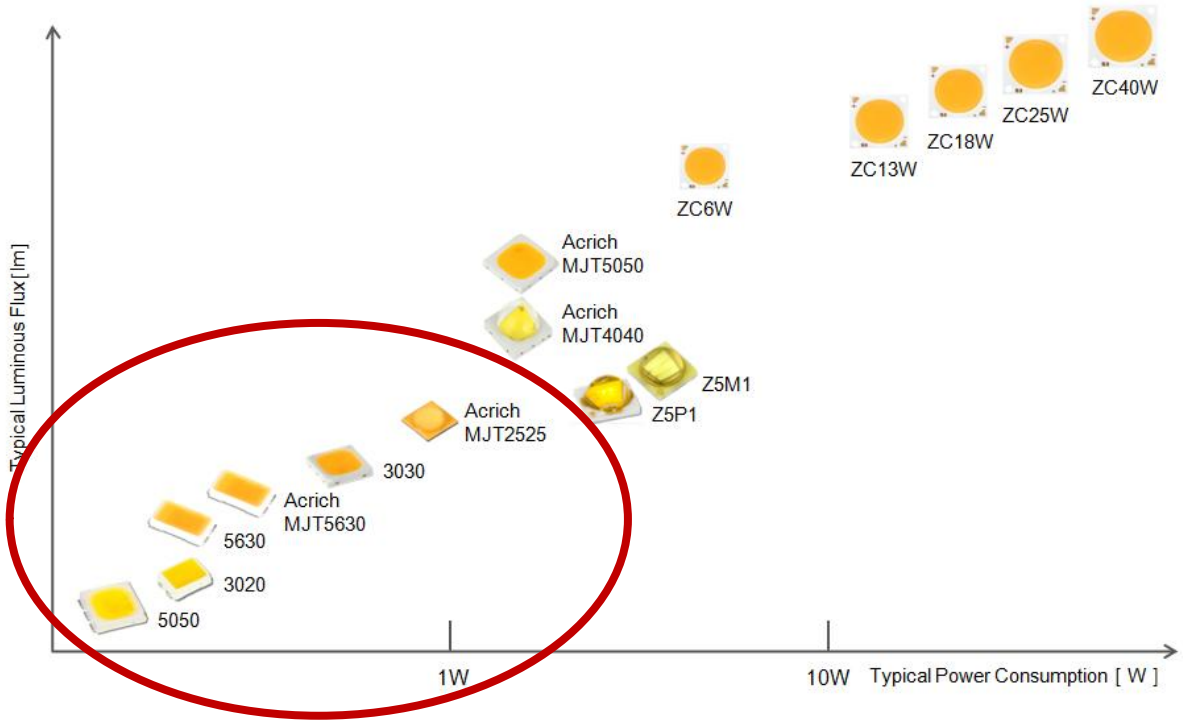
- **Agenda**
  - Mid-Power LED's definities
  - Typische applicaties
  - Verschillende Parameters die van invloed zijn op LED applicaties
    - **Binning**
    - **Temperatuur – Package**
    - **Aansturing**
    - **Produktie en assemblage**
  - Toekomst verwachting

