

## Isolation Amplifier with Video Driver

### ■FEATURES

- Operating Voltage 4.5 to 5.5V
- Operating Temperature -40 to 105°C
- Common Mode Rejection Ratio -55dBtyp.
- 75Ω Driver
- DC Coupling, AC Coupling
- Voltage Gain 0dBtyp.
- Frequency Characteristics 0dB at 10MHz
- Bipolar Technology
- Package Outline SOT-23-5

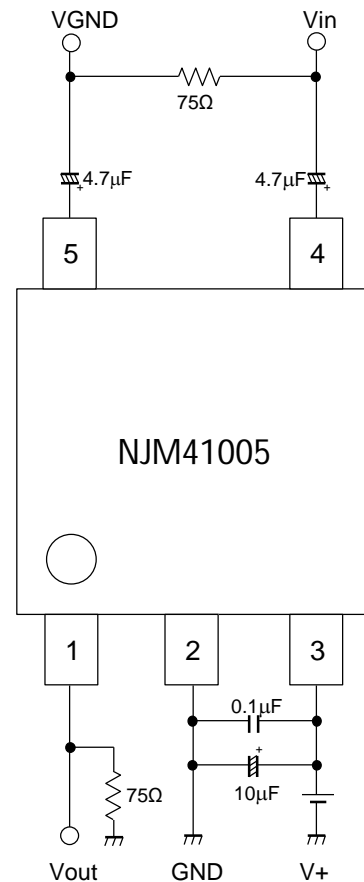
### ■GENERAL DESCRIPTION

NJM41005 is the isolation amplifier that has been developed in the video signal applications. It can remove the common-mode noise of the signal by the isolation amplifier. In addition, it has a built-in 75Ω driver, well suited to the interface of CAR AV.

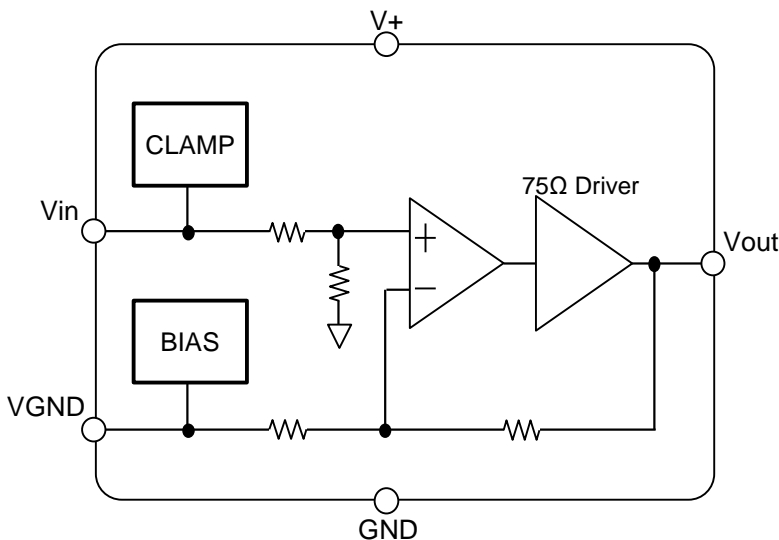
### ■APPLICATION

- Car Navigation
- Vehicle Camera ECU

### ■APPLICATION CIRCUIT (DC Coupling)



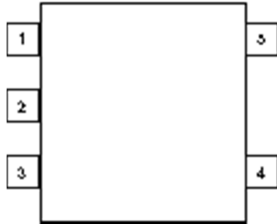
### ■EQUIVALENT CIRCUIT · BLOCK DIAGRAM



■ Isolation amplifier series

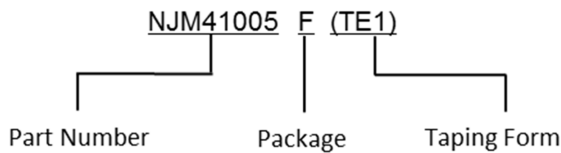
| Channel | Part No. |
|---------|----------|
| 1ch     | NJM2505A |
| 3ch     | NJM41033 |

■ PIN CONFIGURATION



| PIN NO. | SYMBOL | DESCRIPTION                           |
|---------|--------|---------------------------------------|
| 1       | Vout   | Video Signal Output Terminal          |
| 2       | GND    | GND Terminal                          |
| 3       | V+     | Power Supply Terminal                 |
| 4       | Vin    | Video Signal Input Terminal           |
| 5       | VGND   | GND Input Terminal (from source side) |

■ MARK INFORMATION



■ ORDERING INFORMATION

| PART NUMBER | PACKAGE OUTLINE | RoHS | HALOGEN-FREE | TERMINAL FINISH | MARKING | WEIGHT (mg) | MOQ(pcs) |
|-------------|-----------------|------|--------------|-----------------|---------|-------------|----------|
| NJM41005F-T | SOT-23-5        | YES  | YES          | Sn-Bi           | AK2     | 15.0        | 3,000    |

