TIL302, TIL302A, TIL303, TIL303A, TIL304, TIL304A
NUMERIC DISPLAYS

D1021, APRIL 1971 – REVISED JUNE 1982

RED SOLID-STATE DISPLAYS

T-41-33

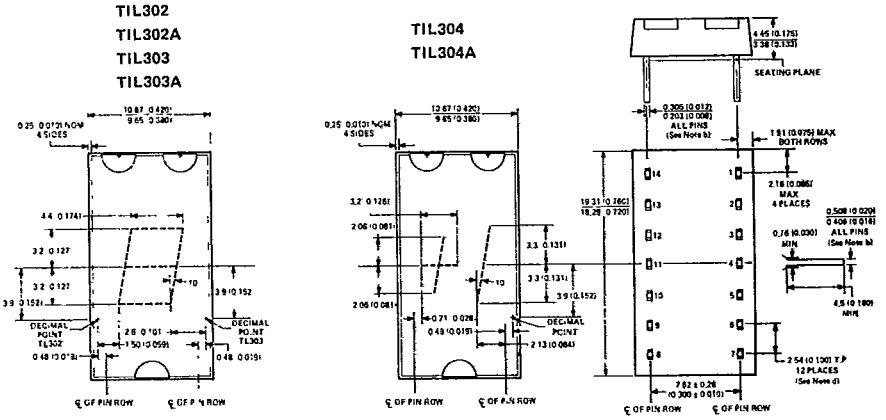
- 6,9-mm (0.270-Inch) Character Height
- High Luminous Intensity
- Low Power Requirements
- Sign, Overflow, Left or Right Decimal Capability
- Wide Viewing Angle
- Compatible with Most TTL and DTL Circuits
- Each Unit Visually Checked for Uniformity of Elements

mechanical data

These assemblies consist of display chips mounted on a header with either a red molded plastic body for the TIL302, TIL303, and TIL304 or a red plastic cap for the TIL302A, TIL303A, and TIL304A. Multiple displays may be mounted on 11,43-mm (0.450-inch) centers.

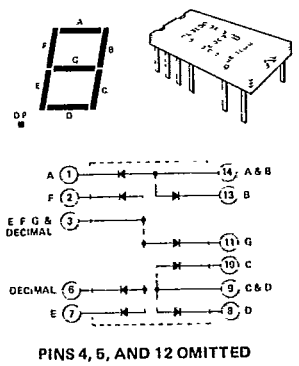
TIL302
TIL302A
TIL303
TIL303A

TIL304
TIL304A



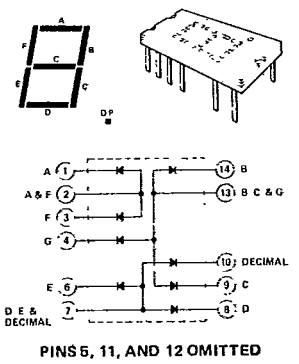
NOTES: a. All linear dimensions are in millimeters and parenthetically in inches.
b. Lead dimensions are not controlled above the seating plane.
c. Centerlines of character segments and decimal points are shown as dashed lines. Associated dimensions are nominal.
d. The true-position pin spacing is 2,54 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.
e. On TIL302A, TIL303A, and TIL304A devices, the 3 mold indentations are not present.

TIL302, TIL302A



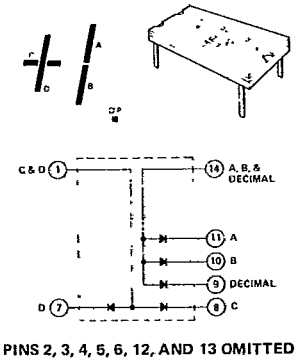
PINS 4, 5, AND 12 OMITTED

TIL303, TIL303A



PINS 5, 11, AND 12 OMITTED

TIL304, TIL304A



PINS 2, 3, 4, 5, 6, 12, AND 13 OMITTED

TEXAS INSTRUMENTS
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

TIL302, TIL302A, TIL303, TIL303A, TIL304, TIL304A
NUMERIC DISPLAYS

T-41-33

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, TIL302A, TIL303, TIL303A . . . . . 240 mA
- Total for TIL304, TIL304A . . . . . 150 mA

