

SPECIFICATIONS FOR NICHIA CHIP TYPE UV LED

MODEL : **NSSU100AT**

NICHIA CORPORATION

1.SPECIFICATIONS

(1) Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Absolute Maximum Rating	Unit
Forward Current	I _F	25	mA
Pulse Forward Current	I _{FP}	80	mA
Allowable Reverse Current	I _R	85	mA
Power Dissipation	P _D	100	mW
Operating Temperature	T _{opr}	-30 ~ + 85	°C
Storage Temperature	T _{stg}	-40 ~ +100	°C
Soldering Temperature	T _{sld}	Reflow Soldering : 260°C for 10sec. Hand Soldering : 350°C for 3sec.	

I_{FP} Conditions : Pulse Width ≤ 10msec. and Duty ≤ 1/10

(2) Initial Electrical/Optical Characteristics (Ta=25°C)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage		V _F	I _F =20[mA]	-	(3.6)	4.0	V
Peak Wavelength	Rank Ua	λ _P	I _F =20[mA]	360	(365)	370	nm
Spectrum Half Width		△λ	I _F =20[mA]	-	(15)	-	nm
Optical Power Output	Rank 4	P _o	I _F =20[mA]	1700	-	2400	μW
	Rank 5	P _o	I _F =20[mA]	2400	-	3400	μW
	Rank 6	P _o	I _F =20[mA]	3400	-	4800	μW

* Optical Power Output Measurement allowance is ±10%.

** Peak Wavelength Measurement allowance is ±3nm.

*** One delivery will include up to three different ranks of the products.

The quantity-ratio of the three ranks is decided by Nichia.

2.INITIAL OPTICAL/ELECTRICAL CHARACTERISTICS

Please refer to figure's page.

3.OUTLINE DIMENSIONS AND MATERIALS

Please refer to figure's page.

Material as follows ; Package : Ceramics
 Encapsulating Resin : Silicone Resin
 Electrodes : Au Plating

4.PACKAGING

- The LEDs are packed in cardboard boxes after taping.

Please refer to figure's page.

The label on the minimum packing unit shows ; Part Number, Lot Number, Ranking, Quantity

- In order to protect the LEDs from mechanical shock, we pack them in cardboard boxes for transportation.
- The LEDs may be damaged if the boxes are dropped or receive a strong impact against them, so precautions must be taken to prevent any damage.
- The boxes are not water resistant and therefore must be kept away from water and moisture.
- When the LEDs are transported, we recommend that you use the same packing method as Nichia.

5.LOT NUMBER

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

The lot number is composed of the following characters;

○□×××× - △■

○ - Year (6 for 2006, 7 for 2007)

□ - Month (1 for Jan., 9 for Sep., A for Oct., B for Nov.)

×××× - Nichia's Product Number

△ - Ranking by Wavelength

■ - Ranking by Optical Power Output

6.RELIABILITY

(1) TEST ITEMS AND RESULTS

Test Item	Standard Test Method	Test Conditions	Note	Number of Damaged
Resistance to Soldering Heat (Reflow Soldering)	JEITA ED-4701 300 301	Tsld=260°C, 10sec. (Pre treatment 30°C,70%,168hrs.)	2 times	0/50
Solderability (Reflow Soldering)	JEITA ED-4701 300 303	Tsld=215 ± 5°C, 3sec. (Lead Solder)	1 time over 95%	0/50
Thermal Shock	JEITA ED-4701 300 307	0°C ~ 100°C 15sec. 15sec.	20 cycles	0/50
Temperature Cycle	JEITA ED-4701 100 105	-40°C ~ 25°C ~ 100°C ~ 25°C 30min. 5min. 30min. 5min.	100 cycles	0/50
Moisture Resistance Cyclic	JEITA ED-4701 200 203	25°C ~ 65°C ~ -10°C 90%RH 24hrs./1cycle	10 cycles	0/50
High Temperature Storage	JEITA ED-4701 200 201	Ta=100°C	1000 hrs.	0/50
Temperature Humidity Storage	JEITA ED-4701 100 103	Ta=60°C, RH=90%	1000 hrs.	0/50
Low Temperature Storage	JEITA ED-4701 200 202	Ta=-40°C	1000 hrs.	0/50
Steady State Operating Life		Ta=25°C, IF=25mA	1000 hrs.	0/50
Steady State Operating Life of High Temperature		Ta=85°C, IF=7.5mA	1000 hrs.	0/50
Steady State Operating Life of High Humidity Heat		60°C, RH=90%, IF=20mA	500 hrs.	0/50
Steady State Operating Life of Low Temperature		Ta=-30°C, IF=20mA	1000 hrs.	0/50
Vibration	JEITA ED-4701 400 403	100 ~ 2000 ~ 100Hz Sweep 4min. 200m/s ² 3directions, 4cycles	48min.	0/50
Substrate Bending	JEITA ED-4702	3mm, 5 ± 1 sec.	1 time	0/50
Adhesion Strength	JEITA ED-4702	5N, 10 ± 1 sec.	1 time	0/50

