HEWLETT PACKARD

10 mm and 13 mm Slim Font Seven Segment Displays

Technical Data

HDSP-315X Series
HDSP-316X Series
HDSP-515X Series
HDSP-516X Series

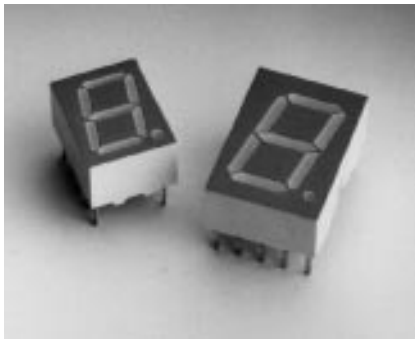
Features

- **Excellent Appearance**
- **Slim Font Design**
- **Mitered Corners, Evenly Illuminated Segments**
- **Gray Face for Optimum On/Off Contrast**
- **Choice of Colors: Standard Red, DH AlGaAs Red, High Efficiency Red (HER), Yellow, and Green**
- **Low Current Available, AlGaAs Red and HER Choice of Character Size: 10 mm and 13 mm**
- **±50° Viewing Angle**
- **Characterized for Luminous Intensity**

Description

The HDSP-31XX-51XX Series of displays incorporates a new slim font character design. This slim font features narrow width, specially mitered segments to give a fuller appearance to the illuminated character. Faces of these displays are painted a neutral gray for enhanced on/off contrast.

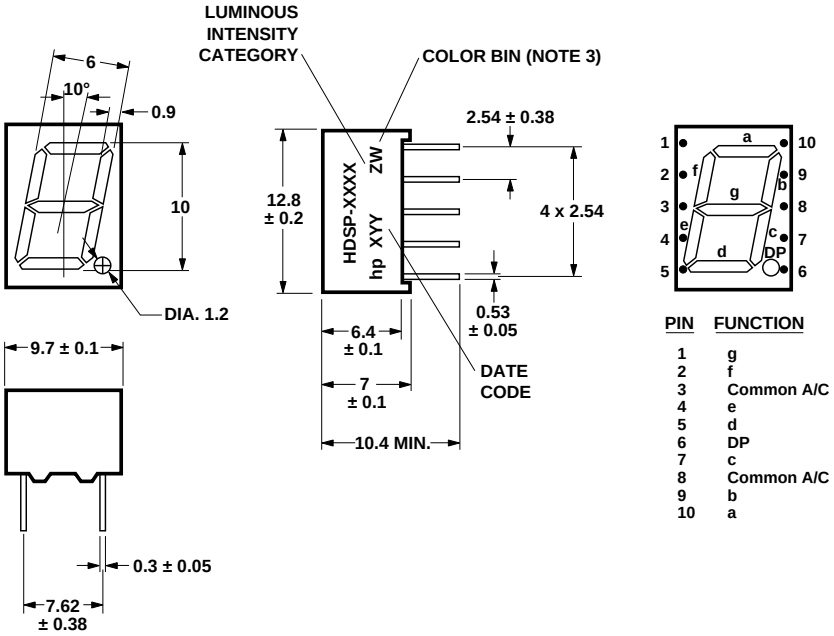
All devices are available in either common anode or common cathode configuration with right hand decimal point. Low current versions are available in either AlGaAs red or HER.



