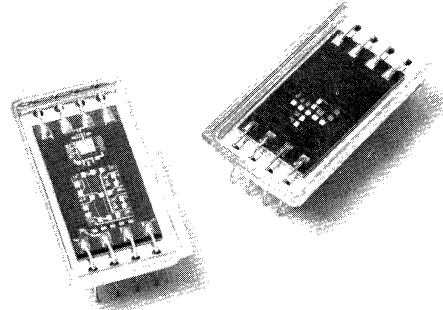


## Features

- RUGGED, SHOCK RESISTANT, HERMETIC
- DESIGNED TO MEET MIL STANDARDS
- INCLUDES DECODER/DRIVER  
BCD Inputs
- TTL/DTL COMPATIBLE
- CONTROLLABLE LIGHT OUTPUT
- 5 x 7 LED MATRIX CHARACTER



## Description

The HP 5082-7010 solid state numeric indicator with built-in decoder/driver provides a hermetically tested 6.8mm (0.27 in.) display for use in military or adverse industrial environments. Typical applications include ground, airborne and shipboard equipment, fire control systems, medical instruments, and space flight systems.

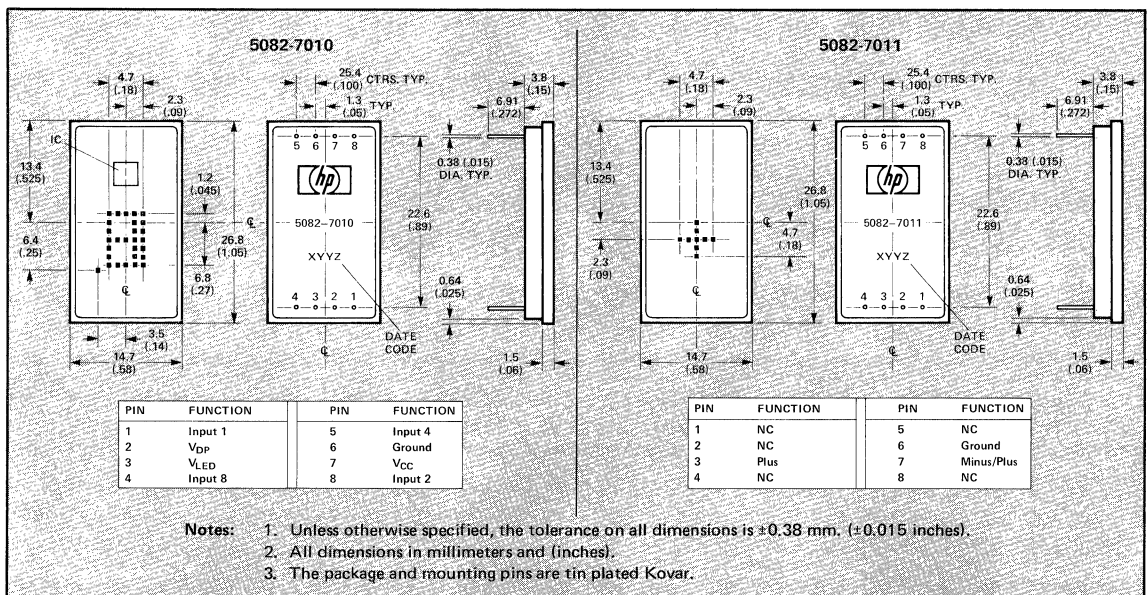
The 5082-7010 is a modified 5x7 matrix display that indicates the numerals 0-9 when presented with a BCD code. The BCD code is negative logic with blanks

displayed for invalid codes. A left-hand decimal point is included which must be externally current limited.

The 5082-7011 is a companion plus/minus sign in the same hermetically tested package. Plus/minus indications require only that voltage be applied to two input pins.

Both displays allow luminous intensity to be varied by changing the DC drive voltage or by pulse duration modulation of the LED voltage.

