



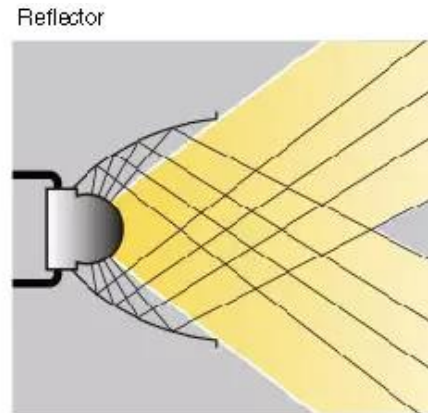
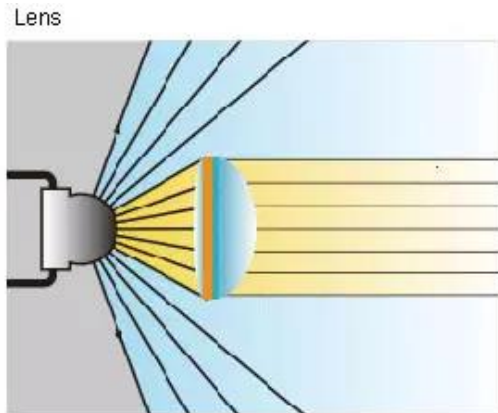
XLamp[®] XP-LR & XP-GR LEDs

Flashlight Optics Analysis

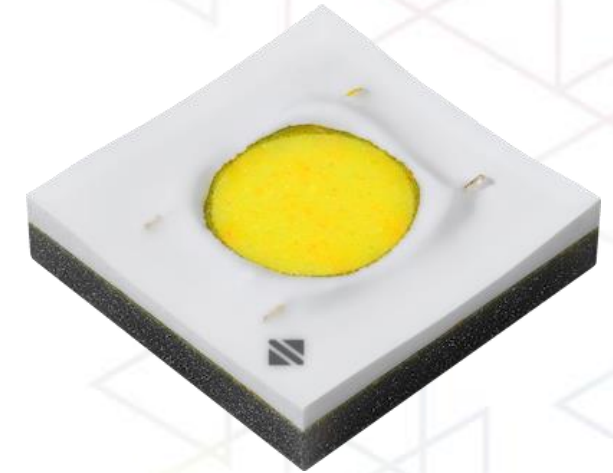


Flashlight Optics Analysis Overview

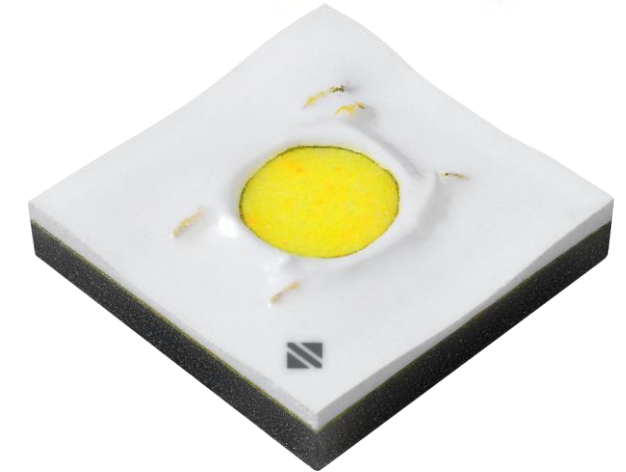
- With the launch of the XLamp® XP-LR & XP-GR LEDs, Cree LED expands its best-in-class portfolio for torch applications
- The round light emitting surface (LES) offers unique advantages for beam pattern symmetry and luminance
- This reference design highlights the benefits of a round LES in two common torch optic geometries
 - 1) Reflector plus flat lens
 - 2) Aspheric projection lens with variable zoom



XP-LR



XP-GR





Reflector + Flat Lens Torch Optic



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Torch Test Vehicle Details

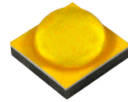
- Commercially available flashlight used for testing
- Smooth reflector + flat optic
- 4 Modes of operation
 - TURBO
 - HIGH
 - MEDIUM
 - LOW
- Battery details
 - Battery size: 21700
 - Voltage: 3.6V
 - Capacity: 5000 mAh
 - Discharge rate: 8A
 - Driver design: Constant current