Devices

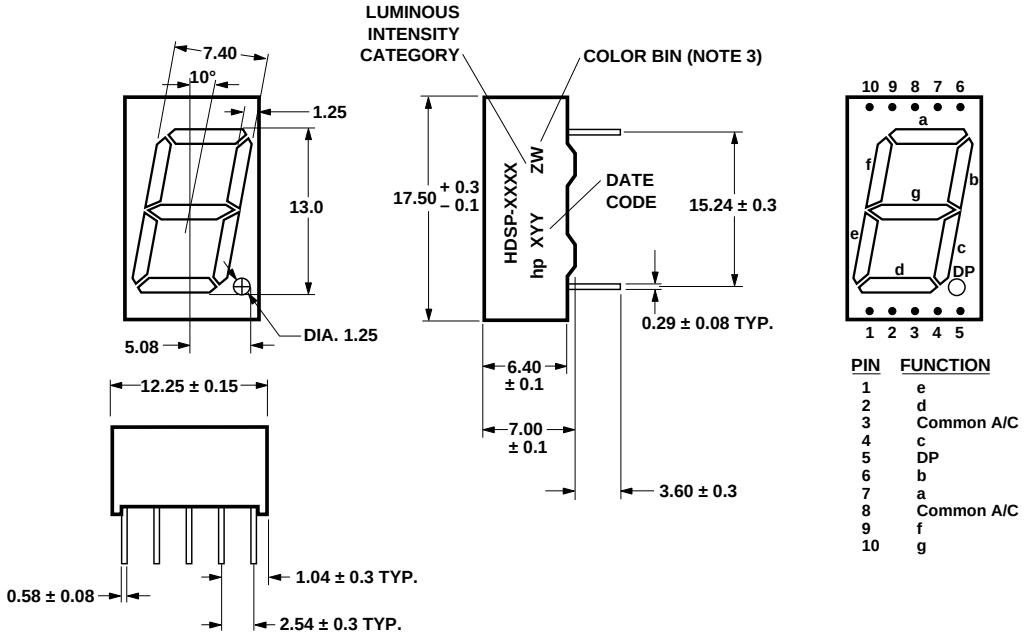
Red Std. Current HDSP-	AlGaAs Red Low Current HDSP-	HER Std. Current HDSP-	HER Low Current HDSP-	Yellow Std. Current HDSP-	Green Std. Current HDSP-	Description	Package Drawing
315R	315H	315E	315L	315Y	315G	Common Anode, 10 mm Display	A
316R	316H	316E	316L	316Y	316G	Common Cathode, 10 mm Display	B
515R	515H	515E	515L	515Y	515G	Common Anode, 13 mm Display	A
516R	516H	516E	516L	516Y	516G	Common Cathode, 13 mm Display	B

HDSP-315X/316X Series



PIN	FUNCTION
1	g
2	f
3	Common A/C
4	e
5	d
6	DP
7	c
8	Common A/C
9	b
10	a

HDSP-515X/516X Series



PIN	FUNCTION
1	e
2	d
3	Common A/C
4	c
5	DP
6	b
7	a
8	Common A/C
9	f
10	g

NOTES: 1. PACKAGE DIMENSIONS IN MILLIMETERS.
2. UNTOLERANCED DIMENSIONS ARE FOR REFERENCE ONLY.
3. FOR YELLOW AND GREEN DEVICES ONLY.

Absolute Maximum Ratings

Description	Standard Red	AlGaAs Red Low Current	HER	HER Low Current	Yellow	Green	Units
Average Power per Segment or DP	82	37	105	52	105	105	mW
Peak Forward Current per Segment or DP	150[1]	45	90[4]	45	90[7]	90[9]	mA
DC Forward Current per Segment or DP	25[2]	15[3]	30[5]	15[6]	30[8]	30[10]	mA
Operating Temperature Range	-40 to +100	-20 to 100	-40 to +100				°C
Storage Temperature Range	-40 to +100						°C
Reverse Voltage per Segment or DP	3.0						V
Lead Solder Temperature for 3 seconds 1.59 mm. below seating plane	260						°C

Notes:
1. See Figure 1 to establish pulsed conditions.
2. Derate above 80°C at 0.63 mA/°C.
3. Derate above 91°C at 0.53 mA/°C.
4. See Figure 9 to establish pulsed conditions.
5. Derate above 53°C at 0.45 mA/°C.
6. Derate above 80°C at 0.38 mA/°C.
7. See Figure 10 to establish pulsed conditions.
8. Derate above 81°C at 0.52 mA/°C.
9. See Figure 11 to establish pulsed ocnditions.
10. Derate above 39°C at 0.37 mA/°C.

Electrical/Optical Characteristics at T_A = 25°C

Standard Red

Device Series HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
315/316R 515/516R	Luminous Intensity/Segment[1,2] (Digit Average)	I_V	180	650		µcd	I_F = 10 mA
	Forward Voltage/Segment or DP	V_F		1.6	2.1	V	I_F = 10 mA
	Peak Wavelength	λ_{PEAK}		655		nm	
	Dominant Wavelength[3]	λ_d		640		nm	
	Reverse Voltage/Segment or DP[4]	V_R	3	12		V	I_R = 100 µA
	Thermal Resistance LED Junction-to-Pin	$R\theta_{J\text{-}PIN}$		200		°C/W/Seg	

