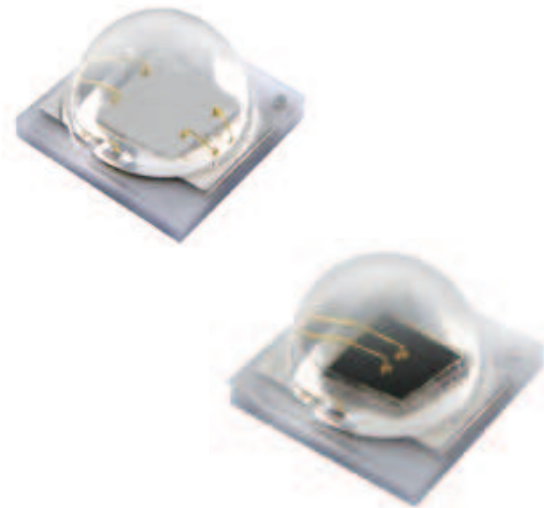


# Federal 3535 UV & IR Series Datasheet



## Features :

- High power performance
- Promising power maintenance characteristics
- High efficiency package
- Level 1 on JEDEC moisture sensitivity analysis
- RoHS compliant

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## General Information

### Introduction

Federal 3535 UV&IR Series is a smaller and brighter single-chip LED. Federal is a surface mount, compact, high brightness LED that is suitable for various illumination needs such as Machine Vision.

### Ordering Code Format

2      F      X0      01      xx      00      F02      xxx  
X1      X2      X3      X4      X5      X6      X7      X8

X1		X2		X3		X4		X5	
Type		Component		Series		Wattage		Color	
2	Emitter	F	Federal	X0	3535	01	1W	VX	UV
								DX	Indigo
								EX	Deep Red
								FX	Cherry Red
								IX	IR850

X6		X7		X8	
Internal code		PCB Board		Serial Number	
00	-	F02	3535	-	-

### Ordering Code Format (Emitter on Star )

5      F      X0      01      xx      S      001      xxxx  
X1      X2      X3      X4      X5      X6      X7      X8

X1		X2		X3		X4		X5	
Type		Component		Series		Wattage		Color	
5	Module	F	Federal	X0	3535	01	1W	VX	UV
								EX	Deep Red
								FX	Cherry Red
								IX	IR850

X6		X7		X8	
Internal code		Quantity		Serial Number	
S	Star	001	1 pcs	0001	-

## Absolute Maximum Ratings

Parameter	Symbol	Value	Units
DC Forward Current <sup>[1]</sup> (each chip)	$I_F$	Ultraviolet, Indigo : 350/700 Deep Red, Cherry Red : 350/700 IR 850 : 700/1000	mA
Peak Pulsed Current; (tp≤100μs, Duty cycle=0.25)	$I_{pulse}$	Ultraviolet, Indigo : 1000 Deep Red, Cherry Red : 1000 IR 850 : 1400	mA
Transient Surge Voltage	-	Ultraviolet, Indigo : 5 Deep Red, Cherry Red, IR 850 : 3	V
Reverse Voltage <sup>[2]</sup>	$V_R$	Note 2	V
LED Junction Temperature <sup>[3]</sup>	$T_J$	125	°C
Operating Temperature	-	-40 ~ +85	°C
Storage Temperature	-	-40 ~ +125	°C
Soldering Temperature	-	260	°C

Notes:

1. Proper current derating must be observed to maintain junction temperature below the maximum at all time.
2. LEDs are not designed to drive in reverse bias.
3. Allowable reflow cycles are 3 times for each LED
4. tp: 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.)	$2\Theta_{1/2}$	Ultraviolet, : 120 Indigo/ Deep Red/ Cherry Red/ IR 850 : 110	Degree
Thermal resistance	-	10	°C/W
Wavelength Range	$\lambda_p$	Ultraviolet : 390 - 410 Indigo : 415 - 435 Deep Red : 650 - 670 Cherry Red : 720 - 745 IR 850 : 835 - 870	nm
JEDEC Moisture Sensitivity	-	Level 1 <b>Floor Life</b> Conditions: ≤30°C / 85% RH <b>Soak Requirements(Standard)</b> Time (hours): 168+5/-0 Conditions: 85°C / 85% RH	-

Notes:

1. Wavelengths are stated as peak wavelength.
2. Edison maintains a tolerance of ±2nm for peak wavelength.

## Radiant Power Characteristic

Radiant Power Characteristics T<sub>j</sub>=25°C

Color	Group	Min. Radiant Power@350mA (mW)	Min. Radiant Power@700mA (mW)	Order Code
Ultraviolet	B3	400	750	2FX001VX00F02001
	C0	500	950	
	C1	600	1150	
Indigo	B3	400	720	2FX001DX00F02001
	C0	500	920	
	C1	600	1100	
Deep Red	B1	200	500	2FX001EX00F02001
	B2	300	600	
	B3	400	700	
Cherry Red	B0	100	320	2FX001FX00F02002
	B1	200	360	
	B2	300	400	
IR 850	--	--	500	2FX001IX00F02001
	--	--	600	
	--	--	700	

Note:

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

## Voltage Bin Structure (Ultraviolet, Indigo)

Group	Min. Voltage (V)	Max. Voltage (V)
V01	2.8	3.1
V02	3.1	3.4
V03	3.4	3.7

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

## Voltage Bin Structure (Deep Red, Cherry Red, IR850)

Group	Min. Voltage (V)	Max. Voltage (V)
U02	1.3	1.6
U03	1.6	1.9
U04	1.9	2.2
U05	2.2	2.5

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

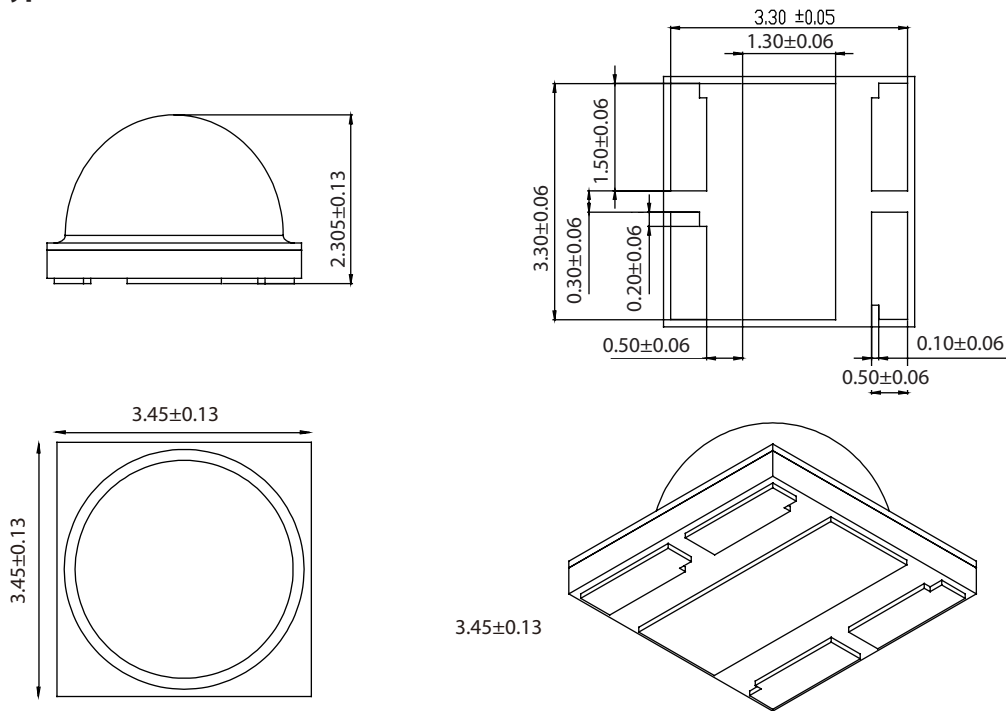
## Wavelength Bin Structure

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
IR850	IX0	835	870

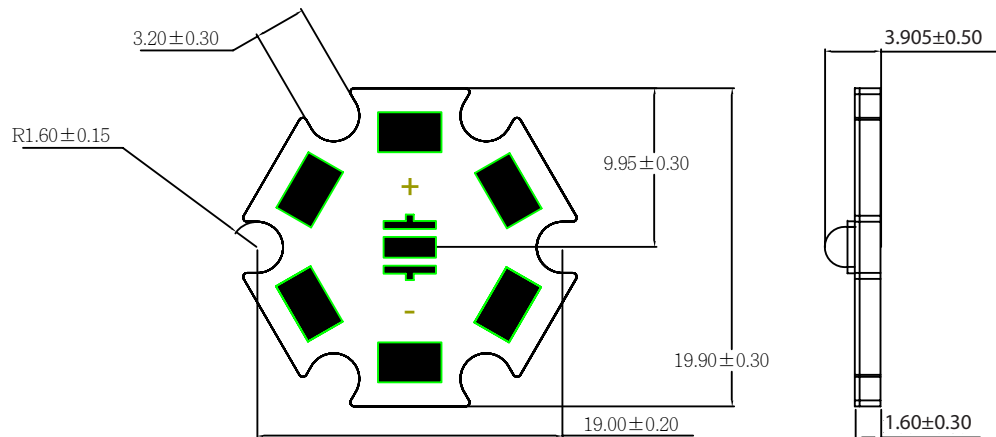
Note:  
Peak wavelength measurement allowance:  $\pm 2nm$ .

## Mechanical Dimensions

### Emitter Type Dimension



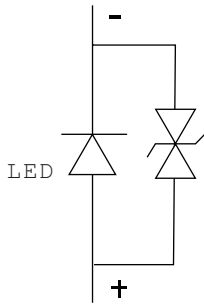
### Star PCB Type Dimension (5FX001xxS0010001)



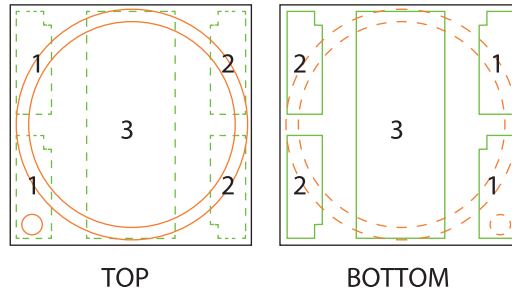
Notes:

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

### Circuit



### PCB Layout



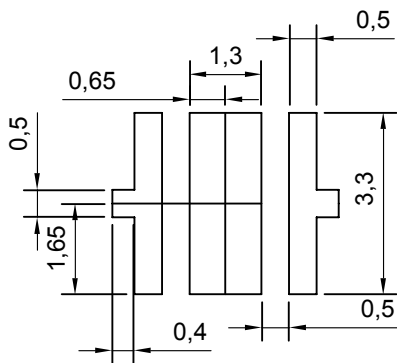
### Pad Configuration

PAD	FUNCTION
1	ANODE
2	CATHODE
3	THERMAL

### Note:

The thermal pad is electrically isolated from anode and cathode.

