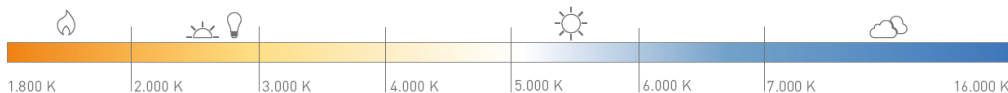




COB DOWNLIGHT SYSTEM - ZHAGA



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

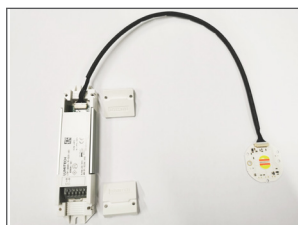


Excellent CRI
CRI > 90

*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	20.0W	28.0W	37.0W
Luminous flux	1,840lm	2,400lm	3,200lm
Control mode	ZigBee 3.0, DALI DT8		
Dimmable	1% - 100%		
CCT and colour control	Modular Dimming: no effects caused by flicker* / Camera-Ready*		
Ambient and storage temperature	1,800 - 16,000K / adjustable CIE-xy-colours and RGB colours		
$t_{c,max}$ LED Module / $t_{c,max}$ LMU	+10°C ... +45°C / -20°C ... +80°C		
Lifetime	+85°C / +85°C		
Further features	50,000h L80B10		
	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-COB2	PI-LED Spot 2300LM+Cover+Cap / DALI DT8 / COB-LES14,5 / 20W / 400mm	DALI DT8	1,840	2,300	20.0 / 22.0	E / E
LTS-02322-16-COB2	PI-LED Spot 2300LM+Cover+Cap / ZigBee 3.0 / COB-LES14,5 / 20W / 400mm	ZigBee 3.0	1,840	2,300	20.0 / 22.0	E / E
LTS-03022-15-COB2	PI-LED Spot 3000LM+Cover+Cap / DALI DT8 / COB-LES14,5 / 28W / 400mm	DALI DT8	2,400	3,000	28.0 / 31.0	E / E
LTS-03022-16-COB2	PI-LED Spot 3000LM+Cover+Cap / ZigBee 3.0 / COB-LES14,5 / 28W / 400mm	ZigBee 3.0	2,400	3,000	28.0 / 31.0	E / E
LTS-04022-15-COB2	PI-LED Spot 4000LM+Cover+Cap / DALI DT8 / COB-LES14,5 / 37W / 400mm	DALI DT8	3,200	4,000	37.0 / 40.7	E / E
LTS-04022-16-COB2	PI-LED Spot 4000LM+Cover+Cap / ZigBee 3.0 / COB-LES14,5 / 37W / 400mm	ZigBee 3.0	3,200	4,000	37.0 / 40.7	E / E

