TLCS / R / O / Y / YG / PG / TG / BG / B5100

Vishay Semiconductors

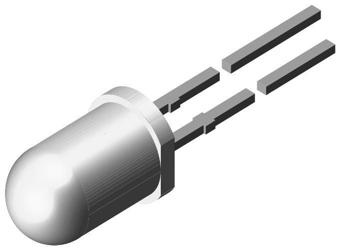
Ultrabright LED, ∅ 5 mm Untinted Non-Diffused

Description

The TLC.51.. series is a clear, non diffused 5 mm LED for high end applications where supreme luminous intensity required.

These lamps with clear untinted plastic case utilize the highly developed ultrabright AlInGaP (AS) and InGaN technologies.

The lens and the viewing angle is optimized to achieve best performance of light output and visibility.



e2

Pb-free

Features

- Untinted non diffused lens
- Utilizing ultrabright AllnGaP (AS) and InGaN technology
- High luminous intensity
- High operating tempreature: T_j (chip junction temperature) up to 125 °C for AllnGaP devices
- Luminous intensity and color categorized for each packing unit
- ESD-withstand voltage: 2 kV acc. to MIL STD 883 D, Method 3015.7 for AllnGaP, 1 kV for InGaN
- Lead-free device

Applications

Interior and exterior lighting

Outdoor LED panels

Instrumentation and front panel indicators

Central high mounted stop lights (CHMSL) for motor vehicles

Replaces incandescent lamps

Traffic signals

Light guide design

Parts Table

Part	Color, Luminous Intensity	Angle of Half Intensity (±φ)	Technology
TLCS5100	Red, I_V 7500 mcd (typ)	9 °	AllnGaP on GaAs
TLCR5100	Red, I_V 12000 mcd (typ.)	9 °	AllnGaP on GaAs
TLCO5100	Orange, I_V 12000 mcd (typ.)	9 °	AllnGaP on GaAs
TLCY5100	Yellow, I_V 10000 mcd (typ.)	9 °	AllnGaP on GaAs
TLCY5101	Yellow, I_V 6900 mcd to 16000 mcd	9 °	AllnGaP on GaAs
TLCYG5100	Yellow green, I_V 3500 mcd (typ.)	9 °	AllnGaP on GaAs
TLCPG5100	Pure green, I_V 1250 mcd (typ.)	9 °	AllnGaP on GaAs
TLCTG5100	True green, I_V 6000 mcd (typ.)	9 °	InGaN on SiC
TLCBG5100	Blue green, I_V 6000 mcd (typ.)	9 °	AllnGaP on GaAs
TLCB5100	Blue, I_V 1500 mcd (typ.)	9 °	InGaN on SiC

Absolute Maximum Ratings

T_{amb} = 25 °C, unless otherwise specified

TLCS5100 , TLCR5100 , TLCO5100 , TLCY5100 , TLCYG5100 , TLCPG5100

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	5	V
DC Forward current	$T_{amb} \leq 85$ °C	I_F	50	mA
Surge forward current	$t_p \leq 10\ \mu s$	I_{FSM}	1	A
Power dissipation	$T_{amb} \leq 85$ °C	P_V	135	mW
Junction temperature		T_j	125	°C
Operating temperature range		T_{amb}	- 40 to + 100	°C
Storage temperature range		T_{stg}	- 40 to + 100	°C
Soldering temperature	t ≤ 5 s, 2 mm from body	T_{sd}	260	°C
Thermal resistance junction/ ambient		R_{thJA}	300	K/W

TLCTG5100 , TLCB5100 , TLCBG5100

Parameter	Test condition	Symbol	Value	Unit
Reverse voltage		V_R	5	V
DC Forward current	$T_{amb} \leq 60$ °C	I_F	30	mA
Surge forward current	$t_p \leq 10\ \mu s$	I_{FSM}	0.1	A
Power dissipation	$T_{amb} \leq 60$ °C	P_V	135	mW
Junction temperature		T_j	100	°C
Operating temperature range		T_{amb}	- 40 to + 100	°C
Storage temperature range		T_{stg}	- 40 to + 100	°C
Soldering temperature	t ≤ 5 s, 2 mm from body	T_{sd}	260	°C
Thermal resistance junction/ ambient		R_{thJA}	300	K/W

Optical and Electrical Characteristics

T_{amb} = 25 °C, unless otherwise specified

Super red

TLCS5100

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Luminous intensity [1]	I_F = 50 mA	TLCS5100	I_V	2400	7500		mcd
Dominant wavelength	I_F = 50 mA		λ_d	626	630	638	nm
Peak wavelength	I_F = 50 mA		λ_p		641		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	I_F = 50 mA		$\Delta\lambda$		20		nm
Angle of half intensity	I_F = 50 mA		φ		± 9		deg
Forward voltage	I_F = 50 mA		V_F		2.1	2.7	V
Reverse voltage	$I_R = 10\ \mu A$		V_R	5			V
Temperature coefficient of V_F	I_F = 50 mA		TC_{VF}		- 2		mV/K
Temperature coefficient of λ_d	I_F = 50 mA		$TC\lambda_d$		0.04		nm/K

[1] in one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

Red

TLCR5100

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Luminous intensity [1]	I_F = 50 mA	TLCR5100	I_V	4300	12000		mcd
Dominant wavelength	I_F = 50 mA		λ_d	611	616	622	nm
Peak wavelength	I_F = 50 mA		λ_p		622		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	I_F = 50 mA		$\Delta\lambda$		18		nm
Angle of half intensity	I_F = 50 mA		φ		± 9		deg
Forward voltage	I_F = 50 mA		V_F		2.1	2.7	V
Reverse voltage	I_R = 10 µA		V_R	5			V
Temperature coefficient of V_F	I_F = 50 mA		TC_{VF}		- 3.2		mV/K
Temperature coefficient of λ_d	I_F = 50 mA		$TC\lambda_d$		0.08		nm/K

[1] in one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

Soft orange

TLCO5100

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Luminous intensity [1]	I_F = 50 mA	TLCO5100	I_V	4300	12000		mcd
Dominant wavelength	I_F = 50 mA		λ_d	600	605	611	nm
Peak wavelength	I_F = 50 mA		λ_p		611		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	I_F = 50 mA		$\Delta\lambda$		17		nm
Angle of half intensity	I_F = 50 mA		φ		± 9		deg
Forward voltage	I_F = 50 mA		V_F		2.1	2.7	V
Reverse voltage	I_R = 10 µA		V_R	5			V
Temperature coefficient of V_F	I_F = 50 mA		TC_{VF}		- 2.5		mV/K
Temperature coefficient of λ_d	I_F = 50 mA		$TC\lambda_d$		0.08		nm/K

