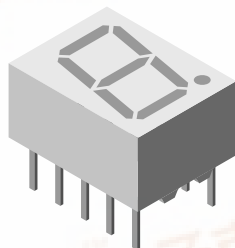


## Standard 7-Segment Display 10 mm



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:  $\pm 50^\circ$

### PARTS TABLE

| PART        | COLOR      | LUMINOUS INTENSITY AT 2 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 |

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**TDSO3150, TDSO3160, TDSY3150, TDSY3160, TDSG3150, TDSG3160**

| 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,<br>TDSO3160,<br>TDSY3150,<br>TDSY3160,<br>TDSG3150,<br>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                   | $t \leq 3\text{ s}$ ,<br>2 mm below seating plane |                                                                           | $T_{sd}$   | 260          | $^{\circ}\text{C}$ |
| Thermal resistance LED junction/ambient |                                                   |                                                                           | $R_{thJA}$ | 120          | K/W                |

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)**TDSO3150, TDSO3160, ORANGE RED**

| 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,<br>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.

### 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)

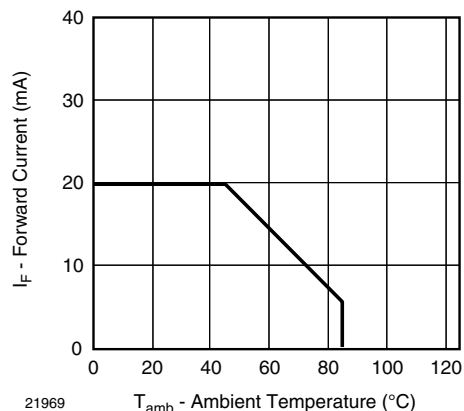


Fig. 1 - Forward Current vs. Ambient Temperature

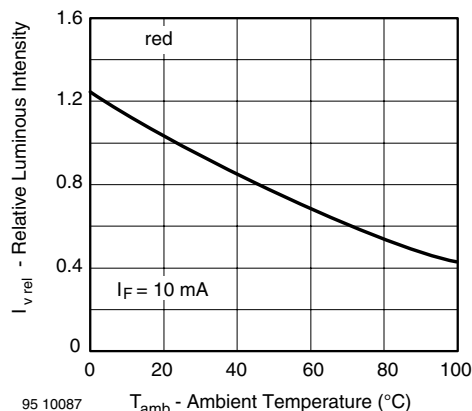


Fig. 4 - Rel. Luminous Intensity vs. Ambient Temperature

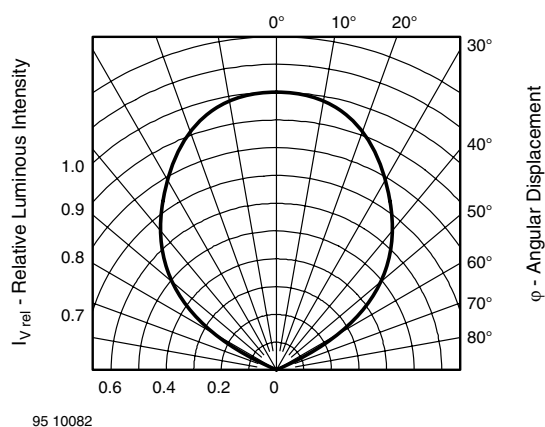


Fig. 2 - Rel. Luminous Intensity vs. Angular Displacement

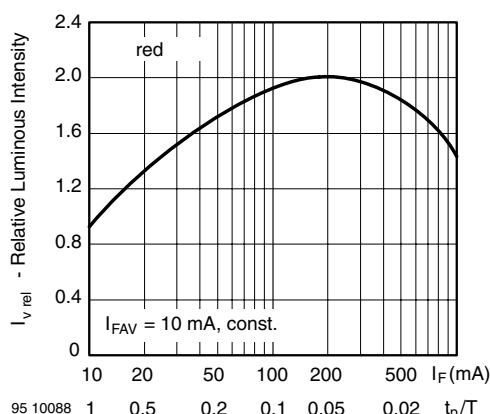


Fig. 5 - Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