# Mid-Power LED definities




**< 1Watt power**
**< 100 lumen**
**Low voltage**
**Low current**

## Mid-Power & Low-Power

## Typische toepassingen

- Cost Effective
- Diffuse Lighting
- Slim Design

### Downlighter

Multi-Lens Design
- Cost Effective
- Wide Beam
- High Efficacy

### Outdoor

### High Bay

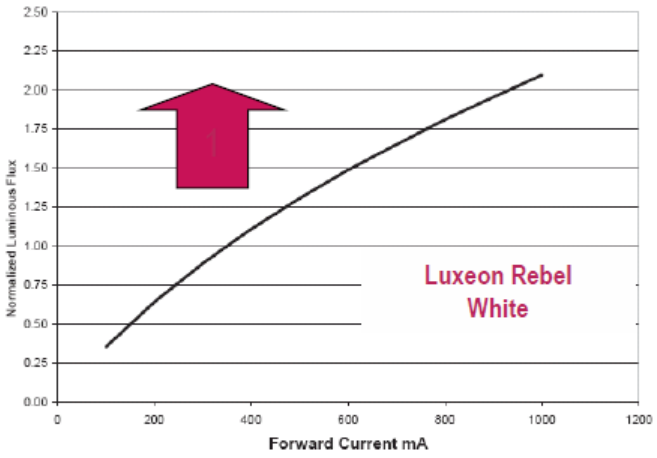
### Troffer

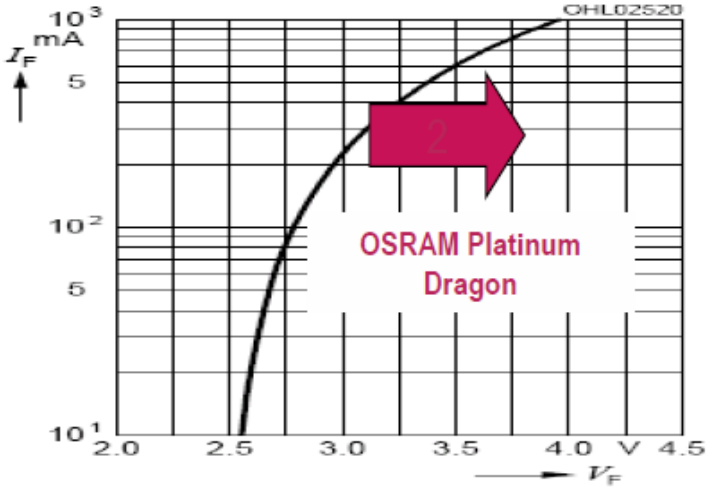
- Cost Effective
- Diffuse Beam
- Slim Designs

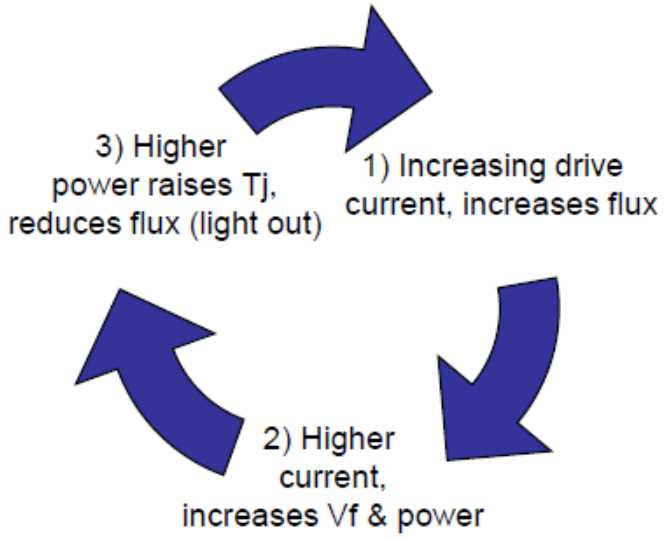
### Streetlight

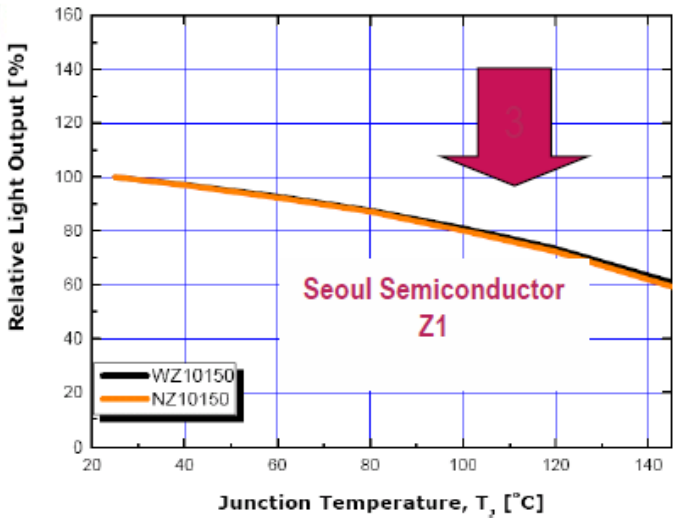
- Spotlight
- Low Bay
- TLEDs
- GU10
- MR16
- PAR

