HLMP-3351, HLMP-3366, HLMP-3451, HLMP-3466, HLMP-3554, HLMP-3568

T-1³/₄ (5 mm) Low Profile LED Lamps

Data Sheet

Description

The HLMP-335x/-336x Series are Gallium Arsenide Phosphide on Gallium Phosphide High Efficiency Red Light Emitting Diodes.

The HLMP-345x/-346x Series are Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diodes.

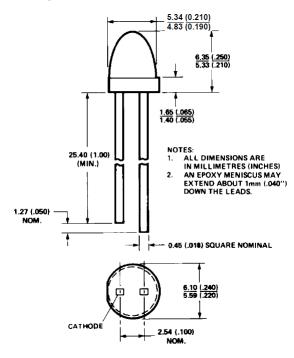
The HLMP-355x/-356x Series are Gallium Phosphide Green Light Emitting Diodes.

The Low Profile $T-1^{3}/_{4}$ package provides space savings and is excellent for backlighting applications.

Features

- High intensity
- Low profile: 5.8 mm (0.23 in.) nominal
- T-1³/₄ diameter package
- Diffused and non-diffused types
- General purpose leads
- IC compatible/low current requirements
- Reliable and rugged

Package Dimensions



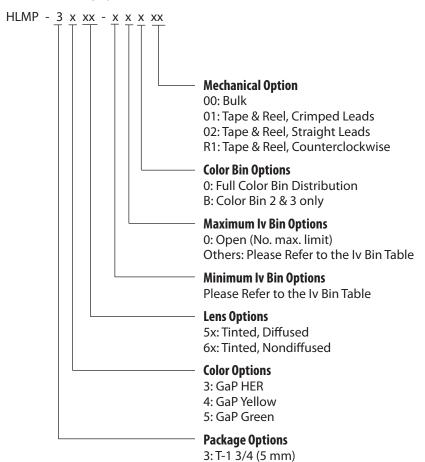




Selection Guide

			Part Number	Luminous I	ntensity lv (mcd)
Color	Package Description	2 ⊕ ^{1/2[1]}	HLMP-	Min.	Max.
Red	T-1 ³ / ₄ Tinted, diffused	50	3351	5.4	-
			3351-D00xx	2.1	-
			3351-F00xx	5.4	-
	T-1 ³ / ₄ Tinted, non-diffused	45	3366	13.8	-
			3366-H00xx	13.8	-
Yellow	T-1 ³ / ₄ Tinted, diffused	50	3451	3.6	-
			3451-D00xx	3.6	-
			3451-EFBxx	5.7	18.4
			3451-F00xx	9.2	-
	T-1 ³ / ₄ Tinted, non-diffused	45	3466	9.2	-
			3466-F00xx	9.2	-
Green	T-1 ³ / ₄ Tinted, diffused	50	3554	6.7	-
			3554-E00xx	6.7	-
	T-1 ³ / ₄ Tinted, non-diffused	40	3568	10.6	-
			3568-F00xx	10.6	-

Part Numbering System



Absolute Maximum Ratings at $T_A = 25^{\circ}C$

Parameter	3350 Series	3450 Series	3550 Series	Units
Peak Forward Current	90	60	90	mA
Average Forward Current ^[1]	25	20	25	mA
DC Current ^[2]	30	20	30	mA
Power Dissipation ^[3]	135	85	135	mW
Reverse Voltage ($I_R = 100 \ \mu A$)	5	5	5	V
Transient Forward Current ^[4] (10 μs Pulse)	500	500	500	mA
Operating Temperature Range	-40 to +100	-40 to +100	-20 to +100	°C
Storage Temperature Range	-40 to +100	-40 to +100	-40 to +100	
Wave Soldering Temperature [1.59 mm (0.063 in.) from Body]		250°C for 3 seco	nds	
Solder Dipping Temperature [1.59 mm (0.063 in.) from Body]	260°C for 5 seconds			

Notes:

1. See Figure 10 (High Efficiency Red), 15 (Yellow), or 20 (Green) to establish pulsed operating conditions.

2. For High Efficiency Red and Green Series, derate linearly from 50°C at 0.5 mA/°C. For Red and Yellow Series, derate linearly from 50°C at 0.2 mA/°C.

3. For High Efficiency Red and Green Series, derate power linearly from 25°C at 1.8 mW/°C. For Red and Yellow Series, derate power linearly from 50°C at 1.6 mW/°C.

