NJM2903C/NJM2903CA
SINGLE-SUPPLY DUAL COMPARATOR

FEATURES

- Operating Voltage +2V to +36V
- Single Supply Operation
- Open Collector Output
- Package Outline
  SOP8, DMP8, SSOP8, EQFN14-D7
  MSOP-8-BM *MEET JEDEC MO-187-DA
  MSOP8 (TVSP8) *MEET JEDEC MO-187-DA / THIN TYPE
- Bipolar Technology
- Internal ESD protection
  Human body model (HBM) ±2000V typ.
- Wide temperature range -40℃ to +125℃
- Input Offset Voltage Grade

NJM2903C(Normal-Grade)	NJM2903CA (A-Grade)
5mV max.	2mV max.

* NJM2903CMD7 / NJM2903CBM don't have a A version.

GENERAL DESCRIPTION

The NJM2903C / NJM2903CA consist of two independent voltage comparators that are designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

The NJM2903C / NJM2903CA has a unique characteristic: the input common-mode voltage range includes ground, even though operated from a single power supply voltage.

Application areas include limit comparators, simple analog-to-digital converters; pulse, square-wave and time delay generators; wide range V_{CO}; MOS clock timers; multivibrators and high voltage digital logic gates. The NJM2903C / NJM2903CA were designed to directly interface with TTL and MOS. When operated from both plus and minus power supplies, the NJM2903C / NJM2903CA will directly interface with MOS logic where their low power drain is a distinct advantage over standard comparators


NJM2903CG
NJM2903CAG
(SOP8)


NJM2903CM
NJM2903CAM
(DMP8)

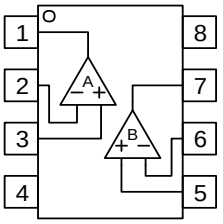

NJM2903CV
NJM2903CAV
(SSOP8)


NJM2903CRB1
NJM2903CARB1
(MSOP8(TVSP8)


NJM2903CBM
(MSOP-8-BM)

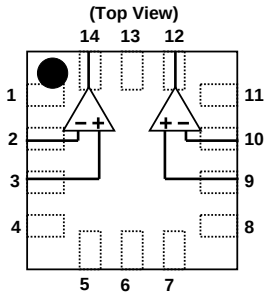

NJM2903CMD7
(EQFN14-D7)

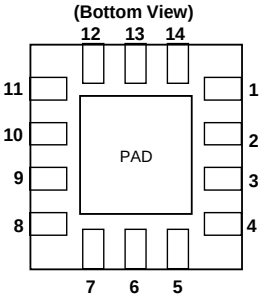
PIN CONFIGURATION



PIN FUNCTION
1.A OUTPUT
2.A - INPUT
3.A + INPUT
4.V-
5.B + INPUT
6.B - INPUT
7.B OUTPUT
8.V+

NJM2903CG / NJM2903CAG
NJM2903CM / NJM2903CAM
NJM2903CRB1 / NJM2903CARB1
NJM2903CV / NJM2903CAV
NJM2903CBM



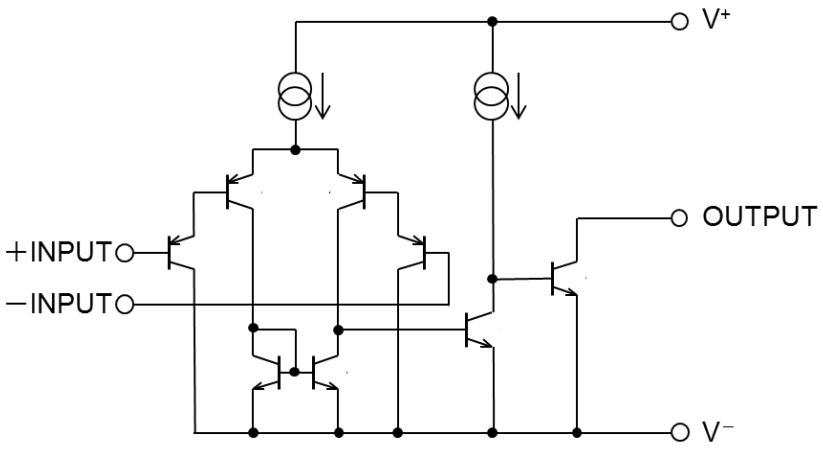


NJM2903CMD7 (Note1, 2, 3)

PIN FUNCTION
1. NF(No Function)
2. A –INPUT
3. A +INPUT
4. NF(No Function)
5. NC
6. V-
7. NC
8. NF(No Function)
9. B +INPUT
10. B –INPUT
11. NF(No Function)
12. B OUTPUT
13. V+
14. A OUTPUT

(Note1) The NF pin, NC pin and The PAD have to be wired as short as possible to connect with a V⁻ pin.
(Note2) The NF pin and The PAD are electronically connected to the backside of the die. But, there cannot be used as V- pin.
(Note3) The NC pin is not internally connected.

■ **EQUIVALENT CIRCUIT** (1/2 Shown)



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25˚C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+-V^-	+36	V
Differential Input Voltage (Note4)	V_{ID}	±36	V
Input Voltage (Note5)	V_{IN}	V^- -0.3 to V^- +36	V
Output Terminal Input Voltage (Note6)	V_O	V^- -0.3 to V^- +36	V
Power Dissipation	P_D	SOP8 : 690 (Note7) 1000 (Note8) DMP8 : 470 (Note7) 600 (Note8) MSOP8 : 510 (Note7) 680 (Note8) SSOP8 : 430 (Note7) 540 (Note8) EQFN14-D7 : 440 (Note7) 770 (Note8) MSOP-8-BM : 960 (Note9)	mW
Operating Temperature Range	T_{opr}	-40 to +125	˚C
Storage Temperature Range	T_{stg}	-65 to +150	˚C

(Note4) Differential voltage is the voltage difference between +INPUT and -INPUT.
(Note5) Input voltage is the voltage should be allowed to apply to the input terminal independent of the magnitude of V^+
(Note6) Output voltage is the voltage should be allowed to apply to the output terminal independent of the magnitude of V^+.
(Note7) EIA/JEDEC STANDARD Test board (76.2 x 114.3 x 1.6mm, 2layers, FR-4) mounting
(Note8) EIA/JEDEC STANDARD Test board (76.2 x 114.3 x 1.6mm, 4layers, FR-4) mounting
(Note 9) Power consumption is measured on our original specification board (76.2x114.3x0.8mm, 4 layers, FR-4) mounted based on EIA/JEDEC

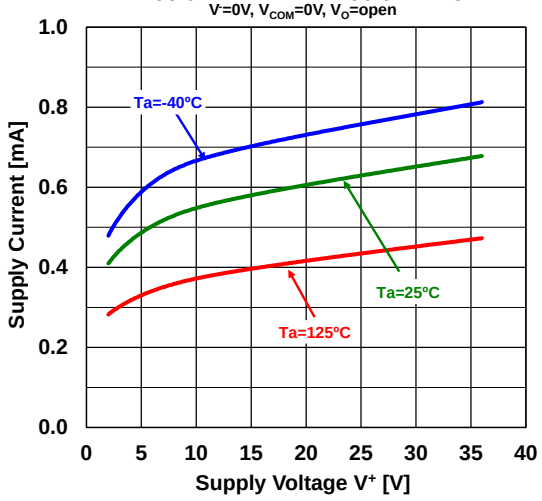
■ ELECTRICAL CHARACTERISTICS

(V^+=5V,V^-=0V,Ta=25˚C unless otherwise noted.)

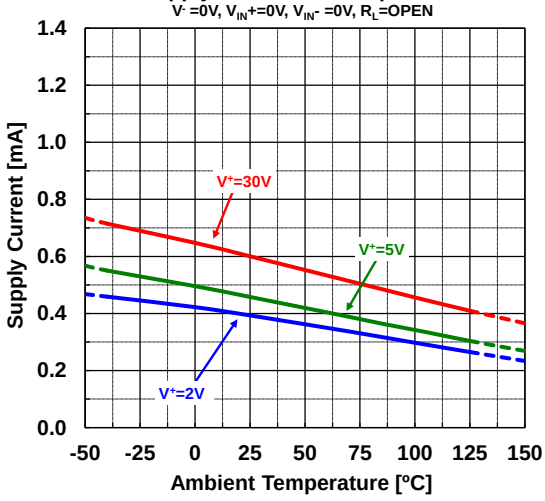
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	R_S=0Ω, V_O=1.4V R_S=0Ω, V_O=1.4V,NJM2903CA	-	0.5 0.5	5 2	mV
Input Offset Current	I_{IO}		-	0.5	50	nA
Input Bias Current	I_B		-	20	250	nA
Large Signal Voltage Gain	A_V	V^+= 15V, R_L=15kΩ, V_O = 1V to 11V	94	106	-	dB
Common Mode Input Voltage Range	V_{ICM}		0	-	3.5	V
Supply Current (all comparators)	I_{SUPPLY}	no load V^+= +30V, no load	- -	0.45 0.6	1 2.5	mA
Low-level Output Voltage	V_{OL}	V_{IN+} = 0V, V_{IN-} = 1V, I_{SINK} = 4mA	-	80	400	mV
Output Leakage Current	I_{LEAK}	V^+= V_O = 30V, V_{IN+} = 1V, V_{IN-} = 0V	-	-	1	uA
Output Sink Current	I_{SINK}	V_{IN+} = 0V, V_{IN-} = 1V, V_O = 1.5V	6	16	-	mA
Response Time	tre	R_L = 5.1kΩ to V^+	-	1.3	-	μs
Large Signal Response Time	trel	R_L = 5.1kΩ to V^+, Vref = +1.4V, TTL input	-	250	-	ns

■ TYPICAL CHARACTERISTICS

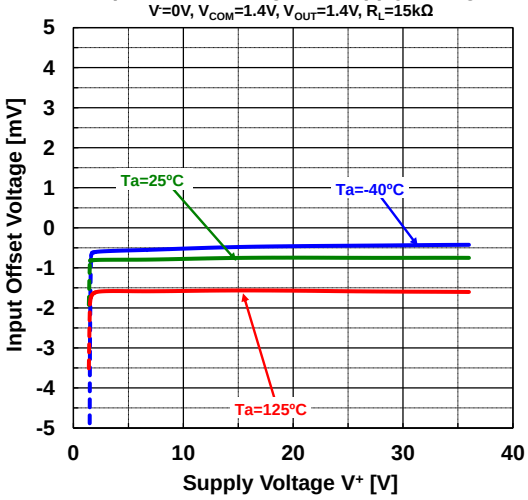
Supply Current vs. Supply Voltage
V⁻=0V, V_{COM}=0V, V_O=open



