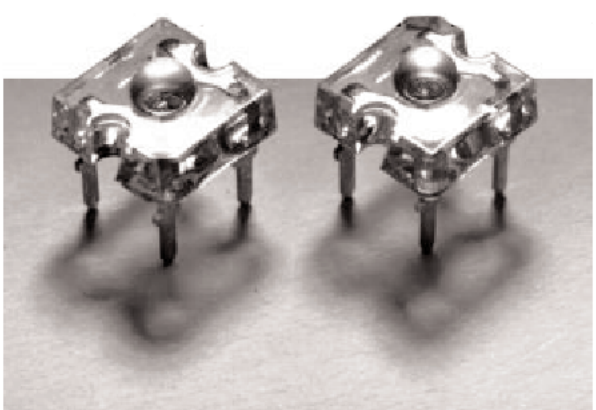
Technical Datasheet DS05

SuperFlux LEDs

Introduction

This revolutionary package design allows the lighting designer to reduce the number of LEDs required and provide a more uniform and unique illuminated appearance than with other LED solutions. This is possible through the efficient optical package design and high-current capabilities.

The low profile package can be easily coupled with reflectors or lenses to efficiently distribute light and provide the desired lit appearance. This product family employs the world's brightest red, red-orange, amber, blue, cyan, and green LED materials, which allow designers to match the color of many lighting applications like vehicle signal lamps, specialty lighting, and electronic signs.



HPWA-MH00-XXXX
HPWT-MH00-XXXX
HPWA-DH00-XXXX
HPWT-DH00-XXXX
HPWT-RD00-XXXX
HPWT-BH00-XXXX
HPWT-MD00-XXXX
HPWT-RL00-XXXX
HPWT-DD00-XXXX
HPWT-ML00-XXXX
HPWT-BD00-XXXX
HPWT-DL00-XXXX
HPWT-RH00-XXXX
HPWT-BL00-XXXX
HPWN-MB00-XXXX
HPWN-MC00-XXXX
HPWN-MG00-XXXX

Key Benefits

- Rugged Lighting Products
- Electricity Savings
- Maintenance Savings

Features

- High Luminance
- Uniform Color
- Low Power Consumption
- Low Thermal Resistance
- Low Profile
- Meets SAE/ECE/JIS Automotive Color Requirements
- Packaged in tubes for use with automatic insertion equipment

Typical Applications

- Automotive Exterior Lighting
- Electronic Signs and Signals
- Specialty Lighting

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Selection Guide

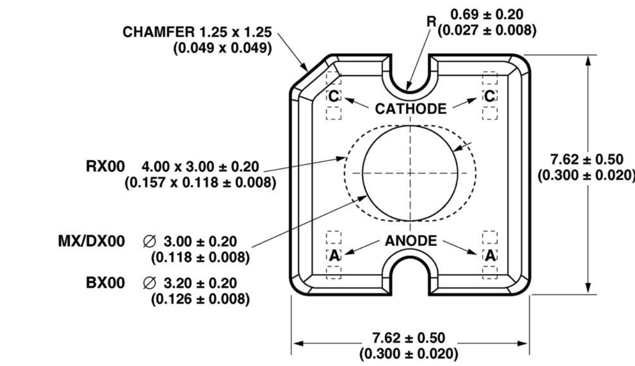
Table 1.

