



NKFG

INNOVATION & UVC
TOTAL SOLUTION





Evolving From a Strong Manufacturer To a UVC LED Strategic Planner For All Mankind



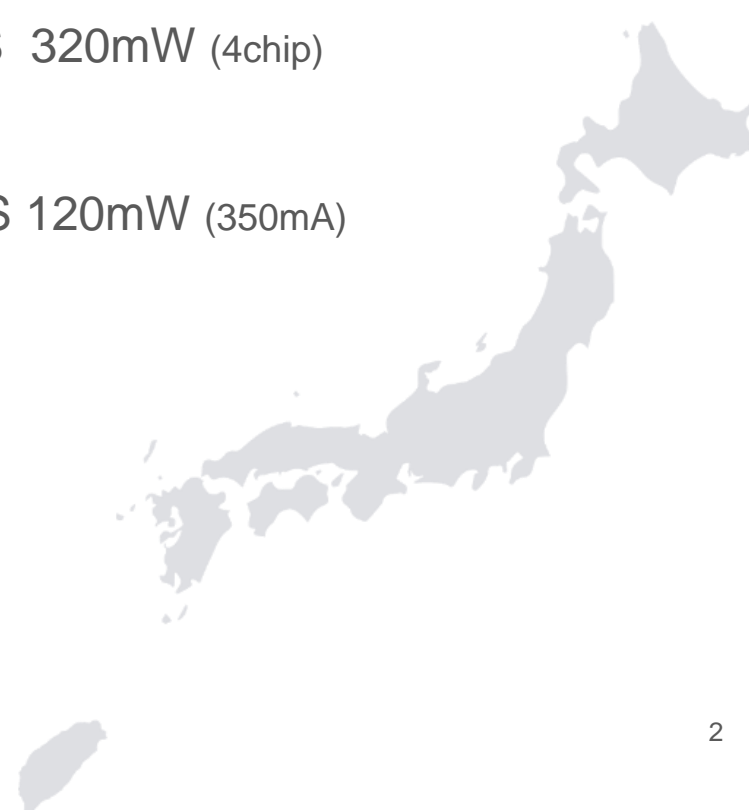
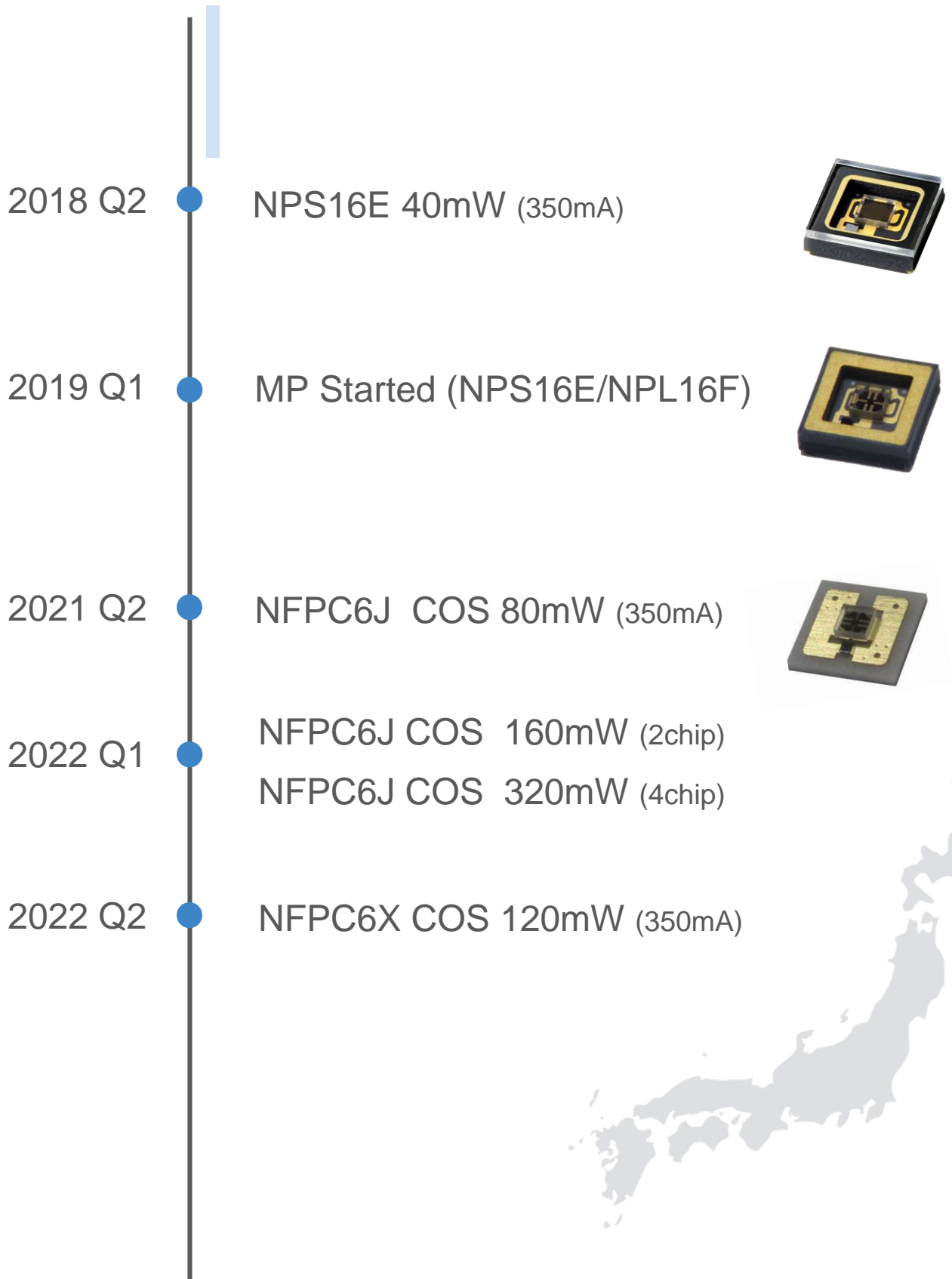
Overview of NKFG

NKFG is a leading UVC LED manufacturer that develops the top UVC LED devices in the world.

As a strong manufacturer continuing to evolve, NKFG is leading the drive to launch new businesses with a stream of innovations.

To concretely fulfill our commitment toward a better environment for all mankind, NKFG delivers optimal solutions and strategic plans with concrete and measurable goals. We envision our innovation & UVC Total Solutions will invigorate and awake the awareness to save earth.

NKFG Technology Milestone

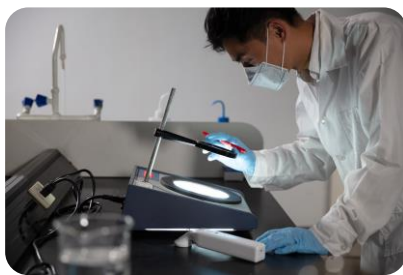


Core Competency



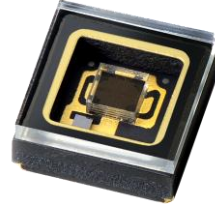
Formosa Plastics Group

- Formosa Plastics Group was founded by brothers Wang Yung-ching and Wang Yung-tsai in 1954. Over sixty years later, FPG has become one of the largest private corporate groups in Taiwan.



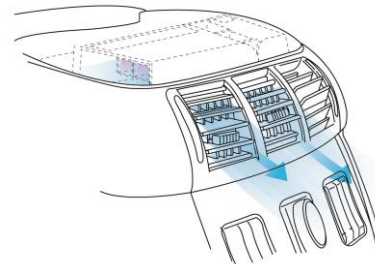
Research Capability

- Application Lab – Ming-Zhi University Laboratory
- All Test available by applications



World High Power and Best UV LED















- World's Highest Performance
- New generation UV LED using differentiated technology



Customized Product Available

- PKG, COB, Module, whole production line
- Total UVC LED Solution provider

UV LED Trend

	UV LED		UV Lamp	
	10,000~50,000 Hour	Life Time	2,000~10,000 Hour	
	Low	Energy Consumption	High	
	None	Heavy Metals	Mercury	
	Narrow UV Band, Customizable	Emission Wavelength	Multiple Peaks	
	Instant	Warm-up Time	Long	
	Non Toxic	Enviromental Friendliness	Toxic(Hg ,O ₃)	
	Low	Heat generation	High	

NKFG UVC LED Technology

What is NKFG technology?

NKFG technology sourced from JV company “Nikkiso” which has been a pioneer in Japan, developing and introducing groundbreaking technologies in highly specialized fields ranging from specialty pumps for the manufacturing industry to carbon fiber-reinforced plastic components for aircraft and dialysis and blood purifiers for the medical field and deep UV LEDs for clean environment and health.

Nikkiso’s UVC LED Boasting the World’s Highest Performance with Nobel Prize winners.

Both the light output and long service life of 1.7 times of conventional products were achieved. Nikkiso possesses the development and manufacturing base dedicated to Deep UV-LEDs. Matching the optical characteristics and fluid characteristics, which accelerates practical realization. We will pursue further applications for Deep UVC LED by taking advantage of synergy with the conventional business.