(2) CRITERIA FOR JUDGING DAMAGE

Item	Symbol	Test Conditions	Criteria for Judgement	
			Min.	Max.
Forward Voltage	V _F	I _F =20mA	-	U.S.L.*) × 1.1
Optical Power Output	P _o	I _F =20mA	L.S.L.***) × 0.7	-

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

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

7. CAUTIONS

(1) Cautions

- The devices are UV light LEDs. The LED during operation radiates intense UV light, which precautions must be taken to prevent looking directly at the UV light with unaided eyes. Do not look directly into the UV light or look through the optical system. When there is a possibility to receive the reflection of light, protect by using the UV light protective glasses so that light should not catch one's eye directly.
- The caution label is attached to cardboard box.



(2) Moisture Proof Package

- When moisture is absorbed into the SMT package it may vaporize and expand during soldering. There is a possibility that this can cause exfoliation of the contacts and damage to the optical characteristics of the LEDs. For this reason, the moisture proof package is used to keep moisture to a minimum in the package.
- The moisture proof package is made of an aluminum moisture proof bag. A package of a moisture absorbent material (silica gel) is inserted into the aluminum moisture proof bag. The silica gel changes its color from blue to pink as it absorbs moisture.

(3) Storage

· Storage Conditions

Before opening the package :

The LEDs should be kept at 30°C or less and 90%RH or less. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with absorbent material (silica gel) is recommended.

After opening the package :

The LEDs should be kept at 30°C or less and 70%RH or less. The LEDs should be soldered within 168 hours (7days) after opening the package. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with packages of moisture absorbent material (silica gel). It is also recommended to return the LEDs to the original moisture proof bag and to reseal the moisture proof bag again.

- If the moisture absorbent material (silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.

Baking treatment : more than 24 hours at $65 \pm 5^{\circ}\text{C}$

- Nichia LED electrodes are gold plated. The gold surface may be affected by environments which contain corrosive substances. Please avoid conditions which may cause the LED to corrode, tarnish or discolor. This corrosion or discoloration may cause difficulty during soldering operations. It is recommended that the User use the LEDs as soon as possible.
- Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.

(4) Circuit Design

- For electrical design of the product, make sure that no voltage is applied to an LED while it is off.

(5) Soldering Conditions

- The LEDs can be soldered in place using the reflow soldering method. Nichia cannot make a guarantee on the LEDs after they have been assembled using the dip soldering method.
- Recommended soldering conditions

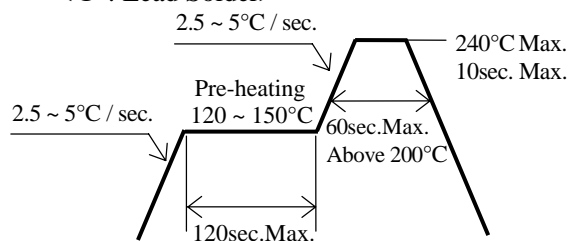
	Reflow Soldering		Hand Soldering	
	Lead Solder	Lead-free Solder	Temperature	Soldering time
Pre-heat	120 ~ 150°C	180 ~ 200°C		350°C Max.
Pre-heat time	120 sec. Max.	120 sec. Max.		3 sec. Max.
Peak temperature	240°C Max.	260°C Max.		(one time only)
Soldering time	10 sec. Max.	10 sec. Max.		
Condition	refer to Temperature - profile ①.	refer to Temperature - profile ②. (N ₂ reflow is recommended.)		

