

HORTICULTURE LIGHTING BRIEF

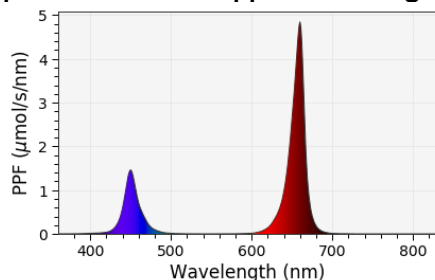
LED SPDs for Plant Growth

LED lighting is used for a broad range of applications in horticulture. Luminus LEDs offer a wide variety of spectral power distributions (SPDs) that can be combined to support these different applications, including:

- **Replacement lighting** such as vertical farming, multilayer cultivation, and home farming where the LED is the only source of light.
- **Supplemental lighting** applications where LED lighting is used to increase crop yields in combination with natural sunlight. Using LEDs to enhance greenhouse growth in winter months and to locally illuminate the sides of plants, where top light is often blocked, provides more energy for fruit growth and is an exciting development for the food production industry.
- **Photoperiod lighting** designed to stimulate specific plant growth phases.

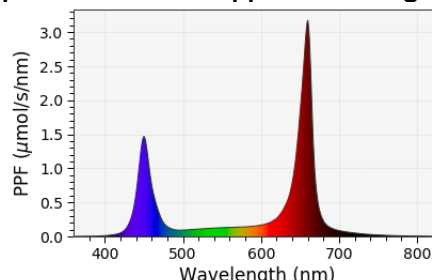
Four Typical Plant Growth SPDs and Luminus Solutions

Replacement and supplemental lighting



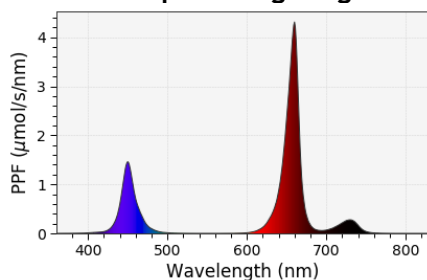
Red Blue spectrum with 15 SST-10-B (450 nm) packages and 45 SST-10-DR (660 nm) packages. The electrical input is 49 Watts 350 mA drive current and the PPF output is 135 $\mu\text{mol/s}$ with a PPF/W of 2.76 $\mu\text{mol/J}$.

Replacement and supplemental lighting



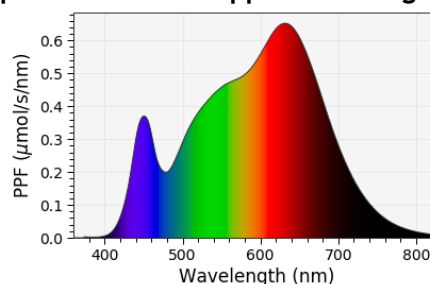
Red-Blue-WW spectrum with 14 SST-10-B (450 nm) packages, 28 SST-10-DR (660) packages and 14 SST-20-W40H warm white (3000K) packages. The electrical input is 50 Watts at 350 mA drive current and the PPF output is 128 $\mu\text{mol/s}$ with a PPF/W of 2.55 $\mu\text{mol/J}$.

Photoperiod lighting



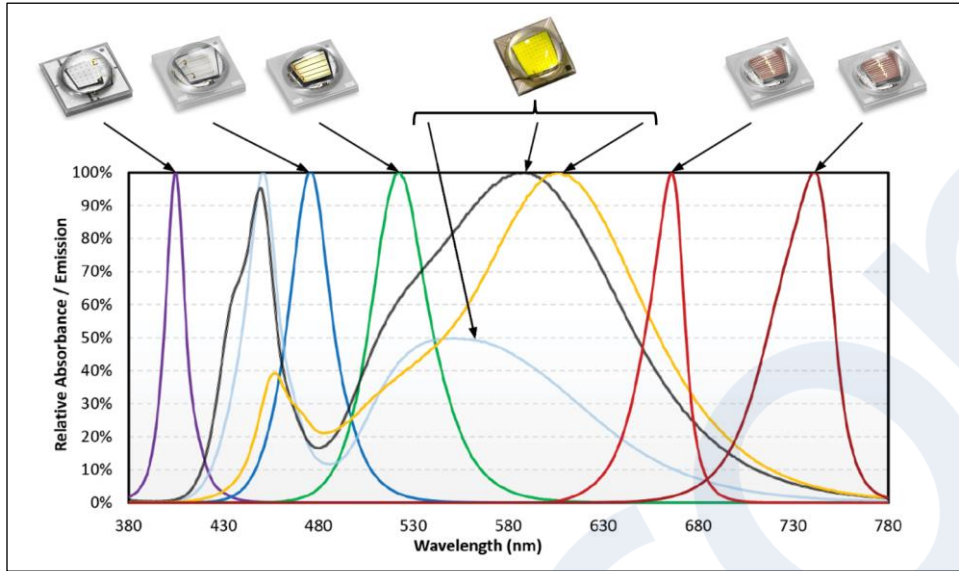
Red-Blue-IR spectrum with 14 SST-10-B (450 nm) packages, 40 SST-10-DR (660) packages and 5 SST-10-FR infrared (730 nm) packages. The electrical input is 49 W at 350 mA drive current and the PPF output is 124 $\mu\text{mol/s}$ with a PPF/W of 2.54 $\mu\text{mol/J}$.

