

Texte zu EU-Regelungen zur umweltgerechten Produktgestaltung und zur Energieverbrauchskennzeichnung in der Beleuchtung – Zusammenstellung ^[1] des Umweltbundesamtes (UBA), Deutschland



Diskussion über eine künftige Änderungsverordnung (Produktgestaltung und -information)

Informelles Interessensgruppentreffen am 19. Februar 2020:
**SVM-Höchstwert: Vortrag von Herrn Bertrand Hontelé,
Signify**

Hinweis: Bitte beachten Sie, daß der angehängte Text nur in Englisch verfaßt ist.

EN: Information on EU Lighting Regulations – Ecodesign and Energy Labelling – Compilation ^[1] of the Federal Environment Agency (UBA), Germany

Discussion of a future amending regulation (Product Design and Information)

**Informal stakeholder meeting on 19 February 2020: Presentation
SVM maximum value: Presentation by Mr. Bertrand Hontelé, Signify**

FR: Informations sur réglementations de l'UE concernant l'éclairage – l'écoconception et l'étiquetage énergétique – Compilation ^[1] de l'Agence Fédérale de l'Environnement (UBA), Allemagne

Discussion d'un futur règlement modificatif (Conception des produits et informations sur les produits)

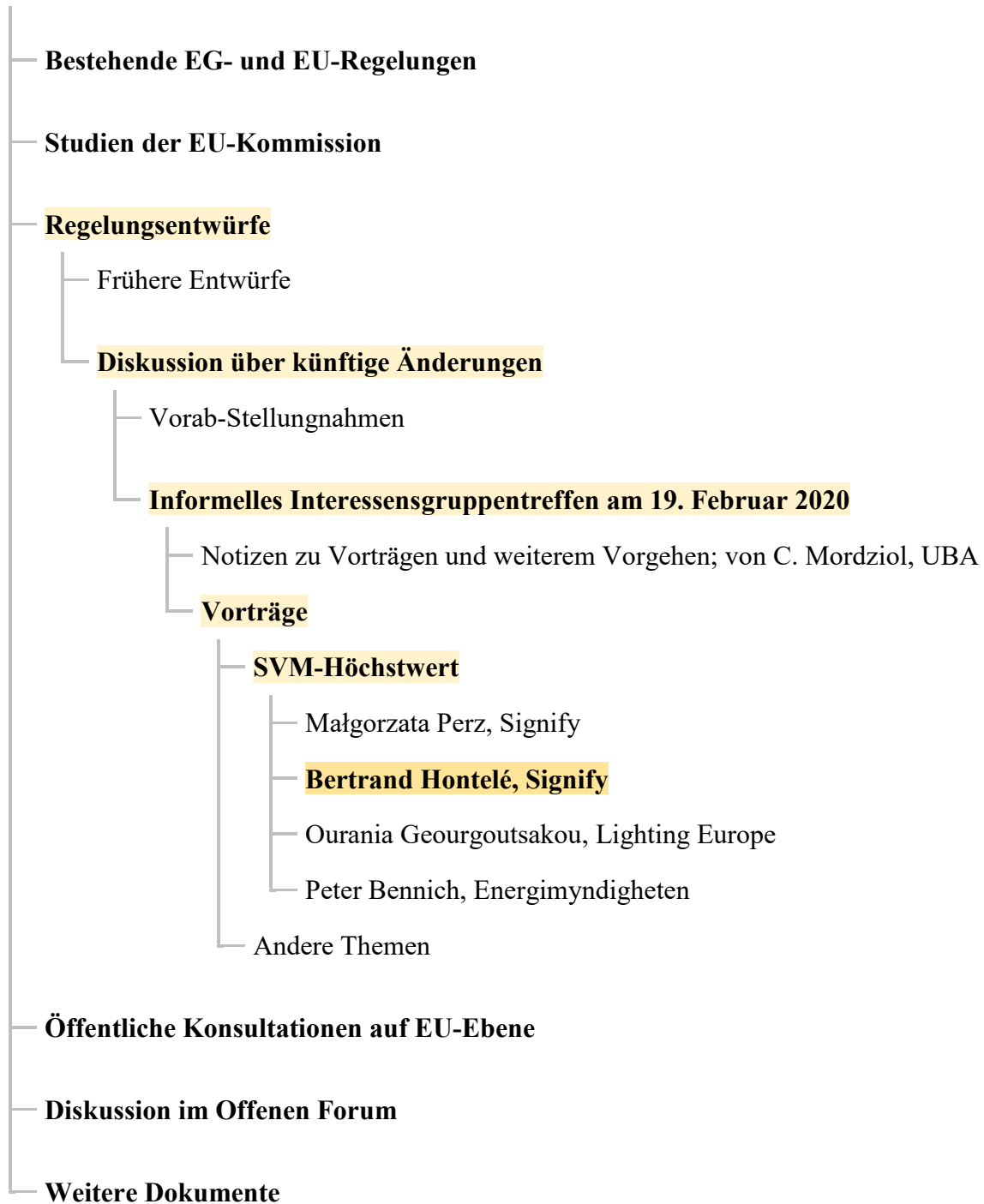
**Réunion informelle des parties prenantes le 19 février 2020 :
La valeur maximale du SVM : Exposé par M. Bertrand Hontelé, Signify**