# LED aansturing

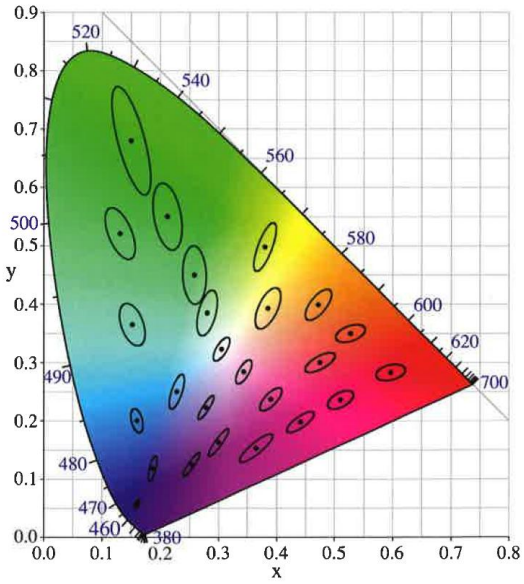


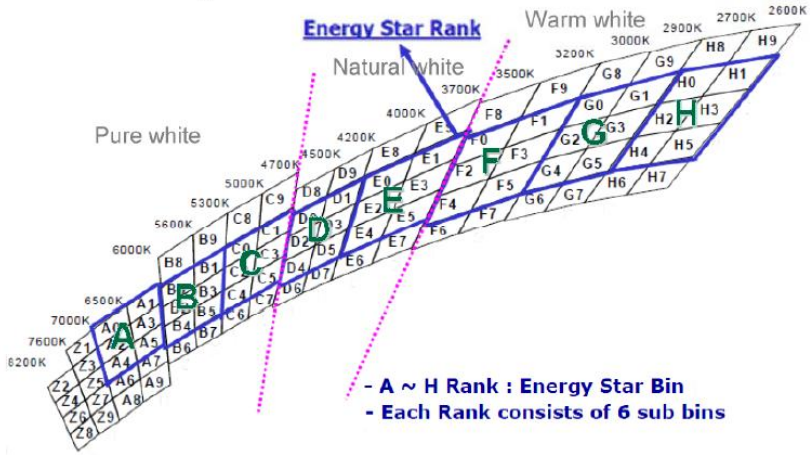



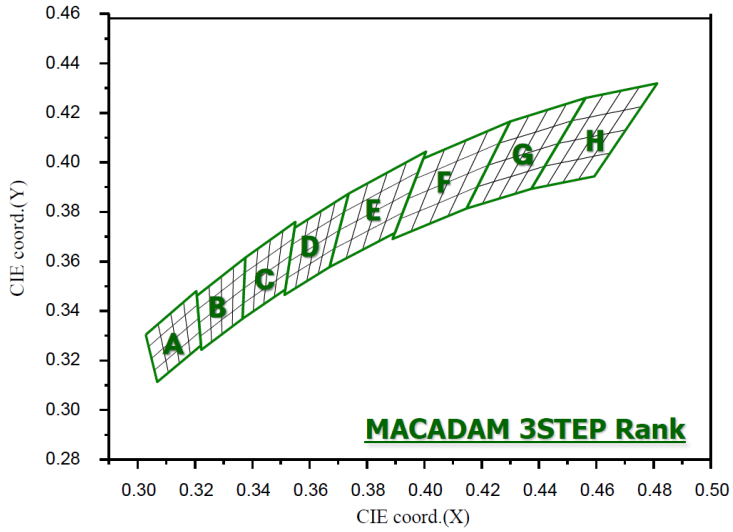



# LED en binning




| CCT | CIE | IV Rank | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6000 ~ 7000K | A | R0 | R5 | S0 | S5 | T0 | T5 | U0 |
| 5300 – 6000K | B | R0 | R5 | S0 | S5 | T0 | T5 | U0 |
| 4700 ~ 5300K | C | R0 | R5 | S0 | S5 | T0 | T5 | U0 |
| 4200 ~ 4700K | D | R0 | R5 | S0 | S5 | T0 | T5 | U0 |
| 3700 ~ 4200K | E | R0 | R5 | S0 | S5 | T0 | T5 | U0 |
| 3200 ~ 3700K | F | R0 | R5 | S0 | S5 | T0 | T5 | U0 |
| 2900 ~ 3200K | G | R0 | R5 | S0 | S5 | T0 | T5 | U0 |
| 2600 ~ 2900K | H | R0 | R5 | S0 | S5 | T0 | T5 | U0 |



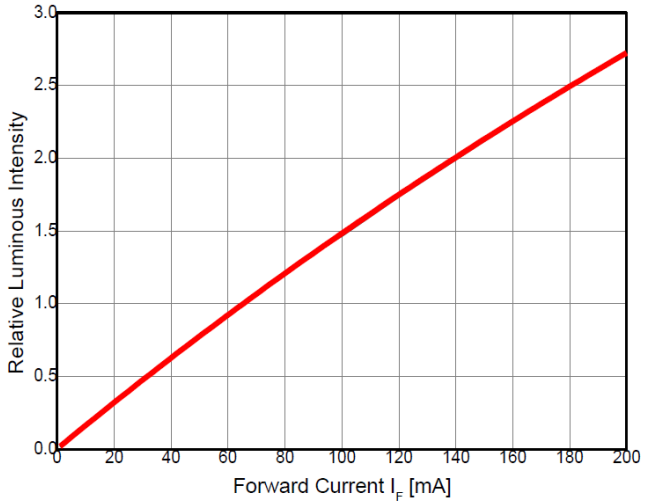



# LED binning in relatie tot Flux

| Part Number | Luminous Intensity (cd) @ $I_F$ = 100mA | | | Color Chromaticity Coordinate @ $I_F$ = 100mA | Typical Forward Voltage ($V_f$) @ $I_F$ = 100mA | | |
|---|---|---|---|---|---|---|---|
| | Bin Code | Min. | Max. | | Bin Code | Min. | Max. |
| STW8Q14C | U0 | 11.0 | 11.7 | Refer to page.12 | Y2 | 2.8 | 2.9 |
| | U7 | 11.7 | 12.5 | | Y3 | 2.9 | 3.0 |
| | V5 | 12.5 | 13.5 | | Z1 | 3.0 | 3.1 |
| | W5 | 13.5 | 14.5 | | Z2 | 3.1 | 3.2 |
| | X5 | 14.5 | 15.2 | | Z3 | 3.2 | 3.3 |
| | J15 | 15.2 | 16 | | A1 | 3.3 | 3.4 |

