SPECIFICATIONS FOR NICHIA CHIP TYPE **WHITE**　LED

MODEL : **NSSW105T**

NICHIA CORPORATION

1.SPECIFICATIONS

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

Item	Symbol	Absolute Maximum Rating	Unit
Forward Current	I_F	30	mA
Pulse Forward Current	I_{FP}	100	mA
Reverse Voltage	V_R	5	V
Power Dissipation	P_D	105	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 $\leqq$ 10msec.   and   Duty $\leqq$ 1/10

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

Item	Symbol	Condition	Typ.	Max.	Unit
Forward Voltage	V_F	I_F=20[mA]	(3.2)	3.5	V
Reverse Current	I_R	V_R= 5[V]	-	50	µA
Luminous Intensity (Chromaticity Coordinate 1)	I_v	I_F=20[mA]	(1.95)	-	cd
Chromaticity Coordinate 1* — x	-	I_F=20[mA]	0.310	-	-
Chromaticity Coordinate 1* — y	-	I_F=20[mA]	0.320	-	-
Luminous Intensity (Chromaticity Coordinate 2)	I_v	I_F=20[mA]	(1.85)	-	cd
Luminous Flux (Chromaticity Coordinate 2)	ϕv	I_F=20[mA]	(5.0)		lm
Chromaticity Coordinate 2* — x	-	I_F=20[mA]	0.300	-	-
Chromaticity Coordinate 2* — y	-	I_F=20[mA]	0.295	-	-

＊ Please refer to CIE 1931 chromaticity diagram.

(3) Ranking   (Ta=25°C)

Item		Symbol	Condition	Min.	Max.	Unit
Luminous Intensity	Rank A20	I_v	I_F=20[mA]	2.00	2.10	cd
	Rank A19	I_v	I_F=20[mA]	1.90	2.00	cd
	Rank A18	I_v	I_F=20[mA]	1.80	1.90	cd
	Rank A17	I_v	I_F=20[mA]	1.70	1.80	cd
	Rank A16	I_v	I_F=20[mA]	1.60	1.70	cd
	Rank A15	I_v	I_F=20[mA]	1.50	1.60	cd

＊ Luminous Intensity Measurement allowance is ± 7%.

Color Ranks   (I_F=20mA,Ta=25°C)

	Rank a52			
x	0.2800	0.2720	0.2820	0.2880
y	0.2480	0.2580	0.2720	0.2620

	Rank a56			
x	0.2830	0.2800	0.2880	0.2910
y	0.2440	0.2480	0.2620	0.2580

	Rank a57		
x	0.2720	0.2793	0.2820
y	0.2580	0.2755	0.2720

	Rank a62			
x	0.2880	0.2820	0.2910	0.2960
y	0.2620	0.2720	0.2870	0.2760

	Rank a66			
x	0.2910	0.2880	0.2960	0.2980
y	0.2580	0.2620	0.2760	0.2710

	Rank a67			
x	0.2820	0.2793	0.2887	0.2910
y	0.2720	0.2755	0.2916	0.2870

	Rank bj2			
x	0.2960	0.2910	0.2990	0.3040
y	0.2760	0.2870	0.3010	0.2900

	Rank bj6			
x	0.2980	0.2960	0.3040	0.3062
y	0.2710	0.2760	0.2900	0.2853

	Rank bj7			
x	0.2910	0.2887	0.2968	0.2990
y	0.2870	0.2916	0.3058	0.3010

	Rank bk2			
x	0.3040	0.2990	0.3070	0.3120
y	0.2900	0.3010	0.3150	0.3040

	Rank bk6			
x	0.3062	0.3040	0.3120	0.3142
y	0.2853	0.2900	0.3040	0.2993

	Rank bk7			
x	0.2990	0.2968	0.3048	0.3070
y	0.3010	0.3058	0.3198	0.3150

＊ Color Coordinates Measurement allowance is ± 0.005.

＊ Basically, a shipment shall consist of the LEDs of a combination of the above ranks.

