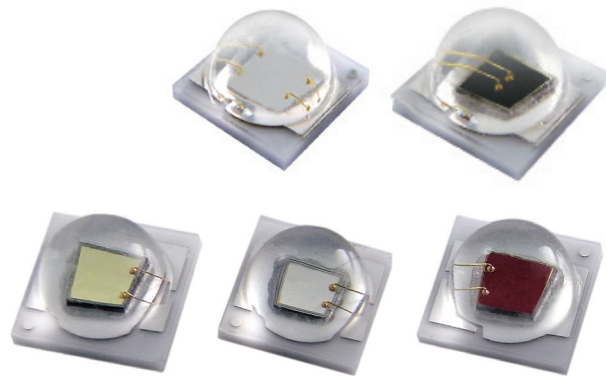


Federal Series

3535 Horticulture Series

Datasheet



Features :

- High Intensity and the color uniformity
- Beneficial for plant growth
- Reduce the cost of cultivation
- Superior ESD protection
- Level 1 on JEDEC moisture sensitivity analysis
- Easy to collocate the color spectrum
- RoHS compliant

Typical Applications :

- Indoor Cultivation
- Vertical Farm/ Green Wall
- Replacement HPS in Greenhouse
- Home Farming/ Hydroponic Pot

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General Information

Introduction

Edison Federal 3535 Horticulture Series can help our customers design spectrums for plant in different growth stages and application fields. Excellent efficiency and quality can reduce the cost and help growers improve their crop yield.

Ordering Code Format

<u>2</u>	<u>F</u>	<u>X 0</u>	<u>0 1</u>	<u>x x</u>	<u>0 0</u>	<u>F 0 2</u>	<u>x x x</u>
X1	X2	X3	X4	X5	X6	X7	X8
X1 Type	X2 Component	X3 Series	X4 Wattage	X5 Color			
2	Emitter	F	Federal	X0	3535	01	1W
				VX			UV
				GX			Indigo
				RX			Red
				TX			True Green
				BX			Blue
				AX			Amber
				EX			Deep Red
				FX			Cherry Red
				CW			Cool White
				NW			Neutral White
				WW			Warm White
X6	X7	X8					
Internal code	PCB Board	Serial Number					
-	-	F02	3535	-	-		

Absolute Maximum Ratings

Parameter	Symbol	Value	Units
DC Forward Current ^[1]	I_F	350/700	mA
Peak Pulsed Current; ($t_p \leq 100\mu s$, Duty cycle=0.25)	I_{pulse}	1000	mA
Transient Surge Voltage	-	UV, Indigo : 5 B/T/A/R : 8 Deep Red, Cherry Red : 3 CW/NW/WW : 8	V
Reverse Voltage ^[2]	V_R	Note 2	V
LED Junction Temperature ^[3]	T_J	125	°C
Operating Temperature	-	-40 ~ +85	°C
Storage Temperature	-	-40 ~ +125	°C
ESD Sensitivity (HBM)	-	8000	V
Allowable Reflow Cycles	-	3	cycles
Soldering Temperature	-	260	°C

Notes:

1. Maximum forward current for 1W and 3W are 350mA and 700mA respectively.
2. LEDs are not designed to drive in reverse bias.
3. Proper current derating must be observed to maintain junction temperature below the maximum.
4. t_p : Pulse width time

Warning:

The transient surge voltage of EFE4I must < 3V, otherwise the components get damaged!

Characteristics

Parameter	Symbol	Value	Units
Viewing Angle	(Typ.) $2\Theta_{1/2}$	UV/ T : 120 Indigo/ B/ A / R : 110 Deep Red : 120 Cherry Red : 110 CW/ NW/ WW : 110	Degree
Thermal resistance	-	8-10	°C/W
Wavelength	Wd	B : 455 - 470 T : 520 - 535 A : 585 - 595 R : 620 - 630	nm
	Wp	UV : 390 - 410 Indigo : 415 - 435 Deep Red : 650 - 670 Cherry Red : 720 - 745	nm
CCT	-	CW : 5,000 - 10,000 NW : 3,800 - 5,000 WW : 2,670 - 3,800	K
CRI (Ra.)	-	CW : 70 NW : 75 WW : 80	
JEDEC Moisture Sensitivity	-	Level 1 Floor Life Conditions: $\leq 30^{\circ}\text{C}$ / 85% RH Soak Requirements(Standard) Time (hours): 168+5/-0 Conditions: 85°C / 85% RH	-

Notes:

- Edison maintains a tolerance of $\pm 1\text{nm}$ on Dominant wavelength measurement, $\pm 2\text{nm}$ for Peak wavelength measurement.
- Viewing angle is measured with accuracy of $\pm 10\%$.
- CIE_x/y tolerance: ± 0.005
- Color rendering index CRI Tolerance: ± 2

Photosynthetic Photon Flux (PPF) Characteristic

PPF Characteristics, $I_F=350\text{mA}$ and $T_j=25^\circ\text{C}$

Color	Group	Min. PPF($\mu\text{mol/s}$)	Max. PPF($\mu\text{mol/s}$)	Order Code
Ultraviolet	B1	0.6	0.7	2FX001VX00F02H01
	B2	0.7	0.8	
	B3	0.8	0.9	
	B4	0.9	1.0	
	C1	1.0	1.1	
	C2	1.1	1.2	
	C3	1.2	1.3	
	C4	1.3	1.4	
Indigo	D4	1.7	1.8	2FX001GX00F02H01
	E1	1.8	1.9	
	E2	1.9	2.0	
Blue	D4	1.7	1.8	2FX001BX00F02H01
	E1	1.8	1.9	
	E2	1.9	2.0	
	E3	2.0	2.1	
	E4	2.1	2.2	
True Green	B2	0.7	0.8	2FX001TX00F02H01
	B3	0.8	0.9	
	B4	0.9	1.0	
	C1	1.0	1.1	
Amber	A4	0.5	0.6	2FX001AX00F02H01
	B1	0.6	0.7	
	B2	0.7	0.8	
Red	C3	1.2	1.3	2FX001RX00F02H01
	C4	1.3	1.4	
	D1	1.4	1.5	

Notes:

Photosynthetic photon flux includes wavelength between 400 and 700nm.

PPF Characteristics, $I_f=350\text{mA}$ and $T_j=25^\circ\text{C}$

Color	Group	Min. PPF($\mu\text{mol/s}$)	Max. PPF($\mu\text{mol/s}$)	Order Code
Deep Red	E1	1.8	1.9	2FX001EX00F02H01
	E2	1.9	2.0	
	E3	2.0	2.1	
	E4	2.1	2.2	
	E5	2.2	2.3	
	F1	2.3	2.4	
	F2	2.4	2.5	
	F3	2.5	2.6	
Cool White	D3	1.6	1.7	2FX001CW06F02H01
	D4	1.7	1.8	
	E1	1.8	1.9	
	E2	1.9	2.0	
	E3	2.0	2.1	
Neutral White	C2	1.1	1.2	2FX001NW05F02H01
	C3	1.2	1.3	
	C4	1.3	1.4	
	D1	1.4	1.5	
	D2	1.5	1.6	
	D3	1.6	1.7	
	D4	1.7	1.8	
	E1	1.8	1.9	
Warm White	C1	1.0	1.1	2FX001WW05F02H01
	C2	1.1	1.2	
	C3	1.2	1.3	
	C4	1.3	1.4	
	D1	1.4	1.5	
	D2	1.5	1.6	
	D3	1.6	1.7	

Notes:

Photosynthetic photon flux includes wavelength between 400 and 700nm.

Radiometric Power Characteristic

Radiometric power characteristics T_j=25°C

Color	Group	Min. Radiometric power @350mA(mW)	Max. Radiometric power @350mA(mW)	Order Code
Cherry Red	W03	100	150	2FX001FX00F02H01
	W04	150	200	
	W05	200	250	
	W06	250	300	
	W07	300	350	

Notes:

The Radiometric power performance is guaranteed within published operating conditions. Edison Opto maintains a tolerance of ±10% on mW measurements.

Voltage Bin Structure

Color	Group	Min. Voltage (V)	Max. Voltage (V)
Ultraviolet	V01	2.8	3.1
	V02	3.1	3.4
	V03	3.4	3.7
Indigo	V01	2.8	3.1
	V02	3.1	3.4
	V03	3.4	3.7
Blue	V01	2.8	3.1
	V02	3.1	3.4
	V03	3.4	3.7
	V04	3.7	4.0
True Green	V01	2.8	3.1
	V02	3.1	3.4
	V03	3.4	3.7
	V04	3.7	4.0
Amber	U03	1.6	1.9
	U04	1.9	2.2
	U05	2.2	2.5
	V00	2.5	2.8
Red	U03	1.6	1.9
	U04	1.9	2.2
	U05	2.2	2.5
	V00	2.5	2.8

Note:
Forward voltage measurement allowance is $\pm 0.06V$.

Color	Group	Min. Voltage (V)	Max. Voltage (V)
Deep Red	U02	1.3	1.6
	U03	1.6	1.9
	U04	1.9	2.2
	U05	2.2	2.5
Cherry Red	U02	1.3	1.6
	U03	1.6	1.9
	U04	1.9	2.2
	U05	2.2	2.5
Cool White	V01	2.8	3.1
	V02	3.1	3.4
	V03	3.4	3.7
Neutral White	V01	2.8	3.1
	V02	3.1	3.4
	V03	3.4	3.7
Warm White	V01	2.8	3.1
	V02	3.1	3.4
	V03	3.4	3.7

Note:
 Forward voltage measurement allowance is $\pm 0.06V$.

Wavelength Bin Structure

Color	Group	Min. Wd (nm)	Max. Wd (nm)
Red	RX0	620	630
True Green	TW0	520	525
	TX0	525	530
	TY0	530	535
Blue	BV0	455	460
	BW0	460	465
	BX0	465	470
Amber	AX1	585	590
	AZ0	590	595

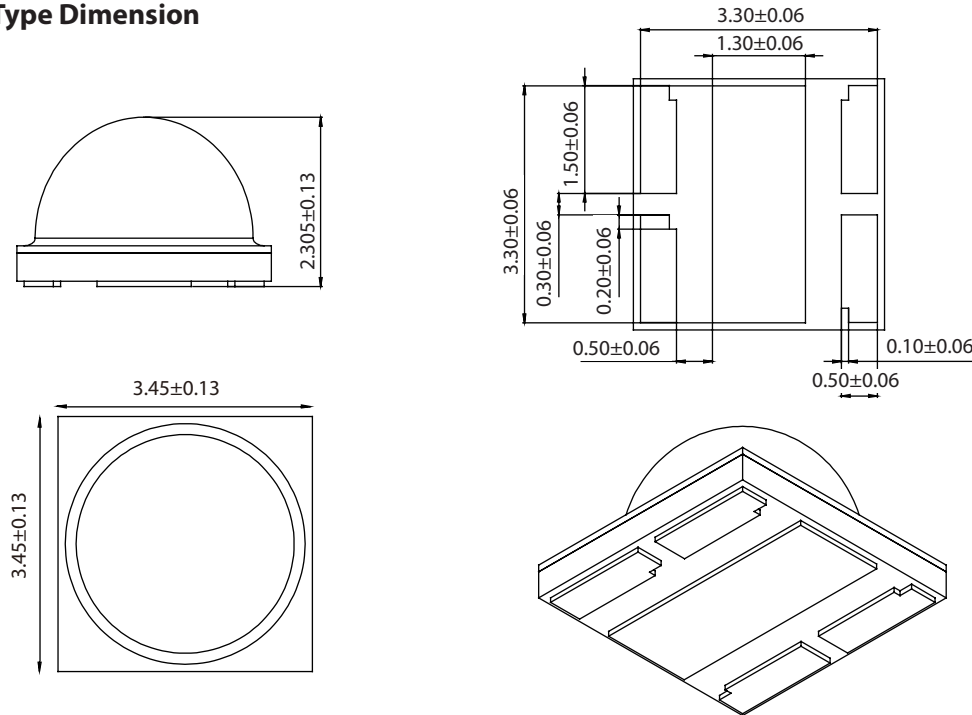
Note:
Dominant wavelength measurement allowance: ± 1 nm.

Color	Group	Min. Wp (nm)	Max. Wp (nm)
Ultraviolet	VV0	390	395
	VW0	395	400
	VX0	400	405
	VY0	405	410
Indigo	DXX	415	435
Deep Red	EX0	650	670
Cherry Red	FX2	720	745

Note:
Peak wavelength measurement allowance: ± 2 nm.