## Package Dimensions



# Absolute Maximum Ratings

Description	Symbol	Min.	Max.	Unit
Storage Temperature, Ambient	$T_S$	-65	+100	°C
Operating Temperature, Case	$T_C$	-55	+95	°C
Logic Supply Voltage to Ground	$V_{CC}$	-0.5	+7.0	V
Logic Input Voltage	$V_I$	-0.5	+5.5	V
LED Supply Voltage to Ground	$V_{LED}^{[1]}$	-0.5	+5.5	V
Decimal Point Current	$I_{DP}$		-10	mA

Note: 1. Above  $T_C = 65^\circ\text{C}$  derate  $V_{LED}$  per derating curve in Figure 10.

## Recommended Operating Conditions

Description	Symbol	Min.	Nom.	Max.	Unit
Logic Supply Voltage	$V_{CC}$	4.5	5.0	5.5	V
LED Supply Voltage, Display Off	$V_{LED}$	-0.5	0	+1.0	V
LED Supply Voltage, Display On	$V_{LED}$	3.0	4.2	5.5	V
Decimal Point Current	$I_{DP}^{[2]}$	0	-5.0	-10.0	mA
Logic Input Voltage, "H" State	$V_{IH}$	2.0		5.5	V
Logic Input Voltage, "L" State	$V_{IL}$	0		0.8	V

Note: 2. Decimal point current must be externally current limited. See application information.

## Electrical/Optical Characteristics

Case Temperature,  $T_C = 0^\circ\text{C}$  to  $70^\circ\text{C}$ , unless otherwise specified

Description	Symbol	Test Conditions		Min.	Typ. <sup>[4]</sup>	Max.	Unit
		$V_{CC}$	$V_{LED}$				
Logic Supply Current	$I_{CC}$	$V_{CC} = 5.5\text{V}$			45	75	mA
LED Supply Current	$I_{LED}^{[3]}$	$V_{CC}$	$V_{LED}$				mA
		5.5V	5.5V		255	350	
		5.5V	4.2V		170	235	
		5.5V	3.5V		125		
Logic Input Current, "H" State (ea. input)	$I_{IH}$	$V_{CC} = 5.5\text{V}$ $V_{IH} = 2.4\text{V}$				100	$\mu\text{A}$
Logic Input Current, "L" State (ea. input)	$I_{IL}$	$V_{CC} = 5.5\text{V}$ $V_{IL} = 0.4\text{V}$				-1.6	mA
Decimal Point Voltage Drop	$V_{LED} - V_{DP}$	$I_{DP} = -10\text{mA}$			1.6	2.0	V
Power Dissipation	$P_T^{[3]}$	$V_{CC}$	$V_{LED}$				W
		5.5V	5.5V		1.7	2.3	
		5.5V	4.2V		1.0	1.4	
		5.5V	3.5V		0.7		
Luminous Intensity per LED (digit avg.)	$I_\nu$	$V_{LED}$	$T_C$				$\mu\text{cd}$
		5.5V	25°C	60	115		
		4.2V	25°C	40	80		
		3.5V	25°C		50		
Peak Wavelength	$\lambda_{\text{peak}}$				655		nm
Spectral Halfwidth	$\Delta\lambda_{1/2}$				30		nm
Weight					4.9		gram

- Notes:
- With numeral 8 displayed.
  - All typical values at  $T_C = 25^\circ\text{C}$ .
  - $T_C = 0^\circ\text{C}$  to  $65^\circ\text{C}$  for  $V_{LED} = 5.5\text{V}$ .

## Truth Table

Character	Logic				
	X8	X4	X2	X1	
0	H	H	H	H	0
1	H	H	H	L	1
2	H	H	L	H	2
3	H	H	L	L	3
4	H	L	H	H	4
5	H	L	H	L	5
6	H	L	L	H	6
7	H	L	L	L	7
8	L	H	H	H	8
9	L	H	H	L	9
Blank	L	H	L	H	
Blank	L	H	L	L	
Blank	L	L	H	H	
Blank	L	L	H	L	
Blank	L	L	L	H	
Blank	L	L	L	L	

$V_{IL} = 0.0$  to  $0.8\text{V}$   
 $V_{IH} = 2.0$  to  $5.5\text{V}$

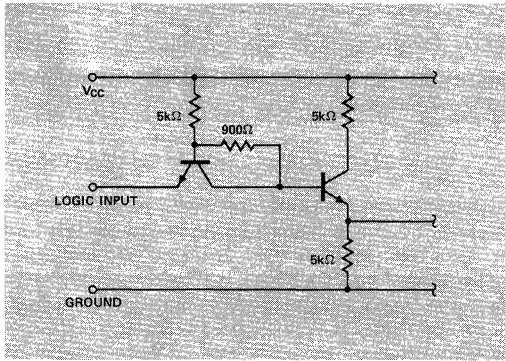


Figure 1. Equivalent input circuit of the 5082-7010 decoder.  
Note: Display metal case is isolated from ground pin #6.

