T- 41-37

⚡TOI Texas Optoelectronics, Inc.

4N57
Numeric Display With Logic

HERMETICALLY SEALED SOLID-STATE SEVEN-SEGMENT DISPLAY WITH TTL DECODER/DRIVER

- Withstands Military Environmental Conditions
- 7,62-mm (0.300-Inch) Character Height
- Internal TTL MSI Chip with Decoder and Driver
- BCD Four-Line Input
- Wide Viewing Angle
- High Luminous Intensity
- Left-Hand Decimal
- Constant-Current Drive for Light-Emitting Diodes
- Compatible with Most TTL Circuits

*mechanical data

The display and TTL logic chip are mounted on a ceramic header, which is then hermetically sealed to a glass window. Multiple displays may be mounted on 15.9-mm (0.625-inch) centers.
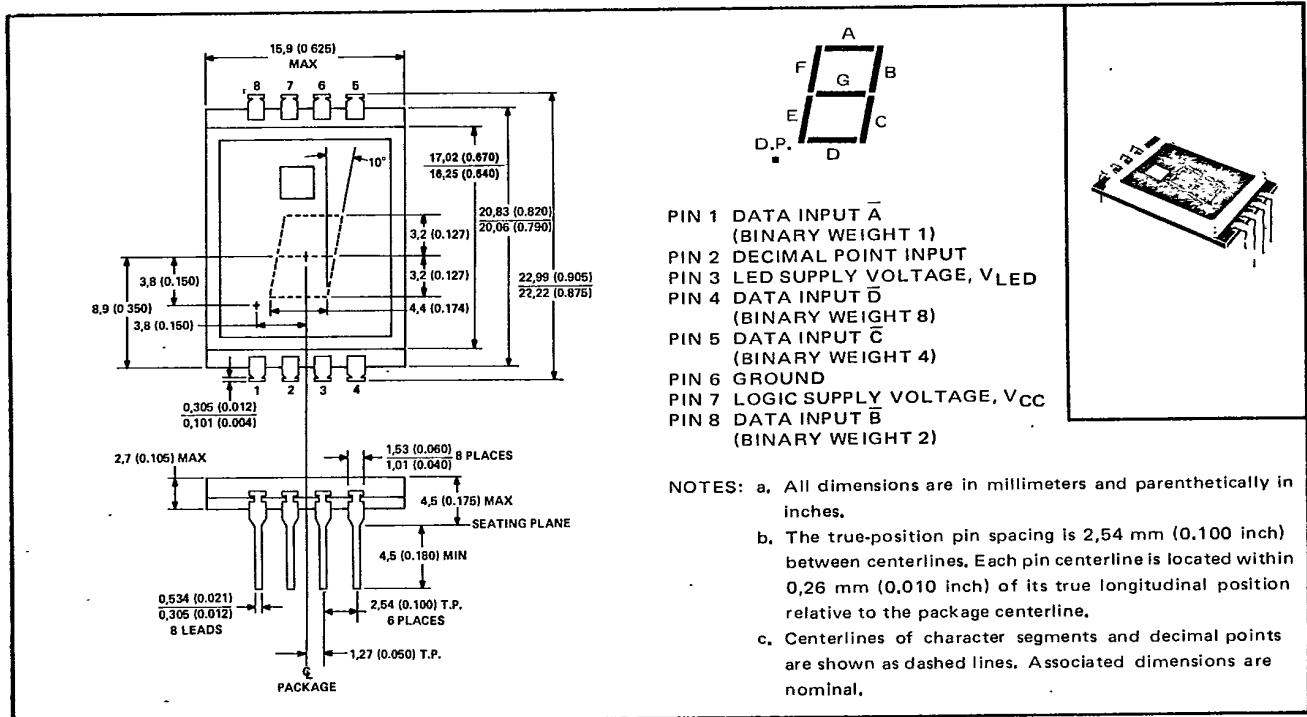
PIN 1 DATA INPUT $\overline{A}$ (BINARY WEIGHT 1)
PIN 2 DECIMAL POINT INPUT
PIN 3 LED SUPPLY VOLTAGE, V_{LED}
PIN 4 DATA INPUT $\overline{D}$ (BINARY WEIGHT 8)
PIN 5 DATA INPUT $\overline{C}$ (BINARY WEIGHT 4)
PIN 6 GROUND
PIN 7 LOGIC SUPPLY VOLTAGE, V_{CC}
PIN 8 DATA INPUT $\overline{B}$ (BINARY WEIGHT 2)

