06/2022

Technical application guide
BackLED® and BoxLED® portfolio

Light is OSRAM

OSRAM

Contents

Please note:
All information in this guide has been prepared with great care. OSRAM, however, does not accept liability for possible errors, changes and/or omissions. Please check www.osram.com or contact your sales partner for an updated copy of this guide. This technical application guide is for information purposes only and aims to support you in tackling the challenges and taking full advantage of all opportunities the technology has to offer. Please note that this guide is based on own measurements, tests, specific parameters and assumptions. Individual applications may not be covered and need different handling. Responsibility and testing obligations remain with the luminaire manufacturer/OEM/application planner.

1 Product overview

1.1 BackLED®

BackLED® S CP G5

BackLED® M CP G5/
BackLED® M CP G5 HF

BackLED® M HO CP G5

BackLED® L CP G5

BackLED® XL CP G5

BackLED® TW CP G5

BackLED® MINI S CP G4

BackLED® MINI M CP G4

BackLED® S Plus G15/
BackLED® S CP G4

BackLED® M CP G4

BackLED® M HO CP G4

BackLED® XS Plus G4

BackLED® L CX G4

BackLED® DS Plus G3

BackLED® RGBW Plus G2

BackLED® AREA G1 900 540x270
BackLED® AREA G1 900 TW

1.2 BoxLED®

BoxLED® XS Plus G3

BoxLED® ECO M Plus G3

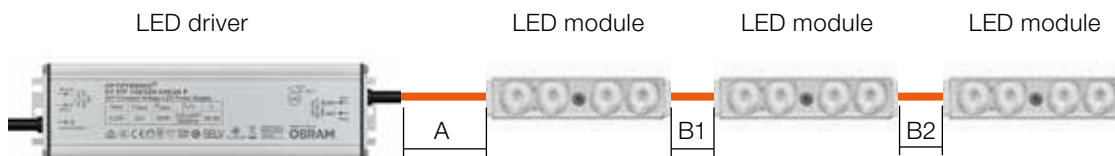BoxLED® M Plus G3

BoxLED® L Plus G15/G3

BoxLED® Indoor L Plus G1

2 Electrical properties

2.1 Electrical connections

We recommend the following cable lengths and cable cross-sections for the electrical connections between the LED chains and the OPTOTRONIC® LED drivers.

2.2 Recommended cable lengths

LED driver   LED module   LED module   LED module

Max. secondary length = LED driver to first LED module (A) + wire extension LED module to LED module (B1) + (B2)…

Disclaimer:
In terms of electromagnetic compatibility (EMC), the maximum permitted cable length is related to the LED driver used to feed the LED modules (please refer to the technical data sheet of the applied OSRAM OPTOTRNIC® LED driver). Users are responsible to ensure EMC.

Please note:
We recommend to use the LED modules only in combination with OSRAM OPTOTRONIC® LED drivers. The maximum secondary length is the maximum cable length between the LED driver and the first LED module of a chain plus the wire extensions between the LED modules (A + B1 + B2 + Bn; see above).

2.2.1 Recommended cable cross-sections

Product	AWG	A [mm²]	Recommended cable cross-section for connecting an LED chain to other LED modules [mm²]
BackLED S CP G5	22	0.32	≥0.32
BackLED M CP G5	22	0.32	≥0.32
BackLED M CP G5 HF	22	0.32	≥0.32
BackLED M HO CP G5	22	0.32	≥0.32
BackLED L CP G5	20	0.52	≥0.52
BackLED XL CP G5	18	0.82	≥0.82
BackLED TW CP G5	18	0.82	≥0.82
BackLED Mini S	24	0.2	≥0.2
BackLED Mini M	22	0.32	≥0.32
BackLED XS Plus G4	22	0.32	≥0.32
BackLED S Plus G15 COL	20	0.52	≥0.52
BackLED S Plus G4	22	0.32	≥0.32
BackLED M Plus G4	22	0.32	≥0.32
BackLED M-HO G4	22	0.32	≥0.32
BackLED L CX G4	20	0.52	≥0.52
BackLED DS Plus G3	18	0.82	≥0.82
BoxLED XS Plus G3	20	0.57	≥0.57
BoxLED ECO M Plus G3	18	0.79	≥ 0.79
BoxLED M Plus G3	18	0.79	≥ 0.79
BoxLED L Plus G15/G3	18	0.79	≥ 0.79
BoxLED Indoor L Plus G1	18	0.79	≥ 0.79
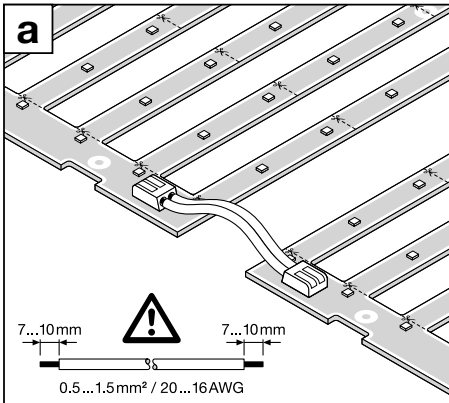
BackLED AREA G1 900:

Push-in connector
Max. 8 boards in series

Recommended cable:
20...16 AWG / 0.5 ... 1.5 mm²
Wire stripping 7 ... 10 mm

AWG20 / 0.5 mm² --> 4 boards in series
AWG18 / 0.8 mm² --> 6 boards in series
AWG16 / 1.3 mm² --> 8 boards in series

Please note that this is the maximum cable length between the power supply and the LED modules and includes any dimmers that may be installed in between the power supply and the LED module.

In some applications, it may be required to extend the maximum permitted cable length. In this case, special EMC filters can be applied on the secondary side (12 V and 24 V). A ferrite close to the output terminals can reduce the effect of radio interference significantly. If OPTOTRONIC® dimmers are also installed, place the filters on output wires as close as possible to the dimmer device.

Simple and easy-to-use solutions are available in the market, see pictures below. One possible ferrite is available from TDK, part number ZCAT3035-1330-BK.

ZCAT-C TYPE
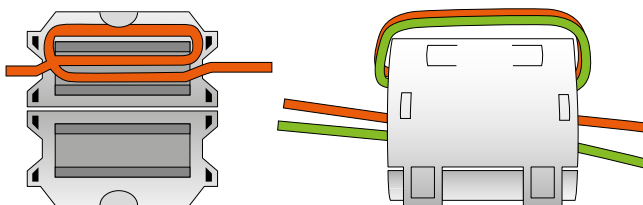
EMI compliance must be verified and confirmed by the luminaire manufacturer.

3 BackLED TW G5 and RGBW G2

3.1 BackLED® TW CP G5

The BackLED® TW CP G5 version has two warm-white LEDs with 2700 K and two cold-white LEDs with 6500 K per single module now equipped with patented Square Lens technology from OSRAM. Connected to light management systems, BackLED® TW CP G5 allows simulating daylight in any of your applications.

Product benefits
— Dynamic white light: Easy control of the color temperature from 2700 to 6500 K (in conjunction with a light management system)
— Outstanding uniform illumination of almost any shape thanks to Square Lens technology

Applications
— Light ceilings for daylight simulation
— Color temperature adjustable to application requirements
— Sales areas: Merchandise can be highlighted with variable color temperatures
— Cultural institutions: Almost IR- and UV-free light protects sensitive exhibits
— Hospitality: Dynamically changing white light activates or relaxes

Technical features
— Maximum power: 60 W
— Luminous efficacy: 138.5 lm/W
— Dimensions (L x W x H): 13950 x 17.8 x 12.4 mm; length adjustable
— 155° beam angle with Square Lens technology
— IP66 protection
— Lifetime: Up to 50 000 hours
— One chain consisting of 30 modules
— No additional heat sink needed
— Mounting profile available as accessory for quick installation without tools

BackLED® TW CP G5

24 V (+)
WW (–)
CW (–)
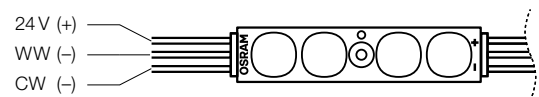
Light distribution curve 2700 K and 6500 K
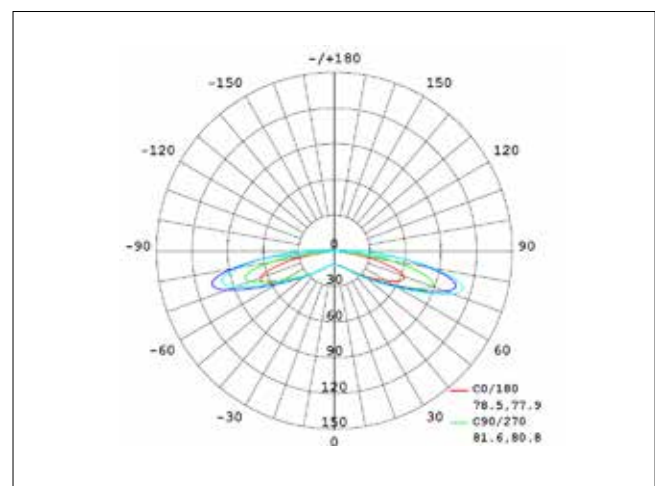
3.2 BackLED® RGBW Plus G2

The BackLED® RGBW Plus G2 has two red, green and blue LEDs each, plus two cold-white 6500 K LEDs, thus enabling even a mixing of soothing pastel colors. In combination with light management systems, the BackLED® RGBW Plus G2 offers you control over dynamic color effects or very specific colors.

