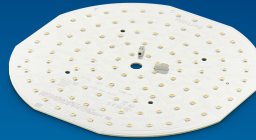


PHILIPS

Fortimo

LED

Fortimo LED CS 220 HF
9xx LV6



Datasheet

Fortimo Circular Shape

The Fortimo LED Circular Shape (CS) is a unique portfolio which offers a combination of energy efficiency, homogenous lighting, long lifetime and design flexibility, making them an important component in many lighting applications. Its form factor makes it easy to design-in and handle in production. Thanks to the availability of three different dimensions, a wide range of needs is covered for our customers.

Key features and benefits

- Typical module efficiency of 200 Lm/W (at 4000K CRI80)
- CRI90 High Efficiency typical performance of 189 Lm/W (at 4000K CRI90)
- Long lifetime: >72,000 hours
- Excellent color consistency of 3 SDCM
- Typical output per dimension available:
 - 220 mm: 2500lm
 - 350 mm: 5500lm
 - 540 mm: 4125lm
- CCTs available: 3000K, 4000K
- CRI >80 & >90 (Based on high efficiency technology)
- Available in Low Voltage (LV)
- Available in front connector (FC)
- PCB thickness of 1.6mm
- Available dimensions: 220mm / 350mm / 540mm / 540Dmm (includes cutout for sensor)
- Wide temperature (Tc) range -40°C to +85°C
- Five-year system warranty (when paired with Xitanium LED drivers)

March 2023



Ordering data

| Commercial product name | 12NC | EPREL registration # | Box quantity |
|-------------------------------|----------------|----------------------|--------------|
| Fortimo LED CS 220 HF 930 LV6 | 9290 029 58406 | 1500755 | 20 |
| Fortimo LED CS 220 HF 940 LV6 | 9290 029 58606 | 1500756 | 20 |

Drive currents

| Parameter | Nominal* | Life** | Max*** | Unit |
|-------------------------------|----------|--------|--------|------|
| Fortimo LED CS 220 HF 9xx LV6 | 307 | 1680 | 1680 | mA |

Module temperatures

| Parameter | Nominal* | Life** | Max*** | Unit |
|---|----------|--------|--------|------|
| T _c (case temperature at T _c point) | 35 | 55 | 85 | °C |

* Nominal value at which typical performance is specified

** Value at which life time is specified

*** Maximum value for safe operation, do not operate above this value

Optical characteristics - table per color (CCT)

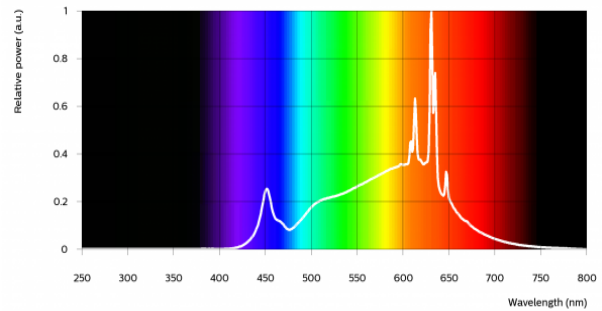
Fortimo LED CS 220 HF 930 LV6

| Parameter | Min | Typ | Max | Unit |
|------------------------------------|------|----------------|---------------|------|
| Luminous flux | 2260 | 2341 | 2550 | lm |
| Efficacy | 167 | 177 | 203 | lm/W |
| Correlated color temperature (CCT) | | 3000 | | K |
| Color coordinates (CIEx, CIEy) | | (0.436, 0.402) | | - |
| Color consistency | | | 3 | SDCM |
| CRI | 90 | | | |
| R9 | 50 | | | |
| Photobiological safety | | | RG1 unlimited | |



Measurement precision $\pm 5\%$ for the flux data and $\pm 6\%$ for the efficacy data. Measurement precision for color coordinates ± 0.005 . Measurement precision for CRI ± 1.5 .

| Operation point | 930 | lm | lm/W |
|-----------------|--------------|-------|------|
| 80% I-nom 246mA | Tc 25 °C | 1903 | 181 |
| | Tc-nom 35 °C | 1882 | 179 |
| | Tc-max 85 °C | 1749 | 163 |
| I-nom 307mA | Tc 25 °C | 2368 | 179 |
| | Tc-nom 35 °C | 2341 | 177 |
| | Tc-max 85 °C | 2176 | 161 |
| I-max 1680mA | Tc 25 °C | 11722 | 142 |
| | Tc-nom 35 °C | 11587 | 140 |
| | Tc-max 85 °C | 10730 | 128 |



