

**SPECIFICATIONS FOR NICHIA WHITE LED**

**MODEL : NSPW300BS**

**NICHIA CORPORATION**

## 1.SPECIFICATIONS

### (1) Absolute Maximum Rating

(Ta=25 )

Item	Symbol	Absolute Maximum Rating	Unit
Forward Current	IF	30	mA
Pulse Forward Current	IFP	100	mA
Reverse Voltage	VR	5	V
Power Dissipation	PD	120	mW
Operating Temperature	Topr	- 30 ~ + 85	
Storage Temperature	Tstg	- 40 ~ + 100	
Lead Soldering Temperature	Tsol	260 ± 5 for 5sec.	

IFP Conditions : Pulse Width 10msec. and Duty 1/10

### (2) Initial Electrical/Optical Characteristics

(Ta=25 )

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Forward Voltage	VF	IF=20[mA]	-	3.6	4.0	V	
Reverse Current	IR	VR= 5[V]	-	-	50	μ A	
Luminous Intensity	Rank S	Iv	IF=20[mA]	3400	4000	4800	mcd
	Rank R	Iv	IF=20[mA]	2400	2800	3400	mcd
	Rank Q	Iv	IF=20[mA]	1700	2000	2400	mcd

Measurement Uncertainty of the Luminous Intensity : ± 10%

One delivery will include three different ranks of products. The quantity-ratio of the three ranks is decided by Nichia.

#### Color Ranks

(IF=20mA, Ta=25 )

	Rank a0			
x	0.280	0.264	0.283	0.296
y	0.248	0.267	0.305	0.276

	Rank b1			
x	0.287	0.283	0.330	0.330
y	0.295	0.305	0.360	0.339

	Rank b2			
x	0.296	0.287	0.330	0.330
y	0.276	0.295	0.339	0.318

	Rank c0			
x	0.330	0.330	0.361	0.356
y	0.318	0.360	0.385	0.351

Measurement Uncertainty of the Color Coordinates : ± 0.02

One delivery will include the consecutive two ranks of products. The quantity-ratio of the two ranks is decided by Nichia.

#### Luminous Intensity

	Ranking by Luminous Intensity		
Ranking by Color Coordinates	Q	R	S
a0			
b1			
b2			
c0			

Shaded ranks are available.

## 2.TYPICAL INITIAL OPTICAL/ELECTRICAL CHARACTERISTICS

Please refer to figure's page.

## 3.OUTLINE DIMENSIONS AND MATERIALS

Please refer to figure's page.

Material as follows ; Resin : Epoxy  
 Leadframe : Ag plating Copper alloy

## 4.PACKAGING

Please refer to figure's page.

The label on the minimum packing unit bag shows;

Part Number , Lot Number , Quantity , Ranking

## 5.LOT NUMBER

The first six digits number shows **lot number**.

The lot number is composed of the following characters;

- × × × × -  
 - Year ( 9 for 1999, 0 for 2000 )  
 - Month ( 1 for Jan., 9 for Sep., A for Oct., B for Nov. )  
 × × × × - Nichia's Product Number  
 - Ranking by Color Coordinates  
 - Ranking by Luminous Intensity

## 6.RELIABILITY

### (1) TEST ITEMS AND RESULTS

Test Item	Standard Test Method	Test Conditions	Note	Number of Damaged
Resistance to Soldering Heat	JIS C 7021 (1977)A-1	Tsol=260 ± 5 , 10sec. 3mm from the base of the epoxy bulb	1 time	0/100
Solderability	JIS C 7021 (1977)A-2	Tsol=235 ± 5 , 5sec. (using flux)	1 time over 95%	0/100
Heat Shock	JIS C 7021 (1977)A-3	0 ~ 100 5sec. 15sec.	100 cycles	0/100
Temperature Cycle	JIS C 7021 (1977)A-4	-40 ~ 25 ~ 100 ~ 25 30min. 5min. 30min. 5min.	100 cycles	0/100
High Humidity Heat Cycle	JIS C 7021 (1977)A-5	30 ~ 65 ~ -10 90%RH 24hrs./1cycle	10 cycles	0/100
Mechanical Strength of Terminal (bend test)	JIS C 7021 (1977)A-11	Load 2.5N (0.25kgf) 0° ~ 90° ~ 0° bend 3 times	No noticeable damage	0/100
Mechanical Strength of Terminal (pull test)	JIS C 7021 (1977)A-11	Load 10N (1kgf) 30 ± 1 sec.	No noticeable damage	0/100
High Temperature Storage	JIS C 7021 (1977)B-10	Ta=100	1000hrs.	0/100
Humidity Heat Load	JIS C 7021 (1977)B-11	Ta=60 , RH=90%	1000hrs.	0/100
Low Temperature Storage	JIS C 7021 (1977)B-12	Ta=-40	1000hrs.	0/100
Life Test	JIS C 7035 (1985)	Ta=25 , IF=30mA	1000hrs.	0/100
High Humidity Heat Life Test		60 , RH=90%, IF=20mA	500hrs.	0/100
Low Temperature Life Test		Ta=-30 , IF=20mA	1000hrs.	0/100

