HEWLETT PACKARD

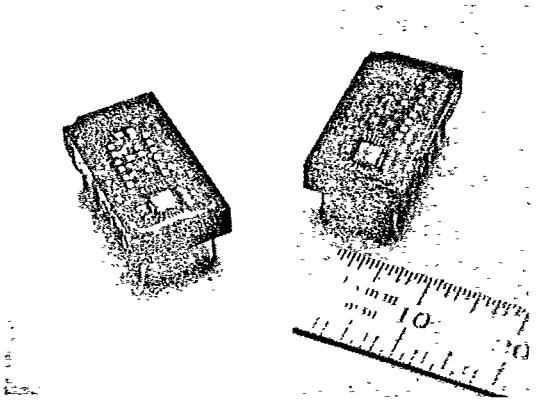
RED HEXADECIMAL 6.86mm (0.27in)

HTIL-311A

T-41-37

Features

- ON-BOARD LOW POWER, EASY TO INTERFACE CMOS IC INCLUDES DECODER, DRIVER AND 4-BIT MEMORY
- DISPLAYS 4 X 7 DOT MATRIX HEXADECIMAL CHARACTERS DIRECTLY FROM 4 BIT DATA
- OPERATES FROM 5 VOLT SUPPLY
- CONSTANT CURRENT DRIVERS
- STANDARD 14 PIN DUAL-IN-LINE PACKAGE INCLUDING CONTRAST ENHANCEMENT FILTER
- CATEGORIZED FOR LUMINOUS INTENSITY
- WIDE VIEWING ANGLE
- STURDY ROUND LEADS
- SUITABLE FOR AUTOMATIC INSERTION



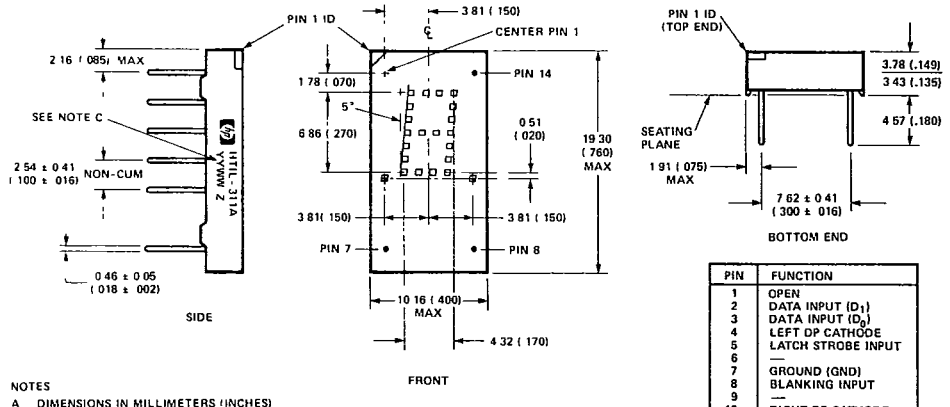
Description

The HTIL-311A is a single character red 4X7 dot matrix display with an on-board CMOS IC to accept, store and display 4-bit binary data. This display decodes positive 4-bit binary data into 16 states, 0-9 and A-F The character height is 6.86mm (0 27 inch). The LEDs and IC are attached to a substrate which is enclosed by a plastic cap and backfill, creating an air gap environment for the LEDs and IC. The encapsulated dual-in-line package construction provides a rugged, environmentally sealed unit. The display may be stacked in either the X or Y direction to create either single or multiline systems. The bullet ended round pins are easy to insert in either PC boards or sockets.

Applications

- INSTRUMENTATION
- COMPUTERS AND PERIPHERALS
- STATUS INDICATORS
- TELECOMMUNICATIONS

Package Dimensions



PIN	FUNCTION
1	OPEN
2	DATA INPUT (D_1)
3	DATA INPUT (D_0)
4	LEFT DP CATHODE
5	LATCH STROBE INPUT
6	—
7	GROUND (GND)
8	BLANKING INPUT
9	—
10	RIGHT DP CATHODE
11	—
12	DATA INPUT (D_3)
13	DATA INPUT (D_2)
14	DISPLAY SUPPLY (V_{DD})

NOTES
A DIMENSIONS IN MILLIMETERS (INCHES)
B ALL UNTOLERANCED DIMENSIONS ARE FOR REFERENCE ONLY
C YY-YEAR WW-WORK WEEK Z INTENSITY CATEGORY NUMBER

ESD WARNING STANDARD CMOS HANDLING PRECAUTIONS SHOULD BE OBSERVED WITH THE HTIL-311A.