　The percentage of each rank in the shipment shall be determined 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　　　　　　　:　Heat-Resistant Polymer

Encapsulating Resin　:　Silicone Resin (with Diffused + Phosphor)

Electrodes　　　　　:　Ag Plating　Copper Alloy

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 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 (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 Condition 1		Ta=25°C, I_F=20mA	1000 hrs.	0/50
Steady State Operating Life Condition 2		Ta=25°C, I_F=30mA	500 hrs.	0/50
Steady State Operating Life of High Temperature		Ta=85°C, I_F=8.5mA	1000 hrs.	0/50
Steady State Operating Life of High Humidity Heat		60°C, RH=90%, I_F=15mA	500 hrs.	0/50
Steady State Operating Life of Low Temperature		Ta=-30°C, I_F=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

(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
Reverse Current	I_R	V_R=5V	-	U.S.L.*)× 2.0
Luminous Intensity	I_V	I_F=20mA	L.S.L.**)× 0.7	-

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

7.CAUTIONS

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

(1) 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.

(2) 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 ± 5°C
· This product has silver plated metal parts that are inside and/or outside the package body.   The silver
plating becomes tarnished when being exposed to an environment which contains corrosive gases.
Any LED with tarnished leads may lead to poor solderability and deterioration of optical characteristics.
Please do not expose the LEDs to corrosive atmosphere during storage.
· After assembly and during use, silver plating can be affected by the corrosive gases emitted by
components and materials in close proximity of the LEDs within an end product, and the gases entering
into the product from the external atmosphere.   The above should be taken into consideration when
designing.
· Please avoid rapid transitions in ambient temperature, especially in high humidity environments where
condensation can occur.

(3) 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.

(4) 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		

Pre-heat
Pre-heat time
Peak
  temperature
Soldering time
Condition
	120 ~ 150°C
	120 sec. Max.
	240°C Max.
	
	10 sec. Max.
	refer to
	  Temperature - profile ①.
		180 ~ 200°C
		120 sec. Max.
		260°C Max.
		
		10 sec. Max.
		refer to
		  Temperature - profile ②.
		(N₂ reflow is recommended.)
			Temperature
			Soldering time
				350°C Max.
				3 sec. Max.
				(one time only)

＊ 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)]
    Use the conditions shown to the under figure.

<① : Lead Solder>   <② : Lead-free Solder>

2.5 ~ 5°C / sec.   240°C Max.   1~ 5°C / sec.   260°C Max.
                                   10sec. Max.   10sec. Max.
Pre-heating   Pre-heating
2.5 ~ 5°C / sec. 120 ~ 150°C 60sec.Max.   1~ 5°C / sec. 180 ~ 200°C 60sec.Max.
                              Above 200°C   Above 220°C
         120sec.Max.   120sec.Max.
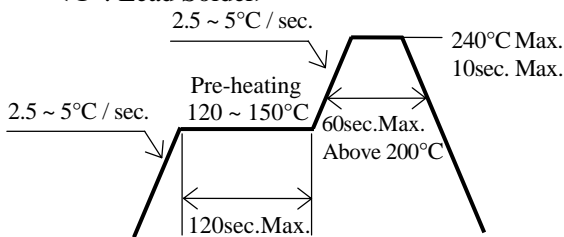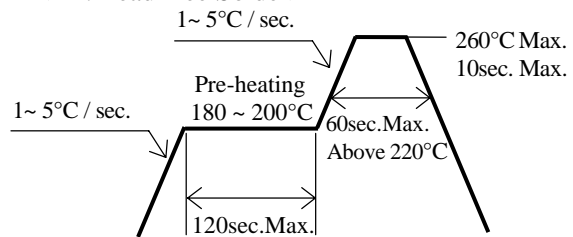
[Recommended soldering pad design]
    Use the following conditions shown in the figure.

1.5   2.1   1.5

0.85   (Unit : mm)
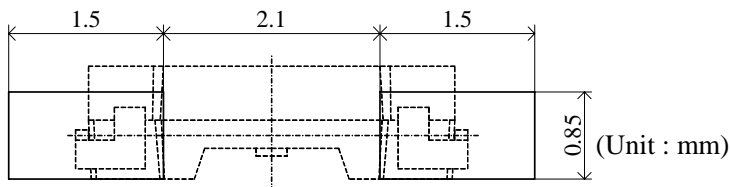
· Occasionally there is a brightness decrease caused by the influence of heat or ambient atmosphere
  during air reflow.   It is recommended that the User use the nitrogen reflow method.
· Repairing should not be done after the LEDs have been soldered.   When repairing is unavoidable,
  a double-head 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.

(5) 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.

