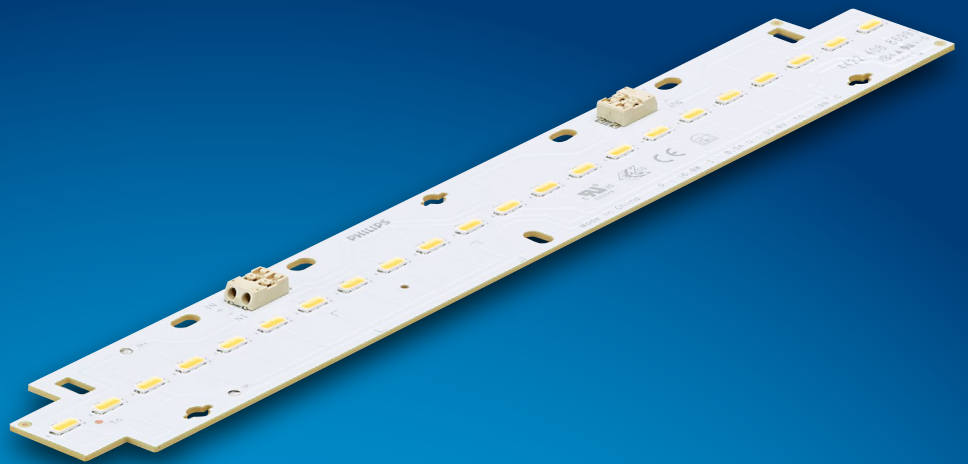


PHILIPS

Fortimo

LED system

Line 1 ft 2000 lm 1R HV2



Datasheet

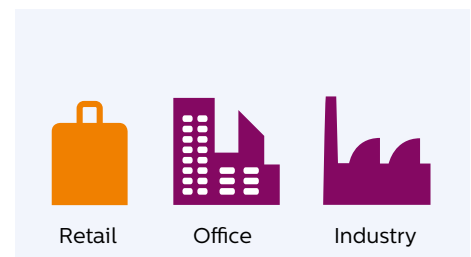
Fortimo LED Line High Flux

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:



Zhaga

May 2015

Ordering data

Commercial product name	EOC	12NC
Fortimo LED Line 1ft 2000lm 830 1R HV2	8718696 418482 00	9290 007 20113
Fortimo LED Line 1ft 2000lm 835 1R HV2	8718696 418512 00	9290 007 20213
Fortimo LED Line 1ft 2000lm 840 1R HV2	8718696 418536 00	9290 007 20313
Fortimo LED Line 1ft 2000lm 850 1R HV2	8718696 418550 00	9290 007 20413

Drive currents and case temperatures

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)

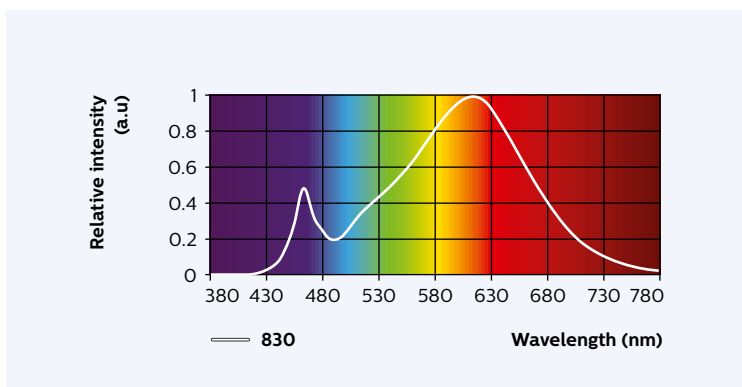
Fortimo LED Line 1 ft 2000 lm 830 1R HV2

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	1629	145
	Tc-nom 55 °C	1547	142
	Tc-life 90 °C	1481	138
I-nom 440 mA	Tc 25 °C	1989	139
	Tc-nom 55 °C	1910	136
	Tc-life 90 °C	1809	132
I-life 500 mA	Tc 25 °C	2222	135
	Tc-55 °C	2137	132
	Tc-life 90 °C	2023	128

