

PHILIPS

Fortimo

LED system

LED Line 2 ft
2200 lm 9xx 1R HV3



Datasheet

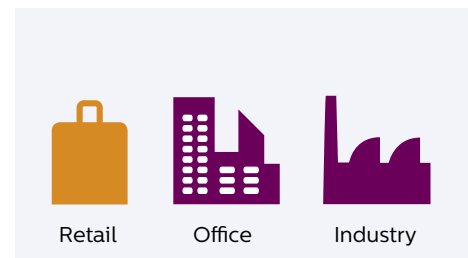
Fortimo LED Line Gen3

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:



June 2015



Ordering data

Commercial product name	EOC	12NC
Fortimo LED Line 2ft 2200lm 930 1R HV3	8718696 481066 00	9290 009 66006
Fortimo LED Line 2ft 2200lm 940 1R HV3	8718696 481080 00	9290 009 66106

Drive currents and case temperatures

Parameter	Nominal*	Life**	Max***	Unit
I (current through the LED module)	275	400	400	mA
Tc (case temperature at Tc point)	50	80	85	°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 2ft 2200 lm 930 1R HV3

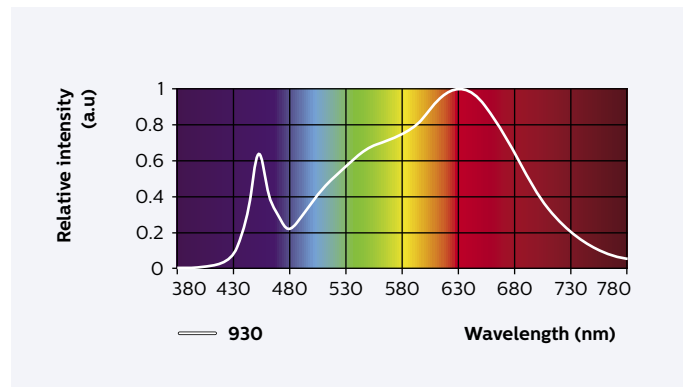
Parameter	Min	Typ	Max	Unit
Correlated color temperature (CCT)		3000		K
Color coordinates (CIEx, CIEy)		(0.431, 0.396)		-
CRI'	90			-
Radiation angle		120		deg

Color consistency of 3 SDCM, averaged over the module.

Operation point	3000K	lm	lm/W
80% I-nom 220 mA	Tc 25 °C	1692	120
	Tc-nom 50 °C	1635	118
	Tc-life 80 °C	1552	113
I-nom 275 mA	Tc 25 °C	2070	116
	Tc-nom 50 °C	2000	113
	Tc-life 80 °C	1898	109
I-life 400 mA	Tc 25 °C	2884	106
	Tc-nom 50 °C	2786	104
	Tc-life 80 °C	2644	100

Tolerance for flux data is ±7.5%.

Tolerance for efficacy data is ±10%.



Fortimo LED Line 2ft 2200 lm 940 1R HV3

Parameter	Min	Typ	Max	Unit
Correlated color temperature (CCT)		4000K		K
Color coordinates (CIEx, CIEy)		(0.379, 0.373)		-
CRI'	90			-
Radiation angle		120		deg

Color consistency of 3 SDCM, averaged over the module.

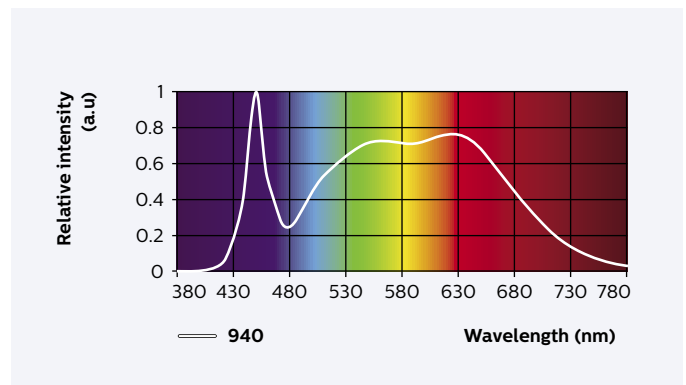
Operation point	4000K	lm	lm/W
80% I-nom 220 mA	Tc 25 °C	1861	132
	Tc-nom 50 °C	1799	129
	Tc-life 80 °C	1707	125
I-nom 275 mA	Tc 25 °C	2277	127
	Tc-nom 50 °C	2200	124
	Tc-life 80 °C	2088	120
I-life 400 mA	Tc 25 °C	3173	117
	Tc-nom 50 °C	3065	115
	Tc-life 80 °C	2908	110

Tolerance for flux data is ±7.5%.