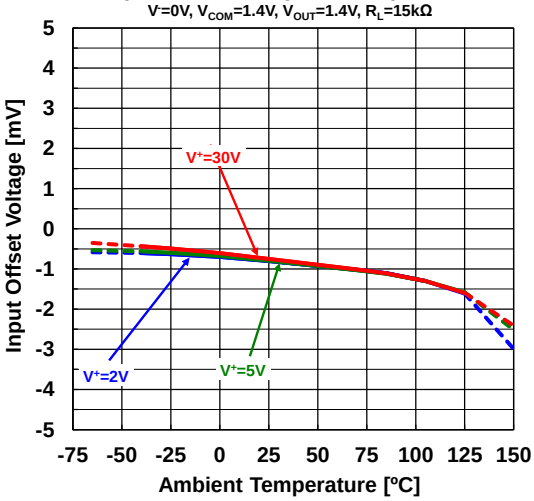
Supply Current vs. Temperature
V⁻ =0V, V_{IN}+=0V, V_{IN}- =0V, R_L=OPEN



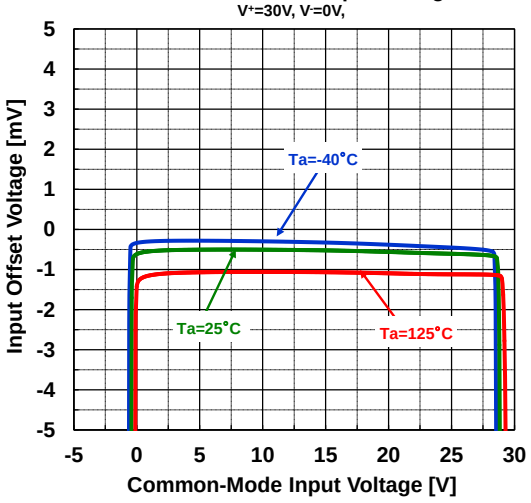
Input Offset Voltage vs. Supply Voltage
V⁻=0V, V_{COM}=1.4V, V_{OUT}=1.4V, R_L=15kΩ



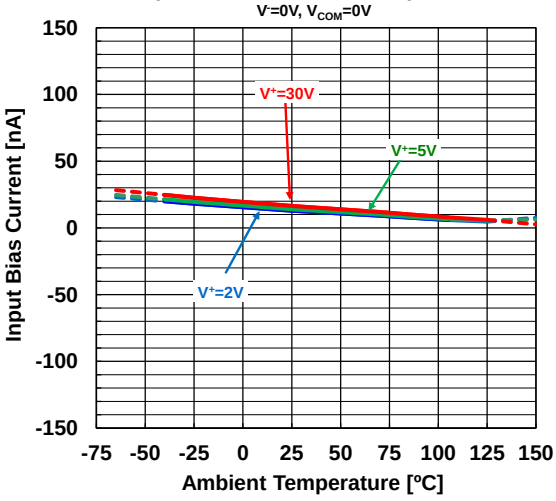
Input Offset Voltage vs. Temperature
V⁻=0V, V_{COM}=1.4V, V_{OUT}=1.4V, R_L=15kΩ



Input Offset Voltage
vs. Common-Mode Input Voltage
V⁺=30V, V⁻=0V,

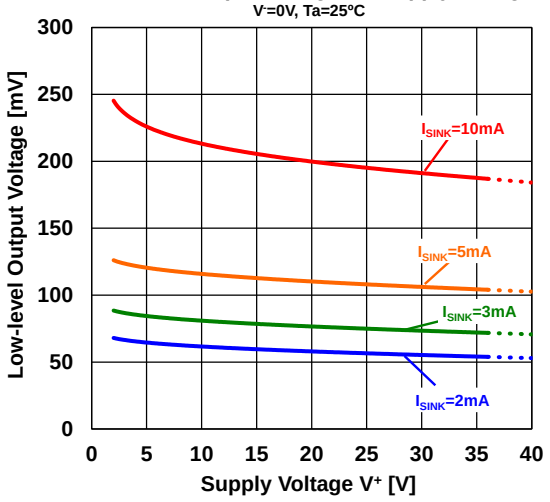


Input Bias Current vs. Temperature
V⁻=0V, V_{COM}=0V

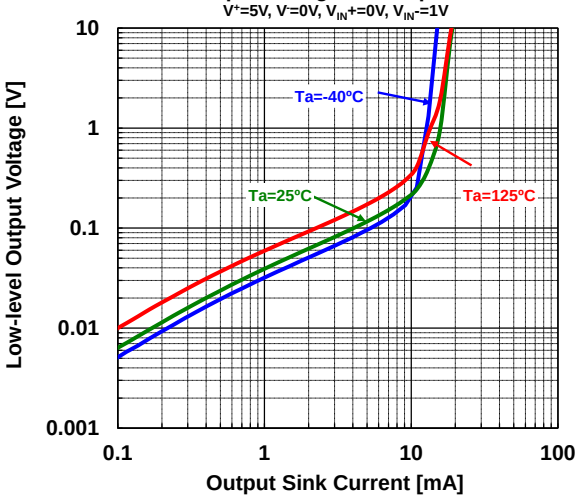


■ TYPICAL CHARACTERISTICS

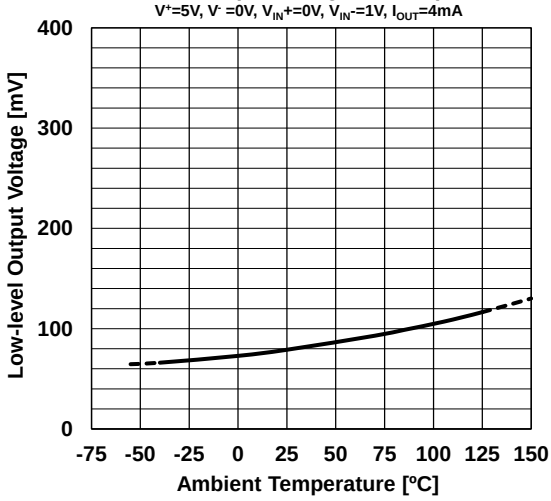
Low-level Output Voltage vs. Supply Voltage
V⁻=0V, Ta=25°C



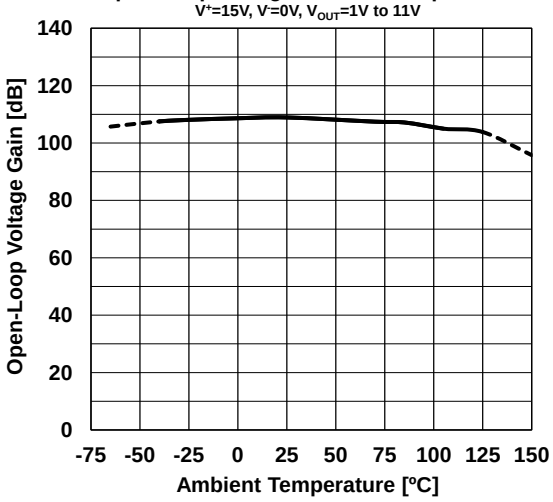
Low-level Output Voltage vs. Output Sink Current
V⁺=5V, V⁻=0V, VIN+=0V, VIN-=1V



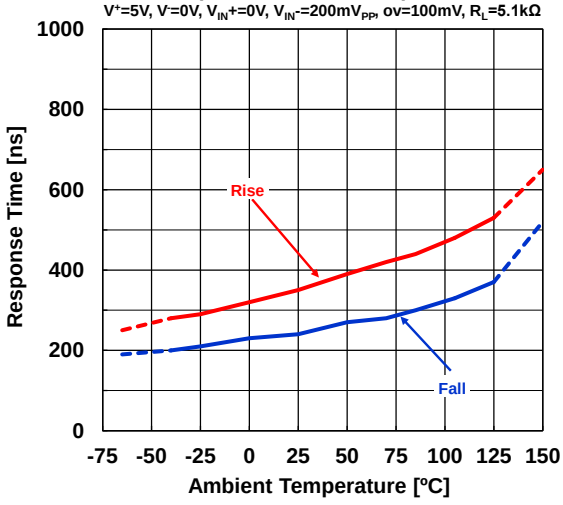
Low-level Output Voltage vs. Temperature
V⁺=5V, V⁻ =0V, VIN+=0V, VIN-=1V, IOUT=4mA



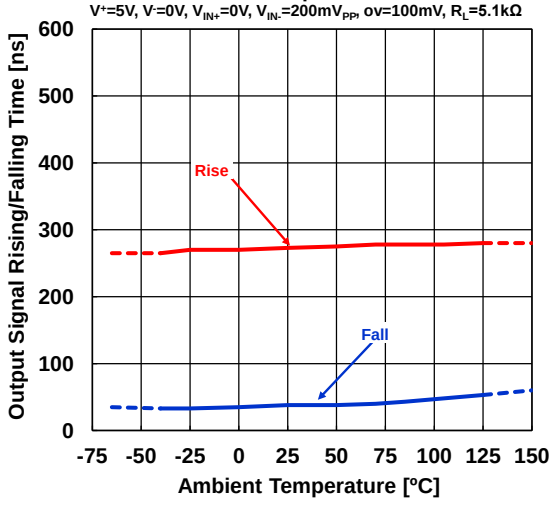
Open-Loop Voltage Gain vs. Temperature
V⁺=15V, V⁻=0V, VOUT=1V to 11V



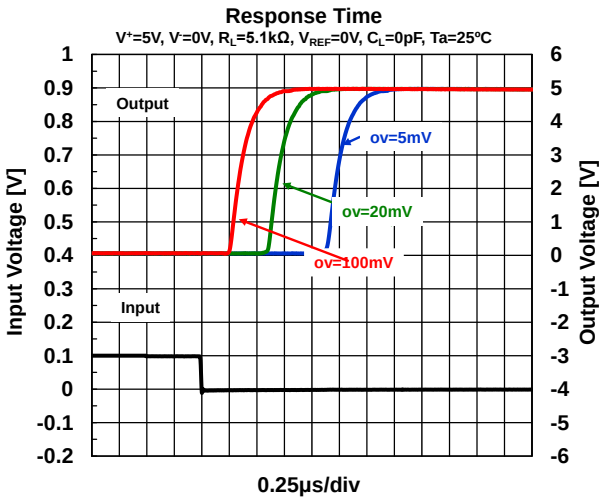
Response Time vs. Temperature
V⁺=5V, V⁻=0V, VIN+=0V, VIN-=200mVPP, ov=100mV, RL=5.1kΩ

