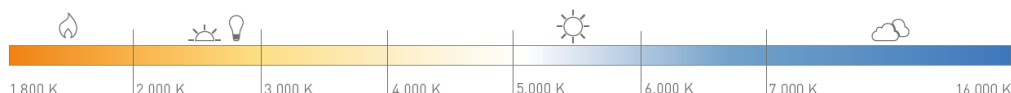




COB DOWNLIGHT SYSTEM - ZHAGA



Human Centric Lighting
makes the day light.



Tunable white
1,800K - 16,000K



Brightness dimmable
1% - 100%



RGB/CIE-xy adjustable
Colour points and sequences



Biorhythmic lighting
Vitalisation and recreation



2 Control modes
DALI DT8, ZigBee 3.0



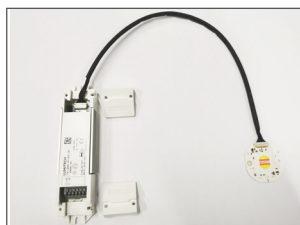
Excellent CRI
CRI > 90

*According to IEEE 1789-2015 (valid for all dimming levels, CCT and colour settings)



TECHNICAL DATA

	LTS-02322	LTS-03022	LTS-04022
Light source	COB LED Downlight Module		
Operation voltage	48V DC		
Typ. power	21.3W	28.0W	43.5W
Luminous flux	1,840lm	2,400lm	3,200lm
Control mode	ZigBee 3.0, DALI DT8		
Dimmable	1% - 100% Modular Dimming: no effects caused by flicker* / Camera-Ready*		
CCT and colour control	1,800 - 16,000K / adjustable CIE-xy-colours and RGB colours		
Ambient and storage temperature	+10°C ... +45°C / -20°C ... +80°C		
t _{c, max} LED Module / t _{c, max} LMU	+85°C / +85°C		
Lifetime	50,000h L80B10		
Further features	Low tolerance for colour temperature MacAdam 1 (typical/initial) Integrated overtemperature protection		



COB DOWNLIGHT SYSTEM - ZHAGA

■ ORDERING DATA AND TECHNICAL DATA - PI-LED COB DOWNLIGHT SYSTEM

Type	Description	Control mode	Lum. flux [lm]	Useful lum. flux [lm]	typ. / max. power [W]	EE class
LTS-02322-15-COB	PI-LED Spot 2300LM+Cover+Cap / DALI DT8 / COB-LES14,5 / 21W / 400mm	DALI DT8	1,840	2,300	21.3 / 27.0	E
LTS-02322-16-COB	PI-LED Spot 2300LM+Cover+Cap / ZigBee 3.0 / COB-LES14,5 / 21W / 400mm	ZigBee 3.0	1,840	2,300	21.3 / 27.0	E
LTS-03022-15-COB	PI-LED Spot 3000LM+Cover+Cap / DALI DT8 / COB-LES14,5 / 28W / 400mm	DALI DT8	2,400	3,000	28.0 / 35.0	E
LTS-03022-16-COB	PI-LED Spot 3000LM+Cover+Cap / ZigBee 3.0 / COB-LES14,5 / 28W / 400mm	ZigBee 3.0	2,400	3,000	28.0 / 35.0	E
LTS-04022-15-COB	PI-LED Spot 4000LM+Cover+Cap / DALI DT8 / COB-LES14,5 / 43W / 400mm	DALI DT8	3,200	4,000	43.5 / 50.0	E
LTS-04022-16-COB	PI-LED Spot 4000LM+Cover+Cap / ZigBee 3.0 / COB-LES14,5 / 43W / 400mm	ZigBee 3.0	3,200	4,000	43.5 / 50.0	E