Replacement and supplemental lighting



50 SST-20-W40H warm white packages. The electrical input is 52.5 W at 350 mA drive current and the PPF output is 118 $\mu\text{mol/s}$ with a PPF/W of 2.26 $\mu\text{mol/J}$.

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Luminus LEDs span the spectral range needed for horticultural applications. For example, left to right: SST- UV, SST-B, SST-G, SST-W, SST-DR and SST-FR.

Luminus provides a complete portfolio of LED products tailored for the horticulture industry.

- The Luminus LED portfolio spans the spectrum from UV-A to Near Infrared, covering the entire range needed to tailor light spectrums for horticulture light recipes.
- Luminus LEDs come in three power families, giving designers flexibility to prioritize high efficiency, low cost, or simple fixture design.
- The Luminus SST family features two different beam angles: 90-degree and 120/130-degree enabling the right solution to be implemented for each crop.

Part Number	Peak Wavelength	Test Current	Max. Current	400–700 nm PPF at Test Current (umol/s)	400–700 nm PPF/W at Test Current (umol/J)	All Wavelengths PF at Test Current (umol/s)	All Wavelengths PF/W at Test Current (umol/J)
SST-10-UV	385 nm	500 mA	1000 mA	0.57	0.34	3.38	1.99
SST-10-UV	405 nm	500 mA	1000 mA	2.53	1.53	3.15	1.91
SST-10-B	450 nm	350 mA	1500 mA	2.37	2.26	2.38	2.27
SST-20-B	450 nm	350 mA	3000 mA	2.67	2.72	2.68	2.73
SST-10-SB	470 nm	350 mA	1500 mA	2.25	2.26	2.25	2.26
SST-10-G	530 nm	350 mA	1500 mA	1.21	1.19	1.21	1.19
SST-10-R	620 nm	350 mA	1500 mA	1.67	2.27	1.67	2.27
SST-10-DR	660 nm	350 mA	1500 mA	2.30	3.13	2.30	3.13
SST-20-DR	660 nm	350 mA	3000 mA	2.41	3.28	2.41	3.28
SST-10-FR	730 nm	350 mA	1500 mA	0.14	0.19	1.94	2.64
SST-20-W40H	4000K	350 mA	3000 mA	2.10	2.14	2.28	2.33
SST-20-WCS	6500K	350 mA	3000 mA	2.44	2.49	2.51	2.56
MP3030-12ZH-30-80	3000K	65 mA	400 mA	0.498	2.85	0.526	3.01
MP3030-210H-30-80	3000K	65 mA	240 mA	0.982	2.67	1.040	2.83
MP3030-12ZH-35-80	3500K	65 mA	400 mA	0.491	2.81	0.509	2.91
MP3030-210H-35-80	3500K	65 mA	240 mA	0.968	2.64	1.000	2.72
MP3030-12ZH-65-80	6500K	65 mA	400 mA	0.490	2.80	0.500	2.86
MP3030-210H-65-80	6500K	65 mA	240 mA	0.994	2.71	1.010	2.75
CXM-14-HS-11-36-AC30	Purple	720 mA	1230 mA	45.00	1.84	53.50	2.19
CXM-14-HM-61-36-AC30	Plant White	720 mA	1440 mA	46.00	1.88	51.26	2.09
CLM-22-HS-11-36-AC30	Purple	1100 mA	1860 mA	73.00	1.96	86.00	2.31
CXM-22-HM-61-54-AC30	Plant White	1100 mA	2200 mA	110.00	1.94	122.57	2.16
CXM-32-HM-61-54-AC30	Plant White	2200 mA	4400 mA	235.00	2.07	261.86	2.31