* Although the recommended soldering conditions are specified in the above table, reflow or hand soldering at the lowest possible temperature is desirable for the LEDs.

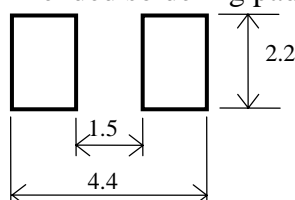
* A rapid-rate process is not recommended for cooling the LEDs down from the peak temperature.

[Temperature-profile (Surface of circuit board)]

<① : Lead Solder>



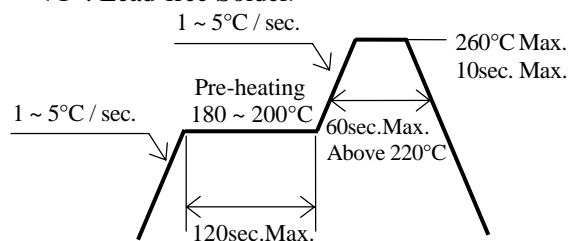
[Recommended soldering pad design]



(Unit : mm)

Use the conditions shown to the under figure.

<② : Lead-free Solder>



Use the following conditions shown in the figure.

- Occasionally there is a brightness decrease caused by the influence of heat or ambient atmosphere during air reflow. It is recommended that the User use the nitrogen reflow method.
- The encapsulated material of the LEDs is silicone. Therefore the LEDs have a soft surface on the top of package. The pressure to the top surface will be influence to the reliability of the LEDs. Precautions should be taken to avoid the strong pressure on the encapsulated part. So when using the chip mounter, the picking up nozzle that does not affect the silicone resin should be used.
- Repairing should not be done after the LEDs have been soldered. When repairing is unavoidable, a double-head soldering iron should be used. It should be confirmed beforehand whether the characteristics of the LEDs will or will not be damaged by repairing.
- Reflow soldering should not be done more than two times.
- When soldering, do not put stress on the LEDs during heating.
- After soldering, do not warp the circuit board.

(6) Heat Generation

- Thermal design of the end product is of paramount importance. Please consider the heat generation of the LED when making the system design. The coefficient of temperature increase per input electric power is affected by the thermal resistance of the circuit board and density of LED placement on the board, as well as other components. It is necessary to avoid intense heat generation and operate within the maximum ratings given in this specification.
- The operating current should be decided after considering the ambient maximum temperature of LEDs.

(7) Cleaning

- It is recommended that isopropyl alcohol be used as a solvent for cleaning the LEDs. When using other solvents, it should be confirmed beforehand whether the solvents will dissolve the package and the resin or not. Freon solvents should not be used to clean the LEDs because of worldwide regulations.
- Do not clean the LEDs by the ultrasonic. When it is absolutely necessary, the influence of ultrasonic cleaning on the LEDs depends on factors such as ultrasonic power and the assembled condition. Before cleaning, a pre-test should be done to confirm whether any damage to the LEDs will occur.

(8) Static Electricity

- Static electricity or surge voltage damages the LEDs.
It is recommended that a wrist band or an anti-electrostatic glove be used when handling the LEDs.
- All devices, equipment and machinery must be properly grounded. It is recommended that precautions be taken against surge voltage to the equipment that mounts the LEDs.
- When inspecting the final products in which LEDs were assembled, it is recommended to check whether the assembled LEDs are damaged by static electricity or not. It is easy to find static-damaged LEDs by a light-on test or a VF test at a lower current (below 10mA is recommended). The LEDs should be used the light detector etc. when testing the light-on. Do not stare into the LEDs when testing.
- Damaged LEDs will show some unusual characteristics such as the forward voltage becomes lower, or the LEDs do not light at the low current.