(6) 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 1mA is recommended).
· Damaged LEDs will show some unusual characteristics such as the leak current remarkably
  increases, the forward voltage becomes lower, or the LEDs do not light at the low current.
          Criteria : ($V_F > 2.0V$ at $I_F=0.5mA$)

(7) Others
· NSSW105 complies with RoHS Directive.
· Care must be taken to ensure that the reverse voltage will not exceed the absolute maximum rating
  when using the LEDs with matrix drive.
· 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.
· Flashing lights have been known to cause discomfort in people; you can prevent this by taking
  precautions during use.   Also, people should be cautious when using equipment that has had LEDs
  incorporated into it.
· 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.
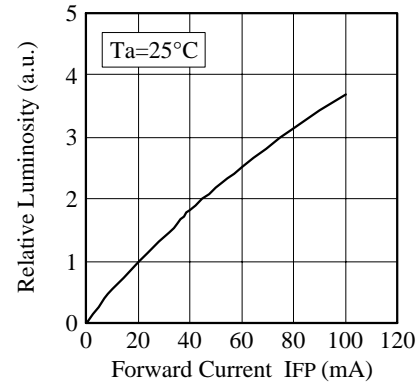· The appearance and specifications of the product may be modified for improvement without notice.

ICI Chromaticity Diagram
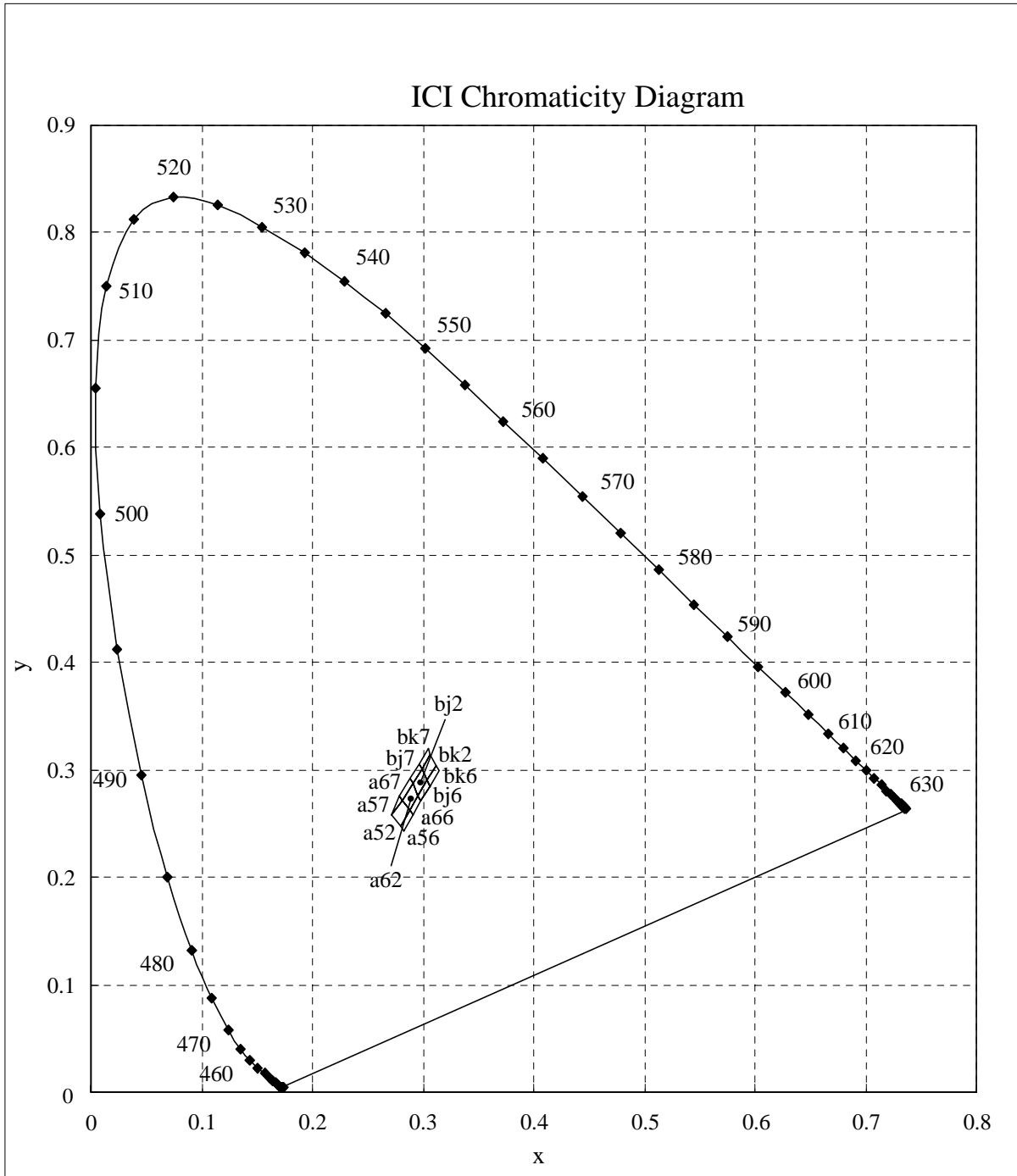
＊ Color Coordinates Measurement allowance is ± 0.005.

