

Evening red bulb Mitochondriak® E27

Spectral measurement · 21 October 2026 · Protocol **ML-2026-10-E27**

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/m ² /nm, illuminance in lx

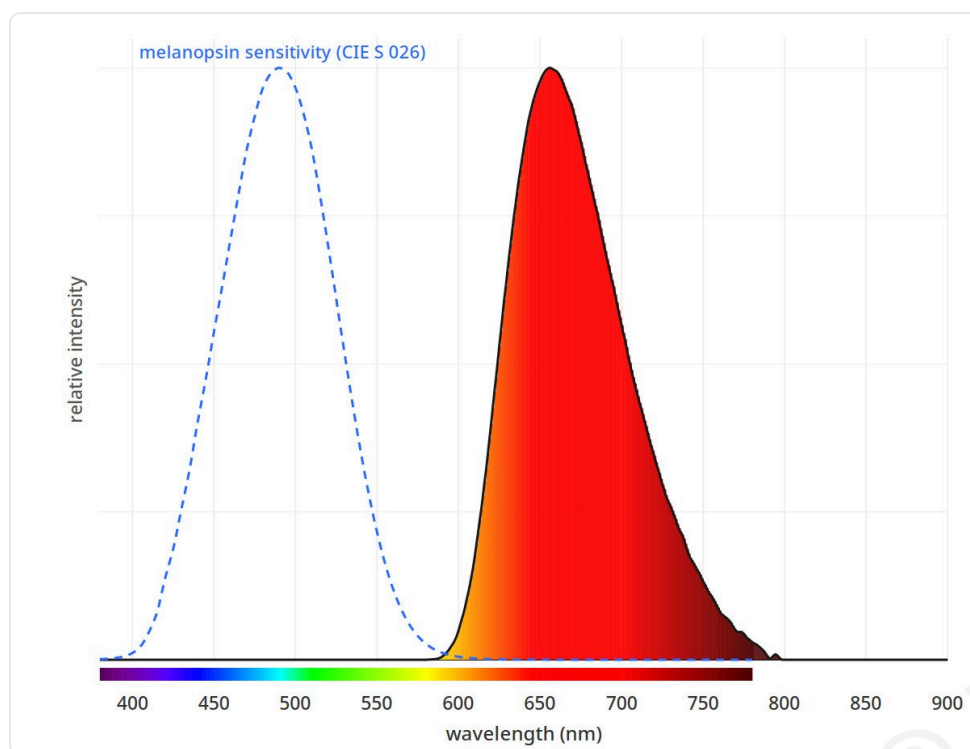
Summary

The red evening bulb E27 has its spectral peak at 656 nm with 95 % of the energy above 620 nm (FWHM 81 nm). It is the deepest red among Mitochondriak® bulbs. The blue and green components are practically 0 (below the instrument noise floor). At equal lux it sends a 270× weaker signal to the body clock than an ordinary white LED. The light is practically flicker-free.

Key results

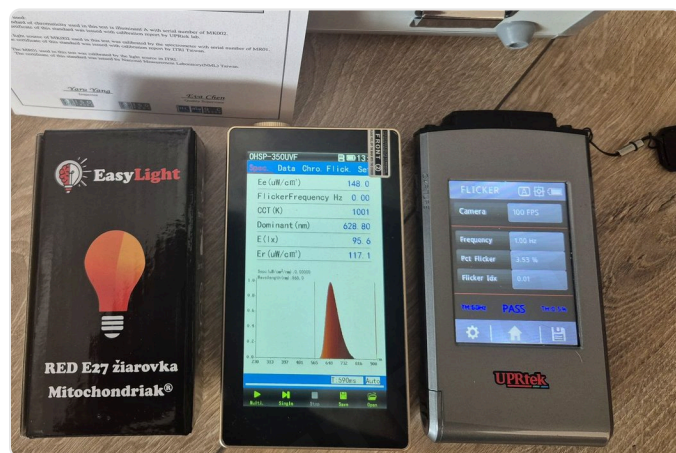
Parameter	OHSP-350UVF	UPRtek CV600
Spectral peak	656 nm	653 nm
Dominant wavelength OHSP-350UVF	628.8 nm	
Full width at half maximum (FWHM)	81 nm (624–705 nm)	81 nm (621–702 nm)
Spectral centroid	671 nm	668 nm
Energy share 600–700 nm	79 %	78 %
Energy share above 620 nm	95 %	93 %
Blue light below 500 nm	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	95.6 lx	112.8 lx
Irradiance 380–780 nm	1.48 W/m ²	1.48 W/m ²
Melanopic EDI (CIE S 026) calculated from the OHSP-350UVF spectrum	0.22 lx	
Melanopic ratio mel-DER ordinary white LED 0.608	0.0023	
Signal to the body clock (circadian rhythm) vs. an ordinary white LED at equal lux CIE S 026	270× weaker	
CIE 1931 chromaticity (x / y)	0.706 / 0.294	0.691 / 0.301
Colour purity OHSP-350UVF	100 %	
S/P ratio OHSP-350UVF	0.04	
Flicker UPRtek CV600	practically flicker-free – flicker index 0.01	

