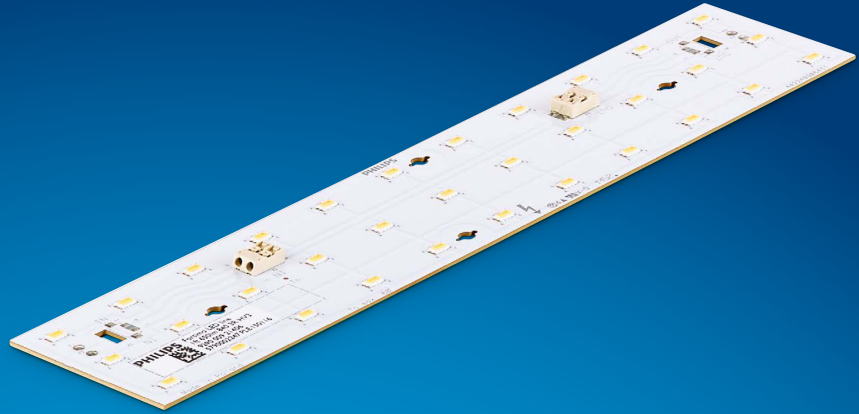


PHILIPS

Fortimo

LED system

LED Line 1 ft
650 lm 3R HV3



Datasheet

Fortimo LED Line Gen3

Fortimo LED Line systems are designed to produce pure white light for general lighting applications with high efficiency levels. The Fortimo LED Line portfolio consists of 3 main ranges of products, which have been differentiated by the number of rows of LEDs contained on the module. Fortimo LED Linear encompasses a wide range, offering solutions for all the different types of linear luminaires.

Key features and benefits

- State-of-the-art LED module efficiency of up to 165 lm/W
- Long life-time: >50,000 hours
- High color rendering (CRI >80 and >90)
- Excellent color consistency of 3 SDCM
- Choice of color temperatures (3000 K, 4000 K and 5000 K)
- Two lumen packages: 650 lm and 1100 lm per foot/280 mm
- LED module range with 1, 2 or 3 rows of LEDs
- Tunable lumen output, efficacy and lifetime
- Push-in connectors enabling automated wiring
- Five year system warranty

Suitable for:



Retail



Office



Industry



May 2016

Zhaga

Ordering data

Commercial product name	EOC	12NC	Box quantity
Fortimo LED Line 1ft 650lm 830 3R HV3	8718696 413104 00	9290 009 21306	180
Fortimo LED Line 1ft 650lm 840 3R HV3	8718696 413142 00	9290 009 21406	180
Fortimo LED Line 1ft 650lm 850 3R HV3	8718696 413166 00	9290 009 21506	180

Drive currents and case temperatures

Parameter	Nominal*	Life**	Max***	Unit
I (current through the LED module)	138	285	285	mA
Tc (case temperature at Tc point)	35	75	80	°C

* Nominal value at which typical performance is specified.

** Value at which lifetime L70B50 ≥ 50,000 hour is specified.

*** Maximum value for safe operation; do not operate above this value.

Optical characteristics - table per color (CCT)

Fortimo LED Line 1 ft 650 lm 830 3R HV3

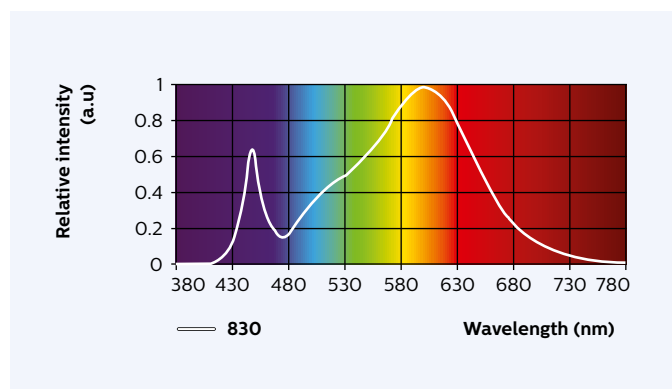
Parameter	Min	Typ	Max	Unit
Correlated color temperature (CCT)		3000		K
Color coordinates (CIEx, CIEy)*		(0.434,0.402)		-
CRI**	80			-
Radiation angle		120		deg

Color consistency of 3 SDCM, averaged over the module.
R9 of 4, typical value.

