

**PHILIPS**

Fortimo

LED system

Line 2 ft 4000 lm 1R HV2



## Datasheet

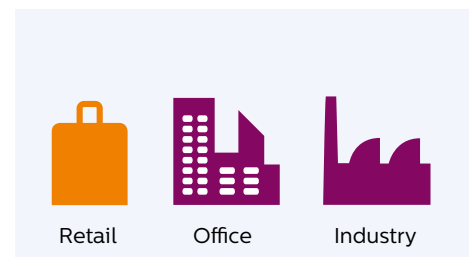
# Fortimo LED Line High Flux

Fortimo LED Line High Flux system are designed to enable LED lighting at higher application heights where more light is needed, such as trunking, battens and high-bay applications in warehouses, factories or big retail stores.

### Key features and benefits

- LED module efficiency of up to 148 lm/W
- Long life-time: >100,000 hours
- High color rendering: CRI >80
- Excellent color consistency of 3 SDCM
- Variation of color temperatures (3000 K, 3500 K, 4000 K and 5000 K)
- Lumen package: 2000 lm per foot (tunable up to 2364 lm per foot)
- Tunable lumen output, efficacy and lifetime
- Wide case temperature (Tc) range from -40 °C to +95 °C
- Push-in connectors enabling automated wiring
- Five year system warranty

### Suitable for:



May 2015

## Ordering data

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Commercial product name	EOC	12NC
Fortimo LED Line 2ft 4000lm 830 1R HV2	8718696 418659 00	9290 007 20913
Fortimo LED Line 2ft 4000lm 835 1R HV2	8718696 418673 00	9290 007 21013
Fortimo LED Line 2ft 4000lm 840 1R HV2	8718696 418697 00	9290 007 21113
Fortimo LED Line 2ft 4000lm 850 1R HV2	8718696 418710 00	9290 007 21213

## Drive currents and case temperatures

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Parameter	Nominal *	Life**	Max***	Unit
I (current through the LED module)	440	500	560	mA
Tc (case temperature at Tc point)	55	90	95	°C

\* Nominal value at which typical performance is specified.

\*\* Value at which lifetime L70B50  $\geq$ 50,000 hour is specified.

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

## Optical characteristics - table per color (CCT)

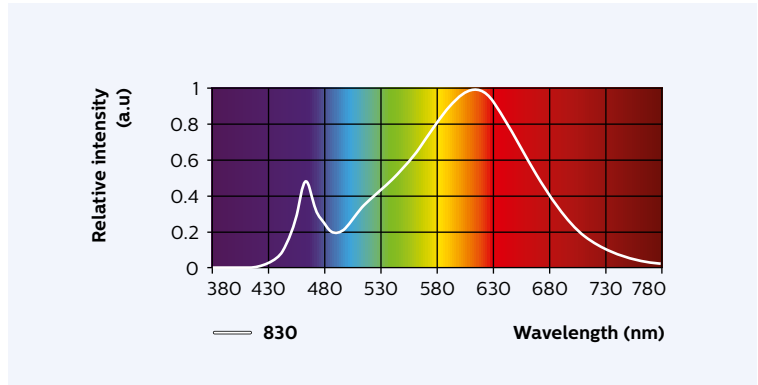
### Fortimo LED Line 2 ft 4000 lm 830 1R HV2

Parameter	Min	Typ	Max	Unit
Correlated color temperature (CCT)		3000		K
Color coordinates (CIEx, CIEy)		(0.432, 0.402)		-
CRI	80			-
Radiation angle		120		deg

Color consistency of 3 SDCM, averaged over the module.

Operation point	830	lm	lm/W
80% I-nom 350 mA	Tc 25 °C	3257	145
	Tc-nom 55 °C	3095	142
	Tc-life 90 °C	2963	138
I-nom 440 mA	Tc 25 °C	3979	139
	Tc-nom 55 °C	<b>3820</b>	<b>136</b>
	Tc-life 90 °C	3618	132
I-life 500 mA	Tc 25 °C	4444	135
	Tc-55 °C	4273	132
	Tc-life 90 °C	4045	128

Tolerance for flux data is  $\pm 7.5\%$ .  
Tolerance for efficacy data is  $\pm 10\%$ .