AlGaAs Red Low Current

Device Series HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
315/316H 515/516H	Luminous Intensity/Segment[1,2] (Digit Average)	I_V	180	650		µcd	I_F = 1 mA
	Forward Voltage/Segment or DP	V_F		1.8	2.2	V	I_F = 1 mA
	Peak Wavelength	λ_{PEAK}		645		nm	
	Dominant Wavelength[3]	λ_d		637		nm	
	Reverse Voltage/Segment or DP[4]	V_R	3	15		V	I_R = 100 µA
	Thermal Resistance LED Junction-to-Pin	$R\theta_{J\text{-}PIN}$		255		°C/W/Seg	

HER

Device Series HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
315/316E 515/516E	Luminous Intensity/Segment[1,2] (Digit Average)	I_V	450	2600		µcd	I_F = 10 mA
	Forward Voltage/Segment or DP	V_F		1.9	2.5	V	I_F = 10 mA
	Peak Wavelength	λ_{PEAK}		635		nm	
	Dominant Wavelength[3]	λ_d		626		nm	
	Reverse Voltage/Segment or DP[4]	V_R	3	30		V	I_R = 100 µA
	Thermal Resistance LED Junction-to-Pin	$R\theta_{J\text{-}PIN}$		200		°C/W/Seg	

HER Low Current

Device Series HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
315/316L 515/516L	Luminous Intensity/Segment[1,2] (Digit Average)	I_V	180	370		µcd	I_F = 2 mA
	Forward Voltage/Segment or DP	V_F		2.1	2.5	V	I_F = 2 mA
	Peak Wavelength	λ_{PEAK}		635		nm	
	Dominant Wavelength[3]	λ_d		626		nm	
	Reverse Voltage/Segment or DP[4]	V_R	3	30		V	I_R = 100 µA
	Thermal Resistance LED Junction-to-Pin	$R\theta_{J\text{-}PIN}$		200		°C/W/Seg	

Yellow

Device Series HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
315/316Y 515/516Y	Luminous Intensity/Segment[1,2] (Digit Average)	I_V	450	1800		µcd	I_F = 10 mA
	Forward Voltage/Segment or DP	V_F		2.0	2.5	V	I_F = 10 mA
	Peak Wavelength	λ_{PEAK}		583		nm	
	Dominant Wavelength[3]	λ_d		586		nm	
	Reverse Voltage/Segment or DP[4]	V_R	3	50		V	I_R = 100 µA
	Thermal Resistance LED Junction-to-Pin	$R\theta_{J\text{-}PIN}$		200		℃/W/Seg	

Green

Device Series HDSP-	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
315/316E 515/516E	Luminous Intensity/Segment[1,2] (Digit Average)	I_V	450	5000		µcd	I_F = 10 mA
	Forward Voltage/Segment or DP	V_F		2.1	2.5	V	I_F = 10 mA
	Peak Wavelength	λ_{PEAK}		566		nm	
	Dominant Wavelength[3]	λ_d		571		nm	
	Reverse Voltage/Segment or DP[4]	V_R	3	50		V	I_R = 100 µA
	Thermal Resistance LED Junction-to-Pin	$R\theta_{J\text{-}PIN}$		200		℃/W/Seg	

Notes:
1. Case temperature of device immediately prior to the intensity measurement is 25℃.
2. The digits are categorized for luminous intensity. The intensity category is designated by a letter on the side of the package.
3. The dominant wavelength, λ is derived from the CIE chromaticity diagram and is that single wavelength which defines the color of the device.
4. Typical specification for reference only. Do not exceed absolute maximum ratings.

Standard Red

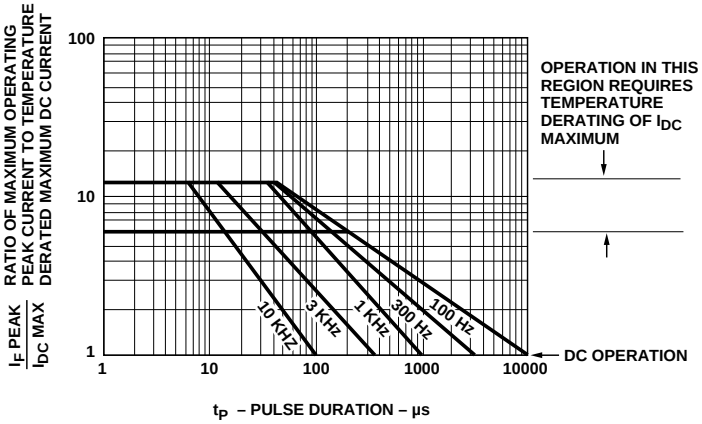


Figure 1. Maximum Tolerable Peak Current vs. Pulse Duration – Red.