Mechanical Dimensions

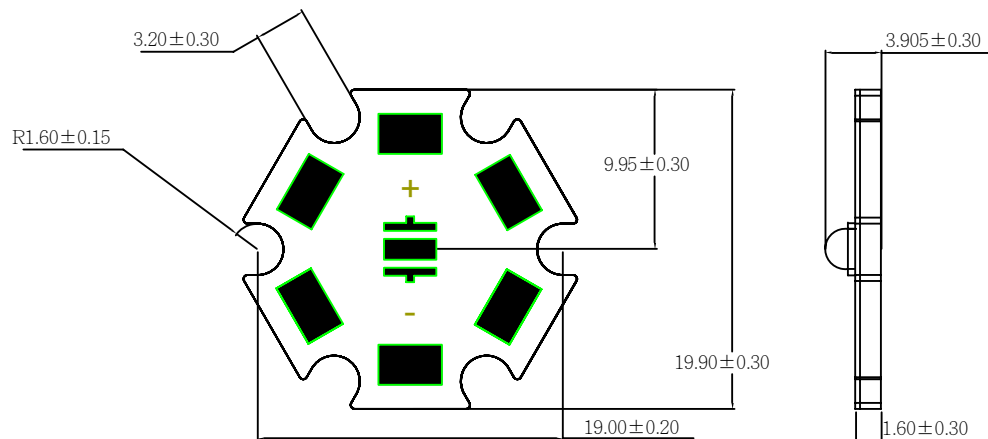
Emitter Type Dimension



Notes:

1. All dimensions are measured in mm.
2. Drawings are not to scale.

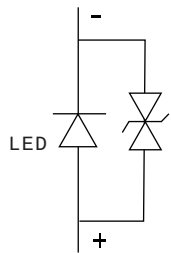
Star PCB Type Dimension



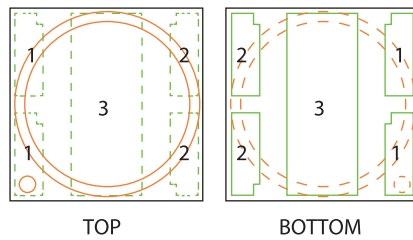
Notes:

1. All dimensions are measured in mm.
2. Drawings are not to scale.

Circuit



PCB Layout



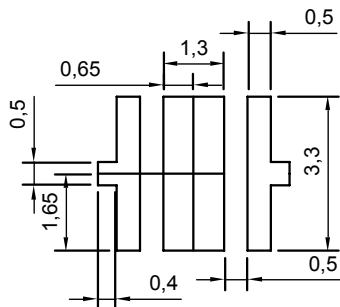
Pad Configuration

PAD	FUNCTION
1	ANODE
2	CATHODE
3	THERMAL

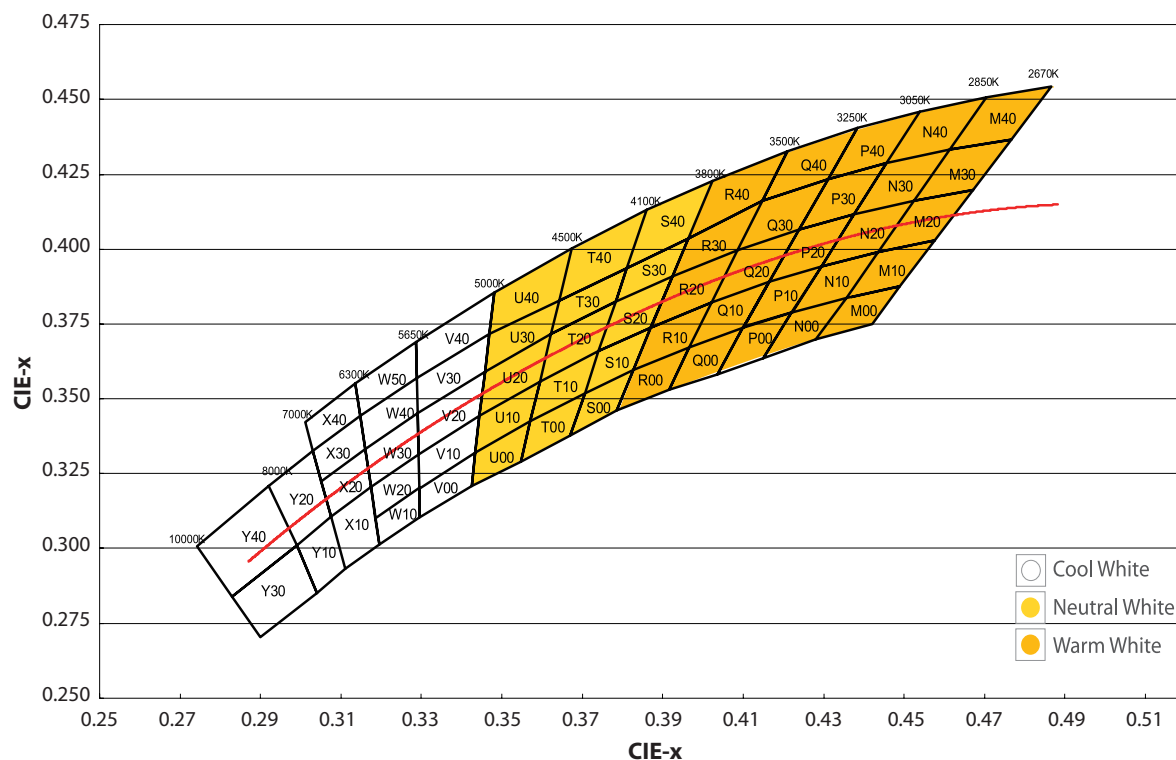
Note:

The thermal pad is electrically isolated from anode and cathode.

Solder Pad



Color BIN code



Cool White

Y10		Y20		Y30		Y40	
X	Y	X	Y	X	Y	X	Y
0.3040	0.2850	0.2990	0.3010	0.3040	0.2850	0.2920	0.3210
0.2990	0.3010	0.2920	0.3210	0.2899	0.2703	0.2742	0.3007
0.3076	0.3108	0.3031	0.3327	0.2830	0.2838	0.2830	0.2838
0.3112	0.2932	0.3076	0.3108	0.2990	0.3010	0.2990	0.3010

X10		X20		X30		X40	
X	Y	X	Y	X	Y	X	Y
0.3076	0.3108	0.3076	0.3108	0.3052	0.3224	0.3031	0.3327
0.3174	0.3204	0.3052	0.3224	0.3031	0.3327	0.3011	0.3422
0.3196	0.3013	0.3160	0.3332	0.3148	0.3444	0.3136	0.3550
0.3112	0.2932	0.3175	0.3204	0.3160	0.3332	0.3148	0.3444

W10		W20		W30		W40		W50	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3294	0.3202	0.3292	0.3313	0.3290	0.3451	0.3290	0.3451	0.3148	0.3444
0.3295	0.3105	0.3294	0.3202	0.3292	0.3313	0.3160	0.3332	0.3136	0.3550
0.3196	0.3013	0.3186	0.3102	0.3175	0.3204	0.3148	0.3444	0.3286	0.3690
0.3186	0.3102	0.3175	0.3204	0.3160	0.3332	0.3288	0.3569	0.3288	0.3569

V00		V10		V20		V30		V40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3434	0.3320	0.3292	0.3313	0.3292	0.3313	0.3290	0.3451	0.3288	0.3569
0.3425	0.3208	0.3444	0.3442	0.3290	0.3451	0.3288	0.3569	0.3286	0.3690
0.3295	0.3105	0.3434	0.3320	0.3458	0.3592	0.3469	0.3717	0.3481	0.3856
0.3294	0.3200	0.3294	0.3200	0.3444	0.3442	0.3458	0.3592	0.3469	0.3717

Neutral White

U00		U10		U20		U30		U40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3571	0.3426	0.3444	0.3442	0.3622	0.3716	0.3642	0.3829	0.3642	0.3829
0.3548	0.3290	0.3434	0.3320	0.3594	0.3557	0.3622	0.3716	0.3673	0.4003
0.3425	0.3208	0.3571	0.3426	0.3444	0.3442	0.3458	0.3592	0.3481	0.3856
0.3434	0.3320	0.3594	0.3557	0.3458	0.3592	0.3469	0.3717	0.3469	0.3717

T00		T10		T20		T30		T40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3706	0.3520	0.3594	0.3557	0.3622	0.3716	0.3642	0.3829	0.3673	0.4003
0.3670	0.3377	0.3571	0.3426	0.3783	0.3825	0.3811	0.3937	0.3860	0.4130
0.3548	0.3290	0.3706	0.3520	0.3741	0.3658	0.3783	0.3825	0.3811	0.3937
0.3571	0.3426	0.3741	0.3658	0.3594	0.3557	0.3622	0.3716	0.3642	0.3829

S00		S10		S20		S30		S40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3826	0.3595	0.3741	0.3658	0.3783	0.3825	0.3783	0.3825	0.3860	0.4130
0.3785	0.3460	0.3871	0.3739	0.3924	0.3909	0.3811	0.3937	0.4023	0.4228
0.3670	0.3377	0.3826	0.3595	0.3871	0.3739	0.3963	0.4035	0.3963	0.4035
0.3706	0.3520	0.3706	0.3520	0.3741	0.3658	0.3924	0.3909	0.3811	0.3937

R00		R10		R20		R30		R40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.3966	0.3673	0.3871	0.3739	0.3924	0.3909	0.4086	0.3995	0.4023	0.4228
0.3917	0.3530	0.4021	0.3822	0.3871	0.3739	0.3924	0.3909	0.4209	0.4326
0.3785	0.3460	0.3966	0.3673	0.4021	0.3822	0.3963	0.4035	0.4148	0.4161
0.3826	0.3595	0.3826	0.3595	0.4086	0.3995	0.4148	0.4161	0.3963	0.4035

Warm White

Q00		Q10		Q20		Q30		Q40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4100	0.3740	0.4165	0.3890	0.4086	0.3995	0.4086	0.3995	0.4385	0.4404
0.4035	0.3580	0.4100	0.3738	0.4240	0.4065	0.4148	0.4161	0.4312	0.4234
0.3917	0.3530	0.4021	0.3822	0.4165	0.3890	0.4312	0.4234	0.4148	0.4161
0.3966	0.3673	0.3966	0.3673	0.4021	0.3822	0.4240	0.4065	0.4209	0.4326

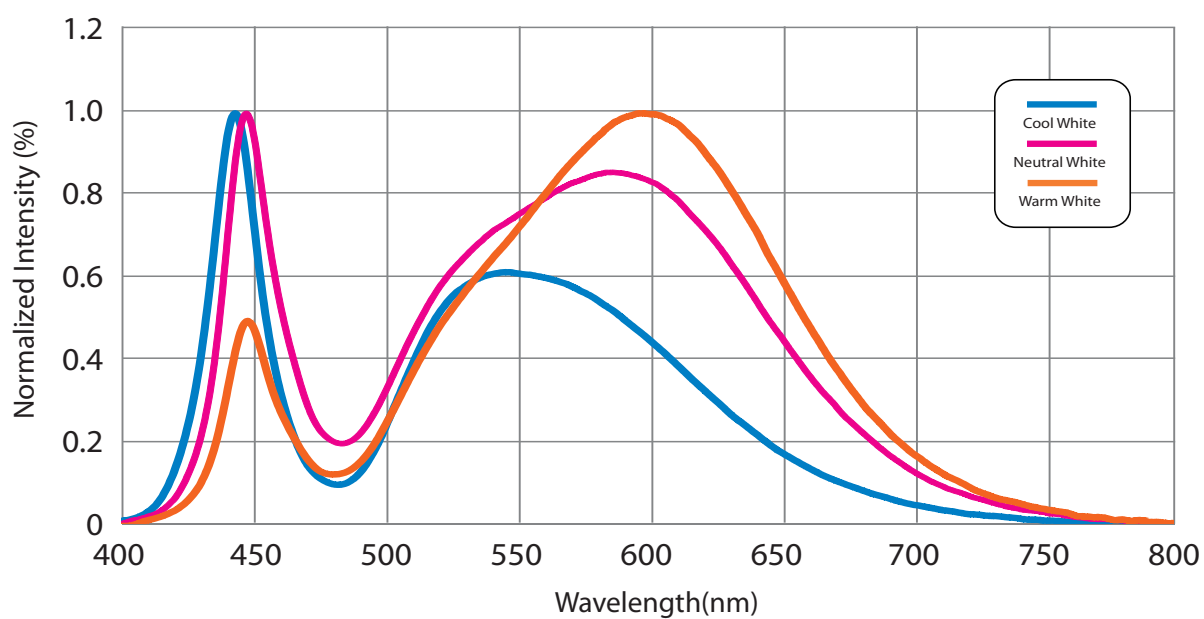
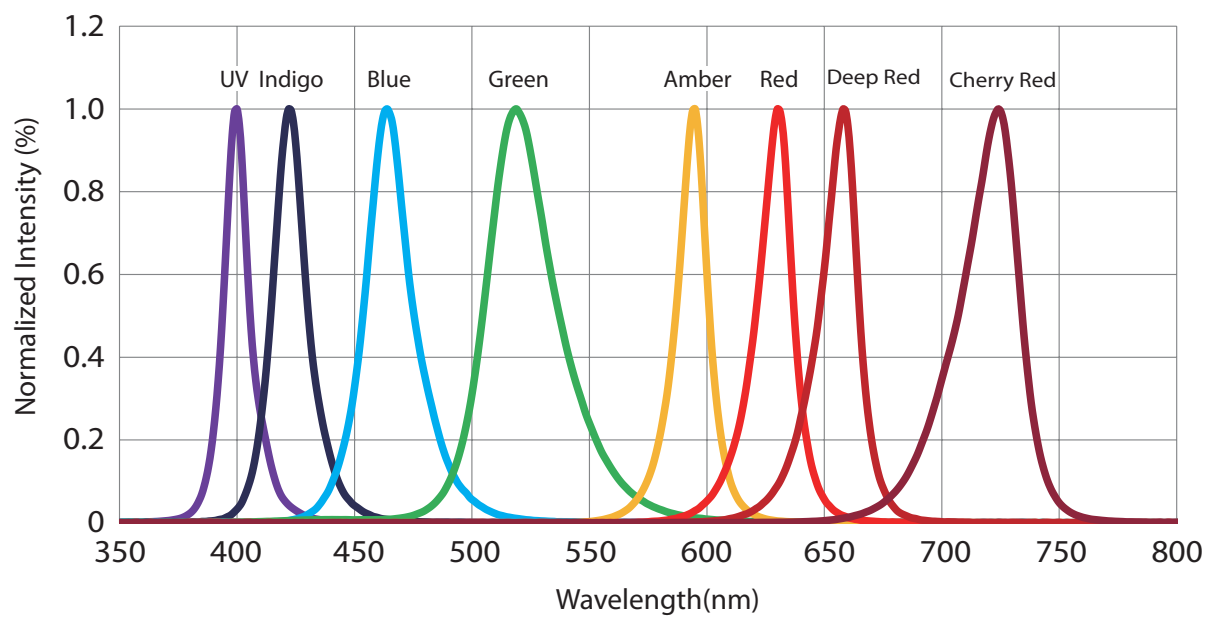
P00		P10		P20		P30		P40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4220	0.3790	0.4294	0.3943	0.4240	0.4065	0.4312	0.4234	0.4385	0.4404
0.4150	0.3635	0.4221	0.3790	0.4376	0.4116	0.4456	0.4287	0.4538	0.4460
0.4035	0.3580	0.4100	0.3738	0.4294	0.3943	0.4376	0.4116	0.4456	0.4287
0.4100	0.3740	0.4165	0.3890	0.4165	0.3890	0.4240	0.4065	0.4312	0.4234