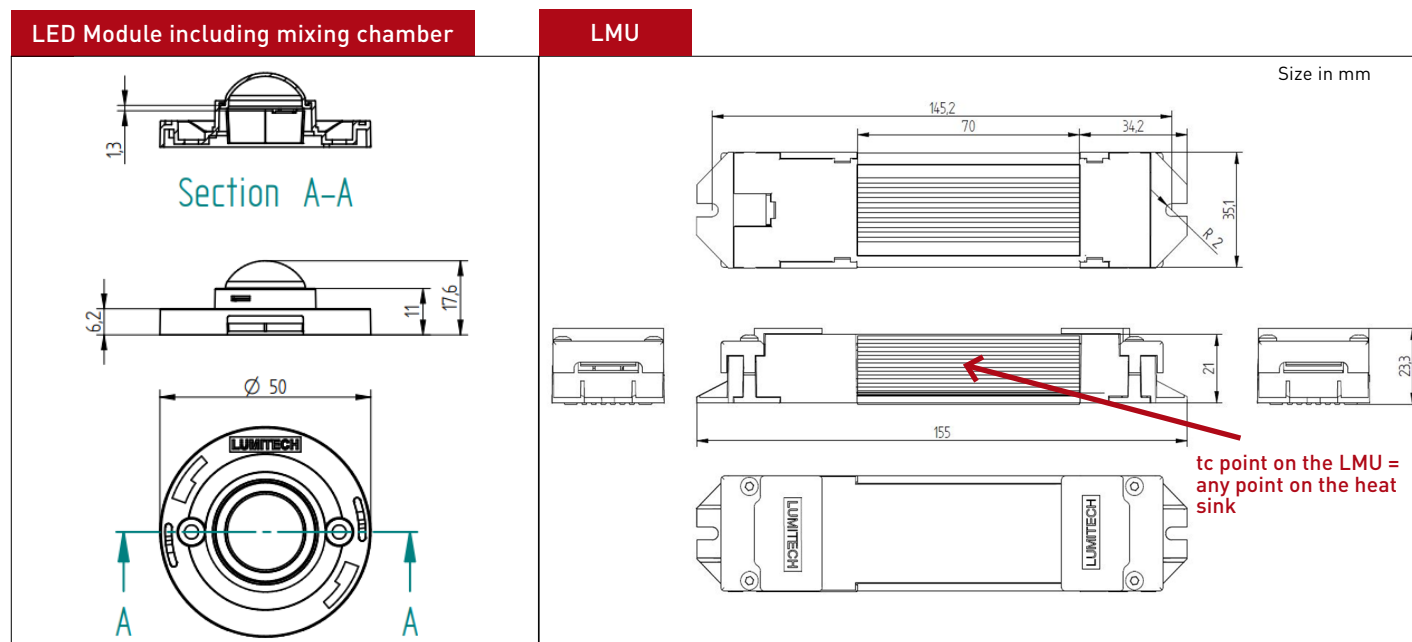
Notes - valid for all articles:

- Operation voltage: 48V DC
- Length of cable between PI-LED LMU and LED Module: 400mm
- EE class: energy efficiency class according to EU regulation 2019/2020 - ecodesign requirements for light sources and separate control gears

■ TECHNICAL DRAWINGS AND DATA - LED MODULE AND LMU

LED Module data

L/W [mm]	Design type	Light field diameter LES [mm]
44 x 46.5	Zhaga	14.5



■ NOTES ON STANDARDS AND SECURITY POLICIES

EOS/ESD security police	The PI-LED COB DOWNLIGHT SYSTEM contains components that are sensitive to electrostatic discharge. It may only be installed if appropriate EOS/ESD protection in manufacturing and in application is applied.
CE - marking of the luminaire	The PI-LED COB DOWNLIGHT SYSTEM is tested according to the applicable standards (see Standards). Corresponding standard tests of the final product must be carried out separately.
Fulfilled standards	EN62031 EN62471 EN61347-2-13 ETSI EN 300 328 V2.1.1 EN 301 489-3 IEEE 1789-2015

Notes:

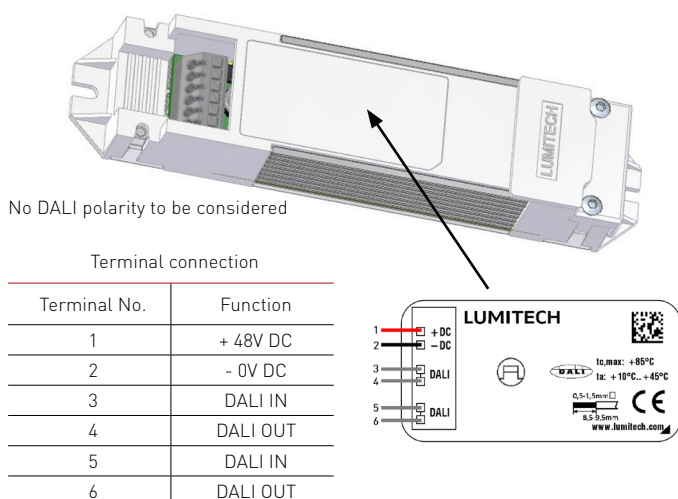
- All values apply at ta=25°C, tc = 65°C and at 4,000K | illumination specifications in accordance with CIE1931
- Tolerance ranges: illumination data +/-15% | electrical data +/-15% | supply voltage 48V DC +/- 5%
- If the supply voltage exceeds the max. permitted operating voltage, the PI-LED system will be overstressed. This will result in a highly reduced service life.
- If the maximum temperature limits are exceeded, the lifetime of the PI-LED system will be greatly reduced or the system may be damaged. Temperature measurements of the LED module or PI-LED system have to be taken in the thermally stable state by means of a temperature sensor as per EN60598-1.
- The maximum system power of the PI-LED COB DOWNLIGHT SYSTEM is limited to the corresponding values [refer to max. power] due to its software.
- According to colour temperature and temperature of the PI-LED system, the Mac Adam tolerance takes on values < 4.
- All diagrams shown in this document show typical curves and not the exact behaviour of single LED modules.

COB DOWNLIGHT SYSTEM - ZHAGA

ACCESSORIES: RECOMMENDED LED DRIVERS

PI-LED system data			LED drivers	
Type	typ. power [W]	max. power [W]	LTP-1067 60W 48V IP20 LT 123x80x22,5mm 	LTP-1066 42W 48V 95x70x32mm 
LTS-02322-1x-COB	21.3	27.0	reommended	reommended
LTS-03022-1x-COB	28.0	35.0	reommended	reommended
LTS-04022-1x-COB	43.5	50.0	reommended	

CONNECTION - DALI DT8



*PI-LED systems with DALI interface are DALI1 / DALI Device Type 8 registered where colour control with regard to DALI Device Type 8 is fully implemented according to the underlying DALI standard. Since there is currently no possibility for testing products for compliance with the DALI Device Type 8 standard (no official DALI tester existing or available), a formal verification can not be provided.

"The DALI colour control functionality (part 209/Device Type 8) of this product has not been verified."

FUNCTIONAL DESCRIPTION - DALI DT8*

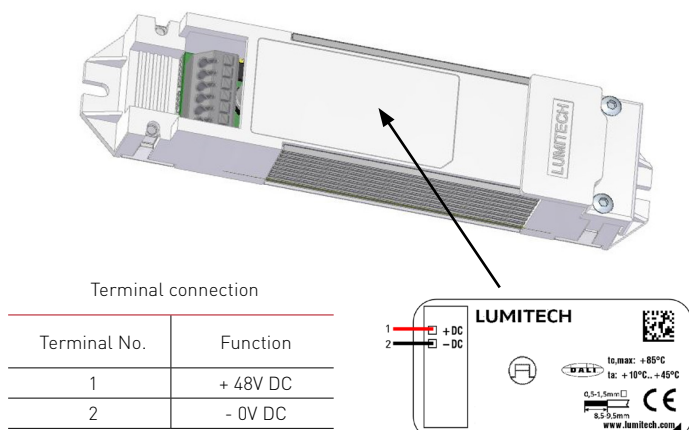
Mode	CCT	RGB	CIE
Colour	1,800K-16,000K	Channels separately controllable	PI-LED colour space
Brightness	1% - 100%		

Information:

Colour accuracy in the colour mode is given only for CIE-xy points.

Possible assignment to a maximum of 16 groups and 16 light scenes

CONNECTION - ZIGBEE 3.0



FUNCTIONAL DESCRIPTION - ZIGBEE 3.0

Mode	CCT	RGB	CIE
Colour	1,800K-16,000K	Channels separately controllable	PI-LED colour space
Brightness	1% - 100%		

Information:

Colour accuracy in the colour mode is given only for CIE-xy points.

