DUAL AUDIO OPERATIONAL AMPLIFIER

FEATURES

- Supply Voltage ±2V to ±18V
- Low Input Noise Voltage 5nV/√Hz typ. at f=1kHz
- Wide Gain Bandwidth Product 15 MHz typ.
- Low Distortion 0.0005% typ.
- Slew Rate 5V/μs typ.
- Bipolar Technology
- Package Outline SOP8
  MSOP8 (TVSP8)*
  *meet JEDEC MO-187-DA / thin type
  SSOP8
- Internal ESD Protection
  Human Body Model (HBM) ±2000V typ.
- Wide Temperature Range -40°C to 125°C

APPLICATIONS

- Home Audio
- Car Audio
- Active Filters
- Servo Control Amplifiers
- Headphone Amplifiers

DESCRIPTION

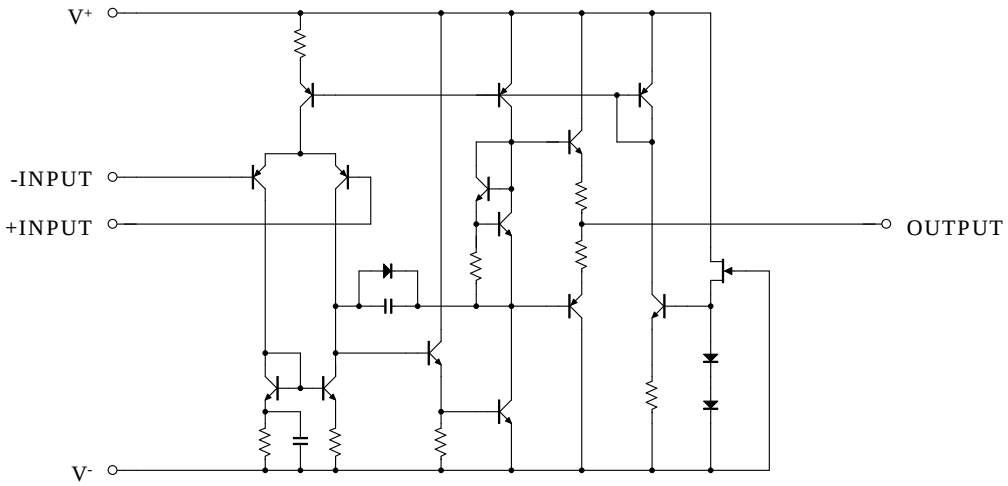
The NJM8080 is dual operational amplifier designed for audio applications. NJM8080 finely refines to every detail from Si-wafer to circuit layout, stick in a thorough improvement in sound quality. The NJM8080 features high resolution and crispy-clear high frequency sound, which can fully perform the digital sound source with loss-less.

NJM8080 features low noise, wide gain-bandwidth, low distortion and high output current, and various reliabilities and conveniences are improved. NJM8080 can widely be used as the standard audio operational amplifier.

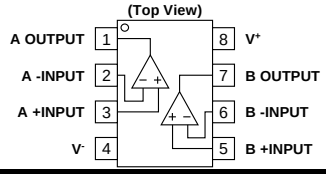
■ RELATED PRODUCT

PRODUCT NAME	FEATURES
NJM8068	3.5nV/√Hz, 0.001%, 6.8V/μs, 19MHz (Low noise, low distortion audio Op-Amp)

■ EQUIVALENT CIRCUIT



■ PIN CONFIGURATIONS

PRODUCT NAME	NJM8080G	NJM8080RB1	NJM8080V
Package	SOP8	MSOP8 (TVSP8)	SSOP8
Pin Functions			

■ PRODUCT NAME INFORMATION

NJM8080 G (TE2)

Part Number Package Taping Form

■ ORDER INFORMATION

PRODUCT NAME	PACKAGE	RoHS	HALOGEN-FREE	TERMINAL FINISH	MARKING	WEIGHT (mg)	MOQ (pcs)
NJM8080G	SOP8	Yes	Yes	Pure Sn	8080	88	2500
NJM8080RB1	MSOP8 (TVSP8)	Yes	Yes	Sn2Bi	8080	18	2000
NJM8080V	SSOP8	Yes	Yes	Sn2Bi	8080	42	2000

■ ABSOLUTE MAXIMUM RATINGS

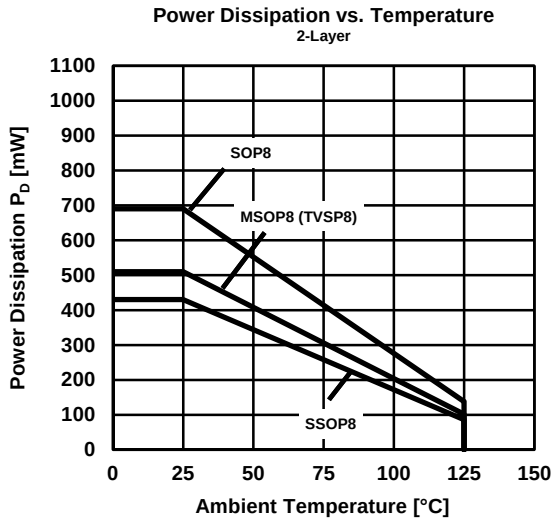
PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V^+/V^-	±18	V
Differential Input Voltage(1)	V_{ID}	±36	V
Input Voltage(2)	V_{IN}	V^--0.3 to V^-+36	V
Output Terminal Input Voltage	V_O	V^--0.3 to V^++0.3	V
Power Dissipation(3) SOP8 MSOP8 (TVSP8) SSOP8	P_D	2-Layer / 4-Layer(4) 690 / 1000 510 / 680 430 / 540	mW
Storage Temperature Range	T_{stg}	-65 to 150	ºC
Maximum Junction Temperature	T_{jmax}	150	ºC

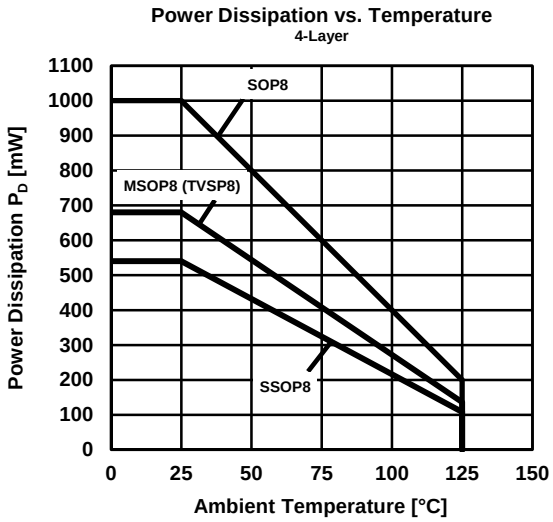
■ THERMAL CHARACTERISTICS

PACKAGE	SYMBOL	VALUE	UNIT
Junction-to-Ambient Thermal Resistance SOP8 MSOP8 (TVSP8) SSOP8	Θja	2-Layer / 4-Layer(4) 181 / 125 245 / 184 291 / 231	°C/W
Junction-to-Top of Package Characterization Parameter SOP8 MSOP8 (TVSP8) SSOP8	Ψjt	2-Layer / 4-Layer(4) 49 / 43 51 / 45 46 / 45	°C/W