N00		N10		N20		N30		N40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4356	0.3837	0.4294	0.3943	0.4376	0.4116	0.4614	0.4333	0.4538	0.4460
0.4280	0.3700	0.4436	0.3991	0.4294	0.3943	0.4525	0.4162	0.4705	0.4508
0.4150	0.3635	0.4356	0.3837	0.4436	0.3991	0.4376	0.4116	0.4614	0.4333
0.4220	0.3790	0.4221	0.3790	0.4525	0.4162	0.4456	0.4287	0.4456	0.4287

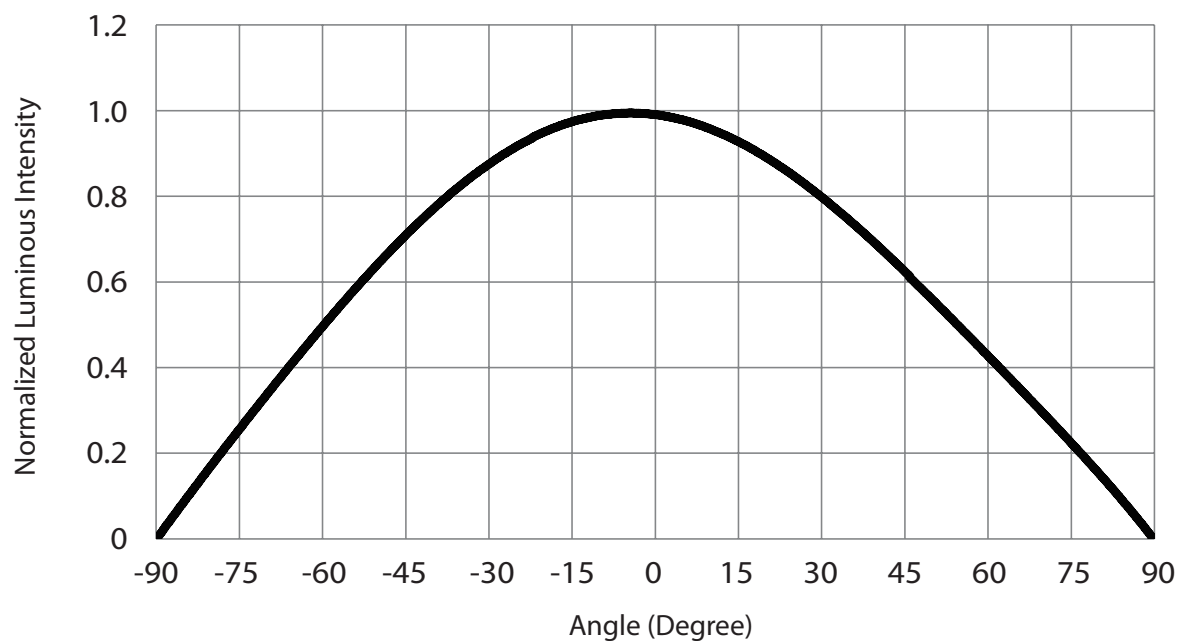
M00		M10		M20		M30		M40	
X	Y	X	Y	X	Y	X	Y	X	Y
0.4490	0.3875	0.4436	0.3991	0.4525	0.4162	0.4614	0.4333	0.4705	0.4508
0.4420	0.3750	0.4577	0.4029	0.4671	0.4196	0.4767	0.4366	0.4866	0.4542
0.4280	0.3700	0.4490	0.3875	0.4577	0.4029	0.4671	0.4196	0.4767	0.4366
0.4356	0.3837	0.4356	0.3837	0.4456	0.4287	0.4525	0.4162	0.4614	0.4333

Characteristic curve

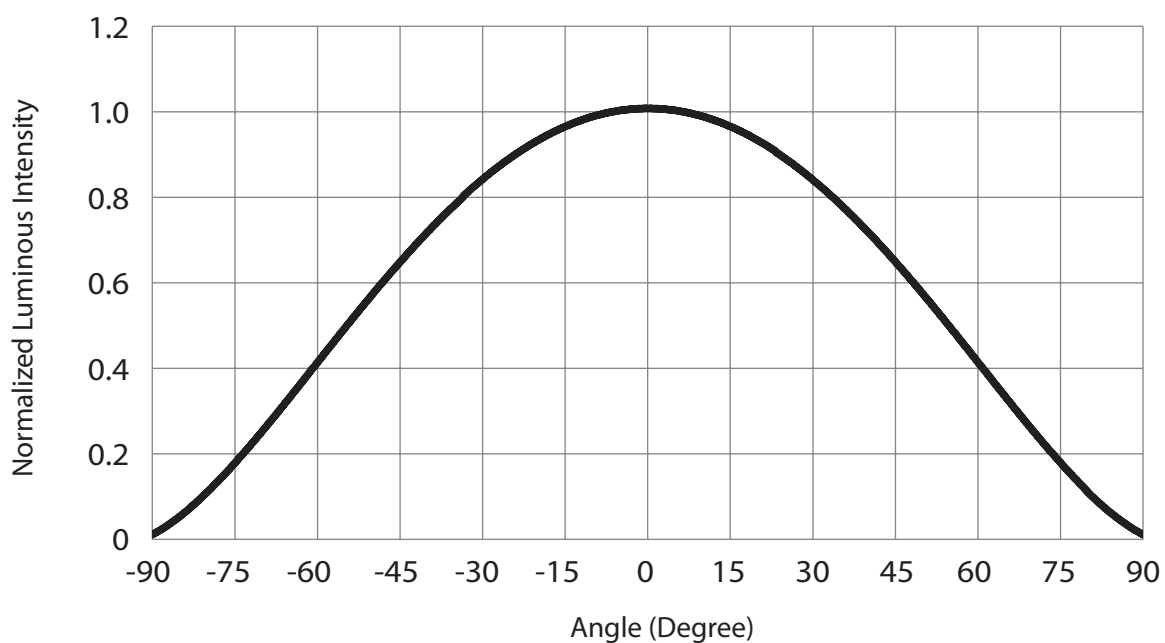
Color Spectrum



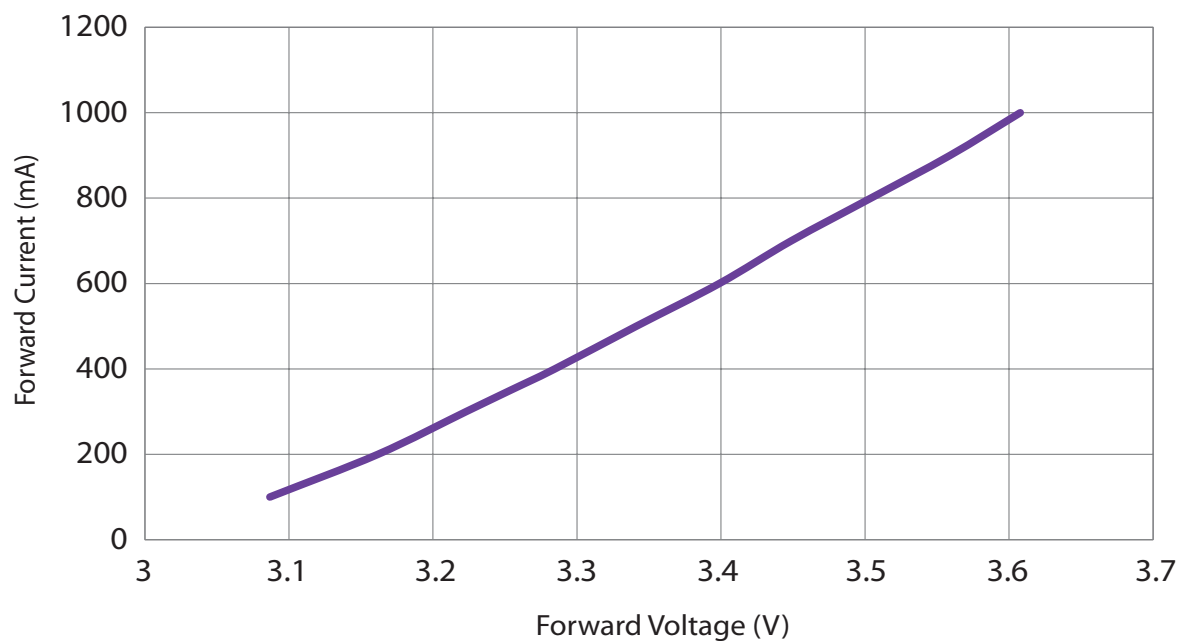
Beam Pattern (UV/ T/ Deep Red)



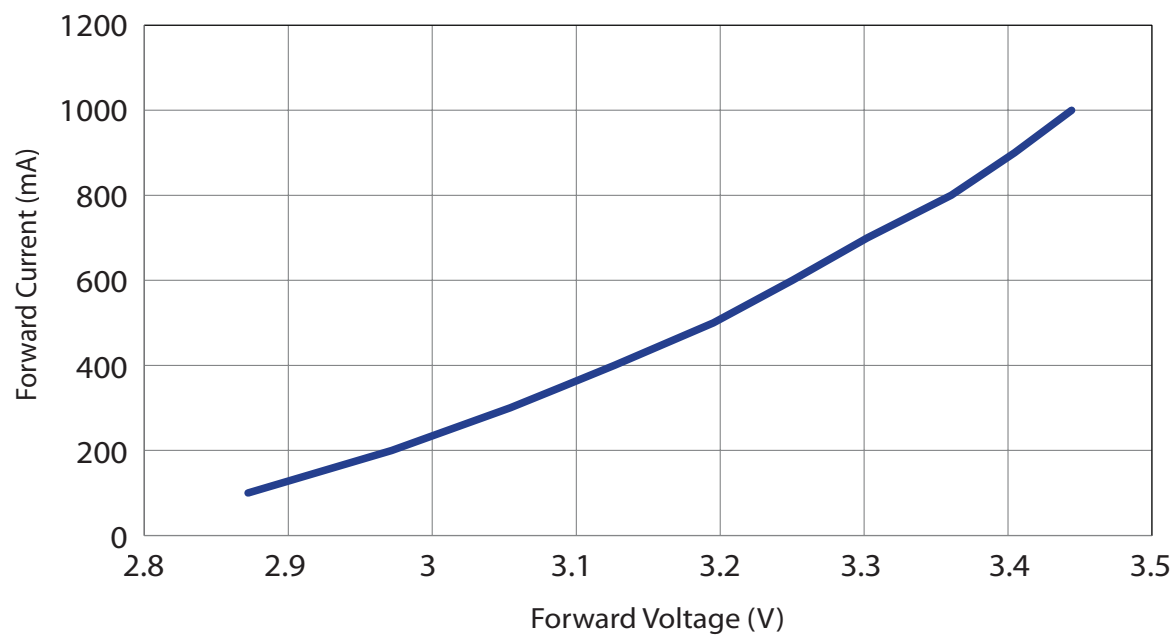
Beam Pattern (Indigo/ B/ A/ R/ Cherry Red/ CW/ NW/ WW)



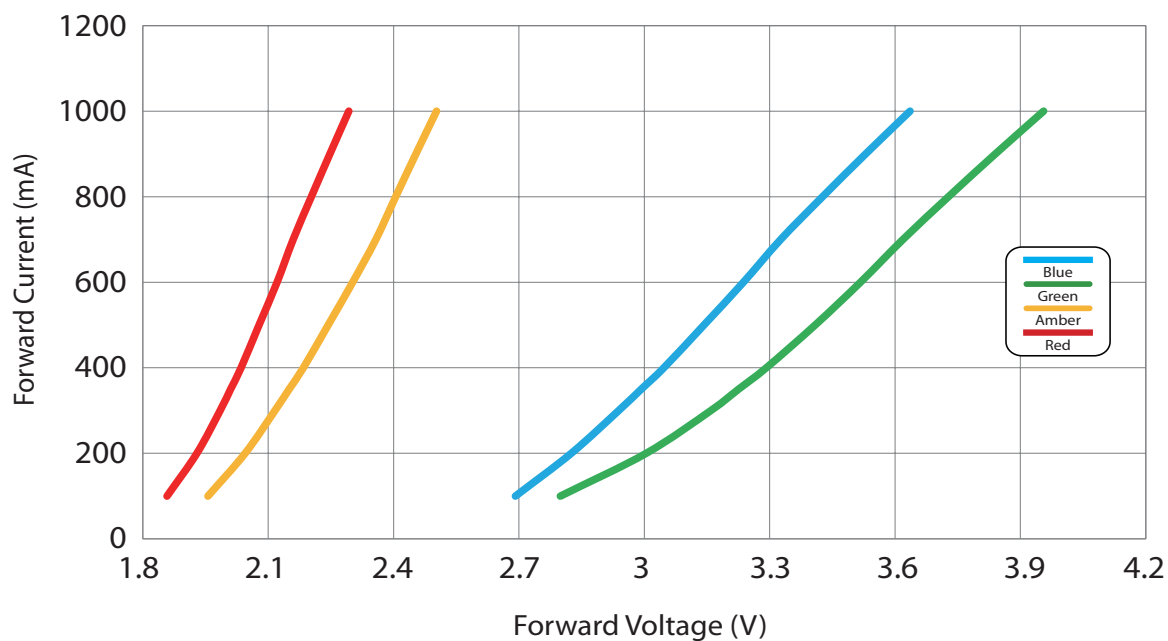
Forward Current vs. Forward Voltage (UV)