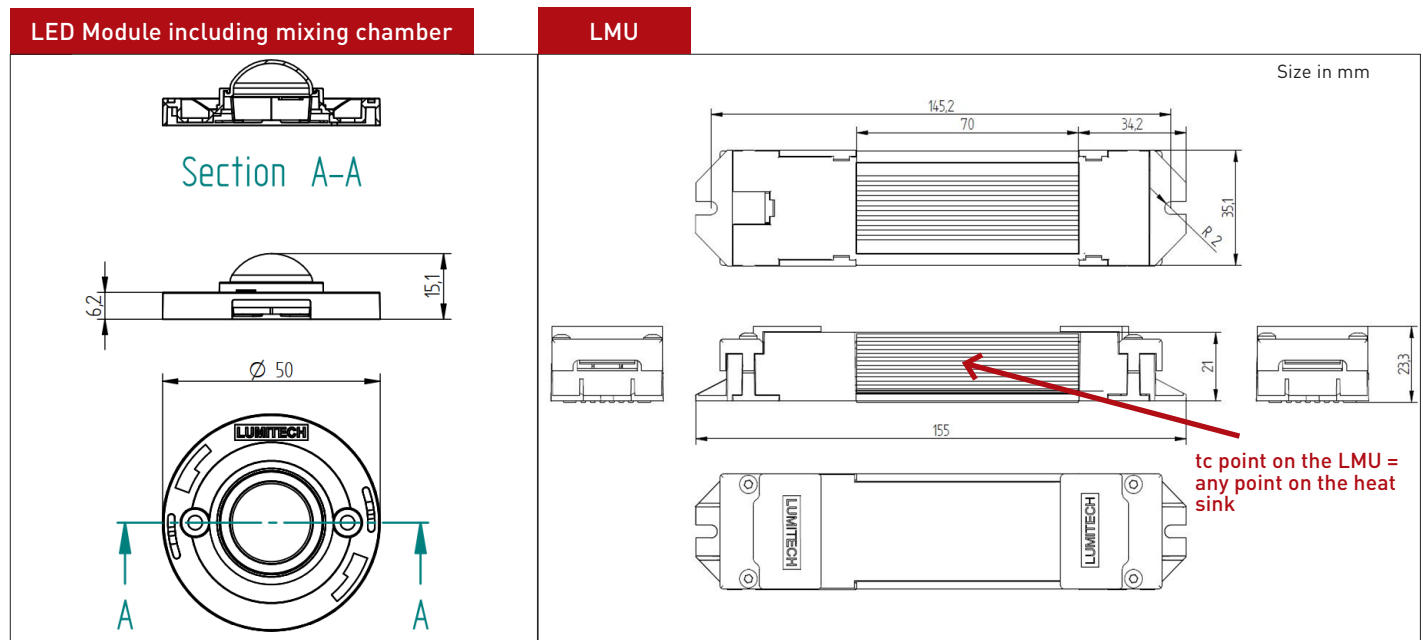
Notes - valid for all articles:

- 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. (2 entries in each row, according to the version of the PI-LED LMU belonging to the system article)

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:

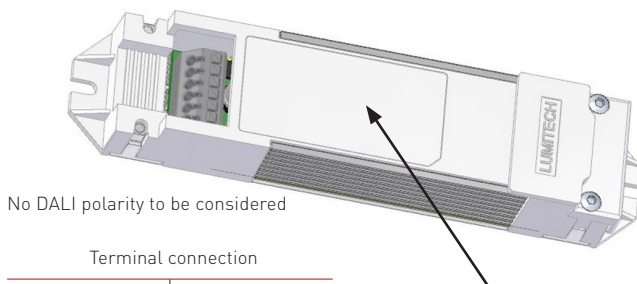
- All values apply at $t_a=25^{\circ}\text{C}$, $t_c = 65^{\circ}\text{C}$ and at 4,000K | illumination specifications in accordance with CIE1931
- Tolerance ranges: illumination data +/-15% | electrical data +/-15% | supply voltage 48V DC +/- 5%
- If the supply voltage exceeds the max. permitted operating 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-COB2	20	22		
LTS-03022-1x-COB2	28	31	reommended	reommended
LTS-04022-1x-COB2	37	41	reommended	

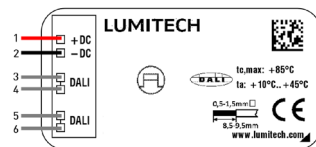
CONNECTION - DALI DT8



No DALI polarity to be considered

Terminal connection

Terminal No.	Function
1	+ 48V DC
2	- 0V DC
3	DALI IN
4	DALI OUT
5	DALI IN
6	DALI OUT



FUNCTIONAL DESCRIPTION - DALI DT8*

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

Information:

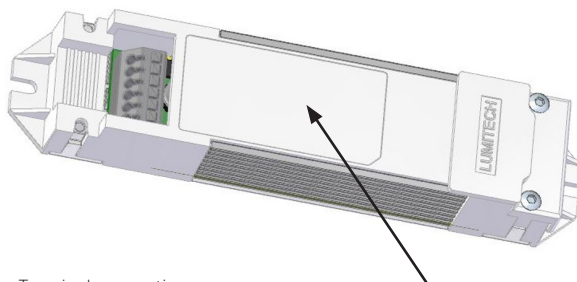
Colour accuracy in the colour mode is given only for CIE-xy points.