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



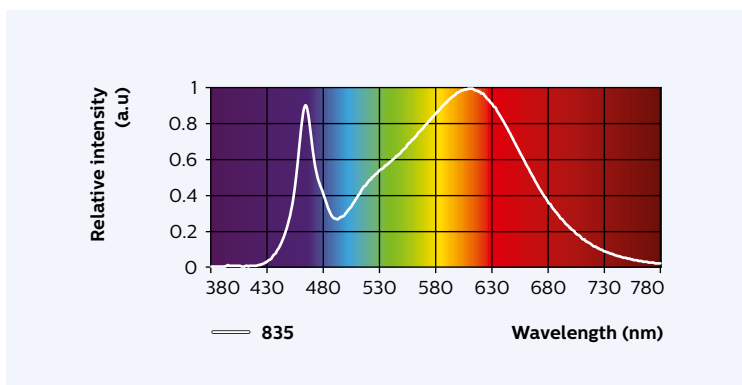
Fortimo LED Line 1 ft 2000 lm 835 1R HV2

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	1680	150
	Tc-nom 55 °C	1597	147
	Tc-life 90 °C	1529	142
I-nom 440 mA	Tc 25 °C	2053	143
	Tc-nom 55 °C	1950	138
	Tc-life 90 °C	1867	136
I-life 500 mA	Tc 25 °C	2293	139
	Tc-55 °C	2205	136
	Tc-life 90 °C	2087	132

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



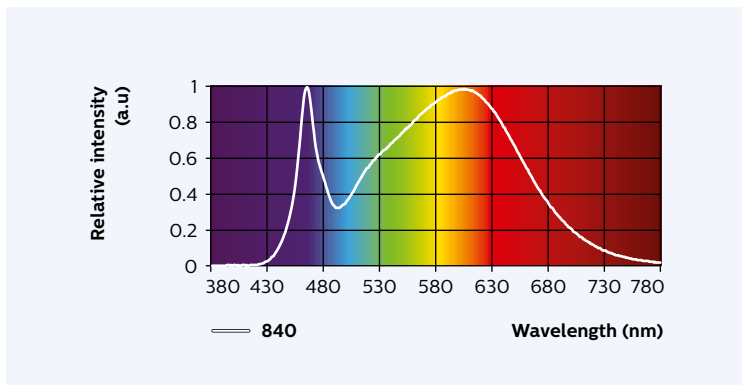
Fortimo LED Line 1 ft 2000 lm 840 1R HV2

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	1715	153
	Tc-nom 55 °C	1630	150
	Tc-life 90 °C	1560	145
I-nom 440 mA	Tc 25 °C	2095	146
	Tc-nom 55 °C	2000	142
	Tc-life 90 °C	1905	139
I-life 500 mA	Tc 25 °C	2340	142
	Tc-nom 55 °C	2250	139
	Tc-life 90 °C	2130	135

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



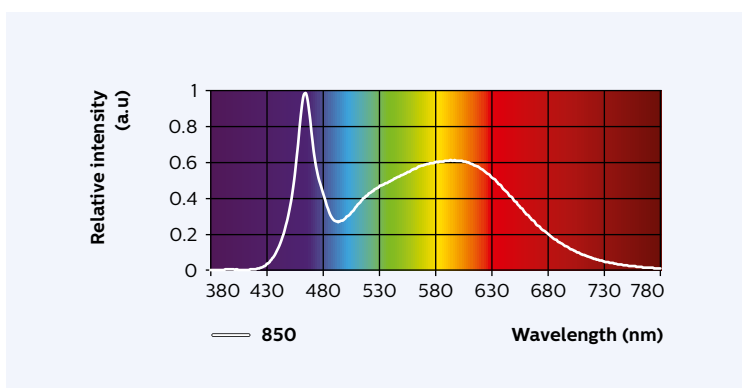
Fortimo LED Line 1 ft 2000 lm 850 1R HV2

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	1732	154
	Tc-nom 55 °C	1646	151
	Tc-life 90 °C	1576	146
I-nom 440 mA	Tc 25 °C	2116	148
	Tc-nom 55 °C	2010	143
	Tc-life 90 °C	1924	140
I-life 500 mA	Tc 25 °C	2364	143
	Tc-nom 55 °C	2273	141
	Tc-life 90 °C	2151	136

