PRELIMINARY SPECIFICATIONS SUBJECT TO CHANGE

NJU7725x / NJU7726x
High-Speed, Rail-to-Rail Input, CMOS Comparator

FEATURES

(V^+ = 5V, Typical value, Ta = 25°C)

- Propagation Delay (T_{PLH} / T_{PHL})
  - NJU7725x 42ns / 35ns
  - NJU7726x 125ns / 32ns
- Rail-to-Rail Common-Mode Input Voltage Range
  0.2V beyond Supply Rails
- Dynamic Transient Stabilizer ™
  - Rail-to-Rail Input with less propagation delay fluctuation
- Push-Pull Output (NJU7725x)
- Open-Drain Output (NJU7726x)
- Output Drive Current
  -Sink (V_O = 1V) 40mA
  -Source (V_O = 4V, NJU7725x) 37mA
- Supply Current 140µA/ch
- Supply Voltage 2.7V to 5.5V
- Operating Temperature -40°C to 125°C
- Lead-less Small Package
  DFN6-G1 (ESON6-G1) (1.6 x 1.6 mm)
  DFN8-U1 (ESON8-U1) (2.0 x 2.0 mm)
- Standard Small Package
  SOT-23-5, SC-88A
  MSOP8 (VSP8)

APPLICATIONS

- Protection circuit for overvoltage detection, overcurrent detection, overheat detection, etc.
- Window comparators
- LED drivers
- Relay drivers
- Electronic and electrical equipment in general
- Voltage Level Translators

DESCRIPTION

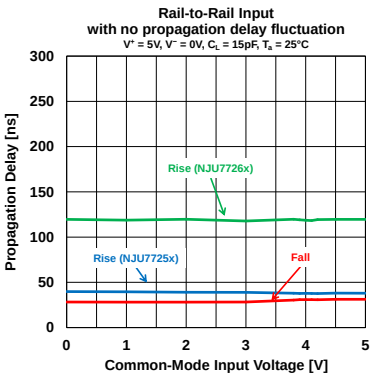
The NJU7725x, NJU7726x series are Rail-to-Rail Input CMOS comparators featuring High-Speed. These comparators operate from 2.7V to 5.5V and low supply current of 140µA/ch. typ. This feature is suitable for battery powered application.

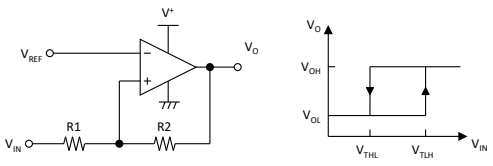
NJU7725x, NJU7726x series features the newly developed circuit technology Dynamic Transient Stabilizer ™ realizes full swing input with suppressed fluctuation of propagation delay time.

In addition, the common mode input voltage range that exceeds the power supply voltage range is specified, and voltage detection near the power supply voltage is supported.

NJU7725x, NJU7726x series are available in ultra-small, leadless package measuring 1.6 mm x 1.6 mm (DFN6-G1) and 2.0 mm x 2.0 mm (DFN8-U1), and industrial standard leaded packages SOT-23-5, SC-88A, and MSOP8 (VSP8).

Dynamic Transient Stabilizer ™ It is a circuit technology that suppresses fluctuations in propagation delay time even if the reference voltage for voltage detection fluctuates.





$$V_{TLH} = \frac{R1+R2}{R2} V_{REF} - \frac{R1}{R2} V_{OL}$$

$$V_{THL} = \frac{R1+R2}{R2} V_{REF} - \frac{R1}{R2} V_{OH}$$

Noninverting Comparator with Hysteresis

■ PRODUCT NAME INFORMATION

NJU772XX a (bbb)

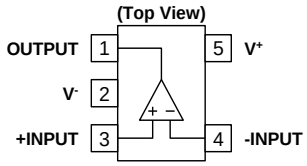
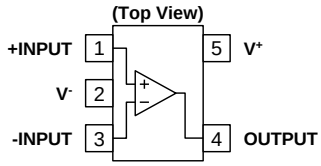
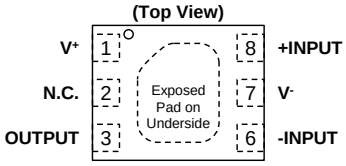
Description of configuration

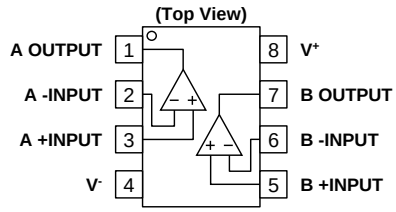
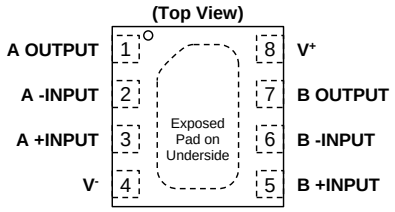
Suffix	Item	Description
a	Package code	Indicates the package. Refer to the order information.
bbb	Packing	Refer to the packing specifications.

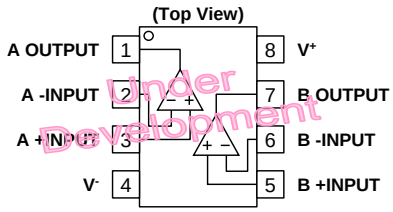
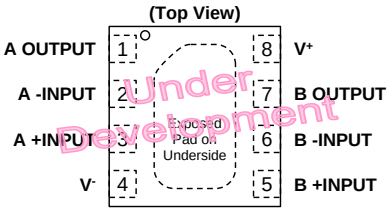
■ ORDER INFORMATION

Product Name (Insert direction)	Package	RoHS	Halogen-Free	Terminal Finish	Marking	Weight (mg)	MOQ (pcs)
NJU77250F (TE1)	SOT-23-5	Yes	Yes	Sn2Bi	1S	15	3000
NJU77250F3 (TE1)	SC-88A	Yes	Yes	Sn2Bi	F5	7.5	3000
NJU77251F (TE1)	SOT-23-5	Yes	Yes	Sn2Bi	1U	15	3000
NJU77251F3 (TE1)	SC-88A	Yes	Yes	Sn2Bi	F6	7.5	3000
NJU77251KG1 (TE3)	DFN6-G1 (ESON6-G1)	Yes	Yes	Sn2Bi	77251	3.5	3000
NJU77260F (TE1)	SOT-23-5	Yes	Yes	Sn2Bi	1V	15	3000
NJU77260F3 (TE1)	SC-88A	Yes	Yes	Sn2Bi	F7	7.5	3000
NJU77261F (TE1)	SOT-23-5	Yes	Yes	Sn2Bi	1W	15	3000
NJU77261F3 (TE1)	SC-88A	Yes	Yes	Sn2Bi	F8	7.5	3000
NJU77261KG1 (TE3)	DFN6-G1 (ESON6-G1)	Yes	Yes	Sn2Bi	77261	3.5	3000
NJU77252R (TE1)	MSOP8 (VSP8)	Yes	Yes	Sn2Bi	77252	21	2000
NJU77252KU1 (TE3)	DFN8-U1 (ESON8-U1)	Yes	Yes	Sn2Bi	77252	5.3	3000
NJU77262R (TE1)	MSOP8 (VSP8)	Yes	Yes	Sn2Bi	77262	21	2000
NJU77262KU1 (TE3)	DFN8-U1 (ESON8-U1)	Yes	Yes	Sn2Bi	77262	5.3	3000

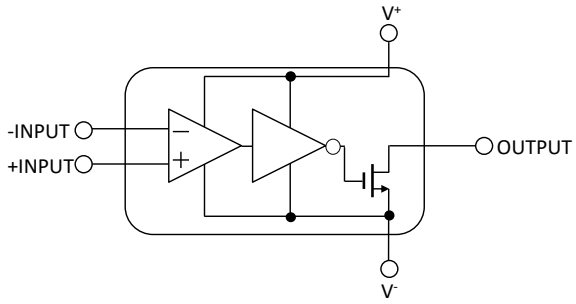
■ PIN DESCRIPTIONS

Product Name	NJU77250F NJU77260F	NJU77250F3 NJU77260F3	NJU77251F NJU77261F	NJU77251F3 NJU77261F3	NJU77251KG1 NJU77261KG1
Package	SOT-23-5	SC-88A	SOT-23-5	SC-88A	DFN6-G1 (ESON6-G1)
Pin Functions					 *Connect to exposed pad to V⁻

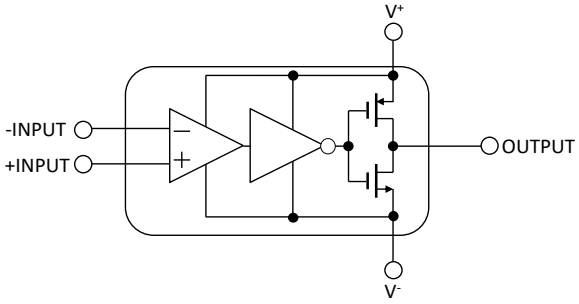
Product Name	NJU77252R	NJU77252KU1
Package	MSOP8 (VSP8)	DFN8-U1 (ESON8-U1)
Pin Functions		 *Connect to exposed pad to V⁻

Product Name	NJU77262R	NJU77262KU1(U.D.)
Package	MSOP8 (VSP8)	DFN8-U1 (ESON8-U1)
Pin Functions		 *Connect to exposed pad to V⁻

■ BLOCK DIAGRAM



Open-Drain Output



Push-Pull Output

■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Unit
Supply Voltage	$V^+ - V^-$	7	V
Input Voltage (*1)	V_{IN}	$V^- - 0.3$ to $V^+ + 0.3$	V
Input Current (*1)	I_{IN}	±10	mA
Differential Input Voltage (*2)	V_{ID}	±7	V
Output Terminal Input Voltage (*3)	V_O	$V^- - 0.3$ to $V^+ + 0.3$*3	V
		$V^- - 0.3$ to $V^- + 7$*4	
Power Dissipation (Ta = 25°C)		2-Layer / 4-Layer	
SOT-23-5	P_D	480*5 / 650*5	mW
SC-88A		360*5 / 490*5	
DFN6-G1 (ESON6-G1)		330*6 / 1200*6	
MSOP8 (VSP8)		500*5 / 660*5	
DFN8-U1 (ESON8-U1)		450*6 / 1200 *6	
Storage Temperature	T_{stg}	-65 to 150	°C
Junction Temperature	T_j	150	°C

*1 Input voltages outside the supply voltage will be clamped by ESD protection diodes. If the input voltage exceeds the supply voltage, the current must be limited 10 mA or less by using a restriction resistance. Input current inflow is positive and Input current outflow is negative. The input voltage is limited at 7V.
*2 Differential voltage is the voltage difference between +INPUT and −INPUT. The absolute maximum input voltage is limited at 7V.
*3 Rating of NJU7725X series. The output terminal input voltage is limited at 7V.
*4 Rating of NJU7726X series. The output terminal input voltage is limited at 7V.

*5 2-Layer: Mounted on glass epoxy board (76.2 mm × 114.3 mm × 1.6 mm: based on EIA/JEDEC standard, 2-layer FR-4).
4-Layer: Mounted on glass epoxy board (76.2 mm × 114.3 mm × 1.6 mm: based on EIA/JEDEC standard, 4-layer FR-4), internal Cu area: 74.2 mm × 74.2 mm.
*6 2-Layer: Mounted on glass epoxy board (101.5 mm × 114.5 mm × 1.6 mm: based on EIA/JEDEC standard, 2-layer FR-4) with exposed pad.
4-Layer: Mounted on glass epoxy board (101.5 mm × 114.5 mm × 1.6 mm: based on EIA/JEDEC standard, 4-layer FR-4) with exposed pad.
(For 4-layer: Applying 99.5 mm × 99.5 mm inner Cu area and a thermal via hole to a board based on JEDEC standard JESD51-5.)