Tolerance for efficacy data is ±10%.

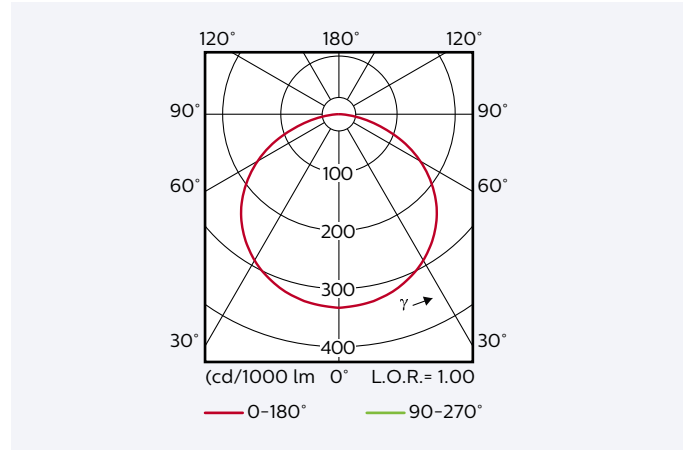
Measurement tolerance is ± 2.5% for the flux data and 5% for the efficacy data.

* Measurement tolerance is ± 1.



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		275		mA
Forward voltage	61.5	64.3	67.2	V
Power consumption	16.9	17.7	18.5	W
Energy efficiency label		A+		
Minimum dimming for performance	10			%
Number of modules per chain			4	
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 220 mA	Tc 25 °C	>50	>50	>50	>50	>50	>50	>50	>50	>50
	Tc-nom 50 °C	>50	>50	>50	>50	>50	>50	>50	>50	>50
	Tc-life 80 °C	>50	>50	>50	>50	>50	>50	>50	>50	>50
I-nom 275 mA	Tc 25 °C	>50	>50	>50	>50	>50	>50	>50	>50	>50
	Tc-nom 50 °C	>50	>50	>50	>50	>50	>50	>50	>50	>50
	Tc-life 80 °C	>50	>50	>50	>50	>50	>50	45	44	43
I-life 400 mA	Tc 25 °C	>50	>50	>50	>50	>50	>50	>50	>50	>50
	Tc-nom 50 °C	>50	>50	>50	>50	>50	>50	30	29	28
	Tc-life 80 °C	>50	>50	>50	43	42	41	20	20	19

Values in the table are based on available LM80 LED data (8000h). Lumen maintenance will be updated once additional measurement data becomes available. 50k 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 $T_c < T_{c-life}$ and $I < I-life$.

Absolute maximum ratings

Parameter	Min	Typ	Max	Unit
Current through the LED module (I-max)			400	mA
Case temperature (Tc-max)			85	°C
Power rated at U-max and I-max			28	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