4. The transient peak current is the maximum non-recurring peak current that can be applied to the device without damaging the LED die and wirebond. It is not recommended that the device be operated at peak current beyond the peak forward current listed in the Absolute Maximum Ratings.

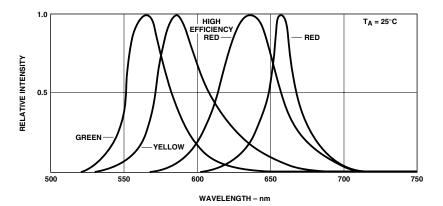


Figure 1. Relative intensity vs. wavelength.

High Efficiency Red HLMP-335x/-336x Series Electrical Specifications at $T_A = 25^{\circ}C$

Description	Device HLMP-	Min.	Тур.	Max.	Units	Test Conditions
Including Angle Between Half Luminous Intensity	3366		50 50		Deg.	Note 1 (Figure 11)
Points			45 45			(
Peak Wavelength			635		nm	Measurement at Peak (Figure 1)
Dominant Wavelength			626		nm	Note 2
Spectral Line Halfwidth			40		nm	
Speed of Response			90		ns	
Capacitance			11		pF	$V_{F} = 0; f = 1 MHz$
Thermal Resistance			260		°C/W	Junction to Cathode Lead
Forward Voltage			1.9	2.4	V	l _F = 10 mA (Figure 7)
Reverse Breakdown Voltage		5.0			V	$I_R = 100 \ \mu A$
Luminous Efficacy			145		lm/W	Note 3
	Including Angle Between Half Luminous Intensity Points Peak Wavelength Dominant Wavelength Spectral Line Halfwidth Speed of Response Capacitance Thermal Resistance Forward Voltage Reverse Breakdown Voltage	DescriptionHLMP-Including Angle Between Half Luminous Intensity Points3366Peak Wavelength1Dominant Wavelength1Spectral Line Halfwidth1Speed of Response1Capacitance1Thermal Resistance1Forward Voltage1Reverse Breakdown Voltage1	DescriptionHLMP-Min.Including Angle Between Half Luminous Intensity Points3366Peak Wavelength3366Dominant WavelengthImage: Comparison of the sponseSpeed of ResponseImage: Comparison of the sponseCapacitanceImage: Comparison of the sponseThermal ResistanceImage: Comparison of the sponseForward Voltage5.0	DescriptionHLMP-Min.Typ.Including Angle Between Half Luminous Intensity Points336650 50 45Peak Wavelength635Dominant Wavelength636Spectral Line Halfwidth40Speed of Response90Capacitance11Thermal Resistance260Forward Voltage5.0	DescriptionHLMP-Min.Typ.Max.Including Angle Between Half Luminous Intensity Points336650 50 45 4550Peak Wavelength63563550Dominant Wavelength6269010Speed of Response901110Capacitance11260119Forward Voltage5.01.92.4	DescriptionHLMP-Min.Typ.Max.UnitsIncluding Angle Between Half Luminous Intensity Points336650 50 45 45Deg.Peak Wavelength635nmDominant Wavelength635nmSpectral Line Halfwidth40nmSpeed of Response90nsCapacitance11pFThermal Resistance260°C/WForward Voltage5.0V

Notes:

1. $\theta^{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

2. Dominant wavelength, λ_d , is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

3. Radiant Intensity, I_e , in watts/steradian may be found from the equation $I_e = I_v/\eta_v$, where I_v is the luminous intensity in candelas and η_v is the luminous efficacy in lumens/watt.

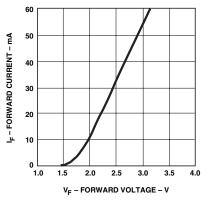


Figure 7. Forward current vs. forward voltage.

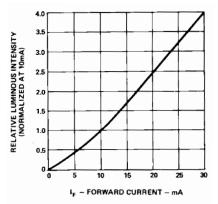
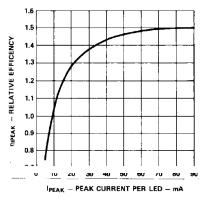
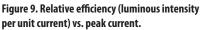


Figure 8. Relative luminous intensity vs. forward current.





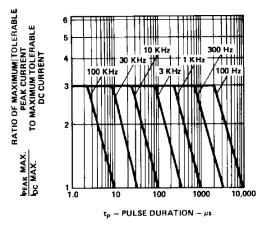


Figure 10. Maximum tolerable peak current vs. pulse duration. (I_{DC} MAX as per MAX ratings).

