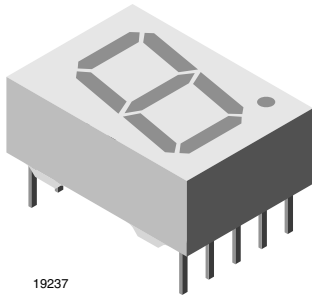




## Standard 7-Segment Display 13 mm



19237

### DESCRIPTION

The TDS.51.. series are 13 mm character seven segment LED displays in a very compact package.

The displays are designed for a viewing distance up to 7 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.

Due to the design of 13 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

- 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
- 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
- Control units
- TV sets

### PRODUCT GROUP AND PACKAGE DATA

- Product group: Display
- Package: 13 mm
- Product series: Standard
- Angle of half intensity:  $\pm 5^\circ$

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.		
TDSO5150	Orange red	700	5000	-	10	612	-	625	10	-	2	3	20	Common anode
TDSO5150-LM	Orange red	2800	-	9000	10	612	-	625	10	-	2	3	20	Common anode
TDSO5160	Orange red	700	5000	-	10	612	-	625	10	-	2	3	20	Common cathode
TDSO5160-LM	Orange red	2800	-	9000	10	612	-	625	10	-	2	3	20	Common cathode
TDSY5150 <sup>(1)</sup>	Yellow	700	4200	-	10	581	-	594	10	-	2.4	3	20	Common anode
TDSG5150	Green	700	9500	-	10	562	-	575	10	-	2.4	3	20	Common anode
TDSG5150-MN	Green	4500	-	14 000	10	562	-	575	10	-	2.4	3	20	Common anode
TDSG5150-N	Green	7000	-	14 000	10	562	-	575	10	-	2.4	3	20	Common anode
TDSG5160	Green	700	9500	-	10	562	-	575	10	-	2.4	3	20	Common cathode
TDSG5160-MN	Green	4500	-	14 000	10	562	-	575	10	-	2.4	3	20	Common cathode
TDSG5160-N	Green	7000	-	14 000	10	562	-	575	10	-	2.4	3	20	Common cathode

### Note

<sup>(1)</sup> Not for new designs



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>TDSO5150, TDSO5160, TDSY5150, TDSG5150, TDSG5160</b>				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage per segment or DP		$V_R$	6	V
DC forward current per segment or DP		$I_F$	25	mA
Surge forward current per segment or DP	$t_p \leq 10\text{ }\mu\text{s}$ (non repetitive)	$I_{FSM}$	0.15	A
Power dissipation	$T_{amb} \leq 45\text{ }^{\circ}\text{C}$	$P_V$	550	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 to ambient		$R_{thJA}$	100	K/W

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>TDSO5150, TDSO5150-LM, TDSO5160, TDSO5160-LM, ORANGE RED</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment (digit average) <sup>(1)</sup>	$I_F = 10\text{ mA}$	TDSO5150	$I_V$	700	5000	-	$\mu\text{cd}$
		TDSO5150-LM		2800	-	9000	
		TDSO5160		700	5000	-	
		TDSO5160-LM		2800	-	9000	
Dominant wavelength	$I_F = 10\text{ mA}$	TDSO5150, TDSO5150-LM, TDSO5160, TDSO5160-LM	$\lambda_d$	612	-	625	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$	-	630	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		$j$	-	$\pm 50$	-	$^{\circ}$
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

