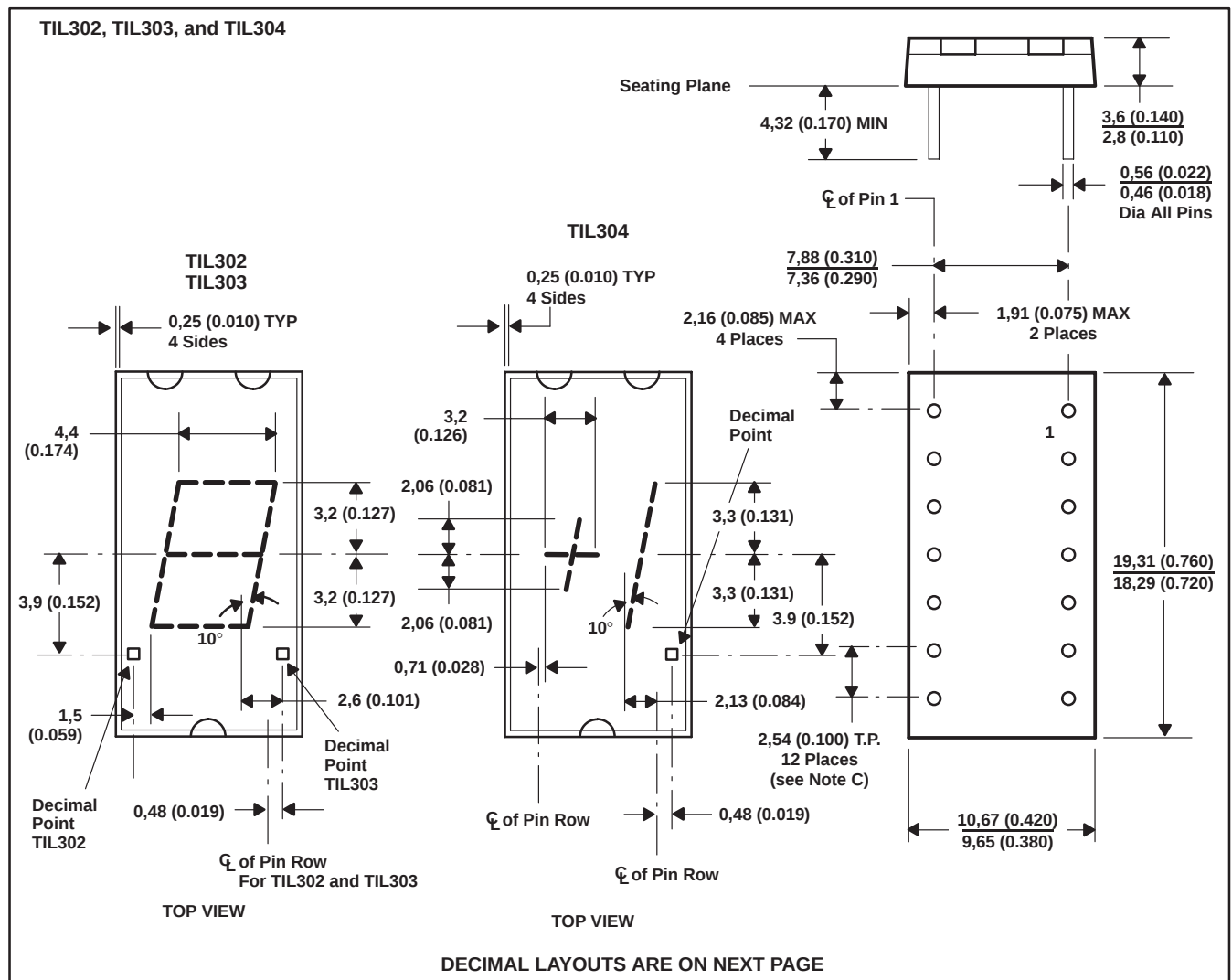


- Red Solid-State Display
- 6,9-mm (0.270-Inch) Character Height
- High Luminous Intensity
- Low Power Requirements
- Each Unit Visually Checked for Uniformity of Elements
- Sign, Overflow, and Left or Right Decimal Capabilities
- Wide Viewing Angle
- Compatible With Most TTL and DTL Circuits

## mechanical data

These assemblies consist of display chips mounted on a header with molded plastic body. Multiple displays may be mounted on 11,43-mm (0.450-inch) centers.

