UPC832, UPC4062

J-FET Input Low-Power Dual Operational Amplifiers

DESCRIPTION

UPC832, 4062 are J-FET input low-power operational amplifier featuring low supply voltage operation from ±2 V. Supply current is ten times smaller than that of UPC803, 4082 type op-amp. With very low input bias current characteristics, UPC832, 4062 are excellent choice for hand-held measurement equipment and other low-power application circuits.

Depending on operating ambient temperature, UPC832 is suited for communication application while UPC4062 is for general purposes usage.

Along with this series of lineup, the quad type op-amp UPC834 and UPC4064 with same circuit configuration are also available.

FEATURES

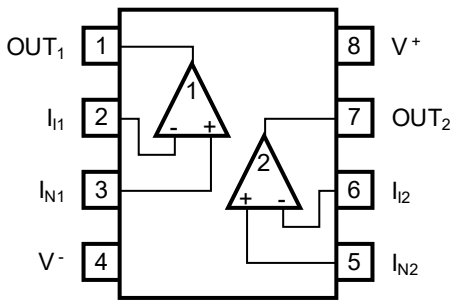
- Input offset voltage ±2 mV (TYP.)
- Input bias current 10 pA (TYP.)
- Slew Rate 3 V/μs (TYP.)
- Unity Gain Frequency 1 MHz (TYP.)
- Circuit current 400 μA (TYP.)
- Low supply voltage operation ±2 V
- Build -in phase correction circuit
- Built-in output short-circuit protection circuit
- Standard dual op-amp terminal connection (pin compatible)

ORDERING INFORMATION

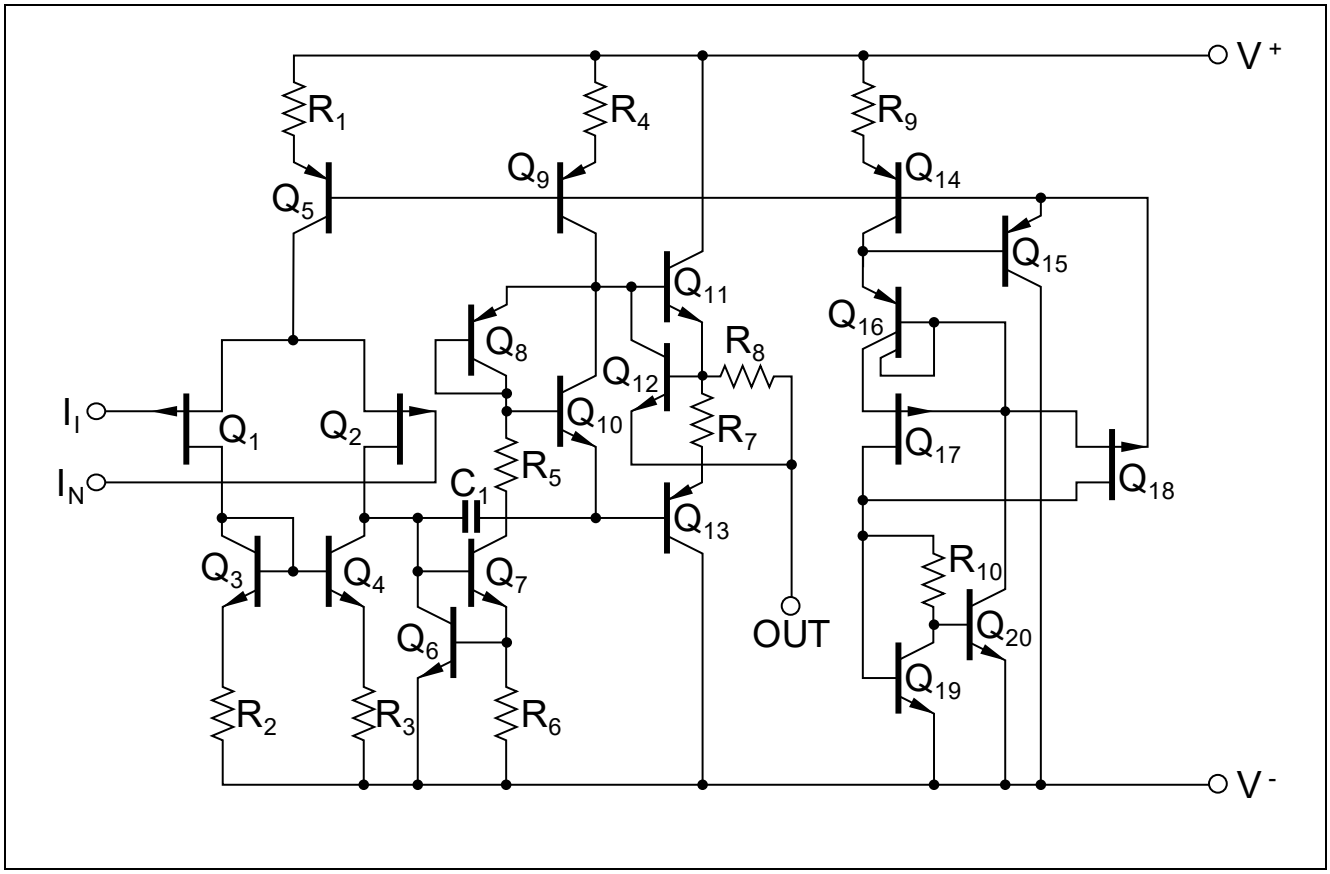
Order Name (1)	Package
UPC832G2-AP	8-Pin plastic SOP (5.72 mm (225))
UPC4062G2-AP	8-Pin plastic SOP (5.72 mm (225))

