

# NCS2005

## Operational Amplifier, Low Power, 8 MHz GBW, Rail-to-Rail Input-Output

The NCS2005 provides high performance in a wide range of applications. The NCS2005 offers beyond rail-to-rail input range, full rail-to-rail output swing, large capacitive load driving ability, and low distortion. The inputs can be driven by voltages that exceed both power supply rails, thus eliminating concerns over exceeding the common-mode voltage range. The rail-to-rail output swing capability provides the maximum possible dynamic range at the output. This is particularly important when operating on low supply voltages.

Operating on supplies of 2.2 V to 32 V, the NCS2005 is excellent for a very wide range of applications in low power systems. With a supply current of 1.3 mA, the 8 MHz gain-bandwidth of this device supports applications where faster speeds are required. Placing the amplifier right at the signal source reduces board size and simplifies signal routing. The NCS2005 is available in a space-saving 5-pin SOT-23 package.

### Features

- Wide Power Supply Range: 2.2 V to 32 V
- Common Mode Voltage Range Wider than Rail-to-Rail:  
 $V_{CM} = -0.1 \text{ V to } 5.1 \text{ V @ } V_S = 5 \text{ V}$
- Wide Gain-bandwidth: 8 MHz typical
- Low Supply Current: 1.3 mA typical
- Stable with a 1 nF Capacitor Load with a Phase Margin over  $25^\circ$  @  $V_S = 10 \text{ V}$
- Available in a Space-saving 5-pin SOT23 Package
- These devices are Pb-free, Halogen free/BFR Free and are RoHS Compliant

### Typical Applications

- Active Filters
- Voltage Referenced Buffers
- Sensors and Instrumentation
- Microphone Amplifiers
- ASIC Input Drivers
- Portable Communications
- PCMCIA Cards



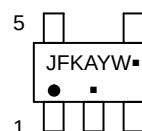
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SOT23-5  
SN SUFFIX  
CASE 483

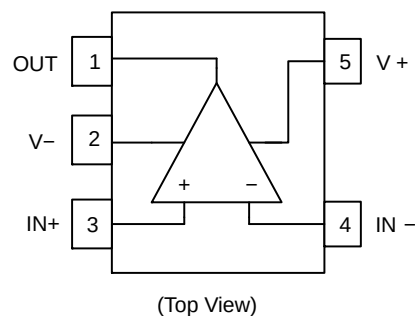
### MARKING DIAGRAM



JFK = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### PIN DIAGRAM



### ORDERING INFORMATION

| Device        | Package             | Shipping†             |
|---------------|---------------------|-----------------------|
| NCS2005SN1T1G | SOT-23<br>(Pb-Free) | 3000 / Tape &<br>Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

**Table 1. PIN DESCRIPTION**

| Pin | Name | Type   | Description                      |
|-----|------|--------|----------------------------------|
| 1   | OUT  | Output | Amplifier output                 |
| 2   | V–   | Power  | Negative power supply            |
| 3   | IN+  | Input  | Non-inverting input of amplifier |
| 4   | IN–  | Input  | Inverting input of amplifier     |
| 5   | V+   | Power  | Positive power supply            |

**Table 2. ABSOLUTE MAXIMUM RATINGS** (Note 1)

| rating                                                              | Symbol       | Value                        | Units |
|---------------------------------------------------------------------|--------------|------------------------------|-------|
| Supply Voltage Range (V+ – V–)                                      | $V_S$        | 0 to 35                      | V     |
| Input Voltage Range                                                 | $V_{CM}$     | (V–) – 0.3 V to (V+) + 0.3 V | V     |
| Differential Input Voltage Range                                    | $V_{diff}$   | 0 to 15                      | V     |
| Input Pin Current                                                   | $I_{IN}$     | ±10                          | mA    |
| Output Pin Current (Note 2)                                         | $I_{OUT}$    | ±20                          | mA    |
| Supply Current                                                      | $I_S$        | 25                           | mA    |
| Maximum Junction Temperature (Note 3)                               | $T_{J(max)}$ | +150                         | °C    |
| Storage Temperature Range                                           | $T_{stg}$    | –65 to +150                  | °C    |
| ESD Capability (Note 4)<br>Human Body Model<br>Charged Device Model | HBM<br>CDM   | 4000<br>400                  | V     |
| Moisture Sensitivity Level (Note 5)                                 | MSL          | Level 1                      |       |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Refer to ELECTRICAL CHARACTERISTICS and APPLICATION INFORMATION for Safe Operating Area.
2. Applies to both single supply and split supply operation. Continuous short circuit operation at elevated ambient temperature can result in exceeding the maximum allowed junction temperature of 150°C.
3. The maximum power dissipation is a function of  $T_{J(MAX)}$ ,  $T_{JA}$ , and  $T_A$ . The maximum allowable dissipation at any ambient temperature is  $P_d = (T_{J(max)} - T_A)/T_{JA}$ . All numbers apply for packages soldered directly to a PC board.
4. This device series incorporates ESD protection and is tested by the following methods:  
ESD Human Body Model tested per JESD22-A114  
ESD Charged Device Model tested per ANSI/ESD S5.3.1-2009
5. Moisture Sensitivity Level tested per IPC/JEDEC standard: J-STD-020A

**Table 3. THERMAL CHARACTERISTICS**

| Parameter                                       | Symbol        | Package  | Single Layer Board | Multi Layer Board | Units |
|-------------------------------------------------|---------------|----------|--------------------|-------------------|-------|
| Thermal Resistance Junction-to-Ambient (Note 6) | $\theta_{JA}$ | SOT-23-5 | 408 (Note 6)       | 355 (Note 7)      | °C/W  |

6. Values based on a 1S standard PCB according to JEDEC51-3 with 1.0 oz copper and a 300 mm<sup>2</sup> copper area
7. Values based on a 1S2P standard PCB according to JEDEC51-7 with 1.0 oz copper and a 100 mm<sup>2</sup> copper area