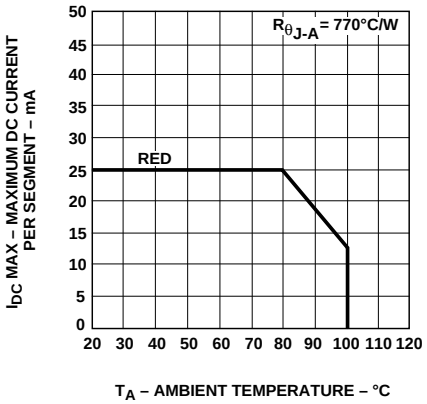


Figure 2. Maximum Allowable DC Current per Segment as a Function of Ambient Temperature.

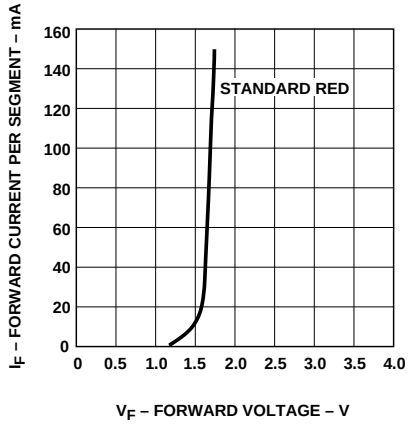


Figure 3. Forward Current vs. Forward Voltage.

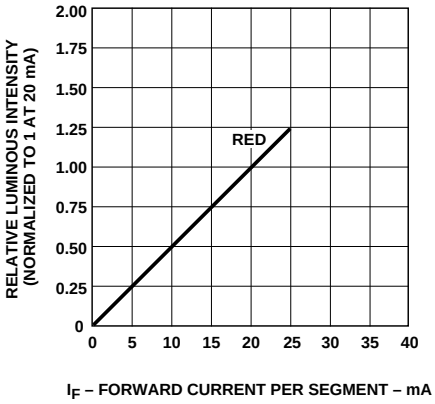


Figure 4. Relative Luminous Intensity vs DC Forward Current.

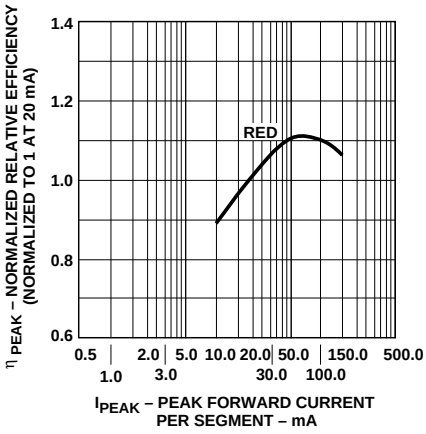


Figure 5. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

AlGaAs Low Current

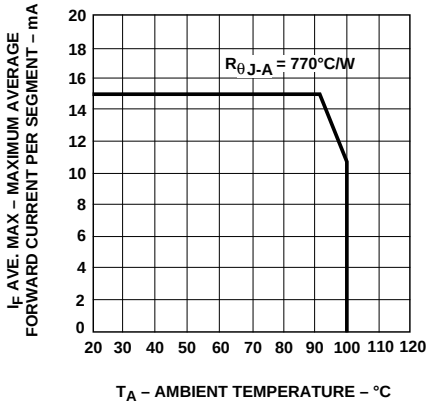


Figure 6. Maximum Allowable Average or DC Current vs. Ambient Temperature.

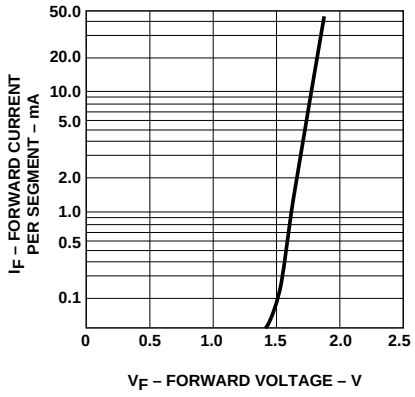


Figure 7. Forward Current vs. Forward Voltage.