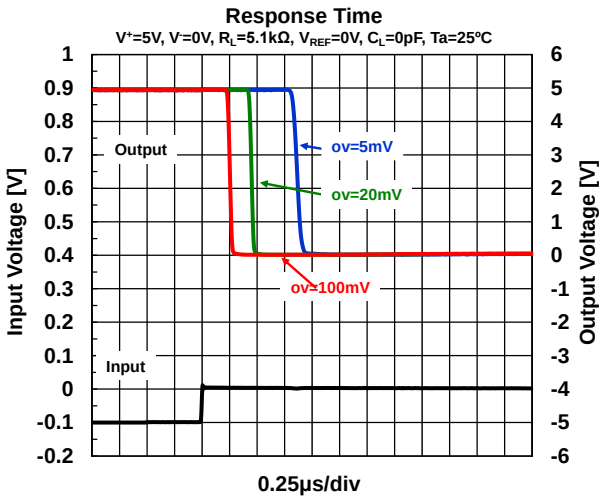


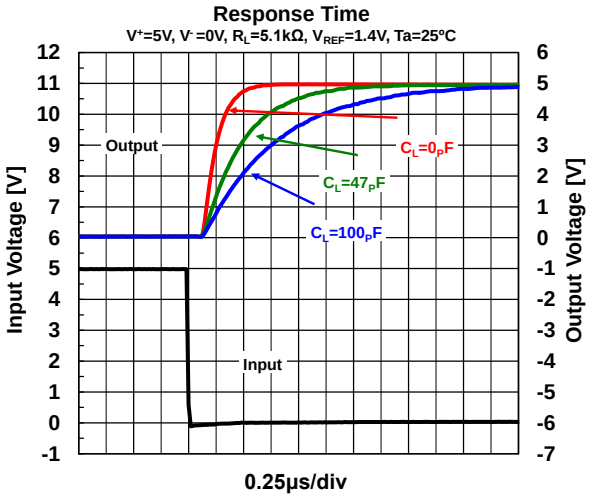
Output Signal Rising/Falling Time vs. Temperature
V⁺=5V, V⁻=0V, VIN+=0V, VIN-=200mVPP, ov=100mV, RL=5.1kΩ

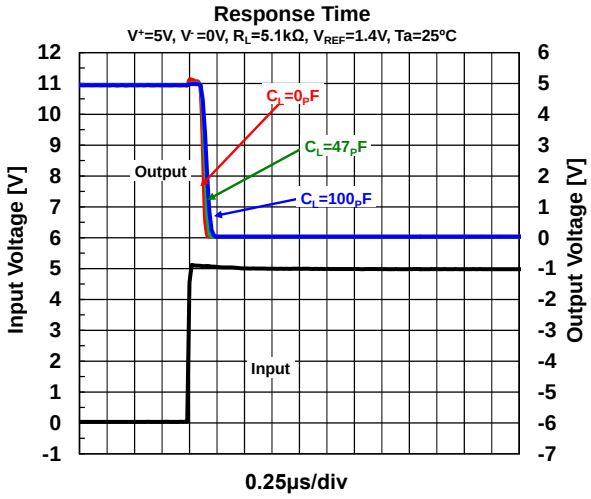


■ TYPICAL CHARACTERISTICS



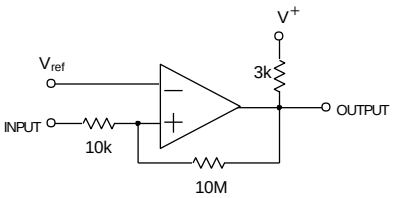




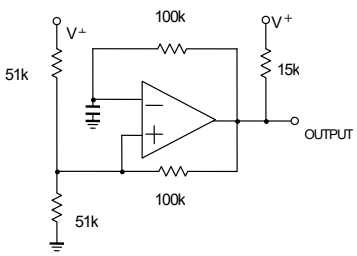


■ TYPICAL APPLICATIONS

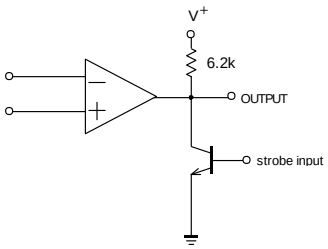
Comparator With Hysteresis



Pulse Generator



Output Strobing Circuit



■ REVISION HISTORY

Date	Revision	Changes
October 13, 2023	Ver.12	・Change of company name and design form ・Revision number (Ver.11 → Ver.12) ・Added revision history ・Added new package (MSOP-8-BM to NJM2903C)

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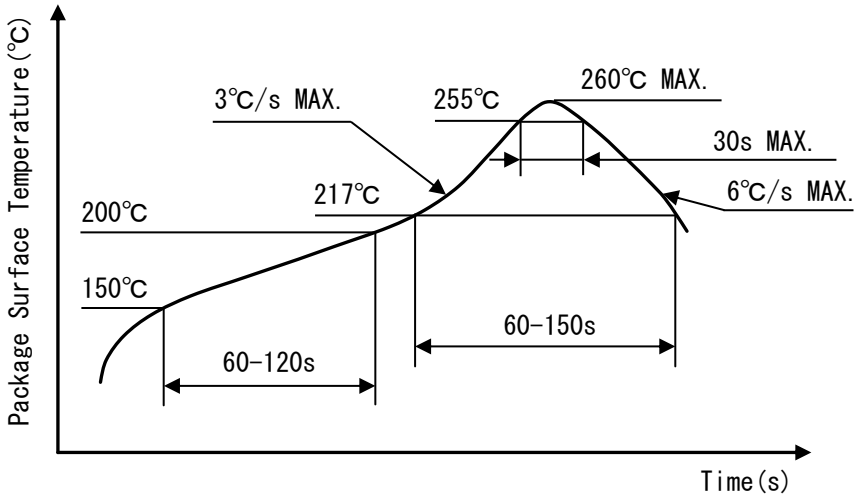
Reflow Profile

■ HEAT-RESISTANCE PROFILES



Reflow profile

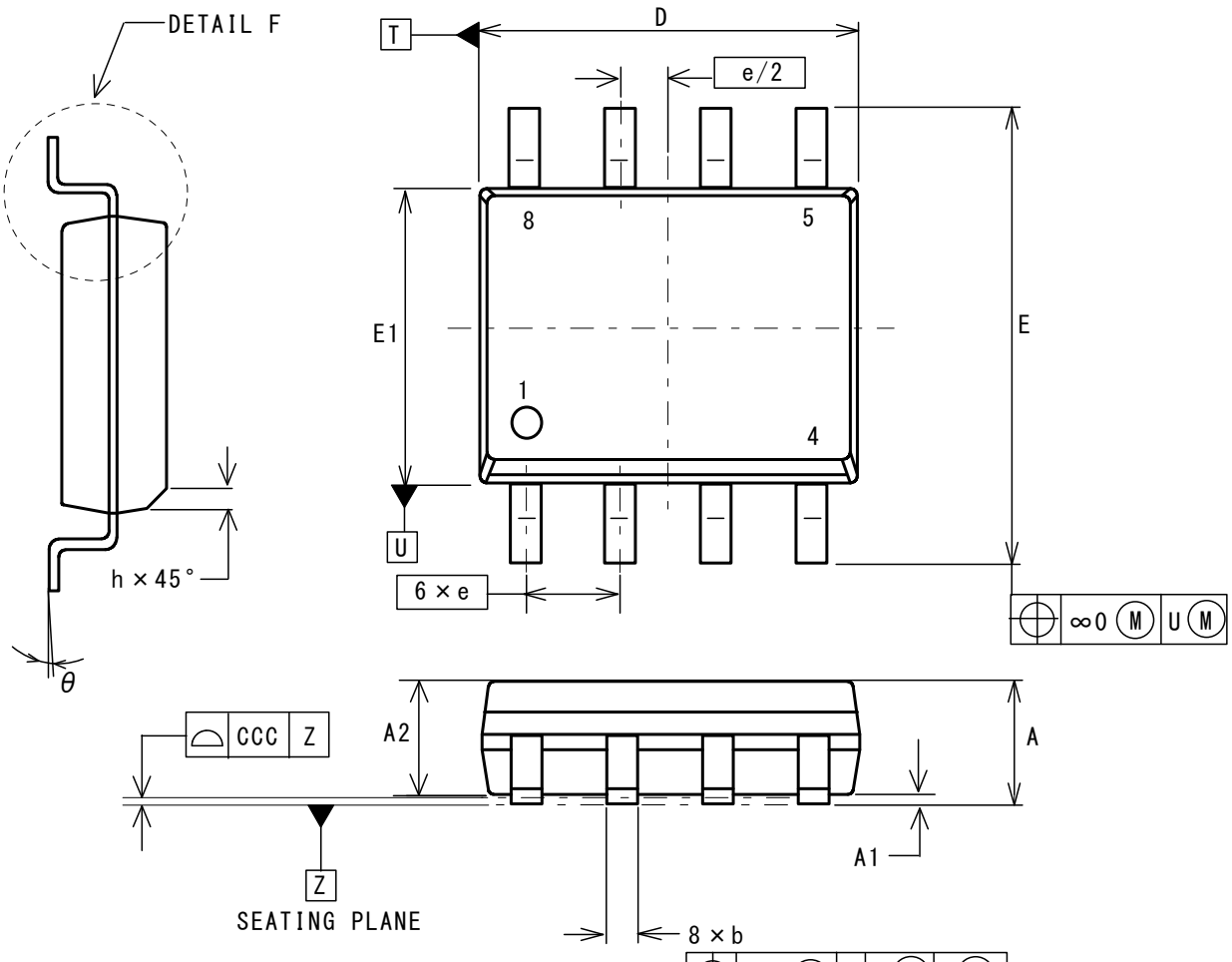
Nisshinbo Micro Devices Inc.