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

*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.

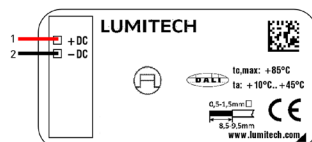
"The DALI colour control functionality [part 209/Device Type 8] of this product has not been verified."

CONNECTION - ZIGBEE 3.0



Terminal connection

Terminal No.	Function
1	+ 48V DC
2	- 0V DC



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:

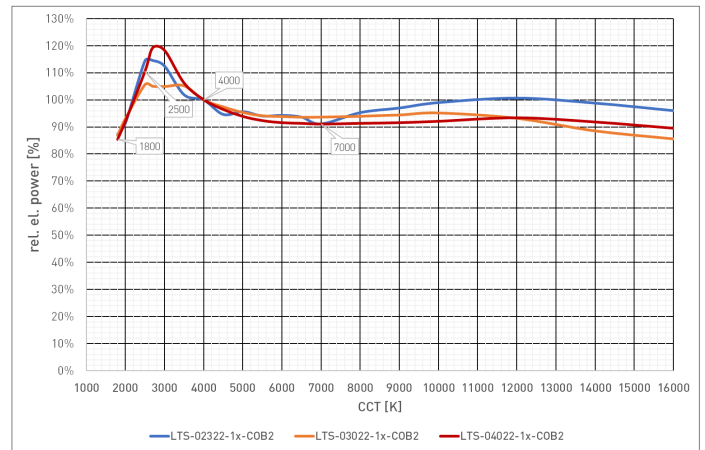
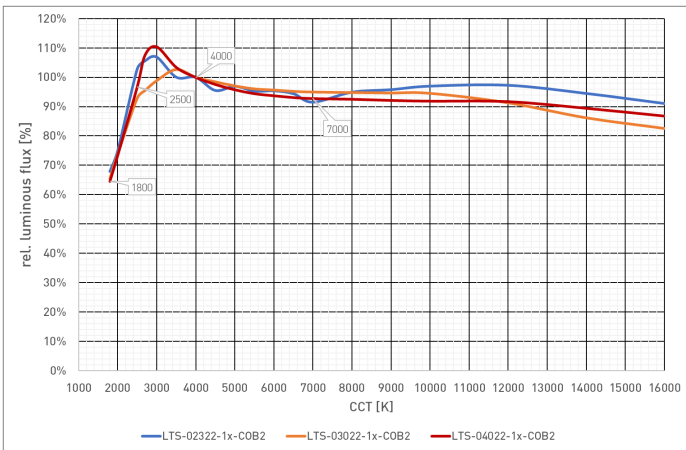
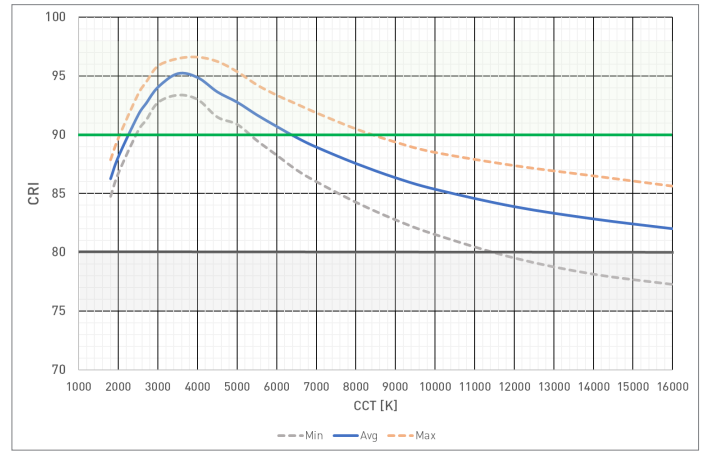
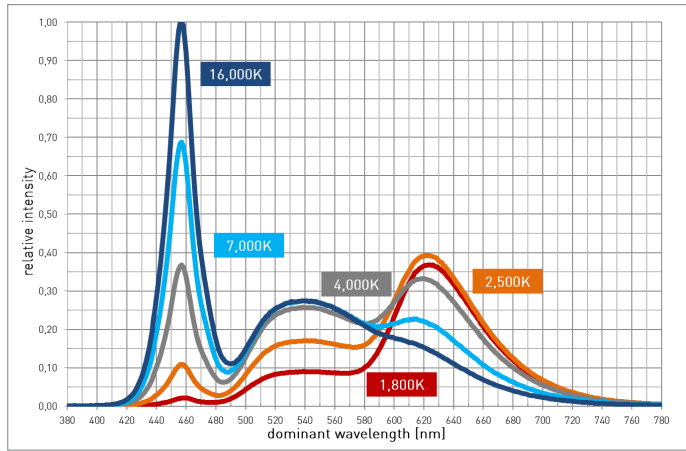
- LTP-1026 (NeoLink Box) together with the myPI-LED App for Android/iOS
- K-ZWALLY-x.2