Product benefits
— Outdoor LED chain for dynamic, colored backlighting
— RGBW LED with specially designed optics for very high color homogeneity

Applications
— Light ceilings for mood lighting
— Signage and illuminated advertising
— Large light boxes, replacement of colored fluorescent tubes
— Backlighting for shop, hospitality and architainment applications

Technical features
— Total maximum power: 42.6 W
— Dimensions (L x W x H): 6000 x 35 x 13.5 mm; length adjustable
— Very broad beam angle for homogeneous backlighting
— IP66/IP68 protection
— Lifetime: Up to 50 000 hours
— One chain consisting of 15 modules with two red, green and blue LEDs each, cuttable after every third module
— Modules optimized for use with OSRAM OPTOTRONIC® LED drivers
— No additional heat sink needed
— Mounting profile available as accessory for quick installation without tools

BackLED® RGBW Plus G2

+
R
G
B
W
O
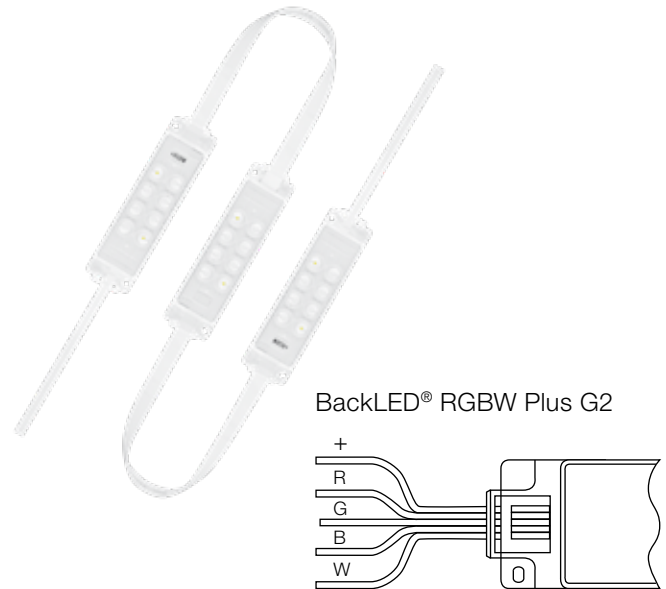
Light distribution curve RGBW
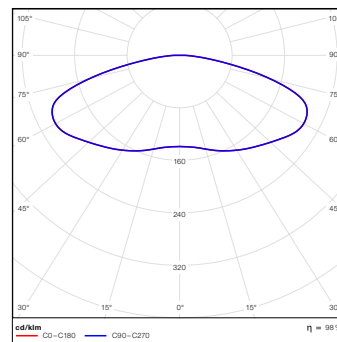
Spectral data red
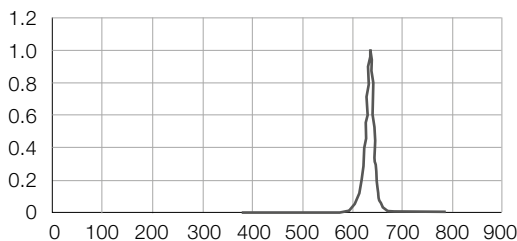
Spectral data green

Spectral data blue

Spectral data white (6500 K)

3.3 System information

3.3.1 Technical data

Product family

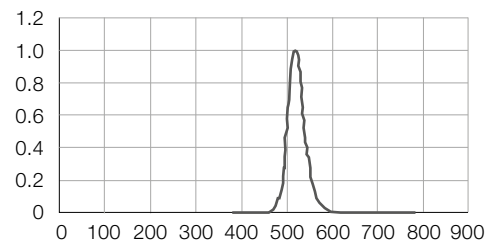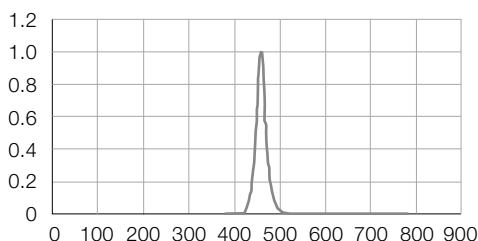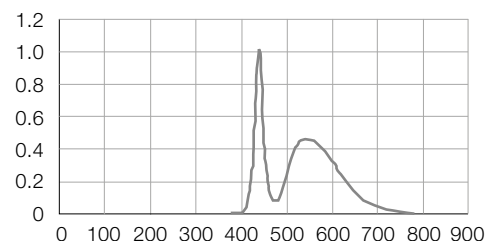| Product group	BackLED RGBW Plus G2				BackLED TW CP G5	
Product reference	BA-RGBW-PL G2				BA-TW-CP-827.865-24-G5	
Product number	4062172030168				4052899627253	
Light color	RGBW				TW	
	white	red	green	blue	cold white	warm white
No. of LED modules per chain (no. of LEDs per module)	15, cuttable after every third module (8)				30, cuttable after every module (4)	
	(2)	(2)	(2)	(2)	(2)	(2)
Voltage [V]	24				24	
Total current [A]	1.775				2.5	
Current per color [A]	0.30	0.45	0.65	0.375	1.25	1.25
Total power per chain (per module) [W]	42.6 (8.52 x min. unit 3 modules)				60 (2)	
Power per color (per module) [W]	7.2	10.8	15.6	9	30 (1)	30 (1)
Luminous flux per chain (per module) [lm]	710 (48)	490 (33)	960 (64)	150 (10)	4500 (150)	3810 (127)
Beam angle [°]	150				155	
Color temperature [K]	6500	–	–	–	6500	2700
Wavelength [nm]	–	620	525	464	–	–

3.4 Accessories

Accessory matching table

EAN 10 code (Product short name)	Dimensions [mm]	BA-RGBW-PL G2	BA-TW-CP-G5	BA-XL-CP-G5	BA-L-CP-G5	BA-M-HO-CP-G5	BA-M-CP-G5	BA-M-CP-G5-HF	BA-S-CP-G5	BA-Mini-M-CP-G4	BA-Mini-S-CP-G4	BA-M-HO-CP-G4	BA-M-CP-G4	BA-S-CP-G4	BA-S-PL G15 COL	BA-DS-PL G3	BX-M-PL-G3	BX-XS-PL-G3	BX-L-PL G3–G15	BXI-L-PL G1	BX-ECO M PL G3
		BackLED®															BoxLED®				
4052899145863 BA-MP	L 2000 x W 20 x H 8		●	●	●													●			
4052899629189 BA-MP-L-G5-2M	L 2000 x W 20 x H 8.3		●	●	●																
4052899629196 BA-MP-SM-G5-2M	L 2000 x W 14.4 x H 7.3					●	●	●	●												
4062172168410 BA-MP-M-CP-2M	L 2000 x W 14.5 x H 8											●	●	●							
4008321981110 BX-MP	L 2365 x W 38 x H 16	●															●		●	●	●
4052899264540 BA-SM-MP	L 2000 x W 14.5 x H 8														●						
4008321880307 BX-DS-MP	L 2000 x W 13.3 x H 13															●					
4008321872173 BX-DS-MB	L 39.5 x W 17 x H 56															●					
4052899629325 BA-CLIP-L-G5	L 22.4 x W 15		●	●	●																
4052899629349 BA-CLIP-SM-G5	L 16.5 x W 15					●	●	●	●												

4 Multi-channel LED module control with OPTOTRONIC® constant voltage drivers

4.1 OPTOTRONIC® all-in-one devices

4.1.1 OTi DALI 50/220-240/24 4CH DT6/8
EAN: 4062172177900

4.1.2 OTi DALI 80/220-240/24 4CH DT6/8
EAN: 4062172177924

Product features
— Dimmable via Touch DIM®
— LED driver whose output power can be shared arbitrarily among the 4 channels
— Dimming range: 0/0.1...100 %
— Line frequency: 0 Hz | 50 Hz | 60 Hz