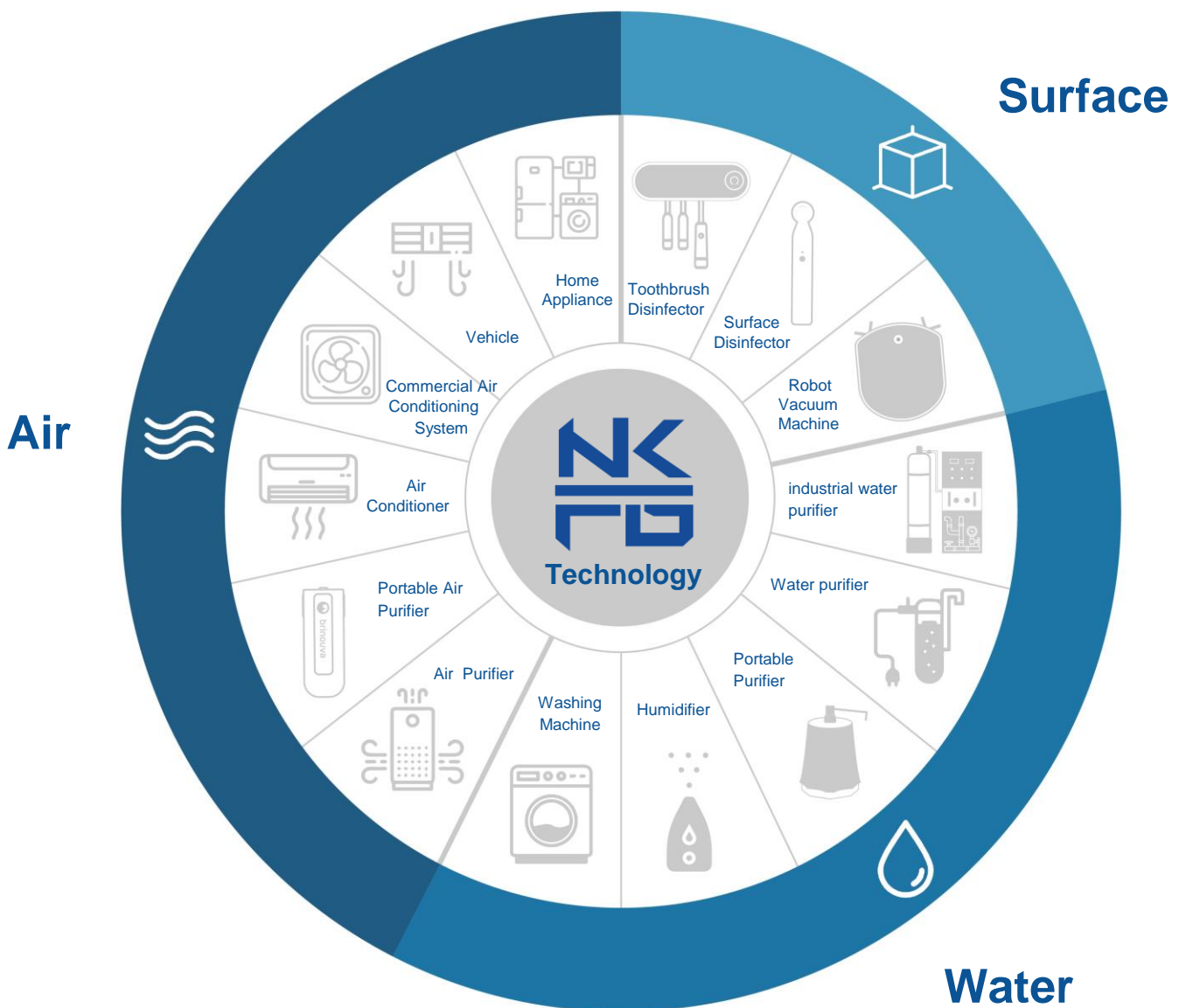
**UVC LED origin from
Semiconductor**

**NKFG UVC LED
Like sun**

**Most advanced
technology
used in International
Space Station**

Application of NKFG Technology

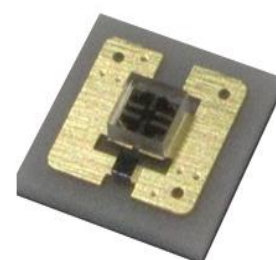
"NKFG technology is able to accommodate customer needs in various applications"



UVC LED Package Line-up

NKFG Series UVC LEDs

With the multinational-patented deep ultraviolet light-emitting diode (UV-C LED) chip and based on the compact, efficient, energy-saving, and durable characteristics of LEDs, NKFG equips our UV-C LED package with the high UVC output to directly provide a brand new sterilization technology on demand.

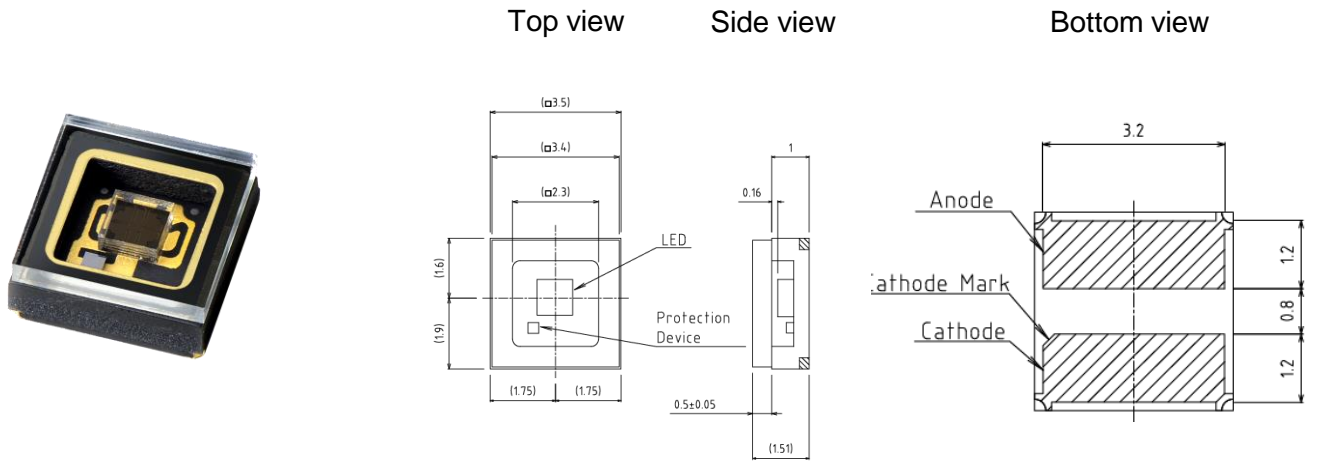


Product	Wave length (nm)	Shape	Forward Voltage (V)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Thermal Resistance (°C/W)	Remark	Data Sheet
NPS16E	280	LID	5.8	40	350	120	3.5x3.5x1.5	15	1chip	P.12~P.16
NPL16F	280	NO-LID	5.8	52	350	120	3.5x3.5x1	15	1chip	P.17~P.21
NFPC6J	280	Flat-Base	6.1	80	350	140	3.5x3.5x1.1	11	1chip	P.22~P.26
NFPC6J-2	280	Flat-Base	12.2	160	350	140	7x7x1.1	11	2chip	Under development
NFPC6J-4	280	Flat-Base	12.2	320	700	140	7x7x1.1	11	4chip	Under development

UVC LED Package

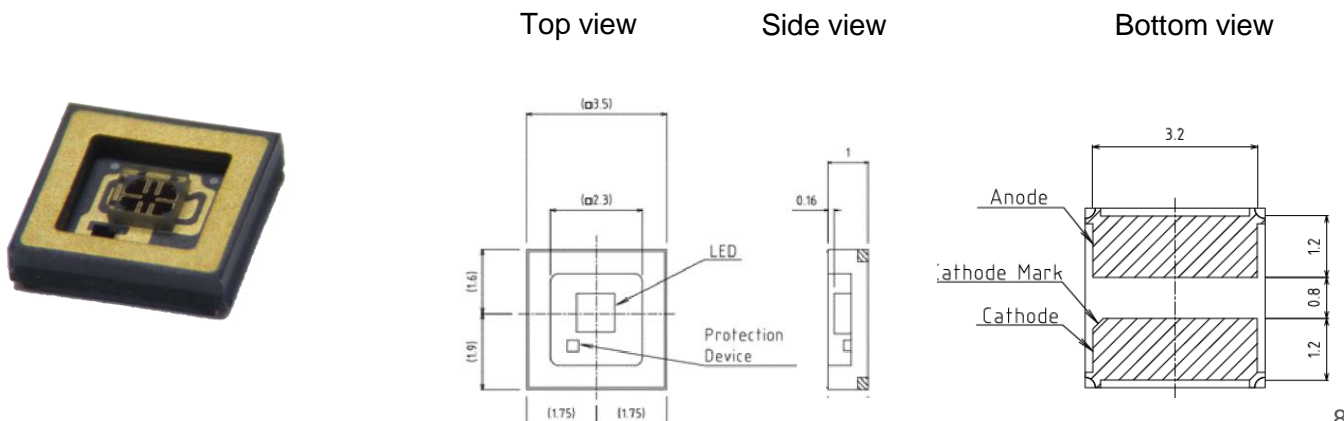
UVC : NPS16E

Product	Wave length (nm)	Shape	Forward Voltage(V)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Thermal Resistance (°C/W)	Remark
NPS16E	280	LID	5.8	40	350	120	3.5x3.5x1.5	15	1chip