<b>OPTICAL AND ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) <b>TDSY5150, YELLOW, NOT FOR NEW DESIGNS</b>							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment (digit average) <sup>(1)</sup>	$I_F = 10\text{ mA}$	TDSY5150	$I_V$	700	4200	-	$\mu\text{cd}$
Dominant wavelength	$I_F = 10\text{ mA}$	TDSY5150	$\lambda_d$	581	-	594	nm
Peak wavelength	$I_F = 10\text{ mA}$		$\lambda_p$	-	585	-	nm
Angle of half intensity	$I_F = 10\text{ mA}$		$j$	-	$\pm 50$	-	$^{\circ}$
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 <sub>amb</sub> = 25 °C, unless otherwise specified)							
TDSG5150, TDSG5150-MN, TDSG5150-N, TDSG5160, TDSG5160-MN, TDSG5160-N, GREEN							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity per segment (digit average) <sup>(1)</sup>	I <sub>F</sub> = 10 mA	TDSG5150	I <sub>V</sub>	700	9500	-	μcd
		TDSG5150-MN		4500	-	14 000	
		TDSG5150-N		7000	-	14 000	
		TDSG5160		700	9500	-	
		TDSG5160-MN		4500	-	14 000	
		TDSG5160-N		7000	-	14 000	
Dominant wavelength	I <sub>F</sub> = 10 mA	TDSG5150, TDSG5150-MN, TDSG5150-N, TDSG5160, TDSG5160-MN, TDSG5160-N	λ <sub>d</sub>	562	-	575	nm
Peak wavelength	I <sub>F</sub> = 10 mA		λ <sub>p</sub>	-	565	-	nm
Angle of half intensity	I <sub>F</sub> = 10 mA		j	-	± 50	-	°
Forward voltage per segment or DP	I <sub>F</sub> = 20 mA		V <sub>F</sub>	-	2.4	3	V
Reverse voltage per segment or DP	I <sub>R</sub> = 10 μA		V <sub>R</sub>	6	15	-	V

**Note**

<sup>(1)</sup> I<sub>Vmin.</sub> and I<sub>V</sub> groups are mean values of all segments (a to g, D1 to D4), matching factor within segments is ≥ 0.5, excluding decimal points and colon

LUMINOUS INTENSITY CLASSIFICATION		
GROUP	LIGHT INTENSITY (μcd)	
	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	612	617	581	584	-	-
2	616	621	583	586	-	-
3	620	625	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 and an accuracy of ± 1 nm



TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

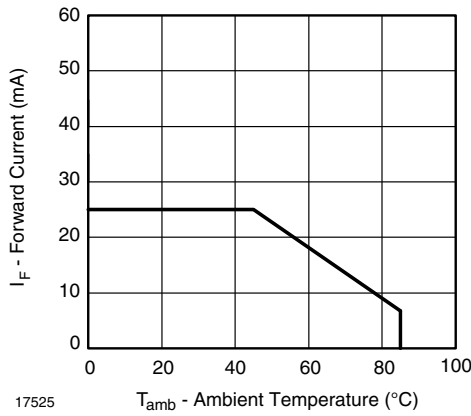


Fig. 1 - Forward Current vs. Ambient Temperature

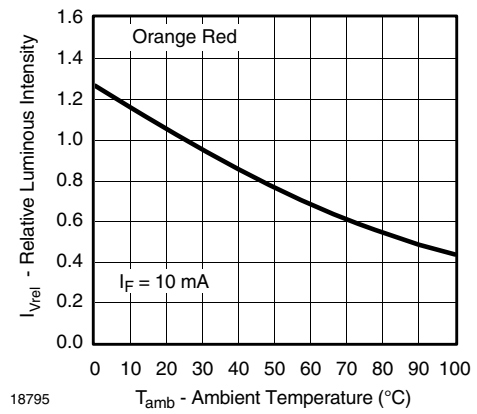


Fig. 4 - Relative Luminous Intensity vs. Ambient Temperature

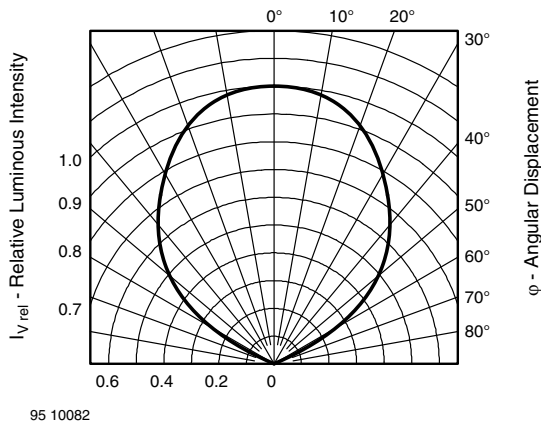


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

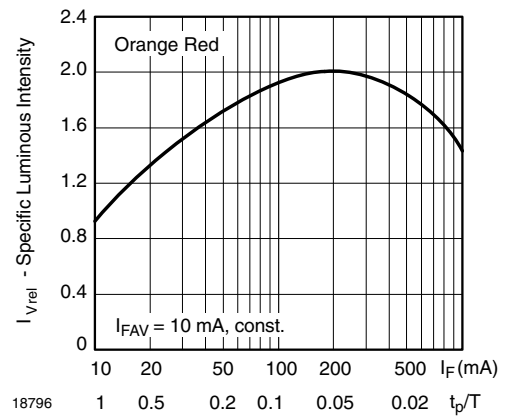


Fig. 5 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

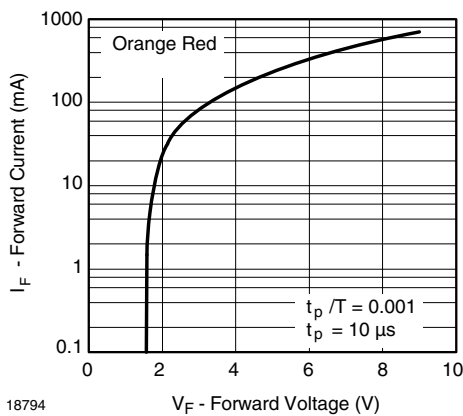


Fig. 3 - Forward Current vs. Forward Voltage

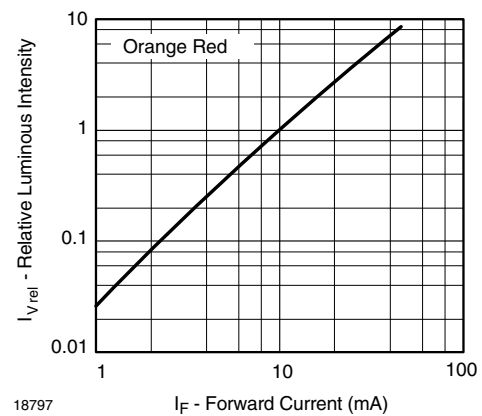


Fig. 6 - Relative Luminous Intensity vs. Forward Current

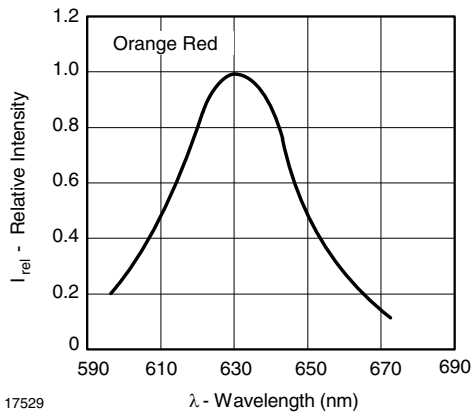


Fig. 7 - Relative Intensity vs. Wavelength