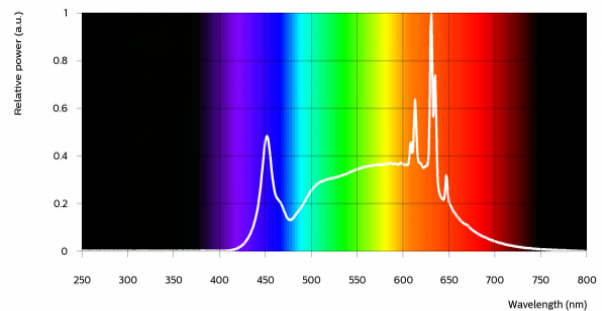
Fortimo LED CS 220 HF 940 LV6

| Parameter | Min | Typ | Max | Unit |
|------------------------------------|------|----------------|---------------|------|
| Luminous flux | 2430 | 2500 | 2740 | lm |
| Efficacy | 180 | 189 | 219 | lm/W |
| Correlated color temperature (CCT) | | 4000 | | K |
| Color coordinates (CIEx, CIEy) | | (0.384, 0.379) | | - |
| Color consistency | | | 3 | SDCM |
| CRI | 90 | | | |
| R9 | 50 | | | |
| Photobiological safety | | | RG1 unlimited | |



Measurement precision $\pm 5\%$ for the flux data and $\pm 6\%$ for the efficacy data. Measurement precision for color coordinates ± 0.005 . Measurement precision for CRI ± 1.5 .

| Operation point | 940 | lm | lm/W |
|-----------------|--------------|-------|------|
| 80% I-nom 246mA | Tc 25 °C | 2035 | 194 |
| | Tc-nom 35 °C | 2010 | 190 |
| | Tc-max 85 °C | 1858 | 173 |
| I-nom 307mA | Tc 25 °C | 2531 | 191 |
| | Tc-nom 35 °C | 2500 | 189 |
| | Tc-max 85 °C | 2311 | 170 |
| I-max 1680mA | Tc 25 °C | 12533 | 152 |
| | Tc-nom 35 °C | 12373 | 149 |
| | Tc-max 85 °C | 11402 | 135 |



Electrical characteristics

Fortimo LED CS 220 HF 930 LV6

| Parameter | Min | Typ | Max | Unit |
|---------------------------------------|------|------|------|---------------|
| Forward voltage | 40.8 | 43.2 | 44.0 | V |
| Power consumption | 12.5 | 13.3 | 13.5 | W = kWh/1000h |
| Number of modules in series per chain | | | 1 | |
| Number of modules in parallel | | | 1 | |

Measurement precision for Vf +/- 3%. Measurement precision for power +/- 3.3%

Fortimo LED CS 220 HF 940 LV6

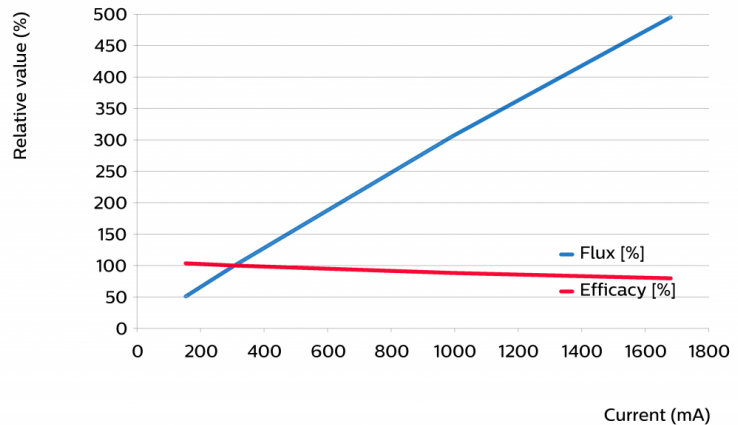
| Parameter | Min | Typ | Max | Unit |
|---------------------------------------|------|------|------|---------------|
| Forward voltage | 40.8 | 43.2 | 44.0 | V |
| Power consumption | 12.5 | 13.3 | 13.5 | W = kWh/1000h |
| Number of modules in series per chain | | | 1 | |
| Number of modules in parallel | | | 1 | |

Measurement precision for Vf +/- 3%. Measurement precision for power +/- 3.3%

Tuning information

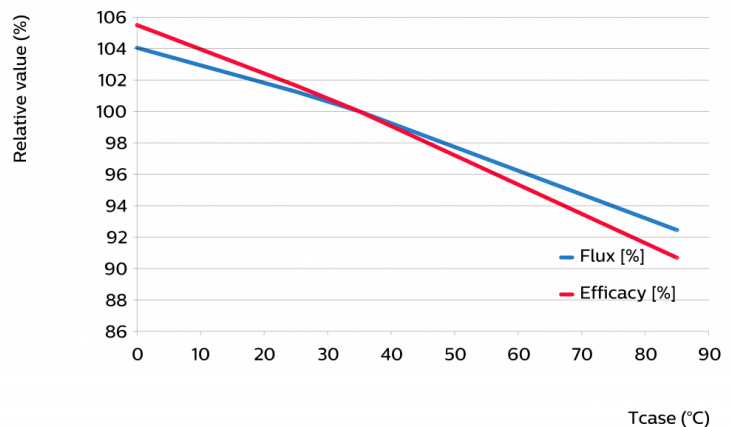
Flux and efficacy versus current (at Tc nominal)

| I [mA] | Flux [%] | Efficacy [%] |
|--------|----------|--------------|
| 1680 | 495 | 79 |
| 994 | 306 | 88 |
| 307 | 100 | 100 |
| 246 | 81 | 101 |
| 154 | 51 | 103 |



