NEMA Standard on Temporal Light Artifacts

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Outline

NEMA TLA Standard Status

NEMA's Selected Metrics

Comparison to other metrics

Complications in characterization

NEMA status

Technical work on standard has completed.
Now in internal NEMA processing.
Expected to publish near the end of Q1 2017.

Includes:

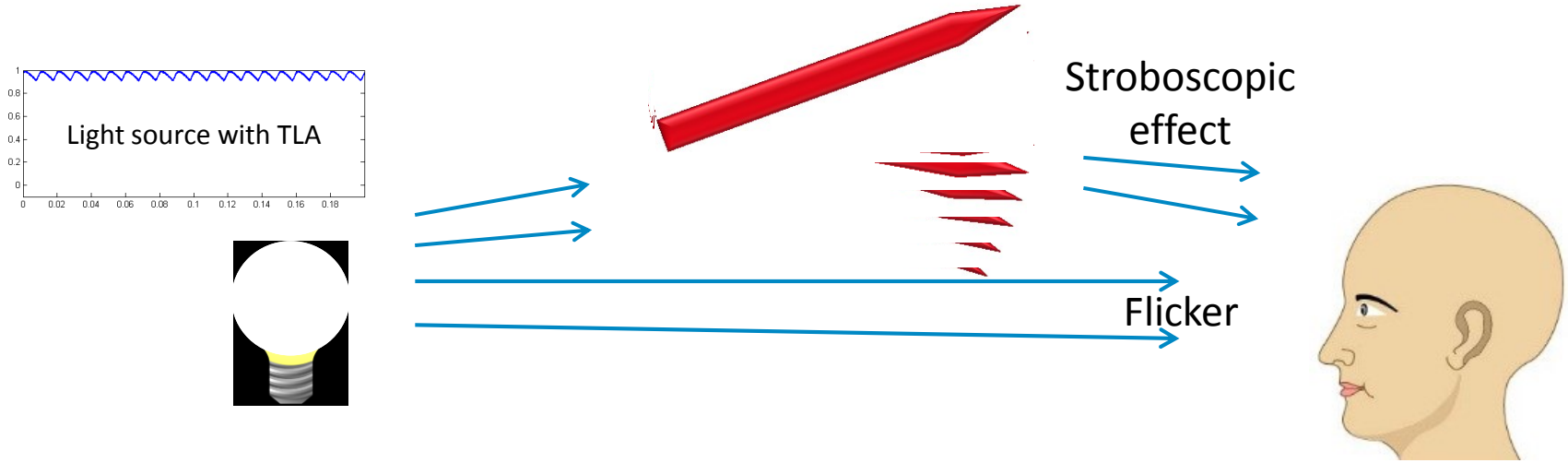
- Measurement method.
  - Flicker (<80 Hz) – Metric P_{st}
  - Stroboscopic Effect (>80 Hz) – Metric SVM
- Guidelines for levels to stay below.

Next steps: IES(+others) will build upon it, to add application-specific limits.

- Task
- Location
- Individual sensitivity

Title: Temporal Light Artifacts: Test Methods and Guidance for Acceptance Criteria

Flicker – Characterize with P_{st}
Stroboscopic Effect – Characterize with SVM



If visible directly, with no motion, frequency is low (<~80 Hz).

↘

Flicker, Characterize with P_{st}

If visible only with object motion, then frequency is high (>~80 Hz).

↘

Stroboscopic effect, Characterize with SVM

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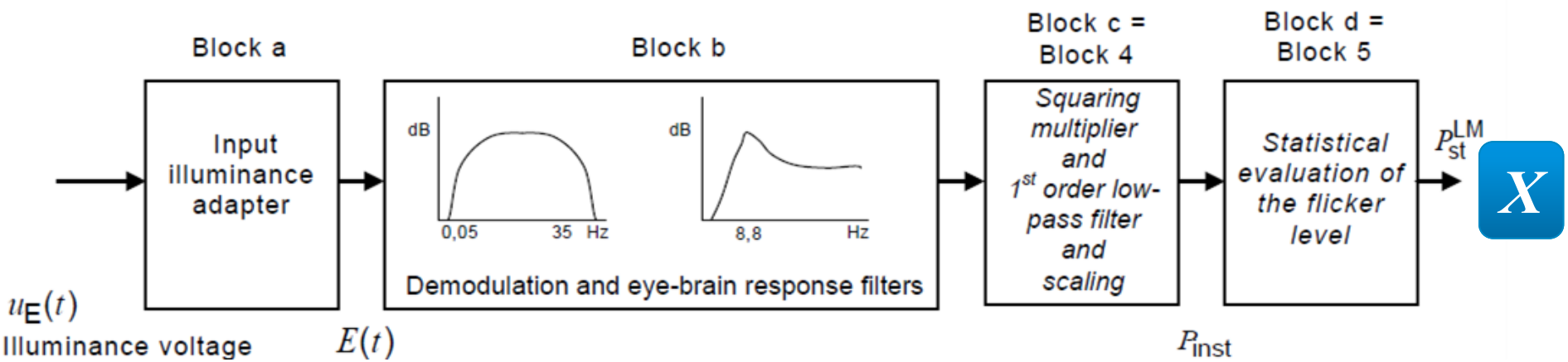
IEC flicker testing (P_{st})

