

***iX-led*** Edition 1

**Circulus Ulla –  
upgrade for downlights**

## The new Circulus Ulla – Uplight for Downlights

Circulus Ulla and the Ulla optics from Ledil create a lighting solution that combines design, technology, and flexibility in one clear system. The LED module was developed as an uplight for pendant downlights, especially for delicate luminaires, and produces a balanced, uniform light pattern for modern room concepts.

The flat uplight avoids hotspots and distributes the light widely across the ceiling. Hard light cones and strong contrasts are avoided, the ceiling appears brighter, and the room appears larger. In combination with the downlight, the result is pleasant lighting that supports the room without dominating it – a conscious alternative to classic LED spots.

## Circulus Ulla also impresses with its high technical quality and versatile application options:

- Uniform, wide illumination
- Pleasant room effect thanks to bright ceiling
- Choice of 8 light colors: 2200 K to 6500 K
- 2 color renderings: CRI 80 or CRI 90
- From 2700 K in KSF technology for maximum LED efficiency
- Perfectly matched to the Ulla optics from Ledil
- Also available as an HCL variant and as a COLOR version

This makes Circulus Ulla suitable for a wide range of applications – from cozy lighting moods to dynamic human-centric lighting concepts and colorful accent solutions. Circulus Ulla stands for calm, homogeneous illumination with architectural clarity – flexible in the system, precise in its effect.

Our iX-led standard modules are available at short notice, even in small quantities, and are advantageous in the overall concept.

## Standard does not mean rigid and unchangeable!

Do you need different light colors, different color renderings or minimally shorter/longer versions of the modules? You need the assembly of soldering nuts as spacers or a threaded insert for simplified mounting of the module? No problem. Other terminals or soldered cables are also possible. With the **iX-led product family** we can adapt and individualize the standard to your needs.

Explore our exclusive module series with more than 1000 lighting possibilities.

LED module with mid-power LEDs for installation in luminaires.

Versatile with:

- ✓ Color rendering: CRI 80 - CRI 90
- ✓ From 2700 K in KSF technology for maximum LED efficiency
- ✓ 8 light colors: CCT 2200 K, 2700 K, 3000 K, 3500 K, 4000 K, 5000 K, 5700 K and 6500 K

Excellent colour consistency in the module: 3 Step MacAdam LEDs.

Plug-in terminals for quick and easy installation.

For operation with suitable constant current drivers.

Maximum working voltage	100 V
Ambient temperature	-20... +50 °C
Max. perm. operating temperature (T <sub>c</sub> )	80 °C
EPREL database entry	yes
Beam angle	120°

### Connections:

Terminals		2	2	2
Connection type		solid	fine-stranded, tinned	fine-stranded
Conductor cross-section AWG		AWG 24-18	AWG 24 – 20	AWG 24 - 18
Conductor cross-section	from	0.2 mm <sup>2</sup>	0.2 mm <sup>2</sup>	0.2 mm <sup>2</sup>
	to	0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>
Stripping length		8.5 +/- 1 mm	8.5 +/- 1 mm	8.5 +/- 1 mm

## Circulus Ulla G1 - Upgrade for Downlights

- ✓ ring-shaped LED module for installation in luminaires
- ✓ fits perfectly with the Ulla optic from Ledil
- ✓ 24 Mid-Power LEDs
- ✓ pitch distance 5.8 mm
- ✓ diameter outside 54.2 mm and inside 29.2 mm
- ✓ two connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 1050 mA
- ✓ maximum forward voltage 17.9 V
- ✓ also available as HCL and COLOR variants



Please also refer to the technical data of the Circulus Ulla family on page 3. Further technical data and drawings from page 5.

CRI	CCT	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 125 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 1.050 mA Tc = 25 °C			
≥80	2200 K	348 lm	176 lm/W	951 lm	167 lm/W	2656 lm	144 lm/W	7543-22000	Circulus Ulla G1 822
	2700 K	430 lm	218 lm/W	1189 lm	208 lm/W	3344 lm	181 lm/W	7543-22001	Circulus Ulla G1 827
	3000 K	434 lm	220 lm/W	1201 lm	210 lm/W	3376 lm	183 lm/W	7543-22002	Circulus Ulla G1 830
	3500 K	444 lm	225 lm/W	1227 lm	215 lm/W	3450 lm	187 lm/W	7543-22003	Circulus Ulla G1 835
	4000 K	451 lm	228 lm/W	1246 lm	218 lm/W	3503 lm	190 lm/W	7543-22004	Circulus Ulla G1 840
	5000 K	449 lm	228 lm/W	1242 lm	218 lm/W	3493 lm	189 lm/W	7543-22005	Circulus Ulla G1 850
	5700 K	448 lm	227 lm/W	1239 lm	217 lm/W	3482 lm	188 lm/W	7543-22006	Circulus Ulla G1 857
	6500 K	442 lm	224 lm/W	1223 lm	214 lm/W	3440 lm	186 lm/W	7543-22007	Circulus Ulla G1 865

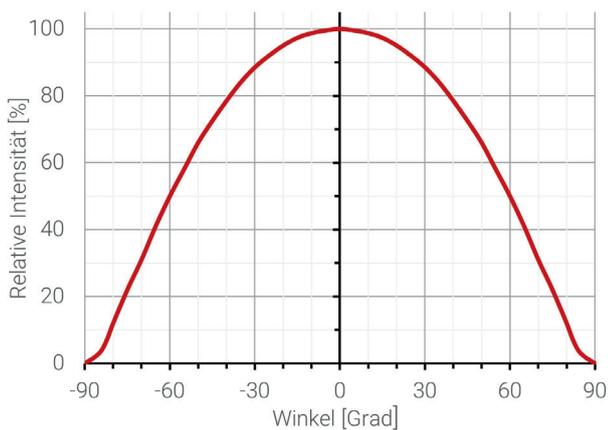
Up to 3503lm!