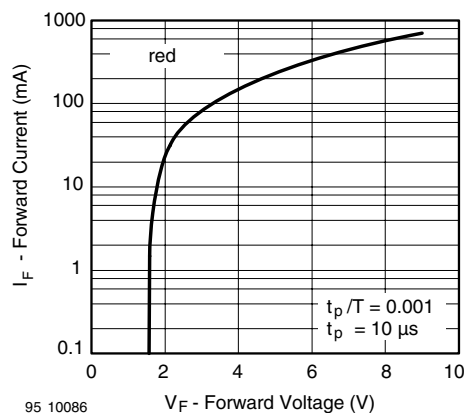


Fig. 3 - Forward Current vs. Forward Voltage

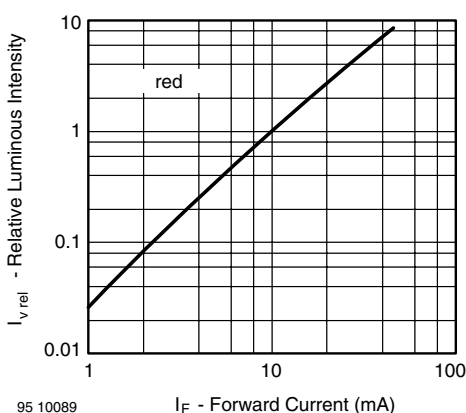


Fig. 6 - Relative Luminous Intensity vs. Forward Current

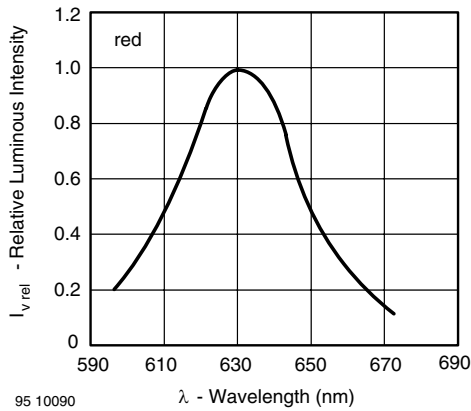


Fig. 7 - Relative Intensity vs. Wavelength

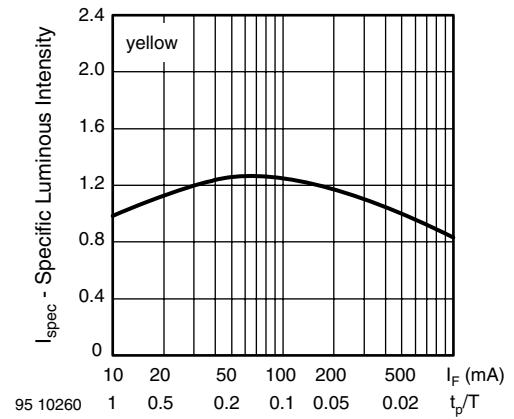


Fig. 10 - Rel. Lumin. Intensity vs. Forw. Current/Duty Cycle

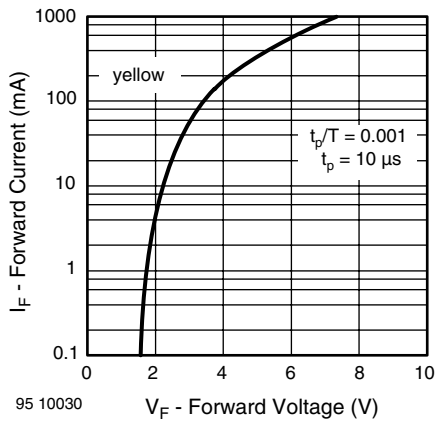


Fig. 8 - Forward Current vs. Forward Voltage

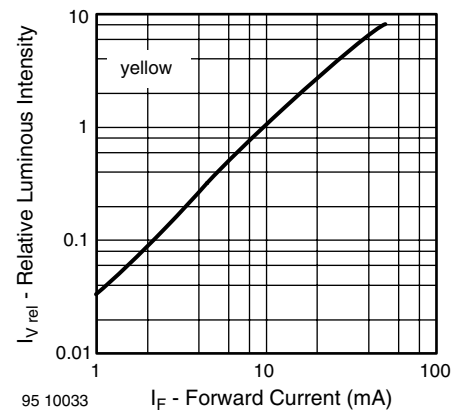


Fig. 11 - Relative Luminous Intensity vs. Forward Current

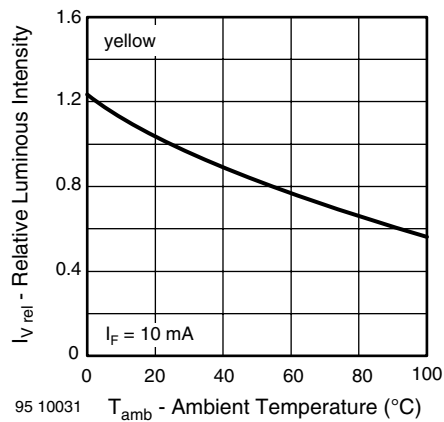


Fig. 9 - Rel. Luminous Intensity vs. Ambient Temperature

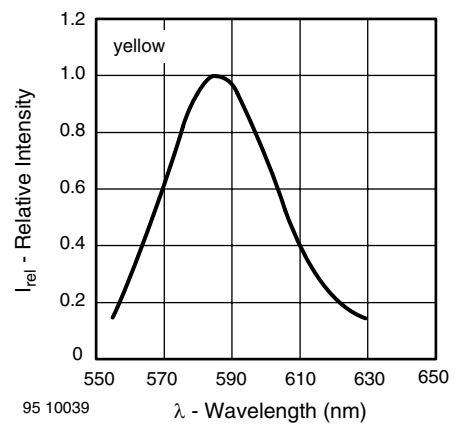


Fig. 12 - Relative Intensity vs. Wavelength

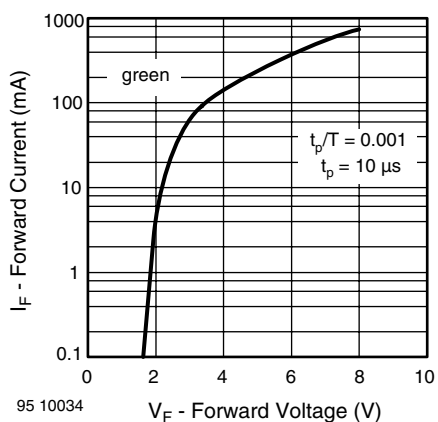