- IEC 61000-4-15
  - "Flickermeter – Functional and design specifications"
- IEC 61000-3-3
  - "Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems"
- Complex; originally developed to quantify power line quality
- IEC TR 61547-1 (Adopts IEC 61000 for use with light)

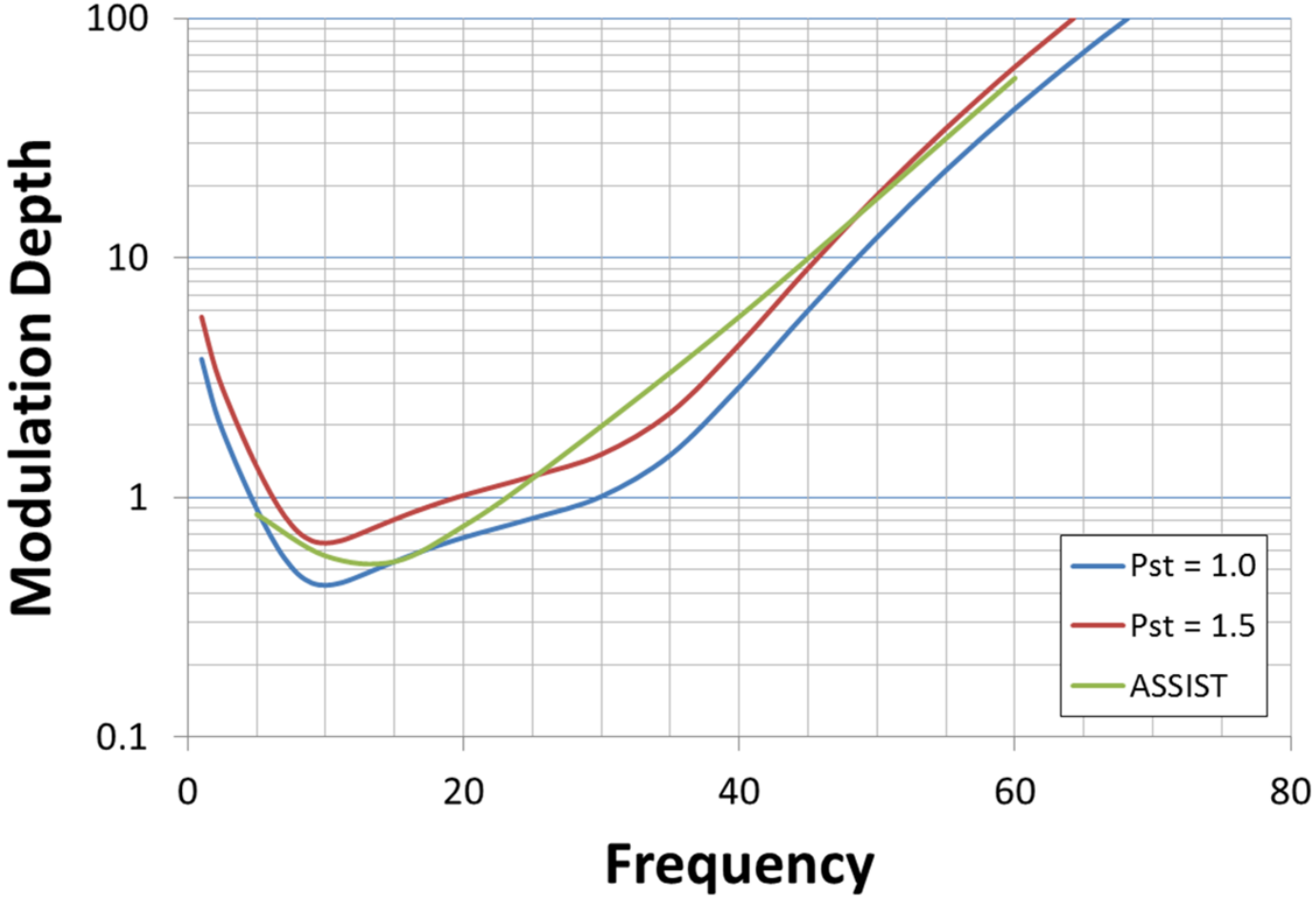


Structure of the IEC light flickermeter

Sources: https://webstore.iec.ch/publication/4150 , https://webstore.iec.ch/publication/4173