[1] in one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

Yellow

TLCY5100

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Luminous intensity [1]	I_F = 50 mA	TLCY5100	I_V	3200	10000		mcd
		TLCY5101	I_V	6900		16000	mcd
Dominant wavelength	I_F = 50 mA		λ_d	585	590	597	nm
Peak wavelength	I_F = 50 mA		λ_p		593		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	I_F = 50 mA		$\Delta\lambda$		15		nm
Angle of half intensity	I_F = 50 mA		φ		± 9		deg
Forward voltage	I_F = 50 mA		V_F		2.1	2.7	V
Reverse voltage	I_R = 10 µA		V_R	5			V
Temperature coefficient of V_F	I_F = 50 mA		TC_{VF}		- 2.1		mV/K
Temperature coefficient of λ_d	I_F = 50 mA		$TC\lambda_d$		0.1		nm/K

[1] in one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

Yellow green

TLCYG5100

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Luminous intensity [1]	I_F = 50 mA	TLCYG5100	I_V	1350	3500		mcd
Dominant wavelength	I_F = 50 mA		λ_d	565	572	577	nm
Peak wavelength	I_F = 50 mA		λ_p		574		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	I_F = 50 mA		$\Delta\lambda$		15		nm
Angle of half intensity	I_F = 50 mA		φ		± 9		deg
Forward voltage	I_F = 50 mA		V_F		2.2	2.7	V
Reverse voltage	I_R = 10 μA		V_R	5			V
Temperature coefficient of V_F	I_F = 50 mA		TC_{VF}		- 4.5		mV/K
Temperature coefficient of λ_d	I_F = 50 mA		$TC\lambda_d$		0.1		nm/K

[1] in one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

Pure green

TLCPG5100

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Luminous intensity [1]	I_F = 50 mA	TLCPG5100	I_V	430	1250		mcd
Dominant wavelength	I_F = 50 mA		λ_d	555	562	567	nm
Peak wavelength	I_F = 50 mA		λ_p		563		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	I_F = 50 mA		$\Delta\lambda$		20		nm
Angle of half intensity	I_F = 50 mA		φ		± 9		deg
Forward voltage	I_F = 50 mA		V_F		2.2	2.7	V
Reverse voltage	I_R = 10 μA		V_R	5			V
Temperature coefficient of V_F	I_F = 50 mA		TC_{VF}		- 3.5		mV/K
Temperature coefficient of λ_d	I_F = 50 mA		$TC\lambda_d$		0.1		nm/K

[1] in one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

True green

TLCTG5100

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Luminous intensity [1]	I_F = 30 mA	TLCTG5100	I_V	1800	6000		mcd
Dominant wavelength	I_F = 30 mA		λ_d	515	525	535	nm
Peak wavelength	I_F = 30 mA		λ_p		520		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	I_F = 30 mA		$\Delta\lambda$		35		nm
Angle of half intensity	I_F = 30 mA		φ		± 9		deg
Forward voltage	I_F = 30 mA		V_F		3.9	4.5	V
Reverse voltage	I_R = 10 μA		V_R	5			V
Temperature coefficient of V_F	I_F = 30 mA		TC_{VF}		- 3.8		mV/K
Temperature coefficient of λ_d	I_F = 30 mA		$TC\lambda_d$		0.03		nm/K

[1] in one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

Blue green

TLCBG5100

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Luminous intensity [1]	$I_F = 30$ mA	TLCBG5100	I_V	1800	6000		mcd
Dominant wavelength	$I_F = 30$ mA		λ_d	496	505	514	nm
Peak wavelength	$I_F = 30$ mA		λ_p		502		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	$I_F = 30$ mA		$\Delta\lambda$		30		nm
Angle of half intensity	$I_F = 30$ mA		φ		± 9		deg
Forward voltage	$I_F = 30$ mA		V_F		3.9	4.5	V
Reverse voltage	$I_R = 10\ \mu A$		V_R	5			V
Temperature coefficient of V_F	$I_F = 30$ mA		TC_{VF}		- 3.5		mV/K
Temperature coefficient of λ_d	$I_F = 30$ mA		$TC\lambda_d$		0.01		nm/K

[1] in one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

Blue

TLCB5100

Parameter	Test condition	Part	Symbol	Min	Typ.	Max	Unit
Luminous intensity [1]	$I_F = 30$ mA	TLCB5100	I_V	575	1500		mcd
Dominant wavelength	$I_F = 30$ mA		λ_d	462	470	476	nm
Peak wavelength	$I_F = 30$ mA		λ_p		464		nm
Spectral bandwidth at 50 % $I_{rel\ max}$	$I_F = 30$ mA		$\Delta\lambda$		26		nm
Angle of half intensity	$I_F = 30$ mA		φ		± 9		deg
Forward voltage	$I_F = 30$ mA		V_F		3.9	4.5	V
Reverse voltage	$I_R = 10\ \mu A$		V_R	5			V
Temperature coefficient of V_F	$I_F = 30$ mA		TC_{VF}		- 4.7		mV/K
Temperature coefficient of λ_d	$I_F = 30$ mA		$TC\lambda_d$		0.02		nm/K

[1] in one Packing Unit $I_{Vmax}/I_{Vmin} \leq 2.0$

Color Classification

Group	Dominant Wavelength (nm)													
	Red		Softorange		Yellow		Pure green		Truegreen		Bluegreen		Blue	
	min	max	min	max	min	max	min	max	min	max	min	max	min	max
0					585	588	555	559						
1	611	618	598	601	587	591	558	561						
2	614	622	600	603	589	594	560	563	509	517	492	498	458	464
3			602	605	592	597	562	565	515	523	496	502	462	468
4			604	607			564	567	521	529	500	506	466	472
5			606	609			566	569	527	535	504	510	470	476
6			608	611			568	571			508	514		
7							570	573						
8							572	575						
9							574	577						

Luminous Intensity Classification

Group	Light Intensity (mcd) / Luminous Flux [mlm]	
	min	max
AA	320	640
BB	430	860
CC	575	1150
DD	750	1500
EE	1000	2000
FF	1350	2700
GG	1800	3600
HH	2400	4800
II	3200	6400
KK	4300	8600
LL	5750	11500
MM	7500	15000
NN	10000	20000
PP	13500	27000
QQ	18000	36000
RR	24000	48000
SS	32000	64000
TT	43000	86000
UU	57500	115000

Typical Characteristics (Tamb = 25 °C unless otherwise specified)