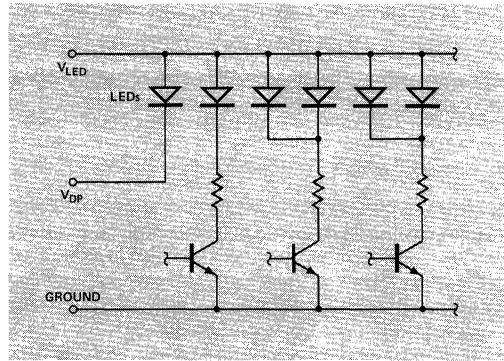


Figure 2. Equivalent circuit of the 5082-7010 as seen from LED and decimal point drive lines.

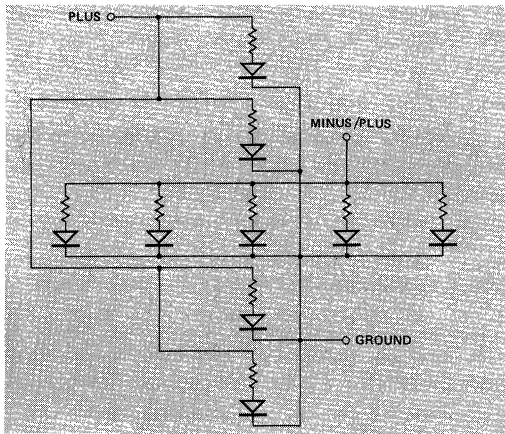


Figure 3. Equivalent circuit of 5082-7011 plus/minus sign. All resistors 345Ω typical. Note: Display metal case is isolated from ground pin #6.

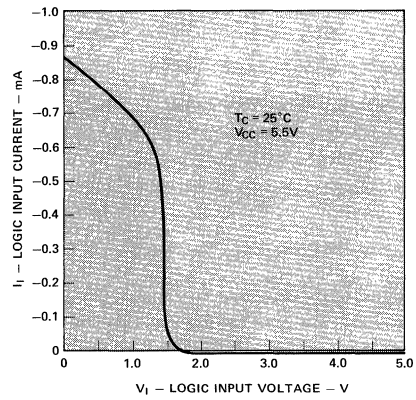


Figure 4. Input current as a function of input voltage, each input.

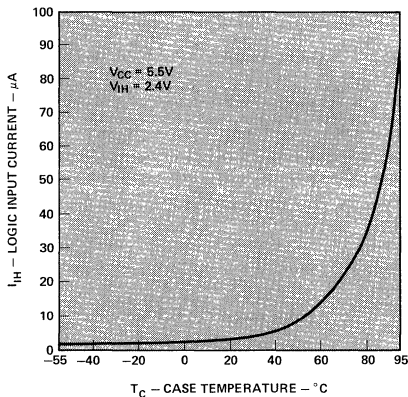


Figure 5. Logic "H" input current as a function of case temperature, each input.

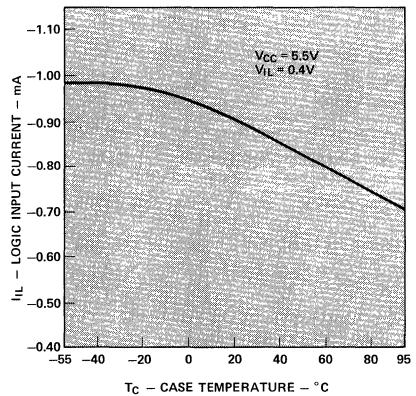


Figure 6. Logic "L" input current as a function of case temperature, each input.