**Table 4. OPERATING RANGES**

| Parameter                 | Symbol   | Min        | Max        | Units |
|---------------------------|----------|------------|------------|-------|
| Power Supply Voltage      | $V_S$    | 2.2        | 32         | V     |
| Common Mode Input Voltage | $V_{CM}$ | (V–) – 0.1 | (V+) + 0.1 | V     |
| Ambient Temperature       | $T_A$    | –40        | 125        | °C    |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

**Table 5. ELECTRICAL CHARACTERISTICS AT 10 V SUPPLY** Unless otherwise noted, values are referenced to  $T_A = 25^\circ\text{C}$ ,  $V_+ = 10\text{ V}$ ,  $V_- = 0\text{ V}$ ,  $V_{CM} = V_+/2$ , and  $R_L > 1\text{ M}\Omega$  to  $V_+/2$ . **Boldface** limits apply from  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$ . (Notes 8, 9)

| Parameter | Test Conditions | Symbol | Min | Typ | Max | Units |
|-----------|-----------------|--------|-----|-----|-----|-------|
|-----------|-----------------|--------|-----|-----|-----|-------|

**SUPPLY CHARACTERISTICS**

|                              |                                     |       |           |      |            |    |
|------------------------------|-------------------------------------|-------|-----------|------|------------|----|
| Quiescent Supply Current     | No load                             | $I_S$ |           | 1.30 | 1.5        | mA |
|                              |                                     |       |           |      | <b>1.7</b> |    |
| Power Supply Rejection Ratio | $V_S = 2.7\text{ V to }30\text{ V}$ | PSRR  |           | 113  |            | dB |
|                              |                                     |       | <b>70</b> |      |            |    |

**INPUT CHARACTERISTICS**

|                             |                                                    |                 |    |     |     |       |
|-----------------------------|----------------------------------------------------|-----------------|----|-----|-----|-------|
| Input Offset Voltage        |                                                    | V <sub>OS</sub> |    | 0.2 | 6   | mV    |
|                             |                                                    |                 |    |     | 6   |       |
| Input Offset Voltage Drift  |                                                    | ΔV/ΔT           |    | 1   |     | μV/°C |
| Input Bias Current          | V <sub>CM</sub> = 0 V                              | I <sub>IB</sub> |    | 50  | 200 | nA    |
|                             |                                                    |                 |    |     | 200 |       |
|                             | V <sub>CM</sub> = 10 V                             |                 |    | 50  | 200 |       |
|                             |                                                    |                 |    |     | 200 |       |
| Input Offset Current        | V <sub>CM</sub> = 0 V                              | I <sub>OS</sub> |    | 2   | 70  | nA    |
|                             |                                                    |                 |    |     | 80  |       |
|                             | V <sub>CM</sub> = 10 V                             |                 |    | 2   | 70  |       |
|                             |                                                    |                 |    |     | 80  |       |
| Input Resistance            |                                                    | R <sub>IN</sub> |    | 95  |     | MΩ    |
| Input Capacitance           |                                                    | C <sub>IN</sub> |    | 3   |     | pF    |
| Common Mode Rejection Ratio | V <sub>CM</sub> = V <sup>−</sup> to V <sup>+</sup> | CMRR            | 73 | 84  |     | dB    |

**OUTPUT CHARACTERISTICS**

|                           |                      |           |      |      |     |    |
|---------------------------|----------------------|-----------|------|------|-----|----|
| High-level output voltage | $I_L = 10\text{ mA}$ | $V_{OH}$  | 9.65 | 9.80 |     | V  |
| Low-Level Output Voltage  | $I_L = 10\text{ mA}$ | $V_{OL}$  |      | 176  | 300 | mV |
| Output Current Capability | Sourcing current     | $I_{OUT}$ |      | 12   |     | mA |
|                           | Sinking current      |           |      | 20   |     |    |

**DYNAMIC PERFORMANCE**

|                                      |                                                                |           |    |        |  |                        |
|--------------------------------------|----------------------------------------------------------------|-----------|----|--------|--|------------------------|
| Open Loop Voltage Gain               | $R_L = 10\text{ k}\Omega$                                      | $A_{VOL}$ | 83 | 107    |  | dB                     |
| Gain-Bandwidth Product               | $R_L = 10\text{ k}\Omega$                                      | GBWP      |    | 8.5    |  | MHz                    |
| Gain Margin                          | $R_L = 10\text{ k}\Omega$                                      | $A_M$     |    | 5.5    |  | dB                     |
| Phase Margin                         | $R_L = 10\text{ k}\Omega$                                      | $\psi_M$  |    | 65     |  | $^\circ$               |
| Slew Rate                            | $R_L = 10\text{ k}\Omega$                                      | SR        |    | 2.8    |  | $\text{V}/\mu\text{s}$ |
| Total Harmonic Distortion Plus Noise | $f_{IN} = 1\text{ kHz}$ , $A_V = 2$ , $R_L = 2\text{ k}\Omega$ | THD+n     |    | 0.0015 |  | %                      |

**NOISE PERFORMANCE**

|                       |                    |       |  |    |  |                              |
|-----------------------|--------------------|-------|--|----|--|------------------------------|
| Voltage Noise Density | $f = 1\text{ kHz}$ | $e_N$ |  | 45 |  | $\text{nV}/\sqrt{\text{Hz}}$ |
|-----------------------|--------------------|-------|--|----|--|------------------------------|

8. Refer to ABSOLUTE MAXIMUM RATINGS and APPLICATION INFORMATION for Safe Operating Area.

9. Performance guaranteed over the indicated operating temperature range by design and/or characterization tested at  $T_J = T_A = 25^\circ\text{C}$ .