SOP8 JEDEC 150mil

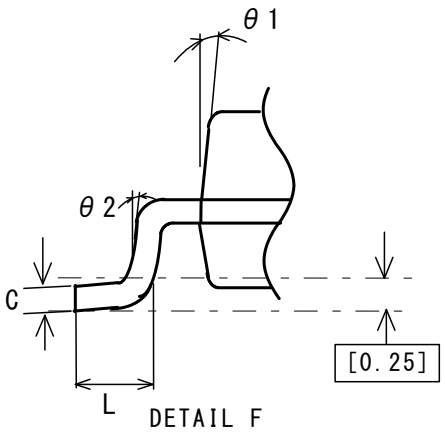
PI-SOP8 JEDEC 150mil-E-B

■ PACKAGE DIMENSIONS

UNIT: mm



DESCRIPTION	SYMBOL	INCH			MILLIMETER		
		MIN	NOM	MAX	MIN	NOM	MAX
TOTAL THICKNESS	A	.053		.069	1.35		1.75
STAND OFF	A_1	.004		.010	0.10		0.25
MOLD THICKNESS	A_2	.049		–	1.25		–
LEAD WIDTH	b	.014		.019	0.35		0.49
L/F THICKNESS	c	.007		.010	0.19		0.25
BODY SIZE	D	.189		.197	4.80		5.00
	E_1	.150		.157	3.80		4.00
LEAD PITCH	E	.228		.244	5.80		6.20
	e	.050 BSC			1.27 BSC		
	L	.015		.049	0.40		1.25
	h	.010		.020	0.25		0.50
	θ	0°		8°	0°		7°
	θ_1	5°		15°	5°		15°
	θ_2	2°	7°	12°	2°	7°	12°
LEAD EDGE OFFSET	∞0	.010			0.25		
LEAD OFFSET	bbb	.010			0.25		
COPLANARITY	ccc	.004			0.10		



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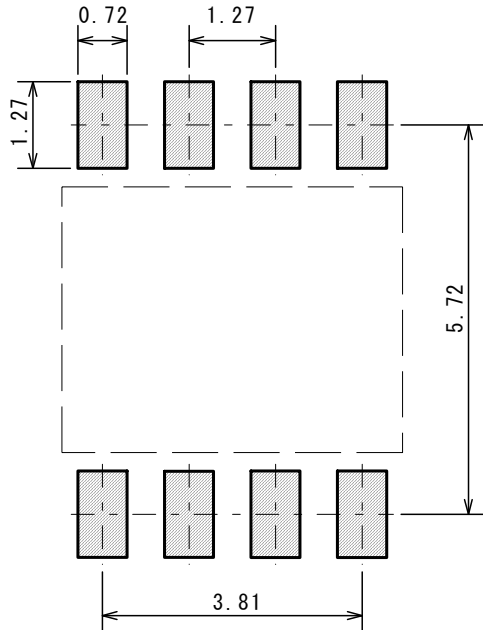
SOP8 JEDEC 150mil

PI-SOP8 JEDEC 150mil-E-B

■ **EXAMPLE OF SOLDER PADS DIMENSIONS**

UNIT: mm



Nisshinbo Micro Devices Inc.

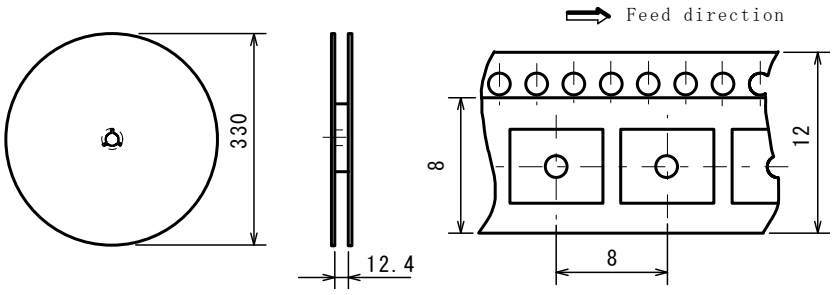
SOP8 JEDEC 150mil

PI-SOP8 JEDEC 150mil-E-B

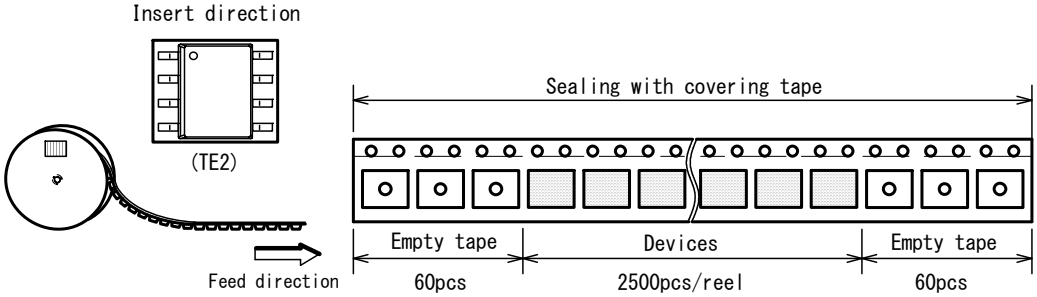
■ PACKING SPEC

UNIT: mm

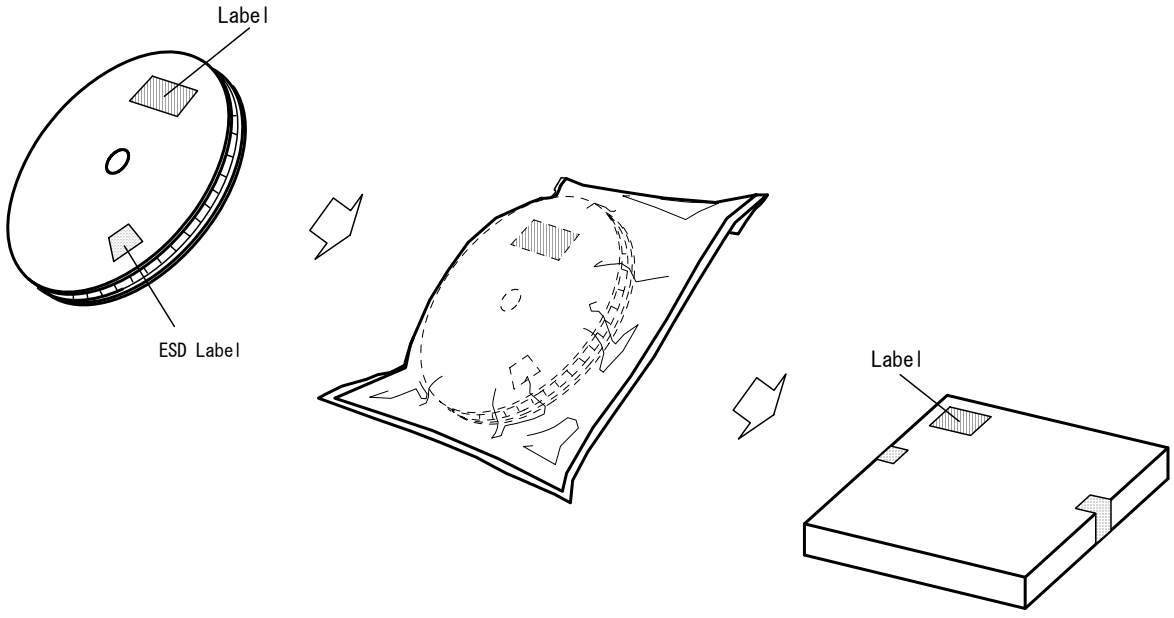
REEL DIMENSIONS / TAPING DIMENSIONS



TAPING STATE



PACKING STATE



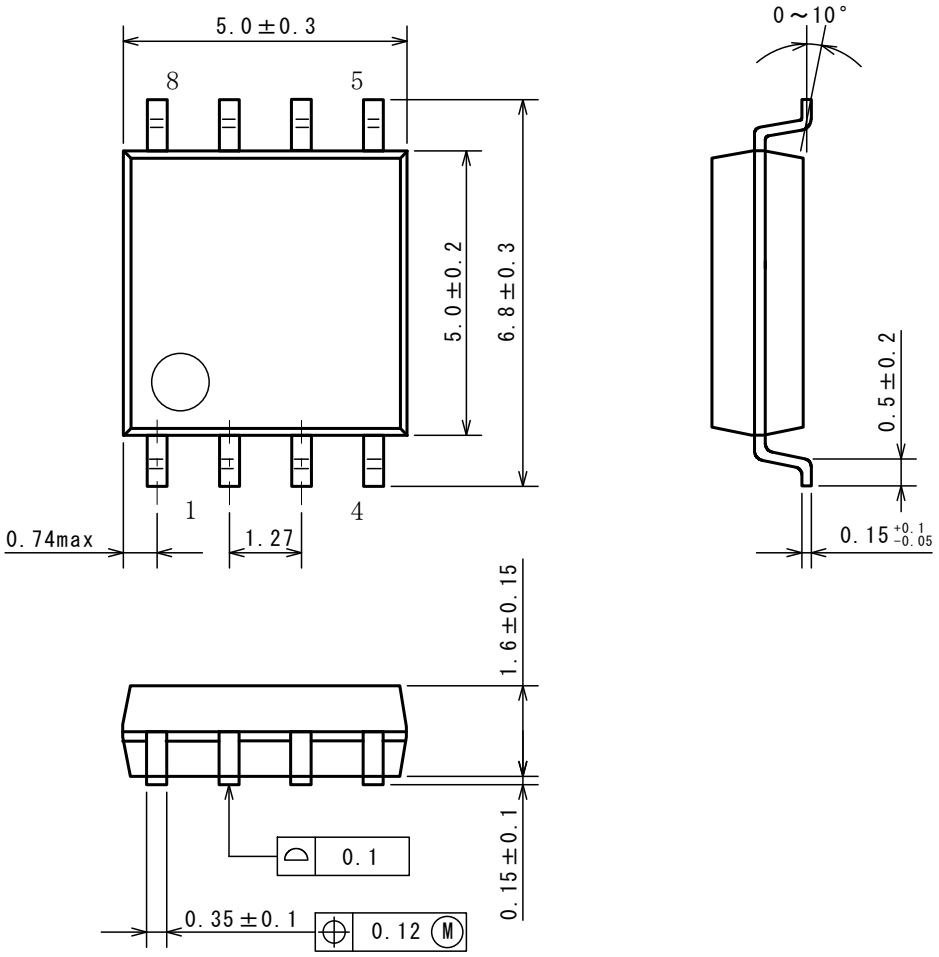
Nisshinbo Micro Devices Inc.

DMP8

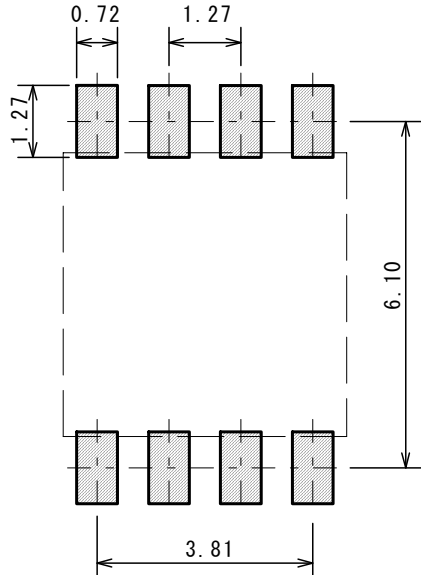
PI-DMP8-E-C

■ PACKAGE DIMENSIONS

UNIT: mm



■ EXAMPLE OF SOLDER PADS DIMENSIONS



Nisshinbo Micro Devices Inc.