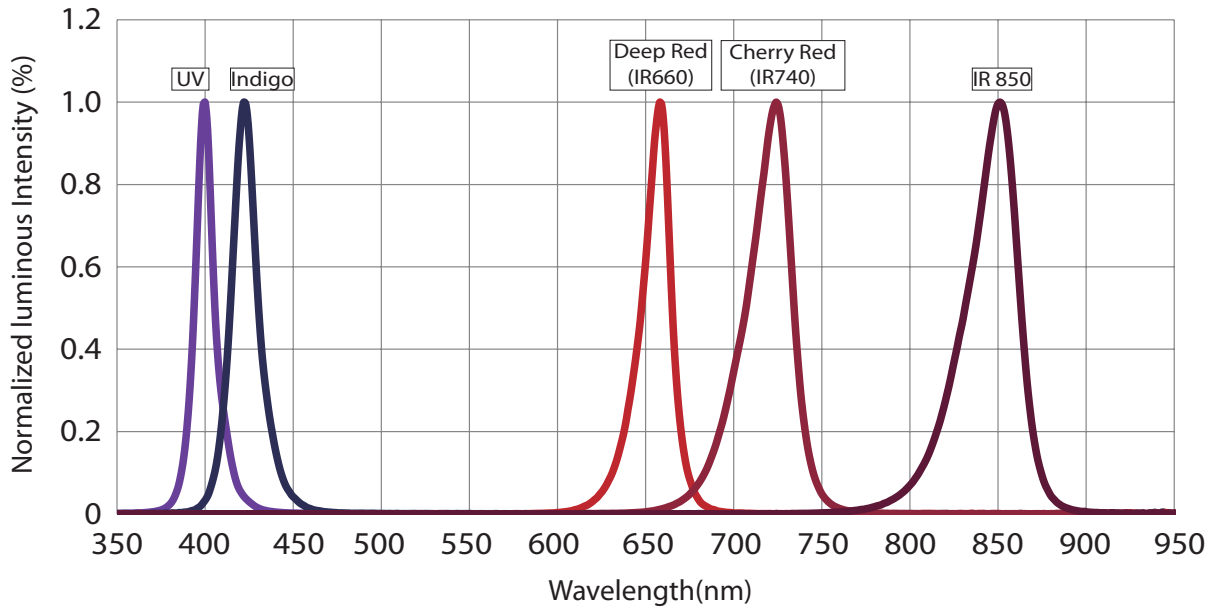
### Solder Pad



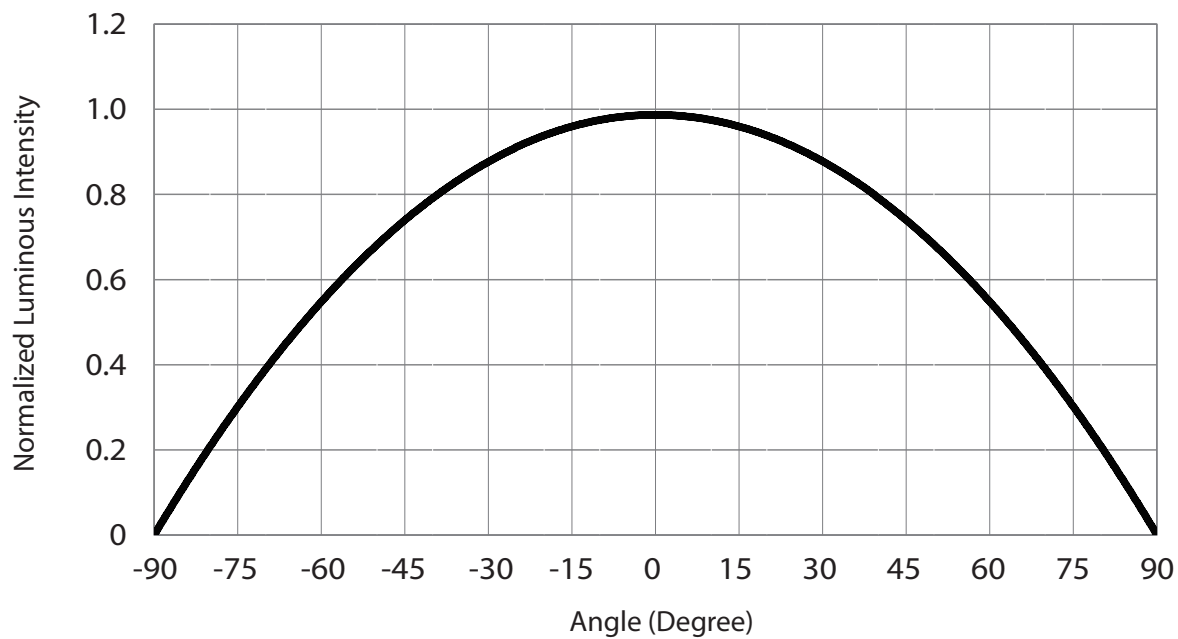


## Characteristic curve

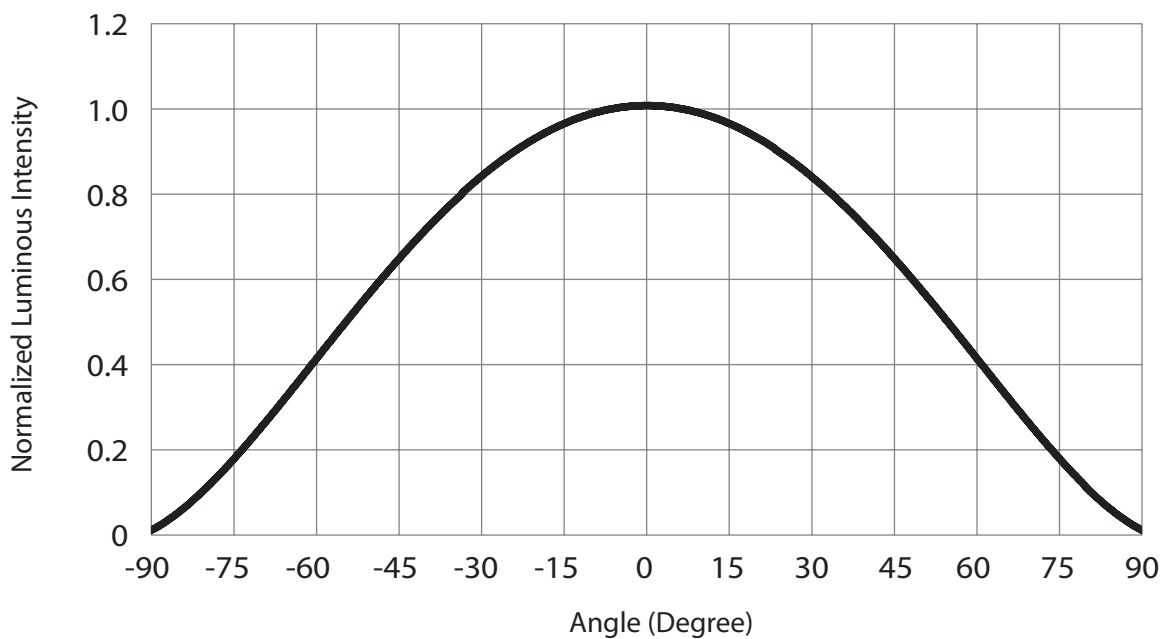
### Color Spectrum



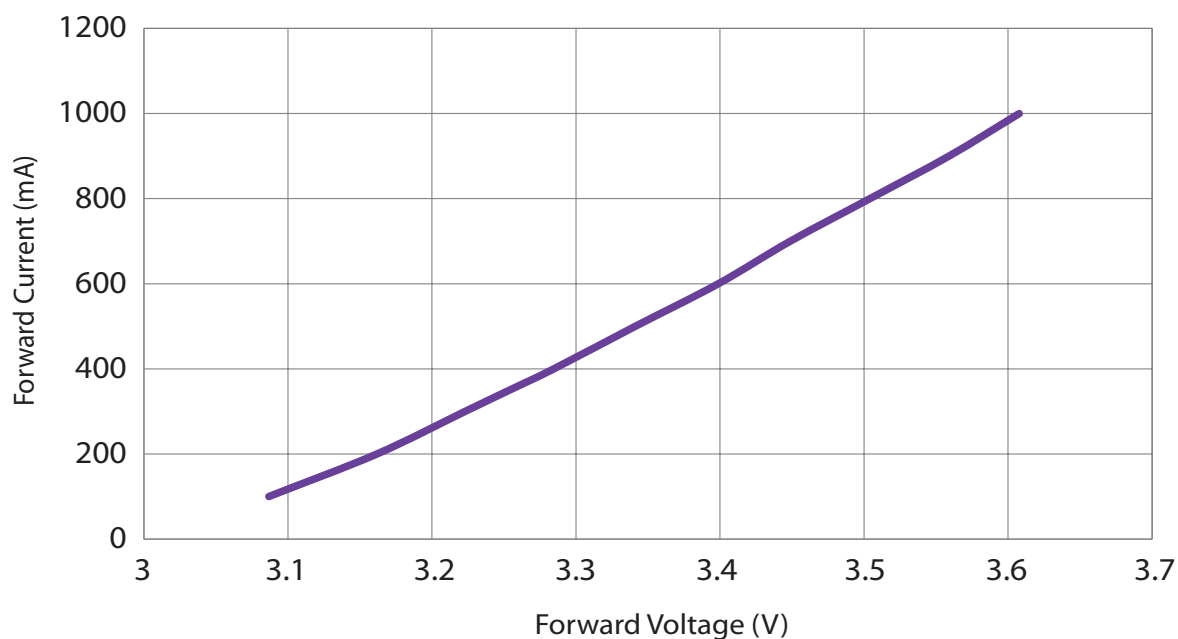
**Beam Pattern (UV )**



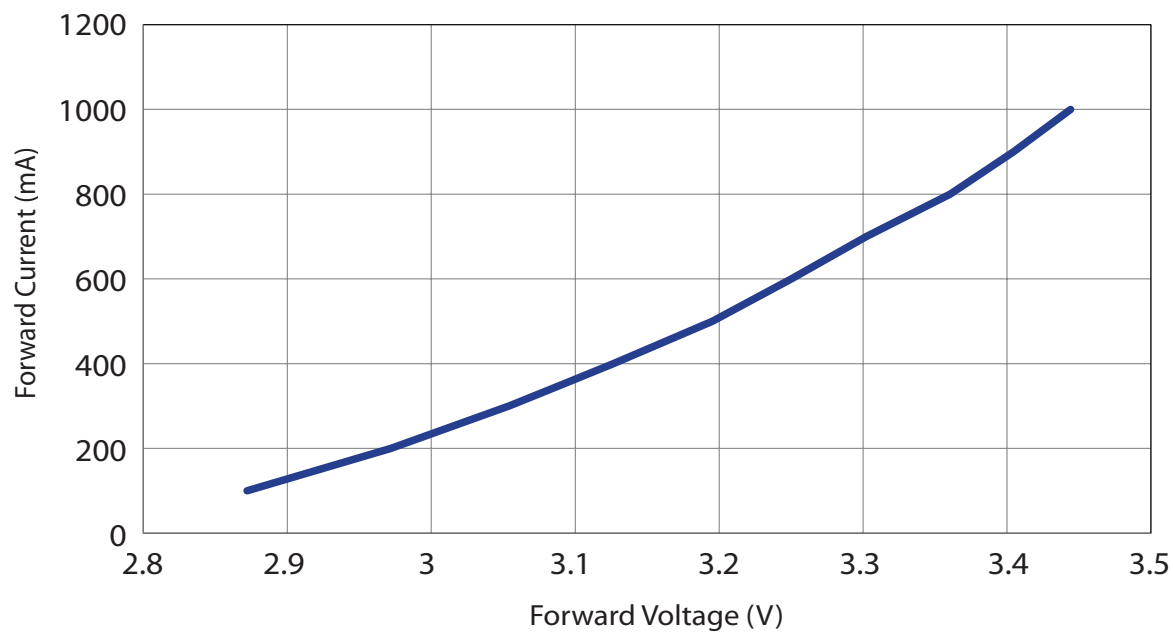
**Beam Pattern (Indigo/ Deep Red/ Cherry Red/ IR850)**