CRI	CCT	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 125 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 1.050 mA Tc = 25 °C			
≥90	2200 K	296 lm	150 lm/W	808 lm	142 lm/W	2257 lm	122 lm/W	7543-22008	Circulus Ulla G1 922
	2700 K	391 lm	198 lm/W	1080 lm	189 lm/W	3036 lm	164 lm/W	7543-22009	Circulus Ulla G1 927
	3000 K	402 lm	203 lm/W	1110 lm	195 lm/W	3121 lm	169 lm/W	7543-22010	Circulus Ulla G1 930
	3500 K	410 lm	208 lm/W	1133 lm	198 lm/W	3185 lm	172 lm/W	7543-22011	Circulus Ulla G1 935
	4000 K	417 lm	211 lm/W	1152 lm	202 lm/W	3238 lm	175 lm/W	7543-22012	Circulus Ulla G1 940
	5000 K	417 lm	211 lm/W	1152 lm	202 lm/W	3238 lm	175 lm/W	7543-22013	Circulus Ulla G1 950
	5700 K	417 lm	211 lm/W	1152 lm	202 lm/W	3238 lm	175 lm/W	7543-22014	Circulus Ulla G1 957
	6500 K	412 lm	209 lm/W	1140 lm	200 lm/W	3206 lm	174 lm/W	7543-22015	Circulus Ulla G1 965

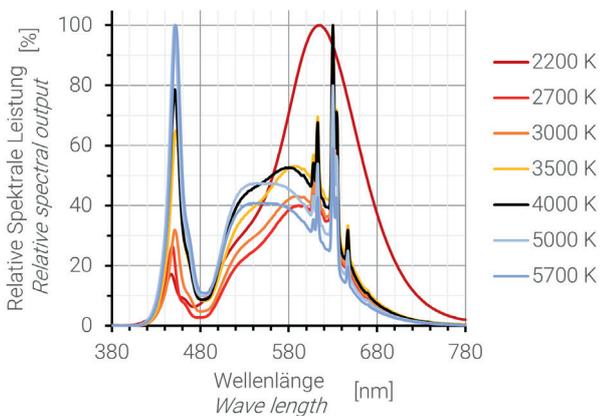
Up to 3238lm!

## Technical data: Circulus Ulla G1 - Upgrade for Downlights

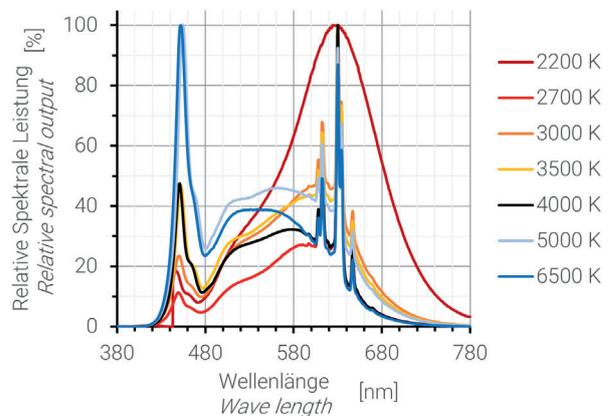
### Light distribution curve



### Spectrum 80



### Spectrum 90



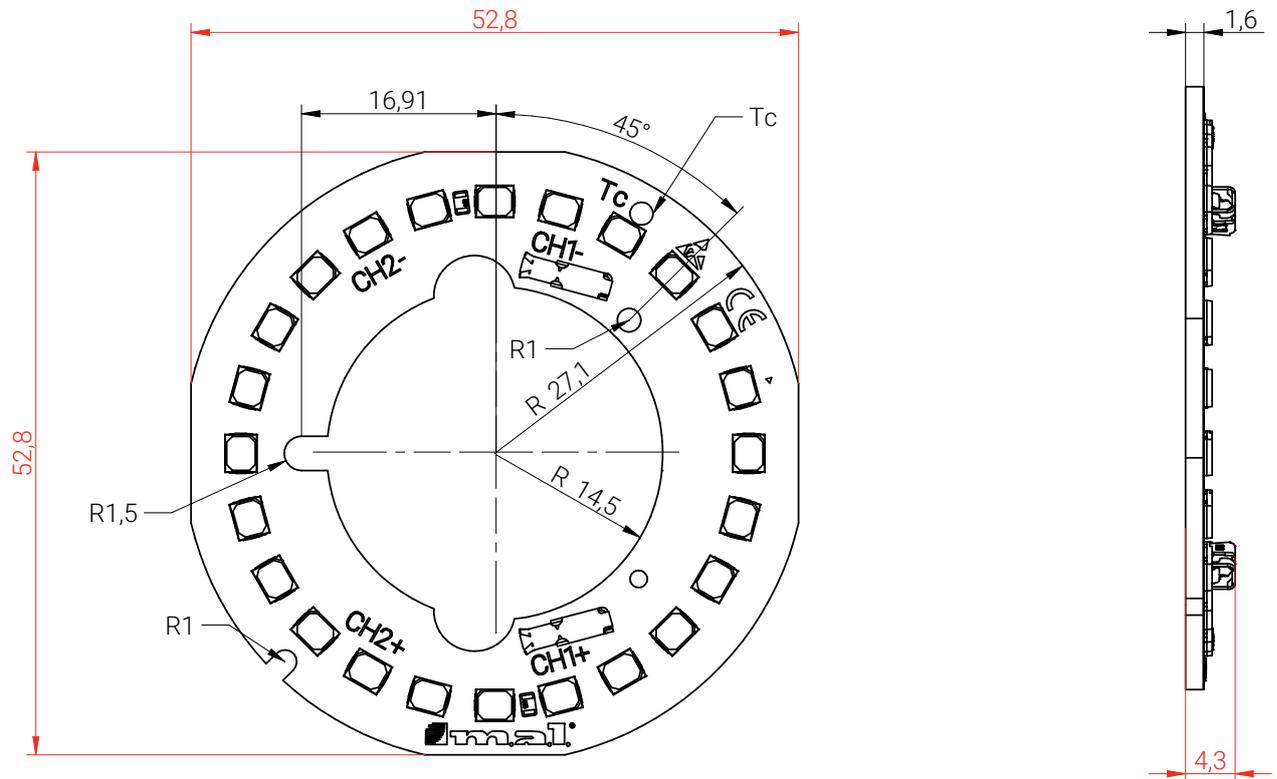
### Lifetime of the LEDs used

- The lifetime data is based on TM21 extrapolations of the available LM80 data of the LEDs used. They are to be regarded as purely informative data from which no warranty claim can be derived.