Indication : Veuillez noter que le présent texte n'est disponible qu'en anglais.

^[1] <https://www.eup-network.de/de/eup-netzwerk-deutschland/offenes-forum-eu-regelungen-beleuchtung/dokumente/texte/>

Texte im Offenen Forum

(abc = vorliegender Text)



Abkürzungen: ● EG = Europäische Gemeinschaft ● EU = Europäische Union ● SVM : Maß für die Sichtbarkeit des Stroboskopeffektes ● UBA = Umweltbundesamt

Documents in the Open Forum

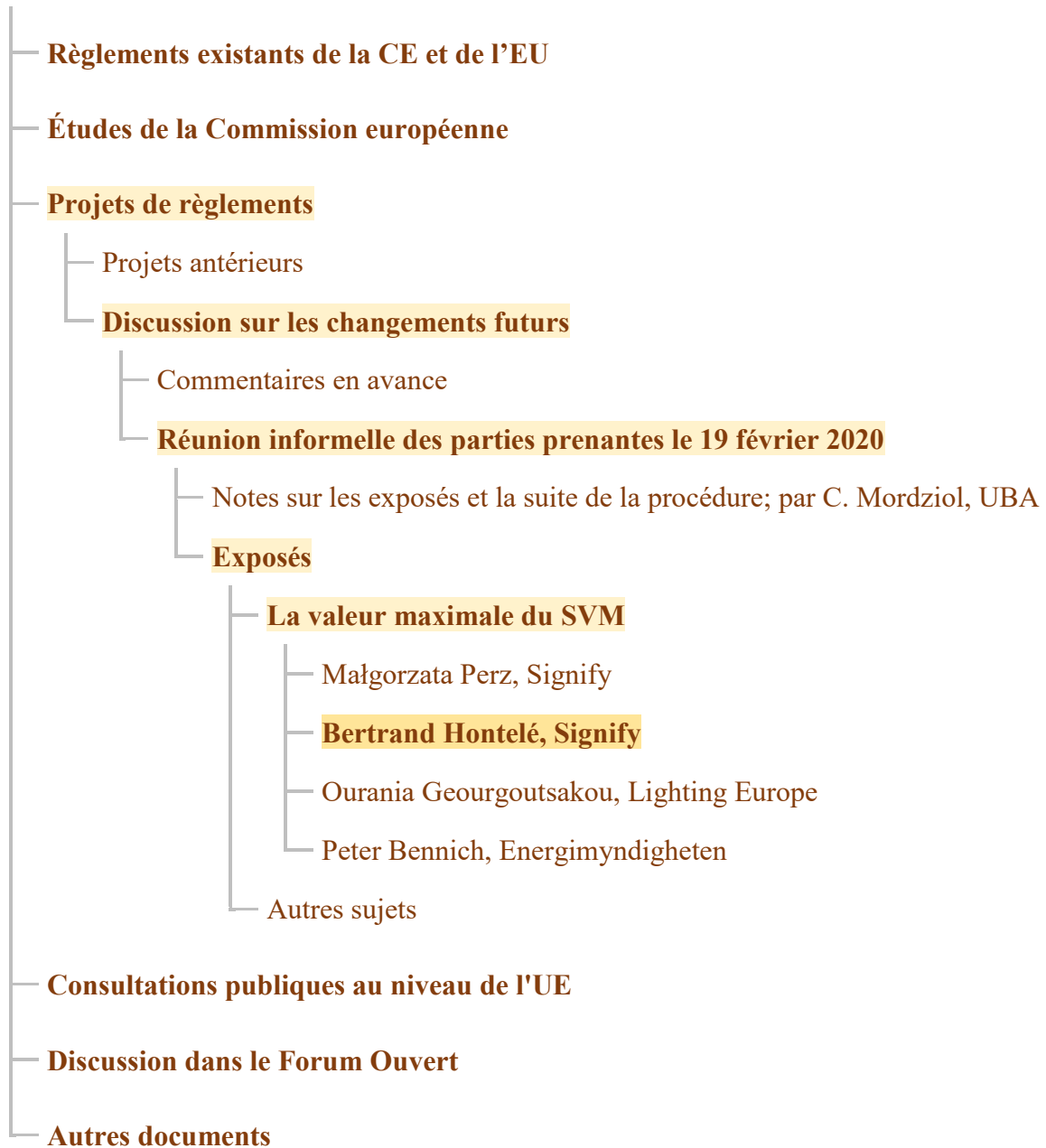
(**abc** = text at hand)