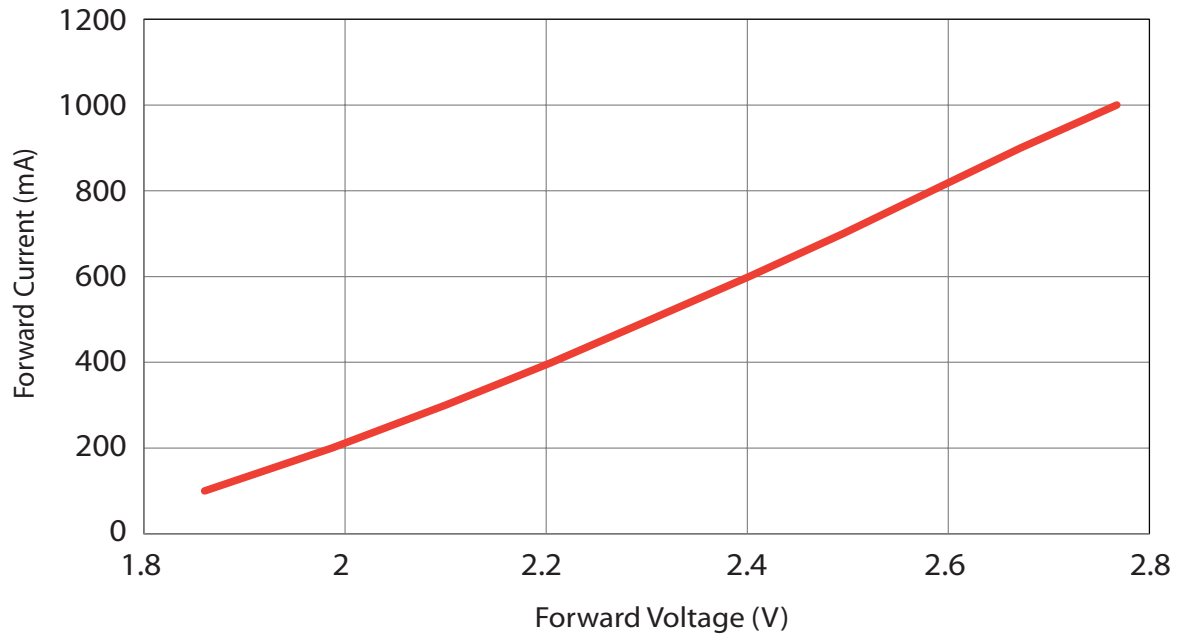
### Forward Current vs. Forward Voltage (UV)



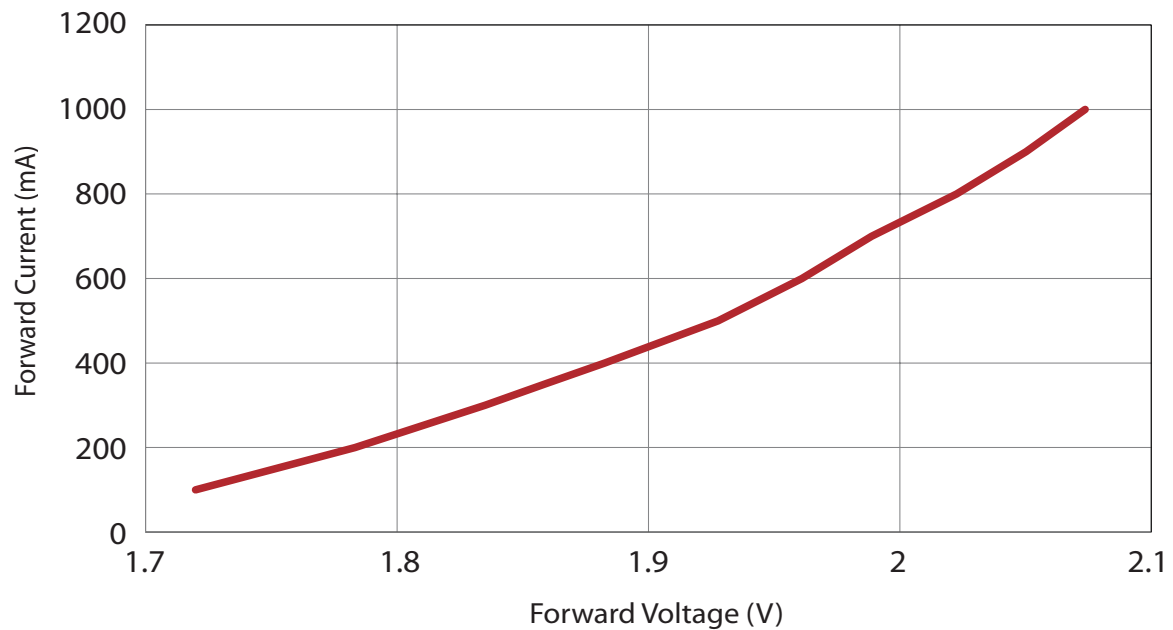
### Forward Current vs. Forward Voltage (Indigo)



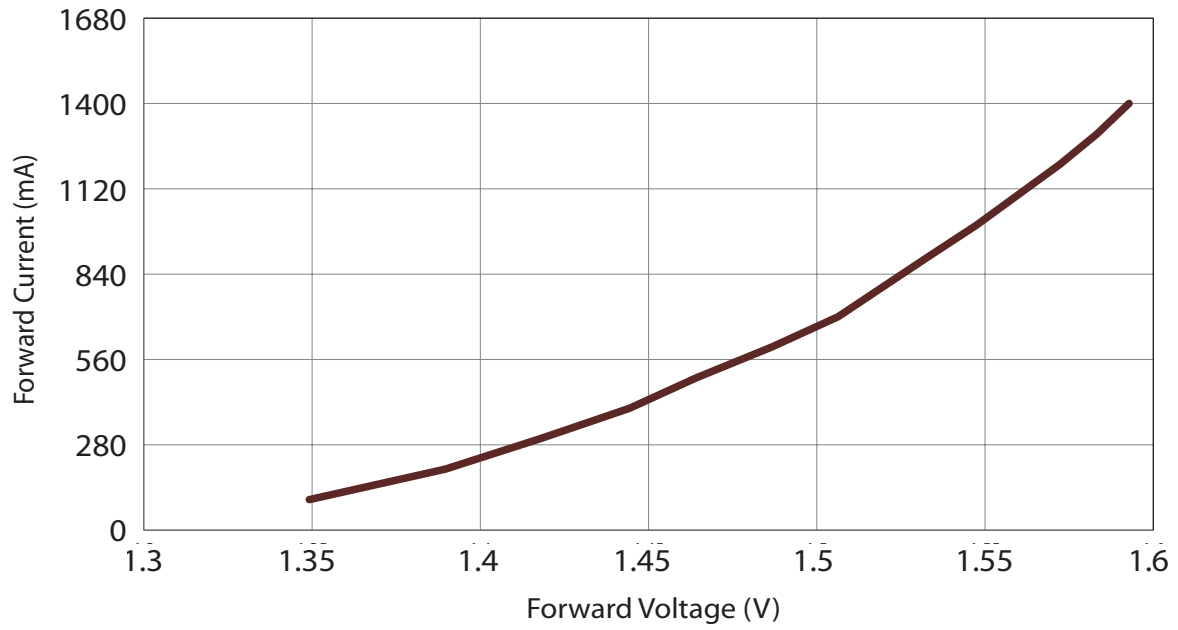
### Forward Current vs. Forward Voltage (Deep Red)



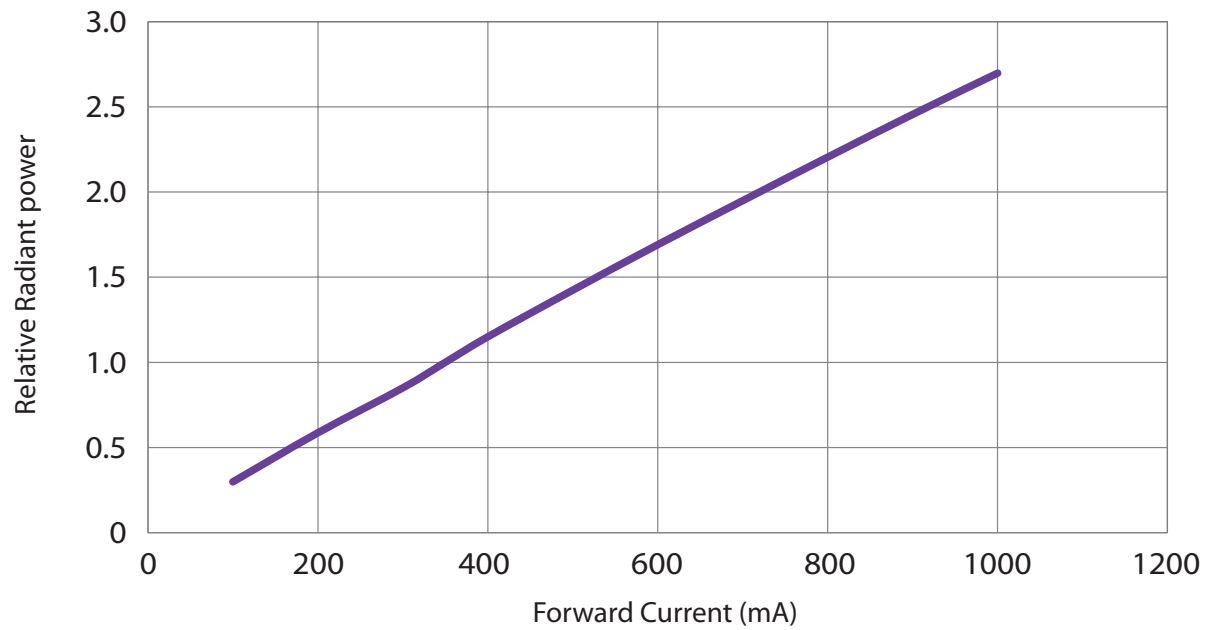
### Forward Current vs. Forward Voltage (Cherry Red)



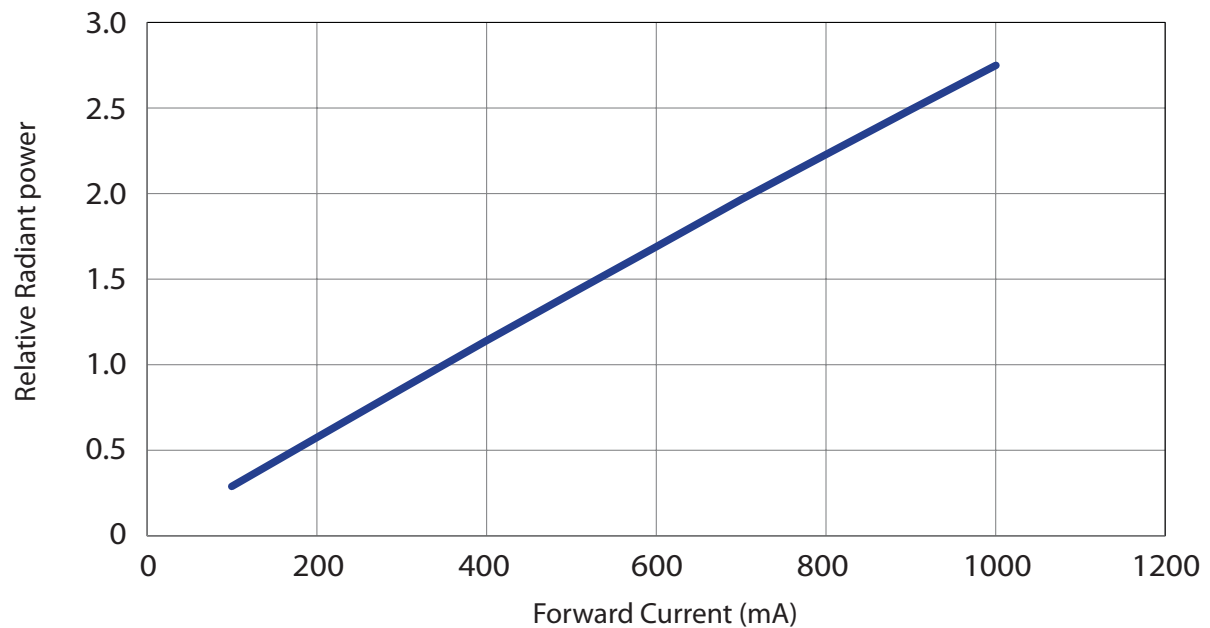
**Forward Current vs. Forward Voltage (IR850)**