## ■ABSOLUTE MAXIMUM RATINGS

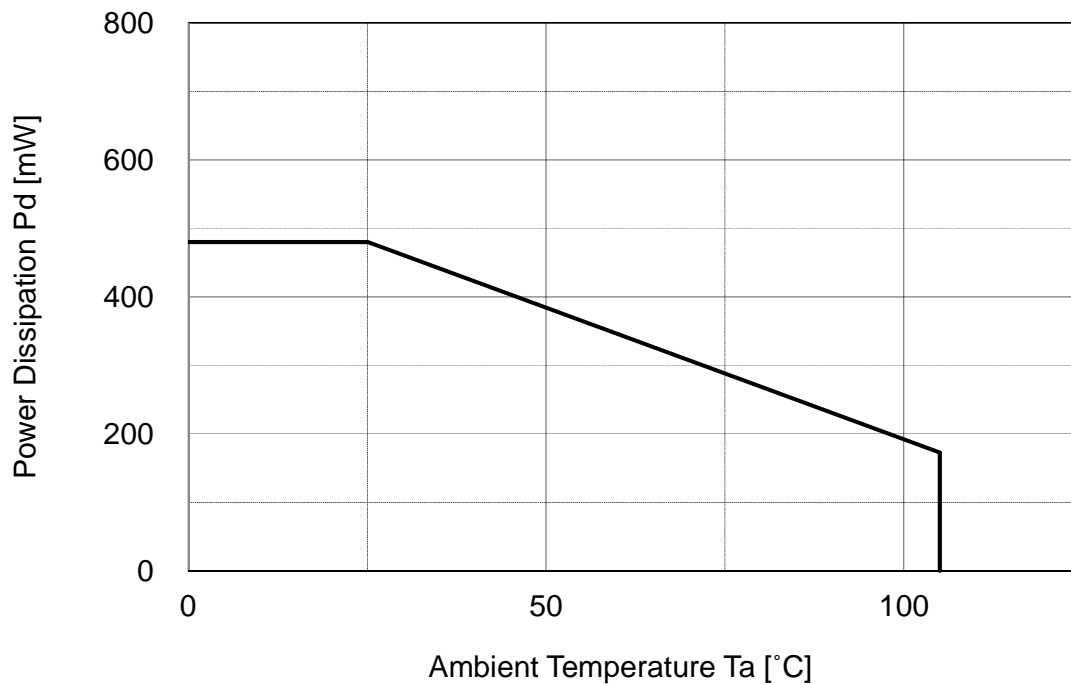
| PARAMETER                                  | SYMBOL           | RATINGS    | UNIT |
|--|------------------|------------|------|
| Supply Voltage                             | V+               | 7          | V    |
| Power Dissipation (Ta=25°C) <sup>(4)</sup> | P <sub>D</sub>   | 480 *1     | mW   |
| Operating Temperature Range                | T <sub>opr</sub> | -40 to 105 | °C   |
| Storage Temperature Range                  | T <sub>stg</sub> | -40 to 150 | °C   |

1) At on a board of EIA/JEDEC specification. (114.3 x 76.2 x 1.6mm 2 layers, FR-4)

## ■RECOMMENDED OPERATING CONDITIONS

| PARAMETER      | SYMBOL | RATINGS    | UNIT |
|----------------|--------|------------|------|
| Supply Voltage | V+     | 4.5 to 5.5 | V    |

## ■POWER DISSIPATION vs. AMBIENT TEMPERATURE

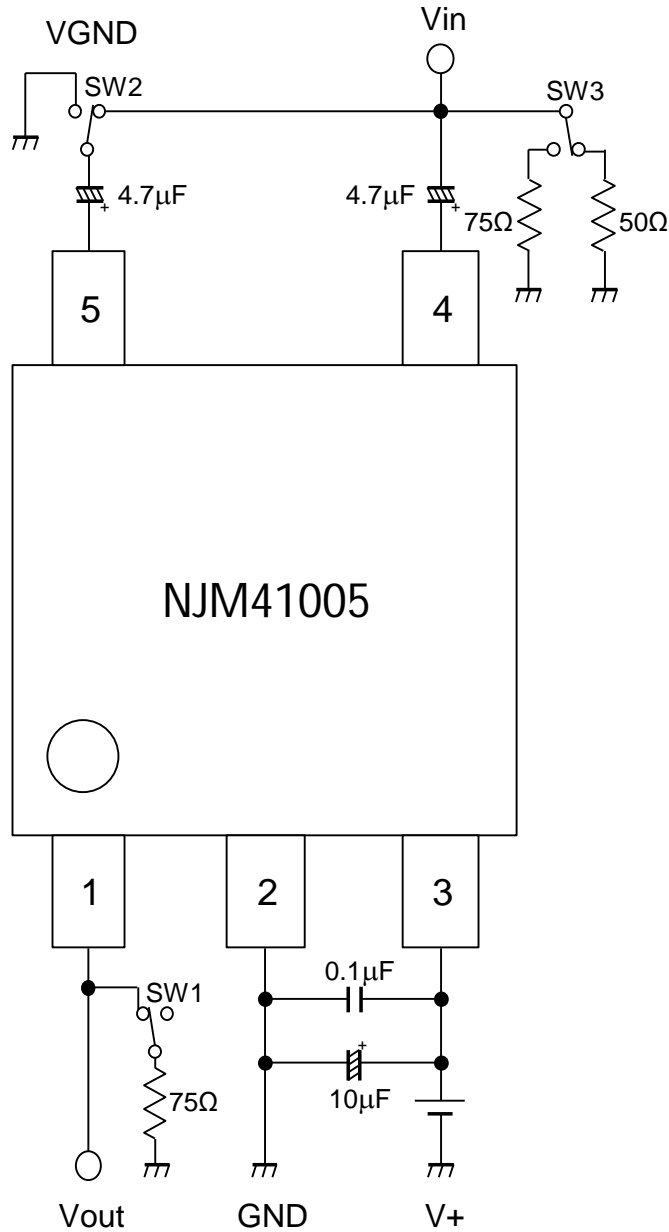


■ **ELECTRICAL CHARACTERISTICS** ( $T_a=25^\circ\text{C}$ ,  $V^+=5.0\text{V}$ ,  $R_L=75\Omega$ , unless otherwise specified)

| PARAMETER                    | SYMBOL     | TEST CONDITION   | MIN. | TYP. | MAX. | UNIT |
|------------------------------|------------|--|------|------|------|------|
| Operating Current            | $I_{cc}$   | No Signal, $R_L=OPEN$  | -    | 10.0 | 14.0 | mA   |
|                              |            | No Signal, $R_L=OPEN$ ,<br>$T_a=-40$ to $105^\circ\text{C}$  | -    | -    | 14.0 |      |
| Maximum Output Voltage Swing | $V_{om}$   | $f=100\text{kHz}$ , Input Sine Signal,<br>THD=1%   | 2.2  | 2.4  | -    | Vp-p |
|                              |            | $f=100\text{kHz}$ , Input Sine Signal,<br>THD=1%, $T_a=-40$ to $105^\circ\text{C}$                 | 2.2  | -    | -    |      |
| Voltage Gain                 | $G_v$      | $V_{in}=100\text{kHz}$ , $1.0\text{Vp-p}$ ,<br>Input Sine Signal                                   | -0.5 | 0    | 0.5  | dB   |
|                              |            | $V_{in}=100\text{kHz}$ , $1.0\text{Vp-p}$ ,<br>Input Sine Signal, $T_a=-40$ to $105^\circ\text{C}$ | -0.5 | -    | 0.5  |      |
| Frequency Characteristic     | $G_{f10M}$ | $V_{in}=10\text{MHz}/1\text{MHz}$ , $1.0\text{Vp-p}$ ,<br>Input Sine Signal                        | -    | 0    | -    | dB   |
| Common Mode Rejection Ratio  | CMRR       | $V_{in}=20\text{kHz}$ , $1\text{Vp-p}$   | -    | -55  | -    | dB   |
| Differential Gain            | DG         | $V_{in}=1.0\text{Vp-p}$ , 10step Video Signal  | -    | 0.1  | -    | %    |
| Differential Phase           | DP         | $V_{in}=1.0\text{Vp-p}$ , 10step Video Signal  | -    | 0.1  | -    | deg  |

