

Devices

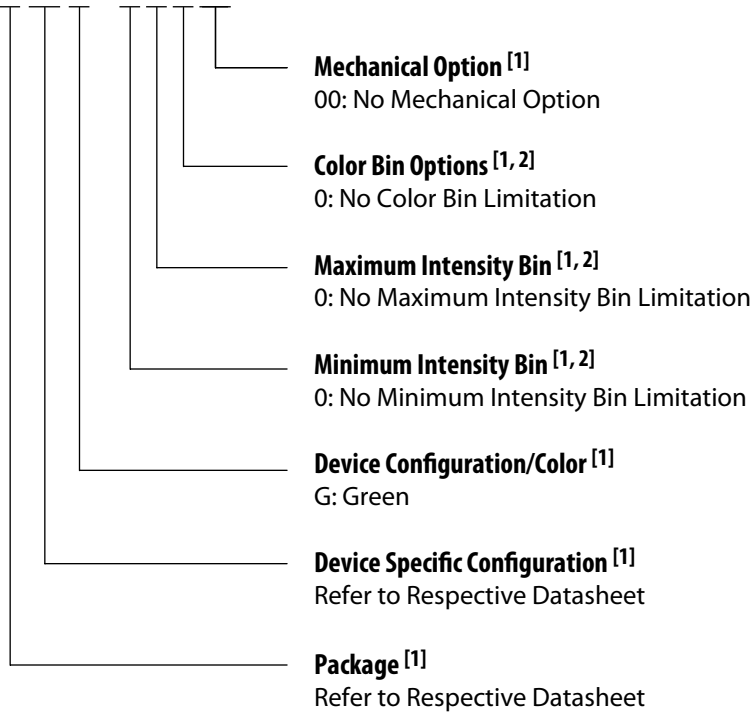
AlGaAs	HER	Yellow	Green	Description	Package Drawing
HDSP-A101	HDSP-7511	HDSP-A801	HDSP-A901	7.6 mm Common Anode Right Hand Decimal	A
HDSP-A103	HDSP-7513	HDSP-A803	HDSP-A903	7.6 mm Common Cathode Right Hand Decimal	B
HDSP-A107	HDSP-7517	HDSP-A807	HDSP-A907	7.6 mm Common Anode ± 1 . Overflow	C
HDSP-A108			HDSP-A908	7.6 mm Common Cathode ± 1 . Overflow	D
HDSP-F101				10 mm Common Anode Right Hand Decimal	E
HDSP-F103				10 mm Common Cathode Right Hand Decimal	F
HDSP-F107				10 mm Common Anode ± 1 . Overflow	G
HDSP-F108				10 mm Common Cathode ± 1 . Overflow	H
HDSP-E100				10.9 mm Common Anode Left Hand Decimal	I
HDSP-E101	HDSP-3351			10.9 mm Common Anode Right Hand Decimal	J
HDSP-E103	HDSP-3353			10.9 mm Common Cathode Right Hand Decimal	K
	HDSP-3356			10.9 mm Universal ± 1 . Overflow[1]	L
HDSP-H101	HDSP-5551			14.2 mm Common Anode Right Hand Decimal	M
HDSP-H103	HDSP-5553			14.2 mm Common Cathode Right Hand Decimal	N
HDSP-H107	HDSP-5557			14.2 mm Common Anode ± 1 . Overflow	O
HDSP-H108	HDSP-5558			14.2 mm Common Cathode ± 1 . Overflow	P
HDSP-K121				14.2 mm Two Digit Common Anode Right Hand Decimal	R
HDSP-K123				14.2 mm Two Digit Common Cathode Right Hand Decimal	S
HDSP-N101				20 mm Common Anode Right Hand Decimal	T
HDSP-N103				20 mm Common Cathode Right Hand Decimal	U
HDSP-N105				20 mm Common Cathode Left Hand Decimal	V

Note:

1. Universal pinout brings the anode and cathode of each segment's LED out to separate pins. See internal diagrams L or W.

Part Numbering System

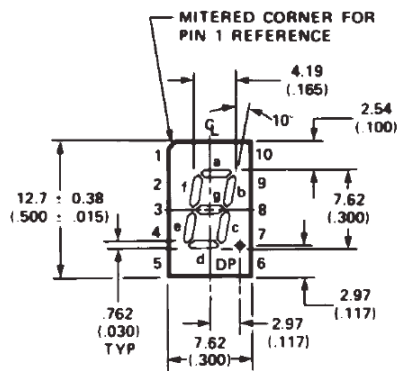
5082 – X XX X – X X X XX
HDSP – X XX X – X X X XX



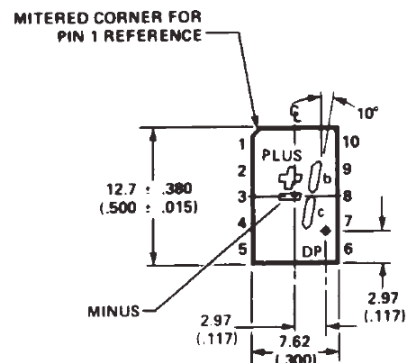
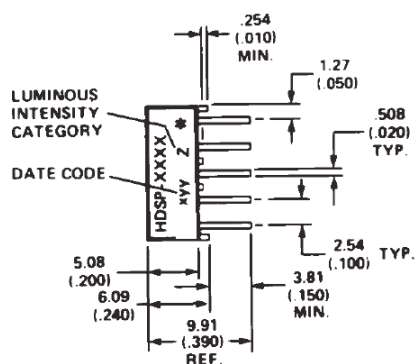
Notes:

1. For codes not listed in the figure above, please refer to the respective datasheet or contact your nearest Avago 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.