Description	If	Tc	L70 B50	L70 B10	L80 B50	L80 B10	L90 B50	L90 B10
Circulus Ulla G1 xxx	1050 mA	80 °C	> 102.000 h	> 102.000 h	> 102.000 h	> 102.000 h	> 50.000 h	> 50.000 h

## Technical drawings: Circulus Ulla G1 - Upgrade for Downlights

### Circulus Ulla G1





**Circulus Ulla HCL —  
upgrade for downlights**



LED module with mid-power LEDs for installation in luminaires.

Versatile with:

- ✓ Color rendering: CRI 80 - CRI 90
- ✓ KSF technology for maximum LED efficiency
- ✓ light color: CCT 2770 K - 6500 K

Excellent colour consistency in the module: 3 Step MacAdam LEDs.

Plug-in terminals for quick and easy installation.

For operation with suitable constant current drivers.

› Channel 1 and channel 2 must not be operated above 700 mA in total.

If (channel 1) + If (channel 2) ≤ 700 mA

Example:

Channel 1 = 500 mA, channel 2 = 200 mA = OK  
 Channel 1 = 500 mA, Channel 2 = 500 mA = not OK

Maximum working voltage	100 V
Ambient temperature	-20...+50 °C
Max. perm. operating temperature (Tc)	80 °C
EPREL database entry	yes
Beam angle	120°

## Connections

Terminals	4	4	4
Connection type	solid	fine-stranded, tinned	fine-stranded
Conductor cross-section AWG	AWG 24-18	AWG 24 – 20	AWG 24 - 18
Conductor cross-section	from 0.2 mm <sup>2</sup>	0.2 mm <sup>2</sup>	0.2 mm <sup>2</sup>
	to 0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>
Stripping length	8.5 +/- 1 mm	8.5 +/- 1 mm	8.5 +/- 1 mm

### Circulus Ulla G1 HCL - Upgrade for Downlights

- ✓ ring-shaped HCL-LED module for installation in luminaires
- ✓ Fits perfectly with the Ulla optic from Ledil
- ✓ 2x12 Mid-Power LEDs
- ✓ pitch distance 5.8 mm
- ✓ diameter outside 54.2 mm and inside 29.2 mm
- ✓ four connection terminals
- ✓ rated current 200 mA
- ✓ maximum operating current 700 mA
- ✓ maximum forward voltage 18.4 V
- ✓ Also available in white and COLOR versions



Please also refer to the technical data of the Circulus Ulla HCL family on page 8. Further technical data and drawings from page 10.

CRI	CCT	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 50 mA Tc = 25 °C		If = 200 mA Tc = 25 °C		If = 1.050 mA Tc = 25 °C			
≥80	2700 K	172 lm	219 lm/W	677 lm	206 lm/W	2156 lm	170 lm/W	7543-22080	Circulus Ulla G1 HCL 827-865
	6500 K	177 lm	219 lm/W	696 lm	206 lm/W	2218 lm	170 lm/W		

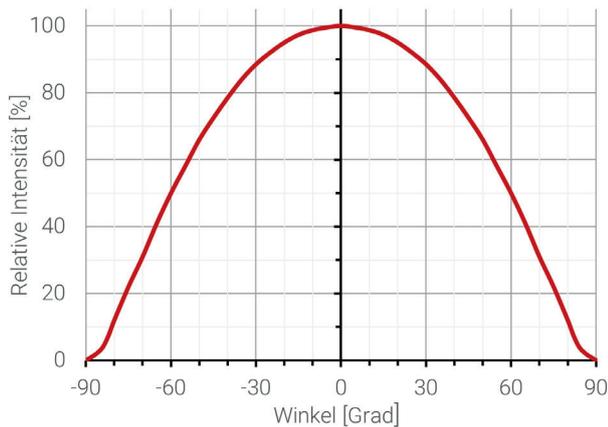
Up to  
2218 lm!

CRI	CCT	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 50 mA Tc = 25 °C		If = 200 mA Tc = 25 °C		If = 1.050 mA Tc = 25 °C			
≥90	2700 K	156 lm	198 lm/W	614 lm	187 lm/W	1958 lm	154 lm/W	7543-22081	Circulus Ulla G1 HCL 927-965
	6500 K	165 lm	210 lm/W	649 lm	198 lm/W	2067 lm	163 lm/W		

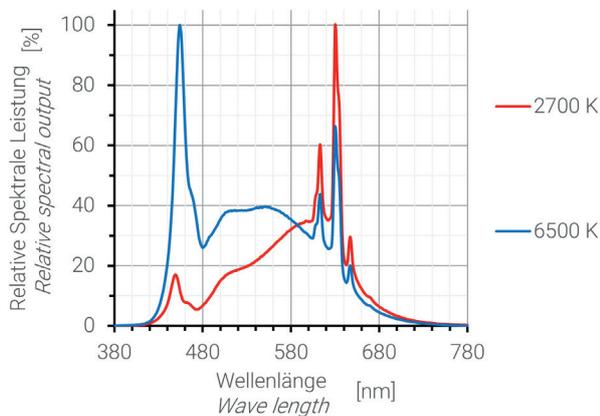
Up to  
2067 lm!