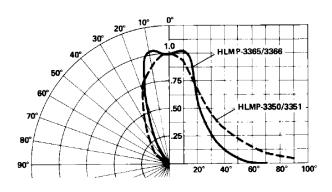


Figure 11. Relative luminous intensity vs. angular displacement.

Yellow HLMP-345x/-346x Series	
Electrical Specifications at $T_A = 25^{\circ}C$	

Symbol	Description	Device HLMP-	Min.	Тур.	Max.	Units	Test Conditions
2θ _{1/2}	Including Angle Between	3466		50		Deg.	Note 1
	Half Luminous Intensity			50			(Figure 16)
	Points			45			
				45			
λρεακ	Peak Wavelength			583		nm	Measurement at Peak (Figure 1)
λ_{d}	Dominant Wavelength			585		nm	Note 2
$\Delta\lambda_{1/2}$	Spectral Line Halfwidth			36		nm	
τ_{s}	Speed of Response			90		ns	
С	Capacitance			15		pF	$V_F = 0; f = 1 MHz$
Rθ _{J-PIN}	Thermal Resistance			260		°C/W	Junction to Cathode Lead
V _F	Forward Voltage			2.0	2.4	V	l _F = 10 mA (Figure 12)
VR	Reverse Breakdown Voltage		5.0			V	$I_R = 100 \ \mu A$
ηv	Luminous Efficacy			500		lm/W	Note 3

Notes:

1. $\theta^{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

2. Dominant wavelength, λ_d , is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

3. Radiant Intensity, I_e , in watts/steradian may be found from the equation $I_e = I_V/\eta_V$, where I_v is the luminous intensity in candelas and η_v is the luminous efficacy in lumens/watt.

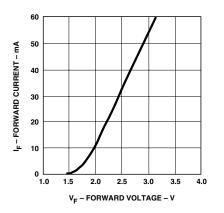


Figure 12. Forward current vs. forward voltage.

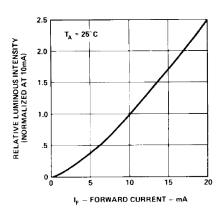


Figure 13. Relative luminous intensity vs. forward current.

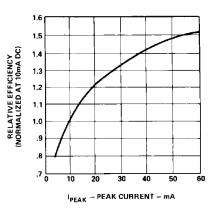


Figure 14. Relative efficiency (luminous intensity per unit current) vs. peak current.

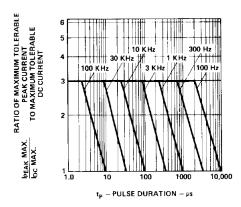


Figure 15. Maximum tolerable peak current vs. pulse duration. (I_{DC} MAX as per MAX ratings).

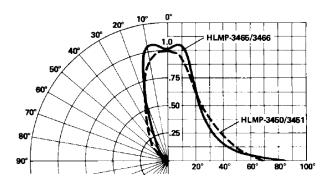


Figure 16. Relative luminous intensity vs. angular displacement.

Green HLMP-355x/-356x Series Electrical Specifications at $T_A = 25^{\circ}C$

Symbol	Description	Device HLMP-	Min.	Тур.	Max.	Units	Test Conditions
2θ _{1/2}	Including Angle Between Half Luminous Intensity Points	3554 3568		50 40		Deg.	Note 1 (Figure 21)
λ_{PEAK}	Peak Wavelength			565		nm	Measurement at Peak (Figure 1)
λ_d	Dominant Wavelength			569		nm	Note 2
$\Delta\lambda_{1/2}$	Spectral Line Halfwidth			28		nm	
τ_{s}	Speed of Response			500		ns	
С	Capacitance			18		pF	$V_F = 0; f = 1 MHz$
Rθj-pin	Thermal Resistance			260		°C/W	Junction to Cathode Lead
V _F	Forward Voltage			2.1	2.7	V	l _F = 10 mA (Figure 17)
V _R	Reverse Breakdown Voltage		5.0			V	$I_R = 100 \ \mu A$
ην	Luminous Efficacy			595		lm/W	Note 3

Notes:

1. $\theta^{1/2}$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

2. Dominant wavelength, λ_d , is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

3. Radiant Intensity, I_e , in watts/steradian may be found from the equation $I_e = I_v/\eta_v$, where I_v is the luminous intensity in candelas and η_v is the luminous efficacy in lumens/watt.