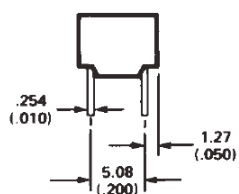
Package Dimensions



A, B



C, D



A, B, C, D

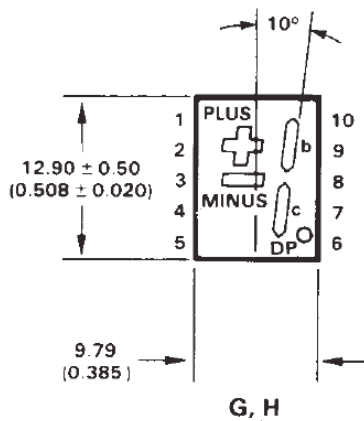
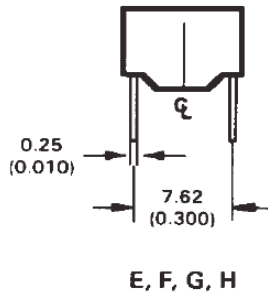
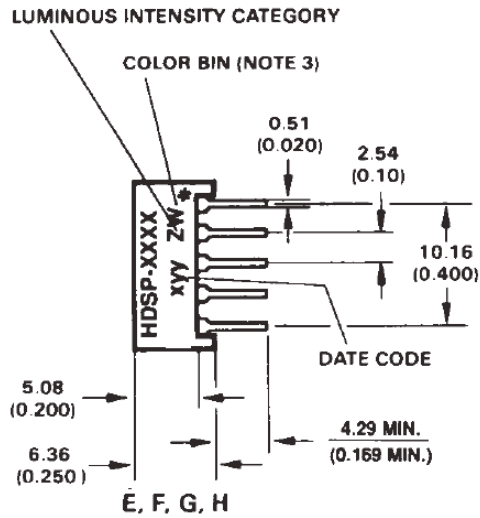
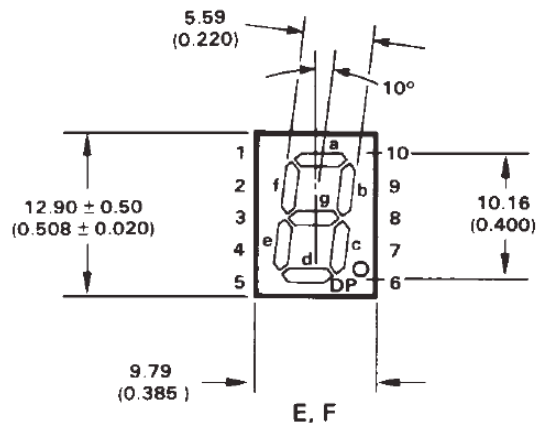
* Side View of package indicates Country of Origin

	FUNCTION			
Pin	A	B	C	D
1	ANODE ^[3]	CATHODE ^[4]	ANODE ^[3]	CATHODE ^[4]
2	CATHODE f	ANODE f	CATHODE PLUS	ANODE PLUS
3	CATHODE g	ANODE g	CATHODE MINUS	ANODE MINUS
4	CATHODE e	ANODE e	NC	NC
5	CATHODE d	ANODE d	NC	NC
6	ANODE ^[3]	CATHODE ^[4]	ANODE ^[3]	CATHODE ^[4]
7	CATHODE DP	ANODE DP	CATHODE DP	ANODE DP
8	CATHODE c	ANODE c	CATHODE c	ANODE c
9	CATHODE b	ANODE b	CATHODE b	ANODE b
10	CATHODE a	ANODE a	NC	NC

Notes:

1. All dimensions in millimetres (inches).
2. All untoleranced dimensions are for reference only.
3. Redundant anodes.
4. Redundant cathodes.

Package Dimensions (cont.)



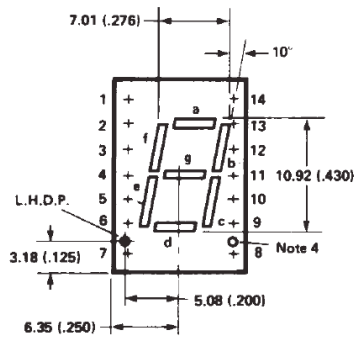
* Side View of package indicates Country of Origin

Pin	FUNCTION			
	E	F	G	H
1	ANODE ^[3]	CATHODE ^[4]	ANODE ^[3]	CATHODE ^[4]
2	CATHODE f	ANODE f	CATHODE PLUS	ANODE PLUS
3	CATHODE g	ANODE g	CATHODE MINUS	ANODE MINUS
4	CATHODE e	ANODE e	NC	NC
5	CATHODE d	ANODE d	NC	NC
6	ANODE ^[3]	CATHODE ^[4]	ANODE ^[3]	CATHODE ^[4]
7	CATHODE DP	ANODE DP	CATHODE DP	ANODE DP
8	CATHODE c	ANODE c	CATHODE c	ANODE c
9	CATHODE b	ANODE b	CATHODE b	ANODE b
10	CATHODE a	ANODE a	NC	NC

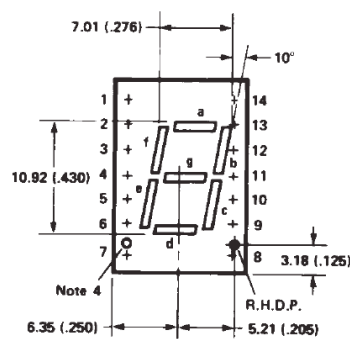
Notes:

1. All dimensions in millimetres (inches).
2. All untoleranced dimensions are for reference only.
3. Redundant anodes.
4. Redundant cathodes.