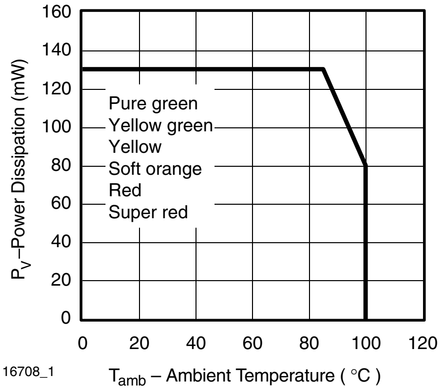


Figure 1. Power Dissipation vs. Ambient Temperature

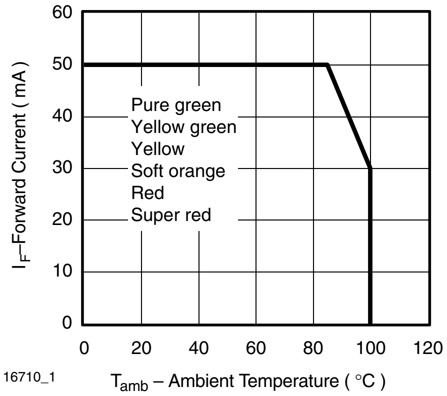


Figure 2. Forward Current vs. Ambient Temperature

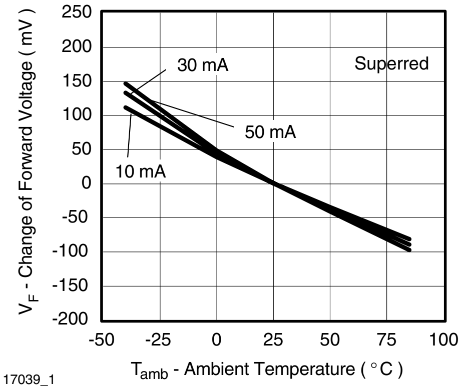


Figure 3. Change of Forward Voltage vs. Ambient Temperature

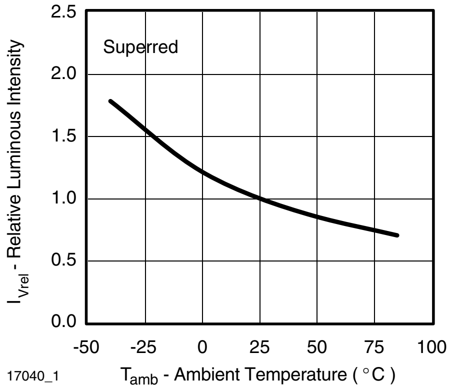


Figure 4. Relative Luminous Intensity vs. Ambient Temperature

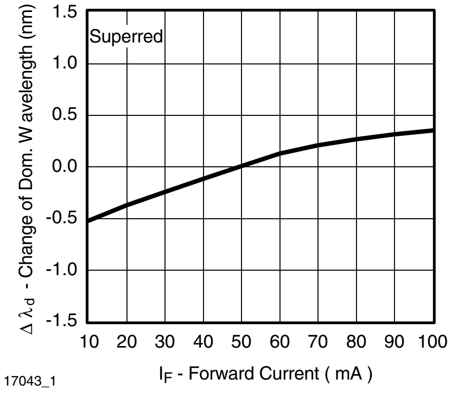


Figure 5. Change of Dominant Wavelength vs. Ambient Temperature

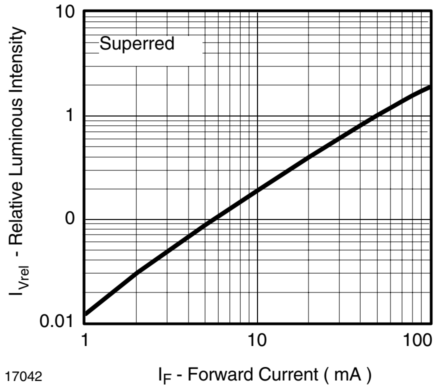


Figure 6. Relative Luminous Flux vs. Forward Current

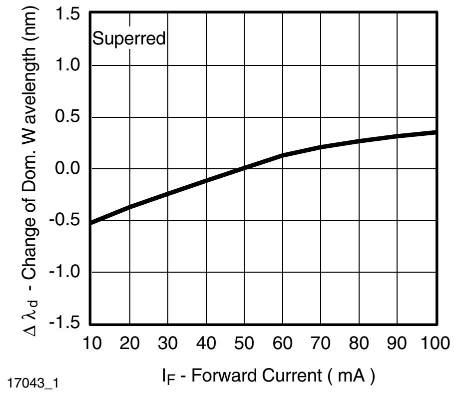


Figure 7. Change of Dominant Wavelength vs. Forward Current

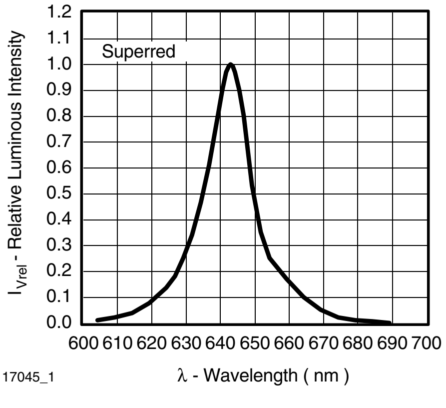


Figure 8. Relative Intensity vs. Wavelength

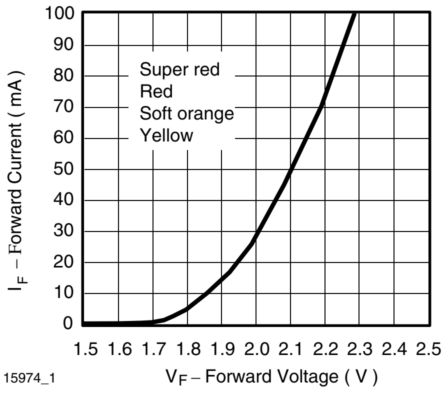


Figure 9. Forward Current vs. Forward Voltage

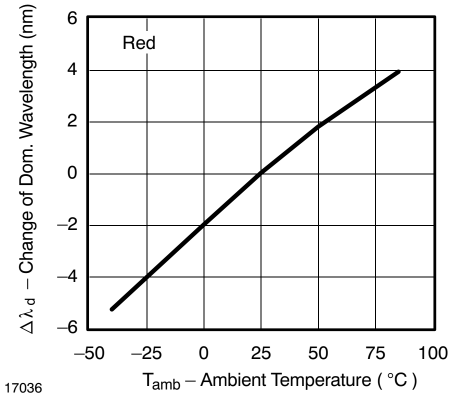


Figure 12. Change of Dominant Wavelength vs. Ambient Temperature

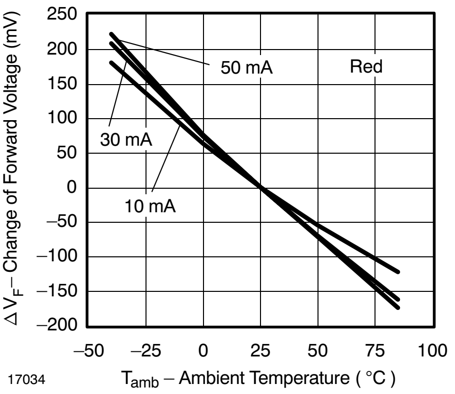