UVC : NPL16F

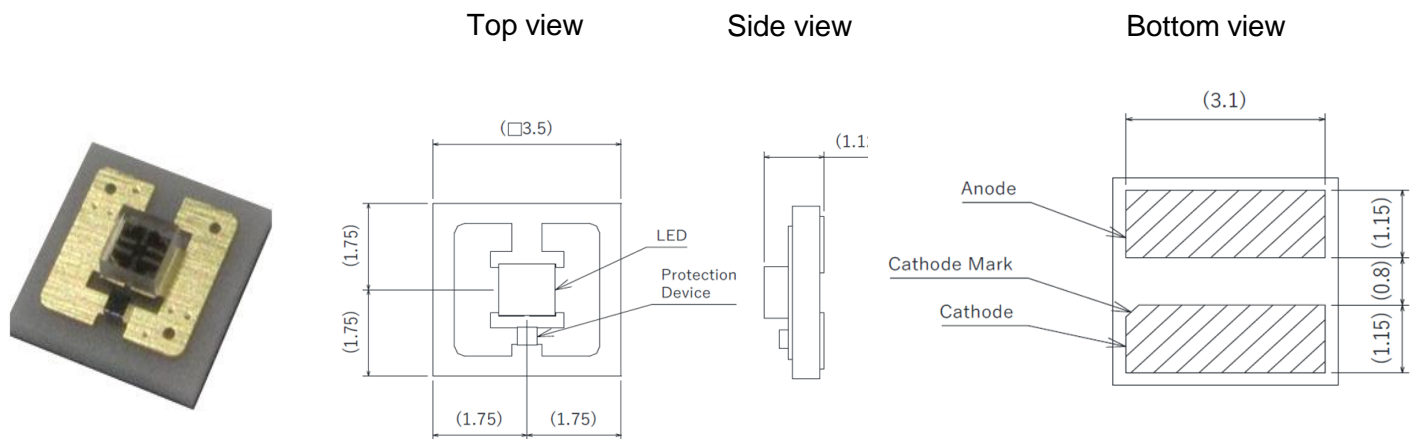
Product	Wavelength (nm)	Shape	Forward Voltage(V)	Optical Power Output(mW)	Forward Current(mA)	View Angle(°)	Size (mm)	Thermal Resistance (°C/W)	Remark
NPL16F	280	NO-LID	5.8	52	350	120	3.5x3.5x1	15	1chip



UVC LED Package

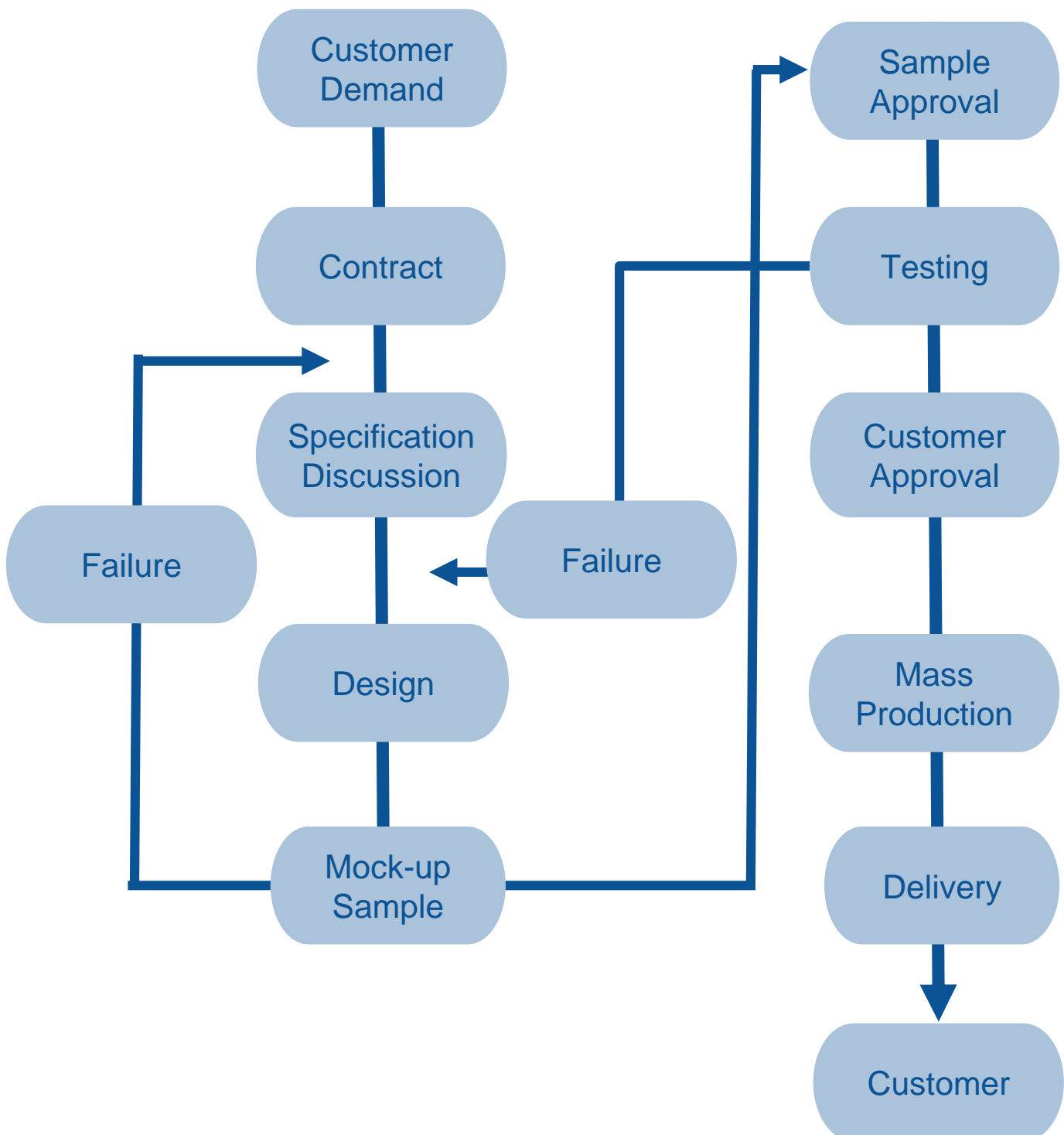
UVC : NFPC6J

Product	Wave length (nm)	Shape	Forward Voltage(V)	Optical Power Output (mW)	Forward Current (mA)	View Angle (°)	Size (mm)	Thermal Resistance (°C/W)	Remark
NFPC6J	280	Flat-Base	5.8	40	150	140	3.5x3.5x1.1	11	1chip
NFPC6J	280	Flat-Base	6.1	80	350	140	3.5x3.5x1.1	11	1chip
NFPC6J	280	Flat-Base	6.5	100	500	140	3.5x3.5x1.1	11	1chip
NFPC6J-2 (Under Development)	280	Flat-Base	12.2	160	350	140	7x7x1.1	11	2chip
NFPC6J-4 (Under Development)	280	Flat-Base	12.2	320	700	140	7x7x1.1	11	4chip