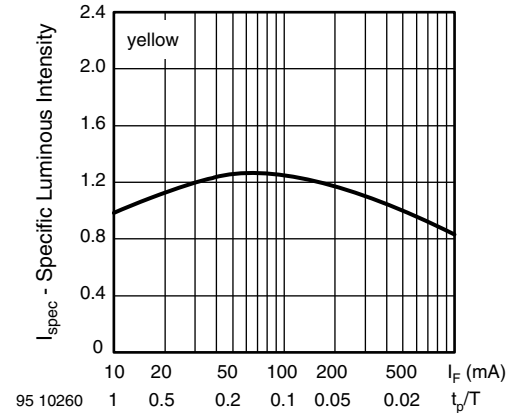


Fig. 10 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

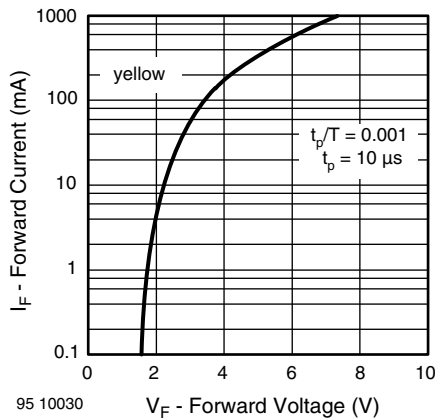


Fig. 8 - Forward Current vs. Forward Voltage

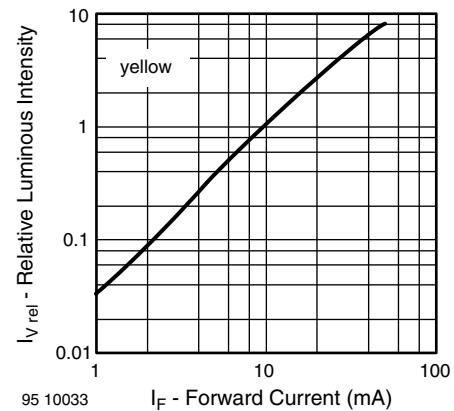


Fig. 11 - Relative Luminous Intensity vs. Forward Current

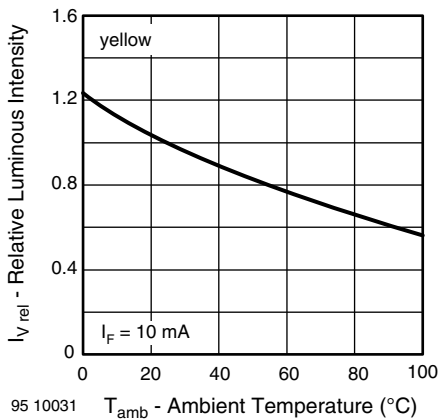


Fig. 9 - Relative Luminous Intensity vs. Ambient Temperature

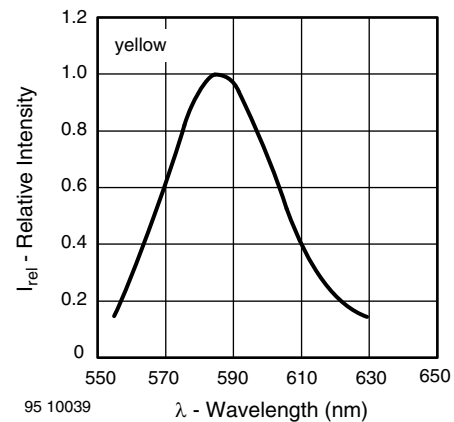


Fig. 12 - Relative Intensity vs. Wavelength

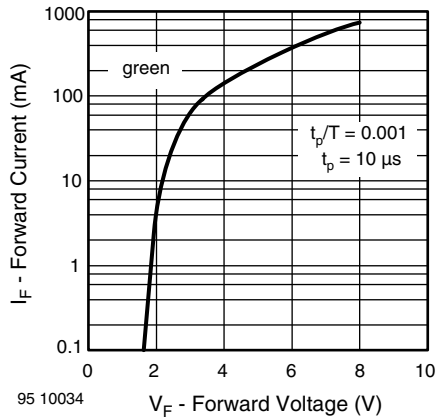


Fig. 13 - Forward Current vs. Forward Voltage



Fig. 16 - Relative Luminous Intensity vs. Forward Current

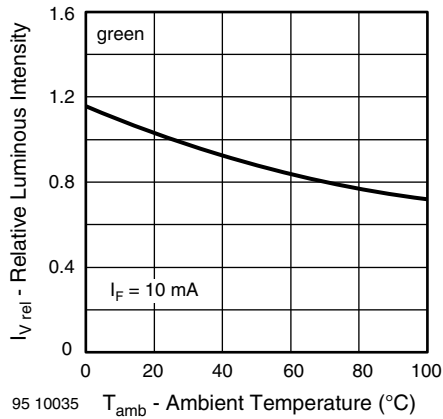


Fig. 14 - Relative Luminous Intensity vs. Ambient Temperature