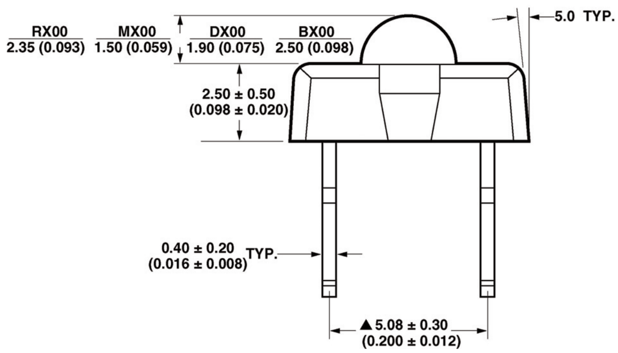
Device Type	LED Color	Total Flux Φ_V (LM) @ 70 mA[1](HPWA, HPWT) 50 mA (HPWN) Typ.	Total Included Angle $\theta_{0.90\ V}$ (Degrees) [2] Typ.	View Angle $2\theta^{1/2}$ (Degrees) Typ.
HPWA-MH00 HPWA-DH00	AS AllnGaP Red-Orange	2.0	95 60	90 55
HPWT-RD00 HPWT-MD00 HPWT-DD00 HPWT-BD00	TS AllnGaP Red	3.8	44 X 88 100 60 50	25x68 70 50 30
HPWT-RH00 HPWT-MH00 HPWT-DH00 HPWT-BH00	TS AllnGaP Red-Orange	5.0	44 X 88 100 60 50	25x68 70 50 30
HPWT-RL00 HPWT-ML00 HPWT-DL00 HPWT-BL00	TS AllnGaP Amber	2.5	44 X 88 100 60 50	25x68 70 50 30
HPWN-MB00	InGaN Blue	2.0	110	90
HPWN-MC00	InGaN Cyan	5.0	110	90
HPWN-MG00	InGaN Green	4.5	110	90

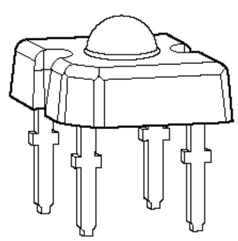
Notes:

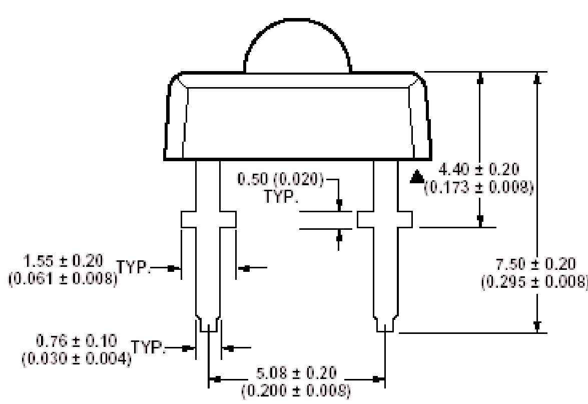
1. Φv is the total luminous flux output as measured with an integrating sphere after the device has stabilized. ($R_{\theta J\text{-}A}$ = 200°C/W, T_A = 25ºC)
2. $\theta_{0.90\ V}$ is the included angle at which 90% of the total luminous flux is captured.

Outline Drawings









Notes:
1. Dimensions are in millimeters (inches).
2. Dimensions without tolerances are nominal.

Absolute Maximum Ratings at T_A = 25ºC

Table 2.

Parameter	HPWA	HPWT	HPWN	Units
DC Forward Current [1]	70	70	50	mA
Power Dissipation	187	221	233	mW
Reverse Voltage (I_R = 100 µA)	10	10	0.55	V
Operating Temperature Range		-40 to +100		ºC
Storage Temperature Range		-55 to +100		ºC
High Temperature Chamber		125ºC, 2 Hours		
LED Junction Temperature		125ºC		
Solder Conditions [2] Preheat Temperature Solder Temperature		85 +/- 15°C, 20 sec (Max 30 sec) 235 +/- 5°C, 2.5 +/- 0.5 sec [1.5mm (0.06 in) below seating plane		

Notes:
1. De-rate as shown in Figures 4a, 4b and 4c.
2. Detail wave soldering instructions found in Application Brief AB13.

Optical Characteristics at
T_A = 25°C, I_F = 70 mA (HPWA, HPWT), I_F = 50 mA (HPWN), $R_{\theta J\text{-}A}$ = 200°C/W

Table 3.