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	85,2	60,0	0.5492	0.4082	1249	68%	0,250	0,275	19	20
2000	87,3	71,5	0.5268	0.4133	1378	75%	0,291	0,321	24	24
2500	91,3	85,3	0.477	0.4137	1893	103%	0,387	0,427	44	35
2700	92,4	86,8	0.4599	0.4106	1943	106%	0,423	0,467	49	40
3000	93,9	88,0	0.4369	0.4041	1967	107%	0,475	0,523	56	46
3500	95,4	88,3	0.4053	0.3907	1841	100%	0,553	0,610	61	55
4000	95,4	86,8	0.3804	0.3767	1840	100%	0,624	0,688	69	63
4500	94,5	83,7	0.3608	0.3635	1758	96%	0,687	0,757	72	70
5000	93,8	79,8	0.3451	0.3516	1784	97%	0,743	0,819	79	76
5500	93,0	79,0	0.3324	0.341	1754	95%	0,793	0,875	83	82
6000	92,0	78,2	0.3221	0.3318	1755	95%	0,838	0,924	88	86
6500	91,2	76,8	0.3135	0.3236	1738	94%	0,878	0,969	91	90
7000	90,4	75,7	0.3064	0.3165	1684	92%	0,915	1,009	92	93
8000	89,1	72,8	0.2952	0.3048	1747	95%	0,976	1,077	102	99
9000	88,0	70,0	0.2869	0.2956	1763	96%	1,027	1,132	108	103
10000	87,0	68,0	0.2806	0.2883	1785	97%	1,068	1,178	114	106
12000	85,6	64,5	0.2718	0.2776	1790	97%	1,132	1,248	121	111
14000	84,6	62,0	0.2659	0.2702	1739	95%	1,178	1,299	123	114
16000	83,9	60,2	0.2618	0.2648	1676	91%	1,213	1,337	122	117

