

Summary of Scope

IEEE PAR1789

Recommended Practices of Modulating Current in High Brightness LEDs for Mitigating Health Risks to Viewers

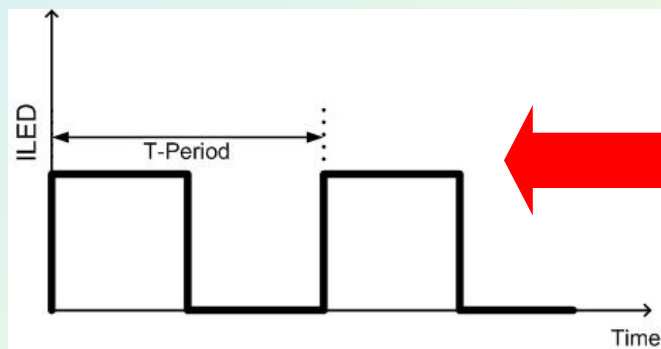
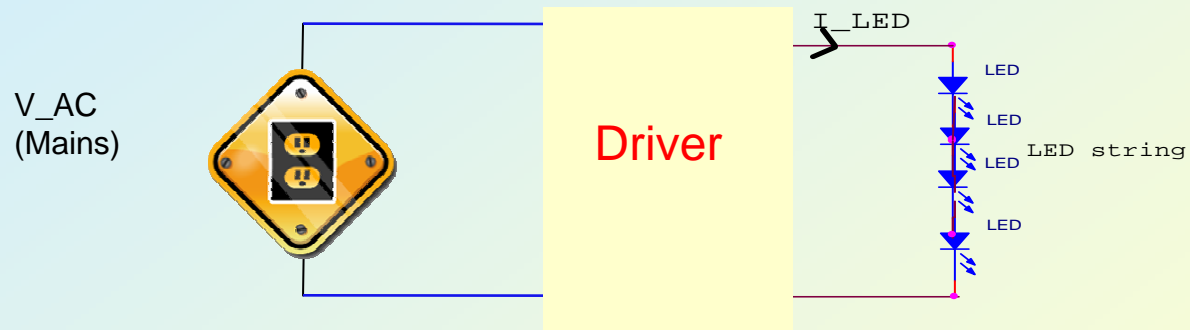
- 1. Describe some possible health risks, such as headaches, eye strain and epileptic seizure, associated with low frequency modulation of High Brightness LEDs in different applications;**
- 2. Provide recommended practices to aid design of LED driving systems to modulate at safe frequencies for their particular applications in order to protect against the described health risks.**

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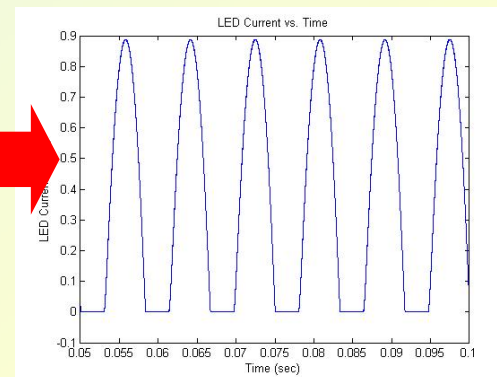
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The Concern

Products, literature, and research papers are using low frequency (120Hz US; 100Hz Europe) to drive High Brightness LEDs in some applications

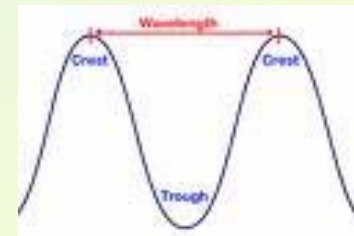
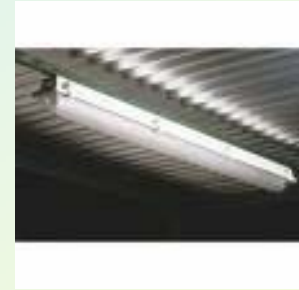


Common LED Currents
($1/T=f=100\sim 120\text{Hz}$)



The Concern

- Research in fluorescent lighting in the late 1980's and early 1990's showed that modulation at low frequencies for office and residential lighting can cause health related problems, such as headaches, eye strain and epileptic seizure.
- The detrimental effects depend on factors such as brightness, angle of viewing, wavelength, depth of modulation, among others.
- Should we worry with LEDs? Is the problem different? Which, if any types of applications are of concern? (Brake Lights, Office Lighting, Under-cabinet Kitchen, Flashlights, Emergency Lighting...)



PURPOSE

Vision: *Bring together a community of lighting environmental psychologists, lamp designers, LED driver designers, and LED lamp users to openly discuss concerns for LED lighting.*

- There is a need to create a community where experts among the above different fields can communicate.
- Suggest a recommended practice, not a standard.
Representation on IEEE P1789 from CIE and NEMA may later incorporate findings into standards if deemed necessary.
- IEEE Standards Association has a unique open process that **MUST** involve all interest groups including academics, national labs, industry, customers...

PURPOSE

Scope: The scope of this standard is to:

- 1) Define the concept of modulation frequencies for LEDs and give discussion on their applications to LED lighting,
- 2) Describe LED lighting applications in which modulation frequencies pose possible health risks to users,
- 3) Discuss the concept of dimming of LEDs by modulating the frequency of driving currents/voltage,
- 4) Present recommendations for modulation frequencies for LED lighting and dimming applications to protect against known adverse health effects.

For Us to Work On (Ideas)

1. Suggest recommended practice, not propose a standard.
2. Investigate the influence of various factors on health risks to viewers, such as
 - a. Frequency modulation: techniques and frequency
 - b. Wavelength/color of the LED
 - c. Angle of viewing
 - d. Brightness
3. If there are types of LED lamps that pose little risk with low frequency modulation, then it is important to describe them. We may decide to divide LED into the three categories (we need to define them)
 - a. Surely needs attention
 - b. May need attention
 - c. Does not need attention

Or, we may even have categories of lighting that represent a need for more research. (This is an extremely valuable outcome to the lighting industry and national labs.)

4. We have a diverse expertise in our IEEE standards group that includes lamp designers, power electronic driver designers, lighting designers and physio-psychologists, etc. We will break up the work into subgroups according to expertise.
5. Goal: Completion Date 12/2010 or earlier

Method of Operation

- **We will follow the IEEE Standards Association Guidelines at <http://standards.ieee.org/guides/companion>**

Highlights

- Complete open process. Membership and participation rules are posted on our website.
- Meetings may run either informally or by Robert's Rules of Order. Each member will be given a turn to express opinions.
- Chair never makes a motion or biases discussion. Role of chair is to guide the meeting only.
- Meetings will include web discussions, telephone conferences, etc.
- Divide into sub-task groups.

Leadership

Year 1 (appointed by IEEE)

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Year 2 – elections for Chair/Vice-chair only

Open Positions for Volunteers

- Secretary
- Task Group Leaders: Standards Liaison, LED Lamp Design, Health Assessment, Far East Discussion Facilitator? Others?