ABSOLUTE MAXIMUM RATINGS

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause permanent damage and may degrade the lifetime and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

■ THERMAL CHARACTERISTICS

Package	Measurement Result		Unit
	Thermal Resistance (Θja)	Thermal Characterization Parameter (ψjt)	
SOT-23-5	260*7/192*7	67*7 / 58*7	°C/W
SC-88A	347*7/255*7	91*7 / 73*7	
DFN6-G1 (ESON6-G1)	379*8/104 *8	64*8 / 26*8	
MSOP8 (VSP8)	250*7/189*7	62*7 / 53*7	
DFN8-U1 (ESON8-U1)	278*8/104*8	42*8 / 25*8	

Θja :Junction-to-Ambient Thermal Resistance
ψjt:Junction-to-Top Thermal Characterization Parameter
*7 2-Layer: Mounted on glass epoxy board (76.2 mm × 114.3 mm × 1.6 mm: based on EIA/JEDEC standard, 2-layer FR-4).
4-Layer: Mounted on glass epoxy board (76.2 mm × 114.3 mm × 1.6 mm: based on EIA/JEDEC standard, 4-layer FR-4), internal Cu area: 74.2 mm × 74.2 mm.
*8 2-Layer: Mounted on glass epoxy board (101.5 mm × 114.5 mm × 1.6 mm: based on EIA/JEDEC standard, 2-layer FR-4) with exposed pad.
4-Layer: Mounted on glass epoxy board (101.5 mm × 114.5 mm × 1.6 mm: based on EIA/JEDEC standard, 4-layer FR-4) with exposed pad.
(For 4-layer: Applying 99.5 mm × 99.5 mm inner Cu area and a thermal via hole to a board based on JEDEC standard JESD51-5.)

■ ELECTROSTATIC DISCHARGE (ESD) PROTECTION VOLTAGE

Parameter	Conditions	Protection Voltage
HBM	C = 100 pF, R = 1.5 kΩ	±1000 V
CDM	Direct CDM	±1000 V

ELECTROSTATIC DISCHARGE RATINGS
The electrostatic discharge test is done based on JEITA ED-4701. In the HBM method, ESD is applied using the power supply pin and GND pin as reference pins.

■ RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Conditions	Rating	Unit
Supply Voltage	$V^+ - V^-$		2.7 to 5.5	V
Input Voltage	V_{IN}		$V^- - 0.2$ to $V^+ + 0.2$ (MAX 5.5)	V
Output Terminal Input Voltage	V_O	NJU7726x	$V^- - 0.2$ to $V^- + 5.5$	V
Operating Temperature	T_{opr}		-40 to 125	°C

RECOMMENDED OPERATING CONDITIONS
All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

■ ELECTRICAL CHARACTERISTICS

V^+ = 5V, V^- = 0V, R_L = Open , T_a = 25°C, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS[*1]						
Input Offset Voltage	V_{IO}	V_{COM} = -0.2V	-	1	7	mV
		V_{COM} = 5.2V	-	1	9	mV
Input Bias Current	I_B		-	1	-	pA
Input Offset Current	I_{IO}		-	1	-	pA
Common-Mode Input Voltage Range	V_{ICM}	CMR ≥ 55dB	-0.2	-	5.2	V
Common-Mode Rejection Ratio	CMR	V_{ICM} = -0.2V to 5.2V	55	70	-	dB
OUTPUT CHARACTERISTICS						
High-level Output Voltage (NJU7725x)	V_{OH}	I_{SOURCE} = 4mA	4.8	4.9	-	V
Low-level Output Voltage	V_{OL}	I_{SINK} = 4mA	-	0.1	0.2	V
Output Leakage Current (NJU7726x)	I_{LEAK}	V_O = 5V	-	1	700	nA
Output Short-Circuit Current (NJU7725x)	I_{SC}	I_{SOURCE}, V_O = 0V	-	85	-	mA
Output Short-Circuit Current	I_{SC}	I_{SINK}, V_O = 5V	-	65	-	mA
POWER SUPPLY						
Supply Current per Comparator	I_{SUPPLY}	V_{COM} = -0.2V	-	140	210	µA
		V_{COM} = 5.2V	-	200	300	µA
Supply Voltage Rejection Ratio	SVR	V^+ = 2.7V to 5.5V	60	85	-	dB
Transient Response (R_L = 5.1kΩ, C_L = 15pF, Overdrive = 100mV)						
(NJU7725x)						
Propagation Delay (Low to High)	t_{PLH}		-	42	-	ns
Propagation Delay (High to Low)	t_{PHL}		-	35	-	ns
Rise Time	t_{TLH}		-	4.0	-	ns
Fall Time	t_{THL}		-	3.5	-	ns
(NJU7726x)						
Propagation Delay (Low to High)	t_{PLH}		-	125	-	ns
Propagation Delay (High to Low)	t_{PHL}		-	32	-	ns
Rise Time	t_{TLH}		-	250	-	ns
Fall Time	t_{THL}		-	2	-	ns

[*1] Input offset voltage and drift, Input bias and offset current are positive or negative, its absolute values are listed in electrical characteristics.

■ APPLICATION NOTE

Single and Dual Supply Voltage Operation

Single and Dual Supply Voltage Operation
The NJU7725x, NJU7726x series works with both single supply and dual supply when the voltage supplied is between V^+ and V^-. These comparators operate from single 2.7V to 5.5V supply and dual ±1.35V to ±2.75V supply. The power supply pin should have bypass capacitor (i.e. 0.1µF).

Input Voltage

The NJU7725x, NJU7726x series are Rail-to-Rail input comparators. The common mode input voltage range is V^- − 0.2V to V^+ + 0.2V, and the differential input voltage can be any voltage within supply voltage. No phase inversion of the comparator output occurs when the input range of V^- − 0.2V to V^+ + 0.2V.

Inputs of the NJU7725x, NJU7726x series are protected by ESD diodes (shown in Figure 1) that will conduct if the input voltages exceed the power supplies by more than approximately 300mV. Momentary voltages greater than 300mV beyond the power supply, inputs can be tolerated if the current is limited to 10mA.

Figure 2 is simple accomplished with an input resistor. If the input voltage exceeds the supply voltage, the input current must be limited 10mA or less by using a restriction RLIMIT as shown in figure 2.

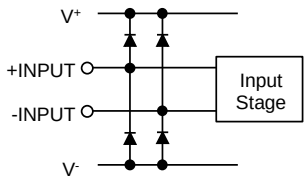


Figure 1. Simplified Schematic

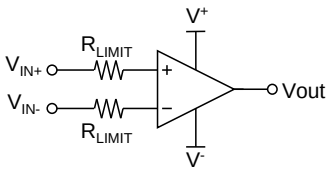


Figure 2. Input Current Protection for Voltages exceeding the Supply Voltage.

Output Voltage

The NJU7725x series features a push-pull output. The output logic level is the same as the supply rail. The circuit can be simplified without the need for an external pull-up resistor.
The NJU7726x series has an open drain output. It can be pulled up to an external power supply up to V^- + 5.5V independent of supply voltage. It can be applied to window comparators and logic level converter.

Dynamic Transient Stabilizer ™

The NJU7725x and NJU7726x series use the new circuit technology Dynamic Transient Stabilizer ™ to realize a rail-to-rail input that suppresses fluctuations in propagation delay.

A general rail-to-rail input comparator operates within the supply rails, but when the input signal level is close to the supply voltage, the propagation delay will decrease and may not be as designed.

Figure 3 compares the NJU7725x and NJU7726x with a conventional rail-to-rail input comparators. Conventional comparators have a delay of 20 ns close to the supply voltage. This change in propagation delay requires a review of the design margin, which increases the design period.

By using the NJU7725x and NJU7726x series with Dynamic Transient Stabilizer ™, stable response can be obtained in any voltage within supply voltage.

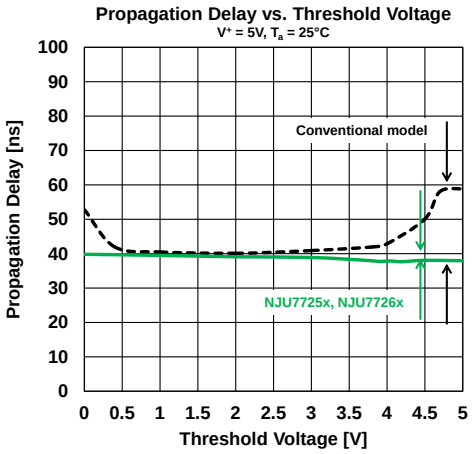
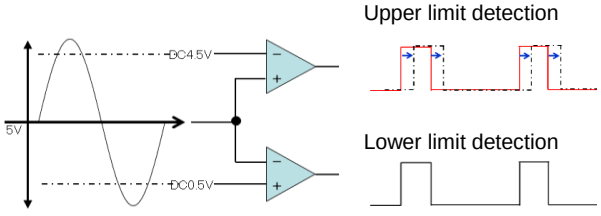


Figure 3. Propagation delay vs. Threshold Voltage

Figure 4 shows a window comparator circuit using the NJU7726x series. Even if the threshold setting is set near the power supply voltage, stable operation can be performed without delay in response time.



In conventional comparators, the upper limit detection was changed.
-> Lower limit detection and upper limit detection are different.

Figure 4. Level detection circuit using window comparator

■ APPLICATION NOTE

Terminating unused comparators

Examples of common methods of terminating an uncommitted comparator are shown in Figure 5. Improper termination can be result increase supply current, heating and noise in comparators.

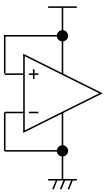


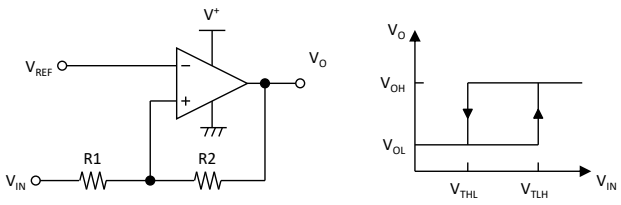
Figure 5. Terminating unused comparators

External Hysteresis

The comparator can change the threshold by using positive feedback. The difference in threshold voltage is called hysteresis, which can improve noise immunity and operation for low-speed signals.

Noninverting Comparator with Hysteresis

Figure 6 shows a hysteresis comparator circuit with two resistors. Assuming that the threshold at which the comparator output is Low-High is V_{TLH} and the threshold at which the comparator output is High-Low is V_{THL}, to achieve the following hysteresis are below.



$$V_{TLH}=\frac{R1+R2}{R2}V_{REF}-\frac{R1}{R2}V_{OL}$$
$$V_{THL}=\frac{R1+R2}{R2}V_{REF}-\frac{R1}{R2}V_{OH}$$

Figure 6. Noninverting Comparator with Hysteresis

Inverting Comparator with Hysteresis

Figure7 shows a hysteresis comparator circuit with three resistors.

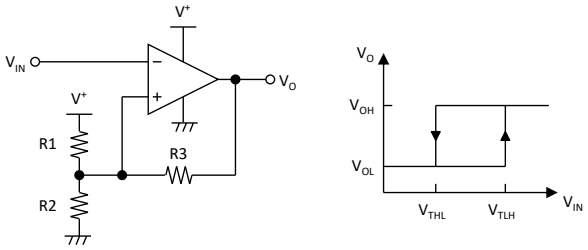
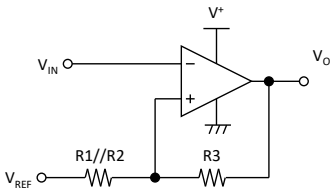


Figure 7. Inverting Comparator with Hysteresis

If R1 and R2 of the circuit in Figure 7 are represented by equivalent resistors, the circuit will be as shown in Figure 8. Since this circuit is the same as the noninverting hysteresis comparator, V_{TLH} and V_{THL} can be calculated by rearranging the equations.



$$R1 /\!/ R2=\frac{R1R2}{R1+R2}$$
$$V_{REF}=\frac{R2}{R1+R2}V^{+}$$

$$V_{TLH}=\frac{R1 /\!/ R2}{R1 /\!/ R2+R3}V_{REF}+\frac{R1 /\!/ R2}{R1 /\!/ R2+R3}V_{OL}$$
$$V_{THL}=\frac{R1 /\!/ R2}{R1 /\!/ R2+R3}V_{REF}+\frac{R1 /\!/ R2}{R1 /\!/ R2+R3}V_{OH}$$

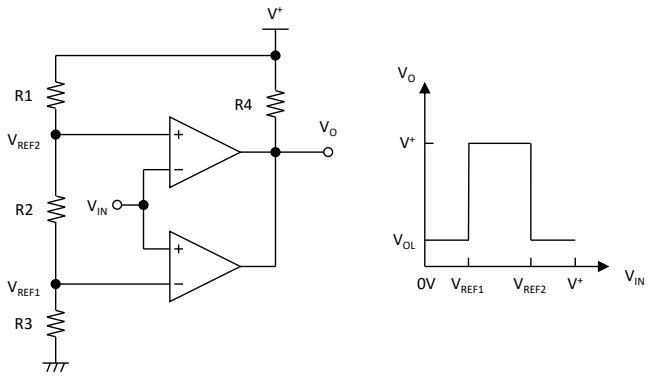
Figure 8. Noninverting hysteresis comparator as equivalent circuits

■ APPLICATION NOTE

Window Comparator

By using the open drain type NJU7726x in parallel, it is achieve to detect whether the signal is between two reference voltages. This circuit is commonly called a window comparator and can be used for monitoring the reference voltage and monitoring abnormal voltages such as signal voltage drop or overvoltage.