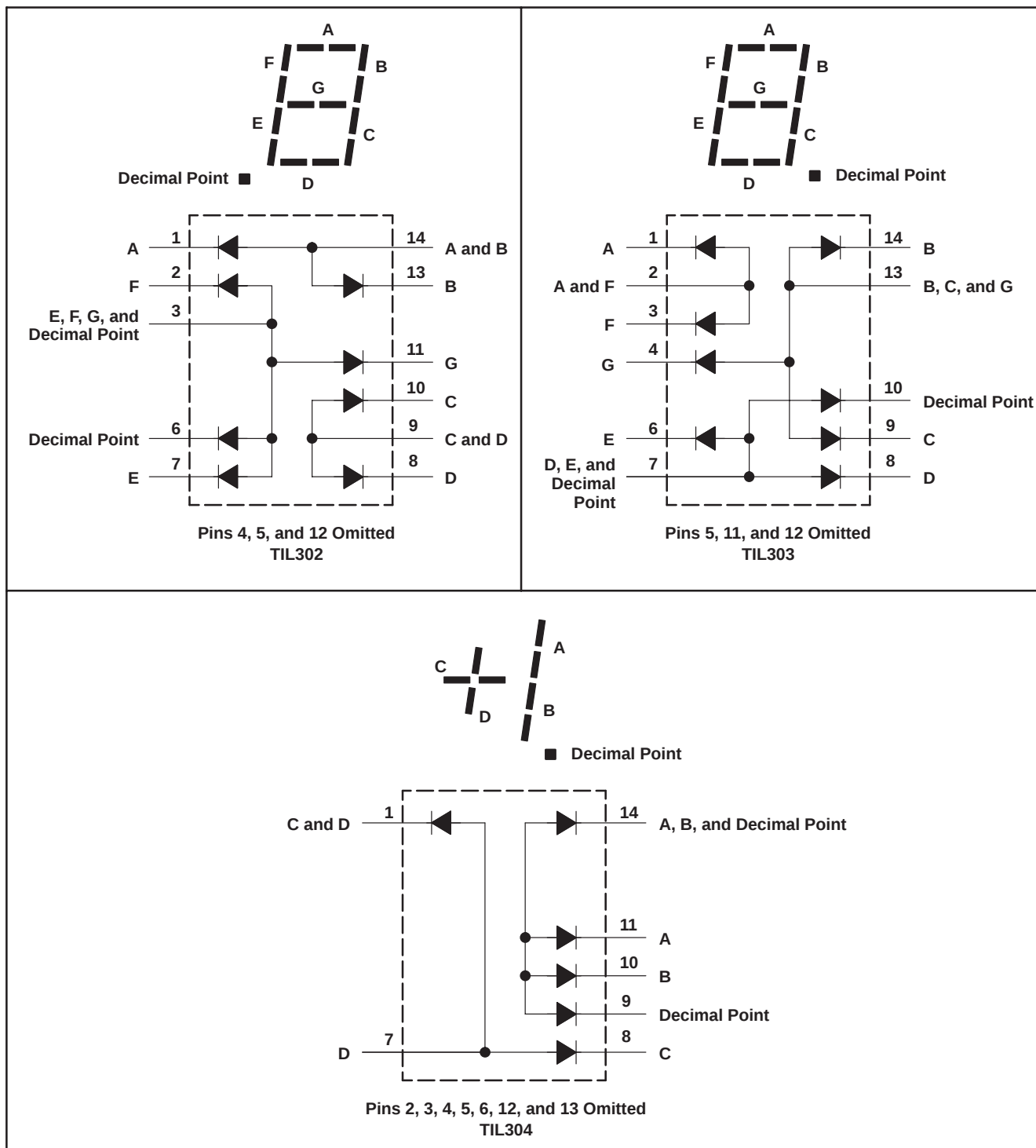


- NOTES: A. All linear dimensions are in millimeters and parenthetically in inches.  
 B. Centerlines of character segments are shown as dashed lines. Associated dimensions are nominal.  
 C. The true-position pin spacing is 2,54 mm (0.100 inch) between centerlines. Each centerline is located within 0,26 mm (0.010 inch) of its true longitudinal position relative to pins 1 and 11.