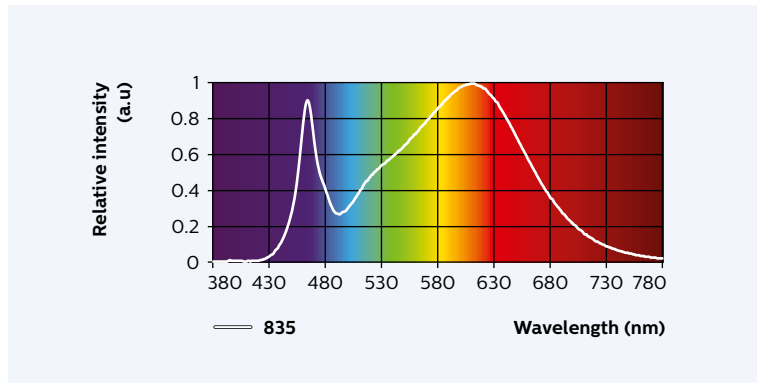
### Fortimo LED Line 2 ft 4000 lm 835 1R HV2

Parameter	Min	Typ	Max	Unit
Correlated color temperature (CCT)		3500		K
Color coordinates (CIEx, CIEy)		(0.405, 0.390)		-
CRI	80			-
Radiation angle		120		deg

Color consistency of 3 SDCM, averaged over the module.

Operation point	835	lm	lm/W
80% I-nom 350 mA	Tc 25 °C	3361	150
	Tc-nom 55 °C	3193	147
	Tc-life 90 °C	3057	142
I-nom 440 mA	Tc 25 °C	4106	143
	Tc-nom 55 °C	<b>3900</b>	<b>138</b>
	Tc-life 90 °C	3733	136
I-life 500 mA	Tc 25 °C	4586	139
	Tc-55 °C	4409	136
	Tc-life 90 °C	4174	132

Tolerance for flux data is  $\pm 7.5\%$ .  
Tolerance for efficacy data is  $\pm 10\%$ .



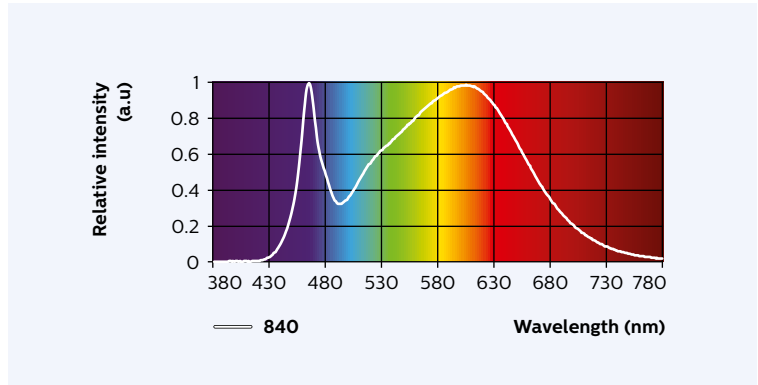
## Fortimo LED Line 2 ft 4000 lm 840 1R HV2

Parameter	Min	Typ	Max	Unit
Correlated color temperature (CCT)		4000		K
Color coordinates (CIEx, CIEy)		(0.380, 0.377)		-
CRI	80			-
Radiation angle		120		deg

Color consistency of 3 SDCM, averaged over the module.

Operation point	840	lm	lm/W
80% I-nom 350 mA	Tc 25 °C	3430	153
	Tc-nom 55 °C	3259	150
	Tc-life 90 °C	3120	145
I-nom 440 mA	Tc 25 °C	4190	146
	Tc-nom 55 °C	<b>4000</b>	<b>142</b>
	Tc-life 90 °C	3810	139
I-life 500 mA	Tc 25 °C	4680	142
	Tc-nom 55 °C	4500	139
	Tc-life 90 °C	4260	135

Tolerance for flux data is ±7.5%.  
Tolerance for efficacy data is ±10%.



