

A nighttime photograph of the Eskilstuna Railway Bridge, featuring large concrete arches illuminated with vibrant blue and green light. The bridge deck above is lit with warm yellow and red light, and the surrounding area is dark, with some city lights visible in the background.

ix-led Edition 2

Color LED-modules

The practical solution for your creative kit

You will find a complete overview of our **iX-led family** in our catalog. But what is „iX-led“ anyway? iX-led is our **LED module system** for your individual lighting solution. And iX-led is **quickly available**.

Thanks to the variously diverse, practical iX-led formats, the numerous light colors and color renderings, we provide you with a creative construction kit for your luminaire development and lighting applications. In the **iX-led product family**, you will find the right LED module for almost any task.

You want more?

We will be happy to equip our LED modules with more powerful, more efficient LEDs at short notice. Or with other terminals. Or with other light colors. Even CRI 95 is possible on request. You prefer to glue the LED modules instead of screwing them? We can make it possible.

That's not enough?

Our LED modules can be customized specifically for your application. In addition, we are happy to optimize our modules so that they add value to your application: e.g. through optimal mounting and design to your driver portfolio. We are also familiar with standards and certifications. Thus we can carry out the Eprel entry for you or obtain the ENEC mark for you.

From the idea to the finished product and beyond - our team at **m.a.l.** develops and produces everything in Germany.



modern.art.of.light.

For more than 30 years, our company **modern.art.of.light.**, in short: m.a.l., stands for experience and sophisticated technology in the field of high-performance LED concepts and efficient LED lighting systems. On May 2, 1994 our company was founded in Bebra by Markus Vockenroth. Quickly we specialized on the production of lighting technology. The main focus was especially on effect technology and lighting for water slides and leisure facilities.

In 2008 our company moved into the business premises in Tromagstraße in Bebra and the development, production and marketing of LED technology developed into the core business. But the will to grow further could not be realized in the Tromagstraße. So in March 2016, the new building in Wiesenweg in Bebra began. Since 2017 our new location shines and the **m.a.l.** Grand Opening was celebrated in May 2017.

Since then, we have been working on our projects with a lot of heart and soul. We support demanding customers in the development of new circuits, luminaires, modules and components. On request, we develop an individual product from layout to serial production and find a tailor-made solution for every challenge.

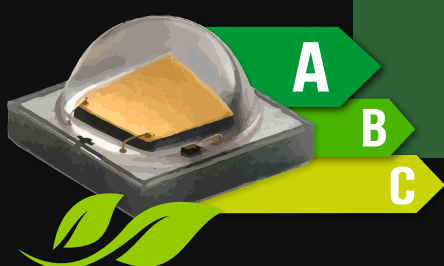
But we as a team of **modern.art.of.light.** do not only offer the pure production: Our services go far beyond the actual production. With experience, creativity and qualified employees as well as an attractive price-performance ratio, **m.a.l.** has become one of the leading partners of well-known manufacturers in the field of LED competence and electronic systems.






Made in Germany

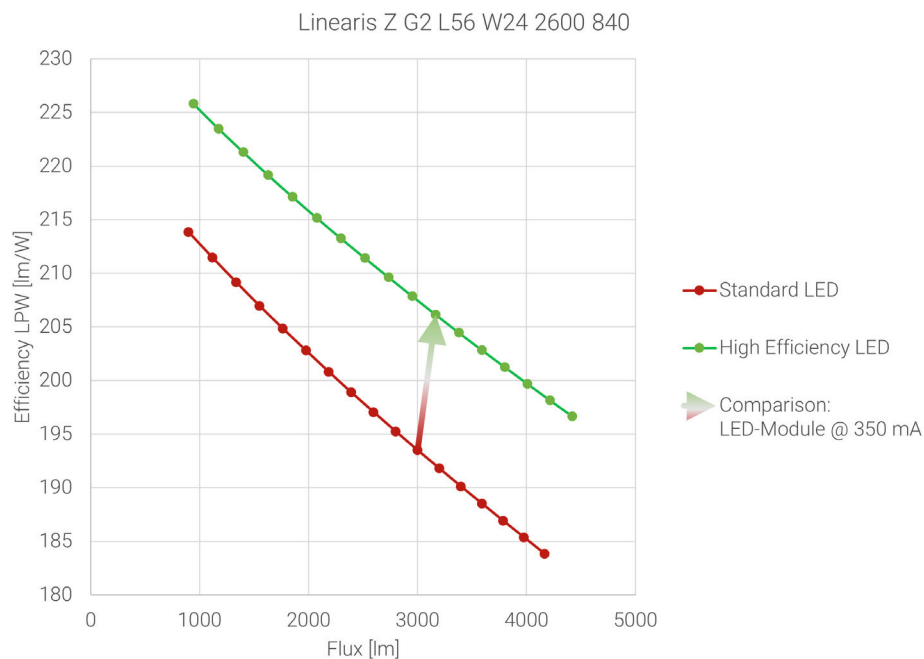
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Smart efficiency

360° Efficiency

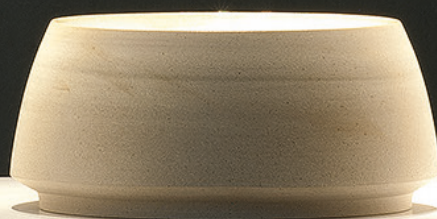
For us, efficiency means reducing the resources and energy required for the production of our LED modules. Also by keeping transport routes as short as possible. We bring efficiency to the overall product by working with you to develop solutions that, for example, enable resource-saving assembly. For us, efficiency also means that we design LED modules so that the driver you have chosen, used operates in the most efficient range. We also see efficiency in our quality. For us, quality comes before profit. We optimize the costs of our LED modules only as far as quality allows without compromising. A long service life means fewer replacements and better material efficiency.



An example of the possibilities we offer you with iX-led: Increased efficiency in the blink of an eye! Of course, our high quality and also the ENEC mark remain unchanged. This allows us - based on operation at 350 mA - to increase efficiency from 193 lm/W to 206 lm/W. The luminous flux also increases from 3000 lm to 3170 lm. With the current development of electricity prices, this investment will pay for itself after a short time.



Table of content



COLOR LED-MODULES 10**► Linear LED-modules**

Linearis Color – Industry standard linear modules.....	12
Linearis Color L14	15
Linearis Color L28	17
Linearis Color L56	19
Technical data and drawings	21

► Ring-shaped LED-modules

Circulus Color – Ring modules	26
Circulus Color 50	29
Circulus Color 105	30
Circulus Color 160	31
Circulus Color 215	32
Circulus Color 270	33
Technical data and drawings	34

► LED-Module for optics

Flexus Color – MidPower LED-modules for Stradella optics	43
Flexus Color 4x4	45
Flexus Color 4x8	46
Flexus Color 4x12	47
Flexus Color 4x16	48
Technical data and drawings	49

► Spotlightmodules

LoB Color – Spotlightmodules	54
LoB Color 1215 LES6	57
LoB Color 1619 LES9	58
LoB Color 2024 LES13	59
LoB Color 2828 LES19	60
Technical data and drawings	61

TECHNICAL APPENDIX 68

Formulas and notes	69
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Color LED-modules

The world is colorful!

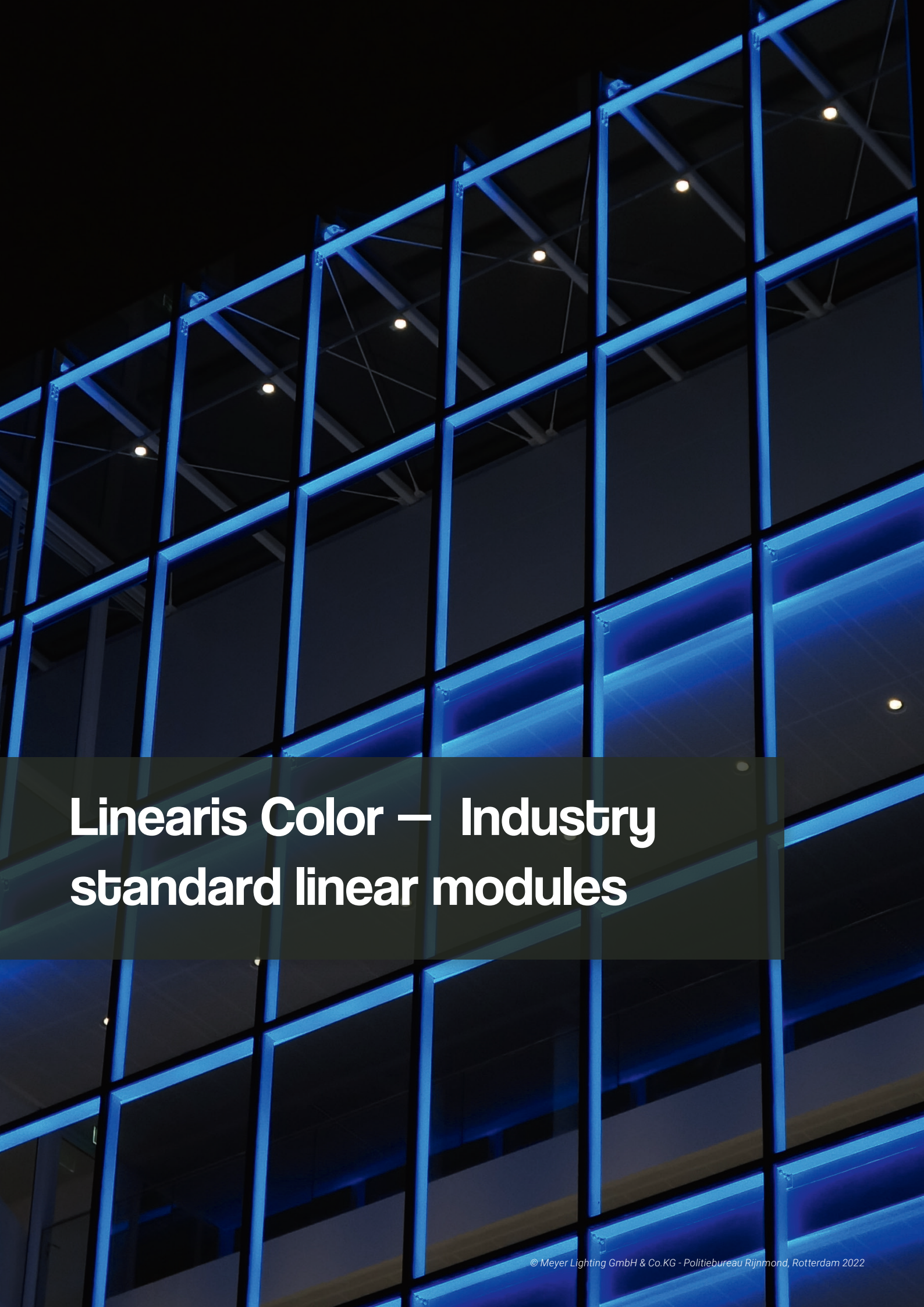
Colors are pure emotions. They generate feelings and direct our attention. This applies to all areas - including colored light, of course.

LEDs have the characteristic of generating colored light particularly intensively.

Today we find colored light in many applications: Be it in the wellness area, to create a special ambience, or in marketing to attract attention.

Colored light is also found today in special applications, such as luminaires that cause rapid plant growth in horticulture applications.





Linearis Color — Industry standard linear modules

Our standard modules of the iX-led series are Zhaga-compliant LED modules with mid-power LEDs, which are ideal for installation in luminaires. Our product portfolio impresses in the area of white light colors with a wide range of variants. This is supplemented by the Linearis Color series with colored LED modules.

iX-led Linearis Color

The Linearis Color series has a uniform width of 24 mm. Choose from three lengths: 140 mm, 280 mm and 560 mm.

Due to the same lengths as our modules with white LEDs, both series are mechanically fully compatible with each other.

The modules are optionally available with an LED pitch of around 11.7 mm or 23.3 mm, so that a module with the best possible performance is available for every application.

The highlight of the iX-led-Linearis Color series, however, is the variety of colors. Choose from eleven colors: Far-Red, Deep-Red, Red, Red-Orange, PC Amber, PC Mint, PC Lime, Green, Cyan, Blue and Royal-Blue.

In addition to decorative architectural and effect lighting, our iX-led Linearis Color modules are also suitable for special applications where specific wavelengths are required - e.g. horticulture applications. If you are missing a light color, please contact us.

Our iX-led standard modules are available at short notice and are cost-effective 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

- ✓ linear module with 3 dimensions: 140 mm, 280 mm and 560 mm x 24 mm
- ✓ 2 light flux packages: Pitch distance 23.3 mm and 11.7 mm
- ✓ 11 light colors: Far-Red, Deep-Red, Red, Red-Orange, PC Amber, PC Mint, PC Lime, Green, Cyan, Blue and Royal-Blue

Plug-in terminals for simple and quick mounting.

For operation with suitable constant current drivers.

ENEC-mark	yes
Maximum operating current	250 V
Ambient temperature	-20...+50 °C
Max. perm. operating temperature (Tc)	80 °C
EPREL database entry	yes
Beam angle	120°

Connections:

Terminals	2
Connection type	rigid / flexible
Conductor cross section AWG	AWG 18-24
Conductor cross section	min 0.2 mm ² max 0.75 mm ²
Stripping length	8 - 9 mm

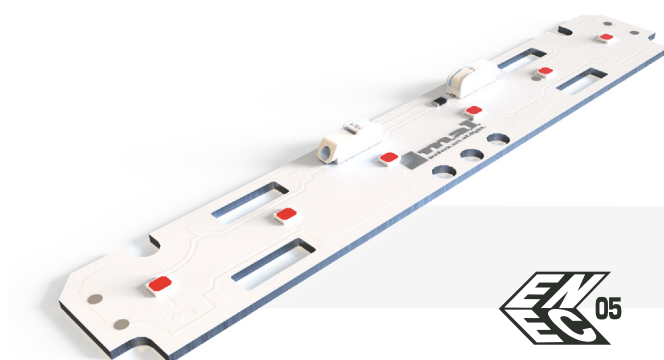
Also available with other terminals on request.