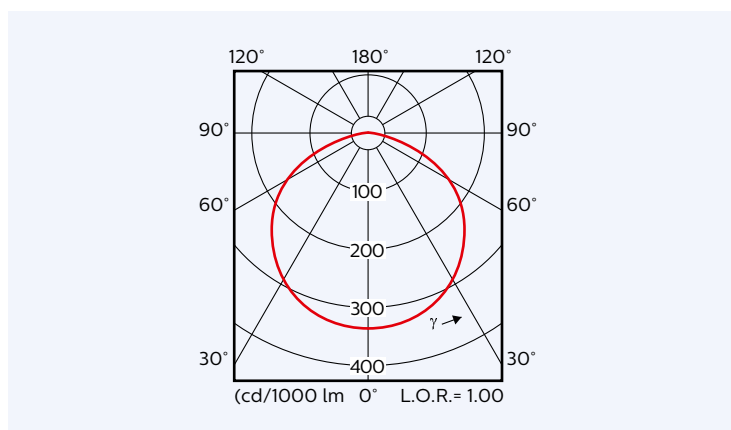
Tolerance for flux data is $\pm 7.5\%$.
Tolerance for efficacy data is $\pm 10\%$.



Measurement tolerance is $\pm 2.5\%$ 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	30	32	33	V
Power consumption	13	14	16	W
Energy efficiency label		A++		
Minimum dimming for performance	10			%
Number of modules per chain			8	
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			16	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

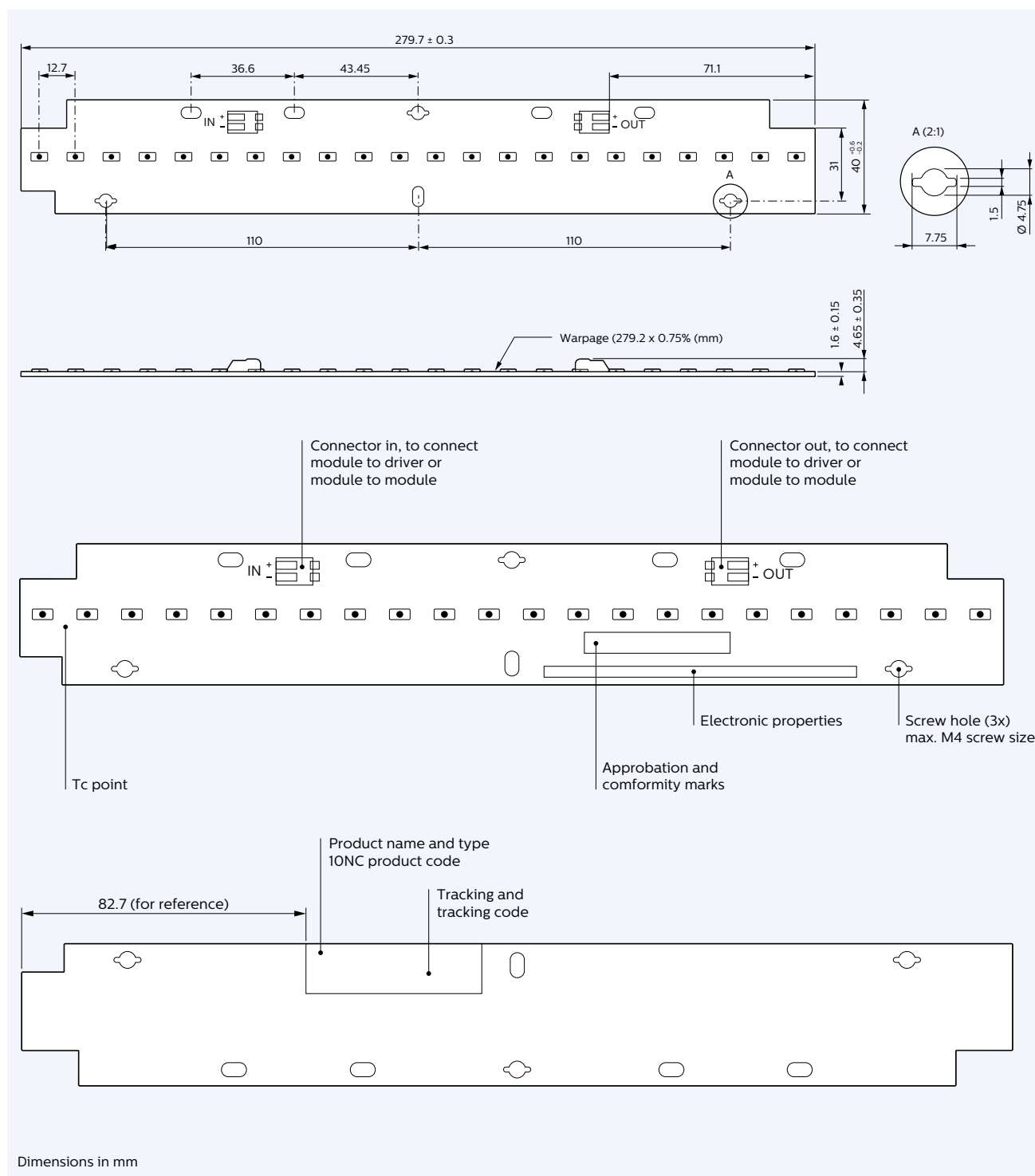
Specification item	Value	Unit	Condition
Input wire cross-section	0.2...0.75	mm ²	Solid
	18...24	AWG	
	0.3...0.5	mm ²	Stranded
	20...22	AWG	
Input wire strip length	7.5...8.5	mm	
Tested cable length	4000	mm	Total length of wiring including LED modules, one way

