

## DUAL OPERATIONAL AMPLIFIER

### ■ GENERAL DESCRIPTION

The NJM8065 integrated circuit is a high-gain, wide bandwidth, dual operational amplifier.

The NJM8065 combines many of the features of the NJM4558 as well as providing the capability of wider bandwidth (10MHz typ.), and higher slew rate (4V/μs typ.) make the NJM8065 ideal for active filters, data and telecommunications, and many instrumentation applications.

### ■ PACKAGE OUTLINE



NJM8065G  
(SOP8)



NJM8065M  
(DMP8)



NJM8065RB1  
(MSOP8 (TVSP8))

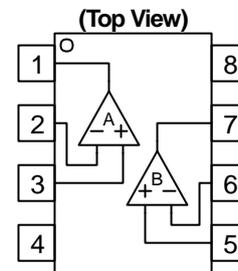


NJM8065V  
(SSOP8)

### ■ FEATURES

- Operating Voltage ±4V to ±18V
- Wide Gain Bandwidth Product 10MHz typ.
- Slew Rate 4V/μs typ.
- Package Outline SOP8, DMP8  
MSOP8 (TVSP8)\*  
\*MEET JEDEC MO-187-DA / THIN TYPE  
SSOP8
- Bipolar Technology
- Internal ESD protection  
Human body model (HBM) ±2000V typ.
- Wide temperature range -40°C to +125°C

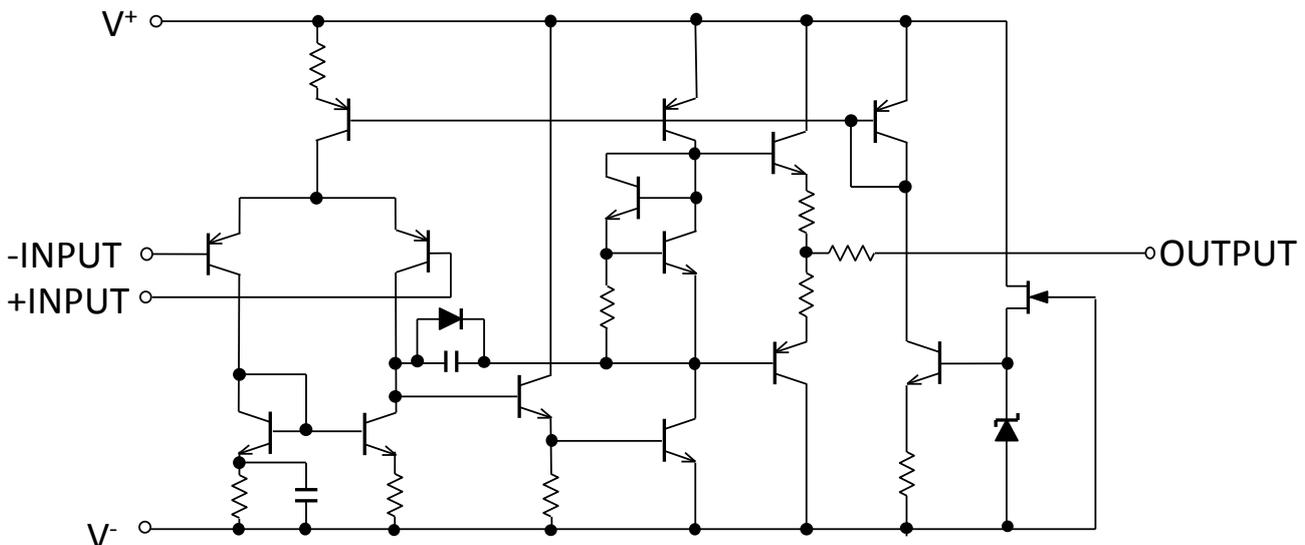
### ■ PIN CONFIGURATION



- PIN FUNCTION**
- 1.A OUTPUT
  - 2.A - INPUT
  - 3.A + INPUT
  - 4.V<sup>-</sup>
  - 5.B + INPUT
  - 6.B - INPUT
  - 7.B OUTPUT
  - 8.V<sup>+</sup>