Did you know? Our **Linearis Color-Modules** are **ENEC-certified!**



Linearis Color L14 325 - Industry standard linear modules

- ✓ linear module with color LEDs
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 6 Mid-Power-LEDs
- ✓ pitch distance 23.3 mm
- ✓ length 140 mm
- ✓ width 24 mm
- ✓ 2 connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 500 mA
- ✓ maximum forward voltage 5.4 ... 7.4 V
- ✓ meets the well-known industry standard

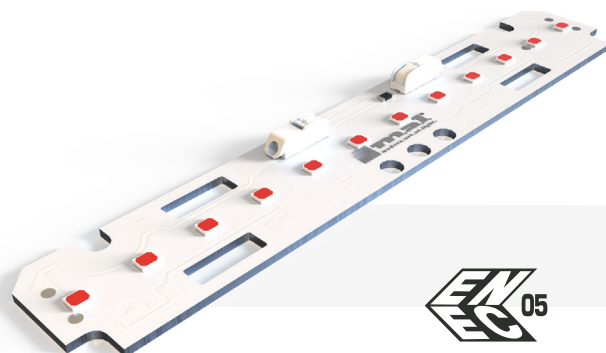


Please also refer to the technical data of the Linearis Color family on page 14. Further technical data and drawings from page 21.

light color	wavelentgh	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 150 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 500 mA Tc = 25 °C			
FRD	720-740 nm	250 mW	-	567 mW	-	790 mW	-	7517-00330	Linearis Z G1 L14 W24 325 FRD
DRD	650-670 nm	280 mW	-	638 mW	-	896 mW	-	7517-00331	Linearis Z G1 L14 W24 325 DRD
RED	620-630 nm	52 lm	88 lm/W	114 lm	78 lm/W	155 lm	72 lm/W	7517-00332	Linearis Z G1 L14 W24 325 RED
RNG	610-620 nm	68 lm	118 lm/W	154 lm	105 lm/W	212 lm	97 lm/W	7517-00333	Linearis Z G1 L14 W24 325 RNG
PCA	-	140 lm	166 lm/W	300 lm	144 lm/W	406 lm	131 lm/W	7517-00334	Linearis Z G1 L14 W24 325 PCA
MNT	-	205 lm	244 lm/W	444 lm	213 lm/W	602 lm	196 lm/W	7517-00335	Linearis Z G1 L14 W24 325 MNT
LME	-	219 lm	263 lm/W	473 lm	227 lm/W	642 lm	207 lm/W	7517-00336	Linearis Z G1 L14 W24 325 LME
GRN	520-540 nm	150 lm	184 lm/W	241 lm	135 lm/W	321 lm	99 lm/W	7517-00337	Linearis Z G1 L14 W24 325 GRN
CYN	490-510 nm	93 lm	111 lm/W	175 lm	82 lm/W	223 lm	69 lm/W	7517-00338	Linearis Z G1 L14 W24 325 CYN
BLU	469-480 nm	52 lm	63 lm/W	106 lm	51 lm/W	140 lm	45 lm/W	7517-00339	Linearis Z G1 L14 W24 325 BLU
RYL	440-455 nm	606 mW	-	1328 mW	-	1822 mW	-	7517-00340	Linearis Z G1 L14 W24 325 RYL

Linearis Color L14 650 - Industry standard linear modules

- ✓ linear module with color LEDs
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 12 Mid-Power LEDs
- ✓ pitch distance 11.7 mm
- ✓ length 140 mm
- ✓ width 24 mm
- ✓ 2 connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 500 mA
- ✓ maximum forward voltage 10.8 ... 14.8 V
- ✓ meets the well-known industry standard

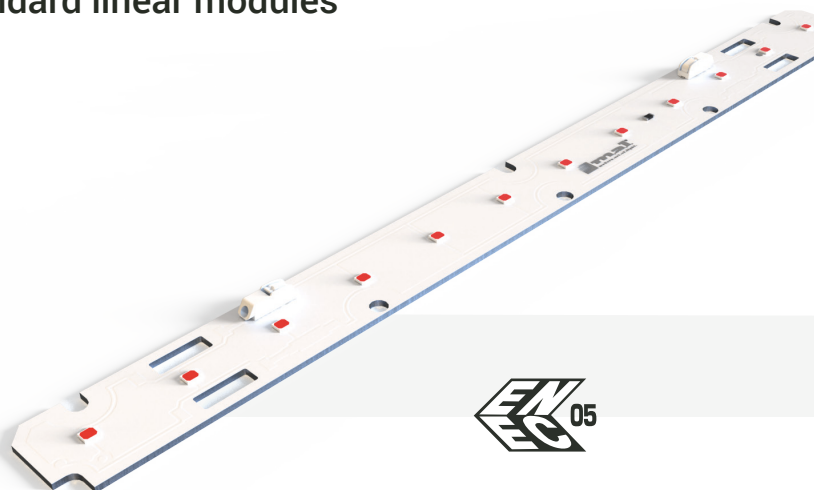


Please also refer to the technical data of the Linearis Color family on page 14. Further technical data and drawings from page 21.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 150 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 500 mA Tc = 25 °C			
FRD	720-740 nm	500 mW	-	1134 mW	-	1580 mW	-	7517-00380	Linearis Z G1 L14 W24 650 FRD
DRD	650-670 nm	559 mW	-	1276 mW	-	1792 mW	-	7517-00381	Linearis Z G1 L14 W24 650 DRD
RED	620-630 nm	103 lm	88 lm/W	227 lm	78 lm/W	309 lm	72 lm/W	7517-00382	Linearis Z G1 L14 W24 650 RED
RNG	610-620 nm	136 lm	118 lm/W	307 lm	105 lm/W	424 lm	97 lm/W	7517-00383	Linearis Z G1 L14 W24 650 RNG
PCA	-	280 lm	166 lm/W	600 lm	144 lm/W	812 lm	131 lm/W	7517-00384	Linearis Z G1 L14 W24 650 PCA
MNT	-	410 lm	244 lm/W	888 lm	213 lm/W	1204 lm	196 lm/W	7517-00385	Linearis Z G1 L14 W24 650 MNT
LME	-	438 lm	263 lm/W	946 lm	227 lm/W	1284 lm	207 lm/W	7517-00386	Linearis Z G1 L14 W24 650 LME
GRN	520-540 nm	300 lm	184 lm/W	482 lm	135 lm/W	643 lm	99 lm/W	7517-00387	Linearis Z G1 L14 W24 650 GRN
CYN	490-510 nm	186 lm	111 lm/W	351 lm	82 lm/W	446 lm	69 lm/W	7517-00388	Linearis Z G1 L14 W24 650 CYN
BLU	469-480 nm	104 lm	63 lm/W	211 lm	51 lm/W	279 lm	45 lm/W	7517-00389	Linearis Z G1 L14 W24 650 BLU
RYL	440-455 nm	1212 mW	-	2656 mW	-	3644 mW	-	7517-00390	Linearis Z G1 L14 W24 650 RYL

Linearis Color L28 650 - Industry standard linear modules

- ✓ linear module with color LEDs
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 12 Mid-Power LEDs
- ✓ pitch distance 23.3 mm
- ✓ length 280 mm
- ✓ width 24 mm
- ✓ 2 connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 500 mA
- ✓ maximum forward voltage 10.8 ... 14.8 V
- ✓ meets the well-known industry standard

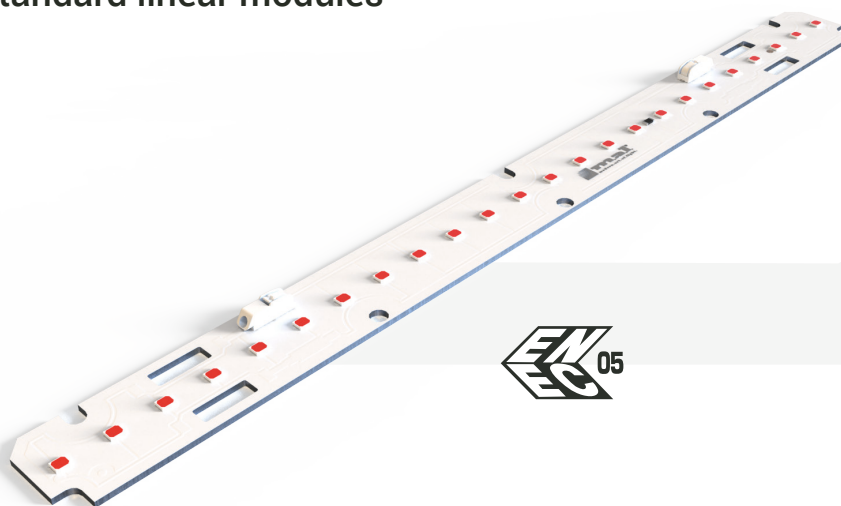


Please also refer to the technical data of the Linearis Color family on page 14.
Further technical data and drawings from page 21.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 150 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 500 mA Tc = 25 °C			
FRD	720-740 nm	500 mW	-	1134 mW	-	1580 mW	-	7517-00430	Linearis Z G1 L28 W24 650 FRD
DRD	650-670 nm	559 mW	-	1276 mW	-	1792 mW	-	7517-00431	Linearis Z G1 L28 W24 650 DRD
RED	620-630 nm	103 lm	88 lm/W	227 lm	78 lm/W	309 lm	72 lm/W	7517-00432	Linearis Z G1 L28 W24 650 RED
RNG	610-620 nm	136 lm	118 lm/W	307 lm	105 lm/W	424 lm	97 lm/W	7517-00433	Linearis Z G1 L28 W24 650 RNG
PCA	-	280 lm	166 lm/W	600 lm	144 lm/W	812 lm	131 lm/W	7517-00434	Linearis Z G1 L28 W24 650 PCA
MNT	-	410 lm	244 lm/W	888 lm	213 lm/W	1204 lm	196 lm/W	7517-00435	Linearis Z G1 L28 W24 650 MNT
LME	-	438 lm	263 lm/W	946 lm	227 lm/W	1284 lm	207 lm/W	7517-00436	Linearis Z G1 L28 W24 650 LME
GRN	520-540 nm	300 lm	184 lm/W	482 lm	135 lm/W	643 lm	99 lm/W	7517-00437	Linearis Z G1 L28 W24 650 GRN
CYN	490-510 nm	186 lm	111 lm/W	351 lm	82 lm/W	446 lm	69 lm/W	7517-00438	Linearis Z G1 L28 W24 650 CYN
BLU	469-480 nm	104 lm	63 lm/W	211 lm	51 lm/W	279 lm	45 lm/W	7517-00439	Linearis Z G1 L28 W24 650 BLU
RYL	440-455 nm	1212 mW	-	2656 mW	-	3644 mW	-	7517-00440	Linearis Z G1 L28 W24 650 RYL

Linearis Color L28 1300 - Industry standard linear modules

- ✓ linear module with color LEDs
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 24 Mid-Power LEDs
- ✓ pitch distance 11.7 mm
- ✓ length 280 mm
- ✓ width 24 mm
- ✓ 2 connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 500 mA
- ✓ maximum forward voltage 21.6 ... 29.6 V
- ✓ meets the well-known industry standard

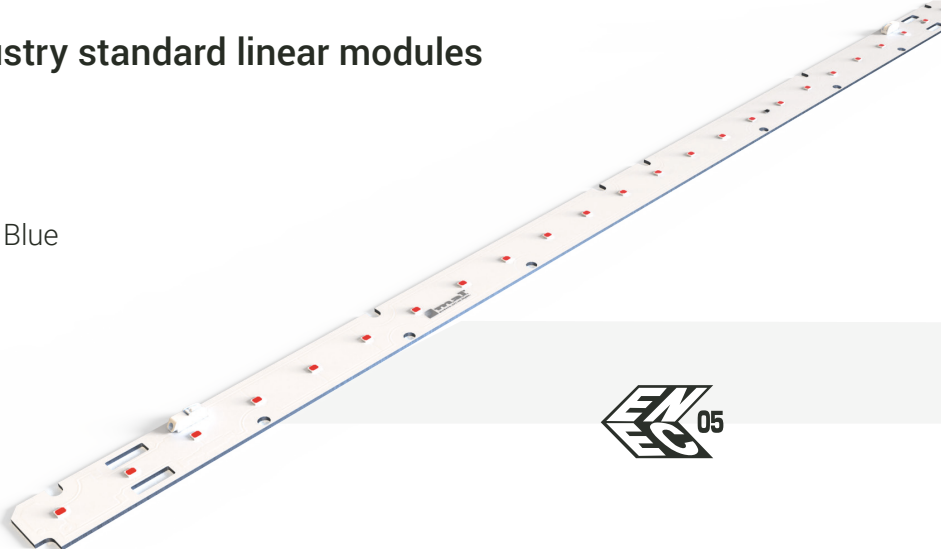


Please also refer to the technical data of the Linearis Color family on page 14. Further technical data and drawings from page 21.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 150 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 500 mA Tc = 25 °C			
FRD	720-740 nm	1001 mW	-	2269 mW	-	3160 mW	-	7517-00480	Linearis Z G1 L28 W24 1300 FRD
DRD	650-670 nm	1118 mW	-	2552 mW	-	3584 mW	-	7517-00481	Linearis Z G1 L28 W24 1300 DRD
RED	620-630 nm	207 lm	88 lm/W	454 lm	78 lm/W	618 lm	72 lm/W	7517-00482	Linearis Z G1 L28 W24 1300 RED
RNG	610-620 nm	271 lm	118 lm/W	614 lm	105 lm/W	849 lm	97 lm/W	7517-00483	Linearis Z G1 L28 W24 1300 RNG
PCA	-	559 lm	166 lm/W	1199 lm	144 lm/W	1624 lm	131 lm/W	7517-00484	Linearis Z G1 L28 W24 1300 PCA
MNT	-	821 lm	244 lm/W	1775 lm	213 lm/W	2409 lm	196 lm/W	7517-00485	Linearis Z G1 L28 W24 1300 MNT
LME	-	876 lm	263 lm/W	1891 lm	227 lm/W	2568 lm	207 lm/W	7517-00486	Linearis Z G1 L28 W24 1300 LME
GRN	520-540 nm	600 lm	184 lm/W	965 lm	135 lm/W	1286 lm	99 lm/W	7517-00487	Linearis Z G1 L28 W24 1300 GRN
CYN	490-510 nm	372 lm	111 lm/W	702 lm	82 lm/W	891 lm	69 lm/W	7517-00488	Linearis Z G1 L28 W24 1300 CYN
BLU	469-480 nm	208 lm	63 lm/W	422 lm	51 lm/W	558 lm	45 lm/W	7517-00489	Linearis Z G1 L28 W24 1300 BLU
RYL	440-455 nm	2424 mW	-	5312 mW	-	7288 mW	-	7517-00490	Linearis Z G1 L28 W24 1300 RYL

Linearis Color L56 1300 - Industry standard linear modules

- ✓ linear module with color LEDs
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 24 Mid-Power LEDs
- ✓ pitch distance 23.3 mm
- ✓ length 560 mm
- ✓ width 24 mm
- ✓ 2 connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 500 mA
- ✓ maximum forward voltage 21.6 ... 29.6 V
- ✓ meets the well-known industry standard