# TIL302, TIL303, TIL304 NUMERIC DISPLAYS

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## pin layouts



**absolute maximum ratings over operating free-air temperature range (unless otherwise noted)**

|                                                                  |                               |               |
|------------------------------------------------------------------|-------------------------------|---------------|
| Reverse voltage at 25°C free-air temperature:                    | Each segment                  | 6 V           |
|                                                                  | Decimal point                 | 3 V           |
| Peak forward current, each segment or decimal point (see Note 1) |                               | 200 mA        |
| Continuous forward current:                                      | Each segment or decimal point | 30 mA         |
|                                                                  | Total for TIL302, TIL303      | 240 mA        |
|                                                                  | Total for TIL304              | 150 mA        |
| Operating free-air temperature range, $T_A$                      |                               | 0°C to 70°C   |
| Storage temperature range                                        |                               | -25°C to 85°C |

NOTE 1: This value applies for PRR  $\geq$  60 Hz, duty cycle  $\leq$  10%.

**operating characteristics of each segment at 25°C free-air temperature (unless otherwise noted)**

| PARAMETER       |                                                           | TEST CONDITIONS                                                 | MIN | TYP  | MAX | UNIT     |
|-----------------|-----------------------------------------------------------|-----------------------------------------------------------------|-----|------|-----|----------|
| $I_V$           | Luminous intensity (see Note 2)                           | $I_F = 20$ mA                                                   | 100 | 275  |     | $\mu$ cd |
| $\lambda_p$     | Wavelength at peak emission                               |                                                                 |     | 660  |     | nm       |
| $\Delta\lambda$ | Spectral bandwidth                                        |                                                                 |     | 20   |     | nm       |
| $V_F$           | Static forward voltage                                    |                                                                 | 3   | 3.4  | 3.8 | V        |
| $\alpha_{VF}$   | Average temperature coefficient of static forward voltage | $I_F = 20$ mA,<br>$T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$ |     | -2.7 |     | mV/°C    |
| $I_R$           | Static reverse current                                    | $V_R = 6$ V                                                     |     |      | 100 | $\mu$ A  |
| C               | Anode-to-cathode capacitance                              | $V_R = 0$ , $f = 1$ MHz                                         |     | 85   |     | pF       |

**operating characteristics of decimal point at 25°C free-air temperature (unless otherwise noted)**

| PARAMETER       |                                                           | TEST CONDITIONS                                                 | MIN | TYP  | MAX | UNIT     |
|-----------------|-----------------------------------------------------------|-----------------------------------------------------------------|-----|------|-----|----------|
| $I_V$           | Luminous intensity (see Note 2)                           | $I_F = 20$ mA                                                   | 40  | 110  |     | $\mu$ cd |
| $\lambda_p$     | Wavelength at peak emission                               |                                                                 |     | 660  |     | nm       |
| $\Delta\lambda$ | Spectral bandwidth                                        |                                                                 |     | 20   |     | nm       |
| $V_F$           | Static forward voltage                                    |                                                                 | 1.5 | 1.65 | 2   | V        |
| $\alpha_{VF}$   | Average temperature coefficient of static forward voltage | $I_F = 20$ mA,<br>$T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$ |     | -1.4 |     | mV/°C    |
| $I_R$           | Static reverse current                                    | $V_R = 3$ V                                                     |     |      | 100 | $\mu$ A  |
| C               | Anode-to-cathode capacitance                              | $V_R = 0$ , $f = 1$ MHz                                         |     | 120  |     | pF       |

NOTE 2: Luminous intensity is measured with a light sensor and filter combination that approximates the CIE (International Commission on Illumination) eye-response curve.

