RENESAS

DATA SHEET

MOS ANALOG INTEGRATED CIRCUIT

# μPD5741T6J

## LOW NOISE AND HIGH GAIN AMPLIFIER FOR IMPEDANCE CONVERTER OF MICROPHONE

### DESCRIPTION

The μPD5741T6J is a silicon MOS monolithic integrated circuit designed as high gain impedance converter for electret condenser microphone. This device exhibits low noise and high voltage gain characteristics.

The package is 3-pin thin-type lead-less minimold, suitable for surface mount.

### FEATURES

- Low Noise : $N_V$ = –101 dBV TYP. @ $V_{DD}$ = 2 V, $C_{in}$ = 3 pF, $R_L$ = 2.2 kΩ
  : $N_V$ = –102 dBV TYP. @ $V_{DD}$ = 2 V, $C_{in}$ = 5 pF, $R_L$ = 2.2 kΩ
- High Gain : $G_V$ = +6.5 dB TYP. @ $V_{DD}$ = 2 V, $C_{in}$ = 3 pF, $R_L$ = 2.2 kΩ
  : $G_V$ = +8.5 dB TYP. @ $V_{DD}$ = 2 V, $C_{in}$ = 5 pF, $R_L$ = 2.2 kΩ
- Low Consumption Current : $I_{DD}$ = 250 μA TYP. @ $V_{DD}$ = 2 V, $R_L$ = 2.2 kΩ
- Built-in the capacitor for RF noise immunity
- High ESD voltage
- 3-pin thin-type lead-less minimold (1.2 × 1.0 × 0.33 mm)

### APPLICATIONS

- Microphone, Sensor, etc.

### ORDERING INFORMATION

| Part Number | Order Number | Package | Marking | Supplying Form |
|---|---|---|---|---|
| μPD5741T6J-E4 | μPD5741T6J-E4-A | 3-pin thin-type lead-less minimold (Pb-Free) | 6T | • Embossed tape 8 mm wide<br>• Pin 3 (GND) face the perforation side of the tape<br>• Qty 10 kpcs/reel |

**Remark** To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPD5741T6J

**Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.**



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## ABSOLUTE MAXIMUM RATINGS ($T_A$ = +25°C)

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Input Voltage (IN-GND) | $V_{in}$ | −0.5 to +0.5 | V |
| Input Current (IN-GND) | $I_{in}$ | 0.5 | mA |
| Output Voltage (OUT-GND) | $V_{out}$ | 0 to +5 | V |
| Output Current (OUT-GND) | $I_{out}$ | 0.5 | mA |
| Channel Temperature | $T_{ch}$ | 130 | °C |
| Operating Ambient Temperature | $T_A$ | −40 to +85 | °C |
| Storage Temperature | $T_{stg}$ | −65 to +150 | °C |

## RECOMMENDED OPERATING CONDITIONS ($T_A$ = +25°C)

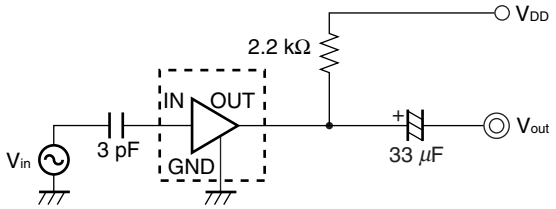
| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|
| Supply Voltage [Note] | $V_{DD}$ | 1.0 | 2.0 | 5.0 | V |