## Technical data: Circulus Ulla G1 HCL - Upgrade for Downlights

### Light distribution curve



### Spectrum 90



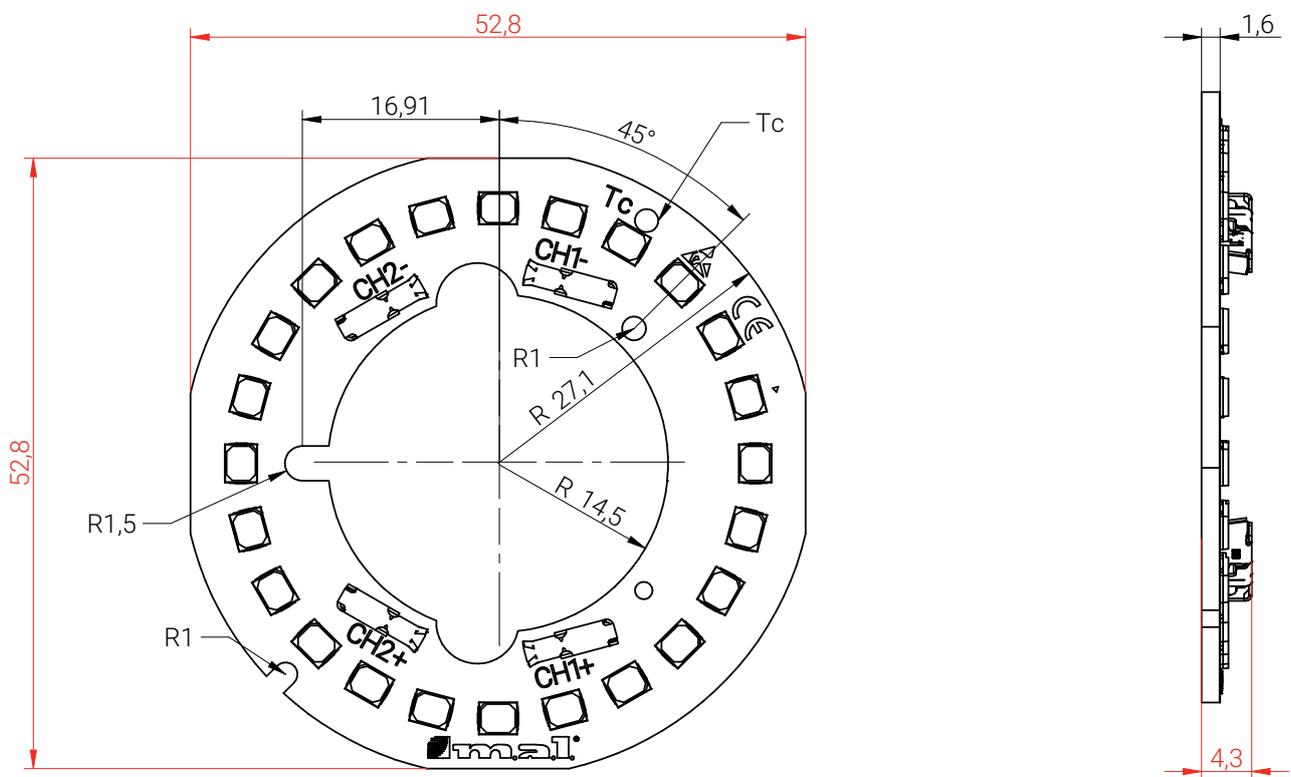
### Lifetime of the LEDs used

- The lifetime data is based on TM21 extrapolations of the available LM80 data of the LEDs used. They are to be regarded as purely informative data from which no warranty claim can be derived.

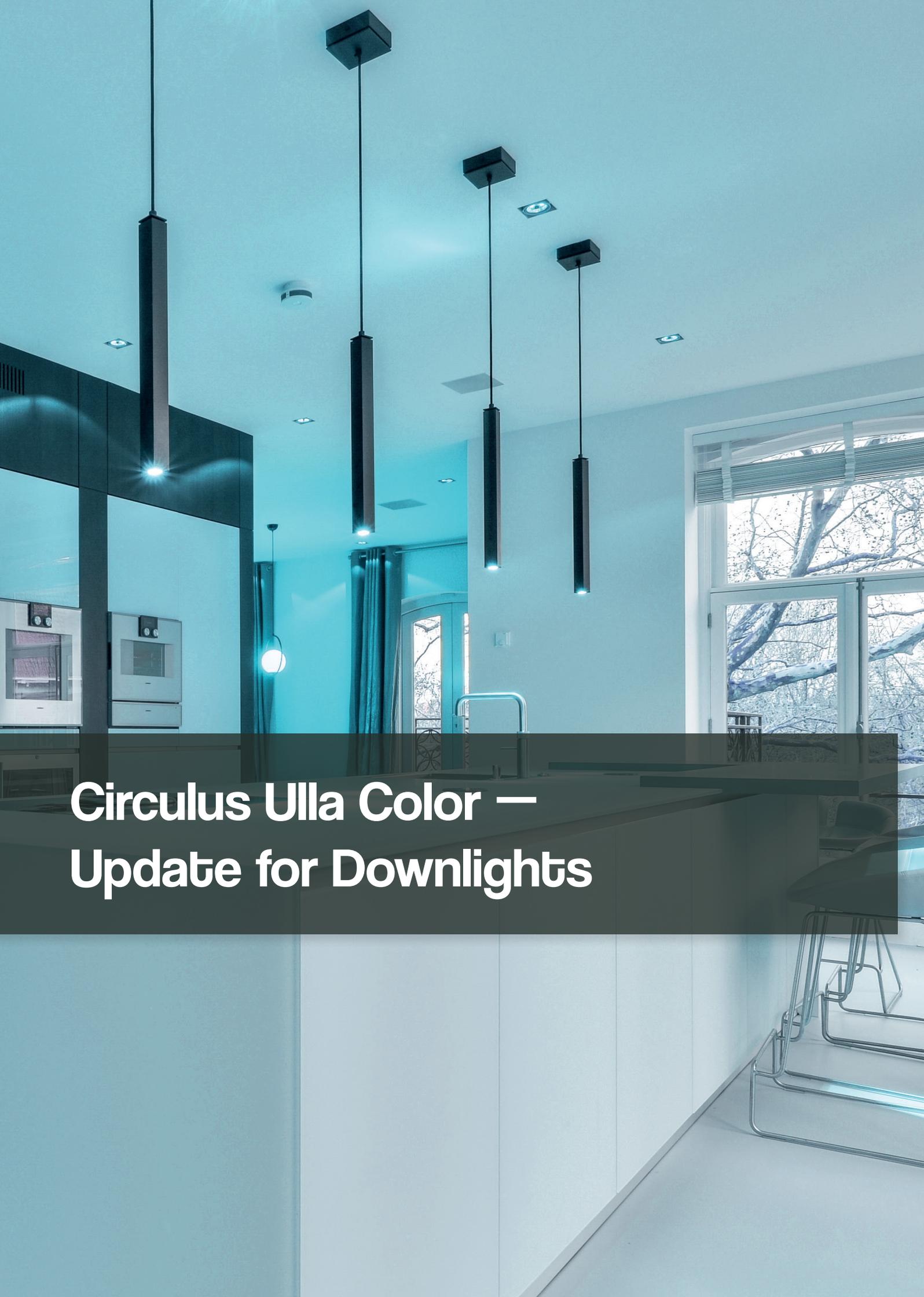
Description	If	Tc	L70 B50	L70 B10	L80 B50	L80 B10	L90 B50	L90 B10
Circulus Ulla G1 HCL xxx	1050 mA	80 °C	> 102.000 h	> 102.000 h	> 102.000 h	> 102.000 h	> 50.000 h	> 50.000 h

## Technical drawings: Circulus Ulla G1 HCL - Upgrade for Downlights

### Circulus Ulla G1 HCL







# Circulus Ulla Color — Update for Downlights

LED module with mid-power LEDs for installation in luminaires.