### (2) CRITERIA FOR JUDGING THE DAMAGE

Item	Symbol	Test Conditions	Criteria for Judgement	
			Min.	Max.
Forward Voltage	V <sub>F</sub>	I <sub>F</sub> =20mA	-	U.S.L.*) × 1.1
Reverse Current	I <sub>R</sub>	V <sub>R</sub> =5V	-	U.S.L.*) × 2.0
Luminous Intensity	I <sub>v</sub>	I <sub>F</sub> =20mA	L.S.L.***) × 0.7	-

\*) U.S.L. : Upper Standard Level

\*\*) L.S.L. : Lower Standard Level

## 7.CAUTIONS

White LEDs are devices which are materialized by combining Blue LEDs and special phosphors. Consequently, the color of White LEDs is changed a little by an operating current. Care should be taken after due consideration when using LEDs.

### (1) Lead Forming

- When forming leads, the leads should be bent at a point at least 3mm from the base of the epoxy bulb. Do not use the base of the leadframe as a fulcrum during lead forming.
- Lead forming should be done before soldering.
- Do not apply any bending stress to the base of the lead. The stress to the base may damage the LED's characteristics or it may break the LEDs.
- When mounting the LEDs onto a printed circuit board, the holes on the circuit board should be exactly aligned with the leads of the LEDs. If the LEDs are mounted with stress at the leads, it causes deterioration of the epoxy resin and this will degrade the LEDs.

### (2) Soldering Conditions

- The leadframes of Nichia LEDs are made of copper-allay by special considering of heat conductance, so that very careful attention must be paid for the handling when soldering the LEDs.
- Solder the LEDs no closer than 3mm from the base of the epoxy bulb. Soldering the LEDs beyond the tie-bar is recommended.
- Maximum Allowable Soldering Conditions

Soldering	Solder Dipping
Soldering Iron : 30W Max.	Pre-Heat : 100 Max.
Temperature : 300 Max.	Pre-Heat Time : 60 seconds Max.
Soldering Time : 3 seconds Max.	Solder Bath Temperature : 260 Max.
Position : No closer than 3 mm from the base of the epoxy bulb.	Dipping Time : 5 seconds Max.
	Dipping Position : No lower than 3 mm from the base of the epoxy bulb.

- Do not apply any stress to the lead particularly when heated.
- The LEDs must not be repositioned after soldering.
- After soldering the LEDs, the epoxy bulb should be protected from mechanical shock or vibration until the LEDs return to room temperature.
- Direct soldering onto a PC board should be avoided. Mechanical stress to the resin may be caused from warping of the PC board or from the clinching and cutting of the lead frames. When it is absolutely necessary, the LEDs may be mounted in this fashion but the User will assume responsibility for any problems. Direct soldering should only be done after testing has confirmed that no damage such as wire bond failure or resin deterioration will occur. Nichia's LEDs should not be soldered directly to double sided PC boards because the heat will deteriorate the epoxy resin.
- When it is necessary to clamp the LEDs to prevent soldering failure, it is important to minimize the mechanical stress on the LEDs.
- Cut the LED leadframes at room temperature. Cutting the leadframes at high temperature may cause failure of the LEDs.

### (3) Heat Generation

- Heat generation must be taken into design consideration when using the LEDs. The coefficient of temperature increase per input electric power at room temperature is about 0.5 degrees C/mW at the LED's active layer. This temperature gets higher when the LEDs are densely mounted. It is necessary to design the circuit so that the operating conditions are within the absolute maximum ratings.
- The operating current should be decided after considering the ambient maximum temperature when the LEDs are illuminating.

