

14.2 mm (0.56 inch) Seven Segment Displays

Technical Data

HDSP-K40x Series HDSP-550x Series HDSP-552x Series HDSP-560x Series HDSP-570x Series HDSP-572x Series HDSP-H15x Series HDSP-H40x Series

Features

- Industry Standard Size
- Industry Standard Pinout 15.24 mm (0.6 in.) DIP Leads on 2.54 mm (0.1 in.) Centers
- Choice of Colors
 AlGaAs Red, High Efficiency
 Red, Yellow, Green, Orange
- Excellent Appearance
 Evenly Lighted Segments
 Mitered Corners on Segments
 Gray Package Gives Optimum
 Contrast
 ± 50° Viewing Angle
- Design Flexibility
 Common Anode or Common Cathode
 Single and Dual Digits
 Right Hand Decimal Point
 ± 1. Overflow Character

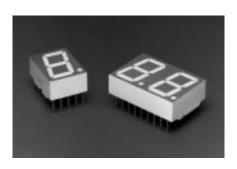
• Categorized for Luminous Intensity

Yellow and Green Categorized for Color Use of Like Categories Yields a Uniform Display

- High Light Output
- High Peak Current
- Excellent for Long Digit String Multiplexing
- Intensity and Color Selection Option
 See Intensity and Color Selected Displays Data Sheet
- Sunlight Viewable AlGaAs

Description

The 14.2 mm (0.56 inch) LED seven segment displays are designed for viewing distances up



to 7 metres (23 feet). These devices use an industry standard size package and pinout. Both the numeric and \pm 1 overflow devices feature a right hand decimal point. All devices are available as either common anode or common cathode.

Devices

Orange HDSP-	AlGaAs Red HDSP-[1]	HER HDSP-[1]	Yellow HDSP-	Green HDSP-	Description	Package Drawing
H401	H151	5501	5701	5601	Common Anode Right Hand Decimal	A
H403	H153	5503	5703	5603	Common Cathode Right Hand Decimal	В
	H157	5507	5707	5607	Common Anode ± 1. Overflow	C
	H158	5508	5708	5608	Common Cathode ± 1. Overflow	D
K401		5521	5721	5621	Two Digit Common Anode Right Hand Decimal	E
K403		5523	5723	5623	Two Digit Common Cathode Right Hand Decimal	F

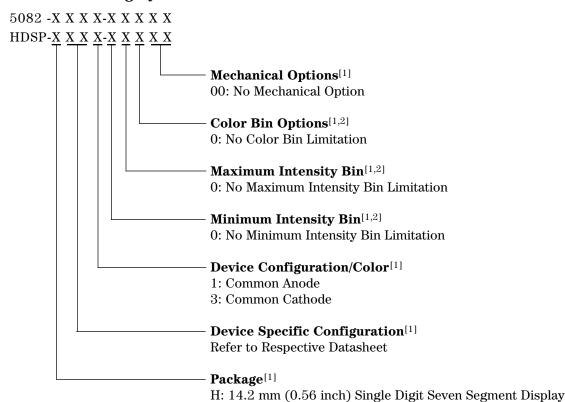
Note

^{1.} These displays are recommended for high ambient light operation. Please refer to the HDSP-H10X/K12X AlGaAs and HDSP-555X HER data sheet for low current operation.

These displays are ideal for most applications. Pin for pin equivalent displays are also available in a low current design. The low current displays are ideal

for portable applications. For additional information see the Low Current Seven Segment Displays data sheet.

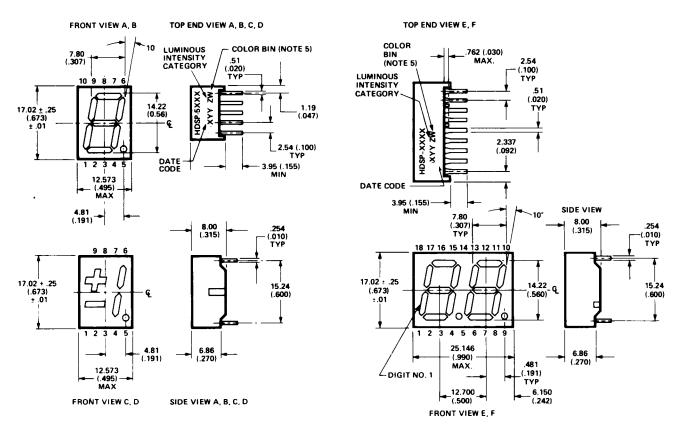
Part Numbering System



Notes

- 1. For codes not listed in the figure above, please refer to the respective datasheet or contact your nearest Agilent representative for details.
- 2. Bin options refer to shippable bins for a part number. Color and Intensity Bins are typically restricted to 1 bin per tube (exceptions may apply). Please refer to respective datasheet for specific bin limit information.