Criteria : (VF > 2.0V at IF=0.5mA)

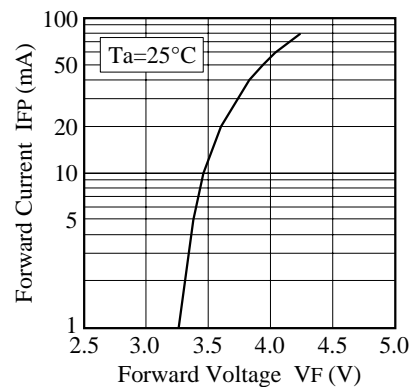
(9) Safety Guideline for Human Eyes

- In 1993, the International Electric Committee (IEC) issued a standard concerning laser product safety (IEC 825-1). Since then, this standard has been applied for diffused light sources (LEDs) as well as lasers. In 1998 IEC 60825-1 Edition 1.1 evaluated the magnitude of the light source. In 2001 IEC 60825-1 Amendment 2 converted the laser class into 7 classes for end products. Components are excluded from this system. Products which contain visible LEDs are now classified as class 1. Products containing UV LEDs are class 1M. Products containing LEDs can be classified as class 2 in cases where viewing angles are narrow, optical manipulation intensifies the light, and/or the energy emitted is high. For these systems it is recommended to avoid long term exposure. It is also recommended to follow the IEC regulations regarding safety and labeling of products.

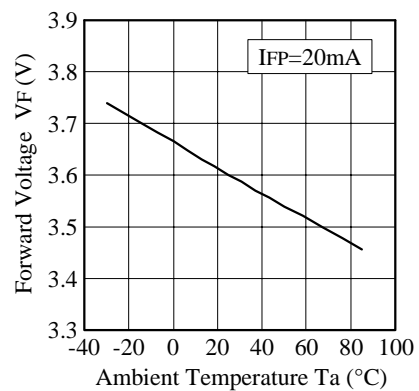
(10) Others

- NSSU100A complies with RoHS Directive.
- This LED also emits visible light. Please take notice of visible light spectrum, in case you use this LED as light source of sensors etc.
- The 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, submersible repeaters, nuclear reactor control systems, automobiles, traffic control equipment, life support systems and safety devices).
- User shall not reverse engineer by disassembling or analysis of the LEDs without having prior written consent from Nichia. When defective LEDs are found, the User shall inform 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.

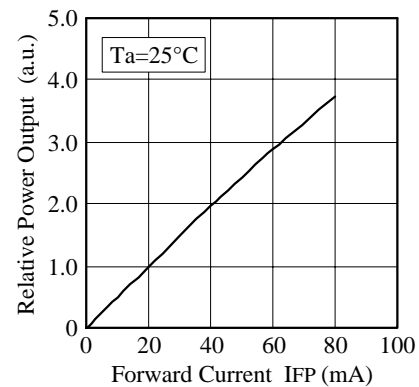
■ Forward Voltage vs.
Forward Current



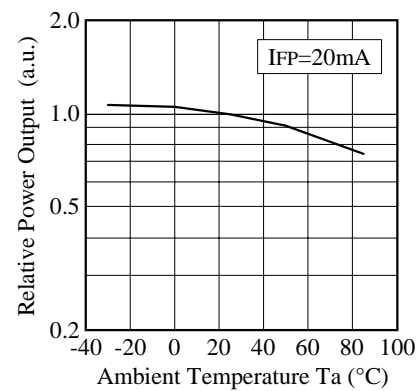
■ Ambient Temperature vs.
Forward Voltage



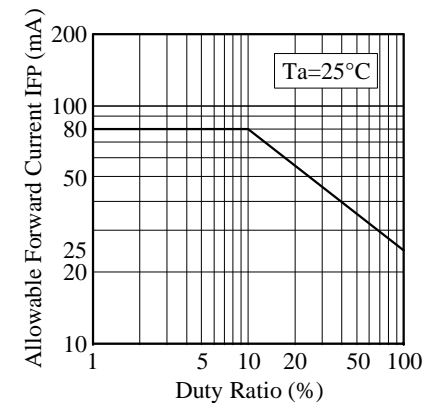
■ Forward Current vs.
Relative Power Output



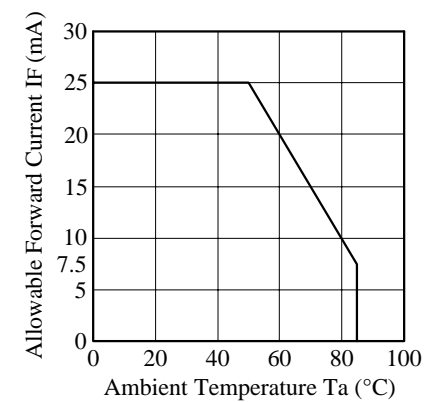
■ Ambient Temperature vs.
Relative Power Output