#### (4) Static Electricity

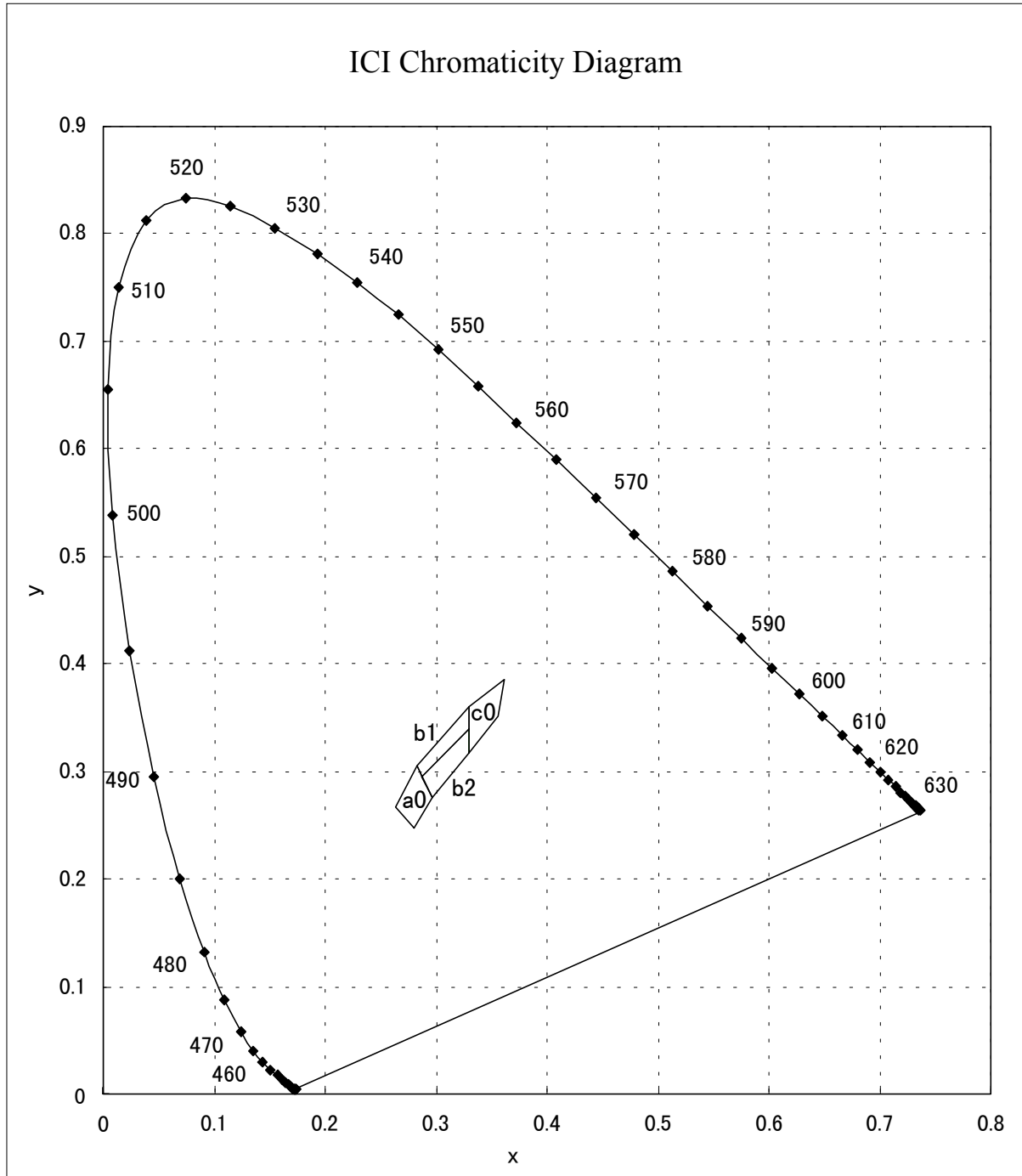
- Static electricity and surge will damage the LEDs. It is recommended to use a wrist band or anti-electrostatic glove when handling the LEDs.
- All devices, equipment and machinery must be properly grounded .
- When inspecting own final products on which LEDs were mounted, it is recommended to check also whether the mounted LEDs are damaged by static electricity or not. It is easy to find static-damaged LEDs by light emission test at lower current (below 1mA is recommended).
- Damaged LEDs will show some unusual characteristics such as leak current remarkably increases, starting forward voltage becomes lower, or the LEDs get unlighted at the low current.

#### (5) Cleaning

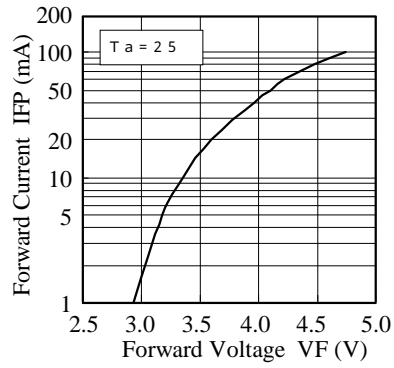
- Avoid exposure to chemicals as they may attack the LED epoxy and cause discoloration. When washing is required, isopropyl alcohol should be used.
- The influence of ultrasonic cleaning on the LEDs differs depending on factors such as oscillator output and how the LEDs are mounted. Before cleaning by ultrasonic wave, testing should be performed to ensure this will not cause damage to the LEDs.