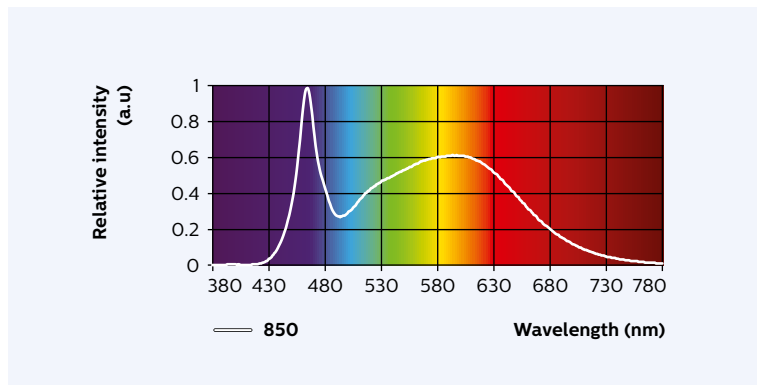
## Fortimo LED Line 2 ft 4000 lm 850 1R HV2

Parameter	Min	Typ	Max	Unit
Correlated color temperature (CCT)		5000		K
Color coordinates (CIEx, CIEy)		(0.342, 0.350)		-
CRI	80			-
Radiation angle		120		deg

Color consistency of 3 SDCM, averaged over the module.

Operation point	850	lm	lm/W
80% I-nom 350 mA	Tc 25 °C	3465	154
	Tc-nom 55 °C	3292	151
	Tc-life 90 °C	3151	146
I-nom 440 mA	Tc 25 °C	4232	148
	Tc-nom 55 °C	<b>4020</b>	<b>143</b>
	Tc-life 90 °C	3848	140
I-life 500 mA	Tc 25 °C	4727	143
	Tc-nom 55 °C	4545	141
	Tc-life 90 °C	4303	136

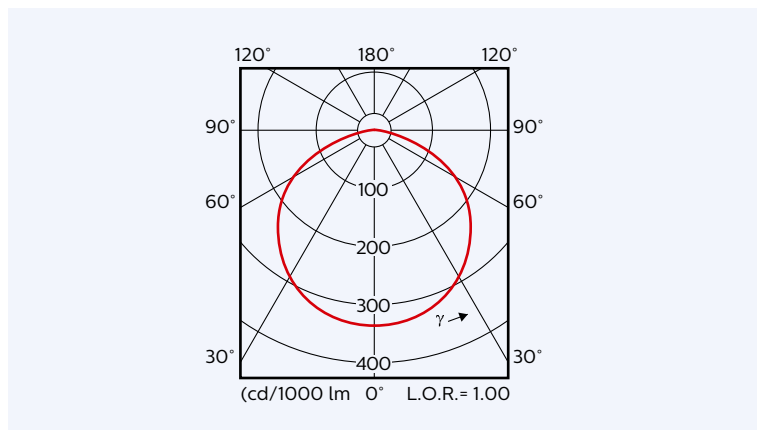
Tolerance for flux data is ±7.5%.  
Tolerance for efficacy data is ±10%.



Measurement tolerance is ± 2.5% for the flux data and 5% for the efficacy data.

## 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		440		mA
Forward voltage	59	64	66	V
Power consumption	26	28	33	W
Energy efficiency label		A++		
Minimum dimming for performance	10			%
Number of modules per chain			4	
Bins		E and F		

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 350 mA	Tc 25 °C	>100	95	92	64	59	57	30	28	27
	Tc-nom 55 °C	83	77	74	52	48	46	24	23	22
	Tc-life 90 °C	55	50	48	34	31	30	16	15	14
I-nom 440 mA	Tc 25 °C	>100	94	91	64	59	57	30	28	27
	Tc-nom 55 °C	83	77	74	52	48	46	24	23	22
	Tc-life 90 °C	54	49	47	34	31	30	16	14	14
I-life 500 mA	Tc 25 °C	>100	94	91	64	59	57	30	28	27
	Tc-nom 55 °C	82	76	73	51	47	46	24	22	22
	Tc-life 90 °C	54	49	47	34	30	29	16	14	14

Values in the table are based on available LM80 LED data (12000h). Lumen maintenance will be updated once additional measurement data becomes available. >70k hours claim is based on extrapolating raw LM80-data to lower temperatures and currents by using statistical techniques.