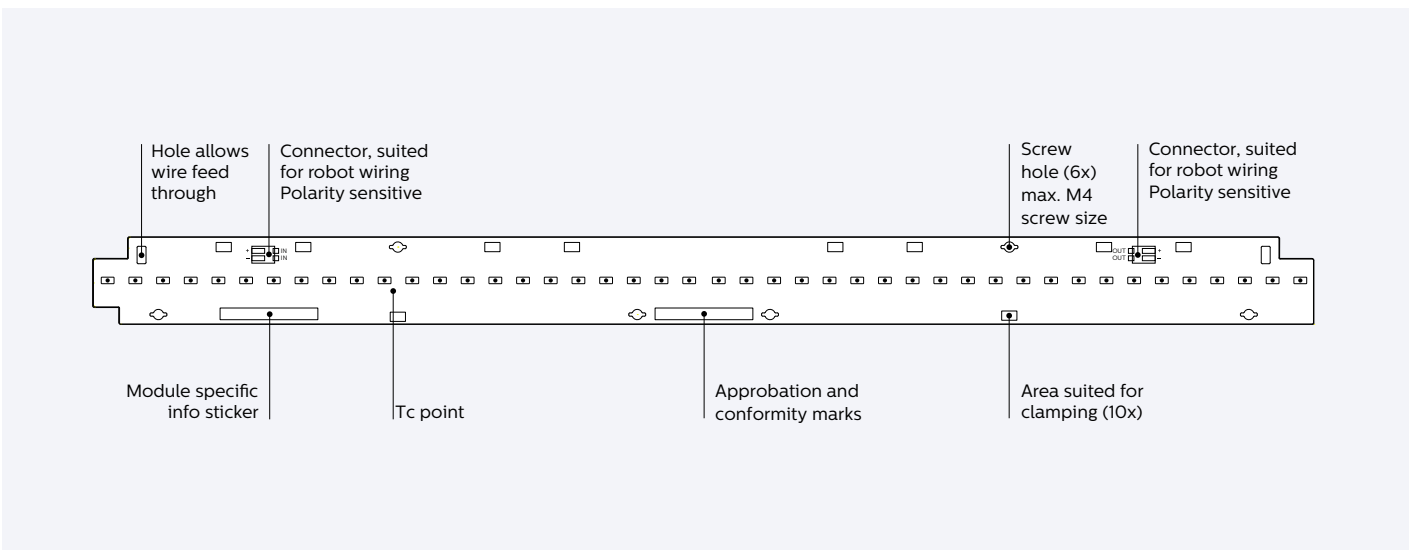
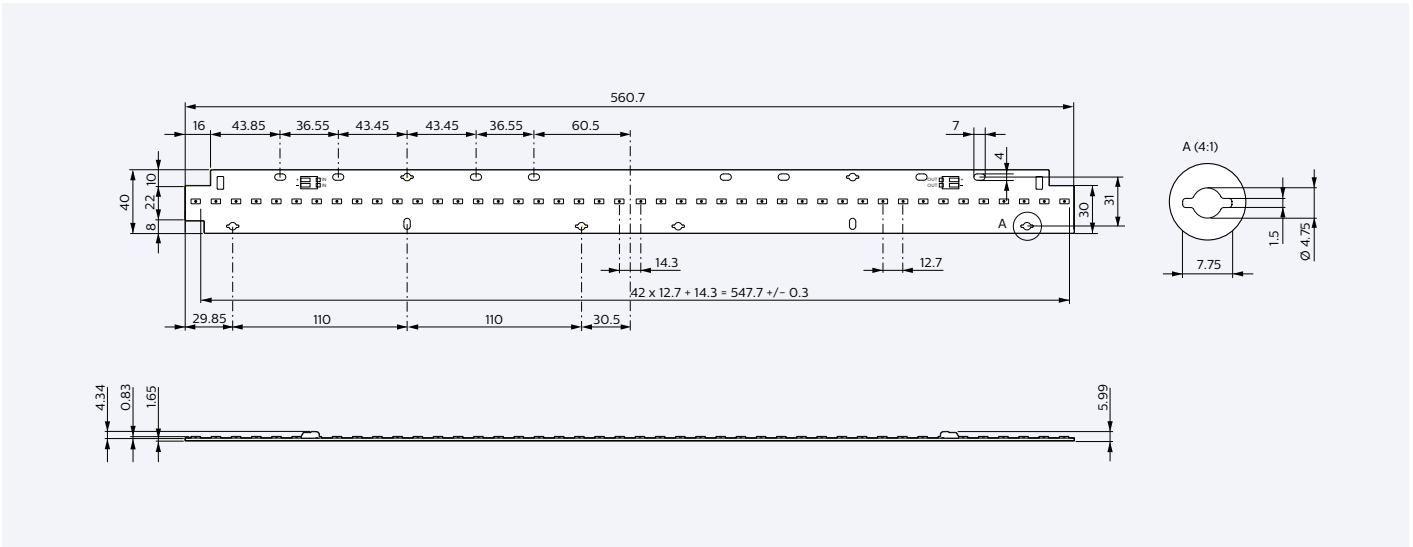
Specification item	Value	Unit	Condition
Input wire cross-section	0.2...0.75	mm ²	Solid
	18...24	AWG	
	0.3...0.5	mm ²	Stranded
	20...22	AWG	
Input wire strip length	7.5..8.5	mm	
Tested cable length	4000	mm	Total length of wiring including LED modules, one way

Connector suited for robot wiring.