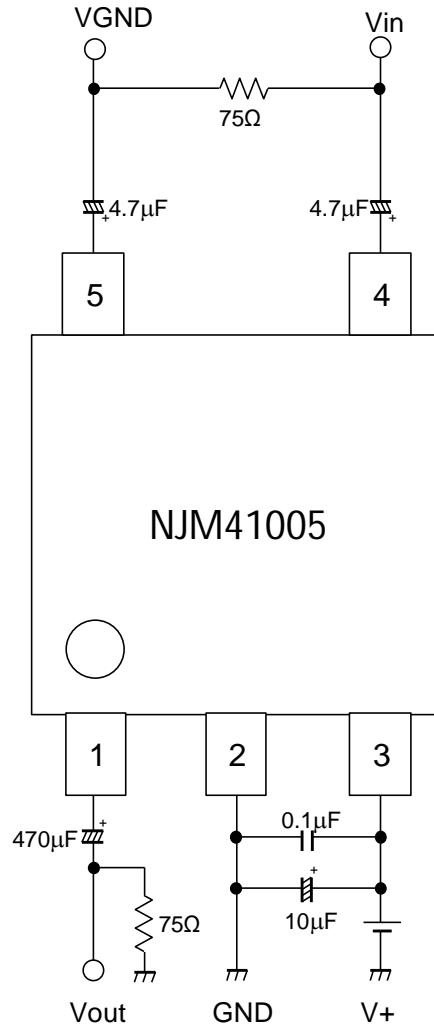
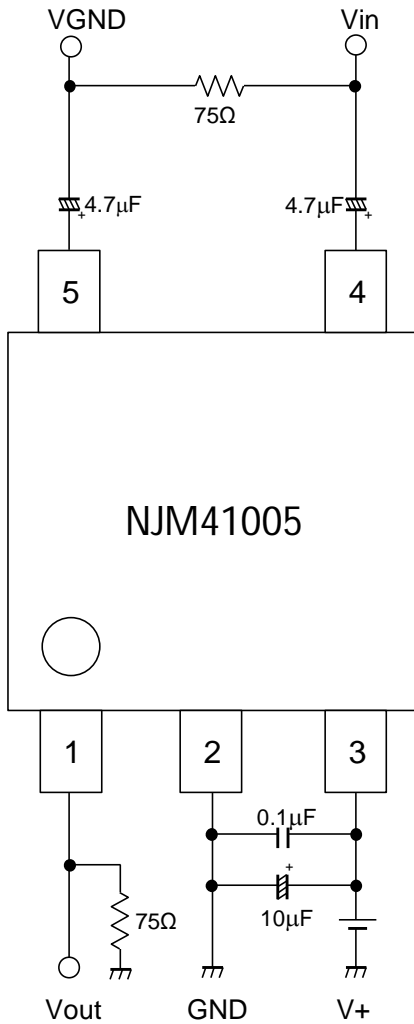
## ■TEST CIRCUIT

( When measuring CMR, SW2 of VGND is connected to .SW2 is connected to when measuring other electrical characteristics. When Icc is measured, SW1 of Vout is connected to and 75 Ω is disconnected and opened. SW1 is connected to in other special features.)



## ■APPLICATION CIRCUIT 1(Output DC Coupling)

## ■APPLICATION CIRCUIT 2(Output AC Coupling)



## ■APPLICATION

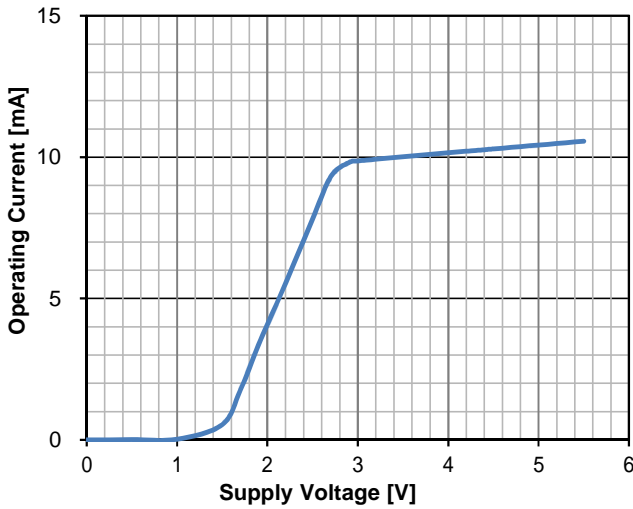
When using an external ESD protection resistor at the video input terminal, please connect the same resistance at the VIN terminal (pin 4) and the VGND terminal (pin 5). Please verify with resistance value about 100 Ω.