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Absolute Maximum Ratings

Description	Symbol	Min.	Max.	Units
Storage Temperature, Ambient	T_S	-25	+85	°C
Operating Case Temperature[1]	T_C	0	+85	°C
IC Supply Voltage to Ground	V_{DD}		7.0	V
Input Voltage, any Pin to Ground	V_{IN}	-0.5	V_{DD}+0.5	V
Maximum Solder Temperature at 1.59 mm (0 063 in) below seating plane; t ≤ 5 sec.			260	°C
ESD Protection @ 1.5 KΩ, 160 pF (each pin)	V_Z		2	kV

Recommended Operating Conditions

Description	Symbol	Min.	Nom.	Max.	Units
IC Supply Voltage	V_{DD}	4.5	5.0	5.5	V
Decimal Point Current	I_{DP}		5.0	20.0	mA
Latch Pulse Width	t_L	40			ns
Data Setup Time to Rising Edge of Latch Pulse	t_S	50			ns
Data Hold Time After Rising Edge of Latch Pulse	t_H	40			ns
Latch Pulse Rise Time	t_R			200	ns

Electrical/Optical Characteristics Over Operating Temperature Range

(Unless Otherwise Specified)

Description	Symbol	Min.	Typ.[2] 25°C	Max.	Units	Test Condition
I_{DD} Current (Blank)	$I_{DD(BLK)}$		3.0	5.0	mA	V_{DD} = BLK = 5.5 V; $I_{F(DP)}$ = 0 mA All other inputs = 0 V
I_{DD} 14 Dots	$I_{DD(0)}$		74	90[9]	mA	V_{DD} = 5.5 V; $I_{F(DP)}$ = 5 mA All other inputs = 0 V
Decimal Point Forward Voltage[3]	$V_{F(DP)}$		1.5		V	$I_{F(DP)}$ = 5 mA
Input Voltage High	V_{IH}	2.0			V	V_{DD} = 4.5 - 5.5 V
Input Voltage Low	V_{IL}			0.8	V	V_{DD} = 4.5 - 5.5 V
Input Current	I_{IN}	-10		10	μA	V_{IN} = 0 V - V_{DD}
Luminous Intensity Average per Character LED[4 5 6 7]	I_V	35	100		μcd	V_{DD} = 5.0 V
Luminous Intensity Each Decimal Point[4]	I_V	35	100		μcd	$I_{F(DP)}$ = 5.0 mA
Peak Wavelength[4]	λ_P		655		nm	
Dominant Wavelength[4 7 8]	λ_D		640		nm	
Spectral Bandwidth	λ_W		24		nm	
Thermal Resistance	θ_{JC}		48		°C/W	

Notes:

1 Case temperature is the surface temperature of the plastic measured directly over the integrated circuit. Forced air cooling may be required to maintain this temperature Maximum IC junction temperature should not exceed 125°C.

2 Typicals measured at V_{DD} = 5 0 V

3 $V_{F(DP)}$ is not tested See Figure 3 for forward voltage versus forward current

4 Measured at 25°C case temperature

5 This parameter is measured with "A" displayed, then again with "E" displayed

6 These displays are categorized for luminous intensity with the intensity category designated by a letter located on the side of the display

7 See Figure 4 for relative luminous intensity versus ambient temperature. See Figure 5 for relative luminous intensity versus logic supply voltage

8 The dominant wavelength, λ_D, is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device

9 Measured at 5 seconds.

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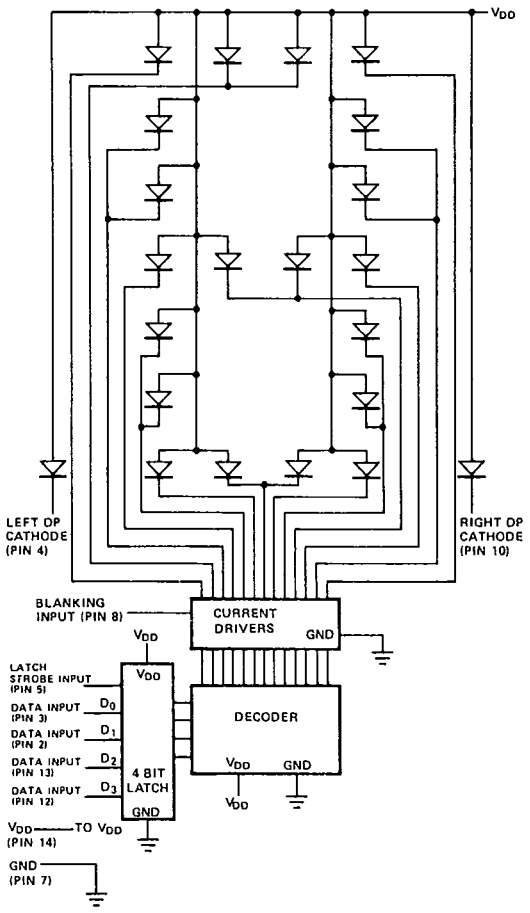