NJM8065G  
NJM8065M  
NJM8065RB1  
NJM8065V

### ■ EQUIVALENT CIRCUIT ( 1/2 Shown )



# NJM8065

## ■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise noted.)

| PARAMETER                          | SYMBOL                         | RATINGS  | UNIT |
|------------------------------------|--------------------------------|--|------|
| Supply Voltage                     | V <sup>+</sup> /V <sup>-</sup> | ±18  | V    |
| Differential Input Voltage (Note1) | V <sub>ID</sub>                | ±36  | V    |
| Input Voltage (Note2)              | V <sub>IN</sub>                | V <sup>-</sup> -0.3 to V <sup>+</sup> +36  | V    |
| Output Terminal Input Voltage      | V <sub>O</sub>                 | V <sup>-</sup> -0.3 to V <sup>+</sup> +0.3   | V    |
| Power Dissipation                  | P <sub>D</sub>                 | SOP : 690(Note3) 1000(Note4)<br>DMP : 470(Note3) 600(Note4)<br>MSOP : 510(Note3) 680(Note4)<br>SSOP : 430 (Note3) 540(Note4) | mW   |
| Operating Temperature Range        | T <sub>opr</sub>               | -40~+125   | °C   |
| Storage Temperature Range          | T <sub>stg</sub>               | -65~+150   | °C   |

(Note1) Differential voltage is the voltage difference between +INPUT and -INPUT.

(Note2) Input voltage is the voltage should be allowed to apply to the input terminal independent of the magnitude of V<sup>+</sup>.

The normal operation will establish when any input is within the Common Mode Input Voltage Range of electrical characteristics.

( Note3) EIA/JEDEC STANDARD Test board (76.2 x 114.3 x 1.6mm, 2layers, FR-4) mounting

( Note4) EIA/JEDEC STANDARD Test board (76.2 x 114.3 x 1.6mm, 4layers, FR-4) mounting

## ■ RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

| PARAMETER      | SYMBOL                         | CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------|--------------------------------|-----------|------|------|------|------|
| Supply Voltage | V <sup>+</sup> /V <sup>-</sup> |           | ±4   | -    | ±18  | V    |

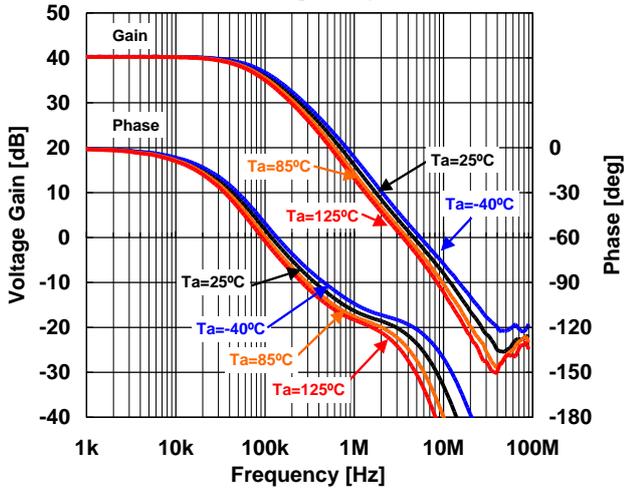
## ■ ELECTRICAL CHARACTERISTICS (V<sup>+</sup>/V<sup>-</sup> = ±15V, Ta=25°C, unless otherwise noted.)

| PARAMETER                       | SYMBOL           | TEST CONDITION                              | MIN. | TYP.   | MAX. | UNIT   |
|---------------------------------|------------------|---|------|--------|------|--------|
| Input Offset Voltage            | V <sub>IO</sub>  | R <sub>S</sub> ≤ 10kΩ                       | -    | 0.5    | 3    | mV     |
| Input Offset Current            | I <sub>IO</sub>  |   | -    | 2      | 50   | nA     |
| Input Bias Current              | I <sub>B</sub>   |   | -    | 50     | 200  | nA     |
| Input Resistance                | R <sub>IN</sub>  |   | -    | 1      | -    | MΩ     |
| Large Signal Voltage Gain       | A <sub>V</sub>   | R <sub>L</sub> ≥ 2kΩ, V <sub>O</sub> = ±10V | 86   | 100    | -    | dB     |
| Maximum Output Voltage Swing 1  | V <sub>OM1</sub> | R <sub>L</sub> ≥ 2kΩ                        | ± 12 | ± 14   | -    | V      |
| Maximum Output Voltage Swing 2  | V <sub>OM2</sub> | I <sub>O</sub> = 25mA                       | ± 10 | ± 11.5 | -    | V      |
| Input Common Mode Voltage Range | V <sub>ICM</sub> |   | ± 12 | ± 14   | -    | V      |
| Common Mode Rejection Ratio     | CMR              | R <sub>S</sub> ≤ 10kΩ                       | 70   | 95     | -    | dB     |
| Supply Voltage Rejection Ratio  | SVR              | R <sub>S</sub> ≤ 10kΩ                       | 76.5 | 100    | -    | dB     |
| Operating Current               | I <sub>CC</sub>  |   | -    | 4.5    | 7    | mA     |
| Slew Rate                       | SR               |   | -    | 4      | -    | V/μs   |
| Gain Bandwidth Product          | GBP              | f = 10kHz                                   | -    | 10     | -    | MHz    |
| Equivalent Input Noise Voltage  | e <sub>n</sub>   | f = 1kHz                                    | -    | 8      | -    | nV/√Hz |