Figure 10. Change of Forward Voltage vs. Ambient Temperature

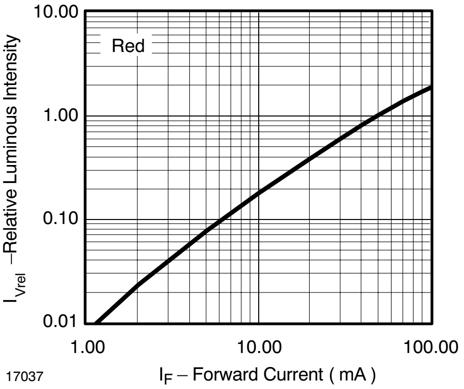


Figure 13. Relative Luminous Flux vs Forward Current

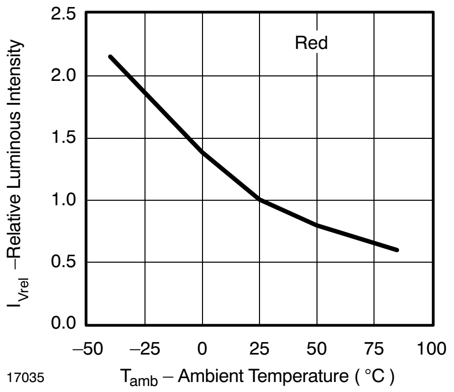


Figure 11. Relative Luminous Intensity vs. Ambient Temperature

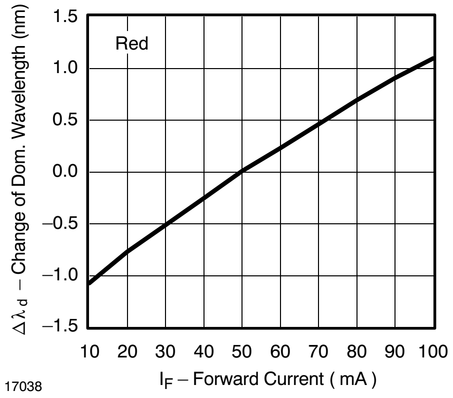


Figure 14. Changes of Dominant Wavelength vs. Forward Current

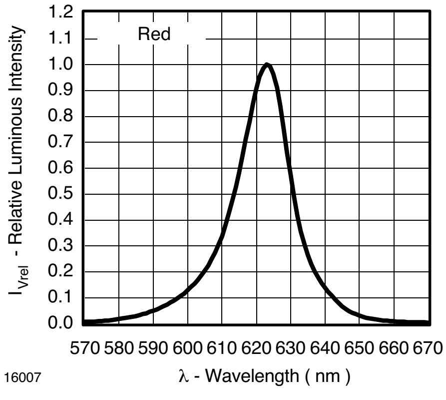


Figure 15. Relative Intensity vs. Wavelength

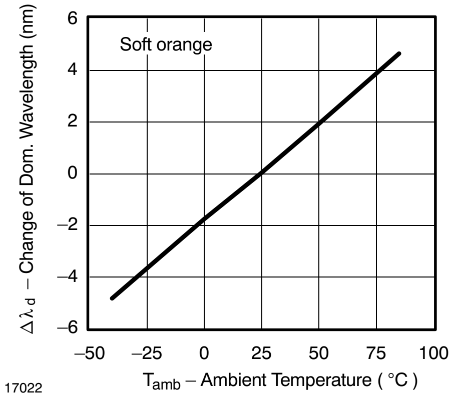


Figure 18. Change of Dominant Wavelength vs. Ambient Temperature

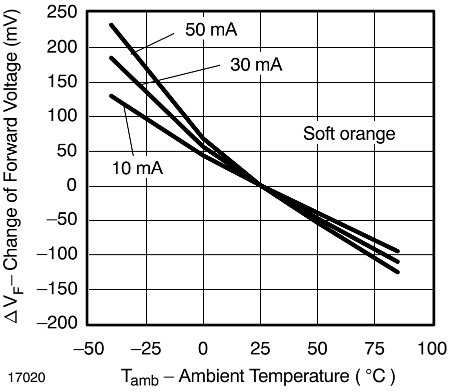


Figure 16. Change of Forward Voltage vs. Ambient Temperature

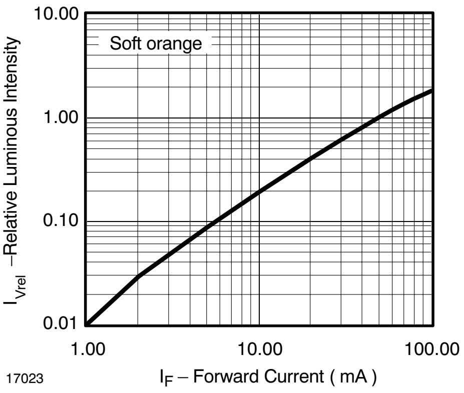


Figure 19. Relative Luminous Flux vs. Forward Current

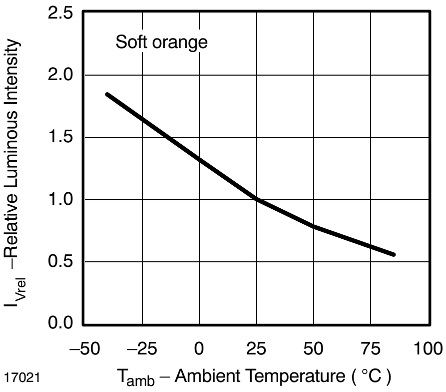


Figure 17. Relative Luminous Intensity vs. Ambient Temperature

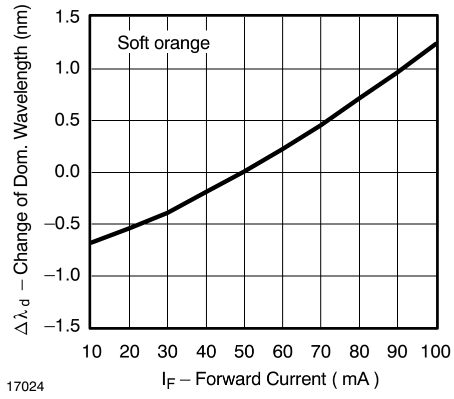


Figure 20. Change of Dominant Wavelength vs. Forward Current

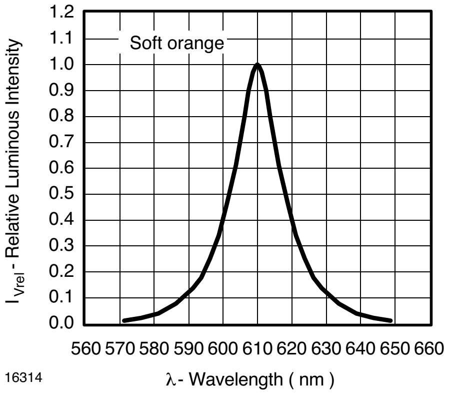