(1) Differential voltage is the voltage difference between +INPUT and -INPUT.
(2) Input voltage is the voltage should be allowed to apply to the input terminal independent of the magnitude of V^+.
The normal operation will establish when any input is within the "Common-Mode Input Voltage Range" of electrical characteristics.
(3) Power dissipation is the power that can be consumed by the IC at Ta=25ºC, and is the typical measured value based on JEDEC condition.
(4) 2-Layer: Mounted on glass epoxy board. (76.2×114.3×1.6 mm: based on EIA/JDEC standard, 2-layer FR-4)
4-Layer: Mounted on glass epoxy board. (76.2×114.3×1.6 mm: based on EIA/JDEC standard, 4-layer FR-4), internal Cu area: 74.2 x 74.2 mm

■ POWER DISSIPATION vs. AMBIENT TEMPERATURE





RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	CONDITIONS	VALUE	UNIT
Supply Voltage	V^+/V^-	Ta=25°C	±2 to ±18	V
Operating Temperature Range	T_{opr}		-40 to 125	°C

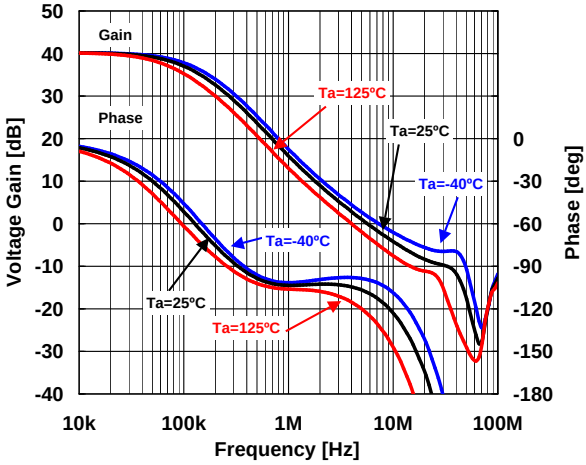
■ ELECTRICAL CHARACTERISTICS (V^+/V^-=±15V, Ta=25°C, unless otherwise noted.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
INPUT/OUTPUT CHARACTERISTICS						
Input Offset Voltage	V_{IO}	R_S≤10kΩ	-	0.3	3	mV
Input Bias Current	I_B		-	100	500	nA
Input Offset Current	I_{IO}		-	5	200	nA
Input Resistance	R_{IN}		-	0.5	-	MΩ
Open-Loop Voltage Gain	A_V	R_L≥2kΩ,V_O=±10V	90	110	-	dB
Maximum Output Voltage	V_{OM}	R_L≥2kΩ	±12	±13.5	-	V
Common-Mode Input Voltage Range	V_{ICM}		±12	±13.5	-	V
Common-Mode Rejection Ratio	CMR	R_S≤10kΩ	80	110	-	dB
POWER SUPPLY						
Supply Voltage Rejection Ratio	SVR	R_S≤10kΩ	80	110	-	dB
Supply Current	I_{SUPPLY}		-	6	9	mA
AC CHARACTERISTICS						
Slew Rate	SR	R_L≥2kΩ	-	5	-	V/μs
Gain Bandwidth Product	GBW	f=10kHz	-	15	-	MHz
Total Harmonic Distortion + Noise	THD+N	A_V=20dB,V_O=5V,R_L=2kΩ,f=1kHz	-	0.0005	-	%
Equivalent Input Noise Voltage	e_n	f=1kHz	-	5	-	nV/√Hz

■ TYPICAL CHARACTERISTICS

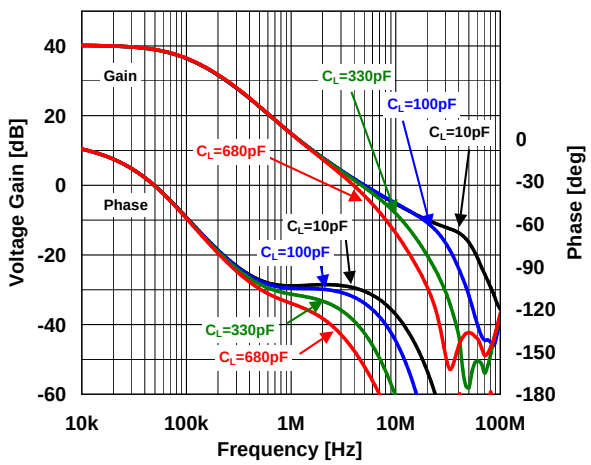
Gain/Phase vs. Frequency

V^+/V^-=±15V, Gv=40dB, R_L=2kΩ, C_L=10pF



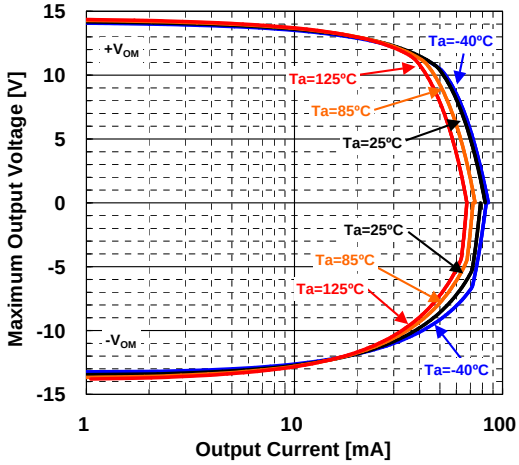
Gain/Phase vs. Frequency

V^+/V^-=±15V, Gv=40dB, R_L=2kΩ, Ta=25°C



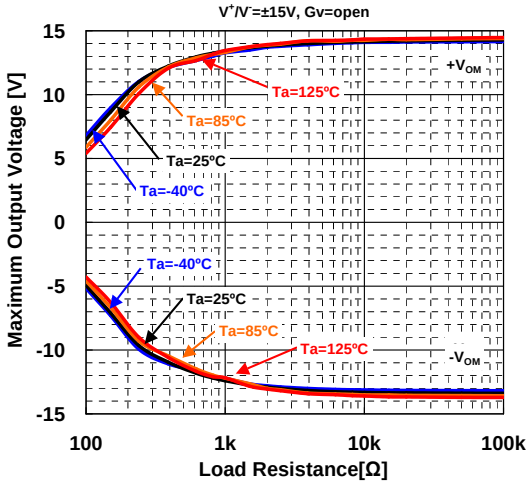
Maximum Output Voltage vs. Output Current

V^+/V^-=±15V



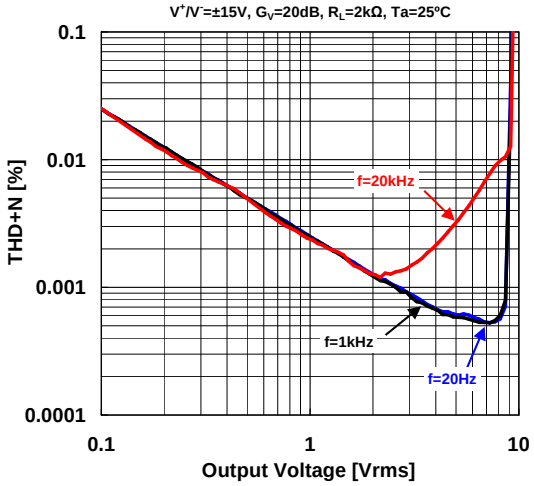
Maximum Output Voltage vs. Load Resistance