Mechanical characteristics

Parameter	Min	Typ	Max	Unit
Length	560.2	560.7	561.2	mm
Width	39.5	40	40.5	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

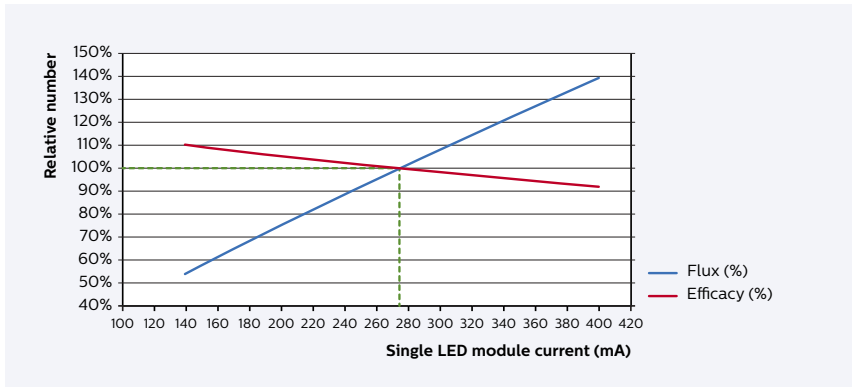
Zhaga	
Designation of the Book-7 LLE category	L56W4
Luminous Flux category	C020
CCT category	3000 K, 4000 K
CRI	90
The position of the temperature measurement point t_p	same as T_c point
The value of $t_{p,max}$	50

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

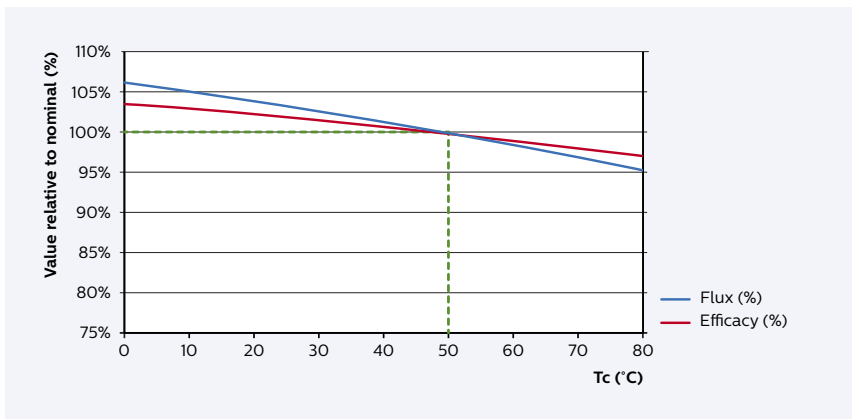
Case temperature T_c [°C]	Amount of cycles
35	14,600
40	14,600
45	14,600
50	14,600
55	14,600
60	14,600
65	14,600
70	14,600
75	14,600
80	14,600
85	14,600

Tuning information



Flux and efficacy versus current

	I [mA]	Flux [%]	Efficacy [%]
50% Inom	140	54%	111%
	160	61%	109%
	180	68%	107%
	200	75%	106%
80% Inom	220	82%	104%
	240	88%	103%
	260	95%	101%
	I nom	275	100%
	280	102%	100%
	300	108%	98%
	320	114%	97%
	340	121%	96%
	360	127%	94%
	380	133%	93%
I life	400	139%	92%