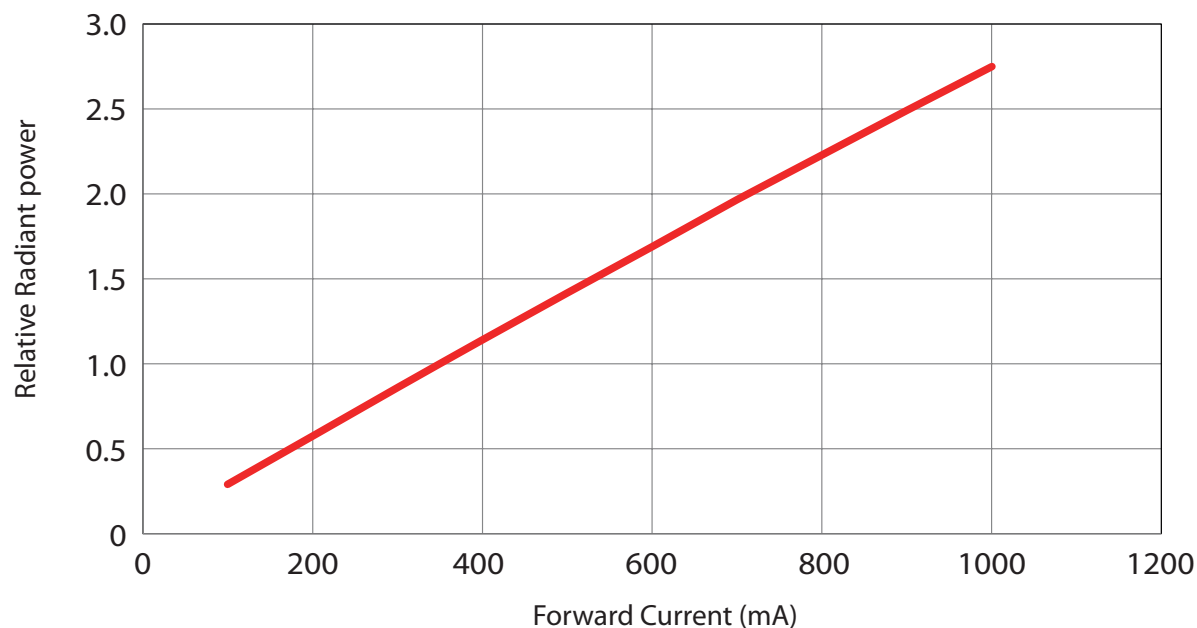
### Relative Radiant power vs. Forward Current (UV)



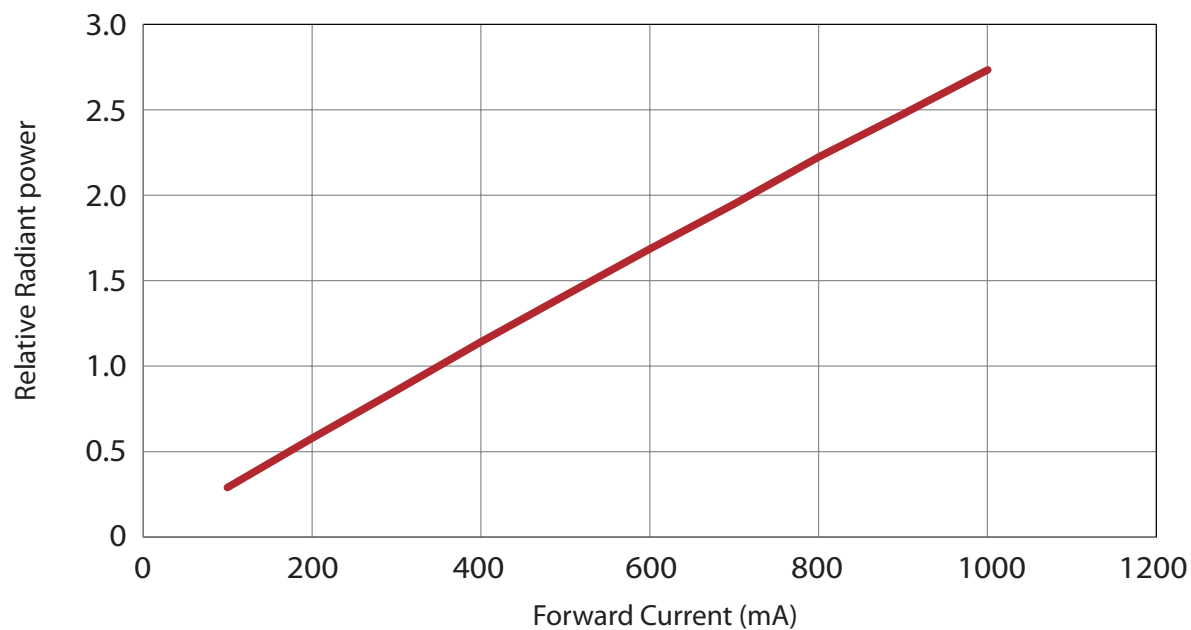
### Relative Radiant power vs. Forward Current (Indigo)



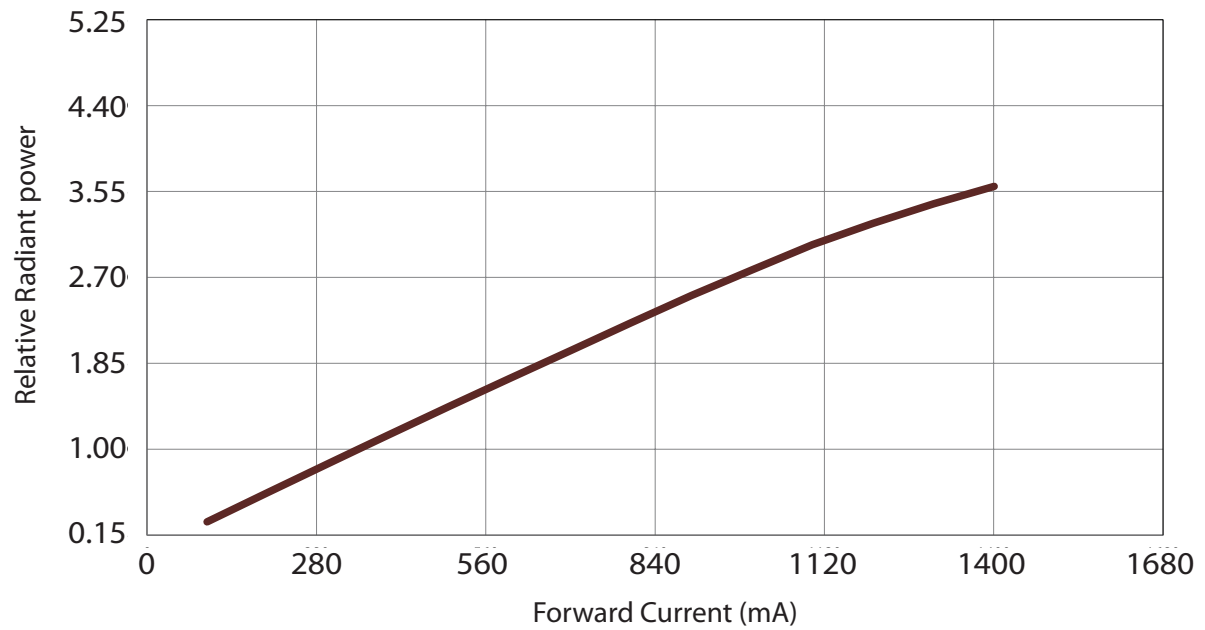
**Relative Radiant power vs. Forward Current (Deep Red)**



