

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

### DESCRIPTION

The  $\mu$ PD5747T6J 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. @  $V_{DD} = 1.5$  V,  $C_{in} = 3$  pF,  $R_L = 2.2$  k $\Omega$   
:  $N_v = -102$  dBV TYP. @  $V_{DD} = 1.5$  V,  $C_{in} = 5$  pF,  $R_L = 2.2$  k $\Omega$
- High Gain :  $G_v = +5.7$  dB TYP. @  $V_{DD} = 1.5$  V,  $C_{in} = 3$  pF,  $R_L = 2.2$  k $\Omega$   
:  $G_v = +7.7$  dB TYP. @  $V_{DD} = 1.5$  V,  $C_{in} = 5$  pF,  $R_L = 2.2$  k $\Omega$
- Low Consumption Current :  $I_{DD} = 190$   $\mu$ A TYP. @  $V_{DD} = 1.5$  V,  $R_L = 2.2$  k $\Omega$
- Built-in the capacitor for RF noise immunity
- High ESD voltage
- 3-pin thin-type lead-less minimold ( $1.2 \times 1.0 \times 0.33$  mm)

### APPLICATIONS

- Microphone, Sensor, etc.

### ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
$\mu$ PD5747T6J-E4	$\mu$ PD5747T6J-E4-A	3-pin thin-type lead-less minimold (Pb-Free)	6X	<ul style="list-style-type: none"> <li>• Embossed tape 8 mm wide</li> <li>• Pin 3 (GND) face the perforation side of the tape</li> <li>• Qty 10 kpcs/reel</li> </ul>

**Remark** To order evaluation samples, please contact your nearby sales office.

Part number for sample order:  $\mu$ PD5747T6J

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

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# ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = +25°C)

Parameter	Symbol	Ratings	Unit
Input Voltage (IN-GND)	V <sub>in</sub>	−0.5 to +0.5	V
Input Current (IN-GND)	I <sub>in</sub>	0.5	mA
Output Voltage (OUT-GND)	V <sub>out</sub>	0 to +5	V
Output Current (OUT-GND)	I <sub>out</sub>	0.5	mA
Channel Temperature	T <sub>ch</sub>	130	°C
Operating Ambient Temperature	T <sub>A</sub>	−40 to +85	°C
Storage Temperature	T <sub>stg</sub>	−65 to +150	°C

# RECOMMENDED OPERATING CONDITIONS (T<sub>A</sub> = +25°C)

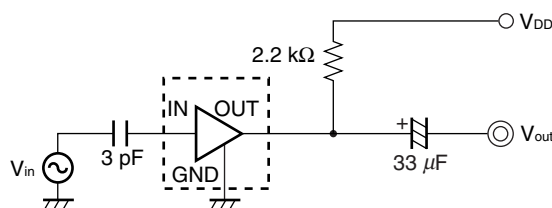
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage <sup>Note</sup>	V <sub>DD</sub>	1.0	1.5	5.0	V