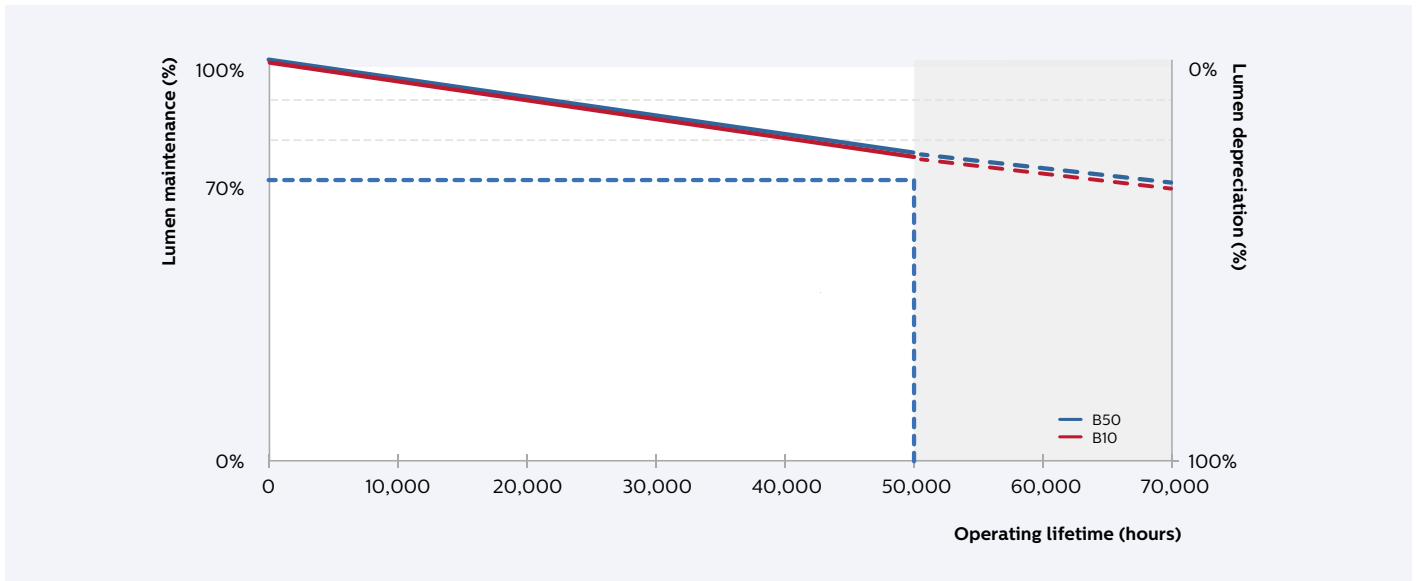


Flux and efficacy versus temperature at Tc

	Tc [°C]	Flux [%]	Efficacy [%]
	0	106%	104%
	20	104%	102%
	25	103%	102%
	30	102%	101%
	40	101%	100%
Tc nom	50	100%	100%
	60	98%	99%
	70	97%	98%
Tc Life	80	95%	97%