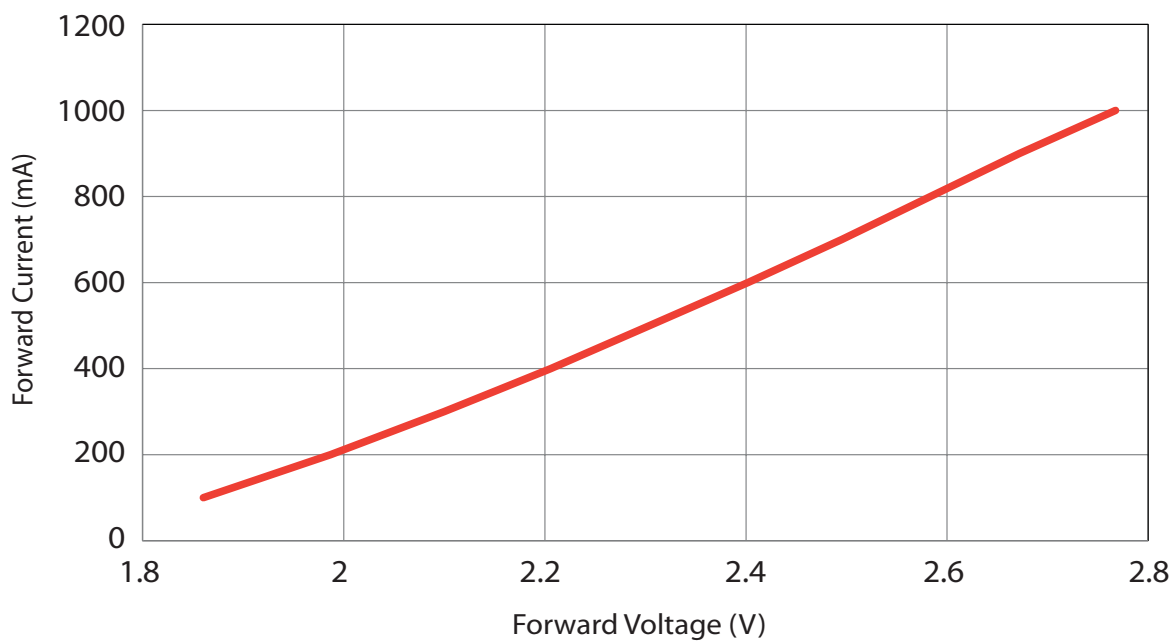
Forward Current vs. Forward Voltage (Indigo)



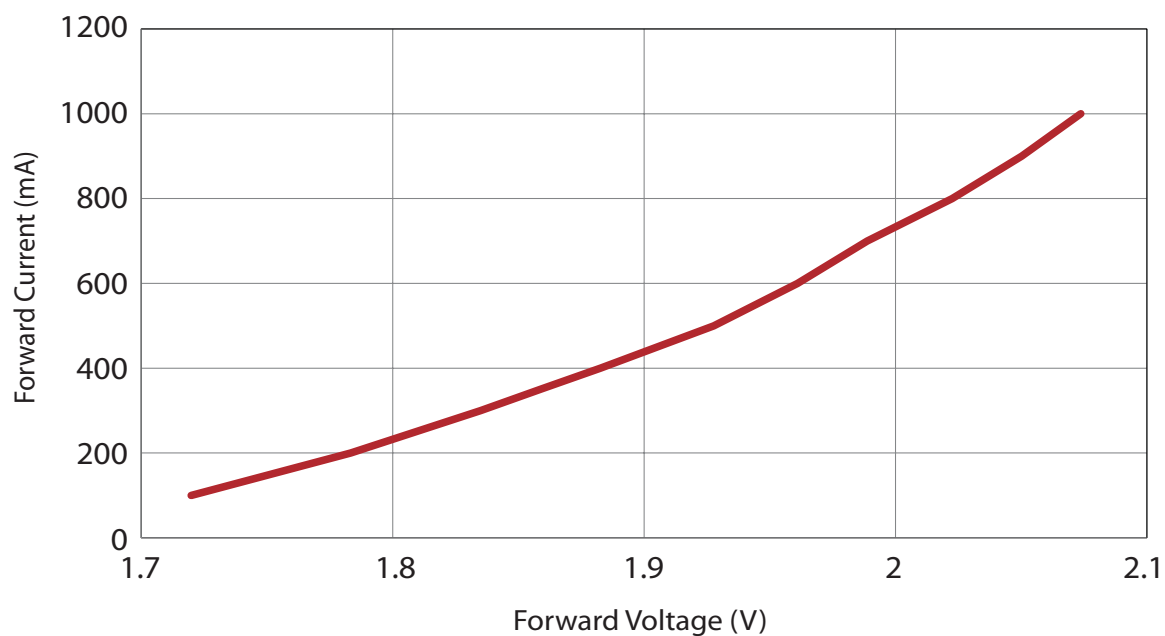
Forward Current vs. Forward Voltage (R/T/B/A)



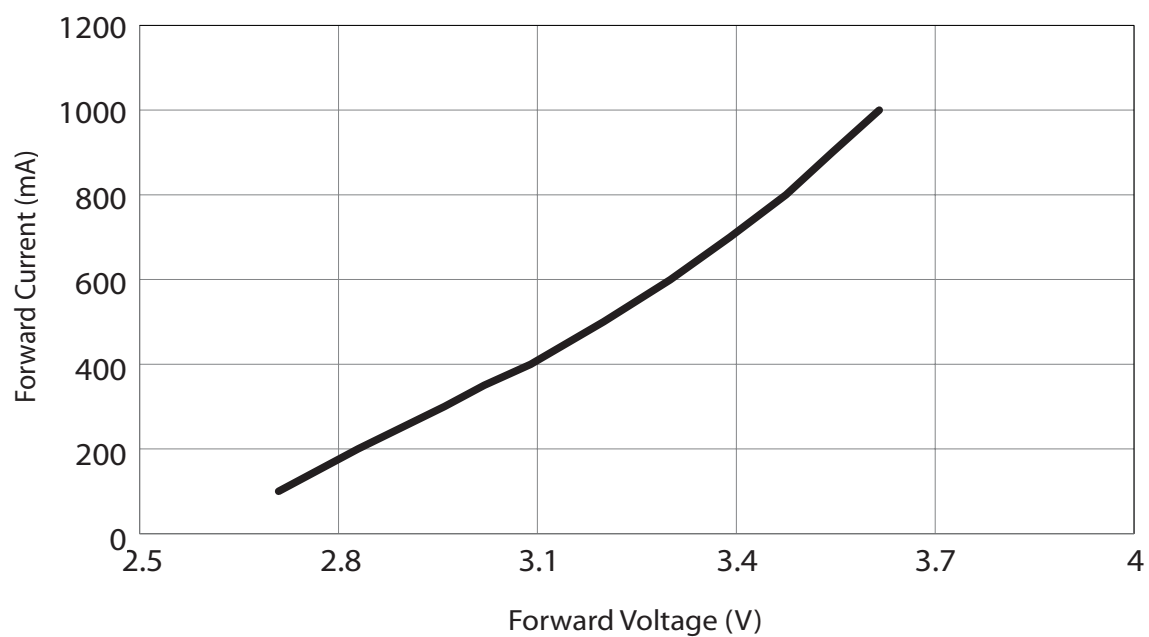
Forward Current vs. Forward Voltage (Deep Red)



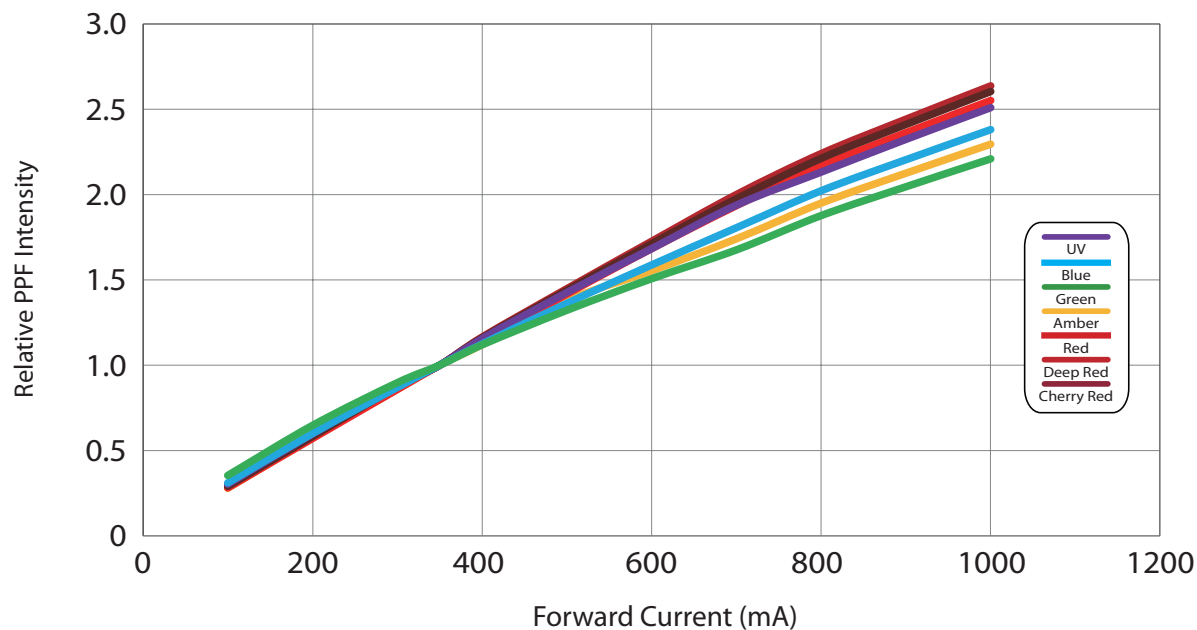
Forward Current vs. Forward Voltage (Cherry Red)



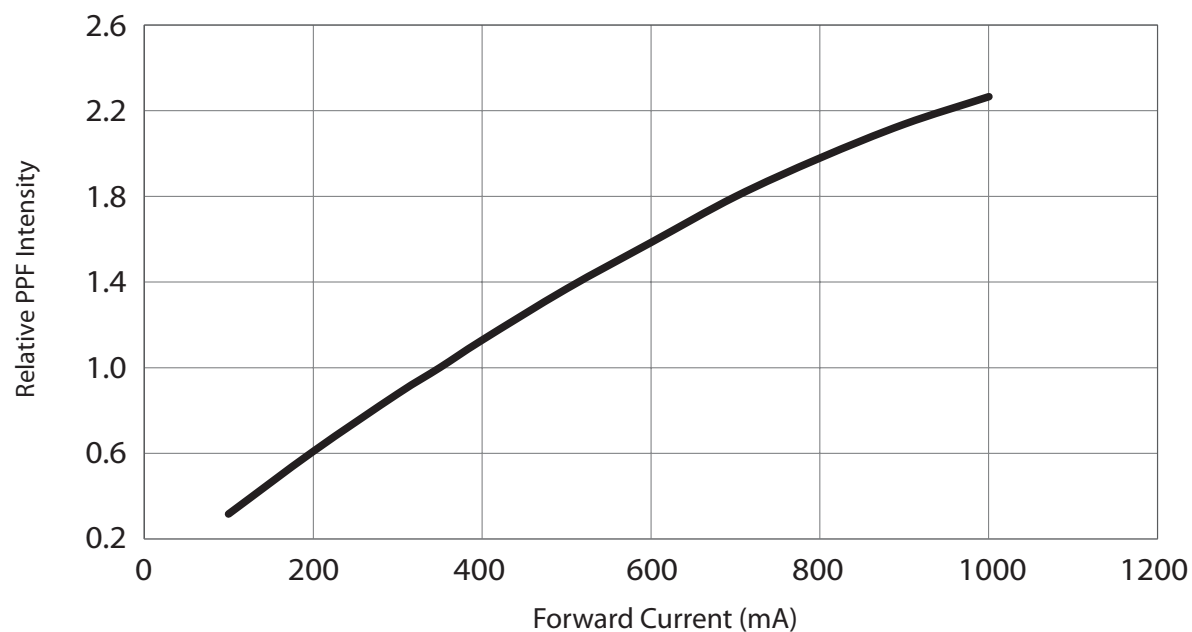
Forward Current vs. Forward Voltage (White series)



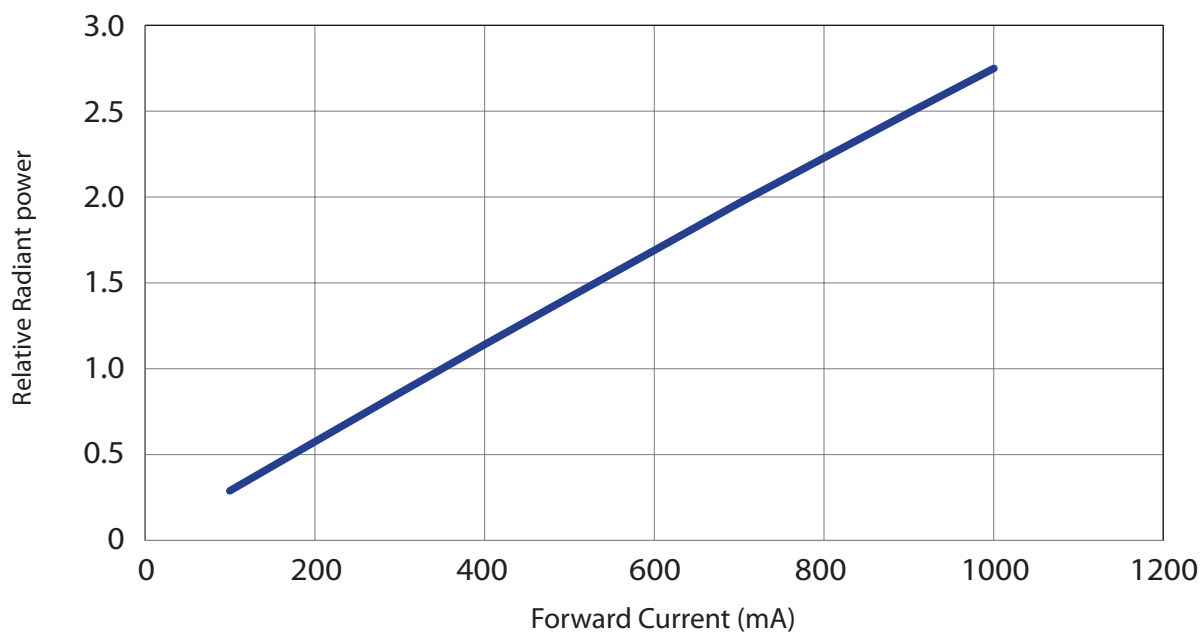
Relative PPF intensity vs. Forward Current