Device Type	Total Stabilized Flux Φ_V (lm) [1] Typ.	Total Instantaneous Flux Φ_V (lm) [2] Typ.	Luminous Intensity to Total Flux I_V(cd)/Φ_V(lm) Typ.	Color, Dominant Wavelength λd (nm)[3] Typ.	Total Included Angle $\theta_{0.90\ V}$ (Degrees)[4] Typ.	Peak Wavelength λpeak (nm) [3] Typ.	Viewing Angle $2\theta^{1/2}$ v (Degrees) Typ.
HPWA-MH00 HPWA-DH00	2.0	2.4	0.6 0.8	618	95 60	624	90 55
HPWT-RD00 HPWT-MD00 HPWT-DD00 HPWT-BD00	3.8	4.6	1.3 0.6 1.1 2.0	630	44x88 100 60 50	640	25x68 70 50 30
HPWT-RH00 HPWT-MH00 HPWT-DH00 HPWT-BH00	5.0	6.2	1.3 0.6 1.1 2.0	620	44x88 100 60 50	626	25x68 70 50 30
HPWT-RL00 HPWT-ML00 HPWT-DL00 HPWT-BL00	2.5	4.0	1.3 0.6 1.1 2.0	594	44x88 100 60 50	596	25x68 70 50 30
HPWN-MB00	2.0	2.0	0.9	470	110	460	90
HPWN-MC00	5	5.2	0.9	505	110	503	90
HPWN-MG00	4.5	4.7	0.9	525	110	520	90

Notes:
1. Total Stabilized Flux Φ_V is the total luminous flux output as measured with an integrating sphere after the device has stabilized to Tj ~ 60°C.
2. Total Instantaneous Flux Φ_V is the total luminous flux output as measured with an integrating sphere at 20ms duration.
3. The dominant wavelength is derived from the CIE Chromaticity Diagram and represents the perceived color of the device at Tj ~ 60 °C.
4. $\theta_{0.90\ V}$ is the included angle at which 90% of the total luminous flux is captured.

Electrical Characteristics at T_A=25°C

Table 4.

Device Type	Forward Voltage V_F (Volts) @ I_F = 70mA (HPWA, HPWT) I_F = 50 mA (HPWN)			Reverse Breakdown V_R (Volts)[1] @ I_R = 100 µA		Capacitance C (pF) V_F = 0, F = 1MHz.	Thermal Resistance $R\theta_{J\text{-}PIN}$ (°C/W)	Speed of Response τ_s (ns) [2]
	Min	Typ	Max	Min	Typ.	Typ.	Typ.	Typ.
HPWA-xH00	1.83	2.2	2.67	10	20	40	155	20
HPWT-xD00	2.19	2.6	3.03	10	20	40	125	20
HPWT-xH00	2.19	2.6	3.03	10	20	40	125	20
HPWT-xL00	2.19	2.6	3.15	10	20	40	125	20
HPWN-xB00	3.00	3.8	4.60	0.55	0.65	1900	130	20
HPWN-xC00	3.00	3.8	4.60	0.55	0.65	1900	130	20
HPWN-xG00	3.00	3.9	4.60	0.55	0.65	1900	130	20

Notes:

1. Operation in reverse bias is not recommended.
2. τs is the time constant, $e^{-t/\tau s}$.

Figures[1]

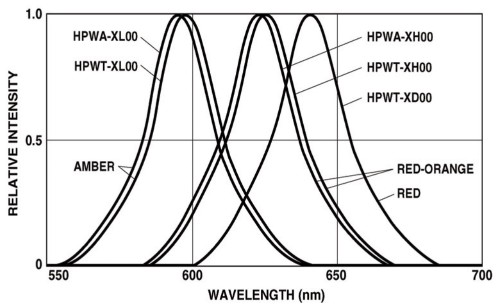


Figure 1a. Relative Intensity vs. Wavelength

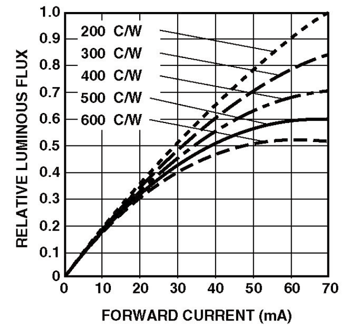


Figure 3. HPWA/HPWT-xx00 Relative Luminous Flux vs. Forward Current.