Product benefits
— Intelligent power matching thanks to Smart Power Supply
— Slim form factor for mounting in light coves or in linear luminaires
— Minimized stroboscopic effect thanks to high PWM frequency with patented intelligence
— Suitable for installation in emergency lighting systems according to EN 60598-2-22
— Works in Tunable White as DALI-2 Device Type 6 or Device Type 8 (selection via DIP switch)
— DALI message detection "LED module failure"
— IP rating: IP20

Please note:
Additional technical information can be found in the technical data overview on page 10 or at the OSRAM website www.osram.com

4.1.3 OTi DALI 160/220-240/24 2CH DT6/8
EAN: 4062172177948

Product features
— Dimmable via Touch DIM®
— LED driver whose output power can be shared
  arbitrarily among the 1 or 2 channels
— Dimming range: 0/0.1...100 %
— Line frequency: 0 Hz | 50 Hz | 60 Hz

Product benefits
— Intelligent power matching thanks to Smart
  Power Supply
— Slim form factor for mounting in light coves
  or in linear luminaires
— Minimized stroboscopic effect thanks to high
  PWM frequency with patented intelligence
— Suitable for installation in emergency lighting
  systems according to EN 60598-2-22
— Works in Tunable White as DALI-2 Device Type 6 or
  Device Type 8 (selection via DIP switch)
— DALI message detection "LED module failure"
— IP rating: IP20

4.1.4 OTi BLE 80/220-240/24 1-4CH
EAN: 4062172046558

Product features:
— Smart Power Supply
— Up to 70000 hours lifetime at T_c of 70 °C
— Casambi Bluetooth Low Energy (BLE)*

Product benefits:
— Slim form factor for mounting in light coves
  or in linear luminaires
— Very low minimal dimming level: 0.4 %
— Wirelessly controllable via app

4.1.5 OTi DALI 210/220-240/24 1-4CH P
EAN: 4062172032087

4.1.6 OTi DALI 100/220-240/24 1-4CH P
EAN: 4062172119191

Product features:
— 1 to 4 self-configuring DALI channels
— Lamp failure detection
— Smart Power Supply
— AstroDIM functionality
— Very low minimal dimming level: 0.1 %
— Output wire length: Up to 50 m

Product benefits:
— Suitable for installation under sunlight
— IP66/IP67, salt-mist-resistant and DC functionality
— AstroDIM functionality for automatic on/off and dimming
— 100 W version certified for emergency lighting

*Download Casambi app from App store or Google play. For the correct functioning of the Casambi app refer to the Casambi website: http://www.casambi.com The Casambi App is provided to you by Casambi. OSRAM shall have no liability for the Casambi app and does not make any representations, express or implied, about the availability and/or performance of the Casambi app. The Casambi cloud services are provided to you by Casambi. OSRAM shall have no liability for the Casambi cloud services and does not make any representations, express or implied, about the availability and/or performance of the Casambi cloud services. OSRAM shall have no liability for and does not make any representations, express or implied, about the connectivity of Casambi ready products of OSRAM with any other Casambi ready products.

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5 Multi-channel system combination

5.1 System overview: LED chains and control devices

~230 V   24 V   24 V DIM

LED drivers (24 V)	
OT 20/200…240/24	4050300618111
OT SLIM 30/220…240/24	4062172135733
OT SLIM 60/220…240/24	4062172135856
OT SLIM 100/220…240/24	4062172135870
OT SLIM 160/220…240/24	4062172135894
OT SLIM 250/220…240/24	4062172135917
OT 20/220…240/24 P	4052899545922
OT 40/220…240/24 P	4052899545946
OT 60/220…240/24 P	4052899545960
OT 100/220…240/24 P	4052899545984
OT 130/220…240/24 P	4052899546004
OT 250/220…240/24 P	4052899546028
OT FIT 80/220-240/24 P	4062172085465
OT FIT 150/220-240/24 P	4062172085601
OT FIT 200/220-240/24 P	4062172085649
OT FIT 300/220-240/24 P	4062172085687

Suggested dimming devices*	
OTi DALI DIM 1-4CH D	4062172166010
OT DMX RGBW DIM	4052899557949
OT BLE DIM	4052899557833

LED modules
BackLED TW CP G5
BackLED RGBW Plus G2
BackLED AREA TW G1

All-in-one devices	
OTi DALI 50/220-240/24 4CH DT6/8	4062172177900
OTi DALI 80/220-240/24 4CH DT6/8	4062172177924
OTi DALI 160/220-240/24 2CH DT6/8	4062172177948
OT BLE 80/220...240/24 1...4 CH	4062172046558
OTi DALI 100/220-240/24 1-4 CH	4062172119191
OTi DALI 210/220...240/24 1...4 CH	4062172032087

*Refer to the OSRAM website www.osram.com for the complete range of dimming devices

5.2 System overview: All-in-one devices – LED chains

Product	BackLED RGBW Plus G2	BackLED TW CP G5	BackLED AREA 900 270x540 TW**
Maximum power per chain	42.6 W	60 W	17.6 W nominal
OTi DALI 50/220-240/24 4CH DT6/8	Maximum: 15 modules	Maximum: 25 modules in DT6 mode, 50 modules in DT8 mode	50W: Max. 4 boards (only in DT8)
OTi DALI 80/220-240/24 4CH DT6/8	1 chain (15 modules) + 12 modules (parallel) Total maximum: 27 modules	Maximum: 40 modules in DT6 mode, 80 modules in DT8 mode	80W (and BLE): Max. 8 boards (only in DT8)
OTi DALI 160/220-240/24 2CH DT6/8		Maximum: 80 modules in DT6 mode, 160 modules in DT8 mode	160W: Max. 16 boards (only in DT8)
OT BLE 80/220...240/24 1...4 CH	1 chain (15 modules) + 12 modules (parallel) Total maximum: 27 modules	Maximum: 40 modules	80W (and BLE): Max. 8 boards (only in DT8)

**Important note concerning BackLED AREA 900 270x540 TW:
  Only use this product with DALI TW versions (DT8) or TW/2xTW BLE lamp profile available on Casambi app from OSRAM.
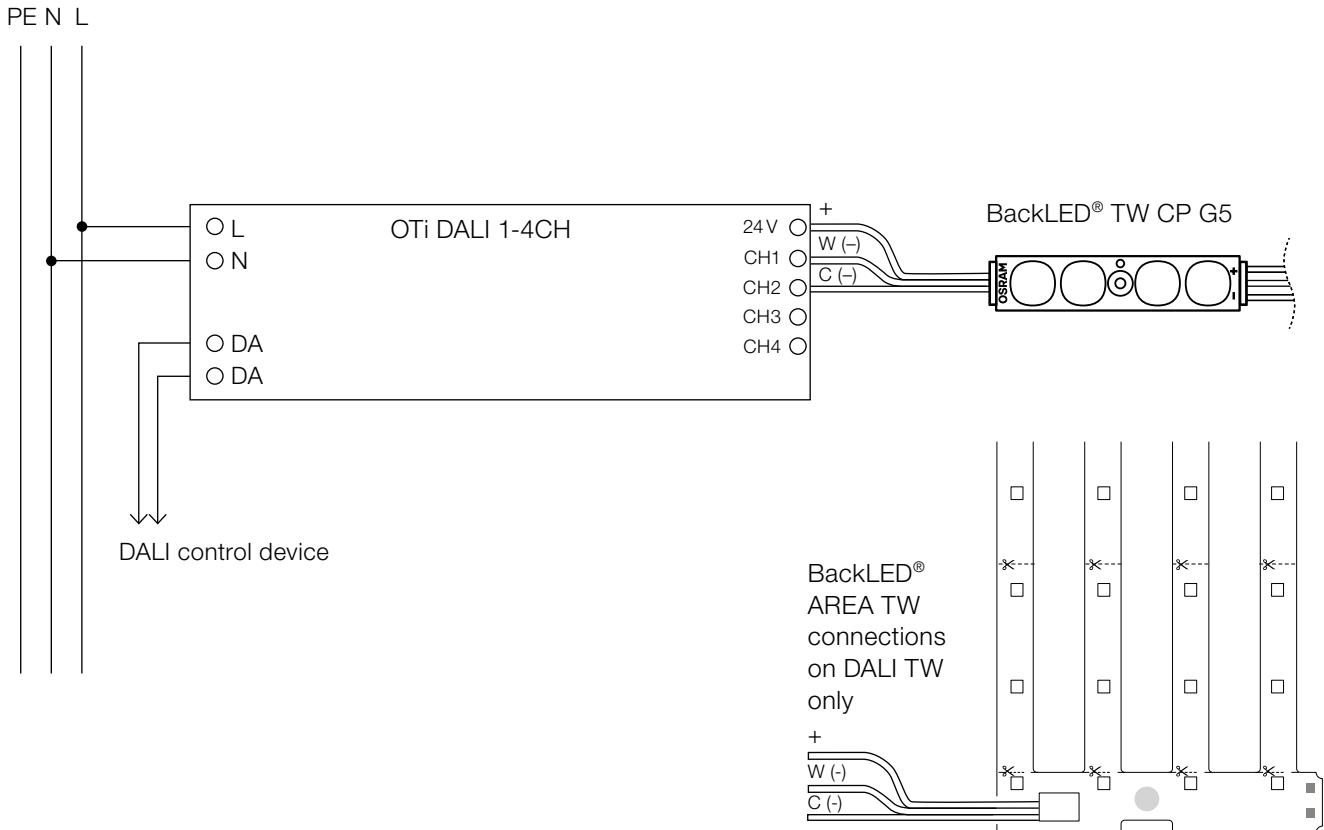
Overview: Power consumption of individual channels