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

**Table 6. ELECTRICAL CHARACTERISTICS AT 5 V SUPPLY** Unless otherwise noted, values are referenced to  $T_A = 25^\circ\text{C}$ ,  $V_+ = 5\text{ V}$ ,  $V_- = 0\text{ V}$ ,  $V_{CM} = V_+/2$ , and  $R_L \geq 1\text{ M}\Omega$  to  $V_+/2$ . **Boldface** limits apply from  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$ , unless otherwise noted. (Notes 10, 11)

| Parameter | Test Conditions | Symbol | Min | Typ | Max | Units |
|-----------|-----------------|--------|-----|-----|-----|-------|
|-----------|-----------------|--------|-----|-----|-----|-------|

**SUPPLY CHARACTERISTICS**

|                              |                                     |       |           |      |  |    |
|------------------------------|-------------------------------------|-------|-----------|------|--|----|
| Quiescent Supply Current     | No load                             | $I_S$ |           | 1.25 |  | mA |
| Power Supply Rejection Ratio | $V_S = 2.7\text{ V to }30\text{ V}$ | PSRR  |           | 113  |  | dB |
|                              |                                     |       | <b>70</b> |      |  |    |

**INPUT CHARACTERISTICS**

|                             |                                |                     |    |     |          |                              |
|-----------------------------|--------------------------------|---------------------|----|-----|----------|------------------------------|
| Input Offset Voltage        |                                | $V_{OS}$            |    | 0.2 | 6        | mV                           |
|                             |                                |                     |    |     | <b>6</b> |                              |
| Input Offset Voltage Drift  |                                | $\Delta V/\Delta T$ |    | 1   |          | $\mu\text{V}/^\circ\text{C}$ |
| Input Bias Current          | $V_{CM} = 0\text{ V}$          | $I_{IB}$            |    | 55  |          | nA                           |
|                             | $V_{CM} = 5\text{ V}$          |                     |    | 55  |          |                              |
| Input Offset Current        | $V_{CM} = 0\text{ V}$          | $I_{OS}$            |    | 2   |          | nA                           |
|                             | $V_{CM} = 5\text{ V}$          |                     |    | 2   |          |                              |
| Input Resistance            |                                | $R_{IN}$            |    | 45  |          | $\text{M}\Omega$             |
| Input Capacitance           |                                | $C_{IN}$            |    | 3   |          | pF                           |
| Common Mode Rejection Ratio | $V_{CM} = V_- \text{ to } V_+$ | CMRR                | 68 | 90  |          | dB                           |

**OUTPUT CHARACTERISTICS**

|                           |                     |           |      |      |     |    |
|---------------------------|---------------------|-----------|------|------|-----|----|
| High-level Output Voltage | $I_L = 5\text{ mA}$ | $V_{OH}$  | 4.75 | 4.83 |     | V  |
| Low-level Output Voltage  | $I_L = 5\text{ mA}$ | $V_{OL}$  |      | 130  | 200 | mV |
| Output Current Capability | Sourcing current    | $I_{OUT}$ |      | 12   |     | mA |
|                           | Sinking current     |           |      | 20   |     |    |

**DYNAMIC PERFORMANCE**

|                                      |                                                                |           |    |       |  |                        |
|--------------------------------------|----------------------------------------------------------------|-----------|----|-------|--|------------------------|
| Open Loop Voltage Gain               | $R_L = 10\text{ k}\Omega$                                      | $A_{VOL}$ | 83 | 100   |  | dB                     |
| Gain-Bandwidth Product               | $R_L = 10\text{ k}\Omega$                                      | GBWP      |    | 8.5   |  | MHz                    |
| Gain Margin                          | $R_L = 10\text{ k}\Omega$                                      | $A_M$     |    | 5.5   |  | dB                     |
| Phase Margin                         | $R_L = 10\text{ k}\Omega$                                      | $\psi_M$  |    | 65    |  | $^\circ$               |
| Slew Rate                            | $R_L = 10\text{ k}\Omega$                                      | SR        |    | 2.7   |  | $\text{V}/\mu\text{s}$ |
| Total Harmonic Distortion Plus Noise | $f_{IN} = 1\text{ kHz}$ , $A_V = 2$ , $R_L = 2\text{ k}\Omega$ | THD+n     |    | 0.002 |  | %                      |

**NOISE PERFORMANCE**

|                       |                    |       |  |    |  |                              |
|-----------------------|--------------------|-------|--|----|--|------------------------------|
| Voltage Noise Density | $f = 1\text{ kHz}$ | $e_N$ |  | 45 |  | $\text{nV}/\sqrt{\text{Hz}}$ |
|-----------------------|--------------------|-------|--|----|--|------------------------------|

10. Refer to ABSOLUTE MAXIMUM RATINGS and APPLICATION INFORMATION for Safe Operating Area.

11. Performance guaranteed over the indicated operating temperature range by design and/or characterization tested at  $T_J = T_A = 25^\circ\text{C}$ .