(1) Order names containing E1 or E2 indicate that the packaging format is embossed taping. Pin 1 of E1 is on draw-out side, and pin 1 of E2 is at take-up side.

PIN CONFIGURATION (Top View)



EQUIVALENT CIRCUIT (1/2 Circuit)



ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Parameter	Symbol	UPC832G2	UPC4062G2	Unit
Voltage between V^+ and V^- Note1	$V^+ - V^-$	-0.3 ~ +36		V
Differential Input Voltage	V_{ID}	±30		V
Input Voltage Note 2	V_I	V^- -0.3 ~ V^+ +0.3		V
Output applied Voltage Note3	V_O	V^- -0.3 ~ V^+ +0.3		V
Total Power Dissipation Note4	P_T	440		mW
Output Short Circuit Duration Note5		Indefinite		s
Operating Ambient Temperature	T_A	-40 ~ +85	-20 ~ +80	°C
Storage Temperature	T_{stg}	-55 ~ +125		°C

【**Note**】**1.** Reverse connections of supply voltage can cause destruction.

2. The input voltage should be allowed to input without damage or destruction. Even during the transition period of supply voltage, power on/off etc., this specification should be kept. The normal operation will establish when the both inputs are within the Common Mode Input Voltage Range of electrical characteristics.

3. This specification is the voltage which should be allowed to supply to the output terminal from external without damage or destruction. Even during the transition period of supply voltage, power on/off etc., this specification should be kept. The output voltage of normal operation will be the Output Voltage Swing of electrical characteristics.

4. Thermal derating factor is -4.4 mW/°C when operating ambient temperature is higher than 25 °C.

5. Pay careful attention to the total power dissipation not to exceed the absolute maximum ratings and **Note 4**.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	$V^{\pm}$	±2		±16	V
Output Source Current	$I_{O\ SOURCE}$			5	mA
Output Sink Current	$I_{O\ SINK}$			3.5	mA
Capacitive Load (A_V = +1)	C_L			100	pF