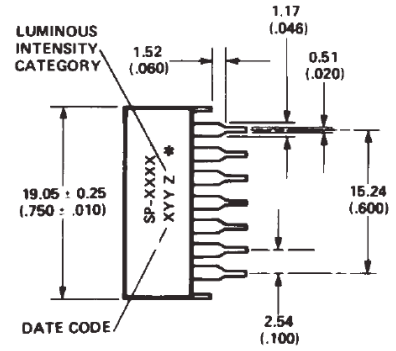
Package Dimensions (cont.)



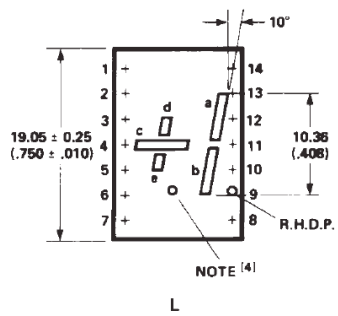
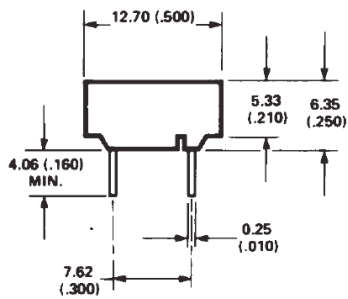
I
FRONT VIEW



J, K
FRONT VIEW



SIDE VIEW



L

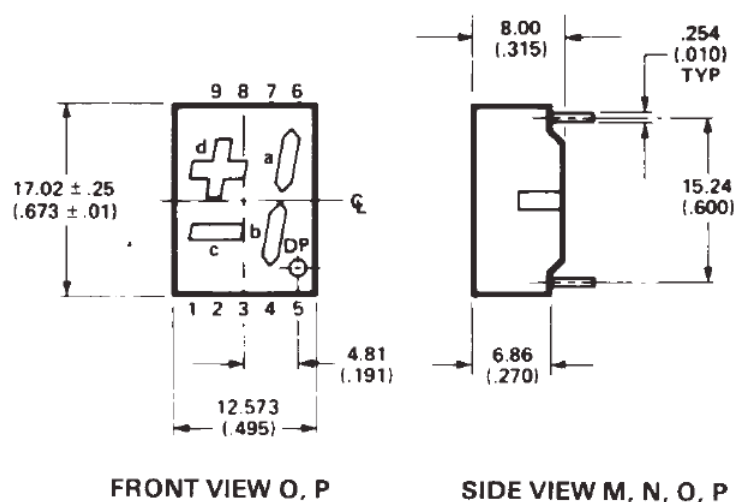
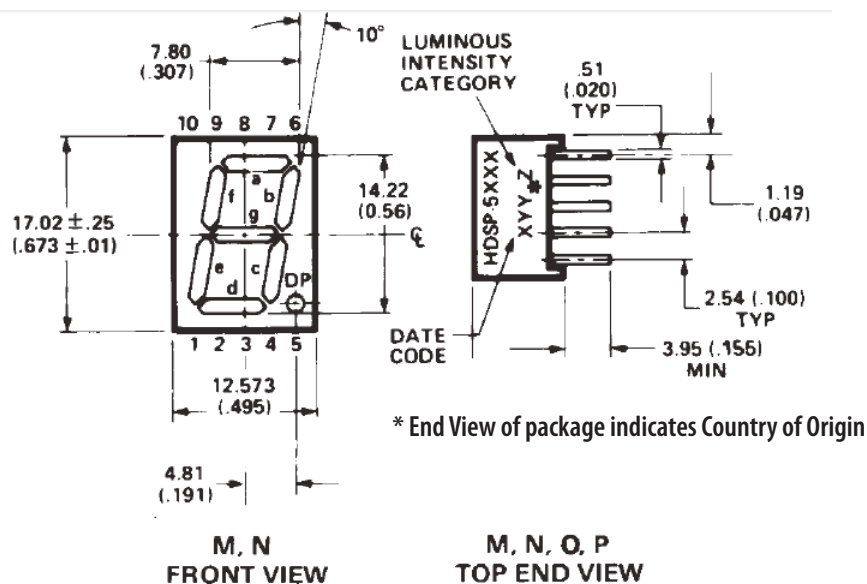
*Side View of package indicates Country of Origin

Pin	FUNCTION			
	I	J	K	L
1	CATHODE a	CATHODE a	ANODE a	CATHODE d
2	CATHODE f	CATHODE f	ANODE f	ANODE d
3	ANODE ^[3]	ANODE ^[3]	CATHODE ^[6] NO	NO PIN
4	NO PIN	NO PIN	PIN	CATHODE c
5	NO PIN	NO PIN	NO PIN	CATHODE e
6	CATHODE dp	NO CONN. ^[5]	NO CONN. ^[5]	ANODE e
7	CATHODE e	CATHODE e	ANODE e	ANODE c
8	CATHODE d	CATHODE d	ANODE d	ANODE dp
9	NO CONN. ^[5]	CATHODE dp	ANODE dp	CATHODE dp
10	CATHODE c	CATHODE c	ANODE c	CATHODE b
11	CATHODE g	CATHODE g	ANODE g	CATHODE a
12	NO PIN	NO PIN	NO PIN	NO PIN
13	CATHODE b	CATHODE b	ANODE b	ANODE a
14	ANODE ^[3]	ANODE ^[3]	CATHODE ^[6]	ANODE b

Notes:

1. All dimensions in millimetres (inches).
2. All untoleranced dimensions are for reference only.
3. Redundant anodes.
4. Unused dp position.
5. See internal circuit diagram.
6. Redundant cathodes.
7. See part number table for L.H.D.P. and R.H.D.P. designation.

Package Dimensions (cont.)