**Table 7. ELECTRICAL CHARACTERISTICS AT 2.7 V SUPPLY** Unless otherwise noted, values are referenced to  $T_A = 25^\circ\text{C}$ ,  $V_+ = 2.7\text{ V}$ ,  $V_- = 0\text{ V}$ ,  $V_{CM} = V_+/2$ , and  $R_L \geq 1\text{ M}\Omega$  to  $V_+/2$ . **Boldface** limits apply from  $T_A = -40^\circ\text{C}$  to  $125^\circ\text{C}$ , unless otherwise noted. (Notes 12, 13)

| Parameter | Test Conditions | Symbol | Min | Typ | Max | Units |
|-----------|-----------------|--------|-----|-----|-----|-------|
|-----------|-----------------|--------|-----|-----|-----|-------|

**SUPPLY CHARACTERISTICS**

|                              |                                       |       |           |      |  |    |
|------------------------------|---------------------------------------|-------|-----------|------|--|----|
| Quiescent Supply Current     | No load                               | $I_S$ |           | 1.25 |  | mA |
| Power Supply Rejection Ratio | $V_S = 2.7\text{ V}$ to $30\text{ V}$ | PSRR  | <b>70</b> | 113  |  | dB |

**INPUT CHARACTERISTICS**

|                             |                         |                     |    |     |          |                              |
|-----------------------------|-------------------------|---------------------|----|-----|----------|------------------------------|
| Input Offset Voltage        |                         | $V_{OS}$            |    | 0.2 | <b>6</b> | mV                           |
|                             |                         |                     |    |     | <b>6</b> |                              |
| Input Offset Voltage Drift  |                         | $\Delta V/\Delta T$ |    | 1   |          | $\mu\text{V}/^\circ\text{C}$ |
| Input Bias Current          | $V_{CM} = 0\text{ V}$   | $I_{IB}$            |    | 45  |          | nA                           |
|                             | $V_{CM} = 2.7\text{ V}$ |                     |    | 45  |          |                              |
| Input Offset Current        | $V_{CM} = 0\text{ V}$   | $I_{OS}$            |    | 2   |          | nA                           |
|                             | $V_{CM} = 2.7\text{ V}$ |                     |    | 2   |          |                              |
| Input Resistance            |                         | $R_{IN}$            |    | 90  |          | $\text{M}\Omega$             |
| Input Capacitance           |                         | $C_{IN}$            |    | 3   |          | pF                           |
| Common Mode Rejection Ratio | $V_{CM} = V_-$ to $V_+$ | CMRR                | 58 | 96  |          | dB                           |

**OUTPUT CHARACTERISTICS**

|                           |                       |           |      |      |     |    |
|---------------------------|-----------------------|-----------|------|------|-----|----|
| High-Level Output Voltage | $I_L = 2.7\text{ mA}$ | $V_{OH}$  | 2.50 | 2.60 |     | V  |
| Low-Level Output Voltage  | $I_L = 2.7\text{ mA}$ | $V_{OL}$  |      | 100  | 130 | mV |
| Output Current Capability | Sourcing current      | $I_{OUT}$ |      | 12   |     | mA |
|                           | Sinking current       |           |      | 20   |     |    |

**DYNAMIC PERFORMANCE**

|                                      |                                                                |           |    |      |  |                        |
|--------------------------------------|----------------------------------------------------------------|-----------|----|------|--|------------------------|
| Open Loop Voltage Gain               | $R_L = 10\text{ k}\Omega$                                      | $A_{VOL}$ | 73 | 114  |  | dB                     |
| Gain-Bandwidth Product               | $R_L = 10\text{ k}\Omega$                                      | GBWP      |    | 8.5  |  | MHz                    |
| Gain Margin                          | $R_L = 10\text{ k}\Omega$                                      | $A_M$     |    | 6    |  | dB                     |
| Phase Margin                         | $R_L = 10\text{ k}\Omega$                                      | $\psi_M$  |    | 60   |  | $^\circ$               |
| Slew Rate                            | $R_L = 10\text{ k}\Omega$                                      | SR        |    | 2.6  |  | $\text{V}/\mu\text{s}$ |
| Total Harmonic Distortion Plus Noise | $f_{IN} = 1\text{ kHz}$ , $A_V = 2$ , $R_L = 2\text{ k}\Omega$ | THD+n     |    | 0.05 |  | %                      |

**NOISE PERFORMANCE**

|                       |                    |       |  |    |  |                              |
|-----------------------|--------------------|-------|--|----|--|------------------------------|
| Voltage Noise Density | $f = 1\text{ kHz}$ | $e_N$ |  | 45 |  | $\text{nV}/\sqrt{\text{Hz}}$ |
|-----------------------|--------------------|-------|--|----|--|------------------------------|

12. Refer to ABSOLUTE MAXIMUM RATINGS and APPLICATION INFORMATION for Safe Operating Area.

13. Performance guaranteed over the indicated operating temperature range by design and/or characterization tested at  $T_J = T_A = 25^\circ\text{C}$ .