Figure 9 shows a simple window comparator circuit. The comparator output V_O is High only when V_{IN} is between V_{REF1} and V_{REF2}, and Low otherwise. If chattering occurs during the output shift period, connect capacitors in parallel with R1 and R3.



$$V_{REF1}=\frac{R3}{R1+R2+R3}V^+$$

$$V_{REF2}=\frac{R2+R3}{R1+R2+R3}V^+$$

Figure 9. Window Comparator with NJU7726x

Example)
Assuming V^+ = 3.3V, R1 = R2 = R3 = 1MΩ, R4 = 10kΩ, the thresholds from the formula in Figure 9 are V_{REF1} = 1.1V, V_{REF2} = 2.2V.
V_O is Low when V_{IN} < 1.1V or V_{IN} > 2.2V, and V_O is High when V_{IN} is between1.1V and 2.2V (Figure 10).

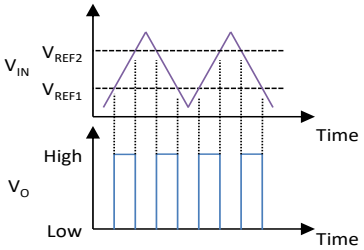


Figure 10. Window comparator output results

Square Wave Oscillator

Figure 11 shows a simple square wave oscillator circuit. It can be used to digital circuits such as microcomputers, oscillation circuits, timing waveforms, and driver circuits for electronic buzzers.

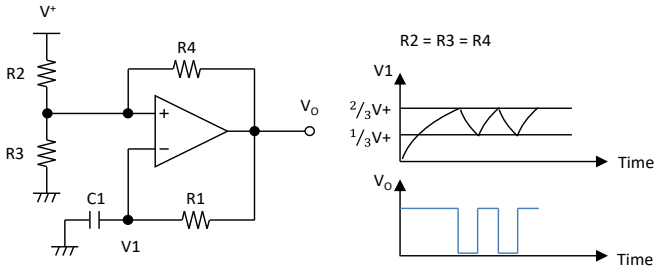


Figure 11. Square Wave Oscillator

When R2 = R3, the oscillator circuit has 50% duty, and the oscillation frequency is as follows.

$$f=\frac{1}{2R1C1\ln\left(1+\frac{R4}{R3}\right)}\ [Hz]$$
$$R2=R3$$

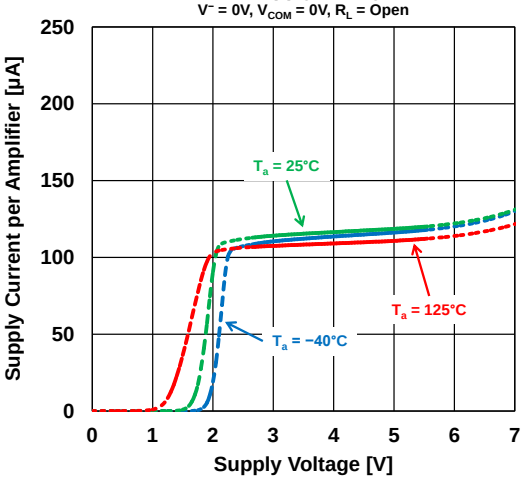
R4 sets the threshold of the comparator that switches between charging and discharging to C1. If R2 = R3 = R4, the oscillation frequency is as follows.

$$f=\frac{1}{2R1C1\ln 2}\ [Hz]$$
$$R2=R3=R4$$

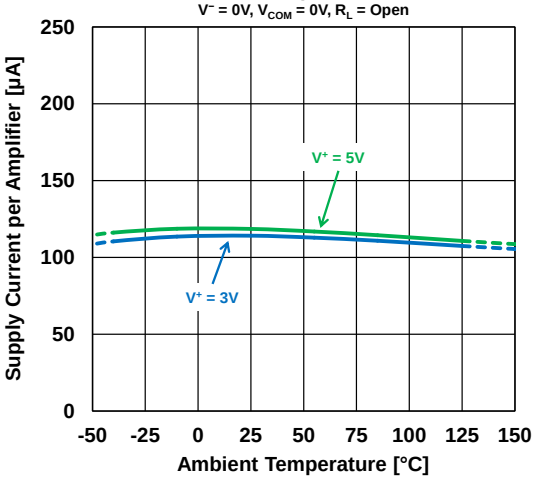
■ TYPICAL CHARACTERISTICS

Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

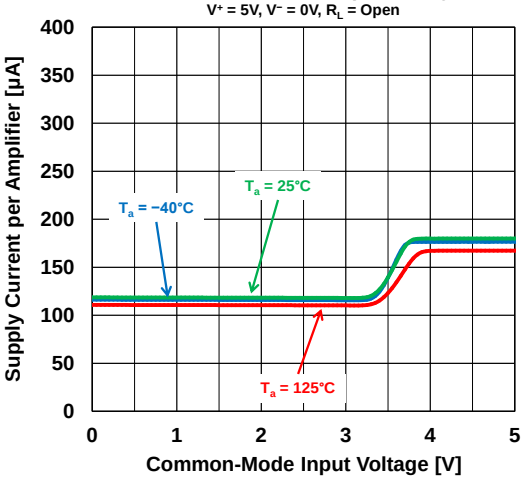
Supply Current per Amplifier vs. Supply Voltage
V^- = 0V, V_{COM} = 0V, R_L = Open



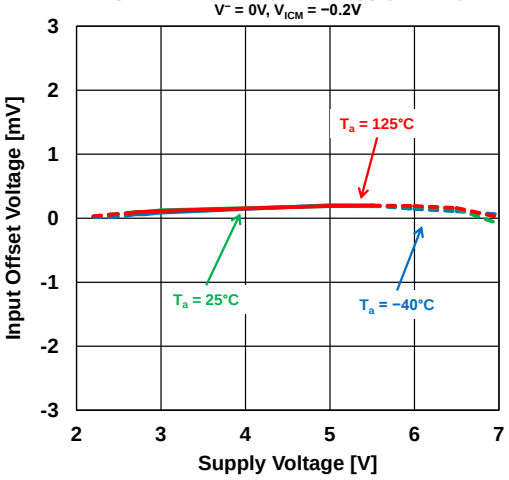
Supply Current per Amplifier vs. Temperature
V^- = 0V, V_{COM} = 0V, R_L = Open



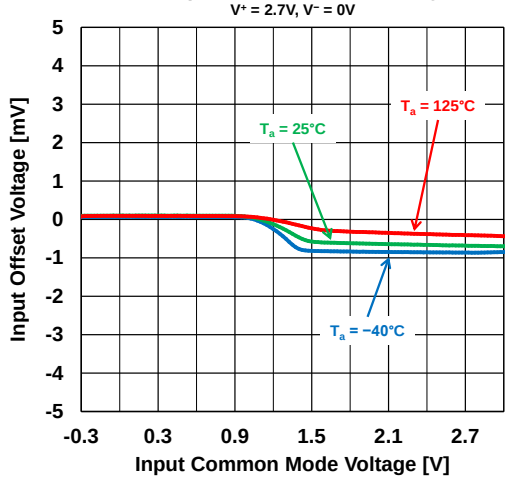
Supply Current per Amplifier vs. Common-Mode Input Voltage
V^+ = 5V, V^- = 0V, R_L = Open



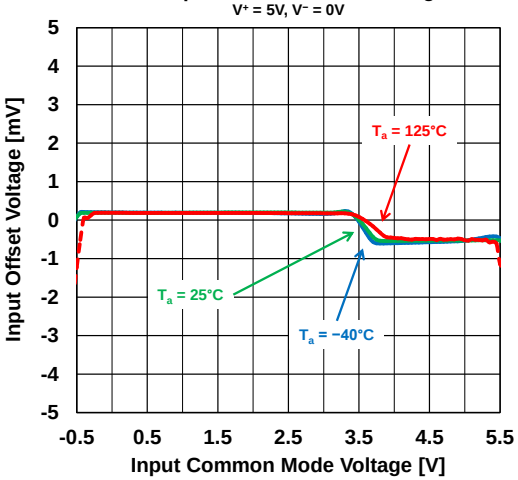
Input Offset Voltage vs. Supply Voltage
V^- = 0V, V_{ICM} = −0.2V



Input Offset Voltage vs. Input Common Mode Voltage
V^+ = 2.7V, V^- = 0V



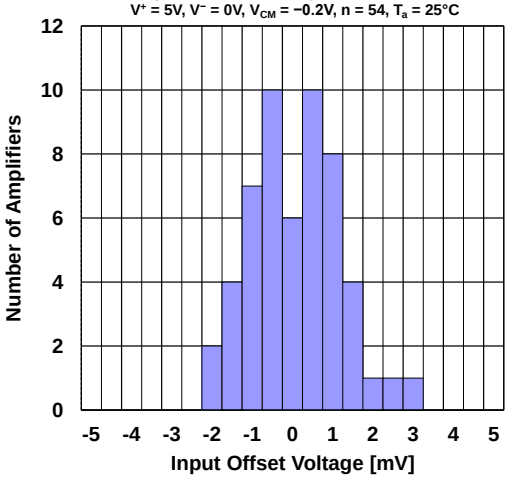
Input Offset Voltage vs. Input Common Mode Voltage
V^+ = 5V, V^- = 0V



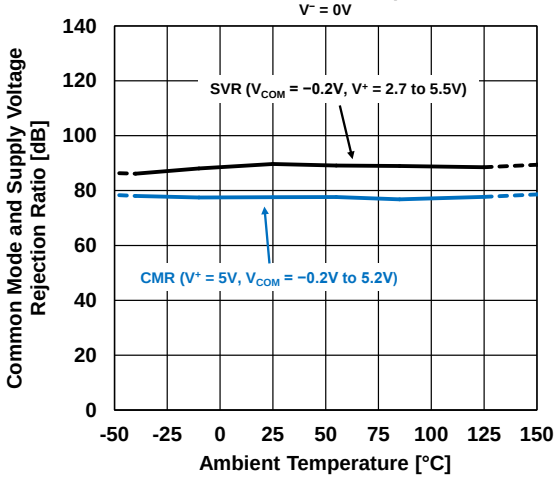
■ TYPICAL CHARACTERISTICS

Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

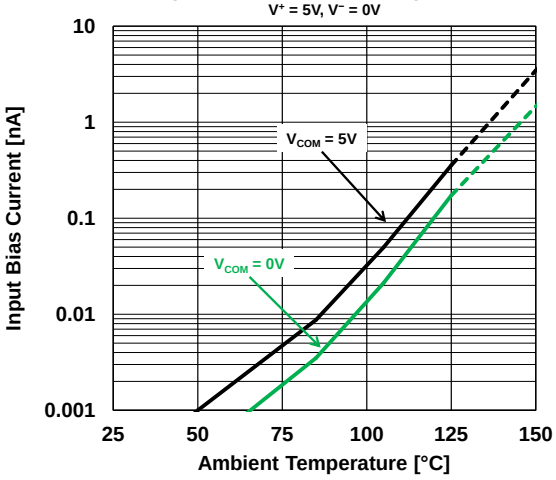
Input Offset Voltage Distribution
V^+ = 5V, V^- = 0V, V_{CM} = −0.2V, n = 54, T_a = 25°C