**Relative Radiant power vs. Forward Current (Cherry Red)**

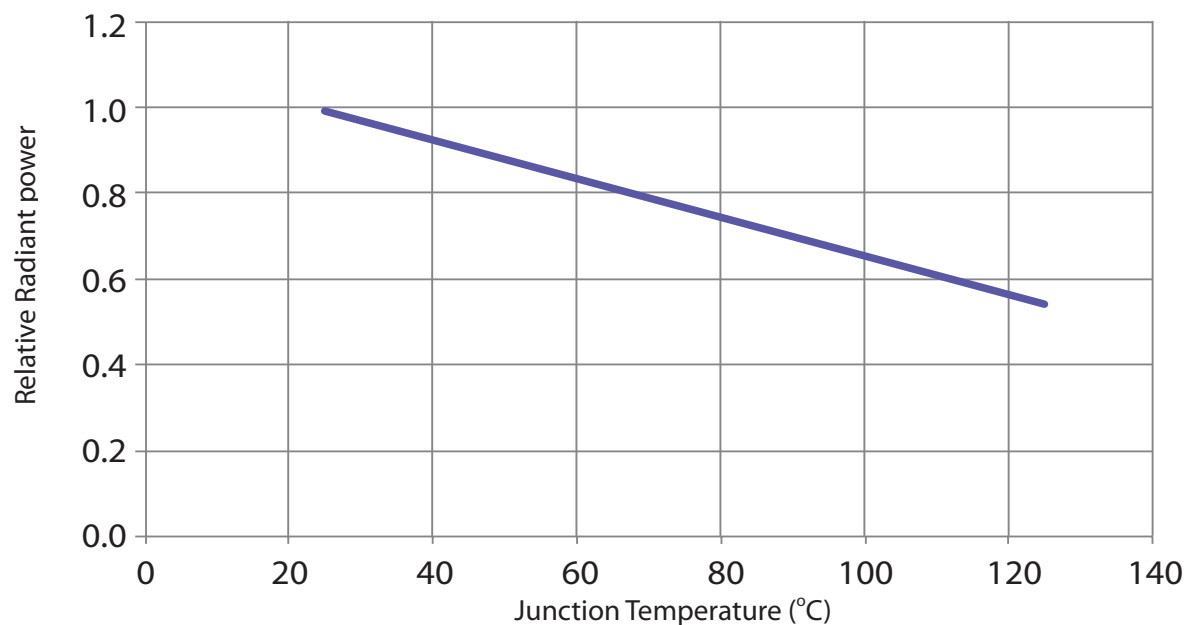


**Relative Radiant power vs. Forward Current (IR850)**

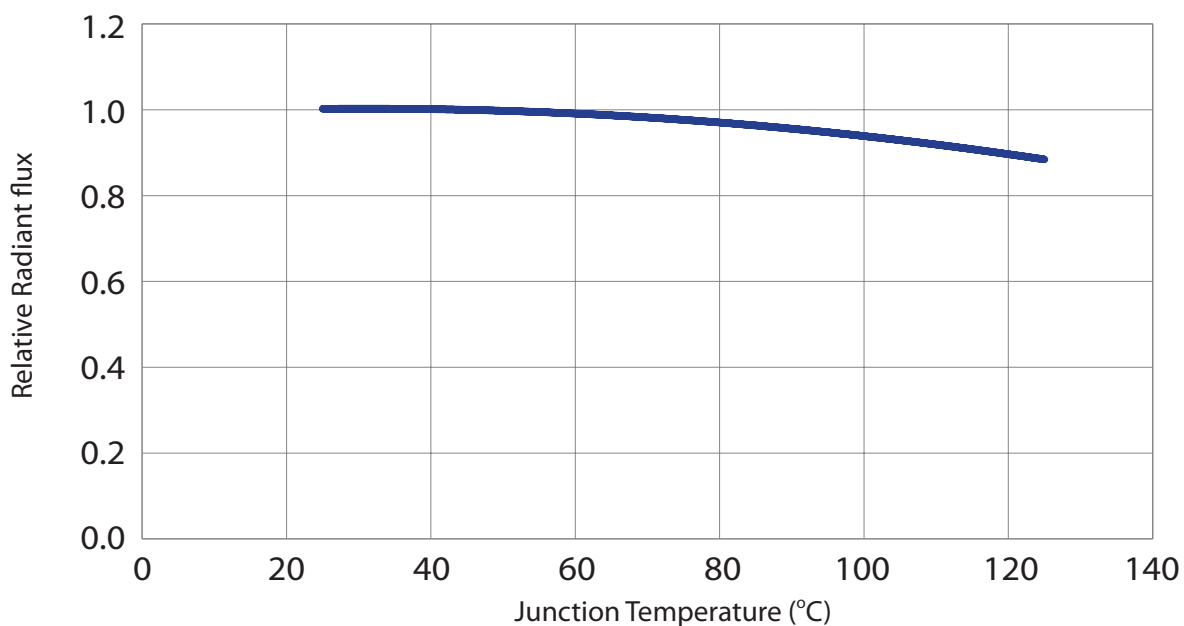




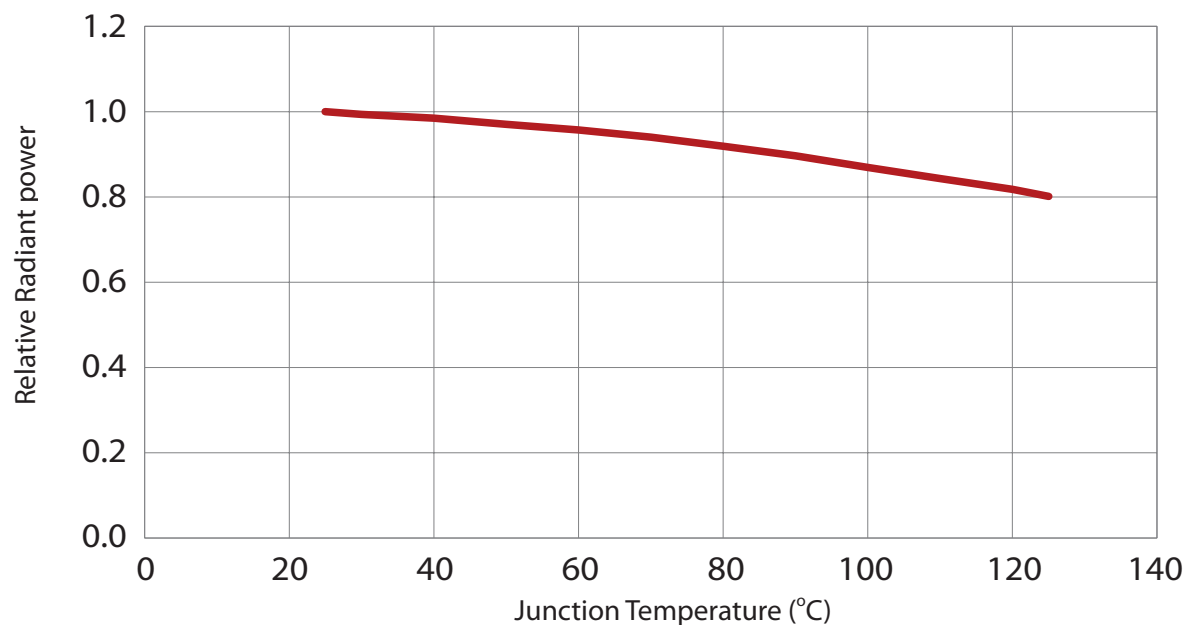
### Relative Radiant power vs. Junction Temperature (UV)



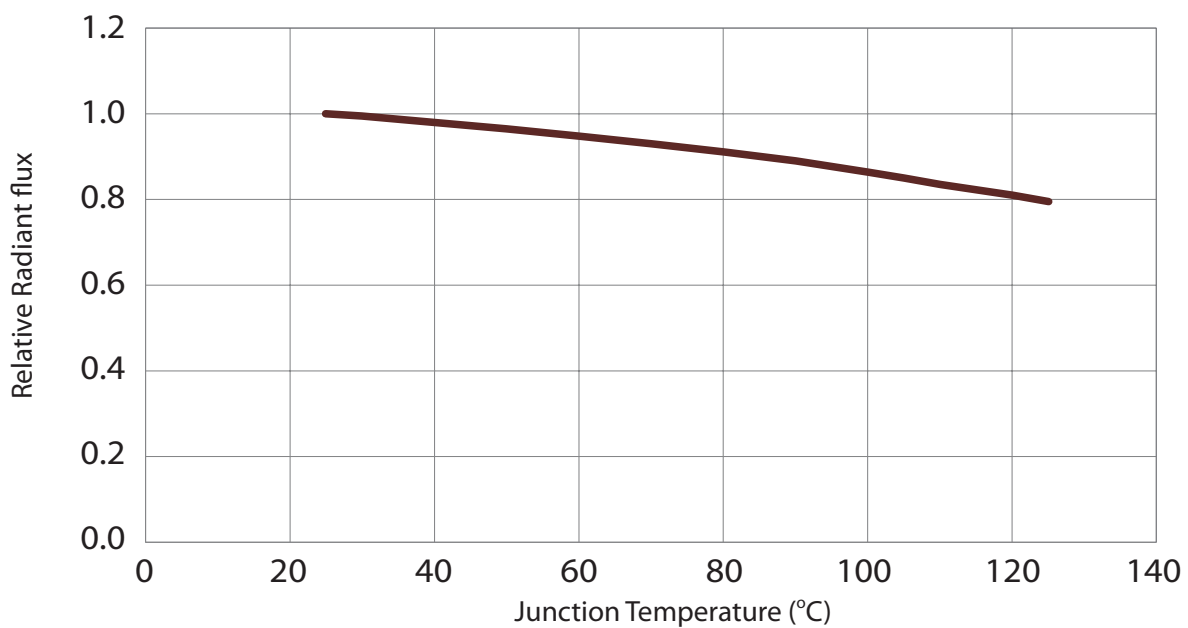
### Relative Radiant flux vs. Junction Temperature (Indigo)



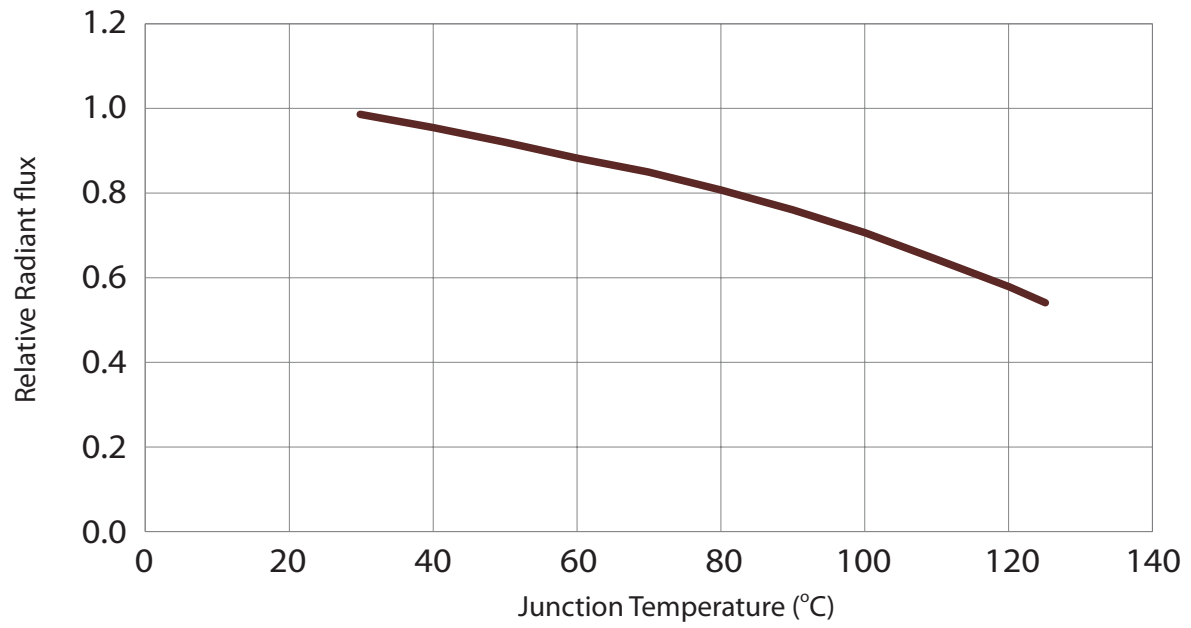
### Relative Radiant power vs. Junction Temperature (Deep Red)



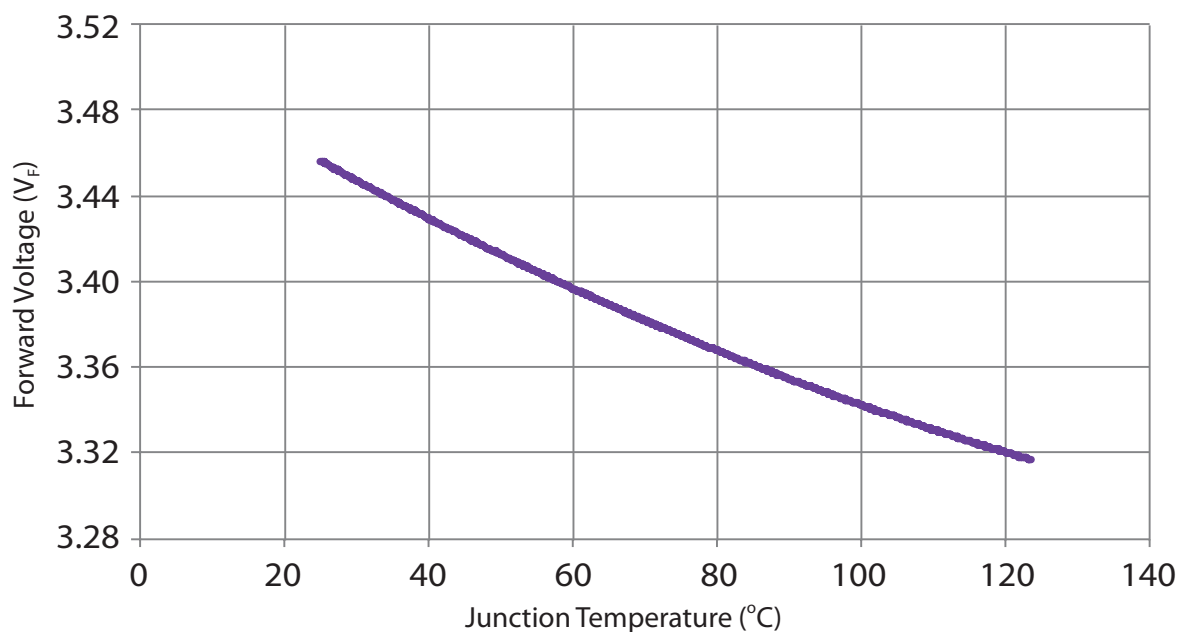
### Relative Radiant flux vs. Junction Temperature (Cherry Red)