Operation point	830	lm	lm/W
80% I-nom 110 mA	Tc 25 °C	507	151
	Tc-nom 35 °C	501	149
	Tc-life 75 °C	463	142
I-nom 138 mA	Tc 25 °C	624	148
	Tc-nom 35 °C	618	146
	Tc-life 75 °C	574	139
I-life 285 mA	Tc 25 °C	1236	132
	Tc-nom 35 °C	1218	132
	Tc-life 75 °C	1135	125

Tolerance for flux data is ±7.5%.

Tolerance for efficacy data is ±10%.



Fortimo LED Line 1 ft 650 lm 840 3R HV3

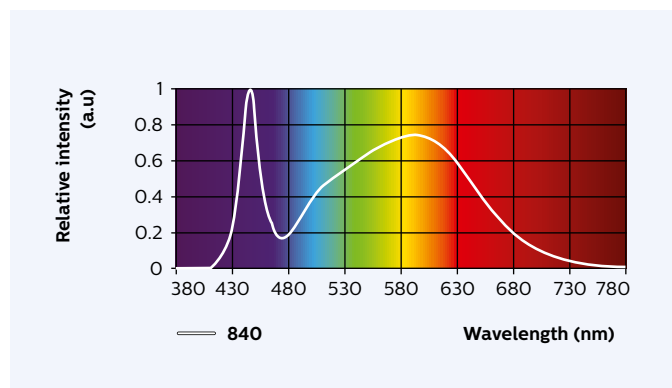
Parameter	Min	Typ	Max	Unit
Correlated color temperature (CCT)		4000		K
Color coordinates (CIEx, CIEy)*		(0.382,0.378)		-
CRI**	80			-
Radiation angle		120		deg

Color consistency of 3 SDCM, averaged over the module.
R9 of 15, typical value.

Operation point	840	lm	lm/W
80% I-nom 110 mA	Tc 25 °C	533	159
	Tc-nom 35 °C	527	157
	Tc-life 75 °C	487	150
I-nom 138 mA	Tc 25 °C	657	155
	Tc-nom 35 °C	650	154
	Tc-life 75 °C	603	147
I-life 285 mA	Tc 25 °C	1300	139
	Tc-nom 35 °C	1281	139
	Tc-life 75 °C	1193	131

Tolerance for flux data is ±7.5%.

Tolerance for efficacy data is ±10%.



Fortimo LED Line 1 ft 650 lm 850 3R HV3

Parameter	Min	Typ	Max	Unit
Correlated color temperature (CCT)		5000		K
Color coordinates (CIEx, CIEy)*		(0.344,0.354)		-
CRI**	80			-
Radiation angle		120		deg

Color consistency of 3 SDCM, averaged over the module.

Operation point	850	lm	lm/W
80% I-nom 110 mA	Tc 25 °C	533	159
	Tc-nom 35 °C	527	157
	Tc-life 75 °C	487	150
I-nom 138 mA	Tc 25 °C	657	155
	Tc-nom 35 °C	650	154
	Tc-life 75 °C	603	147
I-life 285 mA	Tc 25 °C	1300	139
	Tc-nom 35 °C	1281	139
	Tc-life 75 °C	1193	131

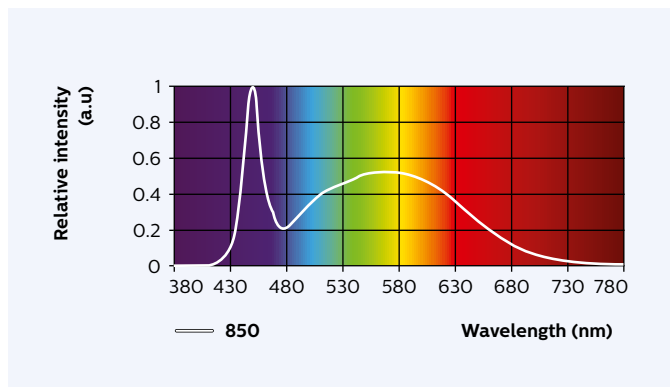
Tolerance for flux data is $\pm 7.5\%$.