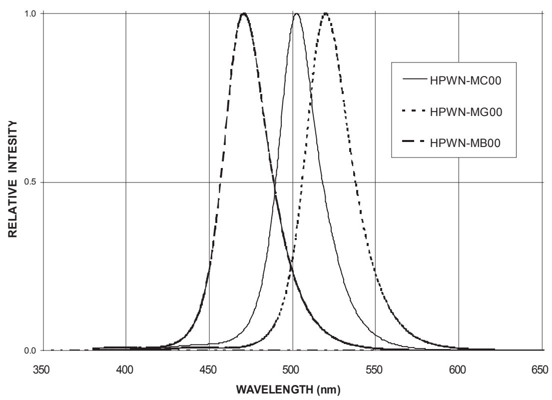


Figure 1b. Relative Intensity vs. Wavelength (HPWN)

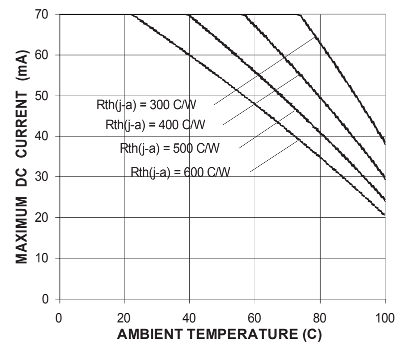


Figure 4a. HPWA-xx00 Maximum DC Forward Current vs. Ambient Temperature.

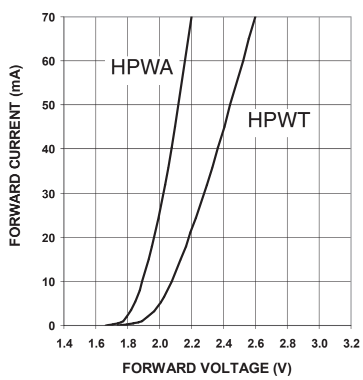


Figure 2a. Forward Current vs. Forward Voltage

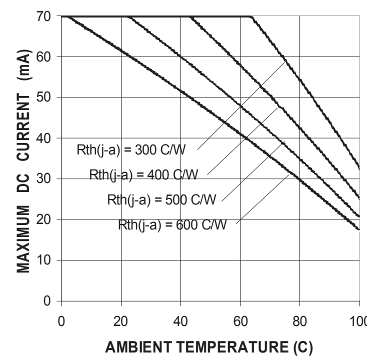


Figure 4b. HPWT-xx00 Maximum DC Forward Current vs. Ambient Temperature.

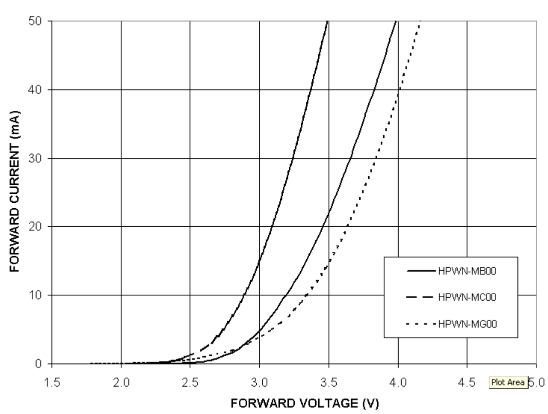


Figure 2b. Forward Current vs. Forward Voltage

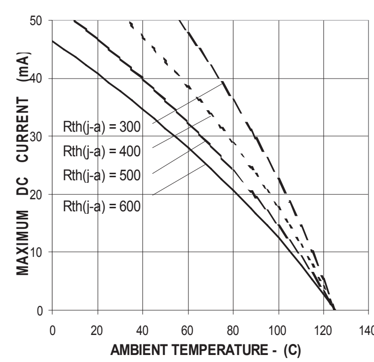


Figure 4c. HPWN-xx00 Maximum DC Forward Current vs. Ambient Temperature.

1. All Figures Typical unless indicated as Maximum.

Note: 1.24mm2 of Cu pad per emitter at cathode lead is recommended for lowest thermal resistance.