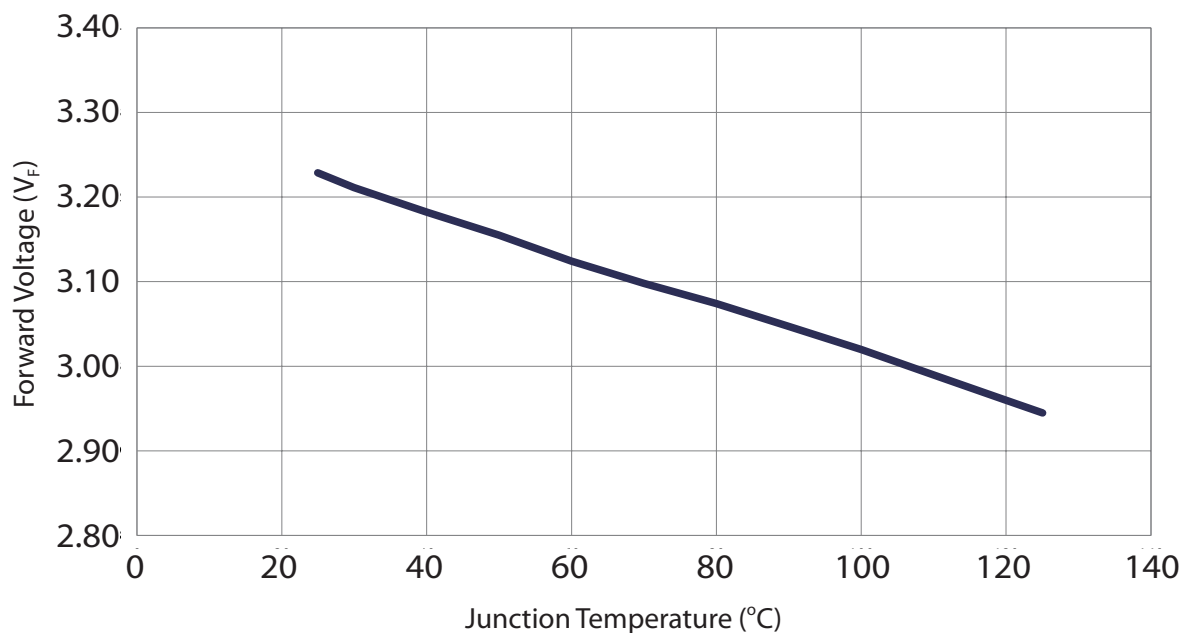
**Relative Radiant flux vs. Junction Temperature (IR850)**



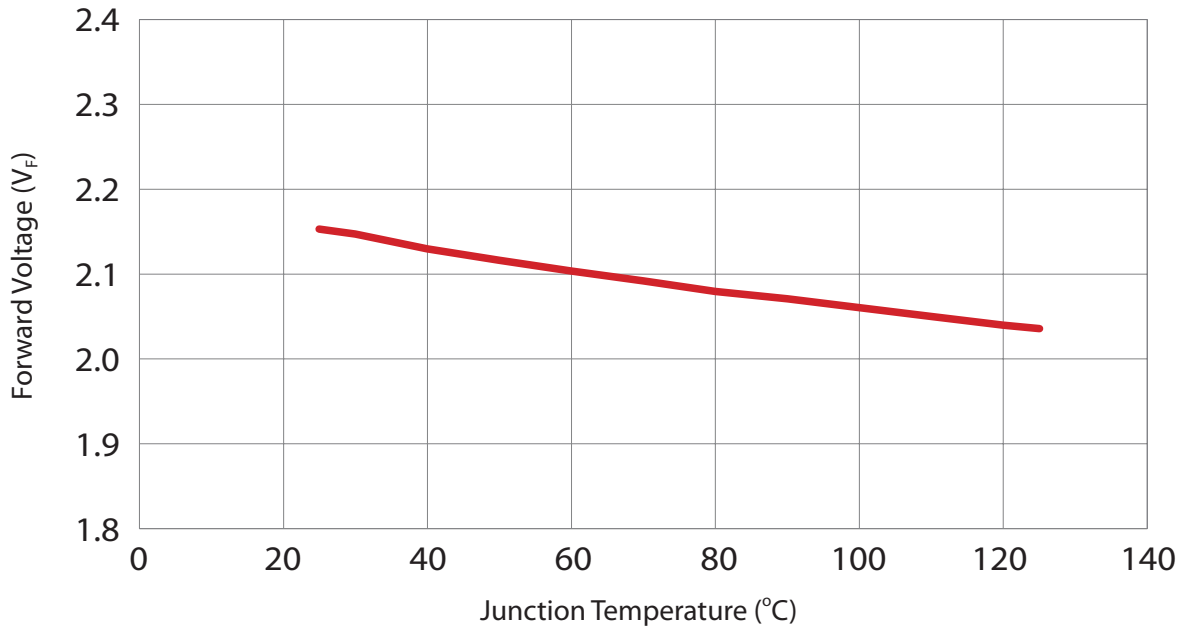
### Forward Voltage vs. Junction Temperature (UV)



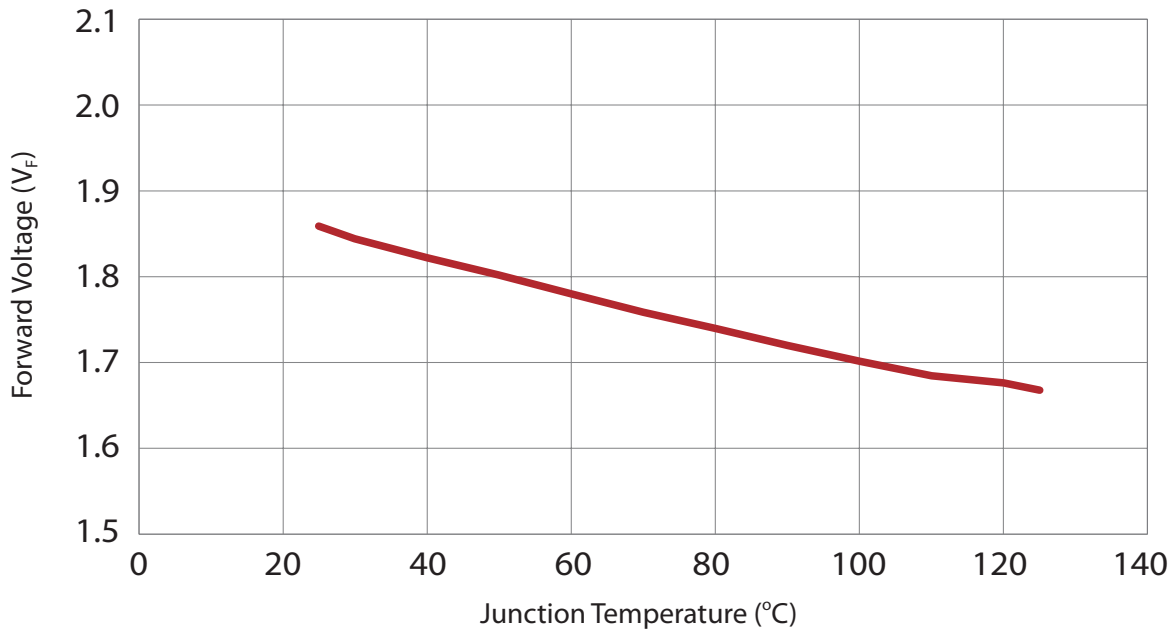
### Forward Voltage vs. Junction Temperature (Indigo)



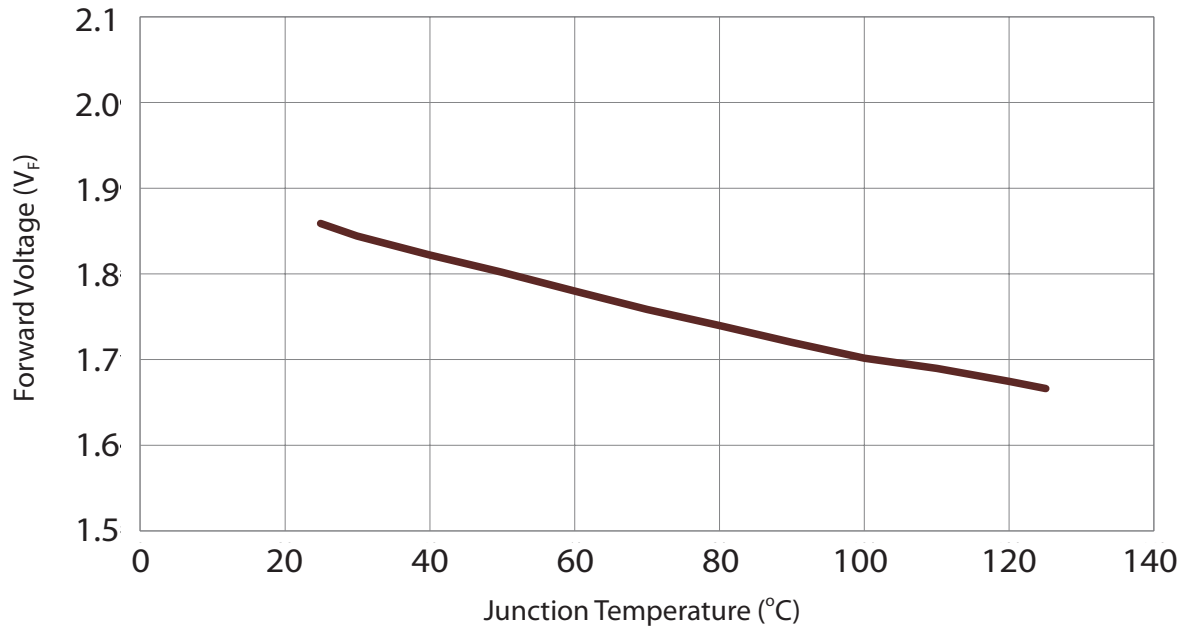
### Forward Voltage vs. Junction Temperature (Deep Red)



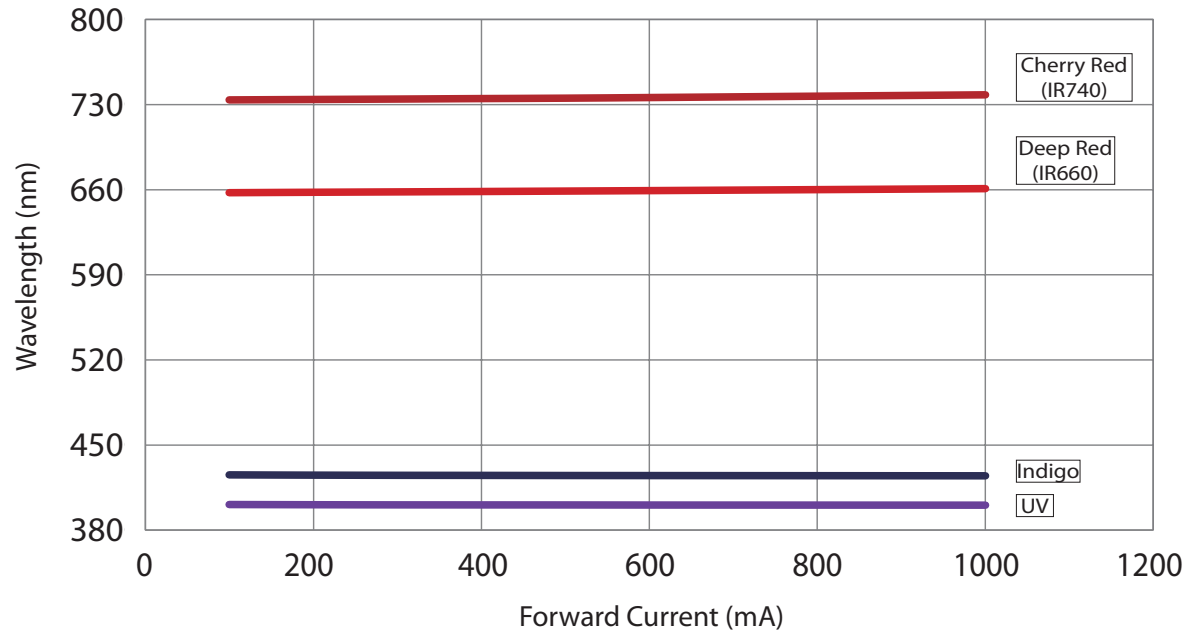
### Forward Voltage vs. Junction Temperature (Cherry Red)