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

Specifications stated while Tc < Tc-life and I < I-life

## Absolute maximum ratings

Parameter	Min	Typ	Max	Unit
Current through the LED module (I-max)			560	mA
Case temperature (Tc-max)			95	°C
Power rated at U-max and I-max			33	W
ESD (direct contact)			8	kV
ESD (air)			15	kV
Working voltage (between input to metal mounting plate)			425	Vdc
Voltage strength (Input to metal mounting plate)			2115	Vdc
Ambient temperature	-40			°C

## Wiring

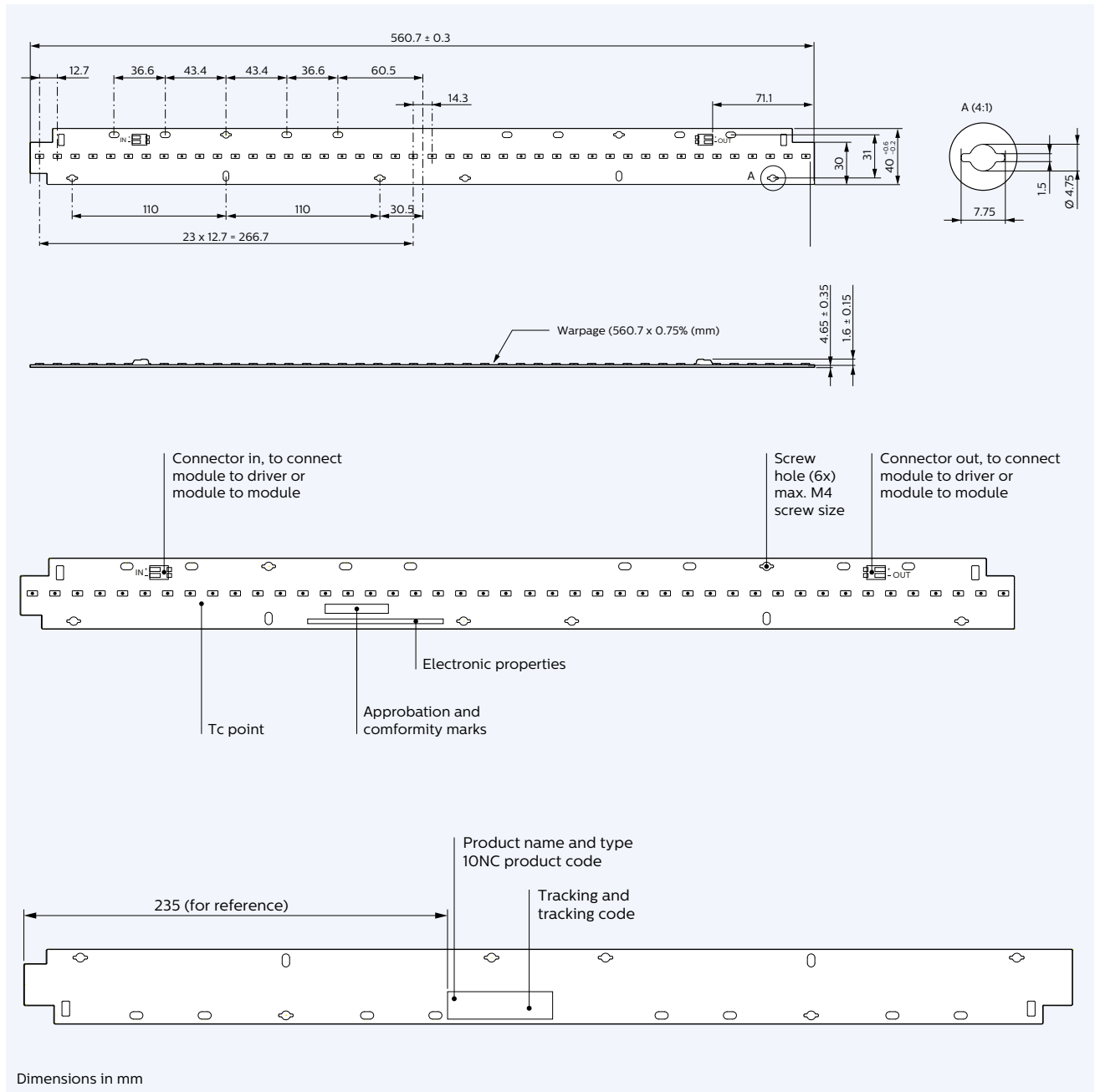
Specification item	Value	Unit	Condition
Input wire cross-section	0.2...0.75	mm <sup>2</sup>	Solid
	18...24	AWG	
	0.3...0.5	mm <sup>2</sup>	Stranded
	20...22	AWG	
Input wire strip length	7.5...8.5	mm	
Tested cable length	4000	mm	Total length of wiring including LED modules, one way

Connector suited for robot wiring.