Fig. 17 - Relative Intensity vs. Wavelength

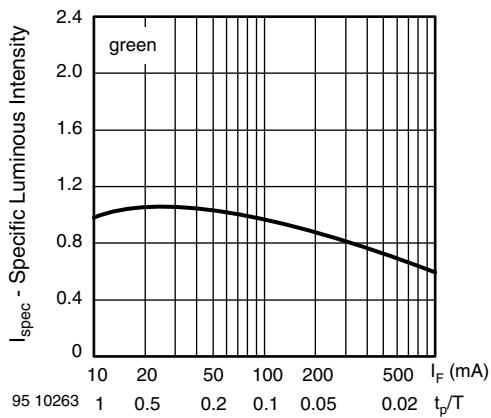


Fig. 15 - Specific Luminous Intensity vs. Forward Current

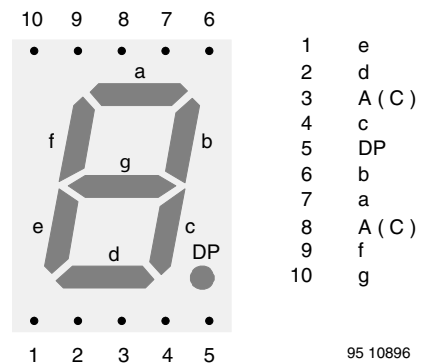
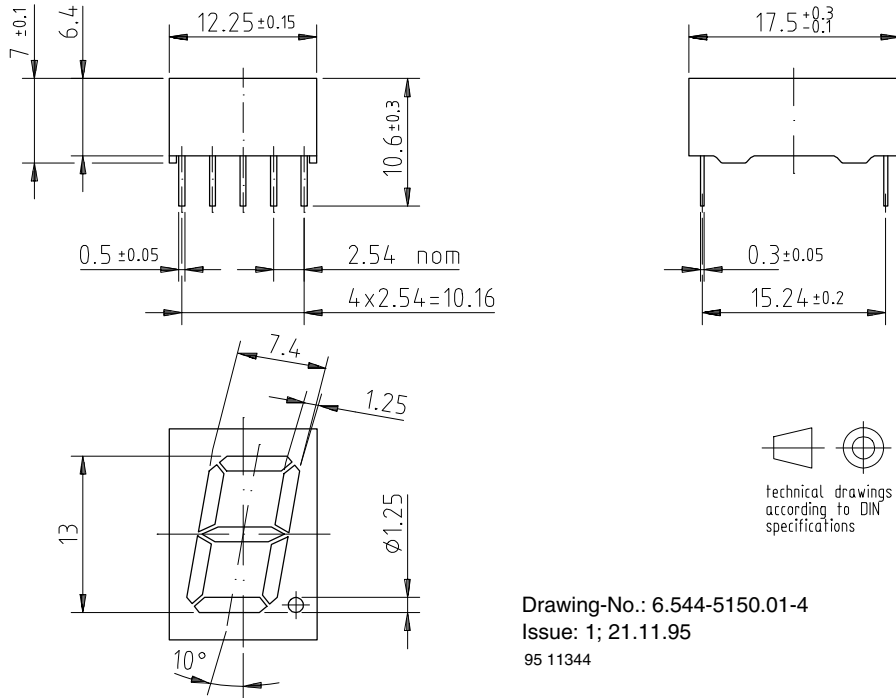


Fig. 18 - TDS.51..



**PACKAGE DIMENSIONS FOR TDS.51..** in millimeters



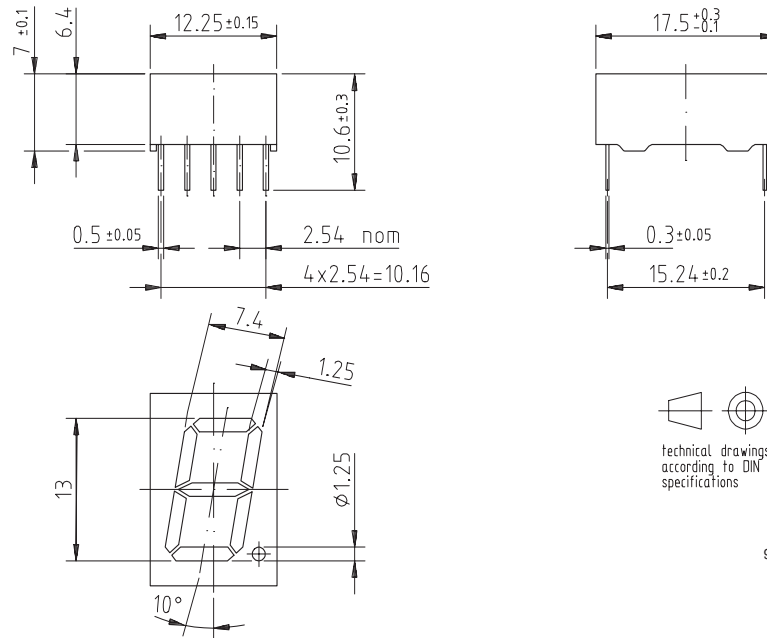
Drawing-No.: 6.544-5150.01-4

Issue: 1; 21.11.95

95 11344

## Display-13 mm

### Package Dimensions in mm



95 11344



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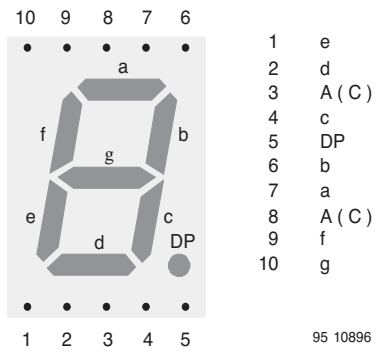
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Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423



## Pin Connections 13 mm



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