Figure 21. Relative Intensity vs. Wavelength

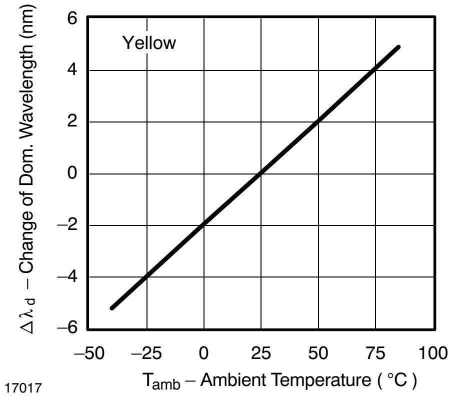


Figure 24. Change of Dominant Wavelength vs. Ambient Temperature

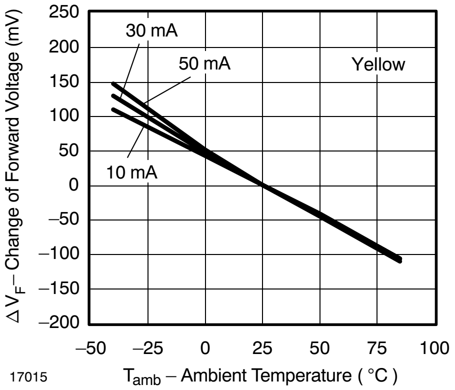


Figure 22. Change of Forward Voltage vs. Ambient Temperature

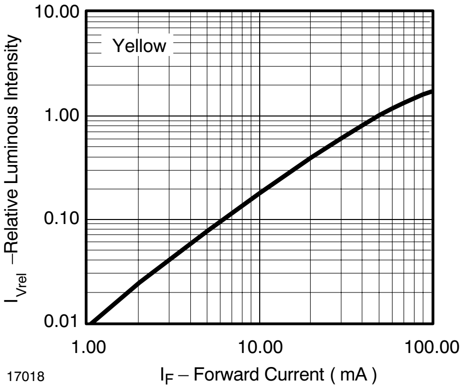


Figure 25. Relative Luminous Flux vs. Forward Current

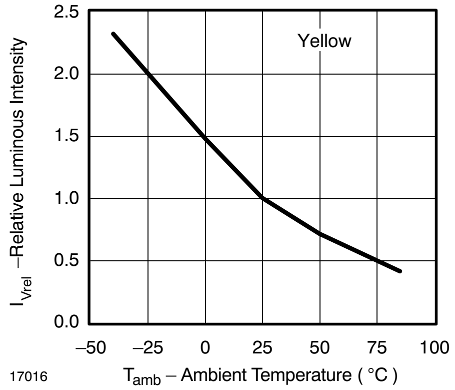


Figure 23. Relative Luminous Intensity vs. Ambient Temperature

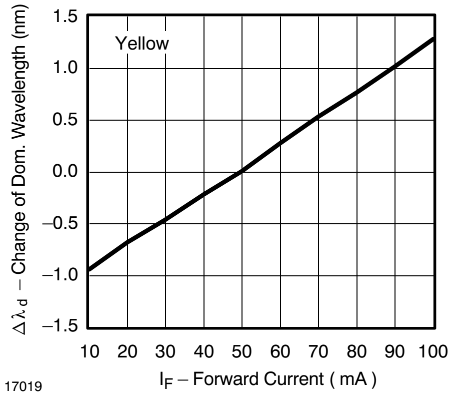


Figure 26. Change of Dominant Wavelength vs. Forward Current

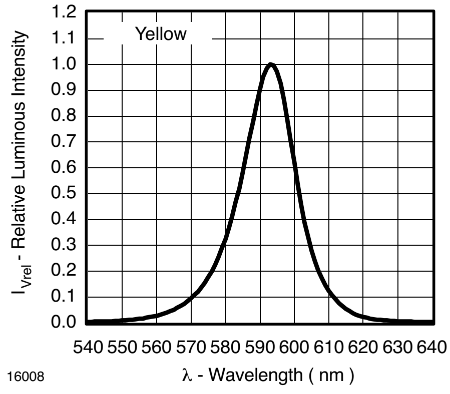


Figure 27. Relative Intensity vs. Wavelength

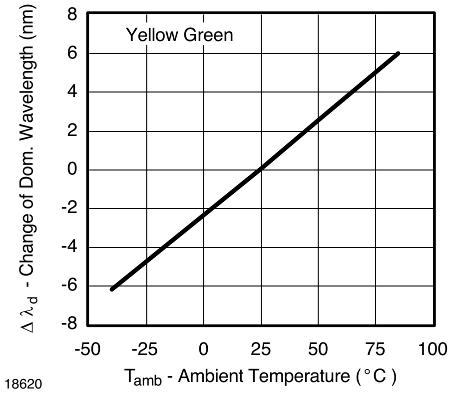


Figure 30. Change of Dominant Wavelength vs. Ambient Temperature

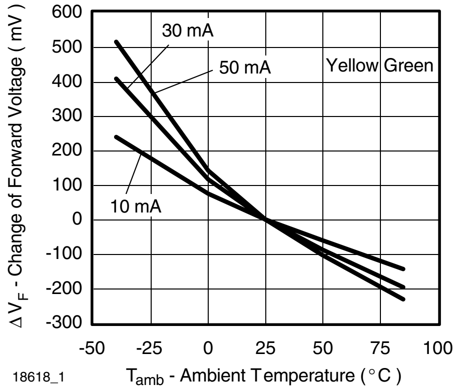


Figure 28. Change of Forward Voltage vs. Ambient Temperature

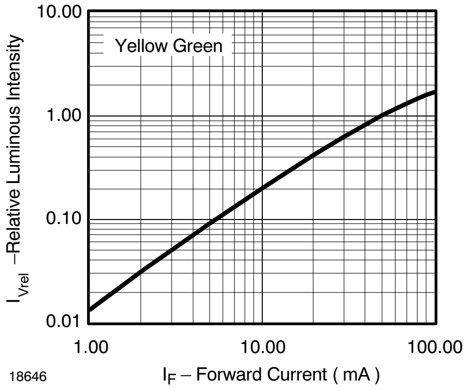


Figure 31. Relative Luminous Flux vs. Forward Current

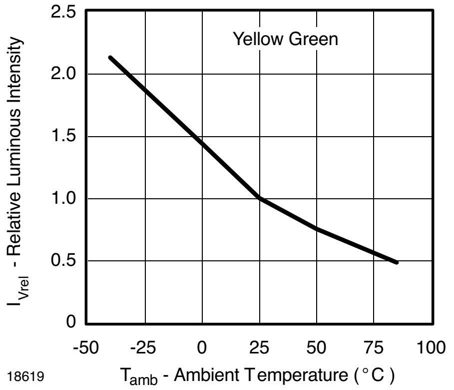