## Mechanical characteristics

Parameter	Min	Typ	Max	Unit
Length	560.4	560.7	561	mm
Width	39.8	40	40.6	mm
Height excl. connector	4.3	4.65	5	mm
Height incl. connector	1.45	1.6	1.75	mm
Warpage (IPC-TM-650)			2,1	mm

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



## Application information

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### Compliance and approval

IEC / EN 62031, IEC / EN 62471

### Photobiological safety

Risk group: Risk group 1

### Environmental

RoHS / REACH.

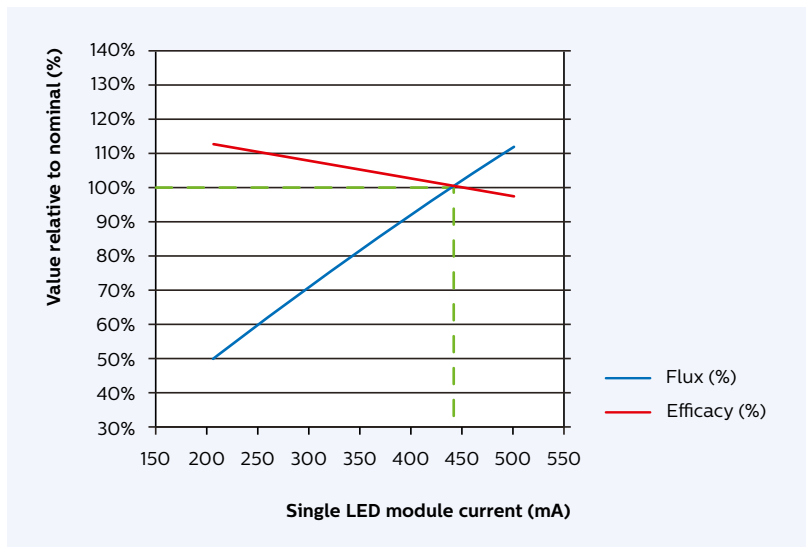
Zhaga	Compliant
IP rating	No IP rating
Overheating protection	No protection
Luminaire class	IEC Class I or Class II

Warranted number of full thermal product cycles at which the survival rate of the population  $\geq 90\%$ , at 25 °C ambient temperature

Case temperature Tc [°C]	Amount of cycles
35	14,600
40	
45	
50	14,600
55	
60	
65	14,600
70	
75	14,600
80	13,000
85	8,000
90	4,000
95	

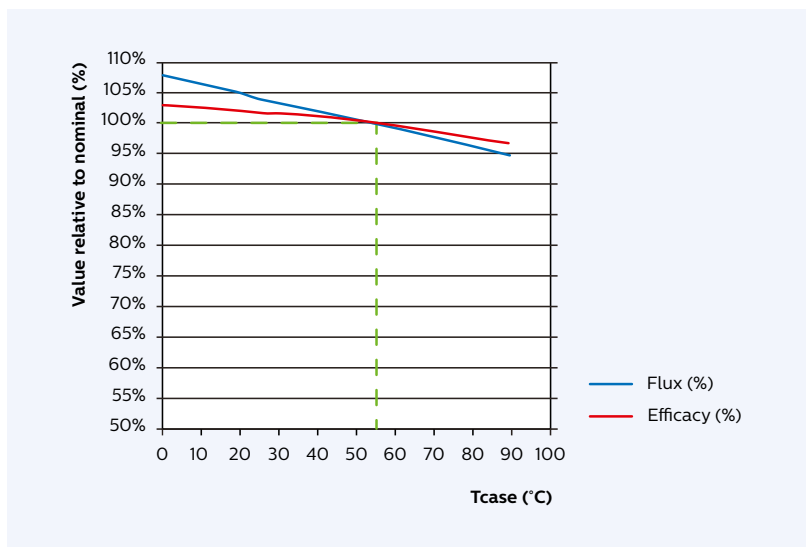
## Tuning information

### Flux and efficacy versus current



I [mA]	Flux [%]	Efficacy [%]
500	112%	97%
490	110%	98%
<b>440</b>	<b>100%</b>	<b>100%</b>
390	90%	103%
342	80%	105%
296	70%	108%
251	60%	110%
207	50%	113%