## ■ EQUIVALENT CIRCUIT

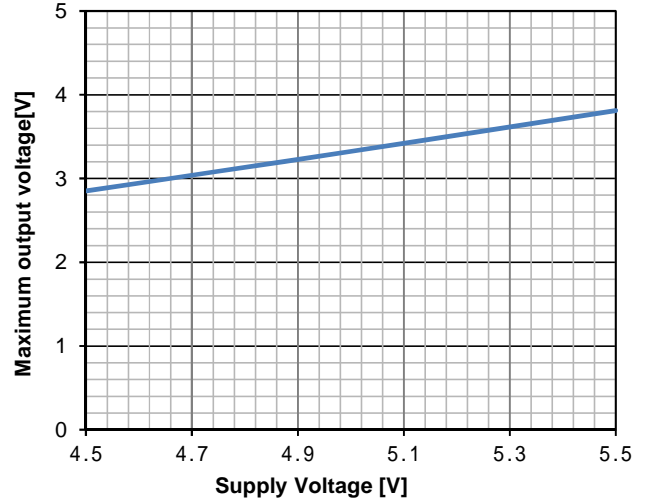
| Pin. No. | Symbol | Function                      | Inside Equivalent Circuit | Voltage |
|----------|--------|-------------------------------|---------------------------|---------|
| 1        | Vout   | Video Signal Output           |                           | 0.5V    |
| 2        | GND    | GND                           | -                         | -       |
| 3        | V+     | Power Supply                  | -                         | -       |
| 4        | Vin    | Video Signal Input            |                           | 1.5V    |
| 5        | VGND   | GND Input<br>From source side |                           | 2.5V    |

## ■ TYPICAL CHARACTERISTICS

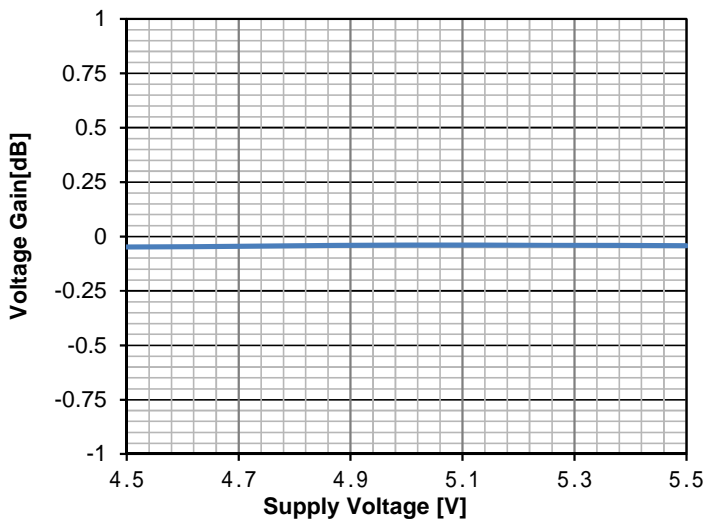
Operating Current vs. Supply Voltage



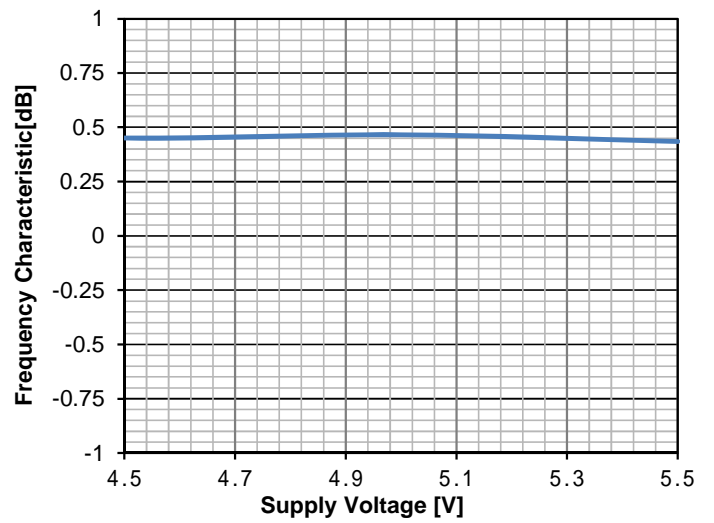
Maximum output voltage vs. Supply Voltage



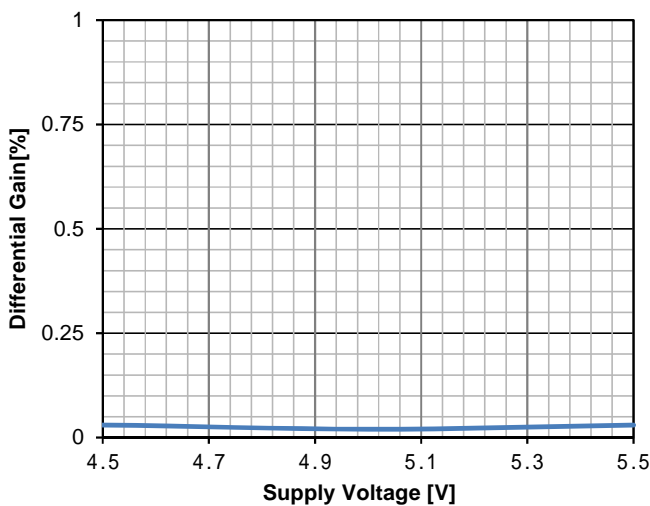
Voltage Gain vs. Supply Voltage  
Vin=1.0Vpp 100KHz Sine Signal Input



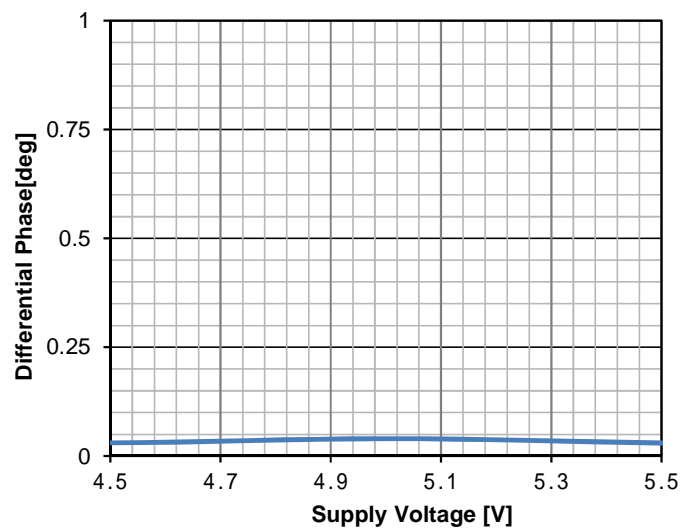
Frequency Characteristic vs. Supply Voltage  
Vin=1.0Vpp 10MHz Sine Signal Input