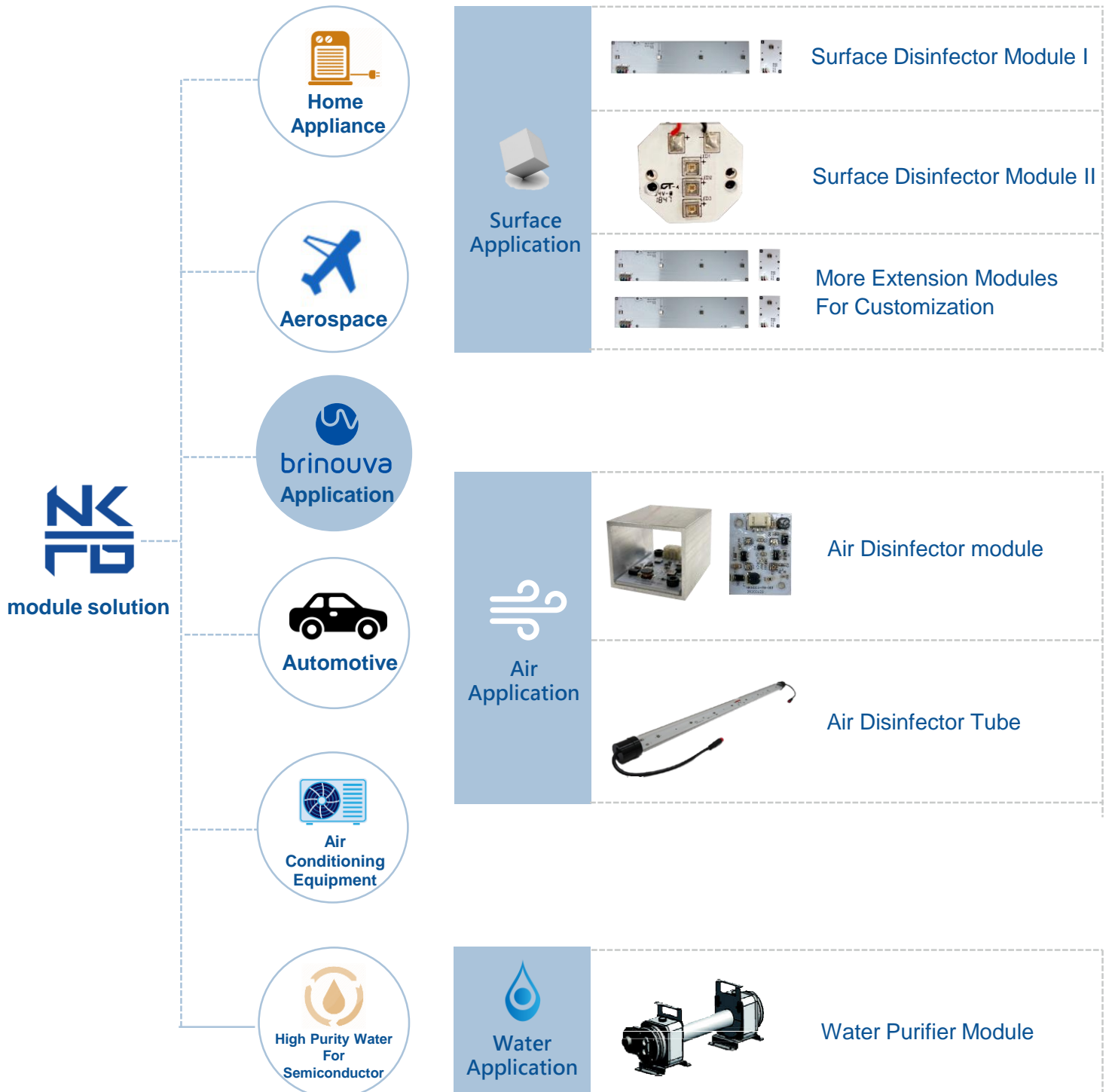
Customized UVC Module

NKFG UVC module refers to the mounting of UVC LED directly in contact with a printed circuit board to produce a high performance module. UVC Module technology improves light intensity and displays compact, efficient, energy-saving, eco-friendly, and durable characteristics of UVC LED.



UVC LED Module for Commercial & Industrial Application

The UVC LED Module of NKFG can be applied to various industries. Below are some of the fields that NKFG can offer UVC LED Module, innovative technology and strategic plans that excel in environments.



NPS16E

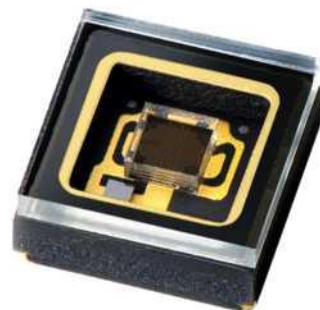
Surface Mount Type UV-LED 280nm

Feature

- High power deep ultraviolet LED with emission wavelength between 275nm and 285nm
- High Radiant Flux: 40mW of UVC power
- Package Size: 3.5mm x 3.5mm
- View angle: 120 degree
- Standard SMT process

Applications

- Deep-UV light source of Water/Air/Surface disinfection
- Healthcare, food and Pharmaceutical Processing
- Analytical Instruments
- Horticulture



Order information

Peak Wavelength	Product Code	Packing Code	Packing
			Tray(100)
280 nm	NPS16E		Tape & Reel(300pcs)
			Tape & Reel(1,000pcs)

Absolute Maximum Ratings

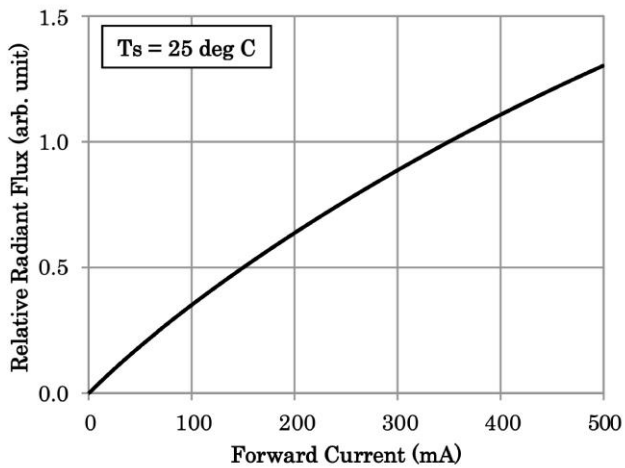
Parameter	Symbol	Unit	Absolute Maximum Ratings	Remark
Forward Current	I_F	mA	500	Ts=25 deg C
Operating Temperature	T_{opr}	deg C	-10 to 55	-
Storage Temperature	T_{stg}	deg C	-30 to 85	-
Junction Temperature	T_j	deg C	100	-

Electrical and Optical Characteristic

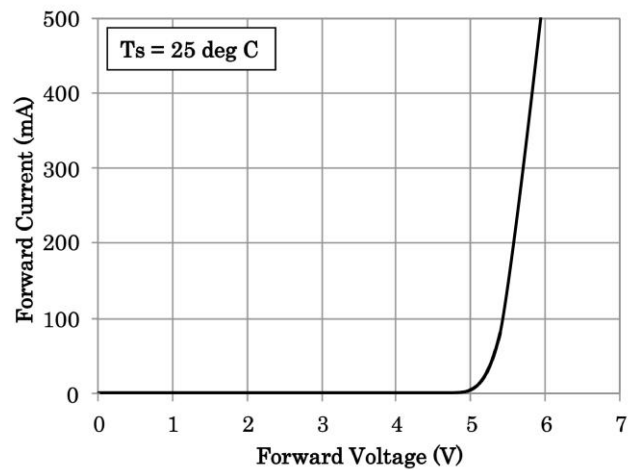
Parameter	Symbol	Unit	Min	Typ.	Max.	Remark
Forward Voltage	V_F	V	4.5	5.8	7.0	-
Peak Wavelength	λ_p	nm	275	280	285	-
Radiant Flux	P_o	mW	33	40	-	-
Spectrum Half Width (FWHM)	$\Delta\lambda$	nm	-	13	20	-
Viewing Angle	$2\theta_{1/2}$	Deg.	-	120	-	-
Thermal Resistance	R_{J-s}	Deg C/W	-	15	18	-
HBM ESD Protection Voltage	VESD	V	$\pm 2KV$ (HBM)	-	-	-

Optical and Electrical Characteristics

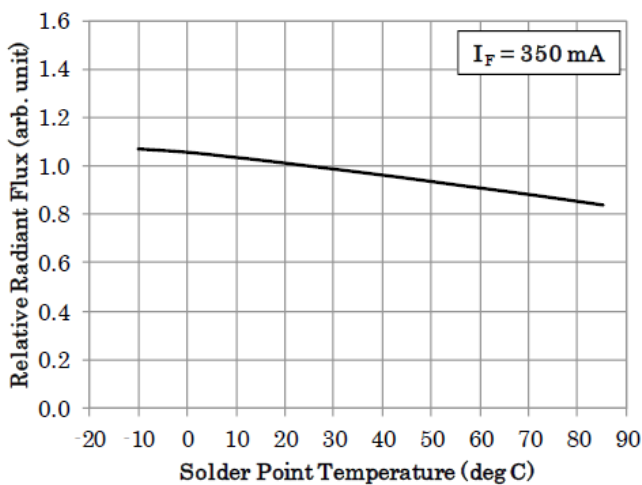
■ Forward Current vs Relative Radiant Flux



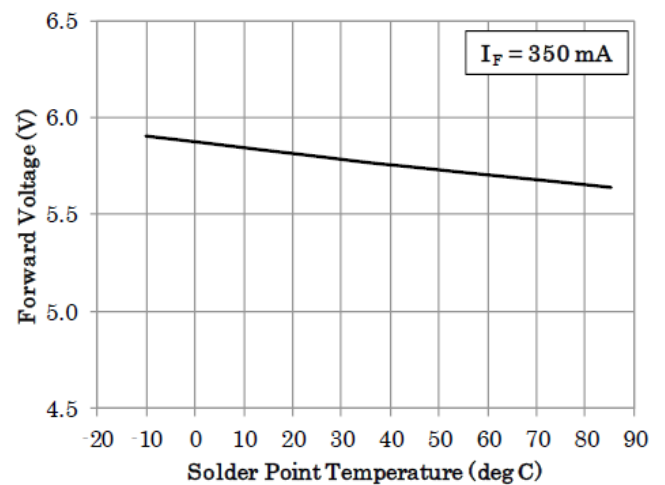
■ Forward Voltage vs Forward Current



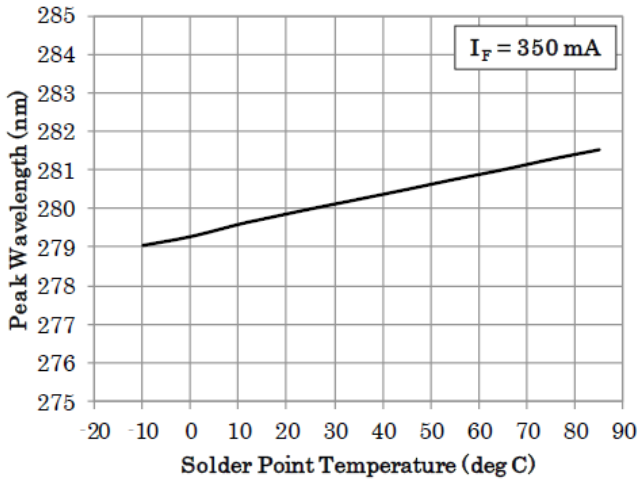
■ Solder Point Temperature vs Relative Radiant Flux