## TYPICAL CHARACTERISTICS

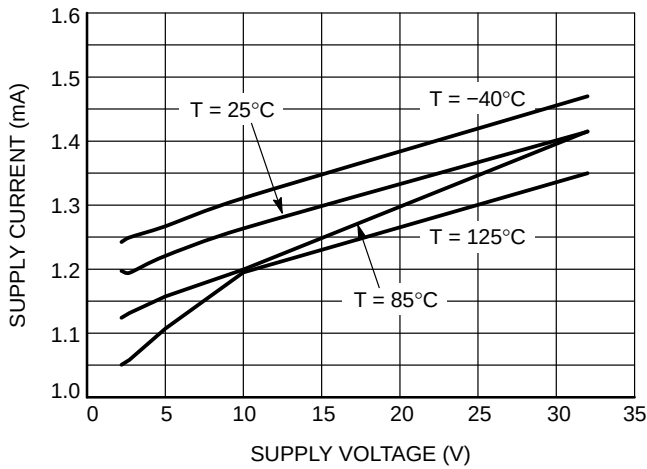


Figure 1. Quiescent Current Per Channel vs. Supply Voltage

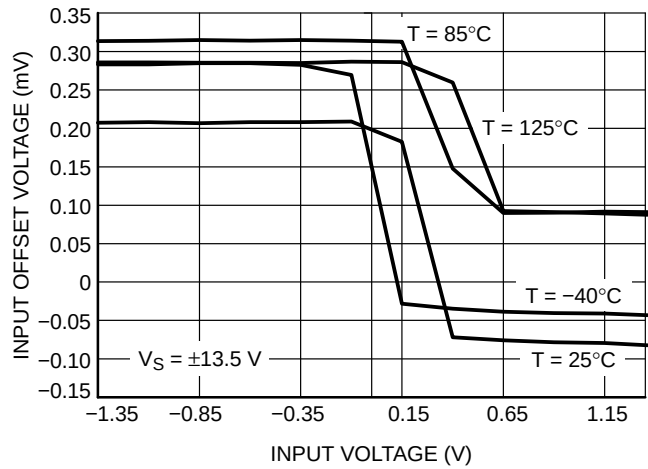


Figure 2. Input Offset Voltage vs. Common Mode Input Voltage

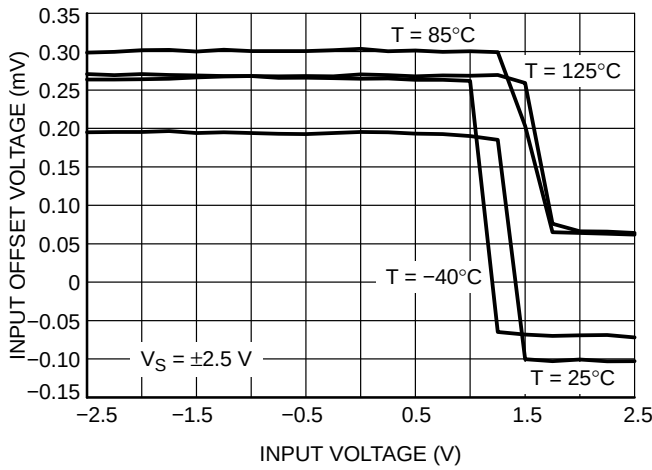


Figure 3. Input Offset Voltage vs. Common Mode Input Voltage

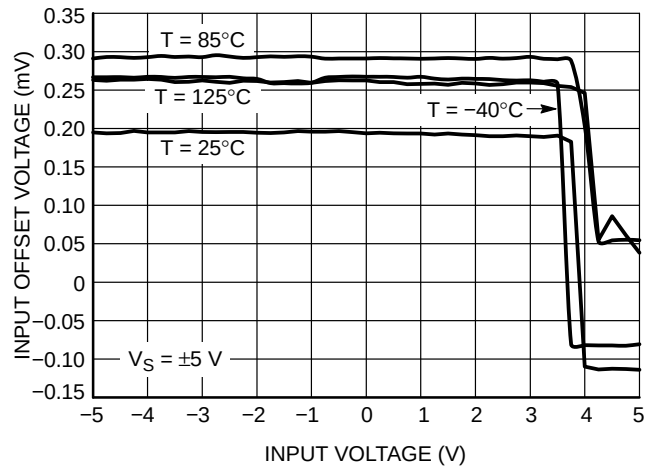


Figure 4. Input Offset Voltage vs. Common Mode Voltage

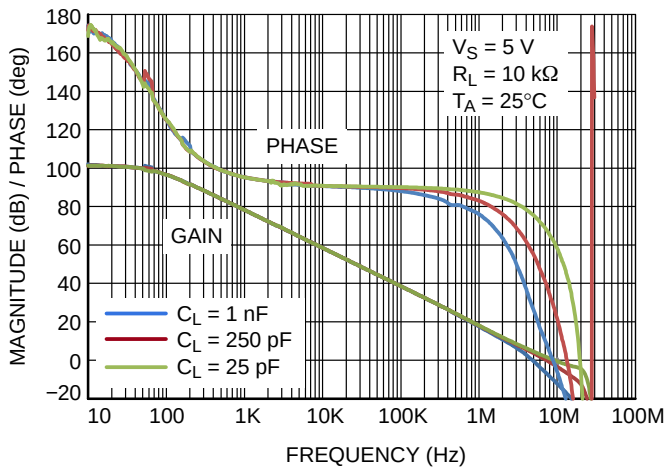


Figure 5. Gain and Phase vs. Frequency

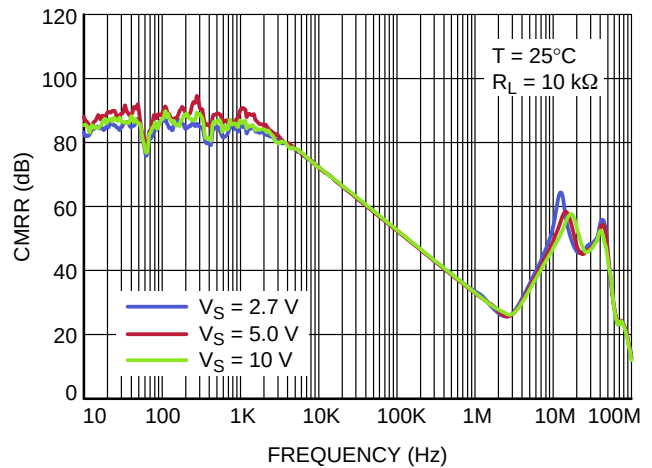


Figure 6. CMRR vs. Frequency