No motion

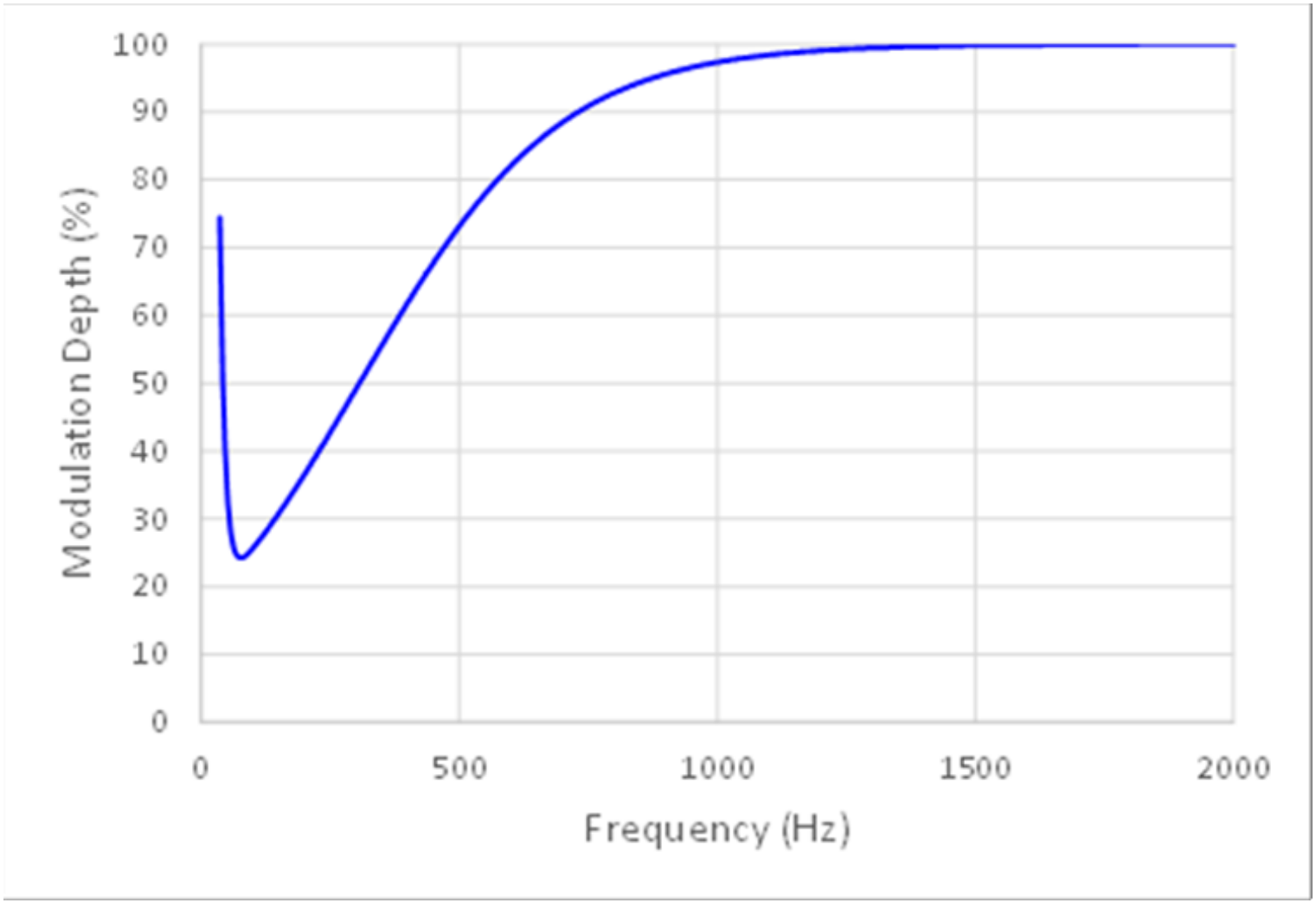
Human sensitivity to flicker



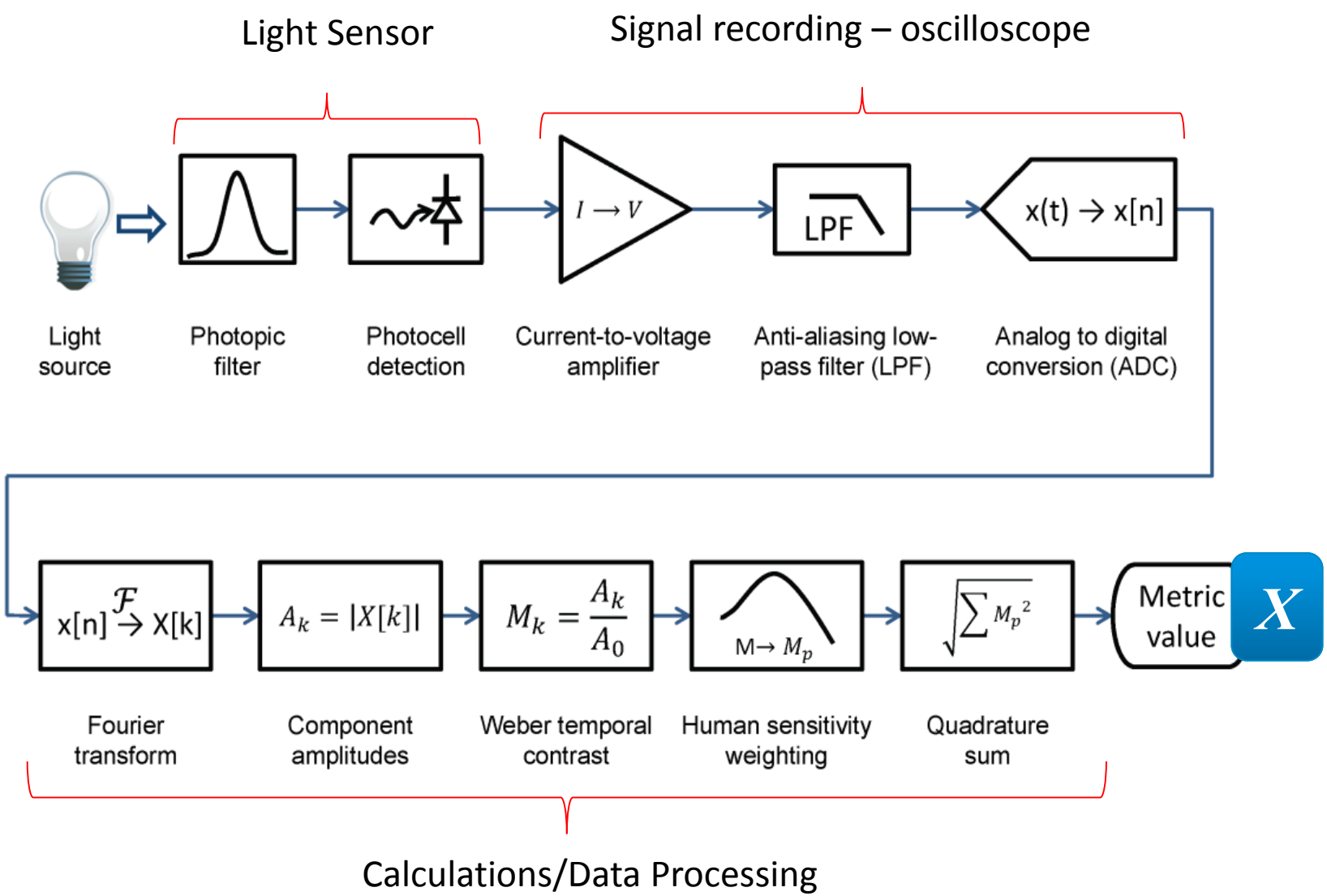
Plot of the visibility threshold (P_{st} = 1 and ASSIST), for visible flicker, expressed in terms of modulation depth, as a function of frequency. The curve is for a single sine wave modulation.

