

DLC HORTICULTURAL LIGHTING RESOURCES:

Horticultural Lighting & Spectral Tuning

What are spectrally tunable products?

Spectrally tunable products are products with the capability to adjust spectral output after installation by varying output channels beyond simple, single-axis dimming of the whole product.

What are spectral tuning channels?

Spectral tuning channels are the independent sets of LEDs that, when powered and their output is mixed within the product, result in a single spectral distribution. The output of each set of LEDs can be adjusted, resulting in a different spectral distribution output of the product.



HIGHLIGHTS

- ▼ Defines spectrally tunable products, which are eligible for listing on the Hort QPL.
- ▼ Defines spectral tuning channels.
- ▼ Provides detail on the specific test reports and documentation needed to submit a Hort application for a spectrally tunable product.
- ▼ Provides examples of acceptable control narratives for spectrally tunable products.

What is needed in DLC applications for spectrally tunable products?

User-facing documentation that narrates the control protocol and input parameters employed in controlling the output.

- This should be uploaded in the “Marketing Brochure/Spectral Tuning Documentation” question under the “Product Information” tab in the DLC application.

An LM-79 test report for the manufacturer-designated state with the highest power consumption (“maximum power”).

- A “control narrative” is required to be included in these test reports to describe each control setting and to ensure that the power consumption is at its maximum dedicated level.
- “Maximum power” may or may not be the same as an “all channels on” condition, since fixtures may not be designed to use all their channels simultaneously.
- Test reports must specifically state that the product is operated in this “maximum power” mode during the testing, with a description of the control narrative to ensure that the power state is at its maximum designed level.
- This LM-79 should be uploaded to the “Photon Flux and Electrical Characteristics” tab under “Attach ‘All-on’ Photon Flux Test Report” in the application.

An LM-79 sphere test for each spectral tuning control channel that is used in the product.

- A “control narrative” is required to be included in these test reports to describe each control setting.
- The channel under test must be set to the maximum designed output, while all other channels must be set to their minimum designed output for this state.
- These test reports must present an identifying name for each channel and setting, and the PPF (400-700nm total with three, 100nm-wide “bins”) and PF_{FR} (700-800nm) for each of the single-channel scenarios.
- These reports should be uploaded in the “Spectral Tuning” tab of the application.

ISTMT testing must be provided on the hottest of each of the LED types. For each unique LED type, ISTMT testing must occur at the operating mode that produces the highest operating temperature in the fixture, for this LED type. Test reports must specifically indicate that the product is operated in this “maximum power” condition during the testing, with a description of the control narrative to ensure that the power state is at its maximum designed level.

- The DLC asks any submitters considering LM-84-based maintenance testing on a spectrally tunable fixture to contact horticulture@designlights.org to discuss their proposed testing pattern to ensure a successful outcome.



What is published on the QPL?

The output of each specific channel testing is displayed on the DLC Horticultural QPL on the ‘Spectral Tuning’ tab, with the corresponding name of the channel reported by submitters (i.e Cool White Only, Warm White Only). “Maximum power” flux outputs are displayed on the “Basic Function” tab. These data are intended to support standardized communication of information about the product’s spectral tuning range, aiding product selection and user acceptance.

The Spectral Tuning tab on the Horticultural QPL

Basic Function Spectral Tuning Version History					
Is spectrally tunable: Yes					
Isolated photon flux					
Name	Isolated channel flux, 400-700nm, μmol/s	Isolated channel flux, 400-500nm, μmol/s	Isolated channel flux, 500-600nm, μmol/s	Isolated channel flux, 600-700nm, μmol/s	Isolated channel flux, 700-800nm, μmol/s
White Only		236.59	458.05	292.95	23.01
Red Only		0.07	1.47	538.6	2.78

Examples of Acceptable Control Channel Setting

Example 1: Control Narrative

Channel	Cool White + Warm White	Cool White Only	Warm White Only
Power (watts)	950	525	425

Example 2: Control Narrative

Maximum power output will occur when channel 1 is set to full power and channel 2 is set to minimum power.

Example 3: Control Narrative

Maximum power state = 50/50 Red/White and 100% intensity	100% Red Only/ 100% Intensity	100% White Only/ 100% Intensity
--	----------------------------------	------------------------------------