Tolerance for efficacy data is $\pm 10\%$.

Measurement tolerance is $\pm 5\%$ for the flux data and 6% for the efficacy data.

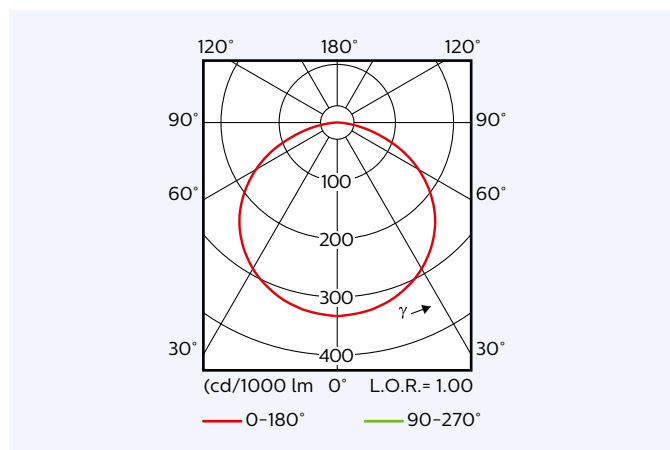
* Measurement tolerance is ± 0.005

** Measurement tolerance is ± 1.5



Beam shape

The Philips LED module generates a Lambertian beam shape, which is a pragmatic starting point for OEMs wishing to design secondary optics.



Electrical characteristics

Parameter	Min	Typ	Max	Unit
Nominal current		138		mA
Forward voltage	29.2	30.7	32.1	V
Power consumption	4	4.2	4.4	W
Energy efficiency label		A++		
Minimum dimming for performance	10			%
Number of modules per chain			8	
Bins		2 (C and D)		

Specifications stated at Tc-nom and I-nom.

Performance over life

Lumen maintenance

Operation point	Time x 1000 hours	L70			L80			L90		
		B50	B20	B10	B50	B20	B10	B50	B20	B10
80% I-nom 110 mA	Tc 25 °C	>70	>70	>70	>70	>70	>70	>70	68	67
	Tc-nom 35 °C	>70	>70	>70	>70	>70	>70	55	53	53
	Tc-life 75 °C	>70	69	68	44	43	42	21	20	20
I-nom 138 mA	Tc 25 °C	>70	>70	>70	>70	>70	>70	>70	68	67
	Tc-nom 35 °C	>70	>70	>70	>70	>70	>70	55	53	53
	Tc-life 75 °C	>70	69	68	44	43	42	21	20	20
I-life 285 mA	Tc 25 °C	>70	>70	>70	>70	>70	>70	>70	68	67
	Tc-nom 35 °C	>70	>70	>70	>70	>70	>70	55	53	53
	Tc-life 75 °C	>70	69	68	44	43	42	21	20	20

Values in the table are based on available LM80 LED data (12000h). Lumen maintenance will be updated once additional measurement data becomes available.

Parameter	Min	Typ	Max	Unit
$\Delta u'v'$ at 6000 hours			0.007	-

Specifications stated while $T_c < T_{c-life}$ and $I < I-life$.

Absolute maximum ratings

Parameter	Min	Typ	Max	Unit
Current through the LED module (I-max)			285	mA
Case temperature (Tc-max)			80	°C
Power rated at U-max and I-max			10.3	W
ESD (direct contact)			8	kV
ESD (air)			15	kV
Working voltage (between input to metal mounting plate)			420	Vdc
Voltage strength (Input to metal mounting plate)			1840	Vac
Ambient temperature	-40			°C