■ Duty Ratio vs.
Allowable Forward Current

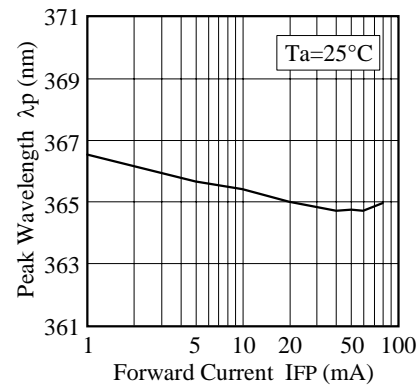


■ Ambient Temperature vs.
Allowable Forward Current

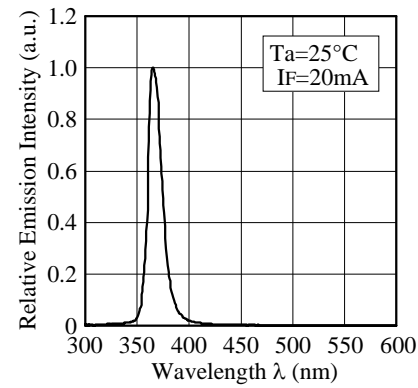


NICHIA CORPORATION	Model	NSSU100A
	Title	CHARACTERISTICS
	No.	070406763431

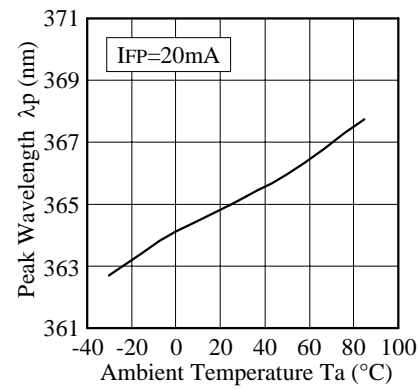
■ Forward Current vs.
Peak Wavelength