Fig. 13 - Forward Current vs. Forward Voltage

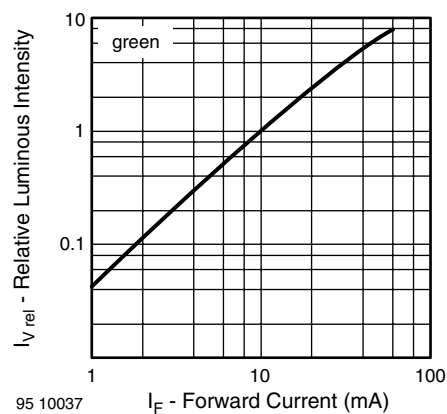


Fig. 16 - Relative Luminous Intensity vs. Forward Current

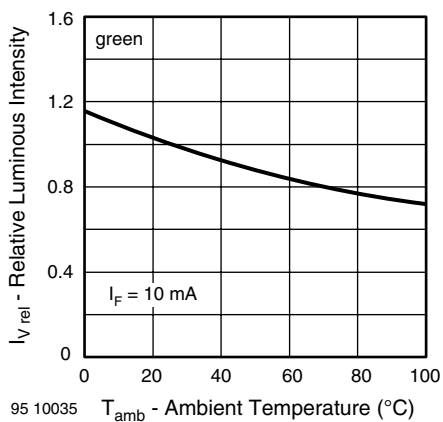


Fig. 14 - Rel. Luminous Intensity vs. Ambient Temperature

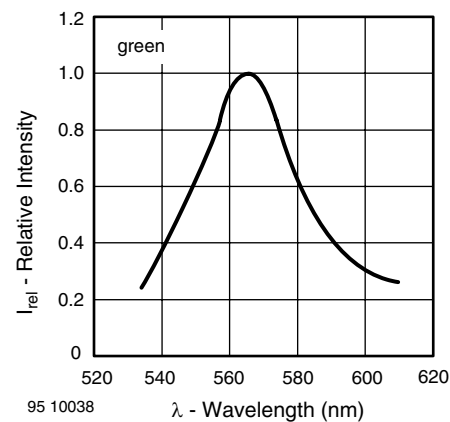


Fig. 17 - Relative Intensity vs. Wavelength

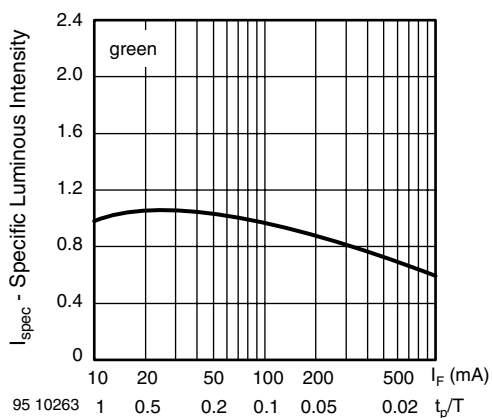


Fig. 15 - Specific Luminous Intensity vs. Forward Current

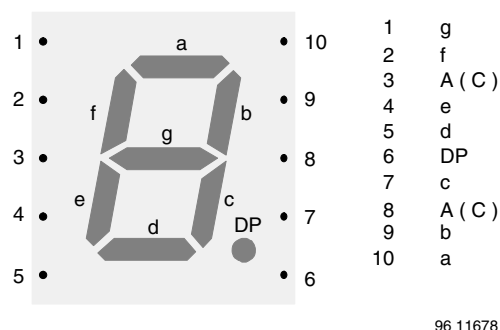
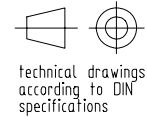
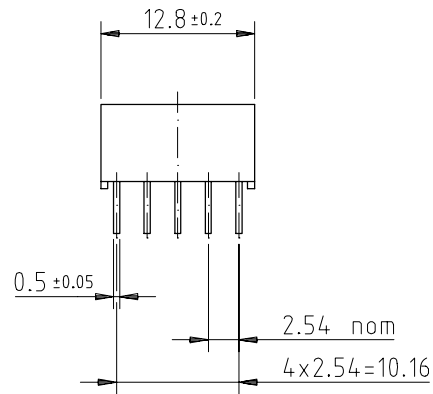
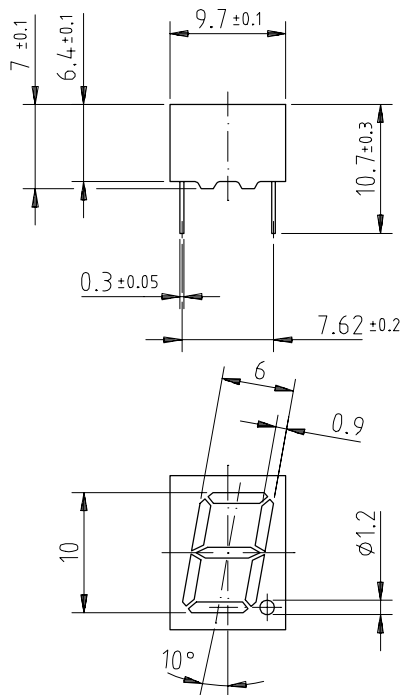


Fig. 18 - TDS.31..

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



Drawing-No.: 6.544-5093.01-4

Issue: 1; 21.11.95

95 11343

## Disclaimer

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