Figure 29. Relative Luminous Intensity vs. Ambient Temperature

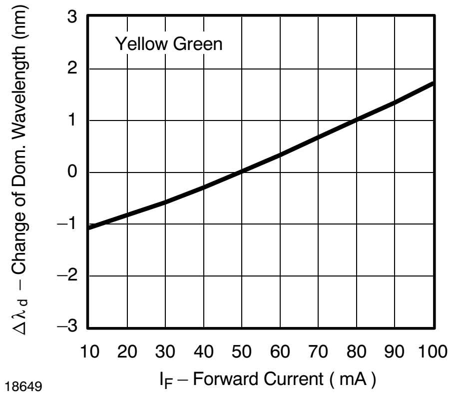


Figure 32. Change of Dominant Wavelength vs. Forward Current

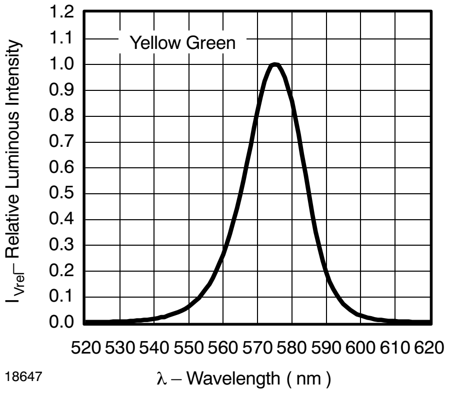


Figure 33. Relative Intensity vs. Wavelength

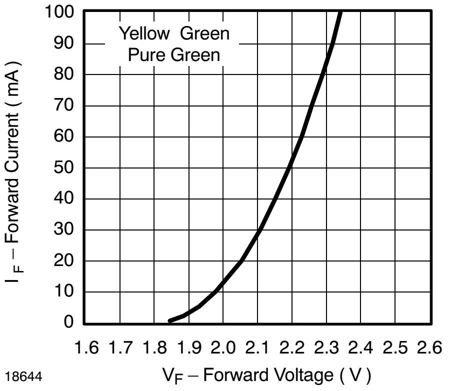


Figure 34. Forward Current vs. Forward Voltage

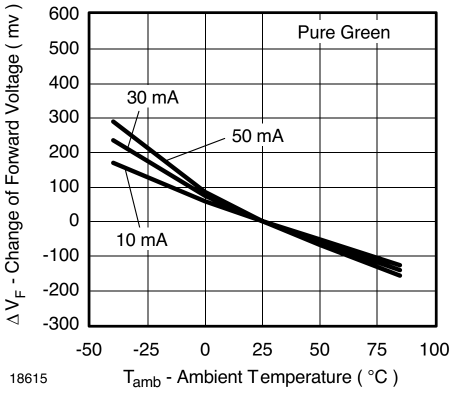


Figure 35. Change of Forward Voltage vs. Ambient Temperature

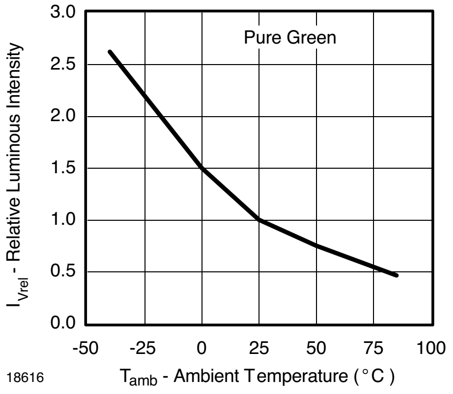


Figure 36. Relative Luminous Intensity vs. Ambient Temperature

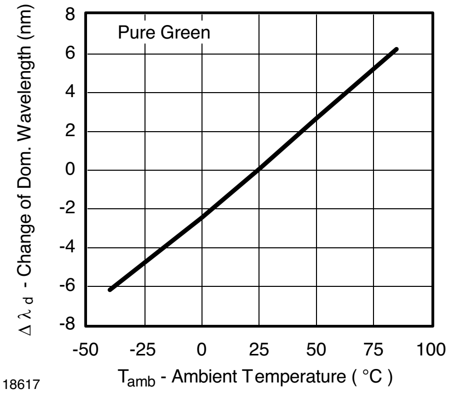


Figure 37. Change of Dominant Wavelength vs. Ambient Temperature

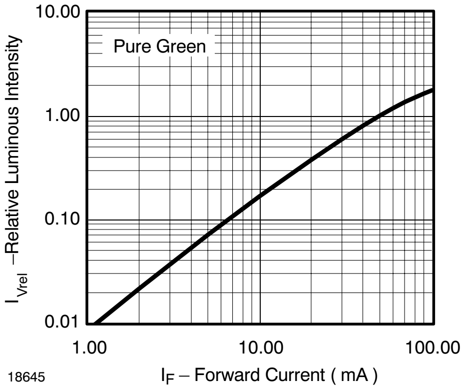


Figure 38. Relative Luminous Flux vs. Forward Current

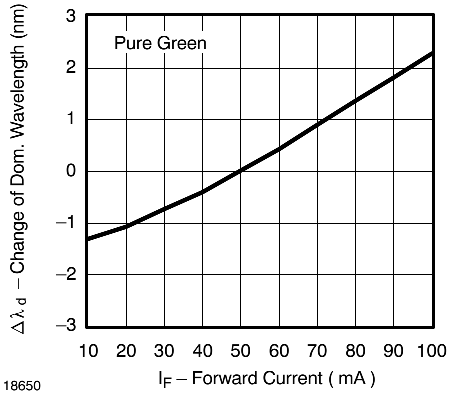


Figure 39. Change of Dominant Wavelength vs. Forward Current

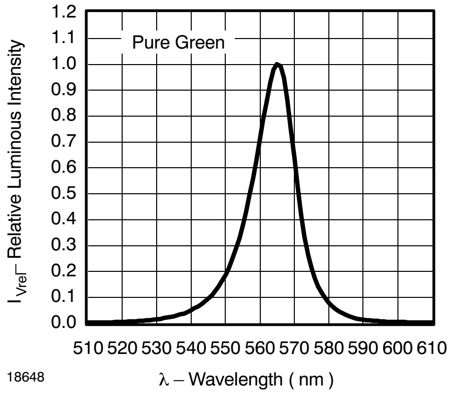


Figure 40. Relative Intensity vs. Wavelength

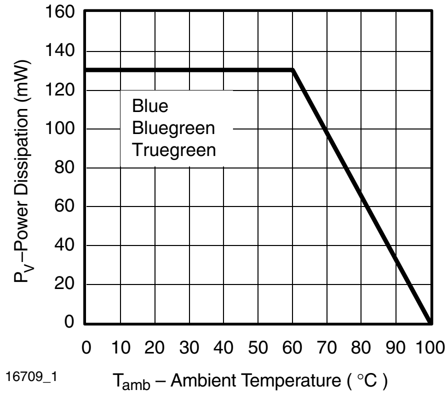


Figure 41. Power Dissipation vs. Ambient Temperature