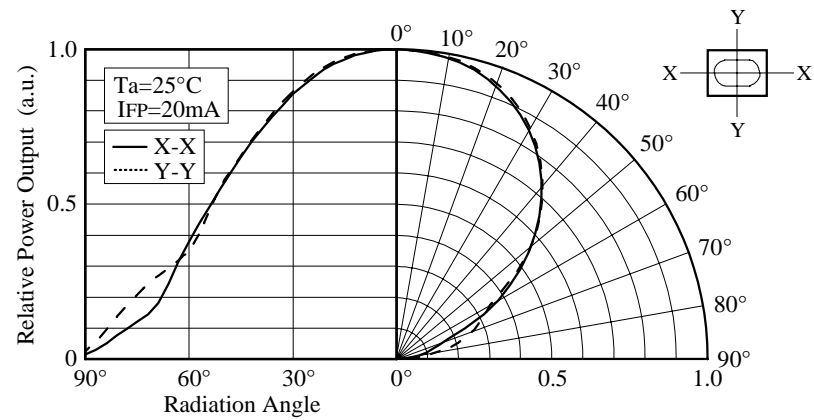
■ Spectrum



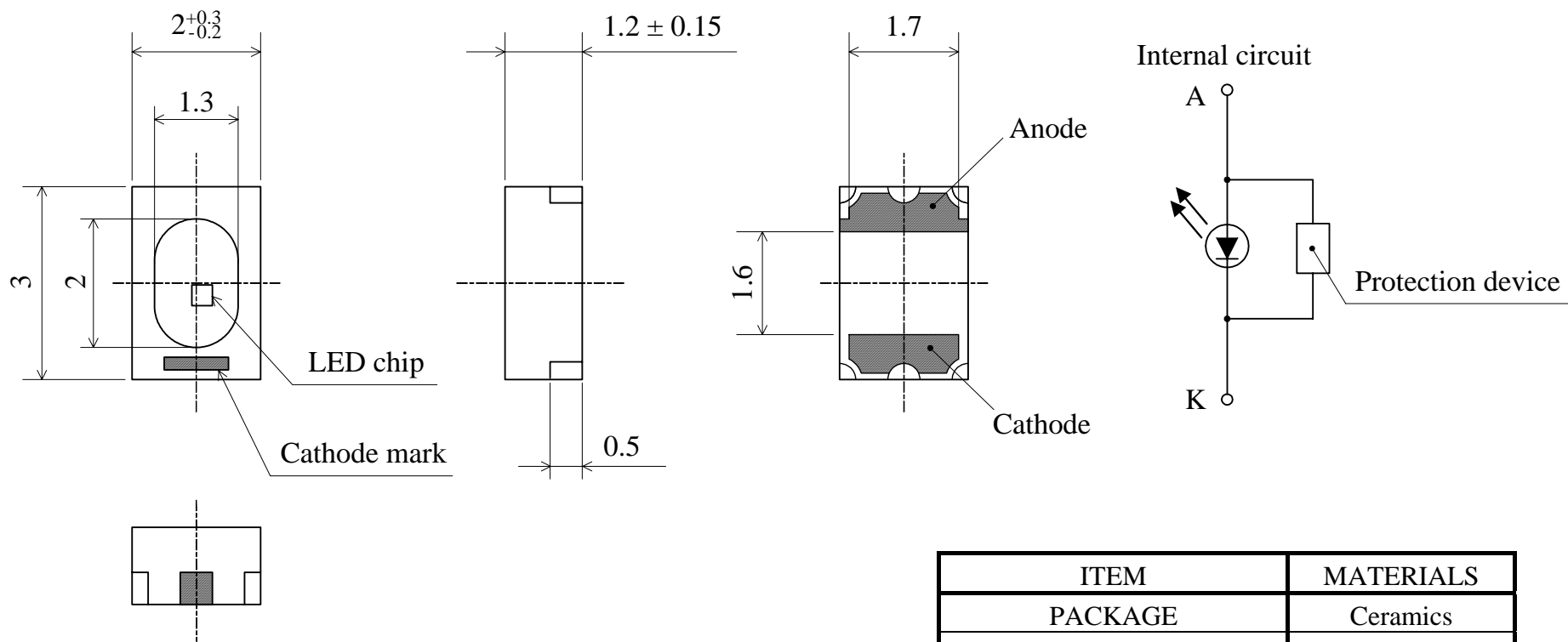
■ Ambient Temperature vs.
Peak Wavelength



■ Directivity



NICHIA CORPORATION	Model	NSSU100A
	Title	CHARACTERISTICS
	No.	070402763441

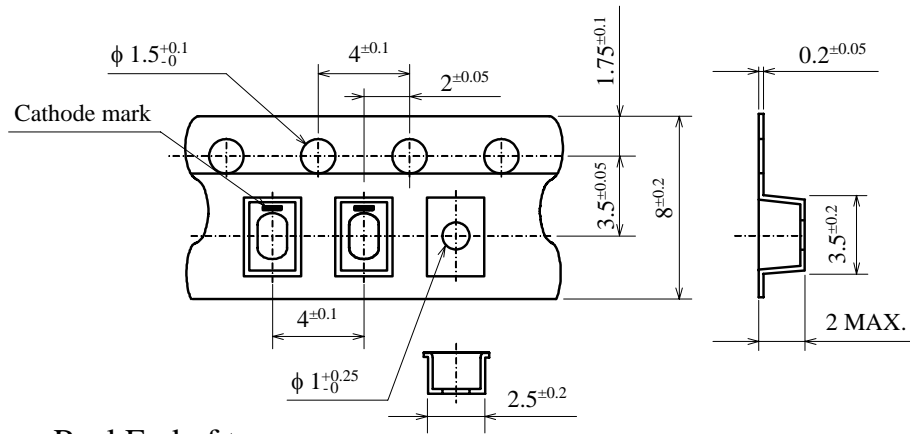


* NSSU100A has a protection device built in as a protection circuit against static electricity.