Possible assignment to groups and light scenes depending on control unit

Possible control units:

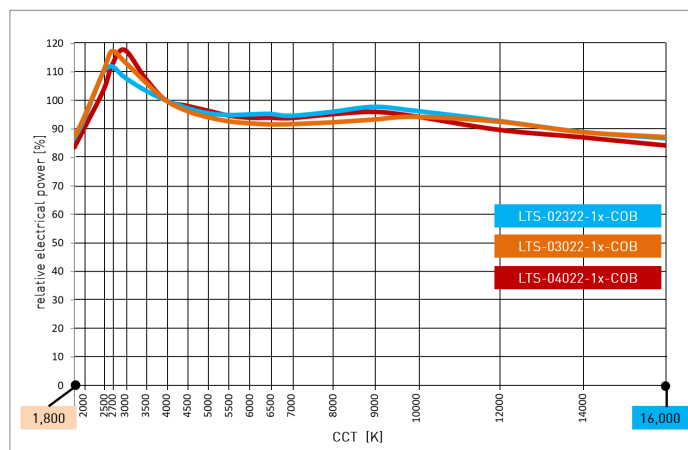
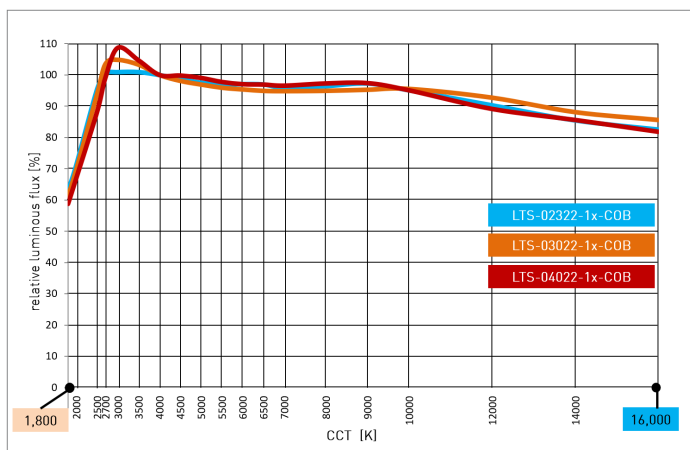
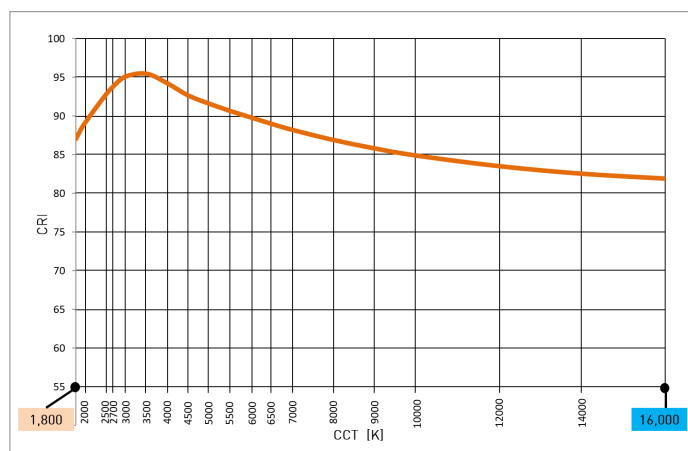
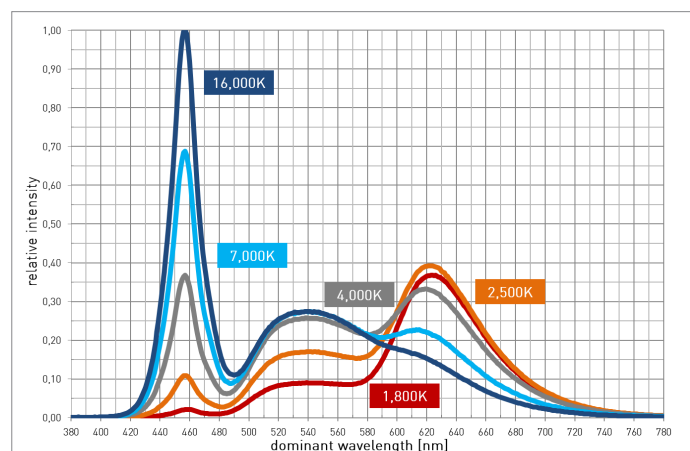
- LTP-1026 (NeoLink Box) together with the myPI-LED App for Android/iOS
- K-ZWALLY-x.2

Information:

Depending on the assembly situation of the LMU, the range of the ZigBee module can vary.
Mounting the LMU inside of a sealed metal case can dramatically reduce the ZigBee range!