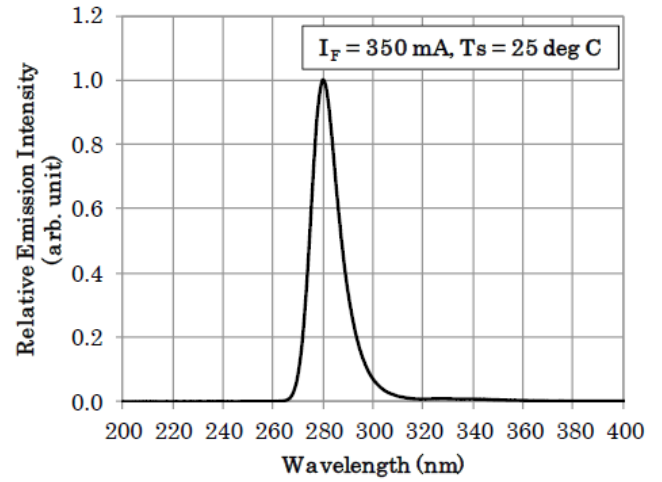
■ Solder Point Temperature vs Forward Voltage



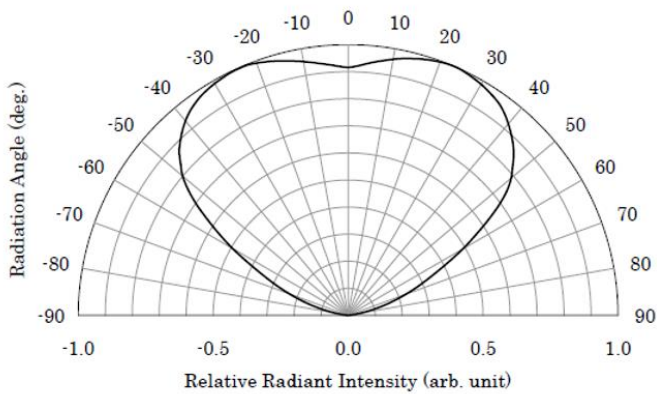
■ Solder Point Temperature vs Peak Wavelength



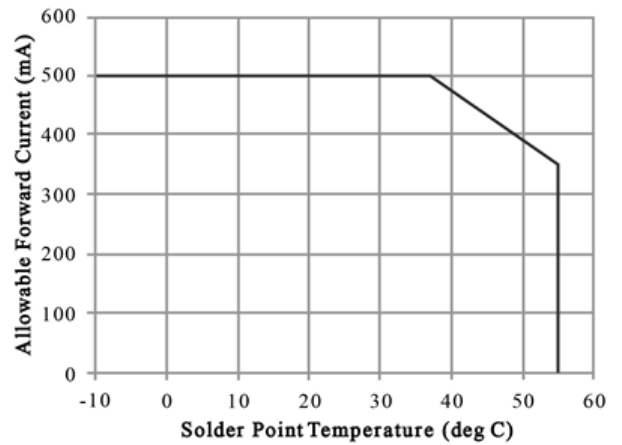
■ Spectrum



■ Directivity (Side to side direction)



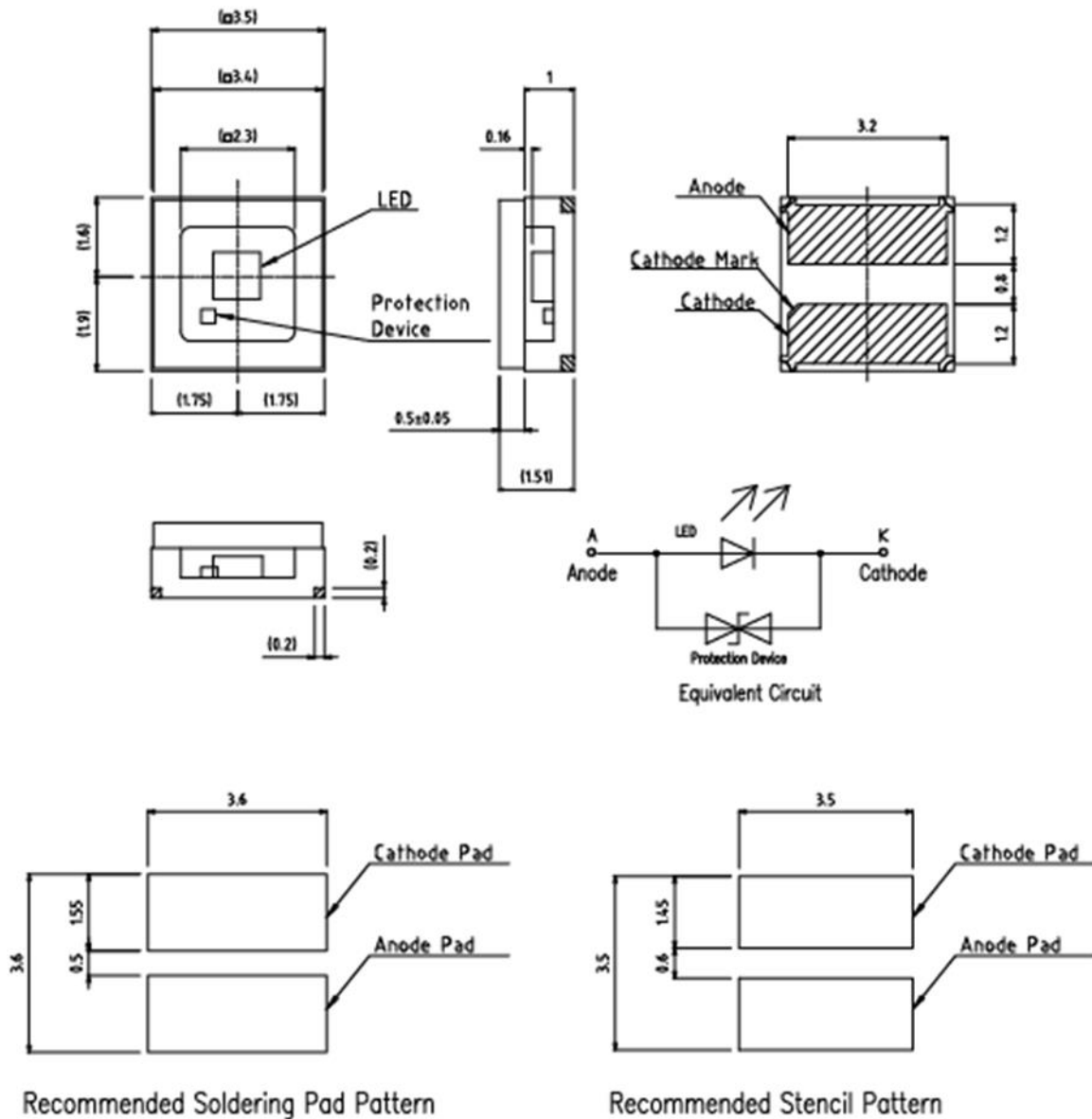
■ Derating Curve



Outline Dimensions and Layout Foot Print

Items	Materials
Package Materials	Ceramics
Glass Materials	Synthetic Quartz
Electrodes Materials	Au-plated

(Unit:mm,Tolerance: ± 0.2)



NOTE: This Product should be operated in forward current.

NPL16F

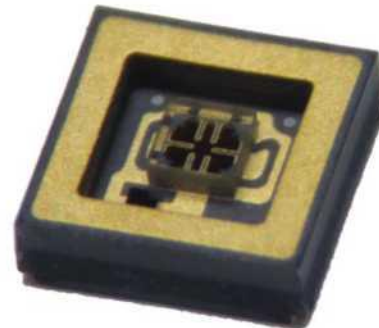
Surface Mount Type UV-LED 280nm

Feature

- High power deep ultraviolet LED with emission wavelength between 275nm and 285nm
- High Radiant Flux: 52mW of UVC power
- Package Size: 3.5mm x 3.5mm
- View angle: 120 degree
- Standard SMT process

Applications

- Deep-UV light source of Water/Air/Surface disinfection
- Healthcare, food and Pharmaceutical Processing
- Analytical Instruments
- Horticulture



Order information

Peak Wavelength	Product Code	Packing Code	Packing
			Tray(100)
280 nm	NPL16F		Tape & Reel(300pcs)
			Tape & Reel(1,000pcs)

Absolute Maximum Ratings

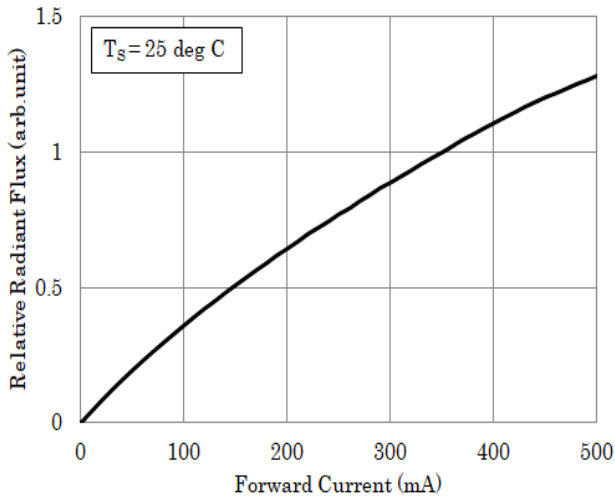
Parameter	Symbol	Unit	Absolute Maximum Ratings	Remark
Forward Current	I_F	mA	500	Ts=25 deg C
Operating Temperature	T_{opr}	deg C	-10 to 55	-
Storage Temperature	T_{stg}	deg C	-30 to 85	-
Junction Temperature	T_j	deg C	100	-