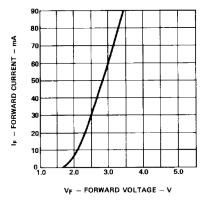


Figure 17. Forward current vs. forward voltage.

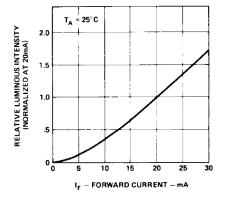


Figure 18. Relative luminous intensity vs. forward current.

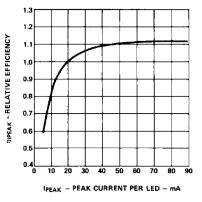


Figure 19. Relative efficiency (luminous intensity per unit current) vs. peak current.

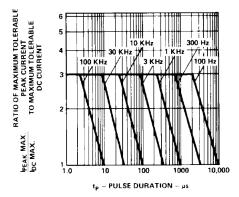


Figure 20. Maximum tolerable peak current vs. pulse duration. (I_{DC} MAX as per MAX ratings).

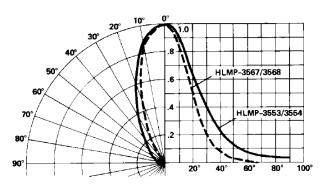


Figure 21. Relative luminous intensity vs. angular displacement.

Intensity Bin Limits

		Intensity Rang	ge (mcd)			Intensity Range (mcd)	
Color	Bin	Min.	Max.	Color	Bin	Min.	Max.
Red	D	2.4	3.8	Yellow	D	4.0	6.5
	E	3.8	6.1	_	E	6.5	10.3
	F	6.1	9.7	_	F	10.3	16.6
	G	9.7	15.5	_	G	16.6	26.5
	Н	15.5	24.8	_	Н	26.5	42.3
	I	24.8	39.6		I	42.3	67.7
	J	39.6	63.4		J	67.7	108.2
	К	63.4	101.5		К	108.2	173.2
	L	101.5	162.4	_	L	173.2	250.0
	М	162.4	234.6	_	М	250.0	360.0
	Ν	234.6	340.0		Ν	360.0	510.0
	0	340.0	540.0		0	510.0	800.0
	Р	540.0	850.0	_	Р	800.0	1250.0
	Q	850.0	1200.0	_	Q	1250.0	1800.0
	R	1200.0	1700.0	_	R	1800.0	2900.0
	S	1700.0	2400.0		S	2900.0	4700.0
	Т	2400.0	3400.0		Т	4700.0	7200.0
	U	3400.0	4900.0	_	U	7200.0	11700.0
	V	4900.0	7100.0	_	V	11700.0	18000.0
	W	7100.0	10200.0	_	W	18000.0	27000.0
	Х	10200.0	14800.0				
	Y	14800.0	21400.0				

Maximum tolerance for each bin limit is $\pm 18\%$.

21400.0

30900.0

Ζ

Intensity Bin Limits, continued

		Intensity Rang	je (mcd)
Color	Bin	Min.	Max.
Green	E	7.6	12.0
	F	12.0	19.1
	G	19.1	30.7
	Н	30.7	49.1
	I	49.1	78.5
	J	78.5	125.7
	К	125.7	201.1
	L	201.1	289.0
	М	289.0	417.0
	Ν	417.0	680.0
	0	680.0	1100.0
	Р	1100.0	1800.0
	Q	1800.0	2700.0
	R	2700.0	4300.0
	S	4300.0	6800.0
	Т	6800.0	10800.0
	U	10800.0	16000.0
	V	16000.0	25000.0
	W	25000.0	40000.0

Color Categories

		Lambda (nm)	
Color	Cat#	Min.	Max.
Green	6	561.5	564.5
	5	564.5	567.5
	4	567.5	570.5
	3	570.5	573.5
	2	573.5	576.5
llow	1	582.0	584.5
	3	584.5	587.0
	2	587.0	589.5
	4	589.5	592.0
	5	592.0	593.0

Maximum tolerance for each bin limit is ± 0.5 nm.

Maximum tolerance for each bin limit is $\pm 18\%$.

Mechanical Option Matrix

Mechanical Option Code	Definition
00	Bulk Packaging, minimum increment 500 pcs/bag
01	Tape & Reel, crimped leads, minimum increment 1300 pcs/bag
02	Tape & Reel, straight leads, minimum increment 1300 pcs/bag
R1	Tape & Reel, crimped leads, reeled counterclockwise, anode leaves first
lata:	

Note:

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

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