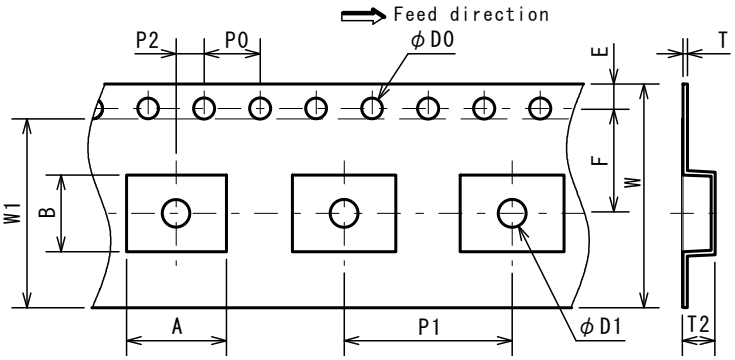
DMP8

PI-DMP8-E-C

■ PACKING SPEC

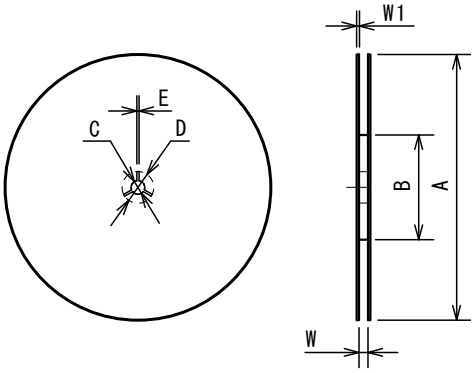
UNIT: mm

TAPING DIMENSIONS



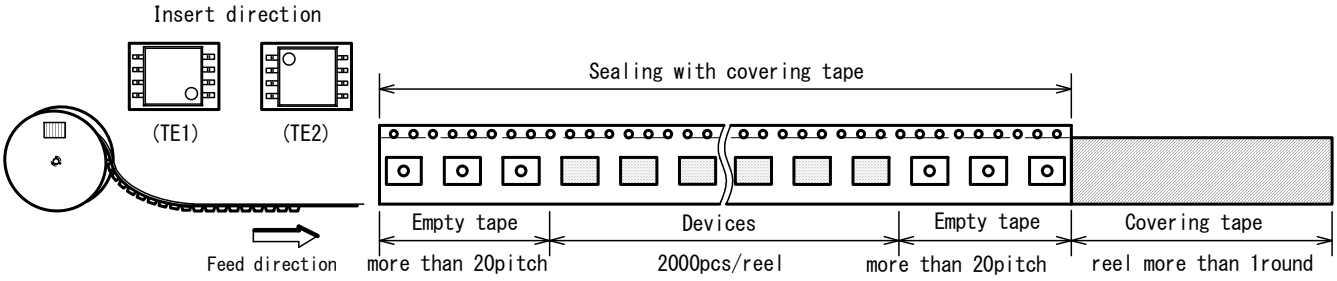
SYMBOL	DIMENSION	REMARKS
A	7.1	BOTTOM DIMENSION
B	5.4	BOTTOM DIMENSION
D0	1.55±0.05	
D1	2.05±0.1	
E	1.75±0.1	
F	7.5±0.1	
P0	4.0±0.1	
P1	12.0±0.1	
P2	2.0±0.1	
T	0.3±0.05	
T2	2.3	
W	16.0±0.3	
W1	13.5	THICKNESS 0.1max

REEL DIMENSIONS

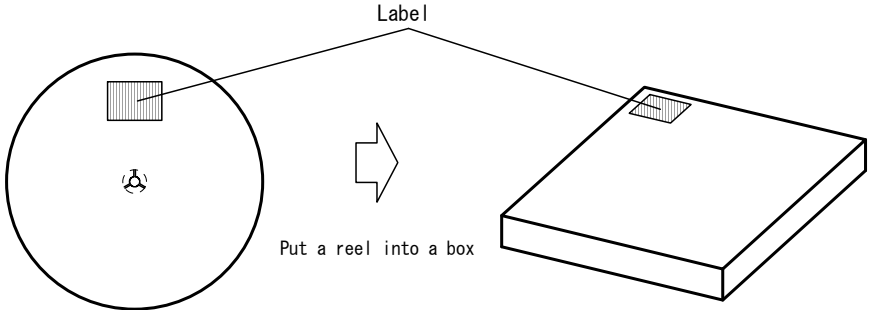


SYMBOL	DIMENSION
A	φ330±2
B	φ 80±1
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	17.5±0.5
W1	2±0.2

TAPING STATE



PACKING STATE



Nisshinbo Micro Devices Inc.

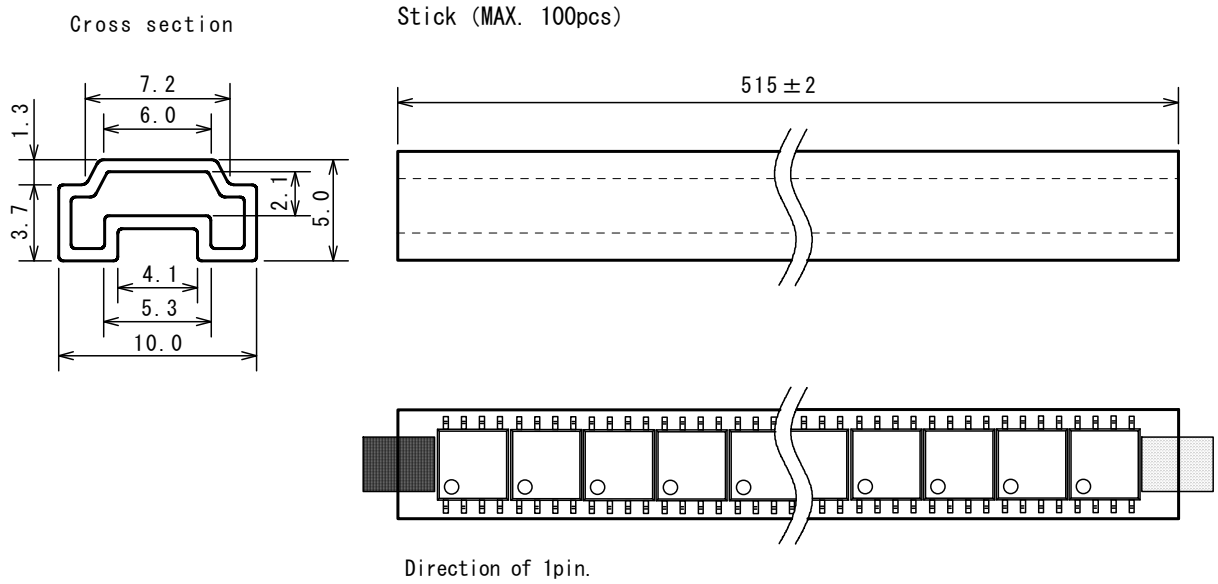
DMP8

PI-DMP8-E-C

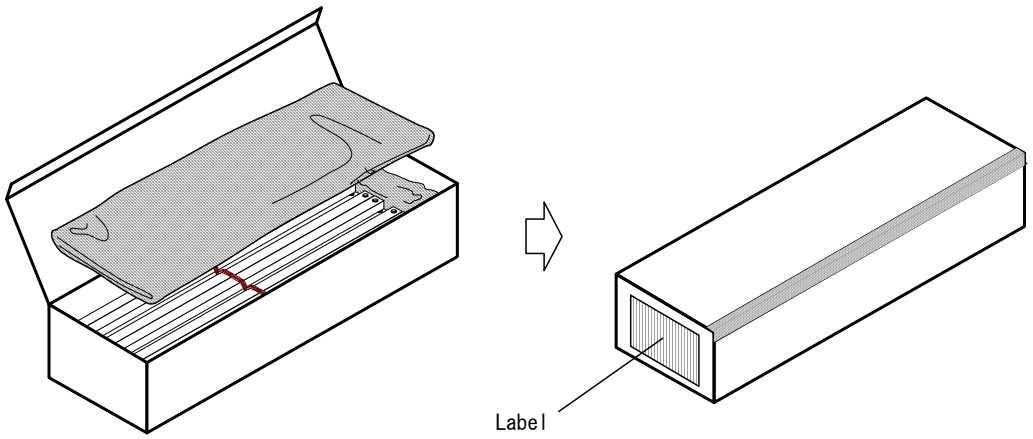
■ PACKING SPEC

UNIT: mm

STICK DIMENSIONS



PACKING STATE



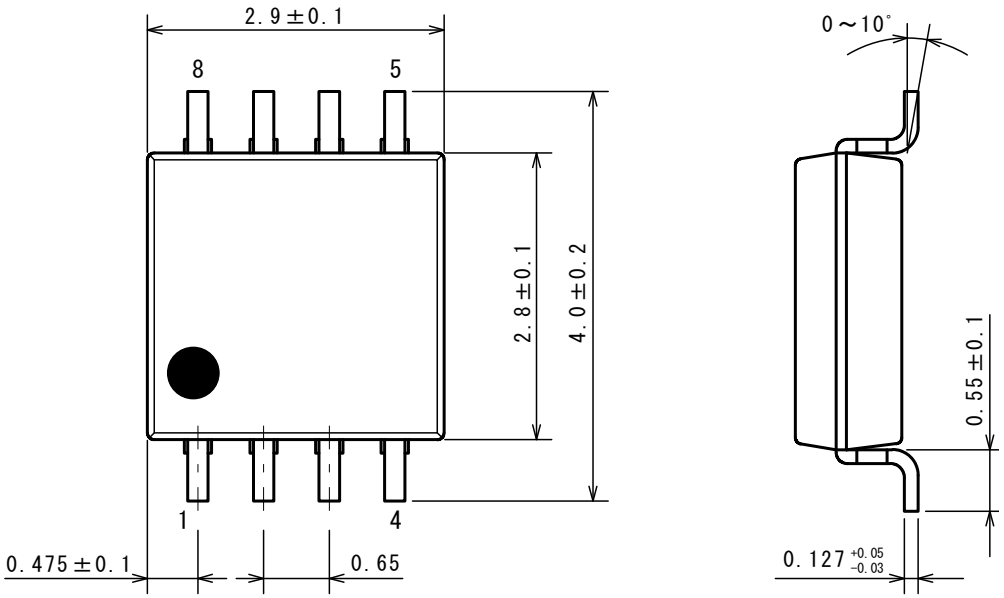
Nisshinbo Micro Devices Inc.