LTS-02322-1x-COB2
Data at Tc = 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	86,5	58,5	0.5492	0.4082	1569	65%	0,245	0,270	18	17
2000	88,2	69,5	0.5268	0.4133	1771	74%	0,288	0,317	23	22
2500	91,6	83,2	0.477	0.4137	2229	93%	0,388	0,428	40	32
2700	92,5	84,7	0.4599	0.4106	2292	95%	0,426	0,470	45	37
3000	93,8	86,0	0.4369	0.4041	2373	99%	0,480	0,529	52	43
3500	94,7	86,8	0.4053	0.3907	2465	103%	0,563	0,621	64	52
4000	94,3	86,5	0.3804	0.3767	2400	100%	0,638	0,704	70	60
4500	93,3	85,3	0.3608	0.3635	2363	98%	0,706	0,778	77	67
5000	92,7	83,0	0.3451	0.3516	2330	97%	0,766	0,845	82	74
5500	91,7	83,3	0.3324	0.341	2305	96%	0,820	0,905	87	79
6000	90,7	83,0	0.3221	0.3318	2296	96%	0,868	0,958	92	84
6500	89,8	82,5	0.3135	0.3236	2285	95%	0,912	1,006	96	88
7000	88,9	82,0	0.3064	0.3165	2280	95%	0,950	1,048	100	91
8000	87,4	80,5	0.2952	0.3048	2276	95%	1,017	1,121	106	97
9000	86,3	78,8	0.2869	0.2956	2272	95%	1,071	1,181	112	101
10000	85,2	77,7	0.2806	0.2883	2269	95%	1,116	1,231	116	105
12000	83,7	75,5	0.2718	0.2776	2191	91%	1,185	1,307	119	110
14000	82,6	73,7	0.2659	0.2702	2068	86%	1,234	1,361	117	114
16000	81,7	72,5	0.2618	0.2648	1981	83%	1,272	1,403	116	116

LTS-03022-1x-COB2
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	86,3	64,0	0.5492	0.4082	2066	65%	0,246	0,271	17	18
2000	88,1	74,8	0.5268	0.4133	2349	74%	0,287	0,317	23	22
2500	91,7	87,5	0.477	0.4137	3097	93%	0,384	0,424	41	32
2700	92,7	89,2	0.4599	0.4106	3443	95%	0,421	0,464	50	36
3000	94,0	90,3	0.4369	0.4041	3532	99%	0,472	0,521	58	42
3500	95,2	90,7	0.4053	0.3907	3309	103%	0,552	0,609	63	51
4000	94,9	88,8	0.3804	0.3767	3200	100%	0,624	0,689	69	60
4500	93,6	85,7	0.3608	0.3635	3123	98%	0,689	0,760	74	66
5000	92,8	81,3	0.3451	0.3516	3065	97%	0,747	0,823	79	73
5500	91,7	80,7	0.3324	0.341	3022	96%	0,798	0,880	83	78
6000	90,7	79,0	0.3221	0.3318	3000	96%	0,844	0,931	87	82
6500	89,8	77,5	0.3135	0.3236	2980	95%	0,886	0,977	91	86
7000	88,9	76,0	0.3064	0.3165	2969	95%	0,922	1,017	94	90
8000	87,5	72,8	0.2952	0.3048	2962	95%	0,985	1,087	101	95
9000	86,3	69,8	0.2869	0.2956	2949	95%	1,037	1,144	105	100
10000	85,4	67,3	0.2806	0.2883	2941	95%	1,080	1,191	109	103
12000	83,9	63,7	0.2718	0.2776	2936	91%	1,145	1,263	116	107
14000	82,8	60,5	0.2659	0.2702	2863	86%	1,192	1,315	118	111
16000	82,0	58,5	0.2618	0.2648	2778	83%	1,229	1,355	118	114

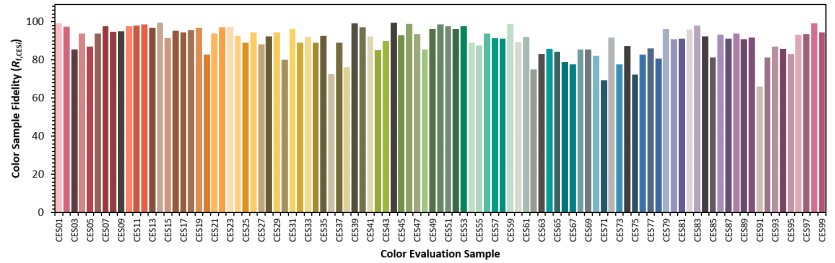
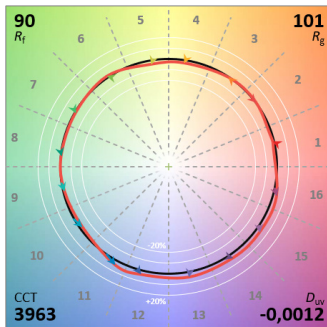
LTS-04022-1x-COB2
Data at Tc = 65°C

