Evening red bulb Mitochondriak® E14

Spectral measurement · 21 October 2026 · Protocol **ML-2026-10-E14**

Measurement date	21 October 2026
Performed by	Mitochondriak® Lab, Easy Light s.r.o., Slovakia
Instruments	certified spectrometer OHSP-350UVF (230–900 nm, 1 nm step) and a second certified spectrometer UPRtek CV600 with calibration certificate (380–780 nm, 1 nm step)
Conditions	dark room, no other light source
Distance source – sensor	50 cm
Power supply	mains 230 V / 50 Hz
Units	spectral irradiance in mW/m²/nm, illuminance in lx

Summary

The red evening bulb E14 has its spectral peak at 632 nm with 77 % of the energy above 620 nm (FWHM 74 nm). The spectrum is warm and broad, from orange-red to deep red. The blue and green components are practically 0 (below the instrument noise floor). At equal lux it sends a 78× weaker signal to the body clock than an ordinary white LED. The light is practically flicker-free.

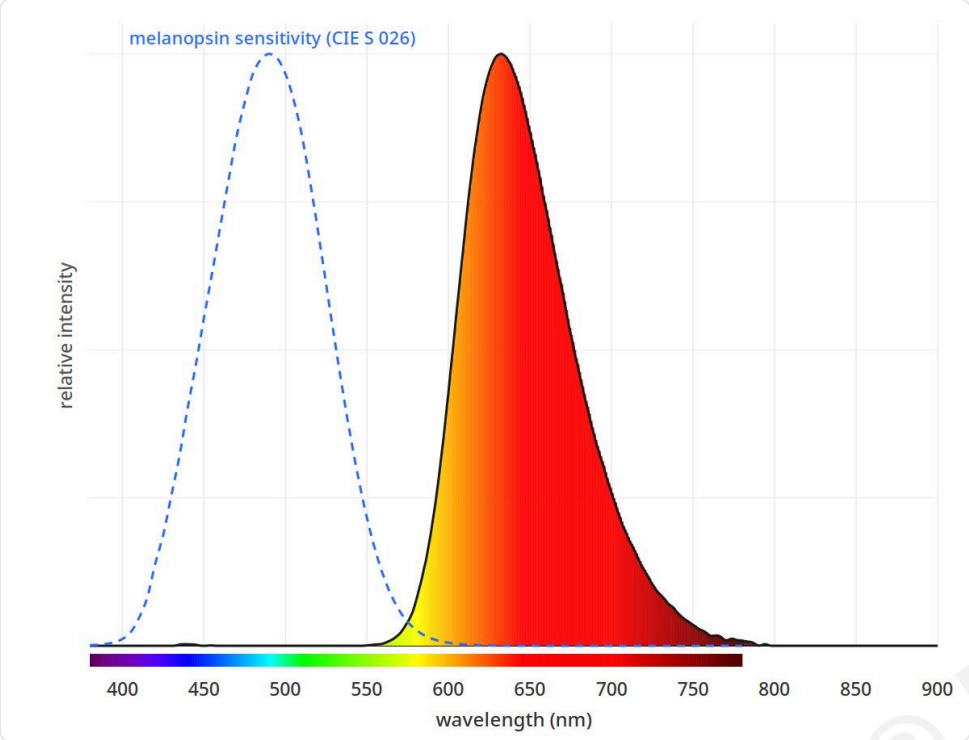
Key results

Parameter	OHSP-350UVF	UPRtek CV600
Spectral peak	**632 nm**	**629 nm**
Dominant wavelength OHSP-350UVF	**612.9 nm**	
Full width at half maximum (FWHM)	**74 nm (603–677 nm)**	**74 nm (599–673 nm)**
Spectral centroid	**647 nm**	**644 nm**
Energy share 600–700 nm	**86 %**	**82 %**
Energy share above 620 nm	**77 %**	**73 %**
Blue light below 500 nm	**practically 0 (below the instrument noise floor)**	
Blue and green light below 550 nm	**practically 0 (below the instrument noise floor)**	
Illuminance at 50 cm	**300.0 lx**	**243.2 lx**
Irradiance 380–780 nm	**1.96 W/m²**	**1.44 W/m²**
Melanopic EDI (CIE S 026) calculated from the OHSP-350UVF spectrum	**2.33 lx**	
Melanopic ratio mel-DER ordinary white LED 0.608	**0.0078**	
Signal to the body clock (circadian rhythm) vs. an ordinary white LED at equal lux CIE S 026	**78× weaker**	
CIE 1931 chromaticity (x / y)	**0.673 / 0.325**	**0.657 / 0.332**
Colour purity OHSP-350UVF	**100 %**	
S/P ratio OHSP-350UVF	**0.09**	
Flicker UPRtek CV600	**practically flicker-free – flicker index 0.01**	

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Spectrum



Spectrum: Red evening bulb E14, OHSP-350UVF, 380–900 nm, normalised. Dashed blue line = melanopsin sensitivity (CIE S 026).

Measurement setup



Measurement setup: Red evening bulb E14, Mitochondriak® Lab, 21 October 2026.

Flicker

0.01	4.68 %
flicker index	% flicker (UPRtek CV600)

Lights powered from 50 Hz AC mains fluctuate slightly at 100 Hz. This is not visible flicker but a small fluctuation of light, described by two quantities: percent flicker and flicker index.

Measured (UPRtek CV600): flicker index 0.01, percent flicker 4.68 % at 100 Hz. The OHSP-350UVF in flicker mode (50 kHz sampling) recorded a flat line with 0.0 % modulation depth – this measurement applies to Mitochondriak® red bulbs. Result: practically flicker-free, below the IEEE 1789 low-risk limit (< 8 % at 100 Hz).