#### (6) Others

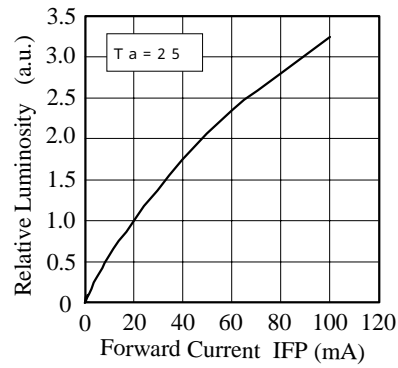
- Care must be taken so that reverse voltage will not exceed the absolute maximum rating when using LEDs with matrix drive.
- The leads are plated with silver. They will become discolored by contact with hydrogen sulfide and other gaseous chemicals. Precautions must be taken to maintain a clean storing atmosphere. Also, if the LEDs are stored for 3 months or more after being shipped from Nichia, a sealed container with a nitrogen atmosphere should be used for storage.
- The LED light output is strong enough to injure human eyes. Precautions must be taken to prevent looking directly at the LEDs with unaided eyes for more than a few seconds.
- These LEDs described in this brochure are intended to be used for ordinary electronic equipment (such as office equipment, communications equipment, measurement instruments and household appliances). Consult Nichia's sales staff in advance for information on the applications in which exceptional quality and reliability are required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as for airplanes, aerospace, automobiles, traffic control equipment, life support systems and safety devices.)
- User shall not reverse engineer by disassembling or analysis of the LEDs without having the prior written consent of Nichia. When defective LEDs are found, User shall inform to Nichia directly before disassembling or analysis.
- The formal specifications must be exchanged and signed by both parties before large volume purchase begins.
- The appearance and specifications of the product may be modified for improvement without notice.



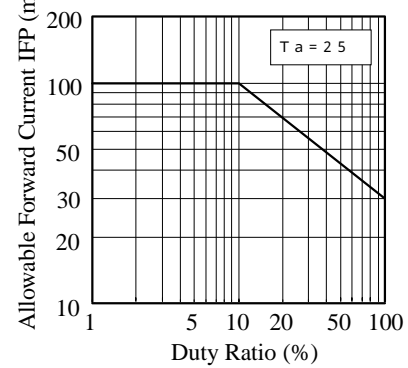
Forward Voltage vs. Forward Current



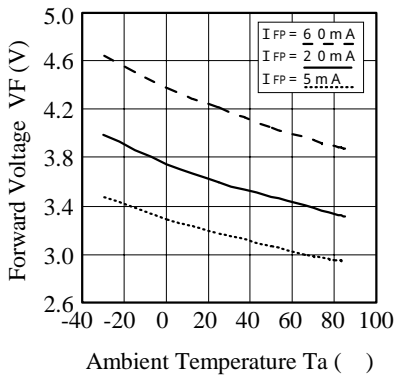
Forward Current vs. Relative Luminosity



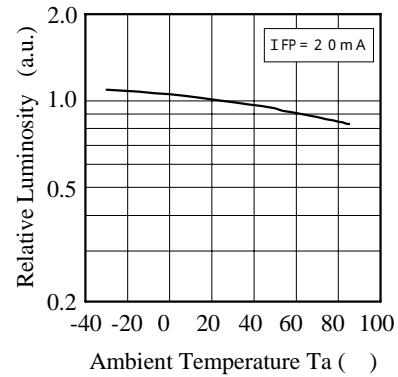
Duty Ratio vs. Allowable Forward Current



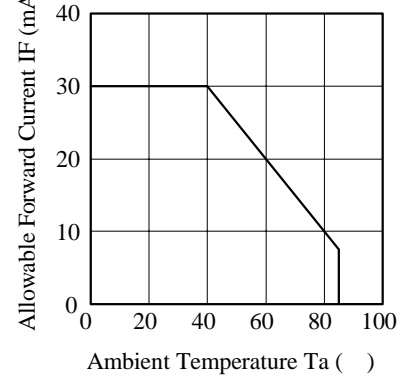
Ambient Temperature vs. Forward Voltage



Ambient Temperature vs. Relative Luminosity

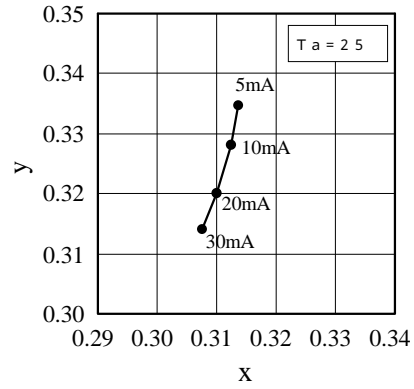


Ambient Temperature vs. Allowable Forward Current

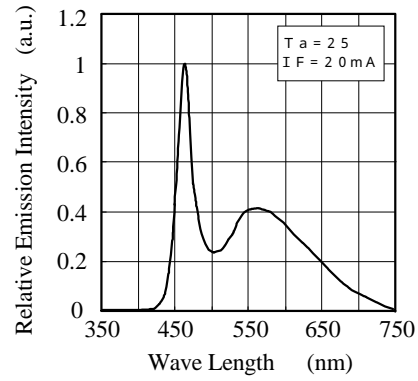


<b>NICHIA CORPORATION</b>	Model	NSPWxxxx
	Title	TYP.CHARACTERISTICS
	No.	000728906042