Versatile with:

✓ 5 light colors: PC Red-Orange, PC Amber, Green, Blue and Royal-Blue

Plug-in terminals for quick and easy installation.

For operation with suitable constant current drivers.

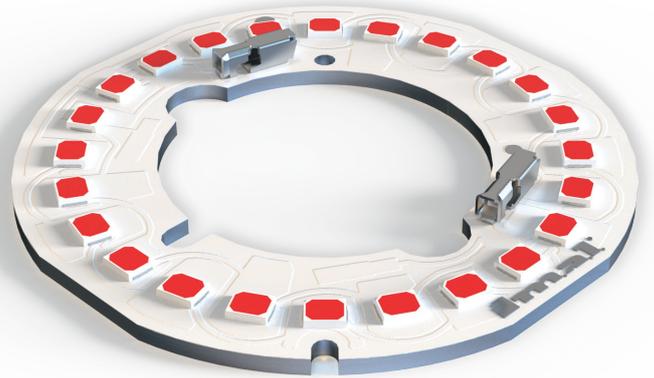
Maximum working voltage	100 V
Ambient temperature	-20... +50 °C
Max. perm. operating temperature (Tc)	80 °C
EPREL database entry	yes
Beam angle	120°

## Connections:

Terminals	2	2	2
Connection type	solid	fine-stranded, tinned	fine-stranded
Conductor cross-section AWG	AWG 24-18	AWG 24 – 20	AWG 24 - 18
Conductor cross-section	from 0.2 mm <sup>2</sup>	0.2 mm <sup>2</sup>	0.2 mm <sup>2</sup>
	to 0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>
Stripping length	8.5 +/- 1 mm	8.5 +/- 1 mm	8.5 +/- 1 mm

### Circulus Ulla G1 Color - Upgrade for Downlights

- ✓ ring-shaped LED module for installation in luminaires
- ✓ fits perfectly with the Ulla optic from Ledil
- ✓ Color 24 Mid-Power LEDs
- ✓ pitch distance 5.8 mm
- ✓ diameter outside 54.2 mm and inside 29.2 mm
- ✓ two connection terminals
- ✓ rated current 200 mA
- ✓ maximum operating current 700 mA
- ✓ maximum forward voltage 18.7 V
- ✓ Also available as an HCL version and in white

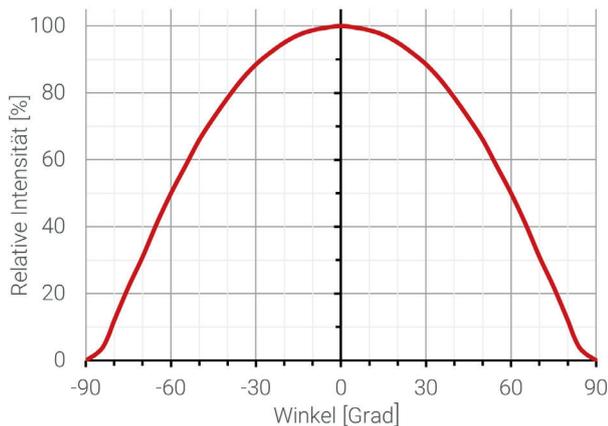


Please also refer to the technical data of the Circulus Ulla Color family on page 14. Further technical data and drawings from page 16.

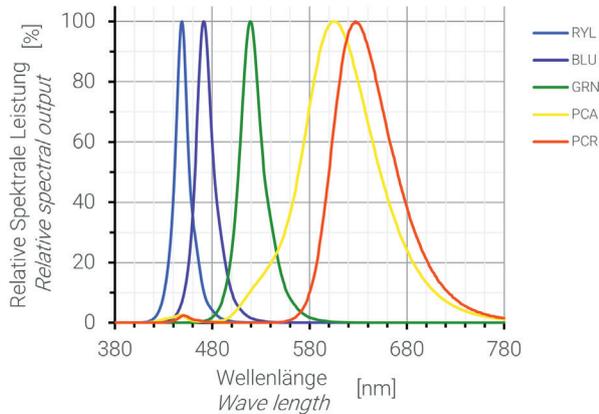
light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 100 mA Tc = 25 °C		If = 200 mA Tc = 25 °C		If = 1.050 mA Tc = 25 °C			
PC Amber	-	198 lm	126 lm/W	389 lm	120 lm/W	1238 lm	98 lm/W	7543-22016	Circulus Ulla G1 PCA
PC Red Orange	-	101 lm	63 lm/W	197 lm	60 lm/W	613 lm	48 lm/W	7543-22017	Circulus Ulla G1 PCR
Green	520 - 530 nm	279 lm	194 lm/W	501 lm	167 lm/W	1248 lm	103 lm/W	7543-22018	Circulus Ulla G1 GRN
Blue	470 - 480 nm	66 lm	44 lm/W	122 lm	39 lm/W	343 lm	27 lm/W	7543-22019	Circulus Ulla G1 BLU
Royal Blue	450 - 460 nm	1206 mW	76 %	2384 mW	73 %	7758 mW	61 %	7543-22020	Circulus Ulla G1 RYL