## TYPICAL CHARACTERISTICS

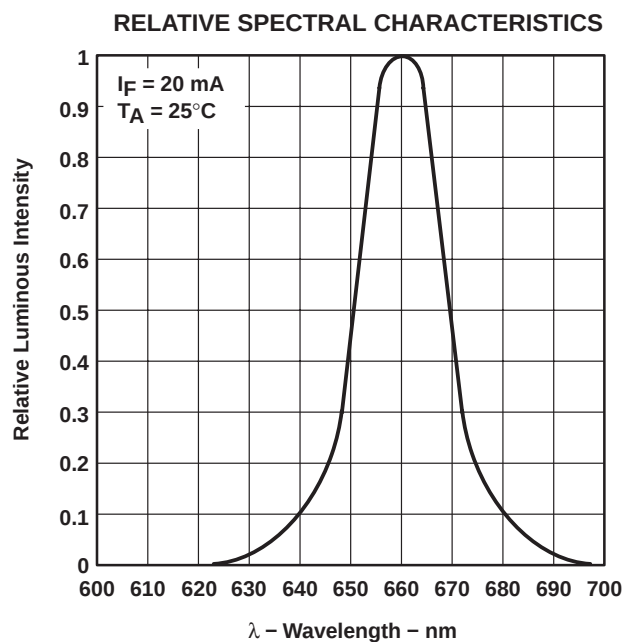


Figure 1

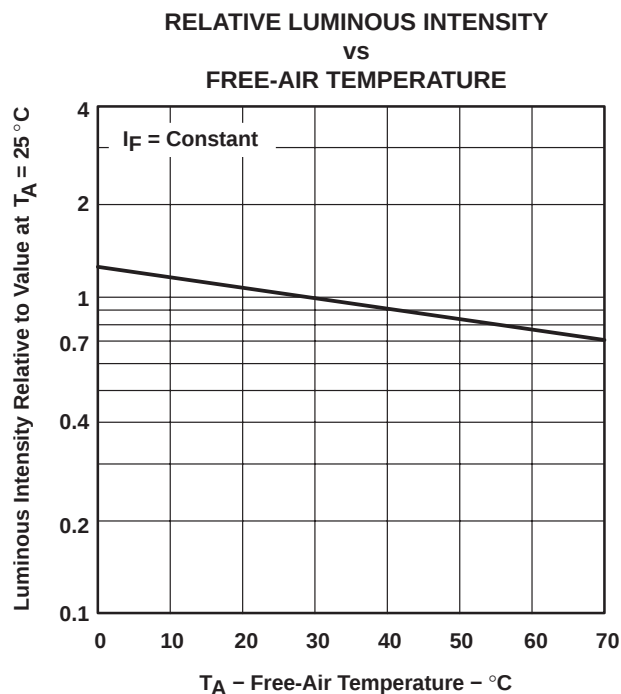


Figure 2

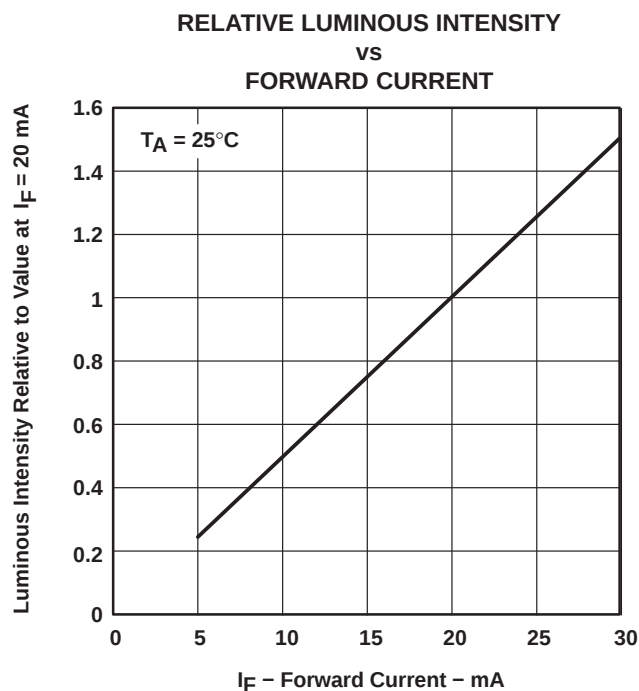


Figure 3