Product / Color	BackLED RGBW Plus G2 Per chain	BackLED RGBW Plus G2 Per min. 3-modules unit	BackLED TW CP G5 Per chain	BackLED TW CP G5 Per single module	BackLED AREA ... TW Per board
2700 K			1.25 A → 30 W	0.042 A → 1 W	0.375 A → 9 W
6500 K			1.25 A → 30 W	0.042 A → 1 W	0.358 A → 8.6 W
Red	0.55 A → 13.2 W	0.11 A → 2.64 W			
Green	0.9 A → 21.6 W	0.18 A → 4.32 W			
Blue	0.45 A → 10.8 W	0.9 A → 2.16 W			
White	0.30 A → 7.2 W	0.06 A → 1.44 W			
Total	2.20 A → 52.8 W		2.5 A → 60 W		0.733 A → 17.6 W

5.3 Recommended solutions

In most cases, the four following options are the four easiest solutions:

Option 1: OTi DALI 2 or 4 CH + BackLED® TW CP G5
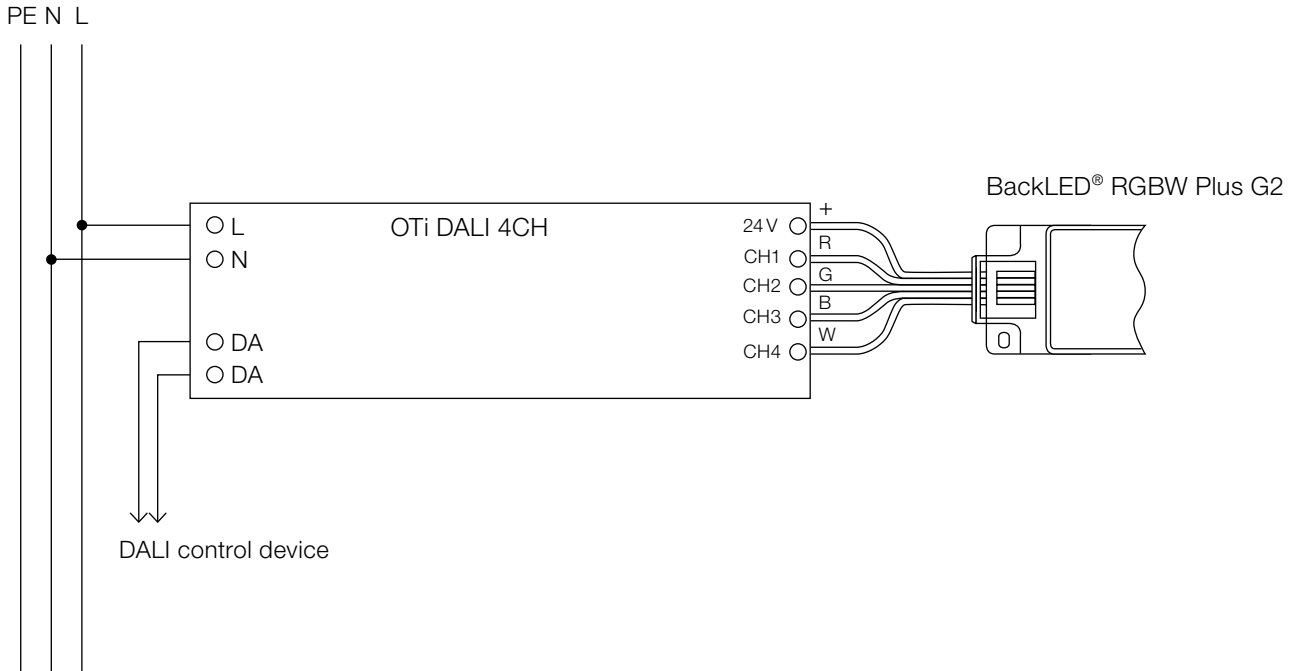**OTi DALI 2 or 4 CH + BackLED® AREA TW**

PE N L

OTi DALI 1-4CH

L
N

DA
DA

DALI control device

24 V   +
CH1   W (–)
CH2   C (–)
CH3
CH4

BackLED® TW CP G5

BackLED®
AREA TW
connections
on DALI TW
only

+
W (-)
C (-)

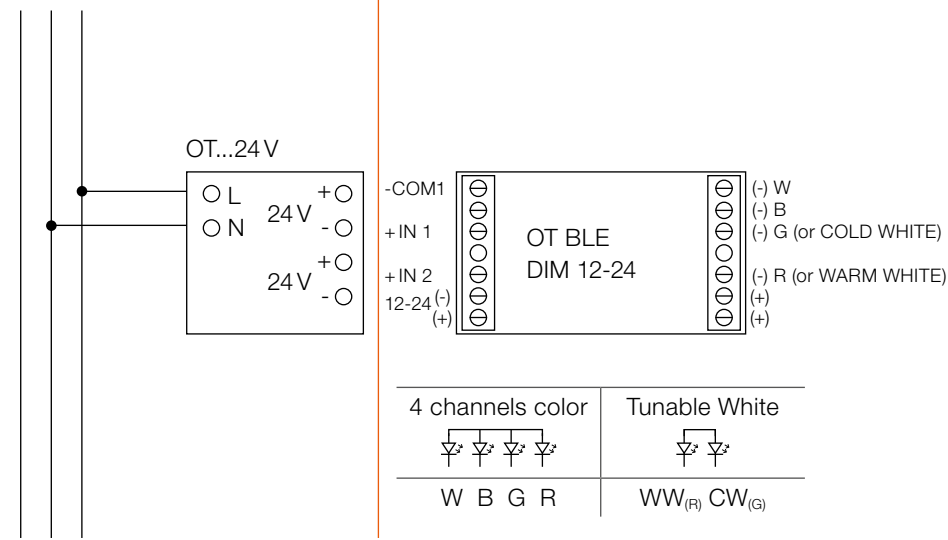| OTi DALI 1-4 CH configuration	DIP1
DALI Device Type 6 operation	ON
DALI Device Type 8 operation	OFF

Option 2: OTi DALI 4 CH + BackLED® RGBW Plus G2

DIP1	OTi DALI DIM 1-4CH D configuration	DIP2	DIP3
ON: DT6	1-channel device (1 DALI address): Channel 1	ON	ON
OFF: DT8 (when set, devices work only with two channels in TW mode)	2-channel device (2 DALI addresses): Split between channel 1 and 2	OFF	ON
	3-channel device (3 DALI addresses): Split between channel 1, 2 and 3	ON	OFF
	4-channel device (4 DALI addresses): Split between channel 1, 2, 3 and 4	OFF	OFF