**Note** R<sub>L</sub> = 2.2 kΩ

# ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = +25°C, unless otherwise specified)

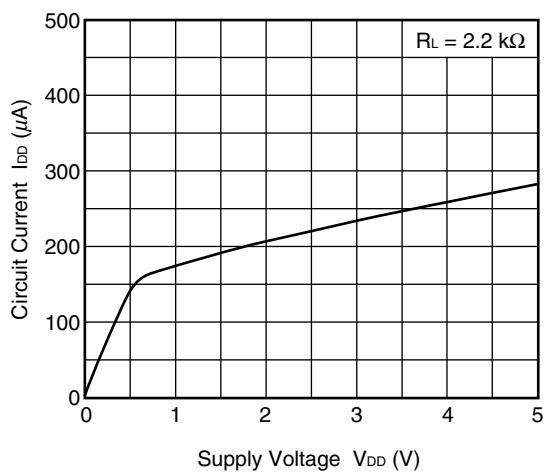
Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	I <sub>DD</sub>	V <sub>DD</sub> = 1.5 V, V <sub>in</sub> = 0 V, R <sub>L</sub> = 2.2 kΩ	140	190	250	μA
Input Capacitance	C <sub>input</sub>	V <sub>DD</sub> = 1.5 V, R <sub>L</sub> = 2.2 kΩ, f = 1 MHz	—	1.5	—	pF
Voltage Gain	G <sub>v</sub>	V <sub>DD</sub> = 1.5 V, V <sub>in</sub> = 10 mV, R <sub>L</sub> = 2.2 kΩ, C <sub>in</sub> = 3 pF, f = 1 kHz, see Test Circuit	4.5	5.7	7.0	dB
Reduced Voltage Gain Characteristics	ΔG <sub>v</sub>	V <sub>DD</sub> = 1.5 → 1.0 V, V <sub>in</sub> = 10 mV, R <sub>L</sub> = 2.2 kΩ, C <sub>in</sub> = 3 pF, f = 1 kHz, see Test Circuit	—	0.7	—	dB
Frequency Characteristics	ΔG <sub>v</sub> f	V <sub>DD</sub> = 1.5 V, V <sub>in</sub> = 10 mV, R <sub>L</sub> = 2.2 kΩ, C <sub>in</sub> = 3 pF, f = 1 kHz → 110 Hz, see Test Circuit	—	0	—	dB
Output Noise Voltage	N <sub>v</sub>	V <sub>DD</sub> = 1.5 V, V <sub>in</sub> = 0 V, R <sub>L</sub> = 2.2 kΩ, C <sub>in</sub> = 3 pF, A-Curve, see Test Circuit	—	−101	—	dBV
Total Harmonic Distortion	THD	V <sub>DD</sub> = 1.5 V, V <sub>out</sub> = 50 mV, R <sub>L</sub> = 2.2 kΩ, C <sub>in</sub> = 3 pF, f = 1 kHz, see Test Circuit	—	0.7	—	%