Abbreviations: ● EC = European Communities ● EU = European Union ● SVM = Stroboscopic Visibility Measure ● UBA = Umweltbundesamt (Federal Environment Agency, Germany)

Documents dans le forum ouvert

(abc = présent document)



Abréviations : • CE = Communauté européenne • SVM : Indice de visibilité de l'effet stroboscopique
• UBA = Umweltbundesamt (Agence Fédérale de l'Environnement, Allemagne) • UE = Union européenne

Es folgt ein unveränderter Originaltext.

EN: The following is an unmodified original text.

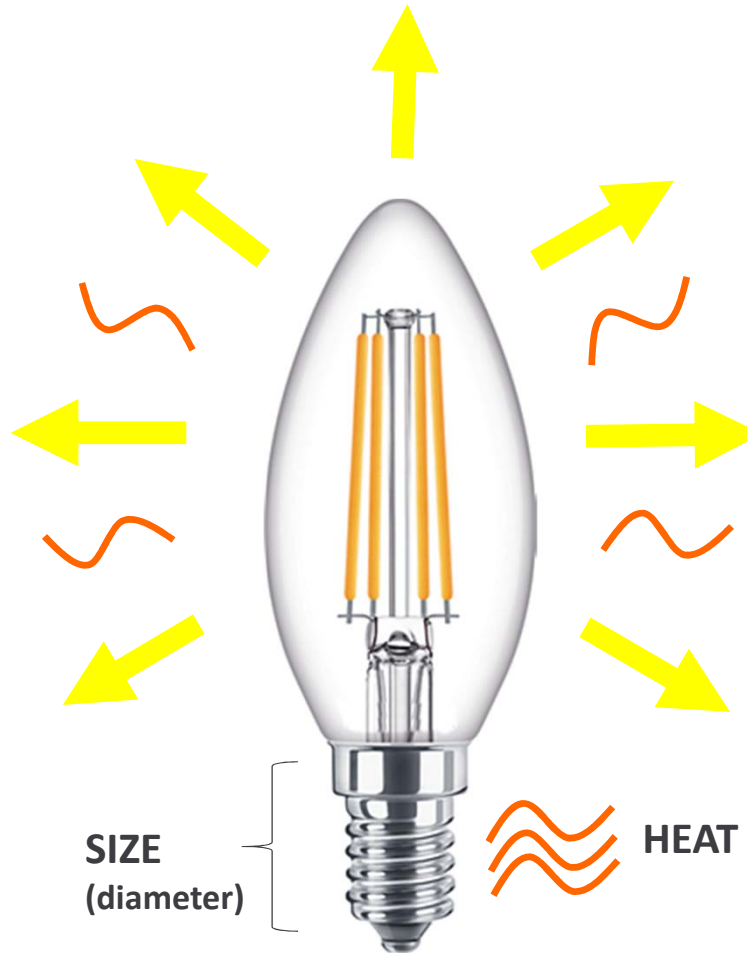
FR: Ce qui suit est un texte original.