■ Forward Voltage vs.
   Forward Current

Forward Current IFP (mA)

Ta=25°C

Forward Voltage VF (V)
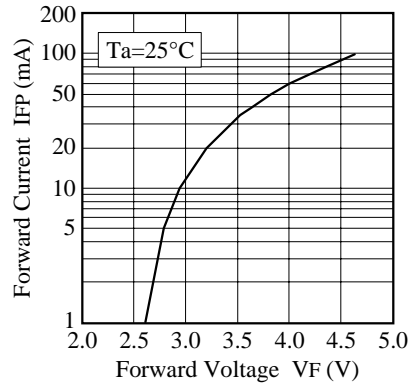
■ Forward Current vs.
   Relative Luminosity

Relative Luminosity (a.u.)

Ta=25°C

Forward Current IFP (mA)

■ Duty Ratio vs.
   Allowable Forward Current

Allowable Forward Current IFP (mA)

Ta=25°C

Duty Ratio (%)
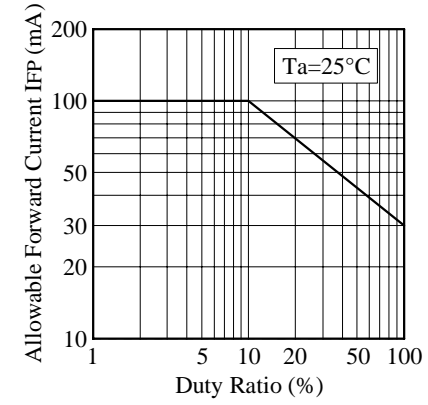
■ Ambient Temperature vs.
   Forward Voltage

Forward Voltage VF (V)

IFP=60mA
IFP=20mA
IFP=5mA

Ambient Temperature Ta (°C)
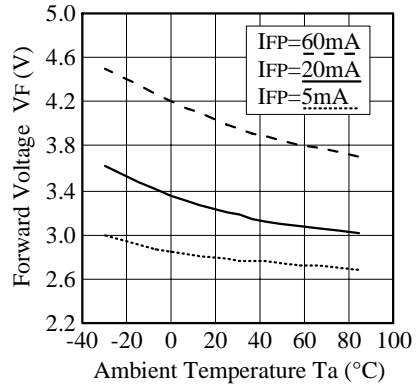
■ Ambient Temperature vs.
   Relative Luminosity

Relative Luminosity (a.u.)

IFP=20mA

Ambient Temperature Ta (°C)
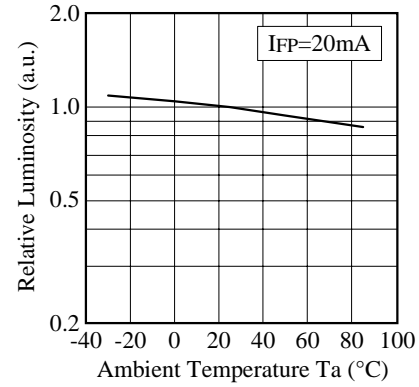
■ Ambient Temperature vs.
   Allowable Forward Current

Allowable Forward Current IF (mA)

Ambient Temperature Ta (°C)
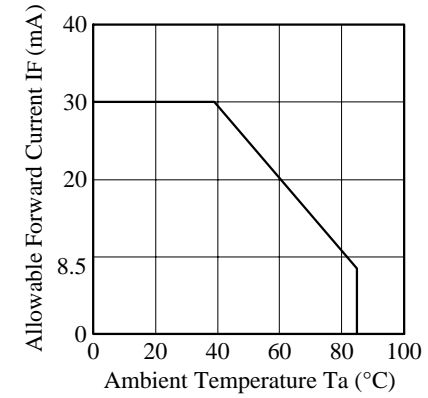
	Model	NSSW105
NICHIA CORPORATION	Title	CHARACTERISTICS
	No.	070705768411

■ Forward Current vs.
Chromaticity Coordinate

Ta=25°C

y

0.34
0.33
0.32
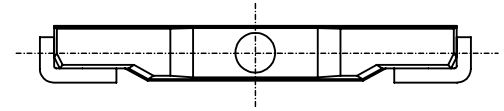0.31
0.30

0.29 0.30 0.31 0.32 0.33
x

1mA
5mA
20mA
50mA
100mA

■ Spectrum

Relative Emission Intensity (a.u.)