| Part Number | Luminous Intensity (cd) @ $I_F$=65mA | | | Color Chromaticity Coordinate @ $I_F$ = 65mA | Typical Forward Voltage ($V_f$) @ $I_F$=65mA | | |
|---|---|---|---|---|---|---|---|
| | Bin Code | Min. | Max. | | Bin Code | Min. | Max. |
| STW8Q14D | R0 | 8.0 | 8.5 | Refer to page.12 | Y1 | 2.7 | 2.8 |
| | R5 | 8.5 | 9.0 | | Y2 | 2.8 | 2.9 |
| | S0 | 9.0 | 9.5 | | Y3 | 2.9 | 3.0 |
| | S5 | 9.5 | 10 | | Z1 | 3.0 | 3.1 |
| | T0 | 10 | 10.5 | | Z2 | 3.1 | 3.2 |
| | T5 | 10.5 | 11 | | | | |
| | U0 | 11 | 11.7 | | | | |

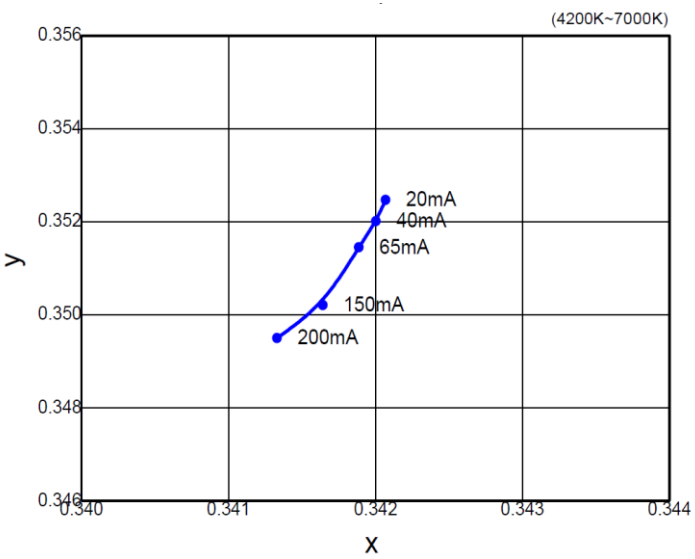
**Forward Current vs. Relative Luminous Flux, $T_j$=25°C**

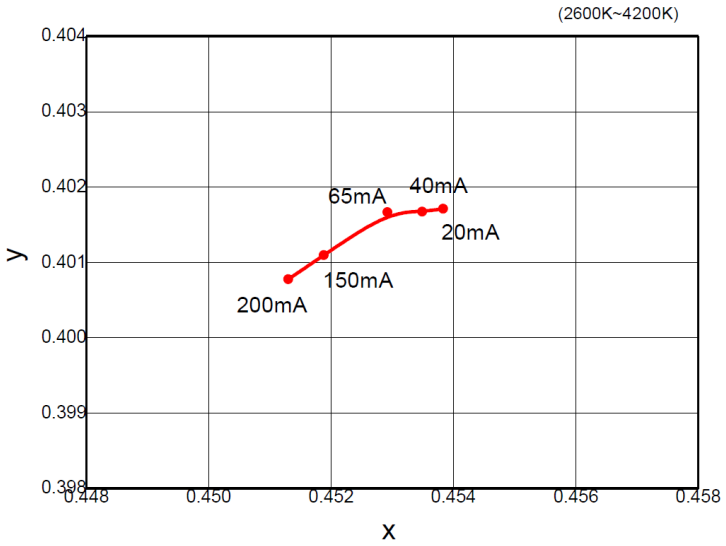



$$\Phi_{v(lm)} = I_{v(cd)} \times \Omega_{(sr)}$$

**Vergelijken van LEDs is soms lastig. Naast specificatie verschillen in stroom sturing, worden ook Cd en Lumen worden naast elkaar gebruikt.**

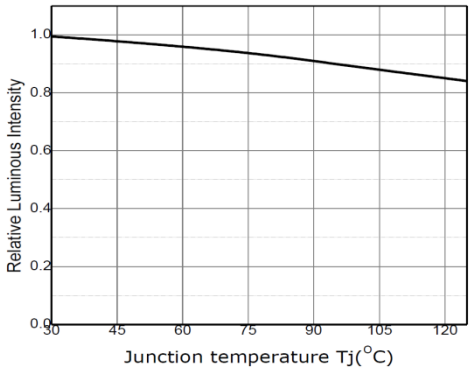
# LED binning en stroom sturing




**Ook de kleur heeft invloed op de stuurstroom, hier zal dus rekening mee gehouden moeten worden bij een dual-color applicatie**

