

# IEEE Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers

IEEE Power Electronics Society

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**Abstract:** This document includes a definition of the concept of modulation frequencies for light-emitting diodes (LEDs), a discussion on their applications to LED lighting, a description of LED lighting applications in which modulation frequencies pose possible health risks to users, a discussion of the dimming of LEDs by modulating the frequency of driving currents/voltage, and recommendations for modulation frequencies (flicker) for LED lighting and dimming applications to help protect against known potential adverse health effects.

**Keywords:** flicker, headaches, health, IEEE 1789™, LED lighting, migraines, modulation, perception, power electronic drivers, seizure, stroboscopic

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