Package Dimensions

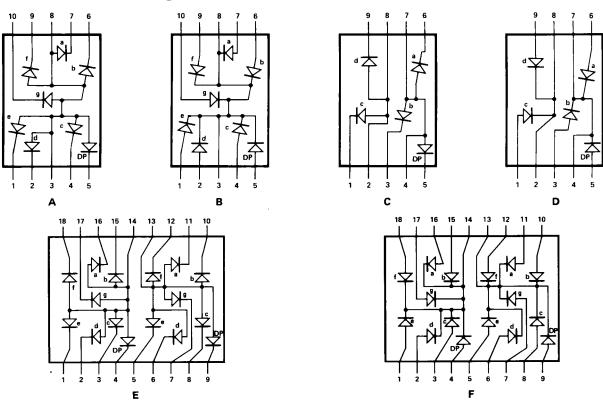


	FUNCTION						
PIN	Α	В	С	D	E	F	
1	CATHODE e	ANODE e	CATHODE c	ANODE c	E CATHODE NO. 1	E ANODE NO. 1	
2	CATHODE d	ANODE d	ANODE c, d	CATHODE c, d	D CATHODE NO. 1	D ANODE NO. 1	
3	ANODE[3]	CATHODE ^[4]	CATHODE b	ANODE b	C CATHODE NO. 1	C ANODE NO. 1	
4	CATHODE c	ANODE c	ANODE a, b, DP	CATHODE a, b, DP	DP CATHODE NO. 1	DP ANODE NO. 1	
5	CATHODE DP	ANODE DP	CATHOPDE DP	ANODE DE	E CATHODE NO. 1	E ANODE NO. 2	
6	CATHODE b	ANODE b	CATHODE a	ANODE a	D CATHODE NO. 2	D ANODE NO. 2	
7	CATHODE a	ANODE a	ANODE a, b, DP	CATHODE a, b, DP	G CATHODE NO. 2	G ANODE NO. 2	
8	ANODE[3]	CATHODE ^[4]	ANODE c, d	CATHODE c, d	C CATHODE NO. 2	C ANODE NO. 2	
9	CATHODE f	ANODE f	CATHODE d	ANODE d	DP CATHODE NO. 2	DP ANODE NO. 2	
10	CATHODE g	ANODE g	NO PIN	NO PIN	B CATHODE NO. 2	B ANODE NO. 2	
11					A CATHODE NO. 2	A ANODE NO. 2	
12					F CATHODE NO. 2	F ANODE NO. 2	
13					DIGIT NO. 2 ANODE	DIGIT NO. 2 CATHODE	
14					DIGIT NO. 1 ANODE	DIGIT NO. 1 CATHODE	
15				<u>'</u>	B CATHODE NO. 1	B ANODE NO. 1	
16					A CATHODE NO. 1	A ANODE NO. 1	
17					G CATHODE NO. 1	G ANODE NO. 1	
18					F CATHODE NO. 1	F ANODE NO. 1	

NOTES:

- 1. ALL DIMENSIONS IN MILLIMETRES (INCHES).
- 2. ALL UNTOLERANCED DIMENSIONS ARE FOR REFERENCE ONLY.
- 3. REDUNDANT ANODES.
- 4. REDUNDANT CATHODES.
- 5. FOR HDSP-5600/-5700 SERIES PRODUCT ONLY.