# LED en temperatuur



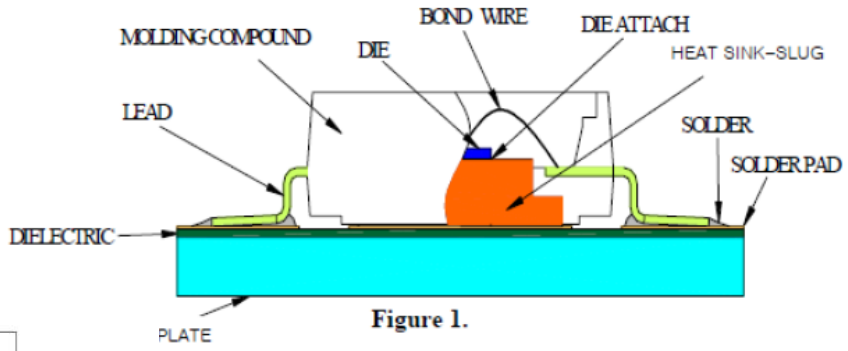
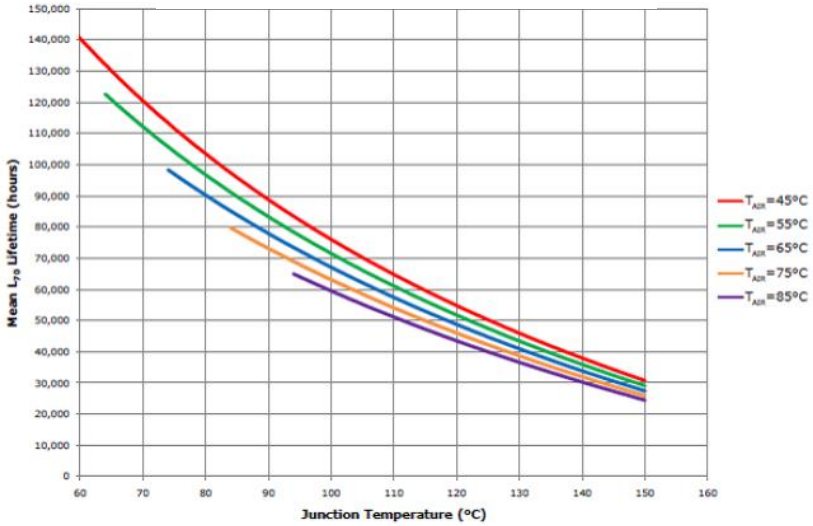




Figure 1.



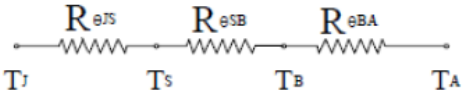
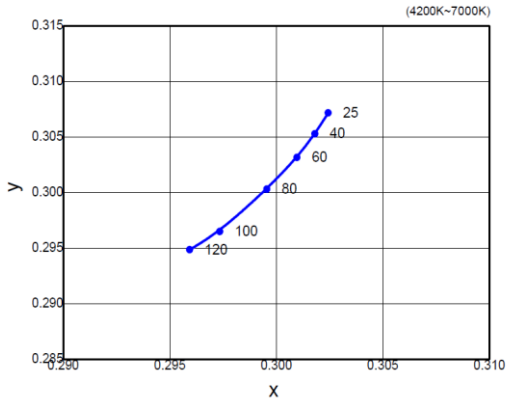
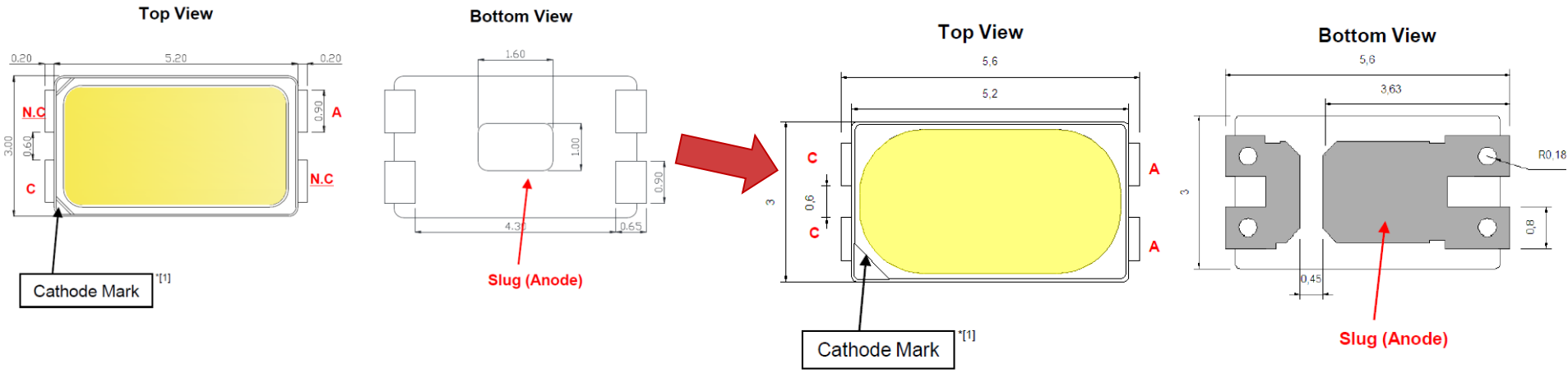