V^+/V^-=±15V, Gv=open



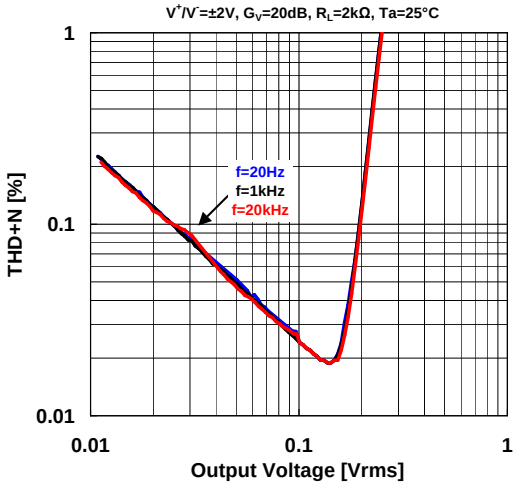
THD+N vs. Output Voltage

V^+/V^-=±15V, G_V=20dB, R_L=2kΩ, Ta=25°C



THD+N vs. Output Voltage

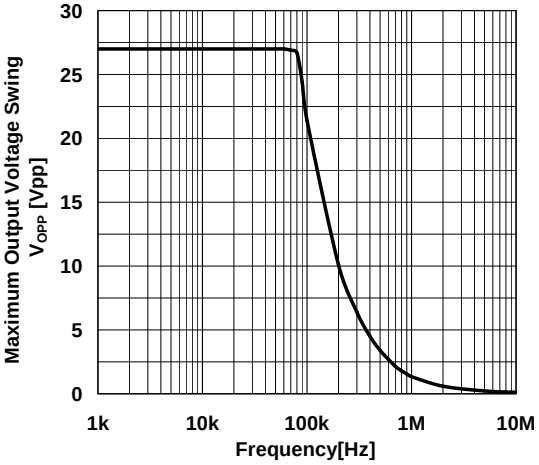
V^+/V^-=±2V, G_V=20dB, R_L=2kΩ, Ta=25°C



■ TYPICAL CHARACTERISTICS

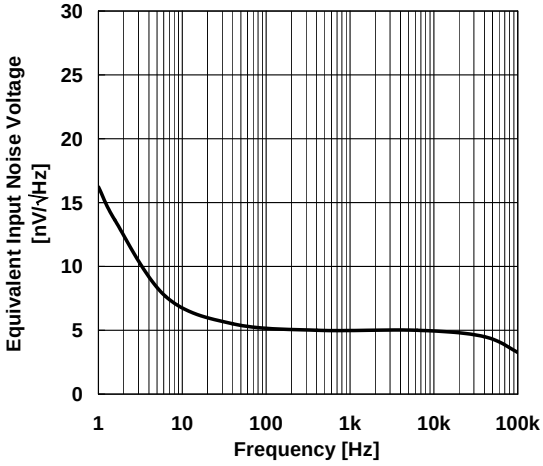
Maximum Output Voltage Swing vs. Frequency

V^+/V^-=±15V, R_L=2kΩ, Ta=25°C



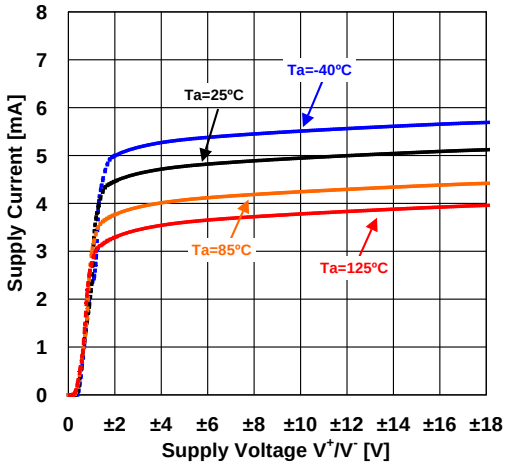
Voltage Noise vs. Frequency

V^+/V^-=±15V, G_V=40dB, R_F=2kΩ, Ta=25°C



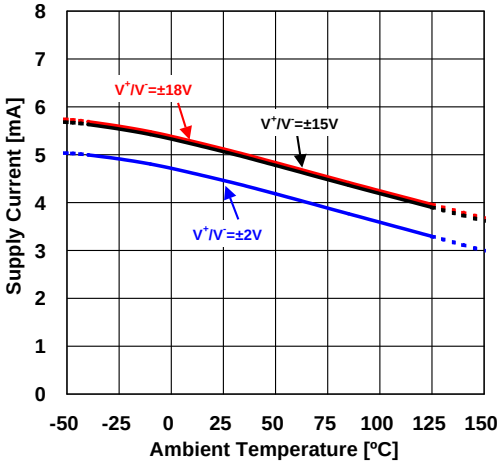
Supply Current vs. Supply Voltage

R_L=open

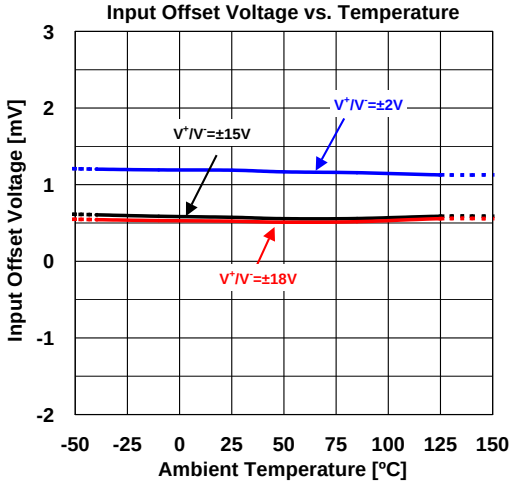


Supply Current vs. Temperature

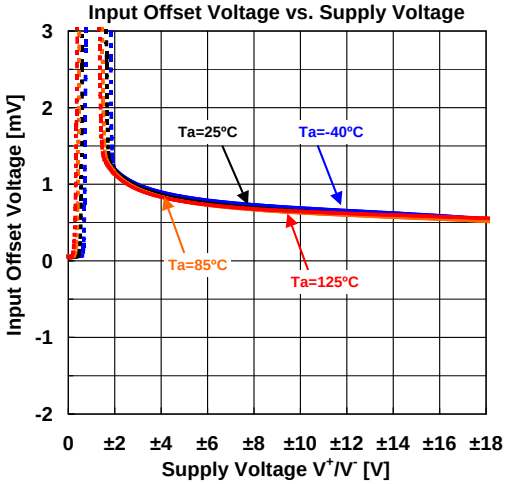
R_L=open



Input Offset Voltage vs. Temperature

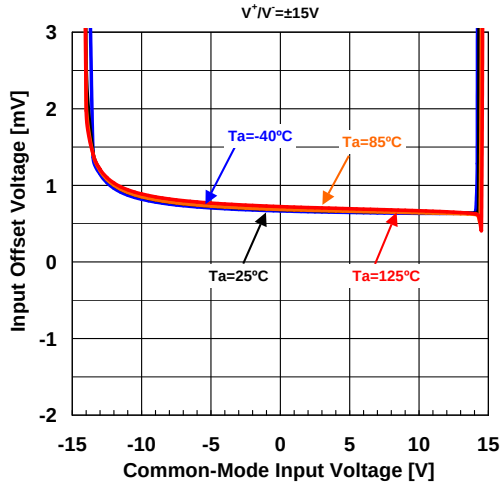


Input Offset Voltage vs. Supply Voltage

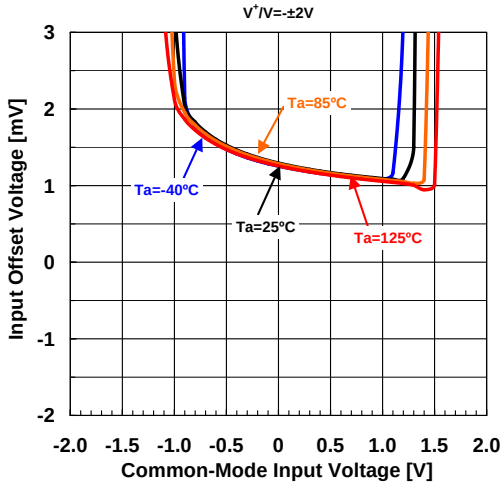


■ TYPICAL CHARACTERISTICS

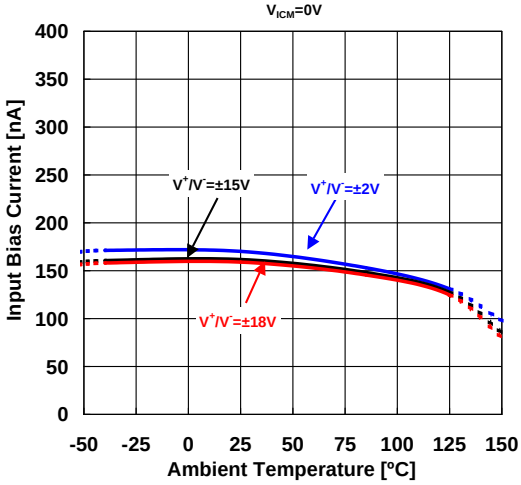
Input Offset Voltage
vs. Common-Mode Input Voltage
V^+/V^-=±15V