Internal Circuit Diagram



Absolute Maximum Ratings

Description	AlGaAs Red HDSP-H150 Series	HER/Orange HDSP-5500 HDSP-H40x HDSP-K40x Series	Yellow HDSP-5700 Series	Green HDSP-5600 Series	Units	
Average Power per Segment or DP	96	105	80	105	mW	
Peak Forward Current per Segment or DP	160[1]	90[3]	60[5]	90[7]	mA	
DC Forward Current per Segment or DP	40[2]	30[4]	20[6]	3018]	mA	
Operating Temperature Range	-20 to +100 ^[9]	-40 to +100				
Storage Temperature Range	-55 to +100					
Reverse Voltage per Segment or DP	3.0					
Lead Solder Temperature for 3 Seconds (1.60 mm [0.063 in.] below seating plane)		20	30		°C	

Notes:

- $1. \ See \ Figure \ 2 \ to \ establish \ pulsed \ conditions.$
- 2. Derate above 46°C at 0.54 mA/°C.
- 3. See Figure 7 to establish pulsed conditions.
- 4. Derate above 53°C at 0.45 mA/°C.
- 5. See Figure 8 to establish pulsed conditions.

- 6. Derate above 81°C at 0.52 mA/°C.
- 7. See Figure 9 to establish pulsed conditions.
- 8. Derate above 39°C at 0.37 mA/°C.

Electrical/Optical Characteristics at $T_A = 25^{\circ}C$

AlGaAs Red

Device Series							
HDSP-	Parameter	Symbol	Min.	Тур.	Max.	Units	Test Conditions
	Luminous Intensity/Segment ^[1,2,5] (Digit Average)	I_{V}	9.1	16.0		mcd	$I_F = 20 \text{ mA}$
	Economical Welter de /Controlled on DD	77		1.8		7.7	$I_{\rm F}$ = 20 mA
H15X	Forward Voltage/Segment or DP	$ m V_F$		2.0	3.0	V	$I_F = 100 \text{ mA}$
	Peak Wavelength	$\lambda_{ ext{PEAK}}$		645		nm	
	Dominant Wavelength ^[3]	$\lambda_{ m d}$		637		nm	
	Reverse Voltage/Segment or DP ^[4]	V_{R}	3.0	15		V	$I_R = 100 \mu\text{A}$
		ΔV_F /°C		-2		mV/°C	
	Thermal Resistance LED Junction-to-Pin	$R\theta_{ ext{J-Pin}}$		400		°C/W/ Seg	

High Efficiency Red

Device Series HDSP-	Parameter	Symbol	Min.	Тур.	Max.	Units	Test Conditions
	Luminous Intensity/Segment[1,2,6]	$I_{ m V}$	900	2800		μcd	$I_{\rm F} = 10 \text{ mA}$
	(Digit Average)	IV.		3700		μοα	I _F = 60 mA Peak: 1 of 6 df
55XX	Forward Voltage/Segment or DP	V_{F}		2.1	2.5	V	$I_{\rm F}$ = 20 mA
SSAA	Peak Wavelength	$\lambda_{ ext{PEAK}}$		635		nm	
	Dominant Wavelength ^[3]	$\lambda_{ m d}$		626		nm	
	Reverse Voltage/Segment or DP ^[4]	V_{R}	3.0	30		V	$I_R = 100 \mu A$
	Temperature Coefficient of V_F /Segment or DP	$\Delta V_F / ^{\circ}C$		-2		mV/°C	
	Thermal Resistance LED Junction-to-Pin	$R\theta_{J ext{-Pin}}$		345		°C/W/ Seg	

Yellow

Device Series		G 1.1	251			T T •	T G. W.
HDSP-	Parameter	Symbol	Min.	Тур.	Max.	Units	Test Conditions
	Luminous Intensity/Segment ^[1,2]	$I_{ m V}$	600	1800		μcd	$I_{\rm F} = 10 \text{ mA}$
	(Digit Average)	TV .		2750		μεα	$I_F = 60$ mA Peak: 1 of 6 df
57XX	Forward Voltage/Segment or DP	$ m V_{F}$		2.1	2.5	V	$I_F = 20 \text{ mA}$
OTAX	Peak Wavelength	$\lambda_{ ext{PEAK}}$		583		nm	
	Dominant Wavelength ^[3,7]	$\lambda_{ m d}$	581.5	586	592.5	nm	
	Reverse Voltage/Segment or DP ^[4]	$V_{ m R}$	3.0	40		V	$I_R = 100 \mu\text{A}$
	Temperature Coefficient of V _F /Segment or DP	$\Delta V_F/^{\circ}C$		-2		mV/°C	
	Thermal Resistance LED Junction-to-Pin	$R\theta_{J ext{-Pin}}$		345		°C/W/ Seg	