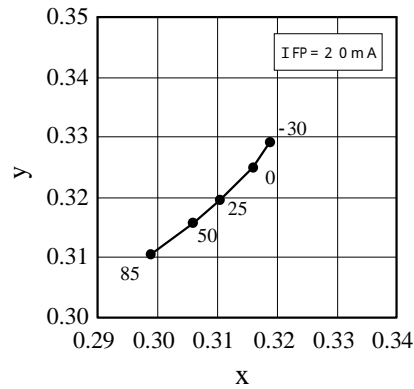
Forward Current vs. Chromaticity diagram



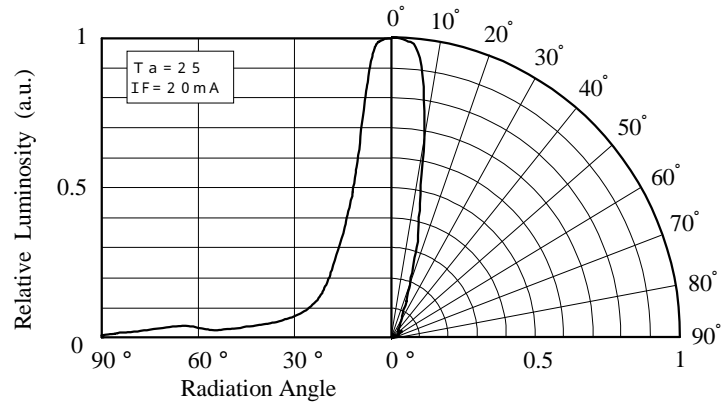
Spectrum



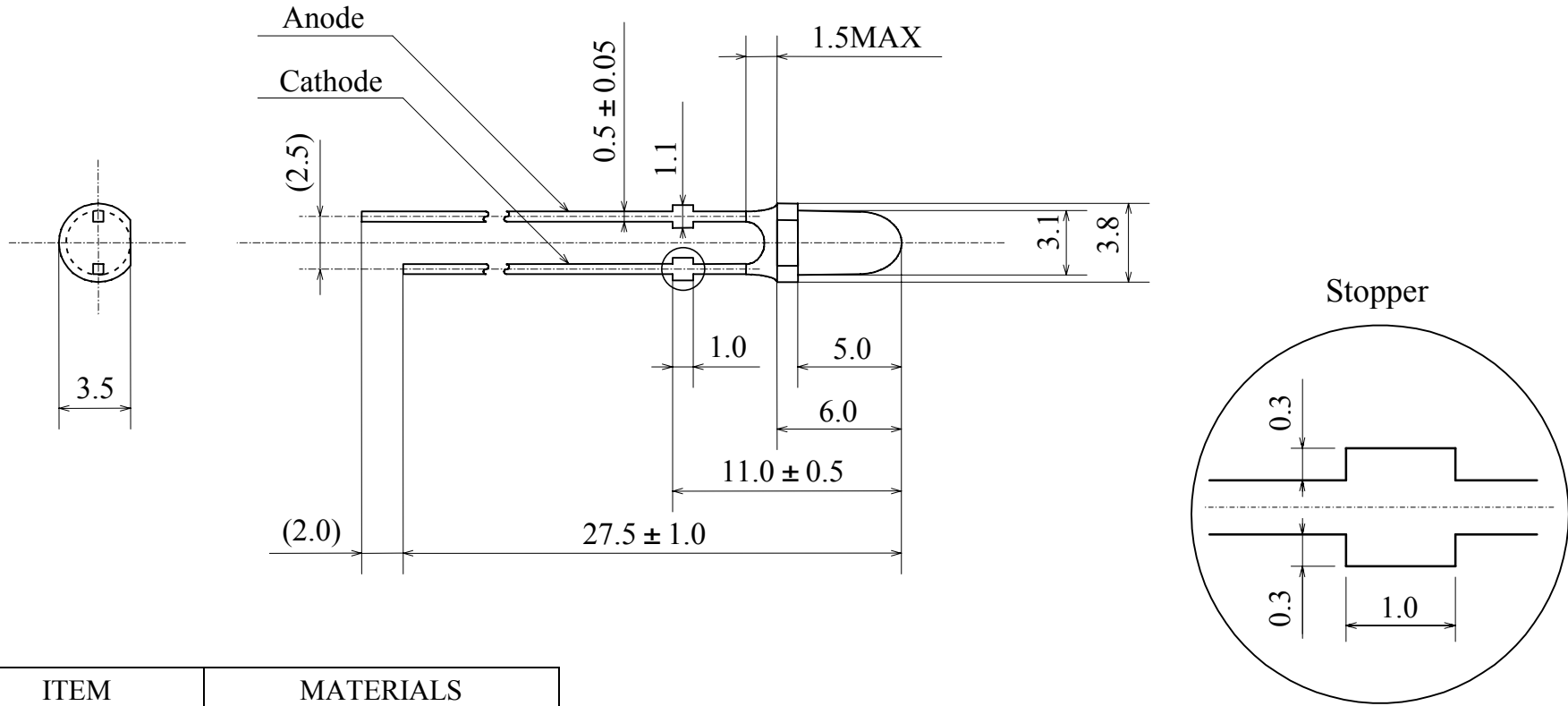
Ambient Temperature vs. Chromaticity diagram