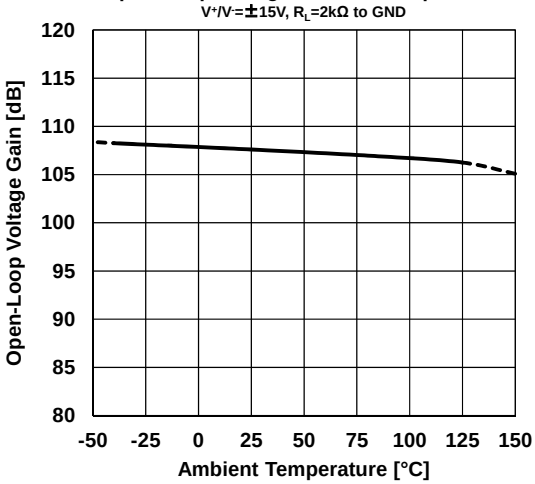
Input Offset Voltage
vs. Common-Mode Input Voltage
V^+/V^-=-±2V



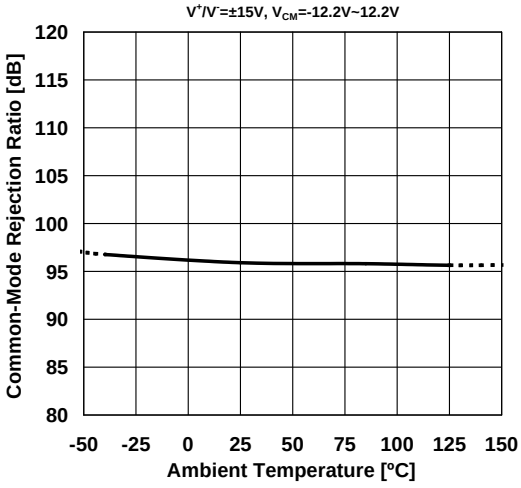
Input Bias Current vs. Temperature
V_{ICM}=0V



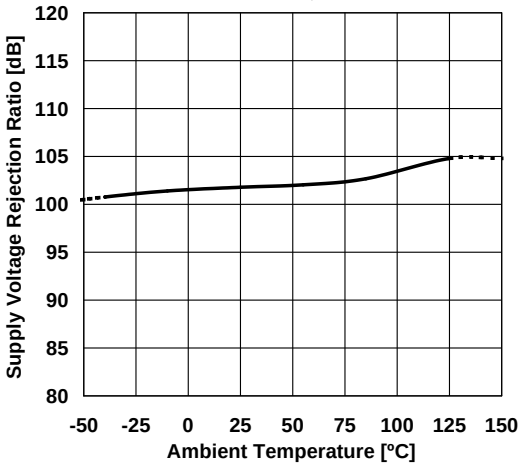
Open-Loop Voltage Gain vs. Temperature
V^+/V^-=±15V, R_L=2kΩ to GND



CMR vs. Temperature
V^+/V^-=±15V, V_{CM}=-12.2V~12.2V

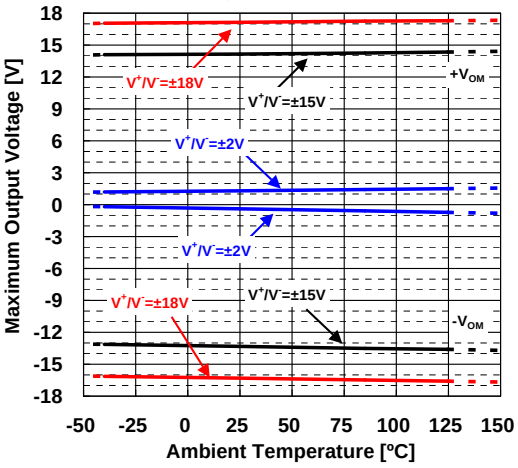


SVR vs. Temperature
V^+/V^-=±9V→±18V

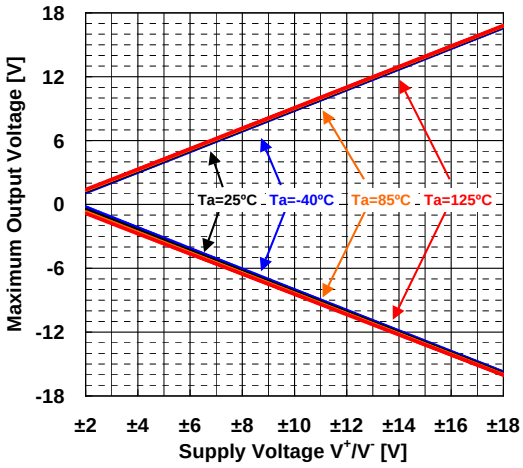


■ TYPICAL CHARACTERISTICS

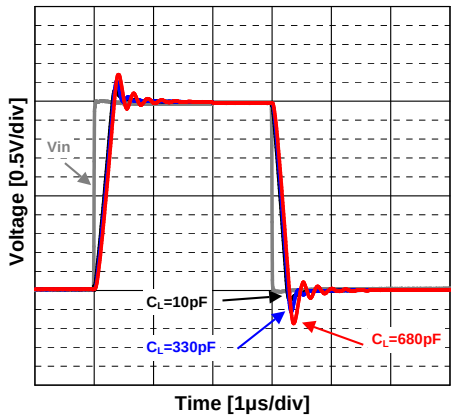
Maximum Output Voltage vs. Temperature
Gv=open, R_L=2kΩ, R_L to GND



Maximum Output Voltage vs. Supply Voltage
R_L=2kΩ to GND

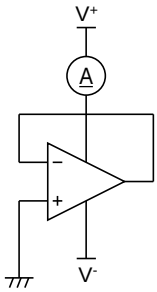


Pulse Response
V^+/V^-=±15V, R_L=2kΩ, Ta=25°C



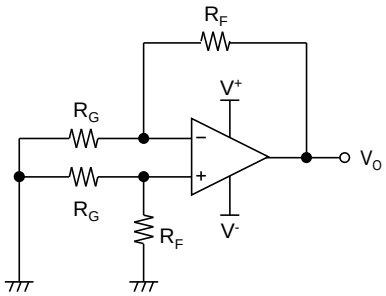
■ TEST CIRCUITS

● I_{SUPPLY}



● V_{IO}, CMR, SVR

R_G=50Ω, R_F=50kΩ



$$V_{IO}=\frac{R_G}{(R_G+R_F)}\times V_O$$

$$CMR=20\log\frac{\Delta V_{COM}\left(1+\frac{R_F}{R_G}\right)}{\Delta V_O}$$

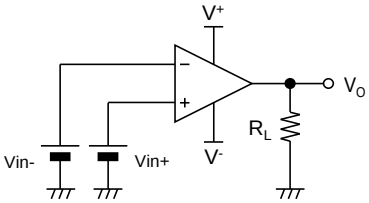
$$SVR=20\log\frac{\Delta V_S\left(1+\frac{R_F}{R_G}\right)}{\Delta V_O}$$