## ■ TYPICAL CHARACTERISTICS

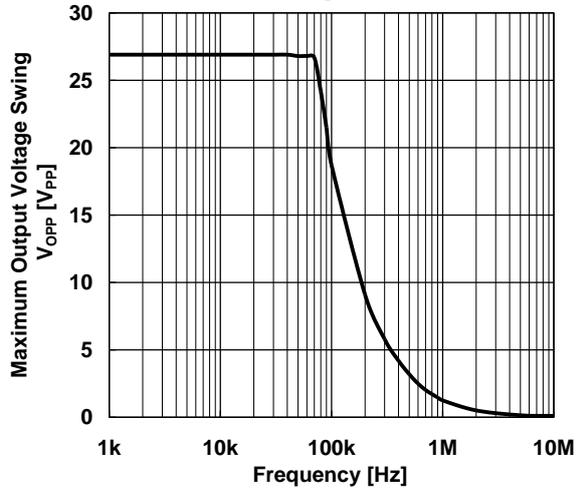
**Gain/Phase vs. Frequency**

$V^+/V^- = \pm 15V$ ,  $R_L = 2k\Omega$ ,  $G_V = 40dB$



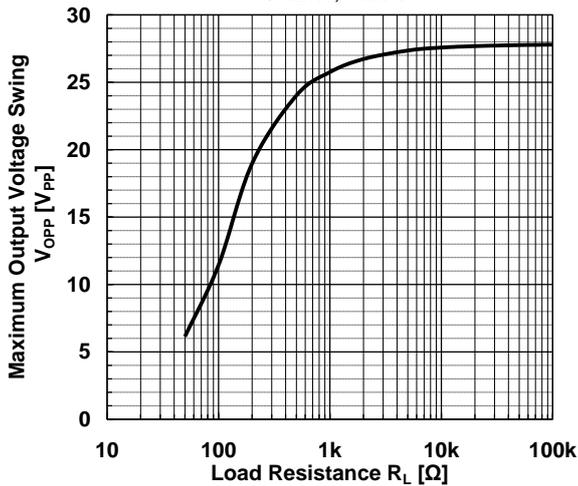
**Maximum Output Voltage Swing vs. Frequency**

$V^+/V^- = \pm 15V$ ,  $R_L = 2k\Omega$ ,  $T_a = 25^\circ C$



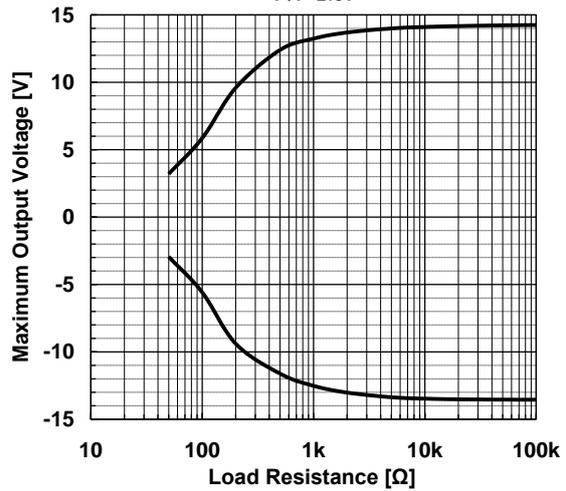
**Maximum Output Voltage Swing vs. Load Resistance**