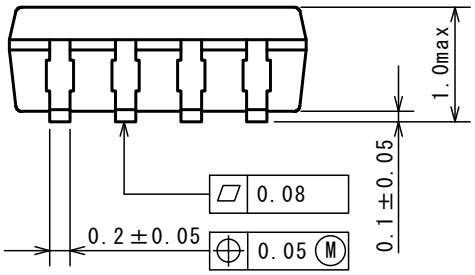
MSOP8 MEET JEDEC MO-187-DA / THIN TYPE (TVSP8)

PI-MSOP8 / THIN TYPE-E-B

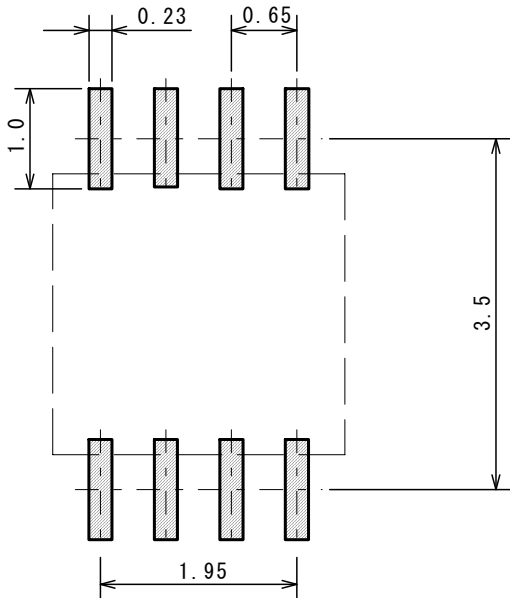
■ PACKAGE DIMENSIONS

UNIT: mm





■ EXAMPLE OF SOLDER PADS DIMENSIONS



Nisshinbo Micro Devices Inc.

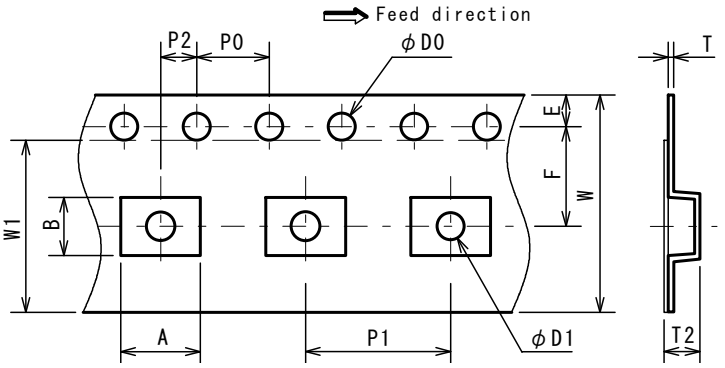
MSOP8 MEET JEDEC MO-187-DA / THIN TYPE (TVSP8)

PI-MSOP8 / THIN TYPE-E-B

■ PACKING SPEC

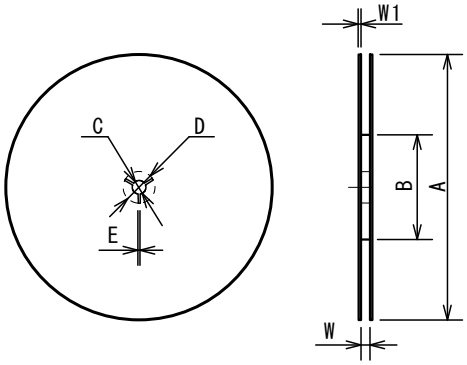
UNIT: mm

TAPING DIMENSIONS



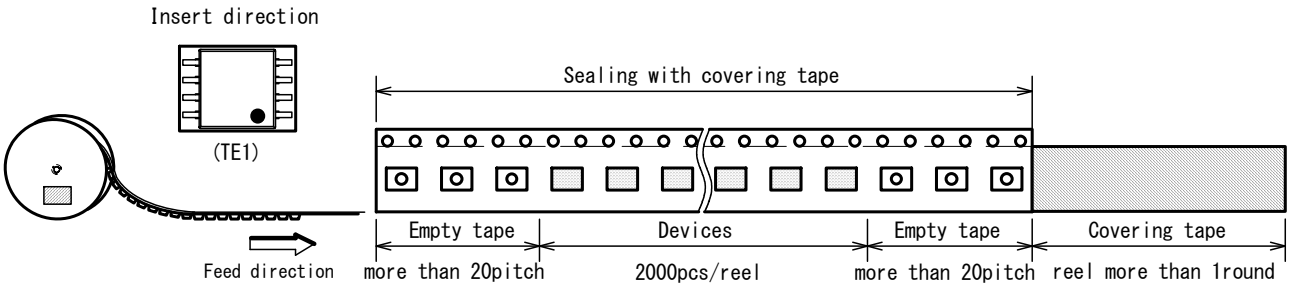
SYMBOL	DIMENSION	REMARKS
A	4.4	BOTTOM DIMENSION
B	3.2	BOTTOM DIMENSION
D0	$1.5^{+0.1}_{0}$	
D1	$1.5^{+0.1}_{0}$	
E	1.75±0.1	
F	5.5±0.05	
P0	4.0±0.1	
P1	8.0±0.1	
P2	2.0±0.05	
T	0.30±0.05	
T2	1.75 (MAX.)	
W	12.0±0.3	
W1	9.5	THICKNESS 0.1max

REEL DIMENSIONS

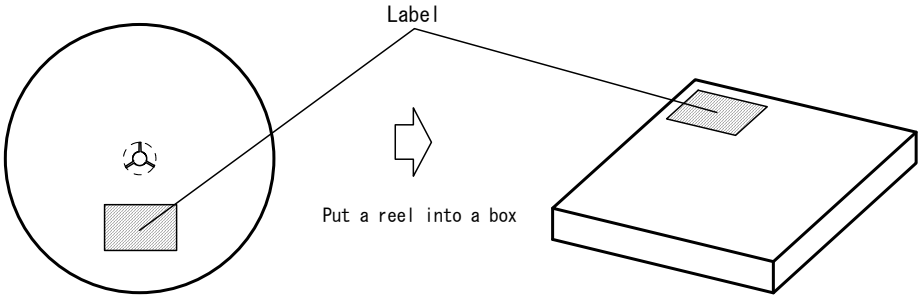


SYMBOL	DIMENSION
A	φ254±2
B	φ100±1
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	13.5±0.5
W1	2.0±0.2

TAPING STATE



PACKING STATE



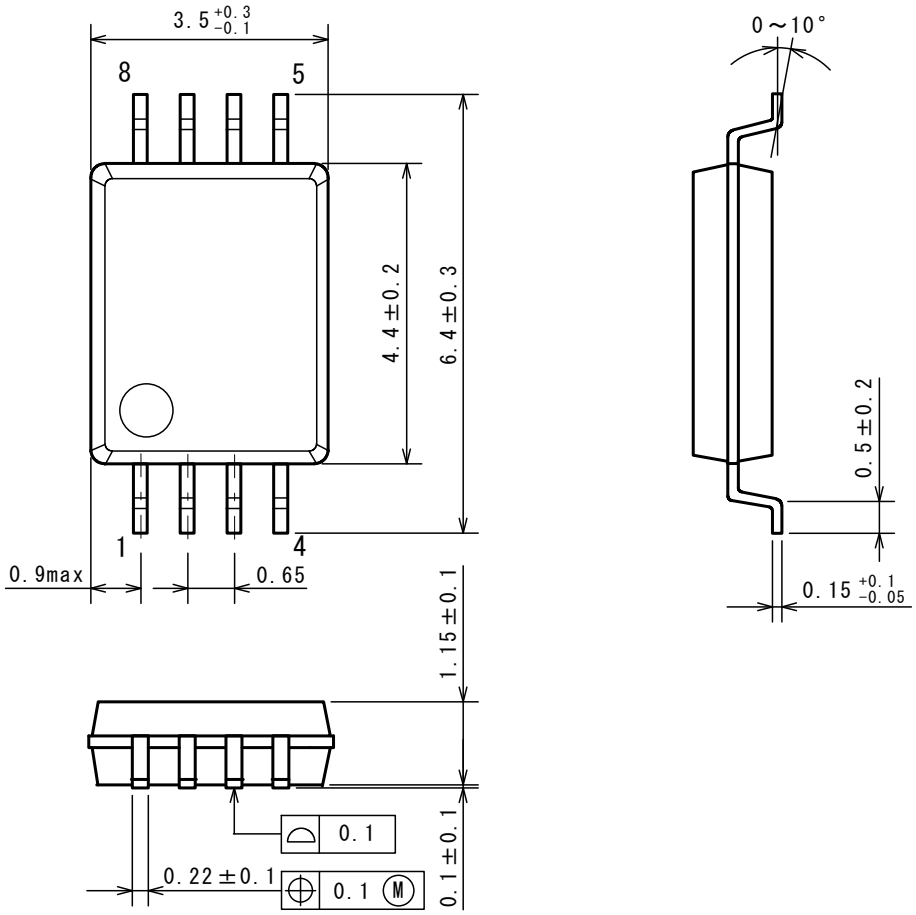
Nisshinbo Micro Devices Inc.

SSOP8

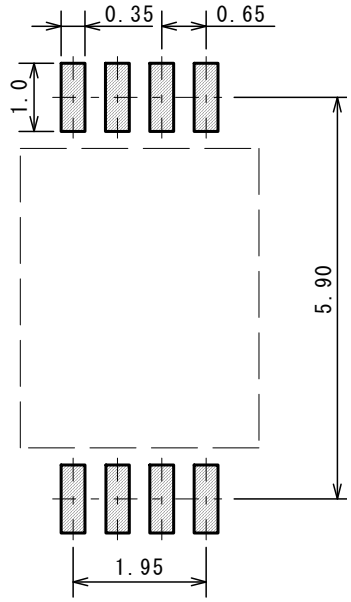
PI-SSOP8-E-B

■ PACKAGE DIMENSIONS

UNIT: mm



■ EXAMPLE OF SOLDER PADS DIMENSIONS



Nisshinbo Micro Devices Inc.