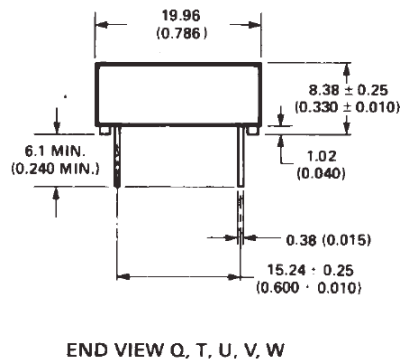
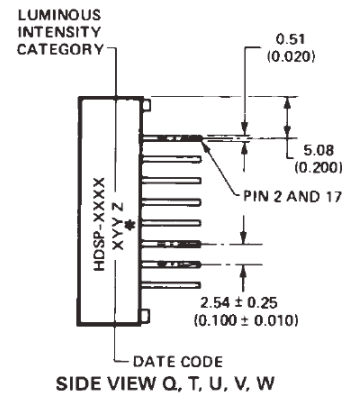
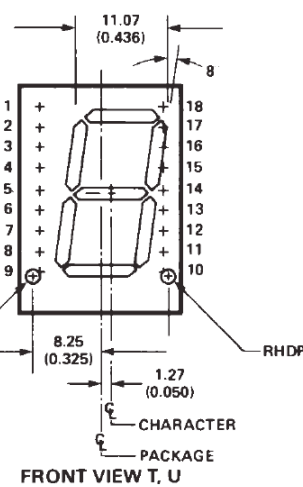
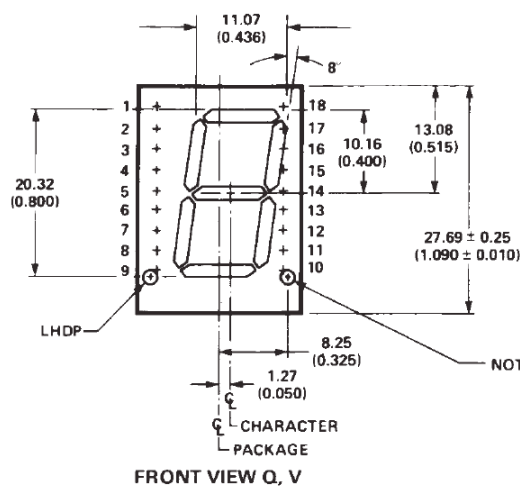


Pin	FUNCTION			
	M	N	O	P
1	CATHODE e	ANODE e	CATHODE c	ANODE c
2	CATHODE d	ANODE d	ANODE c, d	CATHODE c, d
3	ANODE ^[3]	CATHODE ^[4]	CATHODE b	ANODE b
4	CATHODE c	ANODE c	ANODE a, b, DP	CATHODE a, b, DP
5	CATHODE DP	ANODE DP	CATHODE DP	ANODE DP
6	CATHODE b	ANODE b	CATHODE a	ANODE a
7	CATHODE a	ANODE a	ANODE a, b, DP	CATHODE a, b, DP
8	ANODE ^[3]	CATHODE ^[4]	ANODE c, d	CATHODE c, d
9	CATHODE f	ANODE f	CATHODE d	ANODE d
10	CATHODE g	ANODE g	NO PIN	NO PIN

Notes:

1. All dimensions in millimetres (inches).
2. All untoleranced dimensions are for reference only.
3. Redundant anodes.
4. Redundant cathodes.

Package Dimensions (cont.)



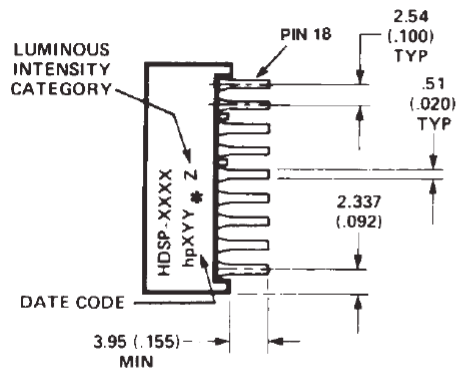
* The Side View of package indicates Country of Origin

Pin	FUNCTION		
	T	U	V
1	NO PIN	NO PIN	NO PIN
2	CATHODE a	ANODE a	ANODE a
3	CATHODE f	ANODE f	ANODE f
4	ANODE ^[3]	CATHODE ^[6]	CATHODE ^[6]
5	CATHODE e	ANODE e	ANODE e
6	ANODE ^[3]	CATHODE ^[6]	CATHODE ^[6]
7	NO CONNECT	NO CONNECT	ANODE dp
8	NO PIN	NO PIN	NO PIN
9	NO PIN	NO PIN	NO PIN
10	CATHODE dp	ANODE dp	NO PIN
11	CATHODE d	ANODE d	ANODE d
12	ANODE ^[3]	CATHODE ^[6]	CATHODE ^[6]
13	CATHODE c	ANODE c	ANODE c
14	CATHODE g	ANODE g	ANODE g
15	CATHODE b	ANODE b	ANODE b
16	NO PIN	NO PIN	NO PIN
17	ANODE ^[3]	CATHODE ^[6]	CATHODE ^[6]
18	NO PIN	NO PIN	NO PIN

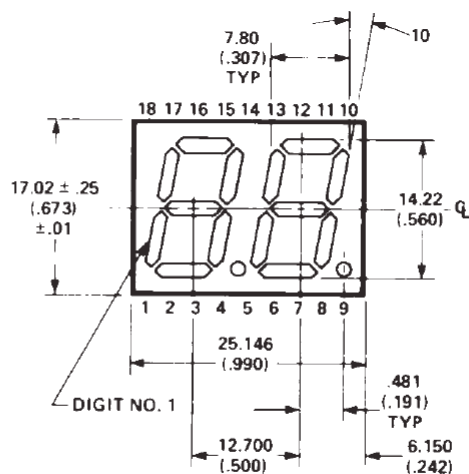
Notes:

1. All dimensions in millimetres (inches).
2. All untoleranced dimensions are for reference only.
3. Redundant anodes.
4. Unused dp position.
5. See internal circuit diagram.
6. Redundant cathodes.
7. See part number table for L.H.D.P. and R.H.D.P. designation.