COB DOWNLIGHT SYSTEM - ZHAGA

PHOTOMETRICAL PROPERTIES / VISUAL DATA AND DATA FOR MELANOPIC LIGHT DESIGN



CCT [K]	general data				visual data	melanopic values (relevant for melanopic light design)			
	CRI	Ra9	CIE-x	CIE-y	Lum. flux [lm]	alpha [smel]	alpha [smel] x correction factor 1.103	Lum. flux [smel, d65] in %	Efficiency [smel, d65] in lm/W
1800	87.1	64.6	0.5492	0.4082	1158 / 63%	0.237	0.262	16	16
2000	89.0	74.5	0.5268	0.4133	1312 / 71%	0.277	0.306	22	20
2500	92.6	85.2	0.477	0.4137	1758 / 96%	0.372	0.410	39	31
2700	93.8	86.3	0.4599	0.4106	1848 / 100%	0.407	0.449	45	35
3000	95.1	86.8	0.4369	0.4041	1857 / 101%	0.458	0.505	51	41
3500	95.5	85.3	0.4053	0.3907	1857 / 101%	0.536	0.591	60	50
4000	94.3	81.9	0.3804	0.3767	1840 / 100%	0.607	0.669	67	58
4500	92.7	77.9	0.3608	0.3635	1817 / 99%	0.670	0.739	73	65
5000	91.7	72.9	0.3451	0.3516	1794 / 98%	0.727	0.802	78	71
5500	90.7	71.6	0.3324	0.341	1785 / 97%	0.779	0.859	83	76
6000	89.9	69.8	0.3221	0.3318	1787 / 97%	0.824	0.909	88	80
6500	89.0	68.1	0.3135	0.3236	1785 / 97%	0.865	0.954	93	84
7000	88.3	66.3	0.3064	0.3165	1765 / 96%	0.901	0.994	95	87
8000	86.9	62.8	0.2952	0.3048	1775 / 96%	0.964	1.063	103	92
9000	85.8	59.9	0.2869	0.2956	1790 / 97%	1.015	1.120	109	96
10000	84.9	57.3	0.2806	0.2883	1750 / 95%	1.057	1.166	111	99
12000	83.6	53.3	0.2718	0.2776	1662 / 90%	1.122	1.238	112	104
14000	82.6	50.5	0.2659	0.2702	1573 / 85%	1.169	1.290	110	107
16000	82.0	49.6	0.2618	0.2648	1519 / 83%	1.205	1.329	110	109

LTS-02322-1x-COB
Data at T_c = 65°C

COB DOWNLIGHT SYSTEM - ZHAGA

CCT [K]	general data				visual data	melanopic values (relevant for melanopic light design)			
	CRI	Ra9	CIE-x	CIE-y	Lum. flux [lm]	alpha [smel]	alpha [smel] x correction factor 1.103	Lum. flux [smel, d65] in %	Efficiency [smel, d65] in lm/W
1800	87.1	64.6	0.5492	0.4082	1472 / 61%	0.237	0.262	16	16
2000	89.0	74.5	0.5268	0.4133	1677 / 70%	0.277	0.306	21	20
2500	92.6	85.2	0.477	0.4137	2255 / 94%	0.372	0.410	39	30
2700	93.8	86.3	0.4599	0.4106	2485 / 104%	0.407	0.449	46	34
3000	95.1	86.8	0.4369	0.4041	2516 / 105%	0.458	0.505	53	40
3500	95.5	85.3	0.4053	0.3907	2479 / 103%	0.536	0.591	61	49
4000	94.3	81.9	0.3804	0.3767	2400 / 100%	0.607	0.669	67	57
4500	92.7	77.9	0.3608	0.3635	2355 / 98%	0.670	0.739	73	65
5000	91.7	72.9	0.3451	0.3516	2327 / 97%	0.727	0.802	78	71
5500	90.7	71.6	0.3324	0.341	2302 / 96%	0.779	0.859	82	76
6000	89.9	69.8	0.3221	0.3318	2289 / 95%	0.824	0.909	87	81
6500	89.0	68.1	0.3135	0.3236	2278 / 95%	0.865	0.954	91	85
7000	88.3	66.3	0.3064	0.3165	2276 / 95%	0.901	0.994	94	88
8000	86.9	62.8	0.2952	0.3048	2279 / 95%	0.964	1.063	101	94
9000	85.8	59.9	0.2869	0.2956	2287 / 95%	1.015	1.120	107	98
10000	84.9	57.3	0.2806	0.2883	2293 / 96%	1.057	1.166	111	101
12000	83.6	53.3	0.2718	0.2776	2226 / 93%	1.122	1.238	115	106
14000	82.6	50.5	0.2659	0.2702	2115 / 88%	1.169	1.290	114	110
16000	82.0	49.6	0.2618	0.2648	2055 / 86%	1.205	1.329	114	112