Differential Gain vs. Supply Voltage



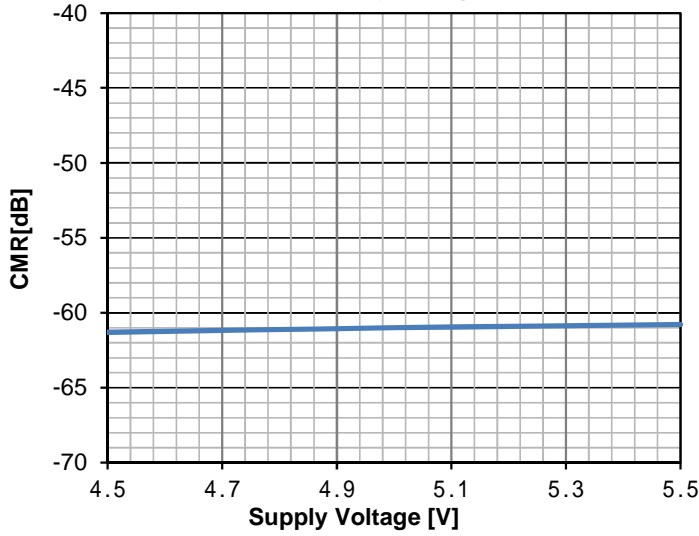
Differential Phase vs. Supply Voltage



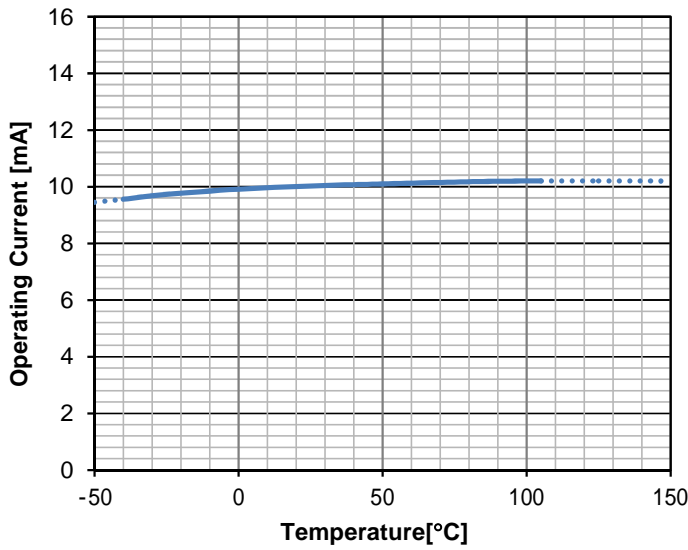


## ■ TYPICAL CHARACTERISTICS

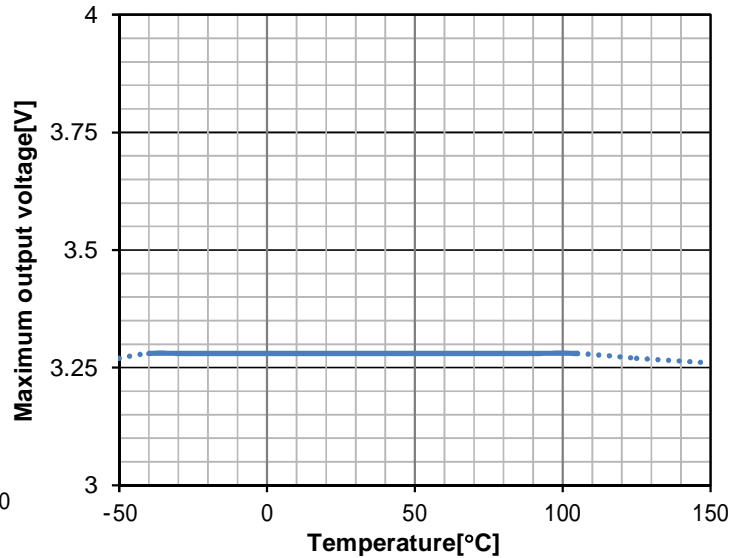
Common Mode Rejection Ratio vs Supply Voltage