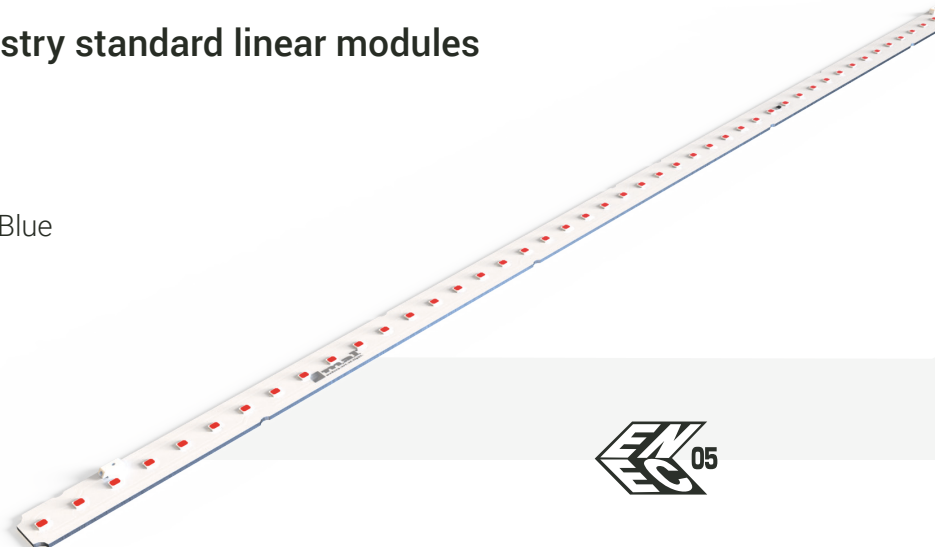


Please also refer to the technical data of the Linearis Color family on page 14.
Further technical data and drawings from page 21.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 150 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 500 mA Tc = 25 °C			
FRD	720-740 nm	1001 mW	-	2269 mW	-	3160 mW	-	7517-00530	Linearis Z G1 L56 W24 1300 FRD
DRD	650-670 nm	1118 mW	-	2552 mW	-	3584 mW	-	7517-00531	Linearis Z G1 L56 W24 1300 DRD
RED	620-630 nm	207 lm	88 lm/W	454 lm	78 lm/W	618 lm	72 lm/W	7517-00532	Linearis Z G1 L56 W24 1300 RED
RNG	610-620 nm	271 lm	118 lm/W	614 lm	105 lm/W	849 lm	97 lm/W	7517-00533	Linearis Z G1 L56 W24 1300 RNG
PCA	-	559 lm	166 lm/W	1199 lm	144 lm/W	1624 lm	131 lm/W	7517-00534	Linearis Z G1 L56 W24 1300 PCA
MNT	-	821 lm	244 lm/W	1775 lm	213 lm/W	2409 lm	196 lm/W	7517-00535	Linearis Z G1 L56 W24 1300 MNT
LME	-	876 lm	263 lm/W	1891 lm	227 lm/W	2568 lm	207 lm/W	7517-00536	Linearis Z G1 L56 W24 1300 LME
GRN	520-540 nm	600 lm	184 lm/W	965 lm	135 lm/W	1286 lm	99 lm/W	7517-00537	Linearis Z G1 L56 W24 1300 GRN
CYN	490-510 nm	372 lm	111 lm/W	702 lm	82 lm/W	891 lm	69 lm/W	7517-00538	Linearis Z G1 L56 W24 1300 CYN
BLU	469-480 nm	208 lm	63 lm/W	422 lm	51 lm/W	558 lm	45 lm/W	7517-00539	Linearis Z G1 L56 W24 1300 BLU
RYL	440-455 nm	2424 mW	-	5312 mW	-	7288 mW	-	7517-00540	Linearis Z G1 L56 W24 1300 RYL

Linearis Color L56 2600 - Industry standard linear modules

- ✓ linear module with color LEDs
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 48 Mid-Power LEDs
- ✓ pitch distance 11.7 mm
- ✓ length 560 mm
- ✓ width 24 mm
- ✓ 2 connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 500 mA
- ✓ maximum forward voltage 43.2 ... 59.2 V
- ✓ meets the well-known industry standard

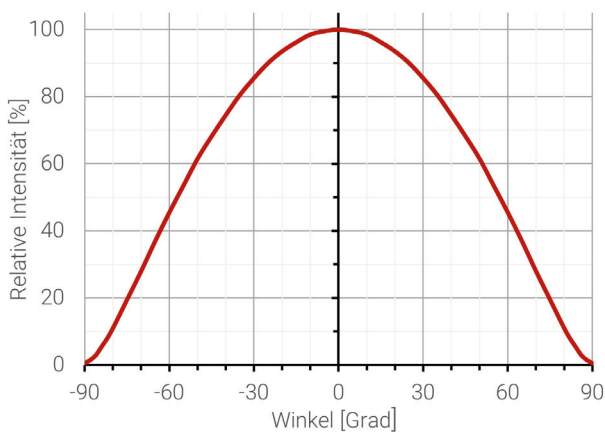


Please also refer to the technical data of the Linearis Color family on page 14. Further technical data and drawings from page 21.

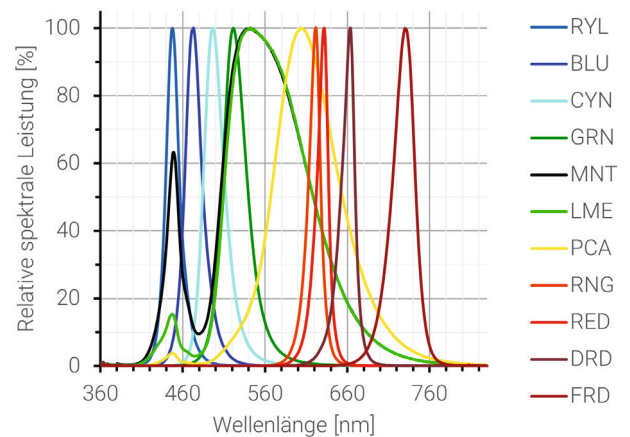
light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 150 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 500 mA Tc = 25 °C			
FRD	720-740 nm	2002 mW	-	4538 mW	-	6320 mW	-	7517-00830	Linearis Z G1 L56 W24 2600 FRD
DRD	650-670 nm	2237 mW	-	5104 mW	-	7168 mW	-	7517-00831	Linearis Z G1 L56 W24 2600 DRD
RED	620-630 nm	414 lm	88 lm/W	909 lm	78 lm/W	1237 lm	72 lm/W	7517-00832	Linearis Z G1 L56 W24 2600 RED
RNG	610-620 nm	542 lm	118 lm/W	1229 lm	105 lm/W	1698 lm	97 lm/W	7517-00833	Linearis Z G1 L56 W24 2600 RNG
PCA	-	1118 lm	166 lm/W	2398 lm	144 lm/W	3248 lm	131 lm/W	7517-00834	Linearis Z G1 L56 W24 2600 PCA
MNT	-	1642 lm	244 lm/W	3550 lm	213 lm/W	4818 lm	196 lm/W	7517-00835	Linearis Z G1 L56 W24 2600 MNT
LME	-	1752 lm	263 lm/W	3782 lm	227 lm/W	5136 lm	207 lm/W	7517-00836	Linearis Z G1 L56 W24 2600 LME
GRN	520-540 nm	1200 lm	184 lm/W	1930 lm	135 lm/W	2571 lm	99 lm/W	7517-00837	Linearis Z G1 L56 W24 2600 GRN
CYN	490-510 nm	744 lm	111 lm/W	1403 lm	82 lm/W	1782 lm	69 lm/W	7517-00838	Linearis Z G1 L56 W24 2600 CYN
BLU	469-480 nm	416 lm	63 lm/W	845 lm	51 lm/W	1117 lm	45 lm/W	7517-00839	Linearis Z G1 L56 W24 2600 BLU
RYL	440-455 nm	4848 mW	-	10624 mW	-	14576 mW	-	7517-00840	Linearis Z G1 L56 W24 2600 RYL

Technical data: Linearis Color - Industry standard linear modules

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
Linearis Z G1 L... W24 ... FRD	500 mA	80 °C	> 50.000 h	> 50.000 h	48.000 h	43.000 h	20.000 h	18.000 h
Linearis Z G1 L... W24 ... DRD			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	25.000 h	24.000 h
Linearis Z G1 L... W24 ... RED			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h
Linearis Z G1 L... W24 ... RNG			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	22.000 h	21.000 h
Linearis Z G1 L... W24 ... PCA			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	22.000 h	21.000 h
Linearis Z G1 L... W24 ... MNT			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	45.000 h	42.000 h
Linearis Z G1 L... W24 ... LME			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	45.000 h	42.000 h
Linearis Z G1 L... W24 ... GRN			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	33.000 h	32.000 h
Linearis Z G1 L... W24 ... CYN			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	49.000 h	47.000 h
Linearis Z G1 L... W24 ... BLU			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	49.000 h	47.000 h
Linearis Z G1 L... W24 ... RYL			22.000 h	20.000 h	14.000 h	13.000 h	7.000 h	6.000 h

Linearis Z G1 L14 W24 325 ...







A modern interior space featuring a long wooden table with thin metal legs. Several teal-colored ergonomic chairs with black bases are arranged around the table. Two large, circular, black pendant lights with a glowing inner ring hang from the ceiling. The background wall is composed of vertical wooden slats, and a portion of the wall to the right is painted a solid teal color. The floor is a light gray with white grid lines.

Circulus Color — Ring modules

With our Circulus LED modules we offer ring-shaped LED modules, which are equipped with colored LEDs.

Choose from six different colors: Red, Red Orange, PC Amber, Green, Blue and Royal Blue, other colors are available on request.

Furthermore you can choose from five different diameters: Circulus D50, Circulus D105, Circulus D160, Circulus D215 and Circulus D270.

All five diameters have a uniform ring width of 25 mm. For optimal thermal management and high efficiency with long lifetime, all Circulus modules are based on high quality aluminum core PCBs.

The LED pitch of 6.5 mm is almost the same for all modules.

Our iX-led standard modules are available at short notice and are favorably priced 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:

√ LED ring module in 5 different diameters:

Ø 50 mm, Ø 105 mm, Ø 160 mm, Ø 215 mm and Ø 270 mm

√ 6 light colors: Red, Red Orange, PC Amber, Green, Blue and Royal Blue

Plug-in terminals for easy and quick mounting.

For operation on suitable constant current drivers.

Maximum working voltage	250 V
Ambient temperature	-20...+50 °C
Max. perm. operating temperature (T _c)	80 °C
EPREL database entry	yes
Beam angle	120°

Connections:

Terminals	2
Connection type	rigid / flexible
Conductor cross section AWG	AWG 18-24
Conductor cross section	min 0.2 mm ²
	max 0.75 mm ²
Stripping length	8 - 9 mm

Also available with other terminals on request.

Circulus Color 50 - Ring modules

- ✓ ring module with color LEDs for installation in luminaires
- ✓ six light colors from Far Red to Royal Blue
- ✓ 24 Mid-Power LEDs
- ✓ pitch distance 6.5 mm
- ✓ diameter outside 75 mm and inside 25 mm
- ✓ 2 connection terminals
- ✓ aluminum core PCB for optimum thermal management
- ✓ rated current 700 mA
- ✓ maximum operating current 1050 mA
- ✓ maximum forward voltage 5.4 ... 7.4 V
- ✓ the five ring modules can be arranged inside each other

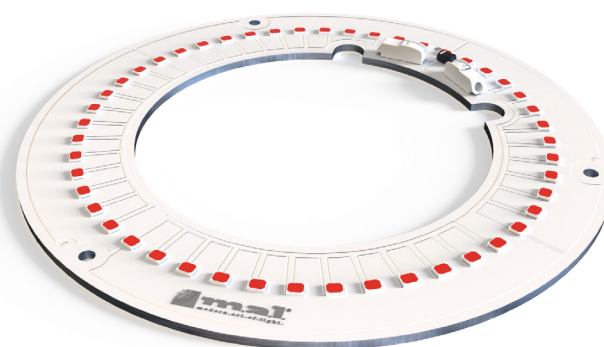


Please also refer to the technical data of the Circulus Color family on page 28. Further technical data and drawings from page 34.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 500 mA Tc = 25 °C		If = 700 mA Tc = 25 °C		If = 1.050 mA Tc = 25 °C			
RED	620-630 nm	173 lm	89 lm/W	240 lm	87 lm/W	350 lm	82 lm/W	7543-00019	Circulus G1 50 RED
RNG	610-620 nm	225 lm	119 lm/W	315 lm	116 lm/W	467 lm	110 lm/W	7543-00020	Circulus G1 50 RNG
PCA	-	471 lm	170 lm/W	645 lm	163 lm/W	931 lm	153 lm/W	7543-00021	Circulus G1 50 PCA
GRN	520-540 nm	526 lm	196 lm/W	670 lm	173 lm/W	883 lm	144 lm/W	7543-00022	Circulus G1 50 GRN
BLU	469-480 nm	178 lm	65 lm/W	237 lm	61 lm/W	333 lm	55 lm/W	7543-00023	Circulus G1 50 BLU
RYL	440-455 nm	2032 mW	-	2804 mW	-	4092 mW	-	7543-00024	Circulus G1 50 RYL

Circulus Color 105 - Ring modules

- ✓ ring module with color LEDs for installation in luminaires
- ✓ six light colors from Far Red to Royal Blue
- ✓ 48 Mid-Power LEDs
- ✓ pitch distance 6.9 mm
- ✓ diameter outside 130 mm and inside 80 mm
- ✓ 2 connection terminals
- ✓ aluminum core PCB for optimal thermal management
- ✓ rated current 700 mA
- ✓ maximum operating current 1050 mA
- ✓ maximum forward voltage 10.8 ... 14.8 V
- ✓ the five ring modules can be arranged inside each other



Please also refer to the technical data of the Circulus Color family on page 28. Further technical data and drawings from page 34.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 500 mA T _c = 25 °C		If = 700 mA T _c = 25 °C		If = 1.050 mA T _c = 25 °C			
RED	620-630 nm	347 lm	89 lm/W	481 lm	87 lm/W	701 lm	82 lm/W	7543-00119	Circulus G1 105 RED
RNG	610-620 nm	450 lm	119 lm/W	630 lm	116 lm/W	935 lm	110 lm/W	7543-00120	Circulus G1 105 RNG
PCA	-	942 lm	170 lm/W	1290 lm	163 lm/W	1862 lm	153 lm/W	7543-00121	Circulus G1 105 PCA
GRN	520-540 nm	1052 lm	196 lm/W	1340 lm	173 lm/W	1766 lm	144 lm/W	7543-00122	Circulus G1 105 GRN
BLU	469-480 nm	355 lm	65 lm/W	473 lm	61 lm/W	666 lm	55 lm/W	7543-00123	Circulus G1 105 BLU
RYL	440-455 nm	4064 mW		5608 mW		8184 mW		7543-00124	Circulus G1 105 RYL

Circulus Color 160 - Ring modules

- ✓ ring module with color LEDs for installation in luminaires
- ✓ six light colors from Far Red to Royal Blue
- ✓ 72 Mid-Power LEDs
- ✓ pitch distance 7 mm
- ✓ diameter outside 185 mm and inside 135 mm
- ✓ 2 connection terminals
- ✓ aluminum core PCB for optimal thermal management
- ✓ rated current 700 mA
- ✓ maximum operating current 1050 mA
- ✓ maximum forward voltage 16.2 ... 22.2 V
- ✓ the five ring modules can be arranged inside each other