Electrical and Optical Characteristic

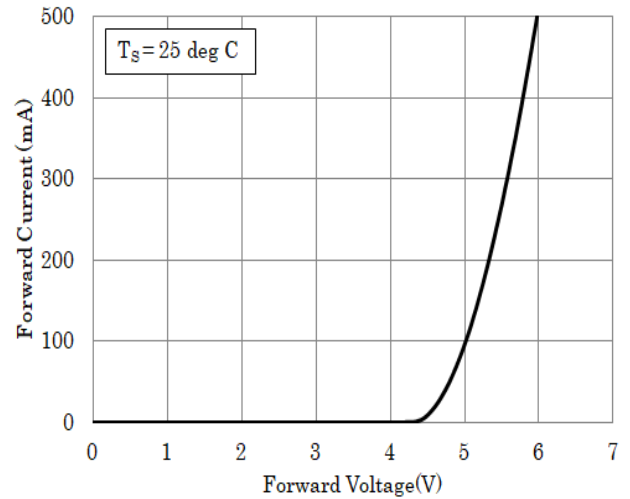
Parameter	Symbol	Unit	Min	Typ.	Max.	Remark
Forward Voltage	V_F	V	4.5	5.8	7.0	-
Peak Wavelength	λ_p	nm	275	280	285	-
Radiant Flux	P_o	mW	33	52	-	-
Spectrum Half Width (FWHM)	$\Delta\lambda$	nm	-	13	20	-
Viewing Angle	$2\theta_{1/2}$	Deg.	-	120	-	-
Thermal Resistance	R_{J-s}	Deg C/W	-	15	18	-
HBM ESD Protection Voltage	VESD	V	$\pm 2KV$ (HBM)	-	-	-

Optical and Electrical Characteristics

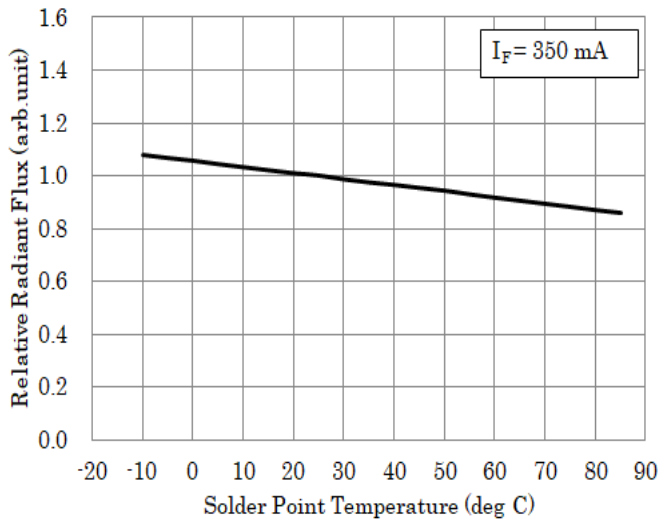
■ Forward Current vs Relative Radiant Flux



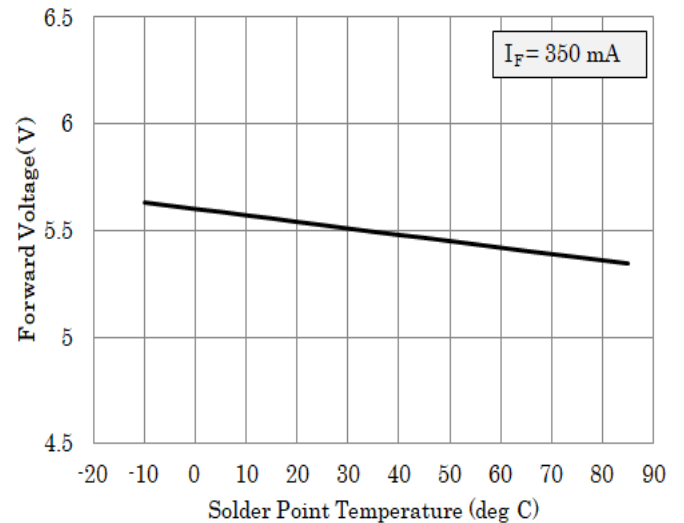
■ Forward Voltage vs Forward Current



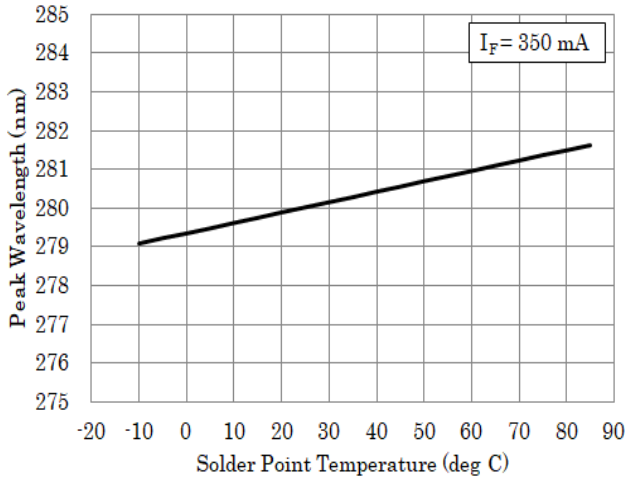
■ Solder Point Temperature vs Relative Radiant Flux



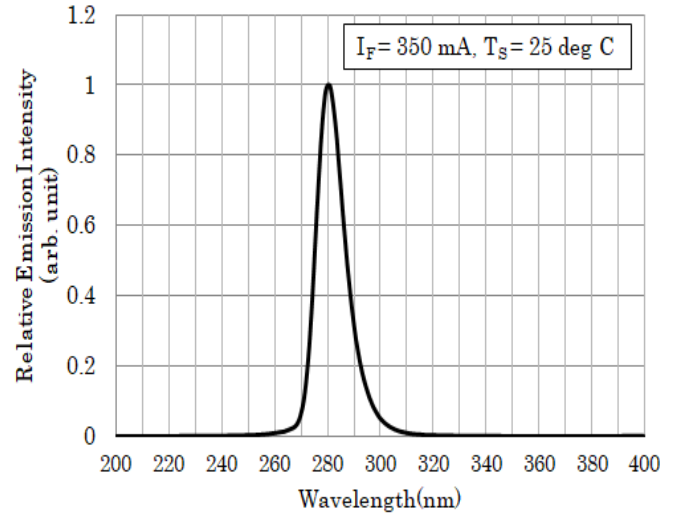
■ Solder Point Temperature vs Forward Voltage



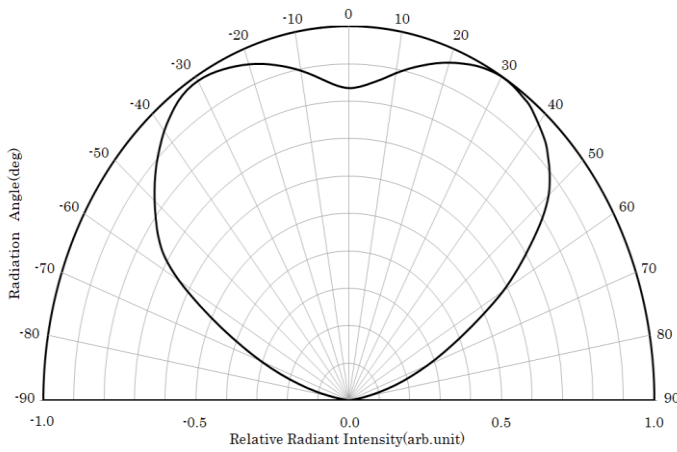
■ Solder Point Temperature vs Peak Wavelength



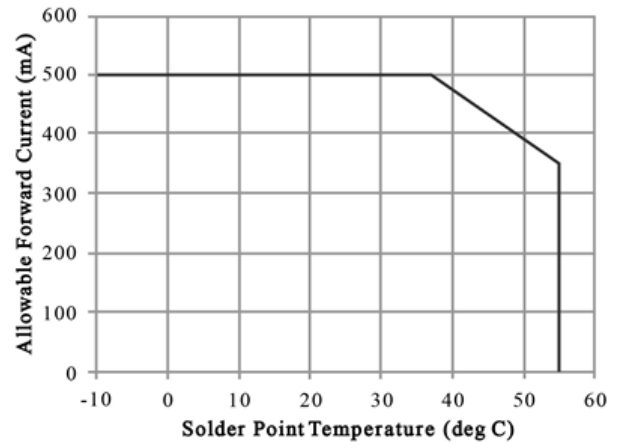
■ Spectrum



■ Directivity (Side to side direction)