### Flux and efficacy versus temperature at Tc

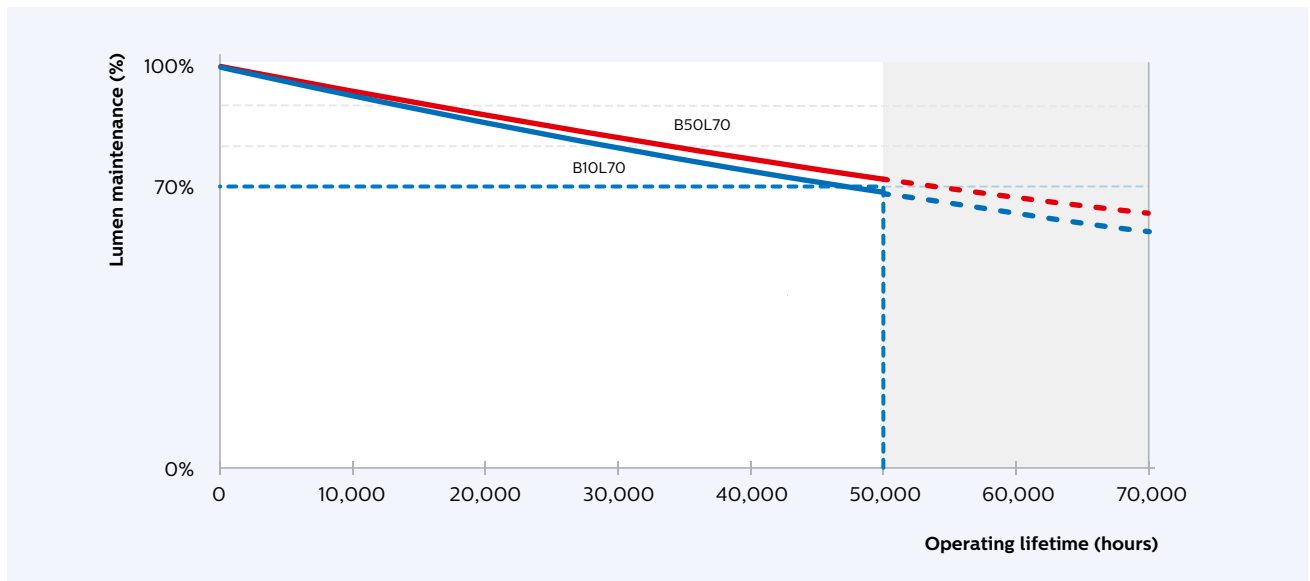


Tc [°C]	Flux [%]	Efficacy [%]
90	95%	97%
85	96%	97%
75	97%	98%
65	99%	99%
<b>55</b>	<b>100%</b>	<b>100%</b>
50	101%	100%
40	102%	101%
30	103%	102%
25	104%	102%
20	105%	102%
10	107%	103%
0	108%	103%