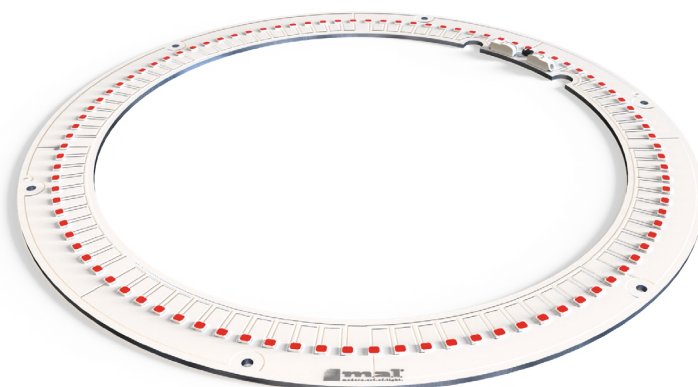


Please also refer to the technical data of the Circulus Color family on page 28. Further technical data and drawings from page 34.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 500 mA Tc = 25 °C		If = 700 mA Tc = 25 °C		If = 1.050 mA Tc = 25 °C			
RED	620-630 nm	520 lm	89 lm/W	721 lm	87 lm/W	1051 lm	82 lm/W	7543-00219	Circulus G1 160 RED
RNG	610-620 nm	675 lm	119 lm/W	946 lm	116 lm/W	1402 lm	110 lm/W	7543-00220	Circulus G1 160 RNG
PCA	-	1414 lm	170 lm/W	1936 lm	163 lm/W	2794 lm	153 lm/W	7543-00221	Circulus G1 160 PCA
GRN	520-540 nm	1578 lm	196 lm/W	2010 lm	173 lm/W	2650 lm	144 lm/W	7543-00222	Circulus G1 160 GRN
BLU	469-480 nm	533 lm	65 lm/W	710 lm	61 lm/W	999 lm	55 lm/W	7543-00223	Circulus G1 160 BLU
RYL	440-455 nm	6096 mW	-	8412 mW	-	12276 mW	-	7543-00224	Circulus G1 160 RYL

Circulus Color 215 - Ring modules

- ✓ ring module with color LEDs for installation in luminaires
- ✓ six light colors from Far Red to Royal Blue
- ✓ 96 Mid-Power LEDs
- ✓ pitch distance 7 mm
- ✓ diameter outside 240 mm and inside 190 mm
- ✓ 2 connection terminals
- ✓ aluminum core PCB for optimal thermal management
- ✓ rated current 700 mA
- ✓ maximum operating current 1050 mA
- ✓ maximum forward voltage 21.6 ... 29.6 V
- ✓ the five ring modules can be arranged inside each other

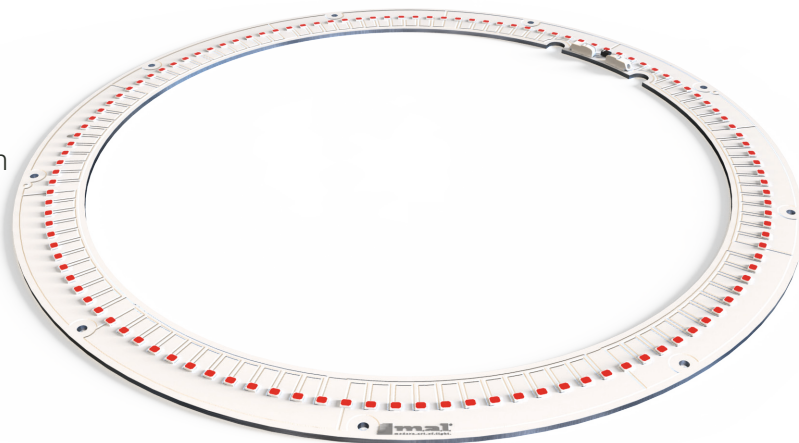


Please also refer to the technical data of the Circulus Color family on page 28. Further technical data and drawings from page 34.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 500 mA Tc = 25 °C		If = 700 mA Tc = 25 °C		If = 1.050 mA Tc = 25 °C			
RED	620-630 nm	693 lm	89 lm/W	962 lm	87 lm/W	1402 lm	82 lm/W	7543-00319	Circulus G1 215 RED
RNG	610-620 nm	900 lm	119 lm/W	1261 lm	116 lm/W	1870 lm	110 lm/W	7543-00320	Circulus G1 215 RNG
PCA	-	1885 lm	170 lm/W	2581 lm	163 lm/W	3725 lm	153 lm/W	7543-00321	Circulus G1 215 PCA
GRN	520-540 nm	2104 lm	196 lm/W	2680 lm	173 lm/W	3533 lm	144 lm/W	7543-00322	Circulus G1 215 GRN
BLU	469-480 nm	711 lm	65 lm/W	947 lm	61 lm/W	1332 lm	55 lm/W	7543-00323	Circulus G1 215 BLU
RYL	440-455 nm	8128 mW	-	11216 mW	-	16368 mW	-	7543-00324	Circulus G1 215 RYL

Circulus Color 270 - Ring modules

- ✓ ring module with color LEDs for installation in luminaires
- ✓ six light colors from Far Red to Royal Blue
- ✓ 120 Mid-Power LEDs
- ✓ pitch distance 7.1 mm
- ✓ diameter outside 295 mm and inside 245 mm
- ✓ 2 connection terminals
- ✓ aluminum core PCB for optimal thermal management
- ✓ rated current 700 mA
- ✓ maximum operating current 1050 mA
- ✓ maximum forward voltage 27 ... 37 V
- ✓ the five ring modules can be arranged inside each other

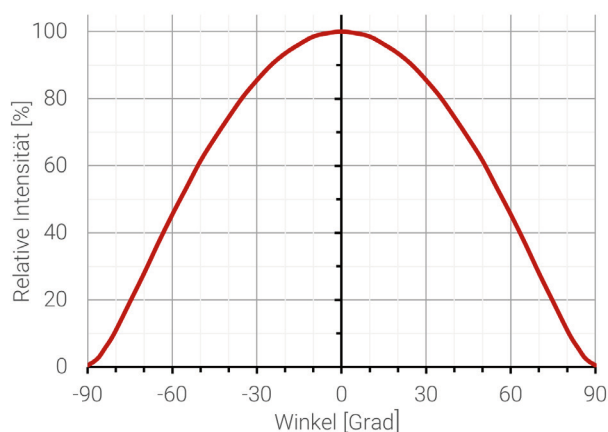


Please also refer to the technical data of the Circulus Color family on page 28. Further technical data and drawings from page 34.

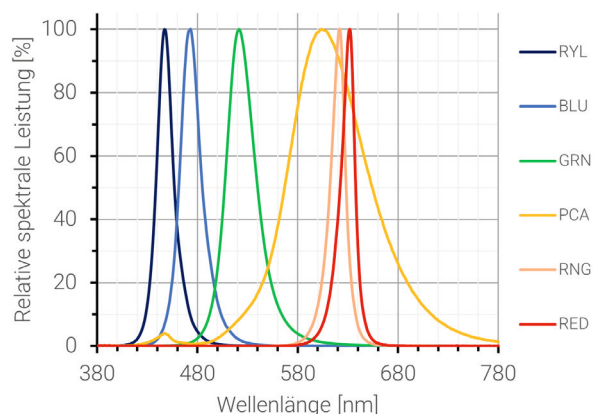
light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 500 mA Tc = 25 °C		If = 700 mA Tc = 25 °C		If = 1.050 mA Tc = 25 °C			
RED	620-630 nm	866 lm	89 lm/W	1202 lm	87 lm/W	1752 lm	82 lm/W	7543-00419	Circulus G1 270 RED
RNG	610-620 nm	1125 lm	119 lm/W	1576 lm	116 lm/W	2337 lm	110 lm/W	7543-00420	Circulus G1 270 RNG
PCA	-	2356 lm	170 lm/W	3226 lm	163 lm/W	4656 lm	153 lm/W	7543-00421	Circulus G1 270 PCA
GRN	520-540 nm	2630 lm	196 lm/W	3350 lm	173 lm/W	4416 lm	144 lm/W	7543-00422	Circulus G1 270 GRN
BLU	469-480 nm	888 lm	65 lm/W	1183 lm	61 lm/W	1665 lm	55 lm/W	7543-00423	Circulus G1 270 BLU
RYL	440-455 nm	10160 mW	-	14020 mW	-	20460 mW	-	7543-00424	Circulus G1 270 RYL

Technical data: Circulus Color - Ring modules

Light distribution curve



Spectrum



Lifetime of the LEDs used

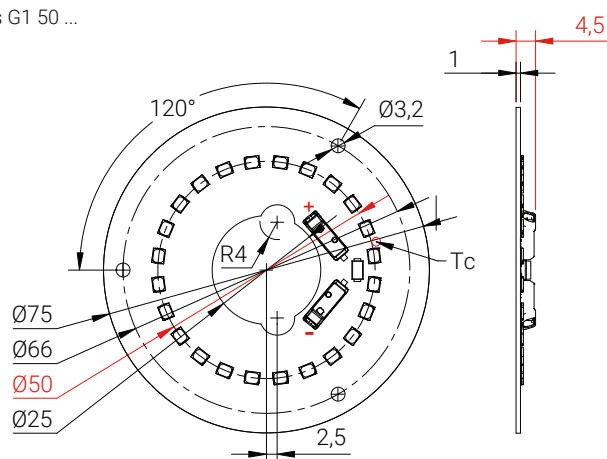
- The lifetime data is based on TM21 extrapolations of the available LM80 data of the LEDs used. They are to be regarded as purely informative data from which no warranty claim can be derived.

Description	If	Tc	L70 B50	L70 B10	L80 B50	L80 B10	L90 B50	L90 B10
Circulus G1 ... RED	1050 mA	80 °C	> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h
Circulus G1 ... RNG			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	22.000 h	21.000 h
Circulus G1 ... PCA			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	22.000 h	21.000 h
Circulus G1 ... GRN			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	33.000 h	32.000 h
Circulus G1 ... BLU			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	49.000 h	47.000 h
Circulus G1 ... RYL			22.000 h	20.000 h	14.000 h	13.000 h	7.000 h	6.000 h

Technical drawings: Circulus Color - Ring modules

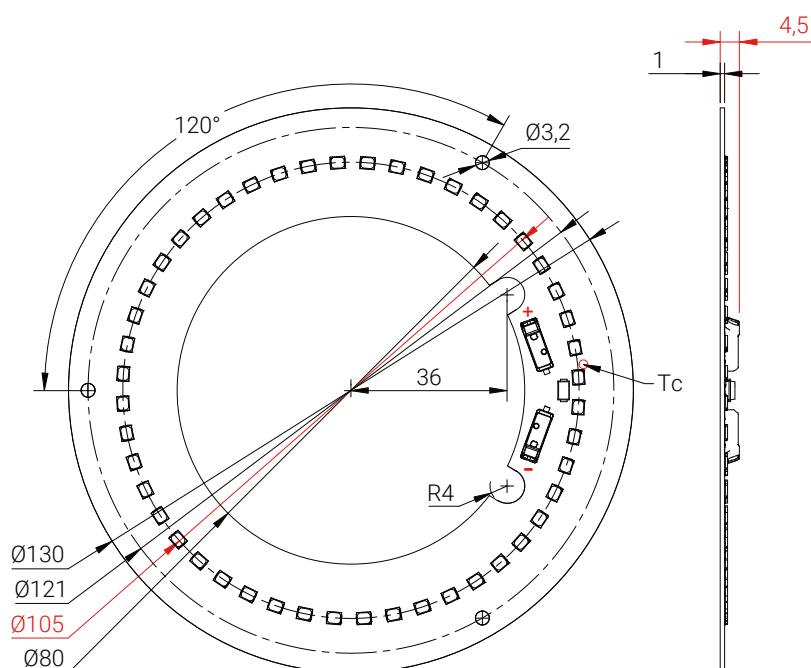
Circulus Color 50

Circulus G1 50 ...



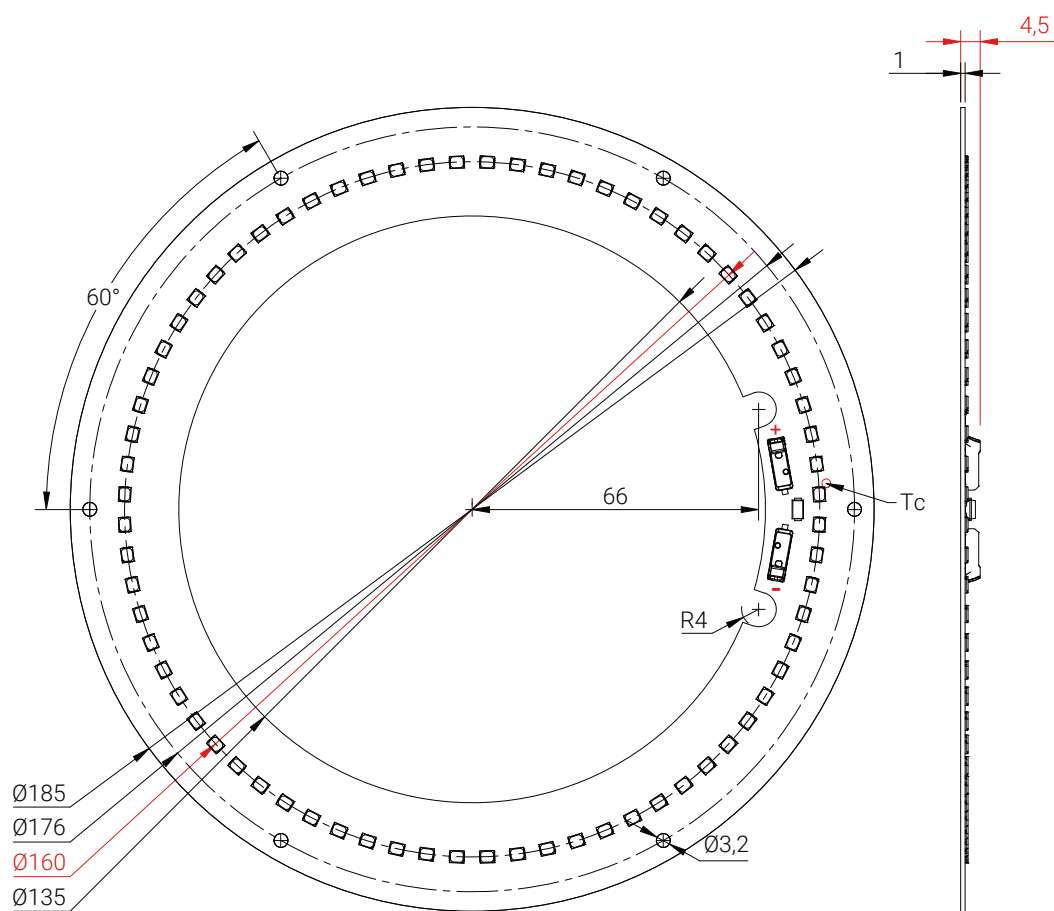
Circulus Color 105

Circulus G1 105 ...