## Technical data: Circulus Ulla G1 Color - Upgrade for Downlights

### Light distribution curve



### Spectrum



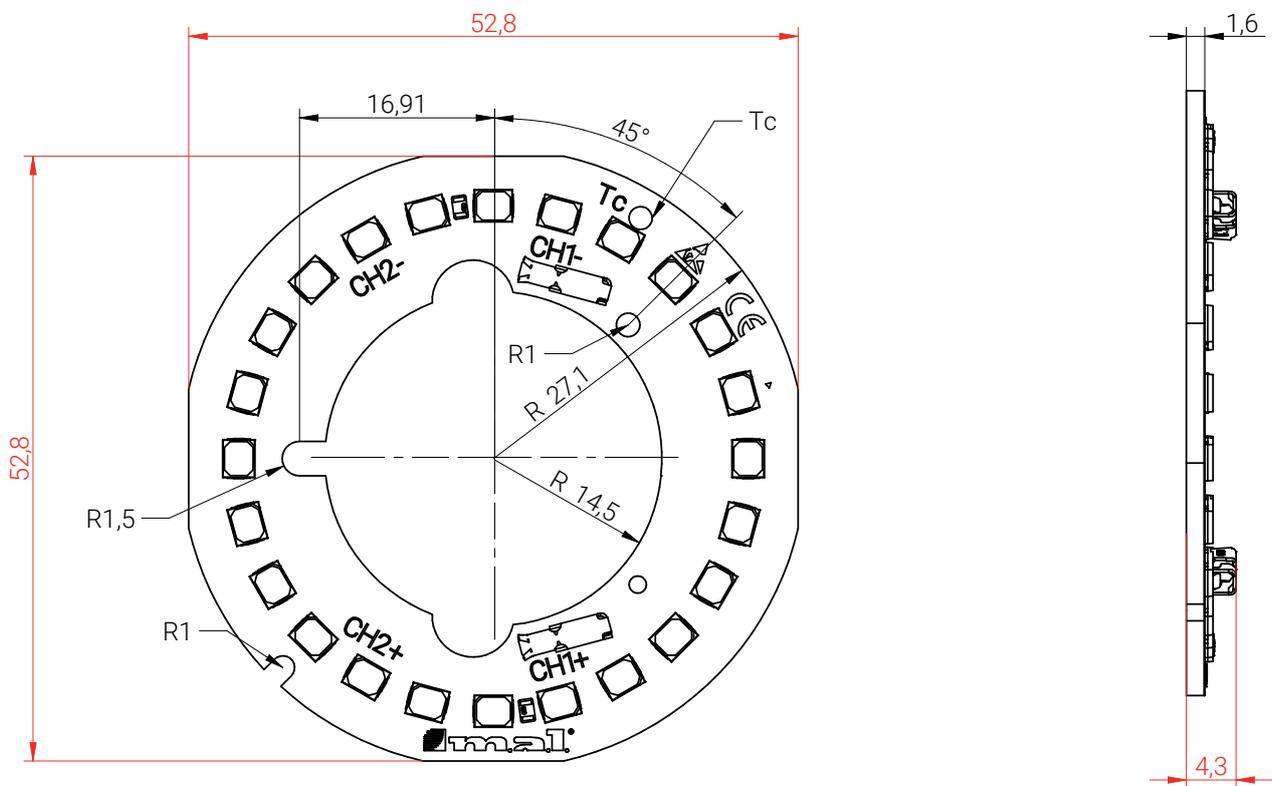
### Lifetime of the LEDs used

- The lifetime data is based on TM21 extrapolations of the available LM80 data of the LEDs used. They are to be regarded as purely informative data from which no warranty claim can be derived.

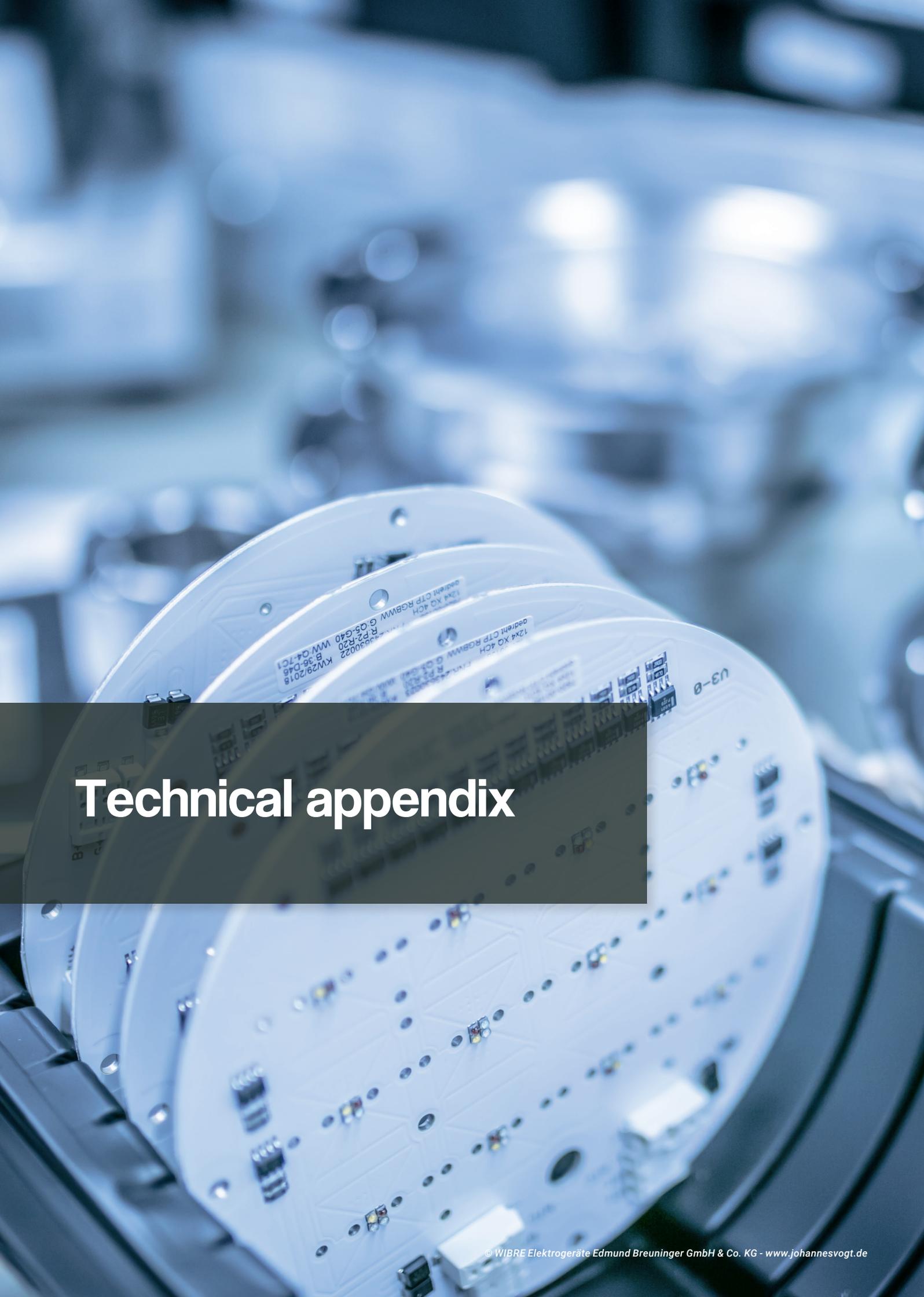
Description	If	Tc	L70 B50	L70 B10	L80 B50	L80 B10	L90 B50	L90 B10
Circulus Ulla G1 PCA	560 mA	80 °C	> 36.000 h					
Circulus Ulla G1 PCR	560 mA	80 °C	> 36.000 h					
Circulus Ulla G1 GRN	560 mA	80 °C	> 36.000 h					
Circulus Ulla G1 BLU	560 mA	80 °C	> 36.000 h					
Circulus Ulla G1 RYL	560 mA	80 °C	27.000 h	> 36.000 h	> 36.000 h	27.000 h	> 36.000 h	> 36.000 h