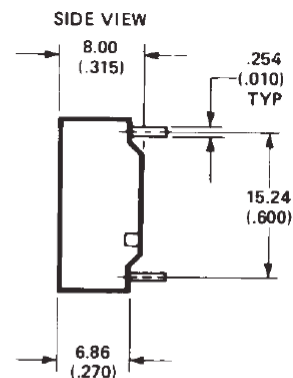
Package Dimensions (cont.)



TOP END VIEW R, S



FRONT VIEW R, S



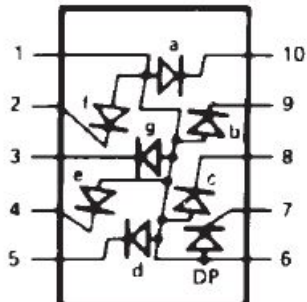
* The Side View of package indicates Country of Origin

Pin	FUNCTION	
	R	S
1	E CATHODE NO. 1	E ANODE NO. 1
2	D CATHODE NO. 1	D ANODE NO. 1
3	C CATHODE NO. 1	C ANODE NO. 1
4	DP CATHODE NO. 1	DP ANODE NO. 1
5	E CATHODE NO. 2	E ANODE NO. 2
6	D CATHODE NO. 2	D ANODE NO. 2
7	G CATHODE NO. 2	G ANODE NO. 2
8	C CATHODE NO. 2	C ANODE NO. 2
9	DP CATHODE NO. 2	DP ANODE NO. 2
10	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	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

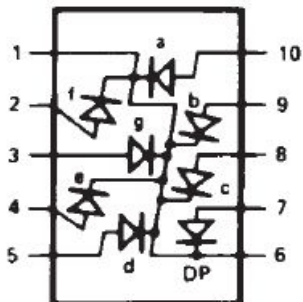
Notes:

1. All dimensions in millimetres (inches).
2. All untoleranced dimensions are for reference only.
3. Where applicable.

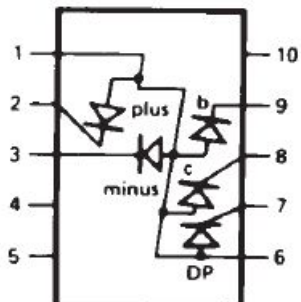
Internal Circuit Diagram



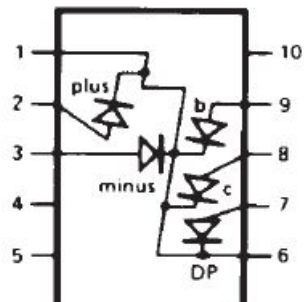
A, E



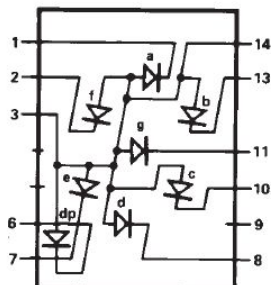
B, F



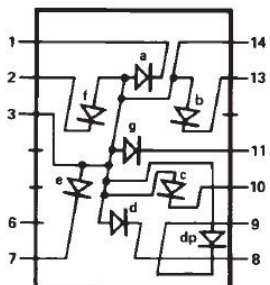
C, G



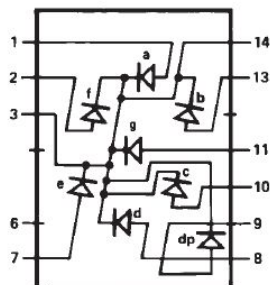
D, H



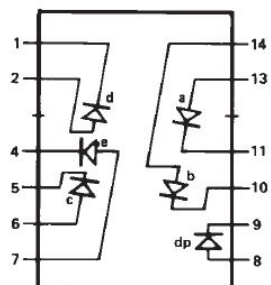
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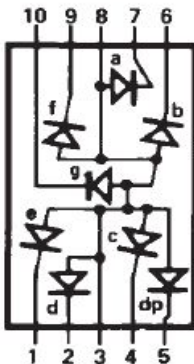
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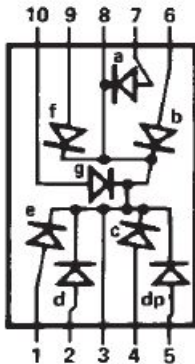
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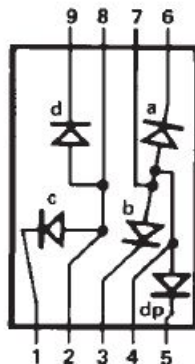
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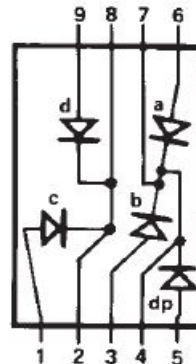
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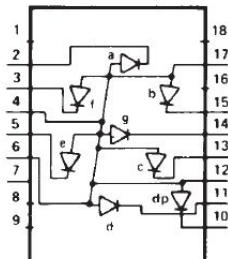
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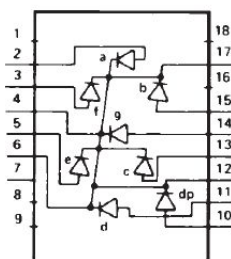
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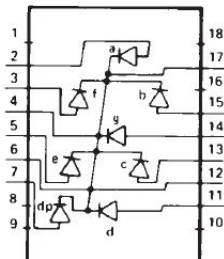
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T

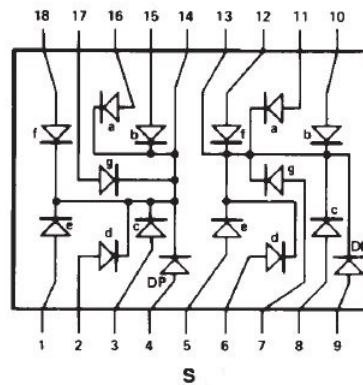
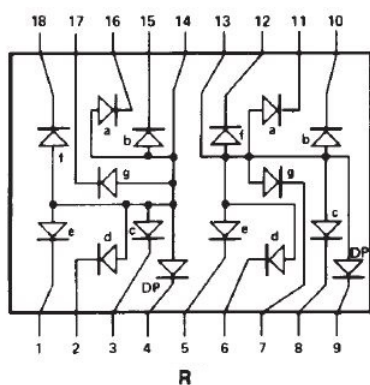


U



V

Internal Circuit Diagram (cont.)