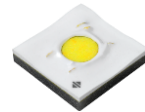
Beam Characterization – White Wall

Output normalized to 300 lumens for comparison

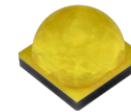
XP-GR and XP-LR display a more concentrated beam pattern with sharper cut offs as compared to typical domed components in the same application (XP-G4 Standard, XP-L2)



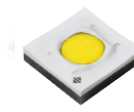
XP-G4 Standard



XP-GR

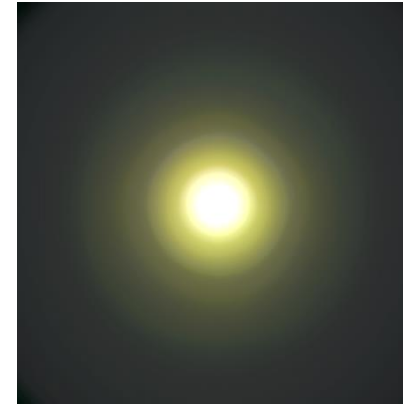
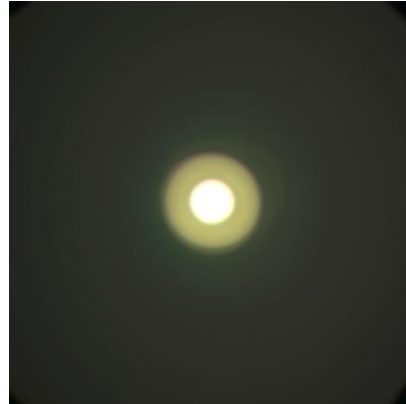