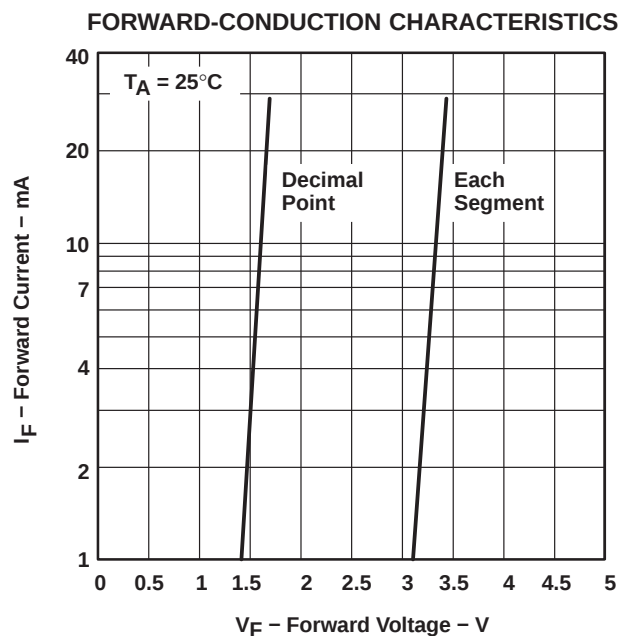
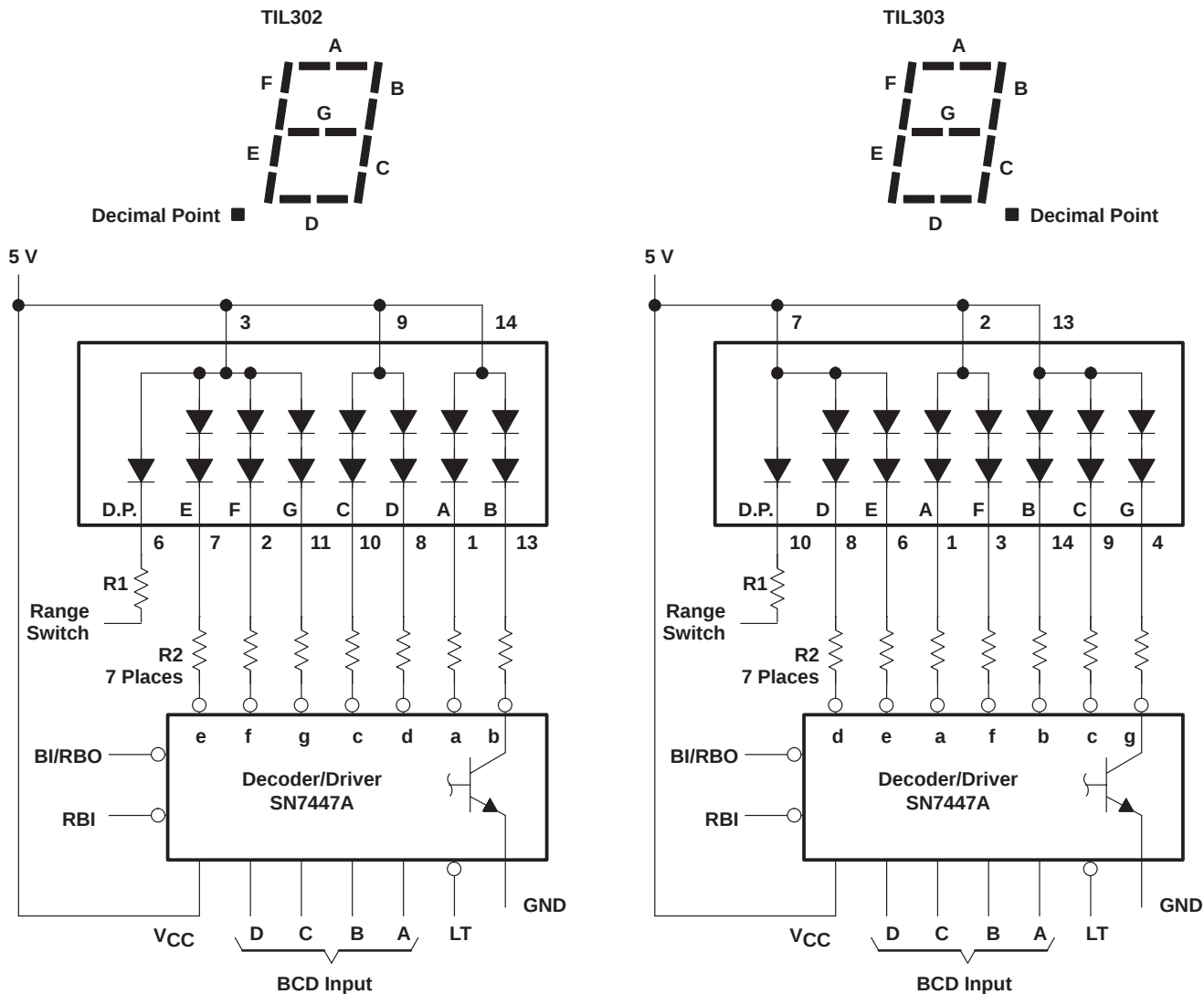


Figure 4

## APPLICATION INFORMATION



NOTE A: R1 and R2 are selected for desired brightness.