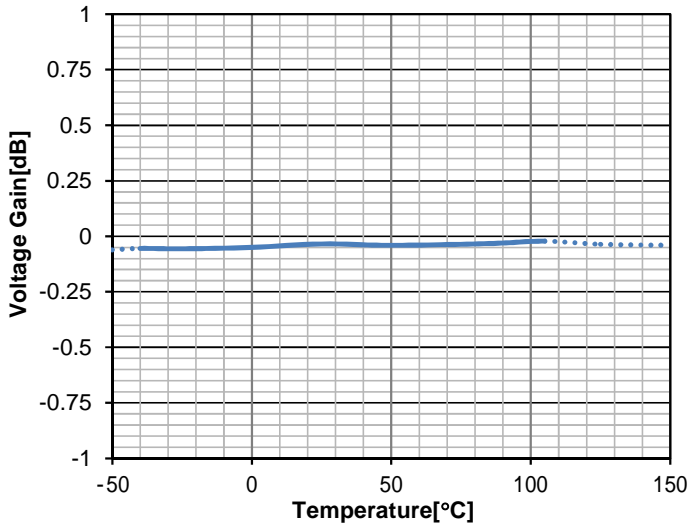
Operating Current vs. Temperature



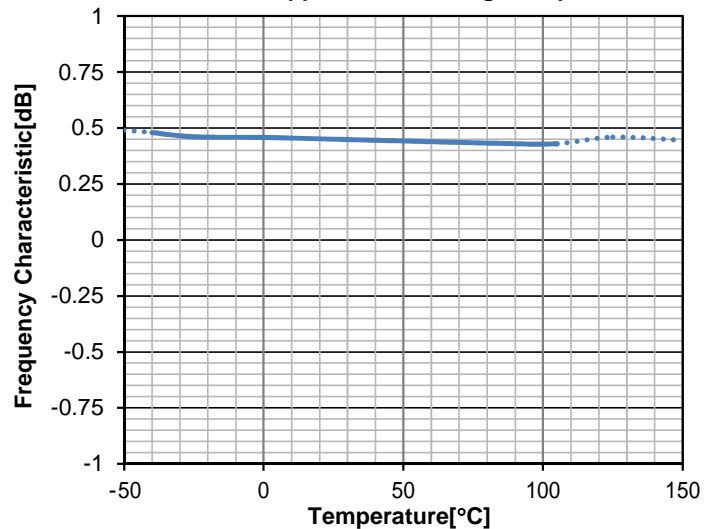
Maximum output voltage vs. Temperature



Voltage Gain vs. Temperature  
Vin=1.0Vpp 100KHz Sine Signal Input

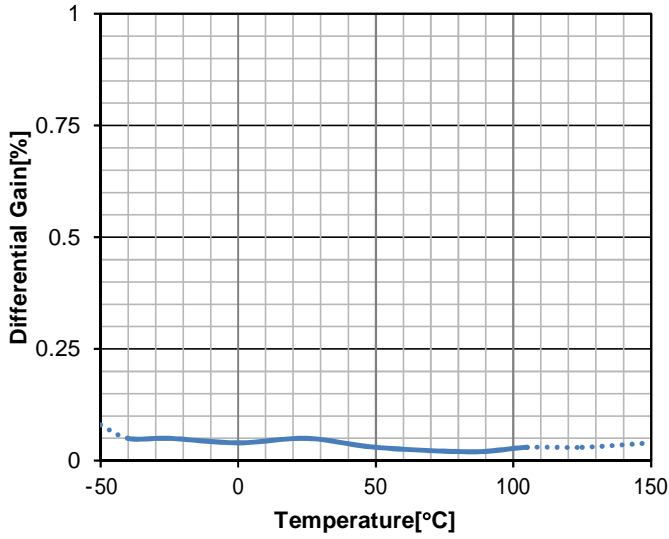


Frequency Characteristic vs. Temperature  
Vin=1.0Vpp 10MHz Sine Signal Input

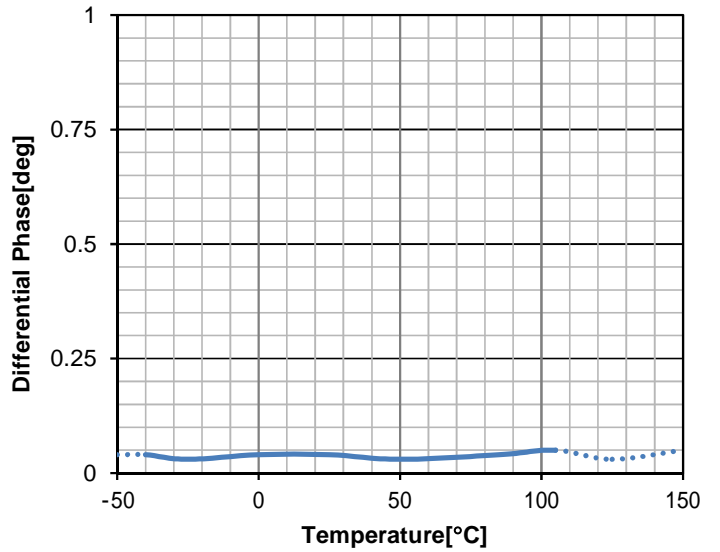