Wiring

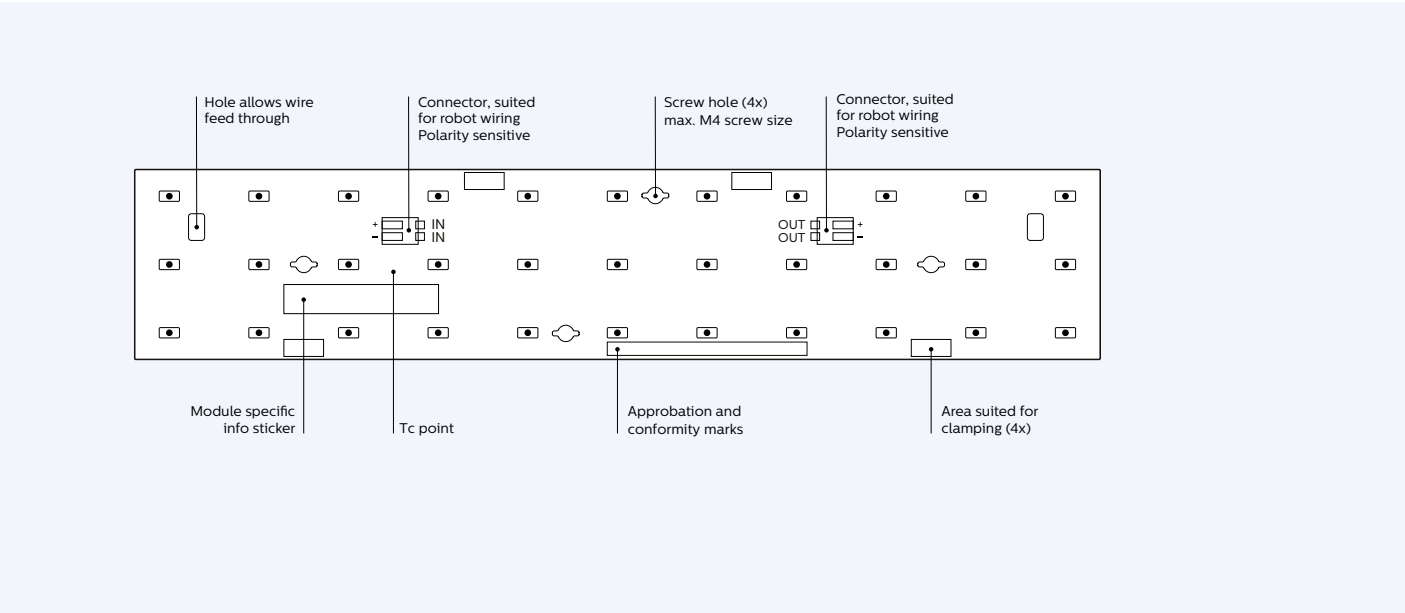
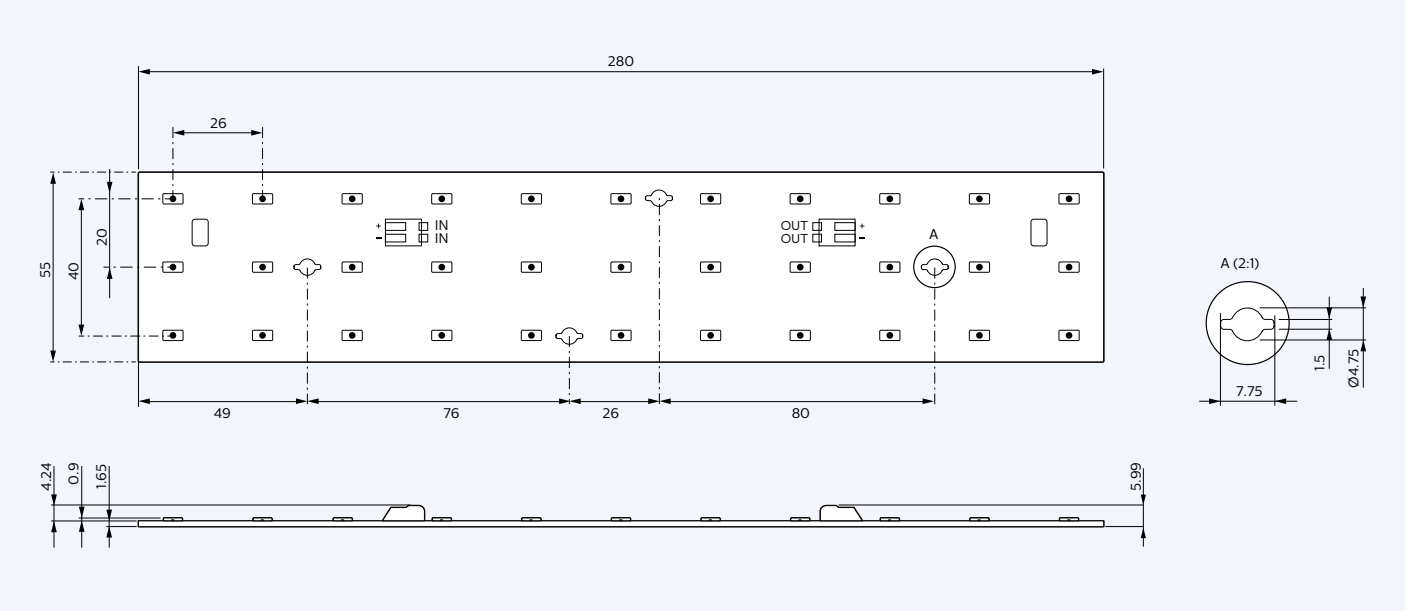
Specification item	Value	Unit	Condition
Input wire cross-section	0.2...0.75	mm ²	Solid
	18...24	AWG	
	0.3...0.5	mm ²	Stranded
	20...22	AWG	
Input wire strip length	7.5..8.5	mm	
Tested cable length	4000	mm	Total length of wiring including LED modules, one way