LED lamp driver design options & constraints for limiting SVM

Bertrand Hontelé, LED Electronics Architect, Signify

LED retrofit lamps

OUTLINE
(shape)



LIGHT & EFFICIENCY

SIZE
(diameter)

HEAT

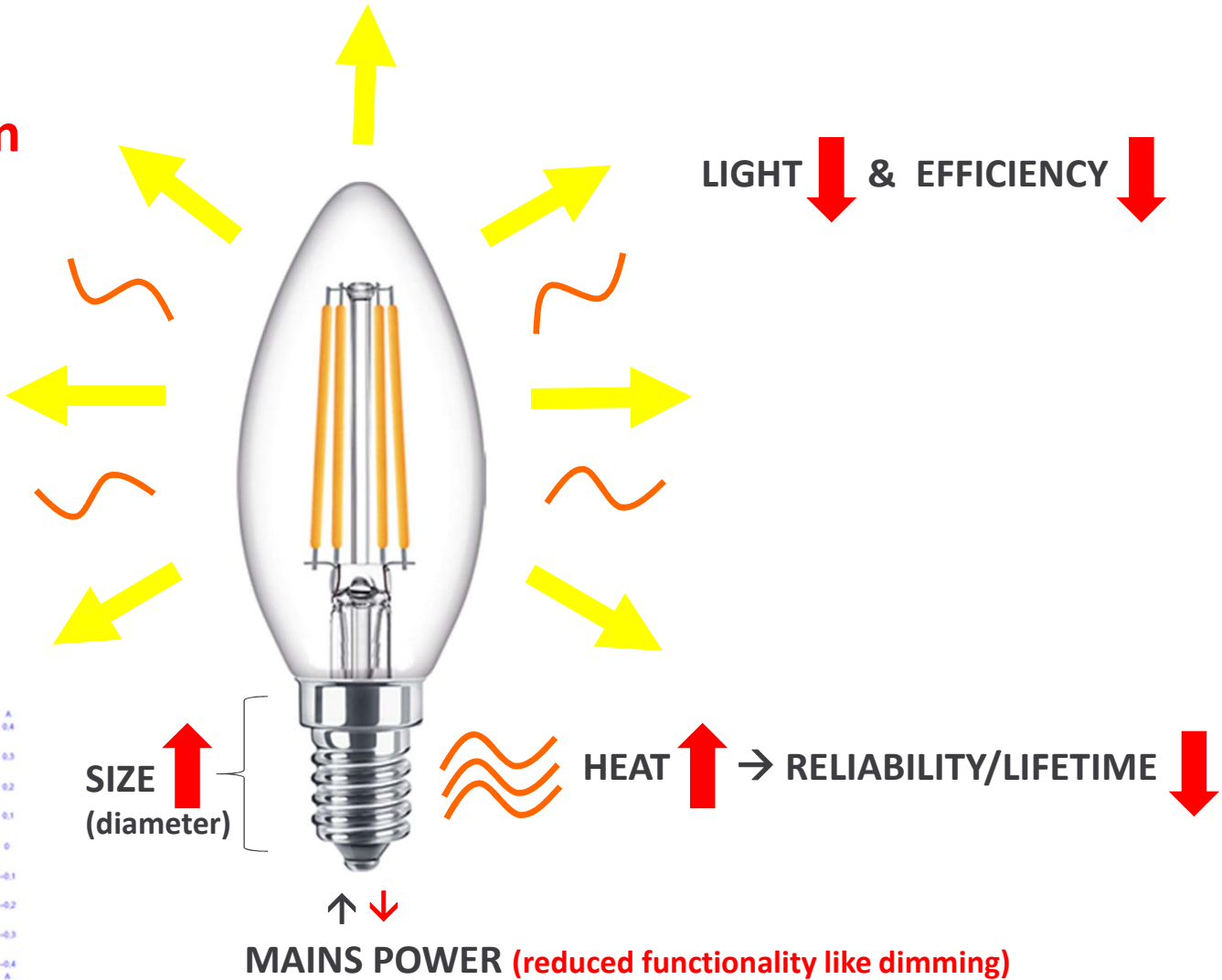
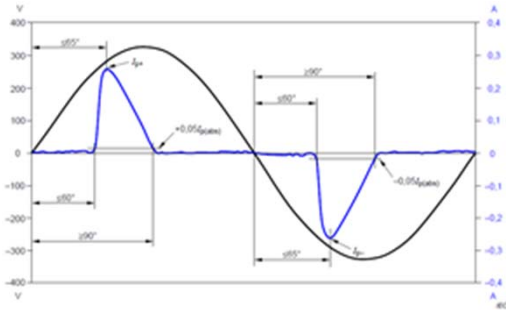
→ RELIABILITY/LIFETIME