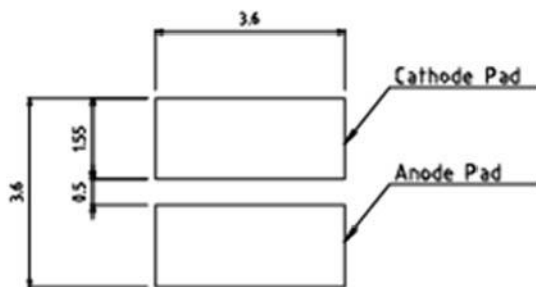
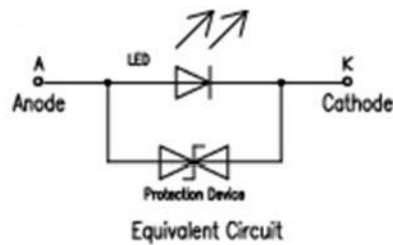
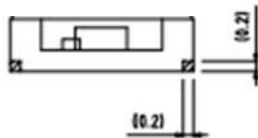
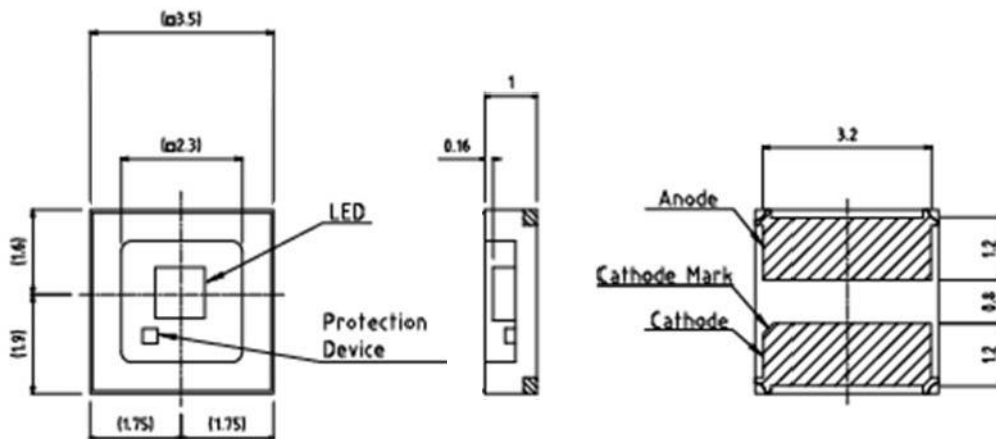
■ Derating Curve



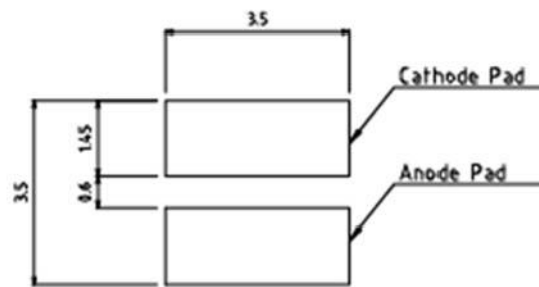
Outline Dimensions and Layout Foot Print

Items	Materials
Package Materials	Ceramics
Electrodes Materials	Au-plated

(Unit:mm,Tolerance: ± 0.2)



Recommended Soldering Pad Pattern



Recommended Stencil Pattern

NOTE: This Product should be operated in forward current.

NFPC6J

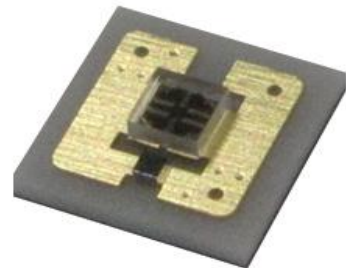
Surface Mount Type UV-LED 280nm

Feature

- High power deep ultraviolet LED with emission wavelength between 275nm and 285nm
- High Radiant Flux: 80mW of UVC power
- Package Size: 3.5mm x 3.5mm
- View angle: 140 degree
- Standard SMT process

Applications

- Deep-UV light source of Water/Air/Surface disinfection
- Healthcare, food and Pharmaceutical Processing
- Analytical Instruments
- Horticulture



Order information

Peak Wavelength	Product Code	Packing Code	Packing
			Tray(100)
280 nm	NFPC6J		Tape & Reel(300pcs)
			Tape & Reel(1,000pcs)

Absolute Maximum Ratings

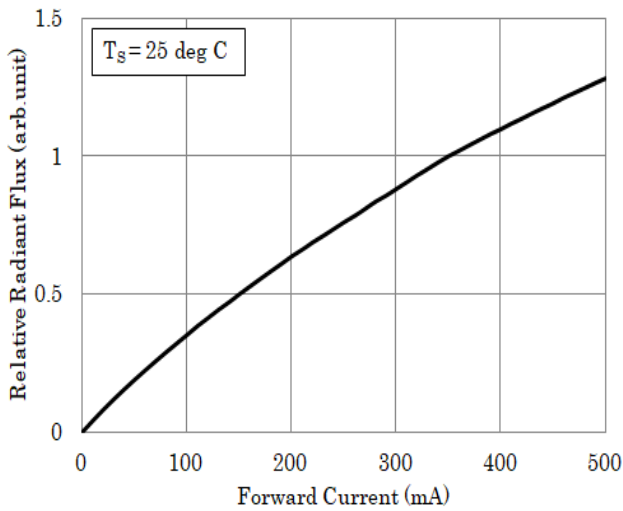
Parameter	Symbol	Unit	Absolute Maximum Ratings	Remark
Forward Current	I_F	mA	500	$T_s=25$ deg C
Operating Temperature	T_{opr}	deg C	-10 to 55	-
Storage Temperature	T_{stg}	deg C	-30 to 85	-
Junction Temperature	T_j	deg C	100	-

Electrical and Optical Characteristic

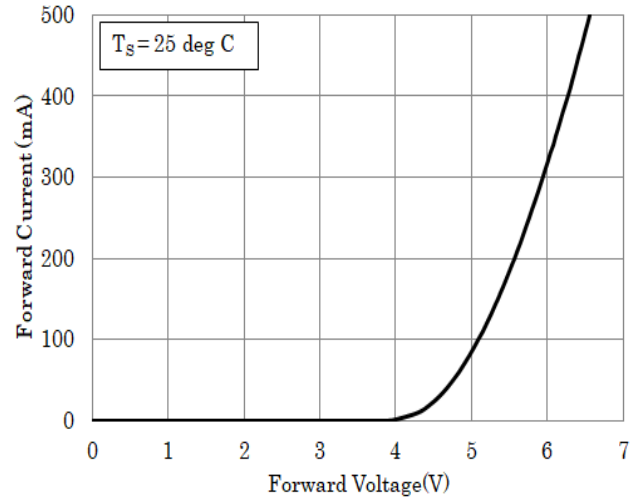
Parameter	Symbol	Unit	Min	Typ.	Max.	Remark
Forward Voltage	V_F	V	4.5	6.1	7.0	-
Peak Wavelength	λ_p	nm	275	280	285	-
Radiant Flux	P_o	mW		80	-	-
Spectrum Half Width (FWHM)	$\Delta\lambda$	nm	-	13	20	-
Viewing Angle	$2\theta_{1/2}$	Deg.	-	140	-	-
Thermal Resistance	R_{j-s}	Deg C/W	-	11		-
HBM ESD Protection Voltage	VESD	V	$\pm 2KV$ (HBM)	-	-	-

Optical and Electrical Characteristics

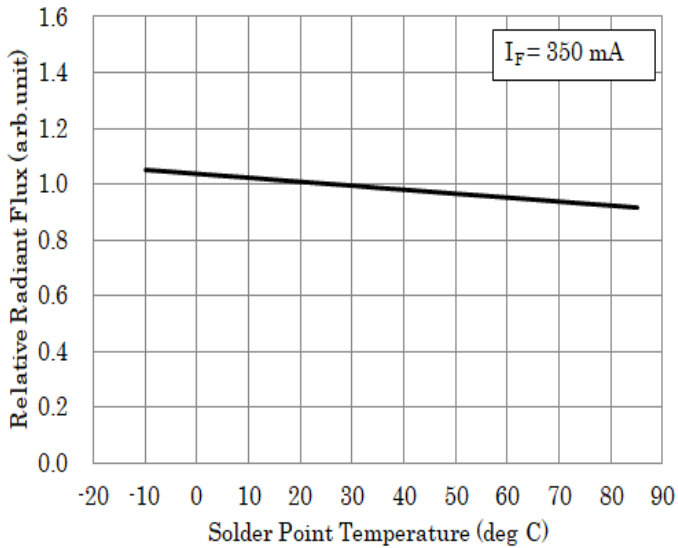
■ Forward Current vs Relative Radiant Flux