ELECTRICAL CHARACTERISTICS ($V^{\pm}$ = ±15 V, T_A = 25 °C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Conditions
Input Offset Voltage	V_{IO}		±2	±10	mV	R_S ≤ 50 Ω
Input Offset Current Note6	I_{IO}		±5	±50	pA	
Input Bias Current Note6	I_B		10	100	pA	
Large Signal Voltage Gain	A_V	3000	9000			R_L ≥ 10 kΩ, V_O = ±10 V
Supply Current Note7	I_{CC}		400	500	μA	I_O = 0 A
Common Mode Rejection Ratio	CMR	70	90		dB	
Supply Voltage Rejection Ratio	SVR	70	90		dB	
Output Voltage Swing	V_{om}	±12	+14.0 -13.6		V	R_L ≥ 10 kΩ
Common Model Input Voltage Range	V_{ICM}	±12	+15 -13		V	
Slew Rate	SR		3		V/μs	A_V = 1
Unity Gain Frequency	f_{unity}		1		MHz	
Input Equivalent Noise Voltage Density	e_n		30		$nV/\sqrt{Hz}$	R_S = 100 Ω, f = 1 kHz
Channel Separation			120		dB	
Input Offset Voltage	V_{IO}			±15	mV	R_S ≤ 50 Ω, T_A = -20 ~ +70 °C
Average V_{IO} Temperature Drift	$\Delta V_{IO}/\Delta T$		±10		μV/°C	T_A = -20 ~ +70 °C
Input Offset Current Note6	I_{IO}			±2	nA	T_A = -20 ~ +70 °C
Input Bias Current Note6	I_B			3.5	nA	T_A = -20 ~ +70 °C

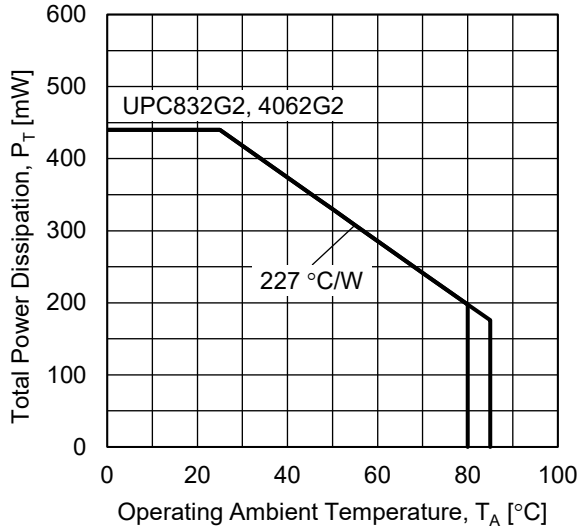
【Note】 **6.** Input bias currents flow into IC. Because each currents are gate leak current of P-channel J-FET on input stage. And that are temperature sensitive. Short time measuring method is recommendable to maintain the junction temperature close to the operating ambient temperature.

7. This current flows irrespective of the existence of use.

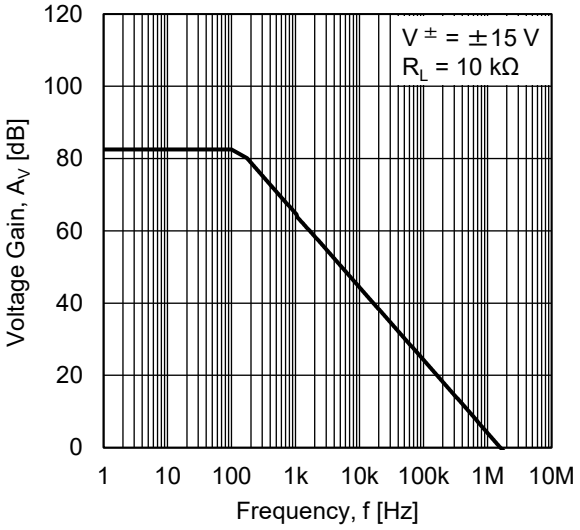
Note Since the UPC832 and UPC4062 have high input impedance characteristics, pay close attention to the isolation between the terminals on the board.

TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25 °C, TYP.) (Reference value)

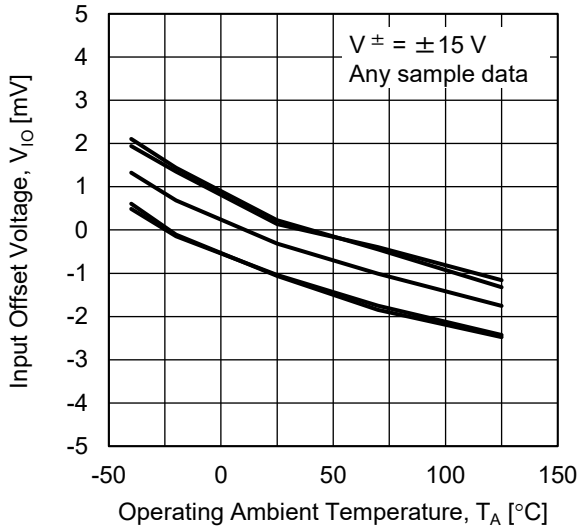
P_T vs. T_A (Absolute maximum rating)



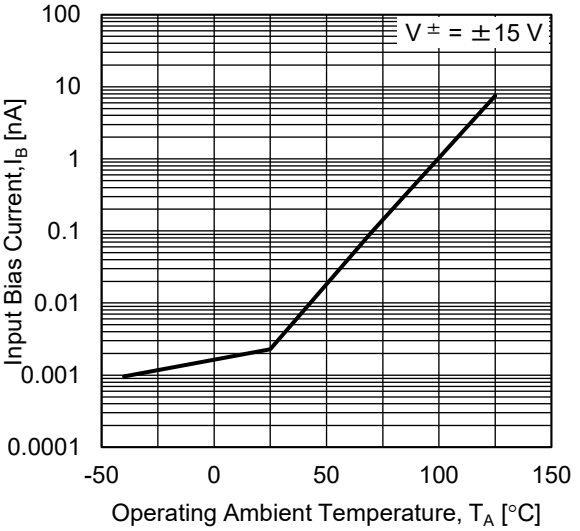
A_V vs. f



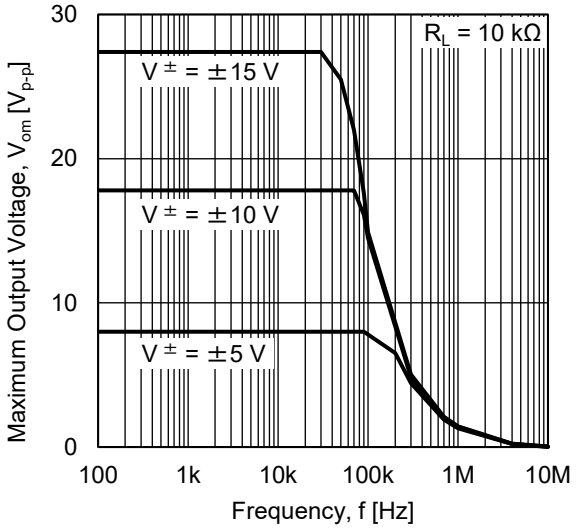
V_{IO} vs. T_A



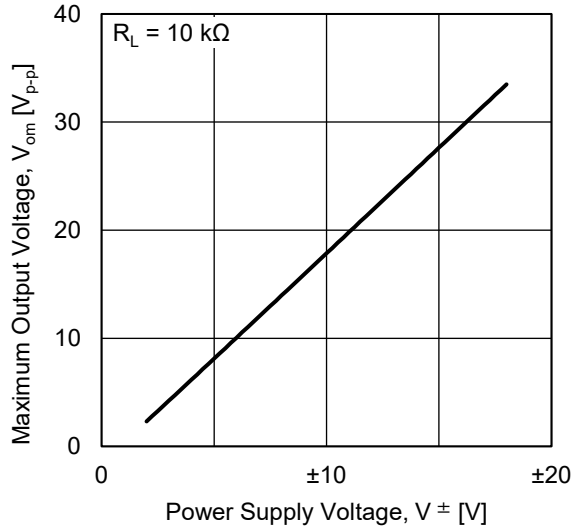
I_B vs. T_A



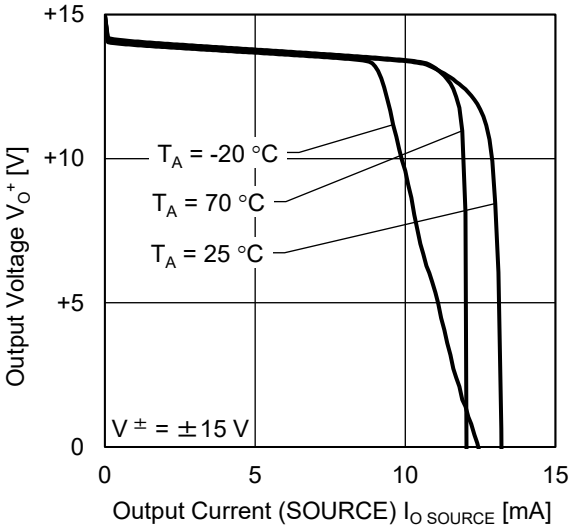
V_{om} vs. f



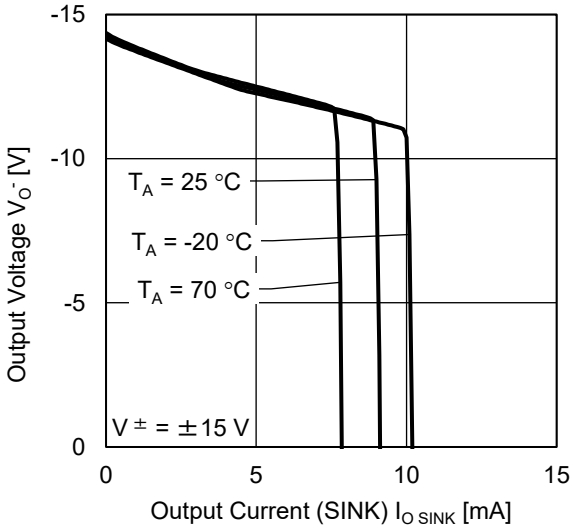
V_{om} vs. $V^{\pm}$



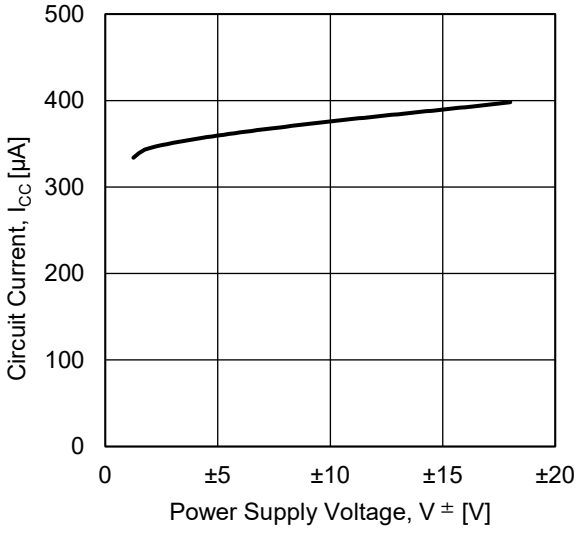
V_O^+ vs. $I_{O\ SOURCE}$



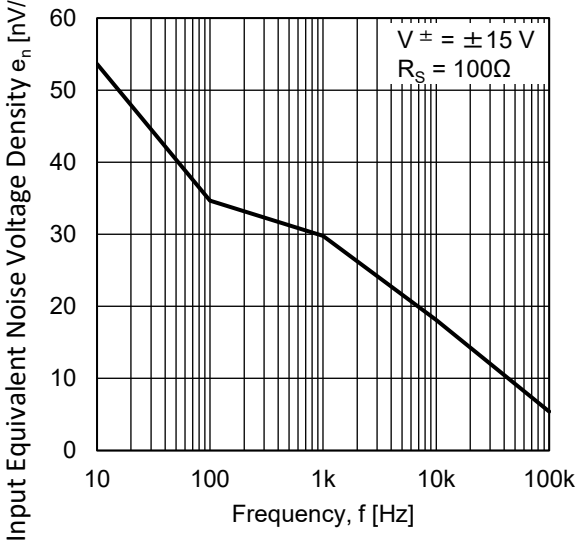
V_O^- vs. $I_{O\ SINK}$



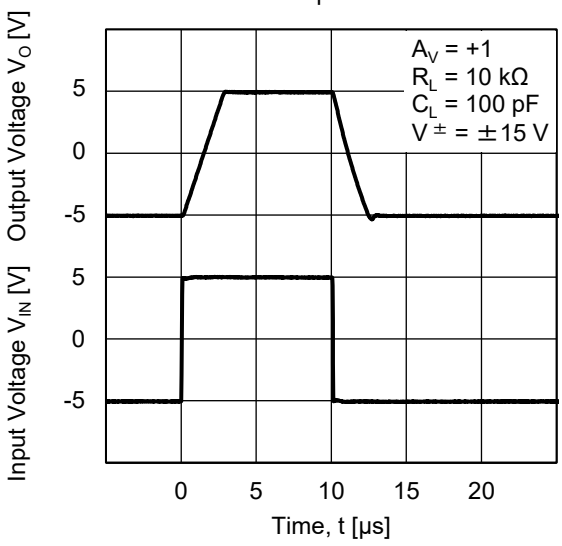
I_{CC} vs. $V^\pm$



e_n vs. f



Pulse Response

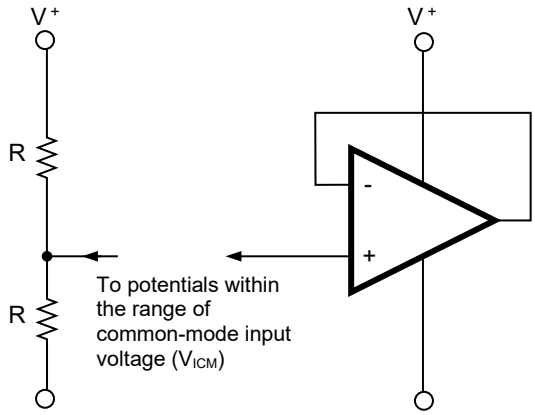


USE WITH PRECAUTIONS

- **Managing unused circuits**

  If there is an unused circuit, the following connection is recommended.