↑
MAINS POWER

LED retrofit lamps

Impact SVM reduction

No fit **↑** **OUTLINE (shape)**



LIGHT **↓** & EFFICIENCY **↓**

SIZE **↑**
(diameter)

HEAT **↑** → RELIABILITY/LIFETIME **↓**

↑ ↓
MAINS POWER (reduced functionality like dimming)

Three technical directions to lower SVM values for LED retrofit lamps

1. Use input capacitor

- Not possible for products $P > 25W$ on luminaire level
- Not possible for **dimmable** products

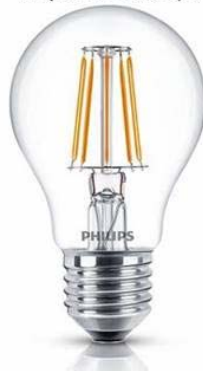
2. Increase output capacitor

- **Size** issue in small / full glass / filament bulbs (too small cap)
- Limitation in **high power** solutions

3. Add ripple remover

- **Energy efficiency** losses 3-5% result in heat & **lifetime issues** and lumen output reduction

SVM ≤ 1.6
Simple architecture, less plastics



SVM ≤ 0.4



1. Simple single-stage topology with an input capacitor

Characteristics:

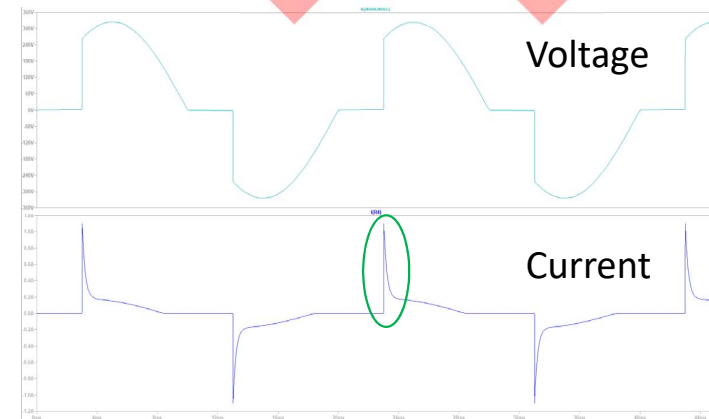
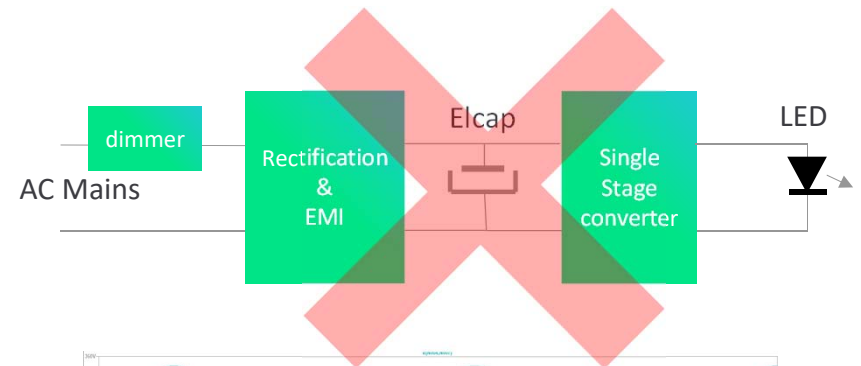
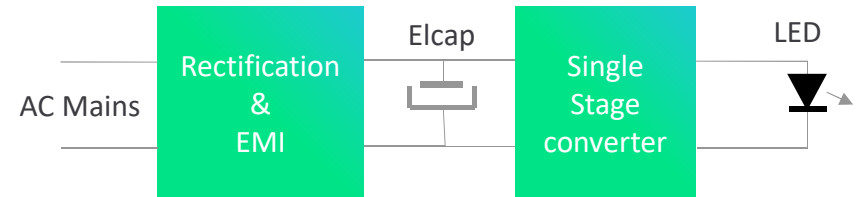
- Fulfils less strict mains current harmonic requirements
- Fulfils $SVM \leq 0.4$ requirement
- Highest conversion efficiencies
- Not compatible with phase-cut dimmers
- Not acceptable for large professional applications (circuit breakers)