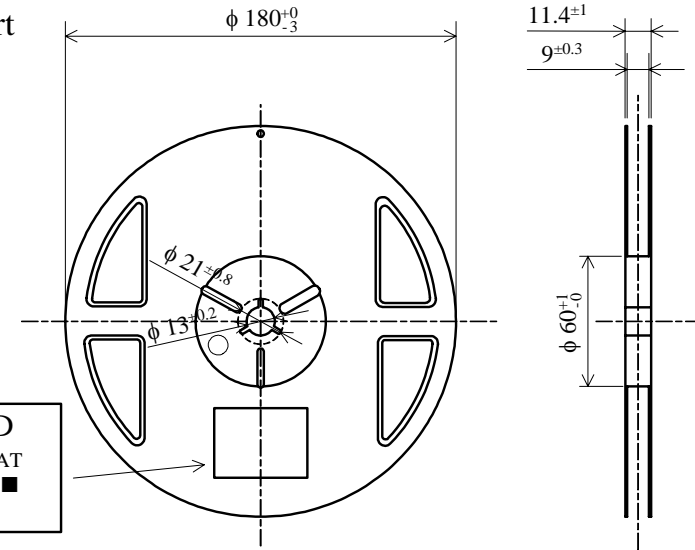
ITEM	MATERIALS
PACKAGE	Ceramics
ENCAPSULATING RESIN	Silicone Resin
ELECTRODES	Au Plating

NICHIA CORPORATION	Model	NSSU100A	Unit mm
	Title	OUTLINE DIMENSIONS	
	No.	070402763451	10/1 Scale
			Allow ±0.2