$V_S=V^+-V^-$

● V_{OH}, V_{OL}

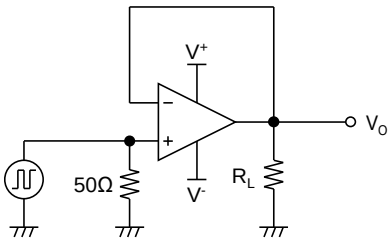
V_{OH}; Vin+ = 1V, Vin- = -1V

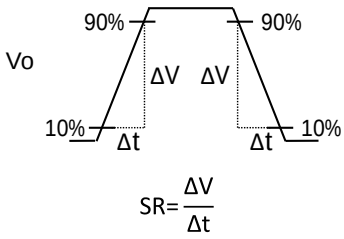
V_{OL}; Vin+ = -1V, Vin- = 1V



● SR

R_L=2kΩ



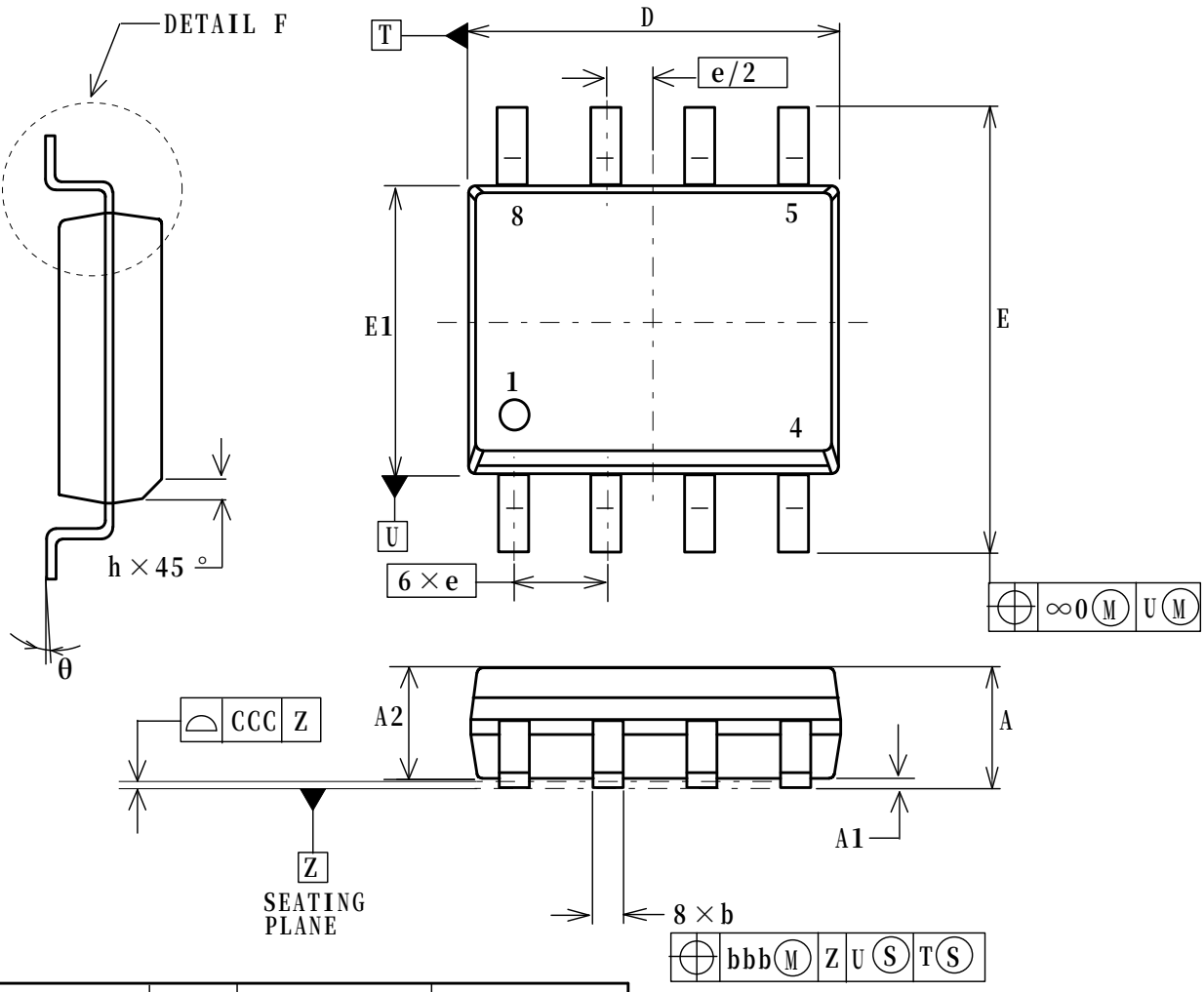


$$SR=\frac{\Delta V}{\Delta t}$$

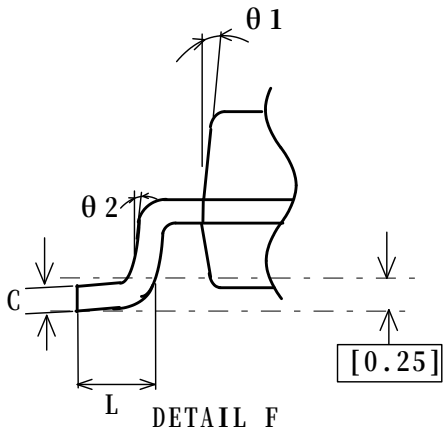
SOP8

Unit: mm

■ PACKAGE DIMENSIONS



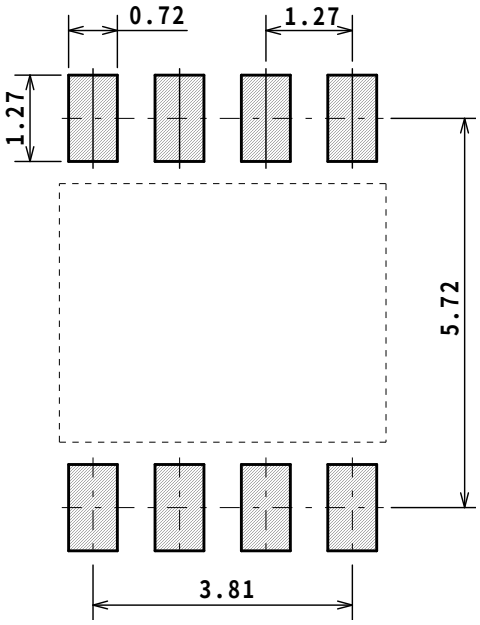
DESCRIPTION	SYMBOL	INCH			MILLIMETER		
		MIN	NOM	MAX	MIN	NOM	MAX
TOTAL THICKNESS	A	.053		.069	1.35		1.75
STAND OFF	A1	.004		.010	0.10		0.25
MOLD THICKNESS	A2	.049		-	1.25		-
LEAD WIDTH	b	.014		.019	0.35		0.49
L/F THICKNESS	C	.007		.010	0.19		0.25
BODY SIZE	D	.189		.197	4.80		5.00
	E1	.150		.157	3.80		4.00
	E	.228		.244	5.80		6.20
LEAD PITCH	e	.050 BSC			1.27 BSC		
	L	.015		.049	0.40		1.25
	h	.010		.020	0.25		0.50
	θ	0 °		7 °	0 °		7 °
	θ1	5 °		15 °	5 °		15 °
	θ2	2 °	7 °	12 °	2 °	7 °	12 °
LEAD EDGE OFFSET	∞0	.010			0.25		
LEAD OFFSET	bbb	.010			0.25		
COPLANARITY	CCC	.004			0.10		