Example of unused circuit process



Remark Note in this example, an intermediate voltage of V^+ and V^- is applied.

- **Power Supply (Dual Power Supply / Single Power Supply)**

  The op-amp operates as long as a predetermined voltage is applied between V^+ and V^-. Therefore, it can operate with a single power supply (V^- = GND), but it cannot operate the input and output near GND. Common-mode input voltage Please pay attention to the range and maximum output voltage.

- **Ratings of input/output pin voltage**

  When the voltage of input/output pin exceeds the absolute maximum rating, the parasitic diode within the IC may conduct, causing characteristics degradation or damage. In addition, if the input pin is lower than V^-, or the output pin exceeds the power supply voltage, it is recommended to make a clamping circuit using a diode with low forward voltage (e.g.: Schottky diode) as protection.

- **Range of common-mode input voltage**

  When the supply voltage does not meet the condition of electrical characteristics, the range of common-mode input voltage is as follows.

  V_{ICM} (TYP.) : V^- +2 ~ V^+ [V] (T_A = 25 °C).

  During designing, do include some tolerance by considering temperature characteristics etc.

- **Maximum output voltage**

  The TYP. value range of the maximum output voltage when the supply voltage does not meet the condition of electrical characteristics is as follows:

  V_{om}^+ (TYP.): V^+ - 1 [V] (T_A = 25°C), V_{om}^- (TYP.): V^- + 1.4 [V] (T_A = 25°C)

  During designing, do include some tolerance by considering characteristics variation, temperature characteristics and so on. In addition, also note that the output voltage range ($V_{om}^+ - V_{om}^-$) will become narrow when the output current increases.