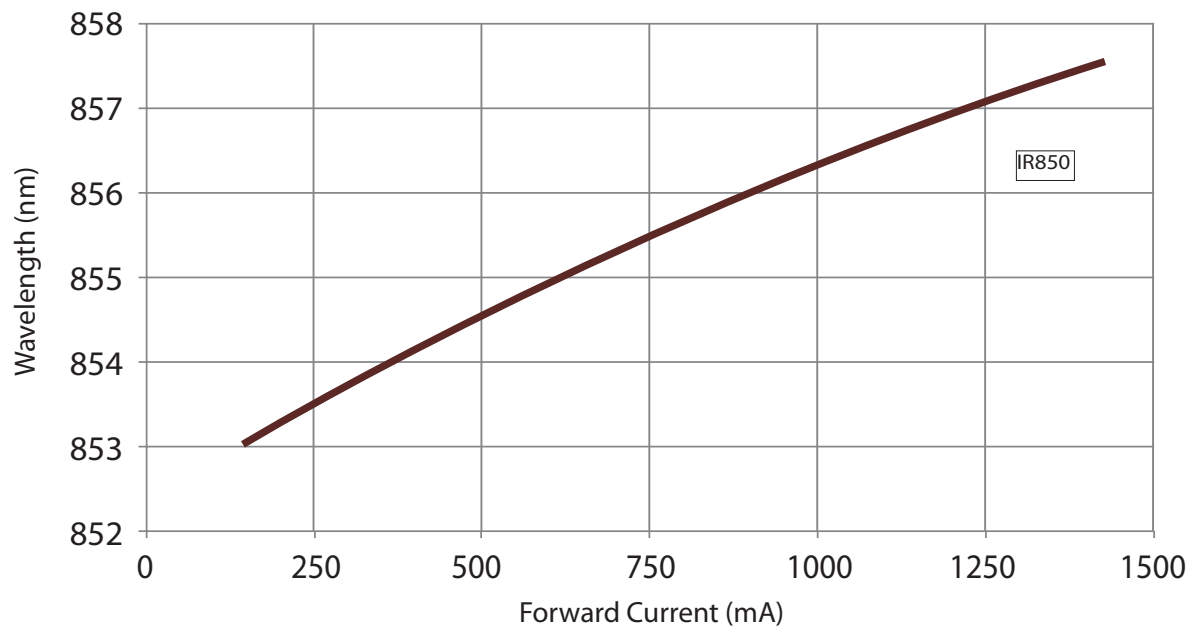
**Forward Voltage vs. Junction Temperature (IR850)**



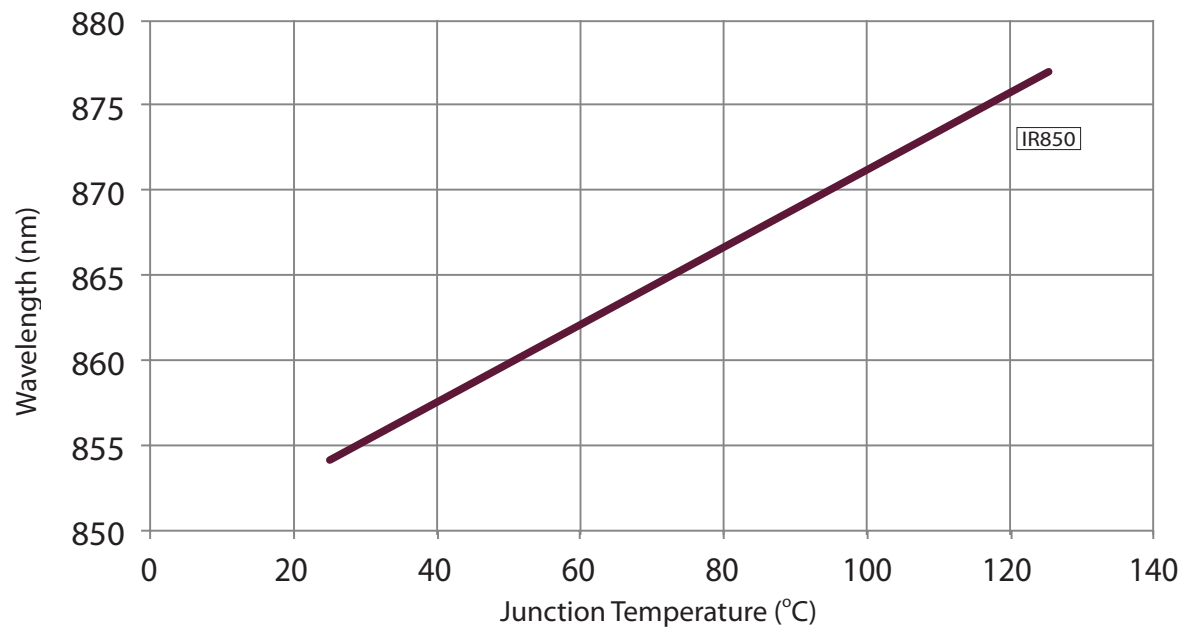
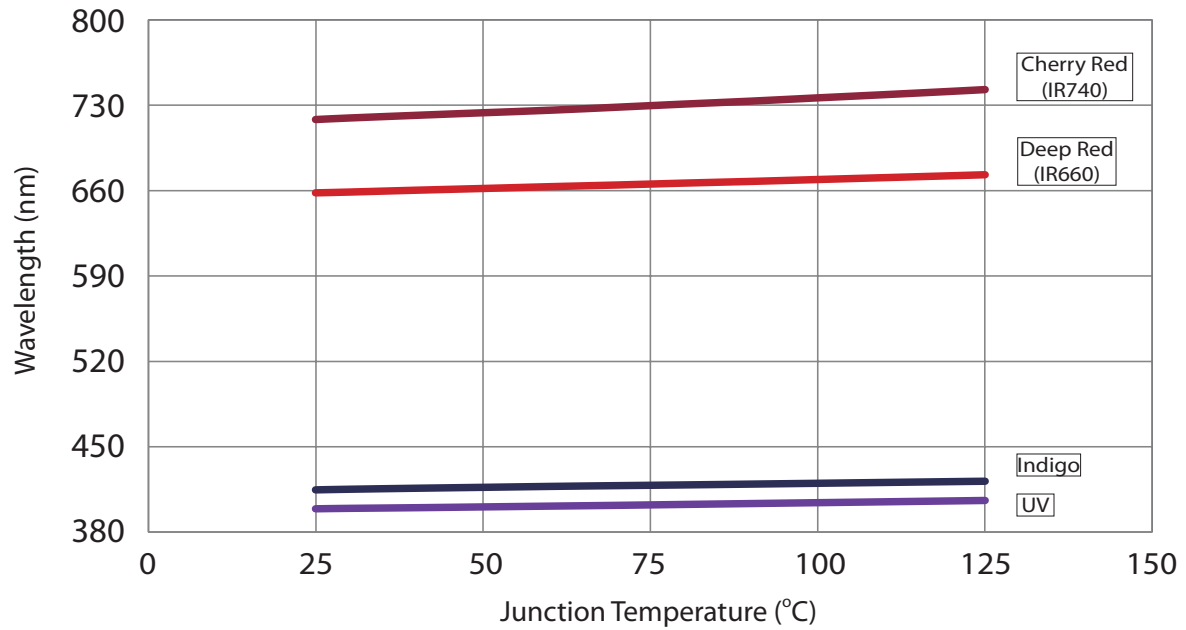
### Wavelength vs. Forward Current