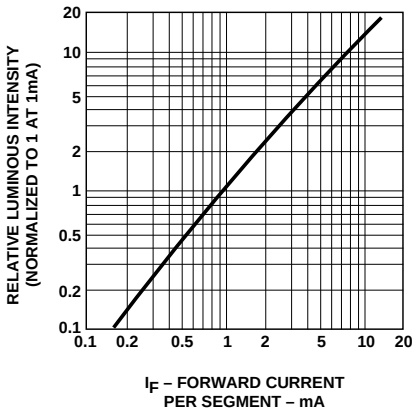


Figure 8. Relative Luminous Intensity vs DC Forward Current.

HER, Yellow, and Green

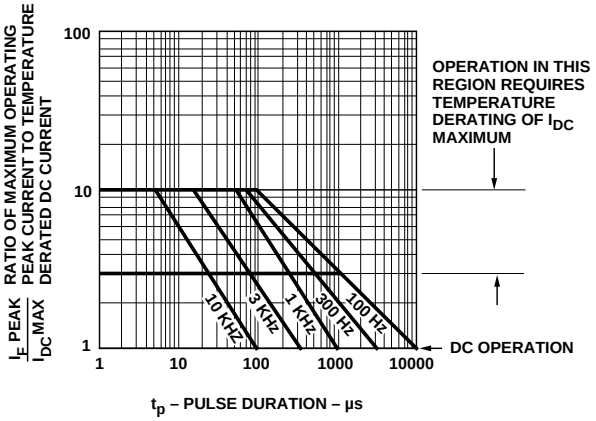


Figure 9. Maximum Tolerable Peak Current vs. Pulse Duration – HER.

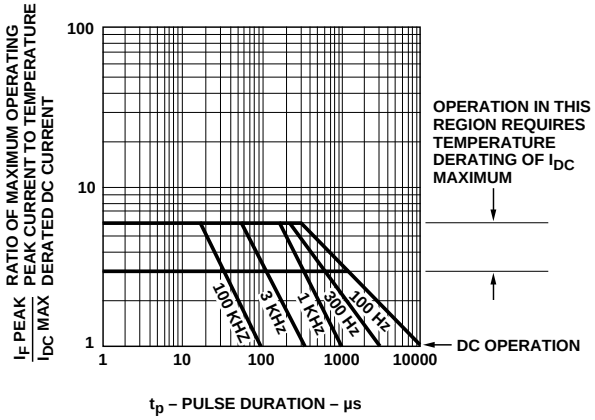


Figure 10. Maximum Tolerable Peak Current vs. Pulse Duration – Yellow.

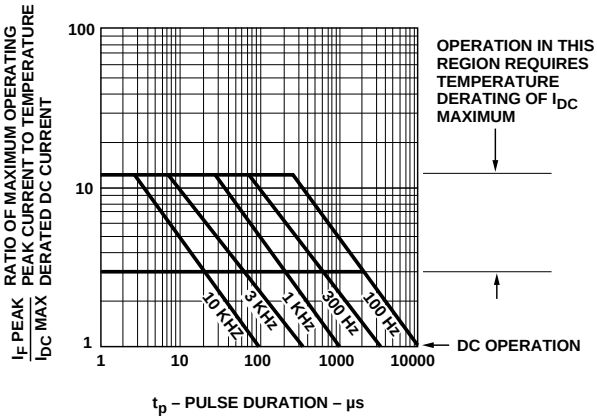


Figure 11. Allowable Peak Current vs. Pulse Duration – Green.

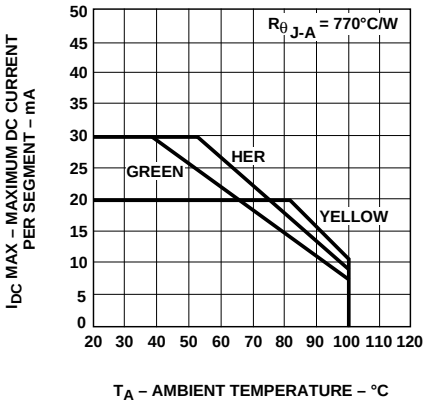


Figure 12. Maximum Allowable DC Current per Segment as a Function of Ambient Temperature.