$V^+/V^- = \pm 15V$ ,  $T_a = 25^\circ C$



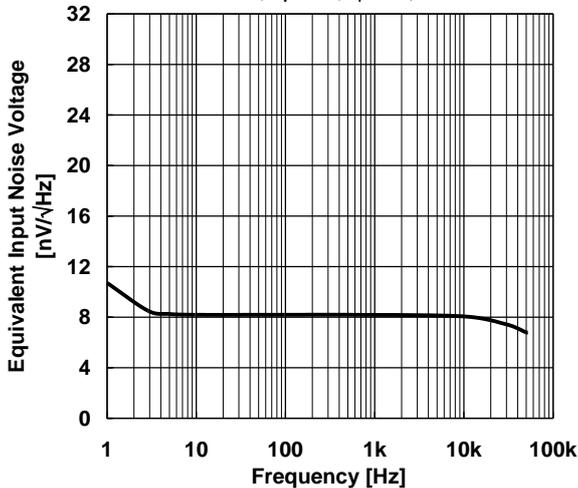
**Maximum Output Voltage vs. Load Resistance**

$V^+/V^- = \pm 15V$



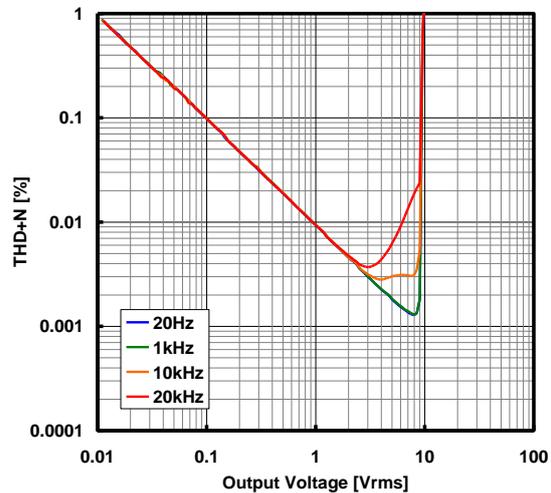
**Voltage Noise vs. Frequency**

$V^+/V^- = \pm 15V$ ,  $G_V = 40dB$ ,  $R_f = 2k\Omega$ ,  $T_a = 25^\circ C$

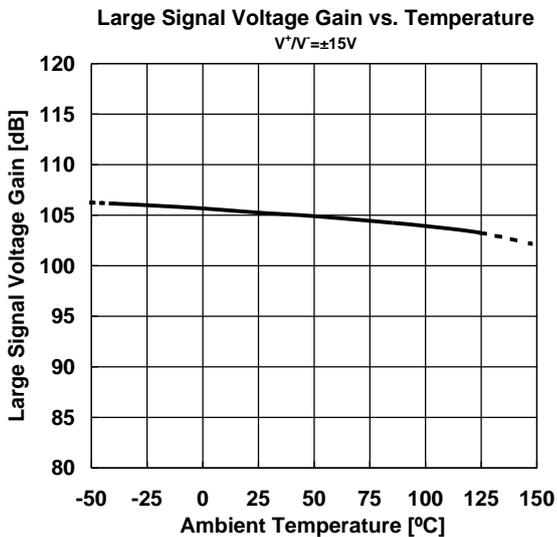
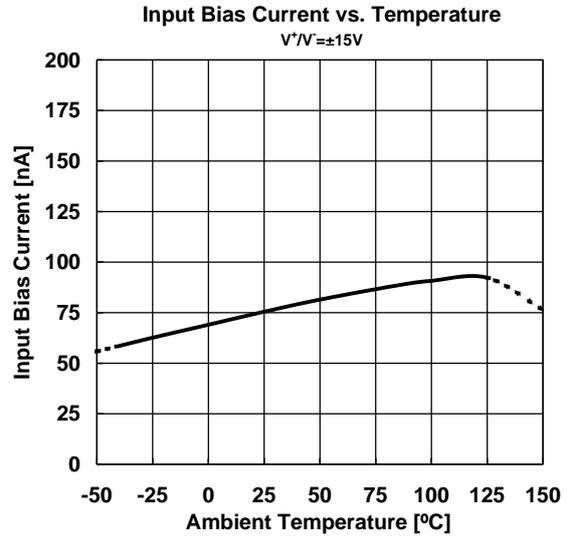
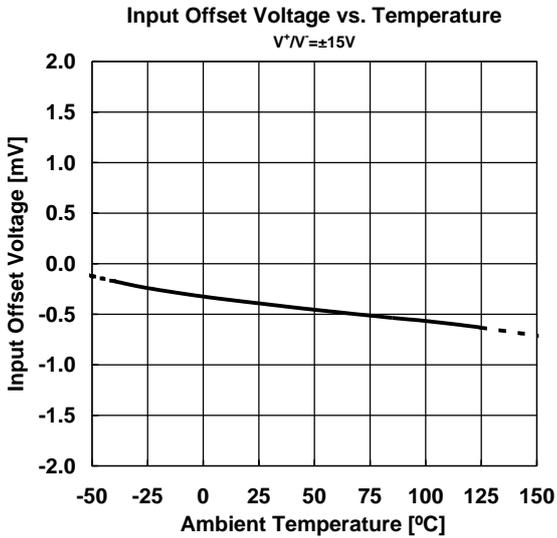
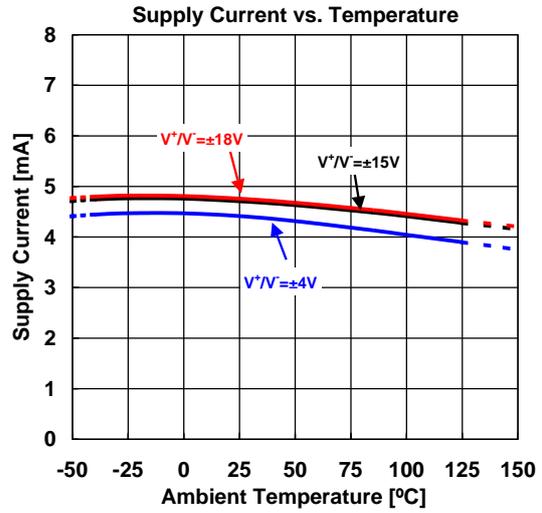
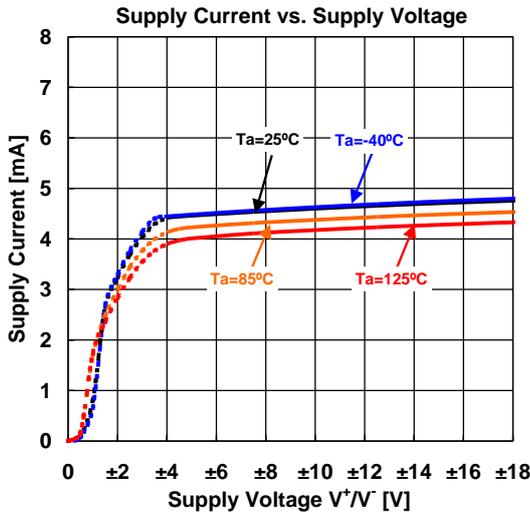