Fig 8. Chromaticity Coordinate vs. Junction Temperature, $I_F$=65mA

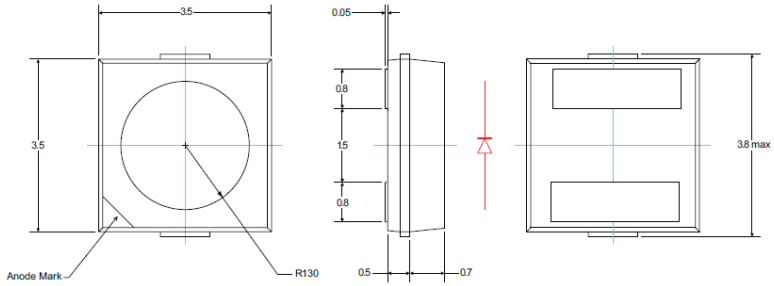



**Temperatuur omhoog → Kleur wijzigt, Vf wijzigt, Licht output minder en kortere levensduur**

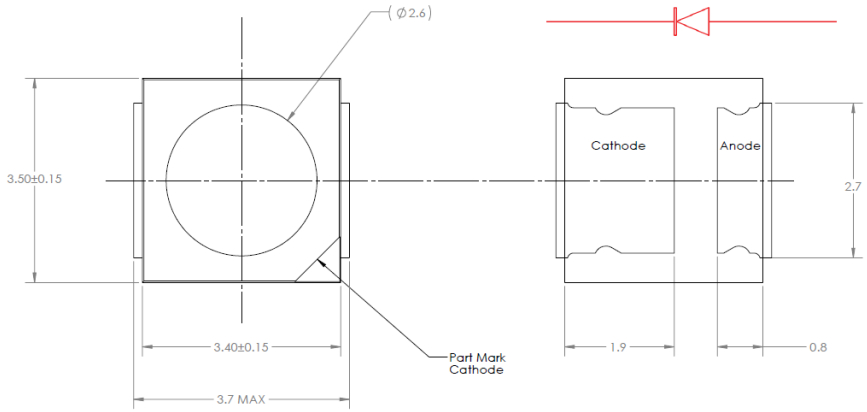
# LED en temperatuur



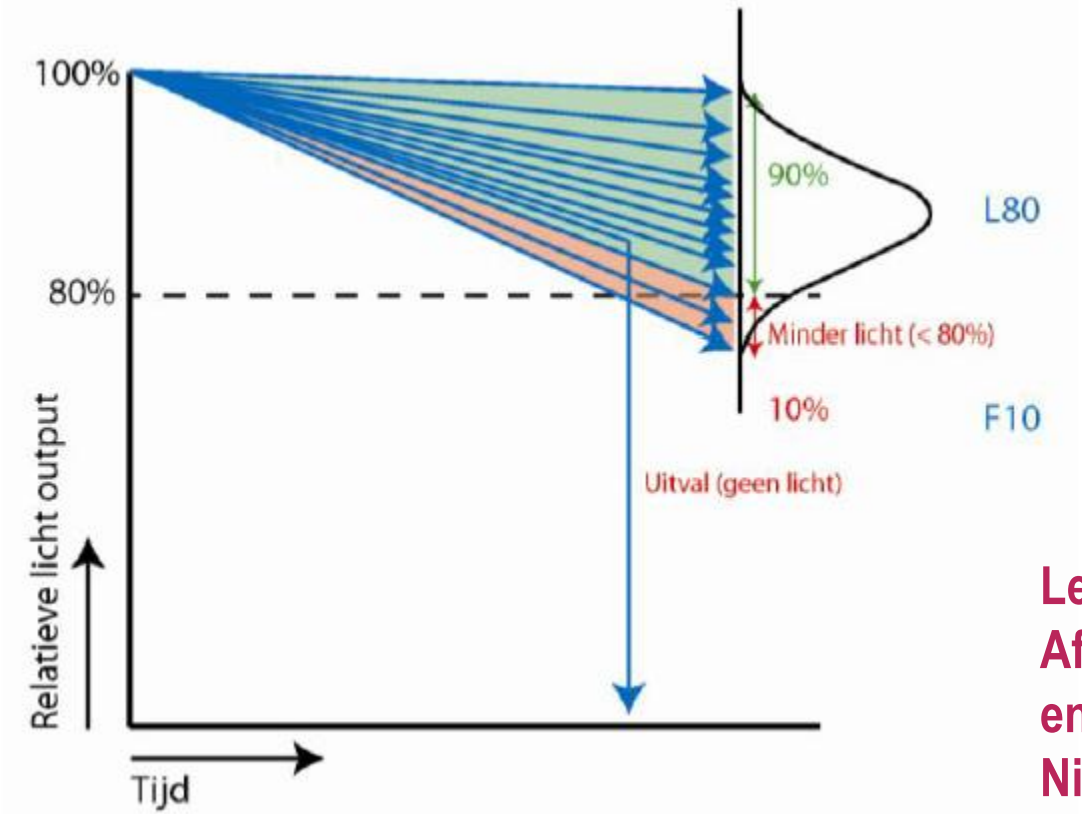

## Mechanical Dimensions

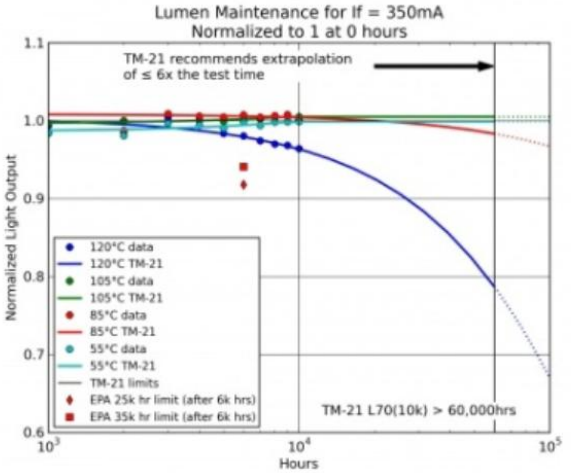



## Mechanical Dimensions



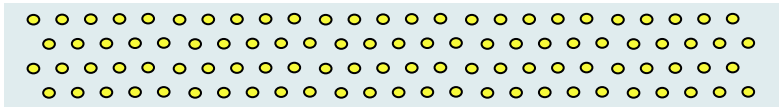
# LED en 'kwaliteit / levensduur'



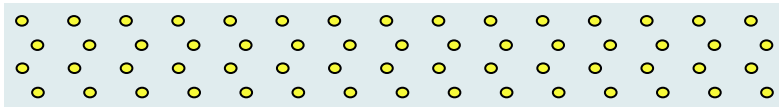

**Let op!**
**Afhankelijk van temperatuur en Stroom**
**Niet elke fabrikant gebuikt dezelfde specificatie (L70, L50 of zelfs L30 komt men tegen, ook F20 of hoger)**

## LED en assemblage



100 LEDs in 1 troffer

- Betere licht distributie
- Lagere stroom