# TIL302, TIL303, TIL304 NUMERIC DISPLAYS

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## APPLICATION INFORMATION

FUNCTION TABLE  
SN7447A

| DECIMAL<br>OR<br>FUNCTION | INPUTS |     |   |   |   |   | BI/RBO† | SEGMENTS |     |     |     |     |     |     | NOTE |
|---------------------------|--------|-----|---|---|---|---|---------|----------|-----|-----|-----|-----|-----|-----|------|
|                           | LT     | RBI | D | C | B | A |         | a        | b   | c   | d   | e   | f   | g   |      |
| 0                         | H      | H   | L | L | L | L | H       | ON       | ON  | ON  | ON  | ON  | ON  | OFF | 1    |
| 1                         | H      | X   | L | L | L | H | H       | OFF      | ON  | ON  | OFF | OFF | OFF | OFF | 1    |
| 2                         | H      | X   | L | L | H | L | H       | ON       | ON  | OFF | ON  | ON  | OFF | ON  | 1    |
| 3                         | H      | X   | L | L | H | H | H       | ON       | ON  | ON  | ON  | OFF | OFF | ON  | 1    |
| 4                         | H      | X   | L | H | L | L | H       | OFF      | ON  | ON  | OFF | OFF | ON  | ON  | 1    |
| 5                         | H      | X   | L | H | L | H | H       | ON       | OFF | ON  | ON  | OFF | ON  | ON  | 1    |
| 6                         | H      | X   | L | H | H | L | H       | OFF      | OFF | ON  | ON  | ON  | ON  | ON  | 1    |
| 7                         | H      | X   | L | H | H | H | H       | ON       | ON  | ON  | OFF | OFF | OFF | OFF | 1    |
| 8                         | H      | X   | H | L | L | L | H       | ON       | ON  | ON  | ON  | ON  | ON  | ON  | 1    |
| 9                         | H      | X   | H | L | L | H | H       | ON       | ON  | ON  | OFF | OFF | ON  | ON  | 1    |
| 10                        | H      | X   | H | L | H | L | H       | OFF      | OFF | OFF | ON  | ON  | OFF | ON  | 1    |
| 11                        | H      | X   | H | L | H | H | H       | OFF      | OFF | ON  | ON  | OFF | OFF | ON  | 1    |
| 12                        | H      | X   | H | H | L | L | H       | OFF      | ON  | OFF | OFF | OFF | ON  | ON  | 1    |
| 13                        | H      | X   | H | H | L | H | H       | ON       | OFF | OFF | ON  | OFF | ON  | ON  | 1    |
| 14                        | H      | X   | H | H | H | L | H       | OFF      | OFF | OFF | ON  | ON  | ON  | ON  | 1    |
| 15                        | H      | X   | H | H | H | H | H       | OFF      | OFF | OFF | OFF | OFF | OFF | OFF | 1    |
| BI                        | X      | X   | X | X | X | X | L       | OFF      | OFF | OFF | OFF | OFF | OFF | OFF | 2    |
| RBI                       | H      | L   | L | L | L | L | L       | OFF      | OFF | OFF | OFF | OFF | OFF | OFF | 3    |
| LT                        | L      | X   | X | X | X | X | H       | ON       | ON  | ON  | ON  | ON  | ON  | ON  | 4    |

H = high level (logic 1 in positive logic), L = low level (logic 0 in positive logic), X = irrelevant

† BI/RBO is a wire-AND logic serving as a blanking input (BI) and/or ripple-blanking output (RBO).

- NOTES: 1. The blanking input (BI) must be open or held at a high logic level when output functions 0 through 15 are desired. The ripple-blanking input (RBI) must be open or high if blanking of a decimal zero is not desired.
2. When a low logic level is applied directly to the blanking input (BI), all segment outputs are off regardless of any other input.
3. When the ripple-blanking input (RBI) and inputs A, B, C, and D are at a low logic level with the lamp-test input (LT) high, all segment outputs are off and the ripple-blanking output (RBO) of the decoder goes to a low level (response condition).
4. When the blanking input/ripple-blanking output (BI/RBO) is open or held high and a low is applied to the lamp-test input (LT), all segments are illuminated.

|   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|   |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |

NUMERICAL DESIGNATIONS RESULTANT DISPLAYS

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