Connector suited for robot wiring.

Mechanical characteristics

Parameter	Min	Typ	Max	Unit
Length	279.5	280	280.5	mm
Width	54.5	55	55.5	mm
Height excl. connector	2	2.1	2.2	mm
Height incl. connector	5.6	5.8	6	mm
Warpage (IPC-TM-650)			4	%

Bow & Twist of the PCB after production tested and released according IPC-TM-650 2.4.22.



Application information

Compliance and approval

IEC / EN 62031, IEC / EN 62471

Photobiological safety

Risk group: Risk group 1

Environmental

RoHS / REACH

Application information

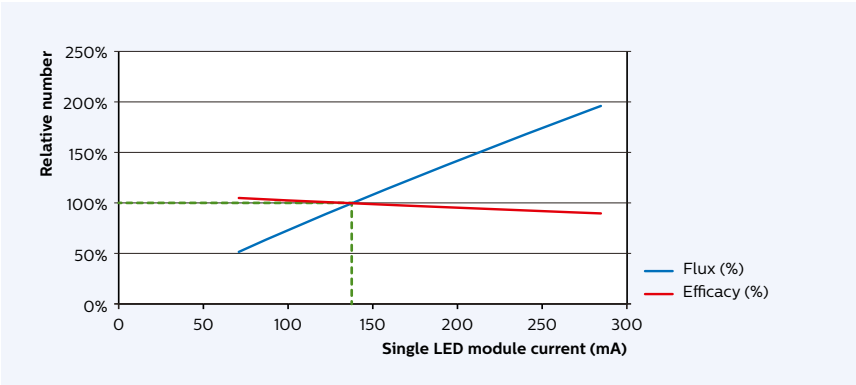
Zhaga	
Designation of the Book-7 LLE category	L28W6
Luminous Flux category	C006
CCT category	3000 K, 4000 K, 5000 K
CRI	80
The position of the temperature measurement point t_p	same as T_c point
The value of $t_{p,max}$	35
IP rating	
Overheating protection	No IP rating
Luminaire class	No protection
	IEC Class I or Class II

Thermal switching table

Calculated number of switches at which the survival rate of the population $\geq 90\%$, at a given ambient temperature and ΔT with respect to T_c (where $T_c = T_{ambient} + \Delta T$)