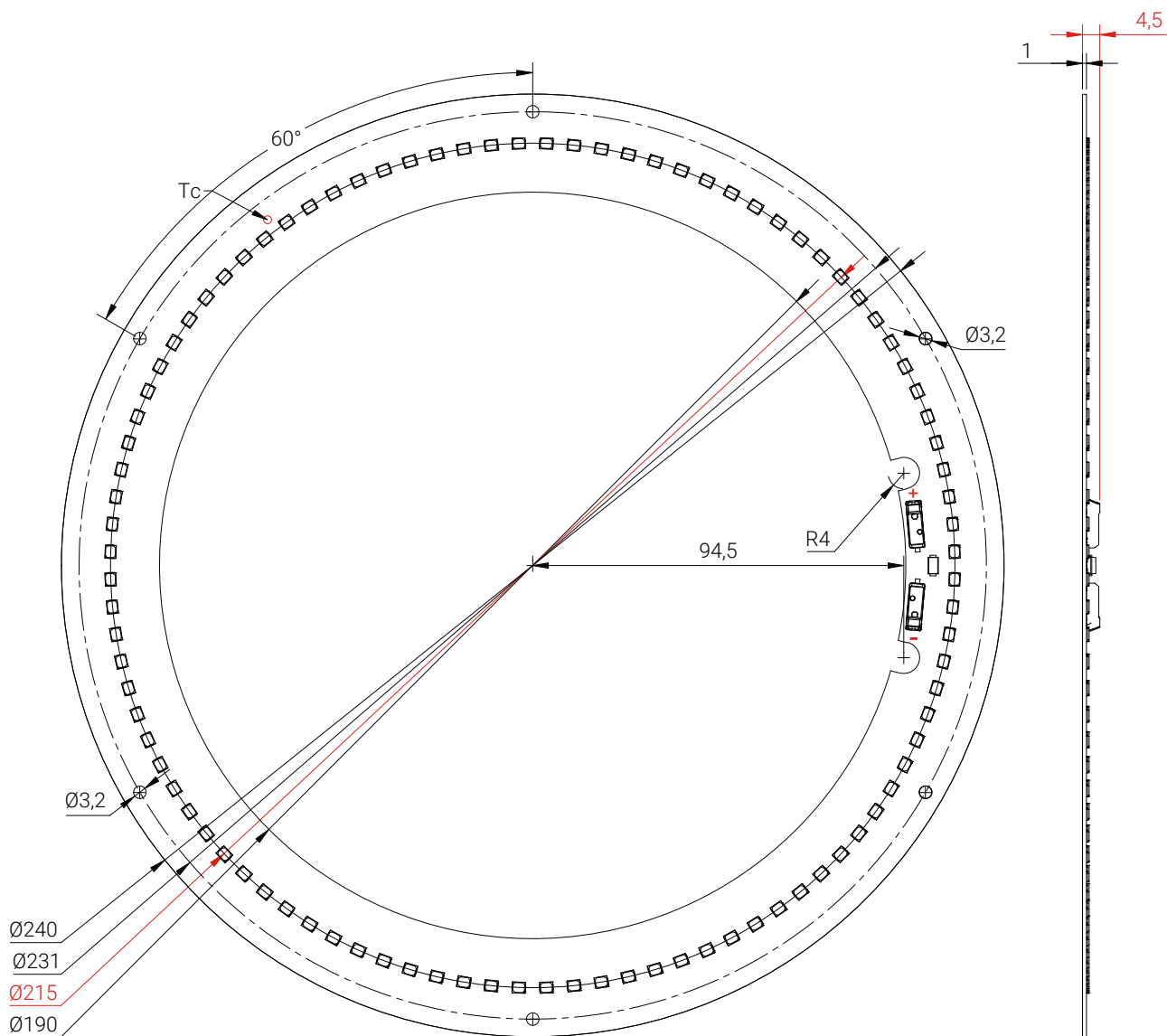
Circulus Color 160

Circulus G1 160 ...



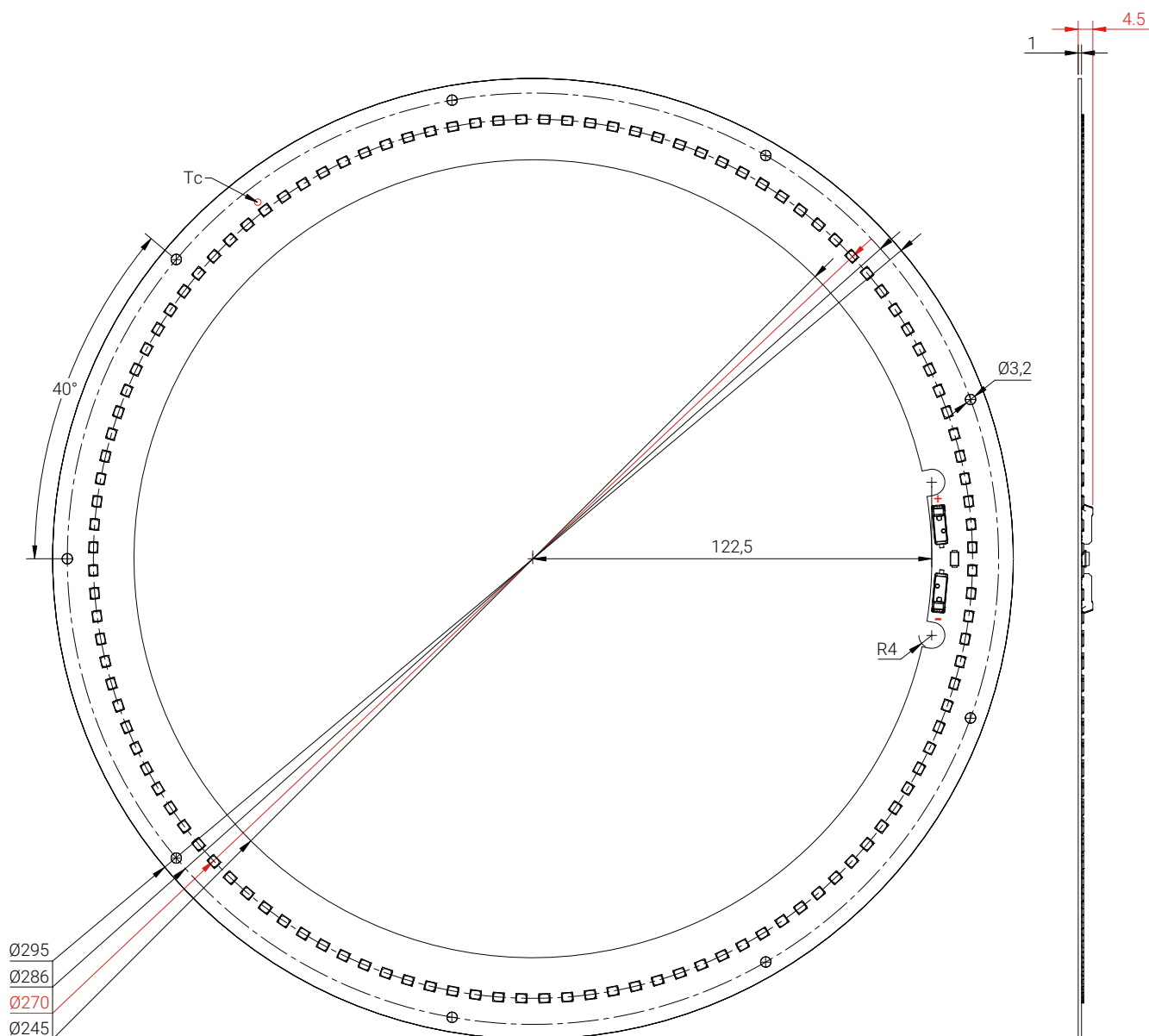
Circulus Color 215

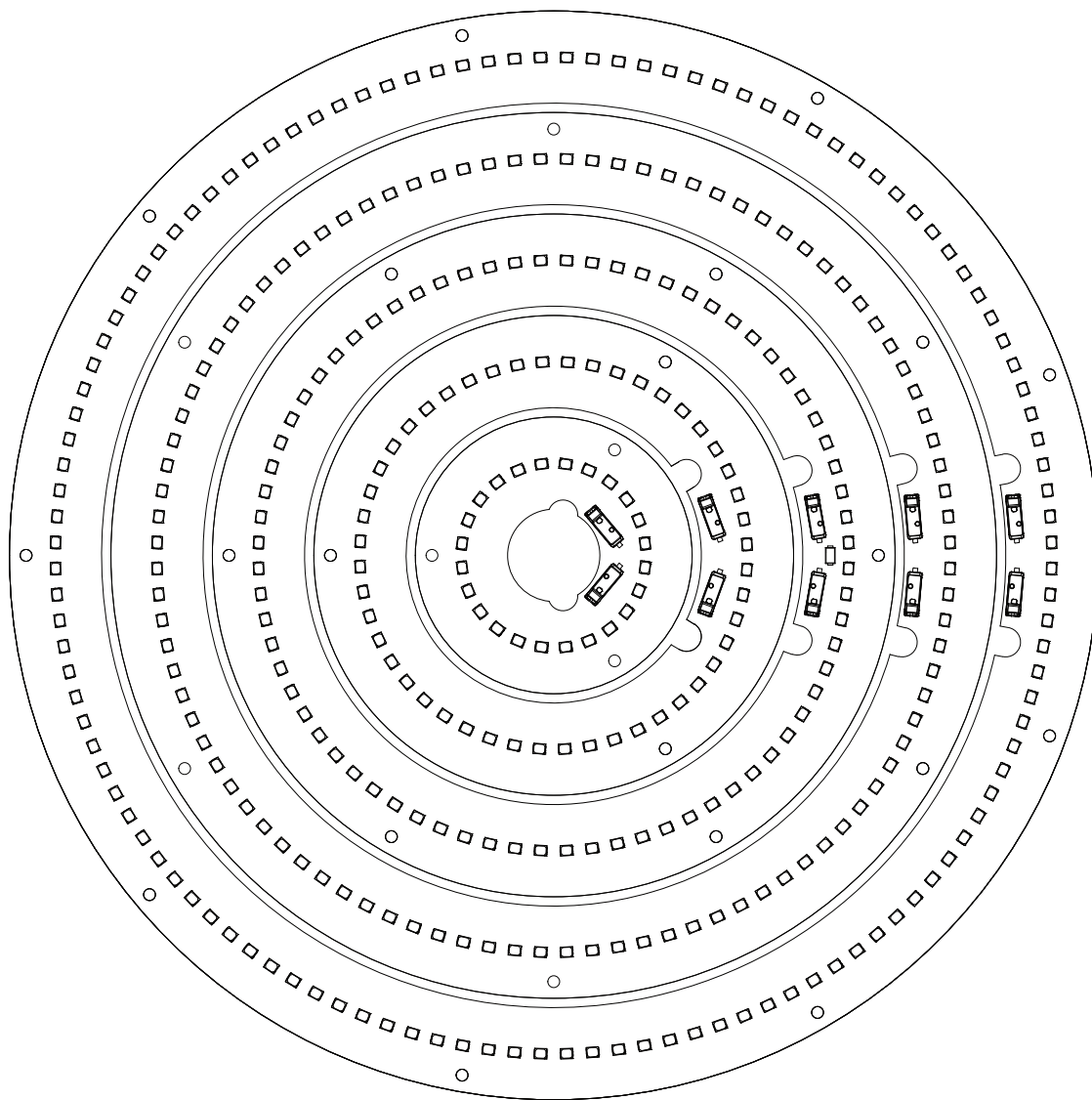
Circulus G1 215 ...



Circulus Color 270

Circulus G1 270 ...











Flexus Color — MidPower LED-modules for Stradella optics

Our Flexus Color modules are available in four different sizes, each with a different number of LEDs - 4x4, 4x8, 4x12 and 4x16 LEDs.

The Flexus Color modules are mechanically compatible with our modules with white LEDs in such a way that existing luminaires do not need to be modified for use with colored light.

They can also be used with our optics for the Flexus modules and are therefore suitable for many applications, such as architectural or effect lighting, as well as colored area lighting and highbay applications (e.g. horticulture area).

Choose from eleven light colors: Far-Red, Deep-Red, Red, Red-Orange, PC Amber, PC Mint, PC Lime, Green, Cyan, Blue and Royal-Blue.

Our iX-led standard modules are available at short notice and are cost-effective 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. Compatible with optics from various manufacturers.

Versatile with:

- ✓ Square modules in four lengths: 71 mm, 121 mm, 172 mm and 223 mm x 50 mm
- ✓ 11 light colors: Far-Red, Deep-Red, Red, Red-Orange, PC Amber, PC Mint, PC Lime, Green, Cyan, Blue and Royal-Blue

four-row LED arrangement.

NTC for temperature monitoring.

Plug-in terminals for easy and fast mounting.

For operation with suitable constant current drivers.

Maximum working voltage	250 V
Ambient temperature	-20...+50 °C
Max. perm. operating temperature (T _c)	80 °C
EPREL database entry	yes
Beam angle	120°

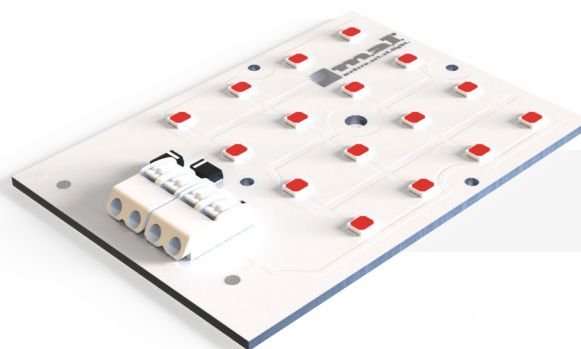
Connections:

Terminals	4
Connection type	rigid / flexible
Conductor cross section AWG	AWG 18-24
Conductor cross section	min 0.2 mm ²
	max 0.75 mm ²
Stripping length	8 - 9 mm

Also available with other terminals on request.