Modifications for SVM requirement:

- None

Consequences / limitations:

- Not possible for $P > 25W$
- Not possible for dimmable lamps



2. Single-stage topology with output capacitor

Characteristics:

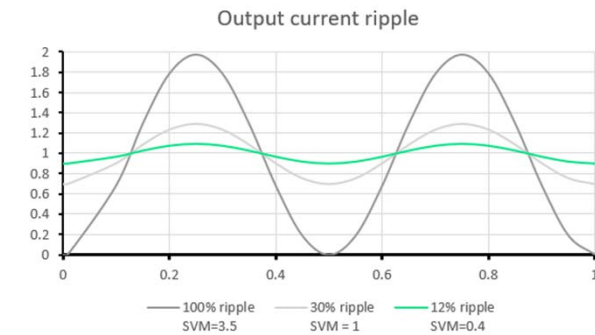
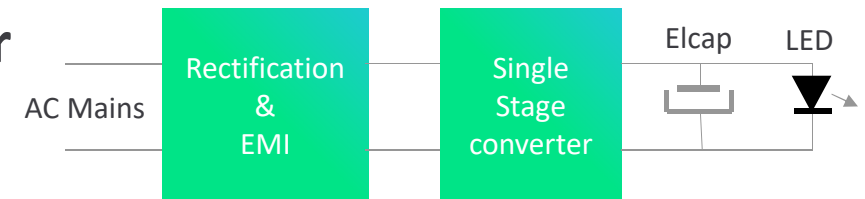
- Fulfils strict mains current harmonic requirements
- Highest conversion efficiencies
- Compatible with phase-cut (wall) dimmers

Modifications for SVM requirement:

- Increasing the electrolytic capacitor (elcap) at the output side

Consequences / limitations:

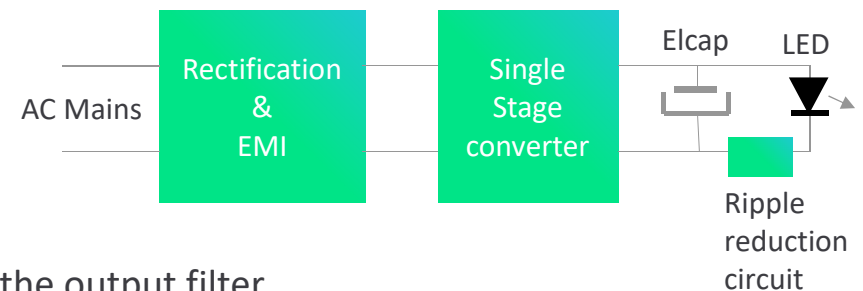
- Capacitor volume scales inversely with SVM requirement
- Capacitor technology is mature, no breakthroughs expected
- **Not possible** for the following products due to **size restrictions**:
 - **Compact** integrated products (GU10, E27/E14 filament bulbs, T5 replacements)
 - **High power** integrated products