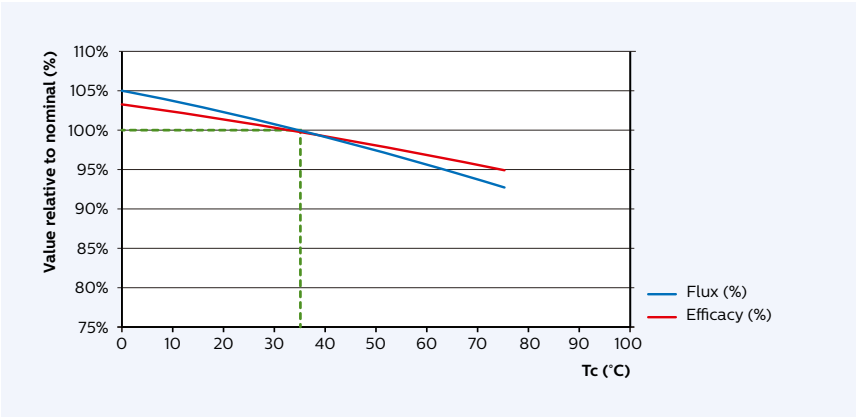
		T _{ambient} [°C]											
		-40	-30	-20	-10	0	10	20	30	40	50	60	70
delta T [°C] (delta T = T _c - T _{ambient})	10	Continuous operation or dimming only	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k
	20		>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	X
	30		>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	>100 k	X	X
	40		45 k	45 k	45 k	45 k	45 k	45 k	45 k	45 k	X	X	X
	50		20 k	20 k	20 k	20 k	20 k	20 k	20 k	X	X	X	X
	60		10 k	10 k	10 k	10 k	10 k	10 k	X	X	X	X	X
	70		5 k	5 k	5 k	5 k	5 k	X	X	X	X	X	X
	80		3 k	3 k	3 k	3 k	X	X	X	X	X	X	X
	90		2 k	2 k	2 k	X	X	X	X	X	X	X	X
	100		1 k	1 k	X	X	X	X	X	X	X	X	X

Tuning information



Flux and efficacy versus current

	I [mA]	Flux [%]	Efficacy [%]
(I-nom x 50%)	70	51%	105%
	90	66%	104%
	110	80%	102%
	130	94%	101%
(I-nom)	138	100%	100%
	150	108%	99%
	170	122%	98%
	190	135%	96%
	210	149%	95%
	230	162%	93%
	250	175%	92%
(I-life)	285	197%	90%