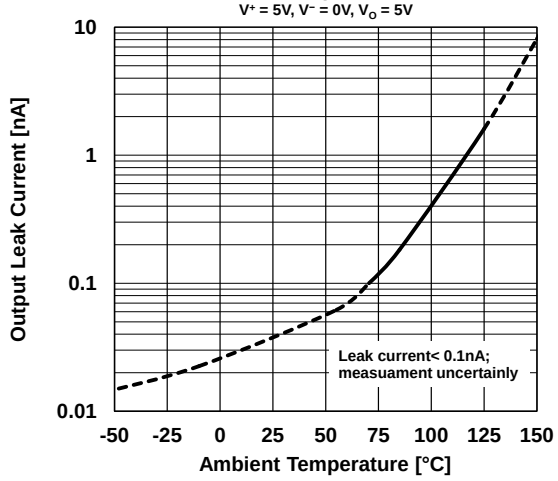
CMR and SVR vs. Temperature
V^- = 0V



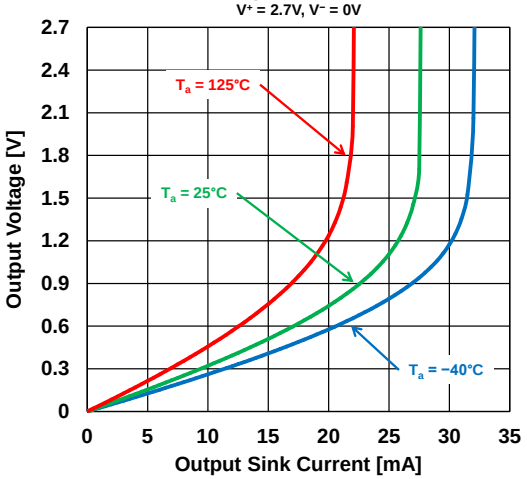
Input Bias Current vs. Temperature
V^+ = 5V, V^- = 0V



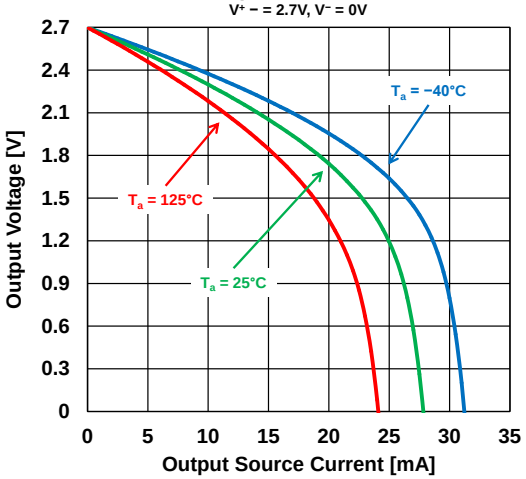
NJU7726x Output Leak Current vs. Temperature
V^+ = 5V, V^- = 0V, V_O = 5V



Low-level Output Voltage vs. Output Sink Current
V^+ = 2.7V, V^- = 0V



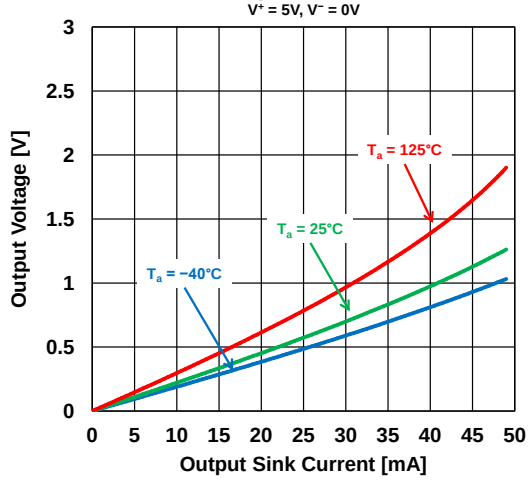
NJU7725x High-level Output Voltage vs. Output Source Current
V^+ − = 2.7V, V^- = 0V



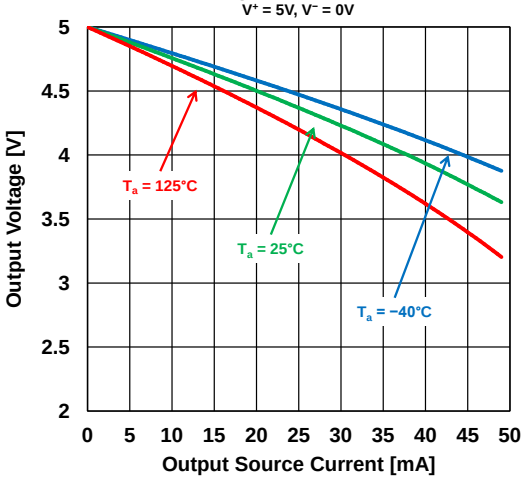
■ TYPICAL CHARACTERISTICS

Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

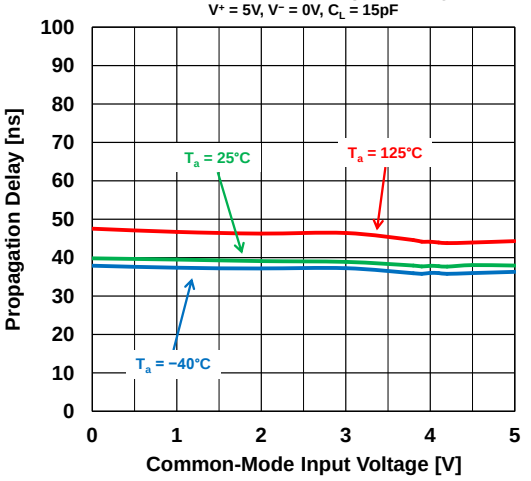
Low-level Output Voltage vs. Output Sink Current
V^+ = 5V, V^- = 0V



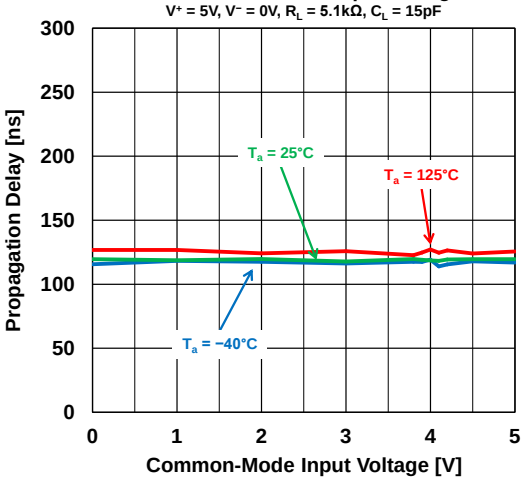
NJU7725x High-level Output Voltage vs. Output Source Current
V^+ = 5V, V^- = 0V



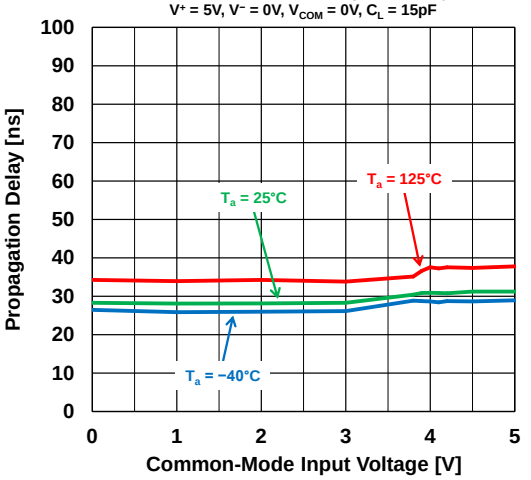
NJU7725x Propagation Delay (Low to High) vs. Common-Mode Input Voltage
V^+ = 5V, V^- = 0V, C_L = 15pF



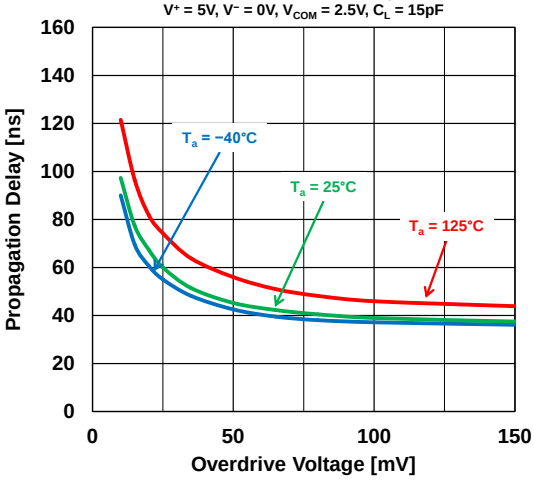
NJU7726x Propagation Delay (Low to High) vs. Common-Mode Input Voltage
V^+ = 5V, V^- = 0V, R_L = 5.1kΩ, C_L = 15pF



Propagation Delay (High to Low) vs. Common-Mode Input Voltage
V^+ = 5V, V^- = 0V, V_{COM} = 0V, C_L = 15pF



NJU7725x Propagation Delay (Low to High) vs. Overdrive Voltage
V^+ = 5V, V^- = 0V, V_{COM} = 2.5V, C_L = 15pF

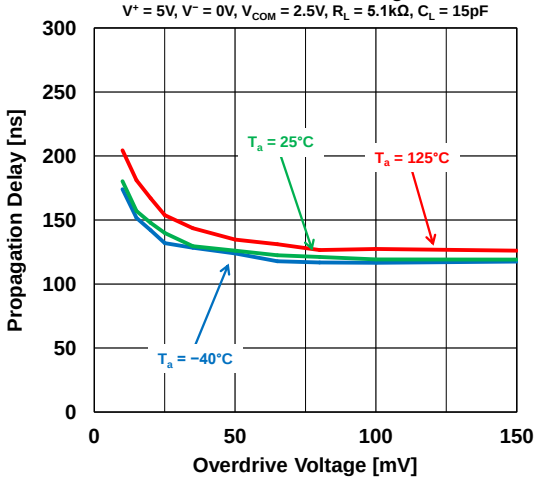


■ TYPICAL CHARACTERISTICS

Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

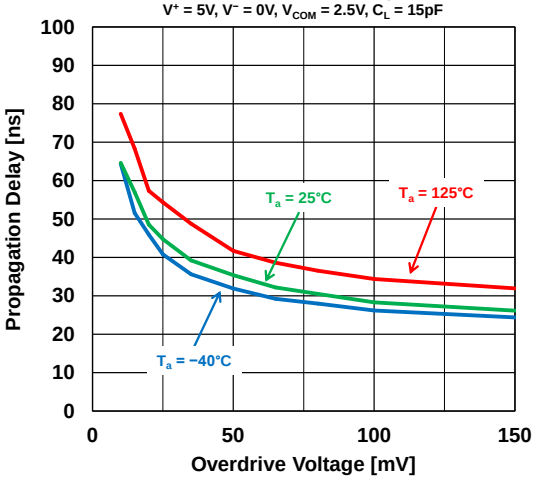
NJU7726x Propagation Delay (Low to High) vs. Overedrive Voltage

V^+ = 5V, V^- = 0V, V_{COM} = 2.5V, R_L = 5.1kΩ, C_L = 15pF



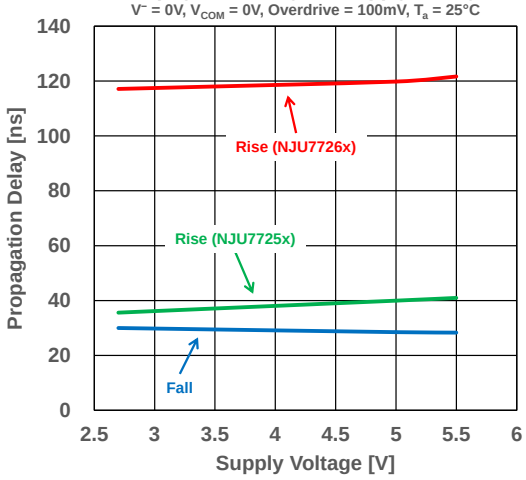
Propagation Delay (High to Low) vs. Overdrive Voltage