## Technical drawings: Circulus Ulla G1 Color - Upgrade for Downlights

### Circulus Ulla G1 Color







# Technical appendix

Sorry, there is not always enough space for all the values... You need more data? We will gladly provide you with our data sheets.

For quick solutions: On this way you can calculate more data by yourself:

### Power input LED-Modul $P_{mod}$ [W]:

$$P_{mod} [W] = \frac{Flux [lm]}{LPW [lm/W]}$$

### Forward voltage $V_f$ [V]:

$$V_f [V] = \frac{Flux [lm]}{LPW [lm/W]} * \frac{1000}{I_f [mA]}$$

### Agenda:

<i>CCT</i>	Color temperature, the color of light. Unit Kelvin (K) Example: 2700 K
<i>CRI</i>	Designates the color rendering index Ra. The value range is 0 to 100. Sunlight has CRI 100. A good color rendering is achieved with CRI 80, a very good color rendering is CRI 90. Some LEDs can even achieve a color rendering of CRI 95.
<i>Flux</i>	Luminous flux. Unit lumen (lm)
<i>I<sub>f</sub></i>	(Forward) current. Unit ampere (A). We express this value in milliamperes (mA).
<i>V<sub>f</sub></i>	Forward voltage. Unit Volt (V)
<i>P<sub>mod</sub></i>	Power consumption of the LED module. Unit Watt (W).
<i>LPW</i>	Abbreviation for lumens per watt. It is also called efficiency or luminous efficacy. Unit lumens per watt (lm/W).

The specified maximum operating currents are informative and must be verified in the application and luminaire by measuring the temperature at the T<sub>c</sub> point.

### Service life specifications

- ! The service life specifications are defined via statistical values and calculations.
- ! The luminous flux of LEDs decreases over time. The L70 value indicates the point in time at which the luminous flux has reduced to 70% of the initial luminous flux. L80 and L90 define the 80% and 90% values respectively.
- ! The B value, usually B10 or B50, defines how many LEDs fall below the L value. L80B10 thus means that 10% of the LEDs have fallen below and 90% above the 80% value of the initial luminous flux.
- ! L80B10 50.000h defines e.g. with it:  
After 50,000h, 90% of the LEDs produce more than 80% of the initial luminous flux.