LTS-03022-1x-COB
Data at Tc = 65°C

CCT [K]	general data				visual data	melanopic values (relevant for melanopic light design)			
	CRI	Ra9	CIE-x	CIE-y	Lum. flux [lm]	alpha [smel]	alpha [smel] x correction factor 1.103	Lum. flux [smel, d65] in %	Efficiency [smel, d65] in lm/W
1800	87.1	64.6	0.5492	0.4082	1879 / 59%	0.237	0.262	15	14
2000	89.0	74.5	0.5268	0.4133	2146 / 67%	0.277	0.306	21	17
2500	92.6	85.2	0.477	0.4137	2826 / 88%	0.372	0.410	36	26
2700	93.8	86.3	0.4599	0.4106	3175 / 99%	0.407	0.449	45	29
3000	95.1	86.8	0.4369	0.4041	3480 / 109%	0.458	0.505	55	34
3500	95.5	85.3	0.4053	0.3907	3349 / 105%	0.536	0.591	62	42
4000	94.3	81.9	0.3804	0.3767	3200 / 100%	0.607	0.669	67	49
4500	92.7	77.9	0.3608	0.3635	3195 / 100%	0.670	0.739	74	55
5000	91.7	72.9	0.3451	0.3516	3171 / 99%	0.727	0.802	79	61
5500	90.7	71.6	0.3324	0.341	3129 / 98%	0.779	0.859	84	65
6000	89.9	69.8	0.3221	0.3318	3106 / 97%	0.824	0.909	88	69
6500	89.0	68.1	0.3135	0.3236	3102 / 97%	0.865	0.954	92	72
7000	88.3	66.3	0.3064	0.3165	3091 / 97%	0.901	0.994	96	75
8000	86.9	62.8	0.2952	0.3048	3114 / 97%	0.964	1.063	103	80
9000	85.8	59.9	0.2869	0.2956	3117 / 97%	1.015	1.120	109	84
10000	84.9	57.3	0.2806	0.2883	3044 / 95%	1.057	1.166	111	86
12000	83.6	53.3	0.2718	0.2776	2852 / 89%	1.122	1.238	110	91
14000	82.6	50.5	0.2659	0.2702	2739 / 86%	1.169	1.290	110	93
16000	82.0	49.6	0.2618	0.2648	2618 / 82%	1.205	1.329	109	95

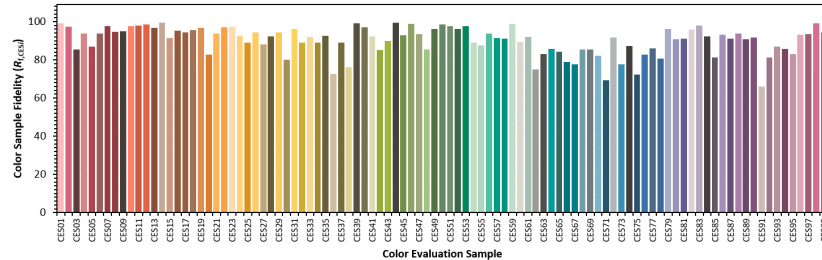
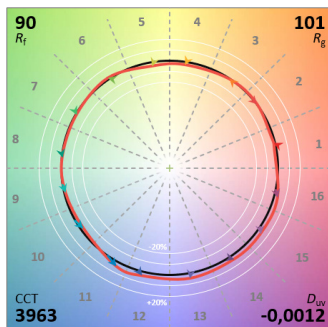
LTS-04022-1x-COB
Data at Tc = 65°C

Remark:

The coefficient alpha[smel] describes the melanopic effectiveness of the light source on humans and their circadian rhythm. To give the natural human biorhythm the best possible support, the melatonin production can be minimized by higher values of alpha[smel] throughout the day and stimulated by lower values in the evening. PI-LED enables the implementation of an illumination that is not only visual but also biological/melanopic effective. For a standard-conforming lighting design, Lumitech recommends the document DIN SPEC 5031-100 to be taken as a basis.