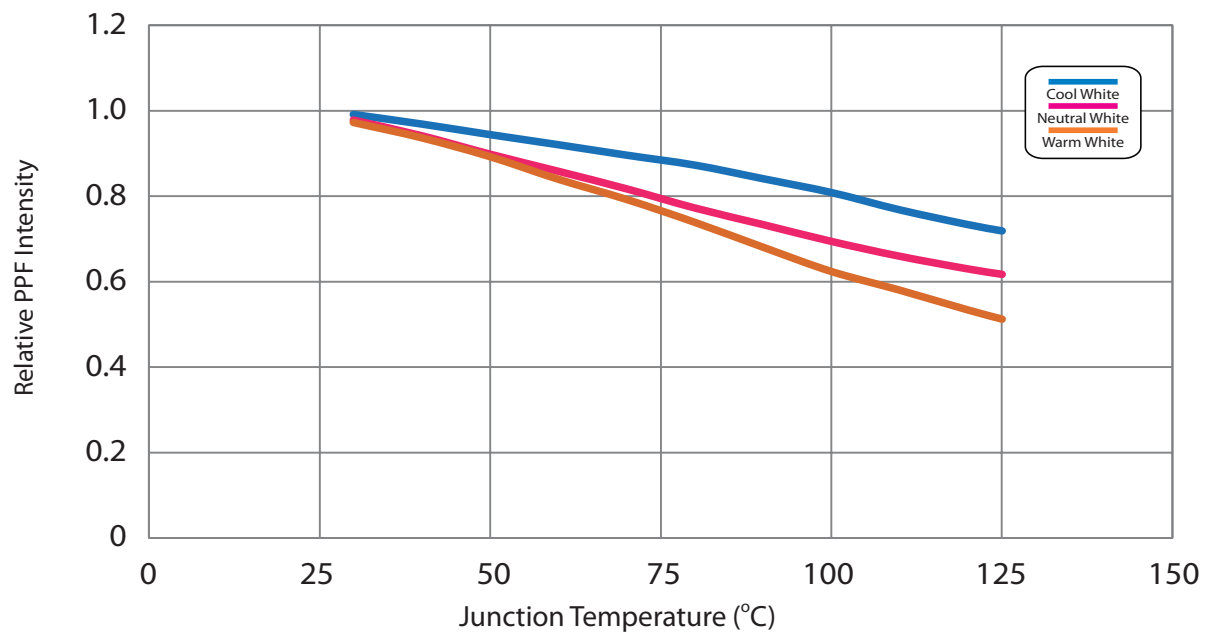
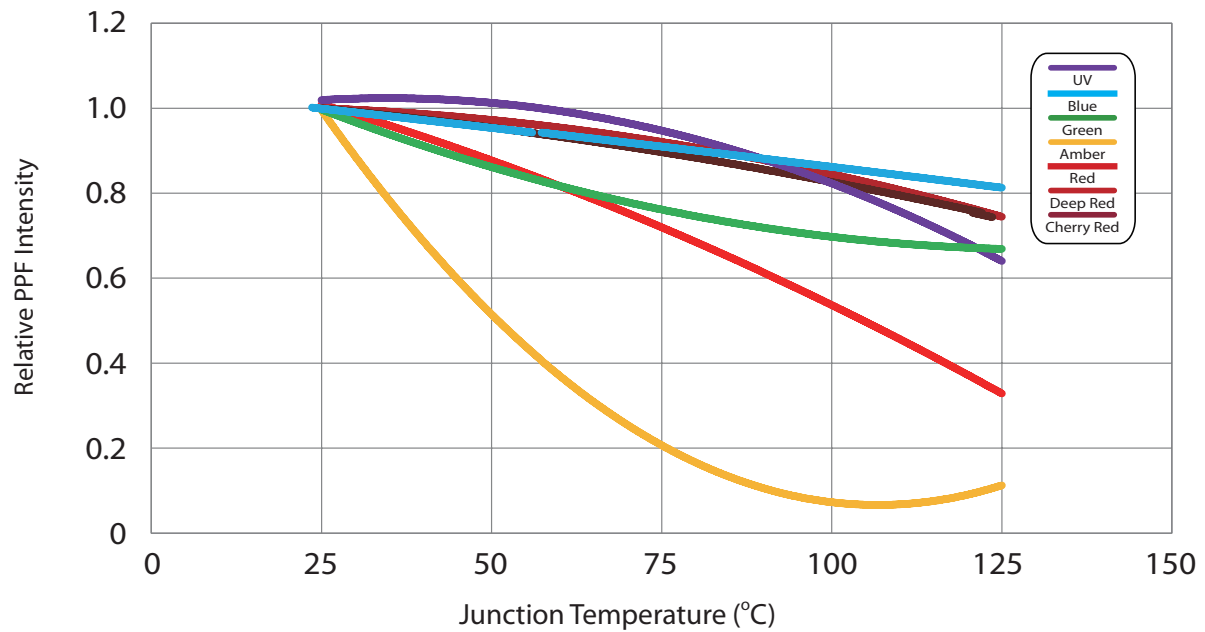
Relative PPF intensity vs. Forward Current (White Series)



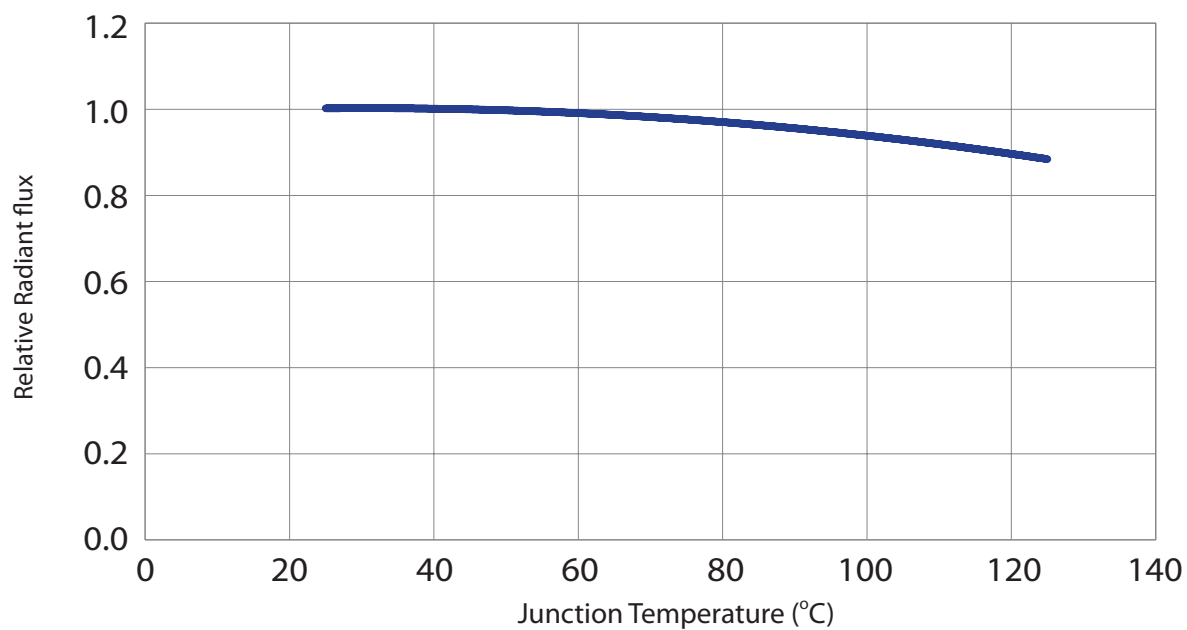
Relative Radiant power vs. Forward Current (Indigo)



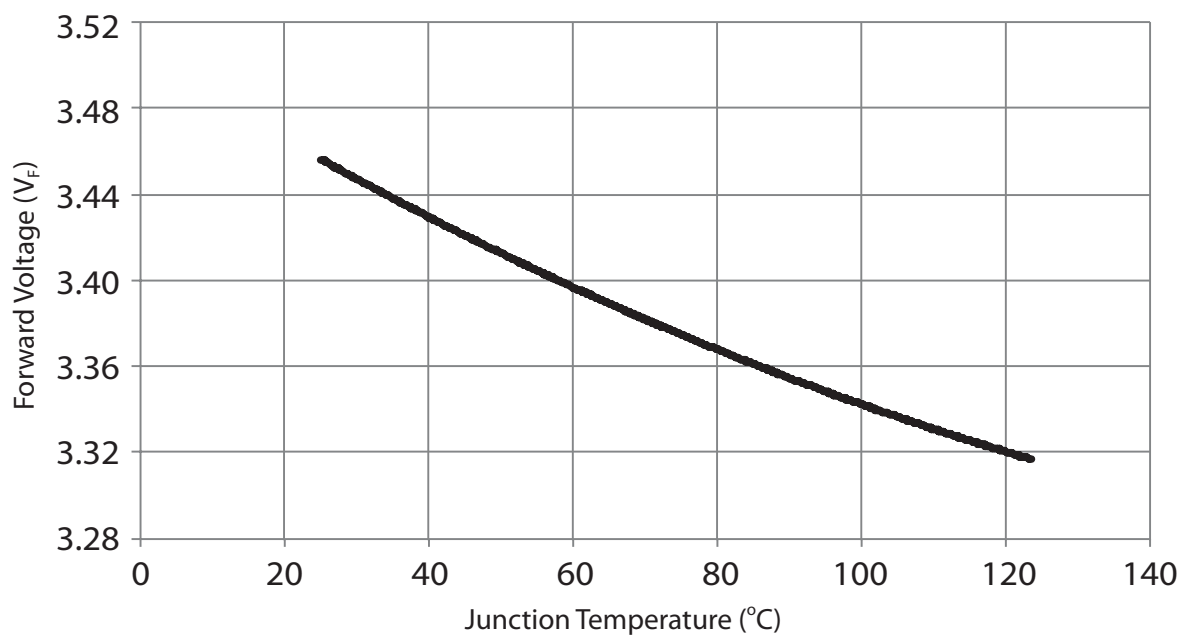
Relative PPF intensity vs. Junction Temperature



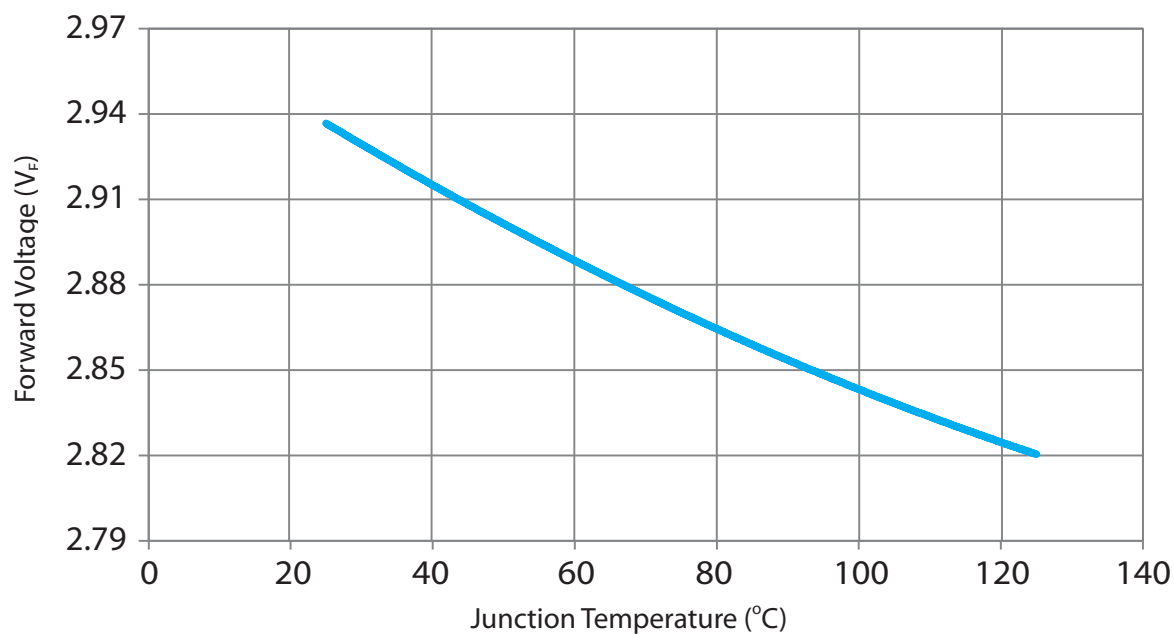
Relative Radiant flux vs. Junction Temperature (Indigo)



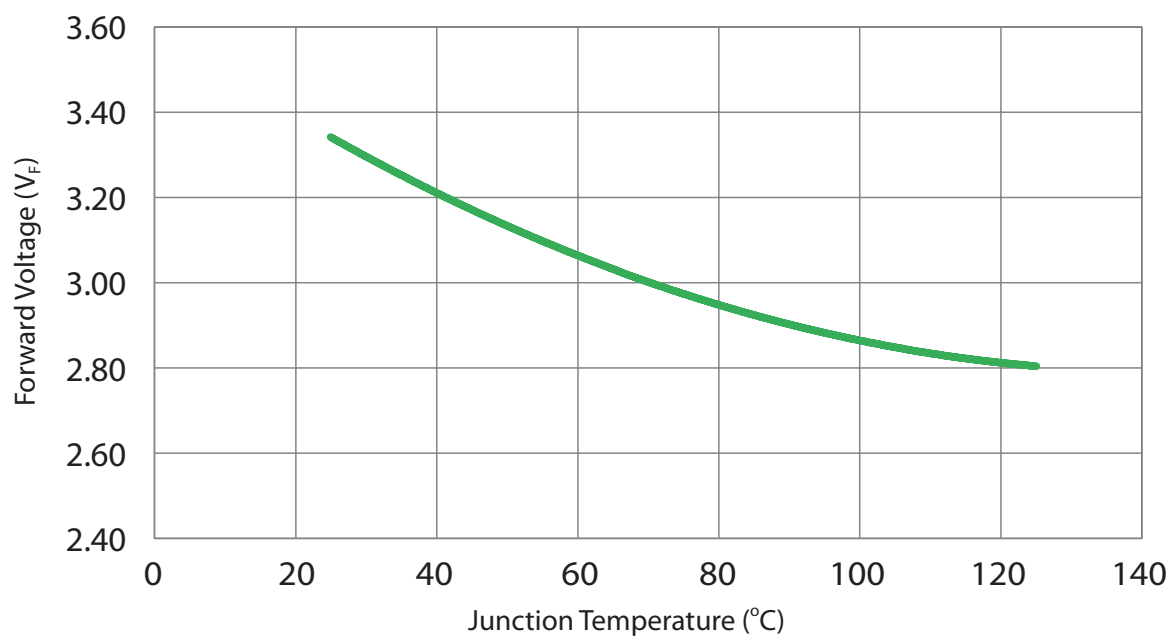
Forward Voltage vs. Junction Temperature (UV/ Indigo)