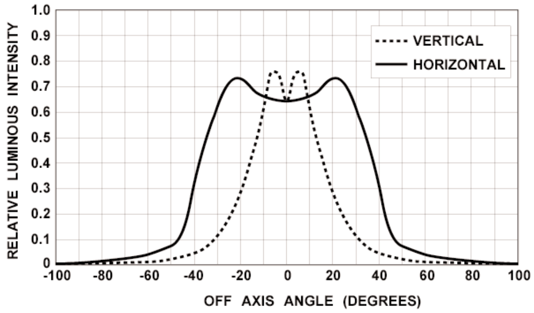


Figure 5a. HPWT-Rx00 Relative Luminous Intensity vs. Off Axis Angle.

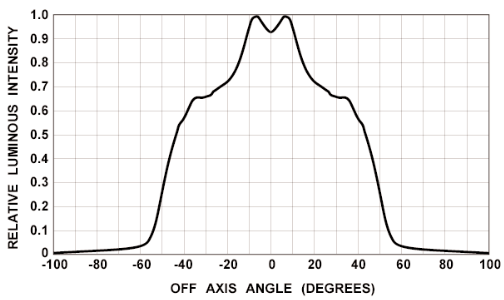


Figure 5b. HPWA-Mx00 Relative Luminous Intensity vs. Off Axis Angle.

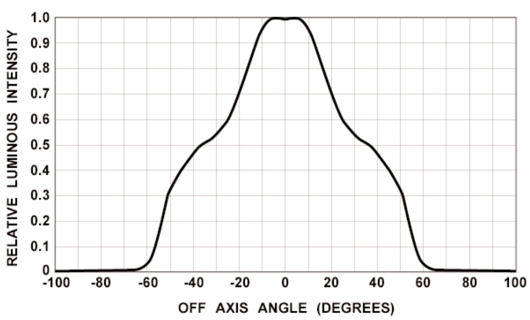


Figure 5c. HPWT-Mx00 Relative Luminous Intensity vs. Off Axis Angle.

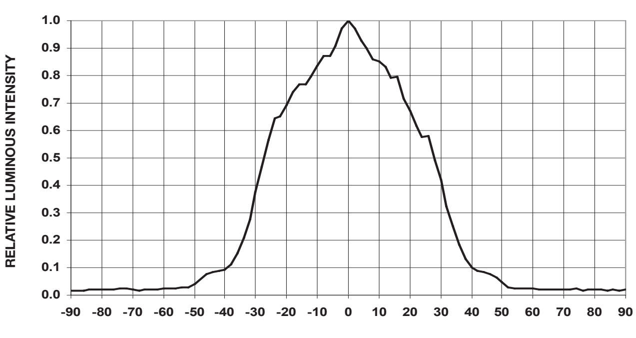


Figure 5d. HPWT-Dx00 Relative Luminous Intensity vs. Off Axis Angle.

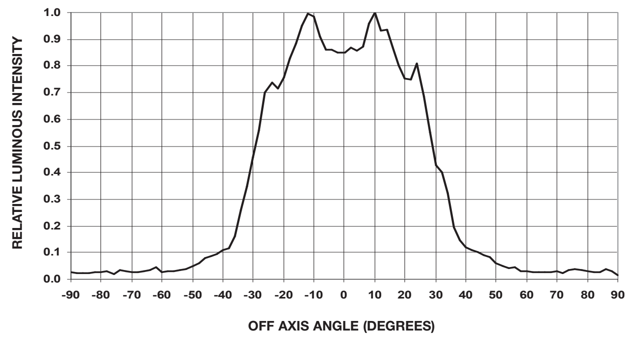


Figure 5e. HPWA(T)-Dx00 Relative Luminous Intensity vs. Off Axis Angle.

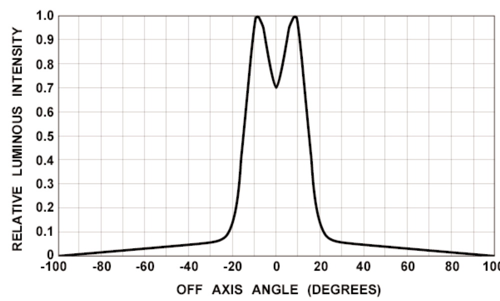


Figure 5f. HPWT-Bx00 Relative Luminous Intensity vs. Off Axis Angle.