COB DOWNLIGHT SYSTEM - ZHAGA

IES TM-30

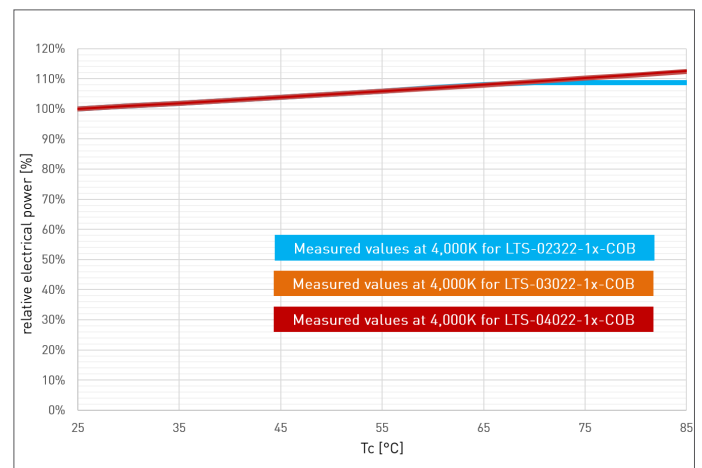
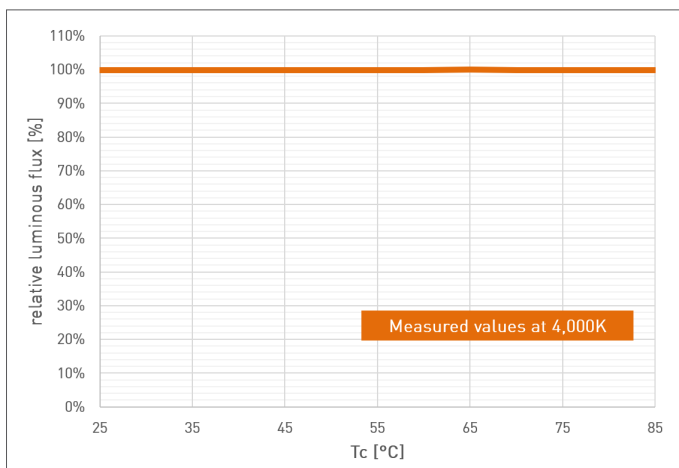


THERMAL CHARACTERISTICS

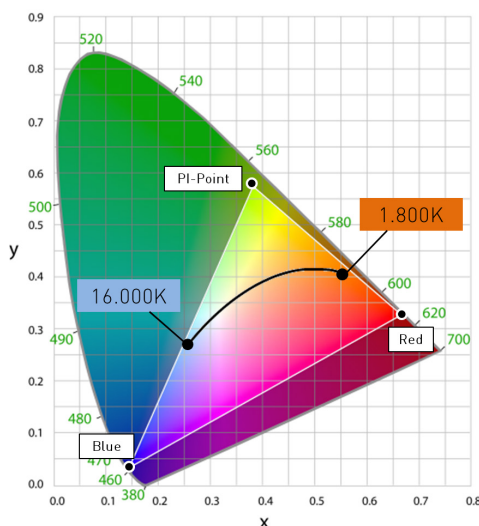
Ambient temperature	+10°C ... +45°C
Storage temperature	-20°C... +80°C
t _{c, max} LED Module	+85°C
t _{c, max} LMU	+85°C

Lumitech PI-LED COB DOWNLIGHT systems are equipped with integrated overtemperature protection that protects the LED module against thermal overloads.

If the temperature t_c at the LED module reaches 85°C, power is reduced by lowering the brightness. If the temperature remains at that level or reaches 90°C, the LED is totally switched off. The LED module is switched on again when the temperature t_c drops to below 65°C again.



COORDINATES AND TOLERANCES ACCORDING TO CIE 1931



Representable PI-LED colour space in the CIE 1931 system

If a colour point outside of the triangle (PI-LED colour space) is set, the closest colour point within the triangle is referenced.

The corner "Red" means Phosphor Converter Red LEDs.

LIFETIME LED MODULES

tp [°C]	L80B10 [h]
85°C	50,000

Notes:

- Value L is a statistical value, the actual drop in the luminous flux can vary across the delivered LED modules.
- tp-position = tc-position LED Module