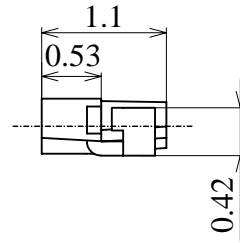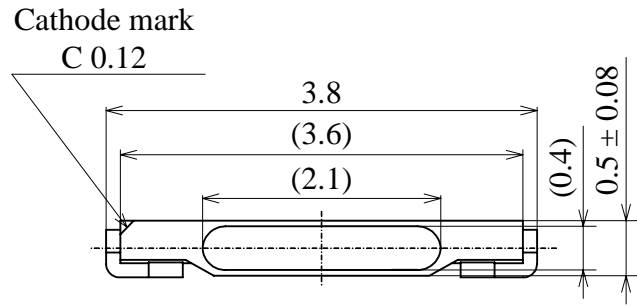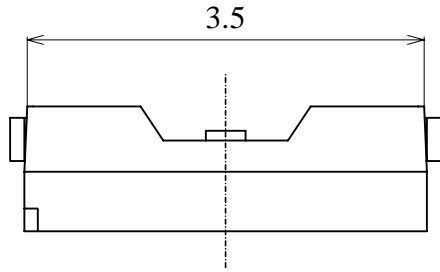1.2
1.0
0.8
0.6
0.4
0.2
0

350 450 550 650 750
Wavelength λ (nm)
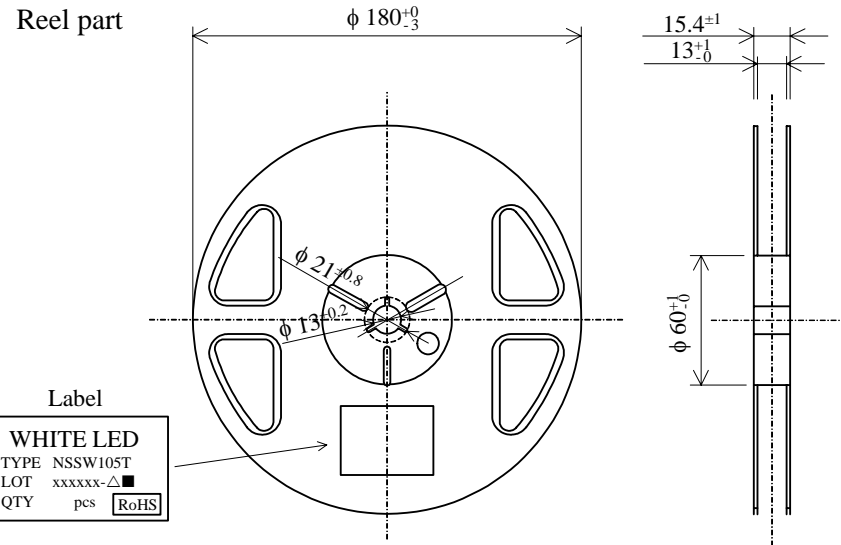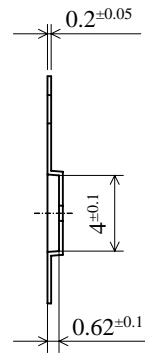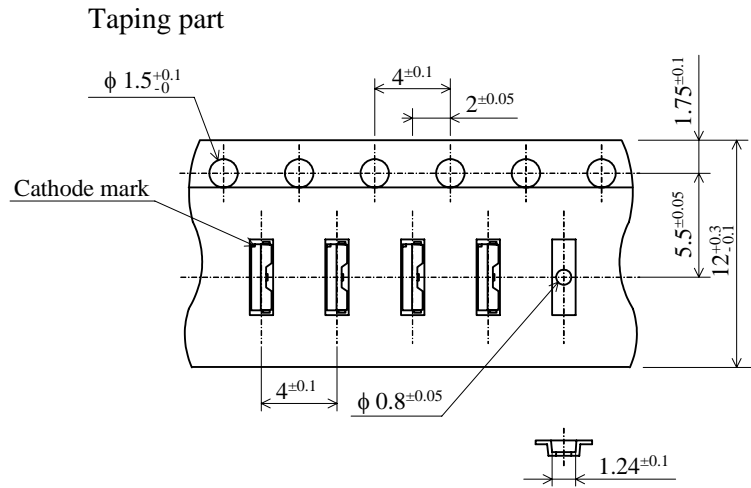
Ta=25°C
IF=20mA
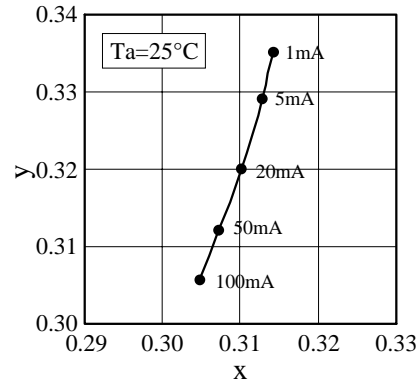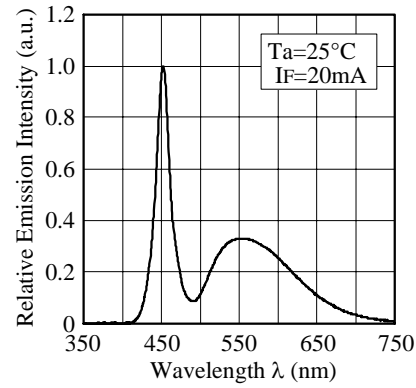
■ Ambient Temperature vs.
Chromaticity Coordinate