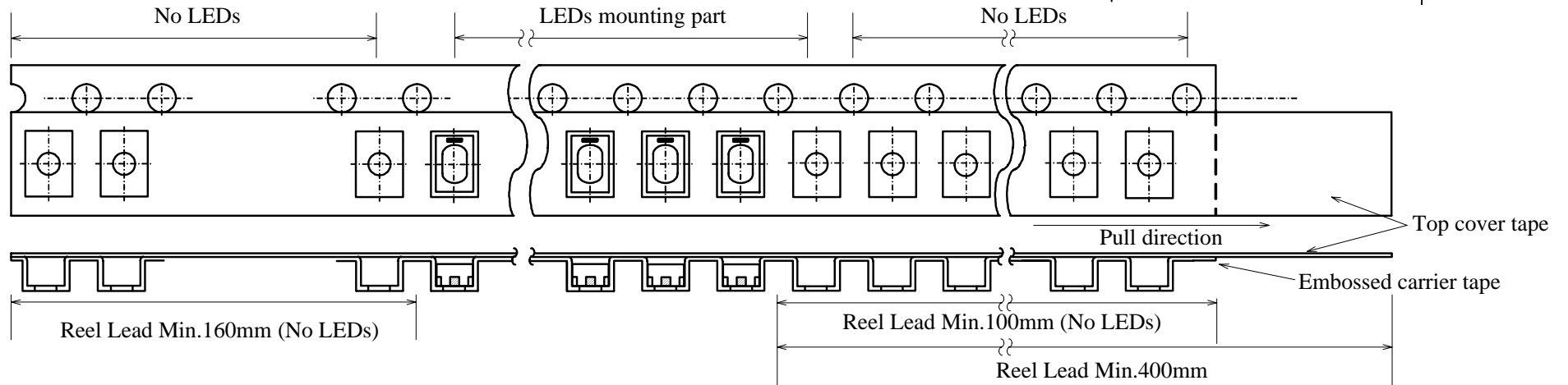
Taping part



Reel part



Reel End of tape



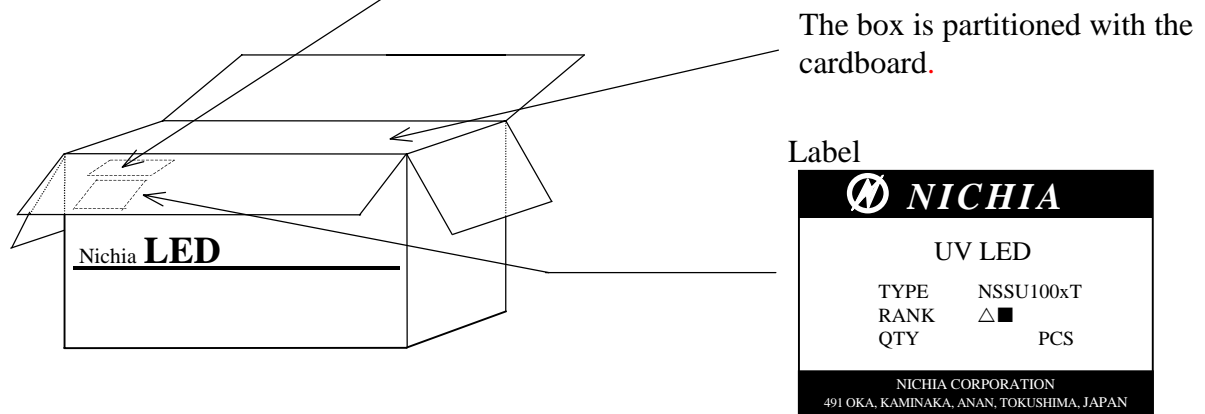
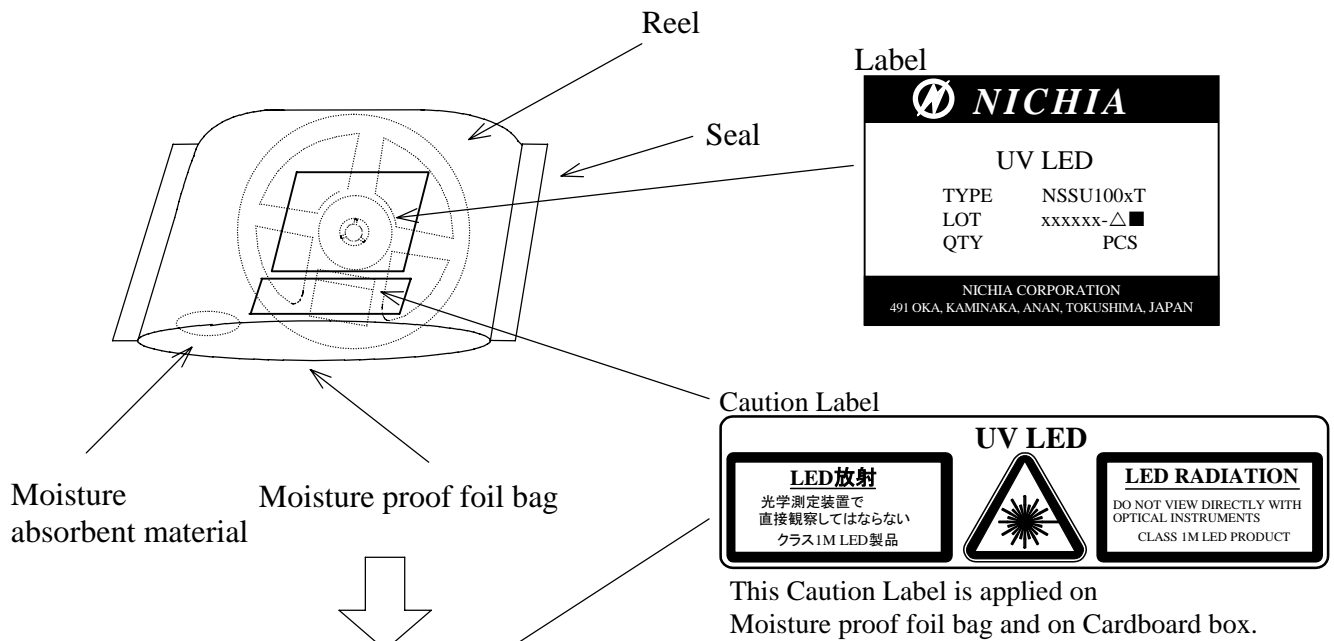
2,500pcs/Reel

Taping is based on the **JIS C 0806** : Packaging of Electronic Components on Continuous Tapes.

NICHIA CORPORATION

Model	NSSU100AT	Unit mm Scale Allow
Title	TAPING DIMENSIONS	
No.	070402763461	

The reel and moisture absorbent material are put in the moisture proof foil bag and then heat sealed.



Packing unit

	Reel/bag	Quantity/bag (pcs)
Moisture proof foil bag	1reel	2,500 MAX.

Cardboard box	Dimensions (mm)	Reel/box	Quantity/box (pcs)
Cardboard box S	291×237×120×8t	7reel MAX.	17,500 MAX.
Cardboard box M	259×247×243×5t	15reel MAX.	37,500 MAX.
Cardboard box L	444×262×259×8t	30reel MAX.	75,000 MAX.

NICHIA CORPORATION	Model	NSSU100xT	
	Title	PACKING	
	No.	070402542442	