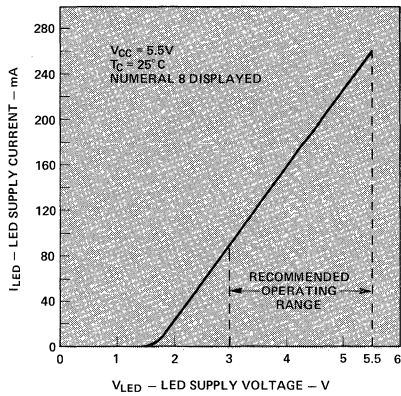


Figure 7. LED supply current as a function of LED supply voltage.

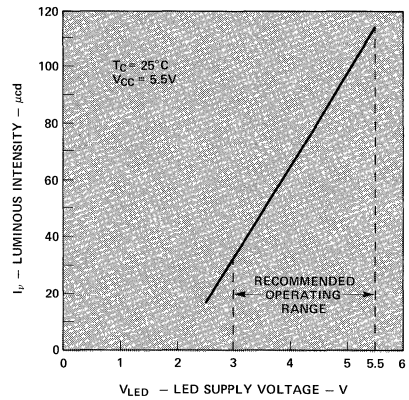


Figure 8. Luminous intensity per LED (digit average) as a function of LED supply voltage.

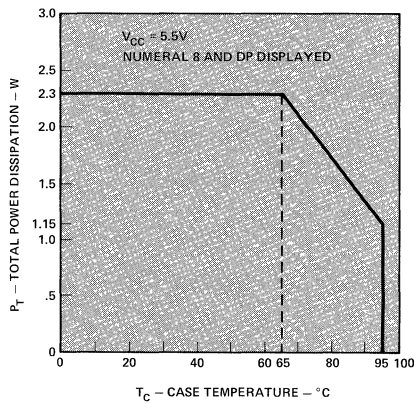


Figure 9. Maximum power derating as a function of case temperature.

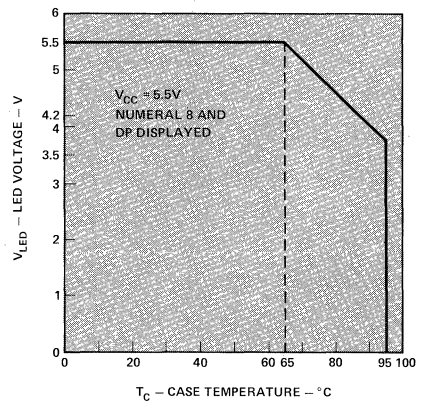


Figure 10. LED voltage derating as a function of case temperature.

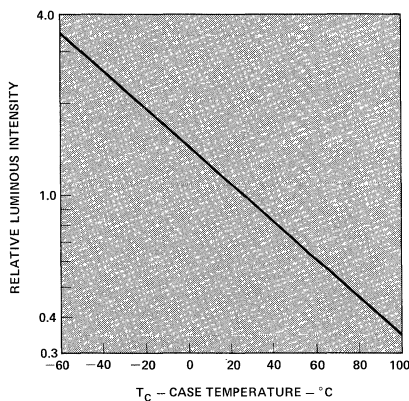


Figure 11. Relative luminous intensity as a function of case temperature at fixed current level.

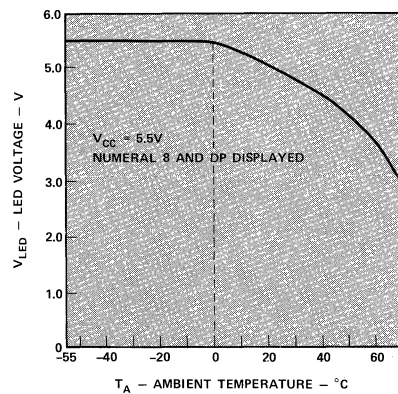


Figure 12. LED voltage derating as a function of ambient temperature, display soldered into P.C. board without heat sink.

