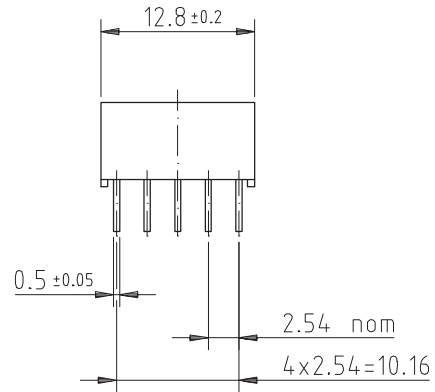
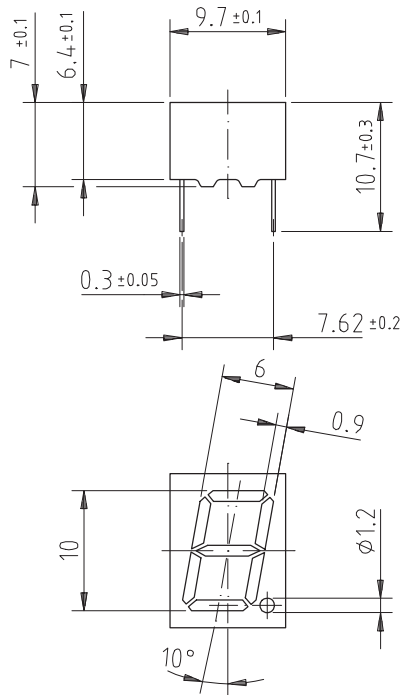
Fig. 18 - TDS.31..

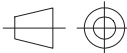


# TDSG3150, TDSG3160, TDSO3150, TDSO3160, TDSY3150, TDSY3160

Standard 7-Segment Display 10 mm Vishay Semiconductors

## PACKAGE DIMENSIONS FOR TDS.31.. in millimeters



  
technical drawings  
according to DIN  
specifications

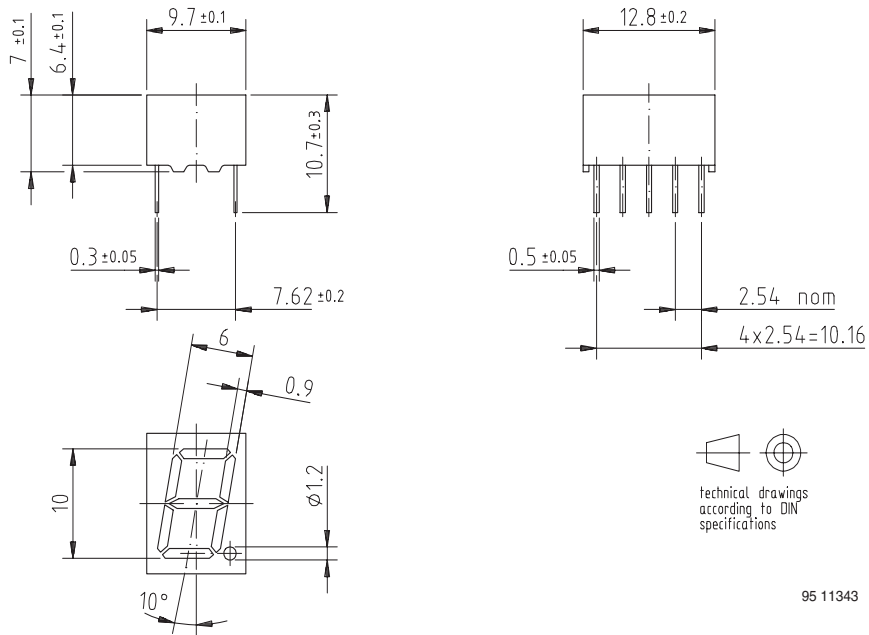
Drawing-No.: 6.544-5093.01-4

Issue: 1; 21.11.95

95 11343

# Display-10 mm

## Package Dimensions in mm



## Ozone Depleting Substances Policy Statement

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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.

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.

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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.

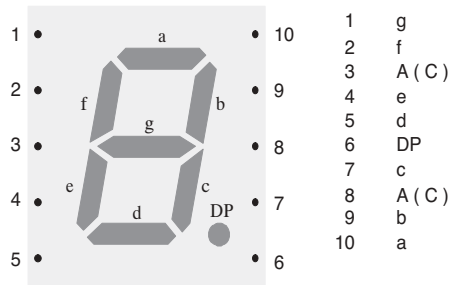
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**We reserve the right to make changes to improve technical design  
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Parameters can vary in different applications. All operating parameters must be validated for each customer application by the 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.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany  
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423

# Pin Connections 10 mm



96 11678

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Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423



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