**Note** $R_L$ = 2.2 kΩ

## ELECTRICAL CHARACTERISTICS ($T_A$ = +25°C, unless otherwise specified)

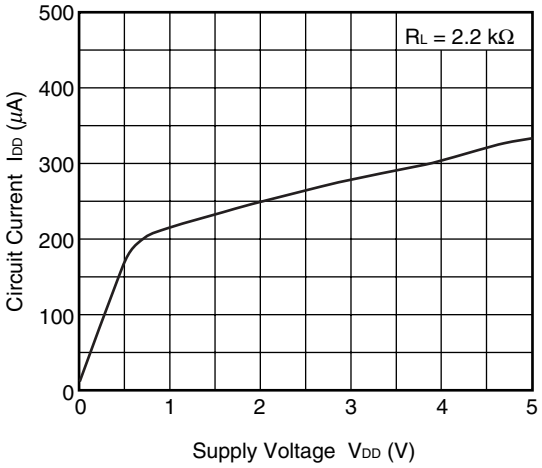
| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| Circuit Current | $I_{DD}$ | $V_{DD}$ = 2 V, $V_{in}$ = 0 V, $R_L$ = 2.2 kΩ | 150 | 250 | 350 | μA |
| Input Capacitance | $C_{input}$ | $V_{DD}$ = 2 V, $R_L$ = 2.2 kΩ, f = 1 MHz | – | 1.5 | – | pF |
| Voltage Gain | $G_V$ | $V_{DD}$ = 2 V, $V_{in}$ = 10 mV, $R_L$ = 2.2 kΩ, $C_{in}$ = 3 pF, f = 1 kHz, see Test Circuit | 5.0 | 6.5 | 8.0 | dB |
| Reduced Voltage Gain Characteristics | $\Delta G_{VV}$ | $V_{DD}$ = 2 → 1.5 V, $V_{in}$ = 10 mV, $R_L$ = 2.2 kΩ, $C_{in}$ = 3 pF, f = 1 kHz, see Test Circuit | – | 0.5 | – | dB |
| Frequency Characteristics | $\Delta G_{Vf}$ | $V_{DD}$ = 2 V, $V_{in}$ = 10 mV, $R_L$ = 2.2 kΩ, $C_{in}$ = 3 pF, f = 1 kHz → 110 Hz, see Test Circuit | – | 0 | – | dB |
| Output Noise Voltage | $N_V$ | $V_{DD}$ = 2 V, $V_{in}$ = 0 V, $R_L$ = 2.2 kΩ, $C_{in}$ = 3 pF, A-Curve, see Test Circuit | – | –101 | – | dBV |
| Total Harmonic Distortion | THD | $V_{DD}$ = 2 V, $V_{out}$ = 50 mV, $R_L$ = 2.2 kΩ, $C_{in}$ = 3 pF, f = 1 kHz, see Test Circuit | – | 0.5 | – | % |

## TEST CIRCUIT (Voltage Gain, Frequency Characteristics, Output Noise Voltage, Total Harmonic Distortion)

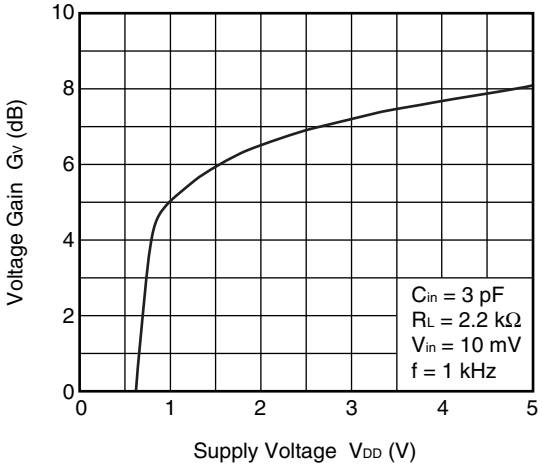


**TYPICAL CHARACTERISTICS ($T_A$ = +25°C, unless otherwise specified)**

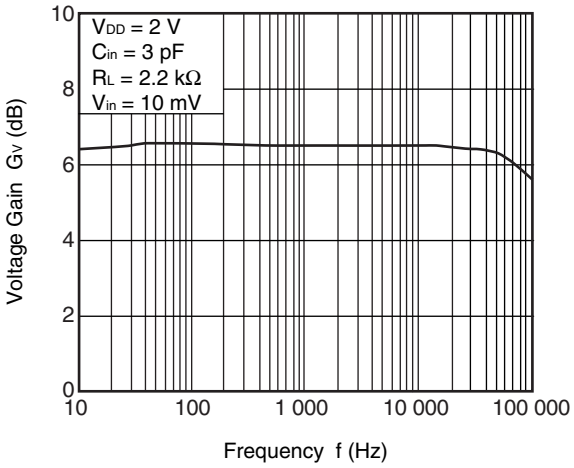
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