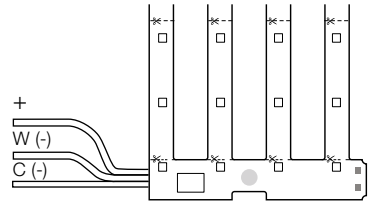**Option 3: OT...24 V + OTi DALI DIM 1-4CH D + BackLED® TW oder RGBW Plus G2 oder BackLED® AREA TW**
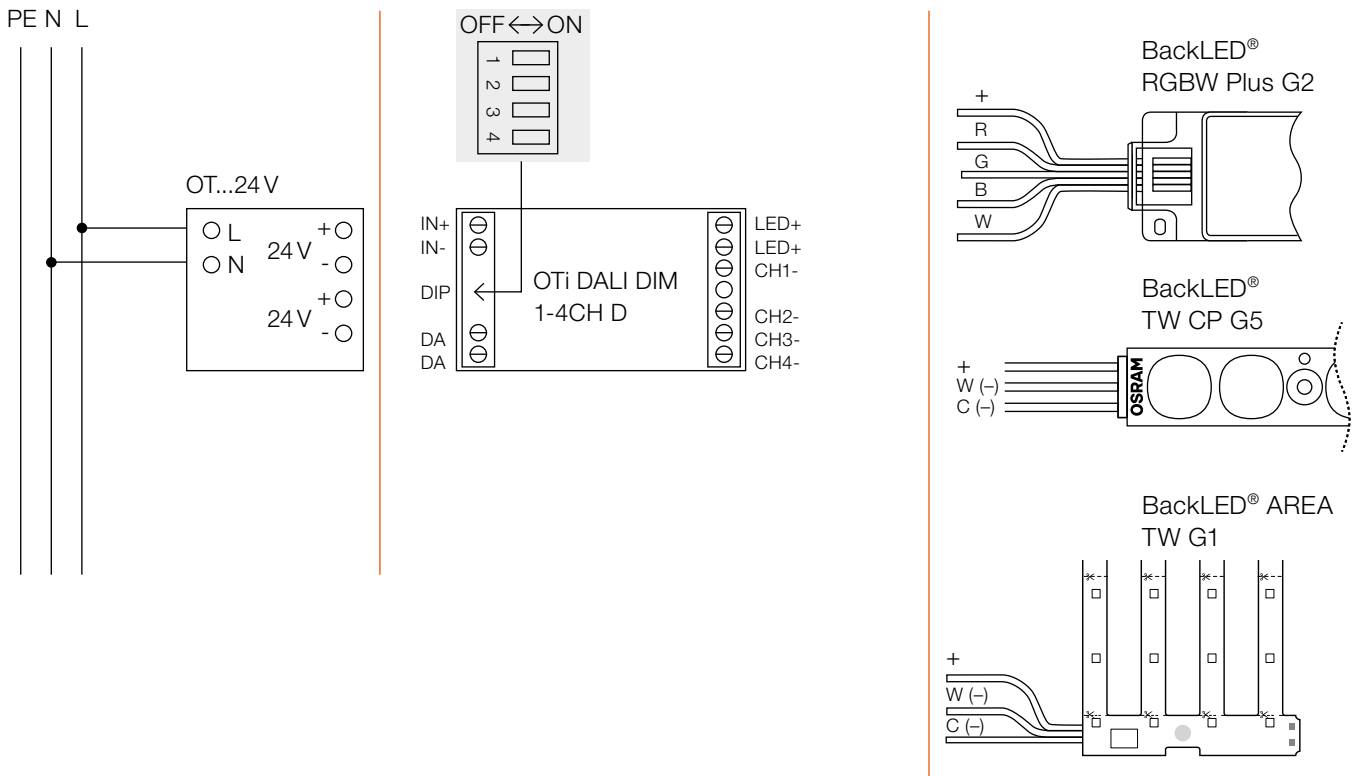
Option 4: OT...24 V + OT BLE DIM + BackLED® TW or RGBW Plus G2 or BackLED® AREA TW

PE N L

OT...24 V

L
N
24 V + ○ - ○
24 V + ○ - ○

-COM1
+ IN 1
+ IN 2
12-24 (-)
(+)

OT BLE
DIM 12-24

(-) W
(-) B
(-) G (or COLD WHITE)
(-) R (or WARM WHITE)
(+)
(+)

4 channels color	Tunable White
W B G R	WW(R) CW(G)

OTi BLE 80

Mains

PRI 220...240V~ Max 10A

OTi BLE 80

+ 24V (+)
– CH1 (-)
– CH2 (-)
– CH3 (-)
– CH4 (-)

Mains

BackLED®
RGBW Plus G2

+
R
G
B
W

BackLED®
TW CP G5

+
W (–)
C (–)
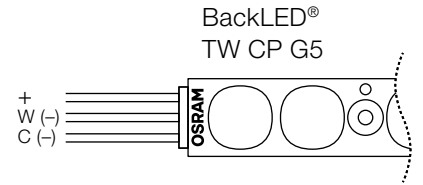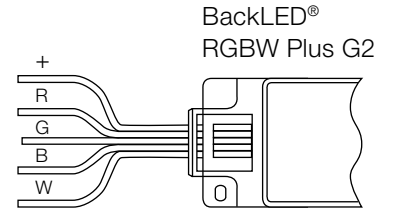
OSRAM

BLE DIM and OTi BLE 80

+
W (-)
C (-)

6 Application overviews for BackLED®

6.1 Perfect planning with the OSRAM LED deSIGNer
Find the best overall package with the OSRAM LED deSIGNer, easily and quickly, and even for very demanding lighting projects. Just enter some data, and this free software will automatically calculate the required amount of LED modules and LED drivers. Moreover, this tool provides the correct layout of the modules that ensures homogeneous illumination in the given application.

Start your planning now at
www.osram.com/led-designer
LED deSIGNer for "direct backlighting".

Further services:
— Luminance calculation for BackLED® products (BackLED TW, RGBW and BackLED AREA not available for layouting with LED deSIGNer)
— Selection of more than 100 acrylic glasses and more than 50 different PVC/woven fabrics
— Can be used to create sales quotes
— Automatically provides a system option with mounting profiles and matching power supplies

7 Application overview

BackLED G5 module application overview also available by looking at the product datasheet in the **download section** of each module version at: **www.osram.com/backlighting**.

BackLED G5 and G4 modules layouting calculations are available via the OSRAM web tool LED deSIGNer.

Product name	Box depth [mm]	Module pitch [mm] with translucent material:			Modules/m² with translucent material:		
Diffuser type		**Vinyl**	**Acrylic**	**Acrylic**	**Vinyl**	**Acrylic**	**Acrylic**
Target intensity		600 cd/m²	1000 cd/m²	1000 cd/m²	600 cd/m²	1000 cd/m²	1000 cd/m²
Translucency		**41 %**	**35 %**	**45 %**	**41 %**	**35 %**	**45 %**
BA-S-CP-8xx-G5	**80**	138	93	96	52	115	109
	130	129	88	87	61	130	133
	180	120	82	82	70	149	149

Product name	Box depth [mm]	Module pitch [mm] with translucent material:			Modules/m² with translucent material:		
Diffuser type		**Vinyl**	**Acrylic**	**Acrylic**	**Vinyl**	**Acrylic**	**Acrylic**
Target intensity		900 cd/m²	900 cd/m²	900 cd/m²	900 cd/m²	900 cd/m²	900 cd/m²
Translucency		**41%**	**35%**	**45%**	**41%**	**35%**	**45%**
BA-M-CP-8xx-G5	**80**	140	131	135	40	59	55
	130	148	123	127	46	67	63
	180	137	115	119	54	76	71

Product name	Box depth [mm]	Module pitch [mm] with translucent material:			Modules/m² with translucent material:		
Diffuser type		**Vinyl**	**Acrylic**	**Acrylic**	**Vinyl**	**Acrylic**	**Acrylic**
Target intensity		1200 cd/m²	1200 cd/m²	1200 cd/m²	1200 cd/m²	1200 cd/m²	1200 cd/m²
Translucency		**41%**	**35%**	**45%**	**41%**	**35%**	**45%**
BA-M-HO-CP-8xx-G5	**80**	169	139	144	36	52	49
	130	157	132	136	41	58	55
	180	146	123	126	47	67	63

Product name	Box depth [mm]	Module pitch [mm] with translucent material:			Modules/m² with translucent material:		
Diffuser type		**Vinyl**	**Acrylic**	**Acrylic**	**Vinyl**	**Acrylic**	**Acrylic**
Target intensity		900 cd/m²	600 cd/m²	1000 cd/m²	900 cd/m²	600 cd/m²	1000 cd/m²
Translucency		**41 %**	**35 %**	**45 %**	**41 %**	**35 %**	**45 %**
BA-L-CP-8xx-G5	**100**	189	197	158	28	26	41
	180	172	182	146	34	31	47
	260	155	169	134	42	36	56

Product name	Box depth [mm]	Module pitch [mm] with translucent material:			Modules/m² with translucent material:		
Diffuser type		**Vinyl**	**Acrylic**	**Acrylic**	**Vinyl**	**Acrylic**	**Acrylic**
Target intensity		900 cd/m²	900 cd/m²	900 cd/m²	900 cd/m²	900 cd/m²	900 cd/m²
Translucency		**41 %**	**35 %**	**45 %**	**41 %**	**35 %**	**45 %**
BA-XL-CP-8xx-G5	**100**	241	216	230	18	22	19
	180	206	196	211	24	27	23
	260	188	183	203	29	30	25

Product name	Box depth [mm]	Module pitch [mm] with translucent material:			Modules/m² with translucent material:		
Diffuser type		**Vinyl**	**Acrylic**	**Acrylic**	**Vinyl**	**Acrylic**	**Acrylic**
Target intensity		750 cd/m²	900 cd/m²	900 cd/m²	750 cd/m²	900 cd/m²	900 cd/m²
Translucency		**41%**	**35%**	**45%**	**41%**	**35%**	**45%**
BA-TW-CP-827.865-G5 (DT8)*	**100**	189	153	157	28	43	41
	180	163	141	148	38	51	46
	260	148	130	140	46	60	52

*) Data refer to BA-TW-CP-827.865-24-G5 under DT8 operation. In case of DT6 operation, data can vary.
Please contact the OSRAM DS support team for layout suggestions.