## TYPICAL CHARACTERISTICS

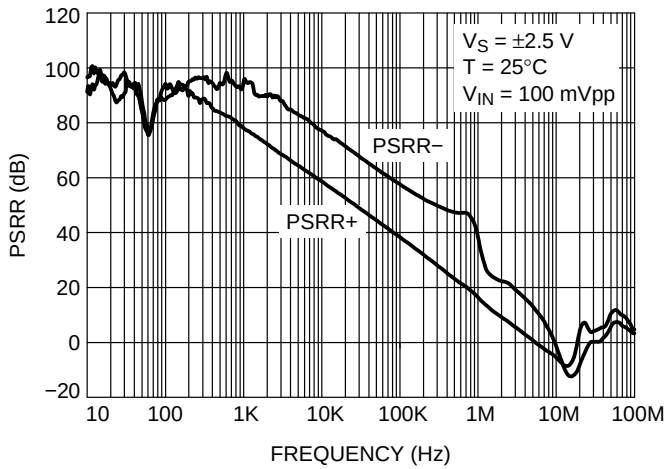


Figure 7. PSRR vs. Frequency

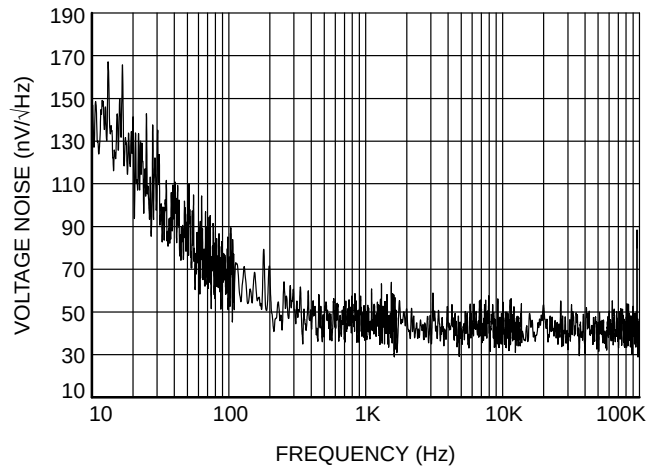


Figure 8. Input Voltage Noise vs. Frequency

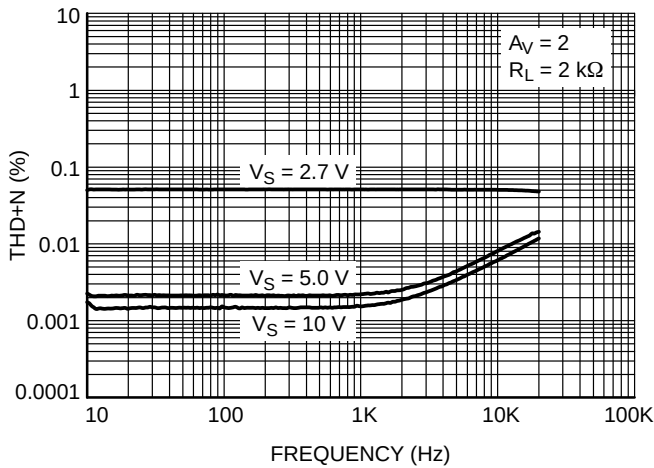
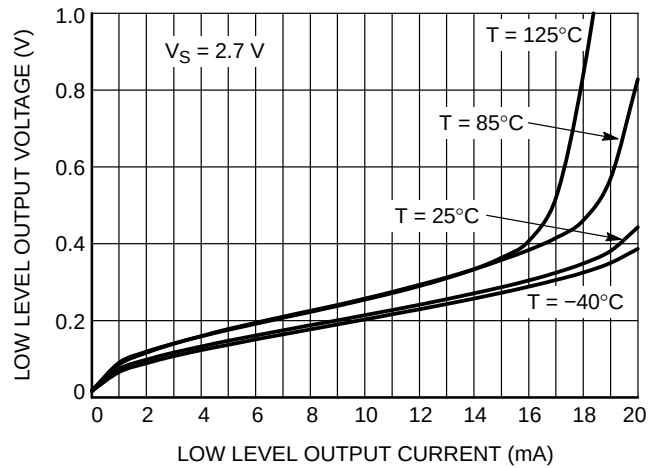
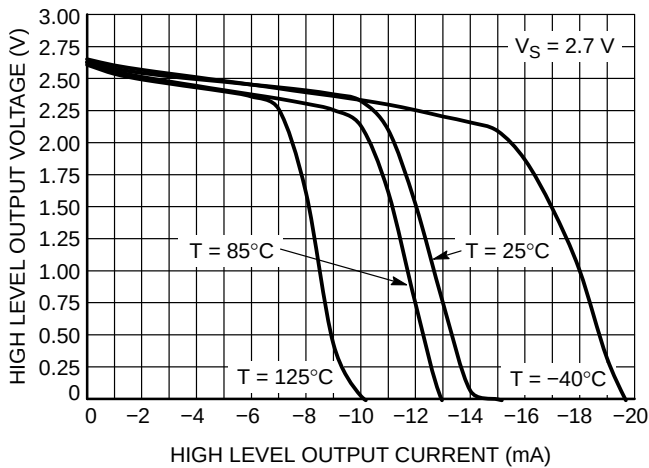
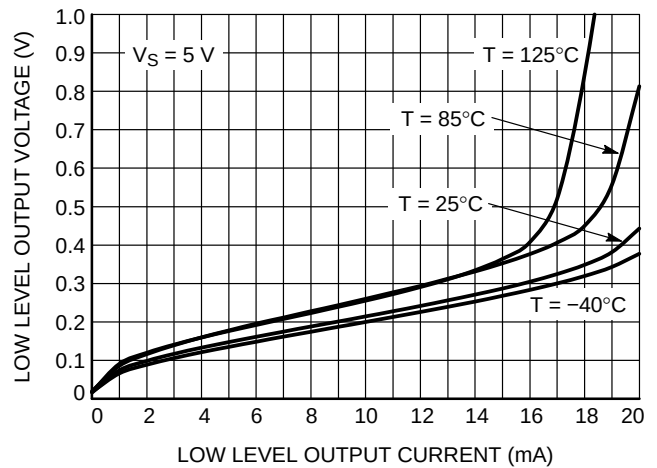


Figure 9. THD+N vs. Frequency

Figure 10. Low Level Output Voltage vs. Output Current @  $V_S = 2.7\text{ V}$ Figure 11. High Level Output Voltage vs. Output Current @  $V_S = 2.7\text{ V}$ Figure 12. Low Level Output Voltage vs. Output Current @  $V_S = 5\text{ V}$