V^+ = 5V, V^- = 0V, V_{COM} = 2.5V, C_L = 15pF



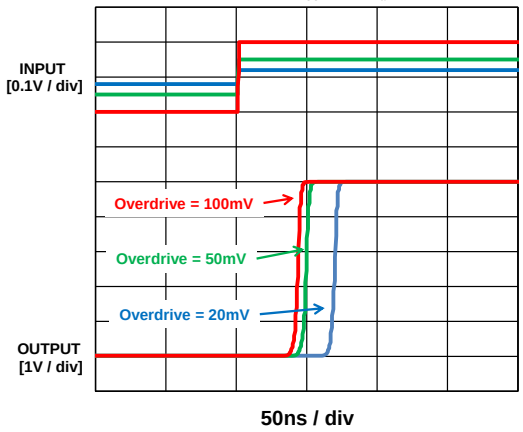
Propagation Delay vs. Supply Voltage

V^- = 0V, V_{COM} = 0V, Overdrive = 100mV, T_a = 25°C



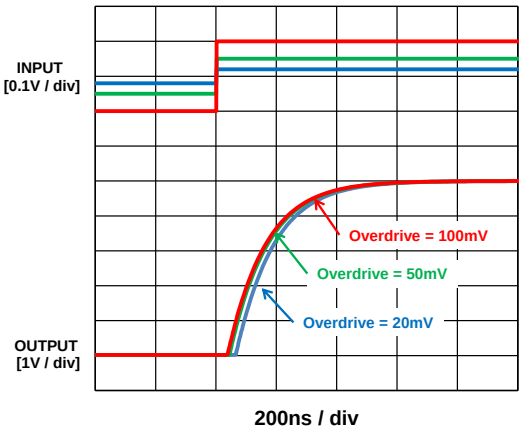
NJU7725x Transient Response (Low to High)

V^+ = 5V, V^- = 0V, V_{COM} = 0V, T_a = 25°C



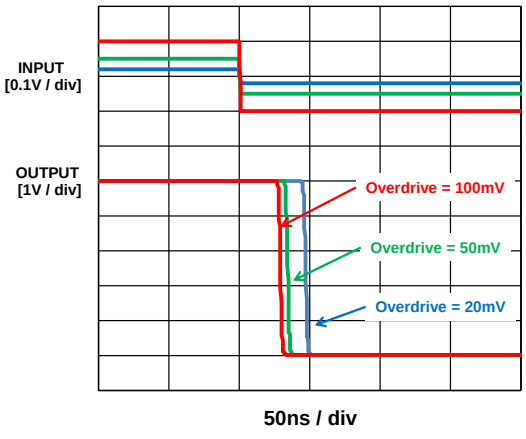
NJU7726x Transient Response (Low to High)

V^+ = 5V, V^- = 0V, V_{COM} = 0V, R_L = 5.1kΩ, T_a = 25°C



Transient Response (High to Low)

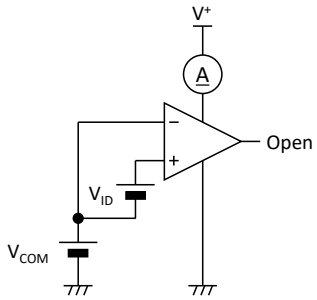
V^+ = 5V, V^- = 0V, V_{COM} = 0V, T_a = 25°C



■ TEST CIRCUITS

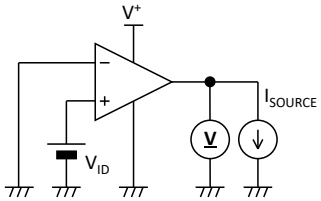
● I_{SUPPLY}

V_{ID} = 100mV



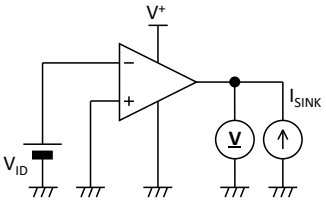
● V_{OH}

V_{ID} = 100mV



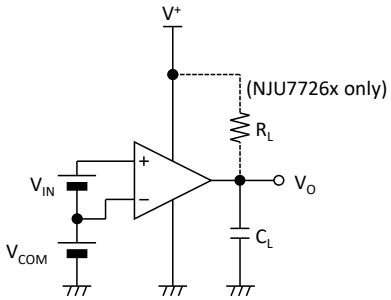
● V_{OL}

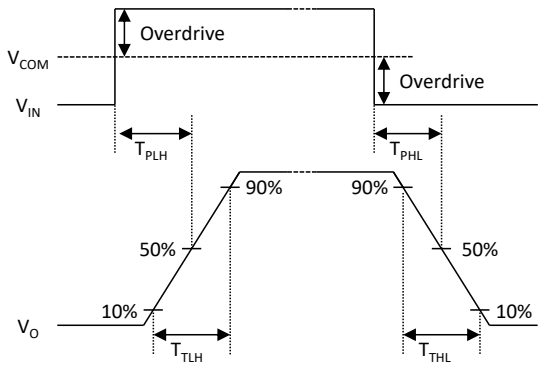
V_{ID} = 100mV



● Propagation Delay

R_L = 5.1kΩ, V_{COM} = 0V, V^+





■ REVISION HISTORY

Date	Revision	changes
August 31, 2020	Ver.0.0	Initial Release
August 19, 2021	Ver.0.1	Added NJU7726x series Added Application Note.
September 22, 2021	Ver.0.2	Updated Descriptions.
June 30, 2022	Ver.0.3	Updated Format Development status update

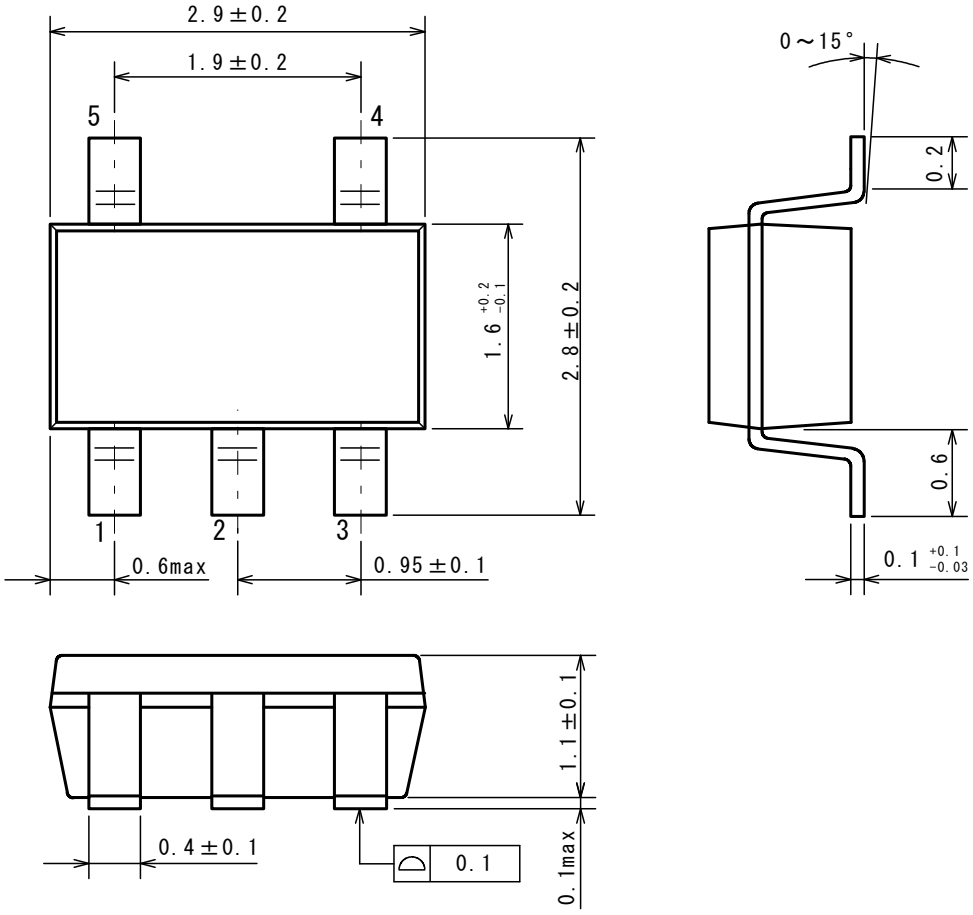
Nisshinbo Micro Devices Inc.

SOT-23-5

PI-SOT-23-5-E-A

■ PACKAGE DIMENSIONS

UNIT: mm



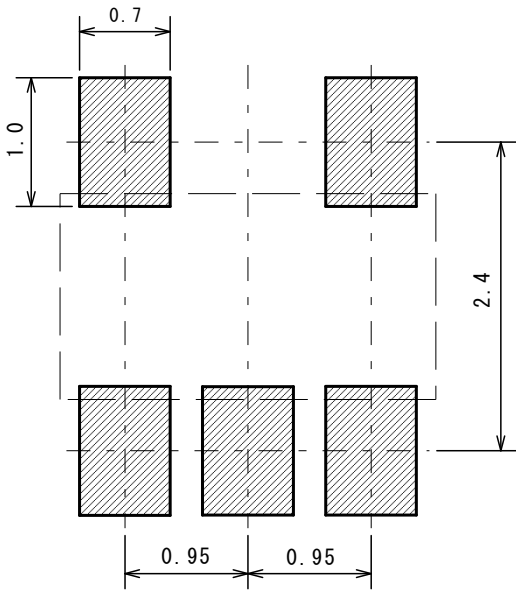
Nisshinbo Micro Devices Inc.

SOT-23-5

PI-SOT-23-5-E-A

■ EXAMPLE OF SOLDER PADS DIMENSIONS

UNIT: mm



Nisshinbo Micro Devices Inc.

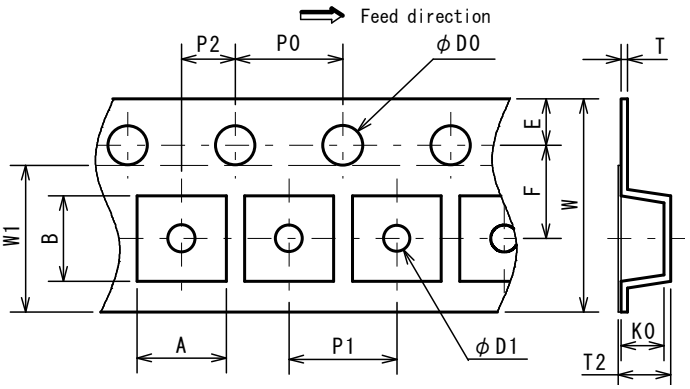
SOT-23-5

PI-SOT-23-5-E-A

■ PACKING SPEC

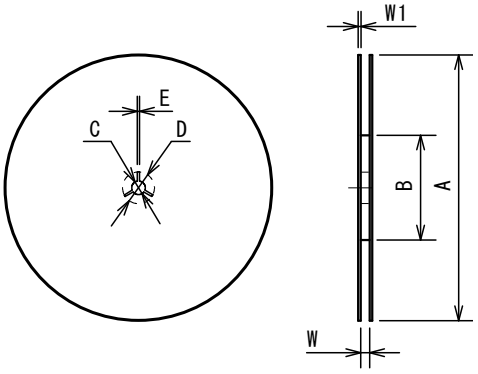
UNIT: mm

TAPING DIMENSIONS



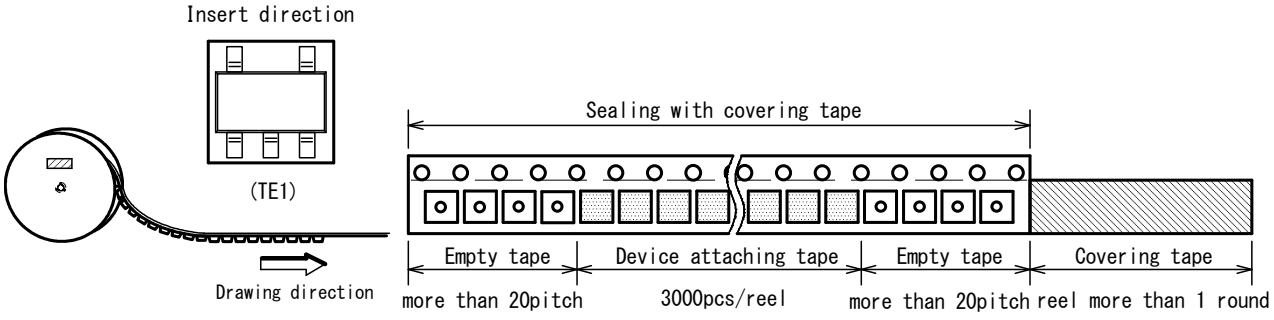
SYMBOL	DIMENSION	REMARKS
A	3.3±0.1	BOTTOM DIMENSION
B	3.2±0.1	BOTTOM DIMENSION
D0	1.55	
D1	1.05	
E	1.75±0.1	
F	3.5±0.05	
P0	4.0±0.1	
P1	4.0±0.1	
P2	2.0±0.05	
T	0.25±0.05	
T2	1.82	
K0	1.5±0.1	
W	8.0±0.3	
W1	5.5	THICKNESS 0.1MAX