Orange

Device Series	D	Complete 1	34:	T D	34	TT24	The st Complitations
HDSP-	Parameter	Symbol	Min.	Тур.	Max.	Units	Test Conditions
	Luminous Intensity/Segment (Segment Average) ^[1,2]	I_V		2.37		mcd	$I_F = 10 \text{ mA}$
	Forward Voltage/Segment or DP	V_{F}		2.1	2.5	V	$I_F = 20 \text{ mA}$
	Peak Wavelength	$\lambda_{ ext{PEAK}}$		600		nm	
H40x	Dominant Wavelength ^[3]	$\lambda_{ m d}$		603		nm	$I_F = 10 \text{ mA}$
K40x	Reverse Voltage/Segment or DP ^[4]	$V_{ m R}$	3.0	30		V	$I_R = 100 \mu\text{A}$
	Temperature Coefficient of V _F /Segment or DP	$\Delta V_F/^{\circ}C$		-2		mV/°C	
	Thermal Resistance LED Junction-to-Pin	$R\theta_{ ext{J-Pin}}$		345		°C/W/ Seg	

High Performance Green

Device Series							
HDSP-	Parameter	Symbol	Min.	Тур.	Max.	Units	Test Conditions
	Luminous Intensity/Segment ^[1,2]	$ m I_{V}$	900	2500		μcd	$I_{\rm F} = 10 \text{ mA}$
	(Digit Average)`	IV -		3100		μοα	$I_F = 60$ mA Peak: 1 of 6 df
56XX	Forward Voltage/Segment or DP	V_{F}		2.1	2.5	V	$I_{\rm F} = 10 \text{ mA}$
JOAA	Peak Wavelength	$\lambda_{ ext{PEAK}}$		566		nm	
	Dominant Wavelength ^[3,7]	$\lambda_{ m d}$		571	577	nm	
	Reverse Voltage/Segment or DP ^[4]	V_{R}	3.0	50		V	$I_R = 100 \mu\text{A}$
		ΔV _F /°C		-2		mV/°C	
	Thermal Resistance LED Junction-to-Pin	$R\theta_{J ext{-Pin}}$		345		°C/W/ Seg	

Notes:

- 1. Device case temperature is 25°C prior to the intensity measurement.
- 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_d , 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.
- 5. For low current operation, the AlGaAs HDSP-H10X series displays are recommended. They are tested at 1 mA dc/segment and are pin for pin compatible with the HDSP-H15X series.
- 6. For low current operation, the HER HDSP-555X series displays are recommended. They are tested at 2 mA dc/segment and are pin for pin compatible with the HDSP-550X series.
- 7. The Yellow (HDSP-5700) and Green (HDSP-5600) displays are categorized for dominant wavelength. The category is designated by a number adjacent to the luminous intensity category letter.

AlGaAs Red

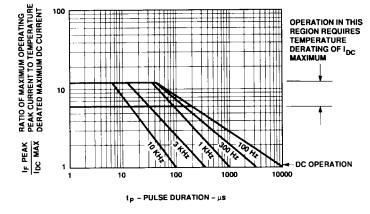


Figure 1. Maximum Tolerable Peak Current vs. Pulse Duration – Red.

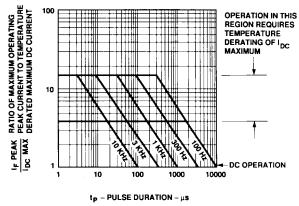


Figure 2. Maximum Tolerable Peak Current vs. Pulse Duration - AlGaAs Red.

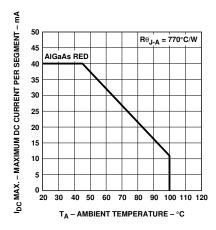


Figure 3. Maximum Allowable DC Current vs. Ambient Temperature.

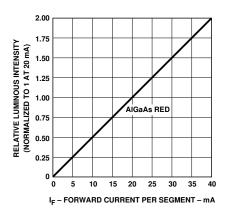


Figure 5. Relative Luminous Intensity vs. DC Forward Current.