Suggestions based on high luminance requirements. This guideline is only an approximation. The actual luminance and uniformity results can deviate due to many different application parameters, e.g. including (but not limited to) reflections of inner box surfaces, overall box/letter dimensions, optical parameters of the light emitting surface, etc.

OSRAM suggests testing LED module performance in the project design phase in order to ensure brightness, uniformity and final color appearance.

Use the free online light planning tool at **https://www.osram.com/ds/tools/leddesigner.jsp** or contact the OSRAM signage support team or your sales representative. The LED deSIGNer online tool is constantly updated but recently launched LED modules may not be immediately available. The OSRAM professional team is available for final light planning suggestions. Contact us at support-ds@osram.com
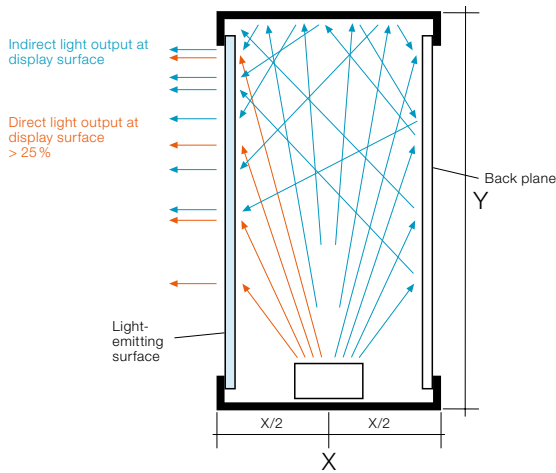
BackLED® RGBW Plus G2 homogeneity

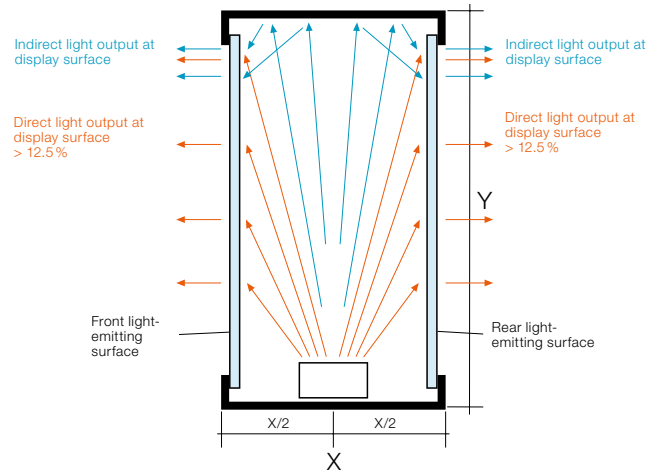| Transmission		T < 25 %		T < 40 %		T < 50 %	
		Luminance [cd/m²]	Minimum depth [mm]	Luminance [cd/m²]	Minimum depth [mm]	Luminance [cd/m²]	Minimum depth [mm]
~8.5 modules per m²	2700 K	≤ 280		≤ 420		≤ 355	
	6500 K	≤ 290	150	≤ 840	175	≤ 355	175
	Both	≤ 575		≤ 425		≤ 720	
~19 modules per m²	2700 K	≤ 675		≤ 1080		≤ 865	
	6500 K	≤ 690	125	≤ 1080	150	≤ 880	150
	Both	≤ 1355		≤ 2140		≤ 1760	

8 Application overviews for BoxLED®

8.1 Recommended dimensions for light boxes

BoxLED® modules provide uniform illumination thanks to a beneficial mix of direct and indirect light.

Direct and indirect light output of a single-sided light box

Indirect light output at display surface

Direct light output at display surface > 25 %

Back plane

Y

Light-emitting surface

X/2   X/2

X

Direct and indirect light output of a double-sided light box

Indirect light output at display surface

Indirect light output at display surface

Direct light output at display surface > 12.5 %

Direct light output at display surface > 12.5 %

Y

Front light-emitting surface

Rear light-emitting surface

X/2   X/2

X

For the illumination of light boxes, we recommend BoxLED® modules to be arranged in the center of the light box frame in order to achieve a uniform distribution of light. Placing the LED modules closer to the light-emitting surface increases the direct light output at such surfaces, possibly causing hot spots.

Note:
See recommended Y/X dimensions for each module in the following charts.

OSRAM's aim is to provide our customers with competitive products while respecting third parties' intellectual property rights. This also comprises efforts to provide our customers with the best possible protection against third parties' patent claims. All our products are carefully examined for interference with third parties' rights before we introduce them into the market. If products have a very limited scope of applications, these applications may be examined as well.

Recently, there have been uncertainties about some intellectual property rights held by third parties. Our BoxLED® products have been thoroughly examined and consequently judged to be not critical.

In particular, we have performed extensive technical investigations on this matter, which have led to the result that, according to OSRAM's interpretation, the use of our products in a rectangular parallelepiped according to our application guide would not fall under the scope of those rights. We are confident that this view will also prove true in a judicial review.

This text is neither a legal advice nor a legally binding statement about patent validity, patent claim interpretation, patent infringement or similar matters and we strongly recommend our customers to seek legal advice on these matters. The information contained herein is not for distribution, directly or indirectly, in or into the United States of America (including its territories and possessions of any state of the United States of America or the District of Columbia) and must not be distributed to U.S. persons (as defined in Regulation S of the U.S. Securities Act of 1933, as amended ("Securities Act")) or publications with a general circulation in the United States of America.

Direct and indirect light output of a single-sided light box

BoxLED® XS Plus G15

X \ Y	<300 mm	≥300 mm, ≤350 mm	≥350 mm, ≤750 mm	>750 mm
≤85 mm		■		
Min. 85 mm Max. 100 mm			■	
Min. 85 mm Max. 210 mm				■
>210 mm				

BoxLED® XS Plus G3

X \ Y	<300 mm	≥300 mm, ≤750 mm	>750 mm
≤100 mm		■	
Min. 100 mm Max. 225 mm			■
>225 mm			

BoxLED® ECO M Plus G3

X \ Y	<300 mm	≥300 mm, ≤430 mm	≥430 mm, ≤750 mm	>750 mm
≤70 mm		■		
Min. 70 mm Max. 100 mm			■	
Min. 100 mm Max. 175 mm				■
>175 mm				

BoxLED® M Plus G3

X \ Y	<200 mm	≥200 mm, ≤300 mm	≥300 mm, ≤750 mm	>750 mm
≤100 mm		■		
Min. 100 mm Max. 150 mm			■	
Min. 150 mm Max. 375 mm				■
>375 mm				

BoxLED® L Plus G15

X \ Y	<300 mm	≥300 mm, ≤340 mm	≥340 mm, ≤750 mm	>750 mm
≤85 mm		■		
Min. 85 mm Max. 100 mm			■	
Min. 100 mm Max. 220 mm				■
>220 mm				

BoxLED® L Plus G3

X \ Y	<300 mm	≥300 mm, ≤420 mm	≥420 mm, ≤750 mm	>750 mm
≤70 mm		■		
Min. 70 mm Max. 100 mm			■	
Min. 100 mm Max. 325 mm				■
>325 mm				

BoxLED® Indoor L Plus G1

X \ Y	<230 mm	≥230 mm, ≤300 mm	≥300 mm, ≤750 mm	>750 mm
≤100 mm		■		
Min. 100 mm Max. 130 mm			■	
Min. 130 mm Max. 325 mm				■
>325 mm				

Direct and indirect light output of a single-sided light box
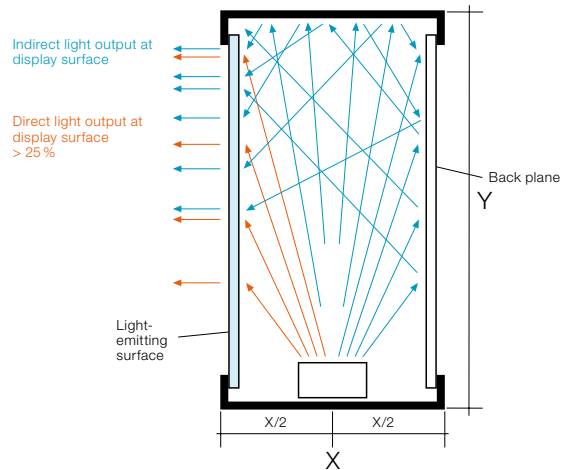
Indirect light output at display surface