## TYPICAL CHARACTERISTICS

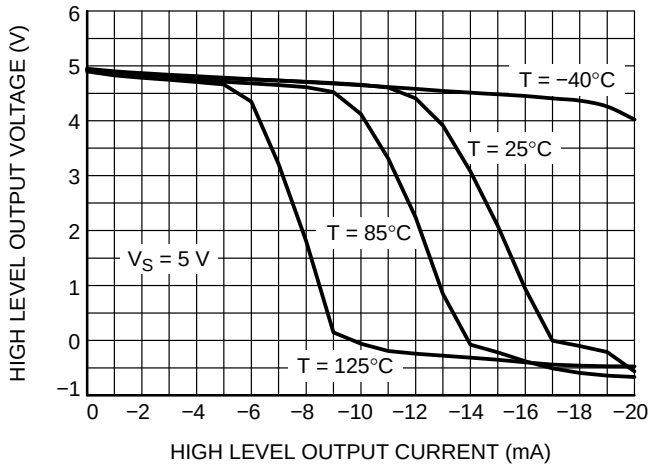


Figure 13. Low Level Output Voltage vs. Output Current

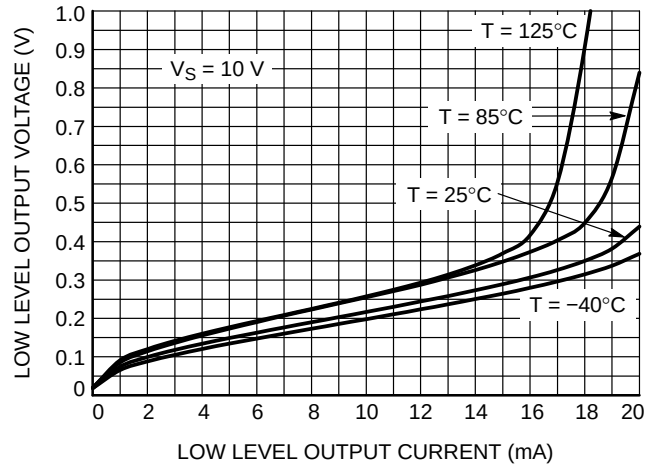


Figure 14. High Level Output Voltage vs. Output Current

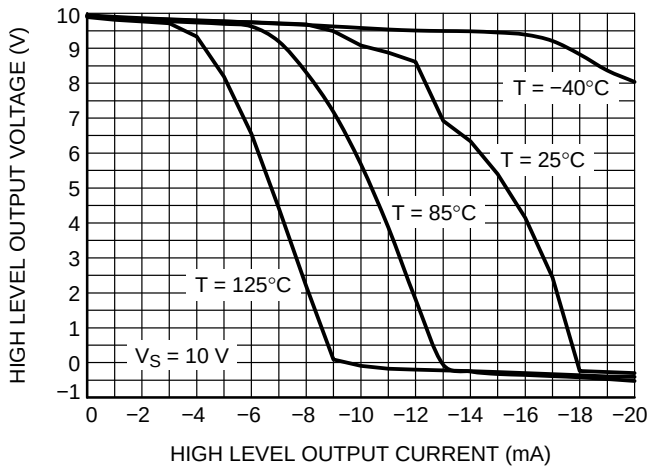


Figure 15. Low Level Output Voltage vs. Output Current

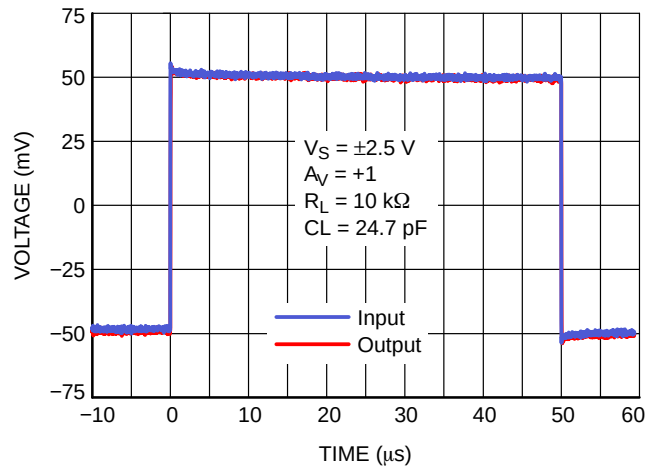


Figure 16. Non-inverting Small Signal Transient Response

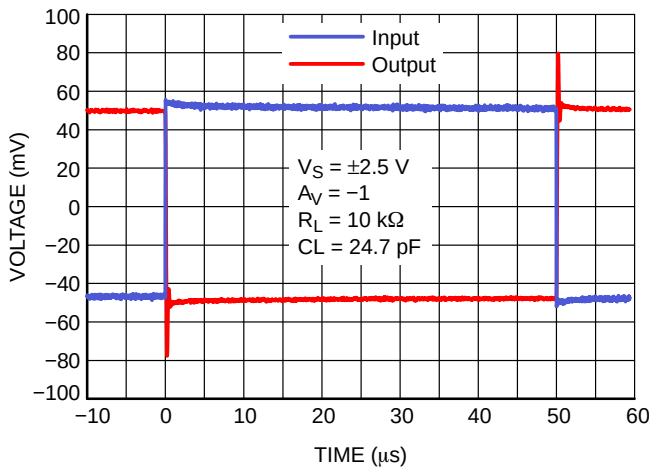


Figure 17. Inverting Small Signal Transient Response

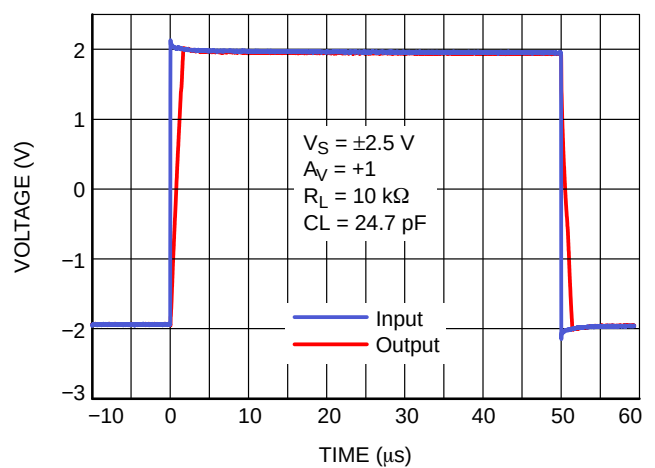
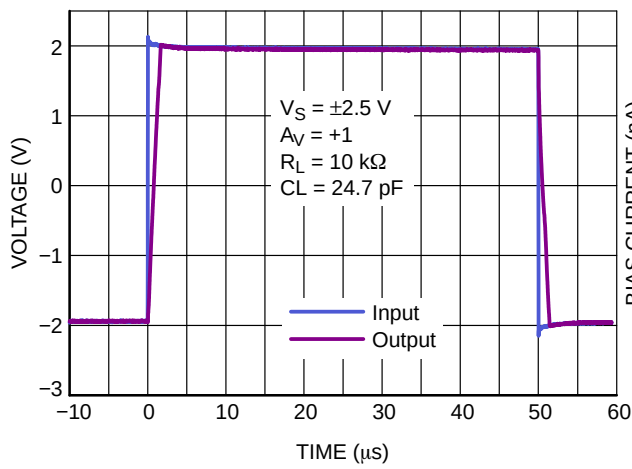


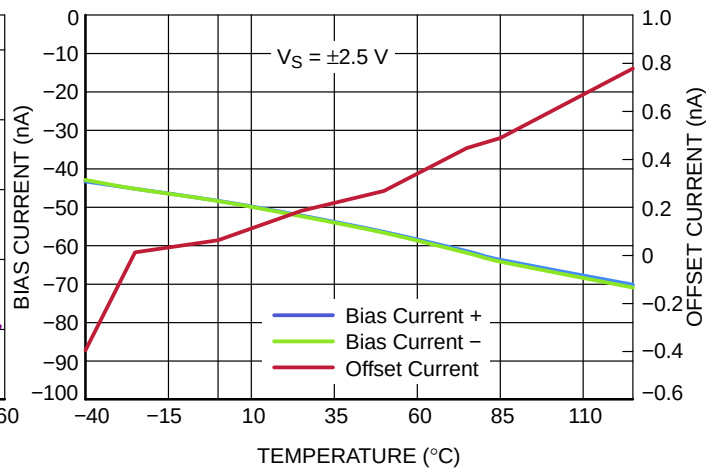
Figure 18. Non-Inverting Large Signal Transient Response



## TYPICAL CHARACTERISTICS

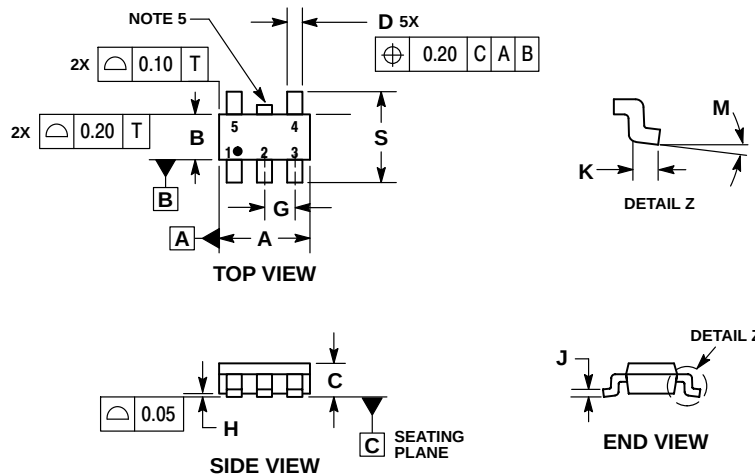