Operating Free-Air Temperature Range . . . . . 0°C to 70°C

Storage Temperature Range . . . . . −25°C to 85°C

NOTE 1: This value applies for PRR ≥ 60 Hz, duty cycle ≤ 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		µcd
λ_p	Wavelength at Peak Emission			660		nm
$\Delta\lambda$	Spectral Bandwidth			20		nm
V_F	Static Forward Voltage		3	3.4	3.8	V
α_{VF}	Average Temperature Coefficient of Static Forward Voltage	I_F = 20 mA, T_A = 0°C to 70°C		−2.7		mV/°C
I_R	Static Reverse Current	V_R = 6 V			100	µA
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		µcd
λ_p	Wavelength at Peak Emission			660		nm
$\Delta\lambda$	Spectral Bandwidth			20		nm
V_F	Static Forward Voltage		1.5	1.65	2	V
α_{VF}	Average Temperature Coefficient of Static Forward Voltage	I_F = 20 mA, T_A = 0°C to 70°C		−1.4		mV/°C
I_R	Static Reverse Current	V_R = 3 V			100	µA
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.

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TYPICAL CHARACTERISTICS

RELATIVE SPECTRAL CHARACTERISTICS

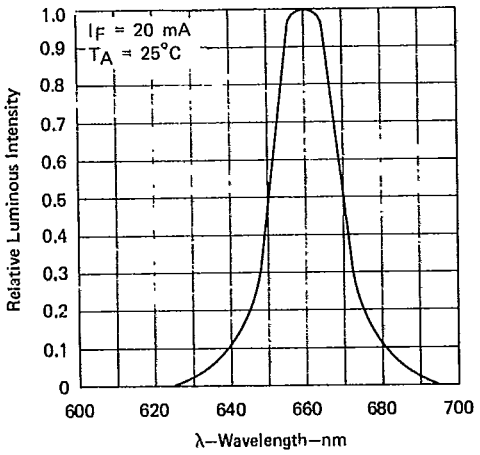

FIGURE 1

RELATIVE LUMINOUS INTENSITY
vs
FREE-AIR TEMPERATURE

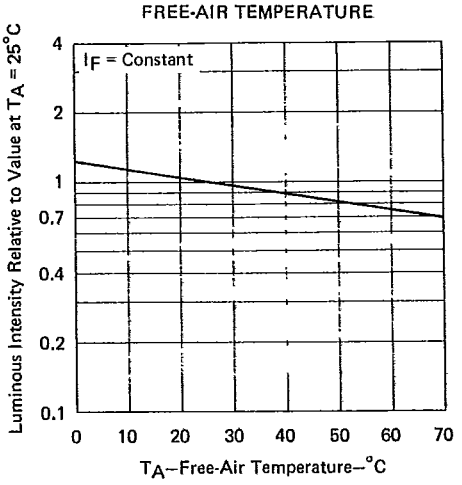

FIGURE 2

RELATIVE LUMINOUS INTENSITY
vs
FORWARD CURRENT

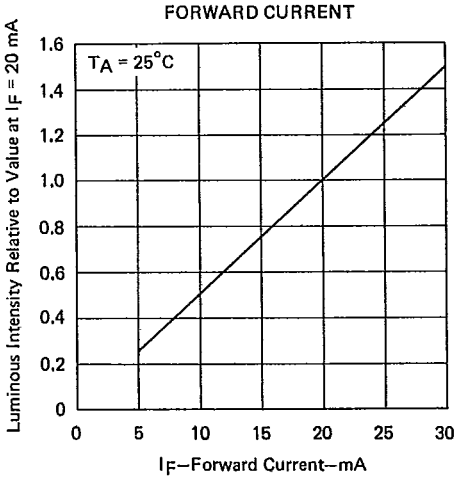

FIGURE 3

FORWARD CONDUCTION CHARACTERISTICS

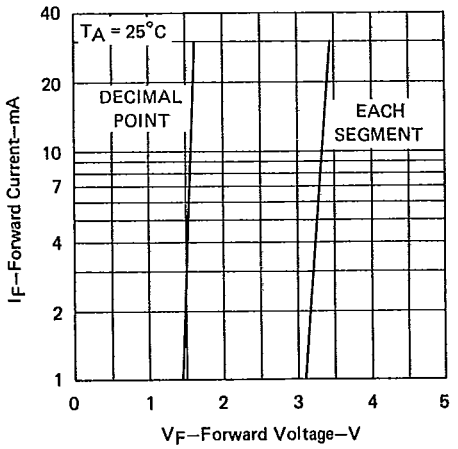

FIGURE 4

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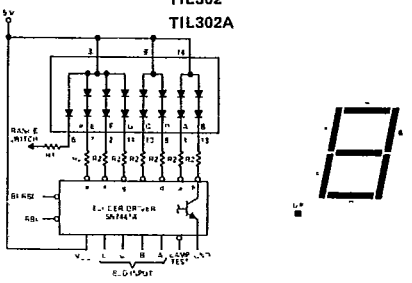
Intelligent LED Displays