Flux and efficacy versus temperature at Tc (at I nominal)

| Tc [°C] | Flux [%] | Efficacy [%] |
|---------|----------|--------------|
| 85 | 92 | 91 |
| 35 | 100 | 100 |
| 25 | 101 | 102 |
| 0 | 104 | 105 |



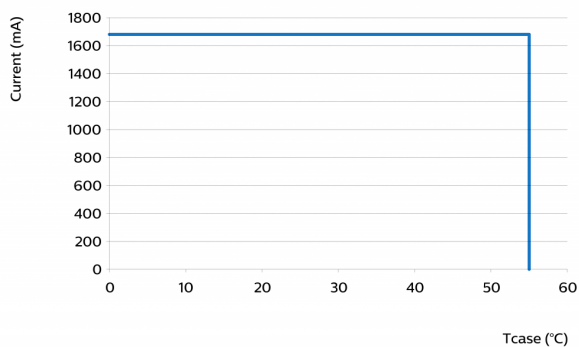
Lumen maintenance

| Operation point | Lumen maintenance x 1000 hours | L70 | | | L80 | | | L90 | | |
|-----------------|-----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | B50 | B20 | B10 | B50 | B20 | B10 | B50 | B20 | B10 |
| 80% I-nom 246mA | Tc 25°C | >72 | >72 | >72 | >72 | >72 | >72 | >72 | >72 | >72 |
| | Tc-nom 35°C | >72 | >72 | >72 | >72 | >72 | >72 | >72 | >72 | >72 |
| | Tc-life 55°C | >72 | >72 | >72 | >72 | >72 | >72 | 54 | 53 | 53 |
| I-nom 307 mA | Tc 25°C | >72 | >72 | >72 | >72 | >72 | >72 | >72 | >72 | >72 |
| | Tc-nom 35°C | >72 | >72 | >72 | >72 | >72 | >72 | 69 | 68 | 67 |
| | Tc-life 55°C | >72 | >72 | >72 | >72 | >72 | >72 | 52 | 51 | 51 |
| I-life 1680 mA | Tc=25°C | >72 | >72 | >72 | >72 | >72 | >72 | 56 | 55 | 54 |
| | Tc-nom 35°C | >72 | >72 | >72 | >72 | >72 | >72 | 48 | 47 | 46 |
| | Tc-life 55°C | >72 | >72 | >72 | >72 | >72 | >72 | 36 | 35 | 35 |

Lifetime

| Parameter | Value | Unit |
|----------------|--------|-------|
| M70F50 nominal | >72000 | hours |
| M70F50 life | >72000 | hours |

Performance Window



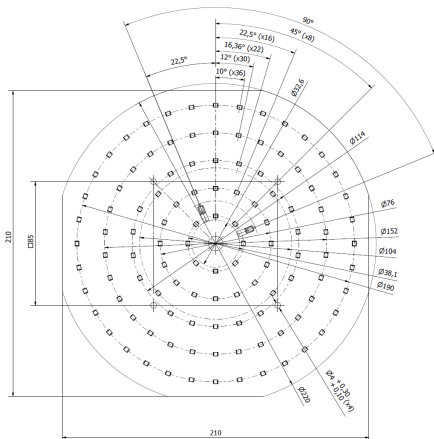
Wiring

| Specification item | Value | Unit | Condition |
|--------------------------|-------------|-----------------|---------------|
| Input wire cross-section | 0.25...0.75 | mm ² | solid wire |
| | 18...24 | AWG | solid wire |
| Input wire strip length | 7.5...8.5 | mm | |
| Input wire cross-section | 0.33...0.5 | mm ² | stranded wire |
| | 20...22 | AWG | stranded wire |
| Input wire strip length | 7.5...8.5 | mm | |



Mechanical characteristics

| Parameter | Min | Typ | Max | Unit |
|--------------|--------|-----|--------|------|
| Length | 209.75 | 210 | 210.25 | mm |
| Width | 209.75 | 210 | 210.25 | mm |
| Height PCB | | 1.6 | | mm |
| Height | 5.9 | 6.1 | 6.3 | mm |
| Product mass | | 122 | | gram |



Absolute ratings

| Parameter | Min | Max | Unit |
|--|-----|------|------------------|
| Current through the LED module (I-max) | | 1680 | mA |
| Case temperature (Tc-max) | | 85 | $^\circ\text{C}$ |
| ESD (direct contact) | 8 | | kV |
| Working voltage | | 350 | V _{dc} |

Application information

Certificates and Standards

CE
ENEC
ENEC+
UL

Environmental

RoHS/REACH

Application

Dimming

Yes

Suitable for Damp Locations



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21/03/2023