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

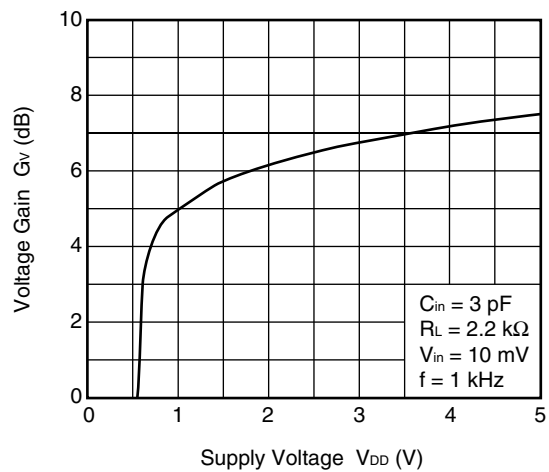


**TYPICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise specified)**

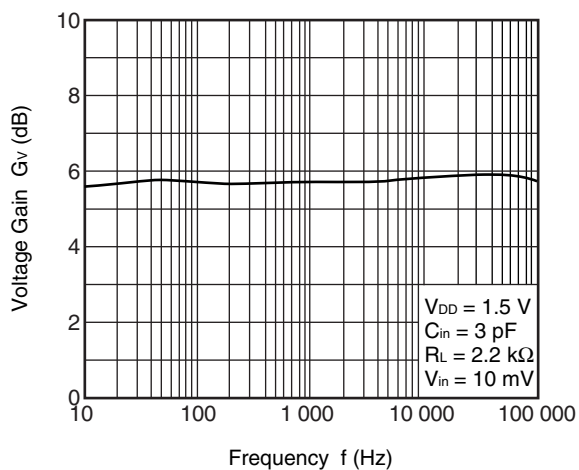
**CIRCUIT CURRENT vs. SUPPLY VOLTAGE**



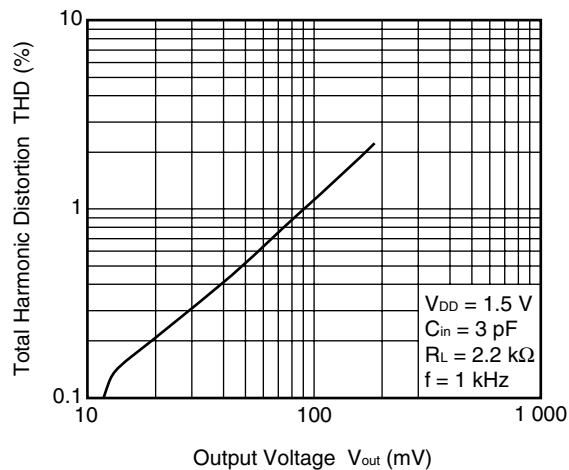
**VOLTAGE GAIN vs. SUPPLY VOLTAGE**



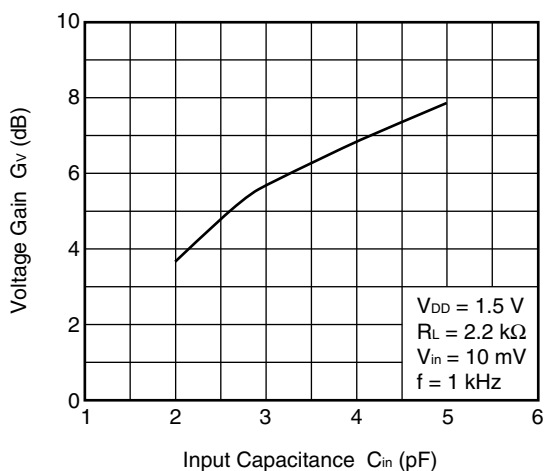
**VOLTAGE GAIN vs. FREQUENCY**



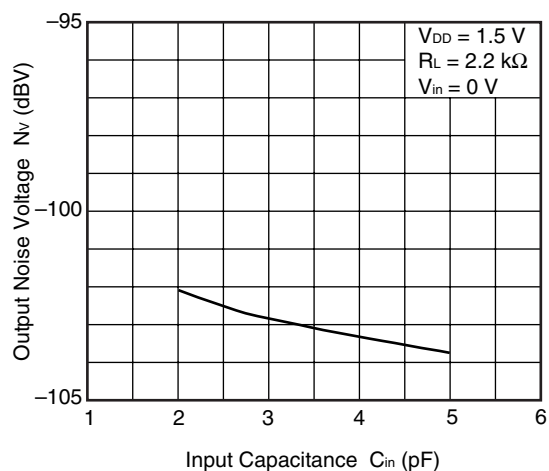
**TOTAL HARMONIC DISTORTION vs. OUTPUT VOLTAGE**



**VOLTAGE GAIN vs. INPUT CAPACITANCE**



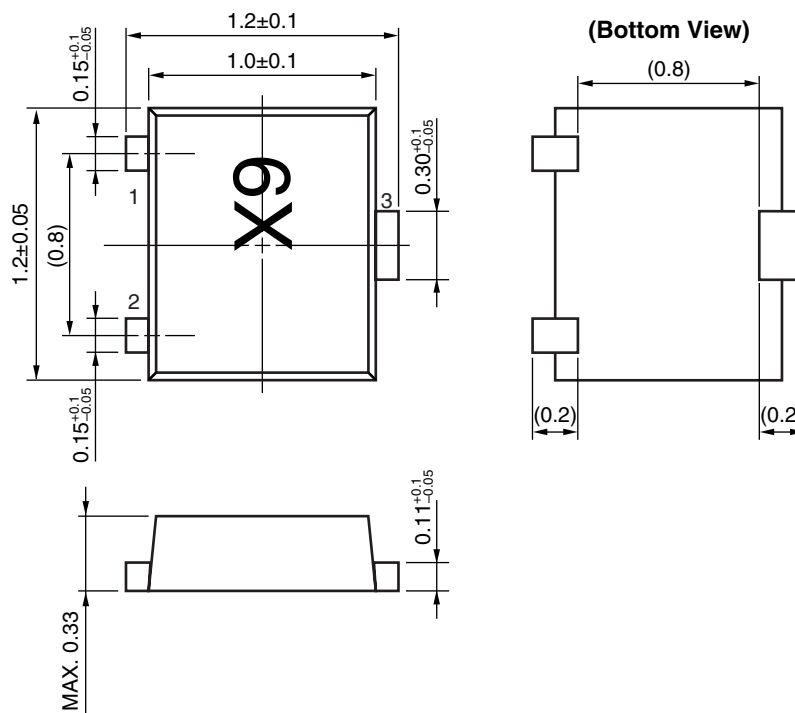
**OUTPUT NOISE VOLTAGE vs. INPUT CAPACITANCE**



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

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

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