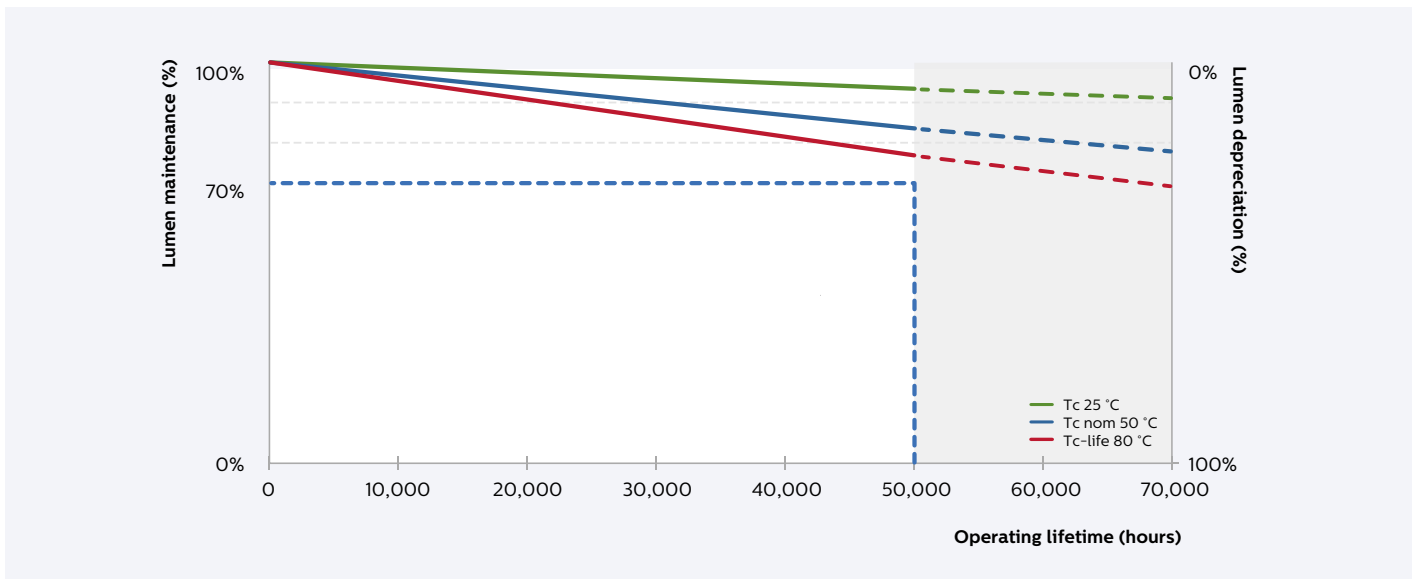
Lumen maintenance

Lumen maintenance at I-life and Tc-life conditions



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

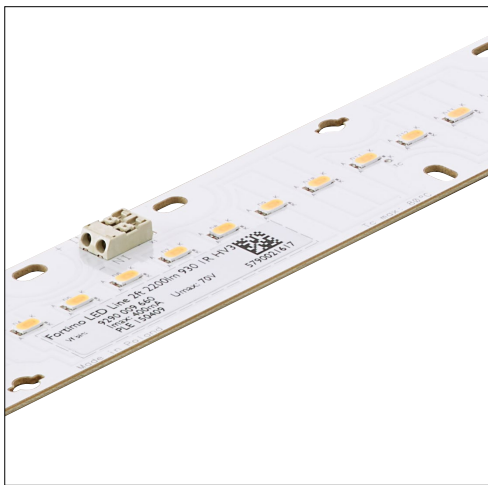
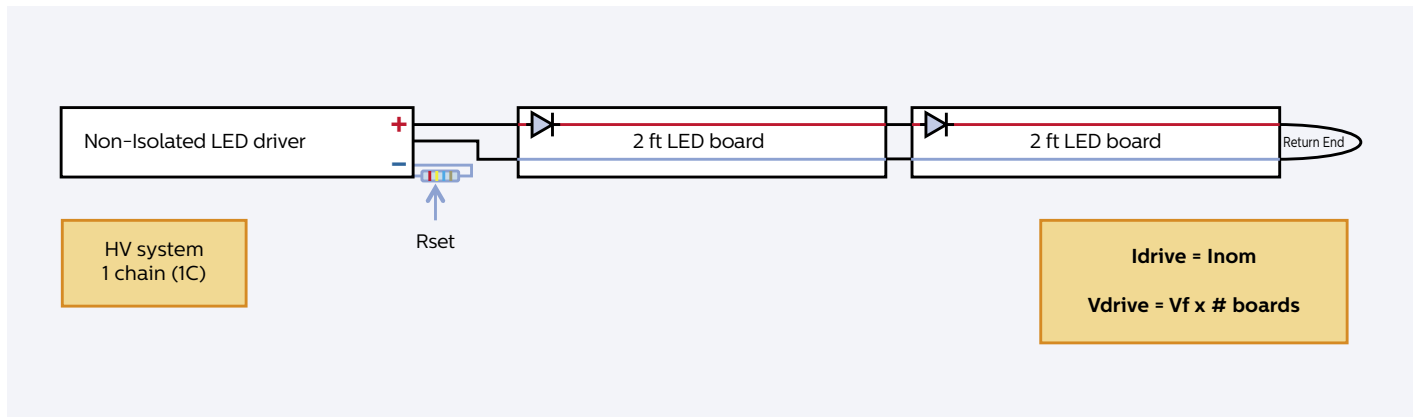
Lumen maintenance for B50 at current I-life conditions



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

Wiring schematic

Examples





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Data subject to change