Connector suited for robot wiring.

Mechanical characteristics

Parameter	Min	Typ	Max	Unit
Length	279.4	279.7	280	mm
Width	39.8	40.0	40.6	mm
Height excl. connector	4.3	4.65	5.00	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

Compliance and approval

IEC / EN 62031, IEC / EN 62471

Photobiological safety

Risk group: Risk group 1

Environmental

RoHS / REACH.

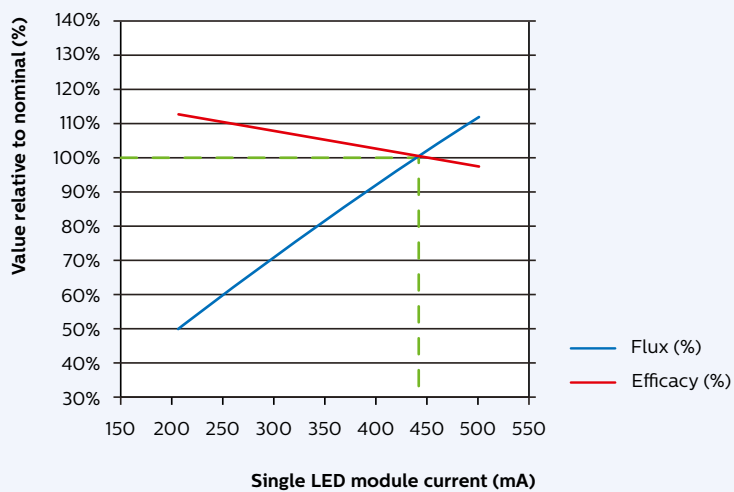
Zhaga	Compliant
IP rating	No IP rating
Overheating protection	No protection
Luminaire class	IEC Class I or Class II