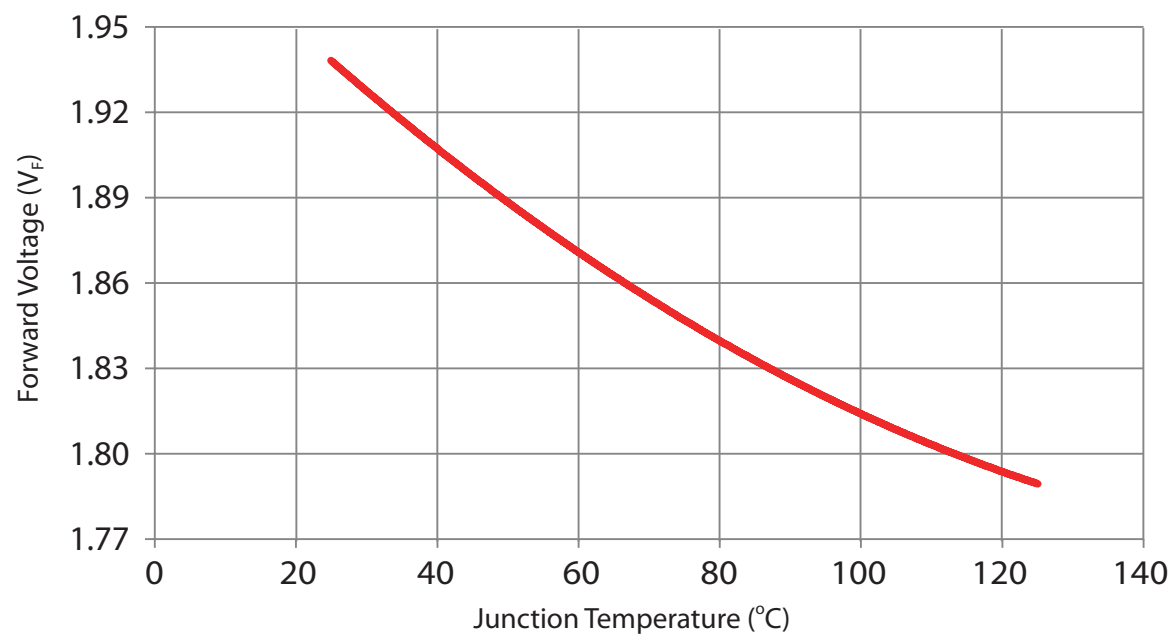
Forward Voltage vs. Junction Temperature (Blue)



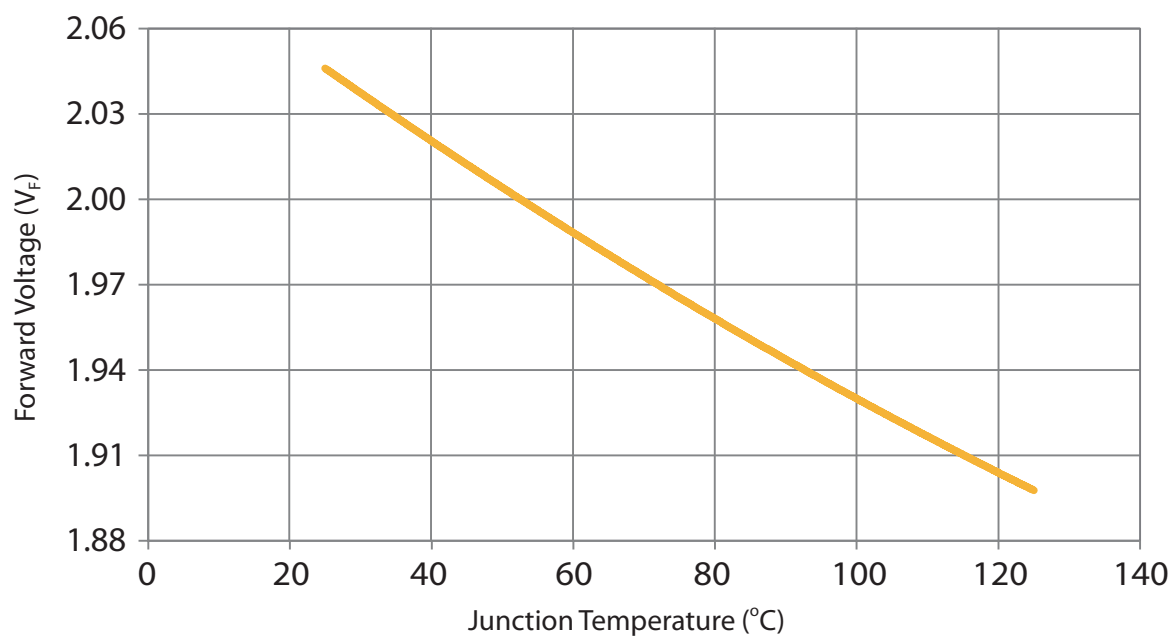
Forward Voltage vs. Junction Temperature (True Green)



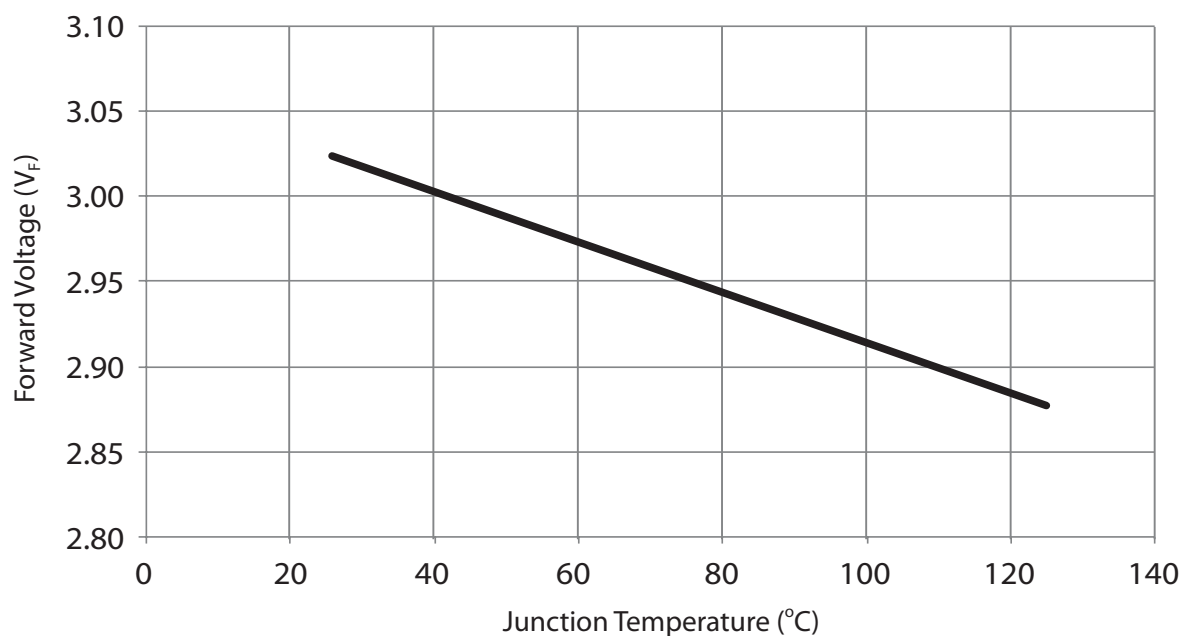
Forward Voltage vs. Junction Temperature (Red)



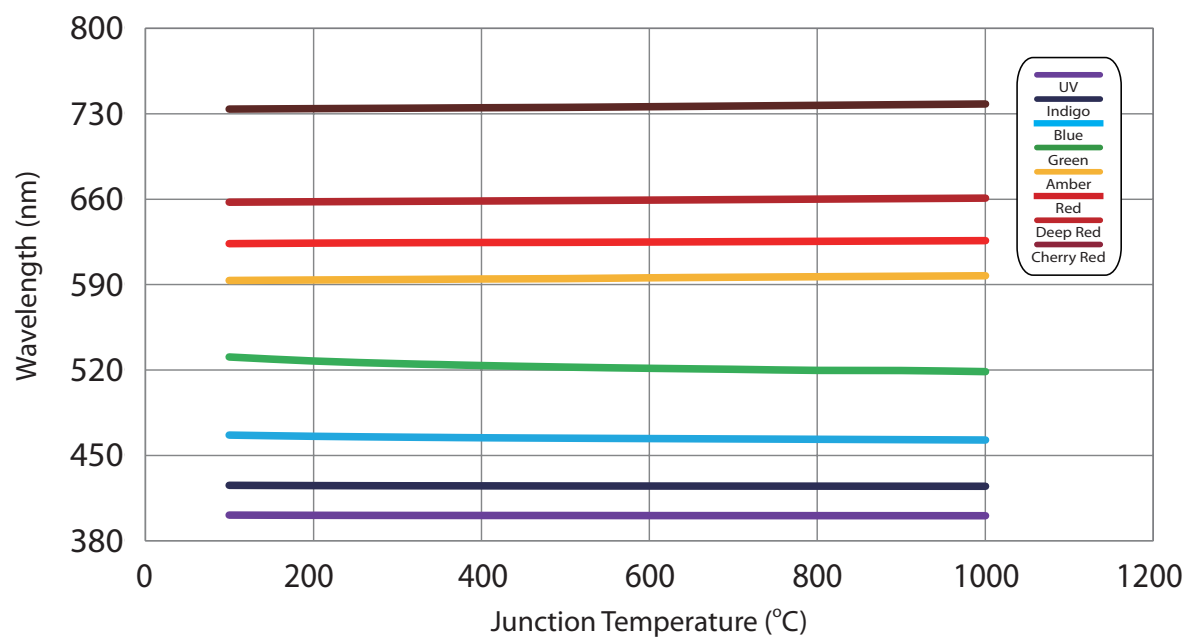
Forward Voltage vs. Junction Temperature (Amber)



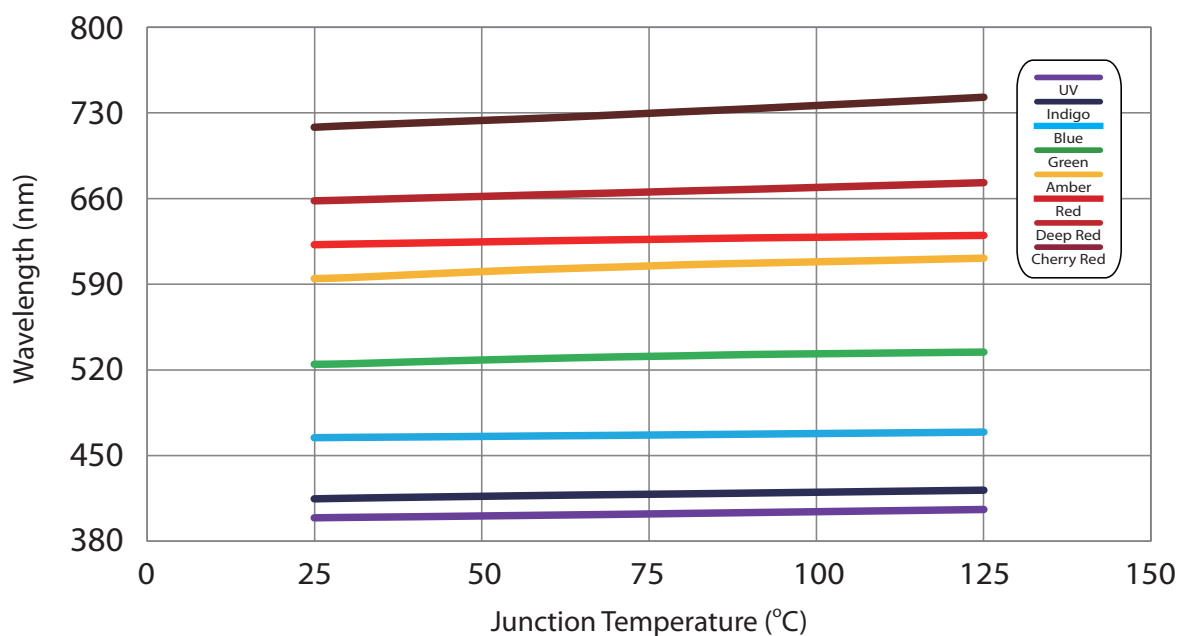
Forward Voltage vs. Junction Temperature (White series)