XP-L2

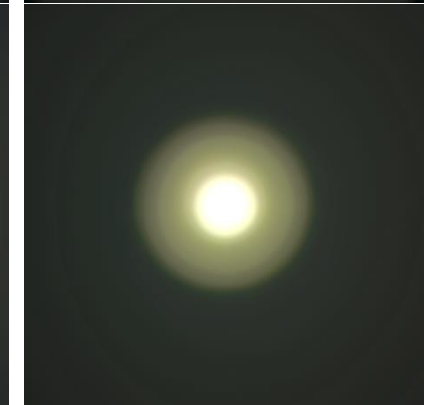


XP-LR

Beam Distance:
0.8 meters

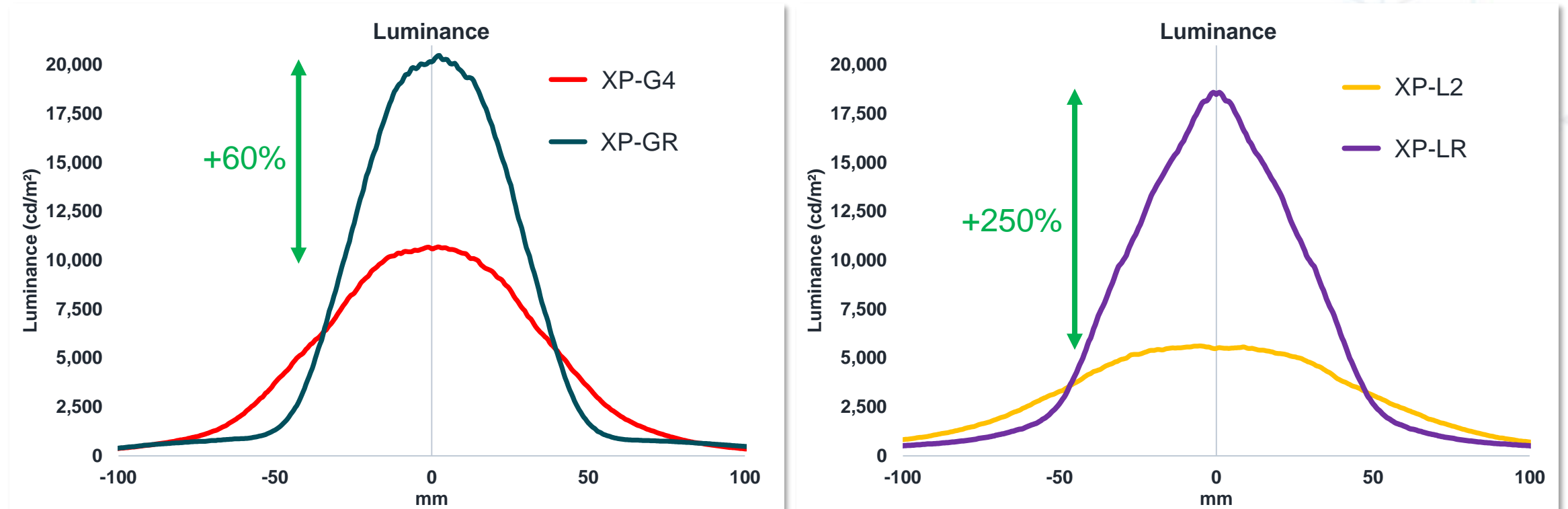


Beam Distance:
1.375 meters



Luminance Scan @ 1.375m

XP-GR and XP-LR demonstrate tighter FWHM and substantially higher total luminance as compared to typical domed components in the same application (XP-G4 Standard, XP-L2)





Aspheric Projection Lens + Zoom



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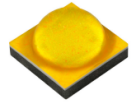
Torch Test Vehicle Details (Aspheric Optic)

- Commercially available flashlight used for testing
- Aspheric projection lens
- 4 Modes of operation
 - HIGH
 - MEDIUM
 - LOW
 - STROBE
- Battery details
 - Battery size: 18650 2S1P
 - Voltage: 7.2V
 - Capacity: 2000 mAh
 - Driver design: Constant current

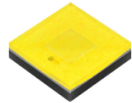


Beam Characterization – White Wall

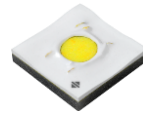
XP-GR and XP-LR display a more concentrated beam pattern with sharper cut offs as compared to typical domed/flat components in the same application (XP-G4 & XP-L2)



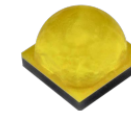
XP-G4 Standard



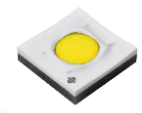
XP-G4 High Intensity



XP-GR

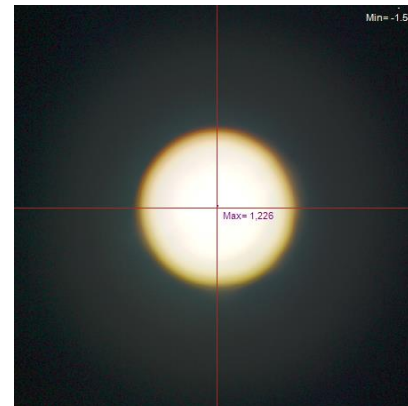
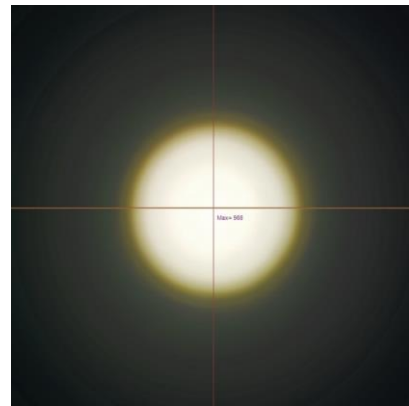
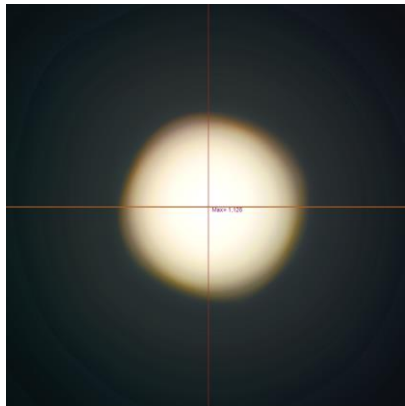