Flexus Color 4x4 - MidPower LED modules for Stradella optics

- ✓ square module with color LEDs for installation in luminaires
- ✓ for 4x4 optics from various manufacturers
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 16 Mid-Power LEDs
- ✓ pitch distance along and across 12.5 mm
- ✓ length 71 mm
- ✓ width 50 mm
- ✓ four connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 700 mA
- ✓ maximum forward voltage 10.8 ... 14.8 V
- ✓ with NTC for temperature monitoring



Please also refer to the technical data of the Flexus MidPower Color family on page 44. Further technical data and drawings from page 49.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 200 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 700 mA Tc = 25 °C			
FRD	720-740 nm	667 mW	-	1149 mW	-	2200 mW	-	7550-01000	Flexus G1 4x4 P0 FRD
DRD	650-670 nm	746 mW	-	1294 mW	-	2496 mW	-	7550-01001	Flexus G1 4x4 P0 DRD
RED	620-630 nm	138 lm	88 lm/W	234 lm	82 lm/W	429 lm	71 lm/W	7550-01002	Flexus G1 4x4 P0 RED
RNG	610-620 nm	181 lm	118 lm/W	312 lm	110 lm/W	590 lm	95 lm/W	7550-01003	Flexus G1 4x4 P0 RNG
PCA	-	373 lm	166 lm/W	621 lm	153 lm/W	1128 lm	130 lm/W	7550-01004	Flexus G1 4x4 P0 PCA
MNT	-	547 lm	244 lm/W	917 lm	226 lm/W	1672 lm	193 lm/W	7550-01005	Flexus G1 4x4 P0 MNT
LME	-	584 lm	263 lm/W	976 lm	241 lm/W	1784 lm	204 lm/W	7550-01006	Flexus G1 4x4 P0 LME
GRN	520-540 nm	400 lm	184 lm/W	589 lm	144 lm/W	643 lm	135 lm/W	7550-01007	Flexus G1 4x4 P0 GRN
CYN	490-510 nm	248 lm	111 lm/W	380 lm	92 lm/W	523 lm	76 lm/W	7550-01008	Flexus G1 4x4 P0 CYN
BLU	469-480 nm	139 lm	63 lm/W	222 lm	55 lm/W	386 lm	44 lm/W	7550-01009	Flexus G1 4x4 P0 BLU
RYL	440-455 nm	1616 mW	-	2728 mW	-	5072 mW	-	7550-01010	Flexus G1 4x4 P0 RYL

Flexus Color 4x8 - MidPower LED modules for Stradella optics

- ✓ square module with color LEDs for installation in luminaires
- ✓ for 4x4 and 4x8 optics from various manufacturers
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 32 Mid-Power LEDs
- ✓ pitch distance along and across 12.5 mm
- ✓ length 121 mm
- ✓ width 50 mm
- ✓ four connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 700 mA
- ✓ maximum forward voltage 21.6 ... 29.6 V
- ✓ with NTC for temperature monitoring

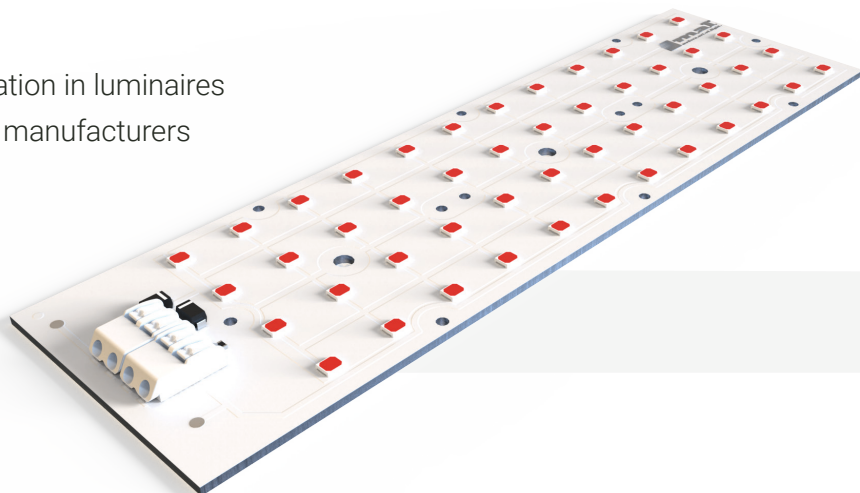


Please also refer to the technical data of the Flexus MidPower Color family on page 44. Further technical data and drawings from page 49.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 200 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 700 mA Tc = 25 °C			
FRD	720-740 nm	1334 mW	-	2298 mW	-	4400 mW	-	7550-01100	Flexus G1 4x8 P0 FRD
DRD	650-670 nm	1491 mW	-	2587 mW	-	4992 mW	-	7550-01101	Flexus G1 4x8 P0 DRD
RED	620-630 nm	276 lm	88 lm/W	467 lm	82 lm/W	858 lm	71 lm/W	7550-01102	Flexus G1 4x8 P0 RED
RNG	610-620 nm	362 lm	118 lm/W	623 lm	110 lm/W	1181 lm	95 lm/W	7550-01103	Flexus G1 4x8 P0 RNG
PCA	-	746 lm	166 lm/W	1242 lm	153 lm/W	2256 lm	130 lm/W	7550-01104	Flexus G1 4x8 P0 PCA
MNT	-	1094 lm	244 lm/W	1834 lm	226 lm/W	3344 lm	193 lm/W	7550-01105	Flexus G1 4x8 P0 MNT
LME	-	1168 lm	263 lm/W	1953 lm	241 lm/W	3568 lm	204 lm/W	7550-01106	Flexus G1 4x8 P0 LME
GRN	520-540 nm	800 lm	184 lm/W	1178 lm	144 lm/W	1286 lm	135 lm/W	7550-01107	Flexus G1 4x8 P0 GRN
CYN	490-510 nm	496 lm	111 lm/W	761 lm	92 lm/W	1046 lm	76 lm/W	7550-01108	Flexus G1 4x8 P0 CYN
BLU	469-480 nm	277 lm	63 lm/W	444 lm	55 lm/W	773 lm	44 lm/W	7550-01109	Flexus G1 4x8 P0 BLU
RYL	440-455 nm	3232 mW	-	5456 mW	-	10144 mW	-	7550-01110	Flexus G1 4x8 P0 RYL

Flexus Color 4x12 - MidPower LED modules for Stradella optics

- ✓ square module with color LEDs for installation in luminaires
- ✓ for 4x4, 4x8 and 4x12 optics from various manufacturers
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 48 Mid-Power LEDs
- ✓ pitch distance along and across 12.5 mm
- ✓ length 172 mm
- ✓ width 50 mm
- ✓ four connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 700 mA
- ✓ maximum forward voltage 32.4 ... 44.4 V
- ✓ with NTC for temperature monitoring

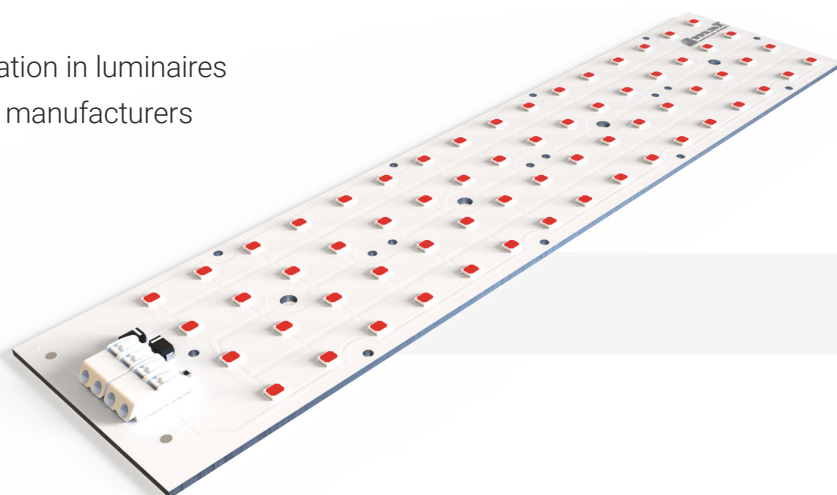


Please also refer to the technical data of the Flexus MidPower Color family on page 44. Further technical data and drawings from page 49.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 200 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 700 mA Tc = 25 °C			
FRD	720-740 nm	2002 mW	-	3448 mW	-	6600 mW	-	7550-01200	Flexus G1 4x12 P0 FRD
DRD	650-670 nm	2237 mW	-	3881 mW	-	7488 mW	-	7550-01201	Flexus G1 4x12 P0 DRD
RED	620-630 nm	414 lm	88 lm/W	701 lm	82 lm/W	1286 lm	71 lm/W	7550-01202	Flexus G1 4x12 P0 RED
RNG	610-620 nm	542 lm	118 lm/W	935 lm	110 lm/W	1771 lm	95 lm/W	7550-01203	Flexus G1 4x12 P0 RNG
PCA	-	1118 lm	166 lm/W	1862 lm	153 lm/W	3384 lm	130 lm/W	7550-01204	Flexus G1 4x12 P0 PCA
MNT	-	1642 lm	244 lm/W	2750 lm	226 lm/W	5016 lm	193 lm/W	7550-01205	Flexus G1 4x12 P0 MNT
LME	-	1752 lm	263 lm/W	2929 lm	241 lm/W	5352 lm	204 lm/W	7550-01206	Flexus G1 4x12 P0 LME
GRN	520-540 nm	1200 lm	184 lm/W	1766 lm	144 lm/W	1930 lm	135 lm/W	7550-01207	Flexus G1 4x12 P0 GRN
CYN	490-510 nm	744 lm	111 lm/W	1141 lm	92 lm/W	1570 lm	76 lm/W	7550-01208	Flexus G1 4x12 P0 CYN
BLU	469-480 nm	416 lm	63 lm/W	666 lm	55 lm/W	1159 lm	44 lm/W	7550-01209	Flexus G1 4x12 P0 BLU
RYL	440-455 nm	4848 mW	-	8184 mW	-	15216 mW	-	7550-01210	Flexus G1 4x12 P0 RYL

Flexus Color 4x16 - MidPower LED modules for Stradella optics

- ✓ square module with color LEDs for installation in luminaires
- ✓ for 4x4, 4x8 and 4x16 optics from various manufacturers
- ✓ 11 light colors from Far Red to Royal Blue
- ✓ 64 Mid-Power LEDs
- ✓ pitch distance along and across 12.5 mm
- ✓ length 223 mm
- ✓ width 50 mm
- ✓ four connection terminals
- ✓ rated current 350 mA
- ✓ maximum operating current 700 mA
- ✓ maximum forward voltage 43.2 ... 59.2 V
- ✓ with NTC for temperature monitoring

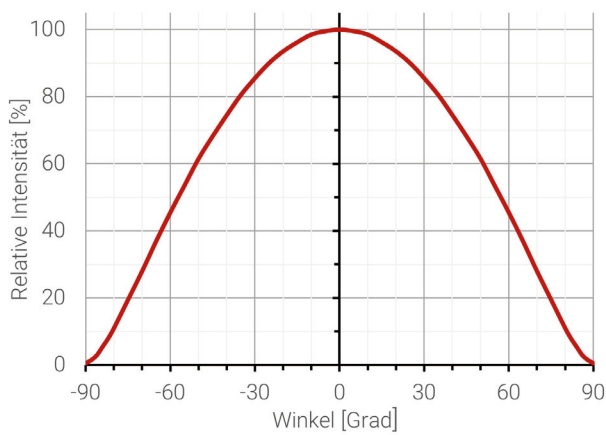


Please also refer to the technical data of the Flexus MidPower Color family on page 44. Further technical data and drawings from page 49.

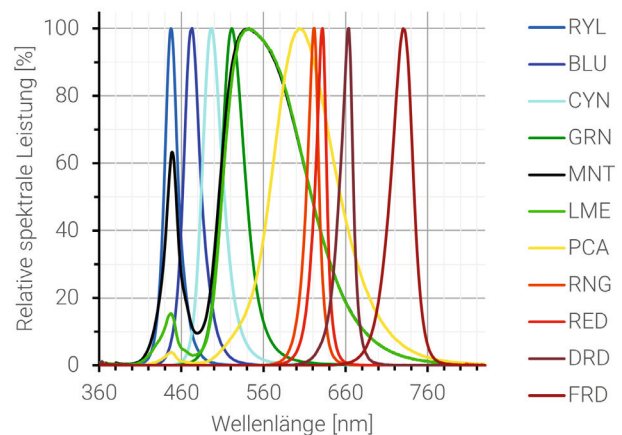
light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 200 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 700 mA Tc = 25 °C			
FRD	720-740 nm	2669 mW	-	4597 mW	-	8800 mW	-	7550-01300	Flexus G1 4x16 P0 FRD
DRD	650-670 nm	2982 mW	-	5174 mW	-	9984 mW	-	7550-01301	Flexus G1 4x16 P0 DRD
RED	620-630 nm	552 lm	88 lm/W	934 lm	82 lm/W	1715 lm	71 lm/W	7550-01302	Flexus G1 4x16 P0 RED
RNG	610-620 nm	723 lm	118 lm/W	1246 lm	110 lm/W	2362 lm	95 lm/W	7550-01303	Flexus G1 4x16 P0 RNG
PCA	-	1491 lm	166 lm/W	2483 lm	153 lm/W	4512 lm	130 lm/W	7550-01304	Flexus G1 4x16 P0 PCA
MNT	-	2189 lm	244 lm/W	3667 lm	226 lm/W	6688 lm	193 lm/W	7550-01305	Flexus G1 4x16 P0 MNT
LME	-	2336 lm	263 lm/W	3906 lm	241 lm/W	7136 lm	204 lm/W	7550-01306	Flexus G1 4x16 P0 LME
GRN	520-540 nm	1600 lm	184 lm/W	2355 lm	144 lm/W	2573 lm	135 lm/W	7550-01307	Flexus G1 4x16 P0 GRN
CYN	490-510 nm	992 lm	111 lm/W	1522 lm	92 lm/W	2093 lm	76 lm/W	7550-01308	Flexus G1 4x16 P0 CYN
BLU	469-480 nm	554 lm	63 lm/W	888 lm	55 lm/W	1546 lm	44 lm/W	7550-01309	Flexus G1 4x16 P0 BLU
RYL	440-455 nm	6464 mW	-	10912 mW	-	20288 mW	-	7550-01310	Flexus G1 4x16 P0 RYL

Technical data: Flexus Color - MidPower LED-modules for Stradella optics

Light distribution curve



Spectrum



Lifetime of the LEDs used

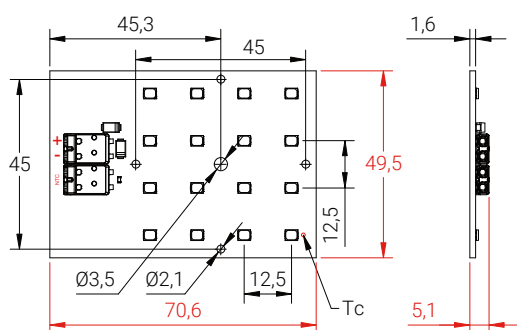
- The lifetime data is based on TM21 extrapolations of the available LM80 data of the LEDs used. They are to be regarded as purely informative data from which no warranty claim can be derived.

Description	If	Tc	L70 B50	L70 B10	L80 B50	L80 B10	L90 B50	L90 B10
Flexus G1 4x12 P0 FRD	700 mA	85 °C	> 50.000 h	> 50.000 h	48.000 h	43.000 h	20.000 h	18.000 h
Flexus G1 4x12 P0 DRD			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	25.000 h	24.000 h
Flexus G1 4x12 P0 RED			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h
Flexus G1 4x12 P0 RNG			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	22.000 h	21.000 h
Flexus G1 4x12 P0 PCA			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	22.000 h	21.000 h
Flexus G1 4x12 P0 MNT			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	45.000 h	42.000 h
Flexus G1 4x12 P0 LME			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	45.000 h	42.000 h
Flexus G1 4x12 P0 GRN			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	33.000 h	32.000 h
Flexus G1 4x12 P0 CYN			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	49.000 h	47.000 h
Flexus G1 4x12 P0 BLU			> 50.000 h	> 50.000 h	> 50.000 h	> 50.000 h	49.000 h	47.000 h
Flexus G1 4x12 P0 RYL			22.000 h	20.000 h	14.000 h	13.000 h	7.000 h	6.000 h

Technical drawings: Flexus Color - MidPower LED-modules for Stradella optics

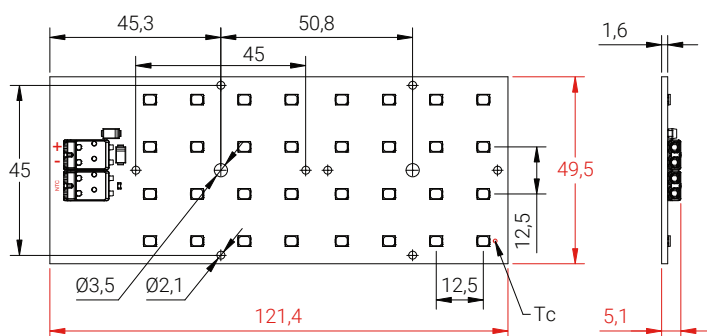
Flexus Color 4x4

Flexus G1 4x4 P0 ...