SOP8

Unit: mm

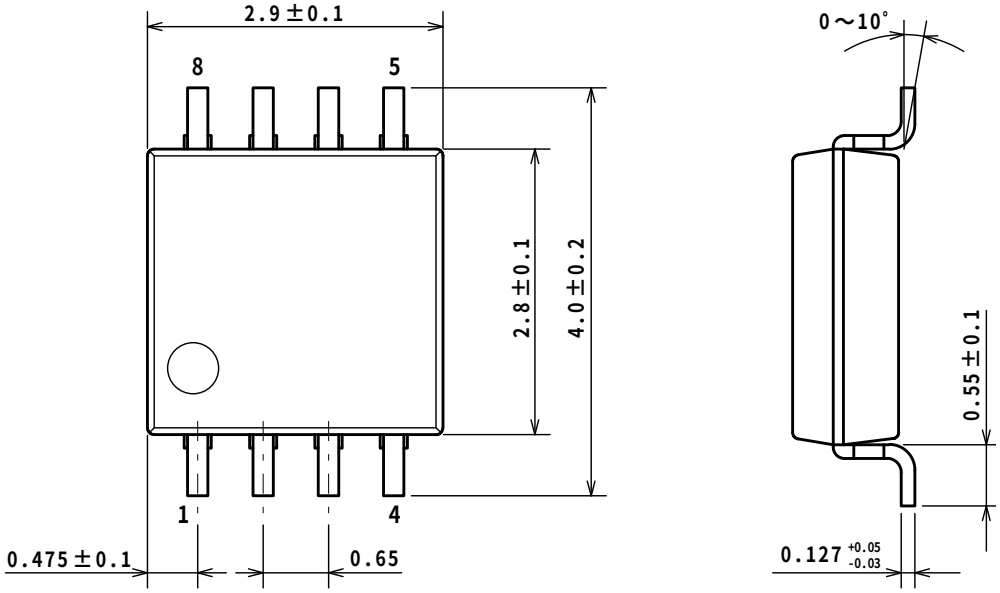
■ EXAMPLE OF SOLDER PADS DIMENSIONS

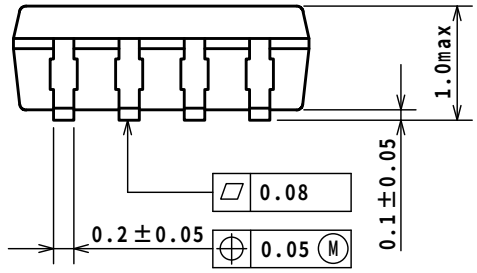


MSOP8 (TVSP8) JEDEC MO-187-DA/THIN TYPE

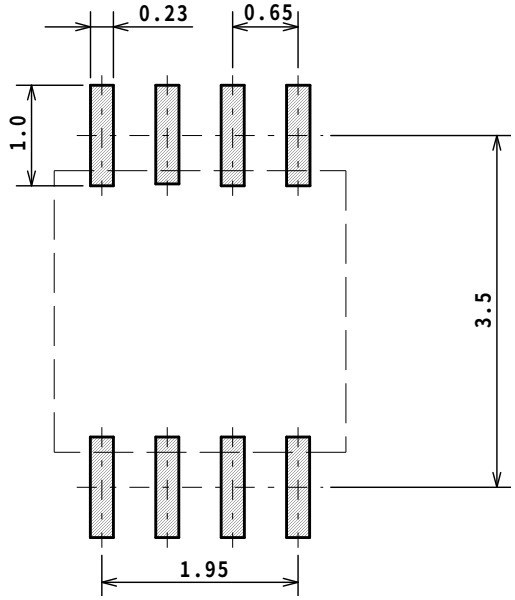
Unit: mm

■ PACKAGE DIMENSIONS





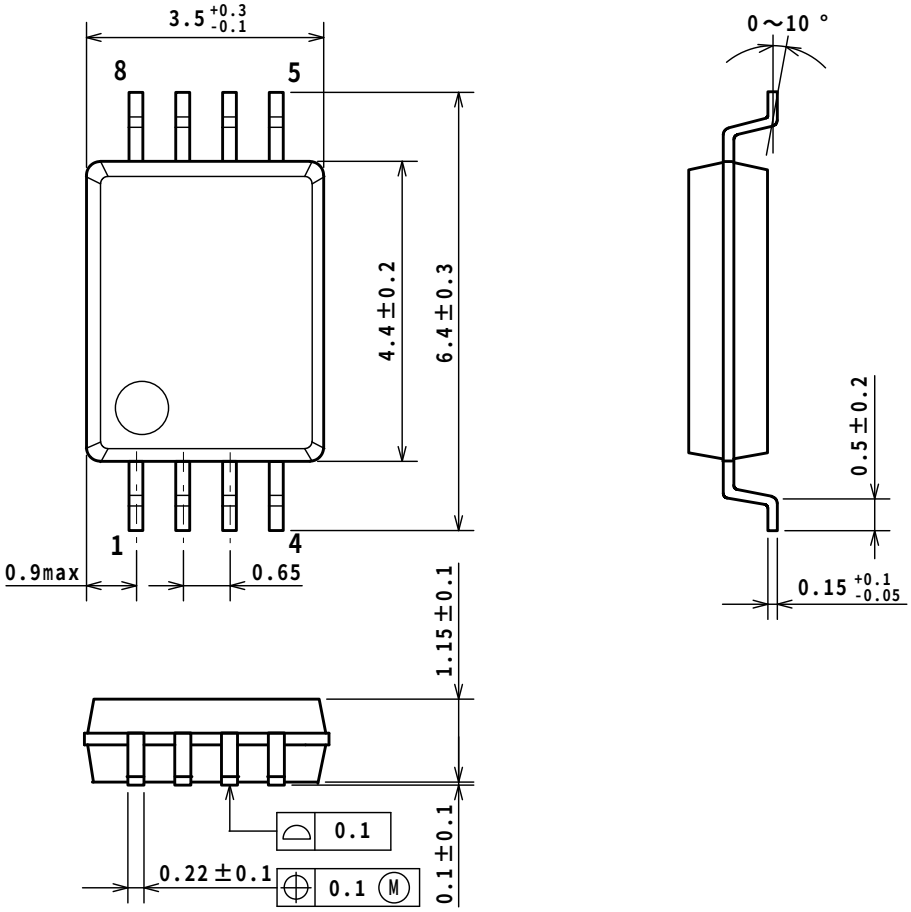
■ EXAMPLE OF SOLDER PADS DIMENSIONS



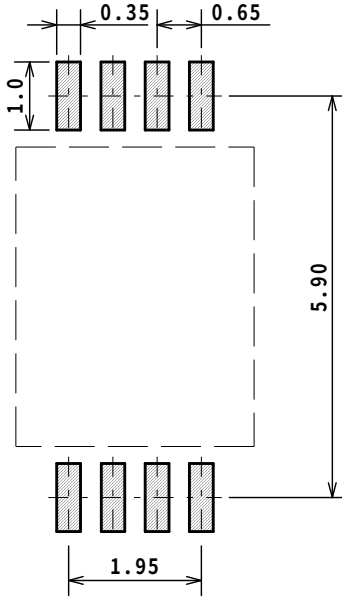
SSOP8

Unit: mm

■ PACKAGE DIMENSIONS



■ EXAMPLE OF SOLDER PADS DIMENSIONS

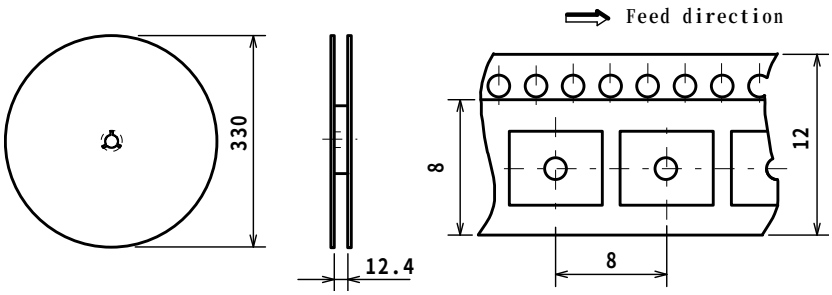


SOP8

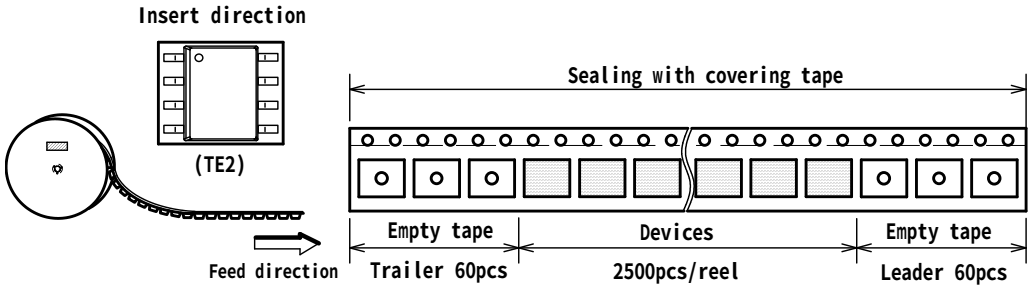
■ PACKING SPEC

Unit: mm