3. Single-stage topology with output capacitor + ripple reduction circuit

Characteristics:

- Fulfills strict mains current harmonic requirements
- Compatible with phase-cut (wall) dimmers

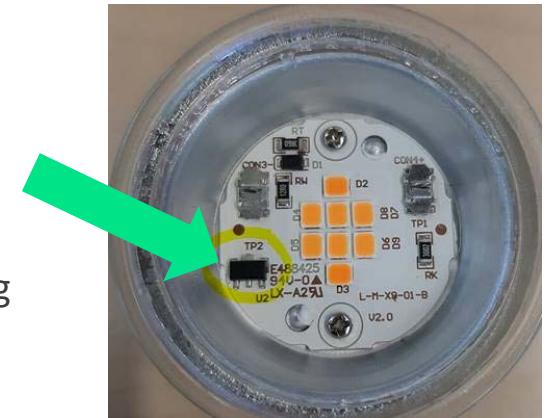


Modifications for SVM requirement:

- Physics of ripple reduction is increasing the RC time constant of the output filter
- RC time constant is formed by electrolytic capacitor (elcap) at the output and dynamic resistance of LED load
- Additional electronic circuits/components increase the resistance of the load

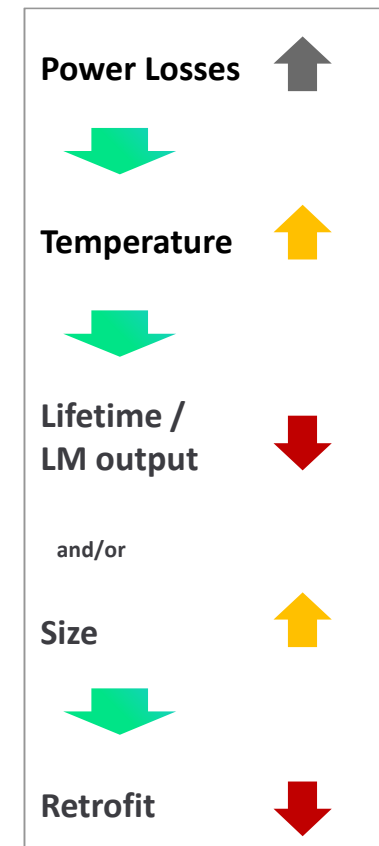
Consequences / limitations:

- Typical **efficiency losses** for the additional ripple reduction circuits **3%-5%**
- These losses cannot be absorbed in small drivers and in filament lamps depending on lamp power and result in **lifetime issues** and **lumen output reduction**



Impact of driver efficiency decrease

- **3% - 5% efficiency** decrease of the **driver** will locally lead to **30% higher losses!**
 - Higher driver losses → **more heat** → higher component temperatures
 - Higher temperatures → **lower lamp lifetime**
 - Higher energy losses → **lower lamp luminous output**
 - Increased driver space → **affects lamp outline, lamp appearance** and radiation pattern
 - Introduction of **higher lumen packages** within the product range is **hampered**
 - Transition of higher power lamps towards LED is slowed down and/or halted
- The ripple reduction circuit is **not suitable** over **the full range**
 - Dimmable LED lamp products, especially with professional lifetime specification
 - High power integrated LED products



Summary

- The combined consumer and professional LED lamp categories incorporate **thousands** of different lamp types
- Each lamp category contains **multiple product ranges** e.g: luminous flux, lifetime, color, efficacy, beam shape, outline and materials (full glass, glass/plastic, full plastic)
- Retrofit LED lamp designs are **restricted by thermal system** constraints:
 - Examples: G9, GU10, R7s, T5, E14, E27 and E40 high power lamps

Driver solutions to limit SVM to 0,4 are feasible.

Driver solutions to limit SVM are not feasible for all LED retrofit lamps for the consumer and professional product ranges.

For illustration only