Absolute Maximum Ratings

Description	AlGaAs Red - HDSP-A10X/ E10X/H10X/K12X/ N10X/F10X/G10X Series	HER HDSP-751X/ 335X/555X/K70X Series	Yellow HDSP-A80X Series	Green HDSP-A90X Series	Units
Average Power per Segment or DP	37	52		64	mW
Peak Forward Current per Segment or DP		45			mA
DC Forward Current per Segment or DP	15 ^[1]		15 ^[2]		mA
Operating Temperature Range	-20 to +100 ^[9]		-40 to +100		°C
Storage Temperature Range		-55 to +100			°C
Reverse Voltage* per segment or DP		3.0			V
Wave Soldering Temperature for 3 Seconds (1.60 mm [0.063 in.] below seating body)		250			°C

* Reverse Voltage is for LED testing purposes and is not recommended to be used as an application condition.

Notes:

1. Derate above 91°C at 0.53 mA/°C.
2. Derate HER/Yellow above 80°C at 0.38 mA/°C and Green above 71°C at 0.31 mA/°C

Electrical/Optical Characteristics at T_A = 25°C

AlGaAs Red

Device Series	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
HDSP-A10x	Luminous Intensity/Segment ^[1,2] (Digit Average)	I _V	315	600		μcd	I _F = 1 mA
				3600			I _F = 5 mA
HDSP-F10x			330	650			I _F = 1 mA
				3900			I _F = 5 mA
HDSP-E10x			390	650			I _F = 1 mA
				3900			I _F = 5 mA
HDSP-H10x, HDSP-K12x			400	700			I _F = 1 mA
				4200			I _F = 5 mA
HDSP-N10x			270	590			I _F = 1 mA
				3500			I _F = 5 mA
All Devices	Forward Voltage/Segment or DP	V _F		1.6		V	I _F = 1 mA
				1.7			I _F = 5 mA
				1.8	2.2		I _F = 20 mA Pk
	Peak Wavelength	λ _{PEAK}		645		nm	
	Dominant Wavelength ^[3]	λ _d		637		nm	
	Reverse Voltage/Segment or DP ^[4]	V _R	3.0	15		V	I _R = 100 μA
	Temperature Coefficient of V _F /Segment or DP	ΔV _F /°C		-2 mV		mV/°C	
	Thermal Resistance LED Junction-to-Pin	R _{θJ-PIN}		255		°C/W/Seg	
HDSP-A10x				320			
HDSP-F10x				340			
HDSP-E10x				400			
HDSP-H10x, HDSP-K12x				430			

High Efficiency Red

Device Series	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
HDSP-751x	Luminous Intensity/Segment ^[1,2,6] (Digit Average)	I _V	160	270		μcd	I _F = 2 mA
				1050			I _F = 5 mA
HDSP-335x, HDSP-555x			200	300			I _F = 2 mA
				1200			I _F = 5 mA
			270	370			I _F = 2 mA
				1480			I _F = 5 mA
	Forward Voltage/Segment or DP	V _F		1.6		V	I _F = 2 mA
				1.7			I _F = 5 mA
			2.1	2.5			I _F = 20 mA Pk
All Devices	Peak Wavelength	λ _{PEAK}		635		nm	
	Dominant Wavelength ^[3]	λ _d		626		nm	
	Reverse Voltage/Segment or DP ^[4]	V _R	3.0	30		V	I _R = 100 μA
	Temperature Coefficient of V _F /Segment or DP	ΔV _F /°C		-2		mV/°C	
HDSP-751x	Thermal Resistance LED Junction-to-Pin	Rθ _{J-PIN}		200		°C/W	
HDSP-335x				280			
HDSP-555x				345			

Yellow

Device Series	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
HDSP-A80x	Luminous Intensity/Segment ^[1,2] (Digit Average)	I_V	250	420	1300	μcd	$I_F = 4 \text{ mA}$
							$I_F = 10 \text{ mA}$
	Forward Voltage/Segment or DP	V_F		1.7	2.5	V	$I_F = 4 \text{ mA}$
				1.8			$I_F = 5 \text{ mA}$
				2.1			$I_F = 20 \text{ mA Pk}$
	Peak Wavelength	λ_{PEAK}		583		nm	
	Dominant Wavelength ^[3,5]	λ_d	581.5	585	592.5	nm	
	Reverse Voltage/Segment or DP ^[4]	V_R	3.0	30		V	$I_R = 100 \mu\text{A}$
	Temperature Coefficient of V_F / Segment or DP	$\Delta V_F/^\circ\text{C}$		-2		mV/ $^\circ\text{C}$	
	Thermal Resistance LED Junction-to-Pin	$R_{\theta\text{J-PIN}}$		200		$^\circ\text{C/W}$	