Direct light output at display surface > 25 %

Back plane

Y

Light-emitting surface

X/2 X/2

X

Direct and indirect light output of a double-sided light box

BoxLED® XS Plus G15

X \ Y	<300 mm	≥300 mm, ≤330 mm	≥350 mm, ≤750 mm	>750 mm
≤90 mm		■		
Min. 90 mm Max. 100 mm			■	
Min. 100 mm Max. 210 mm				■
>210 mm				

BoxLED® XS Plus G3

X \ Y	<270 mm	≥270 mm, ≤300 mm	≥300 mm, ≤750 mm	>750 mm
≤100 mm		■		
Min. 100 mm Max 110 mm			■	
Min. 110 mm Max. 275 mm				■
>275 mm				

BoxLED® ECO M Plus G3

X \ Y	<300 mm	≥300 mm, ≤420 mm	≥420 mm, ≤750 mm	>750 mm
≤70 mm		■		
Min. 70 mm Max. 100 mm			■	
Min. 100 mm Max. 175 mm				■
>175 mm				

BoxLED® M Plus G3

X \ Y	<190 mm	≥190 mm, ≤300 mm	≥300 mm, ≤750 mm	>750 mm
≤100 mm		■		
Min. 100 mm Max. 160 mm			■	
Min. 160 mm Max. 390 mm				■
>390 mm				

BoxLED® L Plus G15

X \ Y	<300 mm	≥300 mm, ≤320 mm	≥320 mm, ≤750 mm	>750 mm
≤90 mm		■		
Min. 90 mm Max. 100 mm			■	
Min. 100 mm Max. 230 mm				■
>230 mm				

BoxLED® L Plus G3

X \ Y	<300 mm	≥300 mm, ≤400 mm	≥400 mm, ≤750 mm	>750 mm
≤75 mm		■		
Min. 75 mm Max. 100 mm			■	
Min. 100 mm Max. 185 mm				■
>185 mm				

BoxLED® Indoor L Plus G1

X \ Y	<210 mm	≥210 mm, ≤300 mm	≥300 mm, ≤750 mm	>750 mm
≤100 mm		■		
Min. 100 mm Max. 140 mm			■	
Min. 140 mm Max. 355 mm				■
>355 mm				

Direct and indirect light output of a double-sided light box

Indirect light output at display surface

Indirect light output at display surface

Direct light output at display surface > 12.5 %

Direct light output at display surface > 12.5 %

Y

Front light-emitting surface

Rear light-emitting surface

X/2   X/2

X
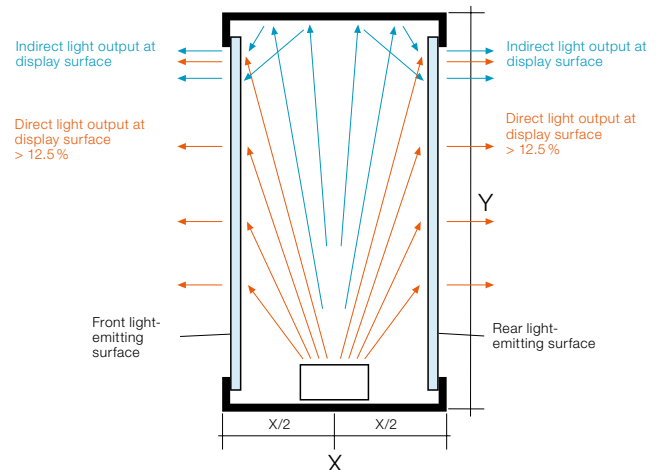
Dimming methods

OSRAM OPTOTRONIC® constant-voltage LED drivers and
dimmers offer a range of different dimming solutions:

— 1-10 V
— DALI
— Bluetooth
— DMX

Please visit www.osram.com/optotronic to learn more about
our product range or download the OPTOTRONIC® CV
application guide.

9 Thermal properties

9.1 Casing temperature at the T_c point

The casing temperature is the temperature at a defined point on the LED casing, the T_c point. The maximum T_c temperature is the highest permitted temperature that may occur at the T_c point under the planned ambient and operating conditions in the thermally steady state.

If the maximum permitted T_c temperature is exceeded, the LED module may go into a state in which the load limits on the module (LED, casing, chip, encapsulation materials) are reached. A thermal link between the modules and the mounting surface is not absolutely essential.

9.2 Measuring the T_c temperature

The indicated lifetime can only be achieved if the permitted operating temperatures at the T_c point are maintained. After the LED modules have been installed in a light box, the T_c temperature must be measured under the planned ambient and operating conditions in the thermally steady state. To do this, attach a temperature sensor to the T_c point with suitable adhesive (cyanoacrylate-free).

Thermo-wire NiCr–Ni

Mini connector "K"

Thermo element Type K with mini connector

9.2.1 Position of the T_c point

BackLED® S CP G5
BackLED® M CP G5
BackLED® M HO CP G5
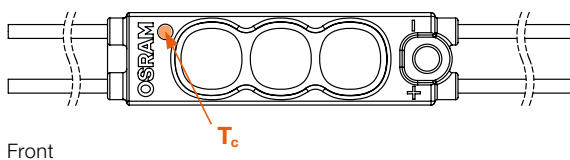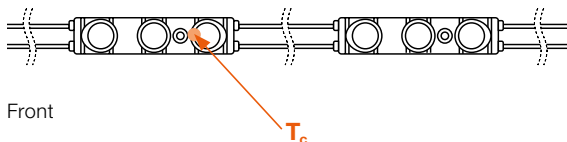
Front   S, M, M HO T_c

BackLED® XL CP G5

Front   XL T_c

BackLED® Mini M CP G4

Front T_c

BackLED® S Plus G15 COL

Front T_c

BackLED® L CX G4

Front T_c

BackLED® L CP G5

Front   L T_c

BackLED® Mini S CP G4

Front T_c

BackLED® XS Plus G4

Front T_c

BackLED® S CP G4
BackLED® M CP G4
BackLED® M HO CP G4

Front T_c

BackLED® DS Plus G3

One side only T_c

BoxLED® XS Plus G4

Front T_c

BoxLED® ECO M Plus G3

Side view T_c

BoxLED® M Plus G3

Front T_c

BoxLED® L Plus G15

Back T_c

BoxLED® L Plus G3

Front T_c

BoxLED® Indoor L Plus G1

Front T_c
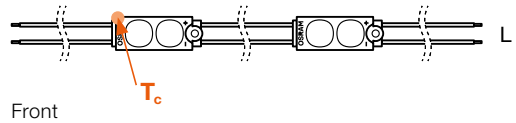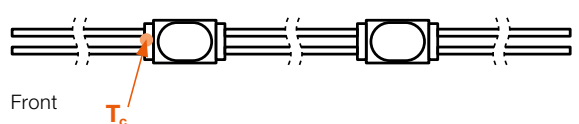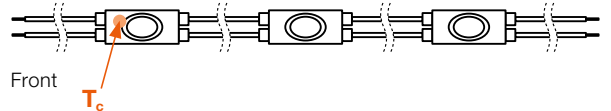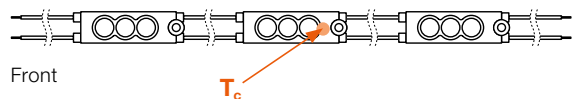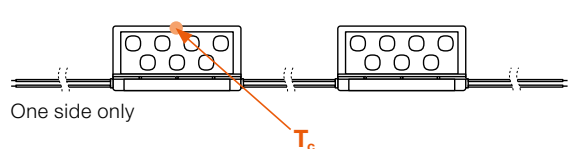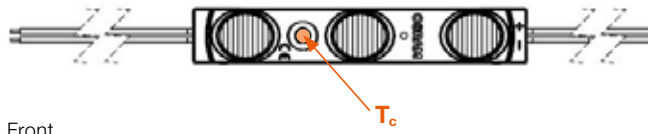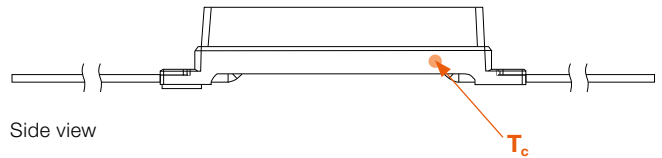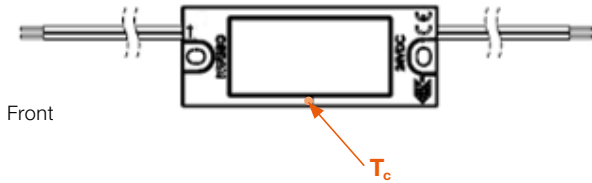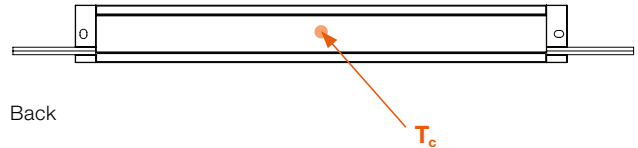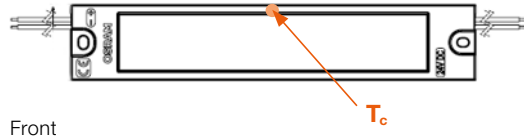
9.2.2 Permitted T_c temperatures