IFP=20mA

y

0.34
0.33
0.32
0.31
0.30

0.29 0.30 0.31 0.32 0.33
x

-30°C
0°C
25°C
50°C
85°C

■ Directivity

Relative Luminosity (a.u.)

1.0

0.5

0

90° 60° 30° 0°
Radiation Angle

Ta=25°C
IFP=20mA
—— X-X
······ Y-Y

0° 10° 20° 30° 40° 50° 60° 70° 80° 90°
0.5 1.0

Y
X   X
Y
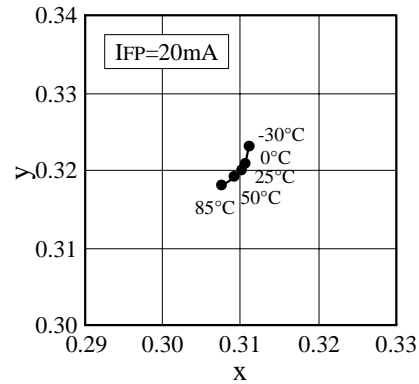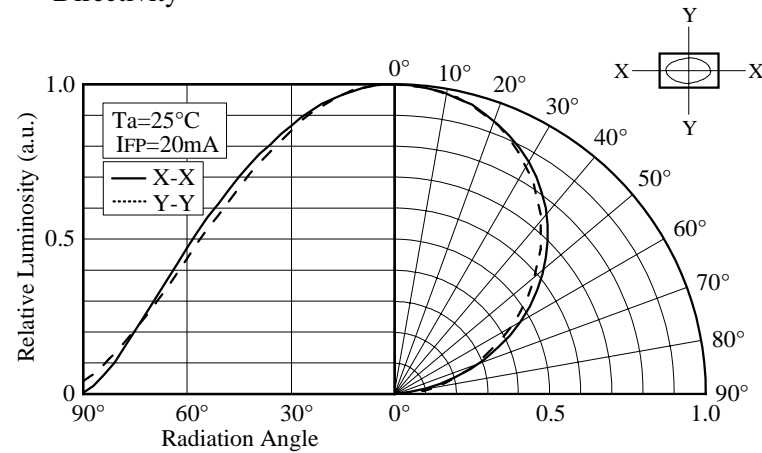
	Model	NSSW105
NICHIA CORPORATION	Title	CHARACTERISTICS
	No.	070705768421

3.5

K ○——— ▶| ———○ A

Cathode mark
C 0.12

3.8
(3.6)
(2.1)

(0.4)
0.5 ± 0.08

1.1
0.53

0.42

Cathode   0.3   Anode

0.72
0.28

(0.6)   0.68   (0.1)