Stroboscopic visibility threshold

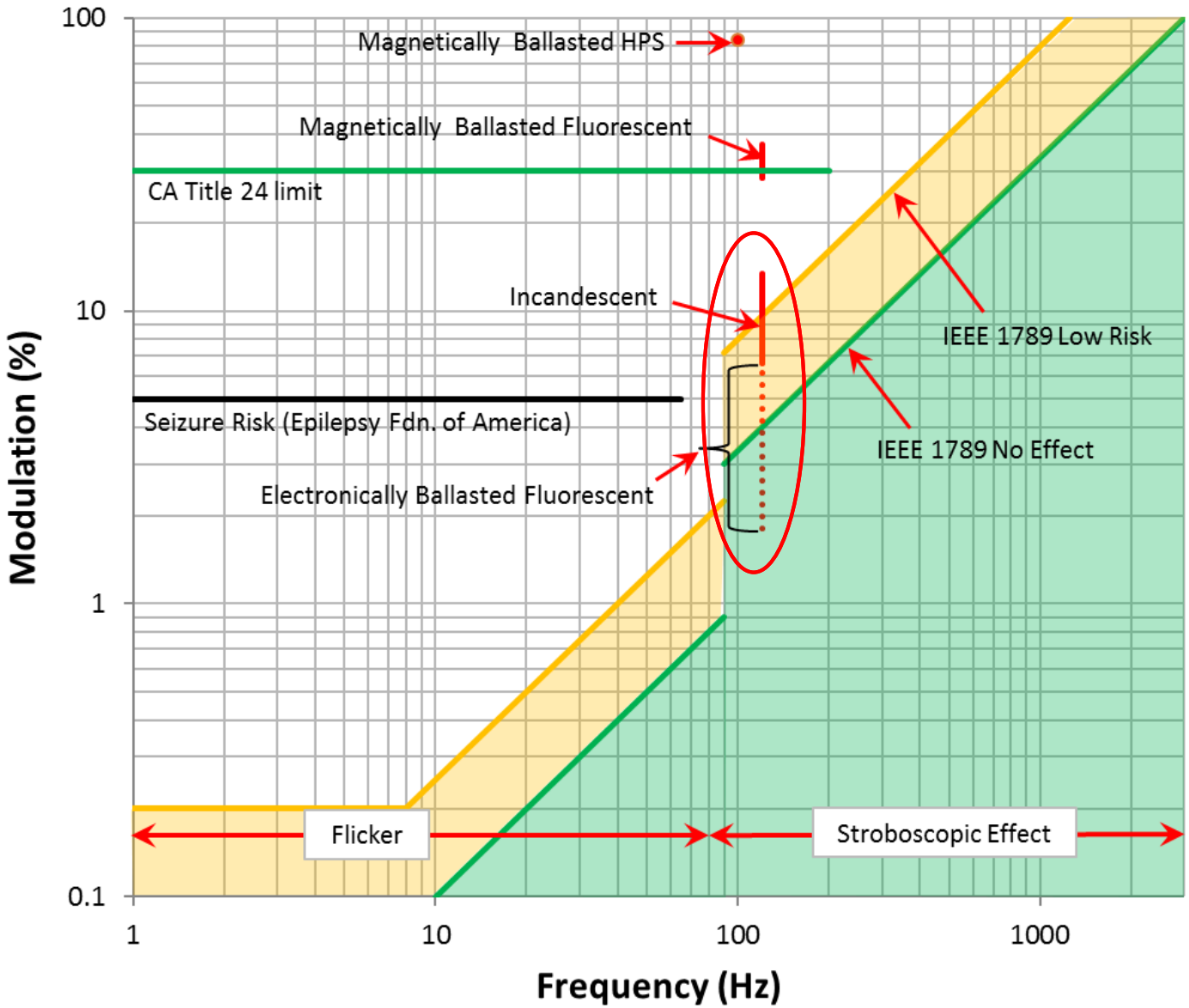
Single sine-wave modulation



Basic SVM Measurement