NOTES: a. All dimensions are in millimeters and parenthetically in inches.
b. The true-position pin spacing is 2,54 mm (0.100 inch) between centerlines. Each pin centerline is located within 0,26 mm (0.010 inch) of its true longitudinal position relative to the package centerline.
c. Centerlines of character segments and decimal points are shown as dashed lines. Associated dimensions are nominal.

*description

The 4N57 contains a seven-segment numeric display with left-hand decimal and a TTL MSI BCD-to-seven-segment decoder and driver. It accepts four-line binary-coded-decimal (BCD) input in negative logic and displays the decimal number in a seven-segment format. Invalid inputs are automatically blanked (see function table). A low-logic-level voltage (≤0.8 V) at the decimal point input turns on the decimal independently of the BCD inputs. The decimal point, as well as each segment, is driven by a constant current from the logic chip. Varying the LED supply voltage will not significantly affect the brightness of the display. The brightness may be controlled by pulse-width modulation of the BCD inputs alternating between a valid code and an invalid code (e.g., all inputs low).

*JEDEC registered data. This data sheet contains all applicable registered data in effect at the time of publication.

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FUNCTION TABLE

FUNCTION	DATA INPUTS					DISPLAY
	$\overline{D}$	$\overline{C}$	$\overline{B}$	$\overline{A}$	$\overline{DP}$	
0	H	H	H	H	H	*0*
1	H	H	H	L	L	*.1*
2	H	H	L	H	H	*2*
3	H	H	L	L	L	*.3*
4	H	L	H	H	H	*4*
5	H	L	H	L	L	*.5*
6	H	L	L	H	H	*6*
7	H	L	L	L	L	*.7*
8	L	H	H	H	H	*8*
9	L	H	H	L	L	*9*
BLANK	L	H	L	H	H	
BLANK	L	H	L	L	L	*.*
BLANK	L	L	H	H	H	
BLANK	L	L	H	L	L	*.*
BLANK	L	L	L	H	H	
BLANK	L	L	L	L	L	*.*

H = high logic level, L = low logic level
$\overline{DP}$ input has arbitrarily been shown activated (low)
on every other line of the table.

*functional block diagram

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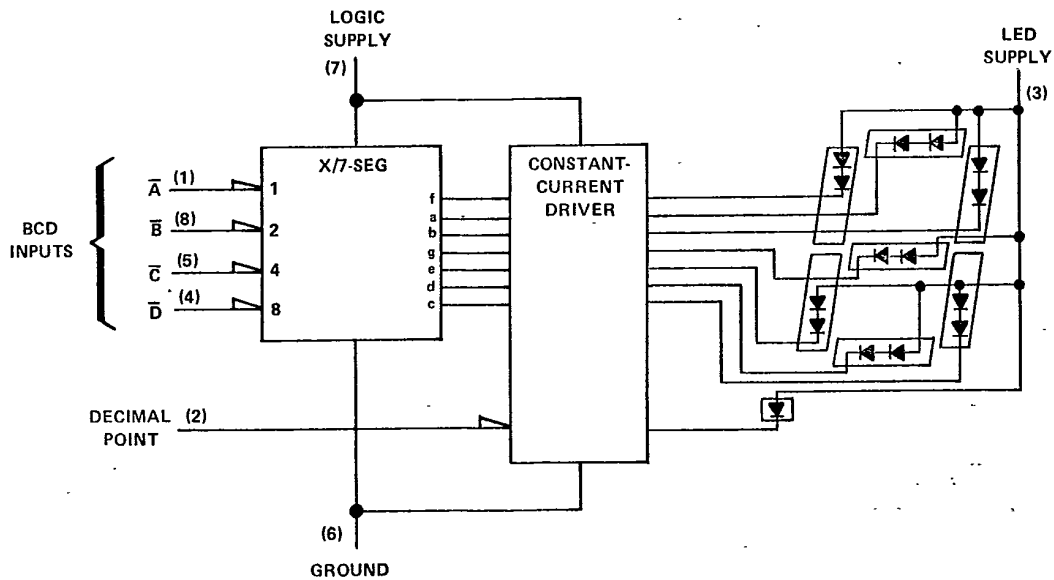
Numeric Display With Logic