REEL DIMENSIONS

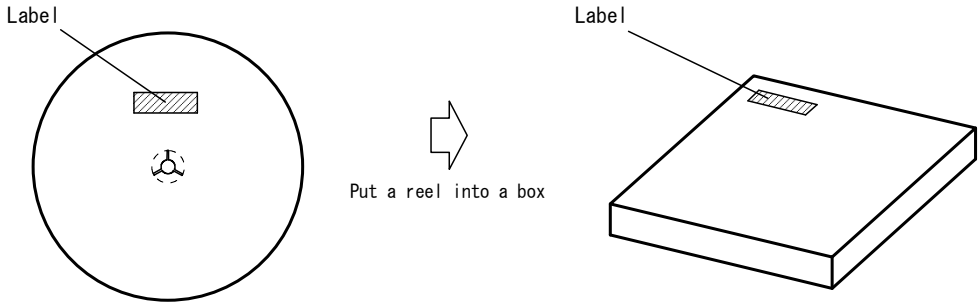


SYMBOL	DIMENSION
A	φ180±1
B	φ 60±1
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	9±0.5
W1	1.2±0.2

TAPING STATE



PACKING STATE



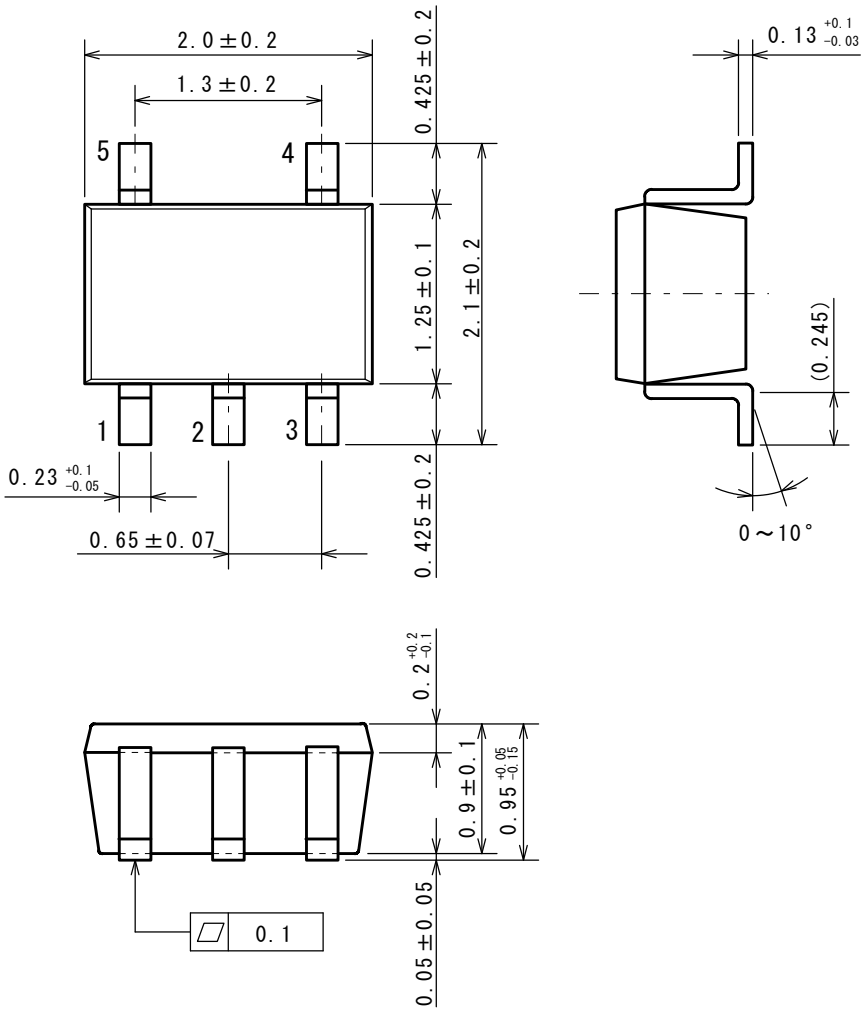
Nisshinbo Micro Devices Inc.

SC-88A

PI-SC-88A-E-A

■ PACKAGE DIMENSIONS

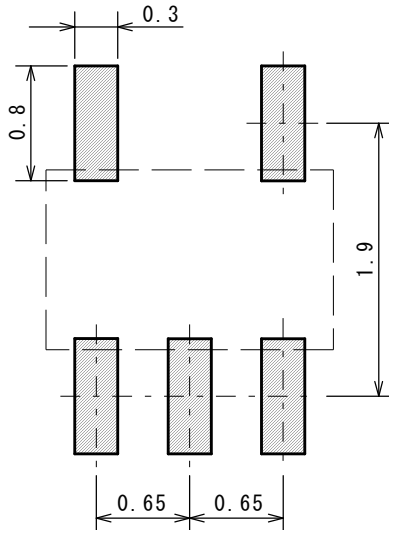
UNIT: mm



SC-88A

■ EXAMPLE OF SOLDER PADS DIMENSIONS

UNIT: mm



Nisshinbo Micro Devices Inc.

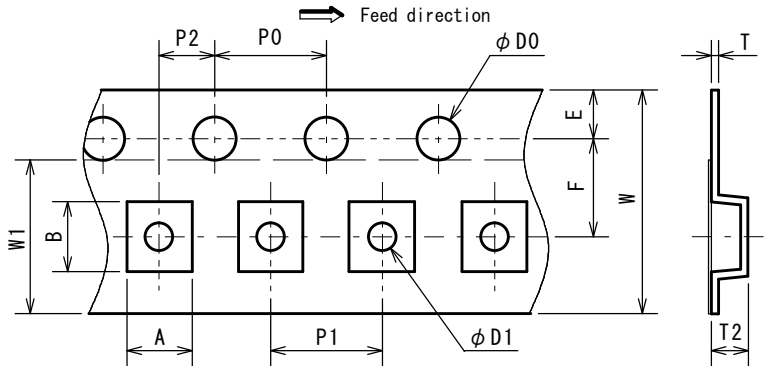
SC-88A

PI-SC-88A-E-A

■ PACKING SPEC

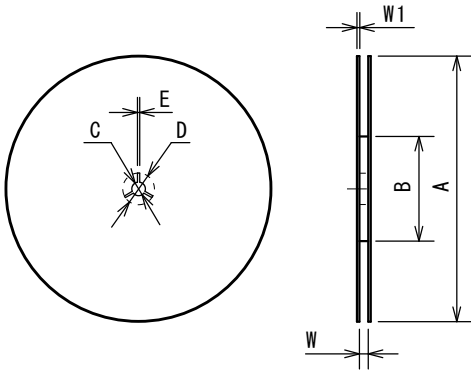
UNIT: mm

TAPING DIMENSIONS



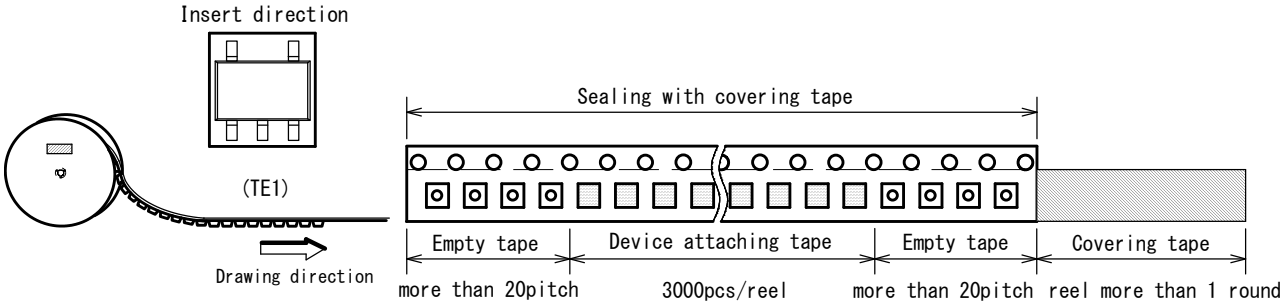
SYMBOL	DIMENSION	REMARKS
A	2.3±0.1	BOTTOM DIMENSION
B	2.5±0.1	BOTTOM DIMENSION
D0	1.55±0.05	
D1	1.05±0.05	
E	1.75±0.1	
F	3.5±0.05	
P0	4.0±0.1	
P1	4.0±0.1	
P2	2.0±0.05	
T	0.25±0.05	
T2	1.3±0.1	
W	8.0±0.2	
W1	5.5	THICKNESS 0.1max

REEL DIMENSIONS

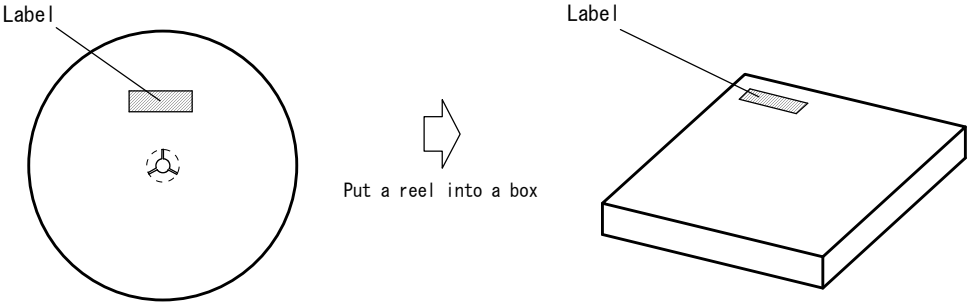


SYMBOL	DIMENSION
A	φ180±1
B	φ 60±1
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	9±0.5
W1	1.2±0.2

TAPING STATE



PACKING STATE



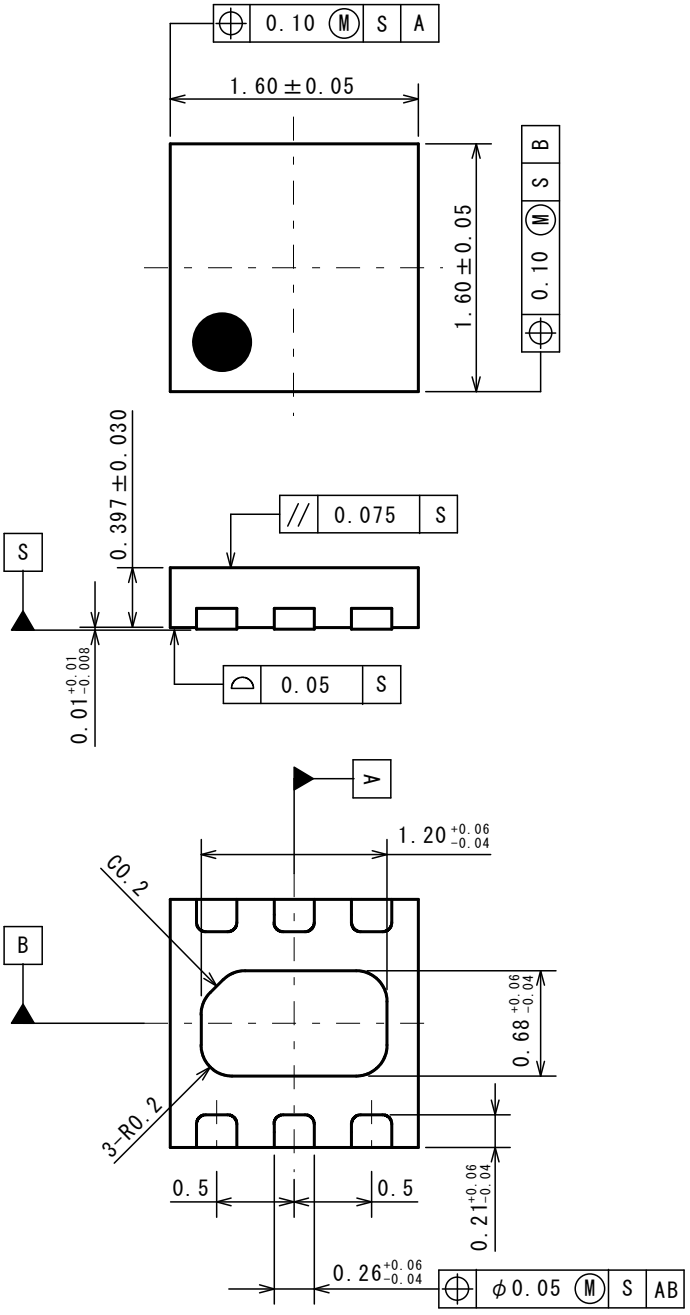
Nisshinbo Micro Devices Inc.