Directivity (NSPW300BS)



<b>NICHIA CORPORATION</b>	Model	NSPW300BS
	Title	TYP.CHARACTERISTICS
	No.	000728906052

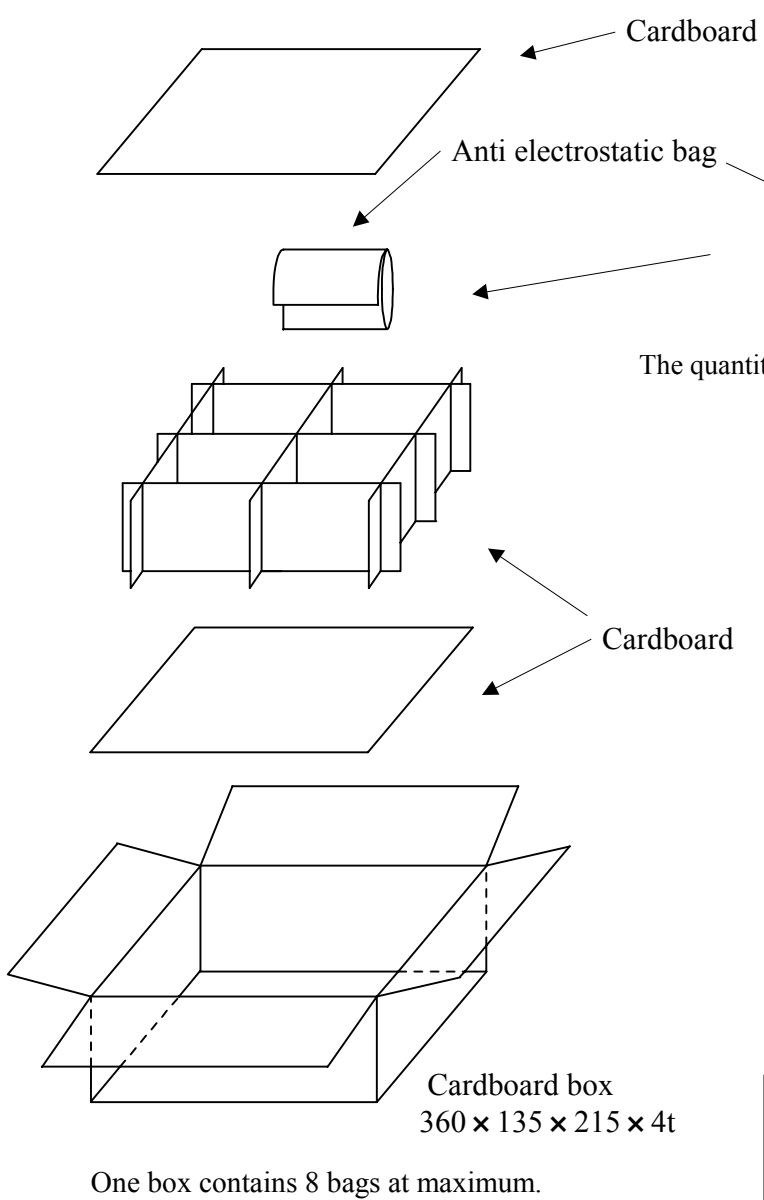


ITEM	MATERIALS
RESIN(MOLD)	Epoxy
LEAD FRAME	Ag Plating Copper alloy

Remark:

Bare copper alloy is exposed at tie-bar portion after cutting.  
 The lamps have sharp and hard points that may injure human eyes or fingers etc. ,so please pay enough care in the handling.

NICHIA CORPORATION	Model	NSPW300BS	Unit mm
	Title	OUTLINE DIMENSIONS	
	No.	000728908061	Allow $\pm 0.2$



Cardboard

Anti electrostatic bag

Cardboard

The quantity is printed on this bag.