Green

Device Series	Parameter	Symbol	Min.	Typ.	Max.	Units	Test Conditions
HDSP-A90x	Luminous Intensity/Segment ^[1,2] (Digit Average)	I_V	250	475	1500	μcd	$I_F = 4 \text{ mA}$
							$I_F = 10 \text{ mA}$
	Forward Voltage/Segment or DP	V_F		1.9	2.5	V	$I_F = 4 \text{ mA}$
				2.0			$I_F = 10 \text{ mA}$
				2.1			$I_F = 20 \text{ mA Pk}$
	Peak Wavelength	λ_{PEAK}		566		nm	
	Dominant Wavelength ^[3,5]	λ_d		571	577	nm	
	Reverse Voltage/Segment or DP ^[4]	V_R	3.0	30		V	$I_R = 100 \mu\text{A}$
	Temperature Coefficient of V_F / Segment or DP	$\Delta V_F/^\circ\text{C}$		-2		mV/ $^\circ\text{C}$	
	Thermal Resistance LED Junction-to-Pin	$R_{\theta\text{J-PIN}}$		200		$^\circ\text{C/W}$	

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 the single wavelength which defines the color of the device.
4. Typical specification for reference only. Do not exceed absolute maximum ratings.
5. The yellow (HDSP-A800) and Green (HDSP-A900) displays are categorized for dominant wavelength. The category is designated by a number adjacent to the luminous intensity category letter.

AlGaAs Red

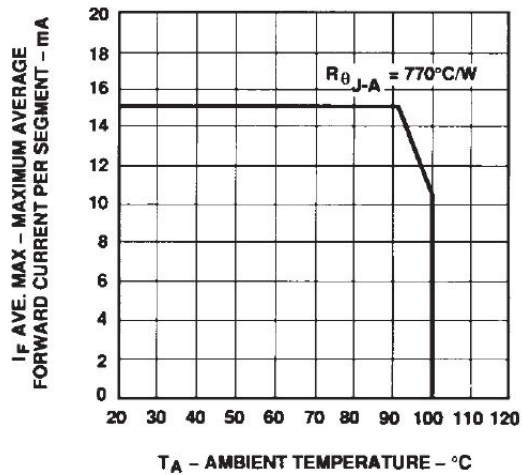


Figure 1. Maximum Allowable Average or DC Current vs. Ambient Temperature.

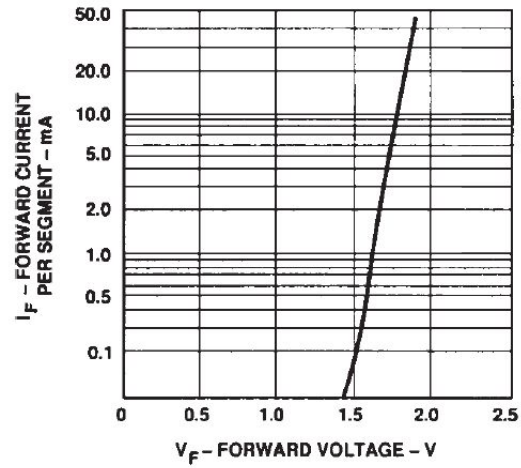


Figure 2. Forward Current vs. Forward Voltage.

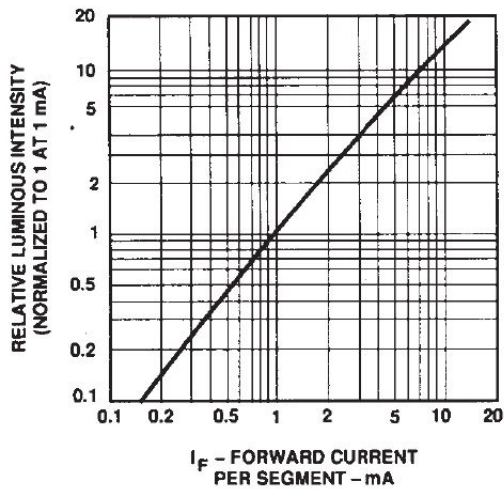


Figure 3. Relative Luminous Intensity vs. DC Forward Current.

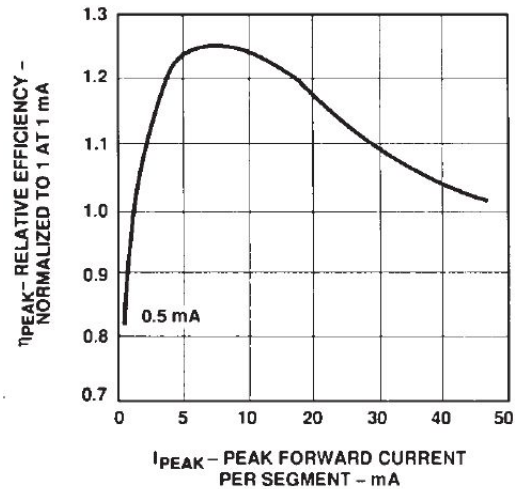


Figure 4. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

HER, Yellow, Green

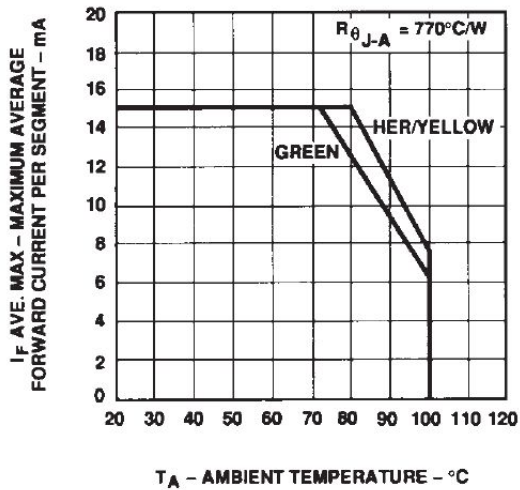


Figure 5. Maximum Allowable Average or DC Current vs. Ambient Temperature.