Spectrum



Spectrum: Red evening bulb E27, OHSP-350UVF, 380–900 nm, normalised. Dashed blue line = melanopsin sensitivity (CIE S 026).

Measurement setup



Measurement setup: Red evening bulb E27, Mitochondriak® Lab, 21 October 2026.

Flicker

0.01

flicker index

3.53 %

% 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 3.53 % 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/e27-red-bulb/measurements/mitochondriak-e27-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>

Citation: Mitochondriak® Lab (2026). Evening red bulb Mitochondriak® E27 – measurement protocol ML-2026-10-E27, 21 October 2026. www.mitochondriak.com. Citation with attribution permitted.

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 $E(\lambda)$ in $\text{mW}/\text{m}^2/\text{nm}$.
- **Illuminance:** $E_v = 683 \text{ lm}/\text{W} \cdot \sum E(\lambda) \cdot V(\lambda) \cdot \Delta\lambda$, where $V(\lambda)$ is the CIE photopic luminous efficiency function and $\Delta\lambda = 1 \text{ nm}$. The value calculated from the spectrum matches the instrument reading.
- **Melanopic EDI** (equivalent daylight illuminance) per CIE S 026:2018: $E_{\text{mel}} = \sum E(\lambda) \cdot s_{\text{mel}}(\lambda) \cdot \Delta\lambda / 1.3262 \text{ mW}/\text{lm}$. 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 $0.02 \text{ mW}/\text{m}^2/\text{nm}$ 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 = $(\text{max} - \text{min}) / (\text{max} + \text{min}) \cdot 100 \%$; 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	0.048	520	0	0.048	660	16.97	16.35
385	0	0.045	525	0	0.048	665	16.51	15.63
390	0	0.026	530	0	0.042	670	15.89	14.80
395	0	0.030	535	0	0.048	675	14.94	13.79
400	0	0.021	540	0	0.044	680	13.90	12.73
405	0	0.028	545	0	0.051	685	12.91	11.76
410	0	0.036	550	0	0.052	690	11.78	10.75
415	0	0.031	555	0	0.060	695	10.76	9.736
420	0	0.036	560	0	0.055	700	9.642	8.738
425	0	0.040	565	0	0.056	705	8.566	7.794
430	0	0.044	570	0	0.074	710	7.590	6.863
435	0	0.046	575	0	0.096	715	6.727	6.069
440	0	0.041	580	0.000	0.140	720	5.874	5.356
445	0	0.052	585	0.015	0.243	725	5.060	4.693
450	0	0.040	590	0.092	0.464	730	4.429	4.101
455	0	0.042	595	0.348	0.867	735	3.792	3.566
460	0	0.038	600	0.838	1.578	740	3.201	3.116
465	0	0.036	605	1.731	2.645	745	2.705	2.720
470	0	0.032	610	2.991	4.120	750	2.253	2.363
475	0	0.038	615	4.738	5.987	755	1.844	2.041
480	0	0.037	620	6.806	8.082	760	1.410	1.764
485	0	0.034	625	9.048	10.26	765	1.175	1.516
490	0	0.041	630	11.20	12.26	770	0.843	1.310
495	0	0.041	635	13.13	13.92	775	0.744	1.132
500	0	0.040	640	14.75	15.32	780	0.511	1.070
505	0	0.044	645	15.97	16.23	785	0.349	–
510	0	0.050	650	16.68	16.67			
515	0	0.047	655	17.06	16.72			

Spectral irradiance in $\text{mW}/\text{m}^2/\text{nm}$, distance 50 cm. The UPRtek CV600 measures 380–780 nm. 230–375 nm (UV): 0 – below the instrument noise floor. 790–900 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.