DFN6-G1 (ESON6-G1)

PI-DFN6-G1-E-A

■ PACKAGE DIMENSIONS

UNIT: mm



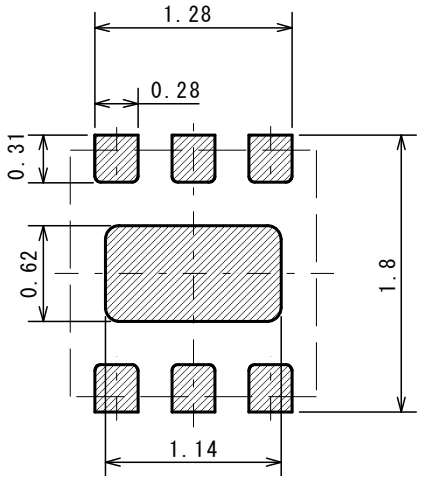
Nisshinbo Micro Devices Inc.

DFN6-G1 (ESON6-G1)

PI-DFN6-G1-E-A

■ EXAMPLE OF SOLDER PADS DIMENSIONS

UNIT: mm



Nisshinbo Micro Devices Inc.

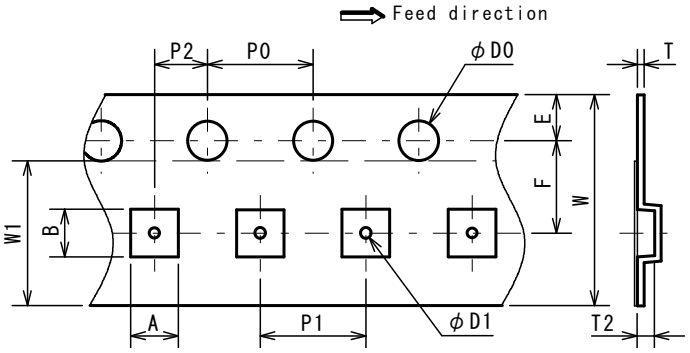
DFN6-G1 (ESON6-G1)

PI-DFN6-G1-E-A

■ PACKING SPEC

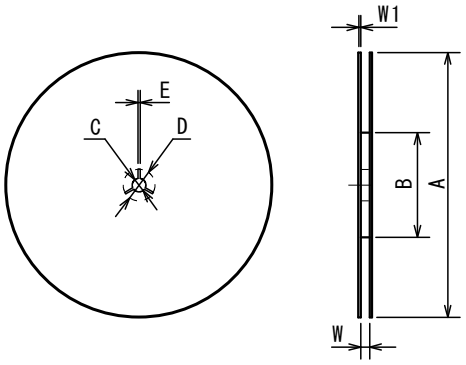
UNIT: mm

TAPING DIMENSIONS



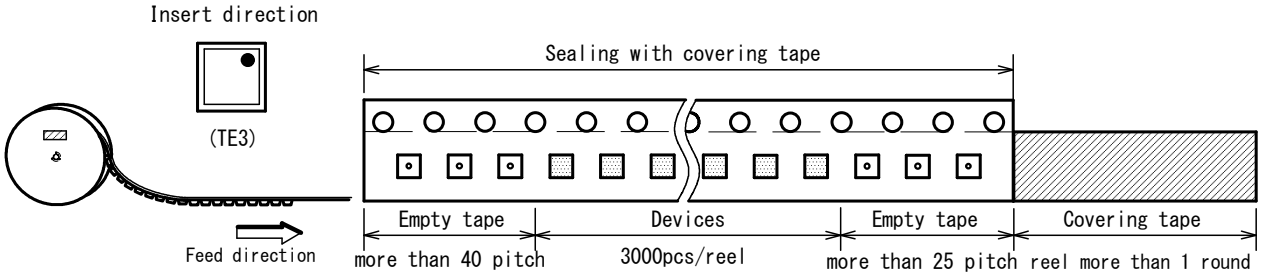
SYMBOL	DIMENSION	REMARKS
A	1.85±0.05	BOTTOM DIMENSION
B	1.85±0.05	BOTTOM DIMENSION
D0	$1.5^{+0.1}_{0}$	
D1	0.5±0.1	
E	1.75±0.1	
F	3.5±0.05	
P0	4.0±0.1	
P1	4.0±0.1	
P2	2.0±0.05	
T	0.25±0.05	
T2	0.65±0.05	
W	8.0±0.2	
W1	5.5	THICKNESS 0.1max

REEL DIMENSIONS

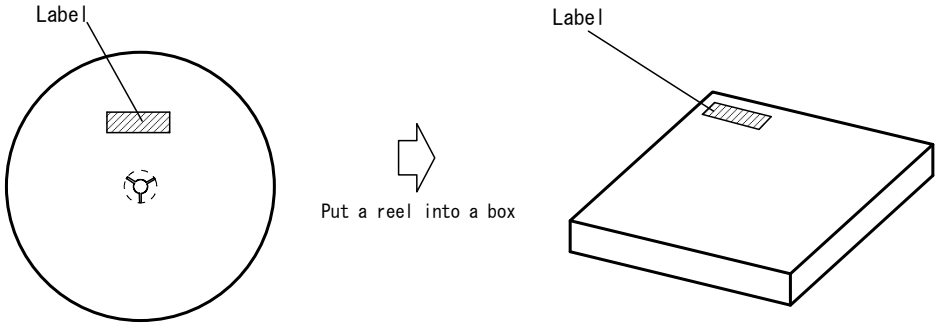


SYMBOL	DIMENSION
A	$\phi 180^{0}_{-1.5}$
B	$\phi\ 60^{+1}_{0}$
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	$9^{+0.3}_{0}$
W1	1.2

TAPING STATE



PACKING STATE



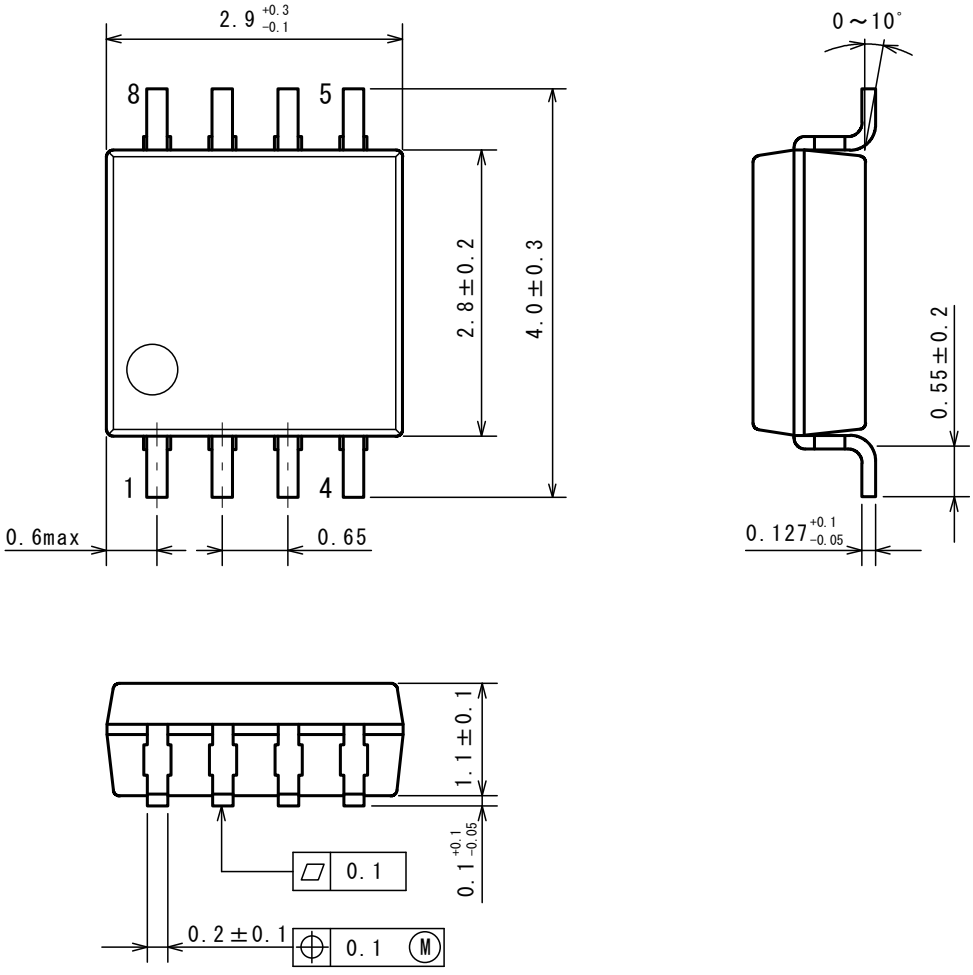
Nisshinbo Micro Devices Inc.

MSOP8 MEET JEDEC MO-187-DA (VSP8)

PI-MSOP8-E-A

■ PACKAGE DIMENSIONS

UNIT: mm



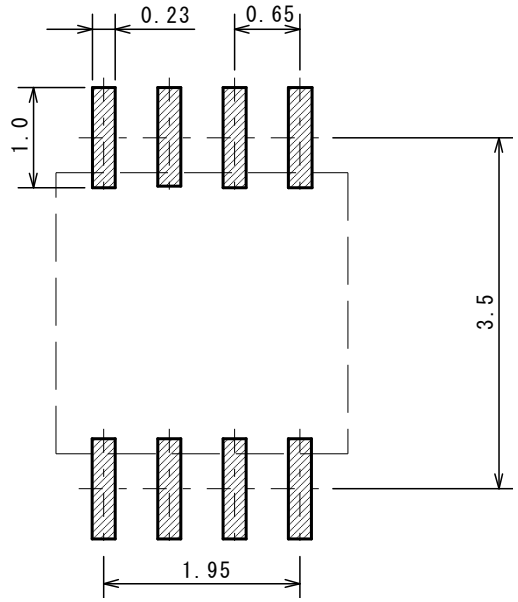
Nisshinbo Micro Devices Inc.

MSOP8 MEET JEDEC MO-187-DA (VSP8)

PI-MSOP8-E-A

■ **EXAMPLE OF SOLDER PADS DIMENSIONS**

UNIT: mm



Nisshinbo Micro Devices Inc.