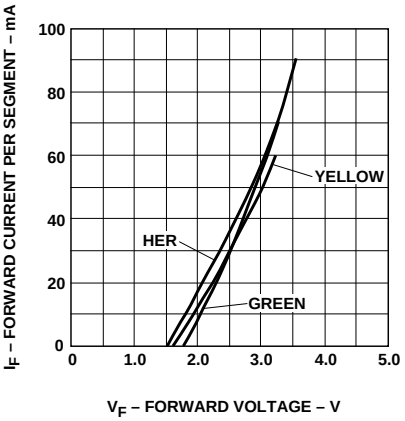


Figure 13. Forward Current vs. Forward Voltage Characteristics.

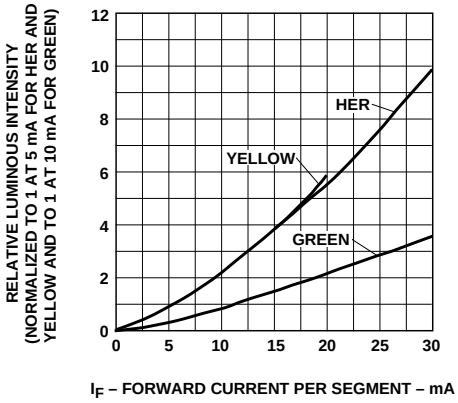


Figure 14. Relative Luminous Intensity vs. DC Forward Current.

HER Low Current

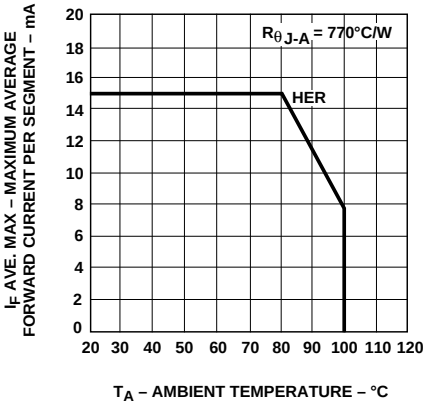


Figure 15. Maximum Allowable Average or DC Current vs. Ambient Temperature.

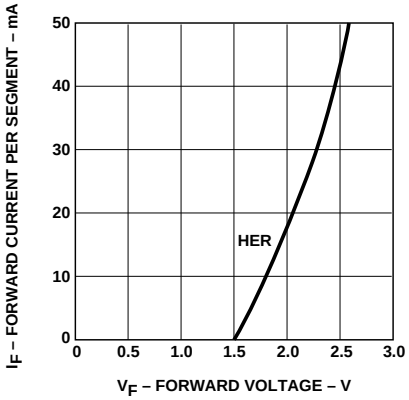


Figure 16. Forward Current vs. Forward Voltage.

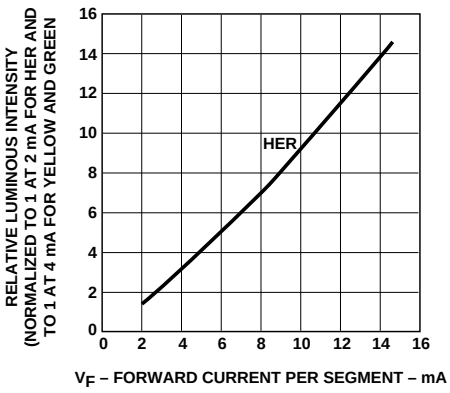


Figure 17. Relative Luminous Intensity vs. DC Forward Current.

Electrical/Optical

For more information on electrical/optical characteristics, please see Application Note 1005.

Contrast Enhancement

For information on contrast enhancement please see Application Note 1015.

Soldering/Cleaning

Cleaning agents from the ketone family (acetone, methyl ethyl ketone, etc.) and from the chlorinated hydrocarbon family (methylene chloride, trichloroethylene, carbon tetrachloride, etc.) are not recommended for cleaning LED parts. All of these various solvents attack or dissolve the encapsulating epoxies used to form the package of plastic LED parts.

For further information on soldering LEDs please refer to Application Note 1027.

www.hp.com/go/led_displays

For technical assistance or the location of your nearest Hewlett-Packard sales office, distributor or representative call:

Americas/Canada: 1-800-235-0312 or 408-654-8675

Far East/Australasia: Call your local HP sales office.

Japan: (81 3) 3335-8152

Europe: Call your local HP sales office.

Data subject to change.

Obsoletes 5963-6975EE (9/95)
5968-2794E (11/98)