HER, Yellow, Green, Orange

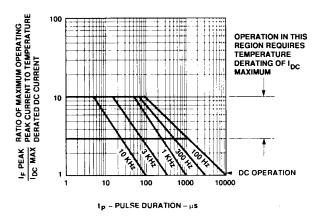


Figure 7. Maximum Tolerable Peak Current vs. Pulse Duration – HER, Orange.

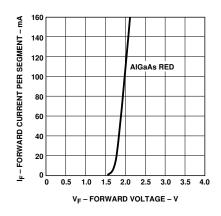


Figure 4. Forward Current vs. Forward Voltage.

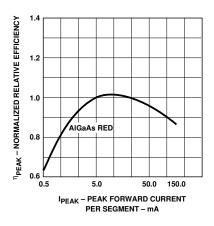


Figure 6. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

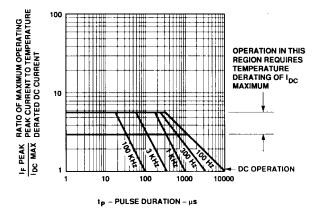


Figure 8. Maximum Tolerable Peak Current vs. Pulse Duration – Yellow.

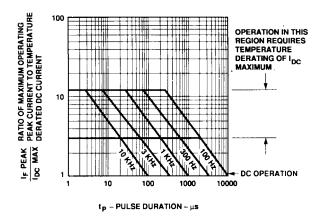
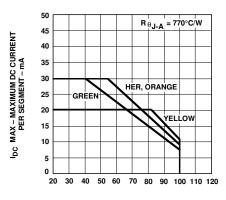


Figure 9. Maximum Tolerable Peak Current vs. Pulse Duration – Green.



TA - AMBIENT TEMPERATURE - °C

Figure 10. Maximum Allowable DC Current vs. Ambient Temperature.

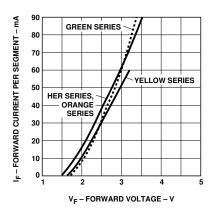


Figure 11. Forward Current vs. Forward Voltage.

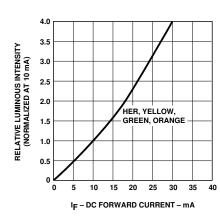


Figure 12. Relative Luminous Intensity vs. DC Forward Current.

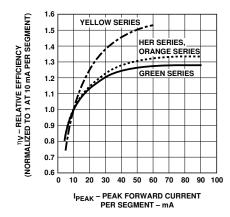


Figure 13. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

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, trichloro– ethylene, 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 information on soldering LEDs please refer to Application Note 1027.

Intensity Bin Limits (mcd)

AlGaAs Red

HDSP-H15x							
IV Bin Category Min. Max.							
K	9.20	16.90					
L	13.80	25.30					
M	20.70	38.00					
N	31.10	56.90					
0	46.60	85.40					

HER

HDSP-550x/552x							
IV Bin Category	Min.	Max.					
E	0.91	1.67					
F	1.37	2.51					
G	2.05	3.76					
Н	3.08	5.64					
I	4.62	8.64					
J	6.93	12.70					
K	10.39	19.04					

Yellow

HDSP-570x/572x							
IV Bin Category	Min.	Max.					
D	0.61	1.11					
E	0.91	1.67					
F	1.37	2.51					
G	2.05	3.76					
Н	3.08	5.64					
I	4.62	8.64					
J	6.93	12.70					
K	10.39	19.04					

Green

HDSP-560x/562x							
IV Bin Category Min. Max.							
E	0.91	1.67					
F	1.37	2.51					
G	2.05	3.76					
Н	3.08	5.64					
I	4.61	8.46					

Orange

HDSP-H40x/K40x			
IV Bin Category	Min.	Max.	
В	0.77	1.17	
С	0.95	1.45	
D	1.19	1.82	
E	1.49	2.27	
F	1.85	2.89	
G	2.32	3.54	
Н	2.90	4.43	

Color Categories

		Dominant Wavelength (nm)	
Color	Bin	Min.	Max.
Yellow	1	581.50	585.00
	3	584.00	587.50
	2	586.50	590.00
	4	589.00	592.50
Green	2	573.00	577.00
	3	570.00	574.00
	4	567.00	571.00
	5	564.00	568.00

Note:

All categories are established for classification of products. Products may not be available in all categories. Please contact your Agilent representatives for further clarification/information.



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