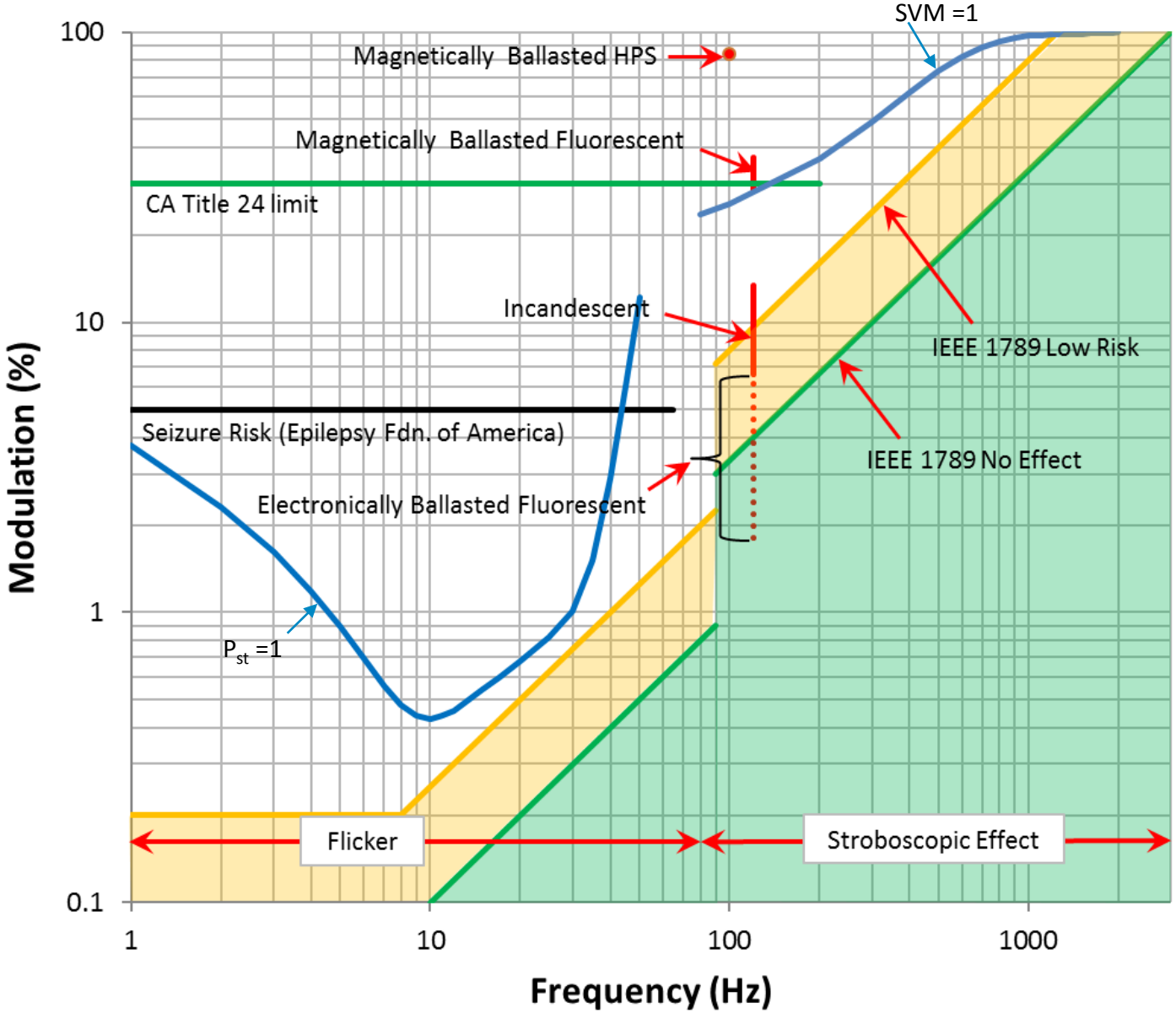


IEEE 1789-2015 and common sources



Source: IEEE Std 1789-2015, Figure 18 “Low Risk Level and No Observable Effect Level”