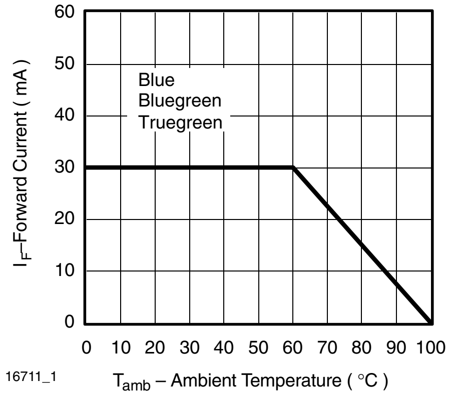


Figure 42. Forward Current vs. Ambient Temperature

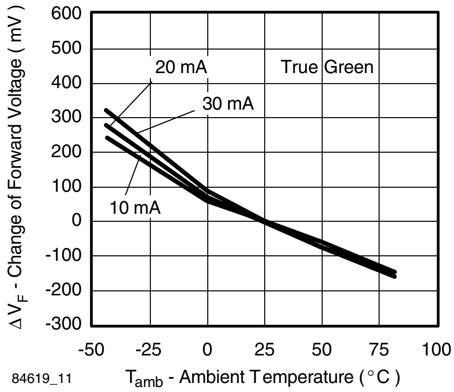


Figure 43. Change of Forward Voltage vs. Ambient Temperature

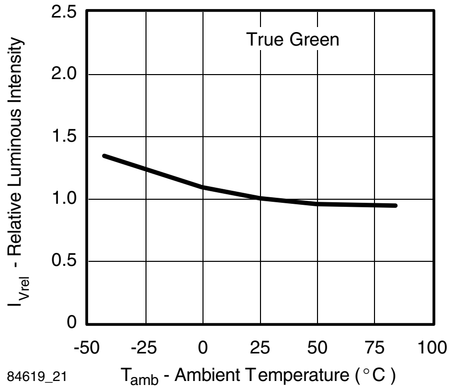


Figure 44. Relative Luminous Intensity vs. Ambient Temperature

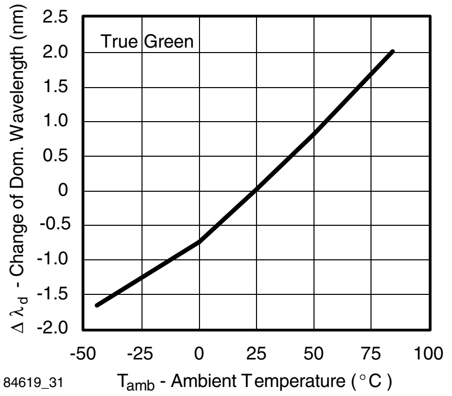


Figure 45. Change of Dominant Wavelength vs. Ambient Temperature

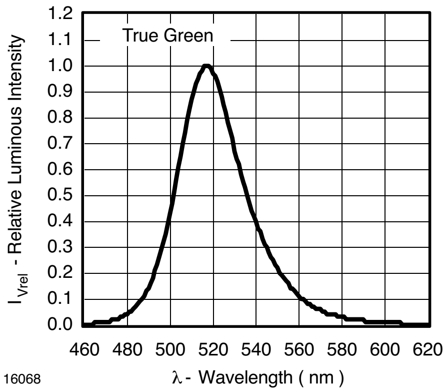


Figure 48. Relative Intensity vs. Wavelength

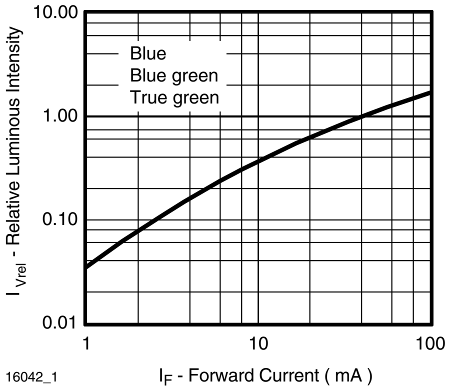


Figure 46. Relative Luminous Flux vs. Forward Current

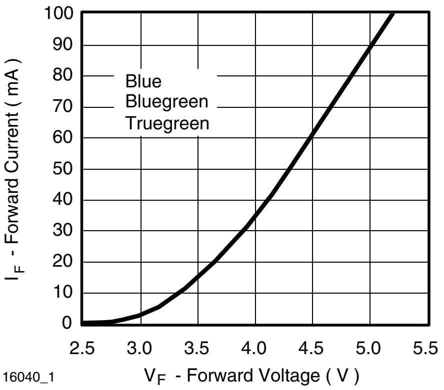


Figure 49. Forward Current vs. Forward Voltage

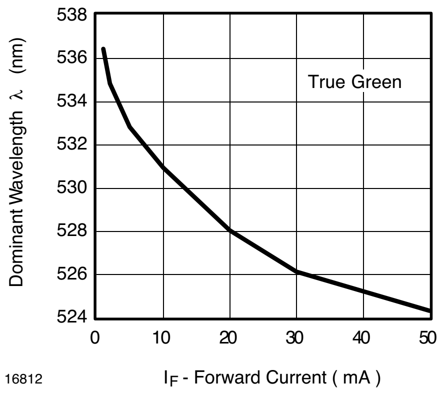


Figure 47. Change of Dominant Wavelength vs. Forward Current

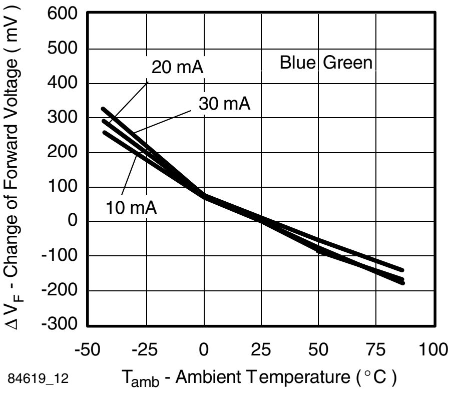


Figure 50. Change of Forward Voltage vs. Ambient Temperature

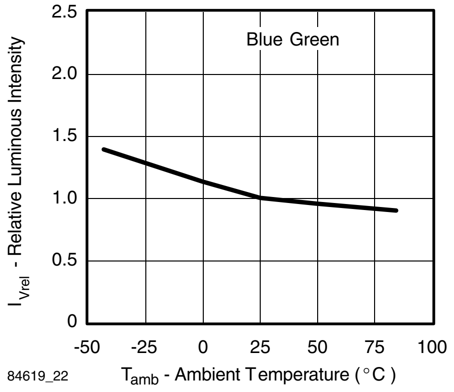


Figure 51. Relative Luminous Intensity vs. Ambient Temperature