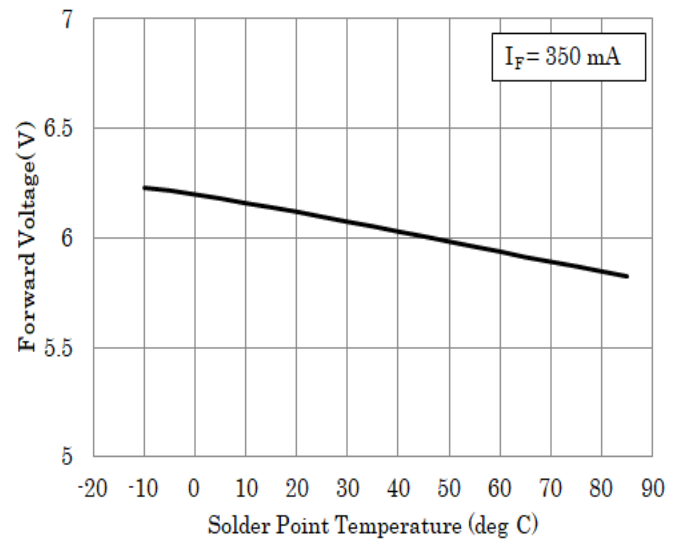
■ Forward Voltage vs Forward Current



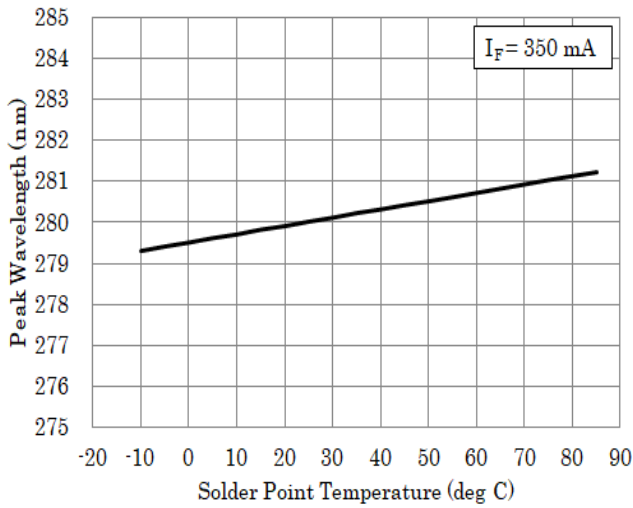
■ Solder Point Temperature vs Relative Radiant Flux



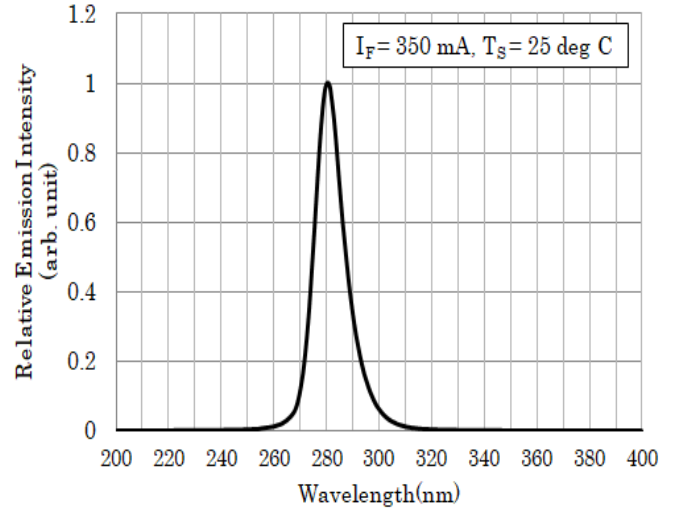
■ Solder Point Temperature vs Forward Voltage



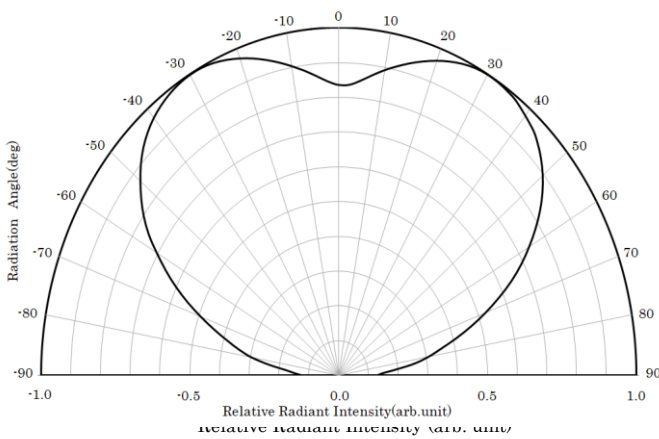
■ Solder Point Temperature vs Peak Wavelength



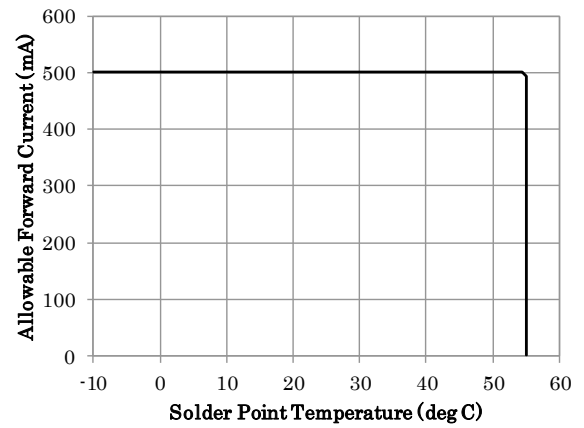
■ Spectrum



■ Directivity (Side to side direction)



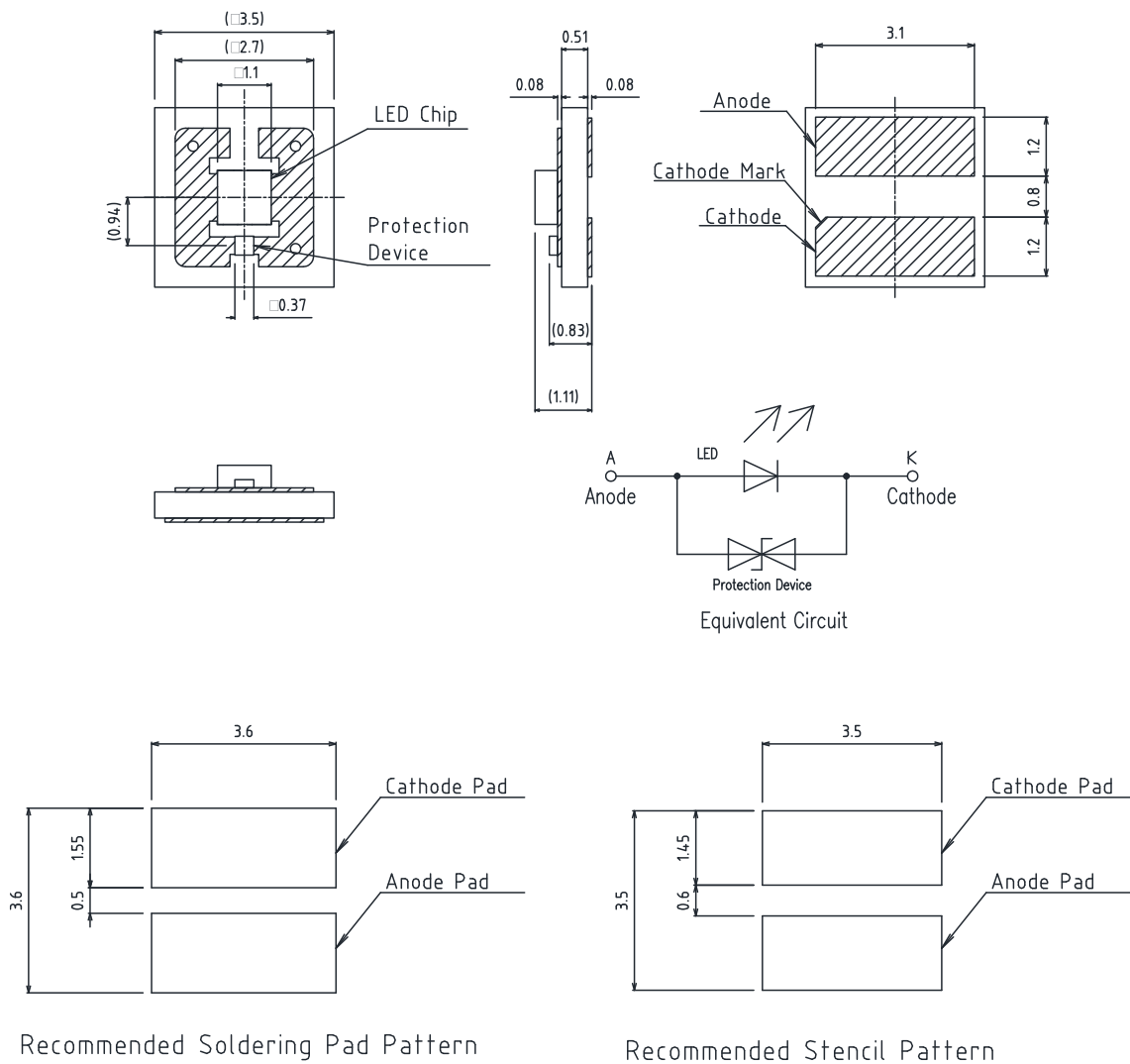
■ Derating Curve



Outline Dimensions and Layout Foot Print

Items	Materials
Package Materials	Ceramics
Electrodes Materials	Au-plated

(Unit:mm,Tolerance: ± 0.2)





NKFG

**INNOVATION &
UVC TOTAL SOLUTION**

Headquarters Taiwan (Taipei)

Production Sites Taiwan (Yun-Lin)

R&D Labs Taiwan (Yun-Lin)

JV Company Formosa Petrochemical Co. & Nikkiso Co., Ltd. (Taipei & JPN)

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