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	

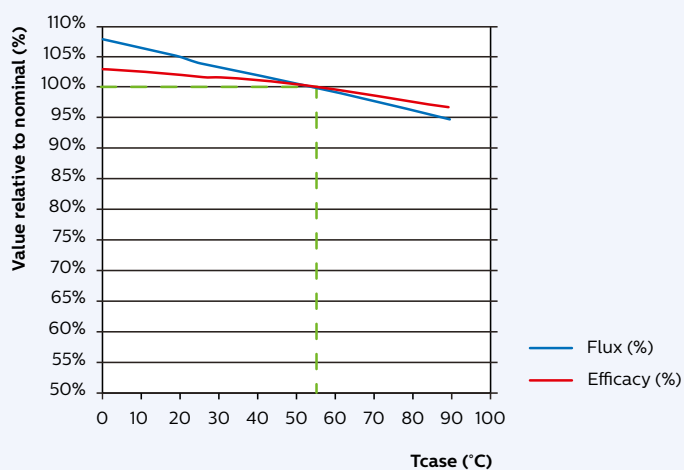
Tuning information

Flux and efficacy versus current



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

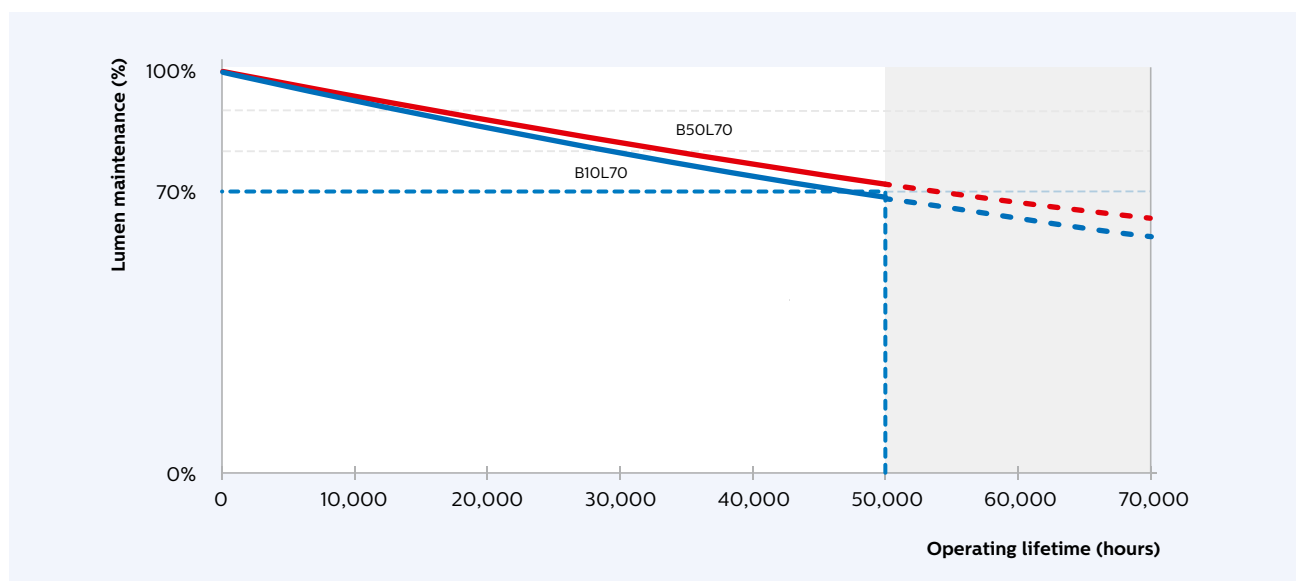
Flux and efficacy versus temperature at Tc