**THD+N vs. Output Voltage**

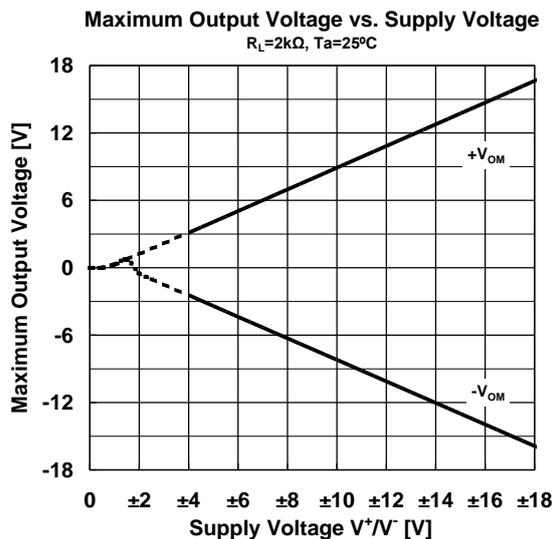
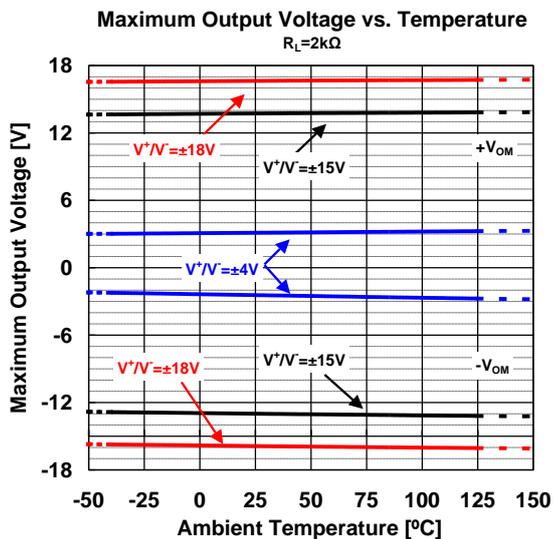
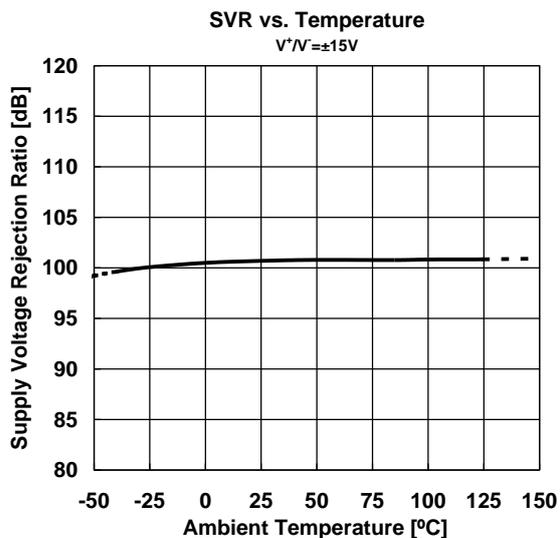
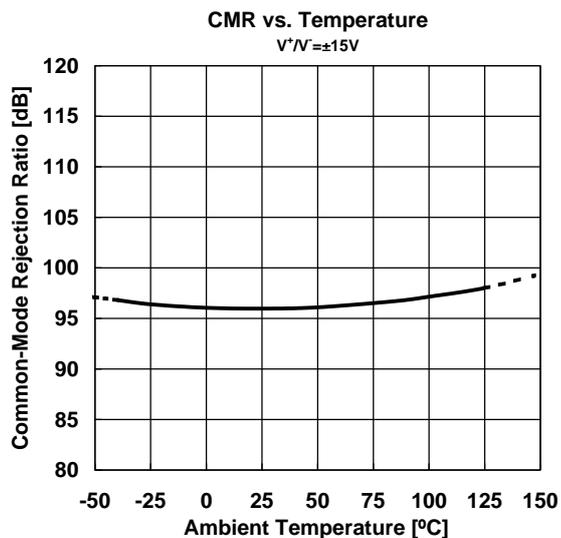
$V^+/V^- = \pm 15V$ ,  $G_V = 20dB$ ,  $R_G = 10k\Omega$ ,  $R_S = 200\Omega$ ,  $R_f = 2k\Omega$ ,  $T_a = 25^\circ C$



## ■ TYPICAL CHARACTERISTICS



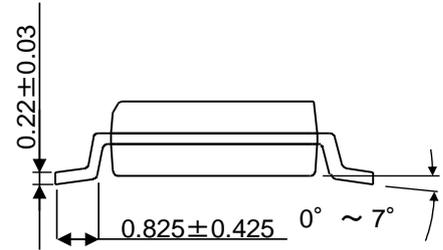
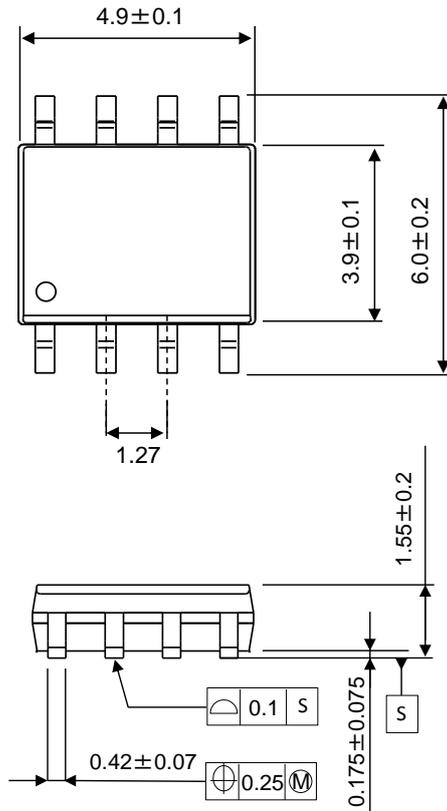
## ■ TYPICAL CHARACTERISTICS