**Figure 19. Inverting Large Signal Transient Response**



**Figure 20. Input Bias and Offset Current vs. Temperature**

## PACKAGE DIMENSIONS

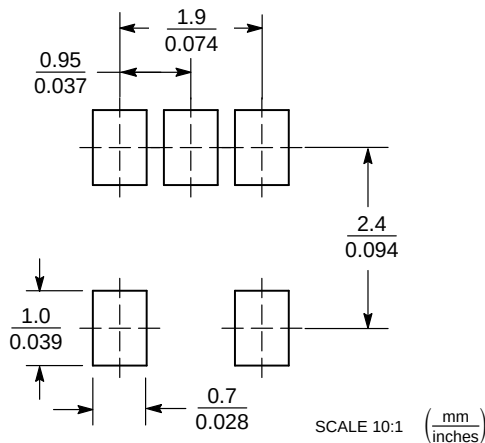
TSOP-5  
CASE 483  
ISSUE L

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE, DIMENSION A.
5. OPTIONAL CONSTRUCTION: AN ADDITIONAL TRIMMED LEAD IS ALLOWED IN THIS LOCATION. TRIMMED LEAD NOT TO EXTEND MORE THAN 0.2 FROM BODY.

| DIM | MILLIMETERS |      |
|-----|-------------|------|
|     | MIN         | MAX  |
| A   | 3.00        | BSC  |
| B   | 1.50        | BSC  |
| C   | 0.90        | 1.10 |
| D   | 0.25        | 0.50 |
| G   | 0.95        | BSC  |
| H   | 0.01        | 0.10 |
| J   | 0.10        | 0.26 |
| K   | 0.20        | 0.60 |
| M   | 0°          | 10°  |
| S   | 2.50        | 3.00 |

## SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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