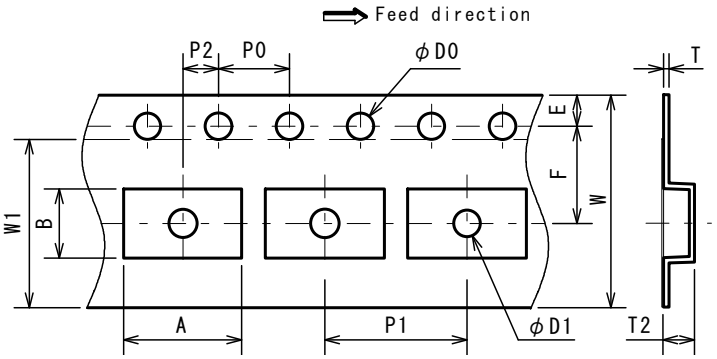
SSOP8

PI-SSOP8-E-B

■ PACKING SPEC

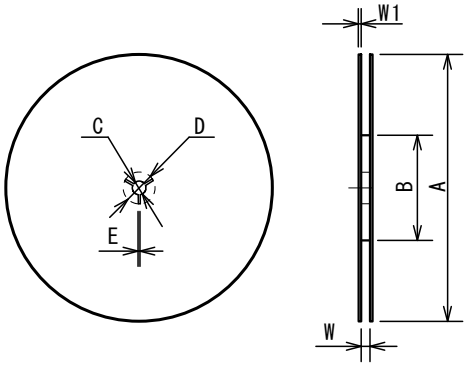
UNIT: mm

TAPING DIMENSIONS



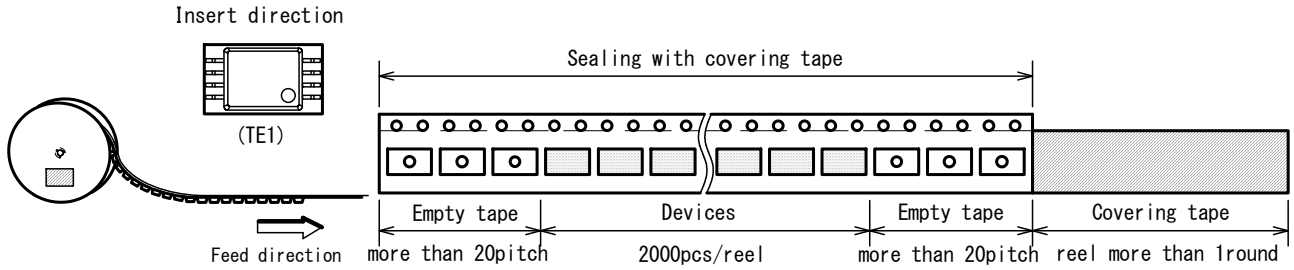
SYMBOL	DIMENSION	REMARKS
A	6.7	BOTTOM DIMENSION
B	3.9	BOTTOM DIMENSION
D0	1.55±0.05	
D1	1.55±0.1	
E	1.75±0.1	
F	5.5±0.05	
P0	4.0±0.1	
P1	8.0±0.1	
P2	2.0±0.05	
T	0.3±0.05	
T2	2.2	
W	12.0±0.3	
W1	9.5	THICKNESS 0.1max

REEL DIMENSIONS

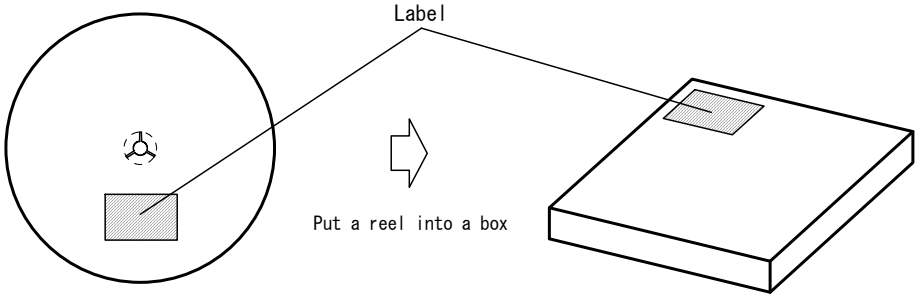


SYMBOL	DIMENSION
A	φ254±2
B	φ100±1
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	13.5±0.5
W1	2±0.2

TAPING STATE



PACKING STATE



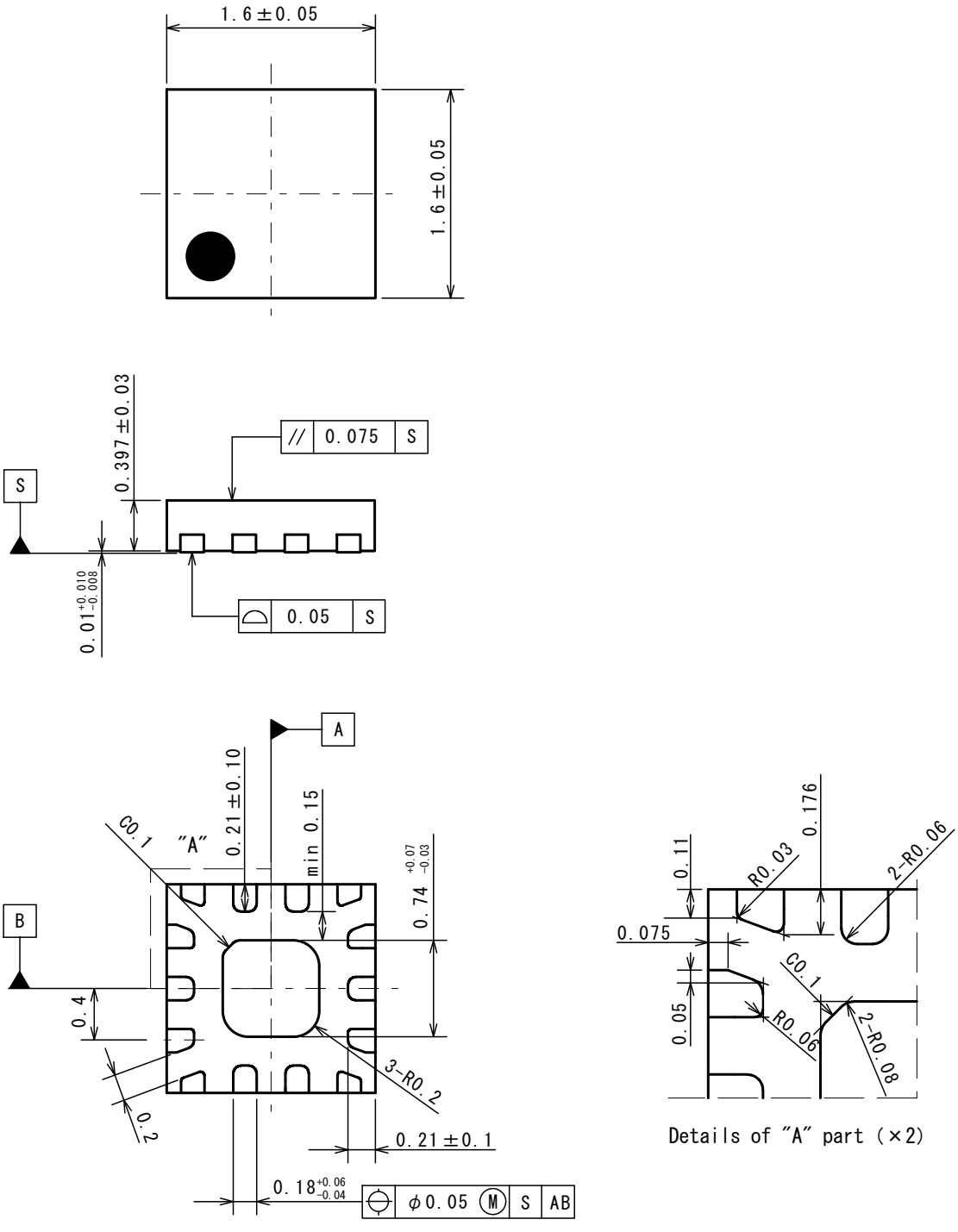
Nisshinbo Micro Devices Inc.

EQFN14-D7

PI-EQFN14-D7-E-B

■ PACKAGE DIMENSIONS

UNIT: mm



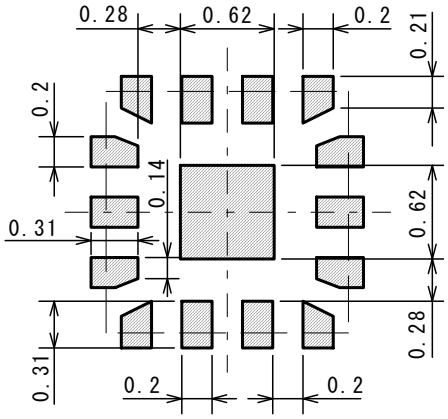
Nisshinbo Micro Devices Inc.

EQFN14-D7

PI-EQFN14-D7-E-B

■ EXAMPLE OF SOLDER PADS DIMENSIONS

UNIT: mm



Nisshinbo Micro Devices Inc.