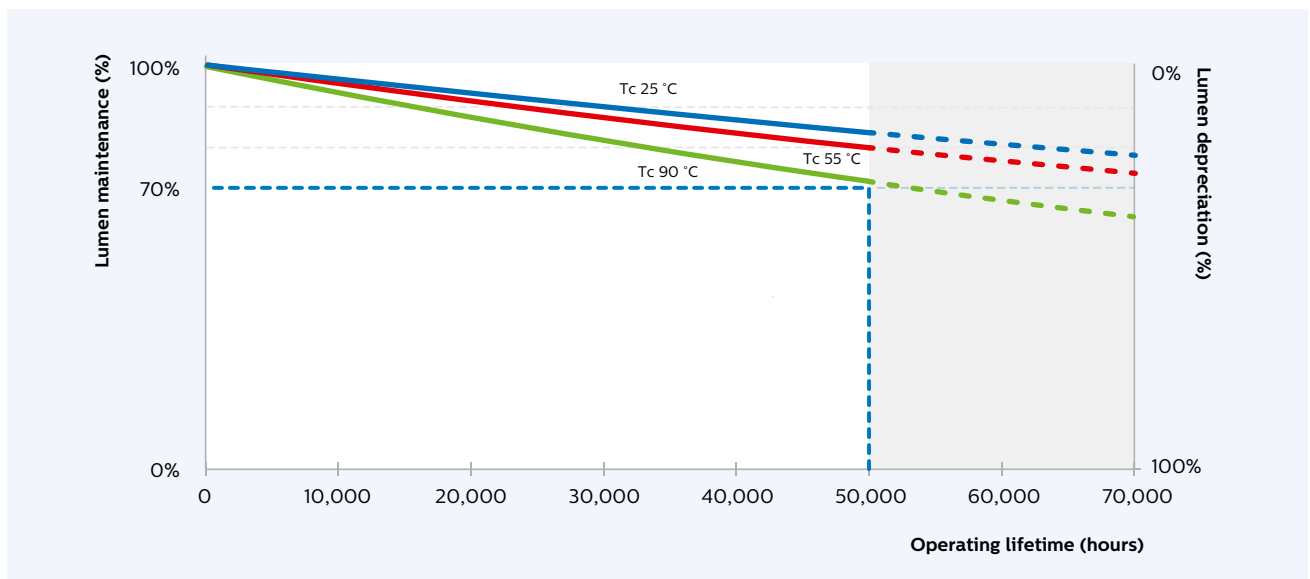
## Lumen maintenance

### Lumen maintenance at I-life and Tc-life conditions



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

### Lumen maintenance for B50 at current I-life conditions

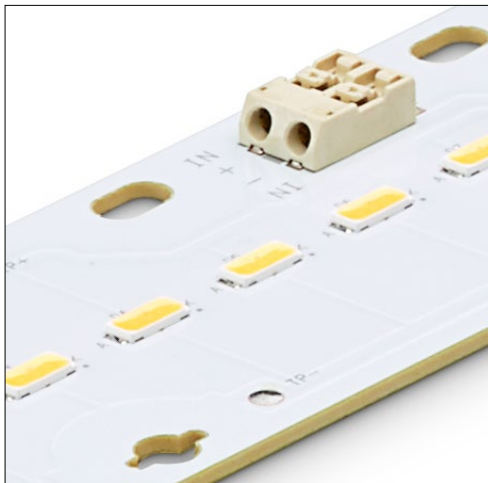
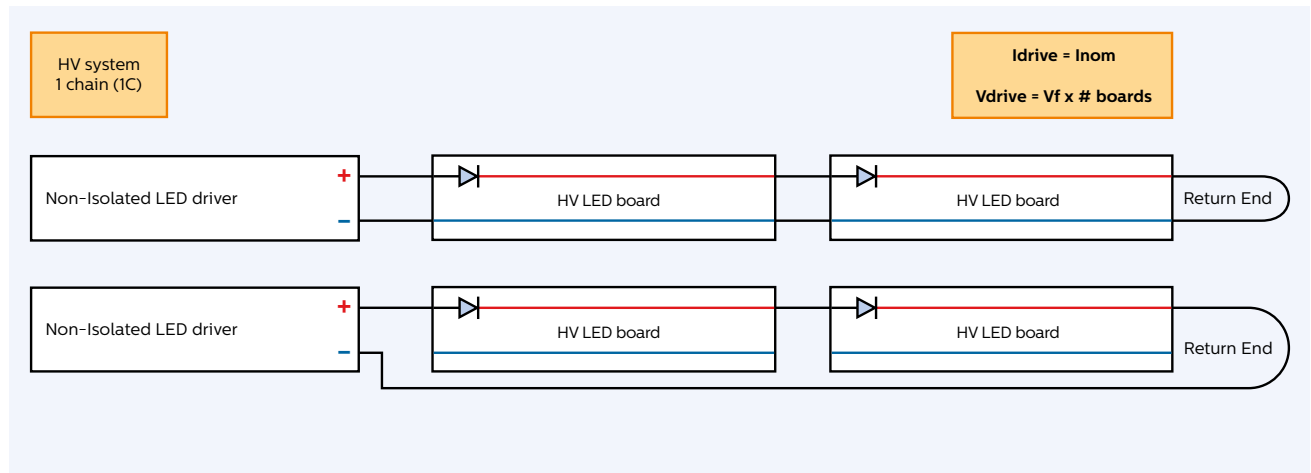


Lumen depreciation as a function of operating hours at different Tc values and I-life.

## Wiring schematic

### Examples

#### Fortimo LED Line 2 ft 4000 lm 1R HV2





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05/2015  
Data subject to change