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

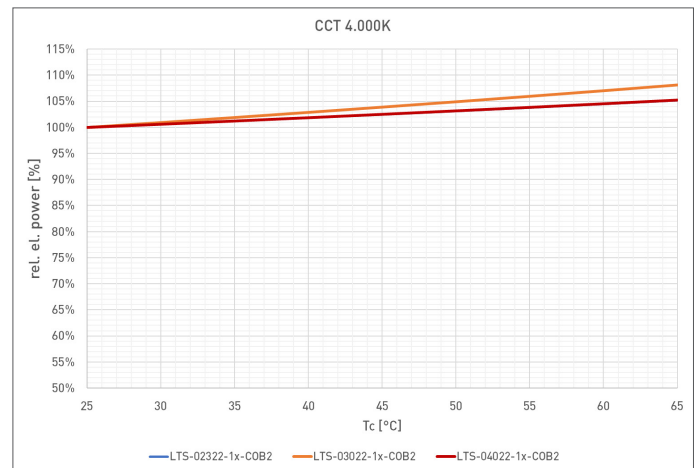
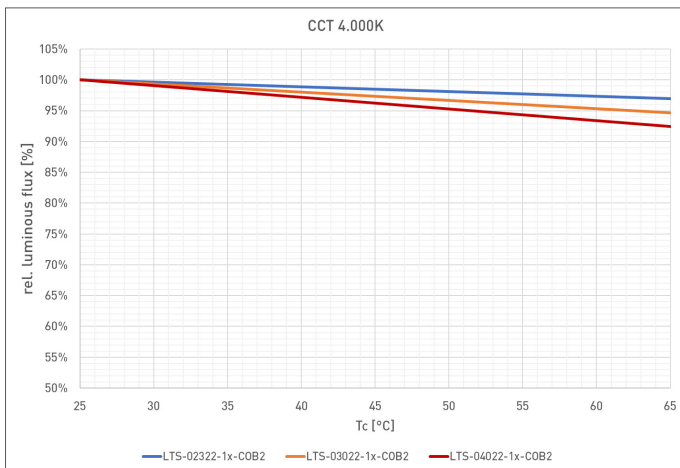


THERMAL CHARACTERISTICS

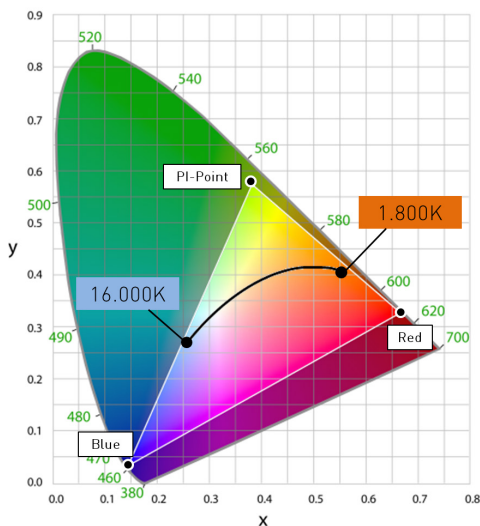
Ambient temperature	+10°C ... +45°C
Storage temperature	-20°C... +80°C
$t_{c, max}$ LED Module	+85°C
$t_{c, max}$ LMU	+85°C

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

t_p [°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.
- t_p -position = t_c -position LED Module