IEEE 1789 + detectability limits



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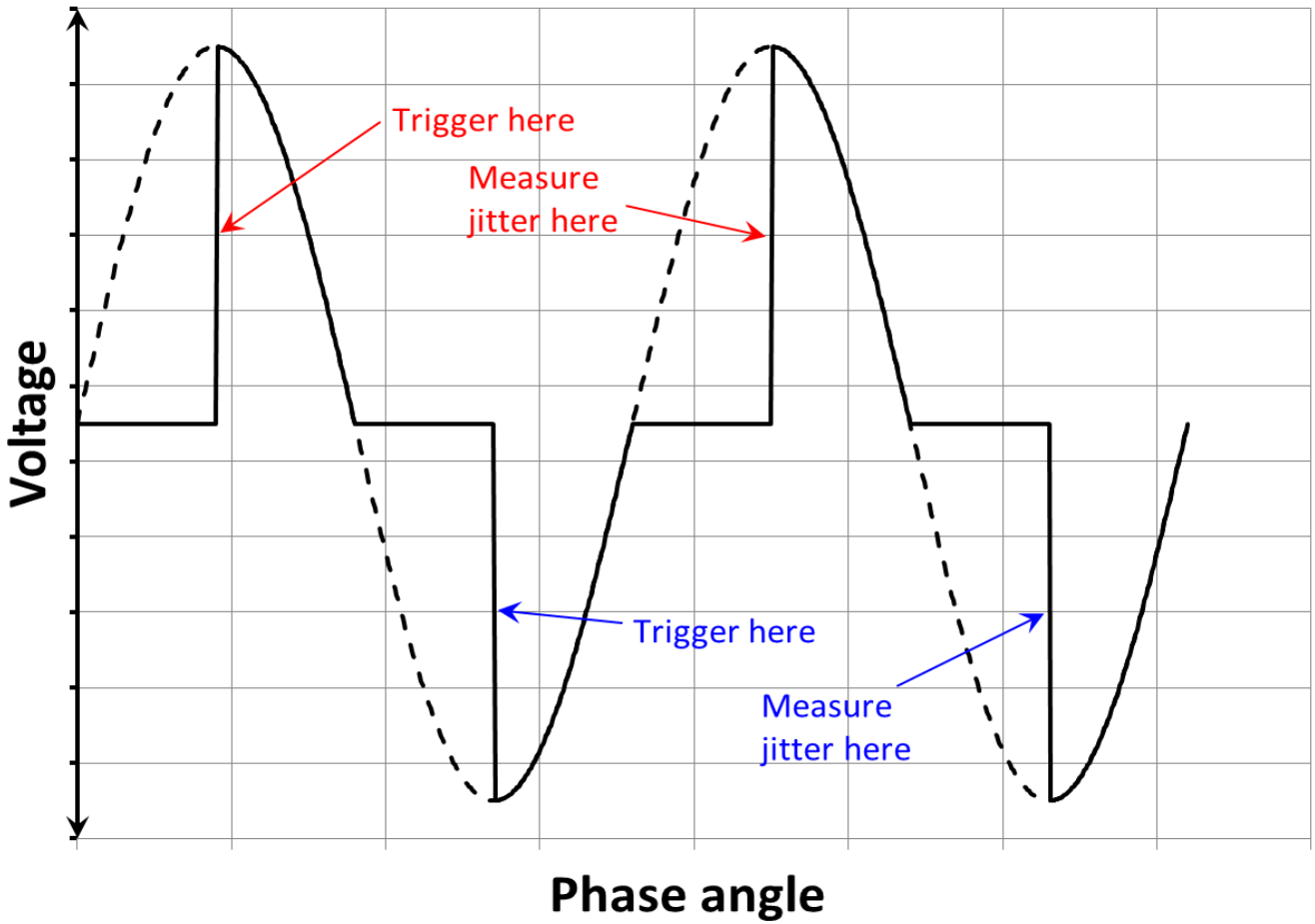
Dimmer Testing - jitter

Phase cut dimmers only



Jitter test is done with SSL7A Synthetic load.

Guidance on Metric Values

The standard provides guidance on the metric values.