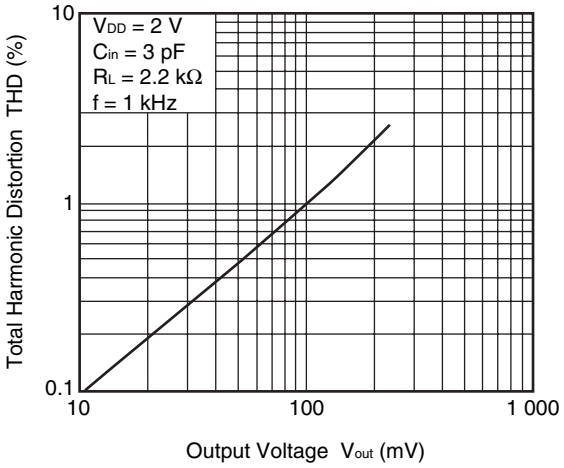

VOLTAGE GAIN vs. SUPPLY VOLTAGE



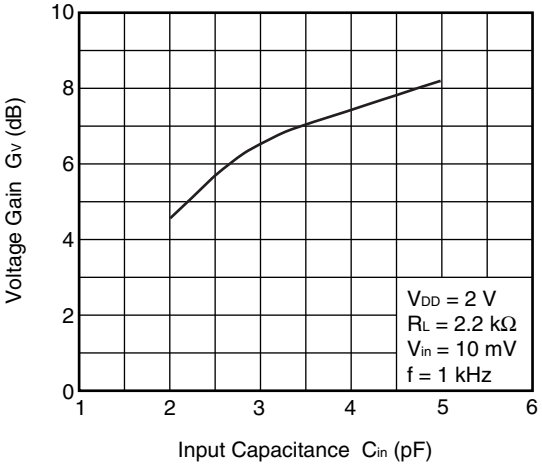

VOLTAGE GAIN vs. FREQUENCY



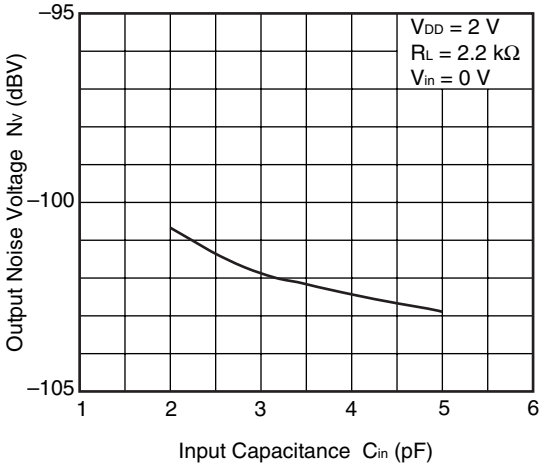

TOTAL HARMONIC DISTORTION vs. OUTPUT VOLTAGE




VOLTAGE GAIN vs. INPUT CAPACITANCE



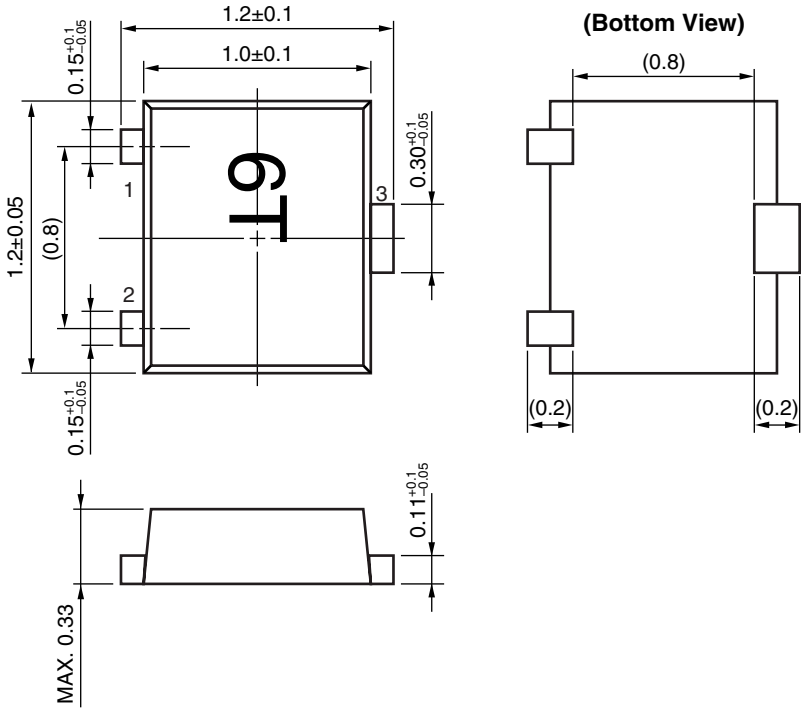

OUTPUT NOISE VOLTAGE vs. INPUT CAPACITANCE




**Remark** The graphs indicate nominal characteristics.

## PACKAGE DIMENSIONS

### 3-PIN THIN-TYPE LEAD-LESS MINIMOLD (UNIT: mm)




### PIN CONNECTIONS

1. OUT
2. IN
3. GND

**Remark** ( ) : Reference value

## RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

| Soldering Method | Soldering Conditions | | Condition Symbol |
|---|---|---|---|
| Infrared Reflow | Peak temperature (package surface temperature)<br>Time at peak temperature<br>Time at temperature of 220°C or higher<br>Preheating time at 120 to 180°C<br>Maximum number of reflow processes<br>Maximum chlorine content of rosin flux (% mass) | : 260°C or below<br>: 10 seconds or less<br>: 60 seconds or less<br>: 120±30 seconds<br>: 3 times<br>: 0.2%(Wt.) or below | IR260 |
| Wave Soldering | Peak temperature (molten solder temperature)<br>Time at peak temperature<br>Preheating temperature (package surface temperature)<br>Maximum number of flow processes<br>Maximum chlorine content of rosin flux (% mass) | : 260°C or below<br>: 10 seconds or less<br>: 120°C or below<br>: 1 time<br>: 0.2%(Wt.) or below | WS260 |
| Partial Heating | Peak temperature (terminal temperature)<br>Soldering time (per side of device)<br>Maximum chlorine content of rosin flux (% mass) | : 350°C or below<br>: 3 seconds or less<br>: 0.2%(Wt.) or below | HS350 |

**Caution Do not use different soldering methods together (except for partial heating).**

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