On repeated measurements, percent flicker varies by tenths of a percent with the tilt of the instrument.

Data and citation

Full data at 1 nm (CSV, both instruments):
https://mitochondriak-media.fsn1.your-objectstorage.com/products/e14-red-bulb/measurements/mitochondriak-e14-red-bulb-spectrum-data.csv

Summary protocol of all measurements:
https://mitochondriak-media.fsn1.your-objectstorage.com/blog/science/lab-2026-10/mitochondriak-lab-measurement-protocol-2026-10-en.pdf

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Method

- **Spectra:** certified spectrometer OHSP-350UVF (230–900 nm) and a second certified spectrometer UPRtek CV600 with calibration certificate (380–780 nm), both with a 1 nm step. Output: spectral irradiance E(λ) in mW/m²/nm.
- **Illuminance:** $E_v = 683\ lm/W \cdot \Sigma\ E(\lambda) \cdot V(\lambda) \cdot \Delta\lambda$, where V(λ) is the CIE photopic luminous efficiency function and Δλ = 1 nm. The value calculated from the spectrum matches the instrument reading.
- **Melanopic EDI** (equivalent daylight illuminance) per CIE S 026:2018: $E_{mel} = \Sigma\ E(\lambda) \cdot s_{mel}(\lambda) \cdot \Delta\lambda\ /\ 1.3262\ mW/lm$. In plain words: how many lux of daylight would send the same signal to the body clock. Technically: the D65 daylight illuminance with the same response of melanopsin in the retinal ipRGCs. mel-DER = melanopic EDI / illuminance. An international expert consensus (Brown et al., PLoS Biology 2022) recommends at least 250 lx during the day, at most 10 lx in the evening and at most 1 lx during sleep (melanopic EDI).
- **Melanopic values** are calculated from the OHSP-350UVF spectrum (lower noise in the blue range, wider range). The UPRtek CV600 has a noise background of about 0.02 mW/m²/nm in the blue range, which for light without a blue component would add up to a small artificial contribution. Both instruments agree on the shape of the spectrum and the peak position (difference 3 nm).
- **Bands:** energy shares below 500 nm (blue), below 550 nm (blue and green), 600–700 nm and above 620 nm are calculated from spectral irradiance in the 380–780 nm range; shares 700–900 nm and 780–900 nm from the 380–900 nm range (OHSP-350UVF). FWHM is the spectral width at half of the peak height; the centroid is the energy-weighted mean wavelength.
- **Flicker:** percent flicker = (max − min) / (max + min) · 100 %; flicker index = area of the light waveform above its mean level / total area per period (IES). UPRtek CV600 in Flicker mode, OHSP-350UVF in Flick mode with 50 kHz sampling.
- **Illuminance** is measured at one point at the stated distance, not as luminous flux in lumens (which requires an integrating sphere). For directional light it depends on the exact position and orientation of the sensor, so we report the values of both instruments. Values apply to the measured unit; negative noise values are clipped to 0.

Spectral table (5 nm step)

λ (nm)	OHSP-350UVF	UPRtek CV600	λ (nm)	OHSP-350UVF	UPRtek CV600	λ (nm)	OHSP-350UVF	UPRtek CV600
380	0	0.046	**515**	0	0.056	**650**	20.96	14.11
385	0	0.043	**520**	0	0.051	**655**	19.42	12.95
390	0	0.031	**525**	0	0.062	**660**	17.77	11.73
395	0	0.044	**530**	0	0.055	**665**	16.03	10.50
400	0	0.031	**535**	0	0.065	**670**	14.42	9.370
405	0	0.035	**540**	0	0.074	**675**	12.70	8.240
410	0	0.045	**545**	0	0.098	**680**	11.17	7.247
415	0	0.050	**550**	0.014	0.138	**685**	9.762	6.373
420	0	0.073	**555**	0.052	0.195	**690**	8.406	5.577
425	0	0.101	**560**	0.094	0.313	**695**	7.339	4.853
430	0	0.145	**565**	0.237	0.498	**700**	6.236	4.220
435	0.045	0.198	**570**	0.489	0.826	**705**	5.255	3.652
440	0.058	0.211	**575**	0.972	1.328	**710**	4.428	3.113
445	0.039	0.185	**580**	1.811	2.115	**715**	3.759	2.691
450	0	0.133	**585**	3.157	3.276	**720**	3.091	2.316
455	0.012	0.108	**590**	4.957	4.800	**725**	2.505	1.985
460	0	0.074	**595**	7.403	6.719	**730**	2.084	1.703
465	0	0.059	**600**	10.37	8.942	**735**	1.696	1.442
470	0	0.048	**605**	13.67	11.23	**740**	1.378	1.267
475	0	0.049	**610**	16.85	13.33	**745**	1.074	1.092
480	0	0.042	**615**	19.75	15.09	**750**	0.847	0.934
485	0	0.042	**620**	21.99	16.35	**755**	0.636	0.804
490	0	0.045	**625**	23.43	17.03	**760**	0.426	0.675
495	0	0.048	**630**	24.11	17.16	**765**	0.417	0.593
500	0	0.045	**635**	24.06	16.77	**770**	0.222	0.529
505	0	0.046	**640**	23.41	16.17	**775**	0.274	0.462
510	0	0.051	**645**	22.37	15.25	**780**	0.214	0.434

Spectral irradiance in mW/m²/nm, distance 50 cm. The UPRtek CV600 measures 380–780 nm. 230–375 nm (UV): 0 – below the instrument noise floor. 785–900 nm: values below 1 % of the peak (below the instrument noise floor or the tail of the spectrum); full 1 nm data are in the CSV.

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