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

Logic Supply Voltage, V_{CC} (See Note 1) . . . . 7 V
LED Supply Voltage, V_{LED}, at (or below) 70°C Free-Air Temperature (See Note 2) . . . . 5.5 V
Data Input Voltage . . . . 5.5 V
Operating Free-Air Temperature Range . . . . −55°C to 100°C
Storage Temperature Range . . . . −65°C to 125°C

NOTES: 1. Voltage values are with respect to the ground terminal.
2. For operation above 70°C free-air temperature, refer to LED Supply Voltage Derating Curve, Figure 1.

*recommended operating conditions

	MIN	NOM	MAX	UNIT
Logic Supply Voltage, V_{CC}	4.5	5	5.5	V
LED Supply Voltage, V_{LED} (See Figure 1)	4	4.6	5	V
High-Level Input Voltage, V_{IH}	2			V
Low-Level Input Voltage, V_{IL}			0.8	V
Operating Free-Air Temperature, T_A	−55		100	°C

LED SUPPLY VOLTAGE DERATING CURVE
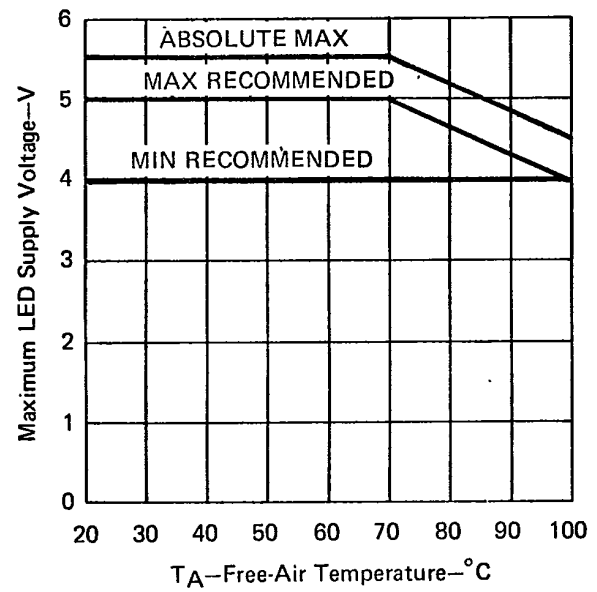
FIGURE 1

*operating characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
I_v Luminous Intensity (See Note 3)	Figure 8	$V_{CC} = 5$ V, $V_{LED} = 4.6$ V, See Note 4		700			μcd
	Decimal Point			40			
λ_p Wavelength at Peak Emission				640	660	680	nm
$\Delta\lambda$ Spectral Bandwidth					20		nm
V_{IK} Input Clamp Voltage		$V_{CC} = 4.5$ V,	$I_I = -12$ mA			−1.5	V
I_I Input Current at Maximum Input Voltage		$V_{CC} = 5.5$ V,	$V_I = 5.5$ V			1	mA
I_{IH} High-Level Input Current		$V_{CC} = 5.5$ V,	$V_I = 2.4$ V			20	μA
I_{IL} Low-Level Input Current		$V_{CC} = 5.5$ V,	$V_I = 0.4$ V			−0.8	mA
I_{CC} Logic Supply Current		$V_{CC} = 5.5$ V,	$V_{LED} = 5$ V,			75	mA
I_{LED} LED Supply Current		DP at 5 V,	Other inputs at 0 V			160	mA

NOTES: 3. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE (International Commission on Illumination) eye-response curve.
4. These parameters were measured with all LED segments and the decimal point on.

*JEDEC registered data.