## Solid State Plus/Minus Sign 5082-7011

For display applications requiring  $\pm$  designation, the 5082-7011 solid state plus/minus sign is available. This display module comes in the same package as the 5082-7010 numeric indicator and is completely compatible with it. Plus or minus information can be indicated by supplying voltage to one (minus sign) or two (plus sign) input leads. A third lead is provided for the ground connection. Luminous intensity is controlled by changing the LED drive voltage. Each LED has its own built-in  $345\Omega$  (nominal) current limiting resistor. Therefore, no external current limiting is required for voltages at 5.5V or lower. Like the numeric indicator, the -7011 plus/minus sign is TTL/DTL compatible.

## Truth Table

CHARACTER	PIN	
	3	7
+	H	H
-	L	H
Blank	L	L

$$V_L = -0.5 \text{ to } 1.0V$$

$$V_H = 3.0 \text{ to } 5.5V$$

## Electrical /Optical Characteristics

Case Temperature,  $T_C = 0^\circ\text{C}$  to  $70^\circ\text{C}$ , unless otherwise specified

Description	Symbol	Test Conditions	Min.	Typ. <sup>[1]</sup>	Max.	Unit
LED Supply Current	$I_{LED}$	$V_{LED} = 5.5V$		105	150	mA
		$V_{LED} = 4.2V$		70	100	
Power Dissipation	$P_T$	$V_{LED} = 5.5V$		0.6	0.9	W
		$V_{LED} = 4.2V$		0.3	0.6	
Luminous Intensity per LED (Digit Avg.)	$I_{\nu}$ [2]	$V_{LED} = 5.5V$	60	115		$\mu\text{cd}$
		$V_{LED} = 4.2V$	40	80		
		$V_{LED} = 3.5V$		50		
Peak Wavelength	$\lambda_{\text{peak}}$			655		nm
Spectral Halfwidth	$\Delta\lambda_{1/2}$			30		nm
Weight				4.9		gram

- Notes: 1. All typical values at  $T_C = 25^\circ\text{C}$   
 2. At  $T_C = 25^\circ\text{C}$

## Absolute Maximum Ratings

Description	Symbol	Min.	Max.	Unit
Storage Temperature, Ambient	$T_S$	-65	+100	$^\circ\text{C}$
Operating Temperature, Case	$T_C$	-55	+95	$^\circ\text{C}$
Plus, Plus/Minus Input Potential to Ground	$V_{LED}$	-0.5	5.5	V

## Recommended Operating Conditions

Description	Symbol	Min.	Nom.	Max.	Unit
LED Supply Voltage, Display Off	$V_{LED}$	-0.5	0	1.0	V
LED Supply Voltage, Display On	$V_{LED}$	3.0	4.2	5.5	V

# Applications

## Decimal Point Limiting Resistor

The decimal point of the 5082-7010 display requires an external current limiting resistor, between pin 2 and ground. Recommended resistor value is  $220\Omega$ , 1/4 watt.

## Mounting

The 5082-7010 and 5082-7011 displays are packaged with two rows of 4 contact pins each in a DIP configuration with a row center line spacing of 0.890 inches.

Normal mounting is directly onto a printed circuit board. If desired, these displays may be socket mounted using contact strip connectors such as Augat's 325-AGI or AMP 583773-1 or 583774-1.

## Heat Sink Operation

Optimum display case operating temperature for the 5082-7010 and 7011 displays is  $T_C=0^\circ\text{C}$  to  $70^\circ\text{C}$  as measured on back surface. Maintaining the display case operating temperature within this range may be achieved by mount-

ing the display on an appropriate heat sink or metal core printed circuit board. Thermal conducting compound such as Wakefield 120 or Dow Corning 340 can be used between display and heat sink. See figure 10 for  $V_{LED}$  derating vs. display case temperature.

## Operation Without Heat Sink

These displays may also be operated without the use of a heat sink. The thermal resistance from case to ambient for these displays when soldered into a printed circuit board is nominally  $\theta_{CA}=30^\circ\text{C/W}$ . See figure 12 for  $V_{LED}$  derating vs. ambient temperature.

## Cleaning

Post solder cleaning may be accomplished using water, Freon/alcohol mixtures formulated for vapor cleaning processing (up to 2 minutes in vapors at boiling) or Freon/alcohol mixtures formulated for room temperature cleaning. Suggested solvents: Freon TF, Freon TE, Genesolv DI-15, Genesolv DE-15.