Print

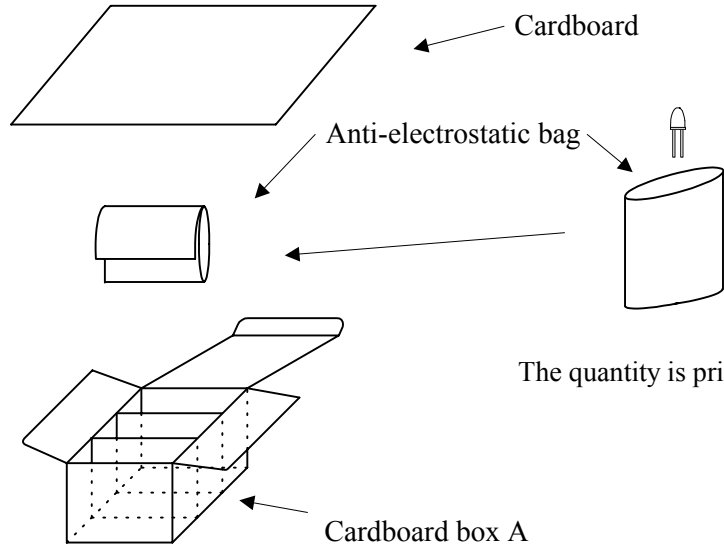
XXXX LED	
TYPE	NSPxxxxxx
LOT	xxxxxx-
QTY	pcs
NICHIA CORPORATION	
491 OKA, KAMINAKA, ANAN, TOKUSHIMA, JAPAN	
CAUTION TO ELECTROSTATIC DAMAGE	
静電気に注意	

Label

XXXX LED	
TYPE	NSPxxxxxx
QTY	PCS
NICHIA CORPORATION	
491 OKA, KAMINAKA, ANAN, TOKUSHIMA, JAPAN	

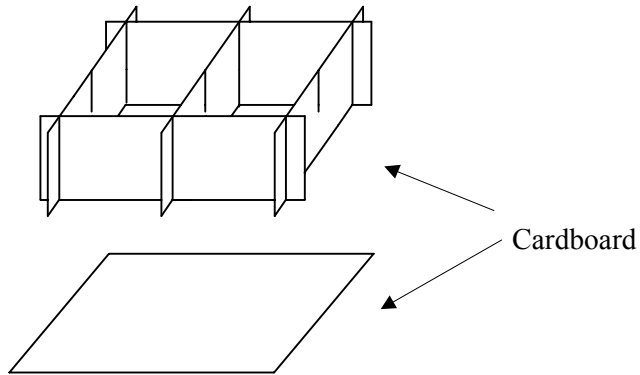
Put this label on the cardboard box .

NICHIA CORPORATION	Model	NSPxxxxxx
	Title	PACKING
	No.	000728801062



The quantity is printed on this bag.

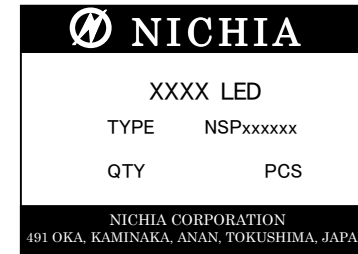
Print



Cardboard box B  
 360 × 135 × 215 × 4t

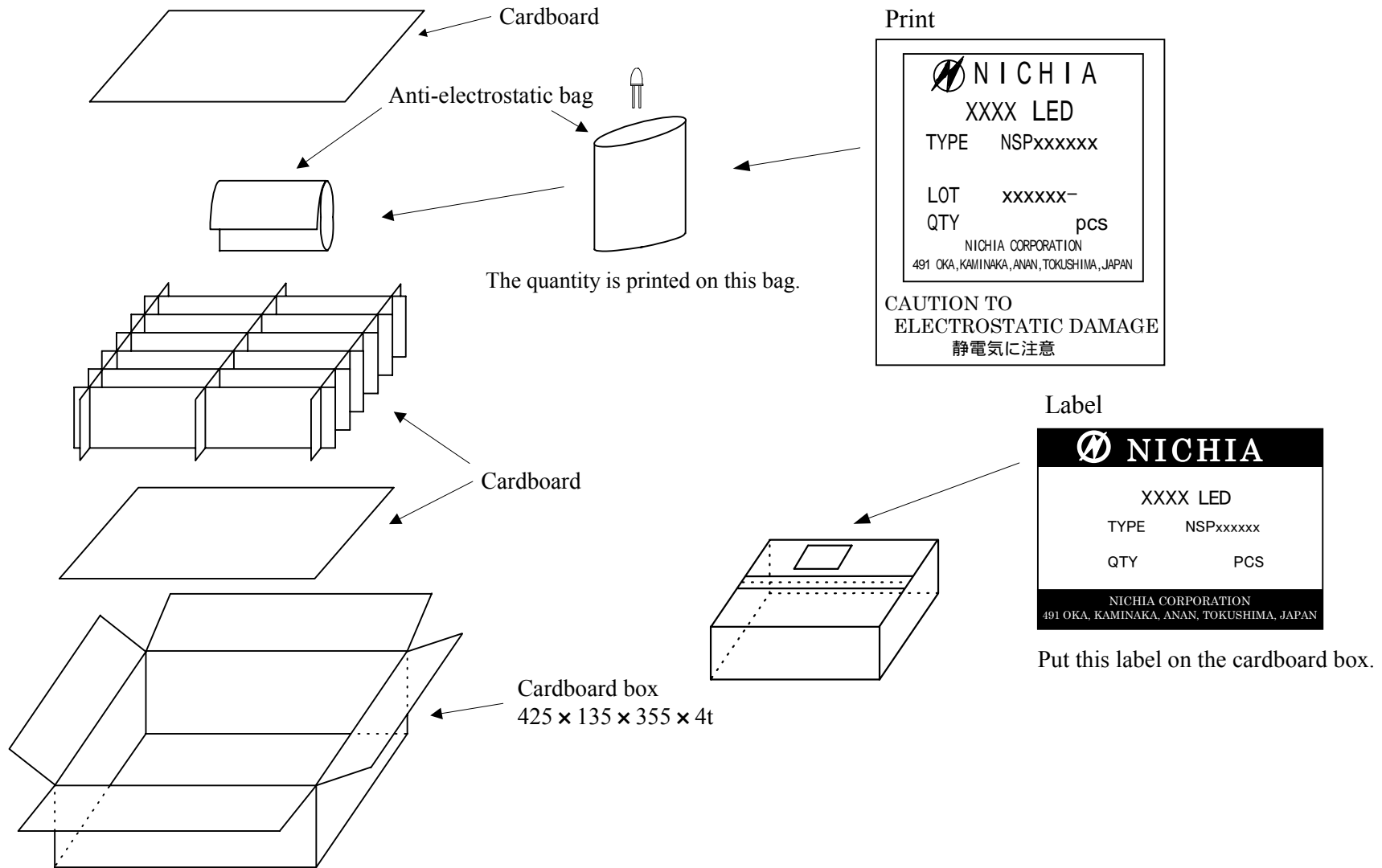
The cardboard box B contains  
 2 cardboard box A at maximum.