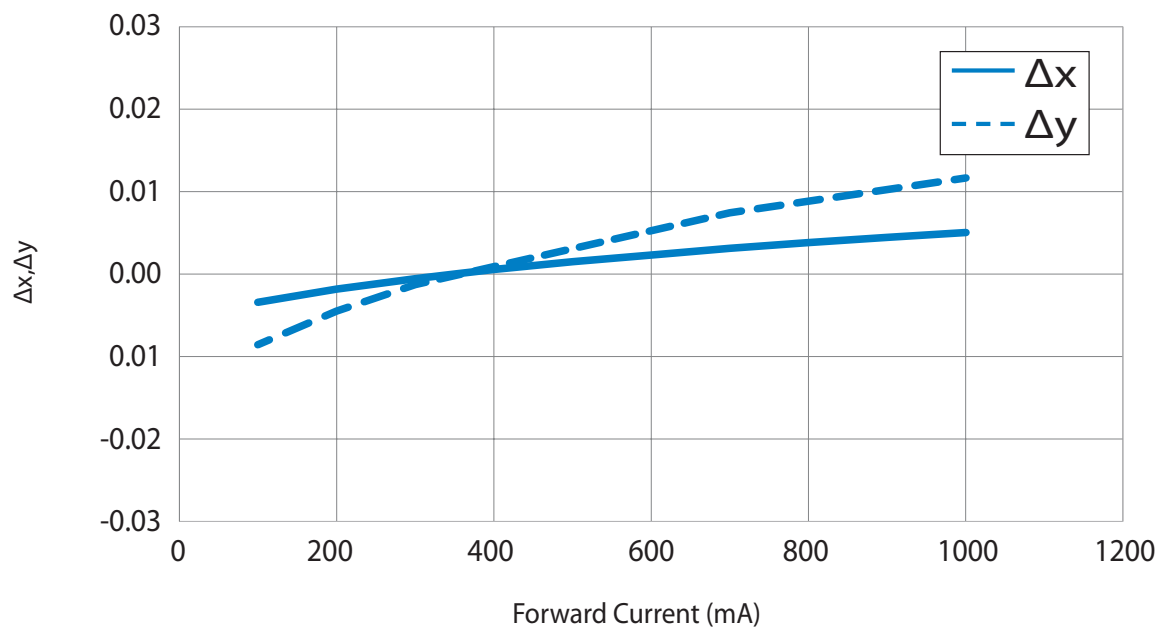
Wavelength vs. Forward Current



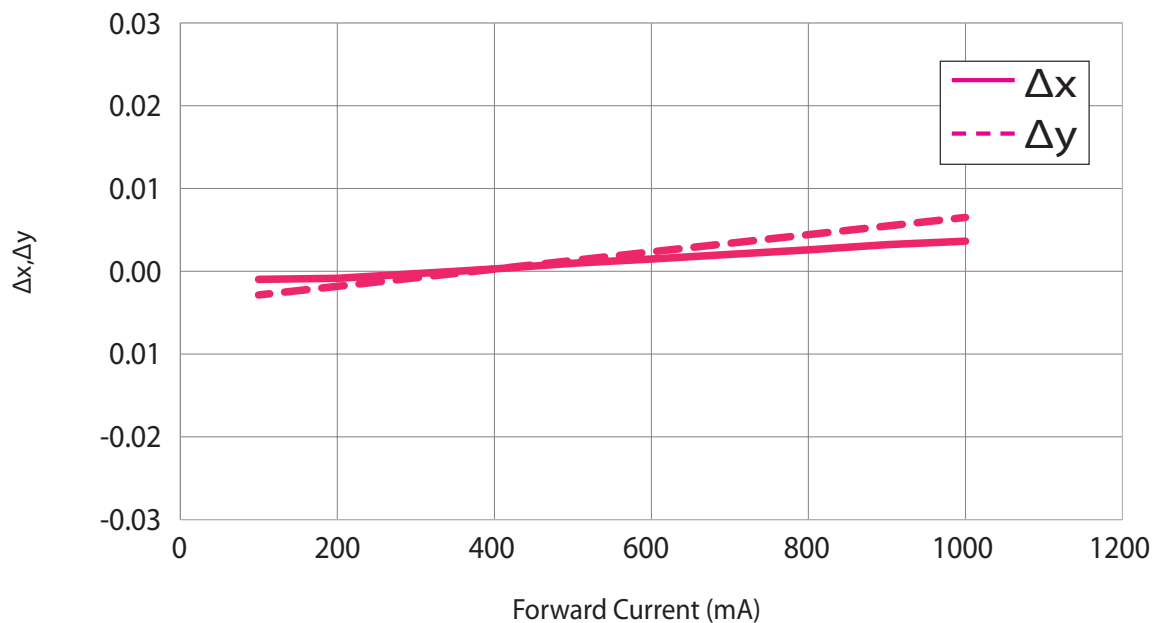
Wavelength vs. Junction Temperature



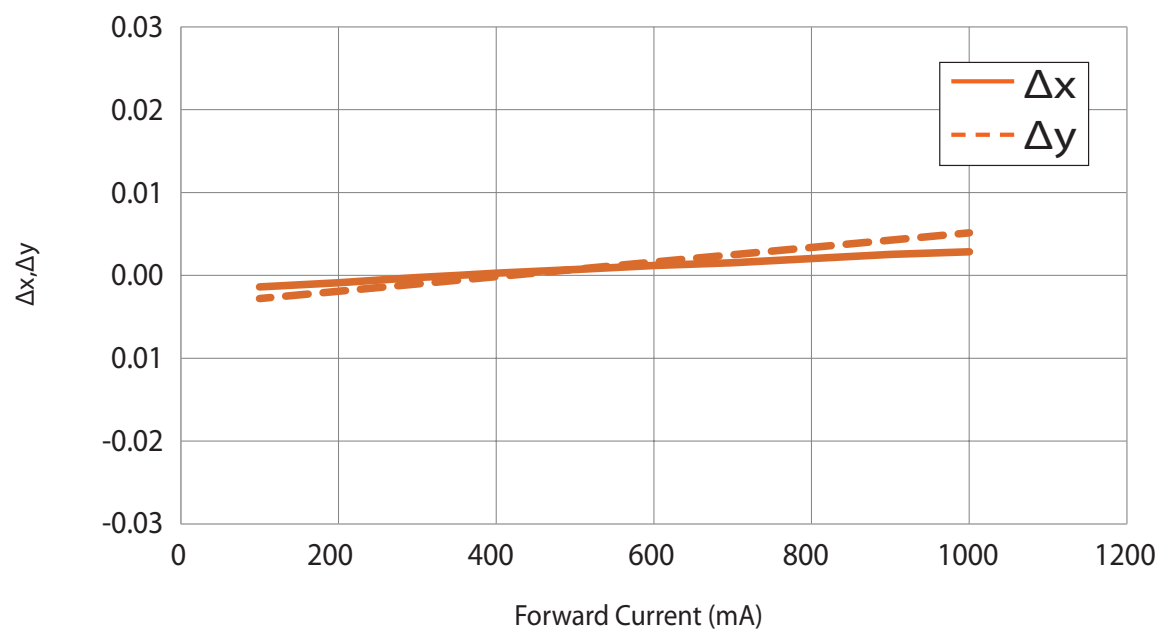
$\Delta x, \Delta y$ vs. Forward Current (Cool White)



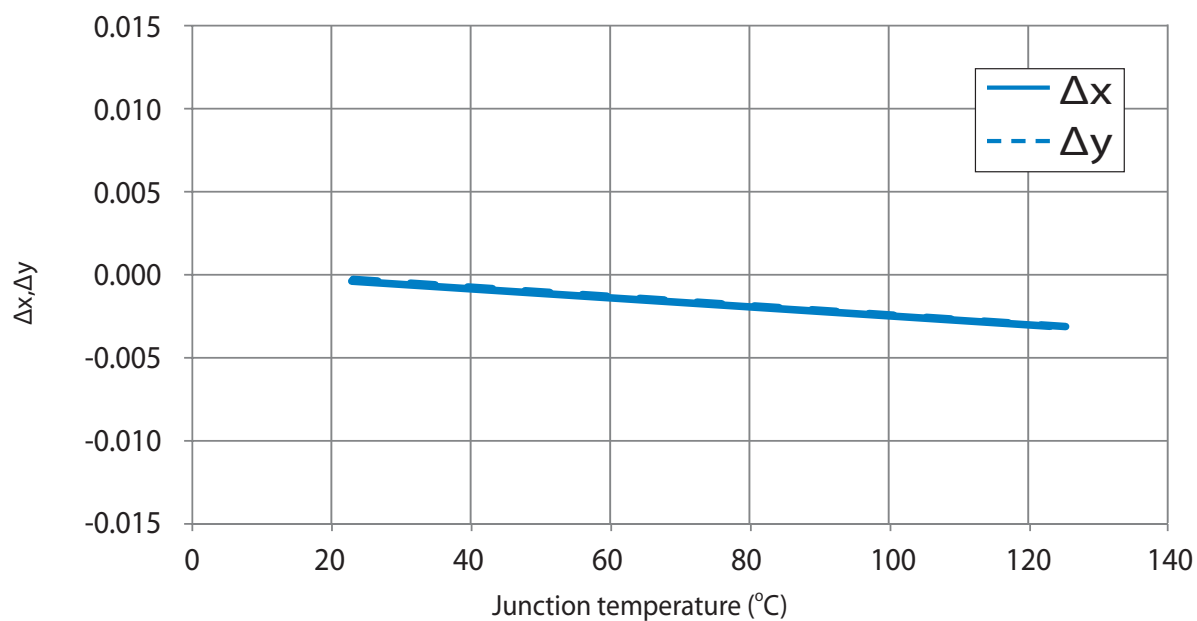
$\Delta x, \Delta y$ vs. Forward Current (Neutral White)



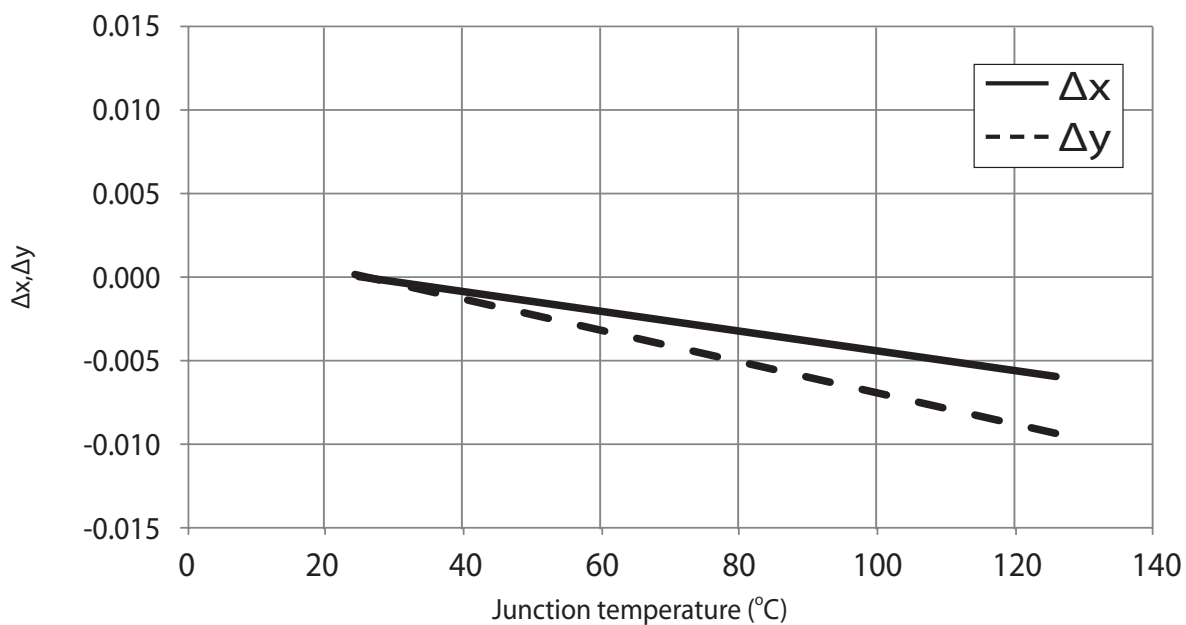
$\Delta x, \Delta y$ vs. Forward Current (Warm White)



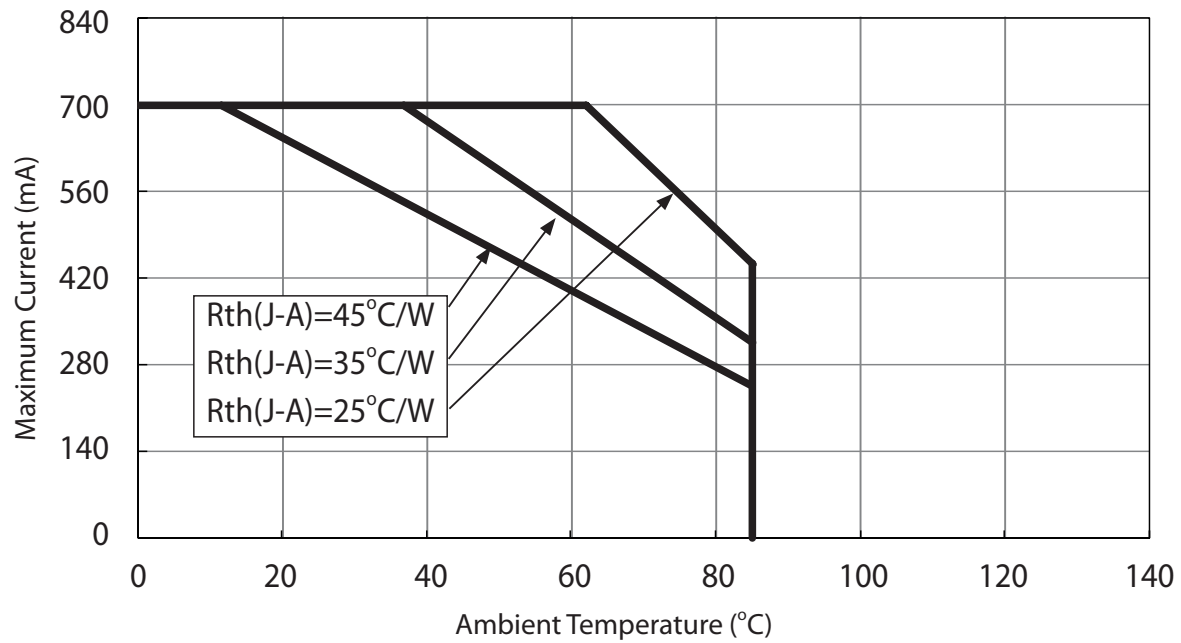
$\Delta x, \Delta y$ vs. Junction Temperature (Cool White)