ITEM	MATERIALS
PACKAGE	Heat-Resistant Polymer
ENCAPSULATING RESIN	Silicone Resin (with Diffused + Phosphor)
ELECTRODES	Ag Plating Copper Alloy
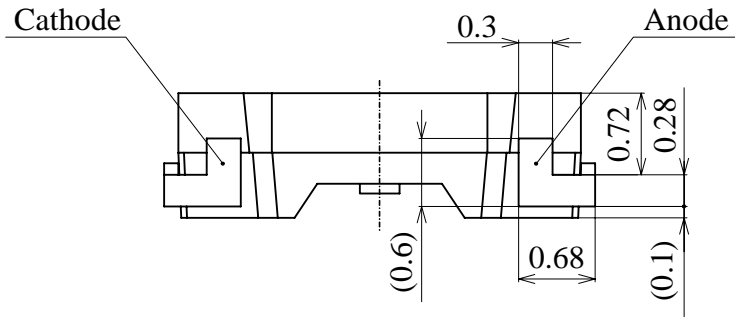
(NOTE) The LED may have flash/flange which exceeds
the tolerance of this print.

NICHIA CORPORATION

Model	NSSW105	Unit mm
Title	OUTLINE DIMENSIONS	15/1 Scale
No.	070705768431	Allow ±0.1

Taping part

$\phi 1.5^{+0.1}_{-0}$

Cathode mark

$4^{\pm0.1}$

$2^{\pm0.05}$

$1.75^{\pm0.1}$

$5.5^{\pm0.05}$

$12^{+0.3}_{-0.1}$

$4^{\pm0.1}$

$\phi 0.8^{\pm0.05}$

$0.2^{\pm0.05}$

$4^{\pm0.1}$

$0.62^{\pm0.1}$

$1.24^{\pm0.1}$

Reel part

$\phi 180^{+0}_{-3}$

$15.4^{\pm1}$

13^{+1}_{-0}

$\phi 21^{+0}_{-0.8}$

$\phi 13^{+0.5}_{-0.2}$

$\phi 60^{+1}_{-0}$

Label

WHITE LED
TYPE NSSW105T
LOT xxxxxx-△■
QTY pcs RoHS

Reel end of tape

No LEDs

LEDs mounting part

No LEDs

Pull direction

Top cover tape

Embossed carrier tape

Reel Lead Min.160mm (No LEDs)

Reel Lead Min.100mm (No LEDs)
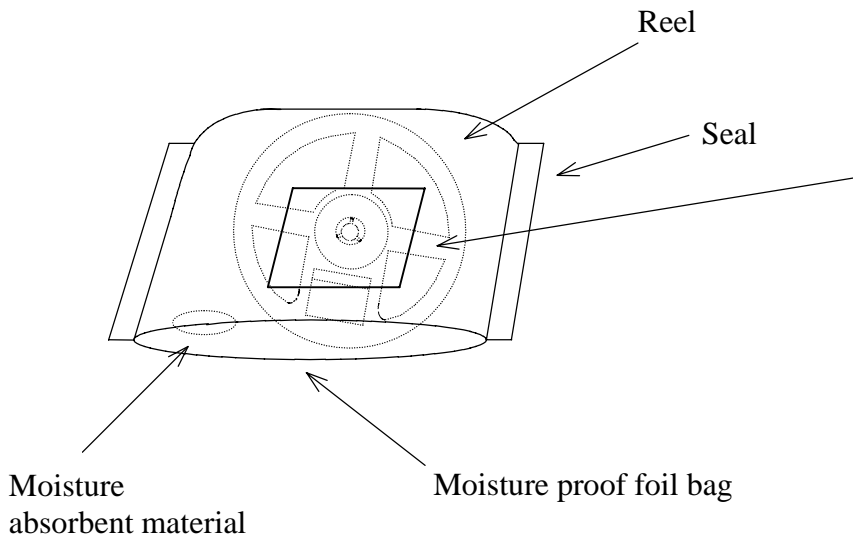
Reel Lead Min.400mm