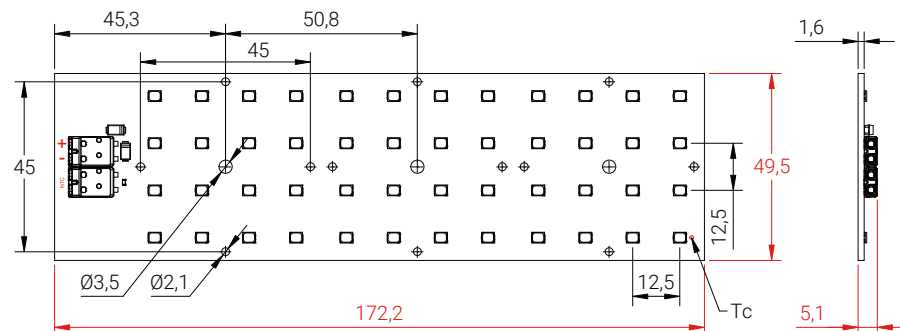
Flexus Color 4x8

Flexus G1 4x8 P0 ...



Flexus Color 4x12

Flexus G1 4x12 P0 ...









LoB Color – Spotlightmodules

Our iX-led LED-on-Board series, LoB for short, is an ideal alternative or supplement to the commercially available CoB modules.

Thanks to SMD LED, it is possible to integrate new LED technologies in a very extremely compact way and implement them according to your wishes. The advantages of the CoB modules are retained, including simple installation, fast luminaire design and a wide range of accessories.

Choose from six light colors: Red, Red-Orange, PC-Amber, Green, Blue and Royal Blue.

In addition, you can choose from four Light-Emitting-Surface sizes (LES): LES 6 mm, LES 9 mm, LES 13 mm, LES 19 mm.

Our iX-led standard modules are available at short notice and are favorable 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 High-Power LEDs for installation in luminaires. Compatible with optics from various manufacturers.

Versatile with:

✓ Compact module in dimensions:

- LES 6 mm: 12 mm x 15 mm
- LES 9 mm: 16 mm x 19 mm
- LES 13 mm: 20 mm x 24 mm
- LES 19 mm: 28 mm x 28 mm

✓ six light colors: Red, Red-Orange, PC-Amber, Green, Blue und Royal Blue

Compatible with COB holders from various manufacturers.

For operation on suitable constant current drivers.

Maximum working voltage	250 V
Ambient temperature	-20...+50 °C
Max. perm. operating temperature (Tc)	90 °C
EPREL database entry	yes
Beam angle	120°

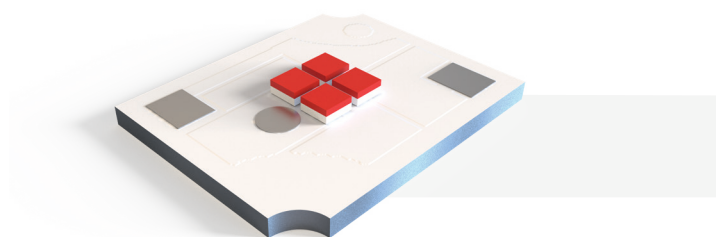
Connections:

Terminals prepared for holder

You can request an overview of suitable holders from us or refer to the data sheets of the LoB LED modules.

LoB Color 1215 LES6 - Spotlightmodules

- ✓ compact module with color LEDs for installation in luminaires
- ✓ LES 6 mm
- ✓ six light colors from Far Red to Royal Blue
- ✓ 4 High-Power LEDs
- ✓ length 12 mm
- ✓ width 15 mm
- ✓ two connection terminals
- ✓ compatible with COB holders from various manufacturers
- ✓ ideal as a supplement to white COB modules
- ✓ rated current 350 mA
- ✓ maximum operating current 750 mA

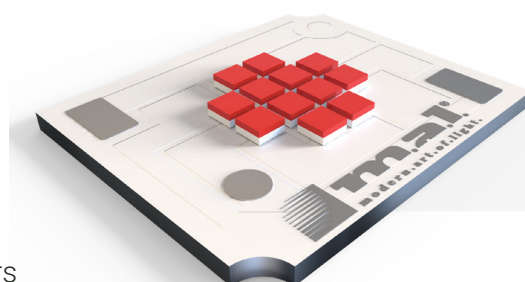


Please also refer to the technical data of the LoB Color family on page 56. Further technical data and drawings from page 61.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 150 mA Tc = 25 °C		If = 350 mA Tc = 25 °C		If = 750 mA Tc = 25 °C			
RED	620-630 nm	98 lm	79 lm/W	222 lm	72 lm/W	440 lm	60 lm/W	7525-00000	LoB G1 1215 LES6 RED
RNG	610-620 nm	138 lm	112 lm/W	314 lm	103 lm/W	616 lm	84 lm/W	7525-00001	LoB G1 1215 LES6 RNG
PCA	-	142 lm	85 lm/W	292 lm	72 lm/W	508 lm	55 lm/W	7525-00002	LoB G1 1215 LES6 PCA
GRN	520-535 nm	235 lm	148 lm/W	444 lm	112 lm/W	712 lm	78 lm/W	7525-00003	LoB G1 1215 LES6 GRN
BLU	465-480 nm	102 lm	61 lm/W	207 lm	50 lm/W	369 lm	39 lm/W	7525-00004	LoB G1 1215 LES6 BLU
RYL	450-465 nm	1076 mW	-	2384 mW	-	4640 mW	-	7525-00005	LoB G1 1215 LES6 RYL

LoB Color 1619 LES9 - Spotlightmodules

- ✓ compact module with color LEDs for installation in luminaires
- ✓ LES 9 mm
- ✓ six light colors from Far Red to Royal Blue
- ✓ 12 High-Power LEDs
- ✓ length 16 mm
- ✓ width 19 mm
- ✓ two connection terminals
- ✓ compatible with COB holders from various manufacturers
- ✓ ideal as a complement to white COB modules
- ✓ rated current 700 mA
- ✓ maximum operating current 1500 mA

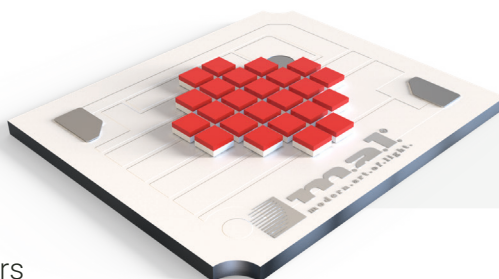


Please also refer to the technical data of the LoB Color family on page 56. Further technical data and drawings from page 61.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 300 mA Tc = 25 °C		If = 700 mA Tc = 25 °C		If = 1500 mA Tc = 25 °C			
RED	620-630 nm	293 lm	79 lm/W	666 lm	72 lm/W	1320 lm	60 lm/W	7525-00010	LoB G1 1619 LES9 RED
RNG	610-620 nm	414 lm	112 lm/W	943 lm	103 lm/W	1848 lm	84 lm/W	7525-00011	LoB G1 1619 LES9 RNG
PCA	-	426 lm	85 lm/W	875 lm	72 lm/W	1524 lm	55 lm/W	7525-00012	LoB G1 1619 LES9 PCA
GRN	520-535 nm	706 lm	148 lm/W	1332 lm	112 lm/W	2136 lm	78 lm/W	7525-00013	LoB G1 1619 LES9 GRN
BLU	465-480 nm	306 lm	61 lm/W	622 lm	50 lm/W	1106 lm	39 lm/W	7525-00014	LoB G1 1619 LES9 BLU
RYL	450-465 nm	3228 mW	-	7152 mW	-	13920 mW	-	7525-00015	LoB G1 1619 LES9 RYL

LoB Color 2024 LES13 - Spotlightmodules

- ✓ compact module with color LEDs for installation in luminaires
- ✓ LES 13 mm
- ✓ six light colors from Far Red to Royal Blue
- ✓ 24 High-Power LEDs
- ✓ length 20 mm
- ✓ width 24 mm
- ✓ two connection terminals
- ✓ compatible with COB holders from various manufacturers
- ✓ ideal as a supplement to white COB modules
- ✓ rated current 700 mA
- ✓ maximum operating current 1500 mA

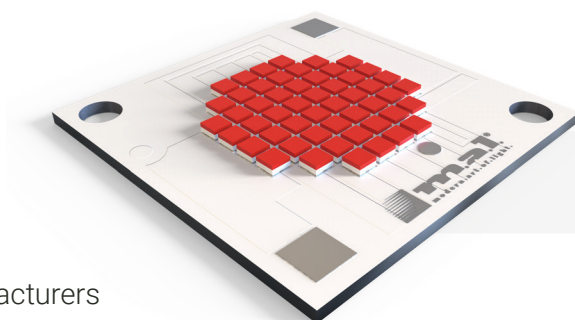


Please also refer to the technical data of the LoB Color family on page 56. Further technical data and drawings from page 61.

light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 300 mA Tc = 25 °C		If = 700 mA Tc = 25 °C		If = 1500 mA Tc = 25 °C			
RED	620-630 nm	586 lm	79 lm/W	1332 lm	72 lm/W	2640 lm	60 lm/W	7525-00020	LoB G1 2024 LES13 RED
RNG	610-620 nm	828 lm	112 lm/W	1886 lm	103 lm/W	3696 lm	84 lm/W	7525-00021	LoB G1 2024 LES13 RNG
PCA	-	852 lm	85 lm/W	1750 lm	72 lm/W	3048 lm	55 lm/W	7525-00022	LoB G1 2024 LES13 PCA
GRN	520-535 nm	1411 lm	148 lm/W	2664 lm	112 lm/W	4272 lm	78 lm/W	7525-00023	LoB G1 2024 LES13 GRN
BLU	465-480 nm	612 lm	61 lm/W	1243 lm	50 lm/W	2213 lm	39 lm/W	7525-00024	LoB G1 2024 LES13 BLU
RYL	450-465 nm	6456 mW	-	14304 mW	-	27840 mW	-	7525-00025	LoB G1 2024 LES13 RYL

LoB Color 2828 LES19 - Spotlightmodules

- ✓ compact module with color LEDs for installation in luminaires
- ✓ LES 19 mm
- ✓ six light colors from Far Red to Royal Blue
- ✓ 52 High-Power LEDs
- ✓ length 28 mm
- ✓ width 28 mm
- ✓ two connection terminals
- ✓ compatible with COB holders from various manufacturers
- ✓ ideal as a supplement to white COB modules
- ✓ rated current 1400 mA
- ✓ maximum operating current 3000 mA

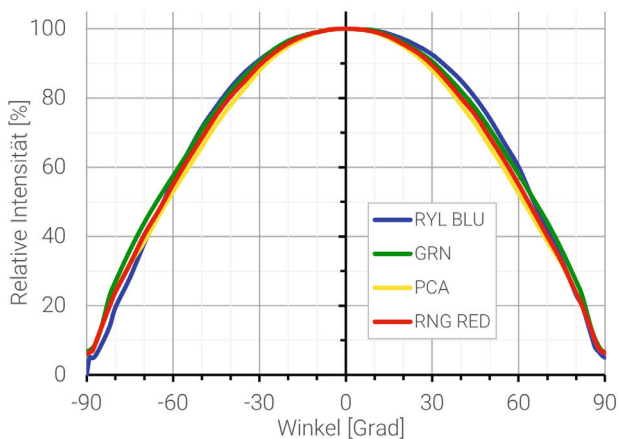


Please also refer to the technical data of the LoB Color family on page 56. Further technical data and drawings from page 61.

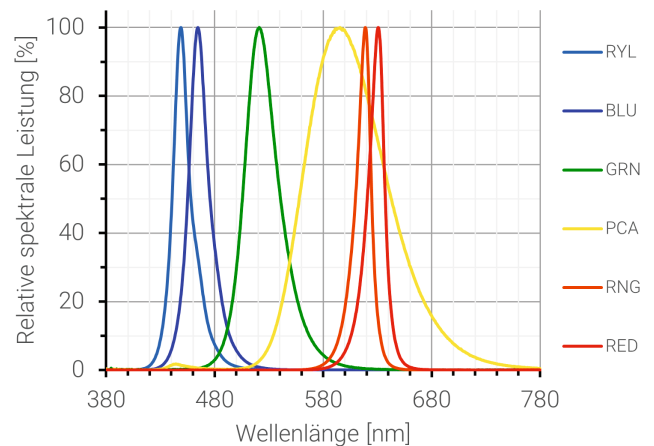
light color	wavelength	Flux typ.	LPW typ.	Flux typ.	LPW typ.	Flux typ.	LPW typ.	order-nr.	description
		If = 600 mA T _c = 25 °C		If = 1400 mA T _c = 25 °C		If = 3000 mA T _c = 25 °C			
RED	620-630 nm	1269 lm	79 lm/W	2886 lm	72 lm/W	5720 lm	60 lm/W	7525-00030	LoB G1 2828 LES19 RED
RNG	610-620 nm	1794 lm	112 lm/W	4087 lm	103 lm/W	8008 lm	84 lm/W	7525-00031	LoB G1 2828 LES19 RNG
PCA	-	1846 lm	85 lm/W	3791 lm	72 lm/W	6604 lm	55 lm/W	7525-00032	LoB G1 2828 LES19 PCA
GRN	520-535 nm	3058 lm	148 lm/W	5772 lm	112 lm/W	9256 lm	78 lm/W	7525-00033	LoB G1 2828 LES19 GRN
BLU	465-480 nm	1326 lm	61 lm/W	2694 lm	50 lm/W	4794 lm	39 lm/W	7525-00034	LoB G1 2828 LES19 BLU
RYL	450-465 nm	13988 mW	-	30992 mW	-	60320 mW	-	7525-00035	LoB G1 2828 LES19 RYL

Technical data: LoB Color - Spotlightmodules

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
LoB G1 1215 LES6 RED	750 mA	90 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
		85 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
LoB G1 1215 LES6 RNG		90 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
		85 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
LoB G1 1215 LES6 PCA		90 °C	30.000 h	29.000 h	19.000 h	19.000 h	9.000 h	9.000 h
		85 °C	> 54.000 h	> 54.000 h	32.000 h	33.000 h	10.000 h	11.000 h
LoB G1 1215 LES6 GRN		90 °C	> 36.000 h	> 36.000 h	> 36.000 h	> 36.000 h	22.000 h	22.000 h
		85 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
LoB G1 1215 LES6 BLU		90 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
		85 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
LoB G1 1215 LES6 RYL		90 °C	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h
		85 °C	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h

Technical data: LoB Color - Spotlightmodules

Lifetime of the LEDs used

Description	If	Tc	L70 B50	L70 B10	L80 B50	L80 B10	L90 B50	L90 B10
LoB G1 1619 LES9 RED	1500 mA	90 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
		85 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
LoB G1 1619 LES9 RNG		90 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
		85 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
LoB G1 1619 LES9 PCA		90 °C	30.000 h	29.000 h	19.000 h	19.000 h	9.000 h	9.000 h
		85 °C	> 54.000 h	> 54.000 h	32.000 h	33.000 h	10.000 h	11.000 h
LoB G1 1619 LES9 GRN		90 °C	> 36.000 h	> 36.000 h	> 36.000 h	> 36.000 h	22.000 h	22.000 h
		85 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
LoB G1 1619 LES9 BLU		90 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
		85 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
LoB G1 1619 LES9 RYL		90 °C	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h
		85 °C	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h