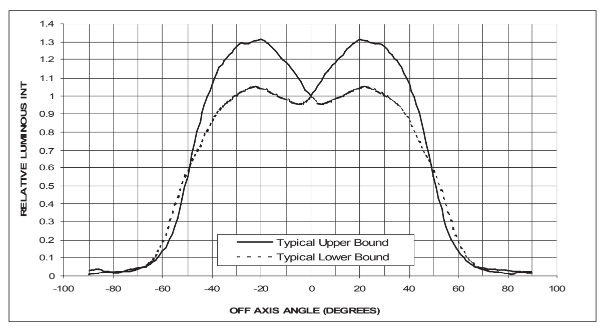


Figure 5g. HPWN-Mx00 Relative Luminous Intensity vs. Off Axis Angle

1. All Figures Typical unless indicated as Maximum.

SuperFlux Product Binning

This section provides bin selection assistance for SuperFlux LEDs. Additional category and label details for SuperFlux product can be found in AB20-7. Product availability varies by color and other factors, and not all bin-selection combinations are available. Contact your Philips Lumileds representative for further assistance.

Luminous Flux Bins

Part Number	Bin Code	Minimum Luminous Flux @ 70 mA (HPWA, HPWT) @ 50 mA (HPWN) [1]	Maximum Luminous Flux @ 70 mA (HPWA, HPWT) @ 50 mA (HPWN) [1]
HPWA-MH00	B	1	1.8
HPWA-DH00	C	1.5	2.4
HPWT-RD00	D	2	3
HPWT-MD00	E	2.5	3.6
HPWT-DD00	F	3	4.2
HPWT-BD00	G	3.5	4.8
HPWT-RH00	E	2.5	3.6
HPWT-MH00	F	3	4.2
HPWT-DH00	G	3.5	4.8
HPWT-BH00	H	4	6.1
	J	5	7.3
HPWT-RL00	C	1.5	2.4
HPWT-ML00	D	2	3
HPWT-DL00	E	2.5	3.6
HPWT-BL00	E	2.5	3.6
HPWN-MB00	-	1	-
HPWN-MC00	-	3	-
HPWN-MG00	-	3	-

Note:

1. Total Luminous Flux as measured with an integrating sphere after the device has stabilized. T_j ~ 60°C

Dominant Wavelength Bins, Red-Orange

Bin Code	Minimum Dominant Wavelength (nm)	Maximum Dominant Wavelength (nm)
1	611	617
2	615	621
3	619	629

Dominant Wavelength Bins, Red

Bin Code	Minimum Dominant Wavelength (nm)	Maximum Dominant Wavelength (nm)
0	622	645

Dominant Wavelength Bins, Amber

Bin Code	Minimum Dominant Wavelength (nm)	Maximum Dominant Wavelength (nm)
1	587	591
2	589	594
9	592	595
3	592	597

Forward Voltage Bins, Red, Red-Orange, and Amber @ 70 mA

Bin Code	Minimum Voltage	Maximum Voltage
1	2.19	2.43
2	2.31	2.55
3	2.43	2.67
4	2.55	2.79
5	2.67	2.91
6	2.79	3.03
7	2.91	3.15

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Company Information

LUXEON® is developed, manufactured and marketed by Philips Lumileds Lighting Company. Philips Lumileds is a world-class supplier of Light Emitting Diodes (LEDs) producing billions of LEDs annually. Philips Lumileds is a fully integrated supplier, producing core LED material in all three base colors (Red, Green, Blue) and White. Philips Lumileds has R&D centers in San Jose, California and in The Netherlands and production capabilities in San Jose and Penang, Malaysia. Founded in 1999, Philips Lumileds is the high-flux LED technology leader and is dedicated to bridging the gap between solid-state LED technology and the lighting world. Philips Lumileds technology, LEDs and systems are enabling new applications and markets in the lighting world.

Philips Lumileds may make process or materials changes affecting the performance or other characteristics of our products. These products supplied after such changes will continue to meet published specifications, but may not be identical to products supplied as samples or under prior orders.

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