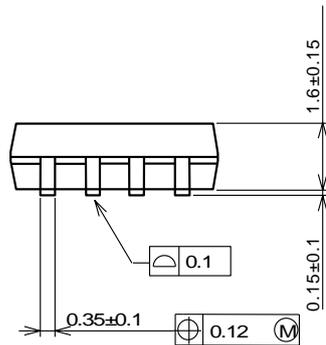
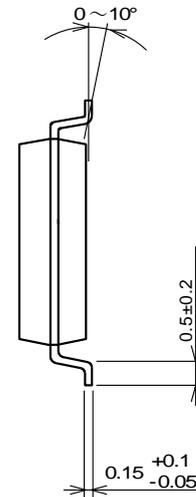
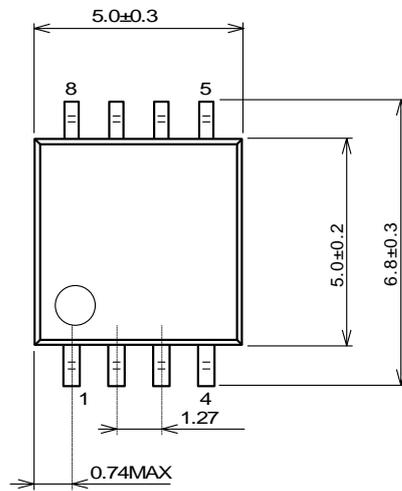
# NJM8065

■PACKAGE OUTLINE UNIT : mm

SOP8



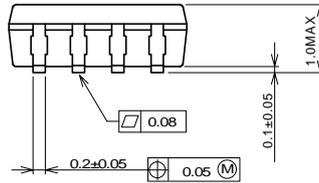
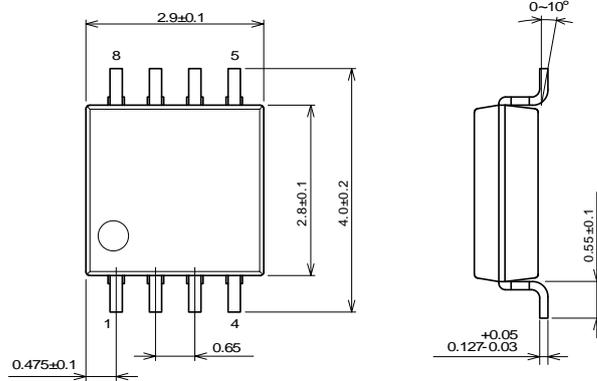
DMP8



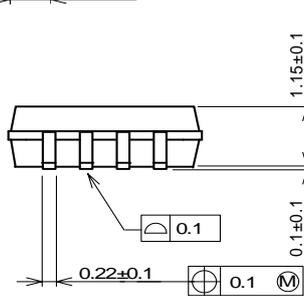
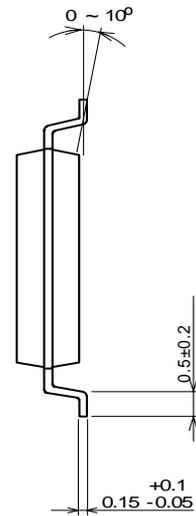
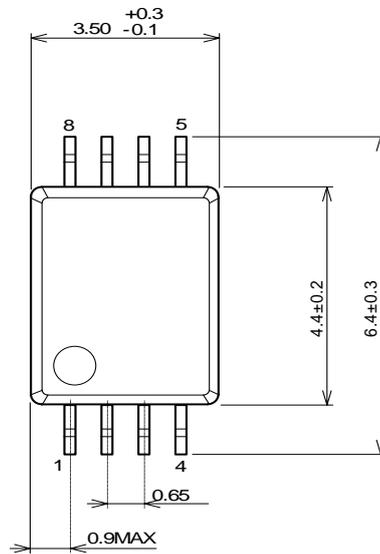
## ■PACKAGE OUTLINE UNIT : mm

### MSOP8 (TVSP8)\*

\*MEET JEDEC MO-187-DA/ THIN TYPE



### SSOP8



**[CAUTION]**

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