	Operating temperature at the T_c point* [°C]
BackLED S CP G5	-25 to 70
BackLED M CP G5	-25 to 70
BackLED M HO CP G5	-25 to 70
BackLED L CP G5	-25 to 70
BackLED XL CP G5	-25 to 70
BackLED Mini S CP G4	-25 to 80
BackLED Mini M CP G4	-25 to 80
BackLED XS Plus G4	-25 to 60
BackLED S Plus G15 COL	-25 to 65
BackLED S CP G4	-25 to 65
BackLED M CP G4	-30 to 70
BackLED M HO CP G4	-30 to 70
BackLED L CX G4	-25 to 75
BackLED DS Plus G3	-25 to 80
BoxLED XS Plus G3	-25 to 70
BoxLED ECO M Plus G3	-25 to 70
BoxLED M Plus G3	-25 to 85
BoxLED L Plus G15	-25 to 80
BoxLED L Plus G3	-25 to 65
BoxLED Indoor L Plus G1	-25 to 60

* If the maximum temperature limits are exceeded, the lifetime of the module will be greatly reduced or the module may be destroyed. The temperature of the LED module at the T_c point should be measured in the thermally steady state by means of a temperature sensor or temperature-sensitive sticker in accordance with EN 60598-1. For the precise position of the T_c point, see chapter 9.2.1.

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## Permitted T_c temperatures

	Operating temperature at the T_c point* [°C]
BackLED RGBW Plus G2	-25 to 75
BackLED TW CP G5	-25 to 75
BackLED AREA	-25 to 55

* If the maximum temperature limits are exceeded, the lifetime of the module will be greatly reduced or the module may be destroyed. The temperature of the LED module at the T_c point should be measured in the thermally steady state by means of a temperature sensor or temperature-sensitive sticker in accordance with EN 60598-1. For the precise position of the T_c point, see the illustration below.

BackLED® RGBW Plus G2

T_c point

BackLED® TW CP G5

T_c point
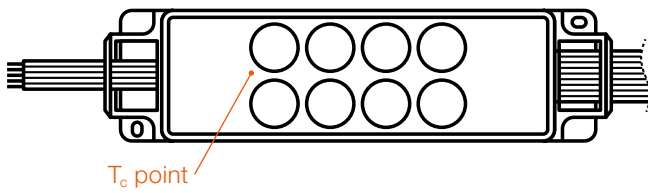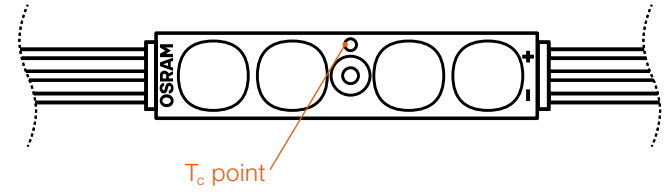
BackLED AREA
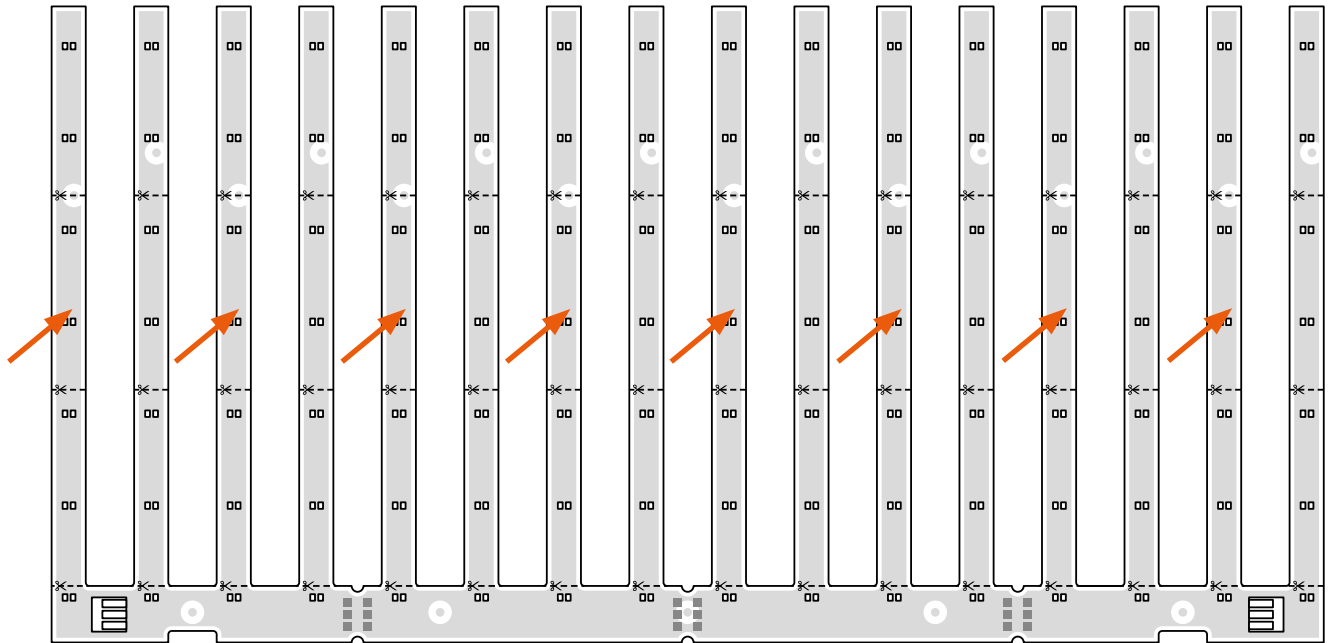
9.3 Mounting profiles and accessories

Mounting profile BX-MP
EAN 4008321981110

38
16
55
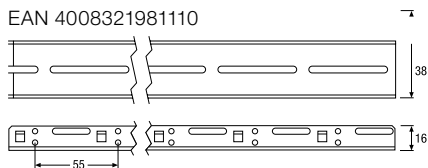
Total length: 2365 mm

Mounting profile BA-MP-SM-G5-2M
EAN 4052899629196

14,4
2000
8,1

BA-CLIP-SM-G5
EAN 4052899629349

5,7
15
16,2
Ø5
t: 0.4 mm

BA-MP-L-G5-2M
EAN 4052899629189

20
2000
8,9

BA-CLIP-L/XL-G5
EAN 4052899629325

11,9
16
23,8
Ø5
t: 0.4 mm

Mounting profile BA-MP
EAN 4052899745863

20
2000
8

Mounting profile BA-SM-MP
EAN 4052899264540

14,5
2000
8
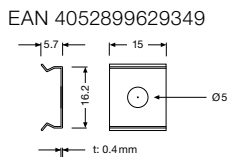
Mounting profile BA-MP-M-CP
EAN 4062172168410

16,3
2000
7

Total length: 2000 mm
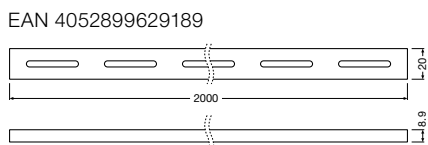
BackLED Area G1 Bars
EAN 4062172197168

568
15
3

Mounting system DS
EAN 4008321880307

13,3
13
2000

Total length: 2000 mm

BX-DS-MB
EAN 4008321872173

LEFT
RIGHT
56
56
39.5
17
17
39.5

All figures in mm

10 Norms and standards

10.1 BackLED® and BoxLED®

Eye security: IEC 62471

Flammability: IEC 60598-1

Protection class: EN 60529

Safety requirements: EN 62031, IEC 60598-1

EMC/radio disturbance characteristics: EN 55015

EMC/immunity: EN 61547

Approvals: CE
See product datasheets for third-party approvals

11 Further information

Product data sheets, technical guides, operating instructions, EULUMDATs and more information concerning the **BackLED®** and **BoxLED®** LED modules and **OPTOTRONIC®** devices are available at the OSRAM website shortcut www.osram.com/backlighting

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