Lamps

- P_{st} maximum – indoor and outdoor uses
- SVM maximum – indoor and outdoor uses

Phase-cut Dimmers

- Jitter maximum

NEMA Logo

Now: Compatibility guides

With Logo:

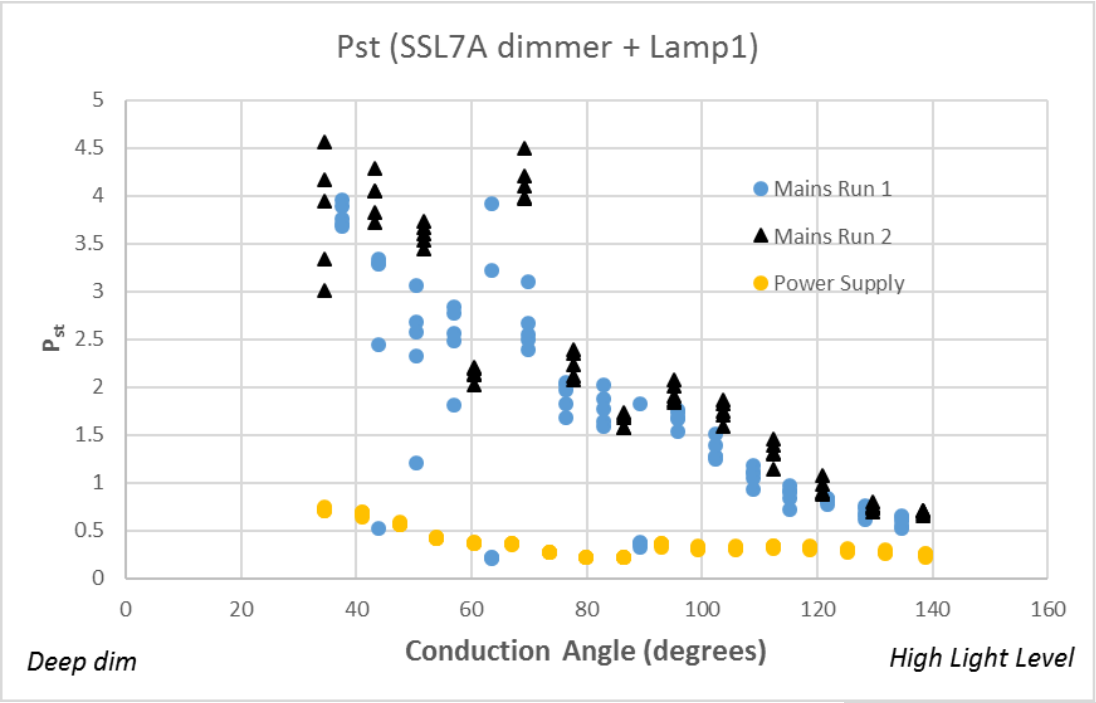
Indicator of Dimmer/Lamp Compatibility

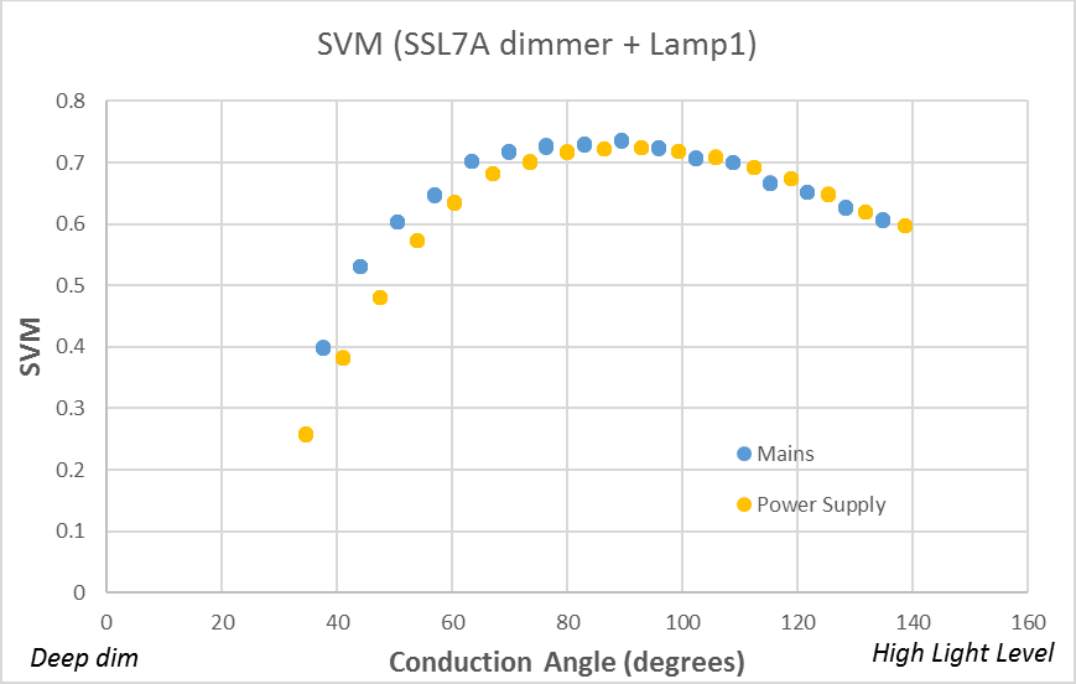
To have the logo, a lamp must meet:

SSL7A
ENERGY STAR Lamps V2.0 Noise & Dimming requirements
NEMA TLA specification

Will only work if both the dimmer and lamp are new. Use compatibility guides if reusing a legacy dimmer.