## ■ TYPICAL CHARACTERISTICS

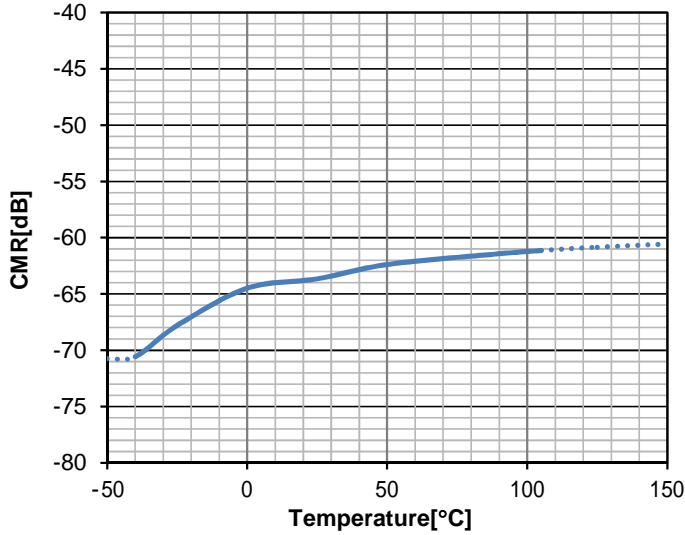
Differential Gain vs. Temperature



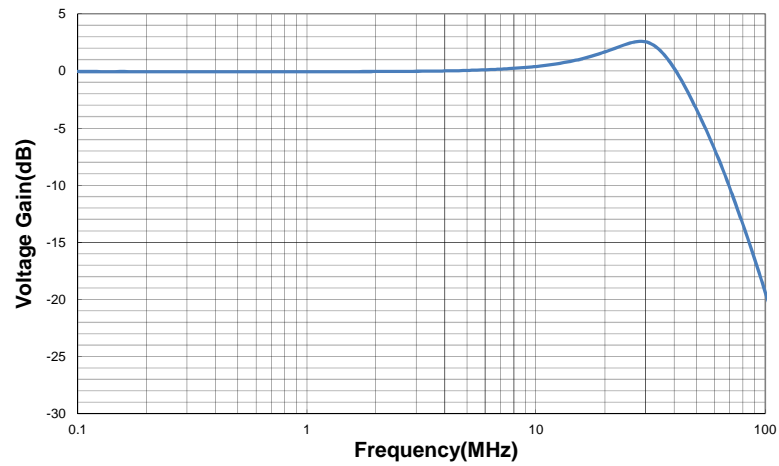
Differential Phase vs. Temperature



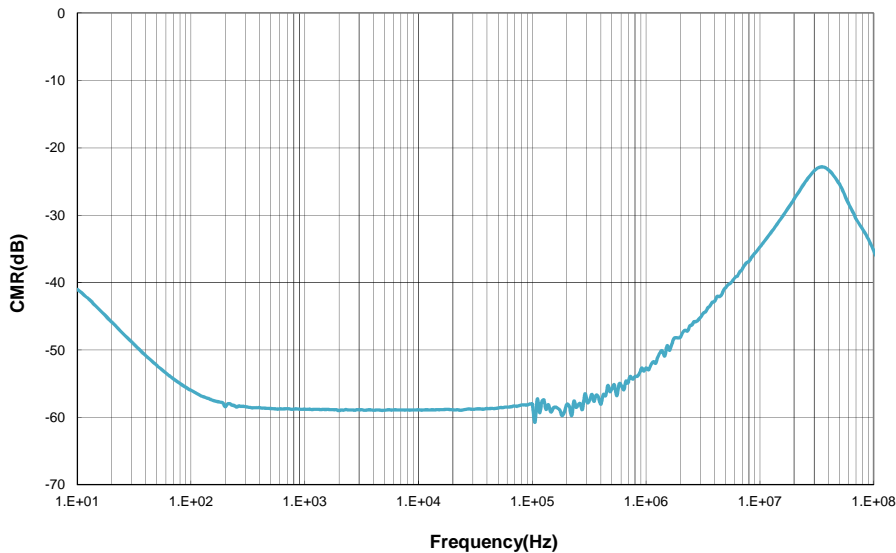
Common Mode Rejection Ratio vs Temperature



Voltage Gain Vs. Frequency  
Vin=1.0Vpp, RL=75ohm, Sine Signal Input



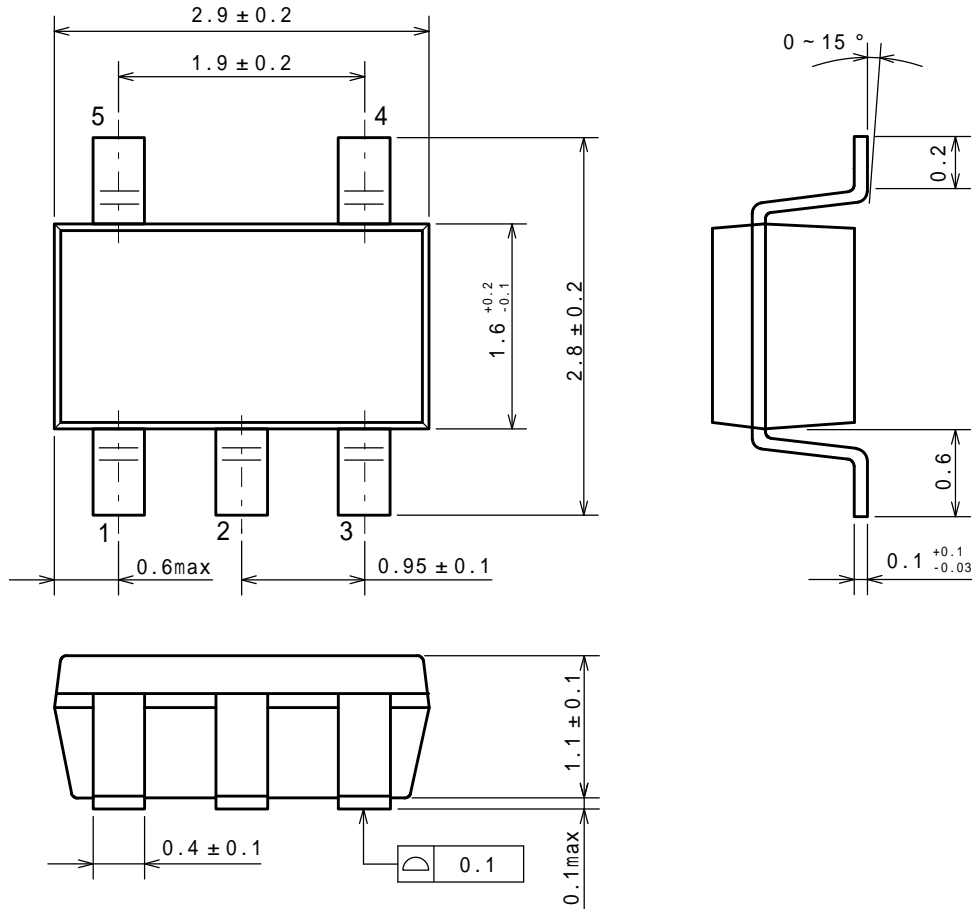
CMR vs Frequency



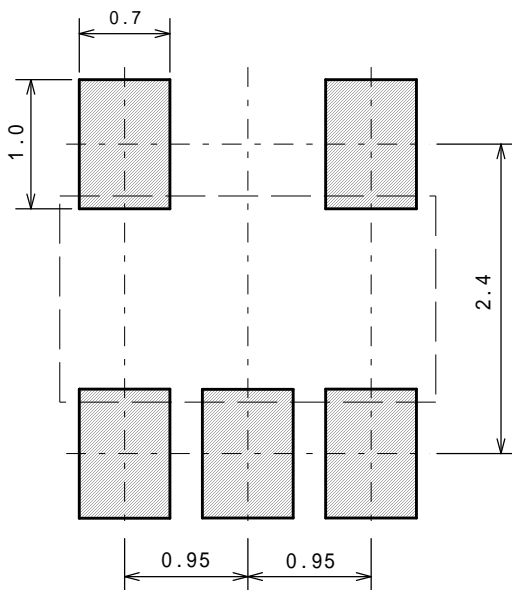
Frequency(Hz)