XP-L2

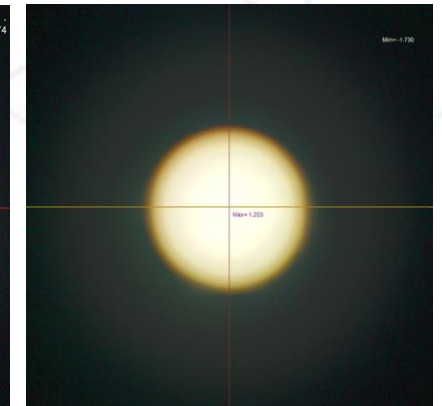
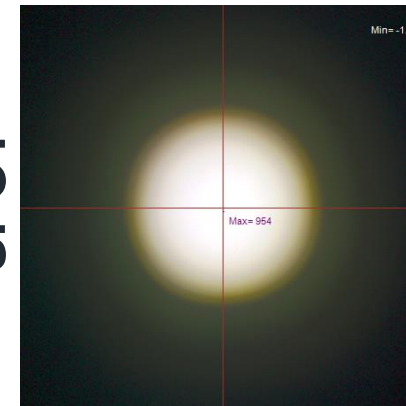


XP-LR

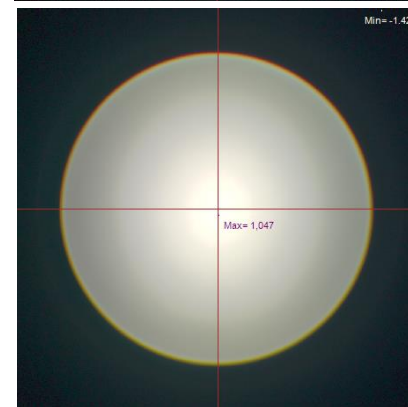
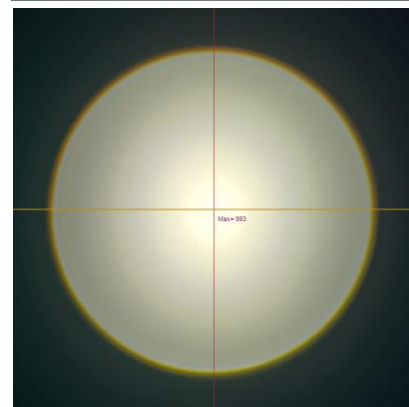
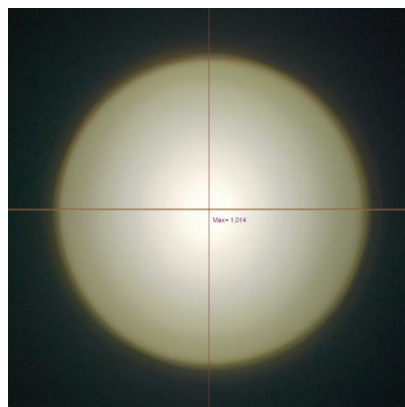
SPOT



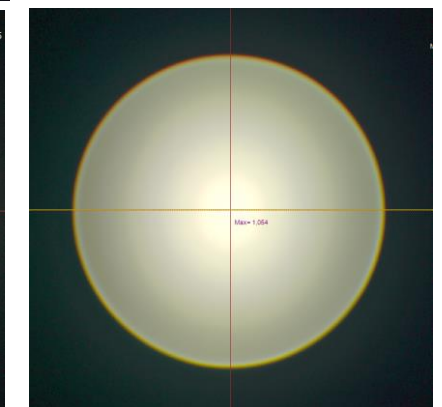
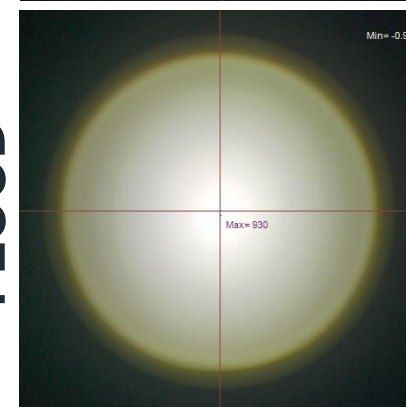
SPOT



FLOOD



FLOOD





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