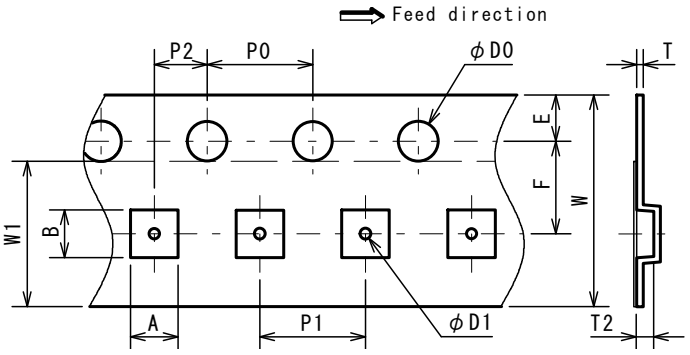
EQFN14-D7

PI-EQFN14-D7-E-B

■ PACKING SPEC

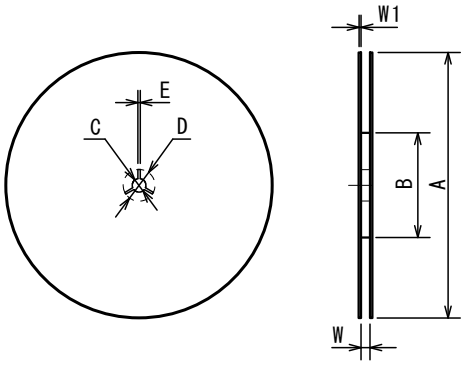
UNIT: mm

TAPING DIMENSIONS



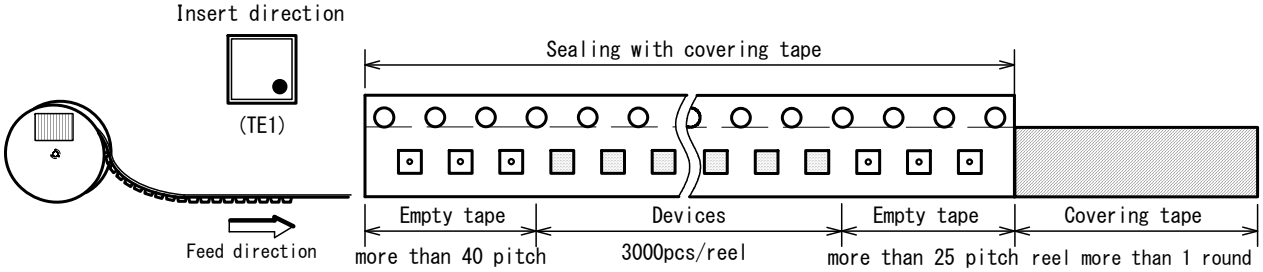
SYMBOL	DIMENSION	REMARKS
A	1.85±0.05	BOTTOM DIMENSION
B	1.85±0.05	BOTTOM DIMENSION
D0	$1.5^{+0.1}_{0}$	
D1	0.5±0.1	
E	1.75±0.1	
F	3.5±0.05	
P0	4.0±0.1	
P1	4.0±0.1	
P2	2.0±0.05	
T	0.25±0.05	
T2	0.65±0.05	
W	8.0±0.2	
W1	5.5	THICKNESS 0.1max

REEL DIMENSIONS

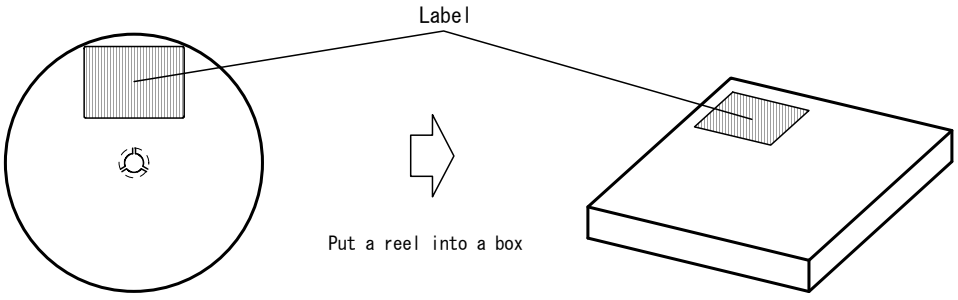


SYMBOL	DIMENSION
A	$\phi 180^{0}_{-1.5}$
B	$\phi 60^{+1}_{0}$
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	$9^{+0.3}_{0}$
W1	1.2

TAPING STATE



PACKING STATE



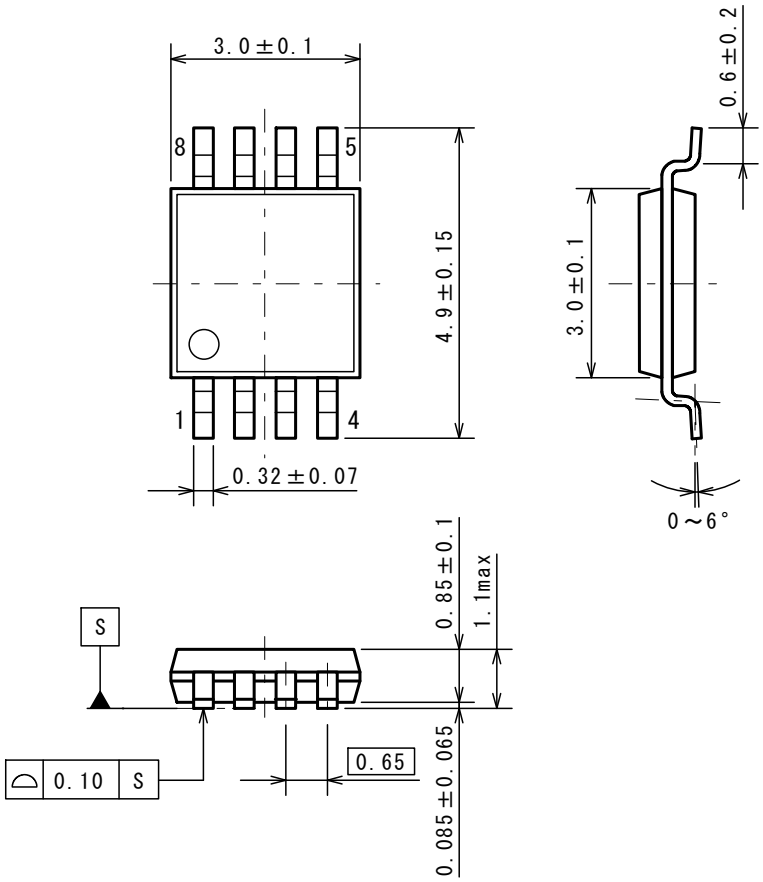
Nisshinbo Micro Devices Inc.

MSOP-8-BM

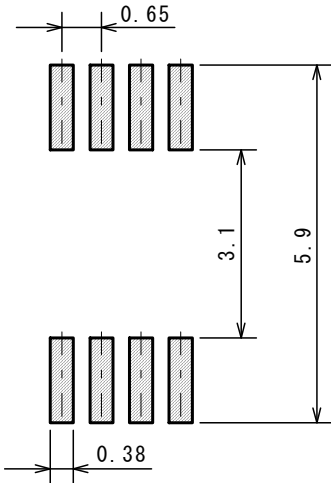
PI-MSOP-8-BM-E-A

■ PACKAGE DIMENSIONS

UNIT: mm



■ EXAMPLE OF SOLDER PADS DIMENSIONS



Nisshinbo Micro Devices Inc.

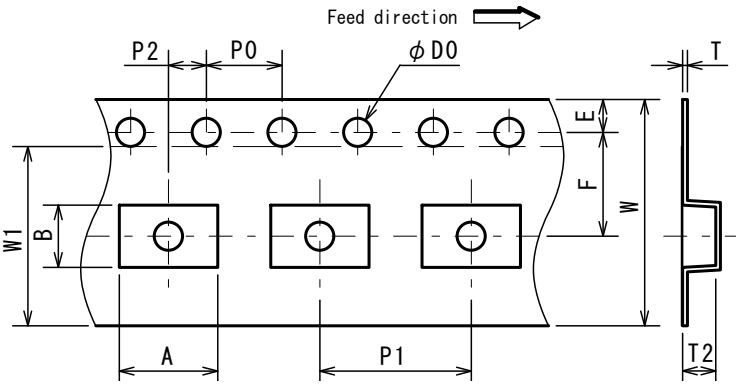
MSOP-8-BM

PI-MSOP-8-BM-E-A

■ PACKING SPEC

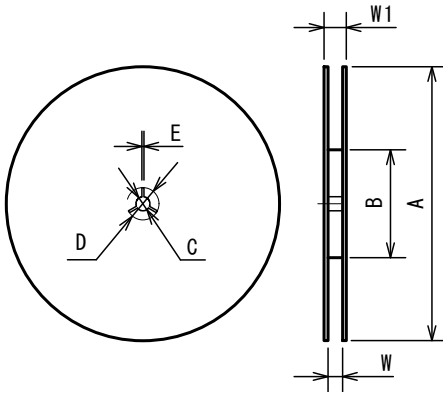
UNIT: mm

TAPING DIMENSIONS



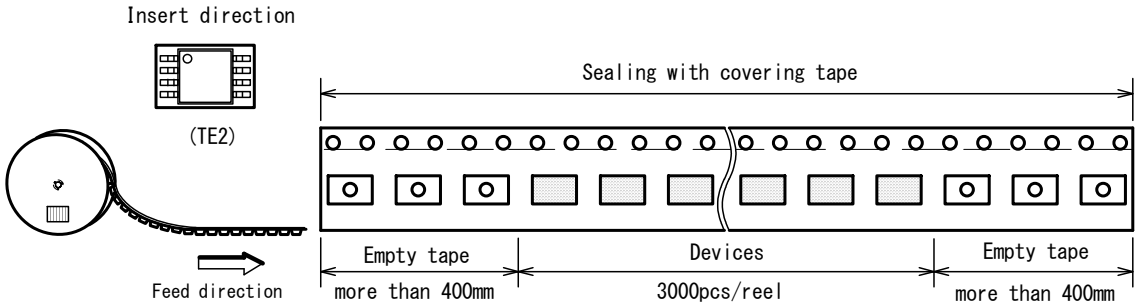
SYMBOL	DIMENSION	REMARKS
A	5.2	BOTTOM DIMENSION
B	3.3	BOTTOM DIMENSION
D0	$1.5^{+0.1}_{0}$	
D1	$1.5^{+0.1}_{0}$	
E	1.75±0.1	
F	5.5±0.05	
P0	4.0±0.1	
P1	8.0±0.1	
P2	2.0±0.05	
T	0.25±0.02	
T2	1.5±0.1	
W	$12.0^{+0.3}_{-0.1}$	
W1	9.5±0.1	THICKNESS 0.048

REEL DIMENSIONS

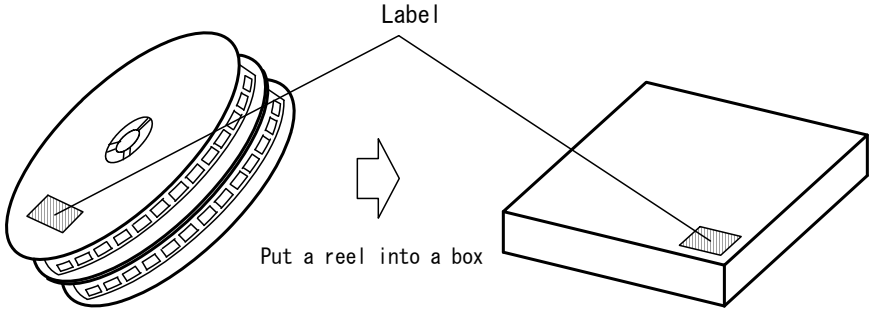


SYMBOL	DIMENSION
A	φ330±1
B	φ100±0.05
C	φ 13±0.2
D	φ 21.0
E	1.9±0.4
W	12.4^{+1}_{0}
W1	17.6^{+1}_{0}

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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