*New Japan Radio Co., Ltd.*

### PACKAGE DIMENSIONS

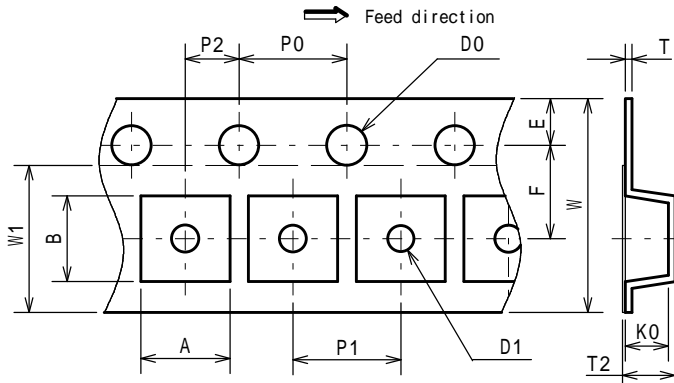


### EXAMPLE OF SOLDER PADS DIMENSIONS



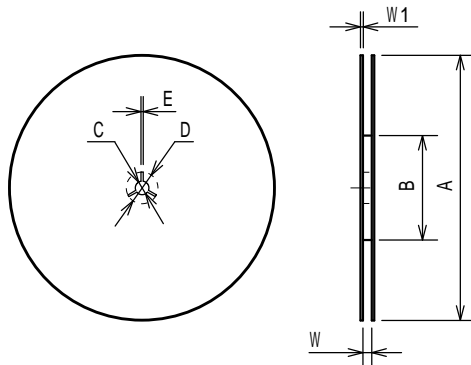
### PACKING SPEC

#### TAPING DIMENSIONS



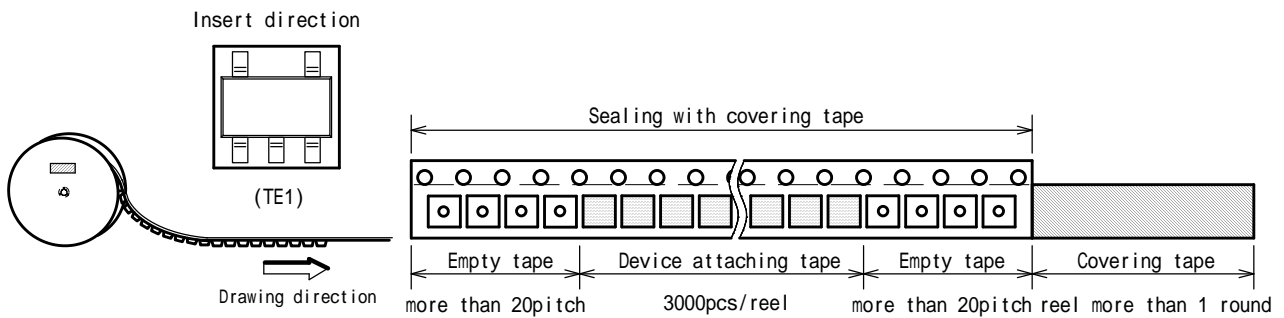
| SYMBOL | DIMENSION   | REMARKS          |
|--------|-------------|------------------|
| A      | 3.3 ± 0.1   | BOTTOM DIMENSION |
| B      | 3.2 ± 0.1   | BOTTOM DIMENSION |
| D0     | 1.55        |                  |
| D1     | 1.05        |                  |
| E      | 1.75 ± 0.1  |                  |
| 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

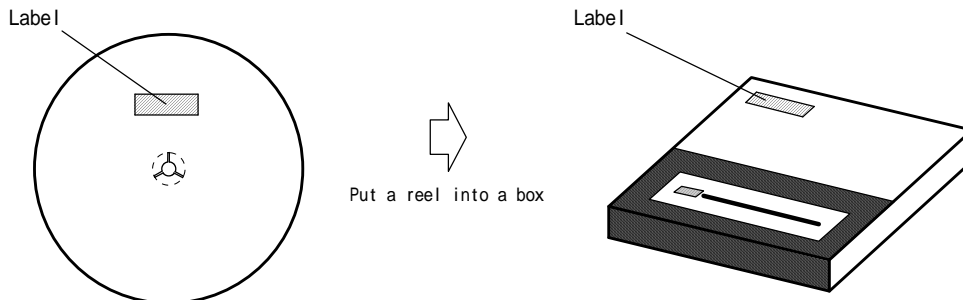


| SYMBOL | DIMENSION |
|--------|-----------|
| A      | 180 ± 1   |
| B      | 60 ± 1    |
| C      | 13 ± 0.2  |
| D      | 21 ± 0.8  |
| E      | 2 ± 0.5   |
| W      | 9 ± 0.5   |
| W1     | 1.2 ± 0.2 |

#### TAPING STATE



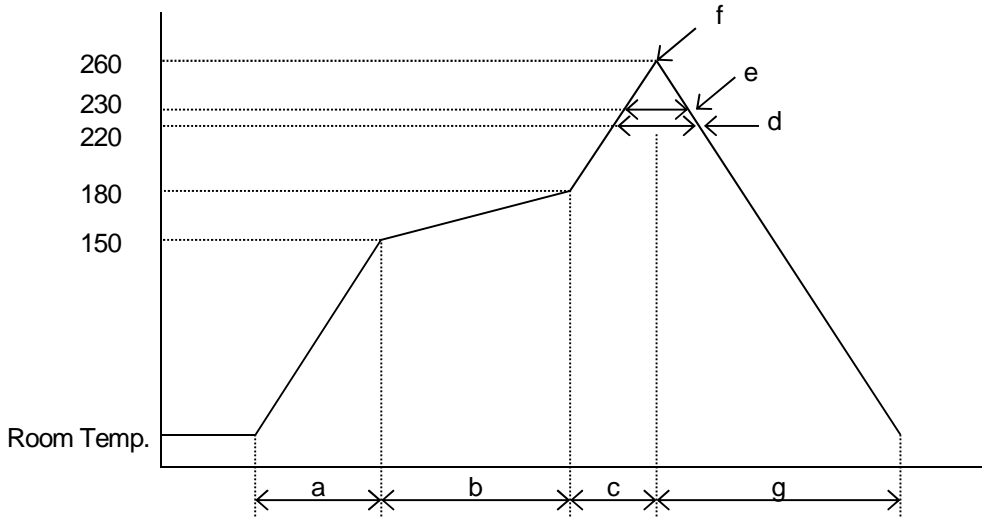
#### PACKING STATE



## INFRARED REFLOW SOLDERING METHOD

EAE-D1006-000-02

\* Recommended reflow soldering procedure



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

The temperature indicates at the surface of mold package.

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