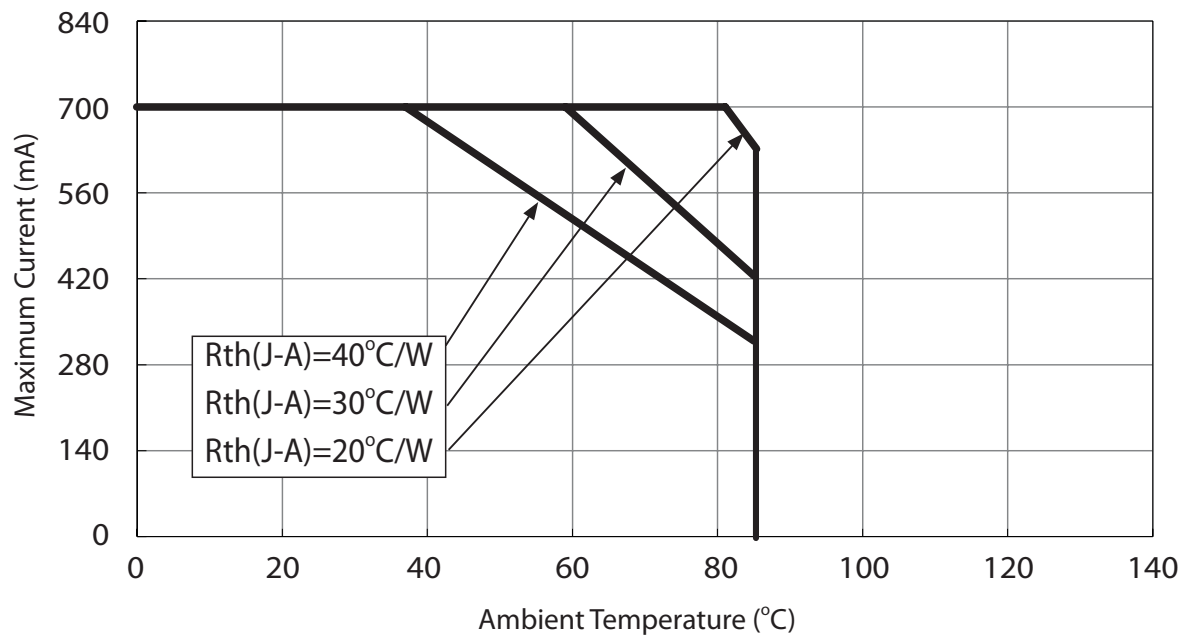
$\Delta x, \Delta y$ vs. Junction Temperature (Neutral White & Warm White)



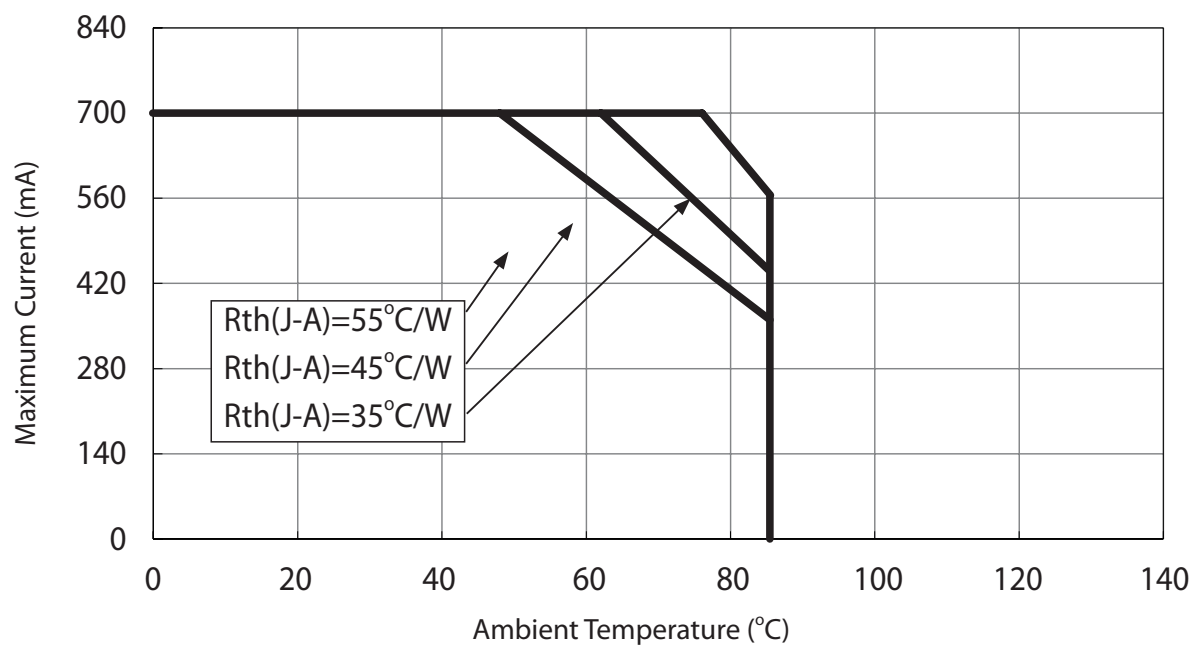
Maximum Current vs. Ambient Temperature (UV, Indigo)



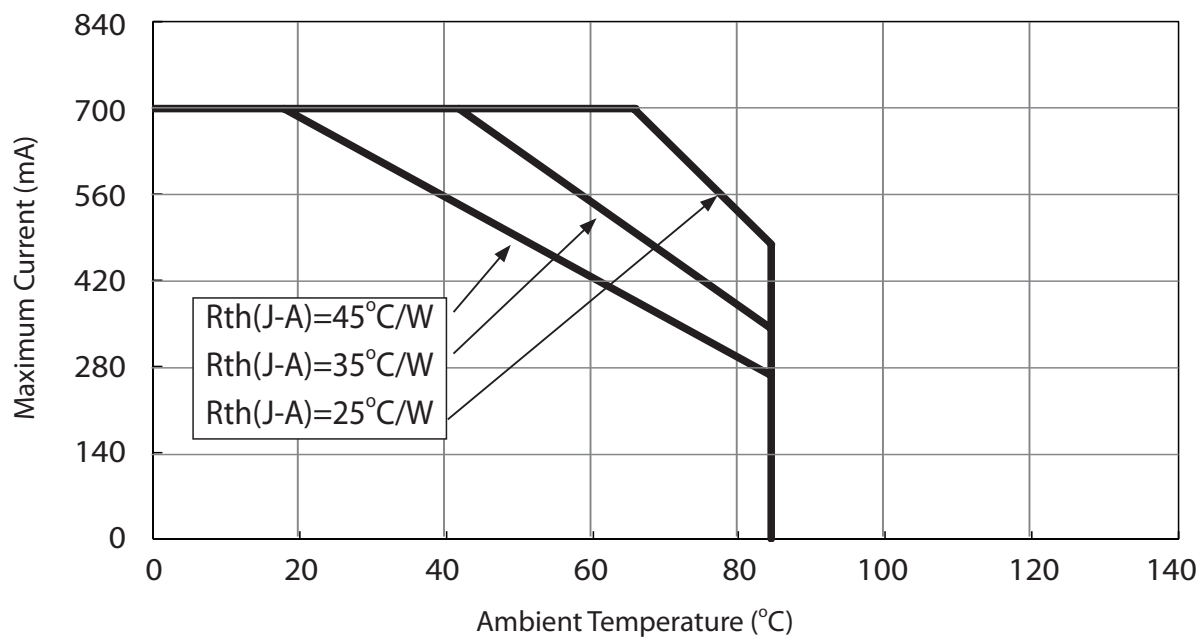
Maximum Current vs. Ambient Temperature (B/T)



Maximum Current vs. Ambient Temperature (R/ A/ Deep Red/ Cherry Red)

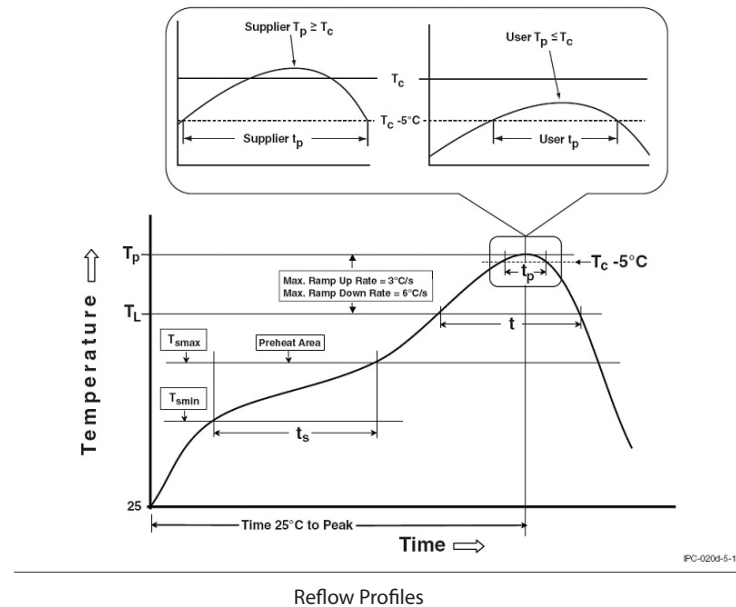


Maximum Current vs. Ambient Temperature (White series)



Reflow Profile

The following reflow profile is from IPC/JEDEC J-STD-020D which provided here for reference.



Classification Reflow Profiles

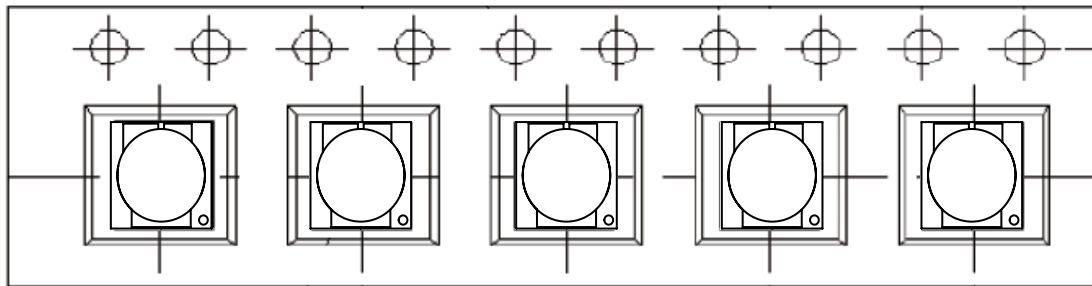
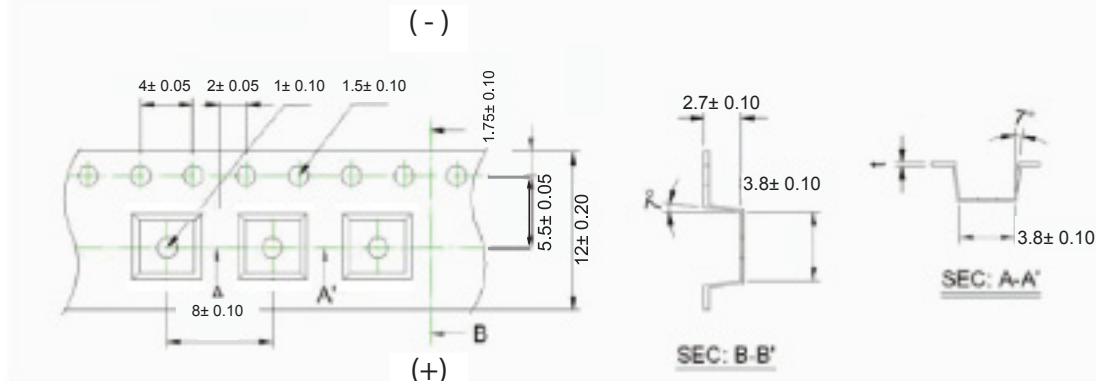
Profile Feature	Pb-Free Assembly
Preheat & Soak	
Temperature min (T_{smin})	150 °C
Temperature max (T_{smax})	200 °C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max.
Liquidous temperature (T_L)	217 °C
Time at liquidous (t_L)	60-150 seconds
Peak package body temperature (T_p)*	255 °C ~260 °C *
Classification temperature (T_c)	260 °C
Time (t_p)** within 5 °C of the specified classification temperature (T_c)	30** seconds
Average ramp-down rate (T_p to T_{smax})	6°C/second max.
Time 25°C to peak temperature	8 minutes max.

Notes:

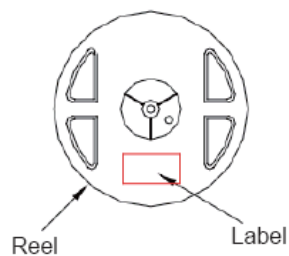
- * Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.
- ** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

Product Packaging Information

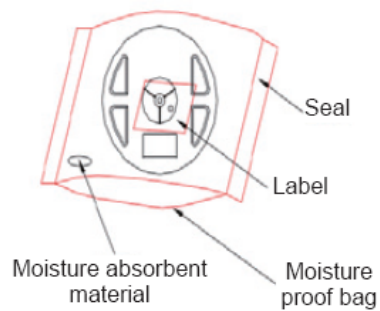
FX Series



ANODE SIDE



Taping reel dimensions



Federal 3535 Package

Item	Quantity	Total	Dimensions(mm)
Reel	500pcs	500pcs	R-178
Box	4 Reels	2,000pcs	240*235*67
Carton	5 boxes	10,000pcs	353*354*256

Starting with 50pcs empty, and 50pcs empty at the last

Revision History

Versions	Description	Release Date
1	Establish a Datasheet	2018/02/06
2	Add Cheery Red Radiometric Power BIN	2018/03/30
3	1. Revise Deep Red&Blue degree of angle 2. Update Deep Red&Blue PPF	2018/10/29

About Edison Opto

Edison Opto is a leading manufacturer of high power LED and a solution provider experienced in LDMS. LDMS is an integrated program derived from the four essential technologies in LED lighting applications- Thermal Management, Electrical Scheme, Mechanical Refinement, Optical Optimization, to provide customer with various LED components and modules. More Information about the company and our products can be found at www.edison-opto.com

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