5,000pcs/Reel
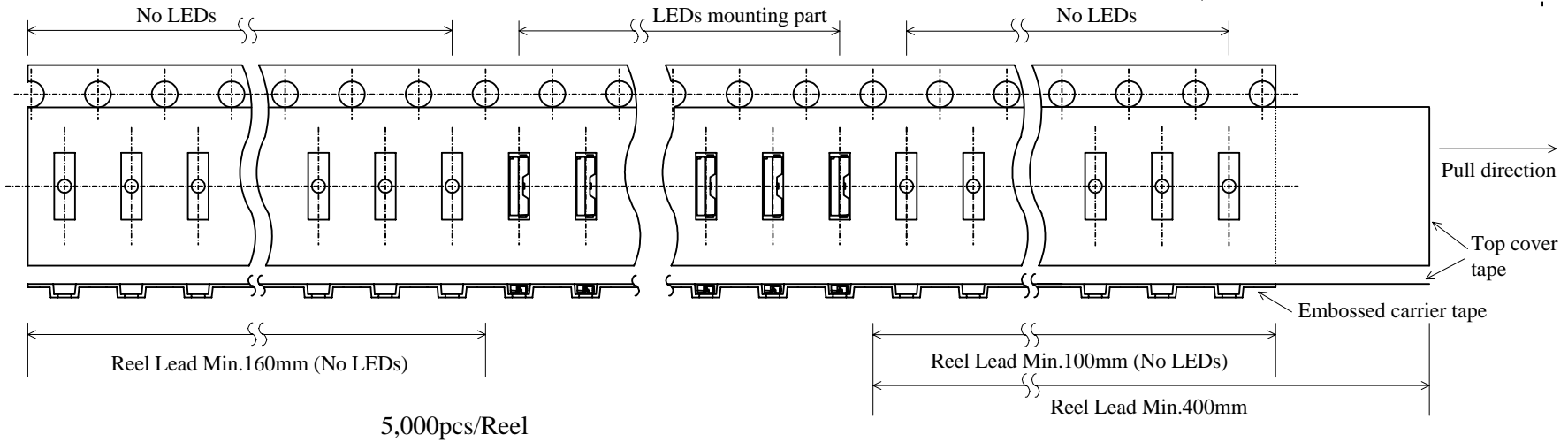
Taping is based on the **JIS C 0806** : Packaging of Electronic
Components on Continuous Tapes.

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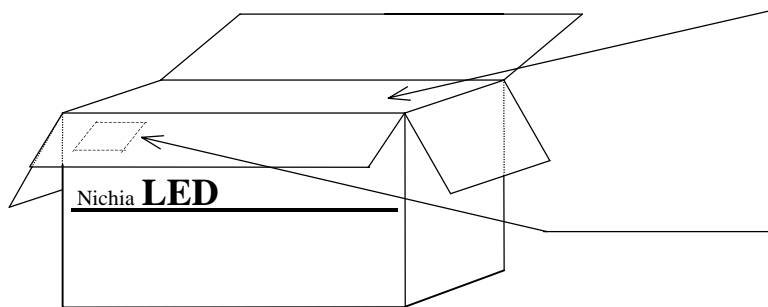| Model | NSSW105T | Unit mm |
Title	TAPING DIMENSIONS	
		Scale
No.	070705768441	Allow

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

Reel

Seal

Label

Ⓧ NICHIA

WHITE LED

TYPE	NSSW105T
LOT	xxxxxx-△■ RoHS
QTY	PCS

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Moisture
absorbent material

Moisture proof foil bag
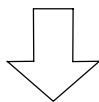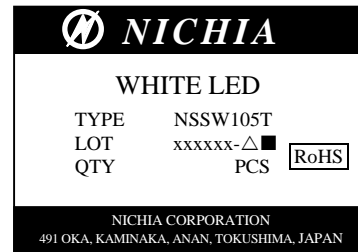
The box is partitioned with the
cardboard.

Label

Ⓧ NICHIA

WHITE LED

TYPE	NSSW105T
RANK	△■ RoHS
QTY	PCS

NICHIA CORPORATION
491 OKA, KAMINAKA, ANAN, TOKUSHIMA, JAPAN

Nichia **LED**

Packing unit

	Reel/bag	Quantity/bag (pcs)
Moisture proof foil bag	1reel	5,000 MAX.

Cardboard box	Dimensions (mm)	Reel/box	Quantity/box (pcs)
Cardboard box S	291×237×120×8t	5reel MAX.	25,000 MAX.
Cardboard box M	259×247×243×5t	10reel MAX.	50,000 MAX.
Cardboard box L	444×262×259×8t	20reel MAX.	100,000 MAX.

NICHIA CORPORATION	Model	NSSW105T
	Title	PACKING
	No.	070705768451