- Langere levensduur
- Hogere spanning of meer LED strings
- Meer kosten voor het plaatsen van de LEDs
- Hogere lumen/watt

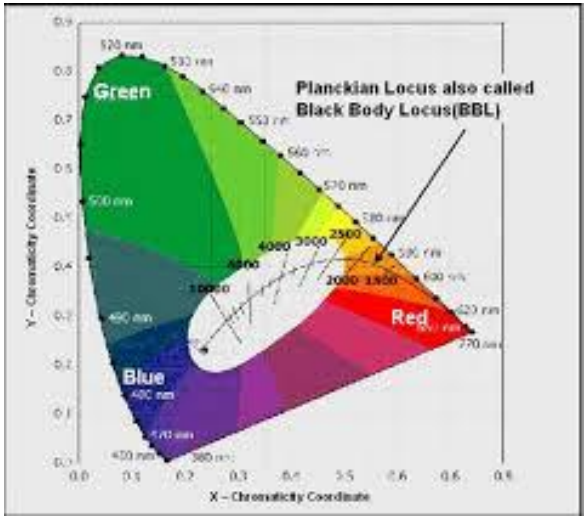


60 LEDs in 1 troffer

- Wellicht  noodzaak tot optics
- Hogere kosten voor print materiaal/koeling
- Minder kosten voor het plaatsen van de LEDs
- Lagere lumen/watt

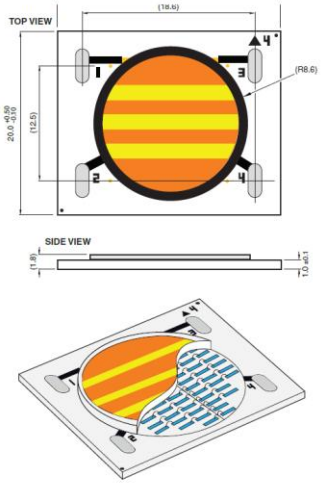
**Behoefte:**
**3000 Lumen in totaal in 1 lichtbak**

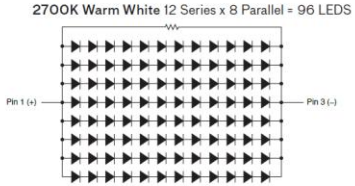
# Mogelijkheid van dual-color applicaties

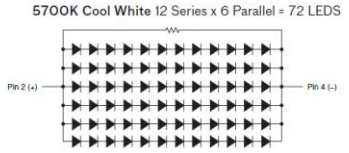



## In één armatuur de licht kleur kunnen regelen van 2700/3000K tot 4000/5000K

## Dual control LED module

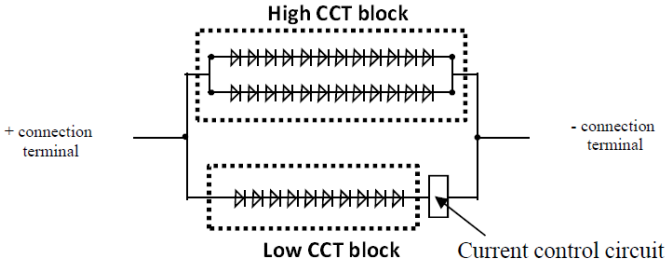



Two separate driver circuits (one warm, one cool) allow blending for a wide range of custom colors.