### General mounting and securing instructions

#### Handling of the LED modules



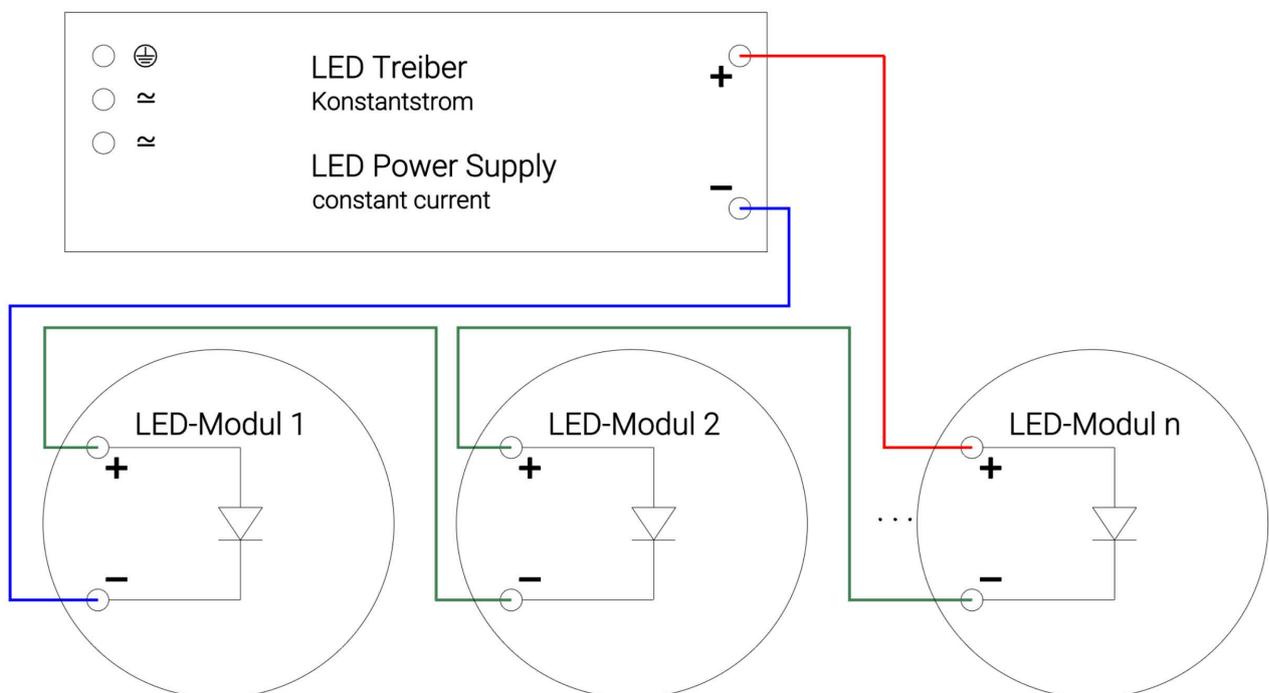
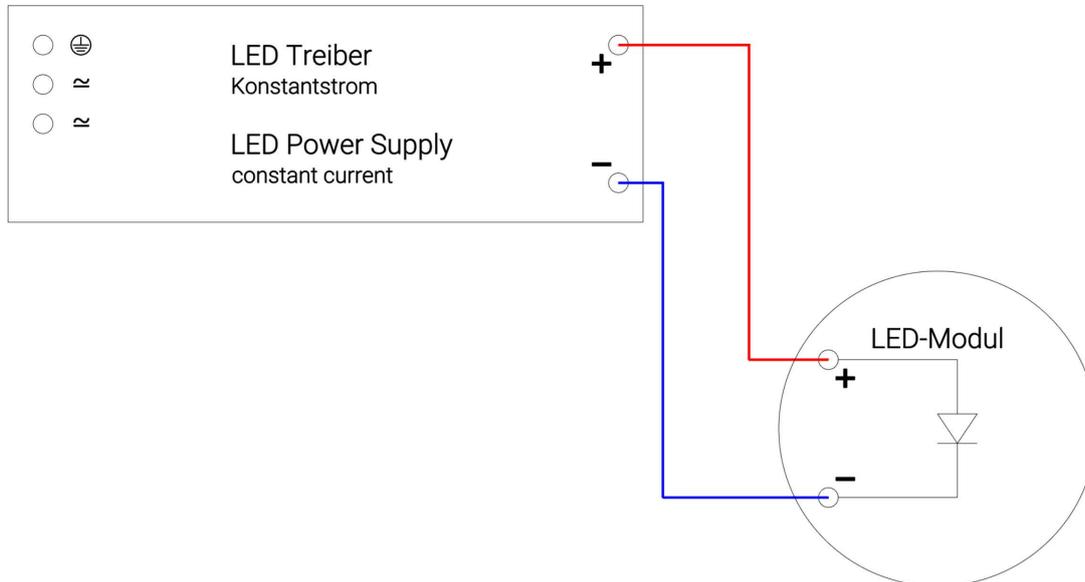
- ! iX-led LED modules are sensitive electronic components that can be damaged or destroyed by improper handling!
- ! The modules may only be mounted in an electrostatic protected area (EPA). Dissipative tools and bases must be used for mounting. The grounding of persons must be ensured by means of suitable ESD footwear, as well as standard-compliant ESD flooring and/or standard-compliant grounding by means of a wrist strap.
- ! LED modules may only be touched at the edges of the circuit board. Do not touch the surface of the circuit board.
- ! The LEDs themselves must never be touched with pointed objects or fingers, as this may destroy or damage the silicone and alter the light image.
- ! If necessary, cleaning may only be carried out with pure isopropyl alcohol/isopropanol (IPA).
- ! If possible, the modules should not come into contact with chemicals during storage, operation or installation, as this can lead to destruction or massive reduction in luminous flux. This applies in particular, but not exclusively, to:
  - Cyanoacrylate adhesives ("super glue")
  - Solvents containing acetone and solvents in general
  - Various, unsuitable cleaners, such as petroleum ether, glass cleaner, etc.
  - Products containing sulfur (this may include cardboard boxes)
  - All substances from which volatile organic compounds (VOC) may be emitted.
- ! Any modification of the modules that has not been approved by **m.a.l.** is not permitted.
- ! If possible, the modules are to be stored only in the sealed original packaging. If this is not possible, it must at least be ensured that the modules are packaged in an ESD-compliant manner and are protected from dust and moisture.
- ! Direct storage in cardboard boxes without additional outer packaging can lead to damage to the LEDs, depending on the LED installed.

## Mounting of LED modules

- ! Use a suitable heat-conducting material to ensure good heat transfer between the LED module and the heat sink.
- ! Mounting must only be carried out using suitable screws or other fastening elements.
- ! When selecting screws and other fastening elements, it must be ensured that the air and creepage distances of the screw heads or other conductive elements do not fall below clearance and creepage distances. In case of doubt, plastic washers with suitable dimensions or plastic screws must be used.
- ! As an alternative or in addition to a screw connection, the assembly can be carried out with suitable thermally conductive adhesive tapes. In this case, it is essential to check the material compatibility!
- ! Any mechanical stress on the module must be avoided, as this can lead to damage or destruction.
- ! Sufficient heat dissipation must be ensured by the luminaire design and correct mounting. The maximum temperature at the Tc point must not be exceeded during operation. For this purpose, measurements must be carried out with the complete luminaire and the permissible operating temperature range of the finished luminaire must be determined accordingly.

## Connection of LED modules

- ! All LED modules listed in this catalog are intended for connection to a constant current LED driver. Safe operation can only be ensured with an LED driver that complies with all relevant regulations. Operation with constant voltage LED drivers is not permitted and can lead to the destruction of the LED module.
- ! Please refer to the data sheet of your LED driver and check if the current and voltage range fits to the LED modules.
- ! Reversing the polarity of the LED module (swapping plus and minus) can damage the LED module.
- ! Multiple LED modules can be connected in series or parallel. The following must be observed:
  - Parallel connection:  
A parallel connection of the modules is not recommended, because due to manufacturing tolerances and different thermal loads different module currents and thus differences in brightness up to overload of modules can occur. Exceptions are modules of the Opticus Daisy T series. In the event of a fault such as an electrical interruption to a module, there is a higher current to the remaining modules. This leads to a reduction in lifetime up to failure.
  - Series connection:  
In a series connection, the forward voltages of the individual modules add up. Please consider the necessary measures in your luminaire design if they leave the SELV range. If the resulting voltage is >60 V, the modules must be installed isolated and protected against accidental contact.
  - The maximum working voltage of the insulation (see data sheets) must never be exceeded even by series connection.



- ! In any case, compliance with the applicable standards and regulations must be ensured.
- ! Before connecting the modules, the operating device must be disconnected from the mains.
- ! Connecting modules under voltage will destroy the modules.

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! You can find our current privacy policy at: [www.mal-effekt.de/datenschutz.html](http://www.mal-effekt.de/datenschutz.html)

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## Technical data available for download

The data shown are excerpts. The complete data sheets are available on our website [www.mal-effekt.de](http://www.mal-effekt.de).



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Rev 0 / 02-2026