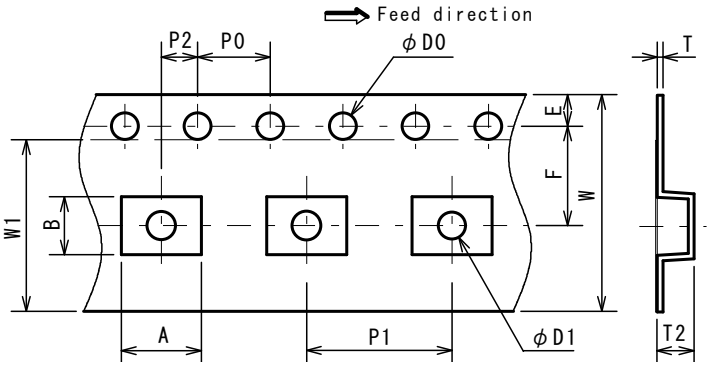
MSOP8 MEET JEDEC MO-187-DA (VSP8)

PI-MSOP8-E-A

■ PACKING SPEC

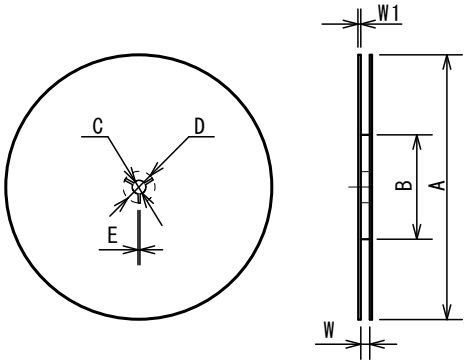
UNIT: mm

TAPING DIMENSIONS



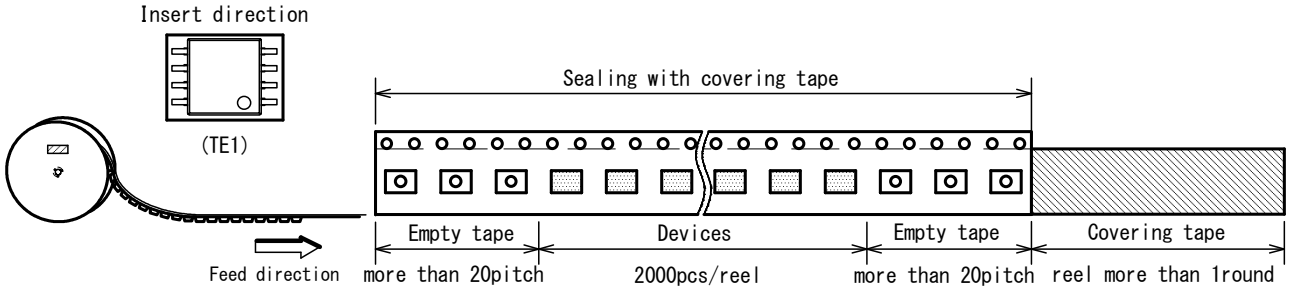
SYMBOL	DIMENSION	REMARKS
A	4.4	BOTTOM DIMENSION
B	3.2	BOTTOM DIMENSION
D0	$1.5^{+0.1}_{0}$	
D1	$1.5^{+0.1}_{0}$	
E	1.75±0.1	
F	5.5±0.05	
P0	4.0±0.1	
P1	8.0±0.1	
P2	2.0±0.05	
T	0.30±0.05	
T2	2.0 (MAX.)	
W	12.0±0.3	
W1	9.5	THICKNESS 0.1max

REEL DIMENSIONS

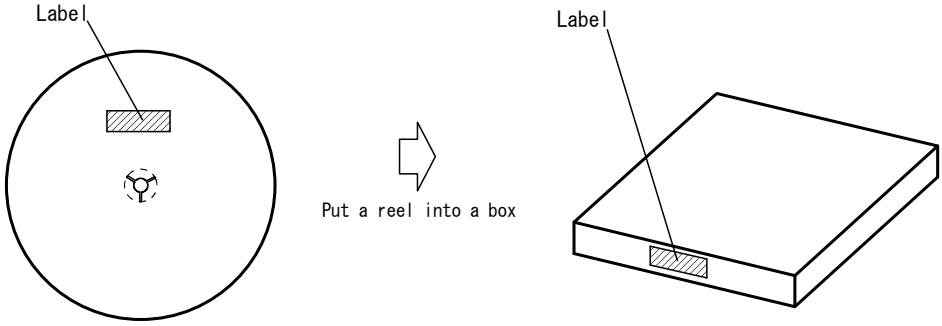


SYMBOL	DIMENSION
A	φ254±2
B	φ100±1
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	13.5±0.5
W1	2.0±0.2

TAPING STATE



PACKING STATE



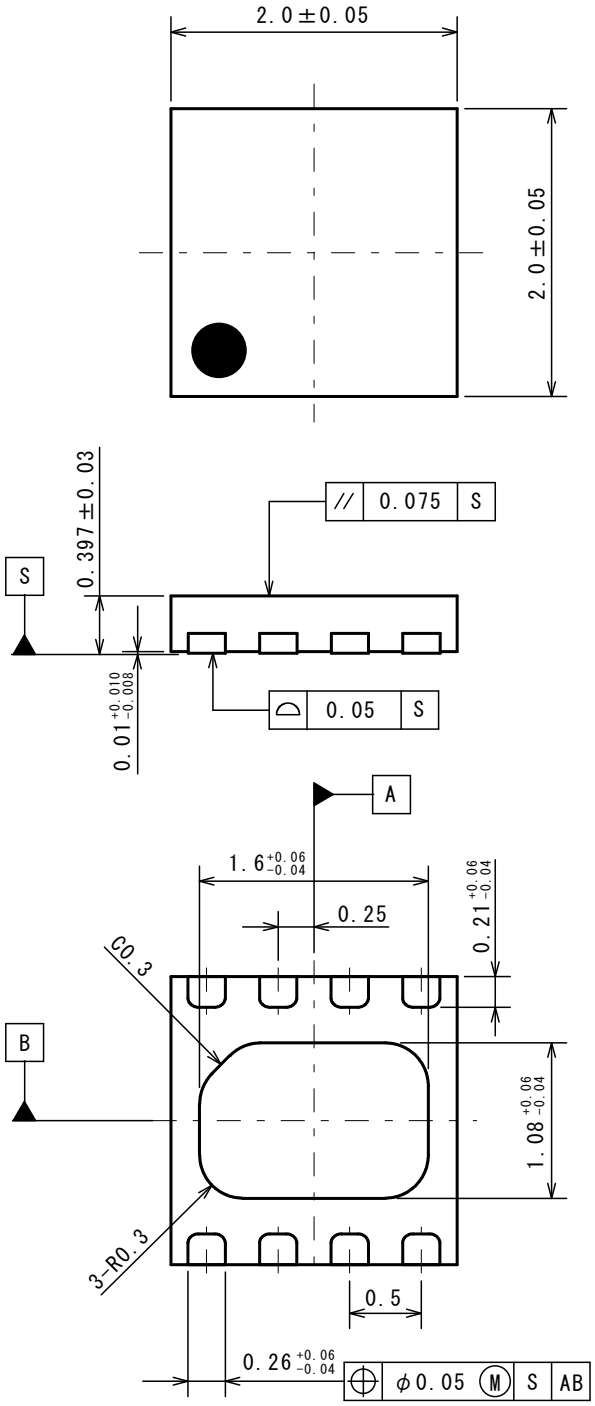
Nisshinbo Micro Devices Inc.

DFN8-U1 (ESON8-U1)

PI-DFN8-U1-E-A

■ PACKAGE DIMENSIONS

UNIT: mm



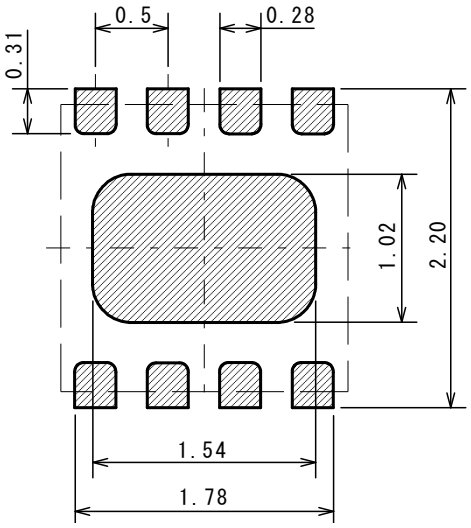
Nisshinbo Micro Devices Inc.

DFN8-U1 (ESON8-U1)

PI-DFN8-U1-E-A

■ EXAMPLE OF SOLDER PADS DIMENSIONS

UNIT: mm



Nisshinbo Micro Devices Inc.

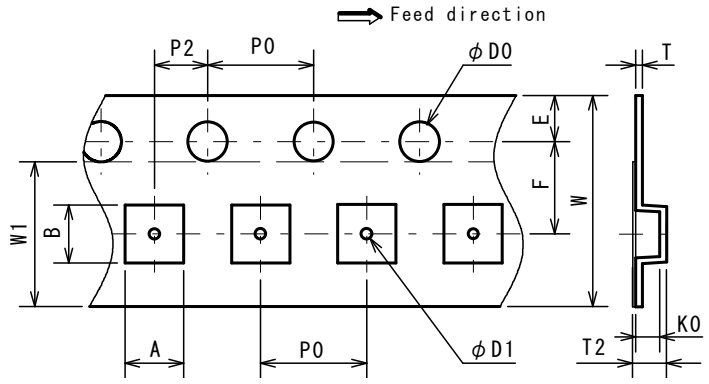
DFN8-U1 (ESON8-U1)

PI-DFN8-U1-E-A

■ PACKING SPEC

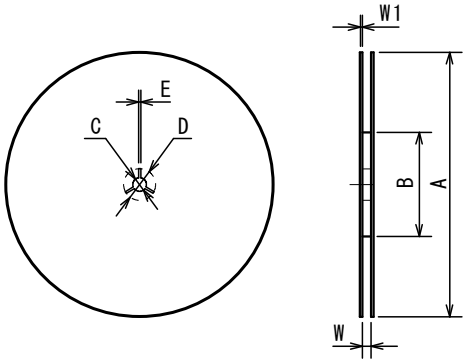
UNIT: mm

TAPING DIMENSIONS



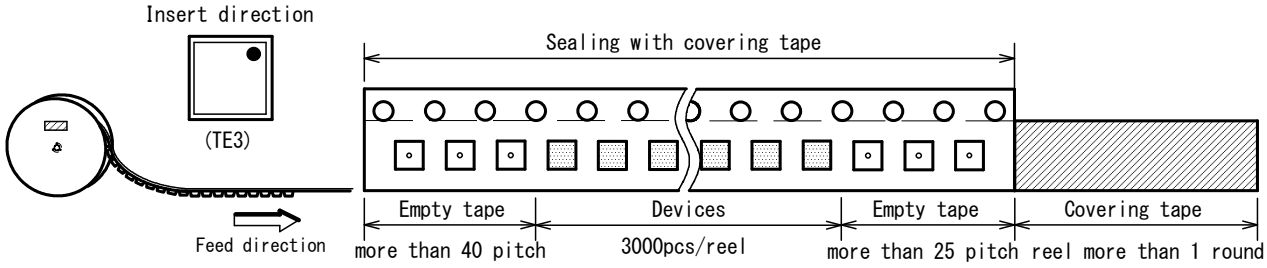
SYMBOL	DIMENSION	REMARKS
A	2.25±0.05	BOTTOM DIMENSION
B	2.25±0.05	BOTTOM DIMENSION
D0	$1.5^{+0.1}_{0}$	
D1	0.5±0.1	
E	1.75±0.1	
F	3.5±0.05	
P0	4.0±0.1	
P1	4.0±0.1	
P2	2.0±0.05	
T	0.25±0.05	
T2	1.00±0.07	
K0	0.65±0.05	
W	8.0±0.2	
W1	5.5	THICKNESS 0.1max

REEL DIMENSIONS

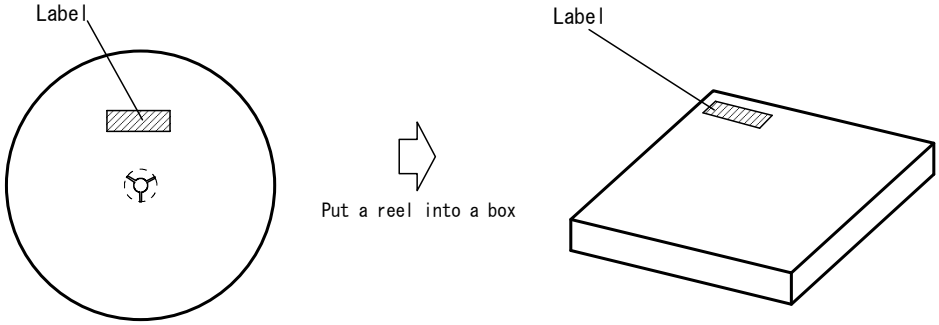


SYMBOL	DIMENSION
A	$\phi 180^{0}_{-1.5}$
B	$\phi 60^{+1}_{0}$
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	$9^{+0.3}_{0}$
W1	1.2

TAPING STATE



PACKING STATE



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    When it has been proved defective due to manufacturing factors as a result of defect analysis by us, we will either deliver a substitute for the defective product or refund the purchase price of the defective product.
    Note that such delivery or refund is sole and exclusive remedies to your company for the defective product.
    8-3. Remedies after Quality Warranty Period
    With respect to any defect of this product found after the quality warranty period, the defect will be analyzed by us. On the basis of the defect analysis results, the scope and amounts of damage shall be determined by mutual agreement of both parties. Then we will deal with upper limit in Section 8-2. This provision is not intended to limit any legal rights of your company.
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