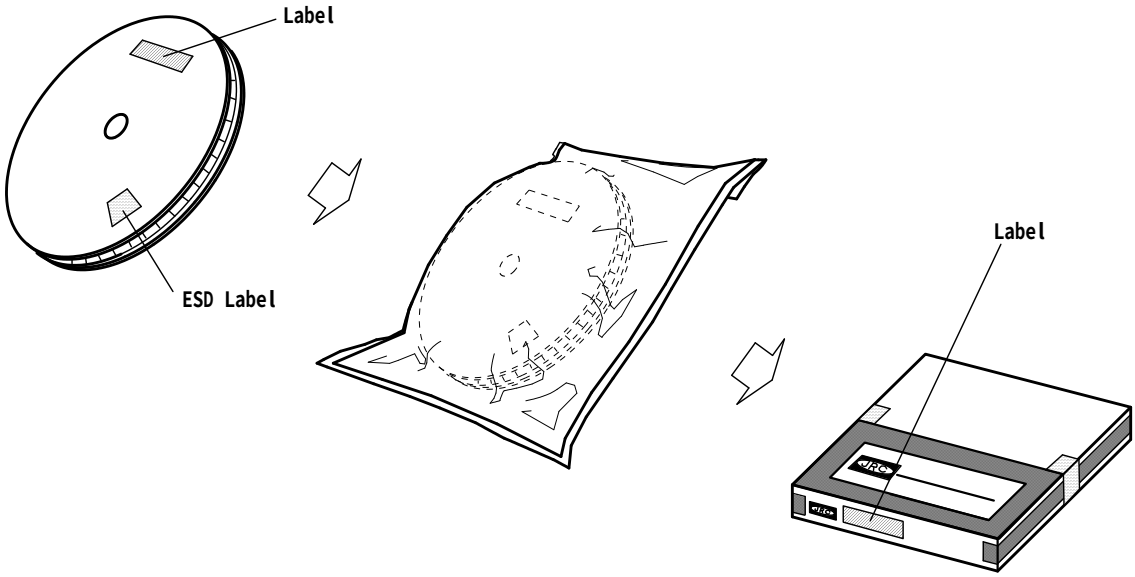
REEL DIMENSIONS / TAPING DIMENSIONS



TAPING STATE



PACKING STATE

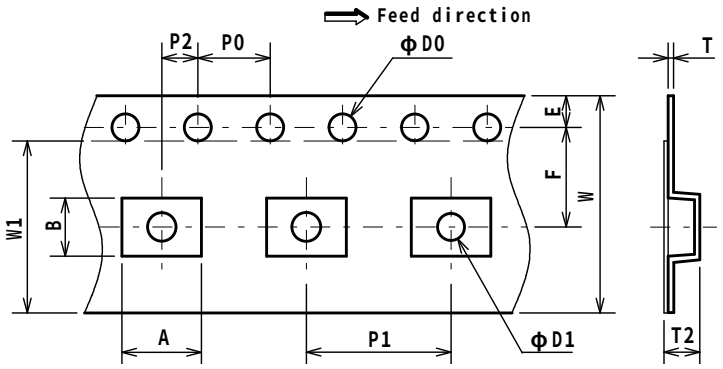


MSOP8 (TVSP8) MEET JEDEC MO-187-DA/THIN TYPE

Unit: mm

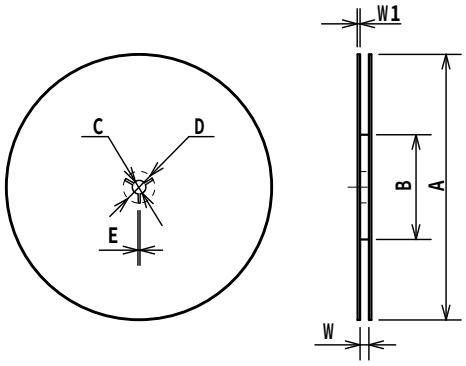
■ PACKING SPEC

TAPING DIMENSIONS



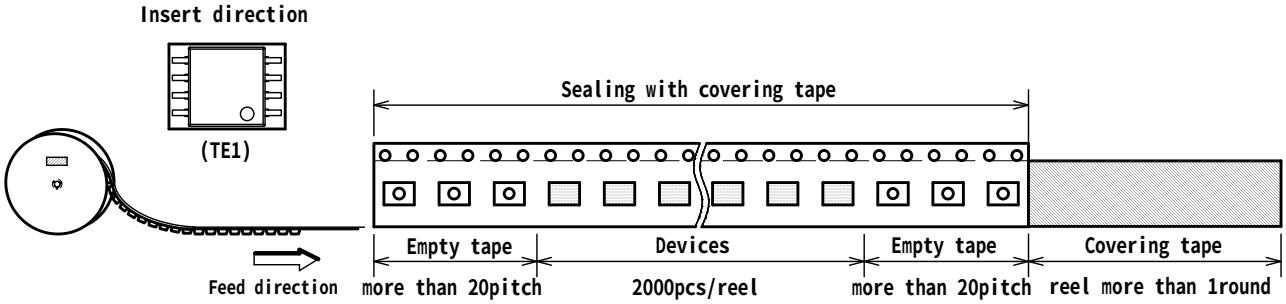
SYMBOL	DIMENSION	REMARKS
A	4.4	BOTTOM DIMENSION
B	3.2	BOTTOM DIMENSION
D0	$1.5^{+0.1}_{0}$	
D1	$1.5^{+0.1}_{0}$	
E	1.75±0.1	
F	5.5±0.05	
P0	4.0±0.1	
P1	8.0±0.1	
P2	2.0±0.05	
T	0.30±0.05	
T2	1.75 (MAX.)	
W	12.0±0.3	
W1	9.5	THICKNESS 0.1max