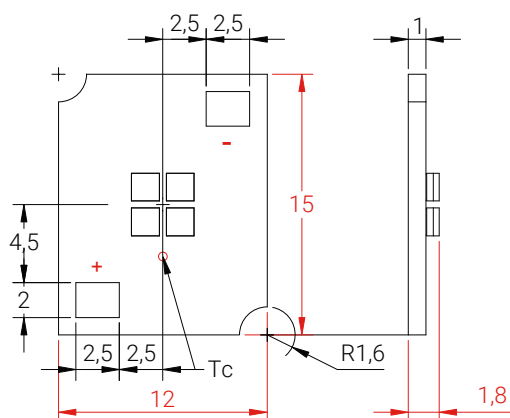
Description	If	Tc	L70 B50	L70 B10	L80 B50	L80 B10	L90 B50	L90 B10
LoB G1 2024 LES13 RED	1500 mA	90 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
		85 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
LoB G1 2024 LES13 RNG		90 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
		85 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
LoB G1 2024 LES13 PCA		90 °C	30.000 h	29.000 h	19.000 h	19.000 h	9.000 h	9.000 h
		85 °C	> 54.000 h	> 54.000 h	32.000 h	33.000 h	10.000 h	11.000 h
LoB G1 2024 LES13 GRN		90 °C	> 36.000 h	> 36.000 h	> 36.000 h	> 36.000 h	22.000 h	22.000 h
		85 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
LoB G1 2024 LES13 BLU		90 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
		85 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
LoB G1 2024 LES13 RYL		90 °C	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h
		85 °C	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h

Lifetime of the LEDs used

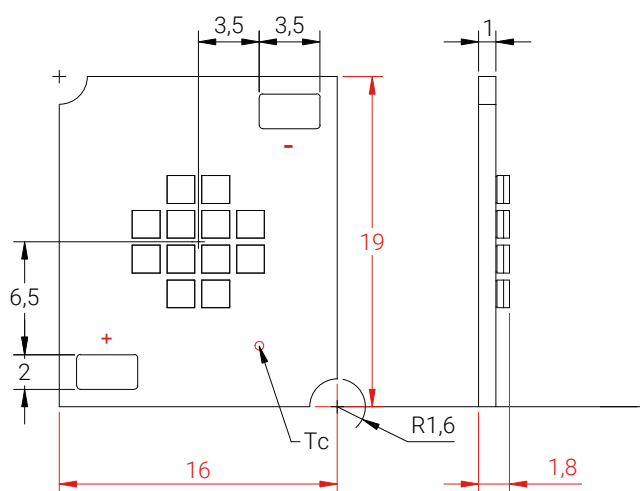
Description	If	Tc	L70 B50	L70 B10	L80 B50	L80 B10	L90 B50	L90 B10
LoB G1 2828 LES19 RED	3000 mA	90 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
		85 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
LoB G1 2828 LES19 RNG		90 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
		85 °C	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h	> 109.000 h
LoB G1 2828 LES19 PCA		90 °C	30.000 h	29.000 h	19.000 h	19.000 h	9.000 h	9.000 h
		85 °C	> 54.000 h	> 54.000 h	32.000 h	33.000 h	10.000 h	11.000 h
LoB G1 2828 LES19 GRN		90 °C	> 36.000 h	> 36.000 h	> 36.000 h	> 36.000 h	22.000 h	22.000 h
		85 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
LoB G1 2828 LES19 BLU		90 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
		85 °C	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h	> 45.000 h
LoB G1 2828 LES19 RYL		90 °C	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h
		85 °C	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h	> 70.000 h

Technical drawings: LoB Color - Spotlightmodules

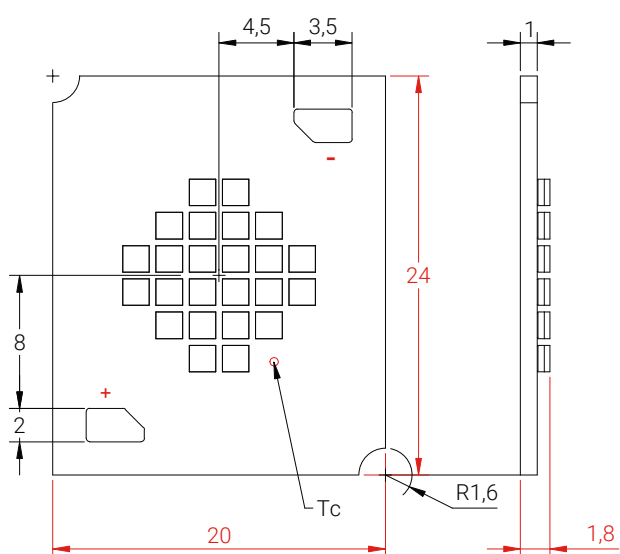
LoB Color 1215 LES6



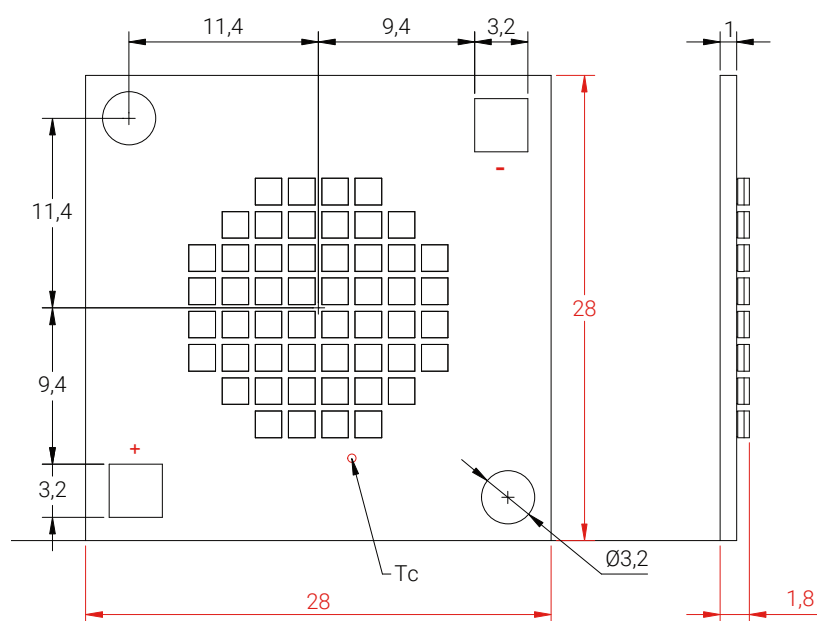
LoB Color 1619 LES9



LoB Color 2024 LES13

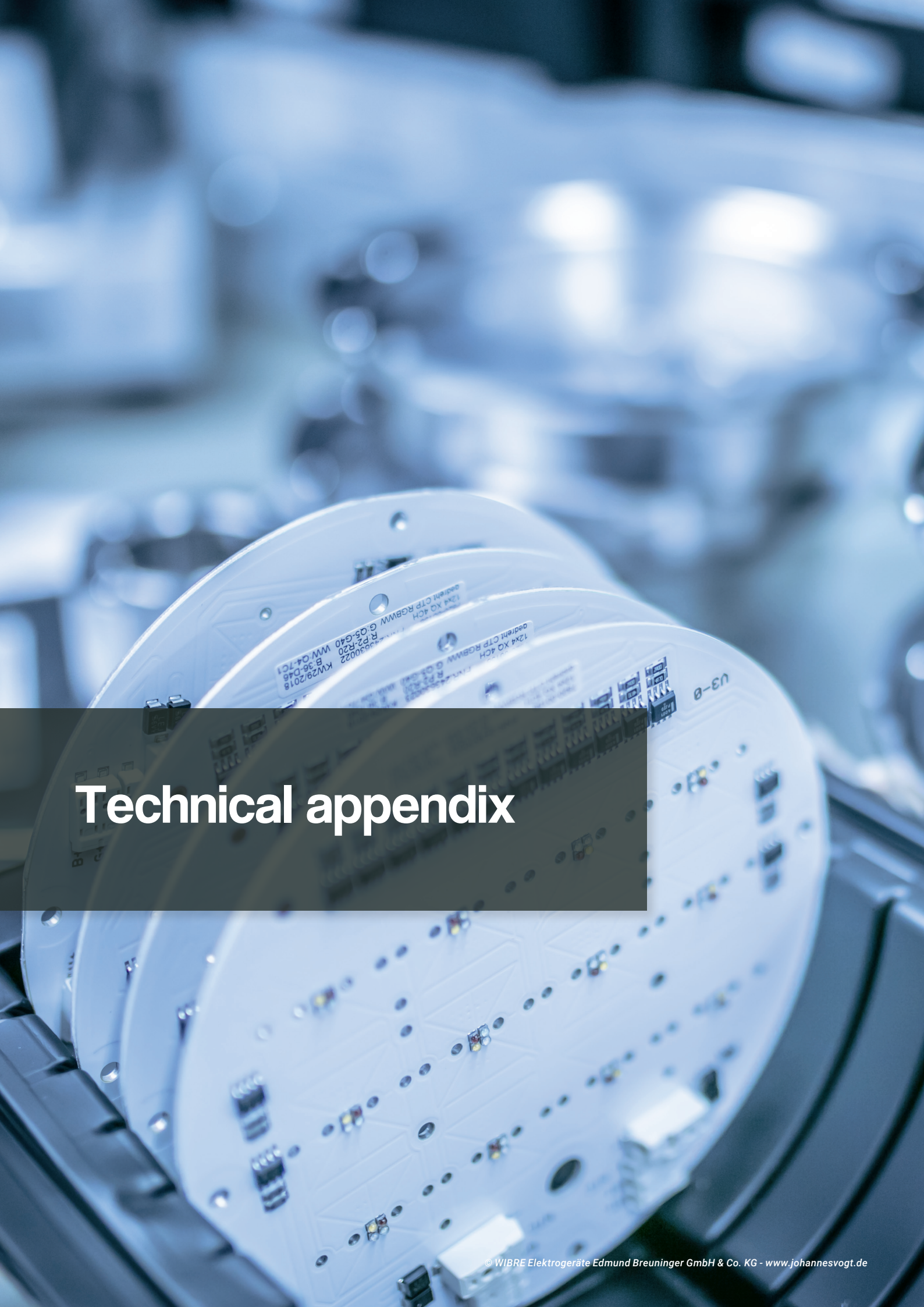


LoB Color 2028 LES19









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_f</i>	(Forward) current. Unit ampere (A). We express this value in milliamperes (mA).
<i>V_f</i>	Forward voltage. Unit Volt (V)
<i>P_{mod}</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_c 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.

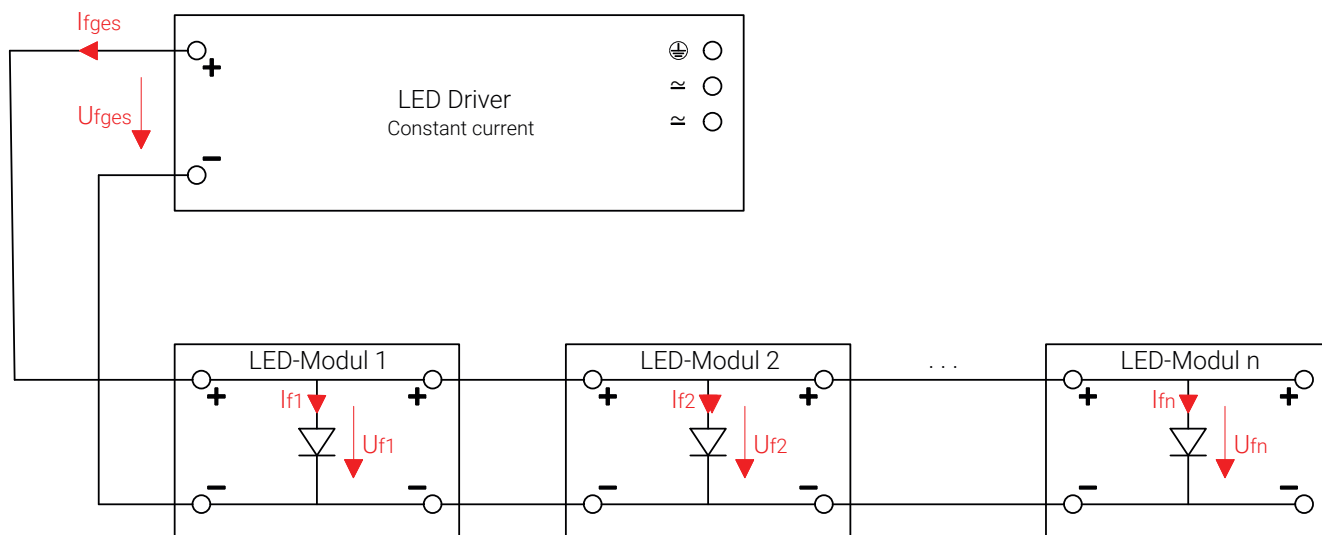
Mounting of LED modules

- ! 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.

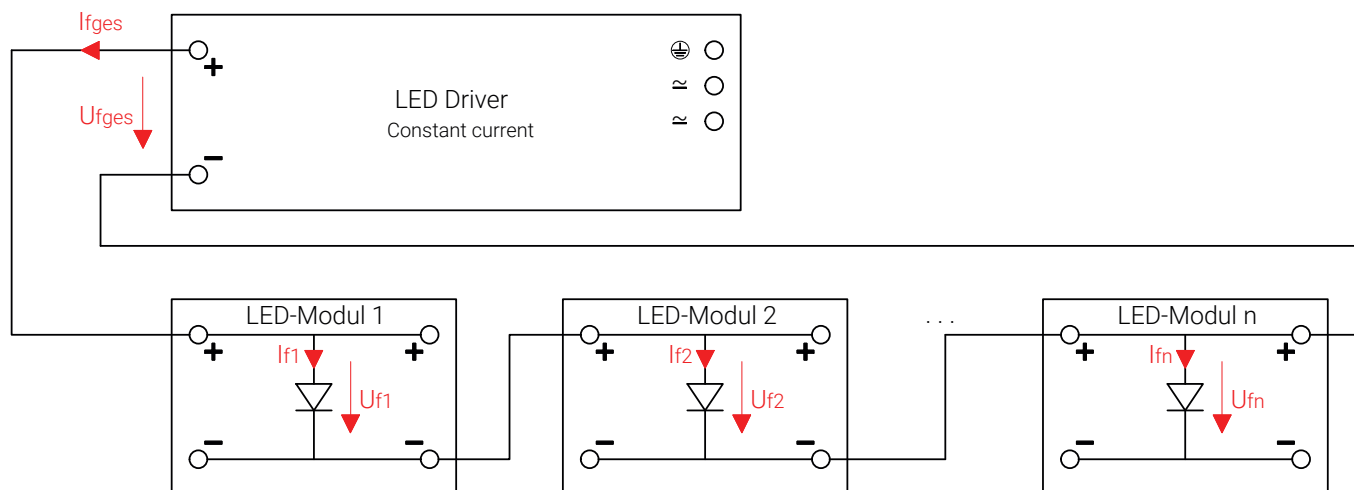
Connection of LED modules

- ! 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.

Parallel connection



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

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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.



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