NEMA measurements example





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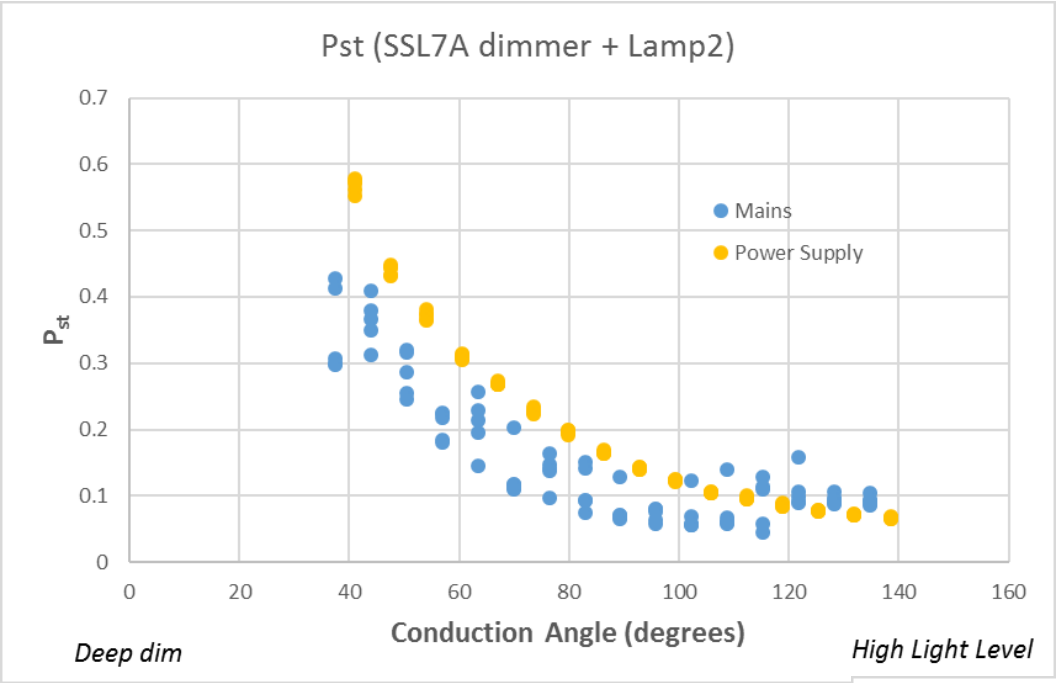

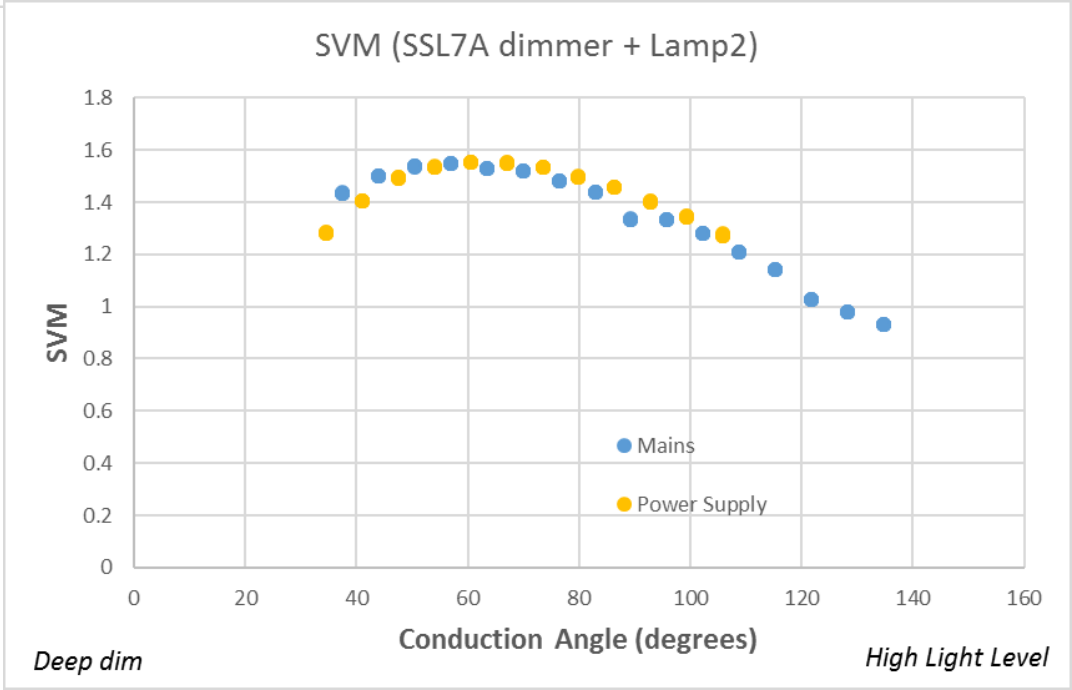

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LSD 75-2017 - Temporal Light Artifacts: Test Methods and Guidance for Acceptance Criteria

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