REEL DIMENSIONS

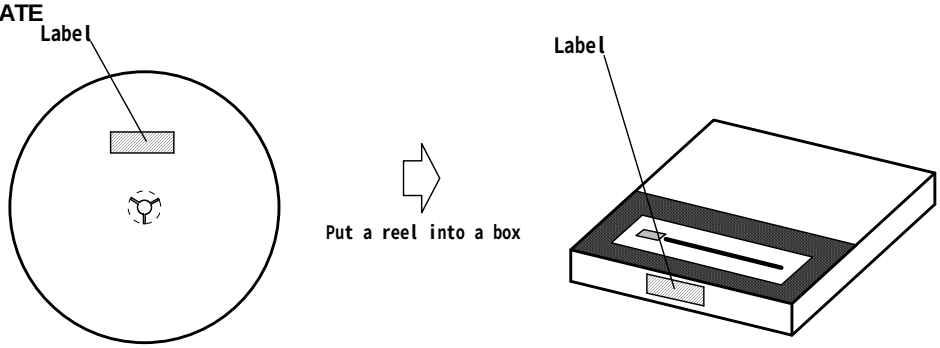


SYMBOL	DIMENSION
A	φ254±2
B	φ100±1
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	13.5±0.5
W1	2.0±0.2

TAPING STATE



PACKING STATE

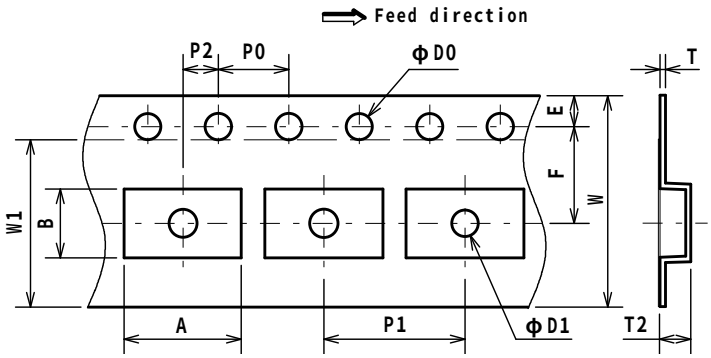


SSOP8

■ PACKING SPEC

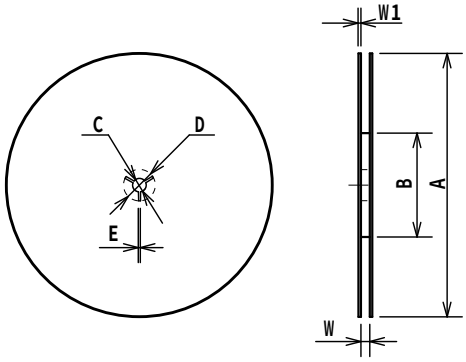
Unit: mm

TAPING DIMENSIONS



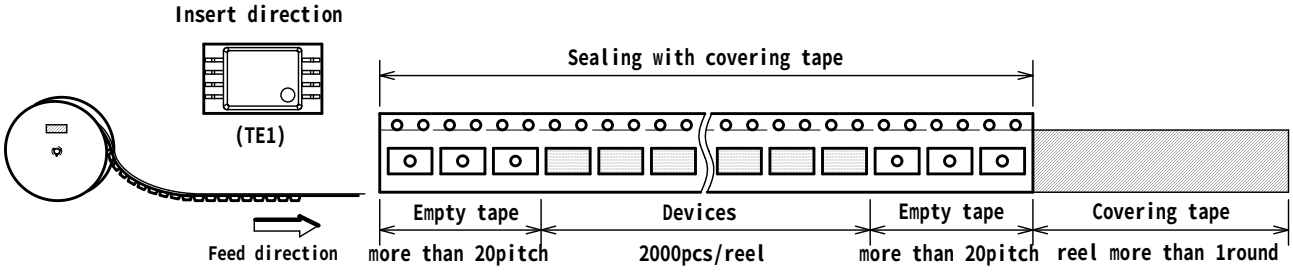
SYMBOL	DIMENSION	REMARKS
A	6.7	BOTTOM DIMENSION
B	3.9	BOTTOM DIMENSION
D0	1.55±0.05	
D1	1.55±0.1	
E	1.75±0.1	
F	5.5±0.05	
P0	4.0±0.1	
P1	8.0±0.1	
P2	2.0±0.05	
T	0.3±0.05	
T2	2.2	
W	12.0±0.3	
W1	9.5	THICKNESS 0.1max

REEL DIMENSIONS

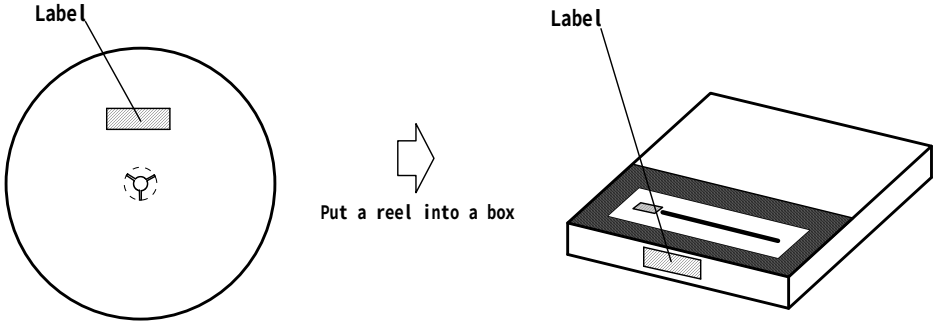


SYMBOL	DIMENSION
A	φ254±2
B	φ100±1
C	φ 13±0.2
D	φ 21±0.8
E	2±0.5
W	13.5±0.5
W1	2±0.2

TAPING STATE

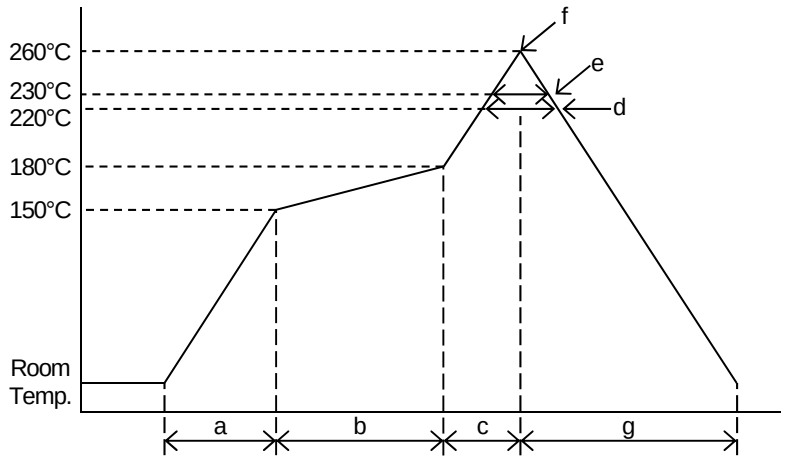


PACKING STATE



■ RECOMMENDED MOUNTING METHOD

INFRARED REFLOW SOLDERING PROFILE



a	Temperature ramping rate	1 to 4°C/s
b	Pre-heating temperature Pre-heating time	150 to 180°C 60 to 120s
c	Temperature ramp rate	1 to 4°C/s
d	220°C or higher time	shorter than 60s
e	230°C or higher time	shorter than 40s
f	Peak temperature	lower than 260°C
g	Temperature ramping rate	1 to 6°C/s

The temperature indicates at the surface of mold package.

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