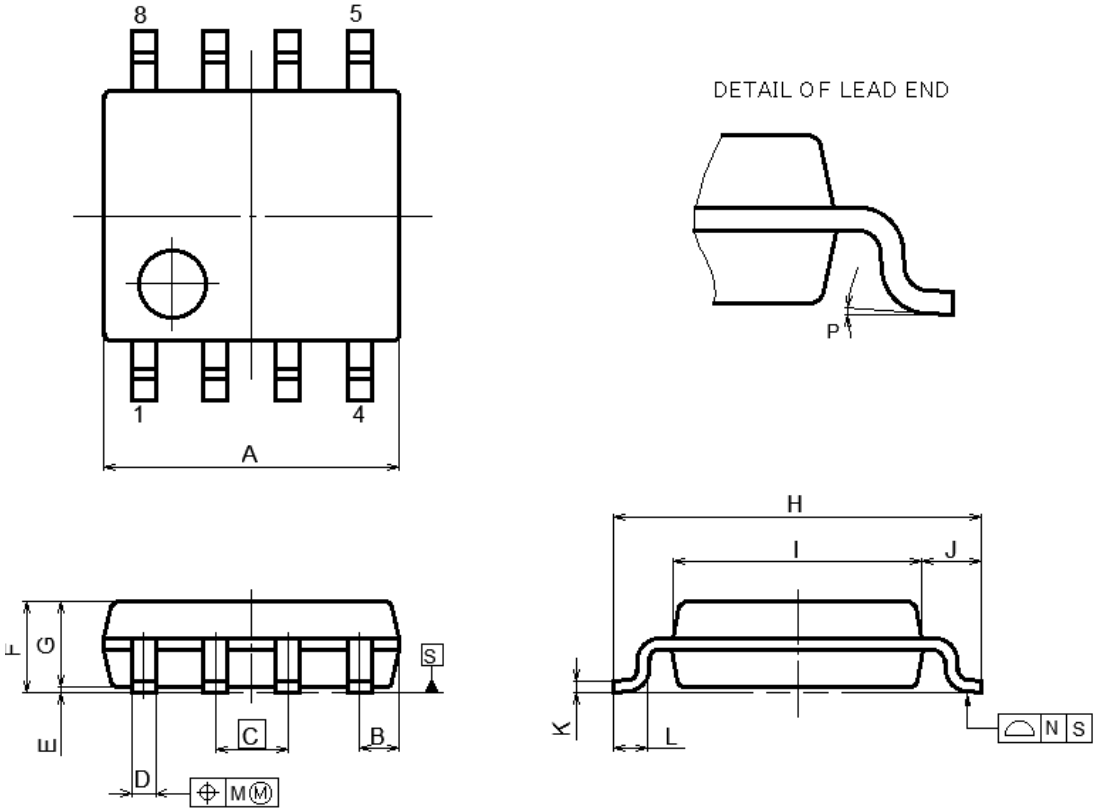
- **Handling of ICs**

  When stress is added to ICs due to warpage or bending of a board, the characteristic may fluctuates due to piezoelectric (piezo) effect. Therefore, pay attention to warpage or bending of a board.

PACKAGE DRAWINGS

8-PIN PLASTIC SOP

JEITA Package code	RENESAS code	MASS (TYP.) [g]
P-LSOP8-4.4×5.2-1.27	PLSP0008DE-A	0.09[g]



NOTE
EACH LEAD CENTERLINE IS LOCATED WITHIN 0.12 MM OF
ITS TRUE POSITION(T.P.) AT MAXIMUM MATERIAL CONDITION.

(UNIT:mm)

ITEM	DIMENSIONS
A	5.2±0.17
B	0.78MAX
C	1.27(T.P)
D	0.40±0.05
E	0.1±0.1
F	1.59±0.21
G	1.49
H	6.5±0.3
I	4.4±0.1
J	1.05±0.15
K	0.2±0.07
L	0.6±0.20
M	0.1MAX
N	0.1MAX
P	4°±4°

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