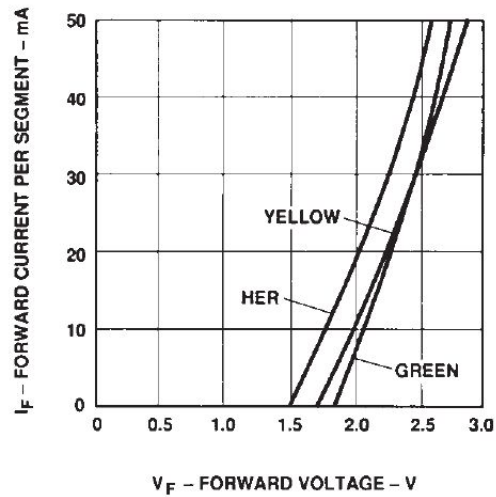


Figure 6. Forward Current vs. Forward Voltage.

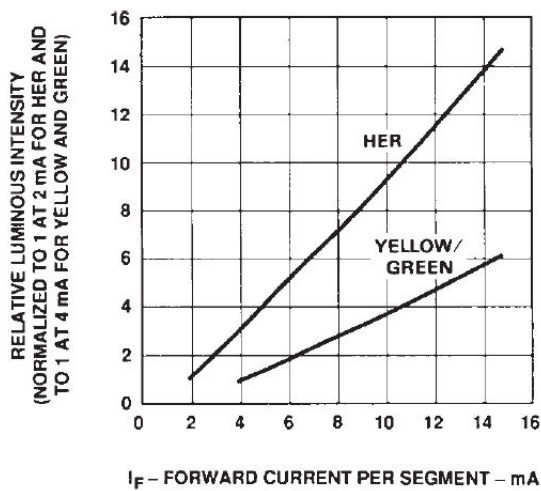


Figure 7. Relative Luminous Intensity vs. DC Forward Current.

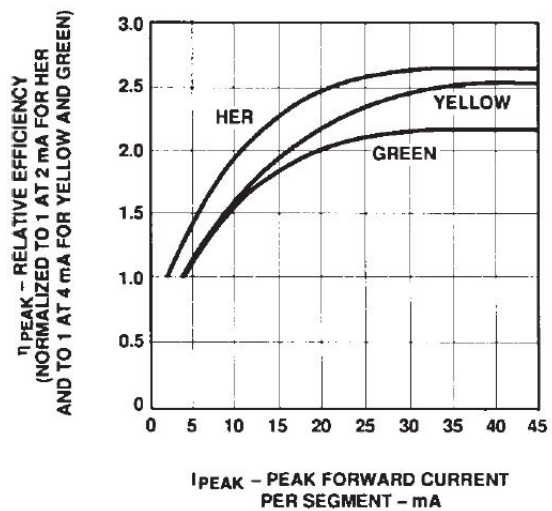


Figure 8. Relative Efficiency (Luminous Intensity per Unit Current) vs. Peak Current.

Intensity Bin Limits (mcd)

AlGaAs Red

HDSP-A10x

IV Bin Category	Min.	Max.
E	0.315	0.520
F	0.428	0.759
G	0.621	1.16
H	0.945	1.71
I	1.40	2.56
J	2.10	3.84
K	3.14	5.75
L	4.70	8.55

HDSP-E10x / HDSP-F10x

IV Bin Category	Min.	Max.
D	0.391	0.650
E	0.532	0.923
F	0.755	1.39
G	1.13	2.08
H	1.70	3.14

HDSP-H10x / HDSP-K12x

IV Bin Category	Min.	Max.
C	0.415	0.690
D	0.565	0.990
E	0.810	1.50
F	1.20	2.20
G	1.80	3.30
H	2.73	5.00
I	4.09	7.50

HDSP-N10x

IV Bin Category	Min.	Max.
A	0.270	0.400
B	0.325	0.500
C	0.415	0.690
D	0.565	0.990
E	0.810	1.50
F	1.20	2.20
G	1.80	3.30
H	2.73	5.00
I	4.09	7.50

HER

HDSP-751x

IV Bin Category	Min.	Max.
B	0.160	0.240
C	0.200	0.300
D	0.250	0.385
E	0.315	0.520
F	0.428	0.759
G	0.621	1.16

HDSP-335x

IV Bin Category	Min.	Max.
B	0.240	0.366
C	0.300	0.477
D	0.391	0.650
E	0.532	0.923
F	0.755	1.39
G	1.13	2.08
H	1.70	3.14

HDSP-555x

IV Bin Category	Min.	Max.
A	0.270	0.400
B	0.325	0.500
C	0.415	0.690
D	0.565	0.990
E	0.810	1.50
F	1.20	2.20
G	1.80	3.30
H	2.73	5.00
I	4.09	7.50

Intensity Bin Limits (mcd) (cont.)

Yellow

HDSP-A80x

IV Bin Category	Min.	Max.
D	0.250	0.385
E	0.315	0.520
F	0.425	0.760
G	0.625	1.14
H	0.940	1.70
I	1.40	2.56
J	2.10	3.84
K	3.14	5.76
L	4.71	8.64
M	7.07	13.00
N	10.60	19.40
O	15.90	29.20
P	23.90	43.80
Q	35.80	65.60

Green

HDSP-A90x

IV Bin Category	Min.	Max.
E	0.315	0.520
F	0.425	0.760
G	0.625	1.14
H	0.940	1.70
I	1.40	2.56
J	2.10	3.84
K	3.14	5.76
L	4.71	8.64
M	7.07	13.00
N	10.60	19.40
O	15.90	29.20
P	23.90	43.80
Q	35.80	65.60

Color Categories

Color	Bin	Dominant Wavelength (nm)	
		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 Avago representatives for further clarification/information.

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

For product information and a complete list of distributors, please go to our web site: www.avagotech.com

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