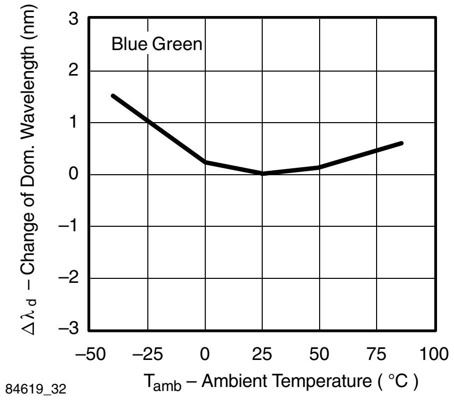


Figure 52. Change of Dominant Wavelength vs. Ambient Temperature

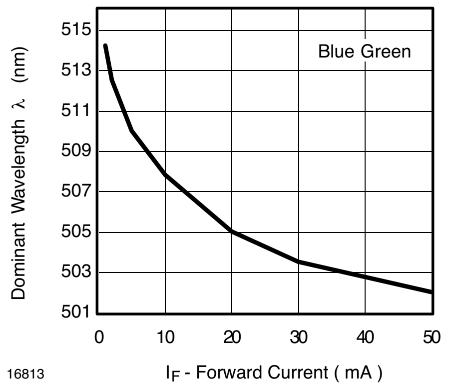


Figure 53. Change of Dominant Wavelength vs. Forward Current

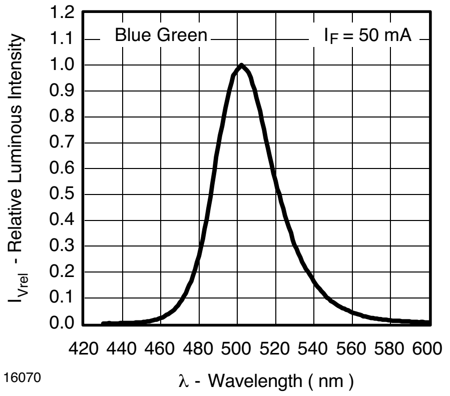


Figure 54. Relative Intensity vs. Wavelength

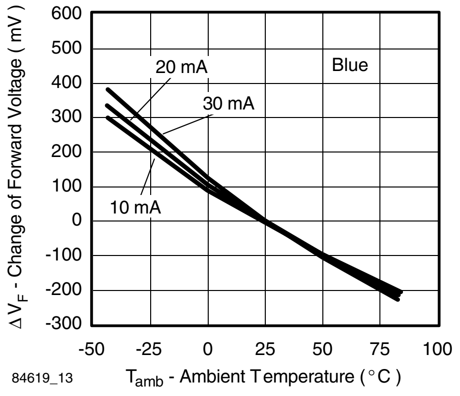


Figure 55. Change of Forward Voltage vs. Ambient Temperature

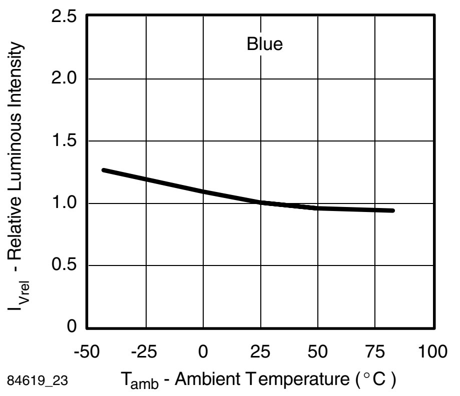


Figure 56. Relative Luminous Intensity vs. Ambient Temperature

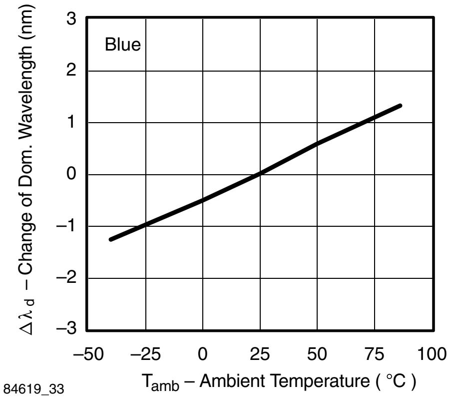


Figure 57. Change of Dominant Wavelength vs. Ambient Temperature

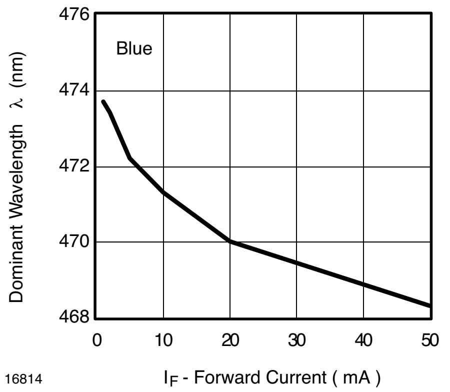


Figure 58. Change of Dominant Wavelength vs. Forward Curren

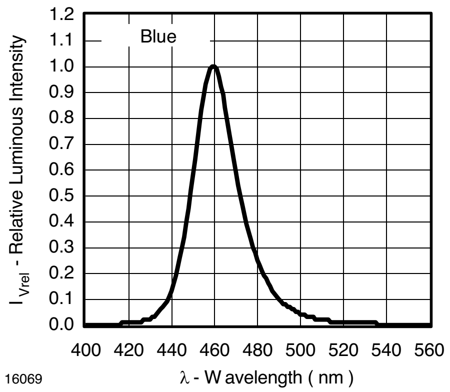
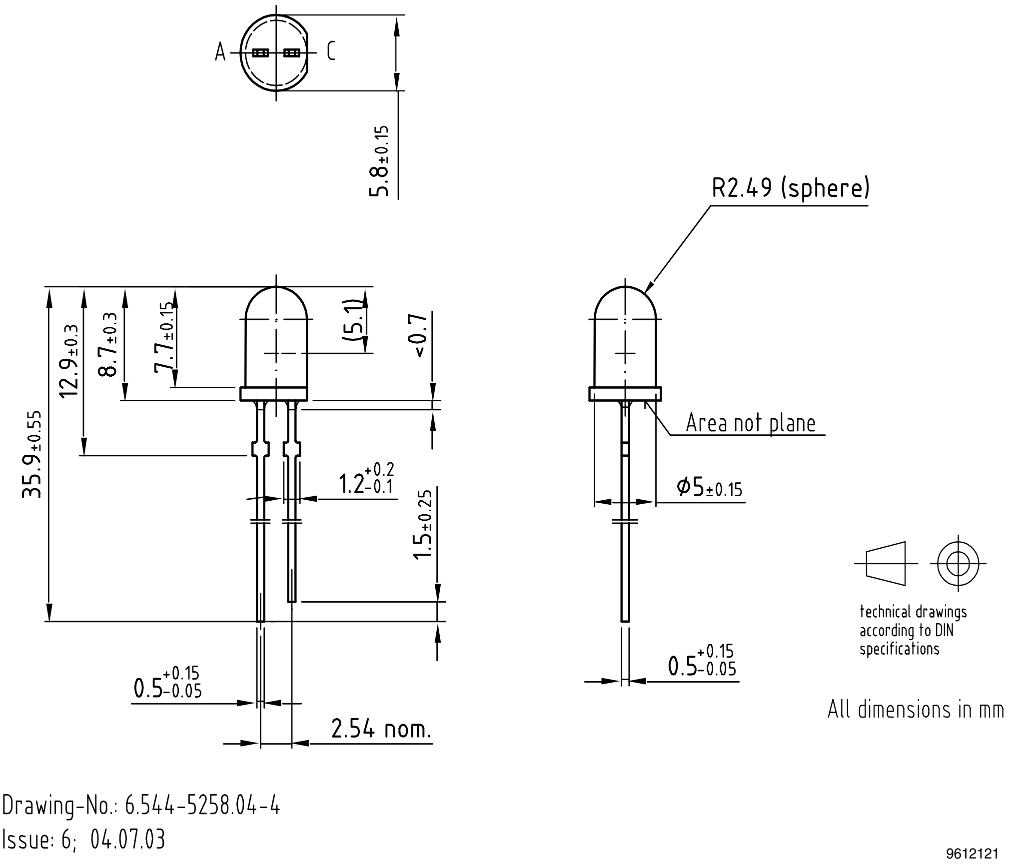


Figure 59. Relative Intensity vs. Wavelength

Package Dimensions in mm



Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operatingsystems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423

Notice