### Wavelength vs. Forward Current (IR850)

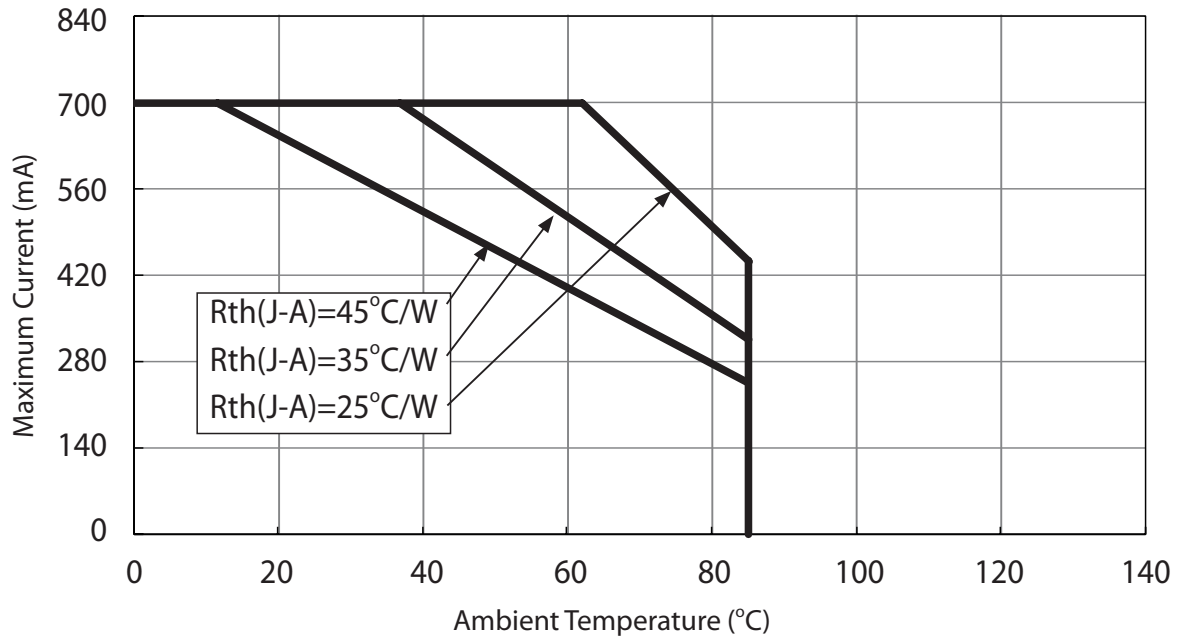


### Wavelength vs. Junction Temperature

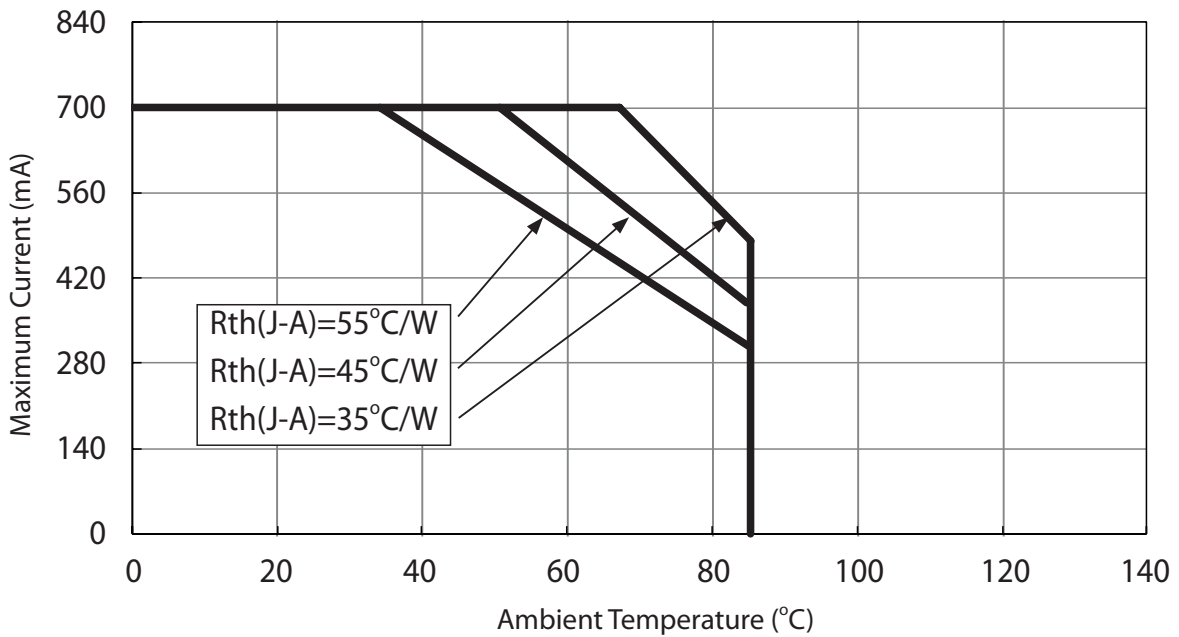




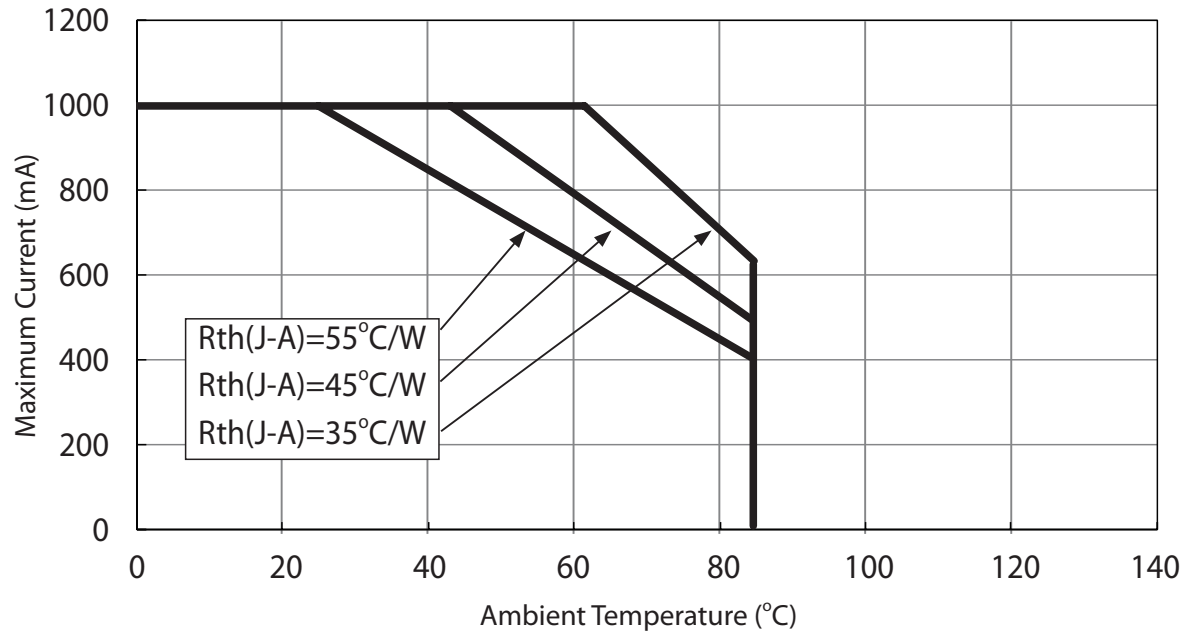
**Maximum Current vs. Ambient Temperature (UV, Indigo)**



**Maximum Current vs. Ambient Temperature (Deep Red, Cherry Red)**

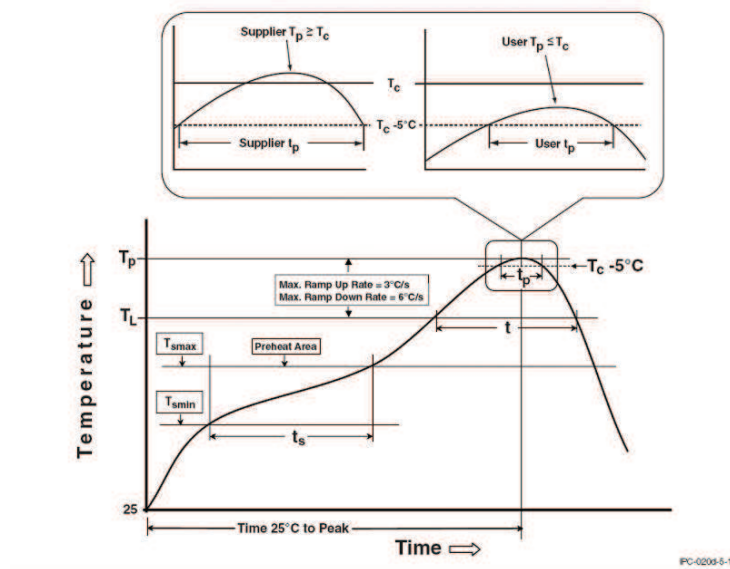


**Maximum Current vs. Ambient Temperature (IR850)**



## Reflow Profile

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



Reflow Profiles

### Classification Reflow Profiles

Profile Feature	Pb-Free Assembly
Preheat & Soak Temperature min (T Amin) Temperature max (T smax) Time (T Amin to T smax) (t s)	150 °C 200 °C 60-120 seconds
Average ramp-up rate (T smax to T p)	3 °C/second max.
Liquidous temperature (T L) Time at liquidous (t L)	217 °C 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.

## Reliability

NO .	Test Item	Test Condition	Remark
1	Temperature Cycle	-40°C~100°C 30, 30, mins	100 Cycle
2	Thermal Shock	-40°C~100°C 15, 15 mins $\leq$ 10 sec	100 Cycle
3	Resistance to Soldering Heat	$T_{SOL}=260^{\circ}C$ , 30 sec	3 times
4	Moisture Resistance	25°C~65°C 90% RH 24 hrs / 1 cycle	10 Cycle
5	High-Temperature Storage	$T_A=100^{\circ}C$	1,000 hrs
6	Humidity Heat Storage	$T_A=85^{\circ}C$ RH=85%	1,000 hrs
7	Low-Temperature Storage	$T_A=-40^{\circ}C$	1,000 hrs
8	Operation Life test	25°C	1,000 hrs
9	High Temperature Operation Life test	85°C	1,000 hrs
10	High Humidity Heat Life Test	85°C, 85%RH	1,000 hrs
11	ON/OFF Test	30 sec ON, 30 sec OFF	1.5W times

### Failure Criteria

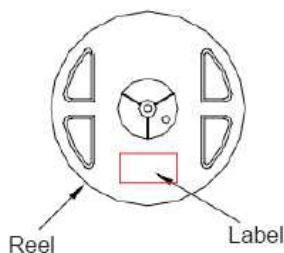
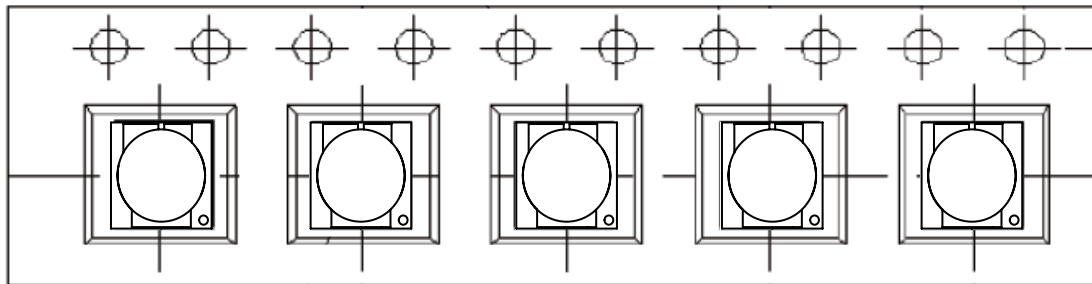
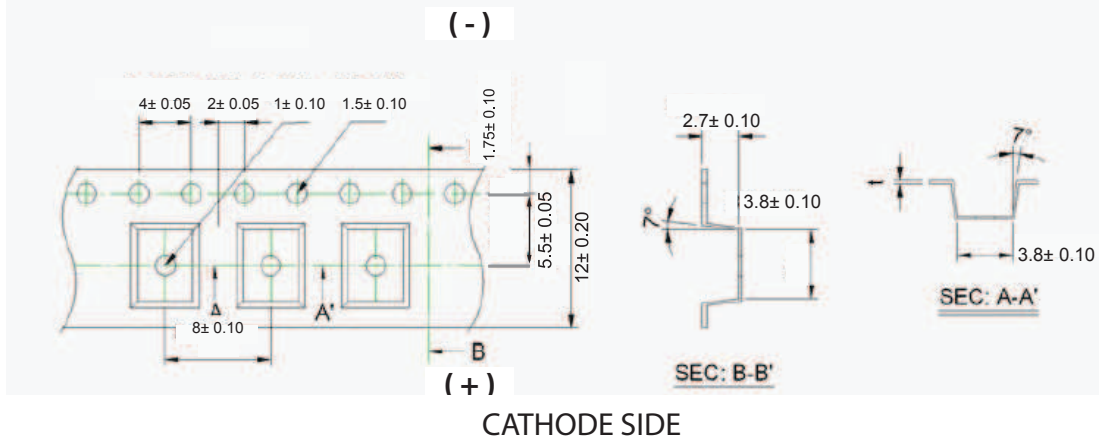
Item	Criteria for Judgment	
	Min.	Max.
Lumen Maintenance	85%	-
$\Delta u'v'$	-	0.006
Forward Voltage	-	Initial Data x 1.1
Reverse Current	-	10 $\mu$ A
Resistance to Soldering Heat	No dead lamps or visual damage	

### Cautions

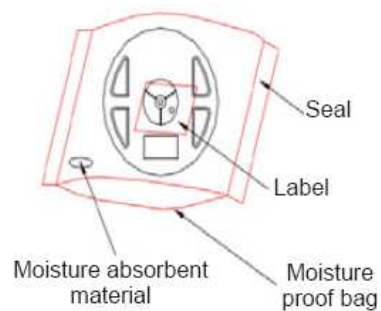
LED avoids being stored and lighted in the environment containing sulfur. Some materials, such as seals, printing ink, enclosure and adhesives, may contain sulfur, avoiding the exposure in acid or halogen environment.

## Product Packaging Information

### FX Series



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 order code information	2012/12/18
2	1. Add the Characteristic curve 2. Add the Emitter on Star ordering code	2013/02/26
3	1. Add Cherry Red information 2. Add Reliability & Reflow Profile	2014/09/15
4	1. Add color BIN of IR850 2. Revise all the characteristic curve 3. Add Voltage BIN Structure 4. Add Color BIN Code	2015/01/20
5	1. Revise Deep Red characteristic 2. Delete Cherry Red information	2015/10/05
6	Revise Luminous flux characteristic	2015/12/10
7	Update Luminous flux characteristic	2016/02/17
8	1. Update UV Luminous flux characteristic 2. Revise Characteristic curve 3. Add the cautions of reliability	2017/05/26
9	1. Add Indigo&Cheery Red information 2. Update Peak Pulsed Current & viewing angle 3. Revise all the characteristic curve	2018/02/06

## 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](http://www.edison-opto.com)

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[LED.Detective@edison-opto.com](mailto:LED.Detective@edison-opto.com)