TIL302, TIL302A, TIL303, TIL303A, TIL304, TIL304A
NUMERIC DISPLAYS

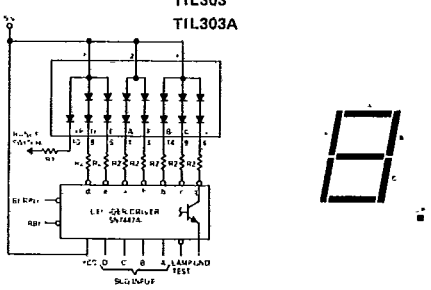
T-41-33

TYPICAL APPLICATION DATA

TIL302
TIL302A



TIL303
TIL303A



NOTE: R1 and R2 are selected for desired brightness.

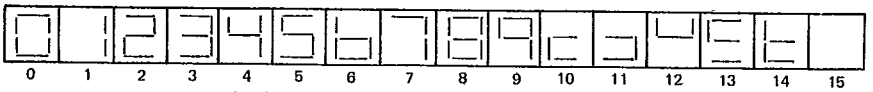
FUNCTION TABLE
SN7447A

DECIMAL OR 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 wire-AND logic serving as 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 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, all segments are illuminated.



NUMERICAL DESIGNATIONS—RESULTANT DISPLAYS

TEXAS INSTRUMENTS
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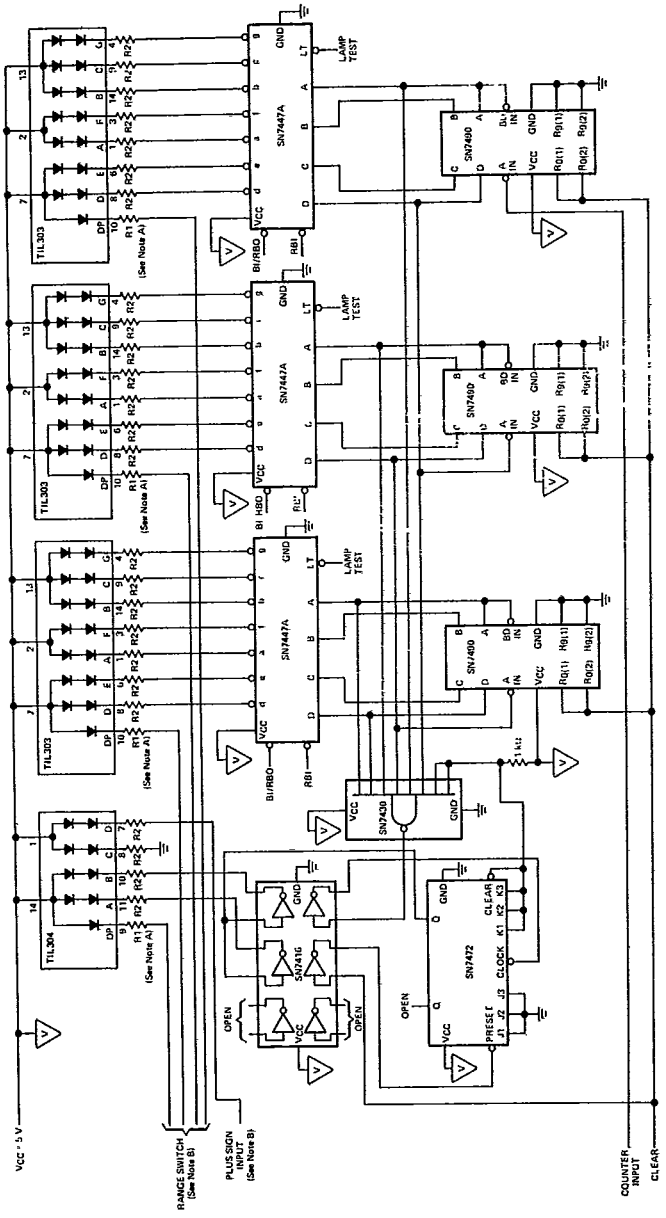
T-41-33

TYPICAL APPLICATION DATA

The TIL303, TIL303A, TIL304, and TIL304A are used in this application to make a three-digit display with sign, which is capable of 100% overrance ("1" plus three digits). The decimal point is located via an external range switch. The clear function will blank the overflow digit and reset the three digits to zero. Following resetting, input pulses will be counted, decoded, and displayed.



NOTES: A. R1 and R2 are selected for desired brightness.
B. Grounding of any of these lines will illuminate the associated function.

▽ . . . V_{CC} bus

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