Label

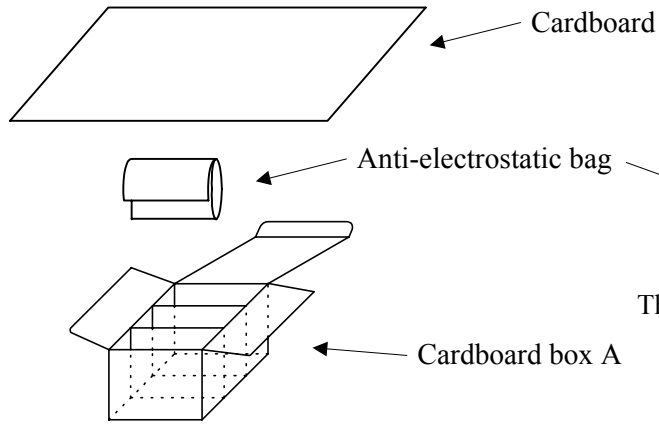


Put this label on the cardboard box B.

NICHIA CORPORATION	Model	NSPxxxxxx	
	Title	PACKING	
	No.	000728801052	

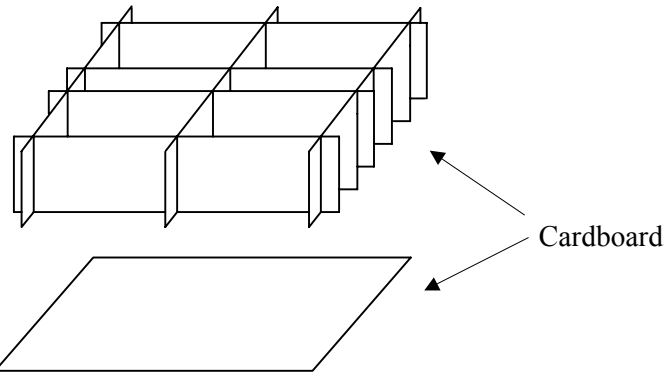
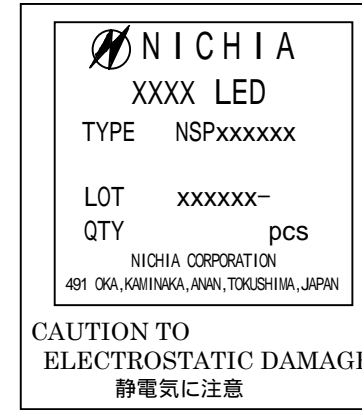


<b>NICHIA CORPORATION</b>	Model	NSPxxxxxx
	Title	PACKING
	No.	000728800982



The quantity is printed on this bag.

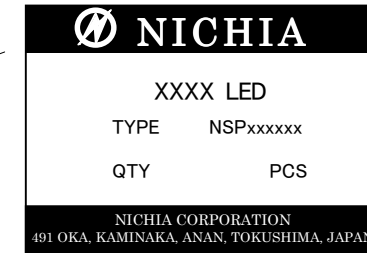
Print



Cardboard box B  
425 × 135 × 355 × 4t

The cardboard box B contains 4 cardboard box A at maximum.

Label



Put this label on the cardboard box B.

NICHIA CORPORATION	Model	NSPxxxxxx	
	Title	PACKING	
	No.	000728801132	