## Natural Toning

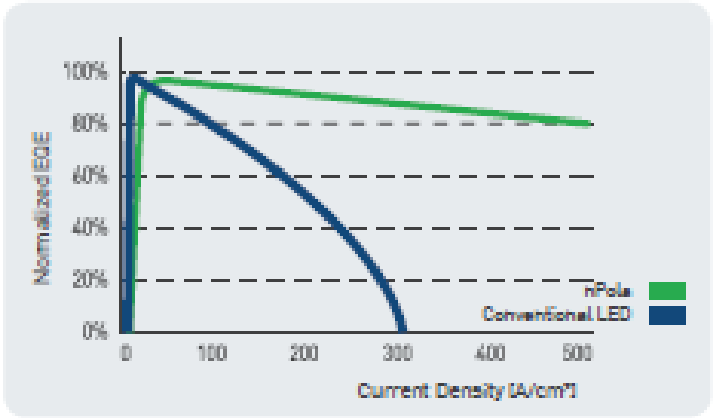



High CCT block 12 series × 2 parallel = 24 pcs of LEDs

Low CCT block 10 series × 1 parallel = 10 pcs of LEDs

## Toekomst van de mid-power LEDs

hogere light efficacy tot boven 200 lm/Watt
Verbeterde LED technologyie(bv nPola; verminderde Efficacy Droop en hogere CRI)
Verbeterde behuizing technologyie(echter, heat-slugs wijzigen)
Dual color producten/aansturing
Verbeterde 'centre-bin' productie en output
Meer optics (minder leds)



## SILICA Lighting Suppliers

### LEDs

**PHILIPS LUMILEDS**
Philips Lumileds focuses on one goal: Creating the world's highest performing LEDs.
Read more

**ROHM**
ROHM designs, manufactures, and sells various types of semiconductor ICs, discretes, opto devices and modules.
Read more

**SEOUL**
Seoul Semiconductor manufactures Low Power, Mid Power, MJT HV-LEDs, Acrich2 Modules and Z-Power LEDs
Read more

**SHARP**
Sharp and its ZENIGATA multi chip On Board LED technology leverages more than 40 years of LED expertise.
Read more

### Optics

**carclo Optics**
Carclo Optics is the specialist division focusing on optical systems and molding.
Read more

**FRAEN**
Fraen CMG specializes in the design, development and manufacture of optics for high-powered LEDs.
Read more

**LEDIL**
LEDIL offers a wide range of high quality standard optic products and custom solutions for lighting producers.
Read more

**lednlight**
LEDnLight manufactures standard and custom optics in different types of polymers: PMMA, PC, COC and COP.
Read more

### Thermal & Connectivity by Avnet

**fischer elektronik**
Fischer Elektronik manufactures extruded and finger-shaped heat sinks for LEDs, IGBTs, and other semiconductor devices.
Read more

**molex** one company > a world of innovation
Molex manufactures electronic, electrical and fibre optic interconnection products and systems.
Read more

**TE connectivity** Authorized Distributor
TE is at the forefront in the development of next-gen lighting solutions with its wire and cable for solid-state applications.
Read more

### LED Power Supply by Avnet

**aimtec** Your Power Partner
Aimtec Inc. is a global designer and manufacturer of modular AC/DC and DC/DC switching power supplies.
Read more

**EMERSON** Network Power
Emerson Network Power is a market leader in ac-dc power supplies providing an extensive standard product portfolio.
Read more

**excelsys**
Excelsys Technologies designs and manufactures high efficiency, low profile power supplies for lighting applications.
Read more

**Lumotech** the art of transforming
Lumotech drivers are robustly designed to perform at the highest level throughout their lifetime.
Read more

**MW MEAN WELL**
Mean Well is a leading switching power supply manufacturer in Taiwan.
Read more

**Power Systems**
Power Systems has a broad offering of power supply products for the lighting market.
Read more

# SILICA VISION 2015

SILICA extended its product and service offerings into new, high growth areas.

SILICA is the preferred semiconductor distribution brand for Customers and Suppliers.

SILICA is the synonym for leading process and operations management in European Distribution.

SILICA differentiates through employee engagement and personal development, employs the best talents in our industry.

# More about Silica? Meet us at:

www.silica.com

www.silicalighting.eu

www.facebook.com/silica.avnet

www.youtube.com/silicamarcom

www.twitter.com/silicatweets

www.linkedin.com/in/silica