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

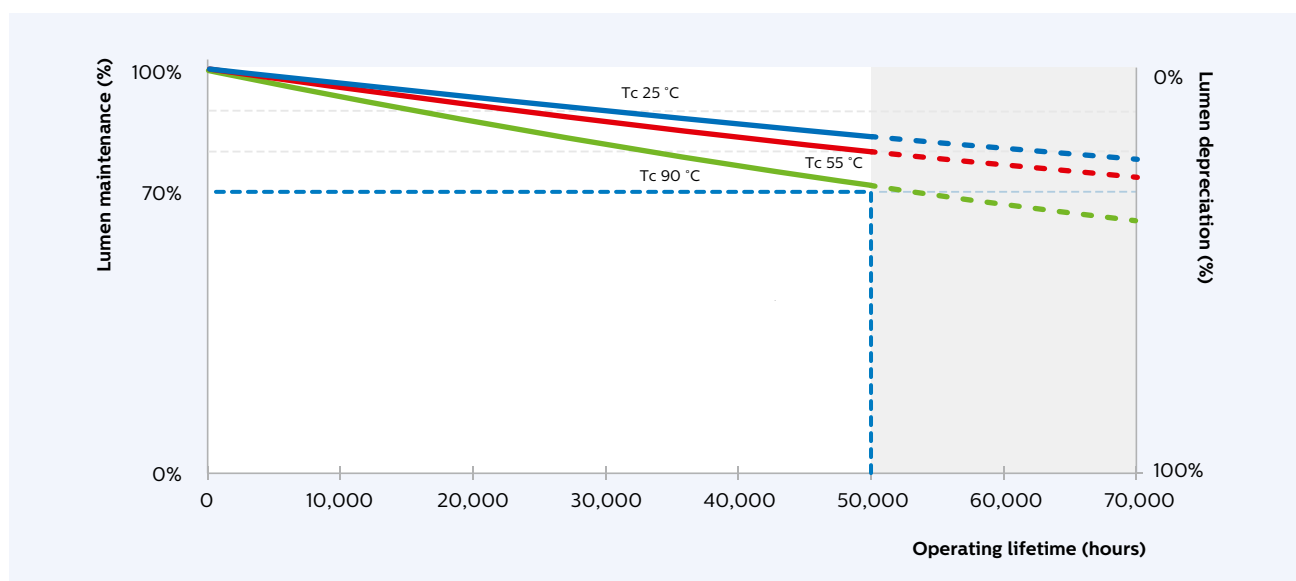
Lumen maintenance

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



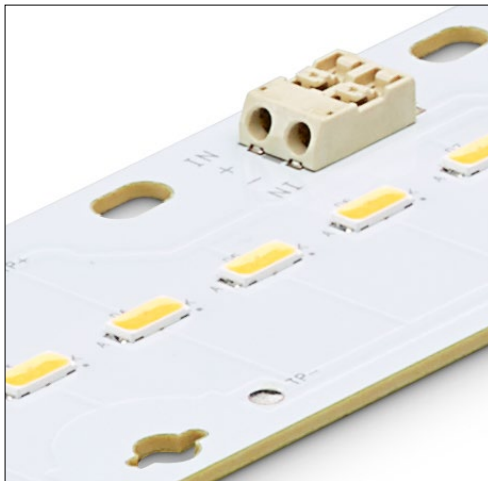
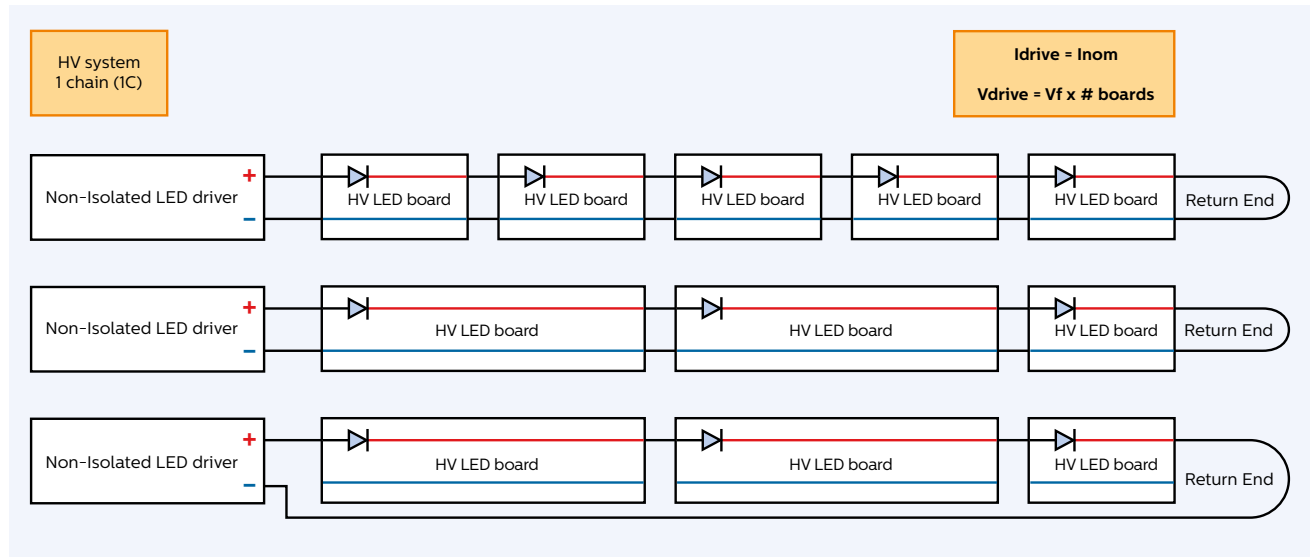
Lumen depreciation as a function of operating hours at different Tc values and I-life.

Wiring schematic

Examples

Fortimo LED Line 1 ft 2000 lm 1R HV2

And two examples of combining 1ft with 2ft boards, in this example making 5ft total length





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05/2015
Data subject to change