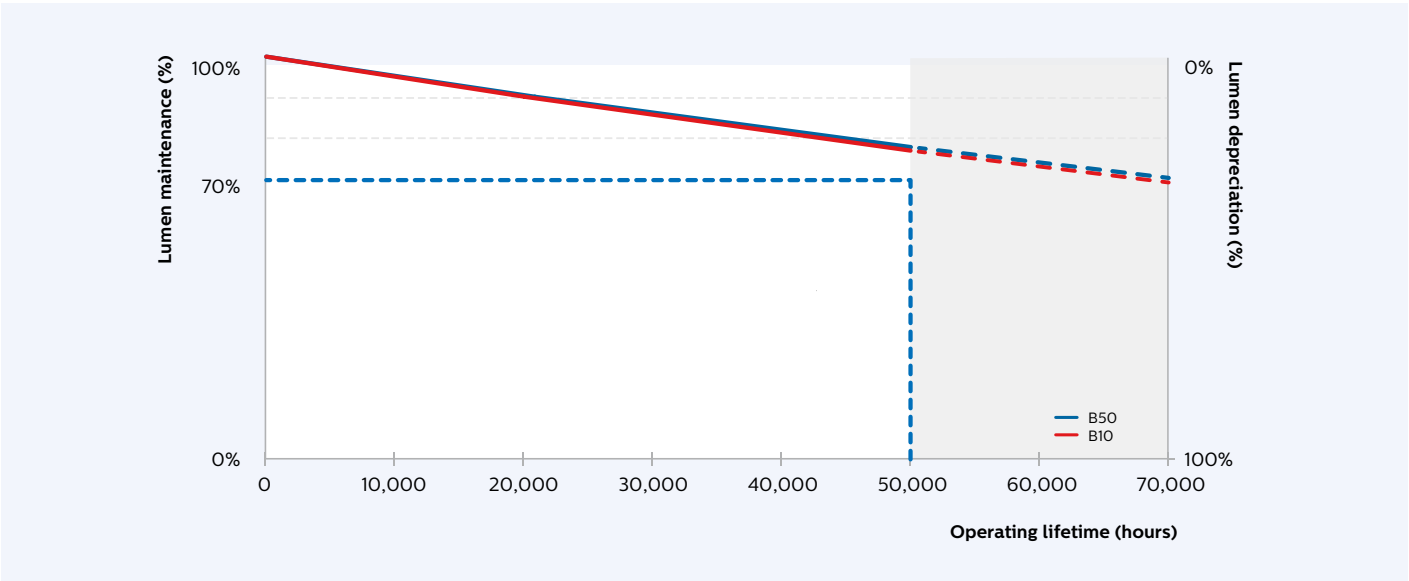


Flux and efficacy versus temperature at Tc

	Tc [°C]	Flux [%]	Efficacy [%]
(Tc-life)	75	93%	95%
	70	94%	96%
(Tc-nom)	35	100%	100%
	25	101%	101%
	0	105%	103%

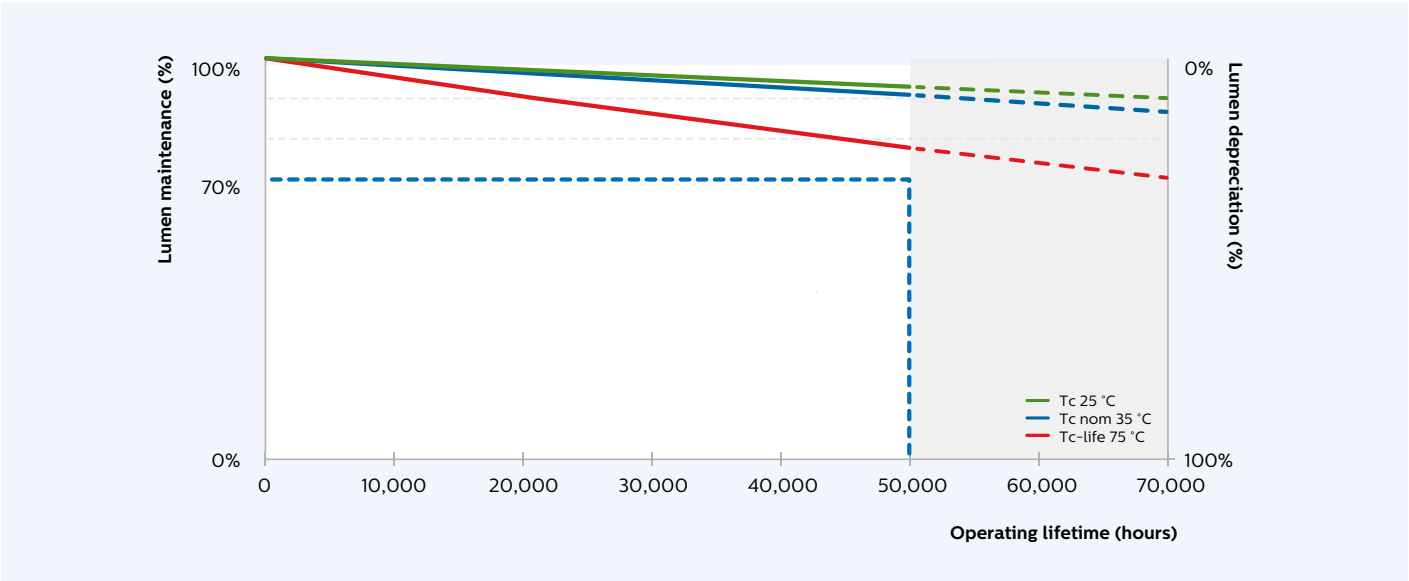
Lumen maintenance

Lumen maintenance at I-life and Tc-life conditions



Lumen depreciation as a function of operating hours for I-life and Tc-life.

Lumen maintenance for B50 at current I-life conditions



Lumen depreciation as a function of operating hours at different Tc values and I-life.

Wiring schematic

Examples