Figure 1. HTIL-311A Internal Block Diagram

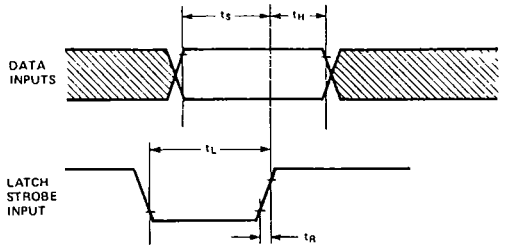

Figure 2. Timing Diagram

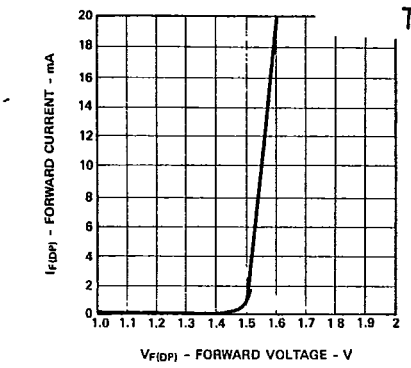

Figure 3. Forward Current vs. Forward Voltage

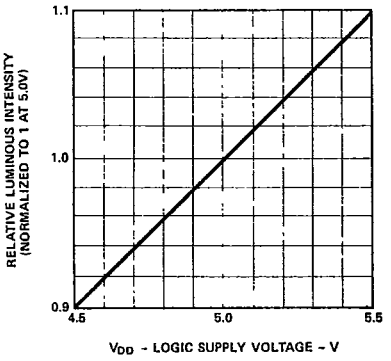

Figure 4. Relative Luminous Intensity vs. Logic Supply Voltage

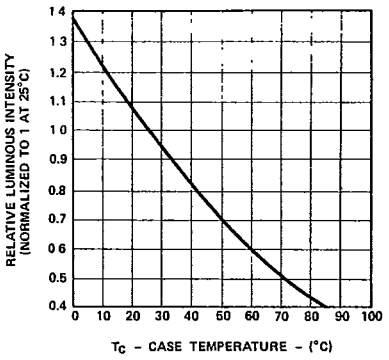

Figure 5. Relative Luminous Intensity vs. Case Temperature

Pin Function

LATCH STROBE INPUT (pin 5)

L: Data inputs are transferred to the decoder and displayed.
H: Data at D_0-D_3 is stored Stored character is displayed regardless of the input data changes. Data stored in the latch is not affected by the blanking input.

BLANKING INPUT (BLK, pin 8)

L. Character is displayed.
H: Display is blanked, except for the decimal points. The display will be blanked regardless of the state of the other inputs. The blanking input may be used to dim the display by pulse width modulation of this input.

DATA INPUTS (D_0-D_3, pins 3, 2, 13, 12)

Four bit hexadecimal data is entered into the latch via the data inputs

DECIMAL POINT CATHODES (pins 4, 10)

The anodes of the left and right decimal points are connected to V_{DD} To illuminate the decimal point, the decimal point cathode must be connected to ground with a resistor or other current limiting device

OPEN PIN (pin 1)

DISPLAY SUPPLY (V_{DD}, pin 14)

This input supplies power to the LEDs and the IC

GROUND (GND, pin 7)

This is the display ground

INSERTION INTO A SOCKET

During insertion into a socket, care must be taken to apply pressure only along the edges of the display window Pressure applied at the center of the window may cause it to deform sufficiently to damage LED and IC wire bonds.

TRUTH TABLE

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Blanking	Latch	Data Input D3	D2	D1	D0	Character Displayed
L	L	L	L	L	L	0
L	L	L	L	L	H	1
L	L	L	L	H	L	2
L	L	L	L	H	H	3
L	L	L	H	L	L	4
L	L	L	H	L	H	5
L	L	L	H	H	L	6
L	L	L	H	H	H	7
L	L	H	L	L	L	8
L	L	H	L	L	H	9
L	L	H	L	H	L	A
L	L	H	L	H	H	B
L	L	H	H	L	L	C
L	L	H	H	L	H	D
L	L	H	H	H	L	E
L	L	H	H	H	H	F
L	H	X	X	X	X	NOTE 1
H	L	X	X	X	X	NOTE 2
H	H	X	X	X	X	NOTE 3

$L = V_{IL}$, $H = V_{IH}$, $0\ V < X < V_{DD}$

Notes:
1. The character stored in the Latch will be displayed. The contents of the Latch will remain unchanged.
2. The display will be blanked, except for the decimal points. The Latch will be updated based on the current logic levels present at the data inputs.
3. The display, except for the decimal points, will be blanked. The contents of the Latch will remain unchanged.